I-55 Managed Lanes Combined Design Report

Appendix A.1 – Travel Performance Measures

- I-55 Managed Lanes Logical Termini Determination
- Managed Lane Modeling Approach, Key Assumptions and Evaluation process
- Travel Model Validation, Base & Design Year No-Build Traffic Estimates
- Tolling Concept and Key Assumptions for EA Traffic Forecasts
- Base and Design Year No-Build Mainline Roadway Performance Measures with HCS Analysis
- Vehicle Occupancy Study
- Crash Analysis of Existing Conditions
- I-55 Origin – Destination Report
- Managed Lanes Alternative Summary Report

Managed Lane Alternatives Summary Report

I-55 Phase I Engineering Study

Veterans Memorial Tollway (I-355) to Dan Ryan Expressway (I-90/94)

September 10, 2014

TABLE OF CONTENTS

1.0 INTRODUCTION

1.1 PROJECT LOCATION

The Study Area is centered along Interstate 55 (I-55) in DuPage and Cook Counties. The project location extends from I-355 (Veterans Memorial Tollway) in the southwestern Chicago Metropolitan region (south terminus) to I-90/94 (Dan Ryan Expressway-north terminus) serving the Chicago's Central Business District (CBD), a distance of approximately 25 miles.

Fiscal constraints and adjacent community impacts eliminated the consideration of reconstructing the existing facility. As such, one additional lane is being proposed within the existing median. The evaluation of alternatives considered providing Managed Lane capacity solutions within the existing roadway. These solutions are evaluated based on the criteria identified in the project Purpose and Need.

2.0 EXISTING CONDITIONS

I-55 provides the primary southwest-northeast roadway access to the Chicago's CBD. It serves Cook, DuPage and Will Counties in the Chicago Metropolitan area. The existing roadway section consists of three continuous lanes in each direction with a separated median. Generally, the southern segment of the project (Lemont Road to Illinois Route 43) provides a 40 foot closed, barrier separated median section. The northern segment of the project (Illinois Route 43 to I-90/94) generally provides a 60 foot grass median with localized barrier at isolated locations located adjacent to the median shoulder.

Within the I-55 project limits, there are three interstate system interchanges at I-355 (Veterans Memorial Tollway), I-294 (Tri-State Tollway), and I-90/94 (Dan Ryan Expressway) and fourteen full or partial service interchanges that provide access to adjacent land uses. The project lies within and/or adjacent to the municipal boundaries of sixteen communities.

The corridor currently provides limited transit options. The Metra's Heritage Corridor Service is constrained by track capacity and runs three trains inbound and outbound daily. Pace Suburban Bus recently has provided express bus on shoulder service to the downtown area. This service has expanded significantly as a result of reliable travel times.

Adjacent land use varies considerably throughout the project limits. North of Lemont Road, I-55 is generally flanked on the outside by frontage roads serving adjacent residential and light commercial land use and open lands and forest preserves. I-55 north of Illinois Route 43 is bordered on both sides by railroad facilities and commercial/ industrial land use. I-55 also generally parallels the Des Plaines River/Illinois-Michigan Canal/Chicago Sanitary Shipping Canal system along the northern half of the Study Area.

2.1 REGIONAL MOBILITY AND TRAVEL TIME RELIABILITY

The regional and local growth along the corridor has changed the nature of the land use and resultant travel demands on the facility. Residential, industrial and commercial properties, as well as active rail corridors depend on I-55 for work trips, access for distribution of goods and services and local mobility.

Travel performance along I-55 was analyzed utilizing 2012 base traffic data and for the projected design year 2040 traffic conditions[1]. The design year 2040 analysis was based on the No-Build scenario; meaning no improvements will be made to I-55 within the project area by the year 2040. The objective of this analysis is to understand the needs based on the anticipated design year traffic demands. A summary of the 2012 design hourly volume (dhv) and the projected 2040 No-Build dhv data is included in Table 1.

[1] I-55 Base & Design Year No-Build Mainline Roadway Performance Measures, Technical Memorandum

The travel demand modeling demonstrates a significant increase in travel demand by the design year 2040.

Table 1
Growth of Travel Demand: I-55 Peak Hour Traffic

Location	# of Lanes	2012 dhv*	2040 dhv*	Traffic Increase
I-355 to I-294	6	8,500 – 9,500	11,700 – 13,900	38-46%
I-294 to IL 43	6	8,800 – 9,300	12,500 – 15,500	42-67%
IL 43 to I-90/94	6	9,400 – 10,200	13,800 – 15,100	45-48%

Note: * DHV (vehicle per hour) is rounded to the nearest 100

2.2 FREIGHT TRAVEL DEMANDS

The Chicago region serves as a rail freight hub of North America, and trucks make up nearly one of every six vehicles on Illinois' urban interstates[2]. Within the Chicago region, freight movement by trucks accounts for 67 percent of all freight movement. The percent of truck traffic on I-55 ranges from 6 to 18 percent of the total traffic during the peak hours within the study corridor as noted in Table 2.

Table 2
I-55 Existing Truck Traffic Percentage

	AM Peak Hour	PM Peak Hour
Northbound	11-14%	8-13%
Southbound	13-18%	6-8%

The Chicago Metropolitan Agency for Planning (CMAP) anticipates that the freight tonnage carried by truck in the Chicago region will grow by approximately 70 percent by 2040[3]. This will result in a significant increase in the truck traffic demand within the study corridor.

Heavy traffic congestion on I-55 will constrain efficient connectivity to and from the study area and regional/national interstate networks resulting in longer travel times and increased shipping costs for freight traffic. The ability to provide reliable and efficient service in the movement of goods along I-55 is a critical component of the economic vitality of the communities and businesses along the route as well as for the southwest Chicago metropolitan area.

[2] CMAP GO TO 2040 Comprehensive Regional Plan; Section 12 - CREATE a more efficient freight network

[3] CMAP GO TO 2040 Comprehensive Regional Plan; Section 12 - CREATE a more efficient freight network

2.3 VEHICLE OCCUPANCY

A vehicle occupancy study was conducted along I-55 to determine carpooling practices during the peak morning and evening hours for both the northbound and southbound direction of traffic[4]. Observations noted the number of single occupancy vehicles (SOV), double occupancy vehicles (HOV2+) and multiple occupancy vehicles (HOV3+). Vehicle occupancy is summarized In Table 3.

Table 3

I-55 Vehicle Occupancy for Northbound & Southbound Traffic (AM & PM peaks)

Location	% SOV AM		% HOV2+ AM		% HOV3+ AM		% SOV PM		% HOV2+ PM		% HOV3+ PM	
	NB	SB	NB	SB	NB	SB	NB	SB	NB	SB	NB	SB
I-355 to I-294	86	88	12	10	2	2	77	85	18	13	5	2
I-294 to IL 43	85	86	13	11	2	3	78	86	17	11	5	3
IL 43 to I-90/94	83	89	15	10	2	1	82	82	14	15	4	3

[4] I-55 Vehicle Occupancy Study, Technical Memorandum , August 23, 2014

3.0 PURPOSE AND NEED

The project Purpose and Need[5] for this study are to:

- Improve mobility and operational efficiency to adapt to changing travel demands, and to better accommodate the movement of people and goods,
- Facilitate congestion management in the corridor to improve system performance and travel time reliability,
- Provide new travel choice in support of transit opportunities,
- Provide a sustainable transportation solution that meets future environmental and economic needs, and
- Maximize use of existing facility to adapt to funding constraints.

The addition of managed lanes within the existing median and implementation of active traffic management technologies will provide options to adapt to frequently changing or real-time traffic conditions across all lanes, and provide sustainable transportation solutions.

[5] I-55 Purpose and Need, January 28, 2014

4.0 ALTERNATIVE EVALUATIONS

As traffic continues to grow along the I-55 corridor, the travel performance will continue to deteriorate. Analysis of the No-Build demand[6] indicates that if no improvements are provided within the corridor, I-55 can expect to be operating at a Level of Service (LOS) E or F throughout almost all segments of the corridor by the year 2040. Based on Highway Capacity Manual (HCM) 2010 edition, (Exhibit 11-6) the ideal traffic capacity for a six-lane facility (resulting in Level of Service E) is approximately 138,000 vehicles per day[7] (assuming 23,000 vpd per lane for a six lane freeway). Most segments of I-55 currently exceed or are on the verge of exceeding this capacity. As a result, any disruptions in traffic flow during peak periods tend to cause an immediate breakdown in traffic flow and operations. Experience has demonstrated that these incidents result in extended delays as traffic congestion clears through the system.

The need to provide improved transportation service along I-55 will require the evaluation of traditional and non-traditional solutions which seek to serve the transportation demands while recognizing the economic and community vitality along the corridor. The current transportation service is inconsistent with national, regional and local expectations for urban interstate corridors and further reinforces the need to improve service and reliability within the I-55 corridor. Thus, in order to serve travel demand and local concerns, managed lane alternatives are considered to address the need for dependable and sustainable travel service while providing new travel choices and improved transit opportunities as identified in the project Purpose and Need.

4.1 ADDITIONAL GENERAL PURPOSE LANE

The construction of an Additional General Purpose Lane will provide additional capacity along I-55 corridor. However, travel demand will quickly fill the new lane resulting in all lanes operating under congested conditions.

The Additional General Purpose Lane Alternative will not provide improved mobility, incorporate congestion management strategies, support expanded transit opportunities or provide for sustainable transportation solutions. As such, this alternative does not meet the Purpose and Need and is not carried forward.

4.2 MANAGED LANE ALTERNATIVES

Managed Lane solutions evaluate the opportunity to provide dependable and sustainable transportation solutions which support increased transit opportunities by implementing a variety of operational strategies including vehicle occupancy, access restrictions and/or congestion pricing strategies.

---

[6] I-55 Base & Design Year No-Build Mainline Roadway Performance Measures, Technical Memorandum

[7] From 2010 edition Highway Capacity Manual, Exhibit 11-6 using volume at 10% of ADT at LOS E

Implementation of managed lane solutions require the incorporation of new technologies to allow real time monitoring of traffic conditions and the ability to apply corresponding operational changes to respond to changing travel conditions. As a result, managed lanes require additional investments that are not incurred in a traditional capacity improvement project.

In order to provide effective operation, managed lane facilities also have unique enforcement needs. Restrictions in vehicle access, occupancy criteria, access constraints and/or congestion pricing strategies will increase the enforcement expectations for these facilities.

Managed lane strategies evaluated are as follows:

4.2.1 Truck Only Lane (TOL)

A truck only facility reserves the managed lanes for truck service only. The operational characteristics and maneuverability of trucks, however, require unique design criteria which is incompatible with the urban environment of the I-55 corridor. Within the I-55 corridor there are numerous potential origin/destinations served by the fourteen local access interchanges. With a median TOL, this will result in increased truck weaving operations within the general purpose lanes and short managed lane trip lengths along the entire length of the corridor.

National design policy[8] recommends TOL's be two lanes in each direction to accommodate safe and efficient operation and must be barrier separated from general purpose lanes. Direct entrance/exit ramps onto a TOL are also preferred in order to reduce truck traffic weaving within the general purpose lanes. This will require reconstruction or widening of bridges, interchanges and roadways.

Although trucks comprise 14-18% of the traffic volume along I-55, the regional distribution of truck origin/destination facilities throughout the corridor will not effectively support higher service volumes in the managed lane. The geometric requirements for a truck lane will also require extensive reconstruction and expansion of the I-55 roadway. Therefore, a TOL Alternative does not provide sustainable transportation solutions, and is not financially feasible. As a result, the TOL Alternative is not carried forward.

4.2.2 High Occupancy Vehicle with Two or More Riders (HOV2+)

This alternative allows continuous access to the managed lane but restricts the use of the lane to HOV2+ users and Pace bus service. Single occupancy vehicles (SOV) are restricted from using these lanes. All HOV2+ vehicles are allowed to utilize the managed lanes and permits free movement between the managed lane and the general purpose lane.

[8] NCHRP/NCFRP Separation of Vehicles – CMV-Only Lanes; Section 5.2.1 - Feasibility Criteria

4.2.3 High Occupancy Vehicle with Three or More Riders (HOV3+)

This alternative allows continuous access to the managed lane but restricts the use of the lane to HOV3+ users and Pace bus service. SOV's and HOV2+ are restricted from using these lanes. All HOV3+ vehicles can utilize the purpose lanes and permits free movement between the managed lane and the general purpose lane.

4.2.4 High Occupancy Toll 2+ (HOT2+)

This alternative utilizes congestion pricing strategies to manage lane capacity and service. HOV2+ users and Pace bus service are allowed to use the lane toll-free. When additional capacity is available, SOV's are allowed to use these lanes for a toll. Tolling allows the optimum use of the available managed lane capacity, thus increasing the corridor travel service. By providing a restricted access facility, vehicles are allowed to enter/exit the managed lane only in designated areas.

4.2.5 High Occupancy Toll 3+ (HOT3+)

This alternative utilizes congestion pricing strategies to manage lane capacity and service. HOV3+ users and Pace bus service are allowed to use the lane toll-free. When additional capacity is available, SOV's and HOV2+ vehicle are tolled. Tolling allows the optimum use of the available managed lane capacity, thus increasing the corridor travel service. By providing a restricted access facility, vehicles can enter/exit the managed lane only in designated areas.

4.2.6 Express Toll Lane (ETL)

This alternative utilizes congestion pricing strategies to manage lane capacity and service. ETL's are dedicated managed lanes that motorists may use by paying a toll. All vehicles are charged or tolled, with the exception of Pace buses. Similar to HOT2+ & HOT3+, all vehicles can enter/exit the managed lane only in designated areas.

5.0 SKETCH LEVEL EVALUATION & RELATIVE COMPARISON

A preliminary assessment of the I-55 travel demand evaluated the addition of one managed lane in each direction. This preliminary evaluation is intended to determine which alternatives will be carried forward to the more detailed analysis. The proposed goals, objectives and evaluation criteria for the Sketch Level Evaluation are described in Table 4.

Table 4

Proposed Goals, Objectives and Evaluation Criteria

Goals (Priority)	Objectives	Criteria
Mobility • Reduce congestion • Reduce AM/PM peak • Improve transit options	• Reduce travel times and improve travel time reliability (increase operational efficiency) • Manage travel demand and traffic congestion • Maintain congestion free options for future travel • Support mobility options such as carpooling • Increase transit opportunities, efficiency and reliability	• Managed lane travel time savings in 2020 and 2040 compared to No-Build • Managed and General Purpose Lane speed and level of service • Managed Lane demand and corridor throughput • HOV usage of Managed Lane and corridor • Assess transit travel options
Financial Feasibility • No funding/No-Build • Sustainable Improvement	• Maximize use of existing infrastructure • Generate revenue to support ongoing operations and maintenance • Generate revenue to cover some/all of the capital costs (revenue target)	• Estimate capital and operating cost of Managed Lanes • Estimate revenue generation potential of managed lanes and coverage of O&M/capital costs
Quality of Life • Add capacity/reduce travel time	• Improve travel time • Provide air quality benefits	• VMT impacts compared to No-Build • VHT impacts compared to No-Build

The analysis used for the Sketch Level Evaluation reflects the criteria identified in the project Purpose and Need[9]. The vehicle occupancy data collected in April/May 2013 for I-55 was incorporated to adjust the model trip tables for the year 2040 to better reflect the proportions of SOV, HOV2+ and HOV3+ vehicles within the I-55 corridor for the Design Year 2040 travel demand. All the managed lane alternatives are compared to the 2040 No-Build conditions.

Mobility was analyzed based on performance criteria defined as the operating speed, time savings, traffic volumes, volume/capacity ratio, person throughput. HOV usage for the managed lane and general purpose lanes during the AM and PM peak hours were evaluated to reflect total corridor benefits. Evaluations were performed for each of the Managed Lane Alternatives to predict the Design Year 2040 performance as compared to the 2040 No-Build condition.

Financial Feasibility assessment was performed for annual weekday AM (7-9) & PM (4-6) peak hours. Projected revenues in the year 2040 were developed for the tolling options. The No-Build and HOV alternatives provided no revenue based on their operational strategies.

Quality of Life is measured by the duration and distance traveled per vehicle traveling during the AM & PM peak hours. Evaluations were performed for each alternative to analyze the vehicle miles traveled (VMT) and vehicle hours traveled (VHT) through the corridor.

A summary of each Alternative's performance for the Design Year 2040 travel demand is summarized in Table 5.

[9] I-55 Travel Model Validation, Base & Design Year No-Build Traffic Estimates, Technical Memorandum, June 20, 2013

Table 5

I-55 Managed Lane Sketch Level Evaluation Summary

Goal	Performance Criteria	Units	Higher Or Lower Desired Value	2040 No Build		HOV2+			HOV3+			HOT2+			HOT3+			ETL		
												$0.10/mile (2040$)			$0.10/mile (2040$)			$0.10/mile (2040$)		
		SCORE =>																		
		Period =>		AM Peak Hour	PM Peak Hour	AM Peak Hour	PM Peak Hour	Indicator	AM Peak Hour	PM Peak Hour	Indicator	AM Peak Hour	PM Peak Hour	Indicator	AM Peak Hour	PM Peak Hour	Indicator	AM Peak Hour	PM Peak Hour	Indicator
Mobility	ML Speed	miles/hour	↑	--	--	54-55	46-54	↑	55	55	↑	42-51	41-53	↑	42-51	41-53	↑	44-52	44-55	↑
	GP Speed	miles/hour	↑	22-29	25-34	35-38	35-44	↑	32-35	32-40	↑	43-52	44-55	↑	37-41	37-43	↑	37-40	37-42	↑
	ML Speed Advantage (ML - GP)	miles/hour	↑	--	--	20	10-15	↑	20	9	↑	9	10-12	↑	5-10	5-10	↑	7-8	7-13	↑
	ML Time Savings (GP - ML)	Minutes	↓	--	--	10	7	↓	13	9	↓	5.5	4-5	↑	4.5-6.5	5.5-7	↑	6-7	6-7	↑
	V/C Ratio - GP	--	↓	1.21-1.25	1.15-1.27	1.13-1.15	1.05-1.15	↓	1.15-1.17	1.10-1.18	↓	1.06-1.11	1.02-1.11	↑	1.06-1.11	1.03-1.11	↑	1.06-1.11	1.03-1.11	↑
	V/C Ratio - ML	--	↑	--	--	0.34-0.56	0.58-0.75	↓	0.05-0.09	0.09-0.18	↓	0.56-0.70	0.47-0.71	↑	0.54-0.69	0.40-0.69	↑	0.54-0.68	0.39-0.68	↑
	Volume - ML	Vehicles/hour	↑	--	--	814	1,224	↑	121	242	↓	1,162	1,125	↑	1,135	1,064	↑	1,129	1,045	↑
	Volume - GP	Vehicles/hour		6,525	6,750	5,870	5,929		6,097	6,299		5,597	5,846		5,616	5,888		5,616	5,899	
	Total Volume (GP+ML)	Vehicles/hour	↑	6,525	6,750	6,684	7,153	↑	6,218	6,541	↓	6,759	6,971	↑	6,752	6,952	↑	6,745	6,944	↑
	Person Throughput - ML	Persons/hour	↑	--	--	1,743	2,672		364	727		1,753	2,096		1,337	1,472		1,209	1,175	
	Person Throughput - GP	Persons/hour	↑	7,223	8,056	5,950	6,059		6,621	7,207		5,834	6,307		6,142	6,818		6,238	7,062	
	Total Person Throughput (GP+ML)	Persons/hour	↑	7,223	8,056	7,694	8,730	↑	6,984	7,933	↓	7,587	8,403	↑	7,479	8,290	↑	7,447	8,237	↑
	HOV Usage - ML	%	↑	--	--	100%	100%	↑	100%	100%	↓	34-52%	55-83%	↑	9-14%	14-29%	↓	4-8%	8-12%	↓
	HOV Usage - GP	%	↓	8-11%	12-18%	1%	1-3%	↓	7-10%	11-16%	↑	3-4%	5-9%	↑	7-11%	11-17%	↑	8-12%	12-19%	↑
Financial Feasibility	Annual Weekday AM & PM Peak Period Revenue (7-9 AM & 4-6 PM)	Millions $ (2040$)	↑	--		$0		↓	$0		↓	$2.14		↑	$3.93		↑	$4.76		↑
Quality of Life	VMT - ML	Vehicle-miles	↑	--	--	32,775	49,491		4,906	9,725		50,797	49,175		49,685	46,508		49,437	45,680	
	VMT - GP	Vehicle-miles	↑	276,511	286,159	239,205	241,638		248,300	256,572		247,253	258,585		248,032	260,381		248,000	260,846	
	Total VMT	Vehicle-miles	↑	276,511	286,159	271,980	291,129	↑	253,206	266,297	↓	298,050	307,760	↑	297,717	306,889	↑	297,437	306,526	↑
	VHT - ML	Vehicle-hours		--	--	601	1,017		89	177		1,135	1,115		1,073	996		1,060	971	
	VHT - GP	Vehicle-hours	↓	10,860	10,457	6,687	6,320		7,415	7,440	↓	6,478	6,611	↓	6,515	6,684	↓	6,510	6,715	↓
	Total VHT	Vehicle-hours	↓	10,860	10,457	7,288	7,337	↓	7,504	7,617	↓	7,613	7,726	↓	7,588	7,680	↓	7,570	7,686	↓

6.0 PREFERRED ALTERNATIVES

Each alternative was compared to determine the overall preferred alternative. The comparison criteria include mobility, financial feasibility and quality of life as summarized in Table 5. Additional considerations included additional Managed Lane comparative operational costs (technology) and enforcement needs. The operational analysis addressed issues such as the alternatives ability to adapt to changing travel demands, traffic volume, and congestion. Comparisons between enforcement will briefly describe the difficulties that may be experienced by each alternative when enforcing the managed lane policies.

6.1 HIGH OCCUPANCY VEHICLE 2+ (HOV2+)

This alternative allows continuous access to the managed lane, but restricts the use of the lane to HOV2+ users.

Advantages:

This alternative provides higher levels of service for the eligible vehicles, while continuing to support an expanded Pace transit service.

Disadvantages:

Traffic volumes in the managed lanes do not provide sustainable and adaptable Managed Lane strategies over the life of the project. The facility will require an increase in enforcement to verify vehicle occupancy, but provides no operational strategy to adapt to changing traffic conditions. HOV alternatives will not provide the Department with flexibility to implement active traffic management strategies in response to real-time traffic conditions.

Recommendation: Alternative not carried forward.

6.2 HIGH OCCUPANCY VEHICLE 3+ (HOV3+)

This alternative allows continuous access to the managed lane, but restricts the use of the lane to HOV3+ users.

Advantages:

This alternative provides high levels of service for the eligible vehicles, while continuing to support an expanded Pace transit service.

Disadvantages:

With only 2 – 5% of the total vehicles on the I-55 corridor eligible to use the managed lanes, the volumes in these lanes are significantly underutilized, thus diminishing the congestion relief on the general purpose lanes. It also will require an increase in enforcement to verify occupancy and provides no strategy to adapt to changing traffic conditions. HOV alternatives will not provide the Department with flexibility to implement active traffic management strategies in response to real-time traffic conditions.

Recommendation: Alternative not carried forward.

6.3 HIGH OCCUPANCY TOLL 2+ (HOT2+)

This alternative utilizes congestion pricing strategies to manage lane capacity and service, while providing restricted access to the new lanes. HOV2+ users are allowed to use the lane toll-free, whereas SOV's are tolled.

Advantages:

This alternative provides travel options for dependable and time reliable service. Congestion pricing strategy provides opportunities to optimize the traffic volumes within the managed lane and is adaptable to changing traffic patterns. This alternative provides high levels of service within the managed lane and will continue to support an expanded Pace transit service. Tolling will generate a new revenue source to partially offset implementation and operational costs. Revenue will be limited by the toll-free usage by the high percentage of HOV2+ users.

Disadvantages:

This alternative will require a higher level of implementation and enforcement to distinguish between the tolled vehicles (SOV's) and the HOV2+ vehicles. Initial traffic volumes indicate a high level (50% or more) of HOV's in the lane through the most congested sections of the corridor. The high level of toll-free vehicles will limit the ability to manage performance within the managed lane to adapt to changing traffic demand and local conditions.

This alternative will require introducing tolling technology into the I-55 corridor. Toll collection strategies, such as HOV vehicle advance registration programs or switchable transponders will be required for effective managed lane management. The switchable transponder technology is not currently in use in this Chicago Metropolitan region.

Recommendation: Alternative not carried forward.

6.4 HIGH OCCUPANCY TOLL 3+ (HOT3+)

This alternative utilizes congestion pricing strategies to manage lane capacity and service, while providing restricted access to the new lanes. HOV3+ users are allowed to use the lane toll-free, whereas single occupancy and HOV2+ vehicles are tolled.

Advantages:

This alternative provides travel options for dependable and time reliable service. The congestion pricing strategy provides opportunities to optimize the traffic volumes within the new lane and is adaptable to changing traffic patterns. This alternative provides high levels of service within the Managed Lane and will continue to support an expanded Pace transit service. Tolling will generate a new revenue source to partially offset the implementation and operational costs, but will be partially impacted by the toll-free usage of HOV3+ users.

Disadvantages:

This alternative will require a higher level of implementation and enforcement to distinguish between the tolled vehicles (SOV and HOV2+) and the HOV3+ vehicles. Initial traffic volumes indicate low level (7% or less) of HOV3+ users in the lane through the most congested sections of the corridor. Even with low levels of HOV3+ users, the lane will still require additional enforcement, implementation and operational costs.

This alternative will require introducing tolling technology into the I-55 corridor. Toll collection strategies, such as HOV vehicle advance registration programs or switchable transponders will be required for effective managed lane management. The switchable transponder technology is not currently in use in this Chicago Metropolitan region.

Recommendation: Alternative not carried forward.

6.5 EXPRESS TOLL LANE (ETL)

This alternative utilizes congestion pricing strategies to manage lane capacity and service. ETLs are dedicated managed lanes within highway right-of-way that motorists may use by paying a variable priced toll. All vehicles are charged or tolled, with the exception of Pace buses.

Advantages:

This alternative provides travel options for dependable and time reliable service. The congestion pricing strategy provides opportunities to optimize the traffic volumes within the ETL and is adaptable to changing

traffic patterns. This alternative provides greater serviceability for the eligible vehicles and will continue to support an expanded Pace transit service. The enforcement, implementation and operation of this lane will be simplified as no distinction will be required for vehicle in the lane.

Tolling will generate a new revenue source to partially offset some of the implementation and operational costs. Since the ETL tolls all vehicles except for Pace buses, the enforceability will be simplified and straight forward. It also no longer requires the need to count the number of passengers in a vehicle. Toll price will be the same regardless of how many passengers are in the vehicle, meaning there will be more incentive to carpool assuming the toll cost is divided among the passengers in the vehicle. In effect, express toll lanes still promote carpooling.

Disadvantages:

Congestion pricing strategies will require a higher level of technology investment on the monitoring of the active traffic management and toll collection. However, ETL does not overtly promote carpooling as much as HOT 2+ and HOT 3+ managed lane alternatives since all passenger vehicles have equal opportunity to use the lane.

Recommendation: Preferred Alternative.

Technical Memorandum

I-55 PHASE I ENGINEERING STUDY

Veterans Memorial Tollway (I-355) to Dan Ryan Expressway (I-90/94)

MANAGED LANES MODELING APPROACH, KEY ASSUMPTIONS AND EVALUATION PROCESS

Original	**September 9, 2013**
Revised	**September 16, 2013**

Table of Contents

1.0 Introduction

1.1 The I-55 Phase I Engineering Study

The purpose of the I-55 Phase I Engineering Study is to "provide an additional travel lane in each direction within the existing median of Interstate 55 (I-55; FAI 55) to reduce the frequently severe congestion along I-55, improve travel time reliability, and improve safety through implementation of managed lane and active traffic management technology that can adapt to frequently changing conditions across all travel lanes, and that is a sustainable transportation solution."[1]

The project location encompasses approximately 25 miles of the I-55 corridor, between I-355 at the southern terminus to I-90/94 at the northern terminus. The project corridor traverses portions of DuPage and Cook Counties, connecting the Chicago Central Business District and suburban communities to the southwest of Chicago.

I-55 generally provides three mainline lanes per direction for the length of the study corridor, auxiliary lanes and additional collector-distributor lanes at the I-355, IL 83, I-294, LaGrange Rd, IL 171, Kedzie-California and Damen Ave interchanges.

1.2 Purpose of this Technical Memorandum

The purpose of this memorandum is to summarize the managed lane modeling approach, key assumptions and the alternatives evaluation process.

Prior efforts refined, calibrated and validated the Chicago Metropolitan Agency for Planning (CMAP) Go To 2040 regional travel demand model for the I-55 Phase I Engineering Study. The model update process, validation of the base year (2012) and development of design year (2040) No-Build traffic estimates are documented in a technical memorandum, "Travel Model Validation, Base and Design Year No-Build Traffic Estimates". The model calibration and validation approach was reviewed with CMAP and received their concurrence on the methodology employed.

The validated travel demand model developed in that effort is the basis for the modeling and evaluation of managed lane alternatives for the I-55 Phase I Managed Lane Study.

[1] Draft I-55 Phase I Engineering Purpose and Need, March 26, 2013.

2.0 Goals, Objectives, Evaluation Criteria & Alternatives

2.1 Project Goals, Objectives & Evaluation Criteria

The project goals were established in consultation with stakeholders and the public. A Corridor Planning Group (CPG) comprised of representatives from communities along the corridor and agencies including CMAP, PACE Suburban Bus Service, Metra, the Regional Transportation Authority, the Chicago Department of Transportation and the Illinois Tollway, was established at the beginning of the study. Following IDOT's Context Sensitive Solution (CSS) process, the CPG developed the Project Problem Statement and discussed the goals of the project based on existing traffic operational and roadway characteristics of the study corridor at its first meeting in October 2012. Subsequently, a public meeting was held in November 2012 to obtain input on the project.

The study team developed the draft Purpose and Need for the project based on the Problem Statement. The purpose of the project is to:

- Improve mobility and operational efficiency to better accommodate the movement of people and goods
- Maximize use of the facility and improve travel time reliability
- Facilitate congestion management in the corridor
- Facilitate reliable incident management
- Provide a sustainable transportation solution.

Based on the goals established by the CPG, the study team developed objectives and criteria to facilitate evaluation of the alternatives. The goals, objectives and evaluation criteria are summarized in Table 1 below.

Table 1: Project Goals, Objectives and Evaluation Criteria

Goals	Objectives	Evaluation Criteria
Improve Mobility and User Safety	• Reduce travel times and improve travel time reliability (increase operational efficiency) • Manage travel demand and traffic congestion • Maintain congestion free options for the future • Enhance mobility options such as carpooling • Increase transit opportunities and reliability (increase travel options) • Adopt operating strategies that minimize risk of traffic crashes (maximize safety)	• Managed lane travel time savings • Managed and GP lane speed and level of service • Managed lane demand and corridor throughput • Average vehicle occupancy • HOV usage of managed lane and corridor • Assess transit travel times • Estimate safety impacts of managed lane alternatives
Financial Feasibility	• Maximize use of existing infrastructure • Generate revenue to support ongoing operations and maintenance • Generate revenue to cover some/all of the capital costs	• Estimate capital and operating cost of managed lanes • Estimate revenue generation potential of managed lanes and coverage of O&M/capital costs
Quality of Life	• Provide air quality benefits • Mitigate noise impacts	• VMT impacts compared to No-Build • VHT impacts compared to No-Build

2.2 Alternatives Development

A range of conceptual alternatives to be evaluated using the calibrated Travel Demand Model were developed consistent with the Problem Statement and Purpose and Need for the project. The following alternatives will be evaluated in this study:

- No-Build
- High Occupancy Vehicle (HOV) lanes, permitting vehicles with 2 or more occupants (HOV2+)
- HOV lanes, permitting vehicles with 3 or more occupants (HOV3+)
- High Occupancy Toll (HOT) lanes, permitting vehicles with 2 or more occupants to use the lanes for free, and Single Occupant Vehicles (SOV) pay a toll to use the lanes (HOT2+)
- HOT lanes, permitting vehicles with 3 or more occupants to use the lanes for free, and SOVs and two occupant vehicles pay a toll to use the lanes (HOT3+)
- Express Toll lanes, where all users pay a toll (ETL).

3.0 Managed Lane Modeling Approach

3.1 Managed Lane Modeling Process

The overall modeling process for managed lanes is designed to answer a series of questions:

- How much demand exists in the corridor?
- How will demand grow?
- How much are motorists willing to pay to use the managed lanes?
- What share of traffic can be expected to use the managed lanes?
- What toll levels are needed to manage demand and maintain reliable travel times in the managed lanes?

The modeling approach used in the study is outlined below:

- Estimating global traffic demand – The global demand is an estimate of the total amount of traffic that would be expected to be using the project corridor under the improved conditions.
- Estimating the managed lane market share – This is the estimated share of total traffic in the corridor that would choose the managed lanes, versus the general purpose lanes, under varying operating conditions and toll rates. The share of corridor traffic in the managed lanes is based on several factors, including location of access points, differences in configurations, time savings offered by the managed lanes, and the toll rates being charged.
- During the traffic assignment process, travel time between a path using the tolled managed lanes is compared to travel time on a path using the next best free routes (most likely the general purpose lanes). For each travel movement, the proportion of motorists expected to use the managed lanes is a function of the computed time savings and the cost to use the lanes vs. the value placed on time savings by the motorist value of time (VOT).
- In modeling managed lanes on toll-free expressways such as I-55, the prior steps are performed in a single operation.
- The traffic and revenue analysis attempts to estimate the amount of traffic willing to pay a toll of $X to save Y minutes. Within the model, for each origin-destination pair, the model identifies the travel movements that are eligible to use the managed lane based on available access points. These movements are considered to be the travel market for the project. The model then estimates the travel time differential between the managed and general purpose lanes. The toll charged for each movement is compared to its time savings to estimate a ratio of "cost-per-minute saved." This cost-per-minute saved is compared to the value-of-time for travelers. Those travelers with values-of-time higher than the cost-per-minute-saved would tend to choose the tolled lanes, while those with lower values of time would tend to choose the free alternative. Drivers' values-of-time are not uniform, so for any given toll rate/time savings

combination, only a portion of those eligible to use the managed lanes would actually choose to use them. As traffic moves from the general purpose to the managed lanes, the time savings advantage offered by the managed lanes is altered. For each toll rate level, the market share corridor model finds the equilibrium point between changes in travel time due to traffic shifting and the willingness-to-pay.

3.1.1. Levels of Analysis

Traffic and revenue modeling will be performed for two phases of the technical evaluation – the Sketch Level Analysis for the full range of alternatives described previously, and detailed analysis of the preferred alternative selected at the conclusion of the Sketch Level Analysis. At each stage, the results of the analysis will be compared to the No-Build base Alternative.

3.2 General Assumptions

The assumptions common to both the Sketch Level Analysis and Evaluation of the Preferred Alternative are summarized below.

3.2.1 Assumed Pricing Strategy

- Type of Pricing - Congestion pricing using a fixed toll schedule that assesses different toll rates by time period is the selected pricing method for modeling purposes. While toll rates would likely vary dynamically with traffic demand during implementation, the CMAP Go To 2040 travel demand model does not currently permit modeling of dynamic toll rates.
- Tolling Regime - The tolling regime includes higher peak-period and lower off-peak period toll rates. For the sketch level analysis of managed lane alternatives, selected toll rates will be modeled to provide a standard basis for comparing the revenue potential of the alternatives. For the evaluation of the preferred alternative, a range of toll rates will be tested, for each time period and travel direction.
- Goal of Congestion Pricing - Traffic management (reducing traffic congestion) was identified as the primary goal of congestion pricing. Therefore, the selection of toll rates will be based on maximizing utilization of the managed lanes, rather than maximizing toll revenues. Higher utilization of the managed lanes will result in lower traffic in the general purpose lanes, and subsequently minimize traffic diversions to local streets.

3.2.2 Assumed Managed Lane Operating Parameters

- Orientation of the Managed Lanes - Managed lanes are assumed to be implemented by adding a single managed lane to the left of existing lanes, utilizing the existing inside shoulder.
- Vehicle Eligibility - Only passenger vehicles were assumed to be eligible to use the managed lanes (commercial trucks are prohibited from using the managed lanes). Under all the managed

lane alternatives, public transit buses are assumed to use the managed lanes for free, and no discount or toll free passage is assumed for low emission or alternative-fueled vehicles. A single managed lane is assumed to be added in each direction of the study corridor using the existing inside shoulder to maximize use of existing infrastructure.

- Managed Lane Access Restrictions & Spacing – HOV lane alternatives are assumed to be continuous-access lanes. Ingress and egress for HOT and Express Toll Lane alternatives are assumed to be restricted to specific locations, spaced several miles apart to ensure the efficient operation of the managed lane and minimize friction due to entering or exiting traffic, and to facilitate toll collection and enforcement.
- Separation of Managed and General Purpose Lanes - Two approaches are typically used in delineating managed lanes - either a physical barrier (such as a concrete barrier), or a painted buffer-zone is provided between the managed and adjacent general purpose lane. Current managed lane design guidelines call for a desirable painted buffer zone width of 4 feet, with an absolute minimum buffer width of 2 feet. The selection of the type of delineation will depend on a number of factors, including available right-of-way, cost, design standards and safety considerations. This study assumes a single, managed lane per direction, separated from the general purpose lanes by a painted buffer-zone.
- Duration of Managed Lane Tolling - A review of the operating profile of the I-55 corridor indicates that that weekday traffic volumes typically begin to rise sharply at 5:00 a.m. and generally dissipate after 8:00 p.m. Therefore, it was assumed that the managed lane would be tolled between 5:00 a.m. and 8:00 p.m. each weekday. No tolls on managed lanes were assumed to occur on weekends and overnight on weekdays for the purpose of this study.
- Assumed Tolling Concept - This study assumes that a vehicle using the managed lane is charged a toll rate based on the actual distance traveled in the lane. This "Per Mile" rate tolling concept is assumed to assess the toll revenue potential of the corridor. This assumption may be changed for the Evaluation of the Preferred Alternative as the managed lane alternatives are refined.

3.2.3 Assumed Managed Lane Modeling Parameters

- Managed Lane Volume-Delay functions – The managed lanes are anticipated to operate better than adjacent general purpose lanes due to the limited access locations, separation of the lanes, and management of traffic demand through pricing. Consequently, the volume-delay function for the managed lane was adjusted to reflect these anticipated operational advantages. Research conducted for the Transportation Research Board (TRB) developed speed-flow relationships for a variety of managed lane alternatives, including continuous-access lanes, 1 and 2-lane buffer- and barrier-separated managed lane facilities.[2] These speed-flow relationships were used to derive alternative volume-delay functions to represent the traffic

[2] "Analysis of Managed Lanes on Freeway Facilities," NCHRP Web Only Document 191, Transportation Research Board, August 2012, http://onlinepubs.trb.org/onlinepubs/nchrp/nchrp_w191.pdf.

operation of the continuous-access HOV and restricted-access HOT and Express Toll lanes. A free-flow speed of 60 mph was assumed for the HOV, HOT and Express Toll lane alternatives. The volume-delay function for the general-purpose lanes incorporated in the CMAP Go To 2040 model was left unchanged in modeling the managed lane alternatives.

- Managed Lane Capacity - In order to maintain free-flow conditions in the managed lanes, traffic demand for the lanes will be limited by charging appropriate toll rates. The assumed capacity of the managed lane is 1,800 passenger cars per hour per lane (pcphpl). Toll rates will generally be selected so as not to exceed the managed lane usage threshold of 1,600 pcphpl. This is anticipated to maintain a speed of 45-50 mph in the managed lane. The assumed capacity of general purpose lanes is 2000 vehicles per hour per lane. This assumption is based on the theoretical capacity of the lane and the proportion of buses and commercial trucks.

- Assumed Values of Travel Time Saved - A key assumption of the traffic and revenue analysis is the value of travel time saved, generally referred to as the Value of Time (VOT). The VOT varies by vehicle type, income, location, trip purpose and type of travel.

  The U.S. Department of Transportation (U.S. DOT) recommends developing VOT's based on Decennial Census data, using the median annual household income and the hours worked per year. Initially, an hourly wage rate is calculated by dividing median annual income by the number of hours worked (assumed as 2,000 hours per year). Next, VOT is estimated by assuming a proportion of the hourly wage rate, depending on the type of travel. For example, for passenger vehicle drivers the U.S. DOT recommends using VOT estimates based on 50 percent of the wage rate for all local personal travel regardless of the mode of travel, 70 percent of the wage rate for all intercity personal travel, and 100 percent of the wage (plus fringe benefits) for all local and intercity business travel, including travel by truck drivers. [3]

  Applying the U.S. DOT's approach, CDM Smith developed VOT estimates for passenger vehicles and commercial trucks for the Chicago region, to be used in travel demand modeling. Census-tract level data from the 2010 U.S. Census for the Chicago metropolitan region (that provided travel data for 2010) was used to develop VOT estimates for passenger vehicle travel. Census-tract level data was aggregated to a traffic analysis zone (TAZ) level. VOTs were developed for four time periods – AM peak, Midday, PM peak and Nighttime. Weights were applied for specific trip purposes to develop VOTs for each time period. Subsequently, an assumed average annual inflation rate of 2.0 percent was used to convert the VOT estimates to future year dollar estimates. For commercial trucks, a number of studies were reviewed to develop VOT estimates for three categories – small, medium and large trucks. The 2010 commercial truck VOT estimates were also converted to future year dollars using the assumed average annual inflation rate of 2.0 percent.

[3] Departmental Guidance on the Valuation of Travel Time in Economic Analysis, Revision 2, U.S. Department of Transportation, September 28, 2011, http://www.dot.gov/sites/dot.dev/files/docs/vot_guidance_092811c.pdf.

- Assumed VOTs for multi-occupant passenger vehicles – The HOV VOT is assumed to be 1.5 times the Single-Occupant Vehicle (SOV) VOT. Recent research conducted for the TRB estimated the VOT for a 2-occupant passenger vehicle to be 1.74 times the VOT for an SOV, while the VOT for a 3-occupant passenger vehicle is estimated to be 2.41 times the VOT for an SOV (VOTs for multi-occupant vehicles calculated by multiplying by a factor of ((No. of occupants)^(0.8)).[4] The assumption applied in this study (i.e. 1.5*SOV VOT) accounts for multiple occupants while recognizing the high proportion of family-based carpools and the presence of children in the vehicle typical of an urban region. This assumption is also consistent with VOT assumptions in CMAP's Activity Based Model used for pricing studies of 1.6 and 2.3 times the SOV VOT for HOV2 and HOV3+ vehicles, respectively.
- Modeling Time Periods – the CMAP Go To 2040 model is a weekday model that is subdivided into 8 time periods. For the purpose of this study, the time periods were modified to better reflect the traffic demand characteristics of the I-55 corridor. The selected time periods are:
    - Pre-AM Peak 5 - 7 a.m.
    - AM Peak 7 - 9 a.m.
    - Midday 9 a.m. – 2 p.m.
    - Pre-PM Peak 2 – 4 p.m.
    - PM Peak 4-6 p.m.
    - Post-PM Peak 6 - 8 p.m.
    - Overnight 8 p.m. – 5 a.m.
- For the purpose of this study, tolling is assumed to occur on weekdays only between 5 a.m. and 8 p.m., with no tolling overnight. Overnight, the managed lanes are assumed to remain open for use by passenger vehicles only.
- Trip tables used in the managed lane modeling reflect the "build" case in the Go To 2040 model. This reflects the additional managed lane in each direction of the corridor.

3.3 Assumptions Specific to the Sketch and Detailed Analyses

Assumptions/adjustments specific to the Sketch Level Analysis and Detailed Evaluation of the Preferred Alternative are summarized below.

---

[4] "Improving our Understanding of How Highway Congestion and Price Affect Travel Demand," Strategic Highway Research Program 2, Transportation Research Board, SHRP 2 Report S2-C04-RW-1, 2013, http://onlinepubs.trb.org/onlinepubs/shrp2/SHRP2_S2-C04-RW-1.pdf.

3.3.1 Sketch Level Analysis

- Incorporation of I-55 Vehicle Occupancy Survey Data – The vehicle occupancy data collected in April/May 2013 for I-55 was used to adjust the model trip tables for the year 2040 to better reflect the proportions of SOV, HOV2 and HOV3+ vehicles in the traffic stream. This was done by conducting traffic assignments with the model for each time period for 2040, performing select link analysis at three locations along the corridor and sequentially adjusting the trip tables to match the observed vehicle occupancy data. The adjusted trip tables are used to conduct subsequent model runs.

3.3.2 Detailed Analysis of Preferred Alternative

- The analysis of the preferred alternative will also incorporate the vehicle occupancy adjustments conducted for the Sketch Level Analysis.
- In addition, the origin-destination (O-D) travel patterns obtained from Bluetooth Sensor Data collected from June 2-8, 2013 will be incorporated into the travel demand model. This will be done by extracting a sub-area model of the I-55 corridor and adjusting the ramp-ramp movements to reflect the O-D patterns obtained from the Bluetooth sensors.
- The Preferred Alternative and No-Build will be evaluated for both the 2020 and 2040 model years.

4.0 Managed Lane Evaluation Approach

The modeling of the managed lane alternatives will follow the process outlined below.

4.1 Modeling Steps

- A sequential process is applied to model the managed lane alternatives. First, the managed lane is coded as a separate lane into the roadway network (separate from the general purpose lanes) in each direction of the study corridor. This is done to allow toll rates and different lane capacities, speeds and volume-delay functions to be assumed for the managed lanes.
- Next, connectors are coded in the roadway network between the managed and general purpose lanes. A continuous-access HOV lane was first modeled, represented by separate ingress and egress connectors between the managed and general purpose lanes for each interchange-interchange roadway segment.
- The volume-delay function (VDF) for a continuous-access managed lanes (with alpha = 1.5 and beta = 8) is coded in the network for the HOV lane alternatives. The VDF for general purpose freeway lanes uses alpha and beta values of 0.15 and 8, respectively.

- Traffic assignments are then conducted for each time period for the continuous-access HOV lane for the HOV2+ and HOV3+ alternatives, and results are summarized for the AM and PM peak period.
- The traffic assigned to the roadway network for the HOV lane is reviewed to assess the level of usage of the HOV lane, and the primary locations along the corridor with significant HOV ingress/egress volumes.
- Traffic assignments are then conducted for a HOT lane scenario, individually for HOT2+ and HOT3+ alternatives, assuming a continuous-access managed lane. These assignments are conducted with a low toll rate (e.g. $0.10/mile (in 2040$)) to allow assessment of the toll-paying (SOV/HOV2) demand for the managed lanes. The traffic volumes at the ingress/egress locations in the AM and PM peak periods are reviewed to assess the SOV, HOV2 and HOV3+ demand at those locations.
- Engineering judgment is then applied to determine the preliminary locations for managed lane access under a restricted-access scenario. This takes into account traffic demand at these ingress/egress locations, the interchanges served, spacing of the access locations and geometric constraints such as interchange spacing, availability of tangent sections, shoulder widths, and sight-distance restrictions. Historical congestion data for the corridor is also compared to the preliminary access locations to assess their feasibility.
- Assuming the preliminary managed lane access locations, traffic assignments for 2040 are then conducted to obtain traffic estimates under the restricted-access HOT2+ and HOT3+ scenarios, for reference toll rates, such as $0.10 and $0.25/mile. A modified VDF is used for the restricted-access managed lane (with alpha = 2.5 and beta = 8). The AM and PM peak period traffic assignment results for the scenarios are reviewed to assess the usage of the managed lanes, assumed ingress/egress locations and weaving volumes. Access locations may be refined further, and traffic assignments rerun.
- Traffic assignments for the Express Toll Lane scenario, assuming the refined managed lane access locations, will then be conducted.

4.2 Evaluation Process

At each stage of the analysis, Sketch or Detailed, data elements identified in Table 1 will be extracted from the model for each alternative considered. In addition, some criteria will require additional analyses to quantify the safety, costs and benefits of the alternatives under consideration.

At the Sketch Level, the performance of each alternative on the evaluation criteria identified will be rated on a qualitative scale of 1 to 5, lowest to highest. The scores for each alternative will be combined to generate an overall score and allow the alternatives to be evaluated against each other.

Technical Memorandum

I-55 PHASE I ENGINEERING STUDY

Veterans Memorial Tollway (I-355) to Dan Ryan Expressway (I-90/94)

TRAVEL MODEL VALIDATION, BASE & DESIGN YEAR NO-BUILD TRAFFIC ESTIMATES

Original	**May 2, 2013**
Revision 1	**June 17, 2013**

Table of Contents

1.0 Introduction

1.1 Background of the I-55 Phase I Engineering Study

The purpose of the I-55 Phase I Engineering Study is to "provide an additional travel lane in each direction within the existing median of Interstate 55 (I-55; FAI 55) to reduce the frequently severe congestion along I-55, improve travel time reliability, and improve safety through implementation of managed lane and active traffic management technology that can adapt to frequently changing conditions across all travel lanes, and that is a sustainable transportation solution."[1]

The project location encompasses approximately 25 miles of the I-55 corridor, between I-355 at the southern terminus to I-90/94 at the northern terminus. The project corridor traverses portions of DuPage and Cook Counties, connecting the Chicago Central Business District and suburban communities to the southwest of Chicago.

Interstate 55 generally provides three mainline lanes per direction for the length of the study corridor, with additional collector-distributor lanes at the IL 83, I-294, Lagrange Rd, IL 171, Kedzie-California and Damen Ave interchanges.

1.2 Purpose of this Technical Memorandum

The purpose of this memorandum is to summarize the I-55 travel model update process and methodology, provide a validation of the base year scenario, and present base year (2012) and design year (2040) No-Build traffic forecasts.

2.0 Model Preparation

2.1 CMAP Go To 2040 Travel Demand Model Set

The Chicago Metropolitan Agency for Planning (CMAP) is the region's official comprehensive planning agency. Among the tools developed for regional planning, the regional Travel Demand Model (TDM) is the analytical tool for analyses of Air Quality Conformity of Chicago region under the Clean Air Act. The TDM undergoes continuous improvement to incorporate the latest socioeconomic data, as well as traffic performance data collected throughout the region on an on-going basis. The latest release of the TDM is the Go To 2040 model, which was adopted in 2010, and serves as the basis for this study. The version of the CMAP data sets used in this analysis is based on Release C11Q1, received in March 2011. Project traffic forecasts for the I-55 Phase I Engineering Study must take into

[1] Draft I-55 Phase I Engineering Purpose and Need, March 26, 2013.

account facilities and policies in the current Regional Transportation Plan. The inclusion of managed lanes on I-55, between Weber Road to the south and I-90/94 to the north, is a key element of the Go To 2040 Regional Transportation Plan. However, this study will evaluate the feasibility of managed lanes between I-355 and I-90/94.

Trip tables and roadway networks provided by CMAP as part of the Go To 2040 Regional Travel Demand Model are the primary inputs used by CDM Smith for this study. CDM Smith imported these into Citilabs' CUBE Voyager travel demand modeling software to perform refinements of the roadway network and develop trip table adjustments as part of the model validation process.

2.2 Enhancement of the CMAP TDM for Illinois Tollway

CDM Smith has long used the CMAP TDM to provide traffic forecasts for the Illinois Tollway. This includes developing future traffic estimates, evaluating interchange improvements and corridor traffic operations analyses. CDM Smith has used extensive traffic data (traffic counts and travel speeds) for the Illinois Tollway, along with data from the Illinois Department of Transportation (IDOT) to further validate the CMAP model. The representation of the Illinois Tollway routes has been significantly enhanced as part of this effort, including recoding of all the service and system interchanges to more closely reflect their physical configuration. In addition, mainline and ramp toll plazas along the Illinois Tollway system have been explicitly coded to reflect tolls charged at these locations.

Major capital improvements included in the Go To 2040 Regional Transportation Plan are reflected in the future highway networks, including: the widening of the Jane Adams Memorial Tollway (I-90) from Rockford to its eastern termini near the O'Hare Airport; the extension of and tolling the Elgin-O'Hare Expressway and construction of a Western Bypass around the O'Hare international airport to connect the Jane Addams and Tri-State Tollways; and, a new system interchange between I-294 and I-57. These regional projects are scheduled to be completed by 2040.

2.3 Traffic Analysis Zones & Study Focus Area

Figure 2.1 illustrates the core area of CMAP's regional TDM. Figure 2.2 provides a zoomed-in view of the model which highlights the I-55 study area.

The light grey grid in the figures is the boundary of Traffic Analysis Zones (TAZ). They continue to be what CMAP has defined in the model. The I-55 study is focused in the area bordered by I-88/I-290 to the north, I-355 to the west, I-80 to the south and the lakeshore/Indiana Stateline to the east.

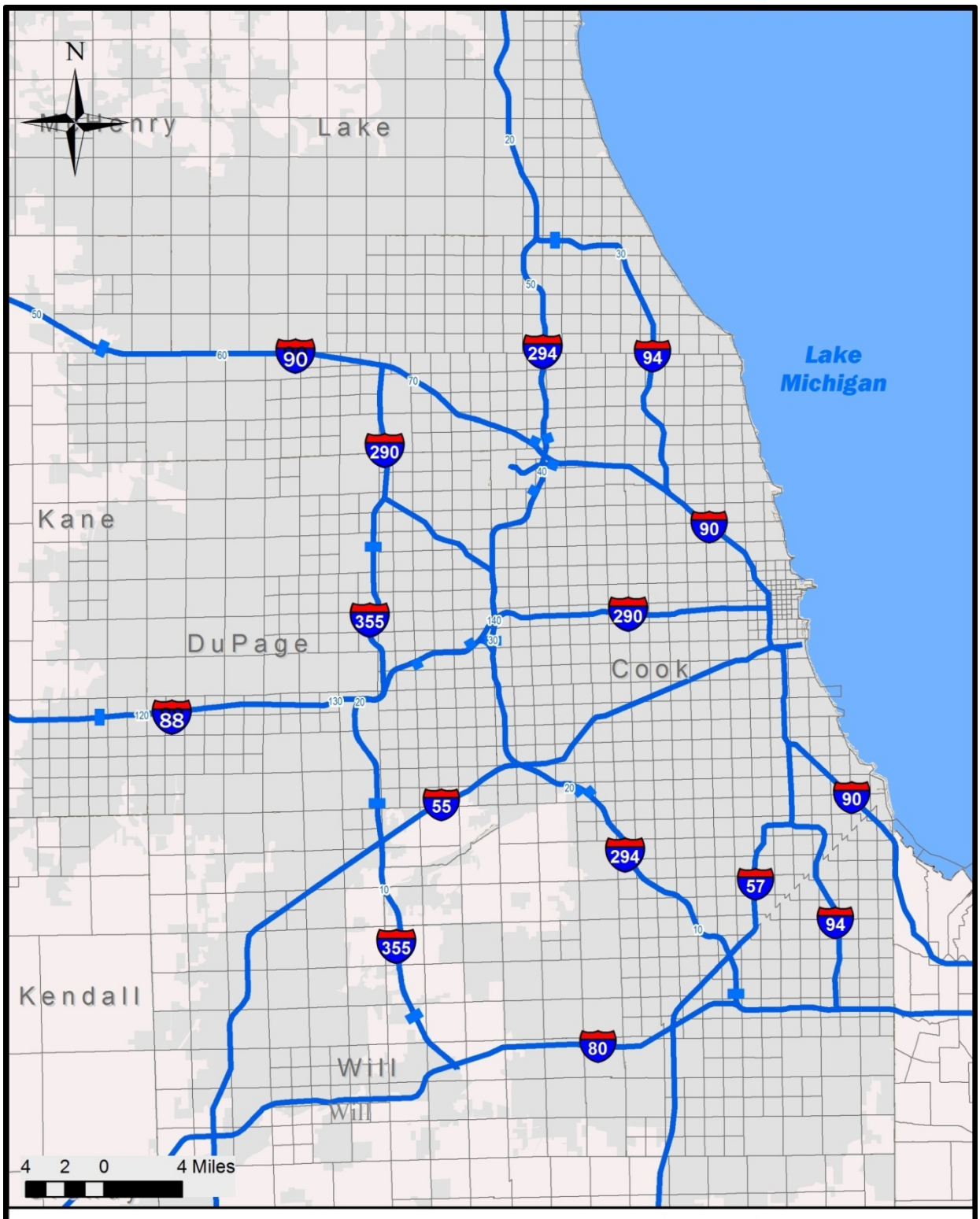


Figure 2.1 Core Area of CMAP Regional Travel Demand Model

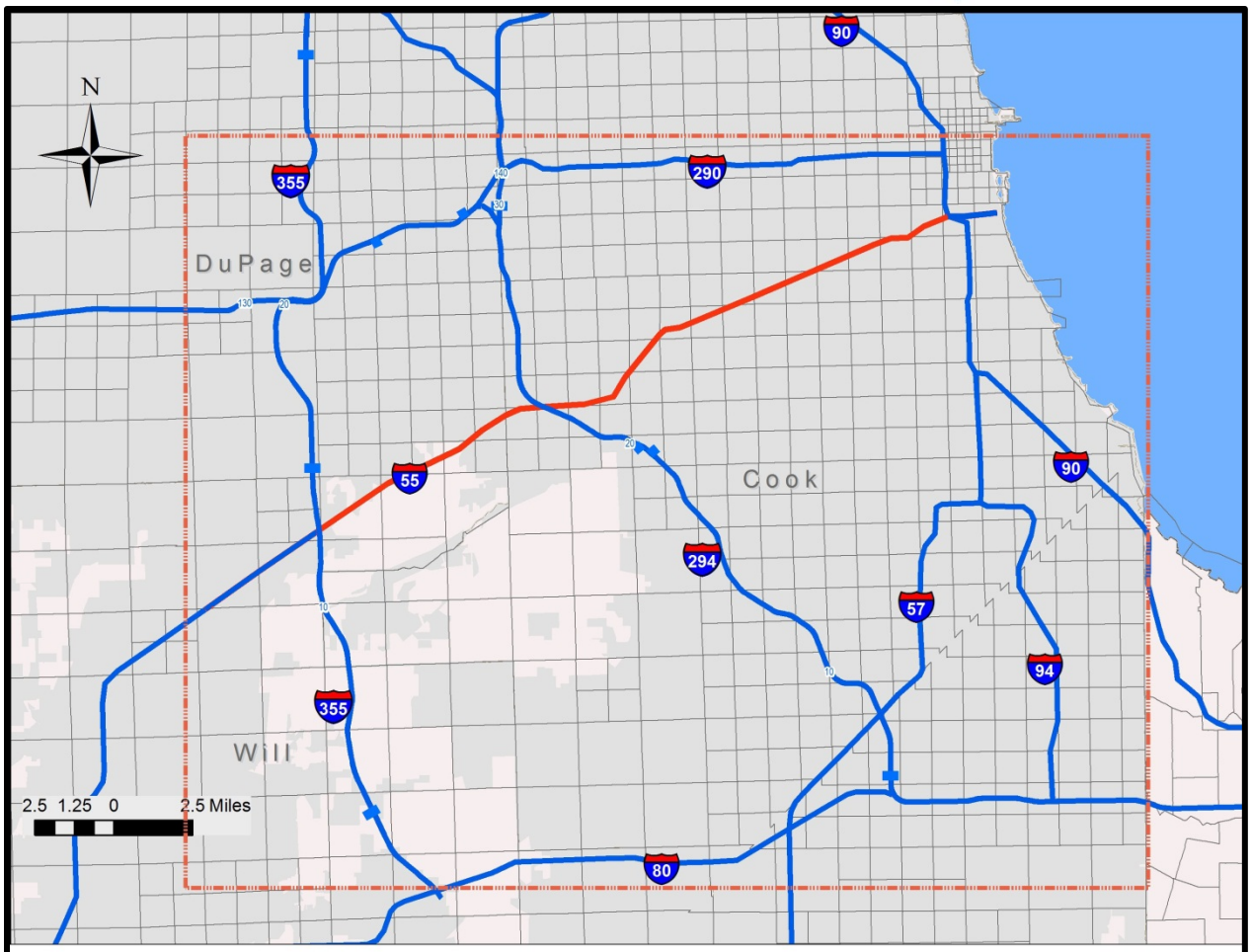


Figure 2.2 I-55 Managed Lane Study Area Boundary

2.4 Enhancement of Study Area Model Network

CDM Smith recoded interchanges along the I-55 study corridor to better reflect the ramp movements by direction as well as collector-distributor lanes. Figure 2.3 presents the CMAP model representation of the study area roadway network, while Figure 2.4 presents the enhanced network in the study corridor for comparison.

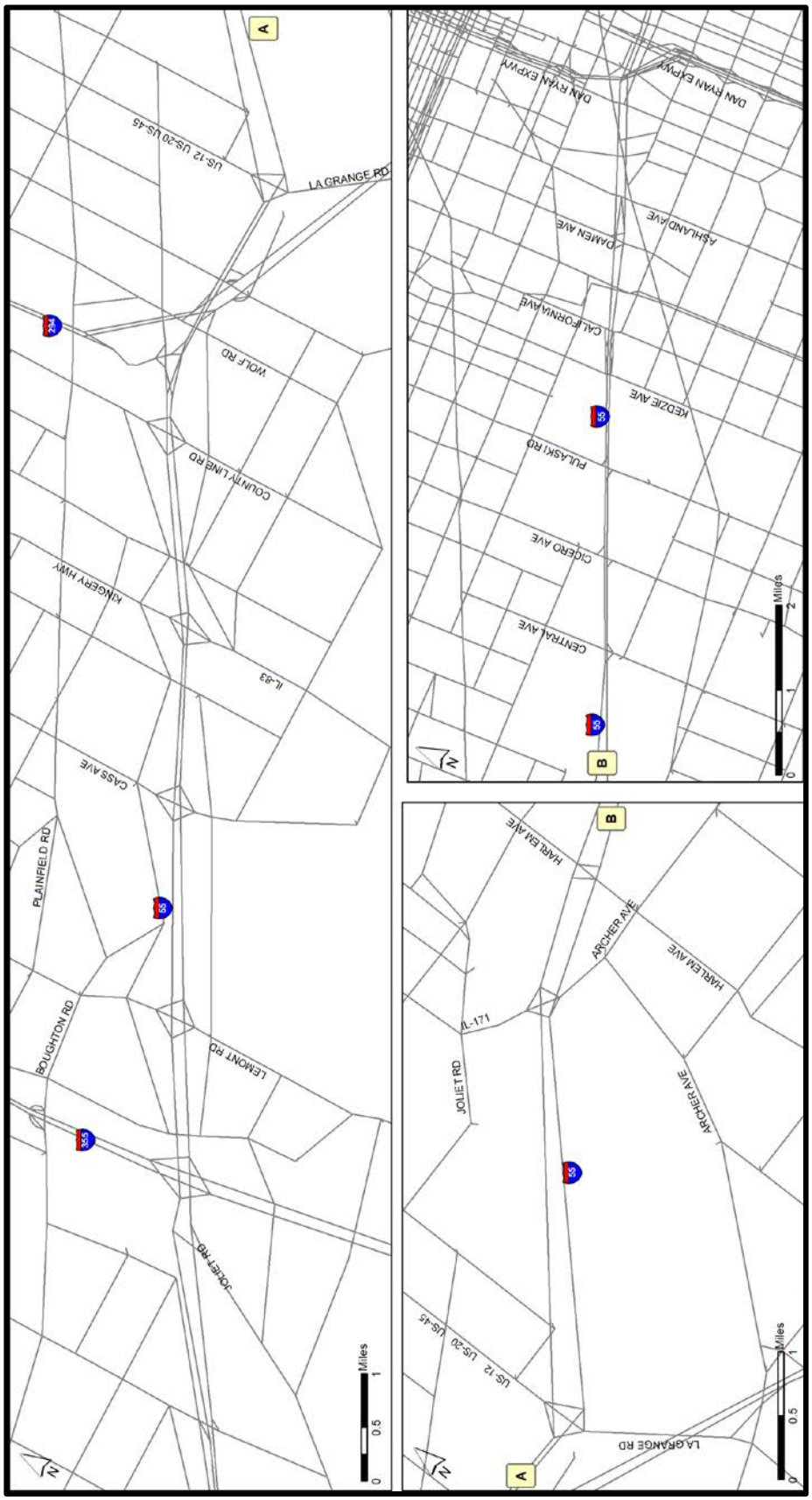


Figure 2.3 Study Corridor Network Representation in CMAP Model

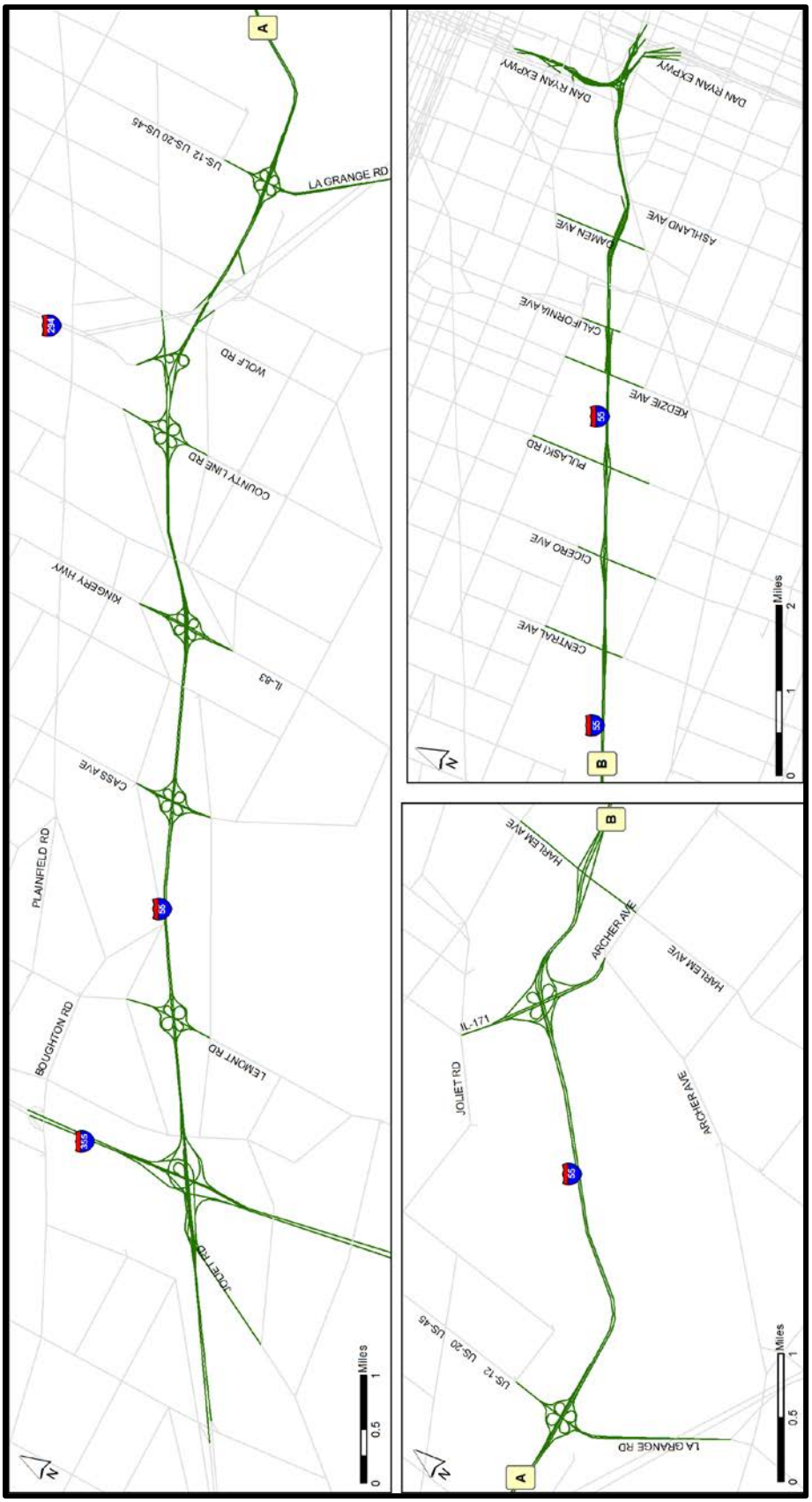


Figure 2.4 Study Corridor Network with Enhanced Coding of Interchanges

2.5 Traffic Assignment Process

The CMAP model uses the EMME/3 standard traffic assignment which is a user-optimal equilibrium assignment with linear approximation (Frank and Wolfe). It assumes that travelers choose the path (or route) perceived as the best, i.e. the shortest path. At the equilibrium, no one can improve their travel time by changing paths.

For this project, CDM Smith performed a multi-class traffic assignment using Cube Voyager software which runs the same user- optimal equilibrium assignment with linear approximation. **Table 2-1** lists the six vehicle classes for the study.

Table 2-1: Vehicle Classes for Traffic Assignment

Number	Link Mode	Description
1	SOV	Single Occupancy Vehicle
2	HOV2	2-Person High Occupancy Vehicle
3	HOV3+	3 or More -Person High Occupancy Vehicle
4	LT	Light Truck
5	MT	Medium Truck
6	HT	Heavy Truck

Cube Cluster Traffic Assignment Process

Cube Cluster distributes model run processes across multiple computer processors dramatically cutting model run times. Cube Cluster can distribute run processes across the processors in one or in multiple PCs. This is a very similar approach to INRO EMME/3's Parallel (Multi-Threaded) Standard Traffic Assignment, with Fixed Demand that makes use of multiprocessor systems when available. It remains an implementation of the linear approximation algorithm equilibrium assignment, hence the same convergence properties as the Standard Traffic Assignment, with the distinction that computing times can be reduced significantly when run on systems with multiple processors.

This allows users to choose how many processors to dedicate to the parallel traffic assignment and provides the opportunity to leave processors for other concurrent computing needs if desired. The I-55 model application integrates calls to the multi-threaded Cube Cluster module thus greatly enhancing run time and efficiency.

Model Set-Up Steps

The I-55 Managed Lane model included 6 time periods in analyzing traffic for the specific time-of-day, even though the overnight period is not going to be used for future project analysis. This is because the overnight period is unlikely to have capacity constraints.

Since the managed lanes are anticipated to be actively in use from 5AM to 8PM, the following model periods are established with the roadway capacity multiplier listed in the right column:

Table 2-2: Time Periods for Traffic Assignment

Time Period	Hours	Capacity Multiplier
Pre-AM	5-7 am	2
AM Peak	7-9 am	2
Midday	9 am – 2 pm	5
Pre-PM	2-4 pm	2
PM Peak	4-6 pm	2
Post PM	6-8 pm	2
Overnight	8 pm – 5 am	5

Capacity multipliers refer to the factors applied to each highway link in the model to convert the hourly capacity to the capacity of each time of day period. Since traffic is not perfectly distributed during each peak hour, the capacity multipliers do not add up to 24 (hours in the day); they add up to 20 total hours of daily capacity.

Since CMAP model overnight period covers 8pm-6am, traffic data profiles were reviewed on I-55 study section and 10% of traffic from CMAP model nighttime was reallocated to I-55 model Pre-AM period (5-7 am).

3.0 Model Validation

Model calibration refers to the adjustment of constants and other model parameters in estimated or asserted models in an effort to make the models replicate observed data for a base (calibration) year or otherwise produce more reasonable results.

Model validation is the application of the calibrated model and comparison of the results against observed data. Ideally, the observed data used for model validation is not the same data used for the model calibration, but this is not always feasible in practice.

The following description outlines the model calibration process for the base year, and provides model validation results.

The model validation process involved:

- Compilation of traffic count and travel speed data;
- Selecting roadway locations for which ground counts were available, both along the I-55 study corridor as well as on regional expressways and arterials in the vicinity of the study corridor;
- Estimating trip matrices for the base year to match ground counts at the selected locations. CUBE Analyst, the Citilabs' CUBE module developed specifically for this purpose was used to perform this;
- Generating measures to assess the tolerances to observed data provided by the model validation process.

Model validation was conducted to:

- Establish a model scenario that matches observed traffic conditions. For this study, a base year of 2012 was selected to match traffic data for the study corridor provided by IDOT. Approximately 6 months of detailed traffic count data for the period January-June 2012 was available for model calibration purposes. In addition, CDM Smith obtained detailed travel speed data for the corridor archived by Traffic.com, a private entity that allows public agency partners access to archived data for planning purposes. The Illinois Tollway provided access to the travel speed data for the purpose of this study.
- Prepare a solid foundation for a future design year. The designated design year for this study is 2040. Once the validated base year travel model is established, socioeconomic inputs, model steps and parameters are assumed to be working correctly, and that design year No-Build and alternative scenarios have an accurate starting point.

3.1 Traffic Counts & Travel Speed Data Sets

Traffic counts from loop detectors on the I-55 study corridor, Illinois Tollway toll plaza traffic counts, as well as counts at key locations on nearby freeways and arterial roads were analyzed and applied in the model validation process. The traffic count data was compiled for the specific time periods described later in this section. Figure 3.1 shows the traffic count locations used for trip table estimation and updates. The roadway links highlighted in red represent the locations for which ground counts were used to validate the base year model and calculate validation statistics.

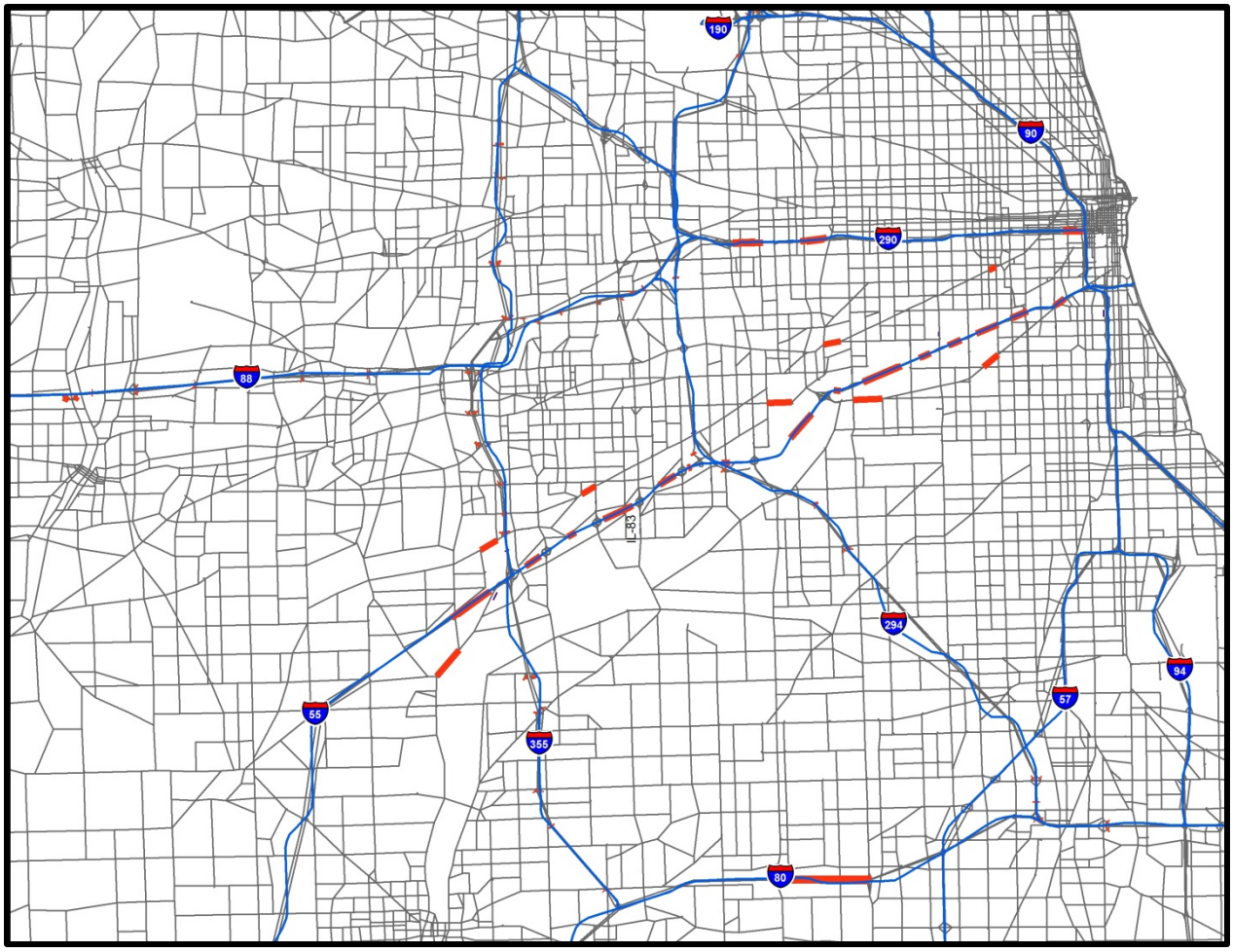
Truck traffic data for calibration of the model for I-55 was derived from sample vehicle classification data provided by IDOT. The dataset contained hourly data for six locations on I-55 between I-355 and the Dan Ryan Expressway:

- Bolingbrook & I-355
- I-355 & Lemont Rd
- Lemont Rd. & Cass Ave.
- Cass Ave. & IL-83
- IL-83 & County Line Rd.
- IL-43 (Harlem Ave) & IL-50 (Cicero Ave)

The vehicle classification data was based on vehicle length. Vehicle lengths of 0-22 feet were considered as passenger cars, 23-38 feet as small trucks and >39 feet as large trucks. Once the vehicle classification data was aggregated based on model time periods, the total truck percentage was calculated. To get truck volumes, the truck percentage was then applied on IDOT counts from loop detectors. For other locations on I-55 not covered by vehicle classification data, the percentage from the closest location that data was available for was assumed. Further break down on truck vehicle types – small, medium, and large trucks was based on Illinois Tollway transactions from nearby mainline plazas on the Tri-State Tollway (Plaza 35 - Cermak Rd.). The final truck volumes were used in calibration.

One of the shortfalls of travel demand models is the model's inability to carry over the traffic congestion from one time period to another. One way to overcome this is to use an initial speed other than the posted speed. The initial speed is a function of the congested speed (obtained from the loop detector data archived by Traffic.com), traffic volumes (counts), the roadway capacity and the volume-delay function (VDF, defined in the model) for specific roadway and time period. The Initial Speed was calculated using the standard Bureau of Public Roads (BPR) VDF function that, under specified conditions (defined by traffic volume, capacity, and parameters of the volume-delay function), will produce the congested speed in the model that matches the observed speed. The Initial Speed for the specific roadway section replaces the posted speed used in the model. The speed data used to calculate the Initial Speed is based on the speed captured by loop detectors archived by Traffic.com. For the modeling purposes the loop detector speed is applied for the whole section between interchanges.

Figure 3.1 Traffic Count Locations



3.2 Trip Table Adjustment with CUBE Analyst

The CMAP regional travel demand model subdivides weekday traffic into the following 8 time periods:

Pre-AM	6:00 – 7:00 am
AM Peak	7:00 – 9:00 am
Post-AM	9:00 – 10:00 am
Midday	10:00 am – 2:00 pm
Pre-PM	2:00 – 4:00 pm
PM Peak	4:00 – 6:00 pm
Post-PM	6:00 – 8:00 pm
Overnight	8:00 pm – 6:00 am

A review of usage of the I-55 corridor by time of day indicated that traffic volumes increase substantially from 5:00 am and decrease after 8:00 pm. Little congestion occurs overnight, between 8 pm and 5 am. Therefore, the CMAP model time periods were modified to allow analysis of the period from 5:00 am to 8:00 pm. CDM Smith restructured the model time periods into 6 time periods during which the managed lanes are anticipated to be actively in use. After analyzing 24-hour traffic profile from the corridor, the Pre-AM period has now been expanded to 5-7 am, while Post-AM is rolled into the Midday period. The revised time periods of analysis are:

Pre-AM	5:00 – 7:00 am
AM Peak	7:00 – 9:00am
Midday	9:00 am – 2:00 pm
Pre-PM	2:00 – 4:00 pm
PM Peak	4:00 – 6:00 pm
Post-PM	6:00 – 8:00 pm
Overnight	8:00 pm – 5:00 am

Trip table calibration was performed using the CUBE Analyst module. The objective of this procedure is to have model estimated traffic volumes reflect the real usage of the highway system, with minimal alteration of trip productions and attractions in the input trip table.

Tables 3.1 and 3.2 show the trip end totals before and after the adjustment of trip tables for the region for each time period, respectively. These results indicate that the validation process has resulted in a minimal change to total weekday trip ends, of approximately ¼ percent.

Table 3.1 CMAP Trip End Summary (Before Adjustment)

2012 Un-Calibrated	PREAM	AMPK	MD	PREPM	PMPK	PSTPM	NT
PC	869,193	2,523,462	7,538,218	3,178,344	3,652,809	2,830,181	2,357,778
SCV	28,471	215,943	152,736	70,948	18,800	5,462	9,756
MCV	33,888	138,105	473,366	88,648	29,938	16,590	50,449
LCV	59,327	179,568	489,706	155,127	82,871	37,805	162,993
							25,450,481

Table 3.2 Trip End Summary After Calibration

2012 Calibrated	PREAM	AMPK	MD	PREPM	PMPK	PSTPM	NT
PC	1,000,152	2,448,623	7,413,153	3,126,763	3,522,177	2,864,764	2,527,684
SCV	29,191	180,075	144,660	65,170	20,315	7,884	13,044
MCV	37,666	121,983	404,187	83,437	33,489	21,517	57,476
LCV	101,644	175,465	527,182	164,616	105,698	73,994	242,552
							25,514,557

3.3 Validated 2012 Base Year Model

The adjusted trip table for each time period obtained through the calibration process was used to conduct traffic assignment for each time period. The model assigned volumes are compared to the ground traffic counts at the selected locations in Tables 3.3, 3.4 and 3.5 for the AM peak, PM peak and overall weekday, respectively.

While absolute criteria for assessing the validation of the travel model to observed conditions are not precisely defined, guidance is provided by the FHWA and some State DOTs. Comparing observed volumes with model assigned traffic based on the percentage difference is one method. The suggested threshold for freeways and expressways is +/- 7% of observed volumes, with less stringent thresholds for less-heavily traveled roadways such as arterial roadways.

The comparison of calibrated traffic assignments to counts indicates a close fit of the model estimates for the study route, surrounding Tollways/freeways and the nearby arterials. Only isolated locations exceed the +/- 7% threshold along the I-55, I-290 and I-80 corridors, with those locations exhibiting low count data that appears to be out of the trend for the corridor, indicating possible issues with those count locations. Arterial validation locations also exhibit acceptable model calibration. Therefore, the calibrated trip table for 2012 is considered suitable for use as the basis for developing future year (2040) trip tables.

Table 3.3A Model Estimates vs Counts for Study Corridor Key Locations (AM Peak)

Route	Segment		Counts	Model	% Difference
	From	To			
I-55 SB	IL - 53	I -355	5,610	5,657	**1%**
	I - 355	Lemont Rd.	5,539	5,496	**-1%**
	Lemont Rd.	Cass Ave.	6,988	6,949	**-1%**
	Cass Ave.	IL - 83	7,020	7,095	**1%**
	IL - 83	County Line	6,659	6,686	**0%**
	County Line	Joliet Rd. / I - 294 Ramp	7,339	7,431	**1%**
	Joliet Rd. / I - 294 Ramp	La Grange Rd.	7,584	7,616	**0%**
	LaGrange Rd.	IL - 171	7,330	7,511	**2%**
	IL - 171	Harlem Ave.	6,399	7,239	**13%**
	Harlem Ave.	Central Ave.	7,963	8,089	**2%**
	Central Ave.	Cicero Ave.	7,751	8,177	**5%**
	Cicero Ave.	Pulaski Rd.	7,470	7,687	**3%**
	California Ave.	Damen Ave.	6,985	7,363	**5%**
	Damen Ave.	Dan Ryan EXP	6,562	6,820	**4%**
I-290 WB	Mannheim Rd.	25th Ave.	12,587	12,071	-4%
I-290 WB	1st Ave.	Des Plaines Ave.	13,707	12,681	-7%
I-290 WB	Loomis St.	Morgan St.	7,125	6,835	-4%
I-80 WB	LaGrange Rd.	Harlem Ave.	4,000	3,982	0%
I-55 NB	IL - 53	I -355	9,759	9,776	**0%**
	I - 355	Lemont Rd.	8,662	8,802	**2%**
	Lemont Rd.	Cass Ave.	10,096	10,196	**1%**
	Cass Ave.	IL - 83	9,634	10,040	**4%**
	IL - 83	County Line	8,927	9,047	**1%**
	County Line	Joliet Rd. / I-294 Ramp	9,266	9,407	**2%**
	Joliet Rd. / I-294 Ramp	LaGrange Rd.	8,317	8,573	**3%**
	LaGrange Rd.	IL 171	9,376	9,505	**1%**
	Harlem Ave.	Central Ave.	8,059	8,335	**3%**
	Central Ave.	Cicero Ave.	7,314	7,521	**3%**
	Cicero Ave.	Pulaski Rd.	9,802	9,966	**2%**
	Pulaski Rd.	Kedzie Ave.	10,273	10,112	**-2%**
	California Ave.	Damen Ave.	7,527	8,090	**7%**
	Damen Ave.	Dan Ryan EXP	6,740	6,830	**1%**
I-290 EB	Mannhem Rd.	25th Ave.	11,076	10,956	-1%
I-290 EB	1st Ave.	Des Plaines Ave.	12,847	12,573	-2%
I-290 EB	Loomis St.	Morgan St.	6,932	7,014	1%
I-80 EB	La Grange Rd.	Harlem Ave.	6,490	6,427	-1%

Table 3.3B Model Estimates vs Counts for Nearby Arterials (AM Peak)

Count Location	Direction	Counts	Model	% Difference
Joliet Rd west of I-355	EB	2,179	2,551	17%
Boughton Rd west of I-355	EB	2,153	2,446	14%
Plainfield Rd - Lemont to Cass	EB	1,071	989	-8%
55th St west of IL-171	EB	1,411	1,430	1%
Ogden Ave east of IL-171	EB	1,087	996	-8%
Archer Ave east of IL-43	EB	2,463	2,304	-6%
Archer Ave west of Kedzie	EB	1,735	1,559	-10%
Ogden Ave west of Kedzie	EB	1,483	1,352	-9%
Joliet Rd west of I-355	WB	1,855	1,857	0%
Boughton Rd west of I-355	WB	1,834	1,823	-1%
Plainfield Rd - Lemont to Cass	WB	971	855	-12%
55th St west of IL-171	WB	957	1,578	65%
Ogden Ave east of IL-171	WB	1,170	1,140	-3%
Archer Ave east of IL-43	WB	2,108	1,914	-9%
Archer Ave west of Kedzie	WB	1,611	1,420	-12%
Ogden Ave west of Kedzie	WB	1,468	1,220	-17%

Table 3.4B Model Estimates vs Counts for Nearby Arterials (PM Peak)

Count Location	Direction	Counts	Model	% Difference
Joliet Rd west of I-355	EB	1,832	2,196	20%
Boughton Rd west of I-355	EB	1,810	1,937	7%
Plainfield Rd - Lemont to Cass	EB	974	876	-10%
55th St west of IL-171	EB	1,581	2,275	44%
Ogden Ave east of IL-171	EB	1,218	1,226	1%
Archer Ave east of IL-43	EB	2,149	2,012	-6%
Archer Ave west of Kedzie	EB	1,514	1,362	-10%
Ogden Ave west of Kedzie	EB	1,519	1,570	3%
Joliet Rd west of I-355	WB	2,626	3,086	18%
Boughton Rd west of I-355	WB	2,597	2,875	11%
Plainfield Rd - Lemont to Cass	WB	1,071	1,030	-4%
55th St west of IL-171	WB	990	1,447	46%
Ogden Ave east of IL-171	WB	1,210	1,126	-7%
Archer Ave east of IL-43	WB	2,158	1,895	-12%
Archer Ave west of Kedzie	WB	1,405	1,009	-28%
Ogden Ave west of Kedzie	WB	1,009	1,142	13%

Table 3.4A Model Estimates vs Counts for Study Corridor Key Locations (PM Peak)

Route	Segment		Counts	Model	% Difference
	From	To			
I-55 SB	IL - 53	I -355	11,322	10,985	**-3%**
	I - 355	Lemont Rd.	8,158	8,363	**3%**
	Lemont Rd.	Cass Ave.	9,979	10,077	**1%**
	Cass Ave.	IL - 83	9,803	9,790	**0%**
	IL - 83	County Line	8,341	8,386	**1%**
	County Line	Joliet Rd. / I - 294 Ramp	9,169	9,264	**1%**
	Joliet Rd. / I - 294 Ramp	La Grange Rd.	7,725	8,267	**7%**
	LaGrange Rd.	IL - 171	9,306	9,304	**0%**
	IL - 171	Harlem Ave.	7,841	9,098	**16%**
	Harlem Ave.	Central Ave.	9,958	9,495	**-5%**
	Central Ave.	Cicero Ave.	8,249	9,528	**16%**
	Cicero Ave.	Pulaski Rd.	10,160	9,728	**-4%**
	California Ave.	Damen Ave.	8,393	8,753	**4%**
	Damen Ave.	Dan Ryan EXP	5,690	6,233	**10%**
I-290 WB	Mannheim Rd.	25th Ave.	14,603	14,499	-1%
I-290 WB	1st Ave.	Des Plaines Ave.	14,343	13,933	-3%
I-290 WB	Loomis St.	Morgan St.	7,921	8,099	2%
I-80 WB	LaGrange Rd.	Harlem Ave.	7,006	6,912	-1%
I-55 NB	IL - 53	I -355	8,562	8,534	**0%**
	I - 355	Lemont Rd.	7,685	7,868	**2%**
	Lemont Rd.	Cass Ave.	8,960	9,113	**2%**
	Cass Ave.	IL - 83	8,901	9,079	**2%**
	IL - 83	County Line	8,182	8,396	**3%**
	County Line	Joliet Rd. / I - 294 Ramp	9,606	9,725	**1%**
	Joliet Rd. / I - 294 Ramp	LaGrange Rd.	9,094	9,039	**-1%**
	LaGrange Rd.	IL - 171	9,288	9,139	**-2%**
	Harlem Ave.	Central Ave.	10,082	10,278	**2%**
	Central Ave.	Cicero Ave.	9,844	9,833	**0%**
	Cicero Ave.	Pulaski Rd.	10,110	10,493	**4%**
	Pulaski Rd.	Kedzie Ave.	10,328	10,185	**-1%**
	California Ave.	Damen Ave.	7,573	8,400	**11%**
	Damen Ave.	Dan Ryan EXP	7,207	7,290	**1%**
I-290 EB	Mannheim Rd.	25th Ave.	8,245	8,430	2%
I-290 EB	1st Ave.	Des Planes Ave.	14,969	14,408	-4%
I-290 EB	Loomis St.	Morgan St.	10,535	10,550	0%
I-80 EB	LaGrange Rd.	Harlem Ave.	8,074	8,065	0%

Table 3.5A Model Estimates vs Counts for Study Corridor Key Locations (Weekday Daily)

Route	Segment		Counts	Model	% Difference
	From	To			
I-55 SB	IL - 53	I -355	72,603	72,296	**0%**
	I - 355	Lemont Rd.	62,926	64,217	**2%**
	Lemont Rd.	Cass Ave.	79,429	80,602	**1%**
	Cass Ave.	IL - 83	80,101	81,212	**1%**
	IL - 83	County Line	73,858	75,226	**2%**
	County Line	Joliet Rd. / I - 294 Ramp	81,777	83,802	**2%**
	Joliet Rd. / I - 294 Ramp	LaGrange Rd.	73,973	78,643	**6%**
	LaGrange Rd.	IL - 171	78,475	81,361	**4%**
	IL - 171	Harlem Ave.	67,923	77,802	**15%**
	Harlem Ave.	Central Ave.	82,485	81,093	**-2%**
	Central Ave.	Cicero Ave.	67,128	79,752	**19%**
	Cicero Ave.	Pulaski Rd.	80,502	81,767	**2%**
	California Ave.	Damen Ave.	81,135	84,975	**5%**
	Damen Ave.	Dan Ryan EXP	68,360	72,751	**6%**
I-290 WB	Mannheim Rd.	25th Ave.	103,366	100,266	-3%
I-290 WB	1st Ave.	Des Plaines Ave.	107,073	99,879	-7%
I-290 WB	Loomis St.	Morgan St.	60,411	60,054	-1%
I-80 WB	La Grange Rd.	Harlem Ave.	39,566	38,919	-2%
I-55 NB	IL - 53	I -355	70,395	70,452	**0%**
	I - 355	Lemont Rd.	69,736	70,464	**1%**
	Lemont Rd.	Cass Ave.	81,506	81,823	**0%**
	Cass Ave.	IL - 83	79,369	80,098	**1%**
	IL - 83	County Line	73,398	73,802	**1%**
	County Line	Joliet Rd. / I - 294 Ramp	79,530	80,005	**1%**
	Joliet Rd. / I - 294 Ramp	LaGrange Rd.	72,527	74,215	**2%**
	LaGrange Rd.	IL - 171	77,666	78,971	**2%**
	Harlem Ave.	Central Ave.	82,907	85,692	**3%**
	Central Ave.	Cicero Ave.	78,300	80,272	**3%**
	Cicero Ave.	Pulaski Rd.	86,746	90,021	**4%**
	Pulaski Rd.	Kedzie Ave.	90,633	88,677	**-2%**
	California Ave.	Damen Ave.	65,847	72,666	**10%**
	Damen Ave.	Dan Ryan EXP	59,899	61,087	**2%**
I-290 EB	Mannheim Rd.	25th Ave.	77,608	77,270	0%
I-290 EB	1st Ave.	Des Plaines Ave.	103,875	99,299	-4%
I-290 EB	Loomis St.	Morgan St.	72,395	73,335	1%
I-80 EB	LaGrange Rd.	Harlem Ave.	50,532	50,126	-1%

Table 3.5B Model Estimates vs Counts for Nearby Arterials (Weekday Daily)

Count Location	Direction	Counts	Model	% Difference
Joliet Rd west of I-355	EB	17,049	20,468	20%
Boughton Rd west of I-355	EB	16,851	17,861	6%
Plainfield Rd - Lemont to Cass	EB	8,837	7,055	-20%
55th St west of IL-171	EB	13,218	17,418	32%
Ogden Ave east of IL-171	EB	10,183	8,268	-19%
Archer Ave east of IL-43	EB	18,769	16,001	-15%
Archer Ave west of Kedzie	EB	13,219	12,081	-9%
Ogden Ave west of Kedzie	EB	13,218	11,226	-15%
Joliet Rd west of I-355	WB	17,047	22,437	32%
Boughton Rd west of I-355	WB	16,851	19,215	14%
Plainfield Rd - Lemont to Cass	WB	8,839	6,952	-21%
55th St west of IL-171	WB	8,334	12,358	48%
Ogden Ave east of IL-171	WB	10,185	7,918	-22%
Archer Ave east of IL-43	WB	18,773	15,633	-17%
Archer Ave west of Kedzie	WB	12,275	8,373	-32%
Ogden Ave west of Kedzie	WB	12,272	8,846	-28%

4.0 Base Year and Design Year No-Build Traffic

The validated model was used to develop validated Base Year (2012) and Design Year (2040) No-Build traffic estimates.

4.1 Base Year (2012) Validated Traffic Estimates

Validated base year (2012) traffic estimates were developed by conducting traffic assignments using the adjusted trip table for each time period obtained through the model calibration process. The traffic assignment process used was described previously Section 2.5.

The base year (2012) traffic estimates are summarized in Figure 4.1. Raw, model-based traffic estimates are presented in this figure and for the design year to preserve flow conservation. However, it should be noted that these traffic estimates would typically be rounded when used in public presentations.

4.2 Design Year (2040) No-Build Traffic Estimates

Estimating design year (2040) No-Build traffic required the development of a no-build roadway network and an adjusted trip table for 2040.

The CMAP Go To 2040 Plan highway network was used as a starting point to develop the 2040 No-Build scenario transportation network. Thus, major capital improvements included in the fiscally constrained Go To 2040 Regional Transportation Plan were reflected in the future highway network, with the exception of the I-55 managed lane project. These included: the widening of the Jane Adams Memorial Tollway (I-90) from Rockford to its eastern termini near the O'Hare Airport; the extension of and tolling the Elgin-O'Hare Expressway and construction of a Western Bypass around the O'Hare international airport to connect the Jane Addams and Tri-State Tollways; and, a new system interchange between I-294 and I-57. All these regional projects are scheduled to be completed by 2040.

As discussed previously, the base year (2012) trip table was calibrated with base year network. Based on recommendations from CMAP staff, no-build 2040 trip tables were obtained from CMAP that did not include the proposed I-55 managed lanes. These trip tables were used to develop 2040 trip tables for the project by taking the positive growth from CMAP's 2012 to 2040 trip tables, and adding on to the base year (2012) calibrated trip table.

This study focuses on the I-55 corridor between I-355 and I-90/94. The modeling approach uses 7 time-periods in a 24 hour day to better represent traffic conditions. It is therefore important to determine the proper initial speeds (and travel times) for each time period to reflect the congestion levels for both no-build and build scenarios.

Even though base year travel time data is available for analysis, it is not possible to directly carry this information over to future years when capacity is added and network changes happen throughout the region. Therefore, to determine the initial speeds for traffic assignment, a feedback loop was implemented for each of the 7 time-of-day periods where an initial assignment was run with the posted speed limits as input, to obtain the congested speed for that time period. This congested speed was then fed into the regular traffic assignment for the corresponding time period to generate the final assigned traffic.

Design year (2040) No-Build traffic estimates for the I-55 corridor are summarized in Figure 4.2.

4.3 Comparison of Base (2012) and Design Year (2040) No-Build Traffic Estimates

Mainline and ramp traffic estimates for the study corridor are compared in Tables 4.1a and 4.1b. The tables also identify the number of mainline and auxiliary lanes in the I-55 study corridor. As shown in these tables, mainline traffic volumes are generally projected to grow by between 30 and 60 percent over the 28-year forecast period, with only one mainline segment projected to grow by 84 percent. It should be noted that this higher growth rate occurs in the southbound direction on the far south end of the corridor, between I-355 and Lemont Road, whereas other sections of the study corridor exhibit

more consistent growth. On an Average Annual basis, mainline traffic growth rates range from 0.9 to 2.2 percent, with most mainline sections growing at an average annual rate of 0.9 to 1.7 percent.

It should also be noted that these traffic estimates represent daily estimates, obtained by aggregating traffic assignments conducted for individual time periods. Traffic growth during the individual time periods vary, with more congested sections generally experiencing lower growth during the peak periods and higher growth during the off-peak periods.

Figure 4.1

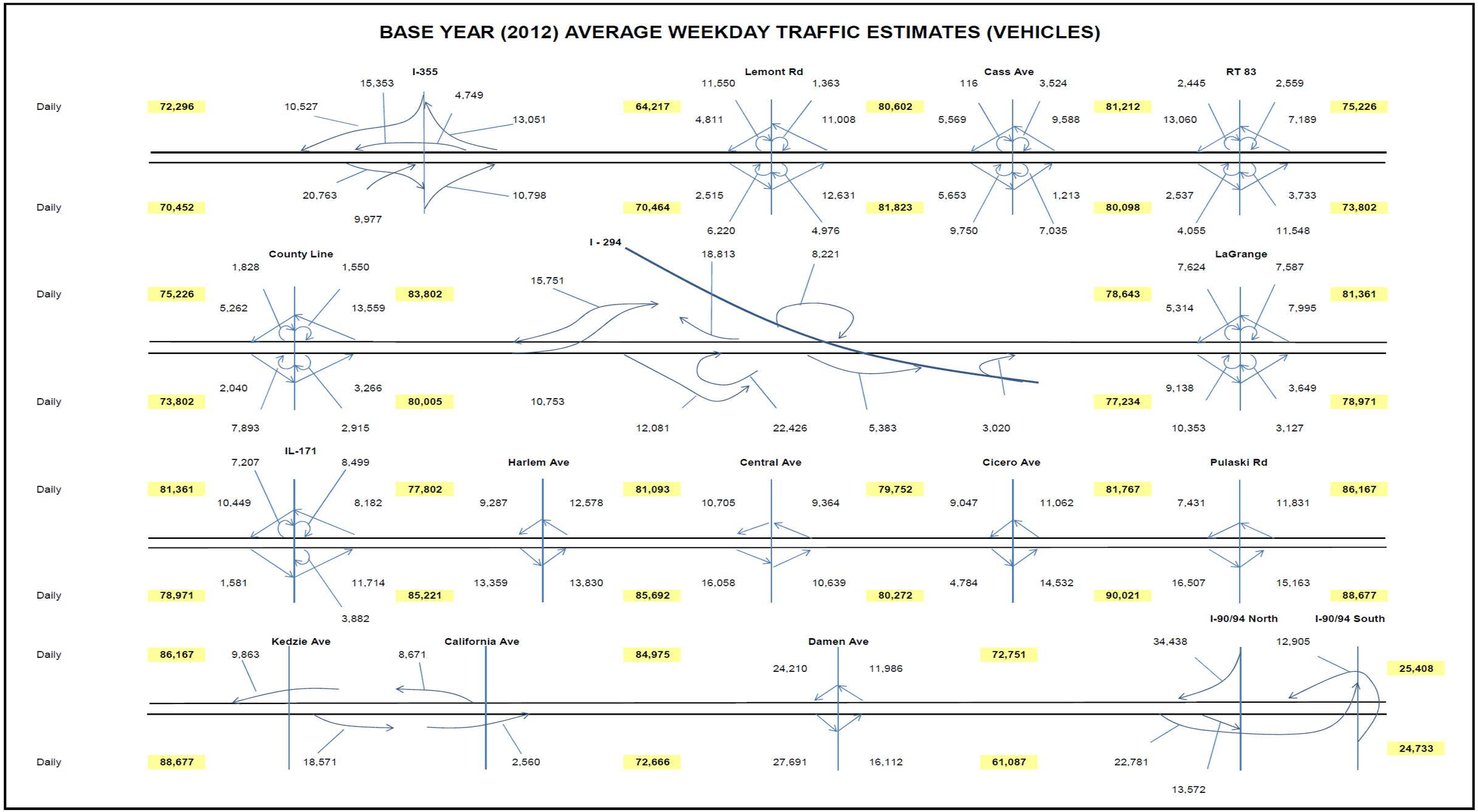

BASE YEAR (2012) AVERAGE WEEKDAY TRAFFIC ESTIMATES (VEHICLES)
I-355
Lemont Rd
Cass Ave
RT 83
Daily
72,296
15,353
4,749
10,527
13,051
64,217
11,550
1,363
4,811
11,008
80,602
116
3,524
5,569
9,588
81,212
2,445
2,559
13,060
7,189
75,226
Daily
70,452
20,763
10,798
9,977
70,464
2,515
12,631
6,220
4,976
81,823
5,653
1,213
9,750
7,035
80,098
2,537
3,733
4,055
11,548
73,802
County Line
I - 294
LaGrange
Daily
75,226
1,828
1,550
5,262
13,559
83,802
15,751
18,813
8,221
78,643
7,624
7,587
5,314
7,995
81,361
Daily
73,802
2,040
3,266
7,893
2,915
80,005
10,753
12,081
22,426
5,383
3,020
77,234
9,138
3,649
10,353
3,127
78,971
IL-171
Harlem Ave
Central Ave
Cicero Ave
Pulaski Rd
Daily
81,361
7,207
8,499
10,449
8,182
77,802
9,287
12,578
81,093
10,705
9,364
79,752
9,047
11,062
81,767
7,431
11,831
86,167
Daily
78,971
1,581
11,714
3,882
85,221
13,359
13,830
85,692
16,058
10,639
80,272
4,784
14,532
90,021
16,507
15,163
88,677
Kedzie Ave
California Ave
Damen Ave
I-90/94 North
I-90/94 South
Daily
86,167
9,863
8,671
84,975
24,210
11,986
72,751
34,438
12,905
25,408
Daily
88,677
18,571
2,560
72,666
27,691
16,112
61,087
22,781
13,572
24,733

Figure 4.2

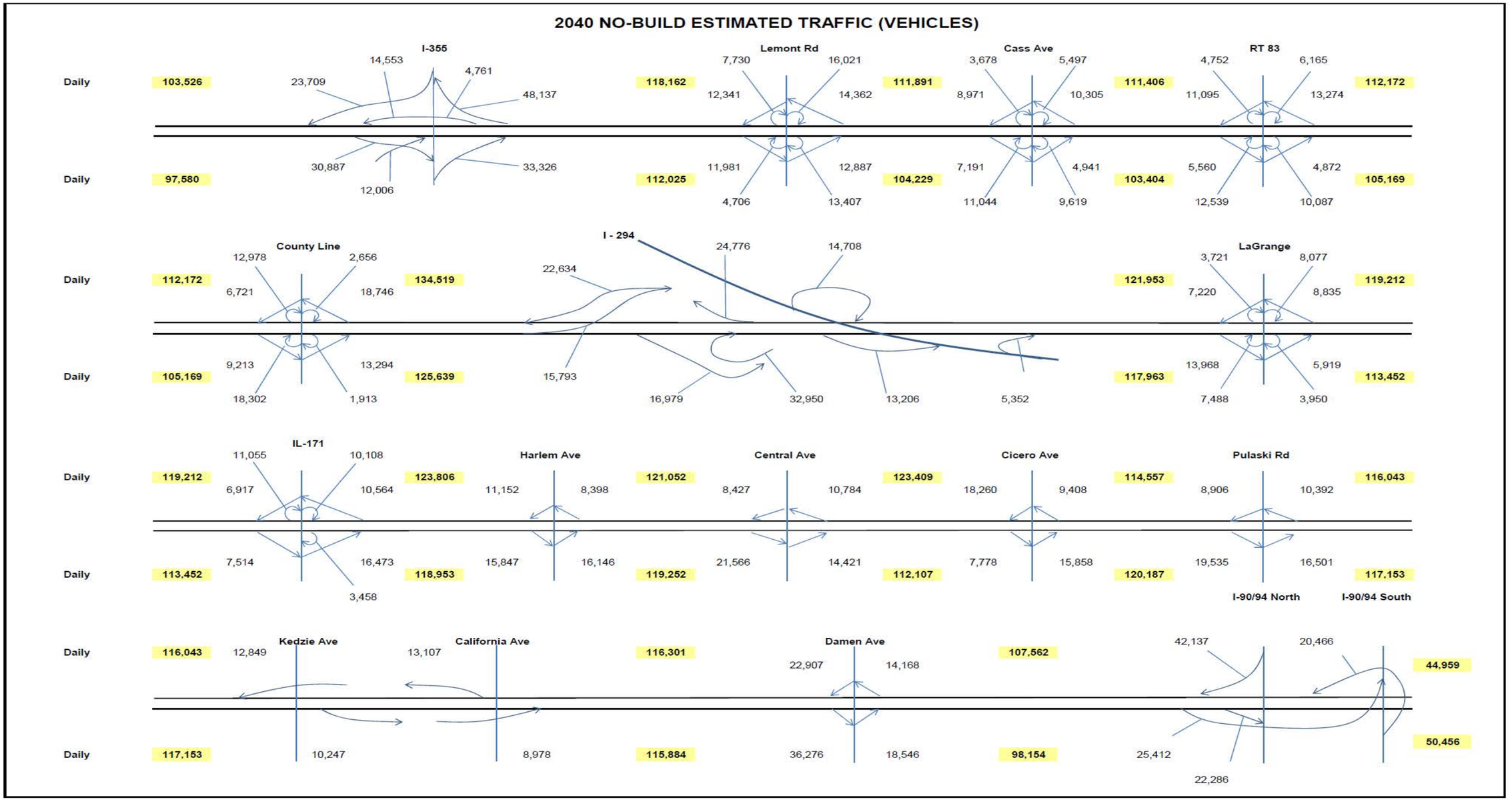

2040 NO-BUILD ESTIMATED TRAFFIC (VEHICLES)
I-355
Lemont Rd
Cass Ave
RT 83
Daily 103,526
14,553
4,761
23,709
48,137
30,887
33,326
12,006
Daily 97,580
118,162
7,730
16,021
12,341
14,362
11,981
12,887
4,706
13,407
Daily 112,025
111,891
Daily 111,406
3,678
5,497
8,971
10,305
7,191
4,941
11,044
9,619
Daily 103,404
112,172
4,752
6,165
11,095
13,274
5,560
4,872
12,539
10,087
Daily 105,169
County Line
I - 294
LaGrange
Daily 112,172
12,978
2,656
6,721
18,746
9,213
13,294
18,302
1,913
Daily 105,169
134,519
22,634
24,776
14,708
15,793
16,979
32,950
13,206
5,352
Daily 125,639
121,953
3,721
8,077
7,220
8,835
13,968
5,919
7,488
3,950
Daily 117,963
119,212
IL-171
Harlem Ave
Central Ave
Cicero Ave
Pulaski Rd
Daily 119,212
11,055
10,108
6,917
10,564
7,514
16,473
3,458
Daily 113,452
123,806
11,152
8,398
15,847
16,146
Daily 118,953
121,052
8,427
10,784
21,566
14,421
Daily 119,252
123,409
18,260
9,408
7,778
15,858
Daily 112,107
114,557
8,906
10,392
19,535
16,501
Daily 120,187
116,043
I-90/94 North
I-90/94 South
Daily 116,043
Kedzie Ave
California Ave
Damen Ave
12,849
13,107
10,247
8,978
Daily 117,153
116,301
22,907
14,168
36,276
18,546
Daily 115,884
107,562
Daily 98,154
42,137
20,466
25,412
22,286
44,959
50,456

Table 4.1a Comparison of Base Year and Design Year No-Build Traffic Estimates

From	To	GP Lanes	Aux-Lane	2012 Estimated Daily Traffic	2040 Estimated Daily Traffic (No-Build)	2012 - 2040 Growth (%)	2012-2040 AAPC (%)
NORTHBOUND							
IL - 53	**I -355**	**3**	**0**	**70,452**	**97,580**	**39%**	**1.2%**
NB Off				20,763	30,887	49%	1.4%
I - 355	**Lemont Rd.**	**3**	**1**	**70,464**	**112,025**	**59%**	**1.7%**
NB On				20,775	45,332	118%	2.8%
NB Off				7,491	25,388	239%	4.5%
Lemont Rd.	**Cass Ave.**	**3**	**0**	**81,823**	**104,230**	**27%**	**0.9%**
NB On				18,851	17,593	-7%	-0.2%
NB Off				12,688	16,810	32%	1.0%
Cass Ave.	**IL - 83**	**3**	**0**	**80,098**	**103,405**	**29%**	**0.9%**
NB On				10,963	15,985	46%	1.4%
NB Off				14,085	15,647	11%	0.4%
IL - 83	**County Line**	**3**	**0**	**73,802**	**105,169**	**43%**	**1.3%**
NB On				7,788	17,411	124%	2.9%
NB Off				4,955	11,126	125%	2.9%
County Line	**Joliet Rd. / I - 294 Ramp**	**3**	**1**	**80,005**	**125,639**	**57%**	**1.6%**
NB On				11,159	31,596	183%	3.8%
NB Off				28,217	45,978	63%	1.8%
Joliet Rd. / I - 294 Ramp	**La Grange Rd.**	**3**	**1**	**77,234**	**117,963**	**53%**	**1.5%**
NB On				25,446	38,302	51%	1.5%
NB Off				12,265	17,918	46%	1.4%
La Grange Rd.	**IL - 171**	**3**	**0**	**78,971**	**113,452**	**44%**	**1.3%**
NB On				14,002	13,407	-4%	-0.2%
NB Off				5,463	10,972	101%	2.5%
IL - 171	**Harlem Ave.**	**3**	**1**	**85,221**	**118,953**	**40%**	**1.2%**
NB On				11,714	16,473	41%	1.2%
NB Off				13,359	15,847	19%	0.6%
Harlem Ave.	**Central Ave.**	**3**	**0**	**85,692**	**119,252**	**39%**	**1.2%**
NB On				13,830	16,146	17%	0.6%
NB Off				16,058	21,566	34%	1.1%
Central Ave.	**Cicero Ave.**	**3**	**0**	**80,272**	**112,107**	**40%**	**1.2%**
NB On				10,639	14,421	36%	1.1%
NB Off				4,784	7,778	63%	1.8%
Cicero Ave.	**Pulaski Rd.**	**3**	**0**	**90,021**	**120,187**	**34%**	**1.0%**
NB On				14,532	15,858	9%	0.3%
NB Off				16,507	19,535	18%	0.6%
Pulaski Rd.	**Kedzie Ave.**	**3**	**0**	**88,677**	**117,153**	**32%**	**1.0%**
NB On				15,163	16,501	9%	0.3%
NB Off				18,571	10,247	-45%	-2.1%
California Ave.	**Damen Ave.**	**3**	**1**	**72,691**	**115,884**	**59%**	**1.7%**
NB On				2,560	8,978	251%	4.6%
NB Off				27,691	36,276	31%	1.0%
Damen Ave.	**Dan Ryan EXP**	**3**	**1**	**61,087**	**98,154**	**61%**	**1.7%**
NB On				16,112	18,546	15%	0.5%

Table 4.1b Comparison of Base Year and Design Year No-Build Traffic Estimates

From	To	GP Lanes	Aux-Lane	2012 Estimated Daily Traffic	2040 Estimated Daily Traffic (No-Build)	2012 - 2040 Growth (%)	2012-2040 AAPC (%)
SOUTHBOUND							
I -355	**IL - 53**	**3**	**0**	**72,296**	**103,525**	**43%**	**1.3%**
SB Off				17,800	52,898	197%	4.0%
SB On				6,174	28,362	359%	5.6%
Lemont Rd.	**I - 355**	**3**	**1**	**64,217**	**118,161**	**84%**	**2.2%**
SB Off				22,558	22,092	-2%	-0.1%
SB On				9,093	14,468	59%	1.7%
Cass Ave.	**Lemont Rd.**	**3**	**0**	**80,602**	**111,891**	**39%**	**1.2%**
SB Off				9,704	13,983	44%	1.3%
SB On				15,619	17,260	11%	0.4%
IL - 83	**Cass Ave.**	**3**	**0**	**81,212**	**111,406**	**37%**	**1.1%**
SB Off				9,634	18,026	87%	2.3%
SB On				6,812	9,377	38%	1.1%
County Line	**IL - 83**	**3**	**0**	**75,226**	**112,172**	**49%**	**1.4%**
SB Off				15,387	31,724	106%	2.6%
SB On				23,972	37,342	56%	1.6%
Joliet Rd. / I - 294 Ramp	**County Line**	**3**	**1**	**83,802**	**134,519**	**61%**	**1.7%**
SB Off				18,813	24,776	32%	1.0%
SB On				12,901	15,297	19%	0.6%
La Grange Rd.	**Joliet Rd. / I - 294 Ramp**	**3**	**1**	**78,643**	**121,953**	**55%**	**1.6%**
SB Off				15,619	12,556	-20%	-0.8%
SB On				18,948	17,025	-10%	-0.4%
IL - 171	**La Grange Rd.**	**3**	**0**	**81,361**	**119,212**	**47%**	**1.4%**
SB Off				15,389	21,619	40%	1.2%
SB On				9,287	11,152	20%	0.7%
Harlem Ave.	**IL - 171**	**3**	**1**	**77,802**	**123,806**	**59%**	**1.7%**
SB Off				12,578	8,398	-33%	-1.4%
SB On				10,705	8,427	-21%	-0.9%
Central Ave.	**Harlem Ave.**	**3**	**0**	**81,093**	**121,052**	**49%**	**1.4%**
SB Off				9,364	10,784	15%	0.5%
SB On				9,047	18,260	102%	2.5%
Cicero Ave.	**Central Ave.**	**3**	**0**	**79,752**	**123,409**	**55%**	**1.6%**
SB Off				11,062	9,408	-15%	-0.6%
SB On				7,431	8,906	20%	0.6%
Pulaski Rd.	**Cicero Ave.**	**3**	**0**	**81,767**	**114,557**	**40%**	**1.2%**
SB Off				11,831	10,392	-12%	-0.5%
SB On				9,863	12,849	30%	0.9%
Kedzie Ave.	**Pulaski Rd.**	**3**	**0**	**86,167**	**116,043**	**35%**	**1.1%**
SB Off				8,671	13,107	51%	1.5%
SB On				24,210	22,907	-5%	-0.2%
Damen Ave.	**California Ave.**	**3**	**0**	**84,975**	**116,301**	**37%**	**1.1%**
SB Off				11,986	14,168	18%	0.6%
SB On				34,438	42,137	22%	0.7%
Dan Ryan EXP	**Damen Ave.**	**3**	**0**	**72,751**	**107,562**	**48%**	**1.4%**

Chicago Metropolitan Agency for Planning

233 South Wacker Drive
Suite 800
Chicago, Illinois 60606

312 454 0400
www.cmap.illinois.gov

July 18, 2013

Stephen Schilke
Project Manager
Illinois Department of Transportation
Region 1/District 1
201 West Center Court
Schaumburg, IL 60196

Re: I-55 Evaluation Modeling Procedures
Veteran's Memorial Tollway (I-355) to Dan Ryan Expressway (I-90/94)

Dear Mr. Schilke:

Thank you for providing the technical memo and the opportunity for your consultants to brief CMAP on the procedures being developed to evaluate additional lanes on I-55. The underlying trip tables and networks used in your efforts were provided by CMAP and are therefore consistent with the region's understanding of today's network characteristics and development patterns, as well as expectations of how they will change in the future. You have also employed standard procedures to adjust the trip tables and calibrate the traffic assignment, and the presented results seem reasonable. Based on these observations, we concur with your methodology.

Sincerely,

Claire Bozic
Senior Analyst

Cc: J. Baczek (IDOT), S. Panguluri (CH2M HILL)

Technical Memorandum

I-55 PHASE I ENGINEERING STUDY

Veterans Memorial Tollway (I-355) to Dan Ryan Expressway (I-90/94)

TOLLING CONCEPT AND KEY ASSUMPTIONS FOR EA TRAFFIC FORECASTS

Original	**September 10, 2015**
Revised	**September 22, 2015**

Table of Contents

1.0 Introduction

1.1 The I-55 Phase I Engineering Study

The purpose of the I-55 Phase I Engineering Study is to "provide an additional travel lane in each direction within the existing median of Interstate 55 (I-55; FAI 55) to reduce the frequently severe congestion along I-55, improve travel time reliability, and improve safety through implementation of managed lane and active traffic management technology that can adapt to frequently changing conditions across all travel lanes, and that is a sustainable transportation solution."[1]

The project location encompasses approximately 25 miles of the I-55 corridor, between I-355 at the southern terminus to I-90/94 at the northern terminus. The project corridor traverses portions of DuPage and Cook Counties, connecting the Chicago Central Business District and suburban communities to the southwest of Chicago.

I-55 generally provides three mainline lanes per direction for the length of the study corridor, auxiliary lanes and additional collector-distributor lanes at the I-355, IL 83, I-294, LaGrange Rd, IL 171, Kedzie-California and Damen Ave interchanges.

1.2 Purpose of this Technical Memorandum

Prior efforts refined, calibrated and validated the Chicago Metropolitan Agency for Planning (CMAP) Go To 2040 regional travel demand model for the I-55 Phase I Engineering Study. The model update process, validation of the base year (2012) and development of design year (2040) No-Build traffic estimates are documented in a technical memorandum, "Travel Model Validation, Base and Design Year No-Build Traffic Estimates," dated June 20, 2013. The model calibration and validation approach was reviewed with CMAP and received their concurrence on the methodology employed.

A number of alternatives are being evaluated as part of the I-55 Environmental Assessment (EA), including a No-Build alternative, as well as added High-Occupancy Vehicle (HOV) lanes, High-Occupancy Toll (HOT) lanes and Express Toll lanes. The modeling approach for developing traffic forecasts for these alternatives was documented in a subsequent technical memorandum, "Managed Lanes Modeling Approach, Key Assumptions and Evaluation Process," dated September 16, 2013, and received concurrence from CMAP.

While a Preferred Alternative has not yet been selected, a need exists to develop appropriate traffic forecasts to allow air quality and noise analyses to be conducted to meet the expedited project schedule. The purpose of this memorandum is to outline the project concept, key technical assumptions and modeling approach to be used to develop traffic forecasts for the I-55 Environmental Assessment.

[1] I-55 Purpose and Need for Action, September 2013.

2.0 Basis for the EA Traffic Forecast

2.1 Defining the EA Traffic Forecast

The study team utilized the following criteria to define the project concept for developing the EA traffic forecast:

(a) Consistency with the Regional Plan is critical for NEPA analyses, as stated in FHWA guidance for developing travel forecasts: "From a NEPA study forecasting perspective, the key considerations include consistency of assumptions and data and evolving analysis methods. It is important that the design concept and scope of the project in the NEPA analysis be consistent with that included in the conforming transportation plan and TIP in non-attainment or maintenance areas." [2]

CMAP's October 2014 Go To 2040 Update includes the addition of Express Toll lanes on I-55, on the Fiscally Constrained list of major capital projects. [3] The regional plan indicates that the project would provide a *congestion-priced express toll lane* in each direction on I-55 between I-355 and the I-90/94, utilizing the wide inside shoulder. The plan indicates that *multi-unit trucks would be prohibited from using the express toll lanes* for safety and operational reasons, although any new capacity would improve travel conditions for all users, including trucks. The Go To 2040 plan also states: "Except on very short or isolated segments, GO TO 2040's policy is to construct added lanes as express toll lanes".

(b) Project Concept – For the purpose of developing alternative traffic forecasts, the Study Team has selected a project concept consistent with the Regional Plan, that would result in traffic forecasts that cover the range of alternatives being considered in the I-55 Phase I Study. The basis for the project concept is outlined below:

i. AASHTO NEPA Guidance states that: "The initial proposal to consider tolling often assumes a particular design concept, such as HOT lanes, express toll lanes, or a toll road in which all lanes are tolled. This initial proposal may be refined many times, through an iterative process that takes into account engineering factors, economic factors, public opinion, and other issues. As a result, "pinning down" the basic tolling concept for purposes of NEPA analysis may be difficult and time-consuming. Rather than being a purely engineering exercise, this task often involves consideration of factors such as public acceptance, revenue potential, construction cost, and environmental impacts." [4]

---

[2] Interim Guidance on the Application of Travel and Land Use Forecasting in NEPA, Federal Highway Administration, March 2010.
[3] CMAP Go To 2040 Update Appendix: Major Capital Projects, October 2014.
[4] Managing the NEPA Process for Toll Lanes and Toll Roads, AASHTO Practitioners Handbook No. 3, July 2006.

The proposed tolling concept for the I-55 managed lanes assumes the addition of a single lane in each direction utilizing the inside shoulder, which would be managed through congestion pricing. For the purpose of developing the EA traffic forecast, a fixed time-of-day toll schedule is assumed that assesses higher toll rates in the peak periods and lower toll rates during the shoulders of the peaks and midday off-peak period. A review of the operating profile of the I-55 corridor indicates that that weekday traffic volumes typically begin to rise sharply at 5:00 a.m. and generally dissipate after 8:00 p.m. Therefore, it was assumed that the managed lane would be tolled between 5:00 a.m. and 8:00 p.m. each weekday. No tolls on the managed lanes are assumed to occur overnight on weekdays, and on weekends for developing the EA forecast.

ii. The assumed time-of-day toll rates were selected by direction of travel, based on the existing traffic profile for the most congested roadway segment in two sections of the study corridor – I-355 to Lagrange Road, and Lagrange Road to the Dan Ryan Expressway (I-90/94). Traffic management (reducing traffic congestion) is assumed to be the primary goal of congestion pricing. Therefore, the selection of toll rates is based on maximizing utilization of the managed lanes, rather than maximizing toll revenues. Higher utilization of the managed lanes will result in more traffic attracted to the general purpose lanes due to the freed-up capacity, and subsequently minimize traffic impacts to local streets.

The EA traffic forecast assumes that a vehicle using the managed lane is charged a toll rate based on the actual distance traveled in the lane. Toll rates for specific time periods and roadway sections are based on the toll rates evaluated in the Sketch-Level Alternatives Analysis. While these toll rates do not represent optimal toll rates, and may be revised during subsequent toll sensitivity testing, they represent toll rates in the range that are likely to be charged during those time periods based on traffic demand.

This assumption is consistent with AASHTO guidance which states: “Toll rates generally are not decided as part of the NEPA process, but instead are left to State and local discretion. However, for purposes of NEPA analysis, it is necessary to make assumptions about the toll rates that will be charged because toll rates will affect the traffic volumes projected in the NEPA document for tolled alternatives. As with any other assumption underlying the NEPA analysis, assumptions about toll rates should be disclosed and explained. Where there is uncertainty about the actual toll rates, it may be appropriate to consider a range of toll rates in order to assess the sensitivity of traffic volumes to toll rates.” [5]

[5] Ibid.

The assumed time of day toll rates and historical 2013 hourly traffic pattern for representative segments of the I-55 corridor are illustrated in Figure 1, for the inbound and outbound directions.

As part of the modeling conducted for the Alternatives Analysis, a toll sensitivity analysis was conducted to gauge traffic demand in the managed lanes for toll rates from $0.10 to $0.25 per mile. Figure 2 illustrates the variation in 2040 corridor traffic demand for the Restricted Access Express Toll Lane alternative during the AM and PM peak hours for fixed toll rates of $0.10 and $0.25 per mile. The results of this analysis demonstrated that the total traffic demand along the corridor varied by less than 5% along all segments of the corridor as a result of the two toll rates. As such, traffic demand is relatively insensitive to the managed lane toll rate in the assumed range of toll rates shown in Figure 1, and will not affect the air quality or noise analysis along the corridor. This is expected due to the heavy traffic demand and frequent congestion experienced over much of the study corridor. The assumed EA tolling alternative as shown in Figure 1 represents a realistic expectation of congestion priced travel management.

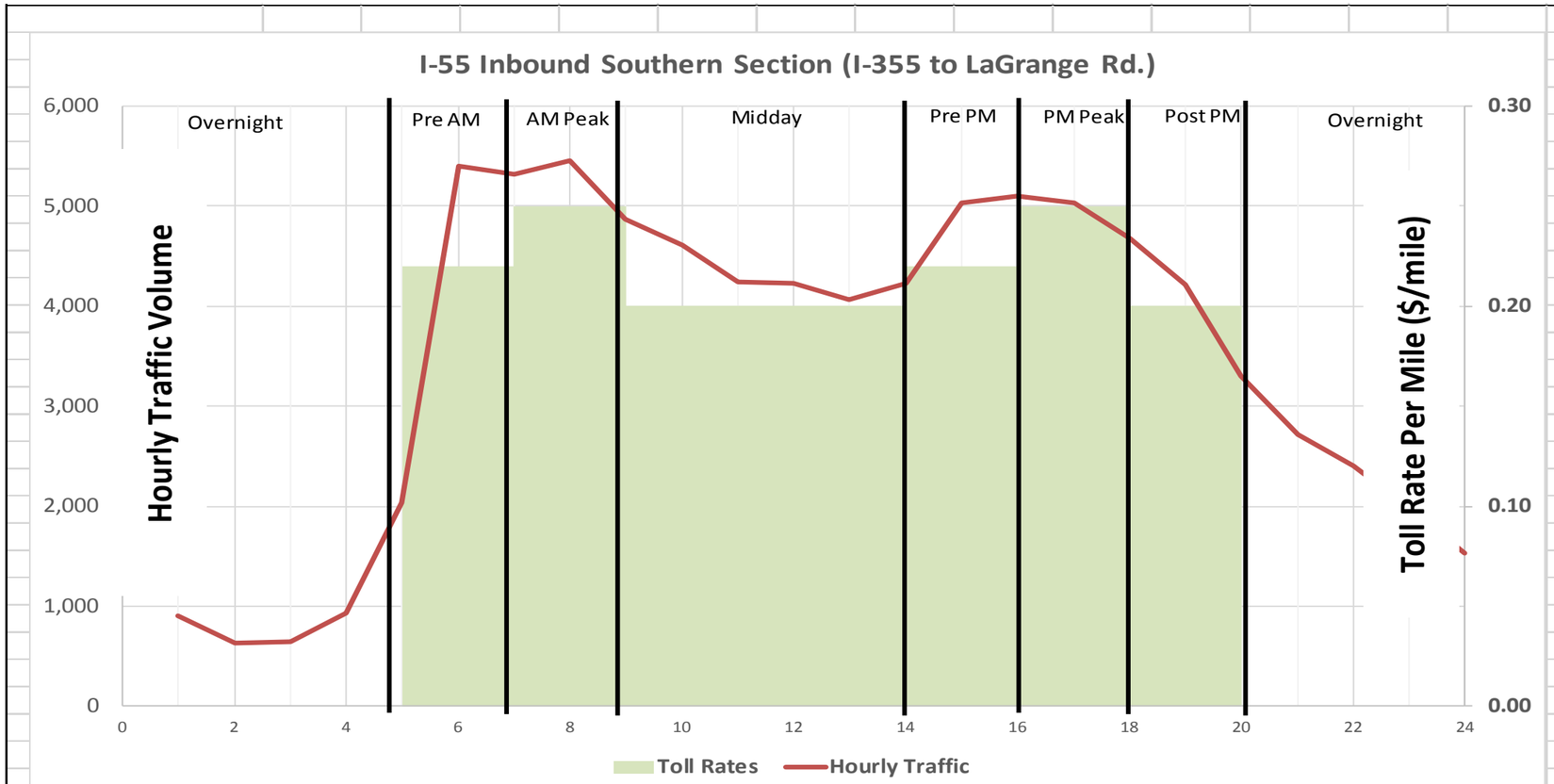
iii. The added managed lanes are assumed to operate as Express Toll Lanes (ETLs), where all passenger vehicles are eligible to use the lanes by paying the toll assessed, and no preferential treatment is provided to HOV or alternative-fueled/hybrid vehicles. Only public transit buses are assumed to be eligible to use the managed lanes toll free, based on current state statute. This assumption maximizes the potential user base for the managed lane as all vehicles (other than trucks) are eligible to use the lane.

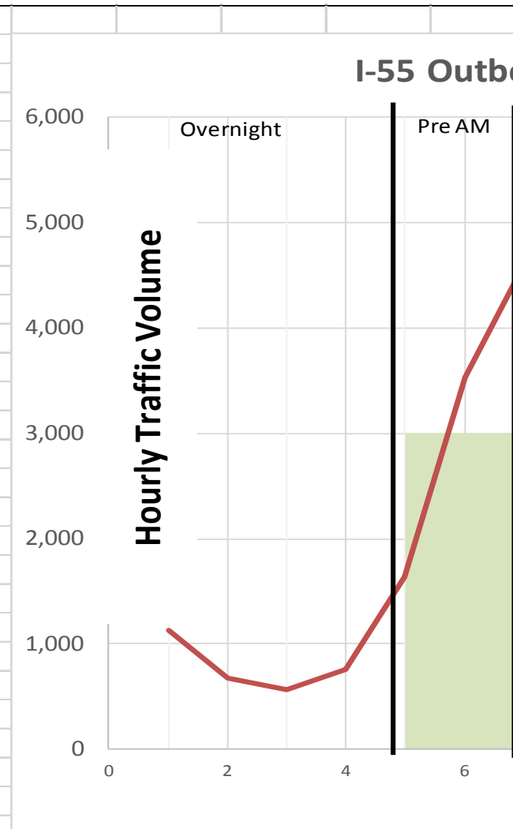
iv. Managed Lane Access – The managed lanes are assumed to be continuous-access lanes, separated from general-purpose lanes by striping for the entire length of the study corridor. Managed lane users will access intermediate interchanges by merging into general-purpose lane traffic, and vice versa. No direct ramp access is assumed between the managed lanes and local roadways.

Preliminary traffic forecasts developed for continuous- and controlled-access ETL scenarios indicate that the continuous access ETL results in slightly higher traffic volumes on the I-55 study corridor compared to the controlled-access ETL, as well as higher utilization of the managed lane.

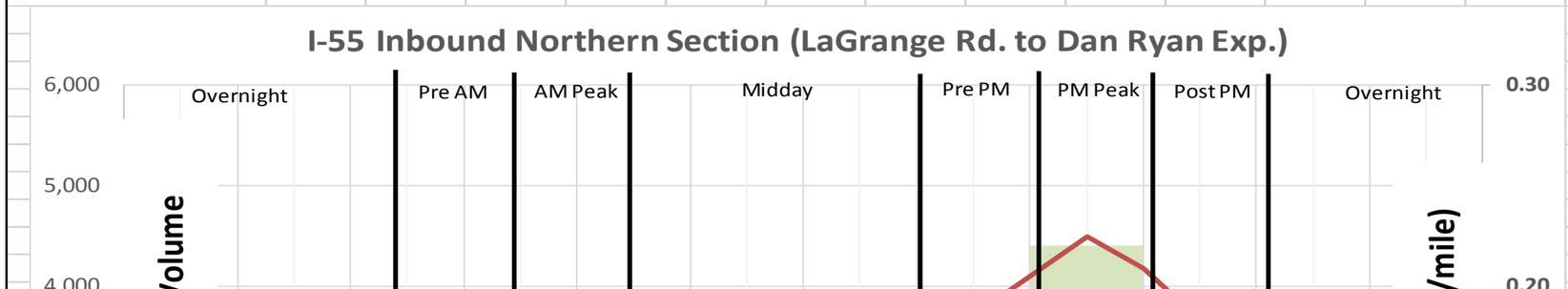
The assumed project concept outlined above is anticipated to result in traffic forecasts that are representative of the potential usage of the managed lanes under the various alternatives under consideration in the EA. Additionally, the assumed toll rates and operating characteristics of the managed lanes are expected to result in conservative corridor traffic forecasts suitable for the purposes of air quality and noise analyses.

Figure 1 Historical Hourly Traffic Profile and Assumed Toll





Note
The hourly profile is based on traffic counts from June 4-6, 2013 for the section between Cass Ave. and IL-83



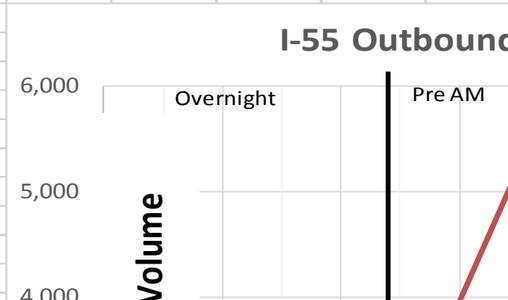
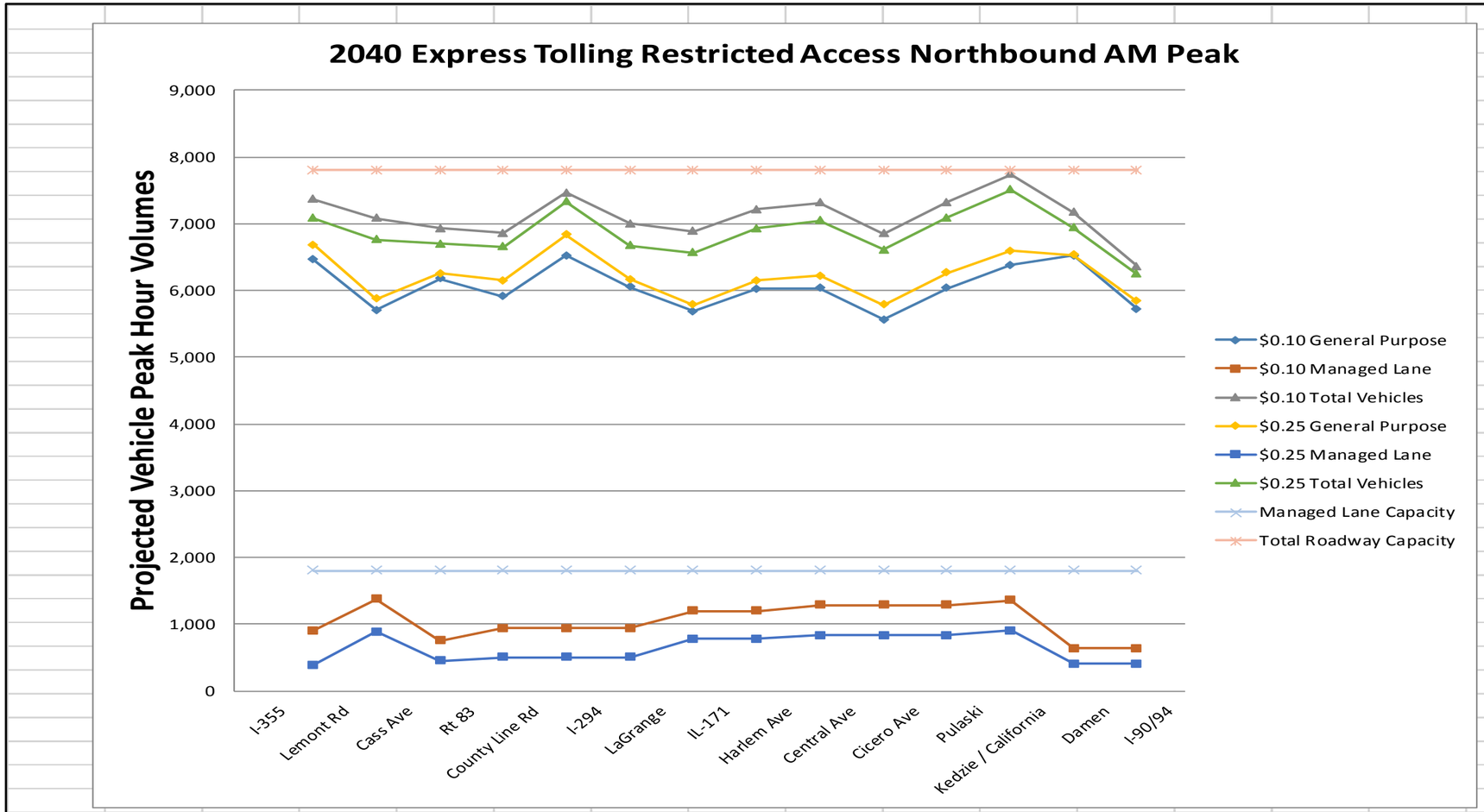
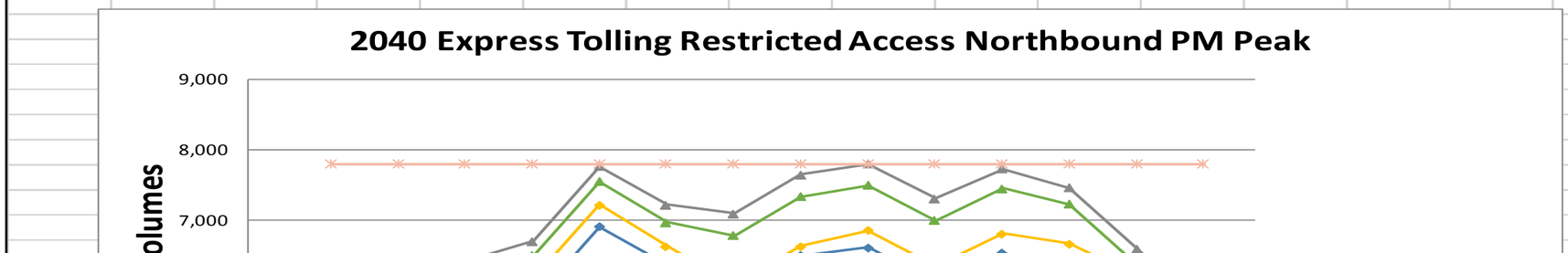


Figure 2 2040 Weekday AM and PM Peak Hour Corridor Traffic Demand – Res





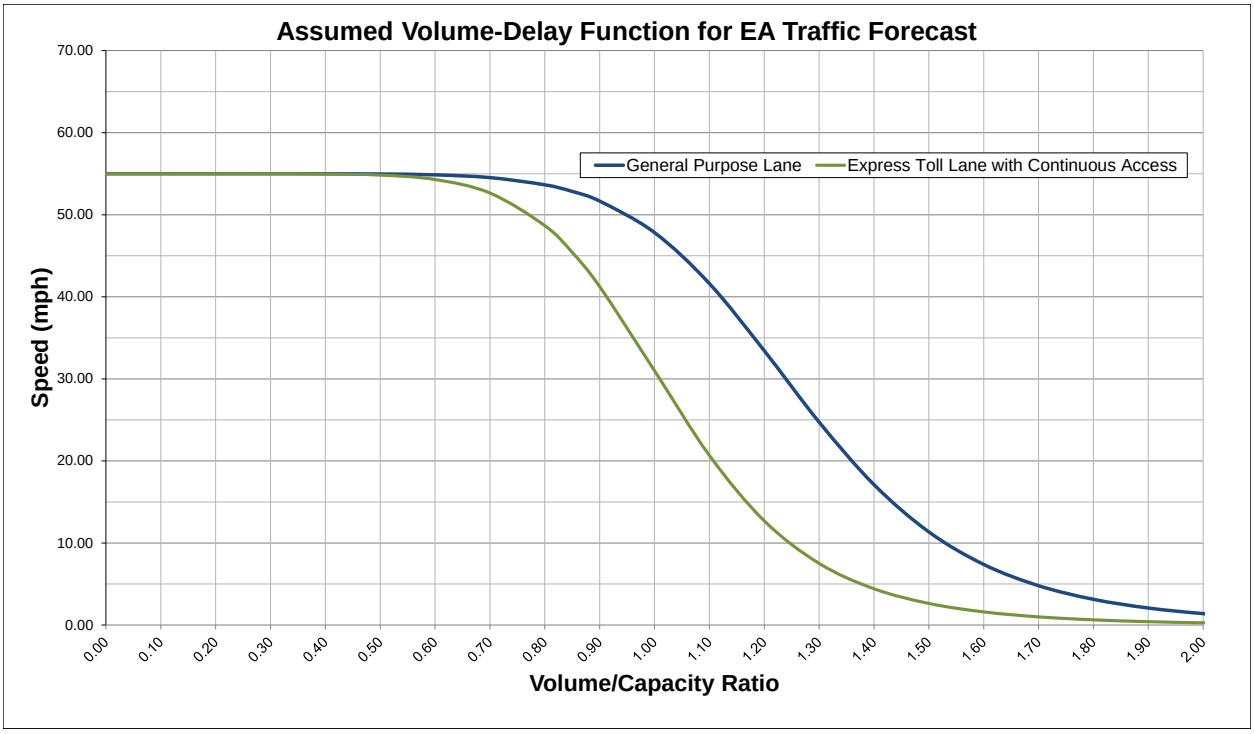
2.2 Key Technical Assumptions

The following technical assumptions will be used in developing the EA traffic forecast:

- Managed Lane Volume-Delay functions – The volume-delay function for the managed lane was adjusted to reflect the type of access (continuous access, delineated by striping) assumed for the lane and the single managed lane in each direction. Research conducted for the Transportation Research Board (TRB) developed speed-flow relationships for a variety of managed lane alternatives, including continuous-access lanes, 1 and 2-lane buffer- and barrier-separated managed lane facilities.[6] These speed-flow relationships were used to derive a volume-delay function to represent the traffic operation of the continuous-access ETL. A free-flow speed of 55 mph is assumed for the ETL. The volume-delay function for the general-purpose lanes incorporated in the CMAP Go To 2040 model is left unchanged in modeling the managed lane.

  The assumed VDF functions for the managed and general-purpose lanes are illustrated in Figure 3.

Figure 3: Assumed Volume Delay Functions



[6] "Analysis of Managed Lanes on Freeway Facilities," NCHRP Web Only Document 191, Transportation Research Board, August 2012, http://onlinepubs.trb.org/onlinepubs/nchrp/nchrp_w191.pdf.

- Managed Lane Capacity - In order to maintain free-flow conditions in the managed lanes, traffic demand for the lanes will be managed by charging appropriate toll rates. The assumed capacity of the managed lane is 1,800 passenger cars per hour per lane (pcphpl). The assumed capacity of general purpose lanes is 2000 vehicles per hour per lane. This assumption is based on the theoretical capacity of the lane and the proportion of buses and commercial trucks.

- Assumed Values of Travel Time Saved - A key assumption of the traffic and revenue analysis is the value of travel time saved, generally referred to as the Value of Time (VOT). The VOT varies by vehicle type, income, location, trip purpose and type of travel.

  The U.S. Department of Transportation (U.S. DOT) recommends developing VOT's based on Decennial Census data, using the median annual household income and the hours worked per year. Initially, an hourly wage rate is calculated by dividing median annual income by the number of hours worked (assumed as 2,000 hours per year). Next, VOT is estimated by assuming a proportion of the hourly wage rate, depending on the type of travel. For example, for passenger vehicle drivers the U.S. DOT recommends using VOT estimates based on 50 percent of the wage rate for all local personal travel regardless of the mode of travel, 70 percent of the wage rate for all intercity personal travel, and 100 percent of the wage (plus fringe benefits) for all local and intercity business travel, including travel by truck drivers. [7]

  Applying the U.S. DOT's approach, CDM Smith developed VOT estimates for passenger vehicles and commercial trucks for the Chicago region, to be used in travel demand modeling. Census-tract level data from the 2010 U.S. Census for the Chicago metropolitan region (that provided travel data for 2010) was used to develop VOT estimates for passenger vehicle travel. Census-tract level data was aggregated to a traffic analysis zone (TAZ) level. VOTs were developed for four time periods – AM peak, Midday, PM peak and Nighttime. Weights were applied for specific trip purposes to develop VOTs for each time period. Subsequently, an assumed average annual inflation rate of 2.0 percent was used to convert the VOT estimates to future year dollar estimates. For commercial trucks, a number of studies were reviewed to develop VOT estimates for three categories – small, medium and large trucks. The 2010 commercial truck VOT estimates were also converted to future year dollars using the assumed average annual inflation rate of 2.0 percent.

- Assumed VOTs for multi-occupant passenger vehicles – The HOV VOT is assumed to be a multiple of the SOV VOT, consistent the CMAP Activity Based Model used for pricing studies, i.e. 1.6 and 2.3 times the SOV VOT for HOV2 and HOV3+ vehicles, respectively.

[7] Departmental Guidance on the Valuation of Travel Time in Economic Analysis, Revision 2, U.S. Department of Transportation, September 28, 2011, http://www.dot.gov/sites/dot.dev/files/docs/vot_guidance_092811c.pdf.

- Modeling Time Periods – the CMAP Go To 2040 model is a weekday model that is subdivided into 8 time periods. For the purpose of this study, the time periods were modified to better reflect the traffic demand characteristics of the I-55 corridor. The selected time periods are:
    - Pre-AM Peak 5 - 7 a.m.
    - AM Peak 7 - 9 a.m.
    - Midday 9 a.m. – 2 p.m.
    - Pre-PM Peak 2 – 4 p.m.
    - PM Peak 4-6 p.m.
    - Post-PM Peak 6 - 8 p.m.
    - Overnight 8 p.m. – 5 a.m.
- For the purpose of this study, tolling is assumed to occur on weekdays only between 5 a.m. and 8 p.m., with no tolling overnight. Overnight, the managed lanes are assumed to remain open for use by passenger vehicles only.
- Trip tables used in the managed lane modeling reflect the "build" case in the Go To 2040 model. This reflects the additional managed lane in each direction of the corridor.
- Incorporation of I-55 Vehicle Occupancy Survey Data – The vehicle occupancy data collected in April/May 2013 for I-55 will be used to adjust the model trip tables for the year 2040 to better reflect the proportions of SOV, HOV2 and HOV3+ vehicles in the traffic stream. This was done by conducting traffic assignments with the model for each time period for 2040, performing select link analysis at three locations along the corridor and sequentially adjusting the trip tables to match the observed vehicle occupancy data. The adjusted trip tables will be used to conduct subsequent model runs.
- While detailed Bluetooth-based origin-destination (O-D) data was collected in 2013 for the I-55 study corridor, the expedited schedule for developing the EA traffic forecast will not provide sufficient time to incorporate the O-D data. However, subsequent detailed modeling conducted for the preferred alternative will incorporate the O-D trip patterns for the corridor.

3.0 Managed Lane Modeling Approach

3.1 Managed Lane Modeling Process

The overall modeling process for managed lanes is designed to answer a series of questions:

- How much demand exists in the corridor?
- How will demand grow?

- How much are motorists willing to pay to use the managed lanes?
- What share of traffic can be expected to use the managed lanes?
- What toll levels are needed to manage demand and maintain reliable travel times in the managed lanes?

The modeling approach is outlined below:

- Estimating global traffic demand – The global demand is an estimate of the total amount of traffic that would be expected to be using the project corridor under the improved conditions.
- Estimating the managed lane market share – This is the estimated share of total traffic in the corridor that would choose the managed lanes, versus the general purpose lanes, under varying operating conditions and toll rates. The share of corridor traffic in the managed lanes is based on several factors, including access between the managed and general-purpose lanes, differences in configurations, time savings offered by the managed lanes, and the toll rates being charged.
- During the traffic assignment process, travel time between a path using the tolled managed lanes is compared to travel time on a path using the next best free routes (most likely the general-purpose lanes). For each travel movement, the proportion of motorists expected to use the managed lanes is a function of the computed time savings and the cost to use the lanes vs. the value placed on time savings by the motorist value of time (VOT).
- In modeling managed lanes on toll-free expressways such as I-55, the prior steps are performed in a single operation.
- The traffic and revenue analysis estimates the amount of traffic willing to pay a toll of $X to save Y minutes. Within the model, for each origin-destination pair, the model identifies the travel movements that are eligible to use the managed lane based on available access points. These movements are considered to be the travel market for the project. The model then estimates the travel time differential between the managed and general-purpose lanes. The toll charged for each movement is compared to its time savings to estimate a ratio of "cost-per-minute saved." This cost-per-minute saved is compared to the value-of-time for travelers. Those travelers with values-of-time higher than the cost-per-minute-saved would tend to choose the tolled lanes, while those with lower values of time would tend to choose the free alternative. Drivers' values-of-time are not uniform, so for any given toll rate/time savings combination, only a portion of those eligible to use the managed lanes would actually choose to use them. As traffic moves from the general purpose to the managed lanes, the time savings advantage offered by the managed lanes is altered. For each toll rate level, the market share corridor model finds the equilibrium point between changes in travel time due to traffic shifting and the willingness-to-pay.

3.2 Modeling Steps

- A sequential process will be applied to model the managed lanes. First, the managed lane is coded as a separate lane into the roadway network (separate from the general purpose lanes) in each direction of the study corridor. This is done to allow toll rates and different lane capacities, speeds and volume-delay functions to be assumed for the managed lanes.
- Next, connectors are coded in the roadway network between the managed and general purpose lanes. The continuous-access ETL lane is represented by ingress and egress connectors between the managed and general-purpose lanes for each roadway segment.
- The assumed volume-delay function (VDF) for a continuous-access managed lanes (with alpha = 0.77 and beta = 8) is coded in the network. The VDF for general purpose freeway lanes uses alpha and beta values of 0.15 and 8, respectively.
- Traffic assignments will then be conducted for each time period for the managed lane, and results are summarized for the AM and PM peak period. These assignments will be conducted with the assumed per-mile toll rates described previously to allow assessment of the traffic demand for the managed lanes.
- The AM and PM peak period traffic assignment results will be provided as inputs to conduct traffic operational assessments.

Technical Memorandum

I-55 PHASE I ENGINEERING STUDY

Veterans Memorial Tollway (I-355) to Dan Ryan Expressway (I-90/94)

BASE & DESIGN YEAR NO-BUILD MAINLINE ROADWAY PERFORMANCE MEASURES

August 2014

Table of Contents

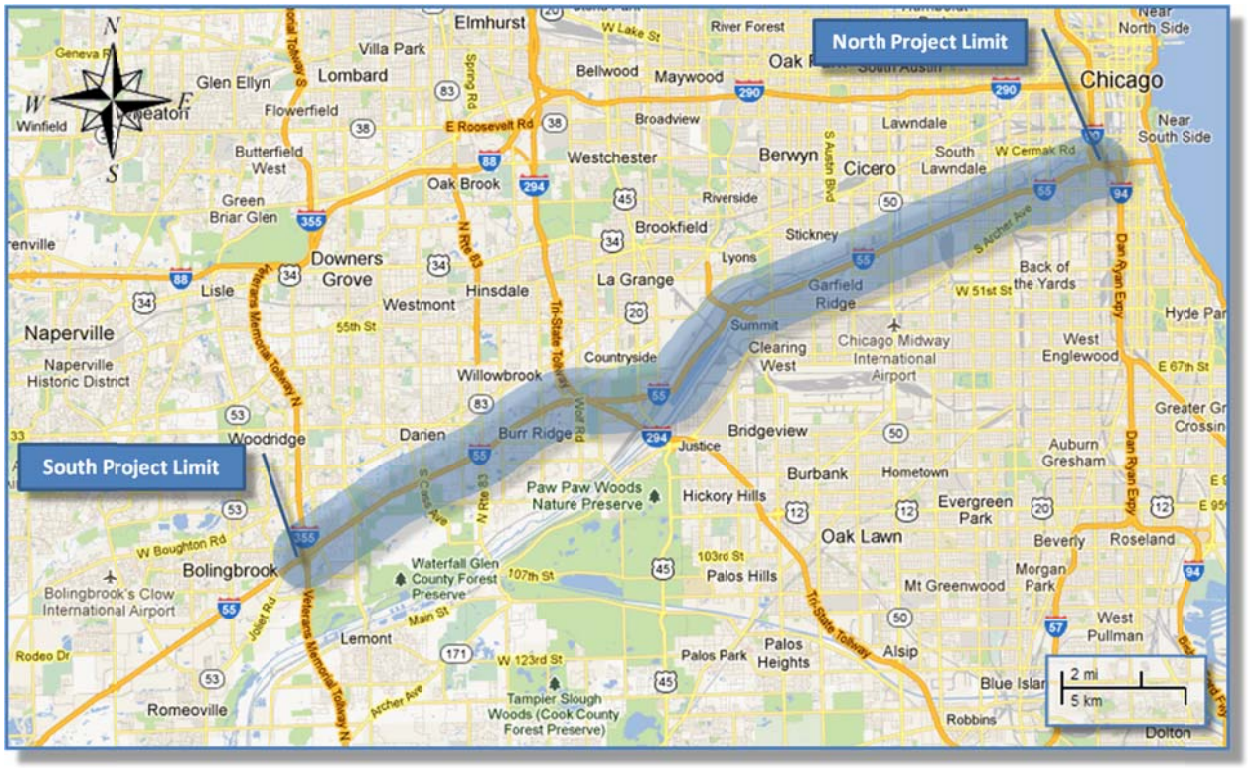
1.0 Introduction

1.1 Background of the I-55 Phase I Engineering Study

The purpose of the I-55 Phase I Managed Lane Study is to evaluate the opportunity of providing an additional travel lane in each direction within the existing median of Interstate 55 (I-55; FAI 55) to address the often unstable and unreliable traffic flow conditions within the I-55 corridor. The current traffic conditions results in frequent congestion along I-55 within the corridor. Through the implementation of managed lane and active traffic management practices, transportation service can be adapted to the frequently changing travel demands across all lanes and provide a sustainable transportation solution within the I-55 corridor.

The project location (Exhibit 1.1) encompasses approximately 25 miles of the I-55 corridor within the Chicago metropolitan region. The study corridor connects I-355 (Veterans Memorial Tollway) at the southern terminus to I-90/94 (Dan Ryan Expressway) at the northern terminus. The project corridor traverses portions of DuPage and Cook Counties, connecting the Chicago Central Business District and southwest suburban communities within the Chicago metropolitan area.

Exhibit 1.1 Project Location Map



I-55 (FAI 55) Managed Lane Project; I-355 to I-90/94

Interstate 55 (I-55) generally provides three mainline lanes per direction for the length of the study corridor. Auxiliary lanes between interchanges and collector-distributor lanes at the I-355, Illinois Route 83, I-294, US 45, Illinois Route 171 and Kedzie-California interchanges are provided to improve traffic flow. The interstate designation for this facility is that of a north-south facility, I-55 generally traverses the Study Area in northeast/southwest direction. For the purpose of this memorandum, the direction of I-55 will utilize the Interstate system designation. The Study Corridor includes three systems (interstate to interstate) interchanges and 14 local interchanges serving the 16 adjacent communities along the route.

The nature of the adjacent urban/suburban lane use along I-55 imposes constraints on the opportunity to expand the existing facility without significant social and economic impacts on the adjacent communities. As such, this evaluation will seek to maximize the use of the existing facility to provide added capacity and apply traffic management strategies, including congestion pricing and improved transit options, to provide improved transportation service along the corridor.

1.2 Purpose of this Technical Memorandum

The purpose of this memorandum is four-fold:

- To understand the existing traffic operations along the I-55 corridor
- Understand the operational conditions of the I-55 corridor for the 2040 Design Year No-Build demand
- To provide input in establishing the Purpose and Need for this project
- To establish baseline roadway performance measures against which managed lane alternatives will be compared

Base Year (2012) traffic profiles and Design Year (2040) No-Build traffic forecasts are presented, and the traffic operation of mainline roadway segments is analyzed using these traffic estimates to provide baseline roadway performance measures.

This assessment is not intended to be a comprehensive evaluation of traffic operational characteristics for the study corridor. Traffic operations along the study corridor are influenced by a variety of factors including: recurring traffic congestion due to roadway capacity constraints; the number and density of interchanges; the volume of entering and exiting traffic; incidents and weather conditions among others.

1.3 I-55 Mainline

I-55 within the Study Corridor was originally opened to traffic in 1964 as a six lane (three lanes in each direction) facility connecting the Chicago Business District to Joliet (locally), St. Louis (regionally) and southwestern United States (nationally). In the intervening years this facility has supported the growth and economic vitality for the communities immediately adjacent to this route as well as the southwestern Chicago metropolitan region. Since this facility was originally opened, segments of I-55

have undergone operational improvements, rehabilitation and a reconstruction of the northern segment of the roadway, but the basic six lane mainline capacity has remained unchanged.

Throughout the corridor, numerous auxiliary lanes provide operational service between adjacent interchange ramps. These lanes improve travel along the route and reduce the impact of traffic maneuvers on mainline traffic flow. For the purpose of this Memorandum, the evaluation of these auxiliary lanes is included in the evaluation of interchange segments.

1.4 Interchanges

As stated previously, I-55 has supported the population and economic growth of the communities in the Chicago southwestern metropolitan region through the local service interchanges along the route. The seventeen (3 system and 14 local) interchanges represents an average interchange spacing of approximately every 1.5 miles. Traffic volumes on these interchange ramps affirm the critical contribution of the I-55 corridor in the economy and mobility of the region.

I-355 – Veterans Memorial Tollway

I-355 serves as an outer circumferential route within the Chicago freeway/tollway system connecting I-290/Illinois Route 53 in northwest Cook County to I-80 in Will County. This system level interchange provides full access high speed directional service between I-55 and I-355. The interchange connects the I-55 corridor to the southwestern suburban communities to the south and the western and northwestern suburban communities to the north.

The I-355 northbound entrance to I-55 is a two lane entrance ramp which merges operating as a major convergence with one lane dropped. The resultant fourth lane serves as an auxiliary lane between this merge and the southbound Lemont Road exit ramp.

In the southbound I-55 direction, I-355 traffic exits to a collector-distributor (C-D) road paralleling SB I-55. An auxiliary lane between Lemont Road and I-355 serves as the start of this C-D road exit which operates as a major divergence with one lane lost. South of the C-D road exit, an exit ramp is provided from I-55 to the C-D road for SB Joliet Road traffic.

Lemont Road

Lemont Road crosses over I-55, providing north/south service within DuPage County and continuation into Will County to the south. This free flow cloverleaf interchange provides full access with I-55 and immediately serves the communities of Lemont, Woodridge and Darien. The interchange also serves Argonne National Laboratory located immediately south of I-55.

The NB I-55 exit to SB Lemont Road exit is the terminus of the auxiliary lane between the I-355 interchange and this interchange. This ramp terminal operates as a major divergence with one lane dropped.

The SB Lemont Road entrance to SB I-355 operates as an auxiliary lane with an additional dedicated exit lane to the I-355 interchange.

Cass Avenue

Cass Avenue crosses over I-55, providing north/south service within eastern DuPage County. This cloverleaf interchange provides full access with I-55 and immediately serves the community of Darien to the north and Argonne National Laboratory to the south.

The ramp merges and divergences with the I-55 mainline are the traditional interchange ramp junctions and do not provide for auxiliary lanes with adjacent interchanges.

Illinois Route 83 - Kingery Highway

Illinois Route 83 crosses over I-55, providing north/south service within DuPage County. This free flow cloverleaf interchange provides full access with I-55 utilizing collector-distributor road systems parallel to the I-55 mainline lanes in each direction. This interchange immediately serves communities of Willowbrook and Burr Ridge as well as sections of unincorporated DuPage County.

The ramp merges and divergences with the I-55 mainline are the traditional interchange ramp junctions and do not provide for auxiliary lanes with adjacent interchanges.

County Line Road

County Line Road provides north/south service to eastern DuPage County and western Cook County. This free flow cloverleaf interchange provides full access with I-55 and immediately serves the community of Burr Ridge.

The NB County Line Road entrance ramp to NB I-55 as a convergence with one lane added. This additional lane serves as an auxiliary lane between this interchange and the I-294 SB exit ramp.

The SB I-55 exit to NB County Line Road operates as a divergence with one lane dropped. The lane drop is the auxiliary lane between this exit and the SB I-294 entrance to I-55.

The proximity of the SB County Line Road entrance to I-55 and the left hand Joliet Road exit ramp allows for movement between these ramps. As such, a weave section for this movement will be evaluated.

Joliet Road

Joliet Road provides northeast/southwest service in western Cook County. This interchange serves the communities of Indian Head Park, Countryside and Hodgkins. This free flow interchange with I-55 serves as the western terminus of Joliet Road, providing a left hand, two lane divergence from northbound I-55 to northeast bound Joliet Road. Southwest bound Joliet Road merges with the SB I-294 entrance ramp prior to entering SB I-55. This entrance ramp operates as a convergence with

an added lane. This additional lane serves as an auxiliary lane between the I-294 interchange and County Line Road NB exit ramp.

I-294 – Tri-State Tollway

I-294 serves as the inner circumferential route within the Chicago metropolitan area freeway/tollway system providing continuous controlled access service from the Wisconsin State Line to I-80/94 near the Indiana State Line. This system level interchange provides partial directional, free flow service between I-55 and I-294. Ramps from I-55 to northbound I-294 and from southbound I-294 to I-55 are routes through an open road tolling ramp plaza located immediately north of I-55 and west of SB I-294.

The exit ramp from NB I-55 to SB I-294 operates as a divergence with one lane dropped as the auxiliary lane terminates at this location. SB I-294 traffic merges with NB I-55 as a convergence with one lane added. This additional lane serves as an auxiliary lane between this entrance ramp and the I-55 exit ramp to I-294.

The NB I-294 entrance to NB I-55 operates as a convergence with one lane added. This additional lane serves as an auxiliary lane between this ramp and the US 45 SB exit ramp.

The entrance ramp from NB I-294 to SB I-55 operates as a convergence with one lane added. The additional lane serves as an auxiliary lane from this entrance to the SB I-55 Ramp to NB I-294 exit. The I-294 exit is the terminus for this auxiliary lane as it operates as a divergence with one lane dropped.

There is no direct access from SB I-55 to SB I-294

US 45 – LaGrange Road

US 45 is grade separated over I-55, providing north/south service to the communities in western and southwestern Cook County. This free flow cloverleaf interchange provides full access with I-55. The interchange immediately serves the Villages of Countryside, Hodgkins and Willow Springs.

The NB I-55 exit ramp to SB US 45 operates as a divergence with one lane dropped. This exit is the terminus of the auxiliary lane between this interchange and the NB I-294 entrance ramp.

In the southbound direction, the interchange has been improved to provide a C-D road for I-55 entrance and exit ramps. SB I-55 traffic heading for SB I-294 must exit at this interchange to SB US 45.

Illinois Route 171 – Archer Avenue

The Illinois Route 171/I-55 interchange is located within the Des Plaines River/Chicago Sanitary Ship Canal/Illinois and Michigan Canal system. Illinois Route 171 crosses over I-55, providing north/south service north of the Des Plaines River to the north of I-55. South of I-55, Illinois Route

171 crosses the Illinois and Michigan Canal and intersects with 55th Street at a signalized, three-leg intersection. Illinois Route 171 continues in a north/south direction through the intersection and 55th Street provides east/west service to the east of Illinois Route 171. The interchange is a partial clover leaf with the southbound Illinois Route 171 movement to northbound I-55 served by a directional high speed ramp. A collector-distributor road is provided along the southbound mainline to accommodate movements between I-55 northbound and Illinois Route 171. The interchange immediately serves the communities of McCook, Summit and Bedford Park.

The NB Illinois Route 171 C-D road entrance to NB I-55 operates as a convergence with on lane added. This lane serves as an auxiliary lane between this ramp and Illinois 43.

The SB I-55 exit to the Illinois Route 171 is a C-D road and operates as a divergence with one lane dropped. This exit is the terminus of the auxiliary lane between this interchange and Illinois Route 43.

Illinois Route 43 – Harlem Avenue

Illinois Route 43 crosses over I-55, providing north/south service in Cook County. This diamond interchange provides full access with I-55 through signalized intersections along Illinois Route 43 north and south of the expressway. This interchange immediately serves the communities of Stickney, Forest View, Summit and the City of Chicago.

The NB exit to Illinois Route 43 serves as the terminus as the auxiliary lane from Illinois Route 171. The exit is a convergence with one dropped lane as the auxiliary lane terminates into the exit ramp.

The Illinois Route 43 entrance to SB I-55 operates as a merge with one lane added. The added lane initiates an auxiliary lane from this interchange to the exiting C-D road serving the Illinois 171 interchange.

Central Avenue

Central Avenue crosses over I-55, providing north/south service to suburban Cook County and the City of Chicago. This interchange is currently under reconstruction to provide a single point urban diamond interchange providing full access with I-55. This interchange immediately serves the communities of Cicero, Stickney, Forest View and the City of Chicago as well as Midway International Airport located approximately 1.2 miles to the south of the interchange.

The ramp merges and divergences with the I-55 mainline are the traditional interchange ramp junctions and do not provide for auxiliary lanes with adjacent interchanges.

Illinois Route 50 – Cicero Avenue

Illinois Route 50 crosses under I-55, providing north/south service to suburban Cook County and the City of Chicago. This diamond interchange provides full access with I-55 with signalized intersection at the ramp terminals on IL 50 north and south of the expressway. Parallel rail corridors north and south of I-55 impose significant restrictions on the operation of this interchange along Illinois Route 50 and the interchange ramps. The interchange serves the community of Cicero and the urban residential communities of the City of Chicago as well as Midway International Airport located approximately 1.5 miles to the south.

The ramp merges and divergences with the I-55 mainline are the traditional interchange ramp junctions and do not provide for auxiliary lanes with adjacent interchanges.

Pulaski Road

Pulaski Road crosses over I-55, providing north/south service within the City of Chicago. This single point urban diamond interchange provides full access with I-55. The interchange serves the predominantly commercial properties along Pulaski and urban residential communities of the City of Chicago.

The ramp merges and divergences with the I-55 mainline are the traditional interchange ramp junctions and do not provide for auxiliary lanes with adjacent interchanges.

Kedzie Avenue -California Avenue

Kedzie Avenue and California Avenues cross under I-55, providing north/south services within the City of Chicago. The proximity of these two arterials (one half mile apart) result in these two half diamond interchanges to operate as a split half diamond interchange connected by collector-distributor roads paralleling both sides of I-55.

The northbound I-55 exit ramp provides an access to California Avenue. The northbound entrance to I-55 provides access from Kedzie Avenue.

The southbound exit from I-55 provides access to Kedzie Avenue and the southbound entrance to I-55 provides access from California Avenue. These interchanges serve the predominantly commercial business along the main arterials and urban residential communities of the City of Chicago.

The northbound entrance from Kedzie Avenue operates as a merge with one lane added. The additional lane provides an auxiliary lane between this interchange and the Damen Avenue exit.

The southbound entrance from California Avenue operates as a merge with one lane dropped. The entrance serves as the terminus for an auxiliary lane between this exit and Damen Avenue.

Damen Avenue

Damen Avenue crosses over I-55, providing north/south service within the City of Chicago. This single point urban interchange provides full service with I-55. This interchange also serves Ashland Avenue through slip ramps to parallel frontage roads. The NB I-55 Damen Avenue exit ramp provides a slip ramp beyond the exit terminal to provide access for I-55 traffic destine for Ashland Avenue. The SB Damen Avenue entrance ramp provides the slip ramp access prior to entering the I-55 mainline for Ashland Avenue traffic destined for I-55. This interchange serves the predominantly commercial businesses along Damen Avenue and Ashland Avenues and urban residential communities of the City of Chicago.

The northbound Exit ramp from NB I-55 operates as a divergence with one lane dropped. The dropped lane is an auxiliary lane connecting this interchange with the NB California entrance ramp.

The NB entrance ramp to NB I-55 operates as a merge with one lane added. The additional lane provides an auxiliary between this ramp and the I-90/94 NB exit ramp.

The SB entrance ramp to I-55 operates as a merge with one lane added. The additional lane serves as an auxiliary lane between this interchange and the Kedzie Avenue exit.

The SB I-55 exit to Damen Avenue operates as a divergence with one lane dropped. This ramp serves as the terminus of the auxiliary lane connecting this interchange to the I-90/94 SB entrance ramp.

I-90/94 – Dan Ryan Expressway

I-90/94 is a major controlled access freeway providing north/south service in the City of Chicago. This route provides direct access to the Chicago Central Business District. This interchange with I-55 is a high volume system level interchange providing direct, free flow movement between these major urban freeways and is a critical link in the Chicago metropolitan freeway system.

The northbound exit from NB I-55 operates as a divergence with a lane dropped. This exit serves as the terminus for the auxiliary lane connecting this interchange with the Damen Avenue interchange. The NB I-55 exit to SB I-90/94 is a traditional divergence from NB I-55. The I-55 mainline continues as a three lane section north of this exit to US 41 (Lake Shore Drive).

The existing SB mainline from US 41 (Lake Shore Drive) extends two through lane at the I-90/94 crossing. The NB I-90/94 entrance ramp operates as a convergence with one lane added. This lane serves as the third lane which operates continuously throughout the limits of the project.

The SB I-90/94 two lane ramp operates as a major convergence with one lane added. The added lane serves as an auxiliary lane connecting this interchange with the Damen Avenue interchange.

2.0 Base Year and Design Year No-Build Traffic

The process for developing Base Year (2012) and Design Year (2040) No-Build traffic estimates is documented in a companion technical memorandum for this project. [1] The validated model developed in that effort was used to develop validated Base Year (2012) and Design Year (2040) No-Build traffic estimates. Weekday AM and PM peak hour traffic estimates developed for the Base and Design Years were used to develop the roadway performance measures presented in this memorandum.

2.1 Base Year (2012) Balanced Traffic

The study corridor encompasses approximately 25 miles of I-55, including three system and 14 local interchanges. Hourly traffic count data was provided by IDOT at multiple locations along the I-55 corridor for January through June 2012. From these raw traffic counts, data was extracted for weekdays, Tuesday through Thursday, and averaged to produce typical AM and PM peak-hour and daily traffic profiles. Traffic counts for the identified peak periods of 7-9 a.m. and 4-6 p.m. were averaged to generate the peak-hour traffic profiles. As a result of the analysis process (averaging of multiple days to generate a typical weekday traffic profile) and the length of the study corridor, the traffic volumes on the ramps and mainline do not satisfy flow conservation, which requires that the total in-flow volume and out-flow volume at any point on the segment should be identical. Due to the length of the corridor, the weighted least squares regression (WLSR) method was selected to balance traffic volumes. The method treats observed ramp and mainline volumes as "true" volumes plus/minus "error" which is a function of counts taken at different times and the sensor data obtained. Also, the WLRS method includes "quality" parameters for each location. Arranging the input data in appropriate format, the WLSR method will "extract" the "true" volumes from observed volumes for every ramp and mainline segment that satisfy flow conservation law.[2]

For the purpose of this study, mainline traffic counts were held constant (assumed as "true") while the volumes on the ramps were allowed to adjust. The WLSR method was applied to derive balanced traffic counts for the base year (2012) along the I-55 corridor. The base year raw traffic count summary and balanced traffic estimates are summarized in Figures 2.1 and 2.2, respectively.

2.2 Design Year (2040) No-Build Traffic Estimates

Design year (2040) No-Build traffic estimates for the I-55 corridor are summarized in Figure 2.3. These traffic estimates were developed by calibrating the CMAP travel demand model to base year traffic counts and then adding on the projected growth between the base (2012) and future (2040) years for a No-Build scenario. The calibration methodology is described in the TRAVEL MODEL VALIDATION; BASE & DESIGN YEAR NO-BUILD TRAFFIC ESTIMATES technical memorandum dated June 20, 2013.

---

[1] I-55 Phase I Engineering Study, Travel Model Validation, Base and Design Year No-Build Traffic Estimates, Technical Memorandum, June 20, 2013.

[2] "An Automatic Method for Imputing and Balancing Link Traffic Counts", Jaimyoung Kwon, et. al, Paper submitted to the 87th Annual Meeting of the Transportation Research Board, January 2008.

Figure 2.1 2012 Raw Traffic Count Data Summary

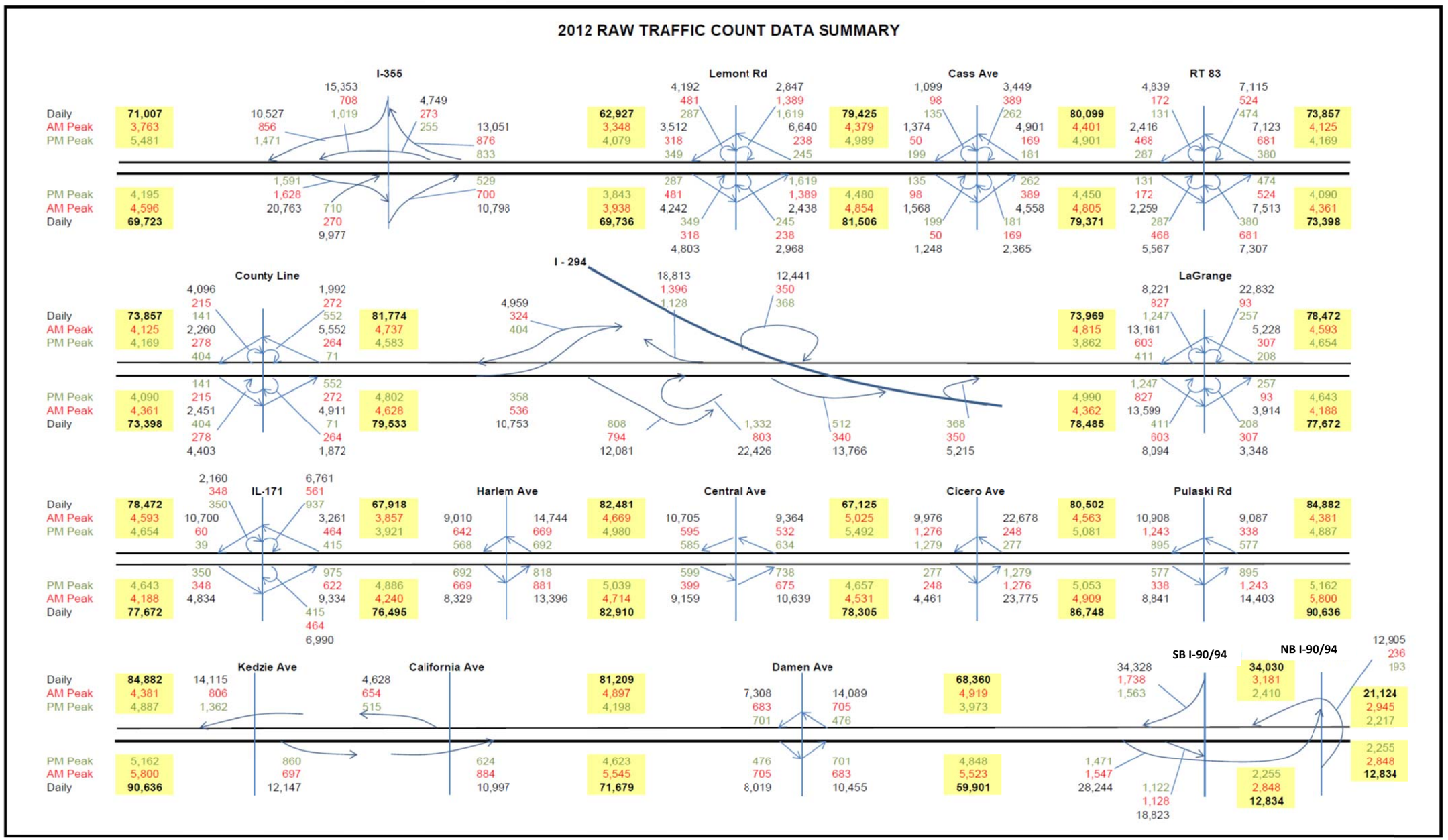


Figure 2.2 2012 Weekday Traffic Count Data

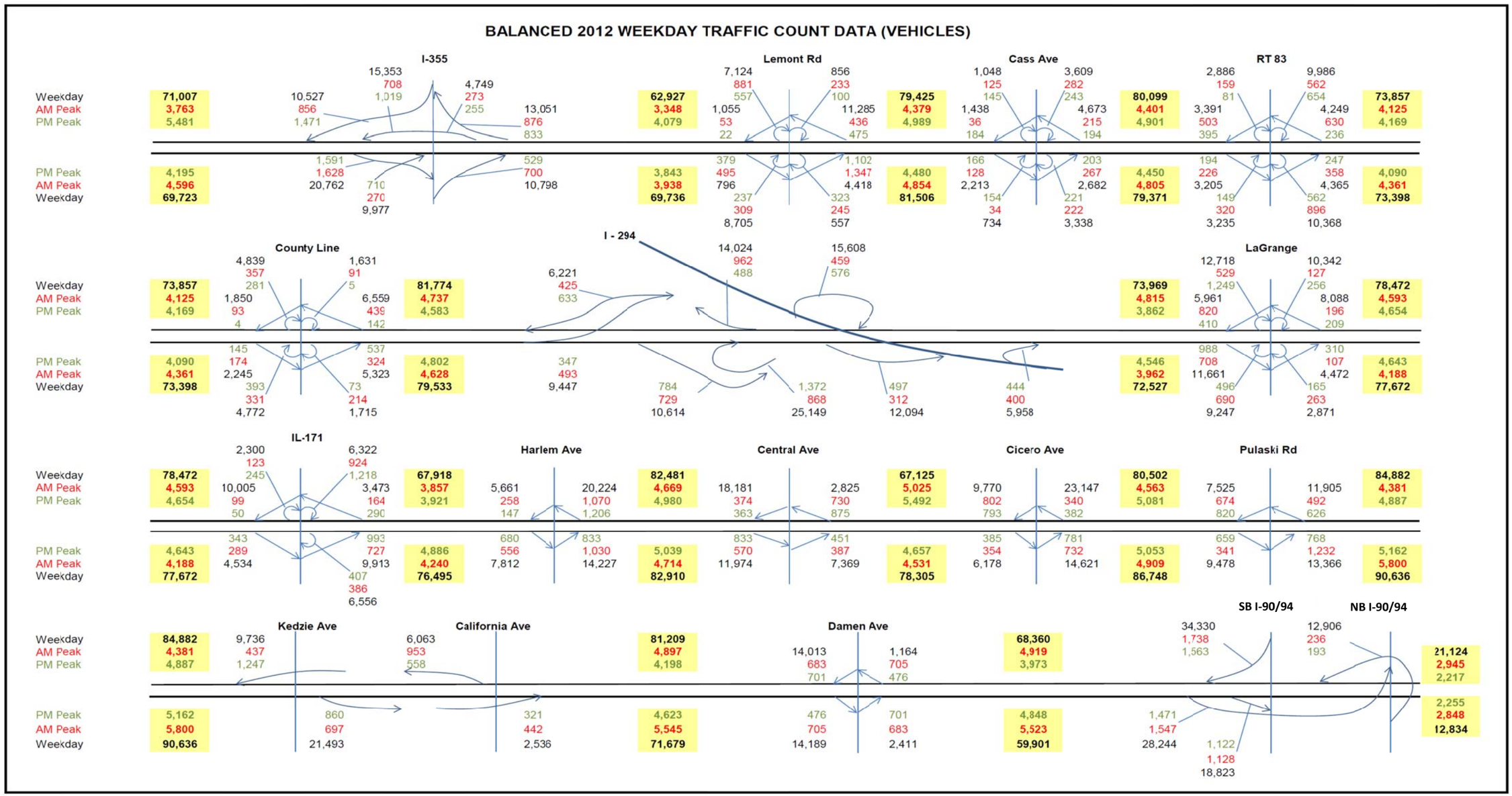
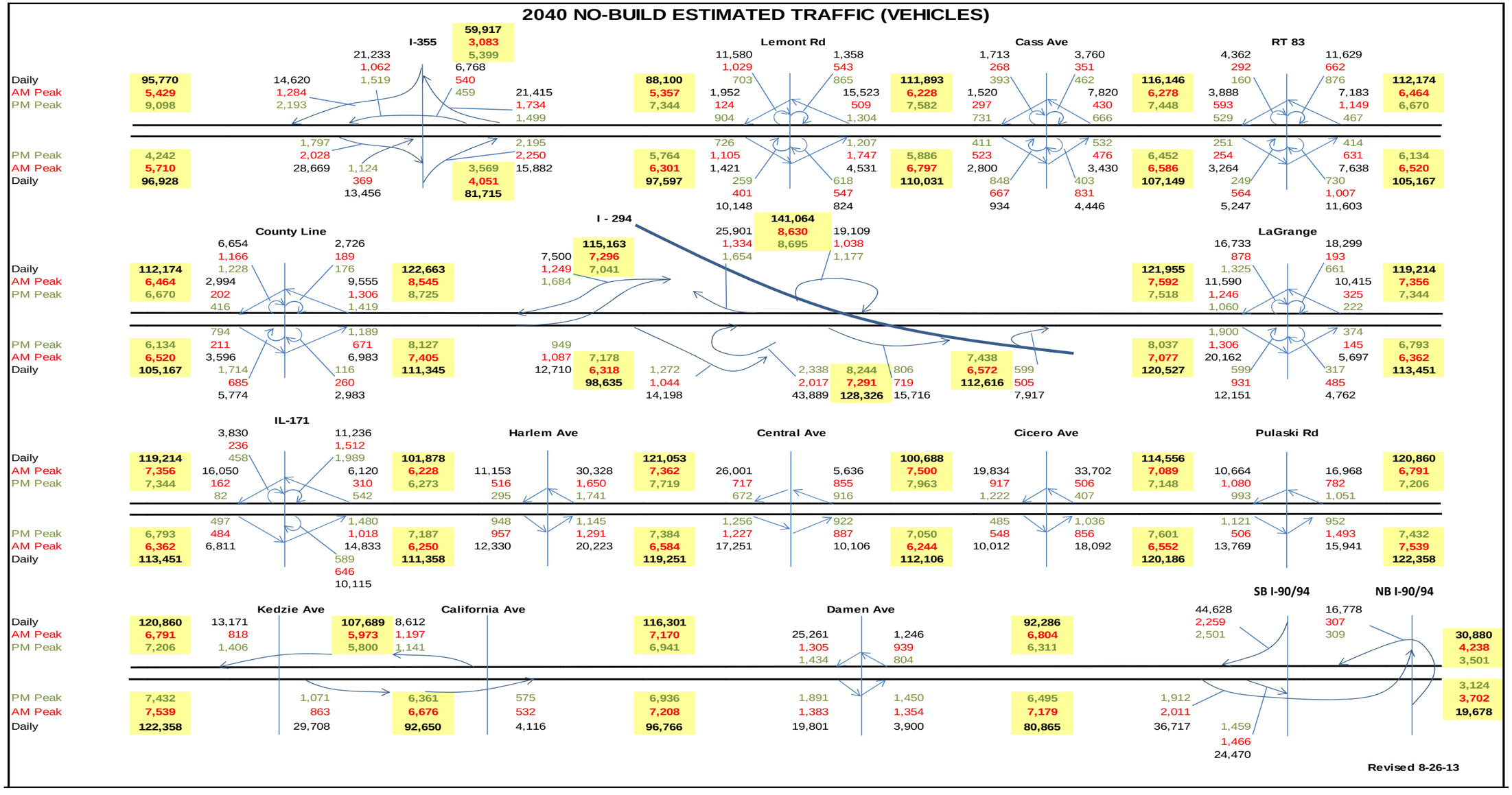


Figure 2.3 2040 No-Build Estimated Traffic



3.0 Operational Considerations

The operational performance of an urban freeway such as I-55 is influenced by a number of factors which result in an overall facility operational performance level. Roadway factors, such as travel demand, free flow speed, number of through lanes, lane width, shoulder width and interchange spacing/configuration combine with environmental factors such as driver behavior, traffic incidents and weather conditions. These roadway factors considered together define the operational performance of the facility.

The following is a summary of key roadway factors which define the base level of operational performance for an urban freeway such as I-55:

3.1 Basic Freeway Segment

Basic freeway segments are portions of the freeway where traffic flow is not influenced by the merging, diverging, or weaving associated with ramp/freeway connections. The primary factors that affect the operation of basic freeway segments are passenger vehicle and truck traffic volumes, lane widths, lateral clearance, the number of lanes, interchange density, grades and driver familiarity.

3.2 Freeway Merging/Diverging Segment

Freeway merging/diverging segments are portion of the freeway at which mainline traffic flow is impacted by interchange ramps. At these locations, merging (on ramps) or diverging (off ramp) maneuvers result in a disruption in the free flow conditions of the mainline traffic. The primary factors that affect the operation of the merge/diverge segment of the freeway are free flow speed, number of mainline lanes, ramp type, ramp traffic demand, ramp speed, acceleration/deceleration length, truck volumes and driver familiarity.

3.3 Freeway Weaving Segment

Freeway weaving segments are portions of the freeway where merging and diverging maneuvers are conducted in a segment in which these two movements cannot operate independently, resulting in disruption of free flow conditions. Generally, these sections result in areas where interchanges are closely spaced or merging/diverging movements occur within cloverleaf interchanges. The primary factors which effect the operation of weave section are free flow speed, length of weave segment, width of weave segment, configuration of weaving segment, weaving traffic volumes and driver familiarity.

3.4 Interchange Spacing

On urban freeways, the traffic flow conditions as described by the basic freeway segment is often disrupted by the number of and spacing between interchanges. Often on urban freeways, such as I-55, when traffic flow is slowed at an interchange it is not fully able to recover before the next upstream merge/diverge movement slows traffic again. High traffic volumes (when a freeway is operating near or over capacity) compounds delay caused by merge/diverge maneuvers. As traffic

demand increases on both the mainline and interchanges, the iterative disruption can at times result in an accumulative effect on overall travel performance.

4.0 HCS Analysis Methodology

The operational performance of the facility can be determined by the length of the study corridor, the density of interchanges, heavy traffic demand, and congestion characteristics. Moreover, the performance of the facility can also be affected by the merging and diverging at ramps and weaving sections. This would suggest that the HCM freeway facilities module or a more detailed microscopic simulation approach is appropriate to analyze the operation of the facility. While the simulation approach is beyond the scope and budget of this study, the HCM freeway facilities module presents its own limitations due to the length of the study corridor and data requirements of this approach. In light of these considerations, the decision was made to analyze the operation of the corridor by separately analyzing the operation of basic freeway segments, ramp merge and diverge sections and weaving sections. This resulted in 16 basic freeway sections and 30 ramp merge/diverge and weaving sections for the study corridor in each direction. The analysis of all these sections represents a comprehensive representation of the operation of the corridor that identifies those locations at which traffic operations disrupt the free flow performance of the mainline traffic.

This section describes the methodology and measures used to analyze their performance. The analysis presented here evaluates each freeway segment utilizing the specific traffic volumes and geometric conditions of the segment. The methodology used for analyzing each operation is described in the 2010 Highway Capacity Manual, as implemented in the 2010 Highway Capacity Software (HCS).

4.1 Methodology and Performance Measures

Travel performance along I-55 was analyzed for the year 2012 and for the projected year 2040 traffic conditions. Analysis for 2040 was based on the "No-Build" scenario, meaning no further capacity improvements to I-55 occur within the project area. The purpose of this comparative analysis is to determine the effect of continued growth in travel demand along I-55 on overall travel performance without capacity improvements.

The most commonly used measure of travel performance on roadways is the Level of Service (LOS). LOS is a letter grade from A through F that represents the travel performance along the corridor with LOS A being best, and LOS F being worst. The Illinois Department of Transportation (IDOT) and the Federal Highway Administration (FHWA) require LOS C or better for the design of urban interstate facilities such as I-55. [3] In some circumstances, LOS D may be allowed in urban areas based on unavoidable design constraints, and/or substantial potentially adverse socio-economic or

[3] IDOT Bureau of Design and Environmental Manual; Section 45-4; Figure 45-4.B – Design Criteria for Urban Expressways.

environmental impacts. IDOT and FHWA require a design speed of 60 miles per hour (mph) for urban freeways.

The typical measure of travel performance in determining LOS is based on traffic density, expressed in passenger cars per mile per lane (pc/mi/ln). The criteria for defining LOS varies slightly depending on if the density is measures along a facility, in a weaving segment, in a merge area or in a diverge area. Tables 4.1a, 4.1b and 4.1c show the LOS criteria for each type.

Table 4.1a Level of Service Criteria for Freeway Facilities

LOS	Traffic Density (pc/mi/ln)
A	Density $\leq$ 11
B	11 < Density $\leq$ 18
C	18 < Density $\leq$ 26
D	26 < Density $\leq$ 35
E	35 < Density $\leq$ 45
F	Density > 45 or any component v_d/c ratio >1.00

Table 4.1b Level of Service Criteria for Weaving Segments

LOS	Traffic Density (pc/mi/ln)	
	Freeway Weaving Segment	Weaving Segment on Multilane Highways or C-D Roadways
A	Density $\leq$ 10	Density $\leq$ 12
B	10 < Density $\leq$ 20	12 < Density $\leq$ 24
C	20 < Density $\leq$ 28	24 < Density $\leq$ 32
D	28 < Density $\leq$ 35	32 < Density $\leq$ 36
E	Density > 35	Density > 36
F	Demand exceeds capacity.	

Table 4.1c Level of Service Criteria for Freeway Merge and Diverge Segments

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

4.2 Assumptions

This section identifies the principal assumptions used in the operational analysis.

Peak Hour Factor (PHF)

2012 LOS Analysis: PHF of 0.95 is assumed. The PHF for several segments of I-55 was calculated using the traffic counts archived by Traffic.com. The PHF generally ranged from 0.92-0.96, so an assumption of 0.95 was deemed reasonable.

2040 LOS Analysis: PHF of 0.95 is assumed based on recommendation from IDOT. The 2010 HCM recommends PHFs for freeways between 0.85 and 0.98. While we would expect the peak periods in 2040 to be highly congested, with not much peaking during the peak hour, and consequently higher PHF, there is no accepted method to estimate future PHFs. Therefore the existing PHF was assumed for the year 2040.

Free Flow Speed (FFS)

A Free-Flow Speed of 60 mph was assumed for the analysis. The posted speed limit along the corridor is 55 mph, and the design speed is 60 mph. In addition, review of speed data for the corridor archived by Traffic.com indicates speeds in the range of 55 to 65 mph during overnight periods, when free-flow conditions are expected.

Proportion of Heavy Vehicles

The proportion of trucks used in the analysis varies through the corridor. The proportion of trucks was calculated using sample vehicle classification counts provided by IDOT.

The assumed truck percentage is summarized in Table 4-2 below. This included the raw data where available, while the truck percentage was inserted for other locations based on the closest location for which data was available.

Grade

The existing grades along I-55 generally vary from 0.3% to less than 2% with the exception of the vicinity near the I-294 underpass in which localized grades 2.9% and 2.3% are introduced along the mainline. For analysis purpose, the grades along the corridor are assumed to be level.

Table 4.2 Assumed AM and PM Truck Traffic Proportions

Assumed I-55 Truck Proportions			
Southbound			
From	To	AM Peak	PM Peak
IL - 53	I -355	15%	8%
I - 355	Lemont Rd.	18%	8%
Lemont Rd.	Cass Ave.	16%	7%
Cass Ave.	IL - 83	15%	7%
IL - 83	County Line	15%	7%
County Line	Joliet Rd. / I - 294 Ramp	15%	7%
Joliet Rd. / I - 294 Ramp	La Grange Rd.	15%	7%
La Grange Rd.	IL - 171	15%	7%
IL - 171	Harlem Ave.	15%	7%
Harlem Ave.	Central Ave.	13%	6%
Central Ave.	Cicero Ave.	13%	6%
Cicero Ave.	Pulaski Rd.	13%	6%
Pulaski Rd.	Kedzie Ave.	13%	6%
California Ave.	Damen Ave.	13%	6%
Damen Ave.	Dan Ryan EXP	13%	6%
Northbound			
From	To	AM Peak	PM Peak
IL - 53	I -355	12%	13%
I - 355	Lemont Rd.	11%	12%
Lemont Rd.	Cass Ave.	12%	11%
Cass Ave.	IL - 83	11%	11%
IL - 83	County Line	11%	10%
County Line	Joliet Rd. / I - 294 Ramp	11%	10%
Joliet Rd. / I - 294 Ramp	La Grange Rd.	11%	10%
La Grange Rd.	IL - 171	11%	10%
IL - 171	Harlem Ave.	11%	10%
Harlem Ave.	Central Ave.	14%	8%
Central Ave.	Cicero Ave.	14%	8%
Cicero Ave.	Pulaski Rd.	14%	8%
Pulaski Rd.	Kedzie Ave.	14%	8%
California Ave.	Damen Ave.	14%	8%
Damen Ave.	Dan Ryan EXP	14%	8%

5.0 Baseline Performance Measures

5.1 2012 LOS Results

Table 5.1 and 5.2 present the LOS analysis results for the Base Year (2012). The LOS worksheets for this analysis are presented in Appendix A.

The results indicate that basic freeway segments on the I-55 study corridor generally operate at LOS D or better during the AM peak, with the exception of the mainline northbound segment between Pulaski Road and Kedzie Avenue, which operates at LOS E. During the PM peak, the basic freeway segments through most of the corridor operate at LOS D or better, with the exception of the segment from Illinois Route 50 to Central Avenue in the southbound direction.

The results indicate that the diverge/merge/weave segments on the I-55 study corridor generally operate at LOS D or better during the AM peak, with the exception of the NB Pulaski Road divergence & merge, NB Kedzie/California Avenue diverge, NB Damen Avenue to NB I-90/94 weave, and the SB Central Avenue divergence, which operate at LOS E. During the PM peak, the diverge/merge/weave segments through most of the corridor operate at LOS D or better, with the exception of the NB Pulaski Road diverge, SB Pulaski Road divergence, SB Illinois Route 50 divergence, SB Central Avenue divergence, and the NB I-294 southbound weave, which operate at a LOS E.

It should be noted that these results do not reflect the impact of traffic incidents, which also have the potential to degrade the operation of the facility.

Table 5.1 LOS Results for Base Year (2012) Northbound

Aerial Reference	From	To	Type	AM Peak Hour		PM Peak Hour	
				LOS	Density (pc/mile/Lane)	LOS	Density (pc/mile/Lane)
Northbound Base Year 2012							
7E - M	I-355 to Lemont Rd w/ Aux. Ln		Mainline	C	18.0	B	17.8
10E -M	Lemont Rd	Cass Ave	Mainline	D	30.5	D	27.8
13E - M	Cass Ave	IL 83	Mainline	D	29.9	D	27.5
18E - M	IL 83	County Line Rd	Mainline	D	26.9	C	25.1
21E - M	County Line Rd	Joliet Rd	Mainline	D	28.7	D	29.7
22E - M	Joliet Rd	I-294	Mainline	C	25.5	D	27.4
28E - M	US 45	IL 171	Mainline	C	25.8	D	28.6
32E - M	IL 43	Central Ave	Mainline	D	29.8	D	31.2
34E - M	Central Ave	IL 50	Mainline	D	28.4	D	28.4
36E - M	IL 50	Pulaski Rd	Mainline	D	31.3	D	31.3
38E - M	Pulaski Rd	Kedzie Ave	Mainline	E	40.4	D	32.2
40E - M	Kedzie Ave	California Ave	Mainline	D	32.9	D	26.2
2E	Joliet Road Entrance		Merge	B	19.9	C	21.8
7E	I-355 Entrance		Merge	A	8.2	C	20.9
10E	Lemont Rd. Entrance		Merge	D	30.2	C	27.8
13E	Cass Ave. Entrance		Merge	C	26.5	C	24.4
18E	IL 83 Entrance		Merge	C	25.7	C	23.7
28E	US 45 NB Entrance		Merge	C	23.1	C	26.2
32E	IL 43 Entrance		Merge	D	29.4	D	30.3
34E	Central Ave Entrance		Merge	C	26.9	C	27.8
36E	IL 50 Entrance		Merge	D	29.3	D	31.6
38E	Pulaski Rd Entrance		Merge	E	35.6	D	31.2
1E	I-355 Exit		Diverge	D	32.6	D	30.9
8E	Lemont Rd Exit		Diverge	A	9.6	A	7.9
11E	Cass Ave. Exit		Diverge	D	31.0	D	29.4
14E	IL 83 Exit		Diverge	D	31.6	D	29.4
19E	County Line Rd. SB Exit		Diverge	C	27.9	C	26.7
29E	IL 171 EB Exit		Diverge	D	28.7	D	31.2
30E	IL 171 NB Exit		Diverge	C	27.4	D	29.6
33E	Central Ave Exit		Diverge	D	28.9	D	30.6
35E	IL 50 Ave Exit		Diverge	D	31.4	D	32.8
37E	Pulaski Rd Exit		Diverge	E	36.9	E	38.9
39E	Kedzie Ave/ California Ave Exit		Diverge	E	37.9	D	32.6
45E	SB I-90/94 Exit		Diverge	C	28.0	C	24.8
9E	Lemont Rd. Cloverleaf		Weave	C	20.5	C	20.4
12E	Cass Ave. Cloverleaf		Weave	C	25.4	C	24.4
20E	County Line Rd. Cloverleaf		Weave	C	25.1	C	24.1
21E	County Line Rd	Joliet Rd	Weave	C	23.9	C	25.2
22E	County Line Rd	I-294	Weave	C	27.0	D	29.2
25E	SB I-294	SB I-294	Weave	C	26.0	E	35.2
26E	I-294 to US 45 (LaGrange Ave) w/ Aux. Ln		Weave	C	25.8	D	31.7
27E	US 45 Cloverleaf		Weave	C	26.0	C	26.0
31E	IL 171 (Archer Ave) to IL 43 (Harlem Ave) w/Aux. Ln		Weave	C	25.4	D	31.7
42E	California/Kedzie Ave	Damen Ave	Weave	D	30.5	C	24.4
44E	Damen Ave to NB I-90/94 w/ Aux. Ln		Weave	E	37.0	D	31.1

Table 5.2 LOS Results for Base Year (2012) Southbound

Aerial Reference	From	To	Type	AM Peak Hour		PM Peak Hour	
				LOS	Density (pc/mile/Lane)	LOS	Density (pc/mile/Lane)
Southbound Base Year 2012							
45W	NB I-90/94	SB I-90/94	Mainline	C	19.7	B	14.6
44W3	I-90/94 to Damen Ave w/ Auxilixary Lane		Mainline	C	22.9	C	18.0
44W2	I-55 at Damen Exit		Mainline	D	26.1	C	21.2
41W - M	Damen Ave	California Ave	Mainline	D	31.2	C	25.5
40W - M	California Ave	Kedzie Ave	Mainline	C	24.7	C	22.1
38W - M	Kedzie Ave	Pulaski Rd	Mainline	D	27.4	D	30.0
36W - M	Pulaski Rd	IL 50	Mainline	D	28.7	D	31.5
34W - M	IL 50	Central Ave	Mainline	D	32.3	E	35.1
32W - M	Central Ave	IL 43	Mainline	D	29.4	D	30.7
28W - M	IL 171	US 45	Mainline	D	28.4	D	28.7
26W - M	US 45	I-294	Mainline	D	30.0	C	23.7
22W - M	I-294	Joliet Rd	Mainline	D	26.5	C	24.4
21W - M	Joliet Rd	County Line Rd	Mainline	D	29.4	D	28.2
18W - M	County Line Rd	IL 83	Mainline	C	25.5	C	25.6
13W - M	IL 83	Cass Ave	Mainline	D	27.2	D	30.7
10W - M	Cass Ave	Lemont Rd	Mainline	D	27.2	D	31.6
6W	Lemont Rd to I-355 w/ Aux. Ln		Mainline	B	15.8	C	18.5
4W	I-355	Joliet Rd	Mainline	B	15.5	C	19.6
44W4	SB I-90/94		Merge	B	16.7	B	10.9
43W	Damen Ave Entrance		Merge	D	31.2	C	25.7
39W	Kedzie/California Ave Entrance		Merge	C	23.0	C	27.4
37W	Pulaski Rd Entrance		Merge	C	27.3	D	29.8
35W	IL 50 Entrance		Merge	D	31.9	D	34.3
33W	Central Ave Entrance		Merge	C	24.9	C	25.9
29W	IL 171 Entrance		Merge	C	26.5	C	26.5
26W	US 45 Entrance		Merge	C	25.1	B	18.2
19W	County Line Rd Entrance		Merge	C	23.1	C	22.3
14W	IL 83 Entrance		Merge	C	26.4	C	28.0
11W	Cass Ave Entrance		Merge	C	23.9	C	26.6
8W	Lemont Rd Entrance		Merge	C	20.7	C	23.6
2W	Joliet Rd/CD Rd Entrance		Merge	B	19.7	C	25.5
1W	I-355 Entrance		Merge	C	23.7	D	33.3
44W1	Damen Ave Exit		Diverge	A	6.9	A	3.3
41W	Kedzie/ California Ave Exit		Diverge	D	30.5	C	25.4
38W	Pulaski Rd Exit		Diverge	D	29.8	E	37.5
36W	IL 50 Exit		Diverge	D	33.6	E	37.0
34W	Central Ave Exit		Diverge	E	38.8	E	40.5
32W	IL 43 Exit		Diverge	D	28.5	D	29.6
28W	US 45 Exit		Diverge	C	24.6	C	25.7
18W	IL 83 Exit		Diverge	D	28.8	C	27.3
13W	Cass Ave Exit		Diverge	D	30.3	D	31.4
10W	Lemont Rd Exit		Diverge	D	29.3	D	31.4
5W	I-355 Exit		Diverge	A	-10.7	A	-9.7
3W	I-355/Joliet Rd Exit C-D Roadway		Diverge	B	18.2	C	21.9
31W	IL 43 to IL 171 w/ Aux. Ln		Weave	C	21.6	C	21.4
25W	NB I-294 NB to Sb I-294 w/ Aux. Ln		Weave	D	34.8	C	25.9
21W	I-294/Joliet Rd to County Line Rd w/ Aux. Ln		Weave	D	28.6	C	26.1
20W	County Line Rd Cloverleaf		Weave	C	24.8	C	23.4
12W	Cass Ave Cloverleaf		Weave	C	25.1	C	26.8
9W	Lemont Rd Cloverleaf		Weave	C	26.1	C	25.9

5.2 2040 No-Build LOS Results

Tables 5.3 and 5.4 presents the LOS analysis results under the Design Year (2040) No-Build estimated traffic. LOS worksheets for the Design Year No-Build conditions are presented in Appendix B.

By 2040, the projected traffic growth from 2012 to 2040 is anticipated to significantly degrade the traffic operation of basic freeway segments through much of the study corridor, resulting in LOS C to LOS F, with LOS F being the vast majority of the roadway segments. There are only two roadway segments with LOS C, both during the southbound AM peak hours.

By 2040, the projected traffic growth from 2012 to 2040 is anticipated to also significantly degrade the traffic operation of diverge/merge/weave segments through much of the study corridor, resulting in LOS F for most of the northbound directions during the AM and PM peak hours. In the southbound direction, LOS F is anticipated to occur for the vast majority of diverge/merge/weave segments.

As noted previously, these results do not reflect the impact of traffic incidents, which would be expected to be more frequent and severe than currently experienced, due to the degraded level of service and unstable flow conditions.

Table 5.3 LOS Results for Design Year (2040) No-Build Northbound

Aerial Reference	From	To	Type	AM Peak Hour		PM Peak Hour	
				LOS	Density (pc/mile/Lane)	LOS	Density (pc/mile/Lane)
Northbound 2040 (No Build)							
7E - M	I-355 to Lemont Rd w/ Aux. Ln		Mainline	D	29.0	D	26.7
10E -M	Lemont Rd	Cass Ave	Mainline	F	57.0	E	40.8
13E - M	Cass Ave	IL 83	Mainline	F	51.6	F	49.0
18E - M	IL 83	County Line Rd	Mainline	F	50.3	E	43.4
21E - M	County Line Rd	Joliet Rd	Mainline	F	75.4	F	121.2
22E - M	Joliet Rd	I-294	Mainline	F	46.7	F	65.8
28E - M	US 45	IL 171	Mainline	F	47.4	F	55.4
32E - M	IL 43	Central Ave	Mainline	F	53.5	F	70.5
34E - M	Central Ave	IL 50	Mainline	F	46.9	F	60.1
36E - M	IL 50	Pulaski Rd	Mainline	F	52.8	F	79.3
38E - M	Pulaski Rd	Kedzie Ave	Mainline	F	87.0	F	72.2
40E - M	Kedzie Ave	California Ave	Mainline	F	55.6	F	45.9
2E	Joliet Road Entrance		Merge	C	24.3	C	24.3
7E	I-355 Entrance		Merge	F	24.7	C	22.2
10E	Lemont Rd. Entrance		Merge	F	41.3	E	35.4
13E	Cass Ave. Entrance		Merge	F	36.7	F	35.8
18E	IL 83 Entrance		Merge	F	38.3	E	35.0
28E	US 45 NB Entrance		Merge	F	34.8	F	38.9
32E	IL 43 Entrance		Merge	F	39.8	F	43.8
34E	Central Ave Entrance		Merge	E	38.6	F	42.3
36E	IL 50 Entrance		Merge	F	39.2	F	49.3
38E	Pulaski Rd Entrance		Merge	F	45.8	F	44.3
1E	I-355 Exit		Diverge	F	38.3	D	31.7
8E	Lemont Rd Exit		Diverge	C	22.6	B	18.4
11E	Cass Ave. Exit		Diverge	F	43.1	E	36.0
14E	IL 83 Exit		Diverge	F	40.2	F	39.5
19E	County Line Rd. SB Exit		Diverge	F	39.7	E	36.9
29E	IL 171 EB Exit		Diverge	F	39.6	F	44.3
30E	IL 171 NB Exit		Diverge	E	36.8	F	39.6
33E	Central Ave Exit		Diverge	F	39.2	F	46.1
35E	IL 50 Ave Exit		Diverge	E	48.1	F	52.1
37E	Pulaski Rd Exit		Diverge	F	46.5	F	55.3
39E	Kedzie Ave/ California Ave Exit		Diverge	F	47.9	F	46.5
45E	SB I-90/94 Exit		Diverge	D	34.2	D	31.5
9E	Lemont Rd. Cloverleaf		Weave	D	34.1	D	32.0
12E	Cass Ave. Cloverleaf		Weave	E	48.4	E	42.1
20E	County Line Rd. Cloverleaf		Weave	E	44.6	E	52.7
21E	County Line Rd	Joliet Rd	Weave	F	-	F	-
22E	County Line Rd	I-294	Weave	E	50.9	F	-
25E	SB I-294	SB I-294	Weave	F	-	F	-
26E	I-294 to US 45 (LaGrange Ave) w/ Aux. Ln		Weave	E	50.4	F	-
27E	US 45 Cloverleaf		Weave	E	46.5	E	43.3
31E	IL 171 (Archer Ave) to IL 43 (Harlem Ave) w/Aux. Ln		Weave	E	43.9	F	-
42E	California/Kedzie Ave	Damen Ave	Weave	E	41.0	E	38.9
44E	Damen Ave to NB I-90/94 w/ Aux. Ln		Weave	F	-	F	-

Table 5.4 LOS Results for Design Year (2040) No-Build Southbound

Aerial Reference	From	To	Type	AM Peak Hour		PM Peak Hour	
				LOS	Density (pc/mile/Lane)	LOS	Density (pc/mile/Lane)
Southbound 2040 (No Build)							
45W	NB I-90/94	SB I-90/94	Mainline	D	28.2	C	23.1
44W3	I-90/94 to Damen Ave w/ Auxilixary Lane		Mainline	D	32.5	D	28.8
44W2	I-55 at Damen Exit		Mainline	E	40.5	E	35.0+
41W - M	Damen Ave	California Ave	Mainline	F	70.2	F	57.3
40W - M	California Ave	Kedzie Ave	Mainline	E	42.7	E	38.4
38W - M	Kedzie Ave	Pulaski Rd	Mainline	F	58.5	F	64.6
36W - M	Pulaski Rd	IL 50	Mainline	F	67.3	F	62.8
34W - M	IL 50	Central Ave	Mainline	F	85.0	F	100.1
32W - M	Central Ave	IL 43	Mainline	F	78.1	F	85.1
28W - M	IL 171	US 45	Mainline	F	73.4	F	71.6
26W - M	US 45	I-294	Mainline	F	84.1	F	78.8
22W - M	I-294	Joliet Rd	Mainline	F	71.1	F	62.6
21W - M	Joliet Rd	County Line Rd	Mainline	F	202.3	F	253.2
18W - M	County Line Rd	IL 83	Mainline	F	49.3	F	52.7
13W - M	IL 83	Cass Ave	Mainline	F	46.0	F	77.2
10W - M	Cass Ave	Lemont Rd	Mainline	F	45.7	F	85.5
6W	Lemont Rd to I-355 w/ Aux. Ln		Mainline	C	25.3	E	35.0
4W	I-355	Joliet Rd	Mainline	C	22.8	E	38.6
44W4	SB I-90/94		Merge	F	27.8	C	25.2
42W	Damen Ave Entrance		Merge	F	46.5	F	44.1
39W	Kedzie/California Ave Entrance		Merge	F	37.1	F	41.0
37W	Pulaski Rd Entrance		Merge	F	42.2	F	40.9
35W	IL 50 Entrance		Merge	F	46.9	F	49.4
33W	Central Ave Entrance		Merge	F	41.8	F	43.4
29W	IL 171 Entrance		Merge	F	43.2	F	42.6
26W	US 45 Entrance		Merge	F	41.7	F	40.4
19W	County Line Rd Entrance		Merge	F	37.0	F	36.5
14W	IL 83 Entrance		Merge	F	37.0	F	42.0
11W	Cass Ave Entrance		Merge	F	34.4	F	43.6
8W	Lemont Rd Entrance		Merge	E	35.6	F	46.7
2W	Joilet Rd/CD Entrance		Merge	C	27.3	F	41.6
1W	I-355 Entrance		Merge	D	33.7	F	56.4
44W1	Damen Ave Exit		Diverge	B	16.9	B	11.7
41W	Kedzie/ California Ave Exit		Diverge	F	47.0	F	46.2
38W	Pulaski Rd Exit		Diverge	F	44.2	F	50.6
36W	IL 50 Exit		Diverge	F	50.6	F	48.0
34W	Central Ave Exit		Diverge	F	51.8	F	58.2
32W	IL 43 Exit		Diverge	F	45.8	F	47.5
28W	US 45 Exit		Diverge	F	43.6	F	40.8
18W	IL 83 Exit		Diverge	F	41.2	F	40.8
13W	Cass Ave Exit		Diverge	F	39.9	F	48.6
10W	Lemont Rd Exit		Diverge	F	38.9	F	49.4
5W	I-355 Exit		Diverge	A	0.6	A	2.8
3W	I-355/Joliet Rd Exit C-D Roadway		Diverge	C	25.2	D	35.0
31W	IL 43 to IL 171 w/ Aux. Ln		Weave	E	40.1	E	39.7
25W	NB I-294 NB to Sb I-294 w/ Aux. Ln		Weave	F	-	F	-
21W	I-294/Joliet Rd to County Line Rd w/ Aux. Ln		Weave	F	-	F	-
20W	County Line Rd Cloverleaf		Weave	F	-	F	-
12W	Cass Ave Cloverleaf		Weave	E	37.8	E	45.1
9W	Lemont Rd Cloverleaf		Weave	E	44.8	E	49.8

5.3 I-55 Congestion Scan

As discussed previously, the performance of I-55 is affected by the cumulative impacts of a large number of unique and site specific traffic congestion issues along the corridor. CMAP provides historic congestion measures by location and time of day to assess the operational congestion of I-55. Figures 5.1 and 5.2 illustrate this measurement of I-55 travel performance within the study corridor.

These scans identify the location and level of congestion along the route by time of day based on historic data. As shown in Figure 5.2, I-55 experiences significant congestion in the northbound direction in the morning peak period, with the heaviest occurring from Illinois Route 171 to north of Pulaski Road. The evening congestion occurs predominantly in the southbound direction with the heaviest experienced from I-90/94 to Pulaski Road and from US 45 to Cass Avenue.

5.4 I-55 Freeway Delay/Travel Index

The LOS evaluation, based on traffic demand and the facilities capacity (e.g. # lanes, type of interchanges, etc.), provides a baseline evaluation of the freeway's ability to meet the travel demands under normal operating conditions. The LOS evaluation does not however, reflect the influence of external factors such as weather, traffic incidents and driver behavior. As such, the perception of I-55's measure of performance by frequent users is generally associated with travel times within the course of their daily commute. TravelMidwest.com provides historic data based on real time monitoring of travel times by time of day for regional freeways throughout the Chicago metropolitan region. Figure 5.3 demonstrates the average travel time as well as the range of travel time experience by time of day for the I-55 corridor.

As demonstrated in Figure 5.3, I-55 users experience significant increase in average travel time during peak travel periods and are exposed to a highly variable travel time during these periods of high demand. The green line represents the Current Travel Time (in this case July 1, 2013) and demonstrates the variability of travel experiences during the course of one day. Average travel time (red line) indicates the average travel time for all samples ever collected. The Normal Range (yellow area) indicates the normal range, based on percentile, of travel time values for each time period. Speed Thresholds (blue lines) indicate the travel time for uncongested travel (55 mph), moderate congested travel time (35 mph and heavy congested travel times (15 mph).

