Interchange Modification Justification Report

I-90/La Crosse Street Interchange
Exit 59

Rapid City, South Dakota
April 2014

Prepared for:

South Dakota Department of Transportation
Office of Project Development
700 East Broadway Avenue
Pierre, South Dakota 57501-2586

Prepared by:

HDR Engineering, Inc.
703 Main Street
Suite 200
Rapid City, SD 57701

Preparation of this report has been financed in part through grant(s) from the Federal Highway Administration and Federal Transit Administration, U.S. Department of Transportation, under the State Planning and Research Program, Section 505 [or Metropolitan Planning Program, Section 104(f)] of Title 23, U.S. Code. The contents of this report do not necessarily reflect the official views or policy of the U.S. Department of Transportation.

TABLE OF CONTENTS

FIGURES AND TABLES

EXECUTIVE SUMMARY

The proposed action is a reconfiguration of the existing La Crosse Street (Exit 59) interchange on Interstate 90 (I-90) in Rapid City, South Dakota. The proposed modification is to provide improved operations at the signalized ramp terminal intersections. Under existing traffic conditions, vehicle queue exceeds available storage at the La Crosse Street/I-90 Westbound Ramp northbound left turn lane during the PM peak. This increased congestion has contributed to elevated crash rates, with the La Crosse Street interchange ranking 5th out of 126 interchanges evaluated in the South Dakota Department of Transportation (SDDOT) Decennial Interstate Corridor Study (2010). No adverse impacts to the Interstate highway system are anticipated due to the proposed change.

The Federal policy considerations and requirements have been addressed beginning on page 33 and summary responses to the eight requirements are provided below:

1. The proposed action is a modification of an existing interchange to improve operational deficiencies and meet planned future travel needs of Rapid City.
2. No additional Interstate capacity or additional Interchange access points are required. The need can be met by providing updated interchange configuration and additional crossroad capacity.
3. Several individual turning movements at the ramp terminal intersections are expected to operate at level of service ‘F’ with the interchange no-build option, but with build alternatives will operate at acceptable levels.
4. The proposed action is an update of an existing full public road interchange.
5. The proposed action is the result of the *SDDOT Decennial Interstate Corridor Study (2010)*.
6. A comprehensive Interstate system study has recommended improvements at this interchange.
7. The proposed action is part of the overall planned transportation system.
8. A Categorical Exclusion is being prepared in conjunction with this report.

The analysis indicates that an update of the existing interchange is necessary to address existing operational issues and future travel demand. When considering the ability to accommodate future traffic, the single-point interchange and diverging diamond interchange would provide adequate operations and capacity to accommodate projected 2035 traffic conditions. However, when considering several metrics including the constructability of each alternative and the anticipated impact on adjacent landowners, the diverging diamond interchange is the preferred interchange option.

Alternative improvements such as changes at adjacent interchanges, changes to the local street system, the increased use of transit, HOV/HOT lanes, etc. were deemed to not satisfy the need for an appropriate Interstate connection for La Crosse Street.

Analysis techniques included evaluation of operational capacity using Highway Capacity Manual 2010 techniques via Highway Capacity Software 2010. Highway Safety Manual techniques were used to the extent possible in this report.

INTRODUCTION

Background

The South Dakota Department of Transportation (SDDOT) is conducting a study to evaluate the design, operations, policy and funding implications of modifying the La Crosse Street interchange (Exit 59) on Interstate 90 (I-90) in northeast Rapid City, South Dakota (the Project). SDDOT initiated the Project in order to address safety issues and the current and future transportation needs noted in the *South Dakota Decennial Interstate Corridor Study* (2010). In compliance with the National Environmental Policy Act (NEPA), the Project is being evaluated for potential environmental impacts through the completion of a Categorical Exclusion (CE).

The 2010 Decennial Study determined that the I-90 Exit 59 to be one of the top ten existing interchanges on South Dakota's Interstate System to target for improvement. The Decennial Study considered three options: Bridge Widening (Diamond Interchange), Single Point Urban Interchange (SPUI), and Diverging Diamond Interchange (DDI). The options also considered roadway and bicycle/pedestrian access, traffic operations, and safety along La Crosse Street.

This Interchange Modification Justification Report (IMJR) is being prepared in conjunction with the CE and will provide traffic analysis for the selection of a preferred alternative in the CE.

Purpose

The purpose of the Project is to address the traffic operations and safety concerns at the I-90/La Crosse Street interchange which serves the growing northeast edge of Rapid City, South Dakota. With traffic volumes projected to increase between 35 to 65 percent on La Crosse Street by 2035, several turning movements associated with the I-90/La Crosse Street interchange are expected experience peak period LOS 'F'. Given the projected operational deficiencies, it is appropriate to evaluate the existing interchange configuration and analyze potential modifications that would alleviate future capacity issues.

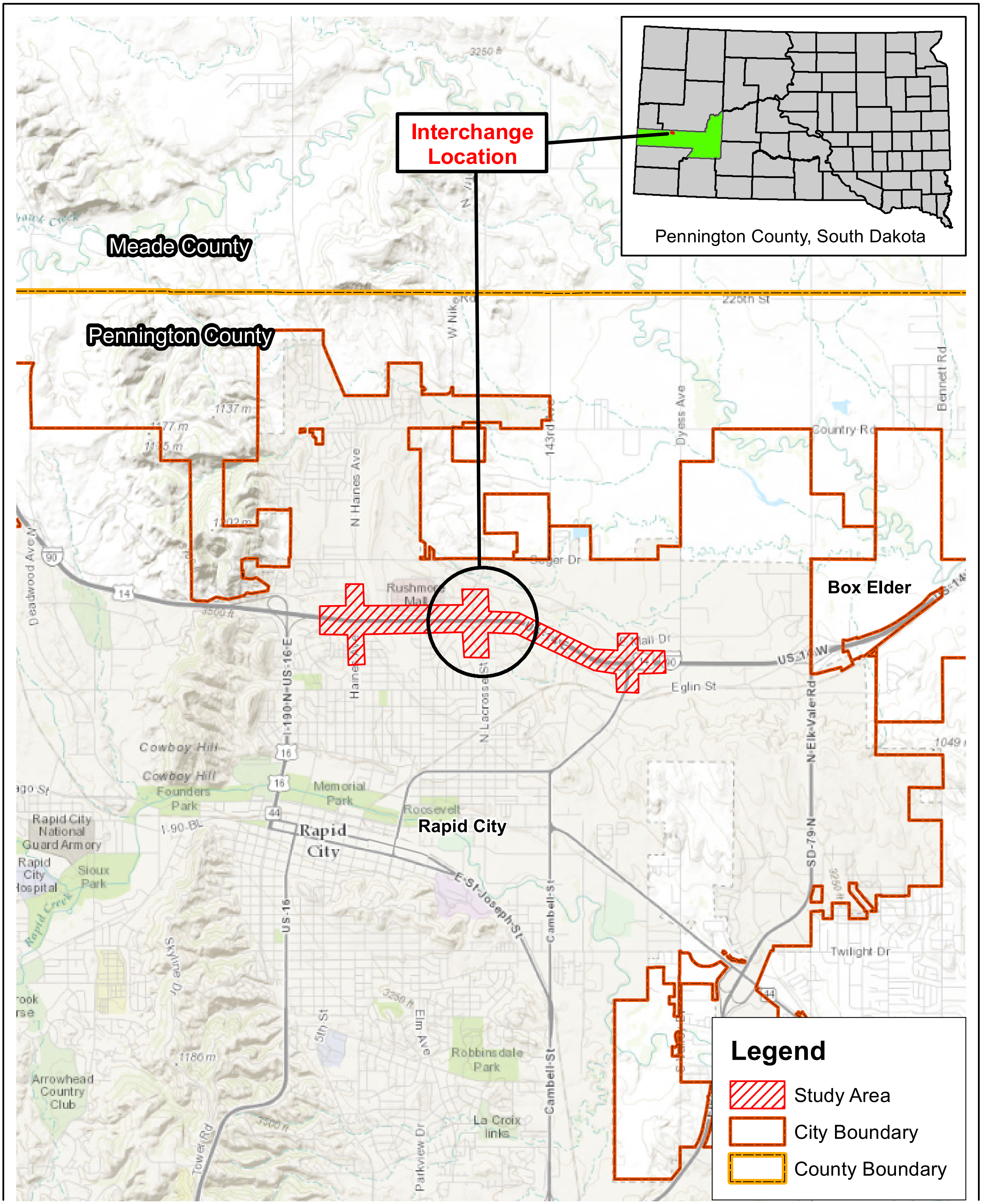
The primary goal of the Project is to develop feasible solutions to address the identified issues and needs. The solutions will follow current design standards and provide acceptable traffic level of service (LOS) and operations under both the current and future traffic conditions. The solutions will continue to promote a livable community that will enhance the economic and social well-being of Rapid City area residents and visitors. The proposed modified interchange would reduce the current delay and operation issues for the traveling public by increasing the capacity and turn lane storage lengths of the interchange.

Project Location

The proposed I-90/La Crosse Street Interchange Project is located in the vicinity of Exit 59 on I-90 at La Crosse Street in Rapid City, South Dakota (see Figure 1 – Project Location). The adjacent interchanges on I-90 are Haines Avenue (Exit 58) to the west and North Street (Exit 60) to the east. The subject interchange and adjacent interchanges are located within the Rapid City Area Metropolitan Planning Organization (Rapid City MPO).

The nearest roadways in the vicinity of the interchange are Disk Drive and Mall Drive to the north and Eglin Street to south. Disk Drive and Mall Drive provide access to the Rushmore Mall and large residential developments in north Rapid City. There are also several business access drives located south of Disk Drive and north of Eglin Street. Four access drives are located between Disk Drive and the interchange, and six access drives are located between Eglin Street and the subject interchange.

Therefore, the Study Area is located in northeastern Rapid City immediately east of the I-190 spur, and includes three I-90 interchanges, Haines Avenue, La Crosse Street, and North Street. The Study Area also includes I-90 in the vicinity of La Crosse Street and La Crosse Street from Eglin Street to Disk Drive (see Figure 2 – Study Area).



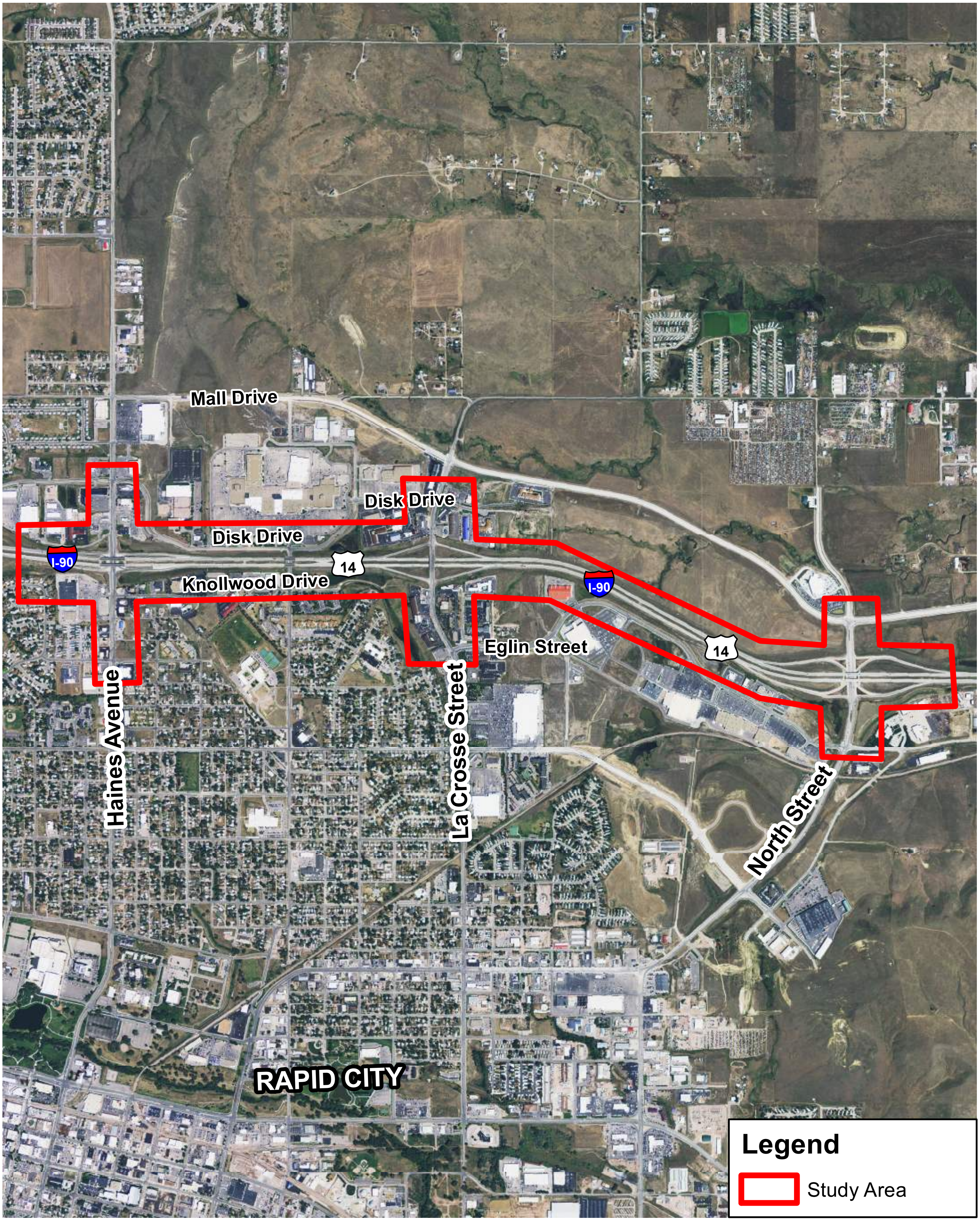
0 0.5 1
Miles

Project Location

I-90 Exit 59 (La Crosse Street) IMJR
Rapid City, South Dakota

DATE
September 2014

FIGURE
1



0 1,000 2,000
Feet

Study Area

I-90 Exit 59 (La Crosse Street) IMJR
Rapid City, South Dakota

DATE
September 2014

FIGURE
2

METHODOLOGY

This IMJR demonstrates that the action associated with implementing the proposed Project does not have adverse impact on the safety or operations of the Interstate System and the connecting local roadway network. Demonstrating that no adverse impact exist, does not endorse the action, but rather allows for the conclusion that the identified interchange alternatives are not flawed from the perspective of traffic operations and safety performance, as required by the Federal Highway Administration (FHWA). Adverse impacts would include a proposed interchange modification that:

- Does not provide full access to public roads,
- Would negatively impact interstate facility traffic operations and cannot be reasonably mitigated,
- Would negatively impact interstate facility/cross street safety and cannot be reasonably mitigated,
- Conflicts with or is inconsistent with local and regional plans, or
- Would create the potential for environmental consequences which could not be mitigated.

The crash analysis is based on crash data provided by SDDOT for calendar years 2008 through 2011. Traffic data and counts were gathered during the summer and fall of 2012. Count data was assembled and balanced to produce a representation of peak hour traffic flows through the Study Area. Peak hour traffic flows for 2035 were developed using output from the Rapid City MPO Travel Demand Model. Traffic analysis was done in accordance with the approved Methods and Assumptions document. Traffic operations were completed using Highway Capacity Software (HCS) 2010.

This IMJR document is organized in accordance with Section 3.5.3 of FHWA's Interstate System Access Information Guide, August 2010.

EXISTING CONDITIONS

Demographics

The Study Area consists of commercial and light industrial land uses, with some high-density and single-family residences located southwest of the I-90/La Crosse Street interchange. Table 1 provides the total population of Rapid City, Pennington County, and the state of South Dakota. Rapid City is the second largest city in South Dakota (Sioux Falls is the largest with a population of 153,888 in 2010) and makes up 67% of Pennington County's population. According to the 2010 Census, 43% of Rapid City's population is under the age of 30, and nearly 20% of the population is over the age of 60. As provided in the 2010 Census data, the majority of Rapid City's residents are white (80.4%). The American Indian population makes up approximately 12.4% of the population and persons identifying themselves of Hispanic or Latino origin comprise about 4% of Rapid City's population.

Table 1. Total Population[1]

Geographic Area	2000 Census	2010 Census	Percent Change
Rapid City	59,607	67,956	+ 14%
Pennington County	88,565	100,948	+ 14%
South Dakota	754,844	814,180	+ 7.9%

[1] Source: 2000 and 2010 Census. American Fact Finder.
http://factfinder2.census.gov/faces/nav/jsf/pages/index.xhtml

According to the U.S. Bureau of Labor Statistics, unemployment in June 2014 for South Dakota was 3.6%, while the Rapid City metropolitan area experienced 3.4% unemployment. The four largest industry sectors in Pennington County are health care, social assistance, retail trade, and accommodation and food service.

Existing Land Use

The Study Area contains a mix of businesses including retail stores, gas stations, hotels, commercial restaurants, and light manufacturing. As detailed in the Rapid City Comprehensive Plan (April, 2014), the future land use for the study area is predominately mixed use commercial (see Figure 3 – Future Land Use).

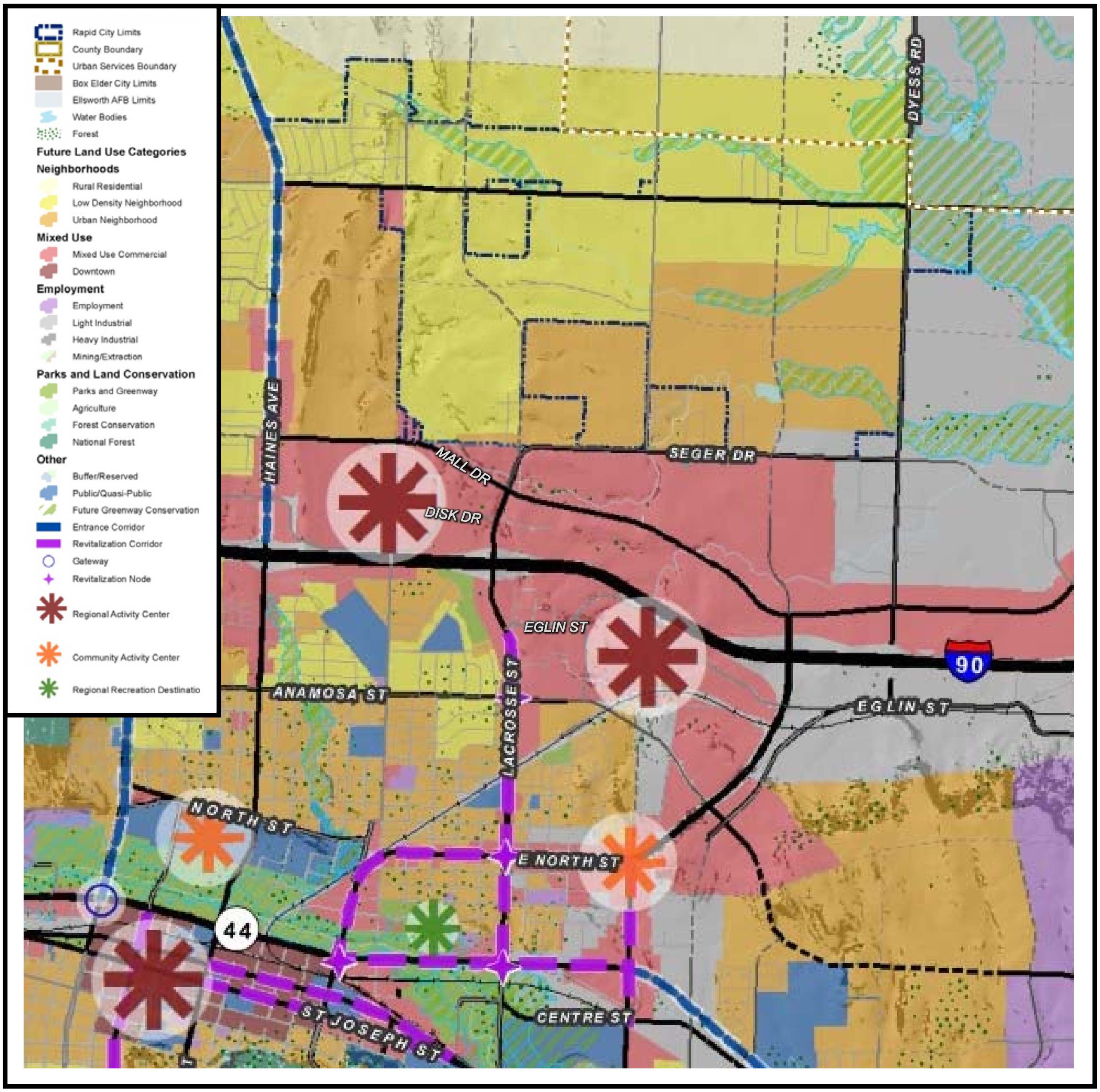


Figure 3 – Study Area Future Land Use (source: *Rapid City Comprehensive Plan – April 2014*)

Existing Roadway Network

The existing roadways within the Study Area include:

- Interstate 90 – currently two through lanes in each direction
- La Crosse Street – currently two through lanes in each direction
- Disk Drive – Urban collector, two through lanes in each direction (west of the La Crosse Street Intersection)
- Eglin Street – Urban collector, varies from 1-2 through lanes in each direction
- North Street – Urban minor arterial, two through lanes in each direction
- Mall Drive – Urban minor arterial, varies from 1-2 through lanes in each direction
- Haines Avenue – Urban minor arterial, two through lanes in each direction

Alternative Travel Modes

Travel within the Study Area is primarily by automobile. Existing bike facilities within the Study Area are provided on Haines Avenue and a bike path is proposed along North Maple Street and Disk Drive, where it would provide access for the residential development northwest of the I-90/Haines Avenue interchange, as documented in the Rapid City Long Range Transportation Plan – *RapidTRIP 2035*. A map of the existing and proposed bicycle facilities from the *RapidTRIP 2035* is in Appendix, Part 7.

Rapid City provides a fixed bus route system that consists of five routes that serve the north, south, west, and central parts of Rapid City. The fixed-routes operate approximately from 6:30 AM to 6:00 PM weekdays and from 9:30 AM to 4:30 PM on Saturdays while no routes operate on Sunday. All routes begin and end at the downtown transportation center. Four routes are provided within the Study Area, including the Washington Route (Haines Avenue, La Crosse Street, and Disk Drive), Jefferson Route (Knollwood Drive), Roosevelt Route (North Maple Street), and the Lincoln Route (Eglin Street). A map of the existing fixed bus routes from the *RapidTRIP 2035* is in Appendix, Part 7.

Interchanges

Modifications to the I-90 Exit 59 (La Crosse Street) interchange would have the potential to affect the intersections of La Crosse Street adjacent to the interstate ramp terminal intersections (La Crosse Street/Disk Drive and La Crosse Street/Eglin Street). Modifications at Exit 59 would also have the potential to affect adjacent interchanges on I-90 at Haines Avenue (Exit 58) and North Street (Exit 60).

The following is a description of the study area interchanges:

- I-90/Haines Avenue (Exit 58) – an adjacent interchange west of the I-90/La Crosse Street interchange. It is a single point urban interchange with I-90 going over Haines Avenue. All the ramps are single lane ramps. The westbound off ramp provides an exclusive left and right turn lane at Haines Avenue and the eastbound off ramp provides dual left turn lanes and an exclusive right turn lane at Haines Avenue.
- I-90/La Crosse Street (Exit 59) – the subject interchange is a standard diamond configuration with traffic signal controlled ramp termini. All ramps are single lane ramps. The westbound off ramp provides dual left turn lanes and an exclusive right turn lane at La Crosse Street. The eastbound off ramp provides an exlcusive left and right turn lane at La Crosse Street.
- I-90/North Street (Exit 60) – an adjacent interchange east of the I-90/La Crosse Street interchange. It is a single point urban interchange with I-90 going over North Street. All ramps are single lane ramps. The westbound and eastbound off ramps provide dual left turn lanes and an exclusive right turn lane at North Street.

Aerial photos of the existing interchanges have been included in Appendix, Part 3.

Existing Data

Most study data was available from the participating agencies, including counts, crash data, and raw travel demand model output. The available data was supplemented with additional counts, travel time runs, and traffic observations. The data is recent and of high quality.

Operational Performance

Operational analyses of free-flow areas along I-90 were completed for basic freeway, ramp merge/diverge and weave areas. All free-flow analyses were conducted for AM and PM peak hour volumes of Existing (Year 2012) and Year 2035 No Build Conditions. Intersection operations were evaluated for all Study Area intersections. Arterial segment analyses were also completed for segments of La Crosse Street between study intersections to identify other modes of transportation that may be affected by added traffic demands and modifications to the interchange geometry. Intersection and segment analyses were conducted for the AM and PM peak 15-minute volumes of Existing (Year 2012) and Year 2035 No-Build Conditions. Existing (Year 2012) volumes, geometrics, and LOS for the Study Area is displayed in Figure 4.

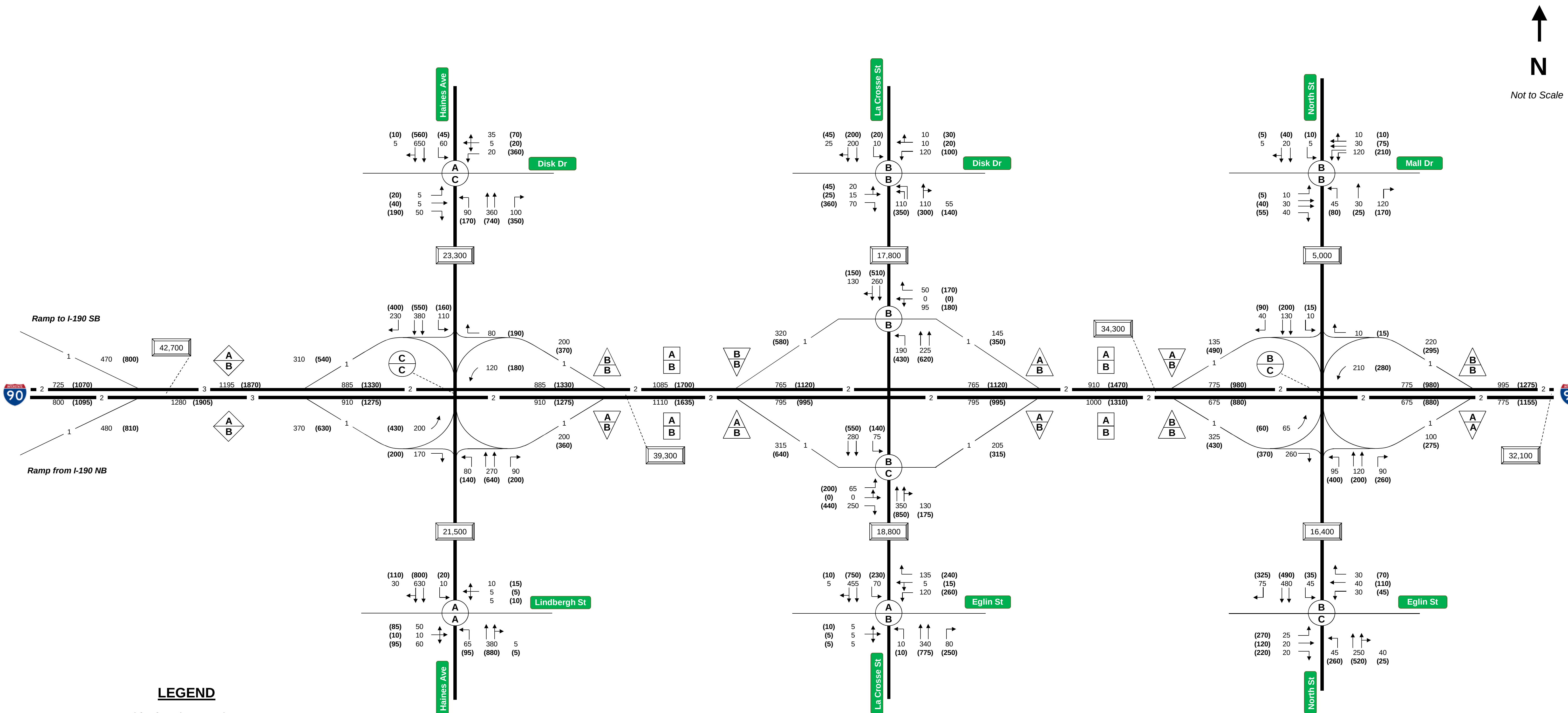
Operational performance for intersections is related to the delay experienced by drivers, as defined by the Highway Capacity Manual. The following table further outlines intersection level of service standards:

Table 2. Level of Service Description

Level of Service	SIGNALIZED[1] Intersection Control Delay (sec.)	UNSIGNALIZED[1] Intersection Control Delay (sec.)	Intersection LOS Description
A	≤10	≤10	Free flow, insignificant delays.
B	>10-20	>10-15	Stable operation, minimal delays.
C	>20-35	>15-25	Stable operation, acceptable delays.
D	>35-55	>25-35	Restricted flow, regular delays.
E	>55-80	>35-50	Maximum capacity, extended delays. Volumes at or near capacity. Long queues form upstream from intersection.
F	>80	>50	Forced flow, excessive delays. Represents jammed conditions. Intersection operates below capacity with low volumes. Queues may block upstream intersections.

Source: *Highway Capacity Manual*, Transportation Research Board, 2010

1. LOS F if volume/capacity > 1.0



LEGEND

XXX **(XXX)**	AM and **(PM)** Peak Hour Volumes
—#—	Number of Free-Flow Lanes
→	Existing Intersection Geometrics
X	Average Daily Traffic (ADT)
X / X	AM Peak Hour Basic Freeway Level of Service PM Peak Hour Basic Freeway Level of Service
X / X	AM Peak Hour Ramp Merge Level of Service PM Peak Hour Ramp Merge Level of Service
X / X	AM Peak Hour Ramp Diverge Level of Service PM Peak Hour Ramp Diverge Level of Service
X / X	AM Peak Hour Weaving Section Level of Service PM Peak Hour Weaving Section Level of Service
X / X	AM Peak 15-Minute Signalized Intersection Level of Service PM Peak 15-Minute Signalized Intersection Level of Service

Sources:
1. Traffic Volumes - HDR, October 2012
2. Traffic Capacity Analysis (Based on *2010 Highway Capacity Manual* Methodologies) - HDR, January 2013

South Dakota DOT
Connecting South Dakota and the Nation

Existing (Year 2012) Volumes, Geometrics and Levels of Service

I-90 Exit 59 (La Crosse Street) IMJR
Rapid City, South Dakota

Date
September 2014

Figure
4

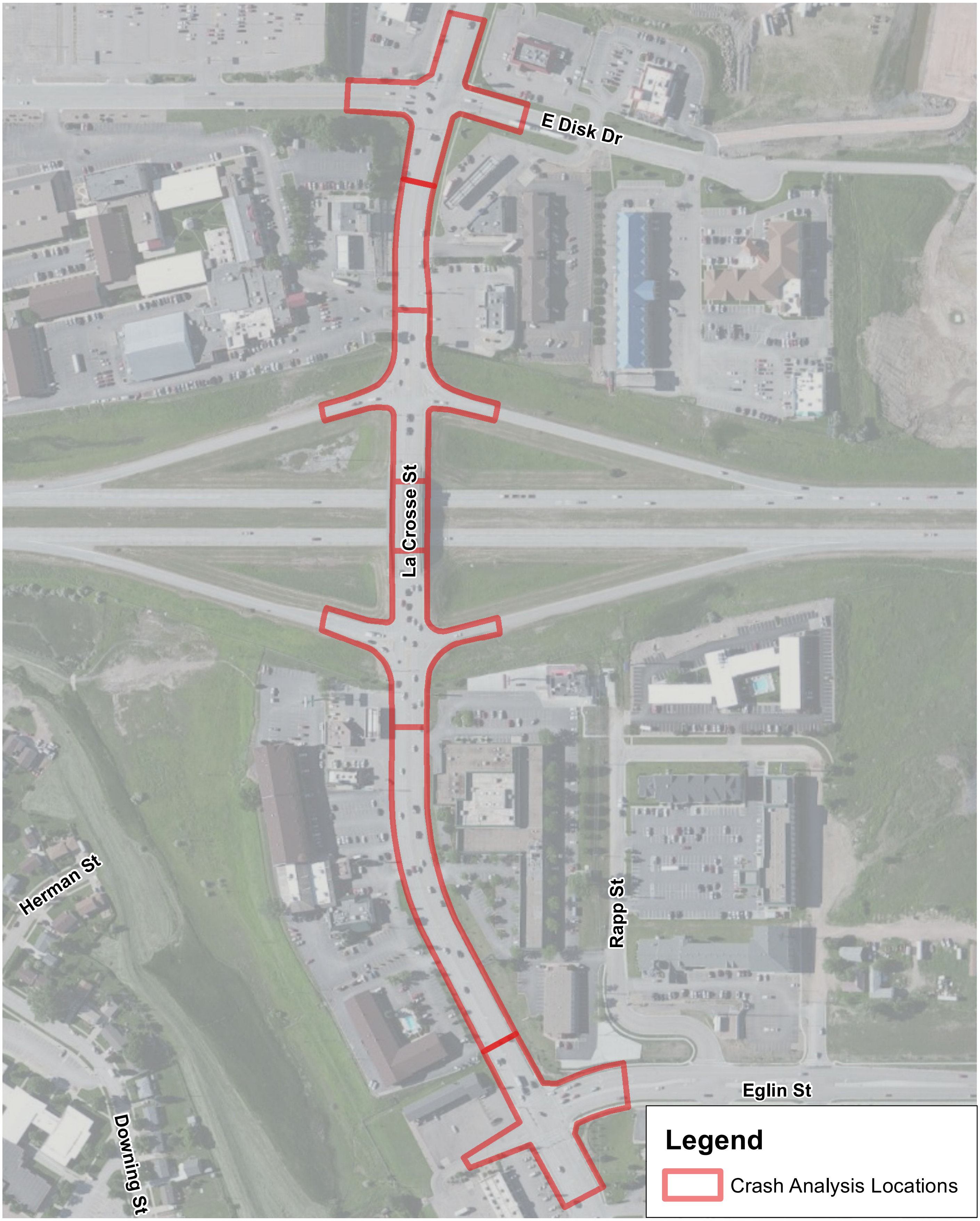
Existing Safety Conditions

The safety analysis is based on crash data provided by SDDOT for calendar years 2008 through 2011. Each recorded crash on the La Crosse Street corridor within the Study Area was assigned to one of seven intersections or roadway segments by SDDOT:

- Intersection of La Crosse Street / Eglin Street
- Intersection of La Crosse Street / I-90 Eastbound Ramps
- Intersection of La Crosse Street / I-90 Westbound Ramps
- Intersection of La Crosse Street / Disk Drive
- La Crosse Street segment between Eglin Street and I-90 Eastbound Ramps
- La Crosse Street segment between I-90 Eastbound Ramps and I-90 Westbound Ramps
- La Crosse Street segment between I-90 Westbound Ramps and Disk Drive

Crashes that occurred within 200 feet of the intersection center were assigned to that intersection; crashes that occurred outside of a 200-foot intersection radius were assigned to a segment. Locations included in the crash analysis are provided in Figure 5.

The existing safety conditions included data related to crash rates, crash types, and crash severity and a summary of this data is provided in Table 3. In an effort to determine improvements or techniques that may reduce crashes in the Study Area, segments with crash rates exceeding the estimated statewide average and study intersections were reviewed to determine improvements or techniques that may reduce crashes at these locations.



0 100 200
Feet

La Crosse Street Crash Analysis Study Area

I-90 Exit 59 (La Crosse Street) IMJR
Rapid City, South Dakota

DATE
February 2015

FIGURE
5

Crash Rates
Observed crash rates for the Study Area for calendar years 2008 through 2011 are shown in Table 3. Also provided in Table 3 are the calculated critical crash rates for each segment or intersection. The critical crash rate uses a statistical approach to identify those locations with crash rates that are "high outliers" compared to the average rates for the Study Area. As shown in Table 3, the intersection of La Crosse Street/I-90 Eastbound Ramps was the only intersection to have a crash rate that exceeded the Study Area critical crash rate. However, the crash rate of two segments (segment between Eglin Street and I-90 eastbound ramps and segment between I-90 eastbound and westbound ramps) exceeded the estimated average statewide urban highway crash rate (calculated to be 2.29 crashes per million vehicle miles traveled).

Crash Types
As shown in Table 3, angle and rear-end crashes are the most frequent types of crashes on the corridor.

Crash Severity
The severity of crashes that were observed from 2008 through 2011 are shown in Table 3. The SDDOT defines the injury categories as:

- *Incapacitating*: Any injury other than fatal which prevents the injured person from walking, driving, or normally continuing the activities he/she was capable of performing before the injury occurred (severe lacerations, broken limbs or unable to leave the scene of the crash without assistance).
- *Non-Incapacitating*: Any injury other than a fatal injury or incapacitating injury that is evident to observers at the scene of the crash (minor lacerations, lumps on the head, abrasions and bruises).
- *Possible Injury*: Any injury reported or claimed which is not a fatal injury, incapacitating injury, or non-incapacitating injury (momentary unconsciousness, limping, nausea, or complaint of pain).[1]

Based on the calendar year 2008 to 2011 crash data provided by SDDOT, no fatalities occurred in the study area and the majority of crashes involved no injuries.

[1] SDDOT, Department of Public Safety, Office of Highway Safety/Accident Records: *2011 South Dakota Motor Vehicle Traffic Crash Summary*, p.23, July 2012.

Table 3. Crash Frequency, Type, and Severity

		La Crosse Street Intersections				La Crosse Street Segments		
		Eglin Street	**I-90 Eastbound Ramps**	**I-90 Westbound Ramps**	**Disk Drive**	**Between Eglin St and I-90 Eastbound Ramps**	**Between I-90 Eastbound and Westbound Ramps**	**Between I-90 Westbound Ramps and Disk Dr**
Crash Frequency	Daily Traffic[1]	20,500 Entering Vehicles	22,000 Entering Vehicles	18,900 Entering Vehicles	19,800 Entering Vehicles	16,600	16,700	16,700
	Total Crashes[2]	29	59	45	25	21	5	2
	Crash Rate[3]	0.97	1.83	1.63	0.86	6.22[4]	6.90[4]	1.63[4]
	Critical Crash Rate[5]	1.69	1.68	1.71	1.70	7.46	10.38	9.07
Crash Type	Angle	41%	30%	47%	64%	47.5%	0%	100%
	Rear-end	52%	68%	47%	28%	47.5%	100%	0%
	Sideswipe	7%	0%	4%	4%	0%	0%	0%
	Single Vehicle	0%	2%	2%	4%	5%	0%	0%
Crash Severity	No Injury	62%	78%	62%	64%	57%	100%	100%
	Possible	21%	19%	24%	32%	28%	0%	0%
	Non-incapacitating	17%	0%	11%	4%	5%	0%	0%
	Incapacitating	0%	3%	2%	0%	10%	0%	0%

1 Daily traffic volumes are based on data available from the 2008 Rapid City Travel Demand Model.

2 Crash data for years 2008 through 2011 provided by SDDOT, June 2012.

3 Segments rates are per Million Vehicle Miles Traveled (MVMT), intersection rates are per Million Entering Vehicles (MEV).

4 For comparison purposes, HDR-developed an estimate of statewide South Dakota urban highway crash rates equaling 2.29 crashes per million vehicle miles traveled (MVMT). The estimated South Dakota urban highway crash rate was based on vehicle miles traveled for year 2011 on South Dakota roadways (published by SDDOT) and data on the number of motor vehicle crashes for year 2010 on South Dakota roadways (published by the Department of Public Safety; Office of Highway Safety/Accident Records).

5 Critical crash rates calculated based on *AASHTO Highway Safety Manual, 1st Edition, 2010*. 95% Confidence Level.

Existing Environmental Constraints

Environmental constraints are being evaluated through a CE that is being prepared simultaneously with this IMJR. The CE is intended for projects that do not individually or cumulatively have a significant impact on the environment as defined by NEPA. Resources evaluated as part of the CE include:

- Federally Threatened, Endangered, and Protected Species
- Section 4(f) and 6(f)
- Historic and Archaeological Preservation
- Wetlands
- FEMA – Floodplain Impacts
- Right-of-Way
- Tribal Consultation

The U.S. Fish and Wildlife Service (USFWS) have reviewed and have no objection to the Project (letter signed April 8, 2013). However, since that time the list of threatened and endangered species in Pennington County has been changed and an updated determination from the USFWS is pending. An intensive Cultural Resources Survey and Historic Structure Documentation within the Study Area was conducted in January and February, 2013. The survey and evaluation identified no buildings that are eligible for the National Register of Historic Places and a finding of No Historic Properties Affected was sent to State Historic Preservation Office (SHPO) for concurrence. The Study Area is not located within a designated floodplain. However, wetlands were preliminary identified within the Study Area. As part of the environmental review, a desktop wetland determination was completed for the Study Area. Eight wetland areas totaling approximately 10 acres were determined within the Study Area. The SDDOT will work with the USACE to obtain appropriate permits for any temporary and/or permanent impacts on wetlands and other Waters of the U.S. The Project is located within the Rapid City Air Quality Control Zone. In an approved letter dated April 19, 2013, the South Dakota Department of Environment and Natural Resources determined that the Project would have little or no impact on the air quality in the area.

PROJECT NEED

The need for the Project was initially documented in the *South Dakota Decennial Interstate Corridor Study* (2010). Phase 1 of the Decennial Study provided an inventory of the South Dakota interstate system and identified ten existing interchanges with geometric, safety, or operational problems or expected problems to occur in the 10 to 20 year future time period. These ten interchanges were further examined in Phase 2 of the Decennial Study (2010). One of the ten interchanges was the I-90/La Crosse Street interchange. Phase 1 of the Decennial Study identified safety and capacity issues at the I-90/La Crosse Street interchange. The crash rate for the Interchange was 5th out of 126 interchanges evaluated in the *Decennial Study* and the Exit 59 interchange is located in a growing area of Rapid City and the increased traffic has resulted in traffic operation issues at the current diamond interchange.

The La Crosse Street interchange serves the growing north-northeast portion of Rapid City. With traffic volumes projected to increase between 35 and 65 percent on La Crosse Street by 2035, there is a need to improve operations at the signalized ramp terminal intersections. With the projected increase in traffic along La Crosse Street, the vehicle queue is expected to exceed available turn lane storage at the following locations:

- La Crosse Street/I-90 EB Ramps
    - Eastbound Left/Right Turn Lanes
    - Southbound Left Turn Lanes
- La Crosse Street/I-90 WB Ramps
    - Northbound Left Turn Lane

Possible improvements include increasing the turn lane storage lengths and providing additional turn lanes to accommodate current and forecasted queues from exceeding the existing turn lane storage lengths.

All Study Area intersections currently operate at LOS 'C' or better; but by 2035, an approach and multiple individual movements at La Crosse Street ramp terminal intersections are expected to fail (LOS 'F') during the PM peak hour. The approach and movements expected to fail include:

- La Crosse Street/Eglin Street – Eastbound Approach
- La Crosse Street/I-90 EB Ramps – Eastbound Right-Turn
- La Crosse Street/I-90 EB Ramps – Northbound Through
- La Crosse Street/I-90 EB Ramps – Northbound Right
- La Crosse Street/I-90 EB Ramps – Southbound Left
- La Crosse Street/I-90 WB Ramps – Westbound Left-Turn

ALTERNATIVES

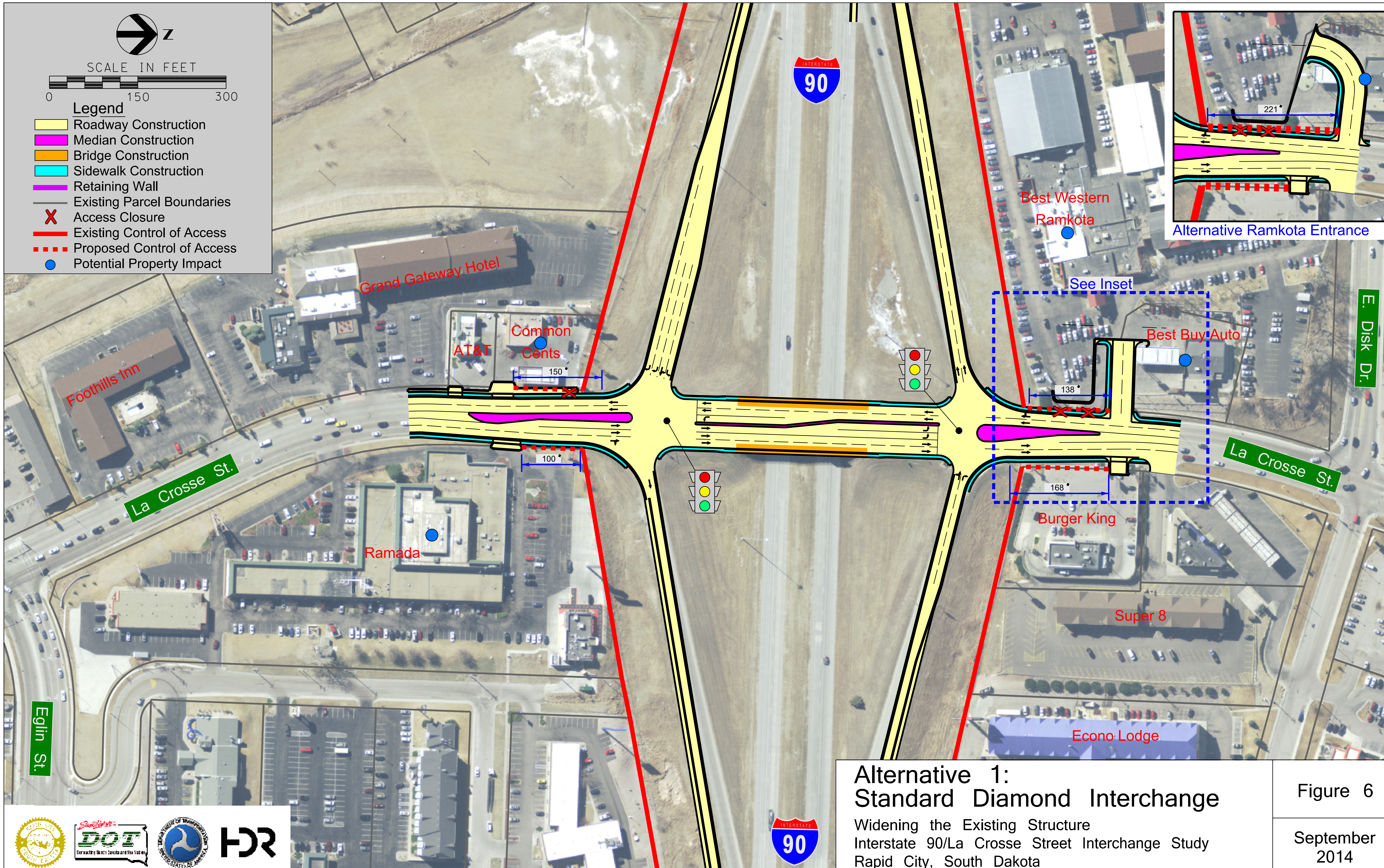
In effort to meet the Project's purpose and need, six build alternatives were developed for the modification of the I-90/La Crosse Street interchange. The build alternatives included a Standard Diamond Interchange, three variations of a Single Point Urban Interchange, two variations of a Diverging Diamond Interchange and one Roundabout option. Of the seven alternatives considered, four have been eliminated from further consideration due to adverse impacts on adjacent property owners or traffic operation concerns. In addition to the No-Build Alternative, the three build alternatives that have been selected for further analysis include:

- Alternative 1: Standard Diamond
- Alternative 2b: Single Point Urban Interchange
- Alternative 3b: Diverging Diamond Interchange
- No-Build

<u>Alternative 1: Standard Diamond Alternative (Figure 6):</u>

This option is similar to the existing compressed diamond interchange configuration. However, this option would provide an additional northbound left-turn lane at the westbound ramp terminal intersection. The outside (right) northbound left-turn lane at the I-90 westbound ramp terminal intersection would extend through the upstream signal at the I-90 eastbound ramp terminal. This option would also include dual eastbound right-turn lanes at the I-90 eastbound ramp terminal intersection. In order to include the additional northbound left-turn lane, the existing La Crosse Street Bridge would have to be widened. This option would allow the access drives adjacent to businesses to be reconstructed in similar locations. All existing businesses along La Crosse Street in the Study Area would still be provided access with the proposed access closures.

- **Advantages**
    - o The diamond interchange configuration matches closely to existing conditions and is familiar to area drivers,
    - o Additional storage for northbound left-turn vehicles at the I-90 westbound ramp terminal intersection to eliminate queuing of left-turn traffic into the northbound through lanes on the La Crosse Street bridge,
    - o All pedestrian crossings at the interchange would be at signalized locations, and
    - o The existing bridge would not need to be replaced, but widened
- **Disadvantages**
    - o Storage for the southbound left-turn movement at the I-90 eastbound ramp terminal intersection would be limited by the raised median on the La Crosse Street bridge, and
    - o The proposed control of access would require closure of two access points and relocation of one other access point along La Crosse Street.



Alternative 1: Standard Diamond Interchange

Widening the Existing Structure
Interstate 90/La Crosse Street Interchange Study
Rapid City, South Dakota

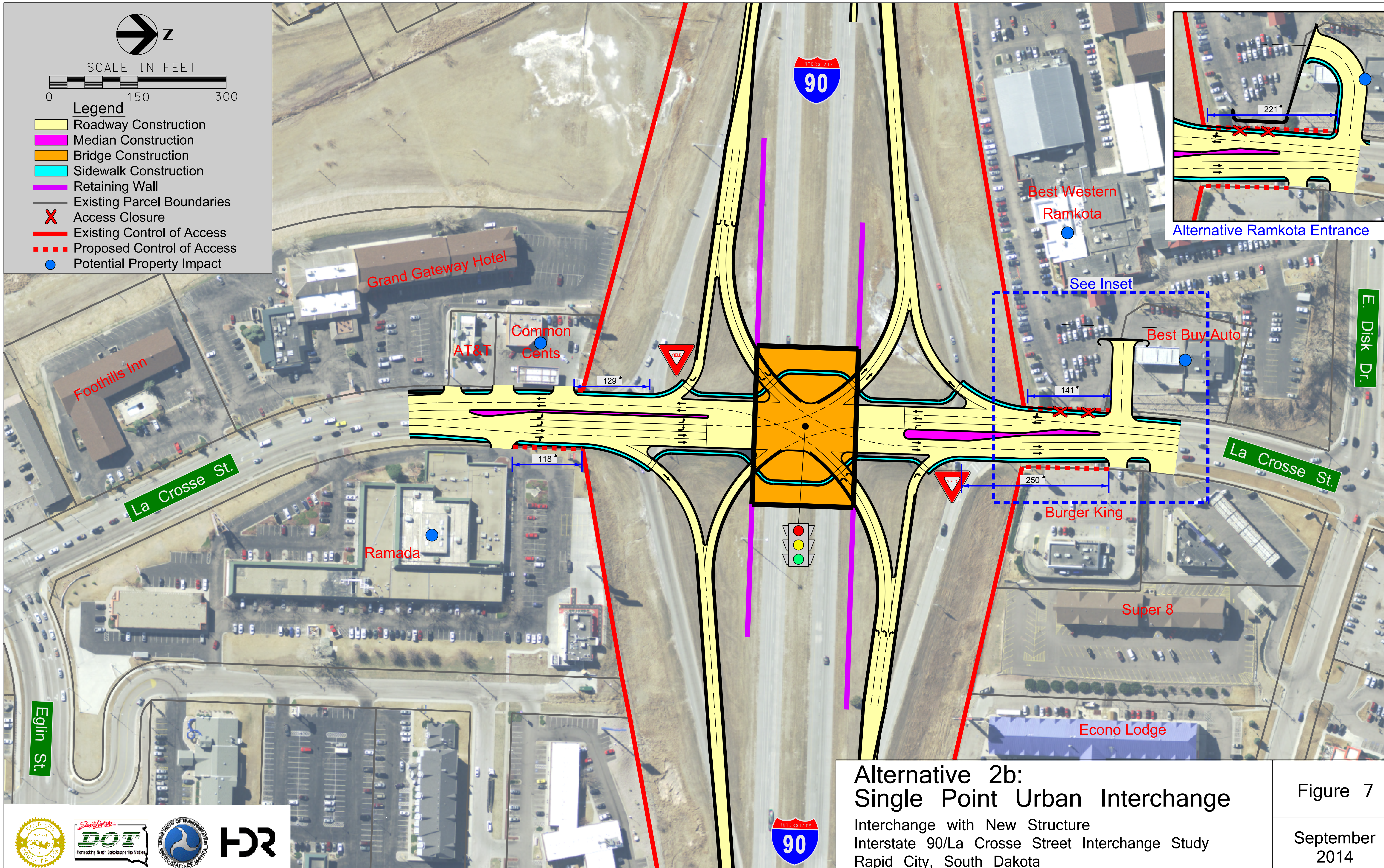
Figure 6

September 2014

<u>Alternative 2b: Single Point Urban Interchange Alternative (Figure 7):</u>

Alternative 2b proposes a Single Point Urban Interchange (SPUI) at the I-90/La Crosse Street interchange. The Single-Point Interchange essentially combines both ramp terminals into one large intersection which accommodates all vehicular movements and is controlled by a single traffic signal. This option would provide dual left-turn lanes for the eastbound, westbound, and northbound approaches. This option would also provide 'free' (yield control) for all right-turn movements at the interchange and the interchange would only utilize one traffic signal. Development of this alternative would result in an impact on Best Buy Auto (Mobil Gas Station) due to the reconstruction of the access drive from La Crosse Street. However, all existing businesses along La Crosse Street in the Study Area would still be provided access with the proposed access closures. This alternative would also require the construction of a new La Crosse Street Bridge over I-90.

- **Advantages**
  - The SPUI configuration is the existing configuration at the I-90 interchanges adjacent to La Crosse Street and is familiar to area drivers,
  - The footprint of the SPUI is smaller than existing conditions,
  - Vehicle delay would be at a single intersection, and
  - The distance between the La Crosse Street intersection for the I-90 interchange and Disk Drive would be increased.
- **Disadvantages**
  - Impacts on Best Buy Auto,
  - Most expensive of the three build alternatives,
  - The existing bridge would need to be replaced and retaining walls constructed along I-90 near the bridge,
  - Four pedestrian crossings at the interchange would be at unsignalized locations,
  - The SPUI configuration has a higher number of vehicular conflicts than the existing (diamond) configuration,
  - The proposed control of access would require closure of one access point and relocation of one other access point along La Crosse Street,
  - Three access points on La Crosse Street south of the interchange would be converted from full access to right-in/right-out access. This would be the result of a raised median constructed on the south portion of the interchange to provide a barrier for northbound left turns at the interchange, and
  - One access point on La Crosse Street north of the interchange would be converted from full access to right-in/right-out/left-out access. This would be the result of a raised median constructed on the north portion of the interchange to provide a barrier for southbound left turns at the interchange.



Alternative 2b: Single Point Urban Interchange

Interchange with New Structure

Interstate 90/La Crosse Street Interchange Study

Rapid City, South Dakota

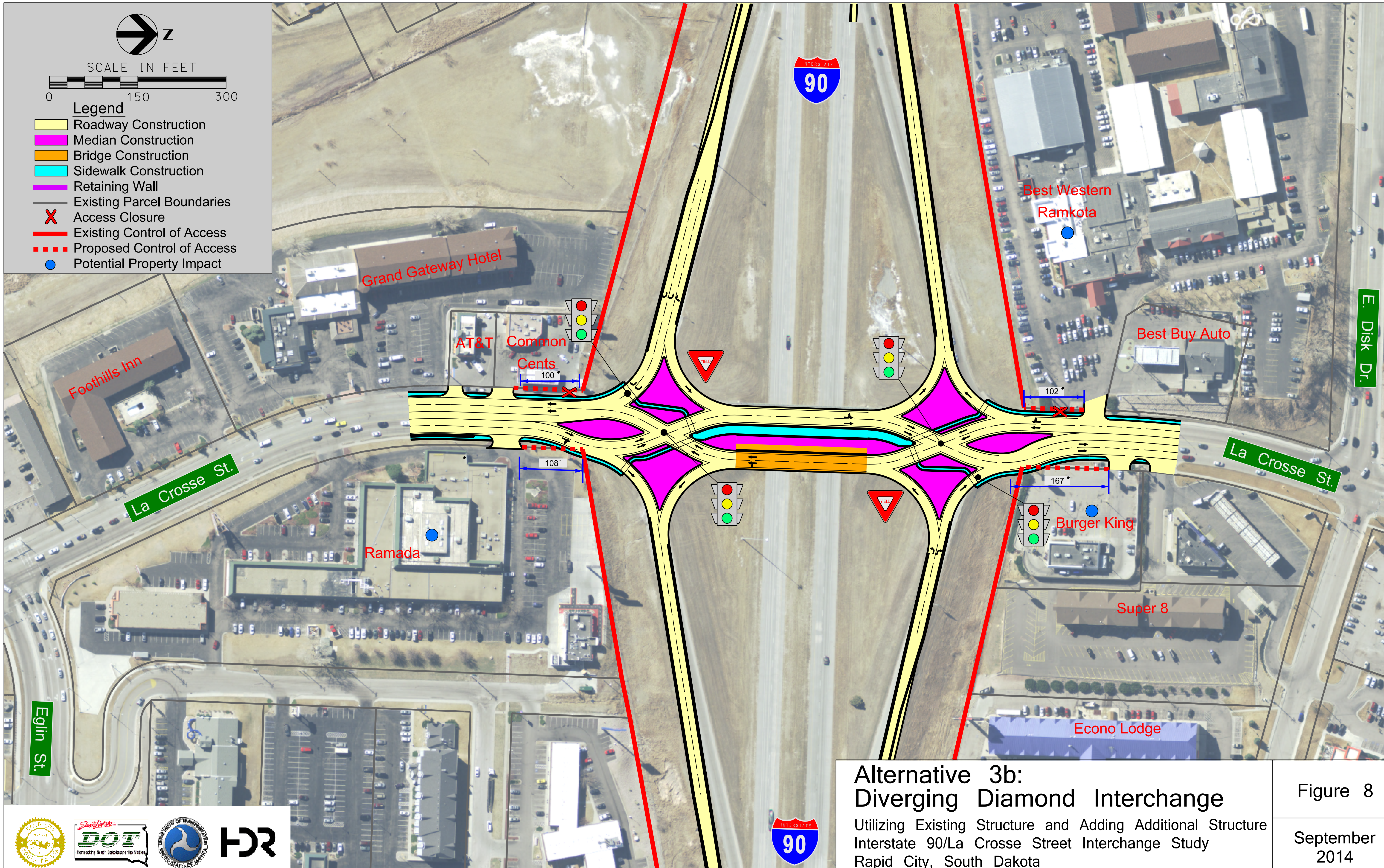
Figure 7

September 2014

Alternative 3b: Diverging Diamond Interchange Alternative (Figure 8):

This alternative proposes a Diverging Diamond Interchange (DDI) at the I-90/La Crosse Street Interchange. This option would provide crossover intersections at the I-90 eastbound and westbound ramp terminal intersections and 'free' (yield control) for all interchange left-turn movements. This option would also provide dual eastbound right-turn lanes at the I-90 eastbound ramp terminal intersection. In order to implement the DDI interchange, this alternative would require the construction a new La Crosse Street Bridge over I-90. The existing bridge would remain in place and there would be a seamless transition between the existing structure and the new bridge. When considering access to adjacent businesses, this alternative would allow for the re-construction of access drives in relatively the same locations of the existing drives, thus avoiding an impact on Best Buy Auto. All existing businesses along La Crosse Street in the Study Area would still be provided access with the proposed access closures.

- **Advantages**
    - No impact on Best Buy Auto,
    - Least expensive of the three build alternatives,
    - The DDI configuration has a lower number of vehicular conflicts than the existing (diamond) configuration,
    - Left turns at the interchange would only travel through one signalized location, and
    - The existing bridge would not need to be replaced, but an additional structure or widening is required.
- **Disadvantages**
    - The DDI configuration does not exist at any locations in Rapid City or neighboring areas and area drivers are not familiar with the configuration,
    - Two pedestrian crossings at the interchange would be at unsignalized intersections,
    - The proposed control of access would require closure of two access points and widening of one other access point along La Crosse Street.



Alternative 3b: Diverging Diamond Interchange

Utilizing Existing Structure and Adding Additional Structure
Interstate 90/La Crosse Street Interchange Study
Rapid City, South Dakota

Figure 8

September 2014

No-Build Alternative

Under the No-Build Alternative, the existing standard diamond interchange of the I-90/La Crosse Street would remain in place and existing and future traffic congestion and safety issues would be unresolved. Because the No-Build Alternative would not meet the Project's purpose and need, it is not further detailed in this report.

FUTURE YEAR TRAFFIC

Traffic operations were completed using Highway Capacity Software (HCS), which is based on Highway Capacity Manual (HCM) methodologies. Operational analyses of free-flow areas along I-90 were completed for basic freeway, ramp merge/diverge and weave areas. All free-flow analyses were conducted for AM and PM peak hour volumes of year 2035 No-Build and Build Conditions. Intersection operations were evaluated for all Study Area intersections. Arterial segment analyses were also completed for segments of La Crosse Street between study intersections to identify other modes of transportation that may be affected by added traffic demands and modifications to the interchange geometry. Intersection and segment analyses were conducted for the AM and PM peak 15-minute volumes of year 2035 No-Build and Build Conditions.

To confirm that the corridor and interchange will provide an acceptable level of service, traffic projections for 20 years from the planned year of construction will be reviewed by SDDOT during final design.

<u>No-Build Analysis</u>
Free-flow and intersection operational results for year 2035 No-Build Conditions are shown in Figure 9. All free-flow areas are expected to operate at LOS ‘C’ or better during the peak hours of year 2035 No-Build Conditions.

All intersections are expected to operate at LOS ‘D’ or better during the peak hours of year 2035 No-Build Conditions. Additionally, an approach and many movements at La Crosse Street study intersections are expected to operate at LOS ‘F’ during the PM peak hour of Year 2035 No-Build Conditions. The approach and movements expected to fail include:

- La Crosse Street/Eglin Street – Eastbound Approach
- La Crosse Street/I-90 EB Ramps – Eastbound Right-Turn
- La Crosse Street/I-90 EB Ramps – Northbound Through
- La Crosse Street/I-90 EB Ramps – Northbound Right
- La Crosse Street/I-90 EB Ramps – Southbound Left
- La Crosse Street/I-90 WB Ramps – Westbound Left-Turn

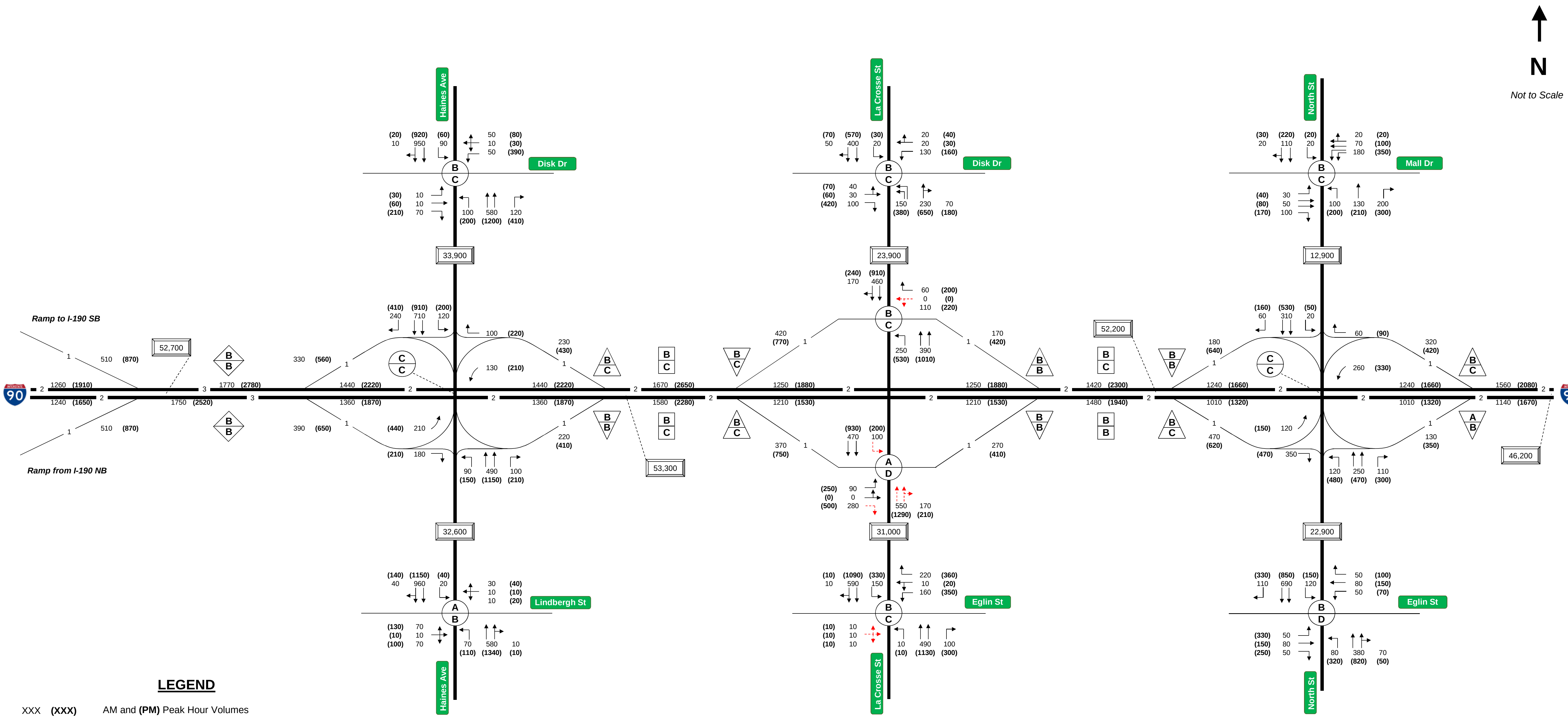
Extensive queuing along La Crosse Street is also expected during the PM peak hour of year 2035 No-Build Conditions. These queues include:

- La Crosse Street/I-90 EB Ramps – The 95th percentile queues for the eastbound left-turn and right-turn lanes are expected to exceed the available storage of these lanes, causing traffic to spillback into the lane that extends to the freeway. The queue of vehicles at the eastbound approach is expected to extend approximately 800 feet, near the ramp gore at the freeway.
- La Crosse Street/I-90 EB Ramps – The 95th percentile queues for the northbound through lanes is expected to extend over 900 feet, less than 200 feet from the upstream signalized intersection at Eglin Street.

- La Crosse Street/I-90 EB Ramps – The 95th percentile queues for the southbound left-turn lane is expected to extend over 250 feet, exceeding the available storage. La Crosse Street/I-90 WB Ramps – The 95th percentile queue for the southbound through lanes is expected to extend over 550 feet, near the upstream signalized intersection at Disk Drive.
- La Crosse Street/I-90 WB Ramps – The 95th percentile queue for the northbound left-turn lane is expected to extend over 500 feet. This queue would extend through the limits of the available storage lane and to the upstream signalized intersection at I-90 Eastbound Ramps.

La Crosse Street segment operational results for year 2035 No-Build Conditions are shown in Figure 9. The La Crosse Street study segments are expected to operate as follows under year 2035 No-Build Conditions.

- The auto mode is expected to operate at LOS 'D' or better on La Crosse Street study segments during the AM peak hour of Year 2035 No-Build Conditions. During the PM peak hour of Year 2035 No-Build Conditions, the auto mode is expected to operate at LOS 'C' or better except for:
    - LOS 'F' in the northbound direction on the segment between Eglin Street and I-90 Eastbound Ramps.
    - LOS 'E' in the northbound direction on the segment between I-90 Westbound Ramps and Disk Drive.
    - LOS 'F' in the southbound direction on the segment between I-90 Westbound Ramps and Disk Drive.



LEGEND

XXX **(XXX)**	AM and **(PM)** Peak Hour Volumes
—#—	Number of Free-Flow Lanes
→	Existing Intersection Geometrics
- - -→	Existing Intersection Geometrics with Level of Service 'F'
X	Average Daily Traffic (ADT)
X / X	AM Peak Hour Basic Freeway Level of Service PM Peak Hour Basic Freeway Level of Service
X / X	AM Peak Hour Ramp Merge Level of Service PM Peak Hour Ramp Merge Level of Service
X / X	AM Peak Hour Ramp Diverge Level of Service PM Peak Hour Ramp Diverge Level of Service
X / X	AM Peak Hour Weaving Section Level of Service PM Peak Hour Weaving Section Level of Service
X / X	AM Peak 15-Minute Signalized Intersection Level of Service PM Peak 15-Minute Signalized Intersection Level of Service

Sources:
1. Traffic Volumes - HDR, October 2012
2. Traffic Capacity Analysis (Based on *2010 Highway Capacity Manual* Methodologies) - HDR, January 2013

South Dakota DOT
Connecting South Dakota and the Nation

Year 2035 No-Build Volumes, Geometrics and Levels of Service

I-90 Exit 59 (La Crosse Street) IMJR
Rapid City, South Dakota

Date
February 2015

Figure
9

Build Analysis – I-90 Free-Flow

The locations of ramp junctions at the La Crosse Street interchange are the same for each of the three build alternatives. Additionally, each build alternative includes construction of a full auxiliary lane on I-90 westbound between La Crosse Street and Haines Avenue since the distance between the noses of the entrance ramp and the exit ramp was less than 1,500 feet, per guidance in **AASHTO A POLICY ON GEOMETRIC DESIGN OF HIGHWAY AND STREET (2004)**. A full auxiliary lane on I-90 eastbound between La Crosse Street and Haines Avenue is not included since the distance between the noses of the entrance ramp and the exit ramp is greater than 1,500 feet.

Free-flow operational results from HCS are the same for each of the three build options. Free-flow operational results for year 2035 build conditions with Option 1 geometry at the La Crosse Street interchange are shown in Figure 10. All free-flow areas are expected to operate at level of service (LOS) 'C' or better during the peak hours of year 2035 build conditions for all three build options

Build Analysis – La Crosse Street at Adjacent Intersections

Operational results at the La Crosse Street study intersections adjacent to the I-90 interchange (La Crosse Street/Disk Drive and La Crosse Street/Eglin Street) are shown in Figures 10 through 12 for each of the build alternative. In all three build alternatives, the La Crosse Street study intersections adjacent to the I-90 interchange are expected to operate at LOS 'C' or better during the peak hours of year 2035 build conditions. Movements at the Disk Drive and Eglin Street intersections with La Crosse Street are expected to have some deviation in operations based on the interchange type at La Crosse Street/I-90, which are reflected in the overall intersection LOS shown in Figures 10 through 12.

The eastbound approach at La Crosse Street/Eglin Street would exceed the minimum allowable LOS defined in the I-90 Exit 59 (La Crosse Street) Interchange Options Study Methods & Assumptions Meeting Document (LOS 'C' for the overall intersection and LOS 'D' for an intersection movement is the minimum allowable LOS). This approach is expected to operate at LOS 'E' during the AM and PM peak hours in all three build options. This is a low volume approach for private businesses and currently operates at LOS 'E'. Additional access points on La Crosse Street are currently provided for these businesses that offer alternate means of access to La Crosse Street and may result in lower delays than those reported. No geometric modifications are proposed at this intersection to mitigate the reported LOS 'E' operations at the eastbound approach.

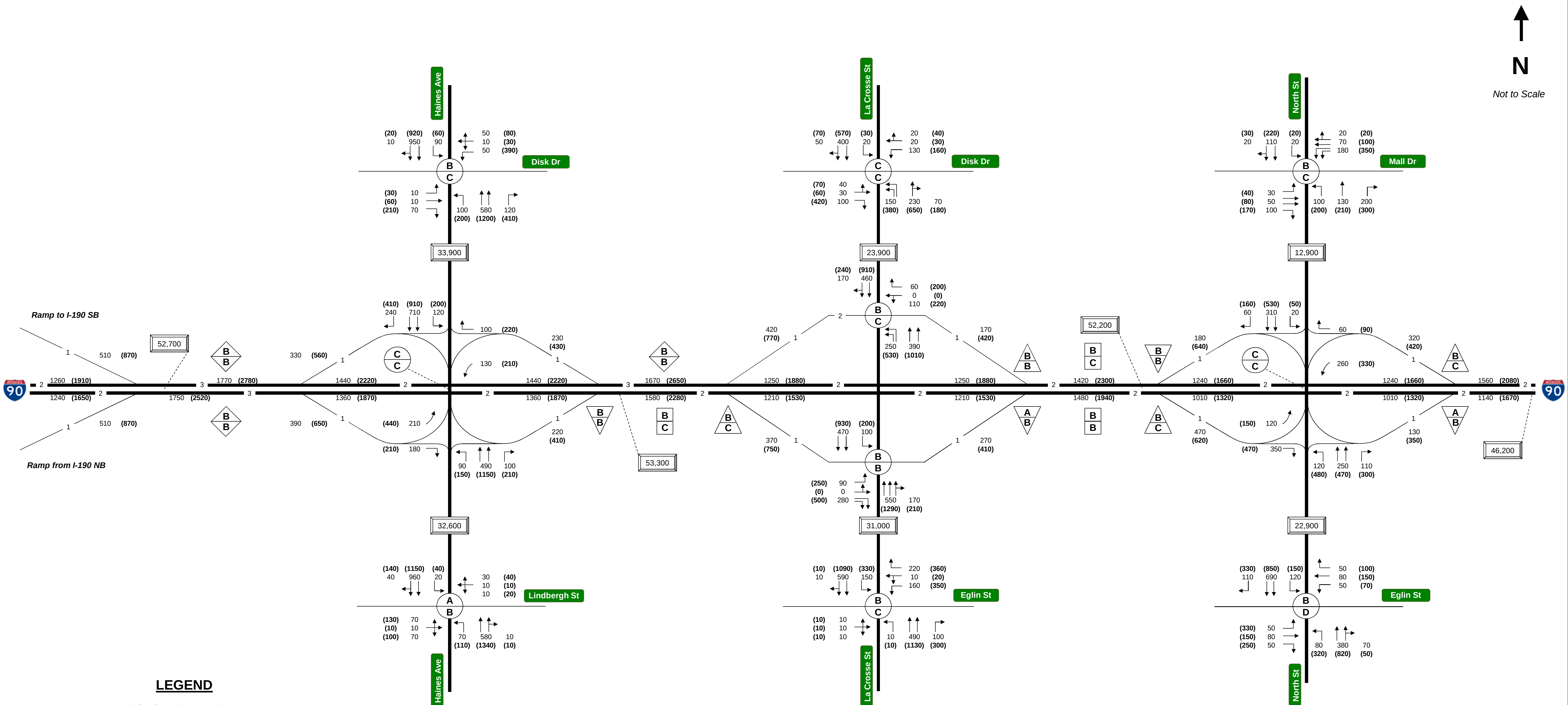
Alternative 1 – Diamond Interchange

Operational results of the diamond interchange alternative for the AM and PM peak hours of year 2035 at the La Crosse Street study intersections are shown in Figure 10. All La Crosse Street study intersections are expected to operate at LOS 'C' or better during the peak hours of year 2035 build conditions for the diamond option.

The southbound left-turn movement at La Crosse Street/I-90 Eastbound Ramps is expected to exceed its available storage during portions of the PM peak hour. The 95th percentile queue is approximately 180 feet. The amount of storage provided for this movement would be limited to approximately 150 feet as a result of the storage needed for the northbound left-turn movement at the La Crosse Street/I-90 Westbound Ramp Terminal intersection. Left-turn queues are not expected to have an impact on operations at upstream intersections.

<u>Alternative 2 – Single Point Urban Interchange (SPUI)</u>
Operational results of the SPUI interchange option for the AM and PM peak hours of year 2035 at the La Crosse Street study intersections are shown in Figure 11. All La Crosse Street study intersections are expected to operate at LOS ‘C’ or better during the peak hours of year 2035 build conditions for the SPUI option. There are no locations where available storage is expected to be exceeded.

<u>Alternative 3 – Diverging Diamond Interchange (DDI)</u>
Operational results of the DDI interchange option for the AM and PM peak hours of year 2035 at the La Crosse Street study intersections are shown in Figure 12. All La Crosse Street study intersections are expected to operate at LOS ‘C’ or better during the peak hours of year 2035 build conditions for the DDI option. There are no locations where available storage is expected to be exceeded.



LEGEND

XXX **(XXX)**	AM and **(PM)** Peak Hour Volumes
—#—	Number of Free-Flow Lanes
→	Existing Intersection Geometrics
X	Average Daily Traffic (ADT)
X / X	AM Peak Hour Basic Freeway Level of Service PM Peak Hour Basic Freeway Level of Service
X / X	AM Peak Hour Ramp Merge Level of Service PM Peak Hour Ramp Merge Level of Service
X / X	AM Peak Hour Ramp Diverge Level of Service PM Peak Hour Ramp Diverge Level of Service
X / X	AM Peak Hour Weaving Section Level of Service PM Peak Hour Weaving Section Level of Service
X / X	AM Peak 15-Minute Signalized Intersection Level of Service PM Peak 15-Minute Signalized Intersection Level of Service

Note:
1. Free-flow operational results represent expected operations for all build options.

Sources:
1. Traffic Volumes - HDR, October 2012
2. Traffic Capacity Analysis (Based on *2010 Highway Capacity Manual* Methodologies) - HDR, October 2013

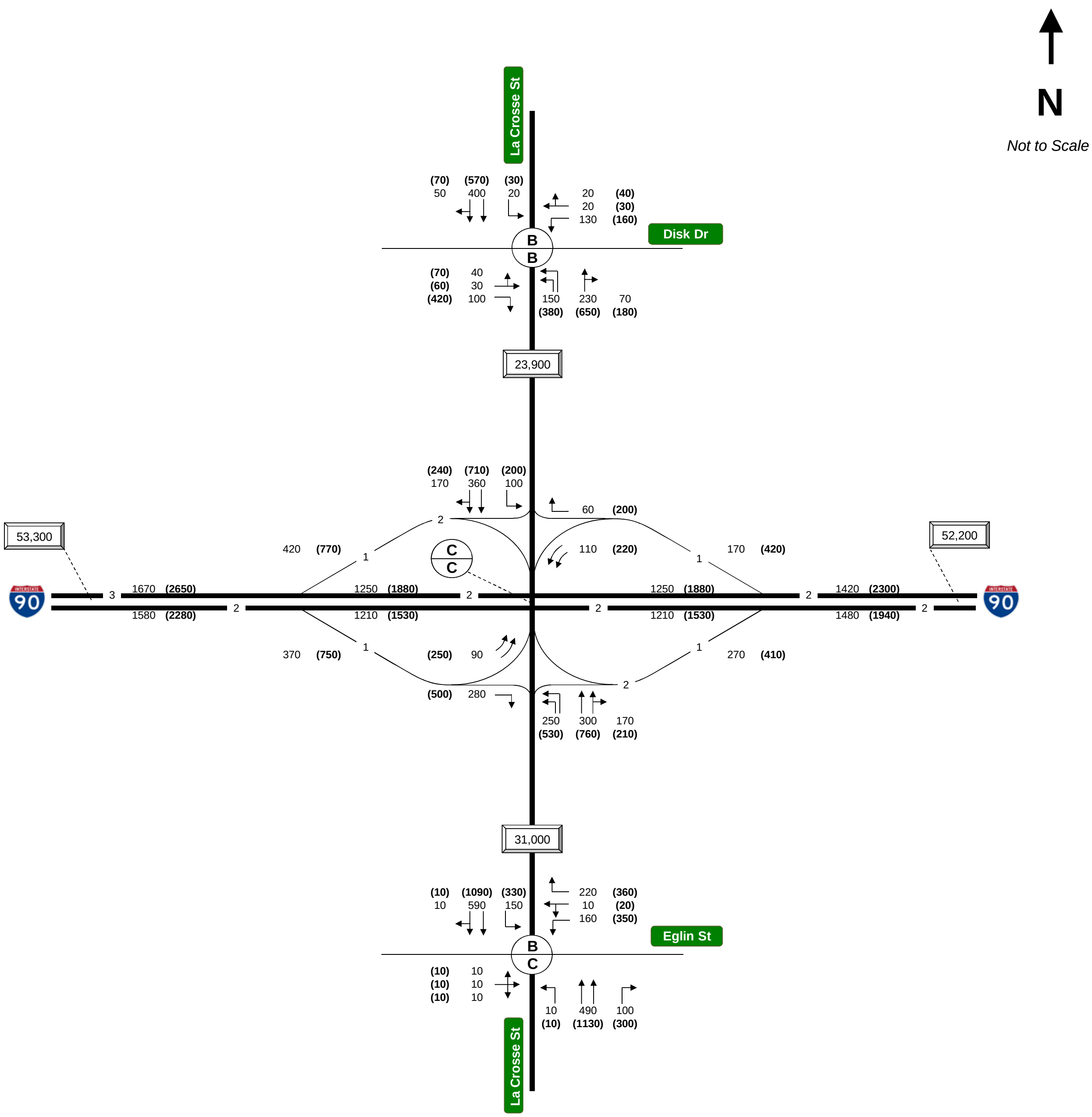
South Dakota DOT
Connecting South Dakota and the Nation

Year 2035 Alternative 1 - Diamond Interchange Volumes, Geometrics and Levels of Service

I-90 Exit 59 (La Crosse Street) Interchange Options Study
Rapid City, South Dakota

Date
September 2014

Figure
10



LEGEND

XXX **(XXX)** AM and **(PM)** Peak Hour Volumes

—#— Number of Free-Flow Lanes

Intersection Geometrics

X Average Daily Traffic (ADT)

X / X AM Peak 15-Minute Signalized Intersection Level of Service
PM Peak 15-Minute Signalized Intersection Level of Service

Note:
1. Free-flow operations are shown in Figure 7.

Sources:
1. Traffic Volumes - HDR, October 2012
2. Traffic Capacity Analysis (Based on *2010 Highway Capacity Manual* Methodologies) - HDR, October 2013

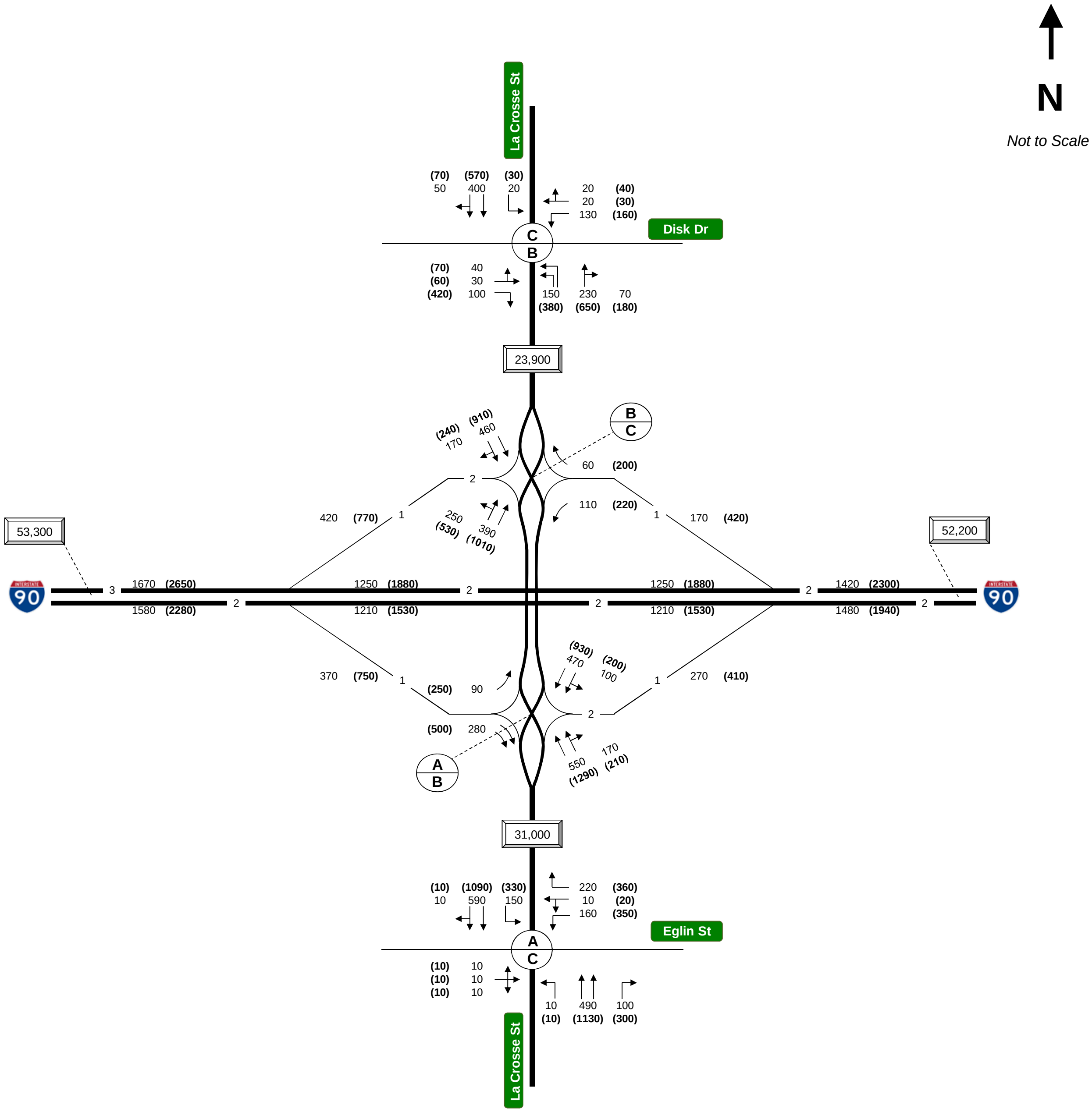
South Dakota DOT
Connecting South Dakota and the Nation

Year 2035 Alternative 2b - Single Point Urban Interchange (SPUI) La Crosse Street Volumes, Geometrics and Levels of Service

I-90 Exit 59 (La Crosse Street) Interchange Options Study
Rapid City, South Dakota

Date
September 2014

Figure
11



LEGEND

XXX **(XXX)** AM and **(PM)** Peak Hour Volumes

—#— Number of Free-Flow Lanes

→ Intersection Geometrics

X Average Daily Traffic (ADT)

X/X AM Peak 15-Minute Signalized Intersection Level of Service
PM Peak 15-Minute Signalized Intersection Level of Service

Note:
1. Free-flow operations are shown in Figure 7.

Sources:
1. Traffic Volumes - HDR, October 2012
2. Traffic Capacity Analysis (Based on *2010 Highway Capacity Manual* Methodologies) - HDR, October 2013

Connecting South Dakota and the Nation

Year 2035 Alternative 3b - Diverging Diamond Interchange (DDI) La Crosse Street Volumes, Geometrics and Levels of Service

I-90 Exit 59 (La Crosse Street) Interchange Options Study
Rapid City, South Dakota

Date
February 2015

Figure
12

ALTERNATIVES ANALYSIS

The retained interchange improvement alternatives were analyzed and compared to determine which may be most suitable for meeting the Project purpose and need. The areas of analysis and comparison are discussed in the following sections.

Conformance with Transportation Plans

The City of Rapid City is the designated Metropolitan Planning Organization (MPO) and oversees transportation planning for the Rapid City Area MPO. The MPO prepares an annual Transportation Improvement Program (TIP) used to identify the funding mechanism for transportation projects using federal money within the Rapid City Area MPO. Although the Project is not yet listed in the TIP, the need for this Project was identified in the South Dakota Decennial Study (SDDOT, 2010). The project is also listed within the Rapid City MPO's Long Range Transportation Plan – *RapidTRIP 2035*.

Compliance with Policies and Engineering Standards

Each of the interchange alternatives is a standard interchange configuration. Conceptual design has used the latest guidance from American Association of State Highway Transportation Officials (AASHTO) and FHWA. Based on a review of the design standards, the final design may be accomplished without conflicting with the geometric design standards.

Each of the build options includes an alternative option to add an auxiliary lane on I-90 westbound between La Crosse Street and Haines Avenue. Reconstruction of the I-90 Exit 59 westbound on-ramp according to SDDOT design standards as a taper/merge ramp would cause the end of the ramp to shift from its current location to a location further west, over the Maple Street bridge. This would result a spacing of 500 feet between the I-90 westbound on-ramp from La Crosse Street and off-ramp to Haines Avenue. An option to the taper/merge ramp would be addition of an auxiliary lane on I-90 westbound between La Crosse Street and Haines Avenue.

The existing configuration and the alternatives are affected by the close proximity of existing La Crosse Street access driveways north and south of I-90. In order to maintain control of access, the business access driveways were designed so that they are located a minimum 100 feet from the interchange per SDDOT *Road Design Manual*. Although some access points may be closed or require relocation as part of the build alternatives, all existing businesses along La Crosse Street in the Study Area would still be provided access.

Environmental Impacts

The Project has been determined to not have a significant impact on the environment, either individually or cumulatively, and therefore does not require formal environmental impact analysis. Therefore, the Project and associated environmental impacts are being evaluated as a Categorical Exclusion (CE).

Safety

The review of crash history documented in the *Existing Safety Conditions* section of this report shows that angle and rear-end crashes account for over 90% of all crashes at the I-90/La Crosse Street interchange ramp terminal intersections. Reviewing the SDDOT crash data provided, these crashes were the result of congested conditions at the intersections, drivers following too closely or drivers misjudging the gap in traffic when making a left turn onto the interstate ramps. These causes are based on current traffic demands and field observations.

Each build alternative would provide enhancements that would likely result in fewer crashes at the ramp terminal intersections than what occurs with the existing configuration. This would primarily be the result of reduced congestion at the ramp terminal intersections with the build improvements. Specific improvements for each build alternative that would likely provide reductions in crashes are noted below.

- Alternative 1 (standard diamond interchange) would add a northbound left-turn lane at the west bound ramp terminal and reduce the potential for queue spillback into the adjacent through lane. This would likely reduce the number of rear-end crashes occurring in this area. Additionally, all left turns at the ramp terminal intersections would become protected only phasing (not allowed to turn while the opposing through movement has the right-of-way). This would likely reduce the number of angle crashes occurring at the ramp terminal intersections.
- Alternative 2b (SPUI) would reduce the number of vehicle conflicts at the ramp terminals by reducing the number of ramp terminal intersections from two to one. The single intersection would eliminate queuing between the ramp terminal intersections and likely reduce the number of rear-end crashes occurring in this area. Similar to Alternative 1, all left turns would be protected only and would likely reduce the number of angle crashes occurring at the ramp terminals.
- Alternative 3b (DDI) would reduce the number of vehicle conflicts at the ramp terminals as a result of the redirected left turns at the intersections. The redirected left turns would likely reduce the number of angle crashes occurring at the ramp terminal intersections. Additionally, Alternative 3 would result in slower speeds on La Crosse Street through the interchange. This would result in a low severity of crashes in the area.

One of the advantages of the SPUI and DDI alternatives is the reduction in vehicle conflict points. The total vehicle conflicts for the proposed interchanges are shown in Table 4.

Table 4. Number of Total Vehicle Conflicts at the Proposed Interchanges

	No-Build	Alternative 1	Alternative 2b (SPUI)	Alternative 3b (DDI)
Number of Total Vehicle Conflicts at the Interchange	26	26	20	14

The safety benefits of building the proposed alternative interchanges are shown in Table 5. Currently, at the two La Crosse Street ramp terminals, there are 26.0 crashes per year. Assuming the configuration and crash rates remain the same, the projected year 2035 crashes at the ramp terminals increase to 40.7 crashes per year. A crash modification factor was calculated for alternative 2b and 3b using crash data from SDDOT and MoDOT. The construction of alternative 2b would reduce year 2035 ramp terminal crashes to 25.6 crashes per year. The construction of alternative 3b would reduce year 2035 ramp terminal crashes to 24.4 crashes per year.

Table 5. Safety Benefits of Proposed Interchanges

Location	Existing Entering Vehicles[1]	Projected Entering Vehicles[2]	Existing Crashes[3]	Projected Crashes No Build[3]	Projected Crashes Alt. 1[3,4]	Projected Crashes Alt. 2b[3,5]	Projected Crashes Alt. 3b[3,6]
La Crosse St / I-90 EB Ramps	22,000	35,000	14.8	23.5	N/A	14.8	14.1
La Crosse St / I-90 WB Ramps	18,900	29,000	11.2	17.2	N/A	10.8	10.3
Total	-	-	26.0	40.7	-	25.6	24.4

[1] Existing entering volumes are based on data available from the 2008 Rapid City Travel Demand Model
[2] Projected entering volumes are based on data available from the 2035 Rapid City Travel Demand Model
[3] Annualized
[4] No applicable Crash Modification Factor (CMF) from Highway Safety Manual (HSM)
[5] Applied CMF of 0.63 calculated from SDDOT before and after crash analysis for four interchanges in South Dakota – I-229/10th Street, I-90/Haines Avenue, I-29/Tea, I-29/12th Street
[6] Applied CMF of 0.60 calculated from "Safety Evaluation of Diverging Diamond Interchanges in Missouri" using three interchanges in Missouri – RT-13/I-44, I-270/Dorsett Road, James River Expressway/National Avenue

Operational Performance

The operations of the alternative interchange configurations were evaluated using appropriate Highway Capacity Manual analysis techniques. Traffic operations performance was analyzed for each alternative using year 2035 AM and PM peak hour traffic conditions. Using the year 2035 No-Build Condition, forecasted 2035 AM and PM peak hour traffic conditions, freeway operations would operate at LOS 'C' or better. The intersections would operate at LOS 'D' or better for the year 2035 No-Build Condition; however, an approach and several individual turning movements would operate at LOS 'F' during PM peak hour traffic conditions.

Freeway operations are expected to operate at LOS 'C' or better for each of the three build alternatives in year 2035. The intersections would also operate at LOS 'C' or better for each of the three build alternatives. The proposed diamond interchange is expected to exceed its available storage during portions of the PM peak hour. There are no locations where available storage is expected to be exceeded for the single point or diverging diamond interchange. The diverging diamond interchange is the preferred alternative as shown in Table 4 of the following section because constructability would work best (using existing bridge while building new bridge),this alternative would minimize impacts on adjacent landowners and provides the best overall traffic operations.

Evaluation Matrix

Table 6 provides a comparison of the characteristics of each of the interchange alternatives. The table shows that Alternative 3b, diverging diamond interchange, provides the best technical solution of the transportation needs at the I-90/La Crosse Street interchange.

Table 6. Interchange Options Evaluation Matrix – Weighted Scores[1]

Option	Description	Driver Familiarity	Maintenance of Traffic During Construction	Property Impacts	Order of Magnitude Cost	Traffic Operations and Year Of Breakdown	Vehicle Conflicts	Pedestrian Crossings at Unsignalized Locations	Weighted Score (1 = Worst; 3 = Best)
1	Diamond Interchange	3	2	1	3	1	2	3	1.80
2b	Single Point Urban Interchange	2	1	2	1	2	3	1	1.65
3b	Diverging Diamond Interchange	1	3	3	3	3	3	2	2.60
	Criteria Weights	10%	10%	15%	20%	25%	15%	5%	

[1]Criteria were scored from 1 to 3, with a value of 1 representing the worst score and 3 representing the best.

Coordination

The Project has been subject to agency coordination and public involvement as part of the environmental review process. Public involvement included two public meetings, one in November, 2012 and the other in February 2014. Both meetings were held in Rapid City and representatives from the SDDOT and FWHA were present. A webpage was established that provides access to the public meeting presentations and displays. Another public meeting will be held later this year at a date to be determined.

Figure 13 – Screenshot of Public Meeting Webpage

FUNDING PLAN

Anticipated Federal fiscal year of letting is year 2020. The anticipated non-inflated funding plan is provided in Table 7.

Table 7. Funding Plan

Project Number	State Funding Category	Federal Funding Category	Federal Funds	State Funds	Total Funds
IM 0090(112)59 PCN 6568	Interstate	National Highway Performance Program	$12.367 Million	$1.833 Million	$14.200 Million

Note: As funding is fluid, category breakdown may be different at time of project authorization.

As the project is anticipated to be let for contract in Federal fiscal year 2020 per SDDOT's developmental program, the inflated estimated cost for the overall Project is $15.991 million.

RECOMMENDATIONS

The technical analysis contained in this Interstate access report have found that the best solution for the transportation needs in the study area is to build a diverging diamond interchange, Alternative 3b, at the I-90/La Crosse Street (Exit 59) interchange in Rapid City, South Dakota. The proposed interchange is at the site of the existing I-90/La Crosse Street interchange (Exit 59).

The eight considerations and requirements for Interstate access are addressed below:

1) The need being addressed by the request cannot be adequately satisfied by existing interchanges to the Interstate, and/or local roads and streets in the corridor can neither provide the desired access, nor can they be reasonably improved (such as access control along surface streets, improving traffic control, modifying ramp terminals and intersections, adding turn bays or lengthening storage) to satisfactorily accommodate the design-year traffic demands.

   The need for the Project was initially documented in the South Dakota Decennial Interstate Corridor Study (SDDOT, 2010). Phase 1 of the Decennial Study identified safety and capacity issues at the I-90/La Crosse Street interchange. The 2009 to 2012 crash rate for the Interchange was 5th highest out of 126 interchanges evaluated in the Decennial Study. Additionally, the interchange is located in a growing area of Rapid City and the increased traffic is straining the capacity of the current diamond interchange.

   The existing standard diamond interchange does not provide adequate turn bay storage to handle the traffic associated with La Crosse Street and the existing turn bays cannot be lengthened to provide the adequate storage. Many movements at La Crosse Street intersections are expected to operate at LOS 'F' during PM peak hour of Year 2035 No-Build Conditions. In order to maintain acceptable levels of traffic flow, this report has identified a diverging diamond interchange as providing the best solution to transportation needs in the Study Area.

   The proposed modification of the existing interchange at Exit 59 would not add any more access points to I-90. The reconfiguration of the existing interchange to a diverging diamond interchange will have negligible effect on I-90 traffic operations and the addition of a westbound auxiliary lane between Exit 59 and Exit 58 will improve I-90 operations.

2) The need being addressed by the request cannot be adequately satisfied by reasonable transportation system management (such as ramp metering, mass transit, and HOV facilities), geometric design, and alternative improvements to the Interstate with the proposed change(s) in access.

   The need to provide additional turn bay storage and increased capacity for certain movements cannot be addressed by transportation system management

(TSM), geometric design and alternative improvements. TSM solutions such as mass transit, ramp metering and HOV facilities would not be effective in addressing the need. It was determined that alternative modal solutions would not significantly alter traffic flow in the area. Through collaboration with SDDOT, the City of Rapid City and the Rapid City MPO it was determined that the reconstruction of the interchange will be necessary.

Initially, six interchange alternatives were developed for I-90/La Crosse Street. A screening of these alternatives was conducted and three of the alternatives were eliminated due to property impacts and traffic operations. A standard compressed diamond interchange, a single point urban interchange and diverging diamond interchange were selected for further evaluation. The diverging diamond interchange was selected as the preferred alternative because constructability would work best (using existing bridge while building new bridge),this alternative would minimize impacts on adjacent landowners and provides the best overall traffic operations.

3) An operational and safety analysis has concluded that the proposed change in access does not have a significant adverse impact on the safety and operation of the Interstate facility (which includes mainline lanes, existing, new, or modified ramps, ramp intersections with crossroad) or on the local street network based on both the current and the planned future traffic projections. The analysis shall, particularly in urbanized areas, include at least the first adjacent existing or proposed interchange on either side of the proposed change in access, shall be included in this analysis to the extent necessary to fully evaluate the safety and operational impacts that the proposed change in access and other transportation improvements may have on the local street network. Requests for a proposed change in access must include a description and assessment of the impacts and ability of the proposed changes to safely and efficiently collect, distribute and accommodate traffic on the Interstate facility, ramps, intersection of ramps with crossroad, and local street network. Each request must also include a conceptual plan of the type and location of the signs proposed to support each design alternative.

The operational analysis contained in this study shows that Interstate and mainline and ramp facilities would continue to operate within operational goals with any of the proposed alternatives. The crossroad intersections (La Crosse Street/Disk Drive and La Crosse Street/Eglin Drive) would operate at LOS 'B' and 'C' with the No-Build Alternative; however, several individual turning movements at the La Crosse Street/Eglin Street Intersection would operate at LOS 'F'. The ramp terminal intersections for each of the three build alternatives detailed in this study would operate at acceptable levels. Details for the operational analysis for each alternative are contained in the "Future Year Traffic" section.

A safety analysis of recent crash records has been provided in the "Existing Safety Analysis" section. It shows that the primary crash types in the Study Area *involve angle and rear-end crashes. The existing interchange configuration has a total of 26 vehicle conflict points at the interchange. The diverging diamond interchange reduces the number of vehicle conflict points to 14. Also, in year 2035 the no-build alternative is projected to have 40.7 ramp terminal crashes annually. The diverging diamond interchange is projected to reduce the year 2035 ramp terminal crashes annually to 24.4. Details for the safety analysis for each alternative are contained in the "Safety" section.*

The conceptual signing plan for the proposed Diverging Diamond Interchange alternative is shown in Figure 14.

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

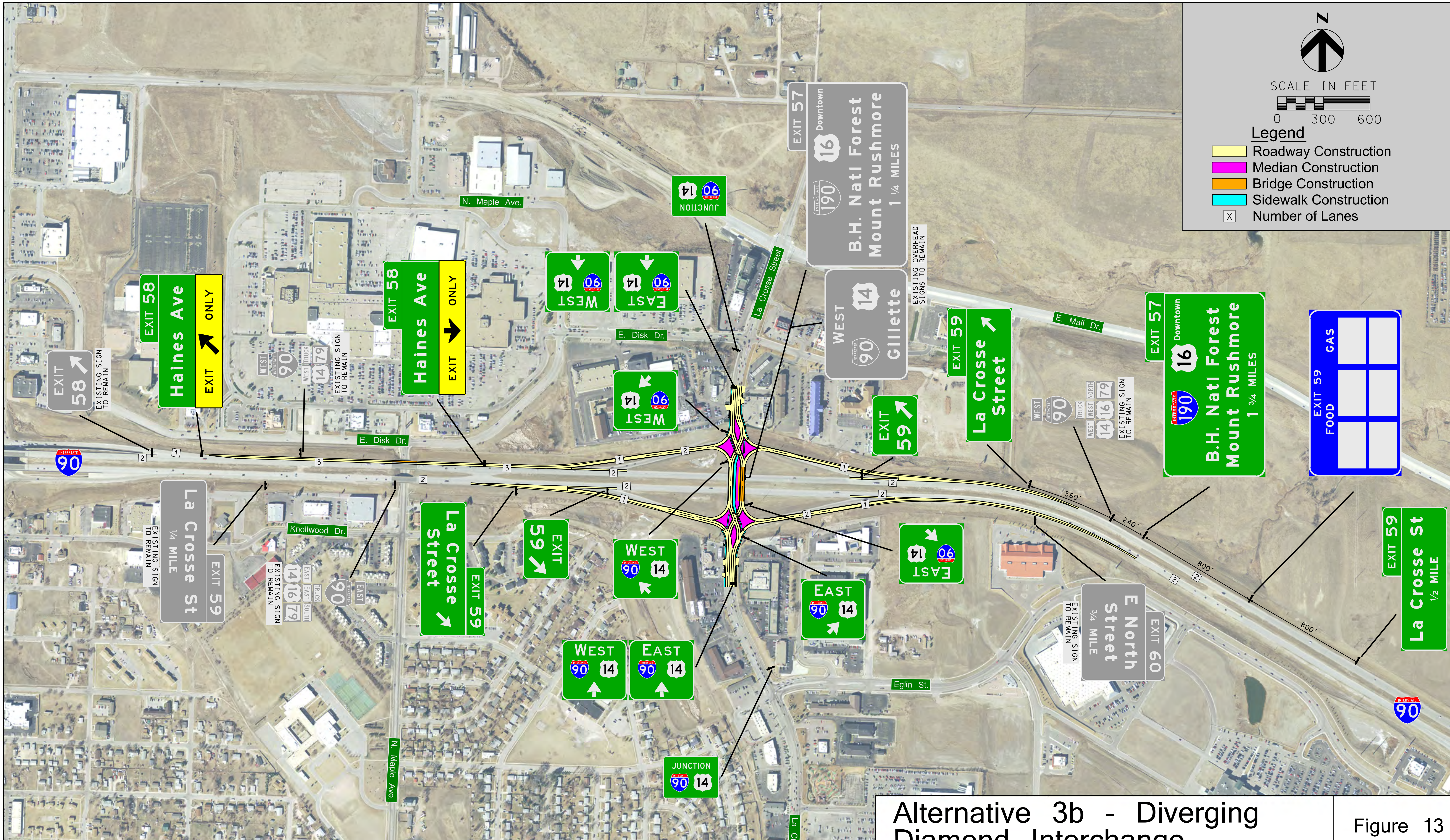
   The proposed access is a reconfiguration of an existing interchange with a public road (La Crosse Street) and provides all movements. The conceptual drawings have been prepared using current standards and design using current standards is anticipated.

5) The proposal considers and is consistent with local and regional land use and transportation plans. Prior to receiving final approval, all requests for new or revised access must be included in an adopted Metropolitan Transportation Plan, in the adopted Statewide or Metropolitan Transportation Improvement Program (STIP or TIP), and the Congestion Management Process within transportation management areas, as appropriate, and as specified.

   The proposal is the result of the SDDOT Decennial Interstate Corridor Study (2010) which identified the La Crosse Street/I-90 interchange as one of ten existing interstate interchanges targeted for improvement in Phase 2 of the Decennial Study. The proposed interchange is consistent with local and regional land use and is included in the Rapid City Metropolitan Planning Organization Long Range Transportation Plan (RapidTRIP 2035). The SDDOT STIP is for 4-year time periods and this project will be included in futures STIPs that include year 2019.

6) In corridors where the potential exists for future multiple interchange additions, a comprehensive corridor or network study must accompany all requests for new or revised access with recommendations that address all of the proposed and desired access changes within the context of a longer-range system or network plan.

   The SDDOT has prepared the Decennial Interstate Corridor Study (2010), which considered all proposed additions to the Interstate Highways System within the state of South Dakota. The proposed interchange modification was addressed in the Decennial Study and no other interchanges were proposed within the Study Area.



NOTE: SIGNS SHOWN IN THIS FIGURE ARE INCREASED IN SIZE TO ENHANCE VISIBILITY AND ARE NOT TO SCALE

Alternative 3b - Diverging Diamond Interchange

Guide Sign Layout

Interstate 90/La Crosse Street Interchange Study

Rapid City, South Dakota

Figure 13

September 2014

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

   The proposed access change results not from any particular development, but from overall growth in the northeast edge of Rapid City and safety issues resulting from congestion in the vicinity of the interchange.

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

   The environmental evaluation is being completed in conjunction with this study. Potential environmental impacts associated with the Project are being evaluated as part of a CE.

APPENDIX

1 – Existing and Year 2035 No-Build Level of Service
2 – Year 2035 Build Level of Service
3 – Interchange Aerial Photos
4 – Methods and Assumptions – Amendment 2
5 – Build Options Analysis and Year of Breakdown Analysis
6 – Interchange Option Evaluation Matrix – Methodology
7 – Bicycle and Pedestrian Plan Map/Transit Plan Map

APPENDIX - 1

Existing and Year 2035 No-Build Level of Service

I. Basic Freeway Segment Analysis

HCS 2010: Basic Freeway Segments Release 6.3

Phone: Fax:
E-mail:

Operational Analysis

Analyst:	MDF
Agency or Company:	HDR
Date Performed:	10/30/2012
Analysis Time Period:	AM Peak
Freeway/Direction:	I-90 EB
From/To:	B/W Haines and La Crosse
Jurisdiction:	SDDOT
Analysis Year:	2012

Description: I-90/La Crosse Street Interchange Study

Flow Inputs and Adjustments

Volume, V	1110	veh/h
Peak-hour factor, PHF	0.87	
Peak 15-min volume, v15	319	v
Trucks and buses	5	%
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	0.976	
Driver population factor, fp	1.00	
Flow rate, vp	654	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	2	
Free-flow speed:	Measured	
FFS or BFFS	65.0	mi/h
Lane width adjustment, fLW	-	mi/h
Lateral clearance adjustment, fLC	-	mi/h
TRD adjustment	-	mi/h
Free-flow speed, FFS	65.0	mi/h

LOS and Performance Measures

Flow rate, vp	654	pc/h/ln
Free-flow speed, FFS	65.0	mi/h
Average passenger-car speed, S	65.0	mi/h
Number of lanes, N	2	
Density, D	10.1	pc/mi/ln
Level of service, LOS	A	

HCS 2010: Basic Freeway Segments Release 6.3

Phone: Fax:
E-mail:

Operational Analysis

Analyst:	MDF
Agency or Company:	HDR
Date Performed:	10/30/2012
Analysis Time Period:	AM Peak
Freeway/Direction:	I-90 EB
From/To:	B/W La Crosse and North
Jurisdiction:	SDDOT
Analysis Year:	2012

Description: I-90/La Crosse Street Interchange Study

Flow Inputs and Adjustments

Volume, V	1000	veh/h
Peak-hour factor, PHF	0.87	
Peak 15-min volume, v15	287	v
Trucks and buses	5	%
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	0.976	
Driver population factor, fp	1.00	
Flow rate, vp	589	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	2	
Free-flow speed:	Measured	
FFS or BFFS	65.0	mi/h
Lane width adjustment, fLW	-	mi/h
Lateral clearance adjustment, fLC	-	mi/h
TRD adjustment	-	mi/h
Free-flow speed, FFS	65.0	mi/h

LOS and Performance Measures

Flow rate, vp	589	pc/h/ln
Free-flow speed, FFS	65.0	mi/h
Average passenger-car speed, S	65.0	mi/h
Number of lanes, N	2	
Density, D	9.1	pc/mi/ln
Level of service, LOS	A	

HCS 2010: Basic Freeway Segments Release 6.3

Phone: Fax:
E-mail:

Operational Analysis

Analyst:	MDF
Agency or Company:	HDR
Date Performed:	10/30/2012
Analysis Time Period:	AM Peak
Freeway/Direction:	I-90 WB
From/To:	B/W North and La Crosse
Jurisdiction:	SDDOT
Analysis Year:	2012

Description: I-90/La Crosse Street Interchange Study

Flow Inputs and Adjustments

Volume, V	910	veh/h
Peak-hour factor, PHF	0.82	
Peak 15-min volume, v15	277	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	577	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	2	
Free-flow speed:	Measured	
FFS or BFFS	65.0	mi/h
Lane width adjustment, fLW	-	mi/h
Lateral clearance adjustment, fLC	-	mi/h
TRD adjustment	-	mi/h
Free-flow speed, FFS	65.0	mi/h

LOS and Performance Measures

Flow rate, vp	577	pc/h/ln
Free-flow speed, FFS	65.0	mi/h
Average passenger-car speed, S	65.0	mi/h
Number of lanes, N	2	
Density, D	8.9	pc/mi/ln
Level of service, LOS	A	

HCS 2010: Basic Freeway Segments Release 6.3

Phone: Fax:
E-mail:

Operational Analysis

Analyst:	MDF
Agency or Company:	HDR
Date Performed:	10/30/2012
Analysis Time Period:	AM Peak
Freeway/Direction:	I-90 WB
From/To:	B/W La Crosse and Haines
Jurisdiction:	SDDOT
Analysis Year:	2012

Description: I-90/La Crosse Street Interchange Study

Flow Inputs and Adjustments

Volume, V	1085	veh/h
Peak-hour factor, PHF	0.82	
Peak 15-min volume, v15	331	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	688	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	2	
Free-flow speed:	Measured	
FFS or BFFS	65.0	mi/h
Lane width adjustment, fLW	-	mi/h
Lateral clearance adjustment, fLC	-	mi/h
TRD adjustment	-	mi/h
Free-flow speed, FFS	65.0	mi/h

LOS and Performance Measures

Flow rate, vp	688	pc/h/ln
Free-flow speed, FFS	65.0	mi/h
Average passenger-car speed, S	65.0	mi/h
Number of lanes, N	2	
Density, D	10.6	pc/mi/ln
Level of service, LOS	A	

HCS 2010: Basic Freeway Segments Release 6.3

Phone: Fax:
E-mail:

Operational Analysis

Analyst:	MDF
Agency or Company:	HDR
Date Performed:	10/30/2012
Analysis Time Period:	PM Peak
Freeway/Direction:	I-90 EB
From/To:	B/W Haines and La Crosse
Jurisdiction:	SDDOT
Analysis Year:	2012

Description: I-90/La Crosse Street Interchange Study

Flow Inputs and Adjustments

Volume, V	1635	veh/h
Peak-hour factor, PHF	0.88	
Peak 15-min volume, v15	464	v
Trucks and buses	5	%
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	0.976	
Driver population factor, fp	1.00	
Flow rate, vp	952	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	2	
Free-flow speed:	Measured	
FFS or BFFS	65.0	mi/h
Lane width adjustment, fLW	-	mi/h
Lateral clearance adjustment, fLC	-	mi/h
TRD adjustment	-	mi/h
Free-flow speed, FFS	65.0	mi/h

LOS and Performance Measures

Flow rate, vp	952	pc/h/ln
Free-flow speed, FFS	65.0	mi/h
Average passenger-car speed, S	65.0	mi/h
Number of lanes, N	2	
Density, D	14.6	pc/mi/ln
Level of service, LOS	B	

HCS 2010: Basic Freeway Segments Release 6.3

Phone: Fax:
E-mail:

Operational Analysis

Analyst:	MDF
Agency or Company:	HDR
Date Performed:	10/30/2012
Analysis Time Period:	PM Peak
Freeway/Direction:	I-90 EB
From/To:	B/W La Crosse and North
Jurisdiction:	SDDOT
Analysis Year:	2012

Description: I-90/La Crosse Street Interchange Study

Flow Inputs and Adjustments

Volume, V	1310	veh/h
Peak-hour factor, PHF	0.88	
Peak 15-min volume, v15	372	v
Trucks and buses	5	%
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	0.976	
Driver population factor, fp	1.00	
Flow rate, vp	763	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	2	
Free-flow speed:	Measured	
FFS or BFFS	65.0	mi/h
Lane width adjustment, fLW	-	mi/h
Lateral clearance adjustment, fLC	-	mi/h
TRD adjustment	-	mi/h
Free-flow speed, FFS	65.0	mi/h

LOS and Performance Measures

Flow rate, vp	763	pc/h/ln
Free-flow speed, FFS	65.0	mi/h
Average passenger-car speed, S	65.0	mi/h
Number of lanes, N	2	
Density, D	11.7	pc/mi/ln
Level of service, LOS	B	

HCS 2010: Basic Freeway Segments Release 6.3

Phone: Fax:
E-mail:

Operational Analysis

Analyst:	MDF
Agency or Company:	HDR
Date Performed:	10/30/2012
Analysis Time Period:	PM Peak
Freeway/Direction:	I-90 WB
From/To:	B/W North and La Crosse
Jurisdiction:	SDDOT
Analysis Year:	2012

Description: I-90/La Crosse Street Interchange Study

Flow Inputs and Adjustments

Volume, V	1470	veh/h
Peak-hour factor, PHF	0.85	
Peak 15-min volume, v15	432	v
Trucks and buses	3	%
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	0.985	
Driver population factor, fp	1.00	
Flow rate, vp	878	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	2	
Free-flow speed:	Measured	
FFS or BFFS	65.0	mi/h
Lane width adjustment, fLW	-	mi/h
Lateral clearance adjustment, fLC	-	mi/h
TRD adjustment	-	mi/h
Free-flow speed, FFS	65.0	mi/h

LOS and Performance Measures

Flow rate, vp	878	pc/h/ln
Free-flow speed, FFS	65.0	mi/h
Average passenger-car speed, S	65.0	mi/h
Number of lanes, N	2	
Density, D	13.5	pc/mi/ln
Level of service, LOS	B	

HCS 2010: Basic Freeway Segments Release 6.3

Phone: Fax:
E-mail:

Operational Analysis

Analyst:	MDF
Agency or Company:	HDR
Date Performed:	10/30/2012
Analysis Time Period:	PM Peak
Freeway/Direction:	I-90 WB
From/To:	B/W La Crosse and Haines
Jurisdiction:	SDDOT
Analysis Year:	2012

Description: I-90/La Crosse Street Interchange Study

Flow Inputs and Adjustments

Volume, V	1700	veh/h
Peak-hour factor, PHF	0.85	
Peak 15-min volume, v15	500	v
Trucks and buses	3	%
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	0.985	
Driver population factor, fp	1.00	
Flow rate, vp	1015	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	2	
Free-flow speed:	Measured	
FFS or BFFS	65.0	mi/h
Lane width adjustment, fLW	-	mi/h
Lateral clearance adjustment, fLC	-	mi/h
TRD adjustment	-	mi/h
Free-flow speed, FFS	65.0	mi/h

LOS and Performance Measures

Flow rate, vp	1015	pc/h/ln
Free-flow speed, FFS	65.0	mi/h
Average passenger-car speed, S	65.0	mi/h
Number of lanes, N	2	
Density, D	15.6	pc/mi/ln
Level of service, LOS	B	

HCS 2010: Basic Freeway Segments Release 6.3

Phone: Fax:
E-mail:

Operational Analysis

Analyst:	MDF
Agency or Company:	HDR
Date Performed:	10/30/2012
Analysis Time Period:	AM Peak
Freeway/Direction:	I-90 EB
From/To:	B/W Haines and La Crosse
Jurisdiction:	SDDOT
Analysis Year:	2035 No-Build

Description: I-90/La Crosse Street Interchange Study

Flow Inputs and Adjustments

Volume, V	1580	veh/h
Peak-hour factor, PHF	0.90	
Peak 15-min volume, v15	439	v
Trucks and buses	5	%
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	0.976	
Driver population factor, fp	1.00	
Flow rate, vp	900	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	2	
Free-flow speed:	Measured	
FFS or BFFS	65.0	mi/h
Lane width adjustment, fLW	-	mi/h
Lateral clearance adjustment, fLC	-	mi/h
TRD adjustment	-	mi/h
Free-flow speed, FFS	65.0	mi/h

LOS and Performance Measures

Flow rate, vp	900	pc/h/ln
Free-flow speed, FFS	65.0	mi/h
Average passenger-car speed, S	65.0	mi/h
Number of lanes, N	2	
Density, D	13.8	pc/mi/ln
Level of service, LOS	B	

HCS 2010: Basic Freeway Segments Release 6.3

Phone: Fax:
E-mail:

Operational Analysis

Analyst:	MDF
Agency or Company:	HDR
Date Performed:	10/30/2012
Analysis Time Period:	AM Peak
Freeway/Direction:	I-90 EB
From/To:	B/W La Crosse and North
Jurisdiction:	SDDOT
Analysis Year:	2035 No-Build

Description: I-90/La Crosse Street Interchange Study

Flow Inputs and Adjustments

Volume, V	1480	veh/h
Peak-hour factor, PHF	0.90	
Peak 15-min volume, v15	411	v
Trucks and buses	5	%
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	0.976	
Driver population factor, fp	1.00	
Flow rate, vp	843	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	2	
Free-flow speed:	Measured	
FFS or BFFS	65.0	mi/h
Lane width adjustment, fLW	-	mi/h
Lateral clearance adjustment, fLC	-	mi/h
TRD adjustment	-	mi/h
Free-flow speed, FFS	65.0	mi/h

LOS and Performance Measures

Flow rate, vp	843	pc/h/ln
Free-flow speed, FFS	65.0	mi/h
Average passenger-car speed, S	65.0	mi/h
Number of lanes, N	2	
Density, D	13.0	pc/mi/ln
Level of service, LOS	B	

HCS 2010: Basic Freeway Segments Release 6.3

Phone: Fax:
E-mail:

Operational Analysis

Analyst:	MDF
Agency or Company:	HDR
Date Performed:	10/30/2012
Analysis Time Period:	AM Peak
Freeway/Direction:	I-90 WB
From/To:	B/W North and La Crosse
Jurisdiction:	SDDOT
Analysis Year:	2035 No-Build

Description: I-90/La Crosse Street Interchange Study

Flow Inputs and Adjustments

Volume, V	1420	veh/h
Peak-hour factor, PHF	0.85	
Peak 15-min volume, v15	418	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	869	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	2	
Free-flow speed:	Measured	
FFS or BFFS	65.0	mi/h
Lane width adjustment, fLW	-	mi/h
Lateral clearance adjustment, fLC	-	mi/h
TRD adjustment	-	mi/h
Free-flow speed, FFS	65.0	mi/h

LOS and Performance Measures

Flow rate, vp	869	pc/h/ln
Free-flow speed, FFS	65.0	mi/h
Average passenger-car speed, S	65.0	mi/h
Number of lanes, N	2	
Density, D	13.4	pc/mi/ln
Level of service, LOS	B	

HCS 2010: Basic Freeway Segments Release 6.3

Phone: Fax:
E-mail:

Operational Analysis

Analyst:	MDF
Agency or Company:	HDR
Date Performed:	10/30/2012
Analysis Time Period:	AM Peak
Freeway/Direction:	I-90 WB
From/To:	B/W La Crosse and Haines
Jurisdiction:	SDDOT
Analysis Year:	2035 No-Build

Description: I-90/La Crosse Street Interchange Study

Flow Inputs and Adjustments

Volume, V	1670	veh/h
Peak-hour factor, PHF	0.85	
Peak 15-min volume, v15	491	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	1022	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	2	
Free-flow speed:	Measured	
FFS or BFFS	65.0	mi/h
Lane width adjustment, fLW	-	mi/h
Lateral clearance adjustment, fLC	-	mi/h
TRD adjustment	-	mi/h
Free-flow speed, FFS	65.0	mi/h

LOS and Performance Measures

Flow rate, vp	1022	pc/h/ln
Free-flow speed, FFS	65.0	mi/h
Average passenger-car speed, S	65.0	mi/h
Number of lanes, N	2	
Density, D	15.7	pc/mi/ln
Level of service, LOS	B	

Phone: Fax:
E-mail:

Operational Analysis

Analyst:	MDF
Agency or Company:	HDR
Date Performed:	10/30/2012
Analysis Time Period:	PM Peak
Freeway/Direction:	I-90 EB
From/To:	B/W Haines and La Crosse
Jurisdiction:	SDDOT
Analysis Year:	2035 No-Build

Description: I-90/La Crosse Street Interchange Study

Flow Inputs and Adjustments

Volume, V	2280	veh/h
Peak-hour factor, PHF	0.90	
Peak 15-min volume, v15	633	v
Trucks and buses	5	%
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	0.976	
Driver population factor, fp	1.00	
Flow rate, vp	1298	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	2	
Free-flow speed:	Measured	
FFS or BFFS	65.0	mi/h
Lane width adjustment, fLW	-	mi/h
Lateral clearance adjustment, fLC	-	mi/h
TRD adjustment	-	mi/h
Free-flow speed, FFS	65.0	mi/h

LOS and Performance Measures

Flow rate, vp	1298	pc/h/ln
Free-flow speed, FFS	65.0	mi/h
Average passenger-car speed, S	65.0	mi/h
Number of lanes, N	2	
Density, D	20.0	pc/mi/ln
Level of service, LOS	C	

HCS 2010: Basic Freeway Segments Release 6.3

Phone: Fax:
E-mail:

Operational Analysis

Analyst:	MDF
Agency or Company:	HDR
Date Performed:	10/30/2012
Analysis Time Period:	PM Peak
Freeway/Direction:	I-90 EB
From/To:	B/W La Crosse and North
Jurisdiction:	SDDOT
Analysis Year:	2035 No-Build

Description: I-90/La Crosse Street Interchange Study

Flow Inputs and Adjustments

Volume, V	1940	veh/h
Peak-hour factor, PHF	0.90	
Peak 15-min volume, v15	539	v
Trucks and buses	5	%
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	0.976	
Driver population factor, fp	1.00	
Flow rate, vp	1105	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	2	
Free-flow speed:	Measured	
FFS or BFFS	65.0	mi/h
Lane width adjustment, fLW	-	mi/h
Lateral clearance adjustment, fLC	-	mi/h
TRD adjustment	-	mi/h
Free-flow speed, FFS	65.0	mi/h

LOS and Performance Measures

Flow rate, vp	1105	pc/h/ln
Free-flow speed, FFS	65.0	mi/h
Average passenger-car speed, S	65.0	mi/h
Number of lanes, N	2	
Density, D	17.0	pc/mi/ln
Level of service, LOS	B	

HCS 2010: Basic Freeway Segments Release 6.3

Phone: Fax:
E-mail:

Operational Analysis

Analyst:	MDF
Agency or Company:	HDR
Date Performed:	10/30/2012
Analysis Time Period:	PM Peak
Freeway/Direction:	I-90 WB
From/To:	B/W North and La Crosse
Jurisdiction:	SDDOT
Analysis Year:	2035 No-Build

Description: I-90/La Crosse Street Interchange Study

Flow Inputs and Adjustments

Volume, V	2300	veh/h
Peak-hour factor, PHF	0.90	
Peak 15-min volume, v15	639	v
Trucks and buses	3	%
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	0.985	
Driver population factor, fp	1.00	
Flow rate, vp	1297	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	2	
Free-flow speed:	Measured	
FFS or BFFS	65.0	mi/h
Lane width adjustment, fLW	-	mi/h
Lateral clearance adjustment, fLC	-	mi/h
TRD adjustment	-	mi/h
Free-flow speed, FFS	65.0	mi/h

LOS and Performance Measures

Flow rate, vp	1297	pc/h/ln
Free-flow speed, FFS	65.0	mi/h
Average passenger-car speed, S	65.0	mi/h
Number of lanes, N	2	
Density, D	20.0	pc/mi/ln
Level of service, LOS	C	

HCS 2010: Basic Freeway Segments Release 6.3

Phone: Fax:
E-mail:

Operational Analysis

Analyst:	MDF
Agency or Company:	HDR
Date Performed:	10/30/2012
Analysis Time Period:	PM Peak
Freeway/Direction:	I-90 WB
From/To:	B/W La Crosse and Haines
Jurisdiction:	SDDOT
Analysis Year:	2035 No-Build

Description: I-90/La Crosse Street Interchange Study

Flow Inputs and Adjustments

Volume, V	2650	veh/h
Peak-hour factor, PHF	0.90	
Peak 15-min volume, v15	736	v
Trucks and buses	3	%
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	0.985	
Driver population factor, fp	1.00	
Flow rate, vp	1494	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	2	
Free-flow speed:	Measured	
FFS or BFFS	65.0	mi/h
Lane width adjustment, fLW	-	mi/h
Lateral clearance adjustment, fLC	-	mi/h
TRD adjustment	-	mi/h
Free-flow speed, FFS	65.0	mi/h

LOS and Performance Measures

Flow rate, vp	1494	pc/h/ln
Free-flow speed, FFS	65.0	mi/h
Average passenger-car speed, S	64.9	mi/h
Number of lanes, N	2	
Density, D	23.0	pc/mi/ln
Level of service, LOS	C	

II. Freeway Merge and Diverge Segment Analysis

HCS 2010: Freeway Merge and Diverge Segments Release 6.3

Phone: Fax:
E-mail:

Merge Analysis

Analyst:	MDF
Agency/Co.:	HDR
Date performed:	10/30/2012
Analysis time period:	AM Peak
Freeway/Dir of Travel:	I-90 EB
Junction:	Merge from Haines
Jurisdiction:	SDDOT
Analysis Year:	2012

Description: I-90/La Crosse Street Interchange Study

Freeway Data

Type of analysis	Merge	
Number of lanes in freeway	2	
Free-flow speed on freeway	65.0	mph
Volume on freeway	910	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	200	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	370	vph
Position of adjacent Ramp	Upstream	
Type of adjacent Ramp	Off	
Distance to adjacent Ramp	2200	ft

Conversion to pc/h Under Base Conditions

Junction Components	Freeway		Ramp		Adjacent Ramp	
Volume, V (vph)	910		200		370	vph
Peak-hour factor, PHF	0.87		0.87		0.87	
Peak 15-min volume, v15	261		57		106	v
Trucks and buses	5		5		5	%
Recreational vehicles	0		0		0	%
Terrain type:	Level		Level		Level	
Grade		%		%		%
Length		mi		mi		mi
Trucks and buses PCE, ET	1.5		1.5		1.5	
Recreational vehicle PCE, ER	1.2		1.2		1.2	

```
Heavy vehicle adjustment, fHV          0.976       0.976       0.976
Driver population factor, fP           1.00        1.00        1.00
Flow rate, vp                          1072        236         436        pcph

_________________________Estimation of V12 Merge Areas_________________________

                  L  =            (Equation 13-6 or 13-7)
                   EQ
                  P  =    1.000   Using Equation  0
                   FM
                  v  = v  (P  ) =  1072   pc/h
                   12   F   FM

_______________________________Capacity Checks________________________________

                           Actual        Maximum         LOS F?
     v                     1308          4700            No
      FO
     v  or v               0    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    = 1072                   (Equation 13-15, 13-16, 13-18, or 13-19)
         12A

________________________Flow Entering Merge Influence Area_____________________
                      Actual        Max Desirable        Violation?
     v                1308          4600                 No
      R12
_________________Level of Service Determination (if not F)____________________

Density, D = 5.475 + 0.00734 v  + 0.0078 v   - 0.00627 L   =   9.9     pc/mi/ln
         R                    R           12             A
Level of service for ramp-freeway junction areas of influence  A

_____________________________Speed Estimation_________________________________

Intermediate speed variable,                 M  = 0.254
                                              S
Space mean speed in ramp influence area,     S  = 59.1    mph
                                              R
Space mean speed in outer lanes,             S  =  N/A    mph
                                              0
Space mean speed for all vehicles,           S  = 59.1    mph
_______________________________________________________________________________
```

Phone: Fax:
E-mail:

Diverge Analysis

Analyst:	MDF
Agency/Co.:	HDR
Date performed:	10/30/2012
Analysis time period:	AM Peak
Freeway/Dir of Travel:	I-90 EB
Junction:	Diverge to La Crosse
Jurisdiction:	SDDOT
Analysis Year:	2012

Description: I-90/La Crosse Street Interchange Study

Freeway Data

Type of analysis	Diverge	
Number of lanes in freeway	2	
Free-flow speed on freeway	65.0	mph
Volume on freeway	1110	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	315	vph
Length of first accel/decel lane	680	ft
Length of second accel/decel lane		ft

Adjacent Ramp Data (if one exists)

Does adjacent ramp exist?	Yes	
Volume on adjacent ramp	205	vph
Position of adjacent ramp	Downstream	
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)	1110		315		205	vph
Peak-hour factor, PHF	0.87		0.87		0.87	
Peak 15-min volume, v15	319		91		59	v
Trucks and buses	5		5		5	%
Recreational vehicles	0		0		0	%
Terrain type:	Level		Level		Level	
Grade	0.00	%	0.00	%	0.00	%
Length	0.00	mi	0.00	mi	0.00	mi
Trucks and buses PCE, ET	1.5		1.5		1.5	
Recreational vehicle PCE, ER	1.2		1.2		1.2	

```
Heavy vehicle adjustment, fHV           0.976       0.976       0.976
Driver population factor, fP            1.00        1.00        1.00
Flow rate, vp                           1308        371         242        pcph

_________________________Estimation of V12 Diverge Areas_______________________

                  L  =            (Equation 13-12 or 13-13)
                   EQ
                  P  =    1.000   Using Equation  0
                   FD
                  v  = v  + (v - v ) P  =  1308   pc/h
                   12   R     F   R   FD

_______________________________Capacity Checks_________________________________

                           Actual        Maximum         LOS F?
     v  = v                1308          4700            No
      Fi   F
     v  = v - v            937           4700            No
      FO   F   R
     v                     371           2100            No
      R
     v  or v               0    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    = 1308                   (Equation 13-15, 13-16, 13-18, or 13-19)
         12A

______________________Flow Entering Diverge Influence Area_____________________
                      Actual        Max Desirable         Violation?
     v                1308          4400                  No
      12
_________________Level of Service Determination (if not F)_____________________

Density,               D = 4.252 + 0.0086 v  - 0.009  L   =   9.4     pc/mi/ln
                        R                  12          D
Level of service for ramp-freeway junction areas of influence A

_____________________________Speed Estimation__________________________________

Intermediate speed variable,                D  = 0.331
                                             S
Space mean speed in ramp influence area,    S  = 57.4    mph
                                             R
Space mean speed in outer lanes,            S  =  N/A    mph
                                             0
Space mean speed for all vehicles,          S  = 57.4    mph
_______________________________________________________________________________
```

HCS 2010: Freeway Merge and Diverge Segments Release 6.3

Phone: Fax:
E-mail:

Merge Analysis

Analyst:	MDF
Agency/Co.:	HDR
Date performed:	10/30/2012
Analysis time period:	AM Peak
Freeway/Dir of Travel:	I-90 EB
Junction:	Merge from La Crosse
Jurisdiction:	SDDOT
Analysis Year:	2012

Description: I-90/La Crosse Street Interchange Study

Freeway Data

Type of analysis	Merge	
Number of lanes in freeway	2	
Free-flow speed on freeway	65.0	mph
Volume on freeway	795	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	205	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	315	vph
Position of adjacent Ramp	Upstream	
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)	795		205		315	vph
Peak-hour factor, PHF	0.87		0.87		0.87	
Peak 15-min volume, v15	228		59		91	v
Trucks and buses	5		5		5	%
Recreational vehicles	0		0		0	%
Terrain type:	Level		Level		Level	
Grade		%		%		%
Length		mi		mi		mi
Trucks and buses PCE, ET	1.5		1.5		1.5	
Recreational vehicle PCE, ER	1.2		1.2		1.2	

```
Heavy vehicle adjustment, fHV           0.976       0.976       0.976
Driver population factor, fP            1.00        1.00        1.00
Flow rate, vp                           937         242         371       pcph

_________________________Estimation of V12 Merge Areas_________________________

                  L   =            (Equation 13-6 or 13-7)
                   EQ
                  P   =    1.000   Using Equation  0
                   FM
                  v  = v  (P  ) =  937    pc/h
                   12   F   FM

_______________________________Capacity Checks_________________________________

                           Actual        Maximum         LOS F?
     v                     1179          4700            No
      FO
     v  or v               0    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    = 937                    (Equation 13-15, 13-16, 13-18, or 13-19)
         12A

________________________Flow Entering Merge Influence Area_____________________
                      Actual        Max Desirable        Violation?
     v                1179          4600                 No
      R12
_________________Level of Service Determination (if not F)_____________________

Density, D = 5.475 + 0.00734 v  + 0.0078 v   - 0.00627 L   =   8.3     pc/mi/ln
          R                   R           12            A
Level of service for ramp-freeway junction areas of influence  A

_____________________________Speed Estimation__________________________________

Intermediate speed variable,                 M  = 0.244
                                              S
Space mean speed in ramp influence area,     S  = 59.4    mph
                                              R
Space mean speed in outer lanes,             S  =  N/A    mph
                                              0
Space mean speed for all vehicles,           S  = 59.4    mph
_______________________________________________________________________________
```

HCS 2010: Freeway Merge and Diverge Segments Release 6.3

Phone: Fax:
E-mail:

Diverge Analysis

Analyst:	MDF
Agency/Co.:	HDR
Date performed:	10/30/2012
Analysis time period:	AM Peak
Freeway/Dir of Travel:	I-90 EB
Junction:	Diverge to North
Jurisdiction:	SDDOT
Analysis Year:	2012

Description: I-90/La Crosse Street Interchange Study

Freeway Data

Type of analysis	Diverge	
Number of lanes in freeway	2	
Free-flow speed on freeway	65.0	mph
Volume on freeway	1000	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	325	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	100	vph
Position of adjacent ramp	Downstream	
Type of adjacent ramp	On	
Distance to adjacent ramp	3100	ft

Conversion to pc/h Under Base Conditions

Junction Components	Freeway		Ramp		Adjacent Ramp		
Volume, V (vph)	1000		325		100		vph
Peak-hour factor, PHF	0.87		0.87		0.87		
Peak 15-min volume, v15	287		93		29		v
Trucks and buses	5		5		5		%
Recreational vehicles	0		0		0		%
Terrain type:	Level		Level		Level		
Grade	0.00	%	0.00	%	0.00	%	
Length	0.00	mi	0.00	mi	0.00	mi	
Trucks and buses PCE, ET	1.5		1.5		1.5		
Recreational vehicle PCE, ER	1.2		1.2		1.2		

Heavy vehicle adjustment, fHV	0.976	0.976	0.976	
Driver population factor, fP	1.00	1.00	1.00	
Flow rate, vp	1178	383	118	pcph

Estimation of V12 Diverge Areas

L_{EQ} = (Equation 13-12 or 13-13)

P_{FD} = 1.000 Using Equation 0

$v_{12} = v_R + (v_F - v_R) P_{FD}$ = 1178 pc/h

Capacity Checks

	Actual	Maximum	LOS F?
$v_{Fi} = v_F$	1178	4700	No
$v_{FO} = v_F - v_R$	795	4700	No
v_R	383	2100	No
v_3 or v_{av34}	0 pc/h	(Equation 13-14 or 13-17)	

Is v_3 or v_{av34} > 2700 pc/h? No

Is v_3 or v_{av34} > 1.5 v_{12}/2 No

If yes, v_{12A} = 1178 (Equation 13-15, 13-16, 13-18, or 13-19)

Flow Entering Diverge Influence Area

	Actual	Max Desirable	Violation?
v_{12}	1178	4400	No

Level of Service Determination (if not F)

Density, $D_R = 4.252 + 0.0086\, v_{12} - 0.009\, L_D$ = 12.1 pc/mi/ln

Level of service for ramp-freeway junction areas of influence B

Speed Estimation

Intermediate speed variable, D_S = 0.332

Space mean speed in ramp influence area, S_R = 57.4 mph

Space mean speed in outer lanes, S_0 = N/A mph

Space mean speed for all vehicles, S = 57.4 mph

HCS 2010: Freeway Merge and Diverge Segments Release 6.3

Phone: Fax:
E-mail:

Merge Analysis

Analyst:	MDF
Agency/Co.:	HDR
Date performed:	10/30/2012
Analysis time period:	AM Peak
Freeway/Dir of Travel:	I-90 EB
Junction:	Merge from North
Jurisdiction:	SDDOT
Analysis Year:	2012

Description: I-90/La Crosse Street Interchange Study

Freeway Data

Type of analysis	Merge	
Number of lanes in freeway	2	
Free-flow speed on freeway	65.0	mph
Volume on freeway	675	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	100	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	325	vph
Position of adjacent Ramp	Upstream	
Type of adjacent Ramp	Off	
Distance to adjacent Ramp	3100	ft

Conversion to pc/h Under Base Conditions

Junction Components	Freeway		Ramp		Adjacent Ramp	
Volume, V (vph)	675		100		325	vph
Peak-hour factor, PHF	0.87		0.87		0.87	
Peak 15-min volume, v15	194		29		93	v
Trucks and buses	5		5		5	%
Recreational vehicles	0		0		0	%
Terrain type:	Level		Level		Level	
Grade		%		%		%
Length		mi		mi		mi
Trucks and buses PCE, ET	1.5		1.5		1.5	
Recreational vehicle PCE, ER	1.2		1.2		1.2	

```
Heavy vehicle adjustment, fHV          0.976       0.976       0.976
Driver population factor, fP           1.00        1.00        1.00
Flow rate, vp                          795         118         383       pcph

_________________________Estimation of V12 Merge Areas_________________________

                  L  =            (Equation 13-6 or 13-7)
                   EQ
                  P  =    1.000   Using Equation  0
                   FM
                  v  = v  (P  ) =  795    pc/h
                   12   F   FM

_______________________________Capacity Checks_________________________________

                             Actual        Maximum         LOS F?
     v                       913           4700            No
      FO
     v  or v                 0    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    = 795                      (Equation 13-15, 13-16, 13-18, or 13-19)
         12A

________________________Flow Entering Merge Influence Area_____________________
                        Actual        Max Desirable        Violation?
     v                  913           4600                 No
      R12
_________________Level of Service Determination (if not F)_____________________

Density, D = 5.475 + 0.00734 v  + 0.0078 v   - 0.00627 L   =   5.6     pc/mi/ln
          R                   R           12             A
Level of service for ramp-freeway junction areas of influence  A

_____________________________Speed Estimation__________________________________

Intermediate speed variable,                 M  = 0.232
                                              S
Space mean speed in ramp influence area,     S  = 59.7    mph
                                              R
Space mean speed in outer lanes,             S  =  N/A    mph
                                              0
Space mean speed for all vehicles,           S  = 59.7    mph
_______________________________________________________________________________
```

HCS 2010: Freeway Merge and Diverge Segments Release 6.3

Phone: Fax:
E-mail:

Diverge Analysis

Analyst:	MDF
Agency/Co.:	HDR
Date performed:	10/30/2012
Analysis time period:	AM Peak
Freeway/Dir of Travel:	I-90 WB
Junction:	Diverge to North
Jurisdiction:	SDDOT
Analysis Year:	2012

Description: I-90/La Crosse Street Interchange Study

Freeway Data

Type of analysis	Diverge	
Number of lanes in freeway	2	
Free-flow speed on freeway	65.0	mph
Volume on freeway	995	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	220	vph
Length of first accel/decel lane	310	ft
Length of second accel/decel lane		ft

Adjacent Ramp Data (if one exists)

Does adjacent ramp exist?	Yes	
Volume on adjacent ramp	135	vph
Position of adjacent ramp	Downstream	
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)	995		220		135		vph
Peak-hour factor, PHF	0.82		0.82		0.82		
Peak 15-min volume, v15	303		67		41		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	1262	279	171	pcph

Estimation of V12 Diverge Areas

L_{EQ} = (Equation 13-12 or 13-13)

P_{FD} = 1.000 Using Equation 0

$v_{12} = v_R + (v_F - v_R) P_{FD}$ = 1262 pc/h

Capacity Checks

	Actual	Maximum	LOS F?
$v_{Fi} = v_F$	1262	4700	No
$v_{FO} = v_F - v_R$	983	4700	No
v_R	279	2100	No
v_3 or v_{av34}	0 pc/h	(Equation 13-14 or 13-17)	
Is v_3 or v_{av34} > 2700 pc/h?		No	
Is v_3 or v_{av34} > 1.5 v_{12}/2		No	

If yes, v_{12A} = 1262 (Equation 13-15, 13-16, 13-18, or 13-19)

Flow Entering Diverge Influence Area

	Actual	Max Desirable	Violation?
v_{12}	1262	4400	No

Level of Service Determination (if not F)

Density, $D_R = 4.252 + 0.0086\, v_{12} - 0.009\, L_D$ = 12.3 pc/mi/ln

Level of service for ramp-freeway junction areas of influence B

Speed Estimation

Intermediate speed variable, D_S = 0.323

Space mean speed in ramp influence area, S_R = 57.6 mph

Space mean speed in outer lanes, S_0 = N/A mph

Space mean speed for all vehicles, S = 57.6 mph

HCS 2010: Freeway Merge and Diverge Segments Release 6.3

Phone: Fax:
E-mail:

Merge Analysis

Analyst:	MDF
Agency/Co.:	HDR
Date performed:	10/30/2012
Analysis time period:	AM Peak
Freeway/Dir of Travel:	I-90 WB
Junction:	Merge from North
Jurisdiction:	SDDOT
Analysis Year:	2012

Description: I-90/La Crosse Street Interchange Study

Freeway Data

Type of analysis	Merge	
Number of lanes in freeway	2	
Free-flow speed on freeway	65.0	mph
Volume on freeway	775	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	135	vph
Length of first accel/decel lane	1300	ft
Length of second accel/decel lane		ft

Adjacent Ramp Data (if one exists)

Does adjacent ramp exist?	Yes	
Volume on adjacent Ramp	220	vph
Position of adjacent Ramp	Upstream	
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)	775	135	220	vph
Peak-hour factor, PHF	0.82	0.82	0.82	
Peak 15-min volume, v15	236	41	67	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	983	171	279	pcph

Estimation of V12 Merge Areas

L_{EQ} = (Equation 13-6 or 13-7)

P_{FM} = 1.000 Using Equation 0

$v_{12} = v_F (P_{FM})$ = 983 pc/h

Capacity Checks

	Actual	Maximum	LOS F?
v_{FO}	1154	4700	No

v_3 or v_{av34} 0 pc/h (Equation 13-14 or 13-17)

Is v_3 or v_{av34} > 2700 pc/h? No

Is v_3 or v_{av34} > 1.5 v_{12}/2 No

If yes, v_{12A} = 983 (Equation 13-15, 13-16, 13-18, or 13-19)

Flow Entering Merge Influence Area

	Actual	Max Desirable	Violation?
v_{R12}	1154	4600	No

Level of Service Determination (if not F)

Density, $D_R = 5.475 + 0.00734\, v_R + 0.0078\, v_{12} - 0.00627\, L_A$ = 6.2 pc/mi/ln

Level of service for ramp-freeway junction areas of influence A

Speed Estimation

Intermediate speed variable, M_S = 0.216

Space mean speed in ramp influence area, S_R = 60.0 mph

Space mean speed in outer lanes, S_0 = N/A mph

Space mean speed for all vehicles, S = 60.0 mph

HCS 2010: Freeway Merge and Diverge Segments Release 6.3

Phone: Fax:
E-mail:

Diverge Analysis

Analyst: MDF
Agency/Co.: HDR
Date performed: 10/30/2012
Analysis time period: AM Peak
Freeway/Dir of Travel: I-90 WB
Junction: Diverge to La Crosse
Jurisdiction: SDDOT
Analysis Year: 2012
Description: I-90/La Crosse Street Interchange Study

Freeway Data

Type of analysis	Diverge	
Number of lanes in freeway	2	
Free-flow speed on freeway	65.0	mph
Volume on freeway	910	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	145	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	320	vph
Position of adjacent ramp	Downstream	
Type of adjacent ramp	On	
Distance to adjacent ramp	1800	ft

Conversion to pc/h Under Base Conditions

Junction Components	Freeway		Ramp		Adjacent Ramp		
Volume, V (vph)	910		145		320		vph
Peak-hour factor, PHF	0.82		0.82		0.82		
Peak 15-min volume, v15	277		44		98		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                          1154        184         406       pcph

_________________________Estimation of V12 Diverge Areas_______________________

                  L  =            (Equation 13-12 or 13-13)
                   EQ
                  P  =    1.000   Using Equation  0
                   FD
                  v  = v  + (v - v ) P  =  1154   pc/h
                   12   R     F   R   FD

_______________________________Capacity Checks_________________________________

                             Actual        Maximum         LOS F?
     v  = v                  1154          4700            No
      Fi   F
     v  = v - v              970           4700            No
      FO   F   R
     v                       184           2100            No
      R
     v  or v                 0    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    = 1154                     (Equation 13-15, 13-16, 13-18, or 13-19)
         12A

______________________Flow Entering Diverge Influence Area_____________________
                      Actual        Max Desirable         Violation?
     v                1154          4400                  No
      12
_________________Level of Service Determination (if not F)_____________________

Density,               D = 4.252 + 0.0086 v  - 0.009  L   =   7.4     pc/mi/ln
                        R                  12          D
Level of service for ramp-freeway junction areas of influence A

_____________________________Speed Estimation__________________________________

Intermediate speed variable,                  D  = 0.315
                                               S
Space mean speed in ramp influence area,      S  = 57.8    mph
                                               R
Space mean speed in outer lanes,              S  =  N/A    mph
                                               0
Space mean speed for all vehicles,            S  = 57.8    mph
_______________________________________________________________________________
```

HCS 2010: Freeway Merge and Diverge Segments Release 6.3

Phone: Fax:
E-mail:

Merge Analysis

Analyst:	MDF
Agency/Co.:	HDR
Date performed:	10/30/2012
Analysis time period:	AM Peak
Freeway/Dir of Travel:	I-90 WB
Junction:	Merge from La Crosse
Jurisdiction:	SDDOT
Analysis Year:	2012

Description: I-90/La Crosse Street Interchange Study

Freeway Data

Type of analysis	Merge	
Number of lanes in freeway	2	
Free-flow speed on freeway	65.0	mph
Volume on freeway	765	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	320	vph
Length of first accel/decel lane	830	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	Upstream	
Type of adjacent Ramp	Off	
Distance to adjacent Ramp	1800	ft

Conversion to pc/h Under Base Conditions

Junction Components	Freeway	Ramp	Adjacent Ramp	
Volume, V (vph)	765	320	145	vph
Peak-hour factor, PHF	0.82	0.82	0.82	
Peak 15-min volume, v15	233	98	44	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                           970         406         184       pcph

_________________________Estimation of V12 Merge Areas_________________________

                  L  =            (Equation 13-6 or 13-7)
                   EQ
                  P  =    1.000   Using Equation  0
                   FM
                  v  = v  (P  ) =  970    pc/h
                   12   F   FM

_______________________________Capacity Checks_______________________________

                           Actual        Maximum         LOS F?
     v                     1376          4700            No
      FO
     v  or v               0    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    = 970                    (Equation 13-15, 13-16, 13-18, or 13-19)
         12A

________________________Flow Entering Merge Influence Area_____________________
                      Actual        Max Desirable        Violation?
     v                1376          4600                 No
      R12
_________________Level of Service Determination (if not F)_____________________

Density, D = 5.475 + 0.00734 v  + 0.0078 v   - 0.00627 L   =   10.8    pc/mi/ln
          R                   R           12             A
Level of service for ramp-freeway junction areas of influence  B

_____________________________Speed Estimation_________________________________

Intermediate speed variable,                 M  = 0.262
                                              S
Space mean speed in ramp influence area,     S  = 59.0    mph
                                              R
Space mean speed in outer lanes,             S  =  N/A    mph
                                              0
Space mean speed for all vehicles,           S  = 59.0    mph
_______________________________________________________________________________
```

HCS 2010: Freeway Merge and Diverge Segments Release 6.3

Phone: Fax:
E-mail:

Diverge Analysis

Analyst:	MDF
Agency/Co.:	HDR
Date performed:	10/30/2012
Analysis time period:	AM Peak
Freeway/Dir of Travel:	I-90 WB
Junction:	Diverge to Haines
Jurisdiction:	SDDOT
Analysis Year:	2012

Description: I-90/La Crosse Street Interchange Study

Freeway Data

Type of analysis	Diverge	
Number of lanes in freeway	2	
Free-flow speed on freeway	65.0	mph
Volume on freeway	1085	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	200	vph
Length of first accel/decel lane	230	ft
Length of second accel/decel lane		ft

Adjacent Ramp Data (if one exists)

Does adjacent ramp exist?	Yes	
Volume on adjacent ramp	310	vph
Position of adjacent ramp	Downstream	
Type of adjacent ramp	On	
Distance to adjacent ramp	2400	ft

Conversion to pc/h Under Base Conditions

Junction Components	Freeway		Ramp		Adjacent Ramp	
Volume, V (vph)	1085		200		310	vph
Peak-hour factor, PHF	0.82		0.82		0.82	
Peak 15-min volume, v15	331		61		95	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	1376	254	393	pcph

Estimation of V12 Diverge Areas

L_{EQ} = (Equation 13-12 or 13-13)

P_{FD} = 1.000 Using Equation 0

$v_{12} = v_R + (v_F - v_R)\, P_{FD}$ = 1376 pc/h

Capacity Checks

	Actual	Maximum	LOS F?
$v_{Fi} = v_F$	1376	4700	No
$v_{FO} = v_F - v_R$	1122	4700	No
v_R	254	2100	No
v_3 or v_{av34}	0 pc/h	(Equation 13-14 or 13-17)	

Is v_3 or v_{av34} > 2700 pc/h? No

Is v_3 or v_{av34} > 1.5 v_{12}/2 No

If yes, v_{12A} = 1376 (Equation 13-15, 13-16, 13-18, or 13-19)

Flow Entering Diverge Influence Area

	Actual	Max Desirable	Violation?
v_{12}	1376	4400	No

Level of Service Determination (if not F)

Density, $D_R = 4.252 + 0.0086\, v_{12} - 0.009\, L_D$ = 14.0 pc/mi/ln

Level of service for ramp-freeway junction areas of influence B

Speed Estimation

Intermediate speed variable, D_S = 0.321

Space mean speed in ramp influence area, S_R = 57.6 mph

Space mean speed in outer lanes, S_0 = N/A mph

Space mean speed for all vehicles, S = 57.6 mph

HCS 2010: Freeway Merge and Diverge Segments Release 6.3

Phone: Fax:
E-mail:

Merge Analysis

Analyst:	MDF
Agency/Co.:	HDR
Date performed:	10/30/2012
Analysis time period:	PM Peak
Freeway/Dir of Travel:	I-90 EB
Junction:	Merge from Haines
Jurisdiction:	SDDOT
Analysis Year:	2012

Description: I-90/La Crosse Street Interchange Study

Freeway Data

Type of analysis	Merge	
Number of lanes in freeway	2	
Free-flow speed on freeway	65.0	mph
Volume on freeway	1275	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	360	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	630	vph
Position of adjacent Ramp	Upstream	
Type of adjacent Ramp	Off	
Distance to adjacent Ramp	2200	ft

Conversion to pc/h Under Base Conditions

Junction Components	Freeway		Ramp		Adjacent Ramp	
Volume, V (vph)	1275		360		630	vph
Peak-hour factor, PHF	0.88		0.88		0.88	
Peak 15-min volume, v15	362		102		179	v
Trucks and buses	5		5		5	%
Recreational vehicles	0		0		0	%
Terrain type:	Level		Level		Level	
Grade		%		%		%
Length		mi		mi		mi
Trucks and buses PCE, ET	1.5		1.5		1.5	
Recreational vehicle PCE, ER	1.2		1.2		1.2	

Heavy vehicle adjustment, fHV	0.976	0.976	0.976	
Driver population factor, fP	1.00	1.00	1.00	
Flow rate, vp	1485	419	734	pcph

Estimation of V12 Merge Areas

L_{EQ} = (Equation 13-6 or 13-7)

P_{FM} = 1.000 Using Equation 0

$v_{12} = v_F (P_{FM})$ = 1485 pc/h

Capacity Checks

	Actual	Maximum	LOS F?
v_{FO}	1904	4700	No

v_3 or v_{av34} 0 pc/h (Equation 13-14 or 13-17)

Is v_3 or v_{av34} > 2700 pc/h? No

Is v_3 or v_{av34} > 1.5 v_{12}/2 No

If yes, v_{12A} = 1485 (Equation 13-15, 13-16, 13-18, or 13-19)

Flow Entering Merge Influence Area

	Actual	Max Desirable	Violation?
v_{R12}	1904	4600	No

Level of Service Determination (if not F)

Density, $D_R = 5.475 + 0.00734\, v_R + 0.0078\, v_{12} - 0.00627\, L_A$ = 14.5 pc/mi/ln

Level of service for ramp-freeway junction areas of influence B

Speed Estimation

Intermediate speed variable, M_S = 0.266

Space mean speed in ramp influence area, S_R = 58.9 mph

Space mean speed in outer lanes, S_0 = N/A mph

Space mean speed for all vehicles, S = 58.9 mph

HCS 2010: Freeway Merge and Diverge Segments Release 6.3

Phone: Fax:
E-mail:

Diverge Analysis

Analyst:	MDF
Agency/Co.:	HDR
Date performed:	10/30/2012
Analysis time period:	PM Peak
Freeway/Dir of Travel:	I-90 EB
Junction:	Diverge to La Crosse
Jurisdiction:	SDDOT
Analysis Year:	2012

Description: I-90/La Crosse Street Interchange Study

Freeway Data

Type of analysis	Diverge	
Number of lanes in freeway	2	
Free-flow speed on freeway	65.0	mph
Volume on freeway	1635	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	640	vph
Length of first accel/decel lane	680	ft
Length of second accel/decel lane		ft

Adjacent Ramp Data (if one exists)