Figure 5.1 I-55 Congestion Scan – I-355 to I-294 (2011)

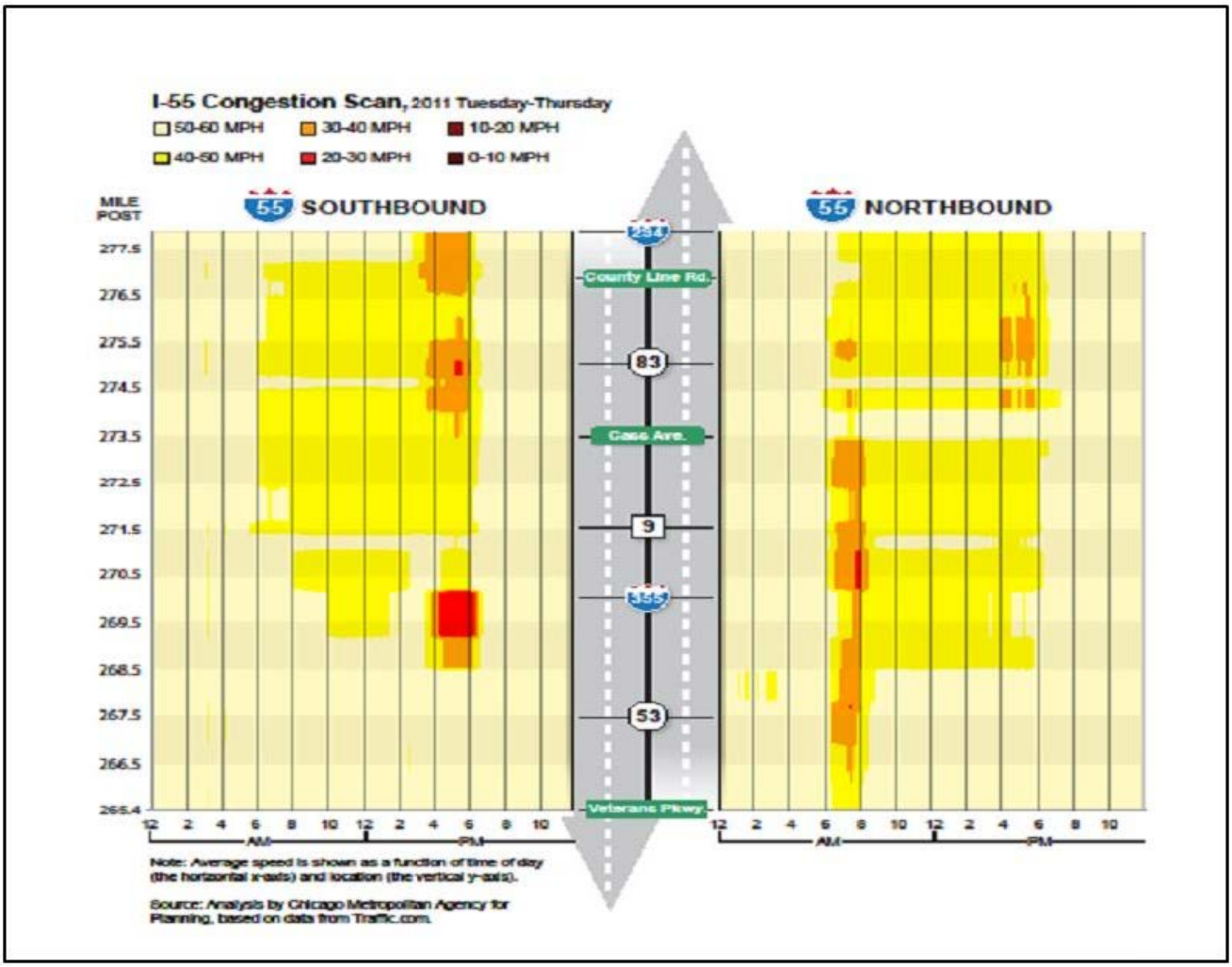


Figure 5.2 I-55 Congestion Scan – I-294 to Lake Shore Drive (2011)

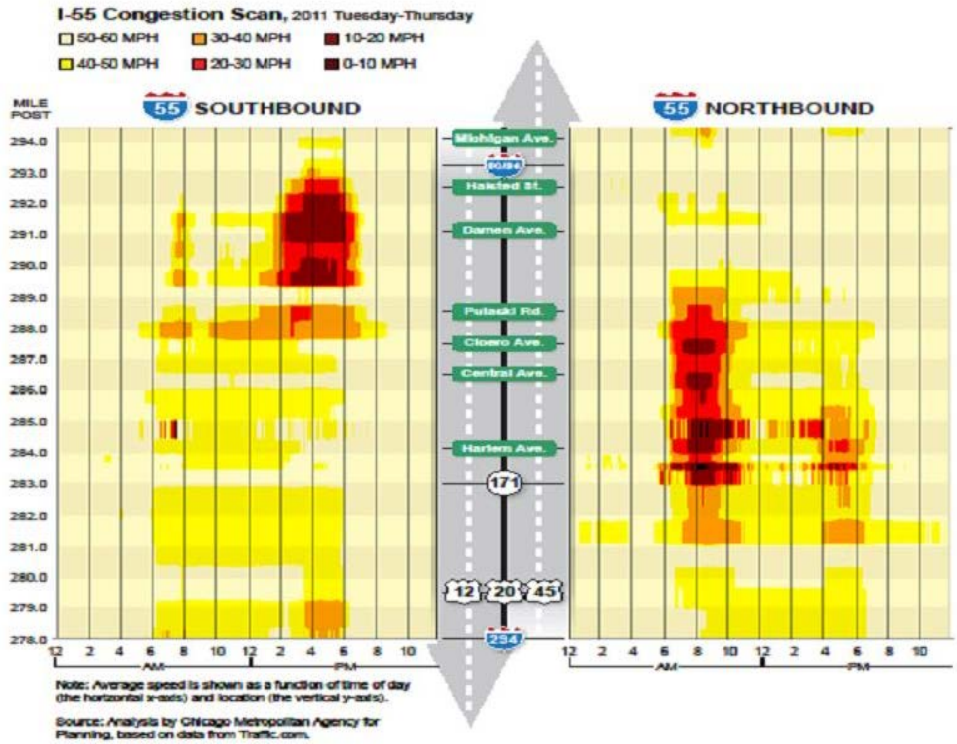
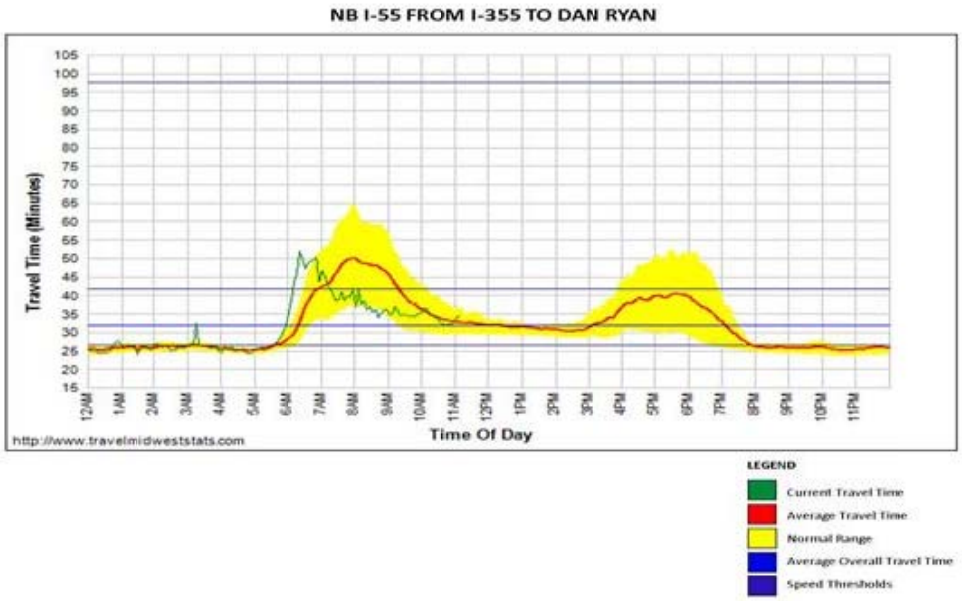
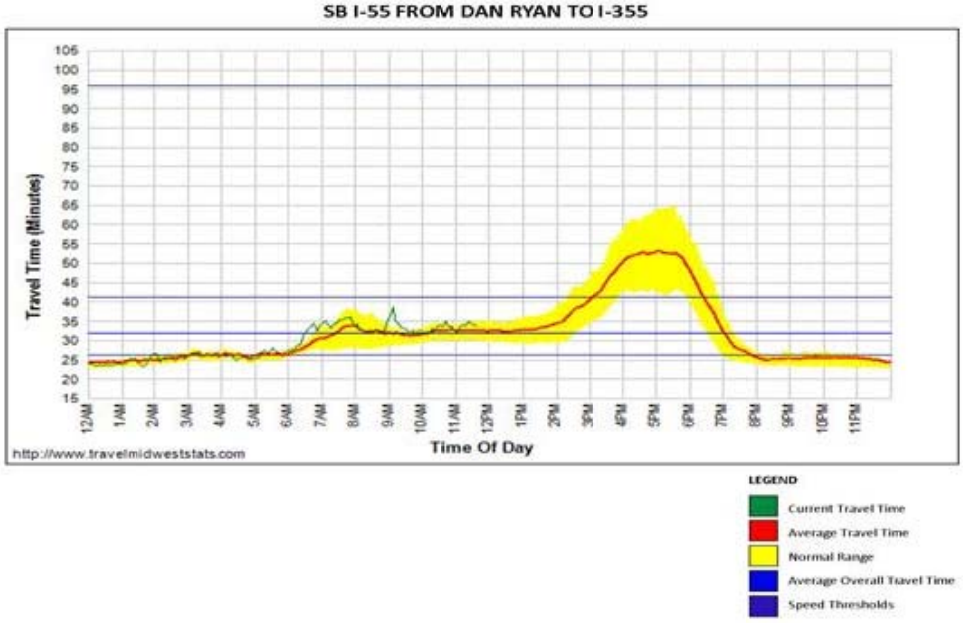


Figure 5.3 I-55 Historic Travel Times by Hour





5.5 I-55 Reliability Indices

Similarly, CMAP provides historic measures to assess the operational reliability of I-55 as measured by the route's Planning Time Index (ratio of total time needed to ensure 95% on-time arrival to free flow travel time) and Congested Hours (average hours in which facility operates at less than 50 mph). A summary of these performance measures for the most recent year for which data is available (2011) are shown in Table 5.5.

Table 5.5 I-55 Historic Average Daily Performance Measures

Section Along I-55	Performance Measure - 2011			
	Free Flow Travel (min)	AM Planning Time Index	PM Planning Time Index	Congested Hours
I-355 to I-294 NB	11.44	2.67	2.51	10.85
I-355 to I-294 SB	11.40	4.40	2.38	11.24
I-294 to I-90/94 NB	16.33	3.06	2.10	12.27
I-294 to I-90/94 SB	16.30	1.93	3.31	12.37

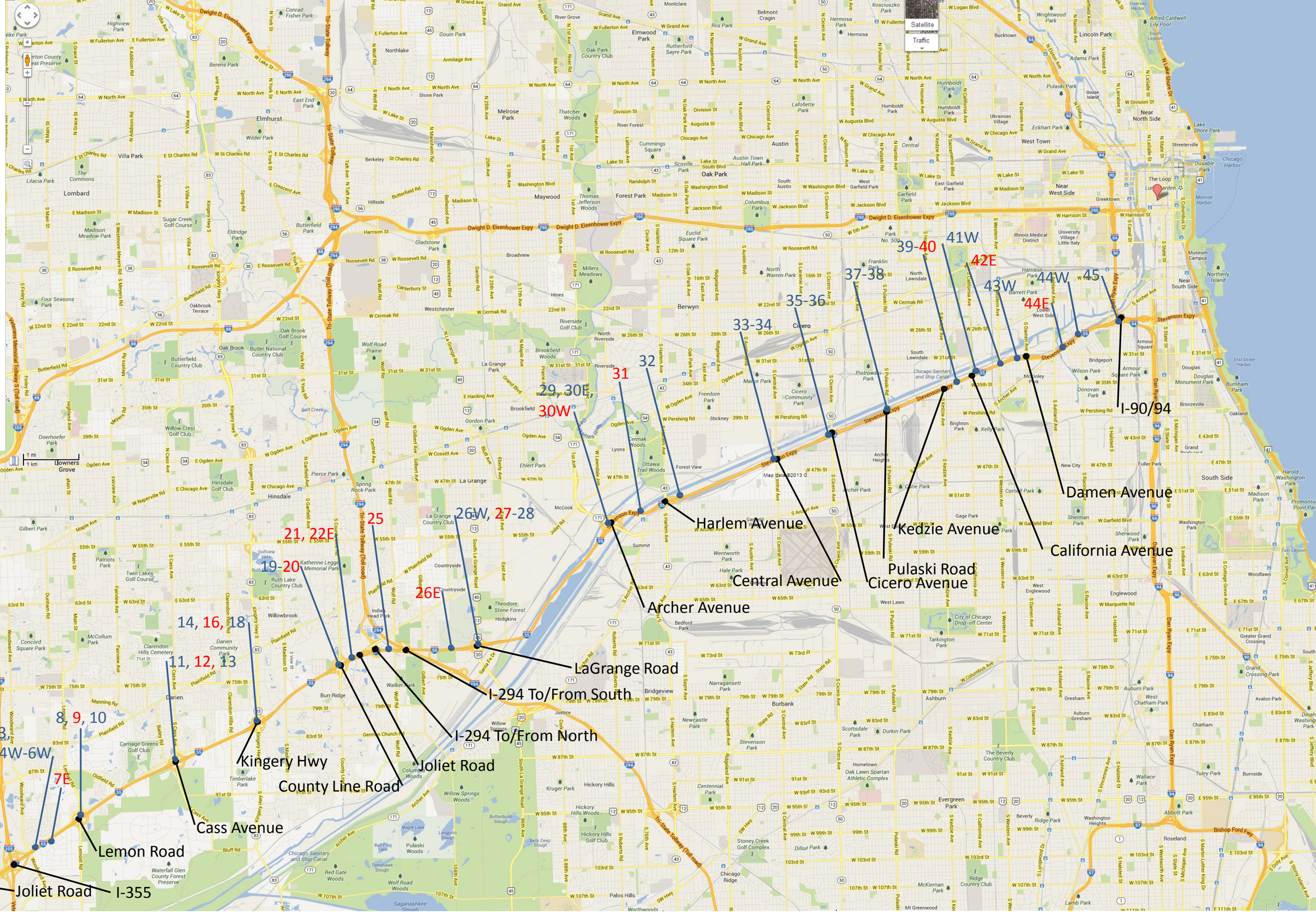
Source: CMAP Freeway Congestion Scans (www.cmap.illinois.gov/cmp/scans/55-lakes-shore to--294 and www.cmap.illinois.gov/cmp/scans/55-294-to-veterns-parkway)

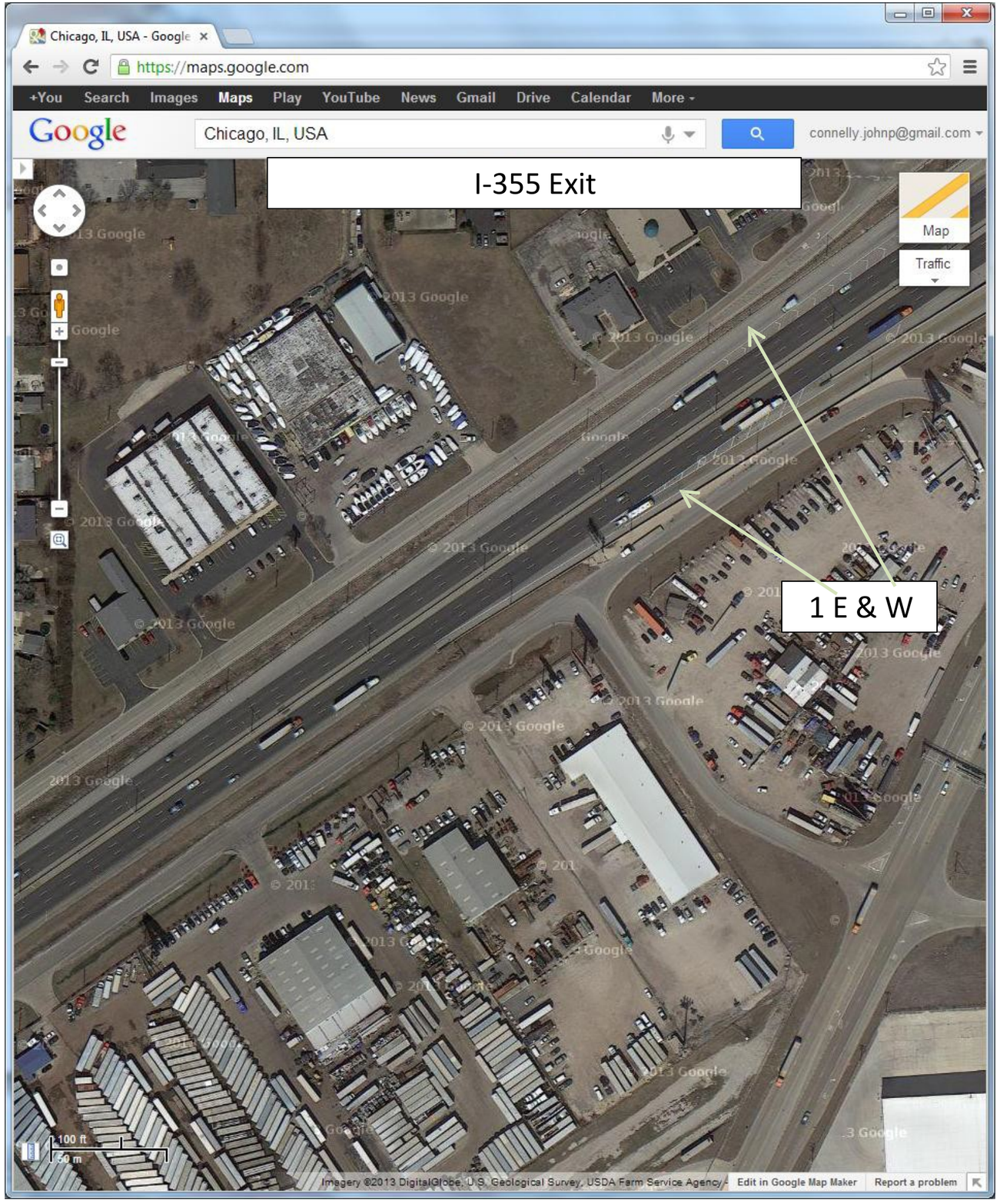
These measures indicate that travel times on the I-55 corridor exhibit significant variability. For example, between I-294 and I-90/94, Planning Time Indices of 3.06 in the northbound direction during the AM peak and 3.31 in the southbound direction during the PM peak indicate extremely unreliable travel times, with drivers having to allow for over three times the travel time under free-flow conditions to ensure reaching their destinations on time. Travel along the section of the I-55 corridor between I-355 and I-294 is more reliable, although drivers need to allow for significantly more time (more than twice the free-flow travel time) for trips in the AM northbound, PM northbound and PM southbound.

6.0 Summary

The I-55 corridor is, and will continue to be, a vital component of the Chicago metropolitan transportation system. The current facility is experiencing significant congestion and is subject to unreliable service on a daily basis. Consistent with the regional population and economic growth trends, the analysis for the design year (2040) indicates a significant growth in travel demand on this facility. In order to meet this demand, innovative solutions will be necessary. These solutions must recognize the urban and fiscal constraints faced by the Chicago region and include additional capacity on I-55, improved transit options in the corridor, additional funding resources, and proactive management of traffic demand through a combination of traffic management strategies and congestion pricing.

Corridor Aerials


1
2
3
4W-6W
7E
8
9, 10
11, 12, 13
14, 16, 18
19-20
21, 22E
25
26E
26W, 27-28
29, 30E, 30W
31
32
33-34
35-36
37-38
39-40
41W
42E
43W
44E
44W
45
I-90/94
Joliet Road
I-355
Lemon Road
Cass Avenue
Kingery Hwy
County Line Road
Joliet Road
I-294 To/From North
I-294 To/From South
LaGrange Road
Archer Avenue
Harlem Avenue
Central Avenue
Cicero Avenue
Pulaski Road
Kedzie Avenue
California Avenue
Damen Avenue
Dwight D. Eisenhower Expy
Stevenson Expy
Tri-State Tollway (Toll road)
Satellite
Traffic


Chicago, IL, USA - Google
https://maps.google.com
+You Search Images Maps Play YouTube News Gmail Drive Calendar More
Google
Chicago, IL, USA
connelly.johnp@gmail.com
I-355 Exit
Map
Traffic
1 E & W
100 ft
50 m
Imagery ©2013 DigitalGlobe, U.S. Geological Survey, USDA Farm Service Agency
Edit in Google Map Maker
Report a problem

S County Line Rd to Joliet

https://maps.google.com

+You Search Images Maps Play YouTube News Gmail Drive Calendar More

Google

Chicago, IL, USA

connelly.johnp@gmail.com

I-355 Interchange CD Road
Entrance
#2W-Merge

Map

Traffic

100 ft
50 m

Imagery ©2013 DigitalGlobe, U.S. Geological Survey, USDA Farm Service Agency - Edit in Google Map Maker Report a problem

Chicago, IL, USA - Google

https://maps.google.com

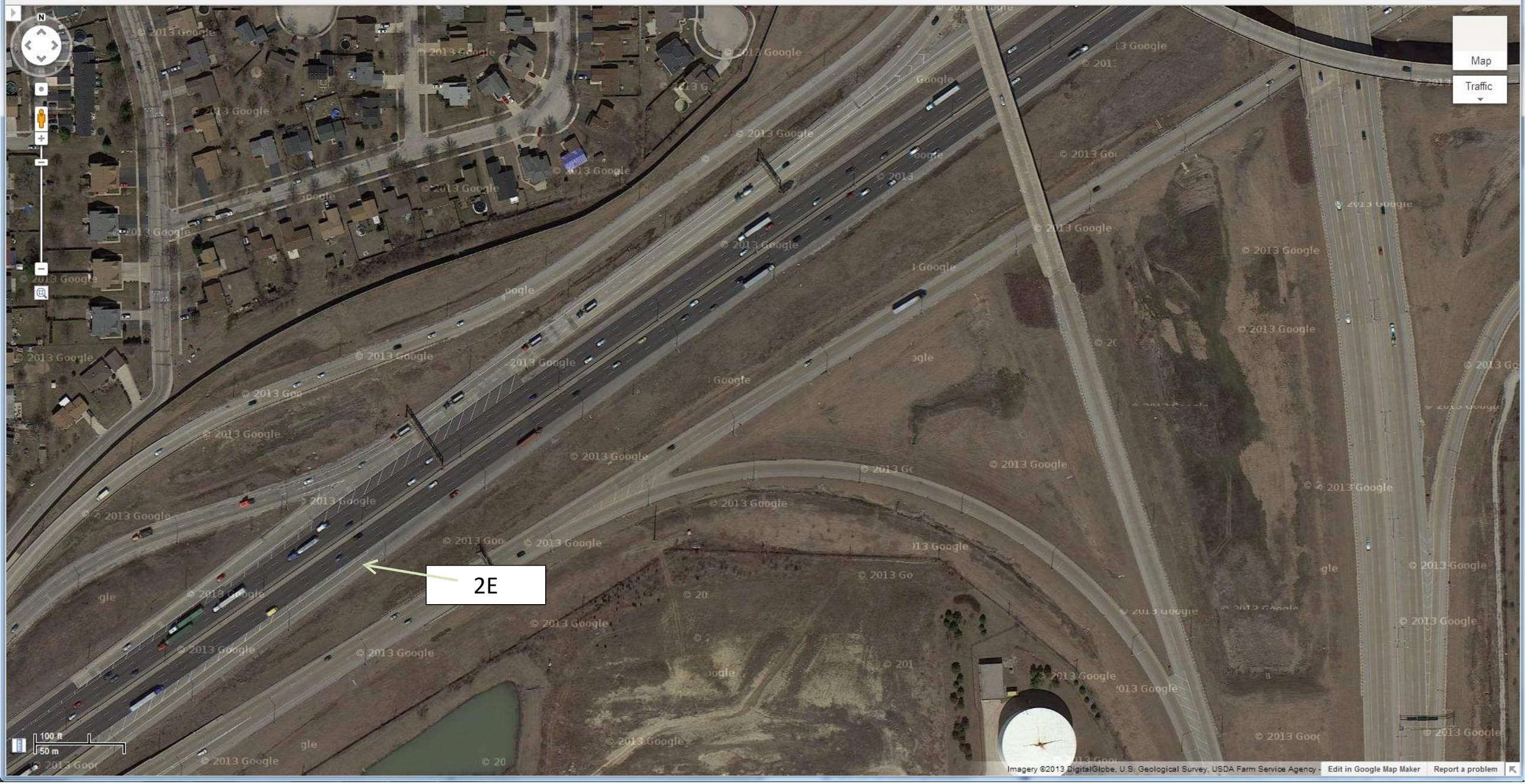
+You Search Images Maps Play YouTube News Gmail Drive Calendar More

Google

Chicago, IL, USA

Joliet Road Entrance

connelly.johnp@gmail.com



S County Line Rd to Joliet

https://maps.google.com

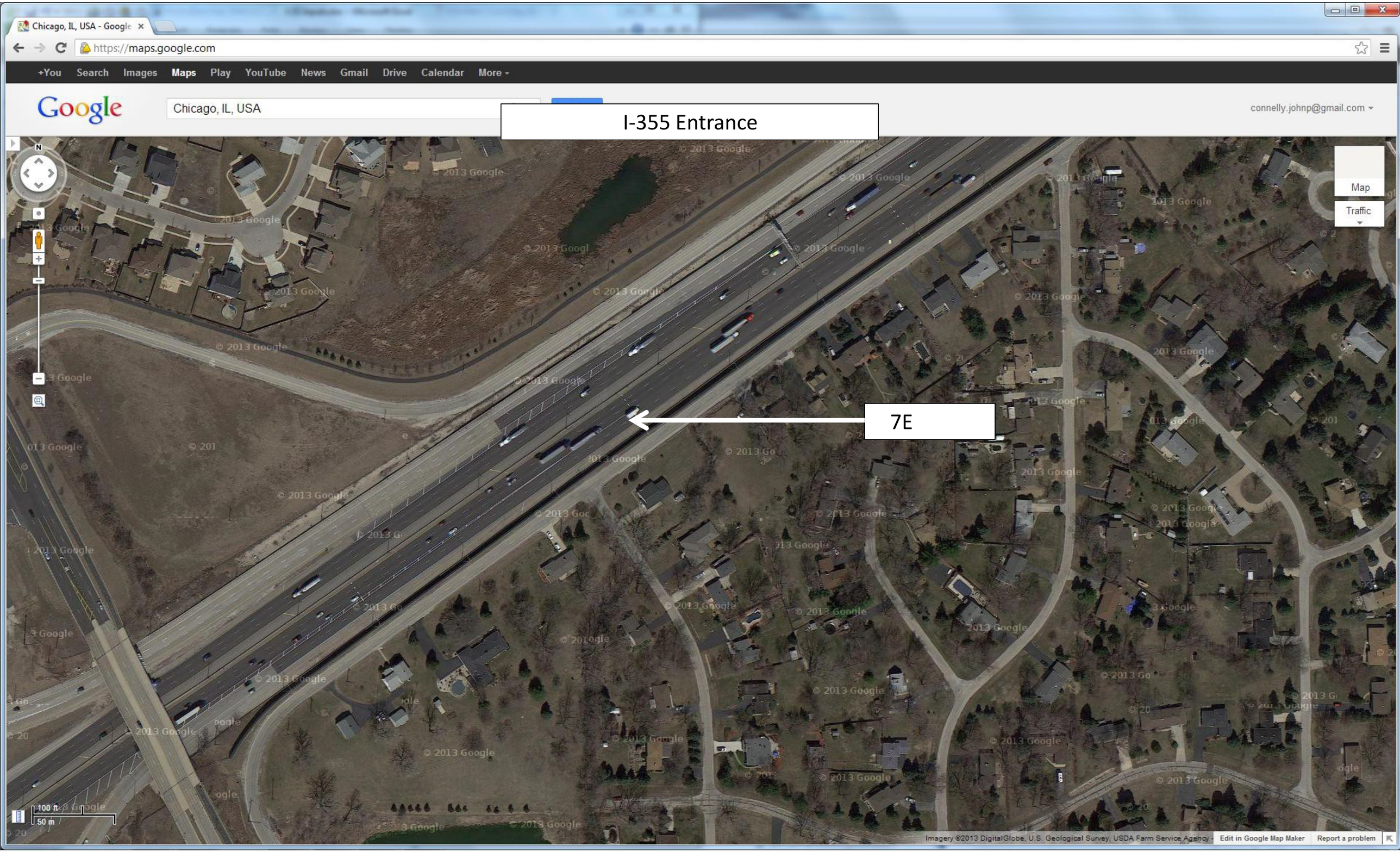
+You Search Images Maps Play YouTube News Gmail Drive Calendar More

Google

Chicago, IL, USA

connelly.johnp@gmail.com

I-355 Interchange CD Road Exit
#3W-Diverge


Chicago, IL, USA - Google
https://maps.google.com
+You Search Images Maps Play YouTube News Gmail Drive Calendar More
Google
Chicago, IL, USA
connelly.johnp@gmail.com
I-355 Entrance
7E
Map
Traffic
© 2013 Google
100 ft
50 m
Imagery ©2013 DigitalGlobe, U.S. Geological Survey, USDA Farm Service Agency
Edit in Google Map Maker
Report a problem

#4W
3 Lane Freeway
Segment

#5W
Diverge

#6W
4 Lane Freeway
Segment

8 E & W

Chicago, IL, USA - Google

https://maps.google.com

+You Search Images Maps Play YouTube News Gmail Drive Calendar More

Google

Chicago, IL, USA

connelly.johnp@gmail.com

Lemont Road Exit

Map

Traffic

7E – M

4 Lane Freeway

Segment

100 ft

50 m

Imagery ©2013 DigitalGlobe, U.S. Geological Survey, USDA Farm Service Agency

Edit in Google Map Maker

Report a problem

Chicago, IL, USA - Google

https://maps.google.com

+You Search Images Maps Play YouTube News Gmail Drive Calendar More

Google

Chicago, IL, USA

connelly.johnp@gmail.com

Lemont Road Weave

9 E & W

Map

Traffic

100 ft

50 m

Edit in Google Map Maker

Report a problem

Chicago, IL, USA - Google x

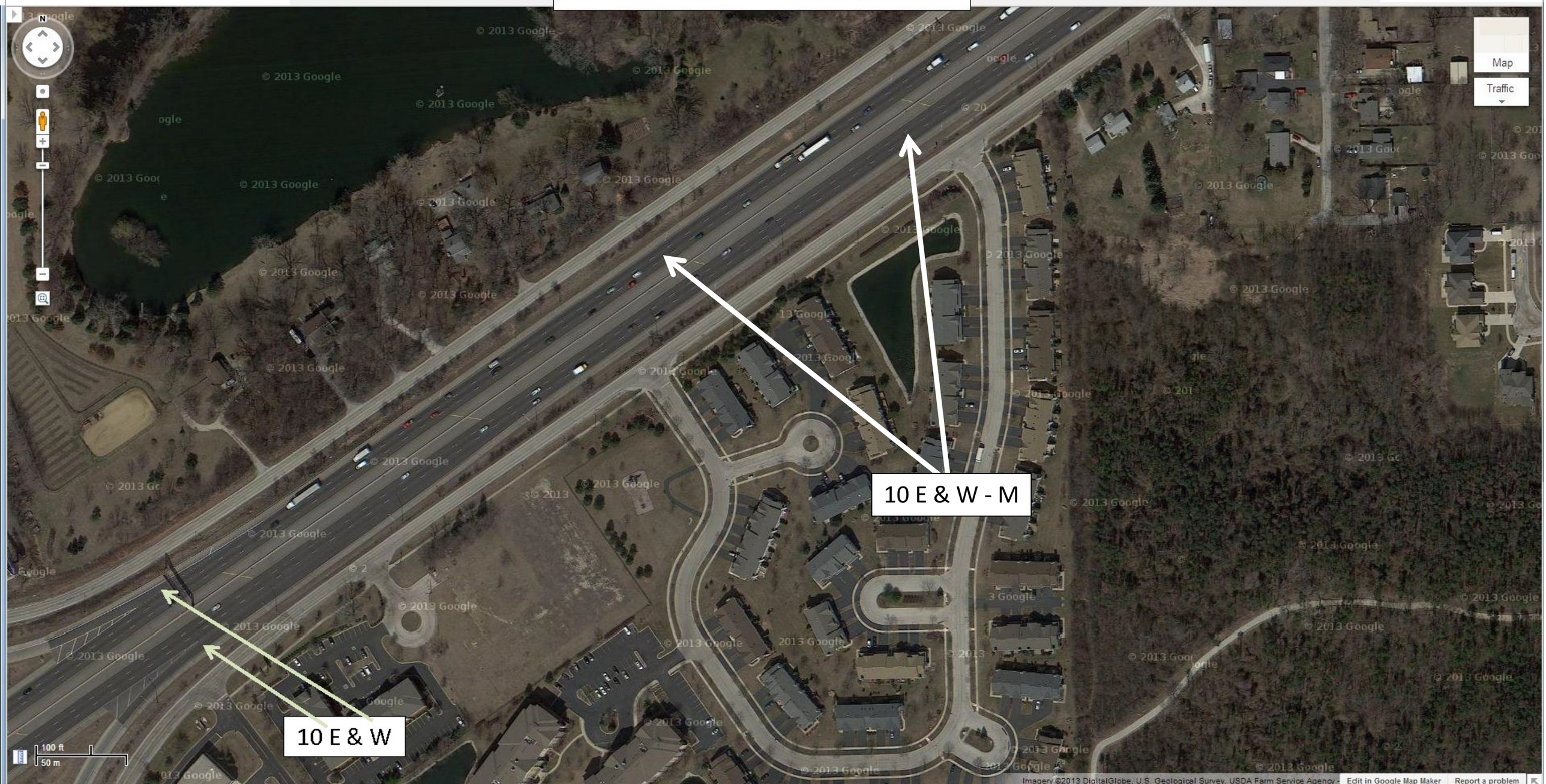
https://maps.google.com

+You Search Images Maps Play YouTube News Gmail Drive Calendar More-

Google Chicago, IL, USA

connelly.johnp@gmail.com

Iemont Road Entrance



Chicago, IL, USA - Google

https://maps.google.com

+You Search Images Maps Play YouTube News Gmail Drive Calendar More

Google

Chicago, IL, USA

connelly.johnp@gmail.com

Cass Avenue Western Side

Chicago, IL, USA - Google

https://maps.google.com

+You Search Images Maps Play YouTube News Gmail Drive Calendar More

Google

Chicago, IL, USA

connelly.johnp@gmail.com

Cass Avenue Weave

Chicago, IL, USA - Google x

https://maps.google.com

+You Search Images Maps Play YouTube News Gmail Drive Calendar More-

Google Chicago, IL, USA

connelly.johnp@gmail.com

Cass Avenue Eastern Side

Chicago, IL, USA - Google

https://maps.google.com

+You Search Images Maps Play YouTube News Gmail Drive Calendar More

Google

Chicago, IL, USA

connelly.johnp@gmail.com

Kingery Hwy Western Side

14 E & W

Map

Traffic

100 ft

50 m

Imagery ©2013 DigitalGlobe, U.S. Geological Survey, USDA Farm Service Agency

Edit in Google Map Maker

Report a problem

Chicago, IL, USA - Google

https://maps.google.com

+You Search Images Maps Play YouTube News Gmail Drive Calendar More

Google

Chicago, IL, USA

connelly.johnp@gmail.com

Kingery Hwy Weave

Chicago, IL, USA - Google

https://maps.google.com

+You Search Images Maps Play YouTube News Gmail Drive Calendar More

Google

Chicago, IL, USA

connelly.johnp@gmail.com

Kingery Hwy Eastern Side

18 E & W

Map

Traffic

100 ft
50 m

Edit in Google Map Maker

Report a problem

Chicago, IL, USA - Google

https://maps.google.com

+You Search Images Maps Play YouTube News Gmail Drive Calendar More

Google

Chicago, IL, USA

connelly.johnp@gmail.com

County Line Road Western Side

18 E & W - M

19 E & W

Map

Traffic

100 ft

50 m

Imagery ©2013 DigitalGlobe, U.S. Geological Survey, USDA Farm Service Agency

Edit in Google Map Maker

Report a problem

Chicago, IL, USA - Google

https://maps.google.com

+You Search Images Maps Play YouTube News Gmail Drive Calendar More

Google

Chicago, IL, USA

connelly.johnp@gmail.com

County Line Road Weave

20 E & W

Map

Traffic

100 ft
50 m

Chicago, IL, USA - Google

https://maps.google.com

+You Search Images Maps Play YouTube News Gmail Drive Calendar More

Google Chicago, IL, USA

connelly.johnp@gmail.com

County Line Road Eastern Side
Weave to Joliet Road Exit, I-294 North Exit

21W Weave

21 E & W - M

21E Weave to Left Exit

22E Weave Btw Right Entrance & Exit

22 E - M

Map

Traffic

100 ft
50 m

Edit in Google Map Maker Report a problem

Chicago, IL, USA - Google x

+You Search Images Maps Play ou u e : : d r More -

Coogle Chicago, IL, USA connelly.johnp@gma1l.com

S County Line Rd to Joliet

https://maps.google.com

+You Search Images Maps Play YouTube News Gmail Drive Calendar More

Google

Chicago, IL, USA

connelly.johnp@gmail.com

#25W Weave

Exit to I-294 NB

22 W - M

I-294NB

I-294SB

Map

Traffic

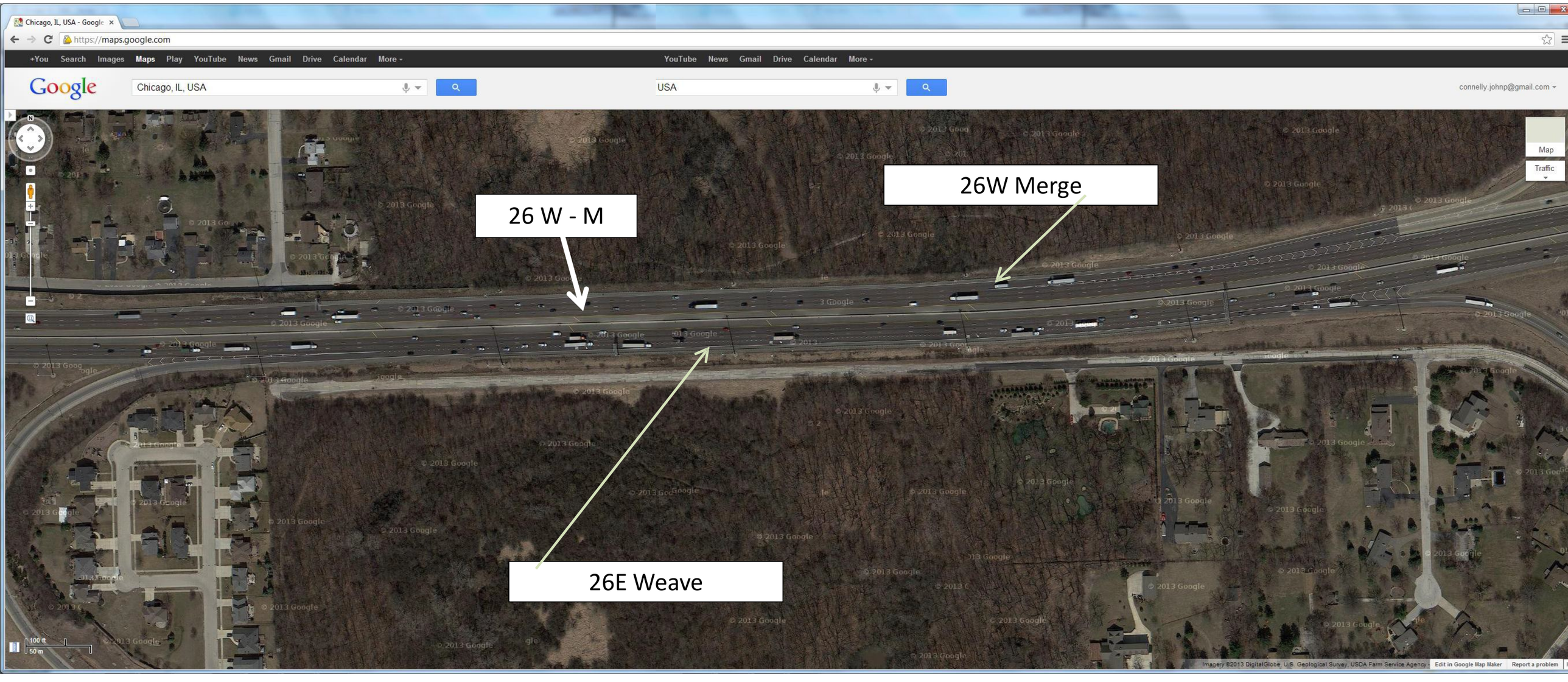
100 ft

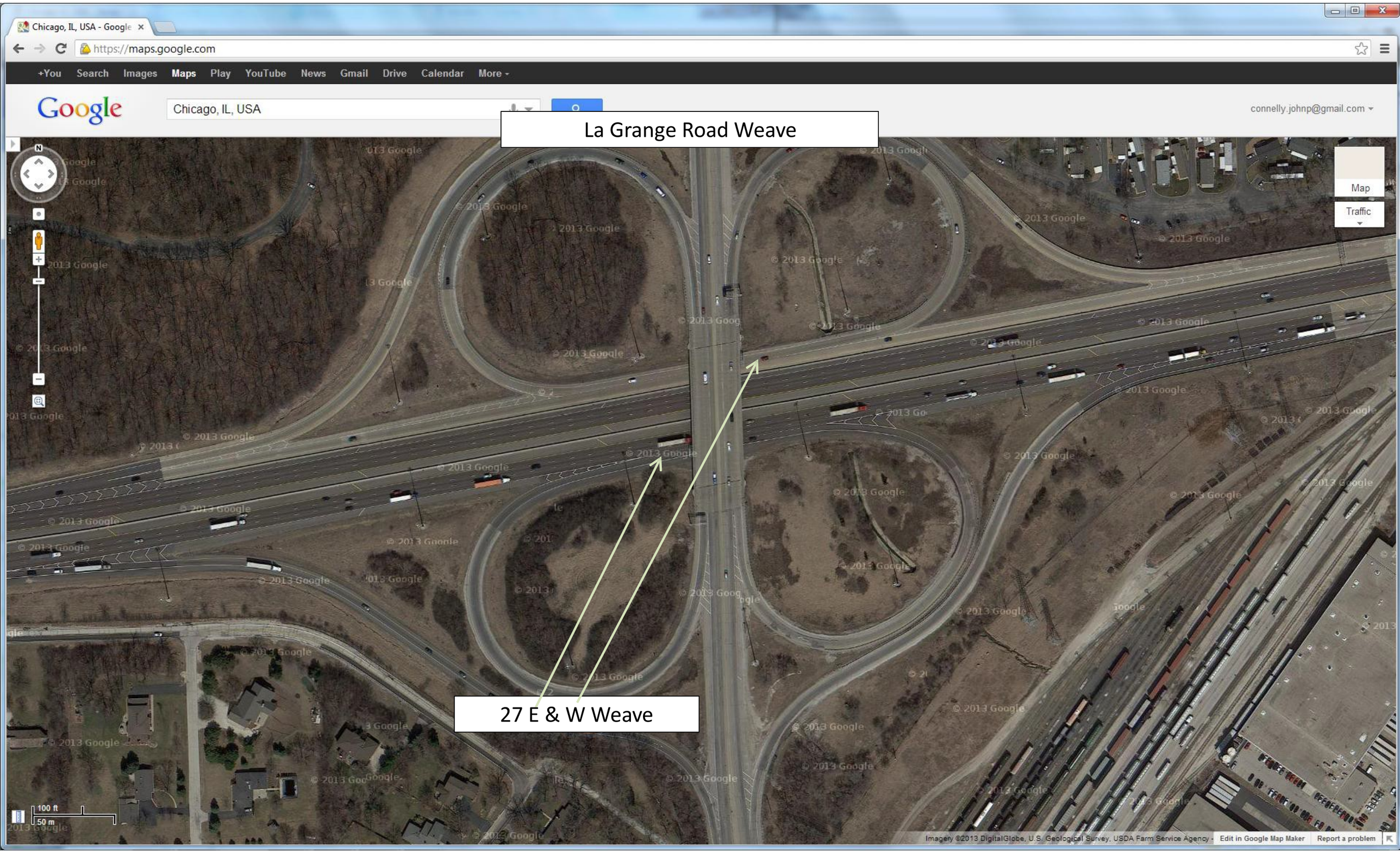
50 m

Edit in Google Map Maker

Report a problem

I-294 NB Entrance (to I-55 EB)
To West Side of S La Grange Road




Chicago, IL, USA - Google
https://maps.google.com
+You Search Images Maps Play YouTube News Gmail Drive Calendar More
Google
Chicago, IL, USA
connelly.johnp@gmail.com
La Grange Road Weave
27 E & W Weave
Map
Traffic
© 2013 Google
100 ft
50 m
Imagery ©2013 DigitalGlobe, U.S. Geological Survey, USDA Farm Service Agency
Edit in Google Map Maker
Report a problem

Chicago, IL, USA - Google

https://maps.google.com

+You Search Images Maps Play YouTube News Gmail Drive Calendar More

Google

Chicago, IL, USA

connelly.johnp@gmail.com

La Grange Road Eastern Side

28 E & W

Map

Traffic

100 ft

50 m

Imagery ©2013 DigitalGlobe, U.S. Geological Survey, USDA Farm Service Agency

Edit in Google Map Maker

Report a problem

Segment Between La Grange Road & Archer Avenue

Chicago, IL, USA - Google x

https://maps.google.com

+You Search Images Maps Play YouTube News Gmail Drive Calendar More

Google Chicago, IL, USA connelly.johnp@gmail.com

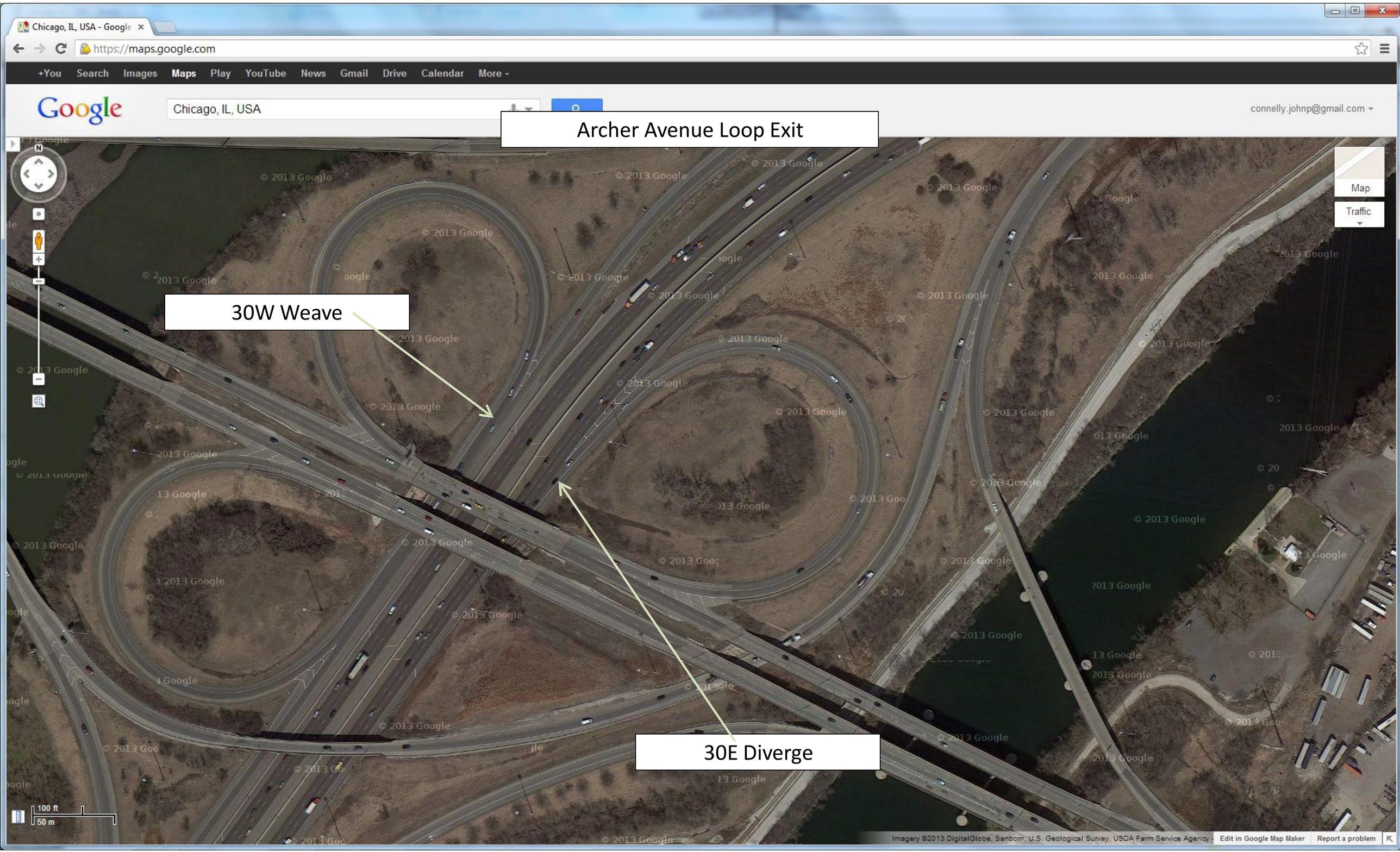
Archer Avenue SW Side

29 E & W

Map Traffic

100 ft 50 m

Imagery ©2013 DigitalGlobe, Sanborn, U.S. Geological Survey, USDA Farm Service Agency - Edit in Google Map Maker Report a problem


Chicago, IL, USA - Google
https://maps.google.com
+You Search Images Maps Play YouTube News Gmail Drive Calendar More
Google
Chicago, IL, USA
connelly.johnp@gmail.com
Archer Avenue Loop Exit
30W Weave
30E Diverge
Map
Traffic
100 ft
50 m
Imagery ©2013 DigitalGlobe, Sanborn, U.S. Geological Survey, USDA Farm Service Agency
Edit in Google Map Maker
Report a problem

S County Line Rd to Joliet x

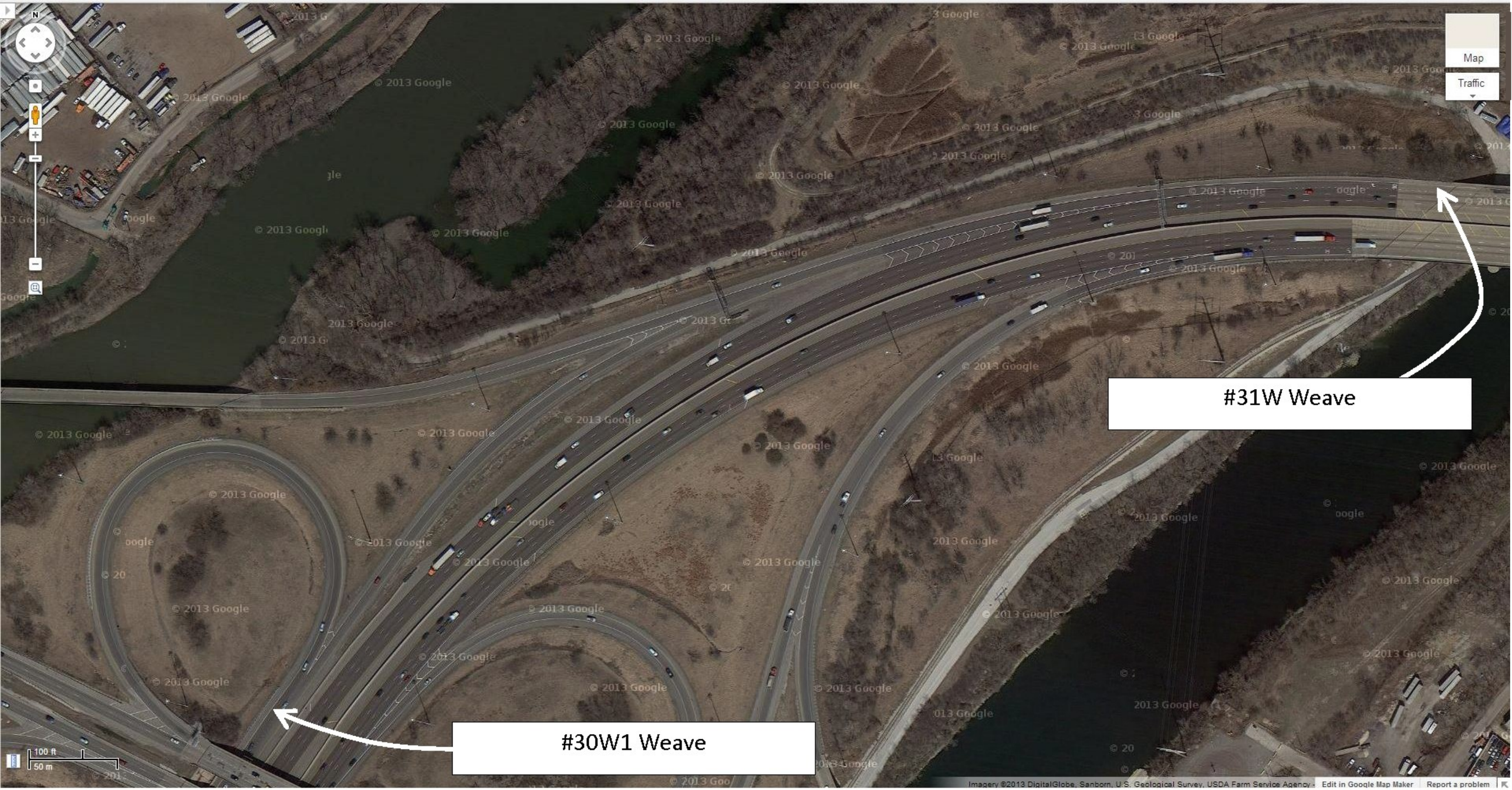
https://maps.google.com

+You Search Images Maps Play YouTube News Gmail Drive Calendar More

Google

Chicago, IL, USA

connelly.johnp@gmail.com



Chicago, IL, USA - Google

https://maps.google.com

+You Search Images Maps Play YouTube News Gmail Drive Calendar More

Google

Chicago, IL, USA

connelly.johnp@gmail.com

Archer Avenue Eastern Side
To Harlem Avenue

Chicago, IL, USA - Google x

https://maps.google.com

+You Search Images Maps Play YouTube News Gmail Drive Calendar More-

Google Chicago, IL, USA

connelly.johnp@gmail.com

Harlem Avenue Eastern Side

Chicago, IL, USA - Google

https://maps.google.com

+You Search Images Maps Play YouTube News Gmail Drive Calendar More

Google Chicago, IL, USA

connelly.johnp@gmail.com

Central Avenue Western Side (Ramps under Construction)

32 E & W - M

33E & W

Map Traffic

100 ft 50 m

Central Avenue Eastern Side

34 E & W - M

34E & W

Chicago, IL, USA - Google

https://maps.google.com

+You Search Images Maps Play YouTube News Gmail Drive Calendar More

Google

Chicago, IL, USA


Cicero Avenue Western Side
35E & W
100 ft
50 m

Chicago, IL, USA - Google x

google.com

+You Search Images Maps Drive Calendar More

Google Chicago, IL, USA

connelly_phnp@gmail.com

Cicero Avenue Eastern Side

Chicago, IL, USA - Google

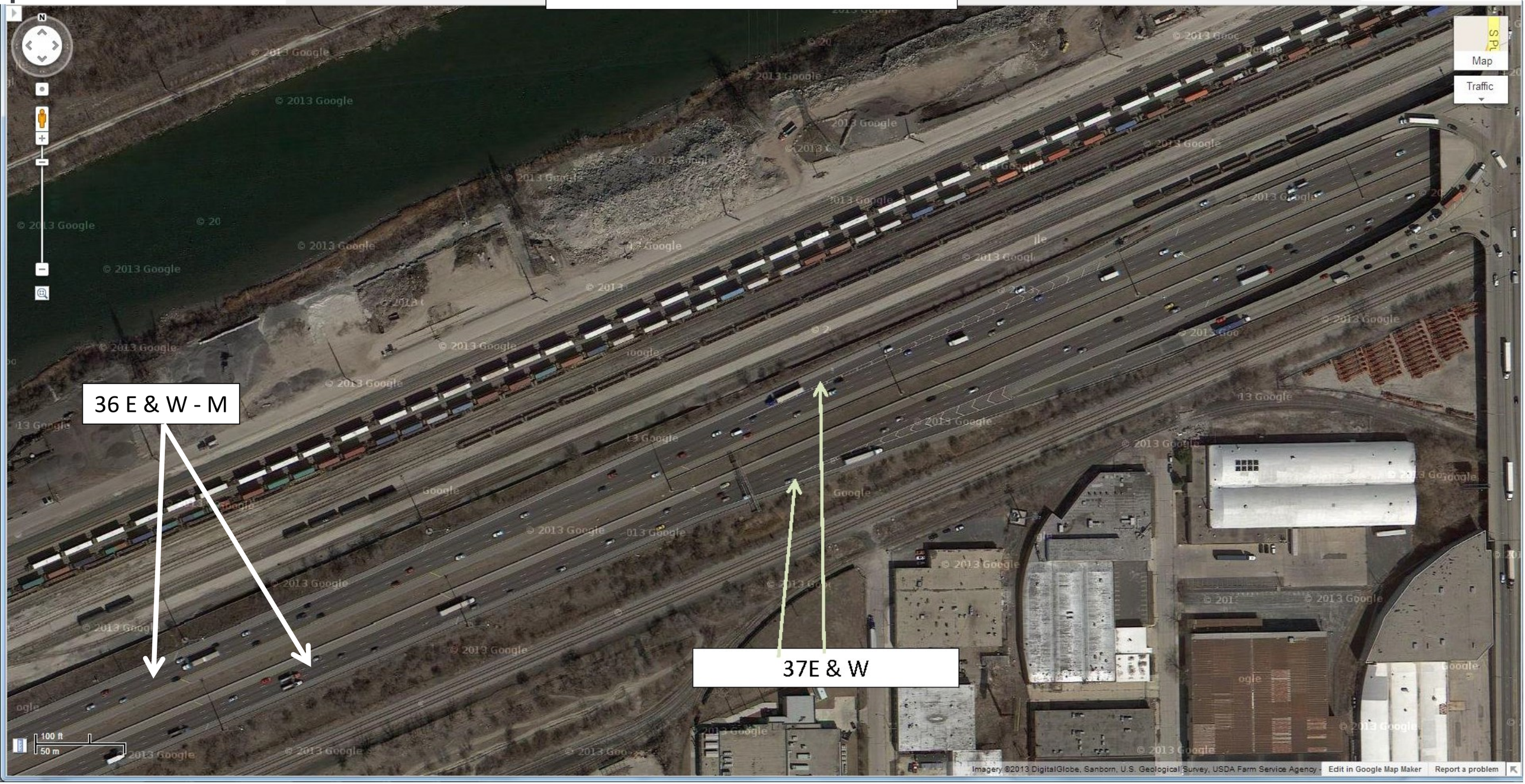
https://maps.google.com

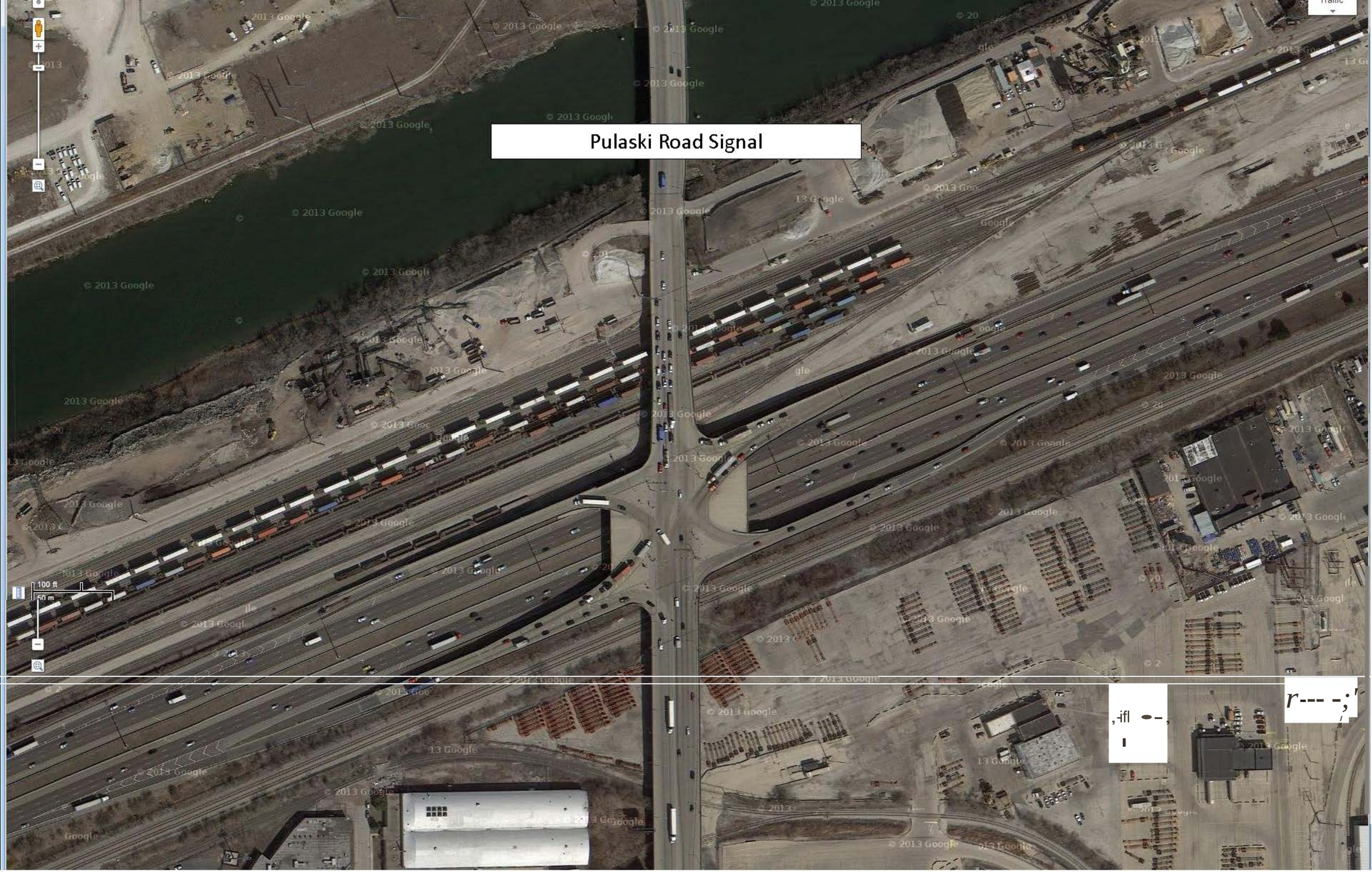
News Gmail Drive Calendar More

Google Chicago, IL, USA

connelly.johnp@gmail.com

Pulaski Road Western Side




Pulaski Road Signal
100 ft
50 m
© 2013 Google

Chicago, IL, USA - Google

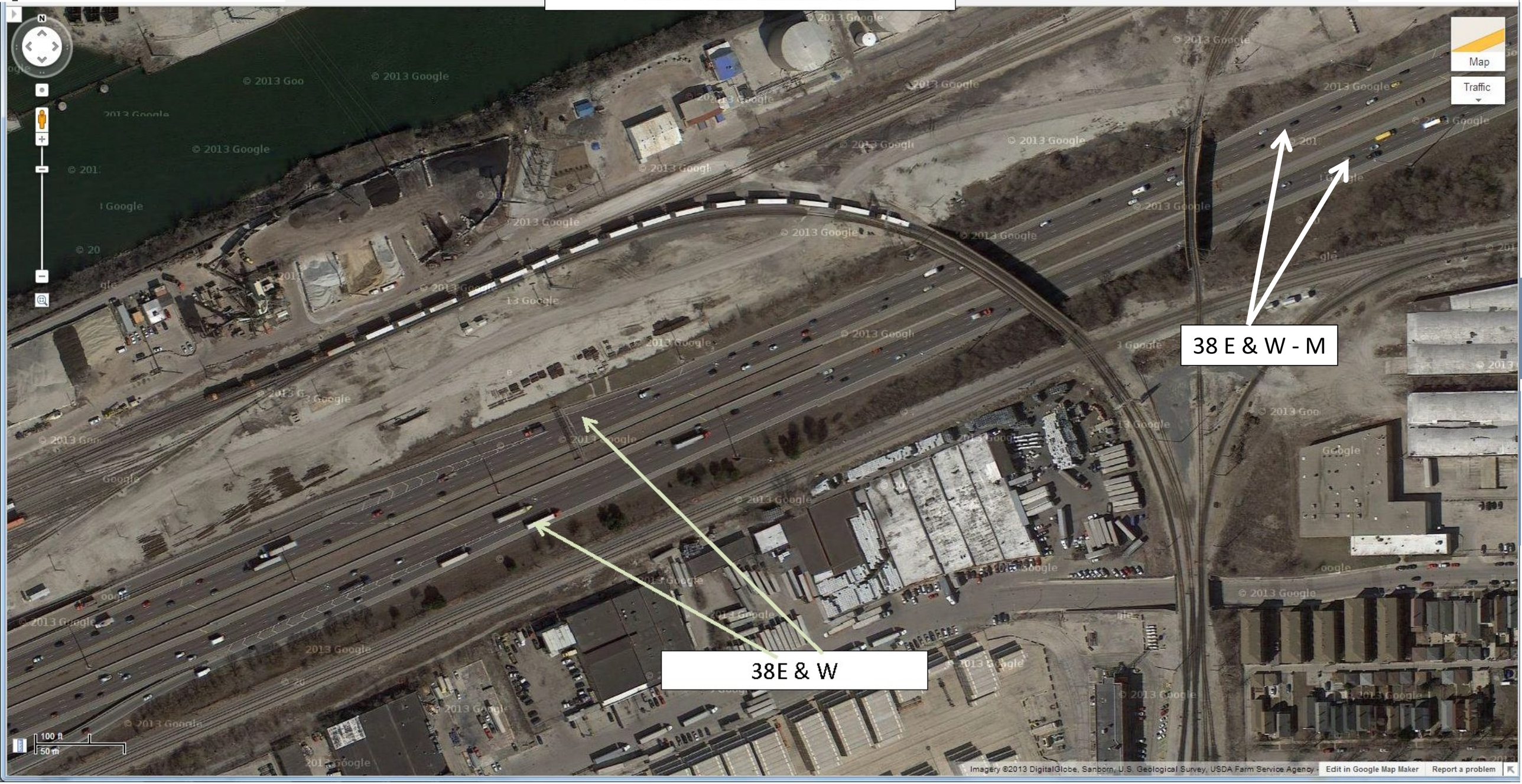
https://maps.google.com

Gmail Drive Calendar More

Google Chicago, IL, USA

connelly_johnp@gmail.com

Pulaski Road Eastern Side



Chicago, IL, USA - Google

https://maps.google.com

+You Search Images Maps Play YouTube News Gmail Drive Calendar More

Google

Chicago, IL, USA

connelly.johnp@gmail.com

Kedzie Ave to California Ave
Western Side

Map

Traffic

39E & W

100 ft
50 m

Imagery ©2013 DigitalGlobe, Sanborn, U.S. Geological Survey, USDA Farm Service Agency - Edit in Google Map Maker Report a problem

Chicago, IL, USA - Google

https://maps.google.com

+You Search Images Maps Play YouTube News Gmail Drive Calendar More

Google

Chicago, IL, USA

connelly.johnp@gmail.com

Kedzie Ave to California Ave
Between Cross Streets

40 E & W - M

40E & W Weave

Map

Traffic

100 ft
50 m

Imagery ©2013 DigitalGlobe, Sanborn, U.S. Geological Survey, USDA Farm Service Agency

Edit in Google Map Maker

Report a problem

Kedzie Ave to California Ave
Eastern Side

41W Diverge

42 E Weave

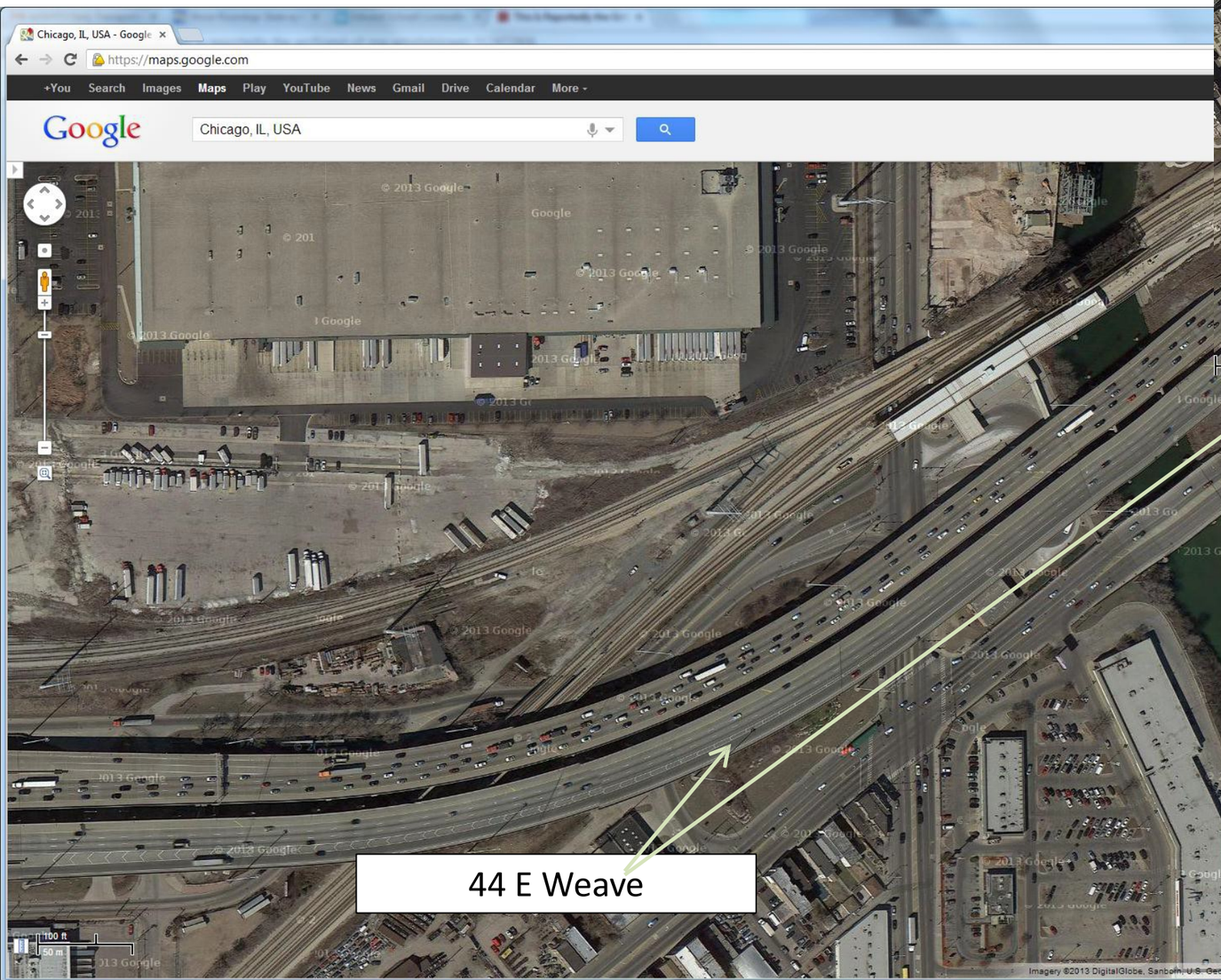
Damen Avenue
Western Side

42 W Merge

42 E Weave

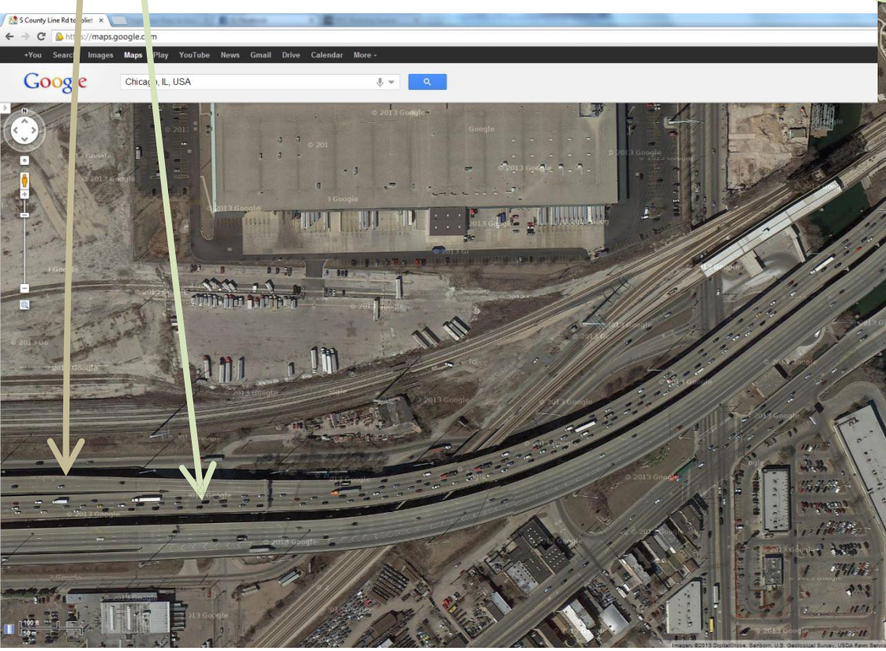
Damen Avenue
Signal

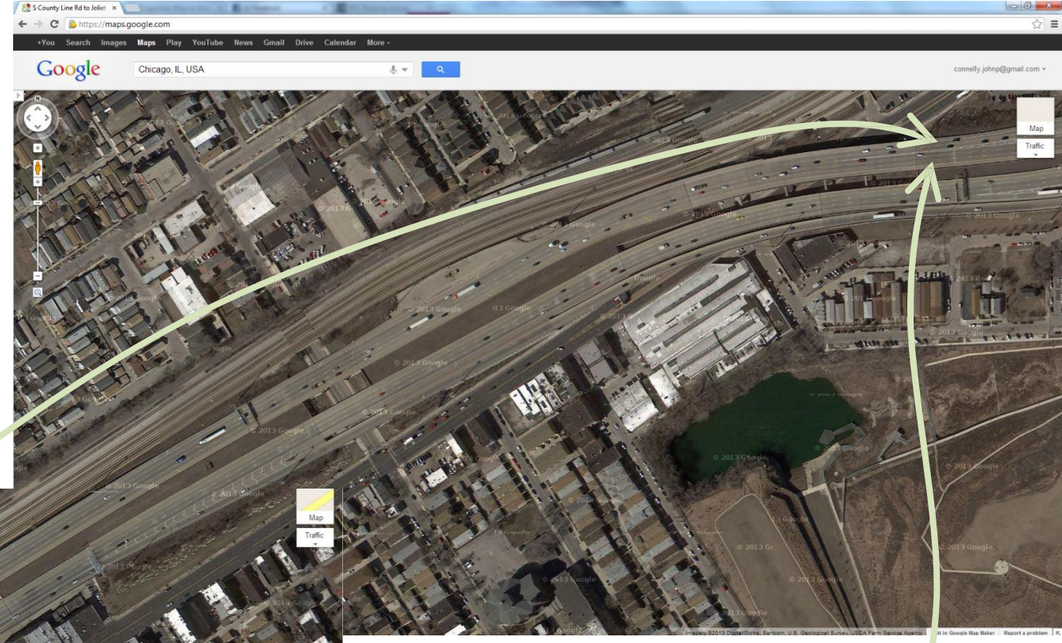
Damen Avenue
Eastern Side



44 E Weave

#44W1-Diverge
#44W2-3Lane Freeway
#44W3-4 Lane Freeway
#44W4-Merge





#45W-3 Lane Freeway


Chicago, IL, USA - Google
https://maps.google.com
+You Search Images Maps Play YouTube News Gmail Drive Calendar More
Google
Chicago, IL, USA
Between Damen Ave and I-90/94
45 E Diverge
44 E Weave
Map
Traffic
100 ft
50 m
Imagery ©2013 DigitalGlobe, Sanborn, U.S. Geological Survey, USDA Farm Service Agency
Edit in Google Map Maker
Report a problem

Chicago, IL, USA - Google x

https://maps.google.com

+You Search Images Maps Play YouTube News Gmail Drive Calendar More-

Coogle Chicago, IL, USA

connelly.johnp@gmail.com

1-90/94

Technical Memorandum

I-55 PHASE I ENGINEERING STUDY

Veterans Memorial Tollway (I-355) to Dan Ryan Expressway (I-90/94)

BASE AND DESIGN YEAR NO-BUILD MAINLINE ROADWAY PERFORMANCE

APPENDIX A 2012 LEVEL OF SERVICE
AUGUST 2014

NOTE ON HCS DIRECTION REFERENCES:

I-55 is designated a north-south facility, and this orientation is used in this memorandum. Some of the HCS file output sheets refer to eastbound or westbound; when this is used “eastbound” refers to I-55 northbound and “westbound” refers to I-55 southbound.

Mainline Segment

Northbound AM

HCS 2010: Basic Freeway Segments Release 6.1

Phone: Fax:
E-mail:

Operational Analysis

Analyst:	Alex Ericksen
Agency or Company:	
Date Performed:	1/9/2014
Analysis Time Period:	AM Peak Hour
Freeway/Direction:	I-55 Eastbound
From/To:	I-355 to Lemont Rd
Jurisdiction:	
Analysis Year:	
Description:	

Flow Inputs and Adjustments

Volume, V	3938	veh/h
Peak-hour factor, PHF	0.95	
Peak 15-min volume, v15	1036	v
Trucks and buses	9	%
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	0.957	
Driver population factor, fp	1.00	
Flow rate, vp	1083	pc/h/ln

Speed Inputs and Adjustments

Lane width	-	ft
Right-side lateral clearance	-	ft
Total ramp density, TRD	-	ramps/mi
Number of lanes, N	4	
Free-flow speed:	Measured	
FFS or BFFS	60.0	mi/h
Lane width adjustment, fLW	-	mi/h
Lateral clearance adjustment, fLC	-	mi/h
TRD adjustment	-	mi/h
Free-flow speed, FFS	60.0	mi/h

LOS and Performance Measures

Flow rate, vp	1083	pc/h/ln
Free-flow speed, FFS	60.0	mi/h
Average passenger-car speed, S	60.0	mi/h
Number of lanes, N	4	
Density, D	18.0+	pc/mi/ln
Level of service, LOS	C	

Overall results are not computed when free-flow speed is less than 55 mph.

BASIC FREEWAY SEGMENTS WORKSHEET

General Information

Analyst	*RK*
Agency or Company	*CDM Smith*
Date Performed	*4/5/2013*
Analysis Time Period	*AM Peak*

Site Information

Highway/Direction of Travel	*I-55/NB*
From/To	*Lemont Rd/Cass Ave*
Jurisdiction	*DuPage Co.*
Analysis Year	*2012*

Project Description *IDOT I-55 Phase I Engg Study*

☑ Oper.(LOS) ☐ Des.(N) ☐ Planning Data

Flow Inputs

Volume, V	*4854*	veh/h	Peak-Hour Factor, PHF	*0.95*
AADT		veh/day	%Trucks and Buses, P_T	*12*
Peak-Hr Prop. of AADT, K			%RVs, P_R	*0*
Peak-Hr Direction Prop, D			General Terrain:	*Level*
DDHV = AADT x K x D		veh/h	Grade % Length Up/Down %	*mi*

Calculate Flow Adjustments

f_p	*1.00*	E_R	*1.2*
E_T	*1.5*	$f_{HV} = 1/(1+P_T(E_T - 1) + P_R(E_R - 1))$	*0.943*

Speed Inputs

Lane Width		ft
Rt-Side Lat. Clearance		ft
Number of Lanes, N	*3*	
Total Ramp Density, TRD		ramps/mi
FFS (measured)	*60.0*	mph
Base free-flow Speed, BFFS		mph

Calc Speed Adj and FFS

f_{LW}		mph
f_{LC}		mph
TRD Adjustment		mph
FFS	*60.0*	mph

LOS and Performance Measures

Operational (LOS)

v_p = (V or DDHV) / (PHF x N x f_{HV} x f_p)	*1805*	pc/h/ln
S	*59.2*	mph
D = v_p / S	*30.5*	pc/mi/ln
LOS	*D*	

Design (N)

Design (N)

Design LOS		
v_p = (V or DDHV) / (PHF x N x f_{HV} x f_p)		pc/h/ln
S		mph
D = v_p / S		pc/mi/ln
Required Number of Lanes, N		

Glossary

N - Number of lanes	S - Speed
V - Hourly volume	D - Density
v_p - Flow rate	FFS - Free-flow speed
LOS - Level of service	BFFS - Base free-flow speed
DDHV - Directional design hour volume	

Factor Location

E_R - Exhibits 11-10, 11-12	f_{LW} - Exhibit 11-8
E_T - Exhibits 11-10, 11-11, 11-13	f_{LC} - Exhibit 11-9
f_p - Page 11-18	TRD - Page 11-11
LOS, S, FFS, v_p - Exhibits 11-2, 11-3	

BASIC FREEWAY SEGMENTS WORKSHEET

General Information		Site Information	
Analyst	*RK*	Highway/Direction of Travel	*I-55/NB*
Agency or Company	*CDM Smith*	From/To	*Cass/IL 83*
Date Performed	*4/5/2013*	Jurisdiction	*DuPage Co.*
Analysis Time Period	*AM Peak*	Analysis Year	*2012*

Project Description *IDOT I-55 Phase I Engg Study*

☑ Oper.(LOS) ☐ Des.(N) ☐ Planning Data

Flow Inputs

Volume, V	*4805*	veh/h	Peak-Hour Factor, PHF	*0.95*	
AADT		veh/day	%Trucks and Buses, P_T	*11*	
Peak-Hr Prop. of AADT, K			%RVs, P_R	*0*	
Peak-Hr Direction Prop, D			General Terrain:	*Level*	
DDHV = AADT x K x D		veh/h	Grade % Length Up/Down %	*mi*	

Calculate Flow Adjustments

f_p	*1.00*		E_R	*1.2*
E_T	*1.5*		$f_{HV} = 1/[1+P_T(E_T - 1) + P_R(E_R - 1)]$	*0.948*

Speed Inputs

Lane Width		ft
Rt-Side Lat. Clearance		ft
Number of Lanes, N	*3*	
Total Ramp Density, TRD		ramps/mi
FFS (measured)	*60.0*	mph
Base free-flow Speed, BFFS		mph

Calc Speed Adj and FFS

f_{LW}		mph
f_{LC}		mph
TRD Adjustment		mph
FFS	*60.0*	mph

LOS and Performance Measures

Operational (LOS)

v_p = (V or DDHV) / (PHF x N x f_{HV} x f_p)	*1779*	pc/h/ln
S	*59.4*	mph
D = v_p / S	*29.9*	pc/mi/ln
LOS	*D*	

Design (N)

Design (N)

Design LOS		
v_p = (V or DDHV) / (PHF x N x f_{HV} x f_p)		pc/h/ln
S		mph
D = v_p / S		pc/mi/ln
Required Number of Lanes, N		

Glossary

N - Number of lanes	S - Speed
V - Hourly volume	D - Density
v_p - Flow rate	FFS - Free-flow speed
LOS - Level of service	BFFS - Base free-flow speed
DDHV - Directional design hour volume	

Factor Location

E_R - Exhibits 11-10, 11-12	f_{LW} - Exhibit 11-8
E_T - Exhibits 11-10, 11-11, 11-13	f_{LC} - Exhibit 11-9
f_p - Page 11-18	TRD - Page 11-11
LOS, S, FFS, v_p - Exhibits 11-2, 11-3	

BASIC FREEWAY SEGMENTS WORKSHEET

General Information		Site Information	
Analyst	*RK*	Highway/Direction of Travel	*I-55/NB*
Agency or Company	*CDM Smith*	From/To	*IL 83/County Line Rd*
Date Performed	*11/9/2012*	Jurisdiction	*DuPage Co.*
Analysis Time Period	*AM Peak*	Analysis Year	*2012*
Project Description	*IDOT I-55 Phase I Engg Study*		

☑ Oper.(LOS) ☐ Des.(N) ☐ Planning Data

Flow Inputs

Volume, V	*4361*	veh/h	Peak-Hour Factor, PHF	*0.95*
AADT		veh/day	%Trucks and Buses, P_T	*11*
Peak-Hr Prop. of AADT, K			%RVs, P_R	*0*
Peak-Hr Direction Prop, D			General Terrain:	*Level*
DDHV = AADT x K x D		veh/h	Grade % Length	*mi*
			Up/Down %	

Calculate Flow Adjustments

f_p	*1.00*	E_R	*1.2*
E_T	*1.5*	$f_{HV} = 1/[1+P_T(E_T - 1) + P_R(E_R - 1)]$	*0.948*

Speed Inputs

Lane Width		ft
Rt-Side Lat. Clearance		ft
Number of Lanes, N	*3*	
Total Ramp Density, TRD		ramps/mi
FFS (measured)	*60.0*	mph
Base free-flow Speed, BFFS		mph

Calc Speed Adj and FFS

f_{LW}		mph
f_{LC}		mph
TRD Adjustment		mph
FFS	*60.0*	mph

LOS and Performance Measures

Operational (LOS)

v_p = (V or DDHV) / (PHF x N x f_{HV} x f_p)	*1614*	pc/h/ln
S	*60.0*	mph
D = v_p / S	*26.9*	pc/mi/ln
LOS	*D*	

Design (N)

Design (N)

Design LOS		
v_p = (V or DDHV) / (PHF x N x f_{HV} x f_p)		pc/h/ln
S		mph
D = v_p / S		pc/mi/ln
Required Number of Lanes, N		

Glossary

N - Number of lanes	S - Speed
V - Hourly volume	D - Density
v_p - Flow rate	FFS - Free-flow speed
LOS - Level of service	BFFS - Base free-flow speed
DDHV - Directional design hour volume	

Factor Location

E_R - Exhibits 11-10, 11-12	f_{LW} - Exhibit 11-8
E_T - Exhibits 11-10, 11-11, 11-13	f_{LC} - Exhibit 11-9
f_p - Page 11-18	TRD - Page 11-11
LOS, S, FFS, v_p - Exhibits 11-2, 11-3	

BASIC FREEWAY SEGMENTS WORKSHEET

General Information		Site Information	
Analyst	*RK*	Highway/Direction of Travel	*I-55/NB*
Agency or Company	*CDM Smith*	From/To	*County Line Rd/Joliet Rd*
Date Performed	*4/5/2013*	Jurisdiction	*DuPage/Cook Co.*
Analysis Time Period	*AM Peak*	Analysis Year	*2012*

Project Description *IDOT I-55 Phase I Engg Study*

☑ Oper.(LOS) ☐ Des.(N) ☐ Planning Data

Flow Inputs

Volume, V	*4628*	veh/h	Peak-Hour Factor, PHF	*0.95*
AADT		veh/day	%Trucks and Buses, P_T	*11*
Peak-Hr Prop. of AADT, K			%RVs, P_R	*0*
Peak-Hr Direction Prop, D			General Terrain:	*Level*
DDHV = AADT x K x D		veh/h	Grade % Length Up/Down %	*mi*

Calculate Flow Adjustments

f_p	*1.00*	E_R	*1.2*
E_T	*1.5*	$f_{HV} = 1/[1+P_T(E_T - 1) + P_R(E_R - 1)]$	*0.948*

Speed Inputs			Calc Speed Adj and FFS		
Lane Width		ft			
Rt-Side Lat. Clearance		ft	f_{LW}		mph
Number of Lanes, N	*3*		f_{LC}		mph
Total Ramp Density, TRD		ramps/mi	TRD Adjustment		mph
FFS (measured)	*60.0*	mph	FFS	*60.0*	mph
Base free-flow Speed, BFFS		mph			

LOS and Performance Measures			Design (N)	
Operational (LOS)			Design (N)	
v_p = (V or DDHV) / (PHF x N x f_{HV} x f_p)	*1713*	pc/h/ln	Design LOS	
S	*59.8*	mph	v_p = (V or DDHV) / (PHF x N x f_{HV} x f_p)	pc/h/ln
D = v_p / S	*28.7*	pc/mi/ln	S	mph
LOS	*D*		D = v_p / S	pc/mi/ln
			Required Number of Lanes, N	

Glossary		Factor Location	
N - Number of lanes	S - Speed	E_R - Exhibits 11-10, 11-12	f_{LW} - Exhibit 11-8
V - Hourly volume	D - Density	E_T - Exhibits 11-10, 11-11, 11-13	f_{LC} - Exhibit 11-9
v_p - Flow rate	FFS - Free-flow speed	f_p - Page 11-18	TRD - Page 11-11
LOS - Level of service	BFFS - Base free-flow speed	LOS, S, FFS, v_p - Exhibits 11-2, 11-3	
DDHV - Directional design hour volume			

BASIC FREEWAY SEGMENTS WORKSHEET

General Information

Analyst	*RK*
Agency or Company	*CDM Smith*
Date Performed	*4/5/2013*
Analysis Time Period	*AM Peak*

Site Information

Highway/Direction of Travel	*I-55/NB*
From/To	*Joliet Rd/I-294*
Jurisdiction	*DuPage/Cook Co.*
Analysis Year	*2012*

Project Description *IDOT I-55 Phase I Engg Study*

☑ Oper.(LOS) ☐ Des.(N) ☐ Planning Data

Flow Inputs

Volume, V	*4135*	veh/h	Peak-Hour Factor, PHF	*0.95*
AADT		veh/day	%Trucks and Buses, P_T	*11*
Peak-Hr Prop. of AADT, K			%RVs, P_R	*0*
Peak-Hr Direction Prop, D			General Terrain:	*Level*
DDHV = AADT x K x D		veh/h	Grade % Length	*mi*
			Up/Down %	

Calculate Flow Adjustments

f_p	*1.00*	E_R	*1.2*
E_T	*1.5*	$f_{HV} = 1/[1+P_T(E_T - 1) + P_R(E_R - 1)]$	*0.948*

Speed Inputs

Lane Width		ft
Rt-Side Lat. Clearance		ft
Number of Lanes, N	*3*	
Total Ramp Density, TRD		ramps/mi
FFS (measured)	*60.0*	mph
Base free-flow Speed, BFFS		mph

Calc Speed Adj and FFS

f_{LW}		mph
f_{LC}		mph
TRD Adjustment		mph
FFS	*60.0*	mph

LOS and Performance Measures

Operational (LOS)

v_p = (V or DDHV) / (PHF x N x f_{HV} x f_p)	*1531*	pc/h/ln
S	*60.0*	mph
D = v_p / S	*25.5*	pc/mi/ln
LOS	*C*	

Design (N)

Design (N)

Design LOS		
v_p = (V or DDHV) / (PHF x N x f_{HV} x f_p)		pc/h/ln
S		mph
D = v_p / S		pc/mi/ln
Required Number of Lanes, N		

Glossary

N - Number of lanes	S - Speed
V - Hourly volume	D - Density
v_p - Flow rate	FFS - Free-flow speed
LOS - Level of service	BFFS - Base free-flow speed
DDHV - Directional design hour volume	

Factor Location

E_R - Exhibits 11-10, 11-12	f_{LW} - Exhibit 11-8
E_T - Exhibits 10-10, 11-11, 11-13	f_{LC} - Exhibit 11-9
f_p - Page 11-18	TRD - Page 11-11
LOS, S, FFS, v_p - Exhibits 11-2, 11-3	

BASIC FREEWAY SEGMENTS WORKSHEET

General Information		Site Information	
Analyst	*RK*	Highway/Direction of Travel	*I-55/NB*
Agency or Company	*CDM Smith*	From/To	*Lagrange Rd/IL 171 Archer Ave*
Date Performed	*4/5/2013*	Jurisdiction	*Cook Co.*
Analysis Time Period	*AM Peak*	Analysis Year	*2012*
Project Description	*IDOT I-55 Phase I Engg Study*		

☑ Oper.(LOS) ☐ Des.(N) ☐ Planning Data

Flow Inputs

Volume, V	*4188*	veh/h	Peak-Hour Factor, PHF	*0.95*
AADT		veh/day	%Trucks and Buses, P_T	*11*
Peak-Hr Prop. of AADT, K			%RVs, P_R	*0*
Peak-Hr Direction Prop, D			General Terrain:	*Level*
DDHV = AADT x K x D		veh/h	Grade % Length Up/Down %	*mi*

Calculate Flow Adjustments

f_p	*1.00*	E_R	*1.2*
E_T	*1.5*	$f_{HV} = 1/[1+P_T(E_T - 1) + P_R(E_R - 1)]$	*0.948*

Speed Inputs

Lane Width		ft
Rt-Side Lat. Clearance		ft
Number of Lanes, N	*3*	
Total Ramp Density, TRD		ramps/mi
FFS (measured)	*60.0*	mph
Base free-flow Speed, BFFS		mph

Calc Speed Adj and FFS

f_{LW}		mph
f_{LC}		mph
TRD Adjustment		mph
FFS	*60.0*	mph

LOS and Performance Measures

Operational (LOS)

v_p = (V or DDHV) / (PHF x N x f_{HV} x f_p)	*1550*	pc/h/ln
S	*60.0*	mph
D = v_p / S	*25.8*	pc/mi/ln
LOS	*C*	

Design (N)

Design (N)

Design LOS		
v_p = (V or DDHV) / (PHF x N x f_{HV} x f_p)		pc/h/ln
S		mph
D = v_p / S		pc/mi/ln
Required Number of Lanes, N		

Glossary

N - Number of lanes	S - Speed
V - Hourly volume	D - Density
v_p - Flow rate	FFS - Free-flow speed
LOS - Level of service	BFFS - Base free-flow speed
DDHV - Directional design hour volume	

Factor Location

E_R - Exhibits 11-10, 11-12	f_{LW} - Exhibit 11-8
E_T - Exhibits 11-10, 11-11, 11-13	f_{LC} - Exhibit 11-9
f_p - Page 11-18	TRD - Page 11-11
LOS, S, FFS, v_p - Exhibits 11-2, 11-3	

BASIC FREEWAY SEGMENTS WORKSHEET

General Information

Analyst	*RK*
Agency or Company	*CDM Smith*
Date Performed	*4/5/2013*
Analysis Time Period	*AM Peak*

Site Information

Highway/Direction of Travel	*I-55/NB*
From/To	*Harlem Ave/Central Ave*
Jurisdiction	*Cook Co.*
Analysis Year	*2012*

Project Description *IDOT I-55 Phase I Engg Study*

☑ Oper.(LOS) ☐ Des.(N) ☐ Planning Data

Flow Inputs

Volume, V	*4714*	veh/h	Peak-Hour Factor, PHF	*0.95*
AADT		veh/day	%Trucks and Buses, P_T	*14*
Peak-Hr Prop. of AADT, K			%RVs, P_R	*0*
Peak-Hr Direction Prop, D			General Terrain:	*Level*
DDHV = AADT x K x D		veh/h	Grade % Length Up/Down %	*mi*

Calculate Flow Adjustments

f_p	*1.00*	E_R	*1.2*
E_T	*1.5*	$f_{HV} = 1/[1+P_T(E_T - 1) + P_R(E_R - 1)]$	*0.935*

Speed Inputs

Lane Width		ft
Rt-Side Lat. Clearance		ft
Number of Lanes, N	*3*	
Total Ramp Density, TRD		ramps/mi
FFS (measured)	*60.0*	mph
Base free-flow Speed, BFFS		mph

Calc Speed Adj and FFS

f_{LW}		mph
f_{LC}		mph
TRD Adjustment		mph
FFS	*60.0*	mph

LOS and Performance Measures

Operational (LOS)

v_p = (V or DDHV) / (PHF x N x f_{HV} x f_p)	*1770*	pc/h/ln
S	*59.5*	mph
D = v_p / S	*29.8*	pc/mi/ln
LOS	*D*	

Design (N)

Design (N)

Design LOS		
v_p = (V or DDHV) / (PHF x N x f_{HV} x f_p)		pc/h/ln
S		mph
D = v_p / S		pc/mi/ln
Required Number of Lanes, N		

Glossary

N - Number of lanes	S - Speed
V - Hourly volume	D - Density
v_p - Flow rate	FFS - Free-flow speed
LOS - Level of service	BFFS - Base free-flow speed
DDHV - Directional design hour volume	

Factor Location

E_R - Exhibits 11-10, 11-12	f_{LW} - Exhibit 11-8
E_T - Exhibits 11-10, 11-11, 11-13	f_{LC} - Exhibit 11-9
f_p - Page 11-18	TRD - Page 11-11
LOS, S, FFS, v_p - Exhibits 11-2, 11-3	

BASIC FREEWAY SEGMENTS WORKSHEET

General Information

Analyst	*RK*
Agency or Company	*CDM Smith*
Date Performed	*4/5/2013*
Analysis Time Period	*AM Peak*

Site Information

Highway/Direction of Travel	*I-55/NB*
From/To	*Central Ave/Cicero Ave*
Jurisdiction	*Cook Co.*
Analysis Year	*2012*

Project Description *IDOT I-55 Phase I Engg Study*

☑ Oper.(LOS) ☐ Des.(N) ☐ Planning Data

Flow Inputs

Volume, V	*4531*	veh/h	Peak-Hour Factor, PHF	*0.95*
AADT		veh/day	%Trucks and Buses, P_T	*14*
Peak-Hr Prop. of AADT, K			%RVs, P_R	*0*
Peak-Hr Direction Prop, D			General Terrain:	*Level*
DDHV = AADT x K x D		veh/h	Grade % Length Up/Down %	*mi*

Calculate Flow Adjustments

f_p	*1.00*	E_R	*1.2*
E_T	*1.5*	$f_{HV} = 1/[1+P_T(E_T - 1) + P_R(E_R - 1)]$	*0.935*

Speed Inputs

Lane Width		ft
Rt-Side Lat. Clearance		ft
Number of Lanes, N	*3*	
Total Ramp Density, TRD		ramps/mi
FFS (measured)	*60.0*	mph
Base free-flow Speed, BFFS		mph

Calc Speed Adj and FFS

f_{LW}		mph
f_{LC}		mph
TRD Adjustment		mph
FFS	*60.0*	mph

LOS and Performance Measures

Operational (LOS)

v_p = (V or DDHV) / (PHF x N x f_{HV} x f_p)	*1701*	pc/h/ln
S	*59.8*	mph
D = v_p / S	*28.4*	pc/mi/ln
LOS	*D*	

Design (N)

Design (N)

Design LOS	
v_p = (V or DDHV) / (PHF x N x f_{HV} x f_p)	pc/h/ln
S	mph
D = v_p / S	pc/mi/ln
Required Number of Lanes, N	

Glossary

N - Number of lanes	S - Speed
V - Hourly volume	D - Density
v_p - Flow rate	FFS - Free-flow speed
LOS - Level of service	BFFS - Base free-flow speed
DDHV - Directional design hour volume	

Factor Location

E_R - Exhibits 11-10, 11-12	f_{LW} - Exhibit 11-8
E_T - Exhibits 10-10, 11-11, 11-13	f_{LC} - Exhibit 11-9
f_p - Page 11-18	TRD - Page 11-11
LOS, S, FFS, v_p - Exhibits 11-2, 11-3	

BASIC FREEWAY SEGMENTS WORKSHEET

General Information

Analyst	*RK*
Agency or Company	*CDM Smith*
Date Performed	*4/5/2013*
Analysis Time Period	*AM Peak*

Site Information

Highway/Direction of Travel	*I-55/NB*
From/To	*Cicero Ave/Pulaski Rd*
Jurisdiction	*Cook Co.*
Analysis Year	*2012*

Project Description *IDOT I-55 Phase I Engg Study*

☑ Oper.(LOS) ☐ Des.(N) ☒ Planning Data

Flow Inputs

Volume, V	*4909*	veh/h	Peak-Hour Factor, PHF	*0.95*
AADT		veh/day	%Trucks and Buses, P_T	*14*
Peak-Hr Prop. of AADT, K			%RVs, P_R	*0*
Peak-Hr Direction Prop, D			General Terrain:	*Level*
DDHV = AADT x K x D		veh/h	Grade % Length	*mi*
			Up/Down %	

Calculate Flow Adjustments

f_p	*1.00*	E_R	*1.2*
E_T	*1.5*	$f_{HV} = 1/[1+P_T(E_T - 1) + P_R(E_R - 1)]$	*0.935*

Speed Inputs

Lane Width		ft
Rt-Side Lat. Clearance		ft
Number of Lanes, N	*3*	
Total Ramp Density, TRD		ramps/mi
FFS (measured)	*60.0*	mph
Base free-flow Speed, BFFS		mph

Calc Speed Adj and FFS

f_{LW}		mph
f_{LC}		mph
TRD Adjustment		mph
FFS	*60.0*	mph

LOS and Performance Measures

Operational (LOS)

v_p = (V or DDHV) / (PHF x N x f_{HV} x f_p)	*1843*	pc/h/ln
S	*58.9*	mph
D = v_p / S	*31.3*	pc/mi/ln
LOS	*D*	

Design (N)

Design (N)

Design LOS		
v_p = (V or DDHV) / (PHF x N x f_{HV} x f_p)		pc/h/ln
S		mph
D = v_p / S		pc/mi/ln
Required Number of Lanes, N		

Glossary

N - Number of lanes	S - Speed
V - Hourly volume	D - Density
v_p - Flow rate	FFS - Free-flow speed
LOS - Level of service	BFFS - Base free-flow speed
DDHV - Directional design hour volume	

Factor Location

E_R - Exhibits 11-10, 11-12	f_{LW} - Exhibit 11-8
E_T - Exhibits 11-10, 11-11, 11-13	f_{LC} - Exhibit 11-9
f_p - Page 11-18	TRD - Page 11-11
LOS, S, FFS, v_p - Exhibits 11-2, 11-3	

BASIC FREEWAY SEGMENTS WORKSHEET

General Information		Site Information	
Analyst	*RK*	Highway/Direction of Travel	*I-55/NB*
Agency or Company	*CDM Smith*	From/To	*Pulaski Rd/Kedzie Ave*
Date Performed	*4/5/2013*	Jurisdiction	*Cook Co.*
Analysis Time Period	*AM Peak*	Analysis Year	*2012*

Project Description *IDOT I-55 Phase I Engg Study*

☑ Oper.(LOS) ☐ Des.(N) ☐ Planning Data

Flow Inputs				
Volume, V	*5800*	veh/h	Peak-Hour Factor, PHF	*0.95*
AADT		veh/day	%Trucks and Buses, P_T	*14*
Peak-Hr Prop. of AADT, K			%RVs, P_R	*0*
Peak-Hr Direction Prop, D			General Terrain:	*Level*
DDHV = AADT x K x D		veh/h	Grade % Length Up/Down %	*mi*

Calculate Flow Adjustments			
f_p	*1.00*	E_R	*1.2*
E_T	*1.5*	$f_{HV} = 1/[1+P_T(E_T - 1) + P_R(E_R - 1)]$	*0.935*

Speed Inputs			Calc Speed Adj and FFS		
Lane Width		ft			
Rt-Side Lat. Clearance		ft	f_{LW}		mph
Number of Lanes, N	*3*		f_{LC}		mph
Total Ramp Density, TRD		ramps/mi	TRD Adjustment		mph
FFS (measured)	*60.0*	mph	FFS	*60.0*	mph
Base free-flow Speed, BFFS		mph			

LOS and Performance Measures			Design (N)		
Operational (LOS)			Design (N)		
v_p = (V or DDHV) / (PHF x N x f_{HV} x f_p)	*2178*	pc/h/ln	Design LOS		
			v_p = (V or DDHV) / (PHF x N x f_{HV} x f_p)		pc/h/ln
S	*53.9*	mph	S		mph
D = v_p / S	*40.4*	pc/mi/ln	D = v_p / S		pc/mi/ln
LOS	*E*		Required Number of Lanes, N		

Glossary		Factor Location	
N - Number of lanes	S - Speed	E_R - Exhibits 11-10, 11-12	f_{LW} - Exhibit 11-8
V - Hourly volume	D - Density	E_T - Exhibits 11-10, 11-11, 11-13	f_{LC} - Exhibit 11-9
v_p - Flow rate	FFS - Free-flow speed	f_p - Page 11-18	TRD - Page 11-11
LOS - Level of service	BFFS - Base free-flow speed	LOS, S, FFS, v_p - Exhibits 11-2, 11-3	
DDHV - Directional design hour volume			

BASIC FREEWAY SEGMENTS WORKSHEET

General Information		Site Information	
Analyst	*RK*	Highway/Direction of Travel	*I-55/NB*
Agency or Company	*CDM Smith*	From/To	*Kedzie Ave/California Ave*
Date Performed	*4/5/2013*	Jurisdiction	*Cook Co.*
Analysis Time Period	*AM Peak*	Analysis Year	*2012*

Project Description *IDOT I-55 Phase I Engg Study*

☑ Oper.(LOS) ☐ Des.(N) ☐ Planning Data

Flow Inputs

Volume, V	*5103*	veh/h	Peak-Hour Factor, PHF	*0.95*
AADT		veh/day	%Trucks and Buses, P_T	*14*
Peak-Hr Prop. of AADT, K			%RVs, P_R	*0*
Peak-Hr Direction Prop, D			General Terrain:	*Level*
DDHV = AADT x K x D		veh/h	Grade % Length Up/Down %	*mi*

Calculate Flow Adjustments

f_p	*1.00*	E_R	*1.2*
E_T	*1.5*	$f_{HV} = 1/[1+P_T(E_T - 1) + P_R(E_R - 1)]$	*0.935*

Speed Inputs

Lane Width		ft
Rt-Side Lat. Clearance		ft
Number of Lanes, N	*3*	
Total Ramp Density, TRD		ramps/mi
FFS (measured)	*60.0*	mph
Base free-flow Speed, BFFS		mph

Calc Speed Adj and FFS

f_{LW}		mph
f_{LC}		mph
TRD Adjustment		mph
FFS	*60.0*	mph

LOS and Performance Measures

Operational (LOS)

v_p = (V or DDHV) / (PHF x N x f_{HV} x f_p)	*1916*	pc/h/ln
S	*58.2*	mph
D = v_p / S	*32.9*	pc/mi/ln
LOS	*D*	

Design (N)

Design (N)

Design LOS		
v_p = (V or DDHV) / (PHF x N x f_{HV} x f_p)		pc/h/ln
S		mph
D = v_p / S		pc/mi/ln
Required Number of Lanes, N		

Glossary

N - Number of lanes	S - Speed
V - Hourly volume	D - Density
v_p - Flow rate	FFS - Free-flow speed
LOS - Level of service	BFFS - Base free-flow speed
DDHV - Directional design hour volume	

Factor Location

E_R - Exhibits 11-10, 11-12	f_{LW} - Exhibit 11-8
E_T - Exhibits 11-10, 11-11, 11-13	f_{LC} - Exhibit 11-9
f_p - Page 11-18	TRD - Page 11-11
LOS, S, FFS, v_p - Exhibits 11-2, 11-3	

Mainline Segment

Northbound PM

HCS 2010: Basic Freeway Segments Release 6.1

Phone: Fax:
E-mail:

Operational Analysis

Analyst:	Alex Ericksen
Agency or Company:	
Date Performed:	1/9/2014
Analysis Time Period:	PM Off Peak Hour
Freeway/Direction:	I-55 Eastbound
From/To:	I-355 to Lemont Rd
Jurisdiction:	
Analysis Year:	
Description:	

Flow Inputs and Adjustments

Volume, V	3843	veh/h
Peak-hour factor, PHF	0.95	
Peak 15-min volume, v15	1011	v
Trucks and buses	11	%
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	0.948	
Driver population factor, fp	1.00	
Flow rate, vp	1067	pc/h/ln

Speed Inputs and Adjustments

Lane width	-	ft
Right-side lateral clearance	-	ft
Total ramp density, TRD	-	ramps/mi
Number of lanes, N	4	
Free-flow speed:	Measured	
FFS or BFFS	60.0	mi/h
Lane width adjustment, fLW	-	mi/h
Lateral clearance adjustment, fLC	-	mi/h
TRD adjustment	-	mi/h
Free-flow speed, FFS	60.0	mi/h

LOS and Performance Measures

Flow rate, vp	1067	pc/h/ln
Free-flow speed, FFS	60.0	mi/h
Average passenger-car speed, S	60.0	mi/h
Number of lanes, N	4	
Density, D	17.8	pc/mi/ln
Level of service, LOS	B	

Overall results are not computed when free-flow speed is less than 55 mph.

BASIC FREEWAY SEGMENTS WORKSHEET

General Information		Site Information	
Analyst	*RK*	Highway/Direction of Travel	*I-55/NB*
Agency or Company	*CDM Smith*	From/To	*Lemont Rd/Cass Ave*
Date Performed	*4/5/2013*	Jurisdiction	*DuPage Co.*
Analysis Time Period	*PM Peak*	Analysis Year	*2012*

Project Description *IDOT I-55 Phase I Engg Study*

☑ Oper.(LOS) ☐ Des.(N) ☐ Planning Data

Flow Inputs

Volume, V	*4480*	veh/h	Peak-Hour Factor, PHF	*0.95*
AADT		veh/day	%Trucks and Buses, P_T	*12*
Peak-Hr Prop. of AADT, K			%RVs, P_R	*0*
Peak-Hr Direction Prop, D			General Terrain:	*Level*
DDHV = AADT x K x D		veh/h	Grade % Length Up/Down %	*mi*

Calculate Flow Adjustments

f_p	*1.00*	E_R	*1.2*
E_T	*1.5*	$f_{HV} = 1/[1+P_T(E_T - 1) + P_R(E_R - 1)]$	*0.943*

Speed Inputs

Lane Width		ft
Rt-Side Lat. Clearance		ft
Number of Lanes, N	*3*	
Total Ramp Density, TRD		ramps/mi
FFS (measured)	*60.0*	mph
Base free-flow Speed, BFFS		mph

Calc Speed Adj and FFS

f_{LW}		mph
f_{LC}		mph
TRD Adjustment		mph
FFS	*60.0*	mph

LOS and Performance Measures

Operational (LOS)

v_p = (V or DDHV) / (PHF x N x f_{HV} x f_p)	*1666*	pc/h/ln
S	*59.9*	mph
D = v_p / S	*27.8*	pc/mi/ln
LOS	*D*	

Design (N)

Design (N)

Design LOS		
v_p = (V or DDHV) / (PHF x N x f_{HV} x f_p)		pc/h/ln
S		mph
D = v_p / S		pc/mi/ln
Required Number of Lanes, N		

Glossary

N - Number of lanes	S - Speed
V - Hourly volume	D - Density
v_p - Flow rate	FFS - Free-flow speed
LOS - Level of service	BFFS - Base free-flow speed
DDHV - Directional design hour volume	

Factor Location

E_R - Exhibits 11-10, 11-12	f_{LW} - Exhibit 11-8
E_T - Exhibits 11-10, 11-11, 11-13	f_{LC} - Exhibit 11-9
f_p - Page 11-18	TRD - Page 11-11
LOS, S, FFS, v_p - Exhibits 11-2, 11-3	

BASIC FREEWAY SEGMENTS WORKSHEET

General Information

Analyst	*RK*
Agency or Company	*CDM Smith*
Date Performed	*4/5/2013*
Analysis Time Period	*PM Peak*

Site Information

Highway/Direction of Travel	*I-55/NB*
From/To	*Cass/IL 83*
Jurisdiction	*DuPage Co.*
Analysis Year	*2012*

Project Description *IDOT I-55 Phase I Engg Study*

☑ Oper.(LOS) ☐ Des.(N) ☐ Planning Data

Flow Inputs

Volume, V	*4450*	veh/h	Peak-Hour Factor, PHF	*0.95*
AADT		veh/day	%Trucks and Buses, P_T	*11*
Peak-Hr Prop. of AADT, K			%RVs, P_R	*0*
Peak-Hr Direction Prop, D			General Terrain:	*Level*
DDHV = AADT x K x D		veh/h	Grade % Length	*mi*
			Up/Down %	

Calculate Flow Adjustments

f_p	*1.00*	E_R	*1.2*
E_T	*1.5*	$f_{HV} = 1/[1+P_T(E_T - 1) + P_R(E_R - 1)]$	*0.948*

Speed Inputs

Lane Width		ft
Rt-Side Lat. Clearance		ft
Number of Lanes, N	*3*	
Total Ramp Density, TRD		ramps/mi
FFS (measured)	*60.0*	mph
Base free-flow Speed, BFFS		mph

Calc Speed Adj and FFS

f_{LW}		mph
f_{LC}		mph
TRD Adjustment		mph
FFS	*60.0*	mph

LOS and Performance Measures

Operational (LOS)

v_p = (V or DDHV) / (PHF x N x f_{HV} x f_p)	*1647*	pc/h/ln
S	*60.0*	mph
D = v_p / S	*27.5*	pc/mi/ln
LOS	*D*	

Design (N)

Design (N)

Design LOS	
v_p = (V or DDHV) / (PHF x N x f_{HV} x f_p)	pc/h/ln
S	mph
D = v_p / S	pc/mi/ln
Required Number of Lanes, N	

Glossary

N - Number of lanes	S - Speed
V - Hourly volume	D - Density
v_p - Flow rate	FFS - Free-flow speed
LOS - Level of service	BFFS - Base free-flow speed
DDHV - Directional design hour volume	

Factor Location

E_R - Exhibits 11-10, 11-12	f_{LW} - Exhibit 11-8
E_T - Exhibits 10-10, 11-11, 11-13	f_{LC} - Exhibit 11-9
f_p - Page 11-18	TRD - Page 11-11
LOS, S, FFS, v_p - Exhibits 11-2, 11-3	

BASIC FREEWAY SEGMENTS WORKSHEET

General Information		Site Information	
Analyst	*RK*	Highway/Direction of Travel	*I-55/NB*
Agency or Company	*CDM Smith*	From/To	*IL 83/County Line Rd*
Date Performed	*4/5/2013*	Jurisdiction	*DuPage Co.*
Analysis Time Period	*PM Peak*	Analysis Year	*2012*

Project Description *IDOT I-55 Phase I Engg Study*

☑ Oper.(LOS) ☐ Des.(N) ☐ Planning Data

Flow Inputs

Volume, V	*4090*	veh/h	Peak-Hour Factor, PHF	*0.95*
AADT		veh/day	%Trucks and Buses, P_T	*10*
Peak-Hr Prop. of AADT, K			%RVs, P_R	*0*
Peak-Hr Direction Prop, D			General Terrain:	*Level*
DDHV = AADT x K x D		veh/h	Grade % Length Up/Down %	*mi*

Calculate Flow Adjustments

f_p	*1.00*	E_R	*1.2*
E_T	*1.5*	$f_{HV} = 1/[1+P_T(E_T - 1) + P_R(E_R - 1)]$	*0.952*

Speed Inputs

Lane Width		ft
Rt-Side Lat. Clearance		ft
Number of Lanes, N	*3*	
Total Ramp Density, TRD		ramps/mi
FFS (measured)	*60.0*	mph
Base free-flow Speed, BFFS		mph

Calc Speed Adj and FFS

f_{LW}		mph
f_{LC}		mph
TRD Adjustment		mph
FFS	*60.0*	mph

LOS and Performance Measures

Operational (LOS)

v_p = (V or DDHV) / (PHF x N x f_{HV} x f_p)	*1507*	pc/h/ln
S	*60.0*	mph
D = v_p / S	*25.1*	pc/mi/ln
LOS	*C*	

Design (N)

Design (N)

Design LOS		
v_p = (V or DDHV) / (PHF x N x f_{HV} x f_p)		pc/h/ln
S		mph
D = v_p / S		pc/mi/ln
Required Number of Lanes, N		

Glossary

N - Number of lanes	S - Speed
V - Hourly volume	D - Density
v_p - Flow rate	FFS - Free-flow speed
LOS - Level of service	BFFS - Base free-flow speed
DDHV - Directional design hour volume	

Factor Location

E_R - Exhibits 11-10, 11-12	f_{LW} - Exhibit 11-8
E_T - Exhibits 11-10, 11-11, 11-13	f_{LC} - Exhibit 11-9
f_p - Page 11-18	TRD - Page 11-11
LOS, S, FFS, v_p - Exhibits 11-2, 11-3	

BASIC FREEWAY SEGMENTS WORKSHEET

General Information

Analyst	*RK*
Agency or Company	*CDM Smith*
Date Performed	*4/5/2013*
Analysis Time Period	*PM Peak*

Site Information

Highway/Direction of Travel	*I-55/NB*
From/To	*County Line Rd/Joliet Rd*
Jurisdiction	*DuPage/Cook Co.*
Analysis Year	*2012*

Project Description *IDOT I-55 Phase I Engg Study*

☑ Oper.(LOS) ☐ Des.(N) ☐ Planning Data

Flow Inputs

Volume, V	*4802*	veh/h	Peak-Hour Factor, PHF	*0.95*
AADT		veh/day	%Trucks and Buses, P_T	*10*
Peak-Hr Prop. of AADT, K			%RVs, P_R	*0*
Peak-Hr Direction Prop, D			General Terrain:	*Level*
DDHV = AADT x K x D		veh/h	Grade % Length Up/Down %	*mi*

Calculate Flow Adjustments

f_p	*1.00*	E_R	*1.2*
E_T	*1.5*	$f_{HV} = 1/[1+P_T(E_T - 1) + P_R(E_R - 1)]$	*0.952*

Speed Inputs

Lane Width		ft
Rt-Side Lat. Clearance		ft
Number of Lanes, N	*3*	
Total Ramp Density, TRD		ramps/mi
FFS (measured)	*60.0*	mph
Base free-flow Speed, BFFS		mph

Calc Speed Adj and FFS

f_{LW}		mph
f_{LC}		mph
TRD Adjustment		mph
FFS	*60.0*	mph

LOS and Performance Measures

Operational (LOS)

v_p = (V or DDHV) / (PHF x N x f_{HV} x f_p)	*1769*	pc/h/ln
S	*59.5*	mph
D = v_p / S	*29.7*	pc/mi/ln
LOS	*D*	

Design (N)

Design (N)

Design LOS	
v_p = (V or DDHV) / (PHF x N x f_{HV} x f_p)	pc/h/ln
S	mph
D = v_p / S	pc/mi/ln
Required Number of Lanes, N	

Glossary

N - Number of lanes	S - Speed
V - Hourly volume	D - Density
v_p - Flow rate	FFS - Free-flow speed
LOS - Level of service	BFFS - Base free-flow speed
DDHV - Directional design hour volume	

Factor Location

E_R - Exhibits 11-10, 11-12	f_{LW} - Exhibit 11-8
E_T - Exhibits 11-10, 11-11, 11-13	f_{LC} - Exhibit 11-9
f_p - Page 11-18	TRD - Page 11-11
LOS, S, FFS, v_p - Exhibits 11-2, 11-3	

BASIC FREEWAY SEGMENTS WORKSHEET

General Information		Site Information	
Analyst	*RK*	Highway/Direction of Travel	*I-55/NB*
Agency or Company	*CDM Smith*	From/To	*Joliet Rd/I-294*
Date Performed	*4/5/2013*	Jurisdiction	*DuPage/Cook Co.*
Analysis Time Period	*PM Peak*	Analysis Year	*2012*

Project Description *IDOT I-55 Phase I Engg Study*

☑ Oper.(LOS) ☐ Des.(N) ☐ Planning Data

Flow Inputs

Volume, V	*4455*	veh/h	Peak-Hour Factor, PHF	*0.95*
AADT		veh/day	%Trucks and Buses, P_T	*10*
Peak-Hr Prop. of AADT, K			%RVs, P_R	*0*
Peak-Hr Direction Prop, D			General Terrain:	*Level*
DDHV = AADT x K x D		veh/h	Grade % Length Up/Down %	*mi*

Calculate Flow Adjustments

f_p	*1.00*	E_R	*1.2*
E_T	*1.5*	$f_{HV} = 1/[1+P_T(E_T - 1) + P_R(E_R - 1)]$	*0.952*

Speed Inputs

Lane Width		ft
Rt-Side Lat. Clearance		ft
Number of Lanes, N	*3*	
Total Ramp Density, TRD		ramps/mi
FFS (measured)	*60.0*	mph
Base free-flow Speed, BFFS		mph

Calc Speed Adj and FFS

f_{LW}		mph
f_{LC}		mph
TRD Adjustment		mph
FFS	*60.0*	mph

LOS and Performance Measures

Operational (LOS)

v_p = (V or DDHV) / (PHF x N x f_{HV} x f_p)	*1641*	pc/h/ln
S	*60.0*	mph
D = v_p / S	*27.4*	pc/mi/ln
LOS	*D*	

Design (N)

Design (N)

Design LOS		
v_p = (V or DDHV) / (PHF x N x f_{HV} x f_p)		pc/h/ln
S		mph
D = v_p / S		pc/mi/ln
Required Number of Lanes, N		

Glossary

N - Number of lanes	S - Speed
V - Hourly volume	D - Density
v_p - Flow rate	FFS - Free-flow speed
LOS - Level of service	BFFS - Base free-flow speed
DDHV - Directional design hour volume	

Factor Location

E_R - Exhibits 11-10, 11-12	f_{LW} - Exhibit 11-8
E_T - Exhibits 11-10, 11-11, 11-13	f_{LC} - Exhibit 11-9
f_p - Page 11-18	TRD - Page 11-11
LOS, S, FFS, v_p - Exhibits 11-2, 11-3	

BASIC FREEWAY SEGMENTS WORKSHEET

General Information		Site Information	
Analyst	*RK*	Highway/Direction of Travel	*I-55/NB*
Agency or Company	*CDM Smith*	From/To	*Lagrange Rd/IL 171 Archer Ave*
Date Performed	*4/5/2013*	Jurisdiction	*Cook Co.*
Analysis Time Period	*PM Peak*	Analysis Year	*2012*

Project Description *IDOT I-55 Phase I Engg Study*

☑ Oper.(LOS) ☐ Des.(N) ☐ Planning Data

Flow Inputs				
Volume, V	*4643*	veh/h	Peak-Hour Factor, PHF	*0.95*
AADT		veh/day	%Trucks and Buses, P_T	*10*
Peak-Hr Prop. of AADT, K			%RVs, P_R	*0*
Peak-Hr Direction Prop, D			General Terrain:	*Level*
DDHV = AADT x K x D		veh/h	Grade % Length Up/Down %	*mi*

Calculate Flow Adjustments			
f_p	*1.00*	E_R	*1.2*
E_T	*1.5*	$f_{HV} = 1/[1+P_T(E_T - 1) + P_R(E_R - 1)]$	*0.952*

Speed Inputs			Calc Speed Adj and FFS		
Lane Width		ft			
Rt-Side Lat. Clearance		ft	f_{LW}		mph
Number of Lanes, N	*3*		f_{LC}		mph
Total Ramp Density, TRD		ramps/mi	TRD Adjustment		mph
FFS (measured)	*60.0*	mph	FFS	*60.0*	mph
Base free-flow Speed, BFFS		mph			

LOS and Performance Measures			Design (N)		
Operational (LOS)			Design (N)		
v_p = (V or DDHV) / (PHF x N x f_{HV} x f_p)	*1711*	pc/h/ln	Design LOS		
			v_p = (V or DDHV) / (PHF x N x f_{HV} x f_p)		pc/h/ln
S	*59.8*	mph	S		mph
D = v_p / S	*28.6*	pc/mi/ln	D = v_p / S		pc/mi/ln
LOS	*D*		Required Number of Lanes, N		

Glossary		Factor Location	
N - Number of lanes	S - Speed	E_R - Exhibits 11-10, 11-12	f_{LW} - Exhibit 11-8
V - Hourly volume	D - Density	E_T - Exhibits 11-10, 11-11, 11-13	f_{LC} - Exhibit 11-9
v_p - Flow rate	FFS - Free-flow speed	f_p - Page 11-18	TRD - Page 11-11
LOS - Level of service	BFFS - Base free-flow speed	LOS, S, FFS, v_p - Exhibits 11-2, 11-3	
DDHV - Directional design hour volume			

BASIC FREEWAY SEGMENTS WORKSHEET

General Information		Site Information	
Analyst	*RK*	Highway/Direction of Travel	*I-55/NB*
Agency or Company	*CDM Smith*	From/To	*Harlem Ave/Central Ave*
Date Performed	*4/5/2013*	Jurisdiction	*Cook Co.*
Analysis Time Period	*PM Peak*	Analysis Year	*2012*

Project Description *IDOT I-55 Phase I Engg Study*

☑ Oper.(LOS) ☐ Des.(N) ☐ Planning Data

Flow Inputs

Volume, V	*5039*	veh/h	Peak-Hour Factor, PHF	*0.95*
AADT		veh/day	%Trucks and Buses, P_T	*8*
Peak-Hr Prop. of AADT, K			%RVs, P_R	*0*
Peak-Hr Direction Prop, D			General Terrain:	*Level*
DDHV = AADT x K x D		veh/h	Grade % Length Up/Down %	*mi*

Calculate Flow Adjustments

f_p	*1.00*	E_R	*1.2*
E_T	*1.5*	$f_{HV} = 1/[1+P_T(E_T - 1) + P_R(E_R - 1)]$	*0.962*

Speed Inputs			Calc Speed Adj and FFS		
Lane Width		ft			
Rt-Side Lat. Clearance		ft	f_{LW}		mph
Number of Lanes, N	*3*		f_{LC}		mph
Total Ramp Density, TRD		ramps/mi	TRD Adjustment		mph
FFS (measured)	*60.0*	mph	FFS	*60.0*	mph
Base free-flow Speed, BFFS		mph			

LOS and Performance Measures			Design (N)		
Operational (LOS)			Design (N)		
v_p = (V or DDHV) / (PHF x N x f_{HV} x f_p)	*1839*	pc/h/ln	Design LOS		
			v_p = (V or DDHV) / (PHF x N x f_{HV} x f_p)		pc/h/ln
S	*59.0*	mph	S		mph
D = v_p / S	*31.2*	pc/mi/ln	D = v_p / S		pc/mi/ln
LOS	*D*		Required Number of Lanes, N		

Glossary		Factor Location	
N - Number of lanes	S - Speed	E_R - Exhibits 11-10, 11-12	f_{LW} - Exhibit 11-8
V - Hourly volume	D - Density	E_T - Exhibits 11-10, 11-11, 11-13	f_{LC} - Exhibit 11-9
v_p - Flow rate	FFS - Free-flow speed	f_p - Page 11-18	TRD - Page 11-11
LOS - Level of service	BFFS - Base free-flow speed	LOS, S, FFS, v_p - Exhibits 11-2, 11-3	
DDHV - Directional design hour volume			

BASIC FREEWAY SEGMENTS WORKSHEET

General Information

Analyst	*RK*
Agency or Company	*CDM Smith*
Date Performed	*4/5/2013*
Analysis Time Period	*PM Peak*

Site Information

Highway/Direction of Travel	*I-55/NB*
From/To	*Central Ave/Cicero Ave*
Jurisdiction	*Cook Co.*
Analysis Year	*2012*

Project Description *IDOT I-55 Phase I Engg Study*

☑ Oper.(LOS) ☑ Des.(N) ☐ Planning Data

Flow Inputs

Volume, V	*4657*	veh/h	Peak-Hour Factor, PHF	*0.95*
AADT		veh/day	%Trucks and Buses, P_T	*8*
Peak-Hr Prop. of AADT, K			%RVs, P_R	*0*
Peak-Hr Direction Prop, D			General Terrain:	*Level*
DDHV = AADT x K x D		veh/h	Grade % Length	*mi*
			Up/Down %	

Calculate Flow Adjustments

f_p	*1.00*	E_R	*1.2*
E_T	*1.5*	$f_{HV} = 1/[1+P_T(E_T - 1) + P_R(E_R - 1)]$	*0.962*

Speed Inputs

Lane Width		ft
Rt-Side Lat. Clearance		ft
Number of Lanes, N	*3*	
Total Ramp Density, TRD		ramps/mi
FFS (measured)	*60.0*	mph
Base free-flow Speed, BFFS		mph

Calc Speed Adj and FFS

f_{LW}		mph
f_{LC}		mph
TRD Adjustment		mph
FFS	*60.0*	mph

LOS and Performance Measures

Operational (LOS)

v_p = (V or DDHV) / (PHF x N x f_{HV} x f_p)	*1699*	pc/h/ln
S	*59.8*	mph
D = v_p / S	*28.4*	pc/mi/ln
LOS	*D*	

Design (N)

Design (N)

Design LOS	
v_p = (V or DDHV) / (PHF x N x f_{HV} x f_p)	pc/h/ln
S	mph
D = v_p / S	pc/mi/ln
Required Number of Lanes, N	

Glossary

N - Number of lanes	S - Speed
V - Hourly volume	D - Density
v_p - Flow rate	FFS - Free-flow speed
LOS - Level of service	BFFS - Base free-flow speed
DDHV - Directional design hour volume	

Factor Location

E_R - Exhibits 11-10, 11-12	f_{LW} - Exhibit 11-8
E_T - Exhibits 11-10, 11-11, 11-13	f_{LC} - Exhibit 11-9
f_p - Page 11-18	TRD - Page 11-11
LOS, S, FFS, v_p - Exhibits 11-2, 11-3	

BASIC FREEWAY SEGMENTS WORKSHEET

General Information		Site Information	
Analyst	*RK*	Highway/Direction of Travel	*I-55/NB*
Agency or Company	*CDM Smith*	From/To	*Cicero Ave/Pulaski Rd*
Date Performed	*4/5/2013*	Jurisdiction	*Cook Co.*
Analysis Time Period	*PM Peak*	Analysis Year	*2012*

Project Description *IDOT I-55 Phase I Engg Study*

☑ Oper.(LOS) ☐ Des.(N) ☐ Planning Data

Flow Inputs

Volume, V	*5053*	veh/h	Peak-Hour Factor, PHF	*0.95*
AADT		veh/day	%Trucks and Buses, P_T	*8*
Peak-Hr Prop. of AADT, K			%RVs, P_R	*0*
Peak-Hr Direction Prop, D			General Terrain:	*Level*
DDHV = AADT x K x D		veh/h	Grade % Length Up/Down %	*mi*

Calculate Flow Adjustments

f_p	*1.00*	E_R	*1.2*
E_T	*1.5*	$f_{HV} = 1/[1+P_T(E_T - 1) + P_R(E_R - 1)]$	*0.962*

Speed Inputs			Calc Speed Adj and FFS		
Lane Width		ft			
Rt-Side Lat. Clearance		ft	f_{LW}		mph
Number of Lanes, N	*3*		f_{LC}		mph
Total Ramp Density, TRD		ramps/mi	TRD Adjustment		mph
FFS (measured)	*60.0*	mph	FFS	*60.0*	mph
Base free-flow Speed, BFFS		mph			

LOS and Performance Measures			Design (N)		
Operational (LOS)			Design (N)		
v_p = (V or DDHV) / (PHF x N x f_{HV} x f_p)	*1844*	pc/h/ln	Design LOS		
S	*58.9*	mph	v_p = (V or DDHV) / (PHF x N x f_{HV} x f_p)		pc/h/ln
D = v_p / S	*31.3*	pc/mi/ln	S		mph
LOS	*D*		D = v_p / S		pc/mi/ln
			Required Number of Lanes, N		

Glossary

N - Number of lanes	S - Speed
V - Hourly volume	D - Density
v_p - Flow rate	FFS - Free-flow speed
LOS - Level of service	BFFS - Base free-flow speed
DDHV - Directional design hour volume	

Factor Location

E_R - Exhibits 11-10, 11-12	f_{LW} - Exhibit 11-8
E_T - Exhibits 11-10, 11-11, 11-13	f_{LC} - Exhibit 11-9
f_p - Page 11-18	TRD - Page 11-11
LOS, S, FFS, v_p - Exhibits 11-2, 11-3	

BASIC FREEWAY SEGMENTS WORKSHEET

General Information		Site Information	
Analyst	*RK*	Highway/Direction of Travel	*I-55/NB*
Agency or Company	*CDM Smith*	From/To	*Pulaski Rd/Kedzie Ave*
Date Performed	*4/5/2013*	Jurisdiction	*Cook Co.*
Analysis Time Period	*PM Peak*	Analysis Year	*2012*

Project Description *IDOT I-55 Phase I Engg Study*

☑ Oper.(LOS) ☐ Des.(N) ☐ Planning Data

Flow Inputs

Volume, V	*5162*	veh/h	Peak-Hour Factor, PHF	*0.95*
AADT		veh/day	%Trucks and Buses, P_T	*8*
Peak-Hr Prop. of AADT, K			%RVs, P_R	*0*
Peak-Hr Direction Prop, D			General Terrain:	*Level*
DDHV = AADT x K x D		veh/h	Grade % Length Up/Down %	*mi*

Calculate Flow Adjustments

f_p	*1.00*	E_R	*1.2*
E_T	*1.5*	$f_{HV} = 1/[1+P_T(E_T - 1) + P_R(E_R - 1)]$	*0.962*

Speed Inputs

Lane Width		ft
Rt-Side Lat. Clearance		ft
Number of Lanes, N	*3*	
Total Ramp Density, TRD		ramps/mi
FFS (measured)	*60.0*	mph
Base free-flow Speed, BFFS		mph

Calc Speed Adj and FFS

f_{LW}		mph
f_{LC}		mph
TRD Adjustment		mph
FFS	*60.0*	mph

LOS and Performance Measures

Operational (LOS)

v_p = (V or DDHV) / (PHF x N x f_{HV} x f_p)	*1884*	pc/h/ln
S	*58.5*	mph
D = v_p / S	*32.2*	pc/mi/ln
LOS	*D*	

Design (N)

Design (N)

Design LOS		
v_p = (V or DDHV) / (PHF x N x f_{HV} x f_p)		pc/h/ln
S		mph
D = v_p / S		pc/mi/ln
Required Number of Lanes, N		

Glossary

N - Number of lanes	S - Speed
V - Hourly volume	D - Density
v_p - Flow rate	FFS - Free-flow speed
LOS - Level of service	BFFS - Base free-flow speed
DDHV - Directional design hour volume	

Factor Location

E_R - Exhibits 11-10, 11-12	f_{LW} - Exhibit 11-8
E_T - Exhibits 11-10, 11-11, 11-13	f_{LC} - Exhibit 11-9
f_p - Page 11-18	TRD - Page 11-11
LOS, S, FFS, v_p - Exhibits 11-2, 11-3	

BASIC FREEWAY SEGMENTS WORKSHEET

General Information

Analyst	*RK*
Agency or Company	*CDM Smith*
Date Performed	*4/5/2013*
Analysis Time Period	*PM Peak*

Site Information

Highway/Direction of Travel	*I-55/NB*
From/To	*Kedzie Ave/California Ave*
Jurisdiction	*Cook Co.*
Analysis Year	*2012*

Project Description *IDOT I-55 Phase I Engg Study*

☑ Oper.(LOS) ☐ Des.(N) ☐ Planning Data

Flow Inputs

Volume, V	*4302*	veh/h	Peak-Hour Factor, PHF	*0.95*
AADT		veh/day	%Trucks and Buses, P_T	*8*
Peak-Hr Prop. of AADT, K			%RVs, P_R	*0*
Peak-Hr Direction Prop, D			General Terrain:	*Level*
DDHV = AADT x K x D		veh/h	Grade % Length Up/Down %	*mi*

Calculate Flow Adjustments

f_p	*1.00*	E_R	*1.2*
E_T	*1.5*	$f_{HV} = 1/[1+P_T(E_T - 1) + P_R(E_R - 1)]$	*0.962*

Speed Inputs

Lane Width		ft
Rt-Side Lat. Clearance		ft
Number of Lanes, N	*3*	
Total Ramp Density, TRD		ramps/mi
FFS (measured)	*60.0*	mph
Base free-flow Speed, BFFS		mph

Calc Speed Adj and FFS

f_{LW}		mph
f_{LC}		mph
TRD Adjustment		mph
FFS	*60.0*	mph

LOS and Performance Measures

Operational (LOS)

v_p = (V or DDHV) / (PHF x N x f_{HV} x f_p)	*1570*	pc/h/ln
S	*60.0*	mph
D = v_p / S	*26.2*	pc/mi/ln
LOS	*D*	

Design (N)

Design (N)

Design LOS		
v_p = (V or DDHV) / (PHF x N x f_{HV} x f_p)		pc/h/ln
S		mph
D = v_p / S		pc/mi/ln
Required Number of Lanes, N		

Glossary

N - Number of lanes
V - Hourly volume
v_p - Flow rate
LOS - Level of service
S - Speed
D - Density
FFS - Free-flow speed
BFFS - Base free-flow speed
DDHV - Directional design hour volume

Factor Location

E_R - Exhibits 11-10, 11-12
E_T - Exhibits 11-10, 11-11, 11-13
f_p - Page 11-18
LOS, S, FFS, v_p - Exhibits 11-2, 11-3
f_{LW} - Exhibit 11-8
f_{LC} - Exhibit 11-9
TRD - Page 11-11

Mainline Segment

Southbound AM

HCS 2010: Basic Freeway Segments Release 6.1

Phone: Fax:
E-mail:

Operational Analysis

Analyst: John Connelly
Agency or Company:
Date Performed: 6/14/2013
Analysis Time Period: 2012 PM Peak Hour
Freeway/Direction: I-55 WB
From/To: West of Diverge to I-355
Jurisdiction:
Analysis Year:
Description:

Flow Inputs and Adjustments

Volume, V	2472	veh/h
Peak-hour factor, PHF	0.95	
Peak 15-min volume, v15	651	v
Trucks and buses	15	%
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	0.930	
Driver population factor, fp	1.00	
Flow rate, vp	932	pc/h/ln

Speed Inputs and Adjustments

Lane width	-	ft
Right-side lateral clearance	-	ft
Total ramp density, TRD	-	ramps/mi
Number of lanes, N	3	
Free-flow speed:	Measured	
FFS or BFFS	60.0	mi/h
Lane width adjustment, fLW	-	mi/h
Lateral clearance adjustment, fLC	-	mi/h
TRD adjustment	-	mi/h
Free-flow speed, FFS	60.0	mi/h

LOS and Performance Measures

Flow rate, vp	932	pc/h/ln
Free-flow speed, FFS	60.0	mi/h
Average passenger-car speed, S	60.0	mi/h
Number of lanes, N	3	
Density, D	15.5	pc/mi/ln
Level of service, LOS	B	

Overall results are not computed when free-flow speed is less than 55 mph.

HCS 2010: Basic Freeway Segments Release 6.1

Phone: Fax:
E-mail:

Operational Analysis

Analyst:	John Connelly
Agency or Company:	
Date Performed:	6/14/2013
Analysis Time Period:	PM Peak Hour
Freeway/Direction:	I-55 WB
From/To:	Lemont to I-355
Jurisdiction:	
Analysis Year:	
Description:	

Flow Inputs and Adjustments

Volume, V	3348	veh/h
Peak-hour factor, PHF	0.95	
Peak 15-min volume, v15	881	v
Trucks and buses	15	%
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	0.930	
Driver population factor, fp	1.00	
Flow rate, vp	947	pc/h/ln

Speed Inputs and Adjustments

Lane width	-	ft
Right-side lateral clearance	-	ft
Total ramp density, TRD	-	ramps/mi
Number of lanes, N	4	
Free-flow speed:	Measured	
FFS or BFFS	60.0	mi/h
Lane width adjustment, fLW	-	mi/h
Lateral clearance adjustment, fLC	-	mi/h
TRD adjustment	-	mi/h
Free-flow speed, FFS	60.0	mi/h

LOS and Performance Measures

Flow rate, vp	947	pc/h/ln
Free-flow speed, FFS	60.0	mi/h
Average passenger-car speed, S	60.0	mi/h
Number of lanes, N	4	
Density, D	15.8	pc/mi/ln
Level of service, LOS	B	

Overall results are not computed when free-flow speed is less than 55 mph.

BASIC FREEWAY SEGMENTS WORKSHEET

General Information		Site Information	
Analyst	*RK*	Highway/Direction of Travel	*I-55/SB*
Agency or Company	*CDM Smith*	From/To	*Cass Ave/Lemont Rd*
Date Performed	*4/5/2013*	Jurisdiction	*DuPage Co.*
Analysis Time Period	*AM Peak*	Analysis Year	*2012*
Project Description	*IDOT I-55 Phase I Engg Study*		

☑ Oper.(LOS) ☐ Des.(N) ☐ Planning Data

Flow Inputs

Volume, V	*4379*	veh/h	Peak-Hour Factor, PHF	*0.95*
AADT		veh/day	%Trucks and Buses, P_T	*12*
Peak-Hr Prop. of AADT, K			%RVs, P_R	*0*
Peak-Hr Direction Prop, D			General Terrain:	*Level*
DDHV = AADT x K x D		veh/h	Grade % Length	*mi*
			Up/Down %	

Calculate Flow Adjustments

f_p	*1.00*	E_R	*1.2*
E_T	*1.5*	$f_{HV} = 1/[1+P_T(E_T - 1) + P_R(E_R - 1)]$	*0.943*

Speed Inputs

Lane Width		ft
Rt-Side Lat. Clearance		ft
Number of Lanes, N	*3*	
Total Ramp Density, TRD		ramps/mi
FFS (measured)	*60.0*	mph
Base free-flow Speed, BFFS		mph

Calc Speed Adj and FFS

f_{LW}		mph
f_{LC}		mph
TRD Adjustment		mph
FFS	*60.0*	mph

LOS and Performance Measures

Operational (LOS)

v_p = (V or DDHV) / (PHF x N x f_{HV} x f_p)	*1629*	pc/h/ln
S	*60.0*	mph
D = v_p / S	*27.2*	pc/mi/ln
LOS	*D*	

Design (N)

Design (N)

Design LOS		
v_p = (V or DDHV) / (PHF x N x f_{HV} x f_p)		pc/h/ln
S		mph
D = v_p / S		pc/mi/ln
Required Number of Lanes, N		

Glossary

N - Number of lanes	S - Speed
V - Hourly volume	D - Density
v_p - Flow rate	FFS - Free-flow speed
LOS - Level of service	BFFS - Base free-flow speed
DDHV - Directional design hour volume	

Factor Location

E_R - Exhibits 11-10, 11-12	f_{LW} - Exhibit 11-8
E_T - Exhibits 10-10, 11-11, 11-13	f_{LC} - Exhibit 11-9
f_p - Page 11-18	TRD - Page 11-11
LOS, S, FFS, v_p - Exhibits 11-2, 11-3	

BASIC FREEWAY SEGMENTS WORKSHEET

General Information		Site Information	
Analyst	*RK*	Highway/Direction of Travel	*I-55/SB*
Agency or Company	*CDM Smith*	From/To	*IL 83/Cass Ave*
Date Performed	*4/5/2013*	Jurisdiction	*DuPage Co.*
Analysis Time Period	*AM Peak*	Analysis Year	*2012*

Project Description *IDOT I-55 Phase I Engg Study*

☑ Oper.(LOS) ☐ Des.(N) ☐ Planning Data

Flow Inputs

Volume, V	*4401*	veh/h	Peak-Hour Factor, PHF	*0.95*
AADT		veh/day	%Trucks and Buses, P_T	*11*
Peak-Hr Prop. of AADT, K			%RVs, P_R	*0*
Peak-Hr Direction Prop, D			General Terrain:	*Level*
DDHV = AADT x K x D		veh/h	Grade % Length Up/Down %	*mi*

Calculate Flow Adjustments

f_p	*1.00*	E_R	*1.2*
E_T	*1.5*	$f_{HV} = 1/[1+P_T(E_T - 1) + P_R(E_R - 1)]$	*0.948*

Speed Inputs

Lane Width		ft
Rt-Side Lat. Clearance		ft
Number of Lanes, N	*3*	
Total Ramp Density, TRD		ramps/mi
FFS (measured)	*60.0*	mph
Base free-flow Speed, BFFS		mph

Calc Speed Adj and FFS

f_{LW}		mph
f_{LC}		mph
TRD Adjustment		mph
FFS	*60.0*	mph

LOS and Performance Measures

Operational (LOS)

v_p = (V or DDHV) / (PHF x N x f_{HV} x f_p)	*1629*	pc/h/ln
S	*60.0*	mph
D = v_p / S	*27.2*	pc/mi/ln
LOS	*D*	

Design (N)

Design (N)

Design LOS		
v_p = (V or DDHV) / (PHF x N x f_{HV} x f_p)		pc/h/ln
S		mph
D = v_p / S		pc/mi/ln
Required Number of Lanes, N		

Glossary

N - Number of lanes	S - Speed
V - Hourly volume	D - Density
v_p - Flow rate	FFS - Free-flow speed
LOS - Level of service	BFFS - Base free-flow speed
DDHV - Directional design hour volume	

Factor Location

E_R - Exhibits 11-10, 11-12	f_{LW} - Exhibit 11-8
E_T - Exhibits 10-10, 11-11, 11-13	f_{LC} - Exhibit 11-9
f_p - Page 11-18	TRD - Page 11-11
LOS, S, FFS, v_p - Exhibits 11-2, 11-3	

BASIC FREEWAY SEGMENTS WORKSHEET

General Information		Site Information	
Analyst	*RK*	Highway/Direction of Travel	*I-55/SB*
Agency or Company	*CDM Smith*	From/To	*County Line Rd/IL 83*
Date Performed	*4/5/2013*	Jurisdiction	*DuPage Co.*
Analysis Time Period	*AM Peak*	Analysis Year	*2012*
Project Description	*IDOT I-55 Phase I Engg Study*		

☑ Oper.(LOS) ☐ Des.(N) ☐ Planning Data

Flow Inputs

Volume, V	*4125*	veh/h	Peak-Hour Factor, PHF	*0.95*
AADT		veh/day	%Trucks and Buses, P_T	*11*
Peak-Hr Prop. of AADT, K			%RVs, P_R	*0*
Peak-Hr Direction Prop, D			General Terrain:	*Level*
DDHV = AADT x K x D		veh/h	Grade % Length Up/Down %	*mi*

Calculate Flow Adjustments

f_p	*1.00*	E_R	*1.2*
E_T	*1.5*	$f_{HV} = 1/[1+P_T(E_T - 1) + P_R(E_R - 1)]$	*0.948*

Speed Inputs

Lane Width		ft
Rt-Side Lat. Clearance		ft
Number of Lanes, N	*3*	
Total Ramp Density, TRD		ramps/mi
FFS (measured)	*60.0*	mph
Base free-flow Speed, BFFS		mph

Calc Speed Adj and FFS

f_{LW}		mph
f_{LC}		mph
TRD Adjustment		mph
FFS	*60.0*	mph

LOS and Performance Measures

Operational (LOS)

v_p = (V or DDHV) / (PHF x N x f_{HV} x f_p)	*1527*	pc/h/ln
S	*60.0*	mph
D = v_p / S	*25.5*	pc/mi/ln
LOS	*C*	

Design (N)

Design (N)

Design LOS		
v_p = (V or DDHV) / (PHF x N x f_{HV} x f_p)		pc/h/ln
S		mph
D = v_p / S		pc/mi/ln
Required Number of Lanes, N		

Glossary

N - Number of lanes	S - Speed
V - Hourly volume	D - Density
v_p - Flow rate	FFS - Free-flow speed
LOS - Level of service	BFFS - Base free-flow speed
DDHV - Directional design hour volume	

Factor Location

E_R - Exhibits 11-10, 11-12	f_{LW} - Exhibit 11-8
E_T - Exhibits 11-10, 11-11, 11-13	f_{LC} - Exhibit 11-9
f_p - Page 11-18	TRD - Page 11-11
LOS, S, FFS, v_p - Exhibits 11-2, 11-3	

BASIC FREEWAY SEGMENTS WORKSHEET

General Information		Site Information	
Analyst	*RK*	Highway/Direction of Travel	*I-55/SB*
Agency or Company	*CDM Smith*	From/To	*Joliet Rd/County Line Rd*
Date Performed	*4/5/2013*	Jurisdiction	*DuPage/Cook Co.*
Analysis Time Period	*AM Peak*	Analysis Year	*2012*

Project Description *IDOT I-55 Phase I Engg Study*

☑ Oper.(LOS) ☐ Des.(N) ☐ Planning Data

Flow Inputs

Volume, V	*4737*	veh/h	Peak-Hour Factor, PHF	*0.95*
AADT		veh/day	%Trucks and Buses, P_T	*11*
Peak-Hr Prop. of AADT, K			%RVs, P_R	*0*
Peak-Hr Direction Prop, D			General Terrain:	*Level*
DDHV = AADT x K x D		veh/h	Grade % Length Up/Down %	*mi*

Calculate Flow Adjustments

f_p	*1.00*	E_R	*1.2*
E_T	*1.5*	$f_{HV} = 1/[1+P_T(E_T - 1) + P_R(E_R - 1)]$	*0.948*

Speed Inputs

Lane Width		ft
Rt-Side Lat. Clearance		ft
Number of Lanes, N	*3*	
Total Ramp Density, TRD		ramps/mi
FFS (measured)	*60.0*	mph
Base free-flow Speed, BFFS		mph

Calc Speed Adj and FFS

f_{LW}		mph
f_{LC}		mph
TRD Adjustment		mph
FFS	*60.0*	mph

LOS and Performance Measures

Operational (LOS)

v_p = (V or DDHV) / (PHF x N x f_{HV} x f_p)	*1754*	pc/h/ln
S	*59.6*	mph
D = v_p / S	*29.4*	pc/mi/ln
LOS	*D*	

Design (N)

Design (N)

Design LOS		
v_p = (V or DDHV) / (PHF x N x f_{HV} x f_p)		pc/h/ln
S		mph
D = v_p / S		pc/mi/ln
Required Number of Lanes, N		

Glossary

N - Number of lanes	S - Speed
V - Hourly volume	D - Density
v_p - Flow rate	FFS - Free-flow speed
LOS - Level of service	BFFS - Base free-flow speed
DDHV - Directional design hour volume	

Factor Location

E_R - Exhibits 11-10, 11-12	f_{LW} - Exhibit 11-8
E_T - Exhibits 10-10, 11-11, 11-13	f_{LC} - Exhibit 11-9
f_p - Page 11-18	TRD - Page 11-11
LOS, S, FFS, v_p - Exhibits 11-2, 11-3	

BASIC FREEWAY SEGMENTS WORKSHEET

General Information		Site Information	
Analyst	*RK*	Highway/Direction of Travel	*I-55/SB*
Agency or Company	*CDM Smith*	From/To	*I-294/Joliet Rd*
Date Performed	*4/5/2013*	Jurisdiction	*DuPage/Cook Co.*
Analysis Time Period	*AM Peak*	Analysis Year	*2012*

Project Description *IDOT I-55 Phase I Engg Study*

☑ Oper.(LOS) ☐ Des.(N) ☐ Planning Data

Flow Inputs

Volume, V	*4312*	veh/h	Peak-Hour Factor, PHF	*0.95*
AADT		veh/day	%Trucks and Buses, P_T	*10*
Peak-Hr Prop. of AADT, K			%RVs, P_R	*0*
Peak-Hr Direction Prop, D			General Terrain:	*Level*
DDHV = AADT x K x D		veh/h	Grade % Length Up/Down %	*mi*

Calculate Flow Adjustments

f_p	*1.00*	E_R	*1.2*
E_T	*1.5*	$f_{HV} = 1/[1+P_T(E_T - 1) + P_R(E_R - 1)]$	*0.952*

Speed Inputs

Lane Width		ft
Rt-Side Lat. Clearance		ft
Number of Lanes, N	*3*	
Total Ramp Density, TRD		ramps/mi
FFS (measured)	*60.0*	mph
Base free-flow Speed, BFFS		mph

Calc Speed Adj and FFS

f_{LW}		mph
f_{LC}		mph
TRD Adjustment		mph
FFS	*60.0*	mph

LOS and Performance Measures

Operational (LOS)

v_p = (V or DDHV) / (PHF x N x f_{HV} x f_p)	*1589*	pc/h/ln
S	*60.0*	mph
D = v_p / S	*26.5*	pc/mi/ln
LOS	*D*	

Design (N)

Design (N)

Design LOS		
v_p = (V or DDHV) / (PHF x N x f_{HV} x f_p)		pc/h/ln
S		mph
D = v_p / S		pc/mi/ln
Required Number of Lanes, N		

Glossary

N - Number of lanes	S - Speed
V - Hourly volume	D - Density
v_p - Flow rate	FFS - Free-flow speed
LOS - Level of service	BFFS - Base free-flow speed
DDHV - Directional design hour volume	

Factor Location

E_R - Exhibits 11-10, 11-12	f_{LW} - Exhibit 11-8
E_T - Exhibits 10-10, 11-11, 11-13	f_{LC} - Exhibit 11-9
f_p - Page 11-18	TRD - Page 11-11
LOS, S, FFS, v_p - Exhibits 11-2, 11-3	

BASIC FREEWAY SEGMENTS WORKSHEET

General Information

Analyst	*RK*
Agency or Company	*CDM Smith*
Date Performed	*4/5/2013*
Analysis Time Period	*AM Peak*

Site Information

Highway/Direction of Travel	*I-55/SB*
From/To	*Lagrange Rd/I-294*
Jurisdiction	*Cook Co.*
Analysis Year	*2012*

Project Description *IDOT I-55 Phase I Engg Study*

☑ Oper.(LOS) ☐ Des.(N) ☐ Planning Data

Flow Inputs

Volume, V	*4815*	veh/h	Peak-Hour Factor, PHF	*0.95*
AADT		veh/day	%Trucks and Buses, P_T	*11*
Peak-Hr Prop. of AADT, K			%RVs, P_R	*0*
Peak-Hr Direction Prop, D			General Terrain:	*Level*
DDHV = AADT x K x D		veh/h	Grade % Length Up/Down %	*mi*

Calculate Flow Adjustments

f_p	*1.00*	E_R	*1.2*
E_T	*1.5*	$f_{HV} = 1/[1+P_T(E_T - 1) + P_R(E_R - 1)]$	*0.948*

Speed Inputs

Lane Width		ft
Rt-Side Lat. Clearance		ft
Number of Lanes, N	*3*	
Total Ramp Density, TRD		ramps/mi
FFS (measured)	*60.0*	mph
Base free-flow Speed, BFFS		mph

Calc Speed Adj and FFS

f_{LW}		mph
f_{LC}		mph
TRD Adjustment		mph
FFS	*60.0*	mph

LOS and Performance Measures

Operational (LOS)

v_p = (V or DDHV) / (PHF x N x f_{HV} x f_p)	*1782*	pc/h/ln
S	*59.4*	mph
D = v_p / S	*30.0*	pc/mi/ln
LOS	*D*	

Design (N)

Design (N)

Design LOS		
v_p = (V or DDHV) / (PHF x N x f_{HV} x f_p)		pc/h/ln
S		mph
D = v_p / S		pc/mi/ln
Required Number of Lanes, N		

Glossary

N - Number of lanes	S - Speed
V - Hourly volume	D - Density
v_p - Flow rate	FFS - Free-flow speed
LOS - Level of service	BFFS - Base free-flow speed
DDHV - Directional design hour volume	

Factor Location

E_R - Exhibits 11-10, 11-12	f_{LW} - Exhibit 11-8
E_T - Exhibits 10-10, 11-11, 11-13	f_{LC} - Exhibit 11-9
f_p - Page 11-18	TRD - Page 11-11
LOS, S, FFS, v_p - Exhibits 11-2, 11-3	

BASIC FREEWAY SEGMENTS WORKSHEET

General Information		Site Information	
Analyst	*RK*	Highway/Direction of Travel	*I-55/SB*
Agency or Company	*CDM Smith*	From/To	*IL 171 Archer Ave/Lagrange Rd*
Date Performed	*4/5/2013*	Jurisdiction	*Cook Co.*
Analysis Time Period	*AM Peak*	Analysis Year	*2012*

Project Description *IDOT I-55 Phase I Engg Study*

☑ Oper.(LOS) ☐ Des.(N) ☐ Planning Data

Flow Inputs

Volume, V	*4593*	veh/h	Peak-Hour Factor, PHF	*0.95*
AADT		veh/day	%Trucks and Buses, P_T	*11*
Peak-Hr Prop. of AADT, K			%RVs, P_R	*0*
Peak-Hr Direction Prop, D			General Terrain:	*Level*
DDHV = AADT x K x D		veh/h	Grade % Length Up/Down %	*mi*

Calculate Flow Adjustments

f_p	*1.00*	E_R	*1.2*
E_T	*1.5*	$f_{HV} = 1/[1+P_T(E_T - 1) + P_R(E_R - 1)]$	*0.948*

Speed Inputs

Lane Width		ft
Rt-Side Lat. Clearance		ft
Number of Lanes, N	*3*	
Total Ramp Density, TRD		ramps/mi
FFS (measured)	*60.0*	mph
Base free-flow Speed, BFFS		mph

Calc Speed Adj and FFS

f_{LW}		mph
f_{LC}		mph
TRD Adjustment		mph
FFS	*60.0*	mph

LOS and Performance Measures

Operational (LOS)

v_p = (V or DDHV) / (PHF x N x f_{HV} x f_p)	*1700*	pc/h/ln
S	*59.8*	mph
D = v_p / S	*28.4*	pc/mi/ln
LOS	*D*	

Design (N)

Design (N)

Design LOS		
v_p = (V or DDHV) / (PHF x N x f_{HV} x f_p)		pc/h/ln
S		mph
D = v_p / S		pc/mi/ln
Required Number of Lanes, N		

Glossary

N - Number of lanes	S - Speed
V - Hourly volume	D - Density
v_p - Flow rate	FFS - Free-flow speed
LOS - Level of service	BFFS - Base free-flow speed
DDHV - Directional design hour volume	

Factor Location

E_R - Exhibits 11-10, 11-12	f_{LW} - Exhibit 11-8
E_T - Exhibits 11-10, 11-11, 11-13	f_{LC} - Exhibit 11-9
f_p - Page 11-18	TRD - Page 11-11
LOS, S, FFS, v_p - Exhibits 11-2, 11-3	

BASIC FREEWAY SEGMENTS WORKSHEET

General Information

Analyst	*RK*
Agency or Company	*CDM Smith*
Date Performed	*4/5/2013*
Analysis Time Period	*AM Peak*

Site Information

Highway/Direction of Travel	*I-55/SB*
From/To	*Central Ave/Harlem Ave*
Jurisdiction	*Cook Co.*
Analysis Year	*2012*

Project Description *IDOT I-55 Phase I Engg Study*

☑ Oper.(LOS) ☐ Des.(N) ☐ Planning Data

Flow Inputs

Volume, V	*4669*	veh/h	Peak-Hour Factor, PHF	*0.95*
AADT		veh/day	%Trucks and Buses, P_T	*14*
Peak-Hr Prop. of AADT, K			%RVs, P_R	*0*
Peak-Hr Direction Prop, D			General Terrain:	*Level*
DDHV = AADT x K x D		veh/h	Grade % Length Up/Down %	*mi*

Calculate Flow Adjustments

f_p	*1.00*	E_R	*1.2*
E_T	*1.5*	$f_{HV} = 1/[1+P_T(E_T - 1) + P_R(E_R - 1)]$	*0.935*

Speed Inputs

Lane Width		ft
Rt-Side Lat. Clearance		ft
Number of Lanes, N	*3*	
Total Ramp Density, TRD		ramps/mi
FFS (measured)	*60.0*	mph
Base free-flow Speed, BFFS		mph

Calc Speed Adj and FFS

f_{LW}		mph
f_{LC}		mph
TRD Adjustment		mph
FFS	*60.0*	mph

LOS and Performance Measures

Operational (LOS)

v_p = (V or DDHV) / (PHF x N x f_{HV} x f_p)	*1753*	pc/h/ln
S	*59.6*	mph
D = v_p / S	*29.4*	pc/mi/ln
LOS	*D*	

Design (N)

Design (N)

Design LOS	
v_p = (V or DDHV) / (PHF x N x f_{HV} x f_p)	pc/h/ln
S	mph
D = v_p / S	pc/mi/ln
Required Number of Lanes, N	

Glossary

N - Number of lanes	S - Speed
V - Hourly volume	D - Density
v_p - Flow rate	FFS - Free-flow speed
LOS - Level of service	BFFS - Base free-flow speed
DDHV - Directional design hour volume	

Factor Location

E_R - Exhibits 11-10, 11-12	f_{LW} - Exhibit 11-8
E_T - Exhibits 11-10, 11-11, 11-13	f_{LC} - Exhibit 11-9
f_p - Page 11-18	TRD - Page 11-11
LOS, S, FFS, v_p - Exhibits 11-2, 11-3	

BASIC FREEWAY SEGMENTS WORKSHEET

General Information

Analyst	*RK*
Agency or Company	*CDM Smith*
Date Performed	*4/5/2013*
Analysis Time Period	*AM Peak*

Site Information

Highway/Direction of Travel	*I-55/SB*
From/To	*Cicero Ave/Central Ave*
Jurisdiction	*Cook Co.*
Analysis Year	*2012*

Project Description *IDOT I-55 Phase I Engg Study*

☑ Oper.(LOS) ☐ Des.(N) ☐ Planning Data

Flow Inputs

Volume, V	*5025*	veh/h	Peak-Hour Factor, PHF	*0.95*
AADT		veh/day	%Trucks and Buses, P_T	*14*
Peak-Hr Prop. of AADT, K			%RVs, P_R	*0*
Peak-Hr Direction Prop, D			General Terrain:	*Level*
DDHV = AADT x K x D		veh/h	Grade % Length Up/Down %	*mi*

Calculate Flow Adjustments

f_p	*1.00*	E_R	*1.2*
E_T	*1.5*	$f_{HV} = 1/[1+P_T(E_T - 1) + P_R(E_R - 1)]$	*0.935*

Speed Inputs

Lane Width		ft
Rt-Side Lat. Clearance		ft
Number of Lanes, N	*3*	
Total Ramp Density, TRD		ramps/mi
FFS (measured)	*60.0*	mph
Base free-flow Speed, BFFS		mph

Calc Speed Adj and FFS

f_{LW}		mph
f_{LC}		mph
TRD Adjustment		mph
FFS	*60.0*	mph

LOS and Performance Measures

Operational (LOS)

v_p = (V or DDHV) / (PHF x N x f_{HV} x f_p)	*1887*	pc/h/ln
S	*58.5*	mph
D = v_p / S	*32.3*	pc/mi/ln
LOS	*D*	

Design (N)

Design (N)

Design LOS	
v_p = (V or DDHV) / (PHF x N x f_{HV} x f_p)	pc/h/ln
S	mph
D = v_p / S	pc/mi/ln
Required Number of Lanes, N	

Glossary

N - Number of lanes	S - Speed
V - Hourly volume	D - Density
v_p - Flow rate	FFS - Free-flow speed
LOS - Level of service	BFFS - Base free-flow speed
DDHV - Directional design hour volume	

Factor Location

E_R - Exhibits 11-10, 11-12	f_{LW} - Exhibit 11-8
E_T - Exhibits 11-10, 11-11, 11-13	f_{LC} - Exhibit 11-9
f_p - Page 11-18	TRD - Page 11-11
LOS, S, FFS, v_p - Exhibits 11-2, 11-3	

BASIC FREEWAY SEGMENTS WORKSHEET

General Information

Analyst	*RK*
Agency or Company	*CDM Smith*
Date Performed	*11/9/2012*
Analysis Time Period	*AM Peak*

Site Information

Highway/Direction of Travel	*I-55/SB*
From/To	*Cicero Ave/Pulaski Rd*
Jurisdiction	*Cook Co.*
Analysis Year	*2012*

Project Description *IDOT I-55 Phase I Engg Study*

☑ Oper.(LOS) ☐ Des.(N) ☐ Planning Data

Flow Inputs

Volume, V	*4563*	veh/h	Peak-Hour Factor, PHF	*0.95*	
AADT		veh/day	%Trucks and Buses, P_T	*14*	
Peak-Hr Prop. of AADT, K			%RVs, P_R	*0*	
Peak-Hr Direction Prop, D			General Terrain:	*Level*	
DDHV = AADT x K x D		veh/h	Grade % Length Up/Down %	*mi*	

Calculate Flow Adjustments

f_p	*1.00*	E_R	*1.2*
E_T	*1.5*	$f_{HV} = 1/[1+P_T(E_T - 1) + P_R(E_R - 1)]$	*0.935*

Speed Inputs

Lane Width		ft
Rt-Side Lat. Clearance		ft
Number of Lanes, N	*3*	
Total Ramp Density, TRD		ramps/mi
FFS (measured)	*60.0*	mph
Base free-flow Speed, BFFS		mph

Calc Speed Adj and FFS

f_{LW}		mph
f_{LC}		mph
TRD Adjustment		mph
FFS	*60.0*	mph

LOS and Performance Measures

Operational (LOS)

v_p = (V or DDHV) / (PHF x N x f_{HV} x f_p)	*1713*	pc/h/ln
S	*59.8*	mph
D = v_p / S	*28.7*	pc/mi/ln
LOS	*D*	

Design (N)

Design (N)

Design LOS		
v_p = (V or DDHV) / (PHF x N x f_{HV} x f_p)		pc/h/ln
S		mph
D = v_p / S		pc/mi/ln
Required Number of Lanes, N		

Glossary

N - Number of lanes	S - Speed
V - Hourly volume	D - Density
v_p - Flow rate	FFS - Free-flow speed
LOS - Level of service	BFFS - Base free-flow speed
DDHV - Directional design hour volume	

Factor Location

E_R - Exhibits 11-10, 11-12	f_{LW} - Exhibit 11-8
E_T - Exhibits 11-10, 11-11, 11-13	f_{LC} - Exhibit 11-9
f_p - Page 11-18	TRD - Page 11-11
LOS, S, FFS, v_p - Exhibits 11-2, 11-3	

BASIC FREEWAY SEGMENTS WORKSHEET

General Information

Analyst	*RK*
Agency or Company	*CDM Smith*
Date Performed	*4/5/2013*
Analysis Time Period	*AM Peak*

Site Information

Highway/Direction of Travel	*I-55/SB*
From/To	*Pulaski Rd/Kedzie Ave*
Jurisdiction	*Cook Co.*
Analysis Year	*2012*

Project Description *IDOT I-55 Phase I Engg Study*

☑ Oper.(LOS) ☐ Des.(N) ☐ Planning Data

Flow Inputs

Volume, V	*4381*	veh/h	Peak-Hour Factor, PHF	*0.95*
AADT		veh/day	%Trucks and Buses, P_T	*14*
Peak-Hr Prop. of AADT, K			%RVs, P_R	*0*
Peak-Hr Direction Prop, D			General Terrain:	*Level*
DDHV = AADT x K x D		veh/h	Grade % Length Up/Down %	*mi*

Calculate Flow Adjustments

f_p	*1.00*	E_R	*1.2*
E_T	*1.5*	$f_{HV} = 1/[1+P_T(E_T - 1) + P_R(E_R - 1)]$	*0.935*

Speed Inputs

Lane Width		ft
Rt-Side Lat. Clearance		ft
Number of Lanes, N	*3*	
Total Ramp Density, TRD		ramps/mi
FFS (measured)	*60.0*	mph
Base free-flow Speed, BFFS		mph

Calc Speed Adj and FFS

f_{LW}		mph
f_{LC}		mph
TRD Adjustment		mph
FFS	*60.0*	mph

LOS and Performance Measures

Operational (LOS)

v_p = (V or DDHV) / (PHF x N x f_{HV} x f_p)	*1645*	pc/h/ln
S	*60.0*	mph
D = v_p / S	*27.4*	pc/mi/ln
LOS	*D*	

Design (N)

Design (N)

Design LOS	
v_p = (V or DDHV) / (PHF x N x f_{HV} x f_p)	pc/h/ln
S	mph
D = v_p / S	pc/mi/ln
Required Number of Lanes, N	

Glossary

N - Number of lanes	S - Speed
V - Hourly volume	D - Density
v_p - Flow rate	FFS - Free-flow speed
LOS - Level of service	BFFS - Base free-flow speed
DDHV - Directional design hour volume	

Factor Location

E_R - Exhibits 11-10, 11-12	f_{LW} - Exhibit 11-8
E_T - Exhibits 11-10, 11-11, 11-13	f_{LC} - Exhibit 11-9
f_p - Page 11-18	TRD - Page 11-11
LOS, S, FFS, v_p - Exhibits 11-2, 11-3	

BASIC FREEWAY SEGMENTS WORKSHEET

General Information

Analyst	*RK*
Agency or Company	*CDM Smith*
Date Performed	*4/5/2013*
Analysis Time Period	*AM Peak*

Site Information

Highway/Direction of Travel	*I-55/SB*
From/To	*Kedzie Ave/California Ave*
Jurisdiction	*Cook Co.*
Analysis Year	*2012*

Project Description *IDOT I-55 Phase I Engg Study*

☑ Oper.(LOS) ☐ Des.(N) ☐ Planning Data

Flow Inputs

Volume, V	*3944*	veh/h	Peak-Hour Factor, PHF	*0.95*
AADT		veh/day	%Trucks and Buses, P_T	*14*
Peak-Hr Prop. of AADT, K			%RVs, P_R	*0*
Peak-Hr Direction Prop, D			General Terrain:	*Level*
DDHV = AADT x K x D		veh/h	Grade % Length Up/Down %	*mi*

Calculate Flow Adjustments

f_p	*1.00*	E_R	*1.2*
E_T	*1.5*	$f_{HV} = 1/[1+P_T(E_T - 1) + P_R(E_R - 1)]$	*0.935*

Speed Inputs

Lane Width		ft
Rt-Side Lat. Clearance		ft
Number of Lanes, N	*3*	
Total Ramp Density, TRD		ramps/mi
FFS (measured)	*60.0*	mph
Base free-flow Speed, BFFS		mph

Calc Speed Adj and FFS

f_{LW}		mph
f_{LC}		mph
TRD Adjustment		mph
FFS	*60.0*	mph

LOS and Performance Measures

Operational (LOS)

v_p = (V or DDHV) / (PHF x N x f_{HV} x f_p)	*1481*	pc/h/ln
S	*60.0*	mph
D = v_p / S	*24.7*	pc/mi/ln
LOS	*C*	

Design (N)

Design (N)

Design LOS		
v_p = (V or DDHV) / (PHF x N x f_{HV} x f_p)		pc/h/ln
S		mph
D = v_p / S		pc/mi/ln
Required Number of Lanes, N		

Glossary

N - Number of lanes	S - Speed
V - Hourly volume	D - Density
v_p - Flow rate	FFS - Free-flow speed
LOS - Level of service	BFFS - Base free-flow speed
DDHV - Directional design hour volume	

Factor Location

E_R - Exhibits 11-10, 11-12	f_{LW} - Exhibit 11-8
E_T - Exhibits 11-10, 11-11, 11-13	f_{LC} - Exhibit 11-9
f_p - Page 11-18	TRD - Page 11-11
LOS, S, FFS, v_p - Exhibits 11-2, 11-3	

BASIC FREEWAY SEGMENTS WORKSHEET

General Information

Analyst	*RK*
Agency or Company	*CDM Smith*
Date Performed	*4/5/2013*
Analysis Time Period	*AM Peak*

Site Information

Highway/Direction of Travel	*I-55/SB*
From/To	*Damen Ave/California Ave*
Jurisdiction	*Cook Co.*
Analysis Year	*2012*

Project Description *IDOT I-55 Phase I Engg Study*

☑ Oper.(LOS) ☐ Des.(N) ☐ Planning Data

Flow Inputs

Volume, V	*4897*	veh/h	Peak-Hour Factor, PHF	*0.95*
AADT		veh/day	%Trucks and Buses, P_T	*14*
Peak-Hr Prop. of AADT, K			%RVs, P_R	*0*
Peak-Hr Direction Prop, D			General Terrain:	*Level*
DDHV = AADT x K x D		veh/h	Grade % Length Up/Down %	*mi*

Calculate Flow Adjustments

f_p	*1.00*	E_R	*1.2*
E_T	*1.5*	$f_{HV} = 1/[1+P_T(E_T - 1) + P_R(E_R - 1)]$	*0.935*

Speed Inputs

Lane Width		ft
Rt-Side Lat. Clearance		ft
Number of Lanes, N	*3*	
Total Ramp Density, TRD		ramps/mi
FFS (measured)	*60.0*	mph
Base free-flow Speed, BFFS		mph

Calc Speed Adj and FFS

f_{LW}		mph
f_{LC}		mph
TRD Adjustment		mph
FFS	*60.0*	mph

LOS and Performance Measures

Operational (LOS)

v_p = (V or DDHV) / (PHF x N x f_{HV} x f_p)	*1839*	pc/h/ln
S	*59.0*	mph
D = v_p / S	*31.2*	pc/mi/ln
LOS	*D*	

Design (N)

Design (N)

Design LOS	
v_p = (V or DDHV) / (PHF x N x f_{HV} x f_p)	pc/h/ln
S	mph
D = v_p / S	pc/mi/ln
Required Number of Lanes, N	

Glossary

N - Number of lanes	S - Speed
V - Hourly volume	D - Density
v_p - Flow rate	FFS - Free-flow speed
LOS - Level of service	BFFS - Base free-flow speed
DDHV - Directional design hour volume	

Factor Location

E_R - Exhibits 11-10, 11-12	f_{LW} - Exhibit 11-8
E_T - Exhibits 11-10, 11-11, 11-13	f_{LC} - Exhibit 11-9
f_p - Page 11-18	TRD - Page 11-11
LOS, S, FFS, v_p - Exhibits 11-2, 11-3	

HCS 2010: Basic Freeway Segments Release 6.1

Phone: Fax:
E-mail:

Operational Analysis

Analyst:	John Connelly
Agency or Company:	
Date Performed:	6/14/2013
Analysis Time Period:	PM Peak Hour
Freeway/Direction:	I-55 WB
From/To:	I-55 at Damen
Jurisdiction:	
Analysis Year:	
Description:	

Flow Inputs and Adjustments

Volume, V	4214	veh/h
Peak-hour factor, PHF	0.95	
Peak 15-min volume, v15	1109	v
Trucks and buses	12	%
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	0.943	
Driver population factor, fp	1.00	
Flow rate, vp	1567	pc/h/ln

Speed Inputs and Adjustments

Lane width	-	ft
Right-side lateral clearance	-	ft
Total ramp density, TRD	-	ramps/mi
Number of lanes, N	3	
Free-flow speed:	Measured	
FFS or BFFS	60.0	mi/h
Lane width adjustment, fLW	-	mi/h
Lateral clearance adjustment, fLC	-	mi/h
TRD adjustment	-	mi/h
Free-flow speed, FFS	60.0	mi/h

LOS and Performance Measures

Flow rate, vp	1567	pc/h/ln
Free-flow speed, FFS	60.0	mi/h
Average passenger-car speed, S	60.0	mi/h
Number of lanes, N	3	
Density, D	26.1	pc/mi/ln
Level of service, LOS	D	

Overall results are not computed when free-flow speed is less than 55 mph.

HCS 2010: Basic Freeway Segments Release 6.1

Phone: Fax:
E-mail:

Operational Analysis

Analyst:	John Connelly
Agency or Company:	
Date Performed:	6/14/2013
Analysis Time Period:	PM Peak Hour
Freeway/Direction:	I-55 WB
From/To:	SB I-90/94 to Damen
Jurisdiction:	
Analysis Year:	
Description:	

Flow Inputs and Adjustments

Volume, V	4919	veh/h
Peak-hour factor, PHF	0.95	
Peak 15-min volume, v15	1294	v
Trucks and buses	12	%
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	0.943	
Driver population factor, fp	1.00	
Flow rate, vp	1372	pc/h/ln

Speed Inputs and Adjustments

Lane width	-	ft
Right-side lateral clearance	-	ft
Total ramp density, TRD	-	ramps/mi
Number of lanes, N	4	
Free-flow speed:	Measured	
FFS or BFFS	60.0	mi/h
Lane width adjustment, fLW	-	mi/h
Lateral clearance adjustment, fLC	-	mi/h
TRD adjustment	-	mi/h
Free-flow speed, FFS	60.0	mi/h

LOS and Performance Measures

Flow rate, vp	1372	pc/h/ln
Free-flow speed, FFS	60.0	mi/h
Average passenger-car speed, S	60.0	mi/h
Number of lanes, N	4	
Density, D	22.9	pc/mi/ln
Level of service, LOS	C	

Overall results are not computed when free-flow speed is less than 55 mph.

HCS 2010: Basic Freeway Segments Release 6.1

Phone: Fax:
E-mail:

Operational Analysis

Analyst:	John Connelly
Agency or Company:	
Date Performed:	6/14/2013
Analysis Time Period:	AM Peak Hour
Freeway/Direction:	I-55 WB
From/To:	I-90/94 Entrance
Jurisdiction:	
Analysis Year:	
Description:	

Flow Inputs and Adjustments

Volume, V	3181	veh/h
Peak-hour factor, PHF	0.95	
Peak 15-min volume, v15	837	v
Trucks and buses	12	%
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	0.943	
Driver population factor, fp	1.00	
Flow rate, vp	1183	pc/h/ln

Speed Inputs and Adjustments

Lane width	-	ft
Right-side lateral clearance	-	ft
Total ramp density, TRD	-	ramps/mi
Number of lanes, N	3	
Free-flow speed:	Measured	
FFS or BFFS	60.0	mi/h
Lane width adjustment, fLW	-	mi/h
Lateral clearance adjustment, fLC	-	mi/h
TRD adjustment	-	mi/h
Free-flow speed, FFS	60.0	mi/h

LOS and Performance Measures

Flow rate, vp	1183	pc/h/ln
Free-flow speed, FFS	60.0	mi/h
Average passenger-car speed, S	60.0	mi/h
Number of lanes, N	3	
Density, D	19.7	pc/mi/ln
Level of service, LOS	C	

Overall results are not computed when free-flow speed is less than 55 mph.

Mainline Segment

Southbound PM

HCS 2010: Basic Freeway Segments Release 6.1

Phone: Fax:
E-mail:

Operational Analysis

Analyst: John Connelly
Agency or Company:
Date Performed: 6/14/2013
Analysis Time Period: 2012 PM Peak Hour
Freeway/Direction: I-55 WB
From/To: West of Diverge to I-355
Jurisdiction:
Analysis Year:
Description:

Flow Inputs and Adjustments

Volume, V	3246	veh/h
Peak-hour factor, PHF	0.95	
Peak 15-min volume, v15	854	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	1179	pc/h/ln

Speed Inputs and Adjustments

Lane width	-	ft
Right-side lateral clearance	-	ft
Total ramp density, TRD	-	ramps/mi
Number of lanes, N	3	
Free-flow speed:	Measured	
FFS or BFFS	60.0	mi/h
Lane width adjustment, fLW	-	mi/h
Lateral clearance adjustment, fLC	-	mi/h
TRD adjustment	-	mi/h
Free-flow speed, FFS	60.0	mi/h

LOS and Performance Measures

Flow rate, vp	1179	pc/h/ln
Free-flow speed, FFS	60.0	mi/h
Average passenger-car speed, S	60.0	mi/h
Number of lanes, N	3	
Density, D	19.6	pc/mi/ln
Level of service, LOS	C	

Overall results are not computed when free-flow speed is less than 55 mph.

HCS 2010: Basic Freeway Segments Release 6.1

Phone: Fax:
E-mail:

Operational Analysis

Analyst:	Alex Ericksen
Agency or Company:	
Date Performed:	1/13/2014
Analysis Time Period:	PM Peak Hour
Freeway/Direction:	I-55 WB
From/To:	Lemont to I-355
Jurisdiction:	
Analysis Year:	
Description:	

Flow Inputs and Adjustments

Volume, V	4079	veh/h
Peak-hour factor, PHF	0.95	
Peak 15-min volume, v15	1073	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	1111	pc/h/ln

Speed Inputs and Adjustments

Lane width	-	ft
Right-side lateral clearance	-	ft
Total ramp density, TRD	-	ramps/mi
Number of lanes, N	4	
Free-flow speed:	Measured	
FFS or BFFS	60.0	mi/h
Lane width adjustment, fLW	-	mi/h
Lateral clearance adjustment, fLC	-	mi/h
TRD adjustment	-	mi/h
Free-flow speed, FFS	60.0	mi/h

LOS and Performance Measures

Flow rate, vp	1111	pc/h/ln
Free-flow speed, FFS	60.0	mi/h
Average passenger-car speed, S	60.0	mi/h
Number of lanes, N	4	
Density, D	18.5	pc/mi/ln
Level of service, LOS	C	

Overall results are not computed when free-flow speed is less than 55 mph.

BASIC FREEWAY SEGMENTS WORKSHEET

General Information

Analyst	*RK*
Agency or Company	*CDM Smith*
Date Performed	*4/5/2013*
Analysis Time Period	*PM Peak*

Site Information

Highway/Direction of Travel	*I-55/SB*
From/To	*Cass Ave/Lemont Rd*
Jurisdiction	*DuPage Co.*
Analysis Year	*2012*

Project Description *IDOT I-55 Phase I Engg Study*

☑ Oper.(LOS) ☐ Des.(N) ☐ Planning Data

Flow Inputs

Volume, V	*4989*	veh/h	Peak-Hour Factor, PHF	*0.95*
AADT		veh/day	%Trucks and Buses, P_T	*12*
Peak-Hr Prop. of AADT, K			%RVs, P_R	*0*
Peak-Hr Direction Prop, D			General Terrain:	*Level*
DDHV = AADT x K x D		veh/h	Grade % Length Up/Down %	*mi*

Calculate Flow Adjustments

f_p	*1.00*	E_R	*1.2*
E_T	*1.5*	$f_{HV} = 1/[1+P_T(E_T - 1) + P_R(E_R - 1)]$	*0.943*

Speed Inputs

Lane Width		ft
Rt-Side Lat. Clearance		ft
Number of Lanes, N	*3*	
Total Ramp Density, TRD		ramps/mi
FFS (measured)	*60.0*	mph
Base free-flow Speed, BFFS		mph

Calc Speed Adj and FFS

f_{LW}		mph
f_{LC}		mph
TRD Adjustment		mph
FFS	*60.0*	mph

LOS and Performance Measures

Operational (LOS)

v_p = (V or DDHV) / (PHF x N x f_{HV} x f_p)	*1856*	pc/h/ln
S	*58.8*	mph
D = v_p / S	*31.6*	pc/mi/ln
LOS	*D*	

Design (N)

Design (N)

Design LOS	
v_p = (V or DDHV) / (PHF x N x f_{HV} x f_p)	pc/h/ln
S	mph
D = v_p / S	pc/mi/ln
Required Number of Lanes, N	

Glossary

N - Number of lanes	S - Speed
V - Hourly volume	D - Density
v_p - Flow rate	FFS - Free-flow speed
LOS - Level of service	BFFS - Base free-flow speed
DDHV - Directional design hour volume	

Factor Location

E_R - Exhibits 11-10, 11-12	f_{LW} - Exhibit 11-8
E_T - Exhibits 10-10, 11-11, 11-13	f_{LC} - Exhibit 11-9
f_p - Page 11-18	TRD - Page 11-11
LOS, S, FFS, v_p - Exhibits 11-2, 11-3	

BASIC FREEWAY SEGMENTS WORKSHEET

General Information

Analyst	*RK*
Agency or Company	*CDM Smith*
Date Performed	*4/5/2013*
Analysis Time Period	*PM Peak*

Site Information

Highway/Direction of Travel	*I-55/SB*
From/To	*IL 83/Cass Ave*
Jurisdiction	*DuPage Co.*
Analysis Year	*2012*

Project Description *IDOT I-55 Phase I Engg Study*

☑ Oper.(LOS) ☐ Des.(N) ☐ Planning Data

Flow Inputs

Volume, V	*4901*	veh/h	Peak-Hour Factor, PHF	*0.95*
AADT		veh/day	%Trucks and Buses, P_T	*11*
Peak-Hr Prop. of AADT, K			%RVs, P_R	*0*
Peak-Hr Direction Prop, D			General Terrain:	*Level*
DDHV = AADT x K x D		veh/h	Grade % Length Up/Down %	*mi*

Calculate Flow Adjustments

f_p	*1.00*	E_R	*1.2*
E_T	*1.5*	$f_{HV} = 1/[1+P_T(E_T - 1) + P_R(E_R - 1)]$	*0.948*

Speed Inputs

Lane Width		ft
Rt-Side Lat. Clearance		ft
Number of Lanes, N	*3*	
Total Ramp Density, TRD		ramps/mi
FFS (measured)	*60.0*	mph
Base free-flow Speed, BFFS		mph

Calc Speed Adj and FFS

f_{LW}		mph
f_{LC}		mph
TRD Adjustment		mph
FFS	*60.0*	mph

LOS and Performance Measures

Operational (LOS)

v_p = (V or DDHV) / (PHF x N x f_{HV} x f_p)	*1814*	pc/h/ln
S	*59.2*	mph
D = v_p / S	*30.7*	pc/mi/ln
LOS	*D*	

Design (N)

Design (N)

Design LOS	
v_p = (V or DDHV) / (PHF x N x f_{HV} x f_p)	pc/h/ln
S	mph
D = v_p / S	pc/mi/ln
Required Number of Lanes, N	

Glossary

N - Number of lanes	S - Speed
V - Hourly volume	D - Density
v_p - Flow rate	FFS - Free-flow speed
LOS - Level of service	BFFS - Base free-flow speed
DDHV - Directional design hour volume	

Factor Location

E_R - Exhibits 11-10, 11-12	f_{LW} - Exhibit 11-8
E_T - Exhibits 11-10, 11-11, 11-13	f_{LC} - Exhibit 11-9
f_p - Page 11-18	TRD - Page 11-11
LOS, S, FFS, v_p - Exhibits 11-2, 11-3	

BASIC FREEWAY SEGMENTS WORKSHEET

General Information		Site Information	
Analyst	*RK*	Highway/Direction of Travel	*I-55/SB*
Agency or Company	*CDM Smith*	From/To	*County Line Rd/IL 83*
Date Performed	*4/5/2013*	Jurisdiction	*DuPage Co.*
Analysis Time Period	*PM Peak*	Analysis Year	*2012*
Project Description	*IDOT I-55 Phase I Engg Study*		

☑ Oper.(LOS) ☐ Des.(N) ☐ Planning Data

Flow Inputs

Volume, V	*4169*	veh/h	Peak-Hour Factor, PHF	*0.95*	
AADT		veh/day	%Trucks and Buses, P_T	*10*	
Peak-Hr Prop. of AADT, K			%RVs, P_R	*0*	
Peak-Hr Direction Prop, D			General Terrain:	*Level*	
DDHV = AADT x K x D		veh/h	Grade % Length Up/Down %	*mi*	

Calculate Flow Adjustments

f_p	*1.00*		E_R	*1.2*
E_T	*1.5*		$f_{HV} = 1/[1+P_T(E_T - 1) + P_R(E_R - 1)]$	*0.952*

Speed Inputs

Lane Width		ft
Rt-Side Lat. Clearance		ft
Number of Lanes, N	*3*	
Total Ramp Density, TRD		ramps/mi
FFS (measured)	*60.0*	mph
Base free-flow Speed, BFFS		mph

Calc Speed Adj and FFS

f_{LW}		mph
f_{LC}		mph
TRD Adjustment		mph
FFS	*60.0*	mph

LOS and Performance Measures

Operational (LOS)

v_p = (V or DDHV) / (PHF x N x f_{HV} x f_p)	*1536*	pc/h/ln
S	*60.0*	mph
D = v_p / S	*25.6*	pc/mi/ln
LOS	*C*	

Design (N)

Design (N)

Design LOS		
v_p = (V or DDHV) / (PHF x N x f_{HV} x f_p)		pc/h/ln
S		mph
D = v_p / S		pc/mi/ln
Required Number of Lanes, N		

Glossary

N - Number of lanes	S - Speed
V - Hourly volume	D - Density
v_p - Flow rate	FFS - Free-flow speed
LOS - Level of service	BFFS - Base free-flow speed
DDHV - Directional design hour volume	

Factor Location

E_R - Exhibits 11-10, 11-12	f_{LW} - Exhibit 11-8
E_T - Exhibits 11-10, 11-11, 11-13	f_{LC} - Exhibit 11-9
f_p - Page 11-18	TRD - Page 11-11
LOS, S, FFS, v_p - Exhibits 11-2, 11-3	

BASIC FREEWAY SEGMENTS WORKSHEET

General Information		Site Information	
Analyst	*RK*	Highway/Direction of Travel	*I-55/SB*
Agency or Company	*CDM Smith*	From/To	*Joliet Rd/County Line Rd*
Date Performed	*4/5/2013*	Jurisdiction	*DuPage/Cook Co.*
Analysis Time Period	*PM Peak*	Analysis Year	*2012*
Project Description	*IDOT I-55 Phase I Engg Study*		

☑ Oper.(LOS) ☐ Des.(N) ☐ Planning Data

Flow Inputs

Volume, V	*4583*	veh/h	Peak-Hour Factor, PHF	*0.95*
AADT		veh/day	%Trucks and Buses, P_T	*10*
Peak-Hr Prop. of AADT, K			%RVs, P_R	*0*
Peak-Hr Direction Prop, D			General Terrain:	*Level*
DDHV = AADT x K x D		veh/h	Grade % Length Up/Down %	*mi*

Calculate Flow Adjustments

f_p	*1.00*	E_R	*1.2*
E_T	*1.5*	$f_{HV} = 1/[1+P_T(E_T - 1) + P_R(E_R - 1)]$	*0.952*

Speed Inputs

Lane Width		ft
Rt-Side Lat. Clearance		ft
Number of Lanes, N	*3*	
Total Ramp Density, TRD		ramps/mi
FFS (measured)	*60.0*	mph
Base free-flow Speed, BFFS		mph

Calc Speed Adj and FFS

f_{LW}		mph
f_{LC}		mph
TRD Adjustment		mph
FFS	*60.0*	mph

LOS and Performance Measures

Operational (LOS)

v_p = (V or DDHV) / (PHF x N x f_{HV} x f_p)	*1688*	pc/h/ln
S	*59.9*	mph
D = v_p / S	*28.2*	pc/mi/ln
LOS	*D*	

Design (N)

Design (N)

Design LOS		
v_p = (V or DDHV) / (PHF x N x f_{HV} x f_p)		pc/h/ln
S		mph
D = v_p / S		pc/mi/ln
Required Number of Lanes, N		

Glossary

N - Number of lanes	S - Speed
V - Hourly volume	D - Density
v_p - Flow rate	FFS - Free-flow speed
LOS - Level of service	BFFS - Base free-flow speed
DDHV - Directional design hour volume	

Factor Location

E_R - Exhibits 11-10, 11-12	f_{LW} - Exhibit 11-8
E_T - Exhibits 11-10, 11-11, 11-13	f_{LC} - Exhibit 11-9
f_p - Page 11-18	TRD - Page 11-11
LOS, S, FFS, v_p - Exhibits 11-2, 11-3	

BASIC FREEWAY SEGMENTS WORKSHEET

General Information

Analyst	*RK*
Agency or Company	*CDM Smith*
Date Performed	*4/5/2013*
Analysis Time Period	*PM Peak*

Site Information

Highway/Direction of Travel	*I-55/SB*
From/To	*I-294/Joliet Rd*
Jurisdiction	*DuPage/Cook Co.*
Analysis Year	*2012*

Project Description *IDOT I-55 Phase I Engg Study*

☑ Oper.(LOS) ☐ Des.(N) ☐ Planning Data

Flow Inputs

Volume, V	*3950*	veh/h	Peak-Hour Factor, PHF	*0.95*
AADT		veh/day	%Trucks and Buses, P_T	*11*
Peak-Hr Prop. of AADT, K			%RVs, P_R	*0*
Peak-Hr Direction Prop, D			General Terrain:	*Level*
DDHV = AADT x K x D		veh/h	Grade % Length	*mi*
			Up/Down %	

Calculate Flow Adjustments

f_p	*1.00*	E_R	*1.2*
E_T	*1.5*	$f_{HV} = 1/[1+P_T(E_T - 1) + P_R(E_R - 1)]$	*0.948*

Speed Inputs

Lane Width		ft
Rt-Side Lat. Clearance		ft
Number of Lanes, N	*3*	
Total Ramp Density, TRD		ramps/mi
FFS (measured)	*60.0*	mph
Base free-flow Speed, BFFS		mph

Calc Speed Adj and FFS

f_{LW}		mph
f_{LC}		mph
TRD Adjustment		mph
FFS	*60.0*	mph

LOS and Performance Measures

Operational (LOS)

v_p = (V or DDHV) / (PHF x N x f_{HV} x f_p)	*1462*	pc/h/ln
S	*60.0*	mph
D = v_p / S	*24.4*	pc/mi/ln
LOS	*C*	

Design (N)

Design (N)

Design LOS	
v_p = (V or DDHV) / (PHF x N x f_{HV} x f_p)	pc/h/ln
S	mph
D = v_p / S	pc/mi/ln
Required Number of Lanes, N	

Glossary

N - Number of lanes	S - Speed
V - Hourly volume	D - Density
v_p - Flow rate	FFS - Free-flow speed
LOS - Level of service	BFFS - Base free-flow speed
DDHV - Directional design hour volume	

Factor Location

E_R - Exhibits 11-10, 11-12	f_{LW} - Exhibit 11-8
E_T - Exhibits 11-10, 11-11, 11-13	f_{LC} - Exhibit 11-9
f_p - Page 11-18	TRD - Page 11-11
LOS, S, FFS, v_p - Exhibits 11-2, 11-3	

BASIC FREEWAY SEGMENTS WORKSHEET

General Information		Site Information	
Analyst	*RK*	Highway/Direction of Travel	*I-55/SB*
Agency or Company	*CDM Smith*	From/To	*Lagrange Rd/I-294*
Date Performed	*4/5/2013*	Jurisdiction	*Cook Co.*
Analysis Time Period	*PM Peak*	Analysis Year	*2012*

Project Description *IDOT I-55 Phase I Engg Study*

☑ Oper.(LOS) ☐ Des.(N) ☐ Planning Data

Flow Inputs

Volume, V	*3862*	veh/h	Peak-Hour Factor, PHF	*0.95*
AADT		veh/day	%Trucks and Buses, P_T	*10*
Peak-Hr Prop. of AADT, K			%RVs, P_R	*0*
Peak-Hr Direction Prop, D			General Terrain:	*Level*
DDHV = AADT x K x D		veh/h	Grade % Length Up/Down %	*mi*

Calculate Flow Adjustments

f_p	*1.00*	E_R	*1.2*
E_T	*1.5*	$f_{HV} = 1/(1+P_T(E_T - 1) + P_R(E_R - 1))$	*0.952*

Speed Inputs

Lane Width		ft
Rt-Side Lat. Clearance		ft
Number of Lanes, N	*3*	
Total Ramp Density, TRD		ramps/mi
FFS (measured)	*60.0*	mph
Base free-flow Speed, BFFS		mph

Calc Speed Adj and FFS

f_{LW}		mph
f_{LC}		mph
TRD Adjustment		mph
FFS	*60.0*	mph

LOS and Performance Measures

Operational (LOS)

v_p = (V or DDHV) / (PHF x N x f_{HV} x f_p)	*1423*	pc/h/ln
S	*60.0*	mph
D = v_p / S	*23.7*	pc/mi/ln
LOS	*C*	

Design (N)

Design (N)

Design LOS		
v_p = (V or DDHV) / (PHF x N x f_{HV} x f_p)		pc/h/ln
S		mph
D = v_p / S		pc/mi/ln
Required Number of Lanes, N		

Glossary

N - Number of lanes	S - Speed
V - Hourly volume	D - Density
v_p - Flow rate	FFS - Free-flow speed
LOS - Level of service	BFFS - Base free-flow speed
DDHV - Directional design hour volume	

Factor Location

E_R - Exhibits 11-10, 11-12	f_{LW} - Exhibit 11-8
E_T - Exhibits 11-10, 11-11, 11-13	f_{LC} - Exhibit 11-9
f_p - Page 11-18	TRD - Page 11-11
LOS, S, FFS, v_p - Exhibits 11-2, 11-3	

BASIC FREEWAY SEGMENTS WORKSHEET

General Information		Site Information	
Analyst	*RK*	Highway/Direction of Travel	*I-55/SB*
Agency or Company	*CDM Smith*	From/To	*IL 171 Archer Ave/Lagrange Rd*
Date Performed	*4/5/2013*	Jurisdiction	*Cook Co.*
Analysis Time Period	*PM Peak*	Analysis Year	*2012*
Project Description	*IDOT I-55 Phase I Engg Study*		

☐ Oper.(LOS) ☐ Des.(N) ☐ Planning Data

Flow Inputs

Volume, V	*4654*	veh/h	Peak-Hour Factor, PHF	*0.95*
AADT		veh/day	%Trucks and Buses, P_T	*10*
Peak-Hr Prop. of AADT, K			%RVs, P_R	*0*
Peak-Hr Direction Prop, D			General Terrain:	*Level*
DDHV = AADT x K x D		veh/h	Grade % Length Up/Down %	*mi*

Calculate Flow Adjustments

f_p	*1.00*	E_R	*1.2*
E_T	*1.5*	$f_{HV} = 1/[1+P_T(E_T - 1) + P_R(E_R - 1)]$	*0.952*

Speed Inputs

Lane Width		ft
Rt-Side Lat. Clearance		ft
Number of Lanes, N	*3*	
Total Ramp Density, TRD		ramps/mi
FFS (measured)	*60.0*	mph
Base free-flow Speed, BFFS		mph

Calc Speed Adj and FFS

f_{LW}		mph
f_{LC}		mph
TRD Adjustment		mph
FFS	*60.0*	mph

LOS and Performance Measures

Operational (LOS)

v_p = (V or DDHV) / (PHF x N x f_{HV} x f_p)	*1715*	pc/h/ln
S	*59.8*	mph
D = v_p / S	*28.7*	pc/mi/ln
LOS	*D*	

Design (N)

Design (N)

Design LOS		
v_p = (V or DDHV) / (PHF x N x f_{HV} x f_p)		pc/h/ln
S		mph
D = v_p / S		pc/mi/ln
Required Number of Lanes, N		

Glossary

N - Number of lanes	S - Speed
V - Hourly volume	D - Density
v_p - Flow rate	FFS - Free-flow speed
LOS - Level of service	BFFS - Base free-flow speed
DDHV - Directional design hour volume	

Factor Location

E_R - Exhibits 11-10, 11-12	f_{LW} - Exhibit 11-8
E_T - Exhibits 11-10, 11-11, 11-13	f_{LC} - Exhibit 11-9
f_p - Page 11-18	TRD - Page 11-11
LOS, S, FFS, v_p - Exhibits 11-2, 11-3	

BASIC FREEWAY SEGMENTS WORKSHEET

General Information

Analyst	*RK*
Agency or Company	*CDM Smith*
Date Performed	*4/5/2013*
Analysis Time Period	*PM Peak*

Site Information

Highway/Direction of Travel	*I-55/SB*
From/To	*Central Ave/Harlem Ave*
Jurisdiction	*Cook Co.*
Analysis Year	*2012*

Project Description *IDOT I-55 Phase I Engg Study*

☑ Oper.(LOS) ☐ Des.(N) ☐ Planning Data

Flow Inputs

Volume, V	*4980*	veh/h	Peak-Hour Factor, PHF	*0.95*
AADT		veh/day	%Trucks and Buses, P_T	*8*
Peak-Hr Prop. of AADT, K			%RVs, P_R	*0*
Peak-Hr Direction Prop, D			General Terrain:	*Level*
DDHV = AADT x K x D		veh/h	Grade % Length Up/Down %	*mi*

Calculate Flow Adjustments

f_p	*1.00*	E_R	*1.2*
E_T	*1.5*	$f_{HV} = 1/[1+P_T(E_T - 1) + P_R(E_R - 1)]$	*0.962*

Speed Inputs

Lane Width		ft
Rt-Side Lat. Clearance		ft
Number of Lanes, N	*3*	
Total Ramp Density, TRD		ramps/mi
FFS (measured)	*60.0*	mph
Base free-flow Speed, BFFS		mph

Calc Speed Adj and FFS

f_{LW}		mph
f_{LC}		mph
TRD Adjustment		mph
FFS	*60.0*	mph

LOS and Performance Measures

Operational (LOS)

v_p = (V or DDHV) / (PHF x N x f_{HV} x f_p)	*1817*	pc/h/ln
S	*59.1*	mph
D = v_p / S	*30.7*	pc/mi/ln
LOS	*D*	

Design (N)

Design (N)

Design LOS		
v_p = (V or DDHV) / (PHF x N x f_{HV} x f_p)		pc/h/ln
S		mph
D = v_p / S		pc/mi/ln
Required Number of Lanes, N		

Glossary

N - Number of lanes	S - Speed
V - Hourly volume	D - Density
v_p - Flow rate	FFS - Free-flow speed
LOS - Level of service	BFFS - Base free-flow speed
DDHV - Directional design hour volume	

Factor Location

E_R - Exhibits 11-10, 11-12	f_{LW} - Exhibit 11-8
E_T - Exhibits 11-10, 11-11, 11-13	f_{LC} - Exhibit 11-9
f_p - Page 11-18	TRD - Page 11-11
LOS, S, FFS, v_p - Exhibits 11-2, 11-3	

BASIC FREEWAY SEGMENTS WORKSHEET

General Information

Analyst	*RK*
Agency or Company	*CDM Smith*
Date Performed	*4/5/2013*
Analysis Time Period	*PM Peak*

Site Information

Highway/Direction of Travel	*I-55/SB*
From/To	*Cicero Ave/Central Ave*
Jurisdiction	*Cook Co.*
Analysis Year	*2012*

Project Description *IDOT I-55 Phase I Engg Study*

☑ Oper.(LOS) ☐ Des.(N) ☐ Planning Data

Flow Inputs

Volume, V	*5492*	veh/h	Peak-Hour Factor, PHF	*0.95*
AADT		veh/day	%Trucks and Buses, P_T	*8*
Peak-Hr Prop. of AADT, K			%RVs, P_R	*0*
Peak-Hr Direction Prop, D			General Terrain:	*Level*
DDHV = AADT x K x D		veh/h	Grade % Length Up/Down %	*mi*

Calculate Flow Adjustments

f_p	*1.00*	E_R	*1.2*
E_T	*1.5*	$f_{HV} = 1/[1+P_T(E_T - 1) + P_R(E_R - 1)]$	*0.962*

Speed Inputs

Lane Width		ft
Rt-Side Lat. Clearance		ft
Number of Lanes, N	*3*	
Total Ramp Density, TRD		ramps/mi
FFS (measured)	*60.0*	mph
Base free-flow Speed, BFFS		mph

Calc Speed Adj and FFS

f_{LW}		mph
f_{LC}		mph
TRD Adjustment		mph
FFS	*60.0*	mph

LOS and Performance Measures

Operational (LOS)

v_p = (V or DDHV) / (PHF x N x f_{HV} x f_p)	*2004*	pc/h/ln
S	*57.0*	mph
D = v_p / S	*35.1*	pc/mi/ln
LOS	*E*	

Design (N)

Design (N)

Design LOS		
v_p = (V or DDHV) / (PHF x N x f_{HV} x f_p)		pc/h/ln
S		mph
D = v_p / S		pc/mi/ln
Required Number of Lanes, N		

Glossary

N - Number of lanes	S - Speed
V - Hourly volume	D - Density
v_p - Flow rate	FFS - Free-flow speed
LOS - Level of service	BFFS - Base free-flow speed
DDHV - Directional design hour volume	

Factor Location

E_R - Exhibits 11-10, 11-12	f_{LW} - Exhibit 11-8
E_T - Exhibits 11-10, 11-11, 11-13	f_{LC} - Exhibit 11-9
f_p - Page 11-18	TRD - Page 11-11
LOS, S, FFS, v_p - Exhibits 11-2, 11-3	

BASIC FREEWAY SEGMENTS WORKSHEET

General Information

Analyst	*RK*
Agency or Company	*CDM Smith*
Date Performed	*11/9/2012*
Analysis Time Period	*PM Peak*

Site Information

Highway/Direction of Travel	*I-55/SB*
From/To	*Cicero Ave/Pulaski Rd*
Jurisdiction	*Cook Co.*
Analysis Year	*2012*

Project Description *IDOT I-55 Phase I Engg Study*

☑ Oper.(LOS) ☐ Des.(N) ☐ Planning Data

Flow Inputs

Volume, V	*5081*	veh/h	Peak-Hour Factor, PHF	*0.95*	
AADT		veh/day	%Trucks and Buses, P_T	*8*	
Peak-Hr Prop. of AADT, K			%RVs, P_R	*0*	
Peak-Hr Direction Prop, D			General Terrain:	*Level*	
DDHV = AADT x K x D		veh/h	Grade % Length Up/Down %	*mi*	

Calculate Flow Adjustments

f_p	*1.00*		E_R	*1.2*
E_T	*1.5*		$f_{HV} = 1/[1+P_T(E_T - 1) + P_R(E_R - 1)]$	*0.962*

Speed Inputs

Lane Width		ft
Rt-Side Lat. Clearance		ft
Number of Lanes, N	*3*	
Total Ramp Density, TRD		ramps/mi
FFS (measured)	*60.0*	mph
Base free-flow Speed, BFFS		mph

Calc Speed Adj and FFS

f_{LW}		mph
f_{LC}		mph
TRD Adjustment		mph
FFS	*60.0*	mph

LOS and Performance Measures

Operational (LOS)

v_p = (V or DDHV) / (PHF x N x f_{HV} x f_p)	*1854*	pc/h/ln
S	*58.8*	mph
D = v_p / S	*31.5*	pc/mi/ln
LOS	*D*	

Design (N)

Design (N)

Design LOS	
v_p = (V or DDHV) / (PHF x N x f_{HV} x f_p)	pc/h/ln
S	mph
D = v_p / S	pc/mi/ln
Required Number of Lanes, N	

Glossary

N - Number of lanes	S - Speed
V - Hourly volume	D - Density
v_p - Flow rate	FFS - Free-flow speed
LOS - Level of service	BFFS - Base free-flow speed
DDHV - Directional design hour volume	

Factor Location

E_R - Exhibits 11-10, 11-12	f_{LW} - Exhibit 11-8
E_T - Exhibits 11-10, 11-11, 11-13	f_{LC} - Exhibit 11-9
f_p - Page 11-18	TRD - Page 11-11
LOS, S, FFS, v_p - Exhibits 11-2, 11-3	

BASIC FREEWAY SEGMENTS WORKSHEET

General Information		Site Information	
Analyst	*RK*	Highway/Direction of Travel	*I-55/SB*
Agency or Company	*CDM Smith*	From/To	*Pulaski Rd/Kedzie Ave*
Date Performed	*4/5/2013*	Jurisdiction	*Cook Co.*
Analysis Time Period	*PM Peak*	Analysis Year	*2012*

Project Description *IDOT I-55 Phase I Engg Study*

☑ Oper.(LOS) ☐ Des.(N) ☐ Planning Data

Flow Inputs

Volume, V	*4887*	veh/h	Peak-Hour Factor, PHF	*0.95*	
AADT		veh/day	%Trucks and Buses, P_T	*8*	
Peak-Hr Prop. of AADT, K			%RVs, P_R	*0*	
Peak-Hr Direction Prop, D			General Terrain:	*Level*	
DDHV = AADT x K x D		veh/h	Grade % Length Up/Down %	*mi*	

Calculate Flow Adjustments

f_p	*1.00*	E_R	*1.2*
E_T	*1.5*	$f_{HV} = 1/[1+P_T(E_T - 1) + P_R(E_R - 1)]$	*0.962*

Speed Inputs

Lane Width		ft
Rt-Side Lat. Clearance		ft
Number of Lanes, N	*3*	
Total Ramp Density, TRD		ramps/mi
FFS (measured)	*60.0*	mph
Base free-flow Speed, BFFS		mph

Calc Speed Adj and FFS

f_{LW}		mph
f_{LC}		mph
TRD Adjustment		mph
FFS	*60.0*	mph

LOS and Performance Measures

Operational (LOS)

v_p = (V or DDHV) / (PHF x N x f_{HV} x f_p)	*1783*	pc/h/ln
S	*59.4*	mph
D = v_p / S	*30.0*	pc/mi/ln
LOS	*D*	

Design (N)

Design (N)

Design LOS		
v_p = (V or DDHV) / (PHF x N x f_{HV} x f_p)		pc/h/ln
S		mph
D = v_p / S		pc/mi/ln
Required Number of Lanes, N		

Glossary

N - Number of lanes	S - Speed
V - Hourly volume	D - Density
v_p - Flow rate	FFS - Free-flow speed
LOS - Level of service	BFFS - Base free-flow speed
DDHV - Directional design hour volume	

Factor Location

E_R - Exhibits 11-10, 11-12	f_{LW} - Exhibit 11-8
E_T - Exhibits 11-10, 11-11, 11-13	f_{LC} - Exhibit 11-9
f_p - Page 11-18	TRD - Page 11-11
LOS, S, FFS, v_p - Exhibits 11-2, 11-3	

HCS 2010: Basic Freeway Segments Release 6.1

Phone: Fax:
E-mail:

Operational Analysis

Analyst:	Alex Ericksen
Agency or Company:	
Date Performed:	1/13/2014
Analysis Time Period:	PM Peak Hour
Freeway/Direction:	I-55 Westbound
From/To:	Kedzie/Cali Ave Frontage Rd
Jurisdiction:	
Analysis Year:	
Description:	

Flow Inputs and Adjustments

Volume, V	3640	veh/h
Peak-hour factor, PHF	0.95	
Peak 15-min volume, v15	958	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	1328	pc/h/ln

Speed Inputs and Adjustments

Lane width	-	ft
Right-side lateral clearance	-	ft
Total ramp density, TRD	-	ramps/mi
Number of lanes, N	3	
Free-flow speed:	Measured	
FFS or BFFS	60.0	mi/h
Lane width adjustment, fLW	-	mi/h
Lateral clearance adjustment, fLC	-	mi/h
TRD adjustment	-	mi/h
Free-flow speed, FFS	60.0	mi/h

LOS and Performance Measures

Flow rate, vp	1328	pc/h/ln
Free-flow speed, FFS	60.0	mi/h
Average passenger-car speed, S	60.0	mi/h
Number of lanes, N	3	
Density, D	22.1	pc/mi/ln
Level of service, LOS	C	

Overall results are not computed when free-flow speed is less than 55 mph.

BASIC FREEWAY SEGMENTS WORKSHEET

General Information

Analyst	*RK*
Agency or Company	*CDM Smith*
Date Performed	*4/5/2013*
Analysis Time Period	*PM Peak*

Site Information

Highway/Direction of Travel	*I-55/SB*
From/To	*Damen Ave/California Ave*
Jurisdiction	*Cook Co.*
Analysis Year	*2012*

Project Description *IDOT I-55 Phase I Engg Study*

☑ Oper.(LOS) ☐ Des.(N) ☐ Planning Data

Flow Inputs

Volume, V	*4198*	veh/h	Peak-Hour Factor, PHF	*0.95*
AADT		veh/day	%Trucks and Buses, P_T	*8*
Peak-Hr Prop. of AADT, K			%RVs, P_R	*0*
Peak-Hr Direction Prop, D			General Terrain:	*Level*
DDHV = AADT x K x D		veh/h	Grade % Length Up/Down %	*mi*

Calculate Flow Adjustments

f_p	*1.00*	E_R	*1.2*
E_T	*1.5*	$f_{HV} = 1/[1+P_T(E_T - 1) + P_R(E_R - 1)]$	*0.962*

Speed Inputs

Lane Width		ft
Rt-Side Lat. Clearance		ft
Number of Lanes, N	*3*	
Total Ramp Density, TRD		ramps/mi
FFS (measured)	*60.0*	mph
Base free-flow Speed, BFFS		mph

Calc Speed Adj and FFS

f_{LW}		mph
f_{LC}		mph
TRD Adjustment		mph
FFS	*60.0*	mph

LOS and Performance Measures

Operational (LOS)

v_p = (V or DDHV) / (PHF x N x f_{HV} x f_p)	*1532*	pc/h/ln
S	*60.0*	mph
D = v_p / S	*25.5*	pc/mi/ln
LOS	*C*	

Design (N)

Design (N)

Design LOS	
v_p = (V or DDHV) / (PHF x N x f_{HV} x f_p)	pc/h/ln
S	mph
D = v_p / S	pc/mi/ln
Required Number of Lanes, N	

Glossary

N - Number of lanes	S - Speed
V - Hourly volume	D - Density
v_p - Flow rate	FFS - Free-flow speed
LOS - Level of service	BFFS - Base free-flow speed
DDHV - Directional design hour volume	

Factor Location

E_R - Exhibits 11-10, 11-12	f_{LW} - Exhibit 11-8
E_T - Exhibits 11-10, 11-11, 11-13	f_{LC} - Exhibit 11-9
f_p - Page 11-18	TRD - Page 11-11
LOS, S, FFS, v_p - Exhibits 11-2, 11-3	

HCS 2010: Basic Freeway Segments Release 6.1

Phone: Fax:
E-mail:

Operational Analysis

Analyst:	Alex Ericksen
Agency or Company:	
Date Performed:	1/13/2014
Analysis Time Period:	PM Peak Hour
Freeway/Direction:	I-55 WB
From/To:	I-55 at Damen
Jurisdiction:	
Analysis Year:	
Description:	

Flow Inputs and Adjustments

Volume, V	3497	veh/h
Peak-hour factor, PHF	0.95	
Peak 15-min volume, v15	920	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	1270	pc/h/ln

Speed Inputs and Adjustments

Lane width	-	ft
Right-side lateral clearance	-	ft
Total ramp density, TRD	-	ramps/mi
Number of lanes, N	3	
Free-flow speed:	Measured	
FFS or BFFS	60.0	mi/h
Lane width adjustment, fLW	-	mi/h
Lateral clearance adjustment, fLC	-	mi/h
TRD adjustment	-	mi/h
Free-flow speed, FFS	60.0	mi/h

LOS and Performance Measures

Flow rate, vp	1270	pc/h/ln
Free-flow speed, FFS	60.0	mi/h
Average passenger-car speed, S	60.0	mi/h
Number of lanes, N	3	
Density, D	21.2	pc/mi/ln
Level of service, LOS	C	

Overall results are not computed when free-flow speed is less than 55 mph.

HCS 2010: Basic Freeway Segments Release 6.1

Phone: Fax:
E-mail:

Operational Analysis

Analyst:	Alex Ericksen
Agency or Company:	
Date Performed:	1/12/2014
Analysis Time Period:	PM Peak Hour
Freeway/Direction:	I-55 WB
From/To:	SB I-90/94 to Damen
Jurisdiction:	
Analysis Year:	
Description:	

Flow Inputs and Adjustments

Volume, V	3973	veh/h
Peak-hour factor, PHF	0.95	
Peak 15-min volume, v15	1046	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	1082	pc/h/ln

Speed Inputs and Adjustments

Lane width	-	ft
Right-side lateral clearance	-	ft
Total ramp density, TRD	-	ramps/mi
Number of lanes, N	4	
Free-flow speed:	Measured	
FFS or BFFS	60.0	mi/h
Lane width adjustment, fLW	-	mi/h
Lateral clearance adjustment, fLC	-	mi/h
TRD adjustment	-	mi/h
Free-flow speed, FFS	60.0	mi/h

LOS and Performance Measures

Flow rate, vp	1082	pc/h/ln
Free-flow speed, FFS	60.0	mi/h
Average passenger-car speed, S	60.0	mi/h
Number of lanes, N	4	
Density, D	18.0+	pc/mi/ln
Level of service, LOS	C	

Overall results are not computed when free-flow speed is less than 55 mph.

HCS 2010: Basic Freeway Segments Release 6.1

Phone: Fax:
E-mail:

Operational Analysis

Analyst:	Alex Ericksen
Agency or Company:	
Date Performed:	1/13/2014
Analysis Time Period:	PM Peak Hour
Freeway/Direction:	I-55 WB
From/To:	I-90/94 Entrance
Jurisdiction:	
Analysis Year:	
Description:	

Flow Inputs and Adjustments

Volume, V	2410	veh/h
Peak-hour factor, PHF	0.95	
Peak 15-min volume, v15	634	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	875	pc/h/ln

Speed Inputs and Adjustments

Lane width	-	ft
Right-side lateral clearance	-	ft
Total ramp density, TRD	-	ramps/mi
Number of lanes, N	3	
Free-flow speed:	Measured	
FFS or BFFS	60.0	mi/h
Lane width adjustment, fLW	-	mi/h
Lateral clearance adjustment, fLC	-	mi/h
TRD adjustment	-	mi/h
Free-flow speed, FFS	60.0	mi/h

LOS and Performance Measures

Flow rate, vp	875	pc/h/ln
Free-flow speed, FFS	60.0	mi/h
Average passenger-car speed, S	60.0	mi/h
Number of lanes, N	3	
Density, D	14.6	pc/mi/ln
Level of service, LOS	B	

Overall results are not computed when free-flow speed is less than 55 mph.