Does adjacent ramp exist?	Yes	
Volume on adjacent ramp	315	vph
Position of adjacent ramp	Downstream	
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)	1635		640		315	vph
Peak-hour factor, PHF	0.88		0.88		0.88	
Peak 15-min volume, v15	464		182		89	v
Trucks and buses	5		5		5	%
Recreational vehicles	0		0		0	%
Terrain type:	Level		Level		Level	
Grade	0.00	%	0.00	%	0.00	%
Length	0.00	mi	0.00	mi	0.00	mi
Trucks and buses PCE, ET	1.5		1.5		1.5	
Recreational vehicle PCE, ER	1.2		1.2		1.2	

```
Heavy vehicle adjustment, fHV           0.976       0.976       0.976
Driver population factor, fP            1.00        1.00        1.00
Flow rate, vp                           1904        745         367       pcph

_________________________Estimation of V12 Diverge Areas_______________________

                  L  =            (Equation 13-12 or 13-13)
                   EQ
                  P  =    1.000   Using Equation  0
                   FD
                  v  = v  + (v - v ) P  =  1904   pc/h
                   12   R     F   R   FD

_______________________________Capacity Checks_________________________________

                             Actual        Maximum         LOS F?
     v  = v                  1904          4700            No
      Fi   F
     v  = v - v              1159          4700            No
      FO   F   R
     v                       745           2100            No
      R
     v  or v                 0    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    = 1904                     (Equation 13-15, 13-16, 13-18, or 13-19)
         12A

______________________Flow Entering Diverge Influence Area______________________
                      Actual        Max Desirable          Violation?
     v                1904          4400                   No
      12
_________________Level of Service Determination (if not F)_____________________

Density,               D = 4.252 + 0.0086 v  - 0.009  L   =   14.5    pc/mi/ln
                        R                  12          D
Level of service for ramp-freeway junction areas of influence B

_____________________________Speed Estimation__________________________________

Intermediate speed variable,                 D  = 0.365
                                              S
Space mean speed in ramp influence area,     S  = 56.6    mph
                                              R
Space mean speed in outer lanes,             S  =  N/A    mph
                                              0
Space mean speed for all vehicles,           S  = 56.6    mph
_______________________________________________________________________________
```

HCS 2010: Freeway Merge and Diverge Segments Release 6.3

Phone: Fax:
E-mail:

Merge Analysis

Analyst:	MDF
Agency/Co.:	HDR
Date performed:	10/30/2012
Analysis time period:	PM Peak
Freeway/Dir of Travel:	I-90 EB
Junction:	Merge from La Crosse
Jurisdiction:	SDDOT
Analysis Year:	2012

Description: I-90/La Crosse Street Interchange Study

Freeway Data

Type of analysis	Merge	
Number of lanes in freeway	2	
Free-flow speed on freeway	65.0	mph
Volume on freeway	995	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	315	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	640	vph
Position of adjacent Ramp	Upstream	
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)	995		315		640	vph
Peak-hour factor, PHF	0.88		0.88		0.88	
Peak 15-min volume, v15	283		89		182	v
Trucks and buses	5		5		5	%
Recreational vehicles	0		0		0	%
Terrain type:	Level		Level		Level	
Grade		%		%		%
Length		mi		mi		mi
Trucks and buses PCE, ET	1.5		1.5		1.5	
Recreational vehicle PCE, ER	1.2		1.2		1.2	

Heavy vehicle adjustment, fHV	0.976	0.976	0.976	
Driver population factor, fP	1.00	1.00	1.00	
Flow rate, vp	1159	367	745	pcph

Estimation of V12 Merge Areas

L_{EQ} = (Equation 13-6 or 13-7)

P_{FM} = 1.000 Using Equation 0

$v_{12} = v_F (P_{FM})$ = 1159 pc/h

Capacity Checks

	Actual	Maximum	LOS F?
v_{FO}	1526	4700	No
v_3 or v_{av34}	0 pc/h	(Equation 13-14 or 13-17)	
Is v_3 or v_{av34} > 2700 pc/h?		No	
Is v_3 or v_{av34} > 1.5 v_{12}/2		No	

If yes, v_{12A} = 1159 (Equation 13-15, 13-16, 13-18, or 13-19)

Flow Entering Merge Influence Area

	Actual	Max Desirable	Violation?
v_{R12}	1526	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 = 0.249	
Space mean speed in ramp influence area,	S_R = 59.3	mph
Space mean speed in outer lanes,	S_0 = N/A	mph
Space mean speed for all vehicles,	S = 59.3	mph

HCS 2010: Freeway Merge and Diverge Segments Release 6.3

Phone: Fax:
E-mail:

Diverge Analysis

Analyst:	MDF
Agency/Co.:	HDR
Date performed:	10/30/2012
Analysis time period:	PM Peak
Freeway/Dir of Travel:	I-90 EB
Junction:	Diverge to North
Jurisdiction:	SDDOT
Analysis Year:	2012

Description: I-90/La Crosse Street Interchange Study

Freeway Data

Type of analysis	Diverge	
Number of lanes in freeway	2	
Free-flow speed on freeway	65.0	mph
Volume on freeway	1310	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	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	275	vph
Position of adjacent ramp	Downstream	
Type of adjacent ramp	On	
Distance to adjacent ramp	3100	ft

Conversion to pc/h Under Base Conditions

Junction Components	Freeway		Ramp		Adjacent Ramp	
Volume, V (vph)	1310		430		275	vph
Peak-hour factor, PHF	0.88		0.88		0.88	
Peak 15-min volume, v15	372		122		78	v
Trucks and buses	5		5		5	%
Recreational vehicles	0		0		0	%
Terrain type:	Level		Level		Level	
Grade	0.00	%	0.00	%	0.00	%
Length	0.00	mi	0.00	mi	0.00	mi
Trucks and buses PCE, ET	1.5		1.5		1.5	
Recreational vehicle PCE, ER	1.2		1.2		1.2	

```
Heavy vehicle adjustment, fHV          0.976        0.976        0.976
Driver population factor, fP           1.00         1.00         1.00
Flow rate, vp                          1526         501          320          pcph

_________________________Estimation of V12 Diverge Areas_______________________

                  L  =            (Equation 13-12 or 13-13)
                   EQ
                  P  =    1.000   Using Equation  0
                   FD
                  v  = v  + (v - v ) P  =  1526   pc/h
                   12   R      F   R   FD

_______________________________Capacity Checks_________________________________

                           Actual        Maximum          LOS F?
     v  = v                1526          4700             No
      Fi   F
     v  = v - v            1025          4700             No
      FO   F   R
     v                     501           2100             No
      R
     v  or v               0    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    = 1526                   (Equation 13-15, 13-16, 13-18, or 13-19)
         12A

______________________Flow Entering Diverge Influence Area_____________________
                      Actual        Max Desirable         Violation?
     v                1526          4400                  No
      12
_________________Level of Service Determination (if not F)_____________________

Density,               D = 4.252 + 0.0086 v  - 0.009  L   =   15.1    pc/mi/ln
                        R                  12          D
Level of service for ramp-freeway junction areas of influence B

_____________________________Speed Estimation__________________________________

Intermediate speed variable,                 D  = 0.343
                                              S
Space mean speed in ramp influence area,     S  = 57.1    mph
                                              R
Space mean speed in outer lanes,             S  =  N/A    mph
                                              0
Space mean speed for all vehicles,           S  = 57.1    mph
_______________________________________________________________________________
```

HCS 2010: Freeway Merge and Diverge Segments Release 6.3

Phone: Fax:
E-mail:

Merge Analysis

Analyst:	MDF
Agency/Co.:	HDR
Date performed:	10/30/2012
Analysis time period:	PM Peak
Freeway/Dir of Travel:	I-90 EB
Junction:	Merge from North
Jurisdiction:	SDDOT
Analysis Year:	2012

Description: I-90/La Crosse Street Interchange Study

Freeway Data

Type of analysis	Merge	
Number of lanes in freeway	2	
Free-flow speed on freeway	65.0	mph
Volume on freeway	880	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	275	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	430	vph
Position of adjacent Ramp	Upstream	
Type of adjacent Ramp	Off	
Distance to adjacent Ramp	3100	ft

Conversion to pc/h Under Base Conditions

Junction Components	Freeway	Ramp	Adjacent Ramp	
Volume, V (vph)	880	275	430	vph
Peak-hour factor, PHF	0.88	0.88	0.88	
Peak 15-min volume, v15	250	78	122	v
Trucks and buses	5	5	5	%
Recreational vehicles	0	0	0	%
Terrain type:	Level	Level	Level	
Grade	%	%	%	
Length	mi	mi	mi	
Trucks and buses PCE, ET	1.5	1.5	1.5	
Recreational vehicle PCE, ER	1.2	1.2	1.2	

```
Heavy vehicle adjustment, fHV          0.976       0.976       0.976
Driver population factor, fP           1.00        1.00        1.00
Flow rate, vp                          1025        320         501       pcph

_________________________Estimation of V12 Merge Areas_________________________

                  L  =            (Equation 13-6 or 13-7)
                   EQ
                  P  =    1.000   Using Equation  0
                   FM
                  v  = v  (P  ) =  1025   pc/h
                   12   F   FM

_______________________________Capacity Checks_________________________________

                           Actual        Maximum         LOS F?
     v                     1345          4700            No
      FO
     v  or v               0    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    = 1025                   (Equation 13-15, 13-16, 13-18, or 13-19)
         12A

________________________Flow Entering Merge Influence Area_____________________
                      Actual        Max Desirable        Violation?
     v                1345          4600                 No
      R12
_________________Level of Service Determination (if not F)_____________________

Density, D = 5.475 + 0.00734 v  + 0.0078 v   - 0.00627 L   =   8.9     pc/mi/ln
          R                   R           12             A
Level of service for ramp-freeway junction areas of influence  A

_____________________________Speed Estimation__________________________________

Intermediate speed variable,                 M  = 0.237
                                              S
Space mean speed in ramp influence area,     S  = 59.5    mph
                                              R
Space mean speed in outer lanes,             S  =  N/A    mph
                                              0
Space mean speed for all vehicles,           S  = 59.5    mph
_______________________________________________________________________________
```

HCS 2010: Freeway Merge and Diverge Segments Release 6.3

Phone: Fax:
E-mail:

Diverge Analysis

Analyst:	MDF
Agency/Co.:	HDR
Date performed:	10/30/2012
Analysis time period:	PM Peak
Freeway/Dir of Travel:	I-90 WB
Junction:	Diverge to North
Jurisdiction:	SDDOT
Analysis Year:	2012

Description: I-90/La Crosse Street Interchange Study

Freeway Data

Type of analysis	Diverge	
Number of lanes in freeway	2	
Free-flow speed on freeway	65.0	mph
Volume on freeway	1275	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	295	vph
Length of first accel/decel lane	310	ft
Length of second accel/decel lane		ft

Adjacent Ramp Data (if one exists)

Does adjacent ramp exist?	Yes	
Volume on adjacent ramp	490	vph
Position of adjacent ramp	Downstream	
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)	1275		295		490		vph
Peak-hour factor, PHF	0.85		0.85		0.85		
Peak 15-min volume, v15	375		87		144		v
Trucks and buses	3		3		3		%
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           0.985       0.985       0.985
Driver population factor, fP            1.00        1.00        1.00
Flow rate, vp                           1522        352         585       pcph

_________________________Estimation of V12 Diverge Areas_______________________

                  L  =            (Equation 13-12 or 13-13)
                   EQ
                  P  =    1.000   Using Equation  0
                   FD
                  v  = v  + (v - v ) P  =  1522   pc/h
                   12   R     F   R   FD

_______________________________Capacity Checks_________________________________

                             Actual        Maximum         LOS F?
     v  = v                  1522          4700            No
      Fi   F
     v  = v - v              1170          4700            No
      FO   F   R
     v                       352           2100            No
      R
     v  or v                 0    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    = 1522                     (Equation 13-15, 13-16, 13-18, or 13-19)
         12A

______________________Flow Entering Diverge Influence Area______________________
                      Actual        Max Desirable         Violation?
     v                1522          4400                  No
      12
_________________Level of Service Determination (if not F)______________________

Density,               D = 4.252 + 0.0086 v  - 0.009  L   =   14.6    pc/mi/ln
                        R                  12          D
Level of service for ramp-freeway junction areas of influence B

_____________________________Speed Estimation__________________________________

Intermediate speed variable,                 D  = 0.330
                                              S
Space mean speed in ramp influence area,     S  = 57.4    mph
                                              R
Space mean speed in outer lanes,             S  =  N/A    mph
                                              0
Space mean speed for all vehicles,           S  = 57.4    mph
_______________________________________________________________________________
```

HCS 2010: Freeway Merge and Diverge Segments Release 6.3

Phone: Fax:
E-mail:

Merge Analysis

Analyst:	MDF
Agency/Co.:	HDR
Date performed:	10/30/2012
Analysis time period:	PM Peak
Freeway/Dir of Travel:	I-90 WB
Junction:	Merge from North
Jurisdiction:	SDDOT
Analysis Year:	2012

Description: I-90/La Crosse Street Interchange Study

Freeway Data

Type of analysis	Merge	
Number of lanes in freeway	2	
Free-flow speed on freeway	65.0	mph
Volume on freeway	980	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	490	vph
Length of first accel/decel lane	1300	ft
Length of second accel/decel lane		ft

Adjacent Ramp Data (if one exists)

Does adjacent ramp exist?	Yes	
Volume on adjacent Ramp	295	vph
Position of adjacent Ramp	Upstream	
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)	980	490	295	vph
Peak-hour factor, PHF	0.85	0.85	0.85	
Peak 15-min volume, v15	288	144	87	v
Trucks and buses	3	3	3	%
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	0.985	0.985	0.985	
Driver population factor, fP	1.00	1.00	1.00	
Flow rate, vp	1170	585	352	pcph

Estimation of V12 Merge Areas

L_{EQ} = (Equation 13-6 or 13-7)

P_{FM} = 1.000 Using Equation 0

$v_{12} = v_F (P_{FM})$ = 1170 pc/h

Capacity Checks

	Actual	Maximum	LOS F?
v_{FO}	1755	4700	No
v_3 or v_{av34}	0 pc/h	(Equation 13-14 or 13-17)	
Is v_3 or v_{av34} > 2700 pc/h?		No	
Is v_3 or v_{av34} > 1.5 v_{12}/2		No	

If yes, v_{12A} = 1170 (Equation 13-15, 13-16, 13-18, or 13-19)

Flow Entering Merge Influence Area

	Actual	Max Desirable	Violation?
v_{R12}	1755	4600	No

Level of Service Determination (if not F)

Density, $D_R = 5.475 + 0.00734\, v_R + 0.0078\, v_{12} - 0.00627\, L_A$ = 10.7 pc/mi/ln

Level of service for ramp-freeway junction areas of influence B

Speed Estimation

Intermediate speed variable,	M_S = 0.227		
Space mean speed in ramp influence area,	S_R = 59.8	mph	
Space mean speed in outer lanes,	S_0 = N/A	mph	
Space mean speed for all vehicles,	S = 59.8	mph	

HCS 2010: Freeway Merge and Diverge Segments Release 6.3

Phone: Fax:
E-mail:

Diverge Analysis

Analyst:	MDF
Agency/Co.:	HDR
Date performed:	10/30/2012
Analysis time period:	PM Peak
Freeway/Dir of Travel:	I-90 WB
Junction:	Diverge to La Crosse
Jurisdiction:	SDDOT
Analysis Year:	2012

Description: I-90/La Crosse Street Interchange Study

Freeway Data

Type of analysis	Diverge	
Number of lanes in freeway	2	
Free-flow speed on freeway	65.0	mph
Volume on freeway	1470	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	350	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	580	vph
Position of adjacent ramp	Downstream	
Type of adjacent ramp	On	
Distance to adjacent ramp	1800	ft

Conversion to pc/h Under Base Conditions

Junction Components	Freeway		Ramp		Adjacent Ramp	
Volume, V (vph)	1470		350		580	vph
Peak-hour factor, PHF	0.85		0.85		0.85	
Peak 15-min volume, v15	432		103		171	v
Trucks and buses	3		3		3	%
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           0.985       0.985       0.985
Driver population factor, fP            1.00        1.00        1.00
Flow rate, vp                           1755        418         693       pcph

_________________________Estimation of V12 Diverge Areas_______________________

                  L  =            (Equation 13-12 or 13-13)
                   EQ
                  P  =    1.000   Using Equation  0
                   FD
                  v  = v  + (v - v ) P  =  1755   pc/h
                   12   R     F   R   FD

_______________________________Capacity Checks_________________________________

                           Actual        Maximum         LOS F?
     v  = v                1755          4700            No
      Fi   F
     v  = v - v            1337          4700            No
      FO   F   R
     v                     418           2100            No
      R
     v  or v               0    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    = 1755                   (Equation 13-15, 13-16, 13-18, or 13-19)
         12A

______________________Flow Entering Diverge Influence Area______________________
                      Actual        Max Desirable         Violation?
     v                1755          4400                  No
      12
_________________Level of Service Determination (if not F)______________________

Density,               D = 4.252 + 0.0086 v  - 0.009  L   =   12.6    pc/mi/ln
                        R                  12          D
Level of service for ramp-freeway junction areas of influence B

_____________________________Speed Estimation__________________________________

Intermediate speed variable,                 D  = 0.336
                                              S
Space mean speed in ramp influence area,     S  = 57.3    mph
                                              R
Space mean speed in outer lanes,             S  =  N/A    mph
                                              0
Space mean speed for all vehicles,           S  = 57.3    mph
_______________________________________________________________________________
```

HCS 2010: Freeway Merge and Diverge Segments Release 6.3

Phone: Fax:
E-mail:

Merge Analysis

Analyst:	MDF
Agency/Co.:	HDR
Date performed:	10/30/2012
Analysis time period:	PM Peak
Freeway/Dir of Travel:	I-90 WB
Junction:	Merge from La Crosse
Jurisdiction:	SDDOT
Analysis Year:	2012

Description: I-90/La Crosse Street Interchange Study

Freeway Data

Type of analysis	Merge	
Number of lanes in freeway	2	
Free-flow speed on freeway	65.0	mph
Volume on freeway	1120	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	580	vph
Length of first accel/decel lane	830	ft
Length of second accel/decel lane		ft

Adjacent Ramp Data (if one exists)

Does adjacent ramp exist?	Yes	
Volume on adjacent Ramp	350	vph
Position of adjacent Ramp	Upstream	
Type of adjacent Ramp	Off	
Distance to adjacent Ramp	1800	ft

Conversion to pc/h Under Base Conditions

Junction Components	Freeway	Ramp	Adjacent Ramp	
Volume, V (vph)	1120	580	350	vph
Peak-hour factor, PHF	0.85	0.85	0.85	
Peak 15-min volume, v15	329	171	103	v
Trucks and buses	3	3	3	%
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           0.985       0.985       0.985
Driver population factor, fP            1.00        1.00        1.00
Flow rate, vp                           1337        693         418       pcph

_________________________Estimation of V12 Merge Areas_________________________

                  L  =             (Equation 13-6 or 13-7)
                   EQ
                  P  =    1.000   Using Equation  0
                   FM
                  v  = v  (P  ) =  1337   pc/h
                   12   F   FM

_______________________________Capacity Checks_________________________________

                           Actual        Maximum         LOS F?
     v                     2030          4700            No
      FO
     v  or v               0    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    = 1337                   (Equation 13-15, 13-16, 13-18, or 13-19)
         12A

________________________Flow Entering Merge Influence Area_____________________
                      Actual        Max Desirable         Violation?
     v                2030          4600                  No
      R12
_________________Level of Service Determination (if not F)_____________________

Density, D = 5.475 + 0.00734 v  + 0.0078 v   - 0.00627 L   =   15.8    pc/mi/ln
          R                   R            12            A
Level of service for ramp-freeway junction areas of influence  B

_____________________________Speed Estimation__________________________________

Intermediate speed variable,                 M  = 0.276
                                              S
Space mean speed in ramp influence area,     S  = 58.7    mph
                                              R
Space mean speed in outer lanes,             S  =  N/A    mph
                                              0
Space mean speed for all vehicles,           S  = 58.7    mph
_______________________________________________________________________________
```

HCS 2010: Freeway Merge and Diverge Segments Release 6.3

Phone: Fax:
E-mail:

Diverge Analysis

Analyst:	MDF
Agency/Co.:	HDR
Date performed:	10/30/2012
Analysis time period:	PM Peak
Freeway/Dir of Travel:	I-90 WB
Junction:	Diverge to Haines
Jurisdiction:	SDDOT
Analysis Year:	2012

Description: I-90/La Crosse Street Interchange Study

Freeway Data

Type of analysis	Diverge	
Number of lanes in freeway	2	
Free-flow speed on freeway	65.0	mph
Volume on freeway	1700	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	370	vph
Length of first accel/decel lane	230	ft
Length of second accel/decel lane		ft

Adjacent Ramp Data (if one exists)

Does adjacent ramp exist?	Yes	
Volume on adjacent ramp	540	vph
Position of adjacent ramp	Downstream	
Type of adjacent ramp	On	
Distance to adjacent ramp	2400	ft

Conversion to pc/h Under Base Conditions

Junction Components	Freeway		Ramp		Adjacent Ramp	
Volume, V (vph)	1700		370		540	vph
Peak-hour factor, PHF	0.85		0.85		0.85	
Peak 15-min volume, v15	500		109		159	v
Trucks and buses	3		3		3	%
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          0.985       0.985       0.985
Driver population factor, fP           1.00        1.00        1.00
Flow rate, vp                          2030        442         645       pcph

_________________________Estimation of V12 Diverge Areas_______________________

                  L  =            (Equation 13-12 or 13-13)
                   EQ
                  P  =    1.000   Using Equation  0
                   FD
                  v  = v  + (v - v ) P  =  2030   pc/h
                   12   R     F   R   FD

_______________________________Capacity Checks_________________________________

                           Actual        Maximum         LOS F?
     v  = v                2030          4700            No
      Fi   F
     v  = v - v            1588          4700            No
      FO   F   R
     v                     442           2100            No
      R
     v  or v               0    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    = 2030                   (Equation 13-15, 13-16, 13-18, or 13-19)
         12A

______________________Flow Entering Diverge Influence Area______________________
                      Actual        Max Desirable        Violation?
     v                2030          4400                 No
      12
_________________Level of Service Determination (if not F)______________________

Density,               D = 4.252 + 0.0086 v  - 0.009  L   =   19.6    pc/mi/ln
                        R                  12          D
Level of service for ramp-freeway junction areas of influence B

_____________________________Speed Estimation__________________________________

Intermediate speed variable,                 D  = 0.338
                                              S
Space mean speed in ramp influence area,     S  = 57.2    mph
                                              R
Space mean speed in outer lanes,             S  =  N/A    mph
                                              0
Space mean speed for all vehicles,           S  = 57.2    mph
_______________________________________________________________________________
```

HCS 2010: Freeway Merge and Diverge Segments Release 6.3

Phone: Fax:
E-mail:

Merge Analysis

Analyst:	MDF
Agency/Co.:	HDR
Date performed:	10/30/2012
Analysis time period:	AM Peak
Freeway/Dir of Travel:	I-90 EB
Junction:	Merge from Haines
Jurisdiction:	SDDOT
Analysis Year:	2035 No-Build

Description: I-90/La Crosse Street Interchange Study

Freeway Data

Type of analysis	Merge	
Number of lanes in freeway	2	
Free-flow speed on freeway	65.0	mph
Volume on freeway	1360	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	220	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	390	vph
Position of adjacent Ramp	Upstream	
Type of adjacent Ramp	Off	
Distance to adjacent Ramp	2200	ft

Conversion to pc/h Under Base Conditions

Junction Components	Freeway		Ramp		Adjacent Ramp	
Volume, V (vph)	1360		220		390	vph
Peak-hour factor, PHF	0.90		0.90		0.90	
Peak 15-min volume, v15	378		61		108	v
Trucks and buses	5		5		5	%
Recreational vehicles	0		0		0	%
Terrain type:	Level		Level		Level	
Grade		%		%		%
Length		mi		mi		mi
Trucks and buses PCE, ET	1.5		1.5		1.5	
Recreational vehicle PCE, ER	1.2		1.2		1.2	

Heavy vehicle adjustment, fHV	0.976	0.976	0.976	
Driver population factor, fP	1.00	1.00	1.00	
Flow rate, vp	1549	251	444	pcph

Estimation of V12 Merge Areas

L_{EQ} = (Equation 13-6 or 13-7)

P_{FM} = 1.000 Using Equation 0

$v_{12} = v_F (P_{FM})$ = 1549 pc/h

Capacity Checks

	Actual	Maximum	LOS F?
v_{FO}	1800	4700	No
v_3 or v_{av34}	0 pc/h	(Equation 13-14 or 13-17)	
Is v_3 or v_{av34} > 2700 pc/h?		No	
Is v_3 or v_{av34} > 1.5 v_{12}/2		No	

If yes, v_{12A} = 1549 (Equation 13-15, 13-16, 13-18, or 13-19)

Flow Entering Merge Influence Area

	Actual	Max Desirable	Violation?
v_{R12}	1800	4600	No

Level of Service Determination (if not F)

Density, $D_R = 5.475 + 0.00734\, v_R + 0.0078\, v_{12} - 0.00627\, L_A$ = 13.8 pc/mi/ln

Level of service for ramp-freeway junction areas of influence B

Speed Estimation

Intermediate speed variable, M_S = 0.264

Space mean speed in ramp influence area, S_R = 58.9 mph

Space mean speed in outer lanes, S_0 = N/A mph

Space mean speed for all vehicles, S = 58.9 mph

HCS 2010: Freeway Merge and Diverge Segments Release 6.3

Phone: Fax:
E-mail:

Diverge Analysis

Analyst:	MDF
Agency/Co.:	HDR
Date performed:	10/30/2012
Analysis time period:	AM Peak
Freeway/Dir of Travel:	I-90 EB
Junction:	Diverge to La Crosse
Jurisdiction:	SDDOT
Analysis Year:	2035 No-Build

Description: I-90/La Crosse Street Interchange Study

Freeway Data

Type of analysis	Diverge	
Number of lanes in freeway	2	
Free-flow speed on freeway	65.0	mph
Volume on freeway	1580	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	370	vph
Length of first accel/decel lane	680	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	1900	ft

Conversion to pc/h Under Base Conditions

Junction Components	Freeway		Ramp		Adjacent Ramp	
Volume, V (vph)	1580		370		270	vph
Peak-hour factor, PHF	0.90		0.90		0.90	
Peak 15-min volume, v15	439		103		75	v
Trucks and buses	5		5		5	%
Recreational vehicles	0		0		0	%
Terrain type:	Level		Level		Level	
Grade	0.00	%	0.00	%	0.00	%
Length	0.00	mi	0.00	mi	0.00	mi
Trucks and buses PCE, ET	1.5		1.5		1.5	
Recreational vehicle PCE, ER	1.2		1.2		1.2	

Heavy vehicle adjustment, fHV	0.976	0.976	0.976	
Driver population factor, fP	1.00	1.00	1.00	
Flow rate, vp	1799	421	308	pcph

Estimation of V12 Diverge Areas

L_{EQ} = (Equation 13-12 or 13-13)

P_{FD} = 1.000 Using Equation 0

$v_{12} = v_R + (v_F - v_R) P_{FD}$ = 1799 pc/h

Capacity Checks

	Actual	Maximum	LOS F?
$v_{Fi} = v_F$	1799	4700	No
$v_{FO} = v_F - v_R$	1378	4700	No
v_R	421	2100	No
v_3 or v_{av34}	0 pc/h	(Equation 13-14 or 13-17)	

Is v_3 or v_{av34} > 2700 pc/h? No

Is v_3 or v_{av34} > 1.5 v_{12}/2 No

If yes, v_{12A} = 1799 (Equation 13-15, 13-16, 13-18, or 13-19)

Flow Entering Diverge Influence Area

	Actual	Max Desirable	Violation?
v_{12}	1799	4400	No

Level of Service Determination (if not F)

Density, $D_R = 4.252 + 0.0086\, v_{12} - 0.009\, L_D$ = 13.6 pc/mi/ln

Level of service for ramp-freeway junction areas of influence B

Speed Estimation

Intermediate speed variable,	D_S = 0.336	
Space mean speed in ramp influence area,	S_R = 57.3	mph
Space mean speed in outer lanes,	S_0 = N/A	mph
Space mean speed for all vehicles,	S = 57.3	mph

HCS 2010: Freeway Merge and Diverge Segments Release 6.3

Phone: Fax:
E-mail:

Merge Analysis

Analyst:	MDF
Agency/Co.:	HDR
Date performed:	10/30/2012
Analysis time period:	AM Peak
Freeway/Dir of Travel:	I-90 EB
Junction:	Merge from La Crosse
Jurisdiction:	SDDOT
Analysis Year:	2035 No-Build

Description: I-90/La Crosse Street Interchange Study

Freeway Data

Type of analysis	Merge	
Number of lanes in freeway	2	
Free-flow speed on freeway	65.0	mph
Volume on freeway	1210	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	270	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	370	vph
Position of adjacent Ramp	Upstream	
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)	1210	270	370	vph
Peak-hour factor, PHF	0.90	0.90	0.90	
Peak 15-min volume, v15	336	75	103	v
Trucks and buses	5	5	5	%
Recreational vehicles	0	0	0	%
Terrain type:	Level	Level	Level	
Grade	%	%	%	
Length	mi	mi	mi	
Trucks and buses PCE, ET	1.5	1.5	1.5	
Recreational vehicle PCE, ER	1.2	1.2	1.2	

Heavy vehicle adjustment, fHV	0.976	0.976	0.976	
Driver population factor, fP	1.00	1.00	1.00	
Flow rate, vp	1378	308	421	pcph

Estimation of V12 Merge Areas

L_{EQ} = (Equation 13-6 or 13-7)

P_{FM} = 1.000 Using Equation 0

$v_{12} = v_F (P_{FM})$ = 1378 pc/h

Capacity Checks

	Actual	Maximum	LOS F?
v_{FO}	1686	4700	No

v_3 or v_{av34} 0 pc/h (Equation 13-14 or 13-17)

Is v_3 or v_{av34} > 2700 pc/h? No

Is v_3 or v_{av34} > 1.5 v_{12}/2 No

If yes, v_{12A} = 1378 (Equation 13-15, 13-16, 13-18, or 13-19)

Flow Entering Merge Influence Area

	Actual	Max Desirable	Violation?
v_{R12}	1686	4600	No

Level of Service Determination (if not F)

Density, $D_R = 5.475 + 0.00734\ v_R + 0.0078\ v_{12} - 0.00627\ L_A$ = 12.2 pc/mi/ln

Level of service for ramp-freeway junction areas of influence B

Speed Estimation

Intermediate speed variable,	M_S = 0.252	
Space mean speed in ramp influence area,	S_R = 59.2	mph
Space mean speed in outer lanes,	S_0 = N/A	mph
Space mean speed for all vehicles,	S = 59.2	mph

Phone: Fax:
E-mail:

Diverge Analysis

Analyst:	MDF
Agency/Co.:	HDR
Date performed:	10/30/2012
Analysis time period:	AM Peak
Freeway/Dir of Travel:	I-90 EB
Junction:	Diverge to North
Jurisdiction:	SDDOT
Analysis Year:	2035 No-Build

Description: I-90/La Crosse Street Interchange Study

Freeway Data

Type of analysis	Diverge	
Number of lanes in freeway	2	
Free-flow speed on freeway	65.0	mph
Volume on freeway	1480	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	470	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	130	vph
Position of adjacent ramp	Downstream	
Type of adjacent ramp	On	
Distance to adjacent ramp	3100	ft

Conversion to pc/h Under Base Conditions

Junction Components	Freeway		Ramp		Adjacent Ramp	
Volume, V (vph)	1480		470		130	vph
Peak-hour factor, PHF	0.90		0.90		0.90	
Peak 15-min volume, v15	411		131		36	v
Trucks and buses	5		5		5	%
Recreational vehicles	0		0		0	%
Terrain type:	Level		Level		Level	
Grade	0.00	%	0.00	%	0.00	%
Length	0.00	mi	0.00	mi	0.00	mi
Trucks and buses PCE, ET	1.5		1.5		1.5	
Recreational vehicle PCE, ER	1.2		1.2		1.2	

Heavy vehicle adjustment, fHV	0.976	0.976	0.976	
Driver population factor, fP	1.00	1.00	1.00	
Flow rate, vp	1686	535	148	pcph

Estimation of V12 Diverge Areas

L_{EQ} = (Equation 13-12 or 13-13)

P_{FD} = 1.000 Using Equation 0

$v_{12} = v_R + (v_F - v_R) P_{FD}$ = 1686 pc/h

Capacity Checks

	Actual	Maximum	LOS F?
$v_{Fi} = v_F$	1686	4700	No
$v_{FO} = v_F - v_R$	1151	4700	No
v_R	535	2100	No
v_3 or v_{av34}	0 pc/h	(Equation 13-14 or 13-17)	

Is v_3 or v_{av34} > 2700 pc/h? No

Is v_3 or v_{av34} > 1.5 v_{12}/2 No

If yes, v_{12A} = 1686 (Equation 13-15, 13-16, 13-18, or 13-19)

Flow Entering Diverge Influence Area

	Actual	Max Desirable	Violation?
v_{12}	1686	4400	No

Level of Service Determination (if not F)

Density, $D_R = 4.252 + 0.0086\, v_{12} - 0.009\, L_D$ = 16.5 pc/mi/ln

Level of service for ramp-freeway junction areas of influence B

Speed Estimation

Intermediate speed variable,	D_S = 0.346	
Space mean speed in ramp influence area,	S_R = 57.0	mph
Space mean speed in outer lanes,	S_0 = N/A	mph
Space mean speed for all vehicles,	S = 57.0	mph

HCS 2010: Freeway Merge and Diverge Segments Release 6.3

Phone: Fax:
E-mail:

Merge Analysis

Analyst:	MDF
Agency/Co.:	HDR
Date performed:	10/30/2012
Analysis time period:	AM Peak
Freeway/Dir of Travel:	I-90 EB
Junction:	Merge from North
Jurisdiction:	SDDOT
Analysis Year:	2035 No-Build

Description: I-90/La Crosse Street Interchange Study

Freeway Data

Type of analysis	Merge	
Number of lanes in freeway	2	
Free-flow speed on freeway	65.0	mph
Volume on freeway	1010	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	130	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	470	vph
Position of adjacent Ramp	Upstream	
Type of adjacent Ramp	Off	
Distance to adjacent Ramp	3100	ft

Conversion to pc/h Under Base Conditions

Junction Components	Freeway		Ramp		Adjacent Ramp	
Volume, V (vph)	1010		130		470	vph
Peak-hour factor, PHF	0.90		0.90		0.90	
Peak 15-min volume, v15	281		36		131	v
Trucks and buses	5		5		5	%
Recreational vehicles	0		0		0	%
Terrain type:	Level		Level		Level	
Grade		%		%		%
Length		mi		mi		mi
Trucks and buses PCE, ET	1.5		1.5		1.5	
Recreational vehicle PCE, ER	1.2		1.2		1.2	

```
Heavy vehicle adjustment, fHV            0.976       0.976       0.976
Driver population factor, fP             1.00        1.00        1.00
Flow rate, vp                            1150        148         535       pcph

_________________________Estimation of V12 Merge Areas_________________________

                  L  =             (Equation 13-6 or 13-7)
                   EQ
                  P  =    1.000   Using Equation  0
                   FM
                  v  = v  (P  ) =  1150   pc/h
                   12   F   FM

_______________________________Capacity Checks_________________________________

                           Actual        Maximum         LOS F?
     v                     1298          4700            No
      FO
     v  or v               0    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    = 1150                   (Equation 13-15, 13-16, 13-18, or 13-19)
         12A

________________________Flow Entering Merge Influence Area_____________________
                      Actual        Max Desirable        Violation?
     v                1298          4600                 No
      R12
_________________Level of Service Determination (if not F)_____________________

Density, D = 5.475 + 0.00734 v  + 0.0078 v   - 0.00627 L   =   8.6     pc/mi/ln
          R                    R           12             A
Level of service for ramp-freeway junction areas of influence  A

_____________________________Speed Estimation__________________________________

Intermediate speed variable,                 M  = 0.236
                                              S
Space mean speed in ramp influence area,     S  = 59.6    mph
                                              R
Space mean speed in outer lanes,             S  =  N/A    mph
                                              0
Space mean speed for all vehicles,           S  = 59.6    mph
_______________________________________________________________________________
```

HCS 2010: Freeway Merge and Diverge Segments Release 6.3

Phone: Fax:
E-mail:

Diverge Analysis

Analyst:	MDF
Agency/Co.:	HDR
Date performed:	10/30/2012
Analysis time period:	AM Peak
Freeway/Dir of Travel:	I-90 WB
Junction:	Diverge to North
Jurisdiction:	SDDOT
Analysis Year:	2035 No-Build

Description: I-90/La Crosse Street Interchange Study

Freeway Data

Type of analysis	Diverge	
Number of lanes in freeway	2	
Free-flow speed on freeway	65.0	mph
Volume on freeway	1560	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	320	vph
Length of first accel/decel lane	310	ft
Length of second accel/decel lane		ft

Adjacent Ramp Data (if one exists)

Does adjacent ramp exist?	Yes	
Volume on adjacent ramp	180	vph
Position of adjacent ramp	Downstream	
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)	1560		320		180		vph
Peak-hour factor, PHF	0.85		0.85		0.85		
Peak 15-min volume, v15	459		94		53		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                          1909        392         220       pcph

_________________________Estimation of V12 Diverge Areas_______________________

                  L  =            (Equation 13-12 or 13-13)
                   EQ
                  P  =    1.000   Using Equation  0
                   FD
                  v  = v  + (v - v ) P  =  1909   pc/h
                   12   R     F   R   FD

_______________________________Capacity Checks________________________________

                           Actual        Maximum          LOS F?
     v  = v                1909          4700             No
      Fi   F
     v  = v - v            1517          4700             No
      FO   F   R
     v                     392           2100             No
      R
     v  or v               0    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    = 1909                   (Equation 13-15, 13-16, 13-18, or 13-19)
         12A

______________________Flow Entering Diverge Influence Area_____________________
                      Actual        Max Desirable         Violation?
     v                1909          4400                  No
      12
_________________Level of Service Determination (if not F)_____________________

Density,               D = 4.252 + 0.0086 v  - 0.009  L   =   17.9    pc/mi/ln
                        R                  12          D
Level of service for ramp-freeway junction areas of influence B

_____________________________Speed Estimation__________________________________

Intermediate speed variable,                 D  = 0.333
                                              S
Space mean speed in ramp influence area,     S  = 57.3    mph
                                              R
Space mean speed in outer lanes,             S  =  N/A    mph
                                              0
Space mean speed for all vehicles,           S  = 57.3    mph
_______________________________________________________________________________
```

HCS 2010: Freeway Merge and Diverge Segments Release 6.3

Phone: Fax:
E-mail:

Merge Analysis

Analyst:	MDF
Agency/Co.:	HDR
Date performed:	10/30/2012
Analysis time period:	AM Peak
Freeway/Dir of Travel:	I-90 WB
Junction:	Merge from North
Jurisdiction:	SDDOT
Analysis Year:	2035 No-Build

Description: I-90/La Crosse Street Interchange Study

Freeway Data

Type of analysis	Merge	
Number of lanes in freeway	2	
Free-flow speed on freeway	65.0	mph
Volume on freeway	1240	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	180	vph
Length of first accel/decel lane	1300	ft
Length of second accel/decel lane		ft

Adjacent Ramp Data (if one exists)

Does adjacent ramp exist?	Yes	
Volume on adjacent Ramp	320	vph
Position of adjacent Ramp	Upstream	
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)	1240	180	320	vph
Peak-hour factor, PHF	0.85	0.85	0.85	
Peak 15-min volume, v15	365	53	94	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                          1517        220         392       pcph

_________________________Estimation of V12 Merge Areas_________________________

                  L  =            (Equation 13-6 or 13-7)
                   EQ
                  P  =    1.000   Using Equation  0
                   FM
                  v  = v  (P  ) =  1517   pc/h
                   12   F   FM

_______________________________Capacity Checks_________________________________

                           Actual        Maximum         LOS F?
     v                     1737          4700            No
      FO
     v  or v               0    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    = 1517                   (Equation 13-15, 13-16, 13-18, or 13-19)
         12A

________________________Flow Entering Merge Influence Area_____________________
                      Actual        Max Desirable        Violation?
     v                1737          4600                 No
      R12
_________________Level of Service Determination (if not F)_____________________

Density, D = 5.475 + 0.00734 v  + 0.0078 v   - 0.00627 L   =   10.8    pc/mi/ln
          R                   R           12            A
Level of service for ramp-freeway junction areas of influence  B

_____________________________Speed Estimation__________________________________

Intermediate speed variable,                 M  = 0.226
                                              S
Space mean speed in ramp influence area,     S  = 59.8    mph
                                              R
Space mean speed in outer lanes,             S  =  N/A    mph
                                              0
Space mean speed for all vehicles,           S  = 59.8    mph
_______________________________________________________________________________
```

HCS 2010: Freeway Merge and Diverge Segments Release 6.3

Phone: Fax:
E-mail:

Diverge Analysis

Analyst:	MDF
Agency/Co.:	HDR
Date performed:	10/30/2012
Analysis time period:	AM Peak
Freeway/Dir of Travel:	I-90 WB
Junction:	Diverge to La Crosse
Jurisdiction:	SDDOT
Analysis Year:	2035 No-Build

Description: I-90/La Crosse Street Interchange Study

Freeway Data

Type of analysis	Diverge	
Number of lanes in freeway	2	
Free-flow speed on freeway	65.0	mph
Volume on freeway	1420	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	170	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	420	vph
Position of adjacent ramp	Downstream	
Type of adjacent ramp	On	
Distance to adjacent ramp	1800	ft

Conversion to pc/h Under Base Conditions

Junction Components	Freeway		Ramp		Adjacent Ramp	
Volume, V (vph)	1420		170		420	vph
Peak-hour factor, PHF	0.85		0.85		0.85	
Peak 15-min volume, v15	418		50		124	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                             1737        208         514       pcph

_________________________Estimation of V12 Diverge Areas_______________________

                  L  =            (Equation 13-12 or 13-13)
                   EQ
                  P  =    1.000   Using Equation  0
                   FD
                  v  = v  + (v - v ) P  =  1737   pc/h
                   12   R     F   R   FD

_______________________________Capacity Checks_________________________________

                             Actual        Maximum         LOS F?
     v  = v                  1737          4700            No
      Fi   F
     v  = v - v              1529          4700            No
      FO   F   R
     v                       208           2100            No
      R
     v  or v                 0    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    = 1737                     (Equation 13-15, 13-16, 13-18, or 13-19)
         12A

______________________Flow Entering Diverge Influence Area______________________
                      Actual        Max Desirable         Violation?
     v                1737          4400                  No
      12
_________________Level of Service Determination (if not F)_____________________

Density,               D = 4.252 + 0.0086 v  - 0.009  L   =   12.4    pc/mi/ln
                        R                  12          D
Level of service for ramp-freeway junction areas of influence B

_____________________________Speed Estimation__________________________________

Intermediate speed variable,                D  = 0.317
                                             S
Space mean speed in ramp influence area,    S  = 57.7    mph
                                             R
Space mean speed in outer lanes,            S  =  N/A    mph
                                             0
Space mean speed for all vehicles,          S  = 57.7    mph
_______________________________________________________________________________
```

HCS 2010: Freeway Merge and Diverge Segments Release 6.3

Phone: Fax:
E-mail:

Merge Analysis

Analyst:	MDF
Agency/Co.:	HDR
Date performed:	10/30/2012
Analysis time period:	AM Peak
Freeway/Dir of Travel:	I-90 WB
Junction:	Merge from La Crosse
Jurisdiction:	SDDOT
Analysis Year:	2035 No-Build

Description: I-90/La Crosse Street Interchange Study

Freeway Data

Type of analysis	Merge	
Number of lanes in freeway	2	
Free-flow speed on freeway	65.0	mph
Volume on freeway	1250	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	420	vph
Length of first accel/decel lane	830	ft
Length of second accel/decel lane		ft

Adjacent Ramp Data (if one exists)

Does adjacent ramp exist?	Yes	
Volume on adjacent Ramp	170	vph
Position of adjacent Ramp	Upstream	
Type of adjacent Ramp	Off	
Distance to adjacent Ramp	1800	ft

Conversion to pc/h Under Base Conditions

Junction Components	Freeway		Ramp		Adjacent Ramp	
Volume, V (vph)	1250		420		170	vph
Peak-hour factor, PHF	0.85		0.85		0.85	
Peak 15-min volume, v15	368		124		50	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                           1529        514         208       pcph

_________________________Estimation of V12 Merge Areas_________________________

                  L  =            (Equation 13-6 or 13-7)
                   EQ
                  P  =    1.000   Using Equation  0
                   FM
                  v  = v  (P  ) =  1529   pc/h
                   12   F   FM

_______________________________Capacity Checks________________________________

                           Actual        Maximum         LOS F?
     v                     2043          4700            No
      FO
     v  or v               0    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    = 1529                   (Equation 13-15, 13-16, 13-18, or 13-19)
         12A

________________________Flow Entering Merge Influence Area_____________________
                      Actual        Max Desirable        Violation?
     v                2043          4600                 No
      R12
_________________Level of Service Determination (if not F)_____________________

Density, D = 5.475 + 0.00734 v  + 0.0078 v   - 0.00627 L   =   16.0    pc/mi/ln
         R                    R           12            A
Level of service for ramp-freeway junction areas of influence  B

_____________________________Speed Estimation__________________________________

Intermediate speed variable,                 M  = 0.276
                                              S
Space mean speed in ramp influence area,     S  = 58.6    mph
                                              R
Space mean speed in outer lanes,             S  =  N/A    mph
                                              0
Space mean speed for all vehicles,           S  = 58.6    mph
_______________________________________________________________________________
```

HCS 2010: Freeway Merge and Diverge Segments Release 6.3

Phone: Fax:
E-mail:

Diverge Analysis

Analyst:	MDF
Agency/Co.:	HDR
Date performed:	10/30/2012
Analysis time period:	AM Peak
Freeway/Dir of Travel:	I-90 WB
Junction:	Diverge to Haines
Jurisdiction:	SDDOT
Analysis Year:	2035 No-Build

Description: I-90/La Crosse Street Interchange Study

Freeway Data

Type of analysis	Diverge	
Number of lanes in freeway	2	
Free-flow speed on freeway	65.0	mph
Volume on freeway	1670	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	230	vph
Length of first accel/decel lane	230	ft
Length of second accel/decel lane		ft

Adjacent Ramp Data (if one exists)

Does adjacent ramp exist?	Yes	
Volume on adjacent ramp	330	vph
Position of adjacent ramp	Downstream	
Type of adjacent ramp	On	
Distance to adjacent ramp	2400	ft

Conversion to pc/h Under Base Conditions

Junction Components	Freeway		Ramp		Adjacent Ramp	
Volume, V (vph)	1670		230		330	vph
Peak-hour factor, PHF	0.85		0.85		0.85	
Peak 15-min volume, v15	491		68		97	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                           2043        281         404       pcph

_________________________Estimation of V12 Diverge Areas_______________________

                  L  =            (Equation 13-12 or 13-13)
                   EQ
                  P  =    1.000   Using Equation  0
                   FD
                  v  = v  + (v - v ) P  =  2043   pc/h
                   12   R     F   R   FD

_______________________________Capacity Checks_________________________________

                           Actual        Maximum         LOS F?
     v  = v                2043          4700            No
      Fi   F
     v  = v - v            1762          4700            No
      FO   F   R
     v                     281           2100            No
      R
     v  or v               0    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    = 2043                   (Equation 13-15, 13-16, 13-18, or 13-19)
         12A

______________________Flow Entering Diverge Influence Area_____________________
                      Actual        Max Desirable         Violation?
     v                2043          4400                  No
      12
_________________Level of Service Determination (if not F)_____________________

Density,               D = 4.252 + 0.0086 v  - 0.009  L   =   19.8    pc/mi/ln
                        R                  12          D
Level of service for ramp-freeway junction areas of influence B

_____________________________Speed Estimation__________________________________

Intermediate speed variable,                 D  = 0.323
                                              S
Space mean speed in ramp influence area,     S  = 57.6    mph
                                              R
Space mean speed in outer lanes,             S  =  N/A    mph
                                              0
Space mean speed for all vehicles,           S  = 57.6    mph
_______________________________________________________________________________
```

HCS 2010: Freeway Merge and Diverge Segments Release 6.3

Phone: Fax:
E-mail:

Merge Analysis

Analyst:	MDF
Agency/Co.:	HDR
Date performed:	10/30/2012
Analysis time period:	PM Peak
Freeway/Dir of Travel:	I-90 EB
Junction:	Merge from Haines
Jurisdiction:	SDDOT
Analysis Year:	2035 No-Build

Description: I-90/La Crosse Street Interchange Study

Freeway Data

Type of analysis	Merge	
Number of lanes in freeway	2	
Free-flow speed on freeway	65.0	mph
Volume on freeway	1870	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	410	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	650	vph
Position of adjacent Ramp	Upstream	
Type of adjacent Ramp	Off	
Distance to adjacent Ramp	2200	ft

Conversion to pc/h Under Base Conditions

Junction Components	Freeway		Ramp		Adjacent Ramp	
Volume, V (vph)	1870		410		650	vph
Peak-hour factor, PHF	0.90		0.90		0.90	
Peak 15-min volume, v15	519		114		181	v
Trucks and buses	5		5		5	%
Recreational vehicles	0		0		0	%
Terrain type:	Level		Level		Level	
Grade		%		%		%
Length		mi		mi		mi
Trucks and buses PCE, ET	1.5		1.5		1.5	
Recreational vehicle PCE, ER	1.2		1.2		1.2	

```
Heavy vehicle adjustment, fHV           0.976       0.976       0.976
Driver population factor, fP            1.00        1.00        1.00
Flow rate, vp                           2130        467         740       pcph

_________________________Estimation of V12 Merge Areas_________________________

                  L  =             (Equation 13-6 or 13-7)
                   EQ
                  P  =    1.000   Using Equation  0
                   FM
                  v  = v  (P  ) =  2130   pc/h
                   12   F   FM

_______________________________Capacity Checks_______________________________

                           Actual        Maximum         LOS F?
     v                     2597          4700            No
      FO
     v  or v               0    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    = 2130                   (Equation 13-15, 13-16, 13-18, or 13-19)
         12A

________________________Flow Entering Merge Influence Area_____________________
                      Actual       Max Desirable        Violation?
     v                2597         4600                 No
      R12
_________________Level of Service Determination (if not F)_____________________

Density, D = 5.475 + 0.00734 v  + 0.0078 v   - 0.00627 L   =   19.9    pc/mi/ln
         R                    R           12             A
Level of service for ramp-freeway junction areas of influence  B

_____________________________Speed Estimation__________________________________

Intermediate speed variable,                 M  = 0.292
                                              S
Space mean speed in ramp influence area,     S  = 58.3    mph
                                              R
Space mean speed in outer lanes,             S  =  N/A    mph
                                              0
Space mean speed for all vehicles,           S  = 58.3    mph
_______________________________________________________________________________
```

HCS 2010: Freeway Merge and Diverge Segments Release 6.3

Phone: Fax:
E-mail:

Diverge Analysis

Analyst:	MDF
Agency/Co.:	HDR
Date performed:	10/30/2012
Analysis time period:	PM Peak
Freeway/Dir of Travel:	I-90 EB
Junction:	Diverge to La Crosse
Jurisdiction:	SDDOT
Analysis Year:	2035 No-Build

Description: I-90/La Crosse Street Interchange Study

Freeway Data

Type of analysis	Diverge	
Number of lanes in freeway	2	
Free-flow speed on freeway	65.0	mph
Volume on freeway	2280	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	750	vph
Length of first accel/decel lane	680	ft
Length of second accel/decel lane		ft

Adjacent Ramp Data (if one exists)

Does adjacent ramp exist?	Yes	
Volume on adjacent ramp	410	vph
Position of adjacent ramp	Downstream	
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)	2280		750		410	vph
Peak-hour factor, PHF	0.90		0.90		0.90	
Peak 15-min volume, v15	633		208		114	v
Trucks and buses	5		5		5	%
Recreational vehicles	0		0		0	%
Terrain type:	Level		Level		Level	
Grade	0.00	%	0.00	%	0.00	%
Length	0.00	mi	0.00	mi	0.00	mi
Trucks and buses PCE, ET	1.5		1.5		1.5	
Recreational vehicle PCE, ER	1.2		1.2		1.2	

Heavy vehicle adjustment, fHV	0.976	0.976	0.976	
Driver population factor, fP	1.00	1.00	1.00	
Flow rate, vp	2597	854	467	pcph

Estimation of V12 Diverge Areas

L_{EQ} = (Equation 13-12 or 13-13)

P_{FD} = 1.000 Using Equation 0

$v_{12} = v_R + (v_F - v_R) P_{FD}$ = 2597 pc/h

Capacity Checks

	Actual	Maximum	LOS F?
$v_{Fi} = v_F$	2597	4700	No
$v_{FO} = v_F - v_R$	1743	4700	No
v_R	854	2100	No
v_3 or v_{av34}	0 pc/h	(Equation 13-14 or 13-17)	

Is v_3 or v_{av34} > 2700 pc/h? No

Is v_3 or v_{av34} > 1.5 v_{12}/2 No

If yes, v_{12A} = 2597 (Equation 13-15, 13-16, 13-18, or 13-19)

Flow Entering Diverge Influence Area

	Actual	Max Desirable	Violation?
v_{12}	2597	4400	No

Level of Service Determination (if not F)

Density, $D_R = 4.252 + 0.0086\, v_{12} - 0.009\, L_D$ = 20.5 pc/mi/ln

Level of service for ramp-freeway junction areas of influence C

Speed Estimation

Intermediate speed variable,	D_S = 0.375	
Space mean speed in ramp influence area,	S_R = 56.4	mph
Space mean speed in outer lanes,	S_0 = N/A	mph
Space mean speed for all vehicles,	S = 56.4	mph

HCS 2010: Freeway Merge and Diverge Segments Release 6.3

Phone: Fax:
E-mail:

Merge Analysis

Analyst:	MDF
Agency/Co.:	HDR
Date performed:	10/30/2012
Analysis time period:	PM Peak
Freeway/Dir of Travel:	I-90 EB
Junction:	Merge from La Crosse
Jurisdiction:	SDDOT
Analysis Year:	2035 No-Build

Description: I-90/La Crosse Street Interchange Study

Freeway Data

Type of analysis	Merge	
Number of lanes in freeway	2	
Free-flow speed on freeway	65.0	mph
Volume on freeway	1530	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	410	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	750	vph
Position of adjacent Ramp	Upstream	
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)	1530	410	750	vph
Peak-hour factor, PHF	0.90	0.90	0.90	
Peak 15-min volume, v15	425	114	208	v
Trucks and buses	5	5	5	%
Recreational vehicles	0	0	0	%
Terrain type:	Level	Level	Level	
Grade	%	%	%	
Length	mi	mi	mi	
Trucks and buses PCE, ET	1.5	1.5	1.5	
Recreational vehicle PCE, ER	1.2	1.2	1.2	

```
Heavy vehicle adjustment, fHV           0.976       0.976       0.976
Driver population factor, fP            1.00        1.00        1.00
Flow rate, vp                           1743        467         854        pcph

_________________________Estimation of V12 Merge Areas_________________________

                  L  =             (Equation 13-6 or 13-7)
                   EQ
                  P  =    1.000   Using Equation  0
                   FM
                  v  = v  (P  ) =  1743   pc/h
                   12   F   FM

_______________________________Capacity Checks_________________________________

                           Actual        Maximum         LOS F?
     v                     2210          4700            No
      FO
     v  or v               0    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    = 1743                   (Equation 13-15, 13-16, 13-18, or 13-19)
         12A

________________________Flow Entering Merge Influence Area_____________________
                      Actual        Max Desirable        Violation?
     v                2210          4600                 No
      R12
_________________Level of Service Determination (if not F)_____________________

Density, D = 5.475 + 0.00734 v  + 0.0078 v   - 0.00627 L   =   16.2    pc/mi/ln
          R                   R           12             A
Level of service for ramp-freeway junction areas of influence  B

_____________________________Speed Estimation__________________________________

Intermediate speed variable,                 M  = 0.267
                                              S
Space mean speed in ramp influence area,     S  = 58.9    mph
                                              R
Space mean speed in outer lanes,             S  =  N/A    mph
                                              0
Space mean speed for all vehicles,           S  = 58.9    mph
_______________________________________________________________________________
```

Phone: Fax:
E-mail:

Diverge Analysis

Analyst:	MDF
Agency/Co.:	HDR
Date performed:	10/30/2012
Analysis time period:	PM Peak
Freeway/Dir of Travel:	I-90 EB
Junction:	Diverge to North
Jurisdiction:	SDDOT
Analysis Year:	2035 No-Build

Description: I-90/La Crosse Street Interchange Study

Freeway Data

Type of analysis	Diverge	
Number of lanes in freeway	2	
Free-flow speed on freeway	65.0	mph
Volume on freeway	1940	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	620	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	350	vph
Position of adjacent ramp	Downstream	
Type of adjacent ramp	On	
Distance to adjacent ramp	3100	ft

Conversion to pc/h Under Base Conditions

Junction Components	Freeway		Ramp		Adjacent Ramp	
Volume, V (vph)	1940		620		350	vph
Peak-hour factor, PHF	0.90		0.90		0.90	
Peak 15-min volume, v15	539		172		97	v
Trucks and buses	5		5		5	%
Recreational vehicles	0		0		0	%
Terrain type:	Level		Level		Level	
Grade	0.00	%	0.00	%	0.00	%
Length	0.00	mi	0.00	mi	0.00	mi
Trucks and buses PCE, ET	1.5		1.5		1.5	
Recreational vehicle PCE, ER	1.2		1.2		1.2	

```
Heavy vehicle adjustment, fHV          0.976       0.976       0.976
Driver population factor, fP           1.00        1.00        1.00
Flow rate, vp                          2209        706         399       pcph

_________________________Estimation of V12 Diverge Areas_______________________

                  L  =            (Equation 13-12 or 13-13)
                   EQ
                  P  =    1.000   Using Equation  0
                   FD
                  v  = v  + (v - v ) P  =  2209   pc/h
                   12   R     F   R   FD

_______________________________Capacity Checks_________________________________

                           Actual        Maximum         LOS F?
     v  = v                2209          4700            No
      Fi   F
     v  = v - v            1503          4700            No
      FO   F   R
     v                     706           2100            No
      R
     v  or v               0    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    = 2209                   (Equation 13-15, 13-16, 13-18, or 13-19)
         12A

______________________Flow Entering Diverge Influence Area_____________________
                      Actual        Max Desirable         Violation?
     v                2209          4400                  No
      12
_________________Level of Service Determination (if not F)_____________________

Density,               D = 4.252 + 0.0086 v  - 0.009  L   =   21.0    pc/mi/ln
                        R                  12          D
Level of service for ramp-freeway junction areas of influence C

_____________________________Speed Estimation__________________________________

Intermediate speed variable,               D  = 0.362
                                            S
Space mean speed in ramp influence area,   S  = 56.7    mph
                                            R
Space mean speed in outer lanes,           S  =  N/A    mph
                                            0
Space mean speed for all vehicles,         S  = 56.7    mph
_______________________________________________________________________________
```

HCS 2010: Freeway Merge and Diverge Segments Release 6.3

Phone: Fax:
E-mail:

Merge Analysis

Analyst:	MDF
Agency/Co.:	HDR
Date performed:	10/30/2012
Analysis time period:	PM Peak
Freeway/Dir of Travel:	I-90 EB
Junction:	Merge from North
Jurisdiction:	SDDOT
Analysis Year:	2035 No-Build

Description: I-90/La Crosse Street Interchange Study

Freeway Data

Type of analysis	Merge	
Number of lanes in freeway	2	
Free-flow speed on freeway	65.0	mph
Volume on freeway	1320	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	350	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	620	vph
Position of adjacent Ramp	Upstream	
Type of adjacent Ramp	Off	
Distance to adjacent Ramp	3100	ft

Conversion to pc/h Under Base Conditions

Junction Components	Freeway	Ramp	Adjacent Ramp	
Volume, V (vph)	1320	350	620	vph
Peak-hour factor, PHF	0.90	0.90	0.90	
Peak 15-min volume, v15	367	97	172	v
Trucks and buses	5	5	5	%
Recreational vehicles	0	0	0	%
Terrain type:	Level	Level	Level	
Grade	%	%	%	
Length	mi	mi	mi	
Trucks and buses PCE, ET	1.5	1.5	1.5	
Recreational vehicle PCE, ER	1.2	1.2	1.2	

```
Heavy vehicle adjustment, fHV            0.976       0.976       0.976
Driver population factor, fP             1.00        1.00        1.00
Flow rate, vp                            1503        399         706       pcph

_________________________Estimation of V12 Merge Areas_________________________

                  L  =             (Equation 13-6 or 13-7)
                   EQ
                  P  =    1.000   Using Equation  0
                   FM
                  v  = v  (P  ) =  1503   pc/h
                   12   F   FM

_______________________________Capacity Checks_________________________________

                           Actual        Maximum         LOS F?
     v                     1902          4700            No
      FO
     v  or v               0    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    = 1503                   (Equation 13-15, 13-16, 13-18, or 13-19)
         12A

________________________Flow Entering Merge Influence Area_____________________
                      Actual        Max Desirable        Violation?
     v                1902          4600                 No
      R12
_________________Level of Service Determination (if not F)_____________________

Density, D = 5.475 + 0.00734 v  + 0.0078 v   - 0.00627 L   =   13.2    pc/mi/ln
          R                   R           12             A
Level of service for ramp-freeway junction areas of influence  B

_____________________________Speed Estimation__________________________________

Intermediate speed variable,                 M  = 0.248
                                              S
Space mean speed in ramp influence area,     S  = 59.3    mph
                                              R
Space mean speed in outer lanes,             S  =  N/A    mph
                                              0
Space mean speed for all vehicles,           S  = 59.3    mph
_______________________________________________________________________________
```

Phone: Fax:
E-mail:

Diverge Analysis

Analyst:	MDF
Agency/Co.:	HDR
Date performed:	10/30/2012
Analysis time period:	PM Peak
Freeway/Dir of Travel:	I-90 WB
Junction:	Diverge to North
Jurisdiction:	SDDOT
Analysis Year:	2035 No-Build

Description: I-90/La Crosse Street Interchange Study

Freeway Data

Type of analysis	Diverge	
Number of lanes in freeway	2	
Free-flow speed on freeway	65.0	mph
Volume on freeway	2080	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	420	vph
Length of first accel/decel lane	310	ft
Length of second accel/decel lane		ft

Adjacent Ramp Data (if one exists)

Does adjacent ramp exist?	Yes	
Volume on adjacent ramp	640	vph
Position of adjacent ramp	Downstream	
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)	2080		420		640	vph
Peak-hour factor, PHF	0.90		0.90		0.90	
Peak 15-min volume, v15	578		117		178	v
Trucks and buses	3		3		3	%
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           0.985       0.985       0.985
Driver population factor, fP            1.00        1.00        1.00
Flow rate, vp                           2346        474         722       pcph

_________________________Estimation of V12 Diverge Areas_______________________

                  L  =            (Equation 13-12 or 13-13)
                   EQ
                  P  =    1.000   Using Equation  0
                   FD
                  v  = v  + (v - v ) P  =  2346   pc/h
                   12   R     F   R   FD

_______________________________Capacity Checks_________________________________

                             Actual        Maximum         LOS F?
     v  = v                  2346          4700            No
      Fi   F
     v  = v - v              1872          4700            No
      FO   F   R
     v                       474           2100            No
      R
     v  or v                 0    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    = 2346                     (Equation 13-15, 13-16, 13-18, or 13-19)
         12A

______________________Flow Entering Diverge Influence Area_____________________
                         Actual        Max Desirable        Violation?
     v                   2346          4400                 No
      12
_________________Level of Service Determination (if not F)_____________________

Density,                  D = 4.252 + 0.0086 v  - 0.009  L   =   21.6    pc/mi/ln
                           R                   12          D
Level of service for ramp-freeway junction areas of influence C

_____________________________Speed Estimation__________________________________

Intermediate speed variable,                 D  = 0.341
                                              S
Space mean speed in ramp influence area,     S  = 57.2    mph
                                              R
Space mean speed in outer lanes,             S  =  N/A    mph
                                              0
Space mean speed for all vehicles,           S  = 57.2    mph
_______________________________________________________________________________
```

HCS 2010: Freeway Merge and Diverge Segments Release 6.3

Phone: Fax:
E-mail:

Merge Analysis

Analyst:	MDF
Agency/Co.:	HDR
Date performed:	10/30/2012
Analysis time period:	PM Peak
Freeway/Dir of Travel:	I-90 WB
Junction:	Merge from North
Jurisdiction:	SDDOT
Analysis Year:	2035 No-Build

Description: I-90/La Crosse Street Interchange Study

Freeway Data

Type of analysis	Merge	
Number of lanes in freeway	2	
Free-flow speed on freeway	65.0	mph
Volume on freeway	1660	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	640	vph
Length of first accel/decel lane	1300	ft
Length of second accel/decel lane		ft

Adjacent Ramp Data (if one exists)

Does adjacent ramp exist?	Yes	
Volume on adjacent Ramp	420	vph
Position of adjacent Ramp	Upstream	
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)	1660	640	420	vph
Peak-hour factor, PHF	0.90	0.90	0.90	
Peak 15-min volume, v15	461	178	117	v
Trucks and buses	3	3	3	%
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           0.985       0.985       0.985
Driver population factor, fP            1.00        1.00        1.00
Flow rate, vp                           1872        722         474       pcph

_________________________Estimation of V12 Merge Areas_________________________

                  L  =            (Equation 13-6 or 13-7)
                   EQ
                  P  =    1.000   Using Equation  0
                   FM
                  v  = v  (P  ) =  1872   pc/h
                   12   F   FM

_______________________________Capacity Checks_______________________________

                           Actual        Maximum         LOS F?
     v                     2594          4700            No
      FO
     v  or v               0    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    = 1872                   (Equation 13-15, 13-16, 13-18, or 13-19)
         12A

________________________Flow Entering Merge Influence Area_____________________
                      Actual        Max Desirable        Violation?
     v                2594          4600                 No
      R12
_________________Level of Service Determination (if not F)_____________________

Density, D = 5.475 + 0.00734 v  + 0.0078 v   - 0.00627 L   =   17.2    pc/mi/ln
          R                   R           12             A
Level of service for ramp-freeway junction areas of influence  B

_____________________________Speed Estimation_________________________________

Intermediate speed variable,                 M  = 0.256
                                              S
Space mean speed in ramp influence area,     S  = 59.1    mph
                                              R
Space mean speed in outer lanes,             S  =  N/A    mph
                                              0
Space mean speed for all vehicles,           S  = 59.1    mph
_______________________________________________________________________________
```

HCS 2010: Freeway Merge and Diverge Segments Release 6.3

Phone: Fax:
E-mail:

Diverge Analysis

Analyst:	MDF
Agency/Co.:	HDR
Date performed:	10/30/2012
Analysis time period:	PM Peak
Freeway/Dir of Travel:	I-90 WB
Junction:	Diverge to La Crosse
Jurisdiction:	SDDOT
Analysis Year:	2035 No-Build

Description: I-90/La Crosse Street Interchange Study

Freeway Data

Type of analysis	Diverge	
Number of lanes in freeway	2	
Free-flow speed on freeway	65.0	mph
Volume on freeway	2300	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	420	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	770	vph
Position of adjacent ramp	Downstream	
Type of adjacent ramp	On	
Distance to adjacent ramp	1800	ft

Conversion to pc/h Under Base Conditions

Junction Components	Freeway		Ramp		Adjacent Ramp	
Volume, V (vph)	2300		420		770	vph
Peak-hour factor, PHF	0.90		0.90		0.90	
Peak 15-min volume, v15	639		117		214	v
Trucks and buses	3		3		3	%
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           0.985       0.985       0.985
Driver population factor, fP            1.00        1.00        1.00
Flow rate, vp                           2594        474         868       pcph

_________________________Estimation of V12 Diverge Areas_______________________

                  L  =            (Equation 13-12 or 13-13)
                   EQ
                  P  =    1.000   Using Equation  0
                   FD
                  v  = v  + (v - v ) P  =  2594   pc/h
                   12   R     F   R   FD

_______________________________Capacity Checks_________________________________

                           Actual        Maximum         LOS F?
     v  = v                2594          4700            No
      Fi   F
     v  = v - v            2120          4700            No
      FO   F   R
     v                     474           2100            No
      R
     v  or v               0    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    = 2594                   (Equation 13-15, 13-16, 13-18, or 13-19)
         12A

______________________Flow Entering Diverge Influence Area_____________________
                      Actual        Max Desirable        Violation?
     v                2594          4400                 No
      12
_________________Level of Service Determination (if not F)_____________________

Density,               D = 4.252 + 0.0086 v  - 0.009  L   =   19.8    pc/mi/ln
                        R                  12          D
Level of service for ramp-freeway junction areas of influence B

_____________________________Speed Estimation__________________________________

Intermediate speed variable,                 D  = 0.341
                                              S
Space mean speed in ramp influence area,     S  = 57.2    mph
                                              R
Space mean speed in outer lanes,             S  =  N/A    mph
                                              0
Space mean speed for all vehicles,           S  = 57.2    mph
_______________________________________________________________________________
```

HCS 2010: Freeway Merge and Diverge Segments Release 6.3

Phone: Fax:
E-mail:

Merge Analysis

Analyst:	MDF
Agency/Co.:	HDR
Date performed:	10/30/2012
Analysis time period:	PM Peak
Freeway/Dir of Travel:	I-90 WB
Junction:	Merge from La Crosse
Jurisdiction:	SDDOT
Analysis Year:	2035 No-Build

Description: I-90/La Crosse Street Interchange Study

Freeway Data

Type of analysis	Merge	
Number of lanes in freeway	2	
Free-flow speed on freeway	65.0	mph
Volume on freeway	1880	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	770	vph
Length of first accel/decel lane	830	ft
Length of second accel/decel lane		ft

Adjacent Ramp Data (if one exists)

Does adjacent ramp exist?	Yes	
Volume on adjacent Ramp	420	vph
Position of adjacent Ramp	Upstream	
Type of adjacent Ramp	Off	
Distance to adjacent Ramp	1800	ft

Conversion to pc/h Under Base Conditions

Junction Components	Freeway	Ramp	Adjacent Ramp	
Volume, V (vph)	1880	770	420	vph
Peak-hour factor, PHF	0.90	0.90	0.90	
Peak 15-min volume, v15	522	214	117	v
Trucks and buses	3	3	3	%
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          0.985       0.985       0.985
Driver population factor, fP           1.00        1.00        1.00
Flow rate, vp                          2120        868         474       pcph

_________________________Estimation of V12 Merge Areas_________________________

                  L  =            (Equation 13-6 or 13-7)
                   EQ
                  P  =    1.000   Using Equation  0
                   FM
                  v  = v  (P  ) =  2120   pc/h
                   12   F   FM

_______________________________Capacity Checks_______________________________

                           Actual        Maximum         LOS F?
     v                     2988          4700            No
      FO
     v  or v               0    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    = 2120                   (Equation 13-15, 13-16, 13-18, or 13-19)
         12A

________________________Flow Entering Merge Influence Area_____________________
                      Actual        Max Desirable        Violation?
     v                2988          4600                 No
      R12
_________________Level of Service Determination (if not F)_____________________

Density, D = 5.475 + 0.00734 v  + 0.0078 v   - 0.00627 L   =   23.2    pc/mi/ln
          R                   R           12            A
Level of service for ramp-freeway junction areas of influence  C

_____________________________Speed Estimation__________________________________

Intermediate speed variable,                 M  = 0.324
                                              S
Space mean speed in ramp influence area,     S  = 57.6    mph
                                              R
Space mean speed in outer lanes,             S  =  N/A    mph
                                              0
Space mean speed for all vehicles,           S  = 57.6    mph
_______________________________________________________________________________
```

HCS 2010: Freeway Merge and Diverge Segments Release 6.3

Phone: Fax:
E-mail:

Diverge Analysis

Analyst:	MDF
Agency/Co.:	HDR
Date performed:	10/30/2012
Analysis time period:	PM Peak
Freeway/Dir of Travel:	I-90 WB
Junction:	Diverge to Haines
Jurisdiction:	SDDOT
Analysis Year:	2035 No-Build

Description: I-90/La Crosse Street Interchange Study

Freeway Data

Type of analysis	Diverge	
Number of lanes in freeway	2	
Free-flow speed on freeway	65.0	mph
Volume on freeway	2650	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	430	vph
Length of first accel/decel lane	230	ft
Length of second accel/decel lane		ft

Adjacent Ramp Data (if one exists)

Does adjacent ramp exist?	Yes	
Volume on adjacent ramp	560	vph
Position of adjacent ramp	Downstream	
Type of adjacent ramp	On	
Distance to adjacent ramp	2400	ft

Conversion to pc/h Under Base Conditions

Junction Components	Freeway		Ramp		Adjacent Ramp	
Volume, V (vph)	2650		430		560	vph
Peak-hour factor, PHF	0.90		0.90		0.90	
Peak 15-min volume, v15	736		119		156	v
Trucks and buses	3		3		3	%
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          0.985       0.985       0.985
Driver population factor, fP           1.00        1.00        1.00
Flow rate, vp                          2989        485         632        pcph

_________________________Estimation of V12 Diverge Areas_______________________

                  L  =            (Equation 13-12 or 13-13)
                   EQ
                  P  =    1.000   Using Equation  0
                   FD
                  v  = v  + (v - v ) P  =  2989   pc/h
                   12   R     F   R   FD

_______________________________Capacity Checks_________________________________

                           Actual        Maximum         LOS F?
     v  = v                2989          4700            No
      Fi   F
     v  = v - v            2504          4700            No
      FO   F   R
     v                     485           2100            No
      R
     v  or v               0    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    = 2989                   (Equation 13-15, 13-16, 13-18, or 13-19)
         12A

______________________Flow Entering Diverge Influence Area_____________________
                      Actual        Max Desirable        Violation?
     v                2989          4400                 No
      12
_________________Level of Service Determination (if not F)_____________________

Density,               D = 4.252 + 0.0086 v  - 0.009  L   =   27.9    pc/mi/ln
                        R                  12          D
Level of service for ramp-freeway junction areas of influence C

_____________________________Speed Estimation__________________________________

Intermediate speed variable,                 D  = 0.342
                                              S
Space mean speed in ramp influence area,     S  = 57.1    mph
                                              R
Space mean speed in outer lanes,             S  =  N/A    mph
                                              0
Space mean speed for all vehicles,           S  = 57.1    mph
_______________________________________________________________________________
```

III. Freeway Weaving Analysis

HCS 2010: Freeway Weaving Release 6.3

Phone: Fax:

E-mail:

Operational Analysis

Analyst:	MDF
Agency/Co.:	HDR
Date Performed:	10/30/2012
Analysis Time Period:	AM Peak
Freeway/Dir of Travel:	I-90 EB
Weaving Location:	B/W I-190 and Haines
Analysis Year:	2012
Description:	I-90/La Crosse Street Interchange Study

Inputs

Segment Type	Freeway	
Weaving configuration	One-Sided	
Number of lanes, N	3	ln
Weaving segment length, LS	720	ft
Freeway free-flow speed, FFS	65	mi/h
Minimum segment speed, SMIN	15	mi/h
Freeway maximum capacity, cIFL	1800*	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	537	373	263	107	veh/h
Peak hour factor, PHF	0.87	0.87	0.87	0.87	
Peak 15-min volume, v15	154	107	76	31	
Trucks and buses	5	5	5	5	%
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	0.976	0.976	0.976	0.976	
Driver population adjustment, fP	1.00	1.00	1.00	1.00	
Flow rate, v	633	439	310	126	pc/h

Volume ratio, VR 0.497

Configuration Characteristics

Number of maneuver lanes, NWL	2	ln
Interchange density, ID	0.8	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	749	lc/h
Weaving lane changes, LCW	864	lc/h
Non-weaving vehicle index, INW	44	
Non-weaving lane change, LCNW	0	lc/h
Total lane changes, LCALL	864	lc/h

Weaving and Non-Weaving Speeds

Weaving intensity factor, W 0.261

Average weaving speed, SW	54.7	mi/h
Average non-weaving speed, SNW	57.2	mi/h

Weaving Segment Speed, Density, Level of Service and Capacity

Weaving segment speed, S	55.9	mi/h
Weaving segment density, D	9.0	pc/mi/ln
Level of service, LOS	A	
Weaving segment v/c ratio	0.399	
Weaving segment flow rate, v	1508	pc/h
Weaving segment capacity, cW	3685	veh/h

Limitations on Weaving Segments

If limit reached, see note.

	Minimum	Maximum	Actual	Note
Weaving length (ft)	300	7788	720	a,b
		Maximum	Analyzed	
Density-based capacty, cIWL (pc/h/ln)		1800*	1259	c
		Maximum	Analyzed	
v/c ratio		1.00	0.399	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 6.3

Phone: Fax:
E-mail:

Operational Analysis

Analyst:	MDF
Agency/Co.:	HDR
Date Performed:	10/30/2012
Analysis Time Period:	AM Peak
Freeway/Dir of Travel:	I-90 WB
Weaving Location:	B/W Haines and I-190
Analysis Year:	2012
Description:	I-90/La Crosse Street Interchange Study

Inputs

Segment Type	Freeway	
Weaving configuration	One-Sided	
Number of lanes, N	3	ln
Weaving segment length, LS	1600	ft
Freeway free-flow speed, FFS	65	mi/h
Minimum segment speed, SMIN	15	mi/h
Freeway maximum capacity, cIFL	1800*	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	565	160	320	150	veh/h
Peak hour factor, PHF	0.82	0.82	0.82	0.82	
Peak 15-min volume, v15	172	49	98	46	
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	717	203	406	190	pc/h

Volume ratio, VR 0.402

Configuration Characteristics

Number of maneuver lanes, NWL	2	ln
Interchange density, ID	0.8	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	609	lc/h
Weaving lane changes, LCW	812	lc/h
Non-weaving vehicle index, INW	116	
Non-weaving lane change, LCNW	476	lc/h
Total lane changes, LCALL	1288	lc/h

Weaving and Non-Weaving Speeds

Weaving intensity factor, W 0.190

Average weaving speed, SW	57.0	mi/h
Average non-weaving speed, SNW	58.2	mi/h

Weaving Segment Speed, Density, Level of Service and Capacity

Weaving segment speed, S	57.7	mi/h
Weaving segment density, D	8.8	pc/mi/ln
Level of service, LOS	A	
Weaving segment v/c ratio	0.358	
Weaving segment flow rate, v	1516	pc/h
Weaving segment capacity, cW	4067	veh/h

Limitations on Weaving Segments

If limit reached, see note.

	Minimum	Maximum	Actual	Note
Weaving length (ft)	300	6700	1600	a,b
		Maximum	Analyzed	
Density-based capacty, cIWL (pc/h/ln)		1800*	1410	c
		Maximum	Analyzed	
v/c ratio		1.00	0.358	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 6.3

Phone: Fax:
E-mail:

Operational Analysis

Analyst:	MDF
Agency/Co.:	HDR
Date Performed:	10/30/2012
Analysis Time Period:	PM Peak
Freeway/Dir of Travel:	I-90 EB
Weaving Location:	B/W I-190 and Haines
Analysis Year:	2012
Description:	I-90/La Crosse Street Interchange Study

Inputs

Segment Type	Freeway	
Weaving configuration	One-Sided	
Number of lanes, N	3	ln
Weaving segment length, LS	720	ft
Freeway free-flow speed, FFS	65	mi/h
Minimum segment speed, SMIN	15	mi/h
Freeway maximum capacity, cIFL	1800*	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	803	472	292	338	veh/h
Peak hour factor, PHF	0.88	0.88	0.88	0.88	
Peak 15-min volume, v15	228	134	83	96	
Trucks and buses	5	5	5	5	%
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	0.976	0.976	0.976	0.976	
Driver population adjustment, fP	1.00	1.00	1.00	1.00	
Flow rate, v	935	550	340	394	pc/h

Volume ratio, VR 0.401

Configuration Characteristics

Number of maneuver lanes, NWL	2	ln
Interchange density, ID	0.8	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	1005	lc/h
Non-weaving vehicle index, INW	77	
Non-weaving lane change, LCNW	86	lc/h
Total lane changes, LCALL	1091	lc/h

Weaving and Non-Weaving Speeds

Weaving intensity factor, W 0.314

Average weaving speed, SW	53.1	mi/h
Average non-weaving speed, SNW	55.0	mi/h

Weaving Segment Speed, Density, Level of Service and Capacity

Weaving segment speed, S	54.2	mi/h
Weaving segment density, D	13.6	pc/mi/ln
Level of service, LOS	B	
Weaving segment v/c ratio	0.551	
Weaving segment flow rate, v	2219	pc/h
Weaving segment capacity, cW	3931	veh/h

Limitations on Weaving Segments

If limit reached, see note.

	Minimum	Maximum	Actual	Note
Weaving length (ft)	300	6693	720	a,b
		Maximum	Analyzed	
Density-based capacty, cIWL (pc/h/ln)		1800*	1343	c
		Maximum	Analyzed	
v/c ratio		1.00	0.551	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 6.3

Phone: Fax:
E-mail:

Operational Analysis

Analyst:	MDF
Agency/Co.:	HDR
Date Performed:	10/30/2012
Analysis Time Period:	PM Peak
Freeway/Dir of Travel:	I-90 WB
Weaving Location:	B/W Haines and I-190
Analysis Year:	2012
Description:	I-90/La Crosse Street Interchange Study

Inputs

Segment Type	Freeway	
Weaving configuration	One-Sided	
Number of lanes, N	3	ln
Weaving segment length, LS	1600	ft
Freeway free-flow speed, FFS	65	mi/h
Minimum segment speed, SMIN	15	mi/h
Freeway maximum capacity, cIFL	1800*	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	788	282	542	258	veh/h
Peak hour factor, PHF	0.85	0.85	0.85	0.85	
Peak 15-min volume, v15	232	83	159	76	
Trucks and buses	3	3	3	3	%
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	0.985	0.985	0.985	0.985	
Driver population adjustment, fP	1.00	1.00	1.00	1.00	
Flow rate, v	941	337	647	308	pc/h

Volume ratio, VR 0.441

Configuration Characteristics

Number of maneuver lanes, NWL	2	ln
Interchange density, ID	0.8	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	984	lc/h
Weaving lane changes, LCW	1187	lc/h
Non-weaving vehicle index, INW	160	
Non-weaving lane change, LCNW	547	lc/h
Total lane changes, LCALL	1734	lc/h

Weaving and Non-Weaving Speeds

Weaving intensity factor, W 0.241

Average weaving speed, SW	55.3	mi/h
Average non-weaving speed, SNW	54.3	mi/h

Weaving Segment Speed, Density, Level of Service and Capacity

Weaving segment speed, S	54.8	mi/h
Weaving segment density, D	13.6	pc/mi/ln
Level of service, LOS	B	
Weaving segment v/c ratio	0.541	
Weaving segment flow rate, v	2233	pc/h
Weaving segment capacity, cW	4067	veh/h

Limitations on Weaving Segments

If limit reached, see note.

	Minimum	Maximum	Actual	Note
Weaving length (ft)	300	7141	1600	a,b
		Maximum	Analyzed	
Density-based capacty, cIWL (pc/h/ln)		1800*	1376	c
		Maximum	Analyzed	
v/c ratio		1.00	0.541	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 6.3

Phone: Fax:

E-mail:

Operational Analysis

Analyst:	MDF
Agency/Co.:	HDR
Date Performed:	10/30/2012
Analysis Time Period:	AM Peak
Freeway/Dir of Travel:	I-90 EB
Weaving Location:	B/W I-190 and Haines
Analysis Year:	2035 No-Build
Description:	I-90/La Crosse Street Interchange Study

Inputs

Segment Type	Freeway	
Weaving configuration	One-Sided	
Number of lanes, N	3	ln
Weaving segment length, LS	720	ft
Freeway free-flow speed, FFS	65	mi/h
Minimum segment speed, SMIN	15	mi/h
Freeway maximum capacity, cIFL	1800*	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	960	400	280	110	veh/h
Peak hour factor, PHF	0.90	0.90	0.90	0.90	
Peak 15-min volume, v15	267	111	78	31	
Trucks and buses	5	5	5	5	%
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	0.976	0.976	0.976	0.976	
Driver population adjustment, fP	1.00	1.00	1.00	1.00	
Flow rate, v	1093	456	319	125	pc/h

Volume ratio, VR 0.389

Configuration Characteristics

Number of maneuver lanes, NWL	2	ln
Interchange density, ID	0.8	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	775	lc/h
Weaving lane changes, LCW	890	lc/h
Non-weaving vehicle index, INW	70	
Non-weaving lane change, LCNW	63	lc/h
Total lane changes, LCALL	953	lc/h

Weaving and Non-Weaving Speeds

Weaving intensity factor, W 0.282

Average weaving speed, SW   54.0   mi/h
Average non-weaving speed, SNW   56.2   mi/h

Weaving Segment Speed, Density, Level of Service and Capacity

Weaving segment speed, S	55.3	mi/h
Weaving segment density, D	12.0	pc/mi/ln
Level of service, LOS	B	
Weaving segment v/c ratio	0.491	
Weaving segment flow rate, v	1993	pc/h
Weaving segment capacity, cW	3960	veh/h

Limitations on Weaving Segments

If limit reached, see note.

	Minimum	Maximum	Actual	Note
Weaving length (ft)	300	6557	720	a,b
		Maximum	Analyzed	
Density-based capacty, cIWL (pc/h/ln)		1800*	1353	c
		Maximum	Analyzed	
v/c ratio		1.00	0.491	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 6.3

Phone: Fax:

E-mail:

Operational Analysis

Analyst:	MDF
Agency/Co.:	HDR
Date Performed:	10/30/2012
Analysis Time Period:	AM Peak
Freeway/Dir of Travel:	I-90 EB
Weaving Location:	B/W Haines and La Crosse
Analysis Year:	2035 No-Build
Description:	I-90/La Crosse Street Interchange Study

Inputs

Segment Type	Freeway	
Weaving configuration	One-Sided	
Number of lanes, N	3	ln
Weaving segment length, LS	2790	ft
Freeway free-flow speed, FFS	65	mi/h
Minimum segment speed, SMIN	15	mi/h
Freeway maximum capacity, cIFL	1800*	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	1057	153	303	67	veh/h
Peak hour factor, PHF	0.90	0.90	0.90	0.90	
Peak 15-min volume, v15	294	43	84	19	
Trucks and buses	5	5	5	5	%
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	0.976	0.976	0.976	0.976	
Driver population adjustment, fP	1.00	1.00	1.00	1.00	
Flow rate, v	1204	174	345	76	pc/h

Volume ratio, VR 0.288

Configuration Characteristics

Number of maneuver lanes, NWL	2	ln
Interchange density, ID	0.8	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	799	lc/h
Non-weaving vehicle index, INW	286	
Non-weaving lane change, LCNW	1198	lc/h
Total lane changes, LCALL	1997	lc/h

Weaving and Non-Weaving Speeds

Weaving intensity factor, W 0.174

Average weaving speed, SW	57.6	mi/h
Average non-weaving speed, SNW	58.4	mi/h

Weaving Segment Speed, Density, Level of Service and Capacity

Weaving segment speed, S	58.2	mi/h
Weaving segment density, D	10.3	pc/mi/ln
Level of service, LOS	B	
Weaving segment v/c ratio	0.376	
Weaving segment flow rate, v	1799	pc/h
Weaving segment capacity, cW	4671	veh/h

Limitations on Weaving Segments

If limit reached, see note.

	Minimum	Maximum	Actual	Note
Weaving length (ft)	300	5461	2790	a,b
		Maximum	Analyzed	
Density-based capacty, cIWL (pc/h/ln)		1800*	1596	c
		Maximum	Analyzed	
v/c ratio		1.00	0.376	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 6.3

Phone: Fax:
E-mail:

Operational Analysis

Analyst:	MDF
Agency/Co.:	HDR
Date Performed:	10/30/2012
Analysis Time Period:	AM Peak
Freeway/Dir of Travel:	I-90 WB
Weaving Location:	B/W La Crosse and Haines
Analysis Year:	2035
Description:	I-90/La Crosse Street Interchange Study

Inputs

Segment Type	Freeway	
Weaving configuration	One-Sided	
Number of lanes, N	3	ln
Weaving segment length, LS	2570	ft
Freeway free-flow speed, FFS	65	mi/h
Minimum segment speed, SMIN	15	mi/h
Freeway maximum capacity, cIFL	1800*	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	1050	390	200	30	veh/h
Peak hour factor, PHF	0.85	0.85	0.85	0.85	
Peak 15-min volume, v15	309	115	59	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	1285	477	245	37	pc/h

Volume ratio, VR 0.353

Configuration Characteristics

Number of maneuver lanes, NWL	2	ln
Interchange density, ID	0.8	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	722	lc/h
Weaving lane changes, LCW	990	lc/h
Non-weaving vehicle index, INW	272	
Non-weaving lane change, LCNW	1087	lc/h
Total lane changes, LCALL	2077	lc/h

Weaving and Non-Weaving Speeds

Weaving intensity factor, W 0.191

Average weaving speed, SW	57.0	mi/h
Average non-weaving speed, SNW	56.5	mi/h

Weaving Segment Speed, Density, Level of Service and Capacity

Weaving segment speed, S	56.7	mi/h
Weaving segment density, D	12.0	pc/mi/ln
Level of service, LOS	B	
Weaving segment v/c ratio	0.447	
Weaving segment flow rate, v	2044	pc/h
Weaving segment capacity, cW	4399	veh/h

Limitations on Weaving Segments

If limit reached, see note.

	Minimum	Maximum	Actual	Note
Weaving length (ft)	300	6162	2570	a,b
		Maximum	Analyzed	
Density-based capacty, cIWL (pc/h/ln)		1800*	1525	c
		Maximum	Analyzed	
v/c ratio		1.00	0.447	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 6.3

Phone: Fax:
E-mail:

Operational Analysis

Analyst:	MDF
Agency/Co.:	HDR
Date Performed:	10/30/2012
Analysis Time Period:	AM Peak
Freeway/Dir of Travel:	I-90 WB
Weaving Location:	B/W Haines and I-190
Analysis Year:	2035 No-Build
Description:	I-90/La Crosse Street Interchange Study

Inputs

Segment Type	Freeway	
Weaving configuration	One-Sided	
Number of lanes, N	3	ln
Weaving segment length, LS	1600	ft
Freeway free-flow speed, FFS	65	mi/h
Minimum segment speed, SMIN	15	mi/h
Freeway maximum capacity, cIFL	1800*	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	1080	180	360	150	veh/h
Peak hour factor, PHF	0.85	0.85	0.85	0.85	
Peak 15-min volume, v15	318	53	106	44	
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	1321	220	440	184	pc/h
Volume ratio, VR		0.305			

Configuration Characteristics

Number of maneuver lanes, NWL	2	ln
Interchange density, ID	0.8	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	660	lc/h
Weaving lane changes, LCW	863	lc/h
Non-weaving vehicle index, INW	193	
Non-weaving lane change, LCNW	599	lc/h
Total lane changes, LCALL	1462	lc/h

Weaving and Non-Weaving Speeds

Weaving intensity factor, W	0.210

Average weaving speed, SW	56.3	mi/h
Average non-weaving speed, SNW	56.8	mi/h

Weaving Segment Speed, Density, Level of Service and Capacity

Weaving segment speed, S	56.6	mi/h
Weaving segment density, D	12.7	pc/mi/ln
Level of service, LOS	B	
Weaving segment v/c ratio	0.484	
Weaving segment flow rate, v	2165	pc/h
Weaving segment capacity, cW	4301	veh/h

Limitations on Weaving Segments

If limit reached, see note.

	Minimum	Maximum	Actual	Note
Weaving length (ft)	300	5636	1600	a,b
		Maximum	Analyzed	
Density-based capacty, cIWL (pc/h/ln)		1800*	1491	c
		Maximum	Analyzed	
v/c ratio		1.00	0.484	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 6.3

Phone: Fax:

E-mail:

Operational Analysis

Analyst:	MDF
Agency/Co.:	HDR
Date Performed:	10/30/2012
Analysis Time Period:	PM Peak
Freeway/Dir of Travel:	I-90 EB
Weaving Location:	B/W I-190 and Haines
Analysis Year:	2035 No-Build
Description:	I-90/La Crosse Street Interchange Study

Inputs

Segment Type	Freeway	
Weaving configuration	One-Sided	
Number of lanes, N	3	ln
Weaving segment length, LS	720	ft
Freeway free-flow speed, FFS	65	mi/h
Minimum segment speed, SMIN	15	mi/h
Freeway maximum capacity, cIFL	1800*	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	1340	530	310	340	veh/h
Peak hour factor, PHF	0.90	0.90	0.90	0.90	
Peak 15-min volume, v15	372	147	86	94	
Trucks and buses	5	5	5	5	%
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	0.976	0.976	0.976	0.976	
Driver population adjustment, fP	1.00	1.00	1.00	1.00	
Flow rate, v	1526	604	353	387	pc/h

Volume ratio, VR 0.333

Configuration Characteristics

Number of maneuver lanes, NWL	2	ln
Interchange density, ID	0.8	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	957	lc/h
Weaving lane changes, LCW	1072	lc/h
Non-weaving vehicle index, INW	110	
Non-weaving lane change, LCNW	207	lc/h
Total lane changes, LCALL	1279	lc/h

Weaving and Non-Weaving Speeds

Weaving intensity factor, W 0.356

Average weaving speed, SW	51.9	mi/h
Average non-weaving speed, SNW	53.5	mi/h

Weaving Segment Speed, Density, Level of Service and Capacity

Weaving segment speed, S	53.0	mi/h
Weaving segment density, D	18.1	pc/mi/ln
Level of service, LOS	B	
Weaving segment v/c ratio	0.683	
Weaving segment flow rate, v	2870	pc/h
Weaving segment capacity, cW	4098	veh/h

Limitations on Weaving Segments

If limit reached, see note.

	Minimum	Maximum	Actual	Note
Weaving length (ft)	300	5945	720	a,b
		Maximum	Analyzed	
Density-based capacty, cIWL (pc/h/ln)		1800*	1400	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 6.3

Phone: Fax:
E-mail:

Operational Analysis

Analyst:	MDF
Agency/Co.:	HDR
Date Performed:	10/30/2012
Analysis Time Period:	PM Peak
Freeway/Dir of Travel:	I-90 EB
Weaving Location:	B/W Haines and La Crosse
Analysis Year:	2035 No-Build
Description:	I-90/La Crosse Street Interchange Study

Inputs

Segment Type	Freeway	
Weaving configuration	One-Sided	
Number of lanes, N	3	ln
Weaving segment length, LS	2790	ft
Freeway free-flow speed, FFS	65	mi/h
Minimum segment speed, SMIN	15	mi/h
Freeway maximum capacity, cIFL	1800*	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	1280	250	590	160	veh/h
Peak hour factor, PHF	0.90	0.90	0.90	0.90	
Peak 15-min volume, v15	356	69	164	44	
Trucks and buses	5	5	5	5	%
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	0.976	0.976	0.976	0.976	
Driver population adjustment, fP	1.00	1.00	1.00	1.00	
Flow rate, v	1458	285	672	182	pc/h

Volume ratio, VR 0.369

Configuration Characteristics

Number of maneuver lanes, NWL	2	ln
Interchange density, ID	0.8	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	957	lc/h
Weaving lane changes, LCW	1237	lc/h
Non-weaving vehicle index, INW	366	
Non-weaving lane change, LCNW	1272	lc/h
Total lane changes, LCALL	2509	lc/h

Weaving and Non-Weaving Speeds

Weaving intensity factor, W 0.208

Average weaving speed, SW	56.4	mi/h
Average non-weaving speed, SNW	54.0	mi/h

__________Weaving Segment Speed, Density, Level of Service and Capacity__________

Weaving segment speed, S	54.8	mi/h
Weaving segment density, D	15.8	pc/mi/ln
Level of service, LOS	B	
Weaving segment v/c ratio	0.566	
Weaving segment flow rate, v	2597	pc/h
Weaving segment capacity, cW	4475	veh/h

_______________________Limitations on Weaving Segments_________________________

If limit reached, see note.

	Minimum	Maximum	Actual	Note
Weaving length (ft)	300	6330	2790	a,b
		Maximum	Analyzed	
Density-based capacty, cIWL (pc/h/ln)		1800*	1529	c
		Maximum	Analyzed	
v/c ratio		1.00	0.566	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 6.3

Phone: Fax:
E-mail:

Operational Analysis

Analyst:	MDF
Agency/Co.:	HDR
Date Performed:	10/30/2012
Analysis Time Period:	PM Peak
Freeway/Dir of Travel:	I-90 WB
Weaving Location:	B/W La Crosse and Haines
Analysis Year:	2035
Description:	I-90/La Crosse Street Interchange Study

Inputs

Segment Type	Freeway	
Weaving configuration	One-Sided	
Number of lanes, N	3	ln
Weaving segment length, LS	2570	ft
Freeway free-flow speed, FFS	65	mi/h
Minimum segment speed, SMIN	15	mi/h
Freeway maximum capacity, cIFL	1800*	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	1591	629	289	141	veh/h
Peak hour factor, PHF	0.90	0.90	0.90	0.90	
Peak 15-min volume, v15	442	175	80	39	
Trucks and buses	3	3	3	3	%
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	0.985	0.985	0.985	0.985	
Driver population adjustment, fP	1.00	1.00	1.00	1.00	
Flow rate, v	1794	709	326	159	pc/h
Volume ratio, VR		0.346			

Configuration Characteristics

Number of maneuver lanes, NWL	2	ln
Interchange density, ID	0.8	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	1035	lc/h
Weaving lane changes, LCW	1303	lc/h
Non-weaving vehicle index, INW	402	
Non-weaving lane change, LCNW	1217	lc/h
Total lane changes, LCALL	2520	lc/h

Weaving and Non-Weaving Speeds

Weaving intensity factor, W	0.223

Average weaving speed, SW	55.9	mi/h
Average non-weaving speed, SNW	52.8	mi/h

Weaving Segment Speed, Density, Level of Service and Capacity

Weaving segment speed, S	53.8	mi/h
Weaving segment density, D	18.5	pc/mi/ln
Level of service, LOS	B	
Weaving segment v/c ratio	0.651	
Weaving segment flow rate, v	2988	pc/h
Weaving segment capacity, cW	4525	veh/h

Limitations on Weaving Segments

If limit reached, see note.

	Minimum	Maximum	Actual	Note
Weaving length (ft)	300	6087	2570	a,b
		Maximum	Analyzed	
Density-based capacty, cIWL (pc/h/ln)		1800*	1531	c
		Maximum	Analyzed	
v/c ratio		1.00	0.651	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 6.3

Phone: Fax:
E-mail:

Operational Analysis

Analyst:	MDF
Agency/Co.:	HDR
Date Performed:	10/30/2012
Analysis Time Period:	PM Peak
Freeway/Dir of Travel:	I-90 WB
Weaving Location:	B/W Haines and I-190
Analysis Year:	2035 No-Build
Description:	I-90/La Crosse Street Interchange Study

Inputs

Segment Type	Freeway	
Weaving configuration	One-Sided	
Number of lanes, N	3	ln
Weaving segment length, LS	1600	ft
Freeway free-flow speed, FFS	65	mi/h
Minimum segment speed, SMIN	15	mi/h
Freeway maximum capacity, cIFL	1800*	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	1610	300	610	260	veh/h
Peak hour factor, PHF	0.90	0.90	0.90	0.90	
Peak 15-min volume, v15	447	83	169	72	
Trucks and buses	3	3	3	3	%
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	0.985	0.985	0.985	0.985	
Driver population adjustment, fP	1.00	1.00	1.00	1.00	
Flow rate, v	1816	338	688	293	pc/h

Volume ratio, VR 0.327

Configuration Characteristics

Number of maneuver lanes, NWL	2	ln
Interchange density, ID	0.8	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	1026	lc/h
Weaving lane changes, LCW	1229	lc/h
Non-weaving vehicle index, INW	270	
Non-weaving lane change, LCNW	724	lc/h
Total lane changes, LCALL	1953	lc/h

Weaving and Non-Weaving Speeds

Weaving intensity factor, W 0.264

Average weaving speed, SW	54.5	mi/h
Average non-weaving speed, SNW	52.6	mi/h

Weaving Segment Speed, Density, Level of Service and Capacity

Weaving segment speed, S	53.2	mi/h
Weaving segment density, D	19.6	pc/mi/ln
Level of service, LOS	B	
Weaving segment v/c ratio	0.709	
Weaving segment flow rate, v	3135	pc/h
Weaving segment capacity, cW	4354	veh/h

Limitations on Weaving Segments

If limit reached, see note.

	Minimum	Maximum	Actual	Note
Weaving length (ft)	300	5878	1600	a,b
		Maximum	Analyzed	
Density-based capacty, cIWL (pc/h/ln)		1800*	1473	c
		Maximum	Analyzed	
v/c ratio		1.00	0.709	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."

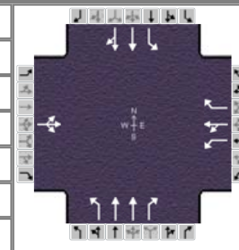
c. The density-based capacity exceeds the capacity of a basic freeway segment, under equivalent ideal conditions.

d. Volumes exceed the weaving segment capacity. The level of service is F.

IV. La Crosse Street Intersection/Segment Analysis

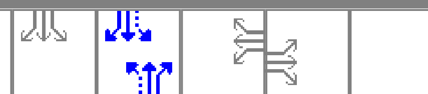
HCS 2010 Signalized Intersection Results Summary

General Information				Intersection Information	
Agency	HDR			Duration, h	0.25
Analyst	MDF	Analysis Date	Jan 30, 2013	Area Type	Other
Jurisdiction		Time Period	AM Peak	PHF	0.90
Intersection	Eglin Street	Analysis Year	Existing (2012)	Analysis Period	1> 7:45
File Name	Existing_AM_LaCrosse.xus				
Project Description					

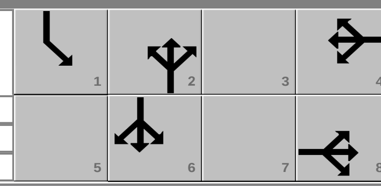


Demand Information	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Demand (*v*), veh/h	5	5	5	120	5	135	10	340	80	70	455	5

Signal Information			
Cycle, s	85.0	Reference Phase	2
Offset, s	56	Reference Point	End
Uncoordinated	No	Simult. Gap E/W	Off
Force Mode	Float	Simult. Gap N/S	Off



Green	3.4	53.4	6.1	0.9	0.0	0.0
Yellow	3.0	3.9	3.2	3.2	0.0	0.0
Red	2.0	1.9	2.0	2.0	0.0	0.0



Timer Results	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Assigned Phase		8		4		2	1	6
Case Number		12.0		9.0		5.3	1.0	4.0
Phase Duration, s		6.1		11.3		59.2	8.4	67.6
Change Period, *($Y+R_c$)*, s		5.2		5.2		5.8	5.0	5.8
Max Allow Headway *(MAH)*, s		4.1		4.1		0.0	4.1	0.0
Queue Clearance Time *(g_s)*, s		2.5		5.9			3.3	
Green Extension Time *(g_e)*, s		0.0		0.3		0.0	0.1	0.0
Phase Call Probability		0.23		0.97			0.84	
Max Out Probability		0.12		0.00			0.02	

Movement Group Results	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Assigned Movement	3	8	18	7	4	14	5	2	12	1	6	16
Adjusted Flow Rate (*v*), veh/h		11		80	59	16	11	378	48	78	255	255
Adjusted Saturation Flow Rate (*s*), veh/h/ln		1722		1681	1689	1496	886	1680	1496	1681	1765	1759
Queue Service Time (g_s), s		0.5		3.9	2.9	0.8	0.2	1.8	0.5	1.3	3.1	3.1
Cycle Queue Clearance Time (g_c), s		0.5		3.9	2.9	0.8	0.2	1.8	0.5	1.3	3.1	3.1
Green Ratio (*g/C*)		0.01		0.07	0.07	0.07	0.63	0.63	0.63	0.69	0.73	0.73
Capacity (*c*), veh/h		19		121	122	108	641	2111	939	732	1282	1278
Volume-to-Capacity Ratio *(X)*		0.594		0.661	0.484	0.144	0.017	0.179	0.051	0.106	0.199	0.199
Available Capacity (c_a), veh/h		158		352	354	313	641	2111	939	883	1282	1278
Back of Queue (*Q*), veh/ln (95th percentile)		0.7		3.2	2.3	0.6	0.1	1.0	0.3	0.6	1.5	1.5
Queue Storage Ratio *(RQ)* (95th percentile)		0.03		0.41	0.11	0.03	0.01	0.02	0.04	0.05	0.03	0.03
Uniform Delay (d_1), s/veh		41.9		38.4	37.9	37.0	2.6	2.7	2.6	4.5	2.8	2.8
Incremental Delay (d_2), s/veh		26.6		6.0	3.0	0.6	0.0	0.2	0.1	0.1	0.3	0.3
Initial Queue Delay (d_3), s/veh		0.0		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Control Delay (*d*), s/veh		68.4		44.5	40.9	37.6	2.6	2.9	2.7	4.5	3.1	3.1
Level of Service (LOS)		E		D	D	D	A	A	A	A	A	A

	EB		WB		NB		SB	
Approach Delay, s/veh / LOS	68.4	E	42.4	D	2.9	A	3.3	A
Intersection Delay, s/veh / LOS	8.8				A			

Multimodal Results	EB		WB		NB		SB	
Pedestrian LOS Score / LOS	3.2	C	3.0	C	2.9	C	2.2	B
Bicycle LOS Score / LOS	2.2	B	2.9	C	3.1	C	3.0	C

 HCS 2010™ Streets Version 6.50 Generated: 1/31/2013 11:37:17 AM

This Signals text report was created on January 31, 2013 at 12:17:26

Intersection number = 1, Segment number = 1, Period number = 1

Chapter 18 Summary Input

Cycle Length, s	85											
	EB LT	EB TH	EB RT	WB LT	WB TH	WB RT	NB LT	NB TH	NB RT	SB LT	SB TH	SB RT
Movement	3	8	18	7	4	14	5	2	12	1	6	16
Volume, veh/h	5	5	5	120	5	135	10	340	80	70	455	5
Lanes	0	1	0	1	1	1	1	2	1	1	2	0
Bay Length, ft	0	500	0	200	500	500	150	1000	150	300	1131	0
Receiving Lanes	1	2	1	1	1	1	2	2	2	2	2	2
SatFlow, vplphg	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800
Lane Width, ft	12	12	12	12	12	12	12	12	12	12	12	12
Heavy Vehicles, %	0	2	0	2	2	2	2	2	2	2	2	0
Grade, %	0	0	0	0	0	0	0	0	0	0	0	0
Buses, per h	0	0	0	0	0	0	0	0	0	0	0	0
Parking, per h	0	0	0	0	0	0	0	0	0	0	0	0
Bicycles, per h	0	0	0	0	0	0	0	0	0	0	0	0
Pedestrians, per h	0	0	0	0	0	0	0	0	0	0	0	0
Heavy Veh Equivalent	2	2	2	2	2	2	2	2	2	2	2	2
Bus Blockage Time	14.4	14.4	14.4	14.4	14.4	14.4	14.4	14.4	14.4	14.4	14.4	14.4
Turns in Shrd Ln, %	0	0	0	40	0	0	0	0	0	0	0	0
Unopposed Lefts, %	0	0	0	0	0	0	0	0	0	0	0	0
Parking Time, sec	18	18	18	18	18	18	18	18	18	18	18	18
Arrival Type	3	3	3	3	3	3	4	4	4	4	4	4
Initial Queue, veh	0	0	0	0	0	0	0	0	0	0	0	0
Speed Limit, mph	30	30	30	30	30	30	35	35	35	35	35	35
Detector Length, ft	40	40	40	40	40	40	40	40	40	40	40	40
StartLostTime, sec	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0
EndUseTime, sec	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0
RTOR, veh/h		5			121			37			1	
I-Factor		1.00			1.00			1.00			1.00	
Walk + PC, sec		0.0			0.0			0.0			0.0	

	EB	EB	WB	WB	NB	NB	SB	SB
Phase	3	8	7	4	5	2	1	6
Movement		LT+TH+RT		LT+TH+RT		LT+TH+RT	LT	LT+TH+RT
Left-Turn Mode	--	Split	--	Split	--	Perm.	Pr/Pm	--
Phase Splits, s	0.0	13.0	0.0	23.0	0.0	33.0	16.0	49.0
Yellow Change, s	4.0	3.2	4.0	3.2	4.0	3.9	3.0	3.9
Red Clearance, s	1.0	2.0	1.0	2.0	1.0	1.9	2.0	1.9
Minimum Green, s	5	4	5	4	5	5	4	5
Lead/Lag							Lead	
Passage Time, s	2.0	3.0	2.0	3.0	2.0	2.0	3.0	2.0
Recall	Off	Off	Off	Off	Off	Min	Off	Min
Dual Entry	No	No	No	No	No	Yes	No	Yes
Prot. Right-Turn	False	False	False	False	False	False	False	False

	E/W	N/S
Simultaneous Gap out	Off	Off
Dallas Phasing	Off	Off

Cycle Length, s	85
Offset, s	56
Reference Phase	2
Reference Point	End
Force Mode	Float
Uncoordinated	No
Field Measured Phase Times	No
Exclusive Ped Phase Time, s	0.0

Timer:	1	2	3	4	5	6	7	8
Assigned Phase	1	2	4	8	0	6	0	0
Assigned Left-Turn Mvmt.	1	5	7	3	0	0	0	0
Assigned Through Mvmt.	0	2	4	8	0	6	0	0
Assigned Right-Turn Mvmt.	0	12	14	18	0	16	0	0
Timer w/Pr-Pm From Shared	0	0	0	0	0	0	0	0

Chapter 18 Summary Output

Cycle Length, s	85											
	EB LT	EB TH	EB RT	WB LT	WB TH	WB RT	NB LT	NB TH	NB RT	SB LT	SB TH	SB RT
Movement	3	8	18	7	4	14	5	2	12	1	6	16
Volume, veh/h	5.56	5.56	0	133.33	5.56	15.56	11.11	377.78	47.78	77.78	505.56	4.44
SatFlow, veh/h/ln	0	1764.7	0	1764.7	1764.7	1764.7	1764.7	1764.7	1764.7	1764.7	1764.7	0
Lane Util Factor	1	1	1	1	1	1	1	0.95	1	1	1	1
Capacity, veh/h	9.35	0	0	121.04	121.61	107.71	641.27	2110.5	939.39	732.17	2537.9	22.3
Discharge Vol, veh/h	5.56	0	0	0	0	15.56	0	377.78	0	0	0	0
Prop Arriv On Green	0.01	0.01	0	0.07	0.07	0.07	0.84	0.84	0.84	0.02	0.79	0.8
Apprch Vol, veh/h	0	11.11	0	0	154.44	0	0	436.67	0	0	587.78	0
Apprch Stops, #/veh	0	1.39	0	0	0.92	0	0	0.12	0	0	0.14	0
Apprch Delay, s/veh	0	68.41	0	0	42.4	0	0	2.87	0	0	3.3	0

Apprch LOS	E	D	A	A
Int Delay, s/veh	8.83			
Int LOS	A			

Timer Data

Timer:	1	2	3	4	5	6	7	8
Assigned Phase	1	2	4	8	0	6	0	0
Case No	1	5.3	9	12	0	4	0	0
Phase Duration, s	8.36	59.19	11.32	6.12	0	67.56	0	0
Change Period, s	5	5.8	5.2	5.2	0	5.8	0	5.2
Phase Start Time, s	79.25	2.61	61.8	73.12	79.25	79.25	61.8	79.25
Phase End Time, s	2.61	61.8	73.12	79.25	79.25	61.8	61.8	79.25
Max Allow Headway, s	4.08	0	4.13	4.09	0	0	0	0
Equiv Max Green, s	11	5	17.8	7.8		5		
Queue Clear Time, s	3.27		5.94	2.55				
Green Exten Time, s	0.09	0	0.34	0	0	0	0	0
Prob of Phase Call	0.84		0.97	0.23				
Prob of Max Out	0.02		0	0.12				
Left-Turn Movement Data								
Assigned Movement	1	5	7	3	0	0	0	0
Mvmt. Sat Flow, veh/h	1680.67	886.21	1680.67	860.82	0	0	0	0
Through Movement Data								
Assigned Movement	0	2	4	8	0	6	0	0
Mvmt. Sat Flow, veh/h	0	3360	1688.6	860.84	0	3493.19	0	0
Right-Turn Movement Data								
Assigned Movement	0	12	14	18	0	16	0	0
Mvmt. Sat Flow, veh/h	0	1495.51	1495.51	0	0	30.7	0	0

Left Lane Group Output

Timer:	1	2	3	4	5	6	7	8
Assigned Phase	1	2	4	8	0	6	0	0
Left Lane Group Data								
Assigned Movement	1	5	7	3	0	0	0	0
Lane Assignment	L Pr/Pm	L	L	L+T				
Lanes in Group	1	1	1	1	0	0	0	0
Group Volume, veh/h	77.78	11.11	80	11.11	0	0	0	0
Group SatFlow, vphpl	1680.67	886.21	1680.67	1721.66	0	0	0	0
Queue Serve Time, s	1.27	0.18	3.94	0.55	0	0	0	0
Cycle Clear Time, s	1.27	0.19	3.94	0.55	0	0	0	0
Perm SatFlow, vphpl	957.93	886.21	1680.67	0	0	0	0	0
Shared SatFlow, vphpl								
Perm Eff Green, s	55.39	53.39	0	0	0	0	0	0
Perm Serve Time, s	51.55	53.38	0	0	0	0	0	0
Perm Que Serve Time, s	0.35	0.17						
Time to first Blk, s	0	0	0	0	0	0	0	0
Serve Time pre Blk, s								
Prop Inside Lane	1	1	1	0.5	0	0	0	0
Lane Grp Capacity, vph	732.17	641.27	121.04	18.7				
v/c Ratio	0.11	0.02	0.66	0.59	0	0	0	0
Avail Capacity, veh/h	883.18	641.27	351.95	157.99				
I-Factor	1	1	1	1	0	0	0	0
Uniform Delay, s/veh	4.45	2.58	38.43	41.85				
Increm Delay, s/veh	0.06	0.05	6.02	26.56	0	0	0	0
Overflow Delay, s/veh	0	0	0	0	0	0	0	0
Control Delay, s/veh	4.51	2.63	44.45	68.42				
Group LOS	A	A	D	E				
Uniform Stops, #/veh	0.18	0.1	0.84	0.86				
Increm Stops, #/veh	0.01	0.03	0.11	0.53	0	0	0	0
Overflow Stops, #/veh	0	0	0	0	0	0	0	0
Stop Rate, #/veh	0.19	0.14	0.94	1.39				
Uniform Queue, veh/ln	0.33	0.03	1.58	0.23				
Increm Queue, veh/ln	0.01	0.01	0.2	0.14	0	0	0	0
Overflow Queue, veh/ln	0	0	0	0	0	0	0	0
Back of Queue Factor	1.8	1.8	1.8	1.8	0	0	0	0
Back of Queue, veh/ln	0.62	0.06	3.21	0.66				
Storage Ratio	0.05	0.01	0.41	0.03	0	0	0	0
Initial Queue, veh	0	0	0	0	0	0	0	0
Final Queue, veh	0	0	0	0	0	0	0	0
Saturated Delay, s/veh	0	0	0	0	0	0	0	0
Saturated Stops, #/veh	0	0	0	0	0	0	0	0
Saturated Queue, veh/ln	0	0	0	0	0	0	0	0
Saturated Capacity, vph	0	0	0	0	0	0	0	0
Init Que Clear Time, s	0	0	0	0	0	0	0	0

Thru Lane Group Output

Timer:	1	2	3	4	5	6	7	8
Assigned Phase	1	2	4	8	0	6	0	0
Thru Lane Group Data								
Assigned Movement	0	2	4	8	0	6	0	0
Lane Assignment		T	T			T		
Lanes in Group	0	2	1	0	0	1	0	0
Group Volume, veh/h	0	377.78	58.89	0	0	255.31	0	0
Group SatFlow, vphpl	0	1680	1688.6	0	0	1764.71	0	0
Queue Serve Time, s	0	1.83	2.85	0	0	3.07	0	0
Cycle Clear Time, s	0	1.83	2.85	0	0	3.07	0	0
Lane Grp Capacity, vph		2110.55	121.61	0		1282.11		
v/c Ratio	0	0.18	0.48	0	0	0.2	0	0

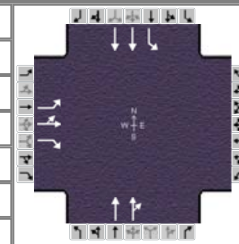
Avail Capacity, veh/h		2110.55	353.61			1282.11		
I-Factor	0	1	1	0	0	1	0	0
Uniform Delay, s/veh		2.72	37.92			2.77		
Increm Delay, s/veh	0	0.19	2.96	0	0	0.35	0	0
Overflow Delay, s/veh	0	0	0	0	0	0	0	0
Control Delay, s/veh		2.9	40.89			3.11		
Group LOS		A	D			A		
Uniform Stops, #/veh		0.11	0.83			0.12		
Increm Stops, #/veh	0	0.01	0.07	0	0	0.02	0	0
Overflow Stops, #/veh	0	0	0	0	0	0	0	0
Stop Rate, #/veh		0.12	0.9			0.14		
Uniform Queue, veh/ln		0.48	1.15			0.7		
Increm Queue, veh/ln	0	0.05	0.1	0	0	0.12	0	0
Overflow Queue, veh/ln	0	0	0	0	0	0	0	0
Back of Queue Factor	0	1.8	1.8	1	0	1.8	0	0
Back of Queue, veh/ln		0.96	2.25			1.48		
Storage Ratio	0	0.02	0.11	0	0	0.03	0	0
Initial Queue, veh	0	0	0	0	0	0	0	0
Final Queue, veh	0	0	0	0	0	0	0	0
Saturated Delay, s/veh	0	0	0	0	0	0	0	0
Saturated Stops, #/veh	0	0	0	0	0	0	0	0
Saturated Queue, veh/ln	0	0	0	0	0	0	0	0
Saturated Capacity, vph	0	0	0	0	0	0	0	0
Init Que Clear Time, s	0	0	0	0	0	0	0	0

Right Lane Group Output

Timer:	1	2	3	4	5	6	7	8
Assigned Phase	1	2	4	8	0	6	0	0
Right Lane Group Data								
Assigned Movement	0	12	14	18	0	16	0	0
Lane Assignment		R	R			T+R		
Lanes in Group	0	1	1	0	0	1	0	0
Group Volume, veh/h	0	47.78	15.56	0	0	254.69	0	0
Group SatFlow, vphpl	0	1495.51	1495.51	0	0	1759.18	0	0
Queue Serve Time, s	0	0.46	0.83	0	0	3.07	0	0
Cycle Clear Time, s	0	0.46	0.83	0	0	3.07	0	0
Prot RT SatFlow, vphpl		0	0					
Prot RT Eff Green, s		0	0					
Prop Outside Lane	0	1	1	0	0	0.02	0	0
Lane Grp Capacity, vph		939.39	107.71			1278.1		
v/c Ratio	0	0.05	0.14	0	0	0.2	0	0
Avail Capacity, veh/h		939.39	313.18			1278.1		
I-Factor	0	1	1	0	0	1	0	0
Uniform Delay, s/veh		2.61	36.98			2.76		
Increm Delay, s/veh	0	0.1	0.61	0	0	0.35	0	0
Overflow Delay, s/veh	0	0	0	0	0	0	0	0
Control Delay, s/veh		2.71	37.59			3.11		
Group LOS		A	D			A		
Uniform Stops, #/veh		0.1	0.81			0.12		
Increm Stops, #/veh	0	0.02	0.05	0	0	0.02	0	0
Overflow Stops, #/veh	0	0	0	0	0	0	0	0
Stop Rate, #/veh		0.13	0.86			0.14		
Uniform Queue, veh/ln		0.12	0.3			0.7		
Increm Queue, veh/ln	0	0.03	0.02	0	0	0.12	0	0
Overflow Queue, veh/ln	0	0	0	0	0	0	0	0
Back of Queue Factor	0	1.8	1.8	1	0	1.8	0	0
Back of Queue, veh/ln		0.26	0.57			1.48		
Storage Ratio	0	0.04	0.03	0	0	0.03	0	0
Initial Queue, veh	0	0	0	0	0	0	0	0
Final Queue, veh	0	0	0	0	0	0	0	0
Saturated Delay, s/veh	0	0	0	0	0	0	0	0
Saturated Stops, #/veh	0	0	0	0	0	0	0	0
Saturated Queue, veh/ln	0	0	0	0	0	0	0	0
Saturated Capacity, vph	0	0	0	0	0	0	0	0
Init Que Clear Time, s	0	0	0	0	0	0	0	0

HCS 2010 Signalized Intersection Results Summary

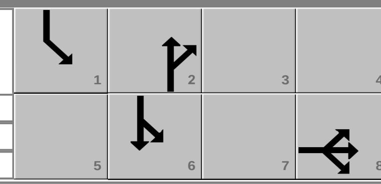
General Information				**Intersection Information**	
Agency	HDR			Duration, h	0.25
Analyst	MDF	Analysis Date	Jan 30, 2013	Area Type	Other
Jurisdiction		Time Period	AM Peak	PHF	0.90
Intersection	I-90 EB Ramps	Analysis Year	Existing (2012)	Analysis Period	1> 7:45
File Name	Existing_AM_LaCrosse.xus				
Project Description					



Demand Information	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Demand (v), veh/h	65	0	250					350	130	75	280	

Signal Information			
Cycle, s	85.0	Reference Phase	2
Offset, s	39	Reference Point	End
Uncoordinated	No	Simult. Gap E/W	Off
Force Mode	Float	Simult. Gap N/S	Off

Green	56.5	8.6	5.4	0.0	0.0	0.0
Yellow	4.5	4.5	4.0	0.0	0.0	0.0
Red	0.5	0.5	0.5	0.0	0.0	0.0



Timer Results	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Assigned Phase		8				2	1	6
Case Number		9.0				8.3	1.0	4.0
Phase Duration, s		9.9				61.5	13.6	75.1
Change Period, *($Y+R_c$)*, s		4.5				5.0	5.0	5.0
Max Allow Headway *(MAH)*, s		5.1				0.0	5.1	0.0
Queue Clearance Time *(g_s)*, s		5.6					2.0	
Green Extension Time *(g_e)*, s		0.4				0.0	0.2	0.0
Phase Call Probability		0.92					0.86	
Max Out Probability		0.00					0.02	

Movement Group Results	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Assigned Movement	3	8	18					2	12	1	6	
Adjusted Flow Rate (v), veh/h	72	0	32					211	290	83	311	
Adjusted Saturation Flow Rate (s), veh/h/ln	1681	1765	1496					1216	1650	1681	1680	
Queue Service Time (g_s), s	3.6	0.0	1.8					8.0	8.1	0.0	2.8	
Cycle Queue Clearance Time (g_c), s	3.6	0.0	1.8					8.0	8.1	0.0	2.8	
Green Ratio (g/C)	0.06	0.06	0.06					0.66	0.66	0.74	0.82	
Capacity (c), veh/h	107	113	95					808	1096	743	2770	
Volume-to-Capacity Ratio (X)	0.674	0.000	0.338					0.261	0.265	0.112	0.112	
Available Capacity (c_a), veh/h	405	426	361					808	1096	810	2770	
Back of Queue (Q), veh/ln (95th percentile)	3.0	0.0	1.2					3.4	4.7	0.9	0.6	
Queue Storage Ratio (RQ) (95th percentile)	0.38	0.00	0.16					0.08	0.11	0.12	0.03	
Uniform Delay (d_1), s/veh	38.9	0.0	38.1					8.2	8.5	6.1	2.9	
Incremental Delay (d_2), s/veh	10.0	0.0	2.9					0.8	0.6	0.1	0.1	
Initial Queue Delay (d_3), s/veh	0.0	0.0	0.0					0.0	0.0	0.0	0.0	
Control Delay (d), s/veh	48.9	0.0	41.0					8.9	9.0	6.2	3.0	
Level of Service (LOS)	D		D					A	A	A	A	

	EB		WB		NB		SB	
Approach Delay, s/veh / LOS	46.5	D	0.0		9.0	A	3.6	A
Intersection Delay, s/veh / LOS	10.8				B			

Multimodal Results	EB		WB		NB		SB	
Pedestrian LOS Score / LOS	3.0	C	3.0	C	2.1	B	2.4	B
Bicycle LOS Score / LOS	2.3	B			2.9	C	2.8	C

This Signals text report was created on January 31, 2013 at 12:17:51

Intersection number = 2, Segment number = 1, Period number = 1

Chapter 18 Summary Input

Cycle Length, s	85											
	EB LT	EB TH	EB RT	WB LT	WB TH	WB RT	NB LT	NB TH	NB RT	SB LT	SB TH	SB RT
Movement	3	8	18	7	4	14	5	2	12	1	6	16
Volume, veh/h	65	0	250	0	0	0	0	350	130	75	280	0
Lanes	1	1	1	0	0	0	0	2	0	1	2	0
Bay Length, ft	200	500	200	0	0	0	0	1131	0	200	575	0
Receiving Lanes	1	1	1	0	0	0	2	2	2	2	2	2
SatFlow, vplphg	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800
Lane Width, ft	12	12	12	12	12	12	12	12	12	12	12	12
Heavy Vehicles, %	2	2	2	0	0	0	0	2	0	2	2	0
Grade, %	0	0	0	0	0	0	0	0	0	0	0	0
Buses, per h	0	0	0	0	0	0	0	0	0	0	0	0
Parking, per h	0	0	0	0	0	0	0	0	0	0	0	0
Bicycles, per h	0	0	0	0	0	0	0	0	0	0	0	0
Pedestrians, per h	0	0	0	0	0	0	0	0	0	0	0	0
Heavy Veh Equivalent	2	2	2	2	2	2	2	2	2	2	2	2
Bus Blockage Time	14.4	14.4	14.4	14.4	14.4	14.4	14.4	14.4	14.4	14.4	14.4	14.4
Turns in Shrd Ln, %	0	0	0	0	0	0	0	0	0	0	0	0
Unopposed Lefts, %	0	0	0	0	0	0	0	0	0	0	0	0
Parking Time, sec	18	18	18	18	18	18	18	18	18	18	18	18
Arrival Type	3	3	3	3	3	3	3	4	4	4	4	3
Initial Queue, veh	0	0	0	0	0	0	0	0	0	0	0	0
Speed Limit, mph	45	45	45	35	35	35	35	35	35	35	35	35
Detector Length, ft	40	40	40	40	40	40	40	40	40	40	40	40
StartLostTime, sec	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0
EndUseTime, sec	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0
RTOR, veh/h		221			0			29			0	
I-Factor		1.00			1.00			0.95			0.95	
Walk + PC, sec		0.0			0.0			0.0			0.0	

	EB	EB	WB	WB	NB	NB	SB	SB
Phase	3	8	7	4	5	2	1	6
Movement		LT+TH+RT				TH+RT	LT	LT+TH
Left-Turn Mode	--	Split	--	Split	--	Perm.	Pr/Pm	--
Phase Splits, s	0.0	25.0	0.0	0.0	0.0	43.0	17.0	60.0
Yellow Change, s	4.0	4.0	4.0	4.0	4.0	4.5	4.5	4.5
Red Clearance, s	1.0	0.5	1.0	1.0	1.0	0.5	0.5	0.5
Minimum Green, s	5	5	5	5	5	5	10	5
Lead/Lag							Lag	
Passage Time, s	2.0	4.0	2.0	2.0	2.0	2.0	4.0	2.0
Recall	Off	Off	Off	Off	Off	Min	Off	Min
Dual Entry	No	No	No	Yes	No	Yes	No	Yes
Prot. Right-Turn	False	False	False	False	False	False	False	False

	E/W	N/S
Simultaneous Gap out	Off	Off
Dallas Phasing	Off	Off

Cycle Length, s	85
Offset, s	39
Reference Phase	2
Reference Point	End
Force Mode	Float
Uncoordinated	No
Field Measured Phase Times	No
Exclusive Ped Phase Time, s	0.0

Timer:	1	2	3	4	5	6	7	8
Assigned Phase	2	1	0	8	0	6	0	0
Assigned Left-Turn Mvmt.	5	1	0	3	0	0	0	0
Assigned Through Mvmt.	2	0	0	8	0	6	0	0
Assigned Right-Turn Mvmt.	12	0	0	18	0	16	0	0
Timer w/Pr-Pm From Shared	0	0	0	0	0	0	0	0

Chapter 18 Summary Output

Cycle Length, s	85											
	EB LT	EB TH	EB RT	WB LT	WB TH	WB RT	NB LT	NB TH	NB RT	SB LT	SB TH	SB RT
Movement	3	8	18	7	4	14	5	2	12	1	6	16
Volume, veh/h	72.22	0	32.22	0	0	0	0	388.89	112.22	83.33	311.11	0
SatFlow, veh/h/ln	1764.7	1764.7	1764.7	0	0	0	0	1764.7	0	1764.7	1764.7	0
Lane Util Factor	1	1	1	1	1	1	1	0.69	1	1	0.95	1
Capacity, veh/h	107.21	112.57	95.4	0			42.35	1480.4	423.64	742.56	2770.1	0
Discharge Vol, veh/h	72.22	0	32.22	0	0		0	388.89	0	0	311.11	0
Prop Arriv On Green	0.06	0	0.06	0	0	0	0	0.55	0.52	0.06	0.67	0
Apprch Vol, veh/h	0	104.44	0	0	0	0	0	501.11	0	0	394.44	0
Apprch Stops, #/veh	0	0.96	0	0	0	0	0	0.38	0	0	0.13	0
Apprch Delay, s/veh	0	46.47	0	0	0	0	0	9	0	0	3.65	0

Apprch LOS D A A
Int Delay, s/veh 10.8
Int LOS B

Timer Data

Timer:	1	2	3	4	5	6	7	8
Assigned Phase	2	1	0	8	0	6	0	0
Case No	8.3	1	0	9	0	4	0	0
Phase Duration, s	61.48	13.6	0	9.92	0	75.08	0	0
Change Period, s	5	5	0	4.5	0	5	0	0
Phase Start Time, s	67.52	44	57.6	57.6	67.52	67.52	57.6	67.52
Phase End Time, s	44	57.6	57.6	67.52	67.52	57.6	57.6	67.52
Max Allow Headway, s	0	5.08	0	5.06	0	0	0	0
Equiv Max Green, s	5	12		20.5		5		
Queue Clear Time, s		2		5.57				
Green Exten Time, s	0	0.2	0	0.35	0	0	0	0
Prob of Phase Call		0.86		0.92				
Prob of Max Out		0.02		0				
Left-Turn Movement Data								
Assigned Movement	5	1	0	3	0	0	0	0
Mvmt. Sat Flow, veh/h	0	1680.67	0	1680.67	0	0	0	0
Through Movement Data								
Assigned Movement	2	0	0	8	0	6	0	0
Mvmt. Sat Flow, veh/h	2777.02	0	0	1764.71	0	3444.71	0	0
Right-Turn Movement Data								
Assigned Movement	12	0	0	18	0	16	0	0
Mvmt. Sat Flow, veh/h	637.62	0	0	1495.51	0	0	0	0

Left Lane Group Output

Timer:	1	2	3	4	5	6	7	8
Assigned Phase	2	1	0	8	0	6	0	0
Left Lane Group Data								
Assigned Movement	5	1	0	3	0	0	0	0
Lane Assignment		L Pr/Pm		L				
Lanes in Group	0	1	0	1	0	0	0	0
Group Volume, veh/h	0	83.33	0	72.22	0	0	0	0
Group SatFlow, vphpl	0	1680.67	0	1680.67	0	0	0	0
Queue Serve Time, s	0	0	0	3.57	0	0	0	0
Cycle Clear Time, s	0	0	0	3.57	0	0	0	0
Perm SatFlow, vphpl	1085.28	893.51	0	1680.67	0	0	0	0
Shared SatFlow, vphpl	0							
Perm Eff Green, s	0	54.48	0	0	0	0	0	0
Perm Serve Time, s	0	46.4	0	0	0	0	0	0
Perm Que Serve Time, s		3.23						
Time to first Blk, s	56.48	0	0	0	0	0	0	0
Serve Time pre Blk, s								
Prop Inside Lane	0	1	0	1	0	0	0	0
Lane Grp Capacity, vph		742.56		107.21				
v/c Ratio	0	0.11	0	0.67	0	0	0	0
Avail Capacity, veh/h		809.74		405.34				
I-Factor	0	0.95	0	1	0	0	0	0
Uniform Delay, s/veh		6.11		38.92				
Increm Delay, s/veh	0	0.09	0	9.99	0	0	0	0
Overflow Delay, s/veh	0	0	0	0	0	0	0	0
Control Delay, s/veh		6.2		48.91				
Group LOS		A		D				
Uniform Stops, #/veh		0.25		0.81				
Increm Stops, #/veh	0	0.01	0	0.17	0	0	0	0
Overflow Stops, #/veh	0	0	0	0	0	0	0	0
Stop Rate, #/veh		0.26		0.99				
Uniform Queue, veh/ln		0.49		1.38				
Increm Queue, veh/ln	0	0.02	0	0.3	0	0	0	0
Overflow Queue, veh/ln	0	0	0	0	0	0	0	0
Back of Queue Factor	1	1.8	0	1.8	0	0	0	0
Back of Queue, veh/ln		0.91		3.02				
Storage Ratio	0	0.12	0	0.38	0	0	0	0
Initial Queue, veh	0	0	0	0	0	0	0	0
Final Queue, veh	0	0	0	0	0	0	0	0
Saturated Delay, s/veh	0	0	0	0	0	0	0	0
Saturated Stops, #/veh	0	0	0	0	0	0	0	0
Saturated Queue, veh/ln	0	0	0	0	0	0	0	0
Saturated Capacity, vph	0	0	0	0	0	0	0	0
Init Que Clear Time, s	0	0	0	0	0	0	0	0

Thru Lane Group Output

Timer:	1	2	3	4	5	6	7	8
Assigned Phase	2	1	0	8	0	6	0	0
Thru Lane Group Data								
Assigned Movement	2	0	0	8	0	6	0	0
Lane Assignment	T			T		T		
Lanes in Group	1	0	0	1	0	2	0	0
Group Volume, veh/h	210.72	0	0	0	0	311.11	0	0
Group SatFlow, vphpl	1215.84	0	0	1764.71	0	1680	0	0
Queue Serve Time, s	8.03	0	0	0	0	2.78	0	0
Cycle Clear Time, s	8.03	0	0	0	0	2.78	0	0
Lane Grp Capacity, vph	807.83			112.57		2770.13		
v/c Ratio	0.26	0	0	0	0	0.11	0	0

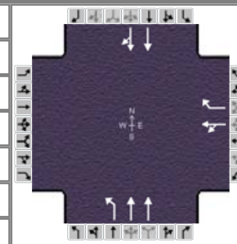
Avail Capacity, veh/h	807.83			425.61		2770.13		
I-Factor	0.99	0	0	0	0	0.95	0	0
Uniform Delay, s/veh	8.16			0		2.89		
Increm Delay, s/veh	0.78	0	0	0	0	0.08	0	0
Overflow Delay, s/veh	0	0	0	0	0	0	0	0
Control Delay, s/veh	8.94			0		2.97		
Group LOS	A					A		
Uniform Stops, #/veh	0.34			0		0.08		
Increm Stops, #/veh	0.04	0	0	0	0	0.01	0	0
Overflow Stops, #/veh	0	0	0	0	0	0	0	0
Stop Rate, #/veh	0.38			0		0.09		
Uniform Queue, veh/ln	1.71			0		0.3		
Increm Queue, veh/ln	0.17	0	0	0	0	0.03	0	0
Overflow Queue, veh/ln	0	0	0	0	0	0	0	0
Back of Queue Factor	1.8	0	0	1	0	1.8	0	0
Back of Queue, veh/ln	3.39			0		0.6		
Storage Ratio	0.08	0	0	0	0	0.03	0	0
Initial Queue, veh	0	0	0	0	0	0	0	0
Final Queue, veh	0	0	0	0	0	0	0	0
Saturated Delay, s/veh	0	0	0	0	0	0	0	0
Saturated Stops, #/veh	0	0	0	0	0	0	0	0
Saturated Queue, veh/ln	0	0	0	0	0	0	0	0
Saturated Capacity, vph	0	0	0	0	0	0	0	0
Init Que Clear Time, s	0	0	0	0	0	0	0	0

Right Lane Group Output

Timer:	1	2	3	4	5	6	7	8
Assigned Phase	2	1	0	8	0	6	0	0
Right Lane Group Data								
Assigned Movement	12	0	0	18	0	16	0	0
Lane Assignment	T+R			R				
Lanes in Group	1	0	0	1	0	0	0	0
Group Volume, veh/h	290.39	0	0	32.22	0	0	0	0
Group SatFlow, vphpl	1649.93	0	0	1495.51	0	0	0	0
Queue Serve Time, s	8.07	0	0	1.75	0	0	0	0
Cycle Clear Time, s	8.07	0	0	1.75	0	0	0	0
Prot RT SatFlow, vphpl				0				
Prot RT Eff Green, s				0				
Prop Outside Lane	0.39	0	0	1	0	0	0	0
Lane Grp Capacity, vph	1096.26			95.4				
v/c Ratio	0.26	0	0	0.34	0	0	0	0
Avail Capacity, veh/h	1096.26			360.68				
I-Factor	0.99	0	0	1	0	0	0	0
Uniform Delay, s/veh	8.46			38.07				
Increm Delay, s/veh	0.58	0	0	2.93	0	0	0	0
Overflow Delay, s/veh	0	0	0	0	0	0	0	0
Control Delay, s/veh	9.05			41.01				
Group LOS	A			D				
Uniform Stops, #/veh	0.36			0.79				
Increm Stops, #/veh	0.03	0	0	0.1	0	0	0	0
Overflow Stops, #/veh	0	0	0	0	0	0	0	0
Stop Rate, #/veh	0.38			0.9				
Uniform Queue, veh/ln	2.45			0.6				
Increm Queue, veh/ln	0.18	0	0	0.08	0	0	0	0
Overflow Queue, veh/ln	0	0	0	0	0	0	0	0
Back of Queue Factor	1.8	0	0	1.8	0	1	0	0
Back of Queue, veh/ln	4.74			1.23				
Storage Ratio	0.11	0	0	0.16	0	0	0	0
Initial Queue, veh	0	0	0	0	0	0	0	0
Final Queue, veh	0	0	0	0	0	0	0	0
Saturated Delay, s/veh	0	0	0	0	0	0	0	0
Saturated Stops, #/veh	0	0	0	0	0	0	0	0
Saturated Queue, veh/ln	0	0	0	0	0	0	0	0
Saturated Capacity, vph	0	0	0	0	0	0	0	0
Init Que Clear Time, s	0	0	0	0	0	0	0	0

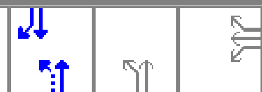
HCS 2010 Signalized Intersection Results Summary

General Information				Intersection Information	
Agency	HDR			Duration, h	0.25
Analyst	MDF	Analysis Date	Jan 30, 2013	Area Type	Other
Jurisdiction		Time Period	AM Peak	PHF	0.90
Intersection	I-90 WB Ramps	Analysis Year	Existing (2012)	Analysis Period	1> 7:45
File Name	Existing_AM_LaCrosse.xus				
Project Description					

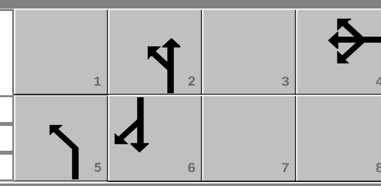


Demand Information	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Demand (v), veh/h				95	0	50	190	225			260	130

Signal Information			
Cycle, s	85.0	Reference Phase	6
Offset, s	12	Reference Point	End
Uncoordinated	No	Simult. Gap E/W	Off
Force Mode	Float	Simult. Gap N/S	Off



Green	48.1	14.9	7.0	0.0	0.0	0.0
Yellow	4.0	4.0	4.0	0.0	0.0	0.0
Red	1.0	1.0	1.0	0.0	0.0	0.0



Timer Results	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Assigned Phase				4	5	2		6
Case Number				11.0	1.0	4.0		8.3
Phase Duration, s				12.0	19.9	73.0		53.1
Change Period, *($Y+R_c$)*, s				5.0	5.0	5.0		5.0
Max Allow Headway *(MAH)*, s				5.0	5.1	0.0		0.0
Queue Clearance Time *(g_s)*, s				7.2	2.0			
Green Extension Time *(g_e)*, s				0.3	1.0	0.0		0.0
Phase Call Probability				0.93	0.99			
Max Out Probability				0.00	0.00			

Movement Group Results	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Assigned Movement				7	4	14	5	2			6	16
Adjusted Flow Rate *(v)*, veh/h					106	7	211	250			191	182
Adjusted Saturation Flow Rate *(s)*, veh/h/ln					1681	1496	1681	1680			1765	1629
Queue Service Time (g_s), s					5.2	0.3	0.0	1.4			6.7	6.5
Cycle Queue Clearance Time (g_c), s					5.2	0.3	0.0	1.4			6.7	6.5
Green Ratio *(g/C)*					0.08	0.08	0.72	0.80			0.57	0.57
Capacity *(c)*, veh/h					139	124	845	2687			998	921
Volume-to-Capacity Ratio *(X)*					0.759	0.054	0.250	0.093			0.192	0.198
Available Capacity (c_a), veh/h					395	352	945	2687			998	921
Back of Queue *(Q)*, veh/ln (95th percentile)					4.4	0.2	2.3	0.4			3.6	4.2
Queue Storage Ratio *(RQ)* (95th percentile)					0.22	0.03	0.24	0.02			0.14	0.16
Uniform Delay (d_1), s/veh					38.2	35.9	6.3	1.9			11.3	13.7
Incremental Delay (d_2), s/veh					11.3	0.3	0.2	0.1			0.4	0.5
Initial Queue Delay (d_3), s/veh					0.0	0.0	0.0	0.0			0.0	0.0
Control Delay *(d)*, s/veh					49.5	36.2	6.5	1.9			11.8	14.1
Level of Service (LOS)					D	D	A	A			B	B

	EB		WB		NB		SB	
Approach Delay, s/veh / LOS	0.0		48.7	D	4.0	A	12.9	B
Intersection Delay, s/veh / LOS	12.8				B			

Multimodal Results	EB		WB		NB		SB	
Pedestrian LOS Score / LOS	3.0	C	3.0	C	1.9	A	2.1	B
Bicycle LOS Score / LOS			2.2	B	2.9	C	2.8	C

 HCS 2010™ Streets Version 6.50 Generated: 1/31/2013 11:37:17 AM

This Signals text report was created on January 31, 2013 at 12:18:02

Intersection number = 3, Segment number = 2, Period number = 1

Chapter 18 Summary Input

Cycle Length, s 85

	EB LT	EB TH	EB RT	WB LT	WB TH	WB RT	NB LT	NB TH	NB RT	SB LT	SB TH	SB RT
Movement	3	8	18	7	4	14	5	2	12	1	6	16
Volume, veh/h	0	0	0	95	0	50	190	225	0	0	260	130
Lanes	0	0	0	0	1	1	1	2	0	0	2	0
Bay Length, ft	0	0	0	0	500	200	250	575	0	0	670	0
Receiving Lanes	0	0	0	1	1	1	2	2	2	2	2	2
SatFlow, vplphg	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800
Lane Width, ft	12	12	12	12	12	12	12	12	12	12	12	12
Heavy Vehicles, %	0	0	0	0	2	2	2	2	0	0	2	0
Grade, %	0	0	0	0	0	0	0	0	0	0	0	0
Buses, per h	0	0	0	0	0	0	0	0	0	0	0	0
Parking, per h	0	0	0	0	0	0	0	0	0	0	0	0
Bicycles, per h	0	0	0	0	0	0	0	0	0	0	0	0
Pedestrians, per h	0	0	0	0	0	0	0	0	0	0	0	0
Heavy Veh Equivalent	2	2	2	2	2	2	2	2	2	2	2	2
Bus Blockage Time	14.4	14.4	14.4	14.4	14.4	14.4	14.4	14.4	14.4	14.4	14.4	14.4
Turns in Shrd Ln, %	0	0	0	0	0	0	0	0	0	0	0	0
Unopposed Lefts, %	0	0	0	0	0	0	0	0	0	0	0	0
Parking Time, sec	18	18	18	18	18	18	18	18	18	18	18	18
Arrival Type	3	3	3	3	3	3	4	4	3	3	4	4
Initial Queue, veh	0	0	0	0	0	0	0	0	0	0	0	0
Speed Limit, mph	35	35	35	45	45	45	35	35	35	35	35	35
Detector Length, ft	40	40	40	40	40	40	40	40	40	40	40	40
StartLostTime, sec	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0
EndUseTime, sec	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0
RTOR, veh/h		0			44			0			54	
I-Factor		1.00			1.00			0.95			0.95	
Walk + PC, sec		0.0			0.0			0.0			0.0	

	EB	EB	WB	WB	NB	NB	SB	SB
Phase	3	8	7	4	5	2	1	6
Movement				LT+TH+RT	LT	LT+TH		TH+RT
Left-Turn Mode	--	Split	--	Split	Pr/Pm	--	--	Perm.
Phase Splits, s	0.0	0.0	0.0	25.0	25.0	60.0	0.0	35.0
Yellow Change, s	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Red Clearance, s	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0
Minimum Green, s	5	5	5	5	15	5	5	5
Lead/Lag					Lag			
Passage Time, s	2.0	2.0	2.0	4.0	4.0	2.0	2.0	2.0
Recall	Off	Off	Off	Off	Off	Min	Off	Min
Dual Entry	No	Yes	No	No	No	Yes	No	Yes
Prot. Right-Turn	False	False	False	False	False	False	False	False

	E/W	N/S
Simultaneous Gap out	Off	Off
Dallas Phasing	Off	Off

Cycle Length, s	85
Offset, s	12
Reference Phase	6
Reference Point	End
Force Mode	Float
Uncoordinated	No
Field Measured Phase Times	No
Exclusive Ped Phase Time, s	0.0

Timer:	1	2	3	4	5	6	7	8
Assigned Phase	0	2	4	0	6	5	0	0
Assigned Left-Turn Mvmt.	0	0	7	0	1	5	0	0
Assigned Through Mvmt.	0	2	4	0	6	0	0	0
Assigned Right-Turn Mvmt.	0	12	14	0	16	0	0	0
Timer w/Pr-Pm From Shared	0	0	0	0	0	0	0	0

Chapter 18 Summary Output

Cycle Length, s 85

	EB LT	EB TH	EB RT	WB LT	WB TH	WB RT	NB LT	NB TH	NB RT	SB LT	SB TH	SB RT
Movement	3	8	18	7	4	14	5	2	12	1	6	16
Volume, veh/h	0	0	0	105.56	0	6.67	211.11	250	0	0	288.89	84.44
SatFlow, veh/h/ln	0	0	0	0	1764.7	1764.7	1764.7	1764.7	0	0	1764.7	0
Lane Util Factor	1	1	1	1	1	1	1	0.95	1	1	1	1
Capacity, veh/h	0			139.12	0	351.89	844.58	2686.6	0	42.35	1491.5	427.43
Discharge Vol, veh/h	0	0		105.56	0	6.67	0	250	0	0	288.89	0
Prop Arriv On Green	0	0	0	0.08	0	0.08	0.25	0.8	0	0	0.46	0.26
Apprch Vol, veh/h	0	0	0	0	112.22	0	0	461.11	0	0	373.33	0
Apprch Stops, #/veh	0	0	0	0	0.97	0	0	0.16	0	0	0.49	0
Apprch Delay, s/veh	0	0	0	0	48.7	0	0	4.02	0	0	12.91	0

Apprch LOS		D	A	B
Int Delay, s/veh	12.82			
Int LOS	B			

Timer Data

Timer:	1	2	3	4	5	6	7	8
Assigned Phase	0	2	4	0	6	5	0	0
Case No	0	4	11	0	8.3	1	0	0
Phase Duration, s	0	72.96	12.04	0	53.07	19.9	0	0
Change Period, s	0	5	5	0	5	5	0	0
Phase Start Time, s	48.93	48.93	36.9	36.9	48.93	17	36.9	36.9
Phase End Time, s	48.93	36.9	48.93	36.9	17	36.9	36.9	36.9
Max Allow Headway, s	0	0	5	0	0	5.08	0	0
Equiv Max Green, s		5	20		5	20		
Queue Clear Time, s			7.22			2		
Green Exten Time, s	0	0	0.35	0	0	0.99	0	0
Prob of Phase Call			0.93			0.99		
Prob of Max Out			0			0		
Left-Turn Movement Data								
Assigned Movement	0	0	7	0	1	5	0	0
Mvmt. Sat Flow, veh/h	0	0	1680.67	0	0	1680.67	0	0
Through Movement Data								
Assigned Movement	0	2	4	0	6	0	0	0
Mvmt. Sat Flow, veh/h	0	3444.71	0	0	2637.5	0	0	0
Right-Turn Movement Data								
Assigned Movement	0	12	14	0	16	0	0	0
Mvmt. Sat Flow, veh/h	0	0	1495.51	0	755.86	0	0	0

Left Lane Group Output

Timer:	1	2	3	4	5	6	7	8
Assigned Phase	0	2	4	0	6	5	0	0
Left Lane Group Data								
Assigned Movement	0	0	7	0	1	5	0	0
Lane Assignment			L+T			L Pr/Pm		
Lanes in Group	0	0	1	0	0	1	0	0
Group Volume, veh/h	0	0	105.56	0	0	211.11	0	0
Group SatFlow, vphpl	0	0	1680.67	0	0	1680.67	0	0
Queue Serve Time, s	0	0	5.22	0	0	0	0	0
Cycle Clear Time, s	0	0	5.22	0	0	0	0	0
Perm SatFlow, vphpl	0	0	0	0	1147.62	1005.02	0	0
Shared SatFlow, vphpl					0			
Perm Eff Green, s	0	0	0	0	0	46.07	0	0
Perm Serve Time, s	0	0	0	0	0	39.35	0	0
Perm Que Serve Time, s						7.3		
Time to first Blk, s	0	0	0	0	48.07	0	0	0
Serve Time pre Blk, s								
Prop Inside Lane	0	0	1	0	0	1	0	0
Lane Grp Capacity, vph			139.12			844.58		
v/c Ratio	0	0	0.76	0	0	0.25	0	0
Avail Capacity, veh/h			395.45			945.47		
I-Factor	0	0	1	0	0	0.95	0	0
Uniform Delay, s/veh			38.15			6.29		
Increm Delay, s/veh	0	0	11.34	0	0	0.21	0	0
Overflow Delay, s/veh	0	0	0	0	0	0	0	0
Control Delay, s/veh			49.5			6.49		
Group LOS			D			A		
Uniform Stops, #/veh			0.81			0.25		
Increm Stops, #/veh	0	0	0.18	0	0	0.01	0	0
Overflow Stops, #/veh	0	0	0	0	0	0	0	0
Stop Rate, #/veh			0.98			0.26		
Uniform Queue, veh/ln			2.01			1.25		
Increm Queue, veh/ln	0	0	0.44	0	0	0.05	0	0
Overflow Queue, veh/ln	0	0	0	0	0	0	0	0
Back of Queue Factor	0	0	1.8	0	1	1.8	0	0
Back of Queue, veh/ln			4.41			2.34		
Storage Ratio	0	0	0.22	0	0	0.24	0	0
Initial Queue, veh	0	0	0	0	0	0	0	0
Final Queue, veh	0	0	0	0	0	0	0	0
Saturated Delay, s/veh	0	0	0	0	0	0	0	0
Saturated Stops, #/veh	0	0	0	0	0	0	0	0
Saturated Queue, veh/ln	0	0	0	0	0	0	0	0
Saturated Capacity, vph	0	0	0	0	0	0	0	0
Init Que Clear Time, s	0	0	0	0	0	0	0	0

Thru Lane Group Output

Timer:	1	2	3	4	5	6	7	8
Assigned Phase	0	2	4	0	6	5	0	0
Thru Lane Group Data								
Assigned Movement	0	2	4	0	6	0	0	0
Lane Assignment		T			T			
Lanes in Group	0	2	0	0	1	0	0	0
Group Volume, veh/h	0	250	0	0	191.38	0	0	0
Group SatFlow, vphpl	0	1680	0	0	1764.71	0	0	0
Queue Serve Time, s	0	1.38	0	0	6.71	0	0	0
Cycle Clear Time, s	0	1.38	0	0	6.71	0	0	0
Lane Grp Capacity, vph		2686.58			997.92			
v/c Ratio	0	0.09	0	0	0.19	0	0	0

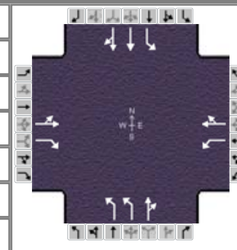
Avail Capacity, veh/h		2686.58			997.92			
I-Factor	0	0.95	0	0	0.95	0	0	0
Uniform Delay, s/veh		1.86			11.35			
Increm Delay, s/veh	0	0.07	0	0	0.41	0	0	0
Overflow Delay, s/veh	0	0	0	0	0	0	0	0
Control Delay, s/veh		1.93			11.75			
Group LOS		A			B			
Uniform Stops, #/veh		0.07			0.42			
Increm Stops, #/veh	0	0.01	0	0	0.02	0	0	0
Overflow Stops, #/veh	0	0	0	0	0	0	0	0
Stop Rate, #/veh		0.08			0.45			
Uniform Queue, veh/ln		0.2			1.9			
Increm Queue, veh/ln	0	0.02	0	0	0.11	0	0	0
Overflow Queue, veh/ln	0	0	0	0	0	0	0	0
Back of Queue Factor	0	1.8	1	0	1.8	0	0	0
Back of Queue, veh/ln		0.4			3.62			
Storage Ratio	0	0.02	0	0	0.14	0	0	0
Initial Queue, veh	0	0	0	0	0	0	0	0
Final Queue, veh	0	0	0	0	0	0	0	0
Saturated Delay, s/veh	0	0	0	0	0	0	0	0
Saturated Stops, #/veh	0	0	0	0	0	0	0	0
Saturated Queue, veh/ln	0	0	0	0	0	0	0	0
Saturated Capacity, vph	0	0	0	0	0	0	0	0
Init Que Clear Time, s	0	0	0	0	0	0	0	0

Right Lane Group Output

Timer:	1	2	3	4	5	6	7	8
Assigned Phase	0	2	4	0	6	5	0	0
Right Lane Group Data								
Assigned Movement	0	12	14	0	16	0	0	0
Lane Assignment			R		T+R			
Lanes in Group	0	0	1	0	1	0	0	0
Group Volume, veh/h	0	0	6.67	0	181.95	0	0	0
Group SatFlow, vphpl	0	0	1495.51	0	1628.65	0	0	0
Queue Serve Time, s	0	0	0.35	0	6.46	0	0	0
Cycle Clear Time, s	0	0	0.35	0	6.46	0	0	0
Prot RT SatFlow, vphpl			0					
Prot RT Eff Green, s			0					
Prop Outside Lane	0	0	1	0	0.46	0	0	0
Lane Grp Capacity, vph			123.79		920.99			
v/c Ratio	0	0	0.05	0	0.2	0	0	0
Avail Capacity, veh/h			351.89		920.99			
I-Factor	0	0	1	0	0.95	0	0	0
Uniform Delay, s/veh			35.92		13.67			
Increm Delay, s/veh	0	0	0.25	0	0.46	0	0	0
Overflow Delay, s/veh	0	0	0	0	0	0	0	0
Control Delay, s/veh			36.17		14.13			
Group LOS			D		B			
Uniform Stops, #/veh			0.76		0.51			
Increm Stops, #/veh	0	0	0.06	0	0.03	0	0	0
Overflow Stops, #/veh	0	0	0	0	0	0	0	0
Stop Rate, #/veh			0.82		0.54			
Uniform Queue, veh/ln			0.12		2.2			
Increm Queue, veh/ln	0	0	0.01	0	0.12	0	0	0
Overflow Queue, veh/ln	0	0	0	0	0	0	0	0
Back of Queue Factor	0	1	1.8	0	1.8	0	0	0
Back of Queue, veh/ln			0.23		4.16			
Storage Ratio	0	0	0.03	0	0.16	0	0	0
Initial Queue, veh	0	0	0	0	0	0	0	0
Final Queue, veh	0	0	0	0	0	0	0	0
Saturated Delay, s/veh	0	0	0	0	0	0	0	0
Saturated Stops, #/veh	0	0	0	0	0	0	0	0
Saturated Queue, veh/ln	0	0	0	0	0	0	0	0
Saturated Capacity, vph	0	0	0	0	0	0	0	0
Init Que Clear Time, s	0	0	0	0	0	0	0	0