Merge

Northbound AM

HCS 2010: Freeway Merge and Diverge Segments Release 6.1

Phone: Fax:
E-mail:

Merge Analysis

Analyst: Caitlin Bowen
Agency/Co.:
Date performed: 6/13/2013
Analysis time period: AM Peak Hour
Freeway/Dir of Travel: I-55 Eastbound
Junction: Joliet Rd Entrance
Jurisdiction:
Analysis Year:
Description:

Freeway Data

Type of analysis	Merge	
Number of lanes in freeway	3	
Free-flow speed on freeway	60.0	mph
Volume on freeway	2968	vph

On Ramp Data

Side of freeway	Right	
Number of lanes in ramp	1	
Free-flow speed on ramp	40.0	mph
Volume on ramp	270	vph
Length of first accel/decel lane	450	ft
Length of second accel/decel lane		ft

Adjacent Ramp Data (if one exists)

Does adjacent ramp exist?	Yes	
Volume on adjacent Ramp	1628	vph
Position of adjacent Ramp	Upstream	
Type of adjacent Ramp	Off	
Distance to adjacent Ramp	2500	ft

Conversion to pc/h Under Base Conditions

Junction Components	Freeway	Ramp	Adjacent Ramp	
Volume, V (vph)	2968	270	1628	vph
Peak-hour factor, PHF	0.95	0.95	0.95	

Peak 15-min volume, v15	781	71	428	v
Trucks and buses	9	9	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	0.957	0.957	0.957	
Driver population factor, fP	1.00	1.00	1.00	
Flow rate, vp	3265	297	1791	pcph

Estimation of V12 Merge Areas

L = 651.87 (Equation 13-6 or 13-7)
EQ

P = 0.590 Using Equation 1
FM

v = v (P) = 1927 pc/h
12 F FM

Capacity Checks

	Actual	Maximum	LOS F?
v FO	3562	6900	No

v or v 1338 pc/h (Equation 13-14 or 13-17)
3 av34

Is v or v > 2700 pc/h? No
3 av34

Is v or v > 1.5 v /2 No
3 av34 12

If yes, v = 1927 (Equation 13-15, 13-16, 13-18, or 13-19)
12A

Flow Entering Merge Influence Area

	Actual	Max Desirable	Violation?
v R12	3562	4600	No

Level of Service Determination (if not F)

Density, $D = 5.475 + 0.00734 v_R + 0.0078 v_{12} - 0.00627 L_A = 19.9$ pc/mi/ln

Level of service for ramp-freeway junction areas of influence B

Speed Estimation

Intermediate speed variable, $M_S = 0.321$

Space mean speed in ramp influence area, $S_R = 54.2$ mph

Space mean speed in outer lanes, $S_0 = 57.0$ mph

Space mean speed for all vehicles, $S = 55.2$ mph

HCS 2010: Freeway Merge and Diverge Segments Release 6.1

Phone: Fax:
E-mail:

Merge Analysis

Analyst:	Alex Ericksen
Agency/Co.:	
Date performed:	1/9/2014
Analysis time period:	AM Peak Hour
Freeway/Dir of Travel:	I-55 Eastbound
Junction:	I-355 Entrance
Jurisdiction:	
Analysis Year:	
Description:	

Freeway Data

Type of analysis	Merge	
Number of lanes in freeway	3	
Free-flow speed on freeway	60.0	mph
Volume on freeway	3238	vph

On Ramp Data

Side of freeway	Right	
Number of lanes in ramp	2	
Free-flow speed on ramp	40.0	mph
Volume on ramp	700	vph
Length of first accel/decel lane	1000	ft
Length of second accel/decel lane	1000	ft

Adjacent Ramp Data (if one exists)

Does adjacent ramp exist?	Yes	
Volume on adjacent Ramp	495	vph
Position of adjacent Ramp	Downstream	
Type of adjacent Ramp	Off	
Distance to adjacent Ramp	3550	ft

Conversion to pc/h Under Base Conditions

Junction Components	Freeway	Ramp	Adjacent Ramp	
Volume, V (vph)	3238	700	495	vph
Peak-hour factor, PHF	0.95	0.95	0.95	
Peak 15-min volume, v15	852	184	130	v
Trucks and buses	9	9	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	0.957	0.957	0.957	
Driver population factor, fP	1.00	1.00	1.00	

Flow rate, vp	3562	770	545	pcph

Estimation of V12 Merge Areas

L_{EQ} = 2516.16 (Equation 13-6 or 13-7)

P_{FM} = 0.555 Using Equation 0

$v_{12} = v_F (P_{FM})$ = 1977 pc/h

Capacity Checks

	Actual	Maximum	LOS F?
v_{FO}	4332	6900	No
v_3 or v_{av34}	1585 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} = 2035 (Equation 13-15, 13-16, 13-18, or 13-19)

Flow Entering Merge Influence Area

	Actual	Max Desirable	Violation?
v_{12A}	4332	4600	No

Level of Service Determination (if not F)

Density, $D_R = 5.475 + 0.00734\ v_R + 0.0078\ v_{12} - 0.00627\ L_A$ = 8.2 pc/mi/ln

Level of service for ramp-freeway junction areas of influence A

Speed Estimation

Intermediate speed variable,	M_S = 0.145	
Space mean speed in ramp influence area,	S_R = 57.4	mph
Space mean speed in outer lanes,	S_0 = 56.3	mph
Space mean speed for all vehicles,	S = 57.0	mph

HCS 2010: Freeway Merge and Diverge Segments Release 6.1

Phone: Fax:
E-mail:

Merge Analysis

Analyst: Caitlin Bowen
Agency/Co.:
Date performed: 6/13/2013
Analysis time period: AM Peak Hour
Freeway/Dir of Travel: I-55 Eastbound
Junction: Lemont Rd Entrance
Jurisdiction:
Analysis Year:
Description:

Freeway Data

Type of analysis	Merge	
Number of lanes in freeway	3	
Free-flow speed on freeway	60.0	mph
Volume on freeway	3507	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	1347	vph
Length of first accel/decel lane	650	ft
Length of second accel/decel lane		ft

Adjacent Ramp Data (if one exists)

Does adjacent ramp exist?	Yes	
Volume on adjacent Ramp	128	vph
Position of adjacent Ramp	Downstream	
Type of adjacent Ramp	Off	
Distance to adjacent Ramp	8000	ft

Conversion to pc/h Under Base Conditions

Junction Components	Freeway	Ramp	Adjacent Ramp	
Volume, V (vph)	3507	1347	128	vph
Peak-hour factor, PHF	0.95	0.95	0.95	

Peak 15-min volume, v15	923	354	34	v
Trucks and buses	9	9	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	0.957	0.957	0.957	
Driver population factor, fP	1.00	1.00	1.00	
Flow rate, vp	3858	1482	141	pcph

Estimation of V12 Merge Areas

L = 787.05 (Equation 13-6 or 13-7)
EQ

P = 0.596 Using Equation 1
FM

v = v (P) = 2298 pc/h
12 F FM

Capacity Checks

	Actual	Maximum	LOS F?
v FO	5340	6900	No

v or v 1560 pc/h (Equation 13-14 or 13-17)
3 av34

Is v or v > 2700 pc/h? No
3 av34

Is v or v > 1.5 v /2 No
3 av34 12

If yes, v = 2298 (Equation 13-15, 13-16, 13-18, or 13-19)
12A

Flow Entering Merge Influence Area

	Actual	Max Desirable	Violation?
v R12	5340	4600	No

Level of Service Determination (if not F)

Density, $D_R = 5.475 + 0.00734\, v_R + 0.0078\, v_{12} - 0.00627\, L_A = 30.2$ pc/mi/ln

Level of service for ramp-freeway junction areas of influence D

Speed Estimation

Intermediate speed variable, $M_S = 0.446$

Space mean speed in ramp influence area, $S_R = 52.0$ mph

Space mean speed in outer lanes, $S_0 = 56.2$ mph

Space mean speed for all vehicles, $S = 53.1$ mph

HCS 2010: Freeway Merge and Diverge Segments Release 6.1

Phone: Fax:
E-mail:

Merge Analysis

Analyst:	Alex Ericksen
Agency/Co.:	
Date performed:	1/9/2014
Analysis time period:	AM Peak Hour
Freeway/Dir of Travel:	I-55 Eastbound
Junction:	Cass Ave East Side
Jurisdiction:	
Analysis Year:	
Description:	

Freeway Data

Type of analysis	Merge	
Number of lanes in freeway	3	
Free-flow speed on freeway	60.0	mph
Volume on freeway	4538	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	267	vph
Length of first accel/decel lane	750	ft
Length of second accel/decel lane		ft

Adjacent Ramp Data (if one exists)

Does adjacent ramp exist?	Yes	
Volume on adjacent Ramp	1122	vph
Position of adjacent Ramp	Downstream	
Type of adjacent Ramp	Off	
Distance to adjacent Ramp	5800	ft

Conversion to pc/h Under Base Conditions

Junction Components	Freeway	Ramp	Adjacent Ramp	
Volume, V (vph)	4538	267	1122	vph
Peak-hour factor, PHF	0.95	0.95	0.95	
Peak 15-min volume, v15	1194	70	295	v
Trucks and buses	9	9	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	0.957	0.957	0.957	
Driver population factor, fP	1.00	1.00	1.00	

Flow rate, vp 4992 294 1234 pcph

Estimation of V12 Merge Areas

L_{EQ} = 6499.87 (Equation 13-6 or 13-7)

P_{FM} = 0.605 Using Equation 3

$v_{12} = v_F (P_{FM})$ = 3018 pc/h

Capacity Checks

	Actual	Maximum	LOS F?
v_{FO}	5286	6900	No
v_3 or v_{av34}	1974 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} = 3018 (Equation 13-15, 13-16, 13-18, or 13-19)

Flow Entering Merge Influence Area

	Actual	Max Desirable	Violation?
v_{R12}	5286	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 = 0.376

Space mean speed in ramp influence area, S_R = 53.2 mph

Space mean speed in outer lanes, S_0 = 54.7 mph

Space mean speed for all vehicles, S = 53.8 mph

HCS 2010: Freeway Merge and Diverge Segments Release 6.1

Phone: Fax:
E-mail:

Merge Analysis

Analyst: Caitlin Bowen
Agency/Co.:
Date performed: 6/13/2013
Analysis time period: AM Peak Hour
Freeway/Dir of Travel: I-55 Eastbound
Junction: Kingery Hwy East Side
Jurisdiction:
Analysis Year:
Description:

Freeway Data

Type of analysis	Merge	
Number of lanes in freeway	3	
Free-flow speed on freeway	60.0	mph
Volume on freeway	3683	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	678	vph
Length of first accel/decel lane	650	ft
Length of second accel/decel lane		ft

Adjacent Ramp Data (if one exists)

Does adjacent ramp exist?	Yes	
Volume on adjacent Ramp	174	vph
Position of adjacent Ramp	Downstream	
Type of adjacent Ramp	Off	
Distance to adjacent Ramp	6500	ft

Conversion to pc/h Under Base Conditions

Junction Components	Freeway	Ramp	Adjacent Ramp	
Volume, V (vph)	3683	678	174	vph
Peak-hour factor, PHF	0.95	0.95	0.95	

Peak 15-min volume, v15	969	178	46	v
Trucks and buses	9	9	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	0.957	0.957	0.957	
Driver population factor, fP	1.00	1.00	1.00	
Flow rate, vp	4051	746	191	pcph

Estimation of V12 Merge Areas

L = 1066.15 (Equation 13-6 or 13-7)
EQ

P = 0.596 Using Equation 1
FM

v = v (P) = 2413 pc/h
12 F FM

Capacity Checks

	Actual	Maximum	LOS F?
v FO	4797	6900	No

v or v 1638 pc/h (Equation 13-14 or 13-17)
3 av34

Is v or v > 2700 pc/h? No
3 av34

Is v or v > 1.5 v /2 No
3 av34 12

If yes, v = 2413 (Equation 13-15, 13-16, 13-18, or 13-19)
12A

Flow Entering Merge Influence Area

	Actual	Max Desirable	Violation?
v R12	4797	4600	No

Level of Service Determination (if not F)

Density, D = 5.475 + 0.00734 v + 0.0078 v - 0.00627 L = 25.7 pc/mi/ln
R R 12 A

Level of service for ramp-freeway junction areas of influence C

Speed Estimation

Intermediate speed variable, M = 0.367
S

Space mean speed in ramp influence area, S = 53.4 mph
R

Space mean speed in outer lanes, S = 55.9 mph
0

Space mean speed for all vehicles, S = 54.2 mph

HCS 2010: Freeway Merge and Diverge Segments Release 6.1

Phone: Fax:
E-mail:

Merge Analysis

Analyst: Caitlin Bowen
Agency/Co.:
Date performed: 6/12/2013
Analysis time period: AM Peak Hour
Freeway/Dir of Travel: I-55 Eastbound
Junction: La Grange Rd East
Jurisdiction:
Analysis Year:
Description:

Freeway Data

Type of analysis	Merge	
Number of lanes in freeway	3	
Free-flow speed on freeway	60.0	mph
Volume on freeway	4081	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	107	vph
Length of first accel/decel lane	660	ft
Length of second accel/decel lane		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)	4081	107		vph
Peak-hour factor, PHF	0.95	0.95		

Peak 15-min volume, v15	1074	28	v
Trucks and buses	9	9	%
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	0.957	0.957	
Driver population factor, fP	1.00	1.00	
Flow rate, vp	4489	118	pcph

Estimation of V12 Merge Areas

L_{EQ} = (Equation 13-6 or 13-7)

P_{FM} = 0.596 Using Equation 1

$v_{12} = v_{12A} (P_{FM}) =$ 2675 pc/h

Capacity Checks

	Actual	Maximum	LOS F?
v_{FO}	4607	6900	No

v_{3} or v_{av34} 1814 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} = 2675 (Equation 13-15, 13-16, 13-18, or 13-19)

Flow Entering Merge Influence Area

	Actual	Max Desirable	Violation?
v_{R12}	4607	4600	No

Level of Service Determination (if not F)

$D_R = 5.475 + 0.00734\, v_{12} + 0.0078\, v_{R} - 0.00627\, L_A =$ 23.1 pc/mi/ln

Level of service for ramp-freeway junction areas of influence C

Speed Estimation

Intermediate speed variable, M_S = 0.345

Space mean speed in ramp influence area, S_R = 53.8 mph

Space mean speed in outer lanes, S_0 = 55.3 mph

Space mean speed for all vehicles, S = 54.4 mph

HCS 2010: Freeway Merge and Diverge Segments Release 6.1

Phone: Fax:
E-mail:

Merge Analysis

Analyst: Caitlin Bowen
Agency/Co.:
Date performed: 6/12/2013
Analysis time period: AM Peak Hour
Freeway/Dir of Travel: I-55 Eastbound
Junction: Harlem Ave East
Jurisdiction:
Analysis Year:
Description:

Freeway Data

Type of analysis	Merge	
Number of lanes in freeway	3	
Free-flow speed on freeway	60.0	mph
Volume on freeway	3684	vph

On Ramp Data

Side of freeway	Right	
Number of lanes in ramp	1	
Free-flow speed on ramp	40.0	mph
Volume on ramp	1030	vph
Length of first accel/decel lane	500	ft
Length of second accel/decel lane		ft

Adjacent Ramp Data (if one exists)

Does adjacent ramp exist?	Yes	
Volume on adjacent Ramp	570	vph
Position of adjacent Ramp	Downstream	
Type of adjacent Ramp	Off	
Distance to adjacent Ramp	7500	ft

Conversion to pc/h Under Base Conditions

Junction Components	Freeway	Ramp	Adjacent Ramp	
Volume, V (vph)	3684	1030	570	vph
Peak-hour factor, PHF	0.95	0.95	0.95	

Peak 15-min volume, v15	969	271	150	v
Trucks and buses	9	9	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	0.957	0.957	0.957	
Driver population factor, fP	1.00	1.00	1.00	
Flow rate, vp	4052	1133	627	pcph

Estimation of V12 Merge Areas

L = 3844.27 (Equation 13-6 or 13-7)
EQ

P = 0.591 Using Equation 1
FM

v = v (P) = 2397 pc/h
12 F FM

Capacity Checks

	Actual	Maximum	LOS F?
v FO	5185	6900	No

v or v 1655 pc/h (Equation 13-14 or 13-17)
3 av34

Is v or v > 2700 pc/h? No
3 av34

Is v or v > 1.5 v /2 No
3 av34 12

If yes, v = 2397 (Equation 13-15, 13-16, 13-18, or 13-19)
12A

Flow Entering Merge Influence Area

	Actual	Max Desirable	Violation?
v R12	5185	4600	No

Level of Service Determination (if not F)

Density, D = 5.475 + 0.00734 v + 0.0078 v - 0.00627 L = 29.4 pc/mi/ln
R R 12 A

Level of service for ramp-freeway junction areas of influence D

Speed Estimation

Intermediate speed variable, M = 0.414
S

Space mean speed in ramp influence area, S = 52.5 mph
R

Space mean speed in outer lanes, S = 55.8 mph
0

Space mean speed for all vehicles, S = 53.6 mph

HCS 2010: Freeway Merge and Diverge Segments Release 6.1

Phone: Fax:
E-mail:

Merge Analysis

Analyst: Caitlin Bowen
Agency/Co.:
Date performed: 6/12/2013
Analysis time period: AM Peak Hours
Freeway/Dir of Travel: I-55 Eastbound
Junction: Central Ave East
Jurisdiction:
Analysis Year:
Description:

Freeway Data

Type of analysis	Merge	
Number of lanes in freeway	3	
Free-flow speed on freeway	60.0	mph
Volume on freeway	4144	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	387	vph
Length of first accel/decel lane	500	ft
Length of second accel/decel lane		ft

Adjacent Ramp Data (if one exists)

Does adjacent ramp exist?	Yes	
Volume on adjacent Ramp	354	vph
Position of adjacent Ramp	Downstream	
Type of adjacent Ramp	Off	
Distance to adjacent Ramp	1900	ft

Conversion to pc/h Under Base Conditions

Junction Components	Freeway	Ramp	Adjacent Ramp	
Volume, V (vph)	4144	387	354	vph
Peak-hour factor, PHF	0.95	0.95	0.95	

Peak 15-min volume, v15	1091	102	93	v
Trucks and buses	9	9	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	0.957	0.957	0.957	
Driver population factor, fP	1.00	1.00	1.00	
Flow rate, vp	4558	426	389	pcph

Estimation of V12 Merge Areas

L = 2385.04 (Equation 13-6 or 13-7)
EQ

P = 0.603 Using Equation 3
FM

v = v (P) = 2746 pc/h
12 F FM

Capacity Checks

	Actual	Maximum	LOS F?
v FO	4984	6900	No

v or v 1812 pc/h (Equation 13-14 or 13-17)
3 av34

Is v or v > 2700 pc/h? No
3 av34

Is v or v > 1.5 v /2 No
3 av34 12

If yes, v = 2746 (Equation 13-15, 13-16, 13-18, or 13-19)
12A

Flow Entering Merge Influence Area

	Actual	Max Desirable	Violation?
v R12	4984	4600	No

Level of Service Determination (if not F)

Density, $D = 5.475 + 0.00734 v_R + 0.0078 v_{12} - 0.00627 L_A = 26.9$ pc/mi/ln

Level of service for ramp-freeway junction areas of influence C

Speed Estimation

Intermediate speed variable, $M_S = 0.379$

Space mean speed in ramp influence area, $S_R = 53.2$ mph

Space mean speed in outer lanes, $S_0 = 55.3$ mph

Space mean speed for all vehicles, S = 53.9 mph

HCS 2010: Freeway Merge and Diverge Segments Release 6.1

Phone: Fax:
E-mail:

Merge Analysis

Analyst: John Connelly
Agency/Co.:
Date performed: 6/10/2013
Analysis time period: AM Peak Hour
Freeway/Dir of Travel: I-55 Eastbound
Junction: Cicero Avenue Entrance
Jurisdiction:
Analysis Year:
Description:

Freeway Data

Type of analysis	Merge	
Number of lanes in freeway	3	
Free-flow speed on freeway	60.0	mph
Volume on freeway	4177	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	732	vph
Length of first accel/decel lane	500	ft
Length of second accel/decel lane		ft

Adjacent Ramp Data (if one exists)

Does adjacent ramp exist?	Yes	
Volume on adjacent Ramp	341	vph
Position of adjacent Ramp	Downstream	
Type of adjacent Ramp	Off	
Distance to adjacent Ramp	2300	ft

Conversion to pc/h Under Base Conditions

Junction Components	Freeway	Ramp	Adjacent Ramp	
Volume, V (vph)	4177	732	341	vph
Peak-hour factor, PHF	0.95	0.95	0.95	

Peak 15-min volume, v15	1099	193	90	v
Trucks and buses	8	9	9	%
Recreational vehicles	0	0	0	%
Terrain type:	Level	Grade	Level	
Grade	%	2.00 %	%	
Length	mi	0.20 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	0.957	0.957	
Driver population factor, fP	1.00	1.00	1.00	
Flow rate, vp	4573	805	375	pcph

Estimation of V12 Merge Areas

L = 2299.20 (Equation 13-6 or 13-7)
EQ

P = 0.591 Using Equation 1
FM

v = v (P) = 2705 pc/h
12 F FM

Capacity Checks

	Actual	Maximum	LOS F?
v FO	5378	6900	No

v or v 1868 pc/h (Equation 13-14 or 13-17)
3 av34

Is v or v > 2700 pc/h? No
3 av34

Is v or v > 1.5 v /2 No
3 av34 12

If yes, v = 2705 (Equation 13-15, 13-16, 13-18, or 13-19)
12A

Flow Entering Merge Influence Area

	Actual	Max Desirable	Violation?
v R12	5378	4600	No

Level of Service Determination (if not F)

Density, $D = 5.475 + 0.00734 v_R + 0.0078 v_{12} - 0.00627 L_A = 29.3$ pc/mi/ln

Level of service for ramp-freeway junction areas of influence D

Speed Estimation

Intermediate speed variable, $M_S = 0.406$

Space mean speed in ramp influence area, $S_R = 52.7$ mph

Space mean speed in outer lanes, $S_0 = 55.1$ mph

Space mean speed for all vehicles, $S = 53.5$ mph

HCS 2010: Freeway Merge and Diverge Segments Release 6.1

Phone: Fax:
E-mail:

Merge Analysis

Analyst:	John Connelly
Agency/Co.:	
Date performed:	6/10/2013
Analysis time period:	AM Peak Hour
Freeway/Dir of Travel:	I-55 Eastbound
Junction:	Pulaski Road Entrance
Jurisdiction:	
Analysis Year:	
Description:	

Freeway Data

Type of analysis	Merge	
Number of lanes in freeway	3	
Free-flow speed on freeway	60.0	mph
Volume on freeway	4568	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	1232	vph
Length of first accel/decel lane	500	ft
Length of second accel/decel lane		ft

Adjacent Ramp Data (if one exists)

Does adjacent ramp exist?	Yes	
Volume on adjacent Ramp	697	vph
Position of adjacent Ramp	Downstream	
Type of adjacent Ramp	Off	
Distance to adjacent Ramp	4400	ft

Conversion to pc/h Under Base Conditions

Junction Components	Freeway	Ramp	Adjacent Ramp	
Volume, V (vph)	4568	1232	697	vph
Peak-hour factor, PHF	0.95	0.95	0.95	
Peak 15-min volume, v15	1202	324	183	v
Trucks and buses	9	9	9	%
Recreational vehicles	0	0	0	%
Terrain type:	Level	Grade	Level	
Grade	%	-2.00 %	%	
Length	mi	0.20 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	0.957	0.957	0.957	
Driver population factor, fP	1.00	1.00	1.00	

Flow rate, vp 5025 1355 767 pcph

Estimation of V12 Merge Areas

L_{EQ} = 4702.64 (Equation 13-6 or 13-7)

P_{FM} = 0.595 Using Equation 3

$v_{12} = v_F (P_{FM})$ = 2987 pc/h

Capacity Checks

	Actual	Maximum	LOS F?
v_{FO}	6380	6900	No
v_3 or v_{av34}	2038 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} = 2987 (Equation 13-15, 13-16, 18, or 19)

Flow Entering Merge Influence Area

	Actual	Max Desirable	Violation?
v_{R12}	6380	4600	No

Level of Service Determination (if not F)

Density, $D_R = 5.475 + 0.00734\ v_{R} + 0.0078\ v_{12} - 0.00627\ L_A$ = 35.6 pc/mi/ln

Level of service for ramp-freeway junction areas of influence E

Speed Estimation

Intermediate speed variable,	M_S = 0.576	
Space mean speed in ramp influence area,	S_R = 49.6	mph
Space mean speed in outer lanes,	S_0 = 54.5	mph
Space mean speed for all vehicles,	S = 51.1	mph

Merge

Northbound PM

HCS 2010: Freeway Merge and Diverge Segments Release 6.1

Phone: Fax:
E-mail:

Merge Analysis

Analyst: Caitlin Bowen
Agency/Co.:
Date performed: 6/13/2013
Analysis time period: PM Off Peak Hour
Freeway/Dir of Travel: I-55 Eastbound
Junction: Joliet Rd Entrance
Jurisdiction:
Analysis Year:
Description:

Freeway Data

Type of analysis	Merge	
Number of lanes in freeway	3	
Free-flow speed on freeway	60.0	mph
Volume on freeway	2604	vph

On Ramp Data

Side of freeway	Right	
Number of lanes in ramp	1	
Free-flow speed on ramp	40.0	mph
Volume on ramp	710	vph
Length of first accel/decel lane	450	ft
Length of second accel/decel lane		ft

Adjacent Ramp Data (if one exists)

Does adjacent ramp exist?	Yes	
Volume on adjacent Ramp	1591	vph
Position of adjacent Ramp	Upstream	
Type of adjacent Ramp	Off	
Distance to adjacent Ramp	2500	ft

Conversion to pc/h Under Base Conditions

Junction Components	Freeway	Ramp	Adjacent Ramp	
Volume, V (vph)	2604	710	1591	vph
Peak-hour factor, PHF	0.95	0.95	0.95	

Peak 15-min volume, v15	685	187	419	v
Trucks and buses	11	11	11	%
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	0.948	0.948	0.948	
Driver population factor, fP	1.00	1.00	1.00	
Flow rate, vp	2892	788	1767	pcph

Estimation of V12 Merge Areas

L = 677.12 (Equation 13-6 or 13-7)
EQ

P = 0.590 Using Equation 1
FM

v = v (P) = 1707 pc/h
12 F FM

Capacity Checks

	Actual	Maximum	LOS F?
v FO	3680	6900	No

v or v 1185 pc/h (Equation 13-14 or 13-17)
3 av34

Is v or v > 2700 pc/h? No
3 av34

Is v or v > 1.5 v /2 No
3 av34 12

If yes, v = 1707 (Equation 13-15, 13-16, 13-18, or 13-19)
12A

Flow Entering Merge Influence Area

	Actual	Max Desirable	Violation?
v R12	3680	4600	No

Level of Service Determination (if not F)

Density, $D = 5.475 + 0.00734 v_R + 0.0078 v_{12} - 0.00627 L_A = 21.8$ pc/mi/ln

Level of service for ramp-freeway junction areas of influence C

Speed Estimation

Intermediate speed variable, $M_S = 0.332$

Space mean speed in ramp influence area, $S_R = 54.0$ mph

Space mean speed in outer lanes, $S_0 = 57.5$ mph

Space mean speed for all vehicles, $S = 55.1$ mph

HCS 2010: Freeway Merge and Diverge Segments Release 6.1

Phone: Fax:
E-mail:

Merge Analysis

Analyst:	Alex Ericksen
Agency/Co.:	
Date performed:	1/9/2014
Analysis time period:	PM Off Peak Hour
Freeway/Dir of Travel:	I-55 Eastbound
Junction:	1-355 Entrance
Jurisdiction:	
Analysis Year:	
Description:	

Freeway Data

Type of analysis	Merge	
Number of lanes in freeway	3	
Free-flow speed on freeway	60.0	mph
Volume on freeway	3314	vph

On Ramp Data

Side of freeway	Right	
Number of lanes in ramp	1	
Free-flow speed on ramp	40.0	mph
Volume on ramp	529	vph
Length of first accel/decel lane	1000	ft
Length of second accel/decel lane		ft

Adjacent Ramp Data (if one exists)

Does adjacent ramp exist?	Yes	
Volume on adjacent Ramp	379	vph
Position of adjacent Ramp	Downstream	
Type of adjacent Ramp	Off	
Distance to adjacent Ramp	3550	ft

Conversion to pc/h Under Base Conditions

Junction Components	Freeway	Ramp	Adjacent Ramp	
Volume, V (vph)	3314	529	379	vph
Peak-hour factor, PHF	0.95	0.95	0.95	
Peak 15-min volume, v15	872	139	100	v
Trucks and buses	11	11	11	%
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	0.948	0.948	0.948	
Driver population factor, fP	1.00	1.00	1.00	

Flow rate, vp 3680 587 421 pcph

Estimation of V12 Merge Areas

L_{EQ} = 1943.67 (Equation 13-6 or 13-7)

P_{FM} = 0.605 Using Equation 1

$v_{12} = v_F (P_{FM})$ = 2228 pc/h

Capacity Checks

	Actual	Maximum	LOS F?
v_{FO}	4267	6900	No
v_3 or v_{av34}	1452 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} = 2228 (Equation 13-15, 13-16, 18, or 19)

Flow Entering Merge Influence Area

	Actual	Max Desirable	Violation?
v_{R12}	4267	4600	No

Level of Service Determination (if not F)

Density, $D_R = 5.475 + 0.00734\ v_R + 0.0078\ v_{12} - 0.00627\ L_A$ = 20.9 pc/mi/ln

Level of service for ramp-freeway junction areas of influence C

Speed Estimation

Intermediate speed variable, M_S = 0.306

Space mean speed in ramp influence area, S_R = 54.5 mph

Space mean speed in outer lanes, S_0 = 56.6 mph

Space mean speed for all vehicles, S = 55.2 mph

HCS 2010: Freeway Merge and Diverge Segments Release 6.1

Phone: Fax:
E-mail:

Merge Analysis

Analyst: Caitlin Bowen
Agency/Co.:
Date performed: 6/13/2013
Analysis time period: PM Off Peak Hour
Freeway/Dir of Travel: I-55 Eastbound
Junction: Lemont Rd Entrance
Jurisdiction:
Analysis Year:
Description:

Freeway Data

Type of analysis	Merge	
Number of lanes in freeway	3	
Free-flow speed on freeway	60.0	mph
Volume on freeway	3378	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	1102	vph
Length of first accel/decel lane	650	ft
Length of second accel/decel lane		ft

Adjacent Ramp Data (if one exists)

Does adjacent ramp exist?	Yes	
Volume on adjacent Ramp	166	vph
Position of adjacent Ramp	Downstream	
Type of adjacent Ramp	Off	
Distance to adjacent Ramp	8000	ft

Conversion to pc/h Under Base Conditions

Junction Components	Freeway	Ramp	Adjacent Ramp	
Volume, V (vph)	3378	1102	166	vph
Peak-hour factor, PHF	0.95	0.95	0.95	

Peak 15-min volume, v15	889	290	44	v
Trucks and buses	11	11	11	%
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	0.948	0.948	0.948	
Driver population factor, fP	1.00	1.00	1.00	
Flow rate, vp	3751	1224	184	pcph

Estimation of V12 Merge Areas

L = 1027.07 (Equation 13-6 or 13-7)
EQ

P = 0.596 Using Equation 1
FM

v = v (P) = 2234 pc/h
12 F FM

Capacity Checks

	Actual	Maximum	LOS F?
v FO	4975	6900	No

v or v 1517 pc/h (Equation 13-14 or 13-17)
3 av34

Is v or v > 2700 pc/h? No
3 av34

Is v or v > 1.5 v /2 No
3 av34 12

If yes, v = 2234 (Equation 13-15, 13-16, 13-18, or 13-19)
12A

Flow Entering Merge Influence Area

	Actual	Max Desirable	Violation?
v R12	4975	4600	No

Level of Service Determination (if not F)

Density, $D_R = 5.475 + 0.00734\, v_R + 0.0078\, v_{12} - 0.00627\, L_A = 27.8$ pc/mi/ln

Level of service for ramp-freeway junction areas of influence C

Speed Estimation

Intermediate speed variable, $M_S = 0.399$

Space mean speed in ramp influence area, $S_R = 52.8$ mph

Space mean speed in outer lanes, $S_0 = 56.3$ mph

Space mean speed for all vehicles, $S = 53.8$ mph

HCS 2010: Freeway Merge and Diverge Segments Release 6.1

Phone: Fax:
E-mail:

Merge Analysis

Analyst:	Alex Ericksen
Agency/Co.:	
Date performed:	1/9/2014
Analysis time period:	PM Off Peak Hour
Freeway/Dir of Travel:	I-55 Eastbound
Junction:	Cass Ave East Side
Jurisdiction:	
Analysis Year:	
Description:	

Freeway Data

Type of analysis	Merge	
Number of lanes in freeway	3	
Free-flow speed on freeway	60.0	mph
Volume on freeway	4247	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	203	vph
Length of first accel/decel lane	750	ft
Length of second accel/decel lane		ft

Adjacent Ramp Data (if one exists)

Does adjacent ramp exist?	Yes	
Volume on adjacent Ramp	756	vph
Position of adjacent Ramp	Downstream	
Type of adjacent Ramp	Off	
Distance to adjacent Ramp	5800	ft

Conversion to pc/h Under Base Conditions

Junction Components	Freeway	Ramp	Adjacent Ramp	
Volume, V (vph)	4247	203	756	vph
Peak-hour factor, PHF	0.95	0.95	0.95	
Peak 15-min volume, v15	1118	53	199	v
Trucks and buses	11	11	11	%
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	0.948	0.948	0.948	
Driver population factor, fP	1.00	1.00	1.00	

Flow rate, vp 4716 225 840 pcph

Estimation of V12 Merge Areas

L_{EQ} = 4424.55 (Equation 13-6 or 13-7)

P_{FM} = 0.599 Using Equation 1

$v_{12} = v_F (P_{FM})$ = 2823 pc/h

Capacity Checks

	Actual	Maximum	LOS F?
v_{FO}	4941	6900	No
v_3 or v_{av34}	1893 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} = 2823 (Equation 13-15, 13-16, 13-18, or 13-19)

Flow Entering Merge Influence Area

	Actual	Max Desirable	Violation?
v_{R12}	4941	4600	No

Level of Service Determination (if not F)

Density, $D_R = 5.475 + 0.00734\ v_R + 0.0078\ v_{12} - 0.00627\ L_A$ = 24.4 pc/mi/ln

Level of service for ramp-freeway junction areas of influence C

Speed Estimation

Intermediate speed variable, M_S = 0.351

Space mean speed in ramp influence area, S_R = 53.7 mph

Space mean speed in outer lanes, S_0 = 55.0 mph

Space mean speed for all vehicles, S = 54.2 mph

HCS 2010: Freeway Merge and Diverge Segments Release 6.1

Phone: Fax:
E-mail:

Merge Analysis

Analyst: Caitlin Bowen
Agency/Co.:
Date performed: 6/13/2013
Analysis time period: PM Off Peak Hour
Freeway/Dir of Travel: I-55 Eastbound
Junction: Kingery Hwy East Side
Jurisdiction:
Analysis Year:
Description:

Freeway Data

Type of analysis	Merge	
Number of lanes in freeway	3	
Free-flow speed on freeway	60.0	mph
Volume on freeway	3694	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	396	vph
Length of first accel/decel lane	650	ft
Length of second accel/decel lane		ft

Adjacent Ramp Data (if one exists)

Does adjacent ramp exist?	Yes	
Volume on adjacent Ramp	145	vph
Position of adjacent Ramp	Downstream	
Type of adjacent Ramp	Off	
Distance to adjacent Ramp	6500	ft

Conversion to pc/h Under Base Conditions

Junction Components	Freeway	Ramp	Adjacent Ramp	
Volume, V (vph)	3694	396	145	vph
Peak-hour factor, PHF	0.95	0.95	0.95	

Peak 15-min volume, v15	972	104	38	v
Trucks and buses	11	11	11	%
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	0.948	0.948	0.948	
Driver population factor, fP	1.00	1.00	1.00	
Flow rate, vp	4102	440	161	pcph

Estimation of V12 Merge Areas

L = 898.69 (Equation 13-6 or 13-7)
EQ

P = 0.596 Using Equation 1
FM

$v_{12} = v_{F}(P_{FM}) =$ 2444 pc/h

Capacity Checks

	Actual	Maximum	LOS F?
v_{FO}	4542	6900	No

v_{3} or v_{av34} 1658 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} = 2444 (Equation 13-15, 13-16, 13-18, or 13-19)

Flow Entering Merge Influence Area

	Actual	Max Desirable	Violation?
v_{R12}	4542	4600	No

Level of Service Determination (if not F)

Density, $D_R = 5.475 + 0.00734\, v_{R12} + 0.0078\, v_{A} - 0.00627\, L$ = 23.7 pc/mi/ln

Level of service for ramp-freeway junction areas of influence C

Speed Estimation

Intermediate speed variable, M_S = 0.345

Space mean speed in ramp influence area, S_R = 53.8 mph

Space mean speed in outer lanes, S_0 = 55.8 mph

Space mean speed for all vehicles, S = 54.5 mph

HCS 2010: Freeway Merge and Diverge Segments Release 6.1

Phone: Fax:
E-mail:

Merge Analysis

Analyst: Caitlin Bowen
Agency/Co.:
Date performed: 6/12/2013
Analysis time period: PM Off Peak Hour
Freeway/Dir of Travel: I-55 Eastbound
Junction: La Grange Rd East
Jurisdiction:
Analysis Year:
Description:

Freeway Data

Type of analysis	Merge	
Number of lanes in freeway	3	
Free-flow speed on freeway	60.0	mph
Volume on freeway	4333	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	310	vph
Length of first accel/decel lane	660	ft
Length of second accel/decel lane		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)	4333	310		vph
Peak-hour factor, PHF	0.95	0.95		

Peak 15-min volume, v15	1140	82	v
Trucks and buses	11	11	%
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	0.948	0.948	
Driver population factor, fP	1.00	1.00	
Flow rate, vp	4812	344	pcph

Estimation of V12 Merge Areas

L_{EQ} = (Equation 13-6 or 13-7)

P_{FM} = 0.596 Using Equation 1

$v_{12} = v_{F} (P_{FM}) =$ 2868 pc/h

Capacity Checks

	Actual	Maximum	LOS F?
v_{FO}	5156	6900	No

v_{3} or v_{av34} 1944 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} = 2868 (Equation 13-15, 13-16, 13-18, or 13-19)

Flow Entering Merge Influence Area

	Actual	Max Desirable	Violation?
v_{R12}	5156	4600	No

Level of Service Determination (if not F)

$D_R = 5.475 + 0.00734\, v_{R} + 0.0078\, v_{12} - 0.00627\, L_{A} =$ 26.2 pc/mi/ln

Level of service for ramp-freeway junction areas of influence C

Speed Estimation

Intermediate speed variable, M_S = 0.378

Space mean speed in ramp influence area, S_R = 53.2 mph

Space mean speed in outer lanes, S_0 = 54.8 mph

Space mean speed for all vehicles, S = 53.8 mph

HCS 2010: Freeway Merge and Diverge Segments Release 6.1

Phone: Fax:
E-mail:

Merge Analysis

Analyst: Caitlin Bowen
Agency/Co.:
Date performed: 6/12/2013
Analysis time period: PM Off Peak Hour
Freeway/Dir of Travel: I-55 Eastbound
Junction: Harlem Ave East
Jurisdiction:
Analysis Year:
Description:

Freeway Data

Type of analysis	Merge	
Number of lanes in freeway	3	
Free-flow speed on freeway	60.0	mph
Volume on freeway	4206	vph

On Ramp Data

Side of freeway	Right	
Number of lanes in ramp	1	
Free-flow speed on ramp	40.0	mph
Volume on ramp	833	vph
Length of first accel/decel lane	500	ft
Length of second accel/decel lane		ft

Adjacent Ramp Data (if one exists)

Does adjacent ramp exist?	Yes	
Volume on adjacent Ramp	833	vph
Position of adjacent Ramp	Downstream	
Type of adjacent Ramp	Off	
Distance to adjacent Ramp	7500	ft

Conversion to pc/h Under Base Conditions

Junction Components	Freeway	Ramp	Adjacent Ramp	
Volume, V (vph)	4206	833	833	vph
Peak-hour factor, PHF	0.95	0.95	0.95	

Peak 15-min volume, v15	1107	219	219	v
Trucks and buses	8	8	8	%
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	0.962	0.962	
Driver population factor, fP	1.00	1.00	1.00	
Flow rate, vp	4604	912	912	pcph

Estimation of V12 Merge Areas

L = 5591.66 (Equation 13-6 or 13-7)
EQ

P = 0.591 Using Equation 1
FM

v = v (P) = 2723 pc/h
12 F FM

Capacity Checks

	Actual	Maximum	LOS F?
v FO	5516	6900	No

v or v 1881 pc/h (Equation 13-14 or 13-17)
3 av34

Is v or v > 2700 pc/h? No
3 av34

Is v or v > 1.5 v /2 No
3 av34 12

If yes, v = 2723 (Equation 13-15, 13-16, 13-18, or 13-19)
12A

Flow Entering Merge Influence Area

	Actual	Max Desirable	Violation?
v R12	5516	4600	No

Level of Service Determination (if not F)

Density, $D = 5.475 + 0.00734 v_R + 0.0078 v_{12} - 0.00627 L_A = 30.3$ pc/mi/ln

Level of service for ramp-freeway junction areas of influence D

Speed Estimation

Intermediate speed variable, $M_S = 0.429$

Space mean speed in ramp influence area, $S_R = 52.3$ mph

Space mean speed in outer lanes, $S_0 = 55.0$ mph

Space mean speed for all vehicles, $S = 53.2$ mph

HCS 2010: Freeway Merge and Diverge Segments Release 6.1

Phone: Fax:
E-mail:

Merge Analysis

Analyst: Caitlin Bowen
Agency/Co.:
Date performed: 6/12/2013
Analysis time period: PM Off Peak Hour
Freeway/Dir of Travel: I-55 Eastbound
Junction: Central Ave East
Jurisdiction:
Analysis Year:
Description:

Freeway Data

Type of analysis	Merge	
Number of lanes in freeway	3	
Free-flow speed on freeway	60.0	mph
Volume on freeway	4206	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	451	vph
Length of first accel/decel lane	500	ft
Length of second accel/decel lane		ft

Adjacent Ramp Data (if one exists)

Does adjacent ramp exist?	Yes	
Volume on adjacent Ramp	385	vph
Position of adjacent Ramp	Downstream	
Type of adjacent Ramp	Off	
Distance to adjacent Ramp	1900	ft

Conversion to pc/h Under Base Conditions

Junction Components	Freeway	Ramp	Adjacent Ramp	
Volume, V (vph)	4206	451	385	vph
Peak-hour factor, PHF	0.95	0.95	0.95	

Peak 15-min volume, v15	1107	119	101	v
Trucks and buses	8	8	8	%
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	0.962	0.962	
Driver population factor, fP	1.00	1.00	1.00	
Flow rate, vp	4604	494	421	pcph

Estimation of V12 Merge Areas

L_{EQ} = 2581.24 (Equation 13-6 or 13-7)

P_{FM} = 0.607 Using Equation 3

$v_{12} = v_{12A} (P_{FM}) =$ 2794 pc/h

Capacity Checks

	Actual	Maximum	LOS F?
v_{FO}	5098	6900	No

v_3 or v_{av34} 1810 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} = 2794 (Equation 13-15, 13-16, 13-18, or 13-19)

Flow Entering Merge Influence Area

	Actual	Max Desirable	Violation?
v_{R12}	5098	4600	No

Level of Service Determination (if not F)

$D_R = 5.475 + 0.00734\, v_{R12} + 0.0078\, v_{R12} - 0.00627\, L_A$ = 27.8 pc/mi/ln

Level of service for ramp-freeway junction areas of influence C

Speed Estimation

Intermediate speed variable, M_S = 0.390

Space mean speed in ramp influence area, S_R = 53.0 mph

Space mean speed in outer lanes, S_0 = 55.3 mph

Space mean speed for all vehicles, S = 53.8 mph

HCS 2010: Freeway Merge and Diverge Segments Release 6.1

Phone: Fax:
E-mail:

Merge Analysis

Analyst: John Connelly
Agency/Co.:
Date performed: 6/10/2013
Analysis time period: PM Off Peak Hour
Freeway/Dir of Travel: I-55 Eastbound
Junction: Cicero Avenue Entrance
Jurisdiction:
Analysis Year:
Description:

Freeway Data

Type of analysis	Merge	
Number of lanes in freeway	3	
Free-flow speed on freeway	60.0	mph
Volume on freeway	4272	vph

On Ramp Data

Side of freeway	Right	
Number of lanes in ramp	1	
Free-flow speed on ramp	40.0	mph
Volume on ramp	781	vph
Length of first accel/decel lane	500	ft
Length of second accel/decel lane		ft

Adjacent Ramp Data (if one exists)

Does adjacent ramp exist?	Yes	
Volume on adjacent Ramp	659	vph
Position of adjacent Ramp	Downstream	
Type of adjacent Ramp	Off	
Distance to adjacent Ramp	2300	ft

Conversion to pc/h Under Base Conditions

Junction Components	Freeway	Ramp	Adjacent Ramp	
Volume, V (vph)	4272	781	659	vph
Peak-hour factor, PHF	0.95	0.95	0.95	

Peak 15-min volume, v15	1124	206	173	v
Trucks and buses	8	8	8	%
Recreational vehicles	0	0	0	%
Terrain type:	Level	Grade	Level	
Grade	%	2.00 %	%	
Length	mi	0.20 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	0.962	0.962	
Driver population factor, fP	1.00	1.00	1.00	
Flow rate, vp	4677	855	721	pcph

Estimation of V12 Merge Areas

L = 4420.60 (Equation 13-6 or 13-7)
EQ

P = 0.631 Using Equation 3
FM

$v_{12} = v_{F}(P_{FM}) =$ 2952 pc/h

Capacity Checks

	Actual	Maximum	LOS F?
v_{FO}	5532	6900	No

v_{3} or v_{av34} 1725 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} = 2952 (Equation 13-15, 13-16, 13-18, or 13-19)

Flow Entering Merge Influence Area

	Actual	Max Desirable	Violation?
v_{R12}	5532	4600	No

Level of Service Determination (if not F)

Density, $D_R = 5.475 + 0.00734\, v_R + 0.0078\, v_{12} - 0.00627\, L_A$ = 31.6 pc/mi/ln

Level of service for ramp-freeway junction areas of influence D

Speed Estimation

Intermediate speed variable, M_S = 0.457

Space mean speed in ramp influence area, S_R = 51.8 mph

Space mean speed in outer lanes, S_0 = 55.6 mph

Space mean speed for all vehicles, S = 52.9 mph

HCS 2010: Freeway Merge and Diverge Segments Release 6.1

Phone: Fax:
E-mail:

Merge Analysis

Analyst:	Alex Ericksen
Agency/Co.:	
Date performed:	1/9/2014
Analysis time period:	PM Off Peak Hour
Freeway/Dir of Travel:	I-55 Eastbound
Junction:	Pulaski Road Entrance
Jurisdiction:	
Analysis Year:	
Description:	

Freeway Data

Type of analysis	Merge	
Number of lanes in freeway	3	
Free-flow speed on freeway	60.0	mph
Volume on freeway	4394	vph

On Ramp Data

Side of freeway	Right	
Number of lanes in ramp	1	
Free-flow speed on ramp	40.0	mph
Volume on ramp	768	vph
Length of first accel/decel lane	500	ft
Length of second accel/decel lane		ft

Adjacent Ramp Data (if one exists)

Does adjacent ramp exist?	Yes	
Volume on adjacent Ramp	860	vph
Position of adjacent Ramp	Downstream	
Type of adjacent Ramp	Off	
Distance to adjacent Ramp	4400	ft

Conversion to pc/h Under Base Conditions

Junction Components	Freeway	Ramp	Adjacent Ramp	
Volume, V (vph)	4394	768	860	vph
Peak-hour factor, PHF	0.95	0.95	0.95	
Peak 15-min volume, v15	1156	202	226	v
Trucks and buses	8	8	8	%
Recreational vehicles	0	0	0	%
Terrain type:	Level	Grade	Level	
Grade	%	-2.00 %	%	
Length	mi	0.20 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	0.962	0.962	
Driver population factor, fP	1.00	1.00	1.00	

Flow rate, vp 4810 841 941 pcph

Estimation of V12 Merge Areas

L_{EQ} = 5769.47 (Equation 13-6 or 13-7)

P_{FM} = 0.605 Using Equation 3

$v_{12} = v_F (P_{FM})$ = 2910 pc/h

Capacity Checks

	Actual	Maximum	LOS F?
v_{FO}	5651	6900	No
v_3 or v_{av34}	1900 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} = 2910 (Equation 13-15, 13-16, 18, or 19)

Flow Entering Merge Influence Area

	Actual	Max Desirable	Violation?
v_{R12}	5651	4600	No

Level of Service Determination (if not F)

Density, $D_R = 5.475 + 0.00734\ v_{R} + 0.0078\ v_{12} - 0.00627\ L_A$ = 31.2 pc/mi/ln

Level of service for ramp-freeway junction areas of influence D

Speed Estimation

Intermediate speed variable, M_S = 0.447

Space mean speed in ramp influence area, S_R = 52.0 mph

Space mean speed in outer lanes, S_0 = 55.0 mph

Space mean speed for all vehicles, S = 52.9 mph

Merge

Southbound AM

HCS 2010: Freeway Merge and Diverge Segments Release 6.1

Phone: Fax:
E-mail:

Merge Analysis

Analyst: Caitlin Bowen
Agency/Co.:
Date performed: 6/14/2013
Analysis time period: AM Off Peak Hour
Freeway/Dir of Travel: I-55 Westbound
Junction: I-355 Entrance
Jurisdiction:
Analysis Year:
Description:

Freeway Data

Type of analysis	Merge	
Number of lanes in freeway	3	
Free-flow speed on freeway	60.0	mph
Volume on freeway	2907	vph

On Ramp Data

Side of freeway	Right	
Number of lanes in ramp	1	
Free-flow speed on ramp	40.0	mph
Volume on ramp	856	vph
Length of first accel/decel lane	675	ft
Length of second accel/decel lane		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)	2907	856		vph
Peak-hour factor, PHF	0.95	0.95		

Peak 15-min volume, v15	765	225	v
Trucks and buses	15	15	%
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	0.930	0.930	
Driver population factor, fP	1.00	1.00	
Flow rate, vp	3289	969	pcph

Estimation of V12 Merge Areas

L_{EQ} = (Equation 13-6 or 13-7)

P_{FM} = 0.596 Using Equation 1

$v_{12} = v_{F} (P_{FM}) =$ 1962 pc/h

Capacity Checks

	Actual	Maximum	LOS F?
v_{FO}	4258	6900	No

v_{3} or v_{av34} 1327 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} = 1962 (Equation 13-15, 13-16, 13-18, or 13-19)

Flow Entering Merge Influence Area

	Actual	Max Desirable	Violation?
v_{R12}	4258	4600	No

Level of Service Determination (if not F)

$D_R = 5.475 + 0.00734\, v_{R} + 0.0078\, v_{12} - 0.00627\, L_A =$ 23.7 pc/mi/ln

Level of service for ramp-freeway junction areas of influence C

Speed Estimation

Intermediate speed variable, M_S = 0.340

Space mean speed in ramp influence area, S_R = 53.9 mph

Space mean speed in outer lanes, S_0 = 57.0 mph

Space mean speed for all vehicles, S = 54.8 mph

HCS 2010: Freeway Merge and Diverge Segments Release 6.1

Phone: Fax:
E-mail:

Merge Analysis

Analyst: Caitlin Bowen
Agency/Co.:
Date performed: 6/14/2013
Analysis time period: AM Off Peak Hour
Freeway/Dir of Travel: I-55 Westbound
Junction: Joliet Rd/CD Rd Entrance
Jurisdiction:
Analysis Year:
Description:

Freeway Data

Type of analysis	Merge	
Number of lanes in freeway	3	
Free-flow speed on freeway	60.0	mph
Volume on freeway	2199	vph

On Ramp Data

Side of freeway	Right	
Number of lanes in ramp	1	
Free-flow speed on ramp	40.0	mph
Volume on ramp	708	vph
Length of first accel/decel lane	500	ft
Length of second accel/decel lane		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)	2199	708		vph
Peak-hour factor, PHF	0.95	0.95		

Peak 15-min volume, v15	579	186	v
Trucks and buses	15	15	%
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	0.930	0.930	
Driver population factor, fP	1.00	1.00	
Flow rate, vp	2488	801	pcph

Estimation of V12 Merge Areas

L_{EQ} = (Equation 13-6 or 13-7)

P_{FM} = 0.591 Using Equation 1

$v_{12} = v_{F}(P_{FM})$ = 1472 pc/h

Capacity Checks

	Actual	Maximum	LOS F?
v_{FO}	3289	6900	No

v_{3} or v_{av34} 1016 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} = 1472 (Equation 13-15, 13-16, 13-18, or 13-19)

Flow Entering Merge Influence Area

	Actual	Max Desirable	Violation?
v_{R12}	3289	4600	No

Level of Service Determination (if not F)

$D_R = 5.475 + 0.00734\, v_{R} + 0.0078\, v_{12} - 0.00627\, L_{A}$ = 19.7 pc/mi/ln

Level of service for ramp-freeway junction areas of influence B

Speed Estimation

Intermediate speed variable, M_S = 0.319

Space mean speed in ramp influence area, S_R = 54.3 mph

Space mean speed in outer lanes, S_0 = 58.1 mph

Space mean speed for all vehicles, S = 55.4 mph

HCS 2010: Freeway Merge and Diverge Segments Release 6.1

Phone: Fax:
E-mail:

Merge Analysis

Analyst:	Caitlin Bowen
Agency/Co.:	
Date performed:	6/14/2013
Analysis time period:	AM Off Peak Hour
Freeway/Dir of Travel:	I-55 Westbound
Junction:	Lemont Rd Entrance
Jurisdiction:	
Analysis Year:	
Description:	

Freeway Data

Type of analysis	Merge	
Number of lanes in freeway	3	
Free-flow speed on freeway	60.0	mph
Volume on freeway	3295	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	53	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	876	vph
Position of adjacent Ramp	Downstream	
Type of adjacent Ramp	Off	
Distance to adjacent Ramp	2950	ft

Conversion to pc/h Under Base Conditions

Junction Components	Freeway	Ramp	Adjacent Ramp	
Volume, V (vph)	3295	53	876	vph
Peak-hour factor, PHF	0.95	0.95	0.95	
Peak 15-min volume, v15	867	14	231	v
Trucks and buses	15	15	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	0.930	0.930	0.930	
Driver population factor, fP	1.00	1.00	1.00	

Flow rate, vp	3729	60	991 pcph

Estimation of V12 Merge Areas

L_{EQ} = 5701.96 (Equation 13-6 or 13-7)

P_{FM} = 0.637 Using Equation 3

$v_{12} = v_F (P_{FM})$ = 2375 pc/h

Capacity Checks

	Actual	Maximum	LOS F?
v_{FO}	3789	6900	No
v_3 or v_{av34}	1354 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} = 2375 (Equation 13-15, 13-16, 13-18, or 13-19)

Flow Entering Merge Influence Area

	Actual	Max Desirable	Violation?
v_{R12}	3789	4600	No

Level of Service Determination (if not F)

Density, $D_R = 5.475 + 0.00734\ v_R + 0.0078\ v_{12} - 0.00627\ L_A$ = 20.7 pc/mi/ln

Level of service for ramp-freeway junction areas of influence C

Speed Estimation

Intermediate speed variable,	M_S = 0.324	
Space mean speed in ramp influence area,	S_R = 54.2	mph
Space mean speed in outer lanes,	S_0 = 56.9	mph
Space mean speed for all vehicles,	S = 55.1	mph

HCS 2010: Freeway Merge and Diverge Segments Release 6.1

Phone: Fax:
E-mail:

Merge Analysis

Analyst: Caitlin Bowen
Agency/Co.:
Date performed: 6/14/2013
Analysis time period: AM Off Peak Hour
Freeway/Dir of Travel: I-55 Westbound
Junction: Cass Avenue Entrance
Jurisdiction:
Analysis Year:
Description:

Freeway Data

Type of analysis	Merge	
Number of lanes in freeway	3	
Free-flow speed on freeway	60.0	mph
Volume on freeway	4343	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	36	vph
Length of first accel/decel lane	775	ft
Length of second accel/decel lane		ft

Adjacent Ramp Data (if one exists)

Does adjacent ramp exist?	Yes	
Volume on adjacent Ramp	436	vph
Position of adjacent Ramp	Downstream	
Type of adjacent Ramp	Off	
Distance to adjacent Ramp	8000	ft

Conversion to pc/h Under Base Conditions

Junction Components	Freeway	Ramp	Adjacent Ramp	
Volume, V (vph)	4343	36	436	vph
Peak-hour factor, PHF	0.95	0.95	0.95	

Peak 15-min volume, v15	1143	9	115	v
Trucks and buses	15	15	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	0.930	0.930	0.930	
Driver population factor, fP	1.00	1.00	1.00	
Flow rate, vp	4914	41	493	pcph

Estimation of V12 Merge Areas

L = 2560.71 (Equation 13-6 or 13-7)
EQ

P = 0.599 Using Equation 1
FM

$v_{12} = v_{F}(P_{FM}) =$ 2944 pc/h

Capacity Checks

	Actual	Maximum	LOS F?
v_{FO}	4955	6900	No

v_{3} or v_{av34} 1970 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} = 2944 (Equation 13-15, 13-16, 13-18, or 13-19)

Flow Entering Merge Influence Area

	Actual	Max Desirable	Violation?
v_{R12}	4955	4600	No

Level of Service Determination (if not F)

Density, $D_R = 5.475 + 0.00734\, v_{R12} + 0.0078\, v_{R} - 0.00627\, L_A$ = 23.9 pc/mi/ln

Level of service for ramp-freeway junction areas of influence C

Speed Estimation

Intermediate speed variable, M_S = 0.344

Space mean speed in ramp influence area, S_R = 53.8 mph

Space mean speed in outer lanes, S_0 = 54.7 mph

Space mean speed for all vehicles, S = 54.2 mph

HCS 2010: Freeway Merge and Diverge Segments Release 6.1

Phone: Fax:
E-mail:

Merge Analysis

Analyst: Caitlin Bowen
Agency/Co.:
Date performed: 6/14/2013
Analysis time period: AM Off Peak Hour
Freeway/Dir of Travel: I-55 Westbound
Junction: Kingery Hwy Entrance
Jurisdiction:
Analysis Year:
Description:

Freeway Data

Type of analysis	Merge	
Number of lanes in freeway	3	
Free-flow speed on freeway	60.0	mph
Volume on freeway	3336	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	1065	vph
Length of first accel/decel lane	900	ft
Length of second accel/decel lane		ft

Adjacent Ramp Data (if one exists)

Does adjacent ramp exist?	Yes	
Volume on adjacent Ramp	215	vph
Position of adjacent Ramp	Downstream	
Type of adjacent Ramp	Off	
Distance to adjacent Ramp	6000	ft

Conversion to pc/h Under Base Conditions

Junction Components	Freeway	Ramp	Adjacent Ramp	
Volume, V (vph)	3336	1065	215	vph
Peak-hour factor, PHF	0.95	0.95	0.95	

Peak 15-min volume, v15	878	280	57	v
Trucks and buses	15	15	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	0.930	0.930	0.930	
Driver population factor, fP	1.00	1.00	1.00	
Flow rate, vp	3775	1205	243	pcph

Estimation of V12 Merge Areas

L = 1180.18 (Equation 13-6 or 13-7)
EQ

P = 0.603 Using Equation 1
FM

$v_{12} = v_{FM} (P_{FM}) =$ 2275 pc/h

Capacity Checks

	Actual	Maximum	LOS F?
v_{FO}	4980	6900	No

v_3 or v_{av34} 1500 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} = 2275 (Equation 13-15, 13-16, 13-18, or 13-19)

Flow Entering Merge Influence Area

	Actual	Max Desirable	Violation?
v_{R12}	4980	4600	No

Level of Service Determination (if not F)

Density, $D_R = 5.475 + 0.00734\ v_{R12} + 0.0078\ v_A - 0.00627\ L =$ 26.4 pc/mi/ln

Level of service for ramp-freeway junction areas of influence C

Speed Estimation

Intermediate speed variable, $M_S = 0.385$

Space mean speed in ramp influence area, $S_R = 53.1$ mph

Space mean speed in outer lanes, $S_0 = 56.4$ mph

Space mean speed for all vehicles, $S = 54.0$ mph

HCS 2010: Freeway Merge and Diverge Segments Release 6.1

Phone: Fax:
E-mail:

Merge Analysis

Analyst:	Alex Ericksen
Agency/Co.:	
Date performed:	1/10/2014
Analysis time period:	AM Off Peak Hour
Freeway/Dir of Travel:	I-55 Westbound
Junction:	County Line Rd Entrance
Jurisdiction:	
Analysis Year:	
Description:	

Freeway Data

Type of analysis	Merge	
Number of lanes in freeway	3	
Free-flow speed on freeway	60.0	mph
Volume on freeway	4032	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	93	vph
Length of first accel/decel lane	700	ft
Length of second accel/decel lane		ft

Adjacent Ramp Data (if one exists)

Does adjacent ramp exist?	Yes	
Volume on adjacent Ramp	789	vph
Position of adjacent Ramp	Downstream	
Type of adjacent Ramp	Off	
Distance to adjacent Ramp	6500	ft

Conversion to pc/h Under Base Conditions

Junction Components	Freeway	Ramp	Adjacent Ramp	
Volume, V (vph)	4032	93	789	vph
Peak-hour factor, PHF	0.95	0.95	0.95	
Peak 15-min volume, v15	1061	24	208	v
Trucks and buses	15	15	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	0.930	0.930	0.930	
Driver population factor, fP	1.00	1.00	1.00	

Flow rate, vp	4563	105	893	pcph

Estimation of V12 Merge Areas

L_{EQ} = 4840.11 (Equation 13-6 or 13-7)

P_{FM} = 0.597 Using Equation 1

$v_{12} = v_F (P_{FM})$ = 2725 pc/h

Capacity Checks

	Actual	Maximum	LOS F?
v_{FO}	4668	6900	No
v_3 or v_{av34}	1838 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} = 2725 (Equation 13-15, 13-16, 13-18, or 13-19)

Flow Entering Merge Influence Area

	Actual	Max Desirable	Violation?
v_{R12}	4668	4600	No

Level of Service Determination (if not F)

Density, $D_R = 5.475 + 0.00734\ v_R + 0.0078\ v_{12} - 0.00627\ L_A$ = 23.1 pc/mi/ln

Level of service for ramp-freeway junction areas of influence C

Speed Estimation

Intermediate speed variable,	M_S = 0.338	
Space mean speed in ramp influence area,	S_R = 53.9	mph
Space mean speed in outer lanes,	S_0 = 55.2	mph
Space mean speed for all vehicles,	S = 54.4	mph

HCS 2010: Freeway Merge and Diverge Segments Release 6.1

Phone: Fax:
E-mail:

Merge Analysis

Analyst: Caitlin Bowen
Agency/Co.:
Date performed: 6/14/2013
Analysis time period: AM Off Peak Hour
Freeway/Dir of Travel: I-55 Westbound
Junction: LaGrange Entrance
Jurisdiction:
Analysis Year:
Description:

Freeway Data

Type of analysis	Merge	
Number of lanes in freeway	3	
Free-flow speed on freeway	60.0	mph
Volume on freeway	3868	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	947	vph
Length of first accel/decel lane	1500	ft
Length of second accel/decel lane		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)	3868	947		vph
Peak-hour factor, PHF	0.95	0.95		

Peak 15-min volume, v15	1018	249	v
Trucks and buses	15	15	%
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	0.930	0.930	
Driver population factor, fP	1.00	1.00	
Flow rate, vp	4377	1072	pcph

Estimation of V12 Merge Areas

L_{EQ} = (Equation 13-6 or 13-7)

P_{FM} = 0.619 Using Equation 1

$v_{12} = v_{12A} (P_{FM}) =$ 2712 pc/h

Capacity Checks

	Actual	Maximum	LOS F?
v_{FO}	5449	6900	No

v_{3} or v_{av34} 1665 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} = 2712 (Equation 13-15, 13-16, 13-18, or 13-19)

Flow Entering Merge Influence Area

	Actual	Max Desirable	Violation?
v_{R12}	5449	4600	No

Level of Service Determination (if not F)

$D_R = 5.475 + 0.00734\, v_{R} + 0.0078\, v_{12} - 0.00627\, L_A =$ 25.1 pc/mi/ln

Level of service for ramp-freeway junction areas of influence C

Speed Estimation

Intermediate speed variable, M_S = 0.388

Space mean speed in ramp influence area, S_R = 53.0 mph

Space mean speed in outer lanes, S_0 = 55.8 mph

Space mean speed for all vehicles, S = 53.8 mph

HCS 2010: Freeway Merge and Diverge Segments Release 6.1

Phone: Fax:
E-mail:

Merge Analysis

Analyst: Caitlin Bowen
Agency/Co.:
Date performed: 6/14/2013
Analysis time period: AM Off Peak Hour
Freeway/Dir of Travel: I-55 Westbound
Junction: Archer Avenue Entrance
Jurisdiction:
Analysis Year:
Description:

Freeway Data

Type of analysis	Merge	
Number of lanes in freeway	3	
Free-flow speed on freeway	60.0	mph
Volume on freeway	3570	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	1023	vph
Length of first accel/decel lane	1050	ft
Length of second accel/decel lane		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)	3570	1023		vph
Peak-hour factor, PHF	0.95	0.95		

Peak 15-min volume, v15	939	269	v
Trucks and buses	15	15	%
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	0.930	0.930	
Driver population factor, fP	1.00	1.00	
Flow rate, vp	4040	1158	pcph

Estimation of V12 Merge Areas

L_{EQ} = (Equation 13-6 or 13-7)

P_{FM} = 0.607 Using Equation 1

$v_{12} = v_{F} (P_{FM}) =$ 2452 pc/h

Capacity Checks

	Actual	Maximum	LOS F?
v_{FO}	5198	6900	No

v_{3} or v_{av34} 1588 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} = 2452 (Equation 13-15, 13-16, 13-18, or 13-19)

Flow Entering Merge Influence Area

	Actual	Max Desirable	Violation?
v_{R12}	5198	4600	No

Level of Service Determination (if not F)

$D_{R} = 5.475 + 0.00734\, v_{R} + 0.0078\, v_{12} - 0.00627\, L_{A} =$ 26.5 pc/mi/ln

Level of service for ramp-freeway junction areas of influence C

Speed Estimation

Intermediate speed variable, $M_{S} = 0.392$

Space mean speed in ramp influence area, $S_{R} =$ 52.9 mph

Space mean speed in outer lanes, $S_{0} =$ 56.1 mph

Space mean speed for all vehicles, $S =$ 53.9 mph

HCS 2010: Freeway Merge and Diverge Segments Release 6.1

Phone: Fax:
E-mail:

Merge Analysis

Analyst: Caitlin Bowen
Agency/Co.:
Date performed: 6/14/2013
Analysis time period: AM Off Peak Hour
Freeway/Dir of Travel: I-55 Westbound
Junction: Central Avenue Entrance
Jurisdiction:
Analysis Year:
Description:

Freeway Data

Type of analysis	Merge	
Number of lanes in freeway	3	
Free-flow speed on freeway	60.0	mph
Volume on freeway	4295	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	374	vph
Length of first accel/decel lane	1000	ft
Length of second accel/decel lane		ft

Adjacent Ramp Data (if one exists)

Does adjacent ramp exist?	Yes	
Volume on adjacent Ramp	1070	vph
Position of adjacent Ramp	Downstream	
Type of adjacent Ramp	Off	
Distance to adjacent Ramp	7500	ft

Conversion to pc/h Under Base Conditions

Junction Components	Freeway	Ramp	Adjacent Ramp	
Volume, V (vph)	4295	374	1070	vph
Peak-hour factor, PHF	0.95	0.95	0.95	

Peak 15-min volume, v15	1130	98	282	v
Trucks and buses	12	12	12	%
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	0.943	0.943	0.943	
Driver population factor, fP	1.00	1.00	1.00	
Flow rate, vp	4792	417	1194	pcph

Estimation of V12 Merge Areas

L = 5512.47 (Equation 13-6 or 13-7)
EQ

P = 0.605 Using Equation 1
FM

$v_{12} = v_{F}(P_{FM}) =$ 2902 pc/h

Capacity Checks

	Actual	Maximum	LOS F?
v_{FO}	5209	6900	No

v_{3} or v_{av34} 1890 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} = 2902 (Equation 13-15, 13-16, 13-18, or 13-19)

Flow Entering Merge Influence Area

	Actual	Max Desirable	Violation?
v_{R12}	5209	4600	No

Level of Service Determination (if not F)

Density, $D_R = 5.475 + 0.00734\ v_{R} + 0.0078\ v_{12} - 0.00627\ L_A$ = 24.9 pc/mi/ln

Level of service for ramp-freeway junction areas of influence C

Speed Estimation

Intermediate speed variable, M_S = 0.359

Space mean speed in ramp influence area, S_R = 53.5 mph

Space mean speed in outer lanes, S_0 = 55.0 mph

Space mean speed for all vehicles, S = 54.1 mph

HCS 2010: Freeway Merge and Diverge Segments Release 6.1

Phone: Fax:
E-mail:

Merge Analysis

Analyst: Caitlin Bowen
Agency/Co.:
Date performed: 6/14/2013
Analysis time period: AM Off Peak Hour
Freeway/Dir of Travel: I-55 Westbound
Junction: Cicero Avenue Entrance
Jurisdiction:
Analysis Year:
Description:

Freeway Data

Type of analysis	Merge	
Number of lanes in freeway	3	
Free-flow speed on freeway	60.0	mph
Volume on freeway	4223	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	802	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	730	vph
Position of adjacent Ramp	Downstream	
Type of adjacent Ramp	Off	
Distance to adjacent Ramp	2300	ft

Conversion to pc/h Under Base Conditions

Junction Components	Freeway	Ramp	Adjacent Ramp	
Volume, V (vph)	4223	802	730	vph
Peak-hour factor, PHF	0.95	0.95	0.95	

Peak 15-min volume, v15	1111	211	192	v
Trucks and buses	12	12	12	%
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	0.943	0.943	0.943	
Driver population factor, fP	1.00	1.00	1.00	
Flow rate, vp	4712	895	815	pcph

Estimation of V12 Merge Areas

L = 4689.30 (Equation 13-6 or 13-7)
EQ

P = 0.642 Using Equation 3
FM

v = v (P) = 3024 pc/h
12 F FM

Capacity Checks

	Actual	Maximum	LOS F?
v FO	5607	6900	No

v or v 1688 pc/h (Equation 13-14 or 13-17)
3 av34

Is v or v > 2700 pc/h? No
3 av34

Is v or v > 1.5 v /2 No
3 av34 12

If yes, v = 3024 (Equation 13-15, 13-16, 13-18, or 13-19)
12A

Flow Entering Merge Influence Area

	Actual	Max Desirable	Violation?
v R12	5607	4600	No

Level of Service Determination (if not F)

Density, D = 5.475 + 0.00734 v + 0.0078 v - 0.00627 L = 31.9 pc/mi/ln
R R 12 A

Level of service for ramp-freeway junction areas of influence D

Speed Estimation

Intermediate speed variable, M = 0.475
S

Space mean speed in ramp influence area, S = 51.4 mph
R

Space mean speed in outer lanes, S = 55.7 mph
0

Space mean speed for all vehicles, S = 52.7 mph

HCS 2010: Freeway Merge and Diverge Segments Release 6.1

Phone: Fax:
E-mail:

Merge Analysis

Analyst: Caitlin Bowen
Agency/Co.:
Date performed: 6/14/2013
Analysis time period: AM Off Peak Hour
Freeway/Dir of Travel: I-55 Westbound
Junction: Pulaski Road Entrance
Jurisdiction:
Analysis Year:
Description:

Freeway Data

Type of analysis	Merge	
Number of lanes in freeway	3	
Free-flow speed on freeway	60.0	mph
Volume on freeway	3889	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	674	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	340	vph
Position of adjacent Ramp	Downstream	
Type of adjacent Ramp	Off	
Distance to adjacent Ramp	2600	ft

Conversion to pc/h Under Base Conditions

Junction Components	Freeway	Ramp	Adjacent Ramp	
Volume, V (vph)	3889	674	340	vph
Peak-hour factor, PHF	0.95	0.95	0.95	

Peak 15-min volume, v15	1023	177	89	v
Trucks and buses	12	12	12	%
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	0.943	0.943	0.943	
Driver population factor, fP	1.00	1.00	1.00	
Flow rate, vp	4339	752	379	pcph

Estimation of V12 Merge Areas

L = 2180.67 (Equation 13-6 or 13-7)
EQ

P = 0.594 Using Equation 1
FM

v = v (P) = 2579 pc/h
12 F FM

Capacity Checks

	Actual	Maximum	LOS F?
v FO	5091	6900	No
v or v	1760 pc/h	(Equation 13-14 or 13-17)	
3 av34			
Is v or v > 2700 pc/h?			No
3 av34			
Is v or v > 1.5 v /2			No
3 av34	12		
If yes, v = 2579		(Equation 13-15, 13-16, 13-18, or 13-19)	
12A			

Flow Entering Merge Influence Area

	Actual	Max Desirable	Violation?
v R12	5091	4600	No

Level of Service Determination (if not F)

Density, D = 5.475 + 0.00734 v + 0.0078 v - 0.00627 L = 27.3 pc/mi/ln
R R 12 A

Level of service for ramp-freeway junction areas of influence C

Speed Estimation

Intermediate speed variable, M = 0.388
S

Space mean speed in ramp influence area, S = 53.0 mph
R

Space mean speed in outer lanes, S = 55.5 mph
0

Space mean speed for all vehicles, S = 53.8 mph

HCS 2010: Freeway Merge and Diverge Segments Release 6.1

Phone: Fax:
E-mail:

Merge Analysis

Analyst: John Connelly
Agency/Co.:
Date performed: 6/20/2013
Analysis time period: 2012 Westbound AM
Freeway/Dir of Travel: I-55
Junction: at Kedzie Ave Entrance
Jurisdiction:
Analysis Year: 2012
Description:

Freeway Data

Type of analysis	Merge	
Number of lanes in freeway	3	
Free-flow speed on freeway	60.0	mph
Volume on freeway	3944	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	437	vph
Length of first accel/decel lane	1100	ft
Length of second accel/decel lane		ft

Adjacent Ramp Data (if one exists)

Does adjacent ramp exist?	Yes	
Volume on adjacent Ramp	492	vph
Position of adjacent Ramp	Downstream	
Type of adjacent Ramp	Off	
Distance to adjacent Ramp	3600	ft

Conversion to pc/h Under Base Conditions

Junction Components	Freeway	Ramp	Adjacent Ramp	
Volume, V (vph)	3944	437	492	vph
Peak-hour factor, PHF	0.95	0.95	0.95	

Peak 15-min volume, v15	1038	115	129	v
Trucks and buses	12	12	12	%
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	0.943	0.943	0.943	
Driver population factor, fP	1.00	1.00	1.00	
Flow rate, vp	4401	488	549	pcph

Estimation of V12 Merge Areas

L = 2415.31 (Equation 13-6 or 13-7)
EQ

P = 0.608 Using Equation 1
FM

$v_{12} = v_{F}(P_{FM}) =$ 2677 pc/h

Capacity Checks

	Actual	Maximum	LOS F?
v_{FO}	4889	6900	No

v_{3} or v_{av34} 1724 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} = 2677 (Equation 13-15, 13-16, 13-18, or 13-19)

Flow Entering Merge Influence Area

	Actual	Max Desirable	Violation?
v_{R12}	4889	4600	No

Level of Service Determination (if not F)

Density, $D_R = 5.475 + 0.00734\ v_{R} + 0.0078\ v_{12} - 0.00627\ L_A$ = 23.0 pc/mi/ln

Level of service for ramp-freeway junction areas of influence C

Speed Estimation

Intermediate speed variable, M_S = 0.336

Space mean speed in ramp influence area, S_R = 53.9 mph

Space mean speed in outer lanes, S_0 = 55.6 mph

Space mean speed for all vehicles, S = 54.5 mph

HCS 2010: Freeway Merge and Diverge Segments Release 6.1

Phone: Fax:
E-mail:

Merge Analysis

Analyst:	Alex Ericksen
Agency/Co.:	
Date performed:	1/10/2014
Analysis time period:	AM Off Peak Hour
Freeway/Dir of Travel:	I-55 Westbound
Junction:	Damen Avenue Entrance
Jurisdiction:	
Analysis Year:	
Description:	

Freeway Data

Type of analysis	Merge	
Number of lanes in freeway	3	
Free-flow speed on freeway	60.0	mph
Volume on freeway	4214	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	683	vph
Length of first accel/decel lane	500	ft
Length of second accel/decel lane		ft

Adjacent Ramp Data (if one exists)

Does adjacent ramp exist?	Yes	
Volume on adjacent Ramp	953	vph
Position of adjacent Ramp	Downstream	
Type of adjacent Ramp	Off	
Distance to adjacent Ramp	3300	ft

Conversion to pc/h Under Base Conditions

Junction Components	Freeway	Ramp	Adjacent Ramp	
Volume, V (vph)	4214	683	953	vph
Peak-hour factor, PHF	0.95	0.95	0.95	
Peak 15-min volume, v15	1109	180	251	v
Trucks and buses	12	12	12	%
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	0.943	0.943	0.943	
Driver population factor, fP	1.00	1.00	1.00	

Flow rate, vp	4702	762	1063	pcph

Estimation of V12 Merge Areas

L_{EQ} = 6517.47 (Equation 13-6 or 13-7)

P_{FM} = 0.633 Using Equation 3

$v_{12} = v_F (P_{FM})$ = 2978 pc/h

Capacity Checks

	Actual	Maximum	LOS F?
v_{FO}	5464	6900	No
v_3 or v_{av34}	1724 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} = 2978 (Equation 13-15, 13-16, 18, or 19)

Flow Entering Merge Influence Area

	Actual	Max Desirable	Violation?
v_{R12}	5464	4600	No

Level of Service Determination (if not F)

Density, $D_R = 5.475 + 0.00734\ v_{R} + 0.0078\ v_{12} - 0.00627\ L_A$ = 31.2 pc/mi/ln

Level of service for ramp-freeway junction areas of influence D

Speed Estimation

Intermediate speed variable, M_S = 0.450

Space mean speed in ramp influence area, S_R = 51.9 mph

Space mean speed in outer lanes, S_0 = 55.6 mph

Space mean speed for all vehicles, S = 53.0 mph

HCS 2010: Freeway Merge and Diverge Segments Release 6.1

Phone: Fax:
E-mail:

Merge Analysis

Analyst:	Alex Ericksen
Agency/Co.:	
Date performed:	1/10/2014
Analysis time period:	PM Peak Hour
Freeway/Dir of Travel:	I-55 Westbound
Junction:	SB I-90/94
Jurisdiction:	
Analysis Year:	
Description:	

Freeway Data

Type of analysis	Merge	
Number of lanes in freeway	3	
Free-flow speed on freeway	60.0	mph
Volume on freeway	3181	vph

On Ramp Data

Side of freeway	Right	
Number of lanes in ramp	2	
Free-flow speed on ramp	30.0	mph
Volume on ramp	1738	vph
Length of first accel/decel lane	1000	ft
Length of second accel/decel lane	1000	ft

Adjacent Ramp Data (if one exists)

Does adjacent ramp exist?	Yes	
Volume on adjacent Ramp	705	vph
Position of adjacent Ramp	Downstream	
Type of adjacent Ramp	Off	
Distance to adjacent Ramp	6100	ft

Conversion to pc/h Under Base Conditions

Junction Components	Freeway	Ramp	Adjacent Ramp	
Volume, V (vph)	3181	1738	705	vph
Peak-hour factor, PHF	0.95	0.95	0.95	
Peak 15-min volume, v15	837	457	186	v
Trucks and buses	12	12	12	%
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	0.943	0.943	0.943	
Driver population factor, fP	1.00	1.00	1.00	

Flow rate, vp	3549	1939	787	pcph

Estimation of V12 Merge Areas

L_{EQ} = (Equation 13-6 or 13-7)

P_{FM} = 0.555 Using Equation 0

$v_{12} = v_F (P_{FM})$ = 1970 pc/h

Capacity Checks

	Actual	Maximum	LOS F?
v_{FO}	5488	6900	No
v_3 or v_{av34}	1579 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} = 2028 (Equation 13-15, 13-16, 13-18, or 13-19)

Flow Entering Merge Influence Area

	Actual	Max Desirable	Violation?
v_{12A}	5488	4600	No

Level of Service Determination (if not F)

Density, $D_R = 5.475 + 0.00734\ v_R + 0.0078\ v_{12} - 0.00627\ L_A$ = 16.7 pc/mi/ln

Level of service for ramp-freeway junction areas of influence B

Speed Estimation

Intermediate speed variable,	M_S = 0.347	
Space mean speed in ramp influence area,	S_R = 53.8	mph
Space mean speed in outer lanes,	S_0 = 56.3	mph
Space mean speed for all vehicles,	S = 54.4	mph

Merge

Southbound PM

HCS 2010: Freeway Merge and Diverge Segments Release 6.1

Phone: Fax:
E-mail:

Merge Analysis

Analyst: Caitlin Bowen
Agency/Co.:
Date performed: 6/14/2013
Analysis time period: PM Peak Hour
Freeway/Dir of Travel: I-55 Westbound
Junction: I-355 Entrance
Jurisdiction:
Analysis Year:
Description:

Freeway Data

Type of analysis	Merge	
Number of lanes in freeway	3	
Free-flow speed on freeway	60.0	mph
Volume on freeway	4010	vph

On Ramp Data

Side of freeway	Right	
Number of lanes in ramp	1	
Free-flow speed on ramp	40.0	mph
Volume on ramp	1471	vph
Length of first accel/decel lane	675	ft
Length of second accel/decel lane		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)	4010	1471		vph
Peak-hour factor, PHF	0.95	0.95		

Peak 15-min volume, v15	1055	387	v
Trucks and buses	7	7	%
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	0.966	
Driver population factor, fP	1.00	1.00	
Flow rate, vp	4369	1603	pcph

Estimation of V12 Merge Areas

L_{EQ} = (Equation 13-6 or 13-7)

P_{FM} = 0.596 Using Equation 1

$v_{12} = v_{F} (P_{FM}) =$ 2606 pc/h

Capacity Checks

	Actual	Maximum	LOS F?
v_{FO}	5972	6900	No

v_{3} or v_{av34} 1763 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} = 2606 (Equation 13-15, 13-16, 13-18, or 13-19)

Flow Entering Merge Influence Area

	Actual	Max Desirable	Violation?
v_{R12}	5972	4600	No

Level of Service Determination (if not F)

$D_R = 5.475 + 0.00734\, v_R + 0.0078\, v_{12} - 0.00627\, L_A =$ 33.3 pc/mi/ln

Level of service for ramp-freeway junction areas of influence D

Speed Estimation

Intermediate speed variable, M_S = 0.529

Space mean speed in ramp influence area, S_R = 50.5 mph

Space mean speed in outer lanes, S_0 = 55.5 mph

Space mean speed for all vehicles, S = 51.8 mph

HCS 2010: Freeway Merge and Diverge Segments Release 6.1

Phone: Fax:
E-mail:

Merge Analysis

Analyst: Caitlin Bowen
Agency/Co.:
Date performed: 6/14/2013
Analysis time period: PM Peak Hour
Freeway/Dir of Travel: I-55 Westbound
Junction: Joliet Rd/CD Rd Entrance
Jurisdiction:
Analysis Year:
Description:

Freeway Data

Type of analysis	Merge	
Number of lanes in freeway	3	
Free-flow speed on freeway	60.0	mph
Volume on freeway	2991	vph

On Ramp Data

Side of freeway	Right	
Number of lanes in ramp	1	
Free-flow speed on ramp	40.0	mph
Volume on ramp	1019	vph
Length of first accel/decel lane	500	ft
Length of second accel/decel lane		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)	2991	1019		vph
Peak-hour factor, PHF	0.95	0.95		

Peak 15-min volume, v15	787	268	v
Trucks and buses	7	7	%
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	0.966	
Driver population factor, fP	1.00	1.00	
Flow rate, vp	3259	1110	pcph

Estimation of V12 Merge Areas

L_{EQ} = (Equation 13-6 or 13-7)

P_{FM} = 0.591 Using Equation 1

$v_{12} = v_{F} (P_{FM})$ = 1928 pc/h

Capacity Checks

	Actual	Maximum	LOS F?
v_{FO}	4369	6900	No

v_{3} or v_{av34} 1331 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} = 1928 (Equation 13-15, 13-16, 13-18, or 13-19)

Flow Entering Merge Influence Area

	Actual	Max Desirable	Violation?
v_{R12}	4369	4600	No

Level of Service Determination (if not F)

$D_R = 5.475 + 0.00734\, v_{R} + 0.0078\, v_{12} - 0.00627\, L_A$ = 25.5 pc/mi/ln

Level of service for ramp-freeway junction areas of influence C

Speed Estimation

Intermediate speed variable, M_S = 0.362

Space mean speed in ramp influence area, S_R = 53.5 mph

Space mean speed in outer lanes, S_0 = 57.0 mph

Space mean speed for all vehicles, S = 54.5 mph

HCS 2010: Freeway Merge and Diverge Segments Release 6.1

Phone: Fax:
E-mail:

Merge Analysis

Analyst:	Alex Ericksen
Agency/Co.:	
Date performed:	1/14/2014
Analysis time period:	PM Peak Hour
Freeway/Dir of Travel:	I-55 Westbound
Junction:	Lemont Rd Entrance
Jurisdiction:	
Analysis Year:	
Description:	

Freeway Data

Type of analysis	Merge	
Number of lanes in freeway	3	
Free-flow speed on freeway	60.0	mph
Volume on freeway	4057	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	22	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	833	vph
Position of adjacent Ramp	Downstream	
Type of adjacent Ramp	Off	
Distance to adjacent Ramp	2950	ft

Conversion to pc/h Under Base Conditions

Junction Components	Freeway	Ramp	Adjacent Ramp	
Volume, V (vph)	4057	22	833	vph
Peak-hour factor, PHF	0.95	0.95	0.95	
Peak 15-min volume, v15	1068	6	219	v
Trucks and buses	7	7	7	%
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	0.966	0.966	
Driver population factor, fP	1.00	1.00	1.00	

Flow rate, vp 4420 24 908 pcph

Estimation of V12 Merge Areas

L_{EQ} = 5224.40 (Equation 13-6 or 13-7)

P_{FM} = 0.630 Using Equation 3

$v_{12} = v_F (P_{FM})$ = 2783 pc/h

Capacity Checks

	Actual	Maximum	LOS F?
v_{FO}	4444	6900	No
v_3 or v_{av34}	1637 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} = 2783 (Equation 13-15, 13-16, 18, or 19)

Flow Entering Merge Influence Area

	Actual	Max Desirable	Violation?
v_{R12}	4444	4600	No

Level of Service Determination (if not F)

Density, $D_R = 5.475 + 0.00734\ v_R + 0.0078\ v_{12} - 0.00627\ L_A$ = 23.6 pc/mi/ln

Level of service for ramp-freeway junction areas of influence C

Speed Estimation

Intermediate speed variable, M_S = 0.344

Space mean speed in ramp influence area, S_R = 53.8 mph

Space mean speed in outer lanes, S_0 = 55.9 mph

Space mean speed for all vehicles, S = 54.6 mph

HCS 2010: Freeway Merge and Diverge Segments Release 6.1

Phone: Fax:
E-mail:

Merge Analysis

Analyst: Caitlin Bowen
Agency/Co.:
Date performed: 6/14/2013
Analysis time period: PM Peak Hour
Freeway/Dir of Travel: I-55 Westbound
Junction: Cass Avenue Entrance
Jurisdiction:
Analysis Year:
Description:

Freeway Data

Type of analysis	Merge	
Number of lanes in freeway	3	
Free-flow speed on freeway	60.0	mph
Volume on freeway	4805	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	184	vph
Length of first accel/decel lane	775	ft
Length of second accel/decel lane		ft

Adjacent Ramp Data (if one exists)

Does adjacent ramp exist?	Yes	
Volume on adjacent Ramp	475	vph
Position of adjacent Ramp	Downstream	
Type of adjacent Ramp	Off	
Distance to adjacent Ramp	8000	ft

Conversion to pc/h Under Base Conditions

Junction Components	Freeway	Ramp	Adjacent Ramp	
Volume, V (vph)	4805	184	475	vph
Peak-hour factor, PHF	0.95	0.95	0.95	

Peak 15-min volume, v15	1264	48	125	v
Trucks and buses	7	7	7	%
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	0.966	0.966	
Driver population factor, fP	1.00	1.00	1.00	
Flow rate, vp	5235	200	517	pcph

Estimation of V12 Merge Areas

L = 2685.37 (Equation 13-6 or 13-7)
EQ

P = 0.599 Using Equation 1
FM

v = v (P) = 3137 pc/h
12 F FM

Capacity Checks

	Actual	Maximum	LOS F?
v FO	5435	6900	No

v or v 2098 pc/h (Equation 13-14 or 13-17)
3 av34

Is v or v > 2700 pc/h? No
3 av34

Is v or v > 1.5 v /2 No
3 av34 12

If yes, v = 3137 (Equation 13-15, 13-16, 13-18, or 13-19)
12A

Flow Entering Merge Influence Area

	Actual	Max Desirable	Violation?
v R12	5435	4600	No

Level of Service Determination (if not F)

Density, $D = 5.475 + 0.00734 v_R + 0.0078 v_{12} - 0.00627 L_A = 26.6$ pc/mi/ln

Level of service for ramp-freeway junction areas of influence C

Speed Estimation

Intermediate speed variable, $M_S = 0.376$

Space mean speed in ramp influence area, $S_R = 53.2$ mph

Space mean speed in outer lanes, $S_0 = 54.2$ mph

Space mean speed for all vehicles, $S = 53.6$ mph

HCS 2010: Freeway Merge and Diverge Segments Release 6.1

Phone: Fax:
E-mail:

Merge Analysis

Analyst: Caitlin Bowen
Agency/Co.:
Date performed: 6/14/2013
Analysis time period: PM Peak Hour
Freeway/Dir of Travel: I-55 Westbound
Junction: Kingery Hwy Entrance
Jurisdiction:
Analysis Year:
Description:

Freeway Data

Type of analysis	Merge	
Number of lanes in freeway	3	
Free-flow speed on freeway	60.0	mph
Volume on freeway	3852	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	1049	vph
Length of first accel/decel lane	900	ft
Length of second accel/decel lane		ft

Adjacent Ramp Data (if one exists)

Does adjacent ramp exist?	Yes	
Volume on adjacent Ramp	194	vph
Position of adjacent Ramp	Downstream	
Type of adjacent Ramp	Off	
Distance to adjacent Ramp	6000	ft

Conversion to pc/h Under Base Conditions

Junction Components	Freeway	Ramp	Adjacent Ramp	
Volume, V (vph)	3852	1049	194	vph
Peak-hour factor, PHF	0.95	0.95	0.95	

Peak 15-min volume, v15	1014	276	51	v
Trucks and buses	7	7	7	%
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	0.966	0.966	
Driver population factor, fP	1.00	1.00	1.00	
Flow rate, vp	4197	1143	211	pcph

Estimation of V12 Merge Areas

L = 1024.77 (Equation 13-6 or 13-7)
EQ

P = 0.603 Using Equation 1
FM

v = v (P) = 2530 pc/h
12 F FM

Capacity Checks

	Actual	Maximum	LOS F?
v FO	5340	6900	No

v or v 1667 pc/h (Equation 13-14 or 13-17)
3 av34

Is v or v > 2700 pc/h? No
3 av34

Is v or v > 1.5 v /2 No
3 av34 12

If yes, v = 2530 (Equation 13-15, 13-16, 13-18, or 13-19)
12A

Flow Entering Merge Influence Area

	Actual	Max Desirable	Violation?
v R12	5340	4600	No

Level of Service Determination (if not F)

Density, $D = 5.475 + 0.00734 v_R + 0.0078 v_{R12} - 0.00627 L_A = 28.0$- pc/mi/ln

Level of service for ramp-freeway junction areas of influence C

Speed Estimation

Intermediate speed variable, $M_S = 0.412$

Space mean speed in ramp influence area, $S_R = 52.6$ mph

Space mean speed in outer lanes, $S_0 = 55.8$ mph

Space mean speed for all vehicles, $S = 53.6$ mph

HCS 2010: Freeway Merge and Diverge Segments Release 6.1

Phone: Fax:
E-mail:

Merge Analysis

Analyst:	Alex Ericksen
Agency/Co.:	
Date performed:	1/12/2014
Analysis time period:	PM Peak Hour
Freeway/Dir of Travel:	I-55 Westbound
Junction:	County Line Rd Entrance
Jurisdiction:	
Analysis Year:	
Description:	

Freeway Data

Type of analysis	Merge	
Number of lanes in freeway	3	
Free-flow speed on freeway	60.0	mph
Volume on freeway	4165	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	4	vph
Length of first accel/decel lane	700	ft
Length of second accel/decel lane		ft

Adjacent Ramp Data (if one exists)

Does adjacent ramp exist?	Yes	
Volume on adjacent Ramp	317	vph
Position of adjacent Ramp	Downstream	
Type of adjacent Ramp	Off	
Distance to adjacent Ramp	6500	ft

Conversion to pc/h Under Base Conditions

Junction Components	Freeway	Ramp	Adjacent Ramp	
Volume, V (vph)	4165	4	317	vph
Peak-hour factor, PHF	0.95	0.95	0.95	
Peak 15-min volume, v15	1096	1	83	v
Trucks and buses	7	7	7	%
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	0.966	0.966	
Driver population factor, fP	1.00	1.00	1.00	

Flow rate, vp 4538 4 345 pcph

Estimation of V12 Merge Areas

L_{EQ} = 1869.92 (Equation 13-6 or 13-7)

P_{FM} = 0.597 Using Equation 1

$v_{12} = v_F (P_{FM})$ = 2710 pc/h

Capacity Checks

	Actual	Maximum	LOS F?
v_{FO}	4542	6900	No
v_3 or v_{av34}	1828 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} = 2710 (Equation 13-15, 13-16, 13-18, or 13-19)

Flow Entering Merge Influence Area

	Actual	Max Desirable	Violation?
v_{R12}	4542	4600	No

Level of Service Determination (if not F)

Density, $D_R = 5.475 + 0.00734\ v_R + 0.0078\ v_{12} - 0.00627\ L_A$ = 22.3 pc/mi/ln

Level of service for ramp-freeway junction areas of influence C

Speed Estimation

Intermediate speed variable, M_S = 0.331

Space mean speed in ramp influence area, S_R = 54.0 mph

Space mean speed in outer lanes, S_0 = 55.2 mph

Space mean speed for all vehicles, S = 54.5 mph

HCS 2010: Freeway Merge and Diverge Segments Release 6.1

Phone: Fax:
E-mail:

Merge Analysis

Analyst: Caitlin Bowen
Agency/Co.:
Date performed: 6/14/2013
Analysis time period: PM Peak Hour
Freeway/Dir of Travel: I-55 Westbound
Junction: LaGrange Entrance
Jurisdiction:
Analysis Year:
Description:

Freeway Data

Type of analysis	Merge	
Number of lanes in freeway	3	
Free-flow speed on freeway	60.0	mph
Volume on freeway	3196	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	666	vph
Length of first accel/decel lane	1500	ft
Length of second accel/decel lane		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)	3196	666		vph
Peak-hour factor, PHF	0.95	0.95		

Peak 15-min volume, v15	841	175	v
Trucks and buses	7	7	%
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	0.966	
Driver population factor, fP	1.00	1.00	
Flow rate, vp	3482	726	pcph

Estimation of V12 Merge Areas

L_{EQ} = (Equation 13-6 or 13-7)

P_{FM} = 0.619 Using Equation 1

$v_{12} = v_{F}(P_{FM})$ = 2157 pc/h

Capacity Checks

	Actual	Maximum	LOS F?
v_{FO}	4208	6900	No

v_{3} or v_{av34} 1325 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} = 2157 (Equation 13-15, 13-16, 13-18, or 13-19)

Flow Entering Merge Influence Area

	Actual	Max Desirable	Violation?
v_{R12}	4208	4600	No

Level of Service Determination (if not F)

$D_R = 5.475 + 0.00734\, v_{R} + 0.0078\, v_{12} - 0.00627\, L_{A}$ = 18.2 pc/mi/ln

Level of service for ramp-freeway junction areas of influence B

Speed Estimation

Intermediate speed variable, M_S = 0.286

Space mean speed in ramp influence area, S_R = 54.9 mph

Space mean speed in outer lanes, S_0 = 57.0 mph

Space mean speed for all vehicles, S = 55.5 mph

HCS 2010: Freeway Merge and Diverge Segments Release 6.1

Phone: Fax:
E-mail:

Merge Analysis

Analyst: Caitlin Bowen
Agency/Co.:
Date performed: 6/14/2013
Analysis time period: PM Peak Hour
Freeway/Dir of Travel: I-55 Westbound
Junction: Archer Avenue Entrance
Jurisdiction:
Analysis Year:
Description:

Freeway Data

Type of analysis	Merge	
Number of lanes in freeway	3	
Free-flow speed on freeway	60.0	mph
Volume on freeway	3386	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	1268	vph
Length of first accel/decel lane	1050	ft
Length of second accel/decel lane		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)	3386	1268		vph
Peak-hour factor, PHF	0.95	0.95		

Peak 15-min volume, v15	891	334	v
Trucks and buses	7	7	%
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	0.966	
Driver population factor, fP	1.00	1.00	
Flow rate, vp	3689	1381	pcph

Estimation of V12 Merge Areas

L_{EQ} = (Equation 13-6 or 13-7)

P_{FM} = 0.607 Using Equation 1

$v_{12} = v_{F} (P_{FM}) =$ 2239 pc/h

Capacity Checks

	Actual	Maximum	LOS F?
v_{FO}	5070	6900	No

v_{3} or v_{av34} 1450 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} = 2239 (Equation 13-15, 13-16, 13-18, or 13-19)

Flow Entering Merge Influence Area

	Actual	Max Desirable	Violation?
v_{R12}	5070	4600	No

Level of Service Determination (if not F)

$D_{R} = 5.475 + 0.00734\, v_{R} + 0.0078\, v_{12} - 0.00627\, L_{A} =$ 26.5 pc/mi/ln

Level of service for ramp-freeway junction areas of influence C

Speed Estimation

Intermediate speed variable, $M_{S} = 0.393$

Space mean speed in ramp influence area, $S_{R} =$ 52.9 mph

Space mean speed in outer lanes, $S_{0} =$ 56.6 mph

Space mean speed for all vehicles, $S =$ 53.9 mph

HCS 2010: Freeway Merge and Diverge Segments Release 6.1

Phone: Fax:
E-mail:

Merge Analysis

Analyst: Caitlin Bowen
Agency/Co.:
Date performed: 6/14/2013
Analysis time period: PM Peak Hour
Freeway/Dir of Travel: I-55 Westbound
Junction: Central Avenue Entrance
Jurisdiction:
Analysis Year:
Description:

Freeway Data

Type of analysis	Merge	
Number of lanes in freeway	3	
Free-flow speed on freeway	60.0	mph
Volume on freeway	4617	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	363	vph
Length of first accel/decel lane	1000	ft
Length of second accel/decel lane		ft

Adjacent Ramp Data (if one exists)

Does adjacent ramp exist?	Yes	
Volume on adjacent Ramp	1206	vph
Position of adjacent Ramp	Downstream	
Type of adjacent Ramp	Off	
Distance to adjacent Ramp	7500	ft

Conversion to pc/h Under Base Conditions

Junction Components	Freeway	Ramp	Adjacent Ramp	
Volume, V (vph)	4617	363	1206	vph
Peak-hour factor, PHF	0.95	0.95	0.95	

Peak 15-min volume, v15	1215	96	317	v
Trucks and buses	7	7	7	%
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	0.966	0.966	
Driver population factor, fP	1.00	1.00	1.00	
Flow rate, vp	5030	395	1314	pcph

Estimation of V12 Merge Areas

L = 6066.48 (Equation 13-6 or 13-7)
EQ

P = 0.605 Using Equation 1
FM

v = v (P) = 3046 pc/h
12 F FM

Capacity Checks

	Actual	Maximum	LOS F?
v	5425	6900	No
FO			

v or v 1984 pc/h (Equation 13-14 or 13-17)
3 av34

Is v or v > 2700 pc/h? No
3 av34

Is v or v > 1.5 v /2 No
3 av34 12

If yes, v = 3046 (Equation 13-15, 13-16, 13-18, or 13-19)
12A

Flow Entering Merge Influence Area

	Actual	Max Desirable	Violation?
v	5425	4600	No
R12			

Level of Service Determination (if not F)

Density, $D_R = 5.475 + 0.00734\, v_R + 0.0078\, v_{12} - 0.00627\, L_A = 25.9$ pc/mi/ln

Level of service for ramp-freeway junction areas of influence C

Speed Estimation

Intermediate speed variable, $M_S = 0.373$

Space mean speed in ramp influence area, $S_R = 53.3$ mph

Space mean speed in outer lanes, $S_0 = 54.7$ mph

Space mean speed for all vehicles, $S = 53.8$ mph

HCS 2010: Freeway Merge and Diverge Segments Release 6.1

Phone: Fax:
E-mail:

Merge Analysis

Analyst: Caitlin Bowen
Agency/Co.:
Date performed: 6/14/2013
Analysis time period: PM Peak Hour
Freeway/Dir of Travel: I-55 Westbound
Junction: Cicero Avenue Entrance
Jurisdiction:
Analysis Year:
Description:

Freeway Data

Type of analysis	Merge	
Number of lanes in freeway	3	
Free-flow speed on freeway	60.0	mph
Volume on freeway	4699	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	793	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	875	vph
Position of adjacent Ramp	Downstream	
Type of adjacent Ramp	Off	
Distance to adjacent Ramp	2300	ft

Conversion to pc/h Under Base Conditions

Junction Components	Freeway	Ramp	Adjacent Ramp	
Volume, V (vph)	4699	793	875	vph
Peak-hour factor, PHF	0.95	0.95	0.95	

Peak 15-min volume, v15	1237	209	230	v
Trucks and buses	7	7	7	%
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	0.966	0.966	
Driver population factor, fP	1.00	1.00	1.00	
Flow rate, vp	5119	864	953	pcph

Estimation of V12 Merge Areas

L = 5483.31 (Equation 13-6 or 13-7)
EQ

P = 0.658 Using Equation 3
FM

v = v (P) = 3366 pc/h
12 F FM

Capacity Checks

	Actual	Maximum	LOS F?
v	5983	6900	No
FO			

v or v 1753 pc/h (Equation 13-14 or 13-17)
3 av34

Is v or v > 2700 pc/h? No
3 av34

Is v or v > 1.5 v /2 No
3 av34 12

If yes, v = 3366 (Equation 13-15, 13-16, 13-18, or 13-19)
12A

Flow Entering Merge Influence Area

	Actual	Max Desirable	Violation?
v	5983	4600	No
R12			

Level of Service Determination (if not F)

Density, $D = 5.475 + 0.00734 v_{R} + 0.0078 v_{R12} - 0.00627 L_{A} = 34.3$ pc/mi/ln

Level of service for ramp-freeway junction areas of influence D

Speed Estimation

Intermediate speed variable, $M_{S} = 0.547$

Space mean speed in ramp influence area, $S_{R} = 50.2$ mph

Space mean speed in outer lanes, $S_{0} = 55.5$ mph

Space mean speed for all vehicles, $S = 51.6$ mph

HCS 2010: Freeway Merge and Diverge Segments Release 6.1

Phone: Fax:
E-mail:

Merge Analysis

Analyst: Caitlin Bowen
Agency/Co.:
Date performed: 6/14/2013
Analysis time period: PM Peak Hour
Freeway/Dir of Travel: I-55 Westbound
Junction: Pulaski Road Entrance
Jurisdiction:
Analysis Year:
Description:

Freeway Data

Type of analysis	Merge	
Number of lanes in freeway	3	
Free-flow speed on freeway	60.0	mph
Volume on freeway	4261	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	820	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	382	vph
Position of adjacent Ramp	Downstream	
Type of adjacent Ramp	Off	
Distance to adjacent Ramp	2600	ft

Conversion to pc/h Under Base Conditions

Junction Components	Freeway	Ramp	Adjacent Ramp	
Volume, V (vph)	4261	820	382	vph
Peak-hour factor, PHF	0.95	0.95	0.95	

Peak 15-min volume, v15	1121	216	101	v
Trucks and buses	7	7	7	%
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	0.966	0.966	
Driver population factor, fP	1.00	1.00	1.00	
Flow rate, vp	4642	893	416	pcph

Estimation of V12 Merge Areas

L = 2393.56 (Equation 13-6 or 13-7)
EQ

P = 0.594 Using Equation 1
FM

v = v (P) = 2759 pc/h
12 F FM

Capacity Checks

	Actual	Maximum	LOS F?
v FO	5535	6900	No

v or v 1883 pc/h (Equation 13-14 or 13-17)
3 av34

Is v or v > 2700 pc/h? No
3 av34

Is v or v > 1.5 v /2 No
3 av34 12

If yes, v = 2759 (Equation 13-15, 13-16, 13-18, or 13-19)
12A

Flow Entering Merge Influence Area

	Actual	Max Desirable	Violation?
v R12	5535	4600	No

Level of Service Determination (if not F)

Density, $D = 5.475 + 0.00734 v_{R} + 0.0078 v_{R12} - 0.00627 L_{A} = 29.8$ pc/mi/ln

Level of service for ramp-freeway junction areas of influence D

Speed Estimation

Intermediate speed variable, $M_{S} = 0.429$

Space mean speed in ramp influence area, $S_{R} = 52.3$ mph

Space mean speed in outer lanes, $S_{0} = 55.0$ mph

Space mean speed for all vehicles, S = 53.2 mph

HCS 2010: Freeway Merge and Diverge Segments Release 6.1

Phone: Fax:
E-mail:

Merge Analysis

Analyst: John Connelly
Agency/Co.:
Date performed: 6/20/2013
Analysis time period: 2012 Westbound PM
Freeway/Dir of Travel: I-55
Junction: at Kedzie Ave Entrance
Jurisdiction:
Analysis Year: 2012
Description:

Freeway Data

Type of analysis	Merge	
Number of lanes in freeway	3	
Free-flow speed on freeway	60.0	mph
Volume on freeway	3640	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	1247	vph
Length of first accel/decel lane	1100	ft
Length of second accel/decel lane		ft

Adjacent Ramp Data (if one exists)

Does adjacent ramp exist?	Yes	
Volume on adjacent Ramp	626	vph
Position of adjacent Ramp	Downstream	
Type of adjacent Ramp	Off	
Distance to adjacent Ramp	3600	ft

Conversion to pc/h Under Base Conditions

Junction Components	Freeway	Ramp	Adjacent Ramp	
Volume, V (vph)	3640	1247	626	vph
Peak-hour factor, PHF	0.95	0.95	0.95	

Peak 15-min volume, v15	958	328	165	v
Trucks and buses	7	7	7	%
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	0.966	0.966	
Driver population factor, fP	1.00	1.00	1.00	
Flow rate, vp	3966	1359	682	pcph

Estimation of V12 Merge Areas

L = 3000.44 (Equation 13-6 or 13-7)
EQ

P = 0.608 Using Equation 1
FM

v = v (P) = 2413 pc/h
12 F FM

Capacity Checks

	Actual	Maximum	LOS F?
v FO	5325	6900	No

v or v 1553 pc/h (Equation 13-14 or 13-17)
3 av34

Is v or v > 2700 pc/h? No
3 av34

Is v or v > 1.5 v /2 No
3 av34 12

If yes, v = 2413 (Equation 13-15, 13-16, 13-18, or 13-19)
12A

Flow Entering Merge Influence Area

	Actual	Max Desirable	Violation?
v R12	5325	4600	No

Level of Service Determination (if not F)

Density, $D = 5.475 + 0.00734 v_R + 0.0078 v_{12} - 0.00627 L_A = 27.4$ pc/mi/ln

Level of service for ramp-freeway junction areas of influence C

Speed Estimation

Intermediate speed variable, $M_S = 0.414$

Space mean speed in ramp influence area, $S_R = 52.6$ mph

Space mean speed in outer lanes, $S_0 = 56.2$ mph

Space mean speed for all vehicles, $S = 53.6$ mph

HCS 2010: Freeway Merge and Diverge Segments Release 6.1

Phone: Fax:
E-mail:

Merge Analysis

Analyst: Caitlin Bowen
Agency/Co.:
Date performed: 6/14/2013
Analysis time period: PM Peak Hour
Freeway/Dir of Travel: I-55 Westbound
Junction: Damen Avenue Entrance
Jurisdiction:
Analysis Year:
Description:

Freeway Data

Type of analysis	Merge	
Number of lanes in freeway	3	
Free-flow speed on freeway	60.0	mph
Volume on freeway	3497	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	701	vph
Length of first accel/decel lane	500	ft
Length of second accel/decel lane		ft

Adjacent Ramp Data (if one exists)

Does adjacent ramp exist?	Yes	
Volume on adjacent Ramp	558	vph
Position of adjacent Ramp	Downstream	
Type of adjacent Ramp	Off	
Distance to adjacent Ramp	3300	ft

Conversion to pc/h Under Base Conditions

Junction Components	Freeway	Ramp	Adjacent Ramp	
Volume, V (vph)	3497	701	558	vph
Peak-hour factor, PHF	0.95	0.95	0.95	

Peak 15-min volume, v15	920	184	147	v
Trucks and buses	7	7	7	%
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	0.966	0.966	
Driver population factor, fP	1.00	1.00	1.00	
Flow rate, vp	3810	764	608	pcph

Estimation of V12 Merge Areas

L = 3727.77 (Equation 13-6 or 13-7)
EQ

P = 0.597 Using Equation 3
FM

v = v (P) = 2275 pc/h
12 F FM

Capacity Checks

	Actual	Maximum	LOS F?
v FO	4574	6900	No

v or v 1535 pc/h (Equation 13-14 or 13-17)
3 av34

Is v or v > 2700 pc/h? No
3 av34

Is v or v > 1.5 v /2 No
3 av34 12

If yes, v = 2275 (Equation 13-15, 13-16, 13-18, or 13-19)
12A

Flow Entering Merge Influence Area

	Actual	Max Desirable	Violation?
v R12	4574	4600	No

Level of Service Determination (if not F)

Density, $D = 5.475 + 0.00734 v_R + 0.0078 v_{12} - 0.00627 L_A = 25.7$ pc/mi/ln

Level of service for ramp-freeway junction areas of influence C

Speed Estimation

Intermediate speed variable, $M_S = 0.367$

Space mean speed in ramp influence area, $S_R = 53.4$ mph

Space mean speed in outer lanes, $S_0 = 56.3$ mph

Space mean speed for all vehicles, $S = 54.3$ mph

HCS 2010: Freeway Merge and Diverge Segments Release 6.1

Phone: Fax:
E-mail:

Merge Analysis

Analyst:	Alex Ericksen
Agency/Co.:	
Date performed:	1/13/2014
Analysis time period:	PM Peak Hour
Freeway/Dir of Travel:	I-55 Westbound
Junction:	SB I-90/94
Jurisdiction:	
Analysis Year:	
Description:	

Freeway Data

Type of analysis	Merge	
Number of lanes in freeway	3	
Free-flow speed on freeway	60.0	mph
Volume on freeway	2410	vph

On Ramp Data

Side of freeway	Right	
Number of lanes in ramp	2	
Free-flow speed on ramp	30.0	mph
Volume on ramp	1563	vph
Length of first accel/decel lane	1000	ft
Length of second accel/decel lane	1000	ft

Adjacent Ramp Data (if one exists)

Does adjacent ramp exist?	Yes	
Volume on adjacent Ramp	476	vph
Position of adjacent Ramp	Downstream	
Type of adjacent Ramp	Off	
Distance to adjacent Ramp	6100	ft

Conversion to pc/h Under Base Conditions

Junction Components	Freeway	Ramp	Adjacent Ramp	
Volume, V (vph)	2410	1563	476	vph
Peak-hour factor, PHF	0.95	0.95	0.95	
Peak 15-min volume, v15	634	411	125	v
Trucks and buses	7	7	7	%
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	0.966	0.966	
Driver population factor, fP	1.00	1.00	1.00	

Flow rate, vp 2626 1703 519 pcph

Estimation of V12 Merge Areas

L_{EQ} = (Equation 13-6 or 13-7)

P_{FM} = 0.555 Using Equation 0

$v_{12} = v_F (P_{FM}) =$ 1457 pc/h

Capacity Checks

	Actual	Maximum	LOS F?
v_{FO}	4329	6900	No
v_3 or v_{av34}	1169 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} = 1500 (Equation 13-15, 13-16, 13-18, or 13-19)

Flow Entering Merge Influence Area

	Actual	Max Desirable	Violation?
v_{12A}	4329	4600	No

Level of Service Determination (if not F)

Density, $D_R = 5.475 + 0.00734\ v_R + 0.0078\ v_{12} - 0.00627\ L_A =$ 10.9 pc/mi/ln

Level of service for ramp-freeway junction areas of influence B

Speed Estimation

Intermediate speed variable, M_S = 0.237

Space mean speed in ramp influence area, S_R = 55.7 mph

Space mean speed in outer lanes, S_0 = 57.7 mph

Space mean speed for all vehicles, S = 56.2 mph

Diverge

Northbound AM

HCS 2010: Freeway Merge and Diverge Segments Release 6.1

Phone: Fax:
E-mail:

Diverge Analysis

Analyst: Caitlin Bowen
Agency/Co.:
Date performed: 6/13/2013
Analysis time period: AM Peak Hour
Freeway/Dir of Travel: I-55 Eastbound
Junction: I-355 Exit
Jurisdiction:
Analysis Year:
Description:

Freeway Data

Type of analysis	Diverge	
Number of lanes in freeway	3	
Free-flow speed on freeway	60.0	mph
Volume on freeway	4596	vph

Off Ramp Data

Side of freeway	Right	
Number of lanes in ramp	1	
Free-Flow speed on ramp	40.0	mph
Volume on ramp	1628	vph
Length of first accel/decel lane	280	ft
Length of second accel/decel lane		ft

Adjacent Ramp Data (if one exists)

Does adjacent ramp exist?	Yes	
Volume on adjacent ramp	270	vph
Position of adjacent ramp	Downstream	
Type of adjacent ramp	On	
Distance to adjacent ramp	2500	ft

Conversion to pc/h Under Base Conditions

Junction Components	Freeway	Ramp	Adjacent Ramp	
Volume, V (vph)	4596	1628	270	vph
Peak-hour factor, PHF	0.95	0.95	0.95	

Peak 15-min volume, v15	1209	428	71	v
Trucks and buses	9	9	9	%
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	0.957	0.957	0.957	
Driver population factor, fP	1.00	1.00	1.00	
Flow rate, vp	5056	1791	297	pcph

Estimation of V12 Diverge Areas

L_{EQ} = (Equation 13-12 or 13-13)

P_{FD} = 0.551 Using Equation 5

$v_{12} = v_R + (v - v_F) P_{FD}$ = 3591 pc/h

Capacity Checks

	Actual	Maximum	LOS F?
$v_{Fi} = v_F$	5056	6900	No
$v_{FO} = v - v_F$	3265	6900	No
v_R	1791	2100	No

v_3 or v_{av34} 1465 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} = 3591 (Equation 13-15, 13-16, 13-18, or 13-19)

Flow Entering Diverge Influence Area

	Actual	Max Desirable	Violation?
v_{12}	3591	4400	No

Level of Service Determination (if not F)

Density, $D_R = 4.252 + 0.0086 v_{12} - 0.009 L_D$ = 32.6 pc/mi/ln

Level of service for ramp-freeway junction areas of influence D

Speed Estimation

Intermediate speed variable, D_S = 0.524

Space mean speed in ramp influence area, S = 50.6 mph

Space mean speed in outer lanes, S_R = 64.0 mph

Space mean speed for all vehicles, S_0 = 53.8 mph

HCS 2010: Freeway Merge and Diverge Segments Release 6.1

Phone: Fax:
E-mail:

Diverge Analysis

Analyst:	Alex Ericksen
Agency/Co.:	
Date performed:	1/9/2014
Analysis time period:	AM Peak Hour
Freeway/Dir of Travel:	I-55 Eastbound
Junction:	Lemont Rd West Side
Jurisdiction:	
Analysis Year:	
Description:	

Freeway Data

Type of analysis	Diverge	
Number of lanes in freeway	4	
Free-flow speed on freeway	60.0	mph
Volume on freeway	3938	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	495	vph
Length of first accel/decel lane	1500	ft
Length of second accel/decel lane		ft

Adjacent Ramp Data (if one exists)

Does adjacent ramp exist?	Yes	
Volume on adjacent ramp	700	vph
Position of adjacent ramp	Upstream	
Type of adjacent ramp	On	
Distance to adjacent ramp	3550	ft

Conversion to pc/h Under Base Conditions

Junction Components	Freeway		Ramp		Adjacent Ramp		
Volume, V (vph)	3938		495		700		vph
Peak-hour factor, PHF	0.95		0.95		0.95		
Peak 15-min volume, v15	1036		130		184		v
Trucks and buses	9		9		9		%
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	0.957		0.957		0.957		
Driver population factor, fP	1.00		1.00		1.00		

Flow rate, vp	4332	545	770	pcph

Estimation of V12 Diverge Areas

L_{EQ} = 6905.46 (Equation 13-12 or 13-13)

P_{FD} = 0.436 Using Equation 8

$v_{12} = v_R + (v_F - v_R) P_{FD}$ = 2196 pc/h

Capacity Checks

	Actual	Maximum	LOS F?
$v_{Fi} = v_F$	4332	9200	No
$v_{FO} = v_F - v_R$	3787	9200	No
v_R	545	2100	No
v_3 or v_{av34}	1068 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} = 2196 (Equation 13-15, 13-16, 13-18, or 13-19)

Flow Entering Diverge Influence Area

	Actual	Max Desirable	Violation?
v_{12}	2196	4400	No

Level of Service Determination (if not F)

Density, $D_R = 4.252 + 0.0086\ v_{12} - 0.009\ L_D$ = 9.6 pc/mi/ln

Level of service for ramp-freeway junction areas of influence A

Speed Estimation

Intermediate speed variable,	D_S = 0.347	
Space mean speed in ramp influence area,	S_R = 53.8	mph
Space mean speed in outer lanes,	S_0 = 65.6	mph
Space mean speed for all vehicles,	S = 59.0	mph

HCS 2010: Freeway Merge and Diverge Segments Release 6.1

Phone: Fax:
E-mail:

Diverge Analysis

Analyst: Caitlin Bowen
Agency/Co.:
Date performed: 6/13/2013
Analysis time period: AM Peak Hour
Freeway/Dir of Travel: I-55 Eastbound
Junction: Cass Ave West Side
Jurisdiction:
Analysis Year:
Description:

Freeway Data

Type of analysis	Diverge	
Number of lanes in freeway	3	
Free-flow speed on freeway	60.0	mph
Volume on freeway	4854	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	128	vph
Length of first accel/decel lane	250	ft
Length of second accel/decel lane		ft

Adjacent Ramp Data (if one exists)

Does adjacent ramp exist?	Yes	
Volume on adjacent ramp	1347	vph
Position of adjacent ramp	Upstream	
Type of adjacent ramp	On	
Distance to adjacent ramp	8000	ft

Conversion to pc/h Under Base Conditions

Junction Components	Freeway	Ramp	Adjacent Ramp	
Volume, V (vph)	4854	128	1347	vph
Peak-hour factor, PHF	0.95	0.95	0.95	

Peak 15-min volume, v15	1277	34	354	v
Trucks and buses	9	9	9	%
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	0.957	0.957	0.957	
Driver population factor, fP	1.00	1.00	1.00	
Flow rate, vp	5339	141	1482	pcph

Estimation of V12 Diverge Areas

L_{EQ} = 8094.78 (Equation 13-12 or 13-13)

P_{FD} = 0.621 Using Equation 6

$v_{12} = v_R + (v - v_F) P_{FD}$ = 3367 pc/h

Capacity Checks

	Actual	Maximum	LOS F?
$v_{Fi} = v_F$	5339	6900	No
$v_{FO} = v - v_R$	5198	6900	No
v_R	141	2100	No

v_3 or v_{av34} 1972 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} = 3367 (Equation 13-15, 13-16, 13-18, or 13-19)

Flow Entering Diverge Influence Area

	Actual	Max Desirable	Violation?
v_{12}	3367	4400	No

Level of Service Determination (if not F)

Density, $D_R = 4.252 + 0.0086 v_{12} - 0.009 L_D$ = 31.0 pc/mi/ln

Level of service for ramp-freeway junction areas of influence D

Speed Estimation

Intermediate speed variable, D_S = 0.311

Space mean speed in ramp influence area, S = 54.4 mph

Space mean speed in outer lanes, S_R = 62.0 mph

Space mean speed for all vehicles, S_0 = 57.0 mph

HCS 2010: Freeway Merge and Diverge Segments Release 6.1

Phone: Fax:
E-mail:

Diverge Analysis

Analyst: Caitlin Bowen
Agency/Co.:
Date performed: 6/13/2013
Analysis time period: AM Peak Hour
Freeway/Dir of Travel: I-55 Eastbound
Junction: Kingery West Side
Jurisdiction:
Analysis Year:
Description:

Freeway Data

Type of analysis	Diverge	
Number of lanes in freeway	3	
Free-flow speed on freeway	60.0	mph
Volume on freeway	4805	vph

Off Ramp Data

Side of freeway	Right	
Number of lanes in ramp	1	
Free-Flow speed on ramp	35.0	mph
Volume on ramp	1122	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	267	vph
Position of adjacent ramp	Upstream	
Type of adjacent ramp	On	
Distance to adjacent ramp	5800	ft

Conversion to pc/h Under Base Conditions

Junction Components	Freeway	Ramp	Adjacent Ramp	
Volume, V (vph)	4805	1122	267	vph
Peak-hour factor, PHF	0.95	0.95	0.95	

Peak 15-min volume, v15	1264	295	70	v
Trucks and buses	9	9	9	%
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	0.957	0.957	0.957	
Driver population factor, fP	1.00	1.00	1.00	
Flow rate, vp	5286	1234	294	pcph

Estimation of V12 Diverge Areas

L_{EQ} = 2975.89 (Equation 13-12 or 13-13)

P_{FD} = 0.571 Using Equation 5

$v_{12} = v_R + (v - v_F) P_{FD}$ = 3548 pc/h

Capacity Checks

	Actual	Maximum	LOS F?
$v_{Fi} = v_F$	5286	6900	No
$v_{FO} = v - v_R$	4052	6900	No
v_R	1234	2000	No
v_3 or v_{av34}	1738 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} = 3548 (Equation 13-15, 13-16, 13-18, or 13-19)

Flow Entering Diverge Influence Area

	Actual	Max Desirable	Violation?
v_{12}	3548	4400	No

Level of Service Determination (if not F)

Density, $D_R = 4.252 + 0.0086\ v_{12} - 0.009\ L_D$ = 31.6 pc/mi/ln

Level of service for ramp-freeway junction areas of influence D

Speed Estimation

Intermediate speed variable, D_S = 0.539

Space mean speed in ramp influence area, S = 50.3 mph

Space mean speed in outer lanes, S_R = 62.9 mph

Space mean speed for all vehicles, S_0 = 53.9 mph

HCS 2010: Freeway Merge and Diverge Segments Release 6.1

Phone: Fax:
E-mail:

Diverge Analysis

Analyst:	Alex Ericksen
Agency/Co.:	
Date performed:	1/9/2014
Analysis time period:	AM Peak Hour
Freeway/Dir of Travel:	I-55 Eastbound
Junction:	County Line Rd West Side
Jurisdiction:	
Analysis Year:	
Description:	

Freeway Data

Type of analysis	Diverge	
Number of lanes in freeway	3	
Free-flow speed on freeway	60.0	mph
Volume on freeway	4361	vph

Off Ramp Data

Side of freeway	Right	
Number of lanes in ramp	1	
Free-Flow speed on ramp	40.0	mph
Volume on ramp	174	vph
Length of first accel/decel lane	330	ft
Length of second accel/decel lane		ft

Adjacent Ramp Data (if one exists)

Does adjacent ramp exist?	Yes	
Volume on adjacent ramp	678	vph
Position of adjacent ramp	Upstream	
Type of adjacent ramp	On	
Distance to adjacent ramp	6500	ft

Conversion to pc/h Under Base Conditions

Junction Components	Freeway		Ramp		Adjacent Ramp		
Volume, V (vph)	4361		174		678		vph
Peak-hour factor, PHF	0.95		0.95		0.95		
Peak 15-min volume, v15	1148		46		178		v
Trucks and buses	9		9		9		%
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	0.957		0.957		0.957		
Driver population factor, fP	1.00		1.00		1.00		

Flow rate, vp	4797	191	746	pcph

Estimation of V12 Diverge Areas

L_{EQ} = 4472.02 (Equation 13-12 or 13-13)

P_{FD} = 0.631 Using Equation 5

$v_{12} = v_R + (v_F - v_R) P_{FD}$ = 3099 pc/h

Capacity Checks

	Actual	Maximum	LOS F?
$v_{Fi} = v_F$	4797	6900	No
$v_{FO} = v_F - v_R$	4606	6900	No
v_R	191	2100	No
v_3 or v_{av34}	1698 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} = 3099 (Equation 13-15, 13-16, 13-18, or 13-19)

Flow Entering Diverge Influence Area

	Actual	Max Desirable	Violation?
v_{12}	3099	4400	No

Level of Service Determination (if not F)

Density, $D_R = 4.252 + 0.0086\ v_{12} - 0.009\ L_D$ = 27.9 pc/mi/ln

Level of service for ramp-freeway junction areas of influence C

Speed Estimation

Intermediate speed variable,	D_S = 0.380	
Space mean speed in ramp influence area,	S_R = 53.2	mph
Space mean speed in outer lanes,	S_0 = 63.1	mph
Space mean speed for all vehicles,	S = 56.3	mph

HCS 2010: Freeway Merge and Diverge Segments Release 6.1

Phone: Fax:
E-mail:

Diverge Analysis

Analyst:	Alex Ericksen
Agency/Co.:	
Date performed:	1/9/2014
Analysis time period:	AM Peak Hour
Freeway/Dir of Travel:	I-55 Eastbound
Junction:	Archer Ave SW Side
Jurisdiction:	
Analysis Year:	
Description:	

Freeway Data

Type of analysis	Diverge	
Number of lanes in freeway	3	
Free-flow speed on freeway	60.0	mph
Volume on freeway	4188	vph

Off Ramp Data

Side of freeway	Right	
Number of lanes in ramp	1	
Free-Flow speed on ramp	35.0	mph
Volume on ramp	289	vph
Length of first accel/decel lane	175	ft
Length of second accel/decel lane		ft

Adjacent Ramp Data (if one exists)

Does adjacent ramp exist?	Yes	
Volume on adjacent ramp	386	vph
Position of adjacent ramp	Downstream	
Type of adjacent ramp	Off	
Distance to adjacent ramp	1700	ft

Conversion to pc/h Under Base Conditions

Junction Components	Freeway		Ramp		Adjacent Ramp		
Volume, V (vph)	4188		289		386		vph
Peak-hour factor, PHF	0.95		0.95		0.95		
Peak 15-min volume, v15	1102		76		102		v
Trucks and buses	9		9		9		%
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	0.957		0.957		0.957		
Driver population factor, fP	1.00		1.00		1.00		

Flow rate, vp 4607 318 425 pcph

Estimation of V12 Diverge Areas

L_{EQ} = 480.37 (Equation 13-12 or 13-13)

P_{FD} = 0.630 Using Equation 5

$v_{12} = v_R + (v_F - v_R) P_{FD}$ = 3021 pc/h

Capacity Checks

	Actual	Maximum	LOS F?
$v_{Fi} = v_F$	4607	6900	No
$v_{FO} = v_F - v_R$	4289	6900	No
v_R	318	2000	No
v_3 or v_{av34}	1586 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} = 3021 (Equation 13-15, 13-16, 13-18, or 13-19)

Flow Entering Diverge Influence Area

	Actual	Max Desirable	Violation?
v_{12}	3021	4400	No

Level of Service Determination (if not F)

Density, $D_R = 4.252 + 0.0086\, v_{12} - 0.009\, L_D$ = 28.7 pc/mi/ln

Level of service for ramp-freeway junction areas of influence D

Speed Estimation

Intermediate speed variable, D_S = 0.457

Space mean speed in ramp influence area, S_R = 51.8 mph

Space mean speed in outer lanes, S_0 = 63.5 mph

Space mean speed for all vehicles, S = 55.3 mph

HCS 2010: Freeway Merge and Diverge Segments Release 6.1

Phone: Fax:
E-mail:

Diverge Analysis

Analyst: Caitlin Bowen
Agency/Co.:
Date performed: 6/12/2013
Analysis time period: AM Peak Hour
Freeway/Dir of Travel: I-55 Eastbound
Junction: Archer Ave Loop Exit
Jurisdiction:
Analysis Year:
Description:

Freeway Data

Type of analysis	Diverge	
Number of lanes in freeway	3	
Free-flow speed on freeway	60.0	mph
Volume on freeway	3899	vph

Off Ramp Data

Side of freeway	Right	
Number of lanes in ramp	1	
Free-Flow speed on ramp	25.0	mph
Volume on ramp	386	vph
Length of first accel/decel lane	175	ft
Length of second accel/decel lane		ft

Adjacent Ramp Data (if one exists)

Does adjacent ramp exist?	Yes	
Volume on adjacent ramp	289	vph
Position of adjacent ramp	Upstream	
Type of adjacent ramp	Off	
Distance to adjacent ramp	1700	ft

Conversion to pc/h Under Base Conditions

Junction Components	Freeway	Ramp	Adjacent Ramp	
Volume, V (vph)	3899	386	289	vph
Peak-hour factor, PHF	0.95	0.95	0.95	

Peak 15-min volume, v15	1026	102	76	v
Trucks and buses	9	9	9	%
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	0.957	0.957	0.957	
Driver population factor, fP	1.00	1.00	1.00	
Flow rate, vp	4289	425	318	pcph

Estimation of V12 Diverge Areas

L_{EQ} = (Equation 13-12 or 13-13)

P_{FD} = 0.633 Using Equation 5

$v_{12} = v_R + (v - v_F) P_{FD}$ = 2872 pc/h

Capacity Checks

	Actual	Maximum	LOS F?
$v_{Fi} = v_F$	4289	6900	No
$v_{FO} = v - v_R$	3864	6900	No
v_R	425	1900	No

v_3 or v_{av34} 1417 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} = 2872 (Equation 13-15, 13-16, 13-18, or 13-19)

Flow Entering Diverge Influence Area

	Actual	Max Desirable	Violation?
v_{12}	2872	4400	No

Level of Service Determination (if not F)

Density, $D_R = 4.252 + 0.0086 v_{12} - 0.009 L_D$ = 27.4 pc/mi/ln

Level of service for ramp-freeway junction areas of influence C

Speed Estimation

Intermediate speed variable, D_S = 0.596

Space mean speed in ramp influence area, S = 49.3 mph

Space mean speed in outer lanes, S_R = 64.2 mph

Space mean speed for all vehicles, S_0 = 53.4 mph

HCS 2010: Freeway Merge and Diverge Segments Release 6.1

Phone: Fax:
E-mail:

Diverge Analysis

Analyst: Caitlin Bowen
Agency/Co.:
Date performed: 6/12/2013
Analysis time period: AM Peak Hour
Freeway/Dir of Travel: I-55 Eastbound
Junction: Central Ave West(Under constr)
Jurisdiction:
Analysis Year:
Description:

Freeway Data

Type of analysis	Diverge	
Number of lanes in freeway	3	
Free-flow speed on freeway	60.0	mph
Volume on freeway	4714	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	570	vph
Length of first accel/decel lane	500	ft
Length of second accel/decel lane		ft

Adjacent Ramp Data (if one exists)

Does adjacent ramp exist?	Yes	
Volume on adjacent ramp	1030	vph
Position of adjacent ramp	Upstream	
Type of adjacent ramp	On	
Distance to adjacent ramp	7500	ft

Conversion to pc/h Under Base Conditions

Junction Components	Freeway	Ramp	Adjacent Ramp	
Volume, V (vph)	4714	570	1030	vph
Peak-hour factor, PHF	0.95	0.95	0.95	

Peak 15-min volume, v15	1241	150	271	v
Trucks and buses	9	9	9	%
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	0.957	0.957	0.957	
Driver population factor, fP	1.00	1.00	1.00	
Flow rate, vp	5185	627	1133	pcph

Estimation of V12 Diverge Areas

L_{EQ} = 7945.13 (Equation 13-12 or 13-13)

P_{FD} = 0.606 Using Equation 6

$v_{12} = v_R + (v - v_F) P_{FD}$ = 3389 pc/h

Capacity Checks

	Actual	Maximum	LOS F?
$v_{Fi} = v_F$	5185	6900	No
$v_{FO} = v - v_R$	4558	6900	No
v_R	627	2000	No

v_3 or v_{av34} 1796 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} = 3389 (Equation 13-15, 13-16, 13-18, or 13-19)

Flow Entering Diverge Influence Area

	Actual	Max Desirable	Violation?
v_{12}	3389	4400	No

Level of Service Determination (if not F)

Density, $D_R = 4.252 + 0.0086 v_{12} - 0.009 L_D$ = 28.9 pc/mi/ln

Level of service for ramp-freeway junction areas of influence D

Speed Estimation

Intermediate speed variable, D_S = 0.549

Space mean speed in ramp influence area, S = 50.1 mph

Space mean speed in outer lanes, S_R = 62.7 mph

Space mean speed for all vehicles, S_0 = 53.9 mph

HCS 2010: Freeway Merge and Diverge Segments Release 6.1

Phone: Fax:
E-mail:

Diverge Analysis

Analyst: Caitlin Bowen
Agency/Co.:
Date performed: 6/12/2013
Analysis time period: AM Peak Hours
Freeway/Dir of Travel: I-55 Eastbound
Junction: Cicero Ave West
Jurisdiction:
Analysis Year:
Description:

Freeway Data

Type of analysis	Diverge	
Number of lanes in freeway	3	
Free-flow speed on freeway	60.0	mph
Volume on freeway	4531	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	354	vph
Length of first accel/decel lane	250	ft
Length of second accel/decel lane		ft

Adjacent Ramp Data (if one exists)

Does adjacent ramp exist?	Yes	
Volume on adjacent ramp	387	vph
Position of adjacent ramp	Upstream	
Type of adjacent ramp	On	
Distance to adjacent ramp	1900	ft

Conversion to pc/h Under Base Conditions

Junction Components	Freeway	Ramp	Adjacent Ramp	
Volume, V (vph)	4531	354	387	vph
Peak-hour factor, PHF	0.95	0.95	0.95	

Peak 15-min volume, v15	1192	93	102	v
Trucks and buses	9	9	9	%
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	0.957	0.957	0.957	
Driver population factor, fP	1.00	1.00	1.00	
Flow rate, vp	4984	389	426	pcph

Estimation of V12 Diverge Areas

L_{EQ} = 2729.58 (Equation 13-12 or 13-13)

P_{FD} = 0.658 Using Equation 6

$v_{12} = v_R + (v - v_F) P_{FD}$ = 3413 pc/h

Capacity Checks

	Actual	Maximum	LOS F?
$v_{Fi} = v_F$	4984	6900	No
$v_{FO} = v - v_R$	4595	6900	No
v_R	389	2000	No

v_3 or v_{av34} 1571 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} = 3413 (Equation 13-15, 13-16, 13-18, or 13-19)

Flow Entering Diverge Influence Area

	Actual	Max Desirable	Violation?
v_{12}	3413	4400	No

Level of Service Determination (if not F)

Density, $D_R = 4.252 + 0.0086 v_{12} - 0.009 L_D$ = 31.4 pc/mi/ln

Level of service for ramp-freeway junction areas of influence D

Speed Estimation

Intermediate speed variable, D_S = 0.528

Space mean speed in ramp influence area, S = 50.5 mph

Space mean speed in outer lanes, S_R = 63.6 mph

Space mean speed for all vehicles, S_0 = 54.0 mph

HCS 2010: Freeway Merge and Diverge Segments Release 6.1

Phone: Fax:
E-mail:

Diverge Analysis

Analyst: Caitlin Bowen
Agency/Co.:
Date performed: 6/12/2013
Analysis time period: AM Peak Hour
Freeway/Dir of Travel: I-55 Eastbound
Junction: Pulaski Road West
Jurisdiction:
Analysis Year:
Description:

Freeway Data

Type of analysis	Diverge	
Number of lanes in freeway	3	
Free-flow speed on freeway	60.0	mph
Volume on freeway	4909	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	341	vph
Length of first accel/decel lane	175	ft
Length of second accel/decel lane		ft

Adjacent Ramp Data (if one exists)

Does adjacent ramp exist?	Yes	
Volume on adjacent ramp	732	vph
Position of adjacent ramp	Upstream	
Type of adjacent ramp	On	
Distance to adjacent ramp	2300	ft

Conversion to pc/h Under Base Conditions

Junction Components	Freeway	Ramp	Adjacent Ramp	
Volume, V (vph)	4909	341	732	vph
Peak-hour factor, PHF	0.95	0.95	0.95	

Peak 15-min volume, v15	1292	90	193	v
Trucks and buses	9	9	9	%
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	0.957	0.957	0.957	
Driver population factor, fP	1.00	1.00	1.00	
Flow rate, vp	5400	375	805	pcph

Estimation of V12 Diverge Areas

L_{EQ} = 4829.03 (Equation 13-12 or 13-13)

P_{FD} = 0.718 Using Equation 6

$v_{12} = v_R + (v - v_F) P_{FD}$ = 3982 pc/h

Capacity Checks

	Actual	Maximum	LOS F?
$v_{Fi} = v_F$	5400	6900	No
$v_{FO} = v - v_R$	5025	6900	No
v_R	375	2000	No

v_3 or v_{av34} 1418 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} = 3982 (Equation 13-15, 13-16, 13-18, or 13-19)

Flow Entering Diverge Influence Area

	Actual	Max Desirable	Violation?
v_{12}	3982	4400	No

Level of Service Determination (if not F)

Density, $D_R = 4.252 + 0.0086 v_{12} - 0.009 L_D$ = 36.9 pc/mi/ln

Level of service for ramp-freeway junction areas of influence E

Speed Estimation

Intermediate speed variable, D_S = 0.527

Space mean speed in ramp influence area, S = 50.5 mph

Space mean speed in outer lanes, S_R = 64.2 mph

Space mean speed for all vehicles, S_0 = 53.5 mph

HCS 2010: Freeway Merge and Diverge Segments Release 6.1

Phone: Fax:
E-mail:

Diverge Analysis

Analyst: Caitlin Bowen
Agency/Co.:
Date performed: 6/12/2013
Analysis time period: AM Peak Hour
Freeway/Dir of Travel: I-55 Eastbound
Junction: Kedzie and California Ave West
Jurisdiction:
Analysis Year:
Description:

Freeway Data

Type of analysis	Diverge	
Number of lanes in freeway	3	
Free-flow speed on freeway	60.0	mph
Volume on freeway	5800	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	697	vph
Length of first accel/decel lane	500	ft
Length of second accel/decel lane		ft

Adjacent Ramp Data (if one exists)

Does adjacent ramp exist?	Yes	
Volume on adjacent ramp	1232	vph
Position of adjacent ramp	Upstream	
Type of adjacent ramp	On	
Distance to adjacent ramp	4400	ft

Conversion to pc/h Under Base Conditions

Junction Components	Freeway	Ramp	Adjacent Ramp	
Volume, V (vph)	5800	697	1232	vph
Peak-hour factor, PHF	0.95	0.95	0.95	

Peak 15-min volume, v15	1526	183	324	v
Trucks and buses	9	9	9	%
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	0.957	0.957	0.957	
Driver population factor, fP	1.00	1.00	1.00	
Flow rate, vp	6380	767	1355	pcph

Estimation of V12 Diverge Areas

L_{EQ} = 8498.07 (Equation 13-12 or 13-13)

P_{FD} = 0.654 Using Equation 6

$v_{12} = v_R + (v - v_F) P_{FD}$ = 4439 pc/h

Capacity Checks

	Actual	Maximum	LOS F?
$v_{Fi} = v_F$	6380	6900	No
$v_{FO} = v - v_R$	5613	6900	No
v_R	767	2000	No

v_3 or v_{av34} 1941 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} = 4439 (Equation 13-15, 13-16, 13-18, or 13-19)

Flow Entering Diverge Influence Area

	Actual	Max Desirable	Violation?
v_{12}	4439	4400	Yes

Level of Service Determination (if not F)

Density, $D_R = 4.252 + 0.0086 v_{12} - 0.009 L_D$ = 37.9 pc/mi/ln

Level of service for ramp-freeway junction areas of influence E

Speed Estimation

Intermediate speed variable, D_S = 0.562

Space mean speed in ramp influence area, S = 49.9 mph

Space mean speed in outer lanes, S_R = 62.2 mph

Space mean speed for all vehicles, S_0 = 53.1 mph

HCS 2010: Freeway Merge and Diverge Segments Release 6.1

Phone: Fax:
E-mail:

Diverge Analysis

Analyst:	Caitlin Bowen
Agency/Co.:	
Date performed:	6/12/2013
Analysis time period:	AM Peak Hour
Freeway/Dir of Travel:	I-55 Eastbound
Junction:	SB I-90/94
Jurisdiction:	
Analysis Year:	
Description:	

Freeway Data

Type of analysis	Diverge	
Number of lanes in freeway	3	
Free-flow speed on freeway	60.0	mph
Volume on freeway	3976	vph

Off Ramp Data

Side of freeway	Right	
Number of lanes in ramp	1	
Free-Flow speed on ramp	25.0	mph
Volume on ramp	1128	vph
Length of first accel/decel lane	330	ft
Length of second accel/decel lane		ft

Adjacent Ramp Data (if one exists)

Does adjacent ramp exist?	Yes	
Volume on adjacent ramp	1547	vph
Position of adjacent ramp	Upstream	
Type of adjacent ramp	Off	
Distance to adjacent ramp	3000	ft

Conversion to pc/h Under Base Conditions

Junction Components	Freeway		Ramp		Adjacent Ramp		
Volume, V (vph)	3976		1128		1547		vph
Peak-hour factor, PHF	0.95		0.95		0.95		
Peak 15-min volume, v15	1046		297		407		v
Trucks and buses	9		9		9		%
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	0.957		0.957		0.957		
Driver population factor, fP	1.00		1.00		1.00		

Flow rate, vp 4374 1241 1702 pcph

Estimation of V12 Diverge Areas

L_{EQ} = (Equation 13-12 or 13-13)

P_{FD} = 0.594 Using Equation 5

$v_{12} = v_R + (v_F - v_R) P_{FD}$ = 3101 pc/h

Capacity Checks

	Actual	Maximum	LOS F?
$v_{Fi} = v_F$	4374	6900	No
$v_{FO} = v_F - v_R$	3133	6900	No
v_R	1241	1900	No
v_3 or v_{av34}	1273 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} = 3101 (Equation 13-15, 13-16, 13-18, or 13-19)

Flow Entering Diverge Influence Area

	Actual	Max Desirable	Violation?
v_{12}	3101	4400	No

Level of Service Determination (if not F)

Density, $D_R = 4.252 + 0.0086\ v_{12} - 0.009\ L_D$ = 28.0- pc/mi/ln

Level of service for ramp-freeway junction areas of influence C

Speed Estimation

Intermediate speed variable, D_S = 0.670

Space mean speed in ramp influence area, S_R = 47.9 mph

Space mean speed in outer lanes, S_0 = 64.8 mph

Space mean speed for all vehicles, S = 51.9 mph

Diverge

Northbound PM

HCS 2010: Freeway Merge and Diverge Segments Release 6.1

Phone: Fax:
E-mail:

Diverge Analysis

Analyst: Caitlin Bowen
Agency/Co.:
Date performed: 6/13/2013
Analysis time period: PM Off Peak Hour
Freeway/Dir of Travel: I-55 Eastbound
Junction: I-355 Exit
Jurisdiction:
Analysis Year:
Description:

Freeway Data

Type of analysis	Diverge	
Number of lanes in freeway	3	
Free-flow speed on freeway	60.0	mph
Volume on freeway	4195	vph

Off Ramp Data

Side of freeway	Right	
Number of lanes in ramp	1	
Free-Flow speed on ramp	40.0	mph
Volume on ramp	1591	vph
Length of first accel/decel lane	280	ft
Length of second accel/decel lane		ft

Adjacent Ramp Data (if one exists)

Does adjacent ramp exist?	Yes	
Volume on adjacent ramp	710	vph
Position of adjacent ramp	Downstream	
Type of adjacent ramp	On	
Distance to adjacent ramp	2500	ft

Conversion to pc/h Under Base Conditions

Junction Components	Freeway	Ramp	Adjacent Ramp	
Volume, V (vph)	4195	1591	710	vph
Peak-hour factor, PHF	0.95	0.95	0.95	

Peak 15-min volume, v15	1104	419	187	v
Trucks and buses	11	11	11	%
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	0.948	0.948	
Driver population factor, fP	1.00	1.00	1.00	
Flow rate, vp	4659	1767	788	pcph

Estimation of V12 Diverge Areas

L_{EQ} = (Equation 13-12 or 13-13)

P_{FD} = 0.562 Using Equation 5

$v_{12} = v_R + (v - v_F) P_{FD}$ = 3393 pc/h

Capacity Checks

	Actual	Maximum	LOS F?
$v_{Fi} = v_F$	4659	6900	No
$v_{FO} = v - v_F$	2892	6900	No
v_R	1767	2100	No

v_3 or v_{av34} 1266 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} = 3393 (Equation 13-15, 13-16, 13-18, or 13-19)

Flow Entering Diverge Influence Area

	Actual	Max Desirable	Violation?
v_{12}	3393	4400	No

Level of Service Determination (if not F)

Density, $D_R = 4.252 + 0.0086 v_{12} - 0.009 L_D$ = 30.9 pc/mi/ln

Level of service for ramp-freeway junction areas of influence D

Speed Estimation

Intermediate speed variable, D_S = 0.522

Space mean speed in ramp influence area, S = 50.6 mph

Space mean speed in outer lanes, S_R = 64.8 mph

Space mean speed for all vehicles, S_0 = 53.8 mph

HCS 2010: Freeway Merge and Diverge Segments Release 6.1

Phone: Fax:
E-mail:

Diverge Analysis

Analyst:	Alex Ericksen
Agency/Co.:	
Date performed:	1/9/2014
Analysis time period:	PM Off Peak Hour
Freeway/Dir of Travel:	I-55 Eastbound
Junction:	Lemont Rd West Side
Jurisdiction:	
Analysis Year:	
Description:	

Freeway Data

Type of analysis	Diverge	
Number of lanes in freeway	4	
Free-flow speed on freeway	60.0	mph
Volume on freeway	3843	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	379	vph
Length of first accel/decel lane	1500	ft
Length of second accel/decel lane		ft

Adjacent Ramp Data (if one exists)

Does adjacent ramp exist?	Yes	
Volume on adjacent ramp	529	vph
Position of adjacent ramp	Upstream	
Type of adjacent ramp	On	
Distance to adjacent ramp	3550	ft

Conversion to pc/h Under Base Conditions

Junction Components	Freeway		Ramp		Adjacent Ramp		
Volume, V (vph)	3843		379		529		vph
Peak-hour factor, PHF	0.95		0.95		0.95		
Peak 15-min volume, v15	1011		100		139		v
Trucks and buses	0		0		0		%
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	1.000		1.000		1.000		
Driver population factor, fP	1.00		1.00		1.00		

Flow rate, vp 4045 399 557 pcph

Estimation of V12 Diverge Areas

L_{EQ} = (Equation 13-12 or 13-13)

P_{FD} = 0.436 Using Equation 8

$v_{12} = v_R + (v_F - v_R) P_{FD}$ = 1989 pc/h

Capacity Checks

	Actual	Maximum	LOS F?
$v_{Fi} = v_F$	4045	9200	No
$v_{FO} = v_F - v_R$	3646	9200	No
v_R	399	2100	No
v_3 or v_{av34}	1028 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} = 1989 (Equation 13-15, 13-16, 13-18, or 13-19)

Flow Entering Diverge Influence Area

	Actual	Max Desirable	Violation?
v_{12}	1989	4400	No

Level of Service Determination (if not F)

Density, $D_R = 4.252 + 0.0086\ v_{12} - 0.009\ L_D$ = 7.9 pc/mi/ln

Level of service for ramp-freeway junction areas of influence A

Speed Estimation

Intermediate speed variable, D_S = 0.334

Space mean speed in ramp influence area, S_R = 54.0 mph

Space mean speed in outer lanes, S_0 = 65.7 mph

Space mean speed for all vehicles, S = 59.4 mph

HCS 2010: Freeway Merge and Diverge Segments Release 6.1

Phone: Fax:
E-mail:

Diverge Analysis

Analyst: Caitlin Bowen
Agency/Co.:
Date performed: 6/13/2013
Analysis time period: PM Off Peak Hour
Freeway/Dir of Travel: I-55 Eastbound
Junction: Cass Ave West Side
Jurisdiction:
Analysis Year:
Description:

Freeway Data

Type of analysis	Diverge	
Number of lanes in freeway	3	
Free-flow speed on freeway	60.0	mph
Volume on freeway	4480	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	166	vph
Length of first accel/decel lane	250	ft
Length of second accel/decel lane		ft

Adjacent Ramp Data (if one exists)

Does adjacent ramp exist?	Yes	
Volume on adjacent ramp	1102	vph
Position of adjacent ramp	Upstream	
Type of adjacent ramp	On	
Distance to adjacent ramp	8000	ft

Conversion to pc/h Under Base Conditions

Junction Components	Freeway	Ramp	Adjacent Ramp	
Volume, V (vph)	4480	166	1102	vph
Peak-hour factor, PHF	0.95	0.95	0.95	

Peak 15-min volume, v15	1179	44	290	v
Trucks and buses	11	11	11	%
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	0.948	0.948	
Driver population factor, fP	1.00	1.00	1.00	
Flow rate, vp	4975	184	1224	pcph

Estimation of V12 Diverge Areas

L_{EQ} = 7139.48 (Equation 13-12 or 13-13)

P_{FD} = 0.627 Using Equation 5

$v_{12} = v_R + (v - v_F) P_{FD}$ = 3189 pc/h

Capacity Checks

	Actual	Maximum	LOS F?
$v_{Fi} = v_F$	4975	6900	No
$v_{FO} = v - v_R$	4791	6900	No
v_R	184	2100	No

v_3 or v_{av34} = 1786 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} = 3189 (Equation 13-15, 13-16, 13-18, or 13-19)

Flow Entering Diverge Influence Area

	Actual	Max Desirable	Violation?
v_{12}	3189	4400	No

Level of Service Determination (if not F)

Density, $D_R = 4.252 + 0.0086 v_{12} - 0.009 L_D$ = 29.4 pc/mi/ln

Level of service for ramp-freeway junction areas of influence D

Speed Estimation

Intermediate speed variable, D_S = 0.315

Space mean speed in ramp influence area, S = 54.3 mph

Space mean speed in outer lanes, S_R = 62.8 mph

Space mean speed for all vehicles, S_0 = 57.1 mph

HCS 2010: Freeway Merge and Diverge Segments Release 6.1

Phone: Fax:
E-mail:

Diverge Analysis

Analyst: Caitlin Bowen
Agency/Co.:
Date performed: 6/13/2013
Analysis time period: PM Off Peak Hour
Freeway/Dir of Travel: I-55 Eastbound
Junction: Kingery West Side
Jurisdiction:
Analysis Year:
Description:

Freeway Data

Type of analysis	Diverge	
Number of lanes in freeway	3	
Free-flow speed on freeway	60.0	mph
Volume on freeway	4450	vph

Off Ramp Data

Side of freeway	Right	
Number of lanes in ramp	1	
Free-Flow speed on ramp	35.0	mph
Volume on ramp	756	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	203	vph
Position of adjacent ramp	Upstream	
Type of adjacent ramp	On	
Distance to adjacent ramp	5800	ft

Conversion to pc/h Under Base Conditions

Junction Components	Freeway	Ramp	Adjacent Ramp	
Volume, V (vph)	4450	756	203	vph
Peak-hour factor, PHF	0.95	0.95	0.95	

Peak 15-min volume, v15	1171	199	53	v
Trucks and buses	11	11	11	%
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	0.948	0.948	
Driver population factor, fP	1.00	1.00	1.00	
Flow rate, vp	4942	840	225	pcph

Estimation of V12 Diverge Areas

L_{EQ} = 1862.18 (Equation 13-12 or 13-13)

P_{FD} = 0.598 Using Equation 5

$v_{12} = v_R + (v - v_F) P_{FD}$ = 3292 pc/h

Capacity Checks

	Actual	Maximum	LOS F?
$v_{Fi} = v_F$	4942	6900	No
$v_{FO} = v - v_R$	4102	6900	No
v_R	840	2000	No

v_3 or v_{av34} 1650 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} = 3292 (Equation 13-15, 13-16, 13-18, or 13-19)

Flow Entering Diverge Influence Area

	Actual	Max Desirable	Violation?
v_{12}	3292	4400	No

Level of Service Determination (if not F)

Density, $D_R = 4.252 + 0.0086 v_{12} - 0.009 L_D$ = 29.4 pc/mi/ln

Level of service for ramp-freeway junction areas of influence D

Speed Estimation

Intermediate speed variable, D_S = 0.504

Space mean speed in ramp influence area, S = 50.9 mph

Space mean speed in outer lanes, S_R = 63.3 mph

Space mean speed for all vehicles, S_0 = 54.5 mph

HCS 2010: Freeway Merge and Diverge Segments Release 6.1

Phone: Fax:
E-mail:

Diverge Analysis

Analyst:	Alex Ericksen
Agency/Co.:	
Date performed:	1/9/2014
Analysis time period:	PM Off Peak Hour
Freeway/Dir of Travel:	I-55 Eastbound
Junction:	County Line Rd West Side
Jurisdiction:	
Analysis Year:	
Description:	

Freeway Data

Type of analysis	Diverge	
Number of lanes in freeway	3	
Free-flow speed on freeway	60.0	mph
Volume on freeway	4090	vph

Off Ramp Data

Side of freeway	Right	
Number of lanes in ramp	1	
Free-Flow speed on ramp	40.0	mph
Volume on ramp	145	vph
Length of first accel/decel lane	330	ft
Length of second accel/decel lane		ft

Adjacent Ramp Data (if one exists)

Does adjacent ramp exist?	Yes	
Volume on adjacent ramp	396	vph
Position of adjacent ramp	Upstream	
Type of adjacent ramp	On	
Distance to adjacent ramp	6500	ft

Conversion to pc/h Under Base Conditions

Junction Components	Freeway		Ramp		Adjacent Ramp		
Volume, V (vph)	4090		145		396		vph
Peak-hour factor, PHF	0.95		0.95		0.95		
Peak 15-min volume, v15	1076		38		104		v
Trucks and buses	11		11		11		%
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		0.948		0.948		
Driver population factor, fP	1.00		1.00		1.00		

Flow rate, vp 4542 161 440 pcph

Estimation of V12 Diverge Areas

L_{EQ} = 2695.58 (Equation 13-12 or 13-13)

P_{FD} = 0.639 Using Equation 5

$v_{12} = v_R + (v_F - v_R) P_{FD}$ = 2961 pc/h

Capacity Checks

	Actual	Maximum	LOS F?
$v_{Fi} = v_F$	4542	6900	No
$v_{FO} = v_F - v_R$	4381	6900	No
v_R	161	2100	No
v_3 or v_{av34}	1581 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} = 2961 (Equation 13-15, 13-16, 13-18, or 13-19)

Flow Entering Diverge Influence Area

	Actual	Max Desirable	Violation?
v_{12}	2961	4400	No

Level of Service Determination (if not F)

Density, $D_R = 4.252 + 0.0086\ v_{12} - 0.009\ L_D$ = 26.7 pc/mi/ln

Level of service for ramp-freeway junction areas of influence C

Speed Estimation

Intermediate speed variable,	D_S = 0.377	
Space mean speed in ramp influence area,	S_R = 53.2	mph
Space mean speed in outer lanes,	S_0 = 63.6	mph
Space mean speed for all vehicles,	S = 56.4	mph

HCS 2010: Freeway Merge and Diverge Segments Release 6.1

Phone: Fax:
E-mail:

Diverge Analysis

Analyst:	Alex Ericksen
Agency/Co.:	
Date performed:	1/9/2014
Analysis time period:	PM Off Peak Hour
Freeway/Dir of Travel:	I-55 Eastbound
Junction:	Archer Ave SW Side
Jurisdiction:	
Analysis Year:	
Description:	

Freeway Data

Type of analysis	Diverge	
Number of lanes in freeway	3	
Free-flow speed on freeway	60.0	mph
Volume on freeway	4643	vph

Off Ramp Data

Side of freeway	Right	
Number of lanes in ramp	1	
Free-Flow speed on ramp	35.0	mph
Volume on ramp	343	vph
Length of first accel/decel lane	175	ft
Length of second accel/decel lane		ft

Adjacent Ramp Data (if one exists)

Does adjacent ramp exist?	Yes	
Volume on adjacent ramp	407	vph
Position of adjacent ramp	Downstream	
Type of adjacent ramp	Off	
Distance to adjacent ramp	1700	ft

Conversion to pc/h Under Base Conditions

Junction Components	Freeway		Ramp		Adjacent Ramp		
Volume, V (vph)	4643		343		407		vph
Peak-hour factor, PHF	0.95		0.95		0.95		
Peak 15-min volume, v15	1222		90		107		v
Trucks and buses	11		11		11		%
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		0.948		0.948		
Driver population factor, fP	1.00		1.00		1.00		

Flow rate, vp 5156 381 452 pcph

Estimation of V12 Diverge Areas

L_{EQ} = 535.64 (Equation 13-12 or 13-13)

P_{FD} = 0.614 Using Equation 5

$v_{12} = v_R + (v_F - v_R) P_{FD}$ = 3311 pc/h

Capacity Checks

	Actual	Maximum	LOS F?
$v_{Fi} = v_F$	5156	6900	No
$v_{FO} = v_F - v_R$	4775	6900	No
v_R	381	2000	No
v_3 or v_{av34}	1845 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} = 3311 (Equation 13-15, 13-16, 13-18, or 13-19)

Flow Entering Diverge Influence Area

	Actual	Max Desirable	Violation?
v_{12}	3311	4400	No

Level of Service Determination (if not F)

Density, $D_R = 4.252 + 0.0086\, v_{12} - 0.009\, L_D$ = 31.2 pc/mi/ln

Level of service for ramp-freeway junction areas of influence D

Speed Estimation

Intermediate speed variable, D_S = 0.462

Space mean speed in ramp influence area, S_R = 51.7 mph

Space mean speed in outer lanes, S_0 = 62.5 mph

Space mean speed for all vehicles, S = 55.1 mph

HCS 2010: Freeway Merge and Diverge Segments Release 6.1

Phone: Fax:
E-mail:

Diverge Analysis

Analyst: Caitlin Bowen
Agency/Co.:
Date performed: 6/12/2013
Analysis time period: PM Off Peak Hour
Freeway/Dir of Travel: I-55 Eastbound
Junction: Archer Ave Loop Exit
Jurisdiction:
Analysis Year:
Description:

Freeway Data

Type of analysis	Diverge	
Number of lanes in freeway	3	
Free-flow speed on freeway	60.0	mph
Volume on freeway	4300	vph

Off Ramp Data

Side of freeway	Right	
Number of lanes in ramp	1	
Free-Flow speed on ramp	25.0	mph
Volume on ramp	407	vph
Length of first accel/decel lane	175	ft
Length of second accel/decel lane		ft

Adjacent Ramp Data (if one exists)

Does adjacent ramp exist?	Yes	
Volume on adjacent ramp	343	vph
Position of adjacent ramp	Upstream	
Type of adjacent ramp	Off	
Distance to adjacent ramp	1700	ft

Conversion to pc/h Under Base Conditions

Junction Components	Freeway	Ramp	Adjacent Ramp	
Volume, V (vph)	4300	407	343	vph
Peak-hour factor, PHF	0.95	0.95	0.95	

Peak 15-min volume, v15	1132	107	90	v
Trucks and buses	11	11	11	%
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	0.948	0.948	
Driver population factor, fP	1.00	1.00	1.00	
Flow rate, vp	4775	452	381	pcph

Estimation of V12 Diverge Areas

L_{EQ} = (Equation 13-12 or 13-13)

P_{FD} = 0.620 Using Equation 5

$v_{12} = v_R + (v - v_F) P_{FD}$ = 3132 pc/h

Capacity Checks

	Actual	Maximum	LOS F?
$v_{Fi} = v_F$	4775	6900	No
$v_{FO} = v - v_R$	4323	6900	No
v_R	452	1900	No

v_3 or v_{av34} 1643 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} = 3132 (Equation 13-15, 13-16, 13-18, or 13-19)

Flow Entering Diverge Influence Area

	Actual	Max Desirable	Violation?
v_{12}	3132	4400	No

Level of Service Determination (if not F)

Density, $D_R = 4.252 + 0.0086 v_{12} - 0.009 L_D$ = 29.6 pc/mi/ln

Level of service for ramp-freeway junction areas of influence D

Speed Estimation

Intermediate speed variable, D_S = 0.599

Space mean speed in ramp influence area, S = 49.2 mph

Space mean speed in outer lanes, S_R = 63.3 mph

Space mean speed for all vehicles, S_0 = 53.3 mph

HCS 2010: Freeway Merge and Diverge Segments Release 6.1

Phone: Fax:
E-mail:

Diverge Analysis

Analyst: Caitlin Bowen
Agency/Co.:
Date performed: 6/12/2013
Analysis time period: PM Off Peak Hour
Freeway/Dir of Travel: I-55 Eastbound
Junction: Central Ave West(Under constr)
Jurisdiction:
Analysis Year:
Description:

Freeway Data

Type of analysis	Diverge	
Number of lanes in freeway	3	
Free-flow speed on freeway	60.0	mph
Volume on freeway	5039	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	833	vph
Length of first accel/decel lane	500	ft
Length of second accel/decel lane		ft

Adjacent Ramp Data (if one exists)

Does adjacent ramp exist?	Yes	
Volume on adjacent ramp	833	vph
Position of adjacent ramp	Upstream	
Type of adjacent ramp	On	
Distance to adjacent ramp	7500	ft

Conversion to pc/h Under Base Conditions

Junction Components	Freeway	Ramp	Adjacent Ramp	
Volume, V (vph)	5039	833	833	vph
Peak-hour factor, PHF	0.95	0.95	0.95	

Peak 15-min volume, v15	1326	219	219	v
Trucks and buses	8	8	8	%
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	0.962	0.962	
Driver population factor, fP	1.00	1.00	1.00	
Flow rate, vp	5516	912	912	pcph

Estimation of V12 Diverge Areas

L_{EQ} = 7094.18 (Equation 13-12 or 13-13)

P_{FD} = 0.580 Using Equation 5

$v_{12} = v_R + (v - v_F) P_{FD}$ = 3583 pc/h

Capacity Checks

	Actual	Maximum	LOS F?
$v_{Fi} = v_F$	5516	6900	No
$v_{FO} = v - v_R$	4604	6900	No
v_R	912	2000	No

v_{av34} or v_3 1933 pc/h (Equation 13-14 or 13-17)

Is v_{av34} or v_3 > 2700 pc/h? No

Is v_{av34} or v_3 > 1.5 v_{12} /2 No

If yes, v_{12A} = 3583 (Equation 13-15, 13-16, 13-18, or 13-19)

Flow Entering Diverge Influence Area

	Actual	Max Desirable	Violation?
v_{12}	3583	4400	No

Level of Service Determination (if not F)

Density, $D_R = 4.252 + 0.0086 v_{12} - 0.009 L_D$ = 30.6 pc/mi/ln

Level of service for ramp-freeway junction areas of influence D

Speed Estimation

Intermediate speed variable, D_S = 0.575

Space mean speed in ramp influence area, S = 49.6 mph

Space mean speed in outer lanes, S_R = 62.2 mph

Space mean speed for all vehicles, S_0 = 53.4 mph

HCS 2010: Freeway Merge and Diverge Segments Release 6.1

Phone: Fax:
E-mail:

Diverge Analysis

Analyst: Caitlin Bowen
Agency/Co.:
Date performed: 6/12/2013
Analysis time period: PM Off Peak Hour
Freeway/Dir of Travel: I-55 Eastbound
Junction: Cicero Ave West
Jurisdiction:
Analysis Year:
Description:

Freeway Data

Type of analysis	Diverge	
Number of lanes in freeway	3	
Free-flow speed on freeway	60.0	mph
Volume on freeway	4657	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	385	vph
Length of first accel/decel lane	250	ft
Length of second accel/decel lane		ft

Adjacent Ramp Data (if one exists)

Does adjacent ramp exist?	Yes	
Volume on adjacent ramp	451	vph
Position of adjacent ramp	Upstream	
Type of adjacent ramp	On	
Distance to adjacent ramp	1900	ft

Conversion to pc/h Under Base Conditions

Junction Components	Freeway	Ramp	Adjacent Ramp	
Volume, V (vph)	4657	385	451	vph
Peak-hour factor, PHF	0.95	0.95	0.95	

Peak 15-min volume, v15	1226	101	119	v
Trucks and buses	8	8	8	%
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	0.962	0.962	
Driver population factor, fP	1.00	1.00	1.00	
Flow rate, vp	5098	421	494	pcph

Estimation of V12 Diverge Areas

L_{EQ} = 3161.44 (Equation 13-12 or 13-13)

P_{FD} = 0.675 Using Equation 6

$v_{12} = v_R + (v - v_F) P_{FD}$ = 3579 pc/h

Capacity Checks

	Actual	Maximum	LOS F?
$v_{Fi} = v_F$	5098	6900	No
$v_{FO} = v - v_R$	4677	6900	No
v_R	421	2000	No

v_3 or v_{av34} 1519 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} = 3579 (Equation 13-15, 13-16, 13-18, or 13-19)

Flow Entering Diverge Influence Area

	Actual	Max Desirable	Violation?
v_{12}	3579	4400	No

Level of Service Determination (if not F)

Density, $D_R = 4.252 + 0.0086 v_{12} - 0.009 L_D$ = 32.8 pc/mi/ln

Level of service for ramp-freeway junction areas of influence D

Speed Estimation

Intermediate speed variable, D_S = 0.531

Space mean speed in ramp influence area, S = 50.4 mph

Space mean speed in outer lanes, S_R = 63.8 mph

Space mean speed for all vehicles, S_0 = 53.8 mph

HCS 2010: Freeway Merge and Diverge Segments Release 6.1

Phone: Fax:
E-mail:

Diverge Analysis

Analyst: Caitlin Bowen
Agency/Co.:
Date performed: 6/12/2013
Analysis time period: PM Off Peak Hour
Freeway/Dir of Travel: I-55 Eastbound
Junction: Pulaski Road West
Jurisdiction:
Analysis Year:
Description:

Freeway Data

Type of analysis	Diverge	
Number of lanes in freeway	3	
Free-flow speed on freeway	60.0	mph
Volume on freeway	5053	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	659	vph
Length of first accel/decel lane	175	ft
Length of second accel/decel lane		ft

Adjacent Ramp Data (if one exists)

Does adjacent ramp exist?	Yes	
Volume on adjacent ramp	781	vph
Position of adjacent ramp	Upstream	
Type of adjacent ramp	On	
Distance to adjacent ramp	2300	ft

Conversion to pc/h Under Base Conditions

Junction Components	Freeway	Ramp	Adjacent Ramp	
Volume, V (vph)	5053	659	781	vph
Peak-hour factor, PHF	0.95	0.95	0.95	

Peak 15-min volume, v15	1330	173	206	v
Trucks and buses	8	8	8	%
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	0.962	0.962	
Driver population factor, fP	1.00	1.00	1.00	
Flow rate, vp	5532	721	855	pcph

Estimation of V12 Diverge Areas

L_{EQ} = 5960.68 (Equation 13-12 or 13-13)

P_{FD} = 0.726 Using Equation 6

$v_{12} = v_R + (v - v_F) P_{FD}$ = 4213 pc/h

Capacity Checks

	Actual	Maximum	LOS F?
$v_{Fi} = v_F$	5532	6900	No
$v_{FO} = v - v_R$	4811	6900	No
v_R	721	2000	No

v_{3av34} or v_{av34} 1319 pc/h (Equation 13-14 or 13-17)

Is v_{3av34} or v_{av34} > 2700 pc/h? No

Is v_{3av34} or v_{av34} > 1.5 v_{12} /2 No

If yes, v_{12A} = 4213 (Equation 13-15, 13-16, 13-18, or 13-19)

Flow Entering Diverge Influence Area

	Actual	Max Desirable	Violation?
v_{12}	4213	4400	No

Level of Service Determination (if not F)

Density, $D_R = 4.252 + 0.0086\ v_{12} - 0.009\ L_D$ = 38.9 pc/mi/ln

Level of service for ramp-freeway junction areas of influence E

Speed Estimation

Intermediate speed variable, D_S = 0.558

Space mean speed in ramp influence area, S = 50.0 mph

Space mean speed in outer lanes, S_R = 64.6 mph

Space mean speed for all vehicles, S_0 = 52.8 mph

HCS 2010: Freeway Merge and Diverge Segments Release 6.1

Phone: Fax:
E-mail:

Diverge Analysis

Analyst: Caitlin Bowen
Agency/Co.:
Date performed: 6/12/2013
Analysis time period: PM Off Peak Hour
Freeway/Dir of Travel: I-55 Eastbound
Junction: Kedzie and California Ave West
Jurisdiction:
Analysis Year:
Description:

Freeway Data

Type of analysis	Diverge	
Number of lanes in freeway	3	
Free-flow speed on freeway	60.0	mph
Volume on freeway	5162	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	860	vph
Length of first accel/decel lane	500	ft
Length of second accel/decel lane		ft

Adjacent Ramp Data (if one exists)

Does adjacent ramp exist?	Yes	
Volume on adjacent ramp	768	vph
Position of adjacent ramp	Upstream	
Type of adjacent ramp	On	
Distance to adjacent ramp	4400	ft

Conversion to pc/h Under Base Conditions

Junction Components	Freeway	Ramp	Adjacent Ramp	
Volume, V (vph)	5162	860	768	vph
Peak-hour factor, PHF	0.95	0.95	0.95	

Peak 15-min volume, v15	1358	226	202	v
Trucks and buses	8	8	8	%
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	0.962	0.962	
Driver population factor, fP	1.00	1.00	1.00	
Flow rate, vp	5651	941	841	pcph

Estimation of V12 Diverge Areas

L_{EQ} = 6496.37 (Equation 13-12 or 13-13)

P_{FD} = 0.612 Using Equation 6

$v_{12} = v_R + (v - v_F) P_{FD}$ = 3824 pc/h

Capacity Checks

	Actual	Maximum	LOS F?
$v_{Fi} = v_F$	5651	6900	No
$v_{FO} = v - v_R$	4710	6900	No
v_R	941	2000	No

v_{3} or v_{av34} 1827 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} = 3824 (Equation 13-15, 13-16, 13-18, or 13-19)

Flow Entering Diverge Influence Area

	Actual	Max Desirable	Violation?
v_{12}	3824	4400	No

Level of Service Determination (if not F)

Density, $D_R = 4.252 + 0.0086 v_{12} - 0.009 L_D$ = 32.6 pc/mi/ln

Level of service for ramp-freeway junction areas of influence D

Speed Estimation

Intermediate speed variable, D_S = 0.578

Space mean speed in ramp influence area, S = 49.6 mph

Space mean speed in outer lanes, S_R = 62.6 mph

Space mean speed for all vehicles, S_0 = 53.2 mph

HCS 2010: Freeway Merge and Diverge Segments Release 6.1

Phone: Fax:
E-mail:

Diverge Analysis

Analyst: Caitlin Bowen
Agency/Co.:
Date performed: 6/12/2013
Analysis time period: PM Off Peak Hour
Freeway/Dir of Travel: I-55 Eastbound
Junction: Damen Ave and 1-90/94
Jurisdiction:
Analysis Year:
Description:

Freeway Data

Type of analysis	Diverge	
Number of lanes in freeway	3	
Free-flow speed on freeway	60.0	mph
Volume on freeway	3377	vph

Off Ramp Data

Side of freeway	Right	
Number of lanes in ramp	1	
Free-Flow speed on ramp	25.0	mph
Volume on ramp	1122	vph
Length of first accel/decel lane	330	ft
Length of second accel/decel lane		ft

Adjacent Ramp Data (if one exists)

Does adjacent ramp exist?	Yes	
Volume on adjacent ramp	1471	vph
Position of adjacent ramp	Upstream	
Type of adjacent ramp	Off	
Distance to adjacent ramp	3000	ft

Conversion to pc/h Under Base Conditions

Junction Components	Freeway	Ramp	Adjacent Ramp	
Volume, V (vph)	3377	1122	1471	vph
Peak-hour factor, PHF	0.95	0.95	0.95	

Peak 15-min volume, v15	889	295	387	v
Trucks and buses	8	8	8	%
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	0.962	0.962	
Driver population factor, fP	1.00	1.00	1.00	
Flow rate, vp	3697	1228	1610	pcph

Estimation of V12 Diverge Areas

L_{EQ} = (Equation 13-12 or 13-13)

P_{FD} = 0.611 Using Equation 5

$v_{12} = v_R + (v - v_F) P_{FD}$ = 2737 pc/h

Capacity Checks

	Actual	Maximum	LOS F?
$v_{Fi} = v_F$	3697	6900	No
$v_{FO} = v - v_R$	2469	6900	No
v_R	1228	1900	No
v_3 or v_{av34}	960 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} = 2737 (Equation 13-15, 13-16, 13-18, or 13-19)

Flow Entering Diverge Influence Area

	Actual	Max Desirable	Violation?
v_{12}	2737	4400	No

Level of Service Determination (if not F)

Density, $D_R = 4.252 + 0.0086 v_{12} - 0.009 L_D$ = 24.8 pc/mi/ln

Level of service for ramp-freeway junction areas of influence C

Speed Estimation

Intermediate speed variable, D_S = 0.669

Space mean speed in ramp influence area, S = 48.0 mph

Space mean speed in outer lanes, S_R = 65.8 mph

Space mean speed for all vehicles, S_0 = 51.6 mph

Diverge

Southbound AM

HCS 2010: Freeway Merge and Diverge Segments Release 6.1

Phone: Fax:
E-mail:

Diverge Analysis

Analyst: Caitlin Bowen
Agency/Co.:
Date performed: 6/14/2013
Analysis time period: AM Off Peak Hour
Freeway/Dir of Travel: I-55 Westbound
Junction: I-355/Joliet Rd CD Exit
Jurisdiction:
Analysis Year:
Description:

Freeway Data

Type of analysis	Diverge	
Number of lanes in freeway	3	
Free-flow speed on freeway	60.0	mph
Volume on freeway	2472	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	273	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?	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)	2472	273		vph
Peak-hour factor, PHF	0.95	0.95		

Peak 15-min volume, v15	651	72	v
Trucks and buses	15	15	%
Recreational vehicles	0	0	%
Terrain type:	Level	Level	
Grade	0.00 %	0.00 %	%
Length	0.00 mi	0.00 mi	mi
Trucks and buses PCE, ET	1.5	1.5	
Recreational vehicle PCE, ER	1.2	1.2	
Heavy vehicle adjustment, fHV	0.930	0.930	
Driver population factor, fP	1.00	1.00	
Flow rate, vp	2797	309	pcph

Estimation of V12 Diverge Areas

L_{EQ} = (Equation 13-12 or 13-13)

P_{FD} = 0.676 Using Equation 5

$v_{12} = v_R + (v_F - v_R) P_{FD}$ = 1991 pc/h

Capacity Checks

	Actual	Maximum	LOS F?
$v_{Fi} = v_F$	2797	6900	No
$v_{FO} = v_F - v_R$	2488	6900	No
v_R	309	2100	No

v_3 or v_{av34} = 806 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} = 1991 (Equation 13-15, 13-16, 13-18, or 13-19)

Flow Entering Diverge Influence Area

	Actual	Max Desirable	Violation?
v_{12}	1991	4400	No

Level of Service Determination (if not F)

Density, $D_R = 4.252 + 0.0086\ v_{12} - 0.009\ L_D$ = 18.2 pc/mi/ln

Level of service for ramp-freeway junction areas of influence B

Speed Estimation

Intermediate speed variable, D_S = 0.326

Space mean speed in ramp influence area, S = 54.1 mph

Space mean speed in outer lanes, S_R = 65.8 mph

Space mean speed for all vehicles, S_0 = 57.1 mph

HCS 2010: Freeway Merge and Diverge Segments Release 6.1

Phone: Fax:
E-mail:

Diverge Analysis

Analyst:	Alex Ericksen
Agency/Co.:	
Date performed:	1/10/2014
Analysis time period:	PM Peak Hour
Freeway/Dir of Travel:	I-55 WB
Junction:	Diverge to I-355
Jurisdiction:	
Analysis Year:	
Description:	

Freeway Data

Type of analysis	Diverge	
Number of lanes in freeway	4	
Free-flow speed on freeway	60.0	mph
Volume on freeway	3348	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	876	vph
Length of first accel/decel lane	1100	ft
Length of second accel/decel lane	1100	ft

Adjacent Ramp Data (if one exists)

Does adjacent ramp exist?	Yes	
Volume on adjacent ramp	53	vph
Position of adjacent ramp	Upstream	
Type of adjacent ramp	On	
Distance to adjacent ramp	2950	ft

Conversion to pc/h Under Base Conditions

Junction Components	Freeway		Ramp		Adjacent Ramp		
Volume, V (vph)	3348		876		53		vph
Peak-hour factor, PHF	0.95		0.95		0.95		
Peak 15-min volume, v15	881		231		14		v
Trucks and buses	15		15		15		%
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	0.930		0.930		0.930		
Driver population factor, fP	1.00		1.00		1.00		

Flow rate, vp	3789	991	60	pcph

Estimation of V12 Diverge Areas

L_{EQ} = (Equation 13-12 or 13-13)

P_{FD} = 0.260 Using Equation 0

$v_{12} = v_R + (v_F - v_R) P_{FD}$ = 1718 pc/h

Capacity Checks

	Actual	Maximum	LOS F?
$v_{Fi} = v_F$	3789	9200	No
$v_{FO} = v_F - v_R$	2798	9200	No
v_R	991	4200	No
v_3 or v_{av34}	1035 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} = 1718 (Equation 13-15, 13-16, 13-18, or 13-19)

Flow Entering Diverge Influence Area

	Actual	Max Desirable	Violation?
v_{12}	1718	4400	No

Level of Service Determination (if not F)

Density, $D_R = 4.252 + 0.0086\ v_{12} - 0.009\ L_D$ = -10.7 pc/mi/ln

Level of service for ramp-freeway junction areas of influence A

Speed Estimation

Intermediate speed variable,	D_S = 0.387	
Space mean speed in ramp influence area,	S_R = 53.0	mph
Space mean speed in outer lanes,	S_0 = 65.7	mph
Space mean speed for all vehicles,	S = 59.3	mph

HCS 2010: Freeway Merge and Diverge Segments Release 6.1

Phone: Fax:
E-mail:

Diverge Analysis

Analyst: Caitlin Bowen
Agency/Co.:
Date performed: 6/14/2013
Analysis time period: AM Off Peak Hour
Freeway/Dir of Travel: I-55 Westbound
Junction: Lemont Rd Exit
Jurisdiction:
Analysis Year:
Description:

Freeway Data

Type of analysis	Diverge	
Number of lanes in freeway	3	
Free-flow speed on freeway	60.0	mph
Volume on freeway	4379	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	436	vph
Length of first accel/decel lane	300	ft
Length of second accel/decel lane		ft

Adjacent Ramp Data (if one exists)

Does adjacent ramp exist?	Yes	
Volume on adjacent ramp	36	vph
Position of adjacent ramp	Upstream	
Type of adjacent ramp	On	
Distance to adjacent ramp	8000	ft

Conversion to pc/h Under Base Conditions

Junction Components	Freeway	Ramp	Adjacent Ramp	
Volume, V (vph)	4379	436	36	vph
Peak-hour factor, PHF	0.95	0.95	0.95	

Peak 15-min volume, v15	1152	115	9	v
Trucks and buses	15	15	15	%
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	0.930	0.930	0.930	
Driver population factor, fP	1.00	1.00	1.00	
Flow rate, vp	4955	493	41	pcph

Estimation of V12 Diverge Areas

L_{EQ} = 277.97 (Equation 13-12 or 13-13)

P_{FD} = 0.613 Using Equation 5

$v_{12} = v_R + (v - v_F) P_{FD}$ = 3230 pc/h

Capacity Checks

	Actual	Maximum	LOS F?
$v_{Fi} = v_F$	4955	6900	No
$v_{FO} = v - v_R$	4462	6900	No
v_R	493	2100	No

v_3 or v_{av34} 1725 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} = 3230 (Equation 13-15, 13-16, 13-18, or 13-19)

Flow Entering Diverge Influence Area

	Actual	Max Desirable	Violation?
v_{12}	3230	4400	No

Level of Service Determination (if not F)

Density, $D_R = 4.252 + 0.0086 v_{12} - 0.009 L_D$ = 29.3 pc/mi/ln

Level of service for ramp-freeway junction areas of influence D

Speed Estimation

Intermediate speed variable, D_S = 0.342

Space mean speed in ramp influence area, S = 53.8 mph

Space mean speed in outer lanes, S_R = 63.0 mph

Space mean speed for all vehicles, S_0 = 56.7 mph

HCS 2010: Freeway Merge and Diverge Segments Release 6.1

Phone: Fax:
E-mail:

Diverge Analysis

Analyst:	Caitlin Bowen
Agency/Co.:	
Date performed:	6/14/2013
Analysis time period:	AM Off Peak Hour
Freeway/Dir of Travel:	I-55 Westbound
Junction:	Cass Avenue Exit
Jurisdiction:	
Analysis Year:	
Description:	

Freeway Data

Type of analysis	Diverge	
Number of lanes in freeway	3	
Free-flow speed on freeway	60.0	mph
Volume on freeway	4401	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	215	vph
Length of first accel/decel lane	250	ft
Length of second accel/decel lane		ft

Adjacent Ramp Data (if one exists)

Does adjacent ramp exist?	Yes	
Volume on adjacent ramp	1065	vph
Position of adjacent ramp	Upstream	
Type of adjacent ramp	On	
Distance to adjacent ramp	6000	ft

Conversion to pc/h Under Base Conditions

Junction Components	Freeway		Ramp		Adjacent Ramp		
Volume, V (vph)	4401		215		1065		vph
Peak-hour factor, PHF	0.95		0.95		0.95		
Peak 15-min volume, v15	1158		57		280		v
Trucks and buses	15		15		15		%
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	0.930		0.930		0.930		
Driver population factor, fP	1.00		1.00		1.00		

Flow rate, vp 4980 243 1205 pcph

Estimation of V12 Diverge Areas

L_{EQ} = 7212.46 (Equation 13-12 or 13-13)

P_{FD} = 0.644 Using Equation 6

$v_{12} = v_R + (v_F - v_R) P_{FD}$ = 3294 pc/h

Capacity Checks

	Actual	Maximum	LOS F?
$v_{Fi} = v_F$	4980	6900	No
$v_{FO} = v_F - v_R$	4737	6900	No
v_R	243	2000	No
v_3 or v_{av34}	1686 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} = 3294 (Equation 13-15, 13-16, 13-18, or 13-19)

Flow Entering Diverge Influence Area

	Actual	Max Desirable	Violation?
v_{12}	3294	4400	No

Level of Service Determination (if not F)

Density, $D_R = 4.252 + 0.0086\, v_{12} - 0.009\, L_D$ = 30.3 pc/mi/ln

Level of service for ramp-freeway junction areas of influence D

Speed Estimation

Intermediate speed variable, D_S = 0.515

Space mean speed in ramp influence area, S_R = 50.7 mph

Space mean speed in outer lanes, S_0 = 63.1 mph

Space mean speed for all vehicles, S = 54.3 mph

HCS 2010: Freeway Merge and Diverge Segments Release 6.1

Phone: Fax:
E-mail:

Diverge Analysis

Analyst: Caitlin Bowen
Agency/Co.:
Date performed: 6/14/2013
Analysis time period: AM Off Peak Hour
Freeway/Dir of Travel: I-55 Westbound
Junction: Kingery Hwy Exit
Jurisdiction:
Analysis Year:
Description:

Freeway Data

Type of analysis	Diverge	
Number of lanes in freeway	3	
Free-flow speed on freeway	60.0	mph
Volume on freeway	4125	vph

Off Ramp Data

Side of freeway	Right	
Number of lanes in ramp	1	
Free-Flow speed on ramp	35.0	mph
Volume on ramp	789	vph
Length of first accel/decel lane	300	ft
Length of second accel/decel lane		ft

Adjacent Ramp Data (if one exists)

Does adjacent ramp exist?	Yes	
Volume on adjacent ramp	93	vph
Position of adjacent ramp	Upstream	
Type of adjacent ramp	On	
Distance to adjacent ramp	6500	ft

Conversion to pc/h Under Base Conditions

Junction Components	Freeway	Ramp	Adjacent Ramp	
Volume, V (vph)	4125	789	93	vph
Peak-hour factor, PHF	0.95	0.95	0.95	

Peak 15-min volume, v15	1086	208	24	v
Trucks and buses	15	15	15	%
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	0.930	0.930	0.930	
Driver population factor, fP	1.00	1.00	1.00	
Flow rate, vp	4668	893	105	pcph

Estimation of V12 Diverge Areas

L_{EQ} = 950.26 (Equation 13-12 or 13-13)

P_{FD} = 0.602 Using Equation 5

$v_{12} = v_R + (v - v_F) P_{FD}$ = 3166 pc/h

Capacity Checks

	Actual	Maximum	LOS F?
$v_{Fi} = v_F$	4668	6900	No
$v_{FO} = v - v_R$	3775	6900	No
v_R	893	2000	No

v_{3} or v_{av34} 1502 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} = 3166 (Equation 13-15, 13-16, 13-18, or 13-19)

Flow Entering Diverge Influence Area

	Actual	Max Desirable	Violation?
v_{12}	3166	4400	No

Level of Service Determination (if not F)

Density, $D_R = 4.252 + 0.0086 v_{12} - 0.009 L_D$ = 28.8 pc/mi/ln

Level of service for ramp-freeway junction areas of influence D

Speed Estimation

Intermediate speed variable, D_S = 0.508

Space mean speed in ramp influence area, S = 50.8 mph

Space mean speed in outer lanes, S_R = 63.9 mph

Space mean speed for all vehicles, S_0 = 54.4 mph

HCS 2010: Freeway Merge and Diverge Segments Release 6.1

Phone: Fax:
E-mail:

Diverge Analysis

Analyst: Caitlin Bowen
Agency/Co.:
Date performed: 6/14/2013
Analysis time period: AM Off Peak Hour
Freeway/Dir of Travel: I-55 Westbound
Junction: LaGrange Exit
Jurisdiction:
Analysis Year:
Description:

Freeway Data

Type of analysis	Diverge	
Number of lanes in freeway	3	
Free-flow speed on freeway	60.0	mph
Volume on freeway	4593	vph

Off Ramp Data

Side of freeway	Right	
Number of lanes in ramp	1	
Free-Flow speed on ramp	35.0	mph
Volume on ramp	725	vph
Length of first accel/decel lane	1000	ft
Length of second accel/decel lane		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)	4593	725		vph
Peak-hour factor, PHF	0.95	0.95		

Peak 15-min volume, v15	1209	191	v
Trucks and buses	15	15	%
Recreational vehicles	0	0	%
Terrain type:	Level	Level	
Grade	0.00 %	0.00 %	%
Length	0.00 mi	0.00 mi	mi
Trucks and buses PCE, ET	1.5	1.5	
Recreational vehicle PCE, ER	1.2	1.2	
Heavy vehicle adjustment, fHV	0.930	0.930	
Driver population factor, fP	1.00	1.00	
Flow rate, vp	5197	820	pcph

Estimation of V12 Diverge Areas

L_{EQ} = (Equation 13-12 or 13-13)

P_{FD} = 0.592 Using Equation 5

$v_{12} = v_R + (v - v_F) P_{FD}$ = 3413 pc/h

Capacity Checks

	Actual	Maximum	LOS F?
$v_{Fi} = v_F$	5197	6900	No
$v_{FO} = v - v_R$	4377	6900	No
v_R	820	2000	No

v_{av34} or v_3 1784 pc/h (Equation 13-14 or 13-17)

Is v_{av34} or v_3 > 2700 pc/h? No

Is v_{av34} or v_3 > 1.5 v_{12} /2 No

If yes, v_{12A} = 3413 (Equation 13-15, 13-16, 13-18, or 13-19)

Flow Entering Diverge Influence Area

	Actual	Max Desirable	Violation?
v_{12}	3413	4400	No

Level of Service Determination (if not F)

Density, $D_R = 4.252 + 0.0086 v_{12} - 0.009 L_D$ = 24.6 pc/mi/ln

Level of service for ramp-freeway junction areas of influence C

Speed Estimation

Intermediate speed variable, D_S = 0.502

Space mean speed in ramp influence area, S = 51.0 mph

Space mean speed in outer lanes, S_R = 62.8 mph

Space mean speed for all vehicles, S_0 = 54.5 mph

HCS 2010: Freeway Merge and Diverge Segments Release 6.1

Phone: Fax:
E-mail:

Diverge Analysis

Analyst: Caitlin Bowen
Agency/Co.:
Date performed: 6/14/2013
Analysis time period: AM Off Peak Hour
Freeway/Dir of Travel: I-55 Westbound
Junction: Harlem Avenue Exit
Jurisdiction:
Analysis Year:
Description:

Freeway Data

Type of analysis	Diverge	
Number of lanes in freeway	3	
Free-flow speed on freeway	60.0	mph
Volume on freeway	4669	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	1070	vph
Length of first accel/decel lane	650	ft
Length of second accel/decel lane		ft

Adjacent Ramp Data (if one exists)

Does adjacent ramp exist?	Yes	
Volume on adjacent ramp	374	vph
Position of adjacent ramp	Upstream	
Type of adjacent ramp	On	
Distance to adjacent ramp	7500	ft

Conversion to pc/h Under Base Conditions

Junction Components	Freeway	Ramp	Adjacent Ramp	
Volume, V (vph)	4669	1070	374	vph
Peak-hour factor, PHF	0.95	0.95	0.95	

Peak 15-min volume, v15	1229	282	98	v
Trucks and buses	12	12	12	%
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	0.943	0.943	0.943	
Driver population factor, fP	1.00	1.00	1.00	
Flow rate, vp	5210	1194	417	pcph

Estimation of V12 Diverge Areas

L_{EQ} = 4166.42 (Equation 13-12 or 13-13)

P_{FD} = 0.575 Using Equation 5

$v_{12} = v_R + (v - v_F) P_{FD}$ = 3503 pc/h

Capacity Checks

	Actual	Maximum	LOS F?
$v_{Fi} = v_F$	5210	6900	No
$v_{FO} = v - v_R$	4016	6900	No
v_R	1194	2000	No

v_{av34} or v_3 1707 pc/h (Equation 13-14 or 13-17)

Is v_{av34} or v_3 > 2700 pc/h? No

Is v_{av34} or v_3 > 1.5 v_{12} /2 No

If yes, v_{12A} = 3503 (Equation 13-15, 13-16, 13-18, or 13-19)

Flow Entering Diverge Influence Area

	Actual	Max Desirable	Violation?
v_{12}	3503	4400	No

Level of Service Determination (if not F)

Density, $D_R = 4.252 + 0.0086 v_{12} - 0.009 L_D$ = 28.5 pc/mi/ln

Level of service for ramp-freeway junction areas of influence D

Speed Estimation

Intermediate speed variable, D_S = 0.600

Space mean speed in ramp influence area, S = 49.2 mph

Space mean speed in outer lanes, S_R = 63.1 mph

Space mean speed for all vehicles, S_0 = 53.0 mph

HCS 2010: Freeway Merge and Diverge Segments Release 6.1

Phone: Fax:
E-mail:

Diverge Analysis

Analyst: Caitlin Bowen
Agency/Co.:
Date performed: 6/14/2013
Analysis time period: AM Off Peak Hour
Freeway/Dir of Travel: I-55 Westbound
Junction: Central Avenue Exit
Jurisdiction:
Analysis Year:
Description:

Freeway Data

Type of analysis	Diverge	
Number of lanes in freeway	3	
Free-flow speed on freeway	60.0	mph
Volume on freeway	5025	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	730	vph
Length of first accel/decel lane	300	ft
Length of second accel/decel lane		ft

Adjacent Ramp Data (if one exists)

Does adjacent ramp exist?	Yes	
Volume on adjacent ramp	802	vph
Position of adjacent ramp	Upstream	
Type of adjacent ramp	On	
Distance to adjacent ramp	2300	ft

Conversion to pc/h Under Base Conditions

Junction Components	Freeway	Ramp	Adjacent Ramp	
Volume, V (vph)	5025	730	802	vph
Peak-hour factor, PHF	0.95	0.95	0.95	

Peak 15-min volume, v15	1322	192	211	v
Trucks and buses	12	12	12	%
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	0.943	0.943	0.943	
Driver population factor, fP	1.00	1.00	1.00	
Flow rate, vp	5607	815	895	pcph

Estimation of V12 Diverge Areas

L_{EQ} = 6484.52 (Equation 13-12 or 13-13)

P_{FD} = 0.733 Using Equation 6

$v_{12} = v_R + (v - v_F) P_{FD}$ = 4329 pc/h

Capacity Checks

	Actual	Maximum	LOS F?
$v_{Fi} = v_F$	5607	6900	No
$v_{FO} = v - v_R$	4792	6900	No
v_R	815	2000	No

v_{av34} or v_3 1278 pc/h (Equation 13-14 or 13-17)

Is v_{av34} or v_3 > 2700 pc/h? No

Is v_{av34} or v_3 > 1.5 v_{12} /2 No

If yes, v_{12A} = 4329 (Equation 13-15, 13-16, 13-18, or 13-19)

Flow Entering Diverge Influence Area

	Actual	Max Desirable	Violation?
v_{12}	4329	4400	No

Level of Service Determination (if not F)

Density, $D_R = 4.252 + 0.0086 v_{12} - 0.009 L_D$ = 38.8 pc/mi/ln

Level of service for ramp-freeway junction areas of influence E

Speed Estimation

Intermediate speed variable, D_S = 0.566

Space mean speed in ramp influence area, S = 49.8 mph

Space mean speed in outer lanes, S_R = 64.7 mph

Space mean speed for all vehicles, S_0 = 52.6 mph

HCS 2010: Freeway Merge and Diverge Segments Release 6.1

Phone: Fax:
E-mail:

Diverge Analysis

Analyst: Caitlin Bowen
Agency/Co.:
Date performed: 6/14/2013
Analysis time period: AM Off Peak Hour
Freeway/Dir of Travel: I-55 Westbound
Junction: Cicero Avenue Exit
Jurisdiction:
Analysis Year:
Description:

Freeway Data

Type of analysis	Diverge	
Number of lanes in freeway	3	
Free-flow speed on freeway	60.0	mph
Volume on freeway	4563	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	340	vph
Length of first accel/decel lane	225	ft
Length of second accel/decel lane		ft

Adjacent Ramp Data (if one exists)

Does adjacent ramp exist?	Yes	
Volume on adjacent ramp	674	vph
Position of adjacent ramp	Upstream	
Type of adjacent ramp	On	
Distance to adjacent ramp	2600	ft

Conversion to pc/h Under Base Conditions

Junction Components	Freeway	Ramp	Adjacent Ramp	
Volume, V (vph)	4563	340	674	vph
Peak-hour factor, PHF	0.95	0.95	0.95	

Peak 15-min volume, v15	1201	89	177	v
Trucks and buses	12	12	12	%
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	0.943	0.943	0.943	
Driver population factor, fP	1.00	1.00	1.00	
Flow rate, vp	5091	379	752	pcph

Estimation of V12 Diverge Areas

L_{EQ} = 4720.98 (Equation 13-12 or 13-13)

P_{FD} = 0.693 Using Equation 6

$v_{12} = v_R + (v - v_F) P_{FD}$ = 3645 pc/h

Capacity Checks

	Actual	Maximum	LOS F?
$v_{Fi} = v_F$	5091	6900	No
$v_{FO} = v - v_R$	4712	6900	No
v_R	379	2000	No

$v_{3} \text{ or } v_{av34}$ = 1446 pc/h (Equation 13-14 or 13-17)

Is $v_{3} \text{ or } v_{av34}$ > 2700 pc/h? No

Is $v_{3} \text{ or } v_{av34}$ > 1.5 v_{12} /2 No

If yes, v_{12A} = 3645 (Equation 13-15, 13-16, 13-18, or 13-19)

Flow Entering Diverge Influence Area

	Actual	Max Desirable	Violation?
v_{12}	3645	4400	No

Level of Service Determination (if not F)

Density, $D_R = 4.252 + 0.0086\, v_{12} - 0.009\, L_D$ = 33.6 pc/mi/ln

Level of service for ramp-freeway junction areas of influence D

Speed Estimation

Intermediate speed variable, D_S = 0.527

Space mean speed in ramp influence area, S = 50.5 mph

Space mean speed in outer lanes, S_R = 64.1 mph

Space mean speed for all vehicles, S_0 = 53.7 mph

HCS 2010: Freeway Merge and Diverge Segments Release 6.1

Phone: Fax:
E-mail:

Diverge Analysis

Analyst: Caitlin Bowen
Agency/Co.:
Date performed: 6/14/2013
Analysis time period: AM Off Peak Hour
Freeway/Dir of Travel: I-55 Westbound
Junction: Pulaski Road Exit
Jurisdiction:
Analysis Year:
Description:

Freeway Data

Type of analysis	Diverge	
Number of lanes in freeway	3	
Free-flow speed on freeway	60.0	mph
Volume on freeway	4381	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	492	vph
Length of first accel/decel lane	225	ft
Length of second accel/decel lane		ft

Adjacent Ramp Data (if one exists)

Does adjacent ramp exist?	Yes	
Volume on adjacent ramp	437	vph
Position of adjacent ramp	Upstream	
Type of adjacent ramp	On	
Distance to adjacent ramp	3600	ft

Conversion to pc/h Under Base Conditions

Junction Components	Freeway	Ramp	Adjacent Ramp	
Volume, V (vph)	4381	492	437	vph
Peak-hour factor, PHF	0.95	0.95	0.95	

Peak 15-min volume, v15	1153	129	115	v
Trucks and buses	12	12	12	%
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	0.943	0.943	0.943	
Driver population factor, fP	1.00	1.00	1.00	
Flow rate, vp	4888	549	488	pcph

Estimation of V12 Diverge Areas

L_{EQ} = 3443.90 (Equation 13-12 or 13-13)

P_{FD} = 0.613 Using Equation 5

$v_{12} = v_R + (v - v_F) P_{FD}$ = 3207 pc/h

Capacity Checks

	Actual	Maximum	LOS F?
$v_{Fi} = v_F$	4888	6900	No
$v_{FO} = v - v_R$	4339	6900	No
v_R	549	2000	No

v_3 or v_{av34} 1681 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} = 3207 (Equation 13-15, 13-16, 13-18, or 13-19)

Flow Entering Diverge Influence Area

	Actual	Max Desirable	Violation?
v_{12}	3207	4400	No

Level of Service Determination (if not F)

Density, $D_R = 4.252 + 0.0086 v_{12} - 0.009 L_D$ = 29.8 pc/mi/ln

Level of service for ramp-freeway junction areas of influence D

Speed Estimation

Intermediate speed variable, D_S = 0.542

Space mean speed in ramp influence area, S = 50.2 mph

Space mean speed in outer lanes, S_R = 63.2 mph

Space mean speed for all vehicles, S_0 = 54.0 mph

HCS 2010: Freeway Merge and Diverge Segments Release 6.1

Phone: Fax:
E-mail:

Diverge Analysis

Analyst: Caitlin Bowen
Agency/Co.:
Date performed: 6/14/2013
Analysis time period: AM Off Peak Hour
Freeway/Dir of Travel: I-55 Westbound
Junction: Kedzie/Cali Ave Exit
Jurisdiction:
Analysis Year:
Description:

Freeway Data

Type of analysis	Diverge	
Number of lanes in freeway	3	
Free-flow speed on freeway	60.0	mph
Volume on freeway	4897	vph

Off Ramp Data

Side of freeway	Right	
Number of lanes in ramp	1	
Free-Flow speed on ramp	35.0	mph
Volume on ramp	953	vph
Length of first accel/decel lane	800	ft
Length of second accel/decel lane		ft

Adjacent Ramp Data (if one exists)

Does adjacent ramp exist?	Yes	
Volume on adjacent ramp	683	vph
Position of adjacent ramp	Upstream	
Type of adjacent ramp	On	
Distance to adjacent ramp	3300	ft

Conversion to pc/h Under Base Conditions

Junction Components	Freeway	Ramp	Adjacent Ramp	
Volume, V (vph)	4897	953	683	vph
Peak-hour factor, PHF	0.95	0.95	0.95	

Peak 15-min volume, v15	1289	251	180	v
Trucks and buses	12	12	12	%
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	0.943	0.943	0.943	
Driver population factor, fP	1.00	1.00	1.00	
Flow rate, vp	5464	1063	762	pcph

Estimation of V12 Diverge Areas

L_{EQ} = 6575.54 (Equation 13-12 or 13-13)

P_{FD} = 0.643 Using Equation 6

$v_{12} = v_R + (v - v_F) P_{FD}$ = 3894 pc/h

Capacity Checks

	Actual	Maximum	LOS F?
$v_{Fi} = v_F$	5464	6900	No
$v_{FO} = v - v_R$	4401	6900	No
v_R	1063	2000	No

v_{3} or v_{av34} 1570 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} = 3894 (Equation 13-15, 13-16, 13-18, or 13-19)

Flow Entering Diverge Influence Area

	Actual	Max Desirable	Violation?
v_{12}	3894	4400	No

Level of Service Determination (if not F)

Density, $D_R = 4.252 + 0.0086 v_{12} - 0.009 L_D$ = 30.5 pc/mi/ln

Level of service for ramp-freeway junction areas of influence D

Speed Estimation

Intermediate speed variable, D_S = 0.524

Space mean speed in ramp influence area, S = 50.6 mph

Space mean speed in outer lanes, S_R = 63.6 mph

Space mean speed for all vehicles, S_0 = 53.7 mph

HCS 2010: Freeway Merge and Diverge Segments Release 6.1

Phone: Fax:
E-mail:

Diverge Analysis

Analyst:	Alex Ericksen
Agency/Co.:	
Date performed:	1/13/2014
Analysis time period:	AM Peak Hour
Freeway/Dir of Travel:	I-55 Westbound
Junction:	Diverge at Damen
Jurisdiction:	
Analysis Year:	
Description:	

Freeway Data

Type of analysis	Diverge	
Number of lanes in freeway	4	
Free-flow speed on freeway	60.0	mph
Volume on freeway	4919	vph

Off Ramp Data

Side of freeway	Right	
Number of lanes in ramp	2	
Free-Flow speed on ramp	30.0	mph
Volume on ramp	705	vph
Length of first accel/decel lane	600	ft
Length of second accel/decel lane	600	ft

Adjacent Ramp Data (if one exists)

Does adjacent ramp exist?	Yes	
Volume on adjacent ramp	1738	vph
Position of adjacent ramp	Upstream	
Type of adjacent ramp	On	
Distance to adjacent ramp	6100	ft

Conversion to pc/h Under Base Conditions

Junction Components	Freeway		Ramp		Adjacent Ramp		
Volume, V (vph)	4919		705		1738		vph
Peak-hour factor, PHF	0.95		0.95		0.95		
Peak 15-min volume, v15	1294		186		457		v
Trucks and buses	12		12		12		%
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	0.943		0.943		0.943		
Driver population factor, fP	1.00		1.00		1.00		

Flow rate, vp 5489 787 1939 pcph

Estimation of V12 Diverge Areas

L_{EQ} = (Equation 13-12 or 13-13)

P_{FD} = 0.260 Using Equation 0

$v_{12} = v_R + (v_F - v_R) P_{FD}$ = 2010 pc/h

Capacity Checks

	Actual	Maximum	LOS F?
$v_{Fi} = v_F$	5489	9200	No
$v_{FO} = v_F - v_R$	4702	9200	No
v_R	787	4000	No
v_3 or v_{av34}	1739 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} = 2195 (Equation 13-15, 13-16, 13-18, or 13-19)

Flow Entering Diverge Influence Area

	Actual	Max Desirable	Violation?
v_{12A}	2195	4400	No

Level of Service Determination (if not F)

Density, $D_R = 4.252 + 0.0086\, v_{12} - 0.009\, L_D$ = 6.9 pc/mi/ln

Level of service for ramp-freeway junction areas of influence A

Speed Estimation

Intermediate speed variable, D_S = 0.564

Space mean speed in ramp influence area, S_R = 49.9 mph

Space mean speed in outer lanes, S_0 = 63.3 mph

Space mean speed for all vehicles, S = 57.1 mph

Diverge

Southbound PM

HCS 2010: Freeway Merge and Diverge Segments Release 6.1

Phone: Fax:
E-mail:

Diverge Analysis

Analyst: Caitlin Bowen
Agency/Co.:
Date performed: 6/14/2013
Analysis time period: PM Peak Hour
Freeway/Dir of Travel: I-55 Westbound
Junction: I-355/Joliet Rd CD Exit
Jurisdiction:
Analysis Year:
Description:

Freeway Data

Type of analysis	Diverge	
Number of lanes in freeway	3	
Free-flow speed on freeway	60.0	mph
Volume on freeway	3246	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	255	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?	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)	3246	255		vph
Peak-hour factor, PHF	0.95	0.95		

Peak 15-min volume, v15	854	67	v
Trucks and buses	7	7	%
Recreational vehicles	0	0	%
Terrain type:	Level	Level	
Grade	0.00 %	0.00 %	%
Length	0.00 mi	0.00 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	0.966	
Driver population factor, fP	1.00	1.00	
Flow rate, vp	3536	278	pcph

Estimation of V12 Diverge Areas

L_{EQ} = (Equation 13-12 or 13-13)

P_{FD} = 0.659 Using Equation 5

$v_{12} = v_R + (v_F - v_R) P_{FD}$ = 2424 pc/h

Capacity Checks

	Actual	Maximum	LOS F?
$v_{Fi} = v_F$	3536	6900	No
$v_{FO} = v_F - v_R$	3258	6900	No
v_R	278	2100	No

v_3 or v_{av34} 1112 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} = 2424 (Equation 13-15, 13-16, 13-18, or 13-19)

Flow Entering Diverge Influence Area

	Actual	Max Desirable	Violation?
v_{12}	2424	4400	No

Level of Service Determination (if not F)

Density, $D_R = 4.252 + 0.0086 v_{12} - 0.009 L_D$ = 21.9 pc/mi/ln

Level of service for ramp-freeway junction areas of influence C

Speed Estimation

Intermediate speed variable, D_S = 0.323

Space mean speed in ramp influence area, S = 54.2 mph

Space mean speed in outer lanes, S_R = 65.4 mph

Space mean speed for all vehicles, S_0 = 57.3 mph

HCS 2010: Freeway Merge and Diverge Segments Release 6.1

Phone: Fax:
E-mail:

Diverge Analysis

Analyst:	Alex Ericksen
Agency/Co.:	
Date performed:	1/13/2014
Analysis time period:	PM Peak Hour
Freeway/Dir of Travel:	I-55 WB
Junction:	Diverge to I-355
Jurisdiction:	
Analysis Year:	
Description:	

Freeway Data

Type of analysis	Diverge	
Number of lanes in freeway	4	
Free-flow speed on freeway	60.0	mph
Volume on freeway	4079	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	833	vph
Length of first accel/decel lane	1100	ft
Length of second accel/decel lane	1100	ft

Adjacent Ramp Data (if one exists)

Does adjacent ramp exist?	Yes	
Volume on adjacent ramp	22	vph
Position of adjacent ramp	Upstream	
Type of adjacent ramp	On	
Distance to adjacent ramp	2950	ft

Conversion to pc/h Under Base Conditions

Junction Components	Freeway	Ramp	Adjacent Ramp	
Volume, V (vph)	4079	833	22	vph
Peak-hour factor, PHF	0.95	0.95	0.95	
Peak 15-min volume, v15	1073	219	6	v
Trucks and buses	7	7	7	%
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	0.966	0.966	
Driver population factor, fP	1.00	1.00	1.00	

Flow rate, vp 4444 908 24 pcph

Estimation of V12 Diverge Areas

L_{EQ} = (Equation 13-12 or 13-13)

P_{FD} = 0.260 Using Equation 0

$v_{12} = v_R + (v_F - v_R) P_{FD}$ = 1827 pc/h

Capacity Checks

	Actual	Maximum	LOS F?
$v_{Fi} = v_F$	4444	9200	No
$v_{FO} = v_F - v_R$	3536	9200	No
v_R	908	4200	No
v_3 or v_{av34}	1308 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} = 1827 (Equation 13-15, 13-16, 13-18, or 13-19)

Flow Entering Diverge Influence Area

	Actual	Max Desirable	Violation?
v_{12}	1827	4400	No

Level of Service Determination (if not F)

Density, $D_R = 4.252 + 0.0086\ v_{12} - 0.009\ L_D$ = -9.7 pc/mi/ln

Level of service for ramp-freeway junction areas of influence A

Speed Estimation

Intermediate speed variable, D_S = 0.380

Space mean speed in ramp influence area, S_R = 53.2 mph

Space mean speed in outer lanes, S_0 = 64.6 mph

Space mean speed for all vehicles, S = 59.4 mph

HCS 2010: Freeway Merge and Diverge Segments Release 6.1

Phone: Fax:
E-mail:

Diverge Analysis

Analyst: Caitlin Bowen
Agency/Co.:
Date performed: 6/14/2013
Analysis time period: PM Peak Hour
Freeway/Dir of Travel: I-55 Westbound
Junction: Lemont Rd Exit
Jurisdiction:
Analysis Year:
Description:

Freeway Data

Type of analysis	Diverge	
Number of lanes in freeway	3	
Free-flow speed on freeway	60.0	mph
Volume on freeway	4989	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	475	vph
Length of first accel/decel lane	300	ft
Length of second accel/decel lane		ft

Adjacent Ramp Data (if one exists)

Does adjacent ramp exist?	Yes	
Volume on adjacent ramp	184	vph
Position of adjacent ramp	Upstream	
Type of adjacent ramp	On	
Distance to adjacent ramp	8000	ft

Conversion to pc/h Under Base Conditions

Junction Components	Freeway	Ramp	Adjacent Ramp	
Volume, V (vph)	4989	475	184	vph
Peak-hour factor, PHF	0.95	0.95	0.95	

Peak 15-min volume, v15	1313	125	48	v
Trucks and buses	7	7	7	%
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	0.966	0.966	
Driver population factor, fP	1.00	1.00	1.00	
Flow rate, vp	5435	517	200	pcph

Estimation of V12 Diverge Areas

L_{EQ} = 1276.22 (Equation 13-12 or 13-13)

P_{FD} = 0.600 Using Equation 5

$v_{12} = v_R + (v - v_F) P_{FD}$ = 3469 pc/h

Capacity Checks

	Actual	Maximum	LOS F?
$v_{Fi} = v_F$	5435	6900	No
$v_{FO} = v - v_R$	4918	6900	No
v_R	517	2100	No

v_{3} or v_{av34} 1966 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} = 3469 (Equation 13-15, 13-16, 13-18, or 13-19)

Flow Entering Diverge Influence Area

	Actual	Max Desirable	Violation?
v_{12}	3469	4400	No

Level of Service Determination (if not F)

Density, $D_R = 4.252 + 0.0086 v_{12} - 0.009 L_D$ = 31.4 pc/mi/ln

Level of service for ramp-freeway junction areas of influence D

Speed Estimation

Intermediate speed variable, D_S = 0.345

Space mean speed in ramp influence area, S = 53.8 mph

Space mean speed in outer lanes, S_R = 62.1 mph

Space mean speed for all vehicles, S_0 = 56.5 mph

HCS 2010: Freeway Merge and Diverge Segments Release 6.1

Phone: Fax:
E-mail:

Diverge Analysis

Analyst:	Alex Ericksen
Agency/Co.:	
Date performed:	1/13/2014
Analysis time period:	PM Peak Hour
Freeway/Dir of Travel:	I-55 Westbound
Junction:	Cass Avenue Entrance
Jurisdiction:	
Analysis Year:	
Description:	

Freeway Data

Type of analysis	Diverge	
Number of lanes in freeway	3	
Free-flow speed on freeway	60.0	mph
Volume on freeway	4901	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	194	vph
Length of first accel/decel lane	250	ft
Length of second accel/decel lane		ft

Adjacent Ramp Data (if one exists)

Does adjacent ramp exist?	Yes	
Volume on adjacent ramp	1049	vph
Position of adjacent ramp	Upstream	
Type of adjacent ramp	On	
Distance to adjacent ramp	6000	ft

Conversion to pc/h Under Base Conditions

Junction Components	Freeway		Ramp		Adjacent Ramp		
Volume, V (vph)	4901		194		1049		vph
Peak-hour factor, PHF	0.95		0.95		0.95		
Peak 15-min volume, v15	1290		51		276		v
Trucks and buses	7		7		9		%
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		0.966		0.957		
Driver population factor, fP	1.00		1.00		1.00		

Flow rate, vp 5340 211 1154 pcph

Estimation of V12 Diverge Areas

L_{EQ} = 6491.02 (Equation 13-12 or 13-13)

P_{FD} = 0.625 Using Equation 6

$v_{12} = v_R + (v_F - v_R) P_{FD}$ = 3416 pc/h

Capacity Checks

	Actual	Maximum	LOS F?
$v_{Fi} = v_F$	5340	6900	No
$v_{FO} = v_F - v_R$	5129	6900	No
v_R	211	2000	No
v_3 or v_{av34}	1924 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} = 3416 (Equation 13-15, 13-16, 13-18, or 13-19)

Flow Entering Diverge Influence Area

	Actual	Max Desirable	Violation?
v_{12}	3416	4400	No

Level of Service Determination (if not F)

Density, $D = 4.252 + 0.0086\, v_R - 0.009\, L_D$ = 31.4 pc/mi/ln

Level of service for ramp-freeway junction areas of influence D

Speed Estimation

Intermediate speed variable, D_S = 0.512

Space mean speed in ramp influence area, S_R = 50.8 mph

Space mean speed in outer lanes, S_0 = 62.2 mph

Space mean speed for all vehicles, S = 54.4 mph

HCS 2010: Freeway Merge and Diverge Segments Release 6.1

Phone: Fax:
E-mail:

Diverge Analysis

Analyst: Caitlin Bowen
Agency/Co.:
Date performed: 6/14/2013
Analysis time period: PM Peak Hour
Freeway/Dir of Travel: I-55 Westbound
Junction: Kingery Hwy Exit
Jurisdiction:
Analysis Year:
Description:

Freeway Data

Type of analysis	Diverge	
Number of lanes in freeway	3	
Free-flow speed on freeway	60.0	mph
Volume on freeway	4169	vph

Off Ramp Data

Side of freeway	Right	
Number of lanes in ramp	1	
Free-Flow speed on ramp	35.0	mph
Volume on ramp	317	vph
Length of first accel/decel lane	300	ft
Length of second accel/decel lane		ft

Adjacent Ramp Data (if one exists)

Does adjacent ramp exist?	Yes	
Volume on adjacent ramp	4	vph
Position of adjacent ramp	Upstream	
Type of adjacent ramp	On	
Distance to adjacent ramp	6500	ft

Conversion to pc/h Under Base Conditions

Junction Components	Freeway	Ramp	Adjacent Ramp	
Volume, V (vph)	4169	317	4	vph
Peak-hour factor, PHF	0.95	0.95	0.95	

Peak 15-min volume, v15	1097	83	1	v
Trucks and buses	7	7	7	%
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	0.966	0.966	
Driver population factor, fP	1.00	1.00	1.00	
Flow rate, vp	4542	345	4	pcph

Estimation of V12 Diverge Areas

L_{EQ} = 26.80 (Equation 13-12 or 13-13)

P_{FD} = 0.631 Using Equation 5

$v_{12} = v_R + (v - v_F) P_{FD}$ = 2992 pc/h

Capacity Checks

	Actual	Maximum	LOS F?
$v_{Fi} = v_F$	4542	6900	No
$v_{FO} = v - v_R$	4197	6900	No
v_R	345	2000	No

v_3 or v_{av34} 1550 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} = 2992 (Equation 13-15, 13-16, 13-18, or 13-19)

Flow Entering Diverge Influence Area

	Actual	Max Desirable	Violation?
v_{12}	2992	4400	No

Level of Service Determination (if not F)

Density, $D_R = 4.252 + 0.0086\ v_{12} - 0.009\ L_D$ = 27.3 pc/mi/ln

Level of service for ramp-freeway junction areas of influence C

Speed Estimation

Intermediate speed variable, D_S = 0.459

Space mean speed in ramp influence area, S = 51.7 mph

Space mean speed in outer lanes, S_R = 63.7 mph

Space mean speed for all vehicles, S_0 = 55.3 mph

HCS 2010: Freeway Merge and Diverge Segments Release 6.1

Phone: Fax:
E-mail:

Diverge Analysis

Analyst: Caitlin Bowen
Agency/Co.:
Date performed: 6/14/2013
Analysis time period: PM Peak Hour
Freeway/Dir of Travel: I-55 Westbound
Junction: LaGrange Exit
Jurisdiction:
Analysis Year:
Description:

Freeway Data

Type of analysis	Diverge	
Number of lanes in freeway	3	
Free-flow speed on freeway	60.0	mph
Volume on freeway	4654	vph

Off Ramp Data

Side of freeway	Right	
Number of lanes in ramp	1	
Free-Flow speed on ramp	35.0	mph
Volume on ramp	1458	vph
Length of first accel/decel lane	1000	ft
Length of second accel/decel lane		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)	4654	1458		vph
Peak-hour factor, PHF	0.95	0.95		

Peak 15-min volume, v15	1225	384	v
Trucks and buses	7	7	%
Recreational vehicles	0	0	%
Terrain type:	Level	Level	
Grade	0.00 %	0.00 %	%
Length	0.00 mi	0.00 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	0.966	
Driver population factor, fP	1.00	1.00	
Flow rate, vp	5070	1588	pcph

Estimation of V12 Diverge Areas

L_{EQ} = (Equation 13-12 or 13-13)

P_{FD} = 0.560 Using Equation 5

$v_{12} = v_R + (v - v_F) P_{FD}$ = 3539 pc/h

Capacity Checks

	Actual	Maximum	LOS F?
$v_{Fi} = v_F$	5070	6900	No
$v_{FO} = v - v_R$	3482	6900	No
v_R	1588	2000	No

v_{3} or v_{av34} 1531 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} = 3539 (Equation 13-15, 13-16, 13-18, or 13-19)

Flow Entering Diverge Influence Area

	Actual	Max Desirable	Violation?
v_{12}	3539	4400	No

Level of Service Determination (if not F)

Density, $D_R = 4.252 + 0.0086 v_{12} - 0.009 L_D$ = 25.7 pc/mi/ln

Level of service for ramp-freeway junction areas of influence C

Speed Estimation

Intermediate speed variable, D_S = 0.571

Space mean speed in ramp influence area, S = 49.7 mph

Space mean speed in outer lanes, S_R = 63.7 mph

Space mean speed for all vehicles, S_0 = 53.3 mph

HCS 2010: Freeway Merge and Diverge Segments Release 6.1

Phone: Fax:
E-mail:

Diverge Analysis

Analyst: Caitlin Bowen
Agency/Co.:
Date performed: 6/14/2013
Analysis time period: PM Peak Hour
Freeway/Dir of Travel: I-55 Westbound
Junction: Harlem Avenue Exit
Jurisdiction:
Analysis Year:
Description:

Freeway Data

Type of analysis	Diverge	
Number of lanes in freeway	3	
Free-flow speed on freeway	60.0	mph
Volume on freeway	4980	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	1206	vph
Length of first accel/decel lane	650	ft
Length of second accel/decel lane		ft

Adjacent Ramp Data (if one exists)

Does adjacent ramp exist?	Yes	
Volume on adjacent ramp	363	vph
Position of adjacent ramp	Upstream	
Type of adjacent ramp	On	
Distance to adjacent ramp	7500	ft

Conversion to pc/h Under Base Conditions

Junction Components	Freeway	Ramp	Adjacent Ramp	
Volume, V (vph)	4980	1206	363	vph
Peak-hour factor, PHF	0.95	0.95	0.95	

Peak 15-min volume, v15	1311	317	96	v
Trucks and buses	7	7	7	%
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	0.966	0.966	
Driver population factor, fP	1.00	1.00	1.00	
Flow rate, vp	5426	1314	395	pcph

Estimation of V12 Diverge Areas

L_{EQ} = 4117.41 (Equation 13-12 or 13-13)

P_{FD} = 0.564 Using Equation 5

$v_{12} = v_R + (v - v_F) P_{FD}$ = 3633 pc/h

Capacity Checks

	Actual	Maximum	LOS F?
$v_{Fi} = v_F$	5426	6900	No
$v_{FO} = v - v_R$	4112	6900	No
v_R	1314	2000	No

$v_{3} \text{ or } v_{av34}$ = 1793 pc/h (Equation 13-14 or 13-17)

Is $v_{3} \text{ or } v_{av34}$ > 2700 pc/h? No

Is $v_{3} \text{ or } v_{av34}$ > 1.5 v_{12} /2 No

If yes, v_{12A} = 3633 (Equation 13-15, 13-16, 13-18, or 13-19)

Flow Entering Diverge Influence Area

	Actual	Max Desirable	Violation?
v_{12}	3633	4400	No

Level of Service Determination (if not F)

Density, $D_R = 4.252 + 0.0086\, v_{12} - 0.009\, L_D$ = 29.6 pc/mi/ln

Level of service for ramp-freeway junction areas of influence D

Speed Estimation

Intermediate speed variable, D_S = 0.611

Space mean speed in ramp influence area, S = 49.0 mph

Space mean speed in outer lanes, S_R = 62.7 mph

Space mean speed for all vehicles, S_0 = 52.8 mph

HCS 2010: Freeway Merge and Diverge Segments Release 6.1

Phone: Fax:
E-mail:

Diverge Analysis

Analyst: Caitlin Bowen
Agency/Co.:
Date performed: 6/14/2013
Analysis time period: PM Peak Hour
Freeway/Dir of Travel: I-55 Westbound
Junction: Central Avenue Exit
Jurisdiction:
Analysis Year:
Description:

Freeway Data

Type of analysis	Diverge	
Number of lanes in freeway	3	
Free-flow speed on freeway	60.0	mph
Volume on freeway	5492	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	875	vph
Length of first accel/decel lane	300	ft
Length of second accel/decel lane		ft

Adjacent Ramp Data (if one exists)

Does adjacent ramp exist?	Yes	
Volume on adjacent ramp	793	vph
Position of adjacent ramp	Upstream	
Type of adjacent ramp	On	
Distance to adjacent ramp	2300	ft

Conversion to pc/h Under Base Conditions

Junction Components	Freeway	Ramp	Adjacent Ramp	
Volume, V (vph)	5492	875	793	vph
Peak-hour factor, PHF	0.95	0.95	0.95	

Peak 15-min volume, v15	1445	230	209	v
Trucks and buses	7	7	7	%
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	0.966	0.966	
Driver population factor, fP	1.00	1.00	1.00	
Flow rate, vp	5983	953	864	pcph

Estimation of V12 Diverge Areas

L_{EQ} = 6344.50 (Equation 13-12 or 13-13)

P_{FD} = 0.711 Using Equation 6

$v_{12} = v_R + (v - v_F) P_{FD}$ = 4527 pc/h

Capacity Checks

	Actual	Maximum	LOS F?
$v_{Fi} = v_F$	5983	6900	No
$v_{FO} = v - v_R$	5030	6900	No
v_R	953	2000	No

v_3 or v_{av34} 1456 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} = 4527 (Equation 13-15, 13-16, 13-18, or 13-19)

Flow Entering Diverge Influence Area

	Actual	Max Desirable	Violation?
v_{12}	4527	4400	Yes

Level of Service Determination (if not F)

Density, $D_R = 4.252 + 0.0086\ v_{12} - 0.009\ L_D$ = 40.5 pc/mi/ln

Level of service for ramp-freeway junction areas of influence E

Speed Estimation

Intermediate speed variable, D_S = 0.579

Space mean speed in ramp influence area, S = 49.6 mph

Space mean speed in outer lanes, S_R = 64.0 mph

Space mean speed for all vehicles, S_0 = 52.5 mph

HCS 2010: Freeway Merge and Diverge Segments Release 6.1

Phone: Fax:
E-mail:

Diverge Analysis

Analyst: Caitlin Bowen
Agency/Co.:
Date performed: 6/14/2013
Analysis time period: PM Peak Hour
Freeway/Dir of Travel: I-55 Westbound
Junction: Cicero Avenue Exit
Jurisdiction:
Analysis Year:
Description:

Freeway Data

Type of analysis	Diverge	
Number of lanes in freeway	3	
Free-flow speed on freeway	60.0	mph
Volume on freeway	5081	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	382	vph
Length of first accel/decel lane	225	ft
Length of second accel/decel lane		ft

Adjacent Ramp Data (if one exists)

Does adjacent ramp exist?	Yes	
Volume on adjacent ramp	820	vph
Position of adjacent ramp	Upstream	
Type of adjacent ramp	On	
Distance to adjacent ramp	2600	ft

Conversion to pc/h Under Base Conditions

Junction Components	Freeway	Ramp	Adjacent Ramp	
Volume, V (vph)	5081	382	820	vph
Peak-hour factor, PHF	0.95	0.95	0.95	

Peak 15-min volume, v15	1337	101	216	v
Trucks and buses	7	7	7	%
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	0.966	0.966	
Driver population factor, fP	1.00	1.00	1.00	
Flow rate, vp	5536	416	893	pcph

Estimation of V12 Diverge Areas

L_{EQ} = 5356.54 (Equation 13-12 or 13-13)

P_{FD} = 0.709 Using Equation 6

$v_{12} = v_R + (v - v_F) P_{FD}$ = 4044 pc/h

Capacity Checks

	Actual	Maximum	LOS F?
$v_{Fi} = v_F$	5536	6900	No
$v_{FO} = v - v_R$	5120	6900	No
v_R	416	2000	No

v_3 or v_{av34} 1492 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} = 4044 (Equation 13-15, 13-16, 13-18, or 13-19)

Flow Entering Diverge Influence Area

	Actual	Max Desirable	Violation?
v_{12}	4044	4400	No

Level of Service Determination (if not F)

Density, $D_R = 4.252 + 0.0086 v_{12} - 0.009 L_D$ = 37.0 pc/mi/ln

Level of service for ramp-freeway junction areas of influence E

Speed Estimation

Intermediate speed variable, D_S = 0.530

Space mean speed in ramp influence area, S = 50.5 mph

Space mean speed in outer lanes, S_R = 63.9 mph

Space mean speed for all vehicles, S_0 = 53.5 mph

HCS 2010: Freeway Merge and Diverge Segments Release 6.1

Phone: Fax:
E-mail:

Diverge Analysis

Analyst: Caitlin Bowen
Agency/Co.:
Date performed: 6/14/2013
Analysis time period: PM Peak Hour
Freeway/Dir of Travel: I-55 Westbound
Junction: Pulaski Road Exit
Jurisdiction:
Analysis Year:
Description:

Freeway Data

Type of analysis	Diverge	
Number of lanes in freeway	3	
Free-flow speed on freeway	60.0	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	626	vph
Length of first accel/decel lane	225	ft
Length of second accel/decel lane		ft

Adjacent Ramp Data (if one exists)

Does adjacent ramp exist?	Yes	
Volume on adjacent ramp	1247	vph
Position of adjacent ramp	Upstream	
Type of adjacent ramp	On	
Distance to adjacent ramp	3600	ft

Conversion to pc/h Under Base Conditions

Junction Components	Freeway	Ramp	Adjacent Ramp	
Volume, V (vph)	4887	626	1247	vph
Peak-hour factor, PHF	0.95	0.95	0.95	

Peak 15-min volume, v15	1286	165	328	v
Trucks and buses	7	7	7	%
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	0.966	0.966	
Driver population factor, fP	1.00	1.00	1.00	
Flow rate, vp	5324	682	1359	pcph

Estimation of V12 Diverge Areas

L_{EQ} = 9596.10 (Equation 13-12 or 13-13)

P_{FD} = 0.737 Using Equation 6

$v_{12} = v_R + (v - v_F) P_{FD}$ = 4105 pc/h

Capacity Checks

	Actual	Maximum	LOS F?
$v_{Fi} = v_F$	5324	6900	No
$v_{FO} = v - v_R$	4642	6900	No
v_R	682	2000	No

v_3 or v_{av34} 1219 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} = 4105 (Equation 13-15, 13-16, 13-18, or 13-19)

Flow Entering Diverge Influence Area

	Actual	Max Desirable	Violation?
v_{12}	4105	4400	No

Level of Service Determination (if not F)

Density, $D_R = 4.252 + 0.0086 v_{12} - 0.009 L_D$ = 37.5 pc/mi/ln

Level of service for ramp-freeway junction areas of influence E

Speed Estimation

Intermediate speed variable, D_S = 0.554

Space mean speed in ramp influence area, S = 50.0 mph

Space mean speed in outer lanes, S_R = 65.0 mph

Space mean speed for all vehicles, S_0 = 52.8 mph

HCS 2010: Freeway Merge and Diverge Segments Release 6.1

Phone: Fax:
E-mail:

Diverge Analysis

Analyst: Caitlin Bowen
Agency/Co.:
Date performed: 6/14/2013
Analysis time period: PM Peak Hour
Freeway/Dir of Travel: I-55 Westbound
Junction: Kedzie/Cali Ave Exit
Jurisdiction:
Analysis Year:
Description:

Freeway Data

Type of analysis	Diverge	
Number of lanes in freeway	3	
Free-flow speed on freeway	60.0	mph
Volume on freeway	4198	vph

Off Ramp Data

Side of freeway	Right	
Number of lanes in ramp	1	
Free-Flow speed on ramp	35.0	mph
Volume on ramp	558	vph
Length of first accel/decel lane	800	ft
Length of second accel/decel lane		ft

Adjacent Ramp Data (if one exists)

Does adjacent ramp exist?	Yes	
Volume on adjacent ramp	701	vph
Position of adjacent ramp	Upstream	
Type of adjacent ramp	On	
Distance to adjacent ramp	3300	ft

Conversion to pc/h Under Base Conditions

Junction Components	Freeway	Ramp	Adjacent Ramp	
Volume, V (vph)	4198	558	701	vph
Peak-hour factor, PHF	0.95	0.95	0.95	

Peak 15-min volume, v15	1105	147	184	v
Trucks and buses	7	7	7	%
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	0.966	0.966	
Driver population factor, fP	1.00	1.00	1.00	
Flow rate, vp	4574	608	764	pcph

Estimation of V12 Diverge Areas

L_{EQ} = 5877.19 (Equation 13-12 or 13-13)

P_{FD} = 0.678 Using Equation 6

$v_{12} = v_R + (v - v_F) P_{FD}$ = 3299 pc/h

Capacity Checks

	Actual	Maximum	LOS F?
$v_{Fi} = v_F$	4574	6900	No
$v_{FO} = v - v_R$	3966	6900	No
v_R	608	2000	No

v_{3} or v_{av34} 1275 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} = 3299 (Equation 13-15, 13-16, 13-18, or 13-19)

Flow Entering Diverge Influence Area

	Actual	Max Desirable	Violation?
v_{12}	3299	4400	No

Level of Service Determination (if not F)

Density, $D_R = 4.252 + 0.0086 v_{12} - 0.009 L_D$ = 25.4 pc/mi/ln

Level of service for ramp-freeway junction areas of influence C

Speed Estimation

Intermediate speed variable, D_S = 0.483

Space mean speed in ramp influence area, S = 51.3 mph

Space mean speed in outer lanes, S_R = 64.7 mph

Space mean speed for all vehicles, S_0 = 54.5 mph

HCS 2010: Freeway Merge and Diverge Segments Release 6.1

Phone: Fax:
E-mail:

Diverge Analysis

Analyst:	Alex Ericksen
Agency/Co.:	
Date performed:	1/13/2014
Analysis time period:	PM Peak Hour
Freeway/Dir of Travel:	I-55 Westbound
Junction:	Diverge at Damen
Jurisdiction:	
Analysis Year:	
Description:	

Freeway Data

Type of analysis	Diverge	
Number of lanes in freeway	4	
Free-flow speed on freeway	60.0	mph
Volume on freeway	3973	vph

Off Ramp Data

Side of freeway	Right	
Number of lanes in ramp	2	
Free-Flow speed on ramp	30.0	mph
Volume on ramp	476	vph
Length of first accel/decel lane	600	ft
Length of second accel/decel lane	600	ft

Adjacent Ramp Data (if one exists)

Does adjacent ramp exist?	Yes	
Volume on adjacent ramp	1563	vph
Position of adjacent ramp	Upstream	
Type of adjacent ramp	On	
Distance to adjacent ramp	6100	ft

Conversion to pc/h Under Base Conditions

Junction Components	Freeway		Ramp		Adjacent Ramp		
Volume, V (vph)	3973		476		1563		vph
Peak-hour factor, PHF	0.95		0.95		0.95		
Peak 15-min volume, v15	1046		125		411		v
Trucks and buses	12		12		12		%
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	0.943		0.943		0.943		
Driver population factor, fP	1.00		1.00		1.00		

Flow rate, vp 4433 531 1744 pcph

Estimation of V12 Diverge Areas

L_{EQ} = (Equation 13-12 or 13-13)

P_{FD} = 0.260 Using Equation 0

$v_{12} = v_R + (v_F - v_R) P_{FD}$ = 1546 pc/h

Capacity Checks

	Actual	Maximum	LOS F?
$v_{Fi} = v_F$	4433	9200	No
$v_{FO} = v_F - v_R$	3902	9200	No
v_R	531	4000	No
v_3 or v_{av34}	1443 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} = 1773 (Equation 13-15, 13-16, 13-18, or 13-19)

Flow Entering Diverge Influence Area

	Actual	Max Desirable	Violation?
v_{12A}	1773	4400	No

Level of Service Determination (if not F)

Density, $D_R = 4.252 + 0.0086\, v_{12} - 0.009\, L_D$ = 3.3 pc/mi/ln

Level of service for ramp-freeway junction areas of influence A

Speed Estimation

Intermediate speed variable, D_S = 0.541

Space mean speed in ramp influence area, S_R = 50.3 mph

Space mean speed in outer lanes, S_0 = 64.5 mph

Space mean speed for all vehicles, S = 58.0 mph

Weave

Northbound AM

HCS 2010: Freeway Weaving Release 6.1

Phone: Fax:
E-mail:

Operational Analysis

Analyst: Caitlin Bowen
Agency/Co.:
Date Performed: 6/13/2013
Analysis Time Period: AM Peak Hour
Freeway/Dir of Travel: I-55 Eastbound
Weaving Location: Lemont Rd Weave
Analysis Year:
Description:

Inputs

Segment Type	Freeway	
Weaving configuration	One-Sided	
Number of lanes, N	4	ln
Weaving segment length, LS	750	ft
Freeway free-flow speed, FFS	60	mi/h
Minimum segment speed, SMIN	15	mi/h
Freeway maximum capacity, cIFL	2300	pc/h/ln

Terrain type	Level	
Grade	0.00	%
Length	0.00	mi

Conversion to pc/h Under Base Conditions

	Volume Components				
	VFF	VRF	VFR	VRR	
Volume, V	3198	309	245	0	veh/h
Peak hour factor, PHF	0.95	0.95	0.95	0.95	
Peak 15-min volume, v15	842	81	64	0	
Trucks and buses	9	9	9	9	%
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	0.957	0.957	0.957	0.957	
Driver population adjustment, fP	1.00	1.00	1.00	1.00	
Flow rate, v	3518	340	270	0	pc/h

Volume ratio, VR 0.148

Configuration Characteristics

Number of maneuver lanes, NWL	2	ln
Interchange density, ID	0.75	int/mi
Minimum RF lane changes, LCRF	1	lc/pc
Minimum FR lane changes, LCFR	1	lc/pc
Minimum RR lane changes, LCRR		lc/pc

Minimum weaving lane changes, LCMIN 610 lc/h
Weaving lane changes, LCW 817 lc/h
Non-weaving vehicle index, INW 198
Non-weaving lane change, LCNW 361 lc/h
Total lane changes, LCALL 1178 lc/h

_____Weaving and Non-Weaving Speeds_____
Weaving intensity factor, W 0.323
Average weaving speed, SW 49.0 mi/h
Average non-weaving speed, SNW 50.7 mi/h

_____Weaving Segment Speed, Density, Level of Service and Capacity_____
Weaving segment speed, S 50.4 mi/h
Weaving segment density, D 20.5 pc/mi/ln
Level of service, LOS C
Weaving segment v/c ratio 0.503
Weaving segment flow rate, v 4128 pc/h
Weaving segment capacity, cW 7851 veh/h

_____Limitations on Weaving Segments_____
If limit reached, see note.

	Minimum	Maximum	Actual	Note
Weaving length (ft)	300	4009	750	a,b
	Maximum	Analyzed		
Density-based capacty, cIWL (pc/h/ln)	2300	2051		c
	Maximum	Analyzed		
v/c ratio	1.00	0.503		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 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

Phone: Fax:
E-mail:

Operational Analysis

Analyst: Caitlin Bowen
Agency/Co.:
Date Performed: 6/13/2013
Analysis Time Period: AM Peak Hour
Freeway/Dir of Travel: I-55 Eastbound
Weaving Location: Cass Ave Weave
Analysis Year:
Description:

Inputs

Segment Type	Freeway	
Weaving configuration	One-Sided	
Number of lanes, N	4	ln
Weaving segment length, LS	600	ft
Freeway free-flow speed, FFS	60	mi/h
Minimum segment speed, SMIN	15	mi/h
Freeway maximum capacity, cIFL	2300	pc/h/ln

Terrain type	Level	
Grade	0.00	%
Length	0.00	mi

Conversion to pc/h Under Base Conditions

	Volume Components				
	VFF	VRF	VFR	VRR	
Volume, V	4504	34	222	0	veh/h
Peak hour factor, PHF	0.95	0.95	0.95	0.95	
Peak 15-min volume, v15	1185	9	58	0	
Trucks and buses	9	9	9	9	%
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	0.957	0.957	0.957	0.957	
Driver population adjustment, fP	1.00	1.00	1.00	1.00	
Flow rate, v	4954	37	244	0	pc/h

Volume ratio, VR 0.054

Configuration Characteristics

Number of maneuver lanes, NWL	2	ln
Interchange density, ID	0.75	int/mi
Minimum RF lane changes, LCRF	1	lc/pc
Minimum FR lane changes, LCFR	1	lc/pc
Minimum RR lane changes, LCRR		lc/pc

Minimum weaving lane changes, LCMIN 281 lc/h
Weaving lane changes, LCW 450 lc/h
Non-weaving vehicle index, INW 223
Non-weaving lane change, LCNW 575 lc/h
Total lane changes, LCALL 1025 lc/h

_____Weaving and Non-Weaving Speeds_____
Weaving intensity factor, W 0.345
Average weaving speed, SW 48.5 mi/h
Average non-weaving speed, SNW 51.7 mi/h

_____Weaving Segment Speed, Density, Level of Service and Capacity_____
Weaving segment speed, S 51.5 mi/h
Weaving segment density, D 25.4 pc/mi/ln
Level of service, LOS C
Weaving segment v/c ratio 0.621
Weaving segment flow rate, v 5235 pc/h
Weaving segment capacity, cW 8073 veh/h

_____Limitations on Weaving Segments_____
If limit reached, see note.

	Minimum	Maximum	Actual	Note
Weaving length (ft)	300	3096	600	a,b
	Maximum	Analyzed		
Density-based capacty, cIWL (pc/h/ln)	2300	2109		c
	Maximum	Analyzed		
v/c ratio	1.00	0.621		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 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

Phone: Fax:
E-mail:

Operational Analysis

Analyst: John Connelly
Agency/Co.:
Date Performed: 6/10/2013
Analysis Time Period: AM Peak Hour
Freeway/Dir of Travel: I-55 Eastbound
Weaving Location: County Line Road Cloverleaf
Analysis Year:
Description:

Inputs

Segment Type	Freeway	
Weaving configuration	One-Sided	
Number of lanes, N	4	ln
Weaving segment length, LS	700	ft
Freeway free-flow speed, FFS	60	mi/h
Minimum segment speed, SMIN	15	mi/h
Freeway maximum capacity, cIFL	2300	pc/h/ln

Terrain type	Level	
Grade	0.00	%
Length	0.00	mi

Conversion to pc/h Under Base Conditions

	Volume Components				
	VFF	VRF	VFR	VRR	
Volume, V	3973	331	214	0	veh/h
Peak hour factor, PHF	0.95	0.95	0.95	0.95	
Peak 15-min volume, v15	1046	87	56	0	
Trucks and buses	9	3	3	3	%
Recreational vehicles	2	2	2	2	%
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	0.953	0.981	0.981	0.981	
Driver population adjustment, fP	1.00	1.00	1.00	1.00	
Flow rate, v	4387	355	230	0	pc/h

Volume ratio, VR 0.118

Configuration Characteristics

Number of maneuver lanes, NWL	2	ln
Interchange density, ID	0.75	int/mi
Minimum RF lane changes, LCRF	1	lc/pc
Minimum FR lane changes, LCFR	1	lc/pc
Minimum RR lane changes, LCRR		lc/pc

Minimum weaving lane changes, LCMIN 585 lc/h
Weaving lane changes, LCW 780 lc/h
Non-weaving vehicle index, INW 230
Non-weaving lane change, LCNW 513 lc/h
Total lane changes, LCALL 1293 lc/h

_____Weaving and Non-Weaving Speeds_____
Weaving intensity factor, W 0.367
Average weaving speed, SW 47.9 mi/h
Average non-weaving speed, SNW 49.8 mi/h

_____Weaving Segment Speed, Density, Level of Service and Capacity_____
Weaving segment speed, S 49.6 mi/h
Weaving segment density, D 25.1 pc/mi/ln
Level of service, LOS C
Weaving segment v/c ratio 0.601
Weaving segment flow rate, v 4972 pc/h
Weaving segment capacity, cW 7893 veh/h

_____Limitations on Weaving Segments_____
If limit reached, see note.

	Minimum	Maximum	Actual	Note
Weaving length (ft)	300	3712	700	a,b
	Maximum	Analyzed		
Density-based capacty, cIWL (pc/h/ln)	2300	2070		c
	Maximum	Analyzed		
v/c ratio	1.00	0.601		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 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

Phone: Fax:
E-mail:

Operational Analysis

Analyst: Caitlin Bowen
Agency/Co.:
Date Performed: 6/13/2013
Analysis Time Period: AM Peak Hour
Freeway/Dir of Travel: I-55 Eastbound
Weaving Location: Country Line Rd East WeaveAB
Analysis Year:
Description:

Inputs

Segment Type	Freeway
Weaving configuration	Two-Sided
Number of lanes, N	4 ln
Weaving segment length, LS	800 ft
Freeway free-flow speed, FFS	60 mi/h
Minimum segment speed, SMIN	15 mi/h
Freeway maximum capacity, cIFL	2300 pc/h/ln

Terrain type	Level
Grade	0.00 %
Length	0.00 mi

Conversion to pc/h Under Base Conditions

	Volume Components				
	VFF	VRF	VFR	VRR	
Volume, V	3828	307	476	17	veh/h
Peak hour factor, PHF	0.95	0.95	0.95	0.95	
Peak 15-min volume, v15	1007	81	125	4	
Trucks and buses	9	9	9	9	%
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	0.957	0.957	0.957	0.957	
Driver population adjustment, fP	1.00	1.00	1.00	1.00	
Flow rate, v	4211	338	524	19	pc/h

Volume ratio, VR 0.004

Configuration Characteristics

Number of maneuver lanes, NWL	0 ln
Interchange density, ID	0.75 int/mi
Minimum RF lane changes, LCRF	lc/pc
Minimum FR lane changes, LCFR	lc/pc
Minimum RR lane changes, LCRR	4 lc/pc

Minimum weaving lane changes, LCMIN 76 lc/h
Weaving lane changes, LCW 294 lc/h
Non-weaving vehicle index, INW 304
Non-weaving lane change, LCNW 708 lc/h
Total lane changes, LCALL 1002 lc/h

_____Weaving and Non-Weaving Speeds_____

Weaving intensity factor, W 0.270
Average weaving speed, SW 50.4 mi/h
Average non-weaving speed, SNW 53.3 mi/h

_____Weaving Segment Speed, Density, Level of Service and Capacity_____

Weaving segment speed, S 53.3 mi/h
Weaving segment density, D 23.9 pc/mi/ln
Level of service, LOS C
Weaving segment v/c ratio 0.663
Weaving segment flow rate, v 5092 pc/h
Weaving segment capacity, cW 7349 veh/h

_____Limitations on Weaving Segments_____

If limit reached, see note.

	Minimum	Maximum	Actual	Note
Weaving length (ft)	300	5762	800	a,b
	Maximum	Analyzed		
Density-based capacty, cIWL (pc/h/ln)	2300	1920		c
	Maximum	Analyzed		
v/c ratio	1.00	0.663		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 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

Phone: Fax:
E-mail:

Operational Analysis

Analyst: Caitlin Bowen
Agency/Co.:
Date Performed: 6/13/2013
Analysis Time Period: AM Peak Hour
Freeway/Dir of Travel: I-55 Eastbound
Weaving Location: County Line Rd East Weave
Analysis Year:
Description:

Inputs

Segment Type	Freeway	
Weaving configuration	One-Sided	
Number of lanes, N	4	ln
Weaving segment length, LS	2300	ft
Freeway free-flow speed, FFS	60	mi/h
Minimum segment speed, SMIN	15	mi/h
Freeway maximum capacity, cIFL	2300	pc/h/ln

Terrain type	Level	
Grade	0.00	%
Length	0.00	mi

Conversion to pc/h Under Base Conditions

	Volume Components				
	VFF	VRF	VFR	VRR	
Volume, V	3629	270	675	54	veh/h
Peak hour factor, PHF	0.95	0.95	0.95	0.95	
Peak 15-min volume, v15	955	71	178	14	
Trucks and buses	9	9	9	9	%
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	0.957	0.957	0.957	0.957	
Driver population adjustment, fP	1.00	1.00	1.00	1.00	
Flow rate, v	3992	297	743	59	pc/h

Volume ratio, VR	0.204	

Configuration Characteristics

Number of maneuver lanes, NWL	2	ln
Interchange density, ID	0.75	int/mi
Minimum RF lane changes, LCRF	1	lc/pc
Minimum FR lane changes, LCFR	1	lc/pc
Minimum RR lane changes, LCRR		lc/pc

Minimum weaving lane changes, LCMIN 1040 lc/h
Weaving lane changes, LCW 1477 lc/h
Non-weaving vehicle index, INW 699
Non-weaving lane change, LCNW 1311 lc/h
Total lane changes, LCALL 2788 lc/h

Weaving and Non-Weaving Speeds

Weaving intensity factor, W 0.263
Average weaving speed, SW 50.6 mi/h
Average non-weaving speed, SNW 46.4 mi/h

Weaving Segment Speed, Density, Level of Service and Capacity

Weaving segment speed, S 47.2 mi/h
Weaving segment density, D 27.0 pc/mi/ln
Level of service, LOS C
Weaving segment v/c ratio 0.599
Weaving segment flow rate, v 5091 pc/h
Weaving segment capacity, cW 8138 veh/h

Limitations on Weaving Segments

If limit reached, see note.

	Minimum	Maximum	Actual	Note
Weaving length (ft)	300	4580	2300	a,b
	Maximum	Analyzed		
Density-based capacty, cIWL (pc/h/ln)	2300	2126		c
	Maximum	Analyzed		
v/c ratio	1.00	0.599		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 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

Phone: Fax:
E-mail:

Operational Analysis

Analyst: John Connelly
Agency/Co.:
Date Performed: 6/10/2013
Analysis Time Period: AM Peak Hour
Freeway/Dir of Travel: I-55 Eastbound
Weaving Location: 294 entrance to 294 SB Exit
Analysis Year:
Description:

Inputs

Segment Type	Freeway	
Weaving configuration	One-Sided	
Number of lanes, N	4	ln
Weaving segment length, LS	700	ft
Freeway free-flow speed, FFS	60	mi/h
Minimum segment speed, SMIN	15	mi/h
Freeway maximum capacity, cIFL	2300	pc/h/ln

Terrain type	Level	
Grade	0.00	%
Length	0.00	mi

Conversion to pc/h Under Base Conditions

	Volume Components				
	VFF	VRF	VFR	VRR	
Volume, V	3094	868	312	0	veh/h
Peak hour factor, PHF	0.95	0.95	0.95	0.95	
Peak 15-min volume, v15	814	228	82	0	
Trucks and buses	9	9	9	9	%
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	0.957	0.957	0.957	0.957	
Driver population adjustment, fP	1.00	1.00	1.00	1.00	
Flow rate, v	3403	955	343	0	pc/h

Volume ratio, VR 0.276

Configuration Characteristics

Number of maneuver lanes, NWL	2	ln
Interchange density, ID	0.75	int/mi
Minimum RF lane changes, LCRF	1	lc/pc
Minimum FR lane changes, LCFR	1	lc/pc
Minimum RR lane changes, LCRR		lc/pc

Minimum weaving lane changes, LCMIN 1298 lc/h
Weaving lane changes, LCW 1493 lc/h
Non-weaving vehicle index, INW 179
Non-weaving lane change, LCNW 310 lc/h
Total lane changes, LCALL 1803 lc/h

Weaving and Non-Weaving Speeds

Weaving intensity factor, W 0.477
Average weaving speed, SW 45.5 mi/h
Average non-weaving speed, SNW 45.0 mi/h

Weaving Segment Speed, Density, Level of Service and Capacity

Weaving segment speed, S 45.1 mi/h
Weaving segment density, D 26.0 pc/mi/ln
Level of service, LOS C
Weaving segment v/c ratio 0.604
Weaving segment flow rate, v 4701 pc/h
Weaving segment capacity, cW 7449 veh/h

Limitations on Weaving Segments

If limit reached, see note.

	Minimum	Maximum	Actual	Note
Weaving length (ft)	300	5329	700	a,b
	Maximum	Analyzed		
Density-based capacty, cIWL (pc/h/ln)	2300	1946		c
	Maximum	Analyzed		
v/c ratio	1.00	0.604		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 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

Phone: Fax:
E-mail:

Operational Analysis

Analyst: John Connelly
Agency/Co.:
Date Performed: 6/10/2013
Analysis Time Period: AM Peak Hour
Freeway/Dir of Travel: I-55 Eastbound
Weaving Location: 294 Entrance to LaGrange
Analysis Year:
Description:

Inputs

Segment Type	Freeway	
Weaving configuration	One-Sided	
Number of lanes, N	4	ln
Weaving segment length, LS	2000	ft
Freeway free-flow speed, FFS	60	mi/h
Minimum segment speed, SMIN	15	mi/h
Freeway maximum capacity, cIFL	2300	pc/h/ln

Terrain type	Level	
Grade	0.00	%
Length	0.00	mi

Conversion to pc/h Under Base Conditions

	Volume Components				
	VFF	VRF	VFR	VRR	
Volume, V	3254	400	708	0	veh/h
Peak hour factor, PHF	0.95	0.95	0.95	0.95	
Peak 15-min volume, v15	856	105	186	0	
Trucks and buses	9	9	9	9	%
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	0.957	0.957	0.957	0.957	
Driver population adjustment, fP	1.00	1.00	1.00	1.00	
Flow rate, v	3579	440	779	0	pc/h

Volume ratio, VR 0.254

Configuration Characteristics

Number of maneuver lanes, NWL	2	ln
Interchange density, ID	0.75	int/mi
Minimum RF lane changes, LCRF	1	lc/pc
Minimum FR lane changes, LCFR	1	lc/pc
Minimum RR lane changes, LCRR		lc/pc

Minimum weaving lane changes, LCMIN 1219 lc/h
Weaving lane changes, LCW 1622 lc/h
Non-weaving vehicle index, INW 537
Non-weaving lane change, LCNW 1051 lc/h
Total lane changes, LCALL 2673 lc/h

Weaving and Non-Weaving Speeds

Weaving intensity factor, W 0.284
Average weaving speed, SW 50.0 mi/h
Average non-weaving speed, SNW 45.5 mi/h

Weaving Segment Speed, Density, Level of Service and Capacity

Weaving segment speed, S 46.5 mi/h
Weaving segment density, D 25.8 pc/mi/ln
Level of service, LOS C
Weaving segment v/c ratio 0.581
Weaving segment flow rate, v 4798 pc/h
Weaving segment capacity, cW 7897 veh/h

Limitations on Weaving Segments

If limit reached, see note.

	Minimum	Maximum	Actual	Note
Weaving length (ft)	300	5096	2000	a,b
	Maximum	Analyzed		
Density-based capacty, cIWL (pc/h/ln)	2300	2063		c
	Maximum	Analyzed		
v/c ratio	1.00	0.581		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 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

Phone: Fax:
E-mail:

Operational Analysis

Analyst: Caitlin Bowen
Agency/Co.:
Date Performed: 6/12/2013
Analysis Time Period: AM Peak Hour
Freeway/Dir of Travel: I-55 Eastbound
Weaving Location: La Grange Rd Weave
Analysis Year:
Description:

Inputs

Segment Type	Freeway	
Weaving configuration	One-Sided	
Number of lanes, N	4	ln
Weaving segment length, LS	390	ft
Freeway free-flow speed, FFS	60	mi/h
Minimum segment speed, SMIN	15	mi/h
Freeway maximum capacity, cIFL	2300	pc/h/ln

Terrain type	Level	
Grade	0.00	%
Length	0.00	mi

Conversion to pc/h Under Base Conditions

	Volume Components				
	VFF	VRF	VFR	VRR	
Volume, V	3391	690	263	0	veh/h
Peak hour factor, PHF	0.95	0.95	0.95	0.95	
Peak 15-min volume, v15	892	182	69	0	
Trucks and buses	9	9	9	9	%
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	0.957	0.957	0.957	0.957	
Driver population adjustment, fP	1.00	1.00	1.00	1.00	
Flow rate, v	3730	759	289	0	pc/h

Volume ratio, VR 0.219

Configuration Characteristics

Number of maneuver lanes, NWL	2	ln
Interchange density, ID	0.75	int/mi
Minimum RF lane changes, LCRF	1	lc/pc
Minimum FR lane changes, LCFR	1	lc/pc
Minimum RR lane changes, LCRR		lc/pc

Minimum weaving lane changes, LCMIN 1048 lc/h
Weaving lane changes, LCW 1141 lc/h
Non-weaving vehicle index, INW 109
Non-weaving lane change, LCNW 209 lc/h
Total lane changes, LCALL 1350 lc/h

_____Weaving and Non-Weaving Speeds_____
Weaving intensity factor, W 0.602
Average weaving speed, SW 43.1 mi/h
Average non-weaving speed, SNW 46.7 mi/h

_____Weaving Segment Speed, Density, Level of Service and Capacity_____
Weaving segment speed, S 45.9 mi/h
Weaving segment density, D 26.0 pc/mi/ln
Level of service, LOS C
Weaving segment v/c ratio 0.607
Weaving segment flow rate, v 4778 pc/h
Weaving segment capacity, cW 7533 veh/h

_____Limitations on Weaving Segments_____
If limit reached, see note.

	Minimum	Maximum	Actual	Note
Weaving length (ft)	300	4735	390	a,b
	Maximum	Analyzed		
Density-based capacty, cIWL (pc/h/ln)	2300	1968		c
	Maximum	Analyzed		
v/c ratio	1.00	0.607		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 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

Phone: Fax:
E-mail:

Operational Analysis

Analyst: Caitlin Bowen
Agency/Co.:
Date Performed: 6/12/2013
Analysis Time Period: AM Peak Hour
Freeway/Dir of Travel: I-55 Eastbound
Weaving Location: Archer to Harlem Ave East
Analysis Year:
Description:

Inputs

Segment Type	Freeway	
Weaving configuration	One-Sided	
Number of lanes, N	4	ln
Weaving segment length, LS	2200	ft
Freeway free-flow speed, FFS	60	mi/h
Minimum segment speed, SMIN	15	mi/h
Freeway maximum capacity, cIFL	2300	pc/h/ln

Terrain type	Level	
Grade	0.00	%
Length	0.00	mi

Conversion to pc/h Under Base Conditions

	Volume Components				
	VFF	VRF	VFR	VRR	
Volume, V	2957	727	556	0	veh/h
Peak hour factor, PHF	0.95	0.95	0.95	0.95	
Peak 15-min volume, v15	778	191	146	0	
Trucks and buses	9	9	9	9	%
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	0.957	0.957	0.957	0.957	
Driver population adjustment, fP	1.00	1.00	1.00	1.00	
Flow rate, v	3253	800	612	0	pc/h

Volume ratio, VR 0.303

Configuration Characteristics

Number of maneuver lanes, NWL	2	ln
Interchange density, ID	0.75	int/mi
Minimum RF lane changes, LCRF	1	lc/pc
Minimum FR lane changes, LCFR	1	lc/pc
Minimum RR lane changes, LCRR		lc/pc

Minimum weaving lane changes, LCMIN 1412 lc/h
Weaving lane changes, LCW 1838 lc/h
Non-weaving vehicle index, INW 537
Non-weaving lane change, LCNW 1092 lc/h
Total lane changes, LCALL 2930 lc/h

Weaving and Non-Weaving Speeds

Weaving intensity factor, W 0.283
Average weaving speed, SW 50.1 mi/h
Average non-weaving speed, SNW 44.2 mi/h

Weaving Segment Speed, Density, Level of Service and Capacity

Weaving segment speed, S 45.9 mi/h
Weaving segment density, D 25.4 pc/mi/ln
Level of service, LOS C
Weaving segment v/c ratio 0.588
Weaving segment flow rate, v 4665 pc/h
Weaving segment capacity, cW 7588 veh/h

Limitations on Weaving Segments

If limit reached, see note.

	Minimum	Maximum	Actual	Note
Weaving length (ft)	300	5613	2200	a,b
		Maximum	Analyzed	
Density-based capacty, cIWL (pc/h/ln)		2300	2039	c
		Maximum	Analyzed	
v/c ratio		1.00	0.588	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 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

Phone: Fax:
E-mail:

Operational Analysis

Analyst:	Alex Ericksen
Agency/Co.:	
Date Performed:	8/13/2014
Analysis Time Period:	AM Peak Hour
Freeway/Dir of Travel:	I-55 Eastbound
Weaving Location:	California Ave to Damen Ave
Analysis Year:	
Description:	

Inputs

Segment Type	Freeway	
Weaving configuration	One-Sided	
Number of lanes, N	4	ln
Weaving segment length, LS	2800	ft
Freeway free-flow speed, FFS	60	mi/h
Minimum segment speed, SMIN	15	mi/h
Freeway maximum capacity, cIFL	2300	pc/h/ln
Terrain type	Level	
Grade	0.00	%
Length	0.00	mi

Conversion to pc/h Under Base Conditions

	Volume Components				
	VFF	VRF	VFR	VRR	
Volume, V	4454	386	649	56	veh/h
Peak hour factor, PHF	0.95	0.95	0.95	0.95	
Peak 15-min volume, v15	1172	102	171	15	
Trucks and buses	9	9	9	9	%
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	0.957	0.957	0.957	0.957	
Driver population adjustment, fP	1.00	1.00	1.00	1.00	
Flow rate, v	4899	425	714	62	pc/h
Volume ratio, VR		0.187			

Configuration Characteristics

Number of maneuver lanes, NWL	2	ln
Interchange density, ID	0.75	int/mi
Minimum RF lane changes, LCRF	1	lc/pc
Minimum FR lane changes, LCFR	0	lc/pc
Minimum RR lane changes, LCRR		lc/pc
Minimum weaving lane changes, LCMIN	425	lc/h
Weaving lane changes, LCW	913	lc/h
Non-weaving vehicle index, INW	1042	
Non-weaving lane change, LCNW	1769	lc/h
Total lane changes, LCALL	2682	lc/h

Weaving and Non-Weaving Speeds

Weaving intensity factor, W	0.218	
Average weaving speed, SW	51.9	mi/h
Average non-weaving speed, SNW	49.6	mi/h

Weaving Segment Speed, Density, Level of Service and Capacity

Weaving segment speed, S	50.0	mi/h
Weaving segment density, D	30.5	pc/mi/ln
Level of service, LOS	D	
Weaving segment v/c ratio	0.700	
Weaving segment flow rate, v	6100	pc/h
Weaving segment capacity, cW	8337	veh/h

Limitations on Weaving Segments

If limit reached, see note.

	Minimum	Maximum	Actual	Note
Weaving length (ft)	300	4401	2800	a,b
		Maximum	Analyzed	
Density-based capacty, cIWL (pc/h/ln)		2300	2178	c
		Maximum	Analyzed	
v/c ratio		1.00	0.700	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 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

Phone: Fax:
E-mail:

Operational Analysis

Analyst: Caitlin Bowen
Agency/Co.:
Date Performed: 6/12/2013
Analysis Time Period: AM Peak Hour
Freeway/Dir of Travel: I-55
Weaving Location: Damen Ave and 1-90/94
Analysis Year:
Description:

Inputs

Segment Type	Freeway	
Weaving configuration	One-Sided	
Number of lanes, N	4	ln
Weaving segment length, LS	2130	ft
Freeway free-flow speed, FFS	60	mi/h
Minimum segment speed, SMIN	15	mi/h
Freeway maximum capacity, cIFL	2300	pc/h/ln
Terrain type	Level	
Grade	0.00	%
Length	0.00	mi

Conversion to pc/h Under Base Conditions

	Volume Components				
	VFF	VRF	VFR	VRR	
Volume, V	3484	492	1356	191	veh/h
Peak hour factor, PHF	0.95	0.95	0.95	0.95	
Peak 15-min volume, v15	917	129	357	50	
Trucks and buses	9	9	9	9	%
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	0.957	0.957	0.957	0.957	
Driver population adjustment, fP	1.00	1.00	1.00	1.00	
Flow rate, v	3832	541	1492	210	pc/h

Volume ratio, VR 0.335

Configuration Characteristics

Number of maneuver lanes, NWL	2	ln
Interchange density, ID	0.75	int/mi
Minimum RF lane changes, LCRF	1	lc/pc
Minimum FR lane changes, LCFR	1	lc/pc
Minimum RR lane changes, LCRR		lc/pc

Minimum weaving lane changes, LCMIN 2033 lc/h
Weaving lane changes, LCW 2451 lc/h
Non-weaving vehicle index, INW 646
Non-weaving lane change, LCNW 1217 lc/h
Total lane changes, LCALL 3668 lc/h

_____Weaving and Non-Weaving Speeds_____
Weaving intensity factor, W 0.347
Average weaving speed, SW 48.4 mi/h
Average non-weaving speed, SNW 38.1 mi/h

_____Weaving Segment Speed, Density, Level of Service and Capacity_____
Weaving segment speed, S 41.0 mi/h
Weaving segment density, D 37.0 pc/mi/ln
Level of service, LOS E
Weaving segment v/c ratio 0.847
Weaving segment flow rate, v 6075 pc/h
Weaving segment capacity, cW 6863 veh/h

_____Limitations on Weaving Segments_____
If limit reached, see note.

	Minimum	Maximum	Actual	Note
Weaving length (ft)	300	5959	2130	a,b
	Maximum	Analyzed		
Density-based capacty, cIWL (pc/h/ln)	2300	2007		c
	Maximum	Analyzed		
v/c ratio	1.00	0.847		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 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.

Weave

Northbound PM

HCS 2010: Freeway Weaving Release 6.1

Phone: Fax:
E-mail:

Operational Analysis

Analyst: Caitlin Bowen
Agency/Co.:
Date Performed: 6/13/2013
Analysis Time Period: PM Off Peak Hour
Freeway/Dir of Travel: I-55 Eastbound
Weaving Location: Lemont Rd Weave
Analysis Year:
Description:

Inputs

Segment Type	Freeway	
Weaving configuration	One-Sided	
Number of lanes, N	4	ln
Weaving segment length, LS	750	ft
Freeway free-flow speed, FFS	60	mi/h
Minimum segment speed, SMIN	15	mi/h
Freeway maximum capacity, cIFL	2300	pc/h/ln

Terrain type	Level	
Grade	0.00	%
Length	0.00	mi

Conversion to pc/h Under Base Conditions

	Volume Components				
	VFF	VRF	VFR	VRR	
Volume, V	3141	237	323	0	veh/h
Peak hour factor, PHF	0.95	0.95	0.95	0.95	
Peak 15-min volume, v15	827	62	85	0	
Trucks and buses	11	11	11	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	0.948	0.948	0.948	0.948	
Driver population adjustment, fP	1.00	1.00	1.00	1.00	
Flow rate, v	3488	263	359	0	pc/h

Volume ratio, VR 0.151

Configuration Characteristics

Number of maneuver lanes, NWL	2	ln
Interchange density, ID	0.75	int/mi
Minimum RF lane changes, LCRF	1	lc/pc
Minimum FR lane changes, LCFR	1	lc/pc
Minimum RR lane changes, LCRR		lc/pc

Minimum weaving lane changes, LCMIN 622 lc/h
Weaving lane changes, LCW 829 lc/h
Non-weaving vehicle index, INW 196
Non-weaving lane change, LCNW 355 lc/h
Total lane changes, LCALL 1184 lc/h

_____Weaving and Non-Weaving Speeds_____
Weaving intensity factor, W 0.324
Average weaving speed, SW 49.0 mi/h
Average non-weaving speed, SNW 50.6 mi/h

_____Weaving Segment Speed, Density, Level of Service and Capacity_____
Weaving segment speed, S 50.3 mi/h
Weaving segment density, D 20.4 pc/mi/ln
Level of service, LOS C
Weaving segment v/c ratio 0.502
Weaving segment flow rate, v 4110 pc/h
Weaving segment capacity, cW 7765 veh/h

_____Limitations on Weaving Segments_____
If limit reached, see note.

	Minimum	Maximum	Actual	Note
Weaving length (ft)	300	4045	750	a,b
	Maximum	Analyzed		
Density-based capacty, cIWL (pc/h/ln)	2300	2048		c
	Maximum	Analyzed		
v/c ratio	1.00	0.502		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 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

Phone: Fax:
E-mail:

Operational Analysis

Analyst: Caitlin Bowen
Agency/Co.:
Date Performed: 6/13/2013
Analysis Time Period: PM Off Peak Hour
Freeway/Dir of Travel: I-55 Eastbound
Weaving Location: Cass Ave Weave
Analysis Year:
Description:

Inputs

Segment Type	Freeway	
Weaving configuration	One-Sided	
Number of lanes, N	4	ln
Weaving segment length, LS	600	ft
Freeway free-flow speed, FFS	60	mi/h
Minimum segment speed, SMIN	15	mi/h
Freeway maximum capacity, cIFL	2300	pc/h/ln

Terrain type	Level	
Grade	0.00	%
Length	0.00	mi

Conversion to pc/h Under Base Conditions

	Volume Components				
	VFF	VRF	VFR	VRR	
Volume, V	4093	154	221	0	veh/h
Peak hour factor, PHF	0.95	0.95	0.95	0.95	
Peak 15-min volume, v15	1077	41	58	0	
Trucks and buses	11	11	11	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	0.948	0.948	0.948	0.948	
Driver population adjustment, fP	1.00	1.00	1.00	1.00	
Flow rate, v	4545	171	245	0	pc/h

Volume ratio, VR 0.084

Configuration Characteristics

Number of maneuver lanes, NWL	2	ln
Interchange density, ID	0.75	int/mi
Minimum RF lane changes, LCRF	1	lc/pc
Minimum FR lane changes, LCFR	1	lc/pc
Minimum RR lane changes, LCRR		lc/pc

Minimum weaving lane changes, LCMIN 416 lc/h
Weaving lane changes, LCW 585 lc/h
Non-weaving vehicle index, INW 205
Non-weaving lane change, LCNW 491 lc/h
Total lane changes, LCALL 1076 lc/h

_____Weaving and Non-Weaving Speeds_____
Weaving intensity factor, W 0.358
Average weaving speed, SW 48.1 mi/h
Average non-weaving speed, SNW 51.1 mi/h

_____Weaving Segment Speed, Density, Level of Service and Capacity_____
Weaving segment speed, S 50.8 mi/h
Weaving segment density, D 24.4 pc/mi/ln
Level of service, LOS C
Weaving segment v/c ratio 0.594
Weaving segment flow rate, v 4961 pc/h
Weaving segment capacity, cW 7913 veh/h

_____Limitations on Weaving Segments_____
If limit reached, see note.

	Minimum	Maximum	Actual	Note
Weaving length (ft)	300	3384	600	a,b
	Maximum	Analyzed		
Density-based capacty, cIWL (pc/h/ln)	2300	2087		c
	Maximum	Analyzed		
v/c ratio	1.00	0.594		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 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

Phone: Fax:
E-mail:

Operational Analysis

Analyst: John Connelly
Agency/Co.:
Date Performed: 6/10/2013
Analysis Time Period: PM Off Peak Hour
Freeway/Dir of Travel: I-55 Eastbound
Weaving Location: County Line Road Cloverleaf
Analysis Year:
Description:

Inputs

Segment Type	Freeway	
Weaving configuration	One-Sided	
Number of lanes, N	4	ln
Weaving segment length, LS	700	ft
Freeway free-flow speed, FFS	60	mi/h
Minimum segment speed, SMIN	15	mi/h
Freeway maximum capacity, cIFL	2300	pc/h/ln

Terrain type	Level	
Grade	0.00	%
Length	0.00	mi

Conversion to pc/h Under Base Conditions

	Volume Components				
	VFF	VRF	VFR	VRR	
Volume, V	3872	393	73	0	veh/h
Peak hour factor, PHF	0.95	0.95	0.95	0.95	
Peak 15-min volume, v15	1019	103	19	0	
Trucks and buses	11	11	11	11	%
Recreational vehicles	2	2	2	2	%
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	0.944	0.944	0.944	0.944	
Driver population adjustment, fP	1.00	1.00	1.00	1.00	
Flow rate, v	4316	438	81	0	pc/h

Volume ratio, VR 0.107

Configuration Characteristics

Number of maneuver lanes, NWL	2	ln
Interchange density, ID	0.75	int/mi
Minimum RF lane changes, LCRF	1	lc/pc
Minimum FR lane changes, LCFR	1	lc/pc
Minimum RR lane changes, LCRR		lc/pc

Minimum weaving lane changes, LCMIN 519 lc/h
Weaving lane changes, LCW 714 lc/h
Non-weaving vehicle index, INW 227
Non-weaving lane change, LCNW 498 lc/h
Total lane changes, LCALL 1212 lc/h

_____Weaving and Non-Weaving Speeds_____

Weaving intensity factor, W 0.349
Average weaving speed, SW 48.4 mi/h
Average non-weaving speed, SNW 50.5 mi/h

_____Weaving Segment Speed, Density, Level of Service and Capacity_____

Weaving segment speed, S 50.2 mi/h
Weaving segment density, D 24.1 pc/mi/ln
Level of service, LOS C
Weaving segment v/c ratio 0.582
Weaving segment flow rate, v 4835 pc/h
Weaving segment capacity, cW 7845 veh/h

_____Limitations on Weaving Segments_____

If limit reached, see note.

	Minimum	Maximum	Actual	Note
Weaving length (ft)	300	3611	700	a,b
	Maximum	Analyzed		
Density-based capacty, cIWL (pc/h/ln)	2300	2077		c
	Maximum	Analyzed		
v/c ratio	1.00	0.582		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 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

Phone: Fax:
E-mail:

Operational Analysis

Analyst: Caitlin Bowen
Agency/Co.:
Date Performed: 6/13/2013
Analysis Time Period: PM Off Peak Hour
Freeway/Dir of Travel: I-55 Eastbound
Weaving Location: Country Line Rd East WeaveAB
Analysis Year:
Description:

Inputs

Segment Type	Freeway	
Weaving configuration	Two-Sided	
Number of lanes, N	4	ln
Weaving segment length, LS	800	ft
Freeway free-flow speed, FFS	60	mi/h
Minimum segment speed, SMIN	15	mi/h
Freeway maximum capacity, cIFL	2300	pc/h/ln

Terrain type	Level	
Grade	0.00	%
Length	0.00	mi

Conversion to pc/h Under Base Conditions

	Volume Components				
	VFF	VRF	VFR	VRR	
Volume, V	3937	518	328	19	veh/h
Peak hour factor, PHF	0.95	0.95	0.95	0.95	
Peak 15-min volume, v15	1036	136	86	5	
Trucks and buses	11	11	11	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	0.948	0.948	0.948	0.948	
Driver population adjustment, fP	1.00	1.00	1.00	1.00	
Flow rate, v	4372	575	364	21	pc/h

Volume ratio, VR 0.004

Configuration Characteristics

Number of maneuver lanes, NWL	0	ln
Interchange density, ID	0.75	int/mi
Minimum RF lane changes, LCRF		lc/pc
Minimum FR lane changes, LCFR		lc/pc
Minimum RR lane changes, LCRR	4	lc/pc

Minimum weaving lane changes, LCMIN 84 lc/h
Weaving lane changes, LCW 302 lc/h
Non-weaving vehicle index, INW 319
Non-weaving lane change, LCNW 757 lc/h
Total lane changes, LCALL 1059 lc/h

Weaving and Non-Weaving Speeds

Weaving intensity factor, W 0.282
Average weaving speed, SW 50.1 mi/h
Average non-weaving speed, SNW 53.0 mi/h

Weaving Segment Speed, Density, Level of Service and Capacity

Weaving segment speed, S 53.0 mi/h
Weaving segment density, D 25.2 pc/mi/ln
Level of service, LOS C
Weaving segment v/c ratio 0.694
Weaving segment flow rate, v 5332 pc/h
Weaving segment capacity, cW 7280 veh/h

Limitations on Weaving Segments

If limit reached, see note.

	Minimum	Maximum	Actual	Note
Weaving length (ft)	300	5764	800	a,b
	Maximum	Analyzed		
Density-based capacty, cIWL (pc/h/ln)	2300	1920		c
	Maximum	Analyzed		
v/c ratio	1.00	0.694		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 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

Phone: Fax:
E-mail:

Operational Analysis

Analyst: Caitlin Bowen
Agency/Co.:
Date Performed: 6/13/2013
Analysis Time Period: PM Off Peak Hour
Freeway/Dir of Travel: I-55 Eastbound
Weaving Location: County Line Rd East Weave
Analysis Year:
Description:

Inputs

Segment Type	Freeway	
Weaving configuration	One-Sided	
Number of lanes, N	4	ln
Weaving segment length, LS	2300	ft
Freeway free-flow speed, FFS	60	mi/h
Minimum segment speed, SMIN	15	mi/h
Freeway maximum capacity, cIFL	2300	pc/h/ln
Terrain type	Level	
Grade	0.00	%
Length	0.00	mi

Conversion to pc/h Under Base Conditions

	Volume Components				
	VFF	VRF	VFR	VRR	
Volume, V	3572	446	693	91	veh/h
Peak hour factor, PHF	0.95	0.95	0.95	0.95	
Peak 15-min volume, v15	940	117	182	24	
Trucks and buses	11	11	11	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	0.948	0.948	0.948	0.948	
Driver population adjustment, fP	1.00	1.00	1.00	1.00	
Flow rate, v	3967	495	770	101	pc/h

Volume ratio, VR 0.237

Configuration Characteristics

Number of maneuver lanes, NWL	2	ln
Interchange density, ID	0.75	int/mi
Minimum RF lane changes, LCRF	1	lc/pc
Minimum FR lane changes, LCFR	1	lc/pc
Minimum RR lane changes, LCRR		lc/pc

Minimum weaving lane changes, LCMIN 1265 lc/h
Weaving lane changes, LCW 1702 lc/h
Non-weaving vehicle index, INW 702
Non-weaving lane change, LCNW 1314 lc/h
Total lane changes, LCALL 3016 lc/h

Weaving and Non-Weaving Speeds

Weaving intensity factor, W 0.280
Average weaving speed, SW 50.2 mi/h
Average non-weaving speed, SNW 44.5 mi/h

Weaving Segment Speed, Density, Level of Service and Capacity

Weaving segment speed, S 45.7 mi/h
Weaving segment density, D 29.2 pc/mi/ln
Level of service, LOS D
Weaving segment v/c ratio 0.635
Weaving segment flow rate, v 5333 pc/h
Weaving segment capacity, cW 7962 veh/h

Limitations on Weaving Segments

If limit reached, see note.

	Minimum	Maximum	Actual	Note
Weaving length (ft)	300	4920	2300	a,b
		Maximum	Analyzed	
Density-based capacty, cIWL (pc/h/ln)		2300	2100	c
		Maximum	Analyzed	
v/c ratio		1.00	0.635	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 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

Phone: Fax:
E-mail:

Operational Analysis

Analyst: John Connelly
Agency/Co.:
Date Performed: 6/10/2013
Analysis Time Period: PM Off Peak Hour
Freeway/Dir of Travel: I-55 Eastbound
Weaving Location: 294 entrance to 294 SB Exit
Analysis Year:
Description:

Inputs

Segment Type	Freeway	
Weaving configuration	One-Sided	
Number of lanes, N	4	ln
Weaving segment length, LS	700	ft
Freeway free-flow speed, FFS	60	mi/h
Minimum segment speed, SMIN	15	mi/h
Freeway maximum capacity, cIFL	2300	pc/h/ln

Terrain type	Level	
Grade	0.00	%
Length	0.00	mi

Conversion to pc/h Under Base Conditions

	Volume Components				
	VFF	VRF	VFR	VRR	
Volume, V	3174	1372	497	0	veh/h
Peak hour factor, PHF	0.95	0.95	0.95	0.95	
Peak 15-min volume, v15	835	361	131	0	
Trucks and buses	11	11	11	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	0.948	0.948	0.948	0.948	
Driver population adjustment, fP	1.00	1.00	1.00	1.00	
Flow rate, v	3525	1524	552	0	pc/h

Volume ratio, VR 0.371

Configuration Characteristics

Number of maneuver lanes, NWL	2	ln
Interchange density, ID	0.75	int/mi
Minimum RF lane changes, LCRF	1	lc/pc
Minimum FR lane changes, LCFR	1	lc/pc
Minimum RR lane changes, LCRR		lc/pc

Minimum weaving lane changes, LCMIN 2076 lc/h
Weaving lane changes, LCW 2271 lc/h
Non-weaving vehicle index, INW 185
Non-weaving lane change, LCNW 335 lc/h
Total lane changes, LCALL 2606 lc/h

Weaving and Non-Weaving Speeds

Weaving intensity factor, W 0.638
Average weaving speed, SW 42.5 mi/h
Average non-weaving speed, SNW 38.3 mi/h

Weaving Segment Speed, Density, Level of Service and Capacity

Weaving segment speed, S 39.8 mi/h
Weaving segment density, D 35.2 pc/mi/ln
Level of service, LOS E
Weaving segment v/c ratio 0.865
Weaving segment flow rate, v 5601 pc/h
Weaving segment capacity, cW 6138 veh/h

Limitations on Weaving Segments

If limit reached, see note.

	Minimum	Maximum	Actual	Note
Weaving length (ft)	300	6354	700	a,b
	Maximum	Analyzed		
Density-based capacty, cIWL (pc/h/ln)	2300	1867		c
	Maximum	Analyzed		
v/c ratio	1.00	0.865		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 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

Phone: Fax:
E-mail:

Operational Analysis

Analyst: John Connelly
Agency/Co.:
Date Performed: 6/10/2013
Analysis Time Period: PM Off Peak Hour
Freeway/Dir of Travel: I-55 Eastbound
Weaving Location: 294 Entrance to LaGrange
Analysis Year:
Description:

Inputs

Segment Type	Freeway	
Weaving configuration	One-Sided	
Number of lanes, N	4	ln
Weaving segment length, LS	2000	ft
Freeway free-flow speed, FFS	60	mi/h
Minimum segment speed, SMIN	15	mi/h
Freeway maximum capacity, cIFL	2300	pc/h/ln

Terrain type	Level	
Grade	0.00	%
Length	0.00	mi

Conversion to pc/h Under Base Conditions

	Volume Components				
	VFF	VRF	VFR	VRR	
Volume, V	3558	444	988	0	veh/h
Peak hour factor, PHF	0.95	0.95	0.95	0.95	
Peak 15-min volume, v15	936	117	260	0	
Trucks and buses	11	11	11	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	0.948	0.948	0.948	0.948	
Driver population adjustment, fP	1.00	1.00	1.00	1.00	
Flow rate, v	3951	493	1097	0	pc/h

Volume ratio, VR 0.287

Configuration Characteristics

Number of maneuver lanes, NWL	2	ln
Interchange density, ID	0.75	int/mi
Minimum RF lane changes, LCRF	1	lc/pc
Minimum FR lane changes, LCFR	1	lc/pc
Minimum RR lane changes, LCRR		lc/pc

Minimum weaving lane changes, LCMIN 1590 lc/h
Weaving lane changes, LCW 1993 lc/h
Non-weaving vehicle index, INW 593
Non-weaving lane change, LCNW 1128 lc/h
Total lane changes, LCALL 3121 lc/h

Weaving and Non-Weaving Speeds

Weaving intensity factor, W 0.321
Average weaving speed, SW 49.1 mi/h
Average non-weaving speed, SNW 41.9 mi/h

Weaving Segment Speed, Density, Level of Service and Capacity

Weaving segment speed, S 43.7 mi/h
Weaving segment density, D 31.7 pc/mi/ln
Level of service, LOS D
Weaving segment v/c ratio 0.680
Weaving segment flow rate, v 5541 pc/h
Weaving segment capacity, cW 7719 veh/h

Limitations on Weaving Segments

If limit reached, see note.

	Minimum	Maximum	Actual	Note
Weaving length (ft)	300	5444	2000	a,b
		Maximum	Analyzed	
Density-based capacty, cIWL (pc/h/ln)		2300	2036	c
		Maximum	Analyzed	
v/c ratio		1.00	0.680	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 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

Phone: Fax:
E-mail:

Operational Analysis

Analyst: Caitlin Bowen
Agency/Co.:
Date Performed: 6/12/2013
Analysis Time Period: PM Off Peak Hour
Freeway/Dir of Travel: I-55 Eastbound
Weaving Location: La Grange Rd Weave
Analysis Year:
Description:

Inputs

Segment Type	Freeway	
Weaving configuration	One-Sided	
Number of lanes, N	4	ln
Weaving segment length, LS	390	ft
Freeway free-flow speed, FFS	60	mi/h
Minimum segment speed, SMIN	15	mi/h
Freeway maximum capacity, cIFL	2300	pc/h/ln

Terrain type	Level	
Grade	0.00	%
Length	0.00	mi

Conversion to pc/h Under Base Conditions

	Volume Components				
	VFF	VRF	VFR	VRR	
Volume, V	3837	496	165	0	veh/h
Peak hour factor, PHF	0.95	0.95	0.95	0.95	
Peak 15-min volume, v15	1010	131	43	0	
Trucks and buses	11	11	11	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	0.948	0.948	0.948	0.948	
Driver population adjustment, fP	1.00	1.00	1.00	1.00	
Flow rate, v	4261	551	183	0	pc/h

Volume ratio, VR 0.147

Configuration Characteristics

Number of maneuver lanes, NWL	2	ln
Interchange density, ID	0.75	int/mi
Minimum RF lane changes, LCRF	1	lc/pc
Minimum FR lane changes, LCFR	1	lc/pc
Minimum RR lane changes, LCRR		lc/pc

Minimum weaving lane changes, LCMIN 734 lc/h
Weaving lane changes, LCW 827 lc/h
Non-weaving vehicle index, INW 125
Non-weaving lane change, LCNW 319 lc/h
Total lane changes, LCALL 1146 lc/h

_____Weaving and Non-Weaving Speeds_____

Weaving intensity factor, W 0.529
Average weaving speed, SW 44.4 mi/h
Average non-weaving speed, SNW 48.7 mi/h

_____Weaving Segment Speed, Density, Level of Service and Capacity_____

Weaving segment speed, S 48.0 mi/h
Weaving segment density, D 26.0 pc/mi/ln
Level of service, LOS C
Weaving segment v/c ratio 0.617
Weaving segment flow rate, v 4995 pc/h
Weaving segment capacity, cW 7674 veh/h

_____Limitations on Weaving Segments_____

If limit reached, see note.

	Minimum	Maximum	Actual	Note
Weaving length (ft)	300	4001	390	a,b
		Maximum	Analyzed	
Density-based capacty, cIWL (pc/h/ln)		2300	2024	c
		Maximum	Analyzed	
v/c ratio		1.00	0.617	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 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

Phone: Fax:
E-mail:

Operational Analysis

Analyst: Caitlin Bowen
Agency/Co.:
Date Performed: 6/12/2013
Analysis Time Period: PM Off Peak Hour
Freeway/Dir of Travel: I-55 Eastbound
Weaving Location: Archer to Harlem Ave East
Analysis Year:
Description:

Inputs

Segment Type	Freeway	
Weaving configuration	One-Sided	
Number of lanes, N	4	ln
Weaving segment length, LS	2200	ft
Freeway free-flow speed, FFS	60	mi/h
Minimum segment speed, SMIN	15	mi/h
Freeway maximum capacity, cIFL	2300	pc/h/ln

Terrain type	Level	
Grade	0.00	%
Length	0.00	mi

Conversion to pc/h Under Base Conditions

	Volume Components				
	VFF	VRF	VFR	VRR	
Volume, V	3213	993	680	0	veh/h
Peak hour factor, PHF	0.95	0.95	0.95	0.95	
Peak 15-min volume, v15	846	261	179	0	
Trucks and buses	11	11	11	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	0.948	0.948	0.948	0.948	
Driver population adjustment, fP	1.00	1.00	1.00	1.00	
Flow rate, v	3568	1103	755	0	pc/h

Volume ratio, VR 0.342

Configuration Characteristics

Number of maneuver lanes, NWL	2	ln
Interchange density, ID	0.75	int/mi
Minimum RF lane changes, LCRF	1	lc/pc
Minimum FR lane changes, LCFR	1	lc/pc
Minimum RR lane changes, LCRR		lc/pc

Minimum weaving lane changes, LCMIN 1858 lc/h
Weaving lane changes, LCW 2284 lc/h
Non-weaving vehicle index, INW 589
Non-weaving lane change, LCNW 1157 lc/h
Total lane changes, LCALL 3441 lc/h

Weaving and Non-Weaving Speeds

Weaving intensity factor, W 0.322
Average weaving speed, SW 49.0 mi/h
Average non-weaving speed, SNW 40.1 mi/h

Weaving Segment Speed, Density, Level of Service and Capacity

Weaving segment speed, S 42.8 mi/h
Weaving segment density, D 31.7 pc/mi/ln
Level of service, LOS D
Weaving segment v/c ratio 0.774
Weaving segment flow rate, v 5426 pc/h
Weaving segment capacity, cW 6643 veh/h

Limitations on Weaving Segments

If limit reached, see note.

	Minimum	Maximum	Actual	Note
Weaving length (ft)	300	6043	2200	a,b
	Maximum	Analyzed		
Density-based capacty, cIWL (pc/h/ln)	2300	2006		c
	Maximum	Analyzed		
v/c ratio	1.00	0.774		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 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

Phone: Fax:
E-mail:

Operational Analysis

Analyst:	Alex Ericksen
Agency/Co.:	
Date Performed:	8/13/2014
Analysis Time Period:	PM Off Peak Hour
Freeway/Dir of Travel:	I-55 Eastbound
Weaving Location:	California Ave to Damen Ave
Analysis Year:	
Description:	

Inputs

Segment Type	Freeway	
Weaving configuration	One-Sided	
Number of lanes, N	4	ln
Weaving segment length, LS	2800	ft
Freeway free-flow speed, FFS	60	mi/h
Minimum segment speed, SMIN	15	mi/h
Freeway maximum capacity, cIFL	2300	pc/h/ln
Terrain type	Level	
Grade	0.00	%
Length	0.00	mi

Conversion to pc/h Under Base Conditions

	Volume Components				
	VFF	VRF	VFR	VRR	
Volume, V	3859	288	443	33	veh/h
Peak hour factor, PHF	0.95	0.95	0.95	0.95	
Peak 15-min volume, v15	1016	76	117	9	
Trucks and buses	8	8	8	8	%
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	0.962	0.962	0.962	
Driver population adjustment, fP	1.00	1.00	1.00	1.00	
Flow rate, v	4225	315	485	36	pc/h

Volume ratio, VR 0.158

Configuration Characteristics

Number of maneuver lanes, NWL	2	ln
Interchange density, ID	0.75	int/mi
Minimum RF lane changes, LCRF	1	lc/pc
Minimum FR lane changes, LCFR	0	lc/pc
Minimum RR lane changes, LCRR		lc/pc
Minimum weaving lane changes, LCMIN	315	lc/h
Weaving lane changes, LCW	803	lc/h
Non-weaving vehicle index, INW	895	
Non-weaving lane change, LCNW	1625	lc/h
Total lane changes, LCALL	2428	lc/h

Weaving and Non-Weaving Speeds

Weaving intensity factor, W	0.202	
Average weaving speed, SW	52.4	mi/h
Average non-weaving speed, SNW	51.7	mi/h

Weaving Segment Speed, Density, Level of Service and Capacity

Weaving segment speed, S	51.8	mi/h
Weaving segment density, D	24.4	pc/mi/ln
Level of service, LOS	C	
Weaving segment v/c ratio	0.575	
Weaving segment flow rate, v	5061	pc/h
Weaving segment capacity, cW	8462	veh/h

Limitations on Weaving Segments

If limit reached, see note.

	Minimum	Maximum	Actual	Note
Weaving length (ft)	300	4112	2800	a,b
		Maximum	Analyzed	
Density-based capacty, cIWL (pc/h/ln)		2300	2200	c
		Maximum	Analyzed	
v/c ratio		1.00	0.575	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 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

Phone: Fax:
E-mail:

Operational Analysis

Analyst: Caitlin Bowen
Agency/Co.:
Date Performed: 6/12/2013
Analysis Time Period: PM Off Peak Hour
Freeway/Dir of Travel: I-55
Weaving Location: Damen Ave and 1-90/94
Analysis Year:
Description:

Inputs

Segment Type	Freeway	
Weaving configuration	One-Sided	
Number of lanes, N	4	ln
Weaving segment length, LS	2130	ft
Freeway free-flow speed, FFS	60	mi/h
Minimum segment speed, SMIN	15	mi/h
Freeway maximum capacity, cIFL	2300	pc/h/ln
Terrain type	Level	
Grade	0.00	%
Length	0.00	mi

Conversion to pc/h Under Base Conditions

	Volume Components				
	VFF	VRF	VFR	VRR	
Volume, V	2889	488	1258	213	veh/h
Peak hour factor, PHF	0.95	0.95	0.95	0.95	
Peak 15-min volume, v15	760	128	331	56	
Trucks and buses	8	8	8	8	%
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	0.962	0.962	0.962	
Driver population adjustment, fP	1.00	1.00	1.00	1.00	
Flow rate, v	3163	534	1377	233	pc/h

Volume ratio, VR 0.360

Configuration Characteristics

Number of maneuver lanes, NWL	2	ln
Interchange density, ID	0.75	int/mi
Minimum RF lane changes, LCRF	1	lc/pc
Minimum FR lane changes, LCFR	1	lc/pc
Minimum RR lane changes, LCRR		lc/pc

Minimum weaving lane changes, LCMIN 1911 lc/h
Weaving lane changes, LCW 2329 lc/h
Non-weaving vehicle index, INW 543
Non-weaving lane change, LCNW 1084 lc/h
Total lane changes, LCALL 3413 lc/h

Weaving and Non-Weaving Speeds

Weaving intensity factor, W 0.328
Average weaving speed, SW 48.9 mi/h
Average non-weaving speed, SNW 39.9 mi/h

Weaving Segment Speed, Density, Level of Service and Capacity

Weaving segment speed, S 42.7 mi/h
Weaving segment density, D 31.1 pc/mi/ln
Level of service, LOS D
Weaving segment v/c ratio 0.796
Weaving segment flow rate, v 5307 pc/h
Weaving segment capacity, cW 6409 veh/h

Limitations on Weaving Segments

If limit reached, see note.

	Minimum	Maximum	Actual	Note
Weaving length (ft)	300	6237	2130	a,b
		Maximum	Analyzed	
Density-based capacty, cIWL (pc/h/ln)		2300	1986	c
		Maximum	Analyzed	
v/c ratio		1.00	0.796	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 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.

Weave

Southbound AM

HCS 2010: Freeway Weaving Release 6.1

Phone: Fax:
E-mail:

Operational Analysis

Analyst:	Caitlin Bowen
Agency/Co.:	
Date Performed:	6/14/2013
Analysis Time Period:	AM Off Peak Hour
Freeway/Dir of Travel:	I-55 Westbound
Weaving Location:	Lemont Rd Weave
Analysis Year:	
Description:	

Inputs

Segment Type	Freeway	
Weaving configuration	One-Sided	
Number of lanes, N	4	ln
Weaving segment length, LS	700	ft
Freeway free-flow speed, FFS	60	mi/h
Minimum segment speed, SMIN	15	mi/h
Freeway maximum capacity, cIFL	2300	pc/h/ln
Terrain type	Level	
Grade	0.00	%
Length	0.00	mi

Conversion to pc/h Under Base Conditions

	Volume Components				
	VFF	VRF	VFR	VRR	
Volume, V	3062	233	881	0	veh/h
Peak hour factor, PHF	0.95	0.95	0.95	0.95	
Peak 15-min volume, v15	806	61	232	0	
Trucks and buses	15	15	15	15	%
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	0.930	0.930	0.930	0.930	
Driver population adjustment, fP	1.00	1.00	1.00	1.00	
Flow rate, v	3465	264	997	0	pc/h

Volume ratio, VR 0.267

Configuration Characteristics

Number of maneuver lanes, NWL	2	ln
Interchange density, ID	0.75	int/mi
Minimum RF lane changes, LCRF	1	lc/pc
Minimum FR lane changes, LCFR	1	lc/pc
Minimum RR lane changes, LCRR		lc/pc
Minimum weaving lane changes, LCMIN	1261	lc/h
Weaving lane changes, LCW	1456	lc/h
Non-weaving vehicle index, INW	182	
Non-weaving lane change, LCNW	323	lc/h
Total lane changes, LCALL	1779	lc/h

Weaving and Non-Weaving Speeds

Weaving intensity factor, W	0.472	
Average weaving speed, SW	45.6	mi/h
Average non-weaving speed, SNW	45.2	mi/h

Weaving Segment Speed, Density, Level of Service and Capacity

Weaving segment speed, S	45.3	mi/h
Weaving segment density, D	26.1	pc/mi/ln
Level of service, LOS	C	
Weaving segment v/c ratio	0.605	
Weaving segment flow rate, v	4726	pc/h
Weaving segment capacity, cW	7267	veh/h

Limitations on Weaving Segments

If limit reached, see note.

	Minimum	Maximum	Actual	Note
Weaving length (ft)	300	5231	700	a,b
		Maximum	Analyzed	
Density-based capacty, cIWL (pc/h/ln)		2300	1953	c
		Maximum	Analyzed	
v/c ratio		1.00	0.605	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 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

Phone: Fax:
E-mail:

Operational Analysis

Analyst: Caitlin Bowen
Agency/Co.:
Date Performed: 6/14/2013
Analysis Time Period: AM Off Peak Hour
Freeway/Dir of Travel: I-55 Westbound
Weaving Location: Cass Avenue Weave
Analysis Year:
Description:

Inputs

Segment Type	Freeway	
Weaving configuration	One-Sided	
Number of lanes, N	4	ln
Weaving segment length, LS	650	ft
Freeway free-flow speed, FFS	60	mi/h
Minimum segment speed, SMIN	15	mi/h
Freeway maximum capacity, cIFL	2300	pc/h/ln

Terrain type	Level	
Grade	0.00	%
Length	0.00	mi

Conversion to pc/h Under Base Conditions

	Volume Components				
	VFF	VRF	VFR	VRR	
Volume, V	4061	282	125	0	veh/h
Peak hour factor, PHF	0.95	0.95	0.95	0.95	
Peak 15-min volume, v15	1069	74	33	0	
Trucks and buses	15	15	15	15	%
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	0.930	0.930	0.930	0.930	
Driver population adjustment, fP	1.00	1.00	1.00	1.00	
Flow rate, v	4595	319	141	0	pc/h

Volume ratio, VR 0.091

Configuration Characteristics

Number of maneuver lanes, NWL	2	ln
Interchange density, ID	0.75	int/mi
Minimum RF lane changes, LCRF	1	lc/pc
Minimum FR lane changes, LCFR	1	lc/pc
Minimum RR lane changes, LCRR		lc/pc

Minimum weaving lane changes, LCMIN 460 lc/h
Weaving lane changes, LCW 643 lc/h
Non-weaving vehicle index, INW 224
Non-weaving lane change, LCNW 528 lc/h
Total lane changes, LCALL 1171 lc/h

_____Weaving and Non-Weaving Speeds_____

Weaving intensity factor, W 0.360
Average weaving speed, SW 48.1 mi/h
Average non-weaving speed, SNW 50.6 mi/h

_____Weaving Segment Speed, Density, Level of Service and Capacity_____

Weaving segment speed, S 50.4 mi/h
Weaving segment density, D 25.1 pc/mi/ln
Level of service, LOS C
Weaving segment v/c ratio 0.606
Weaving segment flow rate, v 5055 pc/h
Weaving segment capacity, cW 7762 veh/h

_____Limitations on Weaving Segments_____

If limit reached, see note.

	Minimum	Maximum	Actual	Note
Weaving length (ft)	300	3452	650	a,b
		Maximum	Analyzed	
Density-based capacty, cIWL (pc/h/ln)		2300	2086	c
		Maximum	Analyzed	
v/c ratio		1.00	0.606	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 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

Phone: Fax:
E-mail:

Operational Analysis

Analyst: Caitlin Bowen
Agency/Co.:
Date Performed: 6/14/2013
Analysis Time Period: AM Off Peak Hour
Freeway/Dir of Travel: I-55 Westbound
Weaving Location: County Line Rd Weave
Analysis Year:
Description:

Inputs

Segment Type	Freeway	
Weaving configuration	One-Sided	
Number of lanes, N	4	ln
Weaving segment length, LS	700	ft
Freeway free-flow speed, FFS	60	mi/h
Minimum segment speed, SMIN	15	mi/h
Freeway maximum capacity, cIFL	2300	pc/h/ln

Terrain type	Level	
Grade	0.00	%
Length	0.00	mi

Conversion to pc/h Under Base Conditions

	Volume Components				
	VFF	VRF	VFR	VRR	
Volume, V	3941	91	357	0	veh/h
Peak hour factor, PHF	0.95	0.95	0.95	0.95	
Peak 15-min volume, v15	1037	24	94	0	
Trucks and buses	15	15	15	15	%
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	0.930	0.930	0.930	0.930	
Driver population adjustment, fP	1.00	1.00	1.00	1.00	
Flow rate, v	4460	103	404	0	pc/h

Volume ratio, VR 0.102

Configuration Characteristics

Number of maneuver lanes, NWL	2	ln
Interchange density, ID	0.75	int/mi
Minimum RF lane changes, LCRF	1	lc/pc
Minimum FR lane changes, LCFR	1	lc/pc
Minimum RR lane changes, LCRR		lc/pc

Minimum weaving lane changes, LCMIN 507 lc/h
Weaving lane changes, LCW 702 lc/h
Non-weaving vehicle index, INW 234
Non-weaving lane change, LCNW 528 lc/h
Total lane changes, LCALL 1230 lc/h

_____Weaving and Non-Weaving Speeds_____

Weaving intensity factor, W 0.353
Average weaving speed, SW 48.3 mi/h
Average non-weaving speed, SNW 50.4 mi/h

_____Weaving Segment Speed, Density, Level of Service and Capacity_____

Weaving segment speed, S 50.2 mi/h
Weaving segment density, D 24.8 pc/mi/ln
Level of service, LOS C
Weaving segment v/c ratio 0.597
Weaving segment flow rate, v 4967 pc/h
Weaving segment capacity, cW 7743 veh/h

_____Limitations on Weaving Segments_____

If limit reached, see note.

	Minimum	Maximum	Actual	Note
Weaving length (ft)	300	3560	700	a,b
	Maximum	Analyzed		
Density-based capacty, cIWL (pc/h/ln)	2300	2081		c
	Maximum	Analyzed		
v/c ratio	1.00	0.597		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 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

Phone: Fax:
E-mail:

Operational Analysis

Analyst: Caitlin Bowen
Agency/Co.:
Date Performed: 6/14/2013
Analysis Time Period: AM Off Peak Hour
Freeway/Dir of Travel: I-55 Westbound
Weaving Location: I-294/Joliet to County Line Rd
Analysis Year:
Description:

Inputs

Segment Type	Freeway	
Weaving configuration	One-Sided	
Number of lanes, N	4	ln
Weaving segment length, LS	575	ft
Freeway free-flow speed, FFS	60	mi/h
Minimum segment speed, SMIN	15	mi/h
Freeway maximum capacity, cIFL	2300	pc/h/ln

Terrain type	Level	
Grade	0.00	%
Length	0.00	mi

Conversion to pc/h Under Base Conditions

	Volume Components				
	VFF	VRF	VFR	VRR	
Volume, V	3912	386	400	39	veh/h
Peak hour factor, PHF	0.95	0.95	0.95	0.95	
Peak 15-min volume, v15	1029	102	105	10	
Trucks and buses	15	15	15	15	%
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	0.930	0.930	0.930	0.930	
Driver population adjustment, fP	1.00	1.00	1.00	1.00	
Flow rate, v	4427	437	453	44	pc/h

Volume ratio, VR 0.166

Configuration Characteristics

Number of maneuver lanes, NWL	2	ln
Interchange density, ID	0.75	int/mi
Minimum RF lane changes, LCRF	1	lc/pc
Minimum FR lane changes, LCFR	1	lc/pc
Minimum RR lane changes, LCRR		lc/pc

Minimum weaving lane changes, LCMIN 890 lc/h
Weaving lane changes, LCW 1052 lc/h
Non-weaving vehicle index, INW 193
Non-weaving lane change, LCNW 462 lc/h
Total lane changes, LCALL 1514 lc/h

_____Weaving and Non-Weaving Speeds_____
Weaving intensity factor, W 0.485
Average weaving speed, SW 45.3 mi/h
Average non-weaving speed, SNW 47.2 mi/h

_____Weaving Segment Speed, Density, Level of Service and Capacity_____
Weaving segment speed, S 46.8 mi/h
Weaving segment density, D 28.6 pc/mi/ln
Level of service, LOS D
Weaving segment v/c ratio 0.663
Weaving segment flow rate, v 5361 pc/h
Weaving segment capacity, cW 7527 veh/h

_____Limitations on Weaving Segments_____
If limit reached, see note.

	Minimum	Maximum	Actual	Note
Weaving length (ft)	300	4192	575	a,b
	Maximum	Analyzed		
Density-based capacty, cIWL (pc/h/ln)	2300	2023		c
	Maximum	Analyzed		
v/c ratio	1.00	0.663		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 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

Phone: Fax:
E-mail:

Operational Analysis

Analyst: Caitlin Bowen
Agency/Co.:
Date Performed: 6/14/2013
Analysis Time Period: AM Peak Hour
Freeway/Dir of Travel: I-55 Westbound
Weaving Location: I-294 NB to I-294 SB
Analysis Year:
Description:

Inputs

Segment Type	Freeway	
Weaving configuration	One-Sided	
Number of lanes, N	4	ln
Weaving segment length, LS	1700	ft
Freeway free-flow speed, FFS	60	mi/h
Minimum segment speed, SMIN	15	mi/h
Freeway maximum capacity, cIFL	2300	pc/h/ln

Terrain type	Level	
Grade	0.00	%
Length	0.00	mi

Conversion to pc/h Under Base Conditions

	Volume Components				
	VFF	VRF	VFR	VRR	
Volume, V	3853	459	962	0	veh/h
Peak hour factor, PHF	0.95	0.95	0.95	0.95	
Peak 15-min volume, v15	1014	121	253	0	
Trucks and buses	15	15	15	15	%
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	0.930	0.930	0.930	0.930	
Driver population adjustment, fP	1.00	1.00	1.00	1.00	
Flow rate, v	4360	519	1089	0	pc/h

Volume ratio, VR 0.269

Configuration Characteristics

Number of maneuver lanes, NWL	2	ln
Interchange density, ID	0.75	int/mi
Minimum RF lane changes, LCRF	1	lc/pc
Minimum FR lane changes, LCFR	1	lc/pc
Minimum RR lane changes, LCRR		lc/pc

Minimum weaving lane changes, LCMIN 1608 lc/h
Weaving lane changes, LCW 1973 lc/h
Non-weaving vehicle index, INW 556
Non-weaving lane change, LCNW 1049 lc/h
Total lane changes, LCALL 3022 lc/h

Weaving and Non-Weaving Speeds

Weaving intensity factor, W 0.356
Average weaving speed, SW 48.2 mi/h
Average non-weaving speed, SNW 41.3 mi/h

Weaving Segment Speed, Density, Level of Service and Capacity

Weaving segment speed, S 42.9 mi/h
Weaving segment density, D 34.8 pc/mi/ln
Level of service, LOS D
Weaving segment v/c ratio 0.736
Weaving segment flow rate, v 5968 pc/h
Weaving segment capacity, cW 7546 veh/h

Limitations on Weaving Segments

If limit reached, see note.

	Minimum	Maximum	Actual	Note
Weaving length (ft)	300	5258	1700	a,b
	Maximum	Analyzed		
Density-based capacty, cIWL (pc/h/ln)	2300	2028		c
	Maximum	Analyzed		
v/c ratio	1.00	0.736		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 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

Phone: Fax:
E-mail:

Operational Analysis

Analyst: Caitlin Bowen
Agency/Co.:
Date Performed: 6/14/2013
Analysis Time Period: PM Peak Hour
Freeway/Dir of Travel: I-55 Westbound
Weaving Location: Harlem Ave to Archer Ave
Analysis Year:
Description:

Inputs

Segment Type	Freeway	
Weaving configuration	One-Sided	
Number of lanes, N	4	ln
Weaving segment length, LS	2500	ft
Freeway free-flow speed, FFS	60	mi/h
Minimum segment speed, SMIN	15	mi/h
Freeway maximum capacity, cIFL	2300	pc/h/ln

Terrain type	Level	
Grade	0.00	%
Length	0.00	mi

Conversion to pc/h Under Base Conditions

	Volume Components				
	VFF	VRF	VFR	VRR	
Volume, V	3312	258	287	0	veh/h
Peak hour factor, PHF	0.95	0.95	0.95	0.95	
Peak 15-min volume, v15	872	68	76	0	
Trucks and buses	15	15	15	15	%
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	0.930	0.930	0.930	0.930	
Driver population adjustment, fP	1.00	1.00	1.00	1.00	
Flow rate, v	3748	292	325	0	pc/h

Volume ratio, VR 0.141

Configuration Characteristics

Number of maneuver lanes, NWL	2	ln
Interchange density, ID	0.75	int/mi
Minimum RF lane changes, LCRF	1	lc/pc
Minimum FR lane changes, LCFR	1	lc/pc
Minimum RR lane changes, LCRR		lc/pc

Minimum weaving lane changes, LCMIN 617 lc/h
Weaving lane changes, LCW 1075 lc/h
Non-weaving vehicle index, INW 703
Non-weaving lane change, LCNW 1357 lc/h
Total lane changes, LCALL 2432 lc/h

_____Weaving and Non-Weaving Speeds_____
Weaving intensity factor, W 0.221
Average weaving speed, SW 51.9 mi/h
Average non-weaving speed, SNW 50.3 mi/h

_____Weaving Segment Speed, Density, Level of Service and Capacity_____
Weaving segment speed, S 50.5 mi/h
Weaving segment density, D 21.6 pc/mi/ln
Level of service, LOS C
Weaving segment v/c ratio 0.499
Weaving segment flow rate, v 4365 pc/h
Weaving segment capacity, cW 8145 veh/h

_____Limitations on Weaving Segments_____
If limit reached, see note.

	Minimum	Maximum	Actual	Note
Weaving length (ft)	300	3945	2500	a,b
	Maximum	Analyzed		
Density-based capacty, cIWL (pc/h/ln)	2300	2189		c
	Maximum	Analyzed		
v/c ratio	1.00	0.499		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 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.

Weave

Southbound PM

HCS 2010: Freeway Weaving Release 6.1

Phone: Fax:
E-mail:

Operational Analysis

Analyst:	Alex Ericksen
Agency/Co.:	
Date Performed:	1/13/2013
Analysis Time Period:	PM Peak Hour
Freeway/Dir of Travel:	I-55 Westbound
Weaving Location:	Lemont Rd Weave
Analysis Year:	
Description:	

Inputs

Segment Type	Freeway	
Weaving configuration	One-Sided	
Number of lanes, N	4	ln
Weaving segment length, LS	700	ft
Freeway free-flow speed, FFS	60	mi/h
Minimum segment speed, SMIN	15	mi/h
Freeway maximum capacity, cIFL	2300	pc/h/ln
Terrain type	Level	
Grade	0.00	%
Length	0.00	mi

Conversion to pc/h Under Base Conditions

	Volume Components				
	VFF	VRF	VFR	VRR	
Volume, V	3957	100	557	0	veh/h
Peak hour factor, PHF	0.95	0.95	0.95	0.95	
Peak 15-min volume, v15	1041	26	147	0	
Trucks and buses	7	7	7	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	0.966	0.966	0.966	0.966	
Driver population adjustment, fP	1.00	1.00	1.00	1.00	
Flow rate, v	4311	109	607	0	pc/h

Volume ratio, VR	0.142	

Configuration Characteristics

Number of maneuver lanes, NWL	2	ln
Interchange density, ID	0.75	int/mi
Minimum RF lane changes, LCRF	1	lc/pc
Minimum FR lane changes, LCFR	1	lc/pc
Minimum RR lane changes, LCRR		lc/pc
Minimum weaving lane changes, LCMIN	716	lc/h
Weaving lane changes, LCW	911	lc/h
Non-weaving vehicle index, INW	226	
Non-weaving lane change, LCNW	497	lc/h
Total lane changes, LCALL	1408	lc/h

Weaving and Non-Weaving Speeds

Weaving intensity factor, W	0.392	
Average weaving speed, SW	47.3	mi/h
Average non-weaving speed, SNW	48.8	mi/h

Weaving Segment Speed, Density, Level of Service and Capacity

Weaving segment speed, S	48.6	mi/h
Weaving segment density, D	25.9	pc/mi/ln
Level of service, LOS	C	
Weaving segment v/c ratio	0.613	
Weaving segment flow rate, v	5027	pc/h
Weaving segment capacity, cW	7927	veh/h

Limitations on Weaving Segments

If limit reached, see note.

	Minimum	Maximum	Actual	Note
Weaving length (ft)	300	3956	700	a,b
		Maximum	Analyzed	
Density-based capacty, cIWL (pc/h/ln)		2300	2051	c
		Maximum	Analyzed	
v/c ratio		1.00	0.613	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 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

Phone: Fax:
E-mail:

Operational Analysis

Analyst: Caitlin Bowen
Agency/Co.:
Date Performed: 6/14/2013
Analysis Time Period: PM Peak Hour
Freeway/Dir of Travel: I-55 Westbound
Weaving Location: Cass Avenue Weave
Analysis Year:
Description:

Inputs

Segment Type	Freeway	
Weaving configuration	One-Sided	
Number of lanes, N	4	ln
Weaving segment length, LS	650	ft
Freeway free-flow speed, FFS	60	mi/h
Minimum segment speed, SMIN	15	mi/h
Freeway maximum capacity, cIFL	2300	pc/h/ln
Terrain type	Level	
Grade	0.00	%
Length	0.00	mi

Conversion to pc/h Under Base Conditions

	Volume Components				
	VFF	VRF	VFR	VRR	
Volume, V	4562	243	145	0	veh/h
Peak hour factor, PHF	0.95	0.95	0.95	0.95	
Peak 15-min volume, v15	1201	64	38	0	
Trucks and buses	7	7	7	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	0.966	0.966	0.966	0.966	
Driver population adjustment, fP	1.00	1.00	1.00	1.00	
Flow rate, v	4970	265	158	0	pc/h

Volume ratio, VR 0.078

Configuration Characteristics

Number of maneuver lanes, NWL	2	ln
Interchange density, ID	0.75	int/mi
Minimum RF lane changes, LCRF	1	lc/pc
Minimum FR lane changes, LCFR	1	lc/pc
Minimum RR lane changes, LCRR		lc/pc

Minimum weaving lane changes, LCMIN 423 lc/h
Weaving lane changes, LCW 606 lc/h
Non-weaving vehicle index, INW 242
Non-weaving lane change, LCNW 606 lc/h
Total lane changes, LCALL 1212 lc/h

Weaving and Non-Weaving Speeds

Weaving intensity factor, W 0.369
Average weaving speed, SW 47.9 mi/h
Average non-weaving speed, SNW 50.5 mi/h

Weaving Segment Speed, Density, Level of Service and Capacity

Weaving segment speed, S 50.3 mi/h
Weaving segment density, D 26.8 pc/mi/ln
Level of service, LOS C
Weaving segment v/c ratio 0.644
Weaving segment flow rate, v 5393 pc/h
Weaving segment capacity, cW 8097 veh/h

Limitations on Weaving Segments

If limit reached, see note.

	Minimum	Maximum	Actual	Note
Weaving length (ft)	300	3332	650	a,b
		Maximum	Analyzed	
Density-based capacty, cIWL (pc/h/ln)		2300	2095	c
		Maximum	Analyzed	
v/c ratio		1.00	0.644	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 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

Phone: Fax:
E-mail:

Operational Analysis

Analyst: Caitlin Bowen
Agency/Co.:
Date Performed: 6/14/2013
Analysis Time Period: PM Peak Hour
Freeway/Dir of Travel: I-55 Westbound
Weaving Location: County Line Rd Weave
Analysis Year:
Description:

Inputs

Segment Type: Freeway
Weaving configuration: One-Sided
Number of lanes, N: 4 ln
Weaving segment length, LS: 700 ft
Freeway free-flow speed, FFS: 60 mi/h
Minimum segment speed, SMIN: 15 mi/h
Freeway maximum capacity, cIFL: 2300 pc/h/ln

Terrain type: Level
Grade: 0.00 %
Length: 0.00 mi

Conversion to pc/h Under Base Conditions

Volume Components	VFF	VRF	VFR	VRR	
Volume, V	4160	5	281	0	veh/h
Peak hour factor, PHF	0.95	0.95	0.95	0.95	
Peak 15-min volume, v15	1095	1	74	0	
Trucks and buses	7	7	7	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	0.966	0.966	0.966	0.966	
Driver population adjustment, fP	1.00	1.00	1.00	1.00	
Flow rate, v	4532	5	306	0	pc/h

Volume ratio, VR: 0.064

Configuration Characteristics

Number of maneuver lanes, NWL: 2 ln
Interchange density, ID: 0.75 int/mi
Minimum RF lane changes, LCRF: 1 lc/pc
Minimum FR lane changes, LCFR: 1 lc/pc
Minimum RR lane changes, LCRR: lc/pc

Minimum weaving lane changes, LCMIN	311	lc/h
Weaving lane changes, LCW	506	lc/h
Non-weaving vehicle index, INW	238	
Non-weaving lane change, LCNW	543	lc/h
Total lane changes, LCALL	1049	lc/h

Weaving and Non-Weaving Speeds

Weaving intensity factor, W	0.311	
Average weaving speed, SW	49.3	mi/h
Average non-weaving speed, SNW	51.9	mi/h

Weaving Segment Speed, Density, Level of Service and Capacity

Weaving segment speed, S	51.8	mi/h
Weaving segment density, D	23.4	pc/mi/ln
Level of service, LOS	C	
Weaving segment v/c ratio	0.574	
Weaving segment flow rate, v	4843	pc/h
Weaving segment capacity, cW	8151	veh/h

Limitations on Weaving Segments

If limit reached, see note.

	Minimum	Maximum	Actual	Note
Weaving length (ft)	300	3196	700	a,b
		Maximum	Analyzed	
Density-based capacty, cIWL (pc/h/ln)		2300	2109	c
		Maximum	Analyzed	
v/c ratio		1.00	0.574	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 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

Phone: Fax:
E-mail:

Operational Analysis

Analyst: Caitlin Bowen
Agency/Co.:
Date Performed: 6/14/2013
Analysis Time Period: PM Peak Hour
Freeway/Dir of Travel: I-55 Westbound
Weaving Location: I-294/Joliet to County Line Rd
Analysis Year:
Description:

Inputs

Segment Type	Freeway	
Weaving configuration	One-Sided	
Number of lanes, N	4	ln
Weaving segment length, LS	575	ft
Freeway free-flow speed, FFS	60	mi/h
Minimum segment speed, SMIN	15	mi/h
Freeway maximum capacity, cIFL	2300	pc/h/ln

Terrain type	Level	
Grade	0.00	%
Length	0.00	mi

Conversion to pc/h Under Base Conditions

	Volume Components				
	VFF	VRF	VFR	VRR	
Volume, V	3828	613	122	20	veh/h
Peak hour factor, PHF	0.95	0.95	0.95	0.95	
Peak 15-min volume, v15	1007	161	32	5	
Trucks and buses	7	7	7	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	0.966	0.966	0.966	0.966	
Driver population adjustment, fP	1.00	1.00	1.00	1.00	
Flow rate, v	4171	668	133	22	pc/h

Volume ratio, VR 0.160

Configuration Characteristics

Number of maneuver lanes, NWL	2	ln
Interchange density, ID	0.75	int/mi
Minimum RF lane changes, LCRF	1	lc/pc
Minimum FR lane changes, LCFR	1	lc/pc
Minimum RR lane changes, LCRR		lc/pc

Minimum weaving lane changes, LCMIN 801 lc/h
Weaving lane changes, LCW 963 lc/h
Non-weaving vehicle index, INW 181
Non-weaving lane change, LCNW 405 lc/h
Total lane changes, LCALL 1368 lc/h

_____Weaving and Non-Weaving Speeds_____

Weaving intensity factor, W 0.448
Average weaving speed, SW 46.1 mi/h
Average non-weaving speed, SNW 48.2 mi/h

_____Weaving Segment Speed, Density, Level of Service and Capacity_____

Weaving segment speed, S 47.9 mi/h
Weaving segment density, D 26.1 pc/mi/ln
Level of service, LOS C
Weaving segment v/c ratio 0.616
Weaving segment flow rate, v 4994 pc/h
Weaving segment capacity, cW 7838 veh/h

_____Limitations on Weaving Segments_____

If limit reached, see note.

	Minimum	Maximum	Actual	Note
Weaving length (ft)	300	4135	575	a,b
	Maximum	Analyzed		
Density-based capacty, cIWL (pc/h/ln)	2300	2028		c
	Maximum	Analyzed		
v/c ratio	1.00	0.616		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 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

Phone: Fax:
E-mail:

Operational Analysis

Analyst: Caitlin Bowen
Agency/Co.:
Date Performed: 6/14/2013
Analysis Time Period: AM Peak Hour
Freeway/Dir of Travel: I-55 Westbound
Weaving Location: I-294 NB to I-294 SB
Analysis Year:
Description:

Inputs

Segment Type	Freeway	
Weaving configuration	One-Sided	
Number of lanes, N	4	ln
Weaving segment length, LS	1700	ft
Freeway free-flow speed, FFS	60	mi/h
Minimum segment speed, SMIN	15	mi/h
Freeway maximum capacity, cIFL	2300	pc/h/ln

Terrain type	Level	
Grade	0.00	%
Length	0.00	mi

Conversion to pc/h Under Base Conditions

	Volume Components				
	VFF	VRF	VFR	VRR	
Volume, V	3374	576	488	0	veh/h
Peak hour factor, PHF	0.95	0.95	0.95	0.95	
Peak 15-min volume, v15	888	152	128	0	
Trucks and buses	7	7	7	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	0.966	0.966	0.966	0.966	
Driver population adjustment, fP	1.00	1.00	1.00	1.00	
Flow rate, v	3676	628	532	0	pc/h

Volume ratio, VR 0.240

Configuration Characteristics

Number of maneuver lanes, NWL	2	ln
Interchange density, ID	0.75	int/mi
Minimum RF lane changes, LCRF	1	lc/pc
Minimum FR lane changes, LCFR	1	lc/pc
Minimum RR lane changes, LCRR		lc/pc

Minimum weaving lane changes, LCMIN	1160	lc/h
Weaving lane changes, LCW	1525	lc/h
Non-weaving vehicle index, INW	469	
Non-weaving lane change, LCNW	908	lc/h
Total lane changes, LCALL	2433	lc/h

Weaving and Non-Weaving Speeds

Weaving intensity factor, W	0.300	
Average weaving speed, SW	49.6	mi/h
Average non-weaving speed, SNW	45.8	mi/h

Weaving Segment Speed, Density, Level of Service and Capacity

Weaving segment speed, S	46.7	mi/h
Weaving segment density, D	25.9	pc/mi/ln
Level of service, LOS	C	
Weaving segment v/c ratio	0.589	
Weaving segment flow rate, v	4836	pc/h
Weaving segment capacity, cW	7930	veh/h

Limitations on Weaving Segments

If limit reached, see note.

	Minimum	Maximum	Actual	Note
Weaving length (ft)	300	4948	1700	a,b
		Maximum	Analyzed	
Density-based capacty, cIWL (pc/h/ln)		2300	2052	c
		Maximum	Analyzed	
v/c ratio		1.00	0.589	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 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

Phone: Fax:
E-mail:

Operational Analysis

Analyst: Caitlin Bowen
Agency/Co.:
Date Performed: 6/14/2013
Analysis Time Period: PM Peak Hour
Freeway/Dir of Travel: I-55 Westbound
Weaving Location: Harlem Ave to Archer Ave
Analysis Year:
Description:

Inputs

Segment Type	Freeway	
Weaving configuration	One-Sided	
Number of lanes, N	4	ln
Weaving segment length, LS	2500	ft
Freeway free-flow speed, FFS	60	mi/h
Minimum segment speed, SMIN	15	mi/h
Freeway maximum capacity, cIFL	2300	pc/h/ln

Terrain type	Level	
Grade	0.00	%
Length	0.00	mi

Conversion to pc/h Under Base Conditions

	Volume Components				
	VFF	VRF	VFR	VRR	
Volume, V	3239	147	535	0	veh/h
Peak hour factor, PHF	0.95	0.95	0.95	0.95	
Peak 15-min volume, v15	852	39	141	0	
Trucks and buses	7	7	7	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	0.966	0.966	0.966	0.966	
Driver population adjustment, fP	1.00	1.00	1.00	1.00	
Flow rate, v	3529	160	583	0	pc/h

Volume ratio, VR 0.174

Configuration Characteristics

Number of maneuver lanes, NWL	2	ln
Interchange density, ID	0.75	int/mi
Minimum RF lane changes, LCRF	1	lc/pc
Minimum FR lane changes, LCFR	1	lc/pc
Minimum RR lane changes, LCRR		lc/pc

Minimum weaving lane changes, LCMIN 743 lc/h
Weaving lane changes, LCW 1201 lc/h
Non-weaving vehicle index, INW 662
Non-weaving lane change, LCNW 1312 lc/h
Total lane changes, LCALL 2513 lc/h

Weaving and Non-Weaving Speeds

Weaving intensity factor, W 0.227
Average weaving speed, SW 51.7 mi/h
Average non-weaving speed, SNW 49.5 mi/h

Weaving Segment Speed, Density, Level of Service and Capacity

Weaving segment speed, S 49.9 mi/h
Weaving segment density, D 21.4 pc/mi/ln
Level of service, LOS C
Weaving segment v/c ratio 0.494
Weaving segment flow rate, v 4272 pc/h
Weaving segment capacity, cW 8363 veh/h

Limitations on Weaving Segments

If limit reached, see note.

	Minimum	Maximum	Actual	Note
Weaving length (ft)	300	4271	2500	a,b
	Maximum	Analyzed		
Density-based capacty, cIWL (pc/h/ln)	2300	2164		c
	Maximum	Analyzed		
v/c ratio	1.00	0.494		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 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.

Technical Memorandum

I-55 PHASE I ENGINEERING STUDY

Veterans Memorial Tollway (I-355) to Dan Ryan Expressway (I-90/94)

BASE AND DESIGN YEAR NO-BUILD MAINLINE ROADWAY PERFORMANCE

APPENDIX B 2040 LEVEL OF SERVICE
AUGUST 2014

NOTE ON HCS DIRECTION REFERENCES:

I-55 is designated a north-south facility, and this orientation is used in this memorandum. Some of the HCS file output sheets refer to eastbound or westbound; when this is used “eastbound” refers to I-55 northbound and “westbound” refers to I-55 southbound.

Mainline Segment

Northbound AM

HCS 2010: Basic Freeway Segments Release 6.1

Phone: Fax:
E-mail:

Operational Analysis

Analyst:	Alex Ericksen
Agency or Company:	
Date Performed:	1/8/2014
Analysis Time Period:	AM Peak Hour
Freeway/Direction:	I-55 Eastbound
From/To:	I-355 to Lemont Rd
Jurisdiction:	
Analysis Year:	
Description:	

Flow Inputs and Adjustments

Volume, V	6301	veh/h
Peak-hour factor, PHF	0.95	
Peak 15-min volume, v15	1658	v
Trucks and buses	9	%
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	0.957	
Driver population factor, fp	1.00	
Flow rate, vp	1733	pc/h/ln

Speed Inputs and Adjustments

Lane width	-	ft
Right-side lateral clearance	-	ft
Total ramp density, TRD	-	ramps/mi
Number of lanes, N	4	
Free-flow speed:	Measured	
FFS or BFFS	60.0	mi/h
Lane width adjustment, fLW	-	mi/h
Lateral clearance adjustment, fLC	-	mi/h
TRD adjustment	-	mi/h
Free-flow speed, FFS	60.0	mi/h

LOS and Performance Measures

Flow rate, vp	1733	pc/h/ln
Free-flow speed, FFS	60.0	mi/h
Average passenger-car speed, S	59.7	mi/h
Number of lanes, N	4	
Density, D	29.0	pc/mi/ln
Level of service, LOS	D	

Overall results are not computed when free-flow speed is less than 55 mph.

BASIC FREEWAY SEGMENTS WORKSHEET

General Information

Analyst	*RK*
Agency or Company	*CDM Smith*
Date Performed	*8/30/13*
Analysis Time Period	*AM Peak*

Site Information

Highway/Direction of Travel	*I-55/NB*
From/To	*Lemont Rd/Cass Ave*
Jurisdiction	*DuPage Co.*
Analysis Year	*2040*

Project Description *IDOT I-55 Phase I Engg Study*

☑ Oper.(LOS) ☒ Des.(N) ☐ Planning Data

Flow Inputs

Volume, V	*6797*	veh/h	Peak-Hour Factor, PHF	*0.95*
AADT		veh/day	%Trucks and Buses, P_T	*12*
Peak-Hr Prop. of AADT, K			%RVs, P_R	*0*
Peak-Hr Direction Prop, D			General Terrain:	*Level*
DDHV = AADT x K x D		veh/h	Grade % Length Up/Down %	*mi*

Calculate Flow Adjustments

f_p	*1.00*	E_R	*1.2*
E_T	*1.5*	$f_{HV} = 1/[1+P_T(E_T - 1) + P_R(E_R - 1)]$	*0.943*

Speed Inputs

Lane Width		ft
Rt-Side Lat. Clearance		ft
Number of Lanes, N	*3*	
Total Ramp Density, TRD		ramps/mi
FFS (measured)	*60.0*	mph
Base free-flow Speed, BFFS		mph

Calc Speed Adj and FFS

f_{LW}		mph
f_{LC}		mph
TRD Adjustment		mph
FFS	*60.0*	mph

LOS and Performance Measures

Operational (LOS)

v_p = (V or DDHV) / (PHF x N x f_{HV} x f_p)	*2528*	pc/h/ln
S	*44.4*	mph
D = v_p / S	*57.0*	pc/mi/ln
LOS	*F*	

Design (N)

Design (N)

Design LOS	
v_p = (V or DDHV) / (PHF x N x f_{HV} x f_p)	pc/h/ln
S	mph
D = v_p / S	pc/mi/ln
Required Number of Lanes, N	

Glossary

N - Number of lanes	S - Speed
V - Hourly volume	D - Density
v_p - Flow rate	FFS - Free-flow speed
LOS - Level of service	BFFS - Base free-flow speed
DDHV - Directional design hour volume	

Factor Location

E_R - Exhibits 11-10, 11-12	f_{LW} - Exhibit 11-8
E_T - Exhibits 11-10, 11-11, 11-13	f_{LC} - Exhibit 11-9
f_p - Page 11-18	TRD - Page 11-11
LOS, S, FFS, v_p - Exhibits 11-2, 11-3	

BASIC FREEWAY SEGMENTS WORKSHEET

General Information		Site Information	
Analyst	*RK*	Highway/Direction of Travel	*I-55/NB*
Agency or Company	*CDM Smith*	From/To	*Cass/IL 83*
Date Performed	*8/30/13*	Jurisdiction	*DuPage Co.*
Analysis Time Period	*AM Peak*	Analysis Year	*2040*
Project Description	*IDOT I-55 Phase I Engg Study*		

☑ Oper.(LOS) ☐ Des.(N) ☐ Planning Data

Flow Inputs

Volume, V	*6586*	veh/h	Peak-Hour Factor, PHF	*0.95*
AADT		veh/day	%Trucks and Buses, P_T	*11*
Peak-Hr Prop. of AADT, K			%RVs, P_R	*0*
Peak-Hr Direction Prop, D			General Terrain:	*Level*
DDHV = AADT x K x D		veh/h	Grade % Length Up/Down %	*mi*

Calculate Flow Adjustments

f_p	*1.00*	E_R	*1.2*
E_T	*1.5*	$f_{HV} = 1/[1+P_T(E_T - 1) + P_R(E_R - 1)]$	*0.948*

Speed Inputs

Lane Width		ft
Rt-Side Lat. Clearance		ft
Number of Lanes, N	*3*	
Total Ramp Density, TRD		ramps/mi
FFS (measured)	*60.0*	mph
Base free-flow Speed, BFFS		mph

Calc Speed Adj and FFS

f_{LW}		mph
f_{LC}		mph
TRD Adjustment		mph
FFS	*60.0*	mph

LOS and Performance Measures

Operational (LOS)

v_p = (V or DDHV) / (PHF x N x f_{HV} x f_p)	*2438*	pc/h/ln
S	*47.2*	mph
D = v_p / S	*51.6*	pc/mi/ln
LOS	*F*	

Design (N)

Design (N)

Design LOS		
v_p = (V or DDHV) / (PHF x N x f_{HV} x f_p)		pc/h/ln
S		mph
D = v_p / S		pc/mi/ln
Required Number of Lanes, N		

Glossary

N - Number of lanes	S - Speed
V - Hourly volume	D - Density
v_p - Flow rate	FFS - Free-flow speed
LOS - Level of service	BFFS - Base free-flow speed
DDHV - Directional design hour volume	

Factor Location

E_R - Exhibits 11-10, 11-12	f_{LW} - Exhibit 11-8
E_T - Exhibits 10, 11-11, 11-13	f_{LC} - Exhibit 11-9
f_p - Page 11-18	TRD - Page 11-11
LOS, S, FFS, v_p - Exhibits 11-2, 11-3	

BASIC FREEWAY SEGMENTS WORKSHEET

General Information		Site Information	
Analyst	*RK*	Highway/Direction of Travel	*I-55/NB*
Agency or Company	*CDM Smith*	From/To	*IL 83/County Line Rd*
Date Performed	*8/30/13*	Jurisdiction	*DuPage Co.*
Analysis Time Period	*AM Peak*	Analysis Year	*2040*
Project Description	*IDOT I-55 Phase I Engg Study*		

☑ Oper.(LOS) ☐ Des.(N) ☐ Planning Data

Flow Inputs

Volume, V	*6520*	veh/h	Peak-Hour Factor, PHF	*0.95*
AADT		veh/day	%Trucks and Buses, P_T	*11*
Peak-Hr Prop. of AADT, K			%RVs, P_R	*0*
Peak-Hr Direction Prop, D			General Terrain:	*Level*
DDHV = AADT x K x D		veh/h	Grade % Length Up/Down %	*mi*

Calculate Flow Adjustments

f_p	*1.00*	E_R	*1.2*
E_T	*1.5*	$f_{HV} = 1/[1+P_T(E_T - 1) + P_R(E_R - 1)]$	*0.948*

Speed Inputs

Lane Width		ft
Rt-Side Lat. Clearance		ft
Number of Lanes, N	*3*	
Total Ramp Density, TRD		ramps/mi
FFS (measured)	*60.0*	mph
Base free-flow Speed, BFFS		mph

Calc Speed Adj and FFS

f_{LW}		mph
f_{LC}		mph
TRD Adjustment		mph
FFS	*60.0*	mph

LOS and Performance Measures

Operational (LOS)

v_p = (V or DDHV) / (PHF x N x f_{HV} x f_p)	*2414*	pc/h/ln
S	*48.0*	mph
D = v_p / S	*50.3*	pc/mi/ln
LOS	*F*	

Design (N)

Design (N)

Design LOS		
v_p = (V or DDHV) / (PHF x N x f_{HV} x f_p)		pc/h/ln
S		mph
D = v_p / S		pc/mi/ln
Required Number of Lanes, N		

Glossary

N - Number of lanes	S - Speed
V - Hourly volume	D - Density
v_p - Flow rate	FFS - Free-flow speed
LOS - Level of service	BFFS - Base free-flow speed
DDHV - Directional design hour volume	

Factor Location

E_R - Exhibits 11-10, 11-12	f_{LW} - Exhibit 11-8
E_T - Exhibits 10-10, 11-11, 11-13	f_{LC} - Exhibit 11-9
f_p - Page 11-18	TRD - Page 11-11
LOS, S, FFS, v_p - Exhibits 11-2, 11-3	

BASIC FREEWAY SEGMENTS WORKSHEET

General Information

Analyst	*RK*
Agency or Company	*CDM Smith*
Date Performed	*8/30/13*
Analysis Time Period	*AM Peak*

Site Information

Highway/Direction of Travel	*I-55/NB*
From/To	*County Line Rd/Joliet Rd*
Jurisdiction	*DuPage/Cook Co.*
Analysis Year	*2040*

Project Description *IDOT I-55 Phase I Engg Study*

☑ Oper.(LOS) ☑ Des.(N) ☐ Planning Data

Flow Inputs

Volume, V	*7405*	veh/h	Peak-Hour Factor, PHF	*0.95*
AADT		veh/day	%Trucks and Buses, P_T	*11*
Peak-Hr Prop. of AADT, K			%RVs, P_R	*0*
Peak-Hr Direction Prop, D			General Terrain:	*Level*
DDHV = AADT x K x D		veh/h	Grade % Length Up/Down %	*mi*

Calculate Flow Adjustments

f_p	*1.00*	E_R	*1.2*
E_T	*1.5*	$f_{HV} = 1/[1+P_T(E_T - 1) + P_R(E_R - 1)]$	*0.948*

Speed Inputs

Lane Width		ft
Rt-Side Lat. Clearance		ft
Number of Lanes, N	*3*	
Total Ramp Density, TRD		ramps/mi
FFS (measured)	*60.0*	mph
Base free-flow Speed, BFFS		mph

Calc Speed Adj and FFS

f_{LW}		mph
f_{LC}		mph
TRD Adjustment		mph
FFS	*60.0*	mph

LOS and Performance Measures

Operational (LOS)

v_p = (V or DDHV) / (PHF x N x f_{HV} x f_p)	*2741*	pc/h/ln
S	*36.4*	mph
D = v_p / S	*75.4*	pc/mi/ln
LOS	*F*	

Design (N)

Design (N)

Design LOS		
v_p = (V or DDHV) / (PHF x N x f_{HV} x f_p)		pc/h/ln
S		mph
D = v_p / S		pc/mi/ln
Required Number of Lanes, N		

Glossary

N - Number of lanes	S - Speed
V - Hourly volume	D - Density
v_p - Flow rate	FFS - Free-flow speed
LOS - Level of service	BFFS - Base free-flow speed
DDHV - Directional design hour volume	

Factor Location

E_R - Exhibits 11-10, 11-12	f_{LW} - Exhibit 11-8
E_T - Exhibits 10-10, 11-11, 11-13	f_{LC} - Exhibit 11-9
f_p - Page 11-18	TRD - Page 11-11
LOS, S, FFS, v_p - Exhibits 11-2, 11-3	

BASIC FREEWAY SEGMENTS WORKSHEET

General Information		Site Information	
Analyst	*RK*	Highway/Direction of Travel	*I-55/NB*
Agency or Company	*CDM Smith*	From/To	*Joliet Rd/I-294*
Date Performed	*8/30/13*	Jurisdiction	*DuPage/Cook Co.*
Analysis Time Period	*AM Peak*	Analysis Year	*2040*
Project Description	*IDOT I-55 Phase I Engg Study*		

☑ Oper.(LOS) ☐ Des.(N) ☐ Planning Data

Flow Inputs

Volume, V	*6318*	veh/h	Peak-Hour Factor, PHF	*0.95*
AADT		veh/day	%Trucks and Buses, P_T	*11*
Peak-Hr Prop. of AADT, K			%RVs, P_R	*0*
Peak-Hr Direction Prop, D			General Terrain:	*Level*
DDHV = AADT x K x D		veh/h	Grade % Length Up/Down %	*mi*

Calculate Flow Adjustments

f_p	*1.00*	E_R	*1.2*
E_T	*1.5*	$f_{HV} = 1/[1+P_T(E_T - 1) + P_R(E_R - 1)]$	*0.948*

Speed Inputs

Lane Width		ft
Rt-Side Lat. Clearance		ft
Number of Lanes, N	*3*	
Total Ramp Density, TRD		ramps/mi
FFS (measured)	*60.0*	mph
Base free-flow Speed, BFFS		mph

Calc Speed Adj and FFS

f_{LW}		mph
f_{LC}		mph
TRD Adjustment		mph
FFS	*60.0*	mph

LOS and Performance Measures

Operational (LOS)

v_p = (V or DDHV) / (PHF x N x f_{HV} x f_p)	*2339*	pc/h/ln
S	*50.1*	mph
D = v_p / S	*46.7*	pc/mi/ln
LOS	*F*	

Design (N)

Design (N)

Design LOS		
v_p = (V or DDHV) / (PHF x N x f_{HV} x f_p)		pc/h/ln
S		mph
D = v_p / S		pc/mi/ln
Required Number of Lanes, N		

Glossary

N - Number of lanes	S - Speed
V - Hourly volume	D - Density
v_p - Flow rate	FFS - Free-flow speed
LOS - Level of service	BFFS - Base free-flow speed
DDHV - Directional design hour volume	

Factor Location

E_R - Exhibits 11-10, 11-12	f_{LW} - Exhibit 11-8
E_T - Exhibits 10-10, 11-11, 11-13	f_{LC} - Exhibit 11-9
f_p - Page 11-18	TRD - Page 11-11
LOS, S, FFS, v_p - Exhibits 11-2, 11-3	

BASIC FREEWAY SEGMENTS WORKSHEET

General Information		Site Information	
Analyst	*RK*	Highway/Direction of Travel	*I-55/NB*
Agency or Company	*CDM Smith*	From/To	*Lagrange Rd/IL 171 Archer Ave*
Date Performed	*8/30/13*	Jurisdiction	*Cook Co.*
Analysis Time Period	*AM Peak*	Analysis Year	*2040*

Project Description *IDOT I-55 Phase I Engg Study*

☑ Oper.(LOS) ☒ Des.(N) ☐ Planning Data

Flow Inputs

Volume, V	*6362*	veh/h	Peak-Hour Factor, PHF	*0.95*
AADT		veh/day	%Trucks and Buses, P_T	*11*
Peak-Hr Prop. of AADT, K			%RVs, P_R	*0*
Peak-Hr Direction Prop, D			General Terrain:	*Level*
DDHV = AADT x K x D		veh/h	Grade % Length Up/Down %	*mi*

Calculate Flow Adjustments

f_p	*1.00*	E_R	*1.2*
E_T	*1.5*	$f_{HV} = 1/[1+P_T(E_T - 1) + P_R(E_R - 1)]$	*0.948*

Speed Inputs

Lane Width		ft
Rt-Side Lat. Clearance		ft
Number of Lanes, N	*3*	
Total Ramp Density, TRD		ramps/mi
FFS (measured)	*60.0*	mph
Base free-flow Speed, BFFS		mph

Calc Speed Adj and FFS

f_{LW}		mph
f_{LC}		mph
TRD Adjustment		mph
FFS	*60.0*	mph

LOS and Performance Measures

Operational (LOS)

v_p = (V or DDHV) / (PHF x N x f_{HV} x f_p)	*2355*	pc/h/ln
S	*49.6*	mph
D = v_p / S	*47.4*	pc/mi/ln
LOS	*F*	

Design (N)

Design (N)

Design LOS	
v_p = (V or DDHV) / (PHF x N x f_{HV} x f_p)	pc/h/ln
S	mph
D = v_p / S	pc/mi/ln
Required Number of Lanes, N	

Glossary

N - Number of lanes	S - Speed
V - Hourly volume	D - Density
v_p - Flow rate	FFS - Free-flow speed
LOS - Level of service	BFFS - Base free-flow speed
DDHV - Directional design hour volume	

Factor Location

E_R - Exhibits 11-10, 11-12	f_{LW} - Exhibit 11-8
E_T - Exhibits 10-10, 11-11, 11-13	f_{LC} - Exhibit 11-9
f_p - Page 11-18	TRD - Page 11-11
LOS, S, FFS, v_p - Exhibits 11-2, 11-3	

BASIC FREEWAY SEGMENTS WORKSHEET

General Information		Site Information	
Analyst	*RK*	Highway/Direction of Travel	*I-55/NB*
Agency or Company	*CDM Smith*	From/To	*Harlem Ave/Central Ave*
Date Performed	*8/30/13*	Jurisdiction	*Cook Co.*
Analysis Time Period	*AM Peak*	Analysis Year	*2040*

Project Description *IDOT I-55 Phase I Engg Study*

☑ Oper.(LOS) ☑ Des.(N) ☐ Planning Data

Flow Inputs

Volume, V	*6584*	veh/h	Peak-Hour Factor, PHF	*0.95*
AADT		veh/day	%Trucks and Buses, P_T	*14*
Peak-Hr Prop. of AADT, K			%RVs, P_R	*0*
Peak-Hr Direction Prop, D			General Terrain:	*Level*
DDHV = AADT x K x D		veh/h	Grade % Length Up/Down %	*mi*

Calculate Flow Adjustments

f_p	*1.00*	E_R	*1.2*
E_T	*1.5*	$f_{HV} = 1/[1+P_T(E_T - 1) + P_R(E_R - 1)]$	*0.935*

Speed Inputs

Lane Width		ft
Rt-Side Lat. Clearance		ft
Number of Lanes, N	*3*	
Total Ramp Density, TRD		ramps/mi
FFS (measured)	*60.0*	mph
Base free-flow Speed, BFFS		mph

Calc Speed Adj and FFS

f_{LW}		mph
f_{LC}		mph
TRD Adjustment		mph
FFS	*60.0*	mph

LOS and Performance Measures

Operational (LOS)

v_p = (V or DDHV) / (PHF x N x f_{HV} x f_p)	*2472*	pc/h/ln
S	*46.2*	mph
D = v_p / S	*53.5*	pc/mi/ln
LOS	*F*	

Design (N)

Design (N)

Design LOS		
v_p = (V or DDHV) / (PHF x N x f_{HV} x f_p)		pc/h/ln
S		mph
D = v_p / S		pc/mi/ln
Required Number of Lanes, N		

Glossary

N - Number of lanes	S - Speed
V - Hourly volume	D - Density
v_p - Flow rate	FFS - Free-flow speed
LOS - Level of service	BFFS - Base free-flow speed
DDHV - Directional design hour volume	

Factor Location

E_R - Exhibits 11-10, 11-12	f_{LW} - Exhibit 11-8
E_T - Exhibits 11-10, 11-11, 11-13	f_{LC} - Exhibit 11-9
f_p - Page 11-18	TRD - Page 11-11
LOS, S, FFS, v_p - Exhibits 11-2, 11-3	

BASIC FREEWAY SEGMENTS WORKSHEET

General Information		Site Information	
Analyst	*RK*	Highway/Direction of Travel	*I-55/NB*
Agency or Company	*CDM Smith*	From/To	*Central Ave/Cicero Ave*
Date Performed	*8/30/13*	Jurisdiction	*Cook Co.*
Analysis Time Period	*AM Peak*	Analysis Year	*2040*
Project Description	*IDOT I-55 Phase I Engg Study*		

☑ Oper.(LOS) ☐ Des.(N) ☐ Planning Data

Flow Inputs

Volume, V	*6244*	veh/h	Peak-Hour Factor, PHF	*0.95*
AADT		veh/day	%Trucks and Buses, P_T	*14*
Peak-Hr Prop. of AADT, K			%RVs, P_R	*0*
Peak-Hr Direction Prop, D			General Terrain:	*Level*
DDHV = AADT x K x D		veh/h	Grade % Length Up/Down %	*mi*

Calculate Flow Adjustments

f_p	*1.00*	E_R	*1.2*
E_T	*1.5*	$f_{HV} = 1/[1+P_T(E_T - 1) + P_R(E_R - 1)]$	*0.935*

Speed Inputs

Lane Width		ft
Rt-Side Lat. Clearance		ft
Number of Lanes, N	*3*	
Total Ramp Density, TRD		ramps/mi
FFS (measured)	*60.0*	mph
Base free-flow Speed, BFFS		mph

Calc Speed Adj and FFS

f_{LW}		mph
f_{LC}		mph
TRD Adjustment		mph
FFS	*60.0*	mph

LOS and Performance Measures

Operational (LOS)

v_p = (V or DDHV) / (PHF x N x f_{HV} x f_p)	*2344*	pc/h/ln
S	*49.9*	mph
D = v_p / S	*46.9*	pc/mi/ln
LOS	*F*	

Design (N)

Design (N)

Design LOS		
v_p = (V or DDHV) / (PHF x N x f_{HV} x f_p)		pc/h/ln
S		mph
D = v_p / S		pc/mi/ln
Required Number of Lanes, N		

Glossary

N - Number of lanes	S - Speed
V - Hourly volume	D - Density
v_p - Flow rate	FFS - Free-flow speed
LOS - Level of service	BFFS - Base free-flow speed
DDHV - Directional design hour volume	

Factor Location

E_R - Exhibits 11-10, 11-12	f_{LW} - Exhibit 11-8
E_T - Exhibits 10-10, 11-11, 11-13	f_{LC} - Exhibit 11-9
f_p - Page 11-18	TRD - Page 11-11
LOS, S, FFS, v_p - Exhibits 11-2, 11-3	

BASIC FREEWAY SEGMENTS WORKSHEET

General Information

Analyst	*RK*
Agency or Company	*CDM Smith*
Date Performed	*8/30/13*
Analysis Time Period	*AM Peak*

Site Information

Highway/Direction of Travel	*I-55/NB*
From/To	*Cicero Ave/Pulaski Rd*
Jurisdiction	*Cook Co.*
Analysis Year	*2040*

Project Description *IDOT I-55 Phase I Engg Study*

☑ Oper.(LOS) ☐ Des.(N) ☐ Planning Data

Flow Inputs

Volume, V	*6552*	veh/h	Peak-Hour Factor, PHF	*0.95*
AADT		veh/day	%Trucks and Buses, P_T	*14*
Peak-Hr Prop. of AADT, K			%RVs, P_R	*0*
Peak-Hr Direction Prop, D			General Terrain:	*Level*
DDHV = AADT x K x D		veh/h	Grade % Length Up/Down %	*mi*

Calculate Flow Adjustments

f_p	*1.00*	E_R	*1.2*
E_T	*1.5*	$f_{HV} = 1/[1+P_T(E_T - 1) + P_R(E_R - 1)]$	*0.935*

Speed Inputs

Lane Width		ft
Rt-Side Lat. Clearance		ft
Number of Lanes, N	*3*	
Total Ramp Density, TRD		ramps/mi
FFS (measured)	*60.0*	mph
Base free-flow Speed, BFFS		mph

Calc Speed Adj and FFS

f_{LW}		mph
f_{LC}		mph
TRD Adjustment		mph
FFS	*60.0*	mph

LOS and Performance Measures

Operational (LOS)

v_p = (V or DDHV) / (PHF x N x f_{HV} x f_p)	*2460*	pc/h/ln
S	*46.6*	mph
D = v_p / S	*52.8*	pc/mi/ln
LOS	*F*	

Design (N)

Design (N)

Design LOS	
v_p = (V or DDHV) / (PHF x N x f_{HV} x f_p)	pc/h/ln
S	mph
D = v_p / S	pc/mi/ln
Required Number of Lanes, N	

Glossary

N - Number of lanes	S - Speed
V - Hourly volume	D - Density
v_p - Flow rate	FFS - Free-flow speed
LOS - Level of service	BFFS - Base free-flow speed
DDHV - Directional design hour volume	

Factor Location

E_R - Exhibits 11-10, 11-12	f_{LW} - Exhibit 11-8
E_T - Exhibits 10-10, 11-11, 11-13	f_{LC} - Exhibit 11-9
f_p - Page 11-18	TRD - Page 11-11
LOS, S, FFS, v_p - Exhibits 11-2, 11-3	

BASIC FREEWAY SEGMENTS WORKSHEET

General Information		Site Information	
Analyst	*RK*	Highway/Direction of Travel	*I-55/NB*
Agency or Company	*CDM Smith*	From/To	*Pulaski Rd/Kedzie Ave*
Date Performed	*8/30/13*	Jurisdiction	*Cook Co.*
Analysis Time Period	*AM Peak*	Analysis Year	*2040*

Project Description *IDOT I-55 Phase I Engg Study*

☑ Oper.(LOS) ☐ Des.(N) ☐ Planning Data

Flow Inputs

Volume, V	*7539*	veh/h	Peak-Hour Factor, PHF	*0.95*
AADT		veh/day	%Trucks and Buses, P_T	*14*
Peak-Hr Prop. of AADT, K			%RVs, P_R	*0*
Peak-Hr Direction Prop, D			General Terrain:	*Level*
DDHV = AADT x K x D		veh/h	Grade % Length Up/Down %	*mi*

Calculate Flow Adjustments

f_p	*1.00*	E_R	*1.2*
E_T	*1.5*	$f_{HV} = 1/[1+P_T(E_T - 1) + P_R(E_R - 1)]$	*0.935*

Speed Inputs

Lane Width		ft
Rt-Side Lat. Clearance		ft
Number of Lanes, N	*3*	
Total Ramp Density, TRD		ramps/mi
FFS (measured)	*60.0*	mph
Base free-flow Speed, BFFS		mph

Calc Speed Adj and FFS

f_{LW}		mph
f_{LC}		mph
TRD Adjustment		mph
FFS	*60.0*	mph

LOS and Performance Measures

Operational (LOS)

v_p = (V or DDHV) / (PHF x N x f_{HV} x f_p)	*2830*	pc/h/ln
S	*32.5*	mph
D = v_p / S	*87.0*	pc/mi/ln
LOS	*F*	

Design (N)

Design (N)

Design LOS	
v_p = (V or DDHV) / (PHF x N x f_{HV} x f_p)	pc/h/ln
S	mph
D = v_p / S	pc/mi/ln
Required Number of Lanes, N	

Glossary

N - Number of lanes	S - Speed
V - Hourly volume	D - Density
v_p - Flow rate	FFS - Free-flow speed
LOS - Level of service	BFFS - Base free-flow speed
DDHV - Directional design hour volume	

Factor Location

E_R - Exhibits 11-10, 11-12	f_{LW} - Exhibit 11-8
E_T - Exhibits 10-10, 11-11, 11-13	f_{LC} - Exhibit 11-9
f_p - Page 11-18	TRD - Page 11-11
LOS, S, FFS, v_p - Exhibits 11-2, 11-3	

BASIC FREEWAY SEGMENTS WORKSHEET

General Information

Analyst	*RK*
Agency or Company	*CDM Smith*
Date Performed	*8/30/13*
Analysis Time Period	*AM Peak*

Site Information

Highway/Direction of Travel	*I-55/NB*
From/To	*Kedzie Ave/California Ave*
Jurisdiction	*Cook Co.*
Analysis Year	*2040*

Project Description *IDOT I-55 Phase I Engg Study*

☑ Oper.(LOS) ☐ Des.(N) ☑ Planning Data

Flow Inputs

Volume, V	*6676*	veh/h	Peak-Hour Factor, PHF	*0.95*
AADT		veh/day	%Trucks and Buses, P_T	*14*
Peak-Hr Prop. of AADT, K			%RVs, P_R	*0*
Peak-Hr Direction Prop, D			General Terrain:	*Level*
DDHV = AADT x K x D		veh/h	Grade % Length Up/Down %	*mi*

Calculate Flow Adjustments

f_p	*1.00*	E_R	*1.2*
E_T	*1.5*	$f_{HV} = 1/[1+P_T(E_T - 1) + P_R(E_R - 1)]$	*0.935*

Speed Inputs

Lane Width		ft
Rt-Side Lat. Clearance		ft
Number of Lanes, N	*3*	
Total Ramp Density, TRD		ramps/mi
FFS (measured)	*60.0*	mph
Base free-flow Speed, BFFS		mph

Calc Speed Adj and FFS

f_{LW}		mph
f_{LC}		mph
TRD Adjustment		mph
FFS	*60.0*	mph

LOS and Performance Measures

Operational (LOS)

v_p = (V or DDHV) / (PHF x N x f_{HV} x f_p)	*2506*	pc/h/ln
S	*45.1*	mph
D = v_p / S	*55.6*	pc/mi/ln
LOS	*F*	

Design (N)

Design (N)

Design LOS	
v_p = (V or DDHV) / (PHF x N x f_{HV} x f_p)	pc/h/ln
S	mph
D = v_p / S	pc/mi/ln
Required Number of Lanes, N	

Glossary

N - Number of lanes	S - Speed
V - Hourly volume	D - Density
v_p - Flow rate	FFS - Free-flow speed
LOS - Level of service	BFFS - Base free-flow speed
DDHV - Directional design hour volume	

Factor Location

E_R - Exhibits 11-10, 11-12	f_{LW} - Exhibit 11-8
E_T - Exhibits 10-10, 11-11, 11-13	f_{LC} - Exhibit 11-9
f_p - Page 11-18	TRD - Page 11-11
LOS, S, FFS, v_p - Exhibits 11-2, 11-3	

Mainline Segment

Northbound PM

HCS 2010: Basic Freeway Segments Release 6.1

Phone: Fax:
E-mail:

Operational Analysis

Analyst:	Alex Ericksen
Agency or Company:	
Date Performed:	1/8/2014
Analysis Time Period:	PM Peak Hour
Freeway/Direction:	I-55 Eastbound
From/To:	I-355 to Lemont Rd
Jurisdiction:	
Analysis Year:	
Description:	

Flow Inputs and Adjustments

Volume, V	5764	veh/h
Peak-hour factor, PHF	0.95	
Peak 15-min volume, v15	1517	v
Trucks and buses	11	%
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	0.948	
Driver population factor, fp	1.00	
Flow rate, vp	1600	pc/h/ln

Speed Inputs and Adjustments

Lane width	-	ft
Right-side lateral clearance	-	ft
Total ramp density, TRD	-	ramps/mi
Number of lanes, N	4	
Free-flow speed:	Measured	
FFS or BFFS	60.0	mi/h
Lane width adjustment, fLW	-	mi/h
Lateral clearance adjustment, fLC	-	mi/h
TRD adjustment	-	mi/h
Free-flow speed, FFS	60.0	mi/h

LOS and Performance Measures

Flow rate, vp	1600	pc/h/ln
Free-flow speed, FFS	60.0	mi/h
Average passenger-car speed, S	60.0	mi/h
Number of lanes, N	4	
Density, D	26.7	pc/mi/ln
Level of service, LOS	D	

Overall results are not computed when free-flow speed is less than 55 mph.

BASIC FREEWAY SEGMENTS WORKSHEET

General Information

Analyst	*RK*
Agency or Company	*CDM Smith*
Date Performed	*8/30/13*
Analysis Time Period	*PM Peak*

Site Information

Highway/Direction of Travel	*I-55/NB*
From/To	*Lemont Rd/Cass Ave*
Jurisdiction	*DuPage Co.*
Analysis Year	*2040*

Project Description *IDOT I-55 Phase I Engg Study*

☑ Oper.(LOS) ☒ Des.(N) ☐ Planning Data

Flow Inputs

Volume, V	*5886*	veh/h	Peak-Hour Factor, PHF	*0.95*
AADT		veh/day	%Trucks and Buses, P_T	*12*
Peak-Hr Prop. of AADT, K			%RVs, P_R	*0*
Peak-Hr Direction Prop, D			General Terrain:	*Level*
DDHV = AADT x K x D		veh/h	Grade % Length Up/Down %	*mi*

Calculate Flow Adjustments

f_p	*1.00*	E_R	*1.2*
E_T	*1.5*	$f_{HV} = 1/[1+P_T(E_T - 1) + P_R(E_R - 1)]$	*0.943*

Speed Inputs

Lane Width		ft
Rt-Side Lat. Clearance		ft
Number of Lanes, N	*3*	
Total Ramp Density, TRD		ramps/mi
FFS (measured)	*60.0*	mph
Base free-flow Speed, BFFS		mph

Calc Speed Adj and FFS

f_{LW}		mph
f_{LC}		mph
TRD Adjustment		mph
FFS	*60.0*	mph

LOS and Performance Measures

Operational (LOS)

v_p = (V or DDHV) / (PHF x N x f_{HV} x f_p)	*2189*	pc/h/ln
S	*53.7*	mph
D = v_p / S	*40.8*	pc/mi/ln
LOS	*E*	

Design (N)

Design (N)

Design LOS	
v_p = (V or DDHV) / (PHF x N x f_{HV} x f_p)	pc/h/ln
S	mph
D = v_p / S	pc/mi/ln
Required Number of Lanes, N	

Glossary

N - Number of lanes	S - Speed
V - Hourly volume	D - Density
v_p - Flow rate	FFS - Free-flow speed
LOS - Level of service	BFFS - Base free-flow speed
DDHV - Directional design hour volume	

Factor Location

E_R - Exhibits 11-10, 11-12	f_{LW} - Exhibit 11-8
E_T - Exhibits 10-10, 11-11, 11-13	f_{LC} - Exhibit 11-9
f_p - Page 11-18	TRD - Page 11-11
LOS, S, FFS, v_p - Exhibits 11-2, 11-3	

BASIC FREEWAY SEGMENTS WORKSHEET

General Information		Site Information	
Analyst	*RK*	Highway/Direction of Travel	*I-55/NB*
Agency or Company	*CDM Smith*	From/To	*Cass/IL 83*
Date Performed	*8/30/13*	Jurisdiction	*DuPage Co.*
Analysis Time Period	*PM Peak*	Analysis Year	*2040*
Project Description	*IDOT I-55 Phase I Engg Study*		

☑ Oper.(LOS) ☐ Des.(N) ☐ Planning Data

Flow Inputs

Volume, V	*6452*	veh/h	Peak-Hour Factor, PHF	*0.95*
AADT		veh/day	%Trucks and Buses, P_T	*11*
Peak-Hr Prop. of AADT, K			%RVs, P_R	*0*
Peak-Hr Direction Prop, D			General Terrain:	*Level*
DDHV = AADT x K x D		veh/h	Grade % Length Up/Down %	*mi*

Calculate Flow Adjustments

f_p	*1.00*	E_R	*1.2*
E_T	*1.5*	$f_{HV} = 1/[1+P_T(E_T - 1) + P_R(E_R - 1)]$	*0.948*

Speed Inputs

Lane Width		ft
Rt-Side Lat. Clearance		ft
Number of Lanes, N	*3*	
Total Ramp Density, TRD		ramps/mi
FFS (measured)	*60.0*	mph
Base free-flow Speed, BFFS		mph

Calc Speed Adj and FFS

f_{LW}		mph
f_{LC}		mph
TRD Adjustment		mph
FFS	*60.0*	mph

LOS and Performance Measures

Operational (LOS)

v_p = (V or DDHV) / (PHF x N x f_{HV} x f_p)	*2388*	pc/h/ln
S	*48.7*	mph
D = v_p / S	*49.0*	pc/mi/ln
LOS	*F*	

Design (N)

Design (N)

Design LOS	
v_p = (V or DDHV) / (PHF x N x f_{HV} x f_p)	pc/h/ln
S	mph
D = v_p / S	pc/mi/ln
Required Number of Lanes, N	

Glossary

N - Number of lanes	S - Speed
V - Hourly volume	D - Density
v_p - Flow rate	FFS - Free-flow speed
LOS - Level of service	BFFS - Base free-flow speed
DDHV - Directional design hour volume	

Factor Location

E_R - Exhibits 11-10, 11-12	f_{LW} - Exhibit 11-8
E_T - Exhibits 10-10, 11-11, 11-13	f_{LC} - Exhibit 11-9
f_p - Page 11-18	TRD - Page 11-11
LOS, S, FFS, v_p - Exhibits 11-2, 11-3	

BASIC FREEWAY SEGMENTS WORKSHEET

General Information		Site Information	
Analyst	*RK*	Highway/Direction of Travel	*I-55/NB*
Agency or Company	*CDM Smith*	From/To	*IL 83/County Line Rd*
Date Performed	*8/30/13*	Jurisdiction	*DuPage Co.*
Analysis Time Period	*PM Peak*	Analysis Year	*2040*
Project Description	*IDOT I-55 Phase I Engg Study*		

☑ Oper.(LOS) ☐ Des.(N) ☐ Planning Data

Flow Inputs

Volume, V	*6134*	veh/h	Peak-Hour Factor, PHF	*0.95*
AADT		veh/day	%Trucks and Buses, P_T	*10*
Peak-Hr Prop. of AADT, K			%RVs, P_R	*0*
Peak-Hr Direction Prop, D			General Terrain:	*Level*
DDHV = AADT x K x D		veh/h	Grade % Length Up/Down %	*mi*

Calculate Flow Adjustments

f_p	*1.00*	E_R	*1.2*
E_T	*1.5*	$f_{HV} = 1/[1+P_T(E_T - 1) + P_R(E_R - 1)]$	*0.952*

Speed Inputs

Lane Width		ft
Rt-Side Lat. Clearance		ft
Number of Lanes, N	*3*	
Total Ramp Density, TRD		ramps/mi
FFS (measured)	*60.0*	mph
Base free-flow Speed, BFFS		mph

Calc Speed Adj and FFS

f_{LW}		mph
f_{LC}		mph
TRD Adjustment		mph
FFS	*60.0*	mph

LOS and Performance Measures

Operational (LOS)

v_p = (V or DDHV) / (PHF x N x f_{HV} x f_p)	*2260*	pc/h/ln
S	*52.1*	mph
D = v_p / S	*43.4*	pc/mi/ln
LOS	*E*	

Design (N)

Design (N)

Design LOS		
v_p = (V or DDHV) / (PHF x N x f_{HV} x f_p)		pc/h/ln
S		mph
D = v_p / S		pc/mi/ln
Required Number of Lanes, N		

Glossary

N - Number of lanes	S - Speed
V - Hourly volume	D - Density
v_p - Flow rate	FFS - Free-flow speed
LOS - Level of service	BFFS - Base free-flow speed
DDHV - Directional design hour volume	

Factor Location

E_R - Exhibits 11-10, 11-12	f_{LW} - Exhibit 11-8
E_T - Exhibits 10-10, 11-11, 11-13	f_{LC} - Exhibit 11-9
f_p - Page 11-18	TRD - Page 11-11
LOS, S, FFS, v_p - Exhibits 11-2, 11-3	

BASIC FREEWAY SEGMENTS WORKSHEET

General Information		Site Information	
Analyst	*RK*	Highway/Direction of Travel	*I-55/NB*
Agency or Company	*CDM Smith*	From/To	*County Line Rd/Joliet Rd*
Date Performed	*8/30/13*	Jurisdiction	*DuPage/Cook Co.*
Analysis Time Period	*PM Peak*	Analysis Year	*2040*
Project Description	*IDOT I-55 Phase I Engg Study*		

☑ Oper.(LOS) ☐ Des.(N) ☐ Planning Data

Flow Inputs

Volume, V	*8127*	veh/h	Peak-Hour Factor, PHF	*0.95*
AADT		veh/day	%Trucks and Buses, P_T	*10*
Peak-Hr Prop. of AADT, K			%RVs, P_R	*0*
Peak-Hr Direction Prop, D			General Terrain:	*Level*
DDHV = AADT x K x D		veh/h	Grade % Length Up/Down %	*mi*

Calculate Flow Adjustments

f_p	*1.00*	E_R	*1.2*
E_T	*1.5*	$f_{HV} = 1/[1+P_T(E_T - 1) + P_R(E_R - 1)]$	*0.952*

Speed Inputs

Lane Width		ft
Rt-Side Lat. Clearance		ft
Number of Lanes, N	*3*	
Total Ramp Density, TRD		ramps/mi
FFS (measured)	*60.0*	mph
Base free-flow Speed, BFFS		mph

Calc Speed Adj and FFS

f_{LW}		mph
f_{LC}		mph
TRD Adjustment		mph
FFS	*60.0*	mph

LOS and Performance Measures

Operational (LOS)

v_p = (V or DDHV) / (PHF x N x f_{HV} x f_p)	*2994*	pc/h/ln
S	*24.7*	mph
D = v_p / S	*121.2*	pc/mi/ln
LOS	*F*	

Design (N)

Design (N)

Design LOS	
v_p = (V or DDHV) / (PHF x N x f_{HV} x f_p)	pc/h/ln
S	mph
D = v_p / S	pc/mi/ln
Required Number of Lanes, N	

Glossary

N - Number of lanes	S - Speed
V - Hourly volume	D - Density
v_p - Flow rate	FFS - Free-flow speed
LOS - Level of service	BFFS - Base free-flow speed
DDHV - Directional design hour volume	

Factor Location

E_R - Exhibits 11-10, 11-12	f_{LW} - Exhibit 11-8
E_T - Exhibits 10, 11-11, 11-13	f_{LC} - Exhibit 11-9
f_p - Page 11-18	TRD - Page 11-11
LOS, S, FFS, v_p - Exhibits 11-2, 11-3	

BASIC FREEWAY SEGMENTS WORKSHEET

General Information		Site Information	
Analyst	*RK*	Highway/Direction of Travel	*I-55/NB*
Agency or Company	*CDM Smith*	From/To	*Joliet Rd/I-294*
Date Performed	*8/30/13*	Jurisdiction	*DuPage/Cook Co.*
Analysis Time Period	*PM Peak*	Analysis Year	*2040*

Project Description *IDOT I-55 Phase I Engg Study*

☑ Oper.(LOS) ☑ Des.(N) ☐ Planning Data

Flow Inputs

Volume, V	*7178*	veh/h	Peak-Hour Factor, PHF	*0.95*
AADT		veh/day	%Trucks and Buses, P_T	*10*
Peak-Hr Prop. of AADT, K			%RVs, P_R	*0*
Peak-Hr Direction Prop, D			General Terrain:	*Level*
DDHV = AADT x K x D		veh/h	Grade % Length Up/Down %	*mi*

Calculate Flow Adjustments

f_p	*1.00*	E_R	*1.2*
E_T	*1.5*	$f_{HV} = 1/[1+P_T(E_T - 1) + P_R(E_R - 1)]$	*0.952*

Speed Inputs

Lane Width		ft
Rt-Side Lat. Clearance		ft
Number of Lanes, N	*3*	
Total Ramp Density, TRD		ramps/mi
FFS (measured)	*60.0*	mph
Base free-flow Speed, BFFS		mph

Calc Speed Adj and FFS

f_{LW}		mph
f_{LC}		mph
TRD Adjustment		mph
FFS	*60.0*	mph

LOS and Performance Measures

Operational (LOS)

v_p = (V or DDHV) / (PHF x N x f_{HV} x f_p)	*2645*	pc/h/ln
S	*40.2*	mph
D = v_p / S	*65.8*	pc/mi/ln
LOS	*F*	

Design (N)

Design (N)

Design LOS	
v_p = (V or DDHV) / (PHF x N x f_{HV} x f_p)	pc/h/ln
S	mph
D = v_p / S	pc/mi/ln
Required Number of Lanes, N	

Glossary

N - Number of lanes	S - Speed
V - Hourly volume	D - Density
v_p - Flow rate	FFS - Free-flow speed
LOS - Level of service	BFFS - Base free-flow speed
DDHV - Directional design hour volume	

Factor Location

E_R - Exhibits 11-10, 11-12	f_{LW} - Exhibit 11-8
E_T - Exhibits 10-10, 11-11, 11-13	f_{LC} - Exhibit 11-9
f_p - Page 11-18	TRD - Page 11-11
LOS, S, FFS, v_p - Exhibits 11-2, 11-3	

BASIC FREEWAY SEGMENTS WORKSHEET

General Information

Analyst	*RK*
Agency or Company	*CDM Smith*
Date Performed	*8/30/13*
Analysis Time Period	*PM Peak*

Site Information

Highway/Direction of Travel	*I-55/NB*
From/To	*Lagrange Rd/IL 171 Archer Ave*
Jurisdiction	*Cook Co.*
Analysis Year	*2040*

Project Description *IDOT I-55 Phase I Engg Study*

☑ Oper.(LOS) ☐ Des.(N) ☐ Planning Data

Flow Inputs

Volume, V	*6793*	veh/h	Peak-Hour Factor, PHF	*0.95*
AADT		veh/day	%Trucks and Buses, P_T	*10*
Peak-Hr Prop. of AADT, K			%RVs, P_R	*0*
Peak-Hr Direction Prop, D			General Terrain:	*Level*
DDHV = AADT x K x D		veh/h	Grade % Length Up/Down %	*mi*

Calculate Flow Adjustments

f_p	*1.00*	E_R	*1.2*
E_T	*1.5*	$f_{HV} = 1/[1+P_T(E_T - 1) + P_R(E_R - 1)]$	*0.952*

Speed Inputs

Lane Width		ft
Rt-Side Lat. Clearance		ft
Number of Lanes, N	*3*	
Total Ramp Density, TRD		ramps/mi
FFS (measured)	*60.0*	mph
Base free-flow Speed, BFFS		mph

Calc Speed Adj and FFS

f_{LW}		mph
f_{LC}		mph
TRD Adjustment		mph
FFS	*60.0*	mph

LOS and Performance Measures

Operational (LOS)

v_p = (V or DDHV) / (PHF x N x f_{HV} x f_p)	*2503*	pc/h/ln
S	*45.2*	mph
D = v_p / S	*55.4*	pc/mi/ln
LOS	*F*	

Design (N)

Design (N)

Design LOS	
v_p = (V or DDHV) / (PHF x N x f_{HV} x f_p)	pc/h/ln
S	mph
D = v_p / S	pc/mi/ln
Required Number of Lanes, N	

Glossary

N - Number of lanes	S - Speed
V - Hourly volume	D - Density
v_p - Flow rate	FFS - Free-flow speed
LOS - Level of service	BFFS - Base free-flow speed
DDHV - Directional design hour volume	

Factor Location

E_R - Exhibits 11-10, 11-12	f_{LW} - Exhibit 11-8
E_T - Exhibits 10-11, 11-11, 11-13	f_{LC} - Exhibit 11-9
f_p - Page 11-18	TRD - Page 11-11
LOS, S, FFS, v_p - Exhibits 11-2, 11-3	

BASIC FREEWAY SEGMENTS WORKSHEET

General Information		Site Information	
Analyst	*RK*	Highway/Direction of Travel	*I-55/NB*
Agency or Company	*CDM Smith*	From/To	*Harlem Ave/Central Ave*
Date Performed	*8/30/13*	Jurisdiction	*Cook Co.*
Analysis Time Period	*PM Peak*	Analysis Year	*2040*

Project Description *IDOT I-55 Phase I Engg Study*

☑ Oper.(LOS) ☐ Des.(N) ☑ Planning Data

Flow Inputs

Volume, V	*7384*	veh/h	Peak-Hour Factor, PHF	*0.95*
AADT		veh/day	%Trucks and Buses, P_T	*8*
Peak-Hr Prop. of AADT, K			%RVs, P_R	*0*
Peak-Hr Direction Prop, D			General Terrain:	*Level*
DDHV = AADT x K x D		veh/h	Grade % Length Up/Down %	*mi*

Calculate Flow Adjustments

f_p	*1.00*	E_R	*1.2*
E_T	*1.5*	$f_{HV} = 1/[1+P_T(E_T - 1) + P_R(E_R - 1)]$	*0.962*

Speed Inputs

Lane Width		ft
Rt-Side Lat. Clearance		ft
Number of Lanes, N	*3*	
Total Ramp Density, TRD		ramps/mi
FFS (measured)	*60.0*	mph
Base free-flow Speed, BFFS		mph

Calc Speed Adj and FFS

f_{LW}		mph
f_{LC}		mph
TRD Adjustment		mph
FFS	*60.0*	mph

LOS and Performance Measures

Operational (LOS)

v_p = (V or DDHV) / (PHF x N x f_{HV} x f_p)	*2695*	pc/h/ln
S	*38.2*	mph
D = v_p / S	*70.5*	pc/mi/ln
LOS	*F*	

Design (N)

Design (N)

Design LOS	
v_p = (V or DDHV) / (PHF x N x f_{HV} x f_p)	pc/h/ln
S	mph
D = v_p / S	pc/mi/ln
Required Number of Lanes, N	

Glossary

N - Number of lanes	S - Speed
V - Hourly volume	D - Density
v_p - Flow rate	FFS - Free-flow speed
LOS - Level of service	BFFS - Base free-flow speed
DDHV - Directional design hour volume	

Factor Location

E_R - Exhibits 11-10, 11-12	f_{LW} - Exhibit 11-8
E_T - Exhibits 10-10, 11-11, 11-13	f_{LC} - Exhibit 11-9
f_p - Page 11-18	TRD - Page 11-11
LOS, S, FFS, v_p - Exhibits 11-2, 11-3	

BASIC FREEWAY SEGMENTS WORKSHEET

General Information		Site Information	
Analyst	*RK*	Highway/Direction of Travel	*I-55/NB*
Agency or Company	*CDM Smith*	From/To	*Central Ave/Cicero Ave*
Date Performed	*8/30/13*	Jurisdiction	*Cook Co.*
Analysis Time Period	*PM Peak*	Analysis Year	*2040*

Project Description *IDOT I-55 Phase I Engg Study*

☑ Oper.(LOS) ☐ Des.(N) ☐ Planning Data

Flow Inputs

Volume, V	*7050*	veh/h	Peak-Hour Factor, PHF	*0.95*
AADT		veh/day	%Trucks and Buses, P_T	*8*
Peak-Hr Prop. of AADT, K			%RVs, P_R	*0*
Peak-Hr Direction Prop, D			General Terrain:	*Level*
DDHV = AADT x K x D		veh/h	Grade % Length Up/Down %	*mi*

Calculate Flow Adjustments

f_p	*1.00*	E_R	*1.2*
E_T	*1.5*	$f_{HV} = 1/[1+P_T(E_T - 1) + P_R(E_R - 1)]$	*0.962*

Speed Inputs

Lane Width		ft
Rt-Side Lat. Clearance		ft
Number of Lanes, N	*3*	
Total Ramp Density, TRD		ramps/mi
FFS (measured)	*60.0*	mph
Base free-flow Speed, BFFS		mph

Calc Speed Adj and FFS

f_{LW}		mph
f_{LC}		mph
TRD Adjustment		mph
FFS	*60.0*	mph

LOS and Performance Measures

Operational (LOS)

v_p = (V or DDHV) / (PHF x N x f_{HV} x f_p)	*2573*	pc/h/ln
S	*42.8*	mph
D = v_p / S	*60.1*	pc/mi/ln
LOS	*F*	

Design (N)

Design (N)

Design LOS		
v_p = (V or DDHV) / (PHF x N x f_{HV} x f_p)		pc/h/ln
S		mph
D = v_p / S		pc/mi/ln
Required Number of Lanes, N		

Glossary

N - Number of lanes	S - Speed
V - Hourly volume	D - Density
v_p - Flow rate	FFS - Free-flow speed
LOS - Level of service	BFFS - Base free-flow speed
DDHV - Directional design hour volume	

Factor Location

E_R - Exhibits 11-10, 11-12	f_{LW} - Exhibit 11-8
E_T - Exhibits 10-11, 11-13	f_{LC} - Exhibit 11-9
f_p - Page 11-18	TRD - Page 11-11
LOS, S, FFS, v_p - Exhibits 11-2, 11-3	

BASIC FREEWAY SEGMENTS WORKSHEET

General Information		Site Information	
Analyst	*RK*	Highway/Direction of Travel	*I-55/NB*
Agency or Company	*CDM Smith*	From/To	*Cicero Ave/Pulaski Rd*
Date Performed	*8/30/13*	Jurisdiction	*Cook Co.*
Analysis Time Period	*PM Peak*	Analysis Year	*2040*
Project Description	*IDOT I-55 Phase I Engg Study*		

☑ Oper.(LOS) ☐ Des.(N) ☐ Planning Data

Flow Inputs

Volume, V	*7601*	veh/h	Peak-Hour Factor, PHF	*0.95*
AADT		veh/day	%Trucks and Buses, P_T	*8*
Peak-Hr Prop. of AADT, K			%RVs, P_R	*0*
Peak-Hr Direction Prop, D			General Terrain:	*Level*
DDHV = AADT x K x D		veh/h	Grade % Length Up/Down %	*mi*

Calculate Flow Adjustments

f_p	*1.00*	E_R	*1.2*
E_T	*1.5*	$f_{HV} = 1/[1+P_T(E_T - 1) + P_R(E_R - 1)]$	*0.962*

Speed Inputs

Lane Width		ft
Rt-Side Lat. Clearance		ft
Number of Lanes, N	*3*	
Total Ramp Density, TRD		ramps/mi
FFS (measured)	*60.0*	mph
Base free-flow Speed, BFFS		mph

Calc Speed Adj and FFS

f_{LW}		mph
f_{LC}		mph
TRD Adjustment		mph
FFS	*60.0*	mph

LOS and Performance Measures

Operational (LOS)

v_p = (V or DDHV) / (PHF x N x f_{HV} x f_p)	*2774*	pc/h/ln
S	*35.0*	mph
D = v_p / S	*79.3*	pc/mi/ln
LOS	*F*	

Design (N)

Design (N)

Design LOS	
v_p = (V or DDHV) / (PHF x N x f_{HV} x f_p)	pc/h/ln
S	mph
D = v_p / S	pc/mi/ln
Required Number of Lanes, N	

Glossary

N - Number of lanes	S - Speed
V - Hourly volume	D - Density
v_p - Flow rate	FFS - Free-flow speed
LOS - Level of service	BFFS - Base free-flow speed
DDHV - Directional design hour volume	

Factor Location

E_R - Exhibits 11-10, 11-12	f_{LW} - Exhibit 11-8
E_T - Exhibits 10-10, 11-11, 11-13	f_{LC} - Exhibit 11-9
f_p - Page 11-18	TRD - Page 11-11
LOS, S, FFS, v_p - Exhibits 11-2, 11-3	

BASIC FREEWAY SEGMENTS WORKSHEET

General Information

Analyst	*RK*
Agency or Company	*CDM Smith*
Date Performed	*8/30/13*
Analysis Time Period	*PM Peak*

Site Information

Highway/Direction of Travel	*I-55/NB*
From/To	*Pulaski Rd/Kedzie Ave*
Jurisdiction	*Cook Co.*
Analysis Year	*2040*

Project Description *IDOT I-55 Phase I Engg Study*

☑ Oper.(LOS) ☐ Des.(N) ☐ Planning Data

Flow Inputs

Volume, V	*7432*	veh/h	Peak-Hour Factor, PHF	*0.95*
AADT		veh/day	%Trucks and Buses, P_T	*8*
Peak-Hr Prop. of AADT, K			%RVs, P_R	*0*
Peak-Hr Direction Prop, D			General Terrain:	*Level*
DDHV = AADT x K x D		veh/h	Grade % Length Up/Down %	*mi*

Calculate Flow Adjustments

f_p	*1.00*	E_R	*1.2*
E_T	*1.5*	$f_{HV} = 1/[1+P_T(E_T - 1) + P_R(E_R - 1)]$	*0.962*

Speed Inputs

Lane Width		ft
Rt-Side Lat. Clearance		ft
Number of Lanes, N	*3*	
Total Ramp Density, TRD		ramps/mi
FFS (measured)	*60.0*	mph
Base free-flow Speed, BFFS		mph

Calc Speed Adj and FFS

f_{LW}		mph
f_{LC}		mph
TRD Adjustment		mph
FFS	*60.0*	mph

LOS and Performance Measures

Operational (LOS)

v_p = (V or DDHV) / (PHF x N x f_{HV} x f_p)	*2712*	pc/h/ln
S	*37.5*	mph
D = v_p / S	*72.2*	pc/mi/ln
LOS	*F*	

Design (N)

Design (N)

Design LOS		
v_p = (V or DDHV) / (PHF x N x f_{HV} x f_p)		pc/h/ln
S		mph
D = v_p / S		pc/mi/ln
Required Number of Lanes, N		

Glossary

N - Number of lanes	S - Speed
V - Hourly volume	D - Density
v_p - Flow rate	FFS - Free-flow speed
LOS - Level of service	BFFS - Base free-flow speed
DDHV - Directional design hour volume	

Factor Location

E_R - Exhibits 11-10, 11-12	f_{LW} - Exhibit 11-8
E_T - Exhibits 10-10, 11-11, 11-13	f_{LC} - Exhibit 11-9
f_p - Page 11-18	TRD - Page 11-11
LOS, S, FFS, v_p - Exhibits 11-2, 11-3	

BASIC FREEWAY SEGMENTS WORKSHEET

General Information

Analyst	*RK*
Agency or Company	*CDM Smith*
Date Performed	*8/30/13*
Analysis Time Period	*PM Peak*

Site Information

Highway/Direction of Travel	*I-55/NB*
From/To	*Kedzie Ave/California Ave*
Jurisdiction	*Cook Co.*
Analysis Year	*2040*

Project Description *IDOT I-55 Phase I Engg Study*

☑ Oper.(LOS) ☒ Des.(N) ☐ Planning Data

Flow Inputs

Volume, V	*6361*	veh/h	Peak-Hour Factor, PHF	*0.95*
AADT		veh/day	%Trucks and Buses, P_T	*8*
Peak-Hr Prop. of AADT, K			%RVs, P_R	*0*
Peak-Hr Direction Prop, D			General Terrain:	*Level*
DDHV = AADT x K x D		veh/h	Grade % Length Up/Down %	*mi*

Calculate Flow Adjustments

f_p	*1.00*	E_R	*1.2*
E_T	*1.5*	$f_{HV} = 1/[1+P_T(E_T - 1) + P_R(E_R - 1)]$	*0.962*

Speed Inputs

Lane Width		ft
Rt-Side Lat. Clearance		ft
Number of Lanes, N	*3*	
Total Ramp Density, TRD		ramps/mi
FFS (measured)	*60.0*	mph
Base free-flow Speed, BFFS		mph

Calc Speed Adj and FFS

f_{LW}		mph
f_{LC}		mph
TRD Adjustment		mph
FFS	*60.0*	mph

LOS and Performance Measures

Operational (LOS)

v_p = (V or DDHV) / (PHF x N x f_{HV} x f_p)	*2321*	pc/h/ln
S	*50.6*	mph
D = v_p / S	*45.9*	pc/mi/ln
LOS	*F*	

Design (N)

Design (N)

Design LOS	
v_p = (V or DDHV) / (PHF x N x f_{HV} x f_p)	pc/h/ln
S	mph
D = v_p / S	pc/mi/ln
Required Number of Lanes, N	

Glossary

N - Number of lanes	S - Speed
V - Hourly volume	D - Density
v_p - Flow rate	FFS - Free-flow speed
LOS - Level of service	BFFS - Base free-flow speed
DDHV - Directional design hour volume	

Factor Location

E_R - Exhibits 11-10, 11-12	f_{LW} - Exhibit 11-8
E_T - Exhibits 11-10, 11-11, 11-13	f_{LC} - Exhibit 11-9
f_p - Page 11-18	TRD - Page 11-11
LOS, S, FFS, v_p - Exhibits 11-2, 11-3	

Mainline Segment

Southbound AM

HCS 2010: Basic Freeway Segments Release 6.1

Phone: Fax:
E-mail:

Operational Analysis

Analyst: John Connelly
Agency or Company:
Date Performed: 6/14/2013
Analysis Time Period: AM Off Peak Hour
Freeway/Direction: I-55 WB
From/To: West of Diverge to I-355
Jurisdiction:
Analysis Year:
Description:

Flow Inputs and Adjustments

Volume, V	3623	veh/h
Peak-hour factor, PHF	0.95	
Peak 15-min volume, v15	953	v
Trucks and buses	15	%
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	0.930	
Driver population factor, fp	1.00	
Flow rate, vp	1367	pc/h/ln

Speed Inputs and Adjustments

Lane width	-	ft
Right-side lateral clearance	-	ft
Total ramp density, TRD	-	ramps/mi
Number of lanes, N	3	
Free-flow speed:	Measured	
FFS or BFFS	60.0	mi/h
Lane width adjustment, fLW	-	mi/h
Lateral clearance adjustment, fLC	-	mi/h
TRD adjustment	-	mi/h
Free-flow speed, FFS	60.0	mi/h

LOS and Performance Measures

Flow rate, vp	1367	pc/h/ln
Free-flow speed, FFS	60.0	mi/h
Average passenger-car speed, S	60.0	mi/h
Number of lanes, N	3	
Density, D	22.8	pc/mi/ln
Level of service, LOS	C	

Overall results are not computed when free-flow speed is less than 55 mph.

HCS 2010: Basic Freeway Segments Release 6.1

Phone: Fax:
E-mail:

Operational Analysis

Analyst:	Alex Ericksen
Agency or Company:	
Date Performed:	1/8/2014
Analysis Time Period:	AM Off Peak Hour
Freeway/Direction:	I-55 WB
From/To:	Lemont Rd to I-355
Jurisdiction:	
Analysis Year:	
Description:	

Flow Inputs and Adjustments

Volume, V	5357	veh/h
Peak-hour factor, PHF	0.95	
Peak 15-min volume, v15	1410	v
Trucks and buses	15	%
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	0.930	
Driver population factor, fp	1.00	
Flow rate, vp	1515	pc/h/ln

Speed Inputs and Adjustments

Lane width	-	ft
Right-side lateral clearance	-	ft
Total ramp density, TRD	-	ramps/mi
Number of lanes, N	4	
Free-flow speed:	Measured	
FFS or BFFS	60.0	mi/h
Lane width adjustment, fLW	-	mi/h
Lateral clearance adjustment, fLC	-	mi/h
TRD adjustment	-	mi/h
Free-flow speed, FFS	60.0	mi/h

LOS and Performance Measures

Flow rate, vp	1515	pc/h/ln
Free-flow speed, FFS	60.0	mi/h
Average passenger-car speed, S	60.0	mi/h
Number of lanes, N	4	
Density, D	25.3	pc/mi/ln
Level of service, LOS	C	

Overall results are not computed when free-flow speed is less than 55 mph.

BASIC FREEWAY SEGMENTS WORKSHEET

General Information

Analyst	*RK*
Agency or Company	*CDM Smith*
Date Performed	*8/30/13*
Analysis Time Period	*AM Peak*

Site Information

Highway/Direction of Travel	*I-55/SB*
From/To	*Cass Ave/Lemont Rd*
Jurisdiction	*DuPage Co.*
Analysis Year	*2040*

Project Description *IDOT I-55 Phase I Engg Study*

☑ Oper.(LOS) ☑ Des.(N) ☐ Planning Data

Flow Inputs

Volume, V	*6228*	veh/h	Peak-Hour Factor, PHF	*0.95*
AADT		veh/day	%Trucks and Buses, P_T	*12*
Peak-Hr Prop. of AADT, K			%RVs, P_R	*0*
Peak-Hr Direction Prop, D			General Terrain:	*Level*
DDHV = AADT x K x D		veh/h	Grade % Length Up/Down %	*mi*

Calculate Flow Adjustments

f_p	*1.00*	E_R	*1.2*
E_T	*1.5*	$f_{HV} = 1/[1+P_T(E_T - 1) + P_R(E_R - 1)]$	*0.943*

Speed Inputs

Lane Width		ft
Rt-Side Lat. Clearance		ft
Number of Lanes, N	*3*	
Total Ramp Density, TRD		ramps/mi
FFS (measured)	*60.0*	mph
Base free-flow Speed, BFFS		mph

Calc Speed Adj and FFS

f_{LW}		mph
f_{LC}		mph
TRD Adjustment		mph
FFS	*60.0*	mph

LOS and Performance Measures

Operational (LOS)

v_p = (V or DDHV) / (PHF x N x f_{HV} x f_p)	*2316*	pc/h/ln
S	*50.7*	mph
D = v_p / S	*45.7*	pc/mi/ln
LOS	*F*	

Design (N)

Design (N)

Design LOS		
v_p = (V or DDHV) / (PHF x N x f_{HV} x f_p)		pc/h/ln
S		mph
D = v_p / S		pc/mi/ln
Required Number of Lanes, N		

Glossary

N - Number of lanes	S - Speed
V - Hourly volume	D - Density
v_p - Flow rate	FFS - Free-flow speed
LOS - Level of service	BFFS - Base free-flow speed
DDHV - Directional design hour volume	

Factor Location

E_R - Exhibits 11-10, 11-12	f_{LW} - Exhibit 11-8
E_T - Exhibits 10-10, 11-11, 11-13	f_{LC} - Exhibit 11-9
f_p - Page 11-18	TRD - Page 11-11
LOS, S, FFS, v_p - Exhibits 11-2, 11-3	

BASIC FREEWAY SEGMENTS WORKSHEET

General Information		Site Information	
Analyst	*RK*	Highway/Direction of Travel	*I-55/SB*
Agency or Company	*CDM Smith*	From/To	*IL 83/Cass Ave*
Date Performed	*8/30/13*	Jurisdiction	*DuPage Co.*
Analysis Time Period	*AM Peak*	Analysis Year	*2040*

Project Description *IDOT I-55 Phase I Engg Study*

☑ Oper.(LOS) ☐ Des.(N) ☐ Planning Data

Flow Inputs

Volume, V	*6278*	veh/h	Peak-Hour Factor, PHF	*0.95*
AADT		veh/day	%Trucks and Buses, P_T	*11*
Peak-Hr Prop. of AADT, K			%RVs, P_R	*0*
Peak-Hr Direction Prop, D			General Terrain:	*Level*
DDHV = AADT x K x D		veh/h	Grade % Length Up/Down %	*mi*

Calculate Flow Adjustments

f_p	*1.00*	E_R	*1.2*
E_T	*1.5*	$f_{HV} = 1/[1+P_T(E_T - 1) + P_R(E_R - 1)]$	*0.948*

Speed Inputs

Lane Width		ft
Rt-Side Lat. Clearance		ft
Number of Lanes, N	*3*	
Total Ramp Density, TRD		ramps/mi
FFS (measured)	*60.0*	mph
Base free-flow Speed, BFFS		mph

Calc Speed Adj and FFS

f_{LW}		mph
f_{LC}		mph
TRD Adjustment		mph
FFS	*60.0*	mph

LOS and Performance Measures

Operational (LOS)

v_p = (V or DDHV) / (PHF x N x f_{HV} x f_p)	*2324*	pc/h/ln
S	*50.5*	mph
D = v_p / S	*46.0*	pc/mi/ln
LOS	*F*	

Design (N)

Design (N)

Design LOS		
v_p = (V or DDHV) / (PHF x N x f_{HV} x f_p)		pc/h/ln
S		mph
D = v_p / S		pc/mi/ln
Required Number of Lanes, N		

Glossary

N - Number of lanes	S - Speed
V - Hourly volume	D - Density
v_p - Flow rate	FFS - Free-flow speed
LOS - Level of service	BFFS - Base free-flow speed
DDHV - Directional design hour volume	

Factor Location

E_R - Exhibits 11-10, 11-12	f_{LW} - Exhibit 11-8
E_T - Exhibits 10-10, 11-11, 11-13	f_{LC} - Exhibit 11-9
f_p - Page 11-18	TRD - Page 11-11
LOS, S, FFS, v_p - Exhibits 11-2, 11-3	

BASIC FREEWAY SEGMENTS WORKSHEET

General Information		Site Information	
Analyst	*RK*	Highway/Direction of Travel	*I-55/SB*
Agency or Company	*CDM Smith*	From/To	*County Line Rd/IL 83*
Date Performed	*8/30/13*	Jurisdiction	*DuPage Co.*
Analysis Time Period	*AM Peak*	Analysis Year	*2040*

Project Description *IDOT I-55 Phase I Engg Study*

☑ Oper.(LOS) ☐ Des.(N) ☐ Planning Data

Flow Inputs

Volume, V	*6464*	veh/h	Peak-Hour Factor, PHF	*0.95*
AADT		veh/day	%Trucks and Buses, P_T	*11*
Peak-Hr Prop. of AADT, K			%RVs, P_R	*0*
Peak-Hr Direction Prop, D			General Terrain:	*Level*
DDHV = AADT x K x D		veh/h	Grade % Length Up/Down %	*mi*

Calculate Flow Adjustments

f_p	*1.00*	E_R	*1.2*
E_T	*1.5*	$f_{HV} = 1/[1+P_T(E_T - 1) + P_R(E_R - 1)]$	*0.948*

Speed Inputs

Lane Width		ft
Rt-Side Lat. Clearance		ft
Number of Lanes, N	*3*	
Total Ramp Density, TRD		ramps/mi
FFS (measured)	*60.0*	mph
Base free-flow Speed, BFFS		mph

Calc Speed Adj and FFS

f_{LW}		mph
f_{LC}		mph
TRD Adjustment		mph
FFS	*60.0*	mph

LOS and Performance Measures

Operational (LOS)

v_p = (V or DDHV) / (PHF x N x f_{HV} x f_p)	*2393*	pc/h/ln
S	*48.6*	mph
D = v_p / S	*49.3*	pc/mi/ln
LOS	*F*	

Design (N)

Design (N)

Design LOS		
v_p = (V or DDHV) / (PHF x N x f_{HV} x f_p)		pc/h/ln
S		mph
D = v_p / S		pc/mi/ln
Required Number of Lanes, N		

Glossary

N - Number of lanes	S - Speed
V - Hourly volume	D - Density
v_p - Flow rate	FFS - Free-flow speed
LOS - Level of service	BFFS - Base free-flow speed
DDHV - Directional design hour volume	

Factor Location

E_R - Exhibits 11-10, 11-12	f_{LW} - Exhibit 11-8
E_T - Exhibits 10-10, 11-11, 11-13	f_{LC} - Exhibit 11-9
f_p - Page 11-18	TRD - Page 11-11
LOS, S, FFS, v_p - Exhibits 11-2, 11-3	

BASIC FREEWAY SEGMENTS WORKSHEET

General Information

Analyst	*RK*
Agency or Company	*CDM Smith*
Date Performed	*8/30/13*
Analysis Time Period	*AM Peak*

Site Information

Highway/Direction of Travel	*I-55/SB*
From/To	*Joliet Rd/County Line Rd*
Jurisdiction	*DuPage/Cook Co.*
Analysis Year	*2040*

Project Description *IDOT I-55 Phase I Engg Study*

☑ Oper.(LOS) ☐ Des.(N) ☐ Planning Data

Flow Inputs

Volume, V	*8545*	veh/h	Peak-Hour Factor, PHF	*0.95*
AADT		veh/day	%Trucks and Buses, P_T	*11*
Peak-Hr Prop. of AADT, K			%RVs, P_R	*0*
Peak-Hr Direction Prop, D			General Terrain:	*Level*
DDHV = AADT x K x D		veh/h	Grade % Length Up/Down %	*mi*

Calculate Flow Adjustments

f_p	*1.00*	E_R	*1.2*
E_T	*1.5*	$f_{HV} = 1/[1+P_T(E_T - 1) + P_R(E_R - 1)]$	*0.948*

Speed Inputs

Lane Width		ft
Rt-Side Lat. Clearance		ft
Number of Lanes, N	*3*	
Total Ramp Density, TRD		ramps/mi
FFS (measured)	*60.0*	mph
Base free-flow Speed, BFFS		mph

Calc Speed Adj and FFS

f_{LW}		mph
f_{LC}		mph
TRD Adjustment		mph
FFS	*60.0*	mph

LOS and Performance Measures

Operational (LOS)

v_p = (V or DDHV) / (PHF x N x f_{HV} x f_p)	*3163*	pc/h/ln
S	*15.6*	mph
D = v_p / S	*202.3*	pc/mi/ln
LOS	*F*	

Design (N)

Design (N)

Design LOS		
v_p = (V or DDHV) / (PHF x N x f_{HV} x f_p)		pc/h/ln
S		mph
D = v_p / S		pc/mi/ln
Required Number of Lanes, N		

Glossary

N - Number of lanes	S - Speed
V - Hourly volume	D - Density
v_p - Flow rate	FFS - Free-flow speed
LOS - Level of service	BFFS - Base free-flow speed
DDHV - Directional design hour volume	

Factor Location

E_R - Exhibits 11-10, 11-12	f_{LW} - Exhibit 11-8
E_T - Exhibits 10, 11-11, 11-13	f_{LC} - Exhibit 11-9
f_p - Page 11-18	TRD - Page 11-11
LOS, S, FFS, v_p - Exhibits 11-2, 11-3	

BASIC FREEWAY SEGMENTS WORKSHEET

General Information		Site Information	
Analyst	*RK*	Highway/Direction of Travel	*I-55/SB*
Agency or Company	*CDM Smith*	From/To	*I-294/Joliet Rd*
Date Performed	*8/30/13*	Jurisdiction	*DuPage/Cook Co.*
Analysis Time Period	*AM Peak*	Analysis Year	*2040*

Project Description *IDOT I-55 Phase I Engg Study*

☑ Oper.(LOS) ☐ Des.(N) ☐ Planning Data

Flow Inputs

Volume, V	*7296*	veh/h	Peak-Hour Factor, PHF	*0.95*
AADT		veh/day	%Trucks and Buses, P_T	*11*
Peak-Hr Prop. of AADT, K			%RVs, P_R	*0*
Peak-Hr Direction Prop, D			General Terrain:	*Level*
DDHV = AADT x K x D		veh/h	Grade % Length Up/Down %	*mi*

Calculate Flow Adjustments

f_p	*1.00*	E_R	*1.2*
E_T	*1.5*	$f_{HV} = 1/[1+P_T(E_T - 1) + P_R(E_R - 1)]$	*0.948*

Speed Inputs

Lane Width		ft
Rt-Side Lat. Clearance		ft
Number of Lanes, N	*3*	
Total Ramp Density, TRD		ramps/mi
FFS (measured)	*60.0*	mph
Base free-flow Speed, BFFS		mph

Calc Speed Adj and FFS

f_{LW}		mph
f_{LC}		mph
TRD Adjustment		mph
FFS	*60.0*	mph

LOS and Performance Measures

Operational (LOS)

v_p = (V or DDHV) / (PHF x N x f_{HV} x f_p)	*2701*	pc/h/ln
S	*38.0*	mph
D = v_p / S	*71.1*	pc/mi/ln
LOS	*F*	

Design (N)

Design (N)

Design LOS		
v_p = (V or DDHV) / (PHF x N x f_{HV} x f_p)		pc/h/ln
S		mph
D = v_p / S		pc/mi/ln
Required Number of Lanes, N		

Glossary

N - Number of lanes	S - Speed
V - Hourly volume	D - Density
v_p - Flow rate	FFS - Free-flow speed
LOS - Level of service	BFFS - Base free-flow speed
DDHV - Directional design hour volume	

Factor Location

E_R - Exhibits 11-10, 11-12	f_{LW} - Exhibit 11-8
E_T - Exhibits 10-10, 11-11, 11-13	f_{LC} - Exhibit 11-9
f_p - Page 11-18	TRD - Page 11-11
LOS, S, FFS, v_p - Exhibits 11-2, 11-3	

BASIC FREEWAY SEGMENTS WORKSHEET

General Information		Site Information	
Analyst	*RK*	Highway/Direction of Travel	*I-55/SB*
Agency or Company	*CDM Smith*	From/To	*Lagrange Rd/I-294*
Date Performed	*8/30/13*	Jurisdiction	*Cook Co.*
Analysis Time Period	*AM Peak*	Analysis Year	*2040*

Project Description *IDOT I-55 Phase I Engg Study*

☑ Oper.(LOS) ☑ Des.(N) ☐ Planning Data

Flow Inputs

Volume, V	*7592*	veh/h	Peak-Hour Factor, PHF	*0.95*
AADT		veh/day	%Trucks and Buses, P_T	*11*
Peak-Hr Prop. of AADT, K			%RVs, P_R	*0*
Peak-Hr Direction Prop, D			General Terrain:	*Level*
DDHV = AADT x K x D		veh/h	Grade % Length Up/Down %	*mi*

Calculate Flow Adjustments

f_p	*1.00*	E_R	*1.2*
E_T	*1.5*	$f_{HV} = 1/[1+P_T(E_T - 1) + P_R(E_R - 1)]$	*0.948*

Speed Inputs

Lane Width		ft
Rt-Side Lat. Clearance		ft
Number of Lanes, N	*3*	
Total Ramp Density, TRD		ramps/mi
FFS (measured)	*60.0*	mph
Base free-flow Speed, BFFS		mph

Calc Speed Adj and FFS

f_{LW}		mph
f_{LC}		mph
TRD Adjustment		mph
FFS	*60.0*	mph

LOS and Performance Measures

Operational (LOS)

v_p = (V or DDHV) / (PHF x N x f_{HV} x f_p)	*2810*	pc/h/ln
S	*33.4*	mph
D = v_p / S	*84.1*	pc/mi/ln
LOS	*F*	

Design (N)

Design (N)

Design LOS	
v_p = (V or DDHV) / (PHF x N x f_{HV} x f_p)	pc/h/ln
S	mph
D = v_p / S	pc/mi/ln
Required Number of Lanes, N	

Glossary

N - Number of lanes	S - Speed
V - Hourly volume	D - Density
v_p - Flow rate	FFS - Free-flow speed
LOS - Level of service	BFFS - Base free-flow speed
DDHV - Directional design hour volume	

Factor Location

E_R - Exhibits 11-10, 11-12	f_{LW} - Exhibit 11-8
E_T - Exhibits 11-10, 11-11, 11-13	f_{LC} - Exhibit 11-9
f_p - Page 11-18	TRD - Page 11-11
LOS, S, FFS, v_p - Exhibits 11-2, 11-3	

BASIC FREEWAY SEGMENTS WORKSHEET

General Information

Analyst	*RK*
Agency or Company	*CDM Smith*
Date Performed	*8/30/13*
Analysis Time Period	*AM Peak*

Site Information

Highway/Direction of Travel	*I-55/SB*
From/To	*IL 171 Archer Ave/Lagrange Rd*
Jurisdiction	*Cook Co.*
Analysis Year	*2040*

Project Description *IDOT I-55 Phase I Engg Study*

☑ Oper.(LOS) ☐ Des.(N) ☐ Planning Data

Flow Inputs

Volume, V	*7356*	veh/h	Peak-Hour Factor, PHF	*0.95*
AADT		veh/day	%Trucks and Buses, P_T	*11*
Peak-Hr Prop. of AADT, K			%RVs, P_R	*0*
Peak-Hr Direction Prop, D			General Terrain:	*Level*
DDHV = AADT x K x D		veh/h	Grade % Length Up/Down %	*mi*

Calculate Flow Adjustments

f_p	*1.00*	E_R	*1.2*
E_T	*1.5*	$f_{HV} = 1/[1+P_T(E_T - 1) + P_R(E_R - 1)]$	*0.948*

Speed Inputs

Lane Width		ft
Rt-Side Lat. Clearance		ft
Number of Lanes, N	*3*	
Total Ramp Density, TRD		ramps/mi
FFS (measured)	*60.0*	mph
Base free-flow Speed, BFFS		mph

Calc Speed Adj and FFS

f_{LW}		mph
f_{LC}		mph
TRD Adjustment		mph
FFS	*60.0*	mph

LOS and Performance Measures

Operational (LOS)

v_p = (V or DDHV) / (PHF x N x f_{HV} x f_p)	*2723*	pc/h/ln
S	*37.1*	mph
D = v_p / S	*73.4*	pc/mi/ln
LOS	*F*	

Design (N)

Design (N)

Design LOS		
v_p = (V or DDHV) / (PHF x N x f_{HV} x f_p)		pc/h/ln
S		mph
D = v_p / S		pc/mi/ln
Required Number of Lanes, N		

Glossary

N - Number of lanes	S - Speed
V - Hourly volume	D - Density
v_p - Flow rate	FFS - Free-flow speed
LOS - Level of service	BFFS - Base free-flow speed
DDHV - Directional design hour volume	

Factor Location

E_R - Exhibits 11-10, 11-12	f_{LW} - Exhibit 11-8
E_T - Exhibits 10-10, 11-11, 11-13	f_{LC} - Exhibit 11-9
f_p - Page 11-18	TRD - Page 11-11
LOS, S, FFS, v_p - Exhibits 11-2, 11-3	

BASIC FREEWAY SEGMENTS WORKSHEET

General Information		Site Information	
Analyst	*RK*	Highway/Direction of Travel	*I-55/SB*
Agency or Company	*CDM Smith*	From/To	*Central Ave/Harlem Ave*
Date Performed	*8/30/13*	Jurisdiction	*Cook Co.*
Analysis Time Period	*AM Peak*	Analysis Year	*2040*

Project Description *IDOT I-55 Phase I Engg Study*

☑ Oper.(LOS) ☐ Des.(N) ☐ Planning Data

Flow Inputs

Volume, V	*7362*	veh/h	Peak-Hour Factor, PHF	*0.95*
AADT		veh/day	%Trucks and Buses, P_T	*14*
Peak-Hr Prop. of AADT, K			%RVs, P_R	*0*
Peak-Hr Direction Prop, D			General Terrain:	*Level*
DDHV = AADT x K x D		veh/h	Grade % Length Up/Down %	*mi*

Calculate Flow Adjustments

f_p	*1.00*	E_R	*1.2*
E_T	*1.5*	$f_{HV} = 1/[1+P_T(E_T - 1) + P_R(E_R - 1)]$	*0.935*

Speed Inputs

Lane Width		ft
Rt-Side Lat. Clearance		ft
Number of Lanes, N	*3*	
Total Ramp Density, TRD		ramps/mi
FFS (measured)	*60.0*	mph
Base free-flow Speed, BFFS		mph

Calc Speed Adj and FFS

f_{LW}		mph
f_{LC}		mph
TRD Adjustment		mph
FFS	*60.0*	mph

LOS and Performance Measures

Operational (LOS)

v_p = (V or DDHV) / (PHF x N x f_{HV} x f_p)	*2764*	pc/h/ln
S	*35.4*	mph
D = v_p / S	*78.1*	pc/mi/ln
LOS	*F*	

Design (N)

Design (N)

Design LOS	
v_p = (V or DDHV) / (PHF x N x f_{HV} x f_p)	pc/h/ln
S	mph
D = v_p / S	pc/mi/ln
Required Number of Lanes, N	

Glossary

N - Number of lanes	S - Speed
V - Hourly volume	D - Density
v_p - Flow rate	FFS - Free-flow speed
LOS - Level of service	BFFS - Base free-flow speed
DDHV - Directional design hour volume	

Factor Location

E_R - Exhibits 11-10, 11-12	f_{LW} - Exhibit 11-8
E_T - Exhibits 10-10, 11-11, 11-13	f_{LC} - Exhibit 11-9
f_p - Page 11-18	TRD - Page 11-11
LOS, S, FFS, v_p - Exhibits 11-2, 11-3	

BASIC FREEWAY SEGMENTS WORKSHEET

General Information

Analyst	*RK*
Agency or Company	*CDM Smith*
Date Performed	*8/30/13*
Analysis Time Period	*AM Peak*

Site Information

Highway/Direction of Travel	*I-55/SB*
From/To	*Cicero Ave/Central Ave*
Jurisdiction	*Cook Co.*
Analysis Year	*2040*

Project Description *IDOT I-55 Phase I Engg Study*

☑ Oper.(LOS) ☑ Des.(N) ☐ Planning Data

Flow Inputs

Volume, V	*7500*	veh/h	Peak-Hour Factor, PHF	*0.95*
AADT		veh/day	%Trucks and Buses, P_T	*14*
Peak-Hr Prop. of AADT, K			%RVs, P_R	*0*
Peak-Hr Direction Prop, D			General Terrain:	*Level*
DDHV = AADT x K x D		veh/h	Grade % Length Up/Down %	*mi*

Calculate Flow Adjustments

f_p	*1.00*	E_R	*1.2*
E_T	*1.5*	$f_{HV} = 1/[1+P_T(E_T - 1) + P_R(E_R - 1)]$	*0.935*

Speed Inputs

Lane Width		ft
Rt-Side Lat. Clearance		ft
Number of Lanes, N	*3*	
Total Ramp Density, TRD		ramps/mi
FFS (measured)	*60.0*	mph
Base free-flow Speed, BFFS		mph

Calc Speed Adj and FFS

f_{LW}		mph
f_{LC}		mph
TRD Adjustment		mph
FFS	*60.0*	mph

LOS and Performance Measures

Operational (LOS)

v_p = (V or DDHV) / (PHF x N x f_{HV} x f_p)	*2816*	pc/h/ln
S	*33.1*	mph
D = v_p / S	*85.0*	pc/mi/ln
LOS	*F*	

Design (N)

Design (N)

Design LOS	
v_p = (V or DDHV) / (PHF x N x f_{HV} x f_p)	pc/h/ln
S	mph
D = v_p / S	pc/mi/ln
Required Number of Lanes, N	

Glossary

N - Number of lanes	S - Speed
V - Hourly volume	D - Density
v_p - Flow rate	FFS - Free-flow speed
LOS - Level of service	BFFS - Base free-flow speed
DDHV - Directional design hour volume	

Factor Location

E_R - Exhibits 11-10, 11-12	f_{LW} - Exhibit 11-8
E_T - Exhibits 10-10, 11-11, 11-13	f_{LC} - Exhibit 11-9
f_p - Page 11-18	TRD - Page 11-11
LOS, S, FFS, v_p - Exhibits 11-2, 11-3	

BASIC FREEWAY SEGMENTS WORKSHEET

General Information		Site Information	
Analyst	*RK*	Highway/Direction of Travel	*I-55/SB*
Agency or Company	*CDM Smith*	From/To	*Cicero Ave/Pulaski Rd*
Date Performed	*8/30/13*	Jurisdiction	*Cook Co.*
Analysis Time Period	*AM Peak*	Analysis Year	*2040*
Project Description	*IDOT I-55 Phase I Engg Study*		

☑ Oper.(LOS) ☐ Des.(N) ☐ Planning Data

Flow Inputs				
Volume, V	*7089*	veh/h	Peak-Hour Factor, PHF	*0.95*
AADT		veh/day	%Trucks and Buses, P_T	*14*
Peak-Hr Prop. of AADT, K			%RVs, P_R	*0*
Peak-Hr Direction Prop, D			General Terrain:	*Level*
DDHV = AADT x K x D		veh/h	Grade % Length Up/Down %	*mi*

Calculate Flow Adjustments			
f_p	*1.00*	E_R	*1.2*
E_T	*1.5*	$f_{HV} = 1/[1+P_T(E_T - 1) + P_R(E_R - 1)]$	*0.935*

Speed Inputs			Calc Speed Adj and FFS		
Lane Width		ft			
Rt-Side Lat. Clearance		ft	f_{LW}		mph
Number of Lanes, N	*3*		f_{LC}		mph
Total Ramp Density, TRD		ramps/mi	TRD Adjustment		mph
FFS (measured)	*60.0*	mph	FFS	*60.0*	mph
Base free-flow Speed, BFFS		mph			

LOS and Performance Measures			Design (N)	
Operational (LOS)			Design (N)	
v_p = (V or DDHV) / (PHF x N x f_{HV} x f_p)	*2661*	pc/h/ln	Design LOS	
S	*39.6*	mph	v_p = (V or DDHV) / (PHF x N x f_{HV} x f_p)	pc/h/ln
D = v_p / S	*67.3*	pc/mi/ln	S	mph
LOS	*F*		D = v_p / S	pc/mi/ln
			Required Number of Lanes, N	

Glossary		Factor Location	
N - Number of lanes	S - Speed	E_R - Exhibits 11-10, 11-12	f_{LW} - Exhibit 11-8
V - Hourly volume	D - Density	E_T - Exhibits 11-10, 11-11, 11-13	f_{LC} - Exhibit 11-9
v_p - Flow rate	FFS - Free-flow speed	f_p - Page 11-18	TRD - Page 11-11
LOS - Level of service	BFFS - Base free-flow speed	LOS, S, FFS, v_p - Exhibits 11-2, 11-3	
DDHV - Directional design hour volume			

BASIC FREEWAY SEGMENTS WORKSHEET

General Information

Analyst	*RK*
Agency or Company	*CDM Smith*
Date Performed	*8/30/13*
Analysis Time Period	*AM Peak*

Site Information

Highway/Direction of Travel	*I-55/SB*
From/To	*Pulaski Rd/Kedzie Ave*
Jurisdiction	*Cook Co.*
Analysis Year	*2040*

Project Description *IDOT I-55 Phase I Engg Study*

☑ Oper.(LOS) ☐ Des.(N) ☐ Planning Data

Flow Inputs

Volume, V	*6791*	veh/h	Peak-Hour Factor, PHF	*0.95*
AADT		veh/day	%Trucks and Buses, P_T	*14*
Peak-Hr Prop. of AADT, K			%RVs, P_R	*0*
Peak-Hr Direction Prop, D			General Terrain:	*Level*
DDHV = AADT x K x D		veh/h	Grade % Length Up/Down %	*mi*

Calculate Flow Adjustments

f_p	*1.00*	E_R	*1.2*
E_T	*1.5*	$f_{HV} = 1/[1+P_T(E_T - 1) + P_R(E_R - 1)]$	*0.935*

Speed Inputs

Lane Width		ft
Rt-Side Lat. Clearance		ft
Number of Lanes, N	*3*	
Total Ramp Density, TRD		ramps/mi
FFS (measured)	*60.0*	mph
Base free-flow Speed, BFFS		mph

Calc Speed Adj and FFS

f_{LW}		mph
f_{LC}		mph
TRD Adjustment		mph
FFS	*60.0*	mph

LOS and Performance Measures

Operational (LOS)

v_p = (V or DDHV) / (PHF x N x f_{HV} x f_p)	*2550*	pc/h/ln
S	*43.6*	mph
D = v_p / S	*58.5*	pc/mi/ln
LOS	*F*	

Design (N)

Design (N)

Design LOS		
v_p = (V or DDHV) / (PHF x N x f_{HV} x f_p)		pc/h/ln
S		mph
D = v_p / S		pc/mi/ln
Required Number of Lanes, N		

Glossary

N - Number of lanes	S - Speed
V - Hourly volume	D - Density
v_p - Flow rate	FFS - Free-flow speed
LOS - Level of service	BFFS - Base free-flow speed
DDHV - Directional design hour volume	

Factor Location

E_R - Exhibits 11-10, 11-12	f_{LW} - Exhibit 11-8
E_T - Exhibits 10-10, 11-11, 11-13	f_{LC} - Exhibit 11-9
f_p - Page 11-18	TRD - Page 11-11
LOS, S, FFS, v_p - Exhibits 11-2, 11-3	

BASIC FREEWAY SEGMENTS WORKSHEET

General Information		Site Information	
Analyst	*RK*	Highway/Direction of Travel	*I-55/SB*
Agency or Company	*CDM Smith*	From/To	*Kedzie Ave/California Ave*
Date Performed	*8/30/13*	Jurisdiction	*Cook Co.*
Analysis Time Period	*AM Peak*	Analysis Year	*2040*

Project Description *IDOT I-55 Phase I Engg Study*

☑ Oper.(LOS) ☑ Des.(N) ☐ Planning Data

Flow Inputs

Volume, V	*5973*	veh/h	Peak-Hour Factor, PHF	*0.95*
AADT		veh/day	%Trucks and Buses, P_T	*14*
Peak-Hr Prop. of AADT, K			%RVs, P_R	*0*
Peak-Hr Direction Prop, D			General Terrain:	*Level*
DDHV = AADT x K x D		veh/h	Grade % Length Up/Down %	*mi*

Calculate Flow Adjustments

f_p	*1.00*	E_R	*1.2*
E_T	*1.5*	$f_{HV} = 1/[1+P_T(E_T - 1) + P_R(E_R - 1)]$	*0.935*

Speed Inputs

Lane Width		ft
Rt-Side Lat. Clearance		ft
Number of Lanes, N	*3*	
Total Ramp Density, TRD		ramps/mi
FFS (measured)	*60.0*	mph
Base free-flow Speed, BFFS		mph

Calc Speed Adj and FFS

f_{LW}		mph
f_{LC}		mph
TRD Adjustment		mph
FFS	*60.0*	mph

LOS and Performance Measures

Operational (LOS)

v_p = (V or DDHV) / (PHF x N x f_{HV} x f_p)	*2242*	pc/h/ln
S	*52.5*	mph
D = v_p / S	*42.7*	pc/mi/ln
LOS	*E*	

Design (N)

Design (N)

Design LOS		
v_p = (V or DDHV) / (PHF x N x f_{HV} x f_p)		pc/h/ln
S		mph
D = v_p / S		pc/mi/ln
Required Number of Lanes, N		

Glossary

N - Number of lanes	S - Speed
V - Hourly volume	D - Density
v_p - Flow rate	FFS - Free-flow speed
LOS - Level of service	BFFS - Base free-flow speed
DDHV - Directional design hour volume	

Factor Location

E_R - Exhibits 11-10, 11-12	f_{LW} - Exhibit 11-8
E_T - Exhibits 11-10, 11-11, 11-13	f_{LC} - Exhibit 11-9
f_p - Page 11-18	TRD - Page 11-11
LOS, S, FFS, v_p - Exhibits 11-2, 11-3	

BASIC FREEWAY SEGMENTS WORKSHEET

General Information

Analyst	*RK*
Agency or Company	*CDM Smith*
Date Performed	*8/30/13*
Analysis Time Period	*AM Peak*

Site Information

Highway/Direction of Travel	*I-55/SB*
From/To	*Damen Ave/California Ave*
Jurisdiction	*Cook Co.*
Analysis Year	*2040*

Project Description *IDOT I-55 Phase I Engg Study*

☑ Oper.(LOS) ☐ Des.(N) ☐ Planning Data

Flow Inputs

Volume, V	*7170*	veh/h	Peak-Hour Factor, PHF	*0.95*
AADT		veh/day	%Trucks and Buses, P_T	*14*
Peak-Hr Prop. of AADT, K			%RVs, P_R	*0*
Peak-Hr Direction Prop, D			General Terrain:	*Level*
DDHV = AADT x K x D		veh/h	Grade % Length Up/Down %	*mi*

Calculate Flow Adjustments

f_p	*1.00*	E_R	*1.2*
E_T	*1.5*	$f_{HV} = 1/[1+P_T(E_T - 1) + P_R(E_R - 1)]$	*0.935*

Speed Inputs

Lane Width		ft
Rt-Side Lat. Clearance		ft
Number of Lanes, N	*3*	
Total Ramp Density, TRD		ramps/mi
FFS (measured)	*60.0*	mph
Base free-flow Speed, BFFS		mph

Calc Speed Adj and FFS

f_{LW}		mph
f_{LC}		mph
TRD Adjustment		mph
FFS	*60.0*	mph

LOS and Performance Measures

Operational (LOS)

v_p = (V or DDHV) / (PHF x N x f_{HV} x f_p)	*2692*	pc/h/ln
S	*38.3*	mph
D = v_p / S	*70.2*	pc/mi/ln
LOS	*F*	

Design (N)

Design (N)

Design LOS	
v_p = (V or DDHV) / (PHF x N x f_{HV} x f_p)	pc/h/ln
S	mph
D = v_p / S	pc/mi/ln
Required Number of Lanes, N	

Glossary

N - Number of lanes	S - Speed
V - Hourly volume	D - Density
v_p - Flow rate	FFS - Free-flow speed
LOS - Level of service	BFFS - Base free-flow speed
DDHV - Directional design hour volume	

Factor Location

E_R - Exhibits 11-10, 11-12	f_{LW} - Exhibit 11-8
E_T - Exhibits 10-10, 11-11, 11-13	f_{LC} - Exhibit 11-9
f_p - Page 11-18	TRD - Page 11-11
LOS, S, FFS, v_p - Exhibits 11-2, 11-3	

HCS 2010: Basic Freeway Segments Release 6.1

Phone: Fax:
E-mail:

Operational Analysis

Analyst:	Alex Ericksen
Agency or Company:	
Date Performed:	1/8/2014
Analysis Time Period:	AM Peak Hour
Freeway/Direction:	I-55 WB
From/To:	I-55 at Damen
Jurisdiction:	
Analysis Year:	
Description:	

Flow Inputs and Adjustments

Volume, V	5865	veh/h
Peak-hour factor, PHF	0.95	
Peak 15-min volume, v15	1543	v
Trucks and buses	12	%
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	0.943	
Driver population factor, fp	1.00	
Flow rate, vp	2181	pc/h/ln

Speed Inputs and Adjustments

Lane width	-	ft
Right-side lateral clearance	-	ft
Total ramp density, TRD	-	ramps/mi
Number of lanes, N	3	
Free-flow speed:	Measured	
FFS or BFFS	60.0	mi/h
Lane width adjustment, fLW	-	mi/h
Lateral clearance adjustment, fLC	-	mi/h
TRD adjustment	-	mi/h
Free-flow speed, FFS	60.0	mi/h

LOS and Performance Measures

Flow rate, vp	2181	pc/h/ln
Free-flow speed, FFS	60.0	mi/h
Average passenger-car speed, S	53.9	mi/h
Number of lanes, N	3	
Density, D	40.5	pc/mi/ln
Level of service, LOS	E	

Overall results are not computed when free-flow speed is less than 55 mph.

HCS 2010: Basic Freeway Segments Release 6.1

Phone: Fax:
E-mail:

Operational Analysis

Analyst:	Alex Ericksen
Agency or Company:	
Date Performed:	1/8/2014
Analysis Time Period:	AM Peak Hour
Freeway/Direction:	I-55 WB
From/To:	I-90/94 to Damen Ave
Jurisdiction:	
Analysis Year:	
Description:	

Flow Inputs and Adjustments

Volume, V	6804	veh/h
Peak-hour factor, PHF	0.95	
Peak 15-min volume, v15	1791	v
Trucks and buses	12	%
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	0.943	
Driver population factor, fp	1.00	
Flow rate, vp	1898	pc/h/ln

Speed Inputs and Adjustments

Lane width	-	ft
Right-side lateral clearance	-	ft
Total ramp density, TRD	-	ramps/mi
Number of lanes, N	4	
Free-flow speed:	Measured	
FFS or BFFS	60.0	mi/h
Lane width adjustment, fLW	-	mi/h
Lateral clearance adjustment, fLC	-	mi/h
TRD adjustment	-	mi/h
Free-flow speed, FFS	60.0	mi/h

LOS and Performance Measures

Flow rate, vp	1898	pc/h/ln
Free-flow speed, FFS	60.0	mi/h
Average passenger-car speed, S	58.4	mi/h
Number of lanes, N	4	
Density, D	32.5	pc/mi/ln
Level of service, LOS	D	

Overall results are not computed when free-flow speed is less than 55 mph.

HCS 2010: Basic Freeway Segments Release 6.1

Phone: Fax:
E-mail:

Operational Analysis

Analyst:	Alex Ericksen
Agency or Company:	
Date Performed:	1/8/2014
Analysis Time Period:	AM Peak
Freeway/Direction:	I-55 WB at I-90/94 Entrance
From/To:	
Jurisdiction:	
Analysis Year:	
Description:	

Flow Inputs and Adjustments

Volume, V	4545	veh/h
Peak-hour factor, PHF	0.95	
Peak 15-min volume, v15	1196	v
Trucks and buses	12	%
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	0.943	
Driver population factor, fp	1.00	
Flow rate, vp	1690	pc/h/ln

Speed Inputs and Adjustments

Lane width	-	ft
Right-side lateral clearance	-	ft
Total ramp density, TRD	-	ramps/mi
Number of lanes, N	3	
Free-flow speed:	Measured	
FFS or BFFS	60.0	mi/h
Lane width adjustment, fLW	-	mi/h
Lateral clearance adjustment, fLC	-	mi/h
TRD adjustment	-	mi/h
Free-flow speed, FFS	60.0	mi/h

LOS and Performance Measures

Flow rate, vp	1690	pc/h/ln
Free-flow speed, FFS	60.0	mi/h
Average passenger-car speed, S	59.9	mi/h
Number of lanes, N	3	
Density, D	28.2	pc/mi/ln
Level of service, LOS	D	

Overall results are not computed when free-flow speed is less than 55 mph.

Mainline Segment

Southbound PM

HCS 2010: Basic Freeway Segments Release 6.1

Phone: Fax:
E-mail:

Operational Analysis

Analyst: John Connelly
Agency or Company:
Date Performed: 6/14/2013
Analysis Time Period:
Freeway/Direction: I-55 WB
From/To: West of Diverge to I-355
Jurisdiction:
Analysis Year:
Description:

Flow Inputs and Adjustments

Volume, V	5845	veh/h
Peak-hour factor, PHF	0.95	
Peak 15-min volume, v15	1538	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	2123	pc/h/ln

Speed Inputs and Adjustments

Lane width	-	ft
Right-side lateral clearance	-	ft
Total ramp density, TRD	-	ramps/mi
Number of lanes, N	3	
Free-flow speed:	Measured	
FFS or BFFS	60.0	mi/h
Lane width adjustment, fLW	-	mi/h
Lateral clearance adjustment, fLC	-	mi/h
TRD adjustment	-	mi/h
Free-flow speed, FFS	60.0	mi/h

LOS and Performance Measures

Flow rate, vp	2123	pc/h/ln
Free-flow speed, FFS	60.0	mi/h
Average passenger-car speed, S	55.0	mi/h
Number of lanes, N	3	
Density, D	38.6	pc/mi/ln
Level of service, LOS	E	

Overall results are not computed when free-flow speed is less than 55 mph.

HCS 2010: Basic Freeway Segments Release 6.1

Phone: Fax:
E-mail:

Operational Analysis

Analyst:	Alex Ericksen
Agency or Company:	
Date Performed:	1/8/2014
Analysis Time Period:	
Freeway/Direction:	I-55 WB
From/To:	Lemont Rd to I-355
Jurisdiction:	
Analysis Year:	
Description:	

Flow Inputs and Adjustments

Volume, V	7344	veh/h
Peak-hour factor, PHF	0.95	
Peak 15-min volume, v15	1933	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	2000	pc/h/ln

Speed Inputs and Adjustments

Lane width	-	ft
Right-side lateral clearance	-	ft
Total ramp density, TRD	-	ramps/mi
Number of lanes, N	4	
Free-flow speed:	Measured	
FFS or BFFS	60.0	mi/h
Lane width adjustment, fLW	-	mi/h
Lateral clearance adjustment, fLC	-	mi/h
TRD adjustment	-	mi/h
Free-flow speed, FFS	60.0	mi/h

LOS and Performance Measures

Flow rate, vp	2000	pc/h/ln
Free-flow speed, FFS	60.0	mi/h
Average passenger-car speed, S	57.1	mi/h
Number of lanes, N	4	
Density, D	35.0+	pc/mi/ln
Level of service, LOS	E	

Overall results are not computed when free-flow speed is less than 55 mph.