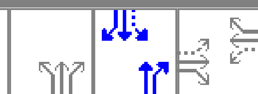
HCS 2010 Signalized Intersection Results Summary

General Information				Intersection Information	
Agency	HDR			Duration, h	0.25
Analyst	MDF	Analysis Date	Jan 30, 2013	Area Type	Other
Jurisdiction		Time Period	AM Peak	PHF	0.90
Intersection	Disk Drive	Analysis Year	Existing (2012)	Analysis Period	1> 7:45
File Name	Existing_AM_LaCrosse.xus				
Project Description					

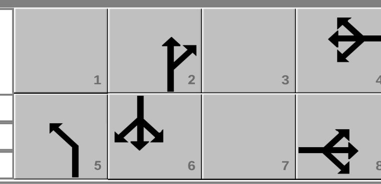


Demand Information	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Demand (*v*), veh/h	20	15	70	120	10	10	110	110	55	10	200	25

Signal Information			
Cycle, s	85.0	Reference Phase	6
Offset, s	18	Reference Point	Begin
Uncoordinated	No	Simult. Gap E/W	Off
Force Mode	Float	Simult. Gap N/S	Off



Green	34.0	24.1	11.9	0.0	0.0	0.0
Yellow	4.0	4.0	4.0	0.0	0.0	0.0
Red	1.0	1.0	1.0	0.0	0.0	0.0



Timer Results	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Assigned Phase		8		4	5	2		6
Case Number		7.0		6.0	2.0	4.0		6.3
Phase Duration, s		16.9		16.9	39.0	68.1		29.1
Change Period, *(Y+Rc)*, s		5.0		5.0	5.0	5.0		5.0
Max Allow Headway *(MAH)*, s		5.1		5.1	5.1	0.0		0.0
Queue Clearance Time (g_s), s		3.7		11.6	3.8			
Green Extension Time (g_e), s		0.1		0.4	0.7	0.0		0.0
Phase Call Probability		0.99		0.99	1.00			
Max Out Probability		0.00		0.13	0.00			

Movement Group Results	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Assigned Movement	3	8	18	7	4	14	5	2	12	1	6	16
Adjusted Flow Rate (*v*), veh/h		39	13	133	13		122	167		11	121	119
Adjusted Saturation Flow Rate (*s*), veh/h/ln		1577	1510	1388	1730		1648	1701		1226	1782	1736
Queue Service Time (g_s), s		0.2	0.7	7.9	0.6		1.8	1.7		0.5	3.9	4.0
Cycle Queue Clearance Time (g_c), s		1.7	0.7	9.6	0.6		1.8	1.7		0.5	3.9	4.0
Green Ratio (*g/C*)		0.14	0.14	0.14	0.14		0.40	0.74		0.28	0.28	0.28
Capacity (*c*), veh/h		287	211	253	242		1318	1262		432	505	492
Volume-to-Capacity Ratio *(X)*		0.135	0.063	0.528	0.055		0.093	0.132		0.026	0.239	0.242
Available Capacity (c_a), veh/h		435	355	385	407		1318	1262		432	505	492
Back of Queue (*Q*), veh/ln (95th percentile)		1.3	0.4	5.0	0.4		1.2	0.8		0.3	3.0	3.0
Queue Storage Ratio (*RQ*) (95th percentile)		0.06	0.02	0.25	0.02		0.12	0.03		0.04	0.08	0.08
Uniform Delay (d_1), s/veh		32.1	31.7	36.3	31.7		14.2	2.1		19.1	20.2	20.2
Incremental Delay (d_2), s/veh		0.3	0.2	2.4	0.1		0.1	0.2		0.1	1.1	1.2
Initial Queue Delay (d_3), s/veh		0.0	0.0	0.0	0.0		0.0	0.0		0.0	0.0	0.0
Control Delay (*d*), s/veh		32.4	31.9	38.8	31.8		14.3	2.3		19.2	21.3	21.4
Level of Service (LOS)		C	C	D	C		B	A		B	C	C
Approach Delay, s/veh / LOS	32.3	C		38.1	D		7.4	A		21.2	C	
Intersection Delay, s/veh / LOS	20.0						B					

Multimodal Results	EB		WB		NB		SB	
Pedestrian LOS Score / LOS	3.1	C	2.6	B	2.4	B	2.8	C
Bicycle LOS Score / LOS	2.4	B	2.4	B	3.0	C	2.7	B

This Signals text report was created on January 31, 2013 at 12:18:12

Intersection number = 4, Segment number = 3, Period number = 1

Chapter 18 Summary Input

Cycle Length, s 85

	EB LT	EB TH	EB RT	WB LT	WB TH	WB RT	NB LT	NB TH	NB RT	SB LT	SB TH	SB RT
Movement	3	8	18	7	4	14	5	2	12	1	6	16
Volume, veh/h	20	15	70	120	10	10	110	110	55	10	200	25
Lanes	0	1	1	1	1	0	2	1	0	1	2	0
Bay Length, ft	0	500	500	500	500	0	250	670	0	150	1000	0
Receiving Lanes	1	1	1	2	2	2	1	1	1	2	2	2
SatFlow, vplphg	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800
Lane Width, ft	12	12	12	12	12	12	12	12	12	12	12	12
Heavy Vehicles, %	0	1	1	1	1	0	1	1	0	1	1	0
Grade, %	0	0	0	0	0	0	0	0	0	0	0	0
Buses, per h	0	0	0	0	0	0	0	0	0	0	0	0
Parking, per h	0	0	0	0	0	0	0	0	0	0	0	0
Bicycles, per h	0	0	0	0	0	0	0	0	0	0	0	0
Pedestrians, per h	0	0	0	0	0	0	0	0	0	0	0	0
Heavy Veh Equivalent	2	2	2	2	2	2	2	2	2	2	2	2
Bus Blockage Time	14.4	14.4	14.4	14.4	14.4	14.4	14.4	14.4	14.4	14.4	14.4	14.4
Turns in Shrd Ln, %	0	0	0	0	0	0	0	0	0	0	0	0
Unopposed Lefts, %	0	0	0	0	0	0	0	0	0	0	0	0
Parking Time, sec	18	18	18	18	18	18	18	18	18	18	18	18
Arrival Type	3	3	3	3	3	3	4	4	4	4	4	4
Initial Queue, veh	0	0	0	0	0	0	0	0	0	0	0	0
Speed Limit, mph	30	30	30	30	30	30	35	35	35	35	35	35
Detector Length, ft	40	40	40	40	40	40	40	40	40	40	40	40
StartLostTime, sec	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0
EndUseTime, sec	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0
RTOR, veh/h		58			8			15			9	
I-Factor		1.00			1.00			1.00			1.00	
Walk + PC, sec		0.0			0.0			0.0			0.0	

	EB	EB	WB	WB	NB	NB	SB	SB
Phase	3	8	7	4	5	2	1	6
Movement		LT+TH+RT		LT+TH+RT	LT	TH+RT		LT+TH+RT
Left-Turn Mode	--	Perm.	--	Perm.	Prot.	--	--	Perm.
Phase Splits, s	0.0	25.0	0.0	25.0	39.0	60.0	0.0	21.0
Yellow Change, s	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Red Clearance, s	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0
Minimum Green, s	5	5	5	5	10	5	5	5
Lead/Lag					Lead			
Passage Time, s	2.0	4.0	2.0	4.0	4.0	2.0	2.0	2.0
Recall	Off	Off	Off	Off	Max	Min	Off	Min
Dual Entry	No	Yes	No	Yes	No	Yes	No	Yes
Prot. Right-Turn	False	False	False	False	False	False	False	False

	E/W	N/S
Simultaneous Gap out	Off	Off
Dallas Phasing	Off	Off

Cycle Length, s	85
Offset, s	18
Reference Phase	6
Reference Point	Begin
Force Mode	Float
Uncoordinated	No
Field Measured Phase Times	No
Exclusive Ped Phase Time, s	0.0

Timer:	1	2	3	4	5	6	7	8
Assigned Phase	0	2	0	4	5	6	0	8
Assigned Left-Turn Mvmt.	0	0	0	7	5	1	0	3
Assigned Through Mvmt.	0	2	0	4	0	6	0	8
Assigned Right-Turn Mvmt.	0	12	0	14	0	16	0	18
Timer w/Pr-Pm From Shared	0	0	0	0	0	0	0	0

Chapter 18 Summary Output

Cycle Length, s 85

	EB LT	EB TH	EB RT	WB LT	WB TH	WB RT	NB LT	NB TH	NB RT	SB LT	SB TH	SB RT
Movement	3	8	18	7	4	14	5	2	12	1	6	16
Volume, veh/h	22.22	16.67	13.33	133.33	11.11	2.22	122.22	122.22	44.44	11.11	222.22	17.78
SatFlow, veh/h/ln	0	1782.2	1782.2	1782.2	1782.2	0	1782.2	1782.2	0	1782.2	1782.2	0
Lane Util Factor	1	1	1	1	1	1	0.97	1	1	1	1	1
Capacity, veh/h	174.88	112.49	355.37	252.5	201.89	40.38	1318.5	925.75	336.63	431.86	924.02	73.32
Discharge Vol, veh/h	0	0	13.33	133.33	0	0	0	0	0	0	222.22	0
Prop Arriv On Green	0.14	0.14	0.14	0.14	0.14	0.14	0.46	0.82	0.82	0.38	0.38	0.38
Apprch Vol, veh/h	0	52.22	0	0	146.67	0	0	288.89	0	0	251.11	0
Apprch Stops, #/veh	0	0.77	0	0	0.87	0	0	0.25	0	0	0.59	0
Apprch Delay, s/veh	0	32.3	0	0	38.13	0	0	7.4	0	0	21.22	0

Apprch LOS	C	D	A	C

Int Delay, s/veh 19.96
Int LOS B

Timer Data

Timer:	1	2	3	4	5	6	7	8
Assigned Phase	0	2	0	4	5	6	0	8
Case No	0	4	0	6	2	6.3	0	7
Phase Duration, s	0	68.12	0	16.88	39	29.12	0	16.88
Change Period, s	0	5	0	5	5	5	0	5
Phase Start Time, s	55.9	55.9	39	39	55.9	9.9	39	39
Phase End Time, s	55.9	39	39	55.9	9.9	39	39	55.9
Max Allow Headway, s	0	0	0	5.13	5.08	0	0	5.15
Equiv Max Green, s		5		20	34	5		20
Queue Clear Time, s				11.57	3.77			3.65
Green Exten Time, s	0	0	0	0.4	0.69	0	0	0.14
Prob of Phase Call				0.99	1			0.99
Prob of Max Out				0.13	0			0
Left-Turn Movement Data								
Assigned Movement	0	0	0	7	5	1	0	3
Mvmt. Sat Flow, veh/h	0	0	0	1387.62	3296.18	1225.9	0	901.17
Through Movement Data								
Assigned Movement	0	2	0	4	0	6	0	8
Mvmt. Sat Flow, veh/h	0	1247.07	0	1441.89	0	3259.18	0	675.88
Right-Turn Movement Data								
Assigned Movement	0	12	0	14	0	16	0	18
Mvmt. Sat Flow, veh/h	0	453.48	0	288.38	0	258.62	0	1510.32

Left Lane Group Output

Timer:	1	2	3	4	5	6	7	8
Assigned Phase	0	2	0	4	5	6	0	8
Left Lane Group Data								
Assigned Movement	0	0	0	7	5	1	0	3
Lane Assignment				L	L (Prot)	L		L+T
Lanes in Group	0	0	0	1	2	1	0	1
Group Volume, veh/h	0	0	0	133.33	122.22	11.11	0	38.89
Group SatFlow, vphpl	0	0	0	1387.62	1648.09	1225.9	0	1577.05
Queue Serve Time, s	0	0	0	7.94	1.77	0.49	0	0.16
Cycle Clear Time, s	0	0	0	9.57	1.77	0.51	0	1.65
Perm SatFlow, vphpl	0	0	0	1387.62	0	1225.9	0	1422.77
Shared SatFlow, vphpl								0
Perm Eff Green, s	0	0	0	11.9	0	24.1	0	11.9
Perm Serve Time, s	0	0	0	10.28	0	24.07	0	11.36
Perm Que Serve Time, s				7.94		0.48		0.16
Time to first Blk, s	0	0	0	0	0	0	0	1.49
Serve Time pre Blk, s								1.49
Prop Inside Lane	0	0	0	1	1	1	0	0.57
Lane Grp Capacity, vph				252.5	1318.47	431.86		287.37
v/c Ratio	0	0	0	0.53	0.09	0.03	0	0.14
Avail Capacity, veh/h				384.71	1318.47	431.86		434.83
I-Factor	0	0	0	1	1	1	0	1
Uniform Delay, s/veh				36.33	14.17	19.11		32.13
Increm Delay, s/veh	0	0	0	2.43	0.14	0.11	0	0.3
Overflow Delay, s/veh	0	0	0	0	0	0	0	0
Control Delay, s/veh				38.76	14.31	19.22		32.44
Group LOS				D	B	B		C
Uniform Stops, #/veh				0.83	0.43	0.5		0.75
Increm Stops, #/veh	0	0	0	0.05	0.02	0.05	0	0.03
Overflow Stops, #/veh	0	0	0	0	0	0	0	0
Stop Rate, #/veh				0.88	0.44	0.55		0.77
Uniform Queue, veh/ln				2.61	0.61	0.13		0.68
Increm Queue, veh/ln	0	0	0	0.17	0.03	0.01	0	0.02
Overflow Queue, veh/ln	0	0	0	0	0	0	0	0
Back of Queue Factor	0	0	0	1.8	1.8	1.8	0	1.8
Back of Queue, veh/ln				5.01	1.15	0.26		1.28
Storage Ratio	0	0	0	0.25	0.12	0.04	0	0.06
Initial Queue, veh	0	0	0	0	0	0	0	0
Final Queue, veh	0	0	0	0	0	0	0	0
Saturated Delay, s/veh	0	0	0	0	0	0	0	0
Saturated Stops, #/veh	0	0	0	0	0	0	0	0
Saturated Queue, veh/ln	0	0	0	0	0	0	0	0
Saturated Capacity, vph	0	0	0	0	0	0	0	0
Init Que Clear Time, s	0	0	0	0	0	0	0	0

Thru Lane Group Output

Timer:	1	2	3	4	5	6	7	8
Assigned Phase	0	2	0	4	5	6	0	8
Thru Lane Group Data								
Assigned Movement	0	2	0	4	0	6	0	8
Lane Assignment						T		
Lanes in Group	0	0	0	0	0	1	0	0
Group Volume, veh/h	0	0	0	0	0	120.69	0	0
Group SatFlow, vphpl	0	0	0	0	0	1782.18	0	0
Queue Serve Time, s	0	0	0	0	0	3.94	0	0
Cycle Clear Time, s	0	0	0	0	0	3.94	0	0
Lane Grp Capacity, vph						505.27		
v/c Ratio	0	0	0	0	0	0.24	0	0

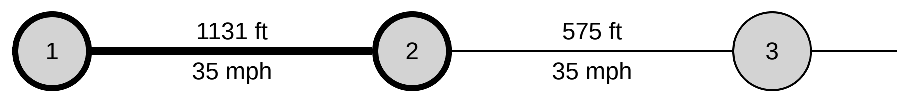
Avail Capacity, veh/h						505.27		
I-Factor	0	0	0	0	0	1	0	0
Uniform Delay, s/veh						20.16		
Increm Delay, s/veh	0	0	0	0	0	1.11	0	0
Overflow Delay, s/veh	0	0	0	0	0	0	0	0
Control Delay, s/veh						21.28		
Group LOS						C		
Uniform Stops, #/veh						0.53		
Increm Stops, #/veh	0	0	0	0	0	0.05	0	0
Overflow Stops, #/veh	0	0	0	0	0	0	0	0
Stop Rate, #/veh						0.59		
Uniform Queue, veh/ln						1.52		
Increm Queue, veh/ln	0	0	0	0	0	0.16	0	0
Overflow Queue, veh/ln	0	0	0	0	0	0	0	0
Back of Queue Factor	0	1	0	1	0	1.8	0	1
Back of Queue, veh/ln						3.01		
Storage Ratio	0	0	0	0	0	0.08	0	0
Initial Queue, veh	0	0	0	0	0	0	0	0
Final Queue, veh	0	0	0	0	0	0	0	0
Saturated Delay, s/veh	0	0	0	0	0	0	0	0
Saturated Stops, #/veh	0	0	0	0	0	0	0	0
Saturated Queue, veh/ln	0	0	0	0	0	0	0	0
Saturated Capacity, vph	0	0	0	0	0	0	0	0
Init Que Clear Time, s	0	0	0	0	0	0	0	0

Right Lane Group Output

Timer:	1	2	3	4	5	6	7	8
Assigned Phase	0	2	0	4	5	6	0	8
Right Lane Group Data								
Assigned Movement	0	12	0	14	0	16	0	18
Lane Assignment		T+R		T+R		T+R		R
Lanes in Group	0	1	0	1	0	1	0	1
Group Volume, veh/h	0	166.67	0	13.33	0	119.31	0	13.33
Group SatFlow, vphpl	0	1700.55	0	1730.27	0	1735.63	0	1510.32
Queue Serve Time, s	0	1.67	0	0.57	0	4	0	0.65
Cycle Clear Time, s	0	1.67	0	0.57	0	4	0	0.65
Prot RT SatFlow, vphpl								0
Prot RT Eff Green, s								0
Prop Outside Lane	0	0.27	0	0.17	0	0.15	0	1
Lane Grp Capacity, vph		1262.39		242.28		492.08		211.47
v/c Ratio	0	0.13	0	0.06	0	0.24	0	0.06
Avail Capacity, veh/h		1262.39		407.13		492.08		355.37
I-Factor	0	1	0	1	0	1	0	1
Uniform Delay, s/veh		2.11		31.68		20.18		31.71
Increm Delay, s/veh	0	0.22	0	0.13	0	1.17	0	0.18
Overflow Delay, s/veh	0	0	0	0	0	0	0	0
Control Delay, s/veh		2.33		31.81		21.35		31.89
Group LOS		A		C		C		C
Uniform Stops, #/veh		0.09		0.74		0.53		0.74
Increm Stops, #/veh	0	0.02	0	0.03	0	0.06	0	0.03
Overflow Stops, #/veh	0	0	0	0	0	0	0	0
Stop Rate, #/veh		0.11		0.76		0.59		0.77
Uniform Queue, veh/ln		0.35		0.23		1.5		0.23
Increm Queue, veh/ln	0	0.08	0	0.01	0	0.16	0	0.01
Overflow Queue, veh/ln	0	0	0	0	0	0	0	0
Back of Queue Factor	0	1.8	0	1.8	0	1.8	0	1.8
Back of Queue, veh/ln		0.76		0.43		2.99		0.44
Storage Ratio	0	0.03	0	0.02	0	0.08	0	0.02
Initial Queue, veh	0	0	0	0	0	0	0	0
Final Queue, veh	0	0	0	0	0	0	0	0
Saturated Delay, s/veh	0	0	0	0	0	0	0	0
Saturated Stops, #/veh	0	0	0	0	0	0	0	0
Saturated Queue, veh/ln	0	0	0	0	0	0	0	0
Saturated Capacity, vph	0	0	0	0	0	0	0	0
Init Que Clear Time, s	0	0	0	0	0	0	0	0

HCS 2010 Urban Street Segment Report

General Information				Streets Information	
Agency	HDR			Number of Intersections	4
Analyst	MDF	Analysis Date	Jan 30, 2013	Number of Segments	3
Jurisdiction		Time Period	AM Peak	Number of Iterations	15
File Name	Existing_AM_LaCrosse.xus	Analysis Year	Existing (2012)	System Cycle Length, s	85
Intersections	Eglin Street	I-90 EB Ramps		Analysis Period	1> 7:45
Project Description					



Basic Segment Information															
Segment	Speed Limit		Through Lanes		Segment Length		Intersection Wid		Length of RM		Percent Curb		Other Delay		
	NB	SB	NB	SB	NB	SB	NB	SB	NB	SB	NB	SB	NB	SB	
1	35	35	2	2	1131	1131	60	60	0	0	90	75	0.0	0.0	

		Northbound			Southbound		
Segment Output Data		NBL	NBT	NBR	SBL	SBT	SBR
Segment	Movement	5	2	12	1	6	16
1	Bay/Lane Spillback Time, h		never			never	
1	Shared Lane Spillback Time, h				never		
1	Base Free-Flow Speed, mph	40.09			40.16		
1	Running Time, s	22.23			22.17		
1	Running Speed, mph	34.69			34.79		
1	Through Delay, s/veh	8.99			3.11		
1	Travel Speed, mph	24.70			30.50		
1	Stop Rate, stops/veh	0.38			0.14		
1	Spatial Stop Rate, stops/mi	1.78			0.64		
1	Through vol/cap Ratio	0.00			0.20		
1	Percent of Base FFS	61.62			75.96		
1	Level of Service	C			B		
1	Auto Traveler Perception Score	2.64			2.23		

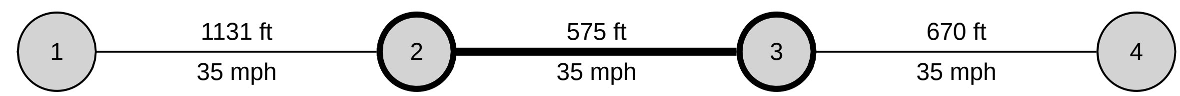
Multimodal Results (Segment)					
1	Pedestrian Segment LOS Score / LOS	3.21	C	3.20	C
1	Bicycle Segment LOS Score / LOS	3.97	D	4.95	E
1	Transit Segment LOS Score / LOS	0.53	A	0.84	A

Facility Output Data	Northbound	Southbound
Facility Travel Time, s	65.52	70.45
Facility Travel Speed, mph	24.72	23.00
Facility Base Free Flow Speed, mph	40.10	40.53
Facility Percent of Base FFS	61.66	56.73
Facility Level of Service	C	C
Facility Auto Traveler Perception Score	2.42	2.42

Multimodal Results (Facility)				
Pedestrian Facility LOS Score / LOS	3.23	C	3.26	C
Bicycle Facility LOS Score / LOS	3.94	D	4.40	E
Transit Facility LOS Score / LOS	0.80	A	0.96	A

HCS 2010 Urban Street Segment Report

General Information				Streets Information	
Agency	HDR			Number of Intersections	4
Analyst	MDF	Analysis Date	Jan 30, 2013	Number of Segments	3
Jurisdiction		Time Period	AM Peak	Number of Iterations	15
File Name	Existing_AM_LaCrosse.xus	Analysis Year	Existing (2012)	System Cycle Length, s	85
Intersections	I-90 EB Ramps	I-90 WB Ramps		Analysis Period	1> 7:45
Project Description					



Basic Segment Information

Segment	Speed Limit		Through Lanes		Segment Length		Intersection Wid		Length of RM		Percent Curb		Other Delay	
	NB	SB	NB	SB	NB	SB	NB	SB	NB	SB	NB	SB	NB	SB
2	35	35	2	2	575	575	60	60	0	0	100	100	0.0	0.0

		Northbound			Southbound		
Segment Output Data		NBL	NBT	NBR	SBL	SBT	SBR
Segment	Movement		2	12	1	6	
2	Bay/Lane Spillback Time, h		never			never	
2	Shared Lane Spillback Time, h	never			never		
2	Base Free-Flow Speed, mph	41.58			41.58		
2	Running Time, s	14.17			14.15		
2	Running Speed, mph	27.66			27.71		
2	Through Delay, s/veh	1.93			2.97		
2	Travel Speed, mph	24.35			22.91		
2	Stop Rate, stops/veh	0.08			0.09		
2	Spatial Stop Rate, stops/mi	0.70			0.83		
2	Through vol/cap Ratio	0.09			0.11		
2	Percent of Base FFS	58.57			55.10		
2	Level of Service	C			C		
2	Auto Traveler Perception Score	2.24			2.48		

Multimodal Results (Segment)

2	Pedestrian Segment LOS Score / LOS	3.16	C	3.50	D
2	Bicycle Segment LOS Score / LOS	3.61	D	3.59	D
2	Transit Segment LOS Score / LOS	1.31	A	1.41	A

Facility Output Data	Northbound	Southbound
Facility Travel Time, s	65.52	70.45
Facility Travel Speed, mph	24.72	23.00
Facility Base Free Flow Speed, mph	40.10	40.53
Facility Percent of Base FFS	61.66	56.73
Facility Level of Service	C	C
Facility Auto Traveler Perception Score	2.42	2.42

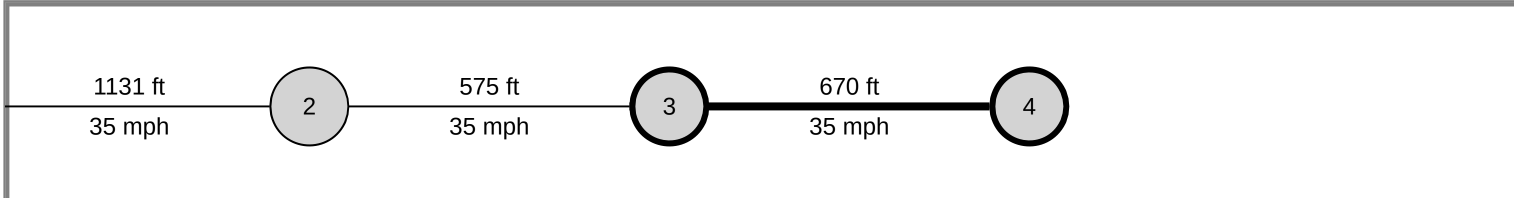
Multimodal Results (Facility)

Pedestrian Facility LOS Score / LOS	3.23	C	3.26	C
Bicycle Facility LOS Score / LOS	3.94	D	4.40	E
Transit Facility LOS Score / LOS	0.80	A	0.96	A

 HCS 2010™ Streets Version 6.50 Generated: 1/31/2013 11:38:37 AM

HCS 2010 Urban Street Segment Report

General Information				Streets Information	
Agency	HDR			Number of Intersections	4
Analyst	MDF	Analysis Date	Jan 30, 2013	Number of Segments	3
Jurisdiction		Time Period	AM Peak	Number of Iterations	15
File Name	Existing_AM_LaCrosse.xus	Analysis Year	Existing (2012)	System Cycle Length, s	85
Intersections	I-90 WB Ramps	Disk Drive		Analysis Period	1> 7:45
Project Description					



Basic Segment Information															
Segment	Speed Limit		Through Lanes		Segment Length		Intersection Wid		Length of RM		Percent Curb		Other Delay	
	NB	SB	NB	SB	NB	SB	NB	SB	NB	SB	NB	SB	NB	SB
3	35	35	1	2	670	670	60	60	0	0	90	85	0.0	0.0

		Northbound			Southbound		
Segment Output Data		NBL	NBT	NBR	SBL	SBT	SBR
Segment	Movement	5	2			6	16
3	Bay/Lane Spillback Time, h		never			never	
3	Shared Lane Spillback Time, h	never					
3	Base Free-Flow Speed, mph	38.93			40.30		
3	Running Time, s	15.88			15.50		
3	Running Speed, mph	28.77			29.48		
3	Through Delay, s/veh	2.33			12.55		
3	Travel Speed, mph	25.09			16.28		
3	Stop Rate, stops/veh	0.11			0.48		
3	Spatial Stop Rate, stops/mi	0.85			3.76		
3	Through vol/cap Ratio	0.13			0.00		
3	Percent of Base FFS	64.45			40.41		
3	Level of Service	C			D		
3	Auto Traveler Perception Score	2.27			2.74		

Multimodal Results (Segment)					
3	Pedestrian Segment LOS Score / LOS	3.30	C	3.16	C
3	Bicycle Segment LOS Score / LOS	4.17	D	4.14	D
3	Transit Segment LOS Score / LOS	0.83	A	0.78	A

Facility Output Data	Northbound	Southbound
Facility Travel Time, s	65.52	70.45
Facility Travel Speed, mph	24.72	23.00
Facility Base Free Flow Speed, mph	40.10	40.53
Facility Percent of Base FFS	61.66	56.73
Facility Level of Service	C	C
Facility Auto Traveler Perception Score	2.42	2.42

Multimodal Results (Facility)				
Pedestrian Facility LOS Score / LOS	3.23	C	3.26	C
Bicycle Facility LOS Score / LOS	3.94	D	4.40	E
Transit Facility LOS Score / LOS	0.80	A	0.96	A

This Urban Streets text report was created on January 31, 2013 at 12:19:04

Period number = 1

Chapter 17 Input

URBAN STREET PARAMETERS

Number of Intersections	4
Number of Segments	3
Analysis period duration, h	0.25
System cycle length, s	85
Urban street forward direction	NB
Sneakers per cycle, veh	2
Saturation flow rate, veh/h/ln	1900
Stored vehicle lane length, ft	25
Detected vehicle length, ft	17
Queue length percent	95
Critical merge gap, s	3.7
Stop threshold speed, mph	5
Acceleration rate, ft/s/s	3.5
Decel. rate (signal), ft/s/s	4
Left-turn equivalency factor (signal)	1.05
Right-turn equivalency factor (signal)	1.18
Minimum headway in a platoon, s/veh	1.5
Maximum headway in a platoon, s/veh	3.6
Number of iterations	15
Length of left-turn bay (access pt.), ft	250
Decel. rate (access pt.), ft/s/s	6.7
Right-turn speed (access pt.), ft/s	20
Critical gap from major left (access pt.), s	4.1
Follow-up time from major left (access pt.), s	2.2
Right-turn equivalency factor (access pt.)	2.2
Stored heavy vehicle lane length, ft	45
Proportion of peds who push button	0.65
Critical gap for permissive left-turn, s	4.5
Follow-up time for permissive left-turn, s	2.5
Calibration factor for platoon dispersion	0.14
Average ratio of speed limit to free-flow speed	0.94

BASIC SEGMENT INFORMATION

Seg	Spd Lmt		TH Lanes		Seg Len		IntWid		LenRM		PctCurb		Other Dly	
Num	NB	SB	NB	SB	NB	SB	NB	SB	NB	SB	NB	SB	NB	SB
1	35	35	2	2	1131	1131	60	60	0	0	90	75	0	0
2	35	35	2	2	575	575	60	60	0	0	100	100	0	0
3	35	35	1	2	670	670	60	60	0	0	90	85	0	0

ORIGIN-DESTINATION SEED PROPORTIONS - Forward Direction

	Cross LT	Major TH	Cross RT	MidEntry
Downstream Left	0.02	0.1	0.05	0.02
Downstream Thru	0.91	0.78	0.92	0.97
Downstream Right	0.05	0.1	0.02	0.01
Mid-segment Exit	0.02	0.02	0.01	0

ORIGIN-DESTINATION SEED PROPORTIONS - Reverse Direction

	Cross LT	Major TH	Cross RT	MidEntry
Downstream Left	0.02	0.1	0.05	0.02
Downstream Thru	0.91	0.78	0.92	0.97
Downstream Right	0.05	0.1	0.02	0.01
Mid-segment Exit	0.02	0.02	0.01	0

ACCESS POINT DATA

SEGMENT 1

Number of access points: 0

SEGMENT 2

Number of access points: 0

SEGMENT 3

Number of access points: 0

Global Output

SEGMENT DATA

		NB	NB	NB	SB	SB	SB
		LT	TH	RT	LT	TH	RT
Seg.No.	Movement	5	2	12	1	6	16
1	Bay/Lane Spillback Time, h	999	999	999	999	999	999
1	ShrdLane Spillback Time, h				999		
1	Base Free-Flow Speed, mph		40.09			40.16	
1	Running Time, s		22.23			22.17	
1	Running Speed, mph		34.69			34.79	
1	Through Delay, s/veh		8.99			3.11	
1	Travel Speed, mph		24.7			30.5	
1	Stop Rate, stops/veh		0.38			0.14	
1	Spatial Stop Rate, stops/mi		1.78			0.64	
1	Through vol/cap ratio		0			0.2	
1	Percent of Base FFS		61.62			75.96	
1	Level of Service		C			B	
1	Automobile Perception Score		2.64			2.23	
2	Bay/Lane Spillback Time, h	999	999	999	999	999	999
2	ShrdLane Spillback Time, h	999			999		
2	Base Free-Flow Speed, mph		41.58			41.58	
2	Running Time, s		14.17			14.15	
2	Running Speed, mph		27.66			27.71	
2	Through Delay, s/veh		1.93			2.97	
2	Travel Speed, mph		24.35			22.91	
2	Stop Rate, stops/veh		0.08			0.09	
2	Spatial Stop Rate, stops/mi		0.7			0.83	
2	Through vol/cap ratio		0.09			0.11	
2	Percent of Base FFS		58.57			55.1	
2	Level of Service		C			C	
2	Automobile Perception Score		2.24			2.48	
3	Bay/Lane Spillback Time, h	999	999	999	999	999	999
3	ShrdLane Spillback Time, h	999					
3	Base Free-Flow Speed, mph		38.93			40.3	
3	Running Time, s		15.88			15.5	
3	Running Speed, mph		28.77			29.48	
3	Through Delay, s/veh		2.33			12.55	
3	Travel Speed, mph		25.09			16.28	
3	Stop Rate, stops/veh		0.11			0.48	
3	Spatial Stop Rate, stops/mi		0.85			3.76	
3	Through vol/cap ratio		0.13			0	
3	Percent of Base FFS		64.45			40.41	
3	Level of Service		C			D	
3	Automobile Perception Score		2.27			2.74	

	NB	SB
Facility Travel Time, s	65.52	70.45
Facility Travel Speed, mph	24.72	23
Facility Spatial Stop Rate, veh/mi	1.25	1.56
Facility Base Free Flow Speed, mph	40.1	40.53
Facility Percent Base Free Flow Speed	61.66	56.73
Facility Level of Service	C	C
Facility Automobile Perception Score	2.42	2.42
Facility Pedestrian Space	Infinity	Infinity
Facility Pedestrian Travel Speed	4.4	4.4
Facility Pedestrian LOS Score	3.23	3.26
Facility Pedestrian LOS	C	C
Facility Bicycle Travel Speed	10.81	10.12
Facility Bicycle LOS Score	3.94	4.4
Facility Bicycle LOS	D	E
Facility Transit Travel Speed	36.32	30.5
Facility Transit LOS Score	0.8	0.96
Facility Transit LOS	A	A

SPILLBACK TIME, h 999

Multimodal Results

1	Roadway crossing difficulty factor	1.11	1.13
1	Ped LOS Score for Link	2.61	2.37

1	Ped LOS Score for Intersection	2.12	2.16
1	Ped LOS Score for Segment	3.21	3.2
1	Ped Segment LOS	C	C
1	Bicycle LOS Score for Link	3.71	3.63
1	Indicator Variable	1	1
1	Bicycle LOS Score for Intersection	2.89	2.98
1	Number of access point approaches	2	8
1	Segment Length, ft	1131	1131
1	Bicycle LOS Score for Segment	3.97	4.95
1	Bicycle Segment LOS	D	E
1	Transit Wait-Ride Score	3.91	3.68
1	Ped LOS Score for Link	2.61	2.37
1	Transit LOS Score for Segment	0.53	0.84
1	Transit Segment LOS	A	A
2	Roadway crossing difficulty factor	1.12	1.2
2	Ped LOS Score for Link	2.53	2.46
2	Ped LOS Score for Intersection	1.9	2.42
2	Ped LOS Score for Segment	3.16	3.5
2	Ped Segment LOS	C	D
2	Bicycle LOS Score for Link	3.57	3.49
2	Indicator Variable	1	1
2	Bicycle LOS Score for Intersection	2.86	2.8
2	Number of access point approaches	0	0
2	Segment Length, ft	575	575
2	Bicycle LOS Score for Segment	3.61	3.59
2	Bicycle Segment LOS	D	D
2	Transit Wait-Ride Score	3.38	3.3
2	Ped LOS Score for Link	2.53	2.46
2	Transit LOS Score for Segment	1.31	1.41
2	Transit Segment LOS	A	A
3	Roadway crossing difficulty factor	1.14	1.12
3	Ped LOS Score for Link	2.4	2.37
3	Ped LOS Score for Intersection	2.37	2.15
3	Ped LOS Score for Segment	3.3	3.16
3	Ped Segment LOS	C	C
3	Bicycle LOS Score for Link	3.51	3.53
3	Indicator Variable	1	1
3	Bicycle LOS Score for Intersection	2.95	2.79
3	Number of access point approaches	2	2
3	Segment Length, ft	670	670
3	Bicycle LOS Score for Segment	4.17	4.14
3	Bicycle Segment LOS	D	D
3	Transit Wait-Ride Score	3.69	3.72
3	Ped LOS Score for Link	2.4	2.37
3	Transit LOS Score for Segment	0.83	0.78
3	Transit Segment LOS	A	A

ACCESS POINT DATA

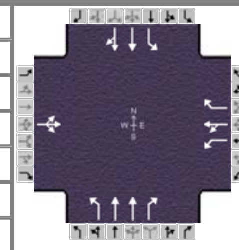
SEGMENT 1

SEGMENT 2

SEGMENT 3

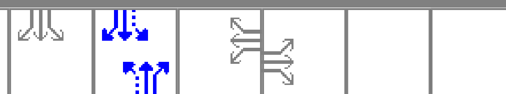
HCS 2010 Signalized Intersection Results Summary

General Information				Intersection Information	
Agency	HDR			Duration, h	0.25
Analyst	MDF	Analysis Date	Jan 30, 2013	Area Type	Other
Jurisdiction		Time Period	PM Peak	PHF	0.90
Intersection	Eglin Street	Analysis Year	Existing (2012)	Analysis Period	1> 16:45
File Name	Existing_PM_LaCrosse.xus				
Project Description					

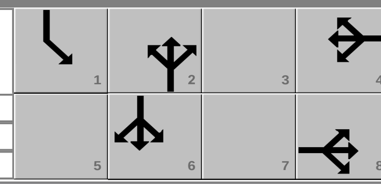


Demand Information	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Demand (*v*), veh/h	10	5	5	260	15	240	10	775	250	230	750	10

Signal Information			
Cycle, s	85.0	Reference Phase	2
Offset, s	56	Reference Point	End
Uncoordinated	No	Simult. Gap E/W	Off
Force Mode	Float	Simult. Gap N/S	Off



Green	7.8	43.6	11.1	1.3	0.0	0.0
Yellow	3.0	3.9	3.2	3.2	0.0	0.0
Red	2.0	1.9	2.0	2.0	0.0	0.0



Timer Results	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Assigned Phase		8		4		2	1	6
Case Number		12.0		9.0		5.3	1.0	4.0
Phase Duration, s		6.5		16.3		49.4	12.8	62.2
Change Period, *(Y+R$_c$)*, s		5.2		5.2		5.8	5.0	5.8
Max Allow Headway *(MAH)*, s		4.1		4.1		0.0	4.1	0.0
Queue Clearance Time *(g_s)*, s		2.8		10.4			7.5	
Green Extension Time *(g_e)*, s		0.0		0.7		0.0	0.3	0.0
Phase Call Probability		0.33		1.00			1.00	
Max Out Probability		0.23		0.19			1.00	

Movement Group Results	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Assigned Movement	3	8	18	7	4	14	5	2	12	1	6	16
Adjusted Flow Rate (*v*), veh/h		17		173	132	43	11	861	124	256	423	421
Adjusted Saturation Flow Rate (*s*), veh/h/ln		1725		1697	1708	1510	656	1697	1510	1697	1782	1775
Queue Service Time (g_s), s		0.8		8.4	6.2	2.2	0.5	10.3	2.5	5.5	6.0	6.0
Cycle Queue Clearance Time (g_c), s		0.8		8.4	6.2	2.2	0.5	10.3	2.5	5.5	6.0	6.0
Green Ratio (*g/C*)		0.02		0.13	0.13	0.13	0.51	0.51	0.51	0.63	0.66	0.66
Capacity (*c*), veh/h		26		222	224	198	421	1739	774	465	1182	1177
Volume-to-Capacity Ratio *(X)*		0.631		0.779	0.591	0.219	0.026	0.495	0.161	0.550	0.358	0.358
Available Capacity (c_a), veh/h		158		355	358	316	421	1739	774	529	1182	1177
Back of Queue (*Q*), veh/ln (95th percentile)		0.9		6.7	4.8	1.5	0.1	5.4	1.4	3.3	3.1	3.1
Queue Storage Ratio (*RQ*) (95th percentile)		0.05		0.85	0.24	0.07	0.02	0.14	0.24	0.27	0.07	0.07
Uniform Delay (d_1), s/veh		41.6		35.7	34.8	33.0	6.6	8.2	7.0	8.7	3.7	3.7
Incremental Delay (d_2), s/veh		22.2		5.8	2.5	0.5	0.1	1.0	0.4	0.9	0.8	0.8
Initial Queue Delay (d_3), s/veh		0.0		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Control Delay (*d*), s/veh		63.8		41.6	37.3	33.6	6.8	9.2	7.4	9.7	4.5	4.5
Level of Service (LOS)		E		D	D	C	A	A	A	A	A	A
Approach Delay, s/veh / LOS	63.8	E		38.9	D		9.0	A		5.7	A	
Intersection Delay, s/veh / LOS	12.1						B					

Multimodal Results	EB		WB		NB		SB	
Pedestrian LOS Score / LOS	3.4	C	3.2	C	3.1	C	2.2	B
Bicycle LOS Score / LOS	2.2	B	3.2	C	3.5	D	3.4	C

 HCS 2010™ Streets Version 6.50 Generated: 1/31/2013 11:42:05 AM

This Signals text report was created on January 31, 2013 at 12:26:00

Intersection number = 1, Segment number = 1, Period number = 1

Chapter 18 Summary Input

Cycle Length, s	85											
	EB	EB	EB	WB	WB	WB	NB	NB	NB	SB	SB	SB
	LT	TH	RT	LT	TH	RT	LT	TH	RT	LT	TH	RT
Movement	3	8	18	7	4	14	5	2	12	1	6	16
Volume, veh/h	10	5	5	260	15	240	10	775	250	230	750	10
Lanes	0	1	0	1	1	1	1	2	1	1	2	0
Bay Length, ft	0	500	0	200	500	500	150	1000	150	300	1131	0
Receiving Lanes	1	2	1	1	1	1	2	2	2	2	2	2
SatFlow, vplphg	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800
Lane Width, ft	12	12	12	12	12	12	12	12	12	12	12	12
Heavy Vehicles, %	0	1	0	1	1	1	1	1	1	1	1	0
Grade, %	0	0	0	0	0	0	0	0	0	0	0	0
Buses, per h	0	0	0	0	0	0	0	0	0	0	0	0
Parking, per h	0	0	0	0	0	0	0	0	0	0	0	0
Bicycles, per h	0	0	0	0	0	0	0	0	0	0	0	0
Pedestrians, per h	0	0	0	0	0	0	0	0	0	0	0	0
Heavy Veh Equivalent	2	2	2	2	2	2	2	2	2	2	2	2
Bus Blockage Time	14.4	14.4	14.4	14.4	14.4	14.4	14.4	14.4	14.4	14.4	14.4	14.4
Turns in Shrd Ln, %	0	0	0	40	0	0	0	0	0	0	0	0
Unopposed Lefts, %	0	0	0	0	0	0	0	0	0	0	0	0
Parking Time, sec	18	18	18	18	18	18	18	18	18	18	18	18
Arrival Type	3	3	3	3	3	3	4	4	4	4	4	4
Initial Queue, veh	0	0	0	0	0	0	0	0	0	0	0	0
Speed Limit, mph	30	30	30	30	30	30	35	35	35	35	35	35
Detector Length, ft	40	40	40	40	40	40	40	40	40	40	40	40
StartLostTime, sec	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0
EndUseTime, sec	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0
RTOR, veh/h		5			201			138			1	
I-Factor		1.00			1.00			1.00			0.91	
Walk + PC, sec		0.0			0.0			0.0			0.0	

	EB	EB	WB	WB	NB	NB	SB	SB
Phase	3	8	7	4	5	2	1	6
Movement		LT+TH+RT		LT+TH+RT		LT+TH+RT	LT	LT+TH+RT
Left-Turn Mode	--	Split	--	Split	--	Perm.	Pr/Pm	--
Phase Splits, s	0.0	13.0	0.0	23.0	0.0	33.0	16.0	49.0
Yellow Change, s	4.0	3.2	4.0	3.2	4.0	3.9	3.0	3.9
Red Clearance, s	1.0	2.0	1.0	2.0	1.0	1.9	2.0	1.9
Minimum Green, s	5	4	5	4	5	5	4	5
Lead/Lag							Lead	
Passage Time, s	2.0	3.0	2.0	3.0	2.0	2.0	3.0	2.0
Recall	Off	Off	Off	Off	Off	Min	Off	Min
Dual Entry	No	No	No	No	No	Yes	No	Yes
Prot. Right-Turn	False	False	False	False	False	False	False	False

	E/W	N/S
Simultaneous Gap out	Off	Off
Dallas Phasing	Off	Off

Cycle Length, s	85
Offset, s	56
Reference Phase	2
Reference Point	End
Force Mode	Float
Uncoordinated	No
Field Measured Phase Times	No
Exclusive Ped Phase Time, s	0.0

Timer:	1	2	3	4	5	6	7	8
Assigned Phase	1	2	4	8	0	6	0	0
Assigned Left-Turn Mvmt.	1	5	7	3	0	0	0	0
Assigned Through Mvmt.	0	2	4	8	0	6	0	0
Assigned Right-Turn Mvmt.	0	12	14	18	0	16	0	0
Timer w/Pr-Pm From Shared	0	0	0	0	0	0	0	0

Chapter 18 Summary Output

Cycle Length, s	85											
	EB	EB	EB	WB	WB	WB	NB	NB	NB	SB	SB	SB
	LT	TH	RT	LT	TH	RT	LT	TH	RT	LT	TH	RT
Movement	3	8	18	7	4	14	5	2	12	1	6	16
Volume, veh/h	11.11	5.56	0	288.89	16.67	43.33	11.11	861.11	124.44	255.56	833.33	10
SatFlow, veh/h/ln	0	1782.2	0	1782.2	1782.2	1782.2	1782.2	1782.2	1782.2	1782.2	1782.2	0
Lane Util Factor	1	1	1	1	1	1	1	0.95	1	1	1	1
Capacity, veh/h	17.61	0	0	222.44	223.84	197.94	421.06	1739.2	774.09	464.78	2330.3	27.96
Discharge Vol, veh/h	11.11	0	0	0	0	43.33	0	861.11	0	0	0	0
Prop Arriv On Green	0.02	0.02	0	0.13	0.13	0.13	0.68	0.68	0.68	0.07	0.78	0.82
Apprch Vol, veh/h	0	16.67	0	0	348.89	0	0	996.67	0	0	1098.9	0
Apprch Stops, #/veh	0	1.28	0	0	0.87	0	0	0.29	0	0	0.21	0
Apprch Delay, s/veh	0	63.82	0	0	38.94	0	0	8.95	0	0	5.71	0

Apprch LOS	E	D	A	A
Int Delay, s/veh	12.13			
Int LOS	B			

Timer Data

Timer:	1	2	3	4	5	6	7	8
Assigned Phase	1	2	4	8	0	6	0	0
Case No	1	5.3	9	12	0	4	0	0
Phase Duration, s	12.79	49.37	16.34	6.5	0	62.16	0	0
Change Period, s	5	5.8	5.2	5.2	0	5.8	0	5.2
Phase Start Time, s	84.64	12.43	61.8	78.14	84.64	84.64	61.8	84.64
Phase End Time, s	12.43	61.8	78.14	84.64	84.64	61.8	61.8	84.64
Max Allow Headway, s	4.08	0	4.14	4.11	0	0	0	0
Equiv Max Green, s	11	5	17.8	7.8		5		
Queue Clear Time, s	7.52		10.4	2.82				
Green Exten Time, s	0.29	0	0.74	0.01	0	0	0	0
Prob of Phase Call	1		1	0.33				
Prob of Max Out	1		0.19	0.23				
Left-Turn Movement Data								
Assigned Movement	1	5	7	3	0	0	0	0
Mvmt. Sat Flow, veh/h	1697.31	656.46	1697.31	1149.79	0	0	0	0
Through Movement Data								
Assigned Movement	0	2	4	8	0	6	0	0
Mvmt. Sat Flow, veh/h	0	3393.27	1708.01	574.9	0	3514.59	0	0
Right-Turn Movement Data								
Assigned Movement	0	12	14	18	0	16	0	0
Mvmt. Sat Flow, veh/h	0	1510.32	1510.32	0	0	42.17	0	0

Left Lane Group Output

Timer:	1	2	3	4	5	6	7	8
Assigned Phase	1	2	4	8	0	6	0	0
Left Lane Group Data								
Assigned Movement	1	5	7	3	0	0	0	0
Lane Assignment	L Pr/Pm	L	L	L+T				
Lanes in Group	1	1	1	1	0	0	0	0
Group Volume, veh/h	255.56	11.11	173.33	16.67	0	0	0	0
Group SatFlow, vphpl	1697.31	656.46	1697.31	1724.69	0	0	0	0
Queue Serve Time, s	5.52	0.47	8.4	0.82	0	0	0	0
Cycle Clear Time, s	5.52	0.48	8.4	0.82	0	0	0	0
Perm SatFlow, vphpl	574.37	656.46	1697.31	0	0	0	0	0
Shared SatFlow, vphpl								
Perm Eff Green, s	45.57	43.57	0	0	0	0	0	0
Perm Serve Time, s	33.22	43.55	0	0	0	0	0	0
Perm Que Serve Time, s	10.28	0.46						
Time to first Blk, s	0	0	0	0	0	0	0	0
Serve Time pre Blk, s								
Prop Inside Lane	1	1	1	0.67	0	0	0	0
Lane Grp Capacity, vph	464.78	421.06	222.44	26.41				
v/c Ratio	0.55	0.03	0.78	0.63	0	0	0	0
Avail Capacity, veh/h	528.82	421.06	355.44	158.27				
I-Factor	0.91	1	1	1	0	0	0	0
Uniform Delay, s/veh	8.74	6.64	35.74	41.61				
Increm Delay, s/veh	0.93	0.12	5.83	22.21	0	0	0	0
Overflow Delay, s/veh	0	0	0	0	0	0	0	0
Control Delay, s/veh	9.67	6.75	41.57	63.82				
Group LOS	A	A	D	E				
Uniform Stops, #/veh	0.29	0.23	0.82	0.86				
Increm Stops, #/veh	0.02	0.05	0.09	0.41	0	0	0	0
Overflow Stops, #/veh	0	0	0	0	0	0	0	0
Stop Rate, #/veh	0.31	0.28	0.91	1.28				
Uniform Queue, veh/ln	1.69	0.06	3.37	0.34				
Increm Queue, veh/ln	0.12	0.01	0.36	0.16	0	0	0	0
Overflow Queue, veh/ln	0	0	0	0	0	0	0	0
Back of Queue Factor	1.8	1.8	1.8	1.8	0	0	0	0
Back of Queue, veh/ln	3.26	0.13	6.71	0.9				
Storage Ratio	0.27	0.02	0.85	0.05	0	0	0	0
Initial Queue, veh	0	0	0	0	0	0	0	0
Final Queue, veh	0	0	0	0	0	0	0	0
Saturated Delay, s/veh	0	0	0	0	0	0	0	0
Saturated Stops, #/veh	0	0	0	0	0	0	0	0
Saturated Queue, veh/ln	0	0	0	0	0	0	0	0
Saturated Capacity, vph	0	0	0	0	0	0	0	0
Init Que Clear Time, s	0	0	0	0	0	0	0	0

Thru Lane Group Output

Timer:	1	2	3	4	5	6	7	8
Assigned Phase	1	2	4	8	0	6	0	0
Thru Lane Group Data								
Assigned Movement	0	2	4	8	0	6	0	0
Lane Assignment		T	T			T		
Lanes in Group	0	2	1	0	0	1	0	0
Group Volume, veh/h	0	861.11	132.22	0	0	422.55	0	0
Group SatFlow, vphpl	0	1696.63	1708.01	0	0	1782.18	0	0
Queue Serve Time, s	0	10.32	6.2	0	0	6.04	0	0
Cycle Clear Time, s	0	10.32	6.2	0	0	6.04	0	0
Lane Grp Capacity, vph		1739.16	223.84	0		1181.66		
v/c Ratio	0	0.5	0.59	0	0	0.36	0	0

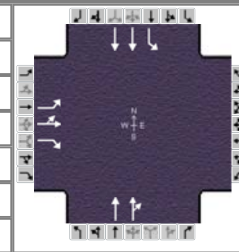
Avail Capacity, veh/h		1739.16	357.68			1181.66		
I-Factor	0	1	1	0	0	0.91	0	0
Uniform Delay, s/veh		8.19	34.78			3.74		
Increm Delay, s/veh	0	1.01	2.47	0	0	0.77	0	0
Overflow Delay, s/veh	0	0	0	0	0	0	0	0
Control Delay, s/veh		9.2	37.26			4.52		
Group LOS		A	D			A		
Uniform Stops, #/veh		0.27	0.8			0.15		
Increm Stops, #/veh	0	0.02	0.05	0	0	0.03	0	0
Overflow Stops, #/veh	0	0	0	0	0	0	0	0
Stop Rate, #/veh		0.29	0.85			0.17		
Uniform Queue, veh/ln		2.75	2.5			1.49		
Increm Queue, veh/ln	0	0.24	0.15	0	0	0.25	0	0
Overflow Queue, veh/ln	0	0	0	0	0	0	0	0
Back of Queue Factor	0	1.8	1.8	1	0	1.8	0	0
Back of Queue, veh/ln		5.39	4.78			3.14		
Storage Ratio	0	0.14	0.24	0	0	0.07	0	0
Initial Queue, veh	0	0	0	0	0	0	0	0
Final Queue, veh	0	0	0	0	0	0	0	0
Saturated Delay, s/veh	0	0	0	0	0	0	0	0
Saturated Stops, #/veh	0	0	0	0	0	0	0	0
Saturated Queue, veh/ln	0	0	0	0	0	0	0	0
Saturated Capacity, vph	0	0	0	0	0	0	0	0
Init Que Clear Time, s	0	0	0	0	0	0	0	0

Right Lane Group Output

Timer:	1	2	3	4	5	6	7	8
Assigned Phase	1	2	4	8	0	6	0	0
Right Lane Group Data								
Assigned Movement	0	12	14	18	0	16	0	0
Lane Assignment		R	R			T+R		
Lanes in Group	0	1	1	0	0	1	0	0
Group Volume, veh/h	0	124.44	43.33	0	0	420.78	0	0
Group SatFlow, vphpl	0	1510.32	1510.32	0	0	1774.59	0	0
Queue Serve Time, s	0	2.49	2.18	0	0	6.02	0	0
Cycle Clear Time, s	0	2.49	2.18	0	0	6.02	0	0
Prot RT SatFlow, vphpl		0	0					
Prot RT Eff Green, s		0	0					
Prop Outside Lane	0	1	1	0	0	0.02	0	0
Lane Grp Capacity, vph		774.09	197.94			1176.64		
v/c Ratio	0	0.16	0.22	0	0	0.36	0	0
Avail Capacity, veh/h		774.09	316.28			1176.64		
I-Factor	0	1	1	0	0	0.91	0	0
Uniform Delay, s/veh		6.95	33.04			3.73		
Increm Delay, s/veh	0	0.44	0.55	0	0	0.78	0	0
Overflow Delay, s/veh	0	0	0	0	0	0	0	0
Control Delay, s/veh		7.4	33.59			4.5		
Group LOS		A	C			A		
Uniform Stops, #/veh		0.24	0.76			0.15		
Increm Stops, #/veh	0	0.03	0.03	0	0	0.03	0	0
Overflow Stops, #/veh	0	0	0	0	0	0	0	0
Stop Rate, #/veh		0.27	0.79			0.17		
Uniform Queue, veh/ln		0.7	0.78			1.48		
Increm Queue, veh/ln	0	0.1	0.03	0	0	0.25	0	0
Overflow Queue, veh/ln	0	0	0	0	0	0	0	0
Back of Queue Factor	0	1.8	1.8	1	0	1.8	0	0
Back of Queue, veh/ln		1.43	1.45			3.11		
Storage Ratio	0	0.24	0.07	0	0	0.07	0	0
Initial Queue, veh	0	0	0	0	0	0	0	0
Final Queue, veh	0	0	0	0	0	0	0	0
Saturated Delay, s/veh	0	0	0	0	0	0	0	0
Saturated Stops, #/veh	0	0	0	0	0	0	0	0
Saturated Queue, veh/ln	0	0	0	0	0	0	0	0
Saturated Capacity, vph	0	0	0	0	0	0	0	0
Init Que Clear Time, s	0	0	0	0	0	0	0	0

HCS 2010 Signalized Intersection Results Summary

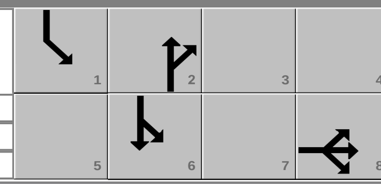
General Information				Intersection Information	
Agency	HDR			Duration, h	0.25
Analyst	MDF	Analysis Date	Jan 30, 2013	Area Type	Other
Jurisdiction		Time Period	PM Peak	PHF	0.90
Intersection	I-90 EB Ramps	Analysis Year	Existing (2012)	Analysis Period	1> 16:45
File Name	Existing_PM_LaCrosse.xus				
Project Description					



Demand Information	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Demand (*v*), veh/h	200	0	440					850	175	140	550	

Signal Information			
Cycle, s	85.0	Reference Phase	2
Offset, s	39	Reference Point	End
Uncoordinated	No	Simult. Gap E/W	Off
Force Mode	Float	Simult. Gap N/S	Off

Green	44.8	9.7	15.9	0.0	0.0	0.0
Yellow	4.5	4.5	4.0	0.0	0.0	0.0
Red	0.5	0.5	0.5	0.0	0.0	0.0



Timer Results	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Assigned Phase		8				2	1	6
Case Number		9.0				8.3	1.0	4.0
Phase Duration, s		20.4				49.8	14.7	64.6
Change Period, *(Y+R_c)*, s		4.5				5.0	5.0	5.0
Max Allow Headway *(MAH)*, s		5.1				0.0	5.1	0.0
Queue Clearance Time *(g_s)*, s		14.6					2.0	
Green Extension Time *(g_e)*, s		1.3				0.0	0.5	0.0
Phase Call Probability		1.00					0.97	
Max Out Probability		0.80					0.05	

Movement Group Results	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Assigned Movement	3	8	18					2	12	1	6	
Adjusted Flow Rate (*v*), veh/h	222	0	233					480	644	156	611	
Adjusted Saturation Flow Rate (*s*), veh/h/ln	1697	1782	1510					1267	1697	1697	1697	
Queue Service Time (g_s), s	10.4	0.0	12.6					22.3	29.0	0.0	8.5	
Cycle Queue Clearance Time (g_c), s	10.4	0.0	12.6					22.3	29.0	0.0	8.5	
Green Ratio (*g/C*)	0.19	0.19	0.19					0.53	0.53	0.62	0.70	
Capacity (*c*), veh/h	318	334	283					668	895	361	2379	
Volume-to-Capacity Ratio *(X)*	0.700	0.000	0.825					0.718	0.719	0.431	0.257	
Available Capacity (c_a), veh/h	409	430	364					668	895	406	2379	
Back of Queue *(Q)*, veh/ln (95th percentile)	7.8	0.0	9.0					14.9	18.9	5.5	4.9	
Queue Storage Ratio *(RQ)* (95th percentile)	0.98	0.00	1.14					0.33	0.42	0.69	0.21	
Uniform Delay (d_1), s/veh	32.3	0.0	33.2					24.3	24.8	32.2	8.2	
Incremental Delay (d_2), s/veh	4.7	0.0	13.0					5.7	4.3	1.0	0.2	
Initial Queue Delay (d_3), s/veh	0.0	0.0	0.0					0.0	0.0	0.0	0.0	
Control Delay *(d)*, s/veh	37.0	0.0	46.2					30.1	29.1	33.2	8.4	
Level of Service (LOS)	D		D					C	C	C	A	
Approach Delay, s/veh / LOS	41.7		D	0.0			29.5		C	13.4		B
Intersection Delay, s/veh / LOS	26.6						C					

Multimodal Results	EB		WB		NB		SB	
Pedestrian LOS Score / LOS	3.1	C	3.1	C	2.1	B	2.6	B
Bicycle LOS Score / LOS	2.9	C			3.4	C	3.1	C

 HCS 2010™ Streets Version 6.50 Generated: 1/31/2013 11:42:05 AM

This Signals text report was created on January 31, 2013 at 12:26:13

Intersection number = 2, Segment number = 1, Period number = 1

Chapter 18 Summary Input

Cycle Length, s 85

	EB LT	EB TH	EB RT	WB LT	WB TH	WB RT	NB LT	NB TH	NB RT	SB LT	SB TH	SB RT
Movement	3	8	18	7	4	14	5	2	12	1	6	16
Volume, veh/h	200	0	440	0	0	0	0	850	175	140	550	0
Lanes	1	1	1	0	0	0	0	2	0	1	2	0
Bay Length, ft	200	500	200	0	0	0	0	1131	0	200	575	0
Receiving Lanes	1	1	1	0	0	0	2	2	2	2	2	2
SatFlow, vplphg	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800
Lane Width, ft	12	12	12	12	12	12	12	12	12	12	12	12
Heavy Vehicles, %	1	1	1	0	0	0	0	1	0	1	1	0
Grade, %	0	0	0	0	0	0	0	0	0	0	0	0
Buses, per h	0	0	0	0	0	0	0	0	0	0	0	0
Parking, per h	0	0	0	0	0	0	0	0	0	0	0	0
Bicycles, per h	0	0	0	0	0	0	0	0	0	0	0	0
Pedestrians, per h	0	0	0	0	0	0	0	0	0	0	0	0
Heavy Veh Equivalent	2	2	2	2	2	2	2	2	2	2	2	2
Bus Blockage Time	14.4	14.4	14.4	14.4	14.4	14.4	14.4	14.4	14.4	14.4	14.4	14.4
Turns in Shrd Ln, %	0	0	0	0	0	0	0	0	0	0	0	0
Unopposed Lefts, %	0	0	0	0	0	0	0	0	0	0	0	0
Parking Time, sec	18	18	18	18	18	18	18	18	18	18	18	18
Arrival Type	3	3	3	3	3	3	3	4	4	4	4	3
Initial Queue, veh	0	0	0	0	0	0	0	0	0	0	0	0
Speed Limit, mph	45	45	45	35	35	35	35	35	35	35	35	35
Detector Length, ft	40	40	40	40	40	40	40	40	40	40	40	40
StartLostTime, sec	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0
EndUseTime, sec	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0
RTOR, veh/h		230			0			14			0	
I-Factor		1.00			1.00			0.85			0.85	
Walk + PC, sec		0.0			0.0			0.0			0.0	

	EB	EB	WB	WB	NB	NB	SB	SB
Phase	3	8	7	4	5	2	1	6
Movement		LT+TH+RT				TH+RT	LT	LT+TH
Left-Turn Mode	--	Split	--	Split	--	Perm.	Pr/Pm	--
Phase Splits, s	0.0	25.0	0.0	0.0	0.0	43.0	17.0	60.0
Yellow Change, s	4.0	4.0	4.0	4.0	4.0	4.5	4.5	4.5
Red Clearance, s	1.0	0.5	1.0	1.0	1.0	0.5	0.5	0.5
Minimum Green, s	5	5	5	5	5	5	10	5
Lead/Lag							Lag	
Passage Time, s	2.0	4.0	2.0	2.0	2.0	2.0	4.0	2.0
Recall	Off	Off	Off	Off	Off	Min	Off	Min
Dual Entry	No	No	No	Yes	No	Yes	No	Yes
Prot. Right-Turn	False	False	False	False	False	False	False	False

	E/W	N/S
Simultaneous Gap out	Off	Off
Dallas Phasing	Off	Off

Cycle Length, s	85
Offset, s	39
Reference Phase	2
Reference Point	End
Force Mode	Float
Uncoordinated	No
Field Measured Phase Times	No
Exclusive Ped Phase Time, s	0.0

Timer:	1	2	3	4	5	6	7	8
Assigned Phase	2	1	0	8	0	6	0	0
Assigned Left-Turn Mvmt.	5	1	0	3	0	0	0	0
Assigned Through Mvmt.	2	0	0	8	0	6	0	0
Assigned Right-Turn Mvmt.	12	0	0	18	0	16	0	0
Timer w/Pr-Pm From Shared	0	0	0	0	0	0	0	0

Chapter 18 Summary Output

Cycle Length, s 85

	EB LT	EB TH	EB RT	WB LT	WB TH	WB RT	NB LT	NB TH	NB RT	SB LT	SB TH	SB RT
Movement	3	8	18	7	4	14	5	2	12	1	6	16
Volume, veh/h	222.22	0	233.33	0	0	0	0	944.44	178.89	155.56	611.11	0
SatFlow, veh/h/ln	1782.2	1782.2	1782.2	0	0	0	0	1782.2	0	1782.2	1782.2	0
Lane Util Factor	1	1	1	1	1	1	1	0.71	1	1	0.95	1
Capacity, veh/h	317.66	333.55	282.67	0			42.35	1314.8	248.9	361.3	2378.9	0
Discharge Vol, veh/h	222.22	0	233.33	0	0		0	944.44	0	0	611.11	0
Prop Arriv On Green	0.19	0	0.19	0	0	0	0	0.29	0.26	0.05	0.52	0
Apprch Vol, veh/h	0	455.56	0	0	0	0	0	1123.3	0	0	766.67	0
Apprch Stops, #/veh	0	0.89	0	0	0	0	0	0.88	0	0	0.47	0
Apprch Delay, s/veh	0	41.71	0	0	0	0	0	29.5	0	0	13.44	0

Apprch LOS	D	C	B
Int Delay, s/veh	26.62		
Int LOS	C		

Timer Data

Timer:	1	2	3	4	5	6	7	8
Assigned Phase	2	1	0	8	0	6	0	0
Case No	8.3	1	0	9	0	4	0	0
Phase Duration, s	49.85	14.75	0	20.41	0	64.59	0	0
Change Period, s	5	5	0	4.5	0	5	0	0
Phase Start Time, s	79.15	44	58.75	58.75	79.15	79.15	58.75	79.15
Phase End Time, s	44	58.75	58.75	79.15	79.15	58.75	58.75	79.15
Max Allow Headway, s	0	5.08	0	5.12	0	0	0	0
Equiv Max Green, s	5	12		20.5		5		
Queue Clear Time, s		2		14.62				
Green Exten Time, s	0	0.48	0	1.28	0	0	0	0
Prob of Phase Call		0.97		1				
Prob of Max Out		0.05		0.8				
Left-Turn Movement Data								
Assigned Movement	5	1	0	3	0	0	0	0
Mvmt. Sat Flow, veh/h	0	1697.31	0	1697.31	0	0	0	0
Through Movement Data								
Assigned Movement	2	0	0	8	0	6	0	0
Mvmt. Sat Flow, veh/h	3007.68	0	0	1782.18	0	3478.81	0	0
Right-Turn Movement Data								
Assigned Movement	12	0	0	18	0	16	0	0
Mvmt. Sat Flow, veh/h	471.76	0	0	1510.32	0	0	0	0

Left Lane Group Output

Timer:	1	2	3	4	5	6	7	8
Assigned Phase	2	1	0	8	0	6	0	0
Left Lane Group Data								
Assigned Movement	5	1	0	3	0	0	0	0
Lane Assignment		L Pr/Pm		L				
Lanes in Group	0	1	0	1	0	0	0	0
Group Volume, veh/h	0	155.56	0	222.22	0	0	0	0
Group SatFlow, vphpl	0	1697.31	0	1697.31	0	0	0	0
Queue Serve Time, s	0	0	0	10.41	0	0	0	0
Cycle Clear Time, s	0	0	0	10.41	0	0	0	0
Perm SatFlow, vphpl	823.21	504.26	0	1697.31	0	0	0	0
Shared SatFlow, vphpl	0							
Perm Eff Green, s	0	42.85	0	0	0	0	0	0
Perm Serve Time, s	0	13.82	0	0	0	0	0	0
Perm Que Serve Time, s		13.82						
Time to first Blk, s	44.85	0	0	0	0	0	0	0
Serve Time pre Blk, s								
Prop Inside Lane	0	1	0	1	0	0	0	0
Lane Grp Capacity, vph		361.3		317.66				
v/c Ratio	0	0.43	0	0.7	0	0	0	0
Avail Capacity, veh/h		406.3		409.35				
I-Factor	0	0.85	0	1	0	0	0	0
Uniform Delay, s/veh		32.21		32.31				
Increm Delay, s/veh	0	0.98	0	4.68	0	0	0	0
Overflow Delay, s/veh	0	0	0	0	0	0	0	0
Control Delay, s/veh		33.19		36.99				
Group LOS		C		D				
Uniform Stops, #/veh		0.8		0.75				
Increm Stops, #/veh	0	0.03	0	0.08	0	0	0	0
Overflow Stops, #/veh	0	0	0	0	0	0	0	0
Stop Rate, #/veh		0.83		0.83				
Uniform Queue, veh/ln		2.95		3.94				
Increm Queue, veh/ln	0	0.1	0	0.41	0	0	0	0
Overflow Queue, veh/ln	0	0	0	0	0	0	0	0
Back of Queue Factor	1	1.8	0	1.79	0	0	0	0
Back of Queue, veh/ln		5.49		7.77				
Storage Ratio	0	0.69	0	0.98	0	0	0	0
Initial Queue, veh	0	0	0	0	0	0	0	0
Final Queue, veh	0	0	0	0	0	0	0	0
Saturated Delay, s/veh	0	0	0	0	0	0	0	0
Saturated Stops, #/veh	0	0	0	0	0	0	0	0
Saturated Queue, veh/ln	0	0	0	0	0	0	0	0
Saturated Capacity, vph	0	0	0	0	0	0	0	0
Init Que Clear Time, s	0	0	0	0	0	0	0	0

Thru Lane Group Output

Timer:	1	2	3	4	5	6	7	8
Assigned Phase	2	1	0	8	0	6	0	0
Thru Lane Group Data								
Assigned Movement	2	0	0	8	0	6	0	0
Lane Assignment	T			T		T		
Lanes in Group	1	0	0	1	0	2	0	0
Group Volume, veh/h	479.74	0	0	0	0	611.11	0	0
Group SatFlow, vphpl	1266.6	0	0	1782.18	0	1696.63	0	0
Queue Serve Time, s	22.35	0	0	0	0	8.52	0	0
Cycle Clear Time, s	22.35	0	0	0	0	8.52	0	0
Lane Grp Capacity, vph	668.25			333.55		2378.95		
v/c Ratio	0.72	0	0	0	0	0.26	0	0

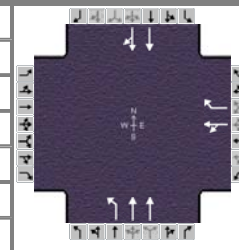
Avail Capacity, veh/h	668.25			429.82		2378.95		
I-Factor	0.87	0	0	0	0	0.85	0	0
Uniform Delay, s/veh	24.34			0		8.18		
Increm Delay, s/veh	5.71	0	0	0	0	0.22	0	0
Overflow Delay, s/veh	0	0	0	0	0	0	0	0
Control Delay, s/veh	30.05			0		8.41		
Group LOS	C					A		
Uniform Stops, #/veh	0.8			0		0.37		
Increm Stops, #/veh	0.09	0	0	0	0	0.01	0	0
Overflow Stops, #/veh	0	0	0	0	0	0	0	0
Stop Rate, #/veh	0.89			0		0.38		
Uniform Queue, veh/ln	9.02			0		2.64		
Increm Queue, veh/ln	1.06	0	0	0	0	0.07	0	0
Overflow Queue, veh/ln	0	0	0	0	0	0	0	0
Back of Queue Factor	1.48	0	0	1	0	1.8	0	0
Back of Queue, veh/ln	14.94			0		4.89		
Storage Ratio	0.33	0	0	0	0	0.21	0	0
Initial Queue, veh	0	0	0	0	0	0	0	0
Final Queue, veh	0	0	0	0	0	0	0	0
Saturated Delay, s/veh	0	0	0	0	0	0	0	0
Saturated Stops, #/veh	0	0	0	0	0	0	0	0
Saturated Queue, veh/ln	0	0	0	0	0	0	0	0
Saturated Capacity, vph	0	0	0	0	0	0	0	0
Init Que Clear Time, s	0	0	0	0	0	0	0	0

Right Lane Group Output

Timer:	1	2	3	4	5	6	7	8
Assigned Phase	2	1	0	8	0	6	0	0
Right Lane Group Data								
Assigned Movement	12	0	0	18	0	16	0	0
Lane Assignment	T+R			R				
Lanes in Group	1	0	0	1	0	0	0	0
Group Volume, veh/h	643.59	0	0	233.33	0	0	0	0
Group SatFlow, vphpl	1697.26	0	0	1510.32	0	0	0	0
Queue Serve Time, s	29	0	0	12.62	0	0	0	0
Cycle Clear Time, s	29	0	0	12.62	0	0	0	0
Prot RT SatFlow, vphpl				0				
Prot RT Eff Green, s				0				
Prop Outside Lane	0.28	0	0	1	0	0	0	0
Lane Grp Capacity, vph	895.48			282.67				
v/c Ratio	0.72	0	0	0.83	0	0	0	0
Avail Capacity, veh/h	895.48			364.25				
I-Factor	0.87	0	0	1	0	0	0	0
Uniform Delay, s/veh	24.77			33.21				
Increm Delay, s/veh	4.32	0	0	12.99	0	0	0	0
Overflow Delay, s/veh	0	0	0	0	0	0	0	0
Control Delay, s/veh	29.09			46.2				
Group LOS	C			D				
Uniform Stops, #/veh	0.81			0.77				
Increm Stops, #/veh	0.07	0	0	0.19	0	0	0	0
Overflow Stops, #/veh	0	0	0	0	0	0	0	0
Stop Rate, #/veh	0.88			0.96				
Uniform Queue, veh/ln	12.25			4.25				
Increm Queue, veh/ln	1.07	0	0	1.02	0	0	0	0
Overflow Queue, veh/ln	0	0	0	0	0	0	0	0
Back of Queue Factor	1.42	0	0	1.71	0	1	0	0
Back of Queue, veh/ln	18.91			9.04				
Storage Ratio	0.42	0	0	1.14	0	0	0	0
Initial Queue, veh	0	0	0	0	0	0	0	0
Final Queue, veh	0	0	0	0	0	0	0	0
Saturated Delay, s/veh	0	0	0	0	0	0	0	0
Saturated Stops, #/veh	0	0	0	0	0	0	0	0
Saturated Queue, veh/ln	0	0	0	0	0	0	0	0
Saturated Capacity, vph	0	0	0	0	0	0	0	0
Init Que Clear Time, s	0	0	0	0	0	0	0	0

HCS 2010 Signalized Intersection Results Summary

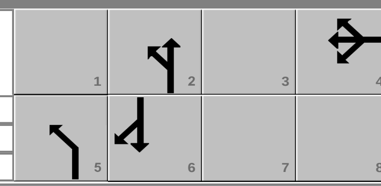
General Information				Intersection Information	
Agency	HDR			Duration, h	0.25
Analyst	MDF	Analysis Date	Jan 30, 2013	Area Type	Other
Jurisdiction		Time Period	PM Peak	PHF	0.90
Intersection	I-90 WB Ramps	Analysis Year	Existing (2012)	Analysis Period	1> 16:45
File Name	Existing_PM_LaCrosse.xus				
Project Description					



Demand Information	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Demand (*v*), veh/h				180	0	170	430	620			510	150

Signal Information			
Cycle, s	85.0	Reference Phase	6
Offset, s	12	Reference Point	End
Uncoordinated	No	Simult. Gap E/W	Off
Force Mode	Float	Simult. Gap N/S	Off

Green	42.6	15.0	12.4	0.0	0.0	0.0
Yellow	4.0	4.0	4.0	0.0	0.0	0.0
Red	1.0	1.0	1.0	0.0	0.0	0.0



Timer Results	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Assigned Phase				4	5	2		6
Case Number				11.0	1.0	4.0		8.3
Phase Duration, s				17.4	20.0	67.6		47.6
Change Period, *(Y+Rc)*, s				5.0	5.0	5.0		5.0
Max Allow Headway *(MAH)*, s				5.0	5.1	0.0		0.0
Queue Clearance Time *(gs)*, s				11.7	4.5			
Green Extension Time *(ge)*, s				0.7	2.6	0.0		0.0
Phase Call Probability				1.00	1.00			
Max Out Probability				0.20	0.06			

Movement Group Results	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Assigned Movement				7	4	14	5	2			6	16
Adjusted Flow Rate (*v*), veh/h					200	34	478	689			363	340
Adjusted Saturation Flow Rate (*s*), veh/h/ln					1697	1510	1697	1697			1782	1662
Queue Service Time (*gs*), s					9.7	1.7	2.5	4.4			14.0	13.4
Cycle Queue Clearance Time (*gc*), s					9.7	1.7	2.5	4.4			14.0	13.4
Green Ratio (*g/C*)					0.15	0.15	0.65	0.74			0.50	0.50
Capacity (*c*), veh/h					247	220	619	2501			894	834
Volume-to-Capacity Ratio *(X)*					0.810	0.157	0.772	0.275			0.406	0.408
Available Capacity (*ca*), veh/h					399	355	719	2501			894	834
Back of Queue *(Q)*, veh/ln (95th percentile)					7.7	1.1	10.9	1.7			8.6	9.4
Queue Storage Ratio *(RQ)* (95th percentile)					0.39	0.14	1.10	0.08			0.32	0.35
Uniform Delay (*d1*), s/veh					35.2	31.8	19.0	2.7			15.8	18.5
Incremental Delay (*d2*), s/veh					8.7	0.5	3.2	0.2			1.3	1.4
Initial Queue Delay (*d3*), s/veh					0.0	0.0	0.0	0.0			0.0	0.0
Control Delay *(d)*, s/veh					43.9	32.2	22.2	2.9			17.1	19.9
Level of Service (LOS)					D	C	C	A			B	B
Approach Delay, s/veh / LOS	0.0			42.2	D		10.8	B		18.5	B	
Intersection Delay, s/veh / LOS	16.8						B					

Multimodal Results	EB		WB		NB		SB	
Pedestrian LOS Score / LOS	3.1	C	3.1	C	2.2	B	2.2	B
Bicycle LOS Score / LOS			2.4	B	3.4	C	3.1	C

This Signals text report was created on January 31, 2013 at 12:26:22

Intersection number = 3, Segment number = 2, Period number = 1

Chapter 18 Summary Input

Cycle Length, s	85											
	EB LT	EB TH	EB RT	WB LT	WB TH	WB RT	NB LT	NB TH	NB RT	SB LT	SB TH	SB RT
Movement	3	8	18	7	4	14	5	2	12	1	6	16
Volume, veh/h	0	0	0	180	0	170	430	620	0	0	510	150
Lanes	0	0	0	0	1	1	1	2	0	0	2	0
Bay Length, ft	0	0	0	0	500	200	250	575	0	0	670	0
Receiving Lanes	0	0	0	1	1	1	2	2	2	2	2	2
SatFlow, vplphg	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800
Lane Width, ft	12	12	12	12	12	12	12	12	12	12	12	12
Heavy Vehicles, %	0	0	0	0	1	1	1	1	0	0	1	0
Grade, %	0	0	0	0	0	0	0	0	0	0	0	0
Buses, per h	0	0	0	0	0	0	0	0	0	0	0	0
Parking, per h	0	0	0	0	0	0	0	0	0	0	0	0
Bicycles, per h	0	0	0	0	0	0	0	0	0	0	0	0
Pedestrians, per h	0	0	0	0	0	0	0	0	0	0	0	0
Heavy Veh Equivalent	2	2	2	2	2	2	2	2	2	2	2	2
Bus Blockage Time	14.4	14.4	14.4	14.4	14.4	14.4	14.4	14.4	14.4	14.4	14.4	14.4
Turns in Shrd Ln, %	0	0	0	0	0	0	0	0	0	0	0	0
Unopposed Lefts, %	0	0	0	0	0	0	0	0	0	0	0	0
Parking Time, sec	18	18	18	18	18	18	18	18	18	18	18	18
Arrival Type	3	3	3	3	3	3	4	4	3	3	4	4
Initial Queue, veh	0	0	0	0	0	0	0	0	0	0	0	0
Speed Limit, mph	35	35	35	45	45	45	35	35	35	35	35	35
Detector Length, ft	40	40	40	40	40	40	40	40	40	40	40	40
StartLostTime, sec	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0
EndUseTime, sec	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0
RTOR, veh/h		0			139			0			27	
I-Factor		1.00			1.00			0.63			0.63	
Walk + PC, sec		0.0			0.0			0.0			0.0	

	EB	EB	WB	WB	NB	NB	SB	SB
Phase	3	8	7	4	5	2	1	6
Movement				LT+TH+RT	LT	LT+TH		TH+RT
Left-Turn Mode	--	Split	--	Split	Pr/Pm	--	--	Perm.
Phase Splits, s	0.0	0.0	0.0	25.0	25.0	60.0	0.0	35.0
Yellow Change, s	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Red Clearance, s	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0
Minimum Green, s	5	5	5	5	15	5	5	5
Lead/Lag					Lag			
Passage Time, s	2.0	2.0	2.0	4.0	4.0	2.0	2.0	2.0
Recall	Off	Off	Off	Off	Off	Min	Off	Min
Dual Entry	No	Yes	No	No	No	Yes	No	Yes
Prot. Right-Turn	False	False	False	False	False	False	False	False

	E/W	N/S
Simultaneous Gap out	Off	Off
Dallas Phasing	Off	Off

Cycle Length, s	85
Offset, s	12
Reference Phase	6
Reference Point	End
Force Mode	Float
Uncoordinated	No
Field Measured Phase Times	No
Exclusive Ped Phase Time, s	0.0

Timer:	1	2	3	4	5	6	7	8
Assigned Phase	0	2	4	0	6	5	0	0
Assigned Left-Turn Mvmt.	0	0	7	0	1	5	0	0
Assigned Through Mvmt.	0	2	4	0	6	0	0	0
Assigned Right-Turn Mvmt.	0	12	14	0	16	0	0	0
Timer w/Pr-Pm From Shared	0	0	0	0	0	0	0	0

Chapter 18 Summary Output

Cycle Length, s	85											
	EB LT	EB TH	EB RT	WB LT	WB TH	WB RT	NB LT	NB TH	NB RT	SB LT	SB TH	SB RT
Movement	3	8	18	7	4	14	5	2	12	1	6	16
Volume, veh/h	0	0	0	200	0	34.44	477.78	688.89	0	0	566.67	136.67
SatFlow, veh/h/ln	0	0	0	0	1782.2	1782.2	1782.2	1782.2	0	0	1782.2	0
Lane Util Factor	1	1	1	1	1	1	1	0.95	1	1	1	1
Capacity, veh/h	0			246.77	0	355.37	619.11	2500.7	0	42.35	1393	334.84
Discharge Vol, veh/h	0	0		200	0	34.44	0	688.89	0	0	566.67	0
Prop Arriv On Green	0	0	0	0.15	0	0.15	0.27	0.8	0	0	0.42	0.21
Apprch Vol, veh/h	0	0	0	0	234.44	0	0	1166.7	0	0	703.33	0
Apprch Stops, #/veh	0	0	0	0	0.89	0	0	0.34	0	0	0.64	0
Apprch Delay, s/veh	0	0	0	0	42.21	0	0	10.77	0	0	18.46	0

Apprch LOS D B B
Int Delay, s/veh 16.84
Int LOS B

Timer Data

Timer:	1	2	3	4	5	6	7	8
Assigned Phase	0	2	4	0	6	5	0	0
Case No	0	4	11	0	8.3	1	0	0
Phase Duration, s	0	67.64	17.36	0	47.64	20	0	0
Change Period, s	0	5	5	0	5	5	0	0
Phase Start Time, s	54.36	54.36	37	37	54.36	17	37	37
Phase End Time, s	54.36	37	54.36	37	17	37	37	37
Max Allow Headway, s	0	0	5.02	0	0	5.08	0	0
Equiv Max Green, s		5	20		5	20		
Queue Clear Time, s			11.7			4.47		
Green Exten Time, s	0	0	0.7	0	0	2.55	0	0
Prob of Phase Call			1			1		
Prob of Max Out			0.2			0.06		
Left-Turn Movement Data								
Assigned Movement	0	0	7	0	1	5	0	0
Mvmt. Sat Flow, veh/h	0	0	1697.31	0	0	1697.31	0	0
Through Movement Data								
Assigned Movement	0	2	4	0	6	0	0	0
Mvmt. Sat Flow, veh/h	0	3478.81	0	0	2776.75	0	0	0
Right-Turn Movement Data								
Assigned Movement	0	12	14	0	16	0	0	0
Mvmt. Sat Flow, veh/h	0	0	1510.32	0	667.46	0	0	0

Left Lane Group Output

Timer:	1	2	3	4	5	6	7	8
Assigned Phase	0	2	4	0	6	5	0	0
Left Lane Group Data								
Assigned Movement	0	0	7	0	1	5	0	0
Lane Assignment			L+T			L Pr/Pm		
Lanes in Group	0	0	1	0	0	1	0	0
Group Volume, veh/h	0	0	200	0	0	477.78	0	0
Group SatFlow, vphpl	0	0	1697.31	0	0	1697.31	0	0
Queue Serve Time, s	0	0	9.7	0	0	2.47	0	0
Cycle Clear Time, s	0	0	9.7	0	0	2.47	0	0
Perm SatFlow, vphpl	0	0	0	0	765.84	748.13	0	0
Shared SatFlow, vphpl					0			
Perm Eff Green, s	0	0	0	0	0	40.64	0	0
Perm Serve Time, s	0	0	0	0	0	26.69	0	0
Perm Que Serve Time, s						26.69		
Time to first Blk, s	0	0	0	0	42.64	0	0	0
Serve Time pre Blk, s								
Prop Inside Lane	0	0	1	0	0	1	0	0
Lane Grp Capacity, vph			246.77			619.11		
v/c Ratio	0	0	0.81	0	0	0.77	0	0
Avail Capacity, veh/h			399.37			718.95		
I-Factor	0	0	1	0	0	0.63	0	0
Uniform Delay, s/veh			35.19			18.96		
Increm Delay, s/veh	0	0	8.74	0	0	3.22	0	0
Overflow Delay, s/veh	0	0	0	0	0	0	0	0
Control Delay, s/veh			43.93			22.18		
Group LOS			D			C		
Uniform Stops, #/veh			0.79			0.6		
Increm Stops, #/veh	0	0	0.13	0	0	0.05	0	0
Overflow Stops, #/veh	0	0	0	0	0	0	0	0
Stop Rate, #/veh			0.91			0.65		
Uniform Queue, veh/ln			3.72			6.81		
Increm Queue, veh/ln	0	0	0.6	0	0	0.55	0	0
Overflow Queue, veh/ln	0	0	0	0	0	0	0	0
Back of Queue Factor	0	0	1.79	0	1	1.48	0	0
Back of Queue, veh/ln			7.72			10.89		
Storage Ratio	0	0	0.39	0	0	1.1	0	0
Initial Queue, veh	0	0	0	0	0	0	0	0
Final Queue, veh	0	0	0	0	0	0	0	0
Saturated Delay, s/veh	0	0	0	0	0	0	0	0
Saturated Stops, #/veh	0	0	0	0	0	0	0	0
Saturated Queue, veh/ln	0	0	0	0	0	0	0	0
Saturated Capacity, vph	0	0	0	0	0	0	0	0
Init Que Clear Time, s	0	0	0	0	0	0	0	0

Thru Lane Group Output

Timer:	1	2	3	4	5	6	7	8
Assigned Phase	0	2	4	0	6	5	0	0
Thru Lane Group Data								
Assigned Movement	0	2	4	0	6	0	0	0
Lane Assignment		T			T			
Lanes in Group	0	2	0	0	1	0	0	0
Group Volume, veh/h	0	688.89	0	0	363.02	0	0	0
Group SatFlow, vphpl	0	1696.63	0	0	1782.18	0	0	0
Queue Serve Time, s	0	4.44	0	0	13.95	0	0	0
Cycle Clear Time, s	0	4.44	0	0	13.95	0	0	0
Lane Grp Capacity, vph		2500.71			894.06			
v/c Ratio	0	0.28	0	0	0.41	0	0	0

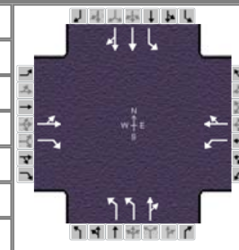
Avail Capacity, veh/h		2500.71			894.06			
I-Factor	0	0.63	0	0	0.96	0	0	0
Uniform Delay, s/veh		2.69			15.78			
Increm Delay, s/veh	0	0.17	0	0	1.31	0	0	0
Overflow Delay, s/veh	0	0	0	0	0	0	0	0
Control Delay, s/veh		2.86			17.1			
Group LOS		A			B			
Uniform Stops, #/veh		0.11			0.55			
Increm Stops, #/veh	0	0.01	0	0	0.04	0	0	0
Overflow Stops, #/veh	0	0	0	0	0	0	0	0
Stop Rate, #/veh		0.12			0.59			
Uniform Queue, veh/ln		0.91			4.7			
Increm Queue, veh/ln	0	0.06	0	0	0.33	0	0	0
Overflow Queue, veh/ln	0	0	0	0	0	0	0	0
Back of Queue Factor	0	1.8	1	0	1.72	0	0	0
Back of Queue, veh/ln		1.74			8.63			
Storage Ratio	0	0.08	0	0	0.32	0	0	0
Initial Queue, veh	0	0	0	0	0	0	0	0
Final Queue, veh	0	0	0	0	0	0	0	0
Saturated Delay, s/veh	0	0	0	0	0	0	0	0
Saturated Stops, #/veh	0	0	0	0	0	0	0	0
Saturated Queue, veh/ln	0	0	0	0	0	0	0	0
Saturated Capacity, vph	0	0	0	0	0	0	0	0
Init Que Clear Time, s	0	0	0	0	0	0	0	0

Right Lane Group Output

Timer:	1	2	3	4	5	6	7	8
Assigned Phase	0	2	4	0	6	5	0	0
Right Lane Group Data								
Assigned Movement	0	12	14	0	16	0	0	0
Lane Assignment			R		T+R			
Lanes in Group	0	0	1	0	1	0	0	0
Group Volume, veh/h	0	0	34.44	0	340.31	0	0	0
Group SatFlow, vphpl	0	0	1510.32	0	1662.04	0	0	0
Queue Serve Time, s	0	0	1.7	0	13.39	0	0	0
Cycle Clear Time, s	0	0	1.7	0	13.39	0	0	0
Prot RT SatFlow, vphpl			0					
Prot RT Eff Green, s			0					
Prop Outside Lane	0	0	1	0	0.4	0	0	0
Lane Grp Capacity, vph			219.59		833.8			
v/c Ratio	0	0	0.16	0	0.41	0	0	0
Avail Capacity, veh/h			355.37		833.8			
I-Factor	0	0	1	0	0.96	0	0	0
Uniform Delay, s/veh			31.76		18.49			
Increm Delay, s/veh	0	0	0.47	0	1.42	0	0	0
Overflow Delay, s/veh	0	0	0	0	0	0	0	0
Control Delay, s/veh			32.23		19.91			
Group LOS			C		B			
Uniform Stops, #/veh			0.71		0.66			
Increm Stops, #/veh	0	0	0.04	0	0.04	0	0	0
Overflow Stops, #/veh	0	0	0	0	0	0	0	0
Stop Rate, #/veh			0.75		0.7			
Uniform Queue, veh/ln			0.58		5.28			
Increm Queue, veh/ln	0	0	0.03	0	0.33	0	0	0
Overflow Queue, veh/ln	0	0	0	0	0	0	0	0
Back of Queue Factor	0	1	1.8	0	1.68	0	0	0
Back of Queue, veh/ln			1.09		9.42			
Storage Ratio	0	0	0.14	0	0.35	0	0	0
Initial Queue, veh	0	0	0	0	0	0	0	0
Final Queue, veh	0	0	0	0	0	0	0	0
Saturated Delay, s/veh	0	0	0	0	0	0	0	0
Saturated Stops, #/veh	0	0	0	0	0	0	0	0
Saturated Queue, veh/ln	0	0	0	0	0	0	0	0
Saturated Capacity, vph	0	0	0	0	0	0	0	0
Init Que Clear Time, s	0	0	0	0	0	0	0	0

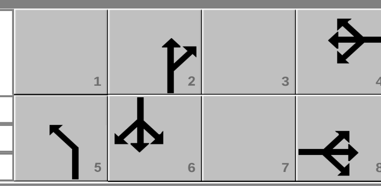
HCS 2010 Signalized Intersection Results Summary

General Information				Intersection Information	
Agency	HDR			Duration, h	0.25
Analyst	MDF	Analysis Date	Jan 30, 2013	Area Type	Other
Jurisdiction		Time Period	PM Peak	PHF	0.90
Intersection	Disk Drive	Analysis Year	Existing (2012)	Analysis Period	1> 16:45
File Name	Existing_PM_LaCrosse.xus				
Project Description					



Demand Information	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Demand (*v*), veh/h	45	25	360	100	20	30	350	300	140	20	200	45

Signal Information										
Cycle, s	85.0	Reference Phase	6							
Offset, s	18	Reference Point	Begin	Green	34.0	22.8	13.2	0.0	0.0	0.0
Uncoordinated	No	Simult. Gap E/W	Off	Yellow	4.0	4.0	4.0	0.0	0.0	0.0
Force Mode	Float	Simult. Gap N/S	Off	Red	1.0	1.0	1.0	0.0	0.0	0.0



Timer Results	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Assigned Phase		8		4	5	2		6
Case Number		7.0		6.0	2.0	4.0		6.3
Phase Duration, s		18.2		18.2	39.0	66.8		27.8
Change Period, *($Y+R_c$)*, s		5.0		5.0	5.0	5.0		5.0
Max Allow Headway *(MAH)*, s		5.2		5.3	5.1	0.0		0.0
Queue Clearance Time *(g_s)*, s		5.7		12.7	8.2			
Green Extension Time *(g_e)*, s		0.5		0.3	2.5	0.0		0.0
Phase Call Probability		1.00		1.00	1.00			
Max Out Probability		0.00		0.29	0.00			

Movement Group Results	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Assigned Movement	3	8	18	7	4	14	5	2	12	1	6	16
Adjusted Flow Rate (*v*), veh/h		78	64	111	28		389	473		22	126	123
Adjusted Saturation Flow Rate *(s)*, veh/h/ln		1531	1510	1312	1720		1648	1692		926	1782	1715
Queue Service Time (g_s), s		2.6	3.2	7.0	1.2		6.2	7.4		1.4	4.3	4.4
Cycle Queue Clearance Time (g_c), s		3.7	3.2	10.7	1.2		6.2	7.4		1.4	4.3	4.4
Green Ratio *(g/C)*		0.15	0.15	0.15	0.15		0.40	0.73		0.27	0.27	0.27
Capacity *(c)*, veh/h		309	236	232	269		1318	1229		332	476	459
Volume-to-Capacity Ratio *(X)*		0.252	0.273	0.479	0.103		0.295	0.385		0.067	0.263	0.269
Available Capacity (c_a), veh/h		428	355	336	405		1318	1229		332	476	459
Back of Queue *(Q)*, veh/ln (95th percentile)		2.6	2.1	4.2	0.9		3.9	3.3		0.6	3.3	3.2
Queue Storage Ratio *(RQ)* (95th percentile)		0.13	0.11	0.21	0.04		0.40	0.12		0.10	0.08	0.08
Uniform Delay (d_1), s/veh		31.8	31.6	36.6	30.8		15.2	3.3		20.5	21.4	21.4
Incremental Delay (d_2), s/veh		0.6	0.9	2.2	0.2		0.6	0.9		0.4	1.3	1.4
Initial Queue Delay (d_3), s/veh		0.0	0.0	0.0	0.0		0.0	0.0		0.0	0.0	0.0
Control Delay *(d)*, s/veh		32.4	32.5	38.8	31.0		15.8	4.2		20.9	22.8	22.9
Level of Service (LOS)		C	C	D	C		B	A		C	C	C
Approach Delay, s/veh / LOS	32.4		C	37.2		D	9.4		A	22.7		C
Intersection Delay, s/veh / LOS	17.0						B					

Multimodal Results	EB		WB		NB		SB	
Pedestrian LOS Score / LOS	3.2	C	2.7	B	2.4	B	3.3	C
Bicycle LOS Score / LOS	2.5	B	2.3	B	3.9	D	2.7	B

 HCS 2010™ Streets Version 6.50 Generated: 1/31/2013 11:42:05 AM

This Signals text report was created on January 31, 2013 at 12:26:32

Intersection number = 4, Segment number = 3, Period number = 1

Chapter 18 Summary Input

Cycle Length, s 85

	EB LT	EB TH	EB RT	WB LT	WB TH	WB RT	NB LT	NB TH	NB RT	SB LT	SB TH	SB RT
Movement	3	8	18	7	4	14	5	2	12	1	6	16
Volume, veh/h	45	25	360	100	20	30	350	300	140	20	200	45
Lanes	0	1	1	1	1	0	2	1	0	1	2	0
Bay Length, ft	0	500	500	500	500	0	250	670	0	150	1000	0
Receiving Lanes	1	1	1	2	2	2	1	1	1	2	2	2
SatFlow, vplphg	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800
Lane Width, ft	12	12	12	12	12	12	12	12	12	12	12	12
Heavy Vehicles, %	0	1	1	1	1	0	1	1	0	1	1	0
Grade, %	0	0	0	0	0	0	0	0	0	0	0	0
Buses, per h	0	0	0	0	0	0	0	0	0	0	0	0
Parking, per h	0	0	0	0	0	0	0	0	0	0	0	0
Bicycles, per h	0	0	0	0	0	0	0	0	0	0	0	0
Pedestrians, per h	0	0	0	0	0	0	0	0	0	0	0	0
Heavy Veh Equivalent	2	2	2	2	2	2	2	2	2	2	2	2
Bus Blockage Time	14.4	14.4	14.4	14.4	14.4	14.4	14.4	14.4	14.4	14.4	14.4	14.4
Turns in Shrd Ln, %	0	0	0	0	0	0	0	0	0	0	0	0
Unopposed Lefts, %	0	0	0	0	0	0	0	0	0	0	0	0
Parking Time, sec	18	18	18	18	18	18	18	18	18	18	18	18
Arrival Type	3	3	3	3	3	3	4	4	4	4	4	4
Initial Queue, veh	0	0	0	0	0	0	0	0	0	0	0	0
Speed Limit, mph	30	30	30	30	30	30	35	35	35	35	35	35
Detector Length, ft	40	40	40	40	40	40	40	40	40	40	40	40
StartLostTime, sec	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0
EndUseTime, sec	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0
RTOR, veh/h		302			25			14			21	
I-Factor		1.00			1.00			0.97			1.00	
Walk + PC, sec		0.0			0.0			0.0			0.0	

	EB	EB	WB	WB	NB	NB	SB	SB
Phase	3	8	7	4	5	2	1	6
Movement		LT+TH+RT		LT+TH+RT	LT	TH+RT		LT+TH+RT
Left-Turn Mode	--	Perm.	--	Perm.	Prot.	--	--	Perm.
Phase Splits, s	0.0	25.0	0.0	25.0	39.0	60.0	0.0	21.0
Yellow Change, s	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Red Clearance, s	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0
Minimum Green, s	5	5	5	5	10	5	5	5
Lead/Lag					Lead			
Passage Time, s	2.0	4.0	2.0	4.0	4.0	2.0	2.0	2.0
Recall	Off	Off	Off	Off	Max	Min	Off	Min
Dual Entry	No	Yes	No	Yes	No	Yes	No	Yes
Prot. Right-Turn	False	False	False	False	False	False	False	False

	E/W	N/S
Simultaneous Gap out	Off	Off
Dallas Phasing	Off	Off

Cycle Length, s	85
Offset, s	18
Reference Phase	6
Reference Point	Begin
Force Mode	Float
Uncoordinated	No
Field Measured Phase Times	No
Exclusive Ped Phase Time, s	0.0

Timer:	1	2	3	4	5	6	7	8
Assigned Phase	0	2	0	4	5	6	0	8
Assigned Left-Turn Mvmt.	0	0	0	7	5	1	0	3
Assigned Through Mvmt.	0	2	0	4	0	6	0	8
Assigned Right-Turn Mvmt.	0	12	0	14	0	16	0	18
Timer w/Pr-Pm From Shared	0	0	0	0	0	0	0	0

Chapter 18 Summary Output

Cycle Length, s 85

	EB LT	EB TH	EB RT	WB LT	WB TH	WB RT	NB LT	NB TH	NB RT	SB LT	SB TH	SB RT
Movement	3	8	18	7	4	14	5	2	12	1	6	16
Volume, veh/h	50	27.78	64.44	111.11	22.22	5.56	388.89	333.33	140	22.22	222.22	26.67
SatFlow, veh/h/ln	0	1782.2	1782.2	1782.2	1782.2	0	1782.2	1782.2	0	1782.2	1782.2	0
Lane Util Factor	1	1	1	1	1	1	0.97	1	1	1	1	1
Capacity, veh/h	208.39	100.39	355.37	231.83	214.95	53.74	1318.5	865.3	363.43	331.52	835.92	99.12
Discharge Vol, veh/h	0	0	64.44	111.11	0	0	0	0	0	0	222.22	0
Prop Arriv On Green	0.16	0.16	0.16	0.16	0.16	0.16	0.47	0.77	0.81	0.36	0.36	0.36
Apprch Vol, veh/h	0	142.22	0	0	138.89	0	0	862.22	0	0	271.11	0
Apprch Stops, #/veh	0	0.78	0	0	0.86	0	0	0.3	0	0	0.62	0
Apprch Delay, s/veh	0	32.42	0	0	37.22	0	0	9.43	0	0	22.66	0

Apprch LOS		C	D	A	C
Int Delay, s/veh	17.01				
Int LOS	B				

Timer Data

Timer:	1	2	3	4	5	6	7	8
Assigned Phase	0	2	0	4	5	6	0	8
Case No	0	4	0	6	2	6.3	0	7
Phase Duration, s	0	66.84	0	18.16	39	27.84	0	18.16
Change Period, s	0	5	0	5	5	5	0	5
Phase Start Time, s	57.28	57.28	39	39	57.28	11.28	39	39
Phase End Time, s	57.28	39	39	57.28	11.28	39	39	57.28
Max Allow Headway, s	0	0	0	5.25	5.08	0	0	5.23
Equiv Max Green, s		5		20	34	5		20
Queue Clear Time, s				12.73	8.19			5.69
Green Exten Time, s	0	0	0	0.34	2.49	0	0	0.55
Prob of Phase Call				1	1			1
Prob of Max Out				0.29	0			0
Left-Turn Movement Data								
Assigned Movement	0	0	0	7	5	1	0	3
Mvmt. Sat Flow, veh/h	0	0	0	1311.62	3296.18	925.78	0	984.46
Through Movement Data								
Assigned Movement	0	2	0	4	0	6	0	8
Mvmt. Sat Flow, veh/h	0	1191.61	0	1376.2	0	3126.83	0	546.93
Right-Turn Movement Data								
Assigned Movement	0	12	0	14	0	16	0	18
Mvmt. Sat Flow, veh/h	0	500.48	0	344.05	0	370.79	0	1510.32

Left Lane Group Output

Timer:	1	2	3	4	5	6	7	8
Assigned Phase	0	2	0	4	5	6	0	8
Left Lane Group Data								
Assigned Movement	0	0	0	7	5	1	0	3
Lane Assignment				L	L (Prot)	L		L+T
Lanes in Group	0	0	0	1	2	1	0	1
Group Volume, veh/h	0	0	0	111.11	388.89	22.22	0	77.78
Group SatFlow, vphpl	0	0	0	1311.62	1648.09	925.78	0	1531.39
Queue Serve Time, s	0	0	0	6.98	6.19	1.36	0	2.58
Cycle Clear Time, s	0	0	0	10.73	6.19	1.42	0	3.69
Perm SatFlow, vphpl	0	0	0	1311.62	0	925.78	0	1404.32
Shared SatFlow, vphpl								0
Perm Eff Green, s	0	0	0	13.28	0	22.72	0	13.28
Perm Serve Time, s	0	0	0	9.53	0	22.66	0	12.16
Perm Que Serve Time, s				6.98		1.34		2.58
Time to first Blk, s	0	0	0	0	0	0	0	1.11
Serve Time pre Blk, s								1.11
Prop Inside Lane	0	0	0	1	1	1	0	0.64
Lane Grp Capacity, vph				231.83	1318.47	331.52		308.77
v/c Ratio	0	0	0	0.48	0.29	0.07	0	0.25
Avail Capacity, veh/h				335.58	1318.47	331.52		428.13
I-Factor	0	0	0	1	0.97	1	0	1
Uniform Delay, s/veh				36.6	15.23	20.52		31.76
Increm Delay, s/veh	0	0	0	2.18	0.56	0.39	0	0.6
Overflow Delay, s/veh	0	0	0	0	0	0	0	0
Control Delay, s/veh				38.78	15.78	20.91		32.36
Group LOS				D	B	C		C
Uniform Stops, #/veh				0.83	0.46	0.53		0.75
Increm Stops, #/veh	0	0	0	0.05	0.02	0.07	0	0.03
Overflow Stops, #/veh	0	0	0	0	0	0	0	0
Stop Rate, #/veh				0.88	0.48	0.6		0.78
Uniform Queue, veh/ln				2.17	2.09	0.28		1.38
Increm Queue, veh/ln	0	0	0	0.14	0.1	0.04	0	0.05
Overflow Queue, veh/ln	0	0	0	0	0	0	0	0
Back of Queue Factor	0	0	0	1.8	1.8	1.8	0	1.8
Back of Queue, veh/ln				4.16	3.95	0.57		2.57
Storage Ratio	0	0	0	0.21	0.4	0.1	0	0.13
Initial Queue, veh	0	0	0	0	0	0	0	0
Final Queue, veh	0	0	0	0	0	0	0	0
Saturated Delay, s/veh	0	0	0	0	0	0	0	0
Saturated Stops, #/veh	0	0	0	0	0	0	0	0
Saturated Queue, veh/ln	0	0	0	0	0	0	0	0
Saturated Capacity, vph	0	0	0	0	0	0	0	0
Init Que Clear Time, s	0	0	0	0	0	0	0	0

Thru Lane Group Output

Timer:	1	2	3	4	5	6	7	8
Assigned Phase	0	2	0	4	5	6	0	8
Thru Lane Group Data								
Assigned Movement	0	2	0	4	0	6	0	8
Lane Assignment						T		
Lanes in Group	0	0	0	0	0	1	0	0
Group Volume, veh/h	0	0	0	0	0	125.52	0	0
Group SatFlow, vphpl	0	0	0	0	0	1782.18	0	0
Queue Serve Time, s	0	0	0	0	0	4.25	0	0
Cycle Clear Time, s	0	0	0	0	0	4.25	0	0
Lane Grp Capacity, vph						476.44		
v/c Ratio	0	0	0	0	0	0.26	0	0

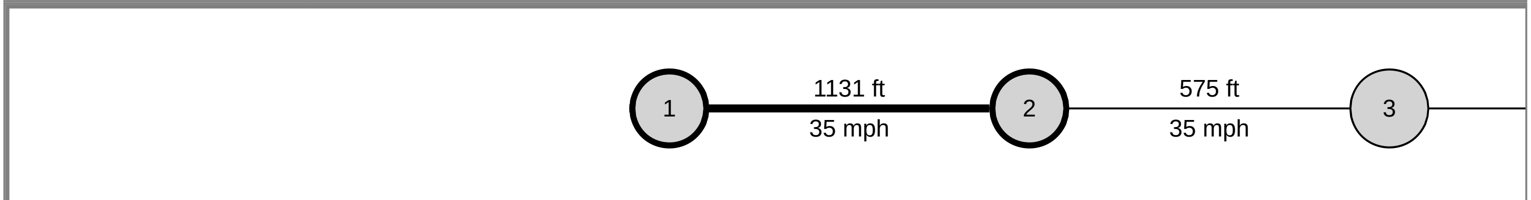
Avail Capacity, veh/h						476.44		
I-Factor	0	0	0	0	0	1	0	0
Uniform Delay, s/veh						21.41		
Increm Delay, s/veh	0	0	0	0	0	1.35	0	0
Overflow Delay, s/veh	0	0	0	0	0	0	0	0
Control Delay, s/veh						22.75		
Group LOS						C		
Uniform Stops, #/veh						0.55		
Increm Stops, #/veh	0	0	0	0	0	0.06	0	0
Overflow Stops, #/veh	0	0	0	0	0	0	0	0
Stop Rate, #/veh						0.62		
Uniform Queue, veh/ln						1.64		
Increm Queue, veh/ln	0	0	0	0	0	0.18	0	0
Overflow Queue, veh/ln	0	0	0	0	0	0	0	0
Back of Queue Factor	0	1	0	1	0	1.8	0	1
Back of Queue, veh/ln						3.28		
Storage Ratio	0	0	0	0	0	0.08	0	0
Initial Queue, veh	0	0	0	0	0	0	0	0
Final Queue, veh	0	0	0	0	0	0	0	0
Saturated Delay, s/veh	0	0	0	0	0	0	0	0
Saturated Stops, #/veh	0	0	0	0	0	0	0	0
Saturated Queue, veh/ln	0	0	0	0	0	0	0	0
Saturated Capacity, vph	0	0	0	0	0	0	0	0
Init Que Clear Time, s	0	0	0	0	0	0	0	0

Right Lane Group Output

Timer:	1	2	3	4	5	6	7	8
Assigned Phase	0	2	0	4	5	6	0	8
Right Lane Group Data								
Assigned Movement	0	12	0	14	0	16	0	18
Lane Assignment		T+R		T+R		T+R		R
Lanes in Group	0	1	0	1	0	1	0	1
Group Volume, veh/h	0	473.33	0	27.78	0	123.37	0	64.44
Group SatFlow, vphpl	0	1692.09	0	1720.25	0	1715.44	0	1510.32
Queue Serve Time, s	0	7.37	0	1.18	0	4.35	0	3.2
Cycle Clear Time, s	0	7.37	0	1.18	0	4.35	0	3.2
Prot RT SatFlow, vphpl								0
Prot RT Eff Green, s								0
Prop Outside Lane	0	0.3	0	0.2	0	0.22	0	1
Lane Grp Capacity, vph		1228.74		268.7		458.61		235.9
v/c Ratio	0	0.39	0	0.1	0	0.27	0	0.27
Avail Capacity, veh/h		1228.74		404.78		458.61		355.37
I-Factor	0	0.97	0	1	0	1	0	1
Uniform Delay, s/veh		3.32		30.76		21.44		31.61
Increm Delay, s/veh	0	0.89	0	0.24	0	1.44	0	0.88
Overflow Delay, s/veh	0	0	0	0	0	0	0	0
Control Delay, s/veh		4.21		30.99		22.88		32.49
Group LOS		A		C		C		C
Uniform Stops, #/veh		0.14		0.73		0.56		0.75
Increm Stops, #/veh	0	0.03	0	0.03	0	0.06	0	0.04
Overflow Stops, #/veh	0	0	0	0	0	0	0	0
Stop Rate, #/veh		0.16		0.75		0.62		0.78
Uniform Queue, veh/ln		1.52		0.48		1.62		1.13
Increm Queue, veh/ln	0	0.3	0	0.02	0	0.18	0	0.06
Overflow Queue, veh/ln	0	0	0	0	0	0	0	0
Back of Queue Factor	0	1.8	0	1.8	0	1.8	0	1.8
Back of Queue, veh/ln		3.28		0.89		3.24		2.15
Storage Ratio	0	0.12	0	0.04	0	0.08	0	0.11
Initial Queue, veh	0	0	0	0	0	0	0	0
Final Queue, veh	0	0	0	0	0	0	0	0
Saturated Delay, s/veh	0	0	0	0	0	0	0	0
Saturated Stops, #/veh	0	0	0	0	0	0	0	0
Saturated Queue, veh/ln	0	0	0	0	0	0	0	0
Saturated Capacity, vph	0	0	0	0	0	0	0	0
Init Que Clear Time, s	0	0	0	0	0	0	0	0

HCS 2010 Urban Street Segment Report

General Information				Streets Information	
Agency	HDR			Number of Intersections	4
Analyst	MDF	Analysis Date	Jan 30, 2013	Number of Segments	3
Jurisdiction		Time Period	PM Peak	Number of Iterations	15
File Name	Existing_PM_LaCrosse.xus	Analysis Year	Existing (2012)	System Cycle Length, s	85
Intersections	Eglin Street	I-90 EB Ramps		Analysis Period	1> 16:45
Project Description					



Basic Segment Information															
Segment	Speed Limit		Through Lanes		Segment Length		Intersection Wid		Length of RM		Percent Curb		Other Delay	
	NB	SB	NB	SB	NB	SB	NB	SB	NB	SB	NB	SB	NB	SB
1	35	35	2	2	1131	1131	60	60	0	0	90	70	0.0	0.0

		Northbound			Southbound		
Segment Output Data		NBL	NBT	NBR	SBL	SBT	SBR
Segment	Movement		2	12	1	6	
1	Bay/Lane Spillback Time, h		never			never	
1	Shared Lane Spillback Time, h				never		
1	Base Free-Flow Speed, mph	40.09			40.18		
1	Running Time, s	22.57			22.48		
1	Running Speed, mph	34.17			34.31		
1	Through Delay, s/veh	29.58			4.51		
1	Travel Speed, mph	14.79			28.58		
1	Stop Rate, stops/veh	0.88			0.17		
1	Spatial Stop Rate, stops/mi	4.13			0.81		
1	Through vol/cap Ratio	0.00			0.36		
1	Percent of Base FFS	36.89			71.11		
1	Level of Service	E			B		
1	Auto Traveler Perception Score	3.06			2.26		

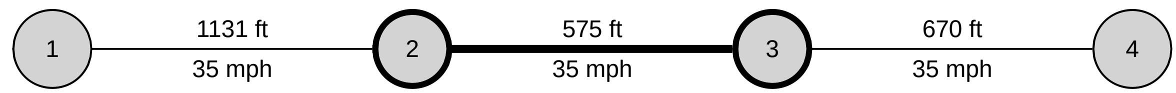
Multimodal Results (Segment)					
1	Pedestrian Segment LOS Score / LOS	3.31	C	3.31	C
1	Bicycle Segment LOS Score / LOS	4.14	D	5.11	F
1	Transit Segment LOS Score / LOS	0.65	A	1.05	A

Facility Output Data	Northbound	Southbound
Facility Travel Time, s	90.05	83.30
Facility Travel Speed, mph	17.99	19.45
Facility Base Free Flow Speed, mph	40.10	40.55
Facility Percent of Base FFS	44.86	47.96
Facility Level of Service	D	D
Facility Auto Traveler Perception Score	2.62	2.57

Multimodal Results (Facility)				
Pedestrian Facility LOS Score / LOS	3.30	C	3.36	C
Bicycle Facility LOS Score / LOS	4.19	D	4.50	E
Transit Facility LOS Score / LOS	0.98	A	1.20	A

HCS 2010 Urban Street Segment Report

General Information				Streets Information	
Agency	HDR			Number of Intersections	4
Analyst	MDF	Analysis Date	Jan 30, 2013	Number of Segments	3
Jurisdiction		Time Period	PM Peak	Number of Iterations	15
File Name	Existing_PM_LaCrosse.xus	Analysis Year	Existing (2012)	System Cycle Length, s	85
Intersections	I-90 EB Ramps	I-90 WB Ramps		Analysis Period	1> 16:45
Project Description					



Basic Segment Information															
Segment	Speed Limit		Through Lanes		Segment Length		Intersection Wid		Length of RM		Percent Curb		Other Delay		
	NB	SB	NB	SB	NB	SB	NB	SB	NB	SB	NB	SB	NB	SB	
2	35	35	2	2	575	575	60	60	0	0	100	100	0.0	0.0	

		Northbound			Southbound		
Segment Output Data		NBL	NBT	NBR	SBL	SBT	SBR
Segment	Movement	5	2			6	16
2	Bay/Lane Spillback Time, h		never			never	
2	Shared Lane Spillback Time, h	never			never		
2	Base Free-Flow Speed, mph	41.58			41.58		
2	Running Time, s	14.46			14.29		
2	Running Speed, mph	27.11			27.44		
2	Through Delay, s/veh	2.86			8.41		
2	Travel Speed, mph	22.63			17.27		
2	Stop Rate, stops/veh	0.12			0.38		
2	Spatial Stop Rate, stops/mi	1.09			3.46		
2	Through vol/cap Ratio	0.28			0.26		
2	Percent of Base FFS	54.43			41.55		
2	Level of Service	C			D		
2	Auto Traveler Perception Score	2.30			2.93		

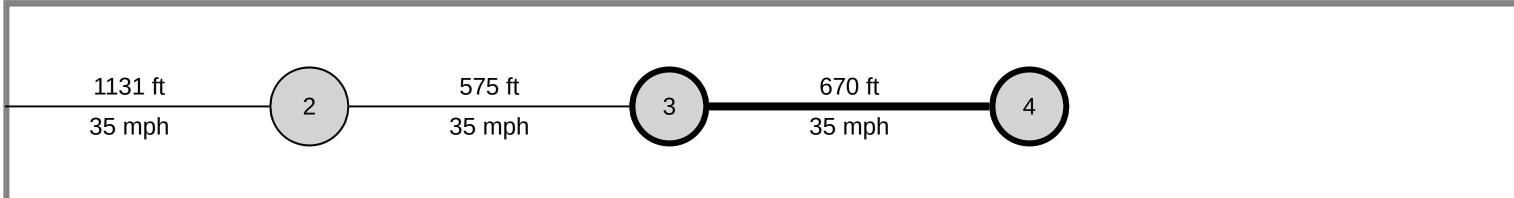
Multimodal Results (Segment)					
2	Pedestrian Segment LOS Score / LOS	3.03	C	3.71	D
2	Bicycle Segment LOS Score / LOS	3.81	D	3.68	D
2	Transit Segment LOS Score / LOS	1.57	A	1.99	A

Facility Output Data	Northbound	Southbound
Facility Travel Time, s	90.05	83.30
Facility Travel Speed, mph	17.99	19.45
Facility Base Free Flow Speed, mph	40.10	40.55
Facility Percent of Base FFS	44.86	47.96
Facility Level of Service	D	D
Facility Auto Traveler Perception Score	2.62	2.57

Multimodal Results (Facility)				
Pedestrian Facility LOS Score / LOS	3.30	C	3.36	C
Bicycle Facility LOS Score / LOS	4.19	D	4.50	E
Transit Facility LOS Score / LOS	0.98	A	1.20	A

HCS 2010 Urban Street Segment Report

General Information				Streets Information	
Agency	HDR			Number of Intersections	4
Analyst	MDF	Analysis Date	Jan 30, 2013	Number of Segments	3
Jurisdiction		Time Period	PM Peak	Number of Iterations	15
File Name	Existing_PM_LaCrosse.xus	Analysis Year	Existing (2012)	System Cycle Length, s	85
Intersections	I-90 WB Ramps	Disk Drive		Analysis Period	1> 16:45
Project Description					



Basic Segment Information															
Segment	Speed Limit		Through Lanes		Segment Length		Intersection Wid		Length of RM		Percent Curb		Other Delay	
	NB	SB	NB	SB	NB	SB	NB	SB	NB	SB	NB	SB	NB	SB
3	35	35	1	2	670	670	60	60	0	0	90	85	0.0	0.0

		Northbound			Southbound		
Segment Output Data		NBL	NBT	NBR	SBL	SBT	SBR
Segment	Movement	5	2			6	16
3	Bay/Lane Spillback Time, h		never			never	
3	Shared Lane Spillback Time, h	never					
3	Base Free-Flow Speed, mph	38.93			40.30		
3	Running Time, s	16.38			15.51		
3	Running Speed, mph	27.90			29.45		
3	Through Delay, s/veh	4.21			18.11		
3	Travel Speed, mph	22.19			13.59		
3	Stop Rate, stops/veh	0.16			0.63		
3	Spatial Stop Rate, stops/mi	1.28			4.94		
3	Through vol/cap Ratio	0.39			0.00		
3	Percent of Base FFS	57.01			33.72		
3	Level of Service	C			E		
3	Auto Traveler Perception Score	2.33			2.96		

Multimodal Results (Segment)					
3	Pedestrian Segment LOS Score / LOS	3.53	D	3.15	C
3	Bicycle Segment LOS Score / LOS	4.59	E	4.18	D
3	Transit Segment LOS Score / LOS	1.05	A	0.78	A

Facility Output Data	Northbound	Southbound
Facility Travel Time, s	90.05	83.30
Facility Travel Speed, mph	17.99	19.45
Facility Base Free Flow Speed, mph	40.10	40.55
Facility Percent of Base FFS	44.86	47.96
Facility Level of Service	D	D
Facility Auto Traveler Perception Score	2.62	2.57

Multimodal Results (Facility)				
Pedestrian Facility LOS Score / LOS	3.30	C	3.36	C
Bicycle Facility LOS Score / LOS	4.19	D	4.50	E
Transit Facility LOS Score / LOS	0.98	A	1.20	A

This Urban Streets text report was created on January 31, 2013 at 12:27:01

Period number = 1

Chapter 17 Input

URBAN STREET PARAMETERS

Number of Intersections	4
Number of Segments	3
Analysis period duration, h	0.25
System cycle length, s	85
Urban street forward direction	NB
Sneakers per cycle, veh	2
Saturation flow rate, veh/h/ln	1900
Stored vehicle lane length, ft	25
Detected vehicle length, ft	17
Queue length percent	95
Critical merge gap, s	3.7
Stop threshold speed, mph	5
Acceleration rate, ft/s/s	3.5
Decel. rate (signal), ft/s/s	4
Left-turn equivalency factor (signal)	1.05
Right-turn equivalency factor (signal)	1.18
Minimum headway in a platoon, s/veh	1.5
Maximum headway in a platoon, s/veh	3.6
Number of iterations	15
Length of left-turn bay (access pt.), ft	250
Decel. rate (access pt.), ft/s/s	6.7
Right-turn speed (access pt.), ft/s	20
Critical gap from major left (access pt.), s	4.1
Follow-up time from major left (access pt.), s	2.2
Right-turn equivalency factor (access pt.)	2.2
Stored heavy vehicle lane length, ft	45
Proportion of peds who push button	0.65
Critical gap for permissive left-turn, s	4.5
Follow-up time for permissive left-turn, s	2.5
Calibration factor for platoon dispersion	0.14
Average ratio of speed limit to free-flow speed	0.94

BASIC SEGMENT INFORMATION

Seg	Spd Lmt		TH Lanes		Seg Len		IntWid		LenRM		PctCurb		Other Dly	
Num	NB	SB	NB	SB	NB	SB	NB	SB	NB	SB	NB	SB	NB	SB
1	35	35	2	2	1131	1131	60	60	0	0	90	70	0	0
2	35	35	2	2	575	575	60	60	0	0	100	100	0	0
3	35	35	1	2	670	670	60	60	0	0	90	85	0	0

ORIGIN-DESTINATION SEED PROPORTIONS - Forward Direction

	Cross LT	Major TH	Cross RT	MidEntry
Downstream Left	0.02	0.1	0.05	0.02
Downstream Thru	0.91	0.78	0.92	0.97
Downstream Right	0.05	0.1	0.02	0.01
Mid-segment Exit	0.02	0.02	0.01	0

ORIGIN-DESTINATION SEED PROPORTIONS - Reverse Direction

	Cross LT	Major TH	Cross RT	MidEntry
Downstream Left	0.02	0.1	0.05	0.02
Downstream Thru	0.91	0.78	0.92	0.97
Downstream Right	0.05	0.1	0.02	0.01
Mid-segment Exit	0.02	0.02	0.01	0

ACCESS POINT DATA

SEGMENT 1

Number of access points: 0

SEGMENT 2

Number of access points: 0

SEGMENT 3

Number of access points: 0

Global Output

SEGMENT DATA

Seg.No.	Movement	NB LT 5	NB TH 2	NB RT 12	SB LT 1	SB TH 6	SB RT 16
1	Bay/Lane Spillback Time, h	999	999	999	999	999	999
1	ShrdLane Spillback Time, h				999		
1	Base Free-Flow Speed, mph		40.09			40.18	
1	Running Time, s		22.57			22.48	
1	Running Speed, mph		34.17			34.31	
1	Through Delay, s/veh		29.58			4.51	
1	Travel Speed, mph		14.79			28.58	
1	Stop Rate, stops/veh		0.88			0.17	
1	Spatial Stop Rate, stops/mi		4.13			0.81	
1	Through vol/cap ratio		0			0.36	
1	Percent of Base FFS		36.89			71.11	
1	Level of Service		E			B	
1	Automobile Perception Score		3.06			2.26	
2	Bay/Lane Spillback Time, h	999	999	999	999	999	999
2	ShrdLane Spillback Time, h	999			999		
2	Base Free-Flow Speed, mph		41.58			41.58	
2	Running Time, s		14.46			14.29	
2	Running Speed, mph		27.11			27.44	
2	Through Delay, s/veh		2.86			8.41	
2	Travel Speed, mph		22.63			17.27	
2	Stop Rate, stops/veh		0.12			0.38	
2	Spatial Stop Rate, stops/mi		1.09			3.46	
2	Through vol/cap ratio		0.28			0.26	
2	Percent of Base FFS		54.43			41.55	
2	Level of Service		C			D	
2	Automobile Perception Score		2.3			2.93	
3	Bay/Lane Spillback Time, h	999	999	999	999	999	999
3	ShrdLane Spillback Time, h	999					
3	Base Free-Flow Speed, mph		38.93			40.3	
3	Running Time, s		16.38			15.51	
3	Running Speed, mph		27.9			29.45	
3	Through Delay, s/veh		4.21			18.11	
3	Travel Speed, mph		22.19			13.59	
3	Stop Rate, stops/veh		0.16			0.63	
3	Spatial Stop Rate, stops/mi		1.28			4.94	
3	Through vol/cap ratio		0.39			0	
3	Percent of Base FFS		57.01			33.72	
3	Level of Service		C			E	
3	Automobile Perception Score		2.33			2.96	

	NB TH	SB TH
Facility Travel Time, s	90.05	83.3
Facility Travel Speed, mph	17.99	19.45
Facility Spatial Stop Rate, veh/mi	2.59	2.62
Facility Base Free Flow Speed, mph	40.1	40.55
Facility Percent Base Free Flow Speed	44.86	47.96
Facility Level of Service	D	D
Facility Automobile Perception Score	2.62	2.57
Facility Pedestrian Space	Infinity	Infinity
Facility Pedestrian Travel Speed	4.4	4.4
Facility Pedestrian LOS Score	3.3	3.36
Facility Pedestrian LOS	C	C
Facility Bicycle Travel Speed	10.5	9.92
Facility Bicycle LOS Score	4.19	4.5
Facility Bicycle LOS	D	E
Facility Transit Travel Speed	35.75	28.57
Facility Transit LOS Score	0.98	1.2
Facility Transit LOS	A	A
SPILLBACK TIME, h	999	

Multimodal Results

1	Roadway crossing difficulty factor	1.07	1.1
1	Ped LOS Score for Link	3.18	2.93

1	Ped LOS Score for Intersection	2.13	2.17
1	Ped LOS Score for Segment	3.31	3.31
1	Ped Segment LOS	C	C
1	Bicycle LOS Score for Link	3.94	3.9
1	Indicator Variable	1	1
1	Bicycle LOS Score for Intersection	3.4	3.4
1	Number of access point approaches	2	8
1	Segment Length, ft	1131	1131
1	Bicycle LOS Score for Segment	4.14	5.11
1	Bicycle Segment LOS	D	F
1	Transit Wait-Ride Score	3.89	3.59
1	Ped LOS Score for Link	3.18	2.93
1	Transit LOS Score for Segment	0.65	1.05
1	Transit Segment LOS	A	A
2	Roadway crossing difficulty factor	0.96	1.2
2	Ped LOS Score for Link	3.32	2.87
2	Ped LOS Score for Intersection	2.19	2.61
2	Ped LOS Score for Segment	3.03	3.71
2	Ped Segment LOS	C	D
2	Bicycle LOS Score for Link	3.87	3.67
2	Indicator Variable	1	1
2	Bicycle LOS Score for Intersection	3.44	3.11
2	Number of access point approaches	0	0
2	Segment Length, ft	575	575
2	Bicycle LOS Score for Segment	3.81	3.68
2	Bicycle Segment LOS	D	D
2	Transit Wait-Ride Score	3.29	2.96
2	Ped LOS Score for Link	3.32	2.87
2	Transit LOS Score for Segment	1.57	1.99
2	Transit Segment LOS	A	A
3	Roadway crossing difficulty factor	1.09	1.1
3	Ped LOS Score for Link	3.44	2.41
3	Ped LOS Score for Intersection	2.43	2.2
3	Ped LOS Score for Segment	3.53	3.15
3	Ped Segment LOS	D	C
3	Bicycle LOS Score for Link	4.01	3.4
3	Indicator Variable	1	1
3	Bicycle LOS Score for Intersection	3.9	3.06
3	Number of access point approaches	2	2
3	Segment Length, ft	670	670
3	Bicycle LOS Score for Segment	4.59	4.18
3	Bicycle Segment LOS	E	D
3	Transit Wait-Ride Score	3.64	3.72
3	Ped LOS Score for Link	3.44	2.41
3	Transit LOS Score for Segment	1.05	0.78
3	Transit Segment LOS	A	A

ACCESS POINT DATA

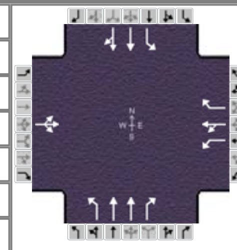
SEGMENT 1

SEGMENT 2

SEGMENT 3

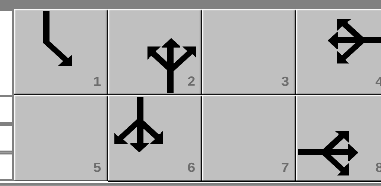
HCS 2010 Signalized Intersection Results Summary

General Information				Intersection Information	
Agency	HDR			Duration, h	0.25
Analyst	MDF	Analysis Date	Jan 30, 2013	Area Type	Other
Jurisdiction		Time Period	AM Peak	PHF	0.90
Intersection	Eglin Street	Analysis Year	2035 No-Build	Analysis Period	1> 7:45
File Name	2035_No-Build_AM_LaCrosse.xus				
Project Description					



Demand Information	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Demand (*v*), veh/h	10	10	10	160	10	220	10	490	100	150	590	10

Signal Information										
Cycle, s	90.0	Reference Phase	2							
Offset, s	64	Reference Point	End	Green	5.4	53.6	8.1	1.7	0.0	0.0
Uncoordinated	No	Simult. Gap E/W	Off	Yellow	3.0	3.9	3.2	3.2	0.0	0.0
Force Mode	Float	Simult. Gap N/S	Off	Red	2.0	1.9	2.0	2.0	0.0	0.0



Timer Results	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Assigned Phase		8		4		2	1	6
Case Number		12.0		9.0		5.3	1.0	4.0
Phase Duration, s		6.9		13.3		59.4	10.4	69.8
Change Period, *($Y+R_c$)*, s		5.2		5.2		5.8	5.0	5.8
Max Allow Headway *(MAH)*, s		4.1		4.1		0.0	4.1	0.0
Queue Clearance Time (g_s), s		3.2		7.6			5.2	
Green Extension Time (g_e), s		0.0		0.6		0.0	0.3	0.0
Phase Call Probability		0.43		1.00			0.98	
Max Out Probability		1.00		0.00			0.12	

Movement Group Results	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Assigned Movement	3	8	18	7	4	14	5	2	12	1	6	16
Adjusted Flow Rate (*v*), veh/h		22		107	82	30	11	544	54	167	334	332
Adjusted Saturation Flow Rate *(s)*, veh/h/ln		1722		1681	1692	1496	767	1680	1496	1681	1765	1755
Queue Service Time (g_s), s		1.2		5.6	4.2	1.7	0.3	3.8	0.7	3.2	6.6	6.7
Cycle Queue Clearance Time (g_c), s		1.2		5.6	4.2	1.7	0.3	3.8	0.7	3.2	6.6	6.7
Green Ratio *(g/C)*		0.02		0.09	0.09	0.09	0.60	0.60	0.60	0.68	0.71	0.71
Capacity *(c)*, veh/h		33		151	152	134	537	2002	891	632	1255	1248
Volume-to-Capacity Ratio *(X)*		0.681		0.706	0.541	0.223	0.021	0.272	0.061	0.264	0.266	0.266
Available Capacity (c_a), veh/h		130		388	391	346	537	2002	891	756	1255	1248
Back of Queue *(Q)*, veh/ln (95th percentile)		1.2		4.5	3.3	1.1	0.1	2.0	0.4	1.6	3.6	3.6
Queue Storage Ratio *(RQ)* (95th percentile)		0.06		0.57	0.17	0.06	0.01	0.05	0.07	0.14	0.08	0.08
Uniform Delay (d_1), s/veh		43.9		39.8	39.2	38.0	3.8	4.1	3.8	5.4	5.2	5.2
Incremental Delay (d_2), s/veh		22.1		5.9	3.0	0.8	0.1	0.3	0.1	0.2	0.5	0.5
Initial Queue Delay (d_3), s/veh		0.0		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Control Delay *(d)*, s/veh		66.0		45.7	42.1	38.9	3.8	4.5	3.9	5.6	5.7	5.7
Level of Service (LOS)		E		D	D	D	A	A	A	A	A	A

	EB		WB		NB		SB	
Approach Delay, s/veh / LOS	66.0	E	43.4	D	4.4	A	5.7	A
Intersection Delay, s/veh / LOS	10.9				B			

Multimodal Results	EB		WB		NB		SB	
Pedestrian LOS Score / LOS	3.2	C	3.1	C	3.0	C	2.2	B
Bicycle LOS Score / LOS	2.2	B	3.0	C	3.2	C	3.2	C

This Signals text report was created on January 31, 2013 at 01:13:28

Intersection number = 1, Segment number = 1, Period number = 1

Chapter 18 Summary Input

Cycle Length, s 90

	EB LT	EB TH	EB RT	WB LT	WB TH	WB RT	NB LT	NB TH	NB RT	SB LT	SB TH	SB RT
Movement	3	8	18	7	4	14	5	2	12	1	6	16
Volume, veh/h	10	10	10	160	10	220	10	490	100	150	590	10
Lanes	0	1	0	1	1	1	1	2	1	1	2	0
Bay Length, ft	0	500	0	200	500	500	150	1000	150	300	1131	0
Receiving Lanes	1	2	1	1	1	1	2	2	2	2	2	2
SatFlow, vplphg	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800
Lane Width, ft	12	12	12	12	12	12	12	12	12	12	12	12
Heavy Vehicles, %	0	2	0	2	2	2	2	2	2	2	2	0
Grade, %	0	0	0	0	0	0	0	0	0	0	0	0
Buses, per h	0	0	0	0	0	0	0	0	0	0	0	0
Parking, per h	0	0	0	0	0	0	0	0	0	0	0	0
Bicycles, per h	0	0	0	0	0	0	0	0	0	0	0	0
Pedestrians, per h	0	0	0	0	0	0	0	0	0	0	0	0
Heavy Veh Equivalent	2	2	2	2	2	2	2	2	2	2	2	2
Bus Blockage Time	14.4	14.4	14.4	14.4	14.4	14.4	14.4	14.4	14.4	14.4	14.4	14.4
Turns in Shrd Ln, %	0	0	0	40	0	0	0	0	0	0	0	0
Unopposed Lefts, %	0	0	0	0	0	0	0	0	0	0	0	0
Parking Time, sec	18	18	18	18	18	18	18	18	18	18	18	18
Arrival Type	3	3	3	3	3	3	4	4	4	4	4	4
Initial Queue, veh	0	0	0	0	0	0	0	0	0	0	0	0
Speed Limit, mph	30	30	30	30	30	30	35	35	35	35	35	35
Detector Length, ft	40	40	40	40	40	40	40	40	40	40	40	40
StartLostTime, sec	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0
EndUseTime, sec	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0
RTOR, veh/h		10			193			51			1	
I-Factor		1.00			1.00			1.00			0.99	
Walk + PC, sec		0.0			0.0			0.0			0.0	

	EB	EB	WB	WB	NB	NB	SB	SB
Phase	3	8	7	4	5	2	1	6
Movement		LT+TH+RT		LT+TH+RT		LT+TH+RT	LT	LT+TH+RT
Left-Turn Mode	--	Split	--	Split	--	Perm.	Pr/Pm	--
Phase Splits, s	0.0	12.0	0.0	26.0	0.0	35.0	17.0	52.0
Yellow Change, s	4.0	3.2	4.0	3.2	4.0	3.9	3.0	3.9
Red Clearance, s	1.0	2.0	1.0	2.0	1.0	1.9	2.0	1.9
Minimum Green, s	5	4	5	4	5	5	4	5
Lead/Lag							Lead	
Passage Time, s	2.0	3.0	2.0	3.0	2.0	2.0	3.0	2.0
Recall	Off	Off	Off	Off	Off	Min	Off	Min
Dual Entry	No	No	No	No	No	Yes	No	Yes
Prot. Right-Turn	False	False	False	False	False	False	False	False

	E/W	N/S
Simultaneous Gap out	Off	Off
Dallas Phasing	Off	Off

Cycle Length, s 90
Offset, s 64
Reference Phase 2
Reference Point End
Force Mode Float
Uncoordinated No
Field Measured Phase Times No
Exclusive Ped Phase Time, s 0.0

Timer:	1	2	3	4	5	6	7	8
Assigned Phase	1	2	4	8	0	6	0	0
Assigned Left-Turn Mvmt.	1	5	7	3	0	0	0	0
Assigned Through Mvmt.	0	2	4	8	0	6	0	0
Assigned Right-Turn Mvmt.	0	12	14	18	0	16	0	0
Timer w/Pr-Pm From Shared	0	0	0	0	0	0	0	0

Chapter 18 Summary Output

Cycle Length, s 90

	EB LT	EB TH	EB RT	WB LT	WB TH	WB RT	NB LT	NB TH	NB RT	SB LT	SB TH	SB RT
Movement	3	8	18	7	4	14	5	2	12	1	6	16
Volume, veh/h	11.11	11.11	0	177.78	11.11	30	11.11	544.44	54.44	166.67	655.56	10
SatFlow, veh/h/ln	0	1764.7	0	1764.7	1764.7	1764.7	1764.7	1764.7	1764.7	1764.7	1764.7	0
Lane Util Factor	1	1	1	1	1	1	1	0.95	1	1	1	1
Capacity, veh/h	16.31	0	0	151.06	152.08	134.42	537.07	2002.1	891.1	631.95	2465.7	37.6
Discharge Vol, veh/h	11.11	0	0	0	0	30	0	544.44	0	0	0	0
Prop Arriv On Green	0.02	0.02	0	0.09	0.09	0.09	0.79	0.79	0.79	0.06	0.68	0.66
Apprch Vol, veh/h	0	22.22	0	0	218.89	0	0	610	0	0	832.22	0
Apprch Stops, #/veh	0	1.23	0	0	0.91	0	0	0.16	0	0	0.24	0
Apprch Delay, s/veh	0	65.95	0	0	43.44	0	0	4.41	0	0	5.72	0

Apprch LOS	E	D	A	A
Int Delay, s/veh 10.94				
Int LOS B				

Timer Data

Timer:	1	2	3	4	5	6	7	8
Assigned Phase	1	2	4	8	0	6	0	0
Case No	1	5.3	9	12	0	4	0	0
Phase Duration, s	10.38	59.43	13.29	6.91	0	69.81	0	0
Change Period, s	5	5.8	5.2	5.2	0	5.8	0	5.2
Phase Start Time, s	89.99	10.37	69.8	83.09	89.99	89.99	69.8	89.99
Phase End Time, s	10.37	69.8	83.09	89.99	89.99	69.8	69.8	89.99
Max Allow Headway, s	4.08	0	4.14	4.09	0	0	0	0
Equiv Max Green, s	12	5	20.8	6.8		5		
Queue Clear Time, s	5.2		7.55	3.15				
Green Exten Time, s	0.26	0	0.57	0.01	0	0	0	0
Prob of Phase Call	0.98		1	0.43				
Prob of Max Out	0.12		0	1				
Left-Turn Movement Data								
Assigned Movement	1	5	7	3	0	0	0	0
Mvmt. Sat Flow, veh/h	1680.67	767.29	1680.67	860.83	0	0	0	0
Through Movement Data								
Assigned Movement	0	2	4	8	0	6	0	0
Mvmt. Sat Flow, veh/h	0	3360	1692.03	860.84	0	3467.02	0	0
Right-Turn Movement Data								
Assigned Movement	0	12	14	18	0	16	0	0
Mvmt. Sat Flow, veh/h	0	1495.51	1495.51	0	0	52.87	0	0

Left Lane Group Output

Timer:	1	2	3	4	5	6	7	8
Assigned Phase	1	2	4	8	0	6	0	0
Left Lane Group Data								
Assigned Movement	1	5	7	3	0	0	0	0
Lane Assignment	L Pr/Pm	L	L	L+T				
Lanes in Group	1	1	1	1	0	0	0	0
Group Volume, veh/h	166.67	11.11	106.67	22.22	0	0	0	0
Group SatFlow, vphpl	1680.67	767.29	1680.67	1721.66	0	0	0	0
Queue Serve Time, s	3.2	0.27	5.55	1.15	0	0	0	0
Cycle Clear Time, s	3.2	0.29	5.55	1.15	0	0	0	0
Perm SatFlow, vphpl	816.26	767.29	1680.67	0	0	0	0	0
Shared SatFlow, vphpl								
Perm Eff Green, s	55.63	53.63	0	0	0	0	0	0
Perm Serve Time, s	49.78	53.61	0	0	0	0	0	0
Perm Que Serve Time, s	1.49	0.27						
Time to first Blk, s	0	0	0	0	0	0	0	0
Serve Time pre Blk, s								
Prop Inside Lane	1	1	1	0.5	0	0	0	0
Lane Grp Capacity, vph	631.95	537.07	151.06	32.62				
v/c Ratio	0.26	0.02	0.71	0.68	0	0	0	0
Avail Capacity, veh/h	755.59	537.07	388.42	130.08				
I-Factor	0.99	1	1	1	0	0	0	0
Uniform Delay, s/veh	5.41	3.77	39.8	43.88				
Increm Delay, s/veh	0.22	0.07	5.92	22.08	0	0	0	0
Overflow Delay, s/veh	0	0	0	0	0	0	0	0
Control Delay, s/veh	5.63	3.84	45.72	65.95				
Group LOS	A	A	D	E				
Uniform Stops, #/veh	0.21	0.14	0.84	0.87				
Increm Stops, #/veh	0.01	0.04	0.09	0.36	0	0	0	0
Overflow Stops, #/veh	0	0	0	0	0	0	0	0
Stop Rate, #/veh	0.22	0.18	0.94	1.23				
Uniform Queue, veh/ln	0.87	0.04	2.25	0.48				
Increm Queue, veh/ln	0.04	0.01	0.25	0.2	0	0	0	0
Overflow Queue, veh/ln	0	0	0	0	0	0	0	0
Back of Queue Factor	1.8	1.8	1.8	1.8	0	0	0	0
Back of Queue, veh/ln	1.64	0.09	4.49	1.23				
Storage Ratio	0.14	0.01	0.57	0.06	0	0	0	0
Initial Queue, veh	0	0	0	0	0	0	0	0
Final Queue, veh	0	0	0	0	0	0	0	0
Saturated Delay, s/veh	0	0	0	0	0	0	0	0
Saturated Stops, #/veh	0	0	0	0	0	0	0	0
Saturated Queue, veh/ln	0	0	0	0	0	0	0	0
Saturated Capacity, vph	0	0	0	0	0	0	0	0
Init Que Clear Time, s	0	0	0	0	0	0	0	0

Thru Lane Group Output

Timer:	1	2	3	4	5	6	7	8
Assigned Phase	1	2	4	8	0	6	0	0
Thru Lane Group Data								
Assigned Movement	0	2	4	8	0	6	0	0
Lane Assignment		T	T			T		
Lanes in Group	0	2	1	0	0	1	0	0
Group Volume, veh/h	0	544.44	82.22	0	0	333.59	0	0
Group SatFlow, vphpl	0	1680	1692.03	0	0	1764.71	0	0
Queue Serve Time, s	0	3.82	4.18	0	0	6.64	0	0
Cycle Clear Time, s	0	3.82	4.18	0	0	6.64	0	0
Lane Grp Capacity, vph		2002.05	152.08	0		1255.01		
v/c Ratio	0	0.27	0.54	0	0	0.27	0	0

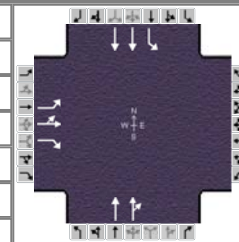
Avail Capacity, veh/h		2002.05	391.05			1255.01		
I-Factor	0	1	1	0	0	0.99	0	0
Uniform Delay, s/veh		4.13	39.18			5.22		
Increm Delay, s/veh	0	0.34	2.97	0	0	0.51	0	0
Overflow Delay, s/veh	0	0	0	0	0	0	0	0
Control Delay, s/veh		4.47	42.15			5.73		
Group LOS		A	D			A		
Uniform Stops, #/veh		0.15	0.83			0.22		
Increm Stops, #/veh	0	0.01	0.06	0	0	0.02	0	0
Overflow Stops, #/veh	0	0	0	0	0	0	0	0
Stop Rate, #/veh		0.16	0.89			0.24		
Uniform Queue, veh/ln		1.03	1.7			1.84		
Increm Queue, veh/ln	0	0.09	0.13	0	0	0.18	0	0
Overflow Queue, veh/ln	0	0	0	0	0	0	0	0
Back of Queue Factor	0	1.8	1.8	1	0	1.8	0	0
Back of Queue, veh/ln		2.02	3.29			3.63		
Storage Ratio	0	0.05	0.17	0	0	0.08	0	0
Initial Queue, veh	0	0	0	0	0	0	0	0
Final Queue, veh	0	0	0	0	0	0	0	0
Saturated Delay, s/veh	0	0	0	0	0	0	0	0
Saturated Stops, #/veh	0	0	0	0	0	0	0	0
Saturated Queue, veh/ln	0	0	0	0	0	0	0	0
Saturated Capacity, vph	0	0	0	0	0	0	0	0
Init Que Clear Time, s	0	0	0	0	0	0	0	0

Right Lane Group Output

Timer:	1	2	3	4	5	6	7	8
Assigned Phase	1	2	4	8	0	6	0	0
Right Lane Group Data								
Assigned Movement	0	12	14	18	0	16	0	0
Lane Assignment		R	R			T+R		
Lanes in Group	0	1	1	0	0	1	0	0
Group Volume, veh/h	0	54.44	30	0	0	331.97	0	0
Group SatFlow, vphpl	0	1495.51	1495.51	0	0	1755.19	0	0
Queue Serve Time, s	0	0.71	1.68	0	0	6.66	0	0
Cycle Clear Time, s	0	0.71	1.68	0	0	6.66	0	0
Prot RT SatFlow, vphpl		0	0					
Prot RT Eff Green, s		0	0					
Prop Outside Lane	0	1	1	0	0	0.03	0	0
Lane Grp Capacity, vph		891.1	134.42			1248.25		
v/c Ratio	0	0.06	0.22	0	0	0.27	0	0
Avail Capacity, veh/h		891.1	345.63			1248.25		
I-Factor	0	1	1	0	0	0.99	0	0
Uniform Delay, s/veh		3.81	38.04			5.23		
Increm Delay, s/veh	0	0.13	0.83	0	0	0.52	0	0
Overflow Delay, s/veh	0	0	0	0	0	0	0	0
Control Delay, s/veh		3.94	38.87			5.75		
Group LOS		A	D			A		
Uniform Stops, #/veh		0.14	0.8			0.22		
Increm Stops, #/veh	0	0.02	0.04	0	0	0.02	0	0
Overflow Stops, #/veh	0	0	0	0	0	0	0	0
Stop Rate, #/veh		0.16	0.84			0.24		
Uniform Queue, veh/ln		0.19	0.6			1.83		
Increm Queue, veh/ln	0	0.03	0.03	0	0	0.18	0	0
Overflow Queue, veh/ln	0	0	0	0	0	0	0	0
Back of Queue Factor	0	1.8	1.8	1	0	1.8	0	0
Back of Queue, veh/ln		0.4	1.14			3.62		
Storage Ratio	0	0.07	0.06	0	0	0.08	0	0
Initial Queue, veh	0	0	0	0	0	0	0	0
Final Queue, veh	0	0	0	0	0	0	0	0
Saturated Delay, s/veh	0	0	0	0	0	0	0	0
Saturated Stops, #/veh	0	0	0	0	0	0	0	0
Saturated Queue, veh/ln	0	0	0	0	0	0	0	0
Saturated Capacity, vph	0	0	0	0	0	0	0	0
Init Que Clear Time, s	0	0	0	0	0	0	0	0

HCS 2010 Signalized Intersection Results Summary

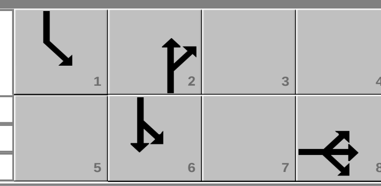
General Information				Intersection Information	
Agency	HDR			Duration, h	0.25
Analyst	MDF	Analysis Date	Jan 30, 2013	Area Type	Other
Jurisdiction		Time Period	AM Peak	PHF	0.90
Intersection	I-90 EB Ramps	Analysis Year	2035 No-Build	Analysis Period	1> 7:45
File Name	2035_No-Build_AM_LaCrosse.xus				
Project Description					



Demand Information	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Demand (v), veh/h	90	0	280					550	170	100	470	

Signal Information			
Cycle, s	90.0	Reference Phase	2
Offset, s	11	Reference Point	End
Uncoordinated	No	Simult. Gap E/W	Off
Force Mode	Float	Simult. Gap N/S	Off

Green	58.6	9.4	7.5	0.0	0.0	0.0
Yellow	4.5	4.5	4.0	0.0	0.0	0.0
Red	0.5	0.5	0.5	0.0	0.0	0.0



Timer Results	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Assigned Phase		8				2	1	6
Case Number		9.0				8.3	1.0	4.0
Phase Duration, s		12.0				63.6	14.4	78.0
Change Period, $(Y+R_c)$, s		4.5				5.0	5.0	5.0
Max Allow Headway *(MAH)*, s		5.1				0.0	5.1	0.0
Queue Clearance Time (g_s), s		7.2					2.0	
Green Extension Time (g_e), s		0.6				0.0	0.3	0.0
Phase Call Probability		0.97					0.94	
Max Out Probability		0.00					0.03	

Movement Group Results	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Assigned Movement	3	8	18					2	12	1	6	
Adjusted Flow Rate (v), veh/h	100	0	37					344	434	111	522	
Adjusted Saturation Flow Rate (s), veh/h/ln	1681	1765	1496					1312	1650	1681	1680	
Queue Service Time (g_s), s	5.2	0.0	2.1					15.5	11.1	0.0	0.7	
Cycle Queue Clearance Time (g_c), s	5.2	0.0	2.1					15.5	11.1	0.0	0.7	
Green Ratio (g/C)	0.08	0.08	0.08					0.65	0.65	0.73	0.81	
Capacity (c), veh/h	141	148	125					854	1074	570	2724	
Volume-to-Capacity Ratio (X)	0.711	0.000	0.293					0.403	0.404	0.195	0.192	
Available Capacity (c_a), veh/h	495	520	440					854	1074	619	2724	
Back of Queue (Q), veh/ln (95th percentile)	4.3	0.0	1.4					5.1	6.3	2.1	0.3	
Queue Storage Ratio (RQ) (95th percentile)	0.55	0.00	0.18					0.11	0.14	0.27	0.01	
Uniform Delay (d_1), s/veh	40.2	0.0	38.7					7.3	7.3	11.4	0.4	
Incremental Delay (d_2), s/veh	9.0	0.0	1.8					1.4	1.1	0.2	0.1	
Initial Queue Delay (d_3), s/veh	0.0	0.0	0.0					0.0	0.0	0.0	0.0	
Control Delay (d), s/veh	49.2	0.0	40.6					8.7	8.4	11.7	0.5	
Level of Service (LOS)	D		D					A	A	B	A	
Approach Delay, s/veh / LOS	46.9	D		0.0			8.5	A		2.5	A	
Intersection Delay, s/veh / LOS	9.4						A					

Multimodal Results	EB		WB		NB		SB	
Pedestrian LOS Score / LOS	3.1	C	3.0	C	2.1	B	2.5	B
Bicycle LOS Score / LOS	2.3	B			3.1	C	3.0	C

This Signals text report was created on January 31, 2013 at 01:13:44

Intersection number = 2, Segment number = 1, Period number = 1

Chapter 18 Summary Input

Cycle Length, s 90

	EB LT	EB TH	EB RT	WB LT	WB TH	WB RT	NB LT	NB TH	NB RT	SB LT	SB TH	SB RT
Movement	3	8	18	7	4	14	5	2	12	1	6	16
Volume, veh/h	90	0	280	0	0	0	0	550	170	100	470	0
Lanes	1	1	1	0	0	0	0	2	0	1	2	0
Bay Length, ft	200	500	200	0	0	0	0	1131	0	200	575	0
Receiving Lanes	1	1	1	0	0	0	2	2	2	2	2	2
SatFlow, vplphg	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800
Lane Width, ft	12	12	12	12	12	12	12	12	12	12	12	12
Heavy Vehicles, %	2	2	2	0	0	0	0	2	0	2	2	0
Grade, %	0	0	0	0	0	0	0	0	0	0	0	0
Buses, per h	0	0	0	0	0	0	0	0	0	0	0	0
Parking, per h	0	0	0	0	0	0	0	0	0	0	0	0
Bicycles, per h	0	0	0	0	0	0	0	0	0	0	0	0
Pedestrians, per h	0	0	0	0	0	0	0	0	0	0	0	0
Heavy Veh Equivalent	2	2	2	2	2	2	2	2	2	2	2	2
Bus Blockage Time	14.4	14.4	14.4	14.4	14.4	14.4	14.4	14.4	14.4	14.4	14.4	14.4
Turns in Shrd Ln, %	0	0	0	0	0	0	0	0	0	0	0	0
Unopposed Lefts, %	0	0	0	0	0	0	0	0	0	0	0	0
Parking Time, sec	18	18	18	18	18	18	18	18	18	18	18	18
Arrival Type	3	3	3	3	3	3	3	4	4	4	4	3
Initial Queue, veh	0	0	0	0	0	0	0	0	0	0	0	0
Speed Limit, mph	45	45	45	35	35	35	35	35	35	35	35	35
Detector Length, ft	40	40	40	40	40	40	40	40	40	40	40	40
StartLostTime, sec	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0
EndUseTime, sec	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0
RTOR, veh/h		247			0			19			0	
I-Factor		1.00			1.00			0.91			0.91	
Walk + PC, sec		0.0			0.0			0.0			0.0	

	EB	EB	WB	WB	NB	NB	SB	SB
Phase	3	8	7	4	5	2	1	6
Movement		LT+TH+RT				TH+RT	LT	LT+TH
Left-Turn Mode	--	Split	--	Split	--	Perm.	Pr/Pm	--
Phase Splits, s	0.0	31.0	0.0	0.0	0.0	42.0	17.0	59.0
Yellow Change, s	4.0	4.0	4.0	4.0	4.0	4.5	4.5	4.5
Red Clearance, s	1.0	0.5	1.0	1.0	1.0	0.5	0.5	0.5
Minimum Green, s	5	5	5	5	5	5	10	5
Lead/Lag							Lag	
Passage Time, s	2.0	4.0	2.0	2.0	2.0	2.0	4.0	2.0
Recall	Off	Off	Off	Off	Off	Min	Off	Min
Dual Entry	No	No	No	Yes	No	Yes	No	Yes
Prot. Right-Turn	False	False	False	False	False	False	False	False