BASIC FREEWAY SEGMENTS WORKSHEET

General Information

Analyst	*RK*
Agency or Company	*CDM Smith*
Date Performed	*8/30/13*
Analysis Time Period	*PM Peak*

Site Information

Highway/Direction of Travel	*I-55/SB*
From/To	*Cass Ave/Lemont Rd*
Jurisdiction	*DuPage Co.*
Analysis Year	*2040*

Project Description *IDOT I-55 Phase I Engg Study*

☑ Oper.(LOS) ☐ Des.(N) ☐ Planning Data

Flow Inputs

Volume, V	*7582*	veh/h	Peak-Hour Factor, PHF	*0.95*
AADT		veh/day	%Trucks and Buses, P_T	*12*
Peak-Hr Prop. of AADT, K			%RVs, P_R	*0*
Peak-Hr Direction Prop, D			General Terrain:	*Level*
DDHV = AADT x K x D		veh/h	Grade % Length Up/Down %	*mi*

Calculate Flow Adjustments

f_p	*1.00*	E_R	*1.2*
E_T	*1.5*	$f_{HV} = 1/[1+P_T(E_T - 1) + P_R(E_R - 1)]$	*0.943*

Speed Inputs

Lane Width		ft
Rt-Side Lat. Clearance		ft
Number of Lanes, N	*3*	
Total Ramp Density, TRD		ramps/mi
FFS (measured)	*60.0*	mph
Base free-flow Speed, BFFS		mph

Calc Speed Adj and FFS

f_{LW}		mph
f_{LC}		mph
TRD Adjustment		mph
FFS	*60.0*	mph

LOS and Performance Measures

Operational (LOS)

v_p = (V or DDHV) / (PHF x N x f_{HV} x f_p)	*2820*	pc/h/ln
S	*33.0*	mph
D = v_p / S	*85.5*	pc/mi/ln
LOS	*F*	

Design (N)

Design (N)

Design LOS		
v_p = (V or DDHV) / (PHF x N x f_{HV} x f_p)		pc/h/ln
S		mph
D = v_p / S		pc/mi/ln
Required Number of Lanes, N		

Glossary

N - Number of lanes	S - Speed
V - Hourly volume	D - Density
v_p - Flow rate	FFS - Free-flow speed
LOS - Level of service	BFFS - Base free-flow speed
DDHV - Directional design hour volume	

Factor Location

E_R - Exhibits 11-10, 11-12	f_{LW} - Exhibit 11-8
E_T - Exhibits 11-10, 11-11, 11-13	f_{LC} - Exhibit 11-9
f_p - Page 11-18	TRD - Page 11-11
LOS, S, FFS, v_p - Exhibits 11-2, 11-3	

BASIC FREEWAY SEGMENTS WORKSHEET

General Information

Analyst	*RK*
Agency or Company	*CDM Smith*
Date Performed	*8/30/13*
Analysis Time Period	*PM Peak*

Site Information

Highway/Direction of Travel	*I-55/SB*
From/To	*IL 83/Cass Ave*
Jurisdiction	*DuPage Co.*
Analysis Year	*2040*

Project Description *IDOT I-55 Phase I Engg Study*

☑ Oper.(LOS) ☐ Des.(N) ☐ Planning Data

Flow Inputs

Volume, V	*7448*	veh/h	Peak-Hour Factor, PHF	*0.95*
AADT		veh/day	%Trucks and Buses, P_T	*11*
Peak-Hr Prop. of AADT, K			%RVs, P_R	*0*
Peak-Hr Direction Prop, D			General Terrain:	*Level*
DDHV = AADT x K x D		veh/h	Grade % Length Up/Down %	*mi*

Calculate Flow Adjustments

f_p	*1.00*	E_R	*1.2*
E_T	*1.5*	$f_{HV} = 1/[1+P_T(E_T - 1) + P_R(E_R - 1)]$	*0.948*

Speed Inputs

Lane Width		ft
Rt-Side Lat. Clearance		ft
Number of Lanes, N	*3*	
Total Ramp Density, TRD		ramps/mi
FFS (measured)	*60.0*	mph
Base free-flow Speed, BFFS		mph

Calc Speed Adj and FFS

f_{LW}		mph
f_{LC}		mph
TRD Adjustment		mph
FFS	*60.0*	mph

LOS and Performance Measures

Operational (LOS)

v_p = (V or DDHV) / (PHF x N x f_{HV} x f_p)	*2757*	pc/h/ln
S	*35.7*	mph
D = v_p / S	*77.2*	pc/mi/ln
LOS	*F*	

Design (N)

Design (N)

Design LOS	
v_p = (V or DDHV) / (PHF x N x f_{HV} x f_p)	pc/h/ln
S	mph
D = v_p / S	pc/mi/ln
Required Number of Lanes, N	

Glossary

N - Number of lanes	S - Speed
V - Hourly volume	D - Density
v_p - Flow rate	FFS - Free-flow speed
LOS - Level of service	BFFS - Base free-flow speed
DDHV - Directional design hour volume	

Factor Location

E_R - Exhibits 11-10, 11-12	f_{LW} - Exhibit 11-8
E_T - Exhibits 10-10, 11-11, 11-13	f_{LC} - Exhibit 11-9
f_p - Page 11-18	TRD - Page 11-11
LOS, S, FFS, v_p - Exhibits 11-2, 11-3	

BASIC FREEWAY SEGMENTS WORKSHEET

General Information		Site Information	
Analyst	*RK*	Highway/Direction of Travel	*I-55/SB*
Agency or Company	*CDM Smith*	From/To	*County Line Rd/IL 83*
Date Performed	*8/30/13*	Jurisdiction	*DuPage Co.*
Analysis Time Period	*PM Peak*	Analysis Year	*2040*

Project Description *IDOT I-55 Phase I Engg Study*

☑ Oper.(LOS) ☐ Des.(N) ☐ Planning Data

Flow Inputs

Volume, V	*6670*	veh/h	Peak-Hour Factor, PHF	*0.95*
AADT		veh/day	%Trucks and Buses, P_T	*10*
Peak-Hr Prop. of AADT, K			%RVs, P_R	*0*
Peak-Hr Direction Prop, D			General Terrain:	*Level*
DDHV = AADT x K x D		veh/h	Grade % Length Up/Down %	*mi*

Calculate Flow Adjustments

f_p	*1.00*	E_R	*1.2*
E_T	*1.5*	$f_{HV} = 1/[1+P_T(E_T - 1) + P_R(E_R - 1)]$	*0.952*

Speed Inputs

Lane Width		ft
Rt-Side Lat. Clearance		ft
Number of Lanes, N	*3*	
Total Ramp Density, TRD		ramps/mi
FFS (measured)	*60.0*	mph
Base free-flow Speed, BFFS		mph

Calc Speed Adj and FFS

f_{LW}		mph
f_{LC}		mph
TRD Adjustment		mph
FFS	*60.0*	mph

LOS and Performance Measures

Operational (LOS)

v_p = (V or DDHV) / (PHF x N x f_{HV} x f_p)	*2457*	pc/h/ln
S	*46.7*	mph
D = v_p / S	*52.7*	pc/mi/ln
LOS	*F*	

Design (N)

Design (N)

Design LOS		
v_p = (V or DDHV) / (PHF x N x f_{HV} x f_p)		pc/h/ln
S		mph
D = v_p / S		pc/mi/ln
Required Number of Lanes, N		

Glossary

N - Number of lanes	S - Speed
V - Hourly volume	D - Density
v_p - Flow rate	FFS - Free-flow speed
LOS - Level of service	BFFS - Base free-flow speed
DDHV - Directional design hour volume	

Factor Location

E_R - Exhibits 11-10, 11-12	f_{LW} - Exhibit 11-8
E_T - Exhibits 10-10, 11-11, 11-13	f_{LC} - Exhibit 11-9
f_p - Page 11-18	TRD - Page 11-11
LOS, S, FFS, v_p - Exhibits 11-2, 11-3	

BASIC FREEWAY SEGMENTS WORKSHEET

General Information		Site Information	
Analyst	*RK*	Highway/Direction of Travel	*I-55/SB*
Agency or Company	*CDM Smith*	From/To	*Joliet Rd/County Line Rd*
Date Performed	*8/30/13*	Jurisdiction	*DuPage/Cook Co.*
Analysis Time Period	*PM Peak*	Analysis Year	*2040*

Project Description *IDOT I-55 Phase I Engg Study*

☑ Oper.(LOS) ☐ Des.(N) ☐ Planning Data

Flow Inputs

Volume, V	*8725*	veh/h	Peak-Hour Factor, PHF	*0.95*
AADT		veh/day	%Trucks and Buses, P_T	*10*
Peak-Hr Prop. of AADT, K			%RVs, P_R	*0*
Peak-Hr Direction Prop, D			General Terrain:	*Level*
DDHV = AADT x K x D		veh/h	Grade % Length Up/Down %	*mi*

Calculate Flow Adjustments

f_p	*1.00*	E_R	*1.2*
E_T	*1.5*	$f_{HV} = 1/[1+P_T(E_T - 1) + P_R(E_R - 1)]$	*0.952*

Speed Inputs

Lane Width		ft
Rt-Side Lat. Clearance		ft
Number of Lanes, N	*3*	
Total Ramp Density, TRD		ramps/mi
FFS (measured)	*60.0*	mph
Base free-flow Speed, BFFS		mph

Calc Speed Adj and FFS

f_{LW}		mph
f_{LC}		mph
TRD Adjustment		mph
FFS	*60.0*	mph

LOS and Performance Measures

Operational (LOS)

v_p = (V or DDHV) / (PHF x N x f_{HV} x f_p)	*3214*	pc/h/ln
S	*12.7*	mph
D = v_p / S	*253.2*	pc/mi/ln
LOS	*F*	

Design (N)

Design (N)

Design LOS		
v_p = (V or DDHV) / (PHF x N x f_{HV} x f_p)		pc/h/ln
S		mph
D = v_p / S		pc/mi/ln
Required Number of Lanes, N		

Glossary

N - Number of lanes	S - Speed
V - Hourly volume	D - Density
v_p - Flow rate	FFS - Free-flow speed
LOS - Level of service	BFFS - Base free-flow speed
DDHV - Directional design hour volume	

Factor Location

E_R - Exhibits 11-10, 11-12	f_{LW} - Exhibit 11-8
E_T - Exhibits 10-10, 11-11, 11-13	f_{LC} - Exhibit 11-9
f_p - Page 11-18	TRD - Page 11-11
LOS, S, FFS, v_p - Exhibits 11-2, 11-3	

BASIC FREEWAY SEGMENTS WORKSHEET

General Information

Analyst	*RK*
Agency or Company	*CDM Smith*
Date Performed	*8/30/13*
Analysis Time Period	*PM Peak*

Site Information

Highway/Direction of Travel	*I-55/SB*
From/To	*I-294/Joliet Rd*
Jurisdiction	*DuPage/Cook Co.*
Analysis Year	*2040*

Project Description *IDOT I-55 Phase I Engg Study*

☑ Oper.(LOS) ☐ Des.(N) ☐ Planning Data

Flow Inputs

Volume, V	*7041*	veh/h	Peak-Hour Factor, PHF	*0.95*
AADT		veh/day	%Trucks and Buses, P_T	*11*
Peak-Hr Prop. of AADT, K			%RVs, P_R	*0*
Peak-Hr Direction Prop, D			General Terrain:	*Level*
DDHV = AADT x K x D		veh/h	Grade % Length Up/Down %	*mi*

Calculate Flow Adjustments

f_p	*1.00*	E_R	*1.2*
E_T	*1.5*	$f_{HV} = 1/[1+P_T(E_T - 1) + P_R(E_R - 1)]$	*0.948*

Speed Inputs

Lane Width		ft
Rt-Side Lat. Clearance		ft
Number of Lanes, N	*3*	
Total Ramp Density, TRD		ramps/mi
FFS (measured)	*60.0*	mph
Base free-flow Speed, BFFS		mph

Calc Speed Adj and FFS

f_{LW}		mph
f_{LC}		mph
TRD Adjustment		mph
FFS	*60.0*	mph

LOS and Performance Measures

Operational (LOS)

v_p = (V or DDHV) / (PHF x N x f_{HV} x f_p)	*2606*	pc/h/ln
S	*41.6*	mph
D = v_p / S	*62.6*	pc/mi/ln
LOS	*F*	

Design (N)

Design (N)

Design LOS	
v_p = (V or DDHV) / (PHF x N x f_{HV} x f_p)	pc/h/ln
S	mph
D = v_p / S	pc/mi/ln
Required Number of Lanes, N	

Glossary

N - Number of lanes	S - Speed
V - Hourly volume	D - Density
v_p - Flow rate	FFS - Free-flow speed
LOS - Level of service	BFFS - Base free-flow speed
DDHV - Directional design hour volume	

Factor Location

E_R - Exhibits 11-10, 11-12	f_{LW} - Exhibit 11-8
E_T - Exhibits 11-10, 11-11, 11-13	f_{LC} - Exhibit 11-9
f_p - Page 11-18	TRD - Page 11-11
LOS, S, FFS, v_p - Exhibits 11-2, 11-3	

BASIC FREEWAY SEGMENTS WORKSHEET

General Information		Site Information	
Analyst	*RK*	Highway/Direction of Travel	*I-55/SB*
Agency or Company	*CDM Smith*	From/To	*Lagrange Rd/I-294*
Date Performed	*8/30/13*	Jurisdiction	*Cook Co.*
Analysis Time Period	*PM Peak*	Analysis Year	*2040*

Project Description *IDOT I-55 Phase I Engg Study*

☑ Oper.(LOS) ☐ Des.(N) ☐ Planning Data

Flow Inputs

Volume, V	*7518*	veh/h	Peak-Hour Factor, PHF	*0.95*
AADT		veh/day	%Trucks and Buses, P_T	*10*
Peak-Hr Prop. of AADT, K			%RVs, P_R	*0*
Peak-Hr Direction Prop, D			General Terrain:	*Level*
DDHV = AADT x K x D		veh/h	Grade % Length Up/Down %	*mi*

Calculate Flow Adjustments

f_p	*1.00*	E_R	*1.2*
E_T	*1.5*	$f_{HV} = 1/[1+P_T(E_T - 1) + P_R(E_R - 1)]$	*0.952*

Speed Inputs

Lane Width		ft
Rt-Side Lat. Clearance		ft
Number of Lanes, N	*3*	
Total Ramp Density, TRD		ramps/mi
FFS (measured)	*60.0*	mph
Base free-flow Speed, BFFS		mph

Calc Speed Adj and FFS

f_{LW}		mph
f_{LC}		mph
TRD Adjustment		mph
FFS	*60.0*	mph

LOS and Performance Measures

Operational (LOS)

v_p = (V or DDHV) / (PHF x N x f_{HV} x f_p)	*2770*	pc/h/ln
S	*35.1*	mph
D = v_p / S	*78.8*	pc/mi/ln
LOS	*F*	

Design (N)

Design (N)

Design LOS	
v_p = (V or DDHV) / (PHF x N x f_{HV} x f_p)	pc/h/ln
S	mph
D = v_p / S	pc/mi/ln
Required Number of Lanes, N	

Glossary

N - Number of lanes	S - Speed
V - Hourly volume	D - Density
v_p - Flow rate	FFS - Free-flow speed
LOS - Level of service	BFFS - Base free-flow speed
DDHV - Directional design hour volume	

Factor Location

E_R - Exhibits 11-10, 11-12	f_{LW} - Exhibit 11-8
E_T - Exhibits 11-10, 11-11, 11-13	f_{LC} - Exhibit 11-9
f_p - Page 11-18	TRD - Page 11-11
LOS, S, FFS, v_p - Exhibits 11-2, 11-3	

BASIC FREEWAY SEGMENTS WORKSHEET

General Information

Analyst	*RK*
Agency or Company	*CDM Smith*
Date Performed	*8/30/13*
Analysis Time Period	*PM Peak*

Site Information

Highway/Direction of Travel	*I-55/SB*
From/To	*IL 171 Archer Ave/Lagrange Rd*
Jurisdiction	*Cook Co.*
Analysis Year	*2040*

Project Description *IDOT I-55 Phase I Engg Study*

☑ Oper.(LOS) ☐ Des.(N) ☐ Planning Data

Flow Inputs

Volume, V	*7344*	veh/h	Peak-Hour Factor, PHF	*0.95*
AADT		veh/day	%Trucks and Buses, P_T	*10*
Peak-Hr Prop. of AADT, K			%RVs, P_R	*0*
Peak-Hr Direction Prop, D			General Terrain:	*Level*
DDHV = AADT x K x D		veh/h	Grade % Length Up/Down %	*mi*

Calculate Flow Adjustments

f_p	*1.00*	E_R	*1.2*
E_T	*1.5*	$f_{HV} = 1/[1+P_T(E_T - 1) + P_R(E_R - 1)]$	*0.952*

Speed Inputs

Lane Width		ft
Rt-Side Lat. Clearance		ft
Number of Lanes, N	*3*	
Total Ramp Density, TRD		ramps/mi
FFS (measured)	*60.0*	mph
Base free-flow Speed, BFFS		mph

Calc Speed Adj and FFS

f_{LW}		mph
f_{LC}		mph
TRD Adjustment		mph
FFS	*60.0*	mph

LOS and Performance Measures

Operational (LOS)

v_p = (V or DDHV) / (PHF x N x f_{HV} x f_p)	*2706*	pc/h/ln
S	*37.8*	mph
D = v_p / S	*71.6*	pc/mi/ln
LOS	*F*	

Design (N)

Design (N)

Design LOS		
v_p = (V or DDHV) / (PHF x N x f_{HV} x f_p)		pc/h/ln
S		mph
D = v_p / S		pc/mi/ln
Required Number of Lanes, N		

Glossary

N - Number of lanes	S - Speed
V - Hourly volume	D - Density
v_p - Flow rate	FFS - Free-flow speed
LOS - Level of service	BFFS - Base free-flow speed
DDHV - Directional design hour volume	

Factor Location

E_R - Exhibits 11-10, 11-12	f_{LW} - Exhibit 11-8
E_T - Exhibits 10-10, 11-11, 11-13	f_{LC} - Exhibit 11-9
f_p - Page 11-18	TRD - Page 11-11
LOS, S, FFS, v_p - Exhibits 11-2, 11-3	

BASIC FREEWAY SEGMENTS WORKSHEET

General Information		Site Information	
Analyst	RK	Highway/Direction of Travel	I-55/SB
Agency or Company	CDM Smith	From/To	Central Ave/Harlem Ave
Date Performed	8/30/13	Jurisdiction	Cook Co.
Analysis Time Period	PM Peak	Analysis Year	2040
Project Description	IDOT I-55 Phase I Engg Study		

☑ Oper.(LOS) ☐ Des.(N) ☐ Planning Data

Flow Inputs				
Volume, V	7719	veh/h	Peak-Hour Factor, PHF	0.95
AADT		veh/day	%Trucks and Buses, P_T	8
Peak-Hr Prop. of AADT, K			%RVs, P_R	0
Peak-Hr Direction Prop, D			General Terrain:	Level
DDHV = AADT x K x D		veh/h	Grade % Length Up/Down %	mi

Calculate Flow Adjustments			
f_p	1.00	E_R	1.2
E_T	1.5	$f_{HV} = 1/[1+P_T(E_T - 1) + P_R(E_R - 1)]$	0.962

Speed Inputs			Calc Speed Adj and FFS		
Lane Width		ft			
Rt-Side Lat. Clearance		ft	f_{LW}		mph
Number of Lanes, N	3		f_{LC}		mph
Total Ramp Density, TRD		ramps/mi	TRD Adjustment		mph
FFS (measured)	60.0	mph	FFS	60.0	mph
Base free-flow Speed, BFFS		mph			

LOS and Performance Measures			Design (N)	
Operational (LOS)			Design (N)	
v_p = (V or DDHV) / (PHF x N x f_{HV} x f_p)	2817	pc/h/ln	Design LOS	
S	33.1	mph	v_p = (V or DDHV) / (PHF x N x f_{HV} x f_p)	pc/h/ln
D = v_p / S	85.1	pc/mi/ln	S	mph
LOS	F		D = v_p / S	pc/mi/ln
			Required Number of Lanes, N	

Glossary		Factor Location	
N - Number of lanes	S - Speed	E_R - Exhibits 11-10, 11-12	f_{LW} - Exhibit 11-8
V - Hourly volume	D - Density	E_T - Exhibits 11-10, 11-11, 11-13	f_{LC} - Exhibit 11-9
v_p - Flow rate	FFS - Free-flow speed	f_p - Page 11-18	TRD - Page 11-11
LOS - Level of service	BFFS - Base free-flow speed	LOS, S, FFS, v_p - Exhibits 11-2, 11-3	
DDHV - Directional design hour volume			

BASIC FREEWAY SEGMENTS WORKSHEET

General Information		Site Information	
Analyst	*RK*	Highway/Direction of Travel	*I-55/SB*
Agency or Company	*CDM Smith*	From/To	*Cicero Ave/Central Ave*
Date Performed	*8/30/13*	Jurisdiction	*Cook Co.*
Analysis Time Period	*PM Peak*	Analysis Year	*2040*

Project Description *IDOT I-55 Phase I Engg Study*

☑ Oper.(LOS) ☐ Des.(N) ☐ Planning Data

Flow Inputs

Volume, V	*7963*	veh/h	Peak-Hour Factor, PHF	*0.95*
AADT		veh/day	%Trucks and Buses, P_T	*8*
Peak-Hr Prop. of AADT, K			%RVs, P_R	*0*
Peak-Hr Direction Prop, D			General Terrain:	*Level*
DDHV = AADT x K x D		veh/h	Grade % Length Up/Down %	*mi*

Calculate Flow Adjustments

f_p	*1.00*	E_R	*1.2*
E_T	*1.5*	$f_{HV} = 1/[1+P_T(E_T - 1) + P_R(E_R - 1)]$	*0.962*

Speed Inputs

Lane Width		ft
Rt-Side Lat. Clearance		ft
Number of Lanes, N	*3*	
Total Ramp Density, TRD		ramps/mi
FFS (measured)	*60.0*	mph
Base free-flow Speed, BFFS		mph

Calc Speed Adj and FFS

f_{LW}		mph
f_{LC}		mph
TRD Adjustment		mph
FFS	*60.0*	mph

LOS and Performance Measures

Operational (LOS)

v_p = (V or DDHV) / (PHF x N x f_{HV} x f_p)	*2906*	pc/h/ln
S	*29.0*	mph
D = v_p / S	*100.1*	pc/mi/ln
LOS	*F*	

Design (N)

Design (N)

Design LOS		
v_p = (V or DDHV) / (PHF x N x f_{HV} x f_p)		pc/h/ln
S		mph
D = v_p / S		pc/mi/ln
Required Number of Lanes, N		

Glossary

N - Number of lanes	S - Speed
V - Hourly volume	D - Density
v_p - Flow rate	FFS - Free-flow speed
LOS - Level of service	BFFS - Base free-flow speed
DDHV - Directional design hour volume	

Factor Location

E_R - Exhibits 11-10, 11-12	f_{LW} - Exhibit 11-8
E_T - Exhibits 10-10, 11-11, 11-13	f_{LC} - Exhibit 11-9
f_p - Page 11-18	TRD - Page 11-11
LOS, S, FFS, v_p - Exhibits 11-2, 11-3	

BASIC FREEWAY SEGMENTS WORKSHEET

General Information		Site Information	
Analyst	*RK*	Highway/Direction of Travel	*I-55/SB*
Agency or Company	*CDM Smith*	From/To	*Cicero Ave/Pulaski Rd*
Date Performed	*8/30/13*	Jurisdiction	*Cook Co.*
Analysis Time Period	*PM Peak*	Analysis Year	*2040*

Project Description *IDOT I-55 Phase I Engg Study*

☑ Oper.(LOS) ☐ Des.(N) ☐ Planning Data

Flow Inputs

Volume, V	*7148*	veh/h	Peak-Hour Factor, PHF	*0.95*
AADT		veh/day	%Trucks and Buses, P_T	*8*
Peak-Hr Prop. of AADT, K			%RVs, P_R	*0*
Peak-Hr Direction Prop, D			General Terrain:	*Level*
DDHV = AADT x K x D		veh/h	Grade % Length Up/Down %	*mi*

Calculate Flow Adjustments

f_p	*1.00*	E_R	*1.2*
E_T	*1.5*	$f_{HV} = 1/[1+P_T(E_T - 1) + P_R(E_R - 1)]$	*0.962*

Speed Inputs

Lane Width		ft
Rt-Side Lat. Clearance		ft
Number of Lanes, N	*3*	
Total Ramp Density, TRD		ramps/mi
FFS (measured)	*60.0*	mph
Base free-flow Speed, BFFS		mph

Calc Speed Adj and FFS

f_{LW}		mph
f_{LC}		mph
TRD Adjustment		mph
FFS	*60.0*	mph

LOS and Performance Measures

Operational (LOS)

v_p = (V or DDHV) / (PHF x N x f_{HV} x f_p)	*2608*	pc/h/ln
S	*41.5*	mph
D = v_p / S	*62.8*	pc/mi/ln
LOS	*F*	

Design (N)

Design (N)

Design LOS		
v_p = (V or DDHV) / (PHF x N x f_{HV} x f_p)		pc/h/ln
S		mph
D = v_p / S		pc/mi/ln
Required Number of Lanes, N		

Glossary

N - Number of lanes	S - Speed
V - Hourly volume	D - Density
v_p - Flow rate	FFS - Free-flow speed
LOS - Level of service	BFFS - Base free-flow speed
DDHV - Directional design hour volume	

Factor Location

E_R - Exhibits 11-10, 11-12	f_{LW} - Exhibit 11-8
E_T - Exhibits 10-10, 11-11, 11-13	f_{LC} - Exhibit 11-9
f_p - Page 11-18	TRD - Page 11-11
LOS, S, FFS, v_p - Exhibits 11-2, 11-3	

BASIC FREEWAY SEGMENTS WORKSHEET

General Information

Analyst	*RK*
Agency or Company	*CDM Smith*
Date Performed	*8/30/13*
Analysis Time Period	*PM Peak*

Site Information

Highway/Direction of Travel	*I-55/SB*
From/To	*Pulaski Rd/Kedzie Ave*
Jurisdiction	*Cook Co.*
Analysis Year	*2040*

Project Description *IDOT I-55 Phase I Engg Study*

☑ Oper.(LOS) ☐ Des.(N) ☐ Planning Data

Flow Inputs

Volume, V	*7206*	veh/h	Peak-Hour Factor, PHF	*0.95*
AADT		veh/day	%Trucks and Buses, P_T	*8*
Peak-Hr Prop. of AADT, K			%RVs, P_R	*0*
Peak-Hr Direction Prop, D			General Terrain:	*Level*
DDHV = AADT x K x D		veh/h	Grade % Length Up/Down %	*mi*

Calculate Flow Adjustments

f_p	*1.00*	E_R	*1.2*
E_T	*1.5*	$f_{HV} = 1/[1+P_T(E_T - 1) + P_R(E_R - 1)]$	*0.962*

Speed Inputs

Lane Width		ft
Rt-Side Lat. Clearance		ft
Number of Lanes, N	*3*	
Total Ramp Density, TRD		ramps/mi
FFS (measured)	*60.0*	mph
Base free-flow Speed, BFFS		mph

Calc Speed Adj and FFS

f_{LW}		mph
f_{LC}		mph
TRD Adjustment		mph
FFS	*60.0*	mph

LOS and Performance Measures

Operational (LOS)

v_p = (V or DDHV) / (PHF x N x f_{HV} x f_p)	*2630*	pc/h/ln
S	*40.7*	mph
D = v_p / S	*64.6*	pc/mi/ln
LOS	*F*	

Design (N)

Design (N)

Design LOS		
v_p = (V or DDHV) / (PHF x N x f_{HV} x f_p)		pc/h/ln
S		mph
D = v_p / S		pc/mi/ln
Required Number of Lanes, N		

Glossary

N - Number of lanes	S - Speed
V - Hourly volume	D - Density
v_p - Flow rate	FFS - Free-flow speed
LOS - Level of service	BFFS - Base free-flow speed
DDHV - Directional design hour volume	

Factor Location

E_R - Exhibits 11-10, 11-12	f_{LW} - Exhibit 11-8
E_T - Exhibits 10-10, 11-11, 11-13	f_{LC} - Exhibit 11-9
f_p - Page 11-18	TRD - Page 11-11
LOS, S, FFS, v_p - Exhibits 11-2, 11-3	

BASIC FREEWAY SEGMENTS WORKSHEET

General Information

Analyst	*RK*
Agency or Company	*CDM Smith*
Date Performed	*8/30/13*
Analysis Time Period	*PM Peak*

Site Information

Highway/Direction of Travel	*I-55/SB*
From/To	*Kedzie Ave/California Ave*
Jurisdiction	*Cook Co.*
Analysis Year	*2040*

Project Description *IDOT I-55 Phase I Engg Study*

☑ Oper.(LOS) ☐ Des.(N) ☐ Planning Data

Flow Inputs

Volume, V	*5800*	veh/h	Peak-Hour Factor, PHF	*0.95*
AADT		veh/day	%Trucks and Buses, P_T	*8*
Peak-Hr Prop. of AADT, K			%RVs, P_R	*0*
Peak-Hr Direction Prop, D			General Terrain:	*Level*
DDHV = AADT x K x D		veh/h	Grade % Length Up/Down %	*mi*

Calculate Flow Adjustments

f_p	*1.00*	E_R	*1.2*
E_T	*1.5*	$f_{HV} = 1/[1+P_T(E_T - 1) + P_R(E_R - 1)]$	*0.962*

Speed Inputs

Lane Width		ft
Rt-Side Lat. Clearance		ft
Number of Lanes, N	*3*	
Total Ramp Density, TRD		ramps/mi
FFS (measured)	*60.0*	mph
Base free-flow Speed, BFFS		mph

Calc Speed Adj and FFS

f_{LW}		mph
f_{LC}		mph
TRD Adjustment		mph
FFS	*60.0*	mph

LOS and Performance Measures

Operational (LOS)

v_p = (V or DDHV) / (PHF x N x f_{HV} x f_p)	*2116*	pc/h/ln
S	*55.2*	mph
D = v_p / S	*38.4*	pc/mi/ln
LOS	*E*	

Design (N)

Design (N)

Design LOS	
v_p = (V or DDHV) / (PHF x N x f_{HV} x f_p)	pc/h/ln
S	mph
D = v_p / S	pc/mi/ln
Required Number of Lanes, N	

Glossary

N - Number of lanes	S - Speed
V - Hourly volume	D - Density
v_p - Flow rate	FFS - Free-flow speed
LOS - Level of service	BFFS - Base free-flow speed
DDHV - Directional design hour volume	

Factor Location

E_R - Exhibits 11-10, 11-12	f_{LW} - Exhibit 11-8
E_T - Exhibits 10-10, 11-11, 11-13	f_{LC} - Exhibit 11-9
f_p - Page 11-18	TRD - Page 11-11
LOS, S, FFS, v_p - Exhibits 11-2, 11-3	

BASIC FREEWAY SEGMENTS WORKSHEET

General Information

Analyst	*RK*
Agency or Company	*CDM Smith*
Date Performed	*8/30/13*
Analysis Time Period	*PM Peak*

Site Information

Highway/Direction of Travel	*I-55/SB*
From/To	*Damen Ave/California Ave*
Jurisdiction	*Cook Co.*
Analysis Year	*2040*

Project Description *IDOT I-55 Phase I Engg Study*

☑ Oper.(LOS) ☐ Des.(N) ☐ Planning Data

Flow Inputs

Volume, V	*6941*	veh/h	Peak-Hour Factor, PHF	*0.95*
AADT		veh/day	%Trucks and Buses, P_T	*8*
Peak-Hr Prop. of AADT, K			%RVs, P_R	*0*
Peak-Hr Direction Prop, D			General Terrain:	*Level*
DDHV = AADT x K x D		veh/h	Grade % Length Up/Down %	*mi*

Calculate Flow Adjustments

f_p	*1.00*	E_R	*1.2*
E_T	*1.5*	$f_{HV} = 1/[1+P_T(E_T - 1) + P_R(E_R - 1)]$	*0.962*

Speed Inputs

Lane Width		ft
Rt-Side Lat. Clearance		ft
Number of Lanes, N	*3*	
Total Ramp Density, TRD		ramps/mi
FFS (measured)	*60.0*	mph
Base free-flow Speed, BFFS		mph

Calc Speed Adj and FFS

f_{LW}		mph
f_{LC}		mph
TRD Adjustment		mph
FFS	*60.0*	mph

LOS and Performance Measures

Operational (LOS)

v_p = (V or DDHV) / (PHF x N x f_{HV} x f_p)	*2533*	pc/h/ln
S	*44.2*	mph
D = v_p / S	*57.3*	pc/mi/ln
LOS	*F*	

Design (N)

Design (N)

Design LOS		
v_p = (V or DDHV) / (PHF x N x f_{HV} x f_p)		pc/h/ln
S		mph
D = v_p / S		pc/mi/ln
Required Number of Lanes, N		

Glossary

N - Number of lanes	S - Speed
V - Hourly volume	D - Density
v_p - Flow rate	FFS - Free-flow speed
LOS - Level of service	BFFS - Base free-flow speed
DDHV - Directional design hour volume	

Factor Location

E_R - Exhibits 11-10, 11-12	f_{LW} - Exhibit 11-8
E_T - Exhibits 10-10, 11-11, 11-13	f_{LC} - Exhibit 11-9
f_p - Page 11-18	TRD - Page 11-11
LOS, S, FFS, v_p - Exhibits 11-2, 11-3	

HCS 2010: Basic Freeway Segments Release 6.1

Phone: Fax:
E-mail:

Operational Analysis

Analyst:	Alex Ericksen
Agency or Company:	
Date Performed:	1/8/2014
Analysis Time Period:	
Freeway/Direction:	I-55 WB
From/To:	I-55 at Damen
Jurisdiction:	
Analysis Year:	
Description:	

Flow Inputs and Adjustments

Volume, V	5507	veh/h
Peak-hour factor, PHF	0.95	
Peak 15-min volume, v15	1449	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	2000	pc/h/ln

Speed Inputs and Adjustments

Lane width	-	ft
Right-side lateral clearance	-	ft
Total ramp density, TRD	-	ramps/mi
Number of lanes, N	3	
Free-flow speed:	Measured	
FFS or BFFS	60.0	mi/h
Lane width adjustment, fLW	-	mi/h
Lateral clearance adjustment, fLC	-	mi/h
TRD adjustment	-	mi/h
Free-flow speed, FFS	60.0	mi/h

LOS and Performance Measures

Flow rate, vp	2000	pc/h/ln
Free-flow speed, FFS	60.0	mi/h
Average passenger-car speed, S	57.1	mi/h
Number of lanes, N	3	
Density, D	35.0+	pc/mi/ln
Level of service, LOS	E	

Overall results are not computed when free-flow speed is less than 55 mph.

HCS 2010: Basic Freeway Segments Release 6.1

Phone: Fax:
E-mail:

Operational Analysis

Analyst:	Alex Ericksen
Agency or Company:	
Date Performed:	1/8/2014
Analysis Time Period:	
Freeway/Direction:	I-55 WB
From/To:	I-90/94 to Damen Ave
Jurisdiction:	
Analysis Year:	
Description:	

Flow Inputs and Adjustments

Volume, V	6311	veh/h
Peak-hour factor, PHF	0.95	
Peak 15-min volume, v15	1661	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	1719	pc/h/ln

Speed Inputs and Adjustments

Lane width	-	ft
Right-side lateral clearance	-	ft
Total ramp density, TRD	-	ramps/mi
Number of lanes, N	4	
Free-flow speed:	Measured	
FFS or BFFS	60.0	mi/h
Lane width adjustment, fLW	-	mi/h
Lateral clearance adjustment, fLC	-	mi/h
TRD adjustment	-	mi/h
Free-flow speed, FFS	60.0	mi/h

LOS and Performance Measures

Flow rate, vp	1719	pc/h/ln
Free-flow speed, FFS	60.0	mi/h
Average passenger-car speed, S	59.7	mi/h
Number of lanes, N	4	
Density, D	28.8	pc/mi/ln
Level of service, LOS	D	

Overall results are not computed when free-flow speed is less than 55 mph.

HCS 2010: Basic Freeway Segments Release 6.1

Phone: Fax:
E-mail:

Operational Analysis

Analyst:	Alex Ericksen
Agency or Company:	
Date Performed:	1/8/2014
Analysis Time Period:	
Freeway/Direction:	I-55 WB at I-90/94 Entrance
From/To:	
Jurisdiction:	
Analysis Year:	
Description:	

Flow Inputs and Adjustments

Volume, V	3810	veh/h
Peak-hour factor, PHF	0.95	
Peak 15-min volume, v15	1003	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	1384	pc/h/ln

Speed Inputs and Adjustments

Lane width	-	ft
Right-side lateral clearance	-	ft
Total ramp density, TRD	-	ramps/mi
Number of lanes, N	3	
Free-flow speed:	Measured	
FFS or BFFS	60.0	mi/h
Lane width adjustment, fLW	-	mi/h
Lateral clearance adjustment, fLC	-	mi/h
TRD adjustment	-	mi/h
Free-flow speed, FFS	60.0	mi/h

LOS and Performance Measures

Flow rate, vp	1384	pc/h/ln
Free-flow speed, FFS	60.0	mi/h
Average passenger-car speed, S	60.0	mi/h
Number of lanes, N	3	
Density, D	23.1	pc/mi/ln
Level of service, LOS	C	

Overall results are not computed when free-flow speed is less than 55 mph.

Merge

Northbound AM

HCS 2010: Freeway Merge and Diverge Segments Release 6.1

Phone: Fax:
E-mail:

Merge Analysis

Analyst: Caitlin Bowen
Agency/Co.:
Date performed: 6/13/2013
Analysis time period: AM Peak Hour
Freeway/Dir of Travel: I-55 Eastbound
Junction: Joliet Rd Entrance
Jurisdiction:
Analysis Year:
Description:

Freeway Data

Type of analysis	Merge	
Number of lanes in freeway	3	
Free-flow speed on freeway	60.0	mph
Volume on freeway	3682	vph

On Ramp Data

Side of freeway	Right	
Number of lanes in ramp	1	
Free-flow speed on ramp	40.0	mph
Volume on ramp	369	vph
Length of first accel/decel lane	450	ft
Length of second accel/decel lane		ft

Adjacent Ramp Data (if one exists)

Does adjacent ramp exist?	Yes	
Volume on adjacent Ramp	2028	vph
Position of adjacent Ramp	Upstream	
Type of adjacent Ramp	Off	
Distance to adjacent Ramp	2500	ft

Conversion to pc/h Under Base Conditions

Junction Components	Freeway	Ramp	Adjacent Ramp	
Volume, V (vph)	3682	369	2028	vph
Peak-hour factor, PHF	0.95	0.95	0.95	

Peak 15-min volume, v15	969	97	534	v
Trucks and buses	9	9	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	0.957	0.957	0.957	
Driver population factor, fP	1.00	1.00	1.00	
Flow rate, vp	4050	406	2231	pcph

Estimation of V12 Merge Areas

L = 843.18 (Equation 13-6 or 13-7)
EQ
P = 0.590 Using Equation 1
FM
v = v (P) = 2390 pc/h
12 F FM

Capacity Checks

	Actual	Maximum	LOS F?
v FO	4456	6900	No

v or v 1660 pc/h (Equation 13-14 or 13-17)
3 av34

Is v or v > 2700 pc/h? No
3 av34

Is v or v > 1.5 v /2 No
3 av34 12

If yes, v = 2390 (Equation 13-15, 13-16, 13-18, or 13-19)
12A

Flow Entering Merge Influence Area

	Actual	Max Desirable	Violation?
v R12	4456	4600	No

Level of Service Determination (if not F)

Density, $D_R = 5.475 + 0.00734\, v_R + 0.0078\, v_{12} - 0.00627\, L_A = 24.3$ pc/mi/ln

Level of service for ramp-freeway junction areas of influence C

Speed Estimation

Intermediate speed variable, $M_S = 0.349$

Space mean speed in ramp influence area, $S_R = 53.7$ mph

Space mean speed in outer lanes, $S_0 = 55.8$ mph

Space mean speed for all vehicles, $S = 54.5$ mph

HCS 2010: Freeway Merge and Diverge Segments Release 6.1

Phone: Fax:
E-mail:

Merge Analysis

Analyst:	Alex Ericksen
Agency/Co.:	
Date performed:	1/8/2014
Analysis time period:	AM Peak Hour
Freeway/Dir of Travel:	I-55 Eastbound
Junction:	I-355 Entrance
Jurisdiction:	
Analysis Year:	
Description:	

Freeway Data

Type of analysis	Merge	
Number of lanes in freeway	3	
Free-flow speed on freeway	60.0	mph
Volume on freeway	4051	vph

On Ramp Data

Side of freeway	Right	
Number of lanes in ramp	2	
Free-flow speed on ramp	40.0	mph
Volume on ramp	2250	vph
Length of first accel/decel lane	1000	ft
Length of second accel/decel lane	1000	ft

Adjacent Ramp Data (if one exists)

Does adjacent ramp exist?	Yes	
Volume on adjacent Ramp	1105	vph
Position of adjacent Ramp	Downstream	
Type of adjacent Ramp	Off	
Distance to adjacent Ramp	3550	ft

Conversion to pc/h Under Base Conditions

Junction Components	Freeway	Ramp	Adjacent Ramp	
Volume, V (vph)	4051	2250	1105	vph
Peak-hour factor, PHF	0.95	0.95	0.95	
Peak 15-min volume, v15	1066	592	291	v
Trucks and buses	9	9	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	0.957	0.957	0.957	
Driver population factor, fP	1.00	1.00	1.00	

Flow rate, vp 4456 2475 1216 pcph

Estimation of V12 Merge Areas

L_{EQ} = 9422.90 (Equation 13-6 or 13-7)

P_{FM} = 0.555 Using Equation 0

$v_{12} = v_F (P_{FM})$ = 2473 pc/h

Capacity Checks

	Actual	Maximum	LOS F?
v_{FO}	6931	6900	Yes
v_3 or v_{av34}	1983 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} = 2546 (Equation 13-15, 13-16, 18, or 19)

Flow Entering Merge Influence Area

	Actual	Max Desirable	Violation?
v_{12A}	6931	4600	Yes

Level of Service Determination (if not F)

Density, $D_R = 5.475 + 0.00734\ v_R + 0.0078\ v_{12} - 0.00627\ L_A$ = 24.7 pc/mi/ln

Level of service for ramp-freeway junction areas of influence F

Speed Estimation

Intermediate speed variable,	M_S = 0.672	
Space mean speed in ramp influence area,	S_R = 47.9	mph
Space mean speed in outer lanes,	S_0 = 54.9	mph
Space mean speed for all vehicles,	S = 49.7	mph

HCS 2010: Freeway Merge and Diverge Segments Release 6.1

Phone: Fax:
E-mail:

Merge Analysis

Analyst:	Alex Ericksen
Agency/Co.:	
Date performed:	1/8/2014
Analysis time period:	AM Peak Hour
Freeway/Dir of Travel:	I-55 Eastbound
Junction:	Lemont Rd Entrance
Jurisdiction:	
Analysis Year:	
Description:	

Freeway Data

Type of analysis	Merge	
Number of lanes in freeway	3	
Free-flow speed on freeway	60.0	mph
Volume on freeway	5050	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	1747	vph
Length of first accel/decel lane	650	ft
Length of second accel/decel lane		ft

Adjacent Ramp Data (if one exists)

Does adjacent ramp exist?	Yes	
Volume on adjacent Ramp	523	vph
Position of adjacent Ramp	Downstream	
Type of adjacent Ramp	Off	
Distance to adjacent Ramp	8000	ft

Conversion to pc/h Under Base Conditions

Junction Components	Freeway	Ramp	Adjacent Ramp	
Volume, V (vph)	5050	1747	523	vph
Peak-hour factor, PHF	0.95	0.95	0.95	
Peak 15-min volume, v15	1329	460	138	v
Trucks and buses	9	9	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	0.957	0.957	0.957	
Driver population factor, fP	1.00	1.00	1.00	

Flow rate, vp	5555	1922	575	pcph

Estimation of V12 Merge Areas

L_{EQ} = 3209.60 (Equation 13-6 or 13-7)

P_{FM} = 0.596 Using Equation 1

$v_{12} = v_F (P_{FM})$ = 3309 pc/h

Capacity Checks

	Actual	Maximum	LOS F?
v_{FO}	7477	6900	Yes
v_3 or v_{av34}	2246 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} = 3309 (Equation 13-15, 13-16, 18, or 19)

Flow Entering Merge Influence Area

	Actual	Max Desirable	Violation?
v_{R12}	7477	4600	Yes

Level of Service Determination (if not F)

$D_R = 5.475 + 0.00734\, v_R + 0.0078\, v_{12} - 0.00627\, L_A$ = 41.3 pc/mi/ln

Level of service for ramp-freeway junction areas of influence F

Speed Estimation

Intermediate speed variable,	M_S = 1.005	
Space mean speed in ramp influence area,	S_R = 41.9	mph
Space mean speed in outer lanes,	S_0 = 53.7	mph
Space mean speed for all vehicles,	S = 44.9	mph

HCS 2010: Freeway Merge and Diverge Segments Release 6.1

Phone: Fax:
E-mail:

Merge Analysis

Analyst: Caitlin Bowen
Agency/Co.:
Date performed: 6/13/2013
Analysis time period: AM Peak Hour
Freeway/Dir of Travel: I-55 Eastbound
Junction: Cass Ave East Side
Jurisdiction:
Analysis Year:
Description:

Freeway Data

Type of analysis	Merge	
Number of lanes in freeway	3	
Free-flow speed on freeway	60.0	mph
Volume on freeway	6110	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	476	vph
Length of first accel/decel lane	750	ft
Length of second accel/decel lane		ft

Adjacent Ramp Data (if one exists)

Does adjacent ramp exist?	Yes	
Volume on adjacent Ramp	1261	vph
Position of adjacent Ramp	Downstream	
Type of adjacent Ramp	Off	
Distance to adjacent Ramp	5800	ft

Conversion to pc/h Under Base Conditions

Junction Components	Freeway	Ramp	Adjacent Ramp	
Volume, V (vph)	6110	476	1261	vph
Peak-hour factor, PHF	0.95	0.95	0.95	

Peak 15-min volume, v15	1608	125	332	v
Trucks and buses	9	9	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	0.957	0.957	0.957	
Driver population factor, fP	1.00	1.00	1.00	
Flow rate, vp	6721	524	1387	pcph

Estimation of V12 Merge Areas

L_{EQ} = 7305.77 (Equation 13-6 or 13-7)

P_{FM} = 0.612 Using Equation 3

$v_{12} = v_{F} (P_{FM})$ = 4110 pc/h

Capacity Checks

	Actual	Maximum	LOS F?
v_{FO}	7245	6900	Yes

v_3 or v_{av34} 2611 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} = 4110 (Equation 13-15, 13-16, 13-18, or 13-19)

Flow Entering Merge Influence Area

	Actual	Max Desirable	Violation?
v_{R12}	7245	4600	Yes

Level of Service Determination (if not F)

Density, $D_R = 5.475 + 0.00734 v_{R} + 0.0078 v_{12} - 0.00627 L_A$ = 36.7 pc/mi/ln

Level of service for ramp-freeway junction areas of influence F

Speed Estimation

Intermediate speed variable, M_S = 0.670

Space mean speed in ramp influence area, S_R = 47.9 mph

Space mean speed in outer lanes, S_0 = 51.6 mph

Space mean speed for all vehicles, S = 49.2 mph

HCS 2010: Freeway Merge and Diverge Segments Release 6.1

Phone: Fax:
E-mail:

Merge Analysis

Analyst: Caitlin Bowen
Agency/Co.:
Date performed: 6/13/2013
Analysis time period: AM Peak Hour
Freeway/Dir of Travel: I-55 Eastbound
Junction: Kingery Hwy East Side
Jurisdiction:
Analysis Year:
Description:

Freeway Data

Type of analysis	Merge	
Number of lanes in freeway	3	
Free-flow speed on freeway	60.0	mph
Volume on freeway	5325	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	1195	vph
Length of first accel/decel lane	650	ft
Length of second accel/decel lane		ft

Adjacent Ramp Data (if one exists)

Does adjacent ramp exist?	Yes	
Volume on adjacent Ramp	211	vph
Position of adjacent Ramp	Downstream	
Type of adjacent Ramp	Off	
Distance to adjacent Ramp	6500	ft

Conversion to pc/h Under Base Conditions

Junction Components	Freeway	Ramp	Adjacent Ramp	
Volume, V (vph)	5325	1195	211	vph
Peak-hour factor, PHF	0.95	0.95	0.95	

Peak 15-min volume, v15	1401	314	56	v
Trucks and buses	9	9	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	0.957	0.957	0.957	
Driver population factor, fP	1.00	1.00	1.00	
Flow rate, vp	5858	1315	232	pcph

Estimation of V12 Merge Areas

L = 1295.00 (Equation 13-6 or 13-7)
EQ

P = 0.596 Using Equation 1
FM

$v_{12} = v_{FM} (P_{FM}) =$ 3490 pc/h

Capacity Checks

	Actual	Maximum	LOS F?
v_{FO}	7173	6900	Yes

v_{av34} or v_3 2368 pc/h (Equation 13-14 or 13-17)

Is v_{av34} or v_3 > 2700 pc/h? No

Is v_{av34} or v_3 > 1.5 v_{12} /2 No

If yes, v_{12A} = 3490 (Equation 13-15, 13-16, 13-18, or 13-19)

Flow Entering Merge Influence Area

	Actual	Max Desirable	Violation?
v_{R12}	7173	4600	Yes

Level of Service Determination (if not F)

Density, $D_R = 5.475 + 0.00734\ v_{R12} + 0.0078\ v_{R12} - 0.00627\ L_A$ = 38.3 pc/mi/ln

Level of service for ramp-freeway junction areas of influence F

Speed Estimation

Intermediate speed variable, M_S = 0.758

Space mean speed in ramp influence area, S_R = 46.4 mph

Space mean speed in outer lanes, S_0 = 53.1 mph

Space mean speed for all vehicles, S = 48.4 mph

HCS 2010: Freeway Merge and Diverge Segments Release 6.1

Phone: Fax:
E-mail:

Merge Analysis

Analyst: Caitlin Bowen
Agency/Co.:
Date performed: 6/12/2013
Analysis time period: AM Peak Hour
Freeway/Dir of Travel: I-55 Eastbound
Junction: La Grange Rd East
Jurisdiction:
Analysis Year:
Description:

Freeway Data

Type of analysis	Merge	
Number of lanes in freeway	3	
Free-flow speed on freeway	60.0	mph
Volume on freeway	6217	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	145	vph
Length of first accel/decel lane	660	ft
Length of second accel/decel lane		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)	6217	145		vph
Peak-hour factor, PHF	0.95	0.95		

Peak 15-min volume, v15	1636	38	v
Trucks and buses	9	9	%
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	0.957	0.957	
Driver population factor, fP	1.00	1.00	
Flow rate, vp	6839	160	pcph

Estimation of V12 Merge Areas

L_{EQ} = (Equation 13-6 or 13-7)

P_{FM} = 0.596 Using Equation 1

$v_{12} = v_{F} (P_{FM}) =$ 4076 pc/h

Capacity Checks

	Actual	Maximum	LOS F?
v_{FO}	6999	6900	Yes

v_{3} or v_{av34} 2763 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} = 4139 (Equation 13-15, 13-16, 13-18, or 13-19)

Flow Entering Merge Influence Area

	Actual	Max Desirable	Violation?
v_{12A}	6999	4600	No

Level of Service Determination (if not F)

Density, $D_R = 5.475 + 0.00734\ v_{12} + 0.0078\ v_R - 0.00627\ L_A$ = 34.8 pc/mi/ln

Level of service for ramp-freeway junction areas of influence F

Speed Estimation

Intermediate speed variable, M_S = 0.569

Space mean speed in ramp influence area, S_R = 49.8 mph

Space mean speed in outer lanes, S_0 = 51.1 mph

Space mean speed for all vehicles, S = 50.3 mph

HCS 2010: Freeway Merge and Diverge Segments Release 6.1

Phone: Fax:
E-mail:

Merge Analysis

Analyst: Caitlin Bowen
Agency/Co.:
Date performed: 6/12/2013
Analysis time period: AM Peak Hour
Freeway/Dir of Travel: I-55 Eastbound
Junction: Harlem Ave East
Jurisdiction:
Analysis Year:
Description:

Freeway Data

Type of analysis	Merge	
Number of lanes in freeway	3	
Free-flow speed on freeway	60.0	mph
Volume on freeway	5293	vph

On Ramp Data

Side of freeway	Right	
Number of lanes in ramp	1	
Free-flow speed on ramp	40.0	mph
Volume on ramp	1291	vph
Length of first accel/decel lane	500	ft
Length of second accel/decel lane		ft

Adjacent Ramp Data (if one exists)

Does adjacent ramp exist?	Yes	
Volume on adjacent Ramp	1227	vph
Position of adjacent Ramp	Downstream	
Type of adjacent Ramp	Off	
Distance to adjacent Ramp	7500	ft

Conversion to pc/h Under Base Conditions

Junction Components	Freeway	Ramp	Adjacent Ramp	
Volume, V (vph)	5293	1291	1227	vph
Peak-hour factor, PHF	0.95	0.95	0.95	

Peak 15-min volume, v15	1393	340	323	v
Trucks and buses	9	9	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	0.957	0.957	0.957	
Driver population factor, fP	1.00	1.00	1.00	
Flow rate, vp	5822	1420	1350	pcph

Estimation of V12 Merge Areas

L = 8277.13 (Equation 13-6 or 13-7)
EQ

P = 0.596 Using Equation 3
FM

$v_{12} = v_{F}(P_{FM}) =$ 3470 pc/h

Capacity Checks

	Actual	Maximum	LOS F?
v_{FO}	7242	6900	Yes

v_3 or v_{av34} 2352 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} = 3470 (Equation 13-15, 13-16, 13-18, or 13-19)

Flow Entering Merge Influence Area

	Actual	Max Desirable	Violation?
v_{R12}	7242	4600	Yes

Level of Service Determination (if not F)

Density, $D_R = 5.475 + 0.00734\ v_{R12} + 0.0078\ v_{R12} - 0.00627\ L_A$ = 39.8 pc/mi/ln

Level of service for ramp-freeway junction areas of influence F

Speed Estimation

Intermediate speed variable, M_S = 0.800

Space mean speed in ramp influence area, S_R = 45.6 mph

Space mean speed in outer lanes, S_0 = 53.2 mph

Space mean speed for all vehicles, S = 47.8 mph

HCS 2010: Freeway Merge and Diverge Segments Release 6.1

Phone: Fax:
E-mail:

Merge Analysis

Analyst: Caitlin Bowen
Agency/Co.:
Date performed: 6/12/2013
Analysis time period: AM Peak Hours
Freeway/Dir of Travel: I-55 Eastbound
Junction: Central Ave East
Jurisdiction:
Analysis Year:
Description:

Freeway Data

Type of analysis	Merge	
Number of lanes in freeway	3	
Free-flow speed on freeway	60.0	mph
Volume on freeway	5357	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	887	vph
Length of first accel/decel lane	500	ft
Length of second accel/decel lane		ft

Adjacent Ramp Data (if one exists)

Does adjacent ramp exist?	Yes	
Volume on adjacent Ramp	548	vph
Position of adjacent Ramp	Downstream	
Type of adjacent Ramp	Off	
Distance to adjacent Ramp	1900	ft

Conversion to pc/h Under Base Conditions

Junction Components	Freeway	Ramp	Adjacent Ramp	
Volume, V (vph)	5357	887	548	vph
Peak-hour factor, PHF	0.95	0.95	0.95	

Peak 15-min volume, v15	1410	233	144	v
Trucks and buses	9	9	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	0.957	0.957	0.957	
Driver population factor, fP	1.00	1.00	1.00	
Flow rate, vp	5893	976	603	pcph

Estimation of V12 Merge Areas

L = 3697.12 (Equation 13-6 or 13-7)
EQ

P = 0.632 Using Equation 3
FM

v = v (P) = 3725 pc/h
12 F FM

Capacity Checks

	Actual	Maximum	LOS F?
v FO	6869	6900	No

v or v 2168 pc/h (Equation 13-14 or 13-17)
3 av34

Is v or v > 2700 pc/h? No
3 av34

Is v or v > 1.5 v /2 No
3 av34 12

If yes, v = 3725 (Equation 13-15, 13-16, 13-18, or 13-19)
12A

Flow Entering Merge Influence Area

	Actual	Max Desirable	Violation?
v R12	6869	4600	Yes

Level of Service Determination (if not F)

Density, $D = 5.475 + 0.00734 v_R + 0.0078 v_{R12} - 0.00627 L_A = 38.6$ pc/mi/ln

Level of service for ramp-freeway junction areas of influence E

Speed Estimation

Intermediate speed variable, $M_S = 0.715$

Space mean speed in ramp influence area, $S_R = 47.1$ mph

Space mean speed in outer lanes, $S_0 = 54.0$ mph

Space mean speed for all vehicles, S = 49.1 mph

HCS 2010: Freeway Merge and Diverge Segments Release 6.1

Phone: Fax:
E-mail:

Merge Analysis

Analyst: John Connelly
Agency/Co.:
Date performed: 6/10/2013
Analysis time period: AM Peak Hour
Freeway/Dir of Travel: I-55 Eastbound
Junction: Cicero Avenue Entrance
Jurisdiction:
Analysis Year:
Description:

Freeway Data

Type of analysis	Merge	
Number of lanes in freeway	3	
Free-flow speed on freeway	60.0	mph
Volume on freeway	5696	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	856	vph
Length of first accel/decel lane	500	ft
Length of second accel/decel lane		ft

Adjacent Ramp Data (if one exists)

Does adjacent ramp exist?	Yes	
Volume on adjacent Ramp	506	vph
Position of adjacent Ramp	Downstream	
Type of adjacent Ramp	Off	
Distance to adjacent Ramp	2300	ft

Conversion to pc/h Under Base Conditions

Junction Components	Freeway	Ramp	Adjacent Ramp	
Volume, V (vph)	5696	856	506	vph
Peak-hour factor, PHF	0.95	0.95	0.95	

Peak 15-min volume, v15	1499	225	133	v
Trucks and buses	9	9	9	%
Recreational vehicles	0	0	0	%
Terrain type:	Level	Grade	Level	
Grade	%	2.00 %	%	
Length	mi	0.20 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	0.957	0.957	0.957	
Driver population factor, fP	1.00	1.00	1.00	
Flow rate, vp	6266	942	557	pcph

Estimation of V12 Merge Areas

L = 3415.08 (Equation 13-6 or 13-7)
EQ

P = 0.612 Using Equation 3
FM

$v_{12} = v_{F}(P_{FM}) =$ 3837 pc/h

Capacity Checks

	Actual	Maximum	LOS F?
v_{FO}	7208	6900	Yes

v_{3} or v_{av34} 2429 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} = 3837 (Equation 13-15, 13-16, 13-18, or 13-19)

Flow Entering Merge Influence Area

	Actual	Max Desirable	Violation?
v_{R12}	7208	4600	Yes

Level of Service Determination (if not F)

Density, $D_R = 5.475 + 0.00734\ v_{R} + 0.0078\ v_{12} - 0.00627\ L_A$ = 39.2 pc/mi/ln

Level of service for ramp-freeway junction areas of influence F

Speed Estimation

Intermediate speed variable, M_S = 0.740

Space mean speed in ramp influence area, S_R = 46.7 mph

Space mean speed in outer lanes, S_0 = 52.7 mph

Space mean speed for all vehicles, S = 48.5 mph

HCS 2010: Freeway Merge and Diverge Segments Release 6.1

Phone: Fax:
E-mail:

Merge Analysis

Analyst:	Alex Ericksen
Agency/Co.:	
Date performed:	1/8/2014
Analysis time period:	AM Peak Hour
Freeway/Dir of Travel:	I-55 Eastbound
Junction:	Pulaski Road Entrance
Jurisdiction:	
Analysis Year:	
Description:	

Freeway Data

Type of analysis	Merge	
Number of lanes in freeway	3	
Free-flow speed on freeway	60.0	mph
Volume on freeway	6046	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	1493	vph
Length of first accel/decel lane	500	ft
Length of second accel/decel lane		ft

Adjacent Ramp Data (if one exists)

Does adjacent ramp exist?	Yes	
Volume on adjacent Ramp	863	vph
Position of adjacent Ramp	Downstream	
Type of adjacent Ramp	Off	
Distance to adjacent Ramp	4400	ft

Conversion to pc/h Under Base Conditions

Junction Components	Freeway	Ramp	Adjacent Ramp	
Volume, V (vph)	6046	1493	863	vph
Peak-hour factor, PHF	0.95	0.95	0.95	
Peak 15-min volume, v15	1591	393	227	v
Trucks and buses	9	9	9	%
Recreational vehicles	0	0	0	%
Terrain type:	Level	Grade	Level	
Grade	%	-2.00 %	%	
Length	mi	0.20 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	0.957	0.957	0.957	
Driver population factor, fP	1.00	1.00	1.00	

Flow rate, vp 6651 1642 949 pcph

Estimation of V12 Merge Areas

L_{EQ} = 5818.52 (Equation 13-6 or 13-7)

P_{FM} = 0.605 Using Equation 3

$v_{12} = v_F (P_{FM})$ = 4026 pc/h

Capacity Checks

	Actual	Maximum	LOS F?
v_{FO}	8293	6900	Yes
v_3 or v_{av34}	2625 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} = 4026 (Equation 13-15, 13-16, 18, or 19)

Flow Entering Merge Influence Area

	Actual	Max Desirable	Violation?
v_{R12}	8293	4600	Yes

Level of Service Determination (if not F)

Density, $D_R = 5.475 + 0.00734\ v_{R} + 0.0078\ v_{12} - 0.00627\ L_A$ = 45.8 pc/mi/ln

Level of service for ramp-freeway junction areas of influence F

Speed Estimation

Intermediate speed variable, M_S = 1.405

Space mean speed in ramp influence area, S_R = 34.7 mph

Space mean speed in outer lanes, S_0 = 51.5 mph

Space mean speed for all vehicles, S = 38.7 mph

Merge

Northbound PM

HCS 2010: Freeway Merge and Diverge Segments Release 6.1

Phone: Fax:
E-mail:

Merge Analysis

Analyst: Caitlin Bowen
Agency/Co.:
Date performed: 6/13/2013
Analysis time period: PM Off Peak Hour
Freeway/Dir of Travel: I-55 Eastbound
Junction: Joliet Rd Entrance
Jurisdiction:
Analysis Year:
Description:

Freeway Data

Type of analysis	Merge	
Number of lanes in freeway	3	
Free-flow speed on freeway	60.0	mph
Volume on freeway	2445	vph

On Ramp Data

Side of freeway	Right	
Number of lanes in ramp	1	
Free-flow speed on ramp	40.0	mph
Volume on ramp	1124	vph
Length of first accel/decel lane	450	ft
Length of second accel/decel lane		ft

Adjacent Ramp Data (if one exists)

Does adjacent ramp exist?	Yes	
Volume on adjacent Ramp	1797	vph
Position of adjacent Ramp	Upstream	
Type of adjacent Ramp	Off	
Distance to adjacent Ramp	2500	ft

Conversion to pc/h Under Base Conditions

Junction Components	Freeway	Ramp	Adjacent Ramp	
Volume, V (vph)	2445	1124	1797	vph
Peak-hour factor, PHF	0.95	0.95	0.95	

Peak 15-min volume, v15	643	296	473	v
Trucks and buses	11	11	11	%
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	0.948	0.948	0.948	
Driver population factor, fP	1.00	1.00	1.00	
Flow rate, vp	2715	1248	1996	pcph

Estimation of V12 Merge Areas

L = 737.68 (Equation 13-6 or 13-7)
EQ
P = 0.590 Using Equation 1
FM
v = v (P) = 1602 pc/h
12 F FM

Capacity Checks

	Actual	Maximum	LOS F?
v	3963	6900	No
FO			

v or v 1113 pc/h (Equation 13-14 or 13-17)
3 av34
Is v or v > 2700 pc/h? No
3 av34
Is v or v > 1.5 v /2 No
3 av34 12
If yes, v = 1602 (Equation 13-15, 13-16, 13-18, or 13-19)
12A

Flow Entering Merge Influence Area

	Actual	Max Desirable	Violation?
v	3963	4600	No
R12			

Level of Service Determination (if not F)

Density, $D = 5.475 + 0.00734 v_{R} + 0.0078 v_{R12} - 0.00627 L_{A} = 24.3$ pc/mi/ln
Level of service for ramp-freeway junction areas of influence C

Speed Estimation

Intermediate speed variable, $M_{S} = 0.352$
Space mean speed in ramp influence area, $S_{R} = 53.7$ mph
Space mean speed in outer lanes, $S_{0} = 57.8$ mph
Space mean speed for all vehicles, $S = 54.8$ mph

HCS 2010: Freeway Merge and Diverge Segments Release 6.1

Phone: Fax:
E-mail:

Merge Analysis

Analyst:	Alex Ericksen
Agency/Co.:	
Date performed:	1/8/2014
Analysis time period:	PM Off Peak Hour
Freeway/Dir of Travel:	I-55 Eastbound
Junction:	I-355 Entrance
Jurisdiction:	
Analysis Year:	
Description:	

Freeway Data

Type of analysis	Merge	
Number of lanes in freeway	3	
Free-flow speed on freeway	60.0	mph
Volume on freeway	3569	vph

On Ramp Data

Side of freeway	Right	
Number of lanes in ramp	2	
Free-flow speed on ramp	40.0	mph
Volume on ramp	2195	vph
Length of first accel/decel lane	1000	ft
Length of second accel/decel lane	1000	ft

Adjacent Ramp Data (if one exists)

Does adjacent ramp exist?	Yes	
Volume on adjacent Ramp	726	vph
Position of adjacent Ramp	Downstream	
Type of adjacent Ramp	Off	
Distance to adjacent Ramp	3550	ft

Conversion to pc/h Under Base Conditions

Junction Components	Freeway	Ramp	Adjacent Ramp	
Volume, V (vph)	3569	2195	726	vph
Peak-hour factor, PHF	0.95	0.95	0.95	
Peak 15-min volume, v15	939	578	191	v
Trucks and buses	11	11	11	%
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	0.948	0.948	0.948	
Driver population factor, fP	1.00	1.00	1.00	

Flow rate, vp 3963 2438 806 pcph

Estimation of V12 Merge Areas

L_{EQ} = (Equation 13-6 or 13-7)

P_{FM} = 0.555 Using Equation 0

$v_{12} = v_F (P_{FM}) =$ 2199 pc/h

Capacity Checks

	Actual	Maximum	LOS F?
v_{FO}	6401	6900	No
v_3 or v_{av34}	1764 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} = 2264 (Equation 13-15, 13-16, 18, or 19)

Flow Entering Merge Influence Area

	Actual	Max Desirable	Violation?
v_{12A}	6401	4600	Yes

Level of Service Determination (if not F)

Density, $D_R = 5.475 + 0.00734\ v_R + 0.0078\ v_{12} - 0.00627\ L_A$ = 22.2 pc/mi/ln

Level of service for ramp-freeway junction areas of influence C

Speed Estimation

Intermediate speed variable, M_S = 0.511

Space mean speed in ramp influence area, S_R = 50.8 mph

Space mean speed in outer lanes, S_0 = 55.7 mph

Space mean speed for all vehicles, S = 52.0 mph

HCS+: Ramps and Ramp Junctions Release 5.3

Phone: Fax:
E-mail:

Merge Analysis

Analyst: Caitlin Bowen
Agency/Co.:
Date performed: 6/13/2013
Analysis time period: PM Off Peak Hour
Freeway/Dir of Travel: I-55 Eastbound
Junction: Lemont Rd Entrance
Jurisdiction:
Analysis Year:
Description:

Freeway Data

Type of analysis	Merge	
Number of lanes in freeway	3	
Free-flow speed on freeway	60.0	mph
Volume on freeway	4679	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	1207	vph
Length of first accel/decel lane	650	ft
Length of second accel/decel lane		ft

Adjacent Ramp Data (if one exists)

Does adjacent ramp exist?	Yes	
Volume on adjacent Ramp	411	vph
Position of adjacent Ramp	Downstream	
Type of adjacent Ramp	Off	
Distance to adjacent Ramp	8000	ft

Conversion to pc/h Under Base Conditions

Junction Components	Freeway	Ramp	Adjacent Ramp	
Volume, V (vph)	4679	1207	411	vph
Peak-hour factor, PHF	0.95	0.95	0.95	

Peak 15-min volume, v15	1231	318	108	v
Trucks and buses	11	11	11	%
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	0.948	0.948	0.948	
Driver population factor, fP	1.00	1.00	1.00	
Flow rate, vp	5196	1340	456	pcph

Estimation of V12 Merge Areas

L = 2545.35 (Equation 25-2 or 25-3)
EQ

P = 0.596 Using Equation 1
FM

v = v (P) = 3095 pc/h
12 F FM

Capacity Checks

	Actual	Maximum	LOS F?
v FO	6536	6900	No

v v 2101 pc/h (Equation 25-4 or 25-5)
3 or av34

Is v v > 2700 pc/h? No
3 or av34

Is v v > 1.5 v /2 No
3 or av34 12

If yes, v = 3095 (Equation 25-8)
12A

Flow Entering Merge Influence Area

	Actual	Max Desirable	Violation?
v R12	3095	4600	No

Level of Service Determination (if not F)

Density, D = 5.475 + 0.00734 v + 0.0078 v - 0.00627 L = 35.4 pc/mi/ln
R R 12 A

Level of service for ramp-freeway junction areas of influence E

Speed Estimation

Intermediate speed variable, M = 0.604
S

Space mean speed in ramp influence area, S = 49.1 mph
R

Space mean speed in outer lanes, S = 54.2 mph
0

Space mean speed for all vehicles, S = 50.7 mph

HCS 2010: Freeway Merge and Diverge Segments Release 6.1

Phone: Fax:
E-mail:

Merge Analysis

Analyst:	Alex Ericksen
Agency/Co.:	
Date performed:	1/8/2014
Analysis time period:	PM Off Peak Hour
Freeway/Dir of Travel:	I-55 Eastbound
Junction:	Cass Ave East Side
Jurisdiction:	
Analysis Year:	
Description:	

Freeway Data

Type of analysis	Merge	
Number of lanes in freeway	3	
Free-flow speed on freeway	60.0	mph
Volume on freeway	5920	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	532	vph
Length of first accel/decel lane	750	ft
Length of second accel/decel lane		ft

Adjacent Ramp Data (if one exists)

Does adjacent ramp exist?	Yes	
Volume on adjacent Ramp	981	vph
Position of adjacent Ramp	Downstream	
Type of adjacent Ramp	Off	
Distance to adjacent Ramp	5800	ft

Conversion to pc/h Under Base Conditions

Junction Components	Freeway	Ramp	Adjacent Ramp	
Volume, V (vph)	5920	532	981	vph
Peak-hour factor, PHF	0.95	0.95	0.95	
Peak 15-min volume, v15	1558	140	258	v
Trucks and buses	11	11	11	%
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	0.948	0.948	0.948	
Driver population factor, fP	1.00	1.00	1.00	

Flow rate, vp 6574 591 1089 pcph

Estimation of V12 Merge Areas

L_{EQ} = 5736.11 (Equation 13-6 or 13-7)

P_{FM} = 0.599 Using Equation 1

$v_{12} = v_F (P_{FM})$ = 3935 pc/h

Capacity Checks

	Actual	Maximum	LOS F?
v_{FO}	7165	6900	Yes
v_3 or v_{av34}	2639 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} = 3935 (Equation 13-15, 13-16, 13-18, or 13-19)

Flow Entering Merge Influence Area

	Actual	Max Desirable	Violation?
v_{R12}	7165	4600	No

Level of Service Determination (if not F)

Density, $D_R = 5.475 + 0.00734\ v_{R} + 0.0078\ v_{12} - 0.00627\ L_A$ = 35.8 pc/mi/ln

Level of service for ramp-freeway junction areas of influence F

Speed Estimation

Intermediate speed variable, M_S = 0.629

Space mean speed in ramp influence area, S_R = 48.7 mph

Space mean speed in outer lanes, S_0 = 51.4 mph

Space mean speed for all vehicles, S = 49.7 mph

HCS 2010: Freeway Merge and Diverge Segments Release 6.1

Phone: Fax:
E-mail:

Merge Analysis

Analyst: Caitlin Bowen
Agency/Co.:
Date performed: 6/13/2013
Analysis time period: PM Off Peak Hour
Freeway/Dir of Travel: I-55 Eastbound
Junction: Kingery Hwy East Side
Jurisdiction:
Analysis Year:
Description:

Freeway Data

Type of analysis	Merge	
Number of lanes in freeway	3	
Free-flow speed on freeway	60.0	mph
Volume on freeway	5471	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	663	vph
Length of first accel/decel lane	650	ft
Length of second accel/decel lane		ft

Adjacent Ramp Data (if one exists)

Does adjacent ramp exist?	Yes	
Volume on adjacent Ramp	794	vph
Position of adjacent Ramp	Downstream	
Type of adjacent Ramp	Off	
Distance to adjacent Ramp	6500	ft

Conversion to pc/h Under Base Conditions

Junction Components	Freeway	Ramp	Adjacent Ramp	
Volume, V (vph)	5471	663	794	vph
Peak-hour factor, PHF	0.95	0.95	0.95	

Peak 15-min volume, v15	1440	174	209	v
Trucks and buses	11	11	11	%
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	0.948	0.948	0.948	
Driver population factor, fP	1.00	1.00	1.00	
Flow rate, vp	6076	736	882	pcph

Estimation of V12 Merge Areas

L = 4923.25 (Equation 13-6 or 13-7)
EQ

P = 0.596 Using Equation 1
FM

v = v (P) = 3619 pc/h
12 F FM

Capacity Checks

	Actual	Maximum	LOS F?
v FO	6812	6900	No

v or v 2457 pc/h (Equation 13-14 or 13-17)
3 av34

Is v or v > 2700 pc/h? No
3 av34

Is v or v > 1.5 v /2 No
3 av34 12

If yes, v = 3619 (Equation 13-15, 13-16, 13-18, or 13-19)
12A

Flow Entering Merge Influence Area

	Actual	Max Desirable	Violation?
v R12	6812	4600	No

Level of Service Determination (if not F)

Density, $D_R = 5.475 + 0.00734\, v_R + 0.0078\, v_{12} - 0.00627\, L_A = 35.0+$ pc/mi/ln

Level of service for ramp-freeway junction areas of influence E

Speed Estimation

Intermediate speed variable, $M_S = 0.579$

Space mean speed in ramp influence area, $S_R = 49.6$ mph

Space mean speed in outer lanes, $S_0 = 52.5$ mph

Space mean speed for all vehicles, $S = 50.6$ mph

HCS+: Ramps and Ramp Junctions Release 5.3

Phone: Fax:
E-mail:

Merge Analysis

Analyst: Caitlin Bowen
Agency/Co.:
Date performed: 6/12/2013
Analysis time period: PM Off Peak Hour
Freeway/Dir of Travel: I-55 Eastbound
Junction: La Grange Rd East
Jurisdiction:
Analysis Year:
Description:

Freeway Data

Type of analysis	Merge	
Number of lanes in freeway	3	
Free-flow speed on freeway	60.0	mph
Volume on freeway	6419	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	374	vph
Length of first accel/decel lane	660	ft
Length of second accel/decel lane		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)	6419	374		vph
Peak-hour factor, PHF	0.95	0.95		

Peak 15-min volume, v15	1689	98	v
Trucks and buses	11	11	%
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	0.948	0.948	
Driver population factor, fP	1.00	1.00	
Flow rate, vp	7128	415	pcph

Estimation of V12 Merge Areas

L_{EQ} = (Equation 25-2 or 25-3)

P_{FM} = 0.596 Using Equation 1

$v_{12} = v_{F}(P_{FM})$ = 4248 pc/h

Capacity Checks

	Actual	Maximum	LOS F?
v_{FO}	7543	6900	Yes

$v_{3 \text{ or } av34}$ = 2880 pc/h (Equation 25-4 or 25-5)

Is $v_{3 \text{ or } av34}$ > 2700 pc/h? Yes

Is $v_{3 \text{ or } av34}$ > 1.5 v_{12} /2 No

If yes, v_{12A} = 4428 (Equation 25-8)

Flow Entering Merge Influence Area

	Actual	Max Desirable	Violation?
v_{12A}	4428	4600	Yes

Level of Service Determination (if not F)

$D_R = 5.475 + 0.00734\, v_{12} + 0.0078\, v_R - 0.00627\, L_A$ = 38.9 pc/mi/ln

Level of service for ramp-freeway junction areas of influence F

Speed Estimation

Intermediate speed variable, M_S = 0.776

Space mean speed in ramp influence area, S_R = 46.0 mph

Space mean speed in outer lanes, S_0 = 51.1 mph

Space mean speed for all vehicles, S = 47.7 mph

HCS+: Ramps and Ramp Junctions Release 5.3

Phone: Fax:
E-mail:

Merge Analysis

Analyst: Caitlin Bowen
Agency/Co.:
Date performed: 6/12/2013
Analysis time period: PM Off Peak Hour
Freeway/Dir of Travel: I-55 Eastbound
Junction: Harlem Ave East
Jurisdiction:
Analysis Year:
Description:

Freeway Data

Type of analysis	Merge	
Number of lanes in freeway	3	
Free-flow speed on freeway	60.0	mph
Volume on freeway	6239	vph

On Ramp Data

Side of freeway	Right	
Number of lanes in ramp	1	
Free-flow speed on ramp	40.0	mph
Volume on ramp	1145	vph
Length of first accel/decel lane	500	ft
Length of second accel/decel lane		ft

Adjacent Ramp Data (if one exists)

Does adjacent ramp exist?	Yes	
Volume on adjacent Ramp	1256	vph
Position of adjacent Ramp	Downstream	
Type of adjacent Ramp	Off	
Distance to adjacent Ramp	7500	ft

Conversion to pc/h Under Base Conditions

Junction Components	Freeway	Ramp	Adjacent Ramp	
Volume, V (vph)	6239	1145	1256	vph
Peak-hour factor, PHF	0.95	0.95	0.95	

Peak 15-min volume, v15	1642	301	331	v
Trucks and buses	8	8	8	%
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	0.962	0.962	
Driver population factor, fP	1.00	1.00	1.00	
Flow rate, vp	6830	1253	1375	pcph

Estimation of V12 Merge Areas

L = 8430.41 (Equation 25-2 or 25-3)
EQ
P = 0.597 Using Equation 3
FM
v = v (P) = 4077 pc/h
12 F FM

Capacity Checks

	Actual	Maximum	LOS F?
v	8083	6900	Yes
FO			
v v	2753 pc/h	(Equation 25-4 or 25-5)	
3 or av34			
Is v v > 2700 pc/h?		Yes	
3 or av34			
Is v v > 1.5 v /2		No	
3 or av34 12			
If yes, v = 4130		(Equation 25-8)	
12A			

Flow Entering Merge Influence Area

	Actual	Max Desirable	Violation?
v	4130	4600	Yes
12A			

Level of Service Determination (if not F)

Density, D = 5.475 + 0.00734 v + 0.0078 v - 0.00627 L = 43.8 pc/mi/ln
R R 12 A
Level of service for ramp-freeway junction areas of influence F

Speed Estimation

Intermediate speed variable, M = 1.130
S
Space mean speed in ramp influence area, S = 39.7 mph
R
Space mean speed in outer lanes, S = 51.1 mph
0
Space mean speed for all vehicles, S = 42.9 mph

HCS+: Ramps and Ramp Junctions Release 5.3

Phone: Fax:
E-mail:

Merge Analysis

Analyst: Caitlin Bowen
Agency/Co.:
Date performed: 6/12/2013
Analysis time period: PM Off Peak Hour
Freeway/Dir of Travel: I-55 Eastbound
Junction: Central Ave East
Jurisdiction:
Analysis Year:
Description:

Freeway Data

Type of analysis	Merge	
Number of lanes in freeway	3	
Free-flow speed on freeway	60.0	mph
Volume on freeway	6128	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	922	vph
Length of first accel/decel lane	500	ft
Length of second accel/decel lane		ft

Adjacent Ramp Data (if one exists)

Does adjacent ramp exist?	Yes	
Volume on adjacent Ramp	485	vph
Position of adjacent Ramp	Downstream	
Type of adjacent Ramp	Off	
Distance to adjacent Ramp	1900	ft

Conversion to pc/h Under Base Conditions

Junction Components	Freeway	Ramp	Adjacent Ramp	
Volume, V (vph)	6128	922	485	vph
Peak-hour factor, PHF	0.95	0.95	0.95	

Peak 15-min volume, v15	1613	243	128	v
Trucks and buses	8	8	8	%
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	0.962	0.962	
Driver population factor, fP	1.00	1.00	1.00	
Flow rate, vp	6709	1009	531	pcph

Estimation of V12 Merge Areas

L = 3255.67 (Equation 25-2 or 25-3)
EQ
P = 0.622 Using Equation 3
FM
v = v (P) = 4174 pc/h
12 F FM

Capacity Checks

	Actual	Maximum	LOS F?
v FO	7718	6900	Yes

v v 2535 pc/h (Equation 25-4 or 25-5)
3 or av34
Is v v > 2700 pc/h? No
3 or av34
Is v v > 1.5 v /2 No
3 or av34 12
If yes, v = 4174 (Equation 25-8)
12A

Flow Entering Merge Influence Area

	Actual	Max Desirable	Violation?
v R12	4174	4600	Yes

Level of Service Determination (if not F)

Density, $D = 5.475 + 0.00734 v_R + 0.0078 v_{12} - 0.00627 L_A$ = 42.3 pc/mi/ln
Level of service for ramp-freeway junction areas of influence F

Speed Estimation

Intermediate speed variable, M_S = 0.981
Space mean speed in ramp influence area, S_R = 42.3 mph
Space mean speed in outer lanes, S_0 = 52.1 mph
Space mean speed for all vehicles, S = 45.1 mph

HCS+: Ramps and Ramp Junctions Release 5.3

Phone: Fax:
E-mail:

Merge Analysis

Analyst: John Connelly
Agency/Co.:
Date performed: 6/10/2013
Analysis time period: PM Off Peak Hour
Freeway/Dir of Travel: I-55 Eastbound
Junction: Cicero Avenue Entrance
Jurisdiction:
Analysis Year:
Description:

Freeway Data

Type of analysis	Merge	
Number of lanes in freeway	3	
Free-flow speed on freeway	60.0	mph
Volume on freeway	6565	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	1036	vph
Length of first accel/decel lane	500	ft
Length of second accel/decel lane		ft

Adjacent Ramp Data (if one exists)

Does adjacent ramp exist?	Yes	
Volume on adjacent Ramp	1121	vph
Position of adjacent Ramp	Downstream	
Type of adjacent Ramp	Off	
Distance to adjacent Ramp	2300	ft

Conversion to pc/h Under Base Conditions

Junction Components	Freeway	Ramp	Adjacent Ramp	
Volume, V (vph)	6565	1036	1121	vph
Peak-hour factor, PHF	0.95	0.95	0.95	

Peak 15-min volume, v15	1728	273	295	v
Trucks and buses	8	8	8	%
Recreational vehicles	0	0	0	%
Terrain type:	Level	Grade	Level	
Grade	%	2.00 %	%	
Length	mi	0.20 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	0.962	0.962	
Driver population factor, fP	1.00	1.00	1.00	
Flow rate, vp	7187	1134	1227	pcph

Estimation of V12 Merge Areas

L = 7522.99 (Equation 25-2 or 25-3)
EQ

P = 0.689 Using Equation 3
FM

v = v (P) = 4951 pc/h
12 F FM

Capacity Checks

	Actual	Maximum	LOS F?
v FO	8321	6900	Yes

v v 2236 pc/h (Equation 25-4 or 25-5)
3 or av34

Is v v > 2700 pc/h? No
3 or av34

Is v v > 1.5 v /2 No
3 or av34 12

If yes, v = 4951 (Equation 25-8)
12A

Flow Entering Merge Influence Area

	Actual	Max Desirable	Violation?
v R12	4951	4600	Yes

Level of Service Determination (if not F)

Density, $D_R = 5.475 + 0.00734\, v_R + 0.0078\, v_{12} - 0.00627\, L_A = 49.3$ pc/mi/ln

Level of service for ramp-freeway junction areas of influence F

Speed Estimation

Intermediate speed variable, $M_S = 1.989$

Space mean speed in ramp influence area, $S_R = 24.2$ mph

Space mean speed in outer lanes, $S_0 = 53.8$ mph

Space mean speed for all vehicles, $S = 28.4$ mph

HCS 2010: Freeway Merge and Diverge Segments Release 6.1

Phone: Fax:
E-mail:

Merge Analysis

Analyst:	Alex Ericksen
Agency/Co.:	
Date performed:	1/8/2014
Analysis time period:	PM Off Peak Hour
Freeway/Dir of Travel:	I-55 Eastbound
Junction:	Pulaski Road Entrance
Jurisdiction:	
Analysis Year:	
Description:	

Freeway Data

Type of analysis	Merge	
Number of lanes in freeway	3	
Free-flow speed on freeway	60.0	mph
Volume on freeway	6480	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	952	vph
Length of first accel/decel lane	500	ft
Length of second accel/decel lane		ft

Adjacent Ramp Data (if one exists)

Does adjacent ramp exist?	Yes	
Volume on adjacent Ramp	1071	vph
Position of adjacent Ramp	Downstream	
Type of adjacent Ramp	Off	
Distance to adjacent Ramp	4400	ft

Conversion to pc/h Under Base Conditions

Junction Components	Freeway	Ramp	Adjacent Ramp	
Volume, V (vph)	6480	952	1071	vph
Peak-hour factor, PHF	0.95	0.95	0.95	
Peak 15-min volume, v15	1705	251	282	v
Trucks and buses	8	8	8	%
Recreational vehicles	0	0	0	%
Terrain type:	Level	Grade	Level	
Grade	%	-2.00 %	%	
Length	mi	0.20 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	0.962	0.962	
Driver population factor, fP	1.00	1.00	1.00	

Flow rate, vp 7094 1042 1172 pcph

Estimation of V12 Merge Areas

L_{EQ} = 7185.78 (Equation 13-6 or 13-7)

P_{FM} = 0.619 Using Equation 3

$v_{12} = v_F (P_{FM})$ = 4389 pc/h

Capacity Checks

	Actual	Maximum	LOS F?
v_{FO}	8136	6900	Yes
v_3 or v_{av34}	2705 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} = 4394 (Equation 13-15, 13-16, 13-18, or 13-19)

Flow Entering Merge Influence Area

	Actual	Max Desirable	Violation?
v_{12A}	8136	4600	Yes

Level of Service Determination (if not F)

$D_R = 5.475 + 0.00734\ v_{12} + 0.0078\ v_R - 0.00627\ L_A$ = 44.3 pc/mi/ln

Level of service for ramp-freeway junction areas of influence F

Speed Estimation

Intermediate speed variable,	M_S = 1.171	
Space mean speed in ramp influence area,	S_R = 38.9	mph
Space mean speed in outer lanes,	S_0 = 51.1	mph
Space mean speed for all vehicles,	S = 42.3	mph

Merge

Southbound AM

HCS 2010: Freeway Merge and Diverge Segments Release 6.1

Phone: Fax:
E-mail:

Merge Analysis

Analyst: Caitlin Bowen
Agency/Co.:
Date performed: 6/14/2013
Analysis time period: AM Off Peak Hour
Freeway/Dir of Travel: I-55 Westbound
Junction: I-355 Entrance
Jurisdiction:
Analysis Year:
Description:

Freeway Data

Type of analysis	Merge	
Number of lanes in freeway	3	
Free-flow speed on freeway	60.0	mph
Volume on freeway	4145	vph

On Ramp Data

Side of freeway	Right	
Number of lanes in ramp	1	
Free-flow speed on ramp	40.0	mph
Volume on ramp	1284	vph
Length of first accel/decel lane	675	ft
Length of second accel/decel lane		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)	4145	1284		vph
Peak-hour factor, PHF	0.95	0.95		

Peak 15-min volume, v15	1091	338	v
Trucks and buses	15	15	%
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	0.930	0.930	
Driver population factor, fP	1.00	1.00	
Flow rate, vp	4690	1453	pcph

Estimation of V12 Merge Areas

L_{EQ} = (Equation 13-6 or 13-7)

P_{FM} = 0.596 Using Equation 1

$v_{12} = v_{12A} (P_{FM}) =$ 2797 pc/h

Capacity Checks

	Actual	Maximum	LOS F?
v_{FO}	6143	6900	No

v_{3} or v_{av34} 1893 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} = 2797 (Equation 13-15, 13-16, 13-18, or 13-19)

Flow Entering Merge Influence Area

	Actual	Max Desirable	Violation?
v_{R12}	6143	4600	No

Level of Service Determination (if not F)

$D_R = 5.475 + 0.00734\, v_{R} + 0.0078\, v_{12} - 0.00627\, L_A =$ 33.7 pc/mi/ln

Level of service for ramp-freeway junction areas of influence D

Speed Estimation

Intermediate speed variable, M_S = 0.540

Space mean speed in ramp influence area, S_R = 50.3 mph

Space mean speed in outer lanes, S_0 = 55.0 mph

Space mean speed for all vehicles, S = 51.6 mph

HCS 2010: Freeway Merge and Diverge Segments Release 6.1

Phone: Fax:
E-mail:

Merge Analysis

Analyst: Caitlin Bowen
Agency/Co.:
Date performed: 6/14/2013
Analysis time period: AM Off Peak Hour
Freeway/Dir of Travel: I-55 Westbound
Junction: Joliet Rd/CD Rd Entrance
Jurisdiction:
Analysis Year:
Description:

Freeway Data

Type of analysis	Merge	
Number of lanes in freeway	3	
Free-flow speed on freeway	60.0	mph
Volume on freeway	3083	vph

On Ramp Data

Side of freeway	Right	
Number of lanes in ramp	1	
Free-flow speed on ramp	40.0	mph
Volume on ramp	1062	vph
Length of first accel/decel lane	500	ft
Length of second accel/decel lane		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)	3083	1062		vph
Peak-hour factor, PHF	0.95	0.95		

Peak 15-min volume, v15	811	279	v
Trucks and buses	15	15	%
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	0.930	0.930	
Driver population factor, fP	1.00	1.00	
Flow rate, vp	3489	1202	pcph

Estimation of V12 Merge Areas

L_{EQ} = (Equation 13-6 or 13-7)

P_{FM} = 0.591 Using Equation 1

$v_{12} = v_{12F}(P_{FM})$ = 2064 pc/h

Capacity Checks

	Actual	Maximum	LOS F?
v_{FO}	4691	6900	No

v_{3} or v_{av34} 1425 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} = 2064 (Equation 13-15, 13-16, 13-18, or 13-19)

Flow Entering Merge Influence Area

	Actual	Max Desirable	Violation?
v_{R12}	4691	4600	No

Level of Service Determination (if not F)

$D_R = 5.475 + 0.00734\, v_{12} + 0.0078\, v_R - 0.00627\, L_A$ = 27.3 pc/mi/ln

Level of service for ramp-freeway junction areas of influence C

Speed Estimation

Intermediate speed variable, M_S = 0.383

Space mean speed in ramp influence area, S_R = 53.1 mph

Space mean speed in outer lanes, S_0 = 56.7 mph

Space mean speed for all vehicles, S = 54.1 mph

HCS 2010: Freeway Merge and Diverge Segments Release 6.1

Phone: Fax:
E-mail:

Merge Analysis

Analyst:	Caitlin Bowen
Agency/Co.:	
Date performed:	6/14/2013
Analysis time period:	AM Off Peak Hour
Freeway/Dir of Travel:	I-55 Westbound
Junction:	Lemont Rd Entrance
Jurisdiction:	
Analysis Year:	
Description:	

Freeway Data

Type of analysis	Merge	
Number of lanes in freeway	3	
Free-flow speed on freeway	60.0	mph
Volume on freeway	5233	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	124	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	1734	vph
Position of adjacent Ramp	Downstream	
Type of adjacent Ramp	Off	
Distance to adjacent Ramp	2950	ft

Conversion to pc/h Under Base Conditions

Junction Components	Freeway	Ramp	Adjacent Ramp	
Volume, V (vph)	5233	124	1734	vph
Peak-hour factor, PHF	0.95	0.95	0.95	
Peak 15-min volume, v15	1377	33	456	v
Trucks and buses	15	15	0	%
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	0.930	0.930	1.000	
Driver population factor, fP	1.00	1.00	1.00	

Flow rate, vp	5922	140	1825 pcph

Estimation of V12 Merge Areas

L_{EQ} = 10500.58 Equation 13-6 or 13-7)

P_{FM} = 0.711 Using Equation 3

$v_{12} = v_F (P_{FM})$ = 4212 pc/h

Capacity Checks

	Actual	Maximum	LOS F?
v_{FO}	6062	6900	No
v_3 or v_{av34}	1710 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} = 4212 (Equation 13-15, 13-16, 18, or 19)

Flow Entering Merge Influence Area

	Actual	Max Desirable	Violation?
v_{R12}	6062	4600	No

Level of Service Determination (if not F)

Density, $D_R = 5.475 + 0.00734\ v_{R} + 0.0078\ v_{12} - 0.00627\ L_A$ = 35.6 pc/mi/ln

Level of service for ramp-freeway junction areas of influence E

Speed Estimation

Intermediate speed variable,	M_S = 0.582	
Space mean speed in ramp influence area,	S_R = 49.5	mph
Space mean speed in outer lanes,	S_0 = 55.6	mph
Space mean speed for all vehicles,	S = 51.1	mph

HCS 2010: Freeway Merge and Diverge Segments Release 6.1

Phone: Fax:
E-mail:

Merge Analysis

Analyst: Caitlin Bowen
Agency/Co.:
Date performed: 6/14/2013
Analysis time period: AM Off Peak Hour
Freeway/Dir of Travel: I-55 Westbound
Junction: Cass Avenue Entrance
Jurisdiction:
Analysis Year:
Description:

Freeway Data

Type of analysis	Merge	
Number of lanes in freeway	3	
Free-flow speed on freeway	60.0	mph
Volume on freeway	5931	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	297	vph
Length of first accel/decel lane	775	ft
Length of second accel/decel lane		ft

Adjacent Ramp Data (if one exists)

Does adjacent ramp exist?	Yes	
Volume on adjacent Ramp	509	vph
Position of adjacent Ramp	Downstream	
Type of adjacent Ramp	Off	
Distance to adjacent Ramp	8000	ft

Conversion to pc/h Under Base Conditions

Junction Components	Freeway	Ramp	Adjacent Ramp	
Volume, V (vph)	5931	297	509	vph
Peak-hour factor, PHF	0.95	0.95	0.95	

Peak 15-min volume, v15	1561	78	134	v
Trucks and buses	15	15	16	%
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	0.930	0.930	0.926	
Driver population factor, fP	1.00	1.00	1.00	
Flow rate, vp	6711	336	579	pcph

Estimation of V12 Merge Areas

L = 3007.40 (Equation 13-6 or 13-7)
EQ

P = 0.599 Using Equation 1
FM

v = v (P) = 4021 pc/h
12 F FM

Capacity Checks

	Actual	Maximum	LOS F?
v FO	7047	6900	Yes

v or v 2690 pc/h (Equation 13-14 or 13-17)
3 av34

Is v or v > 2700 pc/h? No
3 av34

Is v or v > 1.5 v /2 No
3 av34 12

If yes, v = 4021 (Equation 13-15, 13-16, 13-18, or 13-19)
12A

Flow Entering Merge Influence Area

	Actual	Max Desirable	Violation?
v R12	7047	4600	No

Level of Service Determination (if not F)

Density, $D_R = 5.475 + 0.00734\, v_R + 0.0078\, v_{12} - 0.00627\, L_A = 34.4$ pc/mi/ln

Level of service for ramp-freeway junction areas of influence F

Speed Estimation

Intermediate speed variable, $M_S = 0.571$

Space mean speed in ramp influence area, $S_R = 49.7$ mph

Space mean speed in outer lanes, $S_0 = 51.1$ mph

Space mean speed for all vehicles, $S = 50.2$ mph

HCS 2010: Freeway Merge and Diverge Segments Release 6.1

Phone: Fax:
E-mail:

Merge Analysis

Analyst: Caitlin Bowen
Agency/Co.:
Date performed: 6/14/2013
Analysis time period: AM Off Peak Hour
Freeway/Dir of Travel: I-55 Westbound
Junction: Kingery Hwy Entrance
Jurisdiction:
Analysis Year:
Description:

Freeway Data

Type of analysis	Merge	
Number of lanes in freeway	3	
Free-flow speed on freeway	60.0	mph
Volume on freeway	5023	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	1255	vph
Length of first accel/decel lane	900	ft
Length of second accel/decel lane		ft

Adjacent Ramp Data (if one exists)

Does adjacent ramp exist?	Yes	
Volume on adjacent Ramp	430	vph
Position of adjacent Ramp	Downstream	
Type of adjacent Ramp	Off	
Distance to adjacent Ramp	6000	ft

Conversion to pc/h Under Base Conditions

Junction Components	Freeway	Ramp	Adjacent Ramp	
Volume, V (vph)	5023	1255	430	vph
Peak-hour factor, PHF	0.95	0.95	0.95	

Peak 15-min volume, v15	1322	330	113	v
Trucks and buses	15	15	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	0.930	0.930	0.930	
Driver population factor, fP	1.00	1.00	1.00	
Flow rate, vp	5684	1420	487	pcph

Estimation of V12 Merge Areas

L_{EQ} = 2365.23 (Equation 13-6 or 13-7)

P_{FM} = 0.603 Using Equation 1

$v_{12} = v_{12A} (P_{FM}) =$ 3426 pc/h

Capacity Checks

	Actual	Maximum	LOS F?
v_{FO}	7104	6900	Yes

v_3 or v_{av34} 2258 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} = 3426 (Equation 13-15, 13-16, 13-18, or 13-19)

Flow Entering Merge Influence Area

	Actual	Max Desirable	Violation?
v_{R12}	7104	4600	Yes

Level of Service Determination (if not F)

$D_R = 5.475 + 0.00734\, v_R + 0.0078\, v_{12} - 0.00627\, L_A =$ 37.0 pc/mi/ln

Level of service for ramp-freeway junction areas of influence F

Speed Estimation

Intermediate speed variable, M_S = 0.754

Space mean speed in ramp influence area, S_R = 46.4 mph

Space mean speed in outer lanes, S_0 = 53.7 mph

Space mean speed for all vehicles, S = 48.5 mph

HCS 2010: Freeway Merge and Diverge Segments Release 6.1

Phone: Fax:
E-mail:

Merge Analysis

Analyst: Caitlin Bowen
Agency/Co.:
Date performed: 6/14/2013
Analysis time period: AM Off Peak Hour
Freeway/Dir of Travel: I-55 Westbound
Junction: County Line Rd Entrance
Jurisdiction:
Analysis Year:
Description:

Freeway Data

Type of analysis	Merge	
Number of lanes in freeway	3	
Free-flow speed on freeway	60.0	mph
Volume on freeway	6262	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	202	vph
Length of first accel/decel lane	700	ft
Length of second accel/decel lane		ft

Adjacent Ramp Data (if one exists)

Does adjacent ramp exist?	Yes	
Volume on adjacent Ramp	1441	vph
Position of adjacent Ramp	Downstream	
Type of adjacent Ramp	Off	
Distance to adjacent Ramp	6500	ft

Conversion to pc/h Under Base Conditions

Junction Components	Freeway	Ramp	Adjacent Ramp	
Volume, V (vph)	6262	202	1441	vph
Peak-hour factor, PHF	0.95	0.95	0.95	

Peak 15-min volume, v15	1648	53	379	v
Trucks and buses	15	15	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	0.930	0.930	0.930	
Driver population factor, fP	1.00	1.00	1.00	
Flow rate, vp	7086	229	1631	pcph

Estimation of V12 Merge Areas

L = 8840.11 (Equation 13-6 or 13-7)
EQ

P = 0.615 Using Equation 3
FM

v = v (P) = 4355 pc/h
12 F FM

Capacity Checks

	Actual	Maximum	LOS F?
v FO	7315	6900	Yes

v or v 2731 pc/h (Equation 13-14 or 13-17)
3 av34

Is v or v > 2700 pc/h? Yes
3 av34

Is v or v > 1.5 v /2 No
3 av34 12

If yes, v = 4386 (Equation 13-15, 13-16, 13-18, or 13-19)
12A

Flow Entering Merge Influence Area

	Actual	Max Desirable	Violation?
v 12A	7315	4600	Yes

Level of Service Determination (if not F)

Density, $D = 5.475 + 0.00734 v_R + 0.0078 v_{12} - 0.00627 L_A$ = 37.0 pc/mi/ln

Level of service for ramp-freeway junction areas of influence F

Speed Estimation

Intermediate speed variable, M_S = 0.666

Space mean speed in ramp influence area, S_R = 48.0 mph

Space mean speed in outer lanes, S_0 = 51.1 mph

Space mean speed for all vehicles, S = 49.1 mph

HCS 2010: Freeway Merge and Diverge Segments Release 6.1

Phone: Fax:
E-mail:

Merge Analysis

Analyst: Caitlin Bowen
Agency/Co.:
Date performed: 6/14/2013
Analysis time period: AM Off Peak Hour
Freeway/Dir of Travel: I-55 Westbound
Junction: LaGrange Entrance
Jurisdiction:
Analysis Year:
Description:

Freeway Data

Type of analysis	Merge	
Number of lanes in freeway	3	
Free-flow speed on freeway	60.0	mph
Volume on freeway	6153	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	1439	vph
Length of first accel/decel lane	1500	ft
Length of second accel/decel lane		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)	6153	1439		vph
Peak-hour factor, PHF	0.95	0.95		

Peak 15-min volume, v15	1619	379	v
Trucks and buses	15	15	%
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	0.930	0.930	
Driver population factor, fP	1.00	1.00	
Flow rate, vp	6963	1628	pcph

Estimation of V12 Merge Areas

L_{EQ} = (Equation 13-6 or 13-7)

P_{FM} = 0.619 Using Equation 1

$v_{12} = v_{F}(P_{FM})$ = 4314 pc/h

Capacity Checks

	Actual	Maximum	LOS F?
v_{FO}	8591	6900	Yes

v_{3} or v_{av34} 2649 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} = 4314 (Equation 13-15, 13-16, 13-18, or 13-19)

Flow Entering Merge Influence Area

	Actual	Max Desirable	Violation?
v_{R12}	8591	4600	Yes

Level of Service Determination (if not F)

$D_R = 5.475 + 0.00734\, v_{R} + 0.0078\, v_{12} - 0.00627\, L_A$ = 41.7 pc/mi/ln

Level of service for ramp-freeway junction areas of influence F

Speed Estimation

Intermediate speed variable, M_S = 1.701

Space mean speed in ramp influence area, S_R = 29.4 mph

Space mean speed in outer lanes, S_0 = 51.4 mph

Space mean speed for all vehicles, S = 33.9 mph

HCS 2010: Freeway Merge and Diverge Segments Release 6.1

Phone: Fax:
E-mail:

Merge Analysis

Analyst: Caitlin Bowen
Agency/Co.:
Date performed: 6/14/2013
Analysis time period: AM Off Peak Hour
Freeway/Dir of Travel: I-55 Westbound
Junction: Archer Avenue Entrance
Jurisdiction:
Analysis Year:
Description:

Freeway Data

Type of analysis	Merge	
Number of lanes in freeway	3	
Free-flow speed on freeway	60.0	mph
Volume on freeway	5682	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	1674	vph
Length of first accel/decel lane	1050	ft
Length of second accel/decel lane		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)	5682	1674		vph
Peak-hour factor, PHF	0.95	0.95		

Peak 15-min volume, v15	1495	441	v
Trucks and buses	15	15	%
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	0.930	0.930	
Driver population factor, fP	1.00	1.00	
Flow rate, vp	6430	1894	pcph

Estimation of V12 Merge Areas

L_{EQ} = (Equation 13-6 or 13-7)

P_{FM} = 0.607 Using Equation 1

$v_{12} = v_{F}(P_{FM})$ = 3902 pc/h

Capacity Checks

	Actual	Maximum	LOS F?
v_{FO}	8324	6900	Yes

v_{3} or v_{av34} 2528 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} = 3902 (Equation 13-15, 13-16, 13-18, or 13-19)

Flow Entering Merge Influence Area

	Actual	Max Desirable	Violation?
v_{R12}	8324	4600	Yes

Level of Service Determination (if not F)

$D_R = 5.475 + 0.00734\, v_R + 0.0078\, v_{12} - 0.00627\, L_A$ = 43.2 pc/mi/ln

Level of service for ramp-freeway junction areas of influence F

Speed Estimation

Intermediate speed variable, M_S = 1.531

Space mean speed in ramp influence area, S_R = 32.5 mph

Space mean speed in outer lanes, S_0 = 52.1 mph

Space mean speed for all vehicles, S = 36.6 mph

HCS 2010: Freeway Merge and Diverge Segments Release 6.1

Phone: Fax:
E-mail:

Merge Analysis

Analyst: Caitlin Bowen
Agency/Co.:
Date performed: 6/14/2013
Analysis time period: AM Off Peak Hour
Freeway/Dir of Travel: I-55 Westbound
Junction: Central Avenue Entrance
Jurisdiction:
Analysis Year:
Description:

Freeway Data

Type of analysis	Merge	
Number of lanes in freeway	3	
Free-flow speed on freeway	60.0	mph
Volume on freeway	6645	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	717	vph
Length of first accel/decel lane	1000	ft
Length of second accel/decel lane		ft

Adjacent Ramp Data (if one exists)

Does adjacent ramp exist?	Yes	
Volume on adjacent Ramp	1650	vph
Position of adjacent Ramp	Downstream	
Type of adjacent Ramp	Off	
Distance to adjacent Ramp	7500	ft

Conversion to pc/h Under Base Conditions

Junction Components	Freeway	Ramp	Adjacent Ramp	
Volume, V (vph)	6645	717	1650	vph
Peak-hour factor, PHF	0.95	0.95	0.95	

Peak 15-min volume, v15	1749	189	434	v
Trucks and buses	12	12	12	%
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	0.943	0.943	0.943	
Driver population factor, fP	1.00	1.00	1.00	
Flow rate, vp	7414	800	1841	pcph

Estimation of V12 Merge Areas

L = 8499.54 (Equation 13-6 or 13-7)
EQ

P = 0.613 Using Equation 3
FM

$v_{12} = v_{12}(P_{FM}) =$ 4546 pc/h

Capacity Checks

	Actual	Maximum	LOS F?
v_{FO}	8214	6900	Yes

v_3 or v_{av34} 2868 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} = 4714 (Equation 13-15, 13-16, 13-18, or 13-19)

Flow Entering Merge Influence Area

	Actual	Max Desirable	Violation?
v_{12A}	8214	4600	Yes

Level of Service Determination (if not F)

Density, $D_R = 5.475 + 0.00734\ v_R + 0.0078\ v_{12} - 0.00627\ L_A =$ 41.8 pc/mi/ln

Level of service for ramp-freeway junction areas of influence F

Speed Estimation

Intermediate speed variable, M_S = 1.219

Space mean speed in ramp influence area, S_R = 38.1 mph

Space mean speed in outer lanes, S_0 = 51.1 mph

Space mean speed for all vehicles, S = 41.5 mph

HCS 2010: Freeway Merge and Diverge Segments Release 6.1

Phone: Fax:
E-mail:

Merge Analysis

Analyst: Caitlin Bowen
Agency/Co.:
Date performed: 6/14/2013
Analysis time period: AM Off Peak Hour
Freeway/Dir of Travel: I-55 Westbound
Junction: Cicero Avenue Entrance
Jurisdiction:
Analysis Year:
Description:

Freeway Data

Type of analysis	Merge	
Number of lanes in freeway	3	
Free-flow speed on freeway	60.0	mph
Volume on freeway	6583	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	917	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	855	vph
Position of adjacent Ramp	Downstream	
Type of adjacent Ramp	Off	
Distance to adjacent Ramp	2300	ft

Conversion to pc/h Under Base Conditions

Junction Components	Freeway	Ramp	Adjacent Ramp	
Volume, V (vph)	6583	917	855	vph
Peak-hour factor, PHF	0.95	0.95	0.95	

Peak 15-min volume, v15	1732	241	225	v
Trucks and buses	12	12	12	%
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	0.943	0.943	0.943	
Driver population factor, fP	1.00	1.00	1.00	
Flow rate, vp	7345	1023	954	pcph

Estimation of V12 Merge Areas

L = 5489.07 (Equation 13-6 or 13-7)
EQ

P = 0.658 Using Equation 3
FM

v = v (P) = 4831 pc/h
12 F FM

Capacity Checks

	Actual	Maximum	LOS F?
v FO	8368	6900	Yes

v or v 2514 pc/h (Equation 13-14 or 13-17)
3 av34

Is v or v > 2700 pc/h? No
3 av34

Is v or v > 1.5 v /2 No
3 av34 12

If yes, v = 4831 (Equation 13-15, 13-16, 13-18, or 13-19)
12A

Flow Entering Merge Influence Area

	Actual	Max Desirable	Violation?
v R12	8368	4600	Yes

Level of Service Determination (if not F)

Density, D = 5.475 + 0.00734 v + 0.0078 v - 0.00627 L = 46.9 pc/mi/ln
R R 12 A

Level of service for ramp-freeway junction areas of influence F

Speed Estimation

Intermediate speed variable, M = 1.639
S

Space mean speed in ramp influence area, S = 30.5 mph
R

Space mean speed in outer lanes, S = 52.2 mph
0

Space mean speed for all vehicles, S = 34.9 mph

HCS 2010: Freeway Merge and Diverge Segments Release 6.1

Phone: Fax:
E-mail:

Merge Analysis

Analyst: Caitlin Bowen
Agency/Co.:
Date performed: 6/14/2013
Analysis time period: AM Off Peak Hour
Freeway/Dir of Travel: I-55 Westbound
Junction: Pulaski Road Entrance
Jurisdiction:
Analysis Year:
Description:

Freeway Data

Type of analysis	Merge	
Number of lanes in freeway	3	
Free-flow speed on freeway	60.0	mph
Volume on freeway	6009	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	1080	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	506	vph
Position of adjacent Ramp	Downstream	
Type of adjacent Ramp	Off	
Distance to adjacent Ramp	2600	ft

Conversion to pc/h Under Base Conditions

Junction Components	Freeway	Ramp	Adjacent Ramp	
Volume, V (vph)	6009	1080	506	vph
Peak-hour factor, PHF	0.95	0.95	0.95	

Peak 15-min volume, v15	1581	284	133	v
Trucks and buses	12	12	12	%
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	0.943	0.943	0.943	
Driver population factor, fP	1.00	1.00	1.00	
Flow rate, vp	6705	1205	565	pcph

Estimation of V12 Merge Areas

L_{EQ} = 3250.86 (Equation 13-6 or 13-7)

P_{FM} = 0.606 Using Equation 3

$v_{12} = v_{12}(P_{FM})$ = 4062 pc/h

Capacity Checks

	Actual	Maximum	LOS F?
v_{FO}	7910	6900	Yes

v_3 or v_{av34} 2643 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} = 4062 (Equation 13-15, 13-16, 13-18, or 13-19)

Flow Entering Merge Influence Area

	Actual	Max Desirable	Violation?
v_{R12}	7910	4600	Yes

Level of Service Determination (if not F)

$D_R = 5.475 + 0.00734\, v_R + 0.0078\, v_{12} - 0.00627\, L_A$ = 42.2 pc/mi/ln

Level of service for ramp-freeway junction areas of influence F

Speed Estimation

Intermediate speed variable, M_S = 1.035

Space mean speed in ramp influence area, S_R = 41.4 mph

Space mean speed in outer lanes, S_0 = 51.4 mph

Space mean speed for all vehicles, S = 44.3 mph

HCS 2010: Freeway Merge and Diverge Segments Release 6.1

Phone: Fax:
E-mail:

Merge Analysis

Analyst: John Connelly
Agency/Co.:
Date performed: 6/20/2013
Analysis time period: 2040 Westbound AM
Freeway/Dir of Travel: I-55
Junction: at Kedzie Ave Entrance
Jurisdiction:
Analysis Year: 2040
Description:

Freeway Data

Type of analysis	Merge	
Number of lanes in freeway	3	
Free-flow speed on freeway	60.0	mph
Volume on freeway	5973	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	818	vph
Length of first accel/decel lane	1100	ft
Length of second accel/decel lane		ft

Adjacent Ramp Data (if one exists)

Does adjacent ramp exist?	Yes	
Volume on adjacent Ramp	782	vph
Position of adjacent Ramp	Downstream	
Type of adjacent Ramp	Off	
Distance to adjacent Ramp	3600	ft

Conversion to pc/h Under Base Conditions

Junction Components	Freeway	Ramp	Adjacent Ramp	
Volume, V (vph)	5973	818	782	vph
Peak-hour factor, PHF	0.95	0.95	0.95	

Peak 15-min volume, v15	1572	215	206	v
Trucks and buses	12	12	12	%
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	0.943	0.943	0.943	
Driver population factor, fP	1.00	1.00	1.00	
Flow rate, vp	6665	913	873	pcph

Estimation of V12 Merge Areas

L = 3840.74 (Equation 13-6 or 13-7)
EQ

P = 0.612 Using Equation 3
FM

$v_{12} = v_{F}(P_{FM}) =$ 4082 pc/h

Capacity Checks

	Actual	Maximum	LOS F?
v_{FO}	7578	6900	Yes

v_3 or v_{av34} 2583 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} = 4082 (Equation 13-15, 13-16, 13-18, or 13-19)

Flow Entering Merge Influence Area

	Actual	Max Desirable	Violation?
v_{R12}	7578	4600	Yes

Level of Service Determination (if not F)

Density, $D_R = 5.475 + 0.00734\ v_{R12} + 0.0078\ v_{R12} - 0.00627\ L_A$ = 37.1 pc/mi/ln

Level of service for ramp-freeway junction areas of influence F

Speed Estimation

Intermediate speed variable, M_S = 0.820

Space mean speed in ramp influence area, S_R = 45.2 mph

Space mean speed in outer lanes, S_0 = 51.8 mph

Space mean speed for all vehicles, S = 47.3 mph

HCS 2010: Freeway Merge and Diverge Segments Release 6.1

Phone: Fax:
E-mail:

Merge Analysis

Analyst: Caitlin Bowen
Agency/Co.:
Date performed: 6/14/2013
Analysis time period: AM Off Peak Hour
Freeway/Dir of Travel: I-55 Westbound
Junction: Damen Avenue Entrance
Jurisdiction:
Analysis Year:
Description:

Freeway Data

Type of analysis	Merge	
Number of lanes in freeway	3	
Free-flow speed on freeway	60.0	mph
Volume on freeway	5865	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	1305	vph
Length of first accel/decel lane	500	ft
Length of second accel/decel lane		ft

Adjacent Ramp Data (if one exists)

Does adjacent ramp exist?	Yes	
Volume on adjacent Ramp	1197	vph
Position of adjacent Ramp	Downstream	
Type of adjacent Ramp	Off	
Distance to adjacent Ramp	3300	ft

Conversion to pc/h Under Base Conditions

Junction Components	Freeway	Ramp	Adjacent Ramp	
Volume, V (vph)	5865	1305	1197	vph
Peak-hour factor, PHF	0.95	0.95	0.95	

Peak 15-min volume, v15	1543	343	315	v
Trucks and buses	12	12	12	%
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	0.943	0.943	0.943	
Driver population factor, fP	1.00	1.00	1.00	
Flow rate, vp	6544	1456	1336	pcph

Estimation of V12 Merge Areas

L_{EQ} = 8191.29 (Equation 13-6 or 13-7)

P_{FM} = 0.655 Using Equation 3

$v_{12} = v_{12F}(P_{FM})$ = 4287 pc/h

Capacity Checks

	Actual	Maximum	LOS F?
v_{FO}	8000	6900	Yes

v_{3} or v_{av34} 2257 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} = 4287 (Equation 13-15, 13-16, 13-18, or 13-19)

Flow Entering Merge Influence Area

	Actual	Max Desirable	Violation?
v_{R12}	8000	4600	Yes

Level of Service Determination (if not F)

$D_R = 5.475 + 0.00734\, v_R + 0.0078\, v_{12} - 0.00627\, L_A$ = 46.5 pc/mi/ln

Level of service for ramp-freeway junction areas of influence F

Speed Estimation

Intermediate speed variable, M_S = 1.503

Space mean speed in ramp influence area, S_R = 32.9 mph

Space mean speed in outer lanes, S_0 = 53.7 mph

Space mean speed for all vehicles, S = 37.0 mph

HCS 2010: Freeway Merge and Diverge Segments Release 6.1

Phone: Fax:
E-mail:

Merge Analysis

Analyst:	Alex Ericksen
Agency/Co.:	
Date performed:	1/8/2014
Analysis time period:	AM Peak Period
Freeway/Dir of Travel:	I-55 Westbound
Junction:	I-90/94 Entrance
Jurisdiction:	
Analysis Year:	
Description:	

Freeway Data

Type of analysis	Merge	
Number of lanes in freeway	3	
Free-flow speed on freeway	60.0	mph
Volume on freeway	4545	vph

On Ramp Data

Side of freeway	Right	
Number of lanes in ramp	2	
Free-flow speed on ramp	30.0	mph
Volume on ramp	2259	vph
Length of first accel/decel lane	1000	ft
Length of second accel/decel lane	1000	ft

Adjacent Ramp Data (if one exists)

Does adjacent ramp exist?	Yes	
Volume on adjacent Ramp	939	vph
Position of adjacent Ramp	Downstream	
Type of adjacent Ramp	Off	
Distance to adjacent Ramp	6100	ft

Conversion to pc/h Under Base Conditions

Junction Components	Freeway	Ramp	Adjacent Ramp	
Volume, V (vph)	4545	2259	939	vph
Peak-hour factor, PHF	0.95	0.95	0.95	
Peak 15-min volume, v15	1196	594	247	v
Trucks and buses	12	12	12	%
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	0.943	0.943	0.943	
Driver population factor, fP	1.00	1.00	1.00	

Flow rate, vp 5071 2521 1048 pcph

Estimation of V12 Merge Areas

L_{EQ} = (Equation 13-6 or 13-7)

P_{FM} = 0.555 Using Equation 0

$v_{12} = v_F (P_{FM}) =$ 2814 pc/h

Capacity Checks

	Actual	Maximum	LOS F?
v_{FO}	7592	6900	Yes
v_3 or v_{av34}	2257 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} = 2897 (Equation 13-15, 13-16, 13-18, or 13-19)

Flow Entering Merge Influence Area

	Actual	Max Desirable	Violation?
v_{12A}	7592	4600	Yes

Level of Service Determination (if not F)

Density, $D_R = 5.475 + 0.00734\ v_R + 0.0078\ v_{12} - 0.00627\ L_A$ = 27.8 pc/mi/ln

Level of service for ramp-freeway junction areas of influence F

Speed Estimation

Intermediate speed variable, M_S = 1.020

Space mean speed in ramp influence area, S_R = 41.6 mph

Space mean speed in outer lanes, S_0 = 54.0 mph

Space mean speed for all vehicles, S = 44.6 mph

Merge

Southbound PM

HCS 2010: Freeway Merge and Diverge Segments Release 6.1

Phone: Fax:
E-mail:

Merge Analysis

Analyst: Caitlin Bowen
Agency/Co.:
Date performed: 6/14/2013
Analysis time period: PM Peak Hour
Freeway/Dir of Travel: I-55 Westbound
Junction: I-355 Entrance
Jurisdiction:
Analysis Year:
Description:

Freeway Data

Type of analysis	Merge	
Number of lanes in freeway	3	
Free-flow speed on freeway	60.0	mph
Volume on freeway	6905	vph

On Ramp Data

Side of freeway	Right	
Number of lanes in ramp	1	
Free-flow speed on ramp	40.0	mph
Volume on ramp	2193	vph
Length of first accel/decel lane	675	ft
Length of second accel/decel lane		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)	6905	2193		vph
Peak-hour factor, PHF	0.95	0.95		

Peak 15-min volume, v15	1817	577	v
Trucks and buses	7	7	%
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	0.966	
Driver population factor, fP	1.00	1.00	
Flow rate, vp	7523	2389	pcph

Estimation of V12 Merge Areas

L_{EQ} = (Equation 13-6 or 13-7)

P_{FM} = 0.596 Using Equation 1

$v_{12} = v_{F}(P_{FM})$ = 4487 pc/h

Capacity Checks

	Actual	Maximum	LOS F?
v_{FO}	9912	6900	Yes

v_{3} or v_{av34} 3036 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} = 4823 (Equation 13-15, 13-16, 13-18, or 13-19)

Flow Entering Merge Influence Area

	Actual	Max Desirable	Violation?
v_{12A}	9912	4600	Yes

Level of Service Determination (if not F)

Density, $D_R = 5.475 + 0.00734\, v_R + 0.0078\, v_{12} - 0.00627\, L_A$ = 56.4 pc/mi/ln

Level of service for ramp-freeway junction areas of influence F

Speed Estimation

Intermediate speed variable, M_S = 5.554

Space mean speed in ramp influence area, S_R = -40.0 mph

Space mean speed in outer lanes, S_0 = 51.1 mph

Space mean speed for all vehicles, S = mph

HCS 2010: Freeway Merge and Diverge Segments Release 6.1

Phone: Fax:
E-mail:

Merge Analysis

Analyst: Caitlin Bowen
Agency/Co.:
Date performed: 6/14/2013
Analysis time period: PM Peak Hour
Freeway/Dir of Travel: I-55 Westbound
Junction: Joliet Rd/CD Rd Entrance
Jurisdiction:
Analysis Year:
Description:

Freeway Data

Type of analysis	Merge	
Number of lanes in freeway	3	
Free-flow speed on freeway	60.0	mph
Volume on freeway	5386	vph

On Ramp Data

Side of freeway	Right	
Number of lanes in ramp	1	
Free-flow speed on ramp	40.0	mph
Volume on ramp	1519	vph
Length of first accel/decel lane	500	ft
Length of second accel/decel lane		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)	5386	1519		vph
Peak-hour factor, PHF	0.95	0.95		

Peak 15-min volume, v15	1417	400	v
Trucks and buses	7	7	%
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	0.966	
Driver population factor, fP	1.00	1.00	
Flow rate, vp	5868	1655	pcph

Estimation of V12 Merge Areas

L_{EQ} = (Equation 13-6 or 13-7)

P_{FM} = 0.591 Using Equation 1

$v_{12} = v_{12A}(P_{FM})$ = 3471 pc/h

Capacity Checks

	Actual	Maximum	LOS F?
v_{FO}	7523	6900	Yes

v_{3} or v_{av34} 2397 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} = 3471 (Equation 13-15, 13-16, 13-18, or 13-19)

Flow Entering Merge Influence Area

	Actual	Max Desirable	Violation?
v_{R12}	7523	4600	Yes

Level of Service Determination (if not F)

$D_R = 5.475 + 0.00734\, v_{R} + 0.0078\, v_{12} - 0.00627\, L_A$ = 41.6 pc/mi/ln

Level of service for ramp-freeway junction areas of influence F

Speed Estimation

Intermediate speed variable, M_S = 0.938

Space mean speed in ramp influence area, S_R = 43.1 mph

Space mean speed in outer lanes, S_0 = 52.9 mph

Space mean speed for all vehicles, S = 45.8 mph

HCS 2010: Freeway Merge and Diverge Segments Release 6.1

Phone: Fax:
E-mail:

Merge Analysis

Analyst:	Alex Ericksen
Agency/Co.:	
Date performed:	1/14/2014
Analysis time period:	PM Peak Hour
Freeway/Dir of Travel:	I-55 Westbound
Junction:	Lemont Rd Entrance
Jurisdiction:	
Analysis Year:	
Description:	

Freeway Data

Type of analysis	Merge	
Number of lanes in freeway	3	
Free-flow speed on freeway	60.0	mph
Volume on freeway	6440	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	904	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	1499	vph
Position of adjacent Ramp	Downstream	
Type of adjacent Ramp	Off	
Distance to adjacent Ramp	2950	ft

Conversion to pc/h Under Base Conditions

Junction Components	Freeway	Ramp	Adjacent Ramp	
Volume, V (vph)	6440	904	1499	vph
Peak-hour factor, PHF	0.95	0.95	0.95	
Peak 15-min volume, v15	1695	238	394	v
Trucks and buses	7	7	0	%
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	0.966	1.000	
Driver population factor, fP	1.00	1.00	1.00	

Flow rate, vp 7016 985 1578 pcph

Estimation of V12 Merge Areas

L_{EQ} = 9079.40 (Equation 13-6 or 13-7)

P_{FM} = 0.689 Using Equation 3

$v_{12} = v_F (P_{FM})$ = 4836 pc/h

Capacity Checks

	Actual	Maximum	LOS F?
v_{FO}	8001	6900	Yes
v_3 or v_{av34}	2180 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} = 4836 (Equation 13-15, 13-16, 13-18, or 13-19)

Flow Entering Merge Influence Area

	Actual	Max Desirable	Violation?
v_{R12}	8001	4600	Yes

Level of Service Determination (if not F)

Density, $D_R = 5.475 + 0.00734\ v_R + 0.0078\ v_{12} - 0.00627\ L_A$ = 46.7 pc/mi/ln

Level of service for ramp-freeway junction areas of influence F

Speed Estimation

Intermediate speed variable, M_S = 1.595

Space mean speed in ramp influence area, S_R = 31.3 mph

Space mean speed in outer lanes, S_0 = 54.0 mph

Space mean speed for all vehicles, S = 35.3 mph

HCS 2010: Freeway Merge and Diverge Segments Release 6.1

Phone: Fax:
E-mail:

Merge Analysis

Analyst: Caitlin Bowen
Agency/Co.:
Date performed: 6/14/2013
Analysis time period: PM Peak Hour
Freeway/Dir of Travel: I-55 Westbound
Junction: Cass Avenue Entrance
Jurisdiction:
Analysis Year:
Description:

Freeway Data

Type of analysis	Merge	
Number of lanes in freeway	3	
Free-flow speed on freeway	60.0	mph
Volume on freeway	6851	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	731	vph
Length of first accel/decel lane	775	ft
Length of second accel/decel lane		ft

Adjacent Ramp Data (if one exists)

Does adjacent ramp exist?	Yes	
Volume on adjacent Ramp	1304	vph
Position of adjacent Ramp	Downstream	
Type of adjacent Ramp	Off	
Distance to adjacent Ramp	8000	ft

Conversion to pc/h Under Base Conditions

Junction Components	Freeway	Ramp	Adjacent Ramp	
Volume, V (vph)	6851	731	1304	vph
Peak-hour factor, PHF	0.95	0.95	0.95	

Peak 15-min volume, v15	1803	192	343	v
Trucks and buses	7	7	7	%
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	0.966	0.966	
Driver population factor, fP	1.00	1.00	1.00	
Flow rate, vp	7464	796	1421	pcph

Estimation of V12 Merge Areas

L = 7380.86 (Equation 13-6 or 13-7)
EQ

P = 0.599 Using Equation 1
FM

v = v (P) = 4472 pc/h
12 F FM

Capacity Checks

	Actual	Maximum	LOS F?
v FO	8260	6900	Yes

v or v 2992 pc/h (Equation 13-14 or 13-17)
3 av34

Is v or v > 2700 pc/h? Yes
3 av34

Is v or v > 1.5 v /2 No
3 av34 12

If yes, v = 4764 (Equation 13-15, 13-16, 13-18, or 13-19)
12A

Flow Entering Merge Influence Area

	Actual	Max Desirable	Violation?
v 12A	8260	4600	Yes

Level of Service Determination (if not F)

Density, D = 5.475 + 0.00734 v + 0.0078 v - 0.00627 L = 43.6 pc/mi/ln
R R 12 A

Level of service for ramp-freeway junction areas of influence F

Speed Estimation

Intermediate speed variable, M = 1.280
S

Space mean speed in ramp influence area, S = 37.0 mph
R

Space mean speed in outer lanes, S = 51.1 mph
0

Space mean speed for all vehicles, S = 40.6 mph

HCS 2010: Freeway Merge and Diverge Segments Release 6.1

Phone: Fax:
E-mail:

Merge Analysis

Analyst: Caitlin Bowen
Agency/Co.:
Date performed: 6/14/2013
Analysis time period: PM Peak Hour
Freeway/Dir of Travel: I-55 Westbound
Junction: Kingery Hwy Entrance
Jurisdiction:
Analysis Year:
Description:

Freeway Data

Type of analysis	Merge	
Number of lanes in freeway	3	
Free-flow speed on freeway	60.0	mph
Volume on freeway	6043	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	1405	vph
Length of first accel/decel lane	900	ft
Length of second accel/decel lane		ft

Adjacent Ramp Data (if one exists)

Does adjacent ramp exist?	Yes	
Volume on adjacent Ramp	666	vph
Position of adjacent Ramp	Downstream	
Type of adjacent Ramp	Off	
Distance to adjacent Ramp	6000	ft

Conversion to pc/h Under Base Conditions

Junction Components	Freeway	Ramp	Adjacent Ramp	
Volume, V (vph)	6043	1405	666	vph
Peak-hour factor, PHF	0.95	0.95	0.95	

Peak 15-min volume, v15	1590	370	175	v
Trucks and buses	7	7	7	%
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	0.966	0.966	
Driver population factor, fP	1.00	1.00	1.00	
Flow rate, vp	6584	1531	726	pcph

Estimation of V12 Merge Areas

L = 3525.98 (Equation 13-6 or 13-7)
EQ

P = 0.603 Using Equation 1
FM

$v_{12} = v_{FM} (P_{FM}) =$ 3968 pc/h

Capacity Checks

	Actual	Maximum	LOS F?
v_{FO}	8115	6900	Yes

v_{av34} or v_3 2616 pc/h (Equation 13-14 or 13-17)

Is v_{av34} or v_3 > 2700 pc/h? No

Is v_{av34} or v_3 > 1.5 v_{12} /2 No

If yes, v_{12A} = 3968 (Equation 13-15, 13-16, 13-18, or 13-19)

Flow Entering Merge Influence Area

	Actual	Max Desirable	Violation?
v_{R12}	8115	4600	Yes

Level of Service Determination (if not F)

Density, $D_R = 5.475 + 0.00734\ v_{R12} + 0.0078\ v_{R12} - 0.00627\ L_A$ = 42.0 pc/mi/ln

Level of service for ramp-freeway junction areas of influence F

Speed Estimation

Intermediate speed variable, M_S = 1.211

Space mean speed in ramp influence area, S_R = 38.2 mph

Space mean speed in outer lanes, S_0 = 51.6 mph

Space mean speed for all vehicles, S = 41.7 mph

HCS 2010: Freeway Merge and Diverge Segments Release 6.1

Phone: Fax:
E-mail:

Merge Analysis

Analyst: Caitlin Bowen
Agency/Co.:
Date performed: 6/14/2013
Analysis time period: PM Peak Hour
Freeway/Dir of Travel: I-55 Westbound
Junction: County Line Rd Entrance
Jurisdiction:
Analysis Year:
Description:

Freeway Data

Type of analysis	Merge	
Number of lanes in freeway	3	
Free-flow speed on freeway	60.0	mph
Volume on freeway	6254	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	416	vph
Length of first accel/decel lane	700	ft
Length of second accel/decel lane		ft

Adjacent Ramp Data (if one exists)

Does adjacent ramp exist?	Yes	
Volume on adjacent Ramp	627	vph
Position of adjacent Ramp	Downstream	
Type of adjacent Ramp	Off	
Distance to adjacent Ramp	6500	ft

Conversion to pc/h Under Base Conditions

Junction Components	Freeway	Ramp	Adjacent Ramp	
Volume, V (vph)	6254	416	627	vph
Peak-hour factor, PHF	0.95	0.95	0.95	

Peak 15-min volume, v15	1646	109	165	v
Trucks and buses	7	7	7	%
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	0.966	0.966	
Driver population factor, fP	1.00	1.00	1.00	
Flow rate, vp	6814	453	683	pcph

Estimation of V12 Merge Areas

L = 3701.90 (Equation 13-6 or 13-7)
EQ

P = 0.597 Using Equation 1
FM

$v_{12} = v_{12}(P_{FM}) =$ 4069 pc/h

Capacity Checks

	Actual	Maximum	LOS F?
v_{FO}	7267	6900	Yes

v_{3} or v_{av34} 2745 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} = 4114 (Equation 13-15, 13-16, 13-18, or 13-19)

Flow Entering Merge Influence Area

	Actual	Max Desirable	Violation?
v_{12A}	7267	4600	No

Level of Service Determination (if not F)

Density, $D_R = 5.475 + 0.00734\ v_R + 0.0078\ v_{12} - 0.00627\ L_A$ = 36.5 pc/mi/ln

Level of service for ramp-freeway junction areas of influence F

Speed Estimation

Intermediate speed variable, M_S = 0.647

Space mean speed in ramp influence area, S_R = 48.3 mph

Space mean speed in outer lanes, S_0 = 51.1 mph

Space mean speed for all vehicles, S = 49.3 mph

HCS 2010: Freeway Merge and Diverge Segments Release 6.1

Phone: Fax:
E-mail:

Merge Analysis

Analyst: Caitlin Bowen
Agency/Co.:
Date performed: 6/14/2013
Analysis time period: PM Peak Hour
Freeway/Dir of Travel: I-55 Westbound
Junction: LaGrange Entrance
Jurisdiction:
Analysis Year:
Description:

Freeway Data

Type of analysis	Merge	
Number of lanes in freeway	3	
Free-flow speed on freeway	60.0	mph
Volume on freeway	5797	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	1721	vph
Length of first accel/decel lane	1500	ft
Length of second accel/decel lane		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)	5797	1721		vph
Peak-hour factor, PHF	0.95	0.95		

Peak 15-min volume, v15	1526	453	v
Trucks and buses	7	7	%
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	0.966	
Driver population factor, fP	1.00	1.00	
Flow rate, vp	6316	1875	pcph

Estimation of V12 Merge Areas

L_{EQ} = (Equation 13-6 or 13-7)

P_{FM} = 0.619 Using Equation 1

$v_{12} = v_{F}(P_{FM})$ = 3913 pc/h

Capacity Checks

	Actual	Maximum	LOS F?
v_{FO}	8191	6900	Yes

v_{3} or v_{av34} 2403 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} = 3913 (Equation 13-15, 13-16, 13-18, or 13-19)

Flow Entering Merge Influence Area

	Actual	Max Desirable	Violation?
v_{R12}	8191	4600	Yes

Level of Service Determination (if not F)

$D_R = 5.475 + 0.00734\, v_{R} + 0.0078\, v_{12} - 0.00627\, L_{A}$ = 40.4 pc/mi/ln

Level of service for ramp-freeway junction areas of influence F

Speed Estimation

Intermediate speed variable, M_S = 1.489

Space mean speed in ramp influence area, S_R = 33.2 mph

Space mean speed in outer lanes, S_0 = 52.9 mph

Space mean speed for all vehicles, S = 37.3 mph

HCS 2010: Freeway Merge and Diverge Segments Release 6.1

Phone: Fax:
E-mail:

Merge Analysis

Analyst: Caitlin Bowen
Agency/Co.:
Date performed: 6/14/2013
Analysis time period: PM Peak Hour
Freeway/Dir of Travel: I-55 Westbound
Junction: Archer Avenue Entrance
Jurisdiction:
Analysis Year:
Description:

Freeway Data

Type of analysis	Merge	
Number of lanes in freeway	3	
Free-flow speed on freeway	60.0	mph
Volume on freeway	5273	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	2071	vph
Length of first accel/decel lane	1050	ft
Length of second accel/decel lane		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)	5273	2071		vph
Peak-hour factor, PHF	0.95	0.95		

Peak 15-min volume, v15	1388	545	v
Trucks and buses	7	7	%
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	0.966	
Driver population factor, fP	1.00	1.00	
Flow rate, vp	5745	2256	pcph

Estimation of V12 Merge Areas

L_{EQ} = (Equation 13-6 or 13-7)

P_{FM} = 0.607 Using Equation 1

$v_{12} = v_{F}(P_{FM})$ = 3487 pc/h

Capacity Checks

	Actual	Maximum	LOS F?
v_{FO}	8001	6900	Yes

v_{3} or v_{av34} 2258 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} = 3487 (Equation 13-15, 13-16, 13-18, or 13-19)

Flow Entering Merge Influence Area

	Actual	Max Desirable	Violation?
v_{R12}	8001	4600	Yes

Level of Service Determination (if not F)

$D_R = 5.475 + 0.00734\, v_{R} + 0.0078\, v_{12} - 0.00627\, L_A$ = 42.6 pc/mi/ln

Level of service for ramp-freeway junction areas of influence F

Speed Estimation

Intermediate speed variable, M_S = 1.464

Space mean speed in ramp influence area, S_R = 33.6 mph

Space mean speed in outer lanes, S_0 = 53.7 mph

Space mean speed for all vehicles, S = 37.6 mph

HCS 2010: Freeway Merge and Diverge Segments Release 6.1

Phone: Fax:
E-mail:

Merge Analysis

Analyst: Caitlin Bowen
Agency/Co.:
Date performed: 6/14/2013
Analysis time period: PM Peak Hour
Freeway/Dir of Travel: I-55 Westbound
Junction: Central Avenue Entrance
Jurisdiction:
Analysis Year:
Description:

Freeway Data

Type of analysis	Merge	
Number of lanes in freeway	3	
Free-flow speed on freeway	60.0	mph
Volume on freeway	7047	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	672	vph
Length of first accel/decel lane	1000	ft
Length of second accel/decel lane		ft

Adjacent Ramp Data (if one exists)

Does adjacent ramp exist?	Yes	
Volume on adjacent Ramp	1741	vph
Position of adjacent Ramp	Downstream	
Type of adjacent Ramp	Off	
Distance to adjacent Ramp	7500	ft

Conversion to pc/h Under Base Conditions

Junction Components	Freeway	Ramp	Adjacent Ramp	
Volume, V (vph)	7047	672	1741	vph
Peak-hour factor, PHF	0.95	0.95	0.95	

Peak 15-min volume, v15	1854	177	458	v
Trucks and buses	7	7	7	%
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	0.966	0.966	
Driver population factor, fP	1.00	1.00	1.00	
Flow rate, vp	7678	732	1897	pcph

Estimation of V12 Merge Areas

L = 8758.08 (Equation 13-6 or 13-7)
EQ

P = 0.615 Using Equation 3
FM

v = v (P) = 4723 pc/h
12 F FM

Capacity Checks

	Actual	Maximum	LOS F?
v FO	8410	6900	Yes

v or v 2955 pc/h (Equation 13-14 or 13-17)
3 av34

Is v or v > 2700 pc/h? Yes
3 av34

Is v or v > 1.5 v /2 No
3 av34 12

If yes, v = 4978 (Equation 13-15, 13-16, 13-18, or 13-19)
12A

Flow Entering Merge Influence Area

	Actual	Max Desirable	Violation?
v 12A	8410	4600	Yes

Level of Service Determination (if not F)

Density, $D = 5.475 + 0.00734 v_R + 0.0078 v_{12} - 0.00627 L_A = 43.4$ pc/mi/ln

Level of service for ramp-freeway junction areas of influence F

Speed Estimation

Intermediate speed variable, $M_S = 1.428$

Space mean speed in ramp influence area, $S_R = 34.3$ mph

Space mean speed in outer lanes, $S_0 = 51.1$ mph

Space mean speed for all vehicles, $S = 38.3$ mph

HCS 2010: Freeway Merge and Diverge Segments Release 6.1

Phone: Fax:
E-mail:

Merge Analysis

Analyst: Caitlin Bowen
Agency/Co.:
Date performed: 6/14/2013
Analysis time period: PM Peak Hour
Freeway/Dir of Travel: I-55 Westbound
Junction: Cicero Avenue Entrance
Jurisdiction:
Analysis Year:
Description:

Freeway Data

Type of analysis	Merge	
Number of lanes in freeway	3	
Free-flow speed on freeway	60.0	mph
Volume on freeway	6741	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	1222	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	916	vph
Position of adjacent Ramp	Downstream	
Type of adjacent Ramp	Off	
Distance to adjacent Ramp	2300	ft

Conversion to pc/h Under Base Conditions

Junction Components	Freeway	Ramp	Adjacent Ramp	
Volume, V (vph)	6741	1222	916	vph
Peak-hour factor, PHF	0.95	0.95	0.95	

Peak 15-min volume, v15	1774	322	241	v
Trucks and buses	7	7	7	%
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	0.966	0.966	
Driver population factor, fP	1.00	1.00	1.00	
Flow rate, vp	7344	1331	998	pcph

Estimation of V12 Merge Areas

L = 5742.23 (Equation 13-6 or 13-7)
EQ

P = 0.663 Using Equation 3
FM

v = v (P) = 4867 pc/h
12 F FM

Capacity Checks

	Actual	Maximum	LOS F?
v FO	8675	6900	Yes

v or v 2477 pc/h (Equation 13-14 or 13-17)
3 av34

Is v or v > 2700 pc/h? No
3 av34

Is v or v > 1.5 v /2 No
3 av34 12

If yes, v = 4867 (Equation 13-15, 13-16, 13-18, or 13-19)
12A

Flow Entering Merge Influence Area

	Actual	Max Desirable	Violation?
v R12	8675	4600	Yes

Level of Service Determination (if not F)

Density, $D_R = 5.475 + 0.00734\, v_R + 0.0078\, v_{12} - 0.00627\, L_A = 49.4$ pc/mi/ln

Level of service for ramp-freeway junction areas of influence F

Speed Estimation

Intermediate speed variable, $M_S = 2.197$

Space mean speed in ramp influence area, $S_R = 20.5$ mph

Space mean speed in outer lanes, $S_0 = 52.4$ mph

Space mean speed for all vehicles, $S = 24.8$ mph

HCS 2010: Freeway Merge and Diverge Segments Release 6.1

Phone: Fax:
E-mail:

Merge Analysis

Analyst: Caitlin Bowen
Agency/Co.:
Date performed: 6/14/2013
Analysis time period: PM Peak Hour
Freeway/Dir of Travel: I-55 Westbound
Junction: Pulaski Road Entrance
Jurisdiction:
Analysis Year:
Description:

Freeway Data

Type of analysis	Merge	
Number of lanes in freeway	3	
Free-flow speed on freeway	60.0	mph
Volume on freeway	6155	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	993	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	407	vph
Position of adjacent Ramp	Downstream	
Type of adjacent Ramp	Off	
Distance to adjacent Ramp	2600	ft

Conversion to pc/h Under Base Conditions

Junction Components	Freeway	Ramp	Adjacent Ramp	
Volume, V (vph)	6155	993	407	vph
Peak-hour factor, PHF	0.95	0.95	0.95	

Peak 15-min volume, v15	1620	261	107	v
Trucks and buses	7	7	7	%
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	0.966	0.966	
Driver population factor, fP	1.00	1.00	1.00	
Flow rate, vp	6706	1082	443	pcph

Estimation of V12 Merge Areas

L = 2548.91 (Equation 13-6 or 13-7)
EQ

P = 0.594 Using Equation 1
FM

$v_{12} = v_{FM} (P_{FM}) =$ 3985 pc/h

Capacity Checks

	Actual	Maximum	LOS F?
v_{FO}	7788	6900	Yes

v_{av34} or v_3 2721 pc/h (Equation 13-14 or 13-17)

Is v_{av34} or v_3 > 2700 pc/h? Yes

Is v_{av34} or v_3 > 1.5 v_{12} /2 No

If yes, v_{12A} = 4006 (Equation 13-15, 13-16, 13-18, or 13-19)

Flow Entering Merge Influence Area

	Actual	Max Desirable	Violation?
v_{12A}	7788	4600	Yes

Level of Service Determination (if not F)

Density, $D_R = 5.475 + 0.00734\ v_R + 0.0078\ v_{12} - 0.00627\ L_A$ = 40.9 pc/mi/ln

Level of service for ramp-freeway junction areas of influence F

Speed Estimation

Intermediate speed variable, M_S = 0.911

Space mean speed in ramp influence area, S_R = 43.6 mph

Space mean speed in outer lanes, S_0 = 51.1 mph

Space mean speed for all vehicles, S = 45.9 mph

HCS 2010: Freeway Merge and Diverge Segments Release 6.1

Phone: Fax:
E-mail:

Merge Analysis

Analyst: John Connelly
Agency/Co.:
Date performed: 6/20/2013
Analysis time period: 2040 Westbound PM
Freeway/Dir of Travel: I-55
Junction: at Kedzie Ave Entrance
Jurisdiction:
Analysis Year: 2040
Description:

Freeway Data

Type of analysis	Merge	
Number of lanes in freeway	3	
Free-flow speed on freeway	60.0	mph
Volume on freeway	5800	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	1406	vph
Length of first accel/decel lane	1100	ft
Length of second accel/decel lane		ft

Adjacent Ramp Data (if one exists)

Does adjacent ramp exist?	Yes	
Volume on adjacent Ramp	1051	vph
Position of adjacent Ramp	Downstream	
Type of adjacent Ramp	Off	
Distance to adjacent Ramp	3600	ft

Conversion to pc/h Under Base Conditions

Junction Components	Freeway	Ramp	Adjacent Ramp	
Volume, V (vph)	5800	1406	1051	vph
Peak-hour factor, PHF	0.95	0.95	0.95	

Peak 15-min volume, v15	1526	370	277	v
Trucks and buses	7	7	7	%
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	0.966	0.966	
Driver population factor, fP	1.00	1.00	1.00	
Flow rate, vp	6319	1532	1145	pcph

Estimation of V12 Merge Areas

L = 5037.40 (Equation 13-6 or 13-7)
EQ

P = 0.632 Using Equation 3
FM

v = v (P) = 3995 pc/h
12 F FM

Capacity Checks

	Actual	Maximum	LOS F?
v FO	7851	6900	Yes

v or v 2324 pc/h (Equation 13-14 or 13-17)
3 av34

Is v or v > 2700 pc/h? No
3 av34

Is v or v > 1.5 v /2 No
3 av34 12

If yes, v = 3995 (Equation 13-15, 13-16, 13-18, or 13-19)
12A

Flow Entering Merge Influence Area

	Actual	Max Desirable	Violation?
v R12	7851	4600	Yes

Level of Service Determination (if not F)

Density, $D = 5.475 + 0.00734 v_R + 0.0078 v_{R12} - 0.00627 L_A = 41.0$ pc/mi/ln

Level of service for ramp-freeway junction areas of influence F

Speed Estimation

Intermediate speed variable, $M_S = 1.224$

Space mean speed in ramp influence area, $S_R = 38.0$ mph

Space mean speed in outer lanes, $S_0 = 53.3$ mph

Space mean speed for all vehicles, S = 41.5 mph

HCS 2010: Freeway Merge and Diverge Segments Release 6.1

Phone: Fax:
E-mail:

Merge Analysis

Analyst: Caitlin Bowen
Agency/Co.:
Date performed: 6/14/2013
Analysis time period: PM Peak Hour
Freeway/Dir of Travel: I-55 Westbound
Junction: Damen Avenue Entrance
Jurisdiction:
Analysis Year:
Description:

Freeway Data

Type of analysis	Merge	
Number of lanes in freeway	3	
Free-flow speed on freeway	60.0	mph
Volume on freeway	5507	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	1434	vph
Length of first accel/decel lane	500	ft
Length of second accel/decel lane		ft

Adjacent Ramp Data (if one exists)

Does adjacent ramp exist?	Yes	
Volume on adjacent Ramp	1141	vph
Position of adjacent Ramp	Downstream	
Type of adjacent Ramp	Off	
Distance to adjacent Ramp	3300	ft

Conversion to pc/h Under Base Conditions

Junction Components	Freeway	Ramp	Adjacent Ramp	
Volume, V (vph)	5507	1434	1141	vph
Peak-hour factor, PHF	0.95	0.95	0.95	

Peak 15-min volume, v15	1449	377	300	v
Trucks and buses	7	7	7	%
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	0.966	0.966	
Driver population factor, fP	1.00	1.00	1.00	
Flow rate, vp	6000	1562	1243	pcph

Estimation of V12 Merge Areas

L = 7621.09 (Equation 13-6 or 13-7)
EQ

P = 0.648 Using Equation 3
FM

$v_{12} = v_{F}(P_{FM}) =$ 3886 pc/h

Capacity Checks

	Actual	Maximum	LOS F?
v_{FO}	7562	6900	Yes

v_{3} or v_{av34} 2114 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} = 3886 (Equation 13-15, 13-16, 13-18, or 13-19)

Flow Entering Merge Influence Area

	Actual	Max Desirable	Violation?
v_{R12}	7562	4600	Yes

Level of Service Determination (if not F)

Density, $D_R = 5.475 + 0.00734\, v_R + 0.0078\, v_{12} - 0.00627\, L_A =$ 44.1 pc/mi/ln

Level of service for ramp-freeway junction areas of influence F

Speed Estimation

Intermediate speed variable, M_S = 1.192

Space mean speed in ramp influence area, S_R = 38.5 mph

Space mean speed in outer lanes, S_0 = 54.2 mph

Space mean speed for all vehicles, S = 41.9 mph

HCS 2010: Freeway Merge and Diverge Segments Release 6.1

Phone: Fax:
E-mail:

Merge Analysis

Analyst:	Alex Ericksen
Agency/Co.:	
Date performed:	1/8/2014
Analysis time period:	PM Peak Hour
Freeway/Dir of Travel:	I-55 Westbound
Junction:	I-90/94 Entrance
Jurisdiction:	
Analysis Year:	
Description:	

Freeway Data

Type of analysis	Merge	
Number of lanes in freeway	3	
Free-flow speed on freeway	60.0	mph
Volume on freeway	3810	vph

On Ramp Data

Side of freeway	Right	
Number of lanes in ramp	2	
Free-flow speed on ramp	30.0	mph
Volume on ramp	2501	vph
Length of first accel/decel lane	1000	ft
Length of second accel/decel lane	1000	ft

Adjacent Ramp Data (if one exists)

Does adjacent ramp exist?	Yes	
Volume on adjacent Ramp	804	vph
Position of adjacent Ramp	Downstream	
Type of adjacent Ramp	Off	
Distance to adjacent Ramp	6100	ft

Conversion to pc/h Under Base Conditions

Junction Components	Freeway	Ramp	Adjacent Ramp	
Volume, V (vph)	3810	2501	804	vph
Peak-hour factor, PHF	0.95	0.95	0.95	
Peak 15-min volume, v15	1003	658	212	v
Trucks and buses	7	7	7	%
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	0.966	0.966	
Driver population factor, fP	1.00	1.00	1.00	

Flow rate, vp 4151 2725 876 pcph

Estimation of V12 Merge Areas

L_{EQ} = (Equation 13-6 or 13-7)

P_{FM} = 0.555 Using Equation 0

$v_{12} = v_F (P_{FM})$ = 2304 pc/h

Capacity Checks

	Actual	Maximum	LOS F?
v_{FO}	6876	6900	No
v_3 or v_{av34}	1847 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, 18, or 13-19)

Flow Entering Merge Influence Area

	Actual	Max Desirable	Violation?
v_{12A}	6876	4600	Yes

Level of Service Determination (if not F)

$D_R = 5.475 + 0.00734\ v_R + 0.0078\ v_{12} - 0.00627\ L_A$ = 25.2 pc/mi/ln

Level of service for ramp-freeway junction areas of influence C

Speed Estimation

Intermediate speed variable, M_S = 0.779

Space mean speed in ramp influence area, S_R = 46.0 mph

Space mean speed in outer lanes, S_0 = 55.4 mph

Space mean speed for all vehicles, S = 48.1 mph

Diverge

Northbound AM

HCS 2010: Freeway Merge and Diverge Segments Release 6.1

Phone: Fax:
E-mail:

Diverge Analysis

Analyst: Caitlin Bowen
Agency/Co.:
Date performed: 6/13/2013
Analysis time period: AM Peak Hour
Freeway/Dir of Travel: I-55 Eastbound
Junction: I-355 Exit
Jurisdiction:
Analysis Year:
Description:

Freeway Data

Type of analysis	Diverge	
Number of lanes in freeway	3	
Free-flow speed on freeway	60.0	mph
Volume on freeway	5710	vph

Off Ramp Data

Side of freeway	Right	
Number of lanes in ramp	1	
Free-Flow speed on ramp	40.0	mph
Volume on ramp	2028	vph
Length of first accel/decel lane	280	ft
Length of second accel/decel lane		ft

Adjacent Ramp Data (if one exists)

Does adjacent ramp exist?	Yes	
Volume on adjacent ramp	369	vph
Position of adjacent ramp	Downstream	
Type of adjacent ramp	On	
Distance to adjacent ramp	2500	ft

Conversion to pc/h Under Base Conditions

Junction Components	Freeway	Ramp	Adjacent Ramp	
Volume, V (vph)	5710	2028	369	vph
Peak-hour factor, PHF	0.95	0.95	0.95	

Peak 15-min volume, v15	1503	534	97	v
Trucks and buses	9	9	9	%
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	0.957	0.957	0.957	
Driver population factor, fP	1.00	1.00	1.00	
Flow rate, vp	6281	2231	406	pcph

Estimation of V12 Diverge Areas

L_{EQ} = (Equation 13-12 or 13-13)

P_{FD} = 0.500 Using Equation 5

$v_{12} = v_R + (v - v_F) P_{FD}$ = 4257 pc/h

Capacity Checks

	Actual	Maximum	LOS F?
$v_{Fi} = v_F$	6281	6900	No
$v_{FO} = v - v_R$	4050	6900	No
v_R	2231	2100	Yes

v_3 or v_{av34} 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} = 4257 (Equation 13-15, 13-16, 13-18, or 13-19)

Flow Entering Diverge Influence Area

	Actual	Max Desirable	Violation?
v_{12}	4257	4400	No

Level of Service Determination (if not F)

Density, $D_R = 4.252 + 0.0086\ v_{12} - 0.009\ L_D$ = 38.3 pc/mi/ln

Level of service for ramp-freeway junction areas of influence F

Speed Estimation

Intermediate speed variable, D_S = 0.564

Space mean speed in ramp influence area, S = 49.9 mph

Space mean speed in outer lanes, S_R = 61.8 mph

Space mean speed for all vehicles, S_0 = 53.2 mph

HCS 2010: Freeway Merge and Diverge Segments Release 6.1

Phone: Fax:
E-mail:

Diverge Analysis

Analyst:	Alex Ericksen
Agency/Co.:	
Date performed:	1/14/2014
Analysis time period:	AM Peak Hour
Freeway/Dir of Travel:	I-55 Eastbound
Junction:	Lemont Rd West Side
Jurisdiction:	
Analysis Year:	
Description:	

Freeway Data

Type of analysis	Diverge	
Number of lanes in freeway	4	
Free-flow speed on freeway	60.0	mph
Volume on freeway	6301	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	1105	vph
Length of first accel/decel lane	1500	ft
Length of second accel/decel lane		ft

Adjacent Ramp Data (if one exists)

Does adjacent ramp exist?	Yes	
Volume on adjacent ramp	2250	vph
Position of adjacent ramp	Upstream	
Type of adjacent ramp	On	
Distance to adjacent ramp	3550	ft

Conversion to pc/h Under Base Conditions

Junction Components	Freeway		Ramp		Adjacent Ramp		
Volume, V (vph)	6301		1105		2250		vph
Peak-hour factor, PHF	0.95		0.95		0.95		
Peak 15-min volume, v15	1658		291		592		v
Trucks and buses	9		9		9		%
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	0.957		0.957		0.957		
Driver population factor, fP	1.00		1.00		1.00		

Flow rate, vp 6931 1216 2475 pcph

Estimation of V12 Diverge Areas

L_{EQ} = (Equation 13-12 or 13-13)

P_{FD} = 0.436 Using Equation 8

$v_{12} = v_R + (v_F - v_R) P_{FD}$ = 3708 pc/h

Capacity Checks

	Actual	Maximum	LOS F?
$v_{Fi} = v_F$	6931	9200	No
$v_{FO} = v_F - v_R$	5715	9200	No
v_R	1216	2100	No
v_3 or v_{av34}	1611 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} = 3708 (Equation 13-15, 13-16, 13-18, or 13-19)

Flow Entering Diverge Influence Area

	Actual	Max Desirable	Violation?
v_{12}	3708	4400	No

Level of Service Determination (if not F)

Density, $D_R = 4.252 + 0.0086\, v_{12} - 0.009\, L_D$ = 22.6 pc/mi/ln

Level of service for ramp-freeway junction areas of influence C

Speed Estimation

Intermediate speed variable, D_S = 0.407

Space mean speed in ramp influence area, S_R = 52.7 mph

Space mean speed in outer lanes, S_0 = 63.4 mph

Space mean speed for all vehicles, S = 57.2 mph

HCS 2010: Freeway Merge and Diverge Segments Release 6.1

Phone: Fax:
E-mail:

Diverge Analysis

Analyst:	Alex Ericksen
Agency/Co.:	
Date performed:	1/8/2014
Analysis time period:	AM Peak Hour
Freeway/Dir of Travel:	I-55 Eastbound
Junction:	Cass Ave West Side
Jurisdiction:	
Analysis Year:	
Description:	

Freeway Data

Type of analysis	Diverge	
Number of lanes in freeway	3	
Free-flow speed on freeway	60.0	mph
Volume on freeway	6797	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	523	vph
Length of first accel/decel lane	250	ft
Length of second accel/decel lane		ft

Adjacent Ramp Data (if one exists)

Does adjacent ramp exist?	Yes	
Volume on adjacent ramp	1747	vph
Position of adjacent ramp	Upstream	
Type of adjacent ramp	On	
Distance to adjacent ramp	8000	ft

Conversion to pc/h Under Base Conditions

Junction Components	Freeway		Ramp		Adjacent Ramp		
Volume, V (vph)	6797		523		1747		vph
Peak-hour factor, PHF	0.95		0.95		0.95		
Peak 15-min volume, v15	1789		138		460		v
Trucks and buses	9		9		9		%
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	0.957		0.957		0.957		
Driver population factor, fP	1.00		1.00		1.00		

Flow rate, vp 7477 575 1922 pcph

Estimation of V12 Diverge Areas

L_{EQ} = 9645.16 (Equation 13-12 or 13-13)

P_{FD} = 0.571 Using Equation 6

$v_{12} = v_R + (v_F - v_R) P_{FD}$ = 4513 pc/h

Capacity Checks

	Actual	Maximum	LOS F?
$v_{Fi} = v_F$	7477	6900	Yes
$v_{FO} = v_F - v_R$	6902	6900	Yes
v_R	575	2100	No
v_3 or v_{av34}	2964 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} = 4777 (Equation 13-15, 13-16, 13-18, or 13-19)

Flow Entering Diverge Influence Area

	Actual	Max Desirable	Violation?
v_{12A}	4777	4400	Yes

Level of Service Determination (if not F)

Density, $D_R = 4.252 + 0.0086\ v_{12} - 0.009\ L_D$ = 43.1 pc/mi/ln

Level of service for ramp-freeway junction areas of influence F

Speed Estimation

Intermediate speed variable, D_S = 0.350

Space mean speed in ramp influence area, S_R = 53.7 mph

Space mean speed in outer lanes, S_0 = 59.2 mph

Space mean speed for all vehicles, S = 55.6 mph

HCS 2010: Freeway Merge and Diverge Segments Release 6.1

Phone: Fax:
E-mail:

Diverge Analysis

Analyst: Caitlin Bowen
Agency/Co.:
Date performed: 6/13/2013
Analysis time period: AM Peak Hour
Freeway/Dir of Travel: I-55 Eastbound
Junction: Kingery West Side
Jurisdiction:
Analysis Year:
Description:

Freeway Data

Type of analysis	Diverge	
Number of lanes in freeway	3	
Free-flow speed on freeway	60.0	mph
Volume on freeway	6586	vph

Off Ramp Data

Side of freeway	Right	
Number of lanes in ramp	1	
Free-Flow speed on ramp	35.0	mph
Volume on ramp	1261	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	476	vph
Position of adjacent ramp	Upstream	
Type of adjacent ramp	On	
Distance to adjacent ramp	5800	ft

Conversion to pc/h Under Base Conditions

Junction Components	Freeway	Ramp	Adjacent Ramp	
Volume, V (vph)	6586	1261	476	vph
Peak-hour factor, PHF	0.95	0.95	0.95	

Peak 15-min volume, v15	1733	332	125	v
Trucks and buses	9	9	9	%
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	0.957	0.957	0.957	
Driver population factor, fP	1.00	1.00	1.00	
Flow rate, vp	7245	1387	524	pcph

Estimation of V12 Diverge Areas

L = 3963.00 (Equation 13-12 or 13-13)
EQ

P = 0.515 Using Equation 5
FD

$v_{12} = v_R + (v - v_F) P_{FD} = 4404$ pc/h

Capacity Checks

	Actual	Maximum	LOS F?
$v_{Fi} = v_F$	7245	6900	Yes
$v_{FO} = v - v_R$	5858	6900	No
v_R	1387	2000	No

$v_{3} \text{ or } v_{av34}$ 2841 pc/h (Equation 13-14 or 13-17)

Is $v_{3} \text{ or } v_{av34}$ > 2700 pc/h? Yes

Is $v_{3} \text{ or } v_{av34}$ > 1.5 v_{12} /2 No

If yes, v_{12A} = 4545 (Equation 13-15, 13-16, 13-18, or 13-19)

Flow Entering Diverge Influence Area

	Actual	Max Desirable	Violation?
v_{12A}	4545	4400	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 = 0.553

Space mean speed in ramp influence area, S = 50.0 mph

Space mean speed in outer lanes, S_R = 59.2 mph

Space mean speed for all vehicles, S_0 = 53.1 mph

HCS 2010: Freeway Merge and Diverge Segments Release 6.1

Phone: Fax:
E-mail:

Diverge Analysis

Analyst: Caitlin Bowen
Agency/Co.:
Date performed: 6/13/2013
Analysis time period: AM Peak Hour
Freeway/Dir of Travel: I-55 Eastbound
Junction: County Line Rd West Side
Jurisdiction:
Analysis Year:
Description:

Freeway Data

Type of analysis	Diverge	
Number of lanes in freeway	3	
Free-flow speed on freeway	60.0	mph
Volume on freeway	6520	vph

Off Ramp Data

Side of freeway	Right	
Number of lanes in ramp	1	
Free-Flow speed on ramp	40.0	mph
Volume on ramp	211	vph
Length of first accel/decel lane	330	ft
Length of second accel/decel lane		ft

Adjacent Ramp Data (if one exists)

Does adjacent ramp exist?	Yes	
Volume on adjacent ramp	1195	vph
Position of adjacent ramp	Upstream	
Type of adjacent ramp	On	
Distance to adjacent ramp	6500	ft

Conversion to pc/h Under Base Conditions

Junction Components	Freeway	Ramp	Adjacent Ramp	
Volume, V (vph)	6520	211	1195	vph
Peak-hour factor, PHF	0.95	0.95	0.95	

Peak 15-min volume, v15	1716	56	314	v
Trucks and buses	9	9	9	%
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	0.957	0.957	0.957	
Driver population factor, fP	1.00	1.00	1.00	
Flow rate, vp	7172	232	1315	pcph

Estimation of V12 Diverge Areas

L_{EQ} = 6023.16 (Equation 13-12 or 13-13)

P_{FD} = 0.570 Using Equation 5

$v_{12} = v_R + (v - v_F) P_{FD}$ = 4188 pc/h

Capacity Checks

	Actual	Maximum	LOS F?
$v_{Fi} = v_F$	7172	6900	Yes
$v_{FO} = v - v_R$	6940	6900	Yes
v_R	232	2100	No

v_3 or v_{av34} 2984 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} = 4472 (Equation 13-15, 13-16, 13-18, or 13-19)

Flow Entering Diverge Influence Area

	Actual	Max Desirable	Violation?
v_{12A}	4472	4400	No

Level of Service Determination (if not F)

Density, $D_R = 4.252 + 0.0086 v_{12} - 0.009 L_D$ = 39.7 pc/mi/ln

Level of service for ramp-freeway junction areas of influence F

Speed Estimation

Intermediate speed variable, D_S = 0.384

Space mean speed in ramp influence area, S = 53.1 mph

Space mean speed in outer lanes, S_R = 59.2 mph

Space mean speed for all vehicles, S_0 = 55.2 mph

HCS 2010: Freeway Merge and Diverge Segments Release 6.1

Phone: Fax:
E-mail:

Diverge Analysis

Analyst:	Alex Ericksen
Agency/Co.:	
Date performed:	1/8/2014
Analysis time period:	AM Peak Hour
Freeway/Dir of Travel:	I-55 Eastbound
Junction:	Archer Ave SW Side
Jurisdiction:	
Analysis Year:	
Description:	

Freeway Data

Type of analysis	Diverge	
Number of lanes in freeway	3	
Free-flow speed on freeway	60.0	mph
Volume on freeway	6362	vph

Off Ramp Data

Side of freeway	Right	
Number of lanes in ramp	1	
Free-Flow speed on ramp	35.0	mph
Volume on ramp	484	vph
Length of first accel/decel lane	175	ft
Length of second accel/decel lane		ft

Adjacent Ramp Data (if one exists)

Does adjacent ramp exist?	Yes	
Volume on adjacent ramp	646	vph
Position of adjacent ramp	Downstream	
Type of adjacent ramp	Off	
Distance to adjacent ramp	1700	ft

Conversion to pc/h Under Base Conditions

Junction Components	Freeway		Ramp		Adjacent Ramp		
Volume, V (vph)	6362		484		646		vph
Peak-hour factor, PHF	0.95		0.95		0.95		
Peak 15-min volume, v15	1674		127		170		v
Trucks and buses	9		9		9		%
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	0.957		0.957		0.957		
Driver population factor, fP	1.00		1.00		1.00		

Flow rate, vp 6998 532 711 pcph

Estimation of V12 Diverge Areas

L_{EQ} = 975.33 (Equation 13-12 or 13-13)

P_{FD} = 0.561 Using Equation 5

$v_{12} = v_R + (v_F - v_R) P_{FD}$ = 4157 pc/h

Capacity Checks

	Actual	Maximum	LOS F?
$v_{Fi} = v_F$	6998	6900	Yes
$v_{FO} = v_F - v_R$	6466	6900	No
v_R	532	2000	No
v_3 or v_{av34}	2841 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} = 4298 (Equation 13-15, 13-16, 13-18, or 13-19)

Flow Entering Diverge Influence Area

	Actual	Max Desirable	Violation?
v_{12A}	4298	4400	No

Level of Service Determination (if not F)

Density, $D_R = 4.252 + 0.0086\, v_{12} - 0.009\, L_D$ = 39.6 pc/mi/ln

Level of service for ramp-freeway junction areas of influence F

Speed Estimation

Intermediate speed variable, D_S = 0.476

Space mean speed in ramp influence area, S_R = 51.4 mph

Space mean speed in outer lanes, S_0 = 59.2 mph

Space mean speed for all vehicles, S = 54.2 mph

HCS 2010: Freeway Merge and Diverge Segments Release 6.1

Phone: Fax:
E-mail:

Diverge Analysis

Analyst:	Alex Ericksen
Agency/Co.:	
Date performed:	1/8/2014
Analysis time period:	AM Peak Hour
Freeway/Dir of Travel:	I-55 Eastbound
Junction:	Archer Ave Loop Exit
Jurisdiction:	
Analysis Year:	
Description:	

Freeway Data

Type of analysis	Diverge	
Number of lanes in freeway	3	
Free-flow speed on freeway	60.0	mph
Volume on freeway	5878	vph

Off Ramp Data

Side of freeway	Right	
Number of lanes in ramp	1	
Free-Flow speed on ramp	25.0	mph
Volume on ramp	646	vph
Length of first accel/decel lane	175	ft
Length of second accel/decel lane		ft

Adjacent Ramp Data (if one exists)

Does adjacent ramp exist?	Yes	
Volume on adjacent ramp	484	vph
Position of adjacent ramp	Downstream	
Type of adjacent ramp	Off	
Distance to adjacent ramp	1700	ft

Conversion to pc/h Under Base Conditions

Junction Components	Freeway		Ramp		Adjacent Ramp		
Volume, V (vph)	5878		646		484		vph
Peak-hour factor, PHF	0.95		0.95		0.95		
Peak 15-min volume, v15	1547		170		127		v
Trucks and buses	9		9		9		%
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	0.957		0.957		0.957		
Driver population factor, fP	1.00		1.00		1.00		

Flow rate, vp 6466 711 532 pcph

Estimation of V12 Diverge Areas

L_{EQ} = 782.33 (Equation 13-12 or 13-13)

P_{FD} = 0.566 Using Equation 5

$v_{12} = v_R + (v_F - v_R) P_{FD}$ = 3966 pc/h

Capacity Checks

	Actual	Maximum	LOS F?
$v_{Fi} = v_F$	6466	6900	No
$v_{FO} = v_F - v_R$	5755	6900	No
v_R	711	1900	No
v_3 or v_{av34}	2500 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} = 3966 (Equation 13-15, 13-16, 13-18, or 13-19)

Flow Entering Diverge Influence Area

	Actual	Max Desirable	Violation?
v_{12}	3966	4400	No

Level of Service Determination (if not F)

Density, $D_R = 4.252 + 0.0086\, v_{12} - 0.009\, L_D$ = 36.8 pc/mi/ln

Level of service for ramp-freeway junction areas of influence E

Speed Estimation

Intermediate speed variable, D_S = 0.622

Space mean speed in ramp influence area, S_R = 48.8 mph

Space mean speed in outer lanes, S_0 = 60.0 mph

Space mean speed for all vehicles, S = 52.6 mph

HCS 2010: Freeway Merge and Diverge Segments Release 6.1

Phone: Fax:
E-mail:

Diverge Analysis

Analyst: Caitlin Bowen
Agency/Co.:
Date performed: 6/12/2013
Analysis time period: AM Peak Hour
Freeway/Dir of Travel: I-55 Eastbound
Junction: Central Ave West(Under constr)
Jurisdiction:
Analysis Year:
Description:

Freeway Data

Type of analysis	Diverge	
Number of lanes in freeway	3	
Free-flow speed on freeway	60.0	mph
Volume on freeway	6584	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	1227	vph
Length of first accel/decel lane	500	ft
Length of second accel/decel lane		ft

Adjacent Ramp Data (if one exists)

Does adjacent ramp exist?	Yes	
Volume on adjacent ramp	1291	vph
Position of adjacent ramp	Upstream	
Type of adjacent ramp	On	
Distance to adjacent ramp	7500	ft

Conversion to pc/h Under Base Conditions

Junction Components	Freeway	Ramp	Adjacent Ramp	
Volume, V (vph)	6584	1227	1291	vph
Peak-hour factor, PHF	0.95	0.95	0.95	

Peak 15-min volume, v15	1733	323	340	v
Trucks and buses	9	9	9	%
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	0.957	0.957	0.957	
Driver population factor, fP	1.00	1.00	1.00	
Flow rate, vp	7242	1350	1420	pcph

Estimation of V12 Diverge Areas

L = 10521.17 Equation 13-12 or 13-13)
EQ

P = 0.549 Using Equation 6
FD

$v_{12} = v_R + (v - v_F) P_{FD} = 4584$ pc/h

Capacity Checks

	Actual	Maximum	LOS F?
$v_{Fi} = v_F$	7242	6900	Yes
$v_{FO} = v - v_R$	5892	6900	No
v_R	1350	2000	No

v_{av34} or v_3 2658 pc/h (Equation 13-14 or 13-17)

Is v_{av34} or v_3 > 2700 pc/h? No

Is v_{av34} or v_3 > 1.5 v_{12} /2 No

If yes, v_{12A} = 4584 (Equation 13-15, 13-16, 13-18, or 13-19)

Flow Entering Diverge Influence Area

	Actual	Max Desirable	Violation?
v_{12}	4584	4400	Yes

Level of Service Determination (if not F)

Density, $D_R = 4.252 + 0.0086 v_{12} - 0.009 L_D$ = 39.2 pc/mi/ln

Level of service for ramp-freeway junction areas of influence F

Speed Estimation

Intermediate speed variable, D_S = 0.614

Space mean speed in ramp influence area, S = 48.9 mph

Space mean speed in outer lanes, S_R = 59.4 mph

Space mean speed for all vehicles, S_0 = 52.3 mph

HCS 2010: Freeway Merge and Diverge Segments Release 6.1

Phone: Fax:
E-mail:

Diverge Analysis

Analyst: Caitlin Bowen
Agency/Co.:
Date performed: 6/12/2013
Analysis time period: AM Peak Hours
Freeway/Dir of Travel: I-55 Eastbound
Junction: Cicero Ave West
Jurisdiction:
Analysis Year:
Description:

Freeway Data

Type of analysis	Diverge	
Number of lanes in freeway	3	
Free-flow speed on freeway	60.0	mph
Volume on freeway	6244	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	548	vph
Length of first accel/decel lane	250	ft
Length of second accel/decel lane		ft

Adjacent Ramp Data (if one exists)

Does adjacent ramp exist?	Yes	
Volume on adjacent ramp	887	vph
Position of adjacent ramp	Upstream	
Type of adjacent ramp	On	
Distance to adjacent ramp	1900	ft

Conversion to pc/h Under Base Conditions

Junction Components	Freeway	Ramp	Adjacent Ramp	
Volume, V (vph)	6244	548	887	vph
Peak-hour factor, PHF	0.95	0.95	0.95	

Peak 15-min volume, v15	1643	144	233	v
Trucks and buses	9	9	9	%
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	0.957	0.957	0.957	
Driver population factor, fP	1.00	1.00	1.00	
Flow rate, vp	6868	603	976	pcph

Estimation of V12 Diverge Areas

L_{EQ} = 5329.37 (Equation 13-12 or 13-13)

P_{FD} = 0.759 Using Equation 6

$v_{12} = v_R + (v - v_F) P_{FD}$ = 5361 pc/h

Capacity Checks

	Actual	Maximum	LOS F?
$v_{Fi} = v_F$	6868	6900	No
$v_{FO} = v - v_R$	6265	6900	No
v_R	603	2000	No

v_3 or v_{av34} 1507 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} = 5361 (Equation 13-15, 13-16, 13-18, or 13-19)

Flow Entering Diverge Influence Area

	Actual	Max Desirable	Violation?
v_{12}	5361	4400	Yes

Level of Service Determination (if not F)

Density, $D_R = 4.252 + 0.0086 v_{12} - 0.009 L_D$ = 48.1 pc/mi/ln

Level of service for ramp-freeway junction areas of influence E

Speed Estimation

Intermediate speed variable, D_S = 0.547

Space mean speed in ramp influence area, S = 50.1 mph

Space mean speed in outer lanes, S_R = 63.8 mph

Space mean speed for all vehicles, S_0 = 52.6 mph

HCS 2010: Freeway Merge and Diverge Segments Release 6.1

Phone: Fax:
E-mail:

Diverge Analysis

Analyst: Caitlin Bowen
Agency/Co.:
Date performed: 6/12/2013
Analysis time period: AM Peak Hour
Freeway/Dir of Travel: I-55 Eastbound
Junction: Pulaski Road West
Jurisdiction:
Analysis Year:
Description:

Freeway Data

Type of analysis	Diverge	
Number of lanes in freeway	3	
Free-flow speed on freeway	60.0	mph
Volume on freeway	6552	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	506	vph
Length of first accel/decel lane	175	ft
Length of second accel/decel lane		ft

Adjacent Ramp Data (if one exists)

Does adjacent ramp exist?	Yes	
Volume on adjacent ramp	856	vph
Position of adjacent ramp	Upstream	
Type of adjacent ramp	On	
Distance to adjacent ramp	2300	ft

Conversion to pc/h Under Base Conditions

Junction Components	Freeway	Ramp	Adjacent Ramp	
Volume, V (vph)	6552	506	856	vph
Peak-hour factor, PHF	0.95	0.95	0.95	

Peak 15-min volume, v15	1724	133	225	v
Trucks and buses	9	9	9	%
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	0.957	0.957	0.957	
Driver population factor, fP	1.00	1.00	1.00	
Flow rate, vp	7207	557	942	pcph

Estimation of V12 Diverge Areas

L_{EQ} = 4844.96 (Equation 13-12 or 13-13)

P_{FD} = 0.683 Using Equation 6

$v_{12} = v_R + (v - v_F) P_{FD}$ = 5101 pc/h

Capacity Checks

	Actual	Maximum	LOS F?
$v_{Fi} = v_F$	7207	6900	Yes
$v_{FO} = v - v_R$	6650	6900	No
v_R	557	2000	No

v_{av34} or v_3 2106 pc/h (Equation 13-14 or 13-17)

Is v_{av34} or v_3 > 2700 pc/h? No

Is v_{av34} or v_3 > 1.5 v_{12} /2 No

If yes, v_{12A} = 5101 (Equation 13-15, 13-16, 13-18, or 13-19)

Flow Entering Diverge Influence Area

	Actual	Max Desirable	Violation?
v_{12}	5101	4400	Yes

Level of Service Determination (if not F)

Density, $D_R = 4.252 + 0.0086 v_{12} - 0.009 L_D$ = 46.5 pc/mi/ln

Level of service for ramp-freeway junction areas of influence F

Speed Estimation

Intermediate speed variable, D_S = 0.543

Space mean speed in ramp influence area, S = 50.2 mph

Space mean speed in outer lanes, S_R = 61.5 mph

Space mean speed for all vehicles, S_0 = 53.1 mph

HCS 2010: Freeway Merge and Diverge Segments Release 6.1

Phone: Fax:
E-mail:

Diverge Analysis

Analyst: Caitlin Bowen
Agency/Co.:
Date performed: 6/12/2013
Analysis time period: AM Peak Hour
Freeway/Dir of Travel: I-55 Eastbound
Junction: Kedzie and California Ave West
Jurisdiction:
Analysis Year:
Description:

Freeway Data

Type of analysis	Diverge	
Number of lanes in freeway	3	
Free-flow speed on freeway	60.0	mph
Volume on freeway	7539	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	863	vph
Length of first accel/decel lane	500	ft
Length of second accel/decel lane		ft

Adjacent Ramp Data (if one exists)

Does adjacent ramp exist?	Yes	
Volume on adjacent ramp	1493	vph
Position of adjacent ramp	Upstream	
Type of adjacent ramp	On	
Distance to adjacent ramp	4400	ft

Conversion to pc/h Under Base Conditions

Junction Components	Freeway	Ramp	Adjacent Ramp	
Volume, V (vph)	7539	863	1493	vph
Peak-hour factor, PHF	0.95	0.95	0.95	

Peak 15-min volume, v15	1984	227	393	v
Trucks and buses	9	9	9	%
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	0.957	0.957	0.957	
Driver population factor, fP	1.00	1.00	1.00	
Flow rate, vp	8293	949	1642	pcph

Estimation of V12 Diverge Areas

L_{EQ} = 8659.65 (Equation 13-12 or 13-13)

P_{FD} = 0.619 Using Equation 6

$v_{12} = v_R + (v - v_F) P_{FD}$ = 5495 pc/h

Capacity Checks

	Actual	Maximum	LOS F?
$v_{Fi} = v_F$	8293	6900	Yes
$v_{FO} = v - v_R$	7344	6900	Yes
v_R	949	2000	No

v_3 or v_{av34} 2798 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} = 5593 (Equation 13-15, 13-16, 13-18, or 13-19)

Flow Entering Diverge Influence Area

	Actual	Max Desirable	Violation?
v_{12A}	5593	4400	Yes

Level of Service Determination (if not F)

Density, $D_R = 4.252 + 0.0086 v_{12} - 0.009 L_D$ = 47.9 pc/mi/ln

Level of service for ramp-freeway junction areas of influence F

Speed Estimation

Intermediate speed variable, D_S = 0.578

Space mean speed in ramp influence area, S = 49.6 mph

Space mean speed in outer lanes, S_R = 59.2 mph

Space mean speed for all vehicles, S_0 = 52.4 mph

HCS 2010: Freeway Merge and Diverge Segments Release 6.1

Phone: Fax:
E-mail:

Diverge Analysis

Analyst: Caitlin Bowen
Agency/Co.:
Date performed: 6/12/2013
Analysis time period: AM Peak Hour
Freeway/Dir of Travel: I-55 Eastbound
Junction: 1-90/94
Jurisdiction:
Analysis Year:
Description:

Freeway Data

Type of analysis	Diverge	
Number of lanes in freeway	3	
Free-flow speed on freeway	60.0	mph
Volume on freeway	5168	vph

Off Ramp Data

Side of freeway	Right	
Number of lanes in ramp	1	
Free-Flow speed on ramp	25.0	mph
Volume on ramp	1466	vph
Length of first accel/decel lane	330	ft
Length of second accel/decel lane		ft

Adjacent Ramp Data (if one exists)

Does adjacent ramp exist?	Yes	
Volume on adjacent ramp	2011	vph
Position of adjacent ramp	Upstream	
Type of adjacent ramp	Off	
Distance to adjacent ramp	3000	ft

Conversion to pc/h Under Base Conditions

Junction Components	Freeway	Ramp	Adjacent Ramp	
Volume, V (vph)	5168	1466	2011	vph
Peak-hour factor, PHF	0.95	0.95	0.95	

Peak 15-min volume, v15	1360	386	529	v
Trucks and buses	9	9	9	%
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	0.957	0.957	0.957	
Driver population factor, fP	1.00	1.00	1.00	
Flow rate, vp	5685	1613	2212	pcph

Estimation of V12 Diverge Areas

L_{EQ} = (Equation 13-12 or 13-13)

P_{FD} = 0.544 Using Equation 5

$v_{12} = v_R + (v - v_F) P_{FD}$ = 3827 pc/h

Capacity Checks

	Actual	Maximum	LOS F?
$v_{Fi} = v_F$	5685	6900	No
$v_{FO} = v - v_R$	4072	6900	No
v_R	1613	1900	No

v_{3} or v_{av34} 1858 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} = 3827 (Equation 13-15, 13-16, 13-18, or 13-19)

Flow Entering Diverge Influence Area

	Actual	Max Desirable	Violation?
v_{12}	3827	4400	No

Level of Service Determination (if not F)

Density, $D_R = 4.252 + 0.0086\ v_{12} - 0.009\ L_D$ = 34.2 pc/mi/ln

Level of service for ramp-freeway junction areas of influence D

Speed Estimation

Intermediate speed variable, D_S = 0.703

Space mean speed in ramp influence area, S = 47.3 mph

Space mean speed in outer lanes, S_R = 62.5 mph

Space mean speed for all vehicles, S_0 = 51.4 mph

Diverge

Northbound PM

HCS+: Ramps and Ramp Junctions Release 5.3

Phone: Fax:
E-mail:

Diverge Analysis

Analyst: Caitlin Bowen
Agency/Co.:
Date performed: 6/13/2013
Analysis time period: PM Off Peak Hour
Freeway/Dir of Travel: I-55 Eastbound
Junction: I-355 Exit
Jurisdiction:
Analysis Year:
Description:

Freeway Data

Type of analysis	Diverge	
Number of lanes in freeway	3	
Free-flow speed on freeway	60.0	mph
Volume on freeway	4242	vph

Off Ramp Data

Side of freeway	Right	
Number of lanes in ramp	1	
Free-Flow speed on ramp	40.0	mph
Volume on ramp	1797	vph
Length of first accel/decel lane	280	ft
Length of second accel/decel lane		ft

Adjacent Ramp Data (if one exists)

Does adjacent ramp exist?	Yes	
Volume on adjacent ramp	1124	vph
Position of adjacent ramp	Downstream	
Type of adjacent ramp	On	
Distance to adjacent ramp	2500	ft

Conversion to pc/h Under Base Conditions

Junction Components	Freeway	Ramp	Adjacent Ramp	
Volume, V (vph)	4242	1797	1124	vph
Peak-hour factor, PHF	0.95	0.95	0.95	

Peak 15-min volume, v15	1116	473	296	v
Trucks and buses	11	11	11	%
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	0.948	0.948	
Driver population factor, fP	1.00	1.00	1.00	
Flow rate, vp	4711	1996	1248	pcph

Estimation of V12 Diverge Areas

L_{EQ} = (Equation 25-8 or 25-9)

P_{FD} = 0.550 Using Equation 5

$v_{12} = v_R + (v - v_F) P_{FD}$ = 3490 pc/h

Capacity Checks

	Actual	Maximum	LOS F?
$v_{Fi} = v_F$	4711	6900	No
$v_{FO} = v - v_R$	2715	6900	No
v_R	1996	2100	No

$v_{3 \text{ or } av34}$ = 1221 pc/h (Equation 25-15 or 25-16)

Is $v_{3 \text{ or } av34} > 2700$ pc/h? No

Is $v_{3 \text{ or } av34} > 1.5 v_{12}/2$ No

If yes, v_{12A} = 3490 (Equation 25-18)

Flow Entering Diverge Influence Area

	Actual	Max Desirable	Violation?
v_{12}	3490	4400	No

Level of Service Determination (if not F)

Density, $D_R = 4.252 + 0.0086 v_{12} - 0.009 L_D$ = 31.7 pc/mi/ln

Level of service for ramp-freeway junction areas of influence D

Speed Estimation

Intermediate speed variable, D_S = 0.543

Space mean speed in ramp influence area, S = 50.2 mph

Space mean speed in outer lanes, S_R = 65.0 mph

Space mean speed for all vehicles, S_0 = 53.4 mph

HCS 2010: Freeway Merge and Diverge Segments Release 6.1

Phone: Fax:
E-mail:

Diverge Analysis

Analyst:	Alex Ericksen
Agency/Co.:	
Date performed:	1/14/2014
Analysis time period:	PM Peak Hour
Freeway/Dir of Travel:	I-55 Eastbound
Junction:	Lemont Rd West Side
Jurisdiction:	
Analysis Year:	
Description:	

Freeway Data

Type of analysis	Diverge	
Number of lanes in freeway	4	
Free-flow speed on freeway	60.0	mph
Volume on freeway	5764	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	726	vph
Length of first accel/decel lane	1500	ft
Length of second accel/decel lane		ft

Adjacent Ramp Data (if one exists)

Does adjacent ramp exist?	Yes	
Volume on adjacent ramp	2195	vph
Position of adjacent ramp	Upstream	
Type of adjacent ramp	On	
Distance to adjacent ramp	3550	ft

Conversion to pc/h Under Base Conditions

Junction Components	Freeway		Ramp		Adjacent Ramp		
Volume, V (vph)	5764		726		2195		vph
Peak-hour factor, PHF	0.95		0.95		0.95		
Peak 15-min volume, v15	1517		191		578		v
Trucks and buses	9		9		9		%
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	0.957		0.957		0.957		
Driver population factor, fP	1.00		1.00		1.00		

Flow rate, vp 6340 799 2415 pcph

Estimation of V12 Diverge Areas

L_{EQ} = (Equation 13-12 or 13-13)

P_{FD} = 0.436 Using Equation 8

$v_{12} = v_R + (v_F - v_R) P_{FD}$ = 3215 pc/h

Capacity Checks

	Actual	Maximum	LOS F?
$v_{Fi} = v_F$	6340	9200	No
$v_{FO} = v_F - v_R$	5541	9200	No
v_R	799	2100	No
v_3 or v_{av34}	1562 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} = 3215 (Equation 13-15, 13-16, 13-18, or 13-19)

Flow Entering Diverge Influence Area

	Actual	Max Desirable	Violation?
v_{12}	3215	4400	No

Level of Service Determination (if not F)

Density, $D_R = 4.252 + 0.0086\, v_{12} - 0.009\, L_D$ = 18.4 pc/mi/ln

Level of service for ramp-freeway junction areas of influence B

Speed Estimation

Intermediate speed variable, D_S = 0.370

Space mean speed in ramp influence area, S_R = 53.3 mph

Space mean speed in outer lanes, S_0 = 63.6 mph

Space mean speed for all vehicles, S = 58.0 mph

HCS+: Ramps and Ramp Junctions Release 5.3

Phone: Fax:
E-mail:

Diverge Analysis

Analyst: Caitlin Bowen
Agency/Co.:
Date performed: 6/13/2013
Analysis time period: PM Off Peak Hour
Freeway/Dir of Travel: I-55 Eastbound
Junction: Cass Ave West Side
Jurisdiction:
Analysis Year:
Description:

Freeway Data

Type of analysis	Diverge	
Number of lanes in freeway	3	
Free-flow speed on freeway	60.0	mph
Volume on freeway	5886	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	411	vph
Length of first accel/decel lane	250	ft
Length of second accel/decel lane		ft

Adjacent Ramp Data (if one exists)

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	8000	ft

Conversion to pc/h Under Base Conditions

Junction Components	Freeway	Ramp	Adjacent Ramp	
Volume, V (vph)	5886	411	1207	vph
Peak-hour factor, PHF	0.95	0.95	0.95	

Peak 15-min volume, v15	1549	108	318	v
Trucks and buses	11	11	11	%
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	0.948	0.948	
Driver population factor, fP	1.00	1.00	1.00	
Flow rate, vp	6537	456	1340	pcph

Estimation of V12 Diverge Areas

L = 7177.48 (Equation 25-8 or 25-9)
EQ

P = 0.576 Using Equation 5
FD

$v_{12} = v_R + (v - v_F) P_{FD} = 3956$ pc/h

Capacity Checks

	Actual	Maximum	LOS F?
$v_{Fi} = v_F$	6537	6900	No
$v_{FO} = v - v_R$	6081	6900	No
v_R	456	2100	No

$v_{3 \text{ or } av34} = v_{av34}$ 2581 pc/h (Equation 25-15 or 25-16)

Is $v_{3 \text{ or } av34} > 2700$ pc/h? No

Is $v_{3 \text{ or } av34} > 1.5 v_{12} / 2$ No

If yes, $v_{12A} = 3956$ (Equation 25-18)

Flow Entering Diverge Influence Area

	Actual	Max Desirable	Violation?
v_{12}	3956	4400	No

Level of Service Determination (if not F)

Density, $D_R = 4.252 + 0.0086 v_{12} - 0.009 L_D = 36.0$ pc/mi/ln

Level of service for ramp-freeway junction areas of influence E

Speed Estimation

Intermediate speed variable, $D_S = 0.339$

Space mean speed in ramp influence area, $S = 53.9$ mph

Space mean speed in outer lanes, S_R = 59.7 mph

Space mean speed for all vehicles, S_0 = 56.0 mph

HCS 2010: Freeway Merge and Diverge Segments Release 6.1

Phone: Fax:
E-mail:

Diverge Analysis

Analyst: Caitlin Bowen
Agency/Co.:
Date performed: 6/13/2013
Analysis time period: PM Off Peak Hour
Freeway/Dir of Travel: I-55 Eastbound
Junction: Kingery West Side
Jurisdiction:
Analysis Year:
Description:

Freeway Data

Type of analysis	Diverge	
Number of lanes in freeway	3	
Free-flow speed on freeway	60.0	mph
Volume on freeway	6452	vph

Off Ramp Data

Side of freeway	Right	
Number of lanes in ramp	1	
Free-Flow speed on ramp	35.0	mph
Volume on ramp	981	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	532	vph
Position of adjacent ramp	Upstream	
Type of adjacent ramp	On	
Distance to adjacent ramp	5800	ft

Conversion to pc/h Under Base Conditions

Junction Components	Freeway	Ramp	Adjacent Ramp	
Volume, V (vph)	6452	981	532	vph
Peak-hour factor, PHF	0.95	0.95	0.95	

Peak 15-min volume, v15	1698	258	140	v
Trucks and buses	11	11	11	%
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	0.948	0.948	
Driver population factor, fP	1.00	1.00	1.00	
Flow rate, vp	7165	1089	591	pcph

Estimation of V12 Diverge Areas

L_{EQ} = 3861.96 (Equation 13-12 or 13-13)

P_{FD} = 0.531 Using Equation 5

$v_{12} = v_R + (v - v_F) P_{FD}$ = 4314 pc/h

Capacity Checks

	Actual	Maximum	LOS F?
$v_{Fi} = v_F$	7165	6900	Yes
$v_{FO} = v - v_R$	6076	6900	No
v_R	1089	2000	No

v_3 or v_{av34} = 2851 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} = 4465 (Equation 13-15, 13-16, 13-18, or 13-19)

Flow Entering Diverge Influence Area

	Actual	Max Desirable	Violation?
v_{12A}	4465	4400	No

Level of Service Determination (if not F)

Density, $D_R = 4.252 + 0.0086\ v_{12} - 0.009\ L_D$ = 39.5 pc/mi/ln

Level of service for ramp-freeway junction areas of influence F

Speed Estimation

Intermediate speed variable, D_S = 0.526

Space mean speed in ramp influence area, S = 50.5 mph

Space mean speed in outer lanes, S_R = 59.2 mph

Space mean speed for all vehicles, S_0 = 53.5 mph

HCS 2010: Freeway Merge and Diverge Segments Release 6.1

Phone: Fax:
E-mail:

Diverge Analysis

Analyst: Caitlin Bowen
Agency/Co.:
Date performed: 6/13/2013
Analysis time period: PM Off Peak Hour
Freeway/Dir of Travel: I-55 Eastbound
Junction: County Line Rd West Side
Jurisdiction:
Analysis Year:
Description:

Freeway Data

Type of analysis	Diverge	
Number of lanes in freeway	3	
Free-flow speed on freeway	60.0	mph
Volume on freeway	6134	vph

Off Ramp Data

Side of freeway	Right	
Number of lanes in ramp	1	
Free-Flow speed on ramp	40.0	mph
Volume on ramp	794	vph
Length of first accel/decel lane	330	ft
Length of second accel/decel lane		ft

Adjacent Ramp Data (if one exists)

Does adjacent ramp exist?	Yes	
Volume on adjacent ramp	663	vph
Position of adjacent ramp	Upstream	
Type of adjacent ramp	On	
Distance to adjacent ramp	6500	ft

Conversion to pc/h Under Base Conditions

Junction Components	Freeway	Ramp	Adjacent Ramp	
Volume, V (vph)	6134	794	663	vph
Peak-hour factor, PHF	0.95	0.95	0.95	

Peak 15-min volume, v15	1614	209	174	v
Trucks and buses	11	11	11	%
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	0.948	0.948	
Driver population factor, fP	1.00	1.00	1.00	
Flow rate, vp	6812	882	736	pcph

Estimation of V12 Diverge Areas

L_{EQ} = 4581.56 (Equation 13-12 or 13-13)

P_{FD} = 0.549 Using Equation 5

$v_{12} = v_R + (v - v_F) P_{FD}$ = 4138 pc/h

Capacity Checks

	Actual	Maximum	LOS F?
$v_{Fi} = v_F$	6812	6900	No
$v_{FO} = v - v_R$	5930	6900	No
v_R	882	2100	No

v_3 or v_{av34} = 2674 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} = 4138 (Equation 13-15, 13-16, 13-18, or 13-19)

Flow Entering Diverge Influence Area

	Actual	Max Desirable	Violation?
v_{12}	4138	4400	No

Level of Service Determination (if not F)

Density, $D_R = 4.252 + 0.0086 v_{12} - 0.009 L_D$ = 36.9 pc/mi/ln

Level of service for ramp-freeway junction areas of influence E

Speed Estimation

Intermediate speed variable, D_S = 0.442

Space mean speed in ramp influence area, S = 52.0 mph

Space mean speed in outer lanes, S_R = 59.3 mph

Space mean speed for all vehicles, S_0 = 54.7 mph

HCS+: Ramps and Ramp Junctions Release 5.3

Phone: Fax:
E-mail:

Diverge Analysis

Analyst: Caitlin Bowen
Agency/Co.:
Date performed: 6/12/2013
Analysis time period: PM Off Peak Hour
Freeway/Dir of Travel: I-55 Eastbound
Junction: Archer Ave SW Side
Jurisdiction:
Analysis Year:
Description:

Freeway Data

Type of analysis	Diverge	
Number of lanes in freeway	3	
Free-flow speed on freeway	60.0	mph
Volume on freeway	6793	vph

Off Ramp Data

Side of freeway	Right	
Number of lanes in ramp	1	
Free-Flow speed on ramp	35.0	mph
Volume on ramp	497	vph
Length of first accel/decel lane	175	ft
Length of second accel/decel lane		ft

Adjacent Ramp Data (if one exists)

Does adjacent ramp exist?	Yes	
Volume on adjacent ramp	589	vph
Position of adjacent ramp	Downstream	
Type of adjacent ramp	Off	
Distance to adjacent ramp	1700	ft

Conversion to pc/h Under Base Conditions

Junction Components	Freeway	Ramp	Adjacent Ramp	
Volume, V (vph)	6793	497	589	vph
Peak-hour factor, PHF	0.95	0.95	0.95	

Peak 15-min volume, v15	1788	131	155	v
Trucks and buses	11	11	11	%
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	0.948	0.948	
Driver population factor, fP	1.00	1.00	1.00	
Flow rate, vp	7544	552	654	pcph

Estimation of V12 Diverge Areas

L_{EQ} = 928.88 (Equation 25-8 or 25-9)

P_{FD} = 0.546 Using Equation 5

$v_{12} = v_R + (v - v_F) P_{FD}$ = 4370 pc/h

Capacity Checks

	Actual	Maximum	LOS F?
$v_{Fi} = v_F$	7544	6900	Yes
$v_{FO} = v - v_R$	6992	6900	Yes
v_R	552	2000	No

$v_{3 \text{ or } av34}$ = 3174 pc/h (Equation 25-15 or 25-16)

Is $v_{3 \text{ or } av34} > 2700$ pc/h? Yes

Is $v_{3 \text{ or } av34} > 1.5 v_{12} / 2$ No

If yes, v_{12A} = 4844 (Equation 25-18)

Flow Entering Diverge Influence Area

	Actual	Max Desirable	Violation?
v_{12A}	4844	4400	No

Level of Service Determination (if not F)

Density, $D_R = 4.252 + 0.0086 v_{12} - 0.009 L_D$ = 44.3 pc/mi/ln

Level of service for ramp-freeway junction areas of influence F

Speed Estimation

Intermediate speed variable, D_S = 0.478

Space mean speed in ramp influence area, S = 51.4 mph

Space mean speed in outer lanes, S_R = 59.2 mph

Space mean speed for all vehicles, S_0 = 53.9 mph

HCS+: Ramps and Ramp Junctions Release 5.3

Phone: Fax:
E-mail:

Diverge Analysis

Analyst: Caitlin Bowen
Agency/Co.:
Date performed: 6/12/2013
Analysis time period: PM Off Peak Hour
Freeway/Dir of Travel: I-55 Eastbound
Junction: Archer Ave Loop Exit
Jurisdiction:
Analysis Year:
Description:

Freeway Data

Type of analysis	Diverge	
Number of lanes in freeway	3	
Free-flow speed on freeway	60.0	mph
Volume on freeway	6296	vph

Off Ramp Data

Side of freeway	Right	
Number of lanes in ramp	1	
Free-Flow speed on ramp	25.0	mph
Volume on ramp	589	vph
Length of first accel/decel lane	175	ft
Length of second accel/decel lane		ft

Adjacent Ramp Data (if one exists)

Does adjacent ramp exist?	Yes	
Volume on adjacent ramp	497	vph
Position of adjacent ramp	Upstream	
Type of adjacent ramp	Off	
Distance to adjacent ramp	1700	ft

Conversion to pc/h Under Base Conditions

Junction Components	Freeway	Ramp	Adjacent Ramp	
Volume, V (vph)	6296	589	497	vph
Peak-hour factor, PHF	0.95	0.95	0.95	

Peak 15-min volume, v15	1657	155	131	v
Trucks and buses	11	11	11	%
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	0.948	0.948	
Driver population factor, fP	1.00	1.00	1.00	
Flow rate, vp	6992	654	552	pcph

Estimation of V12 Diverge Areas

L_{EQ} = (Equation 25-8 or 25-9)

P_{FD} = 0.555 Using Equation 5

$v_{12} = v_R + (v - v_F) P_{FD}$ = 4172 pc/h

Capacity Checks

	Actual	Maximum	LOS F?
$v_{Fi} = v_F$	6992	6900	Yes
$v_{FO} = v - v_R$	6338	6900	No
v_R	654	1900	No

$v_{3 \text{ or } av34}$ = 2820 pc/h (Equation 25-15 or 25-16)

Is $v_{3 \text{ or } av34} > 2700$ pc/h? Yes

Is $v_{3 \text{ or } av34} > 1.5 v_{12}/2$ No

If yes, v_{12A} = 4292 (Equation 25-18)

Flow Entering Diverge Influence Area

	Actual	Max Desirable	Violation?
v_{12A}	4292	4400	No

Level of Service Determination (if not F)

Density, $D_R = 4.252 + 0.0086 v_{12} - 0.009 L_D$ = 39.6 pc/mi/ln

Level of service for ramp-freeway junction areas of influence F

Speed Estimation

Intermediate speed variable, D_S = 0.617

Space mean speed in ramp influence area, S = 48.9 mph

Space mean speed in outer lanes, S_R = 59.2 mph

Space mean speed for all vehicles, S_0 = 52.4 mph

HCS+: Ramps and Ramp Junctions Release 5.3

Phone: Fax:
E-mail:

Diverge Analysis

Analyst: Caitlin Bowen
Agency/Co.:
Date performed: 6/12/2013
Analysis time period: PM Off Peak Hour
Freeway/Dir of Travel: I-55 Eastbound
Junction: Central Ave West(Under constr)
Jurisdiction:
Analysis Year:
Description:

Freeway Data

Type of analysis	Diverge	
Number of lanes in freeway	3	
Free-flow speed on freeway	60.0	mph
Volume on freeway	7384	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	1256	vph
Length of first accel/decel lane	500	ft
Length of second accel/decel lane		ft

Adjacent Ramp Data (if one exists)

Does adjacent ramp exist?	Yes	
Volume on adjacent ramp	1145	vph
Position of adjacent ramp	Upstream	
Type of adjacent ramp	On	
Distance to adjacent ramp	7500	ft

Conversion to pc/h Under Base Conditions

Junction Components	Freeway	Ramp	Adjacent Ramp	
Volume, V (vph)	7384	1256	1145	vph
Peak-hour factor, PHF	0.95	0.95	0.95	

Peak 15-min volume, v15	1943	331	301	v
Trucks and buses	8	8	8	%
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	0.962	0.962	
Driver population factor, fP	1.00	1.00	1.00	
Flow rate, vp	8084	1375	1253	pcph

Estimation of V12 Diverge Areas

L_{EQ} = 8220.06 (Equation 25-8 or 25-9)

P_{FD} = 0.503 Using Equation 6

$v_{12} = v_R + (v - v_F) P_{FD}$ = 4747 pc/h

Capacity Checks

	Actual	Maximum	LOS F?
$v_{Fi} = v_F$	8084	6900	Yes
$v_{FO} = v - v_R$	6709	6900	No
v_R	1375	2000	No

$v_{3 \text{ or } av34}$ = 3337 pc/h (Equation 25-15 or 25-16)

Is $v_{3 \text{ or } av34}$ > 2700 pc/h? Yes

Is $v_{3 \text{ or } av34}$ > 1.5 v_{12} /2 No

If yes, v_{12A} = 5384 (Equation 25-18)

Flow Entering Diverge Influence Area

	Actual	Max Desirable	Violation?
v_{12A}	5384	4400	Yes

Level of Service Determination (if not F)

Density, $D_R = 4.252 + 0.0086\ v_{12} - 0.009\ L_D$ = 46.1 pc/mi/ln

Level of service for ramp-freeway junction areas of influence F

Speed Estimation

Intermediate speed variable, D_S = 0.617

Space mean speed in ramp influence area, S = 48.9 mph

Space mean speed in outer lanes, S_R = 59.2 mph

Space mean speed for all vehicles, S_0 = 51.9 mph

HCS+: Ramps and Ramp Junctions Release 5.3

Phone: Fax:
E-mail:

Diverge Analysis

Analyst: Caitlin Bowen
Agency/Co.:
Date performed: 6/12/2013
Analysis time period: PM Off Peak Hour
Freeway/Dir of Travel: I-55 Eastbound
Junction: Cicero Ave West
Jurisdiction:
Analysis Year:
Description:

Freeway Data

Type of analysis	Diverge	
Number of lanes in freeway	3	
Free-flow speed on freeway	60.0	mph
Volume on freeway	7050	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	485	vph
Length of first accel/decel lane	250	ft
Length of second accel/decel lane		ft

Adjacent Ramp Data (if one exists)

Does adjacent ramp exist?	Yes	
Volume on adjacent ramp	922	vph
Position of adjacent ramp	Upstream	
Type of adjacent ramp	On	
Distance to adjacent ramp	1900	ft

Conversion to pc/h Under Base Conditions

Junction Components	Freeway	Ramp	Adjacent Ramp	
Volume, V (vph)	7050	485	922	vph
Peak-hour factor, PHF	0.95	0.95	0.95	

Peak 15-min volume, v15	1855	128	243	v
Trucks and buses	8	8	8	%
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	0.962	0.962	
Driver population factor, fP	1.00	1.00	1.00	
Flow rate, vp	7718	531	1009	pcph

Estimation of V12 Diverge Areas

L_{EQ} = 4847.28 (Equation 25-8 or 25-9)

P_{FD} = 0.737 Using Equation 6

$v_{12} = v_R + (v - v_F) P_{FD}$ = 5826 pc/h

Capacity Checks

	Actual	Maximum	LOS F?
$v_{Fi} = v_F$	7718	6900	Yes
$v_{FO} = v - v_R$	7187	6900	Yes
v_R	531	2000	No

$v_{3 \text{ or } av34}$ = 1892 pc/h (Equation 25-15 or 25-16)

Is $v_{3 \text{ or } av34} > 2700$ pc/h? No

Is $v_{3 \text{ or } av34} > 1.5 v_{12}/2$ No

If yes, v_{12A} = 5826 (Equation 25-18)

Flow Entering Diverge Influence Area

	Actual	Max Desirable	Violation?
v_{12}	5826	4400	Yes

Level of Service Determination (if not F)

Density, $D_R = 4.252 + 0.0086 v_{12} - 0.009 L_D$ = 52.1 pc/mi/ln

Level of service for ramp-freeway junction areas of influence F

Speed Estimation

Intermediate speed variable, D_S = 0.541

Space mean speed in ramp influence area, S = 50.3 mph

Space mean speed in outer lanes, S_R = 62.3 mph

Space mean speed for all vehicles, S_0 = 52.8 mph

HCS+: Ramps and Ramp Junctions Release 5.3

Phone: Fax:
E-mail:

Diverge Analysis

Analyst: Caitlin Bowen
Agency/Co.:
Date performed: 6/12/2013
Analysis time period: PM Off Peak Hour
Freeway/Dir of Travel: I-55 Eastbound
Junction: Pulaski Road West
Jurisdiction:
Analysis Year:
Description:

Freeway Data

Type of analysis	Diverge	
Number of lanes in freeway	3	
Free-flow speed on freeway	60.0	mph
Volume on freeway	7601	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	1121	vph
Length of first accel/decel lane	175	ft
Length of second accel/decel lane		ft

Adjacent Ramp Data (if one exists)

Does adjacent ramp exist?	Yes	
Volume on adjacent ramp	1036	vph
Position of adjacent ramp	Upstream	
Type of adjacent ramp	On	
Distance to adjacent ramp	2300	ft

Conversion to pc/h Under Base Conditions

Junction Components	Freeway	Ramp	Adjacent Ramp	
Volume, V (vph)	7601	1121	1036	vph
Peak-hour factor, PHF	0.95	0.95	0.95	

Peak 15-min volume, v15	2000	295	273	v
Trucks and buses	8	8	8	%
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	0.962	0.962	
Driver population factor, fP	1.00	1.00	1.00	
Flow rate, vp	8321	1227	1134	pcph

Estimation of V12 Diverge Areas

L_{EQ} = 6704.86 (Equation 25-8 or 25-9)

P_{FD} = 0.690 Using Equation 6

$v_{12} = v_R + (v - v_F) P_{FD}$ = 6124 pc/h

Capacity Checks

	Actual	Maximum	LOS F?
$v_{Fi} = v_F$	8321	6900	Yes
$v_{FO} = v - v_R$	7094	6900	Yes
v_R	1227	2000	No

$v_{3 \text{ or } av34}$ = 2197 pc/h (Equation 25-15 or 25-16)

Is $v_{3 \text{ or } av34} > 2700$ pc/h? No

Is $v_{3 \text{ or } av34} > 1.5 v_{12}/2$ No

If yes, v_{12A} = 6124 (Equation 25-18)

Flow Entering Diverge Influence Area

	Actual	Max Desirable	Violation?
v_{12}	6124	4400	Yes

Level of Service Determination (if not F)

Density, $D_R = 4.252 + 0.0086 v_{12} - 0.009 L_D$ = 55.3 pc/mi/ln

Level of service for ramp-freeway junction areas of influence F

Speed Estimation

Intermediate speed variable, D_S = 0.603

Space mean speed in ramp influence area, S = 49.1 mph

Space mean speed in outer lanes, S_R = 61.2 mph

Space mean speed for all vehicles, S_0 = 51.8 mph

HCS+: Ramps and Ramp Junctions Release 5.3

Phone: Fax:
E-mail:

Diverge Analysis

Analyst: Caitlin Bowen
Agency/Co.:
Date performed: 6/12/2013
Analysis time period: PM Off Peak Hour
Freeway/Dir of Travel: I-55 Eastbound
Junction: Kedzie and California Ave West
Jurisdiction:
Analysis Year:
Description:

Freeway Data

Type of analysis	Diverge	
Number of lanes in freeway	3	
Free-flow speed on freeway	60.0	mph
Volume on freeway	7432	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	1071	vph
Length of first accel/decel lane	500	ft
Length of second accel/decel lane		ft

Adjacent Ramp Data (if one exists)

Does adjacent ramp exist?	Yes	
Volume on adjacent ramp	952	vph
Position of adjacent ramp	Upstream	
Type of adjacent ramp	On	
Distance to adjacent ramp	4400	ft

Conversion to pc/h Under Base Conditions

Junction Components	Freeway	Ramp	Adjacent Ramp	
Volume, V (vph)	7432	1071	952	vph
Peak-hour factor, PHF	0.95	0.95	0.95	

Peak 15-min volume, v15	1956	282	251	v
Trucks and buses	8	8	8	%
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	0.962	0.962	
Driver population factor, fP	1.00	1.00	1.00	
Flow rate, vp	8136	1172	1042	pcph

Estimation of V12 Diverge Areas

L_{EQ} = 6163.64 (Equation 25-8 or 25-9)

P_{FD} = 0.543 Using Equation 6

$v_{12} = v_R + (v - v_F) P_{FD}$ = 4952 pc/h

Capacity Checks

	Actual	Maximum	LOS F?
$v_{Fi} = v_F$	8136	6900	Yes
$v_{FO} = v - v_R$	6964	6900	Yes
v_R	1172	2000	No

$v_{3 \text{ or } av34}$ = 3184 pc/h (Equation 25-15 or 25-16)

Is $v_{3 \text{ or } av34} > 2700$ pc/h? Yes

Is $v_{3 \text{ or } av34} > 1.5 v_{12} / 2$ No

If yes, v_{12A} = 5436 (Equation 25-18)

Flow Entering Diverge Influence Area

	Actual	Max Desirable	Violation?
v_{12A}	5436	4400	Yes

Level of Service Determination (if not F)

Density, $D_R = 4.252 + 0.0086 v_{12} - 0.009 L_D$ = 46.5 pc/mi/ln

Level of service for ramp-freeway junction areas of influence F

Speed Estimation

Intermediate speed variable, D_S = 0.598

Space mean speed in ramp influence area, S = 49.2 mph

Space mean speed in outer lanes, S_R = 59.2 mph

Space mean speed for all vehicles, S_0 = 52.1 mph

HCS+: Ramps and Ramp Junctions Release 5.3

Phone: Fax:
E-mail:

Diverge Analysis

Analyst: Caitlin Bowen
Agency/Co.:
Date performed: 6/12/2013
Analysis time period: PM Off Peak Hour
Freeway/Dir of Travel: I-55 Eastbound
Junction: 1-90/94
Jurisdiction:
Analysis Year:
Description:

Freeway Data

Type of analysis	Diverge	
Number of lanes in freeway	3	
Free-flow speed on freeway	60.0	mph
Volume on freeway	4583	vph

Off Ramp Data

Side of freeway	Right	
Number of lanes in ramp	1	
Free-Flow speed on ramp	25.0	mph
Volume on ramp	1459	vph
Length of first accel/decel lane	330	ft
Length of second accel/decel lane		ft

Adjacent Ramp Data (if one exists)

Does adjacent ramp exist?	Yes	
Volume on adjacent ramp	1912	vph
Position of adjacent ramp	Upstream	
Type of adjacent ramp	Off	
Distance to adjacent ramp	3000	ft

Conversion to pc/h Under Base Conditions

Junction Components	Freeway	Ramp	Adjacent Ramp	
Volume, V (vph)	4583	1459	1912	vph
Peak-hour factor, PHF	0.95	0.95	0.95	

Peak 15-min volume, v15	1206	384	503	v
Trucks and buses	8	8	8	%
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	0.962	0.962	
Driver population factor, fP	1.00	1.00	1.00	
Flow rate, vp	5017	1597	2093	pcph

Estimation of V12 Diverge Areas

L_{EQ} = (Equation 25-8 or 25-9)

P_{FD} = 0.561 Using Equation 5

$v_{12} = v_R + (v - v_F) P_{FD}$ = 3516 pc/h

Capacity Checks

	Actual	Maximum	LOS F?
$v_{Fi} = v_F$	5017	6900	No
$v_{FO} = v - v_R$	3420	6900	No
v_R	1597	1900	No
$v_{3 \text{ or } av34} = v_{av34}$	1501 pc/h	(Equation 25-15 or 25-16)	

Is $v_{3 \text{ or } av34} > 2700$ pc/h? No

Is $v_{3 \text{ or } av34} > 1.5 v_{12}/2$ No

If yes, v_{12A} = 3516 (Equation 25-18)

Flow Entering Diverge Influence Area

	Actual	Max Desirable	Violation?
v_{12}	3516	4400	No

Level of Service Determination (if not F)

Density, $D_R = 4.252 + 0.0086 v_{12} - 0.009 L_D$ = 31.5 pc/mi/ln

Level of service for ramp-freeway junction areas of influence D

Speed Estimation

Intermediate speed variable, D_S = 0.702

Space mean speed in ramp influence area, S = 47.4 mph

Space mean speed in outer lanes, S_R = 63.9 mph

Space mean speed for all vehicles, S_0 = 51.3 mph

Diverge

Southbound AM

HCS 2010: Freeway Merge and Diverge Segments Release 6.1

Phone: Fax:
E-mail:

Diverge Analysis

Analyst: Caitlin Bowen
Agency/Co.:
Date performed: 6/14/2013
Analysis time period: AM Off Peak Hour
Freeway/Dir of Travel: I-55 Westbound
Junction: I-355/Joliet Rd CD Exit
Jurisdiction:
Analysis Year:
Description:

Freeway Data

Type of analysis	Diverge	
Number of lanes in freeway	3	
Free-flow speed on freeway	60.0	mph
Volume on freeway	3623	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	540	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?	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)	3623	540		vph
Peak-hour factor, PHF	0.95	0.95		

Peak 15-min volume, v15	953	142	v
Trucks and buses	15	15	%
Recreational vehicles	0	0	%
Terrain type:	Level	Level	
Grade	0.00 %	0.00 %	%
Length	0.00 mi	0.00 mi	mi
Trucks and buses PCE, ET	1.5	1.5	
Recreational vehicle PCE, ER	1.2	1.2	
Heavy vehicle adjustment, fHV	0.930	0.930	
Driver population factor, fP	1.00	1.00	
Flow rate, vp	4100	611	pcph

Estimation of V12 Diverge Areas

L_{EQ} = (Equation 13-12 or 13-13)

P_{FD} = 0.629 Using Equation 5

$v_{12} = v_R + (v_F - v_R) P_{FD}$ = 2807 pc/h

Capacity Checks

	Actual	Maximum	LOS F?
$v_{Fi} = v_F$	4100	6900	No
$v_{FO} = v_F - v_R$	3489	6900	No
v_R	611	2100	No

v_3 or v_{av34} 1293 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} = 2807 (Equation 13-15, 13-16, 13-18, or 13-19)

Flow Entering Diverge Influence Area

	Actual	Max Desirable	Violation?
v_{12}	2807	4400	No

Level of Service Determination (if not F)

Density, $D_R = 4.252 + 0.0086 v_{12} - 0.009 L_D$ = 25.2 pc/mi/ln

Level of service for ramp-freeway junction areas of influence C

Speed Estimation

Intermediate speed variable, D_S = 0.353

Space mean speed in ramp influence area, S = 53.6 mph

Space mean speed in outer lanes, S_R = 64.7 mph

Space mean speed for all vehicles, S_0 = 56.7 mph

HCS 2010: Freeway Merge and Diverge Segments Release 6.1

Phone: Fax:
E-mail:

Diverge Analysis

Analyst:	Alex Ericksen
Agency/Co.:	
Date performed:	1/8/2014
Analysis time period:	AM Peak Hour
Freeway/Dir of Travel:	I-55 WB
Junction:	Diverge to I-355
Jurisdiction:	
Analysis Year:	
Description:	

Freeway Data

Type of analysis	Diverge	
Number of lanes in freeway	4	
Free-flow speed on freeway	60.0	mph
Volume on freeway	5357	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	1734	vph
Length of first accel/decel lane	1100	ft
Length of second accel/decel lane	1100	ft

Adjacent Ramp Data (if one exists)

Does adjacent ramp exist?	Yes	
Volume on adjacent ramp	124	vph
Position of adjacent ramp	Upstream	
Type of adjacent ramp	On	
Distance to adjacent ramp	2950	ft

Conversion to pc/h Under Base Conditions

Junction Components	Freeway	Ramp	Adjacent Ramp	
Volume, V (vph)	5357	1734	124	vph
Peak-hour factor, PHF	0.95	0.95	0.95	
Peak 15-min volume, v15	1410	456	33	v
Trucks and buses	15	15	15	%
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	0.930	0.930	0.930	
Driver population factor, fP	1.00	1.00	1.00	

Flow rate, vp 6062 1962 140 pcph

Estimation of V12 Diverge Areas

L_{EQ} = (Equation 13-12 or 13-13)

P_{FD} = 0.260 Using Equation 0

$v_{12} = v_R + (v_F - v_R) P_{FD} = 3028$ pc/h

Capacity Checks

	Actual	Maximum	LOS F?
$v_{Fi} = v_F$	6062	9200	No
$v_{FO} = v_F - v_R$	4100	9200	No
v_R	1962	4200	No
v_3 or v_{av34}	1517 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} = 3028 (Equation 13-15, 13-16, 13-18, or 13-19)

Flow Entering Diverge Influence Area

	Actual	Max Desirable	Violation?
v_{12}	3028	4400	No

Level of Service Determination (if not F)

Density, $D_R = 4.252 + 0.0086\, v_{12} - 0.009\, L_D$ = 0.6 pc/mi/ln

Level of service for ramp-freeway junction areas of influence A

Speed Estimation

Intermediate speed variable, D_S = 0.475

Space mean speed in ramp influence area, S_R = 51.5 mph

Space mean speed in outer lanes, S_0 = 63.8 mph

Space mean speed for all vehicles, S = 57.0 mph

HCS 2010: Freeway Merge and Diverge Segments Release 6.1

Phone: Fax:

E-mail:

Diverge Analysis

Analyst: Caitlin Bowen

Agency/Co.:

Date performed: 6/14/2013

Analysis time period: AM Off Peak Hour

Freeway/Dir of Travel: I-55 Westbound

Junction: Lemont Rd Exit

Jurisdiction:

Analysis Year:

Description:

Freeway Data

Type of analysis	Diverge	
Number of lanes in freeway	3	
Free-flow speed on freeway	60.0	mph
Volume on freeway	6228	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	509	vph
Length of first accel/decel lane	300	ft
Length of second accel/decel lane		ft

Adjacent Ramp Data (if one exists)

Does adjacent ramp exist?	Yes	
Volume on adjacent ramp	297	vph
Position of adjacent ramp	Upstream	
Type of adjacent ramp	On	
Distance to adjacent ramp	8000	ft

Conversion to pc/h Under Base Conditions

Junction Components	Freeway	Ramp	Adjacent Ramp	
Volume, V (vph)	6228	509	297	vph
Peak-hour factor, PHF	0.95	0.95	0.95	
Peak 15-min volume, v15	1639	134	78	v
Trucks and buses	15	15	15	%
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	0.930	0.930	0.930	
Driver population factor, fP	1.00	1.00	1.00	
Flow rate, vp	7047	576	336	pcph

Estimation of V12 Diverge Areas

L_{EQ} = 1774.91 (Equation 13-12 or 13-13)

P_{FD} = 0.557 Using Equation 5

$v_{12} = v_R + (v - v_F) P_{FD}$ = 4182 pc/h

Capacity Checks

	Actual	Maximum	LOS F?
$v_{Fi} = v_F$	7047	6900	Yes
$v_{FO} = v - v_F - v_R$	6471	6900	No
v_R	576	2100	No
v_3 or v_{av34}	2865 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} = 4347 (Equation 13-15, 13-16, 18, or 13-19)

Flow Entering Diverge Influence Area

	Actual	Max Desirable	Violation?
v_{12A}	4347	4400	No

Level of Service Determination (if not F)

Density, $D = 4.252 + 0.0086 v_{12} - 0.009 L$ = 38.9 pc/mi/ln

R 12 D

Level of service for ramp-freeway junction areas of influence F

Speed Estimation

Intermediate speed variable,	D_S = 0.350	
Space mean speed in ramp influence area,	S_R = 53.7	mph
Space mean speed in outer lanes,	S_0 = 59.2	mph
Space mean speed for all vehicles,	S = 55.7	mph

HCS 2010: Freeway Merge and Diverge Segments Release 6.1

Phone: Fax:
E-mail:

Diverge Analysis

Analyst:	Alex Ericksen
Agency/Co.:	
Date performed:	1/8/2014
Analysis time period:	AM Off Peak Hour
Freeway/Dir of Travel:	I-55 Westbound
Junction:	Cass Avenue Exit
Jurisdiction:	
Analysis Year:	
Description:	

Freeway Data

Type of analysis	Diverge	
Number of lanes in freeway	3	
Free-flow speed on freeway	60.0	mph
Volume on freeway	6278	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	430	vph
Length of first accel/decel lane	250	ft
Length of second accel/decel lane		ft

Adjacent Ramp Data (if one exists)

Does adjacent ramp exist?	Yes	
Volume on adjacent ramp	1255	vph
Position of adjacent ramp	Upstream	
Type of adjacent ramp	On	
Distance to adjacent ramp	6000	ft

Conversion to pc/h Under Base Conditions

Junction Components	Freeway		Ramp		Adjacent Ramp		
Volume, V (vph)	6278		430		1255		vph
Peak-hour factor, PHF	0.95		0.95		0.95		
Peak 15-min volume, v15	1652		113		330		v
Trucks and buses	15		15		15		%
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	0.930		0.930		0.930		
Driver population factor, fP	1.00		1.00		1.00		

Flow rate, vp 7104 487 1420 pcph

Estimation of V12 Diverge Areas

L_{EQ} = 7194.24 (Equation 13-12 or 13-13)

P_{FD} = 0.583 Using Equation 6

$v_{12} = v_R + (v_F - v_R) P_{FD}$ = 4344 pc/h

Capacity Checks

	Actual	Maximum	LOS F?
$v_{Fi} = v_F$	7104	6900	Yes
$v_{FO} = v_F - v_R$	6617	6900	No
v_R	487	2000	No
v_3 or v_{av34}	2760 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} = 4404 (Equation 13-15, 13-16, 13-18, or 13-19)

Flow Entering Diverge Influence Area

	Actual	Max Desirable	Violation?
v_{12A}	4404	4400	No

Level of Service Determination (if not F)

Density, $D_R = 4.252 + 0.0086\ v_{12} - 0.009\ L_D$ = 39.9 pc/mi/ln

Level of service for ramp-freeway junction areas of influence F

Speed Estimation

Intermediate speed variable, D_S = 0.537

Space mean speed in ramp influence area, S_R = 50.3 mph

Space mean speed in outer lanes, S_0 = 59.2 mph

Space mean speed for all vehicles, S = 53.4 mph

HCS 2010: Freeway Merge and Diverge Segments Release 6.1

Phone: Fax:

E-mail:

Diverge Analysis

Analyst: Caitlin Bowen

Agency/Co.:

Date performed: 6/14/2013

Analysis time period: AM Off Peak Hour

Freeway/Dir of Travel: I-55 Westbound

Junction: Kingery Hwy Exit

Jurisdiction:

Analysis Year:

Description:

Freeway Data

Type of analysis	Diverge	
Number of lanes in freeway	3	
Free-flow speed on freeway	60.0	mph
Volume on freeway	6464	vph

Off Ramp Data

Side of freeway	Right	

Number of lanes in ramp	1	
Free-Flow speed on ramp	35.0	mph
Volume on ramp	1441	vph
Length of first accel/decel lane	300	ft
Length of second accel/decel lane		ft

Adjacent Ramp Data (if one exists)

Does adjacent ramp exist?	Yes	
Volume on adjacent ramp	202	vph
Position of adjacent ramp	Upstream	
Type of adjacent ramp	On	
Distance to adjacent ramp	6500	ft

Conversion to pc/h Under Base Conditions

Junction Components	Freeway	Ramp	Adjacent Ramp	
Volume, V (vph)	6464	1441	202	vph
Peak-hour factor, PHF	0.95	0.95	0.95	
Peak 15-min volume, v15	1701	379	53	v
Trucks and buses	15	15	15	%
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	0.930	0.930	0.930	
Driver population factor, fP	1.00	1.00	1.00	
Flow rate, vp	7315	1631	229	pcph

Estimation of V12 Diverge Areas

L_{EQ} = 1986.31 (Equation 13-12 or 13-13)

P_{FD} = 0.502 Using Equation 5

$v_{12} = v_R + (v_F - v_R) P_{FD}$ = 4485 pc/h

Capacity Checks

	Actual	Maximum	LOS F?
$v_{Fi} = v_F$	7315	6900	Yes
$v_{FO} = v_F - v_R$	5684	6900	No
v_R	1631	2000	No
v_3 or v_{av34}	2830 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} = 4615 (Equation 13-15, 13-16, 18, or 13-19)

Flow Entering Diverge Influence Area

	Actual	Max Desirable	Violation?
v_{12A}	4615	4400	Yes

Level of Service Determination (if not F)

Density, $D = 4.252 + 0.0086\ v_{12} - 0.009\ L$ = 41.2 pc/mi/ln

R 12 D

Level of service for ramp-freeway junction areas of influence F

Speed Estimation

Intermediate speed variable,	D_S = 0.575	
Space mean speed in ramp influence area,	S_R = 49.7	mph
Space mean speed in outer lanes,	S_0 = 59.2	mph
Space mean speed for all vehicles,	S = 52.8	mph

HCS 2010: Freeway Merge and Diverge Segments Release 6.1

Phone: Fax:
E-mail:

Diverge Analysis

Analyst: Caitlin Bowen
Agency/Co.:
Date performed: 6/14/2013
Analysis time period: AM Off Peak Hour
Freeway/Dir of Travel: I-55 Westbound
Junction: LaGrange Exit
Jurisdiction:
Analysis Year:
Description:

Freeway Data

Type of analysis	Diverge	
Number of lanes in freeway	3	
Free-flow speed on freeway	60.0	mph
Volume on freeway	7356	vph

Off Ramp Data

Side of freeway	Right	
Number of lanes in ramp	1	
Free-Flow speed on ramp	35.0	mph
Volume on ramp	1203	vph
Length of first accel/decel lane	1000	ft
Length of second accel/decel lane		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)	7356	1203		vph
Peak-hour factor, PHF	0.95	0.95		

Peak 15-min volume, v15	1936	317	v
Trucks and buses	15	15	%
Recreational vehicles	0	0	%
Terrain type:	Level	Level	
Grade	0.00 %	0.00 %	%
Length	0.00 mi	0.00 mi	mi
Trucks and buses PCE, ET	1.5	1.5	
Recreational vehicle PCE, ER	1.2	1.2	
Heavy vehicle adjustment, fHV	0.930	0.930	
Driver population factor, fP	1.00	1.00	
Flow rate, vp	8324	1361	pcph

Estimation of V12 Diverge Areas

L_{EQ} = (Equation 13-12 or 13-13)

P_{FD} = 0.489 Using Equation 5

$v_{12} = v_R + (v - v_F) P_{FD}$ = 4768 pc/h

Capacity Checks

	Actual	Maximum	LOS F?
$v_{Fi} = v_F$	8324	6900	Yes
$v_{FO} = v - v_F$	6963	6900	Yes
v_R	1361	2000	No

v_3 or v_{av34} 3556 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} = 5624 (Equation 13-15, 13-16, 13-18, or 13-19)

Flow Entering Diverge Influence Area

	Actual	Max Desirable	Violation?
v_{12A}	5624	4400	Yes

Level of Service Determination (if not F)

Density, $D_R = 4.252 + 0.0086 v_{12} - 0.009 L_D$ = 43.6 pc/mi/ln

Level of service for ramp-freeway junction areas of influence F

Speed Estimation

Intermediate speed variable, D_S = 0.550

Space mean speed in ramp influence area, S = 50.1 mph

Space mean speed in outer lanes, S_R = 59.2 mph

Space mean speed for all vehicles, S_0 = 52.7 mph

HCS 2010: Freeway Merge and Diverge Segments Release 6.1

Phone: Fax:
E-mail:

Diverge Analysis

Analyst: Caitlin Bowen
Agency/Co.:
Date performed: 6/14/2013
Analysis time period: AM Off Peak Hour
Freeway/Dir of Travel: I-55 Westbound
Junction: Harlem Avenue Exit
Jurisdiction:
Analysis Year:
Description:

Freeway Data

Type of analysis	Diverge	
Number of lanes in freeway	3	
Free-flow speed on freeway	60.0	mph
Volume on freeway	7362	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	1650	vph
Length of first accel/decel lane	650	ft
Length of second accel/decel lane		ft

Adjacent Ramp Data (if one exists)

Does adjacent ramp exist?	Yes	
Volume on adjacent ramp	717	vph
Position of adjacent ramp	Upstream	
Type of adjacent ramp	On	
Distance to adjacent ramp	7500	ft

Conversion to pc/h Under Base Conditions

Junction Components	Freeway	Ramp	Adjacent Ramp	
Volume, V (vph)	7362	1650	717	vph
Peak-hour factor, PHF	0.95	0.95	0.95	

Peak 15-min volume, v15	1937	434	189	v
Trucks and buses	12	12	12	%
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	0.943	0.943	0.943	
Driver population factor, fP	1.00	1.00	1.00	
Flow rate, vp	8214	1841	800	pcph

Estimation of V12 Diverge Areas

L_{EQ} = 6666.33 (Equation 13-12 or 13-13)

P_{FD} = 0.470 Using Equation 5

$v_{12} = v_R + (v - v_F) P_{FD}$ = 4836 pc/h

Capacity Checks

	Actual	Maximum	LOS F?
$v_{Fi} = v_F$	8214	6900	Yes
$v_{FO} = v - v_R$	6373	6900	No
v_R	1841	2000	No

v_3 or v_{av34} 3378 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} = 5514 (Equation 13-15, 13-16, 13-18, or 13-19)

Flow Entering Diverge Influence Area

	Actual	Max Desirable	Violation?
v_{12A}	5514	4400	Yes

Level of Service Determination (if not F)

Density, $D_R = 4.252 + 0.0086\ v_{12} - 0.009\ L_D$ = 45.8 pc/mi/ln

Level of service for ramp-freeway junction areas of influence F

Speed Estimation

Intermediate speed variable, D_S = 0.659

Space mean speed in ramp influence area, S = 48.1 mph

Space mean speed in outer lanes, S_R = 59.2 mph

Space mean speed for all vehicles, S_0 = 51.3 mph

HCS 2010: Freeway Merge and Diverge Segments Release 6.1

Phone: Fax:
E-mail:

Diverge Analysis

Analyst: Caitlin Bowen
Agency/Co.:
Date performed: 6/14/2013
Analysis time period: AM Off Peak Hour
Freeway/Dir of Travel: I-55 Westbound
Junction: Central Avenue Exit
Jurisdiction:
Analysis Year:
Description:

Freeway Data

Type of analysis	Diverge	
Number of lanes in freeway	3	
Free-flow speed on freeway	60.0	mph
Volume on freeway	7500	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	855	vph
Length of first accel/decel lane	300	ft
Length of second accel/decel lane		ft

Adjacent Ramp Data (if one exists)

Does adjacent ramp exist?	Yes	
Volume on adjacent ramp	917	vph
Position of adjacent ramp	Upstream	
Type of adjacent ramp	On	
Distance to adjacent ramp	2300	ft

Conversion to pc/h Under Base Conditions

Junction Components	Freeway	Ramp	Adjacent Ramp	
Volume, V (vph)	7500	855	917	vph
Peak-hour factor, PHF	0.95	0.95	0.95	

Peak 15-min volume, v15	1974	225	241	v
Trucks and buses	12	12	12	%
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	0.943	0.943	0.943	
Driver population factor, fP	1.00	1.00	1.00	
Flow rate, vp	8368	954	1023	pcph

Estimation of V12 Diverge Areas

L_{EQ} = 5357.14 (Equation 13-12 or 13-13)

P_{FD} = 0.659 Using Equation 6

$v_{12} = v_R + (v - v_F) P_{FD}$ = 5842 pc/h

Capacity Checks

	Actual	Maximum	LOS F?
$v_{Fi} = v_F$	8368	6900	Yes
$v_{FO} = v - v_F$	7414	6900	Yes
v_R	954	2000	No

v_3 or v_{av34} 2526 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} = 5842 (Equation 13-15, 13-16, 13-18, or 13-19)

Flow Entering Diverge Influence Area

	Actual	Max Desirable	Violation?
v_{12}	5842	4400	Yes

Level of Service Determination (if not F)

Density, $D_R = 4.252 + 0.0086\ v_{12} - 0.009\ L_D$ = 51.8 pc/mi/ln

Level of service for ramp-freeway junction areas of influence F

Speed Estimation

Intermediate speed variable, D_S = 0.579

Space mean speed in ramp influence area, S = 49.6 mph

Space mean speed in outer lanes, S_R = 59.9 mph

Space mean speed for all vehicles, S_0 = 52.3 mph

HCS 2010: Freeway Merge and Diverge Segments Release 6.1

Phone: Fax:
E-mail:

Diverge Analysis

Analyst: Caitlin Bowen
Agency/Co.:
Date performed: 6/14/2013
Analysis time period: AM Off Peak Hour
Freeway/Dir of Travel: I-55 Westbound
Junction: Cicero Avenue Exit
Jurisdiction:
Analysis Year:
Description:

Freeway Data

Type of analysis	Diverge	
Number of lanes in freeway	3	
Free-flow speed on freeway	60.0	mph
Volume on freeway	7089	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	506	vph
Length of first accel/decel lane	225	ft
Length of second accel/decel lane		ft

Adjacent Ramp Data (if one exists)

Does adjacent ramp exist?	Yes	
Volume on adjacent ramp	1080	vph
Position of adjacent ramp	Upstream	
Type of adjacent ramp	On	
Distance to adjacent ramp	2600	ft

Conversion to pc/h Under Base Conditions

Junction Components	Freeway	Ramp	Adjacent Ramp	
Volume, V (vph)	7089	506	1080	vph
Peak-hour factor, PHF	0.95	0.95	0.95	

Peak 15-min volume, v15	1866	133	284	v
Trucks and buses	12	12	12	%
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	0.943	0.943	0.943	
Driver population factor, fP	1.00	1.00	1.00	
Flow rate, vp	7910	565	1205	pcph

Estimation of V12 Diverge Areas

L_{EQ} = 5738.37 (Equation 13-12 or 13-13)

P_{FD} = 0.688 Using Equation 6

$v_{12} = v_R + (v - v_F) P_{FD}$ = 5622 pc/h

Capacity Checks

	Actual	Maximum	LOS F?
$v_{Fi} = v_F$	7910	6900	Yes
$v_{FO} = v - v_R$	7345	6900	Yes
v_R	565	2000	No

v_3 or v_{av34} = 2288 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} = 5622 (Equation 13-15, 13-16, 13-18, or 13-19)

Flow Entering Diverge Influence Area

	Actual	Max Desirable	Violation?
v_{12}	5622	4400	Yes

Level of Service Determination (if not F)

Density, $D_R = 4.252 + 0.0086 v_{12} - 0.009 L_D$ = 50.6 pc/mi/ln

Level of service for ramp-freeway junction areas of influence F

Speed Estimation

Intermediate speed variable, D_S = 0.544

Space mean speed in ramp influence area, S = 50.2 mph

Space mean speed in outer lanes, S_R = 60.8 mph

Space mean speed for all vehicles, S_0 = 52.9 mph

HCS 2010: Freeway Merge and Diverge Segments Release 6.1

Phone: Fax:
E-mail:

Diverge Analysis

Analyst: Caitlin Bowen
Agency/Co.:
Date performed: 6/14/2013
Analysis time period: AM Off Peak Hour
Freeway/Dir of Travel: I-55 Westbound
Junction: Pulaski Road Exit
Jurisdiction:
Analysis Year:
Description:

Freeway Data

Type of analysis	Diverge	
Number of lanes in freeway	3	
Free-flow speed on freeway	60.0	mph
Volume on freeway	6791	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	782	vph
Length of first accel/decel lane	225	ft
Length of second accel/decel lane		ft

Adjacent Ramp Data (if one exists)

Does adjacent ramp exist?	Yes	
Volume on adjacent ramp	818	vph
Position of adjacent ramp	Upstream	
Type of adjacent ramp	On	
Distance to adjacent ramp	3600	ft

Conversion to pc/h Under Base Conditions

Junction Components	Freeway	Ramp	Adjacent Ramp	
Volume, V (vph)	6791	782	818	vph
Peak-hour factor, PHF	0.95	0.95	0.95	

Peak 15-min volume, v15	1787	206	215	v
Trucks and buses	12	12	12	%
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	0.943	0.943	0.943	
Driver population factor, fP	1.00	1.00	1.00	
Flow rate, vp	7577	873	913	pcph

Estimation of V12 Diverge Areas

L_{EQ} = 5102.75 (Equation 13-12 or 13-13)

P_{FD} = 0.575 Using Equation 6

$v_{12} = v_R + (v - v_F) P_{FD}$ = 4726 pc/h

Capacity Checks

	Actual	Maximum	LOS F?
$v_{Fi} = v_F$	7577	6900	Yes
$v_{FO} = v - v_R$	6704	6900	No
v_R	873	2000	No

v_3 or v_{av34} 2851 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} = 4877 (Equation 13-15, 13-16, 13-18, or 13-19)

Flow Entering Diverge Influence Area

	Actual	Max Desirable	Violation?
v_{12A}	4877	4400	Yes

Level of Service Determination (if not F)

Density, $D_R = 4.252 + 0.0086\ v_{12} - 0.009\ L_D$ = 44.2 pc/mi/ln

Level of service for ramp-freeway junction areas of influence F

Speed Estimation

Intermediate speed variable, D_S = 0.572

Space mean speed in ramp influence area, S = 49.7 mph

Space mean speed in outer lanes, S_R = 59.2 mph

Space mean speed for all vehicles, S_0 = 52.7 mph

HCS 2010: Freeway Merge and Diverge Segments Release 6.1

Phone: Fax:
E-mail:

Diverge Analysis

Analyst: Caitlin Bowen
Agency/Co.:
Date performed: 6/14/2013
Analysis time period: AM Off Peak Hour
Freeway/Dir of Travel: I-55 Westbound
Junction: Kedzie/Cali Ave Exit
Jurisdiction:
Analysis Year:
Description:

Freeway Data

Type of analysis	Diverge	
Number of lanes in freeway	3	
Free-flow speed on freeway	60.0	mph
Volume on freeway	7170	vph

Off Ramp Data

Side of freeway	Right	
Number of lanes in ramp	1	
Free-Flow speed on ramp	35.0	mph
Volume on ramp	1197	vph
Length of first accel/decel lane	800	ft
Length of second accel/decel lane		ft

Adjacent Ramp Data (if one exists)

Does adjacent ramp exist?	Yes	
Volume on adjacent ramp	1305	vph
Position of adjacent ramp	Upstream	
Type of adjacent ramp	On	
Distance to adjacent ramp	3300	ft

Conversion to pc/h Under Base Conditions

Junction Components	Freeway	Ramp	Adjacent Ramp	
Volume, V (vph)	7170	1197	1305	vph
Peak-hour factor, PHF	0.95	0.95	0.95	

Peak 15-min volume, v15	1887	315	343	v
Trucks and buses	12	12	12	%
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	0.943	0.943	0.943	
Driver population factor, fP	1.00	1.00	1.00	
Flow rate, vp	8000	1336	1456	pcph

Estimation of V12 Diverge Areas

L_{EQ} = 9487.57 (Equation 13-12 or 13-13)

P_{FD} = 0.671 Using Equation 6

$v_{12} = v_R + (v - v_F) P_{FD}$ = 5811 pc/h

Capacity Checks

	Actual	Maximum	LOS F?
$v_{Fi} = v_F$	8000	6900	Yes
$v_{FO} = v - v_R$	6664	6900	No
v_R	1336	2000	No

v_{av34} or v_3 = 2189 pc/h (Equation 13-14 or 13-17)

Is v_{av34} or v_3 > 2700 pc/h? No

Is v_{av34} or v_3 > 1.5 v_{12} /2 No

If yes, v_{12A} = 5811 (Equation 13-15, 13-16, 13-18, or 13-19)

Flow Entering Diverge Influence Area

	Actual	Max Desirable	Violation?
v_{12}	5811	4400	Yes

Level of Service Determination (if not F)

Density, $D_R = 4.252 + 0.0086\ v_{12} - 0.009\ L_D$ = 47.0 pc/mi/ln

Level of service for ramp-freeway junction areas of influence F

Speed Estimation

Intermediate speed variable, D_S = 0.548

Space mean speed in ramp influence area, S = 50.1 mph

Space mean speed in outer lanes, S_R = 61.2 mph

Space mean speed for all vehicles, S_0 = 52.7 mph

HCS 2010: Freeway Merge and Diverge Segments Release 6.1

Phone: Fax:
E-mail:

Diverge Analysis

Analyst:	Alex Ericksen
Agency/Co.:	
Date performed:	1/14/2014
Analysis time period:	AM Peak Period
Freeway/Dir of Travel:	I-55 Westbound
Junction:	Damen Ave Exit
Jurisdiction:	
Analysis Year:	
Description:	

Freeway Data

Type of analysis	Diverge	
Number of lanes in freeway	4	
Free-flow speed on freeway	60.0	mph
Volume on freeway	6804	vph

Off Ramp Data

Side of freeway	Right	
Number of lanes in ramp	2	
Free-Flow speed on ramp	30.0	mph
Volume on ramp	939	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?	Yes	
Volume on adjacent ramp	2259	vph
Position of adjacent ramp	Upstream	
Type of adjacent ramp	On	
Distance to adjacent ramp	6100	ft

Conversion to pc/h Under Base Conditions

Junction Components	Freeway		Ramp		Adjacent Ramp		
Volume, V (vph)	6804		939		2259		vph
Peak-hour factor, PHF	0.95		0.95		0.95		
Peak 15-min volume, v15	1791		247		594		v
Trucks and buses	12		12		12		%
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	0.943		0.943		0.943		
Driver population factor, fP	1.00		1.00		1.00		

Flow rate, vp 7592 1048 2521 pcph

Estimation of V12 Diverge Areas

L_{EQ} = (Equation 13-12 or 13-13)

P_{FD} = 0.260 Using Equation 0

$v_{12} = v_R + (v_F - v_R) P_{FD}$ = 2749 pc/h

Capacity Checks

	Actual	Maximum	LOS F?
$v_{Fi} = v_F$	7592	9200	No
$v_{FO} = v_F - v_R$	6544	9200	No
v_R	1048	4000	No
v_3 or v_{av34}	2421 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} = 3036 (Equation 13-15, 13-16, 13-18, or 13-19)

Flow Entering Diverge Influence Area

	Actual	Max Desirable	Violation?
v_{12A}	3036	4400	No

Level of Service Determination (if not F)

Density, $D_R = 4.252 + 0.0086\, v_{12} - 0.009\, L_D$ = 16.9 pc/mi/ln

Level of service for ramp-freeway junction areas of influence B

Speed Estimation

Intermediate speed variable, D_S = 0.587

Space mean speed in ramp influence area, S_R = 49.4 mph

Space mean speed in outer lanes, S_0 = 60.8 mph

Space mean speed for all vehicles, S = 55.7 mph

Diverge

Southbound PM

HCS 2010: Freeway Merge and Diverge Segments Release 6.1

Phone: Fax:
E-mail:

Diverge Analysis

Analyst: Caitlin Bowen
Agency/Co.:
Date performed: 6/14/2013
Analysis time period: PM Peak Hour
Freeway/Dir of Travel: I-55 Westbound
Junction: I-355/Joliet Rd CD Exit
Jurisdiction:
Analysis Year:
Description:

Freeway Data

Type of analysis	Diverge	
Number of lanes in freeway	3	
Free-flow speed on freeway	60.0	mph
Volume on freeway	5845	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	459	vph
Length of first accel/decel lane	305	ft
Length of second accel/decel lane		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)	5845	459		vph
Peak-hour factor, PHF	0.95	0.95		

Peak 15-min volume, v15	1538	121	v
Trucks and buses	7	7	%
Recreational vehicles	0	0	%
Terrain type:	Level	Level	
Grade	0.00 %	0.00 %	%
Length	0.00 mi	0.00 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	0.966	
Driver population factor, fP	1.00	1.00	
Flow rate, vp	6368	500	pcph

Estimation of V12 Diverge Areas

L_{EQ} = (Equation 13-12 or 13-13)

P_{FD} = 0.578 Using Equation 5

$v_{12} = v_R + (v - v_F) P_{FD}$ = 3891 pc/h

Capacity Checks

	Actual	Maximum	LOS F?
$v_{Fi} = v_F$	6368	6900	No
$v_{FO} = v - v_F$	5868	6900	No
v_R	500	2100	No

v_{av34} or v_3 2477 pc/h (Equation 13-14 or 13-17)

Is v_{av34} or v_3 > 2700 pc/h? No

Is v_{av34} or v_3 > 1.5 v_{12} /2 No

If yes, v_{12A} = 3891 (Equation 13-15, 13-16, 13-18, or 13-19)

Flow Entering Diverge Influence Area

	Actual	Max Desirable	Violation?
v_{12}	3891	4400	No

Level of Service Determination (if not F)

Density, $D_R = 4.252 + 0.0086 v_{12} - 0.009 L_D$ = 35.0- pc/mi/ln

Level of service for ramp-freeway junction areas of influence D

Speed Estimation

Intermediate speed variable, D_S = 0.343

Space mean speed in ramp influence area, S_R = 53.8 mph

Space mean speed in outer lanes, S_R = 60.1 mph

Space mean speed for all vehicles, S_0 = 56.1 mph

HCS 2010: Freeway Merge and Diverge Segments Release 6.1

Phone: Fax:
E-mail:

Diverge Analysis

Analyst:	Alex Ericksen
Agency/Co.:	
Date performed:	1/8/2014
Analysis time period:	PM Peak Hour
Freeway/Dir of Travel:	I-55 WB
Junction:	Diverge to I-355
Jurisdiction:	
Analysis Year:	
Description:	

Freeway Data

Type of analysis	Diverge	
Number of lanes in freeway	4	
Free-flow speed on freeway	60.0	mph
Volume on freeway	7344	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	1499	vph
Length of first accel/decel lane	1100	ft
Length of second accel/decel lane	1100	ft

Adjacent Ramp Data (if one exists)

Does adjacent ramp exist?	Yes	
Volume on adjacent ramp	904	vph
Position of adjacent ramp	Upstream	
Type of adjacent ramp	On	
Distance to adjacent ramp	2950	ft

Conversion to pc/h Under Base Conditions

Junction Components	Freeway		Ramp		Adjacent Ramp		
Volume, V (vph)	7344		1499		904		vph
Peak-hour factor, PHF	0.95		0.95		0.95		
Peak 15-min volume, v15	1933		394		238		v
Trucks and buses	7		7		7		%
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		0.966		0.966		
Driver population factor, fP	1.00		1.00		1.00		

Flow rate, vp 8001 1633 985 pcph

Estimation of V12 Diverge Areas

L_{EQ} = (Equation 13-12 or 13-13)

P_{FD} = 0.260 Using Equation 0

$v_{12} = v_R + (v_F - v_R) P_{FD}$ = 3289 pc/h

Capacity Checks

	Actual	Maximum	LOS F?
$v_{Fi} = v_F$	8001	9200	No
$v_{FO} = v_F - v_R$	6368	9200	No
v_R	1633	4200	No
v_3 or v_{av34}	2356 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} = 3289 (Equation 13-15, 13-16, 13-18, or 13-19)

Flow Entering Diverge Influence Area

	Actual	Max Desirable	Violation?
v_{12}	3289	4400	No

Level of Service Determination (if not F)

Density, $D_R = 4.252 + 0.0086\, v_{12} - 0.009\, L_D$ = 2.8 pc/mi/ln

Level of service for ramp-freeway junction areas of influence A

Speed Estimation

Intermediate speed variable, D_S = 0.445

Space mean speed in ramp influence area, S_R = 52.0 mph

Space mean speed in outer lanes, S_0 = 60.5 mph

Space mean speed for all vehicles, S = 56.7 mph

HCS 2010: Freeway Merge and Diverge Segments Release 6.1

Phone: Fax:
E-mail:

Diverge Analysis

Analyst: Caitlin Bowen
Agency/Co.:
Date performed: 6/14/2013
Analysis time period: PM Peak Hour
Freeway/Dir of Travel: I-55 Westbound
Junction: Lemont Rd Exit
Jurisdiction:
Analysis Year:
Description:

Freeway Data

Type of analysis	Diverge	
Number of lanes in freeway	3	
Free-flow speed on freeway	60.0	mph
Volume on freeway	7582	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	1304	vph
Length of first accel/decel lane	300	ft
Length of second accel/decel lane		ft

Adjacent Ramp Data (if one exists)

Does adjacent ramp exist?	Yes	
Volume on adjacent ramp	731	vph
Position of adjacent ramp	Upstream	
Type of adjacent ramp	On	
Distance to adjacent ramp	8000	ft

Conversion to pc/h Under Base Conditions

Junction Components	Freeway	Ramp	Adjacent Ramp	
Volume, V (vph)	7582	1304	731	vph
Peak-hour factor, PHF	0.95	0.95	0.95	

Peak 15-min volume, v15	1995	343	192	v
Trucks and buses	7	7	7	%
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	0.966	0.966	
Driver population factor, fP	1.00	1.00	1.00	
Flow rate, vp	8260	1421	796	pcph

Estimation of V12 Diverge Areas

L_{EQ} = 5203.16 (Equation 13-12 or 13-13)

P_{FD} = 0.488 Using Equation 5

$v_{12} = v_R + (v - v_F) P_{FD}$ = 4759 pc/h

Capacity Checks

	Actual	Maximum	LOS F?
$v_{Fi} = v_F$	8260	6900	Yes
$v_{FO} = v - v_R$	6839	6900	No
v_R	1421	2100	No

v_3 or v_{av34} 3501 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} = 5560 (Equation 13-15, 13-16, 13-18, or 13-19)

Flow Entering Diverge Influence Area

	Actual	Max Desirable	Violation?
v_{12A}	5560	4400	Yes

Level of Service Determination (if not F)

Density, $D_R = 4.252 + 0.0086\ v_{12} - 0.009\ L_D$ = 49.4 pc/mi/ln

Level of service for ramp-freeway junction areas of influence F

Speed Estimation

Intermediate speed variable, D_S = 0.426

Space mean speed in ramp influence area, S = 52.3 mph

Space mean speed in outer lanes, S_R = 59.2 mph

Space mean speed for all vehicles, S_0 = 54.4 mph

HCS 2010: Freeway Merge and Diverge Segments Release 6.1

Phone: Fax:
E-mail:

Diverge Analysis

Analyst:	Alex Ericksen
Agency/Co.:	
Date performed:	1/8/2014
Analysis time period:	PM Peak Hour
Freeway/Dir of Travel:	I-55 Westbound
Junction:	Cass Avenue Exit
Jurisdiction:	
Analysis Year:	
Description:	

Freeway Data

Type of analysis	Diverge	
Number of lanes in freeway	3	
Free-flow speed on freeway	60.0	mph
Volume on freeway	7448	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	666	vph
Length of first accel/decel lane	250	ft
Length of second accel/decel lane		ft

Adjacent Ramp Data (if one exists)

Does adjacent ramp exist?	Yes	
Volume on adjacent ramp	1405	vph
Position of adjacent ramp	Upstream	
Type of adjacent ramp	On	
Distance to adjacent ramp	6000	ft

Conversion to pc/h Under Base Conditions

Junction Components	Freeway		Ramp		Adjacent Ramp		
Volume, V (vph)	7448		666		1405		vph
Peak-hour factor, PHF	0.95		0.95		0.95		
Peak 15-min volume, v15	1960		175		370		v
Trucks and buses	7		7		7		%
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		0.966		0.966		
Driver population factor, fP	1.00		1.00		1.00		

Flow rate, vp 8114 726 1531 pcph

Estimation of V12 Diverge Areas

L_{EQ} = 7562.51 (Equation 13-12 or 13-13)

P_{FD} = 0.555 Using Equation 6

$v_{12} = v_R + (v_F - v_R) P_{FD}$ = 4824 pc/h

Capacity Checks

	Actual	Maximum	LOS F?
$v_{Fi} = v_F$	8114	6900	Yes
$v_{FO} = v_F - v_R$	7388	6900	Yes
v_R	726	2000	No
v_3 or v_{av34}	3290 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} = 5414 (Equation 13-15, 13-16, 13-18, or 13-19)

Flow Entering Diverge Influence Area

	Actual	Max Desirable	Violation?
v_{12A}	5414	4400	Yes

Level of Service Determination (if not F)

Density, $D_R = 4.252 + 0.0086\ v_{12} - 0.009\ L_D$ = 48.6 pc/mi/ln

Level of service for ramp-freeway junction areas of influence F

Speed Estimation

Intermediate speed variable, D_S = 0.558

Space mean speed in ramp influence area, S_R = 49.9 mph

Space mean speed in outer lanes, S_0 = 59.2 mph

Space mean speed for all vehicles, S = 52.7 mph

HCS 2010: Freeway Merge and Diverge Segments Release 6.1

Phone: Fax:
E-mail:

Diverge Analysis

Analyst: Caitlin Bowen
Agency/Co.:
Date performed: 6/14/2013
Analysis time period: PM Peak Hour
Freeway/Dir of Travel: I-55 Westbound
Junction: Kingery Hwy Exit
Jurisdiction:
Analysis Year:
Description:

Freeway Data

Type of analysis	Diverge	
Number of lanes in freeway	3	
Free-flow speed on freeway	60.0	mph
Volume on freeway	6670	vph

Off Ramp Data

Side of freeway	Right	
Number of lanes in ramp	1	
Free-Flow speed on ramp	35.0	mph
Volume on ramp	627	vph
Length of first accel/decel lane	300	ft
Length of second accel/decel lane		ft

Adjacent Ramp Data (if one exists)

Does adjacent ramp exist?	Yes	
Volume on adjacent ramp	416	vph
Position of adjacent ramp	Upstream	
Type of adjacent ramp	On	
Distance to adjacent ramp	6500	ft

Conversion to pc/h Under Base Conditions

Junction Components	Freeway	Ramp	Adjacent Ramp	
Volume, V (vph)	6670	627	416	vph
Peak-hour factor, PHF	0.95	0.95	0.95	

Peak 15-min volume, v15	1755	165	109	v
Trucks and buses	7	7	7	%
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	0.966	0.966	
Driver population factor, fP	1.00	1.00	1.00	
Flow rate, vp	7267	683	453	pcph

Estimation of V12 Diverge Areas

L_{EQ} = 2432.44 (Equation 13-12 or 13-13)

P_{FD} = 0.547 Using Equation 5

$v_{12} = v_R + (v - v_F) P_{FD}$ = 4284 pc/h

Capacity Checks

	Actual	Maximum	LOS F?
$v_{Fi} = v_F$	7267	6900	Yes
$v_{FO} = v - v_R$	6584	6900	No
v_R	683	2000	No

v_3 or v_{av34} 2983 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} = 4567 (Equation 13-15, 13-16, 13-18, or 13-19)

Flow Entering Diverge Influence Area

	Actual	Max Desirable	Violation?
v_{12A}	4567	4400	No

Level of Service Determination (if not F)

Density, $D_R = 4.252 + 0.0086 v_{12} - 0.009 L_D$ = 40.8 pc/mi/ln

Level of service for ramp-freeway junction areas of influence F

Speed Estimation

Intermediate speed variable, D_S = 0.489

Space mean speed in ramp influence area, S = 51.2 mph

Space mean speed in outer lanes, S_R = 59.2 mph

Space mean speed for all vehicles, S_0 = 53.9 mph

HCS 2010: Freeway Merge and Diverge Segments Release 6.1

Phone: Fax:
E-mail:

Diverge Analysis

Analyst: Caitlin Bowen
Agency/Co.:
Date performed: 6/14/2013
Analysis time period: PM Peak Hour
Freeway/Dir of Travel: I-55 Westbound
Junction: LaGrange Exit
Jurisdiction:
Analysis Year:
Description:

Freeway Data

Type of analysis	Diverge	
Number of lanes in freeway	3	
Free-flow speed on freeway	60.0	mph
Volume on freeway	7344	vph

Off Ramp Data

Side of freeway	Right	
Number of lanes in ramp	1	
Free-Flow speed on ramp	35.0	mph
Volume on ramp	1547	vph
Length of first accel/decel lane	1000	ft
Length of second accel/decel lane		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)	7344	1547		vph
Peak-hour factor, PHF	0.95	0.95		

Peak 15-min volume, v15	1933	407	v
Trucks and buses	7	7	%
Recreational vehicles	0	0	%
Terrain type:	Level	Level	
Grade	0.00 %	0.00 %	%
Length	0.00 mi	0.00 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	0.966	
Driver population factor, fP	1.00	1.00	
Flow rate, vp	8001	1685	pcph

Estimation of V12 Diverge Areas

L_{EQ} = (Equation 13-12 or 13-13)

P_{FD} = 0.482 Using Equation 5

$v_{12} = v_R + (v - v_F) P_{FD}$ = 4732 pc/h

Capacity Checks

	Actual	Maximum	LOS F?
$v_{Fi} = v$	8001	6900	Yes
$v_{FO} = v - v_F$	6316	6900	No
v_R	1685	2000	No

v_3 or v_{av34} = 3269 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} = 5301 (Equation 13-15, 13-16, 13-18, or 13-19)

Flow Entering Diverge Influence Area

	Actual	Max Desirable	Violation?
v_{12A}	5301	4400	Yes

Level of Service Determination (if not F)

Density, $D_R = 4.252 + 0.0086 v_{12} - 0.009 L_D$ = 40.8 pc/mi/ln

Level of service for ramp-freeway junction areas of influence F

Speed Estimation

Intermediate speed variable, D_S = 0.580

Space mean speed in ramp influence area, S = 49.6 mph

Space mean speed in outer lanes, S_R = 59.2 mph

Space mean speed for all vehicles, S_0 = 52.4 mph

HCS 2010: Freeway Merge and Diverge Segments Release 6.1

Phone: Fax:
E-mail:

Diverge Analysis

Analyst: Caitlin Bowen
Agency/Co.:
Date performed: 6/14/2013
Analysis time period: PM Peak Hour
Freeway/Dir of Travel: I-55 Westbound
Junction: Harlem Avenue Exit
Jurisdiction:
Analysis Year:
Description:

Freeway Data

Type of analysis	Diverge	
Number of lanes in freeway	3	
Free-flow speed on freeway	60.0	mph
Volume on freeway	7719	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	1741	vph
Length of first accel/decel lane	650	ft
Length of second accel/decel lane		ft

Adjacent Ramp Data (if one exists)

Does adjacent ramp exist?	Yes	
Volume on adjacent ramp	672	vph
Position of adjacent ramp	Upstream	
Type of adjacent ramp	On	
Distance to adjacent ramp	7500	ft

Conversion to pc/h Under Base Conditions

Junction Components	Freeway	Ramp	Adjacent Ramp	
Volume, V (vph)	7719	1741	672	vph
Peak-hour factor, PHF	0.95	0.95	0.95	

Peak 15-min volume, v15	2031	458	177	v
Trucks and buses	7	7	7	%
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	0.966	0.966	
Driver population factor, fP	1.00	1.00	1.00	
Flow rate, vp	8410	1897	732	pcph

Estimation of V12 Diverge Areas

L_{EQ} = 6086.91 (Equation 13-12 or 13-13)

P_{FD} = 0.462 Using Equation 5

$v_{12} = v_R + (v - v_F) P_{FD}$ = 4909 pc/h

Capacity Checks

	Actual	Maximum	LOS F?
$v_{Fi} = v_F$	8410	6900	Yes
$v_{FO} = v - v_R$	6513	6900	No
v_R	1897	2000	No

v_3 or v_{av34} 3501 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} = 5710 (Equation 13-15, 13-16, 13-18, or 13-19)

Flow Entering Diverge Influence Area

	Actual	Max Desirable	Violation?
v_{12A}	5710	4400	Yes

Level of Service Determination (if not F)

Density, $D_R = 4.252 + 0.0086\ v_{12} - 0.009\ L_D$ = 47.5 pc/mi/ln

Level of service for ramp-freeway junction areas of influence F

Speed Estimation

Intermediate speed variable, D_S = 0.664

Space mean speed in ramp influence area, S = 48.1 mph

Space mean speed in outer lanes, S_R = 59.2 mph

Space mean speed for all vehicles, S_0 = 51.1 mph

HCS 2010: Freeway Merge and Diverge Segments Release 6.1

Phone: Fax:
E-mail:

Diverge Analysis

Analyst: Caitlin Bowen
Agency/Co.:
Date performed: 6/14/2013
Analysis time period: PM Peak Hour
Freeway/Dir of Travel: I-55 Westbound
Junction: Central Avenue Exit
Jurisdiction:
Analysis Year:
Description:

Freeway Data

Type of analysis	Diverge	
Number of lanes in freeway	3	
Free-flow speed on freeway	60.0	mph
Volume on freeway	7963	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	916	vph
Length of first accel/decel lane	300	ft
Length of second accel/decel lane		ft

Adjacent Ramp Data (if one exists)

Does adjacent ramp exist?	Yes	
Volume on adjacent ramp	1222	vph
Position of adjacent ramp	Upstream	
Type of adjacent ramp	On	
Distance to adjacent ramp	2300	ft

Conversion to pc/h Under Base Conditions

Junction Components	Freeway	Ramp	Adjacent Ramp	
Volume, V (vph)	7963	916	1222	vph
Peak-hour factor, PHF	0.95	0.95	0.95	

Peak 15-min volume, v15	2096	241	322	v
Trucks and buses	7	7	7	%
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	0.966	0.966	
Driver population factor, fP	1.00	1.00	1.00	
Flow rate, vp	8675	998	1331	pcph

Estimation of V12 Diverge Areas

L_{EQ} = 6836.97 (Equation 13-12 or 13-13)

P_{FD} = 0.728 Using Equation 6

$v_{12} = v_R + (v - v_F) P_{FD}$ = 6588 pc/h

Capacity Checks

	Actual	Maximum	LOS F?
$v_{Fi} = v_F$	8675	6900	Yes
$v_{FO} = v - v_R$	7677	6900	Yes
v_R	998	2000	No

v_{3} or v_{av34} 2087 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} = 6588 (Equation 13-15, 13-16, 13-18, or 13-19)

Flow Entering Diverge Influence Area

	Actual	Max Desirable	Violation?
v_{12}	6588	4400	Yes

Level of Service Determination (if not F)

Density, $D_R = 4.252 + 0.0086\ v_{12} - 0.009\ L_D$ = 58.2 pc/mi/ln

Level of service for ramp-freeway junction areas of influence F

Speed Estimation

Intermediate speed variable, D_S = 0.583

Space mean speed in ramp influence area, S = 49.5 mph

Space mean speed in outer lanes, S_R = 61.6 mph

Space mean speed for all vehicles, S_0 = 52.0 mph

HCS 2010: Freeway Merge and Diverge Segments Release 6.1

Phone: Fax:
E-mail:

Diverge Analysis

Analyst: Caitlin Bowen
Agency/Co.:
Date performed: 6/14/2013
Analysis time period: PM Peak Hour
Freeway/Dir of Travel: I-55 Westbound
Junction: Cicero Avenue Exit
Jurisdiction:
Analysis Year:
Description:

Freeway Data

Type of analysis	Diverge	
Number of lanes in freeway	3	
Free-flow speed on freeway	60.0	mph
Volume on freeway	7148	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	407	vph
Length of first accel/decel lane	225	ft
Length of second accel/decel lane		ft

Adjacent Ramp Data (if one exists)

Does adjacent ramp exist?	Yes	
Volume on adjacent ramp	993	vph
Position of adjacent ramp	Upstream	
Type of adjacent ramp	On	
Distance to adjacent ramp	2600	ft

Conversion to pc/h Under Base Conditions

Junction Components	Freeway	Ramp	Adjacent Ramp	
Volume, V (vph)	7148	407	993	vph
Peak-hour factor, PHF	0.95	0.95	0.95	

Peak 15-min volume, v15	1881	107	261	v
Trucks and buses	7	7	7	%
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	0.966	0.966	
Driver population factor, fP	1.00	1.00	1.00	
Flow rate, vp	7788	443	1082	pcph

Estimation of V12 Diverge Areas

L_{EQ} = 4998.71 (Equation 13-12 or 13-13)

P_{FD} = 0.665 Using Equation 6

$v_{12} = v_R + (v - v_F) P_{FD}$ = 5325 pc/h

Capacity Checks

	Actual	Maximum	LOS F?
$v_{Fi} = v_F$	7788	6900	Yes
$v_{FO} = v - v_F$	7345	6900	Yes
v_R	443	2000	No

v_3 or v_{av34} 2463 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} = 5325 (Equation 13-15, 13-16, 13-18, or 13-19)

Flow Entering Diverge Influence Area

	Actual	Max Desirable	Violation?
v_{12}	5325	4400	Yes

Level of Service Determination (if not F)

Density, $D_R = 4.252 + 0.0086 v_{12} - 0.009 L_D$ = 48.0 pc/mi/ln

Level of service for ramp-freeway junction areas of influence F

Speed Estimation

Intermediate speed variable, D_S = 0.533

Space mean speed in ramp influence area, S = 50.4 mph

Space mean speed in outer lanes, S_R = 60.1 mph

Space mean speed for all vehicles, S_0 = 53.1 mph

HCS 2010: Freeway Merge and Diverge Segments Release 6.1

Phone: Fax:
E-mail:

Diverge Analysis

Analyst: Caitlin Bowen
Agency/Co.:
Date performed: 6/14/2013
Analysis time period: PM Peak Hour
Freeway/Dir of Travel: I-55 Westbound
Junction: Pulaski Road Exit
Jurisdiction:
Analysis Year:
Description:

Freeway Data

Type of analysis	Diverge	
Number of lanes in freeway	3	
Free-flow speed on freeway	60.0	mph
Volume on freeway	7206	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	1051	vph
Length of first accel/decel lane	225	ft
Length of second accel/decel lane		ft

Adjacent Ramp Data (if one exists)

Does adjacent ramp exist?	Yes	
Volume on adjacent ramp	1406	vph
Position of adjacent ramp	Upstream	
Type of adjacent ramp	On	
Distance to adjacent ramp	3600	ft

Conversion to pc/h Under Base Conditions

Junction Components	Freeway	Ramp	Adjacent Ramp	
Volume, V (vph)	7206	1051	1406	vph
Peak-hour factor, PHF	0.95	0.95	0.95	

Peak 15-min volume, v15	1896	277	370	v
Trucks and buses	7	7	7	%
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	0.966	0.966	
Driver population factor, fP	1.00	1.00	1.00	
Flow rate, vp	7851	1145	1532	pcph

Estimation of V12 Diverge Areas

L_{EQ} = 9310.07 (Equation 13-12 or 13-13)

P_{FD} = 0.668 Using Equation 6

$v_{12} = v_R + (v - v_F) P_{FD}$ = 5624 pc/h

Capacity Checks

	Actual	Maximum	LOS F?
$v_{Fi} = v_F$	7851	6900	Yes
$v_{FO} = v - v_R$	6706	6900	No
v_R	1145	2000	No

v_3 or v_{av34} 2227 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} = 5624 (Equation 13-15, 13-16, 13-18, or 13-19)

Flow Entering Diverge Influence Area

	Actual	Max Desirable	Violation?
v_{12}	5624	4400	Yes

Level of Service Determination (if not F)

Density, $D_R = 4.252 + 0.0086 v_{12} - 0.009 L_D$ = 50.6 pc/mi/ln

Level of service for ramp-freeway junction areas of influence F

Speed Estimation

Intermediate speed variable, D_S = 0.596

Space mean speed in ramp influence area, S = 49.3 mph

Space mean speed in outer lanes, S_R = 61.0 mph

Space mean speed for all vehicles, S_0 = 52.1 mph

HCS 2010: Freeway Merge and Diverge Segments Release 6.1

Phone: Fax:
E-mail:

Diverge Analysis

Analyst: Caitlin Bowen
Agency/Co.:
Date performed: 6/14/2013
Analysis time period: PM Peak Hour
Freeway/Dir of Travel: I-55 Westbound
Junction: Kedzie/Cali Ave Exit
Jurisdiction:
Analysis Year:
Description:

Freeway Data

Type of analysis	Diverge	
Number of lanes in freeway	3	
Free-flow speed on freeway	60.0	mph
Volume on freeway	6941	vph

Off Ramp Data

Side of freeway	Right	
Number of lanes in ramp	1	
Free-Flow speed on ramp	35.0	mph
Volume on ramp	1141	vph
Length of first accel/decel lane	800	ft
Length of second accel/decel lane		ft

Adjacent Ramp Data (if one exists)

Does adjacent ramp exist?	Yes	
Volume on adjacent ramp	1434	vph
Position of adjacent ramp	Upstream	
Type of adjacent ramp	On	
Distance to adjacent ramp	3300	ft

Conversion to pc/h Under Base Conditions

Junction Components	Freeway	Ramp	Adjacent Ramp	
Volume, V (vph)	6941	1141	1434	vph
Peak-hour factor, PHF	0.95	0.95	0.95	

Peak 15-min volume, v15	1827	300	377	v
Trucks and buses	7	7	7	%
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	0.966	0.966	
Driver population factor, fP	1.00	1.00	1.00	
Flow rate, vp	7562	1243	1562	pcph

Estimation of V12 Diverge Areas

L_{EQ} = 10381.63 Equation 13-12 or 13-13)

P_{FD} = 0.708 Using Equation 6

$v_{12} = v_R + (v - v_F) P_{FD}$ = 5717 pc/h

Capacity Checks

	Actual	Maximum	LOS F?
$v_{Fi} = v_F$	7562	6900	Yes
$v_{FO} = v - v_R$	6319	6900	No
v_R	1243	2000	No

v_3 or v_{av34} 1845 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} = 5717 (Equation 13-15, 13-16, 13-18, or 13-19)

Flow Entering Diverge Influence Area

	Actual	Max Desirable	Violation?
v_{12}	5717	4400	Yes

Level of Service Determination (if not F)

Density, $D_R = 4.252 + 0.0086\ v_{12} - 0.009\ L_D$ = 46.2 pc/mi/ln

Level of service for ramp-freeway junction areas of influence F

Speed Estimation

Intermediate speed variable, D_S = 0.540

Space mean speed in ramp influence area, S = 50.3 mph

Space mean speed in outer lanes, S_R = 62.5 mph

Space mean speed for all vehicles, S_0 = 52.8 mph

HCS 2010: Freeway Merge and Diverge Segments Release 6.1

Phone: Fax:
E-mail:

Diverge Analysis

Analyst:	Alex Ericksen
Agency/Co.:	
Date performed:	1/14/2014
Analysis time period:	PM Peak Period
Freeway/Dir of Travel:	I-55 Westbound
Junction:	Damen Ave Exit
Jurisdiction:	
Analysis Year:	
Description:	

Freeway Data

Type of analysis	Diverge	
Number of lanes in freeway	4	
Free-flow speed on freeway	60.0	mph
Volume on freeway	6311	vph

Off Ramp Data

Side of freeway	Right	
Number of lanes in ramp	2	
Free-Flow speed on ramp	30.0	mph
Volume on ramp	804	vph
Length of first accel/decel lane	600	ft
Length of second accel/decel lane	600	ft

Adjacent Ramp Data (if one exists)

Does adjacent ramp exist?	Yes	
Volume on adjacent ramp	2501	vph
Position of adjacent ramp	Upstream	
Type of adjacent ramp	On	
Distance to adjacent ramp	6100	ft

Conversion to pc/h Under Base Conditions

Junction Components	Freeway		Ramp		Adjacent Ramp	
Volume, V (vph)	6311		804		2501	vph
Peak-hour factor, PHF	0.95		0.95		0.95	
Peak 15-min volume, v15	1661		212		658	v
Trucks and buses	7		7		7	%
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		0.966		0.966	
Driver population factor, fP	1.00		1.00		1.00	

Flow rate, vp 6876 876 2725 pcph

Estimation of V12 Diverge Areas

L_{EQ} = (Equation 13-12 or 13-13)

P_{FD} = 0.260 Using Equation 0

$v_{12} = v_R + (v_F - v_R) P_{FD}$ = 2436 pc/h

Capacity Checks

	Actual	Maximum	LOS F?
$v_{Fi} = v_F$	6876	9200	No
$v_{FO} = v_F - v_R$	6000	9200	No
v_R	876	4000	No
v_3 or v_{av34}	2220 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} = 2750 (Equation 13-15, 13-16, 13-18, or 13-19)

Flow Entering Diverge Influence Area

	Actual	Max Desirable	Violation?
v_{12A}	2750	4400	No

Level of Service Determination (if not F)

Density, $D_R = 4.252 + 0.0086\, v_{12} - 0.009\, L_D$ = 11.7 pc/mi/ln

Level of service for ramp-freeway junction areas of influence B

Speed Estimation

Intermediate speed variable, D_S = 0.572

Space mean speed in ramp influence area, S_R = 49.7 mph

Space mean speed in outer lanes, S_0 = 61.7 mph

Space mean speed for all vehicles, S = 56.3 mph

Weave

Northbound AM

HCS 2010: Freeway Weaving Release 6.1

Phone: Fax:
E-mail:

Operational Analysis

Analyst:	Alex Ericksen
Agency/Co.:	
Date Performed:	1/8/2014
Analysis Time Period:	AM Peak Hour
Freeway/Dir of Travel:	I-55 Eastbound
Weaving Location:	Lemont Rd Weave
Analysis Year:	
Description:	

Inputs

Segment Type	Freeway	
Weaving configuration	One-Sided	
Number of lanes, N	4	ln
Weaving segment length, LS	750	ft
Freeway free-flow speed, FFS	60	mi/h
Minimum segment speed, SMIN	15	mi/h
Freeway maximum capacity, cIFL	2300	pc/h/ln
Terrain type	Level	
Grade	0.00	%
Length	0.00	mi

Conversion to pc/h Under Base Conditions

	Volume Components				
	VFF	VRF	VFR	VRR	
Volume, V	4649	401	547	0	veh/h
Peak hour factor, PHF	0.95	0.95	0.95	0.95	
Peak 15-min volume, v15	1223	106	144	0	
Trucks and buses	9	9	9	9	%
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	0.957	0.957	0.957	0.957	
Driver population adjustment, fP	1.00	1.00	1.00	1.00	
Flow rate, v	5114	441	602	0	pc/h

Volume ratio, VR 0.169

Configuration Characteristics

Number of maneuver lanes, NWL	2	ln
Interchange density, ID	0.75	int/mi
Minimum RF lane changes, LCRF	1	lc/pc
Minimum FR lane changes, LCFR	1	lc/pc
Minimum RR lane changes, LCRR		lc/pc
Minimum weaving lane changes, LCMIN	1043	lc/h
Weaving lane changes, LCW	1250	lc/h
Non-weaving vehicle index, INW	288	
Non-weaving lane change, LCNW	690	lc/h
Total lane changes, LCALL	1940	lc/h

Weaving and Non-Weaving Speeds

Weaving intensity factor, W	0.478	
Average weaving speed, SW	45.4	mi/h
Average non-weaving speed, SNW	45.1	mi/h

Weaving Segment Speed, Density, Level of Service and Capacity

Weaving segment speed, S	45.2	mi/h
Weaving segment density, D	34.1	pc/mi/ln
Level of service, LOS	D	
Weaving segment v/c ratio	0.757	
Weaving segment flow rate, v	6157	pc/h
Weaving segment capacity, cW	7786	veh/h

Limitations on Weaving Segments

If limit reached, see note.

	Minimum	Maximum	Actual	Note
Weaving length (ft)	300	4226	750	a,b
		Maximum	Analyzed	
Density-based capacty, cIWL (pc/h/ln)		2300	2034	c
		Maximum	Analyzed	
v/c ratio		1.00	0.757	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 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

Phone: Fax:
E-mail:

Operational Analysis

Analyst: Caitlin Bowen
Agency/Co.:
Date Performed: 6/13/2013
Analysis Time Period: AM Peak Hour
Freeway/Dir of Travel: I-55 Eastbound
Weaving Location: Cass Ave Weave
Analysis Year:
Description:

Inputs

Segment Type	Freeway	
Weaving configuration	One-Sided	
Number of lanes, N	4	ln
Weaving segment length, LS	600	ft
Freeway free-flow speed, FFS	60	mi/h
Minimum segment speed, SMIN	15	mi/h
Freeway maximum capacity, cIFL	2300	pc/h/ln

Terrain type	Level	
Grade	0.00	%
Length	0.00	mi

Conversion to pc/h Under Base Conditions

	Volume Components				
	VFF	VRF	VFR	VRR	
Volume, V	5443	667	831	0	veh/h
Peak hour factor, PHF	0.95	0.95	0.95	0.95	
Peak 15-min volume, v15	1432	176	219	0	
Trucks and buses	9	9	9	9	%
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	0.957	0.957	0.957	0.957	
Driver population adjustment, fP	1.00	1.00	1.00	1.00	
Flow rate, v	5987	734	914	0	pc/h

Volume ratio, VR 0.216

Configuration Characteristics

Number of maneuver lanes, NWL	2	ln
Interchange density, ID	0.75	int/mi
Minimum RF lane changes, LCRF	1	lc/pc
Minimum FR lane changes, LCFR	1	lc/pc
Minimum RR lane changes, LCRR		lc/pc

Minimum weaving lane changes, LCMIN 1648 lc/h
Weaving lane changes, LCW 1817 lc/h
Non-weaving vehicle index, INW 269
Non-weaving lane change, LCNW 788 lc/h
Total lane changes, LCALL 2605 lc/h

Weaving and Non-Weaving Speeds

Weaving intensity factor, W 0.720
Average weaving speed, SW 41.2 mi/h
Average non-weaving speed, SNW 39.0 mi/h

Weaving Segment Speed, Density, Level of Service and Capacity

Weaving segment speed, S 39.4 mi/h
Weaving segment density, D 48.4 pc/mi/ln
Level of service, LOS E
Weaving segment v/c ratio 0.961
Weaving segment flow rate, v 7635 pc/h
Weaving segment capacity, cW 7602 veh/h

Limitations on Weaving Segments

If limit reached, see note.

	Minimum	Maximum	Actual	Note
Weaving length (ft)	300	4699	600	a,b
		Maximum	Analyzed	
Density-based capacty, cIWL (pc/h/ln)		2300	1986	c
		Maximum	Analyzed	
v/c ratio		1.00	0.961	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 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

Phone: Fax:
E-mail:

Operational Analysis

Analyst: John Connelly
Agency/Co.:
Date Performed: 6/10/2013
Analysis Time Period: AM Peak Hour
Freeway/Dir of Travel: I-55 Eastbound
Weaving Location: County Line Road Cloverleaf
Analysis Year:
Description:

Inputs

Segment Type	Freeway	
Weaving configuration	One-Sided	
Number of lanes, N	4	ln
Weaving segment length, LS	700	ft
Freeway free-flow speed, FFS	60	mi/h
Minimum segment speed, SMIN	15	mi/h
Freeway maximum capacity, cIFL	2300	pc/h/ln

Terrain type	Level	
Grade	0.00	%
Length	0.00	mi

Conversion to pc/h Under Base Conditions

	Volume Components				
	VFF	VRF	VFR	VRR	
Volume, V	6049	685	260	0	veh/h
Peak hour factor, PHF	0.95	0.95	0.95	0.95	
Peak 15-min volume, v15	1592	180	68	0	
Trucks and buses	9	9	9	9	%
Recreational vehicles	2	2	2	2	%
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	0.953	0.953	0.953	0.953	
Driver population adjustment, fP	1.00	1.00	1.00	1.00	
Flow rate, v	6679	756	287	0	pc/h

Volume ratio, VR 0.135

Configuration Characteristics

Number of maneuver lanes, NWL	2	ln
Interchange density, ID	0.75	int/mi
Minimum RF lane changes, LCRF	1	lc/pc
Minimum FR lane changes, LCFR	1	lc/pc
Minimum RR lane changes, LCRR		lc/pc

Minimum weaving lane changes, LCMIN 1043 lc/h
Weaving lane changes, LCW 1238 lc/h
Non-weaving vehicle index, INW 351
Non-weaving lane change, LCNW 985 lc/h
Total lane changes, LCALL 2223 lc/h

Weaving and Non-Weaving Speeds

Weaving intensity factor, W 0.562
Average weaving speed, SW 43.8 mi/h
Average non-weaving speed, SNW 43.2 mi/h

Weaving Segment Speed, Density, Level of Service and Capacity

Weaving segment speed, S 43.3 mi/h
Weaving segment density, D 44.6 pc/mi/ln
Level of service, LOS E
Weaving segment v/c ratio 0.939
Weaving segment flow rate, v 7722 pc/h
Weaving segment capacity, cW 7840 veh/h

Limitations on Weaving Segments

If limit reached, see note.

	Minimum	Maximum	Actual	Note
Weaving length (ft)	300	3883	700	a,b

	Maximum	Analyzed	
Density-based capacty, cIWL (pc/h/ln)	2300	2056	c

	Maximum	Analyzed	
v/c ratio	1.00	0.939	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 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

Phone: Fax:
E-mail:

Operational Analysis

Analyst:	Alex Ericksen
Agency/Co.:	
Date Performed:	1/8/2014
Analysis Time Period:	AM Peak Hour
Freeway/Dir of Travel:	I-55 Eastbound
Weaving Location:	County Line Rd to Joliet Rd
Analysis Year:	
Description:	

Inputs

Segment Type	Freeway	
Weaving configuration	Two-Sided	
Number of lanes, N	4	ln
Weaving segment length, LS	800	ft
Freeway free-flow speed, FFS	60	mi/h
Minimum segment speed, SMIN	15	mi/h
Freeway maximum capacity, cIFL	2300	pc/h/ln
Terrain type	Level	
Grade	0.00	%
Length	0.00	mi

Conversion to pc/h Under Base Conditions

	Volume Components				
	VFF	VRF	VFR	VRR	
Volume, V	5696	622	1038	49	veh/h
Peak hour factor, PHF	0.95	0.95	0.95	0.95	
Peak 15-min volume, v15	1499	164	273	13	
Trucks and buses	9	9	9	9	%
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	0.957	0.957	0.957	0.957	
Driver population adjustment, fP	1.00	1.00	1.00	1.00	
Flow rate, v	6266	684	1142	54	pc/h

Volume ratio, VR 0.007

Configuration Characteristics

Number of maneuver lanes, NWL	0	ln
Interchange density, ID	0.75	int/mi
Minimum RF lane changes, LCRF		lc/pc
Minimum FR lane changes, LCFR		lc/pc
Minimum RR lane changes, LCRR	4	lc/pc
Minimum weaving lane changes, LCMIN		lc/h
Weaving lane changes, LCW		lc/h
Non-weaving vehicle index, INW		
Non-weaving lane change, LCNW		lc/h
Total lane changes, LCALL		lc/h

Weaving and Non-Weaving Speeds

Weaving intensity factor, W		
Average weaving speed, SW		mi/h
Average non-weaving speed, SNW		mi/h

Weaving Segment Speed, Density, Level 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	1.062	
Weaving segment flow rate, v	8146	pc/h
Weaving segment capacity, cW	7342	veh/h

Limitations on Weaving Segments

If limit reached, see note.

	Minimum	Maximum	Actual	Note
Weaving length (ft)	300	5789	800	a,b
		Maximum	Analyzed	
Density-based capacty, cIWL (pc/h/ln)		2300	1918	c
		Maximum	Analyzed	
v/c ratio		1.00	1.062	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 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

Phone: Fax:
E-mail:

Operational Analysis

Analyst:	Alex Ericksen
Agency/Co.:	
Date Performed:	1/8/2014
Analysis Time Period:	AM Peak Hour
Freeway/Dir of Travel:	I-55 Eastbound
Weaving Location:	County Line Rd to I-294
Analysis Year:	
Description:	

Inputs

Segment Type	Freeway	
Weaving configuration	One-Sided	
Number of lanes, N	4	ln
Weaving segment length, LS	2300	ft
Freeway free-flow speed, FFS	60	mi/h
Minimum segment speed, SMIN	15	mi/h
Freeway maximum capacity, cIFL	2300	pc/h/ln
Terrain type	Level	
Grade	0.00	%
Length	0.00	mi

Conversion to pc/h Under Base Conditions

	Volume Components				
	VFF	VRF	VFR	VRR	
Volume, V	5793	568	941	103	veh/h
Peak hour factor, PHF	0.95	0.95	0.95	0.95	
Peak 15-min volume, v15	1524	149	248	27	
Trucks and buses	9	9	9	9	%
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	0.957	0.957	0.957	0.957	
Driver population adjustment, fP	1.00	1.00	1.00	1.00	
Flow rate, v	6372	625	1035	113	pc/h

Volume ratio, VR 0.204

Configuration Characteristics

Number of maneuver lanes, NWL	2	ln
Interchange density, ID	0.75	int/mi
Minimum RF lane changes, LCRF	1	lc/pc
Minimum FR lane changes, LCFR	1	lc/pc
Minimum RR lane changes, LCRR		lc/pc
Minimum weaving lane changes, LCMIN	1660	lc/h
Weaving lane changes, LCW	2097	lc/h
Non-weaving vehicle index, INW	1119	
Non-weaving lane change, LCNW	1812	lc/h
Total lane changes, LCALL	3909	lc/h

Weaving and Non-Weaving Speeds

Weaving intensity factor, W	0.343	
Average weaving speed, SW	48.5	mi/h
Average non-weaving speed, SNW	38.3	mi/h

Weaving Segment Speed, Density, Level of Service and Capacity

Weaving segment speed, S	40.0	mi/h
Weaving segment density, D	50.9	pc/mi/ln
Level of service, LOS	E	
Weaving segment v/c ratio	0.958	
Weaving segment flow rate, v	8145	pc/h
Weaving segment capacity, cW	8138	veh/h

Limitations on Weaving Segments

If limit reached, see note.

	Minimum	Maximum	Actual	Note
Weaving length (ft)	300	4575	2300	a,b
		Maximum	Analyzed	
Density-based capacty, cIWL (pc/h/ln)		2300	2126	c
		Maximum	Analyzed	
v/c ratio		1.00	0.958	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 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

Phone: Fax:
E-mail:

Operational Analysis

Analyst:	Alex Ericksen
Agency/Co.:	
Date Performed:	1/8/2014
Analysis Time Period:	AM Peak Hour
Freeway/Dir of Travel:	I-55 Eastbound
Weaving Location:	I-294 entrance to 294 SB Exit
Analysis Year:	
Description:	

Inputs

Segment Type	Freeway	
Weaving configuration	One-Sided	
Number of lanes, N	4	ln
Weaving segment length, LS	700	ft
Freeway free-flow speed, FFS	60	mi/h
Minimum segment speed, SMIN	15	mi/h
Freeway maximum capacity, cIFL	2300	pc/h/ln
Terrain type	Level	
Grade	0.00	%
Length	0.00	mi

Conversion to pc/h Under Base Conditions

	Volume Components				
	VFF	VRF	VFR	VRR	
Volume, V	4555	2017	719	0	veh/h
Peak hour factor, PHF	0.95	0.95	0.95	0.95	
Peak 15-min volume, v15	1199	531	189	0	
Trucks and buses	9	9	9	9	%
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	0.957	0.957	0.957	0.957	
Driver population adjustment, fP	1.00	1.00	1.00	1.00	
Flow rate, v	5011	2219	791	0	pc/h

Volume ratio, VR	0.375	

Configuration Characteristics

Number of maneuver lanes, NWL	2	ln
Interchange density, ID	0.75	int/mi
Minimum RF lane changes, LCRF	1	lc/pc
Minimum FR lane changes, LCFR	1	lc/pc
Minimum RR lane changes, LCRR		lc/pc
Minimum weaving lane changes, LCMIN		lc/h
Weaving lane changes, LCW		lc/h
Non-weaving vehicle index, INW		
Non-weaving lane change, LCNW		lc/h
Total lane changes, LCALL		lc/h

Weaving and Non-Weaving Speeds

Weaving intensity factor, W		
Average weaving speed, SW		mi/h
Average non-weaving speed, SNW		mi/h

Weaving Segment Speed, Density, Level 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	1.254	
Weaving segment flow rate, v	8021	pc/h
Weaving segment capacity, cW	6120	veh/h

Limitations on Weaving Segments

If limit reached, see note.

	Minimum	Maximum	Actual	Note
Weaving length (ft)	300	6405	700	a,b
		Maximum	Analyzed	
Density-based capacty, cIWL (pc/h/ln)		2300	1864	c
		Maximum	Analyzed	
v/c ratio		1.00	1.254	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 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

Phone: Fax:
E-mail:

Operational Analysis

Analyst: John Connelly
Agency/Co.:
Date Performed: 6/10/2013
Analysis Time Period: AM Peak Hour
Freeway/Dir of Travel: I-55 Eastbound
Weaving Location: 294 Entrance to LaGrange
Analysis Year:
Description:

Inputs

Segment Type	Freeway	
Weaving configuration	One-Sided	
Number of lanes, N	4	ln
Weaving segment length, LS	2000	ft
Freeway free-flow speed, FFS	60	mi/h
Minimum segment speed, SMIN	15	mi/h
Freeway maximum capacity, cIFL	2300	pc/h/ln

Terrain type	Level	
Grade	0.00	%
Length	0.00	mi

Conversion to pc/h Under Base Conditions

	Volume Components				
	VFF	VRF	VFR	VRR	
Volume, V	5266	505	1306	0	veh/h
Peak hour factor, PHF	0.95	0.95	0.95	0.95	
Peak 15-min volume, v15	1386	133	344	0	
Trucks and buses	9	9	9	9	%
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	0.957	0.957	0.957	0.957	
Driver population adjustment, fP	1.00	1.00	1.00	1.00	
Flow rate, v	5793	556	1437	0	pc/h

Volume ratio, VR 0.256

Configuration Characteristics

Number of maneuver lanes, NWL	2	ln
Interchange density, ID	0.75	int/mi
Minimum RF lane changes, LCRF	1	lc/pc
Minimum FR lane changes, LCFR	1	lc/pc
Minimum RR lane changes, LCRR		lc/pc

Minimum weaving lane changes, LCMIN 1993 lc/h
Weaving lane changes, LCW 2396 lc/h
Non-weaving vehicle index, INW 869
Non-weaving lane change, LCNW 1507 lc/h
Total lane changes, LCALL 3903 lc/h

Weaving and Non-Weaving Speeds

Weaving intensity factor, W 0.383
Average weaving speed, SW 47.5 mi/h
Average non-weaving speed, SNW 36.3 mi/h

Weaving Segment Speed, Density, Level of Service and Capacity

Weaving segment speed, S 38.6 mi/h
Weaving segment density, D 50.4 pc/mi/ln
Level of service, LOS E
Weaving segment v/c ratio 0.944
Weaving segment flow rate, v 7786 pc/h
Weaving segment capacity, cW 7893 veh/h

Limitations on Weaving Segments

If limit reached, see note.

	Minimum	Maximum	Actual	Note
Weaving length (ft)	300	5116	2000	a,b
	Maximum	Analyzed		
Density-based capacty, cIWL (pc/h/ln)	2300	2062		c
	Maximum	Analyzed		
v/c ratio	1.00	0.944		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 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

Phone: Fax:
E-mail:

Operational Analysis

Analyst: Caitlin Bowen
Agency/Co.:
Date Performed: 6/12/2013
Analysis Time Period: AM Peak Hour
Freeway/Dir of Travel: I-55 Eastbound
Weaving Location: La Grange Rd Weave
Analysis Year:
Description:

Inputs

Segment Type	Freeway	
Weaving configuration	One-Sided	
Number of lanes, N	4	ln
Weaving segment length, LS	390	ft
Freeway free-flow speed, FFS	60	mi/h
Minimum segment speed, SMIN	15	mi/h
Freeway maximum capacity, cIFL	2300	pc/h/ln

Terrain type	Level	
Grade	0.00	%
Length	0.00	mi

Conversion to pc/h Under Base Conditions

	Volume Components				
	VFF	VRF	VFR	VRR	
Volume, V	5286	931	485	0	veh/h
Peak hour factor, PHF	0.95	0.95	0.95	0.95	
Peak 15-min volume, v15	1391	245	128	0	
Trucks and buses	9	9	9	9	%
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	0.957	0.957	0.957	0.957	
Driver population adjustment, fP	1.00	1.00	1.00	1.00	
Flow rate, v	5815	1024	534	0	pc/h

Volume ratio, VR 0.211

Configuration Characteristics

Number of maneuver lanes, NWL	2	ln
Interchange density, ID	0.75	int/mi
Minimum RF lane changes, LCRF	1	lc/pc
Minimum FR lane changes, LCFR	1	lc/pc
Minimum RR lane changes, LCRR		lc/pc

Minimum weaving lane changes, LCMIN 1558 lc/h
Weaving lane changes, LCW 1651 lc/h
Non-weaving vehicle index, INW 170
Non-weaving lane change, LCNW 639 lc/h
Total lane changes, LCALL 2290 lc/h

Weaving and Non-Weaving Speeds

Weaving intensity factor, W 0.913
Average weaving speed, SW 38.5 mi/h
Average non-weaving speed, SNW 39.9 mi/h

Weaving Segment Speed, Density, Level of Service and Capacity

Weaving segment speed, S 39.6 mi/h
Weaving segment density, D 46.5 pc/mi/ln
Level of service, LOS E
Weaving segment v/c ratio 0.934
Weaving segment flow rate, v 7373 pc/h
Weaving segment capacity, cW 7556 veh/h

Limitations on Weaving Segments

If limit reached, see note.

	Minimum	Maximum	Actual	Note
Weaving length (ft)	300	4652	390	a,b
	Maximum	Analyzed		
Density-based capacty, cIWL (pc/h/ln)	2300	1974		c
	Maximum	Analyzed		
v/c ratio	1.00	0.934		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 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

Phone: Fax:
E-mail:

Operational Analysis

Analyst: Caitlin Bowen
Agency/Co.:
Date Performed: 6/12/2013
Analysis Time Period: AM Peak Hour
Freeway/Dir of Travel: I-55 Eastbound
Weaving Location: Archer to Harlem Ave East
Analysis Year:
Description:

Inputs

Segment Type	Freeway
Weaving configuration	One-Sided
Number of lanes, N	4 ln
Weaving segment length, LS	2200 ft
Freeway free-flow speed, FFS	60 mi/h
Minimum segment speed, SMIN	15 mi/h
Freeway maximum capacity, cIFL	2300 pc/h/ln

Terrain type	Level
Grade	0.00 %
Length	0.00 mi

Conversion to pc/h Under Base Conditions

	Volume Components				
	VFF	VRF	VFR	VRR	
Volume, V	4275	1018	957	0	veh/h
Peak hour factor, PHF	0.95	0.95	0.95	0.95	
Peak 15-min volume, v15	1125	268	252	0	
Trucks and buses	9	9	9	9	%
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	0.957	0.957	0.957	0.957	
Driver population adjustment, fP	1.00	1.00	1.00	1.00	
Flow rate, v	4703	1120	1053	0	pc/h

Volume ratio, VR 0.316

Configuration Characteristics

Number of maneuver lanes, NWL	2 ln
Interchange density, ID	0.75 int/mi
Minimum RF lane changes, LCRF	1 lc/pc
Minimum FR lane changes, LCFR	1 lc/pc
Minimum RR lane changes, LCRR	lc/pc

Minimum weaving lane changes, LCMIN 2173 lc/h
Weaving lane changes, LCW 2599 lc/h
Non-weaving vehicle index, INW 776
Non-weaving lane change, LCNW 1391 lc/h
Total lane changes, LCALL 3990 lc/h

Weaving and Non-Weaving Speeds

Weaving intensity factor, W 0.361
Average weaving speed, SW 48.1 mi/h
Average non-weaving speed, SNW 36.1 mi/h

Weaving Segment Speed, Density, Level of Service and Capacity

Weaving segment speed, S 39.2 mi/h
Weaving segment density, D 43.9 pc/mi/ln
Level of service, LOS E
Weaving segment v/c ratio 0.905
Weaving segment flow rate, v 6876 pc/h
Weaving segment capacity, cW 7267 veh/h

Limitations on Weaving Segments

If limit reached, see note.

	Minimum	Maximum	Actual	Note
Weaving length (ft)	300	5756	2200	a,b
	Maximum	Analyzed		
Density-based capacty, cIWL (pc/h/ln)	2300	2028		c
	Maximum	Analyzed		
v/c ratio	1.00	0.905		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 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

Phone: Fax:
E-mail:

Operational Analysis

Analyst:	Alex Ericksen
Agency/Co.:	
Date Performed:	8/13/2014
Analysis Time Period:	AM Off Peak Hour
Freeway/Dir of Travel:	I-55 Eastbound
Weaving Location:	California Ave to Damen Ave
Analysis Year:	
Description:	

Inputs

Segment Type	Freeway	
Weaving configuration	One-Sided	
Number of lanes, N	4	ln
Weaving segment length, LS	2800	ft
Freeway free-flow speed, FFS	60	mi/h
Minimum segment speed, SMIN	15	mi/h
Freeway maximum capacity, cIFL	2300	pc/h/ln
Terrain type	Level	
Grade	0.00	%
Length	0.00	mi

Conversion to pc/h Under Base Conditions

	Volume Components				
	VFF	VRF	VFR	VRR	
Volume, V	5395	430	1281	102	veh/h
Peak hour factor, PHF	0.95	0.95	0.95	0.95	
Peak 15-min volume, v15	1420	113	337	27	
Trucks and buses	8	8	8	8	%
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	0.962	0.962	0.962	
Driver population adjustment, fP	1.00	1.00	1.00	1.00	
Flow rate, v	5906	471	1402	112	pc/h

Volume ratio, VR 0.237

Configuration Characteristics

Number of maneuver lanes, NWL	2	ln
Interchange density, ID	0.75	int/mi
Minimum RF lane changes, LCRF	1	lc/pc
Minimum FR lane changes, LCFR	0	lc/pc
Minimum RR lane changes, LCRR		lc/pc
Minimum weaving lane changes, LCMIN	471	lc/h
Weaving lane changes, LCW	959	lc/h
Non-weaving vehicle index, INW	1264	
Non-weaving lane change, LCNW	1987	lc/h
Total lane changes, LCALL	2946	lc/h

Weaving and Non-Weaving Speeds

Weaving intensity factor, W	0.235	
Average weaving speed, SW	51.4	mi/h
Average non-weaving speed, SNW	47.1	mi/h

Weaving Segment Speed, Density, Level of Service and Capacity

Weaving segment speed, S	48.1	mi/h
Weaving segment density, D	41.0	pc/mi/ln
Level of service, LOS	E	
Weaving segment v/c ratio	0.923	
Weaving segment flow rate, v	7891	pc/h
Weaving segment capacity, cW	8223	veh/h

Limitations on Weaving Segments

If limit reached, see note.

	Minimum	Maximum	Actual	Note
Weaving length (ft)	300	4922	2800	a,b
		Maximum	Analyzed	
Density-based capacty, cIWL (pc/h/ln)		2300	2138	c
		Maximum	Analyzed	
v/c ratio		1.00	0.923	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 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

Phone: Fax:
E-mail:

Operational Analysis

Analyst: Caitlin Bowen
Agency/Co.:
Date Performed: 6/12/2013
Analysis Time Period: AM Peak Hour
Freeway/Dir of Travel: I-55
Weaving Location: Damen Ave and 1-90/94
Analysis Year:
Description:

Inputs

Segment Type	Freeway	
Weaving configuration	One-Sided	
Number of lanes, N	4	ln
Weaving segment length, LS	2130	ft
Freeway free-flow speed, FFS	60	mi/h
Minimum segment speed, SMIN	15	mi/h
Freeway maximum capacity, cIFL	2300	pc/h/ln

Terrain type	Level	
Grade	0.00	%
Length	0.00	mi

Conversion to pc/h Under Base Conditions

	Volume Components				
	VFF	VRF	VFR	VRR	
Volume, V	4193	975	1632	379	veh/h
Peak hour factor, PHF	0.95	0.95	0.95	0.95	
Peak 15-min volume, v15	1103	257	429	100	
Trucks and buses	9	9	9	9	%
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	0.957	0.957	0.957	0.957	
Driver population adjustment, fP	1.00	1.00	1.00	1.00	
Flow rate, v	4612	1073	1795	417	pc/h

Volume ratio, VR	0.363	

Configuration Characteristics

Number of maneuver lanes, NWL	2	ln
Interchange density, ID	0.75	int/mi
Minimum RF lane changes, LCRF	1	lc/pc
Minimum FR lane changes, LCFR	1	lc/pc
Minimum RR lane changes, LCRR		lc/pc

Minimum weaving lane changes, LCMIN lc/h
Weaving lane changes, LCW lc/h
Non-weaving vehicle index, INW 771
Non-weaving lane change, LCNW lc/h
Total lane changes, LCALL lc/h

_____Weaving and Non-Weaving Speeds_____
Weaving intensity factor, W
Average weaving speed, SW mi/h
Average non-weaving speed, SNW mi/h

_____Weaving Segment Speed, Density, Level 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 1.195
Weaving segment flow rate, v 7897 pc/h
Weaving segment capacity, cW 6324 veh/h

_____Limitations on Weaving Segments_____
If limit reached, see note.

	Minimum	Maximum	Actual	Note
Weaving length (ft)	300	6271	2130	a,b
	Maximum	Analyzed		
Density-based capacty, cIWL (pc/h/ln)	2300	1983		c
	Maximum	Analyzed		
v/c ratio	1.00	1.195		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 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.

Weave

Northbound PM

HCS 2010: Freeway Weaving Release 6.1

Phone: Fax:
E-mail:

Operational Analysis

Analyst:	Alex Ericksen
Agency/Co.:	
Date Performed:	1/8/2014
Analysis Time Period:	PM Off Peak Hour
Freeway/Dir of Travel:	I-55 Eastbound
Weaving Location:	Lemont Rd Weave
Analysis Year:	
Description:	

Inputs

Segment Type	Freeway	
Weaving configuration	One-Sided	
Number of lanes, N	4	ln
Weaving segment length, LS	750	ft
Freeway free-flow speed, FFS	60	mi/h
Minimum segment speed, SMIN	15	mi/h
Freeway maximum capacity, cIFL	2300	pc/h/ln
Terrain type	Level	
Grade	0.00	%
Length	0.00	mi

Conversion to pc/h Under Base Conditions

	Volume Components				
	VFF	VRF	VFR	VRR	
Volume, V	4420	259	618	0	veh/h
Peak hour factor, PHF	0.95	0.95	0.95	0.95	
Peak 15-min volume, v15	1163	68	163	0	
Trucks and buses	11	11	11	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	0.948	0.948	0.948	0.948	
Driver population adjustment, fP	1.00	1.00	1.00	1.00	
Flow rate, v	4909	288	686	0	pc/h

Volume ratio, VR 0.166

Configuration Characteristics

Number of maneuver lanes, NWL	2	ln
Interchange density, ID	0.75	int/mi
Minimum RF lane changes, LCRF	1	lc/pc
Minimum FR lane changes, LCFR	1	lc/pc
Minimum RR lane changes, LCRR		lc/pc
Minimum weaving lane changes, LCMIN	974	lc/h
Weaving lane changes, LCW	1181	lc/h
Non-weaving vehicle index, INW	276	
Non-weaving lane change, LCNW	647	lc/h
Total lane changes, LCALL	1828	lc/h

Weaving and Non-Weaving Speeds

Weaving intensity factor, W	0.456	
Average weaving speed, SW	45.9	mi/h
Average non-weaving speed, SNW	45.9	mi/h

Weaving Segment Speed, Density, Level of Service and Capacity

Weaving segment speed, S	45.9	mi/h
Weaving segment density, D	32.0	pc/mi/ln
Level of service, LOS	D	
Weaving segment v/c ratio	0.722	
Weaving segment flow rate, v	5883	pc/h
Weaving segment capacity, cW	7723	veh/h

Limitations on Weaving Segments

If limit reached, see note.

	Minimum	Maximum	Actual	Note
Weaving length (ft)	300	4187	750	a,b
		Maximum	Analyzed	
Density-based capacty, cIWL (pc/h/ln)		2300	2037	c
		Maximum	Analyzed	
v/c ratio		1.00	0.722	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 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

Phone: Fax:
E-mail:

Operational Analysis

Analyst: Caitlin Bowen
Agency/Co.:
Date Performed: 6/13/2013
Analysis Time Period: PM Off Peak Hour
Freeway/Dir of Travel: I-55 Eastbound
Weaving Location: Cass Ave Weave
Analysis Year:
Description:

Inputs

Segment Type	Freeway	
Weaving configuration	One-Sided	
Number of lanes, N	4	ln
Weaving segment length, LS	600	ft
Freeway free-flow speed, FFS	60	mi/h
Minimum segment speed, SMIN	15	mi/h
Freeway maximum capacity, cIFL	2300	pc/h/ln

Terrain type	Level	
Grade	0.00	%
Length	0.00	mi

Conversion to pc/h Under Base Conditions

	Volume Components				
	VFF	VRF	VFR	VRR	
Volume, V	5072	848	403	0	veh/h
Peak hour factor, PHF	0.95	0.95	0.95	0.95	
Peak 15-min volume, v15	1335	223	106	0	
Trucks and buses	11	11	11	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	0.948	0.948	0.948	0.948	
Driver population adjustment, fP	1.00	1.00	1.00	1.00	
Flow rate, v	5633	942	448	0	pc/h

Volume ratio, VR 0.198

Configuration Characteristics

Number of maneuver lanes, NWL	2	ln
Interchange density, ID	0.75	int/mi
Minimum RF lane changes, LCRF	1	lc/pc
Minimum FR lane changes, LCFR	1	lc/pc
Minimum RR lane changes, LCRR		lc/pc

Minimum weaving lane changes, LCMIN 1390 lc/h
Weaving lane changes, LCW 1559 lc/h
Non-weaving vehicle index, INW 253
Non-weaving lane change, LCNW 715 lc/h
Total lane changes, LCALL 2274 lc/h

Weaving and Non-Weaving Speeds

Weaving intensity factor, W 0.647
Average weaving speed, SW 42.3 mi/h
Average non-weaving speed, SNW 41.6 mi/h

Weaving Segment Speed, Density, Level of Service and Capacity

Weaving segment speed, S 41.7 mi/h
Weaving segment density, D 42.1 pc/mi/ln
Level of service, LOS E
Weaving segment v/c ratio 0.878
Weaving segment flow rate, v 7023 pc/h
Weaving segment capacity, cW 7583 veh/h

Limitations on Weaving Segments

If limit reached, see note.

	Minimum	Maximum	Actual	Note
Weaving length (ft)	300	4515	600	a,b
	Maximum	Analyzed		
Density-based capacty, cIWL (pc/h/ln)	2300	2000		c
	Maximum	Analyzed		
v/c ratio	1.00	0.878		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 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

Phone: Fax:
E-mail:

Operational Analysis

Analyst: John Connelly
Agency/Co.:
Date Performed: 6/10/2013
Analysis Time Period: PM Off Peak Hour
Freeway/Dir of Travel: I-55 Eastbound
Weaving Location: County Line Road Cloverleaf
Analysis Year:
Description:

Inputs

Segment Type	Freeway	
Weaving configuration	One-Sided	
Number of lanes, N	4	ln
Weaving segment length, LS	700	ft
Freeway free-flow speed, FFS	60	mi/h
Minimum segment speed, SMIN	15	mi/h
Freeway maximum capacity, cIFL	2300	pc/h/ln

Terrain type	Level	
Grade	0.00	%
Length	0.00	mi

Conversion to pc/h Under Base Conditions

	Volume Components				
	VFF	VRF	VFR	VRR	
Volume, V	5224	1714	116	0	veh/h
Peak hour factor, PHF	0.95	0.95	0.95	0.95	
Peak 15-min volume, v15	1375	451	31	0	
Trucks and buses	11	11	11	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	0.948	0.948	0.948	0.948	
Driver population adjustment, fP	1.00	1.00	1.00	1.00	
Flow rate, v	5801	1903	129	0	pc/h

Volume ratio, VR 0.259

Configuration Characteristics

Number of maneuver lanes, NWL	2	ln
Interchange density, ID	0.75	int/mi
Minimum RF lane changes, LCRF	1	lc/pc
Minimum FR lane changes, LCFR	1	lc/pc
Minimum RR lane changes, LCRR		lc/pc

Minimum weaving lane changes, LCMIN 2032 lc/h
Weaving lane changes, LCW 2227 lc/h
Non-weaving vehicle index, INW 305
Non-weaving lane change, LCNW 804 lc/h
Total lane changes, LCALL 3031 lc/h

_____Weaving and Non-Weaving Speeds_____
Weaving intensity factor, W 0.718
Average weaving speed, SW 41.2 mi/h
Average non-weaving speed, SNW 36.0 mi/h

_____Weaving Segment Speed, Density, Level of Service and Capacity_____
Weaving segment speed, S 37.2 mi/h
Weaving segment density, D 52.7 pc/mi/ln
Level of service, LOS E
Weaving segment v/c ratio 1.000
Weaving segment flow rate, v 7833 pc/h
Weaving segment capacity, cW 7427 veh/h

_____Limitations on Weaving Segments_____
If limit reached, see note.

	Minimum	Maximum	Actual	Note
Weaving length (ft)	300	5153	700	a,b
	Maximum	Analyzed		
Density-based capacty, cIWL (pc/h/ln)	2300	1959		c
	Maximum	Analyzed		
v/c ratio	1.00	1.000		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 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

Phone: Fax:
E-mail:

Operational Analysis

Analyst:	Alex Ericksen
Agency/Co.:	
Date Performed:	1/8/2014
Analysis Time Period:	PM Off Peak Hour
Freeway/Dir of Travel:	I-55 Eastbound
Weaving Location:	Country Line Rd to Joliet Rd
Analysis Year:	
Description:	

Inputs

Segment Type	Freeway	
Weaving configuration	Two-Sided	
Number of lanes, N	4	ln
Weaving segment length, LS	800	ft
Freeway free-flow speed, FFS	60	mi/h
Minimum segment speed, SMIN	15	mi/h
Freeway maximum capacity, cIFL	2300	pc/h/ln
Terrain type	Level	
Grade	0.00	%
Length	0.00	mi

Conversion to pc/h Under Base Conditions

	Volume Components				
	VFF	VRF	VFR	VRR	
Volume, V	6058	1120	880	69	veh/h
Peak hour factor, PHF	0.95	0.95	0.95	0.95	
Peak 15-min volume, v15	1594	295	232	18	
Trucks and buses	11	11	11	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	0.948	0.948	0.948	0.948	
Driver population adjustment, fP	1.00	1.00	1.00	1.00	
Flow rate, v	6728	1244	977	77	pc/h

Volume ratio, VR 0.009

Configuration Characteristics

Number of maneuver lanes, NWL	0	ln
Interchange density, ID	0.75	int/mi
Minimum RF lane changes, LCRF		lc/pc
Minimum FR lane changes, LCFR		lc/pc
Minimum RR lane changes, LCRR	4	lc/pc
Minimum weaving lane changes, LCMIN		lc/h
Weaving lane changes, LCW		lc/h
Non-weaving vehicle index, INW		
Non-weaving lane change, LCNW		lc/h
Total lane changes, LCALL		lc/h

Weaving and Non-Weaving Speeds

Weaving intensity factor, W	
Average weaving speed, SW	mi/h
Average non-weaving speed, SNW	mi/h

Weaving Segment Speed, Density, Level 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	1.177	
Weaving segment flow rate, v	9026	pc/h
Weaving segment capacity, cW	7268	veh/h

Limitations on Weaving Segments

If limit reached, see note.

	Minimum	Maximum	Actual	Note
Weaving length (ft)	300	5806	800	a,b
		Maximum	Analyzed	
Density-based capacty, cIWL (pc/h/ln)		2300	1917	c
		Maximum	Analyzed	
v/c ratio		1.00	1.177	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 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

Phone: Fax:
E-mail:

Operational Analysis

Analyst:	Alex Ericksen
Agency/Co.:	
Date Performed:	1/8/2014
Analysis Time Period:	PM Off Peak Hour
Freeway/Dir of Travel:	I-55 Eastbound
Weaving Location:	County Line Rd to I-294
Analysis Year:	
Description:	

Inputs

Segment Type	Freeway	
Weaving configuration	One-Sided	
Number of lanes, N	4	ln
Weaving segment length, LS	2300	ft
Freeway free-flow speed, FFS	60	mi/h
Minimum segment speed, SMIN	15	mi/h
Freeway maximum capacity, cIFL	2300	pc/h/ln
Terrain type	Level	
Grade	0.00	%
Length	0.00	mi

Conversion to pc/h Under Base Conditions

	Volume Components				
	VFF	VRF	VFR	VRR	
Volume, V	5864	991	1074	198	veh/h
Peak hour factor, PHF	0.95	0.95	0.95	0.95	
Peak 15-min volume, v15	1543	261	283	52	
Trucks and buses	11	11	11	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	0.948	0.948	0.948	0.948	
Driver population adjustment, fP	1.00	1.00	1.00	1.00	
Flow rate, v	6512	1101	1193	220	pc/h

Volume ratio, VR	0.254	

Configuration Characteristics

Number of maneuver lanes, NWL	2	ln
Interchange density, ID	0.75	int/mi
Minimum RF lane changes, LCRF	1	lc/pc
Minimum FR lane changes, LCFR	1	lc/pc
Minimum RR lane changes, LCRR		lc/pc
Minimum weaving lane changes, LCMIN		lc/h
Weaving lane changes, LCW		lc/h
Non-weaving vehicle index, INW		
Non-weaving lane change, LCNW		lc/h
Total lane changes, LCALL		lc/h

Weaving and Non-Weaving Speeds

Weaving intensity factor, W		
Average weaving speed, SW		mi/h
Average non-weaving speed, SNW		mi/h

Weaving Segment Speed, Density, Level 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	1.082	
Weaving segment flow rate, v	9026	pc/h
Weaving segment capacity, cW	7909	veh/h

Limitations on Weaving Segments

If limit reached, see note.

	Minimum	Maximum	Actual	Note
Weaving length (ft)	300	5097	2300	a,b
		Maximum	Analyzed	
Density-based capacty, cIWL (pc/h/ln)		2300	2086	c
		Maximum	Analyzed	
v/c ratio		1.00	1.082	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 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

Phone: Fax:
E-mail:

Operational Analysis

Analyst:	Alex Ericksen
Agency/Co.:	
Date Performed:	1/8/2014
Analysis Time Period:	PM Off Peak Hour
Freeway/Dir of Travel:	I-55 Eastbound
Weaving Location:	294 entrance to 294 SB Exit
Analysis Year:	
Description:	

Inputs

Segment Type	Freeway	
Weaving configuration	One-Sided	
Number of lanes, N	4	ln
Weaving segment length, LS	700	ft
Freeway free-flow speed, FFS	60	mi/h
Minimum segment speed, SMIN	15	mi/h
Freeway maximum capacity, cIFL	2300	pc/h/ln
Terrain type	Level	
Grade	0.00	%
Length	0.00	mi

Conversion to pc/h Under Base Conditions

	Volume Components				
	VFF	VRF	VFR	VRR	
Volume, V	5100	2338	806	0	veh/h
Peak hour factor, PHF	0.95	0.95	0.95	0.95	
Peak 15-min volume, v15	1342	615	212	0	
Trucks and buses	11	11	11	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	0.948	0.948	0.948	0.948	
Driver population adjustment, fP	1.00	1.00	1.00	1.00	
Flow rate, v	5664	2596	895	0	pc/h

Volume ratio, VR 0.381

Configuration Characteristics

Number of maneuver lanes, NWL	2	ln
Interchange density, ID	0.75	int/mi
Minimum RF lane changes, LCRF	1	lc/pc
Minimum FR lane changes, LCFR	1	lc/pc
Minimum RR lane changes, LCRR		lc/pc
Minimum weaving lane changes, LCMIN		lc/h
Weaving lane changes, LCW		lc/h
Non-weaving vehicle index, INW		
Non-weaving lane change, LCNW		lc/h
Total lane changes, LCALL		lc/h

Weaving and Non-Weaving Speeds

Weaving intensity factor, W		
Average weaving speed, SW		mi/h
Average non-weaving speed, SNW		mi/h

Weaving Segment Speed, Density, Level 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	1.455	
Weaving segment flow rate, v	9155	pc/h
Weaving segment capacity, cW	5966	veh/h

Limitations on Weaving Segments

If limit reached, see note.

	Minimum	Maximum	Actual	Note
Weaving length (ft)	300	6472	700	a,b
Density-based capacty, cIWL (pc/h/ln)		Maximum 2300	Analyzed 1858	c
v/c ratio		Maximum 1.00	Analyzed 1.455	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 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

Phone: Fax:
E-mail:

Operational Analysis

Analyst: John Connelly
Agency/Co.:
Date Performed: 6/10/2013
Analysis Time Period: PM Off Peak Hour
Freeway/Dir of Travel: I-55 Eastbound
Weaving Location: 294 Entrance to LaGrange
Analysis Year:
Description:

Inputs

Segment Type	Freeway	
Weaving configuration	One-Sided	
Number of lanes, N	4	ln
Weaving segment length, LS	2000	ft
Freeway free-flow speed, FFS	60	mi/h
Minimum segment speed, SMIN	15	mi/h
Freeway maximum capacity, cIFL	2300	pc/h/ln

Terrain type	Level	
Grade	0.00	%
Length	0.00	mi

Conversion to pc/h Under Base Conditions

	Volume Components				
	VFF	VRF	VFR	VRR	
Volume, V	5538	599	1900	0	veh/h
Peak hour factor, PHF	0.95	0.95	0.95	0.95	
Peak 15-min volume, v15	1457	158	500	0	
Trucks and buses	11	11	11	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	0.948	0.948	0.948	0.948	
Driver population adjustment, fP	1.00	1.00	1.00	1.00	
Flow rate, v	6150	665	2110	0	pc/h

Volume ratio, VR 0.311

Configuration Characteristics

Number of maneuver lanes, NWL	2	ln
Interchange density, ID	0.75	int/mi
Minimum RF lane changes, LCRF	1	lc/pc
Minimum FR lane changes, LCFR	1	lc/pc
Minimum RR lane changes, LCRR		lc/pc

Minimum weaving lane changes, LCMIN lc/h
Weaving lane changes, LCW lc/h
Non-weaving vehicle index, INW 923
Non-weaving lane change, LCNW lc/h
Total lane changes, LCALL lc/h

_____Weaving and Non-Weaving Speeds_____
Weaving intensity factor, W
Average weaving speed, SW mi/h
Average non-weaving speed, SNW mi/h

_____Weaving Segment Speed, Density, Level 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 1.156
Weaving segment flow rate, v 8925 pc/h
Weaving segment capacity, cW 7317 veh/h

_____Limitations on Weaving Segments_____
If limit reached, see note.

	Minimum	Maximum	Actual	Note
Weaving length (ft)	300	5701	2000	a,b
	Maximum	Analyzed		
Density-based capacty, cIWL (pc/h/ln)	2300	2017		c
	Maximum	Analyzed		
v/c ratio	1.00	1.156		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 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

Phone: Fax:
E-mail:

Operational Analysis

Analyst: Caitlin Bowen
Agency/Co.:
Date Performed: 6/12/2013
Analysis Time Period: PM Off Peak Hour
Freeway/Dir of Travel: I-55 Eastbound
Weaving Location: La Grange Rd Weave
Analysis Year:
Description:

Inputs

Segment Type	Freeway	
Weaving configuration	One-Sided	
Number of lanes, N	4	ln
Weaving segment length, LS	390	ft
Freeway free-flow speed, FFS	60	mi/h
Minimum segment speed, SMIN	15	mi/h
Freeway maximum capacity, cIFL	2300	pc/h/ln

Terrain type	Level	
Grade	0.00	%
Length	0.00	mi

Conversion to pc/h Under Base Conditions

	Volume Components				
	VFF	VRF	VFR	VRR	
Volume, V	5820	599	317	0	veh/h
Peak hour factor, PHF	0.95	0.95	0.95	0.95	
Peak 15-min volume, v15	1532	158	83	0	
Trucks and buses	11	11	11	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	0.948	0.948	0.948	0.948	
Driver population adjustment, fP	1.00	1.00	1.00	1.00	
Flow rate, v	6463	665	352	0	pc/h

Volume ratio, VR 0.136

Configuration Characteristics

Number of maneuver lanes, NWL	2	ln
Interchange density, ID	0.75	int/mi
Minimum RF lane changes, LCRF	1	lc/pc
Minimum FR lane changes, LCFR	1	lc/pc
Minimum RR lane changes, LCRR		lc/pc

Minimum weaving lane changes, LCMIN 1017 lc/h
Weaving lane changes, LCW 1110 lc/h
Non-weaving vehicle index, INW 189
Non-weaving lane change, LCNW 772 lc/h
Total lane changes, LCALL 1882 lc/h

_____Weaving and Non-Weaving Speeds_____
Weaving intensity factor, W 0.782
Average weaving speed, SW 40.2 mi/h
Average non-weaving speed, SNW 43.7 mi/h

_____Weaving Segment Speed, Density, Level of Service and Capacity_____
Weaving segment speed, S 43.2 mi/h
Weaving segment density, D 43.3 pc/mi/ln
Level of service, LOS E
Weaving segment v/c ratio 0.920
Weaving segment flow rate, v 7480 pc/h
Weaving segment capacity, cW 7704 veh/h

_____Limitations on Weaving Segments_____
If limit reached, see note.

	Minimum	Maximum	Actual	Note
Weaving length (ft)	300	3892	390	a,b
		Maximum	Analyzed	
Density-based capacty, cIWL (pc/h/ln)		2300	2032	c
		Maximum	Analyzed	
v/c ratio		1.00	0.920	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 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

Phone: Fax:
E-mail:

Operational Analysis

Analyst: Caitlin Bowen
Agency/Co.:
Date Performed: 6/12/2013
Analysis Time Period: PM Off Peak Hour
Freeway/Dir of Travel: I-55 Eastbound
Weaving Location: Archer to Harlem Ave East
Analysis Year:
Description:

Inputs

Segment Type	Freeway	
Weaving configuration	One-Sided	
Number of lanes, N	4	ln
Weaving segment length, LS	2200	ft
Freeway free-flow speed, FFS	60	mi/h
Minimum segment speed, SMIN	15	mi/h
Freeway maximum capacity, cIFL	2300	pc/h/ln
Terrain type	Level	
Grade	0.00	%
Length	0.00	mi

Conversion to pc/h Under Base Conditions

	Volume Components				
	VFF	VRF	VFR	VRR	
Volume, V	4759	1480	948	0	veh/h
Peak hour factor, PHF	0.95	0.95	0.95	0.95	
Peak 15-min volume, v15	1252	389	249	0	
Trucks and buses	11	11	11	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	0.948	0.948	0.948	0.948	
Driver population adjustment, fP	1.00	1.00	1.00	1.00	
Flow rate, v	5285	1644	1053	0	pc/h

Volume ratio, VR 0.338

Configuration Characteristics

Number of maneuver lanes, NWL	2	ln
Interchange density, ID	0.75	int/mi
Minimum RF lane changes, LCRF	1	lc/pc
Minimum FR lane changes, LCFR	1	lc/pc
Minimum RR lane changes, LCRR		lc/pc

Minimum weaving lane changes, LCMIN lc/h
Weaving lane changes, LCW lc/h
Non-weaving vehicle index, INW
Non-weaving lane change, LCNW lc/h
Total lane changes, LCALL lc/h

Weaving and Non-Weaving Speeds

Weaving intensity factor, W
Average weaving speed, SW mi/h
Average non-weaving speed, SNW mi/h

Weaving Segment Speed, Density, Level 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 1.124
Weaving segment flow rate, v 7982 pc/h
Weaving segment capacity, cW 6733 veh/h

Limitations on Weaving Segments

If limit reached, see note.

	Minimum	Maximum	Actual	Note
Weaving length (ft)	300	5994	2200	a,b
	Maximum	Analyzed		
Density-based capacty, cIWL (pc/h/ln)	2300	2010		c
	Maximum	Analyzed		
v/c ratio	1.00	1.124		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 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

Phone: Fax:
E-mail:

Operational Analysis

Analyst:	Alex Ericksen
Agency/Co.:	
Date Performed:	8/13/2014
Analysis Time Period:	PM Off Peak Hour
Freeway/Dir of Travel:	I-55 Eastbound
Weaving Location:	California Ave to Damen Ave
Analysis Year:	
Description:	

Inputs

Segment Type	Freeway	
Weaving configuration	One-Sided	
Number of lanes, N	4	ln
Weaving segment length, LS	2800	ft
Freeway free-flow speed, FFS	60	mi/h
Minimum segment speed, SMIN	15	mi/h
Freeway maximum capacity, cIFL	2300	pc/h/ln
Terrain type	Level	
Grade	0.00	%
Length	0.00	mi

Conversion to pc/h Under Base Conditions

	Volume Components				
	VFF	VRF	VFR	VRR	
Volume, V	4627	418	1734	157	veh/h
Peak hour factor, PHF	0.95	0.95	0.95	0.95	
Peak 15-min volume, v15	1218	110	456	41	
Trucks and buses	8	8	8	8	%
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	0.962	0.962	0.962	
Driver population adjustment, fP	1.00	1.00	1.00	1.00	
Flow rate, v	5065	458	1898	172	pc/h
Volume ratio, VR		0.310			

Configuration Characteristics

Number of maneuver lanes, NWL	2	ln
Interchange density, ID	0.75	int/mi
Minimum RF lane changes, LCRF	1	lc/pc
Minimum FR lane changes, LCFR	0	lc/pc
Minimum RR lane changes, LCRR		lc/pc
Minimum weaving lane changes, LCMIN	458	lc/h
Weaving lane changes, LCW	946	lc/h
Non-weaving vehicle index, INW	1100	
Non-weaving lane change, LCNW	1826	lc/h
Total lane changes, LCALL	2772	lc/h

Weaving and Non-Weaving Speeds

Weaving intensity factor, W	0.224	
Average weaving speed, SW	51.8	mi/h
Average non-weaving speed, SNW	47.6	mi/h

Weaving Segment Speed, Density, Level of Service and Capacity

Weaving segment speed, S	48.8	mi/h
Weaving segment density, D	38.9	pc/mi/ln
Level of service, LOS	E	
Weaving segment v/c ratio	0.982	
Weaving segment flow rate, v	7593	pc/h
Weaving segment capacity, cW	7437	veh/h

Limitations on Weaving Segments

If limit reached, see note.

	Minimum	Maximum	Actual	Note
Weaving length (ft)	300	5695	2800	a,b
		Maximum	Analyzed	
Density-based capacty, cIWL (pc/h/ln)		2300	2079	c
		Maximum	Analyzed	
v/c ratio		1.00	0.982	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 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

Phone: Fax:
E-mail:

Operational Analysis

Analyst: Caitlin Bowen
Agency/Co.:
Date Performed: 6/12/2013
Analysis Time Period: PM Off Peak Hour
Freeway/Dir of Travel: I-55
Weaving Location: Damen Ave and 1-90/94
Analysis Year:
Description:

Inputs

Segment Type	Freeway	
Weaving configuration	One-Sided	
Number of lanes, N	4	ln
Weaving segment length, LS	2130	ft
Freeway free-flow speed, FFS	60	mi/h
Minimum segment speed, SMIN	15	mi/h
Freeway maximum capacity, cIFL	2300	pc/h/ln

Terrain type	Level	
Grade	0.00	%
Length	0.00	mi

Conversion to pc/h Under Base Conditions

	Volume Components				
	VFF	VRF	VFR	VRR	
Volume, V	3560	1023	1485	427	veh/h
Peak hour factor, PHF	0.95	0.95	0.95	0.95	
Peak 15-min volume, v15	937	269	391	112	
Trucks and buses	8	8	8	8	%
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	0.962	0.962	0.962	
Driver population adjustment, fP	1.00	1.00	1.00	1.00	
Flow rate, v	3897	1120	1626	467	pc/h

Volume ratio, VR 0.386

Configuration Characteristics

Number of maneuver lanes, NWL	2	ln
Interchange density, ID	0.75	int/mi
Minimum RF lane changes, LCRF	1	lc/pc
Minimum FR lane changes, LCFR	1	lc/pc
Minimum RR lane changes, LCRR		lc/pc

Minimum weaving lane changes, LCMIN lc/h
Weaving lane changes, LCW lc/h
Non-weaving vehicle index, INW 673
Non-weaving lane change, LCNW lc/h
Total lane changes, LCALL lc/h

_____Weaving and Non-Weaving Speeds_____
Weaving intensity factor, W
Average weaving speed, SW mi/h
Average non-weaving speed, SNW mi/h

_____Weaving Segment Speed, Density, Level 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 1.144
Weaving segment flow rate, v 7110 pc/h
Weaving segment capacity, cW 5975 veh/h

_____Limitations on Weaving Segments_____
If limit reached, see note.

	Minimum	Maximum	Actual	Note
Weaving length (ft)	300	6527	2130	a,b
	Maximum	Analyzed		
Density-based capacty, cIWL (pc/h/ln)	2300	1964		c
	Maximum	Analyzed		
v/c ratio	1.00	1.144		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 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.

Weave

Southbound AM

HCS 2010: Freeway Weaving Release 6.1

Phone: Fax:
E-mail:

Operational Analysis

Analyst:	Alex Ericksen
Agency/Co.:	
Date Performed:	1/8/2014
Analysis Time Period:	AM Off Peak Hour
Freeway/Dir of Travel:	I-55 Westbound
Weaving Location:	Lemont Rd Weave
Analysis Year:	
Description:	

Inputs

Segment Type	Freeway	
Weaving configuration	One-Sided	
Number of lanes, N	4	ln
Weaving segment length, LS	700	ft
Freeway free-flow speed, FFS	60	mi/h
Minimum segment speed, SMIN	15	mi/h
Freeway maximum capacity, cIFL	2300	pc/h/ln
Terrain type	Level	
Grade	0.00	%
Length	0.00	mi

Conversion to pc/h Under Base Conditions

	Volume Components				
	VFF	VRF	VFR	VRR	
Volume, V	4690	543	1029	0	veh/h
Peak hour factor, PHF	0.95	0.95	0.95	0.95	
Peak 15-min volume, v15	1234	143	271	0	
Trucks and buses	15	15	15	15	%
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	0.930	0.930	0.930	0.930	
Driver population adjustment, fP	1.00	1.00	1.00	1.00	
Flow rate, v	5307	614	1164	0	pc/h

Volume ratio, VR 0.251

Configuration Characteristics

Number of maneuver lanes, NWL	2	ln
Interchange density, ID	0.75	int/mi
Minimum RF lane changes, LCRF	1	lc/pc
Minimum FR lane changes, LCFR	1	lc/pc
Minimum RR lane changes, LCRR		lc/pc
Minimum weaving lane changes, LCMIN	1778	lc/h
Weaving lane changes, LCW	1973	lc/h
Non-weaving vehicle index, INW	279	
Non-weaving lane change, LCNW	702	lc/h
Total lane changes, LCALL	2675	lc/h

Weaving and Non-Weaving Speeds

Weaving intensity factor, W	0.651	
Average weaving speed, SW	42.3	mi/h
Average non-weaving speed, SNW	38.7	mi/h

Weaving Segment Speed, Density, Level of Service and Capacity

Weaving segment speed, S	39.5	mi/h
Weaving segment density, D	44.8	pc/mi/ln
Level of service, LOS	E	
Weaving segment v/c ratio	0.901	
Weaving segment flow rate, v	7085	pc/h
Weaving segment capacity, cW	7315	veh/h

Limitations on Weaving Segments

If limit reached, see note.

	Minimum	Maximum	Actual	Note
Weaving length (ft)	300	5064	700	a,b
		Maximum	Analyzed	
Density-based capacty, cIWL (pc/h/ln)		2300	1966	c
		Maximum	Analyzed	
v/c ratio		1.00	0.901	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 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

Phone: Fax:
E-mail:

Operational Analysis

Analyst: Caitlin Bowen
Agency/Co.:
Date Performed: 6/14/2013
Analysis Time Period: AM Peak Hour
Freeway/Dir of Travel: I-55 Westbound
Weaving Location: Cass Avenue Weave
Analysis Year:
Description:

Inputs

Segment Type	Freeway	
Weaving configuration	One-Sided	
Number of lanes, N	4	ln
Weaving segment length, LS	650	ft
Freeway free-flow speed, FFS	60	mi/h
Minimum segment speed, SMIN	15	mi/h
Freeway maximum capacity, cIFL	2300	pc/h/ln

Terrain type	Level	
Grade	0.00	%
Length	0.00	mi

Conversion to pc/h Under Base Conditions

	Volume Components				
	VFF	VRF	VFR	VRR	
Volume, V	5580	351	268	0	veh/h
Peak hour factor, PHF	0.95	0.95	0.95	0.95	
Peak 15-min volume, v15	1468	92	71	0	
Trucks and buses	15	15	15	15	%
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	0.930	0.930	0.930	0.930	
Driver population adjustment, fP	1.00	1.00	1.00	1.00	
Flow rate, v	6314	397	303	0	pc/h

Volume ratio, VR 0.100

Configuration Characteristics

Number of maneuver lanes, NWL	2	ln
Interchange density, ID	0.75	int/mi
Minimum RF lane changes, LCRF	1	lc/pc
Minimum FR lane changes, LCFR	1	lc/pc
Minimum RR lane changes, LCRR		lc/pc

Minimum weaving lane changes, LCMIN 700 lc/h
Weaving lane changes, LCW 883 lc/h
Non-weaving vehicle index, INW 308
Non-weaving lane change, LCNW 883 lc/h
Total lane changes, LCALL 1766 lc/h

Weaving and Non-Weaving Speeds

Weaving intensity factor, W 0.497
Average weaving speed, SW 45.1 mi/h
Average non-weaving speed, SNW 46.5 mi/h

Weaving Segment Speed, Density, Level of Service and Capacity

Weaving segment speed, S 46.4 mi/h
Weaving segment density, D 37.8 pc/mi/ln
Level of service, LOS E
Weaving segment v/c ratio 0.843
Weaving segment flow rate, v 7014 pc/h
Weaving segment capacity, cW 7736 veh/h

Limitations on Weaving Segments

If limit reached, see note.

	Minimum	Maximum	Actual	Note
Weaving length (ft)	300	3538	650	a,b
		Maximum	Analyzed	
Density-based capacty, cIWL (pc/h/ln)		2300	2079	c
		Maximum	Analyzed	
v/c ratio		1.00	0.843	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 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

Phone: Fax:
E-mail:

Operational Analysis

Analyst: Caitlin Bowen
Agency/Co.:
Date Performed: 6/14/2013
Analysis Time Period: AM Peak Hour
Freeway/Dir of Travel: I-55 Westbound
Weaving Location: County Line Rd Weave
Analysis Year:
Description:

Inputs

Segment Type	Freeway	
Weaving configuration	One-Sided	
Number of lanes, N	4	ln
Weaving segment length, LS	700	ft
Freeway free-flow speed, FFS	60	mi/h
Minimum segment speed, SMIN	15	mi/h
Freeway maximum capacity, cIFL	2300	pc/h/ln

Terrain type	Level	
Grade	0.00	%
Length	0.00	mi

Conversion to pc/h Under Base Conditions

	Volume Components				
	VFF	VRF	VFR	VRR	
Volume, V	6073	189	1166	0	veh/h
Peak hour factor, PHF	0.95	0.95	0.95	0.95	
Peak 15-min volume, v15	1598	50	307	0	
Trucks and buses	15	15	15	15	%
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	0.930	0.930	0.930	0.930	
Driver population adjustment, fP	1.00	1.00	1.00	1.00	
Flow rate, v	6872	214	1319	0	pc/h

Volume ratio, VR 0.182

Configuration Characteristics

Number of maneuver lanes, NWL	2	ln
Interchange density, ID	0.75	int/mi
Minimum RF lane changes, LCRF	1	lc/pc
Minimum FR lane changes, LCFR	1	lc/pc
Minimum RR lane changes, LCRR		lc/pc

Minimum weaving lane changes, LCMIN lc/h
Weaving lane changes, LCW lc/h
Non-weaving vehicle index, INW
Non-weaving lane change, LCNW lc/h
Total lane changes, LCALL lc/h

_____Weaving and Non-Weaving Speeds_____
Weaving intensity factor, W
Average weaving speed, SW mi/h
Average non-weaving speed, SNW mi/h

_____Weaving Segment Speed, Density, Level 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 1.040
Weaving segment flow rate, v 8405 pc/h
Weaving segment capacity, cW 7516 veh/h

_____Limitations on Weaving Segments_____
If limit reached, see note.

	Minimum	Maximum	Actual	Note
Weaving length (ft)	300	4357	700	a,b
	Maximum	Analyzed		
Density-based capacty, cIWL (pc/h/ln)	2300	2020		c
	Maximum	Analyzed		
v/c ratio	1.00	1.040		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 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

Phone: Fax:
E-mail:

Operational Analysis

Analyst: Caitlin Bowen
Agency/Co.:
Date Performed: 6/14/2013
Analysis Time Period: PM Peak Hour
Freeway/Dir of Travel: I-55 Westbound
Weaving Location: I-294/Joliet to County Line Rd
Analysis Year:
Description:

Inputs

Segment Type	Freeway	
Weaving configuration	One-Sided	
Number of lanes, N	4	ln
Weaving segment length, LS	575	ft
Freeway free-flow speed, FFS	60	mi/h
Minimum segment speed, SMIN	15	mi/h
Freeway maximum capacity, cIFL	2300	pc/h/ln

Terrain type	Level	
Grade	0.00	%
Length	0.00	mi

Conversion to pc/h Under Base Conditions

	Volume Components				
	VFF	VRF	VFR	VRR	
Volume, V	6181	1058	1115	191	veh/h
Peak hour factor, PHF	0.95	0.95	0.95	0.95	
Peak 15-min volume, v15	1627	278	293	50	
Trucks and buses	15	15	15	15	%
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	0.930	0.930	0.930	0.930	
Driver population adjustment, fP	1.00	1.00	1.00	1.00	
Flow rate, v	6994	1197	1262	216	pc/h

Volume ratio, VR 0.254

Configuration Characteristics

Number of maneuver lanes, NWL	2	ln
Interchange density, ID	0.75	int/mi
Minimum RF lane changes, LCRF	1	lc/pc
Minimum FR lane changes, LCFR	1	lc/pc
Minimum RR lane changes, LCRR		lc/pc

Minimum weaving lane changes, LCMIN lc/h
Weaving lane changes, LCW lc/h
Non-weaving vehicle index, INW
Non-weaving lane change, LCNW lc/h
Total lane changes, LCALL lc/h

Weaving and Non-Weaving Speeds

Weaving intensity factor, W
Average weaving speed, SW mi/h
Average non-weaving speed, SNW mi/h

Weaving Segment Speed, Density, Level 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 1.237
Weaving segment flow rate, v 9669 pc/h
Weaving segment capacity, cW 7271 veh/h

Limitations on Weaving Segments

If limit reached, see note.

	Minimum	Maximum	Actual	Note
Weaving length (ft)	300	5099	575	a,b
	Maximum	Analyzed		
Density-based capacty, cIWL (pc/h/ln)	2300	1954		c
	Maximum	Analyzed		
v/c ratio	1.00	1.237		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 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

Phone: Fax:
E-mail:

Operational Analysis

Analyst: Caitlin Bowen
Agency/Co.:
Date Performed: 6/14/2013
Analysis Time Period: PM Peak Hour
Freeway/Dir of Travel: I-55 Westbound
Weaving Location: I-294 NB to I-294 SB
Analysis Year:
Description:

Inputs

Segment Type	Freeway	
Weaving configuration	One-Sided	
Number of lanes, N	4	ln
Weaving segment length, LS	1700	ft
Freeway free-flow speed, FFS	60	mi/h
Minimum segment speed, SMIN	15	mi/h
Freeway maximum capacity, cIFL	2300	pc/h/ln

Terrain type	Level	
Grade	0.00	%
Length	0.00	mi

Conversion to pc/h Under Base Conditions

	Volume Components				
	VFF	VRF	VFR	VRR	
Volume, V	6258	1038	1334	0	veh/h
Peak hour factor, PHF	0.95	0.95	0.95	0.95	
Peak 15-min volume, v15	1647	273	351	0	
Trucks and buses	15	15	15	15	%
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	0.930	0.930	0.930	0.930	
Driver population adjustment, fP	1.00	1.00	1.00	1.00	
Flow rate, v	7081	1175	1510	0	pc/h

Volume ratio, VR 0.275

Configuration Characteristics

Number of maneuver lanes, NWL	2	ln
Interchange density, ID	0.75	int/mi
Minimum RF lane changes, LCRF	1	lc/pc
Minimum FR lane changes, LCFR	1	lc/pc
Minimum RR lane changes, LCRR		lc/pc

Minimum weaving lane changes, LCMIN lc/h
Weaving lane changes, LCW lc/h
Non-weaving vehicle index, INW
Non-weaving lane change, LCNW lc/h
Total lane changes, LCALL lc/h

Weaving and Non-Weaving Speeds

Weaving intensity factor, W
Average weaving speed, SW mi/h
Average non-weaving speed, SNW mi/h

Weaving Segment Speed, Density, Level 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 1.207
Weaving segment flow rate, v 9766 pc/h
Weaving segment capacity, cW 7527 veh/h

Limitations on Weaving Segments

If limit reached, see note.

	Minimum	Maximum	Actual	Note
Weaving length (ft)	300	5317	1700	a,b
	Maximum	Analyzed		
Density-based capacty, cIWL (pc/h/ln)	2300	2023		c
	Maximum	Analyzed		
v/c ratio	1.00	1.207		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 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

Phone: Fax:
E-mail:

Operational Analysis

Analyst:	Alex Ericksen
Agency/Co.:	
Date Performed:	1/8/2014
Analysis Time Period:	AM Peak Hour
Freeway/Dir of Travel:	I-55 Westbound
Weaving Location:	Harlem Ave to Archer Ave
Analysis Year:	
Description:	

Inputs

Segment Type	Freeway	
Weaving configuration	One-Sided	
Number of lanes, N	4	ln
Weaving segment length, LS	2500	ft
Freeway free-flow speed, FFS	60	mi/h
Minimum segment speed, SMIN	15	mi/h
Freeway maximum capacity, cIFL	2300	pc/h/ln
Terrain type	Level	
Grade	0.00	%
Length	0.00	mi

Conversion to pc/h Under Base Conditions

	Volume Components				
	VFF	VRF	VFR	VRR	
Volume, V	5166	516	546	0	veh/h
Peak hour factor, PHF	0.95	0.95	0.95	0.95	
Peak 15-min volume, v15	1359	136	144	0	
Trucks and buses	15	15	15	15	%
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	0.930	0.930	0.930	0.930	
Driver population adjustment, fP	1.00	1.00	1.00	1.00	
Flow rate, v	5846	584	618	0	pc/h

Volume ratio, VR 0.171

Configuration Characteristics

Number of maneuver lanes, NWL	2	ln
Interchange density, ID	0.75	int/mi
Minimum RF lane changes, LCRF	1	lc/pc
Minimum FR lane changes, LCFR	1	lc/pc
Minimum RR lane changes, LCRR		lc/pc
Minimum weaving lane changes, LCMIN	1202	lc/h
Weaving lane changes, LCW	1660	lc/h
Non-weaving vehicle index, INW	1096	
Non-weaving lane change, LCNW	1789	lc/h
Total lane changes, LCALL	3449	lc/h

Weaving and Non-Weaving Speeds

Weaving intensity factor, W	0.291	
Average weaving speed, SW	49.8	mi/h
Average non-weaving speed, SNW	42.9	mi/h

Weaving Segment Speed, Density, Level of Service and Capacity

Weaving segment speed, S	43.9	mi/h
Weaving segment density, D	40.1	pc/mi/ln
Level of service, LOS	E	
Weaving segment v/c ratio	0.813	
Weaving segment flow rate, v	7048	pc/h
Weaving segment capacity, cW	8063	veh/h

Limitations on Weaving Segments

If limit reached, see note.

	Minimum	Maximum	Actual	Note
Weaving length (ft)	300	4237	2500	a,b
		Maximum	Analyzed	
Density-based capacty, cIWL (pc/h/ln)		2300	2167	c
		Maximum	Analyzed	
v/c ratio		1.00	0.813	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 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.

Weave

Southbound PM

HCS 2010: Freeway Weaving Release 6.1

Phone: Fax:
E-mail:

Operational Analysis

Analyst:	Alex Ericksen
Agency/Co.:	
Date Performed:	1/8/2014
Analysis Time Period:	PM Peak Hour
Freeway/Dir of Travel:	I-55 Westbound
Weaving Location:	Lemont Rd Weave
Analysis Year:	
Description:	

Inputs

Segment Type	Freeway	
Weaving configuration	One-Sided	
Number of lanes, N	4	ln
Weaving segment length, LS	700	ft
Freeway free-flow speed, FFS	60	mi/h
Minimum segment speed, SMIN	15	mi/h
Freeway maximum capacity, cIFL	2300	pc/h/ln
Terrain type	Level	
Grade	0.00	%
Length	0.00	mi

Conversion to pc/h Under Base Conditions

	Volume Components				
	VFF	VRF	VFR	VRR	
Volume, V	5575	865	703	0	veh/h
Peak hour factor, PHF	0.95	0.95	0.95	0.95	
Peak 15-min volume, v15	1467	228	185	0	
Trucks and buses	7	7	7	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	0.966	0.966	0.966	0.966	
Driver population adjustment, fP	1.00	1.00	1.00	1.00	
Flow rate, v	6074	942	766	0	pc/h

Volume ratio, VR 0.219

Configuration Characteristics

Number of maneuver lanes, NWL	2	ln
Interchange density, ID	0.75	int/mi
Minimum RF lane changes, LCRF	1	lc/pc
Minimum FR lane changes, LCFR	1	lc/pc
Minimum RR lane changes, LCRR		lc/pc
Minimum weaving lane changes, LCMIN	1708	lc/h
Weaving lane changes, LCW	1903	lc/h
Non-weaving vehicle index, INW	319	
Non-weaving lane change, LCNW	860	lc/h
Total lane changes, LCALL	2763	lc/h

Weaving and Non-Weaving Speeds

Weaving intensity factor, W	0.668	
Average weaving speed, SW	42.0	mi/h
Average non-weaving speed, SNW	38.4	mi/h

Weaving Segment Speed, Density, Level of Service and Capacity

Weaving segment speed, S	39.1	mi/h
Weaving segment density, D	49.8	pc/mi/ln
Level of service, LOS	E	
Weaving segment v/c ratio	0.977	
Weaving segment flow rate, v	7782	pc/h
Weaving segment capacity, cW	7695	veh/h

Limitations on Weaving Segments

If limit reached, see note.

	Minimum	Maximum	Actual	Note
Weaving length (ft)	300	4736	700	a,b
		Maximum	Analyzed	
Density-based capacty, cIWL (pc/h/ln)		2300	1991	c
		Maximum	Analyzed	
v/c ratio		1.00	0.977	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 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

Phone: Fax:
E-mail:

Operational Analysis

Analyst: Caitlin Bowen
Agency/Co.:
Date Performed: 6/14/2013
Analysis Time Period: PM Peak Hour
Freeway/Dir of Travel: I-55 Westbound
Weaving Location: Cass Avenue Weave
Analysis Year:
Description:

Inputs

Segment Type	Freeway	
Weaving configuration	One-Sided	
Number of lanes, N	4	ln
Weaving segment length, LS	650	ft
Freeway free-flow speed, FFS	60	mi/h
Minimum segment speed, SMIN	15	mi/h
Freeway maximum capacity, cIFL	2300	pc/h/ln

Terrain type	Level	
Grade	0.00	%
Length	0.00	mi

Conversion to pc/h Under Base Conditions

	Volume Components				
	VFF	VRF	VFR	VRR	
Volume, V	6389	462	393	0	veh/h
Peak hour factor, PHF	0.95	0.95	0.95	0.95	
Peak 15-min volume, v15	1681	122	103	0	
Trucks and buses	7	7	7	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	0.966	0.966	0.966	0.966	
Driver population adjustment, fP	1.00	1.00	1.00	1.00	
Flow rate, v	6961	503	428	0	pc/h

Volume ratio, VR 0.118

Configuration Characteristics

Number of maneuver lanes, NWL	2	ln
Interchange density, ID	0.75	int/mi
Minimum RF lane changes, LCRF	1	lc/pc
Minimum FR lane changes, LCFR	1	lc/pc
Minimum RR lane changes, LCRR		lc/pc

Minimum weaving lane changes, LCMIN 931 lc/h
Weaving lane changes, LCW 1114 lc/h
Non-weaving vehicle index, INW 339
Non-weaving lane change, LCNW 1016 lc/h
Total lane changes, LCALL 2130 lc/h

Weaving and Non-Weaving Speeds

Weaving intensity factor, W 0.577
Average weaving speed, SW 43.5 mi/h
Average non-weaving speed, SNW 43.8 mi/h

Weaving Segment Speed, Density, Level of Service and Capacity

Weaving segment speed, S 43.8 mi/h
Weaving segment density, D 45.1 pc/mi/ln
Level of service, LOS E
Weaving segment v/c ratio 0.955
Weaving segment flow rate, v 7892 pc/h
Weaving segment capacity, cW 7985 veh/h

Limitations on Weaving Segments

If limit reached, see note.

	Minimum	Maximum	Actual	Note
Weaving length (ft)	300	3715	650	a,b
	Maximum	Analyzed		
Density-based capacty, cIWL (pc/h/ln)	2300	2066		c
	Maximum	Analyzed		
v/c ratio	1.00	0.955		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 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

Phone: Fax:
E-mail:

Operational Analysis

Analyst: Caitlin Bowen
Agency/Co.:
Date Performed: 6/14/2013
Analysis Time Period: PM Peak Hour
Freeway/Dir of Travel: I-55 Westbound
Weaving Location: County Line Rd Weave
Analysis Year:
Description:

Inputs

Segment Type	Freeway	
Weaving configuration	One-Sided	
Number of lanes, N	4	ln
Weaving segment length, LS	700	ft
Freeway free-flow speed, FFS	60	mi/h
Minimum segment speed, SMIN	15	mi/h
Freeway maximum capacity, cIFL	2300	pc/h/ln

Terrain type	Level	
Grade	0.00	%
Length	0.00	mi

Conversion to pc/h Under Base Conditions

	Volume Components				
	VFF	VRF	VFR	VRR	
Volume, V	6078	176	1228	0	veh/h
Peak hour factor, PHF	0.95	0.95	0.95	0.95	
Peak 15-min volume, v15	1599	46	323	0	
Trucks and buses	7	7	7	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	0.966	0.966	0.966	0.966	
Driver population adjustment, fP	1.00	1.00	1.00	1.00	
Flow rate, v	6622	192	1338	0	pc/h

Volume ratio, VR 0.188

Configuration Characteristics

Number of maneuver lanes, NWL	2	ln
Interchange density, ID	0.75	int/mi
Minimum RF lane changes, LCRF	1	lc/pc
Minimum FR lane changes, LCFR	1	lc/pc
Minimum RR lane changes, LCRR		lc/pc

Minimum weaving lane changes, LCMIN lc/h
Weaving lane changes, LCW lc/h
Non-weaving vehicle index, INW 348
Non-weaving lane change, LCNW lc/h
Total lane changes, LCALL lc/h

_____Weaving and Non-Weaving Speeds_____
Weaving intensity factor, W
Average weaving speed, SW mi/h
Average non-weaving speed, SNW mi/h

_____Weaving Segment Speed, Density, Level 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 1.011
Weaving segment flow rate, v 8152 pc/h
Weaving segment capacity, cW 7791 veh/h

_____Limitations on Weaving Segments_____
If limit reached, see note.

	Minimum	Maximum	Actual	Note
Weaving length (ft)	300	4411	700	a,b
	Maximum	Analyzed		
Density-based capacty, cIWL (pc/h/ln)	2300	2016		c
	Maximum	Analyzed		
v/c ratio	1.00	1.011		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 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

Phone: Fax:
E-mail:

Operational Analysis

Analyst: Caitlin Bowen
Agency/Co.:
Date Performed: 6/14/2013
Analysis Time Period: PM Peak Hour
Freeway/Dir of Travel: I-55 Westbound
Weaving Location: I-294/Joliet to County Line Rd
Analysis Year:
Description:

Inputs

Segment Type	Freeway	
Weaving configuration	One-Sided	
Number of lanes, N	4	ln
Weaving segment length, LS	575	ft
Freeway free-flow speed, FFS	60	mi/h
Minimum segment speed, SMIN	15	mi/h
Freeway maximum capacity, cIFL	2300	pc/h/ln

Terrain type	Level	
Grade	0.00	%
Length	0.00	mi

Conversion to pc/h Under Base Conditions

	Volume Components				
	VFF	VRF	VFR	VRR	
Volume, V	5896	1410	1145	274	veh/h
Peak hour factor, PHF	0.95	0.95	0.95	0.95	
Peak 15-min volume, v15	1552	371	301	72	
Trucks and buses	7	7	7	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	0.966	0.966	0.966	0.966	
Driver population adjustment, fP	1.00	1.00	1.00	1.00	
Flow rate, v	6424	1536	1247	299	pc/h

Volume ratio, VR 0.293

Configuration Characteristics

Number of maneuver lanes, NWL	2	ln
Interchange density, ID	0.75	int/mi
Minimum RF lane changes, LCRF	1	lc/pc
Minimum FR lane changes, LCFR	1	lc/pc
Minimum RR lane changes, LCRR		lc/pc

Minimum weaving lane changes, LCMIN lc/h
Weaving lane changes, LCW lc/h
Non-weaving vehicle index, INW
Non-weaving lane change, LCNW lc/h
Total lane changes, LCALL lc/h

Weaving and Non-Weaving Speeds

Weaving intensity factor, W
Average weaving speed, SW mi/h
Average non-weaving speed, SNW mi/h

Weaving Segment Speed, Density, Level 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 1.236
Weaving segment flow rate, v 9506 pc/h
Weaving segment capacity, cW 7432 veh/h

Limitations on Weaving Segments

If limit reached, see note.

	Minimum	Maximum	Actual	Note
Weaving length (ft)	300	5506	575	a,b
	Maximum	Analyzed		
Density-based capacty, cIWL (pc/h/ln)	2300	1923		c
	Maximum	Analyzed		
v/c ratio	1.00	1.236		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 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

Phone: Fax:
E-mail:

Operational Analysis

Analyst: Caitlin Bowen
Agency/Co.:
Date Performed: 6/14/2013
Analysis Time Period: PM Peak Hour
Freeway/Dir of Travel: I-55 Westbound
Weaving Location: I-294 NB to I-294 SB
Analysis Year:
Description:

Inputs

Segment Type	Freeway	
Weaving configuration	One-Sided	
Number of lanes, N	4	ln
Weaving segment length, LS	1700	ft
Freeway free-flow speed, FFS	60	mi/h
Minimum segment speed, SMIN	15	mi/h
Freeway maximum capacity, cIFL	2300	pc/h/ln

Terrain type	Level	
Grade	0.00	%
Length	0.00	mi

Conversion to pc/h Under Base Conditions

	Volume Components				
	VFF	VRF	VFR	VRR	
Volume, V	5864	1177	1654	0	veh/h
Peak hour factor, PHF	0.95	0.95	0.95	0.95	
Peak 15-min volume, v15	1543	310	435	0	
Trucks and buses	7	7	7	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	0.966	0.966	0.966	0.966	
Driver population adjustment, fP	1.00	1.00	1.00	1.00	
Flow rate, v	6389	1282	1802	0	pc/h

Volume ratio, VR 0.326

Configuration Characteristics

Number of maneuver lanes, NWL	2	ln
Interchange density, ID	0.75	int/mi
Minimum RF lane changes, LCRF	1	lc/pc
Minimum FR lane changes, LCFR	1	lc/pc
Minimum RR lane changes, LCRR		lc/pc

Minimum weaving lane changes, LCMIN lc/h
Weaving lane changes, LCW lc/h
Non-weaving vehicle index, INW
Non-weaving lane change, LCNW lc/h
Total lane changes, LCALL lc/h

Weaving and Non-Weaving Speeds

Weaving intensity factor, W
Average weaving speed, SW mi/h
Average non-weaving speed, SNW mi/h

Weaving Segment Speed, Density, Level 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 1.285
Weaving segment flow rate, v 9473 pc/h
Weaving segment capacity, cW 7123 veh/h

Limitations on Weaving Segments

If limit reached, see note.

	Minimum	Maximum	Actual	Note
Weaving length (ft)	300	5860	1700	a,b
	Maximum	Analyzed		
Density-based capacty, cIWL (pc/h/ln)	2300	1982		c
	Maximum	Analyzed		
v/c ratio	1.00	1.285		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 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

Phone: Fax:
E-mail:

Operational Analysis

Analyst:	Caitlin Bowen
Agency/Co.:	
Date Performed:	6/14/2013
Analysis Time Period:	PM Peak Hour
Freeway/Dir of Travel:	I-55 Westbound
Weaving Location:	Harlem Ave to Archer Ave
Analysis Year:	
Description:	

Inputs

Segment Type	Freeway	
Weaving configuration	One-Sided	
Number of lanes, N	4	ln
Weaving segment length, LS	2500	ft
Freeway free-flow speed, FFS	60	mi/h
Minimum segment speed, SMIN	15	mi/h
Freeway maximum capacity, cIFL	2300	pc/h/ln
Terrain type	Level	
Grade	0.00	%
Length	0.00	mi

Conversion to pc/h Under Base Conditions

	Volume Components				
	VFF	VRF	VFR	VRR	
Volume, V	4978	295	1000	0	veh/h
Peak hour factor, PHF	0.95	0.95	0.95	0.95	
Peak 15-min volume, v15	1310	78	263	0	
Trucks and buses	7	7	7	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	0.966	0.966	0.966	0.966	
Driver population adjustment, fP	1.00	1.00	1.00	1.00	
Flow rate, v	5423	321	1089	0	pc/h

Volume ratio, VR	0.206	

Configuration Characteristics

Number of maneuver lanes, NWL	2	ln
Interchange density, ID	0.75	int/mi
Minimum RF lane changes, LCRF	1	lc/pc
Minimum FR lane changes, LCFR	1	lc/pc
Minimum RR lane changes, LCRR		lc/pc
Minimum weaving lane changes, LCMIN	1410	lc/h
Weaving lane changes, LCW	1868	lc/h
Non-weaving vehicle index, INW	1017	
Non-weaving lane change, LCNW	1702	lc/h
Total lane changes, LCALL	3570	lc/h

Weaving and Non-Weaving Speeds

Weaving intensity factor, W	0.299	
Average weaving speed, SW	49.6	mi/h
Average non-weaving speed, SNW	41.6	mi/h

Weaving Segment Speed, Density, Level of Service and Capacity

Weaving segment speed, S	43.1	mi/h
Weaving segment density, D	39.7	pc/mi/ln
Level of service, LOS	E	
Weaving segment v/c ratio	0.799	
Weaving segment flow rate, v	6833	pc/h
Weaving segment capacity, cW	8267	veh/h

Limitations on Weaving Segments

If limit reached, see note.

	Minimum	Maximum	Actual	Note
Weaving length (ft)	300	4601	2500	a,b
		Maximum	Analyzed	
Density-based capacty, cIWL (pc/h/ln)		2300	2139	c
		Maximum	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 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.

Technical Memorandum

I-55 PHASE I ENGINEERING STUDY

Veterans Memorial Tollway (I-355) to Dan Ryan Expressway (I-90/94)

BASE AND DESIGN YEAR NO-BUILD VOLUME DIAGRAM

APPENDIX C 2012 & 2040 LEVEL OF SERVICE
AUGUST 2014

NOTE ON HCS DIRECTION REFERENCES:

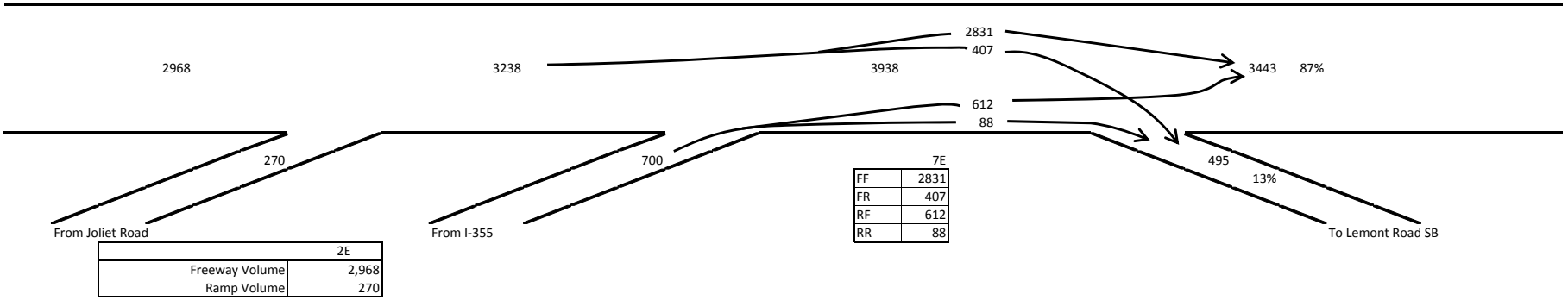
I-55 is designated a north-south facility, and this orientation is used in this memorandum. Some of the HCS file output sheets refer to eastbound or westbound; when this is used “eastbound” refers to I-55 northbound and “westbound” refers to I-55 southbound.

2012 Northbound

AM and PM

Volumes for Locations: 7

2012 EB AM Volumes

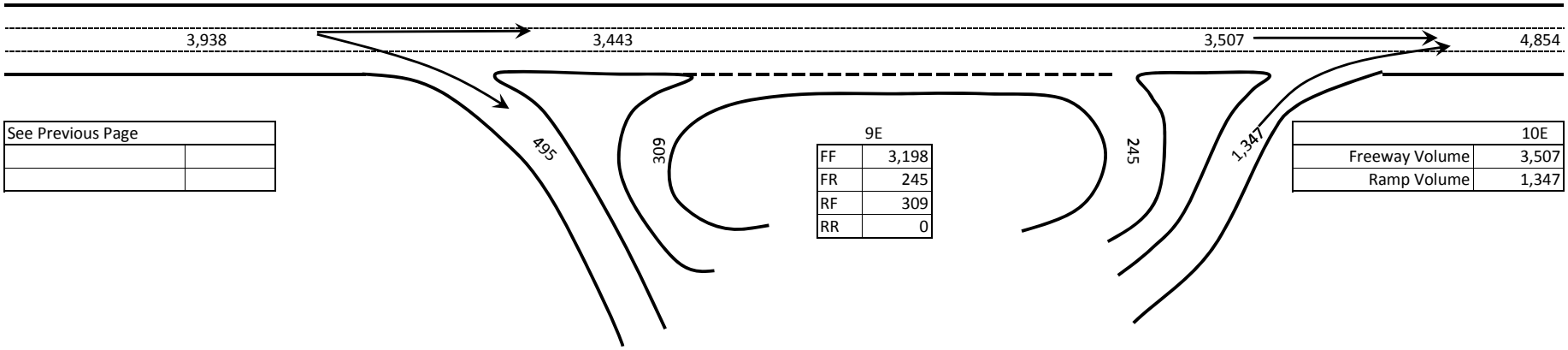


	2E
Freeway Volume	2,968
Ramp Volume	270

FF	2831
FR	407
RF	612
RR	88

Volumes for Locations: 9-10

2012 EB AM Volumes



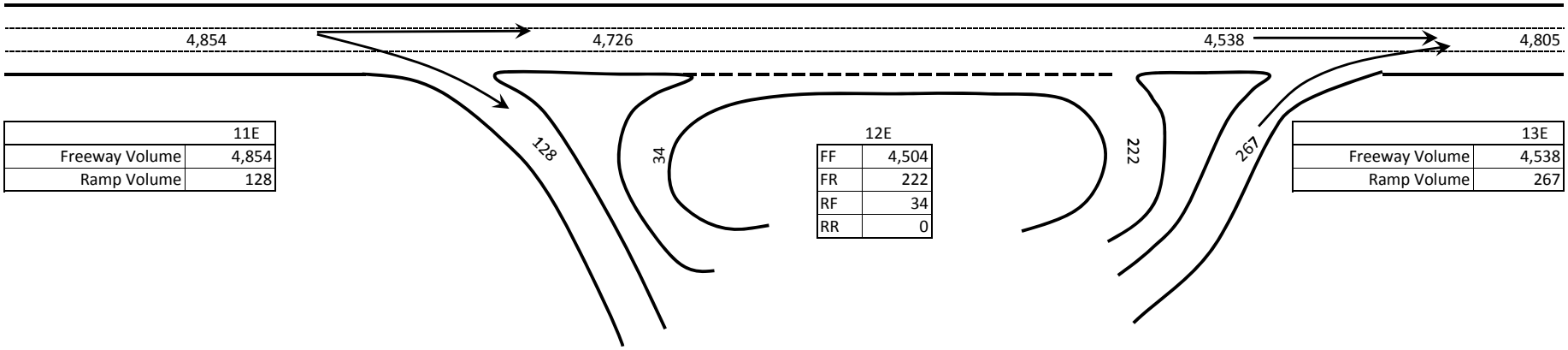
See Previous Page	

9E	
FF	3,198
FR	245
RF	309
RR	0

	10E
Freeway Volume	3,507
Ramp Volume	1,347

Volumes for Locations: 11-13

2012 EB AM Volumes



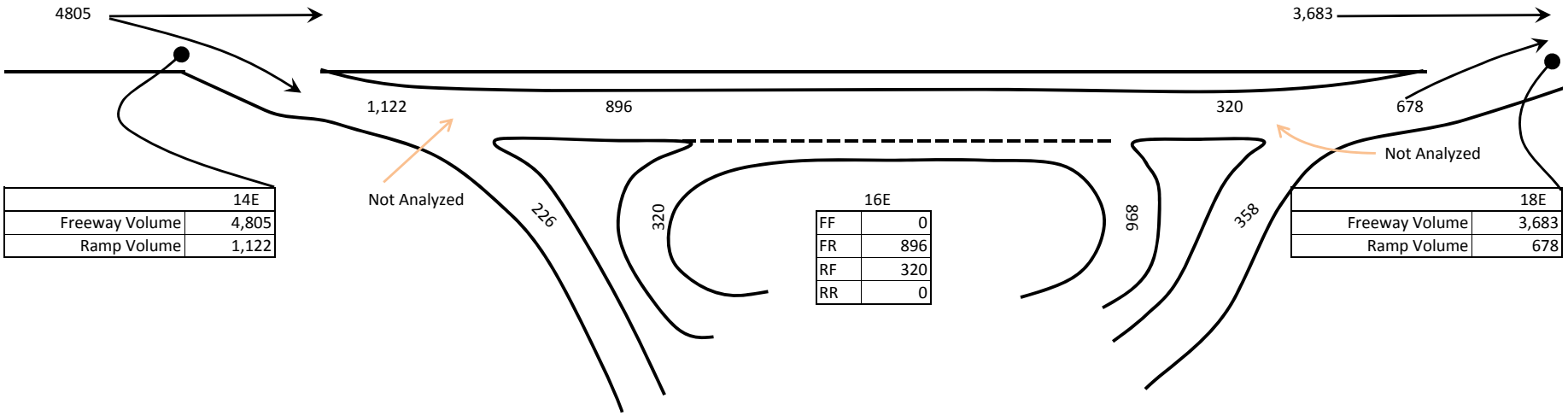
	11E
Freeway Volume	4,854
Ramp Volume	128

12E	
FF	4,504
FR	222
RF	34
RR	0

	13E
Freeway Volume	4,538
Ramp Volume	267

Volumes for Locations: 14, 16, 18

2012 EB AM Volumes



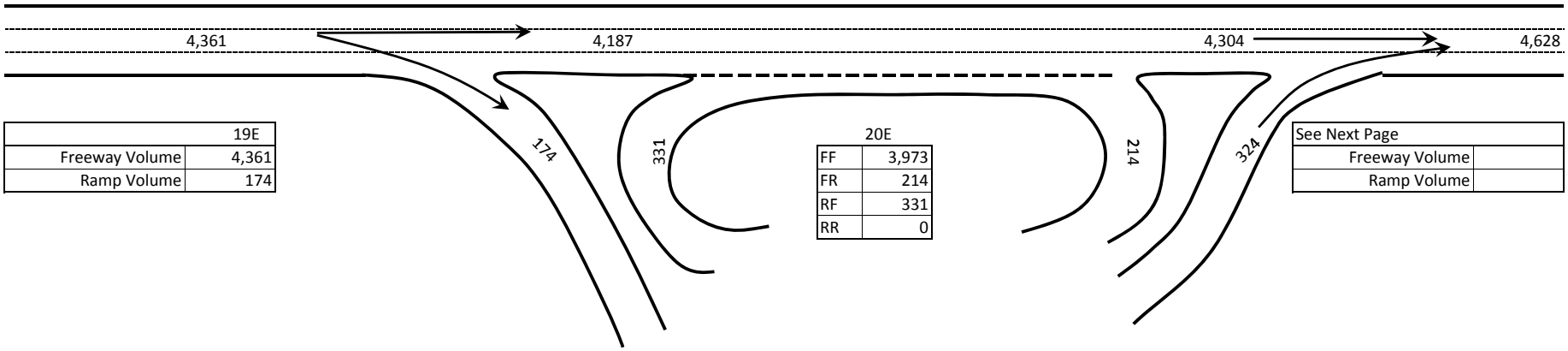
	14E
Freeway Volume	4,805
Ramp Volume	1,122

16E	
FF	0
FR	896
RF	320
RR	0

	18E
Freeway Volume	3,683
Ramp Volume	678

Volumes for Locations: 19,20

2012 EB AM Volumes



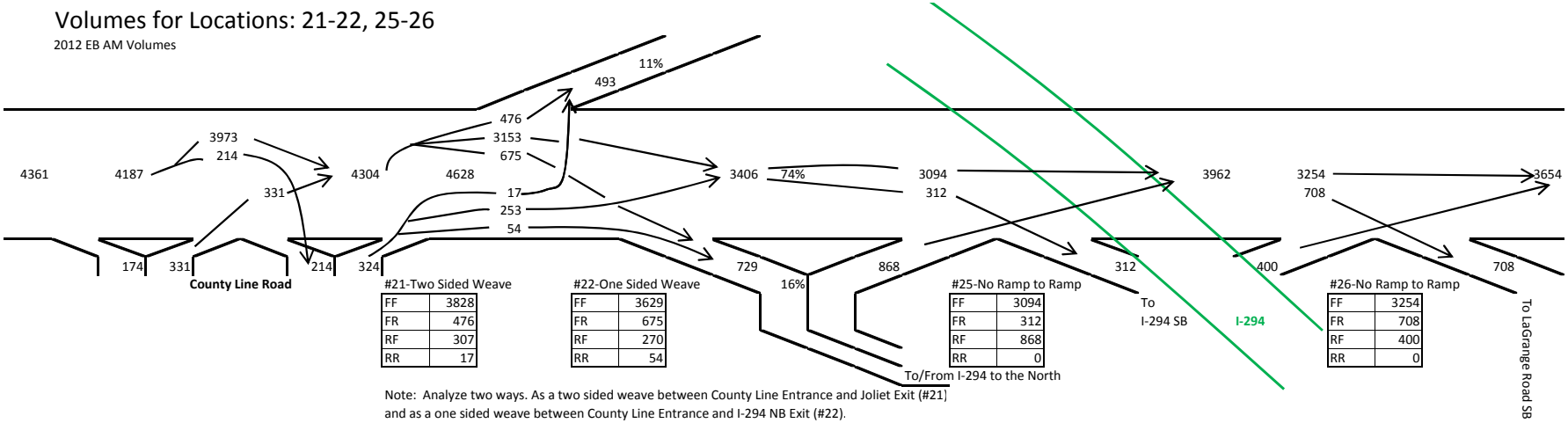
	19E
Freeway Volume	4,361
Ramp Volume	174

20E	
FF	3,973
FR	214
RF	331
RR	0

See Next Page	
Freeway Volume	
Ramp Volume	

Volumes for Locations: 21-22, 25-26

2012 EB AM Volumes



#21-Two Sided Weave

FF	3828
FR	476
RF	307
RR	17

#22-One Sided Weave

FF	3629
FR	675
RF	270
RR	54

#25-No Ramp to Ramp

FF	3094
FR	312
RF	868
RR	0

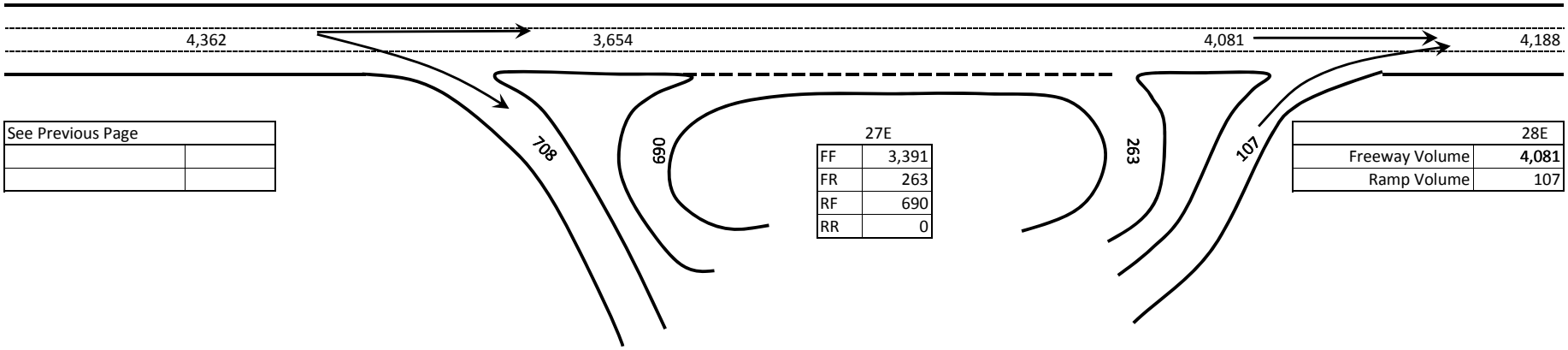
#26-No Ramp to Ramp

FF	3254
FR	708
RF	400
RR	0

Note: Analyze two ways. As a two sided weave between County Line Entrance and Joliet Exit (#21) and as a one sided weave between County Line Entrance and I-294 NB Exit (#22).

Volumes for Locations: 27-28

2012 EB AM Volumes



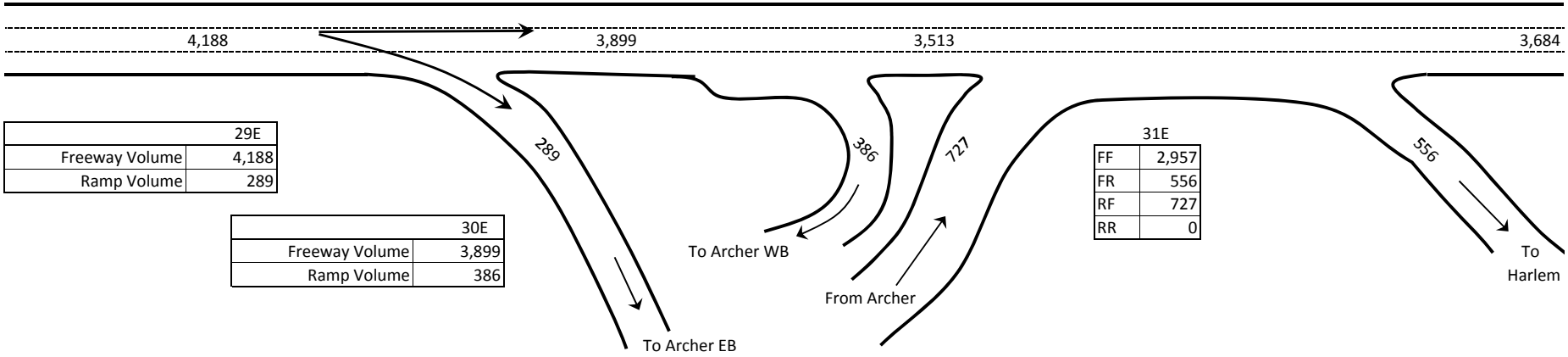
See Previous Page	

27E	
FF	3,391
FR	263
RF	690
RR	0

	28E
Freeway Volume	**4,081**
Ramp Volume	107

Volumes for Locations: 29-31

2012 EB AM Volumes



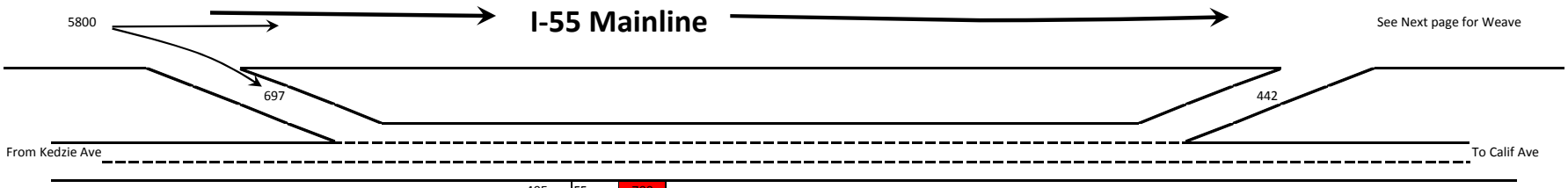
	29E
Freeway Volume	4,188
Ramp Volume	289

	30E
Freeway Volume	3,899
Ramp Volume	386

31E	
FF	2,957
FR	556
RF	727
RR	0

Volumes for Locations: 39-40

2012 EB AM Volumes

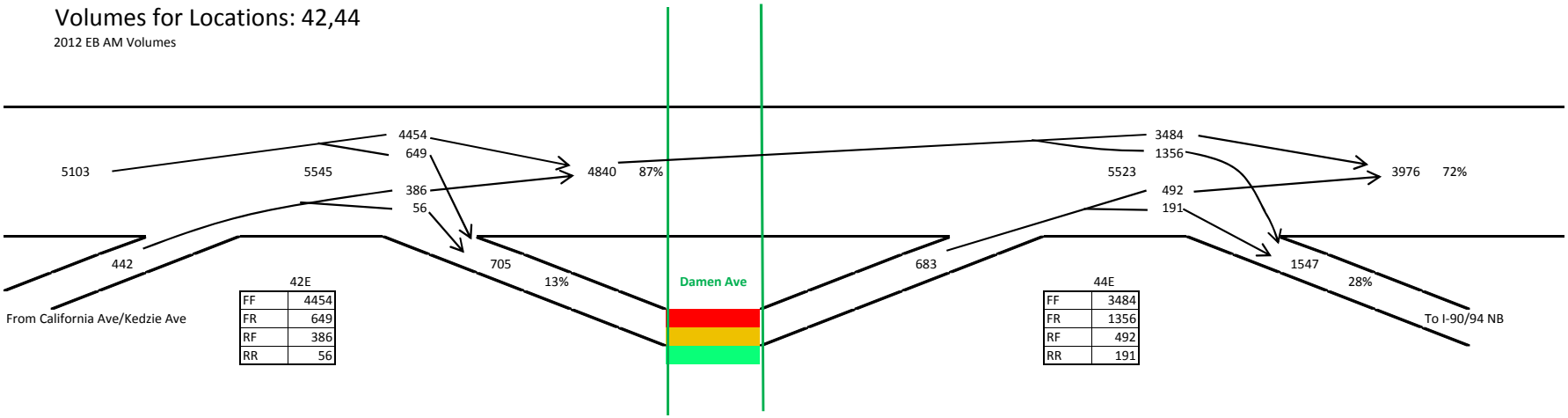


	39E
Freeway Volume	5,800
Ramp Volume	697

40E	FF	700
	FR	442
	RF	697
	RR	0

Volumes for Locations: 42,44

2012 EB AM Volumes



42E

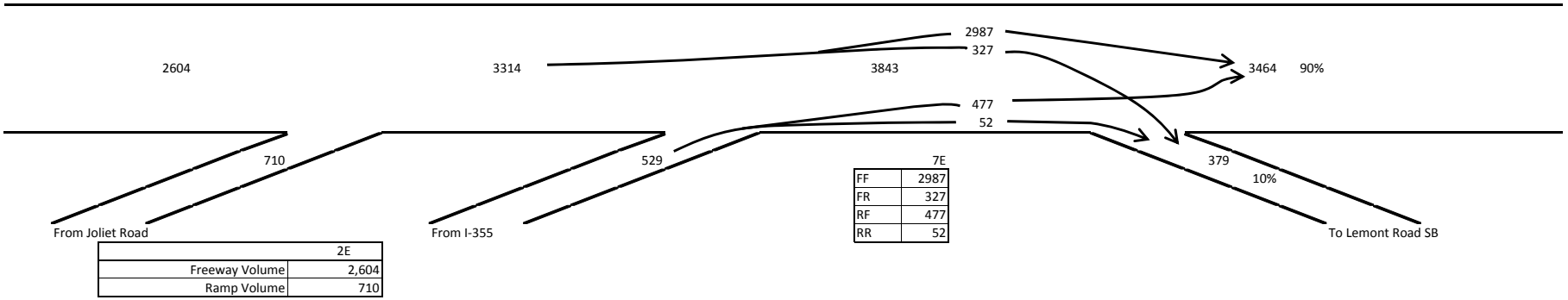
FF	4454
FR	649
RF	386
RR	56

44E

FF	3484
FR	1356
RF	492
RR	191

Volumes for Locations: 7

2012 EB PM Volumes

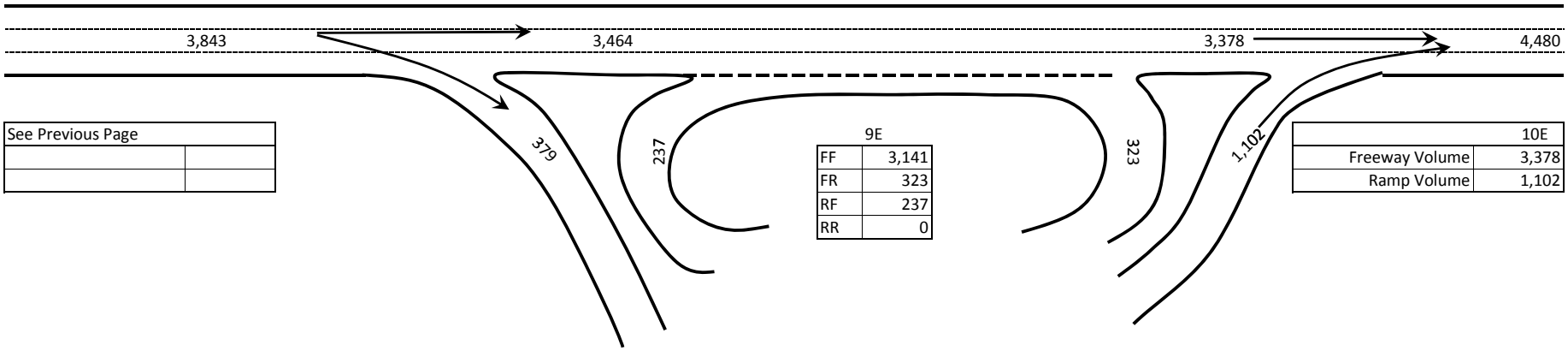


	2E
Freeway Volume	2,604
Ramp Volume	710

7E	
FF	2987
FR	327
RF	477
RR	52

Volumes for Locations: 9-10

2012 EB PM Volumes



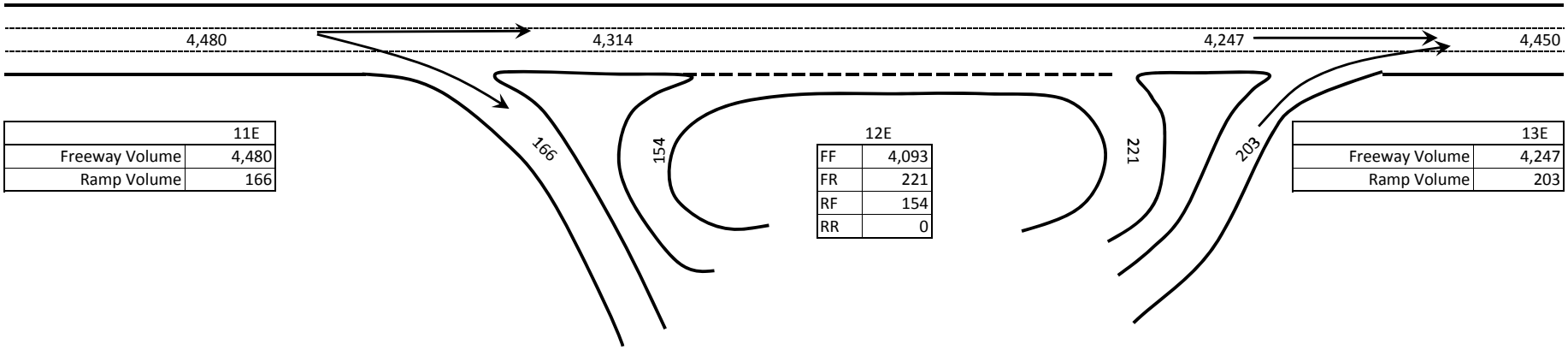
See Previous Page	

9E	
FF	3,141
FR	323
RF	237
RR	0

	10E
Freeway Volume	3,378
Ramp Volume	1,102

Volumes for Locations: 11-13

2012 EB PM Volumes



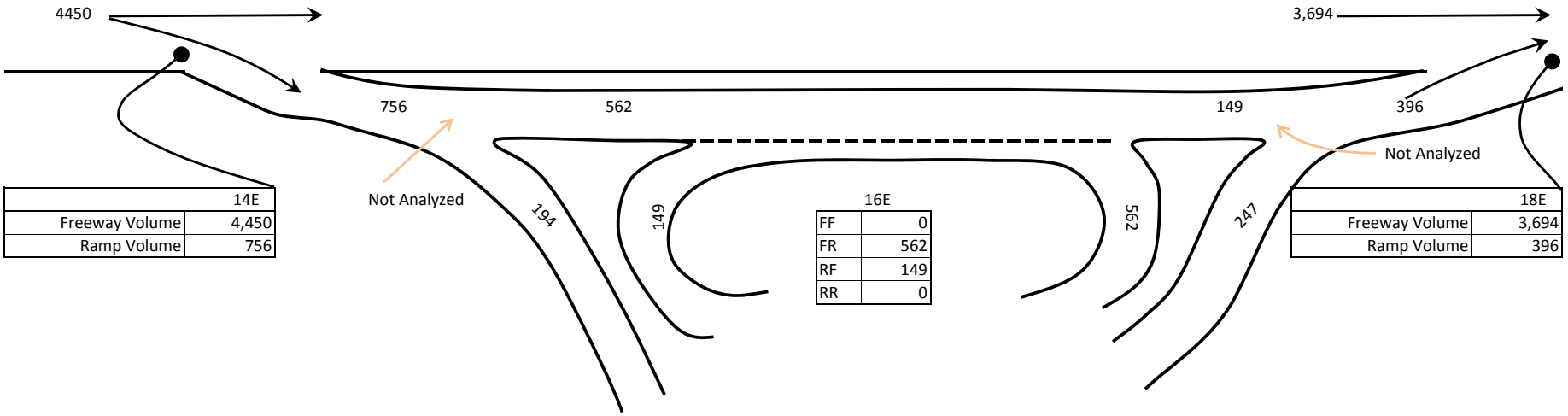
	11E
Freeway Volume	4,480
Ramp Volume	166

12E	
FF	4,093
FR	221
RF	154
RR	0

	13E
Freeway Volume	4,247
Ramp Volume	203

Volumes for Locations: 14, 16, 18

2012 EB PM Volumes



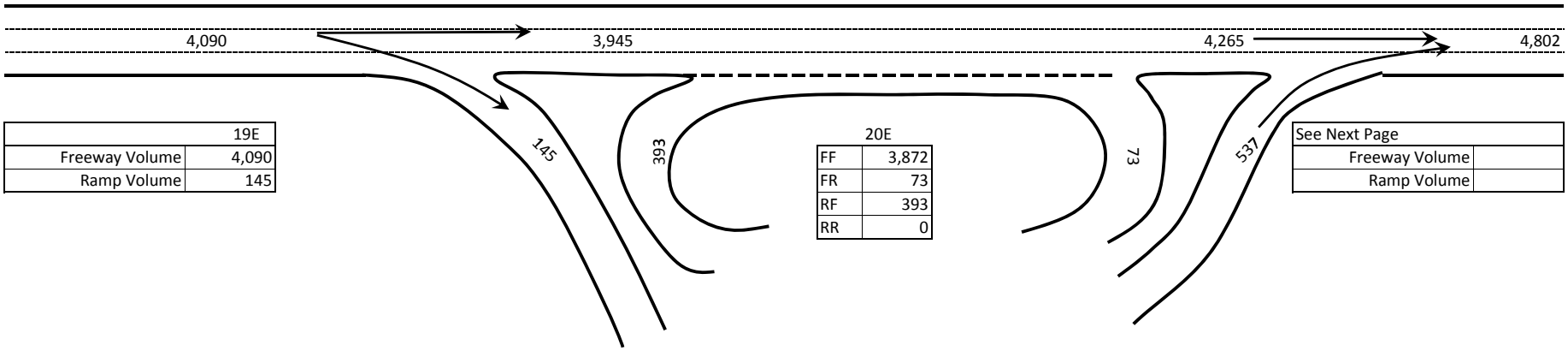
	14E
Freeway Volume	4,450
Ramp Volume	756

16E	
FF	0
FR	562
RF	149
RR	0

	18E
Freeway Volume	3,694
Ramp Volume	396

Volumes for Locations: 19,20

2012 EB PM Volumes



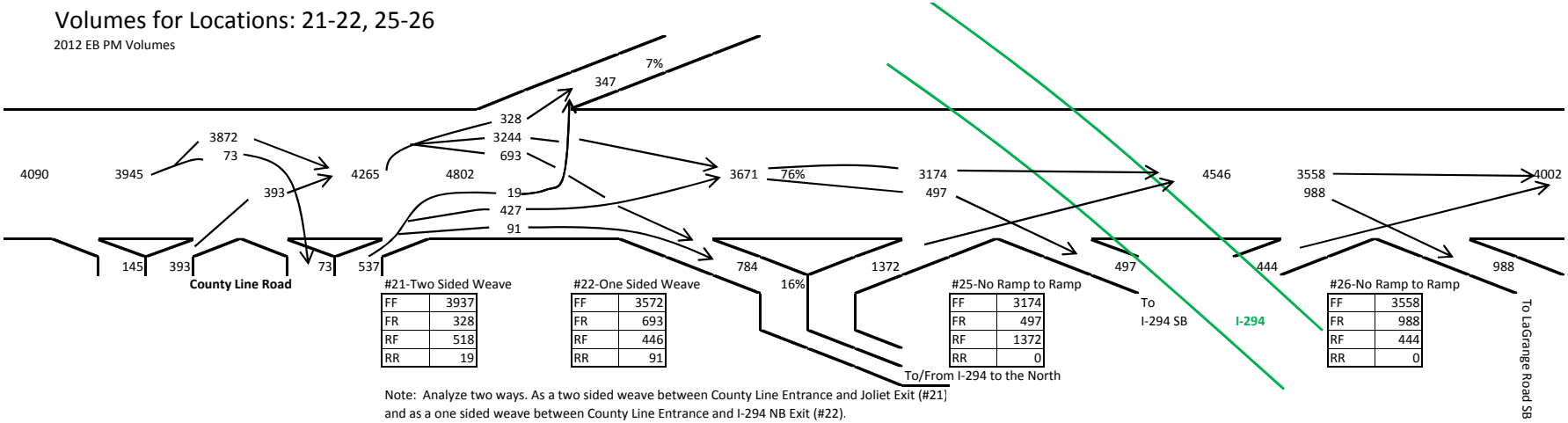
	19E
Freeway Volume	4,090
Ramp Volume	145

20E	
FF	3,872
FR	73
RF	393
RR	0

See Next Page	
Freeway Volume	
Ramp Volume	

Volumes for Locations: 21-22, 25-26

2012 EB PM Volumes



#21-Two Sided Weave

FF	3937
FR	328
RF	518
RR	19

#22-One Sided Weave

FF	3572
FR	693
RF	446
RR	91

#25-No Ramp to Ramp

FF	3174
FR	497
RF	1372
RR	0

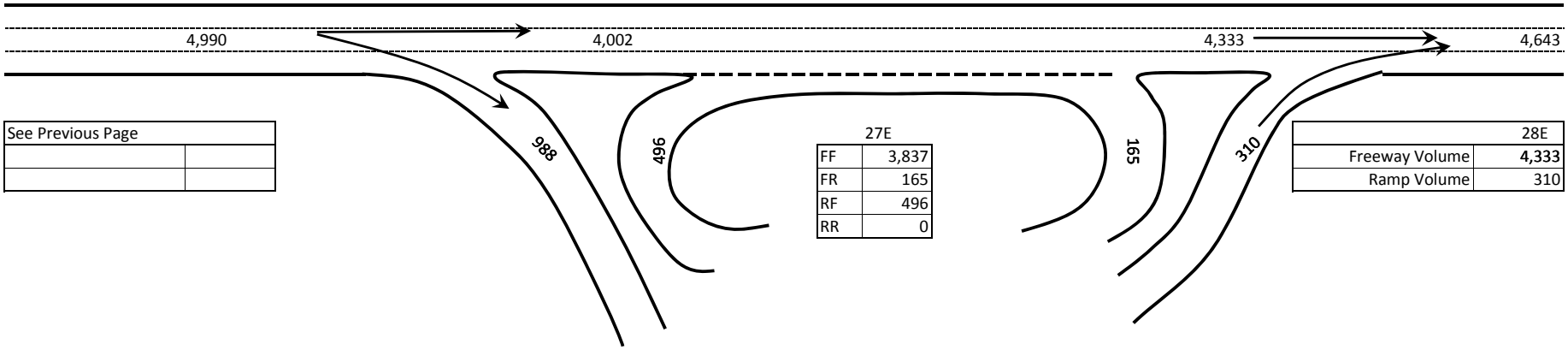
#26-No Ramp to Ramp

FF	3558
FR	988
RF	444
RR	0

Note: Analyze two ways. As a two sided weave between County Line Entrance and Joliet Exit (#21) and as a one sided weave between County Line Entrance and I-294 NB Exit (#22).

Volumes for Locations: 27-28

2012 EB PM Volumes



See Previous Page	

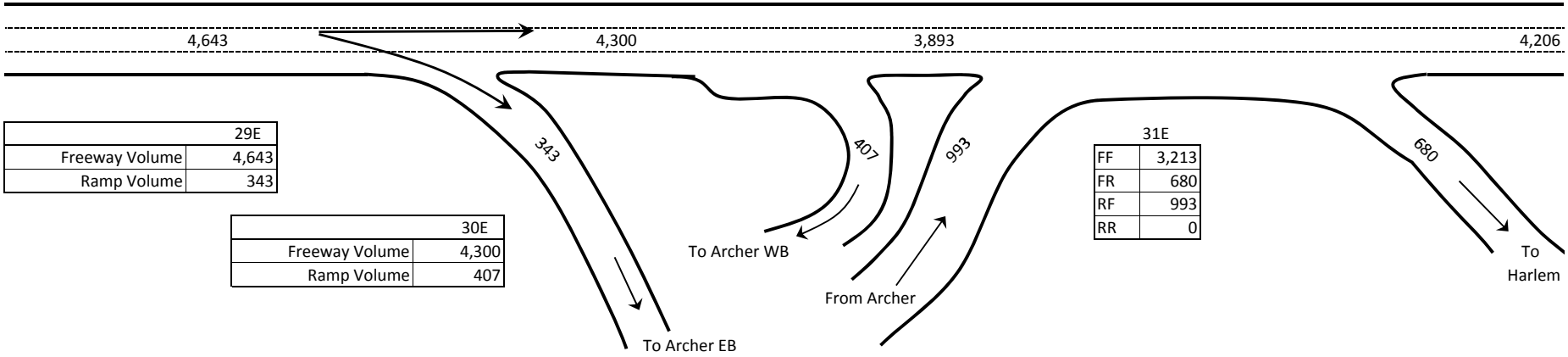
27E

FF	3,837
FR	165
RF	496
RR	0

	28E
Freeway Volume	**4,333**
Ramp Volume	310

Volumes for Locations: 29-31

2012 EB PM Volumes



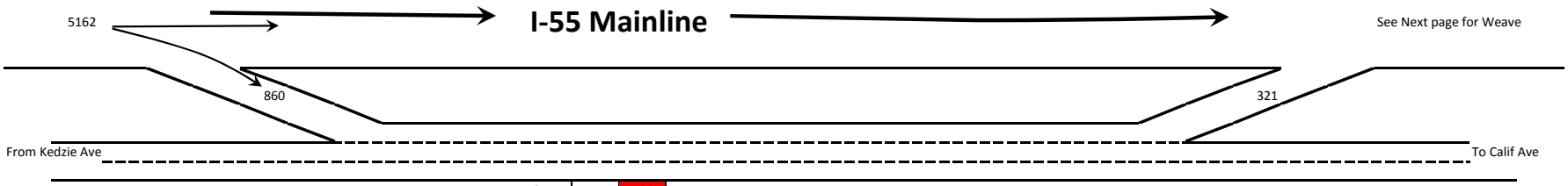
	29E
Freeway Volume	4,643
Ramp Volume	343

	30E
Freeway Volume	4,300
Ramp Volume	407

31E	
FF	3,213
FR	680
RF	993
RR	0

Volumes for Locations: 39-40

2012 EB PM Volumes

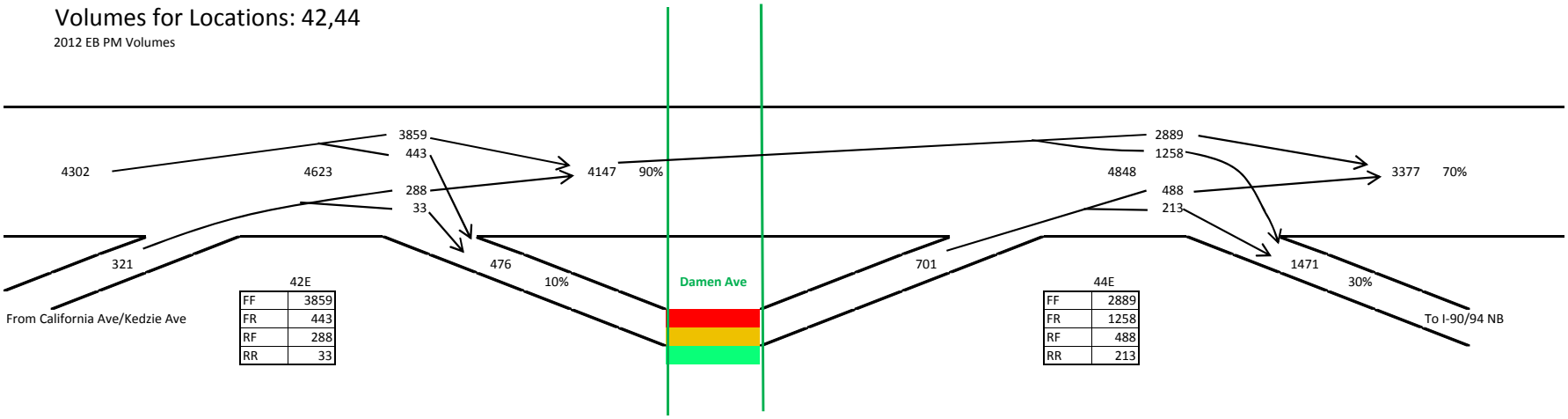


	39E
Freeway Volume	5,162
Ramp Volume	860

40E	FF	700
	FR	321
	RF	860
	RR	0

Volumes for Locations: 42,44

2012 EB PM Volumes



42E

FF	3859
FR	443
RF	288
RR	33

44E

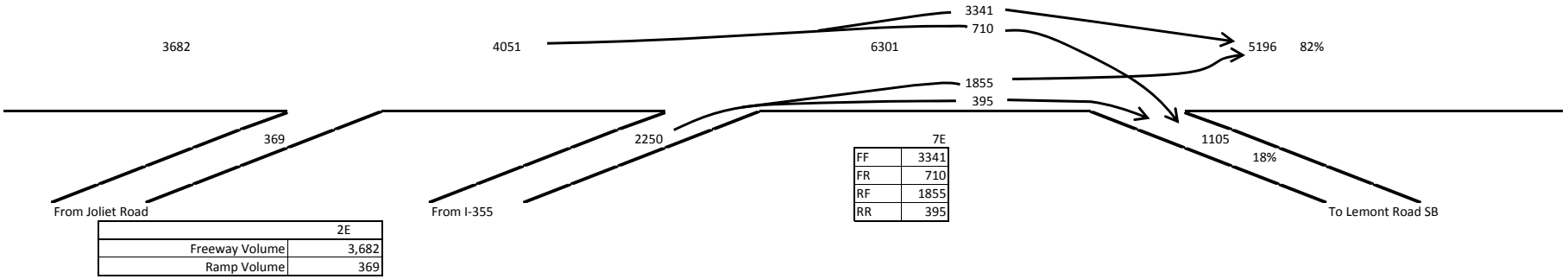
FF	2889
FR	1258
RF	488
RR	213

2040 Northbound

AM and PM

Volumes for Locations: 7

2040 EB AM Volumes

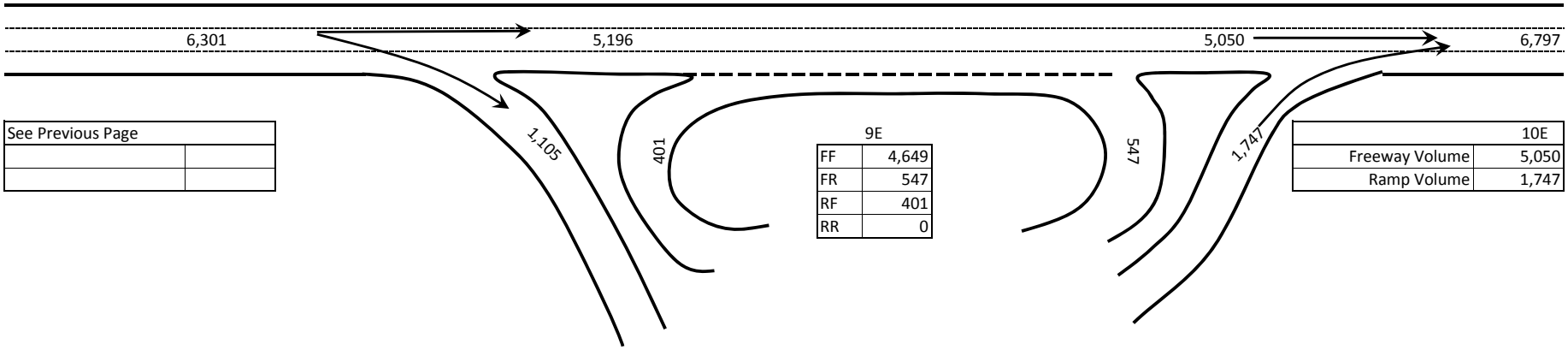


	2E
Freeway Volume	3,682
Ramp Volume	369

FF	3341
FR	710
RF	1855
RR	395

Volumes for Locations: 9-10

2040 EB AM Volumes



See Previous Page	

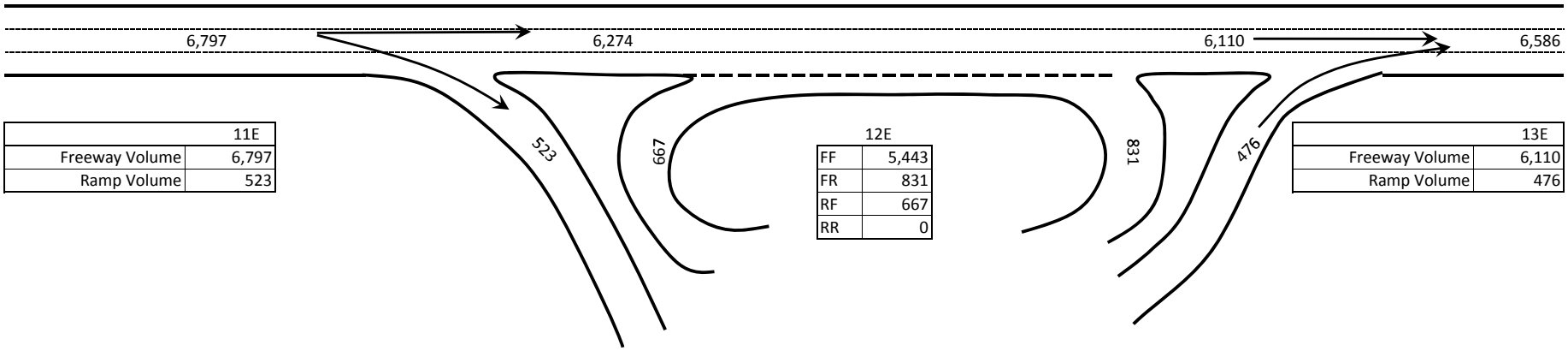
9E

FF	4,649
FR	547
RF	401
RR	0

	10E
Freeway Volume	5,050
Ramp Volume	1,747

Volumes for Locations: 11-13

2040 EB AM Volumes



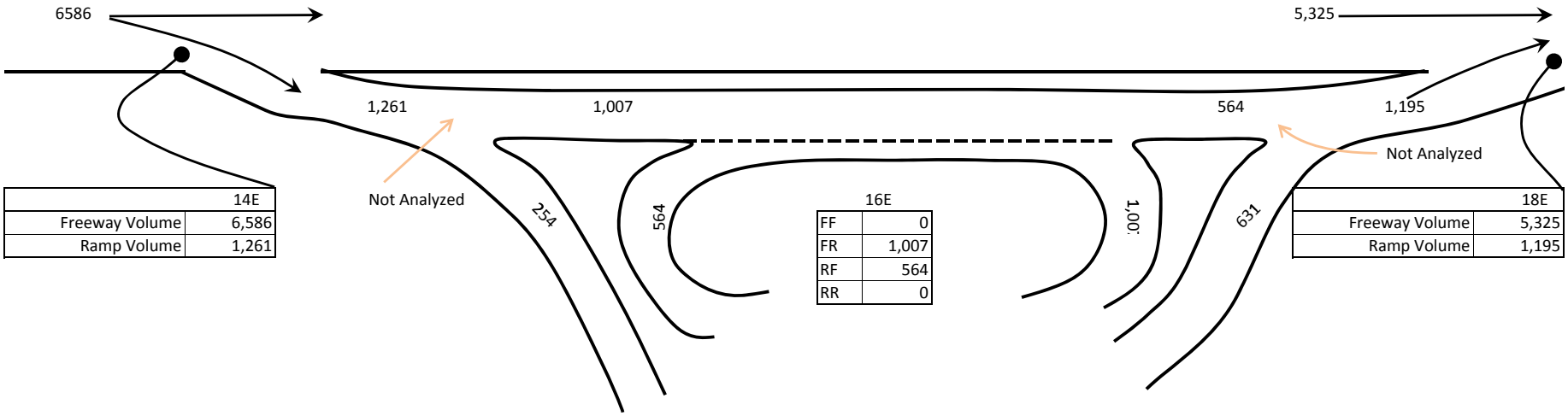
	11E
Freeway Volume	6,797
Ramp Volume	523

12E	
FF	5,443
FR	831
RF	667
RR	0

	13E
Freeway Volume	6,110
Ramp Volume	476

Volumes for Locations: 14, 16, 18

2040 EB AM Volumes



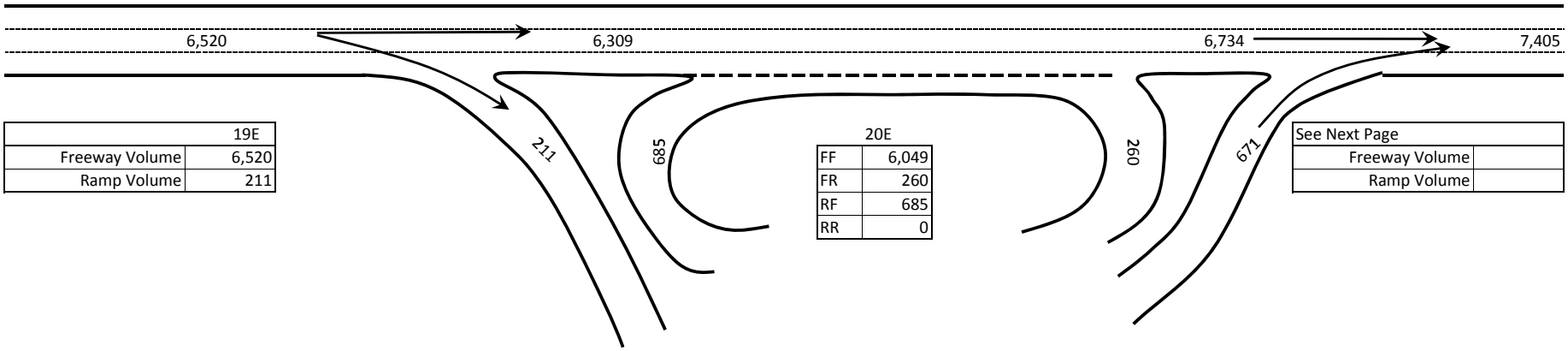
	14E
Freeway Volume	6,586
Ramp Volume	1,261

16E	
FF	0
FR	1,007
RF	564
RR	0

	18E
Freeway Volume	5,325
Ramp Volume	1,195

Volumes for Locations: 19,20

2040 EB AM Volumes



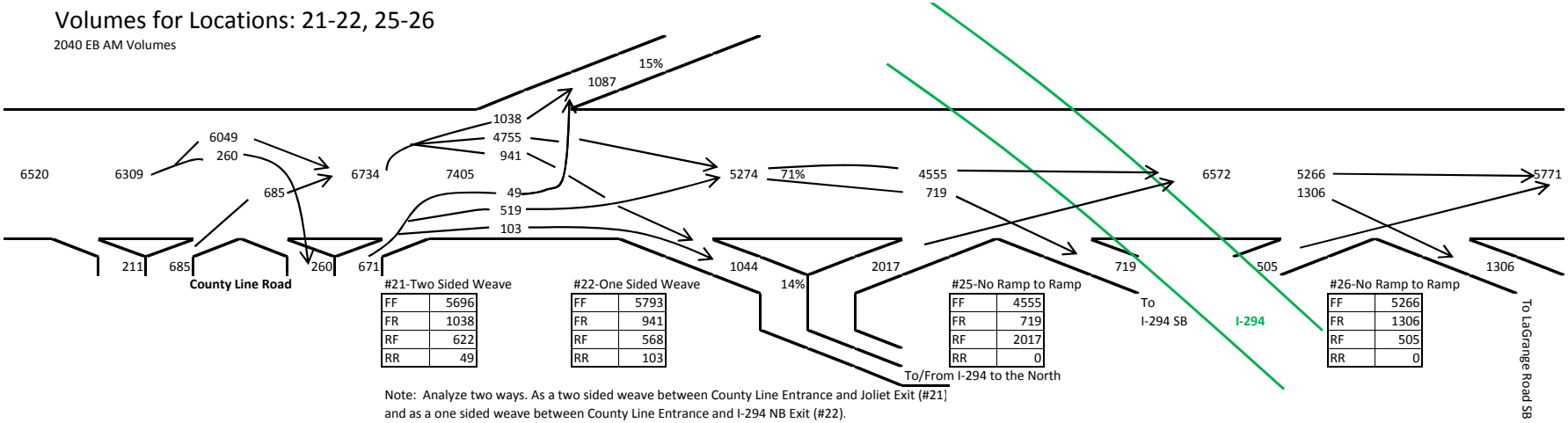
	19E
Freeway Volume	6,520
Ramp Volume	211

20E	
FF	6,049
FR	260
RF	685
RR	0

See Next Page	
Freeway Volume	
Ramp Volume	

Volumes for Locations: 21-22, 25-26

2040 EB AM Volumes



#21-Two Sided Weave

FF	5696
FR	1038
RF	622
RR	49

#22-One Sided Weave

FF	5793
FR	941
RF	568
RR	103

#25-No Ramp to Ramp

FF	4555
FR	719
RF	2017
RR	0

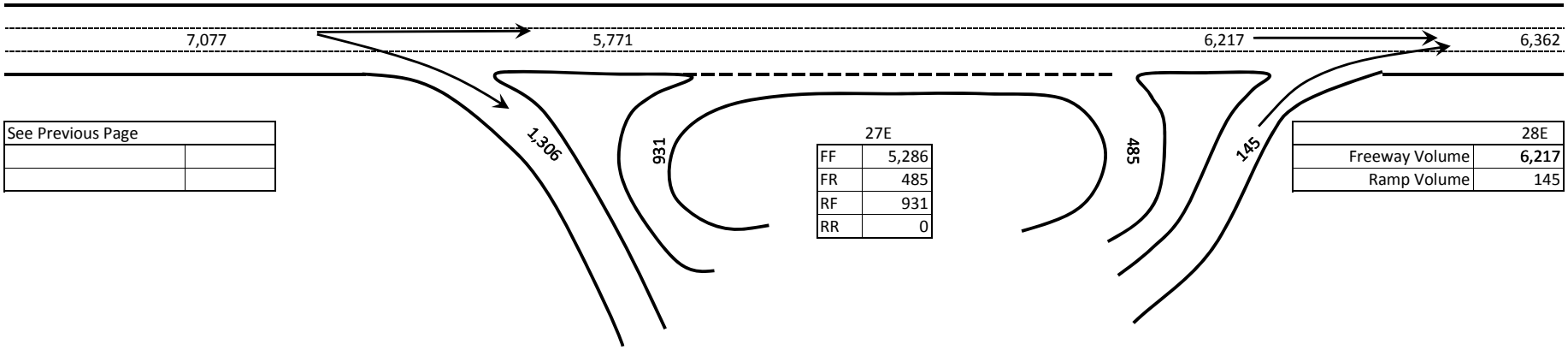
#26-No Ramp to Ramp

FF	5266
FR	1306
RF	505
RR	0

Note: Analyze two ways. As a two sided weave between County Line Entrance and Joliet Exit (#21) and as a one sided weave between County Line Entrance and I-294 NB Exit (#22).

Volumes for Locations: 27-28

2040 EB AM Volumes



See Previous Page	

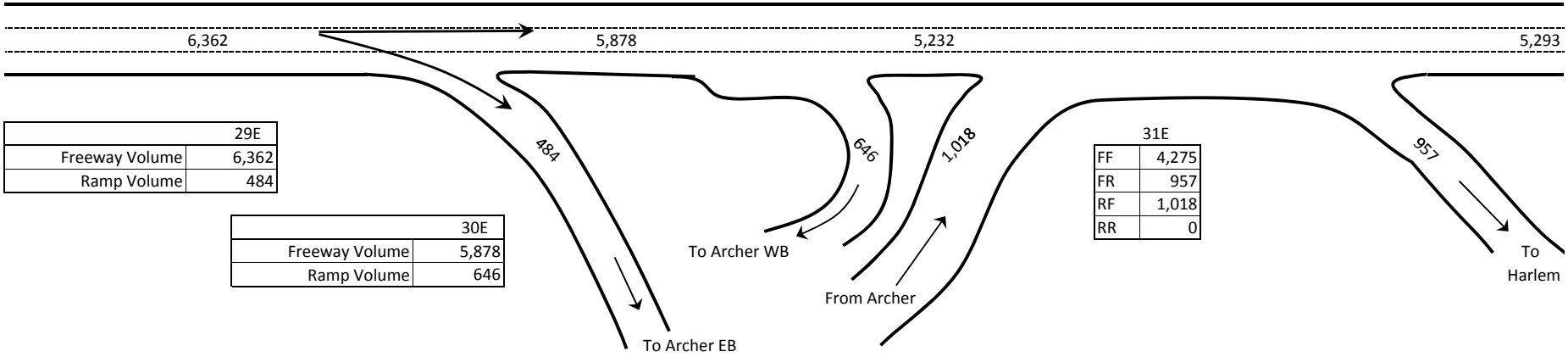
27E

FF	5,286
FR	485
RF	931
RR	0

	28E
Freeway Volume	**6,217**
Ramp Volume	145

Volumes for Locations: 29-31

2040 EB AM Volumes



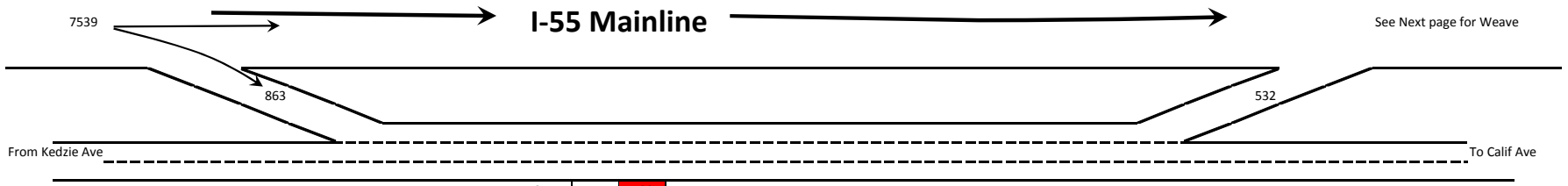
	29E
Freeway Volume	6,362
Ramp Volume	484

	30E
Freeway Volume	5,878
Ramp Volume	646

31E	
FF	4,275
FR	957
RF	1,018
RR	0

Volumes for Locations: 39-40

2040 EB AM Volumes

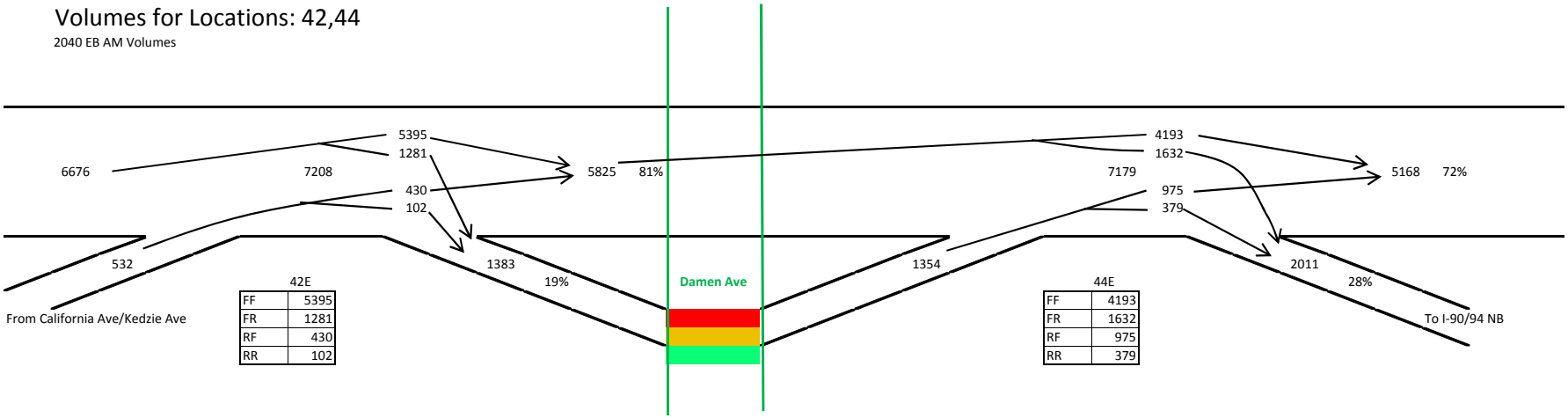


	39E
Freeway Volume	7,539
Ramp Volume	863

40E	FF	700
	FR	532
	RF	863
	RR	0

Volumes for Locations: 42,44

2040 EB AM Volumes



42E

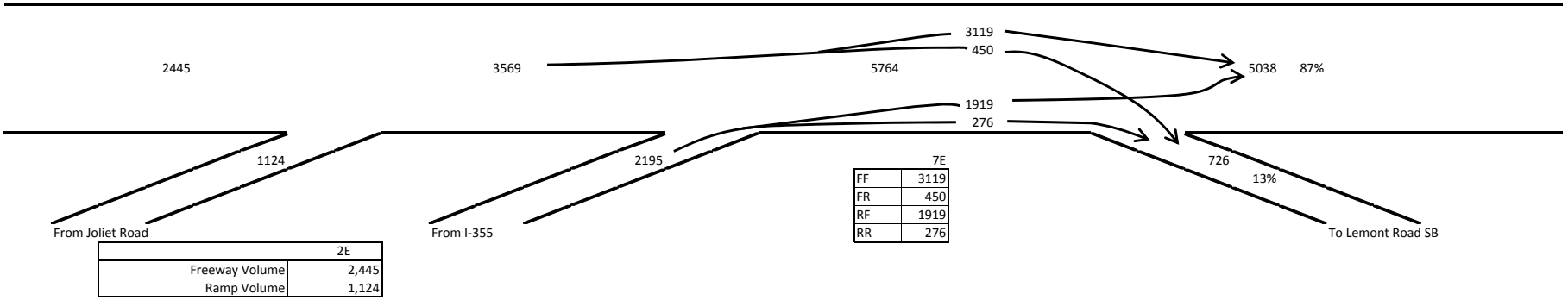
FF	5395
FR	1281
RF	430
RR	102

44E

FF	4193
FR	1632
RF	975
RR	379

Volumes for Locations: 7

2040 EB PM Volumes

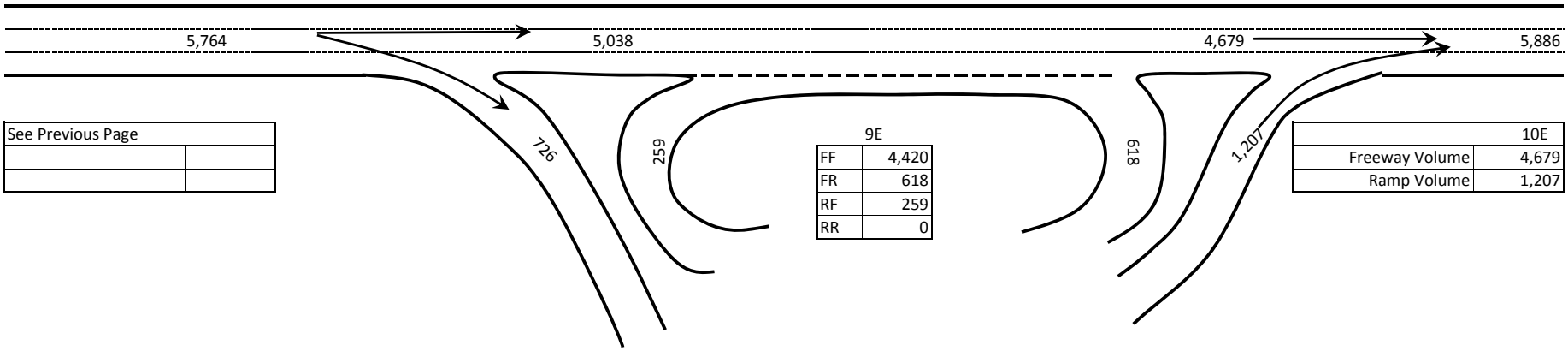


	2E
Freeway Volume	2,445
Ramp Volume	1,124

7E	
FF	3119
FR	450
RF	1919
RR	276

Volumes for Locations: 9-10

2040 EB PM Volumes



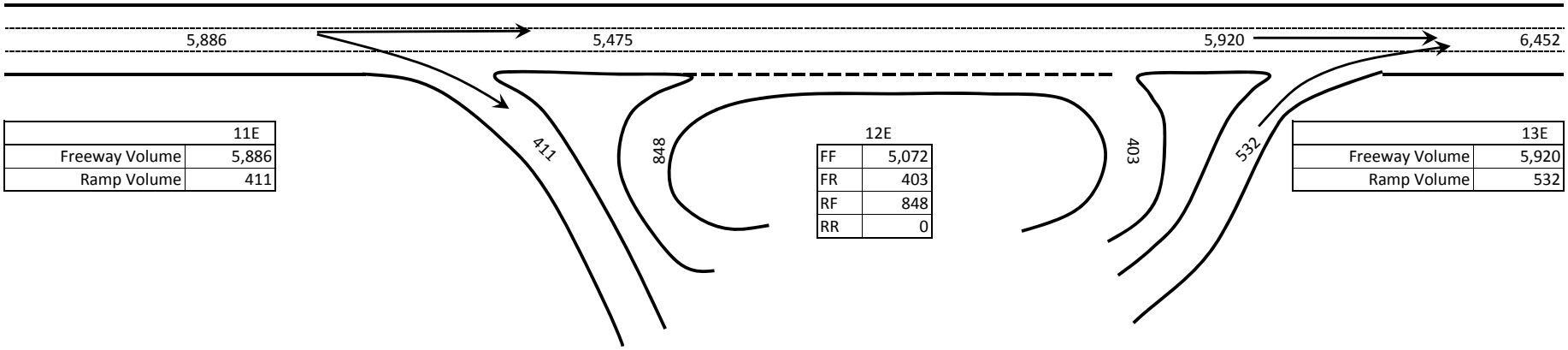
See Previous Page	

9E	
FF	4,420
FR	618
RF	259
RR	0

	10E
Freeway Volume	4,679
Ramp Volume	1,207

Volumes for Locations: 11-13

2040 EB PM Volumes



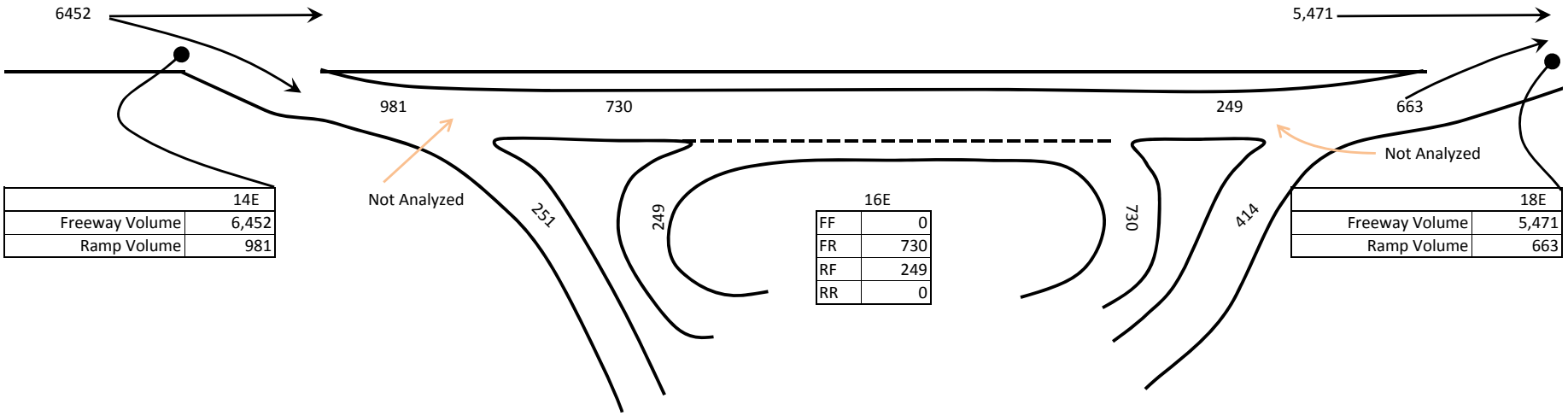
	11E
Freeway Volume	5,886
Ramp Volume	411

12E	
FF	5,072
FR	403
RF	848
RR	0

	13E
Freeway Volume	5,920
Ramp Volume	532

Volumes for Locations: 14, 16, 18

2040 EB PM Volumes



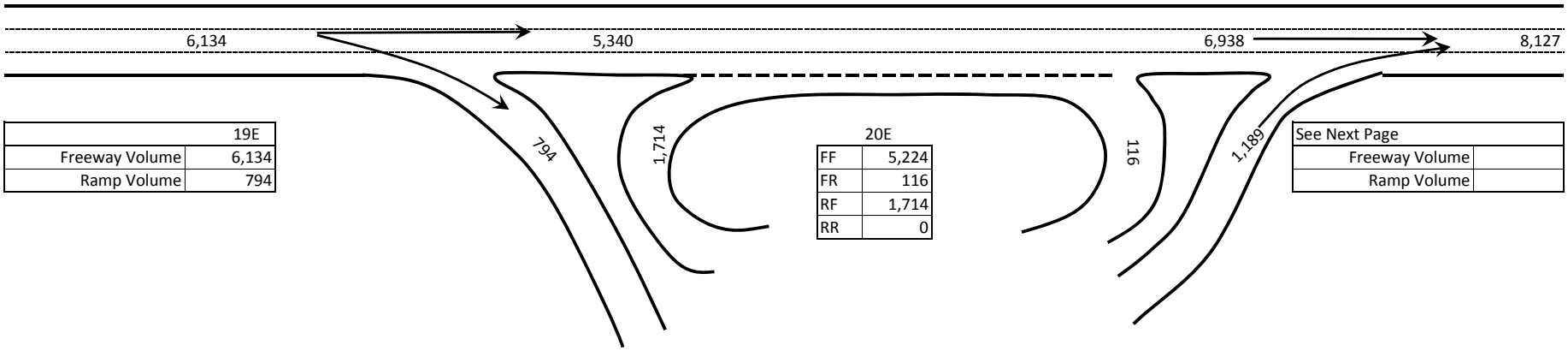
	14E
Freeway Volume	6,452
Ramp Volume	981

16E	
FF	0
FR	730
RF	249
RR	0

	18E
Freeway Volume	5,471
Ramp Volume	663

Volumes for Locations: 19,20

2040 EB PM Volumes



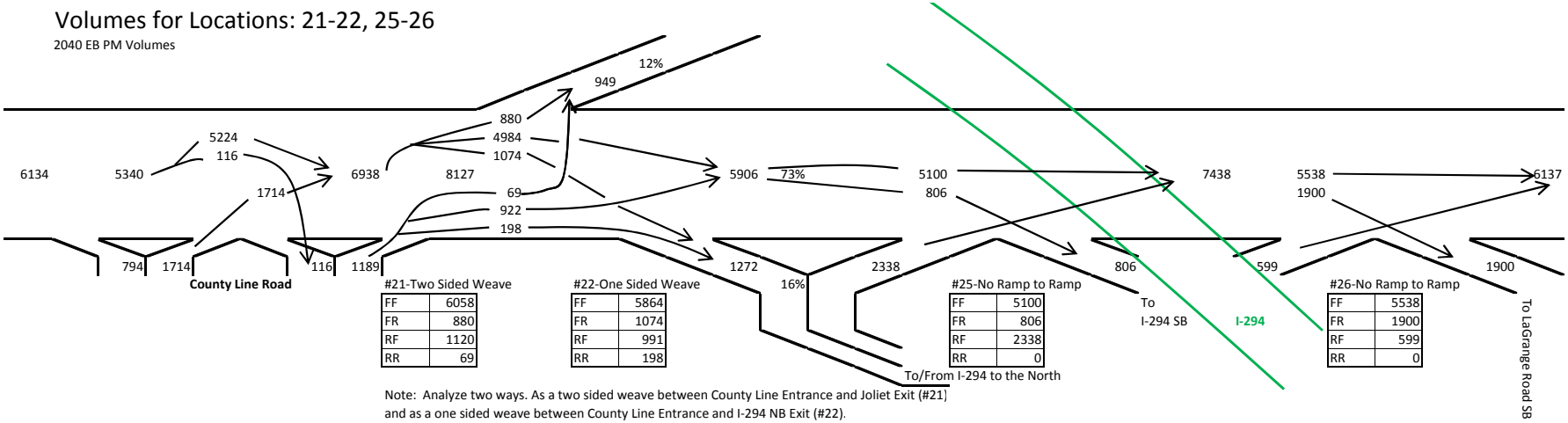
	19E
Freeway Volume	6,134
Ramp Volume	794

20E	
FF	5,224
FR	116
RF	1,714
RR	0

See Next Page	
Freeway Volume	
Ramp Volume	

Volumes for Locations: 21-22, 25-26

2040 EB PM Volumes



#21-Two Sided Weave

FF	6058
FR	880
RF	1120
RR	69

#22-One Sided Weave

FF	5864
FR	1074
RF	991
RR	198

#25-No Ramp to Ramp

FF	5100
FR	806
RF	2338
RR	0

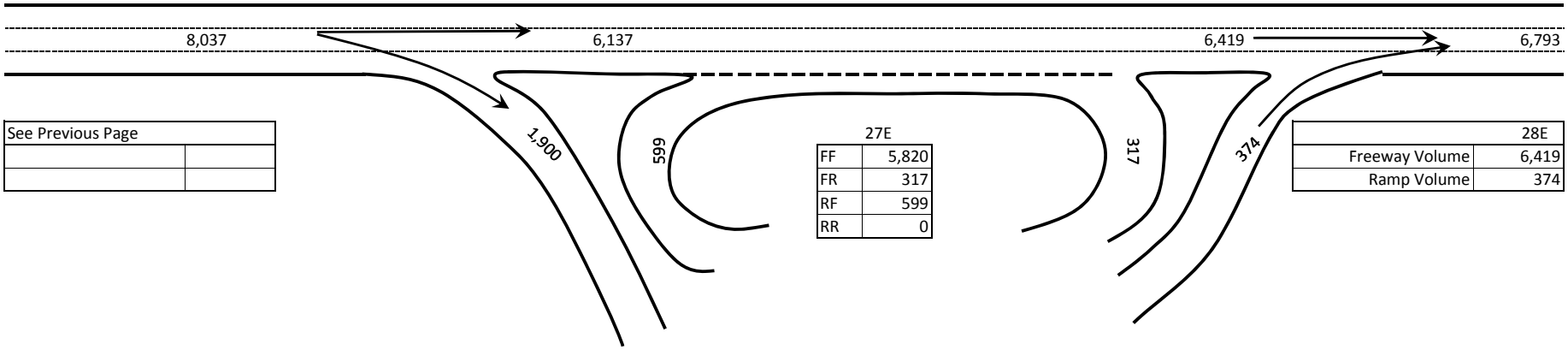
#26-No Ramp to Ramp

FF	5538
FR	1900
RF	599
RR	0

Note: Analyze two ways. As a two sided weave between County Line Entrance and Joliet Exit (#21) and as a one sided weave between County Line Entrance and I-294 NB Exit (#22).