	E/W	N/S
Simultaneous Gap out	Off	Off
Dallas Phasing	Off	Off

Cycle Length, s	90
Offset, s	11
Reference Phase	2
Reference Point	End
Force Mode	Float
Uncoordinated	No
Field Measured Phase Times	No
Exclusive Ped Phase Time, s	0.0

Timer:	1	2	3	4	5	6	7	8
Assigned Phase	2	1	0	8	0	6	0	0
Assigned Left-Turn Mvmt.	5	1	0	3	0	0	0	0
Assigned Through Mvmt.	2	0	0	8	0	6	0	0
Assigned Right-Turn Mvmt.	12	0	0	18	0	16	0	0
Timer w/Pr-Pm From Shared	0	0	0	0	0	0	0	0

Chapter 18 Summary Output

Cycle Length, s 90

	EB LT	EB TH	EB RT	WB LT	WB TH	WB RT	NB LT	NB TH	NB RT	SB LT	SB TH	SB RT
Movement	3	8	18	7	4	14	5	2	12	1	6	16
Volume, veh/h	100	0	36.67	0	0	0	0	611.11	167.78	111.11	522.22	0
SatFlow, veh/h/ln	1764.7	1764.7	1764.7	0	0	0	0	1764.7	0	1764.7	1764.7	0
Lane Util Factor	1	1	1	1	1	1	1	0.74	1	1	0.95	1
Capacity, veh/h	140.71	147.75	125.21	0			40	1513.1	414.81	570.04	2724	0
Discharge Vol, veh/h	100	0	36.67	0	0		0	611.11	0	0	522.22	0
Prop Arriv On Green	0.08	0	0.08	0	0	0	0	0.66	0.65	0.03	0.96	0
Apprch Vol, veh/h	0	136.67	0	0	0	0	0	778.89	0	0	633.33	0
Apprch Stops, #/veh	0	0.93	0	0	0	0	0	0.32	0	0	0.09	0
Apprch Delay, s/veh	0	46.89	0	0	0	0	0	8.54	0	0	2.48	0

Apprch LOS	D				A		A	
Int Delay, s/veh 9.45								
Int LOS A								

Timer Data

Timer:	1	2	3	4	5	6	7	8
Assigned Phase	2	1	0	8	0	6	0	0
Case No	8.3	1	0	9	0	4	0	0
Phase Duration, s	63.59	14.38	0	12.03	0	77.97	0	0
Change Period, s	5	5	0	4.5	0	5	0	0
Phase Start Time, s	42.41	16	30.38	30.38	42.41	42.41	30.38	42.41
Phase End Time, s	16	30.38	30.38	42.41	42.41	30.38	30.38	42.41
Max Allow Headway, s	0	5.08	0	5.05	0	0	0	0
Equiv Max Green, s	5	12		26.5		5		
Queue Clear Time, s		2		7.22				
Green Exten Time, s	0	0.3	0	0.57	0	0	0	0
Prob of Phase Call		0.94		0.97				
Prob of Max Out		0.03		0				
Left-Turn Movement Data								
Assigned Movement	5	1	0	3	0	0	0	0
Mvmt. Sat Flow, veh/h	0	1680.67	0	1680.67	0	0	0	0
Through Movement Data								
Assigned Movement	2	0	0	8	0	6	0	0
Mvmt. Sat Flow, veh/h	2777.49	0	0	1764.71	0	3444.71	0	0
Right-Turn Movement Data								
Assigned Movement	12	0	0	18	0	16	0	0
Mvmt. Sat Flow, veh/h	637.22	0	0	1495.51	0	0	0	0

Left Lane Group Output

Timer:	1	2	3	4	5	6	7	8
Assigned Phase	2	1	0	8	0	6	0	0
Left Lane Group Data								
Assigned Movement	5	1	0	3	0	0	0	0
Lane Assignment		L Pr/Pm		L				
Lanes in Group	0	1	0	1	0	0	0	0
Group Volume, veh/h	0	111.11	0	100	0	0	0	0
Group SatFlow, vphpl	0	1680.67	0	1680.67	0	0	0	0
Queue Serve Time, s	0	0	0	5.22	0	0	0	0
Cycle Clear Time, s	0	0	0	5.22	0	0	0	0
Perm SatFlow, vphpl	893.79	690.4	0	1680.67	0	0	0	0
Shared SatFlow, vphpl	0							
Perm Eff Green, s	0	56.59	0	0	0	0	0	0
Perm Serve Time, s	0	41.05	0	0	0	0	0	0
Perm Que Serve Time, s		8.38						
Time to first Blk, s	58.59	0	0	0	0	0	0	0
Serve Time pre Blk, s								
Prop Inside Lane	0	1	0	1	0	0	0	0
Lane Grp Capacity, vph		570.04		140.71				
v/c Ratio	0	0.19	0	0.71	0	0	0	0
Avail Capacity, veh/h		619		494.86				
I-Factor	0	0.91	0	1	0	0	0	0
Uniform Delay, s/veh		11.45		40.17				
Increm Delay, s/veh	0	0.21	0	9.05	0	0	0	0
Overflow Delay, s/veh	0	0	0	0	0	0	0	0
Control Delay, s/veh		11.66		49.22				
Group LOS		B		D				
Uniform Stops, #/veh		0.41		0.81				
Increm Stops, #/veh	0	0.01	0	0.14	0	0	0	0
Overflow Stops, #/veh	0	0	0	0	0	0	0	0
Stop Rate, #/veh		0.42		0.95				
Uniform Queue, veh/ln		1.13		2.03				
Increm Queue, veh/ln	0	0.03	0	0.35	0	0	0	0
Overflow Queue, veh/ln	0	0	0	0	0	0	0	0
Back of Queue Factor	1	1.8	0	1.8	0	0	0	0
Back of Queue, veh/ln		2.09		4.3				
Storage Ratio	0	0.27	0	0.55	0	0	0	0
Initial Queue, veh	0	0	0	0	0	0	0	0
Final Queue, veh	0	0	0	0	0	0	0	0
Saturated Delay, s/veh	0	0	0	0	0	0	0	0
Saturated Stops, #/veh	0	0	0	0	0	0	0	0
Saturated Queue, veh/ln	0	0	0	0	0	0	0	0
Saturated Capacity, vph	0	0	0	0	0	0	0	0
Init Que Clear Time, s	0	0	0	0	0	0	0	0

Thru Lane Group Output

Timer:	1	2	3	4	5	6	7	8
Assigned Phase	2	1	0	8	0	6	0	0
Thru Lane Group Data								
Assigned Movement	2	0	0	8	0	6	0	0
Lane Assignment	T			T		T		
Lanes in Group	1	0	0	1	0	2	0	0
Group Volume, veh/h	344.45	0	0	0	0	522.22	0	0
Group SatFlow, vphpl	1311.61	0	0	1764.71	0	1680	0	0
Queue Serve Time, s	15.53	0	0	0	0	0.74	0	0
Cycle Clear Time, s	15.53	0	0	0	0	0.74	0	0
Lane Grp Capacity, vph	853.81			147.75		2724.03		
v/c Ratio	0.4	0	0	0	0	0.19	0	0

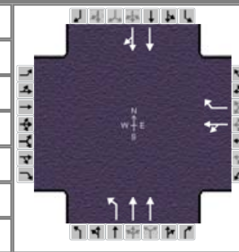
Avail Capacity, veh/h	853.81			519.61		2724.03		
I-Factor	0.97	0	0	0	0	0.91	0	0
Uniform Delay, s/veh	7.3			0		0.38		
Increm Delay, s/veh	1.38	0	0	0	0	0.14	0	0
Overflow Delay, s/veh	0	0	0	0	0	0	0	0
Control Delay, s/veh	8.68			0		0.53		
Group LOS	A					A		
Uniform Stops, #/veh	0.29			0		0.01		
Increm Stops, #/veh	0.04	0	0	0	0	0.01	0	0
Overflow Stops, #/veh	0	0	0	0	0	0	0	0
Stop Rate, #/veh	0.33			0		0.02		
Uniform Queue, veh/ln	2.49			0		0.09		
Increm Queue, veh/ln	0.33	0	0	0	0	0.05	0	0
Overflow Queue, veh/ln	0	0	0	0	0	0	0	0
Back of Queue Factor	1.8	0	0	1	0	1.8	0	0
Back of Queue, veh/ln	5.07			0		0.25		
Storage Ratio	0.11	0	0	0	0	0.01	0	0
Initial Queue, veh	0	0	0	0	0	0	0	0
Final Queue, veh	0	0	0	0	0	0	0	0
Saturated Delay, s/veh	0	0	0	0	0	0	0	0
Saturated Stops, #/veh	0	0	0	0	0	0	0	0
Saturated Queue, veh/ln	0	0	0	0	0	0	0	0
Saturated Capacity, vph	0	0	0	0	0	0	0	0
Init Que Clear Time, s	0	0	0	0	0	0	0	0

Right Lane Group Output

Timer:	1	2	3	4	5	6	7	8
Assigned Phase	2	1	0	8	0	6	0	0
Right Lane Group Data								
Assigned Movement	12	0	0	18	0	16	0	0
Lane Assignment	T+R			R				
Lanes in Group	1	0	0	1	0	0	0	0
Group Volume, veh/h	434.44	0	0	36.67	0	0	0	0
Group SatFlow, vphpl	1650.01	0	0	1495.51	0	0	0	0
Queue Serve Time, s	11.12	0	0	2.07	0	0	0	0
Cycle Clear Time, s	11.12	0	0	2.07	0	0	0	0
Prot RT SatFlow, vphpl				0				
Prot RT Eff Green, s				0				
Prop Outside Lane	0.39	0	0	1	0	0	0	0
Lane Grp Capacity, vph	1074.1			125.21				
v/c Ratio	0.4	0	0	0.29	0	0	0	0
Avail Capacity, veh/h	1074.1			440.35				
I-Factor	0.97	0	0	1	0	0	0	0
Uniform Delay, s/veh	7.33			38.73				
Increm Delay, s/veh	1.1	0	0	1.82	0	0	0	0
Overflow Delay, s/veh	0	0	0	0	0	0	0	0
Control Delay, s/veh	8.43			40.55				
Group LOS	A			D				
Uniform Stops, #/veh	0.29			0.78				
Increm Stops, #/veh	0.03	0	0	0.07	0	0	0	0
Overflow Stops, #/veh	0	0	0	0	0	0	0	0
Stop Rate, #/veh	0.32			0.85				
Uniform Queue, veh/ln	3.16			0.72				
Increm Queue, veh/ln	0.33	0	0	0.06	0	0	0	0
Overflow Queue, veh/ln	0	0	0	0	0	0	0	0
Back of Queue Factor	1.8	0	0	1.8	0	1	0	0
Back of Queue, veh/ln	6.28			1.41				
Storage Ratio	0.14	0	0	0.18	0	0	0	0
Initial Queue, veh	0	0	0	0	0	0	0	0
Final Queue, veh	0	0	0	0	0	0	0	0
Saturated Delay, s/veh	0	0	0	0	0	0	0	0
Saturated Stops, #/veh	0	0	0	0	0	0	0	0
Saturated Queue, veh/ln	0	0	0	0	0	0	0	0
Saturated Capacity, vph	0	0	0	0	0	0	0	0
Init Que Clear Time, s	0	0	0	0	0	0	0	0

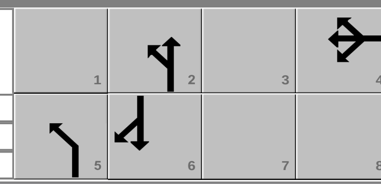
HCS 2010 Signalized Intersection Results Summary

General Information				Intersection Information	
Agency	HDR			Duration, h	0.25
Analyst	MDF	Analysis Date	Jan 30, 2013	Area Type	Other
Jurisdiction		Time Period	AM Peak	PHF	0.90
Intersection	I-90 WB Ramps	Analysis Year	2035 No-Build	Analysis Period	1> 7:45
File Name	2035_No-Build_AM_LaCrosse.xus				
Project Description					



Demand Information	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Demand (*v*), veh/h				110	0	60	250	390			460	170

Signal Information										
Cycle, s	90.0	Reference Phase	6							
Offset, s	3	Reference Point	End	Green	51.6	15.0	8.4	0.0	0.0	0.0
Uncoordinated	No	Simult. Gap E/W	Off	Yellow	4.0	4.0	4.0	0.0	0.0	0.0
Force Mode	Float	Simult. Gap N/S	Off	Red	1.0	1.0	1.0	0.0	0.0	0.0



Timer Results	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Assigned Phase				4	5	2		6
Case Number				11.0	1.0	4.0		8.3
Phase Duration, s				13.4	20.0	76.6		56.6
Change Period, *(Y+R$_c$)*, s				5.0	5.0	5.0		5.0
Max Allow Headway *(MAH)*, s				5.0	5.1	0.0		0.0
Queue Clearance Time *(g$_s$)*, s				8.4	2.0			
Green Extension Time *(g$_e$)*, s				0.3	1.4	0.0		0.0
Phase Call Probability				0.96	1.00			
Max Out Probability				0.09	0.00			

Movement Group Results	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Assigned Movement				7	4	14	5	2			6	16
Adjusted Flow Rate (*v*), veh/h					122	9	278	433			343	318
Adjusted Saturation Flow Rate (*s*), veh/h/ln					1681	1496	1681	1680			1765	1627
Queue Service Time (*g$_s$*), s					6.4	0.5	0.0	0.4			12.9	10.0
Cycle Queue Clearance Time (*g$_c$*), s					6.4	0.5	0.0	0.4			12.9	10.0
Green Ratio (*g/C*)					0.09	0.09	0.72	0.80			0.57	0.57
Capacity (*c*), veh/h					157	140	674	2673			1012	933
Volume-to-Capacity Ratio *(X)*					0.779	0.064	0.412	0.162			0.339	0.341
Available Capacity (*c$_a$*), veh/h					317	282	805	2673			1012	933
Back of Queue (*Q*), veh/ln (95th percentile)					5.4	0.3	5.2	0.2			6.0	6.3
Queue Storage Ratio *(RQ)* (95th percentile)					0.27	0.04	0.53	0.01			0.23	0.24
Uniform Delay (*d$_1$*), s/veh					39.9	37.2	11.1	0.3			10.0	11.3
Incremental Delay (*d$_2$*), s/veh					11.2	0.3	0.5	0.1			0.9	0.9
Initial Queue Delay (*d$_3$*), s/veh					0.0	0.0	0.0	0.0			0.0	0.0
Control Delay (*d*), s/veh					51.1	37.5	11.6	0.4			10.9	12.2
Level of Service (LOS)					D	D	B	A			B	B

Approach Delay, s/veh / LOS	0.0		50.2	D	4.8	A	11.5	B	
Intersection Delay, s/veh / LOS	11.7				B				

Multimodal Results	EB		WB		NB		SB	
Pedestrian LOS Score / LOS	3.0	C	3.1	C	1.9	A	2.1	B
Bicycle LOS Score / LOS			2.2	B	3.1	C	3.0	C

 HCS 2010™ Streets Version 6.50 Generated: 1/31/2013 11:46:47 AM

This Signals text report was created on January 31, 2013 at 01:13:54

Intersection number = 3, Segment number = 2, Period number = 1

Chapter 18 Summary Input

Cycle Length, s	90											
	EB LT	EB TH	EB RT	WB LT	WB TH	WB RT	NB LT	NB TH	NB RT	SB LT	SB TH	SB RT
Movement	3	8	18	7	4	14	5	2	12	1	6	16
Volume, veh/h	0	0	0	110	0	60	250	390	0	0	460	170
Lanes	0	0	0	0	1	1	1	2	0	0	2	0
Bay Length, ft	0	0	0	0	500	200	250	575	0	0	670	0
Receiving Lanes	0	0	0	1	1	1	2	2	2	2	2	2
SatFlow, vplphg	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800
Lane Width, ft	12	12	12	12	12	12	12	12	12	12	12	12
Heavy Vehicles, %	0	0	0	0	2	2	2	2	0	0	2	0
Grade, %	0	0	0	0	0	0	0	0	0	0	0	0
Buses, per h	0	0	0	0	0	0	0	0	0	0	0	0
Parking, per h	0	0	0	0	0	0	0	0	0	0	0	0
Bicycles, per h	0	0	0	0	0	0	0	0	0	0	0	0
Pedestrians, per h	0	0	0	0	0	0	0	0	0	0	0	0
Heavy Veh Equivalent	2	2	2	2	2	2	2	2	2	2	2	2
Bus Blockage Time	14.4	14.4	14.4	14.4	14.4	14.4	14.4	14.4	14.4	14.4	14.4	14.4
Turns in Shrd Ln, %	0	0	0	0	0	0	0	0	0	0	0	0
Unopposed Lefts, %	0	0	0	0	0	0	0	0	0	0	0	0
Parking Time, sec	18	18	18	18	18	18	18	18	18	18	18	18
Arrival Type	3	3	3	3	3	3	4	4	3	3	4	4
Initial Queue, veh	0	0	0	0	0	0	0	0	0	0	0	0
Speed Limit, mph	35	35	35	45	45	45	35	35	35	35	35	35
Detector Length, ft	40	40	40	40	40	40	40	40	40	40	40	40
StartLostTime, sec	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0
EndUseTime, sec	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0
RTOR, veh/h		0			52			0			35	
I-Factor		1.00			1.00			0.89			0.89	
Walk + PC, sec		0.0			0.0			0.0			0.0	

	EB	EB	WB	WB	NB	NB	SB	SB
Phase	3	8	7	4	5	2	1	6
Movement				LT+TH+RT	LT	LT+TH		TH+RT
Left-Turn Mode	--	Split	--	Split	Pr/Pm	--	--	Perm.
Phase Splits, s	0.0	0.0	0.0	22.0	27.0	68.0	0.0	41.0
Yellow Change, s	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Red Clearance, s	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0
Minimum Green, s	5	5	5	5	15	5	5	5
Lead/Lag					Lag			
Passage Time, s	2.0	2.0	2.0	4.0	4.0	2.0	2.0	2.0
Recall	Off	Off	Off	Off	Off	Min	Off	Min
Dual Entry	No	Yes	No	No	No	Yes	No	Yes
Prot. Right-Turn	False	False	False	False	False	False	False	False

	E/W	N/S
Simultaneous Gap out	Off	Off
Dallas Phasing	Off	Off

Cycle Length, s	90
Offset, s	3
Reference Phase	6
Reference Point	End
Force Mode	Float
Uncoordinated	No
Field Measured Phase Times	No
Exclusive Ped Phase Time, s	0.0

Timer:	1	2	3	4	5	6	7	8
Assigned Phase	0	2	4	0	6	5	0	0
Assigned Left-Turn Mvmt.	0	0	7	0	1	5	0	0
Assigned Through Mvmt.	0	2	4	0	6	0	0	0
Assigned Right-Turn Mvmt.	0	12	14	0	16	0	0	0
Timer w/Pr-Pm From Shared	0	0	0	0	0	0	0	0

Chapter 18 Summary Output

Cycle Length, s	90											
	EB LT	EB TH	EB RT	WB LT	WB TH	WB RT	NB LT	NB TH	NB RT	SB LT	SB TH	SB RT
Movement	3	8	18	7	4	14	5	2	12	1	6	16
Volume, veh/h	0	0	0	122.22	0	8.89	277.78	433.33	0	0	511.11	150
SatFlow, veh/h/ln	0	0	0	0	1764.7	1764.7	1764.7	1764.7	0	0	1764.7	0
Lane Util Factor	1	1	1	1	1	1	1	0.95	1	1	1	1
Capacity, veh/h	0			156.82	0	282.49	674.39	2673.1	0	40	1505.6	439.47
Discharge Vol, veh/h	0	0		122.22	0	8.89	0	433.33	0	0	511.11	0
Prop Arriv On Green	0	0	0	0.09	0	0.09	0.24	0.97	0	0	0.58	0.48
Apprch Vol, veh/h	0	0	0	0	131.11	0	0	711.11	0	0	661.11	0
Apprch Stops, #/veh	0	0	0	0	0.96	0	0	0.17	0	0	0.41	0
Apprch Delay, s/veh	0	0	0	0	50.19	0	0	4.77	0	0	11.53	0

Apprch LOS	D	A	B
Int Delay, s/veh 11.7			
Int LOS B			

Timer Data

Timer:	1	2	3	4	5	6	7	8
Assigned Phase	0	2	4	0	6	5	0	0
Case No	0	4	11	0	8.3	1	0	0
Phase Duration, s	0	76.6	13.4	0	56.62	19.99	0	0
Change Period, s	0	5	5	0	5	5	0	0
Phase Start Time, s	41.38	41.38	27.99	27.99	41.38	8	27.99	27.99
Phase End Time, s	41.38	27.99	41.38	27.99	8	27.99	27.99	27.99
Max Allow Headway, s	0	0	5	0	0	5.08	0	0
Equiv Max Green, s		5	17		5	22		
Queue Clear Time, s			8.4			2		
Green Exten Time, s	0	0	0.33	0	0	1.44	0	0
Prob of Phase Call			0.96			1		
Prob of Max Out			0.09			0		
Left-Turn Movement Data								
Assigned Movement	0	0	7	0	1	5	0	0
Mvmt. Sat Flow, veh/h	0	0	1680.67	0	0	1680.67	0	0
Through Movement Data								
Assigned Movement	0	2	4	0	6	0	0	0
Mvmt. Sat Flow, veh/h	0	3444.71	0	0	2625.2	0	0	0
Right-Turn Movement Data								
Assigned Movement	0	12	14	0	16	0	0	0
Mvmt. Sat Flow, veh/h	0	0	1495.51	0	766.28	0	0	0

Left Lane Group Output

Timer:	1	2	3	4	5	6	7	8
Assigned Phase	0	2	4	0	6	5	0	0
Left Lane Group Data								
Assigned Movement	0	0	7	0	1	5	0	0
Lane Assignment			L+T			L Pr/Pm		
Lanes in Group	0	0	1	0	0	1	0	0
Group Volume, veh/h	0	0	122.22	0	0	277.78	0	0
Group SatFlow, vphpl	0	0	1680.67	0	0	1680.67	0	0
Queue Serve Time, s	0	0	6.4	0	0	0	0	0
Cycle Clear Time, s	0	0	6.4	0	0	0	0	0
Perm SatFlow, vphpl	0	0	0	0	970.12	770.46	0	0
Shared SatFlow, vphpl					0			
Perm Eff Green, s	0	0	0	0	0	49.62	0	0
Perm Serve Time, s	0	0	0	0	0	36.74	0	0
Perm Que Serve Time, s						18.88		
Time to first Blk, s	0	0	0	0	51.62	0	0	0
Serve Time pre Blk, s								
Prop Inside Lane	0	0	1	0	0	1	0	0
Lane Grp Capacity, vph			156.82			674.39		
v/c Ratio	0	0	0.78	0	0	0.41	0	0
Avail Capacity, veh/h			317.46			805.37		
I-Factor	0	0	1	0	0	0.89	0	0
Uniform Delay, s/veh			39.9			11.13		
Increm Delay, s/veh	0	0	11.22	0	0	0.51	0	0
Overflow Delay, s/veh	0	0	0	0	0	0	0	0
Control Delay, s/veh			51.11			11.65		
Group LOS			D			B		
Uniform Stops, #/veh			0.82			0.4		
Increm Stops, #/veh	0	0	0.16	0	0	0.01	0	0
Overflow Stops, #/veh	0	0	0	0	0	0	0	0
Stop Rate, #/veh			0.98			0.41		
Uniform Queue, veh/ln			2.49			2.79		
Increm Queue, veh/ln	0	0	0.49	0	0	0.1	0	0
Overflow Queue, veh/ln	0	0	0	0	0	0	0	0
Back of Queue Factor	0	0	1.8	0	1	1.8	0	0
Back of Queue, veh/ln			5.37			5.19		
Storage Ratio	0	0	0.27	0	0	0.53	0	0
Initial Queue, veh	0	0	0	0	0	0	0	0
Final Queue, veh	0	0	0	0	0	0	0	0
Saturated Delay, s/veh	0	0	0	0	0	0	0	0
Saturated Stops, #/veh	0	0	0	0	0	0	0	0
Saturated Queue, veh/ln	0	0	0	0	0	0	0	0
Saturated Capacity, vph	0	0	0	0	0	0	0	0
Init Que Clear Time, s	0	0	0	0	0	0	0	0

Thru Lane Group Output

Timer:	1	2	3	4	5	6	7	8
Assigned Phase	0	2	4	0	6	5	0	0
Thru Lane Group Data								
Assigned Movement	0	2	4	0	6	0	0	0
Lane Assignment		T			T			
Lanes in Group	0	2	0	0	1	0	0	0
Group Volume, veh/h	0	433.33	0	0	342.67	0	0	0
Group SatFlow, vphpl	0	1680	0	0	1764.71	0	0	0
Queue Serve Time, s	0	0.37	0	0	12.87	0	0	0
Cycle Clear Time, s	0	0.37	0	0	12.87	0	0	0
Lane Grp Capacity, vph		2673.15			1012.08			
v/c Ratio	0	0.16	0	0	0.34	0	0	0

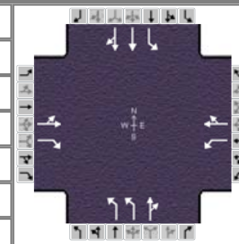
Avail Capacity, veh/h		2673.15			1012.08			
I-Factor	0	0.89	0	0	0.95	0	0	0
Uniform Delay, s/veh		0.25			10.01			
Increm Delay, s/veh	0	0.12	0	0	0.86	0	0	0
Overflow Delay, s/veh	0	0	0	0	0	0	0	0
Control Delay, s/veh		0.37			10.87			
Group LOS		A			B			
Uniform Stops, #/veh		0.01			0.36			
Increm Stops, #/veh	0	0.01	0	0	0.03	0	0	0
Overflow Stops, #/veh	0	0	0	0	0	0	0	0
Stop Rate, #/veh		0.02			0.39			
Uniform Queue, veh/ln		0.05			3.08			
Increm Queue, veh/ln	0	0.04	0	0	0.24	0	0	0
Overflow Queue, veh/ln	0	0	0	0	0	0	0	0
Back of Queue Factor	0	1.8	1	0	1.8	0	0	0
Back of Queue, veh/ln		0.17			5.98			
Storage Ratio	0	0.01	0	0	0.23	0	0	0
Initial Queue, veh	0	0	0	0	0	0	0	0
Final Queue, veh	0	0	0	0	0	0	0	0
Saturated Delay, s/veh	0	0	0	0	0	0	0	0
Saturated Stops, #/veh	0	0	0	0	0	0	0	0
Saturated Queue, veh/ln	0	0	0	0	0	0	0	0
Saturated Capacity, vph	0	0	0	0	0	0	0	0
Init Que Clear Time, s	0	0	0	0	0	0	0	0

Right Lane Group Output

Timer:	1	2	3	4	5	6	7	8
Assigned Phase	0	2	4	0	6	5	0	0
Right Lane Group Data								
Assigned Movement	0	12	14	0	16	0	0	0
Lane Assignment			R		T+R			
Lanes in Group	0	0	1	0	1	0	0	0
Group Volume, veh/h	0	0	8.89	0	318.44	0	0	0
Group SatFlow, vphpl	0	0	1495.51	0	1626.78	0	0	0
Queue Serve Time, s	0	0	0.49	0	10.04	0	0	0
Cycle Clear Time, s	0	0	0.49	0	10.04	0	0	0
Prot RT SatFlow, vphpl			0					
Prot RT Eff Green, s			0					
Prop Outside Lane	0	0	1	0	0.47	0	0	0
Lane Grp Capacity, vph			139.54		932.99			
v/c Ratio	0	0	0.06	0	0.34	0	0	0
Avail Capacity, veh/h			282.49		932.99			
I-Factor	0	0	1	0	0.95	0	0	0
Uniform Delay, s/veh			37.22		11.29			
Increm Delay, s/veh	0	0	0.27	0	0.94	0	0	0
Overflow Delay, s/veh	0	0	0	0	0	0	0	0
Control Delay, s/veh			37.49		12.23			
Group LOS			D		B			
Uniform Stops, #/veh			0.76		0.41			
Increm Stops, #/veh	0	0	0.05	0	0.03	0	0	0
Overflow Stops, #/veh	0	0	0	0	0	0	0	0
Stop Rate, #/veh			0.81		0.44			
Uniform Queue, veh/ln			0.17		3.27			
Increm Queue, veh/ln	0	0	0.01	0	0.24	0	0	0
Overflow Queue, veh/ln	0	0	0	0	0	0	0	0
Back of Queue Factor	0	1	1.8	0	1.8	0	0	0
Back of Queue, veh/ln			0.32		6.32			
Storage Ratio	0	0	0.04	0	0.24	0	0	0
Initial Queue, veh	0	0	0	0	0	0	0	0
Final Queue, veh	0	0	0	0	0	0	0	0
Saturated Delay, s/veh	0	0	0	0	0	0	0	0
Saturated Stops, #/veh	0	0	0	0	0	0	0	0
Saturated Queue, veh/ln	0	0	0	0	0	0	0	0
Saturated Capacity, vph	0	0	0	0	0	0	0	0
Init Que Clear Time, s	0	0	0	0	0	0	0	0

HCS 2010 Signalized Intersection Results Summary

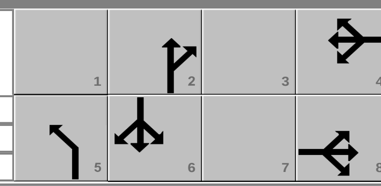
General Information				Intersection Information	
Agency	HDR			Duration, h	0.25
Analyst	MDF	Analysis Date	Jan 30, 2013	Area Type	Other
Jurisdiction		Time Period	AM Peak	PHF	0.90
Intersection	Disk Drive	Analysis Year	2035 No-Build	Analysis Period	1> 7:45
File Name	2035_No-Build_AM_LaCrosse.xus				
Project Description					



Demand Information	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Demand (*v*), veh/h	40	30	100	130	20	20	150	230	70	20	400	50

Signal Information			
Cycle, s	90.0	Reference Phase	6
Offset, s	22	Reference Point	Begin
Uncoordinated	No	Simult. Gap E/W	Off
Force Mode	Float	Simult. Gap N/S	Off

Green	16.0	43.4	15.6	0.0	0.0	0.0
Yellow	4.0	4.0	4.0	0.0	0.0	0.0
Red	1.0	1.0	1.0	0.0	0.0	0.0



Timer Results	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Assigned Phase		8		4	5	2		6
Case Number		7.0		6.0	2.0	4.0		6.3
Phase Duration, s		20.6		20.6	21.0	69.4		48.4
Change Period, *(Y+R$_c$)*, s		5.0		5.0	5.0	5.0		5.0
Max Allow Headway *(MAH)*, s		5.1		5.2	5.1	0.0		0.0
Queue Clearance Time *(g_s)*, s		5.7		14.9	5.8			
Green Extension Time *(g_e)*, s		0.4		0.7	0.6	0.0		0.0
Phase Call Probability		1.00		1.00	1.00			
Max Out Probability		0.00		0.00	0.04			

Movement Group Results	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Assigned Movement	3	8	18	7	4	14	5	2	12	1	6	16
Adjusted Flow Rate (*v*), veh/h		78	20	144	27		167	326		22	247	241
Adjusted Saturation Flow Rate (*s*), veh/h/ln		1559	1510	1359	1730		1648	1716		1060	1782	1725
Queue Service Time (*g_s*), s		2.2	1.0	9.3	1.2		3.8	6.7		0.7	5.5	5.6
Cycle Queue Clearance Time (*g_c*), s		3.7	1.0	12.9	1.2		3.8	6.7		0.8	5.5	5.6
Green Ratio (*g/C*)		0.17	0.17	0.17	0.17		0.18	0.72		0.48	0.48	0.48
Capacity (*c*), veh/h		335	264	263	302		586	1226		589	857	830
Volume-to-Capacity Ratio *(X)*		0.232	0.076	0.550	0.088		0.284	0.266		0.038	0.289	0.291
Available Capacity (*c_a*), veh/h		579	503	479	577		586	1226		589	857	830
Back of Queue (*Q*), veh/ln (95th percentile)		2.7	0.7	5.7	0.9		2.8	3.6		0.3	3.7	3.6
Queue Storage Ratio *(RQ)* (95th percentile)		0.13	0.03	0.29	0.04		0.28	0.13		0.05	0.09	0.09
Uniform Delay (*d_1*), s/veh		32.1	31.1	37.7	31.1		30.9	5.2		8.5	9.4	9.4
Incremental Delay (*d_2*), s/veh		0.5	0.2	2.5	0.2		1.2	0.5		0.1	0.8	0.9
Initial Queue Delay (*d_3*), s/veh		0.0	0.0	0.0	0.0		0.0	0.0		0.0	0.0	0.0
Control Delay (*d*), s/veh		32.6	31.3	40.3	31.3		32.1	5.7		8.7	10.2	10.3
Level of Service (LOS)		C	C	D	C		C	A		A	B	B
Approach Delay, s/veh / LOS	32.4		C	38.9		D	14.7		B	10.2		B
Intersection Delay, s/veh / LOS	17.5						B					

Multimodal Results	EB		WB		NB		SB	
Pedestrian LOS Score / LOS	3.2	C	2.7	B	2.4	B	2.9	C
Bicycle LOS Score / LOS	2.5	B	2.4	B	3.3	C	2.9	C

This Signals text report was created on January 31, 2013 at 01:14:02

Intersection number = 4, Segment number = 3, Period number = 1

Chapter 18 Summary Input

Cycle Length, s 90

	EB LT	EB TH	EB RT	WB LT	WB TH	WB RT	NB LT	NB TH	NB RT	SB LT	SB TH	SB RT
Movement	3	8	18	7	4	14	5	2	12	1	6	16
Volume, veh/h	40	30	100	130	20	20	150	230	70	20	400	50
Lanes	0	1	1	1	1	0	2	1	0	1	2	0
Bay Length, ft	0	500	500	500	500	0	250	670	0	150	1000	0
Receiving Lanes	1	1	1	2	2	2	1	1	1	2	2	2
SatFlow, vplphg	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800
Lane Width, ft	12	12	12	12	12	12	12	12	12	12	12	12
Heavy Vehicles, %	0	1	1	1	1	0	1	1	0	1	1	0
Grade, %	0	0	0	0	0	0	0	0	0	0	0	0
Buses, per h	0	0	0	0	0	0	0	0	0	0	0	0
Parking, per h	0	0	0	0	0	0	0	0	0	0	0	0
Bicycles, per h	0	0	0	0	0	0	0	0	0	0	0	0
Pedestrians, per h	0	0	0	0	0	0	0	0	0	0	0	0
Heavy Veh Equivalent	2	2	2	2	2	2	2	2	2	2	2	2
Bus Blockage Time	14.4	14.4	14.4	14.4	14.4	14.4	14.4	14.4	14.4	14.4	14.4	14.4
Turns in Shrd Ln, %	0	0	0	0	0	0	0	0	0	0	0	0
Unopposed Lefts, %	0	0	0	0	0	0	0	0	0	0	0	0
Parking Time, sec	18	18	18	18	18	18	18	18	18	18	18	18
Arrival Type	3	3	3	3	3	3	4	4	4	4	4	4
Initial Queue, veh	0	0	0	0	0	0	0	0	0	0	0	0
Speed Limit, mph	30	30	30	30	30	30	35	35	35	35	35	35
Detector Length, ft	40	40	40	40	40	40	40	40	40	40	40	40
StartLostTime, sec	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0
EndUseTime, sec	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0
RTOR, veh/h		82			16			7			10	
I-Factor		1.00			1.00			0.99			1.00	
Walk + PC, sec		0.0			0.0			0.0			0.0	

	EB	EB	WB	WB	NB	NB	SB	SB
Phase	3	8	7	4	5	2	1	6
Movement		LT+TH+RT		LT+TH+RT	LT	TH+RT		LT+TH+RT
Left-Turn Mode	--	Perm.	--	Perm.	Prot.	--	--	Perm.
Phase Splits, s	0.0	35.0	0.0	35.0	21.0	55.0	0.0	34.0
Yellow Change, s	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Red Clearance, s	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0
Minimum Green, s	5	5	5	5	10	5	5	5
Lead/Lag					Lead			
Passage Time, s	2.0	4.0	2.0	4.0	4.0	2.0	2.0	2.0
Recall	Off	Off	Off	Off	Max	Min	Off	Min
Dual Entry	No	Yes	No	Yes	No	Yes	No	Yes
Prot. Right-Turn	False	False	False	False	False	False	False	False

	E/W	N/S
Simultaneous Gap out	Off	Off
Dallas Phasing	Off	Off

Cycle Length, s	90
Offset, s	22
Reference Phase	6
Reference Point	Begin
Force Mode	Float
Uncoordinated	No
Field Measured Phase Times	No
Exclusive Ped Phase Time, s	0.0

Timer:	1	2	3	4	5	6	7	8
Assigned Phase	0	2	0	4	5	6	0	8
Assigned Left-Turn Mvmt.	0	0	0	7	5	1	0	3
Assigned Through Mvmt.	0	2	0	4	0	6	0	8
Assigned Right-Turn Mvmt.	0	12	0	14	0	16	0	18
Timer w/Pr-Pm From Shared	0	0	0	0	0	0	0	0

Chapter 18 Summary Output

Cycle Length, s 90

	EB LT	EB TH	EB RT	WB LT	WB TH	WB RT	NB LT	NB TH	NB RT	SB LT	SB TH	SB RT
Movement	3	8	18	7	4	14	5	2	12	1	6	16
Volume, veh/h	44.44	33.33	20	144.44	22.22	4.44	166.67	255.56	70	22.22	444.44	44.44
SatFlow, veh/h/ln	0	1782.2	1782.2	1782.2	1782.2	0	1782.2	1782.2	0	1782.2	1782.2	0
Lane Util Factor	1	1	1	1	1	1	0.97	1	1	1	1	1
Capacity, veh/h	201.4	133.57	503.44	262.84	251.6	50.32	585.99	962.19	263.56	588.77	1534.4	152.76
Discharge Vol, veh/h	0	0	20	144.44	0	0	0	0	0	0	444.44	0
Prop Arriv On Green	0.17	0.17	0.17	0.17	0.17	0.17	0.21	0.68	0.68	0.64	0.64	0.64
Apprch Vol, veh/h	0	97.78	0	0	171.11	0	0	492.22	0	0	511.11	0
Apprch Stops, #/veh	0	0.76	0	0	0.86	0	0	0.42	0	0	0.33	0
Apprch Delay, s/veh	0	32.35	0	0	38.86	0	0	14.67	0	0	10.16	0

Apprch LOS	C	D	B	B
Int Delay, s/veh 17.47				
Int LOS B				

Timer Data								
Timer:	1	2	3	4	5	6	7	8
Assigned Phase	0	2	0	4	5	6	0	8
Case No	0	4	0	6	2	6.3	0	7
Phase Duration, s	0	69.37	0	20.63	21	48.37	0	20.63
Change Period, s	0	5	0	5	5	5	0	5
Phase Start Time, s	76.7	76.7	56	56	76.7	7.7	56	56
Phase End Time, s	76.7	56	56	76.7	7.7	56	56	76.7
Max Allow Headway, s	0	0	0	5.18	5.08	0	0	5.14
Equiv Max Green, s		5		30	16	5		30
Queue Clear Time, s				14.86	5.84			5.71
Green Exten Time, s	0	0	0	0.71	0.59	0	0	0.43
Prob of Phase Call				1	1			1
Prob of Max Out				0	0.04			0
Left-Turn Movement Data								
Assigned Movement	0	0	0	7	5	1	0	3
Mvmt. Sat Flow, veh/h	0	0	0	1358.64	3296.18	1060.41	0	891.13
Through Movement Data								
Assigned Movement	0	2	0	4	0	6	0	8
Mvmt. Sat Flow, veh/h	0	1346.85	0	1441.89	0	3189.65	0	668.35
Right-Turn Movement Data								
Assigned Movement	0	12	0	14	0	16	0	18
Mvmt. Sat Flow, veh/h	0	368.92	0	288.38	0	317.55	0	1510.32

Left Lane Group Output

Timer:	1	2	3	4	5	6	7	8
Assigned Phase	0	2	0	4	5	6	0	8
Left Lane Group Data								
Assigned Movement	0	0	0	7	5	1	0	3
Lane Assignment				L	L (Prot)	L		L+T
Lanes in Group	0	0	0	1	2	1	0	1
Group Volume, veh/h	0	0	0	144.44	166.67	22.22	0	77.78
Group SatFlow, vphpl	0	0	0	1358.64	1648.09	1060.41	0	1559.48
Queue Serve Time, s	0	0	0	9.27	3.84	0.7	0	2.21
Cycle Clear Time, s	0	0	0	12.86	3.84	0.81	0	3.71
Perm SatFlow, vphpl	0	0	0	1358.64	0	1060.41	0	1405.73
Shared SatFlow, vphpl								0
Perm Eff Green, s	0	0	0	15.7	0	43.3	0	15.7
Perm Serve Time, s	0	0	0	12.11	0	43.18	0	14.66
Perm Que Serve Time, s				9.27		0.69		2.21
Time to first Blk, s	0	0	0	0	0	0	0	1.5
Serve Time pre Blk, s								1.5
Prop Inside Lane	0	0	0	1	1	1	0	0.57
Lane Grp Capacity, vph				262.84	585.99	588.77		334.97
v/c Ratio	0	0	0	0.55	0.28	0.04	0	0.23
Avail Capacity, veh/h				478.65	585.99	588.77		578.95
I-Factor	0	0	0	1	0.99	1	0	1
Uniform Delay, s/veh				37.71	30.89	8.54		32.14
Increm Delay, s/veh	0	0	0	2.54	1.21	0.12	0	0.5
Overflow Delay, s/veh	0	0	0	0	0	0	0	0
Control Delay, s/veh				40.25	32.1	8.66		32.64
Group LOS				D	C	A		C
Uniform Stops, #/veh				0.83	0.7	0.27		0.74
Increm Stops, #/veh	0	0	0	0.05	0.05	0.04	0	0.02
Overflow Stops, #/veh	0	0	0	0	0	0	0	0
Stop Rate, #/veh				0.88	0.75	0.31		0.76
Uniform Queue, veh/ln				3	1.46	0.15		1.43
Increm Queue, veh/ln	0	0	0	0.19	0.1	0.02	0	0.05
Overflow Queue, veh/ln	0	0	0	0	0	0	0	0
Back of Queue Factor	0	0	0	1.8	1.8	1.8	0	1.8
Back of Queue, veh/ln				5.74	2.8	0.31		2.67
Storage Ratio	0	0	0	0.29	0.28	0.05	0	0.13
Initial Queue, veh	0	0	0	0	0	0	0	0
Final Queue, veh	0	0	0	0	0	0	0	0
Saturated Delay, s/veh	0	0	0	0	0	0	0	0
Saturated Stops, #/veh	0	0	0	0	0	0	0	0
Saturated Queue, veh/ln	0	0	0	0	0	0	0	0
Saturated Capacity, vph	0	0	0	0	0	0	0	0
Init Que Clear Time, s	0	0	0	0	0	0	0	0

Thru Lane Group Output

Timer:	1	2	3	4	5	6	7	8
Assigned Phase	0	2	0	4	5	6	0	8
Thru Lane Group Data								
Assigned Movement	0	2	0	4	0	6	0	8
Lane Assignment						T		
Lanes in Group	0	0	0	0	0	1	0	0
Group Volume, veh/h	0	0	0	0	0	247.45	0	0
Group SatFlow, vphpl	0	0	0	0	0	1782.18	0	0
Queue Serve Time, s	0	0	0	0	0	5.5	0	0
Cycle Clear Time, s	0	0	0	0	0	5.5	0	0
Lane Grp Capacity, vph						857.34		
v/c Ratio	0	0	0	0	0	0.29	0	0

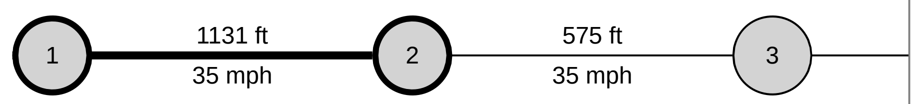
Avail Capacity, veh/h						857.34		
I-Factor	0	0	0	0	0	1	0	0
Uniform Delay, s/veh						9.36		
Increm Delay, s/veh	0	0	0	0	0	0.85	0	0
Overflow Delay, s/veh	0	0	0	0	0	0	0	0
Control Delay, s/veh						10.21		
Group LOS						B		
Uniform Stops, #/veh						0.3		
Increm Stops, #/veh	0	0	0	0	0	0.03	0	0
Overflow Stops, #/veh	0	0	0	0	0	0	0	0
Stop Rate, #/veh						0.33		
Uniform Queue, veh/ln						1.83		
Increm Queue, veh/ln	0	0	0	0	0	0.2	0	0
Overflow Queue, veh/ln	0	0	0	0	0	0	0	0
Back of Queue Factor	0	1	0	1	0	1.8	0	1
Back of Queue, veh/ln						3.66		
Storage Ratio	0	0	0	0	0	0.09	0	0
Initial Queue, veh	0	0	0	0	0	0	0	0
Final Queue, veh	0	0	0	0	0	0	0	0
Saturated Delay, s/veh	0	0	0	0	0	0	0	0
Saturated Stops, #/veh	0	0	0	0	0	0	0	0
Saturated Queue, veh/ln	0	0	0	0	0	0	0	0
Saturated Capacity, vph	0	0	0	0	0	0	0	0
Init Que Clear Time, s	0	0	0	0	0	0	0	0

Right Lane Group Output

Timer:	1	2	3	4	5	6	7	8
Assigned Phase	0	2	0	4	5	6	0	8
Right Lane Group Data								
Assigned Movement	0	12	0	14	0	16	0	18
Lane Assignment		T+R		T+R		T+R		R
Lanes in Group	0	1	0	1	0	1	0	1
Group Volume, veh/h	0	325.56	0	26.67	0	241.43	0	20
Group SatFlow, vphpl	0	1715.77	0	1730.27	0	1725.02	0	1510.32
Queue Serve Time, s	0	6.71	0	1.16	0	5.55	0	1
Cycle Clear Time, s	0	6.71	0	1.16	0	5.55	0	1
Prot RT SatFlow, vphpl								0
Prot RT Eff Green, s								0
Prop Outside Lane	0	0.22	0	0.17	0	0.18	0	1
Lane Grp Capacity, vph		1225.75		301.93		829.86		263.54
v/c Ratio	0	0.27	0	0.09	0	0.29	0	0.08
Avail Capacity, veh/h		1225.75		576.77		829.86		503.44
I-Factor	0	0.99	0	1	0	1	0	1
Uniform Delay, s/veh		5.22		31.15		9.37		31.08
Increm Delay, s/veh	0	0.53	0	0.18	0	0.89	0	0.17
Overflow Delay, s/veh	0	0	0	0	0	0	0	0
Control Delay, s/veh		5.75		31.32		10.26		31.25
Group LOS		A		C		B		C
Uniform Stops, #/veh		0.22		0.71		0.3		0.71
Increm Stops, #/veh	0	0.02	0	0.02	0	0.03	0	0.03
Overflow Stops, #/veh	0	0	0	0	0	0	0	0
Stop Rate, #/veh		0.24		0.74		0.33		0.74
Uniform Queue, veh/ln		1.81		0.48		1.79		0.36
Increm Queue, veh/ln	0	0.18	0	0.01	0	0.2	0	0.01
Overflow Queue, veh/ln	0	0	0	0	0	0	0	0
Back of Queue Factor	0	1.8	0	1.8	0	1.8	0	1.8
Back of Queue, veh/ln		3.59		0.88		3.59		0.66
Storage Ratio	0	0.13	0	0.04	0	0.09	0	0.03
Initial Queue, veh	0	0	0	0	0	0	0	0
Final Queue, veh	0	0	0	0	0	0	0	0
Saturated Delay, s/veh	0	0	0	0	0	0	0	0
Saturated Stops, #/veh	0	0	0	0	0	0	0	0
Saturated Queue, veh/ln	0	0	0	0	0	0	0	0
Saturated Capacity, vph	0	0	0	0	0	0	0	0
Init Que Clear Time, s	0	0	0	0	0	0	0	0

HCS 2010 Urban Street Segment Report

General Information				Streets Information	
Agency	HDR			Number of Intersections	4
Analyst	MDF	Analysis Date	Jan 30, 2013	Number of Segments	3
Jurisdiction		Time Period	AM Peak	Number of Iterations	15
File Name	2035_No-Build_AM_LaCrosse.x	Analysis Year	2035 No-Build	System Cycle Length, s	90
Intersections	Eglin Street	I-90 EB Ramps		Analysis Period	1> 7:45
Project Description					



Basic Segment Information															
Segment	Speed Limit		Through Lanes		Segment Length		Intersection Wid		Length of RM		Percent Curb		Other Delay	
	NB	SB	NB	SB	NB	SB	NB	SB	NB	SB	NB	SB	NB	SB
1	35	35	2	2	1131	1131	60	60	0	0	90	75	0.0	0.0

		Northbound			Southbound		
Segment Output Data		NBL	NBT	NBR	SBL	SBT	SBR
Segment	Movement		2	12	1	6	
1	Bay/Lane Spillback Time, h		never			never	
1	Shared Lane Spillback Time, h				never		
1	Base Free-Flow Speed, mph	40.09			40.16		
1	Running Time, s	22.35			22.30		
1	Running Speed, mph	34.51			34.58		
1	Through Delay, s/veh	8.57			5.74		
1	Travel Speed, mph	24.94			27.50		
1	Stop Rate, stops/veh	0.32			0.24		
1	Spatial Stop Rate, stops/mi	1.51			1.13		
1	Through vol/cap Ratio	0.00			0.27		
1	Percent of Base FFS	62.21			68.49		
1	Level of Service	C			B		
1	Auto Traveler Perception Score	2.59			2.31		

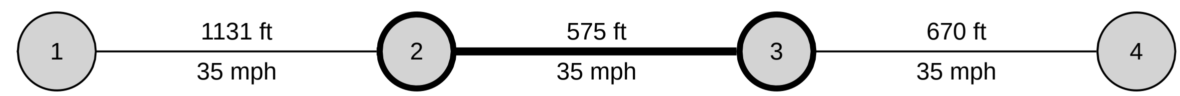
Multimodal Results (Segment)					
1	Pedestrian Segment LOS Score / LOS	3.34	C	3.35	C
1	Bicycle Segment LOS Score / LOS	4.05	D	5.04	F
1	Transit Segment LOS Score / LOS	0.57	A	1.08	A

Facility Output Data	Northbound	Southbound
Facility Travel Time, s	67.36	69.72
Facility Travel Speed, mph	24.05	23.24
Facility Base Free Flow Speed, mph	40.10	40.53
Facility Percent of Base FFS	59.98	57.33
Facility Level of Service	C	C
Facility Auto Traveler Perception Score	2.43	2.41

Multimodal Results (Facility)				
Pedestrian Facility LOS Score / LOS	3.37	C	3.41	C
Bicycle Facility LOS Score / LOS	4.03	D	4.48	E
Transit Facility LOS Score / LOS	0.81	A	1.03	A

HCS 2010 Urban Street Segment Report

General Information				Streets Information	
Agency	HDR			Number of Intersections	4
Analyst	MDF	Analysis Date	Jan 30, 2013	Number of Segments	3
Jurisdiction		Time Period	AM Peak	Number of Iterations	15
File Name	2035_No-Build_AM_LaCrosse.x	Analysis Year	2035 No-Build	System Cycle Length, s	90
Intersections	I-90 EB Ramps	I-90 WB Ramps		Analysis Period	1> 7:45
Project Description					



Basic Segment Information														
Segment	Speed Limit		Through Lanes		Segment Length		Intersection Wid		Length of RM		Percent Curb		Other Delay	
	NB	SB	NB	SB	NB	SB	NB	SB	NB	SB	NB	SB	NB	SB
2	35	35	2	2	575	575	60	60	0	0	100	100	0.0	0.0

		Northbound			Southbound		
Segment Output Data		NBL	NBT	NBR	SBL	SBT	SBR
Segment	Movement		2	12	1	6	
2	Bay/Lane Spillback Time, h		never			never	
2	Shared Lane Spillback Time, h	never			never		
2	Base Free-Flow Speed, mph	41.58			41.58		
2	Running Time, s	14.27			14.24		
2	Running Speed, mph	27.48			27.54		
2	Through Delay, s/veh	0.37			0.53		
2	Travel Speed, mph	26.79			26.56		
2	Stop Rate, stops/veh	0.02			0.02		
2	Spatial Stop Rate, stops/mi	0.16			0.20		
2	Through vol/cap Ratio	0.16			0.19		
2	Percent of Base FFS	64.43			63.87		
2	Level of Service	C			C		
2	Auto Traveler Perception Score	2.16			2.38		

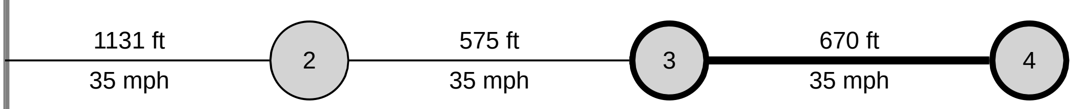
Multimodal Results (Segment)					
2	Pedestrian Segment LOS Score / LOS	3.26	C	3.62	D
2	Bicycle Segment LOS Score / LOS	3.69	D	3.67	D
2	Transit Segment LOS Score / LOS	1.16	A	1.17	A

Facility Output Data	Northbound	Southbound
Facility Travel Time, s	67.36	69.72
Facility Travel Speed, mph	24.05	23.24
Facility Base Free Flow Speed, mph	40.10	40.53
Facility Percent of Base FFS	59.98	57.33
Facility Level of Service	C	C
Facility Auto Traveler Perception Score	2.43	2.41

Multimodal Results (Facility)				
Pedestrian Facility LOS Score / LOS	3.37	C	3.41	C
Bicycle Facility LOS Score / LOS	4.03	D	4.48	E
Transit Facility LOS Score / LOS	0.81	A	1.03	A

HCS 2010 Urban Street Segment Report

General Information				Streets Information	
Agency	HDR			Number of Intersections	4
Analyst	MDF	Analysis Date	Jan 30, 2013	Number of Segments	3
Jurisdiction		Time Period	AM Peak	Number of Iterations	15
File Name	2035_No-Build_AM_LaCrosse.x	Analysis Year	2035 No-Build	System Cycle Length, s	90
Intersections	I-90 WB Ramps	Disk Drive		Analysis Period	1> 7:45
Project Description					



Basic Segment Information															
Segment	Speed Limit		Through Lanes		Segment Length		Intersection Wid		Length of RM		Percent Curb		Other Delay	
	NB	SB	NB	SB	NB	SB	NB	SB	NB	SB	NB	SB	NB	SB
3	35	35	1	2	670	670	60	60	0	0	90	85	0.0	0.0

		Northbound			Southbound		
Segment Output Data		NBL	NBT	NBR	SBL	SBT	SBR
Segment	Movement	5	2			6	16
3	Bay/Lane Spillback Time, h		never			never	
3	Shared Lane Spillback Time, h	never					
3	Base Free-Flow Speed, mph	38.93			40.30		
3	Running Time, s	16.06			15.60		
3	Running Speed, mph	28.45			29.28		
3	Through Delay, s/veh	5.75			11.32		
3	Travel Speed, mph	20.95			16.97		
3	Stop Rate, stops/veh	0.24			0.41		
3	Spatial Stop Rate, stops/mi	1.93			3.20		
3	Through vol/cap Ratio	0.27			0.00		
3	Percent of Base FFS	53.82			42.11		
3	Level of Service	C			D		
3	Auto Traveler Perception Score	2.44			2.65		

Multimodal Results (Segment)					
3	Pedestrian Segment LOS Score / LOS	3.51	D	3.31	C
3	Bicycle Segment LOS Score / LOS	4.30	E	4.23	D
3	Transit Segment LOS Score / LOS	0.92	A	0.83	A

Facility Output Data	Northbound	Southbound
Facility Travel Time, s	67.36	69.72
Facility Travel Speed, mph	24.05	23.24
Facility Base Free Flow Speed, mph	40.10	40.53
Facility Percent of Base FFS	59.98	57.33
Facility Level of Service	C	C
Facility Auto Traveler Perception Score	2.43	2.41

Multimodal Results (Facility)				
Pedestrian Facility LOS Score / LOS	3.37	C	3.41	C
Bicycle Facility LOS Score / LOS	4.03	D	4.48	E
Transit Facility LOS Score / LOS	0.81	A	1.03	A

This Urban Streets text report was created on January 31, 2013 at 01:14:19

Period number = 1

Chapter 17 Input

URBAN STREET PARAMETERS

Number of Intersections	4
Number of Segments	3
Analysis period duration, h	0.25
System cycle length, s	90
Urban street forward direction	NB
Sneakers per cycle, veh	2
Saturation flow rate, veh/h/ln	1900
Stored vehicle lane length, ft	25
Detected vehicle length, ft	17
Queue length percent	95
Critical merge gap, s	3.7
Stop threshold speed, mph	5
Acceleration rate, ft/s/s	3.5
Decel. rate (signal), ft/s/s	4
Left-turn equivalency factor (signal)	1.05
Right-turn equivalency factor (signal)	1.18
Minimum headway in a platoon, s/veh	1.5
Maximum headway in a platoon, s/veh	3.6
Number of iterations	15
Length of left-turn bay (access pt.), ft	250
Decel. rate (access pt.), ft/s/s	6.7
Right-turn speed (access pt.), ft/s	20
Critical gap from major left (access pt.), s	4.1
Follow-up time from major left (access pt.), s	2.2
Right-turn equivalency factor (access pt.)	2.2
Stored heavy vehicle lane length, ft	45
Proportion of peds who push button	0.65
Critical gap for permissive left-turn, s	4.5
Follow-up time for permissive left-turn, s	2.5
Calibration factor for platoon dispersion	0.14
Average ratio of speed limit to free-flow speed	0.94

BASIC SEGMENT INFORMATION

Seg	Spd Lmt		TH Lanes		Seg Len		IntWid		LenRM		PctCurb		Other Dly	
Num	NB	SB	NB	SB	NB	SB	NB	SB	NB	SB	NB	SB	NB	SB
1	35	35	2	2	1131	1131	60	60	0	0	90	75	0	0
2	35	35	2	2	575	575	60	60	0	0	100	100	0	0
3	35	35	1	2	670	670	60	60	0	0	90	85	0	0

ORIGIN-DESTINATION SEED PROPORTIONS - Forward Direction

	Cross LT	Major TH	Cross RT	MidEntry
Downstream Left	0.02	0.1	0.05	0.02
Downstream Thru	0.91	0.78	0.92	0.97
Downstream Right	0.05	0.1	0.02	0.01
Mid-segment Exit	0.02	0.02	0.01	0

ORIGIN-DESTINATION SEED PROPORTIONS - Reverse Direction

	Cross LT	Major TH	Cross RT	MidEntry
Downstream Left	0.02	0.1	0.05	0.02
Downstream Thru	0.91	0.78	0.92	0.97
Downstream Right	0.05	0.1	0.02	0.01
Mid-segment Exit	0.02	0.02	0.01	0

ACCESS POINT DATA

SEGMENT 1

Number of access points: 0

SEGMENT 2

Number of access points: 0

SEGMENT 3

Number of access points: 0

Global Output

SEGMENT DATA

Seg.No.	Movement	NB LT 5	NB TH 2	NB RT 12	SB LT 1	SB TH 6	SB RT 16
1	Bay/Lane Spillback Time, h	999	999	999	999	999	999
1	ShrdLane Spillback Time, h				999		
1	Base Free-Flow Speed, mph		40.09			40.16	
1	Running Time, s		22.35			22.3	
1	Running Speed, mph		34.51			34.58	
1	Through Delay, s/veh		8.57			5.74	
1	Travel Speed, mph		24.94			27.5	
1	Stop Rate, stops/veh		0.32			0.24	
1	Spatial Stop Rate, stops/mi		1.51			1.13	
1	Through vol/cap ratio		0			0.27	
1	Percent of Base FFS		62.21			68.49	
1	Level of Service		C			B	
1	Automobile Perception Score		2.59			2.31	
2	Bay/Lane Spillback Time, h	999	999	999	999	999	999
2	ShrdLane Spillback Time, h	999			999		
2	Base Free-Flow Speed, mph		41.58			41.58	
2	Running Time, s		14.27			14.24	
2	Running Speed, mph		27.48			27.54	
2	Through Delay, s/veh		0.37			0.53	
2	Travel Speed, mph		26.79			26.56	
2	Stop Rate, stops/veh		0.02			0.02	
2	Spatial Stop Rate, stops/mi		0.16			0.2	
2	Through vol/cap ratio		0.16			0.19	
2	Percent of Base FFS		64.43			63.87	
2	Level of Service		C			C	
2	Automobile Perception Score		2.16			2.38	
3	Bay/Lane Spillback Time, h	999	999	999	999	999	999
3	ShrdLane Spillback Time, h	999					
3	Base Free-Flow Speed, mph		38.93			40.3	
3	Running Time, s		16.06			15.6	
3	Running Speed, mph		28.45			29.28	
3	Through Delay, s/veh		5.75			11.32	
3	Travel Speed, mph		20.95			16.97	
3	Stop Rate, stops/veh		0.24			0.41	
3	Spatial Stop Rate, stops/mi		1.93			3.2	
3	Through vol/cap ratio		0.27			0	
3	Percent of Base FFS		53.82			42.11	
3	Level of Service		C			D	
3	Automobile Perception Score		2.44			2.65	

	NB	SB
Facility Travel Time, s	67.36	69.72
Facility Travel Speed, mph	24.05	23.24
Facility Spatial Stop Rate, veh/mi	1.3	1.49
Facility Base Free Flow Speed, mph	40.1	40.53
Facility Percent Base Free Flow Speed	59.98	57.33
Facility Level of Service	C	C
Facility Automobile Perception Score	2.43	2.41
Facility Pedestrian Space	Infinity	Infinity
Facility Pedestrian Travel Speed	4.4	4.4
Facility Pedestrian LOS Score	3.37	3.41
Facility Pedestrian LOS	C	C
Facility Bicycle Travel Speed	10.56	10.59
Facility Bicycle LOS Score	4.03	4.48
Facility Bicycle LOS	D	E
Facility Transit Travel Speed	30.34	31.29
Facility Transit LOS Score	0.81	1.03
Facility Transit LOS	A	A

SPILLBACK TIME, h 999

Multimodal Results

1	Roadway crossing difficulty factor	1.13	1.15
1	Ped LOS Score for Link	2.82	2.61

1	Ped LOS Score for Intersection	2.11	2.18
1	Ped LOS Score for Segment	3.34	3.35
1	Ped Segment LOS	C	C
1	Bicycle LOS Score for Link	3.9	3.88
1	Indicator Variable	1	1
1	Bicycle LOS Score for Intersection	3.12	3.18
1	Number of access point approaches	2	8
1	Segment Length, ft	1131	1131
1	Bicycle LOS Score for Segment	4.05	5.04
1	Bicycle Segment LOS	D	F
1	Transit Wait-Ride Score	3.9	3.54
1	Ped LOS Score for Link	2.82	2.61
1	Transit LOS Score for Segment	0.57	1.08
1	Transit Segment LOS	A	A
2	Roadway crossing difficulty factor	1.11	1.2
2	Ped LOS Score for Link	2.81	2.72
2	Ped LOS Score for Intersection	1.93	2.48
2	Ped LOS Score for Segment	3.26	3.62
2	Ped Segment LOS	C	D
2	Bicycle LOS Score for Link	3.78	3.72
2	Indicator Variable	1	1
2	Bicycle LOS Score for Intersection	3.06	3
2	Number of access point approaches	0	0
2	Segment Length, ft	575	575
2	Bicycle LOS Score for Segment	3.69	3.67
2	Bicycle Segment LOS	D	D
2	Transit Wait-Ride Score	3.51	3.49
2	Ped LOS Score for Link	2.81	2.72
2	Transit LOS Score for Segment	1.16	1.17
2	Transit Segment LOS	A	A
3	Roadway crossing difficulty factor	1.16	1.14
3	Ped LOS Score for Link	2.81	2.64
3	Ped LOS Score for Intersection	2.4	2.13
3	Ped LOS Score for Segment	3.51	3.31
3	Ped Segment LOS	D	C
3	Bicycle LOS Score for Link	3.78	3.77
3	Indicator Variable	1	1
3	Bicycle LOS Score for Intersection	3.29	3.02
3	Number of access point approaches	2	2
3	Segment Length, ft	670	670
3	Bicycle LOS Score for Segment	4.3	4.23
3	Bicycle Segment LOS	E	D
3	Transit Wait-Ride Score	3.67	3.71
3	Ped LOS Score for Link	2.81	2.64
3	Transit LOS Score for Segment	0.92	0.83
3	Transit Segment LOS	A	A

ACCESS POINT DATA

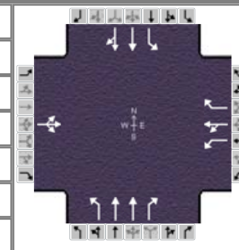
SEGMENT 1

SEGMENT 2

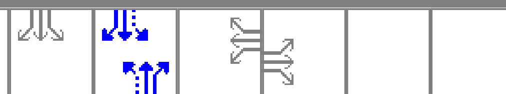
SEGMENT 3

HCS 2010 Signalized Intersection Results Summary

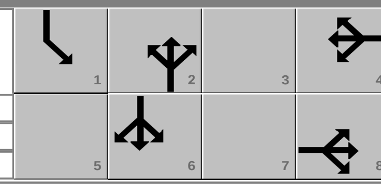
General Information				Intersection Information	
Agency	HDR			Duration, h	0.25
Analyst	MDF	Analysis Date	Jan 30, 2013	Area Type	Other
Jurisdiction		Time Period	PM Peak	PHF	0.90
Intersection	Eglin Street	Analysis Year	2035 No-Build	Analysis Period	1> 16:45
File Name	2035_No-Build_PM_LaCrosse.xus				
Project Description					



Demand Information	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Demand (v), veh/h	10	10	10	350	20	360	10	1130	300	330	1090	10



Signal Information										
Cycle, s	120.0	Reference Phase	2							
Offset, s	114	Reference Point	End	Green	15.1	63.1	18.5	2.1	0.0	0.0
Uncoordinated	No	Simult. Gap E/W	Off	Yellow	3.0	3.9	3.2	3.2	0.0	0.0
Force Mode	Float	Simult. Gap N/S	Off	Red	2.0	1.9	2.0	2.0	0.0	0.0



Timer Results	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Assigned Phase		8		4		2	1	6
Case Number		12.0		9.0		5.3	1.0	4.0
Phase Duration, s		7.3		23.7		68.9	20.1	89.0
Change Period, ($Y+R_c$), s		5.2		5.2		5.8	5.0	5.8
Max Allow Headway (MAH), s		4.1		4.1		0.0	4.1	0.0
Queue Clearance Time (g_s), s		3.5		18.2			14.8	
Green Extension Time (g_e), s		0.0		0.3		0.0	0.2	0.0
Phase Call Probability		0.52		1.00			1.00	
Max Out Probability		0.00		1.00			1.00	

Movement Group Results	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Assigned Movement	3	8	18	7	4	14	5	2	12	1	6	16
Adjusted Flow Rate (v), veh/h		22		233	178	62	11	1256	227	359	600	598
Adjusted Saturation Flow Rate (s), veh/h/ln		1739		1697	1708	1510	470	1697	1510	1697	1782	1776
Queue Service Time (g_s), s		1.5		16.2	11.8	4.4	0.9	26.2	6.7	12.8	19.0	19.1
Cycle Queue Clearance Time (g_c), s		1.5		16.2	11.8	4.4	1.0	26.2	6.7	12.8	19.0	19.1
Green Ratio (g/C)		0.02		0.15	0.15	0.15	0.53	0.53	0.53	0.67	0.69	0.69
Capacity (c), veh/h		30		262	263	233	307	1784	794	383	1236	1232
Volume-to-Capacity Ratio (X)		0.732		0.891	0.675	0.267	0.036	0.704	0.285	0.939	0.486	0.486
Available Capacity (c_a), veh/h		316		280	282	249	307	1784	794	396	1236	1232
Back of Queue (Q), veh/ln (95th percentile)		1.6		13.6	9.2	3.0	0.2	12.0	3.9	11.4	10.4	10.5
Queue Storage Ratio (RQ) (95th percentile)		0.08		1.71	0.46	0.15	0.03	0.30	0.66	0.95	0.23	0.23
Uniform Delay (d_1), s/veh		58.7		49.8	47.9	44.8	8.7	12.4	9.5	22.2	8.8	8.9
Incremental Delay (d_2), s/veh		28.4		26.9	5.8	0.6	0.2	2.4	0.9	23.2	1.0	1.0
Initial Queue Delay (d_3), s/veh		0.0		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Control Delay (d), s/veh		87.1		76.6	53.7	45.4	8.9	14.8	10.4	45.5	9.7	9.8
Level of Service (LOS)		F		E	D	D	A	B	B	D	A	A
Approach Delay, s/veh / LOS	87.1	F		63.9	E		14.1	B		18.0	B	
Intersection Delay, s/veh / LOS	22.9						C					

Multimodal Results	EB		WB		NB		SB	
Pedestrian LOS Score / LOS	3.5	D	3.3	C	3.3	C	2.2	B
Bicycle LOS Score / LOS	2.2	B	3.4	C	3.9	D	3.8	D

This Signals text report was created on January 31, 2013 at 01:16:39

Intersection number = 1, Segment number = 1, Period number = 1

Chapter 18 Summary Input

Cycle Length, s 120

	EB LT	EB TH	EB RT	WB LT	WB TH	WB RT	NB LT	NB TH	NB RT	SB LT	SB TH	SB RT
Movement	3	8	18	7	4	14	5	2	12	1	6	16
Volume, veh/h	10	10	10	350	20	360	10	1130	300	330	1090	10
Lanes	0	1	0	1	1	1	1	2	1	1	2	0
Bay Length, ft	0	500	0	200	500	500	150	1000	150	300	1131	0
Receiving Lanes	1	2	1	1	1	1	2	2	2	2	2	2
SatFlow, vplphg	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800
Lane Width, ft	12	12	12	12	12	12	12	12	12	12	12	12
Heavy Vehicles, %	0	1	0	1	1	1	1	1	1	1	1	0
Grade, %	0	0	0	0	0	0	0	0	0	0	0	0
Buses, per h	0	0	0	0	0	0	0	0	0	0	0	0
Parking, per h	0	0	0	0	0	0	0	0	0	0	0	0
Bicycles, per h	0	0	0	0	0	0	0	0	0	0	0	0
Pedestrians, per h	0	0	0	0	0	0	0	0	0	0	0	0
Heavy Veh Equivalent	2	2	2	2	2	2	2	2	2	2	2	2
Bus Blockage Time	14.4	14.4	14.4	14.4	14.4	14.4	14.4	14.4	14.4	14.4	14.4	14.4
Turns in Shrd Ln, %	0	0	0	40	0	0	0	0	0	0	0	0
Unopposed Lefts, %	0	0	0	0	0	0	0	0	0	0	0	0
Parking Time, sec	18	18	18	18	18	18	18	18	18	18	18	18
Arrival Type	3	3	3	3	3	3	4	4	4	4	4	4
Initial Queue, veh	0	0	0	0	0	0	0	0	0	0	0	0
Speed Limit, mph	30	30	30	30	30	30	35	35	35	35	35	35
Detector Length, ft	40	40	40	40	40	40	40	40	40	40	40	40
StartLostTime, sec	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0
EndUseTime, sec	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0
RTOR, veh/h		10			304			96			0	
I-Factor		1.00			1.00			1.00			0.70	
Walk + PC, sec		0.0			0.0			0.0			0.0	

	EB	EB	WB	WB	NB	NB	SB	SB
Phase	3	8	7	4	5	2	1	6
Movement		LT+TH+RT		LT+TH+RT		LT+TH+RT	LT	LT+TH+RT
Left-Turn Mode	--	Split	--	Split	--	Perm.	Pr/Pm	--
Phase Splits, s	0.0	27.0	0.0	25.0	0.0	47.0	21.0	68.0
Yellow Change, s	4.0	3.2	4.0	3.2	4.0	3.9	3.0	3.9
Red Clearance, s	1.0	2.0	1.0	2.0	1.0	1.9	2.0	1.9
Minimum Green, s	5	4	5	4	5	5	4	5
Lead/Lag							Lead	
Passage Time, s	2.0	3.0	2.0	3.0	2.0	2.0	3.0	2.0
Recall	Off	Off	Off	Off	Off	Min	Off	Min
Dual Entry	No	No	No	No	No	Yes	No	Yes
Prot. Right-Turn	False	False	False	False	False	False	False	False

	E/W	N/S
Simultaneous Gap out	Off	Off
Dallas Phasing	Off	Off

Cycle Length, s	120
Offset, s	114
Reference Phase	2
Reference Point	End
Force Mode	Float
Uncoordinated	No
Field Measured Phase Times	No
Exclusive Ped Phase Time, s	0.0

Timer:	1	2	3	4	5	6	7	8
Assigned Phase	1	2	4	8	0	6	0	0
Assigned Left-Turn Mvmt.	1	5	7	3	0	0	0	0
Assigned Through Mvmt.	0	2	4	8	0	6	0	0
Assigned Right-Turn Mvmt.	0	12	14	18	0	16	0	0
Timer w/Pr-Pm From Shared	0	0	0	0	0	0	0	0

Chapter 18 Summary Output

Cycle Length, s 120

	EB LT	EB TH	EB RT	WB LT	WB TH	WB RT	NB LT	NB TH	NB RT	SB LT	SB TH	SB RT
Movement	3	8	18	7	4	14	5	2	12	1	6	16
Volume, veh/h	11.11	11.11	0	388.89	22.22	62.22	11.11	1255.6	226.67	359.43	1187.2	10.89
SatFlow, veh/h/ln	0	1782.2	0	1782.2	1782.2	1782.2	1782.2	1782.2	1782.2	1782.2	1782.2	0
Lane Util Factor	1	1	1	1	1	1	1	0.95	1	1	1	1
Capacity, veh/h	15.17	0	0	261.76	263.4	232.92	306.65	1784.2	794.15	382.96	2444.8	22.43
Discharge Vol, veh/h	11.11	0	0	0	0	62.22	0	1255.6	0	0	0	0
Prop Arriv On Green	0.02	0.02	0	0.15	0.15	0.15	0.7	0.7	0.7	0.16	0.69	0.57
Apprch Vol, veh/h	0	22.22	0	0	473.33	0	0	1493.3	0	0	1557.6	0
Apprch Stops, #/veh	0	1.23	0	0	1	0	0	0.35	0	0	0.49	0
Apprch Delay, s/veh	0	87.06	0	0	63.9	0	0	14.07	0	0	18.01	0

Apprch LOS	F	E	B	B

Int Delay, s/veh	22.91
Int LOS	C

Timer Data

Timer:	1	2	3	4	5	6	7	8
Assigned Phase	1	2	4	8	0	6	0	0
Case No	1	5.3	9	12	0	4	0	0
Phase Duration, s	20.06	68.94	23.71	7.29	0	89	0	0
Change Period, s	5	5.8	5.2	5.2	0	5.8	0	5.2
Phase Start Time, s	30.8	50.9	119.8	23.51	30.8	30.8	119.8	30.8
Phase End Time, s	50.9	119.8	23.51	30.8	30.8	119.8	119.8	30.8
Max Allow Headway, s	4.08	0	4.14	4.09	0	0	0	0
Equiv Max Green, s	16	5	19.8	21.8		5		
Queue Clear Time, s	14.84		18.18	3.53				
Green Exten Time, s	0.17	0	0.33	0.03	0	0	0	0
Prob of Phase Call	1		1	0.52				
Prob of Max Out	1		1	0				
Left-Turn Movement Data								
Assigned Movement	1	5	7	3	0	0	0	0
Mvmt. Sat Flow, veh/h	1697.31	469.72	1697.31	869.35	0	0	0	0
Through Movement Data								
Assigned Movement	0	2	4	8	0	6	0	0
Mvmt. Sat Flow, veh/h	0	3393.27	1707.92	869.36	0	3526.19	0	0
Right-Turn Movement Data								
Assigned Movement	0	12	14	18	0	16	0	0
Mvmt. Sat Flow, veh/h	0	1510.32	1510.32	0	0	32.35	0	0

Left Lane Group Output

Timer:	1	2	3	4	5	6	7	8
Assigned Phase	1	2	4	8	0	6	0	0
Left Lane Group Data								
Assigned Movement	1	5	7	3	0	0	0	0
Lane Assignment	L Pr/Pm	L	L	L+T				
Lanes in Group	1	1	1	1	0	0	0	0
Group Volume, veh/h	359.43	11.11	233.33	22.22	0	0	0	0
Group SatFlow, vphpl	1697.31	469.72	1697.31	1738.71	0	0	0	0
Queue Serve Time, s	12.84	0.88	16.18	1.53	0	0	0	0
Cycle Clear Time, s	12.84	0.96	16.18	1.53	0	0	0	0
Perm SatFlow, vphpl	358.01	469.72	1697.31	0	0	0	0	0
Shared SatFlow, vphpl								
Perm Eff Green, s	65.1	63.1	0	0	0	0	0	0
Perm Serve Time, s	36.66	63.01	0	0	0	0	0	0
Perm Que Serve Time, s	36.66	0.86						
Time to first Blk, s	0	0	0	0	0	0	0	0
Serve Time pre Blk, s								
Prop Inside Lane	1	1	1	0.5	0	0	0	0
Lane Grp Capacity, vph	382.96	306.65	261.76	30.34				
v/c Ratio	0.94	0.04	0.89	0.73	0	0	0	0
Avail Capacity, veh/h	395.67	306.65	280.06	315.87				
I-Factor	0.7	1	1	1	0	0	0	0
Uniform Delay, s/veh	22.24	8.66	49.76	58.67				
Increm Delay, s/veh	23.24	0.22	26.89	28.38	0	0	0	0
Overflow Delay, s/veh	0	0	0	0	0	0	0	0
Control Delay, s/veh	45.49	8.88	76.65	87.06				
Group LOS	D	A	E	F				
Uniform Stops, #/veh	0.77	0.24	0.87	0.9				
Increm Stops, #/veh	0.21	0.05	0.25	0.32	0	0	0	0
Overflow Stops, #/veh	0	0	0	0	0	0	0	0
Stop Rate, #/veh	0.98	0.29	1.13	1.23				
Uniform Queue, veh/ln	5.12	0.09	6.8	0.67				
Increm Queue, veh/ln	2.47	0.02	1.95	0.24	0	0	0	0
Overflow Queue, veh/ln	0	0	0	0	0	0	0	0
Back of Queue Factor	1.5	1.8	1.55	1.8	0	0	0	0
Back of Queue, veh/ln	11.36	0.19	13.61	1.63				
Storage Ratio	0.95	0.03	1.71	0.08	0	0	0	0
Initial Queue, veh	0	0	0	0	0	0	0	0
Final Queue, veh	0	0	0	0	0	0	0	0
Saturated Delay, s/veh	0	0	0	0	0	0	0	0
Saturated Stops, #/veh	0	0	0	0	0	0	0	0
Saturated Queue, veh/ln	0	0	0	0	0	0	0	0
Saturated Capacity, vph	0	0	0	0	0	0	0	0
Init Que Clear Time, s	0	0	0	0	0	0	0	0

Thru Lane Group Output

Timer:	1	2	3	4	5	6	7	8
Assigned Phase	1	2	4	8	0	6	0	0
Thru Lane Group Data								
Assigned Movement	0	2	4	8	0	6	0	0
Lane Assignment		T	T			T		
Lanes in Group	0	2	1	0	0	1	0	0
Group Volume, veh/h	0	1255.56	177.78	0	0	599.99	0	0
Group SatFlow, vphpl	0	1696.63	1707.92	0	0	1782.18	0	0
Queue Serve Time, s	0	26.2	11.79	0	0	19.03	0	0
Cycle Clear Time, s	0	26.2	11.79	0	0	19.03	0	0
Lane Grp Capacity, vph		1784.22	263.4	0		1235.63		
v/c Ratio	0	0.7	0.67	0	0	0.49	0	0

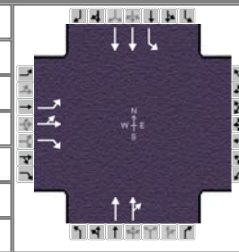
Avail Capacity, veh/h		1784.22	281.81			1235.63		
I-Factor	0	1	1	0	0	0.7	0	0
Uniform Delay, s/veh		12.42	47.91			8.77		
Increm Delay, s/veh	0	2.35	5.75	0	0	0.95	0	0
Overflow Delay, s/veh	0	0	0	0	0	0	0	0
Control Delay, s/veh		14.77	53.66			9.73		
Group LOS		B	D			A		
Uniform Stops, #/veh		0.33	0.84			0.33		
Increm Stops, #/veh	0	0.03	0.07	0	0	0.02	0	0
Overflow Stops, #/veh	0	0	0	0	0	0	0	0
Stop Rate, #/veh		0.36	0.91			0.34		
Uniform Queue, veh/ln		6.93	4.99			6.52		
Increm Queue, veh/ln	0	0.58	0.42	0	0	0.33	0	0
Overflow Queue, veh/ln	0	0	0	0	0	0	0	0
Back of Queue Factor	0	1.6	1.71	1	0	1.52	0	0
Back of Queue, veh/ln		12.01	9.22			10.42		
Storage Ratio	0	0.3	0.46	0	0	0.23	0	0
Initial Queue, veh	0	0	0	0	0	0	0	0
Final Queue, veh	0	0	0	0	0	0	0	0
Saturated Delay, s/veh	0	0	0	0	0	0	0	0
Saturated Stops, #/veh	0	0	0	0	0	0	0	0
Saturated Queue, veh/ln	0	0	0	0	0	0	0	0
Saturated Capacity, vph	0	0	0	0	0	0	0	0
Init Que Clear Time, s	0	0	0	0	0	0	0	0

Right Lane Group Output

Timer:	1	2	3	4	5	6	7	8
Assigned Phase	1	2	4	8	0	6	0	0
Right Lane Group Data								
Assigned Movement	0	12	14	18	0	16	0	0
Lane Assignment		R	R			T+R		
Lanes in Group	0	1	1	0	0	1	0	0
Group Volume, veh/h	0	226.67	62.22	0	0	598.13	0	0
Group SatFlow, vphpl	0	1510.32	1510.32	0	0	1776.36	0	0
Queue Serve Time, s	0	6.73	4.36	0	0	19.14	0	0
Cycle Clear Time, s	0	6.73	4.36	0	0	19.14	0	0
Prot RT SatFlow, vphpl		0	0					
Prot RT Eff Green, s		0	0					
Prop Outside Lane	0	1	1	0	0	0.02	0	0
Lane Grp Capacity, vph		794.15	232.92			1231.61		
v/c Ratio	0	0.29	0.27	0	0	0.49	0	0
Avail Capacity, veh/h		794.15	249.2			1231.61		
I-Factor	0	1	1	0	0	0.7	0	0
Uniform Delay, s/veh		9.51	44.76			8.85		
Increm Delay, s/veh	0	0.9	0.61	0	0	0.96	0	0
Overflow Delay, s/veh	0	0	0	0	0	0	0	0
Control Delay, s/veh		10.41	45.37			9.81		
Group LOS		B	D			A		
Uniform Stops, #/veh		0.26	0.78			0.33		
Increm Stops, #/veh	0	0.03	0.02	0	0	0.02	0	0
Overflow Stops, #/veh	0	0	0	0	0	0	0	0
Stop Rate, #/veh		0.29	0.8			0.35		
Uniform Queue, veh/ln		1.98	1.63			6.57		
Increm Queue, veh/ln	0	0.2	0.04	0	0	0.33	0	0
Overflow Queue, veh/ln	0	0	0	0	0	0	0	0
Back of Queue Factor	0	1.8	1.8	1	0	1.52	0	0
Back of Queue, veh/ln		3.92	3			10.49		
Storage Ratio	0	0.66	0.15	0	0	0.23	0	0
Initial Queue, veh	0	0	0	0	0	0	0	0
Final Queue, veh	0	0	0	0	0	0	0	0
Saturated Delay, s/veh	0	0	0	0	0	0	0	0
Saturated Stops, #/veh	0	0	0	0	0	0	0	0
Saturated Queue, veh/ln	0	0	0	0	0	0	0	0
Saturated Capacity, vph	0	0	0	0	0	0	0	0
Init Que Clear Time, s	0	0	0	0	0	0	0	0

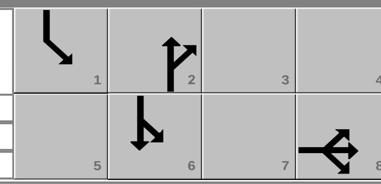
HCS 2010 Signalized Intersection Results Summary

General Information				Intersection Information	
Agency	HDR			Duration, h	0.25
Analyst	MDF	Analysis Date	Jan 30, 2013	Area Type	Other
Jurisdiction		Time Period	PM Peak	PHF	0.90
Intersection	I-90 EB Ramps	Analysis Year	2035 No-Build	Analysis Period	1> 16:45
File Name	2035_No-Build_PM_LaCrosse.xus				
Project Description					



Demand Information	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Demand (*v*), veh/h	250	0	500					1290	210	200	930	

Signal Information										
Cycle, s	120.0	Reference Phase	2							
Offset, s	28	Reference Point	End	Green	60.0	11.0	34.5	0.0	0.0	0.0
Uncoordinated	No	Simult. Gap E/W	Off	Yellow	4.5	4.5	4.0	0.0	0.0	0.0
Force Mode	Float	Simult. Gap N/S	Off	Red	0.5	0.5	0.5	0.0	0.0	0.0



Timer Results	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Assigned Phase		8				2	1	6
Case Number		9.0				8.3	1.0	4.0
Phase Duration, s		39.0				65.0	16.0	81.0
Change Period, *(Y+Rc)*, s		4.5				5.0	5.0	5.0
Max Allow Headway *(MAH)*, s		5.1				0.0	5.1	0.0
Queue Clearance Time *(gs)*, s		36.5					13.0	
Green Extension Time *(ge)*, s		0.0				0.0	0.0	0.0
Phase Call Probability		1.00					1.00	
Max Out Probability		1.00					1.00	

Movement Group Results	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Assigned Movement	3	8	18					2	12	1	6	
Adjusted Flow Rate *(v)*, veh/h	278	0	466					731	925	222	1033	
Adjusted Saturation Flow Rate *(s)*, veh/h/ln	1697	1782	1510					1378	1708	1697	1697	
Queue Service Time *(gs)*, s	16.7	0.0	34.5					54.1	60.0	11.0	1.9	
Cycle Queue Clearance Time *(gc)*, s	16.7	0.0	34.5					54.1	60.0	11.0	1.9	
Green Ratio *(g/C)*	0.29	0.29	0.29					0.50	0.50	0.57	0.63	
Capacity *(c)*, veh/h	488	512	434					689	854	216	2149	
Volume-to-Capacity Ratio *(X)*	0.569	0.000	1.072					1.061	1.084	1.031	0.481	
Available Capacity *(ca)*, veh/h	488	512	434					689	854	216	2149	
Back of Queue *(Q)*, veh/ln (95th percentile)	11.2	0.0	28.4					29.3	37.6	11.0	0.8	
Queue Storage Ratio *(RQ)* (95th percentile)	1.41	0.00	3.58					0.65	0.84	1.39	0.03	
Uniform Delay *(d1)*, s/veh	36.4	0.0	42.8					18.7	18.6	47.0	0.6	
Incremental Delay *(d2)*, s/veh	1.9	0.0	63.8					45.8	51.1	45.5	0.3	
Initial Queue Delay *(d3)*, s/veh	0.0	0.0	0.0					0.0	0.0	0.0	0.0	
Control Delay *(d)*, s/veh	38.4	0.0	106.6					64.5	69.7	92.5	0.9	
Level of Service (LOS)	D		F					F	F	F	A	
Approach Delay, s/veh / LOS	81.1	F		0.0			67.4	E		17.1	B	
Intersection Delay, s/veh / LOS	52.9						D					

Multimodal Results	EB		WB		NB		SB	
Pedestrian LOS Score / LOS	3.2	C	3.2	C	2.1	B	2.5	B
Bicycle LOS Score / LOS	3.3	C			3.8	D	3.5	D

 HCS 2010™ Streets Version 6.50 Generated: 1/31/2013 11:50:00 AM

This Signals text report was created on January 31, 2013 at 01:16:52

Intersection number = 2, Segment number = 1, Period number = 1

Chapter 18 Summary Input

Cycle Length, s 120

	EB LT	EB TH	EB RT	WB LT	WB TH	WB RT	NB LT	NB TH	NB RT	SB LT	SB TH	SB RT
Movement	3	8	18	7	4	14	5	2	12	1	6	16
Volume, veh/h	250	0	500	0	0	0	0	1290	210	200	930	0
Lanes	1	1	1	0	0	0	0	2	0	1	2	0
Bay Length, ft	200	500	200	0	0	0	0	1131	0	200	575	0
Receiving Lanes	1	1	1	0	0	0	2	2	2	2	2	2
SatFlow, vplphg	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800
Lane Width, ft	12	12	12	12	12	12	12	12	12	12	12	12
Heavy Vehicles, %	1	1	1	0	0	0	0	1	0	1	1	0
Grade, %	0	0	0	0	0	0	0	0	0	0	0	0
Buses, per h	0	0	0	0	0	0	0	0	0	0	0	0
Parking, per h	0	0	0	0	0	0	0	0	0	0	0	0
Bicycles, per h	0	0	0	0	0	0	0	0	0	0	0	0
Pedestrians, per h	0	0	0	0	0	0	0	0	0	0	0	0
Heavy Veh Equivalent	2	2	2	2	2	2	2	2	2	2	2	2
Bus Blockage Time	14.4	14.4	14.4	14.4	14.4	14.4	14.4	14.4	14.4	14.4	14.4	14.4
Turns in Shrd Ln, %	0	0	0	0	0	0	0	0	0	0	0	0
Unopposed Lefts, %	0	0	0	0	0	0	0	0	0	0	0	0
Parking Time, sec	18	18	18	18	18	18	18	18	18	18	18	18
Arrival Type	3	3	3	3	3	3	3	4	4	4	4	3
Initial Queue, veh	0	0	0	0	0	0	0	0	0	0	0	0
Speed Limit, mph	45	45	45	35	35	35	35	35	35	35	35	35
Detector Length, ft	40	40	40	40	40	40	40	40	40	40	40	40
StartLostTime, sec	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0
EndUseTime, sec	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0
RTOR, veh/h		81			0			9			0	
I-Factor		1.00			1.00			0.37			0.37	
Walk + PC, sec		0.0			0.0			0.0			0.0	

	EB	EB	WB	WB	NB	NB	SB	SB
Phase	3	8	7	4	5	2	1	6
Movement		LT+TH+RT				TH+RT	LT	LT+TH
Left-Turn Mode	--	Split	--	Split	--	Perm.	Pr/Pm	--
Phase Splits, s	0.0	39.0	0.0	0.0	0.0	65.0	16.0	81.0
Yellow Change, s	4.0	4.0	4.0	4.0	4.0	4.5	4.5	4.5
Red Clearance, s	1.0	0.5	1.0	1.0	1.0	0.5	0.5	0.5
Minimum Green, s	5	5	5	5	5	5	10	5
Lead/Lag							Lag	
Passage Time, s	2.0	4.0	2.0	2.0	2.0	2.0	4.0	2.0
Recall	Off	Off	Off	Off	Off	Min	Off	Min
Dual Entry	No	No	No	Yes	No	Yes	No	Yes
Prot. Right-Turn	False	False	False	False	False	False	False	False

	E/W	N/S
Simultaneous Gap out	Off	Off
Dallas Phasing	Off	Off

Cycle Length, s	120
Offset, s	28
Reference Phase	2
Reference Point	End
Force Mode	Float
Uncoordinated	No
Field Measured Phase Times	No
Exclusive Ped Phase Time, s	0.0

Timer:	1	2	3	4	5	6	7	8
Assigned Phase	2	1	0	8	0	6	0	0
Assigned Left-Turn Mvmt.	5	1	0	3	0	0	0	0
Assigned Through Mvmt.	2	0	0	8	0	6	0	0
Assigned Right-Turn Mvmt.	12	0	0	18	0	16	0	0
Timer w/Pr-Pm From Shared	0	0	0	0	0	0	0	0

Chapter 18 Summary Output

Cycle Length, s 120

	EB LT	EB TH	EB RT	WB LT	WB TH	WB RT	NB LT	NB TH	NB RT	SB LT	SB TH	SB RT
Movement	3	8	18	7	4	14	5	2	12	1	6	16
Volume, veh/h	277.78	0	465.56	0	0	0	0	1433.3	223.33	222.22	1033.3	0
SatFlow, veh/h/ln	1782.2	1782.2	1782.2	0	0	0	0	1782.2	0	1782.2	1782.2	0
Lane Util Factor	1	1	1	1	1	1	1	0.77	1	1	0.95	1
Capacity, veh/h	487.98	512.38	434.22	0			30	1337	206.12	215.59	2149.1	0
Discharge Vol, veh/h	277.78	0	434.22	0	0		0	1337	0	0	1033.3	0
Prop Arriv On Green	0.29	0	0.29	0	0	0	0	0.69	0.69	0.19	0.97	0
Apprch Vol, veh/h	0	743.33	0	0	0	0	0	1656.7	0	0	1255.6	0
Apprch Stops, #/veh	0	1.12	0	0	0	0	0	0.94	0	0	0.09	0
Apprch Delay, s/veh	0	81.08	0	0	0	0	0	67.42	0	0	17.13	0

Apprch LOS F E B
Int Delay, s/veh 52.93
Int LOS D

Timer Data

Timer:	1	2	3	4	5	6	7	8
Assigned Phase	2	1	0	8	0	6	0	0
Case No	8.3	1	0	9	0	4	0	0
Phase Duration, s	65	16	0	39	0	81	0	0
Change Period, s	5	5	0	4.5	0	5	0	0
Phase Start Time, s	88	33	49	49	88	88	49	88
Phase End Time, s	33	49	49	88	88	49	49	88
Max Allow Headway, s	0	5.08	0	5.15	0	0	0	0
Equiv Max Green, s	5	11		34.5		5		
Queue Clear Time, s		13		36.5				
Green Exten Time, s	0	0	0	0	0	0	0	0
Prob of Phase Call		1		1				
Prob of Max Out		1		1				
Left-Turn Movement Data								
Assigned Movement	5	1	0	3	0	0	0	0
Mvmt. Sat Flow, veh/h	0	1697.31	0	1697.31	0	0	0	0
Through Movement Data								
Assigned Movement	2	0	0	8	0	6	0	0
Mvmt. Sat Flow, veh/h	3077.92	0	0	1782.18	0	3478.81	0	0
Right-Turn Movement Data								
Assigned Movement	12	0	0	18	0	16	0	0
Mvmt. Sat Flow, veh/h	412.24	0	0	1510.32	0	0	0	0

Left Lane Group Output

Timer:	1	2	3	4	5	6	7	8
Assigned Phase	2	1	0	8	0	6	0	0
Left Lane Group Data								
Assigned Movement	5	1	0	3	0	0	0	0
Lane Assignment		L Pr/Pm		L				
Lanes in Group	0	1	0	1	0	0	0	0
Group Volume, veh/h	0	222.22	0	277.78	0	0	0	0
Group SatFlow, vphpl	0	1697.31	0	1697.31	0	0	0	0
Queue Serve Time, s	0	11	0	16.73	0	0	0	0
Cycle Clear Time, s	0	11	0	16.73	0	0	0	0
Perm SatFlow, vphpl	554.55	302.56	0	1697.31	0	0	0	0
Shared SatFlow, vphpl	0							
Perm Eff Green, s	0	58	0	0	0	0	0	0
Perm Serve Time, s	0	0	0	0	0	0	0	0
Perm Que Serve Time, s		0						
Time to first Blk, s	60	0	0	0	0	0	0	0
Serve Time pre Blk, s								
Prop Inside Lane	0	1	0	1	0	0	0	0
Lane Grp Capacity, vph		215.59		487.98				
v/c Ratio	0	1.03	0	0.57	0	0	0	0
Avail Capacity, veh/h		215.59		487.98				
I-Factor	0	0.37	0	1	0	0	0	0
Uniform Delay, s/veh		46.98		36.42				
Increm Delay, s/veh	0	45.54	0	1.95	0	0	0	0
Overflow Delay, s/veh	0	0	0	0	0	0	0	0
Control Delay, s/veh		92.52		38.37				
Group LOS		F		D				
Uniform Stops, #/veh		0		0.72				
Increm Stops, #/veh	0	0.37	0	0.03	0	0	0	0
Overflow Stops, #/veh	0	0	0	0	0	0	0	0
Stop Rate, #/veh		0.37		0.74				
Uniform Queue, veh/ln		5.33		6.63				
Increm Queue, veh/ln	0	2.73	0	0.26	0	0	0	0
Overflow Queue, veh/ln	0	0	0	0	0	0	0	0
Back of Queue Factor	1	1.37	0	1.62	0	0	0	0
Back of Queue, veh/ln		11.04		11.2				
Storage Ratio	0	1.39	0	1.41	0	0	0	0
Initial Queue, veh	0	0	0	0	0	0	0	0
Final Queue, veh	0	1.66	0	0	0	0	0	0
Saturated Delay, s/veh	0	0	0	0	0	0	0	0
Saturated Stops, #/veh	0	0	0	0	0	0	0	0
Saturated Queue, veh/ln	0	0	0	0	0	0	0	0
Saturated Capacity, vph	0	0	0	0	0	0	0	0
Init Que Clear Time, s	0	0.26	0	0	0	0	0	0

Thru Lane Group Output

Timer:	1	2	3	4	5	6	7	8
Assigned Phase	2	1	0	8	0	6	0	0
Thru Lane Group Data								
Assigned Movement	2	0	0	8	0	6	0	0
Lane Assignment	T			T		T		
Lanes in Group	1	0	0	1	0	2	0	0
Group Volume, veh/h	731.36	0	0	0	0	1033.33	0	0
Group SatFlow, vphpl	1378.3	0	0	1782.18	0	1696.63	0	0
Queue Serve Time, s	54.08	0	0	0	0	1.9	0	0
Cycle Clear Time, s	54.08	0	0	0	0	1.9	0	0
Lane Grp Capacity, vph	689.15			512.38		2149.07		
v/c Ratio	1.06	0	0	0	0	0.48	0	0

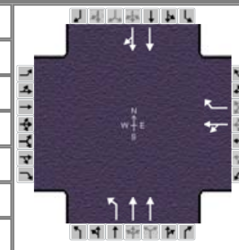
Avail Capacity, veh/h	689.15			512.38		2149.07		
I-Factor	0.67	0	0	0	0	0.37	0	0
Uniform Delay, s/veh	18.66			0		0.63		
Increm Delay, s/veh	45.84	0	0	0	0	0.29	0	0
Overflow Delay, s/veh	0	0	0	0	0	0	0	0
Control Delay, s/veh	64.49			0		0.92		
Group LOS	F					A		
Uniform Stops, #/veh	0.56			0		0.02		
Increm Stops, #/veh	0.36	0	0	0	0	0.01	0	0
Overflow Stops, #/veh	0	0	0	0	0	0	0	0
Stop Rate, #/veh	0.92			0		0.03		
Uniform Queue, veh/ln	12.93			0		0.35		
Increm Queue, veh/ln	8.78	0	0	0	0	0.09	0	0
Overflow Queue, veh/ln	0	0	0	0	0	0	0	0
Back of Queue Factor	1.35	0	0	1	0	1.8	0	0
Back of Queue, veh/ln	29.32			0		0.79		
Storage Ratio	0.65	0	0	0	0	0.03	0	0
Initial Queue, veh	0	0	0	0	0	0	0	0
Final Queue, veh	10.55	0	0	0	0	0	0	0
Saturated Delay, s/veh	0	0	0	0	0	0	0	0
Saturated Stops, #/veh	0	0	0	0	0	0	0	0
Saturated Queue, veh/ln	0	0	0	0	0	0	0	0
Saturated Capacity, vph	0	0	0	0	0	0	0	0
Init Que Clear Time, s	0.27	0	0	0	0	0	0	0

Right Lane Group Output

Timer:	1	2	3	4	5	6	7	8
Assigned Phase	2	1	0	8	0	6	0	0
Right Lane Group Data								
Assigned Movement	12	0	0	18	0	16	0	0
Lane Assignment	T+R			R				
Lanes in Group	1	0	0	1	0	0	0	0
Group Volume, veh/h	925.31	0	0	465.56	0	0	0	0
Group SatFlow, vphpl	1707.98	0	0	1510.32	0	0	0	0
Queue Serve Time, s	60	0	0	34.5	0	0	0	0
Cycle Clear Time, s	60	0	0	34.5	0	0	0	0
Prot RT SatFlow, vphpl				0				
Prot RT Eff Green, s				0				
Prop Outside Lane	0.24	0	0	1	0	0	0	0
Lane Grp Capacity, vph	854			434.22				
v/c Ratio	1.08	0	0	1.07	0	0	0	0
Avail Capacity, veh/h	854			434.22				
I-Factor	0.67	0	0	1	0	0	0	0
Uniform Delay, s/veh	18.63			42.75				
Increm Delay, s/veh	51.09	0	0	63.82	0	0	0	0
Overflow Delay, s/veh	0	0	0	0	0	0	0	0
Control Delay, s/veh	69.73			106.57				
Group LOS	F			F				
Uniform Stops, #/veh	0.56			0.84				
Increm Stops, #/veh	0.39	0	0	0.5	0	0	0	0
Overflow Stops, #/veh	0	0	0	0	0	0	0	0
Stop Rate, #/veh	0.96			1.34				
Uniform Queue, veh/ln	16.04			12.17				
Increm Queue, veh/ln	12.12	0	0	7.7	0	0	0	0
Overflow Queue, veh/ln	0	0	0	0	0	0	0	0
Back of Queue Factor	1.34	0	0	1.43	0	1	0	0
Back of Queue, veh/ln	37.62			28.37				
Storage Ratio	0.84	0	0	3.58	0	0	0	0
Initial Queue, veh	0	0	0	0	0	0	0	0
Final Queue, veh	17.83	0	0	7.83	0	0	0	0
Saturated Delay, s/veh	0	0	0	0	0	0	0	0
Saturated Stops, #/veh	0	0	0	0	0	0	0	0
Saturated Queue, veh/ln	0	0	0	0	0	0	0	0
Saturated Capacity, vph	0	0	0	0	0	0	0	0
Init Que Clear Time, s	0.27	0	0	0.27	0	0	0	0

HCS 2010 Signalized Intersection Results Summary

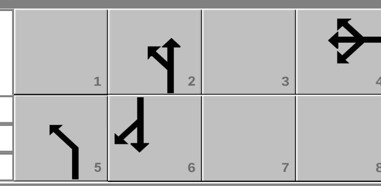
General Information				Intersection Information	
Agency	HDR			Duration, h	0.25
Analyst	MDF	Analysis Date	Jan 30, 2013	Area Type	Other
Jurisdiction		Time Period	PM Peak	PHF	0.90
Intersection	I-90 WB Ramps	Analysis Year	2035 No-Build	Analysis Period	1> 16:45
File Name	2035_No-Build_PM_LaCrosse.xus				
Project Description					



Demand Information	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Demand (*v*), veh/h				220	0	200	530	1010			910	240

Signal Information			
Cycle, s	120.0	Reference Phase	6
Offset, s	32	Reference Point	End
Uncoordinated	No	Simult. Gap E/W	Off
Force Mode	Float	Simult. Gap N/S	Off

Green	51.6	35.4	18.0	0.0	0.0	0.0
Yellow	4.0	4.0	4.0	0.0	0.0	0.0
Red	1.0	1.0	1.0	0.0	0.0	0.0



Timer Results	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Assigned Phase				4	5	2		6
Case Number				11.0	1.0	4.0		8.3
Phase Duration, s				23.0	40.4	97.0		56.6
Change Period, *(Y+R$_c$)*, s				5.0	5.0	5.0		5.0
Max Allow Headway *(MAH)*, s				5.1	5.1	0.0		0.0
Queue Clearance Time *(g$_s$)*, s				19.2	34.2			
Green Extension Time *(g$_e$)*, s				0.0	1.2	0.0		0.0
Phase Call Probability				1.00	1.00			
Max Out Probability				1.00	1.00			

Movement Group Results	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Assigned Movement				7	4	14	5	2			6	16
Adjusted Flow Rate (*v*), veh/h					244	87	556	1059			649	609
Adjusted Saturation Flow Rate (*s*), veh/h/ln					1697	1510	1697	1697			1782	1661
Queue Service Time (*g$_s$*), s					17.2	6.2	32.2	10.6			40.3	37.2
Cycle Queue Clearance Time (*g$_c$*), s					17.2	6.2	32.2	10.6			40.3	37.2
Green Ratio (*g/C*)					0.15	0.15	0.71	0.77			0.43	0.43
Capacity (*c*), veh/h					255	227	595	2602			766	714
Volume-to-Capacity Ratio *(X)*					0.960	0.383	0.934	0.407			0.847	0.852
Available Capacity (*c$_a$*), veh/h					255	227	632	2602			766	714
Back of Queue *(Q)*, veh/ln (95th percentile)					15.5	4.2	20.4	3.5			22.9	20.2
Queue Storage Ratio *(RQ)* (95th percentile)					0.78	0.53	2.05	0.15			0.86	0.76
Uniform Delay (*d$_1$*), s/veh					50.6	46.0	48.0	3.7			26.9	23.6
Incremental Delay (*d$_2$*), s/veh					45.5	1.5	3.6	0.1			9.8	10.8
Initial Queue Delay (*d$_3$*), s/veh					0.0	0.0	0.0	0.0			0.0	0.0
Control Delay (*d*), s/veh					96.1	47.5	51.6	3.7			36.7	34.4
Level of Service (LOS)					F	D	D	A			D	C
Approach Delay, s/veh / LOS	0.0			83.4	F		20.2	C		35.6	D	
Intersection Delay, s/veh / LOS	32.8						C					

Multimodal Results	EB		WB		NB		SB	
Pedestrian LOS Score / LOS	3.3	C	3.1	C	2.2	B	2.2	B
Bicycle LOS Score / LOS			2.5	B	3.9	D	3.5	D

 HCS 2010™ Streets Version 6.50 Generated: 1/31/2013 11:50:00 AM

This Signals text report was created on January 31, 2013 at 01:16:59

Intersection number = 3, Segment number = 2, Period number = 1

Chapter 18 Summary Input

Cycle Length, s	120											
	EB LT	EB TH	EB RT	WB LT	WB TH	WB RT	NB LT	NB TH	NB RT	SB LT	SB TH	SB RT
Movement	3	8	18	7	4	14	5	2	12	1	6	16
Volume, veh/h	0	0	0	220	0	200	530	1010	0	0	910	240
Lanes	0	0	0	0	1	1	1	2	0	0	2	0
Bay Length, ft	0	0	0	0	500	200	250	575	0	0	670	0
Receiving Lanes	0	0	0	1	1	1	2	2	2	2	2	2
SatFlow, vplphg	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800
Lane Width, ft	12	12	12	12	12	12	12	12	12	12	12	12
Heavy Vehicles, %	0	0	0	0	1	1	1	1	0	0	1	0
Grade, %	0	0	0	0	0	0	0	0	0	0	0	0
Buses, per h	0	0	0	0	0	0	0	0	0	0	0	0
Parking, per h	0	0	0	0	0	0	0	0	0	0	0	0
Bicycles, per h	0	0	0	0	0	0	0	0	0	0	0	0
Pedestrians, per h	0	0	0	0	0	0	0	0	0	0	0	0
Heavy Veh Equivalent	2	2	2	2	2	2	2	2	2	2	2	2
Bus Blockage Time	14.4	14.4	14.4	14.4	14.4	14.4	14.4	14.4	14.4	14.4	14.4	14.4
Turns in Shrd Ln, %	0	0	0	0	0	0	0	0	0	0	0	0
Unopposed Lefts, %	0	0	0	0	0	0	0	0	0	0	0	0
Parking Time, sec	18	18	18	18	18	18	18	18	18	18	18	18
Arrival Type	3	3	3	3	3	3	4	4	3	3	4	4
Initial Queue, veh	0	0	0	0	0	0	0	0	0	0	0	0
Speed Limit, mph	35	35	35	45	45	45	35	35	35	35	35	35
Detector Length, ft	40	40	40	40	40	40	40	40	40	40	40	40
StartLostTime, sec	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0
EndUseTime, sec	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0
RTOR, veh/h		0			122			0			18	
I-Factor		1.00			1.00			0.11			0.11	
Walk + PC, sec		0.0			0.0			0.0			0.0	

	EB	EB	WB	WB	NB	NB	SB	SB
Phase	3	8	7	4	5	2	1	6
Movement				LT+TH+RT	LT	LT+TH		TH+RT
Left-Turn Mode	--	Split	--	Split	Pr/Pm	--	--	Perm.
Phase Splits, s	0.0	0.0	0.0	23.0	43.0	97.0	0.0	54.0
Yellow Change, s	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Red Clearance, s	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0
Minimum Green, s	5	5	5	5	15	5	5	5
Lead/Lag					Lag			
Passage Time, s	2.0	2.0	2.0	4.0	4.0	2.0	2.0	2.0
Recall	Off	Off	Off	Off	Off	Min	Off	Min
Dual Entry	No	Yes	No	No	No	Yes	No	Yes
Prot. Right-Turn	False	False	False	False	False	False	False	False

	E/W	N/S
Simultaneous Gap out	Off	Off
Dallas Phasing	Off	Off

Cycle Length, s	120
Offset, s	32
Reference Phase	6
Reference Point	End
Force Mode	Float
Uncoordinated	No
Field Measured Phase Times	No
Exclusive Ped Phase Time, s	0.0

Timer:	1	2	3	4	5	6	7	8
Assigned Phase	0	2	4	0	6	5	0	0
Assigned Left-Turn Mvmt.	0	0	7	0	1	5	0	0
Assigned Through Mvmt.	0	2	4	0	6	0	0	0
Assigned Right-Turn Mvmt.	0	12	14	0	16	0	0	0
Timer w/Pr-Pm From Shared	0	0	0	0	0	0	0	0

Chapter 18 Summary Output

Cycle Length, s	120											
	EB LT	EB TH	EB RT	WB LT	WB TH	WB RT	NB LT	NB TH	NB RT	SB LT	SB TH	SB RT
Movement	3	8	18	7	4	14	5	2	12	1	6	16
Volume, veh/h	0	0	0	244.44	0	86.67	555.74	1059.1	0	0	1011.1	246.67
SatFlow, veh/h/ln	0	0	0	0	1782.2	1782.2	1782.2	1782.2	0	0	1782.2	0
Lane Util Factor	1	1	1	1	1	1	1	0.95	1	1	1	1
Capacity, veh/h	0			254.6	0	226.55	595.12	2601.5	0	30	1191.3	289.53
Discharge Vol, veh/h	0	0		244.44	0	86.67	0	1059.1	0	0	1011.1	0
Prop Arriv On Green	0	0	0	0.15	0	0.15	0.13	0.81	0	0	0.49	0.64
Apprch Vol, veh/h	0	0	0	0	331.11	0	0	1614.8	0	0	1257.8	0
Apprch Stops, #/veh	0	0	0	0	1.14	0	0	0.11	0	0	0.74	0
Apprch Delay, s/veh	0	0	0	0	83.41	0	0	20.19	0	0	35.61	0

Apprch LOS F C D
Int Delay, s/veh 32.78
Int LOS C

Timer Data

Timer:	1	2	3	4	5	6	7	8
Assigned Phase	0	2	4	0	6	5	0	0
Case No	0	4	11	0	8.3	1	0	0
Phase Duration, s	0	97	23	0	56.61	40.39	0	0
Change Period, s	0	5	5	0	5	5	0	0
Phase Start Time, s	100.39	100.39	77.39	77.39	100.39	37	77.39	77.39
Phase End Time, s	100.39	77.39	100.39	77.39	37	77.39	77.39	77.39
Max Allow Headway, s	0	0	5.05	0	0	5.08	0	0
Equiv Max Green, s		5	18		5	38		
Queue Clear Time, s			19.16			34.15		
Green Exten Time, s	0	0	0	0	0	1.24	0	0
Prob of Phase Call			1			1		
Prob of Max Out			1			1		
Left-Turn Movement Data								
Assigned Movement	0	0	7	0	1	5	0	0
Mvmt. Sat Flow, veh/h	0	0	1697.31	0	0	1697.31	0	0
Through Movement Data								
Assigned Movement	0	2	4	0	6	0	0	0
Mvmt. Sat Flow, veh/h	0	3478.81	0	0	2769.96	0	0	0
Right-Turn Movement Data								
Assigned Movement	0	12	14	0	16	0	0	0
Mvmt. Sat Flow, veh/h	0	0	1510.32	0	673.22	0	0	0

Left Lane Group Output

Timer:	1	2	3	4	5	6	7	8
Assigned Phase	0	2	4	0	6	5	0	0
Left Lane Group Data								
Assigned Movement	0	0	7	0	1	5	0	0
Lane Assignment			L+T			L Pr/Pm		
Lanes in Group	0	0	1	0	0	1	0	0
Group Volume, veh/h	0	0	244.44	0	0	555.74	0	0
Group SatFlow, vphpl	0	0	1697.31	0	0	1697.31	0	0
Queue Serve Time, s	0	0	17.16	0	0	32.15	0	0
Cycle Clear Time, s	0	0	17.16	0	0	32.15	0	0
Perm SatFlow, vphpl	0	0	0	0	541.24	443.8	0	0
Shared SatFlow, vphpl					0			
Perm Eff Green, s	0	0	0	0	0	49.61	0	0
Perm Serve Time, s	0	0	0	0	0	9.34	0	0
Perm Que Serve Time, s						9.34		
Time to first Blk, s	0	0	0	0	51.61	0	0	0
Serve Time pre Blk, s								
Prop Inside Lane	0	0	1	0	0	1	0	0
Lane Grp Capacity, vph			254.6			595.12		
v/c Ratio	0	0	0.96	0	0	0.93	0	0
Avail Capacity, veh/h			254.6			632.02		
I-Factor	0	0	1	0	0	0.11	0	0
Uniform Delay, s/veh			50.64			48		
Increm Delay, s/veh	0	0	45.49	0	0	3.59	0	0
Overflow Delay, s/veh	0	0	0	0	0	0	0	0
Control Delay, s/veh			96.14			51.59		
Group LOS			F			D		
Uniform Stops, #/veh			0.86			0		
Increm Stops, #/veh	0	0	0.39	0	0	0.03	0	0
Overflow Stops, #/veh	0	0	0	0	0	0	0	0
Stop Rate, #/veh			1.25			0.03		
Uniform Queue, veh/ln			7.01			17.42		
Increm Queue, veh/ln	0	0	3.22	0	0	0.59	0	0
Overflow Queue, veh/ln	0	0	0	0	0	0	0	0
Back of Queue Factor	0	0	1.51	0	1	1.13	0	0
Back of Queue, veh/ln			15.47			20.35		
Storage Ratio	0	0	0.78	0	0	2.05	0	0
Initial Queue, veh	0	0	0	0	0	0	0	0
Final Queue, veh	0	0	0	0	0	0	0	0
Saturated Delay, s/veh	0	0	0	0	0	0	0	0
Saturated Stops, #/veh	0	0	0	0	0	0	0	0
Saturated Queue, veh/ln	0	0	0	0	0	0	0	0
Saturated Capacity, vph	0	0	0	0	0	0	0	0
Init Que Clear Time, s	0	0	0	0	0	0	0	0

Thru Lane Group Output

Timer:	1	2	3	4	5	6	7	8
Assigned Phase	0	2	4	0	6	5	0	0
Thru Lane Group Data								
Assigned Movement	0	2	4	0	6	0	0	0
Lane Assignment		T			T			
Lanes in Group	0	2	0	0	1	0	0	0
Group Volume, veh/h	0	1059.06	0	0	649.19	0	0	0
Group SatFlow, vphpl	0	1696.63	0	0	1782.18	0	0	0
Queue Serve Time, s	0	10.59	0	0	40.27	0	0	0
Cycle Clear Time, s	0	10.59	0	0	40.27	0	0	0
Lane Grp Capacity, vph		2601.5			766.47			
v/c Ratio	0	0.41	0	0	0.85	0	0	0

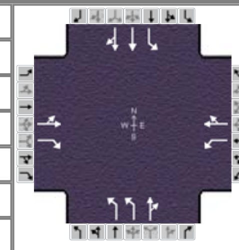
Avail Capacity, veh/h		2601.5			766.47			
I-Factor	0	0.11	0	0	0.86	0	0	0
Uniform Delay, s/veh		3.66			26.92			
Increm Delay, s/veh	0	0.05	0	0	9.83	0	0	0
Overflow Delay, s/veh	0	0	0	0	0	0	0	0
Control Delay, s/veh		3.71			36.75			
Group LOS		A			D			
Uniform Stops, #/veh		0.15			0.67			
Increm Stops, #/veh	0	0	0	0	0.1	0	0	0
Overflow Stops, #/veh	0	0	0	0	0	0	0	0
Stop Rate, #/veh		0.15			0.77			
Uniform Queue, veh/ln		2.58			14.6			
Increm Queue, veh/ln	0	0.02	0	0	2.09	0	0	0
Overflow Queue, veh/ln	0	0	0	0	0	0	0	0
Back of Queue Factor	0	1.34	1	0	1.37	0	0	0
Back of Queue, veh/ln		3.49			22.92			
Storage Ratio	0	0.15	0	0	0.86	0	0	0
Initial Queue, veh	0	0	0	0	0	0	0	0
Final Queue, veh	0	0	0	0	0	0	0	0
Saturated Delay, s/veh	0	0	0	0	0	0	0	0
Saturated Stops, #/veh	0	0	0	0	0	0	0	0
Saturated Queue, veh/ln	0	0	0	0	0	0	0	0
Saturated Capacity, vph	0	0	0	0	0	0	0	0
Init Que Clear Time, s	0	0	0	0	0	0	0	0

Right Lane Group Output

Timer:	1	2	3	4	5	6	7	8
Assigned Phase	0	2	4	0	6	5	0	0
Right Lane Group Data								
Assigned Movement	0	12	14	0	16	0	0	0
Lane Assignment			R		T+R			
Lanes in Group	0	0	1	0	1	0	0	0
Group Volume, veh/h	0	0	86.67	0	608.59	0	0	0
Group SatFlow, vphpl	0	0	1510.32	0	1661	0	0	0
Queue Serve Time, s	0	0	6.21	0	37.17	0	0	0
Cycle Clear Time, s	0	0	6.21	0	37.17	0	0	0
Prot RT SatFlow, vphpl			0					
Prot RT Eff Green, s			0					
Prop Outside Lane	0	0	1	0	0.41	0	0	0
Lane Grp Capacity, vph			226.55		714.36			
v/c Ratio	0	0	0.38	0	0.85	0	0	0
Avail Capacity, veh/h			226.55		714.36			
I-Factor	0	0	1	0	0.86	0	0	0
Uniform Delay, s/veh			45.99		23.61			
Increm Delay, s/veh	0	0	1.51	0	10.78	0	0	0
Overflow Delay, s/veh	0	0	0	0	0	0	0	0
Control Delay, s/veh			47.5		34.4			
Group LOS			D		C			
Uniform Stops, #/veh			0.78		0.61			
Increm Stops, #/veh	0	0	0.03	0	0.11	0	0	0
Overflow Stops, #/veh	0	0	0	0	0	0	0	0
Stop Rate, #/veh			0.81		0.71			
Uniform Queue, veh/ln			2.26		12.28			
Increm Queue, veh/ln	0	0	0.09	0	2.14	0	0	0
Overflow Queue, veh/ln	0	0	0	0	0	0	0	0
Back of Queue Factor	0	1	1.8	0	1.4	0	0	0
Back of Queue, veh/ln			4.23		20.21			
Storage Ratio	0	0	0.53	0	0.76	0	0	0
Initial Queue, veh	0	0	0	0	0	0	0	0
Final Queue, veh	0	0	0	0	0	0	0	0
Saturated Delay, s/veh	0	0	0	0	0	0	0	0
Saturated Stops, #/veh	0	0	0	0	0	0	0	0
Saturated Queue, veh/ln	0	0	0	0	0	0	0	0
Saturated Capacity, vph	0	0	0	0	0	0	0	0
Init Que Clear Time, s	0	0	0	0	0	0	0	0

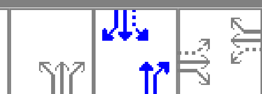
HCS 2010 Signalized Intersection Results Summary

General Information				Intersection Information	
Agency	HDR			Duration, h	0.25
Analyst	MDF	Analysis Date	Jan 30, 2013	Area Type	Other
Jurisdiction		Time Period	PM Peak	PHF	0.90
Intersection	Disk Drive	Analysis Year	2035 No-Build	Analysis Period	1> 16:45
File Name	2035_No-Build_PM_LaCrosse.xus				
Project Description					

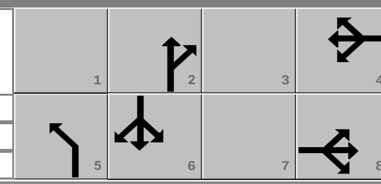


Demand Information	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Demand (*v*), veh/h	70	60	420	160	30	40	380	650	180	30	570	70

Signal Information			
Cycle, s	120.0	Reference Phase	6
Offset, s	108	Reference Point	Begin
Uncoordinated	No	Simult. Gap E/W	Off
Force Mode	Float	Simult. Gap N/S	Off



Green	25.0	51.1	28.9	0.0	0.0	0.0
Yellow	4.0	4.0	4.0	0.0	0.0	0.0
Red	1.0	1.0	1.0	0.0	0.0	0.0



Timer Results	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Assigned Phase		8		4	5	2		6
Case Number		7.0		6.0	2.0	4.0		6.3
Phase Duration, s		33.9		33.9	30.0	86.1		56.1
Change Period, *($Y+R_c$)*, s		5.0		5.0	5.0	5.0		5.0
Max Allow Headway *(MAH)*, s		5.2		5.4	5.1	0.0		0.0
Queue Clearance Time *(g_s)*, s		11.7		28.7	15.7			
Green Extension Time *(g_e)*, s		1.2		0.2	1.7	0.0		0.0
Phase Call Probability		1.00		1.00	1.00			
Max Out Probability		0.00		1.00	0.23			

Movement Group Results	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Assigned Movement	3	8	18	7	4	14	5	2	12	1	6	16
Adjusted Flow Rate *(v)*, veh/h		144	100	178	42		402	872		33	357	346
Adjusted Saturation Flow Rate *(s)*, veh/h/ln		1524	1510	1226	1717		1648	1717		639	1782	1720
Queue Service Time *(g_s)*, s		7.5	6.5	17.1	2.3		13.7	39.1		3.3	14.2	14.3
Cycle Queue Clearance Time *(g_c)*, s		9.7	6.5	26.7	2.3		13.7	39.1		12.9	14.2	14.3
Green Ratio *(g/C)*		0.24	0.24	0.24	0.24		0.21	0.68		0.43	0.43	0.43
Capacity *(c)*, veh/h		414	365	258	415		687	1159		282	758	731
Volume-to-Capacity Ratio *(X)*		0.349	0.274	0.690	0.102		0.586	0.753		0.118	0.472	0.473
Available Capacity *(c_a)*, veh/h		427	378	268	429		687	1159		282	758	731
Back of Queue *(Q)*, veh/ln (95th percentile)		6.5	4.4	9.7	1.8		9.9	19.6		1.0	9.3	9.1
Queue Storage Ratio *(RQ)* (95th percentile)		0.33	0.22	0.49	0.09		1.00	0.74		0.17	0.23	0.23
Uniform Delay *(d_1)*, s/veh		38.2	37.0	49.4	35.4		46.4	12.0		20.4	18.0	18.0
Incremental Delay *(d_2)*, s/veh		0.7	0.6	7.8	0.2		3.3	4.2		0.9	2.1	2.2
Initial Queue Delay *(d_3)*, s/veh		0.0	0.0	0.0	0.0		0.0	0.0		0.0	0.0	0.0
Control Delay *(d)*, s/veh		38.9	37.5	57.2	35.5		49.7	16.1		21.3	20.1	20.2
Level of Service (LOS)		D	D	E	D		D	B		C	C	C
Approach Delay, s/veh / LOS	38.4	D		53.0	D		26.7	C		20.2	C	
Intersection Delay, s/veh / LOS	28.3						C					

Multimodal Results	EB		WB		NB		SB	
Pedestrian LOS Score / LOS	3.4	C	2.9	C	2.5	B	3.3	C
Bicycle LOS Score / LOS	2.7	B	2.5	B	4.7	E	3.1	C

This Signals text report was created on January 31, 2013 at 01:17:10

Intersection number = 4, Segment number = 3, Period number = 1

Chapter 18 Summary Input

Cycle Length, s	120											
	EB LT	EB TH	EB RT	WB LT	WB TH	WB RT	NB LT	NB TH	NB RT	SB LT	SB TH	SB RT
Movement	3	8	18	7	4	14	5	2	12	1	6	16
Volume, veh/h	70	60	420	160	30	40	380	650	180	30	570	70
Lanes	0	1	1	1	1	0	2	1	0	1	2	0
Bay Length, ft	0	500	500	500	500	0	250	670	0	150	1000	0
Receiving Lanes	1	1	1	2	2	2	1	1	1	2	2	2
SatFlow, vplphg	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800
Lane Width, ft	12	12	12	12	12	12	12	12	12	12	12	12
Heavy Vehicles, %	0	1	1	1	1	0	1	1	0	1	1	0
Grade, %	0	0	0	0	0	0	0	0	0	0	0	0
Buses, per h	0	0	0	0	0	0	0	0	0	0	0	0
Parking, per h	0	0	0	0	0	0	0	0	0	0	0	0
Bicycles, per h	0	0	0	0	0	0	0	0	0	0	0	0
Pedestrians, per h	0	0	0	0	0	0	0	0	0	0	0	0
Heavy Veh Equivalent	2	2	2	2	2	2	2	2	2	2	2	2
Bus Blockage Time	14.4	14.4	14.4	14.4	14.4	14.4	14.4	14.4	14.4	14.4	14.4	14.4
Turns in Shrd Ln, %	0	0	0	0	0	0	0	0	0	0	0	0
Unopposed Lefts, %	0	0	0	0	0	0	0	0	0	0	0	0
Parking Time, sec	18	18	18	18	18	18	18	18	18	18	18	18
Arrival Type	3	3	3	3	3	3	4	4	4	4	4	4
Initial Queue, veh	0	0	0	0	0	0	0	0	0	0	0	0
Speed Limit, mph	30	30	30	30	30	30	35	35	35	35	35	35
Detector Length, ft	40	40	40	40	40	40	40	40	40	40	40	40
StartLostTime, sec	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0
EndUseTime, sec	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0
RTOR, veh/h		330			32			6			7	
I-Factor		1.00			1.00			0.92			1.00	
Walk + PC, sec		0.0			0.0			0.0			0.0	

	EB	EB	WB	WB	NB	NB	SB	SB
Phase	3	8	7	4	5	2	1	6
Movement		LT+TH+RT		LT+TH+RT	LT	TH+RT		LT+TH+RT
Left-Turn Mode	--	Perm.	--	Perm.	Prot.	--	--	Perm.
Phase Splits, s	0.0	35.0	0.0	35.0	30.0	85.0	0.0	55.0
Yellow Change, s	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Red Clearance, s	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0
Minimum Green, s	5	5	5	5	10	5	5	5
Lead/Lag					Lead			
Passage Time, s	2.0	4.0	2.0	4.0	4.0	2.0	2.0	2.0
Recall	Off	Off	Off	Off	Max	Min	Off	Min
Dual Entry	No	Yes	No	Yes	No	Yes	No	Yes
Prot. Right-Turn	False	False	False	False	False	False	False	False

	E/W	N/S
Simultaneous Gap out	Off	Off
Dallas Phasing	Off	Off

Cycle Length, s	120
Offset, s	108
Reference Phase	6
Reference Point	Begin
Force Mode	Float
Uncoordinated	No
Field Measured Phase Times	No
Exclusive Ped Phase Time, s	0.0

Timer:	1	2	3	4	5	6	7	8
Assigned Phase	0	2	0	4	5	6	0	8
Assigned Left-Turn Mvmt.	0	0	0	7	5	1	0	3
Assigned Through Mvmt.	0	2	0	4	0	6	0	8
Assigned Right-Turn Mvmt.	0	12	0	14	0	16	0	18
Timer w/Pr-Pm From Shared	0	0	0	0	0	0	0	0

Chapter 18 Summary Output

Cycle Length, s	120											
	EB LT	EB TH	EB RT	WB LT	WB TH	WB RT	NB LT	NB TH	NB RT	SB LT	SB TH	SB RT
Movement	3	8	18	7	4	14	5	2	12	1	6	16
Volume, veh/h	77.78	66.67	100	177.78	33.33	8.89	402.29	688.12	184.2	33.33	633.33	70
SatFlow, veh/h/ln	0	1782.2	1782.2	1782.2	1782.2	0	1782.2	1782.2	0	1782.2	1782.2	0
Lane Util Factor	1	1	1	1	1	1	0.97	1	1	1	1	1
Capacity, veh/h	230.72	183.66	377.58	257.75	327.51	87.34	686.7	914.29	244.75	282.26	1340.5	147.94
Discharge Vol, veh/h	0	0	100	177.78	0	0	0	0	0	0	633.33	0
Prop Arriv On Green	0.24	0.24	0.24	0.24	0.24	0.24	0.15	0.7	0.67	0.57	0.57	0.57
Apprch Vol, veh/h	0	244.44	0	0	220	0	0	1274.6	0	0	736.67	0
Apprch Stops, #/veh	0	0.75	0	0	0.92	0	0	0.61	0	0	0.46	0
Apprch Delay, s/veh	0	38.35	0	0	53.05	0	0	26.74	0	0	20.23	0

Apprch LOS	D	D	C	C

Int Delay, s/veh	28.29
Int LOS	C

Timer Data

Timer:	1	2	3	4	5	6	7	8
Assigned Phase	0	2	0	4	5	6	0	8
Case No	0	4	0	6	2	6.3	0	7
Phase Duration, s	0	86.08	0	33.92	30	56.08	0	33.92
Change Period, s	0	5	0	5	5	5	0	5
Phase Start Time, s	76.99	76.99	43	43	76.99	106.99	43	43
Phase End Time, s	76.99	43	43	76.99	106.99	43	43	76.99
Max Allow Headway, s	0	0	0	5.41	5.08	0	0	5.22
Equiv Max Green, s		5		30	25	5		30
Queue Clear Time, s				28.7	15.67			11.68
Green Exten Time, s	0	0	0	0.15	1.67	0	0	1.21
Prob of Phase Call				1	1			1
Prob of Max Out				1	0.23			0
Left-Turn Movement Data								
Assigned Movement	0	0	0	7	5	1	0	3
Mvmt. Sat Flow, veh/h	0	0	0	1225.9	3296.18	638.86	0	820.71
Through Movement Data								
Assigned Movement	0	2	0	4	0	6	0	8
Mvmt. Sat Flow, veh/h	0	1354.37	0	1355.61	0	3153.68	0	703.46
Right-Turn Movement Data								
Assigned Movement	0	12	0	14	0	16	0	18
Mvmt. Sat Flow, veh/h	0	362.55	0	361.5	0	348.03	0	1510.32

Left Lane Group Output

Timer:	1	2	3	4	5	6	7	8
Assigned Phase	0	2	0	4	5	6	0	8
Left Lane Group Data								
Assigned Movement	0	0	0	7	5	1	0	3
Lane Assignment				L	L (Prot)	L		L+T
Lanes in Group	0	0	0	1	2	1	0	1
Group Volume, veh/h	0	0	0	177.78	402.29	33.33	0	144.44
Group SatFlow, vphpl	0	0	0	1225.9	1648.09	638.86	0	1524.17
Queue Serve Time, s	0	0	0	17.07	13.67	3.31	0	7.48
Cycle Clear Time, s	0	0	0	26.7	13.67	12.87	0	9.68
Perm SatFlow, vphpl	0	0	0	1225.9	0	638.86	0	1386.09
Shared SatFlow, vphpl								0
Perm Eff Green, s	0	0	0	28.99	0	51.01	0	28.99
Perm Serve Time, s	0	0	0	19.36	0	41.75	0	26.79
Perm Que Serve Time, s				17.07		3.49		7.48
Time to first Blk, s	0	0	0	0	0	0	0	1.71
Serve Time pre Blk, s								1.71
Prop Inside Lane	0	0	0	1	1	1	0	0.54
Lane Grp Capacity, vph				257.75	686.7	282.26		414.39
v/c Ratio	0	0	0	0.69	0.59	0.12	0	0.35
Avail Capacity, veh/h				268.06	686.7	282.26		427.29
I-Factor	0	0	0	1	0.92	1	0	1
Uniform Delay, s/veh				49.36	46.39	20.4		38.21
Increm Delay, s/veh	0	0	0	7.85	3.35	0.85	0	0.71
Overflow Delay, s/veh	0	0	0	0	0	0	0	0
Control Delay, s/veh				57.21	49.73	21.25		38.92
Group LOS				E	D	C		D
Uniform Stops, #/veh				0.87	0.86	0.43		0.74
Increm Stops, #/veh	0	0	0	0.09	0.05	0.06	0	0.02
Overflow Stops, #/veh	0	0	0	0	0	0	0	0
Stop Rate, #/veh				0.97	0.9	0.49		0.76
Uniform Queue, veh/ln				5.18	5.75	0.48		3.55
Increm Queue, veh/ln	0	0	0	0.56	0.32	0.07	0	0.08
Overflow Queue, veh/ln	0	0	0	0	0	0	0	0
Back of Queue Factor	0	0	0	1.68	1.64	1.8	0	1.8
Back of Queue, veh/ln				9.67	9.94	0.99		6.55
Storage Ratio	0	0	0	0.49	1	0.17	0	0.33
Initial Queue, veh	0	0	0	0	0	0	0	0
Final Queue, veh	0	0	0	0	0	0	0	0
Saturated Delay, s/veh	0	0	0	0	0	0	0	0
Saturated Stops, #/veh	0	0	0	0	0	0	0	0
Saturated Queue, veh/ln	0	0	0	0	0	0	0	0
Saturated Capacity, vph	0	0	0	0	0	0	0	0
Init Que Clear Time, s	0	0	0	0	0	0	0	0

Thru Lane Group Output

Timer:	1	2	3	4	5	6	7	8
Assigned Phase	0	2	0	4	5	6	0	8
Thru Lane Group Data								
Assigned Movement	0	2	0	4	0	6	0	8
Lane Assignment						T		
Lanes in Group	0	0	0	0	0	1	0	0
Group Volume, veh/h	0	0	0	0	0	357.48	0	0
Group SatFlow, vphpl	0	0	0	0	0	1782.18	0	0
Queue Serve Time, s	0	0	0	0	0	14.24	0	0
Cycle Clear Time, s	0	0	0	0	0	14.24	0	0
Lane Grp Capacity, vph						757.55		
v/c Ratio	0	0	0	0	0	0.47	0	0

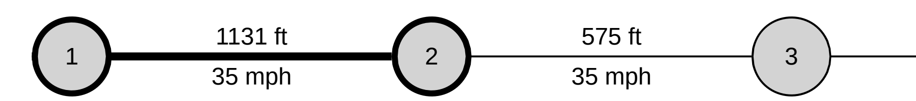
Avail Capacity, veh/h						757.55		
I-Factor	0	0	0	0	0	1	0	0
Uniform Delay, s/veh						18.03		
Increm Delay, s/veh	0	0	0	0	0	2.1	0	0
Overflow Delay, s/veh	0	0	0	0	0	0	0	0
Control Delay, s/veh						20.13		
Group LOS						C		
Uniform Stops, #/veh						0.42		
Increm Stops, #/veh	0	0	0	0	0	0.04	0	0
Overflow Stops, #/veh	0	0	0	0	0	0	0	0
Stop Rate, #/veh						0.46		
Uniform Queue, veh/ln						5.03		
Increm Queue, veh/ln	0	0	0	0	0	0.44	0	0
Overflow Queue, veh/ln	0	0	0	0	0	0	0	0
Back of Queue Factor	0	1	0	1	0	1.7	0	1
Back of Queue, veh/ln						9.31		
Storage Ratio	0	0	0	0	0	0.23	0	0
Initial Queue, veh	0	0	0	0	0	0	0	0
Final Queue, veh	0	0	0	0	0	0	0	0
Saturated Delay, s/veh	0	0	0	0	0	0	0	0
Saturated Stops, #/veh	0	0	0	0	0	0	0	0
Saturated Queue, veh/ln	0	0	0	0	0	0	0	0
Saturated Capacity, vph	0	0	0	0	0	0	0	0
Init Que Clear Time, s	0	0	0	0	0	0	0	0

Right Lane Group Output

Timer:	1	2	3	4	5	6	7	8
Assigned Phase	0	2	0	4	5	6	0	8
Right Lane Group Data								
Assigned Movement	0	12	0	14	0	16	0	18
Lane Assignment		T+R		T+R		T+R		R
Lanes in Group	0	1	0	1	0	1	0	1
Group Volume, veh/h	0	872.33	0	42.22	0	345.85	0	100
Group SatFlow, vphpl	0	1716.92	0	1717.11	0	1719.53	0	1510.32
Queue Serve Time, s	0	39.07	0	2.29	0	14.29	0	6.45
Cycle Clear Time, s	0	39.07	0	2.29	0	14.29	0	6.45
Prot RT SatFlow, vphpl								0
Prot RT Eff Green, s								0
Prop Outside Lane	0	0.21	0	0.21	0	0.2	0	1
Lane Grp Capacity, vph		1159.05		414.85		730.93		364.89
v/c Ratio	0	0.75	0	0.1	0	0.47	0	0.27
Avail Capacity, veh/h		1159.05		429.29		730.93		377.58
I-Factor	0	0.92	0	1	0	1	0	1
Uniform Delay, s/veh		11.95		35.38		18.04		36.96
Increm Delay, s/veh	0	4.19	0	0.15	0	2.19	0	0.57
Overflow Delay, s/veh	0	0	0	0	0	0	0	0
Control Delay, s/veh		16.14		35.53		20.23		37.53
Group LOS		B		D		C		D
Uniform Stops, #/veh		0.43		0.68		0.42		0.71
Increm Stops, #/veh	0	0.05	0	0.01	0	0.04	0	0.02
Overflow Stops, #/veh	0	0	0	0	0	0	0	0
Stop Rate, #/veh		0.47		0.7		0.46		0.73
Uniform Queue, veh/ln		12.45		0.96		4.87		2.38
Increm Queue, veh/ln	0	1.35	0	0.02	0	0.44	0	0.06
Overflow Queue, veh/ln	0	0	0	0	0	0	0	0
Back of Queue Factor	0	1.42	0	1.8	0	1.71	0	1.8
Back of Queue, veh/ln		19.63		1.76		9.1		4.38
Storage Ratio	0	0.74	0	0.09	0	0.23	0	0.22
Initial Queue, veh	0	0	0	0	0	0	0	0
Final Queue, veh	0	0	0	0	0	0	0	0
Saturated Delay, s/veh	0	0	0	0	0	0	0	0
Saturated Stops, #/veh	0	0	0	0	0	0	0	0
Saturated Queue, veh/ln	0	0	0	0	0	0	0	0
Saturated Capacity, vph	0	0	0	0	0	0	0	0
Init Que Clear Time, s	0	0	0	0	0	0	0	0

HCS 2010 Urban Street Segment Report

General Information				Streets Information	
Agency	HDR			Number of Intersections	4
Analyst	MDF	Analysis Date	Jan 30, 2013	Number of Segments	3
Jurisdiction		Time Period	PM Peak	Number of Iterations	15
File Name	2035_No-Build_PM_LaCrosse.x	Analysis Year	2035 No-Build	System Cycle Length, s	120
Intersections	Eglin Street	I-90 EB Ramps		Analysis Period	1> 16:45
Project Description					



Basic Segment Information														
Segment	Speed Limit		Through Lanes		Segment Length		Intersection Wid		Length of RM		Percent Curb		Other Delay	
	NB	SB	NB	SB	NB	SB	NB	SB	NB	SB	NB	SB	NB	SB
1	35	35	2	2	1131	1131	60	60	0	0	90	70	0.0	0.0

		Northbound			Southbound		
Segment Output Data		NBL	NBT	NBR	SBL	SBT	SBR
Segment	Movement		2	12	1	6	
1	Bay/Lane Spillback Time, h		0.89			never	
1	Shared Lane Spillback Time, h				never		
1	Base Free-Flow Speed, mph	40.09			40.18		
1	Running Time, s	22.88			22.96		
1	Running Speed, mph	33.70			33.59		
1	Through Delay, s/veh	67.06			9.77		
1	Travel Speed, mph	8.57			23.56		
1	Stop Rate, stops/veh	0.94			0.34		
1	Spatial Stop Rate, stops/mi	4.39			1.61		
1	Through vol/cap Ratio	0.00			0.49		
1	Percent of Base FFS	21.39			58.64		
1	Level of Service	F			C		
1	Auto Traveler Perception Score	3.11			2.38		

Multimodal Results (Segment)					
1	Pedestrian Segment LOS Score / LOS	3.88	D	3.89	D
1	Bicycle Segment LOS Score / LOS	4.35	E	5.32	F
1	Transit Segment LOS Score / LOS	0.74	A	1.53	A

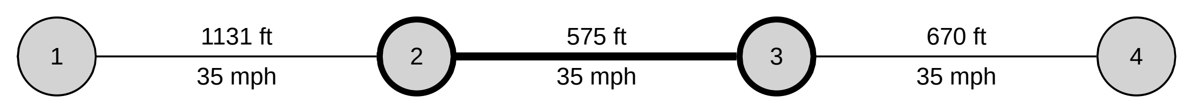
Facility Output Data	Northbound	Southbound
Facility Travel Time, s	141.53	99.80
Facility Travel Speed, mph	11.45	16.23
Facility Base Free Flow Speed, mph	40.10	40.55
Facility Percent of Base FFS	28.54	40.04
Facility Level of Service	F	D
Facility Auto Traveler Perception Score	2.78	2.56

Multimodal Results (Facility)				
Pedestrian Facility LOS Score / LOS	3.82	D	3.82	D
Bicycle Facility LOS Score / LOS	4.53	E	4.70	E
Transit Facility LOS Score / LOS	1.14	A	1.31	A

 HCS 2010™ Streets Version 6.50 Generated: 1/31/2013 11:51:22 AM

HCS 2010 Urban Street Segment Report

General Information				Streets Information	
Agency	HDR			Number of Intersections	4
Analyst	MDF	Analysis Date	Jan 30, 2013	Number of Segments	3
Jurisdiction		Time Period	PM Peak	Number of Iterations	15
File Name	2035_No-Build_PM_LaCrosse.x	Analysis Year	2035 No-Build	System Cycle Length, s	120
Intersections	I-90 EB Ramps	I-90 WB Ramps		Analysis Period	1> 16:45
Project Description					



Basic Segment Information															
Segment	Speed Limit		Through Lanes		Segment Length		Intersection Wid		Length of RM		Percent Curb		Other Delay	
	NB	SB	NB	SB	NB	SB	NB	SB	NB	SB	NB	SB	NB	SB
2	35	35	2	2	575	575	60	60	0	0	100	100	0.0	0.0

		Northbound			Southbound		
Segment Output Data		NBL	NBT	NBR	SBL	SBT	SBR
Segment	Movement		2	12	1	6	
2	Bay/Lane Spillback Time, h		never			never	
2	Shared Lane Spillback Time, h	never			never		
2	Base Free-Flow Speed, mph	41.58			41.58		
2	Running Time, s	14.69			14.50		
2	Running Speed, mph	26.68			27.03		
2	Through Delay, s/veh	3.71			0.92		
2	Travel Speed, mph	21.30			25.41		
2	Stop Rate, stops/veh	0.15			0.03		
2	Spatial Stop Rate, stops/mi	1.35			0.24		
2	Through vol/cap Ratio	0.41			0.48		
2	Percent of Base FFS	51.23			61.12		
2	Level of Service	C			C		
2	Auto Traveler Perception Score	2.34			2.38		

Multimodal Results (Segment)					
2	Pedestrian Segment LOS Score / LOS	3.22	C	3.89	D
2	Bicycle Segment LOS Score / LOS	4.03	D	3.84	D
2	Transit Segment LOS Score / LOS	1.75	A	1.36	A

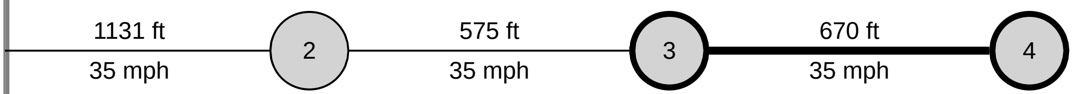
Facility Output Data	Northbound	Southbound
Facility Travel Time, s	141.53	99.80
Facility Travel Speed, mph	11.45	16.23
Facility Base Free Flow Speed, mph	40.10	40.55
Facility Percent of Base FFS	28.54	40.04
Facility Level of Service	F	D
Facility Auto Traveler Perception Score	2.78	2.56

Multimodal Results (Facility)				
Pedestrian Facility LOS Score / LOS	3.82	D	3.82	D
Bicycle Facility LOS Score / LOS	4.53	E	4.70	E
Transit Facility LOS Score / LOS	1.14	A	1.31	A

 HCS 2010™ Streets Version 6.50 Generated: 1/31/2013 11:51:22 AM

HCS 2010 Urban Street Segment Report

General Information				Streets Information	
Agency	HDR			Number of Intersections	4
Analyst	MDF	Analysis Date	Jan 30, 2013	Number of Segments	3
Jurisdiction		Time Period	PM Peak	Number of Iterations	15
File Name	2035_No-Build_PM_LaCrosse.x	Analysis Year	2035 No-Build	System Cycle Length, s	120
Intersections	I-90 WB Ramps	Disk Drive		Analysis Period	1> 16:45
Project Description					



Basic Segment Information															
Segment	Speed Limit		Through Lanes		Segment Length		Intersection Wid		Length of RM		Percent Curb		Other Delay	
	NB	SB	NB	SB	NB	SB	NB	SB	NB	SB	NB	SB	NB	SB
3	35	35	1	2	670	670	60	60	0	0	90	85	0.0	0.0

		Northbound			Southbound		
Segment Output Data		NBL	NBT	NBR	SBL	SBT	SBR
Segment	Movement	5	2			6	16
3	Bay/Lane Spillback Time, h	never	never			never	
3	Shared Lane Spillback Time, h	never					
3	Base Free-Flow Speed, mph	38.93			40.30		
3	Running Time, s	17.05			15.74		
3	Running Speed, mph	26.79			29.03		
3	Through Delay, s/veh	16.14			35.91		
3	Travel Speed, mph	13.76			8.85		
3	Stop Rate, stops/veh	0.47			0.75		
3	Spatial Stop Rate, stops/mi	3.74			5.91		
3	Through vol/cap Ratio	0.75			0.00		
3	Percent of Base FFS	35.36			21.95		
3	Level of Service	E			F		
3	Auto Traveler Perception Score	2.74			3.14		

Multimodal Results (Segment)					
3	Pedestrian Segment LOS Score / LOS	4.25	E	3.64	D
3	Bicycle Segment LOS Score / LOS	5.27	F	4.38	E
3	Transit Segment LOS Score / LOS	1.28	A	0.90	A

Facility Output Data	Northbound	Southbound
Facility Travel Time, s	141.53	99.80
Facility Travel Speed, mph	11.45	16.23
Facility Base Free Flow Speed, mph	40.10	40.55
Facility Percent of Base FFS	28.54	40.04
Facility Level of Service	F	D
Facility Auto Traveler Perception Score	2.78	2.56

Multimodal Results (Facility)				
Pedestrian Facility LOS Score / LOS	3.82	D	3.82	D
Bicycle Facility LOS Score / LOS	4.53	E	4.70	E
Transit Facility LOS Score / LOS	1.14	A	1.31	A

This Urban Streets text report was created on January 31, 2013 at 01:17:24

Period number = 1

Chapter 17 Input

URBAN STREET PARAMETERS

Number of Intersections	4
Number of Segments	3
Analysis period duration, h	0.25
System cycle length, s	120
Urban street forward direction	NB
Sneakers per cycle, veh	2
Saturation flow rate, veh/h/ln	1900
Stored vehicle lane length, ft	25
Detected vehicle length, ft	17
Queue length percent	95
Critical merge gap, s	3.7
Stop threshold speed, mph	5
Acceleration rate, ft/s/s	3.5
Decel. rate (signal), ft/s/s	4
Left-turn equivalency factor (signal)	1.05
Right-turn equivalency factor (signal)	1.18
Minimum headway in a platoon, s/veh	1.5
Maximum headway in a platoon, s/veh	3.6
Number of iterations	15
Length of left-turn bay (access pt.), ft	250
Decel. rate (access pt.), ft/s/s	6.7
Right-turn speed (access pt.), ft/s	20
Critical gap from major left (access pt.), s	4.1
Follow-up time from major left (access pt.), s	2.2
Right-turn equivalency factor (access pt.)	2.2
Stored heavy vehicle lane length, ft	45
Proportion of peds who push button	0.65
Critical gap for permissive left-turn, s	4.5
Follow-up time for permissive left-turn, s	2.5
Calibration factor for platoon dispersion	0.14
Average ratio of speed limit to free-flow speed	0.94

BASIC SEGMENT INFORMATION

Seg	Spd Lmt		TH Lanes		Seg Len		IntWid		LenRM		PctCurb		Other Dly	
Num	NB	SB	NB	SB	NB	SB	NB	SB	NB	SB	NB	SB	NB	SB
1	35	35	2	2	1131	1131	60	60	0	0	90	70	0	0
2	35	35	2	2	575	575	60	60	0	0	100	100	0	0
3	35	35	1	2	670	670	60	60	0	0	90	85	0	0

ORIGIN-DESTINATION SEED PROPORTIONS - Forward Direction

	Cross LT	Major TH	Cross RT	MidEntry
Downstream Left	0.02	0.1	0.05	0.02
Downstream Thru	0.91	0.78	0.92	0.97
Downstream Right	0.05	0.1	0.02	0.01
Mid-segment Exit	0.02	0.02	0.01	0

ORIGIN-DESTINATION SEED PROPORTIONS - Reverse Direction

	Cross LT	Major TH	Cross RT	MidEntry
Downstream Left	0.02	0.1	0.05	0.02
Downstream Thru	0.91	0.78	0.92	0.97
Downstream Right	0.05	0.1	0.02	0.01
Mid-segment Exit	0.02	0.02	0.01	0

ACCESS POINT DATA

SEGMENT 1

Number of access points: 0

SEGMENT 2

Number of access points: 0

SEGMENT 3

Number of access points: 0

Global Output

SEGMENT DATA

Seg.No.	Movement	NB LT 5	NB TH 2	NB RT 12	SB LT 1	SB TH 6	SB RT 16
1	Bay/Lane Spillback Time, h	999	0.89	0	999	999	999
1	ShrdLane Spillback Time, h				999		
1	Base Free-Flow Speed, mph		40.09			40.18	
1	Running Time, s		22.88			22.96	
1	Running Speed, mph		33.7			33.59	
1	Through Delay, s/veh		67.06			9.77	
1	Travel Speed, mph		8.57			23.56	
1	Stop Rate, stops/veh		0.94			0.34	
1	Spatial Stop Rate, stops/mi		4.39			1.61	
1	Through vol/cap ratio		0			0.49	
1	Percent of Base FFS		21.39			58.64	
1	Level of Service		F			C	
1	Automobile Perception Score		3.11			2.38	
2	Bay/Lane Spillback Time, h	999	999	999	1.21	999	999
2	ShrdLane Spillback Time, h	999			999		
2	Base Free-Flow Speed, mph		41.58			41.58	
2	Running Time, s		14.69			14.5	
2	Running Speed, mph		26.68			27.03	
2	Through Delay, s/veh		3.71			0.92	
2	Travel Speed, mph		21.3			25.41	
2	Stop Rate, stops/veh		0.15			0.03	
2	Spatial Stop Rate, stops/mi		1.35			0.24	
2	Through vol/cap ratio		0.41			0.48	
2	Percent of Base FFS		51.23			61.12	
2	Level of Service		C			C	
2	Automobile Perception Score		2.34			2.38	
3	Bay/Lane Spillback Time, h	999	999	999	999	999	999
3	ShrdLane Spillback Time, h	999.05					
3	Base Free-Flow Speed, mph		38.93			40.3	
3	Running Time, s		17.05			15.74	
3	Running Speed, mph		26.79			29.03	
3	Through Delay, s/veh		16.14			35.91	
3	Travel Speed, mph		13.76			8.85	
3	Stop Rate, stops/veh		0.47			0.75	
3	Spatial Stop Rate, stops/mi		3.74			5.91	
3	Through vol/cap ratio		0.75			0	
3	Percent of Base FFS		35.36			21.95	
3	Level of Service		E			F	
3	Automobile Perception Score		2.74			3.14	

	NB TH	SB TH
Facility Travel Time, s	141.53	99.8
Facility Travel Speed, mph	11.45	16.23
Facility Spatial Stop Rate, veh/mi	3.47	2.49
Facility Base Free Flow Speed, mph	40.1	40.55
Facility Percent Base Free Flow Speed	28.54	40.04
Facility Level of Service	F	D
Facility Automobile Perception Score	2.78	2.56
Facility Pedestrian Space	Infinity	Infinity
Facility Pedestrian Travel Speed	4.4	4.4
Facility Pedestrian LOS Score	3.82	3.82
Facility Pedestrian LOS	D	D
Facility Bicycle Travel Speed	9.3	9.78
Facility Bicycle LOS Score	4.53	4.7
Facility Bicycle LOS	E	E
Facility Transit Travel Speed	28.46	30.99
Facility Transit LOS Score	1.14	1.31
Facility Transit LOS	A	A
SPILLBACK TIME, h	0.89	

Multimodal Results

1	Roadway crossing difficulty factor	1.2	1.2
1	Ped LOS Score for Link	3.64	3.61

1	Ped LOS Score for Intersection	2.12	2.19
1	Ped LOS Score for Segment	3.88	3.89
1	Ped Segment LOS	D	D
1	Bicycle LOS Score for Link	4.12	4.16
1	Indicator Variable	1	1
1	Bicycle LOS Score for Intersection	3.84	3.8
1	Number of access point approaches	2	8
1	Segment Length, ft	1131	1131
1	Bicycle LOS Score for Segment	4.35	5.32
1	Bicycle Segment LOS	E	F
1	Transit Wait-Ride Score	3.87	3.34
1	Ped LOS Score for Link	3.64	3.61
1	Transit LOS Score for Segment	0.74	1.53
1	Transit Segment LOS	A	A
2	Roadway crossing difficulty factor	0.97	1.2
2	Ped LOS Score for Link	3.82	3.42
2	Ped LOS Score for Intersection	2.24	2.48
2	Ped LOS Score for Segment	3.22	3.89
2	Ped Segment LOS	C	D
2	Bicycle LOS Score for Link	4.02	3.91
2	Indicator Variable	1	1
2	Bicycle LOS Score for Intersection	3.89	3.51
2	Number of access point approaches	0	0
2	Segment Length, ft	575	575
2	Bicycle LOS Score for Segment	4.03	3.84
2	Bicycle Segment LOS	D	D
2	Transit Wait-Ride Score	3.21	3.44
2	Ped LOS Score for Link	3.82	3.42
2	Transit LOS Score for Segment	1.75	1.36
2	Transit Segment LOS	A	A
3	Roadway crossing difficulty factor	1.2	1.2
3	Ped LOS Score for Link	4.38	2.98
3	Ped LOS Score for Intersection	2.48	2.16
3	Ped LOS Score for Segment	4.25	3.64
3	Ped Segment LOS	E	D
3	Bicycle LOS Score for Link	4.2	3.81
3	Indicator Variable	1	1
3	Bicycle LOS Score for Intersection	4.68	3.52
3	Number of access point approaches	2	2
3	Segment Length, ft	670	670
3	Bicycle LOS Score for Segment	5.27	4.38
3	Bicycle Segment LOS	F	E
3	Transit Wait-Ride Score	3.59	3.7
3	Ped LOS Score for Link	4.38	2.98
3	Transit LOS Score for Segment	1.28	0.9
3	Transit Segment LOS	A	A

ACCESS POINT DATA

SEGMENT 1

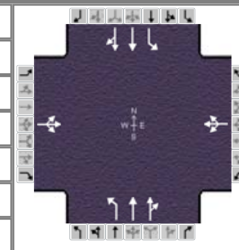
SEGMENT 2

SEGMENT 3

V. Haines Avenue Intersection Analysis

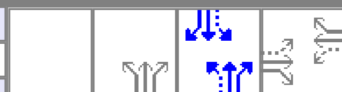
HCS 2010 Signalized Intersection Results Summary

General Information				Intersection Information	
Agency	HDR			Duration, h	0.25
Analyst	MDF	Analysis Date	Jan 30, 2013	Area Type	Other
Jurisdiction		Time Period	AM Peak	PHF	0.77
Intersection	Lindbergh Street	Analysis Year	Existing (2012)	Analysis Period	1> 7:45
File Name	Existing_AM_Haines.xus				
Project Description					

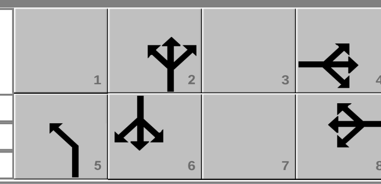


Demand Information	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Demand (*v*), veh/h	50	10	60	5	5	10	65	380	5	10	630	30

Signal Information			
Cycle, s	84.0	Reference Phase	2
Offset, s	41	Reference Point	End
Uncoordinated	No	Simult. Gap E/W	Off
Force Mode	Float	Simult. Gap N/S	Off



Green	4.3	55.8	7.9	0.0	0.0	0.0
Yellow	4.0	4.0	4.0	0.0	0.0	0.0
Red	0.0	2.0	2.0	0.0	0.0	0.0



Timer Results	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Assigned Phase		4		8	5	2		6
Case Number		8.0		8.0	1.0	4.0		6.3
Phase Duration, s		13.9		13.9	8.3	70.1		61.8
Change Period, *(Y+R$_c$)*, s		6.0		6.0	4.0	6.0		6.0
Max Allow Headway *(MAH)*, s		5.2		5.1	5.1	0.0		0.0
Queue Clearance Time *(g_s)*, s		8.0		2.7	3.1			
Green Extension Time *(g_e)*, s		0.3		0.0	0.0	0.0		0.0
Phase Call Probability		0.95		0.95	0.86			
Max Out Probability		0.14		0.00	1.00			

Movement Group Results	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Assigned Movement	7	4	14	3	8	18	5	2	12	1	6	16
Adjusted Flow Rate (*v*), veh/h		110			16		84	250	249	13	430	424
Adjusted Saturation Flow Rate (*s*), veh/h/ln		1498			1607		1697	1782	1776	904	1782	1756
Queue Service Time (g_s), s		5.3			0.0		1.1	0.0	0.0	0.2	7.5	7.4
Cycle Queue Clearance Time (g_c), s		6.0			0.7		1.1	0.0	0.0	0.2	7.5	7.4
Green Ratio (*g/C*)		0.09			0.09		0.74	0.76	0.76	0.66	0.66	0.66
Capacity (*c*), veh/h		208			211		547	1361	1356	687	1185	1167
Volume-to-Capacity Ratio *(X)*		0.530			0.074		0.154	0.183	0.184	0.019	0.363	0.363
Available Capacity (c_a), veh/h		351			360		561	1361	1356	687	1185	1167
Back of Queue (*Q*), veh/ln (95th percentile)		4.2			0.5		0.5	0.2	0.2	0.1	4.0	3.9
Queue Storage Ratio *(RQ)* (95th percentile)		0.21			0.03		0.06	0.01	0.01	0.01	0.07	0.07
Uniform Delay (d_1), s/veh		37.2			34.8		3.5	0.0	0.0	2.8	4.9	4.8
Incremental Delay (d_2), s/veh		3.0			0.2		0.2	0.3	0.3	0.0	0.8	0.8
Initial Queue Delay (d_3), s/veh		0.0			0.0		0.0	0.0	0.0	0.0	0.0	0.0
Control Delay (*d*), s/veh		40.2			35.0		3.7	0.3	0.3	2.8	5.7	5.6
Level of Service (LOS)		D			D		A	A	A	A	A	A
Approach Delay, s/veh / LOS	40.2	D		35.0	D		0.8	A		5.6	A	
Intersection Delay, s/veh / LOS	6.5						A					

Multimodal Results	EB		WB		NB		SB	
Pedestrian LOS Score / LOS	2.8	C	2.9	C	2.0	B	2.1	B
Bicycle LOS Score / LOS	0.7	A	0.5	A	1.0	A	1.2	A

 HCS 2010™ Streets Version 6.50 Generated: 4/11/2013 1:50:49 PM

This Signals text report was created on April 11, 2013 at 01:51:38

Intersection number = 1, Segment number = 1, Period number = 1

Chapter 18 Summary Input

Cycle Length, s	84											
	EB	EB	EB	WB	WB	WB	NB	NB	NB	SB	SB	SB
	LT	TH	RT	LT	TH	RT	LT	TH	RT	LT	TH	RT
Movement	7	4	14	3	8	18	5	2	12	1	6	16
Volume, veh/h	50	10	60	5	5	10	65	380	5	10	630	30
Lanes	0	1	0	0	1	0	1	2	0	1	2	0
Bay Length, ft	0	500	0	200	500	500	200	1000	150	200	1499	0
Receiving Lanes	1	1	1	1	1	1	2	2	2	2	2	2
SatFlow, vplphg	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800
Lane Width, ft	12	12	12	12	12	12	12	12	12	12	12	12
Heavy Vehicles, %	0	1	0	2	1	2	1	1	2	1	1	0
Grade, %	0	0	0	0	0	0	0	0	0	0	0	0
Buses, per h	0	0	0	0	0	0	0	0	0	0	0	0
Parking, per h	0	0	0	0	0	0	0	0	0	0	0	0
Bicycles, per h	0	0	0	0	0	0	0	0	0	0	0	0
Pedestrians, per h	0	0	0	0	0	0	0	0	0	0	0	0
Heavy Veh Equivalent	2	2	2	2	2	2	2	2	2	2	2	2
Bus Blockage Time	14.4	14.4	14.4	14.4	14.4	14.4	14.4	14.4	14.4	14.4	14.4	14.4
Turns in Shrd Ln, %	0	0	0	40	0	0	0	0	0	0	0	0
Unopposed Lefts, %	0	0	0	0	0	0	0	0	0	0	0	0
Parking Time, sec	18	18	18	18	18	18	18	18	18	18	18	18
Arrival Type	3	3	3	3	3	3	4	4	4	4	4	4
Initial Queue, veh	0	0	0	0	0	0	0	0	0	0	0	0
Speed Limit, mph	30	30	30	30	30	30	35	35	35	35	35	35
Detector Length, ft	40	40	40	40	40	40	40	40	40	40	40	40
StartLostTime, sec	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0
EndUseTime, sec	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0
RTOR, veh/h		35			8			1			3	
I-Factor		1.00			1.00			1.00			0.93	
Walk + PC, sec		0.0			0.0			0.0			0.0	

	EB	EB	WB	WB	NB	NB	SB	SB
Phase	7	4	3	8	5	2	1	6
Movement		LT+TH+RT		LT+TH+RT	LT	LT+TH+RT		LT+TH+RT
Left-Turn Mode	--	Perm.	--	Perm.	Pr/Pm	--	--	Perm.
Phase Splits, s	0.0	22.0	0.0	22.0	9.0	62.0	0.0	53.0
Yellow Change, s	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Red Clearance, s	2.0	2.0	2.0	2.0	0.0	2.0	2.0	2.0
Minimum Green, s	5	5	5	5	5	5	5	5
Lead/Lag					Lead			
Passage Time, s	2.0	4.0	2.0	4.0	4.0	2.0	3.0	2.0
Recall	Min	Off	Min	Off	Off	Min	Off	Min
Dual Entry	No	Yes	No	Yes	No	Yes	No	Yes
Prot. Right-Turn	False	False	False	False	False	False	False	False

	E/W	N/S
Simultaneous Gap out	Off	Off
Dallas Phasing	Off	Off

Cycle Length, s	84
Offset, s	41
Reference Phase	2
Reference Point	End
Force Mode	Float
Uncoordinated	No
Field Measured Phase Times	No
Exclusive Ped Phase Time, s	0.0

Timer:	1	2	3	4	5	6	7	8
Assigned Phase	0	2	0	4	5	6	0	8
Assigned Left-Turn Mvmt.	0	0	0	7	5	1	0	3
Assigned Through Mvmt.	0	2	0	4	0	6	0	8
Assigned Right-Turn Mvmt.	0	12	0	14	0	16	0	18
Timer w/Pr-Pm From Shared	0	0	0	0	0	0	0	0

Chapter 18 Summary Output

Cycle Length, s	84											
	EB	EB	EB	WB	WB	WB	NB	NB	NB	SB	SB	SB
	LT	TH	RT	LT	TH	RT	LT	TH	RT	LT	TH	RT
Movement	7	4	14	3	8	18	5	2	12	1	6	16
Volume, veh/h	64.94	12.99	32.47	6.49	6.49	2.6	84.42	493.51	5.19	12.99	818.18	35.06
SatFlow, veh/h/ln	0	1782.2	0	0	1782.2	0	1782.2	1782.2	0	1782.2	1782.2	0
Lane Util Factor	1	1	1	1	1	1	1	1	1	1	1	1
Capacity, veh/h	147.08	23.23	41.18	102.54	83.73	25.04	546.78	2688.6	28.29	686.91	2255.6	96.66
Discharge Vol, veh/h	64.94	0	0	0	0	2.6	0	493.51	0	0	0	0
Prop Arriv On Green	0.09	0.09	0.09	0.09	0.09	0.09	0.07	1	1	0.81	0.73	0.78
Apprch Vol, veh/h	0	110.39	0	0	15.58	0	0	583.12	0	0	866.23	0
Apprch Stops, #/veh	0	0.9	0	0	0.82	0	0	0.04	0	0	0.22	0
Apprch Delay, s/veh	0	40.17	0	0	35.04	0	0	0.79	0	0	5.6	0

Apprch LOS		D	D	A	A
Int Delay, s/veh	6.54				
Int LOS	A				

Timer Data

Timer:	1	2	3	4	5	6	7	8
Assigned Phase	0	2	0	4	5	6	0	8
Case No	0	4	0	8	1	6.3	0	8
Phase Duration, s	0	70.15	0	13.85	8.3	61.85	0	13.85
Change Period, s	0	6	0	6	4	6	0	6
Phase Start Time, s	60.85	60.85	47	47	60.85	69.16	47	47
Phase End Time, s	60.85	47	47	60.85	69.16	47	47	60.85
Max Allow Headway, s	0	0	0	5.16	5.08	0	0	5.15
Equiv Max Green, s		5		16	5	5		16
Queue Clear Time, s				8.03	3.14			2.69
Green Exten Time, s	0	0	0	0.26	0.05	0	0	0.02
Prob of Phase Call				0.95	0.86			0.95
Prob of Max Out				0.14	1			0
Left-Turn Movement Data								
Assigned Movement	0	0	0	7	5	1	0	3
Mvmt. Sat Flow, veh/h	0	0	0	881.09	1697.31	904.37	0	669.52
Through Movement Data								
Assigned Movement	0	2	0	4	0	6	0	8
Mvmt. Sat Flow, veh/h	0	3520.65	0	176.22	0	3392.8	0	669.53
Right-Turn Movement Data								
Assigned Movement	0	12	0	14	0	16	0	18
Mvmt. Sat Flow, veh/h	0	37.04	0	440.54	0	145.39	0	267.81

Left Lane Group Output

Timer:	1	2	3	4	5	6	7	8
Assigned Phase	0	2	0	4	5	6	0	8
Left Lane Group Data								
Assigned Movement	0	0	0	7	5	1	0	3
Lane Assignment				L+T+R	L Pr/Pm	L		L+T+R
Lanes in Group	0	0	0	1	1	1	0	1
Group Volume, veh/h	0	0	0	110.39	84.42	12.99	0	15.58
Group SatFlow, vphpl	0	0	0	1497.85	1697.31	904.37	0	1606.86
Queue Serve Time, s	0	0	0	5.34	1.14	0.24	0	0
Cycle Clear Time, s	0	0	0	6.03	1.14	0.24	0	0.69
Perm SatFlow, vphpl	0	0	0	1428.23	650.39	904.37	0	1382.05
Shared SatFlow, vphpl				1782.18				1554.97
Perm Eff Green, s	0	0	0	7.85	57.84	55.84	0	7.85
Perm Serve Time, s	0	0	0	7.16	48.32	55.84	0	1.82
Perm Que Serve Time, s				5.34	1.39	0.24		0
Time to first Blk, s	0	0	0	0.57	0	0	0	2.46
Serve Time pre Blk, s				0.57				0.54
Prop Inside Lane	0	0	0	0.59	1	1	0	0.42
Lane Grp Capacity, vph				208.09	546.78	686.91		210.93
v/c Ratio	0	0	0	0.53	0.15	0.02	0	0.07
Avail Capacity, veh/h				351.42	560.87	686.91		360.46
I-Factor	0	0	0	1	1	0.93	0	1
Uniform Delay, s/veh				37.2	3.55	2.77		34.83
Increm Delay, s/veh	0	0	0	2.97	0.18	0.05	0	0.21
Overflow Delay, s/veh	0	0	0	0	0	0	0	0
Control Delay, s/veh				40.17	3.73	2.81		35.04
Group LOS				D	A	A		D
Uniform Stops, #/veh				0.84	0.12	0.11		0.78
Increm Stops, #/veh	0	0	0	0.07	0.01	0.03	0	0.03
Overflow Stops, #/veh	0	0	0	0	0	0	0	0
Stop Rate, #/veh				0.9	0.14	0.14		0.82
Uniform Queue, veh/ln				2.16	0.24	0.03		0.28
Increm Queue, veh/ln	0	0	0	0.17	0.03	0.01	0	0.01
Overflow Queue, veh/ln	0	0	0	0	0	0	0	0
Back of Queue Factor	0	0	0	1.8	1.8	1.8	0	1.8
Back of Queue, veh/ln				4.19	0.48	0.08		0.53
Storage Ratio	0	0	0	0.21	0.06	0.01	0	0.03
Initial Queue, veh	0	0	0	0	0	0	0	0
Final Queue, veh	0	0	0	0	0	0	0	0
Saturated Delay, s/veh	0	0	0	0	0	0	0	0
Saturated Stops, #/veh	0	0	0	0	0	0	0	0
Saturated Queue, veh/ln	0	0	0	0	0	0	0	0
Saturated Capacity, vph	0	0	0	0	0	0	0	0
Init Que Clear Time, s	0	0	0	0	0	0	0	0

Thru Lane Group Output

Timer:	1	2	3	4	5	6	7	8
Assigned Phase	0	2	0	4	5	6	0	8
Thru Lane Group Data								
Assigned Movement	0	2	0	4	0	6	0	8
Lane Assignment		T				T		
Lanes in Group	0	1	0	0	0	1	0	0
Group Volume, veh/h	0	249.71	0	0	0	429.73	0	0
Group SatFlow, vphpl	0	1782.18	0	0	0	1782.18	0	0
Queue Serve Time, s	0	0	0	0	0	7.52	0	0
Cycle Clear Time, s	0	0	0	0	0	7.52	0	0
Lane Grp Capacity, vph		1360.98				1184.83		
v/c Ratio	0	0.18	0	0	0	0.36	0	0

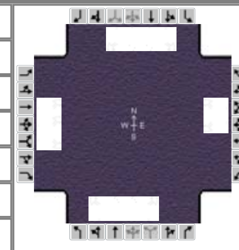
Avail Capacity, veh/h		1360.98				1184.83		
I-Factor	0	1	0	0	0	0.93	0	0
Uniform Delay, s/veh		0				4.88		
Increm Delay, s/veh	0	0.3	0	0	0	0.81	0	0
Overflow Delay, s/veh	0	0	0	0	0	0	0	0
Control Delay, s/veh		0.3				5.68		
Group LOS		A				A		
Uniform Stops, #/veh		0				0.2		
Increm Stops, #/veh	0	0.02	0	0	0	0.03	0	0
Overflow Stops, #/veh	0	0	0	0	0	0	0	0
Stop Rate, #/veh		0.02				0.22		
Uniform Queue, veh/ln		0				1.98		
Increm Queue, veh/ln	0	0.11	0	0	0	0.27	0	0
Overflow Queue, veh/ln	0	0	0	0	0	0	0	0
Back of Queue Factor	0	1.8	0	1	0	1.8	0	1
Back of Queue, veh/ln		0.2				4.04		
Storage Ratio	0	0.01	0	0	0	0.07	0	0
Initial Queue, veh	0	0	0	0	0	0	0	0
Final Queue, veh	0	0	0	0	0	0	0	0
Saturated Delay, s/veh	0	0	0	0	0	0	0	0
Saturated Stops, #/veh	0	0	0	0	0	0	0	0
Saturated Queue, veh/ln	0	0	0	0	0	0	0	0
Saturated Capacity, vph	0	0	0	0	0	0	0	0
Init Que Clear Time, s	0	0	0	0	0	0	0	0

Right Lane Group Output

Timer:	1	2	3	4	5	6	7	8
Assigned Phase	0	2	0	4	5	6	0	8
Right Lane Group Data								
Assigned Movement	0	12	0	14	0	16	0	18
Lane Assignment		T+R				T+R		
Lanes in Group	0	1	0	0	0	1	0	0
Group Volume, veh/h	0	248.99	0	0	0	423.51	0	0
Group SatFlow, vphpl	0	1775.51	0	0	0	1756.01	0	0
Queue Serve Time, s	0	0	0	0	0	7.42	0	0
Cycle Clear Time, s	0	0	0	0	0	7.42	0	0
Prot RT SatFlow, vphpl								
Prot RT Eff Green, s								
Prop Outside Lane	0	0.02	0	0.29	0	0.08	0	0.17
Lane Grp Capacity, vph		1355.9				1167.44		
v/c Ratio	0	0.18	0	0	0	0.36	0	0
Avail Capacity, veh/h		1355.9				1167.44		
I-Factor	0	1	0	0	0	0.93	0	0
Uniform Delay, s/veh		0				4.79		
Increm Delay, s/veh	0	0.3	0	0	0	0.82	0	0
Overflow Delay, s/veh	0	0	0	0	0	0	0	0
Control Delay, s/veh		0.3				5.6		
Group LOS		A				A		
Uniform Stops, #/veh		0				0.19		
Increm Stops, #/veh	0	0.02	0	0	0	0.03	0	0
Overflow Stops, #/veh	0	0	0	0	0	0	0	0
Stop Rate, #/veh		0.02				0.22		
Uniform Queue, veh/ln		0				1.91		
Increm Queue, veh/ln	0	0.11	0	0	0	0.27	0	0
Overflow Queue, veh/ln	0	0	0	0	0	0	0	0
Back of Queue Factor	0	1.8	0	1	0	1.8	0	1
Back of Queue, veh/ln		0.2				3.91		
Storage Ratio	0	0.01	0	0	0	0.07	0	0
Initial Queue, veh	0	0	0	0	0	0	0	0
Final Queue, veh	0	0	0	0	0	0	0	0
Saturated Delay, s/veh	0	0	0	0	0	0	0	0
Saturated Stops, #/veh	0	0	0	0	0	0	0	0
Saturated Queue, veh/ln	0	0	0	0	0	0	0	0
Saturated Capacity, vph	0	0	0	0	0	0	0	0
Init Que Clear Time, s	0	0	0	0	0	0	0	0

HCS 2010 Signalized Intersection Results Summary

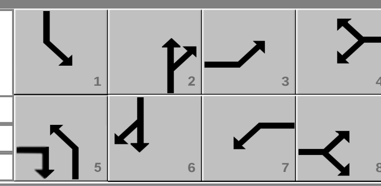
General Information				Intersection Information	
Agency	HDR			Duration, h	0.25
Analyst	MDF	Analysis Date	Jan 30, 2013	Area Type	Other
Jurisdiction		Time Period	AM Peak	PHF	0.77
Intersection	I-90 Ramps (SPUI)	Analysis Year	Existing (2012)	Analysis Period	1> 7:45
File Name	Existing_AM_Haines.xus				
Project Description					



Demand Information	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Demand (*v*), veh/h	200		170	120		80	80	270	90	110	380	230

Signal Information			
Cycle, s	84.0	Reference Phase	2
Offset, s	28	Reference Point	End
Uncoordinated	No	Simult. Gap E/W	Off
Force Mode	Float	Simult. Gap N/S	Off

Green	6.5	2.4	48.6	0.0	7.0	0.0
Yellow	4.0	0.0	4.0	0.0	4.0	0.0
Red	2.5	0.0	2.5	0.0	2.5	0.0



Timer Results	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Assigned Phase	3	8	7	4	5	2	1	6
Case Number	1.4	3.0	1.4	3.0	2.0	3.0	2.0	3.0
Phase Duration, s	13.5	0.0	13.5	0.0	13.0	55.1	15.4	57.4
Change Period, *(Y+Rc)*, s	6.5	0.0	6.5	0.0	6.5	6.5	6.5	6.5
Max Allow Headway *(MAH)*, s	5.0	0.0	5.0	0.0	5.1	0.0	5.1	0.0
Queue Clearance Time *(g_s)*, s	5.7		6.9		7.0		8.8	
Green Extension Time *(g_e)*, s	0.8	0.0	0.3	0.0	0.2	0.0	0.5	0.0
Phase Call Probability	1.00		0.97		0.91		0.96	
Max Out Probability	0.41		0.70		0.75		0.02	

Movement Group Results	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Assigned Movement	3		18	7		14	5	2	12	1	6	16
Adjusted Flow Rate (*v*), veh/h	260		0	156		0	104	351	0	143	494	0
Adjusted Saturation Flow Rate (*s*), veh/h/ln	1648		1510	1714		1510	1697	1697	1510	1697	1697	1510
Queue Service Time (*g_s*), s	3.7		0.0	4.9		0.0	5.0	4.6	0.0	6.8	5.6	0.0
Cycle Queue Clearance Time (*g_c*), s	3.7		0.0	4.9		0.0	5.0	4.6	0.0	6.8	5.6	0.0
Green Ratio (*g/C*)	0.08		0.08	0.08		0.00	0.08	0.58	0.58	0.11	0.61	0.61
Capacity (*c*), veh/h	380		120	195		2	132	1961	873	180	2057	916
Volume-to-Capacity Ratio *(X)*	0.684		0.000	0.799		0.000	0.785	0.179	0.000	0.793	0.240	0.000
Available Capacity (*c_a*), veh/h	594		136	307		18	253	1961	873	414	2057	916
Back of Queue (*Q*), veh/ln (95th percentile)	4.4		0.0	6.1		0.0	4.4	2.7	0.0	5.4	3.2	0.0
Queue Storage Ratio *(RQ)* (95th percentile)	0.75		0.00	0.00		0.00	0.37	0.05	0.00	0.68	0.07	0.00
Uniform Delay (*d_1*), s/veh	38.1		0.0	38.6		0.0	36.8	9.5	0.0	33.8	7.6	0.0
Incremental Delay (*d_2*), s/veh	3.1		0.0	10.5		0.0	13.3	0.2	0.0	9.8	0.3	0.0
Initial Queue Delay (*d_3*), s/veh	0.0		0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0	0.0
Control Delay (*d*), s/veh	41.2		0.0	49.1		0.0	50.1	9.7	0.0	43.6	7.9	0.0
Level of Service (LOS)	D			D			D	A		D	A	
Approach Delay, s/veh / LOS	41.2	D		49.1	D		19.0	B		15.9	B	
Intersection Delay, s/veh / LOS	24.6						C					

Multimodal Results	EB		WB		NB		SB	
Pedestrian LOS Score / LOS	3.1	C	3.3	C	2.4	B	2.6	B
Bicycle LOS Score / LOS		F		F	0.9	A	1.0	A

This Signals text report was created on April 11, 2013 at 01:52:00

Intersection number = 2, Segment number = 1, Period number = 1

Chapter 18 Summary Input

Cycle Length, s 84

	EB LT	EB TH	EB RT	WB LT	WB TH	WB RT	NB LT	NB TH	NB RT	SB LT	SB TH	SB RT
Movement	3	8	18	7	4	14	5	2	12	1	6	16
Volume, veh/h	200	0	170	120	0	80	80	270	90	110	380	230
Lanes	2	0	1	1	0	1	1	2	1	1	2	1
Bay Length, ft	150	500	150	0	150	500	300	1499	300	200	1213	300
Receiving Lanes	1	1	1	1	1	1	2	2	2	2	2	2
SatFlow, vplphg	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800
Lane Width, ft	12	12	12	12	12	12	12	12	12	12	12	12
Heavy Vehicles, %	1	1	1	0	1	1	1	1	1	1	1	1
Grade, %	0	0	0	0	0	0	0	0	0	0	0	0
Buses, per h	0	0	0	0	0	0	0	0	0	0	0	0
Parking, per h	0	0	0	0	0	0	0	0	0	0	0	0
Bicycles, per h	0	0	0	0	0	0	0	0	0	0	0	0
Pedestrians, per h	0	0	0	0	0	0	0	0	0	0	0	0
Heavy Veh Equivalent	2	2	2	2	2	2	2	2	2	2	2	2
Bus Blockage Time	14.4	14.4	14.4	14.4	14.4	14.4	14.4	14.4	14.4	14.4	14.4	14.4
Turns in Shrd Ln, %	0	0	0	0	0	0	0	0	0	0	0	0
Unopposed Lefts, %	0	0	0	0	0	0	0	0	0	0	0	0
Parking Time, sec	18	18	18	18	18	18	18	18	18	18	18	18
Arrival Type	3	3	3	3	3	3	4	4	4	4	4	4
Initial Queue, veh	0	0	0	0	0	0	0	0	0	0	0	0
Speed Limit, mph	45	45	45	45	45	45	35	35	35	35	35	35
Detector Length, ft	40	40	40	40	40	40	40	40	40	40	40	40
StartLostTime, sec	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0
EndUseTime, sec	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0
RTOR, veh/h		170			80			90			230	
I-Factor		1.00			1.00			0.99			0.92	
Walk + PC, sec		0.0			0.0			0.0			0.0	

	EB	EB	WB	WB	NB	NB	SB	SB
Phase	3	8	7	4	5	2	1	6
Movement	LT	LT+RT	LT	LT+RT	LT	TH+RT	LT	TH+RT
Left-Turn Mode	Pr/Pm	--	Pr/Pm	--	Prot.	--	Prot.	--
Phase Splits, s	19.0	1.0	19.0	1.0	19.0	37.0	27.0	45.0
Yellow Change, s	4.0	0.0	4.0	0.0	4.0	4.0	4.0	4.0
Red Clearance, s	2.5	0.0	2.5	0.0	2.5	2.5	2.5	2.5
Minimum Green, s	5	1	5	1	5	5	5	5
Lead/Lag	Lag		Lag		Lead		Lead	
Passage Time, s	4.0	0.0	4.0	0.0	4.0	2.0	4.0	2.0
Recall	Off	Off	Off	Off	Off	Min	Off	Min
Dual Entry	No	Yes	No	Yes	No	Yes	No	Yes
Prot. Right-Turn	False	False	False	False	True	False	False	False

	E/W	N/S
Simultaneous Gap out	Off	Off
Dallas Phasing	Off	Off

Cycle Length, s	84
Offset, s	28
Reference Phase	2
Reference Point	End
Force Mode	Float
Uncoordinated	No
Field Measured Phase Times	No
Exclusive Ped Phase Time, s	0.0

Timer:	1	2	3	4	5	6	7	8
Assigned Phase	1	2	4	3	5	6	8	7
Assigned Left-Turn Mvmt.	1	0	0	3	5	0	0	7
Assigned Through Mvmt.	0	2	4	0	0	6	8	0
Assigned Right-Turn Mvmt.	0	12	14	0	0	16	18	0
Timer w/Pr-Pm From Shared	0	0	0	0	0	0	0	0

Chapter 18 Summary Output

Cycle Length, s 84

	EB LT	EB TH	EB RT	WB LT	WB TH	WB RT	NB LT	NB TH	NB RT	SB LT	SB TH	SB RT
Movement	3	8	18	7	4	14	5	2	12	1	6	16
Volume, veh/h	259.74	0	0	155.84	0	0	103.9	350.65	0	142.86	493.51	0
SatFlow, veh/h/ln	1782.2	1782.2	1782.2	1800	1782.2	1782.2	1782.2	1782.2	1782.2	1782.2	1782.2	1782.2
Lane Util Factor	0.97	1	1	1	1	1	1	0.95	1	1	0.95	1
Capacity, veh/h	379.5	0	17.98	194.95	0	17.98	132.28	1961.3	872.95	180.16	2057	915.55
Discharge Vol, veh/h	259.74	0	0	155.84	0	0	0	350.65	0	0	493.51	0
Prop Arriv On Green	0.08	0	0	0.08	0	0	0.11	0.52	0	0.17	0.61	0
Apprch Vol, veh/h	0	259.74	0	0	155.84	0	0	454.55	0	0	636.36	0
Apprch Stops, #/veh	0	NaN	0	0	NaN	0	0	0.52	0	0	0.44	0
Apprch Delay, s/veh	0	41.18	0	0	49.09	0	0	18.97	0	0	15.88	0

Apprch LOS	D	D	B	B
Int Delay, s/veh	24.61			
Int LOS	C			

Timer Data

Timer:	1	2	3	4	5	6	7	8
Assigned Phase	1	2	4	3	5	6	8	7
Case No	2	3	3	1.4	2	3	3	1.4
Phase Duration, s	15.42	55.05	0	13.53	13.05	57.42	0	13.53
Change Period, s	6.5	6.5	0	6.5	6.5	6.5	0	6.5
Phase Start Time, s	48.03	63.45	34.5	34.5	48.03	61.08	34.5	34.5
Phase End Time, s	63.45	34.5	34.5	48.03	61.08	34.5	34.5	48.03
Max Allow Headway, s	5.08	0	0	4.98	5.08	0	0	4.98
Equiv Max Green, s	20.5	5	1	12.5	12.5	5	1	12.5
Queue Clear Time, s	8.77			5.72	7.01			6.92
Green Exten Time, s	0.47	0	0	0.76	0.17	0	0	0.3
Prob of Phase Call	0.96			1	0.91			0.97
Prob of Max Out	0.02			0.41	0.75			0.7
Left-Turn Movement Data								
Assigned Movement	1	0	0	3	5	0	0	7
Mvmt. Sat Flow, veh/h	1697.31	0	0	3296.18	1697.31	0	0	1714.29
Through Movement Data								
Assigned Movement	0	2	4	0	0	6	8	0
Mvmt. Sat Flow, veh/h	0	3393.27	0	0	0	3393.27	0	0
Right-Turn Movement Data								
Assigned Movement	0	12	14	0	0	16	18	0
Mvmt. Sat Flow, veh/h	0	1510.32	1510.32	0	0	1510.32	1510.32	0

Left Lane Group Output

Timer:	1	2	3	4	5	6	7	8
Assigned Phase	1	2	4	3	5	6	8	7
Left Lane Group Data								
Assigned Movement	1	0	0	3	5	0	0	7
Lane Assignment	L (Prot)			L Pr/Pm	L (Prot)			L Pr/Pm
Lanes in Group	1	0	0	2	1	0	0	1
Group Volume, veh/h	142.86	0	0	259.74	103.9	0	0	155.84
Group SatFlow, vphpl	1697.31	0	0	1648.09	1697.31	0	0	1714.29
Queue Serve Time, s	6.77	0	0	3.72	5.01	0	0	4.92
Cycle Clear Time, s	6.77	0	0	3.72	5.01	0	0	4.92
Perm SatFlow, vphpl	0	0	0	1425.73	0	0	0	1439.99
Shared SatFlow, vphpl								
Perm Eff Green, s	0	0	0	-2	0	0	0	-2
Perm Serve Time, s	0	0	0	-2	0	0	0	-2
Perm Que Serve Time, s				0				0
Time to first Blk, s	0	0	0	0	0	0	0	0
Serve Time pre Blk, s								
Prop Inside Lane	1	0	0	1	1	0	0	1
Lane Grp Capacity, vph	180.16			379.5	132.28			194.95
v/c Ratio	0.79	0	0	0.68	0.79	0	0	0.8
Avail Capacity, veh/h	414.23			594.04	252.58			306.53
I-Factor	0.92	0	0	1	0.99	0	0	1
Uniform Delay, s/veh	33.8			38.08	36.84			38.56
Increm Delay, s/veh	9.77	0	0	3.1	13.29	0	0	10.53
Overflow Delay, s/veh	0	0	0	0	0	0	0	0
Control Delay, s/veh	43.57			41.18	50.13			49.09
Group LOS	D			D	D			D
Uniform Stops, #/veh	0.75			0.76	0.8			0.77
Increm Stops, #/veh	0.15	0	0	0.05	0.2	0	0	0.16
Overflow Stops, #/veh	0	0	0	0	0	0	0	0
Stop Rate, #/veh	0.9			0.82	1.01			0.93
Uniform Queue, veh/ln	2.51			2.31	1.95			2.82
Increm Queue, veh/ln	0.49	0	0	0.16	0.49	0	0	0.57
Overflow Queue, veh/ln	0	0	0	0	0	0	0	0
Back of Queue Factor	1.8	0	0	1.8	1.8	0	0	1.8
Back of Queue, veh/ln	5.4			4.45	4.39			6.1
Storage Ratio	0.68	0	0	0.75	0.37	0	0	0
Initial Queue, veh	0	0	0	0	0	0	0	0
Final Queue, veh	0	0	0	0	0	0	0	0
Saturated Delay, s/veh	0	0	0	0	0	0	0	0
Saturated Stops, #/veh	0	0	0	0	0	0	0	0
Saturated Queue, veh/ln	0	0	0	0	0	0	0	0
Saturated Capacity, vph	0	0	0	0	0	0	0	0
Init Que Clear Time, s	0	0	0	0	0	0	0	0

Thru Lane Group Output

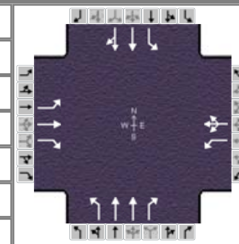
Timer:	1	2	3	4	5	6	7	8
Assigned Phase	1	2	4	3	5	6	8	7
Thru Lane Group Data								
Assigned Movement	0	2	4	0	0	6	8	0
Lane Assignment		T				T		
Lanes in Group	0	2	0	0	0	2	0	0
Group Volume, veh/h	0	350.65	0	0	0	493.51	0	0
Group SatFlow, vphpl	0	1696.63	0	0	0	1696.63	0	0
Queue Serve Time, s	0	4.57	0	0	0	5.63	0	0
Cycle Clear Time, s	0	4.57	0	0	0	5.63	0	0
Lane Grp Capacity, vph		1961.26	0			2056.99	0	
v/c Ratio	0	0.18	0	0	0	0.24	0	0

Avail Capacity, veh/h		1961.26	0			2056.99	0	
I-Factor	0	0.99	0	0	0	0.92	0	0
Uniform Delay, s/veh		9.54	0			7.61	0	
Increm Delay, s/veh	0	0.2	0	0	0	0.25	0	0
Overflow Delay, s/veh	0	0	0	0	0	0	0	0
Control Delay, s/veh		9.74	0			7.87	0	
Group LOS		A				A		
Uniform Stops, #/veh		0.36	NaN			0.29	NaN	
Increm Stops, #/veh	0	0.01	0	0	0	0.01	0	0
Overflow Stops, #/veh	0	0	0	0	0	0	0	0
Stop Rate, #/veh		0.37	NaN			0.31	NaN	
Uniform Queue, veh/ln		1.47	0			1.7	0	
Increm Queue, veh/ln	0	0.05	0	0	0	0.07	0	0
Overflow Queue, veh/ln	0	0	0	0	0	0	0	0
Back of Queue Factor	0	1.8	1	0	0	1.8	1	0
Back of Queue, veh/ln		2.75	0			3.19	0	
Storage Ratio	0	0.05	0	0	0	0.07	0	0
Initial Queue, veh	0	0	0	0	0	0	0	0
Final Queue, veh	0	0	0	0	0	0	0	0
Saturated Delay, s/veh	0	0	0	0	0	0	0	0
Saturated Stops, #/veh	0	0	0	0	0	0	0	0
Saturated Queue, veh/ln	0	0	0	0	0	0	0	0
Saturated Capacity, vph	0	0	0	0	0	0	0	0
Init Que Clear Time, s	0	0	0	0	0	0	0	0

Right Lane Group Output

Timer:	1	2	3	4	5	6	7	8
Assigned Phase	1	2	4	3	5	6	8	7
Right Lane Group Data								
Assigned Movement	0	12	14	0	0	16	18	0
Lane Assignment		R	R			R	R	
Lanes in Group	0	1	1	0	0	1	1	0
Group Volume, veh/h	0	0	0	0	0	0	0	0
Group SatFlow, vphpl	0	1510.32	1510.32	0	0	1510.32	1510.32	0
Queue Serve Time, s	0	0	0	0	0	0	0	0
Cycle Clear Time, s	0	0	0	0	0	0	0	0
Prot RT SatFlow, vphpl		0	0			0	1510.32	
Prot RT Eff Green, s		0	0			0	6.55	
Prop Outside Lane	0	1	1	0	0	1	1	0
Lane Grp Capacity, vph		872.95	1.8			915.55	119.51	
v/c Ratio	0	0	0	0	0	0	0	0
Avail Capacity, veh/h		872.95	17.98			915.55	135.69	
I-Factor	0	0	0	0	0	0	0	0
Uniform Delay, s/veh		0	0			0	0	
Increm Delay, s/veh	0	0	0	0	0	0	0	0
Overflow Delay, s/veh	0	0	0	0	0	0	0	0
Control Delay, s/veh		0	0			0	0	
Group LOS								
Uniform Stops, #/veh		0	0			0	0	
Increm Stops, #/veh	0	0	0	0	0	0	0	0
Overflow Stops, #/veh	0	0	0	0	0	0	0	0
Stop Rate, #/veh		0	0			0	0	
Uniform Queue, veh/ln		0	0			0	0	
Increm Queue, veh/ln	0	0	0	0	0	0	0	0
Overflow Queue, veh/ln	0	0	0	0	0	0	0	0
Back of Queue Factor	0	1	1	0	0	1	1	0
Back of Queue, veh/ln		0	0			0	0	
Storage Ratio	0	0	0	0	0	0	0	0
Initial Queue, veh	0	0	0	0	0	0	0	0
Final Queue, veh	0	0	0	0	0	0	0	0
Saturated Delay, s/veh	0	0	0	0	0	0	0	0
Saturated Stops, #/veh	0	0	0	0	0	0	0	0
Saturated Queue, veh/ln	0	0	0	0	0	0	0	0
Saturated Capacity, vph	0	0	0	0	0	0	0	0
Init Que Clear Time, s	0	0	0	0	0	0	0	0

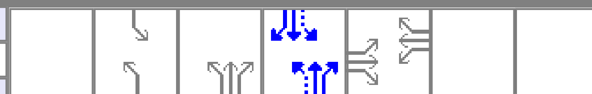
HCS 2010 Signalized Intersection Results Summary



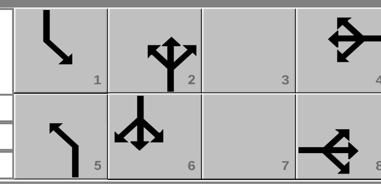
General Information				Intersection Information	
Agency	HDR			Duration, h	0.25
Analyst	MDF	Analysis Date	Jan 30, 2013	Area Type	Other
Jurisdiction		Time Period	AM Peak	PHF	0.77
Intersection	Disk Drive	Analysis Year	Existing (2012)	Analysis Period	1> 7:45
File Name	Existing_AM_Haines.xus				
Project Description					

Demand Information	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Demand (*v*), veh/h	5	5	50	20	5	35	90	360	100	60	650	5

Signal Information			
Cycle, s	84.0	Reference Phase	6
Offset, s	74	Reference Point	End
Uncoordinated	No	Simult. Gap E/W	Off
Force Mode	Float	Simult. Gap N/S	Off



Green	4.2	0.5	53.5	2.2	1.6	0.0
Yellow	4.0	0.0	4.0	4.0	4.0	0.0
Red	0.0	0.0	2.0	2.0	2.0	0.0



Timer Results	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Assigned Phase		8		4	5	2	1	6
Case Number		9.0		10.0	1.1	3.0	1.1	4.0
Phase Duration, s		7.6		8.2	8.7	59.9	8.2	59.5
Change Period, *(Y+R$_c$)*, s		6.0		6.0	4.0	6.0	4.0	6.0
Max Allow Headway *(MAH)*, s		5.2		5.1	5.1	0.0	5.1	0.0
Queue Clearance Time *(g$_s$)*, s		2.3		3.1	3.9		3.3	
Green Extension Time *(g$_e$)*, s		0.0		0.0	0.0	0.0	0.0	0.0
Phase Call Probability		0.33		0.56	0.93		0.84	
Max Out Probability		0.00		0.02	1.00		1.00	

Movement Group Results	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Assigned Movement	3	8	18	7	4	14	5	2	12	1	6	16
Adjusted Flow Rate (*v*), veh/h	6	6	4	23	23		117	468	66	78	390	461
Adjusted Saturation Flow Rate (*s*), veh/h/ln	1697	1782	1510	1697	1697		1697	1697	1510	1697	1504	1778
Queue Service Time (*g$_s$*), s	0.3	0.3	0.2	1.1	1.1		1.9	5.9	2.1	1.3	5.0	5.0
Cycle Queue Clearance Time (*g$_c$*), s	0.3	0.3	0.2	1.1	1.1		1.9	5.9	2.1	1.3	5.0	5.0
Green Ratio (*g/C*)	0.02	0.02	0.02	0.03	0.03		0.70	0.64	0.64	0.69	0.64	0.64
Capacity (*c*), veh/h	33	35	29	45	45		556	2179	970	671	958	1131
Volume-to-Capacity Ratio *(X)*	0.197	0.188	0.133	0.517	0.517		0.210	0.215	0.068	0.116	0.407	0.407
Available Capacity (*c$_a$*), veh/h	242	255	216	242	242		562	2179	970	687	958	1131
Back of Queue (*Q*), veh/ln (95th percentile)	0.3	0.3	0.2	1.1	1.1		0.9	3.4	1.1	0.6	2.3	2.6
Queue Storage Ratio *(RQ)* (95th percentile)	0.08	0.01	0.02	0.14	0.14		0.11	0.07	0.02	0.08	0.06	0.07
Uniform Delay (*d$_1$*), s/veh	40.5	40.5	40.5	40.3	40.3		4.3	8.2	8.9	4.4	2.7	2.7
Incremental Delay (*d$_2$*), s/veh	4.1	3.7	2.9	12.4	12.4		0.2	0.2	0.1	0.1	1.3	1.1
Initial Queue Delay (*d$_3$*), s/veh	0.0	0.0	0.0	0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0
Control Delay (*d*), s/veh	44.6	44.2	43.4	52.8	52.8		4.6	8.4	9.1	4.6	4.0	3.8
Level of Service (LOS)	D	D	D	D	D		A	A	A	A	A	A
Approach Delay, s/veh / LOS	44.2	D		50.0	D		7.7	A		3.9	A	
Intersection Delay, s/veh / LOS	6.9						A					

Multimodal Results	EB		WB		NB		SB	
Pedestrian LOS Score / LOS	3.0	C	2.9	C	2.3	B	2.4	B
Bicycle LOS Score / LOS	0.5	A	0.5	A	1.0	A	1.3	A

This Signals text report was created on April 11, 2013 at 01:52:39

Intersection number = 3, Segment number = 2, Period number = 1

Chapter 18 Summary Input

Cycle Length, s 84

	EB LT	EB TH	EB RT	WB LT	WB TH	WB RT	NB LT	NB TH	NB RT	SB LT	SB TH	SB RT
Movement	3	8	18	7	4	14	5	2	12	1	6	16
Volume, veh/h	5	5	50	20	5	35	90	360	100	60	650	5
Lanes	1	1	1	1	1	0	1	2	1	1	2	0
Bay Length, ft	100	500	200	200	500	200	200	1213	1213	200	1000	0
Receiving Lanes	1	1	1	1	1	1	2	2	2	2	2	2
SatFlow, vplphg	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800
Lane Width, ft	12	12	12	12	12	12	12	12	12	12	12	12
Heavy Vehicles, %	1	1	1	1	1	2	1	1	1	1	1	0
Grade, %	0	0	0	0	0	0	0	0	0	0	0	0
Buses, per h	0	0	0	0	0	0	0	0	0	0	0	0
Parking, per h	0	0	0	0	0	0	0	0	0	0	0	0
Bicycles, per h	0	0	0	0	0	0	0	0	0	0	0	0
Pedestrians, per h	0	0	0	0	0	0	0	0	0	0	0	0
Heavy Veh Equivalent	2	2	2	2	2	2	2	2	2	2	2	2
Bus Blockage Time	14.4	14.4	14.4	14.4	14.4	14.4	14.4	14.4	14.4	14.4	14.4	14.4
Turns in Shrd Ln, %	0	0	0	10	0	0	0	0	0	0	0	0
Unopposed Lefts, %	0	0	0	0	0	0	0	0	0	0	0	0
Parking Time, sec	18	18	18	18	18	18	18	18	18	18	18	18
Arrival Type	3	3	3	3	3	3	4	4	4	4	4	4
Initial Queue, veh	0	0	0	0	0	0	0	0	0	0	0	0
Speed Limit, mph	30	30	30	30	30	30	35	35	35	35	35	35
Detector Length, ft	40	40	40	40	40	40	40	40	40	40	40	40
StartLostTime, sec	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0
EndUseTime, sec	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0
RTOR, veh/h		47			33			49			0	
I-Factor		1.00			1.00			0.93			1.00	
Walk + PC, sec		0.0			0.0			0.0			0.0	

	EB	EB	WB	WB	NB	NB	SB	SB
Phase	3	8	7	4	5	2	1	6
Movement		LT+TH+RT		LT+TH+RT	LT	LT+TH+RT	LT	LT+TH+RT
Left-Turn Mode	--	Split	--	Split	Pr/Pm	--	Pr/Pm	--
Phase Splits, s	0.0	18.0	0.0	18.0	9.0	39.0	9.0	39.0
Yellow Change, s	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Red Clearance, s	1.0	2.0	1.0	2.0	0.0	2.0	0.0	2.0
Minimum Green, s	5	5	5	4	5	5	5	5
Lead/Lag					Lead		Lead	
Passage Time, s	2.0	4.0	2.0	4.0	4.0	2.0	4.0	2.0
Recall	Off	Off	Off	Off	Off	Min	Off	Min
Dual Entry	No	No	No	No	No	Yes	No	Yes
Prot. Right-Turn	False	False	False	False	False	False	False	False

	E/W	N/S
Simultaneous Gap out	Off	Off
Dallas Phasing	Off	Off

Cycle Length, s	84
Offset, s	74
Reference Phase	6
Reference Point	End
Force Mode	Float
Uncoordinated	No
Field Measured Phase Times	No
Exclusive Ped Phase Time, s	0.0

Timer:	1	2	3	4	5	6	7	8
Assigned Phase	1	2	4	8	5	6	0	0
Assigned Left-Turn Mvmt.	1	0	7	3	5	0	0	0
Assigned Through Mvmt.	0	2	4	8	0	6	0	0
Assigned Right-Turn Mvmt.	0	12	14	18	0	16	0	0
Timer w/Pr-Pm From Shared	0	0	0	0	0	0	0	0

Chapter 18 Summary Output

Cycle Length, s 84

	EB LT	EB TH	EB RT	WB LT	WB TH	WB RT	NB LT	NB TH	NB RT	SB LT	SB TH	SB RT
Movement	3	8	18	7	4	14	5	2	12	1	6	16
Volume, veh/h	6.49	6.49	3.9	25.97	6.49	2.6	116.88	467.53	66.23	77.92	844.16	6.49
SatFlow, veh/h/ln	1782.2	1782.2	1782.2	1782.2	1782.2	0	1782.2	1782.2	1782.2	1782.2	1782.2	0
Lane Util Factor	1	1	1	1	1	1	1	0.95	1	1	0.84	1
Capacity, veh/h	32.91	34.55	29.28	45.17	25.06	20.06	555.86	2179.3	969.97	670.65	2073	15.95
Discharge Vol, veh/h	0	0	3.9	25.97	0	0	0	0	0	0	844.16	0
Prop Arriv On Green	0.02	0.02	0.02	0.03	0.03	0.03	0.06	0.55	0.44	0.07	0.85	0.85
Apprch Vol, veh/h	0	16.88	0	0	35.06	0	0	650.65	0	0	928.57	0
Apprch Stops, #/veh	0	1.1	0	0	NaN	0	0	0.32	0	0	0.14	0
Apprch Delay, s/veh	0	44.18	0	0	49.97	0	0	7.75	0	0	3.93	0

Apprch LOS	D	D	A	A
Int Delay, s/veh 6.86				
Int LOS A				

Timer Data

Timer:	1	2	3	4	5	6	7	8
Assigned Phase	1	2	4	8	5	6	0	0
Case No	1.1	3	10	9	1.1	4	0	0
Phase Duration, s	8.19	59.95	8.24	7.63	8.67	59.46	0	0
Change Period, s	4	6	6	6	4	6	0	6
Phase Start Time, s	80	20.05	80	72.37	80	20.54	80	80
Phase End Time, s	4.19	80	4.24	80	4.67	80	80	80
Max Allow Headway, s	5.08	0	5.14	5.16	5.08	0	0	0
Equiv Max Green, s	5	5	12	12	5	5		
Queue Clear Time, s	3.27		3.14	2.32	3.88			
Green Exten Time, s	0.04	0	0.05	0.02	0.05	0	0	0
Prob of Phase Call	0.84		0.56	0.33	0.93			
Prob of Max Out	1		0.02	0	1			
Left-Turn Movement Data								
Assigned Movement	1	0	7	3	5	0	0	0
Mvmt. Sat Flow, veh/h	1697.31	0	1697.31	1697.31	1697.31	0	0	0
Through Movement Data								
Assigned Movement	0	2	4	8	0	6	0	0
Mvmt. Sat Flow, veh/h	0	3393.27	1210.72	1782.18	0	3257.05	0	0
Right-Turn Movement Data								
Assigned Movement	0	12	14	18	0	16	0	0
Mvmt. Sat Flow, veh/h	0	1510.32	753.85	1510.32	0	25.05	0	0

Left Lane Group Output

Timer:	1	2	3	4	5	6	7	8
Assigned Phase	1	2	4	8	5	6	0	0
Left Lane Group Data								
Assigned Movement	1	0	7	3	5	0	0	0
Lane Assignment	L Pr/Pm		L	L	L Pr/Pm			
Lanes in Group	1	0	1	1	1	0	0	0
Group Volume, veh/h	77.92	0	23.38	6.49	116.88	0	0	0
Group SatFlow, vphpl	1697.31	0	1697.31	1697.31	1697.31	0	0	0
Queue Serve Time, s	1.27	0	1.14	0.32	1.88	0	0	0
Cycle Clear Time, s	1.27	0	1.14	0.32	1.88	0	0	0
Perm SatFlow, vphpl	875.55	0	1697.31	1697.31	651.97	0	0	0
Shared SatFlow, vphpl								
Perm Eff Green, s	53.46	0	0	0	53.95	0	0	0
Perm Serve Time, s	48	0	0	0	48.41	0	0	0
Perm Que Serve Time, s	0.52				1.2			
Time to first Blk, s	0	0	0	0	0	0	0	0
Serve Time pre Blk, s								
Prop Inside Lane	1	0	1	1	1	0	0	0
Lane Grp Capacity, vph	670.65		45.17	32.91	555.86			
v/c Ratio	0.12	0	0.52	0.2	0.21	0	0	0
Avail Capacity, veh/h	687.05		242.47	242.47	562.47			
I-Factor	1	0	1	1	0.93	0	0	0
Uniform Delay, s/veh	4.45		40.35	40.54	4.31			
Increm Delay, s/veh	0.11	0	12.44	4.09	0.25	0	0	0
Overflow Delay, s/veh	0	0	0	0	0	0	0	0
Control Delay, s/veh	4.56		52.79	44.64	4.56			
Group LOS	A		D	D	A			
Uniform Stops, #/veh	0.18		0.85	0.85	0.17			
Increm Stops, #/veh	0.01	0	0.29	0.25	0.01	0	0	0
Overflow Stops, #/veh	0	0	0	0	0	0	0	0
Stop Rate, #/veh	0.19		1.14	1.1	0.18			
Uniform Queue, veh/ln	0.32		0.47	0.13	0.46			
Increm Queue, veh/ln	0.02	0	0.16	0.04	0.04	0	0	0
Overflow Queue, veh/ln	0	0	0	0	0	0	0	0
Back of Queue Factor	1.8	0	1.8	1.8	1.8	0	0	0
Back of Queue, veh/ln	0.61		1.12	0.3	0.9			
Storage Ratio	0.08	0	0.14	0.08	0.11	0	0	0
Initial Queue, veh	0	0	0	0	0	0	0	0
Final Queue, veh	0	0	0	0	0	0	0	0
Saturated Delay, s/veh	0	0	0	0	0	0	0	0
Saturated Stops, #/veh	0	0	0	0	0	0	0	0
Saturated Queue, veh/ln	0	0	0	0	0	0	0	0
Saturated Capacity, vph	0	0	0	0	0	0	0	0
Init Que Clear Time, s	0	0	0	0	0	0	0	0

Thru Lane Group Output

Timer:	1	2	3	4	5	6	7	8
Assigned Phase	1	2	4	8	5	6	0	0
Thru Lane Group Data								
Assigned Movement	0	2	4	8	0	6	0	0
Lane Assignment		T		T		T		
Lanes in Group	0	2	0	1	0	1	0	0
Group Volume, veh/h	0	467.53	0	6.49	0	389.91	0	0
Group SatFlow, vphpl	0	1696.63	0	1782.18	0	1504.44	0	0
Queue Serve Time, s	0	5.94	0	0.3	0	5.04	0	0
Cycle Clear Time, s	0	5.94	0	0.3	0	5.04	0	0
Lane Grp Capacity, vph		2179.25	0	34.55		957.51		
v/c Ratio	0	0.21	0	0.19	0	0.41	0	0

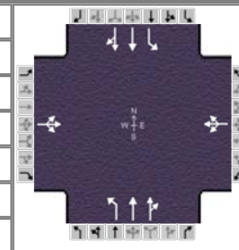
Avail Capacity, veh/h		2179.25	0	254.6		957.51		
I-Factor	0	0.93	0	1	0	1	0	0
Uniform Delay, s/veh		8.15		40.53		2.69		
Increm Delay, s/veh	0	0.21	0	3.67	0	1.29	0	0
Overflow Delay, s/veh	0	0	0	0	0	0	0	0
Control Delay, s/veh		8.36		44.21		3.98		
Group LOS		A		D		A		
Uniform Stops, #/veh		0.33	NaN	0.85		0.1		
Increm Stops, #/veh	0	0.01	0	0.23	0	0.04	0	0
Overflow Stops, #/veh	0	0	0	0	0	0	0	0
Stop Rate, #/veh		0.34	NaN	1.08		0.14		
Uniform Queue, veh/ln		1.82	0	0.13		0.94		
Increm Queue, veh/ln	0	0.06	0	0.04	0	0.34	0	0
Overflow Queue, veh/ln	0	0	0	0	0	0	0	0
Back of Queue Factor	0	1.8	1	1.8	0	1.8	0	0
Back of Queue, veh/ln		3.38	0	0.3		2.31		
Storage Ratio	0	0.07	0	0.01	0	0.06	0	0
Initial Queue, veh	0	0	0	0	0	0	0	0
Final Queue, veh	0	0	0	0	0	0	0	0
Saturated Delay, s/veh	0	0	0	0	0	0	0	0
Saturated Stops, #/veh	0	0	0	0	0	0	0	0
Saturated Queue, veh/ln	0	0	0	0	0	0	0	0
Saturated Capacity, vph	0	0	0	0	0	0	0	0
Init Que Clear Time, s	0	0	0	0	0	0	0	0

Right Lane Group Output

Timer:	1	2	3	4	5	6	7	8
Assigned Phase	1	2	4	8	5	6	0	0
Right Lane Group Data								
Assigned Movement	0	12	14	18	0	16	0	0
Lane Assignment		R	T+R	R		T+R		
Lanes in Group	0	1	1	1	0	1	0	0
Group Volume, veh/h	0	66.23	11.69	3.9	0	460.74	0	0
Group SatFlow, vphpl	0	1510.32	1695.52	1510.32	0	1777.67	0	0
Queue Serve Time, s	0	2.11	0.57	0.21	0	5.04	0	0
Cycle Clear Time, s	0	2.11	0.57	0.21	0	5.04	0	0
Prot RT SatFlow, vphpl		0		0				
Prot RT Eff Green, s		0		0				
Prop Outside Lane	0	1	0.29	1	0	0.01	0	0
Lane Grp Capacity, vph		969.97	45.14	29.28		1131.43		
v/c Ratio	0	0.07	0.26	0.13	0	0.41	0	0
Avail Capacity, veh/h		969.97	242.23	215.76		1131.43		
I-Factor	0	0.93	1	1	0	1	0	0
Uniform Delay, s/veh		8.94	40.07	40.49		2.69		
Increm Delay, s/veh	0	0.13	4.24	2.88	0	1.09	0	0
Overflow Delay, s/veh	0	0	0	0	0	0	0	0
Control Delay, s/veh		9.06	44.31	43.37		3.78		
Group LOS		A	D	D		A		
Uniform Stops, #/veh		0.36	0.85	0.85		0.1		
Increm Stops, #/veh	0	0.02	0.19	0.26	0	0.03	0	0
Overflow Stops, #/veh	0	0	0	0	0	0	0	0
Stop Rate, #/veh		0.38	1.04	1.11		0.14		
Uniform Queue, veh/ln		0.56	0.23	0.08		1.11		
Increm Queue, veh/ln	0	0.03	0.05	0.02	0	0.34	0	0
Overflow Queue, veh/ln	0	0	0	0	0	0	0	0
Back of Queue Factor	0	1.8	1.8	1.8	0	1.8	0	0
Back of Queue, veh/ln		1.07	0.51	0.18		2.62		
Storage Ratio	0	0.02	0.03	0.02	0	0.07	0	0
Initial Queue, veh	0	0	0	0	0	0	0	0
Final Queue, veh	0	0	0	0	0	0	0	0
Saturated Delay, s/veh	0	0	0	0	0	0	0	0
Saturated Stops, #/veh	0	0	0	0	0	0	0	0
Saturated Queue, veh/ln	0	0	0	0	0	0	0	0
Saturated Capacity, vph	0	0	0	0	0	0	0	0
Init Que Clear Time, s	0	0	0	0	0	0	0	0

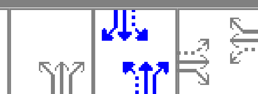
HCS 2010 Signalized Intersection Results Summary

General Information				Intersection Information	
Agency	HDR			Duration, h	0.25
Analyst	MDF	Analysis Date	Jan 30, 2013	Area Type	Other
Jurisdiction		Time Period	PM Peak	PHF	0.90
Intersection	Lindbergh Street	Analysis Year	Existing (2012)	Analysis Period	1> 16:45
File Name	Existing_PM_Haines.xus				
Project Description					

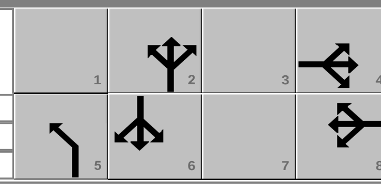


Demand Information	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Demand (*v*), veh/h	85	10	95	10	5	15	95	880	5	20	800	110

Signal Information			
Cycle, s	84.0	Reference Phase	2
Offset, s	82	Reference Point	End
Uncoordinated	No	Simult. Gap E/W	Off
Force Mode	Float	Simult. Gap N/S	Off



Green	4.6	52.1	11.3	0.0	0.0	0.0
Yellow	4.0	4.0	4.0	0.0	0.0	0.0
Red	0.0	2.0	2.0	0.0	0.0	0.0



Timer Results	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Assigned Phase		4		8	5	2		6
Case Number		8.0		8.0	1.0	4.0		6.3
Phase Duration, s		17.3		17.3	8.6	66.7		58.1
Change Period, *(Y+Rc)*, s		6.0		6.0	4.0	6.0		6.0
Max Allow Headway *(MAH)*, s		5.2		5.2	5.1	0.0		0.0
Queue Clearance Time *(gs)*, s		11.2		2.8	3.7			
Green Extension Time *(ge)*, s		0.3		0.0	0.1	0.0		0.0
Phase Call Probability		0.99		0.99	0.91			
Max Out Probability		1.00		0.00	1.00			

Movement Group Results	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Assigned Movement	7	4	14	3	8	18	5	2	12	1	6	16
Adjusted Flow Rate (*v*), veh/h		168			20		106	492	491	21	486	468
Adjusted Saturation Flow Rate (*s*), veh/h/ln		1485			1379		1697	1782	1779	576	1782	1713
Queue Service Time (*gs*), s		8.4			0.0		1.7	1.4	1.4	1.0	11.4	11.2
Cycle Queue Clearance Time (*gc*), s		9.2			0.8		1.7	1.4	1.4	1.0	11.4	11.2
Green Ratio (*g/C*)		0.14			0.14		0.70	0.72	0.72	0.62	0.62	0.62
Capacity (*c*), veh/h		268			253		465	1287	1285	443	1105	1062
Volume-to-Capacity Ratio *(X)*		0.627			0.079		0.227	0.382	0.382	0.048	0.440	0.440
Available Capacity (*ca*), veh/h		331			317		514	1287	1285	443	1105	1062
Back of Queue (*Q*), veh/ln (95th percentile)		6.3			0.6		0.8	0.9	0.9	0.2	6.8	6.4
Queue Storage Ratio (*RQ*) (95th percentile)		0.32			0.03		0.10	0.02	0.02	0.03	0.11	0.11
Uniform Delay (*d1*), s/veh		35.4			31.8		5.3	0.5	0.5	5.2	7.7	7.5
Incremental Delay (*d2*), s/veh		3.5			0.2		0.3	0.9	0.9	0.2	1.2	1.2
Initial Queue Delay (*d3*), s/veh		0.0			0.0		0.0	0.0	0.0	0.0	0.0	0.0
Control Delay (*d*), s/veh		38.9			32.0		5.6	1.3	1.3	5.4	8.8	8.8
Level of Service (LOS)		D			C		A	A	A	A	A	A
Approach Delay, s/veh / LOS	38.9		D	32.0		C	1.7		A	8.7		A
Intersection Delay, s/veh / LOS	7.8						A					

Multimodal Results	EB		WB		NB		SB	
Pedestrian LOS Score / LOS	2.8	C	2.9	C	2.1	B	2.1	B
Bicycle LOS Score / LOS	0.8	A	0.5	A	1.4	A	1.3	A

 HCS 2010™ Streets Version 6.50 Generated: 4/11/2013 1:58:45 PM

This Signals text report was created on April 11, 2013 at 01:59:14

Intersection number = 1, Segment number = 1, Period number = 1

Chapter 18 Summary Input

Cycle Length, s	84											
	EB LT	EB TH	EB RT	WB LT	WB TH	WB RT	NB LT	NB TH	NB RT	SB LT	SB TH	SB RT
Movement	7	4	14	3	8	18	5	2	12	1	6	16
Volume, veh/h	85	10	95	10	5	15	95	880	5	20	800	110
Lanes	0	1	0	0	1	0	1	2	0	1	2	0
Bay Length, ft	0	500	0	200	500	500	200	1000	150	200	1499	0
Receiving Lanes	1	1	1	1	1	1	2	2	2	2	2	2
SatFlow, vplphg	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800
Lane Width, ft	12	12	12	12	12	12	12	12	12	12	12	12
Heavy Vehicles, %	0	1	0	2	1	2	1	1	2	1	1	0
Grade, %	0	0	0	0	0	0	0	0	0	0	0	0
Buses, per h	0	0	0	0	0	0	0	0	0	0	0	0
Parking, per h	0	0	0	0	0	0	0	0	0	0	0	0
Bicycles, per h	0	0	0	0	0	0	0	0	0	0	0	0
Pedestrians, per h	0	0	0	0	0	0	0	0	0	0	0	0
Heavy Veh Equivalent	2	2	2	2	2	2	2	2	2	2	2	2
Bus Blockage Time	14.4	14.4	14.4	14.4	14.4	14.4	14.4	14.4	14.4	14.4	14.4	14.4
Turns in Shrd Ln, %	0	0	0	40	0	0	0	0	0	0	0	0
Unopposed Lefts, %	0	0	0	0	0	0	0	0	0	0	0	0
Parking Time, sec	18	18	18	18	18	18	18	18	18	18	18	18
Arrival Type	3	3	3	3	3	3	4	4	4	4	4	4
Initial Queue, veh	0	0	0	0	0	0	0	0	0	0	0	0
Speed Limit, mph	30	30	30	30	30	30	35	35	35	35	35	35
Detector Length, ft	40	40	40	40	40	40	40	40	40	40	40	40
StartLostTime, sec	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0
EndUseTime, sec	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0
RTOR, veh/h		39			12			1			11	
I-Factor		1.00			1.00			1.00			0.91	
Walk + PC, sec		0.0			0.0			0.0			0.0	

	EB	EB	WB	WB	NB	NB	SB	SB
Phase	7	4	3	8	5	2	1	6
Movement		LT+TH+RT		LT+TH+RT	LT	LT+TH+RT		LT+TH+RT
Left-Turn Mode	--	Perm.	--	Perm.	Pr/Pm	--	--	Perm.
Phase Splits, s	0.0	21.0	0.0	21.0	11.0	63.0	0.0	52.0
Yellow Change, s	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Red Clearance, s	2.0	2.0	2.0	2.0	0.0	2.0	2.0	2.0
Minimum Green, s	5	5	5	5	5	5	5	5
Lead/Lag					Lead			
Passage Time, s	2.0	4.0	2.0	4.0	4.0	2.0	3.0	2.0
Recall	Min	Off	Min	Off	Off	Min	Off	Min
Dual Entry	No	Yes	No	Yes	No	Yes	No	Yes
Prot. Right-Turn	False	False	False	False	False	False	False	False

	E/W	N/S
Simultaneous Gap out	Off	Off
Dallas Phasing	Off	Off

Cycle Length, s	84
Offset, s	82
Reference Phase	2
Reference Point	End
Force Mode	Float
Uncoordinated	No
Field Measured Phase Times	No
Exclusive Ped Phase Time, s	0.0

Timer:	1	2	3	4	5	6	7	8
Assigned Phase	0	2	0	4	5	6	0	8
Assigned Left-Turn Mvmt.	0	0	0	7	5	1	0	3
Assigned Through Mvmt.	0	2	0	4	0	6	0	8
Assigned Right-Turn Mvmt.	0	12	0	14	0	16	0	18
Timer w/Pr-Pm From Shared	0	0	0	0	0	0	0	0

Chapter 18 Summary Output

Cycle Length, s	84											
	EB LT	EB TH	EB RT	WB LT	WB TH	WB RT	NB LT	NB TH	NB RT	SB LT	SB TH	SB RT
Movement	7	4	14	3	8	18	5	2	12	1	6	16
Volume, veh/h	94.44	11.11	62.22	11.11	5.56	3.33	105.56	977.78	4.44	21.22	848.93	105.05
SatFlow, veh/h/ln	0	1782.2	0	0	1782.2	0	1782.2	1782.2	0	1782.2	1782.2	0
Lane Util Factor	1	1	1	1	1	1	1	1	1	1	1	1
Capacity, veh/h	177.38	21.78	74.37	152.52	69.86	31.04	464.92	2560.1	11.64	442.94	1928.4	238.64
Discharge Vol, veh/h	94.44	0	0	0	0	3.33	0	977.78	0	0	0	0
Prop Arriv On Green	0.14	0.14	0.14	0.14	0.14	0.14	0.07	0.96	0.96	0.68	0.65	0.67
Apprch Vol, veh/h	0	167.78	0	0	20	0	0	1087.8	0	0	975.2	0
Apprch Stops, #/veh	0	0.89	0	0	0.77	0	0	0.06	0	0	0.33	0
Apprch Delay, s/veh	0	38.87	0	0	31.98	0	0	1.74	0	0	8.73	0

Apprch LOS	D	C	A	A
Int Delay, s/veh 7.8				
Int LOS A				

Timer Data

Timer:	1	2	3	4	5	6	7	8
Assigned Phase	0	2	0	4	5	6	0	8
Case No	0	4	0	8	1	6.3	0	8
Phase Duration, s	0	66.66	0	17.34	8.57	58.08	0	17.34
Change Period, s	0	6	0	6	4	6	0	6
Phase Start Time, s	21.34	21.34	4	4	21.34	29.92	4	4
Phase End Time, s	21.34	4	4	21.34	29.92	4	4	21.34
Max Allow Headway, s	0	0	0	5.19	5.08	0	0	5.2
Equiv Max Green, s		5		15	7	5		15
Queue Clear Time, s				11.23	3.69			2.85
Green Exten Time, s	0	0	0	0.26	0.11	0	0	0.03
Prob of Phase Call				0.99	0.91			0.99
Prob of Max Out				1	1			0
Left-Turn Movement Data								
Assigned Movement	0	0	0	7	5	1	0	3
Mvmt. Sat Flow, veh/h	0	0	0	835.92	1697.31	576.17	0	766.14
Through Movement Data								
Assigned Movement	0	2	0	4	0	6	0	8
Mvmt. Sat Flow, veh/h	0	3545.34	0	98.34	0	3110.19	0	383.08
Right-Turn Movement Data								
Assigned Movement	0	12	0	14	0	16	0	18
Mvmt. Sat Flow, veh/h	0	16.12	0	550.72	0	384.88	0	229.84

Left Lane Group Output

Timer:	1	2	3	4	5	6	7	8
Assigned Phase	0	2	0	4	5	6	0	8
Left Lane Group Data								
Assigned Movement	0	0	0	7	5	1	0	3
Lane Assignment				L+T+R	L Pr/Pm	L		L+T+R
Lanes in Group	0	0	0	1	1	1	0	1
Group Volume, veh/h	0	0	0	167.78	105.56	21.22	0	20
Group SatFlow, vphpl	0	0	0	1484.98	1697.31	576.17	0	1379.05
Queue Serve Time, s	0	0	0	8.38	1.69	1.02	0	0
Cycle Clear Time, s	0	0	0	9.23	1.69	1.03	0	0.85
Perm SatFlow, vphpl	0	0	0	1428.49	591.7	576.17	0	1347.61
Shared SatFlow, vphpl				1782.18				1282.48
Perm Eff Green, s	0	0	0	11.34	54.08	52.08	0	11.34
Perm Serve Time, s	0	0	0	10.5	40.71	52.08	0	2.12
Perm Que Serve Time, s				8.38	2.84	1.01		0
Time to first Blk, s	0	0	0	0.76	0	0	0	1.58
Serve Time pre Blk, s				0.76				0.66
Prop Inside Lane	0	0	0	0.56	1	1	0	0.56
Lane Grp Capacity, vph				267.51	464.92	442.94		252.89
v/c Ratio	0	0	0	0.63	0.23	0.05	0	0.08
Avail Capacity, veh/h				331.46	513.94	442.94		316.67
I-Factor	0	0	0	1	1	0.91	0	1
Uniform Delay, s/veh				35.36	5.26	5.23		31.79
Increm Delay, s/veh	0	0	0	3.51	0.35	0.19	0	0.19
Overflow Delay, s/veh	0	0	0	0	0	0	0	0
Control Delay, s/veh				38.87	5.61	5.42		31.98
Group LOS				D	A	A		C
Uniform Stops, #/veh				0.83	0.19	0.21		0.74
Increm Stops, #/veh	0	0	0	0.07	0.02	0.05	0	0.03
Overflow Stops, #/veh	0	0	0	0	0	0	0	0
Stop Rate, #/veh				0.89	0.21	0.25		0.77
Uniform Queue, veh/ln				3.23	0.41	0.1		0.35
Increm Queue, veh/ln	0	0	0	0.26	0.05	0.02	0	0.01
Overflow Queue, veh/ln	0	0	0	0	0	0	0	0
Back of Queue Factor	0	0	0	1.8	1.8	1.8	0	1.8
Back of Queue, veh/ln				6.29	0.82	0.23		0.65
Storage Ratio	0	0	0	0.32	0.1	0.03	0	0.03
Initial Queue, veh	0	0	0	0	0	0	0	0
Final Queue, veh	0	0	0	0	0	0	0	0
Saturated Delay, s/veh	0	0	0	0	0	0	0	0
Saturated Stops, #/veh	0	0	0	0	0	0	0	0
Saturated Queue, veh/ln	0	0	0	0	0	0	0	0
Saturated Capacity, vph	0	0	0	0	0	0	0	0
Init Que Clear Time, s	0	0	0	0	0	0	0	0

Thru Lane Group Output

Timer:	1	2	3	4	5	6	7	8
Assigned Phase	0	2	0	4	5	6	0	8
Thru Lane Group Data								
Assigned Movement	0	2	0	4	0	6	0	8
Lane Assignment		T				T		
Lanes in Group	0	1	0	0	0	1	0	0
Group Volume, veh/h	0	491.51	0	0	0	486.44	0	0
Group SatFlow, vphpl	0	1782.18	0	0	0	1782.18	0	0
Queue Serve Time, s	0	1.36	0	0	0	11.36	0	0
Cycle Clear Time, s	0	1.36	0	0	0	11.36	0	0
Lane Grp Capacity, vph		1286.92				1105		
v/c Ratio	0	0.38	0	0	0	0.44	0	0

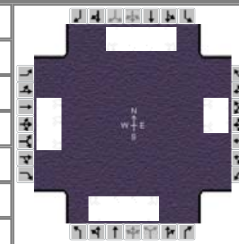
Avail Capacity, veh/h		1286.92				1105		
I-Factor	0	1	0	0	0	0.91	0	0
Uniform Delay, s/veh		0.46				7.68		
Increm Delay, s/veh	0	0.86	0	0	0	1.17	0	0
Overflow Delay, s/veh	0	0	0	0	0	0	0	0
Control Delay, s/veh		1.32				8.85		
Group LOS		A				A		
Uniform Stops, #/veh		0.02				0.3		
Increm Stops, #/veh	0	0.03	0	0	0	0.03	0	0
Overflow Stops, #/veh	0	0	0	0	0	0	0	0
Stop Rate, #/veh		0.05				0.33		
Uniform Queue, veh/ln		0.22				3.41		
Increm Queue, veh/ln	0	0.31	0	0	0	0.36	0	0
Overflow Queue, veh/ln	0	0	0	0	0	0	0	0
Back of Queue Factor	0	1.8	0	1	0	1.8	0	1
Back of Queue, veh/ln		0.95				6.78		
Storage Ratio	0	0.02	0	0	0	0.11	0	0
Initial Queue, veh	0	0	0	0	0	0	0	0
Final Queue, veh	0	0	0	0	0	0	0	0
Saturated Delay, s/veh	0	0	0	0	0	0	0	0
Saturated Stops, #/veh	0	0	0	0	0	0	0	0
Saturated Queue, veh/ln	0	0	0	0	0	0	0	0
Saturated Capacity, vph	0	0	0	0	0	0	0	0
Init Que Clear Time, s	0	0	0	0	0	0	0	0

Right Lane Group Output

Timer:	1	2	3	4	5	6	7	8
Assigned Phase	0	2	0	4	5	6	0	8
Right Lane Group Data								
Assigned Movement	0	12	0	14	0	16	0	18
Lane Assignment		T+R				T+R		
Lanes in Group	0	1	0	0	0	1	0	0
Group Volume, veh/h	0	490.71	0	0	0	467.54	0	0
Group SatFlow, vphpl	0	1779.28	0	0	0	1712.9	0	0
Queue Serve Time, s	0	1.36	0	0	0	11.23	0	0
Cycle Clear Time, s	0	1.36	0	0	0	11.23	0	0
Prot RT SatFlow, vphpl								
Prot RT Eff Green, s								
Prop Outside Lane	0	0.01	0	0.37	0	0.22	0	0.17
Lane Grp Capacity, vph		1284.83				1062.06		
v/c Ratio	0	0.38	0	0	0	0.44	0	0
Avail Capacity, veh/h		1284.83				1062.06		
I-Factor	0	1	0	0	0	0.91	0	0
Uniform Delay, s/veh		0.46				7.54		
Increm Delay, s/veh	0	0.86	0	0	0	1.21	0	0
Overflow Delay, s/veh	0	0	0	0	0	0	0	0
Control Delay, s/veh		1.32				8.75		
Group LOS		A				A		
Uniform Stops, #/veh		0.02				0.29		
Increm Stops, #/veh	0	0.03	0	0	0	0.03	0	0
Overflow Stops, #/veh	0	0	0	0	0	0	0	0
Stop Rate, #/veh		0.05				0.33		
Uniform Queue, veh/ln		0.22				3.2		
Increm Queue, veh/ln	0	0.31	0	0	0	0.36	0	0
Overflow Queue, veh/ln	0	0	0	0	0	0	0	0
Back of Queue Factor	0	1.8	0	1	0	1.8	0	1
Back of Queue, veh/ln		0.95				6.41		
Storage Ratio	0	0.02	0	0	0	0.11	0	0
Initial Queue, veh	0	0	0	0	0	0	0	0
Final Queue, veh	0	0	0	0	0	0	0	0
Saturated Delay, s/veh	0	0	0	0	0	0	0	0
Saturated Stops, #/veh	0	0	0	0	0	0	0	0
Saturated Queue, veh/ln	0	0	0	0	0	0	0	0
Saturated Capacity, vph	0	0	0	0	0	0	0	0
Init Que Clear Time, s	0	0	0	0	0	0	0	0

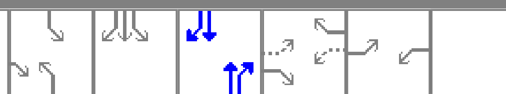
HCS 2010 Signalized Intersection Results Summary

General Information				Intersection Information	
Agency	HDR			Duration, h	0.25
Analyst	MDF	Analysis Date	Jan 30, 2013	Area Type	Other
Jurisdiction		Time Period	PM Peak	PHF	0.90
Intersection	I-90 Ramps (SPUI)	Analysis Year	Existing (2012)	Analysis Period	1> 16:45
File Name	Existing_PM_Haines.xus				
Project Description					

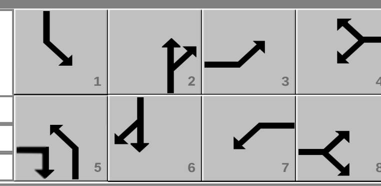


Demand Information	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Demand (*v*), veh/h	430		200	180		190	140	640	200	160	550	400

Signal Information			
Cycle, s	84.0	Reference Phase	2
Offset, s	75	Reference Point	End
Uncoordinated	No	Simult. Gap E/W	Off
Force Mode	Float	Simult. Gap N/S	Off



Green	9.4	0.3	42.5	0.0	12.4	0.0
Yellow	4.0	0.0	4.0	0.0	4.0	0.0
Red	2.5	0.0	2.5	0.0	2.5	0.0



Timer Results	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Assigned Phase	3	8	7	4	5	2	1	6
Case Number	1.4	3.0	1.4	3.0	2.0	3.0	2.0	3.0
Phase Duration, s	18.9	0.0	18.9	0.0	15.9	49.0	16.1	49.2
Change Period, *(Y+R$_c$)*, s	6.5	0.0	6.5	0.0	6.5	6.5	6.5	6.5
Max Allow Headway *(MAH)*, s	5.0	0.0	5.0	0.0	5.1	0.0	5.1	0.0
Queue Clearance Time *(g_s)*, s	11.0		8.6		9.5		9.7	
Green Extension Time *(g_e)*, s	1.4	0.0	0.6	0.0	0.1	0.0	0.1	0.0
Phase Call Probability	1.00		0.99		0.97		0.98	
Max Out Probability	0.87		0.21		1.00		1.00	

Movement Group Results	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Assigned Movement	3		18	7		14	5	2	12	1	6	16
Adjusted Flow Rate (*v*), veh/h	478		0	200		0	156	711	0	164	565	0
Adjusted Saturation Flow Rate (*s*), veh/h/ln	1648		1510	1714		1510	1697	1697	1510	1697	1697	1510
Queue Service Time (g_s), s	9.0		0.0	6.6		0.0	7.5	11.4	0.0	7.7	7.2	0.0
Cycle Queue Clearance Time (g_c), s	9.0		0.0	6.6		0.0	7.5	11.4	0.0	7.7	7.2	0.0
Green Ratio (*g/C*)	0.15		0.11	0.15		0.00	0.11	0.51	0.51	0.11	0.51	0.51
Capacity (*c*), veh/h	591		170	305		2	189	1715	764	194	1726	768
Volume-to-Capacity Ratio *(X)*	0.809		0.000	0.656		0.000	0.823	0.415	0.000	0.846	0.327	0.000
Available Capacity (c_a), veh/h	751		186	388		18	232	1715	764	232	1726	768
Back of Queue (*Q*), veh/ln (95th percentile)	8.2		0.0	6.6		0.0	6.9	7.3	0.0	5.7	4.2	0.0
Queue Storage Ratio *(RQ)* (95th percentile)	1.38		0.00	0.00		0.00	0.58	0.12	0.00	0.72	0.09	0.00
Uniform Delay (d_1), s/veh	35.1		0.0	34.2		0.0	35.4	13.7	0.0	30.2	10.0	0.0
Incremental Delay (d_2), s/veh	6.0		0.0	3.6		0.0	18.1	0.7	0.0	15.0	0.3	0.0
Initial Queue Delay (d_3), s/veh	0.0		0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0	0.0
Control Delay (*d*), s/veh	41.1		0.0	37.8		0.0	53.5	14.3	0.0	45.1	10.3	0.0
Level of Service (LOS)	D			D			D	B		D	B	
Approach Delay, s/veh / LOS	41.1	D		37.8	D		21.4	C		18.2	B	
Intersection Delay, s/veh / LOS	25.9						C					

Multimodal Results	EB		WB		NB		SB	
Pedestrian LOS Score / LOS	3.2	C	3.5	D	2.5	B	2.7	B
Bicycle LOS Score / LOS		F		F	1.2	A	1.1	A

This Signals text report was created on April 11, 2013 at 01:59:32

Intersection number = 2, Segment number = 1, Period number = 1

Chapter 18 Summary Input

Cycle Length, s 84

	EB LT	EB TH	EB RT	WB LT	WB TH	WB RT	NB LT	NB TH	NB RT	SB LT	SB TH	SB RT
Movement	3	8	18	7	4	14	5	2	12	1	6	16
Volume, veh/h	430	0	200	180	0	190	140	640	200	160	550	400
Lanes	2	0	1	1	0	1	1	2	1	1	2	1
Bay Length, ft	150	500	150	0	150	500	300	1499	300	200	1213	300
Receiving Lanes	1	1	1	1	1	1	2	2	2	2	2	2
SatFlow, vplphg	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800
Lane Width, ft	12	12	12	12	12	12	12	12	12	12	12	12
Heavy Vehicles, %	1	1	1	0	1	1	1	1	1	1	1	1
Grade, %	0	0	0	0	0	0	0	0	0	0	0	0
Buses, per h	0	0	0	0	0	0	0	0	0	0	0	0
Parking, per h	0	0	0	0	0	0	0	0	0	0	0	0
Bicycles, per h	0	0	0	0	0	0	0	0	0	0	0	0
Pedestrians, per h	0	0	0	0	0	0	0	0	0	0	0	0
Heavy Veh Equivalent	2	2	2	2	2	2	2	2	2	2	2	2
Bus Blockage Time	14.4	14.4	14.4	14.4	14.4	14.4	14.4	14.4	14.4	14.4	14.4	14.4
Turns in Shrd Ln, %	0	0	0	0	0	0	0	0	0	0	0	0
Unopposed Lefts, %	0	0	0	0	0	0	0	0	0	0	0	0
Parking Time, sec	18	18	18	18	18	18	18	18	18	18	18	18
Arrival Type	3	3	3	3	3	3	4	4	4	4	4	4
Initial Queue, veh	0	0	0	0	0	0	0	0	0	0	0	0
Speed Limit, mph	45	45	45	45	45	45	35	35	35	35	35	35
Detector Length, ft	40	40	40	40	40	40	40	40	40	40	40	40
StartLostTime, sec	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0
EndUseTime, sec	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0
RTOR, veh/h		200			190			200			400	
I-Factor		1.00			1.00			0.92			0.60	
Walk + PC, sec		0.0			0.0			0.0			0.0	

	EB	EB	WB	WB	NB	NB	SB	SB
Phase	3	8	7	4	5	2	1	6
Movement	LT	LT+RT	LT	LT+RT	LT	TH+RT	LT	TH+RT
Left-Turn Mode	Pr/Pm	--	Pr/Pm	--	Prot.	--	Prot.	--
Phase Splits, s	23.0	1.0	23.0	1.0	18.0	42.0	18.0	42.0
Yellow Change, s	4.0	0.0	4.0	0.0	4.0	4.0	4.0	4.0
Red Clearance, s	2.5	0.0	2.5	0.0	2.5	2.5	2.5	2.5
Minimum Green, s	5	1	5	1	5	5	5	5
Lead/Lag	Lag		Lag		Lead		Lead	
Passage Time, s	4.0	0.0	4.0	0.0	4.0	2.0	4.0	2.0
Recall	Off	Off	Off	Off	Off	Min	Off	Min
Dual Entry	No	Yes	No	Yes	No	Yes	No	Yes
Prot. Right-Turn	False	False	False	False	True	False	False	False

	E/W	N/S
Simultaneous Gap out	Off	Off
Dallas Phasing	Off	Off

Cycle Length, s	84
Offset, s	75
Reference Phase	2
Reference Point	End
Force Mode	Float
Uncoordinated	No
Field Measured Phase Times	No
Exclusive Ped Phase Time, s	0.0

Timer:	1	2	3	4	5	6	7	8
Assigned Phase	1	2	4	3	5	6	8	7
Assigned Left-Turn Mvmt.	1	0	0	3	5	0	0	7
Assigned Through Mvmt.	0	2	4	0	0	6	8	0
Assigned Right-Turn Mvmt.	0	12	14	0	0	16	18	0
Timer w/Pr-Pm From Shared	0	0	0	0	0	0	0	0

Chapter 18 Summary Output

Cycle Length, s 84

	EB LT	EB TH	EB RT	WB LT	WB TH	WB RT	NB LT	NB TH	NB RT	SB LT	SB TH	SB RT
Movement	3	8	18	7	4	14	5	2	12	1	6	16
Volume, veh/h	477.78	0	0	200	0	0	155.56	711.11	0	164.42	565.2	0
SatFlow, veh/h/ln	1782.2	1782.2	1782.2	1800	1782.2	1782.2	1782.2	1782.2	1782.2	1782.2	1782.2	1782.2
Lane Util Factor	0.97	1	1	1	1	1	1	0.95	1	1	0.95	1
Capacity, veh/h	590.62	0	17.98	304.75	0	17.98	189.1	1715.5	763.55	194.39	1726.1	768.26
Discharge Vol, veh/h	477.78	0	0	200	0	0	0	711.11	0	0	565.2	0
Prop Arriv On Green	0.15	0	0	0.15	0	0	0.14	0.48	0	0.27	0.59	0
Apprch Vol, veh/h	0	477.78	0	0	200	0	0	866.67	0	0	729.63	0
Apprch Stops, #/veh	0	NaN	0	0	NaN	0	0	0.59	0	0	0.47	0
Apprch Delay, s/veh	0	41.1	0	0	37.82	0	0	21.37	0	0	18.18	0

Apprch LOS	D	D	C	B
Int Delay, s/veh	25.94			
Int LOS	C			

Timer Data

Timer:	1	2	3	4	5	6	7	8
Assigned Phase	1	2	4	3	5	6	8	7
Case No	2	3	3	1.4	2	3	3	1.4
Phase Duration, s	16.12	48.97	0	18.91	15.86	49.23	0	18.91
Change Period, s	6.5	6.5	0	6.5	6.5	6.5	0	6.5
Phase Start Time, s	16.41	32.53	81.5	81.5	16.41	32.27	81.5	81.5
Phase End Time, s	32.53	81.5	81.5	16.41	32.27	81.5	81.5	16.41
Max Allow Headway, s	5.08	0	0	4.98	5.08	0	0	4.98
Equiv Max Green, s	11.5	5	1	16.5	11.5	5	1	16.5
Queue Clear Time, s	9.71			11.05	9.49			8.6
Green Exten Time, s	0.12	0	0	1.36	0.13	0	0	0.55
Prob of Phase Call	0.98			1	0.97			0.99
Prob of Max Out	1			0.87	1			0.21
Left-Turn Movement Data								
Assigned Movement	1	0	0	3	5	0	0	7
Mvmt. Sat Flow, veh/h	1697.31	0	0	3296.18	1697.31	0	0	1714.29
Through Movement Data								
Assigned Movement	0	2	4	0	0	6	8	0
Mvmt. Sat Flow, veh/h	0	3393.27	0	0	0	3393.27	0	0
Right-Turn Movement Data								
Assigned Movement	0	12	14	0	0	16	18	0
Mvmt. Sat Flow, veh/h	0	1510.32	1510.32	0	0	1510.32	1510.32	0

Left Lane Group Output

Timer:	1	2	3	4	5	6	7	8
Assigned Phase	1	2	4	3	5	6	8	7
Left Lane Group Data								
Assigned Movement	1	0	0	3	5	0	0	7
Lane Assignment	L (Prot)			L Pr/Pm	L (Prot)			L Pr/Pm
Lanes in Group	1	0	0	2	1	0	0	1
Group Volume, veh/h	164.42	0	0	477.78	155.56	0	0	200
Group SatFlow, vphpl	1697.31	0	0	1648.09	1697.31	0	0	1714.29
Queue Serve Time, s	7.71	0	0	9.05	7.49	0	0	6.6
Cycle Clear Time, s	7.71	0	0	9.05	7.49	0	0	6.6
Perm SatFlow, vphpl	0	0	0	1425.73	0	0	0	1439.99
Shared SatFlow, vphpl								
Perm Eff Green, s	0	0	0	-2	0	0	0	-2
Perm Serve Time, s	0	0	0	-2	0	0	0	-2
Perm Que Serve Time, s				0				0
Time to first Blk, s	0	0	0	0	0	0	0	0
Serve Time pre Blk, s								
Prop Inside Lane	1	0	0	1	1	0	0	1
Lane Grp Capacity, vph	194.39			590.62	189.1			304.75
v/c Ratio	0.85	0	0	0.81	0.82	0	0	0.66
Avail Capacity, veh/h	232.37			751	232.37			388.16
I-Factor	0.6	0	0	1	0.92	0	0	1
Uniform Delay, s/veh	30.16			35.11	35.43			34.2
Increm Delay, s/veh	14.98	0	0	5.99	18.06	0	0	3.63
Overflow Delay, s/veh	0	0	0	0	0	0	0	0
Control Delay, s/veh	45.15			41.1	53.49			37.82
Group LOS	D			D	D			D
Uniform Stops, #/veh	0.67			0.75	0.8			0.72
Increm Stops, #/veh	0.21	0	0	0.09	0.26	0	0	0.07
Overflow Stops, #/veh	0	0	0	0	0	0	0	0
Stop Rate, #/veh	0.88			0.83	1.06			0.79
Uniform Queue, veh/ln	2.57			4.16	2.89			3.38
Increm Queue, veh/ln	0.81	0	0	0.49	0.95	0	0	0.31
Overflow Queue, veh/ln	0	0	0	0	0	0	0	0
Back of Queue Factor	1.69	0	0	1.76	1.8	0	0	1.8
Back of Queue, veh/ln	5.72			8.19	6.91			6.64
Storage Ratio	0.72	0	0	1.38	0.58	0	0	0
Initial Queue, veh	0	0	0	0	0	0	0	0
Final Queue, veh	0	0	0	0	0	0	0	0
Saturated Delay, s/veh	0	0	0	0	0	0	0	0
Saturated Stops, #/veh	0	0	0	0	0	0	0	0
Saturated Queue, veh/ln	0	0	0	0	0	0	0	0
Saturated Capacity, vph	0	0	0	0	0	0	0	0
Init Que Clear Time, s	0	0	0	0	0	0	0	0

Thru Lane Group Output

Timer:	1	2	3	4	5	6	7	8
Assigned Phase	1	2	4	3	5	6	8	7
Thru Lane Group Data								
Assigned Movement	0	2	4	0	0	6	8	0
Lane Assignment		T				T		
Lanes in Group	0	2	0	0	0	2	0	0
Group Volume, veh/h	0	711.11	0	0	0	565.2	0	0
Group SatFlow, vphpl	0	1696.63	0	0	0	1696.63	0	0
Queue Serve Time, s	0	11.37	0	0	0	7.17	0	0
Cycle Clear Time, s	0	11.37	0	0	0	7.17	0	0
Lane Grp Capacity, vph		1715.49	0			1726.06	0	
v/c Ratio	0	0.41	0	0	0	0.33	0	0

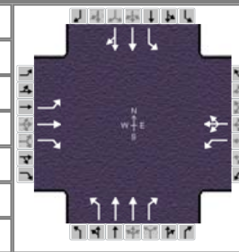
Avail Capacity, veh/h		1715.49	0			1726.06	0	
I-Factor	0	0.92	0	0	0	0.6	0	0
Uniform Delay, s/veh		13.66	0			10.03	0	
Increm Delay, s/veh	0	0.69	0	0	0	0.31	0	0
Overflow Delay, s/veh	0	0	0	0	0	0	0	0
Control Delay, s/veh		14.35	0			10.34	0	
Group LOS		B				B		
Uniform Stops, #/veh		0.47	NaN			0.34	NaN	
Increm Stops, #/veh	0	0.02	0	0	0	0.01	0	0
Overflow Stops, #/veh	0	0	0	0	0	0	0	0
Stop Rate, #/veh		0.49	NaN			0.35	NaN	
Uniform Queue, veh/ln		3.93	0			2.26	0	
Increm Queue, veh/ln	0	0.16	0	0	0	0.07	0	0
Overflow Queue, veh/ln	0	0	0	0	0	0	0	0
Back of Queue Factor	0	1.78	1	0	0	1.8	1	0
Back of Queue, veh/ln		7.28	0			4.21	0	
Storage Ratio	0	0.12	0	0	0	0.09	0	0
Initial Queue, veh	0	0	0	0	0	0	0	0
Final Queue, veh	0	0	0	0	0	0	0	0
Saturated Delay, s/veh	0	0	0	0	0	0	0	0
Saturated Stops, #/veh	0	0	0	0	0	0	0	0
Saturated Queue, veh/ln	0	0	0	0	0	0	0	0
Saturated Capacity, vph	0	0	0	0	0	0	0	0
Init Que Clear Time, s	0	0	0	0	0	0	0	0

Right Lane Group Output

Timer:	1	2	3	4	5	6	7	8
Assigned Phase	1	2	4	3	5	6	8	7
Right Lane Group Data								
Assigned Movement	0	12	14	0	0	16	18	0
Lane Assignment		R	R			R	R	
Lanes in Group	0	1	1	0	0	1	1	0
Group Volume, veh/h	0	0	0	0	0	0	0	0
Group SatFlow, vphpl	0	1510.32	1510.32	0	0	1510.32	1510.32	0
Queue Serve Time, s	0	0	0	0	0	0	0	0
Cycle Clear Time, s	0	0	0	0	0	0	0	0
Prot RT SatFlow, vphpl		0	0			0	1510.32	
Prot RT Eff Green, s		0	0			0	9.36	
Prop Outside Lane	0	1	1	0	0	1	1	0
Lane Grp Capacity, vph		763.55	1.8			768.26	170.07	
v/c Ratio	0	0	0	0	0	0	0	0
Avail Capacity, veh/h		763.55	17.98			768.26	186.25	
I-Factor	0	0	0	0	0	0	0	0
Uniform Delay, s/veh		0	0			0	0	
Increm Delay, s/veh	0	0	0	0	0	0	0	0
Overflow Delay, s/veh	0	0	0	0	0	0	0	0
Control Delay, s/veh		0	0			0	0	
Group LOS								
Uniform Stops, #/veh		0	0			0	0	
Increm Stops, #/veh	0	0	0	0	0	0	0	0
Overflow Stops, #/veh	0	0	0	0	0	0	0	0
Stop Rate, #/veh		0	0			0	0	
Uniform Queue, veh/ln		0	0			0	0	
Increm Queue, veh/ln	0	0	0	0	0	0	0	0
Overflow Queue, veh/ln	0	0	0	0	0	0	0	0
Back of Queue Factor	0	1	1	0	0	1	1	0
Back of Queue, veh/ln		0	0			0	0	
Storage Ratio	0	0	0	0	0	0	0	0
Initial Queue, veh	0	0	0	0	0	0	0	0
Final Queue, veh	0	0	0	0	0	0	0	0
Saturated Delay, s/veh	0	0	0	0	0	0	0	0
Saturated Stops, #/veh	0	0	0	0	0	0	0	0
Saturated Queue, veh/ln	0	0	0	0	0	0	0	0
Saturated Capacity, vph	0	0	0	0	0	0	0	0
Init Que Clear Time, s	0	0	0	0	0	0	0	0

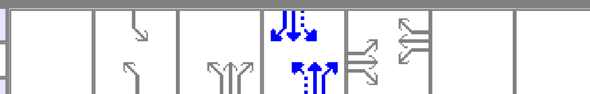
HCS 2010 Signalized Intersection Results Summary

General Information				Intersection Information	
Agency	HDR			Duration, h	0.25
Analyst	MDF	Analysis Date	Jan 30, 2013	Area Type	Other
Jurisdiction		Time Period	PM Peak	PHF	0.90
Intersection	Disk Drive	Analysis Year	Existing (2012)	Analysis Period	1> 16:45
File Name	Existing_PM_Haines.xus				
Project Description					

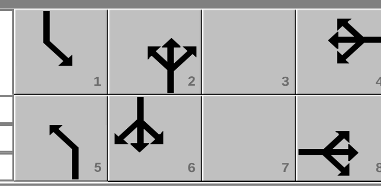


Demand Information	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Demand (*v*), veh/h	20	40	190	360	20	70	170	740	350	45	560	10

Signal Information			
Cycle, s	84.0	Reference Phase	6
Offset, s	34	Reference Point	End
Uncoordinated	No	Simult. Gap E/W	Off
Force Mode	Float	Simult. Gap N/S	Off



Green	3.4	1.6	35.7	16.9	4.5	0.0
Yellow	4.0	0.0	4.0	4.0	4.0	0.0
Red	0.0	0.0	2.0	2.0	2.0	0.0



Timer Results	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Assigned Phase		8		4	5	2	1	6
Case Number		9.0		10.0	1.1	3.0	1.1	4.0
Phase Duration, s		10.5		22.9	9.0	43.2	7.4	41.7
Change Period, *($Y+R_c$)*, s		6.0		6.0	4.0	6.0	4.0	6.0
Max Allow Headway *(MAH)*, s		5.2		5.2	5.1	0.0	5.1	0.0
Queue Clearance Time *(g_s)*, s		4.0		15.5	7.0		3.4	
Green Extension Time *(g_e)*, s		0.1		1.3	0.0	0.0	0.0	0.0
Phase Call Probability		0.89		1.00	0.99		0.69	
Max Out Probability		1.00		0.94	1.00		1.00	

Movement Group Results	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Assigned Movement	3	8	18	7	4	14	5	2	12	1	6	16
Adjusted Flow Rate *(v)*, veh/h	22	44	29	200	200		189	822	152	50	279	353
Adjusted Saturation Flow Rate *(s)*, veh/h/ln	1697	1782	1510	1697	1697		1697	1697	1510	1697	1402	1773
Queue Service Time *(g_s)*, s	1.1	2.0	1.6	9.0	9.0		5.0	13.8	5.7	1.4	9.9	9.9
Cycle Queue Clearance Time *(g_c)*, s	1.1	2.0	1.6	9.0	9.0		5.0	13.8	5.7	1.4	9.9	9.9
Green Ratio *(g/C)*	0.05	0.05	0.05	0.20	0.20		0.50	0.44	0.44	0.47	0.42	0.42
Capacity *(c)*, veh/h	90	95	80	341	341		432	1504	669	317	595	753
Volume-to-Capacity Ratio *(X)*	0.246	0.469	0.360	0.587	0.587		0.437	0.547	0.227	0.158	0.469	0.469
Available Capacity *(c_a)*, veh/h	162	170	144	424	424		432	1504	669	349	595	753
Back of Queue *(Q)*, veh/ln (95th percentile)	0.9	1.8	1.2	6.8	6.8		3.5	7.8	3.5	0.9	5.3	6.5
Queue Storage Ratio *(RQ)* (95th percentile)	0.22	0.09	0.15	0.85	0.85		0.45	0.16	0.07	0.11	0.13	0.16
Uniform Delay *(d_1)*, s/veh	38.2	38.6	38.4	30.4	30.4		13.4	14.8	16.1	13.1	12.6	12.6
Incremental Delay *(d_2)*, s/veh	2.0	5.1	3.8	2.3	2.3		0.8	1.1	0.6	0.3	2.6	2.1
Initial Queue Delay *(d_3)*, s/veh	0.0	0.0	0.0	0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0
Control Delay *(d)*, s/veh	40.2	43.7	42.2	32.7	32.7		14.2	15.9	16.7	13.5	15.3	14.7
Level of Service (LOS)	D	D	D	C	C		B	B	B	B	B	B
Approach Delay, s/veh / LOS	42.4	D		39.8	D		15.7	B		14.8	B	
Intersection Delay, s/veh / LOS	21.3						C					

Multimodal Results	EB		WB		NB		SB	
Pedestrian LOS Score / LOS	3.3	C	2.9	C	2.3	B	2.6	B
Bicycle LOS Score / LOS	0.6	A	1.3	A	1.4	A	1.1	A

 HCS 2010™ Streets Version 6.50 Generated: 4/11/2013 1:59:43 PM

This Signals text report was created on April 11, 2013 at 01:59:55

Intersection number = 3, Segment number = 2, Period number = 1

Chapter 18 Summary Input

	EB LT	EB TH	EB RT	WB LT	WB TH	WB RT	NB LT	NB TH	NB RT	SB LT	SB TH	SB RT
Cycle Length, s	84											
Movement	3	8	18	7	4	14	5	2	12	1	6	16
Volume, veh/h	20	40	190	360	20	70	170	740	350	45	560	10
Lanes	1	1	1	1	1	0	1	2	1	1	2	0
Bay Length, ft	100	500	200	200	500	200	200	1213	1213	200	1000	0
Receiving Lanes	1	1	1	1	1	1	2	2	2	2	2	2
SatFlow, vplphg	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800
Lane Width, ft	12	12	12	12	12	12	12	12	12	12	12	12
Heavy Vehicles, %	1	1	1	1	1	2	1	1	1	1	1	0
Grade, %	0	0	0	0	0	0	0	0	0	0	0	0
Buses, per h	0	0	0	0	0	0	0	0	0	0	0	0
Parking, per h	0	0	0	0	0	0	0	0	0	0	0	0
Bicycles, per h	0	0	0	0	0	0	0	0	0	0	0	0
Pedestrians, per h	0	0	0	0	0	0	0	0	0	0	0	0
Heavy Veh Equivalent	2	2	2	2	2	2	2	2	2	2	2	2
Bus Blockage Time	14.4	14.4	14.4	14.4	14.4	14.4	14.4	14.4	14.4	14.4	14.4	14.4
Turns in Shrd Ln, %	0	0	0	50	0	0	0	0	0	0	0	0
Unopposed Lefts, %	0	0	0	0	0	0	0	0	0	0	0	0
Parking Time, sec	18	18	18	18	18	18	18	18	18	18	18	18
Arrival Type	3	3	3	3	3	3	4	4	4	4	4	4
Initial Queue, veh	0	0	0	0	0	0	0	0	0	0	0	0
Speed Limit, mph	30	30	30	30	30	30	35	35	35	35	35	35
Detector Length, ft	40	40	40	40	40	40	40	40	40	40	40	40
StartLostTime, sec	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0
EndUseTime, sec	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0
RTOR, veh/h		164			19			213			1	
I-Factor		1.00			1.00			0.80			1.00	
Walk + PC, sec		0.0			0.0			0.0			0.0	

	EB	EB	WB	WB	NB	NB	SB	SB
Phase	3	8	7	4	5	2	1	6
Movement		LT+TH+RT		LT+TH+RT	LT	LT+TH+RT	LT	LT+TH+RT
Left-Turn Mode	--	Split	--	Split	Pr/Pm	--	Pr/Pm	--
Phase Splits, s	0.0	14.0	0.0	27.0	9.0	34.0	9.0	34.0
Yellow Change, s	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Red Clearance, s	1.0	2.0	1.0	2.0	0.0	2.0	0.0	2.0
Minimum Green, s	5	5	5	4	5	5	5	5
Lead/Lag					Lead		Lead	
Passage Time, s	2.0	4.0	2.0	4.0	4.0	2.0	4.0	2.0
Recall	Off	Off	Off	Off	Off	Min	Off	Min
Dual Entry	No	No	No	No	No	Yes	No	Yes
Prot. Right-Turn	False	False	False	False	False	False	False	False

	E/W	N/S
Simultaneous Gap out	Off	Off
Dallas Phasing	Off	Off

Cycle Length, s	84
Offset, s	34
Reference Phase	6
Reference Point	End
Force Mode	Float
Uncoordinated	No
Field Measured Phase Times	No
Exclusive Ped Phase Time, s	0.0

Timer:	1	2	3	4	5	6	7	8
Assigned Phase	1	2	4	8	5	6	0	0
Assigned Left-Turn Mvmt.	1	0	7	3	5	0	0	0
Assigned Through Mvmt.	0	2	4	8	0	6	0	0
Assigned Right-Turn Mvmt.	0	12	14	18	0	16	0	0
Timer w/Pr-Pm From Shared	0	0	0	0	0	0	0	0

Chapter 18 Summary Output

	EB LT	EB TH	EB RT	WB LT	WB TH	WB RT	NB LT	NB TH	NB RT	SB LT	SB TH	SB RT
Cycle Length, s	84											
Movement	3	8	18	7	4	14	5	2	12	1	6	16
Volume, veh/h	22.22	44.44	28.89	400	22.22	56.67	188.89	822.22	152.22	50	622.22	10
SatFlow, veh/h/ln	1782.2	1782.2	1782.2	1782.2	1782.2	0	1782.2	1782.2	1782.2	1782.2	1782.2	0
Lane Util Factor	1	1	1	1	1	1	1	0.95	1	1	0.79	1
Capacity, veh/h	90.17	94.68	80.23	340.73	25.24	308.72	432.12	1504	669.43	317.26	1327	21.32
Discharge Vol, veh/h	0	0	28.89	340.73	0	0	0	0	0	0	622.22	0
Prop Arriv On Green	0.05	0.05	0.05	0.2	0.2	0.2	0	0.51	0.39	0.05	0.57	0.57
Apprch Vol, veh/h	0	95.56	0	0	478.89	0	0	1163.3	0	0	682.22	0
Apprch Stops, #/veh	0	0.95	0	0	NaN	0	0	0.49	0	0	0.44	0
Apprch Delay, s/veh	0	42.43	0	0	39.81	0	0	15.74	0	0	14.85	0

Apprch LOS	D	D	B	B
Int Delay, s/veh 21.3				
Int LOS C				

Timer Data

Timer:	1	2	3	4	5	6	7	8
Assigned Phase	1	2	4	8	5	6	0	0
Case No	1.1	3	10	9	1.1	4	0	0
Phase Duration, s	7.44	43.23	22.86	10.46	9	41.67	0	0
Change Period, s	4	6	6	6	4	6	0	6
Phase Start Time, s	40	80.77	40	29.54	40	82.33	40	40
Phase End Time, s	47.44	40	62.86	40	49	40	40	40
Max Allow Headway, s	5.08	0	5.23	5.17	5.08	0	0	0
Equiv Max Green, s	5	5	21	8	5	5		
Queue Clear Time, s	3.36		15.52	4.03	6.95			
Green Exten Time, s	0.02	0	1.34	0.11	0	0	0	0
Prob of Phase Call	0.69		1	0.89	0.99			
Prob of Max Out	1		0.94	1	1			
Left-Turn Movement Data								
Assigned Movement	1	0	7	3	5	0	0	0
Mvmt. Sat Flow, veh/h	1697.31	0	1697.31	1697.31	1697.31	0	0	0
Through Movement Data								
Assigned Movement	0	2	4	8	0	6	0	0
Mvmt. Sat Flow, veh/h	0	3393.27	444.54	1782.18	0	3124.65	0	0
Right-Turn Movement Data								
Assigned Movement	0	12	14	18	0	16	0	0
Mvmt. Sat Flow, veh/h	0	1510.32	1537.85	1510.32	0	50.2	0	0

Left Lane Group Output

Timer:	1	2	3	4	5	6	7	8
Assigned Phase	1	2	4	8	5	6	0	0
Left Lane Group Data								
Assigned Movement	1	0	7	3	5	0	0	0
Lane Assignment	L Pr/Pm		L	L	L Pr/Pm			
Lanes in Group	1	0	1	1	1	0	0	0
Group Volume, veh/h	50	0	200	22.22	188.89	0	0	0
Group SatFlow, vphpl	1697.31	0	1697.31	1697.31	1697.31	0	0	0
Queue Serve Time, s	1.36	0	8.97	1.06	4.95	0	0	0
Cycle Clear Time, s	1.36	0	8.97	1.06	4.95	0	0	0
Perm SatFlow, vphpl	580.41	0	1697.31	1697.31	799.25	0	0	0
Shared SatFlow, vphpl								
Perm Eff Green, s	35.67	0	0	0	37.23	0	0	0
Perm Serve Time, s	23.44	0	0	0	25.79	0	0	0
Perm Que Serve Time, s	1.14				3.83			
Time to first Blk, s	0	0	0	0	0	0	0	0
Serve Time pre Blk, s								
Prop Inside Lane	1	0	1	1	1	0	0	0
Lane Grp Capacity, vph	317.26		340.73	90.17	432.12			
v/c Ratio	0.16	0	0.59	0.25	0.44	0	0	0
Avail Capacity, veh/h	348.72		424.33	161.65	432.12			
I-Factor	1	0	1	1	0.8	0	0	0
Uniform Delay, s/veh	13.14		30.41	38.16	13.43			
Increm Delay, s/veh	0.33	0	2.28	2	0.79	0	0	0
Overflow Delay, s/veh	0	0	0	0	0	0	0	0
Control Delay, s/veh	13.46		32.7	40.15	14.22			
Group LOS	B		C	D	B			
Uniform Stops, #/veh	0.4		0.76	0.83	0.43			
Increm Stops, #/veh	0.02	0	0.05	0.1	0.02	0	0	0
Overflow Stops, #/veh	0	0	0	0	0	0	0	0
Stop Rate, #/veh	0.43		0.8	0.92	0.45			
Uniform Queue, veh/ln	0.46		3.54	0.43	1.88			
Increm Queue, veh/ln	0.03	0	0.22	0.05	0.09	0	0	0
Overflow Queue, veh/ln	0	0	0	0	0	0	0	0
Back of Queue Factor	1.8	0	1.8	1.8	1.8	0	0	0
Back of Queue, veh/ln	0.89		6.76	0.86	3.55			
Storage Ratio	0.11	0	0.85	0.22	0.45	0	0	0
Initial Queue, veh	0	0	0	0	0	0	0	0
Final Queue, veh	0	0	0	0	0	0	0	0
Saturated Delay, s/veh	0	0	0	0	0	0	0	0
Saturated Stops, #/veh	0	0	0	0	0	0	0	0
Saturated Queue, veh/ln	0	0	0	0	0	0	0	0
Saturated Capacity, vph	0	0	0	0	0	0	0	0
Init Que Clear Time, s	0	0	0	0	0	0	0	0

Thru Lane Group Output

Timer:	1	2	3	4	5	6	7	8
Assigned Phase	1	2	4	8	5	6	0	0
Thru Lane Group Data								
Assigned Movement	0	2	4	8	0	6	0	0
Lane Assignment		T		T		T		
Lanes in Group	0	2	0	1	0	1	0	0
Group Volume, veh/h	0	822.22	0	44.44	0	279.03	0	0
Group SatFlow, vphpl	0	1696.63	0	1782.18	0	1401.71	0	0
Queue Serve Time, s	0	13.78	0	2.03	0	9.87	0	0
Cycle Clear Time, s	0	13.78	0	2.03	0	9.87	0	0
Lane Grp Capacity, vph		1504.01	0	94.68		595.31		
v/c Ratio	0	0.55	0	0.47	0	0.47	0	0

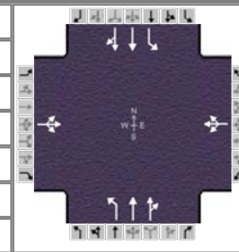
Avail Capacity, veh/h		1504.01	0	169.73		595.31		
I-Factor	0	0.8	0	1	0	1	0	0
Uniform Delay, s/veh		14.76		38.62		12.62		
Increm Delay, s/veh	0	1.14	0	5.07	0	2.64	0	0
Overflow Delay, s/veh	0	0	0	0	0	0	0	0
Control Delay, s/veh		15.9		43.69		15.26		
Group LOS		B		D		B		
Uniform Stops, #/veh		0.46	NaN	0.84		0.39		
Increm Stops, #/veh	0	0.02	0	0.13	0	0.07	0	0
Overflow Stops, #/veh	0	0	0	0	0	0	0	0
Stop Rate, #/veh		0.49	NaN	0.97		0.45		
Uniform Queue, veh/ln		4.43	0	0.87		2.51		
Increm Queue, veh/ln	0	0.24	0	0.13	0	0.44	0	0
Overflow Queue, veh/ln	0	0	0	0	0	0	0	0
Back of Queue Factor	0	1.68	1	1.8	0	1.8	0	0
Back of Queue, veh/ln		7.83	0	1.8		5.3		
Storage Ratio	0	0.16	0	0.09	0	0.13	0	0
Initial Queue, veh	0	0	0	0	0	0	0	0
Final Queue, veh	0	0	0	0	0	0	0	0
Saturated Delay, s/veh	0	0	0	0	0	0	0	0
Saturated Stops, #/veh	0	0	0	0	0	0	0	0
Saturated Queue, veh/ln	0	0	0	0	0	0	0	0
Saturated Capacity, vph	0	0	0	0	0	0	0	0
Init Que Clear Time, s	0	0	0	0	0	0	0	0

Right Lane Group Output

Timer:	1	2	3	4	5	6	7	8
Assigned Phase	1	2	4	8	5	6	0	0
Right Lane Group Data								
Assigned Movement	0	12	14	18	0	16	0	0
Lane Assignment		R	T+R	R		T+R		
Lanes in Group	0	1	1	1	0	1	0	0
Group Volume, veh/h	0	152.22	278.89	28.89	0	353.19	0	0
Group SatFlow, vphpl	0	1510.32	1663.6	1510.32	0	1773.14	0	0
Queue Serve Time, s	0	5.7	13.52	1.55	0	9.88	0	0
Cycle Clear Time, s	0	5.7	13.52	1.55	0	9.88	0	0
Prot RT SatFlow, vphpl		0		0				
Prot RT Eff Green, s		0		0				
Prop Outside Lane	0	1	0.72	1	0	0.03	0	0
Lane Grp Capacity, vph		669.43	333.98	80.23		753.06		
v/c Ratio	0	0.23	0.84	0.36	0	0.47	0	0
Avail Capacity, veh/h		669.43	415.91	143.84		753.06		
I-Factor	0	0.8	1	1	0	1	0	0
Uniform Delay, s/veh		16.12	32.23	38.39		12.62		
Increm Delay, s/veh	0	0.63	12.68	3.84	0	2.09	0	0
Overflow Delay, s/veh	0	0	0	0	0	0	0	0
Control Delay, s/veh		16.74	44.91	42.23		14.72		
Group LOS		B	D	D		B		
Uniform Stops, #/veh		0.52	0.8	0.83		0.39		
Increm Stops, #/veh	0	0.03	0.18	0.13	0	0.05	0	0
Overflow Stops, #/veh	0	0	0	0	0	0	0	0
Stop Rate, #/veh		0.55	0.98	0.96		0.44		
Uniform Queue, veh/ln		1.83	5.23	0.56		3.17		
Increm Queue, veh/ln	0	0.12	1.18	0.09	0	0.44	0	0
Overflow Queue, veh/ln	0	0	0	0	0	0	0	0
Back of Queue Factor	0	1.8	1.65	1.8	0	1.8	0	0
Back of Queue, veh/ln		3.51	10.56	1.16		6.5		
Storage Ratio	0	0.07	0.53	0.15	0	0.16	0	0
Initial Queue, veh	0	0	0	0	0	0	0	0
Final Queue, veh	0	0	0	0	0	0	0	0
Saturated Delay, s/veh	0	0	0	0	0	0	0	0
Saturated Stops, #/veh	0	0	0	0	0	0	0	0
Saturated Queue, veh/ln	0	0	0	0	0	0	0	0
Saturated Capacity, vph	0	0	0	0	0	0	0	0
Init Que Clear Time, s	0	0	0	0	0	0	0	0

HCS 2010 Signalized Intersection Results Summary

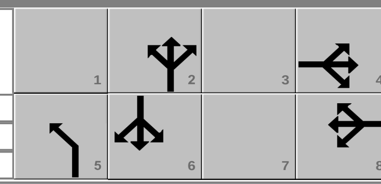
General Information				Intersection Information	
Agency	HDR			Duration, h	0.25
Analyst	MDF	Analysis Date	Jan 30, 2013	Area Type	Other
Jurisdiction		Time Period	AM Peak	PHF	0.80
Intersection	Lindbergh Street	Analysis Year	2035 No-Build	Analysis Period	1> 7:45
File Name	2035_No-Build_AM_Haines.xus				
Project Description					



Demand Information	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Demand (*v*), veh/h	70	10	70	10	10	30	70	580	10	20	960	40

Signal Information			
Cycle, s	90.0	Reference Phase	2
Offset, s	11	Reference Point	End
Uncoordinated	No	Simult. Gap E/W	Off
Force Mode	Float	Simult. Gap N/S	Off

Green	4.4	58.6	10.9	0.0	0.0	0.0
Yellow	4.0	4.0	4.0	0.0	0.0	0.0
Red	0.0	2.0	2.0	0.0	0.0	0.0



Timer Results	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Assigned Phase		4		8	5	2		6
Case Number		8.0		8.0	1.0	4.0		6.3
Phase Duration, s		16.9		16.9	8.4	73.1		64.6
Change Period, *(Y+R$_c$)*, s		6.0		6.0	4.0	6.0		6.0
Max Allow Headway *(MAH)*, s		5.2		5.2	5.1	0.0		0.0
Queue Clearance Time *(g_s)*, s		10.6		3.5	3.4			
Green Extension Time *(g_e)*, s		0.5		0.1	0.1	0.0		0.0
Phase Call Probability		0.99		0.99	0.89			
Max Out Probability		0.04		0.00	1.00			

Movement Group Results	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Assigned Movement	7	4	14	3	8	18	5	2	12	1	6	16
Adjusted Flow Rate (*v*), veh/h		148			31		88	369	367	25	627	619
Adjusted Saturation Flow Rate (*s*), veh/h/ln		1499			1541		1697	1782	1772	726	1782	1759
Queue Service Time (g_s), s		7.1			0.0		1.4	0.2	0.2	0.6	13.0	12.9
Cycle Queue Clearance Time (g_c), s		8.6			1.5		1.4	0.2	0.2	0.6	13.0	12.9
Green Ratio (*g/C*)		0.12			0.12		0.72	0.75	0.75	0.65	0.65	0.65
Capacity (*c*), veh/h		246			243		391	1328	1321	553	1161	1146
Volume-to-Capacity Ratio *(X)*		0.601			0.129		0.224	0.278	0.278	0.045	0.540	0.540
Available Capacity (c_a), veh/h		409			414		421	1328	1321	553	1161	1146
Back of Queue (*Q*), veh/ln (95th percentile)		6.0			1.1		0.7	0.4	0.4	0.2	6.6	6.4
Queue Storage Ratio *(RQ)* (95th percentile)		0.30			0.06		0.08	0.01	0.01	0.02	0.11	0.11
Uniform Delay (d_1), s/veh		38.4			35.4		5.1	0.1	0.1	2.9	5.4	5.3
Incremental Delay (d_2), s/veh		3.3			0.3		0.4	0.5	0.5	0.1	1.6	1.6
Initial Queue Delay (d_3), s/veh		0.0			0.0		0.0	0.0	0.0	0.0	0.0	0.0
Control Delay (*d*), s/veh		41.7			35.7		5.5	0.6	0.6	3.0	7.0	6.9
Level of Service (LOS)		D			D		A	A	A	A	A	A
Approach Delay, s/veh / LOS	41.7	D		35.7	D		1.1	A		6.9	A	
Intersection Delay, s/veh / LOS	7.4						A					

Multimodal Results	EB		WB		NB		SB	
Pedestrian LOS Score / LOS	2.9	C	2.9	C	2.1	B	2.1	B
Bicycle LOS Score / LOS	0.7	A	0.5	A	1.2	A	1.5	A

 HCS 2010™ Streets Version 6.50 Generated: 4/11/2013 2:02:02 PM

This Signals text report was created on April 11, 2013 at 02:02:25

Intersection number = 1, Segment number = 1, Period number = 1

Chapter 18 Summary Input

Cycle Length, s 90

	EB LT	EB TH	EB RT	WB LT	WB TH	WB RT	NB LT	NB TH	NB RT	SB LT	SB TH	SB RT
Movement	7	4	14	3	8	18	5	2	12	1	6	16
Volume, veh/h	70	10	70	10	10	30	70	580	10	20	960	40
Lanes	0	1	0	0	1	0	1	2	0	1	2	0
Bay Length, ft	0	500	0	200	500	500	200	1000	150	200	1499	0
Receiving Lanes	1	1	1	1	1	1	2	2	2	2	2	2
SatFlow, vplphg	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800
Lane Width, ft	12	12	12	12	12	12	12	12	12	12	12	12
Heavy Vehicles, %	0	1	0	2	1	2	1	1	2	1	1	0
Grade, %	0	0	0	0	0	0	0	0	0	0	0	0
Buses, per h	0	0	0	0	0	0	0	0	0	0	0	0
Parking, per h	0	0	0	0	0	0	0	0	0	0	0	0
Bicycles, per h	0	0	0	0	0	0	0	0	0	0	0	0
Pedestrians, per h	0	0	0	0	0	0	0	0	0	0	0	0
Heavy Veh Equivalent	2	2	2	2	2	2	2	2	2	2	2	2
Bus Blockage Time	14.4	14.4	14.4	14.4	14.4	14.4	14.4	14.4	14.4	14.4	14.4	14.4
Turns in Shrd Ln, %	0	0	0	40	0	0	0	0	0	0	0	0
Unopposed Lefts, %	0	0	0	0	0	0	0	0	0	0	0	0
Parking Time, sec	18	18	18	18	18	18	18	18	18	18	18	18
Arrival Type	3	3	3	3	3	3	4	4	4	4	4	4
Initial Queue, veh	0	0	0	0	0	0	0	0	0	0	0	0
Speed Limit, mph	30	30	30	30	30	30	35	35	35	35	35	35
Detector Length, ft	40	40	40	40	40	40	40	40	40	40	40	40
StartLostTime, sec	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0
EndUseTime, sec	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0
RTOR, veh/h		32			25			1			3	
I-Factor		1.00			1.00			1.00			0.87	
Walk + PC, sec		0.0			0.0			0.0			0.0	

	EB	EB	WB	WB	NB	NB	SB	SB
Phase	7	4	3	8	5	2	1	6
Movement		LT+TH+RT		LT+TH+RT	LT	LT+TH+RT		LT+TH+RT
Left-Turn Mode	--	Perm.	--	Perm.	Pr/Pm	--	--	Perm.
Phase Splits, s	0.0	27.0	0.0	27.0	10.0	63.0	0.0	53.0
Yellow Change, s	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Red Clearance, s	2.0	2.0	2.0	2.0	0.0	2.0	2.0	2.0
Minimum Green, s	5	5	5	5	5	5	5	5
Lead/Lag					Lead			
Passage Time, s	2.0	4.0	2.0	4.0	4.0	2.0	3.0	2.0
Recall	Min	Off	Min	Off	Off	Min	Off	Min
Dual Entry	No	Yes	No	Yes	No	Yes	No	Yes
Prot. Right-Turn	False	False	False	False	False	False	False	False

	E/W	N/S
Simultaneous Gap out	Off	Off
Dallas Phasing	Off	Off

Cycle Length, s	90
Offset, s	11
Reference Phase	2
Reference Point	End
Force Mode	Float
Uncoordinated	No
Field Measured Phase Times	No
Exclusive Ped Phase Time, s	0.0

Timer:	1	2	3	4	5	6	7	8
Assigned Phase	0	2	0	4	5	6	0	8
Assigned Left-Turn Mvmt.	0	0	0	7	5	1	0	3
Assigned Through Mvmt.	0	2	0	4	0	6	0	8
Assigned Right-Turn Mvmt.	0	12	0	14	0	16	0	18
Timer w/Pr-Pm From Shared	0	0	0	0	0	0	0	0

Chapter 18 Summary Output

Cycle Length, s 90

	EB LT	EB TH	EB RT	WB LT	WB TH	WB RT	NB LT	NB TH	NB RT	SB LT	SB TH	SB RT
Movement	7	4	14	3	8	18	5	2	12	1	6	16
Volume, veh/h	87.5	12.5	47.5	12.5	12.5	6.25	87.5	725	11.25	25	1200	46.25
SatFlow, veh/h/ln	0	1782.2	0	0	1782.2	0	1782.2	1782.2	0	1782.2	1782.2	0
Lane Util Factor	1	1	1	1	1	1	1	1	1	1	1	1
Capacity, veh/h	168.68	22.89	58.56	109.76	96.31	37.39	391.1	2608.9	40.48	552.66	2221.4	85.57
Discharge Vol, veh/h	87.5	0	0	0	0	6.25	0	725	0	0	0	0
Prop Arriv On Green	0.12	0.12	0.12	0.12	0.12	0.12	0.07	0.99	0.99	0.82	0.76	0.8
Apprch Vol, veh/h	0	147.5	0	0	31.25	0	0	823.75	0	0	1271.2	0
Apprch Stops, #/veh	0	0.9	0	0	0.8	0	0	0.04	0	0	0.23	0
Apprch Delay, s/veh	0	41.73	0	0	35.72	0	0	1.12	0	0	6.86	0

Apprch LOS	D	D	A	A
Int Delay, s/veh	7.44			
Int LOS	A			

Timer Data

Timer:	1	2	3	4	5	6	7	8
Assigned Phase	0	2	0	4	5	6	0	8
Case No	0	4	0	8	1	6.3	0	8
Phase Duration, s	0	73.08	0	16.92	8.44	64.64	0	16.92
Change Period, s	0	6	0	6	4	6	0	6
Phase Start Time, s	33.92	33.92	17	17	33.92	42.36	17	17
Phase End Time, s	33.92	17	17	33.92	42.36	17	17	33.92
Max Allow Headway, s	0	0	0	5.18	5.08	0	0	5.17
Equiv Max Green, s		5		21	6	5		21
Queue Clear Time, s				10.57	3.36			3.46
Green Exten Time, s	0	0	0	0.47	0.07	0	0	0.07
Prob of Phase Call				0.99	0.89			0.99
Prob of Max Out				0.04	1			0
Left-Turn Movement Data								
Assigned Movement	0	0	0	7	5	1	0	3
Mvmt. Sat Flow, veh/h	0	0	0	889.05	1697.31	725.54	0	616.28
Through Movement Data								
Assigned Movement	0	2	0	4	0	6	0	8
Mvmt. Sat Flow, veh/h	0	3500.28	0	127.01	0	3409.39	0	616.29
Right-Turn Movement Data								
Assigned Movement	0	12	0	14	0	16	0	18
Mvmt. Sat Flow, veh/h	0	54.31	0	482.63	0	131.33	0	308.14

Left Lane Group Output

Timer:	1	2	3	4	5	6	7	8
Assigned Phase	0	2	0	4	5	6	0	8
Left Lane Group Data								
Assigned Movement	0	0	0	7	5	1	0	3
Lane Assignment				L+T+R	L Pr/Pm	L		L+T+R
Lanes in Group	0	0	0	1	1	1	0	1
Group Volume, veh/h	0	0	0	147.5	87.5	25	0	31.25
Group SatFlow, vphpl	0	0	0	1498.69	1697.31	725.54	0	1540.72
Queue Serve Time, s	0	0	0	7.11	1.36	0.59	0	0
Cycle Clear Time, s	0	0	0	8.57	1.36	0.59	0	1.46
Perm SatFlow, vphpl	0	0	0	1415.82	448.7	725.54	0	1363.98
Shared SatFlow, vphpl				1782.18				1456.66
Perm Eff Green, s	0	0	0	10.92	60.64	58.64	0	10.92
Perm Serve Time, s	0	0	0	9.47	45.61	58.63	0	2.36
Perm Que Serve Time, s				7.11	3.56	0.57		0
Time to first Blk, s	0	0	0	0.67	0	0	0	2.82
Serve Time pre Blk, s				0.67				1.07
Prop Inside Lane	0	0	0	0.59	1	1	0	0.4
Lane Grp Capacity, vph				245.57	391.1	552.66		242.95
v/c Ratio	0	0	0	0.6	0.22	0.05	0	0.13
Avail Capacity, veh/h				409.32	420.54	552.66		414.44
I-Factor	0	0	0	1	1	0.87	0	1
Uniform Delay, s/veh				38.4	5.1	2.88		35.39
Increm Delay, s/veh	0	0	0	3.33	0.41	0.13	0	0.34
Overflow Delay, s/veh	0	0	0	0	0	0	0	0
Control Delay, s/veh				41.73	5.51	3.02		35.72
Group LOS				D	A	A		D
Uniform Stops, #/veh				0.84	0.19	0.11		0.77
Increm Stops, #/veh	0	0	0	0.06	0.02	0.03	0	0.03
Overflow Stops, #/veh	0	0	0	0	0	0	0	0
Stop Rate, #/veh				0.9	0.21	0.15		0.8
Uniform Queue, veh/ln				3.09	0.32	0.07		0.6
Increm Queue, veh/ln	0	0	0	0.23	0.04	0.02	0	0.02
Overflow Queue, veh/ln	0	0	0	0	0	0	0	0
Back of Queue Factor	0	0	0	1.8	1.8	1.8	0	1.8
Back of Queue, veh/ln				5.96	0.66	0.17		1.12
Storage Ratio	0	0	0	0.3	0.08	0.02	0	0.06
Initial Queue, veh	0	0	0	0	0	0	0	0
Final Queue, veh	0	0	0	0	0	0	0	0
Saturated Delay, s/veh	0	0	0	0	0	0	0	0
Saturated Stops, #/veh	0	0	0	0	0	0	0	0
Saturated Queue, veh/ln	0	0	0	0	0	0	0	0
Saturated Capacity, vph	0	0	0	0	0	0	0	0
Init Que Clear Time, s	0	0	0	0	0	0	0	0

Thru Lane Group Output

Timer:	1	2	3	4	5	6	7	8
Assigned Phase	0	2	0	4	5	6	0	8
Thru Lane Group Data								
Assigned Movement	0	2	0	4	0	6	0	8
Lane Assignment		T				T		
Lanes in Group	0	1	0	0	0	1	0	0
Group Volume, veh/h	0	369.08	0	0	0	626.96	0	0
Group SatFlow, vphpl	0	1782.18	0	0	0	1782.18	0	0
Queue Serve Time, s	0	0.16	0	0	0	13.02	0	0
Cycle Clear Time, s	0	0.16	0	0	0	13.02	0	0
Lane Grp Capacity, vph		1328.31				1161.2		
v/c Ratio	0	0.28	0	0	0	0.54	0	0

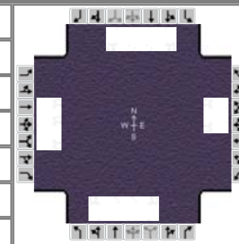
Avail Capacity, veh/h		1328.31				1161.2		
I-Factor	0	1	0	0	0	0.87	0	0
Uniform Delay, s/veh		0.07				5.4		
Increm Delay, s/veh	0	0.52	0	0	0	1.57	0	0
Overflow Delay, s/veh	0	0	0	0	0	0	0	0
Control Delay, s/veh		0.59				6.96		
Group LOS		A				A		
Uniform Stops, #/veh		0				0.2		
Increm Stops, #/veh	0	0.02	0	0	0	0.03	0	0
Overflow Stops, #/veh	0	0	0	0	0	0	0	0
Stop Rate, #/veh		0.02				0.23		
Uniform Queue, veh/ln		0.03				3.14		
Increm Queue, veh/ln	0	0.19	0	0	0	0.51	0	0
Overflow Queue, veh/ln	0	0	0	0	0	0	0	0
Back of Queue Factor	0	1.8	0	1	0	1.8	0	1
Back of Queue, veh/ln		0.4				6.55		
Storage Ratio	0	0.01	0	0	0	0.11	0	0
Initial Queue, veh	0	0	0	0	0	0	0	0
Final Queue, veh	0	0	0	0	0	0	0	0
Saturated Delay, s/veh	0	0	0	0	0	0	0	0
Saturated Stops, #/veh	0	0	0	0	0	0	0	0
Saturated Queue, veh/ln	0	0	0	0	0	0	0	0
Saturated Capacity, vph	0	0	0	0	0	0	0	0
Init Que Clear Time, s	0	0	0	0	0	0	0	0

Right Lane Group Output

Timer:	1	2	3	4	5	6	7	8
Assigned Phase	0	2	0	4	5	6	0	8
Right Lane Group Data								
Assigned Movement	0	12	0	14	0	16	0	18
Lane Assignment		T+R				T+R		
Lanes in Group	0	1	0	0	0	1	0	0
Group Volume, veh/h	0	367.17	0	0	0	619.29	0	0
Group SatFlow, vphpl	0	1772.4	0	0	0	1758.54	0	0
Queue Serve Time, s	0	0.16	0	0	0	12.91	0	0
Cycle Clear Time, s	0	0.16	0	0	0	12.91	0	0
Prot RT SatFlow, vphpl								
Prot RT Eff Green, s								
Prop Outside Lane	0	0.03	0	0.32	0	0.07	0	0.2
Lane Grp Capacity, vph		1321.04				1145.81		
v/c Ratio	0	0.28	0	0	0	0.54	0	0
Avail Capacity, veh/h		1321.04				1145.81		
I-Factor	0	1	0	0	0	0.87	0	0
Uniform Delay, s/veh		0.07				5.31		
Increm Delay, s/veh	0	0.52	0	0	0	1.59	0	0
Overflow Delay, s/veh	0	0	0	0	0	0	0	0
Control Delay, s/veh		0.6				6.9		
Group LOS		A				A		
Uniform Stops, #/veh		0				0.2		
Increm Stops, #/veh	0	0.02	0	0	0	0.03	0	0
Overflow Stops, #/veh	0	0	0	0	0	0	0	0
Stop Rate, #/veh		0.02				0.23		
Uniform Queue, veh/ln		0.03				3.05		
Increm Queue, veh/ln	0	0.19	0	0	0	0.51	0	0
Overflow Queue, veh/ln	0	0	0	0	0	0	0	0
Back of Queue Factor	0	1.8	0	1	0	1.8	0	1
Back of Queue, veh/ln		0.4				6.39		
Storage Ratio	0	0.01	0	0	0	0.11	0	0
Initial Queue, veh	0	0	0	0	0	0	0	0
Final Queue, veh	0	0	0	0	0	0	0	0
Saturated Delay, s/veh	0	0	0	0	0	0	0	0
Saturated Stops, #/veh	0	0	0	0	0	0	0	0
Saturated Queue, veh/ln	0	0	0	0	0	0	0	0
Saturated Capacity, vph	0	0	0	0	0	0	0	0
Init Que Clear Time, s	0	0	0	0	0	0	0	0

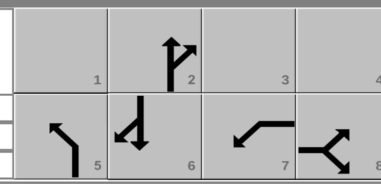
HCS 2010 Signalized Intersection Results Summary

General Information				Intersection Information	
Agency	HDR			Duration, h	0.25
Analyst	MDF	Analysis Date	Jan 30, 2013	Area Type	Other
Jurisdiction		Time Period	AM Peak	PHF	0.80
Intersection	I-90 Ramps (SPUI)	Analysis Year	2035 No-Build	Analysis Period	1> 7:45
File Name	2035_No-Build_AM_Haines.xus				
Project Description					



Demand Information	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Demand (*v*), veh/h	210		180	130		100	90	490	100	120	710	240

Signal Information										
Cycle, s	90.0	Reference Phase	2							
Offset, s	86	Reference Point	End	Green	7.6	2.0	52.8	0.0	8.1	0.0
Uncoordinated	No	Simult. Gap E/W	Off	Yellow	4.0	0.0	4.0	0.0	4.0	0.0
Force Mode	Float	Simult. Gap N/S	Off	Red	2.5	0.0	2.5	0.0	2.5	0.0



Timer Results	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Assigned Phase	3	8	7	4	5	2	1	6
Case Number	1.4	3.0	1.4	3.0	2.0	3.0	2.0	3.0
Phase Duration, s	14.6	0.0	14.6	0.0	14.1	59.3	16.2	61.3
Change Period, *($Y+R_c$)*, s	6.5	0.0	6.5	0.0	6.5	6.5	6.5	6.5
Max Allow Headway *(MAH)*, s	5.0	0.0	5.0	0.0	5.1	0.0	5.1	0.0
Queue Clearance Time (g_s), s	6.2		7.8		7.8		9.5	
Green Extension Time (g_e), s	1.0	0.0	0.4	0.0	0.3	0.0	0.3	0.0
Phase Call Probability	1.00		0.98		0.94		0.98	
Max Out Probability	0.12		0.20		0.04		0.32	

Movement Group Results	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Assigned Movement	3		18	7		14	5	2	12	1	6	16
Adjusted Flow Rate (*v*), veh/h	263		0	163		0	113	613	0	150	888	0
Adjusted Saturation Flow Rate (*s*), veh/h/ln	1648		1510	1714		1510	1697	1697	1510	1697	1697	1510
Queue Service Time (g_s), s	4.2		0.0	5.8		0.0	5.8	9.4	0.0	7.5	11.4	0.0
Cycle Queue Clearance Time (g_c), s	4.2		0.0	5.8		0.0	5.8	9.4	0.0	7.5	11.4	0.0
Green Ratio (*g/C*)	0.09		0.08	0.09		0.00	0.08	0.59	0.59	0.11	0.61	0.61
Capacity (*c*), veh/h	392		129	202		2	144	1990	886	182	2067	920
Volume-to-Capacity Ratio *(X)*	0.670		0.000	0.806		0.000	0.784	0.308	0.000	0.824	0.429	0.000
Available Capacity (c_a), veh/h	664		145	343		17	330	1990	886	311	2067	920
Back of Queue *(Q)*, veh/ln (95th percentile)	4.8		0.0	6.8		0.0	4.9	6.0	0.0	5.6	6.2	0.0
Queue Storage Ratio *(RQ)* (95th percentile)	0.81		0.00	0.00		0.00	0.42	0.10	0.00	0.71	0.13	0.00
Uniform Delay (d_1), s/veh	40.3		0.0	40.9		0.0	39.0	11.3	0.0	33.5	8.1	0.0
Incremental Delay (d_2), s/veh	2.8		0.0	10.2		0.0	12.0	0.4	0.0	9.8	0.5	0.0
Initial Queue Delay (d_3), s/veh	0.0		0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0	0.0
Control Delay (*d*), s/veh	43.1		0.0	51.2		0.0	51.0	11.7	0.0	43.3	8.6	0.0
Level of Service (LOS)	D			D			D	B		D	A	
Approach Delay, s/veh / LOS	43.1		D	51.2		D	17.8		B	13.6		B
Intersection Delay, s/veh / LOS	21.3						C					

Multimodal Results	EB		WB		NB		SB	
Pedestrian LOS Score / LOS	3.1	C	3.3	C	2.4	B	2.6	B
Bicycle LOS Score / LOS		F		F	1.1	A	1.3	A

This Signals text report was created on April 11, 2013 at 02:02:42

Intersection number = 2, Segment number = 1, Period number = 1

Chapter 18 Summary Input

Cycle Length, s	90											
	EB	EB	EB	WB	WB	WB	NB	NB	NB	SB	SB	SB
	LT	TH	RT	LT	TH	RT	LT	TH	RT	LT	TH	RT
Movement	3	8	18	7	4	14	5	2	12	1	6	16
Volume, veh/h	210	0	180	130	0	100	90	490	100	120	710	240
Lanes	2	0	1	1	0	1	1	2	1	1	2	1
Bay Length, ft	150	500	150	0	150	500	300	1499	300	200	1213	300
Receiving Lanes	1	1	1	1	1	1	2	2	2	2	2	2
SatFlow, vplphg	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800
Lane Width, ft	12	12	12	12	12	12	12	12	12	12	12	12
Heavy Vehicles, %	1	1	1	0	1	1	1	1	1	1	1	1
Grade, %	0	0	0	0	0	0	0	0	0	0	0	0
Buses, per h	0	0	0	0	0	0	0	0	0	0	0	0
Parking, per h	0	0	0	0	0	0	0	0	0	0	0	0
Bicycles, per h	0	0	0	0	0	0	0	0	0	0	0	0
Pedestrians, per h	0	0	0	0	0	0	0	0	0	0	0	0
Heavy Veh Equivalent	2	2	2	2	2	2	2	2	2	2	2	2
Bus Blockage Time	14.4	14.4	14.4	14.4	14.4	14.4	14.4	14.4	14.4	14.4	14.4	14.4
Turns in Shrd Ln, %	0	0	0	0	0	0	0	0	0	0	0	0
Unopposed Lefts, %	0	0	0	0	0	0	0	0	0	0	0	0
Parking Time, sec	18	18	18	18	18	18	18	18	18	18	18	18
Arrival Type	3	3	3	3	3	3	4	4	4	4	4	4
Initial Queue, veh	0	0	0	0	0	0	0	0	0	0	0	0
Speed Limit, mph	45	45	45	45	45	45	35	35	35	35	35	35
Detector Length, ft	40	40	40	40	40	40	40	40	40	40	40	40
StartLostTime, sec	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0
EndUseTime, sec	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0
RTOR, veh/h		180			100			100			240	
I-Factor		1.00			1.00			0.96			0.78	
Walk + PC, sec		0.0			0.0			0.0			0.0	

	EB	EB	WB	WB	NB	NB	SB	SB
Phase	3	8	7	4	5	2	1	6
Movement	LT	LT+RT	LT	LT+RT	LT	TH+RT	LT	TH+RT
Left-Turn Mode	Pr/Pm	--	Pr/Pm	--	Prot.	--	Prot.	--
Phase Splits, s	22.0	1.0	22.0	1.0	24.0	44.0	23.0	43.0
Yellow Change, s	4.0	0.0	4.0	0.0	4.0	4.0	4.0	4.0
Red Clearance, s	2.5	0.0	2.5	0.0	2.5	2.5	2.5	2.5
Minimum Green, s	5	1	5	1	5	5	5	5
Lead/Lag	Lag		Lag		Lead		Lead	
Passage Time, s	4.0	0.0	4.0	0.0	4.0	2.0	4.0	2.0
Recall	Off	Off	Off	Off	Off	Min	Off	Min
Dual Entry	No	Yes	No	Yes	No	Yes	No	Yes
Prot. Right-Turn	False	False	False	False	True	False	False	False

	E/W	N/S
Simultaneous Gap out	Off	Off
Dallas Phasing	Off	Off

Cycle Length, s	90
Offset, s	86
Reference Phase	2
Reference Point	End
Force Mode	Float
Uncoordinated	No
Field Measured Phase Times	No
Exclusive Ped Phase Time, s	0.0

Timer:	1	2	3	4	5	6	7	8
Assigned Phase	1	2	4	3	5	6	8	7
Assigned Left-Turn Mvmt.	1	0	0	3	5	0	0	7
Assigned Through Mvmt.	0	2	4	0	0	6	8	0
Assigned Right-Turn Mvmt.	0	12	14	0	0	16	18	0
Timer w/Pr-Pm From Shared	0	0	0	0	0	0	0	0

Chapter 18 Summary Output

Cycle Length, s	90											
	EB	EB	EB	WB	WB	WB	NB	NB	NB	SB	SB	SB
	LT	TH	RT	LT	TH	RT	LT	TH	RT	LT	TH	RT
Movement	3	8	18	7	4	14	5	2	12	1	6	16
Volume, veh/h	262.5	0	0	162.5	0	0	112.5	612.5	0	150	887.5	0
SatFlow, veh/h/ln	1782.2	1782.2	1782.2	1800	1782.2	1782.2	1782.2	1782.2	1782.2	1782.2	1782.2	1782.2
Lane Util Factor	0.97	1	1	1	1	1	1	0.95	1	1	0.95	1
Capacity, veh/h	391.89	0	16.78	201.56	0	16.78	143.54	1990.1	885.77	182.09	2067.1	920.07
Discharge Vol, veh/h	262.5	0	0	162.5	0	0	0	612.5	0	0	887.5	0
Prop Arriv On Green	0.09	0	0	0.09	0	0	0.12	0.51	0	0.24	0.65	0
Apprch Vol, veh/h	0	262.5	0	0	162.5	0	0	725	0	0	1037.5	0
Apprch Stops, #/veh	0	NaN	0	0	NaN	0	0	0.52	0	0	0.39	0
Apprch Delay, s/veh	0	43.1	0	0	51.16	0	0	17.79	0	0	13.62	0

Apprch LOS	D	D	B	B

Int Delay, s/veh	21.33
Int LOS	C

Timer Data

Timer:	1	2	3	4	5	6	7	8
Assigned Phase	1	2	4	3	5	6	8	7
Case No	2	3	3	1.4	2	3	3	1.4
Phase Duration, s	16.16	59.28	0	14.56	14.11	61.33	0	14.56
Change Period, s	6.5	6.5	0	6.5	6.5	6.5	0	6.5
Phase Start Time, s	17.06	33.22	2.5	2.5	17.06	31.17	2.5	2.5
Phase End Time, s	33.22	2.5	2.5	17.06	31.17	2.5	2.5	17.06
Max Allow Headway, s	5.08	0	0	4.98	5.08	0	0	4.98
Equiv Max Green, s	16.5	5	1	15.5	17.5	5	1	15.5
Queue Clear Time, s	9.54			6.22	7.8			7.8
Green Exten Time, s	0.35	0	0	0.96	0.3	0	0	0.41
Prob of Phase Call	0.98			1	0.94			0.98
Prob of Max Out	0.32			0.12	0.04			0.2
Left-Turn Movement Data								
Assigned Movement	1	0	0	3	5	0	0	7
Mvmt. Sat Flow, veh/h	1697.31	0	0	3296.18	1697.31	0	0	1714.29
Through Movement Data								
Assigned Movement	0	2	4	0	0	6	8	0
Mvmt. Sat Flow, veh/h	0	3393.27	0	0	0	3393.27	0	0
Right-Turn Movement Data								
Assigned Movement	0	12	14	0	0	16	18	0
Mvmt. Sat Flow, veh/h	0	1510.32	1510.32	0	0	1510.32	1510.32	0

Left Lane Group Output

Timer:	1	2	3	4	5	6	7	8
Assigned Phase	1	2	4	3	5	6	8	7
Left Lane Group Data								
Assigned Movement	1	0	0	3	5	0	0	7
Lane Assignment	L (Prot)			L Pr/Pm	L (Prot)			L Pr/Pm
Lanes in Group	1	0	0	2	1	0	0	1
Group Volume, veh/h	150	0	0	262.5	112.5	0	0	162.5
Group SatFlow, vphpl	1697.31	0	0	1648.09	1697.31	0	0	1714.29
Queue Serve Time, s	7.54	0	0	4.22	5.8	0	0	5.8
Cycle Clear Time, s	7.54	0	0	4.22	5.8	0	0	5.8
Perm SatFlow, vphpl	0	0	0	1425.73	0	0	0	1439.99
Shared SatFlow, vphpl								
Perm Eff Green, s	0	0	0	-2	0	0	0	-2
Perm Serve Time, s	0	0	0	-2	0	0	0	-2
Perm Que Serve Time, s				0				0
Time to first Blk, s	0	0	0	0	0	0	0	0
Serve Time pre Blk, s								
Prop Inside Lane	1	0	0	1	1	0	0	1
Lane Grp Capacity, vph	182.09			391.89	143.54			201.56
v/c Ratio	0.82	0	0	0.67	0.78	0	0	0.81
Avail Capacity, veh/h	311.17			664.31	330.03			343.24
I-Factor	0.78	0	0	1	0.96	0	0	1
Uniform Delay, s/veh	33.48			40.29	38.96			40.92
Increm Delay, s/veh	9.82	0	0	2.82	12	0	0	10.24
Overflow Delay, s/veh	0	0	0	0	0	0	0	0
Control Delay, s/veh	43.3			43.1	50.96			51.16
Group LOS	D			D	D			D
Uniform Stops, #/veh	0.7			0.77	0.81			0.79
Increm Stops, #/veh	0.13	0	0	0.05	0.17	0	0	0.14
Overflow Stops, #/veh	0	0	0	0	0	0	0	0
Stop Rate, #/veh	0.83			0.82	0.98			0.93
Uniform Queue, veh/ln	2.63			2.53	2.27			3.2
Increm Queue, veh/ln	0.5	0	0	0.15	0.48	0	0	0.57
Overflow Queue, veh/ln	0	0	0	0	0	0	0	0
Back of Queue Factor	1.8	0	0	1.8	1.8	0	0	1.8
Back of Queue, veh/ln	5.63			4.84	4.95			6.79
Storage Ratio	0.71	0	0	0.81	0.42	0	0	0
Initial Queue, veh	0	0	0	0	0	0	0	0
Final Queue, veh	0	0	0	0	0	0	0	0
Saturated Delay, s/veh	0	0	0	0	0	0	0	0
Saturated Stops, #/veh	0	0	0	0	0	0	0	0
Saturated Queue, veh/ln	0	0	0	0	0	0	0	0
Saturated Capacity, vph	0	0	0	0	0	0	0	0
Init Que Clear Time, s	0	0	0	0	0	0	0	0

Thru Lane Group Output

Timer:	1	2	3	4	5	6	7	8
Assigned Phase	1	2	4	3	5	6	8	7
Thru Lane Group Data								
Assigned Movement	0	2	4	0	0	6	8	0
Lane Assignment		T				T		
Lanes in Group	0	2	0	0	0	2	0	0
Group Volume, veh/h	0	612.5	0	0	0	887.5	0	0
Group SatFlow, vphpl	0	1696.63	0	0	0	1696.63	0	0
Queue Serve Time, s	0	9.37	0	0	0	11.37	0	0
Cycle Clear Time, s	0	9.37	0	0	0	11.37	0	0
Lane Grp Capacity, vph		1990.08	0			2067.14	0	
v/c Ratio	0	0.31	0	0	0	0.43	0	0

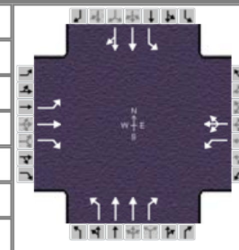
Avail Capacity, veh/h		1990.08	0			2067.14	0	
I-Factor	0	0.96	0	0	0	0.78	0	0
Uniform Delay, s/veh		11.31	0			8.1	0	
Increm Delay, s/veh	0	0.39	0	0	0	0.51	0	0
Overflow Delay, s/veh	0	0	0	0	0	0	0	0
Control Delay, s/veh		11.69	0			8.6	0	
Group LOS		B				A		
Uniform Stops, #/veh		0.42	NaN			0.3	NaN	
Increm Stops, #/veh	0	0.01	0	0	0	0.01	0	0
Overflow Stops, #/veh	0	0	0	0	0	0	0	0
Stop Rate, #/veh		0.43	NaN			0.31	NaN	
Uniform Queue, veh/ln		3.22	0			3.34	0	
Increm Queue, veh/ln	0	0.11	0	0	0	0.15	0	0
Overflow Queue, veh/ln	0	0	0	0	0	0	0	0
Back of Queue Factor	0	1.8	1	0	0	1.77	1	0
Back of Queue, veh/ln		5.99	0			6.18	0	
Storage Ratio	0	0.1	0	0	0	0.13	0	0
Initial Queue, veh	0	0	0	0	0	0	0	0
Final Queue, veh	0	0	0	0	0	0	0	0
Saturated Delay, s/veh	0	0	0	0	0	0	0	0
Saturated Stops, #/veh	0	0	0	0	0	0	0	0
Saturated Queue, veh/ln	0	0	0	0	0	0	0	0
Saturated Capacity, vph	0	0	0	0	0	0	0	0
Init Que Clear Time, s	0	0	0	0	0	0	0	0

Right Lane Group Output

Timer:	1	2	3	4	5	6	7	8
Assigned Phase	1	2	4	3	5	6	8	7
Right Lane Group Data								
Assigned Movement	0	12	14	0	0	16	18	0
Lane Assignment		R	R			R	R	
Lanes in Group	0	1	1	0	0	1	1	0
Group Volume, veh/h	0	0	0	0	0	0	0	0
Group SatFlow, vphpl	0	1510.32	1510.32	0	0	1510.32	1510.32	0
Queue Serve Time, s	0	0	0	0	0	0	0	0
Cycle Clear Time, s	0	0	0	0	0	0	0	0
Prot RT SatFlow, vphpl		0	0			0	1510.32	
Prot RT Eff Green, s		0	0			0	7.61	
Prop Outside Lane	0	1	1	0	0	1	1	0
Lane Grp Capacity, vph		885.77	1.68			920.07	129.41	
v/c Ratio	0	0	0	0	0	0	0	0
Avail Capacity, veh/h		885.77	16.78			920.07	144.51	
I-Factor	0	0	0	0	0	0	0	0
Uniform Delay, s/veh		0	0			0	0	
Increm Delay, s/veh	0	0	0	0	0	0	0	0
Overflow Delay, s/veh	0	0	0	0	0	0	0	0
Control Delay, s/veh		0	0			0	0	
Group LOS								
Uniform Stops, #/veh		0	0			0	0	
Increm Stops, #/veh	0	0	0	0	0	0	0	0
Overflow Stops, #/veh	0	0	0	0	0	0	0	0
Stop Rate, #/veh		0	0			0	0	
Uniform Queue, veh/ln		0	0			0	0	
Increm Queue, veh/ln	0	0	0	0	0	0	0	0
Overflow Queue, veh/ln	0	0	0	0	0	0	0	0
Back of Queue Factor	0	1	1	0	0	1	1	0
Back of Queue, veh/ln		0	0			0	0	
Storage Ratio	0	0	0	0	0	0	0	0
Initial Queue, veh	0	0	0	0	0	0	0	0
Final Queue, veh	0	0	0	0	0	0	0	0
Saturated Delay, s/veh	0	0	0	0	0	0	0	0
Saturated Stops, #/veh	0	0	0	0	0	0	0	0
Saturated Queue, veh/ln	0	0	0	0	0	0	0	0
Saturated Capacity, vph	0	0	0	0	0	0	0	0
Init Que Clear Time, s	0	0	0	0	0	0	0	0

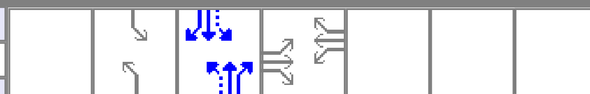
HCS 2010 Signalized Intersection Results Summary

General Information				Intersection Information	
Agency	HDR			Duration, h	0.25
Analyst	MDF	Analysis Date	Jan 30, 2013	Area Type	Other
Jurisdiction		Time Period	AM Peak	PHF	0.80
Intersection	Disk Drive	Analysis Year	2035 No-Build	Analysis Period	1> 7:45
File Name	2035_No-Build_AM_Haines.xus				
Project Description					