Volumes for Locations: 27-28

2040 EB PM Volumes



See Previous Page	

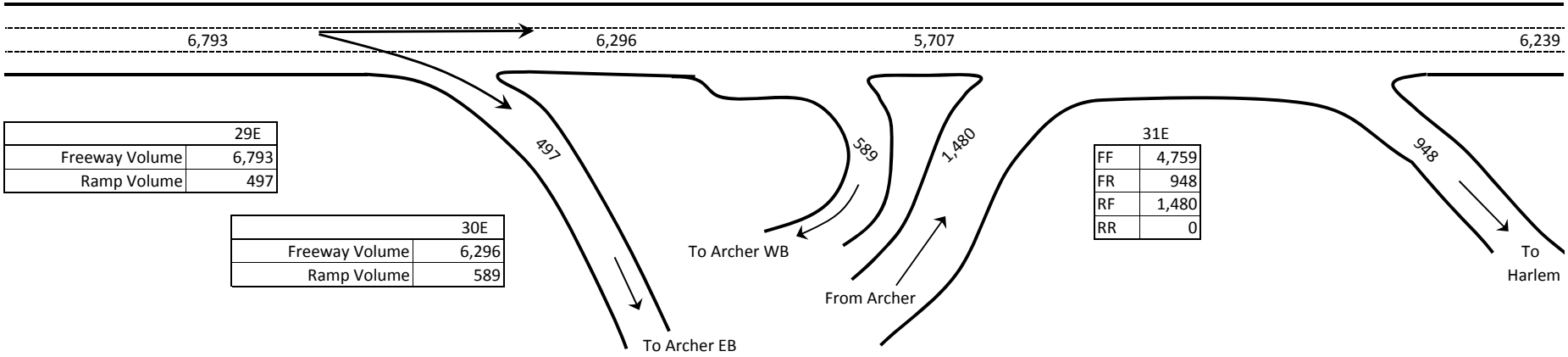
27E

FF	5,820
FR	317
RF	599
RR	0

	28E
Freeway Volume	6,419
Ramp Volume	374

Volumes for Locations: 29-31

2040 EB PM Volumes



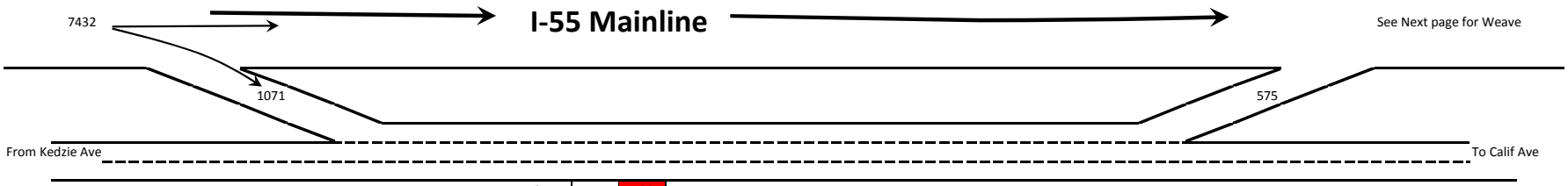
	29E
Freeway Volume	6,793
Ramp Volume	497

	30E
Freeway Volume	6,296
Ramp Volume	589

31E	
FF	4,759
FR	948
RF	1,480
RR	0

Volumes for Locations: 39-40

2040 EB PM Volumes

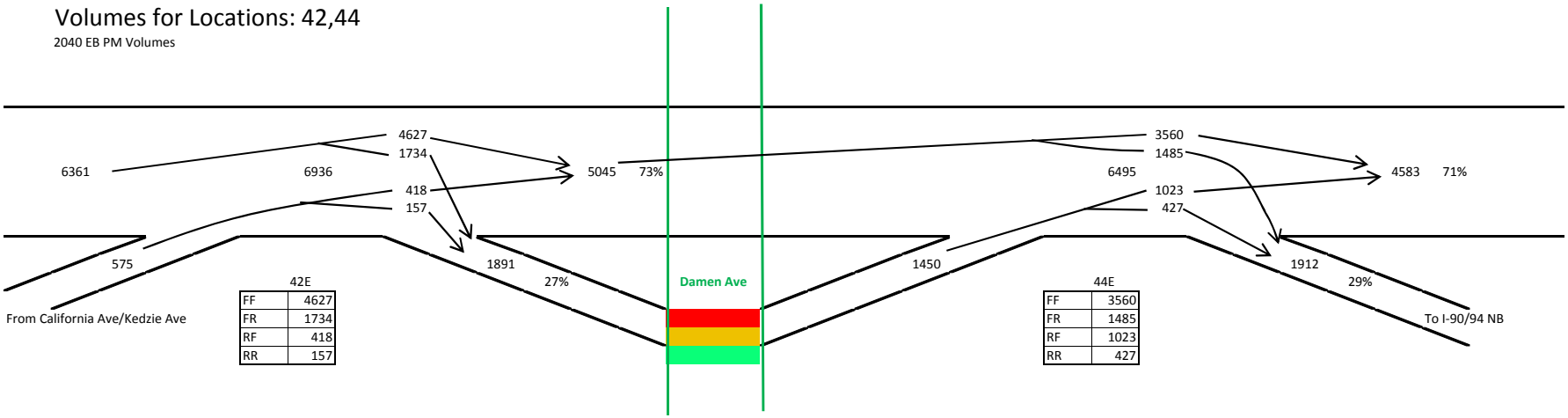


	39E
Freeway Volume	7,432
Ramp Volume	1,071

40E		
	FF	700
	FR	575
	RF	1071
	RR	0

Volumes for Locations: 42,44

2040 EB PM Volumes



42E

FF	4627
FR	1734
RF	418
RR	157

44E

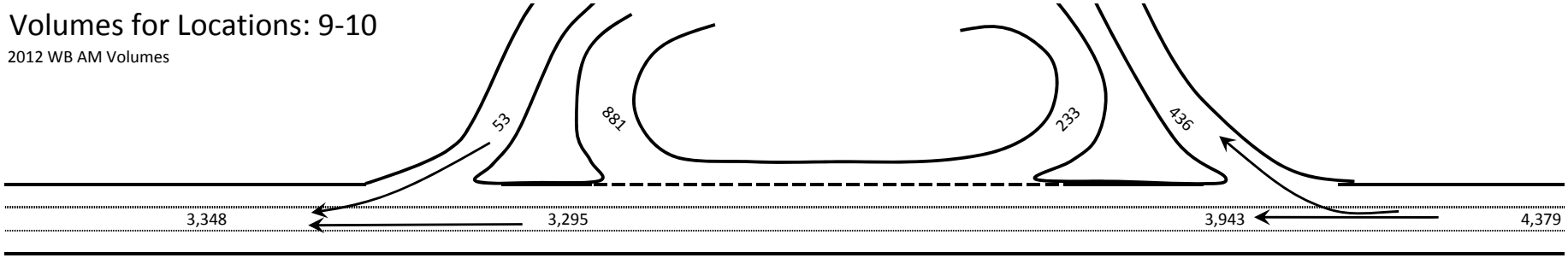
FF	3560
FR	1485
RF	1023
RR	427

2012 Southbound

AM and PM

Volumes for Locations: 9-10

2012 WB AM Volumes



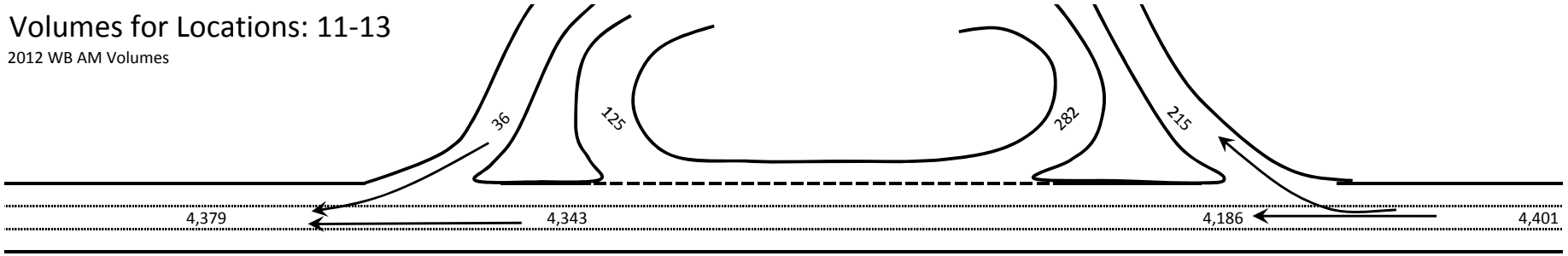
Analyzed as Freeway Segment	

9W	
FF	3,062
FR	881
RF	233
RR	0

	10W
Freeway Volume	4,379
Ramp Volume	436

Volumes for Locations: 11-13

2012 WB AM Volumes



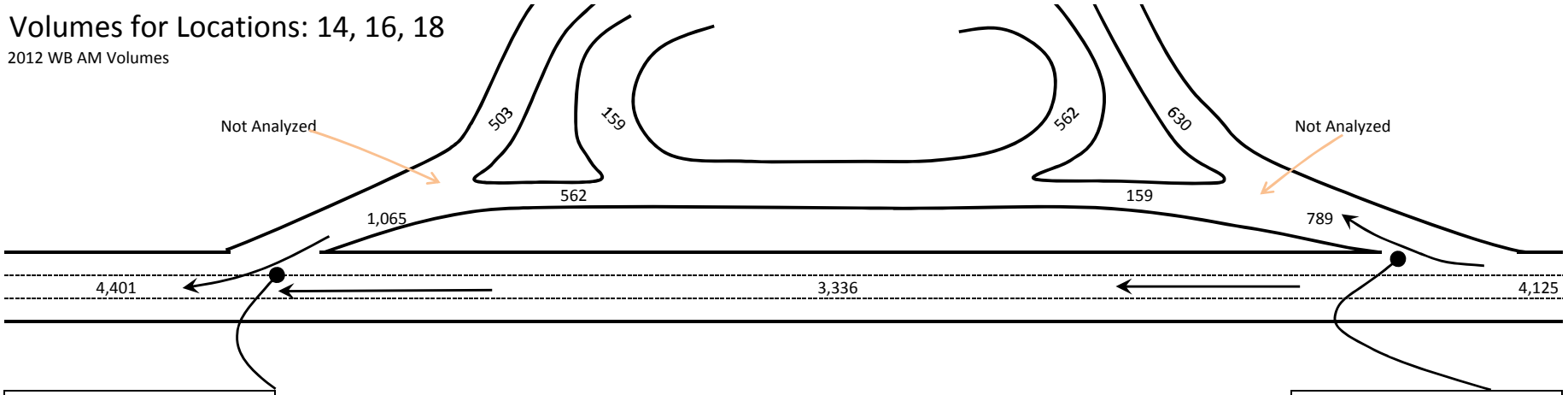
	11W
Freeway Volume	4,343
Ramp Volume	36

12W	
FF	4,061
FR	125
RF	282
RR	0

	13W
Freeway Volume	4,401
Ramp Volume	215

Volumes for Locations: 14, 16, 18

2012 WB AM Volumes



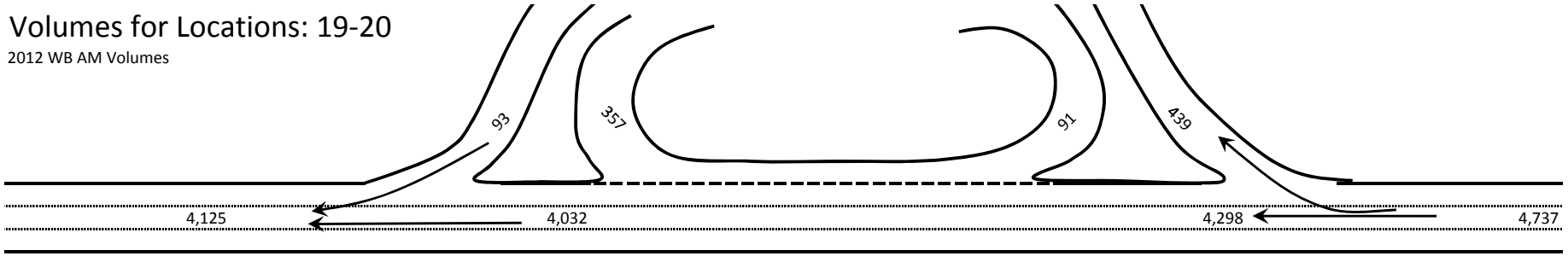
	14W
Freeway Volume	3,336
Ramp Volume	1,065

16W	
FF	0
FR	159
RF	562
RR	0

	18W
Freeway Volume	4,125
Ramp Volume	789

Volumes for Locations: 19-20

2012 WB AM Volumes



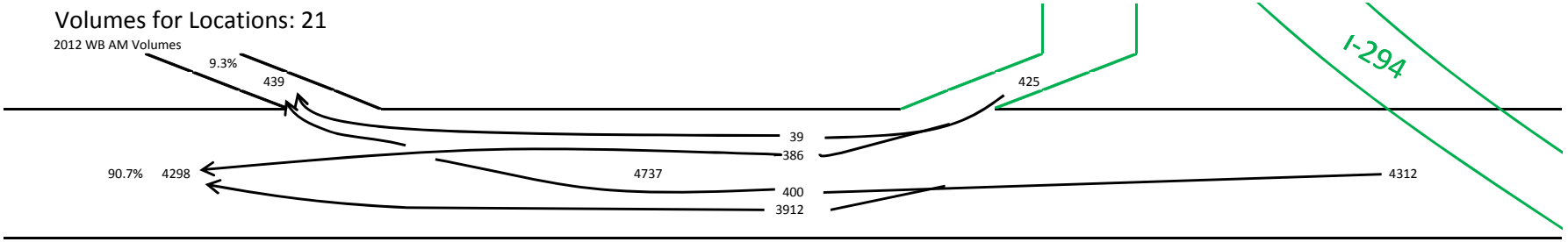
	19W
Freeway Volume	4,032
Ramp Volume	93

20W	
FF	3,941
FR	357
RF	91
RR	0

	See Next Page

Volumes for Locations: 21

2012 WB AM Volumes

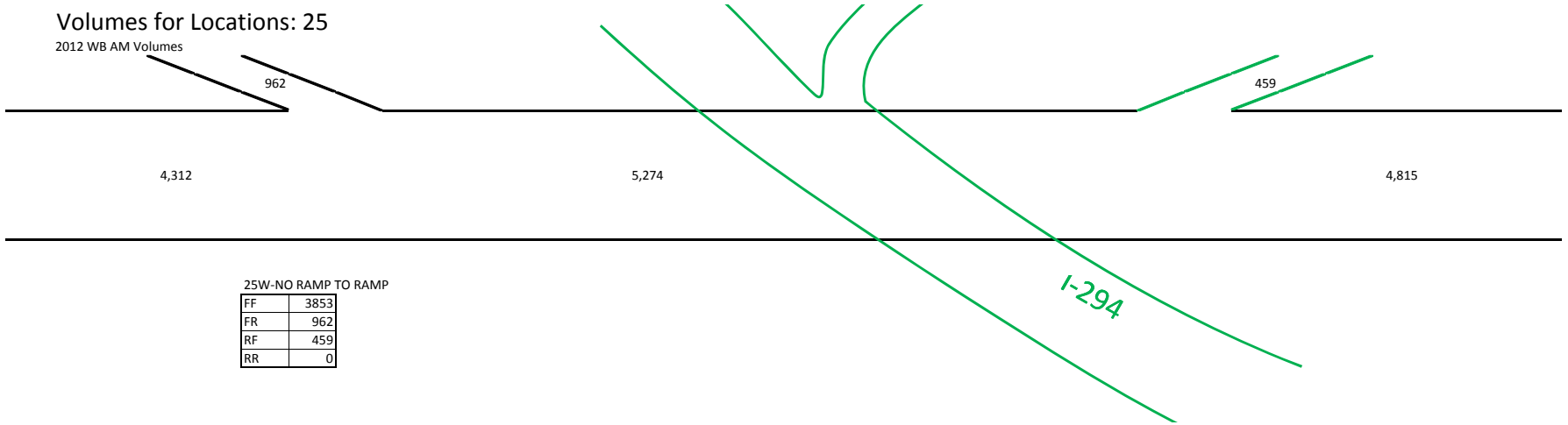


21W-Proportional distribution of traffic

FF	3912
FR	400
RF	386
RR	39

Volumes for Locations: 25

2012 WB AM Volumes

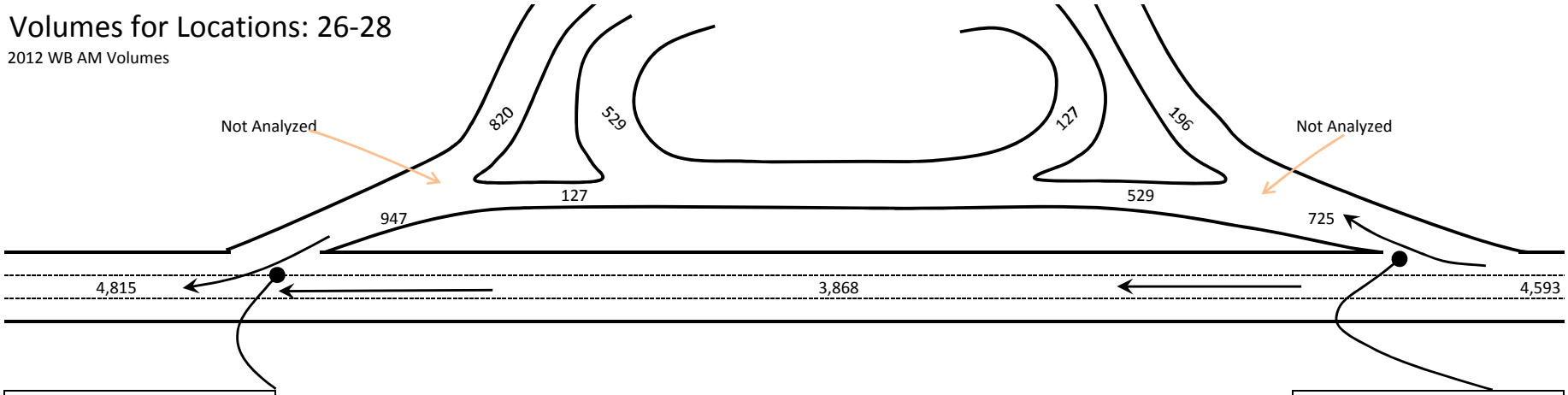


25W-NO RAMP TO RAMP

FF	3853
FR	962
RF	459
RR	0

Volumes for Locations: 26-28

2012 WB AM Volumes



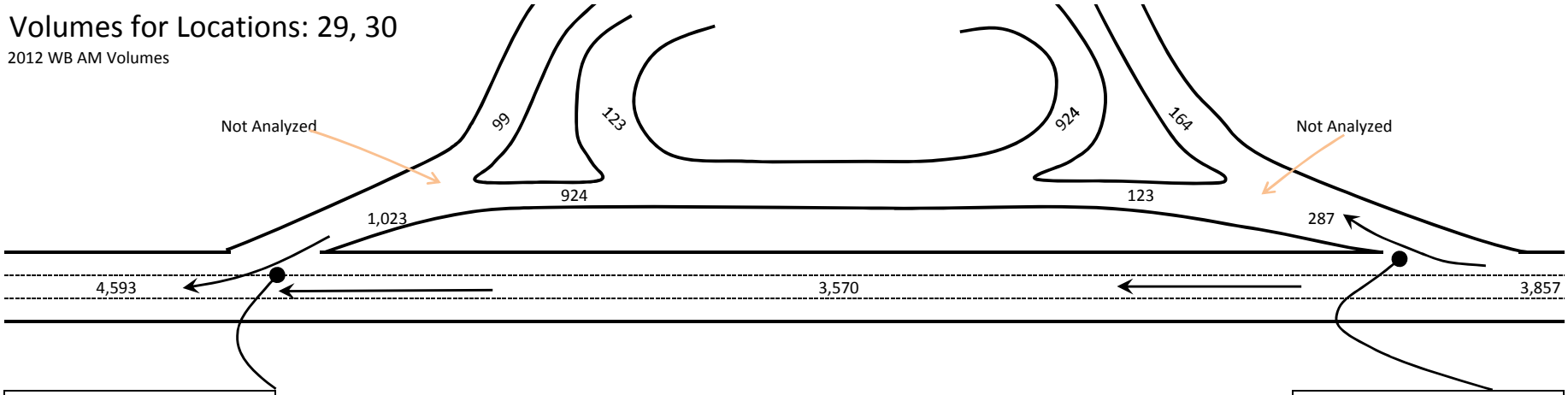
	26W
Freeway Volume	3,868
Ramp Volume	947

27W	
FF	0
FR	529
RF	127
RR	0

	28W
Freeway Volume	4,593
Ramp Volume	725

Volumes for Locations: 29, 30

2012 WB AM Volumes



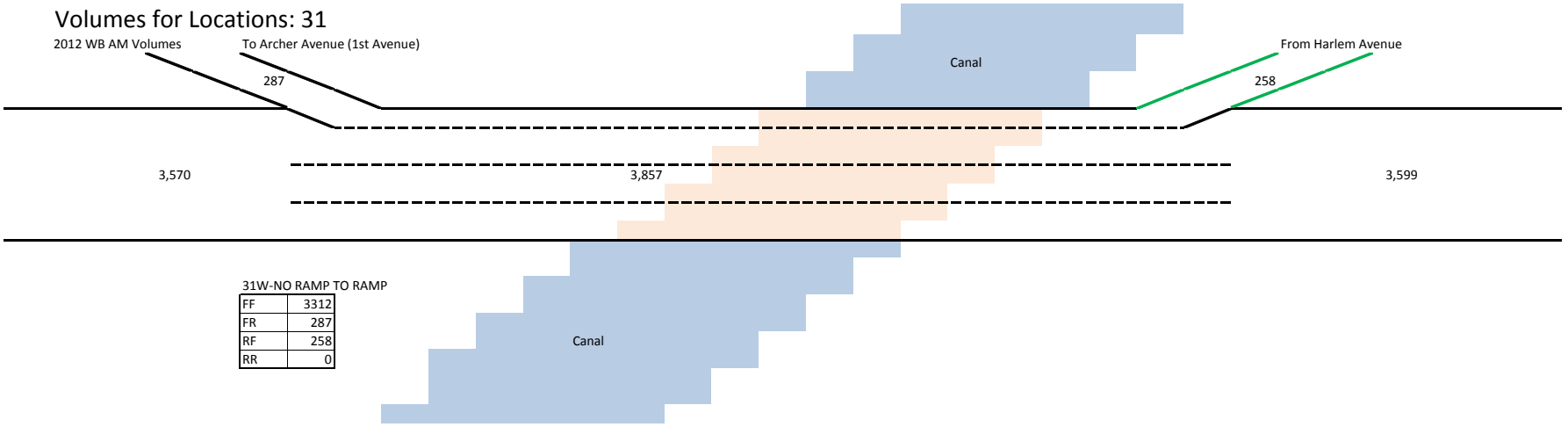
	29W
Freeway Volume	3,570
Ramp Volume	1,023

30W

FF	0
FR	123
RF	924
RR	0

	See Next Page
Freeway Volume	3,857
Ramp Volume	287

Volumes for Locations: 31

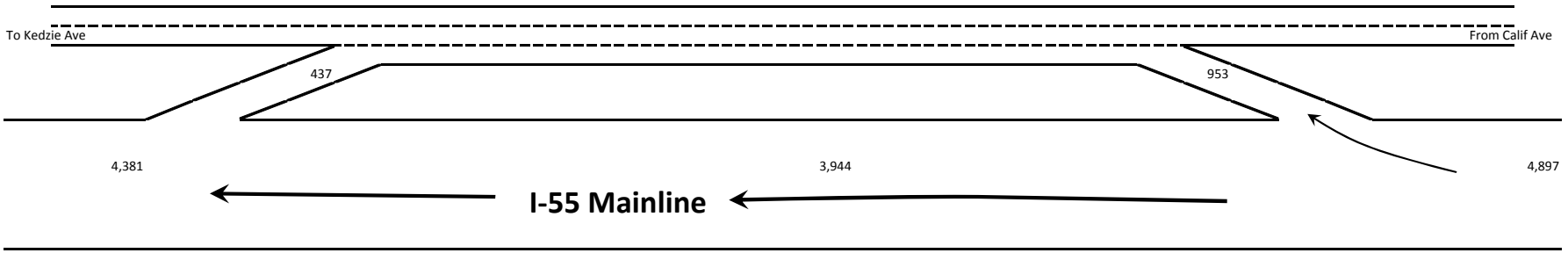


31W-NO RAMP TO RAMP

FF	3312
FR	287
RF	258
RR	0

Volumes for Locations: 39-41

2012 WB AM Volumes



	39W
Freeway Volume	3,944
Ramp Volume	437

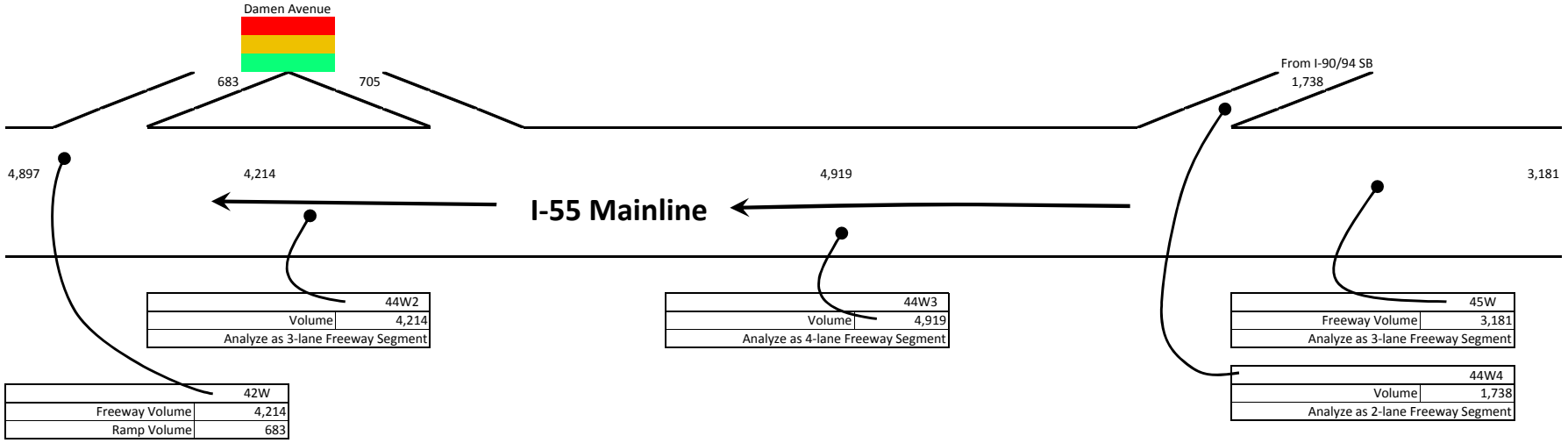
40W

FF	700
FR	437
RF	953
RR	0

	41W
Freeway Volume	4,897
Ramp Volume	953

Volumes for Locations: 42, 44-45

2012 WB AM Volumes



42W	
Freeway Volume	4,214
Ramp Volume	683

44W2	
Volume	4,214
Analyze as 3-lane Freeway Segment	

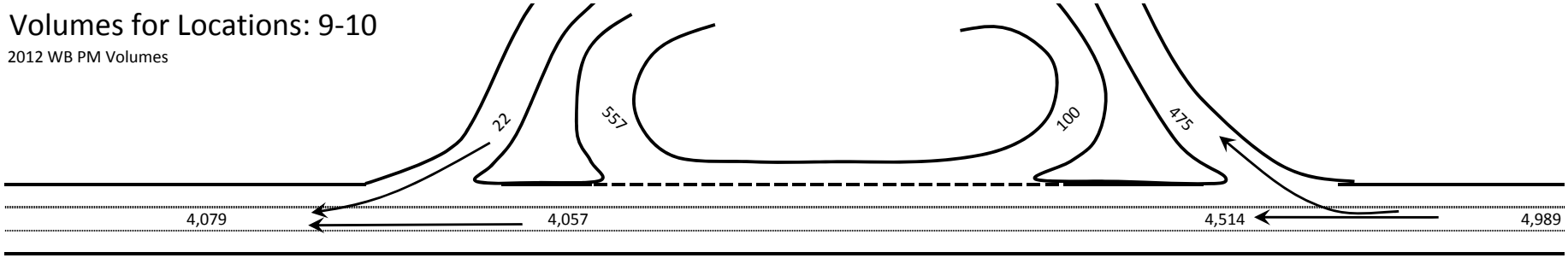
44W3	
Volume	4,919
Analyze as 4-lane Freeway Segment	

45W	
Freeway Volume	3,181
Analyze as 3-lane Freeway Segment	

44W4	
Volume	1,738
Analyze as 2-lane Freeway Segment	

Volumes for Locations: 9-10

2012 WB PM Volumes



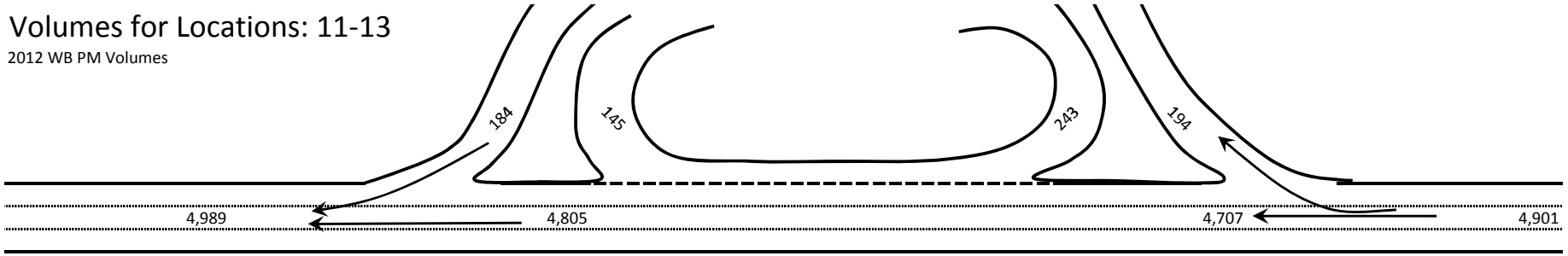
Analyzed as Freeway Segment	

9W	
FF	3,957
FR	557
RF	100
RR	0

	10W
Freeway Volume	4,989
Ramp Volume	475

Volumes for Locations: 11-13

2012 WB PM Volumes



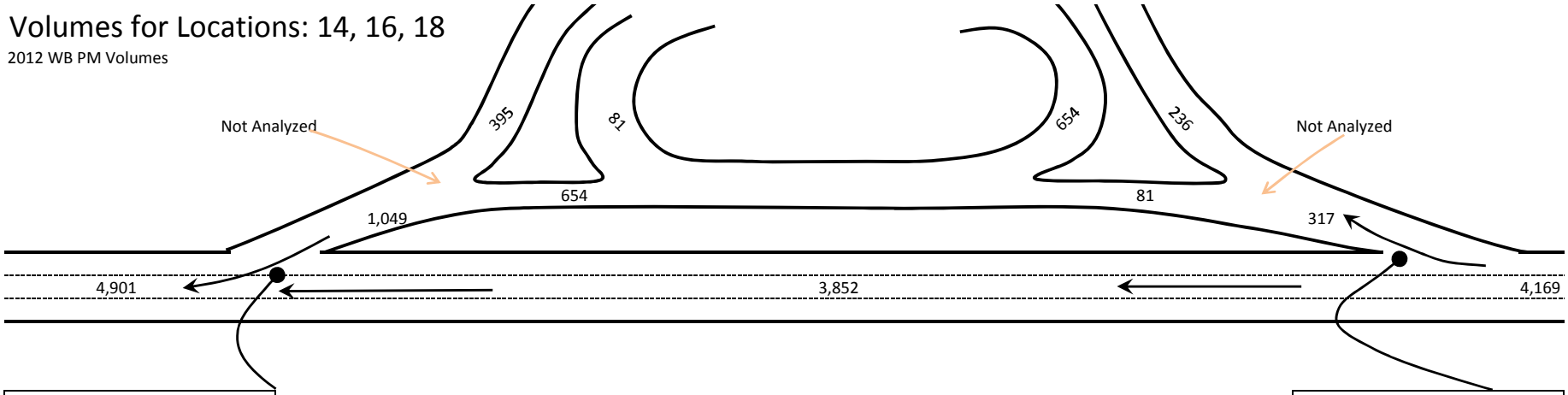
	11W
Freeway Volume	4,805
Ramp Volume	184

12W	
FF	4,562
FR	145
RF	243
RR	0

	13W
Freeway Volume	4,901
Ramp Volume	194

Volumes for Locations: 14, 16, 18

2012 WB PM Volumes



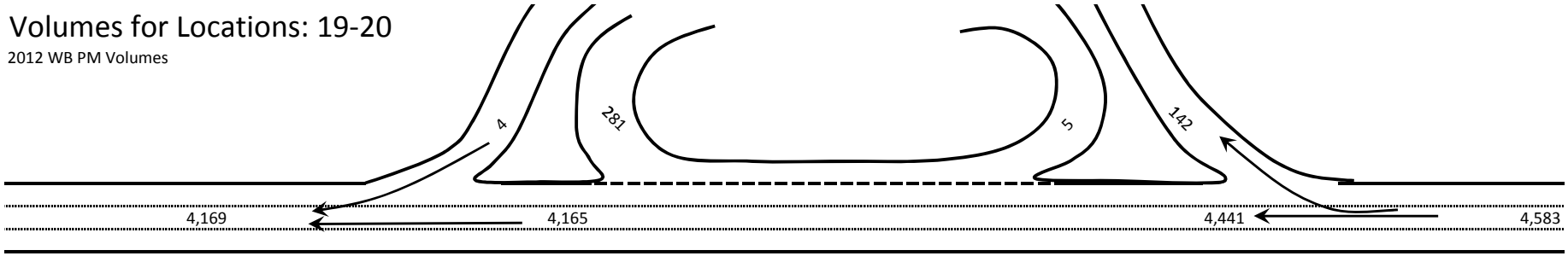
	14W
Freeway Volume	3,852
Ramp Volume	1,049

16W	
FF	0
FR	81
RF	654
RR	0

	18W
Freeway Volume	4,169
Ramp Volume	317

Volumes for Locations: 19-20

2012 WB PM Volumes



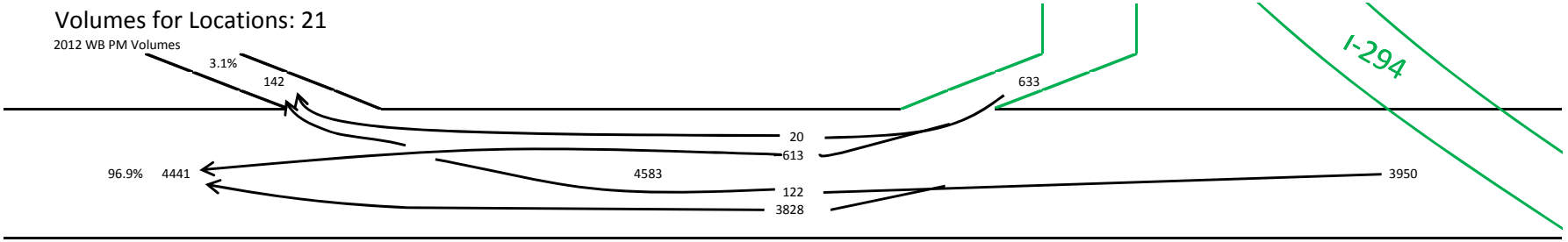
	19W
Freeway Volume	4,165
Ramp Volume	4

20W	
FF	4,160
FR	281
RF	5
RR	0

See Next Page	

Volumes for Locations: 21

2012 WB PM Volumes

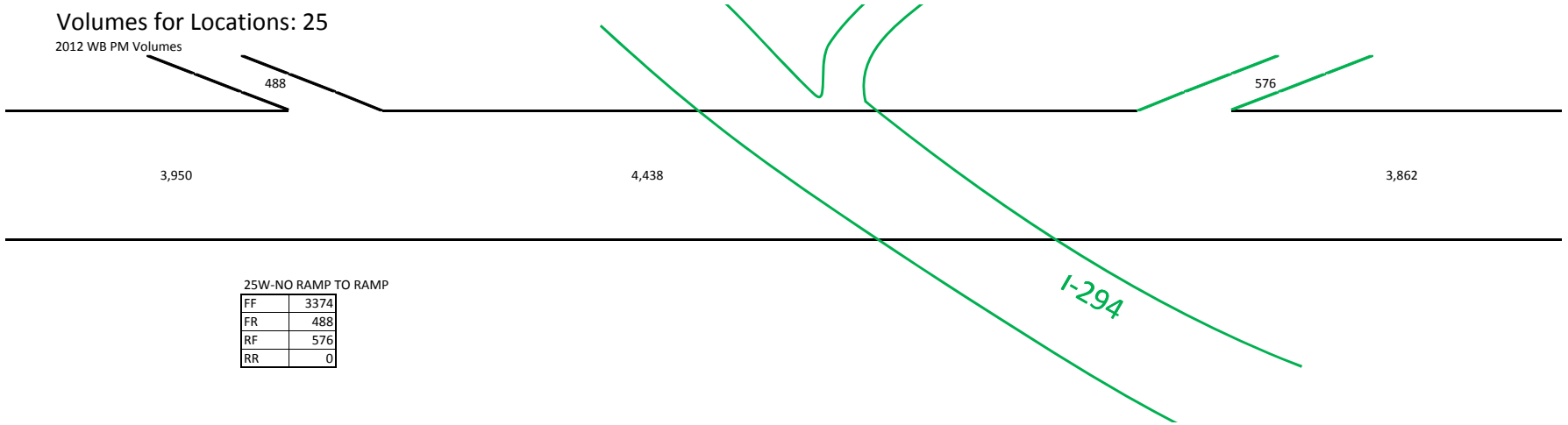


21W-Proportional distribution of traffic

FF	3828
FR	122
RF	613
RR	20

Volumes for Locations: 25

2012 WB PM Volumes

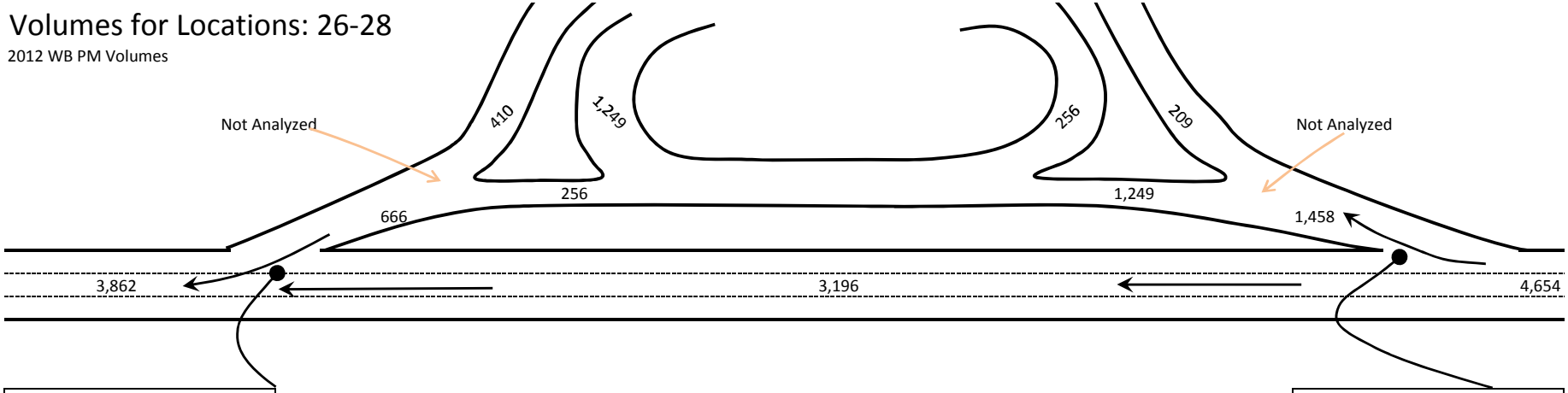


25W-NO RAMP TO RAMP

FF	3374
FR	488
RF	576
RR	0

Volumes for Locations: 26-28

2012 WB PM Volumes



	26W
Freeway Volume	3,196
Ramp Volume	666

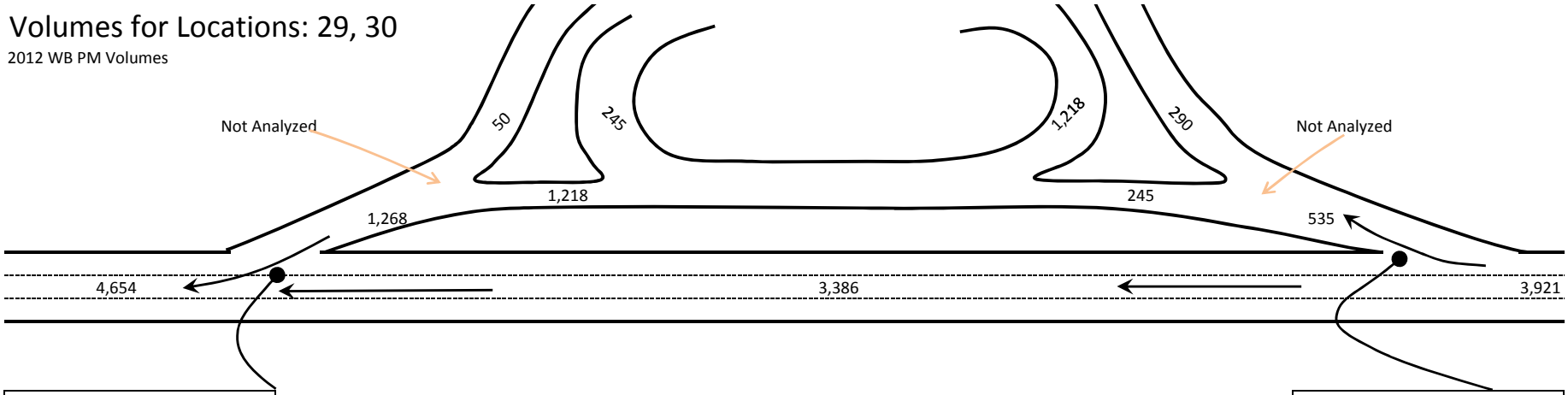
27W

FF	0
FR	1,249
RF	256
RR	0

	28W
Freeway Volume	4,654
Ramp Volume	1,458

Volumes for Locations: 29, 30

2012 WB PM Volumes



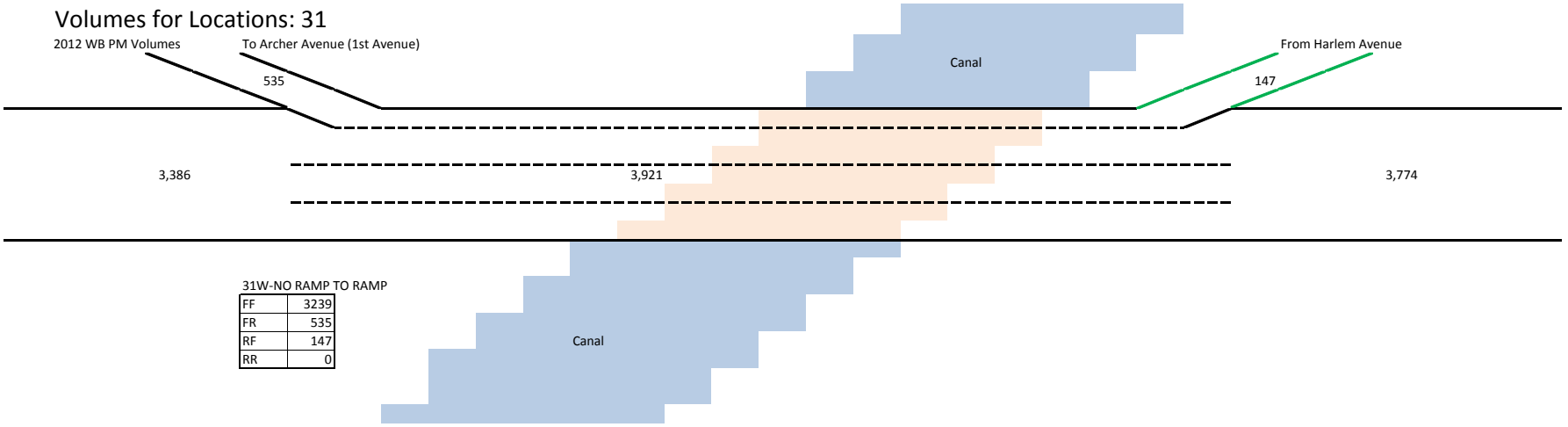
	29W
Freeway Volume	3,386
Ramp Volume	1,268

30W

FF	0
FR	245
RF	1,218
RR	0

	See Next Page
Freeway Volume	3,921
Ramp Volume	535

Volumes for Locations: 31

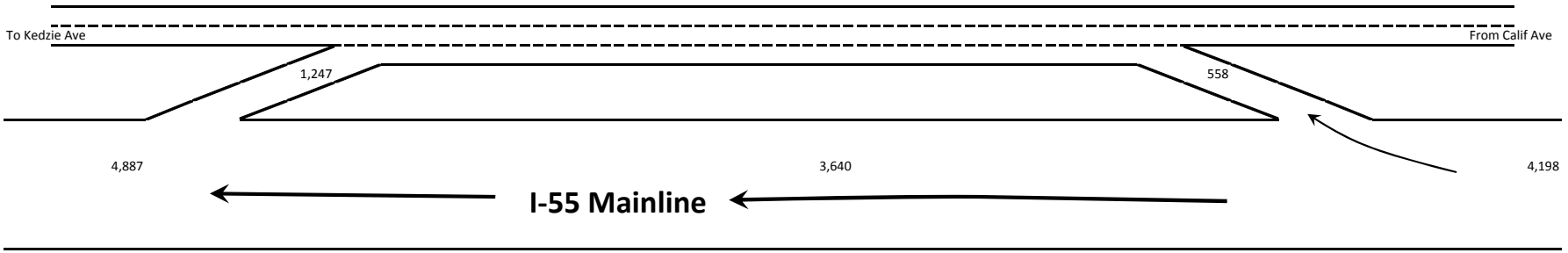


31W-NO RAMP TO RAMP

FF	3239
FR	535
RF	147
RR	0

Volumes for Locations: 39-41

2012 WB PM Volumes



	39W
Freeway Volume	3,640
Ramp Volume	1,247

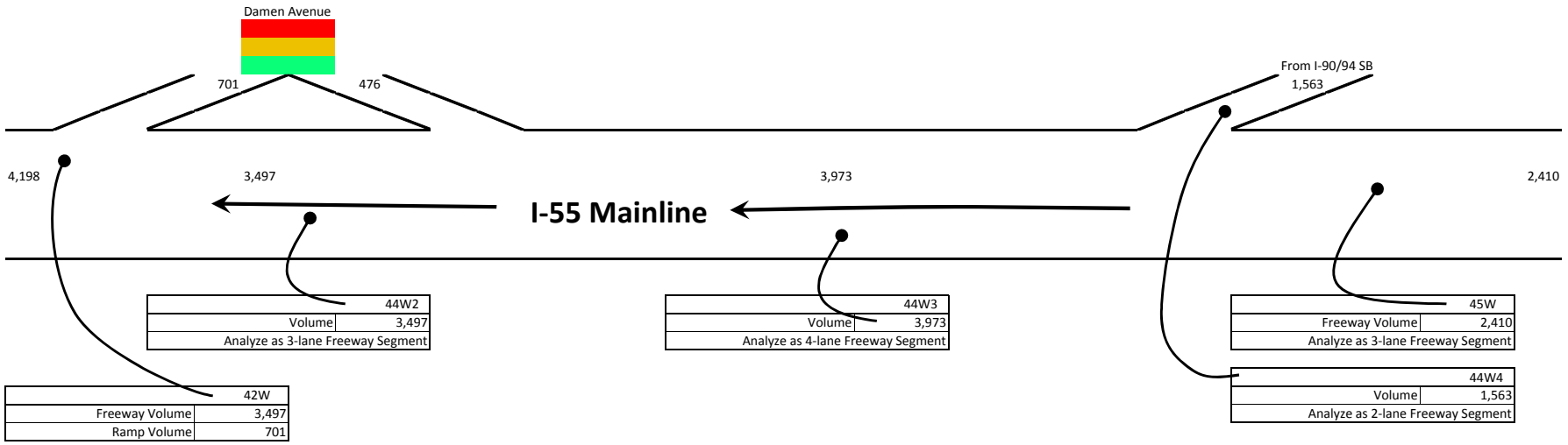
40W

FF	700
FR	1247
RF	558
RR	0

	41W
Freeway Volume	4,198
Ramp Volume	558

Volumes for Locations: 42, 44-45

2012 WB PM Volumes



	42W
Freeway Volume	3,497
Ramp Volume	701

	44W2
Volume	3,497
Analyze as 3-lane Freeway Segment	

	44W3
Volume	3,973
Analyze as 4-lane Freeway Segment	

	45W
Freeway Volume	2,410
Analyze as 3-lane Freeway Segment	

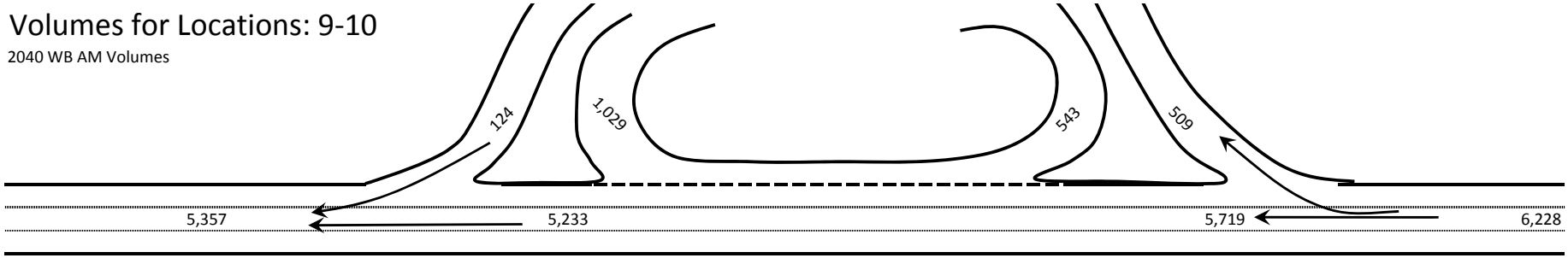
	44W4
Volume	1,563
Analyze as 2-lane Freeway Segment	

2040 Southbound

AM and PM

Volumes for Locations: 9-10

2040 WB AM Volumes



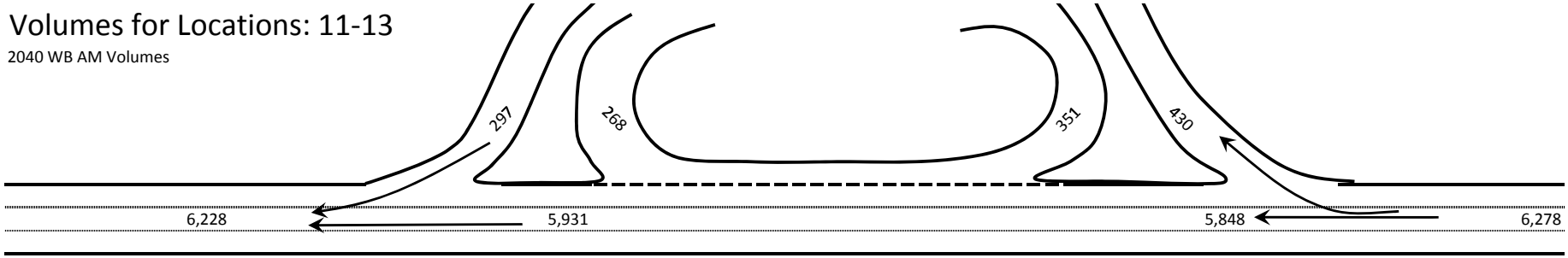
Analyzed as Freeway Segment	

9W	
FF	4,690
FR	1,029
RF	543
RR	0

	10W
Freeway Volume	6,228
Ramp Volume	509

Volumes for Locations: 11-13

2040 WB AM Volumes



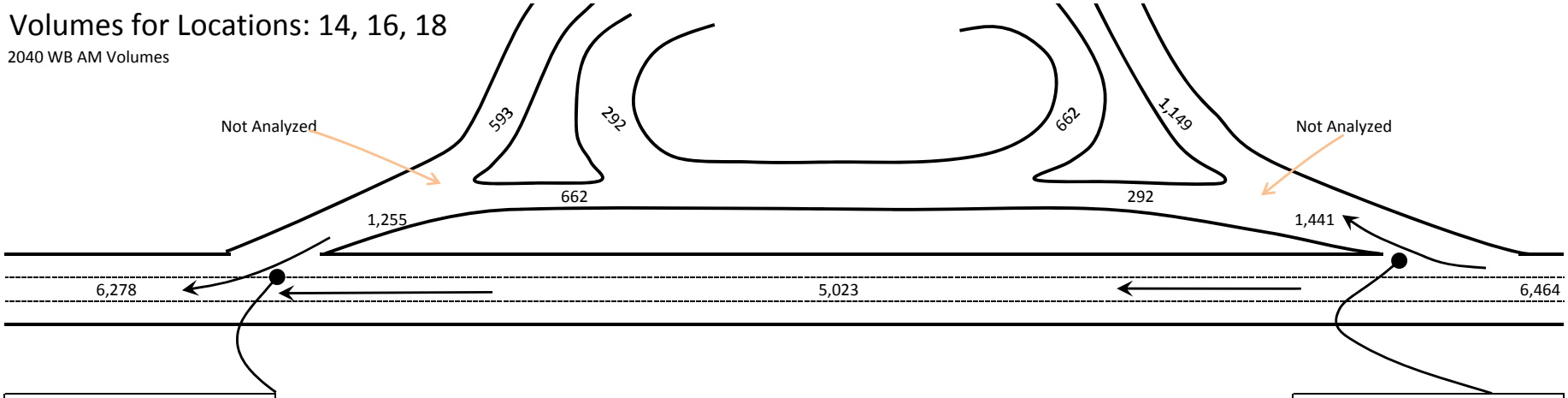
	11W
Freeway Volume	5,931
Ramp Volume	297

12W	
FF	5,580
FR	268
RF	351
RR	0

	13W
Freeway Volume	6,278
Ramp Volume	430

Volumes for Locations: 14, 16, 18

2040 WB AM Volumes



	14W
Freeway Volume	5,023
Ramp Volume	1,255

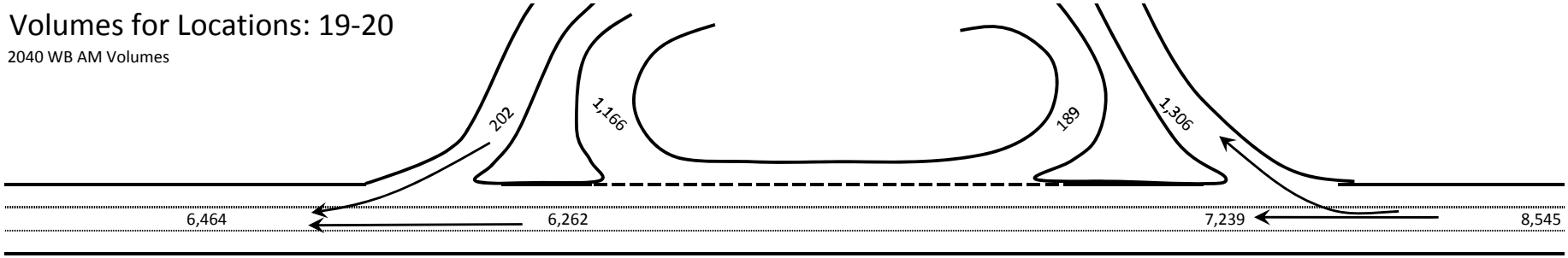
16W

FF	0
FR	292
RF	662
RR	0

	18W
Freeway Volume	6,464
Ramp Volume	1,441

Volumes for Locations: 19-20

2040 WB AM Volumes



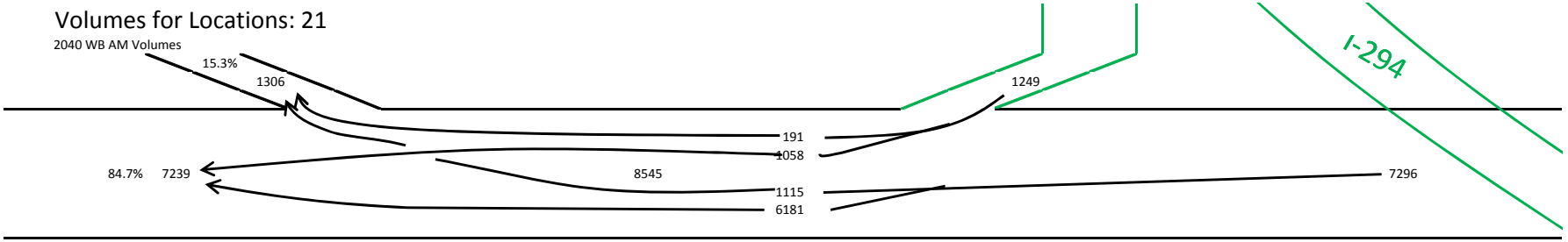
	19W
Freeway Volume	6,262
Ramp Volume	202

20W	
FF	6,073
FR	1,166
RF	189
RR	0

See Next Page	

Volumes for Locations: 21

2040 WB AM Volumes

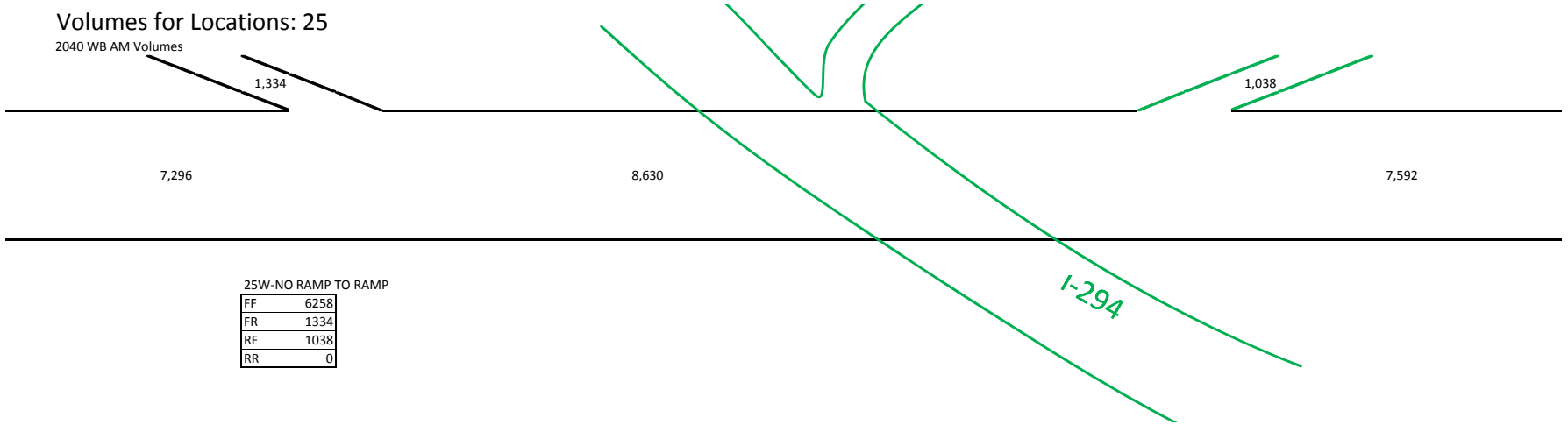


21W-Proportional distribution of traffic

FF	6181
FR	1115
RF	1058
RR	191

Volumes for Locations: 25

2040 WB AM Volumes

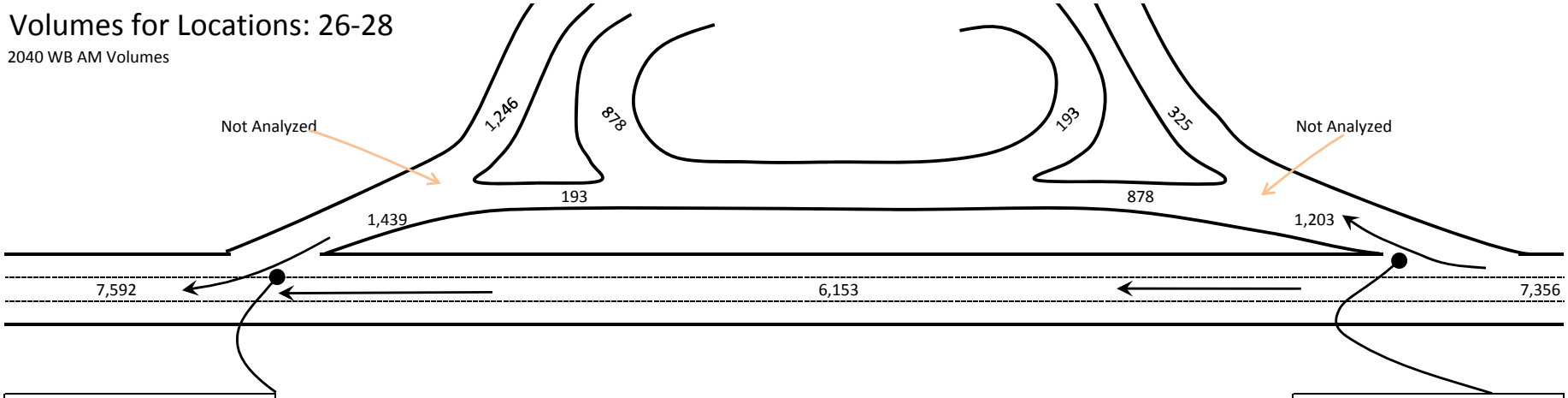


25W-NO RAMP TO RAMP

FF	6258
FR	1334
RF	1038
RR	0

Volumes for Locations: 26-28

2040 WB AM Volumes



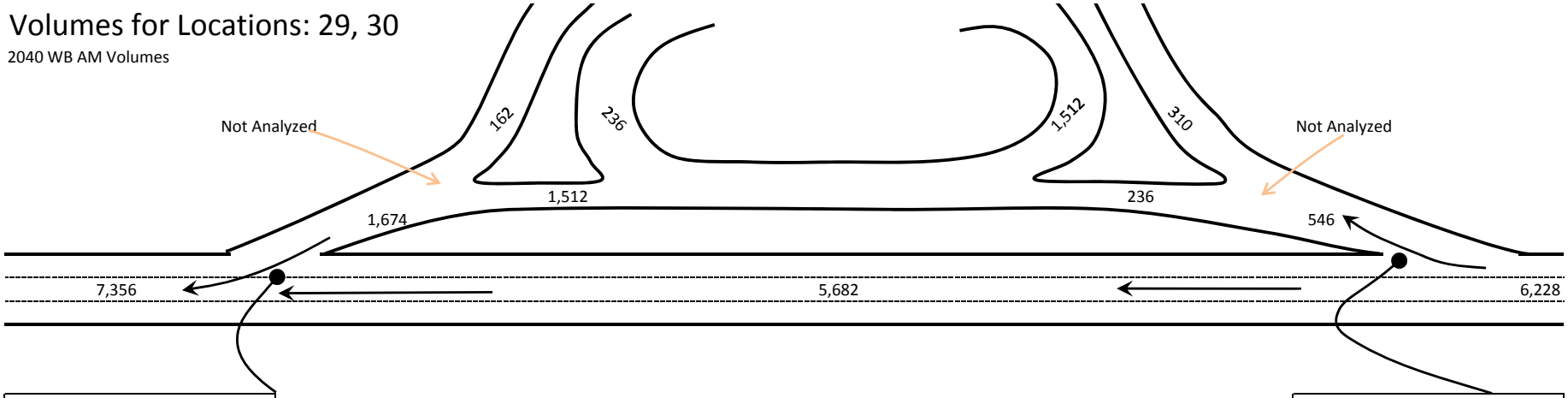
	26W
Freeway Volume	6,153
Ramp Volume	1,439

27W	
FF	0
FR	878
RF	193
RR	0

	28W
Freeway Volume	7,356
Ramp Volume	1,203

Volumes for Locations: 29, 30

2040 WB AM Volumes



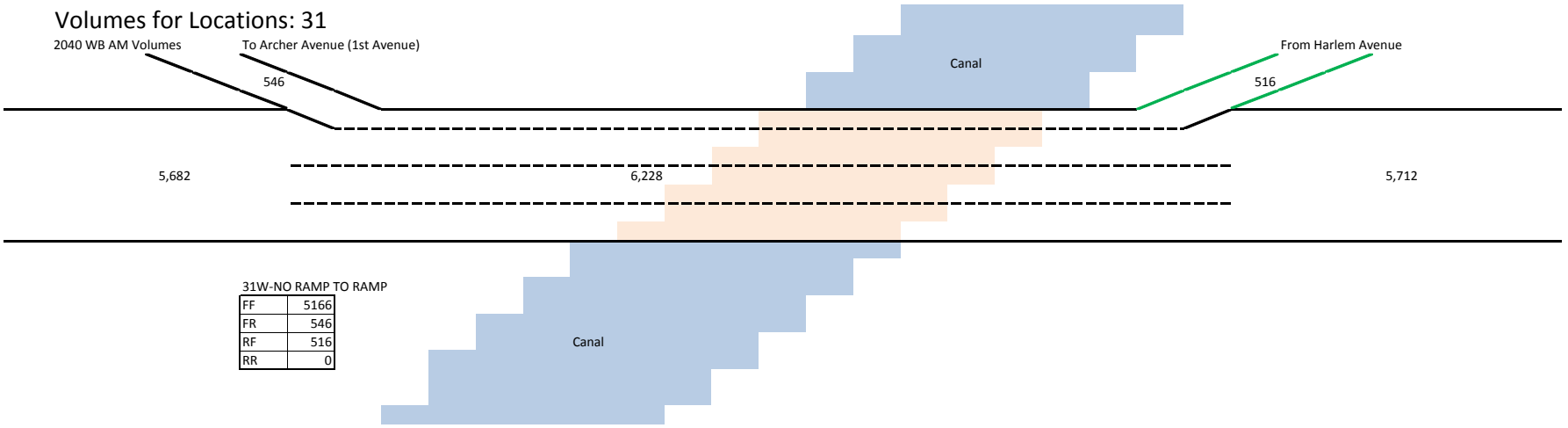
	29W
Freeway Volume	5,682
Ramp Volume	1,674

30W

FF	0
FR	236
RF	1,512
RR	0

	See Next Page
Freeway Volume	6,228
Ramp Volume	546

Volumes for Locations: 31

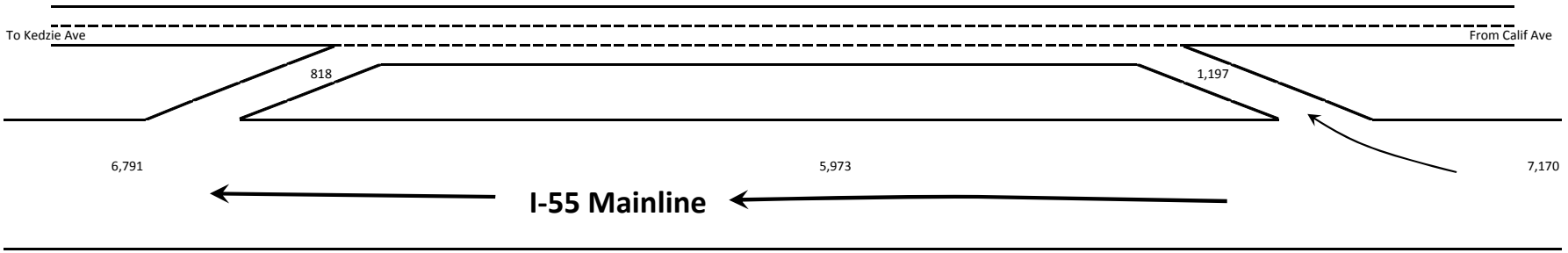


31W-NO RAMP TO RAMP

FF	5166
FR	546
RF	516
RR	0

Volumes for Locations: 39-41

2040 WB AM Volumes



	39W
Freeway Volume	5,973
Ramp Volume	818

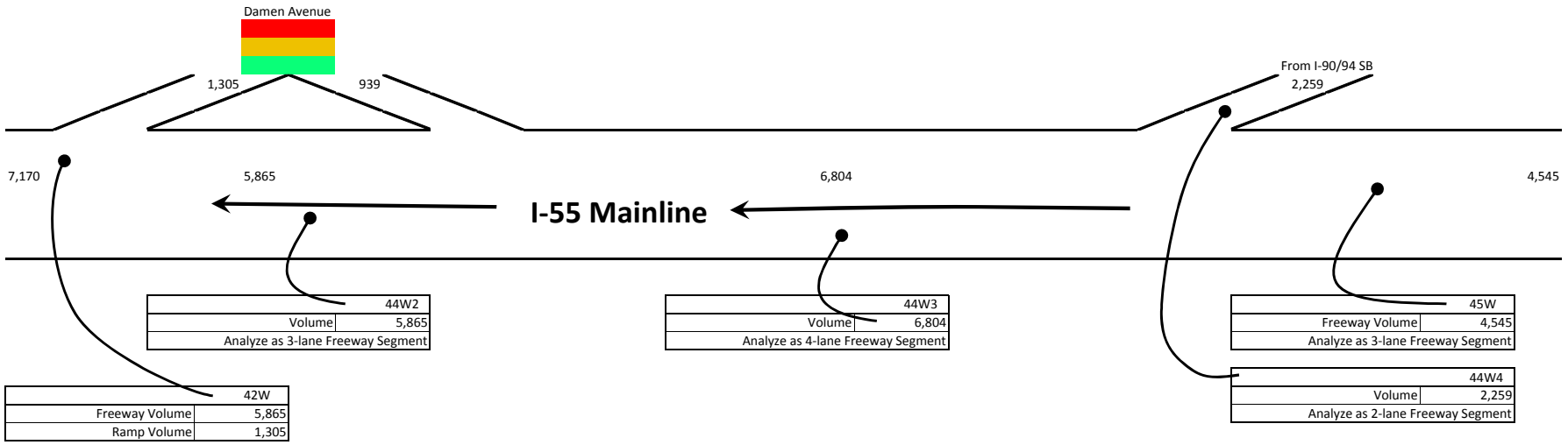
40W

FF	700
FR	818
RF	1197
RR	0

	41W
Freeway Volume	7,170
Ramp Volume	1,197

Volumes for Locations: 42, 44-45

2040 WB AM Volumes



42W	
Freeway Volume	5,865
Ramp Volume	1,305

44W2	
Volume	5,865
Analyze as 3-lane Freeway Segment	

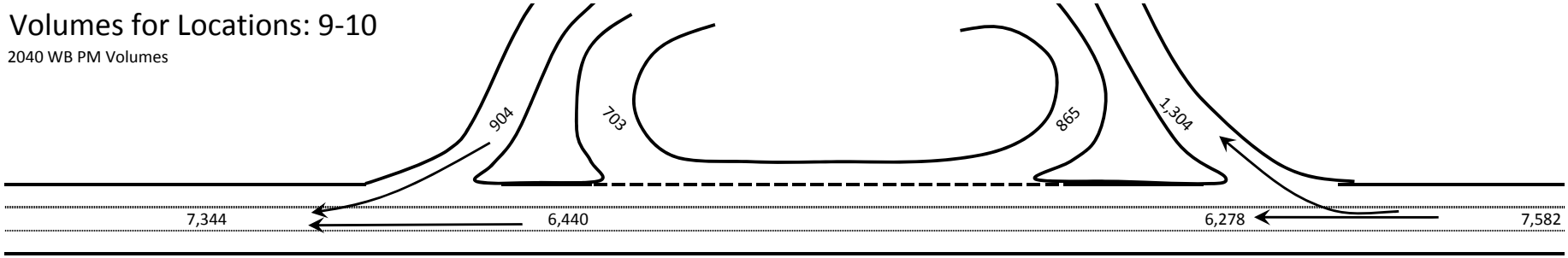
44W3	
Volume	6,804
Analyze as 4-lane Freeway Segment	

45W	
Freeway Volume	4,545
Analyze as 3-lane Freeway Segment	

44W4	
Volume	2,259
Analyze as 2-lane Freeway Segment	

Volumes for Locations: 9-10

2040 WB PM Volumes



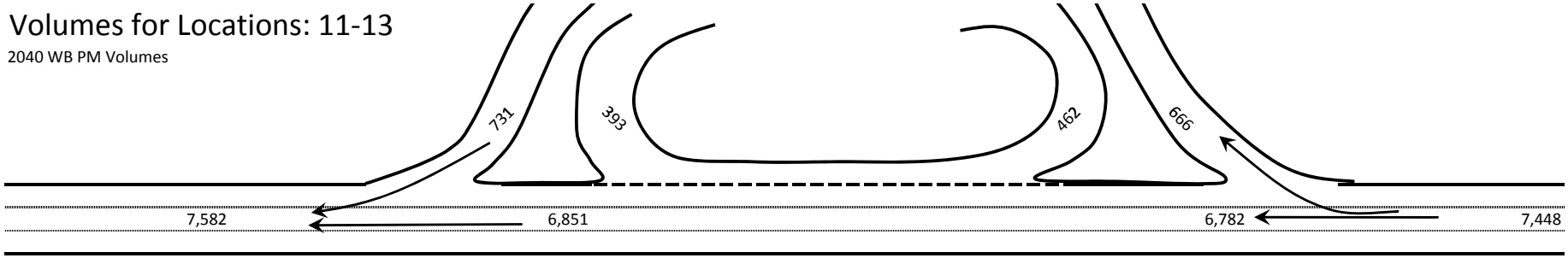
Analyzed as Freeway Segment	

9W	
FF	5,575
FR	703
RF	865
RR	0

	10W
Freeway Volume	7,582
Ramp Volume	1,304

Volumes for Locations: 11-13

2040 WB PM Volumes



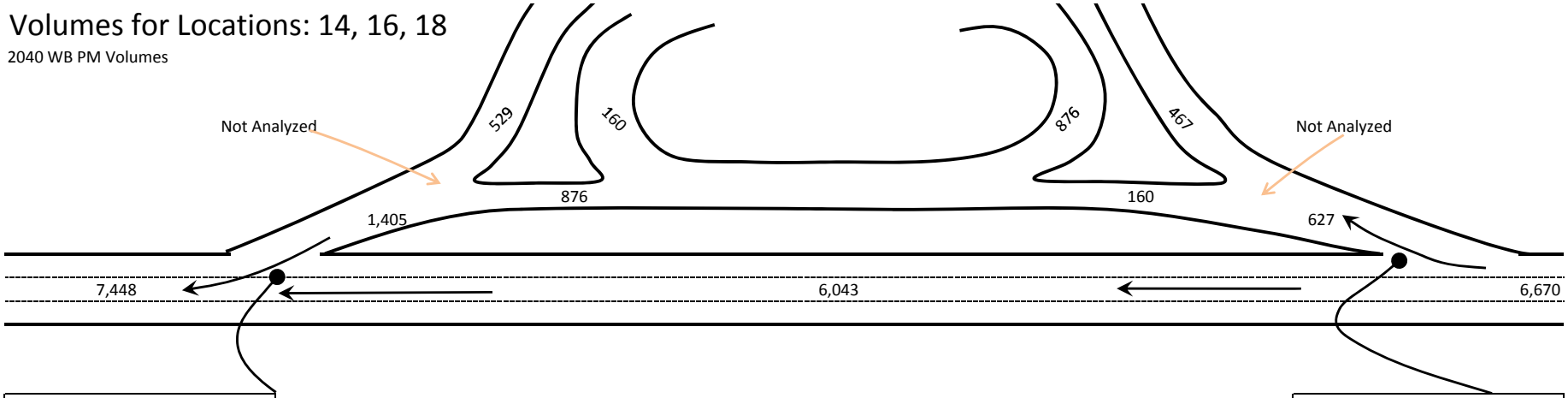
	11W
Freeway Volume	6,851
Ramp Volume	731

12W	
FF	6,389
FR	393
RF	462
RR	0

	13W
Freeway Volume	7,448
Ramp Volume	666

Volumes for Locations: 14, 16, 18

2040 WB PM Volumes



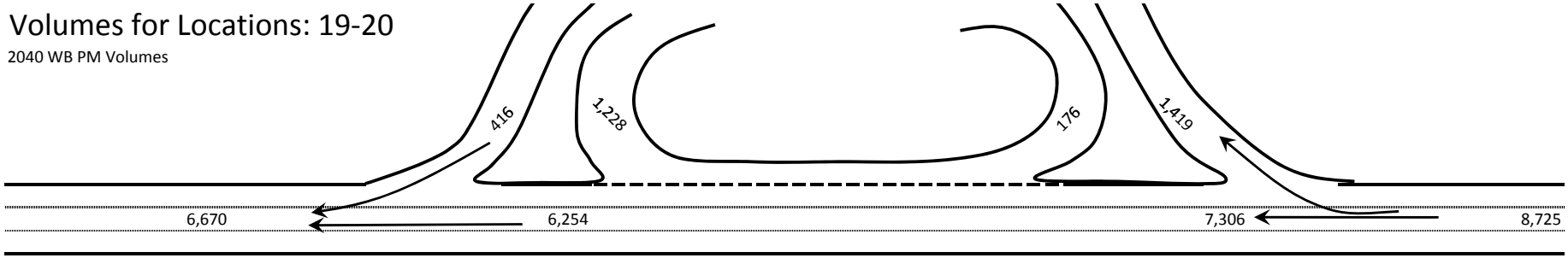
	14W
Freeway Volume	6,043
Ramp Volume	1,405

16W	
FF	0
FR	160
RF	876
RR	0

	18W
Freeway Volume	6,670
Ramp Volume	627

Volumes for Locations: 19-20

2040 WB PM Volumes



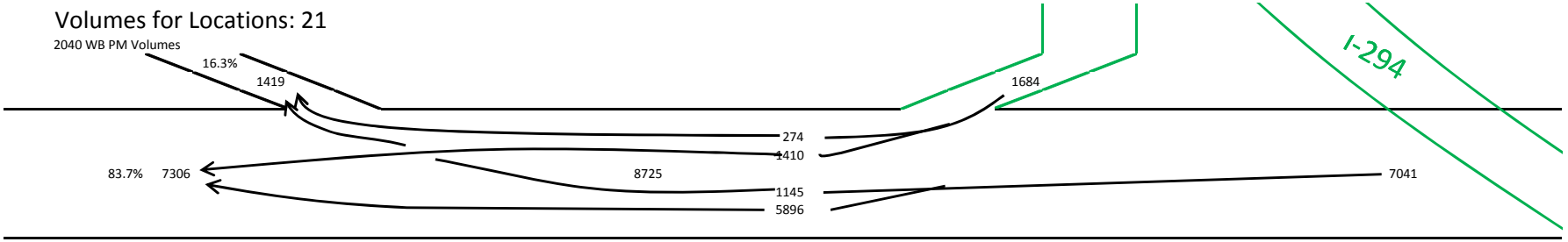
	19W
Freeway Volume	6,254
Ramp Volume	416

20W	
FF	6,078
FR	1,228
RF	176
RR	0

See Next Page	

Volumes for Locations: 21

2040 WB PM Volumes

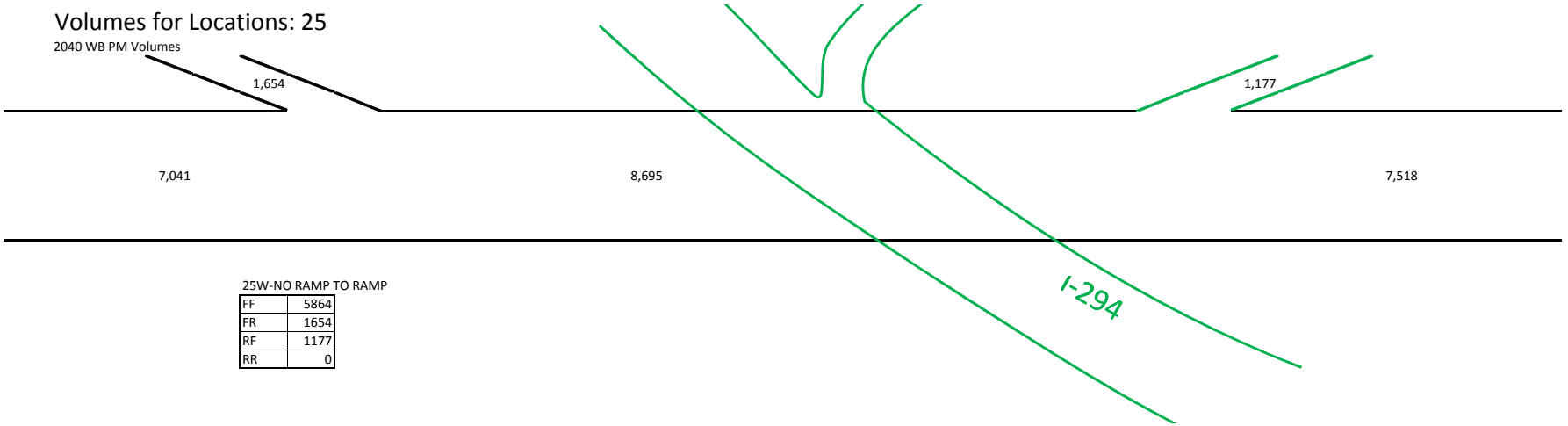


21W-Proportional distribution of traffic

FF	5896
FR	1145
RF	1410
RR	274

Volumes for Locations: 25

2040 WB PM Volumes

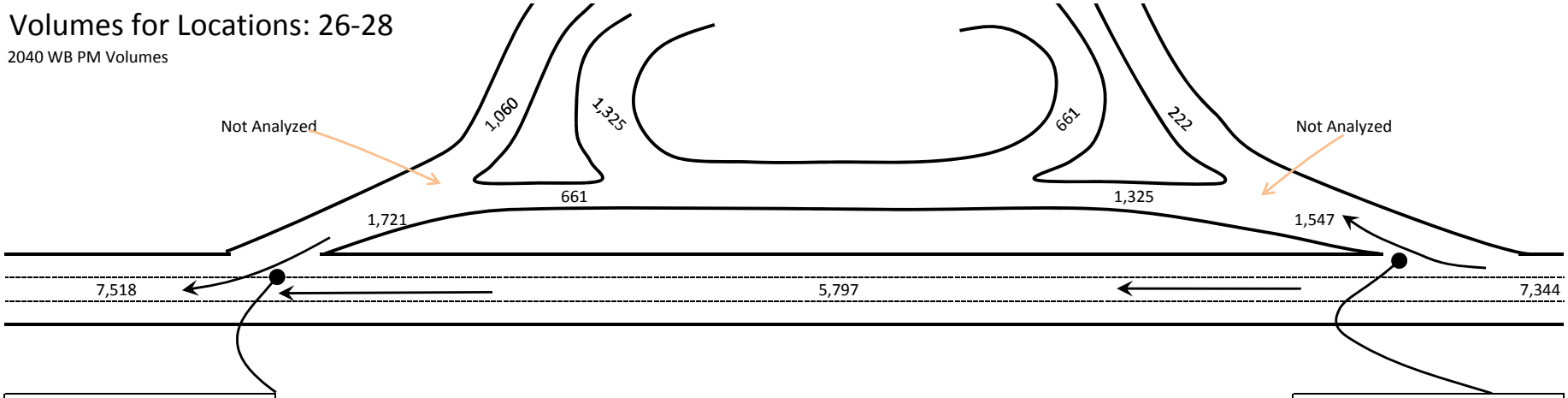


25W-NO RAMP TO RAMP

FF	5864
FR	1654
RF	1177
RR	0

Volumes for Locations: 26-28

2040 WB PM Volumes



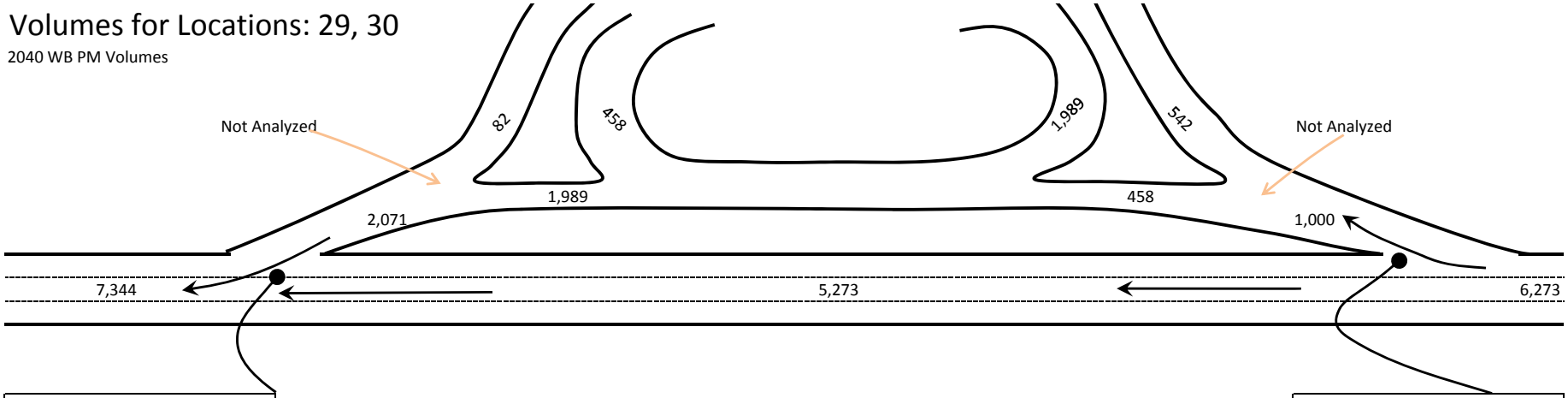
	26W
Freeway Volume	5,797
Ramp Volume	1,721

27W	
FF	0
FR	1,325
RF	661
RR	0

	28W
Freeway Volume	7,344
Ramp Volume	1,547

Volumes for Locations: 29, 30

2040 WB PM Volumes



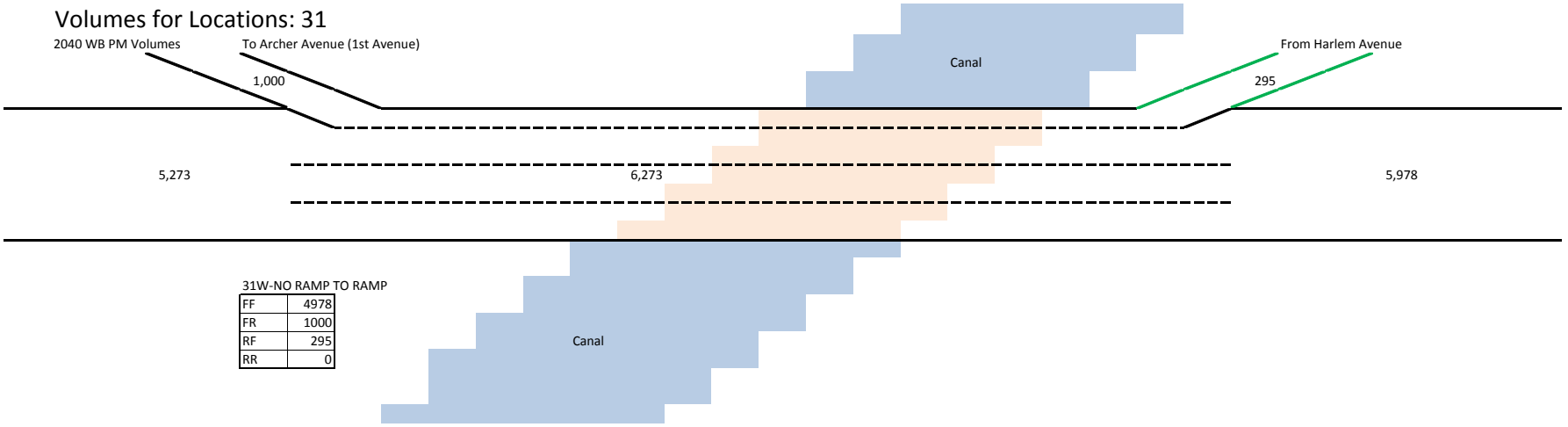
	29W
Freeway Volume	5,273
Ramp Volume	2,071

30W

FF	0
FR	458
RF	1,989
RR	0

	See Next Page
Freeway Volume	6,273
Ramp Volume	1,000

Volumes for Locations: 31

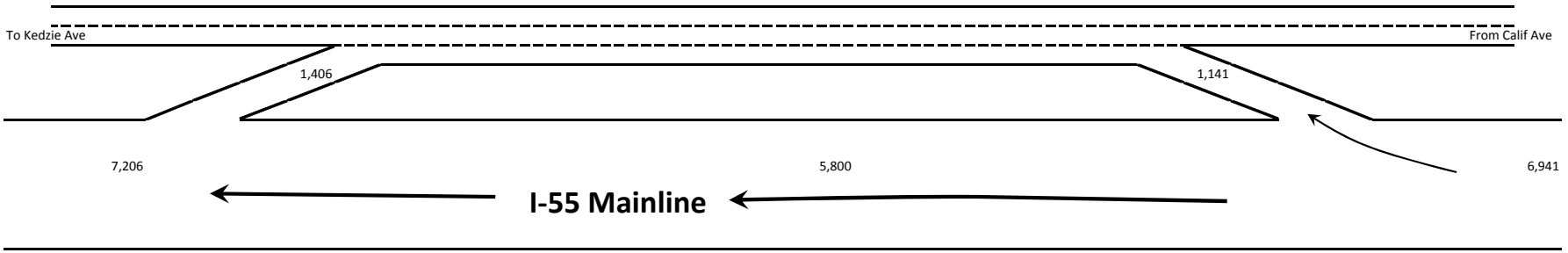


31W-NO RAMP TO RAMP

FF	4978
FR	1000
RF	295
RR	0

Volumes for Locations: 39-41

2040 WB PM Volumes



	39W
Freeway Volume	5,800
Ramp Volume	1,406

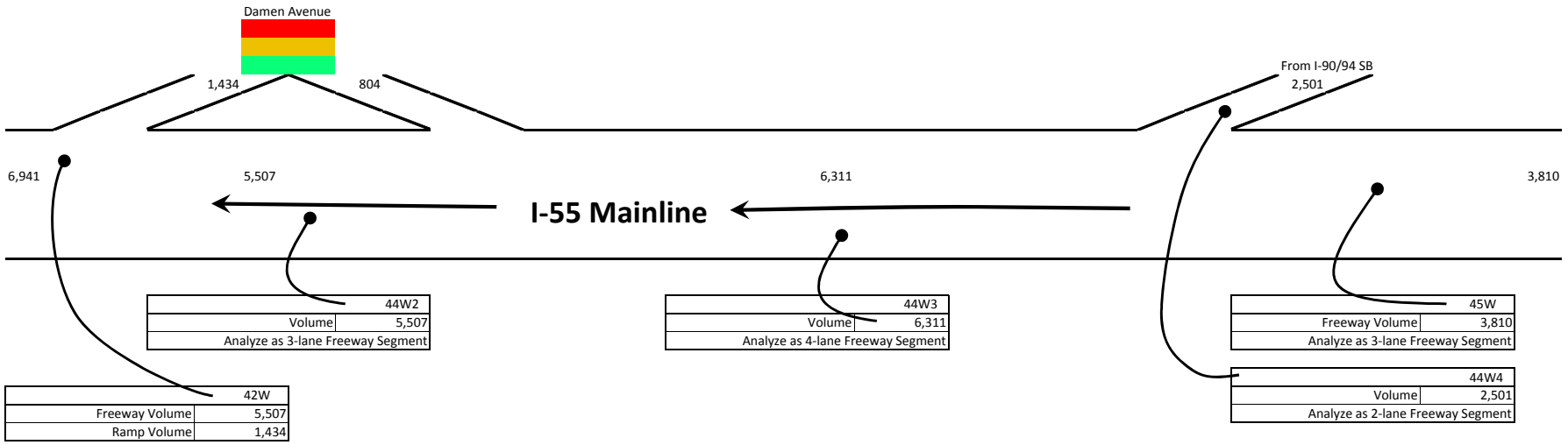
40W

FF	700
FR	1406
RF	1141
RR	0

	41W
Freeway Volume	6,941
Ramp Volume	1,141

Volumes for Locations: 42, 44-45

2040 WB PM Volumes



42W	
Freeway Volume	5,507
Ramp Volume	1,434

44W2	
Volume	5,507
Analyze as 3-lane Freeway Segment	

44W3	
Volume	6,311
Analyze as 4-lane Freeway Segment	

45W	
Freeway Volume	3,810
Analyze as 3-lane Freeway Segment	

44W4	
Volume	2,501
Analyze as 2-lane Freeway Segment	

Technical Memorandum

I-55 PHASE I ENGINEERING STUDY

Veterans Memorial Tollway (I-355) to Dan Ryan Expressway (I-90/94)

BASE AND DESIGN YEAR NO-BUILD COLLECTOR-DISTRIBUTOR ROADWAY PERFORMANCE

APPENDIX D 2012 & 2040 LEVEL OF SERVICE
AUGUST 2014

NOTE ON HCS DIRECTION REFERENCES:

I-55 is designated a north-south facility, and this orientation is used in this memorandum. Some of the HCS file output sheets refer to eastbound or westbound; when this is used “eastbound” refers to I-55 northbound and “westbound” refers to I-55 southbound.

2012 Northbound

AM and PM

HCS 2010: Freeway Weaving Release 6.1

Phone: Fax:
E-mail:

Operational Analysis

Analyst: Caitlin Bowen
Agency/Co.:
Date Performed: 6/13/2013
Analysis Time Period: AM Peak Hour
Freeway/Dir of Travel: I-55 Eastbound
Weaving Location: Kingery Hwy Weave
Analysis Year:
Description:

Inputs

Segment Type	C-D Roadway/ Multilane Highways
Weaving configuration	One-Sided
Number of lanes, N	2 ln
Weaving segment length, LS	550 ft
Freeway free-flow speed, FFS	60 mi/h
Minimum segment speed, SMIN	15 mi/h
Freeway maximum capacity, cIFL	2300 pc/h/ln

Terrain type	Level
Grade	0.00 %
Length	0.00 mi

Conversion to pc/h Under Base Conditions

Volume Components	VFF	VRF	VFR	VRR	
Volume, V	0	320	896	0	veh/h
Peak hour factor, PHF	0.95	0.95	0.95	0.95	
Peak 15-min volume, v15	0	84	236	0	
Trucks and buses	9	9	9	9	%
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	0.957	0.957	0.957	0.957	
Driver population adjustment, fP	1.00	1.00	1.00	1.00	
Flow rate, v	0	352	986	0	pc/h

Volume ratio, VR 1.000

Configuration Characteristics

Number of maneuver lanes, NWL	2 ln
Interchange density, ID	0.00 int/mi
Minimum RF lane changes, LCRF	1 lc/pc
Minimum FR lane changes, LCFR	1 lc/pc
Minimum RR lane changes, LCRR	lc/pc

Minimum weaving lane changes, LCMIN 1338 lc/h
Weaving lane changes, LCW 1363 lc/h
Non-weaving vehicle index, INW 0
Non-weaving lane change, LCNW 0 lc/h
Total lane changes, LCALL 1363 lc/h

_____Weaving and Non-Weaving Speeds_____
Weaving intensity factor, W 0.462
Average weaving speed, SW 45.8 mi/h
Average non-weaving speed, SNW 47.2 mi/h

_____Weaving Segment Speed, Density, Level of Service and Capacity_____
Weaving segment speed, S 45.8 mi/h
Weaving segment density, D 14.6 pc/mi/ln
Level of service, LOS B
Weaving segment v/c ratio 0.557
Weaving segment flow rate, v 1338 pc/h
Weaving segment capacity, cW 2297 veh/h

_____Limitations on Weaving Segments_____
If limit reached, see note.

	Minimum	Maximum	Actual	Note
Weaving length (ft)	300	14232	550	a,b
	Maximum	Analyzed		
Density-based capacty, cIWL (pc/h/ln)	2300	1253		c
	Maximum	Analyzed		
v/c ratio	1.00	0.557		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 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

Phone: Fax:
E-mail:

Operational Analysis

Analyst: Caitlin Bowen
Agency/Co.:
Date Performed: 6/13/2013
Analysis Time Period: AM Peak Hour
Freeway/Dir of Travel: I-55 Eastbound
Weaving Location: Kedzie to California Ave West
Analysis Year:
Description:

Inputs

Segment Type	C-D Roadway/ Multilane Highways	
Weaving configuration	One-Sided	
Number of lanes, N	3	ln
Weaving segment length, LS	900	ft
Freeway free-flow speed, FFS	60	mi/h
Minimum segment speed, SMIN	15	mi/h
Freeway maximum capacity, cIFL	2300	pc/h/ln

Terrain type	Level	
Grade	0.00	%
Length	0.00	mi

Conversion to pc/h Under Base Conditions

	Volume Components				
	VFF	VRF	VFR	VRR	
Volume, V	700	697	442	0	veh/h
Peak hour factor, PHF	0.95	0.95	0.95	0.95	
Peak 15-min volume, v15	184	183	116	0	
Trucks and buses	9	9	9	9	%
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	0.957	0.957	0.957	0.957	
Driver population adjustment, fP	1.00	1.00	1.00	1.00	
Flow rate, v	770	767	486	0	pc/h

Volume ratio, VR 0.619

Configuration Characteristics

Number of maneuver lanes, NWL	2	ln
Interchange density, ID	0.75	int/mi
Minimum RF lane changes, LCRF	1	lc/pc
Minimum FR lane changes, LCFR	1	lc/pc
Minimum RR lane changes, LCRR		lc/pc

Minimum weaving lane changes, LCMIN 1253 lc/h
Weaving lane changes, LCW 1388 lc/h
Non-weaving vehicle index, INW 52
Non-weaving lane change, LCNW 69 lc/h
Total lane changes, LCALL 1457 lc/h

Weaving and Non-Weaving Speeds

Weaving intensity factor, W 0.331
Average weaving speed, SW 48.8 mi/h
Average non-weaving speed, SNW 47.7 mi/h

Weaving Segment Speed, Density, Level of Service and Capacity

Weaving segment speed, S 48.4 mi/h
Weaving segment density, D 13.9 pc/mi/ln
Level of service, LOS B
Weaving segment v/c ratio 0.522
Weaving segment flow rate, v 2023 pc/h
Weaving segment capacity, cW 3708 veh/h

Limitations on Weaving Segments

If limit reached, see note.

	Minimum	Maximum	Actual	Note
Weaving length (ft)	300	9255	900	a,b
	Maximum	Analyzed		
Density-based capacty, cIWL (pc/h/ln)	2300	1661		c
	Maximum	Analyzed		
v/c ratio	1.00	0.522		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 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

Phone: Fax:
E-mail:

Operational Analysis

Analyst: Caitlin Bowen
Agency/Co.:
Date Performed: 6/13/2013
Analysis Time Period: PM Off Peak Hour
Freeway/Dir of Travel: I-55 Eastbound
Weaving Location: Kingery Hwy Weave
Analysis Year:
Description:

Inputs

Segment Type	C-D Roadway/ Multilane Highways
Weaving configuration	One-Sided
Number of lanes, N	2 ln
Weaving segment length, LS	550 ft
Freeway free-flow speed, FFS	60 mi/h
Minimum segment speed, SMIN	15 mi/h
Freeway maximum capacity, cIFL	2300 pc/h/ln

Terrain type	Level
Grade	0.00 %
Length	0.00 mi

Conversion to pc/h Under Base Conditions

Volume Components	VFF	VRF	VFR	VRR	
Volume, V	0	149	562	0	veh/h
Peak hour factor, PHF	0.95	0.95	0.95	0.95	
Peak 15-min volume, v15	0	39	148	0	
Trucks and buses	11	11	11	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	0.948	0.948	0.948	0.948	
Driver population adjustment, fP	1.00	1.00	1.00	1.00	
Flow rate, v	0	165	624	0	pc/h

Volume ratio, VR 1.000

Configuration Characteristics

Number of maneuver lanes, NWL	2 ln
Interchange density, ID	0.00 int/mi
Minimum RF lane changes, LCRF	1 lc/pc
Minimum FR lane changes, LCFR	1 lc/pc
Minimum RR lane changes, LCRR	lc/pc

Minimum weaving lane changes, LCMIN 789 lc/h
Weaving lane changes, LCW 814 lc/h
Non-weaving vehicle index, INW 0
Non-weaving lane change, LCNW 0 lc/h
Total lane changes, LCALL 814 lc/h

_____Weaving and Non-Weaving Speeds_____

Weaving intensity factor, W 0.308
Average weaving speed, SW 49.4 mi/h
Average non-weaving speed, SNW 52.4 mi/h

_____Weaving Segment Speed, Density, Level of Service and Capacity_____

Weaving segment speed, S 49.4 mi/h
Weaving segment density, D 8.0 pc/mi/ln
Level of service, LOS A
Weaving segment v/c ratio 0.329
Weaving segment flow rate, v 789 pc/h
Weaving segment capacity, cW 2275 veh/h

_____Limitations on Weaving Segments_____

If limit reached, see note.

	Minimum	Maximum	Actual	Note
Weaving length (ft)	300	14232	550	a,b
	Maximum	Analyzed		
Density-based capacty, cIWL (pc/h/ln)	2300	1253		c
	Maximum	Analyzed		
v/c ratio	1.00	0.329		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 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

Phone: Fax:
E-mail:

Operational Analysis

Analyst: Caitlin Bowen
Agency/Co.:
Date Performed: 6/13/2013
Analysis Time Period: PM Off Peak Hour
Freeway/Dir of Travel: I-55 Eastbound
Weaving Location: Kedzie to California Ave West
Analysis Year:
Description:

Inputs

Segment Type	C-D Roadway/ Multilane Highways	
Weaving configuration	One-Sided	
Number of lanes, N	3	ln
Weaving segment length, LS	900	ft
Freeway free-flow speed, FFS	60	mi/h
Minimum segment speed, SMIN	15	mi/h
Freeway maximum capacity, cIFL	2300	pc/h/ln

Terrain type	Level	
Grade	0.00	%
Length	0.00	mi

Conversion to pc/h Under Base Conditions

	Volume Components				
	VFF	VRF	VFR	VRR	
Volume, V	700	860	321	0	veh/h
Peak hour factor, PHF	0.95	0.95	0.95	0.95	
Peak 15-min volume, v15	184	226	84	0	
Trucks and buses	8	8	8	8	%
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	0.962	0.962	0.962	
Driver population adjustment, fP	1.00	1.00	1.00	1.00	
Flow rate, v	766	941	351	0	pc/h

Volume ratio, VR 0.628

Configuration Characteristics

Number of maneuver lanes, NWL	2	ln
Interchange density, ID	0.75	int/mi
Minimum RF lane changes, LCRF	1	lc/pc
Minimum FR lane changes, LCFR	1	lc/pc
Minimum RR lane changes, LCRR		lc/pc

Minimum weaving lane changes, LCMIN 1292 lc/h
Weaving lane changes, LCW 1427 lc/h
Non-weaving vehicle index, INW 52
Non-weaving lane change, LCNW 68 lc/h
Total lane changes, LCALL 1495 lc/h

Weaving and Non-Weaving Speeds

Weaving intensity factor, W 0.337
Average weaving speed, SW 48.7 mi/h
Average non-weaving speed, SNW 47.4 mi/h

Weaving Segment Speed, Density, Level of Service and Capacity

Weaving segment speed, S 48.2 mi/h
Weaving segment density, D 14.2 pc/mi/ln
Level of service, LOS B
Weaving segment v/c ratio 0.538
Weaving segment flow rate, v 2058 pc/h
Weaving segment capacity, cW 3676 veh/h

Limitations on Weaving Segments

If limit reached, see note.

	Minimum	Maximum	Actual	Note
Weaving length (ft)	300	9358	900	a,b
	Maximum	Analyzed		
Density-based capacty, cIWL (pc/h/ln)	2300	1653		c
	Maximum	Analyzed		
v/c ratio	1.00	0.538		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 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.

2012 Southbound

AM and PM

HCS 2010: Freeway Weaving Release 6.1

Phone: Fax:
E-mail:

Operational Analysis

Analyst: Caitlin Bowen
Agency/Co.:
Date Performed: 6/14/2013
Analysis Time Period: AM Off Peak Hour
Freeway/Dir of Travel: I-55 Westbound
Weaving Location: Kingery Hwy Weave
Analysis Year:
Description:

Inputs

Segment Type	C-D Roadway/ Multilane Highways
Weaving configuration	One-Sided
Number of lanes, N	2 ln
Weaving segment length, LS	600 ft
Freeway free-flow speed, FFS	60 mi/h
Minimum segment speed, SMIN	15 mi/h
Freeway maximum capacity, cIFL	2300 pc/h/ln

Terrain type	Level
Grade	0.00 %
Length	0.00 mi

Conversion to pc/h Under Base Conditions

Volume Components	VFF	VRF	VFR	VRR	
Volume, V	0	562	159	0	veh/h
Peak hour factor, PHF	0.95	0.95	0.95	0.95	
Peak 15-min volume, v15	0	148	42	0	
Trucks and buses	15	15	15	15	%
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	0.930	0.930	0.930	0.930	
Driver population adjustment, fP	1.00	1.00	1.00	1.00	
Flow rate, v	0	636	180	0	pc/h

Volume ratio, VR 1.000

Configuration Characteristics

Number of maneuver lanes, NWL	2 ln
Interchange density, ID	0.75 int/mi
Minimum RF lane changes, LCRF	1 lc/pc
Minimum FR lane changes, LCFR	1 lc/pc
Minimum RR lane changes, LCRR	lc/pc

Minimum weaving lane changes, LCMIN	816	lc/h
Weaving lane changes, LCW	858	lc/h
Non-weaving vehicle index, INW	0	
Non-weaving lane change, LCNW	0	lc/h
Total lane changes, LCALL	858	lc/h

Weaving and Non-Weaving Speeds

Weaving intensity factor, W	0.300	
Average weaving speed, SW	49.6	mi/h
Average non-weaving speed, SNW	52.2	mi/h

Weaving Segment Speed, Density, Level of Service and Capacity

Weaving segment speed, S	49.6	mi/h
Weaving segment density, D	8.2	pc/mi/ln
Level of service, LOS	A	
Weaving segment v/c ratio	0.340	
Weaving segment flow rate, v	816	pc/h
Weaving segment capacity, cW	2233	veh/h

Limitations on Weaving Segments

If limit reached, see note.

	Minimum	Maximum	Actual	Note
Weaving length (ft)	300	14232	600	a,b
		Maximum	Analyzed	
Density-based capacty, cIWL (pc/h/ln)		2300	1257	c
		Maximum	Analyzed	
v/c ratio		1.00	0.340	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 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

Phone: Fax:
E-mail:

Operational Analysis

Analyst: Caitlin Bowen
Agency/Co.:
Date Performed: 6/14/2013
Analysis Time Period: AM Off Peak Hour
Freeway/Dir of Travel: I-55 Westbound
Weaving Location: LaGrange Weave
Analysis Year:
Description:

Inputs

Segment Type	C-D Roadway/ Multilane Highways	
Weaving configuration	One-Sided	
Number of lanes, N	2	ln
Weaving segment length, LS	450	ft
Freeway free-flow speed, FFS	60	mi/h
Minimum segment speed, SMIN	15	mi/h
Freeway maximum capacity, cIFL	2300	pc/h/ln

Terrain type	Level	
Grade	0.00	%
Length	0.00	mi

Conversion to pc/h Under Base Conditions

	Volume Components				
	VFF	VRF	VFR	VRR	
Volume, V	0	127	529	0	veh/h
Peak hour factor, PHF	0.95	0.95	0.95	0.95	
Peak 15-min volume, v15	0	33	139	0	
Trucks and buses	15	15	15	15	%
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	0.930	0.930	0.930	0.930	
Driver population adjustment, fP	1.00	1.00	1.00	1.00	
Flow rate, v	0	144	599	0	pc/h

Volume ratio, VR 1.000

Configuration Characteristics

Number of maneuver lanes, NWL	2	ln
Interchange density, ID	0.75	int/mi
Minimum RF lane changes, LCRF	1	lc/pc
Minimum FR lane changes, LCFR	1	lc/pc
Minimum RR lane changes, LCRR		lc/pc

Minimum weaving lane changes, LCMIN 743 lc/h
Weaving lane changes, LCW 773 lc/h
Non-weaving vehicle index, INW 0
Non-weaving lane change, LCNW 0 lc/h
Total lane changes, LCALL 773 lc/h

_____Weaving and Non-Weaving Speeds_____
Weaving intensity factor, W 0.346
Average weaving speed, SW 48.4 mi/h
Average non-weaving speed, SNW 52.9 mi/h

_____Weaving Segment Speed, Density, Level of Service and Capacity_____
Weaving segment speed, S 48.4 mi/h
Weaving segment density, D 7.7 pc/mi/ln
Level of service, LOS A
Weaving segment v/c ratio 0.310
Weaving segment flow rate, v 743 pc/h
Weaving segment capacity, cW 2233 veh/h

_____Limitations on Weaving Segments_____
If limit reached, see note.

	Minimum	Maximum	Actual	Note
Weaving length (ft)	300	14232	450	a,b
	Maximum	Analyzed		
Density-based capacty, cIWL (pc/h/ln)	2300	1246		c
	Maximum	Analyzed		
v/c ratio	1.00	0.310		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 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

Phone: Fax:
E-mail:

Operational Analysis

Analyst: Caitlin Bowen
Agency/Co.:
Date Performed: 6/14/2013
Analysis Time Period: AM Off Peak Hour
Freeway/Dir of Travel: I-55 Westbound
Weaving Location: Archer Avenue Weave
Analysis Year:
Description:

Inputs

Segment Type	C-D Roadway/ Multilane Highways
Weaving configuration	One-Sided
Number of lanes, N	2 ln
Weaving segment length, LS	600 ft
Freeway free-flow speed, FFS	60 mi/h
Minimum segment speed, SMIN	15 mi/h
Freeway maximum capacity, cIFL	2300 pc/h/ln

Terrain type	Level
Grade	0.00 %
Length	0.00 mi

Conversion to pc/h Under Base Conditions

Volume Components	VFF	VRF	VFR	VRR	
Volume, V	0	924	123	0	veh/h
Peak hour factor, PHF	0.95	0.95	0.95	0.95	
Peak 15-min volume, v15	0	243	32	0	
Trucks and buses	15	15	15	15	%
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	0.930	0.930	0.930	0.930	
Driver population adjustment, fP	1.00	1.00	1.00	1.00	
Flow rate, v	0	1046	139	0	pc/h

Volume ratio, VR 1.000

Configuration Characteristics

Number of maneuver lanes, NWL	2 ln
Interchange density, ID	0.75 int/mi
Minimum RF lane changes, LCRF	1 lc/pc
Minimum FR lane changes, LCFR	1 lc/pc
Minimum RR lane changes, LCRR	lc/pc

Minimum weaving lane changes, LCMIN 1185 lc/h
Weaving lane changes, LCW 1227 lc/h
Non-weaving vehicle index, INW 0
Non-weaving lane change, LCNW 0 lc/h
Total lane changes, LCALL 1227 lc/h

Weaving and Non-Weaving Speeds

Weaving intensity factor, W 0.397
Average weaving speed, SW 47.2 mi/h
Average non-weaving speed, SNW 48.6 mi/h

Weaving Segment Speed, Density, Level of Service and Capacity

Weaving segment speed, S 47.2 mi/h
Weaving segment density, D 12.6 pc/mi/ln
Level of service, LOS B
Weaving segment v/c ratio 0.494
Weaving segment flow rate, v 1185 pc/h
Weaving segment capacity, cW 2233 veh/h

Limitations on Weaving Segments

If limit reached, see note.

	Minimum	Maximum	Actual	Note
Weaving length (ft)	300	14232	600	a,b
	Maximum	Analyzed		
Density-based capacty, cIWL (pc/h/ln)	2300	1257		c
	Maximum	Analyzed		
v/c ratio	1.00	0.494		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 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

Phone: Fax:
E-mail:

Operational Analysis

Analyst:	Alex Ericksen
Agency/Co.:	
Date Performed:	1/14/2014
Analysis Time Period:	AM Off Peak Hour
Freeway/Dir of Travel:	I-55 Westbound
Weaving Location:	Kedzie/Cali Ave Frontage Rd
Analysis Year:	
Description:	

Inputs

Segment Type	C-D Roadway/ Multilane Highways	
Weaving configuration	One-Sided	
Number of lanes, N	3	ln
Weaving segment length, LS	1000	ft
Freeway free-flow speed, FFS	60	mi/h
Minimum segment speed, SMIN	15	mi/h
Freeway maximum capacity, cIFL	2300	pc/h/ln
Terrain type	Level	
Grade	0.00	%
Length	0.00	mi

Conversion to pc/h Under Base Conditions

	Volume Components				
	VFF	VRF	VFR	VRR	
Volume, V	700	437	953	0	veh/h
Peak hour factor, PHF	0.95	0.95	0.95	0.95	
Peak 15-min volume, v15	184	115	251	0	
Trucks and buses	12	12	12	12	%
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	0.943	0.943	0.943	0.943	
Driver population adjustment, fP	1.00	1.00	1.00	1.00	
Flow rate, v	781	488	1063	0	pc/h

Volume ratio, VR	0.665	

Configuration Characteristics

Number of maneuver lanes, NWL	2	ln
Interchange density, ID	0.75	int/mi
Minimum RF lane changes, LCRF	1	lc/pc
Minimum FR lane changes, LCFR	1	lc/pc
Minimum RR lane changes, LCRR		lc/pc
Minimum weaving lane changes, LCMIN	1551	lc/h
Weaving lane changes, LCW	1696	lc/h
Non-weaving vehicle index, INW	59	
Non-weaving lane change, LCNW	125	lc/h
Total lane changes, LCALL	1821	lc/h

Weaving and Non-Weaving Speeds

Weaving intensity factor, W	0.363	
Average weaving speed, SW	48.0	mi/h
Average non-weaving speed, SNW	45.1	mi/h

Weaving Segment Speed, Density, Level of Service and Capacity

Weaving segment speed, S	47.0	mi/h
Weaving segment density, D	16.5	pc/mi/ln
Level of service, LOS	B	
Weaving segment v/c ratio	0.646	
Weaving segment flow rate, v	2332	pc/h
Weaving segment capacity, cW	3404	veh/h

Limitations on Weaving Segments

If limit reached, see note.

	Minimum	Maximum	Actual	Note
Weaving length (ft)	300	9819	1000	a,b
		Maximum	Analyzed	
Density-based capacty, cIWL (pc/h/ln)		2300	1625	c
		Maximum	Analyzed	
v/c ratio		1.00	0.646	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 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

Phone: Fax:
E-mail:

Operational Analysis

Analyst: Caitlin Bowen
Agency/Co.:
Date Performed: 6/14/2013
Analysis Time Period: PM Peak Hour
Freeway/Dir of Travel: I-55 Westbound
Weaving Location: Kingery Hwy Weave
Analysis Year:
Description:

Inputs

Segment Type: C-D Roadway/ Multilane Highways
Weaving configuration: One-Sided
Number of lanes, N: 2 ln
Weaving segment length, LS: 600 ft
Freeway free-flow speed, FFS: 60 mi/h
Minimum segment speed, SMIN: 15 mi/h
Freeway maximum capacity, cIFL: 2300 pc/h/ln

Terrain type: Level
Grade: 0.00 %
Length: 0.00 mi

Conversion to pc/h Under Base Conditions

Volume Components	VFF	VRF	VFR	VRR	
Volume, V	0	654	81	0	veh/h
Peak hour factor, PHF	0.95	0.95	0.95	0.95	
Peak 15-min volume, v15	0	172	21	0	
Trucks and buses	7	7	7	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	0.966	0.966	0.966	0.966	
Driver population adjustment, fP	1.00	1.00	1.00	1.00	
Flow rate, v	0	713	88	0	pc/h

Volume ratio, VR: 1.000

Configuration Characteristics

Number of maneuver lanes, NWL: 2 ln
Interchange density, ID: 0.75 int/mi
Minimum RF lane changes, LCRF: 1 lc/pc
Minimum FR lane changes, LCFR: 1 lc/pc
Minimum RR lane changes, LCRR: lc/pc

Minimum weaving lane changes, LCMIN 801 lc/h
Weaving lane changes, LCW 843 lc/h
Non-weaving vehicle index, INW 0
Non-weaving lane change, LCNW 0 lc/h
Total lane changes, LCALL 843 lc/h

_____Weaving and Non-Weaving Speeds_____
Weaving intensity factor, W 0.296
Average weaving speed, SW 49.7 mi/h
Average non-weaving speed, SNW 52.3 mi/h

_____Weaving Segment Speed, Density, Level of Service and Capacity_____
Weaving segment speed, S 49.7 mi/h
Weaving segment density, D 8.1 pc/mi/ln
Level of service, LOS A
Weaving segment v/c ratio 0.334
Weaving segment flow rate, v 801 pc/h
Weaving segment capacity, cW 2319 veh/h

_____Limitations on Weaving Segments_____
If limit reached, see note.

	Minimum	Maximum	Actual	Note
Weaving length (ft)	300	14232	600	a,b
	Maximum	Analyzed		
Density-based capacty, cIWL (pc/h/ln)	2300	1257		c
	Maximum	Analyzed		
v/c ratio	1.00	0.334		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 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

Phone: Fax:
E-mail:

Operational Analysis

Analyst: Caitlin Bowen
Agency/Co.:
Date Performed: 6/14/2013
Analysis Time Period: PM Peak Hour
Freeway/Dir of Travel: I-55 Westbound
Weaving Location: LaGrange Weave
Analysis Year:
Description:

Inputs

Segment Type	C-D Roadway/ Multilane Highways	
Weaving configuration	One-Sided	
Number of lanes, N	2	ln
Weaving segment length, LS	450	ft
Freeway free-flow speed, FFS	60	mi/h
Minimum segment speed, SMIN	15	mi/h
Freeway maximum capacity, cIFL	2300	pc/h/ln

Terrain type	Level	
Grade	0.00	%
Length	0.00	mi

Conversion to pc/h Under Base Conditions

Volume Components	VFF	VRF	VFR	VRR	
Volume, V	0	256	1249	0	veh/h
Peak hour factor, PHF	0.95	0.95	0.95	0.95	
Peak 15-min volume, v15	0	67	329	0	
Trucks and buses	7	7	7	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	0.966	0.966	0.966	0.966	
Driver population adjustment, fP	1.00	1.00	1.00	1.00	
Flow rate, v	0	279	1361	0	pc/h

Volume ratio, VR 1.000

Configuration Characteristics

Number of maneuver lanes, NWL	2	ln
Interchange density, ID	0.75	int/mi
Minimum RF lane changes, LCRF	1	lc/pc
Minimum FR lane changes, LCFR	1	lc/pc
Minimum RR lane changes, LCRR		lc/pc

Minimum weaving lane changes, LCMIN 1640 lc/h
Weaving lane changes, LCW 1670 lc/h
Non-weaving vehicle index, INW 0
Non-weaving lane change, LCNW 0 lc/h
Total lane changes, LCALL 1670 lc/h

_____Weaving and Non-Weaving Speeds_____
Weaving intensity factor, W 0.636
Average weaving speed, SW 42.5 mi/h
Average non-weaving speed, SNW 44.3 mi/h

_____Weaving Segment Speed, Density, Level of Service and Capacity_____
Weaving segment speed, S 42.5 mi/h
Weaving segment density, D 19.3 pc/mi/ln
Level of service, LOS B
Weaving segment v/c ratio 0.683
Weaving segment flow rate, v 1640 pc/h
Weaving segment capacity, cW 2319 veh/h

_____Limitations on Weaving Segments_____
If limit reached, see note.

	Minimum	Maximum	Actual	Note
Weaving length (ft)	300	14232	450	a,b
	Maximum	Analyzed		
Density-based capacty, cIWL (pc/h/ln)	2300	1246		c
	Maximum	Analyzed		
v/c ratio	1.00	0.683		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 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

Phone: Fax:
E-mail:

Operational Analysis

Analyst: Caitlin Bowen
Agency/Co.:
Date Performed: 6/14/2013
Analysis Time Period: PM Peak Hour
Freeway/Dir of Travel: I-55 Westbound
Weaving Location: Archer Avenue Weave
Analysis Year:
Description:

Inputs

Segment Type: C-D Roadway/ Multilane Highways
Weaving configuration: One-Sided
Number of lanes, N: 2 ln
Weaving segment length, LS: 600 ft
Freeway free-flow speed, FFS: 60 mi/h
Minimum segment speed, SMIN: 15 mi/h
Freeway maximum capacity, cIFL: 2300 pc/h/ln

Terrain type: Level
Grade: 0.00 %
Length: 0.00 mi

Conversion to pc/h Under Base Conditions

Volume Components	VFF	VRF	VFR	VRR	
Volume, V	0	1218	245	0	veh/h
Peak hour factor, PHF	0.95	0.95	0.95	0.95	
Peak 15-min volume, v15	0	321	64	0	
Trucks and buses	7	7	7	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	0.966	0.966	0.966	0.966	
Driver population adjustment, fP	1.00	1.00	1.00	1.00	
Flow rate, v	0	1327	267	0	pc/h

Volume ratio, VR: 1.000

Configuration Characteristics

Number of maneuver lanes, NWL: 2 ln
Interchange density, ID: 0.75 int/mi
Minimum RF lane changes, LCRF: 1 lc/pc
Minimum FR lane changes, LCFR: 1 lc/pc
Minimum RR lane changes, LCRR: lc/pc

Minimum weaving lane changes, LCMIN 1594 lc/h
Weaving lane changes, LCW 1636 lc/h
Non-weaving vehicle index, INW 0
Non-weaving lane change, LCNW 0 lc/h
Total lane changes, LCALL 1636 lc/h

Weaving and Non-Weaving Speeds

Weaving intensity factor, W 0.499
Average weaving speed, SW 45.0 mi/h
Average non-weaving speed, SNW 44.7 mi/h

Weaving Segment Speed, Density, Level of Service and Capacity

Weaving segment speed, S 45.0 mi/h
Weaving segment density, D 17.7 pc/mi/ln
Level of service, LOS B
Weaving segment v/c ratio 0.664
Weaving segment flow rate, v 1594 pc/h
Weaving segment capacity, cW 2319 veh/h

Limitations on Weaving Segments

If limit reached, see note.

	Minimum	Maximum	Actual	Note
Weaving length (ft)	300	14232	600	a,b
	Maximum	Analyzed		
Density-based capacty, cIWL (pc/h/ln)	2300	1257		c
	Maximum	Analyzed		
v/c ratio	1.00	0.664		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 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

Phone: Fax:
E-mail:

Operational Analysis

Analyst:	Alex Ericksen
Agency/Co.:	
Date Performed:	1/14/2014
Analysis Time Period:	PM Peak Hour
Freeway/Dir of Travel:	I-55 Westbound
Weaving Location:	Kedzie/Cali Ave Frontage Rd
Analysis Year:	
Description:	

Inputs

Segment Type	C-D Roadway/ Multilane Highways	
Weaving configuration	One-Sided	
Number of lanes, N	3	ln
Weaving segment length, LS	1000	ft
Freeway free-flow speed, FFS	60	mi/h
Minimum segment speed, SMIN	15	mi/h
Freeway maximum capacity, cIFL	2300	pc/h/ln
Terrain type	Level	
Grade	0.00	%
Length	0.00	mi

Conversion to pc/h Under Base Conditions

	Volume Components				
	VFF	VRF	VFR	VRR	
Volume, V	700	558	1247	0	veh/h
Peak hour factor, PHF	0.95	0.95	0.95	0.95	
Peak 15-min volume, v15	184	147	328	0	
Trucks and buses	7	7	7	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	0.966	0.966	0.966	0.966	
Driver population adjustment, fP	1.00	1.00	1.00	1.00	
Flow rate, v	763	608	1359	0	pc/h

Volume ratio, VR 0.721

Configuration Characteristics

Number of maneuver lanes, NWL	2	ln
Interchange density, ID	0.75	int/mi
Minimum RF lane changes, LCRF	1	lc/pc
Minimum FR lane changes, LCFR	1	lc/pc
Minimum RR lane changes, LCRR		lc/pc
Minimum weaving lane changes, LCMIN	1967	lc/h
Weaving lane changes, LCW	2112	lc/h
Non-weaving vehicle index, INW	57	
Non-weaving lane change, LCNW	121	lc/h
Total lane changes, LCALL	2233	lc/h

Weaving and Non-Weaving Speeds

Weaving intensity factor, W	0.426	
Average weaving speed, SW	46.6	mi/h
Average non-weaving speed, SNW	41.5	mi/h

Weaving Segment Speed, Density, Level of Service and Capacity

Weaving segment speed, S	45.0	mi/h
Weaving segment density, D	20.2	pc/mi/ln
Level of service, LOS	B	
Weaving segment v/c ratio	0.820	
Weaving segment flow rate, v	2730	pc/h
Weaving segment capacity, cW	3218	veh/h

Limitations on Weaving Segments

If limit reached, see note.

	Minimum	Maximum	Actual	Note
Weaving length (ft)	300	10516	1000	a,b
		Maximum	Analyzed	
Density-based capacty, cIWL (pc/h/ln)		2300	1572	c
		Maximum	Analyzed	
v/c ratio		1.00	0.820	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 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.

2040 Northbound

AM and PM

HCS 2010: Freeway Weaving Release 6.1

Phone: Fax:
E-mail:

Operational Analysis

Analyst: Caitlin Bowen
Agency/Co.:
Date Performed: 6/13/2013
Analysis Time Period: AM Peak Hour
Freeway/Dir of Travel: I-55 Eastbound
Weaving Location: Kingery Hwy Weave
Analysis Year:
Description:

Inputs

Segment Type	C-D Roadway/ Multilane Highways
Weaving configuration	One-Sided
Number of lanes, N	2 ln
Weaving segment length, LS	550 ft
Freeway free-flow speed, FFS	60 mi/h
Minimum segment speed, SMIN	15 mi/h
Freeway maximum capacity, cIFL	2300 pc/h/ln

Terrain type	Level
Grade	0.00 %
Length	0.00 mi

Conversion to pc/h Under Base Conditions

Volume Components	VFF	VRF	VFR	VRR	
Volume, V	0	564	1007	0	veh/h
Peak hour factor, PHF	0.95	0.95	0.95	0.95	
Peak 15-min volume, v15	0	148	265	0	
Trucks and buses	9	9	9	9	%
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	0.957	0.957	0.957	0.957	
Driver population adjustment, fP	1.00	1.00	1.00	1.00	
Flow rate, v	0	620	1108	0	pc/h

Volume ratio, VR 1.000

Configuration Characteristics

Number of maneuver lanes, NWL	2 ln
Interchange density, ID	0.00 int/mi
Minimum RF lane changes, LCRF	1 lc/pc
Minimum FR lane changes, LCFR	1 lc/pc
Minimum RR lane changes, LCRR	lc/pc

Minimum weaving lane changes, LCMIN 1728 lc/h
Weaving lane changes, LCW 1753 lc/h
Non-weaving vehicle index, INW 0
Non-weaving lane change, LCNW 0 lc/h
Total lane changes, LCALL 1753 lc/h

_____Weaving and Non-Weaving Speeds_____
Weaving intensity factor, W 0.564
Average weaving speed, SW 43.8 mi/h
Average non-weaving speed, SNW 43.4 mi/h

_____Weaving Segment Speed, Density, Level of Service and Capacity_____
Weaving segment speed, S 43.8 mi/h
Weaving segment density, D 19.7 pc/mi/ln
Level of service, LOS B
Weaving segment v/c ratio 0.720
Weaving segment flow rate, v 1728 pc/h
Weaving segment capacity, cW 2297 veh/h

_____Limitations on Weaving Segments_____
If limit reached, see note.

	Minimum	Maximum	Actual	Note
Weaving length (ft)	300	14232	550	a,b
	Maximum	Analyzed		
Density-based capacty, cIWL (pc/h/ln)	2300	1253		c
	Maximum	Analyzed		
v/c ratio	1.00	0.720		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 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

Phone: Fax:
E-mail:

Operational Analysis

Analyst: Caitlin Bowen
Agency/Co.:
Date Performed: 6/13/2013
Analysis Time Period: AM Peak Hour
Freeway/Dir of Travel: I-55 Eastbound
Weaving Location: Kedzie to California Ave West
Analysis Year:
Description:

Inputs

Segment Type	C-D Roadway/ Multilane Highways	
Weaving configuration	One-Sided	
Number of lanes, N	3	ln
Weaving segment length, LS	900	ft
Freeway free-flow speed, FFS	60	mi/h
Minimum segment speed, SMIN	15	mi/h
Freeway maximum capacity, cIFL	2300	pc/h/ln

Terrain type	Level	
Grade	0.00	%
Length	0.00	mi

Conversion to pc/h Under Base Conditions

	Volume Components				
	VFF	VRF	VFR	VRR	
Volume, V	700	863	532	0	veh/h
Peak hour factor, PHF	0.95	0.95	0.95	0.95	
Peak 15-min volume, v15	184	227	140	0	
Trucks and buses	9	9	9	9	%
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	0.957	0.957	0.957	0.957	
Driver population adjustment, fP	1.00	1.00	1.00	1.00	
Flow rate, v	770	949	585	0	pc/h

Volume ratio, VR 0.666

Configuration Characteristics

Number of maneuver lanes, NWL	2	ln
Interchange density, ID	0.75	int/mi
Minimum RF lane changes, LCRF	1	lc/pc
Minimum FR lane changes, LCFR	1	lc/pc
Minimum RR lane changes, LCRR		lc/pc

Minimum weaving lane changes, LCMIN 1534 lc/h
Weaving lane changes, LCW 1669 lc/h
Non-weaving vehicle index, INW 52
Non-weaving lane change, LCNW 69 lc/h
Total lane changes, LCALL 1738 lc/h

Weaving and Non-Weaving Speeds

Weaving intensity factor, W 0.380
Average weaving speed, SW 47.6 mi/h
Average non-weaving speed, SNW 45.3 mi/h

Weaving Segment Speed, Density, Level of Service and Capacity

Weaving segment speed, S 46.8 mi/h
Weaving segment density, D 16.4 pc/mi/ln
Level of service, LOS B
Weaving segment v/c ratio 0.639
Weaving segment flow rate, v 2304 pc/h
Weaving segment capacity, cW 3449 veh/h

Limitations on Weaving Segments

If limit reached, see note.

	Minimum	Maximum	Actual	Note
Weaving length (ft)	300	9828	900	a,b
		Maximum	Analyzed	
Density-based capacty, cIWL (pc/h/ln)		2300	1617	c
		Maximum	Analyzed	
v/c ratio		1.00	0.639	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 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

Phone: Fax:
E-mail:

Operational Analysis

Analyst: Caitlin Bowen
Agency/Co.:
Date Performed: 6/13/2013
Analysis Time Period: PM Off Peak Hour
Freeway/Dir of Travel: I-55 Eastbound
Weaving Location: Kingery Hwy Weave
Analysis Year:
Description:

Inputs

Segment Type	C-D Roadway/ Multilane Highways
Weaving configuration	One-Sided
Number of lanes, N	2 ln
Weaving segment length, LS	550 ft
Freeway free-flow speed, FFS	60 mi/h
Minimum segment speed, SMIN	15 mi/h
Freeway maximum capacity, cIFL	2300 pc/h/ln

Terrain type	Level
Grade	0.00 %
Length	0.00 mi

Conversion to pc/h Under Base Conditions

Volume Components	VFF	VRF	VFR	VRR	
Volume, V	0	249	730	0	veh/h
Peak hour factor, PHF	0.95	0.95	0.95	0.95	
Peak 15-min volume, v15	0	66	192	0	
Trucks and buses	11	11	11	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	0.948	0.948	0.948	0.948	
Driver population adjustment, fP	1.00	1.00	1.00	1.00	
Flow rate, v	0	277	811	0	pc/h

Volume ratio, VR 1.000

Configuration Characteristics

Number of maneuver lanes, NWL	2 ln
Interchange density, ID	0.00 int/mi
Minimum RF lane changes, LCRF	1 lc/pc
Minimum FR lane changes, LCFR	1 lc/pc
Minimum RR lane changes, LCRR	lc/pc

Minimum weaving lane changes, LCMIN 1088 lc/h
Weaving lane changes, LCW 1113 lc/h
Non-weaving vehicle index, INW 0
Non-weaving lane change, LCNW 0 lc/h
Total lane changes, LCALL 1113 lc/h

_____Weaving and Non-Weaving Speeds_____
Weaving intensity factor, W 0.394
Average weaving speed, SW 47.3 mi/h
Average non-weaving speed, SNW 49.6 mi/h

_____Weaving Segment Speed, Density, Level of Service and Capacity_____
Weaving segment speed, S 47.3 mi/h
Weaving segment density, D 11.5 pc/mi/ln
Level of service, LOS A
Weaving segment v/c ratio 0.453
Weaving segment flow rate, v 1088 pc/h
Weaving segment capacity, cW 2275 veh/h

_____Limitations on Weaving Segments_____
If limit reached, see note.

	Minimum	Maximum	Actual	Note
Weaving length (ft)	300	14232	550	a,b
	Maximum	Analyzed		
Density-based capacty, cIWL (pc/h/ln)	2300	1253		c
	Maximum	Analyzed		
v/c ratio	1.00	0.453		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 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

Phone: Fax:
E-mail:

Operational Analysis

Analyst: Caitlin Bowen
Agency/Co.:
Date Performed: 6/13/2013
Analysis Time Period: PM Off Peak Hour
Freeway/Dir of Travel: I-55 Eastbound
Weaving Location: Kedzie to California Ave West
Analysis Year:
Description:

Inputs

Segment Type	C-D Roadway/ Multilane Highways	
Weaving configuration	One-Sided	
Number of lanes, N	3	ln
Weaving segment length, LS	900	ft
Freeway free-flow speed, FFS	60	mi/h
Minimum segment speed, SMIN	15	mi/h
Freeway maximum capacity, cIFL	2300	pc/h/ln

Terrain type	Level	
Grade	0.00	%
Length	0.00	mi

Conversion to pc/h Under Base Conditions

	Volume Components				
	VFF	VRF	VFR	VRR	
Volume, V	700	1071	575	0	veh/h
Peak hour factor, PHF	0.95	0.95	0.95	0.95	
Peak 15-min volume, v15	184	282	151	0	
Trucks and buses	8	8	8	8	%
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	0.962	0.962	0.962	
Driver population adjustment, fP	1.00	1.00	1.00	1.00	
Flow rate, v	766	1172	629	0	pc/h

Volume ratio, VR 0.702

Configuration Characteristics

Number of maneuver lanes, NWL	2	ln
Interchange density, ID	0.75	int/mi
Minimum RF lane changes, LCRF	1	lc/pc
Minimum FR lane changes, LCFR	1	lc/pc
Minimum RR lane changes, LCRR		lc/pc

Minimum weaving lane changes, LCMIN 1801 lc/h
Weaving lane changes, LCW 1936 lc/h
Non-weaving vehicle index, INW 52
Non-weaving lane change, LCNW 68 lc/h
Total lane changes, LCALL 2004 lc/h

Weaving and Non-Weaving Speeds

Weaving intensity factor, W 0.425
Average weaving speed, SW 46.6 mi/h
Average non-weaving speed, SNW 42.9 mi/h

Weaving Segment Speed, Density, Level of Service and Capacity

Weaving segment speed, S 45.4 mi/h
Weaving segment density, D 18.8 pc/mi/ln
Level of service, LOS B
Weaving segment v/c ratio 0.750
Weaving segment flow rate, v 2567 pc/h
Weaving segment capacity, cW 3289 veh/h

Limitations on Weaving Segments

If limit reached, see note.

	Minimum	Maximum	Actual	Note
Weaving length (ft)	300	10276	900	a,b
	Maximum	Analyzed		
Density-based capacty, cIWL (pc/h/ln)	2300	1583		c
	Maximum	Analyzed		
v/c ratio	1.00	0.750		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 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.

2040 Southbound

AM and PM

HCS 2010: Freeway Weaving Release 6.1

Phone: Fax:
E-mail:

Operational Analysis

Analyst: Caitlin Bowen
Agency/Co.:
Date Performed: 6/14/2013
Analysis Time Period: AM Peak Hour
Freeway/Dir of Travel: I-55 Westbound
Weaving Location: Kingery Hwy Weave
Analysis Year:
Description:

Inputs

Segment Type	C-D Roadway/ Multilane Highways
Weaving configuration	One-Sided
Number of lanes, N	2 ln
Weaving segment length, LS	600 ft
Freeway free-flow speed, FFS	60 mi/h
Minimum segment speed, SMIN	15 mi/h
Freeway maximum capacity, cIFL	2300 pc/h/ln

Terrain type	Level
Grade	0.00 %
Length	0.00 mi

Conversion to pc/h Under Base Conditions

Volume Components	VFF	VRF	VFR	VRR	
Volume, V	0	662	292	0	veh/h
Peak hour factor, PHF	0.95	0.95	0.95	0.95	
Peak 15-min volume, v15	0	174	77	0	
Trucks and buses	15	15	15	15	%
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	0.930	0.930	0.930	0.930	
Driver population adjustment, fP	1.00	1.00	1.00	1.00	
Flow rate, v	0	749	330	0	pc/h

Volume ratio, VR 1.000

Configuration Characteristics

Number of maneuver lanes, NWL	2 ln
Interchange density, ID	0.75 int/mi
Minimum RF lane changes, LCRF	1 lc/pc
Minimum FR lane changes, LCFR	1 lc/pc
Minimum RR lane changes, LCRR	lc/pc

Minimum weaving lane changes, LCMIN 1079 lc/h
Weaving lane changes, LCW 1121 lc/h
Non-weaving vehicle index, INW 0
Non-weaving lane change, LCNW 0 lc/h
Total lane changes, LCALL 1121 lc/h

Weaving and Non-Weaving Speeds

Weaving intensity factor, W 0.370
Average weaving speed, SW 47.8 mi/h
Average non-weaving speed, SNW 49.6 mi/h

Weaving Segment Speed, Density, Level of Service and Capacity

Weaving segment speed, S 47.8 mi/h
Weaving segment density, D 11.3 pc/mi/ln
Level of service, LOS A
Weaving segment v/c ratio 0.449
Weaving segment flow rate, v 1079 pc/h
Weaving segment capacity, cW 2233 veh/h

Limitations on Weaving Segments

If limit reached, see note.

	Minimum	Maximum	Actual	Note
Weaving length (ft)	300	14232	600	a,b
	Maximum	Analyzed		
Density-based capacty, cIWL (pc/h/ln)	2300	1257		c
	Maximum	Analyzed		
v/c ratio	1.00	0.449		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 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

Phone: Fax:
E-mail:

Operational Analysis

Analyst: Caitlin Bowen
Agency/Co.:
Date Performed: 6/14/2013
Analysis Time Period: AM Peak Hour
Freeway/Dir of Travel: I-55 Westbound
Weaving Location: LaGrange Weave
Analysis Year:
Description:

Inputs

Segment Type	C-D Roadway/ Multilane Highways
Weaving configuration	One-Sided
Number of lanes, N	2 ln
Weaving segment length, LS	450 ft
Freeway free-flow speed, FFS	60 mi/h
Minimum segment speed, SMIN	15 mi/h
Freeway maximum capacity, cIFL	2300 pc/h/ln

Terrain type	Level
Grade	0.00 %
Length	0.00 mi

Conversion to pc/h Under Base Conditions

Volume Components	VFF	VRF	VFR	VRR	
Volume, V	0	193	878	0	veh/h
Peak hour factor, PHF	0.95	0.95	0.95	0.95	
Peak 15-min volume, v15	0	51	231	0	
Trucks and buses	15	15	15	15	%
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	0.930	0.930	0.930	0.930	
Driver population adjustment, fP	1.00	1.00	1.00	1.00	
Flow rate, v	0	218	994	0	pc/h

Volume ratio, VR 1.000

Configuration Characteristics

Number of maneuver lanes, NWL	2 ln
Interchange density, ID	0.75 int/mi
Minimum RF lane changes, LCRF	1 lc/pc
Minimum FR lane changes, LCFR	1 lc/pc
Minimum RR lane changes, LCRR	lc/pc

Minimum weaving lane changes, LCMIN 1212 lc/h
Weaving lane changes, LCW 1242 lc/h
Non-weaving vehicle index, INW 0
Non-weaving lane change, LCNW 0 lc/h
Total lane changes, LCALL 1242 lc/h

Weaving and Non-Weaving Speeds

Weaving intensity factor, W 0.503
Average weaving speed, SW 44.9 mi/h
Average non-weaving speed, SNW 48.4 mi/h

Weaving Segment Speed, Density, Level of Service and Capacity

Weaving segment speed, S 44.9 mi/h
Weaving segment density, D 13.5 pc/mi/ln
Level of service, LOS B
Weaving segment v/c ratio 0.505
Weaving segment flow rate, v 1212 pc/h
Weaving segment capacity, cW 2233 veh/h

Limitations on Weaving Segments

If limit reached, see note.

	Minimum	Maximum	Actual	Note
Weaving length (ft)	300	14232	450	a,b
	Maximum	Analyzed		
Density-based capacty, cIWL (pc/h/ln)	2300	1246		c
	Maximum	Analyzed		
v/c ratio	1.00	0.505		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 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

Phone: Fax:
E-mail:

Operational Analysis

Analyst: Caitlin Bowen
Agency/Co.:
Date Performed: 6/14/2013
Analysis Time Period: AM Peak Hour
Freeway/Dir of Travel: I-55 Westbound
Weaving Location: Archer Avenue Weave
Analysis Year:
Description:

Inputs

Segment Type: C-D Roadway/ Multilane Highways
Weaving configuration: One-Sided
Number of lanes, N: 2 ln
Weaving segment length, LS: 600 ft
Freeway free-flow speed, FFS: 60 mi/h
Minimum segment speed, SMIN: 15 mi/h
Freeway maximum capacity, cIFL: 2300 pc/h/ln

Terrain type: Level
Grade: 0.00 %
Length: 0.00 mi

Conversion to pc/h Under Base Conditions

Volume Components	VFF	VRF	VFR	VRR	
Volume, V	0	1512	236	0	veh/h
Peak hour factor, PHF	0.95	0.95	0.95	0.95	
Peak 15-min volume, v15	0	398	62	0	
Trucks and buses	15	15	15	15	%
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	0.930	0.930	0.930	0.930	
Driver population adjustment, fP	1.00	1.00	1.00	1.00	
Flow rate, v	0	1711	267	0	pc/h

Volume ratio, VR: 1.000

Configuration Characteristics

Number of maneuver lanes, NWL: 2 ln
Interchange density, ID: 0.75 int/mi
Minimum RF lane changes, LCRF: 1 lc/pc
Minimum FR lane changes, LCFR: 1 lc/pc
Minimum RR lane changes, LCRR: lc/pc

Minimum weaving lane changes, LCMIN 1978 lc/h
Weaving lane changes, LCW 2020 lc/h
Non-weaving vehicle index, INW 0
Non-weaving lane change, LCNW 0 lc/h
Total lane changes, LCALL 2020 lc/h

Weaving and Non-Weaving Speeds

Weaving intensity factor, W 0.589
Average weaving speed, SW 43.3 mi/h
Average non-weaving speed, SNW 41.0 mi/h

Weaving Segment Speed, Density, Level of Service and Capacity

Weaving segment speed, S 43.3 mi/h
Weaving segment density, D 22.8 pc/mi/ln
Level of service, LOS B
Weaving segment v/c ratio 0.824
Weaving segment flow rate, v 1978 pc/h
Weaving segment capacity, cW 2233 veh/h

Limitations on Weaving Segments

If limit reached, see note.

	Minimum	Maximum	Actual	Note
Weaving length (ft)	300	14232	600	a,b
	Maximum	Analyzed		
Density-based capacty, cIWL (pc/h/ln)	2300	1257		c
	Maximum	Analyzed		
v/c ratio	1.00	0.824		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 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

Phone: Fax:
E-mail:

Operational Analysis

Analyst:	Alex Ericksen
Agency/Co.:	
Date Performed:	1/8/2014
Analysis Time Period:	AM Peak Hour
Freeway/Dir of Travel:	I-55 Westbound
Weaving Location:	Kedzie/Cali Ave Frontage Rd
Analysis Year:	
Description:	

Inputs

Segment Type	C-D Roadway/ Multilane Highways	
Weaving configuration	One-Sided	
Number of lanes, N	3	ln
Weaving segment length, LS	1000	ft
Freeway free-flow speed, FFS	60	mi/h
Minimum segment speed, SMIN	15	mi/h
Freeway maximum capacity, cIFL	2300	pc/h/ln
Terrain type	Level	
Grade	0.00	%
Length	0.00	mi

Conversion to pc/h Under Base Conditions

	Volume Components				
	VFF	VRF	VFR	VRR	
Volume, V	700	1197	818	0	veh/h
Peak hour factor, PHF	0.95	0.95	0.95	0.95	
Peak 15-min volume, v15	184	315	215	0	
Trucks and buses	12	12	12	12	%
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	0.943	0.943	0.943	0.943	
Driver population adjustment, fP	1.00	1.00	1.00	1.00	
Flow rate, v	781	1336	913	0	pc/h

Volume ratio, VR 0.742

Configuration Characteristics

Number of maneuver lanes, NWL	2	ln
Interchange density, ID	0.75	int/mi
Minimum RF lane changes, LCRF	1	lc/pc
Minimum FR lane changes, LCFR	1	lc/pc
Minimum RR lane changes, LCRR		lc/pc
Minimum weaving lane changes, LCMIN	2249	lc/h
Weaving lane changes, LCW	2394	lc/h
Non-weaving vehicle index, INW	59	
Non-weaving lane change, LCNW	125	lc/h
Total lane changes, LCALL	2519	lc/h

Weaving and Non-Weaving Speeds

Weaving intensity factor, W	0.468	
Average weaving speed, SW	45.6	mi/h
Average non-weaving speed, SNW	39.0	mi/h

Weaving Segment Speed, Density, Level of Service and Capacity

Weaving segment speed, S	43.7	mi/h
Weaving segment density, D	23.1	pc/mi/ln
Level of service, LOS	B	
Weaving segment v/c ratio	0.937	
Weaving segment flow rate, v	3030	pc/h
Weaving segment capacity, cW	3050	veh/h

Limitations on Weaving Segments

If limit reached, see note.

	Minimum	Maximum	Actual	Note
Weaving length (ft)	300	10792	1000	a,b
		Maximum	Analyzed	
Density-based capacty, cIWL (pc/h/ln)		2300	1551	c
		Maximum	Analyzed	
v/c ratio		1.00	0.937	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 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

Phone: Fax:
E-mail:

Operational Analysis

Analyst: Caitlin Bowen
Agency/Co.:
Date Performed: 6/14/2013
Analysis Time Period: PM Peak Hour
Freeway/Dir of Travel: I-55 Westbound
Weaving Location: Kingery Hwy Weave
Analysis Year:
Description:

Inputs

Segment Type	C-D Roadway/ Multilane Highways
Weaving configuration	One-Sided
Number of lanes, N	2 ln
Weaving segment length, LS	600 ft
Freeway free-flow speed, FFS	60 mi/h
Minimum segment speed, SMIN	15 mi/h
Freeway maximum capacity, cIFL	2300 pc/h/ln

Terrain type	Level
Grade	0.00 %
Length	0.00 mi

Conversion to pc/h Under Base Conditions

Volume Components	VFF	VRF	VFR	VRR	
Volume, V	0	876	160	0	veh/h
Peak hour factor, PHF	0.95	0.95	0.95	0.95	
Peak 15-min volume, v15	0	231	42	0	
Trucks and buses	7	7	7	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	0.966	0.966	0.966	0.966	
Driver population adjustment, fP	1.00	1.00	1.00	1.00	
Flow rate, v	0	954	174	0	pc/h

Volume ratio, VR 1.000

Configuration Characteristics

Number of maneuver lanes, NWL	2 ln
Interchange density, ID	0.75 int/mi
Minimum RF lane changes, LCRF	1 lc/pc
Minimum FR lane changes, LCFR	1 lc/pc
Minimum RR lane changes, LCRR	lc/pc

Minimum weaving lane changes, LCMIN 1128 lc/h
Weaving lane changes, LCW 1170 lc/h
Non-weaving vehicle index, INW 0
Non-weaving lane change, LCNW 0 lc/h
Total lane changes, LCALL 1170 lc/h

_____Weaving and Non-Weaving Speeds_____
Weaving intensity factor, W 0.383
Average weaving speed, SW 47.5 mi/h
Average non-weaving speed, SNW 49.2 mi/h

_____Weaving Segment Speed, Density, Level of Service and Capacity_____
Weaving segment speed, S 47.5 mi/h
Weaving segment density, D 11.9 pc/mi/ln
Level of service, LOS A
Weaving segment v/c ratio 0.470
Weaving segment flow rate, v 1128 pc/h
Weaving segment capacity, cW 2319 veh/h

_____Limitations on Weaving Segments_____
If limit reached, see note.

	Minimum	Maximum	Actual	Note
Weaving length (ft)	300	14232	600	a,b
	Maximum	Analyzed		
Density-based capacty, cIWL (pc/h/ln)	2300	1257		c
	Maximum	Analyzed		
v/c ratio	1.00	0.470		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 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

Phone: Fax:
E-mail:

Operational Analysis

Analyst: Caitlin Bowen
Agency/Co.:
Date Performed: 6/14/2013
Analysis Time Period: PM Peak Hour
Freeway/Dir of Travel: I-55 Westbound
Weaving Location: LaGrange Weave
Analysis Year:
Description:

Inputs

Segment Type	C-D Roadway/ Multilane Highways
Weaving configuration	One-Sided
Number of lanes, N	2 ln
Weaving segment length, LS	450 ft
Freeway free-flow speed, FFS	60 mi/h
Minimum segment speed, SMIN	15 mi/h
Freeway maximum capacity, cIFL	2300 pc/h/ln

Terrain type	Level
Grade	0.00 %
Length	0.00 mi

Conversion to pc/h Under Base Conditions

Volume Components	VFF	VRF	VFR	VRR	
Volume, V	0	661	1325	0	veh/h
Peak hour factor, PHF	0.95	0.95	0.95	0.95	
Peak 15-min volume, v15	0	174	349	0	
Trucks and buses	7	7	7	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	0.966	0.966	0.966	0.966	
Driver population adjustment, fP	1.00	1.00	1.00	1.00	
Flow rate, v	0	720	1444	0	pc/h

Volume ratio, VR 1.000

Configuration Characteristics

Number of maneuver lanes, NWL	2 ln
Interchange density, ID	0.75 int/mi
Minimum RF lane changes, LCRF	1 lc/pc
Minimum FR lane changes, LCFR	1 lc/pc
Minimum RR lane changes, LCRR	lc/pc

Minimum weaving lane changes, LCMIN 2164 lc/h
Weaving lane changes, LCW 2194 lc/h
Non-weaving vehicle index, INW 0
Non-weaving lane change, LCNW 0 lc/h
Total lane changes, LCALL 2194 lc/h

_____Weaving and Non-Weaving Speeds_____
Weaving intensity factor, W 0.789
Average weaving speed, SW 40.2 mi/h
Average non-weaving speed, SNW 39.2 mi/h

_____Weaving Segment Speed, Density, Level of Service and Capacity_____
Weaving segment speed, S 40.2 mi/h
Weaving segment density, D 26.9 pc/mi/ln
Level of service, LOS C
Weaving segment v/c ratio 0.902
Weaving segment flow rate, v 2164 pc/h
Weaving segment capacity, cW 2319 veh/h

_____Limitations on Weaving Segments_____
If limit reached, see note.

	Minimum	Maximum	Actual	Note
Weaving length (ft)	300	14232	450	a,b
	Maximum	Analyzed		
Density-based capacty, cIWL (pc/h/ln)	2300	1246		c
	Maximum	Analyzed		
v/c ratio	1.00	0.902		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 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

Phone: Fax:
E-mail:

Operational Analysis

Analyst: Caitlin Bowen
Agency/Co.:
Date Performed: 6/14/2013
Analysis Time Period: PM Peak Hour
Freeway/Dir of Travel: I-55 Westbound
Weaving Location: Archer Avenue Weave
Analysis Year:
Description:

Inputs

Segment Type: C-D Roadway/ Multilane Highways
Weaving configuration: One-Sided
Number of lanes, N: 2 ln
Weaving segment length, LS: 600 ft
Freeway free-flow speed, FFS: 60 mi/h
Minimum segment speed, SMIN: 15 mi/h
Freeway maximum capacity, cIFL: 2300 pc/h/ln

Terrain type: Level
Grade: 0.00 %
Length: 0.00 mi

Conversion to pc/h Under Base Conditions

Volume Components	VFF	VRF	VFR	VRR	
Volume, V	0	1989	458	0	veh/h
Peak hour factor, PHF	0.95	0.95	0.95	0.95	
Peak 15-min volume, v15	0	523	121	0	
Trucks and buses	7	7	7	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	0.966	0.966	0.966	0.966	
Driver population adjustment, fP	1.00	1.00	1.00	1.00	
Flow rate, v	0	2167	499	0	pc/h

Volume ratio, VR: 1.000

Configuration Characteristics

Number of maneuver lanes, NWL: 2 ln
Interchange density, ID: 0.75 int/mi
Minimum RF lane changes, LCRF: 1 lc/pc
Minimum FR lane changes, LCFR: 1 lc/pc
Minimum RR lane changes, LCRR: lc/pc

Minimum weaving lane changes, LCMIN lc/h
Weaving lane changes, LCW lc/h
Non-weaving vehicle index, INW
Non-weaving lane change, LCNW lc/h
Total lane changes, LCALL lc/h

Weaving and Non-Weaving Speeds

Weaving intensity factor, W
Average weaving speed, SW mi/h
Average non-weaving speed, SNW mi/h

Weaving Segment Speed, Density, Level 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 1.111
Weaving segment flow rate, v 2666 pc/h
Weaving segment capacity, cW 2319 veh/h

Limitations on Weaving Segments

If limit reached, see note.

	Minimum	Maximum	Actual	Note
Weaving length (ft)	300	14232	600	a,b
	Maximum	Analyzed		
Density-based capacty, cIWL (pc/h/ln)	2300	1257		c
	Maximum	Analyzed		
v/c ratio	1.00	1.111		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 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

Phone: Fax:
E-mail:

Operational Analysis

Analyst:	Alex Ericksen
Agency/Co.:	
Date Performed:	1/8/2014
Analysis Time Period:	PM Peak Hour
Freeway/Dir of Travel:	I-55 Westbound
Weaving Location:	Kedzie/Cali Ave Frontage Rd
Analysis Year:	
Description:	

Inputs

Segment Type	C-D Roadway/ Multilane Highways	
Weaving configuration	One-Sided	
Number of lanes, N	3	ln
Weaving segment length, LS	1000	ft
Freeway free-flow speed, FFS	60	mi/h
Minimum segment speed, SMIN	15	mi/h
Freeway maximum capacity, cIFL	2300	pc/h/ln
Terrain type	Level	
Grade	0.00	%
Length	0.00	mi

Conversion to pc/h Under Base Conditions

	Volume Components				
	VFF	VRF	VFR	VRR	
Volume, V	700	1141	1406	0	veh/h
Peak hour factor, PHF	0.95	0.95	0.95	0.95	
Peak 15-min volume, v15	184	300	370	0	
Trucks and buses	7	7	7	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	0.966	0.966	0.966	0.966	
Driver population adjustment, fP	1.00	1.00	1.00	1.00	
Flow rate, v	763	1243	1532	0	pc/h

Volume ratio, VR 0.784

Configuration Characteristics

Number of maneuver lanes, NWL	2	ln
Interchange density, ID	0.75	int/mi
Minimum RF lane changes, LCRF	1	lc/pc
Minimum FR lane changes, LCFR	1	lc/pc
Minimum RR lane changes, LCRR		lc/pc
Minimum weaving lane changes, LCMIN		lc/h
Weaving lane changes, LCW		lc/h
Non-weaving vehicle index, INW		
Non-weaving lane change, LCNW		lc/h
Total lane changes, LCALL		lc/h

Weaving and Non-Weaving Speeds

Weaving intensity factor, W	
Average weaving speed, SW	mi/h
Average non-weaving speed, SNW	mi/h

Weaving Segment Speed, Density, Level 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	1.156	
Weaving segment flow rate, v	3538	pc/h
Weaving segment capacity, cW	2956	veh/h

Limitations on Weaving Segments

If limit reached, see note.

	Minimum	Maximum	Actual	Note
Weaving length (ft)	300	11335	1000	a,b
		Maximum	Analyzed	
Density-based capacty, cIWL (pc/h/ln)		2300	1509	c
		Maximum	Analyzed	
v/c ratio		1.00	1.156	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 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.

Technical Memorandum

I-55 PHASE I MANAGED LANE STUDY

Veterans Memorial Tollway (I-355) to Dan Ryan Expressway (I-90/94)

VECHICLE OCCUPANCY STUDY

Table of Contents

List of Figures

List of Tables

1 Introduction

1.1 Purpose of the Project

Interstate 55 (I-55), commonly referred to as the Stevenson Expressway in Cook County provides the primary southwest-northeast roadway access to the Chicago central business district. It serves Cook County, DuPage County and Will County in the Chicago Metropolitan area. The project limits connect the Veterans Memorial Tollway (I-355) (the metropolitan area's outer regional circumferential route) at the southern terminus, the Tri-State Tollway (I-294) (the metropolitan area's inner circumferential route) and I-90/94 (Dan Ryan Expressway) on the north.

The purpose of this project is to:

- Improve mobility, travel time reliability and operational efficiency to better accommodate the movement of people and goods.
- Facilitate congestion management in the corridor.
- Provide new travel choice
- Provide a sustainable transportation solution.
- Maximize use of the existing facility

The addition of managed lanes within the existing median and implementation of active traffic management technologies will provide options to adapt to frequently changing traffic conditions across all lanes, and provide a sustainable transportation solution.

1.2 Project Location

The Study Area is centered along I-55 in DuPage and Cook Counties. The project location extends from I-355 in the southwestern Chicago Metropolitan region (south terminus) to I-90/94 serving the Chicago Commercial District (CBD), a distance of approximately 25 miles as shown on Figure 1-1. Within Cook County, I-55 is known as the Stevenson Expressway.

Existing I-55 is one of several radial expressway links within the larger Chicago Metropolitan area expressway system, providing access between the Chicago Central Business District (CBD) and the southwest Chicago neighborhoods and suburban communities. Although I-55 is designated as a north-south interstate by designation, within the Study Area it is oriented in a southwest/northeast direction within the project limits and provides three travel lanes in each direction. For the purpose of this document, I-55 will refer to direction of travel as northbound (inbound to CBD) and southbound (outbound from CBD).

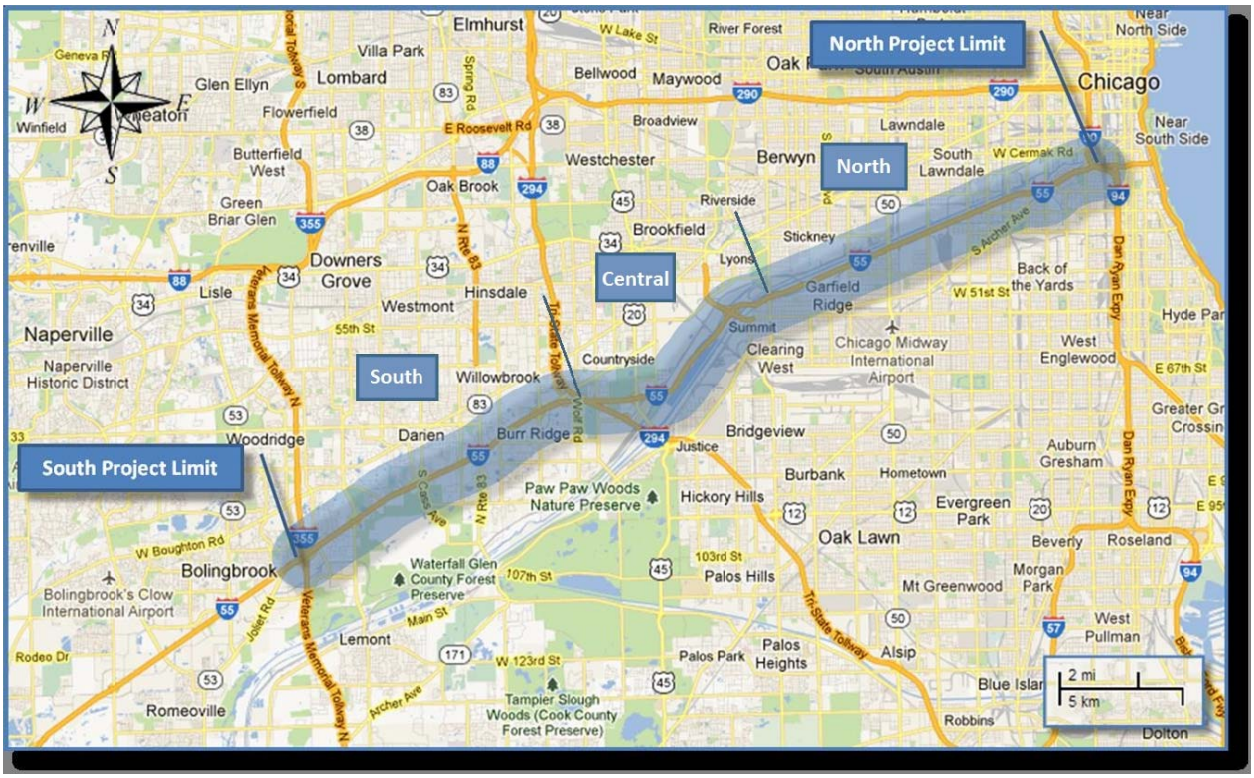
The existing roadway section of three continuous lanes in each direction with median area and adjacent land use varies considerably throughout the project limits. As shown in Figure 1-2, I-55 north of Lemont Road in DuPage County includes a closed median and is generally flanked on the outside by frontage roads serving adjacent residential and light commercial land use. As shown in Figure 1-3, I-55 north of Harlem Avenue in Cook County includes an open median and is flanked on both sides by railroad

facilities and commercial/ industrial land use. I-55 also generally parallels the DesPlaines River/Illinois-Michigan Canal/Chicago Sanitary Shipping Canal system along the northern half of the Study Area.

I-55 is classified as an Interstate Highway in an urban area, and is designated as a Class I Truck Route under the jurisdiction of the Illinois Department of Transportation (IDOT). I-55 is also part of the Strategic Highway Network (STRAHNET).

Within the I-55 project limits, there are three interstate system interchanges at I-355, I-294, and I-90/94. There are 14 full or partial service interchanges that provide access to adjacent land uses. The project lies within and/or adjacent to the municipal boundaries of 16 communities. Existing land use adjacent to I-55 is a combination of residential (predominantly west of US 12/45 (LaGrange Road), commercial, and industrial (predominantly east of LaGrange Road). There is also open space/forest preserve located predominantly west of LaGrange Road.

Figure 1-1 Project Location Map



1.3 Purpose of this Memorandum

The evaluation of managed lane performance is the understanding of corridor vehicle occupancy as an important evaluation parameter as such; a study was conducted to determine number of occupants in passenger vehicles in the study area. A "Carousel Observation" methodology was utilized to gather this data during the morning and afternoon peak travel time periods. The Carousel Study involved observers driving the right general purpose lane of the roadway and documenting the number of occupants in passing vehicles. This memorandum will document the study methods and findings.

2 Information Collection

To collect vehicle occupancy, four observation vehicles were driven along I-55 in the corridor and the occupancy of passing passenger vehicles using the roadway was recorded. An SUV, or similar vehicle with high seating, was used in order to facilitate observations. A three (3) person team, consists of a driver, a recorder and an observer, drove within the flow of the right lane of the freeway and observed passing identifiable passenger vehicles. The driver was directed to maintain a speed which was consistent with the traffic flow of the lane and was not responsible for collecting any information in order to allow him/her to concentrate on safely driving the vehicle. When entering areas where an auxiliary lane was present, the driver remained in the right lane. The observer counted vehicles and occupants from the backseat of the SUV on the drivers' side and relayed the information to the recorder. When approaching auxiliary lanes the observer also counted vehicles and occupants entering and exiting the freeway. The observer also maintains communication with the field study coordinator to maintain appropriate spacing and avoid double counting vehicles. The recorder was responsible to record information from the observer.

The observations were recorded over three (3) days (Tuesday April 30 thru Thursday May 2, 2013). Four (4) vehicles started from a location near the center of the study area (Harlem Avenue) and proceeded inbound and outbound. Observation vehicles began using a staggered start (approximately 10-15 minutes separation) managed by the field study coordinator to maintain this spacing. Observation times were from 6:00 AM – 11:00 AM and 2:00 PM – 7:00 PM. Vehicle occupancy was collected in each direction for both observation periods.

In order to establish consistent data collection techniques, observers were instructed to record only vehicles in which accurate occupancy could be determined. As such, vehicles with tinted windows obstructing the internal vehicle view and the presence of small children were sometimes difficult to verify. Those vehicles in which the occupancy could not be accurately observed were not included in the database. However, this study provided a sample of a significant number of vehicles representing a significant sample of passenger vehicle occupancy within the study corridor.

Additional information, including details about the schedules, travel times, and a sample form are included in Appendix A.

3 Data Collection Details

3.1 Collection Method

The carousel method positions observers in vehicles traveling on multi-lane highways to collect vehicle occupancy data on neighboring vehicles. During data collection, the driver drove in the right lane and observed passing vehicles in the two adjacent lanes. The observer viewed passing vehicles and reported the number of occupants seen in each vehicle. The recorder used the provided data sheets to record the vehicle occupancy data. The driver began a circuit traveling in one direction along the survey route, then turned around to drive the same route in the opposite direction to the beginning point on the roadway segment before another run was started.

The project was divided into three segments as shown in Figure 1-1, which generally represented the potential diverse occupancy/traffic characteristic within the Project corridor. These segments represent the generalized changes in potential vehicle distribution from suburban; to commercial/industrial; to urban and are as follows:

- I-355 to I-294 (suburban)
- I-294 to Harlem Ave. (commercial/industrial)
- Harlem Ave. to I-90/94 (urban)

It should be noted; although the I-55 corridor provides a diverse transportation service, the primary core traffic serve challenges within the corridor are the morning and evening commuter service which provides significant multi-occupancy vehicle opportunities.

3.2 Collection Plan

The northbound route began at Harlem Avenue (approximate midpoint) and entered I-55 northbound towards I-90/94. After passing I-90/94, the vehicle exited on the Martin Luther King Drive interchange immediately north of the project limits and then re-entered I-55 in the southbound direction towards I-355. After passing I-355, the vehicle exited at the IL Route 53 interchange immediately south of the project limits and re-entered I-55 in the northbound direction towards Harlem Avenue. Upon reaching Harlem Avenue, the driver exited to the designated rest area to complete the project circuit and reestablish vehicle spacing. This route was followed on April 30th by vehicles two and three during the morning circuit, May 1st by vehicle two during the morning circuit and vehicle three during the afternoon circuit, and on May 2nd vehicles two and three during the afternoon circuit.

The southbound route began at Harlem Avenue (approximate midpoint) and entered I-55 southbound towards I-355. After passing I-355, the vehicle exited at the IL Route 53 interchange immediately south of the project limits and re-entered I-55 in the northbound direction towards I-90/94. After passing I-90/94, the vehicle exited on the Martin Luther King Drive interchange immediately north of the project limits and then re-entered I-55 in the southbound direction towards Harlem Avenue. Upon reaching Harlem Avenue, the driver exited to the designated rest area to complete the project circuit and reestablish vehicle spacing. This route was followed on April 30th by vehicles one and four during the morning circuit, May 1st by vehicle one during the morning circuit and vehicle four during the afternoon circuit, and on May 2nd vehicles one and four during the afternoon circuit.

3.2.1 Meeting Location, Dates and Times

- Tuesday, April 30 2013
  - Meeting time: 5:30 AM
  - Location: 5406 S. Center Ave Summit, IL (Heritage Corridor lot)
  - Vehicles: 4 Vehicles 2 & 3 began northbound Vehicle 1 & 4 began southbound
    - Observation time: 6:00 AM – 11:00 AM
- Wednesday, May 1 2013
  - AM Circuit: Meeting time: 5:30 AM
  - Location: 5406 S. Center Ave Summit, IL (Heritage Corridor lot)
  - Vehicles: 2 Vehicle 2 began northbound Vehicle 1 began southbound
    - Observation time: 6:00 AM – 11:00 AM
  - PM Circuit: Meeting time: 1:30 PM
  - Location: 5406 S. Center Ave Summit, IL (Heritage Corridor lot)
  - Vehicles: 2 Vehicle 3 began northbound Vehicle 4 began southbound
    - Observation time: 2:00 PM – 7:00 PM
- Thursday, May 2 2013
  - Meeting time: 1:30 PM
  - Location: 5406 S. Center Ave Summit, IL (Heritage Corridor lot)
  - Vehicles: 4 Vehicles 2 & 3 began northbound Vehicles 1 & 4 began southbound
    - Observation time: 2:00 PM – 7:00 PM

3.2.2 Equipment

- Safety Equipment
  - Safety Vest
  - Hard Hats (Kept in Vehicle for emergency)
  - Magnetic Vehicle Identifiers
- Recording Equipment
  - Pencil(s)
  - Clipboard
  - Data Collection Sheets
- Vehicle
  - SUV
- IDOT Right of entry letter

3.2.3 Personnel for Collecting Data (per vehicle)

- Drivers (1)
  - Driver was instructed not to use any communication device (Cell phone, texting, etc.)
  - Maintained a consistent safe speed in the right lane
  - Maintained roughly 10 minutes of spacing between each recording vehicle
- Observer (1)
  - Observed all occupants of passenger vehicles (Did not count: Fed Ex, UPS, trucks/ business vehicles, buses etc.) and reported to the recorder

    - Maintained communication with the field study coordinator to avoid double counting of vehicles and to keep reasonable spacing
    - Did not guess on the number of occupants, recorded what was observed
- Recorder (1)
    - Filled out the current traffic/weather conditions and time of day on the top of each data collection sheet
    - Used a tally method (~~IIII~~) for recording the vehicles
    - Began a new sheet at the terminus (north and south)
- Field Study Coordinator (1, Stationed at office)
    - Maintained communication with all vehicles
    - Recorded times of all vehicles by segment
    - Enforced safety procedures

4 Field Results

Each vehicle made 2-3 full circuits during the observation period depending on traffic congestion. On April 30th all four vehicles completed three full circuits. On May 1st during the AM circuit with two vehicles, five full circuits were completed with one partial, while during the PM circuit with two vehicles only three circuits and one partial were completed. The reduced amount of completed circuits was due to an incident on the freeway between I-355 and I-294 which caused traffic a traffic backup near I-90/94 during peak hours. On May 2nd all four vehicles completed nine full circuits with three partials. This resulted in a total of 29 full circuits and five partial circuits while observing 12,532 vehicles.

Noted errors consisted of data collection on April 30th with one of the vehicles. Vehicle 4 collected data which was taken as a whole without recording the time or zone in which the counts were taken. Although this data was not included, the omitted data was consistent with the overall corridor occupancy data.

The observation data is summarized by segment in the following tables. Additional data is included in Appendix A.

Table 4-1 Vehicle Counts for Northbound I-55

Northbound I-55

I-355 to I-294		Occupant Vehicles				
		1	2	3	4	5+
AM	6:00 AM - 7:00 AM	147	8	2	0	0
	7:00 AM - 8:00 AM	210	20	4	0	0
	8:00 AM - 9:00 AM	76	11	1	0	0
	9:00 AM - 10:00 AM	190	24	2	1	0
	10:00 AM - 11:00 AM	217	52	8	1	0
	Total 974	840	115	17	2	0
		86.2%	11.8%	1.7%	0.2%	0.0%

I-355 to I-294		Occupant Vehicles				
		1	2	3	4	5+
PM	2:00 PM - 3:00 PM	224	51	14	5	0
	3:00 PM - 4:00 PM	209	50	12	1	1
	4:00 PM - 5:00 PM	118	37	4	1	1
	5:00 PM - 6:00 PM	125	23	3	1	0
	6:00 PM - 7:00 PM	175	42	8	1	1
	Total 1107	851	203	41	9	3
		76.9%	18.3%	3.7%	0.8%	0.3%

I-294 to Harlem Ave		Occupant Vehicles				
		1	2	3	4	5+
AM	6:00 AM - 7:00 AM	128	17	1	1	0
	7:00 AM - 8:00 AM	277	27	1	3	0
	8:00 AM - 9:00 AM	173	31	6	0	1
	9:00 AM - 10:00 AM	112	19	1	1	0
	10:00 AM - 11:00 AM	169	32	8	4	0
	Total 1012	859	126	17	9	1
		84.9%	12.5%	1.7%	0.9%	0.1%

I-294 to Harlem Ave		Occupant Vehicles				
		1	2	3	4	5+
PM	2:00 PM - 3:00 PM	121	21	9	7	0
	3:00 PM - 4:00 PM	78	12	4	1	0
	4:00 PM - 5:00 PM	111	24	2	3	1
	5:00 PM - 6:00 PM	83	27	1	1	1
	6:00 PM - 7:00 PM	165	34	5	2	0
	Total 713	558	118	21	14	2
		78.3%	16.5%	2.9%	2.0%	0.3%

Harlem Ave to I-90/94		Occupant Vehicles				
		1	2	3	4	5+
AM	6:00 AM - 7:00 AM	250	43	4	2	0
	7:00 AM - 8:00 AM	165	25	1	3	0
	8:00 AM - 9:00 AM	281	44	2	0	0
	9:00 AM - 10:00 AM	191	30	3	3	0
	10:00 AM - 11:00 AM	211	60	3	0	0
	Total 1321	1098	202	13	8	0
		83.1%	15.3%	1.0%	0.6%	0.0%

Harlem Ave to I-90/94		Occupant Vehicles				
		1	2	3	4	5+
PM	2:00 PM - 3:00 PM	362	54	11	1	3
	3:00 PM - 4:00 PM	248	51	6	8	2
	4:00 PM - 5:00 PM	96	15	5	3	4
	5:00 PM - 6:00 PM	127	17	3	0	2
	6:00 PM - 7:00 PM	43	8	1	0	0
	Total 1070	876	145	26	12	11
		81.9%	13.6%	2.4%	1.1%	1.0%

For detailed field data, see attachments

Table 4-2 Vehicle Counts for Southbound I-55

Southbound I-55

I-90/94 to Harlem Ave		Occupant Vehicles				
		1	2	3	4	5+
AM	6:00 AM - 7:00 AM	171	11	0	1	1
	7:00 AM - 8:00 AM	134	17	1	0	0
	8:00 AM - 9:00 AM	241	23	3	0	0
	9:00 AM - 10:00 AM	210	28	0	3	0
	10:00 AM - 11:00 AM	74	11	3	1	1
	Total 934	830	90	7	5	2
		88.9%	9.6%	0.7%	0.5%	0.2%

I-90/94 to Harlem Ave		Occupant Vehicles				
		1	2	3	4	5+
PM	2:00 PM - 3:00 PM	355	56	5	0	0
	3:00 PM - 4:00 PM	345	49	15	2	0
	4:00 PM - 5:00 PM	248	48	3	2	1
	5:00 PM - 6:00 PM	220	50	12	3	1
	6:00 PM - 7:00 PM	216	47	5	5	1
	Total 1689	1384	250	40	12	3
		81.9%	14.8%	2.4%	0.7%	0.2%

Harlem Ave to I-294		Occupant Vehicles				
		1	2	3	4	5+
AM	6:00 AM - 7:00 AM	140	21	4	2	0
	7:00 AM - 8:00 AM	142	11	2	2	0
	8:00 AM - 9:00 AM	136	15	1	0	0
	9:00 AM - 10:00 AM	52	9	3	0	0
	10:00 AM - 11:00 AM	43	10	3	1	1
	Total 598	513	66	13	5	1
		85.8%	11.0%	2.2%	0.8%	0.2%

Harlem Ave to I-294		Occupant Vehicles				
		1	2	3	4	5+
PM	2:00 PM - 3:00 PM	238	41	8	3	1
	3:00 PM - 4:00 PM	294	53	2	5	0
	4:00 PM - 5:00 PM	307	50	8	3	1
	5:00 PM - 6:00 PM	116	24	1	0	0
	6:00 PM - 7:00 PM	105	18	3	0	0
	Total 1281	1060	186	22	11	2
		82.7%	14.5%	1.7%	0.9%	0.2%

I-294 to I-355		Occupant Vehicles				
		1	2	3	4	5+
AM	6:00 AM - 7:00 AM	219	23	2	0	1
	7:00 AM - 8:00 AM	106	8	1	0	0
	8:00 AM - 9:00 AM	112	12	4	0	0
	9:00 AM - 10:00 AM	83	10	1	0	0
	10:00 AM - 11:00 AM	111	18	2	3	0
	Total 716	631	71	10	3	1
		88.1%	9.9%	1.4%	0.4%	0.1%

I-294 to I-355		Occupant Vehicles				
		1	2	3	4	5+
PM	2:00 PM - 3:00 PM	314	62	6	2	0
	3:00 PM - 4:00 PM	100	16	2	0	0
	4:00 PM - 5:00 PM	223	33	4	0	0
	5:00 PM - 6:00 PM	214	20	1	2	0
	6:00 PM - 7:00 PM	103	10	5	0	0
	Total 1117	954	141	18	4	0
		85.4%	12.6%	1.6%	0.4%	0.0%

For detailed field data, see attachments

5 Vehicle Occupancy Observation Summary

A total of 12,532 vehicles were observed, approximately 17% of the observed vehicles had two (2) or more occupants, as summarized in Table 5-3 below. The results show an average of 1.21 occupants per vehicle.

Table 5-1 Northbound Summary

Northbound Observation Summary						
Category	AM		PM		AM & PM	
	Total Vehicles	Percent	Total Vehicles	Percent	Total Vehicles	Percent
Total Number of Vehicles	3307	100.0%	2890	100.0%	6197	100.0%
1 Occupant Vehicles	2797	84.6%	2285	79.1%	5082	82.0%
2 Occupant Vehicles	443	13.4%	466	16.1%	909	14.7%
3 Occupant Vehicles	47	1.4%	88	3.0%	135	2.2%
4 Occupant Vehicles	19	0.6%	35	1.2%	54	0.9%
5+ Occupant Vehicles	1	0.0%	16	0.6%	17	0.3%

Table 5-2 Southbound Summary

Southbound Observation Summary						
Category	AM		PM		AM & PM	
	Total Vehicles	Percent	Total Vehicles	Percent	Total Vehicles	Percent
Total Number of Vehicles	2248	100.0%	4087	100.0%	6335	100.0%
1 Occupant Vehicles	1974	87.8%	3398	83.1%	5372	84.8%
2 Occupant Vehicles	227	10.1%	577	14.1%	804	12.7%
3 Occupant Vehicles	30	1.3%	80	2.0%	110	1.7%
4 Occupant Vehicles	13	0.6%	27	0.7%	40	0.6%
5+ Occupant Vehicles	4	0.2%	5	0.1%	9	0.1%

Table 5-3 Northbound and Southbound Summary

Northbound & Southbound Observation Summary						
Category	AM		PM		AM & PM	
	Total Vehicles	Percent	Total Vehicles	Percent	Total Vehicles	Percent
Total Number of Vehicles	5555	100.0%	6977	100.0%	12532	100.0%
1 Occupant Vehicles	4771	85.9%	5683	81.5%	10454	83.4%
2 Occupant Vehicles	670	12.1%	1043	14.9%	1713	13.7%
3 Occupant Vehicles	77	1.4%	168	2.4%	245	2.0%
4 Occupant Vehicles	32	0.6%	62	0.9%	94	0.8%
5+ Occupant Vehicles	5	0.1%	21	0.3%	26	0.2%

APPENDIX A

Day	Car #	Time	Location	In/Out	1 Passenger Cars	2 Passenger Cars	3 Passenger Cars	4 Pass. Cars	5+ Pass. Cars	5+ Passengers	Total # Cars	Total # Passengers	Avg Passengers per Car
1	1	6:08 AM	I-294 to I-355	Out	45	2					47	49	1.04
1	1	6:19 AM	I-355 to I-294	In	67	1					68	69	1.01
1	1	6:39 AM	I-294 to Harlem Ave	In	93	14	1	1			109	128	1.17
1	1	6:57 AM	Harlem Ave to I-90/94	In	44	14	2	1			61	82	1.34
1	1	7:12 AM	I-90/94 to Harlem Ave	Out	64	4					68	72	1.06
1	1	7:56 AM	Harlem Ave to I-294	Out	59	6		1			66	75	1.14
1	1	8:07 AM	I-294 to I-355	Out	38	1					39	40	1.03
1	1	8:18 AM	I-355 to I-294	In	45	5					50	55	1.10
1	1	8:30 AM	I-294 to Harlem Ave	In	72	15	1				88	105	1.19
1	1	8:43 AM	Harlem Ave to I-90/94	In	81	17					98	115	1.17
1	1	9:08 AM	I-90/94 to Harlem Ave	Out	98	12					110	122	1.11
1	1	9:40 AM	Harlem Ave to I-294	Out	25	5	1				31	38	1.23
1	1	9:47 AM	I-294 to I-355	Out	36	6	1				43	51	1.19
1	1	10:00 AM	I-355 to I-294	In	52	15					67	82	1.22
1	1	10:13 AM	I-294 to Harlem Ave	In	25	5		1			31	39	1.26
1	1	10:17 AM	Harlem Ave to I-90/94	In	107	31	2				140	175	1.25
1	1	10:35 AM	I-90/94 to Harlem Ave	Out	39	8					47	55	1.17
1	2	6:05 AM	Harlem Ave to I-90/94	In	52	7	1				60	69	1.15
1	2	6:21 AM	I-90/94 to Harlem Ave	Out	50	3					53	56	1.06
1	2	6:32 AM	Harlem Ave to I-294	Out	70	14	2	2			88	112	1.27
1	2	6:40 AM	I-294 to I-355	Out	73	12	1				86	100	1.16
1	2	7:02 AM	I-355 to I-294	In	80	7	1				88	97	1.10
1	2	7:14 AM	I-294 to Harlem Ave	In	100	7					107	114	1.07
1	2	7:51 AM	Harlem Ave to I-90/94	In	119	13	1	1			134	152	1.13
1	2	8:20 AM	I-90/94 to Harlem Ave	Out	76	6	1				83	91	1.10
1	2	8:40 AM	Harlem Ave to I-294	Out	29	3					32	35	1.09
1	2	8:47 AM	I-294 to I-355	Out	58	6	2				66	76	1.15
1	2	9:04 AM	I-355 to I-294	In	60	3	1				64	69	1.08
1	2	9:11 AM	I-294 to Harlem Ave	In	20	5		1			26	34	1.31
1	2	9:28 AM	Harlem Ave to I-90/94	In	75	12	3	1			91	112	1.23
1	2	9:45 AM	I-90/94 to Harlem Ave	Out	52	8		2			62	76	1.23
1	2	9:55 AM	Harlem Ave to I-294	Out	27	4	2				33	41	1.24
1	2	10:03 AM	I-294 to I-355	Out	23	4					27	31	1.15
1	2	10:18 AM	I-355 to I-294	In	40	5	1				46	53	1.15
1	2	10:28 AM	I-294 to Harlem Ave	In	27	7	2				36	47	1.31
1	3	6:20 AM	Harlem Ave to I-90/94	In	78	12	1				91	105	1.15
1	3	6:33 AM	I-90/94 to Harlem Ave	Out	77	3		1	1	5	82	92	1.12
1	3	6:46 AM	Harlem Ave to I-294	Out	83	5	2	1			91	103	1.13
1	3	6:54 AM	I-294 to I-355	Out	68	7	1				76	85	1.12
1	3	7:12 AM	I-355 to I-294	In	70	5	2				77	86	1.12
1	3	7:24 AM	I-294 to Harlem Ave	In	52	6					58	64	1.10

Day	Car #	Time	Location	In/Out	1 Passenger Cars	2 Passenger Cars	3 Passenger Cars	4 Pass. Cars	5+ Pass. Cars	5+ Passengers	Total # Cars	Total # Passengers	Avg Passengers per Car
1	3	8:03 AM	Harlem Ave to I-90/94	In	111	17	1				129	148	1.15
1	3	8:32 AM	I-90/94 to Harlem Ave	Out	128	11	1				140	153	1.09
1	3	8:52 AM	Harlem Ave to I-294	Out	38	3	1				42	47	1.12
1	3	8:59 AM	I-294 to I-355	Out	47	4					51	55	1.08
1	3	9:15 AM	I-355 to I-294	In	69	13					82	95	1.16
1	3	9:27 AM	I-294 to Harlem Ave	In	64	10	1				75	87	1.16
1	3	9:53 AM	Harlem Ave to I-90/94	In	104	29	1				134	165	1.23
1	3	10:08 AM	I-90/94 to Harlem Ave	Out	35	3	3	1	1	6	43	60	1.40
1	3	10:20 AM	Harlem Ave to I-294	Out	19	7	2	1	1	6	30	49	1.63
1	3	10:27 AM	I-294 to I-355	Out	37	6	1	3			47	64	1.36
1	3	10:40 AM	I-355 to I-294	In	49	8	4	1			62	81	1.31
1	3	10:51 AM	I-294 to Harlem Ave	In	39	3	3	1			46	58	1.26
2	1	6:06 AM	Harlem Ave to I-294	Out	30	6	1				37	45	1.22
2	1	6:13 AM	I-294 to I-355	Out	65	8	1		1	5	75	89	1.19
2	1	6:33 AM	I-355 to I-294	In	80	7	2				89	100	1.12
2	1	6:56 AM	I-294 to Harlem Ave	In	35	3					38	41	1.08
2	1	7:21 AM	Harlem Ave to I-90/94	In	46	12		2			60	78	1.30
2	1	7:51 AM	I-90/94 to Harlem Ave	Out	70	13	1				84	99	1.18
2	1	8:28 AM	Harlem Ave to I-294	Out	30	7					37	44	1.19
2	1	8:39 AM	I-294 to I-355	Out	31	5	2				38	47	1.24
2	1	8:55 AM	I-355 to I-294	In	31	6	1				38	46	1.21
2	1	9:03 AM	I-294 to Harlem Ave	In	101	16	5		1	5	123	153	1.24
2	1	9:20 AM	Harlem Ave to I-90/94	In	39	6		1			46	55	1.20
2	1	9:38 AM	I-90/94 to Harlem Ave	Out	36	6		1			43	52	1.21
2	1	10:09 AM	Harlem Ave to I-294	Out	8	1	1				10	13	1.30
2	1	10:18 AM	I-294 to I-355	Out	13	6					19	25	1.32
2	1	10:29 AM	I-355 to I-294	In	46	14	1				61	77	1.26
2	1	10:42 AM	I-294 to Harlem Ave	In	30	8	2	1			41	56	1.37
2	2	6:03 AM	Harlem Ave to I-90/94	In	76	10		1			87	100	1.15
2	2	6:23 AM	I-90/94 to Harlem Ave	Out	44	5					49	54	1.10
2	2	6:36 AM	Harlem Ave to I-294	Out	40	1	1				42	45	1.07
2	2	6:45 AM	I-294 to I-355	Out	36	1					37	38	1.03
2	2	7:04 AM	I-355 to I-294	In	60	8	1				69	79	1.14
2	2	7:17 AM	I-294 to Harlem Ave	In	125	14	1	3			143	168	1.17
2	2	8:08 AM	Harlem Ave to I-90/94	In	89	10	1				100	112	1.12
2	2	8:35 AM	I-90/94 to Harlem Ave	Out	37	6	1				44	52	1.18
2	2	8:45 AM	Harlem Ave to I-294	Out	39	2					41	43	1.05
2	2	8:55 AM	I-294 to I-355	Out	23	1					24	25	1.04
2	2	9:10 AM	I-355 to I-294	In	61	8	1	1			71	84	1.18
2	2	9:19 AM	I-294 to Harlem Ave	In	28	4					32	36	1.13
2	2	9:39 AM	Harlem Ave to I-90/94	In	77	12		1			90	105	1.17

Day	Car #	Time	Location	In/Out	1 Passenger Cars	2 Passenger Cars	3 Passenger Cars	4 Pass. Cars	5+ Pass. Cars	5+ Passengers	Total # Cars	Total # Passengers	Avg Passengers per Car
2	2	9:55 AM	I-90/94 to Harlem Ave	Out	24	2					26	28	1.08
2	2	10:04 AM	Harlem Ave to I-294	Out	16	2					18	20	1.11
2	2	10:11 AM	I-294 to I-355	Out	38	2	1				41	45	1.10
2	2	10:26 AM	I-355 to I-294	In	30	10	2				42	56	1.33
2	2	10:35 AM	I-294 to Harlem Ave	In	48	9	1	1			59	73	1.24
2	3	2:00 PM	Harlem Ave to I-90/94	In	63	11	2	1	1	5	78	100	1.28
2	3	2:11 PM	I-90/94 to Harlem Ave	Out	75	19					94	113	1.20
2	3	2:27 PM	Harlem Ave to I-294	Out	36	6	1	1	1	5	45	60	1.33
2	3	2:34 PM	I-294 to I-355	Out	108	20		1			129	152	1.18
2	3	3:01 PM	I-355 to I-294	In	159	40	10	1	1	5	211	278	1.32
2	3	3:24 PM	I-294 to Harlem Ave	In	44	8	1				53	63	1.19
2	3	3:53 PM	Harlem Ave to I-90/94	In	51	9	4	2	3	15	69	104	1.51
2	3	4:10 PM	I-90/94 to Harlem Ave	Out	81	18		1			100	121	1.21
2	3	4:33 PM	Harlem Ave to I-294	Out	175	30	4	2			211	255	1.21
2	3	5:36 PM	I-294 to I-355	Out	128	14	1	2			145	167	1.15
2	3	6:15 PM	I-355 to I-294	In	67	15	3		1	6	86	112	1.30
2	3	6:26 PM	I-294 to Harlem Ave	In	42	8	1	2			53	69	1.30
2	4	2:00 PM	Harlem Ave to I-294	Out	26	13	1				40	55	1.38
2	4	2:06 PM	I-294 to I-355	Out	54	10	1	1			66	81	1.23
2	4	2:22 PM	I-355 to I-294	In	62	12	5				79	101	1.28
2	4	2:32 PM	I-294 to Harlem Ave	In	37	9	4	1			51	71	1.39
2	4	2:41 PM	Harlem Ave to I-90/94	In	106	17	5				128	155	1.21
2	4	2:56 PM	I-90/94 to Harlem Ave	Out	94	15	1				110	127	1.15
2	4	3:36 PM	Harlem Ave to I-294	In	250	48	1	5			304	369	1.21
2	4	4:20 PM	I-294 to I-355	Out	77	17	2				96	117	1.22
2	4	5:46 PM	I-355 to I-294	In	62	15	3				80	101	1.26
2	4	6:00 PM	I-294 to Harlem Ave	In	40	14	1	1	1	5	57	80	1.40
3	1	2:05 PM	Harlem Ave to I-294	Out	48	4	2				54	62	1.15
3	1	2:12 PM	I-294 to I-355	Out	38	10	1				49	61	1.24
3	1	2:28 PM	I-355 to I-294	In	49	8	1	2			60	76	1.27
3	1	2:45 PM	I-294 to Harlem Ave	In	38	6	2	3			49	68	1.39
3	1	2:56 PM	Harlem Ave to I-90/94	In	63	10	2		2	10	77	99	1.29
3	1	3:05 PM	I-90/94 to Harlem Ave	Out	121	15	7				143	172	1.20
3	1	3:50 PM	Harlem Ave to I-294	Out	44	5	1				50	57	1.14
3	1	4:01 PM	I-294 to I-355	Out	61	11	2				74	89	1.20
3	1	4:20 PM	I-355 to I-294	In	33	5					38	43	1.13
3	1	4:32 PM	I-294 to Harlem Ave	In	48	15		1			64	82	1.28
3	1	4:48 PM	Harlem Ave to I-90/94	In	45	6	1	1	1	7	54	71	1.31
3	1	5:05 PM	I-90/94 to Harlem Ave	In	62	15	4	1			82	108	1.32
3	1	5:51 PM	Harlem Ave to I-294	Out	20	6	1				27	35	1.30
3	1	6:00 PM	I-294 to I-355	Out	29	5	2				36	45	1.25

Day	Car #	Time	Location	In/Out	1 Passenger Cars	2 Passenger Cars	3 Passenger Cars	4 Pass. Cars	5+ Pass. Cars	5+ Passengers	Total # Cars	Total # Passengers	Avg Passengers per Car
3	1	6:21 PM	I-355 to I-294	In	12	5					17	22	1.29
3	1	6:34 PM	I-294 to Harlem Ave	In	14	3	1				18	23	1.28
3	2	2:01 PM	Harlem Ave to I-90/94	In	45	3	1				49	54	1.10
3	2	2:14 PM	I-90/94 to Harlem Ave	Out	73	10	1				84	96	1.14
3	2	2:31 PM	Harlem Ave to I-294	Out	32	4	1				37	43	1.16
3	2	2:38 PM	I-294 to I-355	Out	30	3	2				35	42	1.20
3	2	2:54 PM	I-355 to I-294	In	35	6	2	2			45	61	1.36
3	2	3:04 PM	I-294 to Harlem Ave	In	19	3		1			23	29	1.26
3	2	3:21 PM	Harlem Ave to I-90/94	In	108	20	2	2	1	5	133	167	1.26
3	2	3:42 PM	I-90/94 to Harlem Ave	Out	108	16	3	1			128	153	1.20
3	2	4:09 PM	Harlem Ave to I-294	Out	39	5	1				45	52	1.16
3	2	4:22 PM	I-294 to I-355	Out	64	8					72	80	1.11
3	2	4:45 PM	I-355 to I-294	In	62	18	2	1	1	7	84	115	1.37
3	2	4:58 PM	I-294 to Harlem Ave	In	42	3	2	1	1	5	49	63	1.29
3	2	5:23 PM	Harlem Ave to I-90/94	In	73	10	2				85	99	1.16
3	2	5:40 PM	I-90/94 to Harlem Ave	Out	104	20	4	3	1	5	132	173	1.31
3	2	6:04 PM	Harlem Ave to I-294	Out	75	15	1				91	108	1.19
3	2	6:14 PM	I-294 to I-355	Out	74	5	3				82	93	1.13
3	2	6:38 PM	I-355 to I-294	In	32	7		1			40	50	1.25
3	2	6:50 PM	I-294 to Harlem Ave	In	26	4	1				31	37	1.19
3	3	2:13 PM	Harlem Ave to I-90/94	In	85	13	1				99	114	1.15
3	3	2:29 PM	I-90/94 to Harlem Ave	Out	113	12	3				128	146	1.14
3	3	2:50 PM	Harlem Ave to I-294	Out	36	5	1				42	49	1.17
3	3	2:58 PM	I-294 to I-355	Out	39	5					44	49	1.11
3	3	3:13 PM	I-355 to I-294	In	50	10	2				62	76	1.23
3	3	3:24 PM	I-294 to Harlem Ave	In	15	1	3				19	26	1.37
3	3	3:49 PM	Harlem Ave to I-90/94	In	73	17	4	5	1	8	100	147	1.47
3	3	4:05 PM	I-90/94 to Harlem Ave	Out	167	30	3	1	1	5	202	245	1.21
3	3	4:41 PM	Harlem Ave to I-294	Out	96	18					114	132	1.16
3	3	4:56 PM	I-294 to I-355	Out	86	6					92	98	1.07
3	3	5:18 PM	I-355 to I-294	In	63	8		1			72	83	1.15
3	3	5:33 PM	I-294 to Harlem Ave	In	43	13					56	69	1.23
3	3	6:00 PM	Harlem Ave to I-90/94	In	43	8	1				52	62	1.19
3	3	6:15 PM	I-90/94 to Harlem Ave	Out	112	27	1	2			142	177	1.25
3	3	6:36 PM	Harlem Ave to I-294	Out	30	3	2				35	42	1.20
3	3	6:50 PM	I-294 to Harlem Ave	In	31	10					41	51	1.24
3	4	2:16 PM	Harlem Ave to I-294	Out	60	9	2	2			73	92	1.26
3	4	2:24 PM	I-294 to I-355	Out	84	19	2				105	128	1.22
3	4	2:41 PM	I-355 to I-294	In	78	25	6	1			110	150	1.36
3	4	2:52 PM	I-294 to Harlem Ave	In	46	6	3	3			58	79	1.36
3	4	3:00 PM	Harlem Ave to I-90/94	In	67	14		1			82	99	1.21

Day	Car #	Time	Location	In/Out	1 Passenger Cars	2 Passenger Cars	3 Passenger Cars	4 Pass. Cars	5+ Pass. Cars	5+ Passengers	Total # Cars	Total # Passengers	Avg Passengers per Car
3	4	3:20 PM	I-90/94 to Harlem Ave	Out	116	18	5	1			140	171	1.22
3	4	4:07 PM	Harlem Ave to I-294	Out	93	15	3	1	1	8	113	144	1.27
3	4	4:19 PM	I-294 to I-355	Out	82	8	2				92	104	1.13
3	4	4:41 PM	I-355 to I-294	In	23	14	2				39	57	1.46
3	4	4:54 PM	I-294 to Harlem Ave	In	21	6		1			28	37	1.32
3	4	5:06 PM	Harlem Ave to I-90/94	In	54	7	1		2	10	64	81	1.27
3	4	5:26 PM	I-90/94 to Harlem Ave	Out	158	35	8	2	1	5	204	265	1.30
3	4	6:40 PM	I-355 to I-294	In	64	15	5				84	109	1.30
3	4	6:57 PM	I-294 to Harlem Ave	In	52	9	2				63	76	1.21

*Note: In Car #4, Day 1 there was a recording error with one of the data sets. The data collected was taken as a whole without recording the time or zone in which the counts were taken. This data was not included in the summary.

I-55 CAROUSEL OBSERVATION INBOUND

Driver: _____

Temp: _____ Start Time: _____ Recoder: _____ Observer: _____

Date: _____ Roadway Conditions: _____ Visibility: _____

Location & Time	1 Passenger Cars	2 Passenger Cars	3 Passenger Cars	4 Passenger Cars	>=5 Passenger Cars (Write #)
I-355 to I-294 Time:					
I-294 to Harlem Ave Time:					
Harlem Ave - I-90/94 Time:					

I-55 CAROUSEL OBSERVATION OUTBOUND

Driver: _____

Temp: _____ Start Time: _____ Recoder: _____ Observer: _____

Date: _____ Roadway Conditions: _____ Visibility: _____

Location & Time	1 Passenger Cars	2 Passenger Cars	3 Passenger Cars	4 Passenger Cars	>=5 Passenger Cars (Write #)
I-90/94 - Harlem Ave Time:					
Harlem Ave - I-294 Time:					
I-294 - I-355 Time:					

Illinois Department of Transportation

Division of Highways / Region 1 / District 1
201 West Center Court / Schaumburg, Illinois / 60196-1096
Telephone 847/705-4000

Project and Environmental Studies
Interstate 55 (Interstate 355 to Interstate 94)
Du Page County and Cook County

RE: Letter of Identification and Notice

May 24, 2012

To Whom It May Concern:

This is to certify and serve as notice that personnel representing the consulting firms of **Stantec, Lin Engineering, CDM Smith Inc, Gandhi and Associates, Images, Christopher Burke Engineering, Collins Engineers, and Martinez Geospatial** are doing work for the Department of Transportation of the State of Illinois, and are authorized by law to enter upon private property for the purposes of conducting existing conditions analyses, i.e. topographic surveys, traffic studies, drainage surveys, environmental surveys, and other related work, in accordance with Section 4-503 of the Illinois Highway Code (605 ILCS 5/4-503).

This authority is applicable to the Interstate 55 Phase I Engineering Study which extends from west of Interstate 355 through Interstate 94, in the Counties of Du Page and Cook, in the State of Illinois.

If you have any questions or need additional information, please call Srikanth Panguluri, Project Manager, at (847) 705-4073.

Very truly yours,

Diane M. O'Keefe, P.E.
Deputy Director of Highways,
Region One Engineer

By: John Baczek
John A. Baczek, P.E.
Project and Environmental Studies Section Chief

Stantec

Sheet: _____ of _____
Calc By: BPS Date: 4/30/13
Check By: _____ Date: _____
Project Number: _____
Subject: _____

	Car #1	Car #2	Car #3	Car #4		Occupants
Start Time	6:08 (56)				Car #1:	
South End of Corridor Time #1	6:18	6:52	7:05	6:32	Car #2:	
South End of Corridor Time #2	8:20	9:04	9:10	8:34	Car #3:	
South End of Corridor Time #3	10:00	10:20	10:38	10:15	Car #4:	
South End of Corridor Time #4						
South End of Corridor Time #5						
Break Time #1	7:45	7:29	7:45			
Break Time #2	9:26	9:20	9:40	9:40		
Break Time #3						
Break Time #4						
Break Time #5						
North End of Corridor Time #1	7:14	6:23 OK	6:33	7:30		
North End of Corridor Time #2	9:08	8:20	8:31	9:17		
North End of Corridor Time #3	10:37	9:46	10:07	10:53		
North End of Corridor Time #4						
North End of Corridor Time #5						

Stantec

Sheet: _____ of _____
Calc By: BPS Date: 5/2/13
Check By: _____ Date: _____
Project Number: _____
Subject: _____

	Car #1	Car #2	Car #3	Car #4
Start Time	6:05			
South End of Corridor Time #1	6:28	7:02	2:53	2:18
South End of Corridor Time #2	8:52	9:10	-	5:34
South End of Corridor Time #3	10:29	?		
South End of Corridor Time #4				
South End of Corridor Time #5				
Break Time #1	8:10	7:45	3:32	3:20
Break Time #2	Stop 11:00	9:32 Stop 9:00		
Break Time #3				
Break Time #4				
Break Time #5				
North End of Corridor Time #1	7:51	6:23	2:11	2:55
North End of Corridor Time #2	9:38	8:36	4:10	
North End of Corridor Time #3		9:57		
North End of Corridor Time #4				
North End of Corridor Time #5				

Occupants

Car #1:

Car #2:

Car #3:

Car #4:

Stantec

Sheet: _____ of _____
Calc By: AJS Date: 5/2/13
Check By: _____ Date: _____
Project Number: _____
Subject: _____

	Car #1	Car #2	Car #3	Car #4
Start Time	2:06 OB			
South End of Corridor Time #1	2:28	2:54	3:10	2:38
South End of Corridor Time #2	4:19	4:44	5:14	4:38
South End of Corridor Time #3	6:21	6:32		6:38
South End of Corridor Time #4				
South End of Corridor Time #5				
Break Time #1	3:32	3:15	3:44	3:46
Break Time #2	5:035	5:12	5:48	5:51
Break Time #3				7:05
Break Time #4				
Break Time #5				
North End of Corridor Time #1	3:05	2:14	2:26	3:19
North End of Corridor Time #2	5:04	3:39	4:04	5:22
North End of Corridor Time #3		5:41	6:12	
North End of Corridor Time #4				
North End of Corridor Time #5				

Occupants

Car #1:

Car #2:

Car #3:

Car #4:

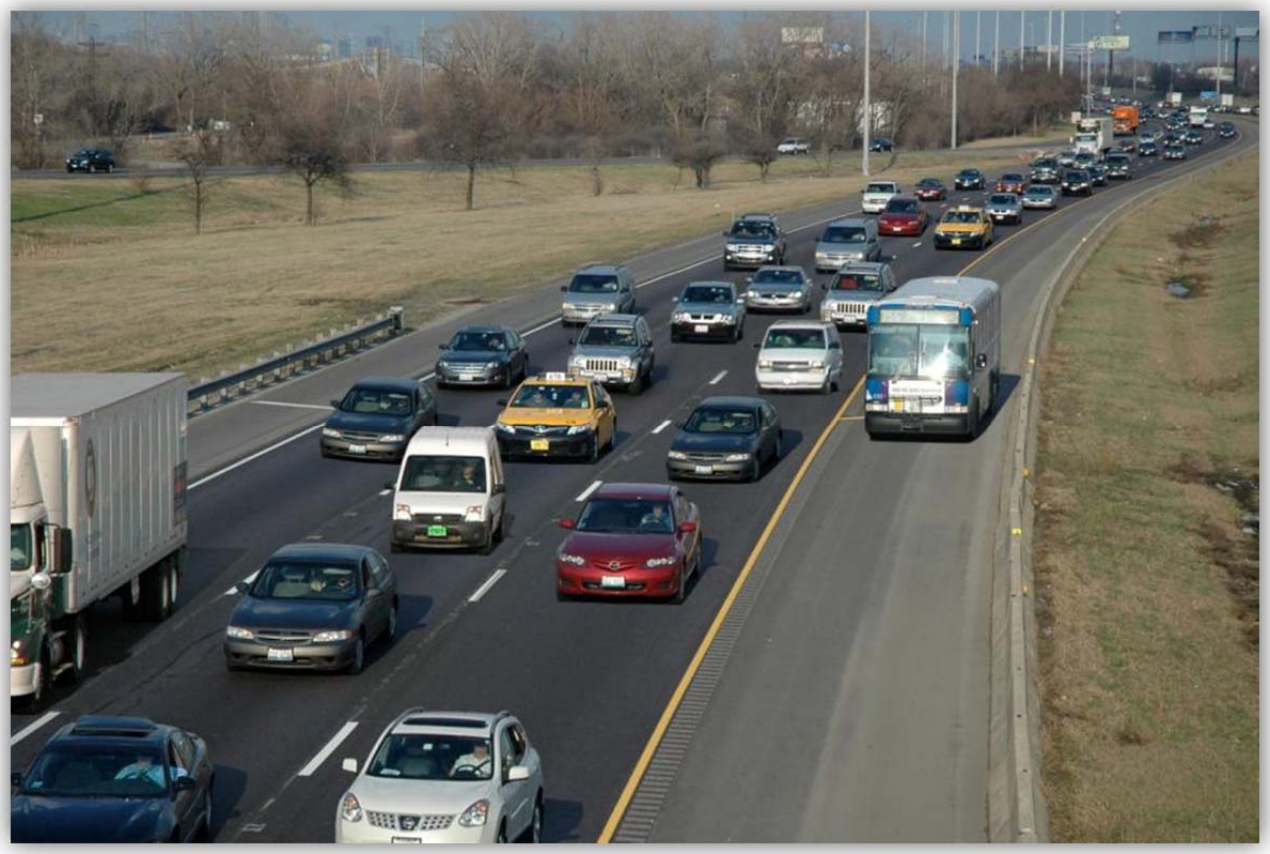
I-55 Managed Lane Project

From I-355 (Veterans Memorial Tollway)

To I-90/94 (Dan Ryan Expressway)

Crash Analysis of Existing Conditions

P-91-762-10



June 2016

TABLE OF CONTENTS

TABLE OF CONTENTS (CONTINUED)

List of Figures

List of Tables

Appendix

1. EXECUTIVE SUMMARY

This report is a summary of the results of a crash analysis performed along a 23.25 mile section of I-55 from I-355 (Veterans Memorial Tollway) bridge to I-90/94 (Dan Ryan Expressway) bridge (see Figure 1 – Location Map). The five year crash data from 2010 to 2014 for I-55 was used for this analysis and is confined to only the mainline and does not include the interchange ramps. The summary of the crash data in tabular format can be found in the appendices.

There were a total of 8,081 reported crashes within the study area with 4,121 (51.0%) crashes on the inbound (northbound) direction, 3,944 (48.8%) crashes on the outbound (southbound) direction and 16 (0.2%) crashes occurred with the direction unknown. Rear end collisions accounted for 4,718 crashes (58.4%), sideswipe-same direction accounted for 1,697 crashes (21.0%), fixed object collisions accounted for 1,236 (15.3%) and all other crashes accounted for 430 collision (5.3%). Of the fixed object crashes, 890 (72.0%) were collisions with the median barrier wall. Overall, there were 1,258 (15.6%) crashes that resulted in a personal injury with 12 (0.2%) of which involving a fatality, 222 (2.7%) Type A injury crashes, 762 (9.4%) Type B injury crashes, and 274 (3.4%) Type C injury crashes. The FHWA 2015 Illinois Five Percent Severe Crash Report, prepared based on a review of statewide crash data from 2009 to 2012, identified six segments within the I-55 corridor as defined 5% locations (See Section 4.2). In 2013 and 2014 the 5% reports were not generated. The majority of the crashes occurred during week day peak hours of 6:00 am to 9:00 am and from 3:00 pm to 6:00 pm, which correspond to the times of heaviest travel demand.

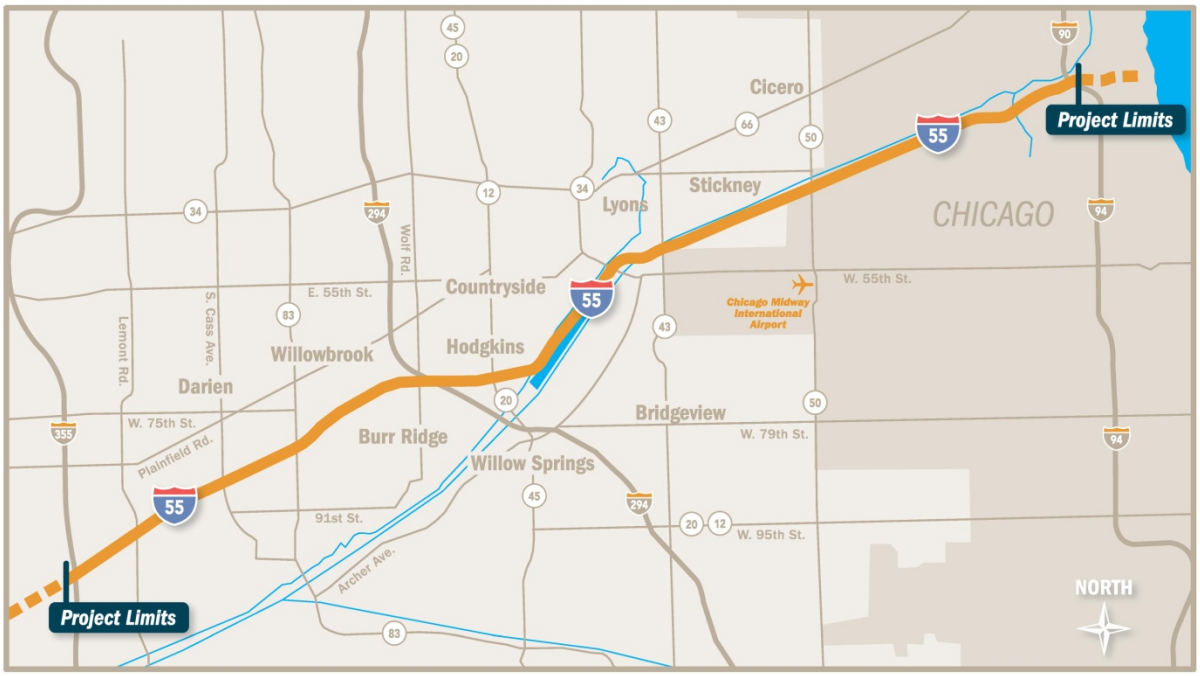


Figure 1 – Location Map

Review of 5% locations within the I-55 corridor indicated a noticeable relationship to interchange locations along the route. Evaluation of these interchanges reveals deficiencies in ramp terminal geometry, ramp geometry, and capacity. These deficiencies hinder mainline entrance and exit movements, which disrupt traffic flow and contribute to mainline crashes at these locations.

As a result of this evaluation, the following countermeasures are identified to address the incidence of crashes within the corridor:

- The high volume of rear-end and sideswipe same direction crashes (79.3%) indicates that traffic congestion is a primary contributor to the number of crashes. Increasing traffic capacity along I-55 can reduce the likelihood of crashes.
- An Active Traffic Management system can be implemented on the mainline to alert motorist of approaching queuing and congestion; allow speed harmonizing management strategies and provide dynamic motorist information to alert oncoming traffic of incidences; provide emergency lane management options and allow adaptable posting advisory speed guidance, resulting in more stable traffic flow conditions within the corridor.
- High volume entrance ramps can be managed through active ramp meter installations to provide smoother ramp/mainline entrance operations.
- Improved ramp terminal and interchange ramp geometry along with expanded ramp shoulder widths can improve interchange movements entering and/or exiting the I-55 mainline resulting in a more stable traffic flow condition within these interchange areas.
- The existing 36 inch high jersey style barrier wall in the median no longer meets current standards. Replacement of this wall with the 42 inch high F-type wall will provide added protection for barrier wall crashes.
- The removal of median barrier wall from the edge of shoulder at Harlem to I-90/94 where a sixty foot edge to edge clear zone is provided will add clearance and recovery distance along this segment.
- Enhanced enforcement measures, including the introduction of camera and license reading technology and speed alert messaging, could serve to reduce the incidence of crashes caused or exacerbated by alcohol/drug use and excessive speeds.

The Managed Lane Project, through the introduction of travel management strategies, congestion pricing options and Active Traffic Management tools will provide additional capacity and improved motorist communications. Thus, reducing congestion and providing for a more stable mainline traffic flow as well as to accommodating the exiting and entering traffic at interchange locations. Long term opportunities to conduct detailed interchange capacity and design studies will offer additional options to improve the efficiency of these interchanges.

2. INTRODUCTION

The I-55 corridor from I-355 to I-90/94 is a major freeway providing access between the Chicago downtown area and the southwestern suburban communities. Built to provide three continuous lanes in each direction almost 50 years ago, much of this route has not undergone a major reconstruction since its initial construction. The segment of this route from east of Pulaski Road to I-90/94 was reconstructed in 1999/2000 to provide new pavement, bridge decks, and operational/safety improvements. Thus, no additional capacity has been added to this route since the original construction. As a result, high traffic volumes, single lane ramps and lower operating speeds make I-55 prone to congestion, which causes it to operate under breakdown conditions for long periods of the day.

2.1. Purpose of the Crash Analysis

The purpose of the crash analysis is to identify trends in crashes and theorize causes in order to define effective countermeasures for incorporation in the Phase I study where practical and achievable. The analysis considers the following:

- Locations with an elevated occurrence of crashes
- Periods of time with an elevated occurrence of crashes
- Leading collision types to theorize the causes of crashes
- Determination if the effects of weather, roadway geometry and/or lighting conditions contribute to crashes
- Examination of the severity of crashes, with added emphasis on crashes with fatalities, Type A (incapacitating), and Type B (Non-incapacitating) injuries (See detailed descriptions in Section 4.0)

2.2. Crash Study Period

IDOT provided crash data for this section of the I-55 for years 2010 to 2014. This is the most recent five-year time period representing normal operating conditions.

2.3. Crash Study Area

For the purpose of this study, the 23.25 mile section of I-55 was divided into three segments as the following locations have major distinctive changes in geometry and/or access locations:

From I-355 (Veterans Memorial Tollway) bridge to south of I-294 (Tri-State Tollway), mile post 269.00 to milepost 278.00 (9.00 miles)

This segment of I-55 traverses through the suburban areas of Cook and DuPage Counties. The roadway provides three twelve foot lanes in each direction, separated by a 40-foot paved median with a 32 inch jersey style barrier wall. Median shoulders are generally 18 feet 6 inches and outside shoulders are 12 feet with a four percent (4%) cross slope. This segment includes four mainline bridges, a portion of I-355 interchange areas, and eight cross street bridges. The mainline bridges provide ten (10) foot shoulders on both sides of the traveled way.

There are seven interchanges within this segment. Two of the interchanges (I-355 and I-294) are system interchanges providing access with these Interstate roadways. The remaining five interchanges (Lemont Road, Cass Avenue, Illinois Route 83, County Line Road and Joliet Road) provide local access for the adjacent communities along the route. The Joliet Road interchange is a functional half diamond with the NB exit operating as a left hand exit. All other local interchanges are cloverleaf interchanges. The number of interchanges within this segment results in a spacing of less than two (2) miles. Two interchanges (I-355 and Illinois Route 83) provide collector distributor (C-D) roads parallel to the I-55 mainline. Auxiliary lanes are located from I-355 to Lemont Avenue and County Line Road to I-294 in the northbound and southbound directions.

The roadway horizontal and vertical geometry meets the 60 mph design speed requirement for an urban freeway. The roadway section is reduced, as it passes under the I-294 roadway, providing a six (6) foot median shoulder and ten (10) foot outside shoulder. Evaluation of interchange entrance and exit geometry indicates that all interchanges within this segment, with the exception of I-355, do not meet current design criteria. In general, loop ramps radius and the entrance/exit ramp tapers do not meet current design standard.

I-294 to Illinois Route 43 (Harlem Avenue), from milepost 278.00 to mile post 283.7 (5.70 miles)

This segment of the corridor transitions from suburban to an urban environment. The roadway provides three twelve foot lanes in each direction, separated by a 40-foot paved median with a 32 inch jersey style barrier wall. Median shoulders are generally 18 feet 6 inches and outside shoulders are twelve feet. This section includes four mainline bridges and eight cross street bridges. The mainline bridges provide 10 foot shoulders both inside and outside.

There are four interchanges within this segment. The southern terminus of this segment is the I-294 system interchange providing access between this Interstate route and I-55. The remaining three interchanges (US 45, Illinois Route 171 and Illinois Route 43) provide local access for the adjacent communities along the route. The US 45 interchange is a cloverleaf interchange with a C-D road paralleling the outbound mainline. Illinois Route 171 is a partial cloverleaf interchange providing a high speed ramp for SB Illinois Route 171 to inbound I-55 with a C-D road paralleling inbound I-55. Illinois Route 43 is a diamond interchange with I-55. Interchange spacing within this segment is generally close to one mile. Auxiliary lanes are located I-294 to Lagrange Avenue northbound and between Archer Avenue to Harlem Avenue in the northbound and southbound direction.

The roadway horizontal and vertical geometry meets the 60 mph design speed requirement for an urban freeway. Evaluation of interchange entrance and exit geometry indicates that all interchanges within this segment do not meet current design criteria.

Illinois Route 43 (Harlem Avenue) to I-90/94 (Dan Ryan Expressway), from mile post 283.70 to milepost 292.25 (8.55 miles)

This segment of I-55 is an urban freeway within the City of Chicago. The roadway provides three twelve foot lanes in each direction, separated by a 60 foot grass median and an offset barrier. Median shoulders are generally 12 feet and outside shoulders are also 12 feet. Median barrier wall parallels the outbound median shoulder within this segment. A 32 inch jersey style barrier wall is provided adjacent to the inbound median shoulder from south of Damon Avenue to the north limits of this segment. This section includes eleven mainline bridges, including a 2400 foot viaduct, and eight cross street bridges. The mainline bridges provide 10 foot shoulders both inside and outside.

There are seven interchanges within this segment. The northern terminus of this segment is the I-90/94 system interchange providing access between this Interstate route and I-55. The remaining seven interchanges (Illinois Route 43, Central Avenue, Illinois Route 50, Pulaski Road, Kedzie Avenue, California Avenue and Damen Avenue) provide local access for the adjacent neighborhoods and businesses along the route. Interchanges at Illinois Route 43, Central Avenue, Pulaski Road and Damen Avenue are diamond interchanges in which the cross street crosses over I-55. Illinois Route 50 is a diamond interchange in which I-55 crosses over the cross street and is located in a very constricted area between two parallel rail corridors, which restricts the crossroad intersection capacity with the I-55 ramp terminals. Auxiliary lanes are located from Damen Avenue to I-90/94 in the northbound and southbound direction. Additionally, during this study period it is noted that Central Avenue was under construction.

The Kedzie Avenue and California Avenue interchanges are half diamond interchanges in which I-55 crosses over the cross streets. The ramps of these interchanges are connected with C-D roads paralleling both sides of I-55. These interchanges function as a ‘reverse diamond’ connecting I-55 to the adjacent community.

The roadway horizontal and vertical geometry meets the 60 mph design speed requirement for an urban freeway. Evaluation of interchange entrance and exit geometry indicates that all interchanges within this segment do not meet current design criteria. The entrance and exit ramp geometry that does not meet criteria includes insufficient distances for the auxiliary weaving lane, merge lanes, and tapers.

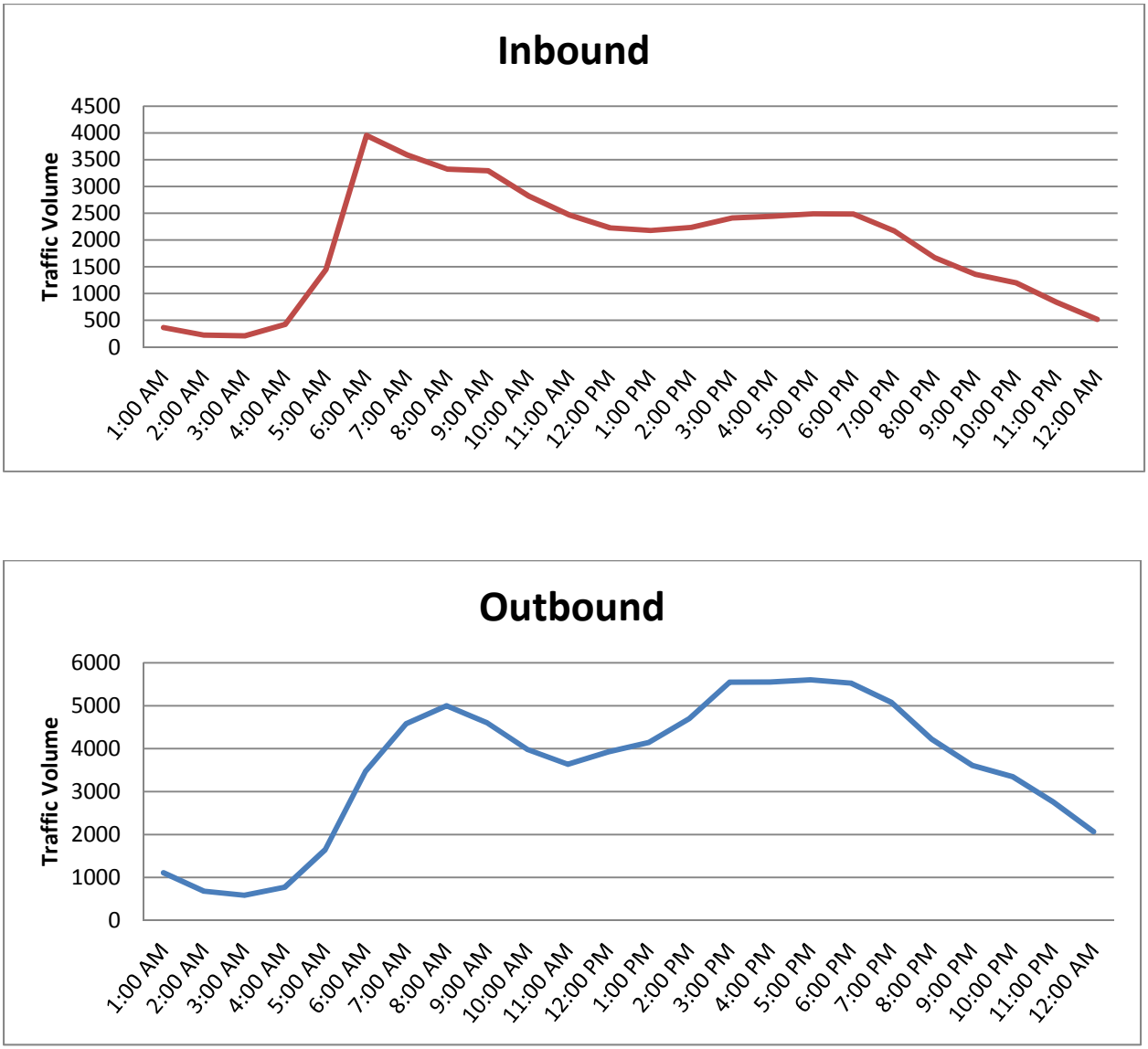


Figure 2 – Typical Hourly Traffic Volumes

(Location shown near Illinois Route 43)

2.4. Methodology

The Illinois Department of Transportation (IDOT) and Division of Traffic Safety (DOTS), provided crash information throughout the crash study area. The Project Study Team extracted, summarized, and analyzed the data from the provided spreadsheets. The extracted data includes crash locations, periods of time, collision types, conditions and crash severity. Regarding severity, any crash involving a fatality or Type A injury was given additional scrutiny through the examination of police reports. The Project Study Team used both qualitative and quantitative approaches to analyze the data, resulting in recommendations on countermeasures to reduce the likelihood of crashes.

The Division of Traffic Safety (DOTS) provided information on 8,081 crashes for the five year study period. The data for each crash starts with an Illinois Traffic Crash Report (police report), followed by entry into the DOTS database. These steps present opportunities for interpretation. For instance, police reports can be completed in the field by an investigating office or at a later time by desk officer. The accuracy of crash information, such as location, can vary depending on when the police report was completed. Crash participants relaying information to a desk officer may be very general in regards to location and other information. The sheer volume of crashes entered into the DOTS database can also present opportunities for misplacement of data. Through the use of the database, these issues are identified and corrected before analyzing the data. It also underscores the importance of qualitative and quantitative analysis to understand the crashes within the crash study area.

3. CRASH ANALYSIS

The crash analysis describes crash trends by year, location, time periods, collision types and conditions. Each section includes figures that illustrate the data.

I-55 was open to traffic in 1964 and was partially rehabilitated in the late 1990s. The corridor segment from I-355 to I-90/94 has three system interchanges (freeway to freeway) and 14 local service interchanges with different ramp configurations for entry to and exit from the expressway. The base year average daily traffic for 2012 identifies I-55 volumes varying from 141,700 vehicles per day (VPD) near the southern limit of the study area to 175,000 VPD along segments within the city limits and approaching the Chicago Central Business District. Truck volumes range from 10 – 14% within the corridor. The directional distribution of traffic is approximately 49% inbound and 51% outbound. From 2010 to 2014 a total of 4,121 inbound, 3,944 outbound and 16 unknown direction crashes were reported within the project limits.

3.1. Overview by Year

Figure 3 provides a summary of total crashes by year and direction. The least number of crashes occurred in 2012. It is noted that 2012 is the only year within the study period where inbound crashes were lower than outbound.

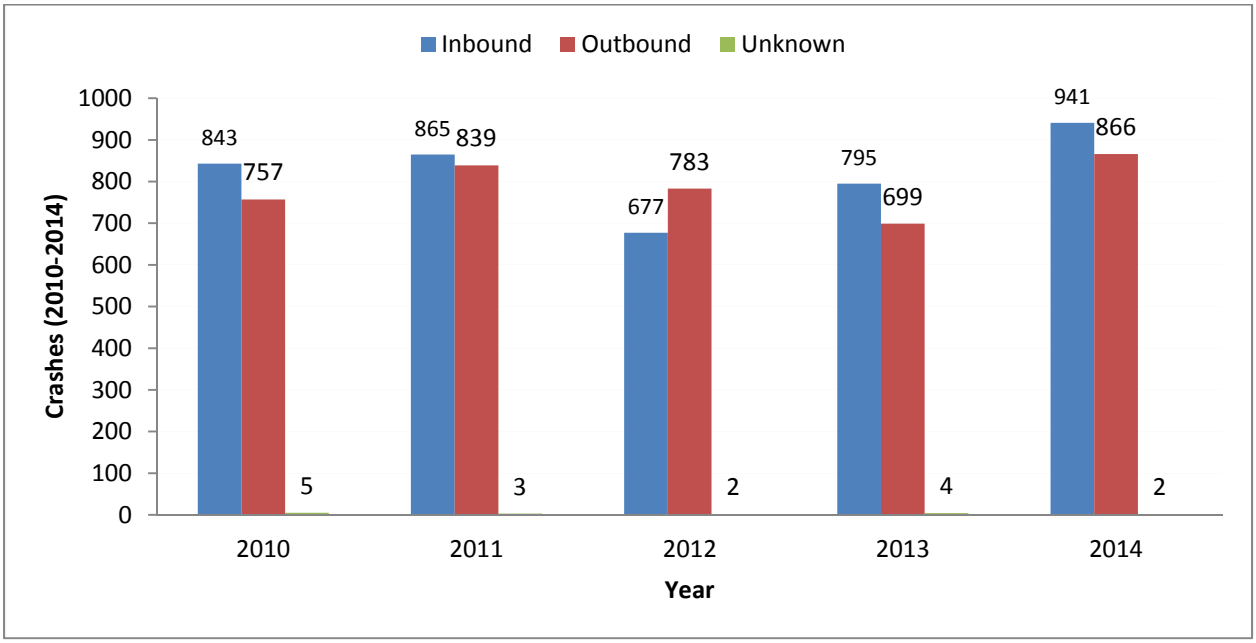


Figure 3 – Crashes by Year

3.2. Analysis by Location

The total number of crashes for the entire length of the study area is shown in Figure 4 for each individual segment. The crashes are separate for both inbound and outbound directions.

Due to traffic congestion, roadway/interchange geometrics, or facility conditions, some locations are more crash prone than others. Identifying where an elevated number of crashes take place can pinpoint those locations in need of special design consideration. Figure 4 separates the 8,081 crashes by three segments of I-55. It identifies that 2,312 crashes (28.6%) occurred on I-55 between the southern limit of study at I-355 and I-294 during the five-year crash study period; 1,859 crashes (23.0%) occurred between I-294 and Harlem Avenue; and 3,910 crashes (48.4%) between Harlem Avenue and I-90/94. These crashes are combined for inbound, outbound and unknown directions. The trend demonstrates that with the higher volume of traffic from Harlem Avenue to I-90/94, there are a higher number of crashes. Figures 5 through 9 provide the number of crashes within each segment per year from 2010 to 2014. There is no significant change from year to year.

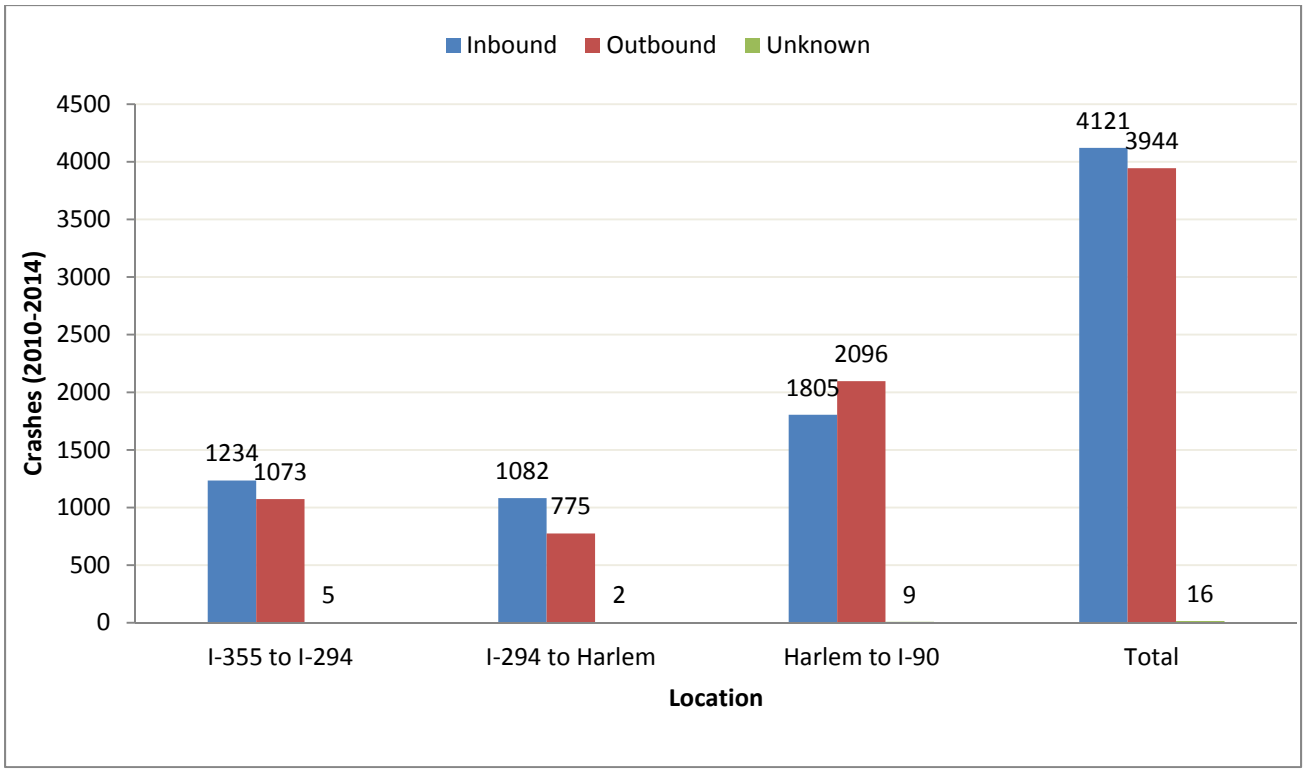


Figure 4 – Crashes by Location

3.2.1. I-355 to I-294

A total of 2,312 crashes occurred in this 7.4 mile section of I-55 for the study period. Four (0.2%) of the crashes resulted in a fatality and 110 (4.8%) were with Type A injuries. The roadway provides three lanes in each direction, auxiliary lanes from I-355 to Lemont Avenue and County Line Road to I-294 in the northbound and southbound direction, and a 40 foot median width. Traffic volumes in this section range from 135,000 to 164,000 ADT. This segment contains zero 5% locations.

3.2.2. I-294 to Harlem Avenue

During the study period, a total of 1,859 crashes occurred in this 6.6 mile section of I-294 with zero (0%) fatalities and 21 (1.1%) Type A injury crashes. This portion of I-55 provides three lanes in each direction, auxiliary lanes from I-294 to Lagrange Avenue northbound and between Archer Avenue to Harlem Avenue in the northbound and southbound direction, and a median width of 40 feet separating the inbound and outbound I-55. Traffic volumes in this section range from 156,000 to 163,000 ADT. This segment contains one 5% location at the Harlem Avenue (IL 43) interchange.

3.2.3. Harlem Avenue to I-90/94

During the study period, 3,910 crashes occurred on this 9.3 mile section of I-55 with 8 (0.2%) fatalities and 91 (2.3%) Type A injury crashes. The roadway in this section generally provides three mainline lanes in each direction, auxiliary lanes from Damen Avenue to I-90/94 in the northbound and southbound direction, and a 60 foot median. Traffic volumes in this section range from 135,000 to 175,000 ADT. During this study period it is noted that Central Avenue was under construction. This segment comprises of seven interchanges; four of the interchanges are listed as 5% locations at Central Avenue, Cicero Avenue, Pulaski Road, and Damen Avenue as well as one segment of roadway near Western Avenue.

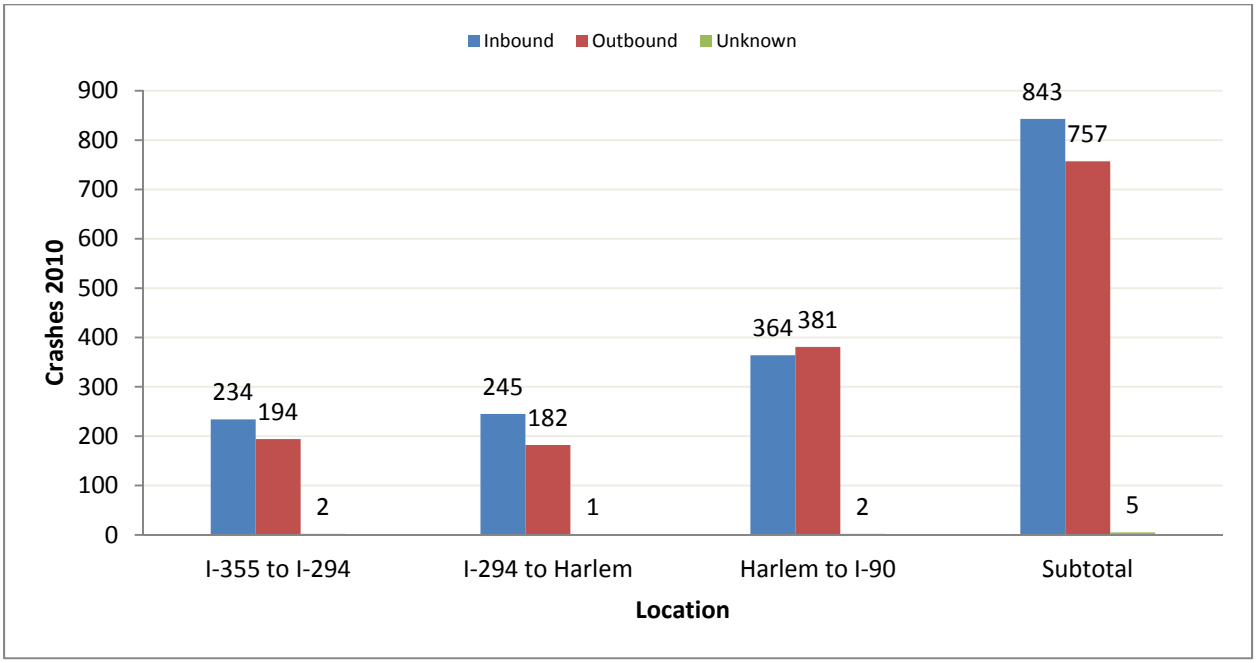


Figure 5 - Location of Crashes For 2010

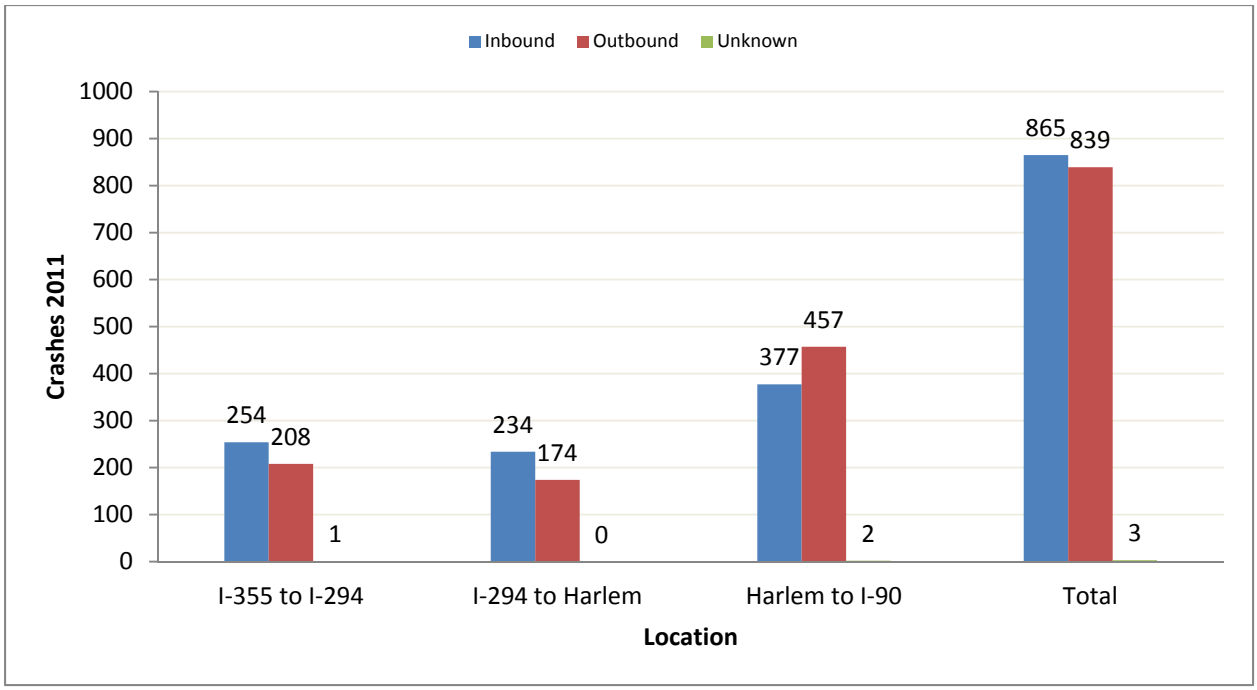


Figure 6 - Location of Crashes For 2011

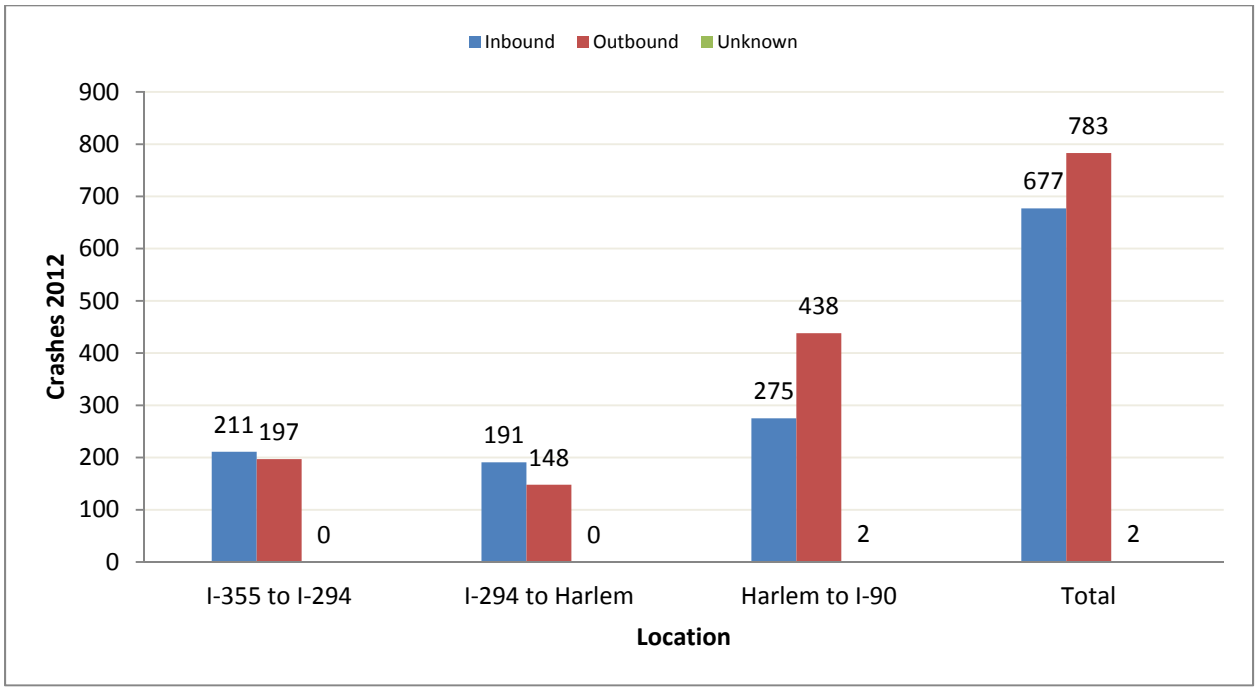


Figure 7 - Location of Crashes For 2012

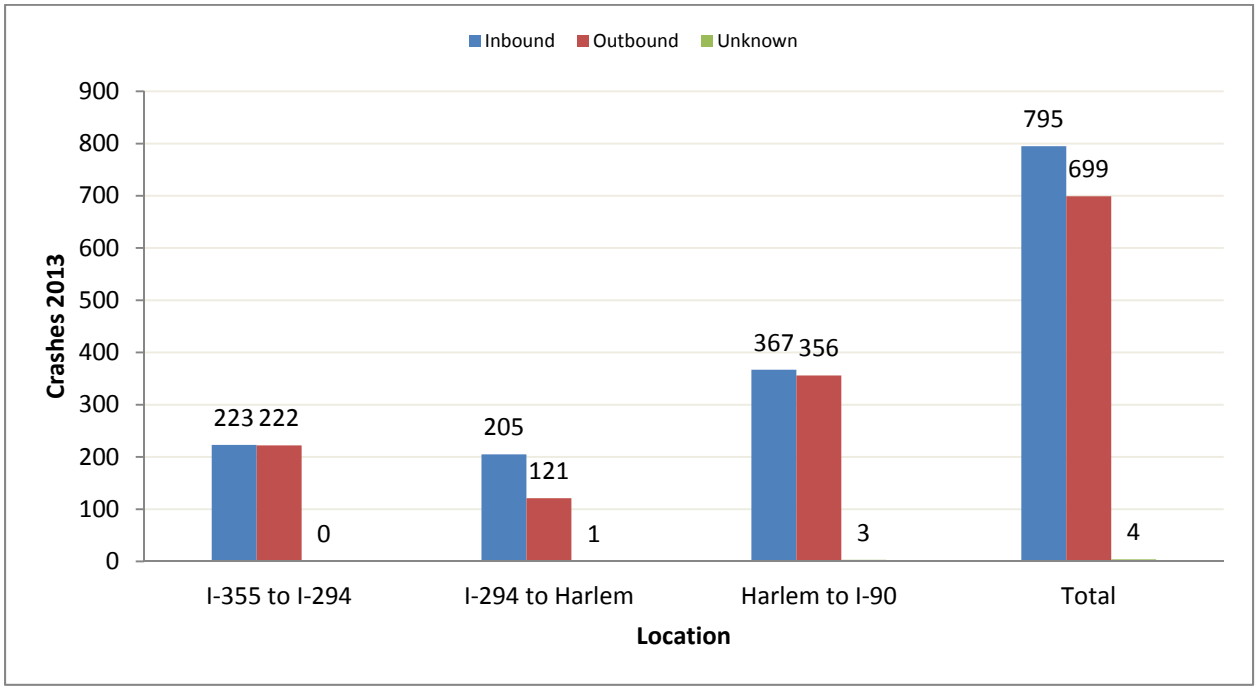


Figure 8 - Location of Crashes For 2013

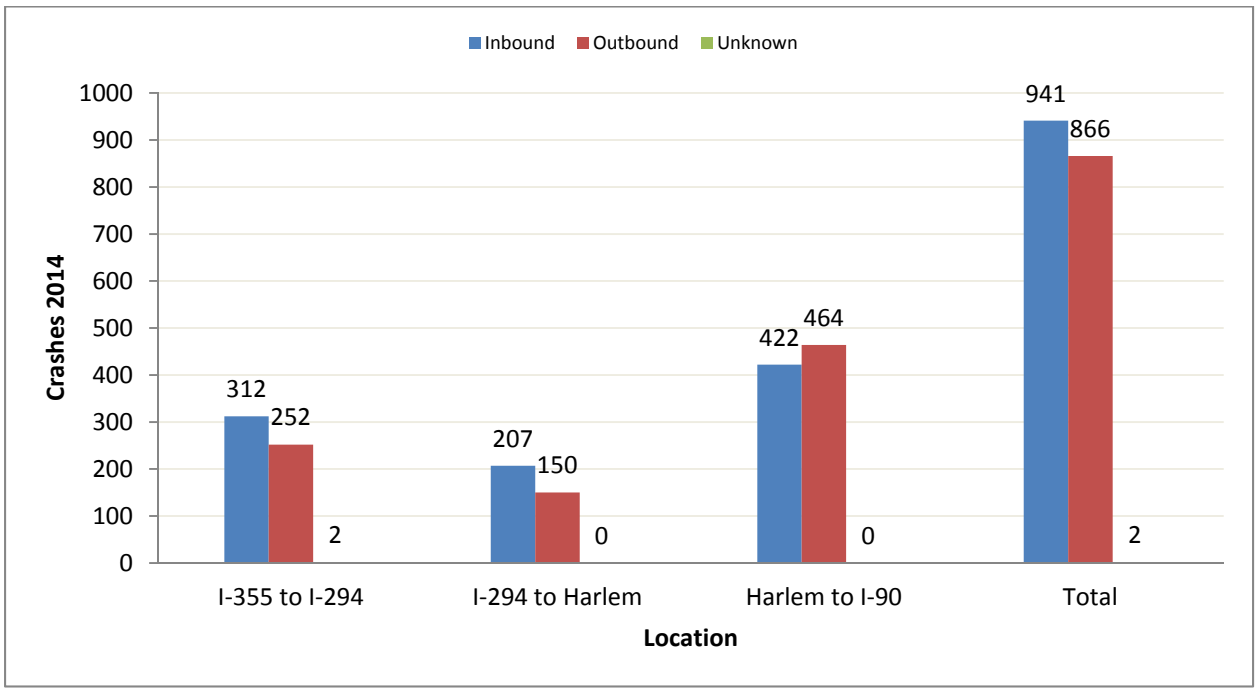


Figure 9 - Location of Crashes For 2014

3.3. Roadway Surface Condition

Crashes are also analyzed by roadway surface condition (dry, wet, snow, ice) and roadway lighting condition (dawn, daylight, dusk, darkness but lighted roadway). This provides an indication if the roadway surface and lighting conditions are contributing factors to the crashes being experienced.

3.3.1. Conditions

The crash data was filtered by three types of conditions: roadway conditions, weather, and lighting (Figures 10 – 12). A vast majority of 8,081 total crashes took place in ideal conditions. These conditions include clear weather (6,734 crashes), dry pavement (6,234 crashes) and during hours of daylight (5,452 crashes).

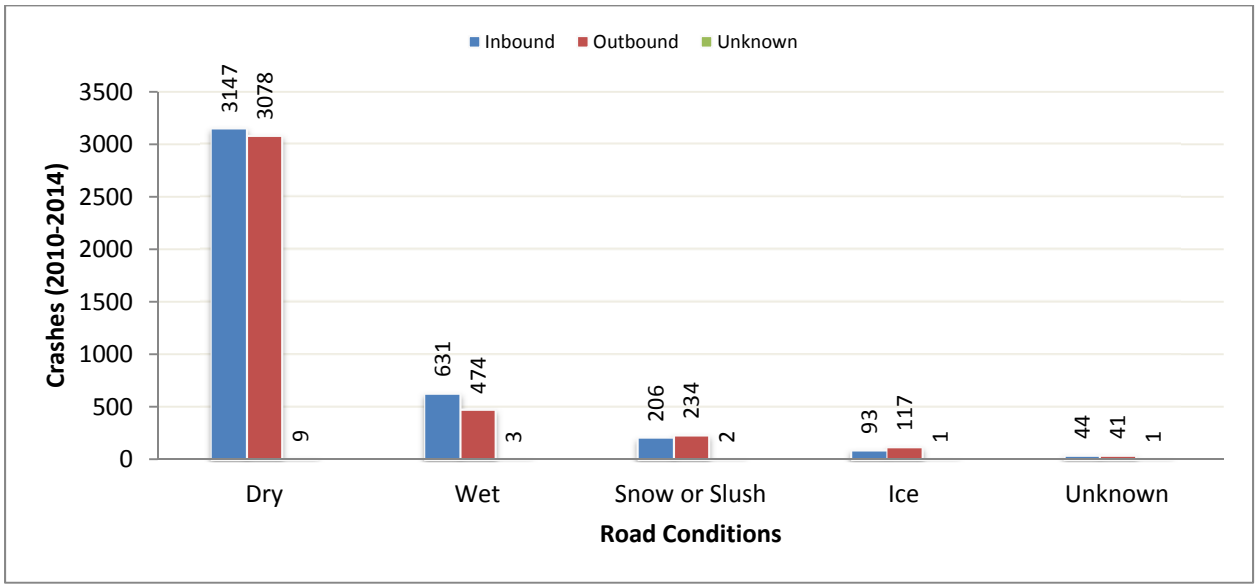


Figure 10 – Crashes by Road Conditions

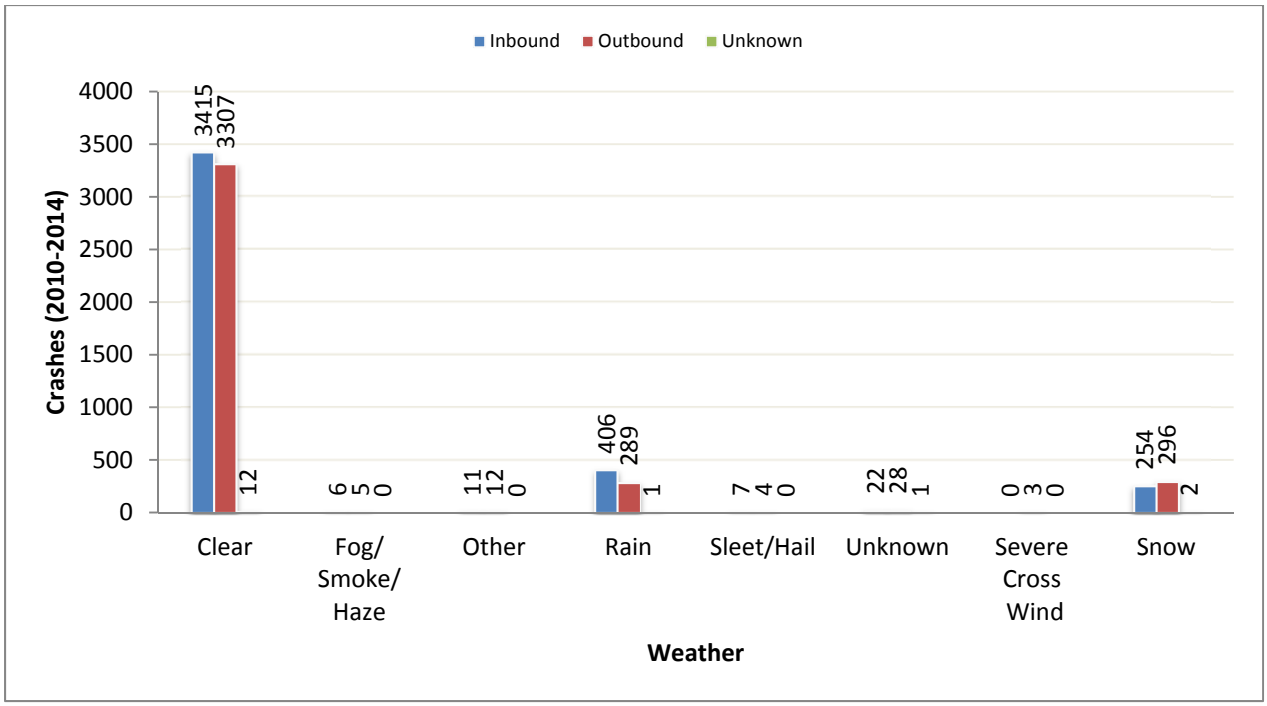


Figure 11 – Crashes by Weather

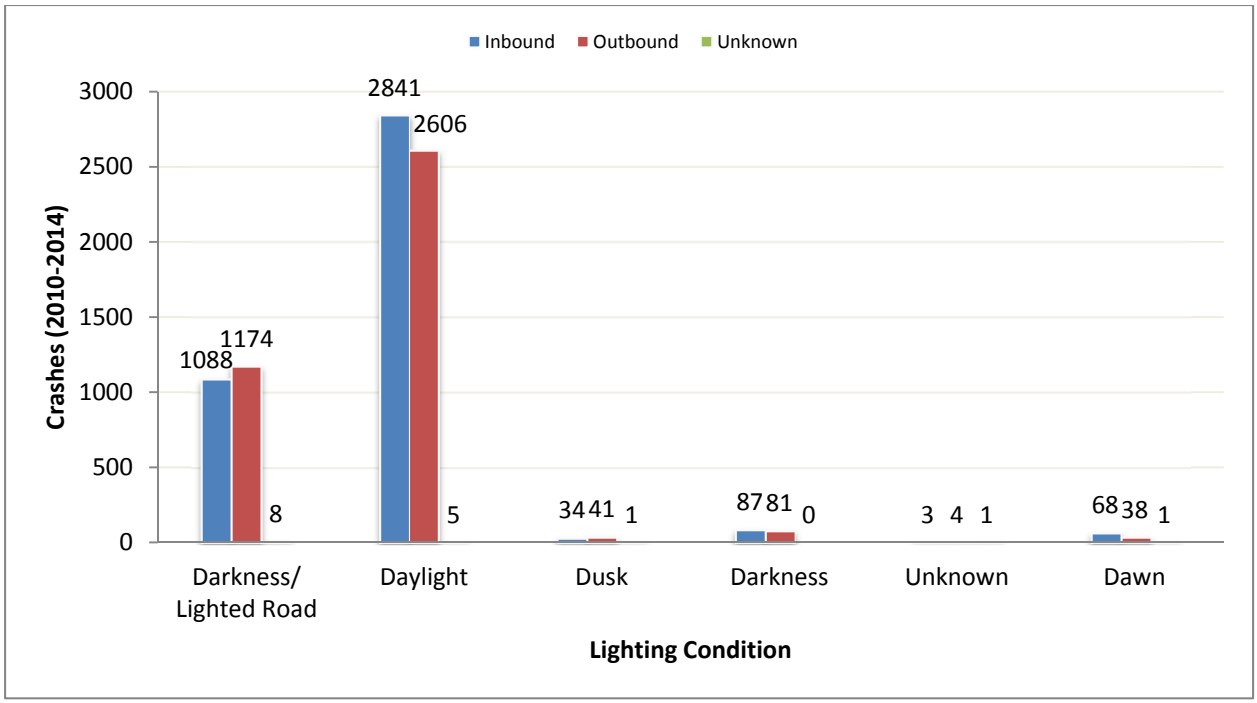


Figure 12 – Crashes by Lighting Conditions

3.4. Periods of Time

The crash data was filtered to analyze crashes by year, month and hour of the day. On a monthly basis, the crashes were distributed such that no month had less than seven percent of the yearly crashes (see Figure 13 – Crashes by Month). On an hourly basis, about 56 percent of the crashes occurred during the traditional peak commute times of the day between the hours of 6:00 AM and 9:00 AM and between 3:00 PM and 6:00 PM. This trend is consistent with the increased traffic volumes measured along I-55, which tend to peak from 6:00 AM to 9:00 AM for the inbound direction, 3:00 PM to 6:00 PM for the outbound direction and 3:00 PM to 6:00 PM for the unknown direction (see Figure 14 – Crashes by Time of Day). The AM peak (6:00-9:00 AM) experienced a significantly higher inbound crash experience while the PM peak (3:00-6:00 PM) experienced a significantly higher crash experience in the outbound direction (Figure 14 – Crashes by Time of Day). This is also consistent with directional traffic volumes experienced on I-55.

The inbound/outbound data for crashes by day of the week (Table 1) shows that 78 percent of crashes occur during the traditional work week when traffic volumes are highest, while 22 percent of crashes occur on the weekends. Days in which crashes are most frequent in the corridor are Friday (19%), Thursday (16%), and Tuesday (15%).

Crashes							
Location	**Sunday**	**Monday**	**Tuesday**	**Wednesday**	**Thursday**	**Friday**	**Saturday**
Inbound	380	553	625	564	673	818	508
Outbound	448	586	547	569	637	717	440
Unknown	4	1	0	3	2	4	2

Table 1 – Crashes by Day of the Week

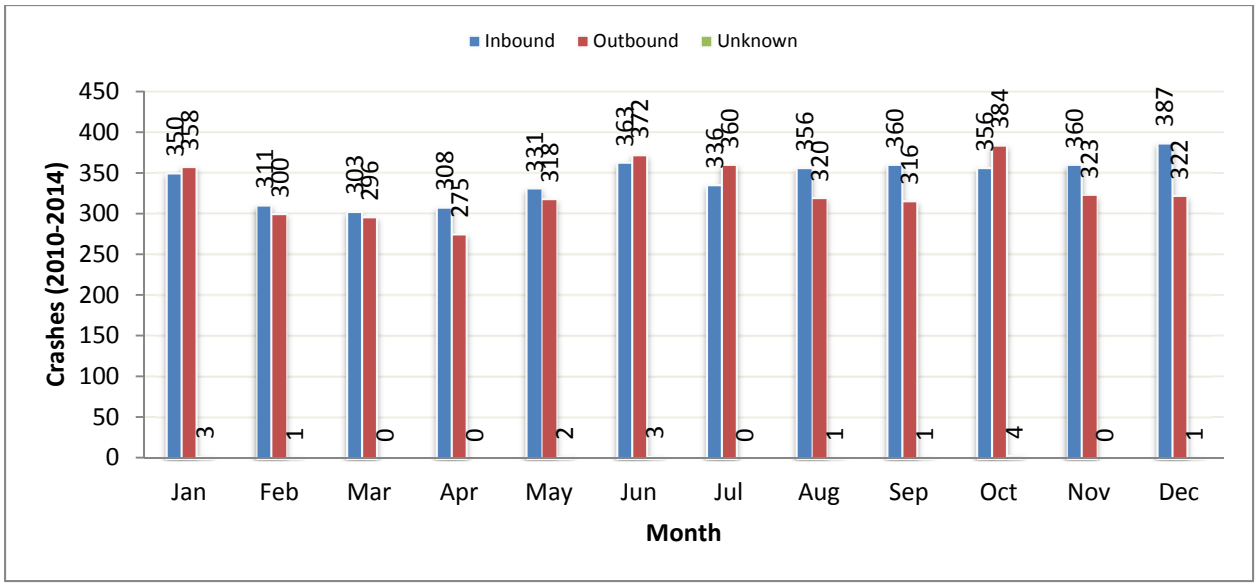


Figure 13 – Crashes by Month

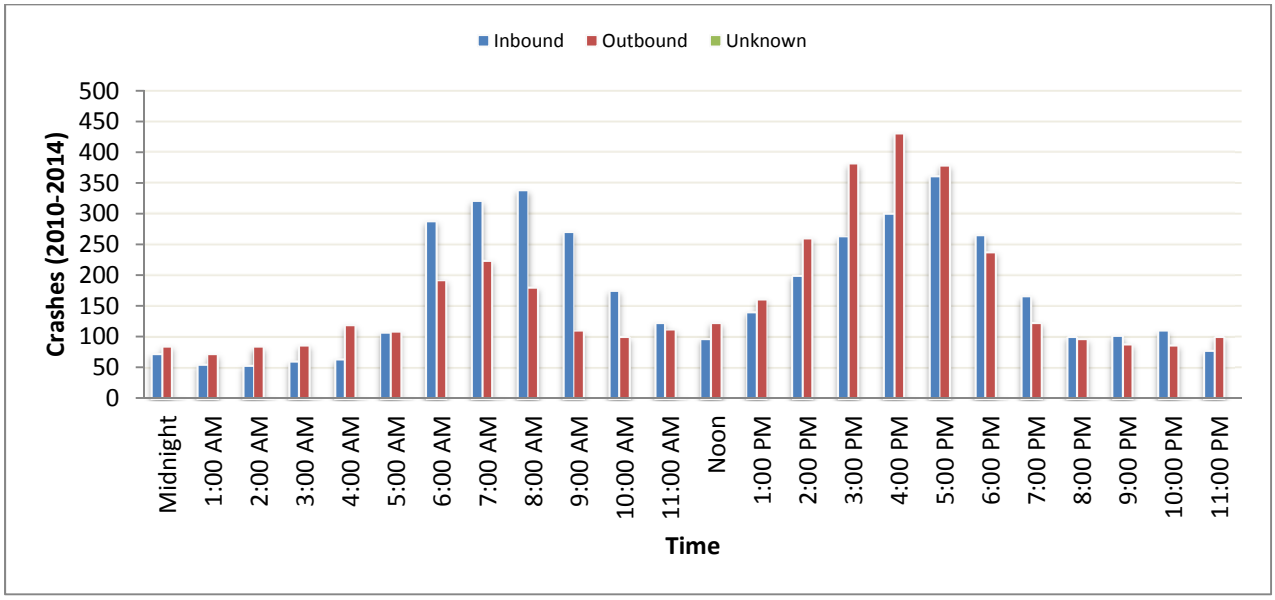


Figure 14 – Crashes by Time of Day

3.5. Collision Types

Three types of collisions are predominant in the 8,081 total crashes. Rear end collisions accounted for 4,718 crashes (58.3%), sideswipe-same direction another 1,697 crashes (21.0%), and 1,236 (15.3%) fixed object crashes. From the fixed object crashes 890 (72.0%) involved striking the concrete median barrier and 78 (6.3%) involved the guardrail face. Rear end and sideswipe collisions are traditionally an indication of traffic congestion, unstable traffic conditions and geometric deficiencies. Fixed object crashes

may be a result of excessive speeds leading into congested conditions and causing vehicles to veer off of the roadway to avoid a crash. The inattention by the vehicles entering the congested areas are further exacerbated by physical barriers/structures adjacent to the roadway. The majority of the fixed object crashes consist of concrete median barrier (72.0%) and guardrail face (6.3%) crashes. "Total Fixed Object Hit Types" can be found in the Appendix providing details of the fixed object crashes.

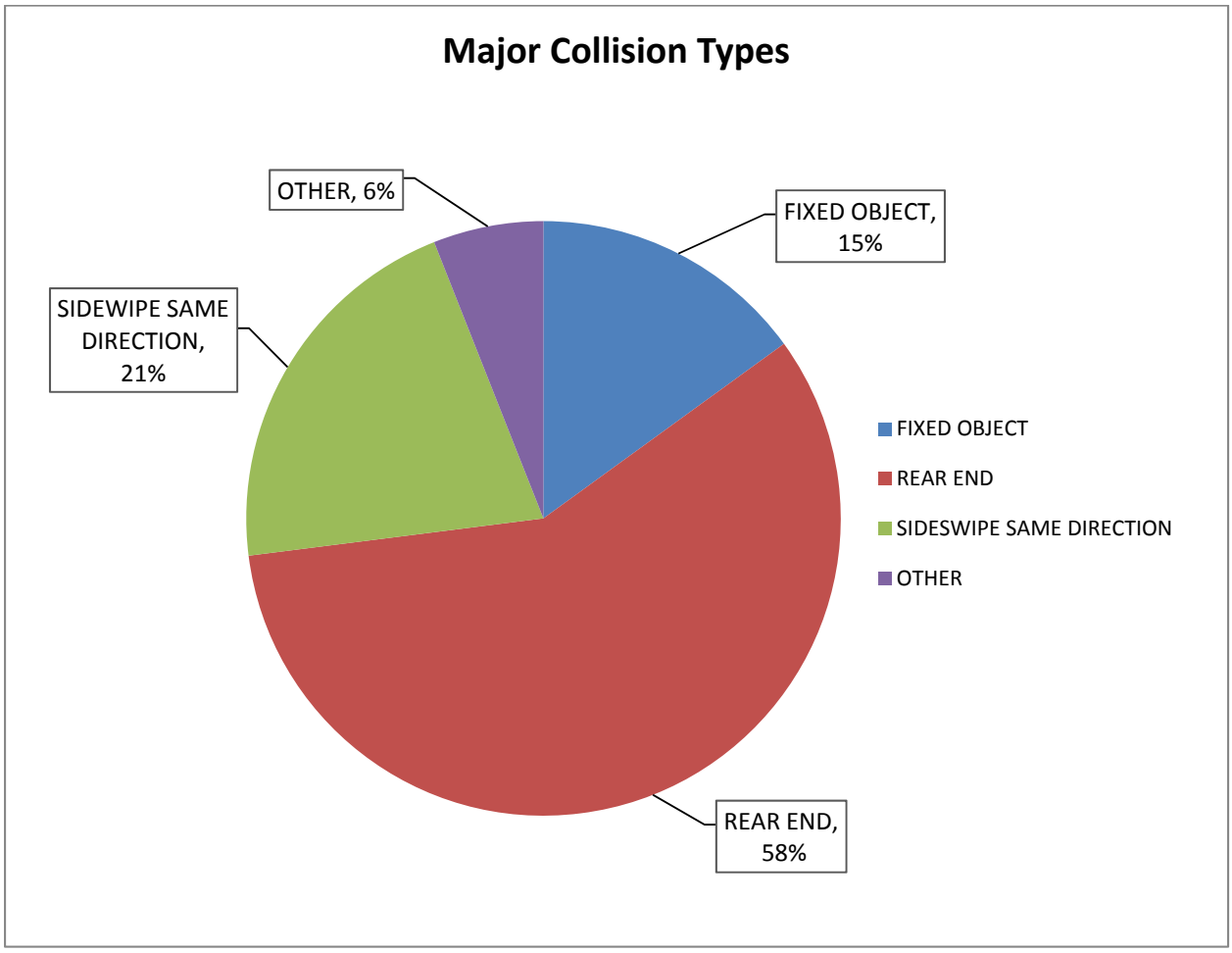


Figure 15 – Major Collision Types

As seen in Figure 16, other crash types (not including rear end, sideswipe, and fixed object) make up the remaining 6% of the total crashes reported during the study period. Evaluation of these crashes reveals no discernible trend in occurrence.

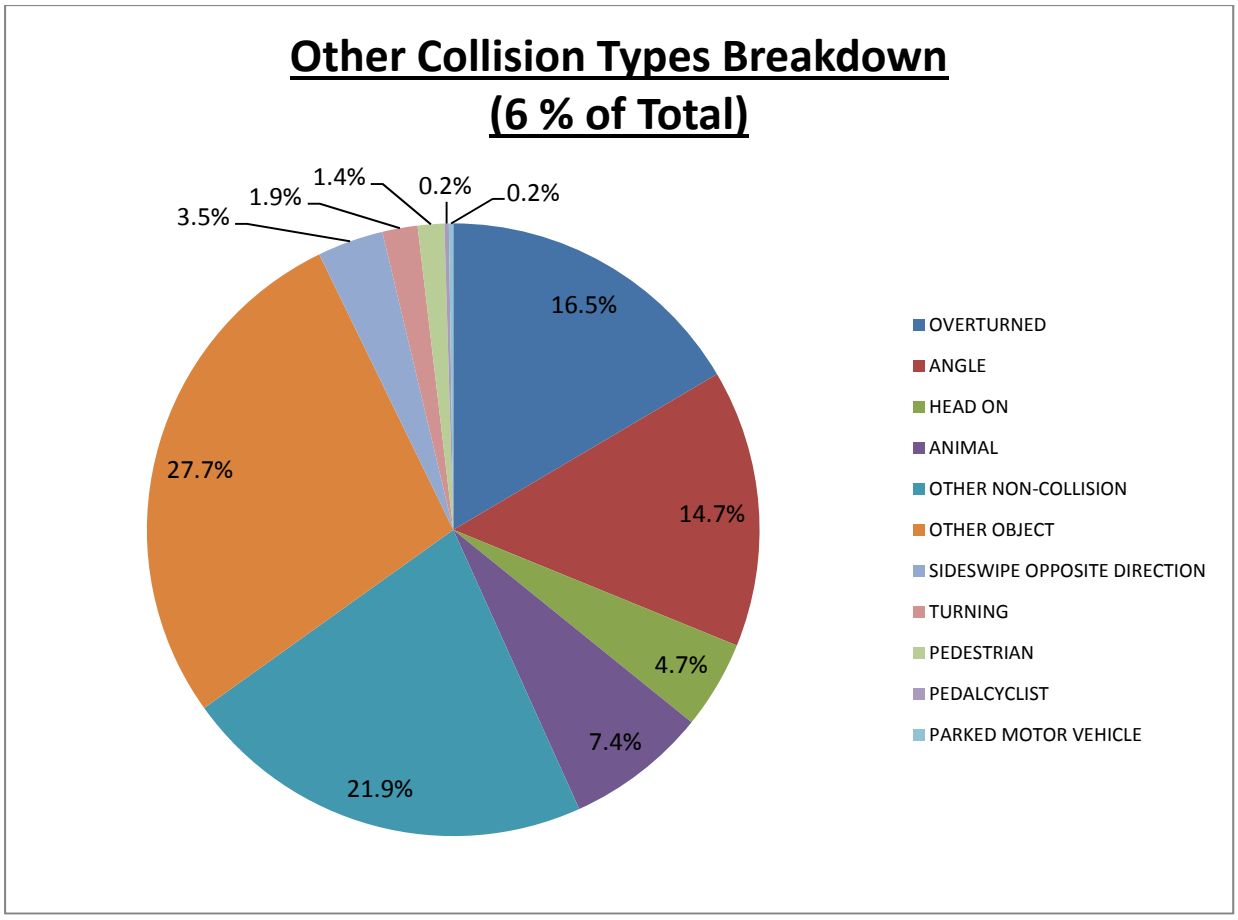


Figure 16 – Other Collision Types Summary

4. CRASH SEVERITY

Crash severity is a key indicator in evaluating the current safety condition of the route. Understanding the severity of injuries allows the implementation of appropriate countermeasures to reduce the severity of crashes in the future. Crash severity is categorized by IDOT into the following categories:

- Type K (Fatal): A traffic crash in which at least one person dies within 30 days of the crash.

- Type A (incapacitating injury): Any injury, other than fatal, that prevents the injured person from walking, driving, or normally continuing the activities he/she was capable of performing before the injury occurred. Inclusions: severe lacerations, broken/distorted limbs, skull injuries, chest injuries and abdominal injuries.

- Type B (Non-incapacitating injury): Any injury, other than a fatal or incapacitating injury, that is evident to observers at the scene of the crash. Inclusions: lumps on the head, abrasions, bruises, and minor lacerations.

- Type C (Reported, injury not evident): Any injury reported or claimed that is not listed above. Inclusions: momentary unconsciousness, claims of injuries not evident, limping, complaints of pain, nausea.

- Property Damage Only: No injuries or fatalities, only damages equal to or greater than $1,500 are reported starting in 2009. Prior to 2009 the reported amount had to be equal to or greater than $500. The property damage only crashes are shown in Figure 17.

4.1. Severe Injury Crashes

Based on sustained injuries, most crashes were not severe. However, 12 crashes involved at least one fatality and another 222 crashes resulted in a Type A injury (see Figure 19 – Crashes by Severity). Figures 21 through 23 compare the severe crashes in each segment by direction. There are no fatal crashes in unknown direction. However, there are 7 fatal crashes occurring in the outbound direction and 5 in the inbound direction, with the largest difference occurring in the segment from Harlem Avenue to I-90/94 where the median barrier is closest to the edge of mainline roadway, adjacent to the 12 foot shoulder. There is no significant trend in number of fatal crashes by year, as shown in Figure 27. There was no identifiable trend in fatal crashes by weather conditions, as show in Figure 28.

Evaluation of police reports for the fatal crashes reveal 4 (33%) were a result of vehicles hitting a fixed object. The remaining 8 crashes (66%) consist of overturned (3), rear end (1),

angle (1), pedestrian (1), sideswipe same direction (1), and head on (1). Six (50%) primary causes of fatal crashes involved the driver being under the influence of alcohol/drugs and three (25%) involved excessive speed. The remaining three primary causes of crashes (25%) consist of vehicle condition (1), reckless driving (1), and wrong side/wrong way (1).

The type A crashes consist on 222 crashes in the inbound and outbound direction of I-55 corridor. A display of KABC crashes is shown in Figure - 20 Major Collision Type Crashes by Severity. The leading crash occurrences for type A crashes involve rear end (57.8%), fixed object (22.1%), sideswipe same direction (17.1%), and other crash types (13.0%). The primary causes of the type A crashes come from speed (35%), alcohol (16%), and other multiple crashes (49%). The other types of crash causes consist of improper lane usage, weather, following too closely, reckless driving, etc. Figure 25 displays the K and A type crash locations in the study area.

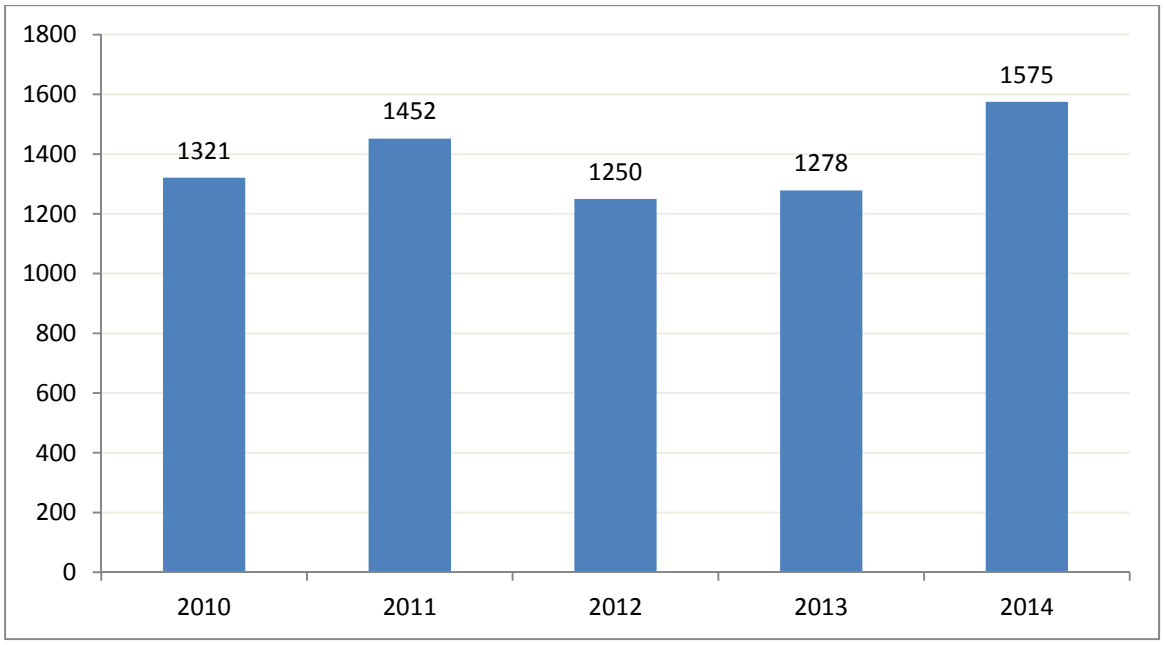


Figure 17 – Property Damage Only Crashes

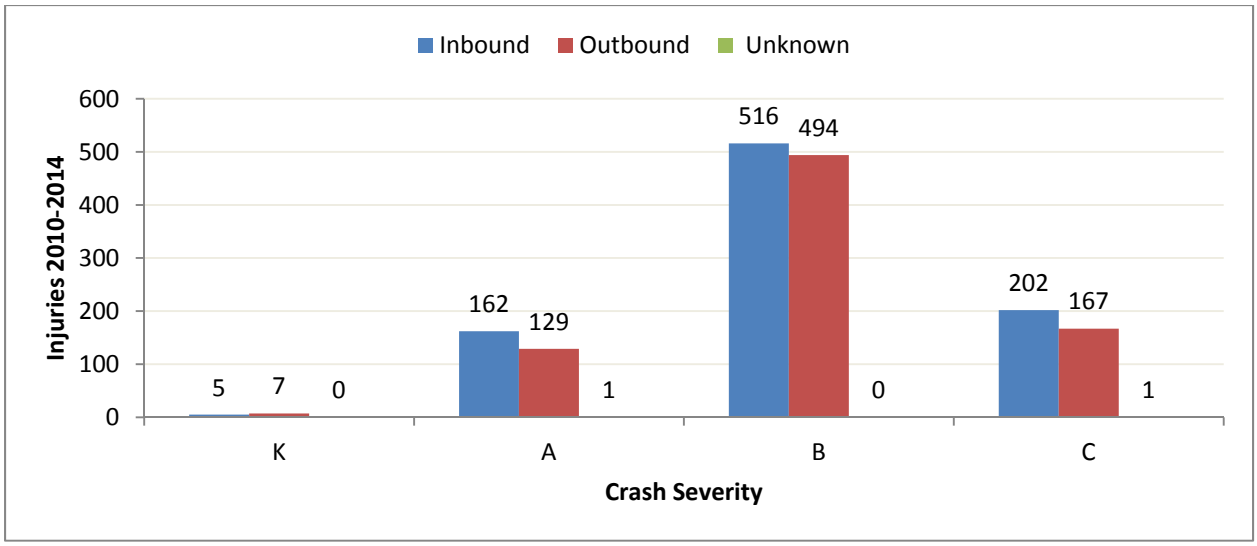


Figure 18 – Total Number of Fatalities/Injuries

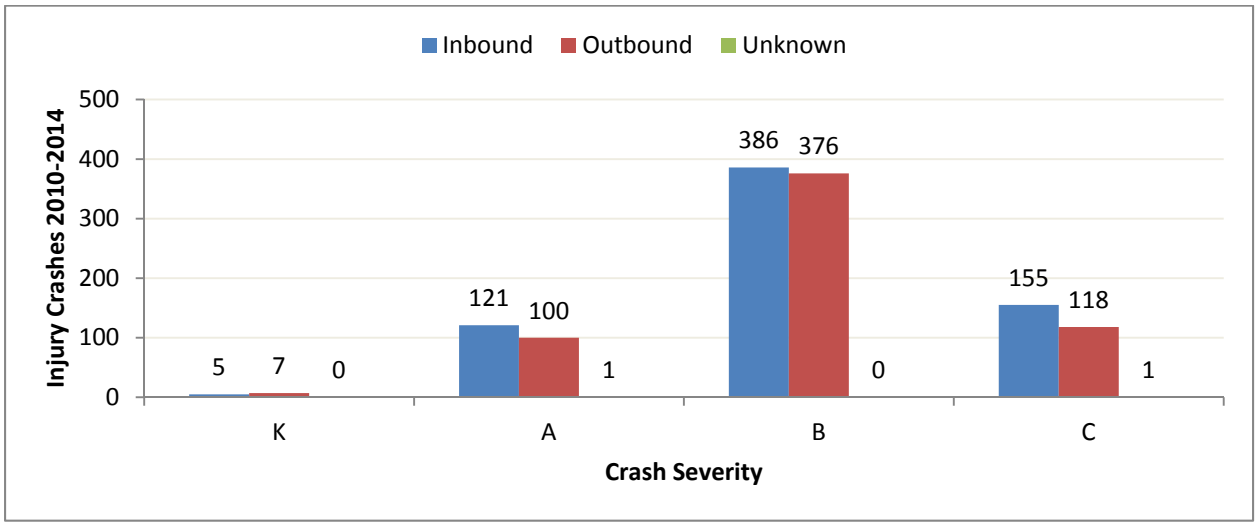


Figure 19 – Total Number of Fatal/Injury Crashes

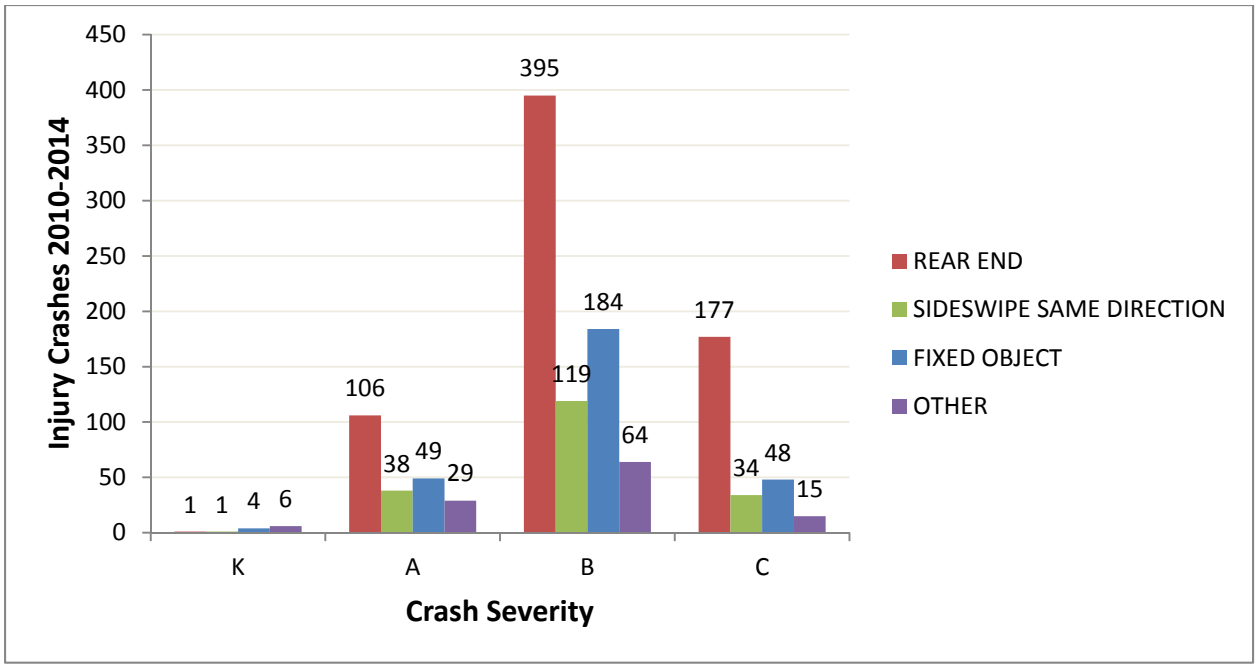


Figure 20 – Major Collision Type Crashes by Severity

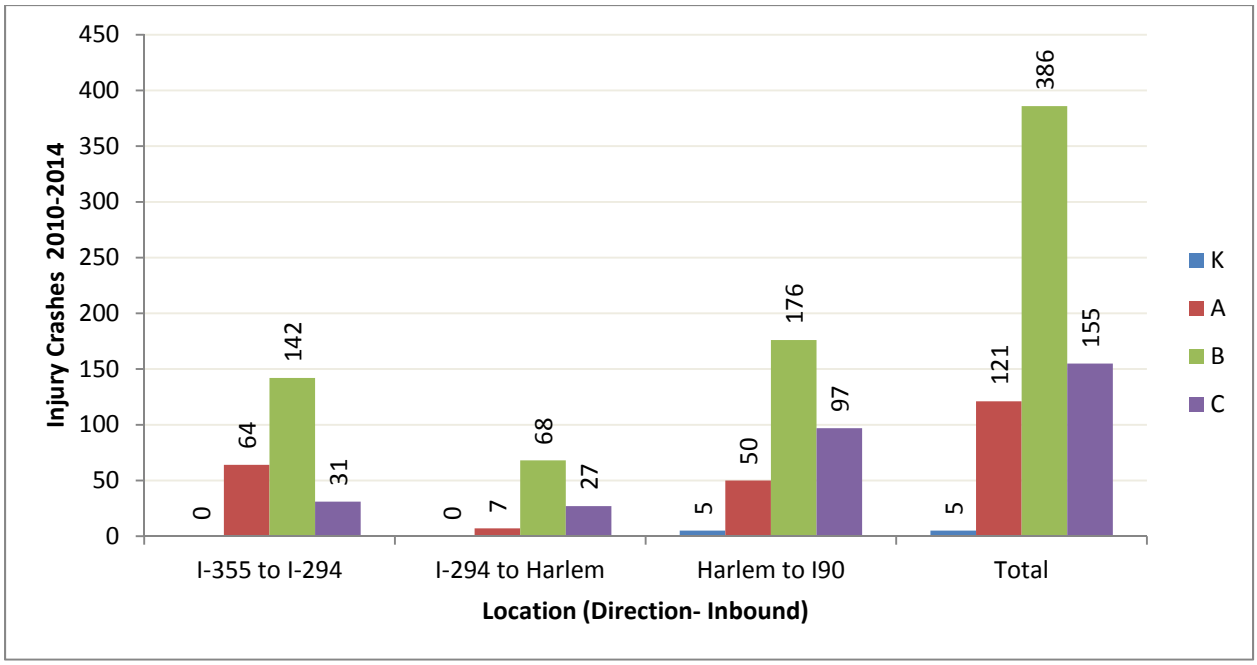


Figure 21 – Injury Crashes by Location Inbound

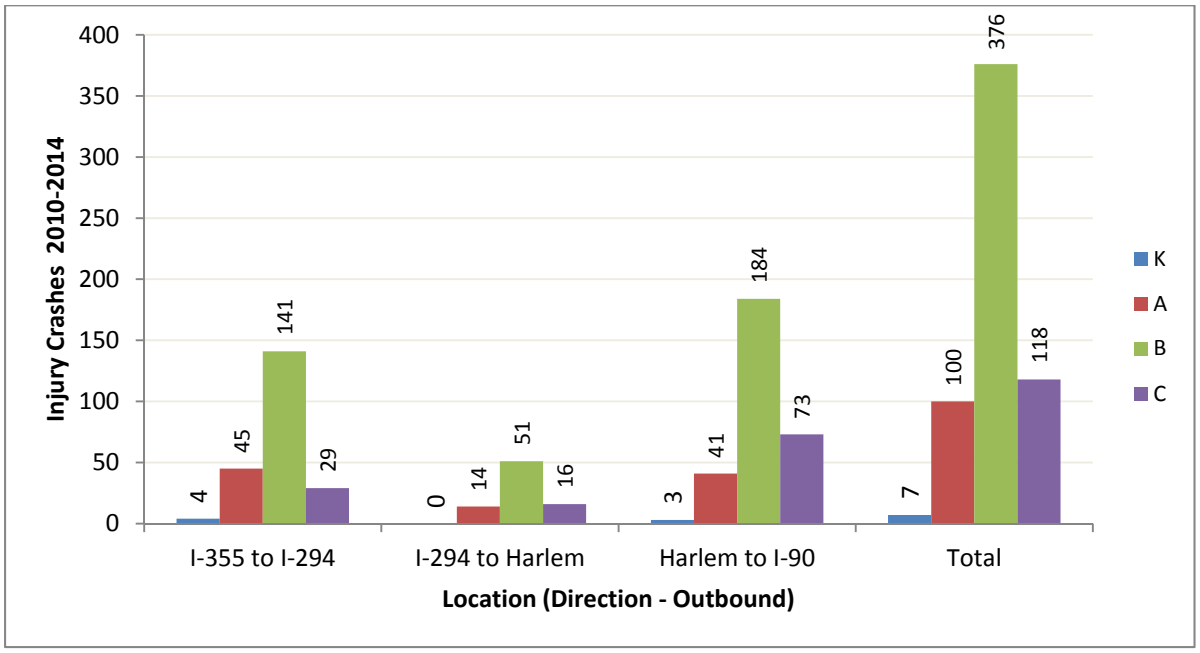


Figure 22 – Injury Crashes by Location Outbound

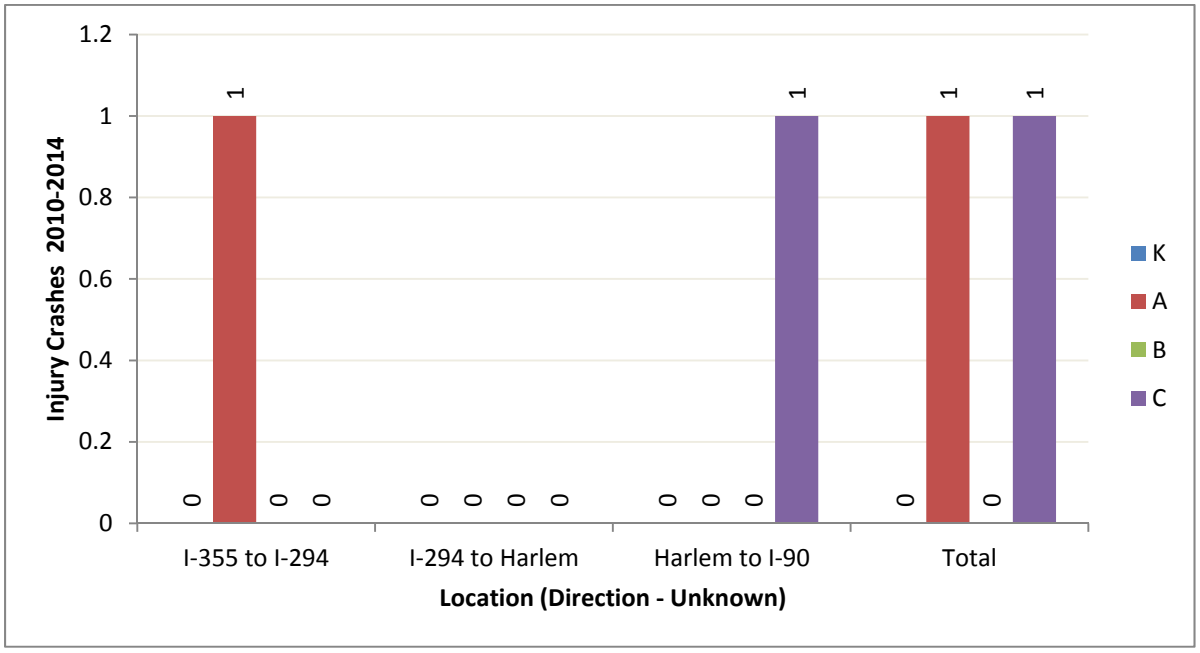


Figure 23 – Injury Crashes by Location Unknown

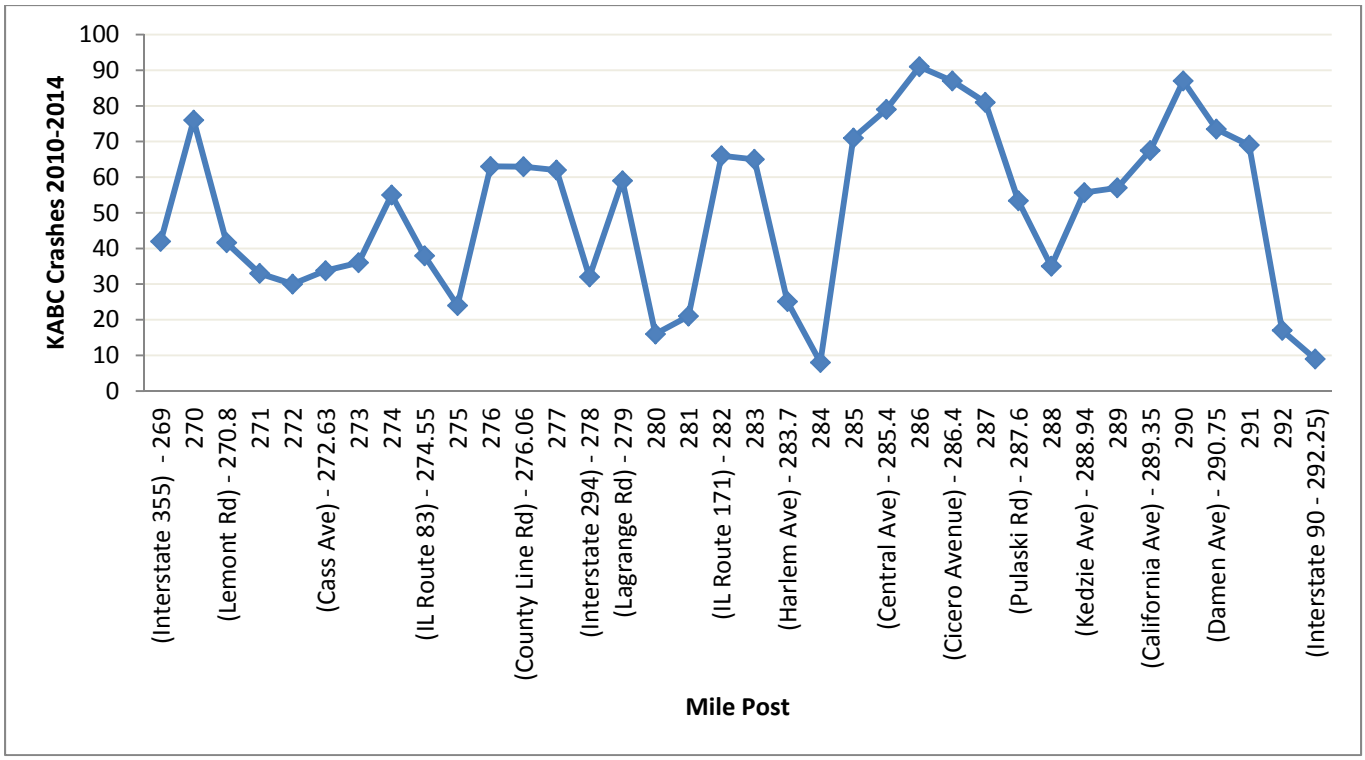


Figure 24 – KABC Injury Crashes by Mile Post

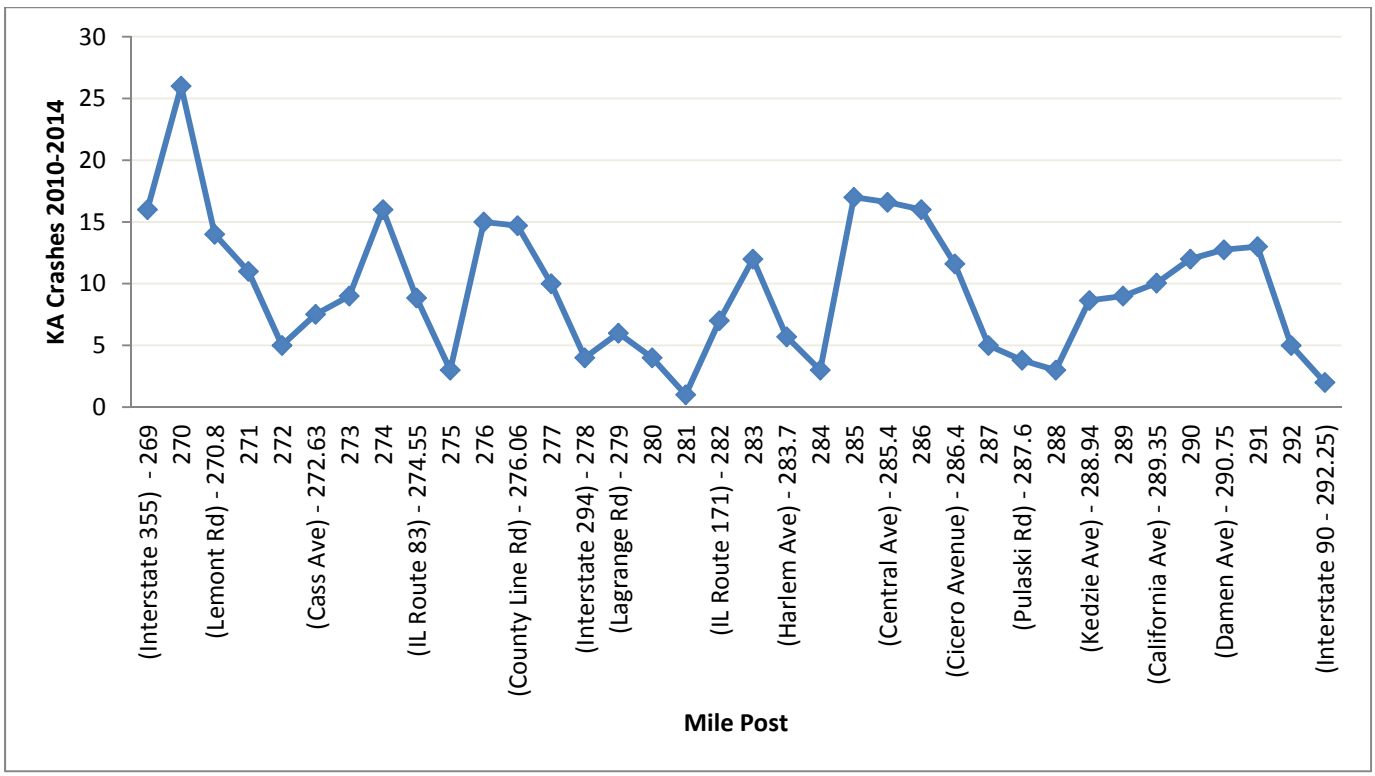


Figure 25 – KA Injury Crashes by Mile Post

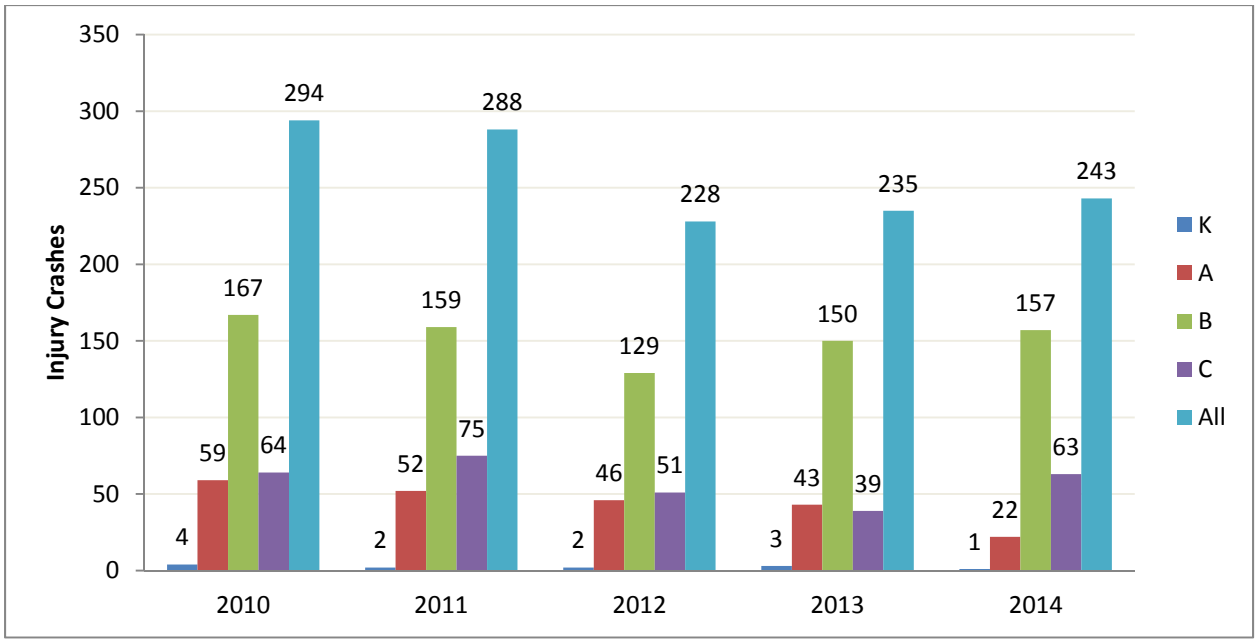


Figure 26 – Injury Crashes by Year

Figure 27 – Fatal Crashes by Year and Location

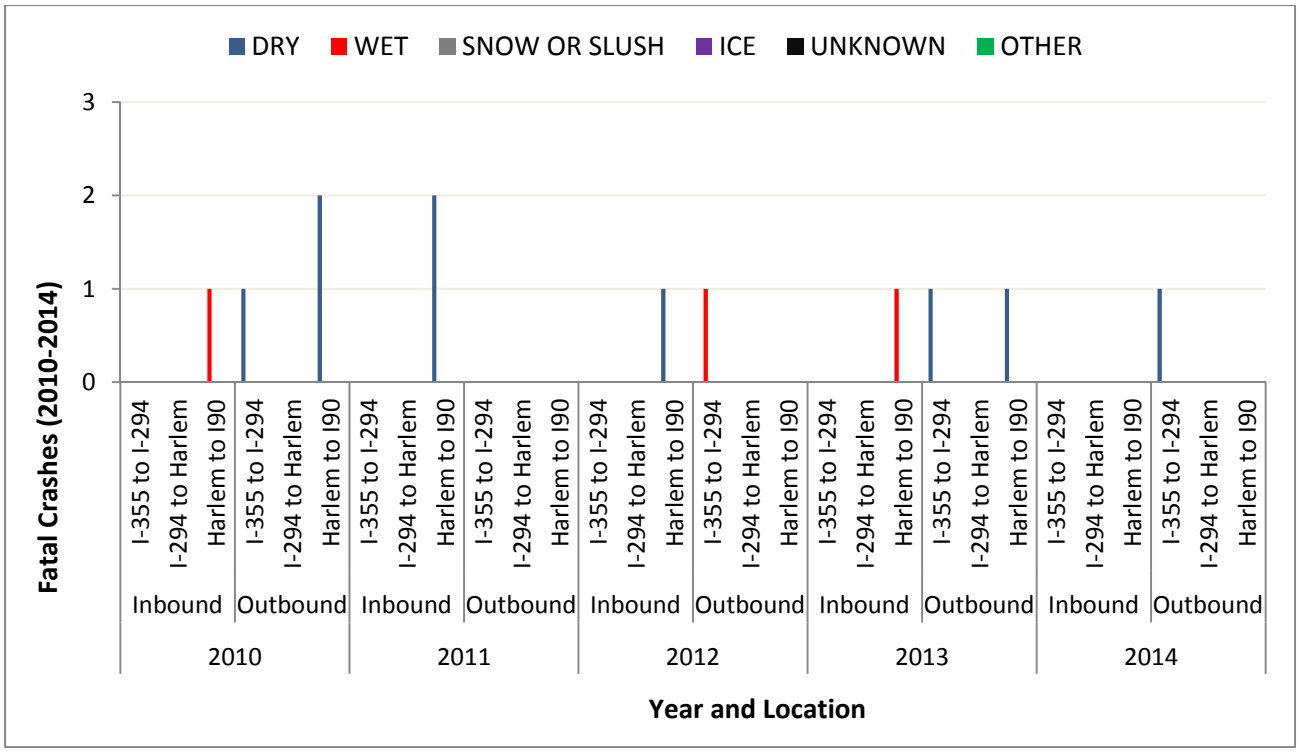


Figure 28 – Fatal Crashes by Weather Condition

4.2. 5% Locations

The FHWA 2015 Illinois Five Percent Severe Crash Report was prepared based on a review of statewide crash data from 2010 to 2014. This report describes at least five percent of highway locations across the state exhibiting the most pressing safety needs. 5% reports were not generated for 2013 and 2014 but the 2015 5% locations represent a current view of the 5% locations. A review of the 2010-2014 KAB crashes associated with these five percent severe locations indicates that approximately 16% of the total inbound crashes, 15% of the total outbound crashes and 2% of the total crashes in unknown direction occurred within these five percent locations. The total length of the study is 23.25 miles; while the total combined lengths of the five percent locations is 3.0 miles, or 13% of the total roadway within the project limits.

The following segments along I-55 within the project limits were identified in this report (refer to Figure 29 – 2015 Five Percent Severe Crash Locations). Additional detail involving the KABC crashes at the five percent locations can be found in “5% Location Crash Data 2010-2014” located in the appendix.

1,870 feet east of Illinois Route 43 to 1,800 feet west of Illinois Route 43 (0.70 mi)

This location corresponds to a diamond interchange at Illinois Route 43. Mainline crash history reveals zero (0) fatalities and fourteen (14) Type A crashes at this location. Twelve (12) of the fourteen (14) Type A crashes occurred in the inbound direction and two (2) in the outbound direction.

2,300 feet west of Central Avenue to 1,520 feet east of Central Avenue (0.72 mi)

This location corresponds to a diamond interchange at Central Avenue. Mainline crash history reveals one (1) fatality and twenty two (22) Type A crashes occurred at this location. The fatality crash occurred in the inbound direction. Fourteen (14) of the twenty two (22) Type A crashes occurred in the inbound direction and eight (8) occurred in the outbound direction.

270 feet east of Illinois Route 50 to 2,800 feet west of Illinois Route 50 (0.58 mi)

This location corresponds to a diamond interchange at Illinois Route 50. Mainline crash history reveals fifteen (15) Type A crashes occurred at this location. Nine (9) of the fifteen (15) Type A crashes occurred in the inbound direction and six (6) Type A crashes in the outbound direction.

125 feet west of Pulaski Road to 1,460 feet east of Pulaski Road (0.30 mi)

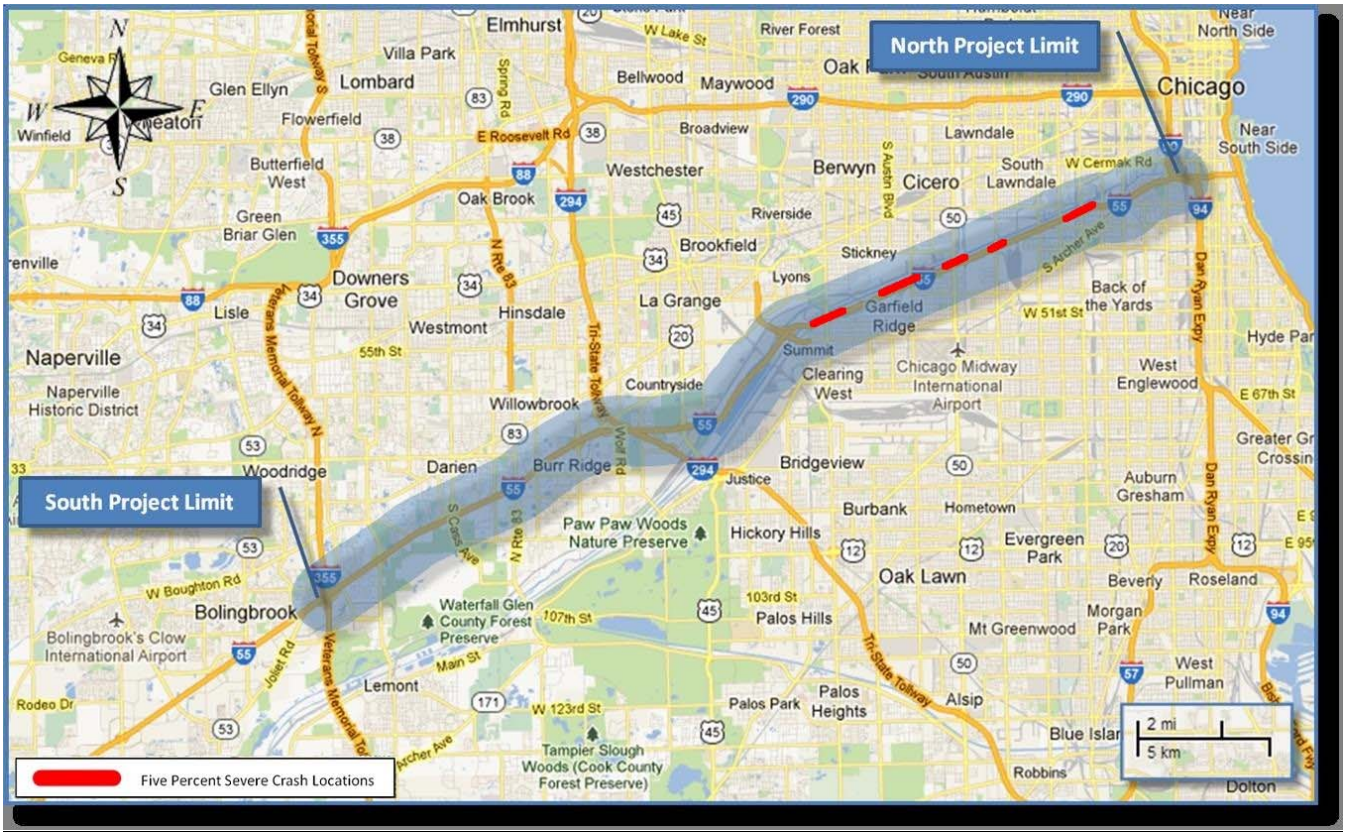
This location corresponds to a diamond interchange between at Pulaski Road. Mainline crash history reveals three (3) Type A crashes occurred at this location. Two (2) of the three (3) Type A crashes occurred in the inbound direction and one (1) occurred in the outbound direction.

650 feet west of Western Avenue to 965 feet west of Damen Avenue (0.48 mi)

This location corresponds to the entrance ramps near Western Avenue before the diamond interchange at Damen Avenue. Mainline crash history reveals one (1) fatality in the inbound direction. Twelve (12) Type A crashes occurred at this location. One (1) Type A crash occurred in the unknown direction and eight (8) Type A crashes occurred in the inbound while three (3) occurred in the outbound direction.

965 feet west of Damen Avenue to 650 feet west of Western Avenue (0.42 mi)

This location corresponds to a diamond interchange at Damen Avenue. Mainline crash history reveals zero (0) fatality and twelve (12) Type A crashes occurred at this location. Six (6) Type A crash occurrences are evenly distributed between the inbound and outbound direction.



DISCLAIMER: As part of the Highway Safety Improvement Program (HSIP), states are required to submit an annual report to the Federal Highway Administration (FHWA) describing at least 5% of highway locations exhibiting the most pressing safety needs. Identified 5% locations shown on this map were developed for the HSIP and are included in the Five Percent Report to the FHWA. The data was used "as is" for analysis purposes and should be interpreted accordingly.

Figure 29 – 2015 Five Percent Severe Crash Locations

5. CRASH CAUSES AND POTENTIAL COUNTERMEASURES

The existing roadway has not undergone a significant capacity improvement since the initial opening to traffic in 1964. Since this time, the communities in the southwest Chicago Metropolitan area have experienced significant growth resulting in a corresponding travel demand on I-55. These high traffic volumes result in I-55 operating under breakdown conditions for long periods of the day.

Overall crashes that occurred along I-55 within the project limits have been analyzed for the five year study period from 2010 to 2014. Crashes have been tabulated by year, crash type, fatal and severe injuries and roadway conditions to ascertain overall trends and determine if any particular statistical representation exists that would warrant special countermeasure consideration. As shown in Figure 4, there were 4,121 inbound, 3,944 outbound and 16 in unknown direction total crashes along I-55 from I-355 to I-90/94 during the five-year study period. The most predominant crash types (inbound, outbound direction percentages respectively) were rear end (60.3%, 54.1%), sideswipe (19.8%, 21.3%), and fixed object (15.6%, 14.2%). During the study period there were a combined 12 Type K (fatality) crashes and 222 Type A (severe injury) crashes.

Evaluation of the 5% locations indicates a noticeable relationship to mainline crashes and interchange locations. Investigation of these interchanges reveal deficient entrance and exit ramp termini, single lane ramps and low ramp geometric design speeds particularly on the clover leaf type ramps. These deficiencies contribute to conditions in which vehicles exiting and entering the mainline can create a speed differential with mainline traffic and result in unstable traffic flow conditions creating an increased potential for crashes along the mainline.

5.1. Potential Countermeasure

The three predominant crash types are rear end, sideswipe and fixed object crashes accounting for 94% of the total number of crashes in the corridor during the study period. The following are improvements that can be incorporated into the corridor to alleviate these potential conditions;

- The high volume of rear-end and sideswipe same direction crashes (79.0%) indicates that traffic congestion is a primary contributor to the number of crashes. Increasing traffic capacity along I-55 could reduce the likelihood of crashes.
- An Active Traffic Management system could be implemented on the mainline to alert motorists of approaching queuing and congestion; allow speed harmonizing management strategies and provide dynamic motorist information to alert oncoming traffic of incidences; provide emergency lane management options and allow adaptable posting advisory speed guidance, resulting in more stable traffic flow conditions within the corridor.
- High volume entrance ramps can be managed through active ramp meter installations to provide smoother ramp/mainline entrance operations.

- Improved ramp terminal and interchange ramp geometry, along with expanded ramp shoulder widths can improve interchange movements entering and/or exiting the I-55 mainline, resulting in a more stable traffic flow condition within these interchange areas.
- The existing 36 inch high jersey style barrier wall in the median no longer meets current standards. Replacement of this wall with the 42 inch high F-type wall will provide added protection for barrier wall crashes in potential reduction.
- The removal of median barrier wall from the edge of shoulder the segment from Harlem to I-90/94 where a sixty foot edge to edge clear zone will provide added clearance and recovery distance along this segment.
- Enhanced enforcement measures, including introduction of camera and license reading technology and speed alert messaging could serve to reduce the incidence of crashes caused or exacerbated by alcohol/drug use and excessive speeds.

The Managed Lane Project, through the introduction of travel management strategies, congestion pricing options and Active Traffic Management tools will provide additional capacity and improved motorist communications. Thus, reducing congestion and providing for a more stable mainline traffic flow as well as to accommodating the exiting and entering traffic at interchange locations. Long term opportunities to conduct detailed interchange capacity and design studies will offer additional options to improve the efficiency of these interchanges.

Appendix A

Crash Data Tables

I-55 INBOUND CRASHES 2010-2014

Total Crashes

Single Vehicle	
Overturned	42
Pedestrian	2
Railroad Train	0
Cyclist	1
Animal	16
Fixed Object	641
Other Object	42
Other NonCollision	47
Total	791

Multi Vehicle	
Parked Motor Vehicle	0
Head On	0
Rear End	2485
Sideswipe Same Direction	817
Sideswipe Opposite Direction	0
Angle	26
Turning	2
Unknown	0
Total	3330

Single Vehicle + Multi Vehicle = 4121

Crashes by Road Conditions

Dry	Wet	Ice	Snow/ Slush	Unknown
3147	631	93	206	44

Total 4121

Crashes Per Lighting Conditions

Darkness	Darkness, Lighted	Dawn	Daylight	Dusk	Unknown
87	1088	68	2841	34	3

Total 4121

Total KABC Injuries

K	A	B	C
5	162	516	155

Total Injuries 838

Total KABC Crashes with Injury

K	A	B	C
5	121	386	155

Total Crashes w/ KABC 667

I-55 Inbound KABC Crashes With Injury by Vehicle Classification 2010-2014

Single Vehicle

OVERTURNED

K	A	B	C	Total
2	6	19	0	27

PEDESTRIAN

K	A	B	C	Total
1	0	1	0	2

RAILROAD TRAIN

K	A	B	C	Total
0	0	0	0	0

CYCLIST

K	A	B	C	Total
0	0	1	0	1

ANIMAL

K	A	B	C	Total
0	0	0	1	1

FIXED OBJECT

K	A	B	C	Total
1	25	86	29	141

OTHER OBJECT

K	A	B	C	Total
0	4	3	2	9

OTHER NONCOLLISION

K	A	B	C	Total
0	2	6	0	8

Single Vehicle Total 189

Multi Vehicle

PARKED MOTOR VEHICLE

K	A	B	C	Total
0	0	0	0	0

HEAD ON

K	A	B	C	Total
0	0	0	0	0

REAR END

K	A	B	C	Total
1	59	205	100	365

SIDESWIPE SAME DIRECTION

K	A	B	C	Total
0	24	60	21	105

SIDESWIPE OPPOSITE DIRECTION

K	A	B	C	Total
0	0	0	0	0

ANGLE

K	A	B	C	Total
0	1	4	2	7

TURNING

K	A	B	C	Total
0	0	1	0	1

UNKNOWN

K	A	B	C	Total
0	0	0	0	0

Multi Vehicle Total 478

I-55 OUTBOUND CRASHES 2010-2014

Total Crashes

Single Vehicle	
Overturned	29
Pedestrian	3
Railroad Train	0
Cyclist	0
Animal	16
Fixed Object	587
Other Object	77
Other NonCollision	45
Total	757

Multi Vehicle	
Parked Motor Vehicle	1
Head On	20
Rear End	2231
Sideswipe Same Direction	879
Sideswipe Opposite Direction	15
Angle	35
Turning	6
Unknown	0
Total	3187

Single Vehicle + Multi Vehicle = 3944

Crashes by Road Conditions

Dry	Wet	Ice	Snow/ Slush	Unknown
3078	474	117	234	41

Total 3944

Crashes Per Lighting Conditions

Darkness	Darkness, Lighted	Dawn	Daylight	Dusk	Unknown
81	1174	38	2606	41	4

Total 3944

Total KABC Injuries

K	A	B	C
7	129	494	167

Total Injuries 797

Total KABC Crashes with Injury

K	A	B	C
7	100	376	118

Total Crashes w/ KABC 601

I-55 Outbound KABC Crashes with Injury by Vehicle Classification 2010-2014

Single Vehicle

OVERTURNED

K	A	B	C	Total
1	1	6	2	10

PEDESTRIAN

K	A	B	C	Total
0	3	1	0	4

RAILROAD TRAIN

K	A	B	C	Total
0	0	0	0	0

CYCLIST

K	A	B	C	Total
0	0	0	0	0

ANIMAL

K	A	B	C	Total
0	1	2	0	3

FIXED OBJECT

K	A	B	C	Total
3	24	98	19	144

OTHER OBJECT

K	A	B	C	Total
0	1	7	2	10

OTHER NONCOLLISION

K	A	B	C	Total
0	1	4	1	6

Single Vehicle Total 177

Multi Vehicle

PARKED MOTOR VEHICLE

K	A	B	C	Total
0	0	0	0	0

HEAD ON

K	A	B	C	Total
1	3	3	1	8

REAR END

K	A	B	C	Total
0	47	190	77	314

SIDESWIPE SAME DIRECTION

K	A	B	C	Total
1	13	59	13	86

SIDESWIPE OPPOSITE DIRECTION

K	A	B	C	Total
0	0	1	0	1

ANGLE

K	A	B	C	Total
1	6	5	3	15

TURNING

K	A	B	C	Total
0	0	0	0	0

UNKNOWN

K	A	B	C	Total
0	0	0	0	0

Multi Vehicle Total 424

I-55 UNKNOWN CRASHES 2010-2014

Total Crashes

Single Vehicle	
Overturned	0
Pedestrian	1
Railroad Train	0
Cyclist	0
Animal	0
Fixed Object	8
Other Object	0
Other NonCollision	2
Total	11

Multi Vehicle	
Parked Motor Vehicle	0
Head On	0
Rear End	2
Sideswipe Same Direction	1
Sideswipe Opposite Direction	0
Angle	2
Turning	0
Unknown	0
Total	5

Single Vehicle + Multi Vehicle = 16

Crashes by Road Conditions

Dry	Wet	Ice	Snow/ Slush	Unknown
9	3	1	2	1

Total 16

Crashes Per Lighting Conditions

Darkness	Darkness, Lighted	Dawn	Daylight	Dusk	Unknown
0	8	1	5	1	1

Total 16

Total KABC Injuries

K	A	B	C
0	1	0	1

Total Injuries 2

Total KABC Crashes with Injury

K	A	B	C
0	1	0	1

Total Crashes w/ KABC 2

I-55 Unknown KABC Crashes with Injury by Vehicle Classification 2010-2014

Single Vehicle

OVERTURNED

K	A	B	C	Total
0	0	0	0	0

PEDESTRIAN

K	A	B	C	Total
0	0	0	1	1

RAILROAD TRAIN

K	A	B	C	Total
0	0	0	0	0

CYCLIST

K	A	B	C	Total
0	0	0	0	0

ANIMAL

K	A	B	C	Total
0	0	0	0	0

FIXED OBJECT

K	A	B	C	Total
0	0	0	0	0

OTHER OBJECT

K	A	B	C	Total
0	0	0	0	0

OTHER NONCOLLISION

K	A	B	C	Total
0	0	0	0	0

Single Vehicle Total 1

Multi Vehicle

PARKED MOTOR VEHICLE

K	A	B	C	Total
0	0	0	0	0

HEAD ON

K	A	B	C	Total
0	0	0	0	0

REAR END

K	A	B	C	Total
0	0	0	0	0

SIDESWIPE SAME DIRECTION

K	A	B	C	Total
0	1	0	0	1

SIDESWIPE OPPOSITE DIRECTION

K	A	B	C	Total
0	0	0	0	0

ANGLE

K	A	B	C	Total
0	0	0	0	0

TURNING

K	A	B	C	Total
0	0	0	0	0

UNKNOWN

K	A	B	C	Total
0	0	0	0	0

Multi Vehicle Total 1

I-55 INBOUND + OUTBOUND + UNKNOWN CRASHES 2010-2014

Total Crashes

Single Vehicle	
Overturned	71
Pedestrian	6
Railroad Train	0
Cyclist	1
Animal	32
Fixed Object	1236
Other Object	119
Other NonCollision	94
Total	1559

Multi Vehicle	
Parked Motor Vehicle	1
Head On	20
Rear End	4718
Sideswipe Same Direction	1697
Sideswipe Opposite Direction	15
Angle	63
Turning	8
Unknown	0
Total	6522

Single Vehicle + Multi Vehicle + Unknown (16 Crashes) = 8081

Crashes by Road Conditions

Dry	Wet	Ice	Snow/ Slush	Unknown
6234	1108	211	442	86

Total 8081

Crashes Per Lighting Conditions

Darkness	Darkness, Lighted	Dawn	Daylight	Dusk	Unknown
168	2270	107	5452	76	8

Total 8081

Total KABC Injuries

K	A	B	C
12	292	1010	323

Total Injuries 1625

Total KABC Crashes with Injury

K	A	B	C
12	222	762	274

Total Crashes w/ KABC 1270

I-55 Inbound + Outbound + Unknown KABC Crashes with Injury by Vehicle Classification 2010-2014

Single Vehicle

OVERTURNED

K	A	B	C	Total
3	7	25	2	37

PEDESTRIAN

K	A	B	C	Total
1	3	2	1	7

RAILROAD TRAIN

K	A	B	C	Total
0	0	0	0	0

CYCLIST

K	A	B	C	Total
0	0	1	0	1

ANIMAL

K	A	B	C	Total
0	1	2	1	4

FIXED OBJECT

K	A	B	C	Total
4	49	184	48	285

OTHER OBJECT

K	A	B	C	Total
0	5	10	4	19

OTHER NONCOLLISION

K	A	B	C	Total
0	3	10	1	14

Single Vehicle Total 367

Multi Vehicle

PARKED MOTOR VEHICLE

K	A	B	C	Total
0	0	0	0	0

HEAD ON

K	A	B	C	Total
1	3	3	1	8

REAR END

K	A	B	C	Total
1	106	395	177	679

SIDESWIPE SAME DIRECTION

K	A	B	C	Total
1	38	119	34	192

SIDESWIPE OPPOSITE DIRECTION

K	A	B	C	Total
0	0	1	0	1

ANGLE

K	A	B	C	Total
1	7	9	5	22

TURNING

K	A	B	C	Total
0	0	0	0	0

UNKNOWN

K	A	B	C	Total
0	0	0	0	0

Multi Vehicle Total 902

Various Crash Data 2010-2014

Crashes by Year and Location

Location	I-355 to I-294			I-294 to Harlem			Harlem to I-90			Subtotal			Total
	Inbound	Outbound	Unknown	Inbound	Outbound	Unknown	Inbound	Outbound	Unknown	Inbound	Outbound	Unknown	
2010	234	194	2	245	182	1	364	381	2	843	757	5	1605
2011	254	208	1	234	174	0	377	457	2	865	839	3	1707
2012	211	197	0	191	148	0	275	438	2	677	783	2	1462
2013	223	222	0	205	121	1	367	356	3	795	699	4	1498
2014	312	252	2	207	150	0	422	464	0	941	866	2	1809
2010-14 Total	1234	1073	5	1082	775	2	1805	2096	9	4121	3944	16	8081

Crashes by Weather Conditions

Location	Clear	Rain	Snow	Sleet/Hail	Fog/Smoke/Haze	Severe Cross Wind	Other	Unknown	Total
Inbound	3415	406	254	7	6	0	11	22	4121
Outbound	3307	289	296	4	5	3	12	28	3944
Unknown	12	1	2	0	0	0	0	1	16
Total	6734	696	552	11	11	3	23	51	8081

Crashes by Hour of Day

	Inbound	Outbound	Unknown	Total
Midnight	73	85	1	159
1:00 AM	56	72	0	128
2:00 AM	54	84	1	139
3:00 AM	60	87	2	149
4:00 AM	64	119	1	184
5:00 AM	108	109	2	219
6:00 AM	288	192	0	480
7:00 AM	321	224	2	547
8:00 AM	339	181	0	520
9:00 AM	271	110	0	381
10:00 AM	176	100	0	276
11:00 AM	124	112	2	238
Noon	98	123	0	221
1:00 PM	141	161	0	302
2:00 PM	200	260	0	460
3:00 PM	263	381	0	644
4:00 PM	301	430	1	732
5:00 PM	361	379	0	740
6:00 PM	266	238	1	505
7:00 PM	166	124	0	290
8:00 PM	100	97	2	199
9:00 PM	103	89	0	192
10:00 PM	110	87	1	198
11:00 PM	78	100	0	178
TOTAL:	4121	3944	16	8081

Injury Crash Data 2010-2014

Crashes with Injury

Type	Inbound	Outbound	Unknown
K	5	7	0
A	121	100	1
B	386	376	0
C	155	118	1

Total Injuries

Type	Inbound	Outbound	Unknown
K	5	7	0
A	162	129	1
B	516	494	0
C	202	167	1

Major Crash Types with Injuries

Crash Type	K	A	B	C
Rear End	1	106	395	177
Sideswipe Same Direction	1	38	119	34
Fixed Object	4	49	184	48
Other	6	29	64	15
Total	12	222	762	274

Crashes with Injuries by Segments Inbound

Location	K	A	B	C	Total
I-355 to I-294	0	64	142	31	237
I-294 to Harlem	0	7	68	27	102
Harlem to I-90/94	5	50	176	97	328
Total	5	121	386	155	667

Crashes with Injuries by Segments Outbound

Location	K	A	B	C	Total
I-355 to I-294	4	45	141	29	219
I-294 to Harlem	0	14	51	16	81
Harlem to I-90/94	3	41	184	73	301
Total	7	100	376	118	601

Crashes with Injuries by Segments Unknown

Location	K	A	B	C	Total
I-355 to I-294	0	1	0	0	1
I-294 to Harlem	0	0	0	0	0
Harlem to I-90/94	0	0	0	1	1
Total	0	1	0	1	2

Crashes with Injuries by Segments Total

Location	K	A	B	C	Total
I-355 to I-294	4	110	283	60	457
I-294 to Harlem	0	21	119	43	183
Harlem to I-90/94	8	91	360	171	630
Total	12	222	762	274	1270

Fatal Crash Data 2010-2014

Fatal Crashes by Location and Crash Type

Year	Direction	Location	Collison Type							Total	
			Overturned	Fixed Object	Angle	Head On	Rear End	Pedestrian	Sideswipe Same Direction		
2010	Inbound	I-355 to I-294								0	
		I-294 to Harlem								0	
		Harlem to I-90		1						1	
	Outbound	I-355 to I-294		1						1	2010
		I-294 to Harlem								0	Total
		Harlem to I-90		1	1					2	4
2011	Inbound	I-355 to I-294								0	
		I-294 to Harlem								0	
		Harlem to I-90					1	1		2	
	Outbound	I-355 to I-294								0	2011
		I-294 to Harlem								0	Total
		Harlem to I-90								0	2
2012	Inbound	I-355 to I-294								0	
		I-294 to Harlem								0	
		Harlem to I-90	1							1	
	Outbound	I-355 to I-294							1	1	2012
		I-294 to Harlem								0	Total
		Harlem to I-90								0	2
2013	Inbound	I-355 to I-294								0	
		I-294 to Harlem								0	
		Harlem to I-90	1							1	
	Outbound	I-355 to I-294				1				1	2013
		I-294 to Harlem								0	Total
		Harlem to I-90		1						1	3
2014	Inbound	I-355 to I-294								0	
		I-294 to Harlem								0	
		Harlem to I-90								0	
	Outbound	I-355 to I-294	1							1	2014
		I-294 to Harlem								0	Total
		Harlem to I-90								0	1
		Total	2	4	1	1	1	1	1	12	

Fatal Crash Causation Summary

Mile Post	Crash Date	Collision Type	Weather	Light	Road Surf	Cause Primary	Cause Secondary
270.89	2/3/2010	Fixed Object	Clear	Darkness/ Lighted Road	Dry	Exceeding Authorized Speed Limit	(N/A)
287.01	3/15/2010	Fixed Object	Clear	Darkness/ Lighted Road	Dry	Operating vehicle in erractic, reckless, careless, negligent or	Improper Lane Usage
291.59	11/5/2010	Fixed Object	Rain	Darkness/ Lighted Road	Wet	Exceeding Safe Speed For Conditions	Improper Lane Usage
291.87	5/3/2010	Angle	Clear	Darkness/ Lighted Road	Dry	Under Influence of Alcohol/Drugs	Improper Lane Usage
284.61	8/4/2011	Rear End	Clear	Darkness/ Lighted Road	Dry	Failing to Reduce Speed to Avoid Crash	Following Too Closely
289.61	3/17/2011	Pedestrian	Clear	Darkness	Dry	Under Influence of Alcohol/Drugs	Improper Lane Usage
270.77	6/30/2012	Sideswipe Same Direction	Clear	Darkness/ Lighted Road	Wet	Under Influence of Alcohol/Drugs	Physical Condition of Driver
292.41	3/18/2012	Overturned	Clear	Daylight	Dry	Under Influence of Alcohol/Drugs	Driving
270.92	12/1/2013	Head On	Clear	Darkness/ Lighted Road	Dry	Driving On Wrong Side/Wrong Way	Improper Lane Usage
285.08	12/21/2013	Overturned	Clear	Darkness/ Lighted Road	Wet	Under Influence of Alcohol/Drugs	Exceeding Safe Speed For Conditions
289.39	3/17/2013	Fixed Object	Clear	Darkness/ Lighted Road	Dry	Under Influence of Alcohol/Drugs	Improper Lane Usage
269.38	8/6/2014	Overturned	Clear	Darkness/ Lighted Road	Dry	Equipment-Vehicle Condition	Improper Lane Usage

5% Location Crash Data 2010-2014

Inbound I-55

	Crashes With Injury					Total
Location	K	A	B	C	Total	Crashes
1,870 feet east of Illinois Route 43 to 1,800 feet west of Illinois Route 43 (0.70 mi)	0	12	25	5	42	357
2,300 feet west of Central Avenue to 1,520 feet east of Central Avenue (0.72 mi)	1	14	24	20	59	285
270 feet east of Illinois Route 50 to 2,800 feet west of Illinois Route 50 (0.58 mi)	0	9	52	15	76	366
125 feet west of Pulaski Road to 1,460 feet east of Pulaski Road (0.30 mi)	0	2	25	11	38	262
650 feet west of Western Avenue to 965 feet west of Damen Avenue (0.48 mi)	1	8	42	24	75	278
965 feet west of Damen Avenue to 650 feet west of Western Avenue (0.42 mi)	0	6	10	11	27	76

Outbound I-55

	Crashes With Injury					Total
Location	K	A	B	C	Total	Crashes
1,870 feet east of Illinois Route 43 to 1,800 feet west of Illinois Route 43 (0.70 mi)	0	2	20	6	28	121
2,300 feet west of Central Avenue to 1,520 feet east of Central Avenue (0.72 mi)	0	8	14	13	35	177
270 feet east of Illinois Route 50 to 2,800 feet west of Illinois Route 50 (0.58 mi)	0	6	32	15	53	285
125 feet west of Pulaski Road to 1,460 feet east of Pulaski Road (0.30 mi)	0	1	40	11	52	291
650 feet west of Western Avenue to 965 feet west of Damen Avenue (0.48 mi)	0	3	12	0	15	135
965 feet west of Damen Avenue to 650 feet west of Western Avenue (0.42 mi)	0	0	6	27	15	338

Various Crash Data 2010-2014

Crash by Month

Month	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Total
Inbound	350	311	303	308	331	363	336	356	360	356	360	387	4121
Outbound	358	300	296	275	318	372	360	320	316	384	323	322	3944
Unknown	3	1	0	0	2	3	0	1	1	4	0	1	16
Total	711	612	599	583	651	738	696	677	677	744	683	710	8081

Fixed Object Crashes

	2010		2011		2012		2013		2014		Total	
Crash Type	Total	%	Total	%	Total	%	Total	%	Total	%	Total	%
Bridge Support	0	0.00%	1	0.35%	0	0.00%	0	0.00%	3	1.00%	4	0.32%
Concrete Median Barrier	197	73.51%	216	76.60%	141	72.31%	129	67.19%	207	69.23%	890	72.01%
Crash Cushion	10	3.73%	9	3.19%	8	4.10%	9	4.69%	6	2.01%	42	3.40%
Ditch/Embankment	10	3.73%	14	4.96%	13	6.67%	15	7.81%	24	8.03%	76	6.15%
Guardrail End	2	0.75%	3	1.06%	1	0.51%	4	2.08%	17	5.69%	27	2.18%
Guardrail Face	14	5.22%	17	6.03%	14	7.18%	18	9.38%	15	5.02%	78	6.31%
Other Fixed Object	22	8.21%	14	4.96%	9	4.62%	14	7.29%	16	5.35%	75	6.07%
Tree or Shrub	4	1.49%	1	0.35%	0	0.00%	2	1.04%	3	1.00%	10	0.81%
Utility Pole	9	3.36%	7	2.48%	9	4.62%	1	0.52%	8	2.68%	34	2.75%
Totals	268	100.00%	282	100.00%	195	100.00%	192	100.00%	299	100.00%	1236	100.00%

Traffax Inc.

Project: Chicago I-55 OD Study
Engineers: Stanley E. Young and Dennis So Ting Fong
Customer: Stantec
Date: 8/19/2013

Outline

- Introduction
- Project Layout and Periods of Interest
- Procedural Explanations
  - Step 1 – Raw OD Matrix
  - Step 2 – Adjusted OD Matrix
  - Step 3 – Factored OD Matrix
  - Step 4 – Trip Length Distributions
  - Step 5 – Hourly Speeds on I-55
- Sample results – for June 2, 2013 – June 8, 2013
  - Data Range and Information
  - Raw, Adjusted, and Factored OD Matrix
  - Trip Length Distributions
  - Hourly Speeds on I-55
- Explanation of supporting spreadsheets
  - Station 31 Estimation
  - Bias Correction
  - BTM Sampling Estimation from Vehicle Counts
- Listing / Index to results
  - a. Full week from June 2, 2012 at 12:00 AM through midnight June 8, 2013
  - b. Tuesday – Thursday (average weekday on an hourly basis)
  - c. Friday (on an hourly basis)
  - d. Saturday (on an hourly basis)
  - e. Sunday (on an hourly basis)
  - f. Trip Length Distributions - Based on specified dates and times
  - g. Hourly Speeds on I-55 - hourly average speeds for the study period (a week)
- Appendices
  - A. Full details of Station 31 Estimation
  - B. Full details of Bias Correction
  - C. Full details of BTM Sampling Estimation from Vehicle Counts

Introduction

The Chicago I-55 project was run and processed with the goal of getting an Origin-Destination (OD) table of vehicle trips that used I-55. Specifically, the study quantified the number of vehicles that entered and exited at different points, and how long vehicles stayed on I-55 for various time aggregations requested by the client. This was accomplished using Traffax's Bluetooth traffic monitoring (BTM) technology to determine the number of paired MAC IDs going from one location to another. Then using vehicle counts provided by Illinois Department of Transportation, the OD matrix determined by Traffax was scaled to get the final scaled OD matrix. Scaled matrices, and various derivative products from these scaled matrices, will be used to draw conclusions relating to the customer's final objective.

Analysis to obtain Origin-Destination matrices is performed in stages.

1) The Bluetooth MAC ID's are first matched between each sensor pair creating a database of traversals from which OD patterns are assessed. Time filters are applied to the traversals between each OD pair in order isolate the trips that reflect direct travel from the origin sensor to the destination sensor. The resulting data is termed the raw trip matrix.
2) In the second step, the raw trip matrix is adjusted to account for identified data collection issues such as data loss (as was the case at South Central Avenue) as well as for directional biases that result when deployment restrictions limit sensor placement to non-ideal locations (as was the case for sensor 55-63 on the northern leg of I-355). An adjusted trip matrix is obtained that accounts for known data collection issues.
3) The third step is to factor the adjusted OD matrix to reflect actual volumes. A series of vehicle counts taken concurrently with the project are used to determine the BTM sampling rate, and in turn factor matched pairs to estimated trip volumes.
4) The last step is to create the requested matrix summaries for date and time aggregations to support study objective.

Project Layout and Periods of Interest

The sensors for the I-55 Chicago Project were installed over 3 days starting on 5/29/2013 and ending on 5/31/2013. The sensors collected data for 10.3 days and were taken down between 6/11/2013 and 6/12/2013. The install location for the sensors is shown on the map below, which is included in the associated files transmitted with the report. The files are in Google earth format, with files extensions of either *.kml or *.kmz.

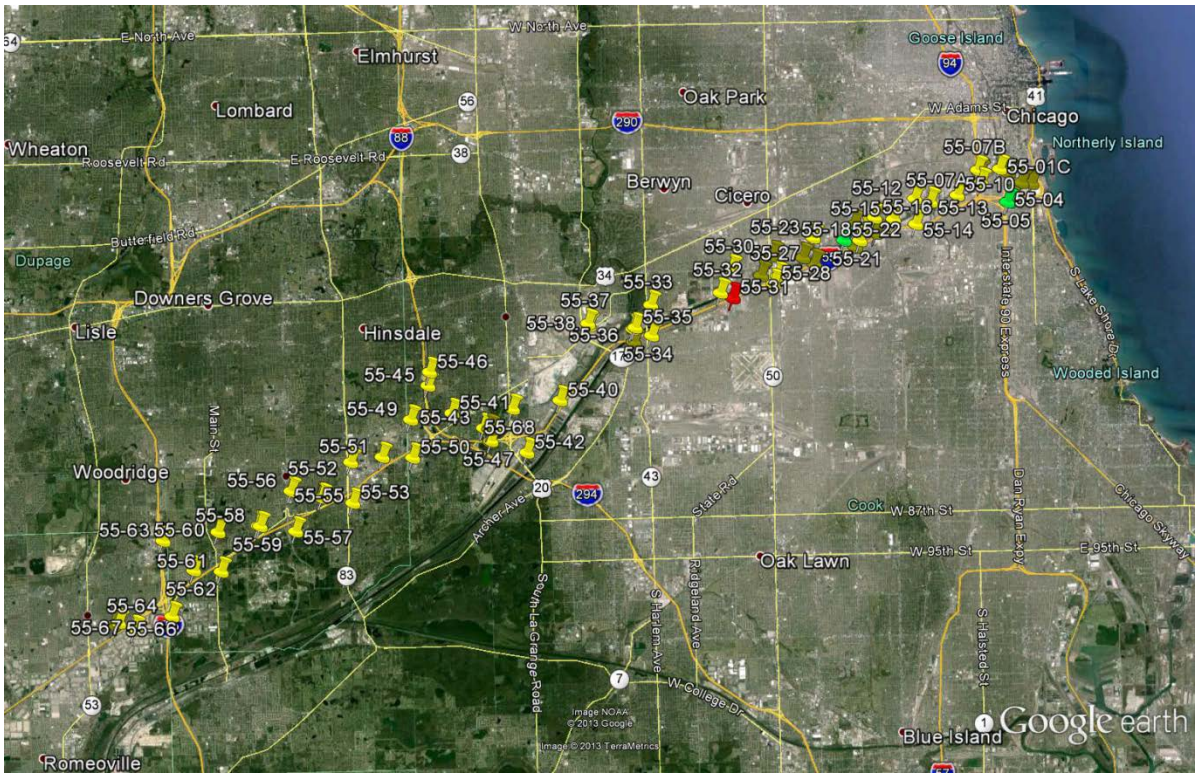


Figure 1 - Chicago I-55 Sensor Location Map

The units on the map are color coded to show the status of the data. The one red unit had problems where all the data was lost, which is corrected for in post-processing. The green units show the units that had minor problems, which were easily corrected for in post-processing. The methodology and process used to correct for these problems is detailed later in the document.

The time span of interest is from June 2, 2013 through June 8, 2013. This provides a full week of data collection that coincides with volume data that was collected concurrently. Within this overall date range the following aggregations are of interest:

a. Full week from June 2, 2012 at 12:00 AM through midnight June 8, 2013
b. Tuesday – Thursday (average weekday on an hourly basis)
c. Friday (on an hourly basis)
d. Saturday (on an hourly basis)
e. Sunday (on an hourly basis)

Trips will be classified in time based on the time of trip origin.

Procedural Explanations

There are three steps to processing the data that will result in three OD Matrices. The procedure to get from the data to each OD matrix is explained below in a series of three steps.

Raw OD Matrix – Step 1

Bluetooth traffic monitoring (BTM) technology uses matched pairs, similar to other re-identification technologies, to determine the travel time and path that a vehicle takes through a given set of locations. Below is a diagram of how this would work. The BluFAX sensors are placed at the locations labeled "A" through "F". The black arrows show the roads and the green and red dotted lines show the path that a vehicle could take through the system.

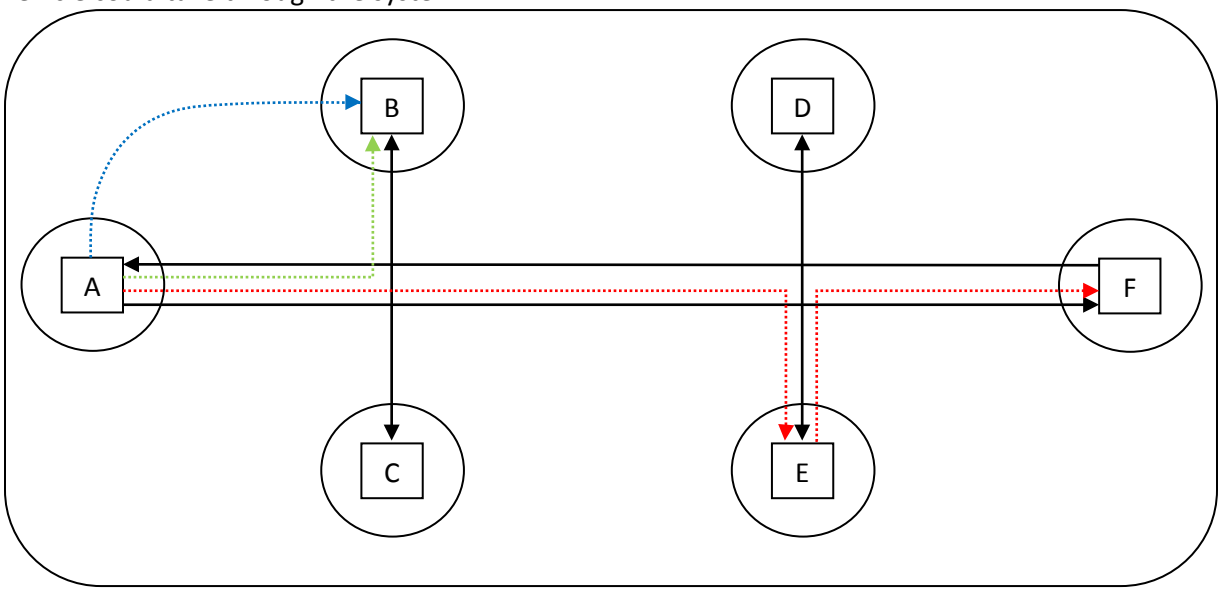


Figure 2 - Bluetooth OD Methodology Mapping

Scenario 1 - Basic Pair Matching (Green and Blue)

In the first scenario, a vehicle passes by BluFAX sensor (A) and proceeds to make a left turn and passes by sensor (B) as shown by the green dotted line. The Bluetooth device in the vehicle is detected at both sensors and a completed traversal is registered from (A) to (B). During the matching process, a basic statistical filter, referred to as the IQR4 filter, is applied that identifies and flags statistical outliers based on the travel times from (A) to (B). This is a classical outlier detection filter in which the standard deviation of the data is estimated within a time window, and any data point falling outside a multiple (typically 2.5) of standard deviations is flagged as an outlier. The process used by BluSTATS (Traffax engineering software utility provided by Traffax Inc.) uses the inter-quartile range to estimate the standard deviation, a robust method that is more stable in the presence of outliers than classical estimates of standard deviation. More detail on the filter can be found in the BluSTATs processing manual, version 1.94.

The green dotted line represents a vehicle that travels between sensor (A) and (B) but not using the network under study, but rather uses local roads or alternative routes, all of which are less direct and typically much longer travel time. The trip represented by the greed dotted line is differentiated from the blue dotted line based on time. The BluSTATs percentile filter was employed to separate these two cases. This filter identifies an anticipated travel time of the most direct route, and then only accepts traversals whose travel time falls within a specified range of the travel time. The parameters of the percentile filter used for this project was the 15^{th} percentile travel time (corresponding to the 85^{th} percentile speed, a common measure of freeflow), and an acceptable range of up to 2.5 times the 15^{th} percentile. In order to adjust for changes in speed due to congestion, the filter is applied to a moving window of 30 data points. In other words, for each traversal, the 30 closest data points in time are used to determine an acceptable range of 2.5 times the computed 15^{th} percentile of the 30 data points. If the travel time falls outside the computed range, it is filtered from the OD tables. Note that this filter is biased to the route with the most traversals and most direct travel route representing the shortest travel time.

Scenario 2 - Multiple Consecutive Trips (Red)

In the second scenario, a vehicle makes multiple trips within the study area starting at sensor (A), exiting at sensor (E) and then re-entering the study area again at sensor (E) and continuing to sensor (F). In this case, multiple matched pairs are registered. Match pairs from (A) to (E), from (E) to (F), and from (A) to (F). The trip from (A) to (F), through (E) takes a longer time than a direct trip from (A) to (F). Thus the BluSTATs percentile filter for trips from (A) to (F) would filter the (A) to (E) to (F) trip because it takes significantly longer than direct (A) to (F) trips.

Adjusted OD Matrix – Step 2

As stated in the project layout, a few problems occurred during the study period where various units were missing a few hours or, in the case of one unit, all data. Directional bias was also observed at some sensors when mounting was restricted to right shoulder only. Using traversal data from other units in close proximity, data from missing units are estimated, and directional bias canceled. The adjusted trip matrix (step 2) compensates for these phenomena. The details of methods of correction are explained below.

Correction 1 - Correcting for a Missing Unit

The OD patterns from locations with missing data can be estimated based on data from adjoining sensors and the road layout. An sample network is shown in Figure 3 in which a the 4-way intersection is being monitored by sensors (A), (B), (C) and (D). Sensor (C), indicated by the red box, failed to collect data. Using the closed properties of a network (all traffic into a network is equal to all traffic out of the network), the data from sensor C can be inferred from available data at other sensors. In this example, the proportion of trips originating from the East through sensors D to sensor C are estimated. The sensor (E) represents a sensor upstream of sensor D. In the diagram, the boxed letters represent the sensors, the circles show the detection range of the sensors and the black arrows show the possible routes a vehicle can take between sensors. The dotted arrows in blue, red, green and purple are there to illustrate the flow of traffic from the East to the various sensor locations (also called nodes).

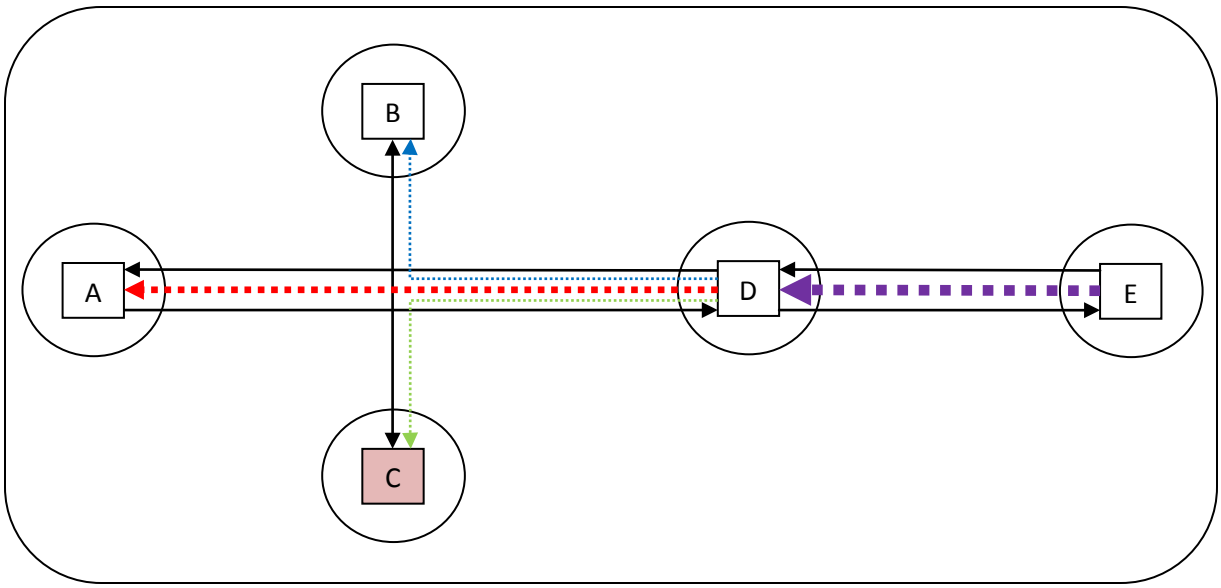


Figure 3 - Bluetooth Missing Sensor Correction Mapping

The method of correcting for the sensor (C) begins first by determining the number of vehicles that are flowing into the intersection from the East, through sensor (D). As it is impossible to determine the directionality of the vehicles with Bluetooth using only a single sensor, the total westbound trips through sensor D are determined by the matched pairs from Sensor (E) to sensor (D). The total number of traversals flowing from (E) to (D), shown by the larger purple dotted arrow, is equal to the total number of detected vehicles entering the intersection from the East.

Each vehicle that enters the intersection must exit from one of the three possible exits, (A), (B) or (C). Thus using the equation below we can determine the vehicles that went to sensor (C).

General Equation: $(E\ to\ D) = (E\ to\ D\ to\ A) + (E\ to\ D\ to\ B) + (E\ to\ D\ to\ C)$

Modified Equation: $(E\ to\ D\ to\ C) = (E\ to\ D) - (E\ to\ D\ to\ A) - (E\ to\ D\ to\ B)$

The above equation is a simplistic model. It does not take into account the probability of detection, which is estimated to be approximately 0.9. That is, the probability that a vehicle with a detectable Bluetooth device being detected at any given sensor is 0.9. It follows that 10% of all vehicles that register a traversal between (E) and (D) will not register at either (A), (B), or (C). Incorporating the probability of detection (at 90%), the equations are modified to be:

General Equation: $0.9 * (E\ to\ D) = (E\ to\ D\ to\ A) + (E\ to\ D\ to\ B) + (E\ to\ D\ to\ C)$

Modified Equation: $(E\ to\ D\ to\ C) = 0.9 * (E\ to\ D) - (E\ to\ D\ to\ A) - (E\ to\ D\ to\ B)$

In general, the probability of detection should be considered as complexity of trip patterns increase.

The Chicago I-55 project required a more complex analysis due to various difficulties that needed to be overcome. Figure 4 is a map of how vehicles can disperse through the intersection of I-55 and South Central Avenue where one of the sensors failed to collect data. The mapping includes the intersection of concern and the surrounding sensors for the Chicago I-55 project.

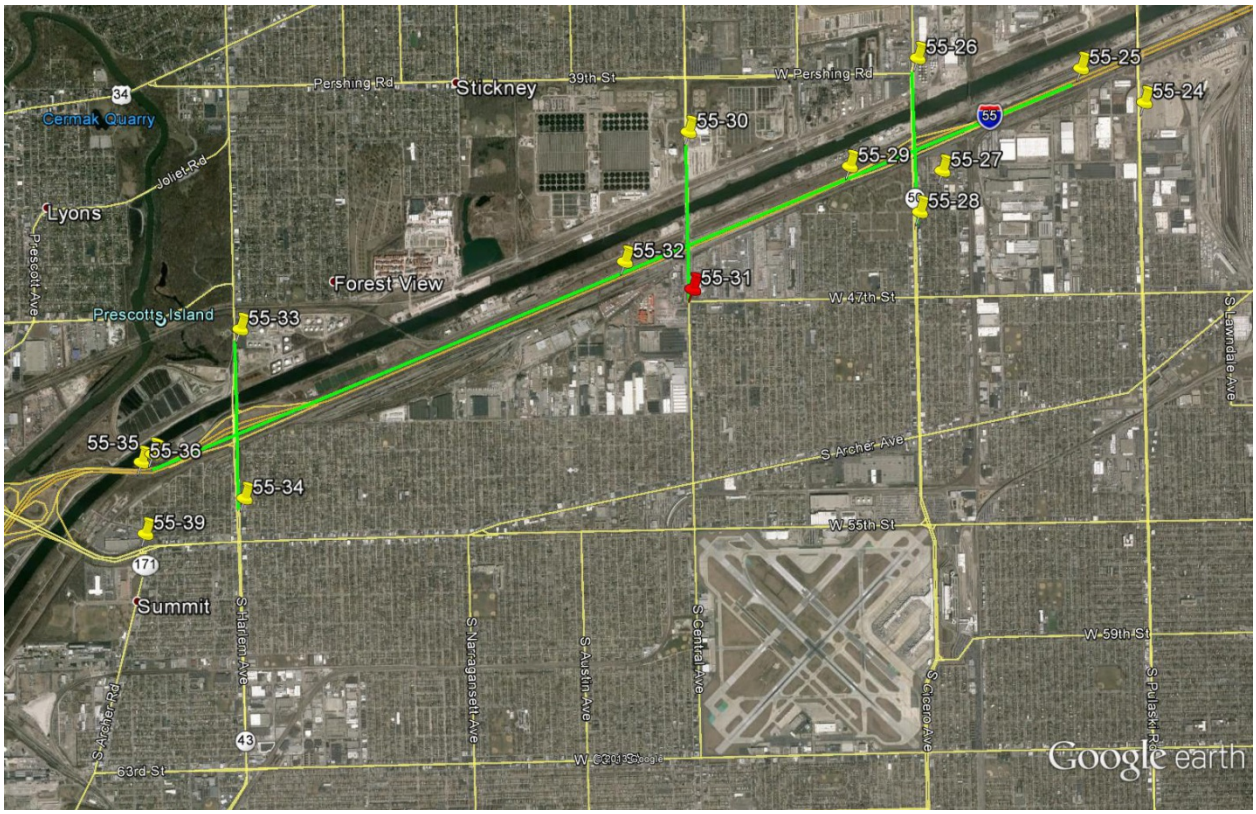


Figure 4 - Mapping of Missing Sensor and the Surrounding Sensors

There are three complications to the model that make this particular intersection more complex:

1. The intersection of sensors (55-29), (55-30), (55-31) and (55-32) had all the western ramps closed during the study period. Thus traversals (55-32) to (55-31), (55-32) to (55-30), (55-31) to (55-32) and (55-30) to (55-32) are not possible.
2. The sensors (55-31) and (55-27 and 55-28) are both monitoring exits to Midway airport from I-55. Thus the two roadways interact, providing both entrance and exit to the heavy commercial area south of I-55 as well as the airport.
3. The mainline traffic on I-55 is much larger than the exiting and entering traffic. Thus small errors on the mainline (such as 5%) may create larger errors when calculating the values for the exits.

The three difficulties are overcome using a method of calculation that relates sensor (55-31) to the surrounding sensors (55-30), (55-26) and (55-27 and 55-28). The analysis is performed using turning movements that started East of the study area and ended at the sensors (55-31), (55-30), (55-26) and (55-27 and 55-28). The reverse direction was also analyzed. The study area is restricted to the nodes shown in Figure 4, where the paths through the system are indicated in green. The distribution of traffic to and from 55-31 to stations east of 55-25 were inferred based on a linear combination of the trips to stations 26,27, 28 and 30. The resulting equation is shown below.

$$(Sensor\ X\ to\ Sensor\ 31) = \frac{\frac{(X\ to\ Sensor\ 30)}{0.37} + \frac{(X\ to\ Sensor\ 26)}{1.19} + \frac{(X\ to\ Sensor\ 27\ and\ 28)}{1.18}}{3}$$

Correction 2 - Correcting Bias

A bias in various sensors is generally caused by the placement of the sensor on the edge of the area it is trying to monitor. The placement of units in the field can be problematic as unforeseen construction, missing or damaged structures or changes to the road layout may cause such a situation to occur. The bias can be corrected in post-processing by using traversal counts with other sensors to adjust the number of traversals in each direction.

The basis for this correction is that the flow of traffic to the sensor in one direction is equal to the flow of traffic from the sensor in the opposite direction over a large period of time. We determined the total traffic to and from, which is used to determine the ratio and direction to weight.

Factored OD Matrix – Step 3

The Factored OD Matrix takes into account the sampling percentage of the traversals versus the vehicle counts and factors up the Adjusted OD Matrix to get an estimate of vehicle counts for each movement. The sampling percentage is determined by comparing vehicle counts to the OD Matrix counts. While this sounds straight forward, the vehicle counts correspond to certain movements while the OD Matrix breaks out movements for an exit based on the origin or destination. Thus we compared the total OD counts for the Bluetooth sensors to the summed movements towards or from the sensors.

Table 1 - Sampling Rate

From BluFAX Sensor	Vehicle Count	Traffax Count	Sampling Rate
42	181301	10250	5.65%
49	54344	2986	5.49%
50	53057	3081	5.81%
52	120910	6834	5.65%
53	66976	3601	5.38%
61	66701	3581	5.37%
23,24	217273	12735	5.86%
33,34	193912	12150	6.27%
37,38	148460	8818	5.94%
45,46	229347	17448	7.61%
16,17,19,20,21	207689	10910	5.25%

The average sampling rate for vehicles that start at the sensors in the table to other sensors in the study area is 5.84%. The average sampling rate for vehicles that end at the sensors in the table from other sensors in the study area is 6.00%. When these are averaged we get a 5.92% sampling rate. This was done using the section of road to the west of the Dan Ryan. The Dan Ryan calculations were done separately and were found to have a sampling rate of 5.30%.

Trip Length Distributions – Step 4

The Trip Length Distributions use the adjusted OD matrix values to compare the percentage of vehicles that traveled various distances. A different set of days and times were requested for this analysis:

1. Full Week - All Times
2. Tuesday through Thursday - 5:00 to 7:00

3. Tuesday through Thursday - 7:00 to 9:00
4. Tuesday through Thursday - 9:00 to 14:00
5. Tuesday through Thursday - 14:00 to 16:00
6. Tuesday through Thursday - 16:00 to 18:00
7. Tuesday through Thursday - 18:00 to 20:00
8. Tuesday through Thursday - 20:00 to 5:00

Raw OD Matrices were processed with these new times. Using the same method above in Step 2, the Adjusted OD Matrices were calculated. A matrix of the trip lengths was provided by CDM Smith, which was used to place the OD Matrix Counts into bins in increments of 1 mile. This analysis excluded trips that did not travel on I-55 as the objective of this step is to measure the length traveled I-55. Some movements of the Dan Ryan and I-355 were excluded as well. The values for the bins were graphed as a bar chart.

Hourly Speeds on I-55 – Step 5

The Hourly Speeds on I-55 were determined using only sensors placed on I-55. A BluSTATs project was created using these sensors. The values for the distances between each of the adjacent sensors were inputted and the average speed values calculated by hour for the whole study period (a week). The speeds of each of the segments were compiled into a single excel sheet.

Sample results – for June 2, 2013 – June 8, 2013

This section will outline how the results are presented in the OD spreadsheets with excerpts to better illustrate the information.

Data Range and Information

The OD result files have three OD tables and an area for settings as seen below. The sample shown below is the settings table taken from the overall OD report for the whole study area. It shows the days and times used for the OD table. The sampling rates that are used are also shown for the From/To the sensor and the average, which is used for the OD scaling. The corrections used for the adjusted matrix are also shown, which are the corrections for sensor 31, 63 and 68.

Table 2 - Sample Data Range, Sampling and Correction Information

Date/Time Range to Sum	
FROM	**Sunday - 06/02/2013**
TO	**Sunday - 06/09/2013**
Start Time	**0:00:00**
End Time	**24:00:00**
Traversal Sampling Rate	6.17%
Sensor ID	**Weighting**
02/08/09	1.667109906
63	1.191738502
04/05/06	1.48205738
Sensor ID	**Imputed from other Sensors**
31	Yes

Raw OD Matrix

The sample below shows the first 7 columns of a raw OD matrix. The rows show the beginning station (Origin) and the columns show the end station (Destination). The sensors for some locations are combined into a single location, which is called a station. A combined station does not double count vehicles as a Mac_ID detected simultaneously by both sensors is only counted one time. In the cells of the matrix are the counts of Bluetooth devices that passed from one location to another. These counts have already passed through the various BluSTATs filters described in earlier sections of this report.

Table 3 - Sample Raw OD Matrix

Raw OD Matrix	END STATION					
BEGIN STATION	**02/08/09**	**04/05/06**	**01/01B/07A/07B**	**12**	**13**	**14**
02/08/09	0	3350	4898	361	8	576
04/05/06	14349	0	0	1247	32	250
01/01B/07A/07B	5741	0	0	312	40	1330
12	304	636	221	0	85	0
13	5	30	20	124	0	22
14	714	218	1047	0	22	0
16/19	334	509	246	66	26	73
17/20/21	445	1094	713	201	10	112
23	180	499	115	32	5	30
24	948	762	1150	373	16	57
26	284	1122	191	72	14	84
27/28	2343	515	1675	260	14	53
30	129	158	86	35	3	23
33	165	120	72	25	0	18
34	656	344	705	167	3	59
37/38	725	574	516	107	6	56
39	217	218	269	57	3	19
41	66	31	37	10	0	3
42	573	302	417	72	4	18
68	159	349	101	40	3	13
45/46	241	487	297	29	6	46
47/48	101	532	123	33	4	12
49	243	35	115	19	0	5
50	257	33	120	20	0	1
52	340	88	104	32	3	9
53	226	59	179	35	0	9
56	143	38	69	36	0	4
57	17	6	13	1	0	0
60	218	49	79	28	0	10
61	72	43	72	14	0	11
63	251	131	107	34	5	35
64	96	48	84	21	3	11
67	113	80	86	24	3	10
60B/66	1381	582	1181	327	21	105
TO Totals	32036	13042	15108	4214	339	3064

Adjusted OD Matrix

The sample below shows the first 7 columns of an adjusted OD matrix. The values shown here are the adjusted values from the Raw Matrix. The adjustments made included inserting the values for sensor 31 (in yellow below), which were imputed from other stations and correcting the weighting for sensors locations 02/08/09 (in green), 04/05/06 (in purple) and 63. Sensor 63 is not highlighted because the traversals ending at 63 were changed due to the weighting method. The values starting at 02/08/09 were adjusted thus the row element of sensor 02/08/09 is highlighted in green. The values ending at 04/05/06 were weighted thus the column element of sensor 02/08/09 is highlighted in purple.

Table 3 - Sample Adjusted OD Matrix

Adjusted Matrix	END STATION					
BEGIN STATION	02/08/09	04/05/06	01/01B/07A/07B	12	13	14
02/08/09	0	8277	8165	601	13	960
04/05/06	14349	0	0	1247	32	250
01/01B/07A/07B	5741	0	0	312	40	1330
12	304	942	221	0	85	0
13	5	44	20	124	0	22
14	714	323	1047	0	22	0
16/19	334	754	246	66	26	73
17/20/21	445	1621	713	201	10	112
23	180	739	115	32	5	30
24	948	1129	1150	373	16	57
26	284	1662	191	72	14	84
27/28	2343	763	1675	260	14	53
30	129	234	86	35	3	23
31	627	816	439	99	9	54
33	165	177	72	25	0	18
34	656	509	705	167	3	59
37/38	725	850	516	107	6	56
39	217	323	269	57	3	19
41	0	0	0	0	0	0
42	573	447	417	72	4	18
68	159	517	101	40	3	13
45/46	241	721	297	29	6	46
47/48	101	788	123	33	4	12
49	243	51	115	19	0	5
50	257	48	120	20	0	1
52	340	130	104	32	3	9
53	226	87	179	35	0	9
56	143	56	69	36	0	4
57	17	8	13	1	0	0

60	218	72	79	28	0	10
61	72	63	72	14	0	11
63	251	194	107	34	5	35
64	96	71	84	21	3	11
67	113	118	86	24	3	10
60B/66	1381	862	1181	327	21	105
TO Totals	32597	23396	18777	4543	353	3499

Factored OD Matrix

The sample below shows the first 7 columns of a factored OD matrix. The values shown here are the scaled values based on the adjusted Matrix. The scaling was done using the vehicles counts obtained from IDOT.

Table 4 - Sample Factored OD Matrix

Factored Matrix	**END STATION**					
BEGIN STATION	**10/11**	**12**	**13**	**14**	**16/19**	**17/20/21**
10/11	0	33764	1198	39420	23213	36499
12	19971	0	1434	27129	1738	2599
13	742	2093	0	371	202	540
14	31941	22774	371	0	1131	2160
16/19	18249	1114	438	1232	0	79633
17/20/21	36161	3393	168	1890	88868	0
23	13286	540	84	506	3747	2718
24	45430	6297	270	962	6887	5199
26	26420	1215	236	1418	2549	7597
27/28	72509	4389	236	894	4777	2110
30	6263	590	50	388	438	2616
31	26386	1671	151	911	1975	4862
33	5942	422	0	303	962	1755
34	26977	2819	50	996	4440	4254
37/38	29797	1806	101	945	2228	5537
39	11463	962	50	320	1671	1958
41	0	0	0	0	0	0
42	17051	1215	67	303	1721	1046
68	9757	692	50	219	877	1131
45/46	11007	489	101	776	1181	4372
47/48	11176	557	67	202	860	827
49	6077	320	0	84	270	557
50	6280	337	0	16	405	405
52	8745	540	50	151	489	675
53	7073	590	0	151	573	540
56	3629	607	0	67	438	219
57	455	16	0	0	33	16

60	5604	472	0	168	742	573
61	2937	236	0	185	455	877
63	8069	573	84	590	573	1080
64	3190	354	50	185	388	725
67	4423	405	50	168	827	1046
60B/66	49144	5520	354	1772	5452	5301
TO Totals	526154	96772	5710	82722	160110	179427

Trip Length Distribution

The sample below shows the Trip Length Distribution for the I-55 Corridor based on the trip length matrix provided by CDM Smith and the Adjusted OD Matrices.

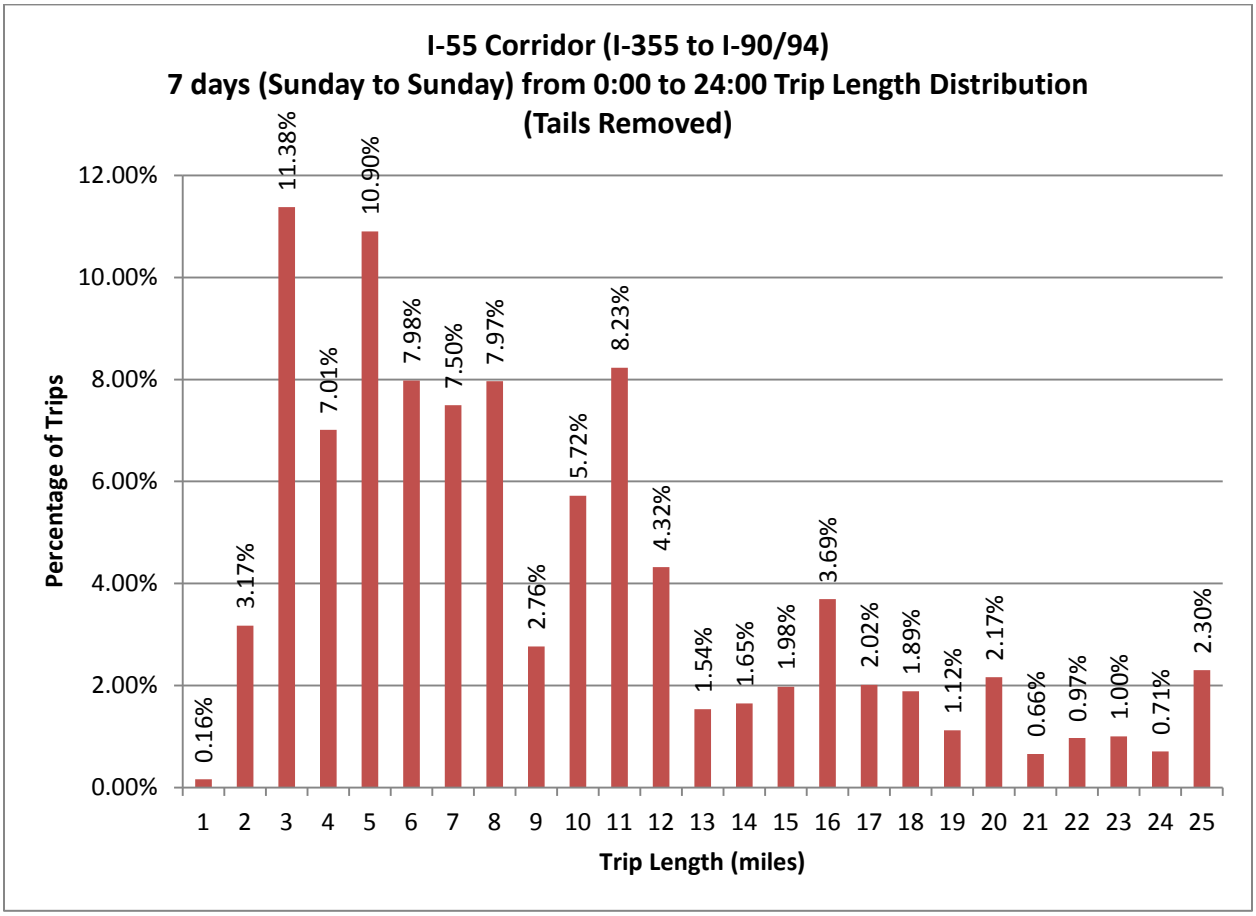


Chart 1 - I-55 Corridor Trip Length Distribution Sample Chart

Hourly Speeds on I-55

The hourly speeds on I-55 are shown in the spreadsheet "Average Speed (mph).xlsx". They are shown going from West to East and East to West. The sample below shows a portion of the trips from West to

East. The feature conditional formatting was used in excel to view the overall pattern of the speeds on the I-55.

		West to East			
		60B/66 to 62	62 to 58/59	58/59 to 54/55	54/55 to 51
Bin Start	Bin End	1	2	3	4
6/2/2013 0:00	6/2/2013 1:00	61.4	64.029	61.761	56.166
6/2/2013 1:00	6/2/2013 2:00	65.309	62.023	64.835	59.455
6/2/2013 2:00	6/2/2013 3:00	61.725	61.725	62.213	58.536
6/2/2013 3:00	6/2/2013 4:00	60.438	60.781	62.414	59.035
6/2/2013 4:00	6/2/2013 5:00	62.713	63.106	64.842	60.061
6/2/2013 5:00	6/2/2013 6:00	65.089	64.828	65.831	63.169
6/2/2013 6:00	6/2/2013 7:00	67.411	66.732	67.743	64.736
6/2/2013 7:00	6/2/2013 8:00	68.111	65.412	68.154	63.607
6/2/2013 8:00	6/2/2013 9:00	66.978	66.458	67.826	62.847
6/2/2013 9:00	6/2/2013 10:00	65.246	64.71	64.603	60.9
6/2/2013 10:00	6/2/2013 11:00	65.736	63.951	65.434	60.513
6/2/2013 11:00	6/2/2013 12:00	65.167	63.067	63.672	58.999
6/2/2013 12:00	6/2/2013 13:00	64.101	62.63	63.579	58.622
6/2/2013 13:00	6/2/2013 14:00	62.646	61.067	62.237	56.899
6/2/2013 14:00	6/2/2013 15:00	61.056	59.653	60.994	56.08

Explanation of supporting spreadsheets

There are a few supporting spreadsheets and documents that outline the various processes. The appendix contains these files and should be examined if there are further inquiries as to the numbers behind the method.

Station 31 estimation

The full details of the sensor 31 estimation is contained in the attached file "Factoring for station 31 v1 2013 Jul 14.docx". A brief summary is supplied at the end of this report in Appendix A.

Bias Corrections

The full details of bias corrections at the various stations can be seen in the Appendix B spreadsheets "**DR OD Corrections.xlsx**" and "**I55 OD Corrections.xlsx**". The spreadsheets would take the raw input OD files from BluSTATs and make the process of weighting much easier to perform. In the "**DR OD Corrections.xlsx**" spreadsheet, the solver tool in Excel was used to minimize the ratios of to/from traffic for each sensor. In the "**I55 OD Corrections.xlsx**" spreadsheet due to the larger study areas, the sensors were corrected by the ratios of to/from traffic with no minimizing. The weighting values were applied to scale up the detection direction that was low. Note that only the sensors that were suspected to have a bias due to the install locations were corrected.

The spreadsheets can be viewed in the folder for Appendix B.

BTM Sampling Estimation from Vehicle Counts

A large sample of data is used when generating a BTM sampling estimation. The sampling rate is constant over a large area and can be approximated using a larger time span. The I-55 study uses a week of sample BluFAX data and vehicle counts to determine the sampling rate. BluFAX samples only a portion of the population and a larger period of time helps to iron out oddities in the sample.

There were three spreadsheets generated to determine the sampling rate. The first spreadsheet looked at the vehicles counts provided by IDOT. The vehicle counts were parsed and filtered to determine which counts to be compared to the OD matrices in the "**Vehicle Counts.xlsx**" spreadsheet. The deciding variables were predominately determined by the count validity and geographic location of the counters relative to the BluFAX sensors.

Using the results from the Vehicle Counts and the adjusted OD matrices, the sampling spreadsheets were produced ("**DR OD Sampling**" and "**I55 OD Sampling**"). The sampling spreadsheets compare the vehicle counts for specific sensors to the counts in the adjusted OD tables. The percentages are then averaged to get the sampling rate. The adjusted matrix is then factored using the sampling rate to get the Factored OD Matrices.

The spreadsheets can be viewed in the folder for Appendix C.

Listing / Index to results

The listing below will indicate the folder structure for the results.

a. OD Matrices - Full week from June 2, 2012 at 12:00 AM through midnight June 8, 2013

4 Files
DanRyan OD\OD Matrices - Overall\ALL OD_REPORT 2013-06-02 000000 168HRS.xls
DanRyan OD\Raw OD Matrix - Overall\OD_REPORT 2013-06-02 000000 168HRS.xls
I-55 OD\OD Matrices - Overall\ALL OD_REPORT 2013-06-02 000000 168HRS.xls
I-55 OD\Raw OD Matrix - Overall\OD_REPORT 2013-06-02 000000 168HRS.xls

b. OD Matrices - Tuesday – Thursday (average weekday on an hourly basis)

96 files
DanRyan OD\OD Matrices - Hourly (Tue-Thu)\ALL OD_REPORT 2013-06-04 to 06 000000 72HRS.xls
DanRyan OD\OD Matrices - Hourly (Tue-Thu)\ALL OD_REPORT 2013-06-04 to 06 010000 72HRS.xls
DanRyan OD\OD Matrices - Hourly (Tue-Thu)\ALL OD_REPORT 2013-06-04 to 06 020000 72HRS.xls
DanRyan OD\OD Matrices - Hourly (Tue-Thu)\ALL OD_REPORT 2013-06-04 to 06 030000 72HRS.xls
DanRyan OD\OD Matrices - Hourly (Tue-Thu)\ALL OD_REPORT 2013-06-04 to 06 040000 72HRS.xls
DanRyan OD\OD Matrices - Hourly (Tue-Thu)\ALL OD_REPORT 2013-06-04 to 06 050000 72HRS.xls
DanRyan OD\OD Matrices - Hourly (Tue-Thu)\ALL OD_REPORT 2013-06-04 to 06 060000 72HRS.xls
DanRyan OD\OD Matrices - Hourly (Tue-Thu)\ALL OD_REPORT 2013-06-04 to 06 070000 72HRS.xls
DanRyan OD\OD Matrices - Hourly (Tue-Thu)\ALL OD_REPORT 2013-06-04 to 06 080000 72HRS.xls
DanRyan OD\OD Matrices - Hourly (Tue-Thu)\ALL OD_REPORT 2013-06-04 to 06 090000 72HRS.xls
DanRyan OD\OD Matrices - Hourly (Tue-Thu)\ALL OD_REPORT 2013-06-04 to 06 100000 72HRS.xls
DanRyan OD\OD Matrices - Hourly (Tue-Thu)\ALL OD_REPORT 2013-06-04 to 06 110000 72HRS.xls
DanRyan OD\OD Matrices - Hourly (Tue-Thu)\ALL OD_REPORT 2013-06-04 to 06 120000 72HRS.xls
DanRyan OD\OD Matrices - Hourly (Tue-Thu)\ALL OD_REPORT 2013-06-04 to 06 130000 72HRS.xls
DanRyan OD\OD Matrices - Hourly (Tue-Thu)\ALL OD_REPORT 2013-06-04 to 06 140000 72HRS.xls
DanRyan OD\OD Matrices - Hourly (Tue-Thu)\ALL OD_REPORT 2013-06-04 to 06 150000 72HRS.xls
DanRyan OD\OD Matrices - Hourly (Tue-Thu)\ALL OD_REPORT 2013-06-04 to 06 160000 72HRS.xls
DanRyan OD\OD Matrices - Hourly (Tue-Thu)\ALL OD_REPORT 2013-06-04 to 06 170000 72HRS.xls
DanRyan OD\OD Matrices - Hourly (Tue-Thu)\ALL OD_REPORT 2013-06-04 to 06 180000 72HRS.xls
DanRyan OD\OD Matrices - Hourly (Tue-Thu)\ALL OD_REPORT 2013-06-04 to 06 190000 72HRS.xls
DanRyan OD\OD Matrices - Hourly (Tue-Thu)\ALL OD_REPORT 2013-06-04 to 06 200000 72HRS.xls
DanRyan OD\OD Matrices - Hourly (Tue-Thu)\ALL OD_REPORT 2013-06-04 to 06 210000 72HRS.xls
DanRyan OD\OD Matrices - Hourly (Tue-Thu)\ALL OD_REPORT 2013-06-04 to 06 220000 72HRS.xls
DanRyan OD\OD Matrices - Hourly (Tue-Thu)\ALL OD_REPORT 2013-06-04 to 06 230000 72HRS.xls
DanRyan OD\Raw OD Matrix - Hourly (Tue-Thu)\OD_REPORT 2013-06-04 to 06 000000 72HRS.xls
DanRyan OD\Raw OD Matrix - Hourly (Tue-Thu)\OD_REPORT 2013-06-04 to 06 010000 72HRS.xls
DanRyan OD\Raw OD Matrix - Hourly (Tue-Thu)\OD_REPORT 2013-06-04 to 06 020000 72HRS.xls

DanRyan OD\Raw OD Matrix - Hourly (Tue-Thu)\OD_REPORT 2013-06-04 to 06 030000 72HRS.xls
DanRyan OD\Raw OD Matrix - Hourly (Tue-Thu)\OD_REPORT 2013-06-04 to 06 040000 72HRS.xls
DanRyan OD\Raw OD Matrix - Hourly (Tue-Thu)\OD_REPORT 2013-06-04 to 06 050000 72HRS.xls
DanRyan OD\Raw OD Matrix - Hourly (Tue-Thu)\OD_REPORT 2013-06-04 to 06 060000 72HRS.xls
DanRyan OD\Raw OD Matrix - Hourly (Tue-Thu)\OD_REPORT 2013-06-04 to 06 070000 72HRS.xls
DanRyan OD\Raw OD Matrix - Hourly (Tue-Thu)\OD_REPORT 2013-06-04 to 06 080000 72HRS.xls
DanRyan OD\Raw OD Matrix - Hourly (Tue-Thu)\OD_REPORT 2013-06-04 to 06 090000 72HRS.xls
DanRyan OD\Raw OD Matrix - Hourly (Tue-Thu)\OD_REPORT 2013-06-04 to 06 100000 72HRS.xls
DanRyan OD\Raw OD Matrix - Hourly (Tue-Thu)\OD_REPORT 2013-06-04 to 06 110000 72HRS.xls
DanRyan OD\Raw OD Matrix - Hourly (Tue-Thu)\OD_REPORT 2013-06-04 to 06 120000 72HRS.xls
DanRyan OD\Raw OD Matrix - Hourly (Tue-Thu)\OD_REPORT 2013-06-04 to 06 130000 72HRS.xls
DanRyan OD\Raw OD Matrix - Hourly (Tue-Thu)\OD_REPORT 2013-06-04 to 06 140000 72HRS.xls
DanRyan OD\Raw OD Matrix - Hourly (Tue-Thu)\OD_REPORT 2013-06-04 to 06 150000 72HRS.xls
DanRyan OD\Raw OD Matrix - Hourly (Tue-Thu)\OD_REPORT 2013-06-04 to 06 160000 72HRS.xls
DanRyan OD\Raw OD Matrix - Hourly (Tue-Thu)\OD_REPORT 2013-06-04 to 06 170000 72HRS.xls
DanRyan OD\Raw OD Matrix - Hourly (Tue-Thu)\OD_REPORT 2013-06-04 to 06 180000 72HRS.xls
DanRyan OD\Raw OD Matrix - Hourly (Tue-Thu)\OD_REPORT 2013-06-04 to 06 190000 72HRS.xls
DanRyan OD\Raw OD Matrix - Hourly (Tue-Thu)\OD_REPORT 2013-06-04 to 06 200000 72HRS.xls
DanRyan OD\Raw OD Matrix - Hourly (Tue-Thu)\OD_REPORT 2013-06-04 to 06 210000 72HRS.xls
DanRyan OD\Raw OD Matrix - Hourly (Tue-Thu)\OD_REPORT 2013-06-04 to 06 220000 72HRS.xls
DanRyan OD\Raw OD Matrix - Hourly (Tue-Thu)\OD_REPORT 2013-06-04 to 06 230000 72HRS.xls
I-55 OD\OD Matrices - Hourly (Tue-Thu)\ALL OD_REPORT 2013-06-04 to 06 000000 1HRS.xls
I-55 OD\OD Matrices - Hourly (Tue-Thu)\ALL OD_REPORT 2013-06-04 to 06 010000 1HRS.xls
I-55 OD\OD Matrices - Hourly (Tue-Thu)\ALL OD_REPORT 2013-06-04 to 06 020000 1HRS.xls
I-55 OD\OD Matrices - Hourly (Tue-Thu)\ALL OD_REPORT 2013-06-04 to 06 030000 1HRS.xls
I-55 OD\OD Matrices - Hourly (Tue-Thu)\ALL OD_REPORT 2013-06-04 to 06 040000 1HRS.xls
I-55 OD\OD Matrices - Hourly (Tue-Thu)\ALL OD_REPORT 2013-06-04 to 06 050000 1HRS.xls
I-55 OD\OD Matrices - Hourly (Tue-Thu)\ALL OD_REPORT 2013-06-04 to 06 060000 1HRS.xls
I-55 OD\OD Matrices - Hourly (Tue-Thu)\ALL OD_REPORT 2013-06-04 to 06 070000 1HRS.xls
I-55 OD\OD Matrices - Hourly (Tue-Thu)\ALL OD_REPORT 2013-06-04 to 06 080000 1HRS.xls
I-55 OD\OD Matrices - Hourly (Tue-Thu)\ALL OD_REPORT 2013-06-04 to 06 090000 1HRS.xls
I-55 OD\OD Matrices - Hourly (Tue-Thu)\ALL OD_REPORT 2013-06-04 to 06 100000 1HRS.xls
I-55 OD\OD Matrices - Hourly (Tue-Thu)\ALL OD_REPORT 2013-06-04 to 06 110000 1HRS.xls
I-55 OD\OD Matrices - Hourly (Tue-Thu)\ALL OD_REPORT 2013-06-04 to 06 120000 1HRS.xls
I-55 OD\OD Matrices - Hourly (Tue-Thu)\ALL OD_REPORT 2013-06-04 to 06 130000 1HRS.xls
I-55 OD\OD Matrices - Hourly (Tue-Thu)\ALL OD_REPORT 2013-06-04 to 06 140000 1HRS.xls
I-55 OD\OD Matrices - Hourly (Tue-Thu)\ALL OD_REPORT 2013-06-04 to 06 150000 1HRS.xls
I-55 OD\OD Matrices - Hourly (Tue-Thu)\ALL OD_REPORT 2013-06-04 to 06 160000 1HRS.xls
I-55 OD\OD Matrices - Hourly (Tue-Thu)\ALL OD_REPORT 2013-06-04 to 06 170000 1HRS.xls
I-55 OD\OD Matrices - Hourly (Tue-Thu)\ALL OD_REPORT 2013-06-04 to 06 180000 1HRS.xls
I-55 OD\OD Matrices - Hourly (Tue-Thu)\ALL OD_REPORT 2013-06-04 to 06 190000 1HRS.xls

I-55 OD\OD Matrices - Hourly (Tue-Thu)\ALL OD_REPORT 2013-06-04 to 06 200000 1HRS.xls
I-55 OD\OD Matrices - Hourly (Tue-Thu)\ALL OD_REPORT 2013-06-04 to 06 210000 1HRS.xls
I-55 OD\OD Matrices - Hourly (Tue-Thu)\ALL OD_REPORT 2013-06-04 to 06 220000 1HRS.xls
I-55 OD\OD Matrices - Hourly (Tue-Thu)\ALL OD_REPORT 2013-06-04 to 06 230000 1HRS.xls
I-55 OD\Raw OD Matrix - Hourly (Tue-Thu)\OD_REPORT 2013-06-04 to 06 000000 1HRS.xls
I-55 OD\Raw OD Matrix - Hourly (Tue-Thu)\OD_REPORT 2013-06-04 to 06 010000 1HRS.xls
I-55 OD\Raw OD Matrix - Hourly (Tue-Thu)\OD_REPORT 2013-06-04 to 06 020000 1HRS.xls
I-55 OD\Raw OD Matrix - Hourly (Tue-Thu)\OD_REPORT 2013-06-04 to 06 030000 1HRS.xls
I-55 OD\Raw OD Matrix - Hourly (Tue-Thu)\OD_REPORT 2013-06-04 to 06 040000 1HRS.xls
I-55 OD\Raw OD Matrix - Hourly (Tue-Thu)\OD_REPORT 2013-06-04 to 06 050000 1HRS.xls
I-55 OD\Raw OD Matrix - Hourly (Tue-Thu)\OD_REPORT 2013-06-04 to 06 060000 1HRS.xls
I-55 OD\Raw OD Matrix - Hourly (Tue-Thu)\OD_REPORT 2013-06-04 to 06 070000 1HRS.xls
I-55 OD\Raw OD Matrix - Hourly (Tue-Thu)\OD_REPORT 2013-06-04 to 06 080000 1HRS.xls
I-55 OD\Raw OD Matrix - Hourly (Tue-Thu)\OD_REPORT 2013-06-04 to 06 090000 1HRS.xls
I-55 OD\Raw OD Matrix - Hourly (Tue-Thu)\OD_REPORT 2013-06-04 to 06 100000 1HRS.xls
I-55 OD\Raw OD Matrix - Hourly (Tue-Thu)\OD_REPORT 2013-06-04 to 06 110000 1HRS.xls
I-55 OD\Raw OD Matrix - Hourly (Tue-Thu)\OD_REPORT 2013-06-04 to 06 120000 1HRS.xls
I-55 OD\Raw OD Matrix - Hourly (Tue-Thu)\OD_REPORT 2013-06-04 to 06 130000 1HRS.xls
I-55 OD\Raw OD Matrix - Hourly (Tue-Thu)\OD_REPORT 2013-06-04 to 06 140000 1HRS.xls
I-55 OD\Raw OD Matrix - Hourly (Tue-Thu)\OD_REPORT 2013-06-04 to 06 150000 1HRS.xls
I-55 OD\Raw OD Matrix - Hourly (Tue-Thu)\OD_REPORT 2013-06-04 to 06 160000 1HRS.xls
I-55 OD\Raw OD Matrix - Hourly (Tue-Thu)\OD_REPORT 2013-06-04 to 06 170000 1HRS.xls
I-55 OD\Raw OD Matrix - Hourly (Tue-Thu)\OD_REPORT 2013-06-04 to 06 180000 1HRS.xls
I-55 OD\Raw OD Matrix - Hourly (Tue-Thu)\OD_REPORT 2013-06-04 to 06 190000 1HRS.xls
I-55 OD\Raw OD Matrix - Hourly (Tue-Thu)\OD_REPORT 2013-06-04 to 06 200000 1HRS.xls
I-55 OD\Raw OD Matrix - Hourly (Tue-Thu)\OD_REPORT 2013-06-04 to 06 210000 1HRS.xls
I-55 OD\Raw OD Matrix - Hourly (Tue-Thu)\OD_REPORT 2013-06-04 to 06 220000 1HRS.xls
I-55 OD\Raw OD Matrix - Hourly (Tue-Thu)\OD_REPORT 2013-06-04 to 06 230000 1HRS.xls

c. OD Matrices - Friday (on an hourly basis)

96 files
DanRyan OD\OD Matrices - Hourly (Fri)\ALL OD_REPORT 2013-06-07 000000 1HRS.xls
DanRyan OD\OD Matrices - Hourly (Fri)\ALL OD_REPORT 2013-06-07 010000 1HRS.xls
DanRyan OD\OD Matrices - Hourly (Fri)\ALL OD_REPORT 2013-06-07 020000 1HRS.xls
DanRyan OD\OD Matrices - Hourly (Fri)\ALL OD_REPORT 2013-06-07 030000 1HRS.xls
DanRyan OD\OD Matrices - Hourly (Fri)\ALL OD_REPORT 2013-06-07 040000 1HRS.xls
DanRyan OD\OD Matrices - Hourly (Fri)\ALL OD_REPORT 2013-06-07 050000 1HRS.xls
DanRyan OD\OD Matrices - Hourly (Fri)\ALL OD_REPORT 2013-06-07 060000 1HRS.xls
DanRyan OD\OD Matrices - Hourly (Fri)\ALL OD_REPORT 2013-06-07 070000 1HRS.xls
DanRyan OD\OD Matrices - Hourly (Fri)\ALL OD_REPORT 2013-06-07 080000 1HRS.xls
DanRyan OD\OD Matrices - Hourly (Fri)\ALL OD_REPORT 2013-06-07 090000 1HRS.xls

DanRyan OD\OD Matrices - Hourly (Fri)\ALL OD_REPORT 2013-06-07 100000 1HRS.xls
DanRyan OD\OD Matrices - Hourly (Fri)\ALL OD_REPORT 2013-06-07 110000 1HRS.xls
DanRyan OD\OD Matrices - Hourly (Fri)\ALL OD_REPORT 2013-06-07 120000 1HRS.xls
DanRyan OD\OD Matrices - Hourly (Fri)\ALL OD_REPORT 2013-06-07 130000 1HRS.xls
DanRyan OD\OD Matrices - Hourly (Fri)\ALL OD_REPORT 2013-06-07 140000 1HRS.xls
DanRyan OD\OD Matrices - Hourly (Fri)\ALL OD_REPORT 2013-06-07 150000 1HRS.xls
DanRyan OD\OD Matrices - Hourly (Fri)\ALL OD_REPORT 2013-06-07 160000 1HRS.xls
DanRyan OD\OD Matrices - Hourly (Fri)\ALL OD_REPORT 2013-06-07 170000 1HRS.xls
DanRyan OD\OD Matrices - Hourly (Fri)\ALL OD_REPORT 2013-06-07 180000 1HRS.xls
DanRyan OD\OD Matrices - Hourly (Fri)\ALL OD_REPORT 2013-06-07 190000 1HRS.xls
DanRyan OD\OD Matrices - Hourly (Fri)\ALL OD_REPORT 2013-06-07 200000 1HRS.xls
DanRyan OD\OD Matrices - Hourly (Fri)\ALL OD_REPORT 2013-06-07 210000 1HRS.xls
DanRyan OD\OD Matrices - Hourly (Fri)\ALL OD_REPORT 2013-06-07 220000 1HRS.xls
DanRyan OD\OD Matrices - Hourly (Fri)\ALL OD_REPORT 2013-06-07 230000 1HRS.xls
DanRyan OD\Raw OD Matrix - Hourly (Fri)\OD_REPORT 2013-06-07 000000 1HRS.xls
DanRyan OD\Raw OD Matrix - Hourly (Fri)\OD_REPORT 2013-06-07 010000 1HRS.xls
DanRyan OD\Raw OD Matrix - Hourly (Fri)\OD_REPORT 2013-06-07 020000 1HRS.xls
DanRyan OD\Raw OD Matrix - Hourly (Fri)\OD_REPORT 2013-06-07 030000 1HRS.xls
DanRyan OD\Raw OD Matrix - Hourly (Fri)\OD_REPORT 2013-06-07 040000 1HRS.xls
DanRyan OD\Raw OD Matrix - Hourly (Fri)\OD_REPORT 2013-06-07 050000 1HRS.xls
DanRyan OD\Raw OD Matrix - Hourly (Fri)\OD_REPORT 2013-06-07 060000 1HRS.xls
DanRyan OD\Raw OD Matrix - Hourly (Fri)\OD_REPORT 2013-06-07 070000 1HRS.xls
DanRyan OD\Raw OD Matrix - Hourly (Fri)\OD_REPORT 2013-06-07 080000 1HRS.xls
DanRyan OD\Raw OD Matrix - Hourly (Fri)\OD_REPORT 2013-06-07 090000 1HRS.xls
DanRyan OD\Raw OD Matrix - Hourly (Fri)\OD_REPORT 2013-06-07 100000 1HRS.xls
DanRyan OD\Raw OD Matrix - Hourly (Fri)\OD_REPORT 2013-06-07 110000 1HRS.xls
DanRyan OD\Raw OD Matrix - Hourly (Fri)\OD_REPORT 2013-06-07 120000 1HRS.xls
DanRyan OD\Raw OD Matrix - Hourly (Fri)\OD_REPORT 2013-06-07 130000 1HRS.xls
DanRyan OD\Raw OD Matrix - Hourly (Fri)\OD_REPORT 2013-06-07 140000 1HRS.xls
DanRyan OD\Raw OD Matrix - Hourly (Fri)\OD_REPORT 2013-06-07 150000 1HRS.xls
DanRyan OD\Raw OD Matrix - Hourly (Fri)\OD_REPORT 2013-06-07 160000 1HRS.xls
DanRyan OD\Raw OD Matrix - Hourly (Fri)\OD_REPORT 2013-06-07 170000 1HRS.xls
DanRyan OD\Raw OD Matrix - Hourly (Fri)\OD_REPORT 2013-06-07 180000 1HRS.xls
DanRyan OD\Raw OD Matrix - Hourly (Fri)\OD_REPORT 2013-06-07 190000 1HRS.xls
DanRyan OD\Raw OD Matrix - Hourly (Fri)\OD_REPORT 2013-06-07 200000 1HRS.xls
DanRyan OD\Raw OD Matrix - Hourly (Fri)\OD_REPORT 2013-06-07 210000 1HRS.xls
DanRyan OD\Raw OD Matrix - Hourly (Fri)\OD_REPORT 2013-06-07 220000 1HRS.xls
DanRyan OD\Raw OD Matrix - Hourly (Fri)\OD_REPORT 2013-06-07 230000 1HRS.xls
I-55 OD\OD Matrices - Hourly (Fri)\ALL OD_REPORT 2013-06-07 000000 1HRS.xls
I-55 OD\OD Matrices - Hourly (Fri)\ALL OD_REPORT 2013-06-07 010000 1HRS.xls
I-55 OD\OD Matrices - Hourly (Fri)\ALL OD_REPORT 2013-06-07 020000 1HRS.xls

I-55 OD\OD Matrices - Hourly (Fri)\ALL OD_REPORT 2013-06-07 030000 1HRS.xls
I-55 OD\OD Matrices - Hourly (Fri)\ALL OD_REPORT 2013-06-07 040000 1HRS.xls
I-55 OD\OD Matrices - Hourly (Fri)\ALL OD_REPORT 2013-06-07 050000 1HRS.xls
I-55 OD\OD Matrices - Hourly (Fri)\ALL OD_REPORT 2013-06-07 060000 1HRS.xls
I-55 OD\OD Matrices - Hourly (Fri)\ALL OD_REPORT 2013-06-07 070000 1HRS.xls
I-55 OD\OD Matrices - Hourly (Fri)\ALL OD_REPORT 2013-06-07 080000 1HRS.xls
I-55 OD\OD Matrices - Hourly (Fri)\ALL OD_REPORT 2013-06-07 090000 1HRS.xls
I-55 OD\OD Matrices - Hourly (Fri)\ALL OD_REPORT 2013-06-07 100000 1HRS.xls
I-55 OD\OD Matrices - Hourly (Fri)\ALL OD_REPORT 2013-06-07 110000 1HRS.xls
I-55 OD\OD Matrices - Hourly (Fri)\ALL OD_REPORT 2013-06-07 120000 1HRS.xls
I-55 OD\OD Matrices - Hourly (Fri)\ALL OD_REPORT 2013-06-07 130000 1HRS.xls
I-55 OD\OD Matrices - Hourly (Fri)\ALL OD_REPORT 2013-06-07 140000 1HRS.xls
I-55 OD\OD Matrices - Hourly (Fri)\ALL OD_REPORT 2013-06-07 150000 1HRS.xls
I-55 OD\OD Matrices - Hourly (Fri)\ALL OD_REPORT 2013-06-07 160000 1HRS.xls
I-55 OD\OD Matrices - Hourly (Fri)\ALL OD_REPORT 2013-06-07 170000 1HRS.xls
I-55 OD\OD Matrices - Hourly (Fri)\ALL OD_REPORT 2013-06-07 180000 1HRS.xls
I-55 OD\OD Matrices - Hourly (Fri)\ALL OD_REPORT 2013-06-07 190000 1HRS.xls
I-55 OD\OD Matrices - Hourly (Fri)\ALL OD_REPORT 2013-06-07 200000 1HRS.xls
I-55 OD\OD Matrices - Hourly (Fri)\ALL OD_REPORT 2013-06-07 210000 1HRS.xls
I-55 OD\OD Matrices - Hourly (Fri)\ALL OD_REPORT 2013-06-07 220000 1HRS.xls
I-55 OD\OD Matrices - Hourly (Fri)\ALL OD_REPORT 2013-06-07 230000 1HRS.xls
I-55 OD\Raw OD Matrix - Hourly (Fri)\OD_REPORT 2013-06-07 000000 1HRS.xls
I-55 OD\Raw OD Matrix - Hourly (Fri)\OD_REPORT 2013-06-07 010000 1HRS.xls
I-55 OD\Raw OD Matrix - Hourly (Fri)\OD_REPORT 2013-06-07 020000 1HRS.xls
I-55 OD\Raw OD Matrix - Hourly (Fri)\OD_REPORT 2013-06-07 030000 1HRS.xls
I-55 OD\Raw OD Matrix - Hourly (Fri)\OD_REPORT 2013-06-07 040000 1HRS.xls
I-55 OD\Raw OD Matrix - Hourly (Fri)\OD_REPORT 2013-06-07 050000 1HRS.xls
I-55 OD\Raw OD Matrix - Hourly (Fri)\OD_REPORT 2013-06-07 060000 1HRS.xls
I-55 OD\Raw OD Matrix - Hourly (Fri)\OD_REPORT 2013-06-07 070000 1HRS.xls
I-55 OD\Raw OD Matrix - Hourly (Fri)\OD_REPORT 2013-06-07 080000 1HRS.xls
I-55 OD\Raw OD Matrix - Hourly (Fri)\OD_REPORT 2013-06-07 090000 1HRS.xls
I-55 OD\Raw OD Matrix - Hourly (Fri)\OD_REPORT 2013-06-07 100000 1HRS.xls
I-55 OD\Raw OD Matrix - Hourly (Fri)\OD_REPORT 2013-06-07 110000 1HRS.xls
I-55 OD\Raw OD Matrix - Hourly (Fri)\OD_REPORT 2013-06-07 120000 1HRS.xls
I-55 OD\Raw OD Matrix - Hourly (Fri)\OD_REPORT 2013-06-07 130000 1HRS.xls
I-55 OD\Raw OD Matrix - Hourly (Fri)\OD_REPORT 2013-06-07 140000 1HRS.xls
I-55 OD\Raw OD Matrix - Hourly (Fri)\OD_REPORT 2013-06-07 150000 1HRS.xls
I-55 OD\Raw OD Matrix - Hourly (Fri)\OD_REPORT 2013-06-07 160000 1HRS.xls
I-55 OD\Raw OD Matrix - Hourly (Fri)\OD_REPORT 2013-06-07 170000 1HRS.xls
I-55 OD\Raw OD Matrix - Hourly (Fri)\OD_REPORT 2013-06-07 180000 1HRS.xls
I-55 OD\Raw OD Matrix - Hourly (Fri)\OD_REPORT 2013-06-07 190000 1HRS.xls

I-55 OD\Raw OD Matrix - Hourly (Fri)\OD_REPORT 2013-06-07 200000 1HRS.xls
I-55 OD\Raw OD Matrix - Hourly (Fri)\OD_REPORT 2013-06-07 210000 1HRS.xls
I-55 OD\Raw OD Matrix - Hourly (Fri)\OD_REPORT 2013-06-07 220000 1HRS.xls
I-55 OD\Raw OD Matrix - Hourly (Fri)\OD_REPORT 2013-06-07 230000 1HRS.xls

d. OD Matrices - Saturday (on an hourly basis)

96 files
DanRyan OD\OD Matrices - Hourly (Sat)\ALL OD_REPORT 2013-06-08 000000 1HRS.xls
DanRyan OD\OD Matrices - Hourly (Sat)\ALL OD_REPORT 2013-06-08 010000 1HRS.xls
DanRyan OD\OD Matrices - Hourly (Sat)\ALL OD_REPORT 2013-06-08 020000 1HRS.xls
DanRyan OD\OD Matrices - Hourly (Sat)\ALL OD_REPORT 2013-06-08 030000 1HRS.xls
DanRyan OD\OD Matrices - Hourly (Sat)\ALL OD_REPORT 2013-06-08 040000 1HRS.xls
DanRyan OD\OD Matrices - Hourly (Sat)\ALL OD_REPORT 2013-06-08 050000 1HRS.xls
DanRyan OD\OD Matrices - Hourly (Sat)\ALL OD_REPORT 2013-06-08 060000 1HRS.xls
DanRyan OD\OD Matrices - Hourly (Sat)\ALL OD_REPORT 2013-06-08 070000 1HRS.xls
DanRyan OD\OD Matrices - Hourly (Sat)\ALL OD_REPORT 2013-06-08 080000 1HRS.xls
DanRyan OD\OD Matrices - Hourly (Sat)\ALL OD_REPORT 2013-06-08 090000 1HRS.xls
DanRyan OD\OD Matrices - Hourly (Sat)\ALL OD_REPORT 2013-06-08 100000 1HRS.xls
DanRyan OD\OD Matrices - Hourly (Sat)\ALL OD_REPORT 2013-06-08 110000 1HRS.xls
DanRyan OD\OD Matrices - Hourly (Sat)\ALL OD_REPORT 2013-06-08 120000 1HRS.xls
DanRyan OD\OD Matrices - Hourly (Sat)\ALL OD_REPORT 2013-06-08 130000 1HRS.xls
DanRyan OD\OD Matrices - Hourly (Sat)\ALL OD_REPORT 2013-06-08 140000 1HRS.xls
DanRyan OD\OD Matrices - Hourly (Sat)\ALL OD_REPORT 2013-06-08 150000 1HRS.xls
DanRyan OD\OD Matrices - Hourly (Sat)\ALL OD_REPORT 2013-06-08 160000 1HRS.xls
DanRyan OD\OD Matrices - Hourly (Sat)\ALL OD_REPORT 2013-06-08 170000 1HRS.xls
DanRyan OD\OD Matrices - Hourly (Sat)\ALL OD_REPORT 2013-06-08 180000 1HRS.xls
DanRyan OD\OD Matrices - Hourly (Sat)\ALL OD_REPORT 2013-06-08 190000 1HRS.xls
DanRyan OD\OD Matrices - Hourly (Sat)\ALL OD_REPORT 2013-06-08 200000 1HRS.xls
DanRyan OD\OD Matrices - Hourly (Sat)\ALL OD_REPORT 2013-06-08 210000 1HRS.xls
DanRyan OD\OD Matrices - Hourly (Sat)\ALL OD_REPORT 2013-06-08 220000 1HRS.xls
DanRyan OD\OD Matrices - Hourly (Sat)\ALL OD_REPORT 2013-06-08 230000 1HRS.xls
DanRyan OD\Raw OD Matrix - Hourly (Sat)\OD_REPORT 2013-06-08 000000 1HRS.xls
DanRyan OD\Raw OD Matrix - Hourly (Sat)\OD_REPORT 2013-06-08 010000 1HRS.xls
DanRyan OD\Raw OD Matrix - Hourly (Sat)\OD_REPORT 2013-06-08 020000 1HRS.xls
DanRyan OD\Raw OD Matrix - Hourly (Sat)\OD_REPORT 2013-06-08 030000 1HRS.xls
DanRyan OD\Raw OD Matrix - Hourly (Sat)\OD_REPORT 2013-06-08 040000 1HRS.xls
DanRyan OD\Raw OD Matrix - Hourly (Sat)\OD_REPORT 2013-06-08 050000 1HRS.xls
DanRyan OD\Raw OD Matrix - Hourly (Sat)\OD_REPORT 2013-06-08 060000 1HRS.xls
DanRyan OD\Raw OD Matrix - Hourly (Sat)\OD_REPORT 2013-06-08 070000 1HRS.xls
DanRyan OD\Raw OD Matrix - Hourly (Sat)\OD_REPORT 2013-06-08 080000 1HRS.xls
DanRyan OD\Raw OD Matrix - Hourly (Sat)\OD_REPORT 2013-06-08 090000 1HRS.xls

DanRyan OD\Raw OD Matrix - Hourly (Sat)\OD_REPORT 2013-06-08 100000 1HRS.xls
DanRyan OD\Raw OD Matrix - Hourly (Sat)\OD_REPORT 2013-06-08 110000 1HRS.xls
DanRyan OD\Raw OD Matrix - Hourly (Sat)\OD_REPORT 2013-06-08 120000 1HRS.xls
DanRyan OD\Raw OD Matrix - Hourly (Sat)\OD_REPORT 2013-06-08 130000 1HRS.xls
DanRyan OD\Raw OD Matrix - Hourly (Sat)\OD_REPORT 2013-06-08 140000 1HRS.xls
DanRyan OD\Raw OD Matrix - Hourly (Sat)\OD_REPORT 2013-06-08 150000 1HRS.xls
DanRyan OD\Raw OD Matrix - Hourly (Sat)\OD_REPORT 2013-06-08 160000 1HRS.xls
DanRyan OD\Raw OD Matrix - Hourly (Sat)\OD_REPORT 2013-06-08 170000 1HRS.xls
DanRyan OD\Raw OD Matrix - Hourly (Sat)\OD_REPORT 2013-06-08 180000 1HRS.xls
DanRyan OD\Raw OD Matrix - Hourly (Sat)\OD_REPORT 2013-06-08 190000 1HRS.xls
DanRyan OD\Raw OD Matrix - Hourly (Sat)\OD_REPORT 2013-06-08 200000 1HRS.xls
DanRyan OD\Raw OD Matrix - Hourly (Sat)\OD_REPORT 2013-06-08 210000 1HRS.xls
DanRyan OD\Raw OD Matrix - Hourly (Sat)\OD_REPORT 2013-06-08 220000 1HRS.xls
DanRyan OD\Raw OD Matrix - Hourly (Sat)\OD_REPORT 2013-06-08 230000 1HRS.xls
I-55 OD\OD Matrices - Hourly (Sat)\ALL OD_REPORT 2013-06-08 000000 1HRS.xls
I-55 OD\OD Matrices - Hourly (Sat)\ALL OD_REPORT 2013-06-08 010000 1HRS.xls
I-55 OD\OD Matrices - Hourly (Sat)\ALL OD_REPORT 2013-06-08 020000 1HRS.xls
I-55 OD\OD Matrices - Hourly (Sat)\ALL OD_REPORT 2013-06-08 030000 1HRS.xls
I-55 OD\OD Matrices - Hourly (Sat)\ALL OD_REPORT 2013-06-08 040000 1HRS.xls
I-55 OD\OD Matrices - Hourly (Sat)\ALL OD_REPORT 2013-06-08 050000 1HRS.xls
I-55 OD\OD Matrices - Hourly (Sat)\ALL OD_REPORT 2013-06-08 060000 1HRS.xls
I-55 OD\OD Matrices - Hourly (Sat)\ALL OD_REPORT 2013-06-08 070000 1HRS.xls
I-55 OD\OD Matrices - Hourly (Sat)\ALL OD_REPORT 2013-06-08 080000 1HRS.xls
I-55 OD\OD Matrices - Hourly (Sat)\ALL OD_REPORT 2013-06-08 090000 1HRS.xls
I-55 OD\OD Matrices - Hourly (Sat)\ALL OD_REPORT 2013-06-08 100000 1HRS.xls
I-55 OD\OD Matrices - Hourly (Sat)\ALL OD_REPORT 2013-06-08 110000 1HRS.xls
I-55 OD\OD Matrices - Hourly (Sat)\ALL OD_REPORT 2013-06-08 120000 1HRS.xls
I-55 OD\OD Matrices - Hourly (Sat)\ALL OD_REPORT 2013-06-08 130000 1HRS.xls
I-55 OD\OD Matrices - Hourly (Sat)\ALL OD_REPORT 2013-06-08 140000 1HRS.xls
I-55 OD\OD Matrices - Hourly (Sat)\ALL OD_REPORT 2013-06-08 150000 1HRS.xls
I-55 OD\OD Matrices - Hourly (Sat)\ALL OD_REPORT 2013-06-08 160000 1HRS.xls
I-55 OD\OD Matrices - Hourly (Sat)\ALL OD_REPORT 2013-06-08 170000 1HRS.xls
I-55 OD\OD Matrices - Hourly (Sat)\ALL OD_REPORT 2013-06-08 180000 1HRS.xls
I-55 OD\OD Matrices - Hourly (Sat)\ALL OD_REPORT 2013-06-08 190000 1HRS.xls
I-55 OD\OD Matrices - Hourly (Sat)\ALL OD_REPORT 2013-06-08 200000 1HRS.xls
I-55 OD\OD Matrices - Hourly (Sat)\ALL OD_REPORT 2013-06-08 210000 1HRS.xls
I-55 OD\OD Matrices - Hourly (Sat)\ALL OD_REPORT 2013-06-08 220000 1HRS.xls
I-55 OD\OD Matrices - Hourly (Sat)\ALL OD_REPORT 2013-06-08 230000 1HRS.xls
I-55 OD\Raw OD Matrix - Hourly (Sat)\OD_REPORT 2013-06-08 000000 1HRS.xls
I-55 OD\Raw OD Matrix - Hourly (Sat)\OD_REPORT 2013-06-08 010000 1HRS.xls
I-55 OD\Raw OD Matrix - Hourly (Sat)\OD_REPORT 2013-06-08 020000 1HRS.xls

I-55 OD\Raw OD Matrix - Hourly (Sat)\OD_REPORT 2013-06-08 030000 1HRS.xls
I-55 OD\Raw OD Matrix - Hourly (Sat)\OD_REPORT 2013-06-08 040000 1HRS.xls
I-55 OD\Raw OD Matrix - Hourly (Sat)\OD_REPORT 2013-06-08 050000 1HRS.xls
I-55 OD\Raw OD Matrix - Hourly (Sat)\OD_REPORT 2013-06-08 060000 1HRS.xls
I-55 OD\Raw OD Matrix - Hourly (Sat)\OD_REPORT 2013-06-08 070000 1HRS.xls
I-55 OD\Raw OD Matrix - Hourly (Sat)\OD_REPORT 2013-06-08 080000 1HRS.xls
I-55 OD\Raw OD Matrix - Hourly (Sat)\OD_REPORT 2013-06-08 090000 1HRS.xls
I-55 OD\Raw OD Matrix - Hourly (Sat)\OD_REPORT 2013-06-08 100000 1HRS.xls
I-55 OD\Raw OD Matrix - Hourly (Sat)\OD_REPORT 2013-06-08 110000 1HRS.xls
I-55 OD\Raw OD Matrix - Hourly (Sat)\OD_REPORT 2013-06-08 120000 1HRS.xls
I-55 OD\Raw OD Matrix - Hourly (Sat)\OD_REPORT 2013-06-08 130000 1HRS.xls
I-55 OD\Raw OD Matrix - Hourly (Sat)\OD_REPORT 2013-06-08 140000 1HRS.xls
I-55 OD\Raw OD Matrix - Hourly (Sat)\OD_REPORT 2013-06-08 150000 1HRS.xls
I-55 OD\Raw OD Matrix - Hourly (Sat)\OD_REPORT 2013-06-08 160000 1HRS.xls
I-55 OD\Raw OD Matrix - Hourly (Sat)\OD_REPORT 2013-06-08 170000 1HRS.xls
I-55 OD\Raw OD Matrix - Hourly (Sat)\OD_REPORT 2013-06-08 180000 1HRS.xls
I-55 OD\Raw OD Matrix - Hourly (Sat)\OD_REPORT 2013-06-08 190000 1HRS.xls
I-55 OD\Raw OD Matrix - Hourly (Sat)\OD_REPORT 2013-06-08 200000 1HRS.xls
I-55 OD\Raw OD Matrix - Hourly (Sat)\OD_REPORT 2013-06-08 210000 1HRS.xls
I-55 OD\Raw OD Matrix - Hourly (Sat)\OD_REPORT 2013-06-08 220000 1HRS.xls
I-55 OD\Raw OD Matrix - Hourly (Sat)\OD_REPORT 2013-06-08 230000 1HRS.xls

e. OD Matrices - Sunday (on an hourly basis)

96 files
DanRyan OD\OD Matrices - Hourly (Sun)\ALL OD_REPORT 2013-06-02 000000 1HRS.xls
DanRyan OD\OD Matrices - Hourly (Sun)\ALL OD_REPORT 2013-06-02 010000 1HRS.xls
DanRyan OD\OD Matrices - Hourly (Sun)\ALL OD_REPORT 2013-06-02 020000 1HRS.xls
DanRyan OD\OD Matrices - Hourly (Sun)\ALL OD_REPORT 2013-06-02 030000 1HRS.xls
DanRyan OD\OD Matrices - Hourly (Sun)\ALL OD_REPORT 2013-06-02 040000 1HRS.xls
DanRyan OD\OD Matrices - Hourly (Sun)\ALL OD_REPORT 2013-06-02 050000 1HRS.xls
DanRyan OD\OD Matrices - Hourly (Sun)\ALL OD_REPORT 2013-06-02 060000 1HRS.xls
DanRyan OD\OD Matrices - Hourly (Sun)\ALL OD_REPORT 2013-06-02 070000 1HRS.xls
DanRyan OD\OD Matrices - Hourly (Sun)\ALL OD_REPORT 2013-06-02 080000 1HRS.xls
DanRyan OD\OD Matrices - Hourly (Sun)\ALL OD_REPORT 2013-06-02 090000 1HRS.xls
DanRyan OD\OD Matrices - Hourly (Sun)\ALL OD_REPORT 2013-06-02 100000 1HRS.xls
DanRyan OD\OD Matrices - Hourly (Sun)\ALL OD_REPORT 2013-06-02 110000 1HRS.xls
DanRyan OD\OD Matrices - Hourly (Sun)\ALL OD_REPORT 2013-06-02 120000 1HRS.xls
DanRyan OD\OD Matrices - Hourly (Sun)\ALL OD_REPORT 2013-06-02 130000 1HRS.xls
DanRyan OD\OD Matrices - Hourly (Sun)\ALL OD_REPORT 2013-06-02 140000 1HRS.xls
DanRyan OD\OD Matrices - Hourly (Sun)\ALL OD_REPORT 2013-06-02 150000 1HRS.xls
DanRyan OD\OD Matrices - Hourly (Sun)\ALL OD_REPORT 2013-06-02 160000 1HRS.xls

DanRyan OD\OD Matrices - Hourly (Sun)\ALL OD_REPORT 2013-06-02 170000 1HRS.xls
DanRyan OD\OD Matrices - Hourly (Sun)\ALL OD_REPORT 2013-06-02 180000 1HRS.xls
DanRyan OD\OD Matrices - Hourly (Sun)\ALL OD_REPORT 2013-06-02 190000 1HRS.xls
DanRyan OD\OD Matrices - Hourly (Sun)\ALL OD_REPORT 2013-06-02 200000 1HRS.xls
DanRyan OD\OD Matrices - Hourly (Sun)\ALL OD_REPORT 2013-06-02 210000 1HRS.xls
DanRyan OD\OD Matrices - Hourly (Sun)\ALL OD_REPORT 2013-06-02 220000 1HRS.xls
DanRyan OD\OD Matrices - Hourly (Sun)\ALL OD_REPORT 2013-06-02 230000 1HRS.xls
DanRyan OD\Raw OD Matrix - Hourly (Sun)\OD_REPORT 2013-06-02 000000 1HRS.xls
DanRyan OD\Raw OD Matrix - Hourly (Sun)\OD_REPORT 2013-06-02 010000 1HRS.xls
DanRyan OD\Raw OD Matrix - Hourly (Sun)\OD_REPORT 2013-06-02 020000 1HRS.xls
DanRyan OD\Raw OD Matrix - Hourly (Sun)\OD_REPORT 2013-06-02 030000 1HRS.xls
DanRyan OD\Raw OD Matrix - Hourly (Sun)\OD_REPORT 2013-06-02 040000 1HRS.xls
DanRyan OD\Raw OD Matrix - Hourly (Sun)\OD_REPORT 2013-06-02 050000 1HRS.xls
DanRyan OD\Raw OD Matrix - Hourly (Sun)\OD_REPORT 2013-06-02 060000 1HRS.xls
DanRyan OD\Raw OD Matrix - Hourly (Sun)\OD_REPORT 2013-06-02 070000 1HRS.xls
DanRyan OD\Raw OD Matrix - Hourly (Sun)\OD_REPORT 2013-06-02 080000 1HRS.xls
DanRyan OD\Raw OD Matrix - Hourly (Sun)\OD_REPORT 2013-06-02 090000 1HRS.xls
DanRyan OD\Raw OD Matrix - Hourly (Sun)\OD_REPORT 2013-06-02 100000 1HRS.xls
DanRyan OD\Raw OD Matrix - Hourly (Sun)\OD_REPORT 2013-06-02 110000 1HRS.xls
DanRyan OD\Raw OD Matrix - Hourly (Sun)\OD_REPORT 2013-06-02 120000 1HRS.xls
DanRyan OD\Raw OD Matrix - Hourly (Sun)\OD_REPORT 2013-06-02 130000 1HRS.xls
DanRyan OD\Raw OD Matrix - Hourly (Sun)\OD_REPORT 2013-06-02 140000 1HRS.xls
DanRyan OD\Raw OD Matrix - Hourly (Sun)\OD_REPORT 2013-06-02 150000 1HRS.xls
DanRyan OD\Raw OD Matrix - Hourly (Sun)\OD_REPORT 2013-06-02 160000 1HRS.xls
DanRyan OD\Raw OD Matrix - Hourly (Sun)\OD_REPORT 2013-06-02 170000 1HRS.xls
DanRyan OD\Raw OD Matrix - Hourly (Sun)\OD_REPORT 2013-06-02 180000 1HRS.xls
DanRyan OD\Raw OD Matrix - Hourly (Sun)\OD_REPORT 2013-06-02 190000 1HRS.xls
DanRyan OD\Raw OD Matrix - Hourly (Sun)\OD_REPORT 2013-06-02 200000 1HRS.xls
DanRyan OD\Raw OD Matrix - Hourly (Sun)\OD_REPORT 2013-06-02 210000 1HRS.xls
DanRyan OD\Raw OD Matrix - Hourly (Sun)\OD_REPORT 2013-06-02 220000 1HRS.xls
DanRyan OD\Raw OD Matrix - Hourly (Sun)\OD_REPORT 2013-06-02 230000 1HRS.xls
I-55 OD\OD Matrices - Hourly (Sun)\ALL OD_REPORT 2013-06-02 000000 1HRS.xls
I-55 OD\OD Matrices - Hourly (Sun)\ALL OD_REPORT 2013-06-02 010000 1HRS.xls
I-55 OD\OD Matrices - Hourly (Sun)\ALL OD_REPORT 2013-06-02 020000 1HRS.xls
I-55 OD\OD Matrices - Hourly (Sun)\ALL OD_REPORT 2013-06-02 030000 1HRS.xls
I-55 OD\OD Matrices - Hourly (Sun)\ALL OD_REPORT 2013-06-02 040000 1HRS.xls
I-55 OD\OD Matrices - Hourly (Sun)\ALL OD_REPORT 2013-06-02 050000 1HRS.xls
I-55 OD\OD Matrices - Hourly (Sun)\ALL OD_REPORT 2013-06-02 060000 1HRS.xls
I-55 OD\OD Matrices - Hourly (Sun)\ALL OD_REPORT 2013-06-02 070000 1HRS.xls
I-55 OD\OD Matrices - Hourly (Sun)\ALL OD_REPORT 2013-06-02 080000 1HRS.xls
I-55 OD\OD Matrices - Hourly (Sun)\ALL OD_REPORT 2013-06-02 090000 1HRS.xls

I-55 OD\OD Matrices - Hourly (Sun)\ALL OD_REPORT 2013-06-02 100000 1HRS.xls
I-55 OD\OD Matrices - Hourly (Sun)\ALL OD_REPORT 2013-06-02 110000 1HRS.xls
I-55 OD\OD Matrices - Hourly (Sun)\ALL OD_REPORT 2013-06-02 120000 1HRS.xls
I-55 OD\OD Matrices - Hourly (Sun)\ALL OD_REPORT 2013-06-02 130000 1HRS.xls
I-55 OD\OD Matrices - Hourly (Sun)\ALL OD_REPORT 2013-06-02 140000 1HRS.xls
I-55 OD\OD Matrices - Hourly (Sun)\ALL OD_REPORT 2013-06-02 150000 1HRS.xls
I-55 OD\OD Matrices - Hourly (Sun)\ALL OD_REPORT 2013-06-02 160000 1HRS.xls
I-55 OD\OD Matrices - Hourly (Sun)\ALL OD_REPORT 2013-06-02 170000 1HRS.xls
I-55 OD\OD Matrices - Hourly (Sun)\ALL OD_REPORT 2013-06-02 180000 1HRS.xls
I-55 OD\OD Matrices - Hourly (Sun)\ALL OD_REPORT 2013-06-02 190000 1HRS.xls
I-55 OD\OD Matrices - Hourly (Sun)\ALL OD_REPORT 2013-06-02 200000 1HRS.xls
I-55 OD\OD Matrices - Hourly (Sun)\ALL OD_REPORT 2013-06-02 210000 1HRS.xls
I-55 OD\OD Matrices - Hourly (Sun)\ALL OD_REPORT 2013-06-02 220000 1HRS.xls
I-55 OD\OD Matrices - Hourly (Sun)\ALL OD_REPORT 2013-06-02 230000 1HRS.xls
I-55 OD\Raw OD Matrix - Hourly (Sun)\OD_REPORT 2013-06-02 000000 1HRS.xls
I-55 OD\Raw OD Matrix - Hourly (Sun)\OD_REPORT 2013-06-02 010000 1HRS.xls
I-55 OD\Raw OD Matrix - Hourly (Sun)\OD_REPORT 2013-06-02 020000 1HRS.xls
I-55 OD\Raw OD Matrix - Hourly (Sun)\OD_REPORT 2013-06-02 030000 1HRS.xls
I-55 OD\Raw OD Matrix - Hourly (Sun)\OD_REPORT 2013-06-02 040000 1HRS.xls
I-55 OD\Raw OD Matrix - Hourly (Sun)\OD_REPORT 2013-06-02 050000 1HRS.xls
I-55 OD\Raw OD Matrix - Hourly (Sun)\OD_REPORT 2013-06-02 060000 1HRS.xls
I-55 OD\Raw OD Matrix - Hourly (Sun)\OD_REPORT 2013-06-02 070000 1HRS.xls
I-55 OD\Raw OD Matrix - Hourly (Sun)\OD_REPORT 2013-06-02 080000 1HRS.xls
I-55 OD\Raw OD Matrix - Hourly (Sun)\OD_REPORT 2013-06-02 090000 1HRS.xls
I-55 OD\Raw OD Matrix - Hourly (Sun)\OD_REPORT 2013-06-02 100000 1HRS.xls
I-55 OD\Raw OD Matrix - Hourly (Sun)\OD_REPORT 2013-06-02 110000 1HRS.xls
I-55 OD\Raw OD Matrix - Hourly (Sun)\OD_REPORT 2013-06-02 120000 1HRS.xls
I-55 OD\Raw OD Matrix - Hourly (Sun)\OD_REPORT 2013-06-02 130000 1HRS.xls
I-55 OD\Raw OD Matrix - Hourly (Sun)\OD_REPORT 2013-06-02 140000 1HRS.xls
I-55 OD\Raw OD Matrix - Hourly (Sun)\OD_REPORT 2013-06-02 150000 1HRS.xls
I-55 OD\Raw OD Matrix - Hourly (Sun)\OD_REPORT 2013-06-02 160000 1HRS.xls
I-55 OD\Raw OD Matrix - Hourly (Sun)\OD_REPORT 2013-06-02 170000 1HRS.xls
I-55 OD\Raw OD Matrix - Hourly (Sun)\OD_REPORT 2013-06-02 180000 1HRS.xls
I-55 OD\Raw OD Matrix - Hourly (Sun)\OD_REPORT 2013-06-02 190000 1HRS.xls
I-55 OD\Raw OD Matrix - Hourly (Sun)\OD_REPORT 2013-06-02 200000 1HRS.xls
I-55 OD\Raw OD Matrix - Hourly (Sun)\OD_REPORT 2013-06-02 210000 1HRS.xls
I-55 OD\Raw OD Matrix - Hourly (Sun)\OD_REPORT 2013-06-02 220000 1HRS.xls
I-55 OD\Raw OD Matrix - Hourly (Sun)\OD_REPORT 2013-06-02 230000 1HRS.xls

f. Trip Length Distributions - Based on specified dates and times.

Raw OD Matrices Tue-Thu\ALL_OD_REPORT 2013-06-02 000000 168HRS.xls

Raw OD Matrices Tue-Thu\OD_REPORT 2013-06-04 000000 72HRS.xls
Raw OD Matrices Tue-Thu\OD_REPORT 2013-06-04 050000 72HRS.xls
Raw OD Matrices Tue-Thu\OD_REPORT 2013-06-04 070000 72HRS.xls
Raw OD Matrices Tue-Thu\OD_REPORT 2013-06-04 090000 72HRS.xls
Raw OD Matrices Tue-Thu\OD_REPORT 2013-06-04 140000 72HRS.xls
Raw OD Matrices Tue-Thu\OD_REPORT 2013-06-04 160000 72HRS.xls
Raw OD Matrices Tue-Thu\OD_REPORT 2013-06-04 180000 72HRS.xls
Raw OD Matrices Tue-Thu\OD_REPORT 2013-06-04 200000 72HRS.xls
Trip Length Distribution Spreadsheets\ALL_TLD_REPORT 2013-06-02 000000 168HRS.xlsx
Trip Length Distribution Spreadsheets\TLD_REPORT 2013-06-02 200000-050000 168HRS.xlsx
Trip Length Distribution Spreadsheets\TLD_REPORT 2013-06-04 000000 72HRS.xlsx
Trip Length Distribution Spreadsheets\TLD_REPORT 2013-06-04 050000 72HRS.xlsx
Trip Length Distribution Spreadsheets\TLD_REPORT 2013-06-04 070000 72HRS.xlsx
Trip Length Distribution Spreadsheets\TLD_REPORT 2013-06-04 090000 72HRS.xlsx
Trip Length Distribution Spreadsheets\TLD_REPORT 2013-06-04 140000 72HRS.xlsx
Trip Length Distribution Spreadsheets\TLD_REPORT 2013-06-04 160000 72HRS.xlsx
Trip Length Distribution Spreadsheets\TLD_REPORT 2013-06-04 180000 72HRS.xlsx
Trip Length Distribution Spreadsheets\TLD_REPORT 2013-06-04 200000 72HRS.xlsx

g. Hourly Speeds on I-55 - hourly average speeds for the study period (a week).

I-55 Hourly Speeds\Average Speed (mph).xlsx

****

Appendix

****

Appendix A - Full details of Station 31 Estimation

The sensor at I-55 and South Central Avenue did not provide any data and therefore needed to have values imputed. This requires more complex analysis than described in the "Raw OD Matrix - Step 1" section due to various difficulties that needed to be overcome for this particular location. Figure 5 below shows the locations of the sensors and how the vehicles can travel from one sensor to another.

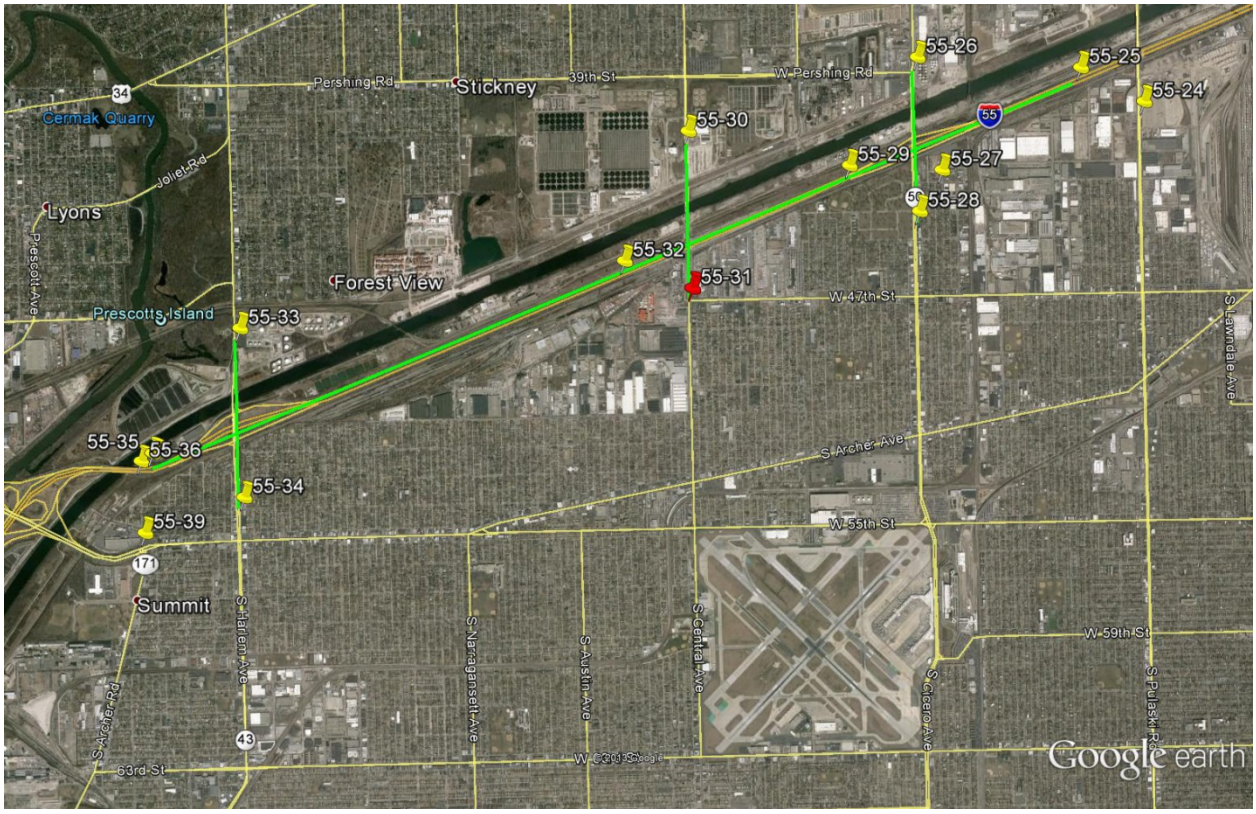


Figure 5 - Mapping of Missing Sensor and the Surrounding Sensors

The map above is simplified to the abstract mapping shown below in Figure 6 to accommodate three simplifying changes:

1. The sensors will be referred to by letters A through K.
2. The sensors 55-27 and 55-28 from the map are combined for the analysis.
3. The sensors 55-24 and 55-39 are visible above but are not needed.

Using the simplifications stated above we can being to analyze this closed system.

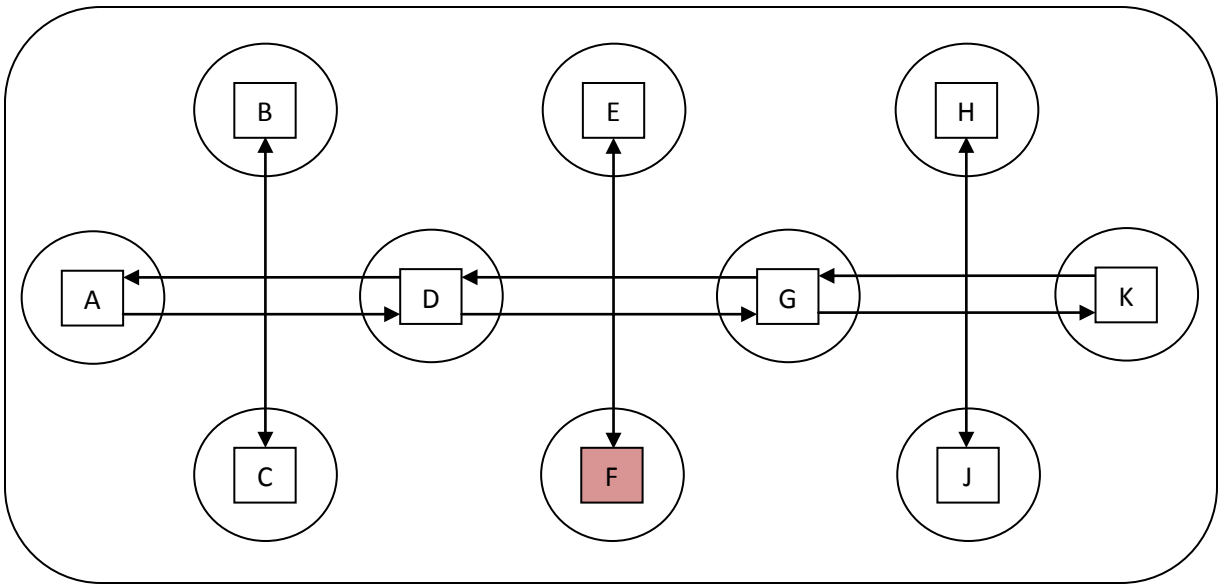


Figure 6 - Bluetooth Missing Sensor (F) Correction Mapping from Sensor (K)

There are three complications that make this particular intersection more complex:

4. The intersection of sensors (D), (E), (F) and (G) had all the western ramps closed during the study period. Thus traversals (E) to (D), (D) to (E), (F) to (D) and (D) to (F) are not possible.
5. The sensors (F) and (J) are both monitoring exits to Midway airport from I-55. Thus the two roadways interact, providing both entrance and exit to the heavy commercial area south of I-55 as well as the airport.
6. The mainline traffic on I-55 is much larger than the exiting and entering traffic. Thus small errors on the mainline (such as 5%) may create larger errors when calculating the values for the exits.

The difficulties are overcome by using the closed properties of a network (all traffic into a network is equal to all traffic out of the network), and accounting for probability of detection. The result is a process to estimate the OD matrix based on the trips matrix from three adjoining sensors, E, H, and J in this synthesis.

The first step uses the system of sensors above to determine the flow of vehicles through the intersection involving the sensors (D), (E), (F) and (G) (I-55 and South Central Avenue). When determining the vehicles that get off of I-55 at sensor (F) we must take into account the logic inherent to the road layout and the nature of Bluetooth traffic technology. The movements to (F) are categorized below:

1. Movements from sensors (A), (B), (C) and (D) towards sensor (F) are not possible due to construction on the western ramps at South Central Avenue.
2. Traversals cannot originate from sensors (D) and (G) and end at (F), as there is no way to enter the system without passing by another sensor. (sensors D and G are internal to the network – traffic must originate at one of the sensors on the periphery, termed an external sensor)
3. Movement from sensor (E) to (F) cannot be determined. The direction of movement of vehicles detected at sensor (E) can't be determined unless it passes by another sensor. Since there are no other sensors between (E) and (F), it impossible to determine the direction a vehicle is traveling.

4. Movement from sensors (H), (J) and (K) towards (F) are possible with the available roadways. The vehicles also pass by an intermediary sensor (G), which allows us to determine the direction of the vehicle and ascertain that it was flowing into the system of sensors and not out.

Using the logic above, trips from (H), (J) and (K) towards (F) are assessed. We will look at the movement (K) to (F) more in depth.

Using another tool that tracks the path of each vehicle through the system we were able to come up with a list of paths and a count for the number of vehicles that followed each. Looking at each path, we can determine which paths most likely resulted in a vehicle turning and exiting the system at sensor (F). This process is run for each of the sensors (H), (J) and (K), of which the sensor (K) will be used as an example.

The trips made to and from sensor (K) were analyzed. A mapping of the movement from sensor (K) to all other stations is illustrated below in figure 7.

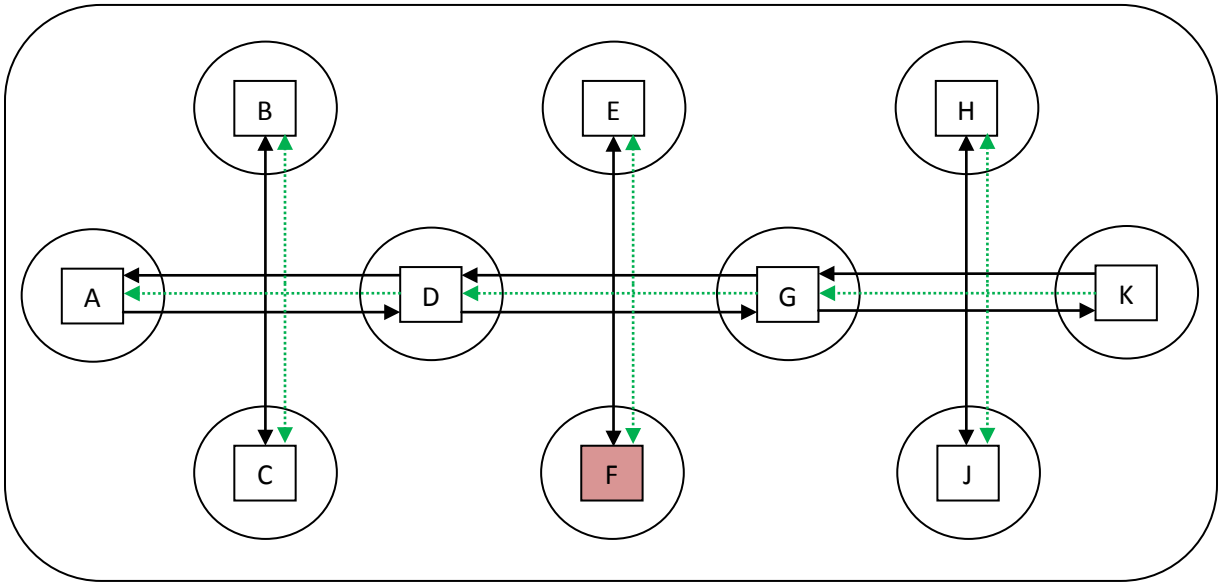


Figure 7 - Bluetooth Missing Sensor Correction Mapping from Sensor (K)

It is possible to find a path from (K) to any of the sensors except (F). We know that the vehicles that pass by (K) and (G) need to pass by one of three sensor locations (E), (D) or (F). If a vehicle is not detected at (E) or (D) then the vehicle must have exited by passing sensor (F). The results of the mapping to and from sensor (K) is shown in Table 1 for the sensors (A), (B), (C), (E) and (F).

Table 5 - O-D trips through K (taken from "Factoring for station 31 v1 2013 Jul 14.docx")

	K	
Sensor	Origin	Destination
A	24349	24837
B	905	892
C	3406	3478
E	804	960
F	2427	2865

H	2804	2856
J	3604	5162

The analysis was repeated for the trips chains from sensors (H) and (J) where the values are inputted into a matrix below.

Table 6 – Base O-D Table for E,F,H,J and K (taken from "Factoring for station 31 v1 2013 Jul 14.docx")

	E	F	H	J	K
E		-	3	26	960
F	-		192	127	2865
H	6	252		5620	2856
J	21	109	6150		5162
K	804	2427	2804	3604	

The values for trips to sensor (F) are then adjusted to account for the 90% probability of detection at the sensor. The resultant matrix is seen below.

Table 3 – Adjusted O/D table (taken from "Factoring for station 31 v1 2013 Jul 14.docx")

	E	F	H	J	K	Total
E		-	3	26	960	989
F	-		**164**	**93**	**2616**	**2873**
H	6	**219**		5620	2856	8701
J	21	**80**	6150		5162	11413
K	804	**2184**	2804	3604		9396
Total	831	**2483**	9121	9343	11594	

The interaction between sensors (E), (H) and (J) from/to sensor (K) can be used to determine the distribution of values from sensors to the east of (K) to the four sensors (E), (F), (H) and (J). If we compare the values from the row for sensor (K) we can develop a ratio of (F) compared with (E), (H) and (J).

1. $K\ to\ E\ =\ K\ to\ F\ \times\ Ratio\ KF$ ==> $804\ =\ 2184\ \times\ RKF$ ==> $RKF\ =\ 0.37$
2. $K\ to\ H\ =\ K\ to\ F\ \times\ Ratio\ KH$ ==> $2804\ =\ 2184\ \times\ RKH$ ==> $RKH\ =\ 1.28$
3. $K\ to\ J\ =\ K\ to\ F\ \times\ Ratio\ KJ$ ==> $3604\ =\ 2184\ \times\ RKJ$ ==> $RKJ\ =\ 1.65$

If we repeat the process for the reverse direction, starting from (K), we get table 6 below. Eastbound refers to trips from (K) and Westbound refers to trips to (K).

Table 6 – Ratio of trip volumes at E, H, and J to Origins/Destination to the east (taken from "Factoring for station 31 v1 2013 Jul 14.docx")

	E	H	J
Eastbound	0.37	1.09	1.97
Westbound	0.37	1.28	1.65
Average	0.37	1.19	1.81

The ratios above can be combined into a simple equation which we will use to determine the values for sensors to the east. The equation to be used is shown below.

$$(X\ to\ F) = \frac{\frac{(X\ to\ E)}{0.37} + \frac{(X\ to\ H)}{1.19} + \frac{(X\ to\ J)}{1.18}}{3}$$

Using this equation and the values for sensors (H) and (J) to/from (F) we will have corrected for the missing unit.

Further information can be found in the document "Factoring for station 31 v1 2013 Jul 14.docx" in the Appendix A project folder.

Appendix B - Full details of Bias Correction

The spreadsheets that correspond with Appendix B are in the Appendix B project folder.

Appendix C - Full details of BTM Sampling Estimation from Vehicle Counts

The spreadsheets that correspond with Appendix C are in the Appendix C project folder.

Interstate 55; I-355 to I-90/94
Managed Lane Project
PTB 158-002
P-91-762-10

Logical Termini Determination
October 24, 2012

FHWA concurrence is being requested to assure that the I-55 Managed lane project from I-355 to I-90/94 is compliant with Logical Termini criteria. The I-55 Managed Lanes Study Area is attached.

The Phase I study for the I-55 Managed Lane project is in follow-up to multiple previous studies by IDOT and the Chicago Metropolitan Agency for Planning (CMAP) concerning potential special use lanes within the median along I-55 from Veterans Memorial Tollway (I-355) to the Dan Ryan Expressway (I-90/94), a distance of approximately 25 miles, to address the frequently severe congestion along I-55 by reducing overall passenger delay and improving travel time reliability. These previous studies have generally considered potential improvements to I-55 from I-355 on the west/south to I-90/94 on the east/north. Based on this project history and approach, FHWA concurrence is being requested that the I-55 Managed Lane project is compliant with Logical Termini criteria based on the below discussion.

In 1993, IDOT completed a feasibility study that examined the benefits of adding High Occupancy Vehicle (HOV) lanes to I-55 predominantly east of the Tri-state Tollway (I-294), but also examined the viability of extending the HOV concept to the Veterans Memorial Tollway The feasibility study concluded that HOV lanes were a viable option for project corridor travel time savings within both the HOV lanes and the general purpose lanes, and improving overall person through-put by encouraging and supporting a reduction in single occupant vehicle (SOV) trips. The feasibility study also concluded that HOV improvement within the I-55 corridor would also provide regional benefits with respect to overall travel time savings. IDOT completed the reconstruction of I-55, east of LaGrange Road, in 1999/2000. Although this reconstruction included accommodations for potential future HOV lanes, such as wider medians and bridge decks, the HOV lanes were not implemented with the reconstruction project.

In 2009, the Chicago Metropolitan Agency for Planning (CMAP) issued a report entitled "A Road Less Traveled" which explored the potential for congestion pricing (fixed and variable rate) as a new, innovative, and sustainable approach to alleviating traffic congestion for all tollways and IDOT expressways within the seven-county Chicago region. This report was followed by an additional report released by CMAP in October 2012 entitled "Congestion Pricing – An Analysis of the GO TO 2040 Major Capital Projects". This report explored the effects of congestion pricing on the new highway facilities recommended in the Go To 2040 plan, including an additional express lane in each direction on I-55 from I-355 to I-90/94. This report demonstrates a travel time savings and improved reliability of travel time along I-55 based on year 2016 traffic modeling.

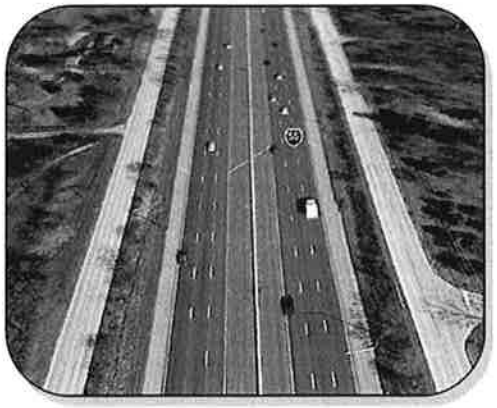


Figure 1 – I-55 east of I-355 to west of Harlem Avenue

Figure 2 – I-55; east of Harlem Avenue to I-90/94

There has been consistency with respect to the I-355 and I-90/94 termini of these previous studies. This is based both on the need to reduce overall passenger delay and improve travel time reliability within the outer circumferential loop (I-355) but also based on available existing median area throughout the project limits. As shown in Figure 1, I-55 from east of I-355 to west of IL 43 (Harlem Avenue) generally includes a 40 foot wide closed median, with the only exception near I-294 where the median narrows, but then widens again to the east. As shown in Figure 2, I-55 east of Harlem Avenue generally includes a 60 foot wide open median to I-90/94.

A special use lane can generally be accommodated within these median areas from east of I-355 to west of I-90/94 without requiring reconstruction or widening of I-55. However, this is not the case to the west/south of I-355 or to the east/north of I-90/94. As shown in Figures 3 and 4, I-55 west of I-355 and east of I-90/94 includes narrow medians of approximately 12 feet in width. Incorporation of special use lanes west of I-355 and east of I-90/94 would require widening and/or reconstruction of I-55 in these areas.

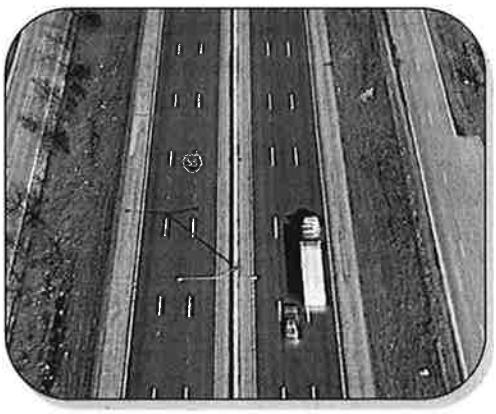


Figure 2 – I-55 west of I-355

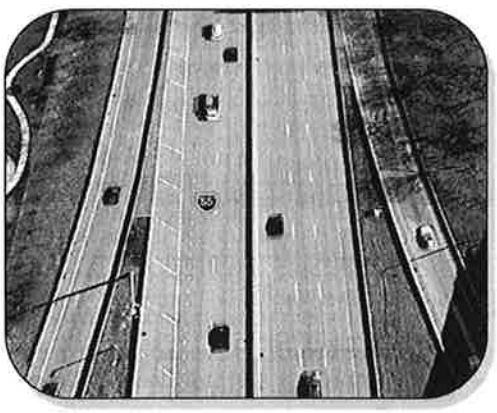


Figure 1 – I-55 east of I-90/94

Notwithstanding these physical limitations that establish practical project termini, the I-355 to I-90/94 project limits comply with the logical termini criteria as stipulated in BDE 22-6.04, and 23 CFR 771.111(f), which requires that each action evaluated as part of an Environmental Assessment (EA)/FONSI shall:

(1) Connect logical termini and be of sufficient length to address environmental matters on a broad scope.

(2) Have independent utility or independent significance, i.e., be usable and be a reasonable expenditure even if no additional transportation improvements in the area are made.

(3) Not restrict consideration of alternatives for other reasonably foreseeable transportation improvements.

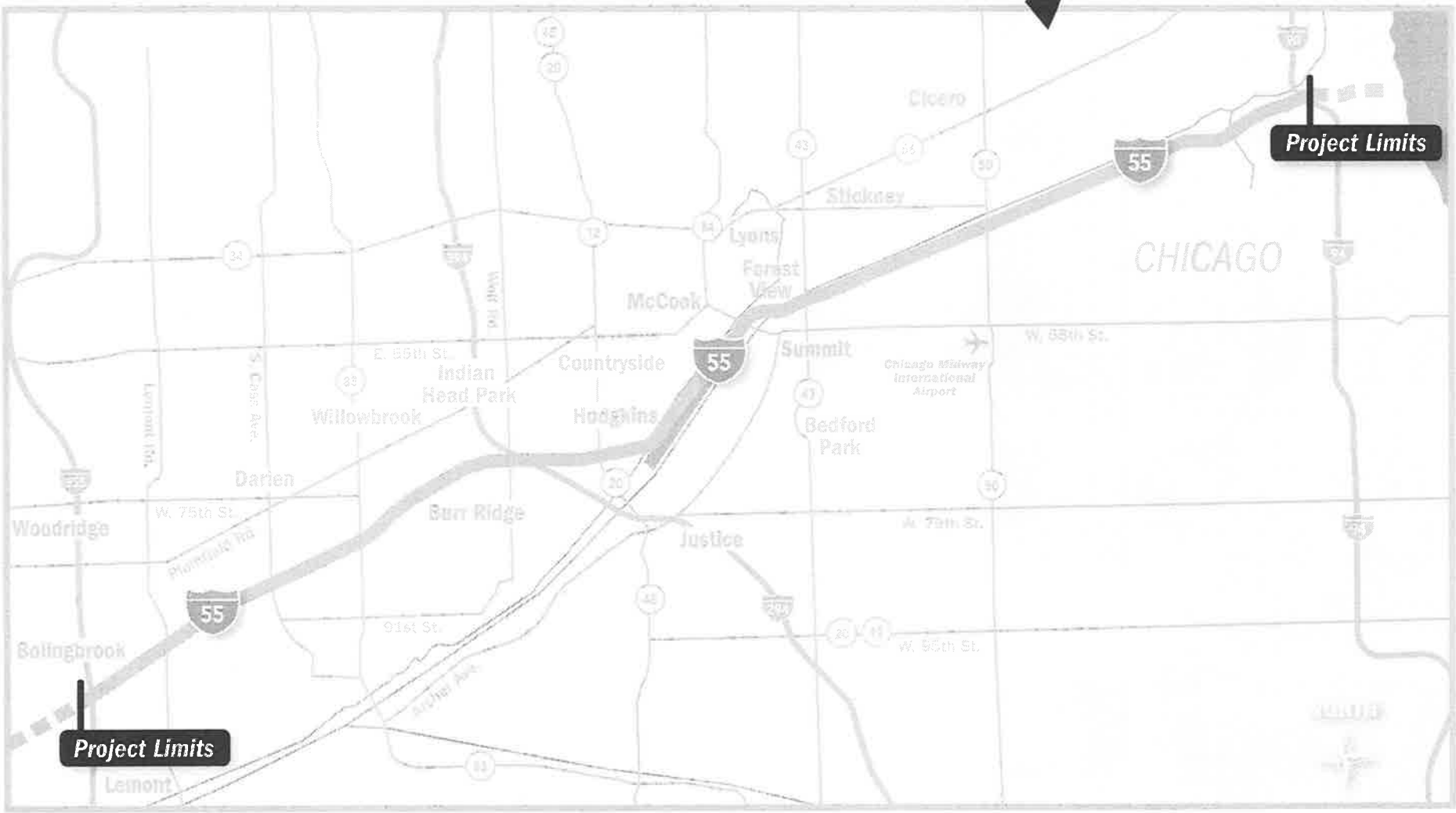
The objective of this criteria is to ensure that contemplated projects are considered as a whole or integrated project that satisfies an identified need, to ensure potential socioeconomic and environmental impacts are evaluated on a broad scale, to ensure the project will function properly without requiring additional improvements elsewhere, and to ensure that the project will not restrict consideration of alternatives for other foreseeable transportation improvements. In this regard, for capacity projects, as opposed to spot safety improvement or interchange improvements, logical termini are commonly points of major traffic generation, including intersecting roadways that have a functional classification at or above the roadway being studied.

On the above basis, both I-355 and I-90/94 are major traffic generators that have a functional classification that is equivalent to I-55. Both I-355 and I-90/94 are interstate highways serving the larger Chicago Metropolitan Area that are logical end points with respect to providing access to and egress from the special use lanes being considered along I-55. An improvement along this 25 mile section of I-55 will have independent utility, most decidedly be useable, and is a reasonable expenditure without requiring, nor will it restrict consideration of, other reasonably foreseeable transportation improvements.

As such, FHWA concurrence is requested that the proposed project limits of I-355 and I-90/94 is compliant with Logical Termini criteria.

I-55 Managed Lane Study Area

I-55 | MANAGED LANE PROJECT



Illinois Department of Transportation