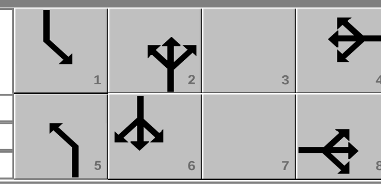


Demand Information	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Demand (*v*), veh/h	10	10	70	50	10	50	100	580	120	90	950	10

Signal Information				
Cycle, s	90.0	Reference Phase	6
Offset, s	48	Reference Point	End
Uncoordinated	No	Simult. Gap E/W	Off
Force Mode	Float	Simult. Gap N/S	Off



Green	4.7	56.4	4.3	2.6	0.0	0.0
Yellow	4.0	4.0	4.0	4.0	0.0	0.0
Red	0.0	2.0	2.0	2.0	0.0	0.0



Timer Results	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Assigned Phase		8		4	5	2	1	6
Case Number		9.0		10.0	1.1	3.0	1.1	4.0
Phase Duration, s		8.6		10.3	8.8	62.4	8.7	62.3
Change Period, *(Y+R$_c$)*, s		6.0		6.0	4.0	6.0	4.0	6.0
Max Allow Headway *(MAH)*, s		5.1		5.1	5.1	0.0	5.1	0.0
Queue Clearance Time (g_s), s		2.6		4.9	4.4		4.1	
Green Extension Time (g_e), s		0.0		0.0	0.2	0.0	0.0	0.0
Phase Call Probability		0.53		0.86	0.96		0.94	
Max Out Probability		1.00		1.00	1.00		1.00	

Movement Group Results	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Assigned Movement	3	8	18	7	4	14	5	2	12	1	6	16
Adjusted Flow Rate (*v*), veh/h	13	13	5	56	56		125	725	89	113	549	651
Adjusted Saturation Flow Rate (*s*), veh/h/ln	1697	1782	1510	1697	1697		1697	1697	1510	1697	1498	1776
Queue Service Time (g_s), s	0.6	0.6	0.3	2.9	2.9		2.4	12.7	3.6	2.1	10.7	10.7
Cycle Queue Clearance Time (g_c), s	0.6	0.6	0.3	2.9	2.9		2.4	12.7	3.6	2.1	10.7	10.7
Green Ratio (*g/C*)	0.03	0.03	0.03	0.05	0.05		0.68	0.63	0.63	0.68	0.63	0.63
Capacity (*c*), veh/h	50	52	44	81	81		408	2125	946	496	937	1111
Volume-to-Capacity Ratio *(X)*	0.251	0.239	0.113	0.696	0.696		0.307	0.341	0.094	0.227	0.586	0.586
Available Capacity (c_a), veh/h	132	139	117	132	132		487	2125	946	502	937	1111
Back of Queue (*Q*), veh/ln (95th percentile)	0.6	0.6	0.2	2.7	2.7		1.1	8.5	2.0	1.1	4.4	5.0
Queue Storage Ratio (*RQ*) (95th percentile)	0.14	0.03	0.03	0.35	0.35		0.14	0.18	0.04	0.14	0.11	0.13
Uniform Delay (d_1), s/veh	42.7	42.7	42.5	42.2	42.2		5.1	13.0	12.1	6.0	3.7	3.7
Incremental Delay (d_2), s/veh	3.7	3.3	1.6	14.2	14.2		0.5	0.4	0.2	0.3	2.7	2.3
Initial Queue Delay (d_3), s/veh	0.0	0.0	0.0	0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0
Control Delay (*d*), s/veh	46.4	46.0	44.1	56.4	56.4		5.7	13.4	12.3	6.3	6.4	6.0
Level of Service (LOS)	D	D	D	E	E		A	B	B	A	A	A
Approach Delay, s/veh / LOS	45.9	D		52.8	D		12.3	B		6.2	A	
Intersection Delay, s/veh / LOS	10.7						B					

Multimodal Results	EB		WB		NB		SB	
Pedestrian LOS Score / LOS	3.1	C	2.9	C	2.3	B	2.5	B
Bicycle LOS Score / LOS	0.5	A	0.6	A	1.3	A	1.6	A

This Signals text report was created on April 11, 2013 at 02:03:00

Intersection number = 3, Segment number = 2, Period number = 1

Chapter 18 Summary Input

	EB LT	EB TH	EB RT	WB LT	WB TH	WB RT	NB LT	NB TH	NB RT	SB LT	SB TH	SB RT
Cycle Length, s	90											
Movement	3	8	18	7	4	14	5	2	12	1	6	16
Volume, veh/h	10	10	70	50	10	50	100	580	120	90	950	10
Lanes	1	1	1	1	1	0	1	2	1	1	2	0
Bay Length, ft	100	500	200	200	500	200	200	1213	1213	200	1000	0
Receiving Lanes	1	1	1	1	1	1	2	2	2	2	2	2
SatFlow, vplphg	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800
Lane Width, ft	12	12	12	12	12	12	12	12	12	12	12	12
Heavy Vehicles, %	1	1	1	1	1	2	1	1	1	1	1	0
Grade, %	0	0	0	0	0	0	0	0	0	0	0	0
Buses, per h	0	0	0	0	0	0	0	0	0	0	0	0
Parking, per h	0	0	0	0	0	0	0	0	0	0	0	0
Bicycles, per h	0	0	0	0	0	0	0	0	0	0	0	0
Pedestrians, per h	0	0	0	0	0	0	0	0	0	0	0	0
Heavy Veh Equivalent	2	2	2	2	2	2	2	2	2	2	2	2
Bus Blockage Time	14.4	14.4	14.4	14.4	14.4	14.4	14.4	14.4	14.4	14.4	14.4	14.4
Turns in Shrd Ln, %	0	0	0	10	0	0	0	0	0	0	0	0
Unopposed Lefts, %	0	0	0	0	0	0	0	0	0	0	0	0
Parking Time, sec	18	18	18	18	18	18	18	18	18	18	18	18
Arrival Type	3	3	3	3	3	3	4	4	4	4	4	4
Initial Queue, veh	0	0	0	0	0	0	0	0	0	0	0	0
Speed Limit, mph	30	30	30	30	30	30	35	35	35	35	35	35
Detector Length, ft	40	40	40	40	40	40	40	40	40	40	40	40
StartLostTime, sec	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0
EndUseTime, sec	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0
RTOR, veh/h		66			47			49			0	
I-Factor		1.00			1.00			0.91			1.00	
Walk + PC, sec		0.0			0.0			0.0			0.0	

	EB	EB	WB	WB	NB	NB	SB	SB
Phase	3	8	7	4	5	2	1	6
Movement		LT+TH+RT		LT+TH+RT	LT	LT+TH+RT	LT	LT+TH+RT
Left-Turn Mode	--	Split	--	Split	Pr/Pm	--	Pr/Pm	--
Phase Splits, s	0.0	13.0	0.0	13.0	13.0	55.0	9.0	51.0
Yellow Change, s	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Red Clearance, s	1.0	2.0	1.0	2.0	0.0	2.0	0.0	2.0
Minimum Green, s	5	5	5	4	5	5	5	5
Lead/Lag					Lead		Lead	
Passage Time, s	2.0	4.0	2.0	4.0	4.0	2.0	4.0	2.0
Recall	Off	Off	Off	Off	Off	Min	Off	Min
Dual Entry	No	No	No	No	No	Yes	No	Yes
Prot. Right-Turn	False	False	False	False	False	False	False	False

	E/W	N/S
Simultaneous Gap out	Off	Off
Dallas Phasing	Off	Off

Cycle Length, s	90
Offset, s	48
Reference Phase	6
Reference Point	End
Force Mode	Float
Uncoordinated	No
Field Measured Phase Times	No
Exclusive Ped Phase Time, s	0.0

Timer:	1	2	3	4	5	6	7	8
Assigned Phase	1	2	4	8	5	6	0	0
Assigned Left-Turn Mvmt.	1	0	7	3	5	0	0	0
Assigned Through Mvmt.	0	2	4	8	0	6	0	0
Assigned Right-Turn Mvmt.	0	12	14	18	0	16	0	0
Timer w/Pr-Pm From Shared	0	0	0	0	0	0	0	0

Chapter 18 Summary Output

	EB LT	EB TH	EB RT	WB LT	WB TH	WB RT	NB LT	NB TH	NB RT	SB LT	SB TH	SB RT
Cycle Length, s	90											
Movement	3	8	18	7	4	14	5	2	12	1	6	16
Volume, veh/h	12.5	12.5	5	62.5	12.5	3.75	125	725	88.75	112.5	1187.5	12.5
SatFlow, veh/h/ln	1782.2	1782.2	1782.2	1782.2	1782.2	0	1782.2	1782.2	1782.2	1782.2	1782.2	0
Lane Util Factor	1	1	1	1	1	1	1	0.95	1	1	0.84	1
Capacity, veh/h	49.76	52.25	44.28	80.87	45.29	36.05	407.55	2125.5	946.03	496	2026.7	21.33
Discharge Vol, veh/h	0	0	5	62.5	0	0	0	0	0	0	1187.5	0
Prop Arriv On Green	0.03	0.03	0.03	0.05	0.05	0.05	0.17	0.44	0.35	0.07	0.83	0.83
Apprch Vol, veh/h	0	30	0	0	78.75	0	0	938.75	0	0	1312.5	0
Apprch Stops, #/veh	0	1.01	0	0	NaN	0	0	0.5	0	0	0.18	0
Apprch Delay, s/veh	0	45.86	0	0	52.84	0	0	12.29	0	0	6.15	0

Apprch LOS	D	D	B	A
Int Delay, s/veh	10.66			
Int LOS	B			

Timer Data

Timer:	1	2	3	4	5	6	7	8
Assigned Phase	1	2	4	8	5	6	0	0
Case No	1.1	3	10	9	1.1	4	0	0
Phase Duration, s	8.7	62.37	10.29	8.64	8.78	62.29	0	0
Change Period, s	4	6	6	6	4	6	0	6
Phase Start Time, s	54	81.63	54	45.36	54	81.71	54	54
Phase End Time, s	62.7	54	64.29	54	62.78	54	54	54
Max Allow Headway, s	5.08	0	5.14	5.14	5.08	0	0	0
Equiv Max Green, s	5	5	7	7	9	5		
Queue Clear Time, s	4.07		4.94	2.65	4.44			
Green Exten Time, s	0.04	0	0.05	0.02	0.19	0	0	0
Prob of Phase Call	0.94		0.86	0.53	0.96			
Prob of Max Out	1		1	1	1			
Left-Turn Movement Data								
Assigned Movement	1	0	7	3	5	0	0	0
Mvmt. Sat Flow, veh/h	1697.31	0	1697.31	1697.31	1697.31	0	0	0
Through Movement Data								
Assigned Movement	0	2	4	8	0	6	0	0
Mvmt. Sat Flow, veh/h	0	3393.27	1316.23	1782.18	0	3240.23	0	0
Right-Turn Movement Data								
Assigned Movement	0	12	14	18	0	16	0	0
Mvmt. Sat Flow, veh/h	0	1510.32	756.66	1510.32	0	34.1	0	0

Left Lane Group Output

Timer:	1	2	3	4	5	6	7	8
Assigned Phase	1	2	4	8	5	6	0	0
Left Lane Group Data								
Assigned Movement	1	0	7	3	5	0	0	0
Lane Assignment	L Pr/Pm		L	L	L Pr/Pm			
Lanes in Group	1	0	1	1	1	0	0	0
Group Volume, veh/h	112.5	0	56.25	12.5	125	0	0	0
Group SatFlow, vphpl	1697.31	0	1697.31	1697.31	1697.31	0	0	0
Queue Serve Time, s	2.07	0	2.94	0.65	2.44	0	0	0
Cycle Clear Time, s	2.07	0	2.94	0.65	2.44	0	0	0
Perm SatFlow, vphpl	674.88	0	1697.31	1697.31	468.88	0	0	0
Shared SatFlow, vphpl								
Perm Eff Green, s	56.29	0	0	0	56.37	0	0	0
Perm Serve Time, s	43.66	0	0	0	45.57	0	0	0
Perm Que Serve Time, s	2.47				3.3			
Time to first Blk, s	0	0	0	0	0	0	0	0
Serve Time pre Blk, s								
Prop Inside Lane	1	0	1	1	1	0	0	0
Lane Grp Capacity, vph	496		80.87	49.76	407.55			
v/c Ratio	0.23	0	0.7	0.25	0.31	0	0	0
Avail Capacity, veh/h	501.67		132.01	132.01	487.13			
I-Factor	1	0	1	1	0.91	0	0	0
Uniform Delay, s/veh	5.96		42.21	42.71	5.14			
Increm Delay, s/veh	0.33	0	14.19	3.7	0.55	0	0	0
Overflow Delay, s/veh	0	0	0	0	0	0	0	0
Control Delay, s/veh	6.28		56.4	46.41	5.69			
Group LOS	A		E	D	A			
Uniform Stops, #/veh	0.21		0.86	0.85	0.18			
Increm Stops, #/veh	0.02	0	0.23	0.16	0.02	0	0	0
Overflow Stops, #/veh	0	0	0	0	0	0	0	0
Stop Rate, #/veh	0.23		1.09	1.02	0.2			
Uniform Queue, veh/ln	0.56		1.21	0.27	0.55			
Increm Queue, veh/ln	0.05	0	0.32	0.05	0.06	0	0	0
Overflow Queue, veh/ln	0	0	0	0	0	0	0	0
Back of Queue Factor	1.8	0	1.8	1.8	1.8	0	0	0
Back of Queue, veh/ln	1.09		2.75	0.57	1.1			
Storage Ratio	0.14	0	0.35	0.14	0.14	0	0	0
Initial Queue, veh	0	0	0	0	0	0	0	0
Final Queue, veh	0	0	0	0	0	0	0	0
Saturated Delay, s/veh	0	0	0	0	0	0	0	0
Saturated Stops, #/veh	0	0	0	0	0	0	0	0
Saturated Queue, veh/ln	0	0	0	0	0	0	0	0
Saturated Capacity, vph	0	0	0	0	0	0	0	0
Init Que Clear Time, s	0	0	0	0	0	0	0	0

Thru Lane Group Output

Timer:	1	2	3	4	5	6	7	8
Assigned Phase	1	2	4	8	5	6	0	0
Thru Lane Group Data								
Assigned Movement	0	2	4	8	0	6	0	0
Lane Assignment		T		T		T		
Lanes in Group	0	2	0	1	0	1	0	0
Group Volume, veh/h	0	725	0	12.5	0	549.05	0	0
Group SatFlow, vphpl	0	1696.63	0	1782.18	0	1498.29	0	0
Queue Serve Time, s	0	12.71	0	0.62	0	10.71	0	0
Cycle Clear Time, s	0	12.71	0	0.62	0	10.71	0	0
Lane Grp Capacity, vph		2125.46	0	52.25		937.15		
v/c Ratio	0	0.34	0	0.24	0	0.59	0	0

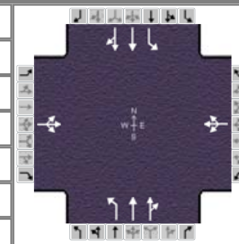
Avail Capacity, veh/h		2125.46	0	138.61		937.15		
I-Factor	0	0.91	0	1	0	1	0	0
Uniform Delay, s/veh		13.03		42.7		3.69		
Increm Delay, s/veh	0	0.4	0	3.3	0	2.68	0	0
Overflow Delay, s/veh	0	0	0	0	0	0	0	0
Control Delay, s/veh		13.43		46		6.37		
Group LOS		B		D		A		
Uniform Stops, #/veh		0.54	NaN	0.85		0.13		
Increm Stops, #/veh	0	0.01	0	0.15	0	0.05	0	0
Overflow Stops, #/veh	0	0	0	0	0	0	0	0
Stop Rate, #/veh		0.55	NaN	1.01		0.18		
Uniform Queue, veh/ln		4.88	0	0.27		1.76		
Increm Queue, veh/ln	0	0.12	0	0.05	0	0.7	0	0
Overflow Queue, veh/ln	0	0	0	0	0	0	0	0
Back of Queue Factor	0	1.7	1	1.8	0	1.8	0	0
Back of Queue, veh/ln		8.5	0	0.57		4.43		
Storage Ratio	0	0.18	0	0.03	0	0.11	0	0
Initial Queue, veh	0	0	0	0	0	0	0	0
Final Queue, veh	0	0	0	0	0	0	0	0
Saturated Delay, s/veh	0	0	0	0	0	0	0	0
Saturated Stops, #/veh	0	0	0	0	0	0	0	0
Saturated Queue, veh/ln	0	0	0	0	0	0	0	0
Saturated Capacity, vph	0	0	0	0	0	0	0	0
Init Que Clear Time, s	0	0	0	0	0	0	0	0

Right Lane Group Output

Timer:	1	2	3	4	5	6	7	8
Assigned Phase	1	2	4	8	5	6	0	0
Right Lane Group Data								
Assigned Movement	0	12	14	18	0	16	0	0
Lane Assignment		R	T+R	R		T+R		
Lanes in Group	0	1	1	1	0	1	0	0
Group Volume, veh/h	0	88.75	22.5	5	0	650.95	0	0
Group SatFlow, vphpl	0	1510.32	1707.27	1510.32	0	1776.04	0	0
Queue Serve Time, s	0	3.56	1.14	0.29	0	10.71	0	0
Cycle Clear Time, s	0	3.56	1.14	0.29	0	10.71	0	0
Prot RT SatFlow, vphpl		0		0				
Prot RT Eff Green, s		0		0				
Prop Outside Lane	0	1	0.23	1	0	0.02	0	0
Lane Grp Capacity, vph		946.03	81.35	44.28		1110.88		
v/c Ratio	0	0.09	0.28	0.11	0	0.59	0	0
Avail Capacity, veh/h		946.03	132.8	117.47		1110.88		
I-Factor	0	0.91	1	1	0	1	0	0
Uniform Delay, s/veh		12.11	41.36	42.54		3.69		
Increm Delay, s/veh	0	0.18	2.58	1.59	0	2.27	0	0
Overflow Delay, s/veh	0	0	0	0	0	0	0	0
Control Delay, s/veh		12.29	43.94	44.13		5.95		
Group LOS		B	D	D		A		
Uniform Stops, #/veh		0.47	0.84	0.85		0.13		
Increm Stops, #/veh	0	0.02	0.1	0.16	0	0.04	0	0
Overflow Stops, #/veh	0	0	0	0	0	0	0	0
Stop Rate, #/veh		0.49	0.94	1.01		0.17		
Uniform Queue, veh/ln		1.04	0.47	0.11		2.09		
Increm Queue, veh/ln	0	0.05	0.06	0.02	0	0.7	0	0
Overflow Queue, veh/ln	0	0	0	0	0	0	0	0
Back of Queue Factor	0	1.8	1.8	1.8	0	1.8	0	0
Back of Queue, veh/ln		1.96	0.96	0.23		5.02		
Storage Ratio	0	0.04	0.05	0.03	0	0.13	0	0
Initial Queue, veh	0	0	0	0	0	0	0	0
Final Queue, veh	0	0	0	0	0	0	0	0
Saturated Delay, s/veh	0	0	0	0	0	0	0	0
Saturated Stops, #/veh	0	0	0	0	0	0	0	0
Saturated Queue, veh/ln	0	0	0	0	0	0	0	0
Saturated Capacity, vph	0	0	0	0	0	0	0	0
Init Que Clear Time, s	0	0	0	0	0	0	0	0

HCS 2010 Signalized Intersection Results Summary

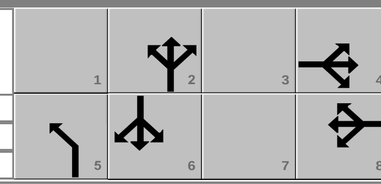
General Information				Intersection Information	
Agency	HDR			Duration, h	0.25
Analyst	MDF	Analysis Date	Jan 30, 2013	Area Type	Other
Jurisdiction		Time Period	PM Peak	PHF	0.90
Intersection	Lindbergh Street	Analysis Year	2035 No-Build	Analysis Period	1> 16:45
File Name	2035_No-Build_PM_Haines.xus				
Project Description					



Demand Information	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Demand (*v*), veh/h	130	10	100	20	10	40	110	1340	10	40	1150	140

Signal Information			
Cycle, s	90.0	Reference Phase	2
Offset, s	59	Reference Point	End
Uncoordinated	No	Simult. Gap E/W	Off
Force Mode	Float	Simult. Gap N/S	Off

Green	4.8	52.8	16.5	0.0	0.0	0.0
Yellow	4.0	4.0	4.0	0.0	0.0	0.0
Red	0.0	2.0	2.0	0.0	0.0	0.0



Timer Results	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Assigned Phase		4		8	5	2		6
Case Number		8.0		8.0	1.0	4.0		6.3
Phase Duration, s		22.5		22.5	8.8	67.5		58.8
Change Period, *($Y+R_c$)*, s		6.0		6.0	4.0	6.0		6.0
Max Allow Headway *(MAH)*, s		5.2		5.2	5.1	0.0		0.0
Queue Clearance Time (g_s), s		15.9		3.9	4.4			
Green Extension Time (g_e), s		0.6		0.1	0.1	0.0		0.0
Phase Call Probability		1.00		1.00	0.95			
Max Out Probability		0.65		0.00	1.00			

Movement Group Results	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Assigned Movement	7	4	14	3	8	18	5	2	12	1	6	16
Adjusted Flow Rate (*v*), veh/h		237			43		122	751	749	42	685	664
Adjusted Saturation Flow Rate (*s*), veh/h/ln		1486			1405		1697	1782	1777	352	1782	1718
Queue Service Time (g_s), s		11.9			0.0		2.4	7.6	7.7	6.5	25.0	25.5
Cycle Queue Clearance Time (g_c), s		13.9			1.9		2.4	7.6	7.7	6.5	25.0	25.5
Green Ratio (*g/C*)		0.18			0.18		0.66	0.68	0.68	0.59	0.59	0.59
Capacity (*c*), veh/h		336			317		293	1219	1215	286	1045	1007
Volume-to-Capacity Ratio *(X)*		0.704			0.137		0.417	0.616	0.617	0.147	0.655	0.659
Available Capacity (c_a), veh/h		425			407		317	1219	1215	286	1045	1007
Back of Queue (*Q*), veh/ln (95th percentile)		9.1			1.4		1.5	3.4	3.4	1.0	14.6	14.6
Queue Storage Ratio (*RQ*) (95th percentile)		0.46			0.07		0.19	0.09	0.09	0.12	0.25	0.25
Uniform Delay (d_1), s/veh		35.5			30.8		11.3	1.6	1.6	12.0	14.7	15.1
Incremental Delay (d_2), s/veh		4.7			0.3		1.3	2.3	2.3	0.9	2.5	2.7
Initial Queue Delay (d_3), s/veh		0.0			0.0		0.0	0.0	0.0	0.0	0.0	0.0
Control Delay (*d*), s/veh		40.3			31.1		12.6	3.9	3.9	12.8	17.2	17.8
Level of Service (LOS)		D			C		B	A	A	B	B	B
Approach Delay, s/veh / LOS	40.3	D		31.1	C		4.6	A		17.4	B	
Intersection Delay, s/veh / LOS	12.9						B					

Multimodal Results	EB		WB		NB		SB	
Pedestrian LOS Score / LOS	2.8	C	2.9	C	2.1	B	2.1	B
Bicycle LOS Score / LOS	0.9	A	0.6	A	1.8	A	1.7	A

This Signals text report was created on April 11, 2013 at 02:05:21

Intersection number = 1, Segment number = 1, Period number = 1

Chapter 18 Summary Input

Cycle Length, s 90

	EB LT	EB TH	EB RT	WB LT	WB TH	WB RT	NB LT	NB TH	NB RT	SB LT	SB TH	SB RT
Movement	7	4	14	3	8	18	5	2	12	1	6	16
Volume, veh/h	130	10	100	20	10	40	110	1340	10	40	1150	140
Lanes	0	1	0	0	1	0	1	2	0	1	2	0
Bay Length, ft	0	500	0	200	500	500	200	1000	150	200	1499	0
Receiving Lanes	1	1	1	1	1	1	2	2	2	2	2	2
SatFlow, vplphg	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800
Lane Width, ft	12	12	12	12	12	12	12	12	12	12	12	12
Heavy Vehicles, %	0	1	0	2	1	2	1	1	2	1	1	0
Grade, %	0	0	0	0	0	0	0	0	0	0	0	0
Buses, per h	0	0	0	0	0	0	0	0	0	0	0	0
Parking, per h	0	0	0	0	0	0	0	0	0	0	0	0
Bicycles, per h	0	0	0	0	0	0	0	0	0	0	0	0
Pedestrians, per h	0	0	0	0	0	0	0	0	0	0	0	0
Heavy Veh Equivalent	2	2	2	2	2	2	2	2	2	2	2	2
Bus Blockage Time	14.4	14.4	14.4	14.4	14.4	14.4	14.4	14.4	14.4	14.4	14.4	14.4
Turns in Shrd Ln, %	0	0	0	40	0	0	0	0	0	0	0	0
Unopposed Lefts, %	0	0	0	0	0	0	0	0	0	0	0	0
Parking Time, sec	18	18	18	18	18	18	18	18	18	18	18	18
Arrival Type	3	3	3	3	3	3	4	4	4	4	4	4
Initial Queue, veh	0	0	0	0	0	0	0	0	0	0	0	0
Speed Limit, mph	30	30	30	30	30	30	35	35	35	35	35	35
Detector Length, ft	40	40	40	40	40	40	40	40	40	40	40	40
StartLostTime, sec	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0
EndUseTime, sec	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0
RTOR, veh/h		27			31			0			9	
I-Factor		1.00			1.00			1.00			0.79	
Walk + PC, sec		0.0			0.0			0.0			0.0	

	EB	EB	WB	WB	NB	NB	SB	SB
Phase	7	4	3	8	5	2	1	6
Movement		LT+TH+RT		LT+TH+RT	LT	LT+TH+RT		LT+TH+RT
Left-Turn Mode	--	Perm.	--	Perm.	Pr/Pm	--	--	Perm.
Phase Splits, s	0.0	28.0	0.0	28.0	10.0	62.0	0.0	52.0
Yellow Change, s	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Red Clearance, s	2.0	2.0	2.0	2.0	0.0	2.0	2.0	2.0
Minimum Green, s	5	5	5	5	5	5	5	5
Lead/Lag					Lead			
Passage Time, s	2.0	4.0	2.0	4.0	4.0	2.0	3.0	2.0
Recall	Min	Off	Min	Off	Off	Min	Off	Min
Dual Entry	No	Yes	No	Yes	No	Yes	No	Yes
Prot. Right-Turn	False	False	False	False	False	False	False	False

	E/W	N/S
Simultaneous Gap out	Off	Off
Dallas Phasing	Off	Off

Cycle Length, s	90
Offset, s	59
Reference Phase	2
Reference Point	End
Force Mode	Float
Uncoordinated	No
Field Measured Phase Times	No
Exclusive Ped Phase Time, s	0.0

Timer:	1	2	3	4	5	6	7	8
Assigned Phase	0	2	0	4	5	6	0	8
Assigned Left-Turn Mvmt.	0	0	0	7	5	1	0	3
Assigned Through Mvmt.	0	2	0	4	0	6	0	8
Assigned Right-Turn Mvmt.	0	12	0	14	0	16	0	18
Timer w/Pr-Pm From Shared	0	0	0	0	0	0	0	0

Chapter 18 Summary Output

Cycle Length, s 90

	EB LT	EB TH	EB RT	WB LT	WB TH	WB RT	NB LT	NB TH	NB RT	SB LT	SB TH	SB RT
Movement	7	4	14	3	8	18	5	2	12	1	6	16
Volume, veh/h	144.44	11.11	81.11	22.22	11.11	10	122.22	1488.9	11.11	42.11	1210.8	137.92
SatFlow, veh/h/ln	0	1782.2	0	0	1782.2	0	1782.2	1782.2	0	1782.2	1782.2	0
Lane Util Factor	1	1	1	1	1	1	1	1	1	1	1	1
Capacity, veh/h	233.4	17.23	93.16	174.56	84.36	59.3	293.34	2416	18.02	286.35	1843.1	209.32
Discharge Vol, veh/h	144.44	0	0	0	0	10	0	1488.9	0	0	0	0
Prop Arriv On Green	0.18	0.18	0.18	0.18	0.18	0.18	0.07	0.91	0.91	0.45	0.53	0.48
Apprch Vol, veh/h	0	236.67	0	0	43.33	0	0	1622.2	0	0	1390.8	0
Apprch Stops, #/veh	0	0.9	0	0	0.74	0	0	0.13	0	0	0.59	0
Apprch Delay, s/veh	0	40.28	0	0	31.1	0	0	4.59	0	0	17.36	0

Apprch LOS	D	C	A	B
Int Delay, s/veh	12.9			
Int LOS	B			

Timer Data

Timer:	1	2	3	4	5	6	7	8
Assigned Phase	0	2	0	4	5	6	0	8
Case No	0	4	0	8	1	6.3	0	8
Phase Duration, s	0	67.54	0	22.46	8.76	58.78	0	22.46
Change Period, s	0	6	0	6	4	6	0	6
Phase Start Time, s	87.46	87.46	65	65	87.46	6.22	65	65
Phase End Time, s	87.46	65	65	87.46	6.22	65	65	87.46
Max Allow Headway, s	0	0	0	5.19	5.08	0	0	5.24
Equiv Max Green, s		5		22	6	5		22
Queue Clear Time, s				15.85	4.38			3.92
Green Exten Time, s	0	0	0	0.62	0.07	0	0	0.12
Prob of Phase Call				1	0.95			1
Prob of Max Out				0.65	1			0
Left-Turn Movement Data								
Assigned Movement	0	0	0	7	5	1	0	3
Mvmt. Sat Flow, veh/h	0	0	0	907.08	1697.31	351.94	0	720.47
Through Movement Data								
Assigned Movement	0	2	0	4	0	6	0	8
Mvmt. Sat Flow, veh/h	0	3533.25	0	69.78	0	3143.15	0	360.24
Right-Turn Movement Data								
Assigned Movement	0	12	0	14	0	16	0	18
Mvmt. Sat Flow, veh/h	0	26.36	0	509.36	0	356.95	0	324.21

Left Lane Group Output

Timer:	1	2	3	4	5	6	7	8
Assigned Phase	0	2	0	4	5	6	0	8
Left Lane Group Data								
Assigned Movement	0	0	0	7	5	1	0	3
Lane Assignment				L+T+R	L Pr/Pm	L		L+T+R
Lanes in Group	0	0	0	1	1	1	0	1
Group Volume, veh/h	0	0	0	236.67	122.22	42.11	0	43.33
Group SatFlow, vphpl	0	0	0	1486.21	1697.31	351.94	0	1404.93
Queue Serve Time, s	0	0	0	11.94	2.38	6.49	0	0
Cycle Clear Time, s	0	0	0	13.85	2.38	6.5	0	1.92
Perm SatFlow, vphpl	0	0	0	1412.8	406.9	351.94	0	1324.74
Shared SatFlow, vphpl				1782.18				1345.64
Perm Eff Green, s	0	0	0	16.46	54.78	52.78	0	16.46
Perm Serve Time, s	0	0	0	14.55	27.31	52.77	0	2.61
Perm Que Serve Time, s				11.94	11.48	7		0
Time to first Blk, s	0	0	0	0.39	0	0	0	1.89
Serve Time pre Blk, s				0.39				1.32
Prop Inside Lane	0	0	0	0.61	1	1	0	0.51
Lane Grp Capacity, vph				336.23	293.34	286.35		317.46
v/c Ratio	0	0	0	0.7	0.42	0.15	0	0.14
Avail Capacity, veh/h				425.49	316.64	286.35		406.97
I-Factor	0	0	0	1	1	0.79	0	1
Uniform Delay, s/veh				35.54	11.28	11.96		30.83
Increm Delay, s/veh	0	0	0	4.74	1.34	0.85	0	0.28
Overflow Delay, s/veh	0	0	0	0	0	0	0	0
Control Delay, s/veh				40.28	12.63	12.82		31.1
Group LOS				D	B	B		C
Uniform Stops, #/veh				0.82	0.46	0.44		0.71
Increm Stops, #/veh	0	0	0	0.07	0.04	0.06	0	0.02
Overflow Stops, #/veh	0	0	0	0	0	0	0	0
Stop Rate, #/veh				0.9	0.49	0.51		0.74
Uniform Queue, veh/ln				4.88	0.74	0.47		0.77
Increm Queue, veh/ln	0	0	0	0.44	0.11	0.07	0	0.02
Overflow Queue, veh/ln	0	0	0	0	0	0	0	0
Back of Queue Factor	0	0	0	1.71	1.8	1.8	0	1.8
Back of Queue, veh/ln				9.1	1.52	0.96		1.43
Storage Ratio	0	0	0	0.46	0.19	0.12	0	0.07
Initial Queue, veh	0	0	0	0	0	0	0	0
Final Queue, veh	0	0	0	0	0	0	0	0
Saturated Delay, s/veh	0	0	0	0	0	0	0	0
Saturated Stops, #/veh	0	0	0	0	0	0	0	0
Saturated Queue, veh/ln	0	0	0	0	0	0	0	0
Saturated Capacity, vph	0	0	0	0	0	0	0	0
Init Que Clear Time, s	0	0	0	0	0	0	0	0

Thru Lane Group Output

Timer:	1	2	3	4	5	6	7	8
Assigned Phase	0	2	0	4	5	6	0	8
Thru Lane Group Data								
Assigned Movement	0	2	0	4	0	6	0	8
Lane Assignment		T				T		
Lanes in Group	0	1	0	0	0	1	0	0
Group Volume, veh/h	0	750.71	0	0	0	684.92	0	0
Group SatFlow, vphpl	0	1782.18	0	0	0	1782.18	0	0
Queue Serve Time, s	0	7.64	0	0	0	24.96	0	0
Cycle Clear Time, s	0	7.64	0	0	0	24.96	0	0
Lane Grp Capacity, vph		1218.61				1045.06		
v/c Ratio	0	0.62	0	0	0	0.66	0	0

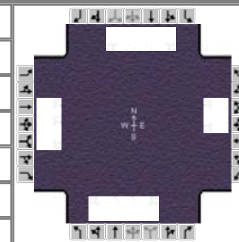
Avail Capacity, veh/h		1218.61				1045.06		
I-Factor	0	1	0	0	0	0.79	0	0
Uniform Delay, s/veh		1.59				14.67		
Increm Delay, s/veh	0	2.34	0	0	0	2.54	0	0
Overflow Delay, s/veh	0	0	0	0	0	0	0	0
Control Delay, s/veh		3.93				17.22		
Group LOS		A				B		
Uniform Stops, #/veh		0.06				0.54		
Increm Stops, #/veh	0	0.04	0	0	0	0.04	0	0
Overflow Stops, #/veh	0	0	0	0	0	0	0	0
Stop Rate, #/veh		0.1				0.58		
Uniform Queue, veh/ln		1.09				9.28		
Increm Queue, veh/ln	0	0.79	0	0	0	0.74	0	0
Overflow Queue, veh/ln	0	0	0	0	0	0	0	0
Back of Queue Factor	0	1.8	0	1	0	1.46	0	1
Back of Queue, veh/ln		3.4				14.62		
Storage Ratio	0	0.09	0	0	0	0.25	0	0
Initial Queue, veh	0	0	0	0	0	0	0	0
Final Queue, veh	0	0	0	0	0	0	0	0
Saturated Delay, s/veh	0	0	0	0	0	0	0	0
Saturated Stops, #/veh	0	0	0	0	0	0	0	0
Saturated Queue, veh/ln	0	0	0	0	0	0	0	0
Saturated Capacity, vph	0	0	0	0	0	0	0	0
Init Que Clear Time, s	0	0	0	0	0	0	0	0

Right Lane Group Output

Timer:	1	2	3	4	5	6	7	8
Assigned Phase	0	2	0	4	5	6	0	8
Right Lane Group Data								
Assigned Movement	0	12	0	14	0	16	0	18
Lane Assignment		T+R				T+R		
Lanes in Group	0	1	0	0	0	1	0	0
Group Volume, veh/h	0	749.29	0	0	0	663.79	0	0
Group SatFlow, vphpl	0	1777.43	0	0	0	1717.93	0	0
Queue Serve Time, s	0	7.65	0	0	0	25.45	0	0
Cycle Clear Time, s	0	7.65	0	0	0	25.45	0	0
Prot RT SatFlow, vphpl								
Prot RT Eff Green, s								
Prop Outside Lane	0	0.01	0	0.34	0	0.21	0	0.23
Lane Grp Capacity, vph		1215.38				1007.39		
v/c Ratio	0	0.62	0	0	0	0.66	0	0
Avail Capacity, veh/h		1215.38				1007.39		
I-Factor	0	1	0	0	0	0.79	0	0
Uniform Delay, s/veh		1.59				15.11		
Increm Delay, s/veh	0	2.35	0	0	0	2.68	0	0
Overflow Delay, s/veh	0	0	0	0	0	0	0	0
Control Delay, s/veh		3.94				17.79		
Group LOS		A				B		
Uniform Stops, #/veh		0.06				0.56		
Increm Stops, #/veh	0	0.04	0	0	0	0.05	0	0
Overflow Stops, #/veh	0	0	0	0	0	0	0	0
Stop Rate, #/veh		0.1				0.6		
Uniform Queue, veh/ln		1.09				9.24		
Increm Queue, veh/ln	0	0.79	0	0	0	0.75	0	0
Overflow Queue, veh/ln	0	0	0	0	0	0	0	0
Back of Queue Factor	0	1.8	0	1	0	1.46	0	1
Back of Queue, veh/ln		3.39				14.59		
Storage Ratio	0	0.09	0	0	0	0.25	0	0
Initial Queue, veh	0	0	0	0	0	0	0	0
Final Queue, veh	0	0	0	0	0	0	0	0
Saturated Delay, s/veh	0	0	0	0	0	0	0	0
Saturated Stops, #/veh	0	0	0	0	0	0	0	0
Saturated Queue, veh/ln	0	0	0	0	0	0	0	0
Saturated Capacity, vph	0	0	0	0	0	0	0	0
Init Que Clear Time, s	0	0	0	0	0	0	0	0

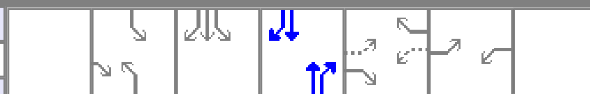
HCS 2010 Signalized Intersection Results Summary

General Information				Intersection Information	
Agency	HDR			Duration, h	0.25
Analyst	MDF	Analysis Date	Jan 30, 2013	Area Type	Other
Jurisdiction		Time Period	PM Peak	PHF	0.90
Intersection	I-90 Ramps (SPUI)	Analysis Year	2035 No-Build	Analysis Period	1> 16:45
File Name	2035_No-Build_PM_Haines.xus				
Project Description					

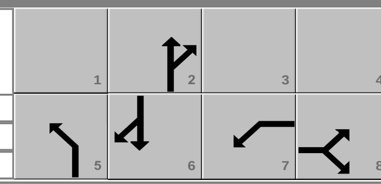


Demand Information	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Demand (*v*), veh/h	440		210	210		220	150	1150	210	200	910	410

Signal Information			
Cycle, s	90.0	Reference Phase	2
Offset, s	4	Reference Point	End
Uncoordinated	No	Simult. Gap E/W	Off
Force Mode	Float	Simult. Gap N/S	Off



Green	10.6	2.2	44.6	0.0	13.2	0.0
Yellow	4.0	0.0	4.0	0.0	4.0	0.0
Red	2.5	0.0	2.5	0.0	2.5	0.0



Timer Results	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Assigned Phase	3	8	7	4	5	2	1	6
Case Number	1.4	3.0	1.4	3.0	2.0	3.0	2.0	3.0
Phase Duration, s	19.7	0.0	19.7	0.0	17.1	51.1	19.2	53.2
Change Period, *(Y+Rc)*, s	6.5	0.0	6.5	0.0	6.5	6.5	6.5	6.5
Max Allow Headway *(MAH)*, s	5.0	0.0	5.0	0.0	5.1	0.0	5.1	0.0
Queue Clearance Time (g_s), s	12.3		11.2		10.5		12.6	
Green Extension Time (g_e), s	0.9	0.0	0.4	0.0	0.2	0.0	0.3	0.0
Phase Call Probability	1.00		1.00		0.98		0.99	
Max Out Probability	1.00		1.00		1.00		1.00	

Movement Group Results	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Assigned Movement	3		18	7		14	5	2	12	1	6	16
Adjusted Flow Rate (*v*), veh/h	489		0	233		0	167	1278	0	205	934	0
Adjusted Saturation Flow Rate (*s*), veh/h/ln	1648		1510	1714		1510	1697	1697	1510	1697	1697	1510
Queue Service Time (g_s), s	10.3		0.0	9.2		0.0	8.5	26.8	0.0	10.6	10.3	0.0
Cycle Queue Clearance Time (g_c), s	10.3		0.0	9.2		0.0	8.5	26.8	0.0	10.6	10.3	0.0
Green Ratio (*g/C*)	0.15		0.12	0.15		0.00	0.12	0.50	0.50	0.14	0.52	0.52
Capacity (*c*), veh/h	580		179	299		2	199	1680	748	240	1763	784
Volume-to-Capacity Ratio *(X)*	0.843		0.000	0.780		0.000	0.837	0.761	0.000	0.854	0.530	0.000
Available Capacity (c_a), veh/h	664		194	343		17	255	1680	748	292	1763	784
Back of Queue (*Q*), veh/ln (95th percentile)	9.3		0.0	9.1		0.0	6.9	13.9	0.0	5.9	3.7	0.0
Queue Storage Ratio *(RQ)* (95th percentile)	1.56		0.00	0.00		0.00	0.58	0.23	0.00	0.74	0.08	0.00
Uniform Delay (d_1), s/veh	37.9		0.0	37.5		0.0	35.9	17.2	0.0	36.1	6.7	0.0
Incremental Delay (d_2), s/veh	9.3		0.0	10.7		0.0	15.1	2.5	0.0	4.9	0.2	0.0
Initial Queue Delay (d_3), s/veh	0.0		0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0	0.0
Control Delay (*d*), s/veh	47.2		0.0	48.2		0.0	51.1	19.7	0.0	41.0	7.0	0.0
Level of Service (LOS)	D			D			D	B		D	A	
Approach Delay, s/veh / LOS	47.2	D		48.2	D		23.3	C		13.1	B	
Intersection Delay, s/veh / LOS	25.1						C					

Multimodal Results	EB		WB		NB		SB	
Pedestrian LOS Score / LOS	3.3	C	3.5	D	2.6	B	2.7	B
Bicycle LOS Score / LOS		F		F	1.7	A	1.5	A

 HCS 2010™ Streets Version 6.50 Generated: 4/11/2013 2:05:29 PM

This Signals text report was created on April 11, 2013 at 02:05:41

Intersection number = 2, Segment number = 1, Period number = 1

Chapter 18 Summary Input

Cycle Length, s	90											
	EB LT	EB TH	EB RT	WB LT	WB TH	WB RT	NB LT	NB TH	NB RT	SB LT	SB TH	SB RT
Movement	3	8	18	7	4	14	5	2	12	1	6	16
Volume, veh/h	440	0	210	210	0	220	150	1150	210	200	910	410
Lanes	2	0	1	1	0	1	1	2	1	1	2	1
Bay Length, ft	150	500	150	0	150	500	300	1499	300	200	1213	300
Receiving Lanes	1	1	1	1	1	1	2	2	2	2	2	2
SatFlow, vplphg	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800
Lane Width, ft	12	12	12	12	12	12	12	12	12	12	12	12
Heavy Vehicles, %	1	1	1	0	1	1	1	1	1	1	1	1
Grade, %	0	0	0	0	0	0	0	0	0	0	0	0
Buses, per h	0	0	0	0	0	0	0	0	0	0	0	0
Parking, per h	0	0	0	0	0	0	0	0	0	0	0	0
Bicycles, per h	0	0	0	0	0	0	0	0	0	0	0	0
Pedestrians, per h	0	0	0	0	0	0	0	0	0	0	0	0
Heavy Veh Equivalent	2	2	2	2	2	2	2	2	2	2	2	2
Bus Blockage Time	14.4	14.4	14.4	14.4	14.4	14.4	14.4	14.4	14.4	14.4	14.4	14.4
Turns in Shrd Ln, %	0	0	0	0	0	0	0	0	0	0	0	0
Unopposed Lefts, %	0	0	0	0	0	0	0	0	0	0	0	0
Parking Time, sec	18	18	18	18	18	18	18	18	18	18	18	18
Arrival Type	3	3	3	3	3	3	4	4	4	4	4	4
Initial Queue, veh	0	0	0	0	0	0	0	0	0	0	0	0
Speed Limit, mph	45	45	45	45	45	45	35	35	35	35	35	35
Detector Length, ft	40	40	40	40	40	40	40	40	40	40	40	40
StartLostTime, sec	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0
EndUseTime, sec	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0
RTOR, veh/h		210			220			210			410	
I-Factor		1.00			1.00			0.75			0.20	
Walk + PC, sec		0.0			0.0			0.0			0.0	

	EB	EB	WB	WB	NB	NB	SB	SB
Phase	3	8	7	4	5	2	1	6
Movement	LT	LT+RT	LT	LT+RT	LT	TH+RT	LT	TH+RT
Left-Turn Mode	Pr/Pm	--	Pr/Pm	--	Prot.	--	Prot.	--
Phase Splits, s	22.0	1.0	22.0	1.0	20.0	45.0	22.0	47.0
Yellow Change, s	4.0	0.0	4.0	0.0	4.0	4.0	4.0	4.0
Red Clearance, s	2.5	0.0	2.5	0.0	2.5	2.5	2.5	2.5
Minimum Green, s	5	1	5	1	5	5	5	5
Lead/Lag	Lag		Lag		Lead		Lead	
Passage Time, s	4.0	0.0	4.0	0.0	4.0	2.0	4.0	2.0
Recall	Off	Off	Off	Off	Off	Min	Off	Min
Dual Entry	No	Yes	No	Yes	No	Yes	No	Yes
Prot. Right-Turn	False	False	False	False	True	False	False	False

	E/W	N/S
Simultaneous Gap out	Off	Off
Dallas Phasing	Off	Off

Cycle Length, s	90
Offset, s	4
Reference Phase	2
Reference Point	End
Force Mode	Float
Uncoordinated	No
Field Measured Phase Times	No
Exclusive Ped Phase Time, s	0.0

Timer:	1	2	3	4	5	6	7	8
Assigned Phase	1	2	4	3	5	6	8	7
Assigned Left-Turn Mvmt.	1	0	0	3	5	0	0	7
Assigned Through Mvmt.	0	2	4	0	0	6	8	0
Assigned Right-Turn Mvmt.	0	12	14	0	0	16	18	0
Timer w/Pr-Pm From Shared	0	0	0	0	0	0	0	0

Chapter 18 Summary Output

Cycle Length, s	90											
	EB LT	EB TH	EB RT	WB LT	WB TH	WB RT	NB LT	NB TH	NB RT	SB LT	SB TH	SB RT
Movement	3	8	18	7	4	14	5	2	12	1	6	16
Volume, veh/h	488.89	0	0	233.33	0	0	166.67	1277.8	0	205.31	934.15	0
SatFlow, veh/h/ln	1782.2	1782.2	1782.2	1800	1782.2	1782.2	1782.2	1782.2	1782.2	1782.2	1782.2	1782.2
Lane Util Factor	0.97	1	1	1	1	1	1	0.95	1	1	0.95	1
Capacity, veh/h	579.84	0	16.78	299.31	0	16.78	199.13	1680.1	747.79	240.38	1762.5	784.49
Discharge Vol, veh/h	488.89	0	0	233.33	0	0	0	1277.8	0	0	934.15	0
Prop Arriv On Green	0.15	0	0	0.15	0	0	0.18	0.52	0	0.18	0.75	0
Apprch Vol, veh/h	0	488.89	0	0	233.33	0	0	1444.4	0	0	1139.5	0
Apprch Stops, #/veh	0	NaN	0	0	NaN	0	0	0.64	0	0	0.33	0
Apprch Delay, s/veh	0	47.22	0	0	48.17	0	0	23.3	0	0	13.11	0

Apprch LOS	D	D	C	B

Int Delay, s/veh	25.08
Int LOS	C

Timer Data

Timer:	1	2	3	4	5	6	7	8
Assigned Phase	1	2	4	3	5	6	8	7
Case No	2	3	3	1.4	2	3	3	1.4
Phase Duration, s	19.25	51.06	0	19.69	17.06	53.25	0	19.69
Change Period, s	6.5	6.5	0	6.5	6.5	6.5	0	6.5
Phase Start Time, s	30.19	49.44	10.5	10.5	30.19	47.25	10.5	10.5
Phase End Time, s	49.44	10.5	10.5	30.19	47.25	10.5	10.5	30.19
Max Allow Headway, s	5.08	0	0	4.98	5.08	0	0	4.98
Equiv Max Green, s	15.5	5	1	15.5	13.5	5	1	15.5
Queue Clear Time, s	12.55			12.28	10.53			11.18
Green Exten Time, s	0.27	0	0	0.92	0.2	0	0	0.43
Prob of Phase Call	0.99			1	0.98			1
Prob of Max Out	1			1	1			1
Left-Turn Movement Data								
Assigned Movement	1	0	0	3	5	0	0	7
Mvmt. Sat Flow, veh/h	1697.31	0	0	3296.18	1697.31	0	0	1714.29
Through Movement Data								
Assigned Movement	0	2	4	0	0	6	8	0
Mvmt. Sat Flow, veh/h	0	3393.27	0	0	0	3393.27	0	0
Right-Turn Movement Data								
Assigned Movement	0	12	14	0	0	16	18	0
Mvmt. Sat Flow, veh/h	0	1510.32	1510.32	0	0	1510.32	1510.32	0

Left Lane Group Output

Timer:	1	2	3	4	5	6	7	8
Assigned Phase	1	2	4	3	5	6	8	7
Left Lane Group Data								
Assigned Movement	1	0	0	3	5	0	0	7
Lane Assignment	L (Prot)			L Pr/Pm	L (Prot)			L Pr/Pm
Lanes in Group	1	0	0	2	1	0	0	1
Group Volume, veh/h	205.31	0	0	488.89	166.67	0	0	233.33
Group SatFlow, vphpl	1697.31	0	0	1648.09	1697.31	0	0	1714.29
Queue Serve Time, s	10.55	0	0	10.28	8.53	0	0	9.18
Cycle Clear Time, s	10.55	0	0	10.28	8.53	0	0	9.18
Perm SatFlow, vphpl	0	0	0	1425.73	0	0	0	1439.99
Shared SatFlow, vphpl								
Perm Eff Green, s	0	0	0	-2	0	0	0	-2
Perm Serve Time, s	0	0	0	-2	0	0	0	-2
Perm Que Serve Time, s				0				0
Time to first Blk, s	0	0	0	0	0	0	0	0
Serve Time pre Blk, s								
Prop Inside Lane	1	0	0	1	1	0	0	1
Lane Grp Capacity, vph	240.38			579.84	199.13			299.31
v/c Ratio	0.85	0	0	0.84	0.84	0	0	0.78
Avail Capacity, veh/h	292.31			664.31	254.6			343.24
I-Factor	0.2	0	0	1	0.75	0	0	1
Uniform Delay, s/veh	36.12			37.87	35.92			37.48
Increm Delay, s/veh	4.87	0	0	9.35	15.14	0	0	10.69
Overflow Delay, s/veh	0	0	0	0	0	0	0	0
Control Delay, s/veh	40.99			47.22	51.06			48.17
Group LOS	D			D	D			D
Uniform Stops, #/veh	0.79			0.77	0.76			0.76
Increm Stops, #/veh	0.06	0	0	0.12	0.2	0	0	0.15
Overflow Stops, #/veh	0	0	0	0	0	0	0	0
Stop Rate, #/veh	0.85			0.89	0.96			0.91
Uniform Queue, veh/ln	4.04			4.69	3.18			4.43
Increm Queue, veh/ln	0.33	0	0	0.75	0.84	0	0	0.89
Overflow Queue, veh/ln	0	0	0	0	0	0	0	0
Back of Queue Factor	1.35	0	0	1.7	1.71	0	0	1.71
Back of Queue, veh/ln	5.91			9.27	6.88			9.11
Storage Ratio	0.74	0	0	1.56	0.58	0	0	0
Initial Queue, veh	0	0	0	0	0	0	0	0
Final Queue, veh	0	0	0	0	0	0	0	0
Saturated Delay, s/veh	0	0	0	0	0	0	0	0
Saturated Stops, #/veh	0	0	0	0	0	0	0	0
Saturated Queue, veh/ln	0	0	0	0	0	0	0	0
Saturated Capacity, vph	0	0	0	0	0	0	0	0
Init Que Clear Time, s	0	0	0	0	0	0	0	0

Thru Lane Group Output

Timer:	1	2	3	4	5	6	7	8
Assigned Phase	1	2	4	3	5	6	8	7
Thru Lane Group Data								
Assigned Movement	0	2	4	0	0	6	8	0
Lane Assignment		T				T		
Lanes in Group	0	2	0	0	0	2	0	0
Group Volume, veh/h	0	1277.78	0	0	0	934.15	0	0
Group SatFlow, vphpl	0	1696.63	0	0	0	1696.63	0	0
Queue Serve Time, s	0	26.81	0	0	0	10.34	0	0
Cycle Clear Time, s	0	26.81	0	0	0	10.34	0	0
Lane Grp Capacity, vph		1680.06	0			1762.53	0	
v/c Ratio	0	0.76	0	0	0	0.53	0	0

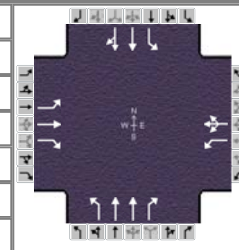
Avail Capacity, veh/h		1680.06	0			1762.53	0	
I-Factor	0	0.75	0	0	0	0.2	0	0
Uniform Delay, s/veh		17.17	0			6.75	0	
Increm Delay, s/veh	0	2.51	0	0	0	0.23	0	0
Overflow Delay, s/veh	0	0	0	0	0	0	0	0
Control Delay, s/veh		19.68	0			6.98	0	
Group LOS		B				A		
Uniform Stops, #/veh		0.56	NaN			0.21	NaN	
Increm Stops, #/veh	0	0.04	0	0	0	0	0	0
Overflow Stops, #/veh	0	0	0	0	0	0	0	0
Stop Rate, #/veh		0.6	NaN			0.22	NaN	
Uniform Queue, veh/ln		8.94	0			2.49	0	
Increm Queue, veh/ln	0	0.59	0	0	0	0.06	0	0
Overflow Queue, veh/ln	0	0	0	0	0	0	0	0
Back of Queue Factor	0	1.46	1	0	0	1.46	1	0
Back of Queue, veh/ln		13.92	0			3.73	0	
Storage Ratio	0	0.23	0	0	0	0.08	0	0
Initial Queue, veh	0	0	0	0	0	0	0	0
Final Queue, veh	0	0	0	0	0	0	0	0
Saturated Delay, s/veh	0	0	0	0	0	0	0	0
Saturated Stops, #/veh	0	0	0	0	0	0	0	0
Saturated Queue, veh/ln	0	0	0	0	0	0	0	0
Saturated Capacity, vph	0	0	0	0	0	0	0	0
Init Que Clear Time, s	0	0	0	0	0	0	0	0

Right Lane Group Output

Timer:	1	2	3	4	5	6	7	8
Assigned Phase	1	2	4	3	5	6	8	7
Right Lane Group Data								
Assigned Movement	0	12	14	0	0	16	18	0
Lane Assignment		R	R			R	R	
Lanes in Group	0	1	1	0	0	1	1	0
Group Volume, veh/h	0	0	0	0	0	0	0	0
Group SatFlow, vphpl	0	1510.32	1510.32	0	0	1510.32	1510.32	0
Queue Serve Time, s	0	0	0	0	0	0	0	0
Cycle Clear Time, s	0	0	0	0	0	0	0	0
Prot RT SatFlow, vphpl		0	0			0	1510.32	
Prot RT Eff Green, s		0	0			0	10.56	
Prop Outside Lane	0	1	1	0	0	1	1	0
Lane Grp Capacity, vph		747.79	1.68			784.49	178.87	
v/c Ratio	0	0	0	0	0	0	0	0
Avail Capacity, veh/h		747.79	16.78			784.49	193.97	
I-Factor	0	0	0	0	0	0	0	0
Uniform Delay, s/veh		0	0			0	0	
Increm Delay, s/veh	0	0	0	0	0	0	0	0
Overflow Delay, s/veh	0	0	0	0	0	0	0	0
Control Delay, s/veh		0	0			0	0	
Group LOS								
Uniform Stops, #/veh		0	0			0	0	
Increm Stops, #/veh	0	0	0	0	0	0	0	0
Overflow Stops, #/veh	0	0	0	0	0	0	0	0
Stop Rate, #/veh		0	0			0	0	
Uniform Queue, veh/ln		0	0			0	0	
Increm Queue, veh/ln	0	0	0	0	0	0	0	0
Overflow Queue, veh/ln	0	0	0	0	0	0	0	0
Back of Queue Factor	0	1	1	0	0	1	1	0
Back of Queue, veh/ln		0	0			0	0	
Storage Ratio	0	0	0	0	0	0	0	0
Initial Queue, veh	0	0	0	0	0	0	0	0
Final Queue, veh	0	0	0	0	0	0	0	0
Saturated Delay, s/veh	0	0	0	0	0	0	0	0
Saturated Stops, #/veh	0	0	0	0	0	0	0	0
Saturated Queue, veh/ln	0	0	0	0	0	0	0	0
Saturated Capacity, vph	0	0	0	0	0	0	0	0
Init Que Clear Time, s	0	0	0	0	0	0	0	0

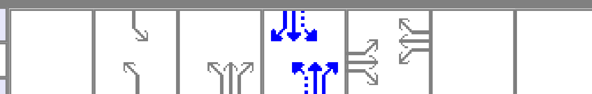
HCS 2010 Signalized Intersection Results Summary

General Information				Intersection Information	
Agency	HDR			Duration, h	0.25
Analyst	MDF	Analysis Date	Jan 30, 2013	Area Type	Other
Jurisdiction		Time Period	PM Peak	PHF	0.90
Intersection	Disk Drive	Analysis Year	2035 No-Build	Analysis Period	1> 16:45
File Name	2035_No-Build_PM_Haines.xus				
Project Description					

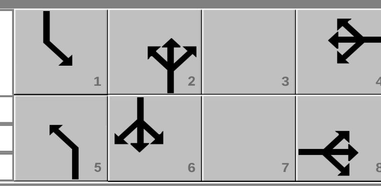


Demand Information	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Demand (*v*), veh/h	30	60	210	390	30	80	200	1200	410	60	920	20

Signal Information			
Cycle, s	90.0	Reference Phase	6
Offset, s	49	Reference Point	End
Uncoordinated	No	Simult. Gap E/W	Off
Force Mode	Float	Simult. Gap N/S	Off



Green	4.1	3.8	36.1	18.0	6.0	0.0
Yellow	4.0	0.0	4.0	4.0	4.0	0.0
Red	0.0	0.0	2.0	2.0	2.0	0.0



Timer Results	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Assigned Phase		8		4	5	2	1	6
Case Number		9.0		10.0	1.1	3.0	1.1	4.0
Phase Duration, s		12.0		24.0	11.9	45.9	8.1	42.1
Change Period, *(Y+R_c)*, s		6.0		6.0	4.0	6.0	4.0	6.0
Max Allow Headway *(MAH)*, s		5.2		5.2	5.1	0.0	5.1	0.0
Queue Clearance Time (g_s), s		7.1		19.2	7.8		4.0	
Green Extension Time (g_e), s		0.0		0.0	0.1	0.0	0.0	0.0
Phase Call Probability		0.99		1.00	1.00		0.81	
Max Out Probability		1.00		1.00	1.00		1.00	

Movement Group Results	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Assigned Movement	3	8	18	7	4	14	5	2	12	1	6	16
Adjusted Flow Rate (*v*), veh/h	33	67	87	217	217		222	1333	203	67	460	584
Adjusted Saturation Flow Rate (*s*), veh/h/ln	1697	1782	1510	1697	1697		1697	1697	1510	1697	1394	1771
Queue Service Time (g_s), s	1.7	3.3	5.1	10.5	10.5		5.8	32.3	8.7	2.0	24.6	24.6
Cycle Queue Clearance Time (g_c), s	1.7	3.3	5.1	10.5	10.5		5.8	32.3	8.7	2.0	24.6	24.6
Green Ratio (*g/C*)	0.07	0.07	0.07	0.20	0.20		0.55	0.44	0.44	0.45	0.40	0.40
Capacity (*c*), veh/h	113	119	101	339	339		298	1506	670	185	559	710
Volume-to-Capacity Ratio *(X)*	0.295	0.561	0.861	0.638	0.638		0.745	0.885	0.303	0.360	0.822	0.822
Available Capacity (c_a), veh/h	113	119	101	339	339		319	1506	670	203	559	710
Back of Queue (*Q*), veh/ln (95th percentile)	1.4	3.0	5.9	8.2	8.2		4.6	16.7	5.1	1.4	12.5	14.6
Queue Storage Ratio *(RQ)* (95th percentile)	0.34	0.15	0.74	1.03	1.03		0.58	0.35	0.11	0.18	0.32	0.37
Uniform Delay (d_1), s/veh	40.0	40.7	41.6	33.0	33.0		20.1	22.7	18.8	19.6	18.3	18.3
Incremental Delay (d_2), s/veh	2.0	7.3	49.7	4.5	4.5		5.2	4.5	0.6	1.7	12.8	10.3
Initial Queue Delay (d_3), s/veh	0.0	0.0	0.0	0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0
Control Delay (*d*), s/veh	42.0	48.1	91.3	37.6	37.6		25.3	27.1	19.4	21.3	31.0	28.6
Level of Service (LOS)	D	D	F	D	D		C	C	B	C	C	C

	EB		WB		NB		SB	
Approach Delay, s/veh / LOS	67.1	E	60.0	E	26.0	C	29.2	C
Intersection Delay, s/veh / LOS	34.2				C			

Multimodal Results	EB		WB		NB		SB	
Pedestrian LOS Score / LOS	3.3	C	2.9	C	2.3	B	2.6	B
Bicycle LOS Score / LOS	0.8	A	1.4	A	1.9	A	1.4	A

This Signals text report was created on April 11, 2013 at 02:05:56

Intersection number = 3, Segment number = 2, Period number = 1

Chapter 18 Summary Input

Cycle Length, s 90

	EB LT	EB TH	EB RT	WB LT	WB TH	WB RT	NB LT	NB TH	NB RT	SB LT	SB TH	SB RT
Movement	3	8	18	7	4	14	5	2	12	1	6	16
Volume, veh/h	30	60	210	390	30	80	200	1200	410	60	920	20
Lanes	1	1	1	1	1	0	1	2	1	1	2	0
Bay Length, ft	100	500	200	200	500	200	200	1213	1213	200	1000	0
Receiving Lanes	1	1	1	1	1	1	2	2	2	2	2	2
SatFlow, vplphg	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800
Lane Width, ft	12	12	12	12	12	12	12	12	12	12	12	12
Heavy Vehicles, %	1	1	1	1	1	2	1	1	1	1	1	0
Grade, %	0	0	0	0	0	0	0	0	0	0	0	0
Buses, per h	0	0	0	0	0	0	0	0	0	0	0	0
Parking, per h	0	0	0	0	0	0	0	0	0	0	0	0
Bicycles, per h	0	0	0	0	0	0	0	0	0	0	0	0
Pedestrians, per h	0	0	0	0	0	0	0	0	0	0	0	0
Heavy Veh Equivalent	2	2	2	2	2	2	2	2	2	2	2	2
Bus Blockage Time	14.4	14.4	14.4	14.4	14.4	14.4	14.4	14.4	14.4	14.4	14.4	14.4
Turns in Shrd Ln, %	0	0	0	50	0	0	0	0	0	0	0	0
Unopposed Lefts, %	0	0	0	0	0	0	0	0	0	0	0	0
Parking Time, sec	18	18	18	18	18	18	18	18	18	18	18	18
Arrival Type	3	3	3	3	3	3	4	4	4	4	4	4
Initial Queue, veh	0	0	0	0	0	0	0	0	0	0	0	0
Speed Limit, mph	30	30	30	30	30	30	35	35	35	35	35	35
Detector Length, ft	40	40	40	40	40	40	40	40	40	40	40	40
StartLostTime, sec	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0
EndUseTime, sec	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0
RTOR, veh/h		132			17			227			1	
I-Factor		1.00			1.00			0.53			1.00	
Walk + PC, sec		0.0			0.0			0.0			0.0	

	EB	EB	WB	WB	NB	NB	SB	SB
Phase	3	8	7	4	5	2	1	6
Movement		LT+TH+RT		LT+TH+RT	LT	LT+TH+RT	LT	LT+TH+RT
Left-Turn Mode	--	Split	--	Split	Pr/Pm	--	Pr/Pm	--
Phase Splits, s	0.0	12.0	0.0	24.0	13.0	45.0	9.0	41.0
Yellow Change, s	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Red Clearance, s	1.0	2.0	1.0	2.0	0.0	2.0	0.0	2.0
Minimum Green, s	5	5	5	4	5	5	5	5
Lead/Lag					Lead		Lead	
Passage Time, s	2.0	4.0	2.0	4.0	4.0	2.0	4.0	2.0
Recall	Off	Off	Off	Off	Off	Min	Off	Min
Dual Entry	No	No	No	No	No	Yes	No	Yes
Prot. Right-Turn	False	False	False	False	False	False	False	False

	E/W	N/S
Simultaneous Gap out	Off	Off
Dallas Phasing	Off	Off

Cycle Length, s	90
Offset, s	49
Reference Phase	6
Reference Point	End
Force Mode	Float
Uncoordinated	No
Field Measured Phase Times	No
Exclusive Ped Phase Time, s	0.0

Timer:	1	2	3	4	5	6	7	8
Assigned Phase	1	2	4	8	5	6	0	0
Assigned Left-Turn Mvmt.	1	0	7	3	5	0	0	0
Assigned Through Mvmt.	0	2	4	8	0	6	0	0
Assigned Right-Turn Mvmt.	0	12	14	18	0	16	0	0
Timer w/Pr-Pm From Shared	0	0	0	0	0	0	0	0

Chapter 18 Summary Output

Cycle Length, s 90

	EB LT	EB TH	EB RT	WB LT	WB TH	WB RT	NB LT	NB TH	NB RT	SB LT	SB TH	SB RT
Movement	3	8	18	7	4	14	5	2	12	1	6	16
Volume, veh/h	33.33	66.67	86.67	433.33	33.33	70	222.22	1333.3	203.33	66.67	1022.2	21.11
SatFlow, veh/h/ln	1782.2	1782.2	1782.2	1782.2	1782.2	0	1782.2	1782.2	1782.2	1782.2	1782.2	0
Lane Util Factor	1	1	1	1	1	1	1	0.95	1	1	0.78	1
Capacity, veh/h	113.15	118.81	100.69	339.46	33.09	299.34	298.25	1506	670.32	185.23	1244.1	25.69
Discharge Vol, veh/h	0	0	86.67	339.46	0	0	0	0	0	0	1022.2	0
Prop Arriv On Green	0.07	0.07	0.07	0.2	0.2	0.2	0	0.45	0.36	0.06	0.53	0.53
Apprch Vol, veh/h	0	186.67	0	0	536.67	0	0	1758.9	0	0	1110	0
Apprch Stops, #/veh	0	1.21	0	0	NaN	0	0	0.74	0	0	0.67	0
Apprch Delay, s/veh	0	67.06	0	0	59.97	0	0	26	0	0	29.17	0

Apprch LOS	E	E	C	C
Int Delay, s/veh	34.19			
Int LOS	C			

Timer Data

Timer:	1	2	3	4	5	6	7	8
Assigned Phase	1	2	4	8	5	6	0	0
Case No	1.1	3	10	9	1.1	4	0	0
Phase Duration, s	8.06	45.94	24	12	11.89	42.11	0	0
Change Period, s	4	6	6	6	4	6	0	6
Phase Start Time, s	55	9.06	55	43	55	12.89	55	55
Phase End Time, s	63.06	55	79	55	66.89	55	55	55
Max Allow Headway, s	5.08	0	5.23	5.23	5.08	0	0	0
Equiv Max Green, s	5	5	18	6	9	5		
Queue Clear Time, s	4.03		19.17	7.11	7.79			
Green Exten Time, s	0.02	0	0	0	0.13	0	0	0
Prob of Phase Call	0.81		1	0.99	1			
Prob of Max Out	1		1	1	1			
Left-Turn Movement Data								
Assigned Movement	1	0	7	3	5	0	0	0
Mvmt. Sat Flow, veh/h	1697.31	0	1697.31	1697.31	1697.31	0	0	0
Through Movement Data								
Assigned Movement	0	2	4	8	0	6	0	0
Mvmt. Sat Flow, veh/h	0	3393.27	512.41	1782.18	0	3100.83	0	0
Right-Turn Movement Data								
Assigned Movement	0	12	14	18	0	16	0	0
Mvmt. Sat Flow, veh/h	0	1510.32	1496.7	1510.32	0	64.04	0	0

Left Lane Group Output

Timer:	1	2	3	4	5	6	7	8
Assigned Phase	1	2	4	8	5	6	0	0
Left Lane Group Data								
Assigned Movement	1	0	7	3	5	0	0	0
Lane Assignment	L Pr/Pm		L	L	L Pr/Pm			
Lanes in Group	1	0	1	1	1	0	0	0
Group Volume, veh/h	66.67	0	216.67	33.33	222.22	0	0	0
Group SatFlow, vphpl	1697.31	0	1697.31	1697.31	1697.31	0	0	0
Queue Serve Time, s	2.03	0	10.54	1.68	5.79	0	0	0
Cycle Clear Time, s	2.03	0	10.54	1.68	5.79	0	0	0
Perm SatFlow, vphpl	339.74	0	1697.31	1697.31	543.9	0	0	0
Shared SatFlow, vphpl								
Perm Eff Green, s	36.11	0	0	0	41.78	0	0	0
Perm Serve Time, s	7.61	0	0	0	11.49	0	0	0
Perm Que Serve Time, s	6.82				11.49			
Time to first Blk, s	0	0	0	0	0	0	0	0
Serve Time pre Blk, s								
Prop Inside Lane	1	0	1	1	1	0	0	0
Lane Grp Capacity, vph	185.23		339.46	113.15	298.25			
v/c Ratio	0.36	0	0.64	0.29	0.75	0	0	0
Avail Capacity, veh/h	203.04		339.46	113.15	319.15			
I-Factor	1	0	1	1	0.53	0	0	0
Uniform Delay, s/veh	19.64		33.01	39.99	20.14			
Increm Delay, s/veh	1.67	0	4.54	2.03	5.16	0	0	0
Overflow Delay, s/veh	0	0	0	0	0	0	0	0
Control Delay, s/veh	21.31		37.56	42.02	25.3			
Group LOS	C		D	D	C			
Uniform Stops, #/veh	0.66		0.78	0.83	0.77			
Increm Stops, #/veh	0.05	0	0.08	0.08	0.08	0	0	0
Overflow Stops, #/veh	0	0	0	0	0	0	0	0
Stop Rate, #/veh	0.71		0.86	0.9	0.85			
Uniform Queue, veh/ln	0.72		4.21	0.69	2.24			
Increm Queue, veh/ln	0.09	0	0.43	0.06	0.43	0	0	0
Overflow Queue, veh/ln	0	0	0	0	0	0	0	0
Back of Queue Factor	1.8	0	1.76	1.8	1.73	0	0	0
Back of Queue, veh/ln	1.45		8.17	1.35	4.62			
Storage Ratio	0.18	0	1.03	0.34	0.58	0	0	0
Initial Queue, veh	0	0	0	0	0	0	0	0
Final Queue, veh	0	0	0	0	0	0	0	0
Saturated Delay, s/veh	0	0	0	0	0	0	0	0
Saturated Stops, #/veh	0	0	0	0	0	0	0	0
Saturated Queue, veh/ln	0	0	0	0	0	0	0	0
Saturated Capacity, vph	0	0	0	0	0	0	0	0
Init Que Clear Time, s	0	0	0	0	0	0	0	0

Thru Lane Group Output

Timer:	1	2	3	4	5	6	7	8
Assigned Phase	1	2	4	8	5	6	0	0
Thru Lane Group Data								
Assigned Movement	0	2	4	8	0	6	0	0
Lane Assignment		T		T		T		
Lanes in Group	0	2	0	1	0	1	0	0
Group Volume, veh/h	0	1333.33	0	66.67	0	459.61	0	0
Group SatFlow, vphpl	0	1696.63	0	1782.18	0	1394.22	0	0
Queue Serve Time, s	0	32.33	0	3.26	0	24.62	0	0
Cycle Clear Time, s	0	32.33	0	3.26	0	24.62	0	0
Lane Grp Capacity, vph		1506.02	0	118.81		559.37		
v/c Ratio	0	0.89	0	0.56	0	0.82	0	0

Avail Capacity, veh/h		1506.02	0	118.81		559.37		
I-Factor	0	0.53	0	1	0	1	0	0
Uniform Delay, s/veh		22.65		40.72		18.26		
Increm Delay, s/veh	0	4.47	0	7.33	0	12.79	0	0
Overflow Delay, s/veh	0	0	0	0	0	0	0	0
Control Delay, s/veh		27.13		48.05		31.04		
Group LOS		C		D		C		
Uniform Stops, #/veh		0.69	NaN	0.84		0.52		
Increm Stops, #/veh	0	0.06	0	0.15	0	0.17	0	0
Overflow Stops, #/veh	0	0	0	0	0	0	0	0
Stop Rate, #/veh		0.75	NaN	0.99		0.69		
Uniform Queue, veh/ln		11.54	0	1.4		5.93		
Increm Queue, veh/ln	0	0.94	0	0.24	0	1.99	0	0
Overflow Queue, veh/ln	0	0	0	0	0	0	0	0
Back of Queue Factor	0	1.34	1	1.8	0	1.58	0	0
Back of Queue, veh/ln		16.68	0	2.96		12.53		
Storage Ratio	0	0.35	0	0.15	0	0.32	0	0
Initial Queue, veh	0	0	0	0	0	0	0	0
Final Queue, veh	0	0	0	0	0	0	0	0
Saturated Delay, s/veh	0	0	0	0	0	0	0	0
Saturated Stops, #/veh	0	0	0	0	0	0	0	0
Saturated Queue, veh/ln	0	0	0	0	0	0	0	0
Saturated Capacity, vph	0	0	0	0	0	0	0	0
Init Que Clear Time, s	0	0	0	0	0	0	0	0

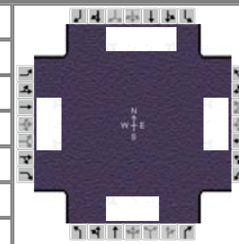
Right Lane Group Output

Timer:	1	2	3	4	5	6	7	8
Assigned Phase	1	2	4	8	5	6	0	0
Right Lane Group Data								
Assigned Movement	0	12	14	18	0	16	0	0
Lane Assignment		R	T+R	R		T+R		
Lanes in Group	0	1	1	1	0	1	0	0
Group Volume, veh/h	0	203.33	320	86.67	0	583.72	0	0
Group SatFlow, vphpl	0	1510.32	1662.17	1510.32	0	1770.65	0	0
Queue Serve Time, s	0	8.69	17.17	5.11	0	24.62	0	0
Cycle Clear Time, s	0	8.69	17.17	5.11	0	24.62	0	0
Prot RT SatFlow, vphpl		0		0				
Prot RT Eff Green, s		0		0				
Prop Outside Lane	0	1	0.68	1	0	0.04	0	0
Lane Grp Capacity, vph		670.32	332.45	100.69		710.41		
v/c Ratio	0	0.3	0.96	0.86	0	0.82	0	0
Avail Capacity, veh/h		670.32	332.45	100.69		710.41		
I-Factor	0	0.53	1	1	0	1	0	0
Uniform Delay, s/veh		18.75	35.67	41.59		18.26		
Increm Delay, s/veh	0	0.61	39.48	49.73	0	10.34	0	0
Overflow Delay, s/veh	0	0	0	0	0	0	0	0
Control Delay, s/veh		19.37	75.15	91.32		28.6		
Group LOS		B	E	F		C		
Uniform Stops, #/veh		0.58	0.84	0.86		0.52		
Increm Stops, #/veh	0	0.02	0.46	0.64	0	0.14	0	0
Overflow Stops, #/veh	0	0	0	0	0	0	0	0
Stop Rate, #/veh		0.6	1.29	1.5		0.66		
Uniform Queue, veh/ln		2.94	6.71	1.86		7.53		
Increm Queue, veh/ln	0	0.11	3.65	1.39	0	2.04	0	0
Overflow Queue, veh/ln	0	0	0	0	0	0	0	0
Back of Queue Factor	0	1.68	1.51	1.8	0	1.53	0	0
Back of Queue, veh/ln		5.13	15.63	5.86		14.65		
Storage Ratio	0	0.11	0.79	0.74	0	0.37	0	0
Initial Queue, veh	0	0	0	0	0	0	0	0
Final Queue, veh	0	0	0	0	0	0	0	0
Saturated Delay, s/veh	0	0	0	0	0	0	0	0
Saturated Stops, #/veh	0	0	0	0	0	0	0	0
Saturated Queue, veh/ln	0	0	0	0	0	0	0	0
Saturated Capacity, vph	0	0	0	0	0	0	0	0
Init Que Clear Time, s	0	0	0	0	0	0	0	0

VI. North Street Intersection Analysis

HCS 2010 Signalized Intersection Results Summary

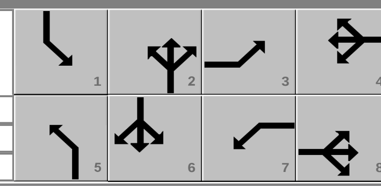
General Information				Intersection Information	
Agency	HDR			Duration, h	0.25
Analyst	MDF	Analysis Date	Jan 30, 2013	Area Type	Other
Jurisdiction		Time Period	AM Peak	PHF	0.83
Intersection	Eglin St	Analysis Year	Existing (2012)	Analysis Period	1> 7:45
File Name	Existing_AM_North.xus				
Project Description					



Demand Information	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Demand (*v*), veh/h	25	20	20	30	40	30	45	250	40	45	480	75

Signal Information			
Cycle, s	78.3	Reference Phase	2
Offset, s	0	Reference Point	End
Uncoordinated	Yes	Simult. Gap E/W	Off
Force Mode	Float	Simult. Gap N/S	Off

Green	3.5	40.0	2.4	0.3	9.1	0.0
Yellow	3.2	3.9	3.2	0.0	3.2	0.0
Red	2.3	2.5	2.3	0.0	2.5	0.0



Timer Results	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Assigned Phase	3	8	7	4	5	2	1	6
Case Number	1.1	3.0	1.1	3.0	1.1	4.0	1.1	3.0
Phase Duration, s	7.9	14.8	8.2	15.1	9.0	46.4	9.0	46.4
Change Period, *($Y+R_c$)*, s	5.5	5.7	5.5	5.7	5.5	6.4	5.5	6.4
Max Allow Headway *(MAH)*, s	5.1	5.1	5.1	5.1	5.1	5.0	5.1	5.0
Queue Clearance Time *(g_s)*, s	3.2	3.0	3.5	3.9	3.2	6.2	3.2	10.0
Green Extension Time *(g_e)*, s	0.0	0.1	0.1	0.2	0.1	1.9	0.1	4.2
Phase Call Probability	0.48	0.91	0.54	0.92	0.69	1.00	0.69	1.00
Max Out Probability	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

Movement Group Results	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Assigned Movement	3	8	18	7	4	14	5	2	12	1	6	16
Adjusted Flow Rate (*v*), veh/h	30	24	2	36	48	4	54	173	168	54	578	48
Adjusted Saturation Flow Rate (*s*), veh/h/ln	1681	1765	1496	1681	1765	1496	1681	1765	1693	1681	1680	1496
Queue Service Time (g_s), s	1.2	1.0	0.1	1.5	1.9	0.2	1.2	4.2	4.2	1.2	8.0	1.3
Cycle Queue Clearance Time (g_c), s	1.2	1.0	0.1	1.5	1.9	0.2	1.2	4.2	4.2	1.2	8.0	1.3
Green Ratio (*g/C*)	0.15	0.12	0.12	0.15	0.12	0.12	0.55	0.51	0.51	0.55	0.51	0.51
Capacity (*c*), veh/h	272	204	173	293	211	179	491	901	864	639	1715	764
Volume-to-Capacity Ratio *(X)*	0.111	0.118	0.014	0.123	0.228	0.020	0.110	0.192	0.195	0.085	0.337	0.063
Available Capacity (c_a), veh/h	542	563	477	556	563	477	739	901	864	886	1715	764
Back of Queue (*Q*), veh/ln (95th percentile)	0.9	0.7	0.1	1.1	1.5	0.1	0.7	2.7	2.7	0.7	4.8	0.7
Queue Storage Ratio *(RQ)* (95th percentile)	0.09	0.04	0.01	0.11	0.08	0.01	0.06	0.07	0.07	0.05	0.11	0.07
Uniform Delay (d_1), s/veh	29.1	31.1	30.7	28.6	31.2	30.4	8.5	10.4	10.4	8.1	11.3	9.7
Incremental Delay (d_2), s/veh	0.3	0.4	0.0	0.3	0.8	0.1	0.1	0.5	0.5	0.1	0.5	0.2
Initial Queue Delay (d_3), s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Control Delay (*d*), s/veh	29.3	31.4	30.7	28.9	32.0	30.5	8.6	10.9	10.9	8.2	11.8	9.8
Level of Service (LOS)	C	C	C	C	C	C	A	B	B	A	B	A
Approach Delay, s/veh / LOS	30.3	C		30.7	C		10.6	B		11.4	B	
Intersection Delay, s/veh / LOS	13.4						B					

Multimodal Results	EB		WB		NB		SB	
Pedestrian LOS Score / LOS	2.9	C	3.0	C	2.4	B	2.4	B
Bicycle LOS Score / LOS	0.6	A	0.6	A	0.8	A	1.0	A

 HCS 2010™ Streets Version 6.50 Generated: 1/31/2013 4:11:18 PM

This Signals text report was created on January 31, 2013 at 04:12:46

Intersection number = 1, Segment number = 1, Period number = 1

Chapter 18 Summary Input

Cycle Length, s	78.35											
	EB	EB	EB	WB	WB	WB	NB	NB	NB	SB	SB	SB
	LT	TH	RT	LT	TH	RT	LT	TH	RT	LT	TH	RT
Movement	3	8	18	7	4	14	5	2	12	1	6	16
Volume, veh/h	25	20	20	30	40	30	45	250	40	45	480	75
Lanes	1	1	1	1	1	1	1	2	0	1	2	1
Bay Length, ft	250	500	200	250	500	350	300	1000	150	350	1073	275
Receiving Lanes	1	1	1	1	1	1	2	2	2	2	2	2
SatFlow, vplphg	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800
Lane Width, ft	12	12	12	12	12	12	12	12	12	12	12	12
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Grade, %	0	0	0	0	0	0	0	0	0	0	0	0
Buses, per h	0	0	0	0	0	0	0	0	0	0	0	0
Parking, per h	0	0	0	0	0	0	0	0	0	0	0	0
Bicycles, per h	0	0	0	0	0	0	0	0	0	0	0	0
Pedestrians, per h	0	0	0	0	0	0	0	0	0	0	0	0
Heavy Veh Equivalent	2	2	2	2	2	2	2	2	2	2	2	2
Bus Blockage Time	14.4	14.4	14.4	14.4	14.4	14.4	14.4	14.4	14.4	14.4	14.4	14.4
Turns in Shrd Ln, %	0	0	0	40	0	0	0	0	0	0	0	0
Unopposed Lefts, %	0	0	0	0	0	0	0	0	0	0	0	0
Parking Time, sec	18	18	18	18	18	18	18	18	18	18	18	18
Arrival Type	3	3	3	3	3	3	3	3	3	3	3	3
Initial Queue, veh	0	0	0	0	0	0	0	0	0	0	0	0
Speed Limit, mph	30	30	30	30	30	30	35	35	35	35	35	35
Detector Length, ft	40	40	40	40	40	40	40	40	40	40	40	40
StartLostTime, sec	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0
EndUseTime, sec	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0
RTOR, veh/h		18			27			7			35	
I-Factor		1.00			1.00			1.00			0.96	
Walk + PC, sec		0.0			0.0			0.0			0.0	

	EB	EB	WB	WB	NB	NB	SB	SB
Phase	3	8	7	4	5	2	1	6
Movement	LT	LT+TH+RT	LT	LT+TH+RT	LT	LT+TH+RT	LT	LT+TH+RT
Left-Turn Mode	Pr/Pm	--	Pr/Pm	--	Pr/Pm	--	Pr/Pm	--
Phase Splits, s	15.0	25.0	15.0	25.0	15.0	40.0	15.0	40.0
Yellow Change, s	3.2	3.2	3.2	3.2	3.2	3.9	3.2	3.9
Red Clearance, s	2.3	2.5	2.3	2.5	2.3	2.5	2.3	2.5
Minimum Green, s	5	10	5	10	5	15	5	15
Lead/Lag	Lead		Lead		Lead		Lead	
Passage Time, s	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Recall	Off	Off	Off	Off	Off	Max	Off	Max
Dual Entry	No	Yes	No	Yes	No	Yes	No	Yes
Prot. Right-Turn	False	False	False	False	False	False	False	False

	E/W	N/S
Simultaneous Gap out	Off	Off
Dallas Phasing	Off	Off

Cycle Length, s	84
Offset, s	0
Reference Phase	2
Reference Point	End
Force Mode	Float
Uncoordinated	Yes
Field Measured Phase Times	No
Exclusive Ped Phase Time, s	0.0

Timer:	1	2	3	4	5	6	7	8
Assigned Phase	1	2	3	4	5	6	7	8
Assigned Left-Turn Mvmt.	1	0	3	0	5	0	7	0
Assigned Through Mvmt.	0	2	0	4	0	6	0	8
Assigned Right-Turn Mvmt.	0	12	0	14	0	16	0	18
Timer w/Pr-Pm From Shared	0	0	0	0	0	0	0	0

Chapter 18 Summary Output

Cycle Length, s	78.35											
	EB	EB	EB	WB	WB	WB	NB	NB	NB	SB	SB	SB
	LT	TH	RT	LT	TH	RT	LT	TH	RT	LT	TH	RT
Movement	3	8	18	7	4	14	5	2	12	1	6	16
Volume, veh/h	30.12	24.1	2.41	36.14	48.19	3.61	54.22	301.2	39.76	54.22	578.31	48.19
SatFlow, veh/h/ln	1764.7	1764.7	1764.7	1764.7	1764.7	1764.7	1764.7	1764.7	0	1764.7	1764.7	1764.7
Lane Util Factor	1	1	1	1	1	1	1	1	1	1	0.95	1
Capacity, veh/h	271.6	204.02	172.9	292.99	211.21	178.99	491.36	1561.2	204.03	638.74	1715.4	763.52
Discharge Vol, veh/h	30.12	0	0	0	0	3.61	0	301.2	0	0	0	0
Prop Arriv On Green	0.03	0.12	0.12	0.03	0.12	0.12	0.04	0.51	0.51	0.04	0.51	0.51
Apprch Vol, veh/h	0	56.63	0	0	87.95	0	0	395.18	0	0	680.72	0
Apprch Stops, #/veh	0	0.78	0	0	0.79	0	0	0.42	0	0	0.43	0
Apprch Delay, s/veh	0	30.29	0	0	30.66	0	0	10.58	0	0	11.42	0

Apprch LOS	C	C	B	B

Int Delay, s/veh	13.41
Int LOS	B

Timer Data

Timer:	1	2	3	4	5	6	7	8
Assigned Phase	1	2	3	4	5	6	7	8
Case No	1.1	4	1.1	3	1.1	3	1.1	3
Phase Duration, s	8.96	46.4	7.91	15.08	8.96	46.4	8.22	14.76
Change Period, s	5.5	6.4	5.5	5.7	5.5	6.4	5.5	5.7
Max Allow Headway, s	5.08	5.03	5.14	5.07	5.08	5.01	5.14	5.07
Max Green Setting, s	15	40	15	25	15	40	15	25
Queue Clear Time, s	3.16	6.24	3.22	3.94	3.16	9.97	3.46	2.96
Green Exten Time, s	0.12	1.91	0.05	0.17	0.12	4.23	0.06	0.06
Prob of Phase Call	0.69	1	0.48	0.92	0.69	1	0.54	0.91
Prob of Max Out	0	0	0	0	0	0	0	0
Left-Turn Movement Data								
Assigned Movement	1	0	3	0	5	0	7	0
Mvmt. Sat Flow, veh/h	1680.67	0	1680.67	0	1680.67	0	1680.67	0
Through Movement Data								
Assigned Movement	0	2	0	4	0	6	0	8
Mvmt. Sat Flow, veh/h	0	3057.85	0	1764.71	0	3360	0	1764.71
Right-Turn Movement Data								
Assigned Movement	0	12	0	14	0	16	0	18
Mvmt. Sat Flow, veh/h	0	399.63	0	1495.51	0	1495.51	0	1495.51

Left Lane Group Output

Timer:	1	2	3	4	5	6	7	8
Assigned Phase	1	2	3	4	5	6	7	8
Left Lane Group Data								
Assigned Movement	1	0	3	0	5	0	7	0
Lane Assignment	L Pr/Pm		L Pr/Pm		L Pr/Pm		L Pr/Pm	
Lanes in Group	1	0	1	0	1	0	1	0
Group Volume, veh/h	54.22	0	30.12	0	54.22	0	36.14	0
Group SatFlow, vphpl	1680.67	0	1680.67	0	1680.67	0	1680.67	0
Queue Serve Time, s	1.16	0	1.22	0	1.16	0	1.46	0
Cycle Clear Time, s	1.16	0	1.22	0	1.16	0	1.46	0
Perm SatFlow, vphpl	1035.3	0	1347.18	0	795.62	0	1378.36	0
Shared SatFlow, vphpl								
Perm Eff Green, s	40	0	9.06	0	40	0	9.38	0
Perm Serve Time, s	35.76	0	7.45	0	32.02	0	8.11	0
Perm Que Serve Time, s	0.23		0.04		0.58		0.03	
Time to first Blk, s	0	0	0	0	0	0	0	0
Serve Time pre Blk, s								
Prop Inside Lane	1	0	1	0	1	0	1	0
Lane Grp Capacity, vph	638.74		271.6		491.36		292.99	
v/c Ratio	0.08	0	0.11	0	0.11	0	0.12	0
Avail Capacity, veh/h	886.17		541.76		738.8		556.31	
I-Factor	0.96	0	1	0	1	0	1	0
Uniform Delay, s/veh	8.15		29.09		8.46		28.63	
Increm Delay, s/veh	0.08	0	0.25	0	0.14	0	0.27	0
Overflow Delay, s/veh	0	0	0	0	0	0	0	0
Control Delay, s/veh	8.22		29.34		8.6		28.9	
Group LOS	A		C		A		C	
Uniform Stops, #/veh	0.35		0.74		0.35		0.74	
Increm Stops, #/veh	0.01	0	0.03	0	0.02	0	0.03	0
Overflow Stops, #/veh	0	0	0	0	0	0	0	0
Stop Rate, #/veh	0.36		0.77		0.37		0.76	
Uniform Queue, veh/ln	0.36		0.48		0.36		0.57	
Increm Queue, veh/ln	0.01	0	0.02	0	0.02	0	0.02	0
Overflow Queue, veh/ln	0	0	0	0	0	0	0	0
Back of Queue Factor	1.8	0	1.8	0	1.8	0	1.8	0
Back of Queue, veh/ln	0.66		0.89		0.67		1.06	
Storage Ratio	0.05	0	0.09	0	0.06	0	0.11	0
Initial Queue, veh	0	0	0	0	0	0	0	0
Final Queue, veh	0	0	0	0	0	0	0	0
Saturated Delay, s/veh	0	0	0	0	0	0	0	0
Saturated Stops, #/veh	0	0	0	0	0	0	0	0
Saturated Queue, veh/ln	0	0	0	0	0	0	0	0
Saturated Capacity, vph	0	0	0	0	0	0	0	0
Init Que Clear Time, s	0	0	0	0	0	0	0	0

Thru Lane Group Output

Timer:	1	2	3	4	5	6	7	8
Assigned Phase	1	2	3	4	5	6	7	8
Thru Lane Group Data								
Assigned Movement	0	2	0	4	0	6	0	8
Lane Assignment		T		T		T		T
Lanes in Group	0	1	0	1	0	2	0	1
Group Volume, veh/h	0	172.55	0	48.19	0	578.31	0	24.1
Group SatFlow, vphpl	0	1764.71	0	1764.71	0	1680	0	1764.71
Queue Serve Time, s	0	4.16	0	1.94	0	7.97	0	0.96
Cycle Clear Time, s	0	4.16	0	1.94	0	7.97	0	0.96
Lane Grp Capacity, vph		900.96		211.21		1715.42		204.02
v/c Ratio	0	0.19	0	0.23	0	0.34	0	0.12
Avail Capacity, veh/h		900.96		563.1		1715.42		563.1
I-Factor	0	1	0	1	0	0.96	0	1

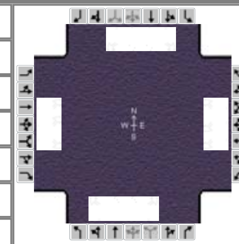
Uniform Delay, s/veh		10.4		31.21		11.34		31.06
Increm Delay, s/veh	0	0.47	0	0.77	0	0.51	0	0.36
Overflow Delay, s/veh	0	0	0	0	0	0	0	0
Control Delay, s/veh		10.87		31.98		11.85		31.43
Group LOS		B		C		B		C
Uniform Stops, #/veh		0.39		0.77		0.42		0.76
Increm Stops, #/veh	0	0.03	0	0.04	0	0.02	0	0.04
Overflow Stops, #/veh	0	0	0	0	0	0	0	0
Stop Rate, #/veh		0.42		0.81		0.44		0.8
Uniform Queue, veh/ln		1.4		0.8		2.57		0.4
Increm Queue, veh/ln	0	0.12	0	0.05	0	0.12	0	0.02
Overflow Queue, veh/ln	0	0	0	0	0	0	0	0
Back of Queue Factor	0	1.8	0	1.8	0	1.8	0	1.8
Back of Queue, veh/ln		2.74		1.52		4.85		0.75
Storage Ratio	0	0.07	0	0.08	0	0.11	0	0.04
Initial Queue, veh	0	0	0	0	0	0	0	0
Final Queue, veh	0	0	0	0	0	0	0	0
Saturated Delay, s/veh	0	0	0	0	0	0	0	0
Saturated Stops, #/veh	0	0	0	0	0	0	0	0
Saturated Queue, veh/ln	0	0	0	0	0	0	0	0
Saturated Capacity, vph	0	0	0	0	0	0	0	0
Init Que Clear Time, s	0	0	0	0	0	0	0	0

Right Lane Group Output

Timer:	1	2	3	4	5	6	7	8
Assigned Phase	1	2	3	4	5	6	7	8
Right Lane Group Data								
Assigned Movement	0	12	0	14	0	16	0	18
Lane Assignment		T+R		R		R		R
Lanes in Group	0	1	0	1	0	1	0	1
Group Volume, veh/h	0	168.41	0	3.61	0	48.19	0	2.41
Group SatFlow, vphpl	0	1692.77	0	1495.51	0	1495.51	0	1495.51
Queue Serve Time, s	0	4.24	0	0.17	0	1.28	0	0.11
Cycle Clear Time, s	0	4.24	0	0.17	0	1.28	0	0.11
Prot RT SatFlow, vphpl				0		0		0
Prot RT Eff Green, s				0		0		0
Prop Outside Lane	0	0.24	0	1	0	1	0	1
Lane Grp Capacity, vph		864.24		178.99		763.52		172.9
v/c Ratio	0	0.19	0	0.02	0	0.06	0	0.01
Avail Capacity, veh/h		864.24		477.2		763.52		477.2
I-Factor	0	1	0	1	0	0.96	0	1
Uniform Delay, s/veh		10.42		30.43		9.7		30.69
Increm Delay, s/veh	0	0.5	0	0.06	0	0.15	0	0.05
Overflow Delay, s/veh	0	0	0	0	0	0	0	0
Control Delay, s/veh		10.93		30.5		9.85		30.73
Group LOS		B		C		A		C
Uniform Stops, #/veh		0.39		0.75		0.37		0.75
Increm Stops, #/veh	0	0.03	0	0.04	0	0.03	0	0.04
Overflow Stops, #/veh	0	0	0	0	0	0	0	0
Stop Rate, #/veh		0.43		0.79		0.4		0.79
Uniform Queue, veh/ln		1.38		0.06		0.37		0.04
Increm Queue, veh/ln	0	0.12	0	0	0	0.03	0	0
Overflow Queue, veh/ln	0	0	0	0	0	0	0	0
Back of Queue Factor	0	1.8	0	1.8	0	1.8	0	1.8
Back of Queue, veh/ln		2.69		0.11		0.72		0.07
Storage Ratio	0	0.07	0	0.01	0	0.07	0	0.01
Initial Queue, veh	0	0	0	0	0	0	0	0
Final Queue, veh	0	0	0	0	0	0	0	0
Saturated Delay, s/veh	0	0	0	0	0	0	0	0
Saturated Stops, #/veh	0	0	0	0	0	0	0	0
Saturated Queue, veh/ln	0	0	0	0	0	0	0	0
Saturated Capacity, vph	0	0	0	0	0	0	0	0
Init Que Clear Time, s	0	0	0	0	0	0	0	0

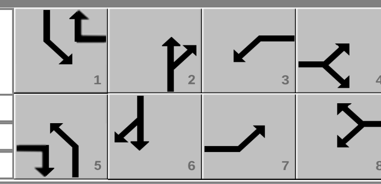
HCS 2010 Signalized Intersection Results Summary

General Information				Intersection Information	
Agency	HDR			Duration, h	0.25
Analyst	MDF	Analysis Date	Jan 30, 2013	Area Type	Other
Jurisdiction		Time Period	AM Peak	PHF	0.83
Intersection	I-90 Ramps (SPUI)	Analysis Year	Existing (2012)	Analysis Period	1> 7:45
File Name	Existing_AM_North.xus				
Project Description					



Demand Information	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Demand (*v*), veh/h	65		260	210		10	95	120	90	10	130	40

Signal Information										
Cycle, s	41.9	Reference Phase	2							
Offset, s	0	Reference Point	End	Green	0.7	3.2	16.8	0.0	4.7	0.0
Uncoordinated	Yes	Simult. Gap E/W	Off	Yellow	4.5	0.0	4.5	0.0	4.5	0.0
Force Mode	Float	Simult. Gap N/S	Off	Red	1.0	0.0	1.0	0.0	1.0	0.0



Timer Results	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Assigned Phase	7	4	3	8	5	2	1	6
Case Number	1.4	3.0	1.4	3.0	2.0	3.0	2.0	3.0
Phase Duration, s	10.2	0.0	10.2	0.0	9.4	25.5	6.2	22.3
Change Period, *($Y+R_c$)*, s	5.5	0.0	5.5	0.0	5.5	5.5	5.5	5.5
Max Allow Headway *(MAH)*, s	5.0	0.0	5.0	0.0	5.1	4.0	5.1	4.0
Queue Clearance Time *(g_s)*, s	2.0		2.2		4.9	3.0	2.3	3.3
Green Extension Time *(g_e)*, s	0.3	0.0	1.3	0.0	0.4	0.4	0.0	0.4
Phase Call Probability	0.60		0.95		0.74	1.00	0.13	1.00
Max Out Probability	0.00		0.00		0.00	0.00	0.00	0.00

Movement Group Results	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Assigned Movement	7		14	3		18	5	2	12	1	6	16
Adjusted Flow Rate (*v*), veh/h	78		0	253		0	114	145	0	12	157	0
Adjusted Saturation Flow Rate *(s)*, veh/h/ln	1585		1453	1585		1453	1633	1632	1453	1633	1632	1453
Queue Service Time (*g_s*), s	0.0		0.0	0.2		0.0	2.9	1.0	0.0	0.3	1.3	0.0
Cycle Queue Clearance Time (*g_c*), s	0.0		0.0	0.2		0.0	2.9	1.0	0.0	0.3	1.3	0.0
Green Ratio (*g/C*)	0.11		0.09	0.11		0.02	0.09	0.48	0.48	0.02	0.40	0.40
Capacity *(c)*, veh/h	571		138	571		26	151	1558	694	26	1307	582
Volume-to-Capacity Ratio *(X)*	0.137		0.000	0.443		0.000	0.756	0.093	0.000	0.472	0.120	0.000
Available Capacity *(c_a)*, veh/h	1651		169	1651		57	779	1558	694	585	1307	582
Back of Queue *(Q)*, veh/ln (95th percentile)	0.5		0.0	1.6		0.0	2.4	0.4	0.0	0.4	0.6	0.0
Queue Storage Ratio *(RQ)* (95th percentile)	0.03		0.00	0.08		0.00	0.17	0.01	0.00	0.03	0.02	0.00
Uniform Delay *(d_1)*, s/veh	18.3		0.0	18.3		0.0	18.5	6.0	0.0	20.4	7.9	0.0
Incremental Delay *(d_2)*, s/veh	0.2		0.0	0.8		0.0	10.3	0.1	0.0	17.7	0.2	0.0
Initial Queue Delay *(d_3)*, s/veh	0.0		0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0	0.0
Control Delay *(d)*, s/veh	18.5		0.0	19.1		0.0	28.8	6.1	0.0	38.2	8.1	0.0
Level of Service (LOS)	B			B			C	A		D	A	
Approach Delay, s/veh / LOS	18.5	B		19.1	B		16.1	B		10.2	B	
Intersection Delay, s/veh / LOS	16.0						B					

Multimodal Results	EB		WB		NB		SB	
Pedestrian LOS Score / LOS	3.1	C	3.0	C	2.4	B	2.8	C
Bicycle LOS Score / LOS		F		F	0.7	A	0.6	A

This Signals text report was created on January 31, 2013 at 04:12:59

Intersection number = 2, Segment number = 1, Period number = 1

Chapter 18 Summary Input

Cycle Length, s 41.89

	EB LT	EB TH	EB RT	WB LT	WB TH	WB RT	NB LT	NB TH	NB RT	SB LT	SB TH	SB RT
Movement	7	4	14	3	8	18	5	2	12	1	6	16
Volume, veh/h	65	0	260	210	0	10	95	120	90	10	130	40
Lanes	2	0	1	2	0	1	1	2	1	1	2	1
Bay Length, ft	500	500	500	500	500	500	375	1073	500	350	851	450
Receiving Lanes	1	1	1	1	1	1	2	2	2	2	2	2
SatFlow, vplphg	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800
Lane Width, ft	12	12	12	12	12	12	12	12	12	12	12	12
Heavy Vehicles, %	5	5	5	5	5	5	5	5	5	5	5	5
Grade, %	0	0	0	0	0	0	0	0	0	0	0	0
Buses, per h	0	0	0	0	0	0	0	0	0	0	0	0
Parking, per h	0	0	0	0	0	0	0	0	0	0	0	0
Bicycles, per h	0	0	0	0	0	0	0	0	0	0	0	0
Pedestrians, per h	0	0	0	0	0	0	0	0	0	0	0	0
Heavy Veh Equivalent	2	2	2	2	2	2	2	2	2	2	2	2
Bus Blockage Time	14.4	14.4	14.4	14.4	14.4	14.4	14.4	14.4	14.4	14.4	14.4	14.4
Turns in Shrd Ln, %	0	0	0	0	0	0	0	0	0	0	0	0
Unopposed Lefts, %	0	0	0	0	0	0	0	0	0	0	0	0
Parking Time, sec	18	18	18	18	18	18	18	18	18	18	18	18
Arrival Type	3	3	3	3	3	3	3	3	3	3	3	3
Initial Queue, veh	0	0	0	0	0	0	0	0	0	0	0	0
Speed Limit, mph	45	45	45	45	45	45	35	35	35	35	35	35
Detector Length, ft	40	40	40	40	40	40	40	40	40	40	40	40
StartLostTime, sec	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0
EndUseTime, sec	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0
RTOR, veh/h		260			10			90			40	
I-Factor		1.00			1.00			0.99			0.98	
Walk + PC, sec		0.0			0.0			0.0			0.0	

	EB	EB	WB	WB	NB	NB	SB	SB
Phase	7	4	3	8	5	2	1	6
Movement	LT	LT+RT	LT	LT+RT	LT	TH+RT	LT	TH+RT
Left-Turn Mode	Pr/Pm	--	Pr/Pm	--	Prot.	--	Prot.	--
Phase Splits, s	19.0	1.0	19.0	1.0	20.0	20.0	15.0	15.0
Yellow Change, s	4.5	0.0	4.5	0.0	4.5	4.5	4.5	4.5
Red Clearance, s	1.0	0.0	1.0	0.0	1.0	1.0	1.0	1.0
Minimum Green, s	5	1	5	1	5	7	5	7
Lead/Lag	Lag		Lag		Lead		Lead	
Passage Time, s	4.0	0.0	4.0	0.0	4.0	3.0	4.0	3.0
Recall	Off	Off	Off	Off	Off	Max	Off	Max
Dual Entry	No	Yes	No	Yes	No	Yes	No	Yes
Prot. Right-Turn	False	False	False	False	True	False	True	False

	E/W	N/S
Simultaneous Gap out	Off	Off
Dallas Phasing	Off	Off

Cycle Length, s	84
Offset, s	0
Reference Phase	2
Reference Point	End
Force Mode	Float
Uncoordinated	Yes
Field Measured Phase Times	No
Exclusive Ped Phase Time, s	0.0

Timer:	1	2	3	4	5	6	7	8
Assigned Phase	1	2	4	3	5	6	8	7
Assigned Left-Turn Mvmt.	1	0	0	3	5	0	0	7
Assigned Through Mvmt.	0	2	4	0	0	6	8	0
Assigned Right-Turn Mvmt.	0	12	14	0	0	16	18	0
Timer w/Pr-Pm From Shared	0	0	0	0	0	0	0	0

Chapter 18 Summary Output

Cycle Length, s 41.89

	EB LT	EB TH	EB RT	WB LT	WB TH	WB RT	NB LT	NB TH	NB RT	SB LT	SB TH	SB RT
Movement	7	4	14	3	8	18	5	2	12	1	6	16
Volume, veh/h	78.31	0	0	253.01	0	0	114.46	144.58	0	12.05	156.63	0
SatFlow, veh/h/ln	1714.3	1714.3	1714.3	1714.3	1714.3	1714.3	1714.3	1714.3	1714.3	1714.3	1714.3	1714.3
Lane Util Factor	0.97	1	1	0.97	1	1	1	0.95	1	1	0.95	1
Capacity, veh/h	571.38	0	20.32	571.38	0	20.32	151.4	1558.2	693.56	25.54	1306.6	581.57
Discharge Vol, veh/h	78.31	0	0	253.01	0	0	0	144.58	0	0	156.63	0
Prop Arriv On Green	0.11	0	0	0.11	0	0	0.09	0.48	0	0.02	0.4	0
Apprch Vol, veh/h	0	78.31	0	0	253.01	0	0	259.04	0	0	168.67	0
Apprch Stops, #/veh	0	NaN	0	0	NaN	0	0	0.68	0	0	0.59	0
Apprch Delay, s/veh	0	18.45	0	0	19.07	0	0	16.14	0	0	10.24	0

Apprch LOS	B	B	B	B
Int Delay, s/veh	16.04			
Int LOS	B			

Timer Data

Timer:	1	2	3	4	5	6	7	8
Assigned Phase	1	2	4	3	5	6	8	7
Case No	2	3	3	1.4	2	3	3	1.4
Phase Duration, s	6.15	25.5	0	10.24	9.38	22.27	0	10.24
Change Period, s	5.5	5.5	0	5.5	5.5	5.5	0	5.5
Max Allow Headway, s	5.08	3.98	0	4.98	5.08	3.98	0	4.98
Max Green Setting, s	15	20	1	19	20	15	1	19
Queue Clear Time, s	2.31	3.01		2.17	4.87	3.27		2
Green Exten Time, s	0.01	0.42	0	1.27	0.41	0.38	0	0.28
Prob of Phase Call	0.13	1		0.95	0.74	1		0.6
Prob of Max Out	0	0		0	0	0		0
Left-Turn Movement Data								
Assigned Movement	1	0	0	3	5	0	0	7
Mvmt. Sat Flow, veh/h	1632.65	0	0	3170.61	1632.65	0	0	3170.61
Through Movement Data								
Assigned Movement	0	2	4	0	0	6	8	0
Mvmt. Sat Flow, veh/h	0	3264	0	0	0	3264	0	0
Right-Turn Movement Data								
Assigned Movement	0	12	14	0	0	16	18	0
Mvmt. Sat Flow, veh/h	0	1452.78	1452.78	0	0	1452.78	1452.78	0

Left Lane Group Output

Timer:	1	2	3	4	5	6	7	8
Assigned Phase	1	2	4	3	5	6	8	7
Left Lane Group Data								
Assigned Movement	1	0	0	3	5	0	0	7
Lane Assignment	L (Prot)			L Pr/Pm	L (Prot)			L Pr/Pm
Lanes in Group	1	0	0	2	1	0	0	2
Group Volume, veh/h	12.05	0	0	253.01	114.46	0	0	78.31
Group SatFlow, vphpl	1632.65	0	0	1585.31	1632.65	0	0	1585.31
Queue Serve Time, s	0.31	0	0	0.17	2.87	0	0	0
Cycle Clear Time, s	0.31	0	0	0.17	2.87	0	0	0
Perm SatFlow, vphpl	0	0	0	1371.42	0	0	0	1371.42
Shared SatFlow, vphpl								
Perm Eff Green, s	0	0	0	-2	0	0	0	-2
Perm Serve Time, s	0	0	0	-2	0	0	0	-2
Perm Que Serve Time, s				0				0
Time to first Blk, s	0	0	0	0	0	0	0	0
Serve Time pre Blk, s								
Prop Inside Lane	1	0	0	1	1	0	0	1
Lane Grp Capacity, vph	25.54			571.38	151.4			571.38
v/c Ratio	0.47	0	0	0.44	0.76	0	0	0.14
Avail Capacity, veh/h	584.57			1650.76	779.43			1650.76
I-Factor	0.98	0	0	1	0.99	0	0	1
Uniform Delay, s/veh	20.45			18.3	18.54			18.3
Increm Delay, s/veh	17.72	0	0	0.77	10.27	0	0	0.15
Overflow Delay, s/veh	0	0	0	0	0	0	0	0
Control Delay, s/veh	38.16			19.07	28.81			18.45
Group LOS	D			B	C			B
Uniform Stops, #/veh	0.85			0.74	0.81			0.74
Increm Stops, #/veh	0.45	0	0	0.02	0.16	0	0	0.01
Overflow Stops, #/veh	0	0	0	0	0	0	0	0
Stop Rate, #/veh	1.3			0.76	0.97			0.75
Uniform Queue, veh/ln	0.1			0.83	0.9			0.26
Increm Queue, veh/ln	0.13	0	0	0.06	0.43	0	0	0.01
Overflow Queue, veh/ln	0	0	0	0	0	0	0	0
Back of Queue Factor	1.8	0	0	1.8	1.8	0	0	1.8
Back of Queue, veh/ln	0.41			1.6	2.39			0.48
Storage Ratio	0.03	0	0	0.08	0.17	0	0	0.03
Initial Queue, veh	0	0	0	0	0	0	0	0
Final Queue, veh	0	0	0	0	0	0	0	0
Saturated Delay, s/veh	0	0	0	0	0	0	0	0
Saturated Stops, #/veh	0	0	0	0	0	0	0	0
Saturated Queue, veh/ln	0	0	0	0	0	0	0	0
Saturated Capacity, vph	0	0	0	0	0	0	0	0
Init Que Clear Time, s	0	0	0	0	0	0	0	0

Thru Lane Group Output

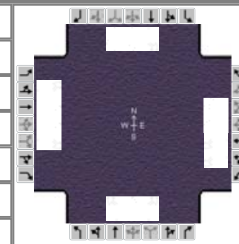
Timer:	1	2	3	4	5	6	7	8
Assigned Phase	1	2	4	3	5	6	8	7
Thru Lane Group Data								
Assigned Movement	0	2	4	0	0	6	8	0
Lane Assignment		T				T		
Lanes in Group	0	2	0	0	0	2	0	0
Group Volume, veh/h	0	144.58	0	0	0	156.63	0	0
Group SatFlow, vphpl	0	1632	0	0	0	1632	0	0
Queue Serve Time, s	0	1.01	0	0	0	1.27	0	0
Cycle Clear Time, s	0	1.01	0	0	0	1.27	0	0
Lane Grp Capacity, vph		1558.23	0			1306.62	0	
v/c Ratio	0	0.09	0	0	0	0.12	0	0
Avail Capacity, veh/h		1558.23	0			1306.62	0	
I-Factor	0	0.99	0	0	0	0.98	0	0

Uniform Delay, s/veh		5.99	0			7.91	0	
Increm Delay, s/veh	0	0.12	0	0	0	0.18	0	0
Overflow Delay, s/veh	0	0	0	0	0	0	0	0
Control Delay, s/veh		6.1	0			8.1	0	
Group LOS		A				A		
Uniform Stops, #/veh		0.44	NaN			0.51	NaN	
Increm Stops, #/veh	0	0.02	0	0	0	0.02	0	0
Overflow Stops, #/veh	0	0	0	0	0	0	0	0
Stop Rate, #/veh		0.45	NaN			0.53	NaN	
Uniform Queue, veh/ln		0.21	0			0.3	0	
Increm Queue, veh/ln	0	0.03	0	0	0	0.03	0	0
Overflow Queue, veh/ln	0	0	0	0	0	0	0	0
Back of Queue Factor	0	1.8	1	0	0	1.8	1	0
Back of Queue, veh/ln		0.42	0			0.61	0	
Storage Ratio	0	0.01	0	0	0	0.02	0	0
Initial Queue, veh	0	0	0	0	0	0	0	0
Final Queue, veh	0	0	0	0	0	0	0	0
Saturated Delay, s/veh	0	0	0	0	0	0	0	0
Saturated Stops, #/veh	0	0	0	0	0	0	0	0
Saturated Queue, veh/ln	0	0	0	0	0	0	0	0
Saturated Capacity, vph	0	0	0	0	0	0	0	0
Init Que Clear Time, s	0	0	0	0	0	0	0	0

Right Lane Group Output

Timer:	1	2	3	4	5	6	7	8
Assigned Phase	1	2	4	3	5	6	8	7
Right Lane Group Data								
Assigned Movement	0	12	14	0	0	16	18	0
Lane Assignment		R	R			R	R	
Lanes in Group	0	1	1	0	0	1	1	0
Group Volume, veh/h	0	0	0	0	0	0	0	0
Group SatFlow, vphpl	0	1452.78	1452.78	0	0	1452.78	1452.78	0
Queue Serve Time, s	0	0	0	0	0	0	0	0
Cycle Clear Time, s	0	0	0	0	0	0	0	0
Prot RT SatFlow, vphpl		0	1452.78			0	1452.78	
Prot RT Eff Green, s		0	3.88			0	0.66	
Prop Outside Lane	0	1	1	0	0	1	1	0
Lane Grp Capacity, vph		693.56	138.19			581.57	26.2	
v/c Ratio	0	0	0	0	0	0	0	0
Avail Capacity, veh/h		693.56	169.4			581.57	57.41	
I-Factor	0	0	0	0	0	0	0	0
Uniform Delay, s/veh		0	0			0	0	
Increm Delay, s/veh	0	0	0	0	0	0	0	0
Overflow Delay, s/veh	0	0	0	0	0	0	0	0
Control Delay, s/veh		0	0			0	0	
Group LOS								
Uniform Stops, #/veh		0	0			0	0	
Increm Stops, #/veh	0	0	0	0	0	0	0	0
Overflow Stops, #/veh	0	0	0	0	0	0	0	0
Stop Rate, #/veh		0	0			0	0	
Uniform Queue, veh/ln		0	0			0	0	
Increm Queue, veh/ln	0	0	0	0	0	0	0	0
Overflow Queue, veh/ln	0	0	0	0	0	0	0	0
Back of Queue Factor	0	1	1	0	0	1	1	0
Back of Queue, veh/ln		0	0			0	0	
Storage Ratio	0	0	0	0	0	0	0	0
Initial Queue, veh	0	0	0	0	0	0	0	0
Final Queue, veh	0	0	0	0	0	0	0	0
Saturated Delay, s/veh	0	0	0	0	0	0	0	0
Saturated Stops, #/veh	0	0	0	0	0	0	0	0
Saturated Queue, veh/ln	0	0	0	0	0	0	0	0
Saturated Capacity, vph	0	0	0	0	0	0	0	0
Init Que Clear Time, s	0	0	0	0	0	0	0	0

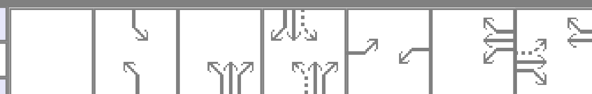
HCS 2010 Signalized Intersection Results Summary



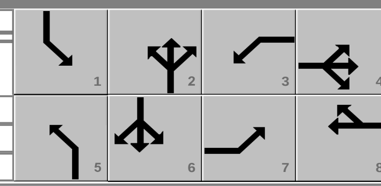
General Information				Intersection Information	
Agency	HDR			Duration, h	0.25
Analyst	MDF	Analysis Date	Jan 30, 2013	Area Type	Other
Jurisdiction		Time Period	AM Peak	PHF	0.83
Intersection	Mall Drive	Analysis Year	Existing (2012)	Analysis Period	1> 7:45
File Name	Existing_AM_North.xus				
Project Description					

Demand Information	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Demand (*v*), veh/h	10	30	40	120	30	10	45	30	120	5	20	5

Signal Information			
Cycle, s	43.2	Reference Phase	6
Offset, s	0	Reference Point	End
Uncoordinated	Yes	Simult. Gap E/W	Off
Force Mode	Float	Simult. Gap N/S	Off



Green	0.3	2.0	3.4	0.7	2.6	4.7
Yellow	3.0	0.0	4.5	3.0	4.5	4.5
Red	2.0	0.0	2.0	2.0	2.0	2.0



Timer Results	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Assigned Phase	7	4	3	8	5	2	1	6
Case Number	1.1	3.0	2.0	4.0	1.1	3.0	1.1	4.0
Phase Duration, s	5.7	11.2	14.7	20.2	7.4	11.9	5.3	9.9
Change Period, *($Y+R_c$)*, s	5.0	6.5	6.5	6.5	5.0	6.5	5.0	6.5
Max Allow Headway *(MAH)*, s	5.1	5.1	5.1	5.1	5.1	5.1	5.1	5.0
Queue Clearance Time *(g_s)*, s	2.3	2.5	3.8	2.4	3.3	2.9	2.2	2.3
Green Extension Time *(g_e)*, s	0.0	0.2	0.5	0.1	0.1	0.1	0.0	0.0
Phase Call Probability	0.13	0.67	0.82	0.93	0.48	0.82	0.07	0.67
Max Out Probability	0.00	0.00	0.05	0.00	0.00	0.00	0.00	0.00

Movement Group Results	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Assigned Movement	7	4	14	3	8	18	5	2	12	1	6	16
Adjusted Flow Rate (*v*), veh/h	12	36	5	145	19	19	54	36	25	6	13	13
Adjusted Saturation Flow Rate (*s*), veh/h/ln	1517	1516	1350	1473	1593	1558	1517	1593	1350	1517	1593	1566
Queue Service Time (g_s), s	0.3	0.5	0.1	1.8	0.4	0.4	1.3	0.9	0.7	0.2	0.3	0.3
Cycle Queue Clearance Time (g_c), s	0.3	0.5	0.1	1.8	0.4	0.4	1.3	0.9	0.7	0.2	0.3	0.3
Green Ratio (*g/C*)	0.12	0.11	0.11	0.19	0.32	0.32	0.18	0.13	0.13	0.09	0.08	0.08
Capacity (*c*), veh/h	324	328	146	562	507	496	339	200	169	273	124	122
Volume-to-Capacity Ratio *(X)*	0.037	0.110	0.033	0.257	0.038	0.039	0.160	0.181	0.150	0.022	0.102	0.104
Available Capacity (c_a), veh/h	827	2107	938	921	1107	1082	782	553	469	788	553	544
Back of Queue (*Q*), veh/ln (95th percentile)	0.2	0.3	0.1	1.0	0.2	0.2	0.7	0.5	0.4	0.1	0.2	0.2
Queue Storage Ratio *(RQ)* (95th percentile)	0.02	0.01	0.00	0.13	0.01	0.01	0.07	0.02	0.01	0.01	0.01	0.01
Uniform Delay (d_1), s/veh	16.7	17.4	17.2	14.9	10.2	10.2	15.1	16.9	16.8	18.1	18.5	18.5
Incremental Delay (d_2), s/veh	0.1	0.2	0.1	0.3	0.0	0.0	0.3	0.6	0.6	0.0	0.5	0.5
Initial Queue Delay (d_3), s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Control Delay (*d*), s/veh	16.8	17.6	17.4	15.2	10.2	10.2	15.4	17.5	17.4	18.2	19.0	19.0
Level of Service (LOS)	B	B	B	B	B	B	B	B	B	B	B	B
Approach Delay, s/veh / LOS	17.4	B		14.1	B		16.5	B		18.9	B	
Intersection Delay, s/veh / LOS	15.7						B					

Multimodal Results	EB		WB		NB		SB	
Pedestrian LOS Score / LOS	3.0	C	2.4	B	2.9	C	3.0	C
Bicycle LOS Score / LOS	0.5	A	0.6	A	0.7	A	0.5	A

 HCS 2010™ Streets Version 6.50 Generated: 1/31/2013 4:11:18 PM

This Signals text report was created on January 31, 2013 at 04:13:06

Intersection number = 3, Segment number = 2, Period number = 1

Chapter 18 Summary Input

Cycle Length, s 43.16

	EB LT	EB TH	EB RT	WB LT	WB TH	WB RT	NB LT	NB TH	NB RT	SB LT	SB TH	SB RT
Movement	7	4	14	3	8	18	5	2	12	1	6	16
Volume, veh/h	10	30	40	120	30	10	45	30	120	5	20	5
Lanes	1	2	1	2	2	0	1	1	1	1	2	0
Bay Length, ft	250	1000	850	200	500	200	275	851	851	300	1000	0
Receiving Lanes	2	2	2	2	2	2	1	1	1	2	2	2
SatFlow, vplphg	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800
Lane Width, ft	12	12	12	12	12	12	12	12	12	12	12	12
Heavy Vehicles, %	13	13	13	13	13	2	13	13	13	13	13	0
Grade, %	0	0	0	0	0	0	0	0	0	0	0	0
Buses, per h	0	0	0	0	0	0	0	0	0	0	0	0
Parking, per h	0	0	0	0	0	0	0	0	0	0	0	0
Bicycles, per h	0	0	0	0	0	0	0	0	0	0	0	0
Pedestrians, per h	0	0	0	0	0	0	0	0	0	0	0	0
Heavy Veh Equivalent	2	2	2	2	2	2	2	2	2	2	2	2
Bus Blockage Time	14.4	14.4	14.4	14.4	14.4	14.4	14.4	14.4	14.4	14.4	14.4	14.4
Turns in Shrd Ln, %	0	0	0	0	0	0	0	0	0	0	0	0
Unopposed Lefts, %	0	0	0	0	0	0	0	0	0	0	0	0
Parking Time, sec	18	18	18	18	18	18	18	18	18	18	18	18
Arrival Type	3	3	3	3	3	3	3	3	3	3	3	3
Initial Queue, veh	0	0	0	0	0	0	0	0	0	0	0	0
Speed Limit, mph	30	30	30	30	30	30	35	35	35	35	35	35
Detector Length, ft	40	40	40	40	40	40	40	40	40	40	40	40
StartLostTime, sec	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0
EndUseTime, sec	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0
RTOR, veh/h		36			8			99			4	
I-Factor		1.00			1.00			1.00			1.00	
Walk + PC, sec		0.0			0.0			0.0			0.0	

	EB	EB	WB	WB	NB	NB	SB	SB
Phase	7	4	3	8	5	2	1	6
Movement	LT	LT+TH+RT	LT	TH+RT	LT	LT+TH+RT	LT	LT+TH+RT
Left-Turn Mode	Pr/Pm	--	Prot.	--	Pr/Pm	--	Pr/Pm	--
Phase Splits, s	15.0	30.0	13.5	30.0	15.0	15.0	15.0	15.0
Yellow Change, s	3.0	4.5	4.5	4.5	3.0	4.5	3.0	4.5
Red Clearance, s	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0
Minimum Green, s	5	7	10	10	5	5	5	5
Lead/Lag	Lead		Lead		Lead		Lead	
Passage Time, s	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Recall	Off	Off	Off	Off	Off	Off	Off	Off
Dual Entry	No	Yes	No	Yes	No	Yes	No	Yes
Prot. Right-Turn	False	False	False	False	False	False	False	False

	E/W	N/S
Simultaneous Gap out	Off	Off
Dallas Phasing	Off	Off

Cycle Length, s	84
Offset, s	0
Reference Phase	6
Reference Point	End
Force Mode	Float
Uncoordinated	Yes
Field Measured Phase Times	No
Exclusive Ped Phase Time, s	0.0

Timer:	1	2	3	4	5	6	7	8
Assigned Phase	1	2	3	4	5	6	7	8
Assigned Left-Turn Mvmt.	1	0	3	0	5	0	7	0
Assigned Through Mvmt.	0	2	0	4	0	6	0	8
Assigned Right-Turn Mvmt.	0	12	0	14	0	16	0	18
Timer w/Pr-Pm From Shared	0	0	0	0	0	0	0	0

Chapter 18 Summary Output

Cycle Length, s 43.16

	EB LT	EB TH	EB RT	WB LT	WB TH	WB RT	NB LT	NB TH	NB RT	SB LT	SB TH	SB RT
Movement	7	4	14	3	8	18	5	2	12	1	6	16
Volume, veh/h	12.05	36.14	4.82	144.58	36.14	2.41	54.22	36.14	25.3	6.02	24.1	1.2
SatFlow, veh/h/ln	1592.9	1592.9	1592.9	1592.9	1592.9	0	1592.9	1592.9	1592.9	1592.9	1592.9	0
Lane Util Factor	1	0.95	1	0.97	1	1	1	1	1	1	1	1
Capacity, veh/h	323.74	328.38	146.16	562.49	940.82	62.03	338.99	199.54	169.1	272.95	234.41	11.62
Discharge Vol, veh/h	0	0	4.82	144.58	0	0	0	0	0	0	24.1	0
Prop Arriv On Green	0.02	0.11	0.11	0.19	0.32	0.32	0.06	0.13	0.13	0.01	0.08	0.08
Apprch Vol, veh/h	0	53.01	0	0	183.13	0	0	115.66	0	0	31.33	0
Apprch Stops, #/veh	0	0.81	0	0	0.71	0	0	0.8	0	0	0.85	0
Apprch Delay, s/veh	0	17.38	0	0	14.15	0	0	16.5	0	0	18.85	0

Apprch LOS	B	B	B	B

Int Delay, s/veh	15.69
Int LOS	B

Timer Data

Timer:	1	2	3	4	5	6	7	8
Assigned Phase	1	2	3	4	5	6	7	8
Case No	1.1	3	2	3	1.1	4	1.1	4
Phase Duration, s	5.35	11.9	14.74	11.17	7.39	9.86	5.67	20.24
Change Period, s	5	6.5	6.5	6.5	5	6.5	5	6.5
Max Allow Headway, s	5.08	5.13	5.14	5.08	5.08	5	5.14	5.06
Max Green Setting, s	15	15	13.5	30	15	15	15	30
Queue Clear Time, s	2.16	2.88	3.8	2.46	3.31	2.32	2.3	2.37
Green Exten Time, s	0	0.15	0.48	0.16	0.12	0.04	0.01	0.13
Prob of Phase Call	0.07	0.82	0.82	0.67	0.48	0.67	0.13	0.93
Prob of Max Out	0	0	0.05	0	0	0	0	0
Left-Turn Movement Data								
Assigned Movement	1	0	3	0	5	0	7	0
Mvmt. Sat Flow, veh/h	1517.07	0	2946.14	0	1517.07	0	1517.07	0
Through Movement Data								
Assigned Movement	0	2	0	4	0	6	0	8
Mvmt. Sat Flow, veh/h	0	1592.92	0	3032.92	0	3009.76	0	2955.86
Right-Turn Movement Data								
Assigned Movement	0	12	0	14	0	16	0	18
Mvmt. Sat Flow, veh/h	0	1349.93	0	1349.93	0	149.22	0	194.9

Left Lane Group Output

Timer:	1	2	3	4	5	6	7	8
Assigned Phase	1	2	3	4	5	6	7	8
Left Lane Group Data								
Assigned Movement	1	0	3	0	5	0	7	0
Lane Assignment	L Pr/Pm		L (Prot)		L Pr/Pm		L Pr/Pm	
Lanes in Group	1	0	2	0	1	0	1	0
Group Volume, veh/h	6.02	0	144.58	0	54.22	0	12.05	0
Group SatFlow, vphpl	1517.07	0	1473.07	0	1517.07	0	1517.07	0
Queue Serve Time, s	0.16	0	1.8	0	1.31	0	0.3	0
Cycle Clear Time, s	0.16	0	1.8	0	1.31	0	0.3	0
Perm SatFlow, vphpl	1205.48	0	0	0	1245.54	0	1230.71	0
Shared SatFlow, vphpl								
Perm Eff Green, s	3.36	0	0	0	5.41	0	4.67	0
Perm Serve Time, s	3.38	0	0	0	3.05	0	4.7	0
Perm Que Serve Time, s	0				0.11		0	
Time to first Blk, s	0	0	0	0	0	0	0	0
Serve Time pre Blk, s								
Prop Inside Lane	1	0	1	0	1	0	1	0
Lane Grp Capacity, vph	272.95		562.49		338.99		323.74	
v/c Ratio	0.02	0	0.26	0	0.16	0	0.04	0
Avail Capacity, veh/h	787.67		921.14		781.82		827.04	
I-Factor	1	0	1	0	1	0	1	0
Uniform Delay, s/veh	18.11		14.86		15.09		16.7	
Increm Delay, s/veh	0.05	0	0.34	0	0.31	0	0.07	0
Overflow Delay, s/veh	0	0	0	0	0	0	0	0
Control Delay, s/veh	18.15		15.2		15.4		16.77	
Group LOS	B		B		B		B	
Uniform Stops, #/veh	0.81		0.72		0.77		0.8	
Increm Stops, #/veh	0.02	0	0.02	0	0.02	0	0.02	0
Overflow Stops, #/veh	0	0	0	0	0	0	0	0
Stop Rate, #/veh	0.84		0.74		0.8		0.83	
Uniform Queue, veh/ln	0.05		0.51		0.36		0.09	
Increm Queue, veh/ln	0	0	0.03	0	0.03	0	0.01	0
Overflow Queue, veh/ln	0	0	0	0	0	0	0	0
Back of Queue Factor	1.8	0	1.8	0	1.8	0	1.8	0
Back of Queue, veh/ln	0.09		0.96		0.71		0.17	
Storage Ratio	0.01	0	0.13	0	0.07	0	0.02	0
Initial Queue, veh	0	0	0	0	0	0	0	0
Final Queue, veh	0	0	0	0	0	0	0	0
Saturated Delay, s/veh	0	0	0	0	0	0	0	0
Saturated Stops, #/veh	0	0	0	0	0	0	0	0
Saturated Queue, veh/ln	0	0	0	0	0	0	0	0
Saturated Capacity, vph	0	0	0	0	0	0	0	0
Init Que Clear Time, s	0	0	0	0	0	0	0	0

Thru Lane Group Output

Timer:	1	2	3	4	5	6	7	8
Assigned Phase	1	2	3	4	5	6	7	8
Thru Lane Group Data								
Assigned Movement	0	2	0	4	0	6	0	8
Lane Assignment		T		T		T		T
Lanes in Group	0	1	0	2	0	1	0	1
Group Volume, veh/h	0	36.14	0	36.14	0	12.66	0	19.29
Group SatFlow, vphpl	0	1592.92	0	1516.46	0	1592.92	0	1592.92
Queue Serve Time, s	0	0.88	0	0.46	0	0.32	0	0.36
Cycle Clear Time, s	0	0.88	0	0.46	0	0.32	0	0.36
Lane Grp Capacity, vph		199.54		328.38		124.06		507.01
v/c Ratio	0	0.18	0	0.11	0	0.1	0	0.04
Avail Capacity, veh/h		553.38		2107.28		553.38		1106.76
I-Factor	0	1	0	1	0	1	0	1

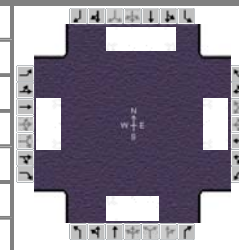
Uniform Delay, s/veh		16.9		17.37		18.5		10.16
Increm Delay, s/veh	0	0.61	0	0.21	0	0.51	0	0.04
Overflow Delay, s/veh	0	0	0	0	0	0	0	0
Control Delay, s/veh		17.51		17.58		19.01		10.2
Group LOS		B		B		B		B
Uniform Stops, #/veh		0.76		0.78		0.79		0.58
Increm Stops, #/veh	0	0.04	0	0.02	0	0.06	0	0.01
Overflow Stops, #/veh	0	0	0	0	0	0	0	0
Stop Rate, #/veh		0.8		0.8		0.85		0.59
Uniform Queue, veh/ln		0.27		0.14		0.1		0.1
Increm Queue, veh/ln	0	0.03	0	0.01	0	0.02	0	0.01
Overflow Queue, veh/ln	0	0	0	0	0	0	0	0
Back of Queue Factor	0	1.8	0	1.8	0	1.8	0	1.8
Back of Queue, veh/ln		0.54		0.27		0.21		0.19
Storage Ratio	0	0.02	0	0.01	0	0.01	0	0.01
Initial Queue, veh	0	0	0	0	0	0	0	0
Final Queue, veh	0	0	0	0	0	0	0	0
Saturated Delay, s/veh	0	0	0	0	0	0	0	0
Saturated Stops, #/veh	0	0	0	0	0	0	0	0
Saturated Queue, veh/ln	0	0	0	0	0	0	0	0
Saturated Capacity, vph	0	0	0	0	0	0	0	0
Init Que Clear Time, s	0	0	0	0	0	0	0	0

Right Lane Group Output

Timer:	1	2	3	4	5	6	7	8
Assigned Phase	1	2	3	4	5	6	7	8
Right Lane Group Data								
Assigned Movement	0	12	0	14	0	16	0	18
Lane Assignment		R		R		T+R		T+R
Lanes in Group	0	1	0	1	0	1	0	1
Group Volume, veh/h	0	25.3	0	4.82	0	12.64	0	19.26
Group SatFlow, vphpl	0	1349.93	0	1349.93	0	1566.06	0	1557.84
Queue Serve Time, s	0	0.72	0	0.14	0	0.32	0	0.37
Cycle Clear Time, s	0	0.72	0	0.14	0	0.32	0	0.37
Prot RT SatFlow, vphpl		0		0				
Prot RT Eff Green, s		0		0				
Prop Outside Lane	0	1	0	1	0	0.1	0	0.13
Lane Grp Capacity, vph		169.1		146.16		121.99		495.87
v/c Ratio	0	0.15	0	0.03	0	0.1	0	0.04
Avail Capacity, veh/h		468.97		937.94		544.07		1082.41
I-Factor	0	1	0	1	0	1	0	1
Uniform Delay, s/veh		16.83		17.23		18.51		10.16
Increm Delay, s/veh	0	0.57	0	0.13	0	0.52	0	0.05
Overflow Delay, s/veh	0	0	0	0	0	0	0	0
Control Delay, s/veh		17.41		17.36		19.03		10.2
Group LOS		B		B		B		B
Uniform Stops, #/veh		0.75		0.77		0.79		0.58
Increm Stops, #/veh	0	0.05	0	0.05	0	0.06	0	0.01
Overflow Stops, #/veh	0	0	0	0	0	0	0	0
Stop Rate, #/veh		0.8		0.82		0.85		0.59
Uniform Queue, veh/ln		0.18		0.04		0.1		0.1
Increm Queue, veh/ln	0	0.03	0	0.01	0	0.02	0	0.01
Overflow Queue, veh/ln	0	0	0	0	0	0	0	0
Back of Queue Factor	0	1.8	0	1.8	0	1.8	0	1.8
Back of Queue, veh/ln		0.38		0.08		0.21		0.19
Storage Ratio	0	0.01	0	0	0	0.01	0	0.01
Initial Queue, veh	0	0	0	0	0	0	0	0
Final Queue, veh	0	0	0	0	0	0	0	0
Saturated Delay, s/veh	0	0	0	0	0	0	0	0
Saturated Stops, #/veh	0	0	0	0	0	0	0	0
Saturated Queue, veh/ln	0	0	0	0	0	0	0	0
Saturated Capacity, vph	0	0	0	0	0	0	0	0
Init Que Clear Time, s	0	0	0	0	0	0	0	0

HCS 2010 Signalized Intersection Results Summary

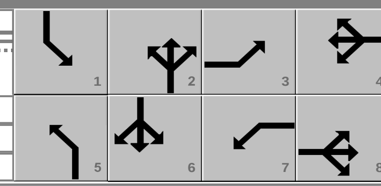
General Information				Intersection Information	
Agency	HDR			Duration, h	0.25
Analyst	MDF	Analysis Date	Jan 30, 2013	Area Type	Other
Jurisdiction		Time Period	PM Peak	PHF	0.90
Intersection	Eglin St	Analysis Year	Existing (2012)	Analysis Period	1> 16:45
File Name	Existing_PM_North.xus				
Project Description					



Demand Information	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Demand (v), veh/h	270	120	220	45	110	70	260	520	25	35	490	325

Signal Information			
Cycle, s	98.8	Reference Phase	2
Offset, s	0	Reference Point	End
Uncoordinated	Yes	Simult. Gap E/W	Off
Force Mode	Float	Simult. Gap N/S	Off

Green	3.3	1.9	40.0	3.7	5.8	10.0
Yellow	3.2	3.2	3.9	3.2	3.2	3.2
Red	2.3	2.3	2.5	2.3	2.3	2.5



Timer Results	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Assigned Phase	3	8	7	4	5	2	1	6
Case Number	1.1	3.0	1.1	3.0	1.1	4.0	1.1	3.0
Phase Duration, s	20.5	27.0	9.2	15.7	16.2	53.8	8.8	46.4
Change Period, *($Y+R_c$)*, s	5.5	5.7	5.5	5.7	5.5	6.4	5.5	6.4
Max Allow Headway *(MAH)*, s	5.1	5.1	5.1	5.1	5.1	5.0	5.1	5.1
Queue Clearance Time *(g_s)*, s	15.2	8.3	4.6	8.6	10.0	14.1	3.3	13.4
Green Extension Time *(g_e)*, s	0.0	0.8	0.1	0.5	0.7	3.5	0.1	4.5
Phase Call Probability	1.00	1.00	0.75	1.00	1.00	1.00	0.66	1.00
Max Out Probability	1.00	0.00	0.01	0.00	1.00	0.01	0.00	0.01

Movement Group Results	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Assigned Movement	3	8	18	7	4	14	5	2	12	1	6	16
Adjusted Flow Rate *(v)*, veh/h	300	133	50	50	122	11	289	272	332	39	544	139
Adjusted Saturation Flow Rate *(s)*, veh/h/ln	1681	1765	1496	1681	1765	1496	1681	1429	1741	1681	1680	1496
Queue Service Time *(g_s)*, s	13.2	6.3	2.7	2.6	6.6	0.7	8.0	12.1	12.1	1.3	11.4	6.0
Cycle Queue Clearance Time *(g_c)*, s	13.2	6.3	2.7	2.6	6.6	0.7	8.0	12.1	12.1	1.3	11.4	6.0
Green Ratio *(g/C)*	0.39	0.22	0.22	0.14	0.10	0.10	0.61	0.48	0.48	0.44	0.40	0.40
Capacity *(c)*, veh/h	371	380	322	257	179	151	473	686	835	419	1360	606
Volume-to-Capacity Ratio *(X)*	0.808	0.351	0.155	0.194	0.684	0.073	0.610	0.396	0.397	0.093	0.400	0.229
Available Capacity *(c_a)*, veh/h	371	447	378	449	447	378	547	686	835	619	1360	606
Back of Queue *(Q)*, veh/ln (95th percentile)	10.5	4.9	1.8	2.0	5.7	0.5	5.1	7.2	8.4	0.9	7.6	3.8
Queue Storage Ratio *(RQ)* (95th percentile)	1.07	0.25	0.22	0.20	0.29	0.03	0.44	0.18	0.21	0.06	0.18	0.35
Uniform Delay *(d_1)*, s/veh	25.1	32.9	31.5	37.7	42.9	40.2	12.7	16.5	16.5	16.1	20.9	19.3
Incremental Delay *(d_2)*, s/veh	13.1	0.8	0.3	0.5	6.4	0.3	2.0	1.7	1.4	0.1	0.8	0.8
Initial Queue Delay *(d_3)*, s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Control Delay *(d)*, s/veh	38.1	33.7	31.8	38.3	49.3	40.5	14.7	18.2	17.9	16.2	21.7	20.1
Level of Service (LOS)	D	C	C	D	D	D	B	B	B	B	C	C
Approach Delay, s/veh / LOS	36.2	D		45.8	D		17.0	B		21.1	C	
Intersection Delay, s/veh / LOS	24.7						C					

Multimodal Results	EB		WB		NB		SB	
Pedestrian LOS Score / LOS	2.8	C	3.3	C	2.5	B	2.7	B
Bicycle LOS Score / LOS	1.3	A	0.8	A	1.2	A	1.1	A

This Signals text report was created on January 31, 2013 at 04:14:59

Intersection number = 1, Segment number = 1, Period number = 1

Chapter 18 Summary Input

Cycle Length, s 98.79

	EB LT	EB TH	EB RT	WB LT	WB TH	WB RT	NB LT	NB TH	NB RT	SB LT	SB TH	SB RT
Movement	3	8	18	7	4	14	5	2	12	1	6	16
Volume, veh/h	270	120	220	45	110	70	260	520	25	35	490	325
Lanes	1	1	1	1	1	1	1	2	0	1	2	1
Bay Length, ft	250	500	200	250	500	350	300	1000	150	350	1073	275
Receiving Lanes	1	1	1	1	1	1	2	2	2	2	2	2
SatFlow, vplphg	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800
Lane Width, ft	12	12	12	12	12	12	12	12	12	12	12	12
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Grade, %	0	0	0	0	0	0	0	0	0	0	0	0
Buses, per h	0	0	0	0	0	0	0	0	0	0	0	0
Parking, per h	0	0	0	0	0	0	0	0	0	0	0	0
Bicycles, per h	0	0	0	0	0	0	0	0	0	0	0	0
Pedestrians, per h	0	0	0	0	0	0	0	0	0	0	0	0
Heavy Veh Equivalent	2	2	2	2	2	2	2	2	2	2	2	2
Bus Blockage Time	14.4	14.4	14.4	14.4	14.4	14.4	14.4	14.4	14.4	14.4	14.4	14.4
Turns in Shrd Ln, %	0	0	0	40	0	0	0	0	0	0	0	0
Unopposed Lefts, %	0	0	0	0	0	0	0	0	0	0	0	0
Parking Time, sec	18	18	18	18	18	18	18	18	18	18	18	18
Arrival Type	3	3	3	3	3	3	3	3	3	3	3	3
Initial Queue, veh	0	0	0	0	0	0	0	0	0	0	0	0
Speed Limit, mph	30	30	30	30	30	30	35	35	35	35	35	35
Detector Length, ft	40	40	40	40	40	40	40	40	40	40	40	40
StartLostTime, sec	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0
EndUseTime, sec	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0
RTOR, veh/h		175			60			2			200	
I-Factor		1.00			1.00			1.00			0.89	
Walk + PC, sec		0.0			0.0			0.0			0.0	

	EB	EB	WB	WB	NB	NB	SB	SB
Phase	3	8	7	4	5	2	1	6
Movement	LT	LT+TH+RT	LT	LT+TH+RT	LT	LT+TH+RT	LT	LT+TH+RT
Left-Turn Mode	Pr/Pm	--	Pr/Pm	--	Pr/Pm	--	Pr/Pm	--
Phase Splits, s	15.0	25.0	15.0	25.0	15.0	40.0	15.0	40.0
Yellow Change, s	3.2	3.2	3.2	3.2	3.2	3.9	3.2	3.9
Red Clearance, s	2.3	2.5	2.3	2.5	2.3	2.5	2.3	2.5
Minimum Green, s	5	10	5	10	5	15	5	15
Lead/Lag	Lead		Lead		Lead		Lead	
Passage Time, s	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Recall	Off	Off	Off	Off	Off	Max	Off	Max
Dual Entry	No	Yes	No	Yes	No	Yes	No	Yes
Prot. Right-Turn	False	False	False	False	False	False	False	False

	E/W	N/S
Simultaneous Gap out	Off	Off
Dallas Phasing	Off	Off

Cycle Length, s	84
Offset, s	0
Reference Phase	2
Reference Point	End
Force Mode	Float
Uncoordinated	Yes
Field Measured Phase Times	No
Exclusive Ped Phase Time, s	0.0

Timer:	1	2	3	4	5	6	7	8
Assigned Phase	1	2	3	4	5	6	7	8
Assigned Left-Turn Mvmt.	1	0	3	0	5	0	7	0
Assigned Through Mvmt.	0	2	0	4	0	6	0	8
Assigned Right-Turn Mvmt.	0	12	0	14	0	16	0	18
Timer w/Pr-Pm From Shared	0	0	0	0	0	0	0	0

Chapter 18 Summary Output

Cycle Length, s 98.79

	EB LT	EB TH	EB RT	WB LT	WB TH	WB RT	NB LT	NB TH	NB RT	SB LT	SB TH	SB RT
Movement	3	8	18	7	4	14	5	2	12	1	6	16
Volume, veh/h	300	133.33	50	50	122.22	11.11	288.89	577.78	25.56	38.89	544.44	138.89
SatFlow, veh/h/ln	1764.7	1764.7	1764.7	1764.7	1764.7	1764.7	1764.7	1764.7	0	1764.7	1764.7	1764.7
Lane Util Factor	1	1	1	1	1	1	1	0.81	1	1	0.95	1
Capacity, veh/h	371.11	379.9	321.95	257.42	178.64	151.39	473.44	1456.8	64.38	419.28	1360.5	605.53
Discharge Vol, veh/h	300	0	0	0	0	11.11	0	577.78	0	0	0	0
Prop Arriv On Green	0.15	0.22	0.22	0.04	0.1	0.1	0.11	0.48	0.48	0.03	0.4	0.4
Apprch Vol, veh/h	0	483.33	0	0	183.33	0	0	892.22	0	0	722.22	0
Apprch Stops, #/veh	0	0.81	0	0	0.88	0	0	0.47	0	0	0.54	0
Apprch Delay, s/veh	0	36.24	0	0	45.75	0	0	16.98	0	0	21.06	0

Apprch LOS	D		D		B		C	
Int Delay, s/veh 24.66								
Int LOS C								

Timer Data

Timer:	1	2	3	4	5	6	7	8
Assigned Phase	1	2	3	4	5	6	7	8
Case No	1.1	4	1.1	3	1.1	3	1.1	3
Phase Duration, s	8.78	53.81	20.5	15.7	16.19	46.4	9.23	26.97
Change Period, s	5.5	6.4	5.5	5.7	5.5	6.4	5.5	5.7
Max Allow Headway, s	5.08	5	5.14	5.07	5.08	5.06	5.14	5.14
Max Green Setting, s	15	40	15	25	15	40	15	25
Queue Clear Time, s	3.31	14.09	15.15	8.61	10.03	13.37	4.61	8.34
Green Exten Time, s	0.07	3.49	0	0.52	0.66	4.51	0.1	0.8
Prob of Phase Call	0.66	1	1	1	1	1	0.75	1
Prob of Max Out	0	0.01	1	0	1	0.01	0.01	0
Left-Turn Movement Data								
Assigned Movement	1	0	3	0	5	0	7	0
Mvmt. Sat Flow, veh/h	1680.67	0	1680.67	0	1680.67	0	1680.67	0
Through Movement Data								
Assigned Movement	0	2	0	4	0	6	0	8
Mvmt. Sat Flow, veh/h	0	3035.77	0	1764.71	0	3360	0	1764.71
Right-Turn Movement Data								
Assigned Movement	0	12	0	14	0	16	0	18
Mvmt. Sat Flow, veh/h	0	134.15	0	1495.51	0	1495.51	0	1495.51

Left Lane Group Output

Timer:	1	2	3	4	5	6	7	8
Assigned Phase	1	2	3	4	5	6	7	8
Left Lane Group Data								
Assigned Movement	1	0	3	0	5	0	7	0
Lane Assignment	L Pr/Pm		L Pr/Pm		L Pr/Pm		L Pr/Pm	
Lanes in Group	1	0	1	0	1	0	1	0
Group Volume, veh/h	38.89	0	300	0	288.89	0	50	0
Group SatFlow, vphpl	1680.67	0	1680.67	0	1680.67	0	1680.67	0
Queue Serve Time, s	1.31	0	13.15	0	8.03	0	2.61	0
Cycle Clear Time, s	1.31	0	13.15	0	8.03	0	2.61	0
Perm SatFlow, vphpl	812.91	0	1251.21	0	754.71	0	1195.61	0
Shared SatFlow, vphpl								
Perm Eff Green, s	40	0	23.27	0	49.41	0	10	0
Perm Serve Time, s	35.31	0	3.4	0	28.63	0	10.01	0
Perm Que Serve Time, s	0.24		3.4		12.89		0	
Time to first Blk, s	0	0	0	0	0	0	0	0
Serve Time pre Blk, s								
Prop Inside Lane	1	0	1	0	1	0	1	0
Lane Grp Capacity, vph	419.28		371.11		473.44		257.42	
v/c Ratio	0.09	0	0.81	0	0.61	0	0.19	0
Avail Capacity, veh/h	618.64		371.11		546.76		449.1	
I-Factor	0.89	0	1	0	1	0	1	0
Uniform Delay, s/veh	16.08		25.06		12.69		37.74	
Increm Delay, s/veh	0.12	0	13.06	0	2.04	0	0.52	0
Overflow Delay, s/veh	0	0	0	0	0	0	0	0
Control Delay, s/veh	16.2		38.12		14.73		38.26	
Group LOS	B		D		B		D	
Uniform Stops, #/veh	0.35		0.67		0.36		0.73	
Increm Stops, #/veh	0.02	0	0.19	0	0.04	0	0.03	0
Overflow Stops, #/veh	0	0	0	0	0	0	0	0
Stop Rate, #/veh	0.37		0.86		0.39		0.76	
Uniform Queue, veh/ln	0.48		5.01		2.59		1.06	
Increm Queue, veh/ln	0.01	0	1.35	0	0.27	0	0.04	0
Overflow Queue, veh/ln	0	0	0	0	0	0	0	0
Back of Queue Factor	1.8	0	1.65	0	1.8	0	1.8	0
Back of Queue, veh/ln	0.89		10.49		5.15		1.97	
Storage Ratio	0.06	0	1.07	0	0.44	0	0.2	0
Initial Queue, veh	0	0	0	0	0	0	0	0
Final Queue, veh	0	0	0	0	0	0	0	0
Saturated Delay, s/veh	0	0	0	0	0	0	0	0
Saturated Stops, #/veh	0	0	0	0	0	0	0	0
Saturated Queue, veh/ln	0	0	0	0	0	0	0	0
Saturated Capacity, vph	0	0	0	0	0	0	0	0
Init Que Clear Time, s	0	0	0	0	0	0	0	0

Thru Lane Group Output

Timer:	1	2	3	4	5	6	7	8
Assigned Phase	1	2	3	4	5	6	7	8
Thru Lane Group Data								
Assigned Movement	0	2	0	4	0	6	0	8
Lane Assignment		T		T		T		T
Lanes in Group	0	1	0	1	0	2	0	1
Group Volume, veh/h	0	271.76	0	122.22	0	544.44	0	133.33
Group SatFlow, vphpl	0	1429.36	0	1764.71	0	1680	0	1764.71
Queue Serve Time, s	0	12.06	0	6.61	0	11.37	0	6.34
Cycle Clear Time, s	0	12.06	0	6.61	0	11.37	0	6.34
Lane Grp Capacity, vph		685.94		178.64		1360.45		379.9
v/c Ratio	0	0.4	0	0.68	0	0.4	0	0.35
Avail Capacity, veh/h		685.94		446.58		1360.45		446.58
I-Factor	0	1	0	1	0	0.89	0	1

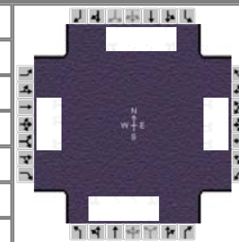
Uniform Delay, s/veh		16.5		42.87		20.88		32.9
Increm Delay, s/veh	0	1.71	0	6.43	0	0.78	0	0.79
Overflow Delay, s/veh	0	0	0	0	0	0	0	0
Control Delay, s/veh		18.21		49.3		21.66		33.69
Group LOS		B		D		C		C
Uniform Stops, #/veh		0.45		0.82		0.53		0.7
Increm Stops, #/veh	0	0.05	0	0.11	0	0.02	0	0.03
Overflow Stops, #/veh	0	0	0	0	0	0	0	0
Stop Rate, #/veh		0.51		0.93		0.56		0.73
Uniform Queue, veh/ln		3.68		2.83		4.23		2.67
Increm Queue, veh/ln	0	0.33	0	0.32	0	0.15	0	0.08
Overflow Queue, veh/ln	0	0	0	0	0	0	0	0
Back of Queue Factor	0	1.8	0	1.8	0	1.74	0	1.8
Back of Queue, veh/ln		7.22		5.68		7.62		4.95
Storage Ratio	0	0.18	0	0.29	0	0.18	0	0.25
Initial Queue, veh	0	0	0	0	0	0	0	0
Final Queue, veh	0	0	0	0	0	0	0	0
Saturated Delay, s/veh	0	0	0	0	0	0	0	0
Saturated Stops, #/veh	0	0	0	0	0	0	0	0
Saturated Queue, veh/ln	0	0	0	0	0	0	0	0
Saturated Capacity, vph	0	0	0	0	0	0	0	0
Init Que Clear Time, s	0	0	0	0	0	0	0	0

Right Lane Group Output

Timer:	1	2	3	4	5	6	7	8
Assigned Phase	1	2	3	4	5	6	7	8
Right Lane Group Data								
Assigned Movement	0	12	0	14	0	16	0	18
Lane Assignment		T+R		R		R		R
Lanes in Group	0	1	0	1	0	1	0	1
Group Volume, veh/h	0	331.58	0	11.11	0	138.89	0	50
Group SatFlow, vphpl	0	1740.56	0	1495.51	0	1495.51	0	1495.51
Queue Serve Time, s	0	12.09	0	0.66	0	6.02	0	2.68
Cycle Clear Time, s	0	12.09	0	0.66	0	6.02	0	2.68
Prot RT SatFlow, vphpl				0		0		0
Prot RT Eff Green, s				0		0		0
Prop Outside Lane	0	0.08	0	1	0	1	0	1
Lane Grp Capacity, vph		835.29		151.39		605.53		321.95
v/c Ratio	0	0.4	0	0.07	0	0.23	0	0.16
Avail Capacity, veh/h		835.29		378.46		605.53		378.46
I-Factor	0	1	0	1	0	0.89	0	1
Uniform Delay, s/veh		16.51		40.2		19.28		31.47
Increm Delay, s/veh	0	1.41	0	0.29	0	0.78	0	0.32
Overflow Delay, s/veh	0	0	0	0	0	0	0	0
Control Delay, s/veh		17.92		40.49		20.07		31.79
Group LOS		B		D		C		C
Uniform Stops, #/veh		0.46		0.77		0.49		0.67
Increm Stops, #/veh	0	0.04	0	0.05	0	0.04	0	0.02
Overflow Stops, #/veh	0	0	0	0	0	0	0	0
Stop Rate, #/veh		0.5		0.82		0.53		0.69
Uniform Queue, veh/ln		4.5		0.24		2		0.96
Increm Queue, veh/ln	0	0.33	0	0.01	0	0.13	0	0.03
Overflow Queue, veh/ln	0	0	0	0	0	0	0	0
Back of Queue Factor	0	1.75	0	1.8	0	1.8	0	1.8
Back of Queue, veh/ln		8.43		0.46		3.83		1.77
Storage Ratio	0	0.21	0	0.03	0	0.35	0	0.22
Initial Queue, veh	0	0	0	0	0	0	0	0
Final Queue, veh	0	0	0	0	0	0	0	0
Saturated Delay, s/veh	0	0	0	0	0	0	0	0
Saturated Stops, #/veh	0	0	0	0	0	0	0	0
Saturated Queue, veh/ln	0	0	0	0	0	0	0	0
Saturated Capacity, vph	0	0	0	0	0	0	0	0
Init Que Clear Time, s	0	0	0	0	0	0	0	0

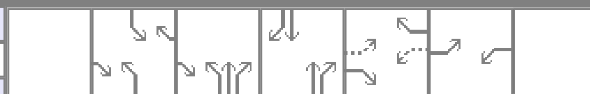
HCS 2010 Signalized Intersection Results Summary

General Information				Intersection Information	
Agency	HDR			Duration, h	0.25
Analyst	MDF	Analysis Date	Jan 30, 2013	Area Type	Other
Jurisdiction		Time Period	PM Peak	PHF	0.90
Intersection	I-90 Ramps (SPUI)	Analysis Year	Existing (2012)	Analysis Period	1> 16:45
File Name	Existing_PM_North.xus				
Project Description					

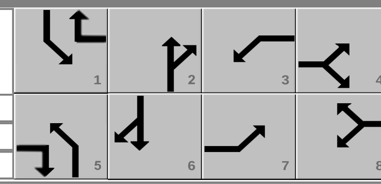


Demand Information	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Demand (*v*), veh/h	60		370	280		15	400	200	260	15	200	90

Signal Information			
Cycle, s	53.5	Reference Phase	2
Offset, s	0	Reference Point	End
Uncoordinated	Yes	Simult. Gap E/W	Off
Force Mode	Float	Simult. Gap N/S	Off



Green	1.1	9.8	15.0	0.0	5.6	0.0
Yellow	4.5	4.5	4.5	0.0	4.5	0.0
Red	1.0	1.0	1.0	0.0	1.0	0.0



Timer Results	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Assigned Phase	7	4	3	8	5	2	1	6
Case Number	1.4	3.0	1.4	3.0	2.0	3.0	2.0	3.0
Phase Duration, s	11.1	0.0	11.1	0.0	21.9	35.8	6.6	20.5
Change Period, *(Y+R$_c$)*, s	5.5	0.0	5.5	0.0	5.5	5.5	5.5	5.5
Max Allow Headway *(MAH)*, s	5.0	0.0	5.0	0.0	5.1	4.0	5.1	4.0
Queue Clearance Time *(g_s)*, s	2.0		4.1		15.3	3.6	2.5	4.7
Green Extension Time *(g_e)*, s	0.2	0.0	1.5	0.0	1.1	0.7	0.0	0.6
Phase Call Probability	0.63		0.99		1.00	1.00	0.22	1.00
Max Out Probability	0.00		0.01		1.00	0.00	0.00	0.01

Movement Group Results	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Assigned Movement	7		14	3		18	5	2	12	1	6	16
Adjusted Flow Rate (*v*), veh/h	67		0	311		0	444	222	0	17	222	0
Adjusted Saturation Flow Rate *(s)*, veh/h/ln	1632		1496	1632		1496	1681	1680	1496	1681	1680	1496
Queue Service Time (*g_s*), s	0.0		0.0	2.1		0.0	13.3	1.6	0.0	0.5	2.7	0.0
Cycle Queue Clearance Time (*g_c*), s	0.0		0.0	2.1		0.0	13.3	1.6	0.0	0.5	2.7	0.0
Green Ratio (*g/C*)	0.10		0.31	0.10		0.02	0.31	0.57	0.57	0.02	0.28	0.28
Capacity *(c)*, veh/h	504		462	504		34	516	1904	848	35	942	419
Volume-to-Capacity Ratio *(X)*	0.132		0.000	0.618		0.000	0.862	0.117	0.000	0.483	0.236	0.000
Available Capacity (*c_a*), veh/h	1323		487	1323		59	629	1904	848	471	942	419
Back of Queue *(Q)*, veh/ln (95th percentile)	0.6		0.0	2.9		0.0	9.1	0.7	0.0	0.6	1.7	0.0
Queue Storage Ratio *(RQ)* (95th percentile)	0.03		0.00	0.15		0.00	0.62	0.02	0.00	0.04	0.05	0.00
Uniform Delay (*d_1*), s/veh	23.3		0.0	23.7		0.0	17.5	5.4	0.0	25.9	14.8	0.0
Incremental Delay (*d_2*), s/veh	0.2		0.0	1.8		0.0	9.4	0.1	0.0	13.6	0.6	0.0
Initial Queue Delay (*d_3*), s/veh	0.0		0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0	0.0
Control Delay (*d*), s/veh	23.5		0.0	25.4		0.0	26.8	5.5	0.0	39.5	15.4	0.0
Level of Service (LOS)	C			C			C	A		D	B	
Approach Delay, s/veh / LOS	23.5	C		25.4	C		19.7	B		17.1	B	
Intersection Delay, s/veh / LOS	20.8						C					

Multimodal Results	EB		WB		NB		SB	
Pedestrian LOS Score / LOS	3.3	C	3.1	C	2.4	B	2.9	C
Bicycle LOS Score / LOS		F		F	1.0	A	0.7	A

 HCS 2010™ Streets Version 6.50 Generated: 1/31/2013 4:14:13 PM

This Signals text report was created on January 31, 2013 at 04:15:09

Intersection number = 2, Segment number = 1, Period number = 1

Chapter 18 Summary Input

Cycle Length, s 53.47

	EB LT	EB TH	EB RT	WB LT	WB TH	WB RT	NB LT	NB TH	NB RT	SB LT	SB TH	SB RT
Movement	7	4	14	3	8	18	5	2	12	1	6	16
Volume, veh/h	60	0	370	280	0	15	400	200	260	15	200	90
Lanes	2	0	1	2	0	1	1	2	1	1	2	1
Bay Length, ft	500	500	500	500	500	500	375	1073	500	350	851	450
Receiving Lanes	1	1	1	1	1	1	2	2	2	2	2	2
SatFlow, vplphg	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800
Lane Width, ft	12	12	12	12	12	12	12	12	12	12	12	12
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Grade, %	0	0	0	0	0	0	0	0	0	0	0	0
Buses, per h	0	0	0	0	0	0	0	0	0	0	0	0
Parking, per h	0	0	0	0	0	0	0	0	0	0	0	0
Bicycles, per h	0	0	0	0	0	0	0	0	0	0	0	0
Pedestrians, per h	0	0	0	0	0	0	0	0	0	0	0	0
Heavy Veh Equivalent	2	2	2	2	2	2	2	2	2	2	2	2
Bus Blockage Time	14.4	14.4	14.4	14.4	14.4	14.4	14.4	14.4	14.4	14.4	14.4	14.4
Turns in Shrd Ln, %	0	0	0	0	0	0	0	0	0	0	0	0
Unopposed Lefts, %	0	0	0	0	0	0	0	0	0	0	0	0
Parking Time, sec	18	18	18	18	18	18	18	18	18	18	18	18
Arrival Type	3	3	3	3	3	3	3	3	3	3	3	3
Initial Queue, veh	0	0	0	0	0	0	0	0	0	0	0	0
Speed Limit, mph	45	45	45	45	45	45	35	35	35	35	35	35
Detector Length, ft	40	40	40	40	40	40	40	40	40	40	40	40
StartLostTime, sec	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0
EndUseTime, sec	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0
RTOR, veh/h		370			15			260			90	
I-Factor		1.00			1.00			0.83			0.96	
Walk + PC, sec		0.0			0.0			0.0			0.0	

	EB	EB	WB	WB	NB	NB	SB	SB
Phase	7	4	3	8	5	2	1	6
Movement	LT	LT+RT	LT	LT+RT	LT	TH+RT	LT	TH+RT
Left-Turn Mode	Pr/Pm	--	Pr/Pm	--	Prot.	--	Prot.	--
Phase Splits, s	19.0	1.0	19.0	1.0	20.0	20.0	15.0	15.0
Yellow Change, s	4.5	0.0	4.5	0.0	4.5	4.5	4.5	4.5
Red Clearance, s	1.0	0.0	1.0	0.0	1.0	1.0	1.0	1.0
Minimum Green, s	5	1	5	1	5	7	5	7
Lead/Lag	Lag		Lag		Lead		Lead	
Passage Time, s	4.0	0.0	4.0	0.0	4.0	3.0	4.0	3.0
Recall	Off	Off	Off	Off	Off	Max	Off	Max
Dual Entry	No	Yes	No	Yes	No	Yes	No	Yes
Prot. Right-Turn	False	False	False	False	True	False	True	False

	E/W	N/S
Simultaneous Gap out	Off	Off
Dallas Phasing	Off	Off

Cycle Length, s	84
Offset, s	0
Reference Phase	2
Reference Point	End
Force Mode	Float
Uncoordinated	Yes
Field Measured Phase Times	No
Exclusive Ped Phase Time, s	0.0

Timer:	1	2	3	4	5	6	7	8
Assigned Phase	1	2	4	3	5	6	8	7
Assigned Left-Turn Mvmt.	1	0	0	3	5	0	0	7
Assigned Through Mvmt.	0	2	4	0	0	6	8	0
Assigned Right-Turn Mvmt.	0	12	14	0	0	16	18	0
Timer w/Pr-Pm From Shared	0	0	0	0	0	0	0	0

Chapter 18 Summary Output

Cycle Length, s 53.47

	EB LT	EB TH	EB RT	WB LT	WB TH	WB RT	NB LT	NB TH	NB RT	SB LT	SB TH	SB RT
Movement	7	4	14	3	8	18	5	2	12	1	6	16
Volume, veh/h	66.67	0	0	311.11	0	0	444.44	222.22	0	16.67	222.22	0
SatFlow, veh/h/ln	1764.7	1764.7	1764.7	1764.7	1764.7	1764.7	1764.7	1764.7	1764.7	1764.7	1764.7	1764.7
Lane Util Factor	0.97	1	1	0.97	1	1	1	0.95	1	1	0.95	1
Capacity, veh/h	503.55	0	20.92	503.55	0	20.92	515.68	1904.4	847.64	34.51	942.46	419.48
Discharge Vol, veh/h	66.67	0	0	311.11	0	0	0	222.22	0	0	222.22	0
Prop Arriv On Green	0.1	0	0	0.1	0	0	0.31	0.57	0	0.02	0.28	0
Apprch Vol, veh/h	0	66.67	0	0	311.11	0	0	666.67	0	0	238.89	0
Apprch Stops, #/veh	0	NaN	0	0	NaN	0	0	0.66	0	0	0.7	0
Apprch Delay, s/veh	0	23.46	0	0	25.44	0	0	19.72	0	0	17.07	0

Apprch LOS	C	C	B	B
Int Delay, s/veh 20.8				
Int LOS C				

Timer Data

Timer:	1	2	3	4	5	6	7	8
Assigned Phase	1	2	4	3	5	6	8	7
Case No	2	3	3	1.4	2	3	3	1.4
Phase Duration, s	6.6	35.81	0	11.07	21.91	20.5	0	11.07
Change Period, s	5.5	5.5	0	5.5	5.5	5.5	0	5.5
Max Allow Headway, s	5.08	3.98	0	4.98	5.08	3.98	0	4.98
Max Green Setting, s	15	20	1	19	20	15	1	19
Queue Clear Time, s	2.52	3.64		4.08	15.33	4.73		2
Green Exten Time, s	0.02	0.71	0	1.54	1.1	0.56	0	0.23
Prob of Phase Call	0.22	1		0.99	1	1		0.63
Prob of Max Out	0	0		0.01	1	0.01		0
Left-Turn Movement Data								
Assigned Movement	1	0	0	3	5	0	0	7
Mvmt. Sat Flow, veh/h	1680.67	0	0	3263.87	1680.67	0	0	3263.87
Through Movement Data								
Assigned Movement	0	2	4	0	0	6	8	0
Mvmt. Sat Flow, veh/h	0	3360	0	0	0	3360	0	0
Right-Turn Movement Data								
Assigned Movement	0	12	14	0	0	16	18	0
Mvmt. Sat Flow, veh/h	0	1495.51	1495.51	0	0	1495.51	1495.51	0

Left Lane Group Output

Timer:	1	2	3	4	5	6	7	8
Assigned Phase	1	2	4	3	5	6	8	7
Left Lane Group Data								
Assigned Movement	1	0	0	3	5	0	0	7
Lane Assignment	L (Prot)			L Pr/Pm	L (Prot)			L Pr/Pm
Lanes in Group	1	0	0	2	1	0	0	2
Group Volume, veh/h	16.67	0	0	311.11	444.44	0	0	66.67
Group SatFlow, vphpl	1680.67	0	0	1631.93	1680.67	0	0	1631.93
Queue Serve Time, s	0.52	0	0	2.08	13.33	0	0	0
Cycle Clear Time, s	0.52	0	0	2.08	13.33	0	0	0
Perm SatFlow, vphpl	0	0	0	1411.75	0	0	0	1411.75
Shared SatFlow, vphpl								
Perm Eff Green, s	0	0	0	-2	0	0	0	-2
Perm Serve Time, s	0	0	0	-2	0	0	0	-2
Perm Que Serve Time, s				0				0
Time to first Blk, s	0	0	0	0	0	0	0	0
Serve Time pre Blk, s								
Prop Inside Lane	1	0	0	1	1	0	0	1
Lane Grp Capacity, vph	34.51			503.55	515.68			503.55
v/c Ratio	0.48	0	0	0.62	0.86	0	0	0.13
Avail Capacity, veh/h	471.42			1323.31	628.56			1323.31
I-Factor	0.96	0	0	1	0.83	0	0	1
Uniform Delay, s/veh	25.91			23.67	17.47			23.29
Increm Delay, s/veh	13.56	0	0	1.76	9.37	0	0	0.17
Overflow Delay, s/veh	0	0	0	0	0	0	0	0
Control Delay, s/veh	39.47			25.44	26.84			23.46
Group LOS	D			C	C			C
Uniform Stops, #/veh	0.85			0.78	0.69			0.74
Increm Stops, #/veh	0.33	0	0	0.03	0.13	0	0	0.02
Overflow Stops, #/veh	0	0	0	0	0	0	0	0
Stop Rate, #/veh	1.18			0.82	0.82			0.76
Uniform Queue, veh/ln	0.19			1.49	4.23			0.32
Increm Queue, veh/ln	0.13	0	0	0.12	1.34	0	0	0.01
Overflow Queue, veh/ln	0	0	0	0	0	0	0	0
Back of Queue Factor	1.8	0	0	1.8	1.63	0	0	1.8
Back of Queue, veh/ln	0.58			2.9	9.11			0.59
Storage Ratio	0.04	0	0	0.15	0.62	0	0	0.03
Initial Queue, veh	0	0	0	0	0	0	0	0
Final Queue, veh	0	0	0	0	0	0	0	0
Saturated Delay, s/veh	0	0	0	0	0	0	0	0
Saturated Stops, #/veh	0	0	0	0	0	0	0	0
Saturated Queue, veh/ln	0	0	0	0	0	0	0	0
Saturated Capacity, vph	0	0	0	0	0	0	0	0
Init Que Clear Time, s	0	0	0	0	0	0	0	0

Thru Lane Group Output

Timer:	1	2	3	4	5	6	7	8
Assigned Phase	1	2	4	3	5	6	8	7
Thru Lane Group Data								
Assigned Movement	0	2	4	0	0	6	8	0
Lane Assignment		T				T		
Lanes in Group	0	2	0	0	0	2	0	0
Group Volume, veh/h	0	222.22	0	0	0	222.22	0	0
Group SatFlow, vphpl	0	1680	0	0	0	1680	0	0
Queue Serve Time, s	0	1.64	0	0	0	2.73	0	0
Cycle Clear Time, s	0	1.64	0	0	0	2.73	0	0
Lane Grp Capacity, vph		1904.42	0			942.46	0	
v/c Ratio	0	0.12	0	0	0	0.24	0	0
Avail Capacity, veh/h		1904.42	0			942.46	0	
I-Factor	0	0.83	0	0	0	0.96	0	0

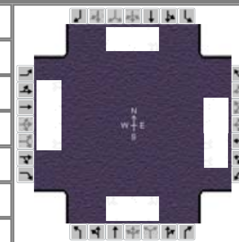
Uniform Delay, s/veh		5.37	0			14.82	0	
Increm Delay, s/veh	0	0.1	0	0	0	0.56	0	0
Overflow Delay, s/veh	0	0	0	0	0	0	0	0
Control Delay, s/veh		5.48	0			15.39	0	
Group LOS		A				B		
Uniform Stops, #/veh		0.35	NaN			0.63	NaN	
Increm Stops, #/veh	0	0.01	0	0	0	0.03	0	0
Overflow Stops, #/veh	0	0	0	0	0	0	0	0
Stop Rate, #/veh		0.36	NaN			0.66	NaN	
Uniform Queue, veh/ln		0.38	0			0.88	0	
Increm Queue, veh/ln	0	0.03	0	0	0	0.07	0	0
Overflow Queue, veh/ln	0	0	0	0	0	0	0	0
Back of Queue Factor	0	1.8	1	0	0	1.8	1	0
Back of Queue, veh/ln		0.73	0			1.71	0	
Storage Ratio	0	0.02	0	0	0	0.05	0	0
Initial Queue, veh	0	0	0	0	0	0	0	0
Final Queue, veh	0	0	0	0	0	0	0	0
Saturated Delay, s/veh	0	0	0	0	0	0	0	0
Saturated Stops, #/veh	0	0	0	0	0	0	0	0
Saturated Queue, veh/ln	0	0	0	0	0	0	0	0
Saturated Capacity, vph	0	0	0	0	0	0	0	0
Init Que Clear Time, s	0	0	0	0	0	0	0	0

Right Lane Group Output

Timer:	1	2	3	4	5	6	7	8
Assigned Phase	1	2	4	3	5	6	8	7
Right Lane Group Data								
Assigned Movement	0	12	14	0	0	16	18	0
Lane Assignment		R	R			R	R	
Lanes in Group	0	1	1	0	0	1	1	0
Group Volume, veh/h	0	0	0	0	0	0	0	0
Group SatFlow, vphpl	0	1495.51	1495.51	0	0	1495.51	1495.51	0
Queue Serve Time, s	0	0	0	0	0	0	0	0
Cycle Clear Time, s	0	0	0	0	0	0	0	0
Prot RT SatFlow, vphpl		0	1495.51			0	1495.51	
Prot RT Eff Green, s		0	16.41			0	1.1	
Prop Outside Lane	0	1	1	0	0	1	1	0
Lane Grp Capacity, vph		847.64	461.67			419.48	33.51	
v/c Ratio	0	0	0	0	0	0	0	0
Avail Capacity, veh/h		847.64	486.84			419.48	58.68	
I-Factor	0	0	0	0	0	0	0	0
Uniform Delay, s/veh		0	0			0	0	
Increm Delay, s/veh	0	0	0	0	0	0	0	0
Overflow Delay, s/veh	0	0	0	0	0	0	0	0
Control Delay, s/veh		0	0			0	0	
Group LOS								
Uniform Stops, #/veh		0	0			0	0	
Increm Stops, #/veh	0	0	0	0	0	0	0	0
Overflow Stops, #/veh	0	0	0	0	0	0	0	0
Stop Rate, #/veh		0	0			0	0	
Uniform Queue, veh/ln		0	0			0	0	
Increm Queue, veh/ln	0	0	0	0	0	0	0	0
Overflow Queue, veh/ln	0	0	0	0	0	0	0	0
Back of Queue Factor	0	1	1	0	0	1	1	0
Back of Queue, veh/ln		0	0			0	0	
Storage Ratio	0	0	0	0	0	0	0	0
Initial Queue, veh	0	0	0	0	0	0	0	0
Final Queue, veh	0	0	0	0	0	0	0	0
Saturated Delay, s/veh	0	0	0	0	0	0	0	0
Saturated Stops, #/veh	0	0	0	0	0	0	0	0
Saturated Queue, veh/ln	0	0	0	0	0	0	0	0
Saturated Capacity, vph	0	0	0	0	0	0	0	0
Init Que Clear Time, s	0	0	0	0	0	0	0	0

HCS 2010 Signalized Intersection Results Summary

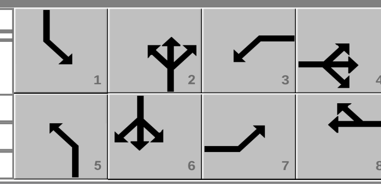
General Information				Intersection Information	
Agency	HDR			Duration, h	0.25
Analyst	MDF	Analysis Date	Jan 30, 2013	Area Type	Other
Jurisdiction		Time Period	PM Peak	PHF	0.90
Intersection	Mall Drive	Analysis Year	Existing (2012)	Analysis Period	1> 16:45
File Name	Existing_PM_North.xus				
Project Description					



Demand Information	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Demand (v), veh/h	5	40	55	210	75	10	80	25	170	10	40	5

Signal Information			
Cycle, s	47.5	Reference Phase	6
Offset, s	0	Reference Point	End
Uncoordinated	Yes	Simult. Gap E/W	Off
Force Mode	Float	Simult. Gap N/S	Off

Green	0.7	2.8	4.0	0.4	4.2	5.9
Yellow	3.0	0.0	4.5	3.0	4.5	4.5
Red	2.0	0.0	2.0	2.0	2.0	2.0



Timer Results	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Assigned Phase	7	4	3	8	5	2	1	6
Case Number	1.1	3.0	2.0	4.0	1.1	3.0	1.1	4.0
Phase Duration, s	5.4	12.4	16.0	23.1	8.5	13.3	5.7	10.5
Change Period, *($Y+R_c$)*, s	5.0	6.5	6.5	6.5	5.0	6.5	5.0	6.5
Max Allow Headway *(MAH)*, s	5.1	5.1	5.1	5.1	5.1	5.2	5.1	5.0
Queue Clearance Time *(g_s)*, s	2.1	2.6	5.0	2.8	4.1	3.1	2.3	2.6
Green Extension Time *(g_e)*, s	0.0	0.2	0.8	0.4	0.2	0.2	0.0	0.1
Phase Call Probability	0.07	0.85	0.95	0.99	0.69	0.93	0.14	0.81
Max Out Probability	0.00	0.00	0.18	0.00	0.01	0.00	0.00	0.00

Movement Group Results	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Assigned Movement	7	4	14	3	8	18	5	2	12	1	6	16
Adjusted Flow Rate (v), veh/h	6	44	6	233	43	43	89	28	40	11	23	23
Adjusted Saturation Flow Rate (s), veh/h/ln	1664	1664	1481	1616	1748	1724	1664	1748	1481	1664	1748	1732
Queue Service Time (g_s), s	0.1	0.6	0.2	3.0	0.8	0.8	2.1	0.7	1.1	0.3	0.6	0.6
Cycle Queue Clearance Time (g_c), s	0.1	0.6	0.2	3.0	0.8	0.8	2.1	0.7	1.1	0.3	0.6	0.6
Green Ratio (g/C)	0.13	0.12	0.12	0.20	0.35	0.35	0.22	0.14	0.14	0.10	0.08	0.08
Capacity (c), veh/h	326	416	185	650	612	604	371	251	212	287	149	147
Volume-to-Capacity Ratio *(X)*	0.017	0.107	0.030	0.359	0.071	0.072	0.240	0.111	0.188	0.039	0.153	0.155
Available Capacity (c_a), veh/h	839	2103	936	919	1105	1090	776	552	468	789	552	548
Back of Queue (Q), veh/ln (95th percentile)	0.1	0.4	0.1	1.8	0.5	0.5	1.3	0.4	0.7	0.2	0.4	0.4
Queue Storage Ratio *(RQ)* (95th percentile)	0.01	0.01	0.00	0.23	0.02	0.02	0.12	0.01	0.02	0.02	0.01	0.01
Uniform Delay (d_1), s/veh	17.9	18.4	18.2	16.3	10.3	10.3	15.5	17.7	17.9	19.4	20.1	20.1
Incremental Delay (d_2), s/veh	0.0	0.2	0.1	0.5	0.1	0.1	0.5	0.3	0.6	0.1	0.7	0.7
Initial Queue Delay (d_3), s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Control Delay (d), s/veh	18.0	18.6	18.3	16.8	10.3	10.4	16.0	18.0	18.5	19.5	20.8	20.8
Level of Service (LOS)	B	B	B	B	B	B	B	B	B	B	C	C

	EB		WB		NB		SB	
Approach Delay, s/veh / LOS	18.5	B	15.1	B	17.0	B	20.5	C
Intersection Delay, s/veh / LOS	16.4				B			

Multimodal Results	EB		WB		NB		SB	
Pedestrian LOS Score / LOS	3.0	C	2.4	B	2.9	C	3.0	C
Bicycle LOS Score / LOS	0.5	A	0.8	A	0.7	A	0.5	A

 HCS 2010™ Streets Version 6.50 Generated: 1/31/2013 4:14:13 PM

This Signals text report was created on January 31, 2013 at 04:15:19

Intersection number = 3, Segment number = 2, Period number = 1

Chapter 18 Summary Input

Cycle Length, s 47.45

	EB LT	EB TH	EB RT	WB LT	WB TH	WB RT	NB LT	NB TH	NB RT	SB LT	SB TH	SB RT
Movement	7	4	14	3	8	18	5	2	12	1	6	16
Volume, veh/h	5	40	55	210	75	10	80	25	170	10	40	5
Lanes	1	2	1	2	2	0	1	1	1	1	2	0
Bay Length, ft	250	1000	850	200	500	200	275	851	851	300	1000	0
Receiving Lanes	2	2	2	2	2	2	1	1	1	2	2	2
SatFlow, vplphg	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800
Lane Width, ft	12	12	12	12	12	12	12	12	12	12	12	12
Heavy Vehicles, %	3	3	3	3	3	2	3	3	3	3	3	0
Grade, %	0	0	0	0	0	0	0	0	0	0	0	0
Buses, per h	0	0	0	0	0	0	0	0	0	0	0	0
Parking, per h	0	0	0	0	0	0	0	0	0	0	0	0
Bicycles, per h	0	0	0	0	0	0	0	0	0	0	0	0
Pedestrians, per h	0	0	0	0	0	0	0	0	0	0	0	0
Heavy Veh Equivalent	2	2	2	2	2	2	2	2	2	2	2	2
Bus Blockage Time	14.4	14.4	14.4	14.4	14.4	14.4	14.4	14.4	14.4	14.4	14.4	14.4
Turns in Shrd Ln, %	0	0	0	0	0	0	0	0	0	0	0	0
Unopposed Lefts, %	0	0	0	0	0	0	0	0	0	0	0	0
Parking Time, sec	18	18	18	18	18	18	18	18	18	18	18	18
Arrival Type	3	3	3	3	3	3	3	3	3	3	3	3
Initial Queue, veh	0	0	0	0	0	0	0	0	0	0	0	0
Speed Limit, mph	30	30	30	30	30	30	35	35	35	35	35	35
Detector Length, ft	40	40	40	40	40	40	40	40	40	40	40	40
StartLostTime, sec	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0
EndUseTime, sec	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0
RTOR, veh/h		50			7			134			4	
I-Factor		1.00			1.00			1.00			1.00	
Walk + PC, sec		0.0			0.0			0.0			0.0	

	EB	EB	WB	WB	NB	NB	SB	SB
Phase	7	4	3	8	5	2	1	6
Movement	LT	LT+TH+RT	LT	TH+RT	LT	LT+TH+RT	LT	LT+TH+RT
Left-Turn Mode	Pr/Pm	--	Prot.	--	Pr/Pm	--	Pr/Pm	--
Phase Splits, s	15.0	30.0	13.5	30.0	15.0	15.0	15.0	15.0
Yellow Change, s	3.0	4.5	4.5	4.5	3.0	4.5	3.0	4.5
Red Clearance, s	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0
Minimum Green, s	5	7	10	10	5	5	5	5
Lead/Lag	Lead		Lead		Lead		Lead	
Passage Time, s	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Recall	Off	Off	Off	Off	Off	Off	Off	Off
Dual Entry	No	Yes	No	Yes	No	Yes	No	Yes
Prot. Right-Turn	False	False	False	False	False	False	False	False

	E/W	N/S
Simultaneous Gap out	Off	Off
Dallas Phasing	Off	Off

Cycle Length, s	84
Offset, s	0
Reference Phase	6
Reference Point	End
Force Mode	Float
Uncoordinated	Yes
Field Measured Phase Times	No
Exclusive Ped Phase Time, s	0.0

Timer:	1	2	3	4	5	6	7	8
Assigned Phase	1	2	3	4	5	6	7	8
Assigned Left-Turn Mvmt.	1	0	3	0	5	0	7	0
Assigned Through Mvmt.	0	2	0	4	0	6	0	8
Assigned Right-Turn Mvmt.	0	12	0	14	0	16	0	18
Timer w/Pr-Pm From Shared	0	0	0	0	0	0	0	0

Chapter 18 Summary Output

Cycle Length, s 47.45

	EB LT	EB TH	EB RT	WB LT	WB TH	WB RT	NB LT	NB TH	NB RT	SB LT	SB TH	SB RT
Movement	7	4	14	3	8	18	5	2	12	1	6	16
Volume, veh/h	5.56	44.44	5.56	233.33	83.33	3.33	88.89	27.78	40	11.11	44.44	1.11
SatFlow, veh/h/ln	1747.6	1747.6	1747.6	1747.6	1747.6	0	1747.6	1747.6	1747.6	1747.6	1747.6	0
Lane Util Factor	1	0.95	1	0.97	1	1	1	1	1	1	1	1
Capacity, veh/h	325.68	415.83	185.08	649.76	1168.9	46.48	370.8	250.59	212.37	287.43	288.6	7.19
Discharge Vol, veh/h	0	0	5.56	233.33	0	0	0	0	0	0	44.44	0
Prop Arriv On Green	0.01	0.12	0.12	0.2	0.35	0.35	0.07	0.14	0.14	0.01	0.08	0.08
Apprch Vol, veh/h	0	55.56	0	0	320	0	0	156.67	0	0	56.67	0
Apprch Stops, #/veh	0	0.78	0	0	0.7	0	0	0.79	0	0	0.84	0
Apprch Delay, s/veh	0	18.49	0	0	15.06	0	0	16.99	0	0	20.55	0

Apprch LOS	B	B	B	C
Int Delay, s/veh 16.42				
Int LOS B				

Timer Data

Timer:	1	2	3	4	5	6	7	8
Assigned Phase	1	2	3	4	5	6	7	8
Case No	1.1	3	2	3	1.1	4	1.1	4
Phase Duration, s	5.68	13.3	16.04	12.43	8.45	10.53	5.35	23.12
Change Period, s	5	6.5	6.5	6.5	5	6.5	5	6.5
Max Allow Headway, s	5.08	5.2	5.14	5.08	5.08	4.99	5.14	5.06
Max Green Setting, s	15	15	13.5	30	15	15	15	30
Queue Clear Time, s	2.29	3.13	4.95	2.56	4.1	2.58	2.14	2.79
Green Exten Time, s	0.01	0.17	0.82	0.21	0.23	0.09	0	0.38
Prob of Phase Call	0.14	0.93	0.95	0.85	0.69	0.81	0.07	0.99
Prob of Max Out	0	0	0.18	0	0.01	0	0	0
Left-Turn Movement Data								
Assigned Movement	1	0	3	0	5	0	7	0
Mvmt. Sat Flow, veh/h	1664.36	0	3232.18	0	1664.36	0	1664.36	0
Through Movement Data								
Assigned Movement	0	2	0	4	0	6	0	8
Mvmt. Sat Flow, veh/h	0	1747.57	0	3327.38	0	3395.39	0	3338.5
Right-Turn Movement Data								
Assigned Movement	0	12	0	14	0	16	0	18
Mvmt. Sat Flow, veh/h	0	1480.99	0	1480.99	0	84.54	0	132.75

Left Lane Group Output

Timer:	1	2	3	4	5	6	7	8
Assigned Phase	1	2	3	4	5	6	7	8
Left Lane Group Data								
Assigned Movement	1	0	3	0	5	0	7	0
Lane Assignment	L Pr/Pm		L (Prot)		L Pr/Pm		L Pr/Pm	
Lanes in Group	1	0	2	0	1	0	1	0
Group Volume, veh/h	11.11	0	233.33	0	88.89	0	5.56	0
Group SatFlow, vphpl	1664.36	0	1616.09	0	1664.36	0	1664.36	0
Queue Serve Time, s	0.29	0	2.95	0	2.1	0	0.14	0
Cycle Clear Time, s	0.29	0	2.95	0	2.1	0	0.14	0
Perm SatFlow, vphpl	1314.96	0	0	0	1341.67	0	1292.65	0
Shared SatFlow, vphpl								
Perm Eff Green, s	4.03	0	0	0	6.81	0	5.93	0
Perm Serve Time, s	4.04	0	0	0	3.46	0	5.95	0
Perm Que Serve Time, s	0				0.24		0	
Time to first Blk, s	0	0	0	0	0	0	0	0
Serve Time pre Blk, s								
Prop Inside Lane	1	0	1	0	1	0	1	0
Lane Grp Capacity, vph	287.43		649.76		370.8		325.68	
v/c Ratio	0.04	0	0.36	0	0.24	0	0.02	0
Avail Capacity, veh/h	789.48		919.36		775.65		839.26	
I-Factor	1	0	1	0	1	0	1	0
Uniform Delay, s/veh	19.38		16.33		15.53		17.92	
Increm Delay, s/veh	0.08	0	0.48	0	0.47	0	0.03	0
Overflow Delay, s/veh	0	0	0	0	0	0	0	0
Control Delay, s/veh	19.45		16.8		16		17.95	
Group LOS	B		B		B		B	
Uniform Stops, #/veh	0.8		0.73		0.77		0.79	
Increm Stops, #/veh	0.02	0	0.02	0	0.02	0	0.02	0
Overflow Stops, #/veh	0	0	0	0	0	0	0	0
Stop Rate, #/veh	0.83		0.74		0.79		0.81	
Uniform Queue, veh/ln	0.1		0.94		0.66		0.05	
Increm Queue, veh/ln	0.01	0	0.04	0	0.05	0	0	0
Overflow Queue, veh/ln	0	0	0	0	0	0	0	0
Back of Queue Factor	1.8	0	1.8	0	1.8	0	1.8	0
Back of Queue, veh/ln	0.18		1.78		1.27		0.09	
Storage Ratio	0.02	0	0.23	0	0.12	0	0.01	0
Initial Queue, veh	0	0	0	0	0	0	0	0
Final Queue, veh	0	0	0	0	0	0	0	0
Saturated Delay, s/veh	0	0	0	0	0	0	0	0
Saturated Stops, #/veh	0	0	0	0	0	0	0	0
Saturated Queue, veh/ln	0	0	0	0	0	0	0	0
Saturated Capacity, vph	0	0	0	0	0	0	0	0
Init Que Clear Time, s	0	0	0	0	0	0	0	0

Thru Lane Group Output

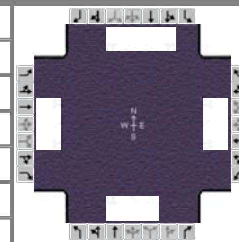
Timer:	1	2	3	4	5	6	7	8
Assigned Phase	1	2	3	4	5	6	7	8
Thru Lane Group Data								
Assigned Movement	0	2	0	4	0	6	0	8
Lane Assignment		T		T		T		T
Lanes in Group	0	1	0	2	0	1	0	1
Group Volume, veh/h	0	27.78	0	44.44	0	22.79	0	43.38
Group SatFlow, vphpl	0	1747.57	0	1663.69	0	1747.57	0	1747.57
Queue Serve Time, s	0	0.66	0	0.56	0	0.57	0	0.79
Cycle Clear Time, s	0	0.66	0	0.56	0	0.57	0	0.79
Lane Grp Capacity, vph		250.59		415.83		148.54		611.89
v/c Ratio	0	0.11	0	0.11	0	0.15	0	0.07
Avail Capacity, veh/h		552.31		2103.2		552.31		1104.62
I-Factor	0	1	0	1	0	1	0	1

Uniform Delay, s/veh		17.69		18.42		20.13		10.28
Increm Delay, s/veh	0	0.27	0	0.16	0	0.67	0	0.07
Overflow Delay, s/veh	0	0	0	0	0	0	0	0
Control Delay, s/veh		17.97		18.58		20.81		10.35
Group LOS		B		B		C		B
Uniform Stops, #/veh		0.73		0.76		0.79		0.55
Increm Stops, #/veh	0	0.03	0	0.02	0	0.05	0	0.01
Overflow Stops, #/veh	0	0	0	0	0	0	0	0
Stop Rate, #/veh		0.76		0.78		0.84		0.57
Uniform Queue, veh/ln		0.23		0.19		0.2		0.25
Increm Queue, veh/ln	0	0.02	0	0.01	0	0.03	0	0.01
Overflow Queue, veh/ln	0	0	0	0	0	0	0	0
Back of Queue Factor	0	1.8	0	1.8	0	1.8	0	1.8
Back of Queue, veh/ln		0.44		0.36		0.41		0.46
Storage Ratio	0	0.01	0	0.01	0	0.01	0	0.02
Initial Queue, veh	0	0	0	0	0	0	0	0
Final Queue, veh	0	0	0	0	0	0	0	0
Saturated Delay, s/veh	0	0	0	0	0	0	0	0
Saturated Stops, #/veh	0	0	0	0	0	0	0	0
Saturated Queue, veh/ln	0	0	0	0	0	0	0	0
Saturated Capacity, vph	0	0	0	0	0	0	0	0
Init Que Clear Time, s	0	0	0	0	0	0	0	0

Right Lane Group Output

Timer:	1	2	3	4	5	6	7	8
Assigned Phase	1	2	3	4	5	6	7	8
Right Lane Group Data								
Assigned Movement	0	12	0	14	0	16	0	18
Lane Assignment		R		R		T+R		T+R
Lanes in Group	0	1	0	1	0	1	0	1
Group Volume, veh/h	0	40	0	5.56	0	22.77	0	43.28
Group SatFlow, vphpl	0	1480.99	0	1480.99	0	1732.36	0	1723.68
Queue Serve Time, s	0	1.13	0	0.16	0	0.58	0	0.79
Cycle Clear Time, s	0	1.13	0	0.16	0	0.58	0	0.79
Prot RT SatFlow, vphpl		0		0				
Prot RT Eff Green, s		0		0				
Prop Outside Lane	0	1	0	1	0	0.05	0	0.08
Lane Grp Capacity, vph		212.37		185.08		147.27		603.54
v/c Ratio	0	0.19	0	0.03	0	0.15	0	0.07
Avail Capacity, veh/h		468.06		936.12		547.52		1089.54
I-Factor	0	1	0	1	0	1	0	1
Uniform Delay, s/veh		17.9		18.24		20.13		10.28
Increm Delay, s/veh	0	0.6	0	0.09	0	0.69	0	0.07
Overflow Delay, s/veh	0	0	0	0	0	0	0	0
Control Delay, s/veh		18.5		18.33		20.82		10.35
Group LOS		B		B		C		B
Uniform Stops, #/veh		0.74		0.75		0.79		0.55
Increm Stops, #/veh	0	0.04	0	0.04	0	0.05	0	0.01
Overflow Stops, #/veh	0	0	0	0	0	0	0	0
Stop Rate, #/veh		0.78		0.79		0.84		0.57
Uniform Queue, veh/ln		0.33		0.05		0.2		0.25
Increm Queue, veh/ln	0	0.04	0	0	0	0.03	0	0.01
Overflow Queue, veh/ln	0	0	0	0	0	0	0	0
Back of Queue Factor	0	1.8	0	1.8	0	1.8	0	1.8
Back of Queue, veh/ln		0.65		0.09		0.41		0.46
Storage Ratio	0	0.02	0	0	0	0.01	0	0.02
Initial Queue, veh	0	0	0	0	0	0	0	0
Final Queue, veh	0	0	0	0	0	0	0	0
Saturated Delay, s/veh	0	0	0	0	0	0	0	0
Saturated Stops, #/veh	0	0	0	0	0	0	0	0
Saturated Queue, veh/ln	0	0	0	0	0	0	0	0
Saturated Capacity, vph	0	0	0	0	0	0	0	0
Init Que Clear Time, s	0	0	0	0	0	0	0	0

HCS 2010 Signalized Intersection Results Summary

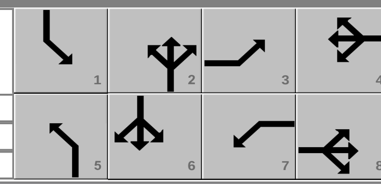


General Information				Intersection Information	
Agency	HDR			Duration, h	0.25
Analyst	MDF	Analysis Date	Jan 30, 2013	Area Type	Other
Jurisdiction		Time Period	AM Peak	PHF	0.85
Intersection	Eglin St	Analysis Year	2035 No-Build	Analysis Period	1> 7:45
File Name	2035_No-Build_AM_North.xus				
Project Description					

Demand Information	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Demand (v), veh/h	50	80	50	50	80	50	80	380	70	120	690	110

Signal Information			
Cycle, s	80.5	Reference Phase	2
Offset, s	0	Reference Point	End
Uncoordinated	Yes	Simult. Gap E/W	Off
Force Mode	Float	Simult. Gap N/S	Off

Green	4.4	0.8	38.5	3.7	10.0	0.0
Yellow	3.2	0.0	3.9	3.2	3.2	0.0
Red	2.3	0.0	2.5	2.3	2.5	0.0



Timer Results	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Assigned Phase	3	8	7	4	5	2	1	6
Case Number	1.1	3.0	1.1	3.0	1.1	4.0	1.1	3.0
Phase Duration, s	9.2	15.7	9.2	15.7	9.9	44.9	10.7	45.7
Change Period, *($Y+R_c$)*, s	5.5	5.7	5.5	5.7	5.5	6.4	5.5	6.4
Max Allow Headway *(MAH)*, s	5.1	5.1	5.1	5.1	5.1	5.0	5.1	5.0
Queue Clearance Time (g_s), s	4.4	6.0	4.4	6.0	4.2	9.4	5.3	15.1
Green Extension Time (g_e), s	0.0	0.2	0.0	0.2	0.1	3.0	0.2	6.0
Phase Call Probability	0.73	1.00	0.73	1.00	0.88	1.00	0.96	1.00
Max Out Probability	1.00	0.33	1.00	0.33	1.00	0.00	1.00	0.05

Movement Group Results	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Assigned Movement	3	8	18	7	4	14	5	2	12	1	6	16
Adjusted Flow Rate (v), veh/h	59	94	5	59	94	5	94	262	252	141	812	66
Adjusted Saturation Flow Rate (s), veh/h/ln	1681	1765	1496	1681	1765	1496	1681	1765	1684	1681	1680	1496
Queue Service Time (g_s), s	2.4	4.0	0.2	2.4	4.0	0.2	2.2	7.3	7.4	3.3	13.1	1.9
Cycle Queue Clearance Time (g_c), s	2.4	4.0	0.2	2.4	4.0	0.2	2.2	7.3	7.4	3.3	13.1	1.9
Green Ratio (g/C)	0.17	0.12	0.12	0.17	0.12	0.12	0.53	0.48	0.48	0.55	0.49	0.49
Capacity (c), veh/h	262	219	185	262	219	185	386	844	806	540	1643	731
Volume-to-Capacity Ratio *(X)*	0.224	0.430	0.025	0.224	0.430	0.025	0.244	0.310	0.313	0.261	0.494	0.090
Available Capacity (c_a), veh/h	342	274	232	342	274	232	472	844	806	608	1643	731
Back of Queue (Q), veh/ln (95th percentile)	1.8	3.2	0.1	1.8	3.2	0.1	1.4	5.0	4.9	1.9	7.9	1.1
Queue Storage Ratio *(RQ)* (95th percentile)	0.18	0.16	0.02	0.18	0.16	0.01	0.12	0.13	0.12	0.14	0.19	0.10
Uniform Delay (d_1), s/veh	28.9	32.6	31.0	28.9	32.6	31.0	10.4	12.8	12.9	9.2	13.9	11.0
Incremental Delay (d_2), s/veh	0.6	1.9	0.1	0.6	1.9	0.1	0.5	1.0	1.0	0.3	1.0	0.2
Initial Queue Delay (d_3), s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Control Delay (d), s/veh	29.5	34.5	31.1	29.5	34.5	31.1	10.8	13.8	13.9	9.6	14.8	11.2
Level of Service (LOS)	C	C	C	C	C	C	B	B	B	A	B	B
Approach Delay, s/veh / LOS	32.5	C		32.5	C		13.4	B		13.9	B	
Intersection Delay, s/veh / LOS	16.7						B					

Multimodal Results	EB		WB		NB		SB	
Pedestrian LOS Score / LOS	2.9	C	3.0	C	2.5	B	2.5	B
Bicycle LOS Score / LOS	0.7	A	0.7	A	1.0	A	1.3	A

 HCS 2010™ Streets Version 6.50 Generated: 1/31/2013 4:26:06 PM

This Signals text report was created on January 31, 2013 at 04:27:02

Intersection number = 1, Segment number = 1, Period number = 1

Chapter 18 Summary Input

	EB LT	EB TH	EB RT	WB LT	WB TH	WB RT	NB LT	NB TH	NB RT	SB LT	SB TH	SB RT
Cycle Length, s	80.45											
Movement	3	8	18	7	4	14	5	2	12	1	6	16
Volume, veh/h	50	80	50	50	80	50	80	380	70	120	690	110
Lanes	1	1	1	1	1	1	1	2	0	1	2	1
Bay Length, ft	250	500	200	250	500	350	300	1000	150	350	1073	275
Receiving Lanes	1	1	1	1	1	1	2	2	2	2	2	2
SatFlow, vplphg	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800
Lane Width, ft	12	12	12	12	12	12	12	12	12	12	12	12
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Grade, %	0	0	0	0	0	0	0	0	0	0	0	0
Buses, per h	0	0	0	0	0	0	0	0	0	0	0	0
Parking, per h	0	0	0	0	0	0	0	0	0	0	0	0
Bicycles, per h	0	0	0	0	0	0	0	0	0	0	0	0
Pedestrians, per h	0	0	0	0	0	0	0	0	0	0	0	0
Heavy Veh Equivalent	2	2	2	2	2	2	2	2	2	2	2	2
Bus Blockage Time	14.4	14.4	14.4	14.4	14.4	14.4	14.4	14.4	14.4	14.4	14.4	14.4
Turns in Shrd Ln, %	0	0	0	40	0	0	0	0	0	0	0	0
Unopposed Lefts, %	0	0	0	0	0	0	0	0	0	0	0	0
Parking Time, sec	18	18	18	18	18	18	18	18	18	18	18	18
Arrival Type	3	3	3	3	3	3	3	3	3	3	3	3
Initial Queue, veh	0	0	0	0	0	0	0	0	0	0	0	0
Speed Limit, mph	30	30	30	30	30	30	35	35	35	35	35	35
Detector Length, ft	40	40	40	40	40	40	40	40	40	40	40	40
StartLostTime, sec	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0
EndUseTime, sec	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0
RTOR, veh/h		46			46			13			54	
I-Factor		1.00			1.00			1.00			0.90	
Walk + PC, sec		0.0			0.0			0.0			0.0	

	EB	EB	WB	WB	NB	NB	SB	SB
Phase	3	8	7	4	5	2	1	6
Movement	LT	LT+TH+RT	LT	LT+TH+RT	LT	LT+TH+RT	LT	LT+TH+RT
Left-Turn Mode	Pr/Pm	--	Pr/Pm	--	Pr/Pm	--	Pr/Pm	--
Phase Splits, s	7.5	12.5	7.5	12.5	8.5	38.5	8.5	38.5
Yellow Change, s	3.2	3.2	3.2	3.2	3.2	3.9	3.2	3.9
Red Clearance, s	2.3	2.5	2.3	2.5	2.3	2.5	2.3	2.5
Minimum Green, s	5	10	5	10	5	15	5	15
Lead/Lag	Lead		Lead		Lead		Lead	
Passage Time, s	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Recall	Off	Off	Off	Off	Off	Max	Off	Max
Dual Entry	No	Yes	No	Yes	No	Yes	No	Yes
Prot. Right-Turn	False	False	False	False	False	False	False	False

	E/W	N/S
Simultaneous Gap out	Off	Off
Dallas Phasing	Off	Off

Cycle Length, s	84
Offset, s	0
Reference Phase	2
Reference Point	End
Force Mode	Float
Uncoordinated	Yes
Field Measured Phase Times	No
Exclusive Ped Phase Time, s	0.0

Timer:	1	2	3	4	5	6	7	8
Assigned Phase	1	2	3	4	5	6	7	8
Assigned Left-Turn Mvmt.	1	0	3	0	5	0	7	0
Assigned Through Mvmt.	0	2	0	4	0	6	0	8
Assigned Right-Turn Mvmt.	0	12	0	14	0	16	0	18
Timer w/Pr-Pm From Shared	0	0	0	0	0	0	0	0

Chapter 18 Summary Output

	EB LT	EB TH	EB RT	WB LT	WB TH	WB RT	NB LT	NB TH	NB RT	SB LT	SB TH	SB RT
Cycle Length, s	80.45											
Movement	3	8	18	7	4	14	5	2	12	1	6	16
Volume, veh/h	58.82	94.12	4.71	58.82	94.12	4.71	94.12	447.06	67.06	141.18	811.76	65.88
SatFlow, veh/h/ln	1764.7	1764.7	1764.7	1764.7	1764.7	1764.7	1764.7	1764.7	0	1764.7	1764.7	1764.7
Lane Util Factor	1	1	1	1	1	1	1	1	1	1	0.95	1
Capacity, veh/h	262.14	218.64	185.29	262.14	218.64	185.29	386.47	1436.3	214.16	540	1642.8	731.22
Discharge Vol, veh/h	58.82	0	0	0	0	4.71	0	447.06	0	0	0	0
Prop Arriv On Green	0.05	0.12	0.12	0.05	0.12	0.12	0.05	0.48	0.48	0.06	0.49	0.49
Apprch Vol, veh/h	0	157.65	0	0	157.65	0	0	608.24	0	0	1018.8	0
Apprch Stops, #/veh	0	0.81	0	0	0.81	0	0	0.47	0	0	0.49	0
Apprch Delay, s/veh	0	32.53	0	0	32.53	0	0	13.38	0	0	13.85	0

Apprch LOS	C	C	B	B

Int Delay, s/veh	16.74
Int LOS	B

Timer Data

Timer:	1	2	3	4	5	6	7	8
Assigned Phase	1	2	3	4	5	6	7	8
Case No	1.1	4	1.1	3	1.1	3	1.1	3
Phase Duration, s	10.73	44.9	9.16	15.67	9.89	45.74	9.16	15.67
Change Period, s	5.5	6.4	5.5	5.7	5.5	6.4	5.5	5.7
Max Allow Headway, s	5.08	5.03	5.14	5.06	5.08	5.01	5.14	5.06
Max Green Setting, s	8.5	38.5	7.5	12.5	8.5	38.5	7.5	12.5
Queue Clear Time, s	5.29	9.39	4.42	5.97	4.23	15.1	4.42	5.97
Green Exten Time, s	0.17	2.99	0.04	0.18	0.12	5.97	0.04	0.18
Prob of Phase Call	0.96	1	0.73	1	0.88	1	0.73	1
Prob of Max Out	1	0	1	0.33	1	0.05	1	0.33
Left-Turn Movement Data								
Assigned Movement	1	0	3	0	5	0	7	0
Mvmt. Sat Flow, veh/h	1680.67	0	1680.67	0	1680.67	0	1680.67	0
Through Movement Data								
Assigned Movement	0	2	0	4	0	6	0	8
Mvmt. Sat Flow, veh/h	0	3001.34	0	1764.71	0	3360	0	1764.71
Right-Turn Movement Data								
Assigned Movement	0	12	0	14	0	16	0	18
Mvmt. Sat Flow, veh/h	0	447.51	0	1495.51	0	1495.51	0	1495.51

Left Lane Group Output

Timer:	1	2	3	4	5	6	7	8
Assigned Phase	1	2	3	4	5	6	7	8
Left Lane Group Data								
Assigned Movement	1	0	3	0	5	0	7	0
Lane Assignment	L Pr/Pm		L Pr/Pm		L Pr/Pm		L Pr/Pm	
Lanes in Group	1	0	1	0	1	0	1	0
Group Volume, veh/h	141.18	0	58.82	0	94.12	0	58.82	0
Group SatFlow, vphpl	1680.67	0	1680.67	0	1680.67	0	1680.67	0
Queue Serve Time, s	3.29	0	2.42	0	2.23	0	2.42	0
Cycle Clear Time, s	3.29	0	2.42	0	2.23	0	2.42	0
Perm SatFlow, vphpl	882.85	0	1291.01	0	629.45	0	1291.01	0
Shared SatFlow, vphpl								
Perm Eff Green, s	39.34	0	9.97	0	38.5	0	9.97	0
Perm Serve Time, s	31.1	0	6	0	26.24	0	6	0
Perm Que Serve Time, s	1.57		0.19		2.16		0.19	
Time to first Blk, s	0	0	0	0	0	0	0	0
Serve Time pre Blk, s								
Prop Inside Lane	1	0	1	0	1	0	1	0
Lane Grp Capacity, vph	540		262.14		386.47		262.14	
v/c Ratio	0.26	0	0.22	0	0.24	0	0.22	0
Avail Capacity, veh/h	608.38		342.41		472.33		342.41	
I-Factor	0.9	0	1	0	1	0	1	0
Uniform Delay, s/veh	9.24		28.86		10.39		28.86	
Increm Delay, s/veh	0.33	0	0.61	0	0.46	0	0.61	0
Overflow Delay, s/veh	0	0	0	0	0	0	0	0
Control Delay, s/veh	9.57		29.47		10.85		29.47	
Group LOS	A		C		B		C	
Uniform Stops, #/veh	0.36		0.73		0.37		0.73	
Increm Stops, #/veh	0.01	0	0.03	0	0.02	0	0.03	0
Overflow Stops, #/veh	0	0	0	0	0	0	0	0
Stop Rate, #/veh	0.37		0.76		0.39		0.76	
Uniform Queue, veh/ln	1.03		0.94		0.71		0.94	
Increm Queue, veh/ln	0.05	0	0.04	0	0.05	0	0.04	0
Overflow Queue, veh/ln	0	0	0	0	0	0	0	0
Back of Queue Factor	1.8	0	1.8	0	1.8	0	1.8	0
Back of Queue, veh/ln	1.94		1.78		1.36		1.78	
Storage Ratio	0.14	0	0.18	0	0.12	0	0.18	0
Initial Queue, veh	0	0	0	0	0	0	0	0
Final Queue, veh	0	0	0	0	0	0	0	0
Saturated Delay, s/veh	0	0	0	0	0	0	0	0
Saturated Stops, #/veh	0	0	0	0	0	0	0	0
Saturated Queue, veh/ln	0	0	0	0	0	0	0	0
Saturated Capacity, vph	0	0	0	0	0	0	0	0
Init Que Clear Time, s	0	0	0	0	0	0	0	0

Thru Lane Group Output

Timer:	1	2	3	4	5	6	7	8
Assigned Phase	1	2	3	4	5	6	7	8
Thru Lane Group Data								
Assigned Movement	0	2	0	4	0	6	0	8
Lane Assignment		T		T		T		T
Lanes in Group	0	1	0	1	0	2	0	1
Group Volume, veh/h	0	261.75	0	94.12	0	811.76	0	94.12
Group SatFlow, vphpl	0	1764.71	0	1764.71	0	1680	0	1764.71
Queue Serve Time, s	0	7.31	0	3.97	0	13.1	0	3.97
Cycle Clear Time, s	0	7.31	0	3.97	0	13.1	0	3.97
Lane Grp Capacity, vph		844.5		218.64		1642.85		218.64
v/c Ratio	0	0.31	0	0.43	0	0.49	0	0.43
Avail Capacity, veh/h		844.5		274.19		1642.85		274.19
I-Factor	0	1	0	1	0	0.9	0	1

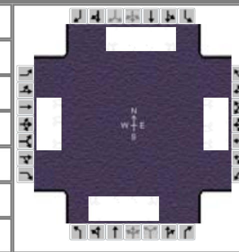
Uniform Delay, s/veh		12.84		32.62		13.85		32.62
Increm Delay, s/veh	0	0.95	0	1.9	0	0.96	0	1.9
Overflow Delay, s/veh	0	0	0	0	0	0	0	0
Control Delay, s/veh		13.8		34.52		14.82		34.52
Group LOS		B		C		B		C
Uniform Stops, #/veh		0.45		0.79		0.49		0.79
Increm Stops, #/veh	0	0.04	0	0.05	0	0.02	0	0.05
Overflow Stops, #/veh	0	0	0	0	0	0	0	0
Stop Rate, #/veh		0.49		0.84		0.51		0.84
Uniform Queue, veh/ln		2.57		1.64		4.35		1.64
Increm Queue, veh/ln	0	0.22	0	0.12	0	0.22	0	0.12
Overflow Queue, veh/ln	0	0	0	0	0	0	0	0
Back of Queue Factor	0	1.8	0	1.8	0	1.73	0	1.8
Back of Queue, veh/ln		5.02		3.16		7.9		3.16
Storage Ratio	0	0.13	0	0.16	0	0.19	0	0.16
Initial Queue, veh	0	0	0	0	0	0	0	0
Final Queue, veh	0	0	0	0	0	0	0	0
Saturated Delay, s/veh	0	0	0	0	0	0	0	0
Saturated Stops, #/veh	0	0	0	0	0	0	0	0
Saturated Queue, veh/ln	0	0	0	0	0	0	0	0
Saturated Capacity, vph	0	0	0	0	0	0	0	0
Init Que Clear Time, s	0	0	0	0	0	0	0	0

Right Lane Group Output

Timer:	1	2	3	4	5	6	7	8
Assigned Phase	1	2	3	4	5	6	7	8
Right Lane Group Data								
Assigned Movement	0	12	0	14	0	16	0	18
Lane Assignment		T+R		R		R		R
Lanes in Group	0	1	0	1	0	1	0	1
Group Volume, veh/h	0	252.37	0	4.71	0	65.88	0	4.71
Group SatFlow, vphpl	0	1684.15	0	1495.51	0	1495.51	0	1495.51
Queue Serve Time, s	0	7.39	0	0.22	0	1.89	0	0.22
Cycle Clear Time, s	0	7.39	0	0.22	0	1.89	0	0.22
Prot RT SatFlow, vphpl				0		0		0
Prot RT Eff Green, s				0		0		0
Prop Outside Lane	0	0.27	0	1	0	1	0	1
Lane Grp Capacity, vph		805.96		185.29		731.22		185.29
v/c Ratio	0	0.31	0	0.03	0	0.09	0	0.03
Avail Capacity, veh/h		805.96		232.36		731.22		232.36
I-Factor	0	1	0	1	0	0.9	0	1
Uniform Delay, s/veh		12.87		30.97		10.99		30.97
Increm Delay, s/veh	0	1.01	0	0.08	0	0.22	0	0.08
Overflow Delay, s/veh	0	0	0	0	0	0	0	0
Control Delay, s/veh		13.88		31.05		11.21		31.05
Group LOS		B		C		B		C
Uniform Stops, #/veh		0.45		0.75		0.39		0.75
Increm Stops, #/veh	0	0.04	0	0.04	0	0.03	0	0.04
Overflow Stops, #/veh	0	0	0	0	0	0	0	0
Stop Rate, #/veh		0.49		0.78		0.42		0.78
Uniform Queue, veh/ln		2.48		0.08		0.56		0.08
Increm Queue, veh/ln	0	0.23	0	0	0	0.04	0	0
Overflow Queue, veh/ln	0	0	0	0	0	0	0	0
Back of Queue Factor	0	1.8	0	1.8	0	1.8	0	1.8
Back of Queue, veh/ln		4.88		0.15		1.09		0.15
Storage Ratio	0	0.12	0	0.01	0	0.1	0	0.02
Initial Queue, veh	0	0	0	0	0	0	0	0
Final Queue, veh	0	0	0	0	0	0	0	0
Saturated Delay, s/veh	0	0	0	0	0	0	0	0
Saturated Stops, #/veh	0	0	0	0	0	0	0	0
Saturated Queue, veh/ln	0	0	0	0	0	0	0	0
Saturated Capacity, vph	0	0	0	0	0	0	0	0
Init Que Clear Time, s	0	0	0	0	0	0	0	0

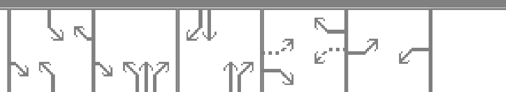
HCS 2010 Signalized Intersection Results Summary

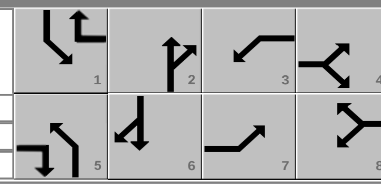
General Information				Intersection Information	
Agency	HDR			Duration, h	0.25
Analyst	MDF	Analysis Date	Jan 30, 2013	Area Type	Other
Jurisdiction		Time Period	AM Peak	PHF	0.85
Intersection	I-90 Ramps (SPUI)	Analysis Year	2035 No-Build	Analysis Period	1> 7:45
File Name	2035_No-Build_AM_North.xus				
Project Description					



Demand Information	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Demand (*v*), veh/h	120		350	260		60	120	250	110	20	310	60

Signal Information										
Cycle, s	75.1	Reference Phase	2							
Offset, s	0	Reference Point	End	Green	1.9	1.1	42.9	0.0	7.2	0.0
Uncoordinated	Yes	Simult. Gap E/W	Off	Yellow	4.5	4.5	4.5	0.0	4.5	0.0
Force Mode	Float	Simult. Gap N/S	Off	Red	1.0	1.0	1.0	0.0	1.0	0.0





Timer Results	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Assigned Phase	7	4	3	8	5	2	1	6
Case Number	1.4	3.0	1.4	3.0	2.0	3.0	2.0	3.0
Phase Duration, s	12.7	0.0	12.7	0.0	14.0	55.0	7.4	48.4
Change Period, *(Y+R$_c$)*, s	5.5	0.0	5.5	0.0	5.5	5.5	5.5	5.5
Max Allow Headway *(MAH)*, s	5.0	0.0	5.0	0.0	5.1	4.0	5.1	4.0
Queue Clearance Time (g_s), s	2.2		6.1		8.2	4.5	3.1	6.0
Green Extension Time (g_e), s	0.5	0.0	1.1	0.0	0.7	1.2	0.0	1.2
Phase Call Probability	0.95		1.00		0.95	1.00	0.39	1.00
Max Out Probability	0.01		0.22		0.00	0.00	0.65	0.00

Movement Group Results	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Assigned Movement	7		14	3		18	5	2	12	1	6	16
Adjusted Flow Rate (*v*), veh/h	141		0	306		0	141	294	0	24	365	0
Adjusted Saturation Flow Rate (*s*), veh/h/ln	1601		1467	1601		1467	1648	1648	1467	1648	1648	1467
Queue Service Time (g_s), s	0.2		0.0	4.1		0.0	6.2	2.5	0.0	1.1	4.0	0.0
Cycle Queue Clearance Time (g_c), s	0.2		0.0	4.1		0.0	6.2	2.5	0.0	1.1	4.0	0.0
Green Ratio (*g/C*)	0.10		0.11	0.10		0.03	0.11	0.66	0.66	0.03	0.57	0.57
Capacity (*c*), veh/h	424		168	424		40	186	2171	966	43	1884	838
Volume-to-Capacity Ratio *(X)*	0.333		0.000	0.721		0.000	0.758	0.135	0.000	0.553	0.194	0.000
Available Capacity (c_a), veh/h	736		185	736		57	823	2171	966	186	1884	838
Back of Queue *(Q)*, veh/ln (95th percentile)	2.0		0.0	4.6		0.0	5.0	1.2	0.0	1.0	2.2	0.0
Queue Storage Ratio *(RQ)* (95th percentile)	0.10		0.00	0.24		0.00	0.34	0.03	0.00	0.08	0.07	0.00
Uniform Delay (d_1), s/veh	32.6		0.0	33.6		0.0	32.3	4.8	0.0	36.2	7.8	0.0
Incremental Delay (d_2), s/veh	0.6		0.0	3.3		0.0	8.3	0.1	0.0	14.1	0.2	0.0
Initial Queue Delay (d_3), s/veh	0.0		0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0	0.0
Control Delay (*d*), s/veh	33.2		0.0	36.9		0.0	40.7	4.9	0.0	50.3	8.0	0.0
Level of Service (LOS)	C			D			D	A		D	A	
Approach Delay, s/veh / LOS	33.2	C		36.9	D		16.5	B		10.5	B	
Intersection Delay, s/veh / LOS	21.5						C					

Multimodal Results	EB		WB		NB		SB	
Pedestrian LOS Score / LOS	3.1	C	3.0	C	2.5	B	2.9	C
Bicycle LOS Score / LOS		F		F	0.8	A	0.8	A

 HCS 2010™ Streets Version 6.50 Generated: 1/31/2013 4:26:06 PM

This Signals text report was created on January 31, 2013 at 04:27:09

Intersection number = 2, Segment number = 1, Period number = 1

Chapter 18 Summary Input

Cycle Length, s	75.13											
	EB LT	EB TH	EB RT	WB LT	WB TH	WB RT	NB LT	NB TH	NB RT	SB LT	SB TH	SB RT
Movement	7	4	14	3	8	18	5	2	12	1	6	16
Volume, veh/h	120	0	350	260	0	60	120	250	110	20	310	60
Lanes	2	0	1	2	0	1	1	2	1	1	2	1
Bay Length, ft	500	500	500	500	500	500	375	1073	500	350	851	450
Receiving Lanes	1	1	1	1	1	1	2	2	2	2	2	2
SatFlow, vplphg	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800
Lane Width, ft	12	12	12	12	12	12	12	12	12	12	12	12
Heavy Vehicles, %	4	4	4	4	4	4	4	4	4	4	4	4
Grade, %	0	0	0	0	0	0	0	0	0	0	0	0
Buses, per h	0	0	0	0	0	0	0	0	0	0	0	0
Parking, per h	0	0	0	0	0	0	0	0	0	0	0	0
Bicycles, per h	0	0	0	0	0	0	0	0	0	0	0	0
Pedestrians, per h	0	0	0	0	0	0	0	0	0	0	0	0
Heavy Veh Equivalent	2	2	2	2	2	2	2	2	2	2	2	2
Bus Blockage Time	14.4	14.4	14.4	14.4	14.4	14.4	14.4	14.4	14.4	14.4	14.4	14.4
Turns in Shrd Ln, %	0	0	0	0	0	0	0	0	0	0	0	0
Unopposed Lefts, %	0	0	0	0	0	0	0	0	0	0	0	0
Parking Time, sec	18	18	18	18	18	18	18	18	18	18	18	18
Arrival Type	3	3	3	3	3	3	3	3	3	3	3	3
Initial Queue, veh	0	0	0	0	0	0	0	0	0	0	0	0
Speed Limit, mph	45	45	45	45	45	45	35	35	35	35	35	35
Detector Length, ft	40	40	40	40	40	40	40	40	40	40	40	40
StartLostTime, sec	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0
EndUseTime, sec	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0
RTOR, veh/h		350			60			110			60	
I-Factor		1.00			1.00			0.96			0.94	
Walk + PC, sec		0.0			0.0			0.0			0.0	

	EB	EB	WB	WB	NB	NB	SB	SB
Phase	7	4	3	8	5	2	1	6
Movement	LT	LT+RT	LT	LT+RT	LT	TH+RT	LT	TH+RT
Left-Turn Mode	Pr/Pm	--	Pr/Pm	--	Prot.	--	Prot.	--
Phase Splits, s	14.5	1.0	14.5	1.0	37.5	49.5	8.5	20.5
Yellow Change, s	4.5	0.0	4.5	0.0	4.5	4.5	4.5	4.5
Red Clearance, s	1.0	0.0	1.0	0.0	1.0	1.0	1.0	1.0
Minimum Green, s	5	1	5	1	5	7	5	7
Lead/Lag	Lag		Lag		Lead		Lead	
Passage Time, s	4.0	0.0	4.0	0.0	4.0	3.0	4.0	3.0
Recall	Off	Off	Off	Off	Off	Max	Off	Max
Dual Entry	No	Yes	No	Yes	No	Yes	No	Yes
Prot. Right-Turn	False	False	False	False	True	False	True	False

	E/W	N/S
Simultaneous Gap out	Off	Off
Dallas Phasing	Off	Off

Cycle Length, s	84
Offset, s	0
Reference Phase	2
Reference Point	End
Force Mode	Float
Uncoordinated	Yes
Field Measured Phase Times	No
Exclusive Ped Phase Time, s	0.0

Timer:	1	2	3	4	5	6	7	8
Assigned Phase	1	2	4	3	5	6	8	7
Assigned Left-Turn Mvmt.	1	0	0	3	5	0	0	7
Assigned Through Mvmt.	0	2	4	0	0	6	8	0
Assigned Right-Turn Mvmt.	0	12	14	0	0	16	18	0
Timer w/Pr-Pm From Shared	0	0	0	0	0	0	0	0

Chapter 18 Summary Output

Cycle Length, s	75.13											
	EB LT	EB TH	EB RT	WB LT	WB TH	WB RT	NB LT	NB TH	NB RT	SB LT	SB TH	SB RT
Movement	7	4	14	3	8	18	5	2	12	1	6	16
Volume, veh/h	141.18	0	0	305.88	0	0	141.18	294.12	0	23.53	364.71	0
SatFlow, veh/h/ln	1730.8	1730.8	1730.8	1730.8	1730.8	1730.8	1730.8	1730.8	1730.8	1730.8	1730.8	1730.8
Lane Util Factor	0.97	1	1	0.97	1	1	1	0.95	1	1	0.95	1
Capacity, veh/h	424.36	0	16.3	424.36	0	16.3	186.31	2171.1	966.35	42.58	1883.8	838.45
Discharge Vol, veh/h	141.18	0	0	305.88	0	0	0	294.12	0	0	364.71	0
Prop Arriv On Green	0.1	0	0	0.1	0	0	0.11	0.66	0	0.03	0.57	0
Apprch Vol, veh/h	0	141.18	0	0	305.88	0	0	435.29	0	0	388.24	0
Apprch Stops, #/veh	0	NaN	0	0	NaN	0	0	0.48	0	0	0.4	0
Apprch Delay, s/veh	0	33.21	0	0	36.91	0	0	16.51	0	0	10.53	0

Apprch LOS		C		D		B		B
Int Delay, s/veh	21.45							
Int LOS	C							

Timer Data

Timer:	1	2	3	4	5	6	7	8
Assigned Phase	1	2	4	3	5	6	8	7
Case No	2	3	3	1.4	2	3	3	1.4
Phase Duration, s	7.44	55	0	12.69	13.99	48.45	0	12.69
Change Period, s	5.5	5.5	0	5.5	5.5	5.5	0	5.5
Max Allow Headway, s	5.08	3.98	0	4.98	5.08	3.98	0	4.98
Max Green Setting, s	8.5	49.5	1	14.5	37.5	20.5	1	14.5
Queue Clear Time, s	3.06	4.51		6.12	8.24	6.01		2.24
Green Exten Time, s	0.02	1.19	0	1.09	0.72	1.22	0	0.51
Prob of Phase Call	0.39	1		1	0.95	1		0.95
Prob of Max Out	0.65	0		0.22	0	0		0.01
Left-Turn Movement Data								
Assigned Movement	1	0	0	3	5	0	0	7
Mvmt. Sat Flow, veh/h	1648.35	0	0	3201.1	1648.35	0	0	3201.1
Through Movement Data								
Assigned Movement	0	2	4	0	0	6	8	0
Mvmt. Sat Flow, veh/h	0	3295.38	0	0	0	3295.38	0	0
Right-Turn Movement Data								
Assigned Movement	0	12	14	0	0	16	18	0
Mvmt. Sat Flow, veh/h	0	1466.75	1466.75	0	0	1466.75	1466.75	0

Left Lane Group Output

Timer:	1	2	3	4	5	6	7	8
Assigned Phase	1	2	4	3	5	6	8	7
Left Lane Group Data								
Assigned Movement	1	0	0	3	5	0	0	7
Lane Assignment	L (Prot)			L Pr/Pm	L (Prot)			L Pr/Pm
Lanes in Group	1	0	0	2	1	0	0	2
Group Volume, veh/h	23.53	0	0	305.88	141.18	0	0	141.18
Group SatFlow, vphpl	1648.35	0	0	1600.55	1648.35	0	0	1600.55
Queue Serve Time, s	1.06	0	0	4.12	6.24	0	0	0.24
Cycle Clear Time, s	1.06	0	0	4.12	6.24	0	0	0.24
Perm SatFlow, vphpl	0	0	0	1384.6	0	0	0	1384.6
Shared SatFlow, vphpl								
Perm Eff Green, s	0	0	0	-2	0	0	0	-2
Perm Serve Time, s	0	0	0	-2	0	0	0	-2
Perm Que Serve Time, s				0				0
Time to first Blk, s	0	0	0	0	0	0	0	0
Serve Time pre Blk, s								
Prop Inside Lane	1	0	0	1	1	0	0	1
Lane Grp Capacity, vph	42.58			424.36	186.31			424.36
v/c Ratio	0.55	0	0	0.72	0.76	0	0	0.33
Avail Capacity, veh/h	186.48			735.73	822.72			735.73
I-Factor	0.94	0	0	1	0.96	0	0	1
Uniform Delay, s/veh	36.17			33.62	32.32			32.56
Increm Delay, s/veh	14.11	0	0	3.29	8.34	0	0	0.65
Overflow Delay, s/veh	0	0	0	0	0	0	0	0
Control Delay, s/veh	50.27			36.91	40.66			33.21
Group LOS	D			D	D			C
Uniform Stops, #/veh	0.85			0.76	0.82			0.75
Increm Stops, #/veh	0.3	0	0	0.05	0.13	0	0	0.02
Overflow Stops, #/veh	0	0	0	0	0	0	0	0
Stop Rate, #/veh	1.15			0.82	0.95			0.77
Uniform Queue, veh/ln	0.41			2.34	2.35			1.07
Increm Queue, veh/ln	0.17	0	0	0.19	0.43	0	0	0.04
Overflow Queue, veh/ln	0	0	0	0	0	0	0	0
Back of Queue Factor	1.8	0	0	1.8	1.8	0	0	1.8
Back of Queue, veh/ln	1.03			4.56	5			1.99
Storage Ratio	0.08	0	0	0.24	0.34	0	0	0.1
Initial Queue, veh	0	0	0	0	0	0	0	0
Final Queue, veh	0	0	0	0	0	0	0	0
Saturated Delay, s/veh	0	0	0	0	0	0	0	0
Saturated Stops, #/veh	0	0	0	0	0	0	0	0
Saturated Queue, veh/ln	0	0	0	0	0	0	0	0
Saturated Capacity, vph	0	0	0	0	0	0	0	0
Init Que Clear Time, s	0	0	0	0	0	0	0	0

Thru Lane Group Output

Timer:	1	2	3	4	5	6	7	8
Assigned Phase	1	2	4	3	5	6	8	7
Thru Lane Group Data								
Assigned Movement	0	2	4	0	0	6	8	0
Lane Assignment		T				T		
Lanes in Group	0	2	0	0	0	2	0	0
Group Volume, veh/h	0	294.12	0	0	0	364.71	0	0
Group SatFlow, vphpl	0	1647.69	0	0	0	1647.69	0	0
Queue Serve Time, s	0	2.51	0	0	0	4.01	0	0
Cycle Clear Time, s	0	2.51	0	0	0	4.01	0	0
Lane Grp Capacity, vph		2171.11	0			1883.76	0	
v/c Ratio	0	0.14	0	0	0	0.19	0	0
Avail Capacity, veh/h		2171.11	0			1883.76	0	
I-Factor	0	0.96	0	0	0	0.94	0	0

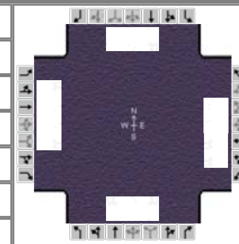
Uniform Delay, s/veh		4.8	0			7.75	0	
Increm Delay, s/veh	0	0.13	0	0	0	0.22	0	0
Overflow Delay, s/veh	0	0	0	0	0	0	0	0
Control Delay, s/veh		4.93	0			7.97	0	
Group LOS		A				A		
Uniform Stops, #/veh		0.24	NaN			0.34	NaN	
Increm Stops, #/veh	0	0.01	0	0	0	0.01	0	0
Overflow Stops, #/veh	0	0	0	0	0	0	0	0
Stop Rate, #/veh		0.25	NaN			0.35	NaN	
Uniform Queue, veh/ln		0.62	0			1.15	0	
Increm Queue, veh/ln	0	0.04	0	0	0	0.06	0	0
Overflow Queue, veh/ln	0	0	0	0	0	0	0	0
Back of Queue Factor	0	1.8	1	0	0	1.8	1	0
Back of Queue, veh/ln		1.18	0			2.18	0	
Storage Ratio	0	0.03	0	0	0	0.07	0	0
Initial Queue, veh	0	0	0	0	0	0	0	0
Final Queue, veh	0	0	0	0	0	0	0	0
Saturated Delay, s/veh	0	0	0	0	0	0	0	0
Saturated Stops, #/veh	0	0	0	0	0	0	0	0
Saturated Queue, veh/ln	0	0	0	0	0	0	0	0
Saturated Capacity, vph	0	0	0	0	0	0	0	0
Init Que Clear Time, s	0	0	0	0	0	0	0	0

Right Lane Group Output

Timer:	1	2	3	4	5	6	7	8
Assigned Phase	1	2	4	3	5	6	8	7
Right Lane Group Data								
Assigned Movement	0	12	14	0	0	16	18	0
Lane Assignment		R	R			R	R	
Lanes in Group	0	1	1	0	0	1	1	0
Group Volume, veh/h	0	0	0	0	0	0	0	0
Group SatFlow, vphpl	0	1466.75	1466.75	0	0	1466.75	1466.75	0
Queue Serve Time, s	0	0	0	0	0	0	0	0
Cycle Clear Time, s	0	0	0	0	0	0	0	0
Prot RT SatFlow, vphpl		0	1466.75			0	1466.75	
Prot RT Eff Green, s		0	8.49			0	1.94	
Prop Outside Lane	0	1	1	0	0	1	1	0
Lane Grp Capacity, vph		966.35	167.74			838.45	39.84	
v/c Ratio	0	0	0	0	0	0	0	0
Avail Capacity, veh/h		966.35	185.31			838.45	57.41	
I-Factor	0	0	0	0	0	0	0	0
Uniform Delay, s/veh		0	0			0	0	
Increm Delay, s/veh	0	0	0	0	0	0	0	0
Overflow Delay, s/veh	0	0	0	0	0	0	0	0
Control Delay, s/veh		0	0			0	0	
Group LOS								
Uniform Stops, #/veh		0	0			0	0	
Increm Stops, #/veh	0	0	0	0	0	0	0	0
Overflow Stops, #/veh	0	0	0	0	0	0	0	0
Stop Rate, #/veh		0	0			0	0	
Uniform Queue, veh/ln		0	0			0	0	
Increm Queue, veh/ln	0	0	0	0	0	0	0	0
Overflow Queue, veh/ln	0	0	0	0	0	0	0	0
Back of Queue Factor	0	1	1	0	0	1	1	0
Back of Queue, veh/ln		0	0			0	0	
Storage Ratio	0	0	0	0	0	0	0	0
Initial Queue, veh	0	0	0	0	0	0	0	0
Final Queue, veh	0	0	0	0	0	0	0	0
Saturated Delay, s/veh	0	0	0	0	0	0	0	0
Saturated Stops, #/veh	0	0	0	0	0	0	0	0
Saturated Queue, veh/ln	0	0	0	0	0	0	0	0
Saturated Capacity, vph	0	0	0	0	0	0	0	0
Init Que Clear Time, s	0	0	0	0	0	0	0	0

HCS 2010 Signalized Intersection Results Summary

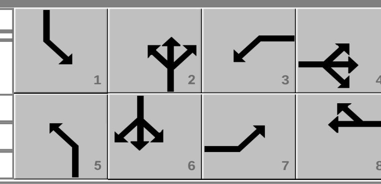
General Information				Intersection Information	
Agency	HDR			Duration, h	0.25
Analyst	MDF	Analysis Date	Jan 30, 2013	Area Type	Other
Jurisdiction		Time Period	AM Peak	PHF	0.85
Intersection	Mall Drive	Analysis Year	2035 No-Build	Analysis Period	1> 7:45
File Name	2035_No-Build_AM_North.xus				
Project Description					



Demand Information	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Demand (*v*), veh/h	30	50	100	180	70	20	100	130	200	20	110	20

Signal Information			
Cycle, s	49.6	Reference Phase	6
Offset, s	0	Reference Point	End
Uncoordinated	Yes	Simult. Gap E/W	Off
Force Mode	Float	Simult. Gap N/S	Off

Green	1.4	2.7	5.0	1.9	2.5	6.5
Yellow	3.0	0.0	4.5	3.0	4.5	4.5
Red	2.0	0.0	2.0	2.0	2.0	2.0



Timer Results	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Assigned Phase	7	4	3	8	5	2	1	6
Case Number	1.1	3.0	2.0	4.0	1.1	3.0	1.1	4.0
Phase Duration, s	6.9	13.0	16.0	22.1	9.1	14.2	6.4	11.5
Change Period, *($Y+R_c$)*, s	5.0	6.5	6.5	6.5	5.0	6.5	5.0	6.5
Max Allow Headway *(MAH)*, s	5.1	5.1	5.1	5.1	5.1	5.1	5.1	5.0
Queue Clearance Time *(g_s)*, s	2.9	2.8	4.9	2.9	5.0	6.2	2.6	3.9
Green Extension Time *(g_e)*, s	0.0	0.2	0.8	0.4	0.2	1.1	0.0	0.6
Phase Call Probability	0.39	0.93	0.95	0.99	0.80	1.00	0.28	1.00
Max Out Probability	1.00	0.00	0.06	0.00	1.00	0.00	1.00	0.00

Movement Group Results	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Assigned Movement	7	4	14	3	8	18	5	2	12	1	6	16
Adjusted Flow Rate (*v*), veh/h	35	59	13	212	44	44	118	153	73	24	68	68
Adjusted Saturation Flow Rate (*s*), veh/h/ln	1602	1601	1426	1556	1682	1643	1602	1682	1426	1602	1682	1651
Queue Service Time (g_s), s	0.9	0.8	0.4	2.9	0.9	0.9	3.0	4.2	2.3	0.6	1.9	1.9
Cycle Queue Clearance Time (g_c), s	0.9	0.8	0.4	2.9	0.9	0.9	3.0	4.2	2.3	0.6	1.9	1.9
Green Ratio (*g/C*)	0.17	0.13	0.13	0.19	0.31	0.31	0.24	0.16	0.16	0.13	0.10	0.10
Capacity (*c*), veh/h	371	422	188	594	528	515	352	262	222	268	169	166
Volume-to-Capacity Ratio *(X)*	0.095	0.140	0.069	0.357	0.084	0.085	0.334	0.584	0.329	0.088	0.405	0.411
Available Capacity (c_a), veh/h	535	1130	503	972	933	911	509	865	733	450	797	782
Back of Queue (*Q*), veh/ln (95th percentile)	0.6	0.5	0.2	1.7	0.5	0.5	1.8	2.9	1.3	0.4	1.4	1.4
Queue Storage Ratio *(RQ)* (95th percentile)	0.06	0.01	0.01	0.23	0.03	0.03	0.17	0.09	0.04	0.04	0.04	0.04
Uniform Delay (d_1), s/veh	17.4	19.1	18.9	17.4	12.0	12.0	15.7	19.4	18.6	19.1	20.9	20.9
Incremental Delay (d_2), s/veh	0.2	0.2	0.2	0.5	0.1	0.1	0.8	2.9	1.2	0.2	2.2	2.3
Initial Queue Delay (d_3), s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Control Delay (*d*), s/veh	17.6	19.3	19.1	17.9	12.1	12.1	16.5	22.3	19.8	19.3	23.1	23.2
Level of Service (LOS)	B	B	B	B	B	B	B	C	B	B	C	C
Approach Delay, s/veh / LOS	18.7		B	16.2		B	19.8		B	22.6		C
Intersection Delay, s/veh / LOS	19.0						B					

Multimodal Results	EB		WB		NB		SB	
Pedestrian LOS Score / LOS	3.0	C	2.4	B	3.0	C	3.1	C
Bicycle LOS Score / LOS	0.6	A	0.7	A	1.1	A	0.6	A

 HCS 2010™ Streets Version 6.50 Generated: 1/31/2013 4:26:06 PM

This Signals text report was created on January 31, 2013 at 04:27:18

Intersection number = 3, Segment number = 2, Period number = 1

Chapter 18 Summary Input

Cycle Length, s 49.59

	EB LT	EB TH	EB RT	WB LT	WB TH	WB RT	NB LT	NB TH	NB RT	SB LT	SB TH	SB RT
Movement	7	4	14	3	8	18	5	2	12	1	6	16
Volume, veh/h	30	50	100	180	70	20	100	130	200	20	110	20
Lanes	1	2	1	2	2	0	1	1	1	1	2	0
Bay Length, ft	250	1000	850	200	500	200	275	851	851	300	1000	0
Receiving Lanes	2	2	2	2	2	2	1	1	1	2	2	2
SatFlow, vplphg	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800
Lane Width, ft	12	12	12	12	12	12	12	12	12	12	12	12
Heavy Vehicles, %	7	7	7	7	7	2	7	7	7	7	7	0
Grade, %	0	0	0	0	0	0	0	0	0	0	0	0
Buses, per h	0	0	0	0	0	0	0	0	0	0	0	0
Parking, per h	0	0	0	0	0	0	0	0	0	0	0	0
Bicycles, per h	0	0	0	0	0	0	0	0	0	0	0	0
Pedestrians, per h	0	0	0	0	0	0	0	0	0	0	0	0
Heavy Veh Equivalent	2	2	2	2	2	2	2	2	2	2	2	2
Bus Blockage Time	14.4	14.4	14.4	14.4	14.4	14.4	14.4	14.4	14.4	14.4	14.4	14.4
Turns in Shrd Ln, %	0	0	0	0	0	0	0	0	0	0	0	0
Unopposed Lefts, %	0	0	0	0	0	0	0	0	0	0	0	0
Parking Time, sec	18	18	18	18	18	18	18	18	18	18	18	18
Arrival Type	3	3	3	3	3	3	3	3	3	3	3	3
Initial Queue, veh	0	0	0	0	0	0	0	0	0	0	0	0
Speed Limit, mph	30	30	30	30	30	30	35	35	35	35	35	35
Detector Length, ft	40	40	40	40	40	40	40	40	40	40	40	40
StartLostTime, sec	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0
EndUseTime, sec	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0
RTOR, veh/h		89			15			138			14	
I-Factor		1.00			1.00			0.99			1.00	
Walk + PC, sec		0.0			0.0			0.0			0.0	

	EB	EB	WB	WB	NB	NB	SB	SB
Phase	7	4	3	8	5	2	1	6
Movement	LT	LT+TH+RT	LT	TH+RT	LT	LT+TH+RT	LT	LT+TH+RT
Left-Turn Mode	Pr/Pm	--	Prot.	--	Pr/Pm	--	Pr/Pm	--
Phase Splits, s	7.0	17.5	15.5	27.5	9.0	25.5	7.0	23.5
Yellow Change, s	3.0	4.5	4.5	4.5	3.0	4.5	3.0	4.5
Red Clearance, s	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0
Minimum Green, s	5	7	10	10	5	5	5	5
Lead/Lag	Lead		Lead		Lead		Lead	
Passage Time, s	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Recall	Off	Off	Off	Off	Off	Off	Off	Off
Dual Entry	No	Yes	No	Yes	No	Yes	No	Yes
Prot. Right-Turn	False	False	False	False	False	False	False	False

	E/W	N/S
Simultaneous Gap out	Off	Off
Dallas Phasing	Off	Off

Cycle Length, s	84
Offset, s	0
Reference Phase	6
Reference Point	End
Force Mode	Float
Uncoordinated	Yes
Field Measured Phase Times	No
Exclusive Ped Phase Time, s	0.0

Timer:	1	2	3	4	5	6	7	8
Assigned Phase	1	2	3	4	5	6	7	8
Assigned Left-Turn Mvmt.	1	0	3	0	5	0	7	0
Assigned Through Mvmt.	0	2	0	4	0	6	0	8
Assigned Right-Turn Mvmt.	0	12	0	14	0	16	0	18
Timer w/Pr-Pm From Shared	0	0	0	0	0	0	0	0

Chapter 18 Summary Output

Cycle Length, s 49.59

	EB LT	EB TH	EB RT	WB LT	WB TH	WB RT	NB LT	NB TH	NB RT	SB LT	SB TH	SB RT
Movement	7	4	14	3	8	18	5	2	12	1	6	16
Volume, veh/h	35.29	58.82	12.94	211.76	82.35	5.88	117.65	152.94	72.94	23.53	129.41	7.06
SatFlow, veh/h/ln	1682.2	1682.2	1682.2	1682.2	1682.2	0	1682.2	1682.2	1682.2	1682.2	1682.2	0
Lane Util Factor	1	0.95	1	0.97	1	1	1	1	1	1	1	1
Capacity, veh/h	370.95	421.52	187.62	593.53	974.34	68.86	352.15	261.94	221.99	268.27	317.32	17.18
Discharge Vol, veh/h	0	0	12.94	211.76	0	0	0	0	0	0	129.41	0
Prop Arriv On Green	0.04	0.13	0.13	0.19	0.31	0.31	0.08	0.16	0.16	0.03	0.1	0.1
Apprch Vol, veh/h	0	107.06	0	0	300	0	0	343.53	0	0	160	0
Apprch Stops, #/veh	0	0.78	0	0	0.71	0	0	0.83	0	0	0.85	0
Apprch Delay, s/veh	0	18.7	0	0	16.22	0	0	19.81	0	0	22.63	0

Apprch LOS B B B C
Int Delay, s/veh 18.99
Int LOS B

Timer Data

Timer:	1	2	3	4	5	6	7	8
Assigned Phase	1	2	3	4	5	6	7	8
Case No	1.1	3	2	3	1.1	4	1.1	4
Phase Duration, s	6.39	14.22	15.96	13.03	9.13	11.48	6.93	22.06
Change Period, s	5	6.5	6.5	6.5	5	6.5	5	6.5
Max Allow Headway, s	5.08	5.1	5.14	5.11	5.08	5	5.14	5.07
Max Green Setting, s	7	25.5	15.5	17.5	9	23.5	7	27.5
Queue Clear Time, s	2.64	6.19	4.93	2.81	4.99	3.92	2.93	2.94
Green Exten Time, s	0.01	1.08	0.84	0.23	0.16	0.56	0.02	0.37
Prob of Phase Call	0.28	1	0.95	0.93	0.8	1	0.39	0.99
Prob of Max Out	1	0	0.06	0	1	0	1	0
Left-Turn Movement Data								
Assigned Movement	1	0	3	0	5	0	7	0
Mvmt. Sat Flow, veh/h	1602.14	0	3111.35	0	1602.14	0	1602.14	0
Through Movement Data								
Assigned Movement	0	2	0	4	0	6	0	8
Mvmt. Sat Flow, veh/h	0	1682.24	0	3202.99	0	3162.41	0	3105.49
Right-Turn Movement Data								
Assigned Movement	0	12	0	14	0	16	0	18
Mvmt. Sat Flow, veh/h	0	1425.63	0	1425.63	0	171.25	0	219.49

Left Lane Group Output

Timer:	1	2	3	4	5	6	7	8
Assigned Phase	1	2	3	4	5	6	7	8
Left Lane Group Data								
Assigned Movement	1	0	3	0	5	0	7	0
Lane Assignment	L Pr/Pm		L (Prot)		L Pr/Pm		L Pr/Pm	
Lanes in Group	1	0	2	0	1	0	1	0
Group Volume, veh/h	23.53	0	211.76	0	117.65	0	35.29	0
Group SatFlow, vphpl	1602.14	0	1555.67	0	1602.14	0	1602.14	0
Queue Serve Time, s	0.64	0	2.93	0	2.99	0	0.93	0
Cycle Clear Time, s	0.64	0	2.93	0	2.99	0	0.93	0
Perm SatFlow, vphpl	1096.41	0	0	0	1189.35	0	1242.56	0
Shared SatFlow, vphpl								
Perm Eff Green, s	4.98	0	0	0	7.72	0	6.53	0
Perm Serve Time, s	3.54	0	0	0	3.06	0	6.53	0
Perm Que Serve Time, s	0.03				0.51		0	
Time to first Blk, s	0	0	0	0	0	0	0	0
Serve Time pre Blk, s								
Prop Inside Lane	1	0	1	0	1	0	1	0
Lane Grp Capacity, vph	268.27		593.53		352.15		370.95	
v/c Ratio	0.09	0	0.36	0	0.33	0	0.1	0
Avail Capacity, veh/h	449.61		972.34		509.39		534.81	
I-Factor	1	0	1	0	0.99	0	1	0
Uniform Delay, s/veh	19.15		17.43		15.74		17.45	
Increm Delay, s/veh	0.2	0	0.52	0	0.78	0	0.16	0
Overflow Delay, s/veh	0	0	0	0	0	0	0	0
Control Delay, s/veh	19.34		17.94		16.52		17.61	
Group LOS	B		B		B		B	
Uniform Stops, #/veh	0.78		0.74		0.8		0.77	
Increm Stops, #/veh	0.03	0	0.02	0	0.03	0	0.02	0
Overflow Stops, #/veh	0	0	0	0	0	0	0	0
Stop Rate, #/veh	0.81		0.75		0.83		0.79	
Uniform Queue, veh/ln	0.21		0.92		0.91		0.3	
Increm Queue, veh/ln	0.01	0	0.04	0	0.08	0	0.02	0
Overflow Queue, veh/ln	0	0	0	0	0	0	0	0
Back of Queue Factor	1.8	0	1.8	0	1.8	0	1.8	0
Back of Queue, veh/ln	0.4		1.73		1.77		0.57	
Storage Ratio	0.04	0	0.23	0	0.17	0	0.06	0
Initial Queue, veh	0	0	0	0	0	0	0	0
Final Queue, veh	0	0	0	0	0	0	0	0
Saturated Delay, s/veh	0	0	0	0	0	0	0	0
Saturated Stops, #/veh	0	0	0	0	0	0	0	0
Saturated Queue, veh/ln	0	0	0	0	0	0	0	0
Saturated Capacity, vph	0	0	0	0	0	0	0	0
Init Que Clear Time, s	0	0	0	0	0	0	0	0

Thru Lane Group Output

Timer:	1	2	3	4	5	6	7	8
Assigned Phase	1	2	3	4	5	6	7	8
Thru Lane Group Data								
Assigned Movement	0	2	0	4	0	6	0	8
Lane Assignment		T		T		T		T
Lanes in Group	0	1	0	2	0	1	0	1
Group Volume, veh/h	0	152.94	0	58.82	0	68.4	0	44.21
Group SatFlow, vphpl	0	1682.24	0	1601.5	0	1682.24	0	1682.24
Queue Serve Time, s	0	4.19	0	0.81	0	1.89	0	0.92
Cycle Clear Time, s	0	4.19	0	0.81	0	1.89	0	0.92
Lane Grp Capacity, vph		261.94		421.52		168.8		527.8
v/c Ratio	0	0.58	0	0.14	0	0.41	0	0.08
Avail Capacity, veh/h		864.9		1130.14		797.07		932.74
I-Factor	0	0.99	0	1	0	1	0	1

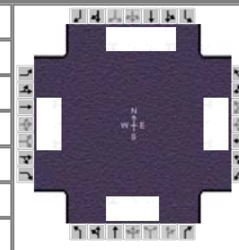
Uniform Delay, s/veh		19.45		19.05		20.92		11.99
Increm Delay, s/veh	0	2.89	0	0.21	0	2.22	0	0.1
Overflow Delay, s/veh	0	0	0	0	0	0	0	0
Control Delay, s/veh		22.33		19.26		23.14		12.09
Group LOS		C		B		C		B
Uniform Stops, #/veh		0.78		0.76		0.8		0.59
Increm Stops, #/veh	0	0.06	0	0.02	0	0.07	0	0.01
Overflow Stops, #/veh	0	0	0	0	0	0	0	0
Stop Rate, #/veh		0.84		0.78		0.86		0.6
Uniform Queue, veh/ln		1.41		0.27		0.65		0.29
Increm Queue, veh/ln	0	0.21	0	0.01	0	0.1	0	0.01
Overflow Queue, veh/ln	0	0	0	0	0	0	0	0
Back of Queue Factor	0	1.8	0	1.8	0	1.8	0	1.8
Back of Queue, veh/ln		2.91		0.5		1.36		0.55
Storage Ratio	0	0.09	0	0.01	0	0.04	0	0.03
Initial Queue, veh	0	0	0	0	0	0	0	0
Final Queue, veh	0	0	0	0	0	0	0	0
Saturated Delay, s/veh	0	0	0	0	0	0	0	0
Saturated Stops, #/veh	0	0	0	0	0	0	0	0
Saturated Queue, veh/ln	0	0	0	0	0	0	0	0
Saturated Capacity, vph	0	0	0	0	0	0	0	0
Init Que Clear Time, s	0	0	0	0	0	0	0	0

Right Lane Group Output

Timer:	1	2	3	4	5	6	7	8
Assigned Phase	1	2	3	4	5	6	7	8
Right Lane Group Data								
Assigned Movement	0	12	0	14	0	16	0	18
Lane Assignment		R		R		T+R		T+R
Lanes in Group	0	1	0	1	0	1	0	1
Group Volume, veh/h	0	72.94	0	12.94	0	68.07	0	44.03
Group SatFlow, vphpl	0	1425.63	0	1425.63	0	1651.42	0	1642.74
Queue Serve Time, s	0	2.26	0	0.39	0	1.92	0	0.94
Cycle Clear Time, s	0	2.26	0	0.39	0	1.92	0	0.94
Prot RT SatFlow, vphpl		0		0				
Prot RT Eff Green, s		0		0				
Prop Outside Lane	0	1	0	1	0	0.1	0	0.13
Lane Grp Capacity, vph		221.99		187.62		165.73		515.43
v/c Ratio	0	0.33	0	0.07	0	0.41	0	0.09
Avail Capacity, veh/h		732.97		503.02		782.48		910.86
I-Factor	0	0.99	0	1	0	1	0	1
Uniform Delay, s/veh		18.63		18.87		20.93		12
Increm Delay, s/veh	0	1.2	0	0.22	0	2.31	0	0.1
Overflow Delay, s/veh	0	0	0	0	0	0	0	0
Control Delay, s/veh		19.83		19.09		23.25		12.1
Group LOS		B		B		C		B
Uniform Stops, #/veh		0.75		0.75		0.8		0.59
Increm Stops, #/veh	0	0.04	0	0.04	0	0.07	0	0.01
Overflow Stops, #/veh	0	0	0	0	0	0	0	0
Stop Rate, #/veh		0.79		0.79		0.86		0.6
Uniform Queue, veh/ln		0.64		0.12		0.65		0.29
Increm Queue, veh/ln	0	0.07	0	0.01	0	0.11	0	0.01
Overflow Queue, veh/ln	0	0	0	0	0	0	0	0
Back of Queue Factor	0	1.8	0	1.8	0	1.8	0	1.8
Back of Queue, veh/ln		1.29		0.23		1.36		0.55
Storage Ratio	0	0.04	0	0.01	0	0.04	0	0.03
Initial Queue, veh	0	0	0	0	0	0	0	0
Final Queue, veh	0	0	0	0	0	0	0	0
Saturated Delay, s/veh	0	0	0	0	0	0	0	0
Saturated Stops, #/veh	0	0	0	0	0	0	0	0
Saturated Queue, veh/ln	0	0	0	0	0	0	0	0
Saturated Capacity, vph	0	0	0	0	0	0	0	0
Init Que Clear Time, s	0	0	0	0	0	0	0	0

HCS 2010 Signalized Intersection Results Summary

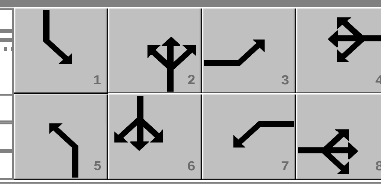
General Information				Intersection Information	
Agency	HDR			Duration, h	0.25
Analyst	MDF	Analysis Date	Jan 30, 2013	Area Type	Other
Jurisdiction		Time Period	PM Peak	PHF	0.90
Intersection	Eglin St	Analysis Year	2035 No-Build	Analysis Period	1> 16:45
File Name	2035_No-Build_PM_North.xus				
Project Description					



Demand Information	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Demand (v), veh/h	330	150	250	70	150	100	320	820	50	150	850	330

Signal Information			
Cycle, s	89.9	Reference Phase	2
Offset, s	0	Reference Point	End
Uncoordinated	Yes	Simult. Gap E/W	Off
Force Mode	Float	Simult. Gap N/S	Off

Green	7.5	1.5	27.5	4.8	4.2	10.3
Yellow	3.2	3.2	3.9	3.2	3.2	3.2
Red	2.3	2.3	2.5	2.3	2.3	2.5



Timer Results	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Assigned Phase	3	8	7	4	5	2	1	6
Case Number	1.1	3.0	1.1	3.0	1.1	4.0	1.1	3.0
Phase Duration, s	20.0	25.7	10.3	16.0	20.0	40.9	13.0	33.9
Change Period, *($Y+R_c$)*, s	5.5	5.7	5.5	5.7	5.5	6.4	5.5	6.4
Max Allow Headway *(MAH)*, s	5.1	5.1	5.1	5.1	5.1	5.0	5.1	5.0
Queue Clearance Time (g_s), s	16.5	9.3	5.6	10.3	15.6	25.5	8.0	26.4
Green Extension Time (g_e), s	0.0	0.7	0.0	0.0	0.0	3.8	0.0	0.7
Phase Call Probability	1.00	1.00	0.86	1.00	1.00	1.00	0.98	1.00
Max Out Probability	1.00	0.14	1.00	1.00	1.00	0.60	1.00	1.00

Movement Group Results	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Assigned Movement	3	8	18	7	4	14	5	2	12	1	6	16
Adjusted Flow Rate (v), veh/h	367	167	60	78	167	13	356	446	516	167	944	123
Adjusted Saturation Flow Rate (s), veh/h/ln	1681	1765	1496	1681	1765	1496	1681	1498	1734	1681	1680	1496
Queue Service Time (g_s), s	14.5	7.3	2.9	3.6	8.3	0.7	13.6	23.5	23.5	6.0	24.4	5.6
Cycle Queue Clearance Time (g_c), s	14.5	7.3	2.9	3.6	8.3	0.7	13.6	23.5	23.5	6.0	24.4	5.6
Green Ratio (g/C)	0.41	0.22	0.22	0.17	0.11	0.11	0.57	0.38	0.38	0.39	0.31	0.31
Capacity (c), veh/h	378	392	332	302	203	172	369	575	665	291	1028	457
Volume-to-Capacity Ratio (X)	0.970	0.425	0.181	0.257	0.823	0.078	0.963	0.776	0.776	0.572	0.919	0.270
Available Capacity (c_a), veh/h	378	392	332	333	206	175	369	575	665	291	1028	457
Back of Queue (Q), veh/ln (95th percentile)	14.6	5.6	1.9	2.7	8.4	0.5	11.6	14.3	15.8	4.3	15.5	3.6
Queue Storage Ratio *(RQ)* (95th percentile)	1.49	0.29	0.24	0.27	0.43	0.04	0.98	0.36	0.40	0.32	0.37	0.34
Uniform Delay (d_1), s/veh	23.3	30.0	28.3	32.6	38.9	35.5	24.6	24.3	24.3	20.7	30.1	23.6
Incremental Delay (d_2), s/veh	38.4	1.0	0.4	0.6	23.5	0.3	37.2	9.9	8.6	2.5	11.3	1.1
Initial Queue Delay (d_3), s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Control Delay (d), s/veh	61.7	31.1	28.7	33.2	62.4	35.8	61.8	34.2	33.0	23.2	41.4	24.7
Level of Service (LOS)	E	C	C	C	E	D	E	C	C	C	D	C
Approach Delay, s/veh / LOS	49.8	D		52.2	D		41.2	D		37.3	D	
Intersection Delay, s/veh / LOS	42.1						D					

Multimodal Results	EB		WB		NB		SB	
Pedestrian LOS Score / LOS	2.8	C	3.3	C	2.5	B	2.7	B
Bicycle LOS Score / LOS	1.5	A	0.9	A	1.6	A	1.5	A

 HCS 2010™ Streets Version 6.50 Generated: 1/31/2013 4:27:55 PM

This Signals text report was created on January 31, 2013 at 04:28:29

Intersection number = 1, Segment number = 1, Period number = 1

Chapter 18 Summary Input

Cycle Length, s 89.92

	EB LT	EB TH	EB RT	WB LT	WB TH	WB RT	NB LT	NB TH	NB RT	SB LT	SB TH	SB RT
Movement	3	8	18	7	4	14	5	2	12	1	6	16
Volume, veh/h	330	150	250	70	150	100	320	820	50	150	850	330
Lanes	1	1	1	1	1	1	1	2	0	1	2	1
Bay Length, ft	250	500	200	250	500	350	300	1000	150	350	1073	275
Receiving Lanes	1	1	1	1	1	1	2	2	2	2	2	2
SatFlow, vplphg	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800
Lane Width, ft	12	12	12	12	12	12	12	12	12	12	12	12
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Grade, %	0	0	0	0	0	0	0	0	0	0	0	0
Buses, per h	0	0	0	0	0	0	0	0	0	0	0	0
Parking, per h	0	0	0	0	0	0	0	0	0	0	0	0
Bicycles, per h	0	0	0	0	0	0	0	0	0	0	0	0
Pedestrians, per h	0	0	0	0	0	0	0	0	0	0	0	0
Heavy Veh Equivalent	2	2	2	2	2	2	2	2	2	2	2	2
Bus Blockage Time	14.4	14.4	14.4	14.4	14.4	14.4	14.4	14.4	14.4	14.4	14.4	14.4
Turns in Shrd Ln, %	0	0	0	40	0	0	0	0	0	0	0	0
Unopposed Lefts, %	0	0	0	0	0	0	0	0	0	0	0	0
Parking Time, sec	18	18	18	18	18	18	18	18	18	18	18	18
Arrival Type	3	3	3	3	3	3	3	3	3	3	3	3
Initial Queue, veh	0	0	0	0	0	0	0	0	0	0	0	0
Speed Limit, mph	30	30	30	30	30	30	35	35	35	35	35	35
Detector Length, ft	40	40	40	40	40	40	40	40	40	40	40	40
StartLostTime, sec	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0
EndUseTime, sec	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0
RTOR, veh/h		196			88			4			219	
I-Factor		1.00			1.00			1.00			0.74	
Walk + PC, sec		0.0			0.0			0.0			0.0	

	EB	EB	WB	WB	NB	NB	SB	SB
Phase	3	8	7	4	5	2	1	6
Movement	LT	LT+TH+RT	LT	LT+TH+RT	LT	LT+TH+RT	LT	LT+TH+RT
Left-Turn Mode	Pr/Pm	--	Pr/Pm	--	Pr/Pm	--	Pr/Pm	--
Phase Splits, s	14.5	18.5	6.5	10.5	14.5	34.5	7.5	27.5
Yellow Change, s	3.2	3.2	3.2	3.2	3.2	3.9	3.2	3.9
Red Clearance, s	2.3	2.5	2.3	2.5	2.3	2.5	2.3	2.5
Minimum Green, s	5	10	5	10	5	15	5	15
Lead/Lag	Lead		Lead		Lead		Lead	
Passage Time, s	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Recall	Off	Off	Off	Off	Off	Max	Off	Max
Dual Entry	No	Yes	No	Yes	No	Yes	No	Yes
Prot. Right-Turn	False	False	False	False	False	False	False	False

	E/W	N/S
Simultaneous Gap out	Off	Off
Dallas Phasing	Off	Off

Cycle Length, s	84
Offset, s	0
Reference Phase	2
Reference Point	End
Force Mode	Float
Uncoordinated	Yes
Field Measured Phase Times	No
Exclusive Ped Phase Time, s	0.0

Timer:	1	2	3	4	5	6	7	8
Assigned Phase	1	2	3	4	5	6	7	8
Assigned Left-Turn Mvmt.	1	0	3	0	5	0	7	0
Assigned Through Mvmt.	0	2	0	4	0	6	0	8
Assigned Right-Turn Mvmt.	0	12	0	14	0	16	0	18
Timer w/Pr-Pm From Shared	0	0	0	0	0	0	0	0

Chapter 18 Summary Output

Cycle Length, s 89.92

	EB LT	EB TH	EB RT	WB LT	WB TH	WB RT	NB LT	NB TH	NB RT	SB LT	SB TH	SB RT
Movement	3	8	18	7	4	14	5	2	12	1	6	16
Volume, veh/h	366.67	166.67	60	77.78	166.67	13.33	355.56	911.11	51.11	166.67	944.44	123.33
SatFlow, veh/h/ln	1764.7	1764.7	1764.7	1764.7	1764.7	1764.7	1764.7	1764.7	0	1764.7	1764.7	1764.7
Lane Util Factor	1	1	1	1	1	1	1	0.85	1	1	0.95	1
Capacity, veh/h	377.99	392.12	332.31	302.39	202.5	171.61	369.21	1174.1	65.87	291.41	1027.6	457.38
Discharge Vol, veh/h	366.67	0	0	0	0	13.33	0	911.11	0	0	0	0
Prop Arriv On Green	0.16	0.22	0.22	0.05	0.11	0.11	0.16	0.38	0.38	0.08	0.31	0.31
Apprch Vol, veh/h	0	593.33	0	0	257.78	0	0	1317.8	0	0	1234.4	0
Apprch Stops, #/veh	0	1	0	0	1.03	0	0	0.89	0	0	0.84	0
Apprch Delay, s/veh	0	49.75	0	0	52.21	0	0	41.17	0	0	37.27	0

Apprch LOS	D	D	D	D
Int Delay, s/veh	42.09			
Int LOS	D			

Timer Data

Timer:	1	2	3	4	5	6	7	8
Assigned Phase	1	2	3	4	5	6	7	8
Case No	1.1	4	1.1	3	1.1	3	1.1	3
Phase Duration, s	13	40.9	20	16.02	20	33.9	10.34	25.68
Change Period, s	5.5	6.4	5.5	5.7	5.5	6.4	5.5	5.7
Max Allow Headway, s	5.08	5	5.14	5.07	5.08	5.02	5.14	5.14
Max Green Setting, s	7.5	34.5	14.5	10.5	14.5	27.5	6.5	18.5
Queue Clear Time, s	8.05	25.5	16.5	10.3	15.57	26.4	5.63	9.29
Green Exten Time, s	0	3.81	0	0.02	0	0.72	0.02	0.75
Prob of Phase Call	0.98	1	1	1	1	1	0.86	1
Prob of Max Out	1	0.6	1	1	1	1	1	0.14
Left-Turn Movement Data								
Assigned Movement	1	0	3	0	5	0	7	0
Mvmt. Sat Flow, veh/h	1680.67	0	1680.67	0	1680.67	0	1680.67	0
Through Movement Data								
Assigned Movement	0	2	0	4	0	6	0	8
Mvmt. Sat Flow, veh/h	0	3060.13	0	1764.71	0	3360	0	1764.71
Right-Turn Movement Data								
Assigned Movement	0	12	0	14	0	16	0	18
Mvmt. Sat Flow, veh/h	0	171.67	0	1495.51	0	1495.51	0	1495.51

Left Lane Group Output

Timer:	1	2	3	4	5	6	7	8
Assigned Phase	1	2	3	4	5	6	7	8
Left Lane Group Data								
Assigned Movement	1	0	3	0	5	0	7	0
Lane Assignment	L Pr/Pm		L Pr/Pm		L Pr/Pm		L Pr/Pm	
Lanes in Group	1	0	1	0	1	0	1	0
Group Volume, veh/h	166.67	0	366.67	0	355.56	0	77.78	0
Group SatFlow, vphpl	1680.67	0	1680.67	0	1680.67	0	1680.67	0
Queue Serve Time, s	6.05	0	14.5	0	13.57	0	3.63	0
Cycle Clear Time, s	6.05	0	14.5	0	13.57	0	3.63	0
Perm SatFlow, vphpl	581.37	0	1199.24	0	526.27	0	1149.33	0
Shared SatFlow, vphpl								
Perm Eff Green, s	27.5	0	21.98	0	36.5	0	10.32	0
Perm Serve Time, s	11	0	2.02	0	3.1	0	10.32	0
Perm Que Serve Time, s	6.63		2.02		3.1		0	
Time to first Blk, s	0	0	0	0	0	0	0	0
Serve Time pre Blk, s								
Prop Inside Lane	1	0	1	0	1	0	1	0
Lane Grp Capacity, vph	291.41		377.99		369.21		302.39	
v/c Ratio	0.57	0	0.97	0	0.96	0	0.26	0
Avail Capacity, veh/h	291.41		377.99		369.21		333.45	
I-Factor	0.74	0	1	0	1	0	1	0
Uniform Delay, s/veh	20.74		23.28		24.62		32.59	
Increm Delay, s/veh	2.46	0	38.41	0	37.22	0	0.63	0
Overflow Delay, s/veh	0	0	0	0	0	0	0	0
Control Delay, s/veh	23.2		61.69		61.84		33.22	
Group LOS	C		E		E		C	
Uniform Stops, #/veh	0.57		0.7		0.62		0.72	
Increm Stops, #/veh	0.05	0	0.47	0	0.46	0	0.03	0
Overflow Stops, #/veh	0	0	0	0	0	0	0	0
Stop Rate, #/veh	0.62		1.17		1.08		0.75	
Uniform Queue, veh/ln	2.21		5.52		3.38		1.44	
Increm Queue, veh/ln	0.2	0	4.03	0	3.82	0	0.05	0
Overflow Queue, veh/ln	0	0	0	0	0	0	0	0
Back of Queue Factor	1.8	0	1.53	0	1.61	0	1.8	0
Back of Queue, veh/ln	4.34		14.62		11.59		2.69	
Storage Ratio	0.32	0	1.49	0	0.98	0	0.27	0
Initial Queue, veh	0	0	0	0	0	0	0	0
Final Queue, veh	0	0	0	0	0	0	0	0
Saturated Delay, s/veh	0	0	0	0	0	0	0	0
Saturated Stops, #/veh	0	0	0	0	0	0	0	0
Saturated Queue, veh/ln	0	0	0	0	0	0	0	0
Saturated Capacity, vph	0	0	0	0	0	0	0	0
Init Que Clear Time, s	0	0	0	0	0	0	0	0

Thru Lane Group Output

Timer:	1	2	3	4	5	6	7	8
Assigned Phase	1	2	3	4	5	6	7	8
Thru Lane Group Data								
Assigned Movement	0	2	0	4	0	6	0	8
Lane Assignment		T		T		T		T
Lanes in Group	0	1	0	1	0	2	0	1
Group Volume, veh/h	0	446.01	0	166.67	0	944.44	0	166.67
Group SatFlow, vphpl	0	1497.99	0	1764.71	0	1680	0	1764.71
Queue Serve Time, s	0	23.5	0	8.3	0	24.4	0	7.29
Cycle Clear Time, s	0	23.5	0	8.3	0	24.4	0	7.29
Lane Grp Capacity, vph		574.75		202.5		1027.6		392.12
v/c Ratio	0	0.78	0	0.82	0	0.92	0	0.43
Avail Capacity, veh/h		574.75		206.07		1027.6		392.12
I-Factor	0	1	0	1	0	0.74	0	1

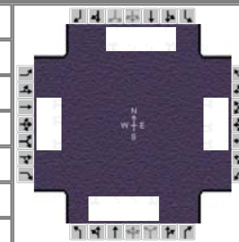
Uniform Delay, s/veh		24.32		38.91		30.13		30.04
Increm Delay, s/veh	0	9.88	0	23.48	0	11.26	0	1.04
Overflow Delay, s/veh	0	0	0	0	0	0	0	0
Control Delay, s/veh		34.2		62.39		41.39		31.08
Group LOS		C		E		D		C
Uniform Stops, #/veh		0.67		0.83		0.76		0.71
Increm Stops, #/veh	0	0.15	0	0.34	0	0.15	0	0.03
Overflow Stops, #/veh	0	0	0	0	0	0	0	0
Stop Rate, #/veh		0.82		1.17		0.91		0.74
Uniform Queue, veh/ln		7.69		3.51		9.23		3.01
Increm Queue, veh/ln	0	1.58	0	1.32	0	1.61	0	0.11
Overflow Queue, veh/ln	0	0	0	0	0	0	0	0
Back of Queue Factor	0	1.54	0	1.75	0	1.43	0	1.8
Back of Queue, veh/ln		14.26		8.43		15.49		5.63
Storage Ratio	0	0.36	0	0.43	0	0.37	0	0.29
Initial Queue, veh	0	0	0	0	0	0	0	0
Final Queue, veh	0	0	0	0	0	0	0	0
Saturated Delay, s/veh	0	0	0	0	0	0	0	0
Saturated Stops, #/veh	0	0	0	0	0	0	0	0
Saturated Queue, veh/ln	0	0	0	0	0	0	0	0
Saturated Capacity, vph	0	0	0	0	0	0	0	0
Init Que Clear Time, s	0	0	0	0	0	0	0	0

Right Lane Group Output

Timer:	1	2	3	4	5	6	7	8
Assigned Phase	1	2	3	4	5	6	7	8
Right Lane Group Data								
Assigned Movement	0	12	0	14	0	16	0	18
Lane Assignment		T+R		R		R		R
Lanes in Group	0	1	0	1	0	1	0	1
Group Volume, veh/h	0	516.22	0	13.33	0	123.33	0	60
Group SatFlow, vphpl	0	1733.81	0	1495.51	0	1495.51	0	1495.51
Queue Serve Time, s	0	23.5	0	0.72	0	5.61	0	2.92
Cycle Clear Time, s	0	23.5	0	0.72	0	5.61	0	2.92
Prot RT SatFlow, vphpl				0		0		0
Prot RT Eff Green, s				0		0		0
Prop Outside Lane	0	0.1	0	1	0	1	0	1
Lane Grp Capacity, vph		665.24		171.61		457.38		332.31
v/c Ratio	0	0.78	0	0.08	0	0.27	0	0.18
Avail Capacity, veh/h		665.24		174.64		457.38		332.31
I-Factor	0	1	0	1	0	0.74	0	1
Uniform Delay, s/veh		24.32		35.55		23.61		28.34
Increm Delay, s/veh	0	8.63	0	0.27	0	1.07	0	0.37
Overflow Delay, s/veh	0	0	0	0	0	0	0	0
Control Delay, s/veh		32.95		35.82		24.68		28.7
Group LOS		C		D		C		C
Uniform Stops, #/veh		0.67		0.76		0.6		0.67
Increm Stops, #/veh	0	0.13	0	0.04	0	0.05	0	0.02
Overflow Stops, #/veh	0	0	0	0	0	0	0	0
Stop Rate, #/veh		0.8		0.8		0.65		0.69
Uniform Queue, veh/ln		8.9		0.26		1.89		1.02
Increm Queue, veh/ln	0	1.6	0	0.01	0	0.14	0	0.03
Overflow Queue, veh/ln	0	0	0	0	0	0	0	0
Back of Queue Factor	0	1.51	0	1.8	0	1.8	0	1.8
Back of Queue, veh/ln		15.81		0.48		3.64		1.9
Storage Ratio	0	0.4	0	0.04	0	0.34	0	0.24
Initial Queue, veh	0	0	0	0	0	0	0	0
Final Queue, veh	0	0	0	0	0	0	0	0
Saturated Delay, s/veh	0	0	0	0	0	0	0	0
Saturated Stops, #/veh	0	0	0	0	0	0	0	0
Saturated Queue, veh/ln	0	0	0	0	0	0	0	0
Saturated Capacity, vph	0	0	0	0	0	0	0	0
Init Que Clear Time, s	0	0	0	0	0	0	0	0

HCS 2010 Signalized Intersection Results Summary

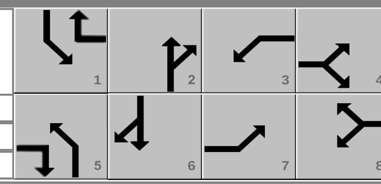
General Information				Intersection Information	
Agency	HDR			Duration, h	0.25
Analyst	MDF	Analysis Date	Jan 30, 2013	Area Type	Other
Jurisdiction		Time Period	PM Peak	PHF	0.90
Intersection	I-90 Ramps (SPUI)	Analysis Year	2035 No-Build	Analysis Period	1> 16:45
File Name	2035_No-Build_PM_North.xus				
Project Description					



Demand Information	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Demand (*v*), veh/h	150		470	330		90	480	470	300	50	530	160

Signal Information			
Cycle, s	81.6	Reference Phase	2
Offset, s	0	Reference Point	End
Uncoordinated	Yes	Simult. Gap E/W	Off
Force Mode	Float	Simult. Gap N/S	Off

Green	3.6	19.9	27.1	0.0	9.0	0.0
Yellow	4.5	4.5	4.5	0.0	4.5	0.0
Red	1.0	1.0	1.0	0.0	1.0	0.0



Timer Results	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Assigned Phase	7	4	3	8	5	2	1	6
Case Number	1.4	3.0	1.4	3.0	2.0	3.0	2.0	3.0
Phase Duration, s	14.5	0.0	14.5	0.0	34.4	58.0	9.1	32.6
Change Period, *(Y+R$_c$)*, s	5.5	0.0	5.5	0.0	5.5	5.5	5.5	5.5
Max Allow Headway *(MAH)*, s	5.0	0.0	5.0	0.0	5.1	4.0	5.1	4.0
Queue Clearance Time *(g_s)*, s	3.1		8.2		26.5	7.4	4.7	13.6
Green Extension Time *(g_e)*, s	0.5	0.0	0.8	0.0	2.5	2.2	0.0	1.7
Phase Call Probability	0.98		1.00		1.00	1.00	0.72	1.00
Max Out Probability	0.06		1.00		0.24	0.00	1.00	0.15

Movement Group Results	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Assigned Movement	7		14	3		18	5	2	12	1	6	16
Adjusted Flow Rate (*v*), veh/h	167		0	367		0	533	522	0	56	589	0
Adjusted Saturation Flow Rate (*s*), veh/h/ln	1632		1496	1632		1496	1681	1680	1496	1681	1680	1496
Queue Service Time (g_s), s	1.1		0.0	6.2		0.0	24.5	5.4	0.0	2.7	11.6	0.0
Cycle Queue Clearance Time (g_c), s	1.1		0.0	6.2		0.0	24.5	5.4	0.0	2.7	11.6	0.0
Green Ratio (*g/C*)	0.11		0.35	0.11		0.04	0.35	0.64	0.64	0.04	0.33	0.33
Capacity (*c*), veh/h	467		532	467		67	596	2162	962	74	1118	497
Volume-to-Capacity Ratio *(X)*	0.357		0.000	0.785		0.000	0.894	0.242	0.000	0.753	0.527	0.000
Available Capacity (c_a), veh/h	607		549	607		84	773	2162	962	155	1118	497
Back of Queue (*Q*), veh/ln (95th percentile)	2.5		0.0	6.3		0.0	13.3	2.7	0.0	2.4	7.4	0.0
Queue Storage Ratio *(RQ)* (95th percentile)	0.13		0.00	0.32		0.00	0.90	0.06	0.00	0.18	0.22	0.00
Uniform Delay (d_1), s/veh	34.2		0.0	35.9		0.0	24.9	6.1	0.0	38.6	22.0	0.0
Incremental Delay (d_2), s/veh	0.7		0.0	6.0		0.0	5.9	0.1	0.0	14.9	1.3	0.0
Initial Queue Delay (d_3), s/veh	0.0		0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0	0.0
Control Delay (*d*), s/veh	34.9		0.0	41.9		0.0	30.8	6.3	0.0	53.4	23.3	0.0
Level of Service (LOS)	C			D			C	A		D	C	
Approach Delay, s/veh / LOS	34.9	C		41.9	D		18.7	B		25.9	C	
Intersection Delay, s/veh / LOS	25.8						C					

Multimodal Results	EB		WB		NB		SB	
Pedestrian LOS Score / LOS	3.4	C	3.2	C	2.5	B	3.1	C
Bicycle LOS Score / LOS		F		F	1.4	A	1.0	A

This Signals text report was created on January 31, 2013 at 04:28:36

Intersection number = 2, Segment number = 1, Period number = 1

Chapter 18 Summary Input

Cycle Length, s 81.58

	EB LT	EB TH	EB RT	WB LT	WB TH	WB RT	NB LT	NB TH	NB RT	SB LT	SB TH	SB RT
Movement	7	4	14	3	8	18	5	2	12	1	6	16
Volume, veh/h	150	0	470	330	0	90	480	470	300	50	530	160
Lanes	2	0	1	2	0	1	1	2	1	1	2	1
Bay Length, ft	500	500	500	500	500	500	375	1073	500	350	851	450
Receiving Lanes	1	1	1	1	1	1	2	2	2	2	2	2
SatFlow, vplphg	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800
Lane Width, ft	12	12	12	12	12	12	12	12	12	12	12	12
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Grade, %	0	0	0	0	0	0	0	0	0	0	0	0
Buses, per h	0	0	0	0	0	0	0	0	0	0	0	0
Parking, per h	0	0	0	0	0	0	0	0	0	0	0	0
Bicycles, per h	0	0	0	0	0	0	0	0	0	0	0	0
Pedestrians, per h	0	0	0	0	0	0	0	0	0	0	0	0
Heavy Veh Equivalent	2	2	2	2	2	2	2	2	2	2	2	2
Bus Blockage Time	14.4	14.4	14.4	14.4	14.4	14.4	14.4	14.4	14.4	14.4	14.4	14.4
Turns in Shrd Ln, %	0	0	0	0	0	0	0	0	0	0	0	0
Unopposed Lefts, %	0	0	0	0	0	0	0	0	0	0	0	0
Parking Time, sec	18	18	18	18	18	18	18	18	18	18	18	18
Arrival Type	3	3	3	3	3	3	3	3	3	3	3	3
Initial Queue, veh	0	0	0	0	0	0	0	0	0	0	0	0
Speed Limit, mph	45	45	45	45	45	45	35	35	35	35	35	35
Detector Length, ft	40	40	40	40	40	40	40	40	40	40	40	40
StartLostTime, sec	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0
EndUseTime, sec	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0
RTOR, veh/h		470			90			300			160	
I-Factor		1.00			1.00			0.46			0.74	
Walk + PC, sec		0.0			0.0			0.0			0.0	

	EB	EB	WB	WB	NB	NB	SB	SB
Phase	7	4	3	8	5	2	1	6
Movement	LT	LT+RT	LT	LT+RT	LT	TH+RT	LT	TH+RT
Left-Turn Mode	Pr/Pm	--	Pr/Pm	--	Prot.	--	Prot.	--
Phase Splits, s	12.5	1.0	12.5	1.0	37.5	52.5	7.5	22.5
Yellow Change, s	4.5	0.0	4.5	0.0	4.5	4.5	4.5	4.5
Red Clearance, s	1.0	0.0	1.0	0.0	1.0	1.0	1.0	1.0
Minimum Green, s	5	1	5	1	5	7	5	7
Lead/Lag	Lag		Lag		Lead		Lead	
Passage Time, s	4.0	0.0	4.0	0.0	4.0	3.0	4.0	3.0
Recall	Off	Off	Off	Off	Off	Max	Off	Max
Dual Entry	No	Yes	No	Yes	No	Yes	No	Yes
Prot. Right-Turn	False	False	False	False	True	False	True	False

	E/W	N/S
Simultaneous Gap out	Off	Off
Dallas Phasing	Off	Off

Cycle Length, s	84
Offset, s	0
Reference Phase	2
Reference Point	End
Force Mode	Float
Uncoordinated	Yes
Field Measured Phase Times	No
Exclusive Ped Phase Time, s	0.0

Timer:	1	2	3	4	5	6	7	8
Assigned Phase	1	2	4	3	5	6	8	7
Assigned Left-Turn Mvmt.	1	0	0	3	5	0	0	7
Assigned Through Mvmt.	0	2	4	0	0	6	8	0
Assigned Right-Turn Mvmt.	0	12	14	0	0	16	18	0
Timer w/Pr-Pm From Shared	0	0	0	0	0	0	0	0

Chapter 18 Summary Output

Cycle Length, s 81.58

	EB LT	EB TH	EB RT	WB LT	WB TH	WB RT	NB LT	NB TH	NB RT	SB LT	SB TH	SB RT
Movement	7	4	14	3	8	18	5	2	12	1	6	16
Volume, veh/h	166.67	0	0	366.67	0	0	533.33	522.22	0	55.56	588.89	0
SatFlow, veh/h/ln	1764.7	1764.7	1764.7	1764.7	1764.7	1764.7	1764.7	1764.7	1764.7	1764.7	1764.7	1764.7
Lane Util Factor	0.97	1	1	0.97	1	1	1	0.95	1	1	0.95	1
Capacity, veh/h	467.22	0	16.62	467.22	0	16.62	596.35	2162.4	962.46	73.77	1117.6	497.46
Discharge Vol, veh/h	166.67	0	0	366.67	0	0	0	522.22	0	0	588.89	0
Prop Arriv On Green	0.11	0	0	0.11	0	0	0.35	0.64	0	0.04	0.33	0
Apprch Vol, veh/h	0	166.67	0	0	366.67	0	0	1055.6	0	0	644.44	0
Apprch Stops, #/veh	0	NaN	0	0	NaN	0	0	0.55	0	0	0.7	0
Apprch Delay, s/veh	0	34.88	0	0	41.91	0	0	18.67	0	0	25.93	0

Apprch LOS	C	D	B	C
Int Delay, s/veh	25.79			
Int LOS	C			

Timer Data

Timer:	1	2	3	4	5	6	7	8
Assigned Phase	1	2	4	3	5	6	8	7
Case No	2	3	3	1.4	2	3	3	1.4
Phase Duration, s	9.08	58	0	14.5	34.45	32.64	0	14.5
Change Period, s	5.5	5.5	0	5.5	5.5	5.5	0	5.5
Max Allow Headway, s	5.08	3.98	0	4.98	5.08	3.98	0	4.98
Max Green Setting, s	7.5	52.5	1	12.5	37.5	22.5	1	12.5
Queue Clear Time, s	4.67	7.35		8.16	26.47	13.57		3.08
Green Exten Time, s	0.04	2.22	0	0.83	2.48	1.71	0	0.54
Prob of Phase Call	0.72	1		1	1	1		0.98
Prob of Max Out	1	0		1	0.24	0.15		0.06
Left-Turn Movement Data								
Assigned Movement	1	0	0	3	5	0	0	7
Mvmt. Sat Flow, veh/h	1680.67	0	0	3263.87	1680.67	0	0	3263.87
Through Movement Data								
Assigned Movement	0	2	4	0	0	6	8	0
Mvmt. Sat Flow, veh/h	0	3360	0	0	0	3360	0	0
Right-Turn Movement Data								
Assigned Movement	0	12	14	0	0	16	18	0
Mvmt. Sat Flow, veh/h	0	1495.51	1495.51	0	0	1495.51	1495.51	0

Left Lane Group Output

Timer:	1	2	3	4	5	6	7	8
Assigned Phase	1	2	4	3	5	6	8	7
Left Lane Group Data								
Assigned Movement	1	0	0	3	5	0	0	7
Lane Assignment	L (Prot)			L Pr/Pm	L (Prot)			L Pr/Pm
Lanes in Group	1	0	0	2	1	0	0	2
Group Volume, veh/h	55.56	0	0	366.67	533.33	0	0	166.67
Group SatFlow, vphpl	1680.67	0	0	1631.93	1680.67	0	0	1631.93
Queue Serve Time, s	2.67	0	0	6.16	24.47	0	0	1.08
Cycle Clear Time, s	2.67	0	0	6.16	24.47	0	0	1.08
Perm SatFlow, vphpl	0	0	0	1411.75	0	0	0	1411.75
Shared SatFlow, vphpl								
Perm Eff Green, s	0	0	0	-2	0	0	0	-2
Perm Serve Time, s	0	0	0	-2	0	0	0	-2
Perm Que Serve Time, s				0				0
Time to first Blk, s	0	0	0	0	0	0	0	0
Serve Time pre Blk, s								
Prop Inside Lane	1	0	0	1	1	0	0	1
Lane Grp Capacity, vph	73.77			467.22	596.35			467.22
v/c Ratio	0.75	0	0	0.78	0.89	0	0	0.36
Avail Capacity, veh/h	154.52			607.42	772.59			607.42
I-Factor	0.74	0	0	1	0.46	0	0	1
Uniform Delay, s/veh	38.56			35.93	24.87			34.23
Increm Delay, s/veh	14.88	0	0	5.97	5.95	0	0	0.66
Overflow Delay, s/veh	0	0	0	0	0	0	0	0
Control Delay, s/veh	53.44			41.91	30.82			34.88
Group LOS	D			D	C			C
Uniform Stops, #/veh	0.84			0.76	0.74			0.73
Increm Stops, #/veh	0.24	0	0	0.09	0.08	0	0	0.02
Overflow Stops, #/veh	0	0	0	0	0	0	0	0
Stop Rate, #/veh	1.08			0.85	0.82			0.75
Uniform Queue, veh/ln	1.06			3.13	8.87			1.37
Increm Queue, veh/ln	0.3	0	0	0.39	0.99	0	0	0.04
Overflow Queue, veh/ln	0	0	0	0	0	0	0	0
Back of Queue Factor	1.8	0	0	1.8	1.35	0	0	1.8
Back of Queue, veh/ln	2.45			6.33	13.34			2.53
Storage Ratio	0.18	0	0	0.32	0.9	0	0	0.13
Initial Queue, veh	0	0	0	0	0	0	0	0
Final Queue, veh	0	0	0	0	0	0	0	0
Saturated Delay, s/veh	0	0	0	0	0	0	0	0
Saturated Stops, #/veh	0	0	0	0	0	0	0	0
Saturated Queue, veh/ln	0	0	0	0	0	0	0	0
Saturated Capacity, vph	0	0	0	0	0	0	0	0
Init Que Clear Time, s	0	0	0	0	0	0	0	0

Thru Lane Group Output

Timer:	1	2	3	4	5	6	7	8
Assigned Phase	1	2	4	3	5	6	8	7
Thru Lane Group Data								
Assigned Movement	0	2	4	0	0	6	8	0
Lane Assignment		T				T		
Lanes in Group	0	2	0	0	0	2	0	0
Group Volume, veh/h	0	522.22	0	0	0	588.89	0	0
Group SatFlow, vphpl	0	1680	0	0	0	1680	0	0
Queue Serve Time, s	0	5.35	0	0	0	11.57	0	0
Cycle Clear Time, s	0	5.35	0	0	0	11.57	0	0
Lane Grp Capacity, vph		2162.39	0			1117.65	0	
v/c Ratio	0	0.24	0	0	0	0.53	0	0
Avail Capacity, veh/h		2162.39	0			1117.65	0	
I-Factor	0	0.46	0	0	0	0.74	0	0

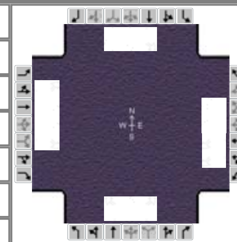
Uniform Delay, s/veh		6.14	0			22.03	0	
Increm Delay, s/veh	0	0.12	0	0	0	1.31	0	0
Overflow Delay, s/veh	0	0	0	0	0	0	0	0
Control Delay, s/veh		6.26	0			23.34	0	
Group LOS		A				C		
Uniform Stops, #/veh		0.26	NaN			0.64	NaN	
Increm Stops, #/veh	0	0.01	0	0	0	0.03	0	0
Overflow Stops, #/veh	0	0	0	0	0	0	0	0
Stop Rate, #/veh		0.27	NaN			0.67	NaN	
Uniform Queue, veh/ln		1.48	0			4.23	0	
Increm Queue, veh/ln	0	0.04	0	0	0	0.2	0	0
Overflow Queue, veh/ln	0	0	0	0	0	0	0	0
Back of Queue Factor	0	1.8	1	0	0	1.67	1	0
Back of Queue, veh/ln		2.73	0			7.39	0	
Storage Ratio	0	0.06	0	0	0	0.22	0	0
Initial Queue, veh	0	0	0	0	0	0	0	0
Final Queue, veh	0	0	0	0	0	0	0	0
Saturated Delay, s/veh	0	0	0	0	0	0	0	0
Saturated Stops, #/veh	0	0	0	0	0	0	0	0
Saturated Queue, veh/ln	0	0	0	0	0	0	0	0
Saturated Capacity, vph	0	0	0	0	0	0	0	0
Init Que Clear Time, s	0	0	0	0	0	0	0	0

Right Lane Group Output

Timer:	1	2	3	4	5	6	7	8
Assigned Phase	1	2	4	3	5	6	8	7
Right Lane Group Data								
Assigned Movement	0	12	14	0	0	16	18	0
Lane Assignment		R	R			R	R	
Lanes in Group	0	1	1	0	0	1	1	0
Group Volume, veh/h	0	0	0	0	0	0	0	0
Group SatFlow, vphpl	0	1495.51	1495.51	0	0	1495.51	1495.51	0
Queue Serve Time, s	0	0	0	0	0	0	0	0
Cycle Clear Time, s	0	0	0	0	0	0	0	0
Prot RT SatFlow, vphpl		0	1495.51			0	1495.51	
Prot RT Eff Green, s		0	28.95			0	3.58	
Prop Outside Lane	0	1	1	0	0	1	1	0
Lane Grp Capacity, vph		962.46	532.48			497.46	67.47	
v/c Ratio	0	0	0	0	0	0	0	0
Avail Capacity, veh/h		962.46	548.98			497.46	83.97	
I-Factor	0	0	0	0	0	0	0	0
Uniform Delay, s/veh		0	0			0	0	
Increm Delay, s/veh	0	0	0	0	0	0	0	0
Overflow Delay, s/veh	0	0	0	0	0	0	0	0
Control Delay, s/veh		0	0			0	0	
Group LOS								
Uniform Stops, #/veh		0	0			0	0	
Increm Stops, #/veh	0	0	0	0	0	0	0	0
Overflow Stops, #/veh	0	0	0	0	0	0	0	0
Stop Rate, #/veh		0	0			0	0	
Uniform Queue, veh/ln		0	0			0	0	
Increm Queue, veh/ln	0	0	0	0	0	0	0	0
Overflow Queue, veh/ln	0	0	0	0	0	0	0	0
Back of Queue Factor	0	1	1	0	0	1	1	0
Back of Queue, veh/ln		0	0			0	0	
Storage Ratio	0	0	0	0	0	0	0	0
Initial Queue, veh	0	0	0	0	0	0	0	0
Final Queue, veh	0	0	0	0	0	0	0	0
Saturated Delay, s/veh	0	0	0	0	0	0	0	0
Saturated Stops, #/veh	0	0	0	0	0	0	0	0
Saturated Queue, veh/ln	0	0	0	0	0	0	0	0
Saturated Capacity, vph	0	0	0	0	0	0	0	0
Init Que Clear Time, s	0	0	0	0	0	0	0	0

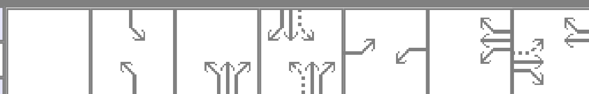
HCS 2010 Signalized Intersection Results Summary

General Information				Intersection Information	
Agency	HDR			Duration, h	0.25
Analyst	MDF	Analysis Date	Jan 30, 2013	Area Type	Other
Jurisdiction		Time Period	PM Peak	PHF	0.90
Intersection	Mall Drive	Analysis Year	2035 No-Build	Analysis Period	1> 16:45
File Name	2035_No-Build_PM_North.xus				
Project Description					

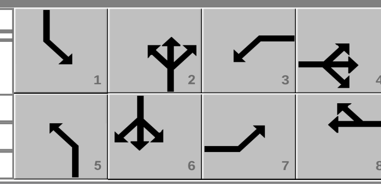


Demand Information	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Demand (*v*), veh/h	40	80	170	350	100	20	200	210	300	20	220	30

Signal Information			
Cycle, s	56.0	Reference Phase	6
Offset, s	0	Reference Point	End
Uncoordinated	Yes	Simult. Gap E/W	Off
Force Mode	Float	Simult. Gap N/S	Off



Green	1.5	1.0	7.0	2.5	2.6	6.9
Yellow	3.0	3.0	4.5	3.0	4.5	4.5
Red	2.0	2.0	2.0	2.0	2.0	2.0



Timer Results	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Assigned Phase	7	4	3	8	5	2	1	6
Case Number	1.1	3.0	2.0	4.0	1.1	3.0	1.1	4.0
Phase Duration, s	7.5	13.4	16.6	22.5	12.5	19.5	6.5	13.5
Change Period, *($Y+R_c$)*, s	5.0	6.5	6.5	6.5	5.0	6.5	5.0	6.5
Max Allow Headway *(MAH)*, s	5.1	5.1	5.1	5.1	5.1	5.1	5.1	5.0
Queue Clearance Time *(g_s)*, s	3.3	3.3	8.3	3.4	7.2	8.6	2.6	6.2
Green Extension Time *(g_e)*, s	0.0	0.4	1.8	0.6	0.6	1.6	0.0	0.8
Phase Call Probability	0.50	0.99	1.00	1.00	0.97	1.00	0.29	1.00
Max Out Probability	1.00	0.00	0.12	0.00	0.42	0.03	1.00	0.23

Movement Group Results	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Assigned Movement	7	4	14	3	8	18	5	2	12	1	6	16
Adjusted Flow Rate (*v*), veh/h	44	89	27	389	60	59	222	233	110	22	135	133
Adjusted Saturation Flow Rate (*s*), veh/h/ln	1664	1664	1481	1616	1748	1707	1664	1748	1481	1664	1748	1694
Queue Service Time (g_s), s	1.3	1.3	0.9	6.3	1.4	1.4	5.2	6.6	3.4	0.6	4.1	4.2
Cycle Queue Clearance Time (g_c), s	1.3	1.3	0.9	6.3	1.4	1.4	5.2	6.6	3.4	0.6	4.1	4.2
Green Ratio (*g/C*)	0.17	0.12	0.12	0.18	0.29	0.29	0.40	0.23	0.23	0.15	0.12	0.12
Capacity (*c*), veh/h	358	411	183	582	499	488	407	407	345	290	218	212
Volume-to-Capacity Ratio *(X)*	0.124	0.217	0.146	0.668	0.119	0.122	0.546	0.573	0.319	0.077	0.618	0.628
Available Capacity (c_a), veh/h	432	1040	463	1125	1045	1021	600	733	621	395	452	439
Back of Queue (*Q*), veh/ln (95th percentile)	0.8	0.9	0.6	4.1	0.9	0.9	3.1	4.5	2.0	0.4	3.2	3.1
Queue Storage Ratio *(RQ)* (95th percentile)	0.09	0.02	0.02	0.53	0.05	0.05	0.29	0.14	0.06	0.04	0.08	0.08
Uniform Delay (d_1), s/veh	19.9	22.1	21.9	21.4	14.8	14.8	13.2	19.0	17.8	20.5	23.2	23.3
Incremental Delay (d_2), s/veh	0.2	0.4	0.5	1.9	0.2	0.2	1.6	1.8	0.7	0.2	4.0	4.3
Initial Queue Delay (d_3), s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Control Delay (*d*), s/veh	20.1	22.5	22.4	23.3	14.9	15.0	14.8	20.8	18.5	20.6	27.2	27.6
Level of Service (LOS)	C	C	C	C	B	B	B	C	B	C	C	C
Approach Delay, s/veh / LOS	21.8	C		21.3	C		18.0	B		26.9	C	
Intersection Delay, s/veh / LOS	21.2						C					

Multimodal Results	EB		WB		NB		SB	
Pedestrian LOS Score / LOS	3.1	C	2.4	B	3.0	C	3.2	C
Bicycle LOS Score / LOS	0.6	A	0.9	A	1.4	A	0.7	A

This Signals text report was created on January 31, 2013 at 04:28:44

Intersection number = 3, Segment number = 2, Period number = 1

Chapter 18 Summary Input

Cycle Length, s 56

	EB LT	EB TH	EB RT	WB LT	WB TH	WB RT	NB LT	NB TH	NB RT	SB LT	SB TH	SB RT
Movement	7	4	14	3	8	18	5	2	12	1	6	16
Volume, veh/h	40	80	170	350	100	20	200	210	300	20	220	30
Lanes	1	2	1	2	2	0	1	1	1	1	2	0
Bay Length, ft	250	1000	850	200	500	200	275	851	851	300	1000	0
Receiving Lanes	2	2	2	2	2	2	1	1	1	2	2	2
SatFlow, vplphg	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800
Lane Width, ft	12	12	12	12	12	12	12	12	12	12	12	12
Heavy Vehicles, %	3	3	3	3	3	2	3	3	3	3	3	0
Grade, %	0	0	0	0	0	0	0	0	0	0	0	0
Buses, per h	0	0	0	0	0	0	0	0	0	0	0	0
Parking, per h	0	0	0	0	0	0	0	0	0	0	0	0
Bicycles, per h	0	0	0	0	0	0	0	0	0	0	0	0
Pedestrians, per h	0	0	0	0	0	0	0	0	0	0	0	0
Heavy Veh Equivalent	2	2	2	2	2	2	2	2	2	2	2	2
Bus Blockage Time	14.4	14.4	14.4	14.4	14.4	14.4	14.4	14.4	14.4	14.4	14.4	14.4
Turns in Shrd Ln, %	0	0	0	0	0	0	0	0	0	0	0	0
Unopposed Lefts, %	0	0	0	0	0	0	0	0	0	0	0	0
Parking Time, sec	18	18	18	18	18	18	18	18	18	18	18	18
Arrival Type	3	3	3	3	3	3	3	3	3	3	3	3
Initial Queue, veh	0	0	0	0	0	0	0	0	0	0	0	0
Speed Limit, mph	30	30	30	30	30	30	35	35	35	35	35	35
Detector Length, ft	40	40	40	40	40	40	40	40	40	40	40	40
StartLostTime, sec	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0
EndUseTime, sec	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0
RTOR, veh/h		146			13			201			9	
I-Factor		1.00			1.00			0.97			1.00	
Walk + PC, sec		0.0			0.0			0.0			0.0	

	EB	EB	WB	WB	NB	NB	SB	SB
Phase	7	4	3	8	5	2	1	6
Movement	LT	LT+TH+RT	LT	TH+RT	LT	LT+TH+RT	LT	LT+TH+RT
Left-Turn Mode	Pr/Pm	--	Prot.	--	Pr/Pm	--	Pr/Pm	--
Phase Splits, s	5.0	17.5	19.5	33.5	14.0	23.5	5.0	14.5
Yellow Change, s	3.0	4.5	4.5	4.5	3.0	4.5	3.0	4.5
Red Clearance, s	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0
Minimum Green, s	5	7	10	10	5	5	5	5
Lead/Lag	Lead		Lead		Lead		Lead	
Passage Time, s	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Recall	Off	Off	Off	Off	Off	Off	Off	Off
Dual Entry	No	Yes	No	Yes	No	Yes	No	Yes
Prot. Right-Turn	False	False	False	False	False	False	False	False

	E/W	N/S
Simultaneous Gap out	Off	Off
Dallas Phasing	Off	Off

Cycle Length, s	84
Offset, s	0
Reference Phase	6
Reference Point	End
Force Mode	Float
Uncoordinated	Yes
Field Measured Phase Times	No
Exclusive Ped Phase Time, s	0.0

Timer:	1	2	3	4	5	6	7	8
Assigned Phase	1	2	3	4	5	6	7	8
Assigned Left-Turn Mvmt.	1	0	3	0	5	0	7	0
Assigned Through Mvmt.	0	2	0	4	0	6	0	8
Assigned Right-Turn Mvmt.	0	12	0	14	0	16	0	18
Timer w/Pr-Pm From Shared	0	0	0	0	0	0	0	0

Chapter 18 Summary Output

Cycle Length, s 56

	EB LT	EB TH	EB RT	WB LT	WB TH	WB RT	NB LT	NB TH	NB RT	SB LT	SB TH	SB RT
Movement	7	4	14	3	8	18	5	2	12	1	6	16
Volume, veh/h	44.44	88.89	26.67	388.89	111.11	7.78	222.22	233.33	110	22.22	244.44	23.33
SatFlow, veh/h/ln	1747.6	1747.6	1747.6	1747.6	1747.6	0	1747.6	1747.6	1747.6	1747.6	1747.6	0
Lane Util Factor	1	0.95	1	0.97	1	1	1	1	1	1	1	1
Capacity, veh/h	357.7	410.51	182.72	582.16	922.89	63.98	407.24	407.08	344.99	289.68	392.98	37.18
Discharge Vol, veh/h	0	0	26.67	388.89	0	0	0	0	0	0	244.44	0
Prop Arriv On Green	0.04	0.12	0.12	0.18	0.29	0.29	0.13	0.23	0.23	0.03	0.12	0.12
Apprch Vol, veh/h	0	160	0	0	507.78	0	0	565.56	0	0	290	0
Apprch Stops, #/veh	0	0.79	0	0	0.78	0	0	0.8	0	0	0.87	0
Apprch Delay, s/veh	0	21.82	0	0	21.34	0	0	17.98	0	0	26.88	0

Apprch LOS	C	C	B	C

Int Delay, s/veh 21.2
Int LOS C

Timer Data

Timer:	1	2	3	4	5	6	7	8
Assigned Phase	1	2	3	4	5	6	7	8
Case No	1.1	3	2	3	1.1	4	1.1	4
Phase Duration, s	6.46	19.54	16.58	13.41	12.51	13.5	7.5	22.5
Change Period, s	5	6.5	6.5	6.5	5	6.5	5	6.5
Max Allow Headway, s	5.08	5.1	5.14	5.12	5.08	5.01	5.14	5.06
Max Green Setting, s	5	23.5	19.5	17.5	14	14.5	5	33.5
Queue Clear Time, s	2.64	8.62	8.28	3.35	7.15	6.17	3.28	3.44
Green Exten Time, s	0.01	1.6	1.82	0.44	0.59	0.82	0.02	0.58
Prob of Phase Call	0.29	1	1	0.99	0.97	1	0.5	1
Prob of Max Out	1	0.03	0.12	0	0.42	0.23	1	0
Left-Turn Movement Data								
Assigned Movement	1	0	3	0	5	0	7	0
Mvmt. Sat Flow, veh/h	1664.36	0	3232.18	0	1664.36	0	1664.36	0
Through Movement Data								
Assigned Movement	0	2	0	4	0	6	0	8
Mvmt. Sat Flow, veh/h	0	1747.57	0	3327.38	0	3144.16	0	3230.84
Right-Turn Movement Data								
Assigned Movement	0	12	0	14	0	16	0	18
Mvmt. Sat Flow, veh/h	0	1480.99	0	1480.99	0	297.44	0	223.98

Left Lane Group Output

Timer:	1	2	3	4	5	6	7	8
Assigned Phase	1	2	3	4	5	6	7	8
Left Lane Group Data								
Assigned Movement	1	0	3	0	5	0	7	0
Lane Assignment	L Pr/Pm		L (Prot)		L Pr/Pm		L Pr/Pm	
Lanes in Group	1	0	2	0	1	0	1	0
Group Volume, veh/h	22.22	0	388.89	0	222.22	0	44.44	0
Group SatFlow, vphpl	1664.36	0	1616.09	0	1664.36	0	1664.36	0
Queue Serve Time, s	0.64	0	6.28	0	5.15	0	1.28	0
Cycle Clear Time, s	0.64	0	6.28	0	5.15	0	1.28	0
Perm SatFlow, vphpl	1023.02	0	0	0	1096.26	0	1255.42	0
Shared SatFlow, vphpl								
Perm Eff Green, s	7	0	0	0	15.05	0	6.91	0
Perm Serve Time, s	6.44	0	0	0	2.84	0	6.92	0
Perm Que Serve Time, s	0.01				2.84		0	
Time to first Blk, s	0	0	0	0	0	0	0	0
Serve Time pre Blk, s								
Prop Inside Lane	1	0	1	0	1	0	1	0
Lane Grp Capacity, vph	289.68		582.16		407.24		357.7	
v/c Ratio	0.08	0	0.67	0	0.55	0	0.12	0
Avail Capacity, veh/h	394.76		1125.32		600.09		432.02	
I-Factor	1	0	1	0	0.97	0	1	0
Uniform Delay, s/veh	20.46		21.4		13.2		19.92	
Increm Delay, s/veh	0.16	0	1.89	0	1.58	0	0.22	0
Overflow Delay, s/veh	0	0	0	0	0	0	0	0
Control Delay, s/veh	20.61		23.29		14.77		20.14	
Group LOS	C		C		B		C	
Uniform Stops, #/veh	0.76		0.79		0.84		0.76	
Increm Stops, #/veh	0.02	0	0.03	0	0.03	0	0.02	0
Overflow Stops, #/veh	0	0	0	0	0	0	0	0
Stop Rate, #/veh	0.78		0.82		0.87		0.79	
Uniform Queue, veh/ln	0.22		2.14		1.53		0.45	
Increm Queue, veh/ln	0.01	0	0.15	0	0.18	0	0.02	0
Overflow Queue, veh/ln	0	0	0	0	0	0	0	0
Back of Queue Factor	1.8	0	1.8	0	1.8	0	1.8	0
Back of Queue, veh/ln	0.42		4.14		3.08		0.85	
Storage Ratio	0.04	0	0.53	0	0.29	0	0.09	0
Initial Queue, veh	0	0	0	0	0	0	0	0
Final Queue, veh	0	0	0	0	0	0	0	0
Saturated Delay, s/veh	0	0	0	0	0	0	0	0
Saturated Stops, #/veh	0	0	0	0	0	0	0	0
Saturated Queue, veh/ln	0	0	0	0	0	0	0	0
Saturated Capacity, vph	0	0	0	0	0	0	0	0
Init Que Clear Time, s	0	0	0	0	0	0	0	0

Thru Lane Group Output

Timer:	1	2	3	4	5	6	7	8
Assigned Phase	1	2	3	4	5	6	7	8
Thru Lane Group Data								
Assigned Movement	0	2	0	4	0	6	0	8
Lane Assignment		T		T		T		T
Lanes in Group	0	1	0	2	0	1	0	1
Group Volume, veh/h	0	233.33	0	88.89	0	134.89	0	59.61
Group SatFlow, vphpl	0	1747.57	0	1663.69	0	1747.57	0	1747.57
Queue Serve Time, s	0	6.62	0	1.35	0	4.1	0	1.41
Cycle Clear Time, s	0	6.62	0	1.35	0	4.1	0	1.41
Lane Grp Capacity, vph		407.08		410.51		218.43		499.19
v/c Ratio	0	0.57	0	0.22	0	0.62	0	0.12
Avail Capacity, veh/h		733.24		1039.65		452.43		1045.26
I-Factor	0	0.97	0	1	0	1	0	1

Uniform Delay, s/veh		19.02		22.11		23.23		14.8
Increm Delay, s/veh	0	1.76	0	0.37	0	4	0	0.15
Overflow Delay, s/veh	0	0	0	0	0	0	0	0
Control Delay, s/veh		20.78		22.48		27.24		14.95
Group LOS		C		C		C		B
Uniform Stops, #/veh		0.73		0.77		0.8		0.62
Increm Stops, #/veh	0	0.04	0	0.02	0	0.08	0	0.02
Overflow Stops, #/veh	0	0	0	0	0	0	0	0
Stop Rate, #/veh		0.76		0.79		0.87		0.63
Uniform Queue, veh/ln		2.33		0.48		1.51		0.5
Increm Queue, veh/ln	0	0.2	0	0.02	0	0.24	0	0.02
Overflow Queue, veh/ln	0	0	0	0	0	0	0	0
Back of Queue Factor	0	1.8	0	1.8	0	1.8	0	1.8
Back of Queue, veh/ln		4.55		0.91		3.16		0.93
Storage Ratio	0	0.14	0	0.02	0	0.08	0	0.05
Initial Queue, veh	0	0	0	0	0	0	0	0
Final Queue, veh	0	0	0	0	0	0	0	0
Saturated Delay, s/veh	0	0	0	0	0	0	0	0
Saturated Stops, #/veh	0	0	0	0	0	0	0	0
Saturated Queue, veh/ln	0	0	0	0	0	0	0	0
Saturated Capacity, vph	0	0	0	0	0	0	0	0
Init Que Clear Time, s	0	0	0	0	0	0	0	0

Right Lane Group Output

Timer:	1	2	3	4	5	6	7	8
Assigned Phase	1	2	3	4	5	6	7	8
Right Lane Group Data								
Assigned Movement	0	12	0	14	0	16	0	18
Lane Assignment		R		R		T+R		T+R
Lanes in Group	0	1	0	1	0	1	0	1
Group Volume, veh/h	0	110	0	26.67	0	132.89	0	59.28
Group SatFlow, vphpl	0	1480.99	0	1480.99	0	1694.03	0	1707.26
Queue Serve Time, s	0	3.45	0	0.9	0	4.17	0	1.44
Cycle Clear Time, s	0	3.45	0	0.9	0	4.17	0	1.44
Prot RT SatFlow, vphpl		0		0				
Prot RT Eff Green, s		0		0				
Prop Outside Lane	0	1	0	1	0	0.18	0	0.13
Lane Grp Capacity, vph		344.99		182.72		211.75		487.69
v/c Ratio	0	0.32	0	0.15	0	0.63	0	0.12
Avail Capacity, veh/h		621.39		462.74		438.58		1021.16
I-Factor	0	0.97	0	1	0	1	0	1
Uniform Delay, s/veh		17.8		21.92		23.27		14.8
Increm Delay, s/veh	0	0.73	0	0.52	0	4.3	0	0.16
Overflow Delay, s/veh	0	0	0	0	0	0	0	0
Control Delay, s/veh		18.53		22.43		27.57		14.96
Group LOS		B		C		C		B
Uniform Stops, #/veh		0.68		0.76		0.8		0.62
Increm Stops, #/veh	0	0.03	0	0.04	0	0.08	0	0.02
Overflow Stops, #/veh	0	0	0	0	0	0	0	0
Stop Rate, #/veh		0.71		0.81		0.88		0.63
Uniform Queue, veh/ln		1.02		0.29		1.49		0.5
Increm Queue, veh/ln	0	0.07	0	0.03	0	0.25	0	0.02
Overflow Queue, veh/ln	0	0	0	0	0	0	0	0
Back of Queue Factor	0	1.8	0	1.8	0	1.8	0	1.8
Back of Queue, veh/ln		1.97		0.56		3.13		0.93
Storage Ratio	0	0.06	0	0.02	0	0.08	0	0.05
Initial Queue, veh	0	0	0	0	0	0	0	0
Final Queue, veh	0	0	0	0	0	0	0	0
Saturated Delay, s/veh	0	0	0	0	0	0	0	0
Saturated Stops, #/veh	0	0	0	0	0	0	0	0
Saturated Queue, veh/ln	0	0	0	0	0	0	0	0
Saturated Capacity, vph	0	0	0	0	0	0	0	0
Init Que Clear Time, s	0	0	0	0	0	0	0	0

APPENDIX - 2

Year 2035 Build Level of Service

Phone: Fax:
E-mail:

Diverge Analysis

Analyst:	MDF
Agency/Co.:	HDR
Date performed:	10/30/2012
Analysis time period:	AM Peak
Freeway/Dir of Travel:	I-90 EB
Junction:	Diverge to La Crosse
Jurisdiction:	SDDOT
Analysis Year:	2035 Build

Description: I-90/La Crosse Street Interchange Study

Freeway Data

Type of analysis	Diverge	
Number of lanes in freeway	2	
Free-flow speed on freeway	65.0	mph
Volume on freeway	1580	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	370	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	220	vph
Position of adjacent ramp	Upstream	
Type of adjacent ramp	On	
Distance to adjacent ramp	2250	ft

Conversion to pc/h Under Base Conditions

Junction Components	Freeway		Ramp		Adjacent Ramp	
Volume, V (vph)	1580		370		220	vph
Peak-hour factor, PHF	0.90		0.90		0.90	
Peak 15-min volume, v15	439		103		61	v
Trucks and buses	5		5		5	%
Recreational vehicles	0		0		0	%
Terrain type:	Level		Level		Level	
Grade	0.00	%	0.00	%	0.00	%
Length	0.00	mi	0.00	mi	0.00	mi
Trucks and buses PCE, ET	1.5		1.5		1.5	
Recreational vehicle PCE, ER	1.2		1.2		1.2	

```
Heavy vehicle adjustment, fHV           0.976        0.976        0.976
Driver population factor, fP            1.00         1.00         1.00
Flow rate, vp                           1799         421          251       pcph

_________________________Estimation of V12 Diverge Areas_______________________

                  L   =            (Equation 13-12 or 13-13)
                   EQ
                  P   =    1.000   Using Equation  0
                   FD
                  v   = v  + (v - v ) P  =  1799   pc/h
                   12   R     F   R   FD

_______________________________Capacity Checks_________________________________

                           Actual        Maximum         LOS F?
     v  = v                1799          4700            No
      Fi   F
     v  = v - v            1378          4700            No
      FO   F   R
     v                     421           2100            No
      R
     v  or v               0    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    = 1799                   (Equation 13-15, 13-16, 13-18, or 13-19)
         12A

______________________Flow Entering Diverge Influence Area_____________________
                      Actual        Max Desirable        Violation?
     v                1799          4400                 No
      12
_________________Level of Service Determination (if not F)_____________________

Density,               D = 4.252 + 0.0086 v  - 0.009  L   =   17.0    pc/mi/ln
                        R                  12          D
Level of service for ramp-freeway junction areas of influence B

_____________________________Speed Estimation__________________________________

Intermediate speed variable,                 D  = 0.336
                                              S
Space mean speed in ramp influence area,     S  = 57.3    mph
                                              R
Space mean speed in outer lanes,             S  =  N/A    mph
                                              0
Space mean speed for all vehicles,           S  = 57.3    mph
_______________________________________________________________________________
```

HCS 2010: Freeway Merge and Diverge Segments Release 6.50

Phone: Fax:
E-mail:

Diverge Analysis

Analyst:	MDF
Agency/Co.:	HDR
Date performed:	10/30/2012
Analysis time period:	PM Peak
Freeway/Dir of Travel:	I-90 EB
Junction:	Diverge to La Crosse
Jurisdiction:	SDDOT
Analysis Year:	2035 Build

Description: I-90/La Crosse Street Interchange Study

Freeway Data

Type of analysis	Diverge	
Number of lanes in freeway	2	
Free-flow speed on freeway	65.0	mph
Volume on freeway	2280	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	750	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	410	vph
Position of adjacent ramp	Upstream	
Type of adjacent ramp	On	
Distance to adjacent ramp	2250	ft

Conversion to pc/h Under Base Conditions

Junction Components	Freeway		Ramp		Adjacent Ramp	
Volume, V (vph)	2280		750		410	vph
Peak-hour factor, PHF	0.90		0.90		0.90	
Peak 15-min volume, v15	633		208		114	v
Trucks and buses	5		5		5	%
Recreational vehicles	0		0		0	%
Terrain type:	Level		Level		Level	
Grade	0.00	%	0.00	%	0.00	%
Length	0.00	mi	0.00	mi	0.00	mi
Trucks and buses PCE, ET	1.5		1.5		1.5	
Recreational vehicle PCE, ER	1.2		1.2		1.2	

```
Heavy vehicle adjustment, fHV            0.976        0.976        0.976
Driver population factor, fP             1.00         1.00         1.00
Flow rate, vp                            2597         854          467       pcph

_________________________Estimation of V12 Diverge Areas_______________________

                  L   =            (Equation 13-12 or 13-13)
                   EQ
                  P   =    1.000   Using Equation  0
                   FD
                  v  = v  + (v - v ) P  =  2597   pc/h
                   12   R      F   R   FD

_______________________________Capacity Checks_________________________________

                             Actual        Maximum         LOS F?
     v  = v                  2597          4700            No
      Fi   F
     v  = v - v              1743          4700            No
      FO   F   R
     v                       854           2100            No
      R
     v  or v                 0    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    = 2597                     (Equation 13-15, 13-16, 13-18, or 13-19)
         12A

______________________Flow Entering Diverge Influence Area_____________________
                      Actual        Max Desirable        Violation?
     v                2597          4400                 No
      12
_________________Level of Service Determination (if not F)_____________________

Density,               D = 4.252 + 0.0086 v  - 0.009  L   =   23.9    pc/mi/ln
                        R                 12          D
Level of service for ramp-freeway junction areas of influence C

_____________________________Speed Estimation__________________________________

Intermediate speed variable,                 D  = 0.375
                                              S
Space mean speed in ramp influence area,     S  = 56.4    mph
                                              R
Space mean speed in outer lanes,             S  =  N/A    mph
                                              0
Space mean speed for all vehicles,           S  = 56.4    mph
_______________________________________________________________________________
```

HCS 2010: Freeway Merge and Diverge Segments Release 6.50

Phone: Fax:
E-mail:

Diverge Analysis

Analyst:	MDF
Agency/Co.:	HDR
Date performed:	10/30/2012
Analysis time period:	AM Peak
Freeway/Dir of Travel:	I-90 WB
Junction:	Diverge to La Crosse
Jurisdiction:	SDDOT
Analysis Year:	2035 Build

Description: I-90/La Crosse Street Interchange Study

Freeway Data

Type of analysis	Diverge	
Number of lanes in freeway	2	
Free-flow speed on freeway	65.0	mph
Volume on freeway	1420	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	170	vph
Length of first accel/decel lane	880	ft
Length of second accel/decel lane		ft

Adjacent Ramp Data (if one exists)

Does adjacent ramp exist?	Yes	
Volume on adjacent ramp	420	vph
Position of adjacent ramp	Downstream	
Type of adjacent ramp	On	
Distance to adjacent ramp	2590	ft

Conversion to pc/h Under Base Conditions

Junction Components	Freeway		Ramp		Adjacent Ramp		
Volume, V (vph)	1420		170		420		vph
Peak-hour factor, PHF	0.85		0.85		0.85		
Peak 15-min volume, v15	418		50		124		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                          1737        208         514       pcph

_________________________Estimation of V12 Diverge Areas_______________________

                  L  =             (Equation 13-12 or 13-13)
                   EQ
                  P  =    1.000   Using Equation  0
                   FD
                  v  = v  + (v - v ) P  =  1737   pc/h
                   12   R     F   R   FD

_______________________________Capacity Checks_________________________________

                             Actual        Maximum         LOS F?
     v  = v                  1737          4700            No
      Fi   F
     v  = v - v              1529          4700            No
      FO   F   R
     v                       208           2100            No
      R
     v  or v                 0    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    = 1737                     (Equation 13-15, 13-16, 13-18, or 13-19)
         12A

______________________Flow Entering Diverge Influence Area_____________________
                      Actual        Max Desirable         Violation?
     v                1737          4400                  No
      12
_________________Level of Service Determination (if not F)_____________________

Density,               D = 4.252 + 0.0086 v  - 0.009  L   =   11.3    pc/mi/ln
                        R                  12          D
Level of service for ramp-freeway junction areas of influence B

_____________________________Speed Estimation__________________________________

Intermediate speed variable,                 D  = 0.317
                                              S
Space mean speed in ramp influence area,     S  = 57.7    mph
                                              R
Space mean speed in outer lanes,             S  =  N/A    mph
                                              0
Space mean speed for all vehicles,           S  = 57.7    mph
_______________________________________________________________________________
```

HCS 2010: Freeway Merge and Diverge Segments Release 6.50

Phone: Fax:
E-mail:

Diverge Analysis

Analyst:	MDF
Agency/Co.:	HDR
Date performed:	10/30/2012
Analysis time period:	PM Peak
Freeway/Dir of Travel:	I-90 WB
Junction:	Diverge to La Crosse
Jurisdiction:	SDDOT
Analysis Year:	2035 Build

Description: I-90/La Crosse Street Interchange Study

Freeway Data

Type of analysis	Diverge	
Number of lanes in freeway	2	
Free-flow speed on freeway	65.0	mph
Volume on freeway	2300	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	420	vph
Length of first accel/decel lane	880	ft
Length of second accel/decel lane		ft

Adjacent Ramp Data (if one exists)

Does adjacent ramp exist?	Yes	
Volume on adjacent ramp	770	vph
Position of adjacent ramp	Downstream	
Type of adjacent ramp	On	
Distance to adjacent ramp	2590	ft

Conversion to pc/h Under Base Conditions

Junction Components	Freeway		Ramp		Adjacent Ramp	
Volume, V (vph)	2300		420		770	vph
Peak-hour factor, PHF	0.90		0.90		0.90	
Peak 15-min volume, v15	639		117		214	v
Trucks and buses	3		3		3	%
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          0.985       0.985       0.985
Driver population factor, fP           1.00        1.00        1.00
Flow rate, vp                          2594        474         868        pcph

_________________________Estimation of V12 Diverge Areas_______________________

                  L  =            (Equation 13-12 or 13-13)
                   EQ
                  P  =    1.000   Using Equation  0
                   FD
                  v  = v  + (v - v ) P  =  2594   pc/h
                   12   R     F   R   FD

_______________________________Capacity Checks_________________________________

                           Actual        Maximum         LOS F?
     v  = v                2594          4700            No
      Fi   F
     v  = v - v            2120          4700            No
      FO   F   R
     v                     474           2100            No
      R
     v  or v               0    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    = 2594                   (Equation 13-15, 13-16, 13-18, or 13-19)
         12A

______________________Flow Entering Diverge Influence Area______________________
                      Actual        Max Desirable        Violation?
     v                2594          4400                 No
      12
_________________Level of Service Determination (if not F)_____________________

Density,               D = 4.252 + 0.0086 v  - 0.009  L   =   18.6    pc/mi/ln
                        R                  12          D
Level of service for ramp-freeway junction areas of influence B

_____________________________Speed Estimation__________________________________

Intermediate speed variable,                 D  = 0.341
                                              S
Space mean speed in ramp influence area,     S  = 57.2    mph
                                              R
Space mean speed in outer lanes,             S  =  N/A    mph
                                              0
Space mean speed for all vehicles,           S  = 57.2    mph
_______________________________________________________________________________
```

HCS 2010: Freeway Merge and Diverge Segments Release 6.50

Phone: Fax:
E-mail:

Merge Analysis

Analyst:	MDF
Agency/Co.:	HDR
Date performed:	10/30/2012
Analysis time period:	AM Peak
Freeway/Dir of Travel:	I-90 EB
Junction:	Merge from La Crosse
Jurisdiction:	SDDOT
Analysis Year:	2035 Build

Description: I-90/La Crosse Street Interchange Study

Freeway Data

Type of analysis	Merge	
Number of lanes in freeway	2	
Free-flow speed on freeway	65.0	mph
Volume on freeway	1210	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	270	vph
Length of first accel/decel lane	1480	ft
Length of second accel/decel lane		ft

Adjacent Ramp Data (if one exists)

Does adjacent ramp exist?	Yes	
Volume on adjacent Ramp	370	vph
Position of adjacent Ramp	Upstream	
Type of adjacent Ramp	Off	
Distance to adjacent Ramp	2610	ft

Conversion to pc/h Under Base Conditions

Junction Components	Freeway		Ramp		Adjacent Ramp	
Volume, V (vph)	1210		270		370	vph
Peak-hour factor, PHF	0.90		0.90		0.90	
Peak 15-min volume, v15	336		75		103	v
Trucks and buses	5		5		5	%
Recreational vehicles	0		0		0	%
Terrain type:	Level		Level		Level	
Grade		%		%		%
Length		mi		mi		mi
Trucks and buses PCE, ET	1.5		1.5		1.5	
Recreational vehicle PCE, ER	1.2		1.2		1.2	

```
Heavy vehicle adjustment, fHV           0.976       0.976       0.976
Driver population factor, fP            1.00        1.00        1.00
Flow rate, vp                           1378        308         421       pcph

_________________________Estimation of V12 Merge Areas_________________________

                  L  =            (Equation 13-6 or 13-7)
                   EQ
                  P  =    1.000   Using Equation  0
                   FM
                  v  = v  (P  ) =  1378   pc/h
                   12   F   FM

_______________________________Capacity Checks_________________________________

                           Actual        Maximum         LOS F?
     v                     1686          4700            No
      FO
     v  or v               0    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    = 1378                   (Equation 13-15, 13-16, 13-18, or 13-19)
         12A

________________________Flow Entering Merge Influence Area_____________________
                      Actual        Max Desirable        Violation?
     v                1686          4600                 No
      R12
_________________Level of Service Determination (if not F)_____________________

Density, D = 5.475 + 0.00734 v  + 0.0078 v   - 0.00627 L   =   9.2     pc/mi/ln
          R                   R           12             A
Level of service for ramp-freeway junction areas of influence  A

_____________________________Speed Estimation__________________________________

Intermediate speed variable,                 M  = 0.209
                                              S
Space mean speed in ramp influence area,     S  = 60.2    mph
                                              R
Space mean speed in outer lanes,             S  =  N/A    mph
                                              0
Space mean speed for all vehicles,           S  = 60.2    mph
_______________________________________________________________________________
```

HCS 2010: Freeway Merge and Diverge Segments Release 6.50

Phone: Fax:
E-mail:

Merge Analysis

Analyst:	MDF
Agency/Co.:	HDR
Date performed:	10/30/2012
Analysis time period:	PM Peak
Freeway/Dir of Travel:	I-90 EB
Junction:	Merge from La Crosse
Jurisdiction:	SDDOT
Analysis Year:	2035 Build

Description: I-90/La Crosse Street Interchange Study

Freeway Data

Type of analysis	Merge	
Number of lanes in freeway	2	
Free-flow speed on freeway	65.0	mph
Volume on freeway	1530	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	410	vph
Length of first accel/decel lane	1480	ft
Length of second accel/decel lane		ft

Adjacent Ramp Data (if one exists)

Does adjacent ramp exist?	Yes	
Volume on adjacent Ramp	750	vph
Position of adjacent Ramp	Upstream	
Type of adjacent Ramp	Off	
Distance to adjacent Ramp	2610	ft

Conversion to pc/h Under Base Conditions

Junction Components	Freeway	Ramp	Adjacent Ramp	
Volume, V (vph)	1530	410	750	vph
Peak-hour factor, PHF	0.90	0.90	0.90	
Peak 15-min volume, v15	425	114	208	v
Trucks and buses	5	5	5	%
Recreational vehicles	0	0	0	%
Terrain type:	Level	Level	Level	
Grade	%	%	%	
Length	mi	mi	mi	
Trucks and buses PCE, ET	1.5	1.5	1.5	
Recreational vehicle PCE, ER	1.2	1.2	1.2	

```
Heavy vehicle adjustment, fHV             0.976        0.976        0.976
Driver population factor, fP              1.00         1.00         1.00
Flow rate, vp                             1743         467          854        pcph

_________________________Estimation of V12 Merge Areas_________________________

                  L  =            (Equation 13-6 or 13-7)
                   EQ
                  P  =    1.000   Using Equation  0
                   FM
                  v  = v  (P  ) =  1743   pc/h
                   12   F   FM

_______________________________Capacity Checks_______________________________

                           Actual        Maximum         LOS F?
     v                     2210          4700            No
      FO
     v  or v               0    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    = 1743                   (Equation 13-15, 13-16, 13-18, or 13-19)
         12A

________________________Flow Entering Merge Influence Area_____________________
                      Actual        Max Desirable         Violation?
     v                2210          4600                  No
      R12
_________________Level of Service Determination (if not F)_____________________

Density, D = 5.475 + 0.00734 v  + 0.0078 v   - 0.00627 L   =   13.2    pc/mi/ln
          R                   R           12             A
Level of service for ramp-freeway junction areas of influence  B

_____________________________Speed Estimation___________________________________

Intermediate speed variable,                 M  = 0.223
                                              S
Space mean speed in ramp influence area,     S  = 59.9    mph
                                              R
Space mean speed in outer lanes,             S  =  N/A    mph
                                              0
Space mean speed for all vehicles,           S  = 59.9    mph
_______________________________________________________________________________
```

HCS 2010: Freeway Weaving Release 6.50

Phone: Fax:
E-mail:

Operational Analysis

Analyst:	MDF
Agency/Co.:	HDR
Date Performed:	10/30/2012
Analysis Time Period:	AM Peak
Freeway/Dir of Travel:	I-90 WB
Weaving Location:	B/W La Crosse and Haines
Analysis Year:	2035
Description:	I-90/La Crosse Street Interchange Study

Inputs

Segment Type	Freeway	
Weaving configuration	One-Sided	
Number of lanes, N	3	ln
Weaving segment length, LS	2010	ft
Freeway free-flow speed, FFS	65	mi/h
Minimum segment speed, SMIN	15	mi/h
Freeway maximum capacity, cIFL	1800*	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	1050	390	200	30	veh/h
Peak hour factor, PHF	0.85	0.85	0.85	0.85	
Peak 15-min volume, v15	309	115	59	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	1285	477	245	37	pc/h

Volume ratio, VR 0.353

Configuration Characteristics

Number of maneuver lanes, NWL	2	ln
Interchange density, ID	0.8	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	722	lc/h
Weaving lane changes, LCW	954	lc/h
Non-weaving vehicle index, INW	213	
Non-weaving lane change, LCNW	784	lc/h
Total lane changes, LCALL	1738	lc/h

Weaving and Non-Weaving Speeds

Weaving intensity factor, W 0.202

Average weaving speed, SW	56.6	mi/h
Average non-weaving speed, SNW	56.5	mi/h

Weaving Segment Speed, Density, Level of Service and Capacity

Weaving segment speed, S	56.6	mi/h
Weaving segment density, D	12.0	pc/mi/ln
Level of service, LOS	B	
Weaving segment v/c ratio	0.460	
Weaving segment flow rate, v	1966	veh/h
Weaving segment capacity, cW	4275	veh/h

Limitations on Weaving Segments

If limit reached, see note.

	Minimum	Maximum	Actual	Note
Weaving length (ft)	300	6162	2010	a,b
		Maximum	Analyzed	
Density-based capacty, cIWL (pc/h/ln)		1800*	1482	c
		Maximum	Analyzed	
v/c ratio		1.00	0.460	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 6.50

Phone: Fax:
E-mail:

Operational Analysis

Analyst:	MDF
Agency/Co.:	HDR
Date Performed:	10/30/2012
Analysis Time Period:	PM Peak
Freeway/Dir of Travel:	I-90 WB
Weaving Location:	B/W La Crosse and Haines
Analysis Year:	2035
Description:	I-90/La Crosse Street Interchange Study

Inputs

Segment Type	Freeway	
Weaving configuration	One-Sided	
Number of lanes, N	3	ln
Weaving segment length, LS	2010	ft
Freeway free-flow speed, FFS	65	mi/h
Minimum segment speed, SMIN	15	mi/h
Freeway maximum capacity, cIFL	1800*	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	1591	629	289	141	veh/h
Peak hour factor, PHF	0.90	0.90	0.90	0.90	
Peak 15-min volume, v15	442	175	80	39	
Trucks and buses	3	3	3	3	%
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	0.985	0.985	0.985	0.985	
Driver population adjustment, fP	1.00	1.00	1.00	1.00	
Flow rate, v	1794	709	326	159	pc/h

Volume ratio, VR 0.346

Configuration Characteristics

Number of maneuver lanes, NWL	2	ln
Interchange density, ID	0.8	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	1035	lc/h
Weaving lane changes, LCW	1267	lc/h
Non-weaving vehicle index, INW	314	
Non-weaving lane change, LCNW	914	lc/h
Total lane changes, LCALL	2181	lc/h

Weaving and Non-Weaving Speeds

Weaving intensity factor, W 0.241

Average weaving speed, SW	55.3	mi/h
Average non-weaving speed, SNW	52.8	mi/h

Weaving Segment Speed, Density, Level of Service and Capacity

Weaving segment speed, S	53.6	mi/h
Weaving segment density, D	18.6	pc/mi/ln
Level of service, LOS	B	
Weaving segment v/c ratio	0.669	
Weaving segment flow rate, v	2944	veh/h
Weaving segment capacity, cW	4398	veh/h

Limitations on Weaving Segments

If limit reached, see note.

	Minimum	Maximum	Actual	Note
Weaving length (ft)	300	6087	2010	a,b
		Maximum	Analyzed	
Density-based capacty, cIWL (pc/h/ln)		1800*	1488	c
		Maximum	Analyzed	
v/c ratio		1.00	0.669	d

Notes:

a. In weaving segments shorter than 300 ft, weaving vehicles are assumed to make only necessary lane changes.

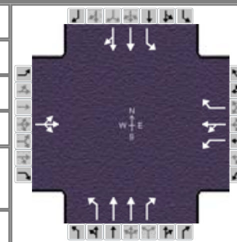
b. Weaving segments longer than the calculated maximum length should be treated as isolated merge and diverge areas using the procedures of Chapter 13, "Freeway Merge and Diverge Segments."

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.

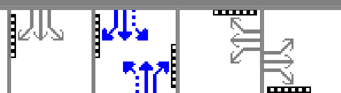
HCS 2010 Signalized Intersection Results Summary

General Information				Intersection Information	
Agency	HDR			Duration, h	0.25
Analyst	MDF	Analysis Date	Jan 30, 2013	Area Type	Other
Jurisdiction		Time Period	AM Peak	PHF	0.90
Intersection	Eglin Street	Analysis Year	2035 Build Diamond	Analysis Period	1> 7:45
File Name	2035_Build_Diamond_AM_LaCrosse.xus				
Project Description					

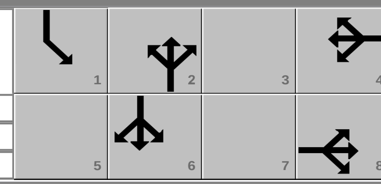


Demand Information	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Demand (*v*), veh/h	10	10	10	160	10	220	10	490	100	150	590	10

Signal Information			
Cycle, s	90.0	Reference Phase	2
Offset, s	22	Reference Point	End
Uncoordinated	No	Simult. Gap E/W	Off
Force Mode	Fixed	Simult. Gap N/S	Off



Green	5.6	53.3	8.1	1.8	0.0	0.0
Yellow	3.0	3.9	3.2	3.2	0.0	0.0
Red	2.0	1.9	2.0	2.0	0.0	0.0

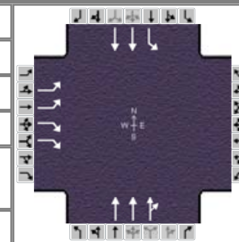


Timer Results	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Assigned Phase		8		4		2	1	6
Case Number		12.0		9.0		5.3	1.0	4.0
Phase Duration, s		7.0		13.3		59.1	10.6	69.8
Change Period, (*Y*+R_c), s		5.2		5.2		5.8	5.0	5.8
Max Allow Headway (*MAH*), s		4.1		4.1		0.0	4.1	0.0
Queue Clearance Time (g_s), s		3.2		7.6			5.2	
Green Extension Time (g_e), s		0.0		0.6		0.0	0.5	0.0
Phase Call Probability		0.44		1.00			0.98	
Max Out Probability		0.00		0.00			0.00	

Movement Group Results	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Assigned Movement	3	8	18	7	4	14	5	2	12	1	6	16
Adjusted Flow Rate (*v*), veh/h		23		107	82	30	11	544	54	167	334	332
Adjusted Saturation Flow Rate (*s*), veh/h/ln		1709		1681	1692	1496	767	1680	1496	1681	1765	1755
Queue Service Time (g_s), s		1.2		5.6	4.2	1.7	0.3	3.9	0.7	3.2	4.9	5.0
Cycle Queue Clearance Time (g_c), s		1.2		5.6	4.2	1.7	0.3	3.9	0.7	3.2	4.9	5.0
Green Ratio (*g/C*)		0.02		0.09	0.09	0.09	0.59	0.59	0.59	0.68	0.71	0.71
Capacity (*c*), veh/h		34		151	152	134	535	1991	886	633	1254	1247
Volume-to-Capacity Ratio (*X*)		0.695		0.708	0.542	0.224	0.021	0.273	0.061	0.263	0.266	0.266
Available Capacity (c_a), veh/h		352		370	372	329	535	1991	886	1065	1254	1247
Back of Queue (*Q*), veh/ln (95th percentile)		1.3		4.5	3.3	1.1	0.1	2.1	0.4	1.6	2.5	2.5
Queue Storage Ratio (*RQ*) (95th percentile)		0.07		0.29	0.17	0.06	0.02	0.05	0.07	0.12	0.06	0.06
Uniform Delay (d_1), s/veh		43.8		39.8	39.2	38.1	3.9	4.3	3.9	5.4	3.6	3.6
Incremental Delay (d_2), s/veh		22.6		6.0	3.0	0.8	0.1	0.3	0.1	0.2	0.5	0.5
Initial Queue Delay (d_3), s/veh		0.0		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Control Delay (*d*), s/veh		66.5		45.8	42.2	38.9	4.0	4.6	4.1	5.6	4.1	4.1
Level of Service (LOS)		E		D	D	D	A	A	A	A	A	A
Approach Delay, s/veh / LOS	66.5	E		43.5	D		4.5	A		4.4	A	
Intersection Delay, s/veh / LOS	10.4						B					

Multimodal Results	EB		WB		NB		SB	
Pedestrian LOS Score / LOS	3.2	C	3.1	C	3.1	C	2.2	B
Bicycle LOS Score / LOS	2.2	B	3.0	C	3.2	C	3.2	C

HCS 2010 Signalized Intersection Results Summary

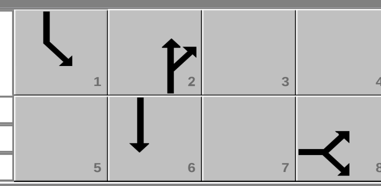


General Information				Intersection Information	
Agency	HDR			Duration, h	0.25
Analyst	MDF	Analysis Date	Jan 30, 2013	Area Type	Other
Jurisdiction		Time Period	AM Peak	PHF	0.90
Intersection	I-90 EB Ramps	Analysis Year	2035 Build Diamond	Analysis Period	1> 7:45
File Name	2035_Build_Diamond_AM_LaCrosse.xus				
Project Description					

Demand Information	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Demand (v), veh/h	90		280					550	170	100	470	

Signal Information			
Cycle, s	90.0	Reference Phase	2
Offset, s	46	Reference Point	End
Uncoordinated	No	Simult. Gap E/W	Off
Force Mode	Fixed	Simult. Gap N/S	Off

Green	48.7	9.4	14.5	0.0	0.0	0.0
Yellow	4.0	4.0	4.5	0.0	0.0	0.0
Red	1.5	1.5	2.0	0.0	0.0	0.0



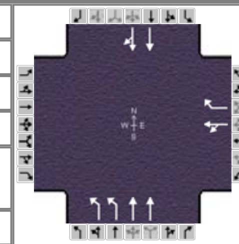
Timer Results	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Assigned Phase		8				2	1	6
Case Number		9.0				8.3	2.0	4.0
Phase Duration, s		21.0				54.2	14.9	69.0
Change Period, (Y+R_c), s		6.5				5.5	5.5	5.5
Max Allow Headway (MAH), s		5.2				0.0	5.1	0.0
Queue Clearance Time (g_s), s		12.1					7.5	
Green Extension Time (g_e), s		2.4				0.0	0.3	0.0
Phase Call Probability		1.00					0.94	
Max Out Probability		0.02					0.07	

Movement Group Results	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Assigned Movement	3		18					2	12	1	6	
Adjusted Flow Rate (v), veh/h	100		311					467	297	111	522	
Adjusted Saturation Flow Rate (s), veh/h/ln	1632		1324					1294	1615	1681	1680	
Queue Service Time (g_s), s	2.4		10.1					11.2	6.7	5.5	0.7	
Cycle Queue Clearance Time (g_c), s	2.4		10.1					11.2	6.7	5.5	0.7	
Green Ratio (g/C)	0.16		0.16					0.54	0.54	0.10	0.71	
Capacity (c), veh/h	524		425					1399	873	175	2372	
Volume-to-Capacity Ratio (X)	0.191		0.732					0.334	0.340	0.634	0.220	
Available Capacity (c_a), veh/h	1074		871					1399	873	308	2372	
Back of Queue (Q), veh/ln (95th percentile)	1.6		5.8					3.0	3.8	4.2	0.4	
Queue Storage Ratio (RQ) (95th percentile)	0.17		0.37					0.07	0.09	0.71	0.02	
Uniform Delay (d_1), s/veh	32.7		35.9					7.9	7.5	35.9	0.5	
Incremental Delay (d_2), s/veh	0.2		3.5					0.6	1.0	4.8	0.2	
Initial Queue Delay (d_3), s/veh	0.0		0.0					0.0	0.0	0.0	0.0	
Control Delay (d), s/veh	33.0		39.4					8.5	8.5	40.7	0.7	
Level of Service (LOS)	C		D					A	A	D	A	

	EB		WB		NB		SB	
Approach Delay, s/veh / LOS	37.8	D	0.0		8.5	A	7.7	A
Intersection Delay, s/veh / LOS	14.9				B			

Multimodal Results	EB		WB		NB		SB	
Pedestrian LOS Score / LOS	3.2	C	3.3	C	2.1	B	2.3	B
Bicycle LOS Score / LOS		F			2.9	C	3.0	C

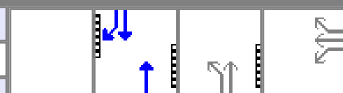
HCS 2010 Signalized Intersection Results Summary



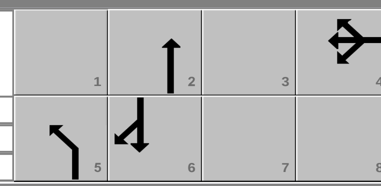
General Information				Intersection Information	
Agency	HDR			Duration, h	0.25
Analyst	MDF	Analysis Date	Jan 30, 2013	Area Type	Other
Jurisdiction		Time Period	AM Peak	PHF	0.90
Intersection	I-90 WB Ramps	Analysis Year	2035 Build Diamond	Analysis Period	1> 7:45
File Name	2035_Build_Diamond_AM_LaCrosse.xus				
Project Description					

Demand Information	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Demand (*v*), veh/h				110	0	60	250	390			460	170

Signal Information			
Cycle, s	90.0	Reference Phase	6
Offset, s	48	Reference Point	End
Uncoordinated	No	Simult. Gap E/W	Off
Force Mode	Fixed	Simult. Gap N/S	Off



Green	49.0	15.0	8.5	0.0	0.0	0.0
Yellow	4.0	4.0	4.5	0.0	0.0	0.0
Red	1.5	1.5	2.0	0.0	0.0	0.0



Timer Results	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Assigned Phase				4	5	2		6
Case Number				11.0	2.0	4.0		8.3
Phase Duration, s				15.0	20.5	75.0		54.5
Change Period, (Y+R_c), s				6.5	5.5	5.5		5.5
Max Allow Headway (*MAH*), s				5.0	5.1	0.0		0.0
Queue Clearance Time (g_s), s				8.4	9.2			
Green Extension Time (g_e), s				0.4	1.1	0.0		0.0
Phase Call Probability				0.96	1.00			
Max Out Probability				0.00	0.09			

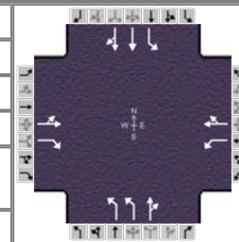
Movement Group Results	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Assigned Movement				7	4	14	5	2			6	16
Adjusted Flow Rate (*v*), veh/h					122	9	278	433			343	318
Adjusted Saturation Flow Rate (*s*), veh/h/ln					1681	1496	1632	1680			1765	1627
Queue Service Time (g_s), s					6.4	0.5	7.2	3.9			13.0	8.4
Cycle Queue Clearance Time (g_c), s					6.4	0.5	7.2	3.9			13.0	8.4
Green Ratio (*g/C*)					0.09	0.09	0.17	0.77			0.54	0.54
Capacity (*c*), veh/h					159	141	543	2595			961	886
Volume-to-Capacity Ratio (*X*)					0.770	0.063	0.511	0.167			0.357	0.359
Available Capacity (c_a), veh/h					411	366	707	2595			961	886
Back of Queue (*Q*), veh/ln (95th percentile)					5.3	0.3	5.2	1.6			4.7	4.9
Queue Storage Ratio (*RQ*) (95th percentile)					0.13	0.04	0.44	0.07			0.18	0.19
Uniform Delay (d_1), s/veh					39.8	37.1	36.3	3.6			8.1	9.1
Incremental Delay (d_2), s/veh					10.6	0.3	1.0	0.1			0.9	1.0
Initial Queue Delay (d_3), s/veh					0.0	0.0	0.0	0.0			0.0	0.0
Control Delay (*d*), s/veh					50.4	37.4	37.3	3.8			9.0	10.1
Level of Service (LOS)					D	D	D	A			A	B
Approach Delay, s/veh / LOS	0.0			49.5	D		16.9	B		9.5	A	
Intersection Delay, s/veh / LOS	16.5						B					

Multimodal Results	EB		WB		NB		SB	
Pedestrian LOS Score / LOS	3.1	C	3.1	C	1.9	A	2.8	C
Bicycle LOS Score / LOS			2.2	B	3.1	C	3.0	C

 HCS 2010™ Streets Version 6.50 Generated: 10/8/2013 5:39:28 PM

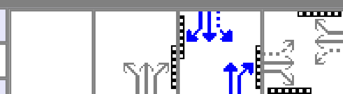
HCS 2010 Signalized Intersection Results Summary

General Information				Intersection Information	
Agency	HDR			Duration, h	0.25
Analyst	MDF	Analysis Date	Jan 30, 2013	Area Type	Other
Jurisdiction		Time Period	AM Peak	PHF	0.90
Intersection	Disk Drive	Analysis Year	2035 Build Diamond	Analysis Period	1> 7:45
File Name	2035_Build_Diamond_AM_LaCrosse.xus				
Project Description					

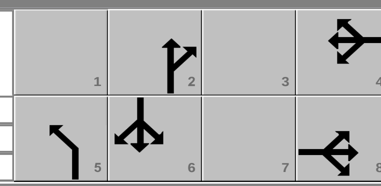


Demand Information	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Demand (v), veh/h	40	30	100	130	20	20	150	230	70	20	400	50

Signal Information			
Cycle, s	90.0	Reference Phase	6
Offset, s	68	Reference Point	Begin
Uncoordinated	No	Simult. Gap E/W	Off
Force Mode	Fixed	Simult. Gap N/S	Off



Green	30.2	29.2	15.6	0.0	0.0	0.0
Yellow	4.0	4.0	4.0	0.0	0.0	0.0
Red	1.0	1.0	1.0	0.0	0.0	0.0



Timer Results	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Assigned Phase		8		4	5	2		6
Case Number		7.0		6.0	2.0	4.0		6.3
Phase Duration, s		20.6		20.6	35.2	69.4		34.2
Change Period, ($Y+R_c$), s		5.0		5.0	5.0	5.0		5.0
Max Allow Headway (MAH), s		5.1		5.2	5.1	0.0		0.0
Queue Clearance Time (g_s), s		5.7		14.9	5.3			
Green Extension Time (g_e), s		0.4		0.7	0.9	0.0		0.0
Phase Call Probability		1.00		1.00	1.00			
Max Out Probability		0.00		0.01	0.00			

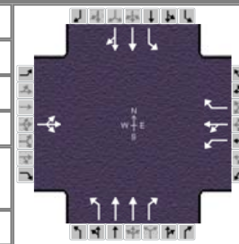
Movement Group Results	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Assigned Movement	3	8	18	7	4	14	5	2	12	1	6	16
Adjusted Flow Rate (v), veh/h		78	20	144	27		167	326		22	247	241
Adjusted Saturation Flow Rate (s), veh/h/ln		1560	1510	1359	1730		1648	1716		1060	1782	1725
Queue Service Time (g_s), s		2.2	1.0	9.3	1.2		3.3	9.6		1.1	8.7	8.8
Cycle Queue Clearance Time (g_c), s		3.7	1.0	12.9	1.2		3.3	9.6		1.2	8.7	8.8
Green Ratio (g/C)		0.17	0.17	0.17	0.17		0.34	0.72		0.32	0.32	0.32
Capacity (c), veh/h		334	263	262	301		1103	1226		423	579	560
Volume-to-Capacity Ratio (X)		0.233	0.076	0.551	0.088		0.151	0.265		0.053	0.428	0.431
Available Capacity (c_a), veh/h		562	487	463	558		1106	1226		423	579	560
Back of Queue (Q), veh/ln (95th percentile)		2.7	0.7	5.7	0.9		2.3	5.9		0.5	6.4	6.3
Queue Storage Ratio (RQ) (95th percentile)		0.13	0.03	0.29	0.04		0.23	0.22		0.09	0.16	0.16
Uniform Delay (d_1), s/veh		32.2	31.1	37.7	31.2		22.1	8.5		17.6	19.7	19.7
Incremental Delay (d_2), s/veh		0.5	0.2	2.6	0.2		0.3	0.5		0.2	2.3	2.4
Initial Queue Delay (d_3), s/veh		0.0	0.0	0.0	0.0		0.0	0.0		0.0	0.0	0.0
Control Delay (d), s/veh		32.7	31.3	40.3	31.4		22.4	9.0		17.8	22.0	22.1
Level of Service (LOS)		C	C	D	C		C	A		B	C	C
Approach Delay, s/veh / LOS	32.4	C		38.9	D		13.6	B		21.9	C	
Intersection Delay, s/veh / LOS	21.8						C					

Multimodal Results	EB		WB		NB		SB	
Pedestrian LOS Score / LOS	3.2	C	2.7	B	2.4	B	2.9	C
Bicycle LOS Score / LOS	2.5	B	2.4	B	3.3	C	2.9	C

 HCS 2010™ Streets Version 6.50 Generated: 10/8/2013 5:39:28 PM

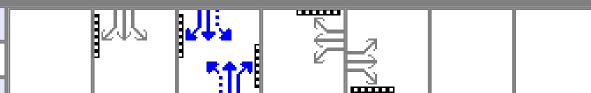
HCS 2010 Signalized Intersection Results Summary

General Information				Intersection Information	
Agency	HDR			Duration, h	0.25
Analyst	MDF	Analysis Date	Jan 30, 2013	Area Type	Other
Jurisdiction		Time Period	PM Peak	PHF	0.90
Intersection	Eglin Street	Analysis Year	2035 Build Diamond	Analysis Period	1> 16:45
File Name	2035_Build_Diamond_PM_LaCrosse.xus				
Project Description					

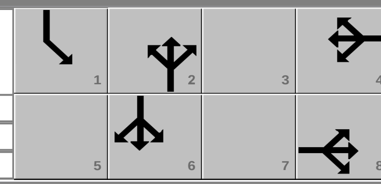


Demand Information	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Demand (*v*), veh/h	10	10	10	350	20	360	10	1130	300	330	1090	10

Signal Information			
Cycle, s	90.0	Reference Phase	2
Offset, s	22	Reference Point	End
Uncoordinated	No	Simult. Gap E/W	Off
Force Mode	Fixed	Simult. Gap N/S	Off



Green	15.9	36.6	14.6	1.7	0.0	0.0
Yellow	3.0	3.9	3.2	3.2	0.0	0.0
Red	2.0	1.9	2.0	2.0	0.0	0.0



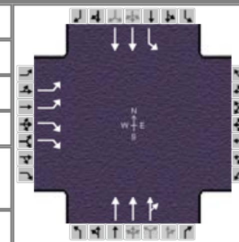
Timer Results	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Assigned Phase		8		4		2	1	6
Case Number		12.0		9.0		5.3	1.0	4.0
Phase Duration, s		6.9		19.8		42.4	20.9	63.3
Change Period, (Y+R_c), s		5.2		5.2		5.8	5.0	5.8
Max Allow Headway (*MAH*), s		4.1		4.1		0.0	4.1	0.0
Queue Clearance Time (g_s), s		3.1		14.0			15.2	
Green Extension Time (g_e), s		0.0		0.5		0.0	0.7	0.0
Phase Call Probability		0.43		1.00			1.00	
Max Out Probability		1.00		1.00			0.37	

Movement Group Results	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Assigned Movement	3	8	18	7	4	14	5	2	12	1	6	16
Adjusted Flow Rate (*v*), veh/h		22		233	178	68	11	1256	198	367	611	610
Adjusted Saturation Flow Rate (*s*), veh/h/ln		1739		1697	1708	1510	460	1697	1510	1697	1782	1777
Queue Service Time (g_s), s		1.1		12.0	8.8	3.5	1.0	30.1	6.5	13.2	16.3	16.4
Cycle Queue Clearance Time (g_c), s		1.1		12.0	8.8	3.5	1.0	30.1	6.5	13.2	16.3	16.4
Green Ratio (*g/C*)		0.02		0.16	0.16	0.16	0.41	0.41	0.41	0.61	0.64	0.64
Capacity (*c*), veh/h		33		275	276	244	267	1380	614	407	1139	1136
Volume-to-Capacity Ratio (*X*)		0.675		0.850	0.643	0.277	0.042	0.910	0.322	0.901	0.537	0.537
Available Capacity (c_a), veh/h		136		317	319	282	267	1380	614	509	1139	1136
Back of Queue (*Q*), veh/ln (95th percentile)		1.2		10.2	6.9	2.4	0.2	16.1	3.9	13.0	8.6	8.7
Queue Storage Ratio (*RQ*) (95th percentile)		0.06		0.64	0.35	0.12	0.04	0.41	0.66	0.93	0.19	0.19
Uniform Delay (d_1), s/veh		43.9		36.7	35.3	33.1	12.5	19.1	13.7	23.3	8.4	8.4
Incremental Delay (d_2), s/veh		21.4		17.3	3.5	0.6	0.3	10.4	1.4	13.1	1.4	1.4
Initial Queue Delay (d_3), s/veh		0.0		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Control Delay (*d*), s/veh		65.2		54.0	38.8	33.7	12.7	29.5	15.1	36.4	9.7	9.8
Level of Service (LOS)		E		D	D	C	B	C	B	D	A	A
Approach Delay, s/veh / LOS	65.2	E		45.5	D		27.5	C		15.9	B	
Intersection Delay, s/veh / LOS	25.0						C					

Multimodal Results	EB		WB		NB		SB	
Pedestrian LOS Score / LOS	3.5	D	3.3	C	3.3	C	2.2	B
Bicycle LOS Score / LOS	2.2	B	3.5	C	3.9	D	3.8	D

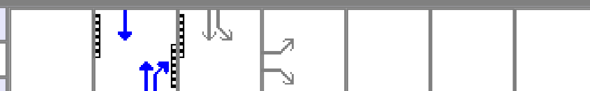
HCS 2010 Signalized Intersection Results Summary

General Information				Intersection Information	
Agency	HDR			Duration, h	0.25
Analyst	MDF	Analysis Date	Jan 30, 2013	Area Type	Other
Jurisdiction		Time Period	PM Peak	PHF	0.90
Intersection	I-90 EB Ramps	Analysis Year	2035 Build Diamond	Analysis Period	1> 16:45
File Name	2035_Build_Diamond_PM_LaCrosse.xus				
Project Description					

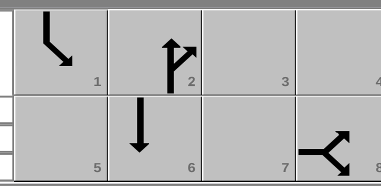


Demand Information	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Demand (v), veh/h	250		500					1290	210	200	930	

Signal Information			
Cycle, s	90.0	Reference Phase	2
Offset, s	46	Reference Point	End
Uncoordinated	No	Simult. Gap E/W	Off
Force Mode	Fixed	Simult. Gap N/S	Off



Green	37.8	13.4	21.3	0.0	0.0	0.0
Yellow	4.0	4.0	4.5	0.0	0.0	0.0
Red	1.5	1.5	2.0	0.0	0.0	0.0



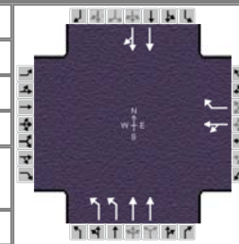
Timer Results	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Assigned Phase		8				2	1	6
Case Number		9.0				8.3	2.0	4.0
Phase Duration, s		27.8				43.3	18.9	62.2
Change Period, (Y+R_c), s		6.5				5.5	5.5	5.5
Max Allow Headway (MAH), s		5.2				0.0	5.1	0.0
Queue Clearance Time (g_s), s		20.0					13.3	
Green Extension Time (g_e), s		1.3				0.0	0.1	0.0
Phase Call Probability		1.00					1.00	
Max Out Probability		1.00					1.00	

Movement Group Results	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Assigned Movement	3		18					2	12	1	6	
Adjusted Flow Rate (v), veh/h	278		556					1041	604	222	1033	
Adjusted Saturation Flow Rate (s), veh/h/ln	1648		1337					1446	1676	1697	1697	
Queue Service Time (g_s), s	6.3		18.0					27.2	15.0	11.3	8.1	
Cycle Queue Clearance Time (g_c), s	6.3		18.0					27.2	15.0	11.3	8.1	
Green Ratio (g/C)	0.24		0.24					0.42	0.42	0.78	0.63	
Capacity (c), veh/h	782		634					1214	703	252	2136	
Volume-to-Capacity Ratio (X)	0.355		0.876					0.858	0.859	0.880	0.484	
Available Capacity (c_a), veh/h	828		672					1214	703	273	2136	
Back of Queue (Q), veh/ln (95th percentile)	4.2		10.6					3.2	3.9	7.2	3.3	
Queue Storage Ratio (RQ) (95th percentile)	0.43		0.67					0.07	0.09	1.21	0.15	
Uniform Delay (d_1), s/veh	28.6		33.1					4.2	3.7	31.5	3.7	
Incremental Delay (d_2), s/veh	0.4		12.5					3.1	5.2	14.0	0.4	
Initial Queue Delay (d_3), s/veh	0.0		0.0					0.0	0.0	0.0	0.0	
Control Delay (d), s/veh	29.0		45.6					7.3	8.9	45.5	4.1	
Level of Service (LOS)	C		D					A	A	D	A	
Approach Delay, s/veh / LOS	40.0	D		0.0			7.9	A		11.4	B	
Intersection Delay, s/veh / LOS	16.2						B					

Multimodal Results	EB		WB		NB		SB	
Pedestrian LOS Score / LOS	3.3	C	3.5	C	2.1	B	2.4	B
Bicycle LOS Score / LOS		F			3.4	C	3.5	D

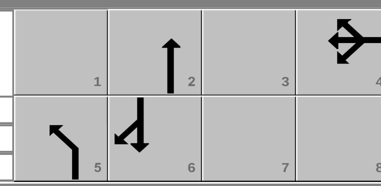
HCS 2010 Signalized Intersection Results Summary

General Information				Intersection Information	
Agency	HDR			Duration, h	0.25
Analyst	MDF	Analysis Date	Jan 30, 2013	Area Type	Other
Jurisdiction		Time Period	PM Peak	PHF	0.90
Intersection	I-90 WB Ramps	Analysis Year	2035 Build Diamond	Analysis Period	1> 16:45
File Name	2035_Build_Diamond_PM_LaCrosse.xus				
Project Description					



Demand Information	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Demand (*v*), veh/h				220	0	200	530	1010			910	240

Signal Information										
Cycle, s	90.0	Reference Phase	6							
Offset, s	50	Reference Point	End	Green	39.8	17.5	15.2	0.0	0.0	0.0
Uncoordinated	No	Simult. Gap E/W	Off	Yellow	4.0	4.0	4.5	0.0	0.0	0.0
Force Mode	Fixed	Simult. Gap N/S	Off	Red	1.5	1.5	2.0	0.0	0.0	0.0



Timer Results	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Assigned Phase				4	5	2		6
Case Number				11.0	2.0	4.0		8.3
Phase Duration, s				21.7	23.0	68.3		45.3
Change Period, ($Y+R_c$), s				6.5	5.5	5.5		5.5
Max Allow Headway (*MAH*), s				5.1	5.1	0.0		0.0
Queue Clearance Time (g_s), s				14.6	17.8			
Green Extension Time (g_e), s				0.6	0.0	0.0		0.0
Phase Call Probability				1.00	1.00			
Max Out Probability				1.00	1.00			

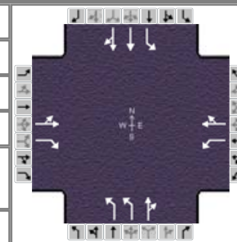
Movement Group Results	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Assigned Movement				7	4	14	5	2			6	16
Adjusted Flow Rate (*v*), veh/h					244	124	589	1122			646	606
Adjusted Saturation Flow Rate (*s*), veh/h/ln					1697	1510	1648	1697			1782	1663
Queue Service Time (g_s), s					12.6	6.7	15.8	11.4			29.6	28.9
Cycle Queue Clearance Time (g_c), s					12.6	6.7	15.8	11.4			29.6	28.9
Green Ratio (*g/C*)					0.17	0.17	0.87	0.70			0.44	0.44
Capacity (*c*), veh/h					286	254	641	2370			789	736
Volume-to-Capacity Ratio (*X*)					0.855	0.489	0.919	0.474			0.819	0.823
Available Capacity (c_a), veh/h					330	294	641	2370			789	736
Back of Queue (*Q*), veh/ln (95th percentile)					10.5	4.4	10.6	4.8			16.9	17.4
Queue Storage Ratio (*RQ*) (95th percentile)					0.26	0.56	0.89	0.21			0.63	0.65
Uniform Delay (d_1), s/veh					36.4	33.9	37.2	4.7			20.2	22.5
Incremental Delay (d_2), s/veh					18.6	2.1	11.5	0.4			7.9	8.6
Initial Queue Delay (d_3), s/veh					0.0	0.0	0.0	0.0			0.0	0.0
Control Delay (*d*), s/veh					54.9	36.0	48.8	5.1			28.1	31.1
Level of Service (LOS)					D	D	D	A			C	C

	EB		WB		NB		SB	
Approach Delay, s/veh / LOS	0.0		48.6	D	20.1	C	29.5	C
Intersection Delay, s/veh / LOS	26.8				C			

Multimodal Results	EB		WB		NB		SB	
Pedestrian LOS Score / LOS	3.3	C	3.1	C	2.2	B	2.8	C
Bicycle LOS Score / LOS			2.6	B	3.9	D	3.5	D

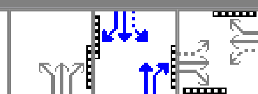
HCS 2010 Signalized Intersection Results Summary

General Information				Intersection Information	
Agency	HDR			Duration, h	0.25
Analyst	MDF	Analysis Date	Jan 30, 2013	Area Type	Other
Jurisdiction		Time Period	PM Peak	PHF	0.90
Intersection	Disk Drive	Analysis Year	2035 Build Diamond	Analysis Period	1> 16:45
File Name	2035_Build_Diamond_PM_LaCrosse.xus				
Project Description					

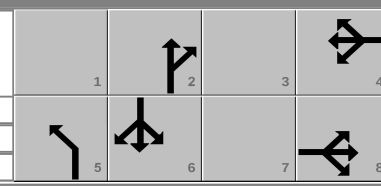


Demand Information	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Demand (*v*), veh/h	70	60	420	160	30	40	380	650	180	30	570	70

Signal Information			
Cycle, s	90.0	Reference Phase	6
Offset, s	67	Reference Point	Begin
Uncoordinated	No	Simult. Gap E/W	Off
Force Mode	Fixed	Simult. Gap N/S	Off



Green	20.1	33.1	21.8	0.0	0.0	0.0
Yellow	4.0	4.0	4.0	0.0	0.0	0.0
Red	1.0	1.0	1.0	0.0	0.0	0.0

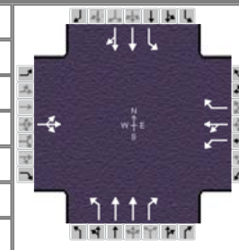


Timer Results	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Assigned Phase		8		4	5	2		6
Case Number		7.0		6.0	2.0	4.0		6.3
Phase Duration, s		26.8		26.8	25.1	63.2		38.1
Change Period, (*Y*+*R*c), s		5.0		5.0	5.0	5.0		5.0
Max Allow Headway (*MAH*), s		5.2		5.4	5.1	0.0		0.0
Queue Clearance Time (g_s), s		8.8		21.5	12.2			
Green Extension Time (g_e), s		1.2		0.3	1.6	0.0		0.0
Phase Call Probability		1.00		1.00	1.00			
Max Out Probability		0.01		1.00	0.39			

Movement Group Results	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Assigned Movement	3	8	18	7	4	14	5	2	12	1	6	16
Adjusted Flow Rate (*v*), veh/h		144	107	178	42		422	913		33	356	344
Adjusted Saturation Flow Rate (*s*), veh/h/ln		1555	1510	1218	1717		1648	1717		615	1782	1722
Queue Service Time (g_s), s		5.1	5.2	12.8	1.7		10.2	38.4		3.3	12.5	12.5
Cycle Queue Clearance Time (g_c), s		6.8	5.2	19.5	1.7		10.2	38.4		17.1	12.5	12.5
Green Ratio (*g/C*)		0.24	0.24	0.24	0.24		0.22	0.65		0.37	0.37	0.37
Capacity (*c*), veh/h		439	367	285	417		735	1110		214	655	633
Volume-to-Capacity Ratio (*X*)		0.329	0.291	0.624	0.101		0.575	0.823		0.155	0.543	0.544
Available Capacity (c_a), veh/h		476	403	314	458		736	1110		214	655	633
Back of Queue (*Q*), veh/ln (95th percentile)		4.7	3.4	7.2	1.3		7.3	21.0		1.0	8.5	8.3
Queue Storage Ratio (*RQ*) (95th percentile)		0.24	0.17	0.36	0.06		0.74	0.79		0.17	0.21	0.21
Uniform Delay (d_1), s/veh		28.3	27.8	36.5	26.5		30.9	14.7		24.0	17.7	17.7
Incremental Delay (d_2), s/veh		0.6	0.6	4.1	0.1		2.9	6.2		1.5	3.2	3.3
Initial Queue Delay (d_3), s/veh		0.0	0.0	0.0	0.0		0.0	0.0		0.0	0.0	0.0
Control Delay (*d*), s/veh		28.9	28.4	40.6	26.6		33.7	20.8		25.5	20.9	21.0
Level of Service (LOS)		C	C	D	C		C	C		C	C	C
Approach Delay, s/veh / LOS	28.7	C		37.9	D		24.9	C		21.2	C	
Intersection Delay, s/veh / LOS	25.3						C					

Multimodal Results	EB		WB		NB		SB	
Pedestrian LOS Score / LOS	3.4	C	2.9	C	2.5	B	3.3	C
Bicycle LOS Score / LOS	2.7	B	2.5	B	4.7	E	3.1	C

HCS 2010 Signalized Intersection Results Summary

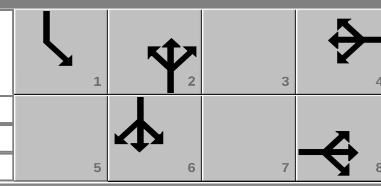


General Information				Intersection Information	
Agency	HDR			Duration, h	0.25
Analyst	MDF	Analysis Date	Jan 30, 2013	Area Type	Other
Jurisdiction		Time Period	AM Peak	PHF	0.90
Intersection	Eglin St	Analysis Year	2035 Build SPUI	Analysis Period	1> 7:45
File Name	2035_Build_SPUI_AM_LaCrosse.xus				
Project Description					

Demand Information	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Demand (*v*), veh/h	10	10	10	160	10	220	10	490	100	150	590	10

Signal Information			
Cycle, s	90.0	Reference Phase	2
Offset, s	10	Reference Point	End
Uncoordinated	No	Simult. Gap E/W	Off
Force Mode	Fixed	Simult. Gap N/S	Off

Green	6.1	52.8	8.1	1.8	0.0	0.0
Yellow	3.0	3.9	3.2	3.2	0.0	0.0
Red	2.0	1.9	2.0	2.0	0.0	0.0



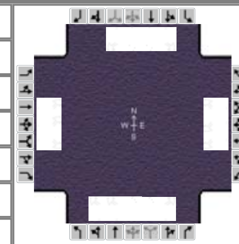
Timer Results	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Assigned Phase		8		4		2	1	6
Case Number		12.0		9.0		5.3	1.0	4.0
Phase Duration, s		7.0		13.3		58.6	11.1	69.8
Change Period, ($Y+R_c$), s		5.2		5.2		5.8	5.0	5.8
Max Allow Headway (*MAH*), s		4.1		4.1		0.0	4.1	0.0
Queue Clearance Time (g_s), s		3.2		7.6			5.7	
Green Extension Time (g_e), s		0.0		0.6		0.0	0.5	0.0
Phase Call Probability		0.44		1.00			0.98	
Max Out Probability		0.00		0.00			0.00	

Movement Group Results	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Assigned Movement	3	8	18	7	4	14	5	2	12	1	6	16
Adjusted Flow Rate (*v*), veh/h		23		107	82	30	11	544	54	167	334	332
Adjusted Saturation Flow Rate (*s*), veh/h/ln		1709		1681	1692	1496	767	1680	1496	1681	1765	1755
Queue Service Time (g_s), s		1.2		5.6	4.2	1.7	0.3	4.0	0.7	3.7	4.5	4.5
Cycle Queue Clearance Time (g_c), s		1.2		5.6	4.2	1.7	0.3	4.0	0.7	3.7	4.5	4.5
Green Ratio (*g/C*)		0.02		0.09	0.09	0.09	0.59	0.59	0.59	0.68	0.71	0.71
Capacity (*c*), veh/h		34		151	152	134	530	1972	878	637	1254	1247
Volume-to-Capacity Ratio (*X*)		0.695		0.708	0.542	0.224	0.021	0.276	0.062	0.262	0.266	0.266
Available Capacity (c_a), veh/h		352		370	372	329	530	1972	878	1059	1254	1247
Back of Queue (*Q*), veh/ln (95th percentile)		1.3		4.5	3.3	1.1	0.1	2.1	0.4	1.3	2.3	2.3
Queue Storage Ratio (*RQ*) (95th percentile)		0.07		0.29	0.17	0.06	0.02	0.05	0.07	0.09	0.04	0.04
Uniform Delay (d_1), s/veh		43.8		39.8	39.2	38.1	4.1	4.5	4.1	4.3	3.2	3.2
Incremental Delay (d_2), s/veh		22.6		6.0	3.0	0.8	0.1	0.3	0.1	0.2	0.5	0.5
Initial Queue Delay (d_3), s/veh		0.0		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Control Delay (*d*), s/veh		66.5		45.8	42.2	38.9	4.2	4.8	4.3	4.5	3.7	3.7
Level of Service (LOS)		E		D	D	D	A	A	A	A	A	A
Approach Delay, s/veh / LOS	66.5		E	43.5		D	4.8		A	3.8		A
Intersection Delay, s/veh / LOS	10.2						B					

Multimodal Results	EB		WB		NB		SB	
Pedestrian LOS Score / LOS	3.1	C	2.9	C	2.8	C	2.1	B
Bicycle LOS Score / LOS	0.5	A	0.8	A	1.0	A	1.2	A

HCS 2010 Signalized Intersection Results Summary

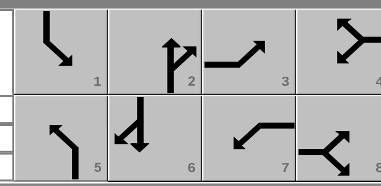
General Information				Intersection Information	
Agency	HDR			Duration, h	0.25
Analyst	MDF	Analysis Date	Jan 30, 2013	Area Type	Other
Jurisdiction		Time Period	AM Peak	PHF	0.90
Intersection	I-90 Ramps (SPUI)	Analysis Year	2035 Build SPUI	Analysis Period	1> 7:45
File Name	2035_Build_SPUI_AM_LaCrosse.xus				
Project Description					



Demand Information	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Demand (v), veh/h	90		280	110		60	250	300	170	100	360	170

Signal Information			
Cycle, s	90.0	Reference Phase	2
Offset, s	59	Reference Point	End
Uncoordinated	No	Simult. Gap E/W	Off
Force Mode	Fixed	Simult. Gap N/S	Off

Green	7.2	3.5	51.0	0.0	4.8	0.0
Yellow	5.5	0.0	5.5	0.0	5.5	0.0
Red	2.5	0.0	2.5	0.0	2.0	0.0



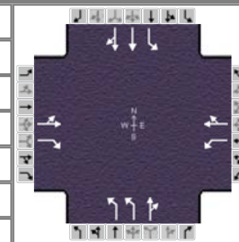
Timer Results	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Assigned Phase	3	8	7	4	5	2	1	6
Case Number	1.4	3.0	1.4	3.0	2.0	3.0	2.0	3.0
Phase Duration, s	12.3	0.0	12.3	0.0	18.7	62.5	15.2	59.0
Change Period, ($Y+R_c$), s	7.5	0.0	7.5	0.0	8.0	8.0	8.0	8.0
Max Allow Headway (MAH), s	5.0	0.0	5.0	0.0	5.1	0.0	5.1	0.0
Queue Clearance Time (g_s), s	2.0		2.5		9.2		7.2	
Green Extension Time (g_e), s	0.3	0.0	0.4	0.0	1.6	0.0	0.5	0.0
Phase Call Probability	0.92		0.95		1.00		0.94	
Max Out Probability	0.01		0.02		0.00		0.00	

Movement Group Results	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Assigned Movement	3		18	7		14	5	2	12	1	6	16
Adjusted Flow Rate (v), veh/h	100		0	122		0	278	333	189	111	400	189
Adjusted Saturation Flow Rate (s), veh/h/ln	1632		1496	1632		1496	1632	1680	1496	1681	1680	1496
Queue Service Time (g_s), s	0.0		0.0	0.5		0.0	7.2	4.8	6.5	5.2	6.1	8.1
Cycle Queue Clearance Time (g_c), s	0.0		0.0	0.5		0.0	7.2	4.8	6.5	5.2	6.1	8.1
Green Ratio (g/C)	0.05		0.00	0.05		0.00	0.12	0.61	0.61	0.08	0.57	0.57
Capacity (c), veh/h	270		2	270		2	389	2034	905	135	1904	847
Volume-to-Capacity Ratio (X)	0.370		0.000	0.453		0.000	0.714	0.164	0.209	0.820	0.210	0.223
Available Capacity (c_a), veh/h	551		17	551		17	1042	2034	905	518	1904	847
Back of Queue (Q), veh/ln (95th percentile)	1.9		0.0	2.3		0.0	5.0	2.9	9.8	3.5	3.8	10.9
Queue Storage Ratio (RQ) (95th percentile)	0.12		0.00	0.15		0.00	0.42	0.05	1.98	0.36	0.10	2.21
Uniform Delay (d_1), s/veh	42.3		0.0	42.3		0.0	35.1	9.9	32.1	25.0	11.5	36.6
Incremental Delay (d_2), s/veh	1.2		0.0	1.7		0.0	3.4	0.2	0.5	14.2	0.2	0.5
Initial Queue Delay (d_3), s/veh	0.0		0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0	0.0
Control Delay (d), s/veh	43.5		0.0	44.0		0.0	38.5	10.0	32.6	39.3	11.8	37.1
Level of Service (LOS)	D			D			D	B	C	D	B	D
Approach Delay, s/veh / LOS	43.5	D		44.0	D		25.2	C		23.0	C	
Intersection Delay, s/veh / LOS	26.7						C					

Multimodal Results	EB		WB		NB		SB	
Pedestrian LOS Score / LOS	3.1	C	3.0	C	2.5	B	3.2	C
Bicycle LOS Score / LOS		F		F	1.1	A	1.1	A

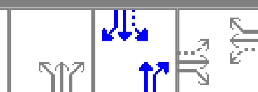
HCS 2010 Signalized Intersection Results Summary

General Information				Intersection Information	
Agency	HDR			Duration, h	0.25
Analyst	MDF	Analysis Date	Jan 30, 2013	Area Type	Other
Jurisdiction		Time Period	AM Peak	PHF	0.90
Intersection	Disk Drive	Analysis Year	2035 Build SPUI	Analysis Period	1> 7:45
File Name	2035_Build_SPUI_AM_LaCrosse.xus				
Project Description					

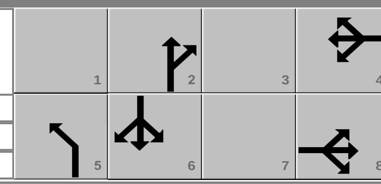


Demand Information	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Demand (v), veh/h	40	30	100	130	20	20	150	230	70	20	400	50

Signal Information			
Cycle, s	90.0	Reference Phase	6
Offset, s	61	Reference Point	Begin
Uncoordinated	No	Simult. Gap E/W	Off
Force Mode	Fixed	Simult. Gap N/S	Off



Green	30.2	29.2	15.6	0.0	0.0	0.0
Yellow	4.0	4.0	4.0	0.0	0.0	0.0
Red	1.0	1.0	1.0	0.0	0.0	0.0



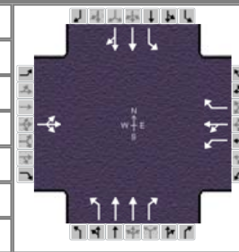
Timer Results	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Assigned Phase		8		4	5	2		6
Case Number		7.0		6.0	2.0	4.0		6.3
Phase Duration, s		20.6		20.6	35.2	69.4		34.2
Change Period, ($Y+R_c$), s		5.0		5.0	5.0	5.0		5.0
Max Allow Headway (MAH), s		5.1		5.2	5.1	0.0		0.0
Queue Clearance Time (g_s), s		5.7		14.9	4.0			
Green Extension Time (g_e), s		0.4		0.7	1.0	0.0		0.0
Phase Call Probability		1.00		1.00	1.00			
Max Out Probability		0.00		0.01	0.00			

Movement Group Results	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Assigned Movement	3	8	18	7	4	14	5	2	12	1	6	16
Adjusted Flow Rate (v), veh/h		78	20	144	27		167	326		22	247	241
Adjusted Saturation Flow Rate (s), veh/h/ln		1560	1510	1359	1730		1648	1716		1060	1782	1725
Queue Service Time (g_s), s		2.2	1.0	9.3	1.2		2.0	3.5		1.1	8.7	8.8
Cycle Queue Clearance Time (g_c), s		3.7	1.0	12.9	1.2		2.0	3.5		1.2	8.7	8.8
Green Ratio (g/C)		0.17	0.17	0.17	0.17		0.34	0.72		0.32	0.32	0.32
Capacity (c), veh/h		334	263	262	301		1103	1226		423	579	560
Volume-to-Capacity Ratio (X)		0.233	0.076	0.551	0.088		0.151	0.265		0.053	0.428	0.431
Available Capacity (c_a), veh/h		562	487	463	558		1106	1226		423	579	560
Back of Queue (Q), veh/ln (95th percentile)		2.7	0.7	5.7	0.9		1.3	1.7		0.5	6.4	6.3
Queue Storage Ratio (RQ) (95th percentile)		0.13	0.03	0.29	0.04		0.13	0.04		0.09	0.16	0.16
Uniform Delay (d_1), s/veh		32.2	31.1	37.7	31.2		12.4	2.3		17.6	19.7	19.7
Incremental Delay (d_2), s/veh		0.5	0.2	2.6	0.2		0.3	0.5		0.2	2.3	2.4
Initial Queue Delay (d_3), s/veh		0.0	0.0	0.0	0.0		0.0	0.0		0.0	0.0	0.0
Control Delay (d), s/veh		32.7	31.3	40.3	31.4		12.7	2.8		17.8	22.0	22.1
Level of Service (LOS)		C	C	D	C		B	A		B	C	C
Approach Delay, s/veh / LOS	32.4		C	38.9		D	6.2		A	21.9		C
Intersection Delay, s/veh / LOS	18.9						B					

Multimodal Results	EB		WB		NB		SB	
Pedestrian LOS Score / LOS	2.9	C	2.5	B	2.2	B	2.7	B
Bicycle LOS Score / LOS	0.6	A	0.8	A	1.3	A	0.9	A

HCS 2010 Signalized Intersection Results Summary

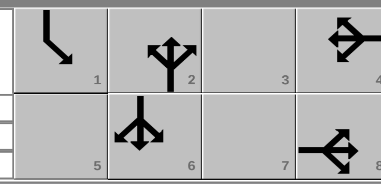
General Information				Intersection Information	
Agency	HDR			Duration, h	0.25
Analyst	MDF	Analysis Date	Jan 30, 2013	Area Type	Other
Jurisdiction		Time Period	PM Peak	PHF	0.90
Intersection	Eglin St	Analysis Year	2035 Build SPUI	Analysis Period	1> 16:45
File Name	2035_Build_SPUI_PM_LaCrosse.xus				
Project Description					



Demand Information	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Demand (*v*), veh/h	10	10	10	350	20	360	10	1130	300	330	1090	10

Signal Information			
Cycle, s	90.0	Reference Phase	2
Offset, s	10	Reference Point	End
Uncoordinated	No	Simult. Gap E/W	Off
Force Mode	Fixed	Simult. Gap N/S	Off

Green	16.2	36.3	14.6	1.7	0.0	0.0
Yellow	3.0	3.9	3.2	3.2	0.0	0.0
Red	2.0	1.9	2.0	2.0	0.0	0.0



Timer Results	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Assigned Phase		8		4		2	1	6
Case Number		12.0		9.0		5.3	1.0	4.0
Phase Duration, s		6.9		19.8		42.1	21.2	63.3
Change Period, (*Y+R*c), s		5.2		5.2		5.8	5.0	5.8
Max Allow Headway (*MAH*), s		4.1		4.1		0.0	4.1	0.0
Queue Clearance Time (g_s), s		3.1		14.0			15.5	
Green Extension Time (g_e), s		0.0		0.5		0.0	0.7	0.0
Phase Call Probability		0.43		1.00			1.00	
Max Out Probability		1.00		1.00			0.42	

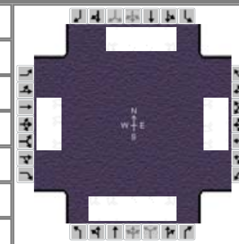
Movement Group Results	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Assigned Movement	3	8	18	7	4	14	5	2	12	1	6	16
Adjusted Flow Rate (*v*), veh/h		22		233	178	68	11	1256	198	367	611	610
Adjusted Saturation Flow Rate (*s*), veh/h/ln		1739		1697	1708	1510	460	1697	1510	1697	1782	1777
Queue Service Time (g_s), s		1.1		12.0	8.8	3.5	1.0	30.3	6.6	13.5	4.4	4.4
Cycle Queue Clearance Time (g_c), s		1.1		12.0	8.8	3.5	1.0	30.3	6.6	13.5	4.4	4.4
Green Ratio (*g/C*)		0.02		0.16	0.16	0.16	0.40	0.40	0.40	0.61	0.64	0.64
Capacity (*c*), veh/h		33		275	276	244	266	1370	610	410	1139	1136
Volume-to-Capacity Ratio (*X*)		0.675		0.850	0.643	0.277	0.042	0.917	0.324	0.894	0.537	0.537
Available Capacity (c_a), veh/h		136		317	319	282	266	1370	610	507	1139	1136
Back of Queue (*Q*), veh/ln (95th percentile)		1.2		10.2	6.9	2.4	0.2	16.4	4.0	5.0	2.2	2.2
Queue Storage Ratio (*RQ*) (95th percentile)		0.06		0.64	0.35	0.12	0.04	0.41	0.67	0.36	0.04	0.04
Uniform Delay (d_1), s/veh		43.9		36.7	35.3	33.1	12.6	19.4	13.9	8.4	1.3	1.3
Incremental Delay (d_2), s/veh		21.4		17.3	3.5	0.6	0.3	11.1	1.4	13.2	1.5	1.5
Initial Queue Delay (d_3), s/veh		0.0		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Control Delay (*d*), s/veh		65.2		54.0	38.8	33.7	12.9	30.5	15.3	21.5	2.8	2.8
Level of Service (LOS)		E		D	D	C	B	C	B	C	A	A
Approach Delay, s/veh / LOS	65.2	E		45.5	D		28.3	C		7.1	A	
Intersection Delay, s/veh / LOS	21.4						C					

Multimodal Results	EB		WB		NB		SB	
Pedestrian LOS Score / LOS	3.2	C	2.9	C	3.0	C	2.1	B
Bicycle LOS Score / LOS	0.5	A	1.3	A	1.7	A	1.8	A

 HCS 2010™ Streets Version 6.50 Generated: 2/20/2015 10:52:24 AM

HCS 2010 Signalized Intersection Results Summary

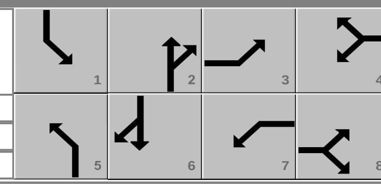
General Information				Intersection Information	
Agency	HDR			Duration, h	0.25
Analyst	MDF	Analysis Date	Jan 30, 2013	Area Type	Other
Jurisdiction		Time Period	PM Peak	PHF	0.90
Intersection	I-90 Ramps (SPUI)	Analysis Year	2035 Build SPUI	Analysis Period	1> 16:45
File Name	2035_Build_SPUI_PM_LaCrosse.xus				
Project Description					



Demand Information	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Demand (*v*), veh/h	250		500	220		200	530	760	210	200	710	240

Signal Information			
Cycle, s	90.0	Reference Phase	2
Offset, s	54	Reference Point	End
Uncoordinated	No	Simult. Gap E/W	Off
Force Mode	Fixed	Simult. Gap N/S	Off

Green	13.4	7.0	38.6	0.0	7.5	0.0
Yellow	5.5	0.0	5.5	0.0	5.5	0.0
Red	2.5	0.0	2.5	0.0	2.0	0.0



Timer Results	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Assigned Phase	3	8	7	4	5	2	1	6
Case Number	1.4	3.0	1.4	3.0	2.0	3.0	2.0	3.0
Phase Duration, s	15.0	0.0	15.0	0.0	28.4	53.5	21.4	46.6
Change Period, ($Y+R_c$), s	7.5	0.0	7.5	0.0	8.0	8.0	8.0	8.0
Max Allow Headway (*MAH*), s	5.0	0.0	5.0	0.0	5.1	0.0	5.1	0.0
Queue Clearance Time (g_s), s	6.7		5.8		17.3		12.5	
Green Extension Time (g_e), s	0.8	0.0	0.8	0.0	3.1	0.0	0.9	0.0
Phase Call Probability	1.00		1.00		1.00		1.00	
Max Out Probability	0.43		0.24		0.16		0.01	

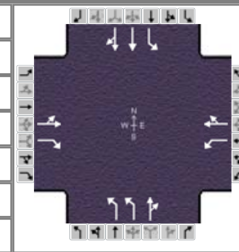
Movement Group Results	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Assigned Movement	3		18	7		14	5	2	12	1	6	16
Adjusted Flow Rate (*v*), veh/h	278		0	244		0	589	844	233	222	789	267
Adjusted Saturation Flow Rate (*s*), veh/h/ln	1648		1510	1648		1510	1648	1697	1510	1697	1697	1510
Queue Service Time (g_s), s	4.7		0.0	3.8		0.0	15.3	8.1	4.1	10.5	15.3	13.3
Cycle Queue Clearance Time (g_c), s	4.7		0.0	3.8		0.0	15.3	8.1	4.1	10.5	15.3	13.3
Green Ratio (*g/C*)	0.08		0.00	0.08		0.00	0.23	0.51	0.51	0.15	0.43	0.43
Capacity (*c*), veh/h	373		2	373		2	747	1717	764	253	1454	647
Volume-to-Capacity Ratio (*X*)	0.746		0.000	0.656		0.000	0.789	0.492	0.305	0.878	0.542	0.412
Available Capacity (c_a), veh/h	591		17	591		17	1098	1717	764	509	1454	647
Back of Queue (*Q*), veh/ln (95th percentile)	5.3		0.0	4.5		0.0	8.6	3.4	2.0	6.0	9.2	9.7
Queue Storage Ratio (*RQ*) (95th percentile)	0.33		0.00	0.28		0.00	0.72	0.06	0.40	0.61	0.24	1.96
Uniform Delay (d_1), s/veh	41.0		0.0	40.6		0.0	34.5	5.8	10.0	21.9	18.4	30.0
Incremental Delay (d_2), s/veh	4.2		0.0	2.8		0.0	1.1	0.4	0.4	11.0	1.2	1.6
Initial Queue Delay (d_3), s/veh	0.0		0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0	0.0
Control Delay (*d*), s/veh	45.2		0.0	43.4		0.0	35.6	6.2	10.3	32.9	19.6	31.6
Level of Service (LOS)	D			D			D	A	B	C	B	C
Approach Delay, s/veh / LOS	45.2	D		43.4	D		17.2	B		24.5	C	
Intersection Delay, s/veh / LOS	23.9						C					

Multimodal Results	EB		WB		NB		SB	
Pedestrian LOS Score / LOS	3.1	C	3.0	C	2.7	B	3.5	D
Bicycle LOS Score / LOS		F		F	1.9	A	1.5	A

 HCS 2010™ Streets Version 6.50 Generated: 10/9/2013 3:00:30 PM

HCS 2010 Signalized Intersection Results Summary

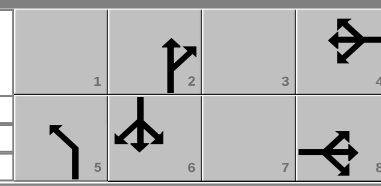
General Information				Intersection Information	
Agency	HDR			Duration, h	0.25
Analyst	MDF	Analysis Date	Jan 30, 2013	Area Type	Other
Jurisdiction		Time Period	PM Peak	PHF	0.90
Intersection	Disk Drive	Analysis Year	2035 Build SPUI	Analysis Period	1> 16:45
File Name	2035_Build_SPUI_PM_LaCrosse.xus				
Project Description					



Demand Information	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Demand (*v*), veh/h	70	60	420	160	30	40	380	650	180	30	570	70

Signal Information			
Cycle, s	90.0	Reference Phase	6
Offset, s	57	Reference Point	Begin
Uncoordinated	No	Simult. Gap E/W	Off
Force Mode	Fixed	Simult. Gap N/S	Off

Green	20.1	33.1	21.8	0.0	0.0	0.0
Yellow	4.0	4.0	4.0	0.0	0.0	0.0
Red	1.0	1.0	1.0	0.0	0.0	0.0



Timer Results	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Assigned Phase		8		4	5	2		6
Case Number		7.0		6.0	2.0	4.0		6.3
Phase Duration, s		26.8		26.8	25.1	63.2		38.1
Change Period, (Y+R_c), s		5.0		5.0	5.0	5.0		5.0
Max Allow Headway (*MAH*), s		5.2		5.4	5.1	0.0		0.0
Queue Clearance Time (g_s), s		8.8		21.5	10.5			
Green Extension Time (g_e), s		1.2		0.3	1.8	0.0		0.0
Phase Call Probability		1.00		1.00	1.00			
Max Out Probability		0.01		1.00	0.22			

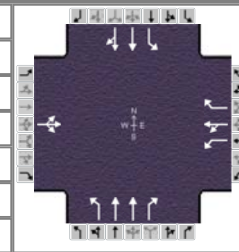
Movement Group Results	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Assigned Movement	3	8	18	7	4	14	5	2	12	1	6	16
Adjusted Flow Rate (*v*), veh/h		144	107	178	42		422	913		33	356	344
Adjusted Saturation Flow Rate (*s*), veh/h/ln		1555	1510	1218	1717		1648	1717		615	1782	1722
Queue Service Time (g_s), s		5.1	5.2	12.8	1.7		8.5	21.8		2.7	12.5	12.5
Cycle Queue Clearance Time (g_c), s		6.8	5.2	19.5	1.7		8.5	21.8		2.7	12.5	12.5
Green Ratio (*g/C*)		0.24	0.24	0.24	0.24		0.22	0.65		0.37	0.37	0.37
Capacity (*c*), veh/h		439	367	285	417		735	1110		306	655	633
Volume-to-Capacity Ratio (*X*)		0.329	0.291	0.624	0.101		0.575	0.823		0.109	0.543	0.544
Available Capacity (c_a), veh/h		476	403	314	458		736	1110		306	655	633
Back of Queue (*Q*), veh/ln (95th percentile)		4.7	3.4	7.2	1.3		5.2	7.0		0.7	8.5	8.3
Queue Storage Ratio (*RQ*) (95th percentile)		0.24	0.17	0.36	0.06		0.52	0.18		0.12	0.21	0.21
Uniform Delay (d_1), s/veh		28.3	27.8	36.5	26.5		21.3	3.5		15.2	17.7	17.7
Incremental Delay (d_2), s/veh		0.6	0.6	4.1	0.1		2.7	5.7		0.7	3.2	3.3
Initial Queue Delay (d_3), s/veh		0.0	0.0	0.0	0.0		0.0	0.0		0.0	0.0	0.0
Control Delay (*d*), s/veh		28.9	28.4	40.6	26.6		23.9	9.2		15.9	20.9	21.0
Level of Service (LOS)		C	C	D	C		C	A		B	C	C
Approach Delay, s/veh / LOS	28.7	C		37.9	D		13.9	B		20.7	C	
Intersection Delay, s/veh / LOS	19.4						B					

Multimodal Results	EB		WB		NB		SB	
Pedestrian LOS Score / LOS	2.8	C	2.5	B	2.3	B	3.0	C
Bicycle LOS Score / LOS	0.9	A	0.9	A	2.7	B	1.1	A

 HCS 2010™ Streets Version 6.50 Generated: 10/9/2013 1:35:05 PM

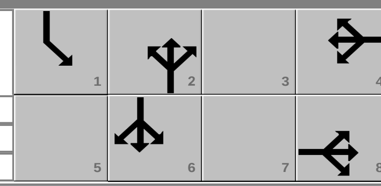
HCS 2010 Signalized Intersection Results Summary

General Information				Intersection Information	
Agency	HDR			Duration, h	0.25
Analyst	MDF	Analysis Date	Feb 13, 2015	Area Type	Other
Jurisdiction		Time Period	AM Peak	PHF	0.90
Intersection	Eglin Street	Analysis Year	2035 Build DDI	Analysis Period	1> 7:45
File Name	2035_Build_DDI_AM_LaCrosse.xus				
Project Description					



Demand Information	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Demand (*v*), veh/h	10	10	10	160	10	220	10	490	100	150	590	10

Signal Information										
Cycle, s	90.0	Reference Phase	2							
Offset, s	62	Reference Point	End	Green	5.5	52.9	8.6	1.8	0.0	0.0
Uncoordinated	No	Simult. Gap E/W	Off	Yellow	3.0	3.9	3.2	3.2	0.0	0.0
Force Mode	Fixed	Simult. Gap N/S	Off	Red	2.0	1.9	2.0	2.0	0.0	0.0



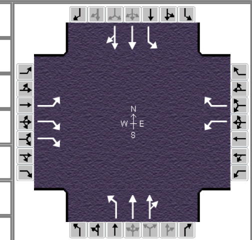
Timer Results	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Assigned Phase		8		4		2	1	6
Case Number		12.0		9.0		5.3	1.0	4.0
Phase Duration, s		7.0		13.8		58.7	10.5	69.2
Change Period, ($Y+R_c$), s		5.2		5.2		5.8	5.0	5.8
Max Allow Headway (*MAH*), s		4.1		4.1		0.0	4.1	0.0
Queue Clearance Time (g_s), s		3.2		8.1			5.1	
Green Extension Time (g_e), s		0.0		0.5		0.0	0.5	0.0
Phase Call Probability		0.44		1.00			0.98	
Max Out Probability		0.00		0.01			0.00	

Movement Group Results	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Assigned Movement	3	8	18	7	4	14	5	2	12	1	6	16
Adjusted Flow Rate (*v*), veh/h		23		71	118	30	11	544	54	166	333	331
Adjusted Saturation Flow Rate (*s*), veh/h/ln		1709		1681	1689	1496	768	1680	1496	1681	1765	1755
Queue Service Time (g_s), s		1.2		3.6	6.1	1.7	0.3	4.0	0.7	3.1	1.7	1.7
Cycle Queue Clearance Time (g_c), s		1.2		3.6	6.1	1.7	0.3	4.0	0.7	3.1	1.7	1.7
Green Ratio (g/C)		0.02		0.10	0.10	0.10	0.59	0.59	0.59	0.67	0.70	0.70
Capacity (*c*), veh/h		34		161	161	143	531	1975	879	626	1244	1237
Volume-to-Capacity Ratio (*X*)		0.695		0.443	0.730	0.210	0.021	0.276	0.062	0.266	0.268	0.268
Available Capacity (c_a), veh/h		342		370	371	329	531	1975	879	1050	1244	1237
Back of Queue (*Q*), veh/ln (95th percentile)		1.3		2.8	5.0	1.1	0.1	2.1	0.4	1.8	1.0	1.0
Queue Storage Ratio (*RQ*) (95th percentile)		0.07		0.18	0.25	0.06	0.02	0.05	0.07	0.13	0.02	0.02
Uniform Delay (d_1), s/veh		43.8		38.4	39.6	37.6	4.1	4.5	4.1	6.0	1.1	1.1
Incremental Delay (d_2), s/veh		22.6		1.9	6.2	0.7	0.1	0.3	0.1	0.2	0.5	0.5
Initial Queue Delay (d_3), s/veh		0.0		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Control Delay (*d*), s/veh		66.5		40.3	45.8	38.3	4.1	4.8	4.2	6.2	1.5	1.6
Level of Service (LOS)		E		D	D	D	A	A	A	A	A	A
Approach Delay, s/veh / LOS	66.5	E		43.0	D		4.7	A		2.5	A	
Intersection Delay, s/veh / LOS	9.5						A					

Multimodal Results	EB		WB		NB		SB	
Pedestrian LOS Score / LOS	3.1	C	2.9	C	2.8	C	2.1	B
Bicycle LOS Score / LOS	0.5	A	0.8	A	1.0	A	1.2	A

HCS 2010 Signalized Intersection Results Summary

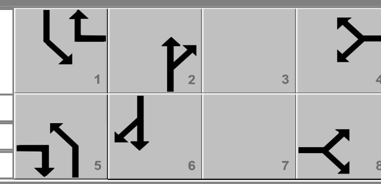
General Information				Intersection Information	
Agency	HDR			Duration, h	0.25
Analyst	MDF	Analysis Date	Feb 13, 2015	Area Type	Other
Jurisdiction		Time Period	AM Peak	PHF	0.90
Intersection	I-90 EB Ramps	Analysis Year	2035 Build DDI	Analysis Period	1> 7:45
File Name	2035_Build_DDI_AM_LaCrosse.xus				
Project Description					



Demand Information	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Demand (v), veh/h	0		280	0		90	1	550	170	1	470	100

Signal Information			
Cycle, s	90.0	Reference Phase	2
Offset, s	9	Reference Point	End
Uncoordinated	No	Simult. Gap E/W	Off
Force Mode	Fixed	Simult. Gap N/S	Off

Green	46.0	0.0	32.0	1.0	0.0	0.0
Yellow	4.0	0.0	4.0	0.0	0.0	0.0
Red	2.0	0.0	1.0	0.0	0.0	0.0



Timer Results	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Assigned Phase		8		4	5	2	1	6
Case Number		5.0		5.0	2.0	4.0	2.0	4.0
Phase Duration, s		1.0		1.0	52.0	52.0	37.0	37.0
Change Period, ($Y+R_c$), s		0.0		0.0	6.0	0.0	5.0	5.0
Max Allow Headway (MAH), s		3.5		3.5	3.1	0.0	3.2	0.0
Queue Clearance Time (g_s), s		3.0		3.0	2.0		2.0	
Green Extension Time (g_e), s		0.0		0.0	0.0	0.0	0.0	0.0
Phase Call Probability		1.00		1.00	1.00		1.00	
Max Out Probability		1.00		1.00	0.00		0.00	

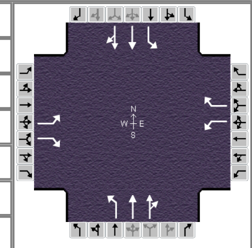
Movement Group Results	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Assigned Movement	3		18	7		14	5	2	12	1	6	16
Adjusted Flow Rate (v), veh/h	0		311	0		36	1	372	427	1	324	307
Adjusted Saturation Flow Rate (s), veh/h/ln	1367		1324	1064		1496	1681	1427	1635	1681	1765	1657
Queue Service Time (g_s), s	0.0		0.5	0.0		0.5	0.0	13.4	13.5	0.0	2.5	2.5
Cycle Queue Clearance Time (g_c), s	0.0		0.5	0.0		0.5	0.0	13.4	13.5	0.0	2.5	2.5
Green Ratio (g/C)	0.01		0.52	0.01		0.36	0.51	0.58	0.58	0.36	0.36	0.36
Capacity (c), veh/h	80		1353	80		532	859	825	945	598	627	589
Volume-to-Capacity Ratio (X)	0.000		0.230	0.000		0.067	0.001	0.451	0.452	0.002	0.517	0.521
Available Capacity (c_a), veh/h	80		1353	80		532	859	825	945	598	627	589
Back of Queue (Q), veh/ln (95th percentile)	0.0		3.0	0.0		0.9	0.0	7.3	8.1	0.0	1.8	1.7
Queue Storage Ratio (RQ) (95th percentile)	0.00		0.22	0.00		0.06	0.01	0.16	0.18	0.00	0.10	0.09
Uniform Delay (d_1), s/veh	0.0		12.2	0.0		19.1	9.5	10.9	11.0	2.3	2.4	2.4
Incremental Delay (d_2), s/veh	0.0		0.0	0.0		0.0	0.0	1.7	1.5	0.0	2.6	2.8
Initial Queue Delay (d_3), s/veh	0.0		0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0	0.0
Control Delay (d), s/veh	0.0		12.2	0.0		19.2	9.5	12.6	12.5	2.3	5.0	5.2
Level of Service (LOS)			B			B	A	B	B	A	A	A

	EB		WB		NB		SB	
Approach Delay, s/veh / LOS	12.2	B	19.2	B	12.6	B	5.1	A
Intersection Delay, s/veh / LOS	10.0				A			

Multimodal Results	EB		WB		NB		SB	
Pedestrian LOS Score / LOS	2.9	C	2.9	C	2.3	B	2.4	B
Bicycle LOS Score / LOS		F		F	1.1	A	1.0	A

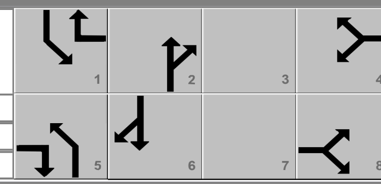
HCS 2010 Signalized Intersection Results Summary

General Information				Intersection Information	
Agency	HDR			Duration, h	0.25
Analyst	MDF	Analysis Date	Feb 13, 2015	Area Type	Other
Jurisdiction		Time Period	AM Peak	PHF	0.90
Intersection	I-90 WB Ramps	Analysis Year	2035 Build DDI	Analysis Period	1> 7:45
File Name	2035_Build_DDI_AM_LaCrosse.xus				
Project Description					



Demand Information	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Demand (*v*), veh/h	0		110	0		60	1	390	250	1	460	170

Signal Information										
Cycle, s	90.0	Reference Phase	2							
Offset, s	0	Reference Point	End	Green	45.0	0.0	33.0	1.0	0.0	0.0
Uncoordinated	No	Simult. Gap E/W	Off	Yellow	4.0	0.0	4.0	0.0	0.0	0.0
Force Mode	Fixed	Simult. Gap N/S	Off	Red	2.0	0.0	1.0	0.0	0.0	0.0



Timer Results	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Assigned Phase		8		4	5	2	1	6
Case Number		5.0		5.0	2.0	4.0	2.0	4.0
Phase Duration, s		1.0		1.0	51.0	51.0	38.0	38.0
Change Period, (*Y+R$_c$*), s		0.0		0.0	6.0	0.0	5.0	5.0
Max Allow Headway (*MAH*), s		3.5		3.5	3.2	0.0	3.1	0.0
Queue Clearance Time (*g$_s$*), s		3.0		3.0	2.0		2.0	
Green Extension Time (*g$_e$*), s		0.0		0.0	0.0	0.0	0.0	0.0
Phase Call Probability		0.96		0.96	1.00		1.00	
Max Out Probability		1.00		1.00	0.00		0.00	

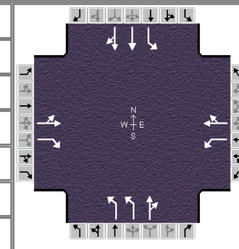
Movement Group Results	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Assigned Movement	3		18	7		14	5	2	12	1	6	16
Adjusted Flow Rate (*v*), veh/h	0		61	0		67	1	378	331	1	365	334
Adjusted Saturation Flow Rate (*s*), veh/h/ln	1329		1496	1336		1496	1681	1765	1534	1681	1765	1602
Queue Service Time (*g$_s$*), s	0.0		0.5	0.0		0.5	0.0	7.0	7.1	0.0	14.3	14.4
Cycle Queue Clearance Time (*g$_c$*), s	0.0		0.5	0.0		0.5	0.0	7.0	7.1	0.0	14.3	14.4
Green Ratio (*g/C*)	0.01		0.51	0.01		0.37	0.50	0.57	0.57	0.37	0.37	0.37
Capacity (*c*), veh/h	80		748	80		548	840	1000	869	616	647	587
Volume-to-Capacity Ratio (*X*)	0.000		0.082	0.000		0.122	0.001	0.378	0.381	0.002	0.564	0.568
Available Capacity (*c$_a$*), veh/h	80		748	80		548	840	1000	869	616	647	587
Back of Queue (*Q*), veh/ln (95th percentile)	0.0		1.1	0.0		1.6	0.0	4.3	3.8	0.0	9.6	9.0
Queue Storage Ratio (*RQ*) (95th percentile)	0.00		0.03	0.00		0.14	0.01	0.23	0.20	0.01	0.33	0.31
Uniform Delay (*d$_1$*), s/veh	0.0		11.7	0.0		18.9	7.4	6.0	6.0	16.4	21.0	21.1
Incremental Delay (*d$_2$*), s/veh	0.0		0.0	0.0		0.0	0.0	1.0	1.2	0.0	3.2	3.6
Initial Queue Delay (*d$_3$*), s/veh	0.0		0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0	0.0
Control Delay (*d*), s/veh	0.0		11.7	0.0		18.9	7.4	7.0	7.2	16.4	24.2	24.6
Level of Service (LOS)			B			B	A	A	A	B	C	C
Approach Delay, s/veh / LOS	11.7	B		18.9	B		7.1	A		24.4	C	
Intersection Delay, s/veh / LOS	15.7						B					

Multimodal Results	EB		WB		NB		SB	
Pedestrian LOS Score / LOS	2.9	C	2.9	C	2.3	B	2.3	B
Bicycle LOS Score / LOS		F		F	1.1	A	1.1	A

 HCS 2010™ Streets Version 6.50 Generated: 2/13/2015 1:04:32 PM

HCS 2010 Signalized Intersection Results Summary

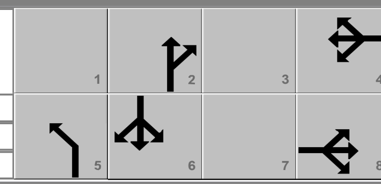
General Information				Intersection Information	
Agency	HDR			Duration, h	0.25
Analyst	MDF	Analysis Date	Feb 13, 2015	Area Type	Other
Jurisdiction		Time Period	AM Peak	PHF	0.90
Intersection	Disk Drive	Analysis Year	2035 Build DDI	Analysis Period	1> 7:45
File Name	2035_Build_DDI_AM_LaCrosse.xus				
Project Description					



Demand Information	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Demand (v), veh/h	40	30	100	130	20	20	150	230	70	20	400	50

Signal Information			
Cycle, s	90.0	Reference Phase	6
Offset, s	66	Reference Point	Begin
Uncoordinated	No	Simult. Gap E/W	Off
Force Mode	Fixed	Simult. Gap N/S	Off

Green	30.2	29.2	15.6	0.0	0.0	0.0
Yellow	4.0	4.0	4.0	0.0	0.0	0.0
Red	1.0	1.0	1.0	0.0	0.0	0.0



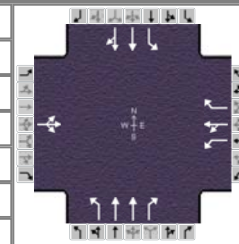
Timer Results	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Assigned Phase		8		4	5	2		6
Case Number		7.0		6.0	2.0	4.0		6.3
Phase Duration, s		20.6		20.6	35.2	69.4		34.2
Change Period, (Y+R_c), s		5.0		5.0	5.0	5.0		5.0
Max Allow Headway (MAH), s		5.1		5.2	5.1	0.0		0.0
Queue Clearance Time (g_s), s		5.7		14.9	5.6			
Green Extension Time (g_e), s		0.4		0.7	0.9	0.0		0.0
Phase Call Probability		1.00		1.00	1.00			
Max Out Probability		0.00		0.01	0.00			

Movement Group Results	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Assigned Movement	3	8	18	7	4	14	5	2	12	1	6	16
Adjusted Flow Rate (v), veh/h		78	20	144	27		166	325		22	247	241
Adjusted Saturation Flow Rate (s), veh/h/ln		1560	1510	1359	1730		1648	1716		1061	1782	1725
Queue Service Time (g_s), s		2.2	1.0	9.3	1.2		3.6	4.0		1.1	8.7	8.8
Cycle Queue Clearance Time (g_c), s		3.7	1.0	12.9	1.2		3.6	4.0		1.2	8.7	8.8
Green Ratio (g/C)		0.17	0.17	0.17	0.17		0.34	0.72		0.32	0.32	0.32
Capacity (c), veh/h		334	263	262	301		1103	1226		423	579	560
Volume-to-Capacity Ratio (X)		0.233	0.076	0.551	0.088		0.151	0.265		0.053	0.428	0.431
Available Capacity (c_a), veh/h		562	487	463	558		1106	1226		423	579	560
Back of Queue (Q), veh/ln (95th percentile)		2.7	0.7	5.7	0.9		2.5	1.9		0.5	6.4	6.3
Queue Storage Ratio (RQ) (95th percentile)		0.13	0.03	0.29	0.04		0.25	0.07		0.09	0.16	0.16
Uniform Delay (d_1), s/veh		32.2	31.1	37.7	31.2		24.1	2.7		17.6	19.7	19.7
Incremental Delay (d_2), s/veh		0.5	0.2	2.6	0.2		0.3	0.5		0.2	2.3	2.4
Initial Queue Delay (d_3), s/veh		0.0	0.0	0.0	0.0		0.0	0.0		0.0	0.0	0.0
Control Delay (d), s/veh		32.7	31.3	40.3	31.4		24.4	3.2		17.8	22.0	22.1
Level of Service (LOS)		C	C	D	C		C	A		B	C	C
Approach Delay, s/veh / LOS	32.4		C	38.9		D	10.4		B	21.9		C
Intersection Delay, s/veh / LOS	20.5						C					

Multimodal Results	EB		WB		NB		SB	
Pedestrian LOS Score / LOS	2.9	C	2.5	B	2.2	B	2.8	C
Bicycle LOS Score / LOS	0.6	A	0.8	A	1.3	A	0.9	A

HCS 2010 Signalized Intersection Results Summary

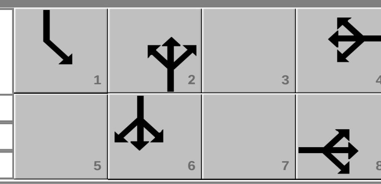
General Information				Intersection Information	
Agency	HDR			Duration, h	0.25
Analyst	MDF	Analysis Date	Feb 13, 2015	Area Type	Other
Jurisdiction		Time Period	PM Peak	PHF	0.90
Intersection	Eglin Street	Analysis Year	2035 Build DDI	Analysis Period	1> 16:45
File Name	2035_Build_DDI_PM_LaCrosse.xus				
Project Description					



Demand Information	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Demand (*v*), veh/h	10	10	10	350	20	360	10	1130	300	330	1090	10

Signal Information			
Cycle, s	90.0	Reference Phase	2
Offset, s	66	Reference Point	End
Uncoordinated	No	Simult. Gap E/W	Off
Force Mode	Fixed	Simult. Gap N/S	Off

Green	17.2	34.4	15.5	1.7	0.0	0.0
Yellow	3.0	3.9	3.2	3.2	0.0	0.0
Red	2.0	1.9	2.0	2.0	0.0	0.0



Timer Results	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Assigned Phase		8		4		2	1	6
Case Number		12.0		9.0		5.3	1.0	4.0
Phase Duration, s		6.9		20.7		40.2	22.2	62.4
Change Period, (Y+R_c), s		5.2		5.2		5.8	5.0	5.8
Max Allow Headway (*MAH*), s		4.1		4.1		0.0	4.1	0.0
Queue Clearance Time (g_s), s		3.1		15.1			16.7	
Green Extension Time (g_e), s		0.0		0.3		0.0	0.5	0.0
Phase Call Probability		0.43		1.00			1.00	
Max Out Probability		1.00		1.00			1.00	

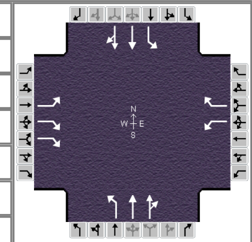
Movement Group Results	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Assigned Movement	3	8	18	7	4	14	5	2	12	1	6	16
Adjusted Flow Rate (*v*), veh/h		22		156	256	68	11	1256	198	366	611	609
Adjusted Saturation Flow Rate (*s*), veh/h/ln		1739		1697	1705	1510	460	1697	1510	1697	1782	1777
Queue Service Time (g_s), s		1.1		7.5	13.1	3.5	1.1	32.2	7.0	14.7	3.1	3.1
Cycle Queue Clearance Time (g_c), s		1.1		7.5	13.1	3.5	1.1	32.2	7.0	14.7	3.1	3.1
Green Ratio (*g/C*)		0.02		0.17	0.17	0.17	0.38	0.38	0.38	0.60	0.63	0.63
Capacity (*c*), veh/h		33		292	293	260	256	1299	578	413	1121	1118
Volume-to-Capacity Ratio (*X*)		0.675		0.533	0.872	0.261	0.043	0.967	0.342	0.887	0.545	0.545
Available Capacity (c_a), veh/h		118		317	318	282	256	1299	578	474	1121	1118
Back of Queue (*Q*), veh/ln (95th percentile)		1.2		5.7	11.4	2.3	0.2	18.9	4.3	12.3	1.2	1.2
Queue Storage Ratio (*RQ*) (95th percentile)		0.06		0.36	0.57	0.12	0.04	0.48	0.72	0.89	0.02	0.02
Uniform Delay (d_1), s/veh		43.9		34.0	36.3	32.3	13.9	21.5	15.3	33.1	0.9	0.9
Incremental Delay (d_2), s/veh		21.4		1.5	21.1	0.5	0.3	18.2	1.6	5.0	0.5	0.5
Initial Queue Delay (d_3), s/veh		0.0		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Control Delay (*d*), s/veh		65.2		35.5	57.4	32.8	14.2	39.7	16.9	38.0	1.4	1.4
Level of Service (LOS)		E		D	E	C	B	D	B	D	A	A
Approach Delay, s/veh / LOS	65.2	E		46.8	D		36.4	D		9.8	A	
Intersection Delay, s/veh / LOS	26.1						C					

Multimodal Results	EB		WB		NB		SB	
Pedestrian LOS Score / LOS	3.2	C	2.9	C	3.0	C	2.1	B
Bicycle LOS Score / LOS	0.5	A	1.3	A	1.7	A	1.8	A

 HCS 2010™ Streets Version 6.50 Generated: 2/20/2015 10:59:33 AM

HCS 2010 Signalized Intersection Results Summary

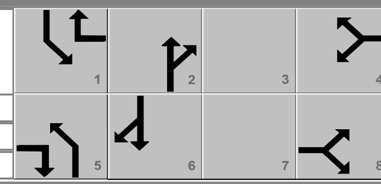
General Information				Intersection Information	
Agency	HDR			Duration, h	0.25
Analyst	MDF	Analysis Date	Feb 13, 2015	Area Type	Other
Jurisdiction		Time Period	PM Peak	PHF	0.90
Intersection	I-90 EB Ramps	Analysis Year	2035 Build DDI	Analysis Period	1> 16:45
File Name	2035_Build_DDI_PM_LaCrosse.xus				
Project Description					



Demand Information	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Demand (v), veh/h	0		500	0		250	1	1290	210	1	930	200

Signal Information			
Cycle, s	90.0	Reference Phase	2
Offset, s	10	Reference Point	End
Uncoordinated	No	Simult. Gap E/W	Off
Force Mode	Fixed	Simult. Gap N/S	Off

Green	45.0	0.0	33.0	1.0	0.0	0.0
Yellow	4.0	0.0	4.0	0.0	0.0	0.0
Red	2.0	0.0	1.0	0.0	0.0	0.0



Timer Results	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Assigned Phase		8		4	5	2	1	6
Case Number		5.0		5.0	2.0	4.0	2.0	4.0
Phase Duration, s		1.0		1.0	51.0	51.0	38.0	38.0
Change Period, ($Y+R_c$), s		0.0		0.0	6.0	0.0	5.0	5.0
Max Allow Headway (MAH), s		3.5		3.5	3.1	0.0	3.2	0.0
Queue Clearance Time (g_s), s		3.0		3.0	2.0		2.0	
Green Extension Time (g_e), s		0.0		0.0	0.0	0.0	0.0	0.0
Phase Call Probability		1.00		1.00	1.00		1.00	
Max Out Probability		1.00		1.00	0.00		0.00	

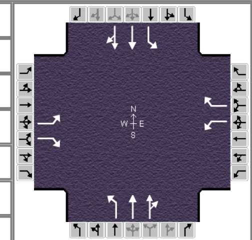
Movement Group Results	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Assigned Movement	3		18	7		14	5	2	12	1	6	16
Adjusted Flow Rate (v), veh/h	0		556	0		253	1	775	890	1	645	608
Adjusted Saturation Flow Rate (s), veh/h/ln	1144		1337	867		1510	1697	1516	1702	1697	1782	1672
Queue Service Time (g_s), s	0.0		0.5	0.0		0.5	0.0	11.7	12.5	0.0	31.9	32.3
Cycle Queue Clearance Time (g_c), s	0.0		0.5	0.0		0.5	0.0	11.7	12.5	0.0	31.9	32.3
Green Ratio (g/C)	0.01		0.51	0.01		0.37	0.50	0.57	0.57	0.37	0.37	0.37
Capacity (c), veh/h	80		1337	80		554	849	859	964	622	653	613
Volume-to-Capacity Ratio (X)	0.000		0.416	0.000		0.457	0.001	0.902	0.923	0.002	0.987	0.992
Available Capacity (c_a), veh/h	80		1337	80		554	849	859	964	622	653	613
Back of Queue (Q), veh/ln (95th percentile)	0.0		6.1	0.0		7.2	0.0	2.5	2.9	0.0	14.6	14.3
Queue Storage Ratio (RQ) (95th percentile)	0.00		0.44	0.00		0.48	0.00	0.05	0.06	0.01	0.78	0.76
Uniform Delay (d_1), s/veh	0.0		14.2	0.0		21.7	0.7	0.8	0.7	10.7	16.7	16.8
Incremental Delay (d_2), s/veh	0.0		0.1	0.0		0.2	0.0	4.5	5.0	0.0	19.3	21.1
Initial Queue Delay (d_3), s/veh	0.0		0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0	0.0
Control Delay (d), s/veh	0.0		14.3	0.0		21.9	0.7	5.3	5.7	10.7	36.0	37.9
Level of Service (LOS)			B			C	A	A	A	B	D	D
Approach Delay, s/veh / LOS	14.3	B		21.9	C		5.5	A		36.9	D	
Intersection Delay, s/veh / LOS	18.5						B					

Multimodal Results	EB		WB		NB		SB	
Pedestrian LOS Score / LOS	2.9	C	2.9	C	2.3	B	2.4	B
Bicycle LOS Score / LOS		F		F	1.9	A	1.5	A

 HCS 2010™ Streets Version 6.50 Generated: 2/13/2015 1:07:18 PM

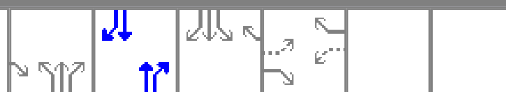
HCS 2010 Signalized Intersection Results Summary

General Information				Intersection Information	
Agency	HDR			Duration, h	0.25
Analyst	MDF	Analysis Date	Feb 13, 2015	Area Type	Other
Jurisdiction		Time Period	PM Peak	PHF	0.90
Intersection	I-90 WB Ramps	Analysis Year	2035 Build DDI	Analysis Period	1> 16:45
File Name	2035_Build_DDI_PM_LaCrosse.xus				
Project Description					

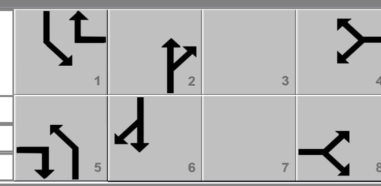


Demand Information	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Demand (*v*), veh/h	0		220	0		200	1	1010	530	1	910	240

Signal Information			
Cycle, s	90.0	Reference Phase	2
Offset, s	7	Reference Point	End
Uncoordinated	No	Simult. Gap E/W	Off
Force Mode	Fixed	Simult. Gap N/S	Off



Green	44.0	0.0	34.0	1.0	0.0	0.0
Yellow	4.0	0.0	4.0	0.0	0.0	0.0
Red	2.0	0.0	1.0	0.0	0.0	0.0



Timer Results	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Assigned Phase		8		4	5	2	1	6
Case Number		5.0		5.0	2.0	4.0	2.0	4.0
Phase Duration, s		1.0		1.0	50.0	50.0	39.0	39.0
Change Period, ($Y+R_c$), s		0.0		0.0	6.0	0.0	5.0	5.0
Max Allow Headway (*MAH*), s		3.5		3.5	3.2	0.0	3.1	0.0
Queue Clearance Time (g_s), s		3.0		3.0	2.0		2.0	
Green Extension Time (g_e), s		0.0		0.0	0.0	0.0	0.0	0.0
Phase Call Probability		1.00		1.00	1.00		1.00	
Max Out Probability		1.00		1.00	0.00		0.00	

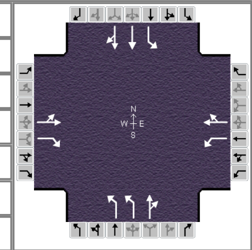
Movement Group Results	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Assigned Movement	3		18	7		14	5	2	12	1	6	16
Adjusted Flow Rate (*v*), veh/h	0		227	0		222	1	877	832	1	660	617
Adjusted Saturation Flow Rate (*s*), veh/h/ln	1177		1510	1172		1510	1697	1782	1581	1697	1782	1654
Queue Service Time (g_s), s	0.0		0.5	0.0		0.5	0.0	36.5	43.1	0.0	32.4	32.7
Cycle Queue Clearance Time (g_c), s	0.0		0.5	0.0		0.5	0.0	36.5	43.1	0.0	32.4	32.7
Green Ratio (*g/C*)	0.01		0.49	0.01		0.38	0.49	0.56	0.56	0.38	0.38	0.38
Capacity (*c*), veh/h	80		738	80		571	830	990	878	641	673	625
Volume-to-Capacity Ratio (*X*)	0.000		0.307	0.000		0.389	0.001	0.886	0.947	0.002	0.980	0.987
Available Capacity (c_a), veh/h	80		738	80		571	830	990	878	641	673	625
Back of Queue (*Q*), veh/ln (95th percentile)	0.0		4.8	0.0		6.0	0.0	16.5	18.4	0.0	18.6	15.0
Queue Storage Ratio (*RQ*) (95th percentile)	0.00		0.12	0.00		0.51	0.01	0.87	0.98	0.00	0.63	0.50
Uniform Delay (d_1), s/veh	0.0		13.8	0.0		20.4	10.7	13.4	14.5	5.7	18.2	14.7
Incremental Delay (d_2), s/veh	0.0		0.1	0.0		0.2	0.0	5.4	10.7	0.0	27.3	30.0
Initial Queue Delay (d_3), s/veh	0.0		0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0	0.0
Control Delay (*d*), s/veh	0.0		13.9	0.0		20.6	10.7	18.8	25.2	5.7	45.5	44.7
Level of Service (LOS)			B			C	B	B	C	A	D	D

	EB		WB		NB		SB	
Approach Delay, s/veh / LOS	13.9	B	20.6	C	21.9	C	45.1	D
Intersection Delay, s/veh / LOS	29.9				C			

Multimodal Results	EB		WB		NB		SB	
Pedestrian LOS Score / LOS	2.9	C	2.9	C	2.3	B	2.3	B
Bicycle LOS Score / LOS		F		F	1.9	A	1.5	A

HCS 2010 Signalized Intersection Results Summary

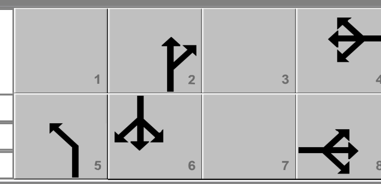
General Information				Intersection Information	
Agency	HDR			Duration, h	0.25
Analyst	MDF	Analysis Date	Feb 13, 2015	Area Type	Other
Jurisdiction		Time Period	PM Peak	PHF	0.90
Intersection	Disk Drive	Analysis Year	2035 Build DDI	Analysis Period	1> 16:45
File Name	2035_Build_DDI_PM_LaCrosse.xus				
Project Description					



Demand Information	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Demand (v), veh/h	70	60	420	160	30	40	380	650	180	30	570	70

Signal Information			
Cycle, s	90.0	Reference Phase	6
Offset, s	87	Reference Point	Begin
Uncoordinated	No	Simult. Gap E/W	Off
Force Mode	Fixed	Simult. Gap N/S	Off

Green	20.1	33.1	21.8	0.0	0.0	0.0
Yellow	4.0	4.0	4.0	0.0	0.0	0.0
Red	1.0	1.0	1.0	0.0	0.0	0.0



Timer Results	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Assigned Phase		8		4	5	2		6
Case Number		7.0		6.0	2.0	4.0		6.3
Phase Duration, s		26.8		26.8	25.1	63.2		38.1
Change Period, (Y+R_c), s		5.0		5.0	5.0	5.0		5.0
Max Allow Headway (MAH), s		5.2		5.4	5.1	0.0		0.0
Queue Clearance Time (g_s), s		8.8		21.5	11.3			
Green Extension Time (g_e), s		1.2		0.3	1.7	0.0		0.0
Phase Call Probability		1.00		1.00	1.00			
Max Out Probability		0.01		1.00	0.28			

Movement Group Results	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Assigned Movement	3	8	18	7	4	14	5	2	12	1	6	16
Adjusted Flow Rate (v), veh/h		144	107	178	42		422	912		33	356	344
Adjusted Saturation Flow Rate (s), veh/h/ln		1555	1510	1218	1717		1648	1717		615	1782	1722
Queue Service Time (g_s), s		5.1	5.2	12.8	1.7		9.3	1.3		2.7	12.5	12.5
Cycle Queue Clearance Time (g_c), s		6.8	5.2	19.5	1.7		9.3	1.3		2.7	12.5	12.5
Green Ratio (g/C)		0.24	0.24	0.24	0.24		0.22	0.65		0.37	0.37	0.37
Capacity (c), veh/h		439	367	285	417		735	1110		306	655	633
Volume-to-Capacity Ratio (X)		0.329	0.291	0.624	0.101		0.574	0.822		0.109	0.543	0.544
Available Capacity (c_a), veh/h		476	403	314	458		736	1110		306	655	633
Back of Queue (Q), veh/ln (95th percentile)		4.7	3.4	7.2	1.3		5.3	2.0		0.7	8.5	8.3
Queue Storage Ratio (RQ) (95th percentile)		0.24	0.17	0.36	0.06		0.54	0.07		0.12	0.21	0.21
Uniform Delay (d_1), s/veh		28.3	27.8	36.5	26.5		25.3	0.1		15.2	17.7	17.7
Incremental Delay (d_2), s/veh		0.6	0.6	4.1	0.1		1.6	3.4		0.7	3.2	3.3
Initial Queue Delay (d_3), s/veh		0.0	0.0	0.0	0.0		0.0	0.0		0.0	0.0	0.0
Control Delay (d), s/veh		28.9	28.4	40.6	26.6		26.8	3.5		15.9	20.9	21.0
Level of Service (LOS)		C	C	D	C		C	A		B	C	C
Approach Delay, s/veh / LOS	28.7	C		37.9	D		10.9	B		20.7	C	
Intersection Delay, s/veh / LOS	17.8						B					

Multimodal Results	EB		WB		NB		SB	
Pedestrian LOS Score / LOS	2.8	C	2.5	B	2.3	B	3.2	C
Bicycle LOS Score / LOS	0.9	A	0.9	A	2.7	B	1.1	A

 HCS 2010™ Streets Version 6.50 Generated: 2/13/2015 1:07:18 PM

APPENDIX - 3

Interchange Aerial Photography

N

0 200 400

Feet

Exit 58 - I-90 / Haines Ave

I-90 Exit 59 (La Crosse Street) IMJR
Rapid City, South Dakota

DATE

September 2014

FIGURE

A3-1

N
0 200 400
Feet

Exit 59 - I-90 / La Crosse Street

I-90 Exit 59 (La Crosse Street) IMJR
Rapid City, South Dakota

DATE
September 2014

FIGURE
A3-2

0 200 400
Feet

Exit 60 - I-90 / North Street

I-90 Exit 59 (La Crosse Street) IMJR
Rapid City, South Dakota

DATE
September 2014

FIGURE
A3-3

APPENDIX - 4

Methods and Assumptions – Amendment 2

HDR | ONE COMPANY *Many Solutions*℠

Methods & Assumptions Meeting Documentation

1. Methods and Assumptions Cover Page

I-90 Exit 59 (La Crosse Street) Interchange Options Study – Amendment 2

To:	Study Advisory Team (SDDOT, FHWA, City of Rapids City)		
From:	Jody Page, HDR Brian Ray, HDR Mike Forsberg, HDR	Project:	I-90/La Crosse Street Interchange Study Project PL 0100(89) 3616 P, PCN 03KM
CC:	File		
Date:	October 18th, 2013	Job No:	183454

Methods and Assumptions Document

This Methods and Assumptions document was developed as a summation of the Methods and Assumptions Meeting held on June 26th, 2012 with representatives from the South Dakota Department of Transportation (SDDOT), Federal Highway Administration (FHWA), City of Rapid City, and HDR. Amendment 2 includes changes to accommodate year to breakdown analysis of the three concept build options selected by the Study Advisory Team (SAT) at the SAT meeting held on September 13th. This document is intended to serve as a historical record of the process, dates, and decisions made by the study team representatives for the ***I-90 Exit 59 (La Crosse Street) Interchange Options Study***.

2. Stakeholder Acceptance Page

The undersigned parties concur with the Methods and Assumptions for the ***I-90 Exit 59 (La Crosse Street) Interchange Options Study*** as presented in this document.

SDDOT:	FHWA:
Signature	Signature
Data Analysis Engineer	Quality / Operations Engineer
Title	Title
9-4-2012	9/7/2012
Date	Date

The undersigned parties concur with Amendment 1 to this document.

SDDOT:	FHWA:
Signature	Signature
Data Analysis Engineer	Planning/Civil Rights Spec.
Title	Title
6-24-2013	6/24/13
Date	Date

The undersigned parties concur with Amendment 2 to this document.

SDDOT:	FHWA:
Signature	Signature
Data Analysis Engineer	Planning/Civil Rights Spec
Title	Title
10-18-2013	10-21-2013
Date	Date

Notes:

(1) Participation on the Study Advisory Team and/or signing of this document does not constitute approval of the ***I-90 Exit 59 (La Crosse Street) Interchange Options Study*** Final Report or conclusions.

(2) All members of the Study Advisory Team will accept this document as a guide and reference as the study progresses through the various stages of development. If there are any agreed upon changes to the assumptions in this document a revision will be created, endorsed and signed by all the signatories.

3. Introduction and Project Description

Project Background and Understanding

The I-90/La Crosse Street interchange ranks 5th out of the 126 interchanges in South Dakota that were evaluated based on weighted crash rates (*South Dakota Decennial Interstate Corridor Study, 2010*). The purpose of this study is to address the congestion and safety concerns at the I-90/La Crosse Street interchange which serves the growing northeast edge of Rapid City. This interchange options study will develop conceptual designs and perform traffic analysis for various interchange options.

Location

The study area is located in Northeastern Rapid City immediately east of the I-190 spur. Three interchanges are located on I-90 within the study area, Haines Avenue, La Crosse Street and North Street.

Need for Study

The study team has determined the following needs for this specific study:

- Congestion at the La Crosse Street interchange.
- Safety concerns at the La Crosse Street interchange.

Study Schedule

Date	Task/Event
2012 May – June	Notice to Proceed; Data collection
July	Methods & Assumptions Documentation
August – September	Existing conditions analysis
October	Business/Landowner Group Meetings; Public Meeting #1
November – January **(2013)**	Develop, document and analyze interchange and roadway options
February	Business/Landowner Group Meetings; Public Meeting #2
March	Refine options
April – June	Prepare draft Interchange Modification Justification Report (IMJR); Identify recommended option(s)
July	Present recommended option(s) to Metropolitan Planning Organization (MPO); Public Meeting #3
August – October	Select recommended option(s); Revise draft IMJR
November	Submit Final IMJR; Present Final Report to MPO

Facilities Affected by the Study

Modifications to the I-90 Exit 59 (La Crosse Street) interchange would have the potential to affect the intersections on La Crosse Street adjacent to the interstate ramp terminal intersections (La Crosse Street/Disk Drive and La Crosse Street/Eglin Street). Modifications at Exit 59 would also have the potential to affect the adjacent interchanges on I-90 at Haines Avenue and North Street.

Previous Studies

The following previous studies will be reviewed during the course of this study:

- 2010 Decennial Interstate Corridor Study Phases 1, 2, & 3
  - http://www.sddot.com/transportation/highways/planning/specialstudies/Default.aspx
- 2003 Eglin Street Study
  - http://www.rcgov.org/Transportation-Planning/special-planning-studies.html
- RapidTRIP 2035 Metropolitan Planning Organization (MPO) Long-Range Transportation Plan (LRTP)
  - http://www.rcgov.org/Transportation-Planning/special-planning-studies.html
- 2011 Rapid City Area Bicycle and Pedestrian Master Plan
  - http://www.rcgov.org/Transportation-Planning/special-planning-studies.html

- Rapid City Arterial Street Safety Study
    - http://www.rcgov.org/Transportation-Planning/special-planning-studies.html
- Rapid City Major Street Plan
    - http://www.rcgov.org/Transportation-Planning/major-street-plan.html
- Anamosa Street Extension Study

Study Advisory Team Members

A Study Advisory Team has been formed to guide the study through completion. The Study Advisory Team is comprised of representative parties of the SDDOT, FHWA and City of Rapid City. Members of the Study Advisory Team are:

Stacy Bartlett	SDDOT – Road Design (Traffic)	Steve Johnson	SDDOT – Bridge Design
Jeff Brosz	SDDOT – Trans. Inv. Management	John Mattheson	SDDOT – Region Traffic Engineer
Steve Gramm	SDDOT – Project Development	Karen Olson	SDDOT – Road Design
Kip Harrington	Rapid City – Community Planning	Brad Remmich	SDDOT – Project Development
Marc Hoelscher	FHWA	Todd Seaman	SDDOT – Rapid City Region
Patsy Horton	Rapid City – Community Planning	Dale Tech	Rapid City – Public Works

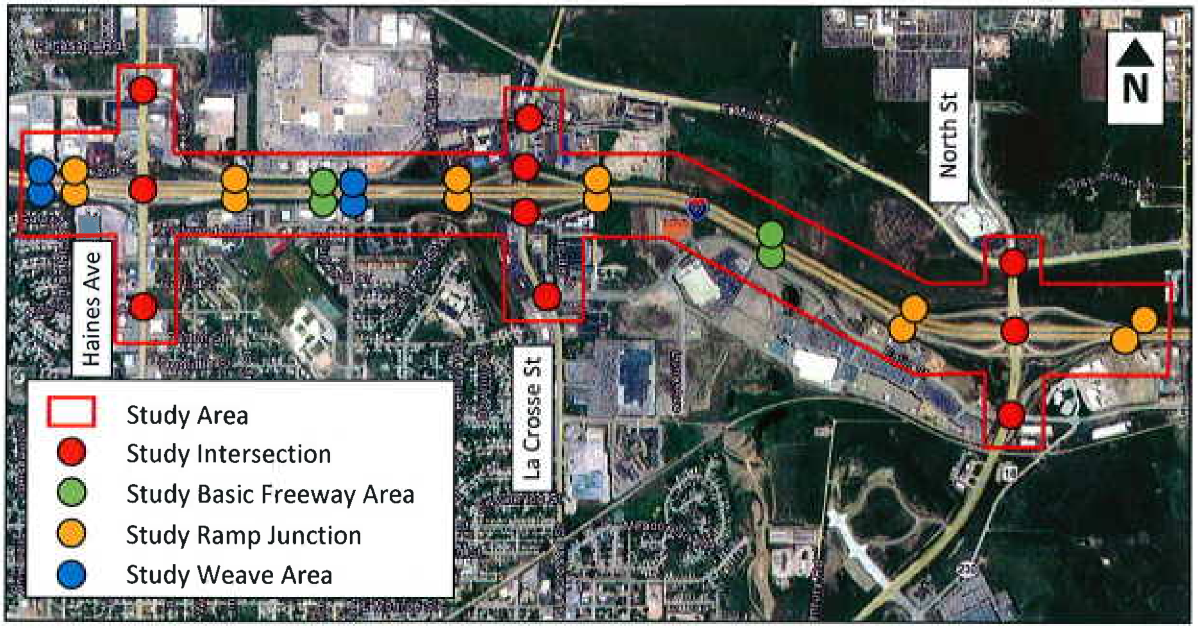
Additional team members may be added as the study progresses.

Study Complexity

This study will evaluate a variety of options for a new interchange configuration at Exit 59 (La Crosse Street). Access points on La Crosse Street that are close in proximity to the I-90 ramp terminal intersections present the complex issue of maintaining access with the interchange options being considered. Another complex issue is the desire to maintain the existing La Crosse Street bridge structure over I-90.

4. Study Area

The study area was defined by the Study Advisory Team and is illustrated in this report for documentation. The study area contains the I-90 interchanges in northeast Rapid City at La Crosse Street, Haines Avenue and North Street. The following graphic shows the study intersections with red dots, ramp junction analysis locations with orange dots and weave areas with blue dots. The study area is bounded by a red box on the graphic. A list of study intersections and ramp junctions are also provided.



Study Intersections:

- La Crosse Street Study Intersections
  - La Crosse Street/Disk Drive
  - La Crosse Street/I-90 Westbound Ramp Terminal
  - La Crosse Street/I-90 Eastbound Ramp Terminal
  - La Crosse Street/Eglin Street
- Haines Avenue Study Intersections
  - Haines Avenue/Disk Drive
  - Haines Avenue/I-90 Single Point Ramp Terminal
  - Haines Avenue/Lindbergh Street
- North Street Study Intersections
  - North Street/Mall Drive
  - North Street/I-90 Single Point Ramp Terminal
  - North Street/Eglin Street

Study Basic Freeway Areas (*See also Note 1 below*):

- I-90 Eastbound
  - Segment between Haines Avenue and La Crosse Street
  - Segment between La Crosse Street and North Street
- I-90 Westbound
  - Segment between North Street and La Crosse Street
  - Segment between La Crosse Street and Haines Avenue

Study Ramp Junctions (*See also Notes 1 and 2 below*):

- I-90 Eastbound
  - Diverge to Haines Avenue
  - Merge from Haines Avenue
  - Diverge to La Crosse Street
  - Merge from La Crosse Street
  - Diverge to North Street
  - Merge from North Street
- I-90 Westbound
  - Diverge to North Street
  - Merge from North Street
  - Diverge to La Crosse Street
  - Merge from La Crosse Street
  - Diverge to Haines Avenue
  - Merge from Haines Avenue

Notes:

(1) *The ramp junctions and basic freeway segments between Haines Avenue and La Crosse Street will also be evaluated as weaving areas to evaluate the possible addition of an auxiliary lane between the two interchanges.*

(2) *Ramp junctions on the west side of the Haines Avenue interchange are part of weave areas with the ramps to/from I-190. These locations will be analyzed as weaves with data obtained for the I-190 ramps.*

5. Analysis Years/Periods

This study will evaluate traffic during and for the following time periods:

Existing Conditions – Existing conditions analyses will be conducted for year 2011/2012 volume conditions. Counts from November/December year 2011 will be compared to counts conducted during the summer (peak season) of year 2012 and the higher volume set will be used to analyze existing conditions. During the summer months traffic volumes are generally higher than other months in Rapid City as a result of tourism in the area. For existing conditions the following time periods will be evaluated:

- Existing Conditions (Year 2012) – AM Peak Hour
- Existing Conditions (Year 2012) – PM Peak Hour

Design Conditions – Design conditions analyses will be conducted for year 2035 peak season conditions. The projected traffic volumes from the Rapid City MPO Travel Demand Model will be utilized to determine year 2035 volumes. The Travel Demand Model was calibrated and updated in year 2008 to a planning horizon of year 2035. For the design conditions the following time periods will be evaluated:

- Design Conditions (Year 2035) – AM Peak Hour
- Design Conditions (Year 2035) – PM Peak Hour

Interim Conditions – No interim conditions will be evaluated as part of this study.

6. Data Collection

Data Collection is one of the most important items during any transportation planning study. The data collection efforts are documented below:

<u>Existing Arterial Intersection Data</u>
SDDOT provided turning movement counts collected at the study intersections. These turning movement counts define actual traffic at the study intersections during the course of a typical weekday. The most recent turning movement counts provided were conducted in November/December of year 2011. Seven of the 10 intersection counts from year 2011 included 12 hours of data (6 AM to 6 PM) in 15-minute intervals. The other intersection counts from year 2011 also included data over the 12-hour period between 6 AM and 6 PM in 15-minute intervals but were missing data for portions of the 12-hour period (including portions of the AM/PM peak period).

<u>Existing Freeway Data</u>
No existing freeway data was provided. Study intersection turning movement counts will be used to determine existing AM and PM peak hour ramp volumes at the three I-90 interchanges within the study area.

<u>Additional Data Collection Needed</u>
Additional data collection is needed to complete project tasks. Additional data needs include intersection turning movement counts, freeway counts, arterial spot speed study, Travel Demand Model volumes and existing signal timings.

Turning movement counts will be collected by HDR at the study intersections on La Crosse Street during the summer of year 2012 on a Tuesday, Wednesday or Thursday to capture peak season traffic volumes on a typical weekday. These turning movement counts will be collected during the AM and PM peak periods in 15-minute intervals. Additionally, these turning movement counts will also include truck counts at the intersections to determine arterial truck percentages. Turning movement counts (including truck counts) will also be conducted by HDR at the Haines Avenue/I-90 single point ramp terminal, Haines Avenue/Lindbergh Street and North Street/Mall Drive intersections during the AM and PM peak periods to replace counts with missing data. A separate turning movement count at the La Crosse/I-90 Eastbound Ramp Terminal study intersection will be conducted by HDR on a Saturday during the summer of year 2012 to determine variations in traffic volumes between a typical weekday and Saturday during the peak season. Additional counts may be conducted on a Saturday depending on the variations between weekday and Saturday traffic volumes.

Freeway counts will be collected by HDR at one location on I-90 within the study area during the summer of year 2012. The freeway counts will be collected for each direction of travel on I-90 during the AM and PM peak periods in 15-minute intervals and will include classification to determine truck percentages along I-90. These freeway counts will be used in combination with interchange ramp traffic volumes from intersection turning movement counts at each study interchange to determine freeway volumes at all freeway locations within the study area.

HDR will also conduct origin-destination studies for the freeway locations between the I-90 interchanges at I-190 and Haines Avenue and between the I-90 interchanges at Haines Avenue and La Crosse Street. As part of these studies freeway counts for the I-190 northbound to I-90 eastbound ramp and the I-90 westbound to I-190 southbound ramp during the AM and PM peak periods in the summer of year 2012 will be conducted. This data will be used when analyzing weaving segments between the I-190 and Haines Avenue interchanges on I-90 and the potential weaving segment between Haines Avenue and La Crosse Street interchanges on I-90 with the addition of an auxiliary lane between Haines Avenue and La Crosse Street.

HDR will conduct a spot speed study along La Crosse Street during off-peak times of a typical weekday to determine the free-flow speed of traffic on La Crosse Street to be used in the analysis. Data collected at the location on La Crosse Street will be used for the free-flow speed of all arterials in the study area (the posted speed on the three arterials in the study area is 35 mph).

The City of Rapid City will provide shapefiles from the Travel Demand Model of roadways in Rapid City, including roadways within the study area, that include year 2008 annual daily traffic (ADT) volumes (non-peak season) and year 2035 post-processed ADTs (non-peak season). These ADTs will be used in combination with the existing intersection turning movement counts and freeway counts to determine year 2035 AM and PM peak hour volumes.

Signal timings will be provided by the City of Rapid City.

The inclusion of simulation on this project is still being determined. If it is determined to include VISSIM simulation, travel time runs along La Crosse Street and saturation flow rates at La Crosse Street signalized intersection approaches will need to be conducted for use in calibrating the simulation models.

<u>Data Collection Techniques</u>
All data was collected and will be collected using standard field practices which consist of using cameras, digital count boards or tube counters.

7. Traffic Operations Analysis

<u>Traffic Operations Analysis</u>

1. Software
    a. Signalized Intersections
        i. Highway Capacity Software (HCS) Release 6.5 (currently in beta) (2010 HCM Methodology) Streets Module
            1. La Crosse Street within the study area
                a. The I-90 ramp terminal intersections at La Crosse Street will be analyzed as part of the La Crosse Street analysis with the HCS Streets Module
                b. Analysis of a Diverging Diamond Interchange will be completed using HCS Release 6.5 (currently in beta) (2010 HCM Methodology). The methodology of analyzing this geometric configuration will follow the methodology outlined

in the 'Analysis Procedures for Diverging Diamond Interchange (DDI)' memorandum, found in the Appendix.

b. Basic Freeway, Ramp Junctions and Weave Areas
    i. HCS Release 6.5 (currently in beta) (2010 HCM Methodology)

2. Operational Analysis Assumptions
    a. Level of Service (LOS)
        i. Signalized Ramp Terminal Intersections (SDDOT's System)
            1. Intersections where geometry is modified because of project improvements
                a. Minimum allowable LOS – LOS 'C'
                    i. Individual movements will be allowed to operate at LOS 'D' but the overall intersection LOS shall be 'C' or better
            2. Other intersections (intersections within the study area that are not modified by project improvements)
                a. Minimum allowable LOS – LOS 'D'
                    i. Individual movements will be allowed to operate at LOS 'E' but the overall intersection LOS shall be 'D' or better
        ii. Signalized Non-Ramp Terminal Intersections (City of Rapid City's System)
            1. Minimum allowable LOS – LOS 'C'
                a. Individual movements will be allowed to operate at LOS 'D' but the overall intersection LOS shall be 'C' or better
        iii. Basic Freeway, Ramp Junctions and Weave Areas
            1. Minimum allowable LOS – LOS 'C'

3. Variables
    a. Peak Hour Factor (PHF)
        i. Existing (year 2012) conditions analysis will use calculated PHFs from existing counts
        ii. Design year (year 2035) conditions analysis will use PHF of 0.90
            1. This will be confirmed upon development of existing PHFs to determine that 0.90 is reasonable
    b. Saturation Flow Rate
        i. SDDOT Design Manual (Page 24, Chapter 15) requires of the use of 1800 vph in Rapid City. This value will be used for the signalized intersections and freeway locations within the study area.
    c. Traffic Signal Controllers
        i. Operational analysis will allow for both actuated and coordinated controllers
    d. Left-Turn Phasing
        i. Protected, Permitted / Protected or Split Phasing will be allowed at intersections
    e. Lane Utilization Factors (Heaviest Lane Volume parameter in HCS Streets Module)
        i. Default Heaviest Lane Volume values in HCS Streets Module
        ii. Manual overrides to the default Heaviest Lane Volume values will be used for the following locations where field observations indicate that traffic volumes in each approach lane are different

1. La Crosse Street/I-90 Eastbound Ramp Terminal – Northbound Approach (inside through lane has heavier traffic flows because of high traffic volumes destined for the left-turn lane at the downstream intersection to access I-90 westbound)
2. Haines Avenue/Disk Drive – Southbound Approach (outside through lane has heavier traffic flows because of high traffic volumes destined for the right-turn lane at the downstream intersection to access I-90 westbound)
3. North Street/Eglin Street – Northbound Approach (inside through lane has heavier traffic flows because of high traffic volumes destined for the left-turn lane at the downstream intersection to access I-90 westbound)

iii. Year 2035 intersection volumes will be reviewed to determine which approaches would have high lane utilization

f. Heavy Vehicle Percentage
   i. Study Intersections
      1. Use turning movement counts (including truck counts) collected at study intersections during the summer of year 2012 to determine arterial truck percentages.
   ii. Ramp Junctions and Weave Areas
      1. Use freeway counts (including truck counts) collected on I-90 within the study area during the summer of year 2012 to determine freeway truck percentages.

g. Phase Change Intervals
   i. Existing (Year 2012) Conditions
      1. Existing signal timings will be used for phase change intervals during existing conditions
   ii. Design Year (Year 2035) Conditions
      1. Existing signal timings will be used for phase change intervals of phases that exist at intersections that have no geometric change from existing conditions
      2. Phase change intervals will be calculated for the following locations:
         a. New phases added at an intersection where geometry is unchanged from existing conditions
         b. All phases at an intersection where geometry is changed from existing conditions

      The calculated values will be based on methodologies presented in the *Institution of Transportation Engineers (ITE) Traffic Engineering Handbook*. The methodologies presented in the handbook use vehicle length and speed and the distance needed to track through the intersection to calculate phase change intervals.

h. Speeds
   i. Arterials
      1. HCS Streets Analysis
         a. For the "posted speed" input use the posted speed
         b. For the "Speed Limit to Base free-flow speed (FFS) Ratio" use the spot speed data obtained on La Crosse Street
   ii. Freeway – Use posted speed for FFS/average speed

4. Year to Breakdown Analysis
    a. Year to breakdown analysis will be completed for the following build options (as shown in the *I-90 Exit 59 (La Crosse Street) Conceptual Interchange Options Evaluation Memo*, dated August 30, 2013)
        i. Option 1 – Diamond Interchange
        ii. Option 2 – Single Point Urban Interchange (SPUI)
        iii. Option 3 – Diverging Diamond Interchange (DDI)
    b. Year to breakdown analysis will be used to determine the following.
        i. When La Crosse Street study intersections will exceed the minimum allowable thresholds listed in sub-section 2 for each of the build options.
        ii. When La Crosse Street study intersections reach LOS 'E' with LOS 'F' movements (or a high delay LOS 'D' for the overall intersections with LOS 'F' movements) for each of the build options.
    c. Analysis Years/Periods
        i. Volumes will be developed in 5-year increments as outlined in Section 8, Travel Forecast. Analysis will be conducted for the AM and PM peak hours of year 2050 as a starting point to determine if breakdown would occur before or after year 2050. Analysis will then be completed for the AM and PM peak hours for additional years, as necessary, to determine the year of breakdown for each build option.

8. Travel Forecast

<u>Travel Demand Model</u>

1. The Rapid City MPO Travel Demand Model will be utilized for the purposes of this study
    a. The Travel Demand Model was created using TransCAD in year 2002
    b. The Model was updated in year 2008 by LSA and was calibrated through a joint effort between LSA and the City of Rapid City
    c. The Model build year is 2035 to match the current LRTP developed in year 2010
        i. The Travel Demand Model forecasts include:
            1. Constrained projects in the LRTP
            2. Post-processed ADT volumes
    d. Volumes in the Travel Demand Model reflect non-peak season conditions
2. Study Forecasting Methodology
    a. Existing (Year 2012) Conditions
        i. Existing counts will be utilized for existing conditions
            1. Intersection turning movement counts collected during November/December of year 2011 (off-peak season) and turning movement counts that will be collected during the summer of year 2012 (peak season) will be utilized to develop intersection turning movement volumes for the AM and PM peak hours. The year 2012 turning movement counts will be collected for the La Crosse Street study intersections, the Haines Avenue intersections at the I-90 single point ramp terminal and Lindbergh Street and the North Street/Mall Drive intersection. The year 2011 and year 2012 counts will be compared and the higher counts will be used. If the counts from the summer of year 2012 are found to be higher, these counts will be used to adjust the year 2011 counts at the Haines Avenue and

North Street study intersections to year 2012 (peak season) volumes.

2. Freeway counts that will be collected during the summer of year 2012 on I-90 at one location within the study area and the existing volumes on study freeway ramps (based on the intersection turning movement counts at the ramp terminal intersections) will be used to determine AM and PM peak hour volumes for all freeway segments within the study area.

ii. Volumes will be smoothed/balanced between study intersections and free-flow locations to eliminate any additions or subtractions (sources/sinks) in traffic volumes between study intersections and freeway ramps. A figure will be provided that shows the balanced volumes within the entire study area.

b. Design Year (Year 2035) Conditions

i. Develop year 2012 ADTs using base year (year 2008) and year 2035 ADTs from the Travel Demand Model. Year 2012 ADTs will be compared to existing (year 2012) peak hour volumes to determine peak hour percentages of daily traffic.

1. Use a straight-line growth rate between year 2008 ADTs and year 2035 ADTs from the Travel Demand Model to determine year 2012 ADTs for arterial and freeway segments within the study area

ii. Use existing conditions AM and PM peak hour volumes, calculated existing (year 2012) ADTs and year 2035 post-processed ADTs from the Travel Demand Model to generate year 2035 AM and PM peak hour volumes

1. Develop existing conditions "K" and "D" factors for the AM and PM peak hours on arterial and freeway segments. These will be used to determine the percentage of daily traffic during the AM and PM peak hours and the percentage of traffic on a given segment traveling in each direction

2. Apply existing conditions AM and PM peak hour "K" and "D" factors and existing AM and PM peak hour turning percentages at intersections to year 2035 forecasted ADTs to generate year 2035 AM and PM peak hour volumes

iii. Volumes will be smoothed/balanced between study intersections and free-flow locations to eliminate any additions or subtractions (sources/sinks) in traffic volumes between study intersections and freeway ramps. A figure will be provided that shows the balanced volumes within the entire study area.

c. Year to Breakdown Conditions

i. Volumes at the I-90 Exit 59 (La Crosse Street) interchange will be developed in 5-year increments beyond year 2035 until breakdown conditions have been identified for each of the three build options.

ii. A straight line growth rate for each individual movement at La Crosse Street study intersections will be developed using the balanced individual movement volumes from years 2012 and 2035.

iii. The straight line growth rates established for each movement will be applied to year 2035 balanced volumes and grown to the desired year (multiple of five beyond year 2035).

iv. Volumes will be smoothed/balanced between study intersections and free-flow locations to eliminate any additions or subtractions (sources/sinks) in traffic volumes between study intersections and freeway ramps.

9. Safety Issues

Crash data will be reviewed for La Crosse Street within the study area for years 2008 thru 2011. This data was provided by SDDOT from their database. To be consistent through the corridor study, the SDDOT's database will be the only database used in the calculation of crash rates and critical crash rates. The Rapid City Arterial Street Safety Study from March of year 2012 was also reviewed for any crash information along La Crosse Street within the study area that could provide supplemental information; however, it did not include any information for La Crosse Street locations within the study area. The following information will be provided as a result of the crash analysis:

- Segment and Intersection Crash Rates
- Segment and Intersection Critical Crash Rates
- Crash Trends
- Potential Mitigation Measures to Improve Locations Above Critical Crash Rates

10. Selection of Measures of Effectiveness (MOE)

The main goal of this study is as follows:

- *Develop feasible solutions to address issues and needs that meet current design standards and/or traffic level of service expectations under both the current and predicated future traffic conditions while promoting a livable community that will enhance the economic and social well-being of Rapid City area residents and visitors.*

To satisfy the study objective, the following MOEs will be used to evaluate and compare the concepts:

- Signalized Intersections: **LEVEL OF SERVICE (LOS)** and **INDIVIDUAL MOVEMENT DELAY**
- La Crosse Street Corridor: **LOS, INDIVIDUAL MOVEMENT DELAY** and **SPEED**
- Freeway Segments, Ramp Junctions and Weave Areas: **LOS** and **DELAY**
- Ramp Terminal Intersections: **LOS** and **INDIVIDUAL MOVEMENT DELAY**

These statements are made assuming that the geometric improvements identified meet all AASHTO, SDDOT, and City of Rapid City guidelines. It is understood that all traffic analysis reporting will be completed using HCM 2010 Methodology.

11. FHWA Interstate Access Modification Policy Points

An Interchange Modification Justification Report (IMJR) will be developed for the I-90/La Crosse Street interchange as part of this project. The level of detail for addressing each of the eight (8) FHWA policy points regarding modifications to Interstate access is outlined below.

Policy Point 1 – Need

The IMJR will illustrate that the existing interchange cannot adequately satisfy the future needs at the location without modification of the existing interchange.

Policy Point 2 – Reasonable Alternatives

The IMJR will discuss any alternative improvements that the Study Advisory Team has considered to meet the need of the interchange.

Policy Point 3 – Operations and Safety

The IMJR will evaluate build conditions for the planning year and identify the preferred alternative.

Policy Point 4 – Access Connections and Design

The IMJR will discuss any restricted movements at the proposed modified interchange and list any exceptions to current design standards.

Policy Point 5 – Land Use and Transportation Plans

The IMJR will document any inconsistencies between the proposed modified interchange and future land use or transportation plans in the area.

Policy Point 6 – Future Interchanges

The IMJR will document any effects to and from other interchange improvements within the study area at adjacent interchanges.

Policy Point 7 – Coordination

The IMJR will identify any improvements outside of the interchange footprint in conjunction with the proposed modified interchange. The IMJR will discuss any coordination efforts needed for all improvements associated with the proposed modified interchange.

Policy Point 8 – Environmental Process

The IMJR will provide a status of the planning and NEPA processes, including anticipated schedule dates. Public involvement will also be discussed.

12. Deviations/Justifications

No deviations from standards are currently known. If it is determined during the study that deviations are required, the methods and assumptions document will be amended prior to proceeding.

13. Conclusion

All sections contained in this document will guide the traffic data collection and traffic assessment for this study. If it is determined during the study that deviations are required to any of the sections included in this document, the document will be amended prior to proceeding.

14. Appendices

The appendix includes the following:

- Methods and Assumptions Study Team Meeting Agenda
- Methods and Assumptions Study Team Meeting Minutes
- Analysis Procedures for Diverging Diamond Interchange (DDI)

APPENDIX

AGENDA
Study Advisory Committee Meeting #1
I-90 Exit 59 (La Crosse Street)
Interchange Options Study

Meeting:	Methods and Assumption Meeting
Date/Time:	June 26, 2012 / 9:00 AM to 11:00 AM (CDT)
Place:	Web Meeting / Conference Call
Conference Call:	(866) 994-6437, Code: 4296852
Attendees:	HDR, Study Advisory Team Members

1. Introductions (Study Advisory Team, HDR)

2. Method and Assumptions

   2.1. Methods and Assumptions Cover Page
   2.2. Stakeholder Acceptance Page
   2.3. Introduction and Project Description
   2.4. Study Area
   2.5. Analysis Years/Periods
   2.6. Data Collection
   2.7. Traffic Operations Analysis
   2.8. Travel Forecast
   2.9. Safety Issues
   2.10. Selection of Measures of Effectiveness (MOE)
   2.11. FHWA Interstate Access Modification Policy Points
   2.12. Deviations/Justifications
   2.13. Conclusions
   2.14. Appendices

3. Other Items

4. Next Steps

5. Adjourn

MEETING MINUTES
Methods & Assumptions Meeting
I-90 Exit 59 (La Crosse Street)
Interchange Options Study

Meeting: Methods & Assumptions Meeting
Date/Time: June 26, 2012 / 9:00 AM to 11 AM
Place: Web Meeting / Conference Call
Attendees: HDR, Study Advisory Team Members

1. Introductions (City, SDDOT, MPO, FHWA, HDR)

2. Methods & Assumptions Process Discussions
    a. Section 1 – Methods & Assumptions Cover Page
    b. Section 2 – Stakeholder Acceptance Page
        i. The Stakeholder Acceptance Page will include the two optional statements provided in the SDDOT's *Methods & Assumptions Process Template*
            1. "Participation on the Study Advisory Team and/or signing of this document does not constitute approval of the ***I-90 Exit 59 (LaCrosse Street) Interchange Options Study*** Final Report or conclusions."
            2. "All members of the Study Advisory Team will accept this document as a guide and reference as the study progresses through the various stages of development. If there are any agreed upon changes to the assumptions in this document a revision will be created, endorsed and signed by all the signatories."
    c. Section 3 – Introduction and Project Description
        i. The schedule will be updated to account for additional time to complete the Methods & Assumptions Document
        ii. The schedule will also be extended to account for the inclusion of an IMJR.
        iii. The Anamosa Street Extension Study will be added to the list of previous studies.
    d. Section 4 – Study Area
        i. The weave areas on I-90 between I-190 and Haines Avenue will be included in the operational analysis.
        ii. The ramp junctions on I-90 east of North Street will be included in the operational analysis.
        iii. The segment of I-90 between Haines Avenue and LaCrosse Street will also consider the addition of an auxiliary lane on I-90. This would result in analysis of this area as a weaving segment.

e. Section 5 – Analysis Years/Periods
    i. Year 2035 will be used as the Design Year and was approved for use by FHWA.
f. Section 6 – Data Collection
    i. Freeway counts will be collected during the AM and PM peak periods at one location on I-90 (both directions) and will include truck counts.
    ii. Counts will be collected for the I-90 westbound to I-190 southbound and I-190 northbound to I-90 eastbound ramps for use in analyzing the weave areas on I-90 between I-190 and Haines Avenue.
    iii. A Saturday count will be conducted on LaCrosse Street at the I-90 eastbound ramp terminal to determine weekday/weekend variation.
    iv. A speed study on LaCrosse Street during off-peak times will be conducted to determine arterial free-flow speed.
g. Section 7 – Traffic Operations Analysis
    i. For the ramp terminal intersections (on SDDOT's system) level of service (LOS) 'D' will be the minimum allowable LOS for an intersection before requiring additional improvements.
    ii. The PHF for the Design Year conditions will be 0.90 (dependent on the existing PHFs).
    iii. Lane utilization factors will be based on the default values provided in Synchro with the exception of locations where field observations indicate heavy lane utilization. These locations will be listed in the M & A document.
    iv. Minimum phase change interval timings will be based on the existing signal timings and calculated phase change interval times. The calculated times will be based on the geometry of the intersection and the methodologies presented in the *ITE Traffic Engineering Handbook*.
    v. Information from the speed study to be collected on LaCrosse Street will be used for arterial free-flow speed. The average arterial travel speed will be 3 mph below the posted speed. The free-flow speed on the freeway will be the posted speed.
    vi. Inclusion of simulation on the project still needs to be determined.
h. Section 8 – Travel Forecast
    i. Diagrams will be provided that show balanced volumes
i. Section 9 – Safety Issues
j. Section 10 – Selection of Measures of Effectiveness
k. Section 11 – FHWA Interstate Access Modification Policy Points
    i. An IMJR will be needed for this project. The level of detail for addressing the Eight Policy Points will be determined at a later date.

    l. Section 12 – Deviations/Justifications
    m. Section 13 – Conclusions
    n. Section 14 – Appendices

3. <u>Other Items</u>

4. <u>Adjourn</u>

HDR | ONE COMPANY *Many Solutions*℠

To:	I-90 Exit 59 (La Crosse Street) Interchange Options Study Advisory Committee		
From:	Mike Forsberg Brian Ray	Project:	I-90 Exit 59 (La Crosse Street) Interchange Options Study Project PL 0100(89) 3616 P, PCN 03KM
CC:	Chung Tran, FHWA 'File'		
Date:	June 19, 2013	Job No:	183454

RE: Analysis Procedures for Diverging Diamond Interchange (DDI)

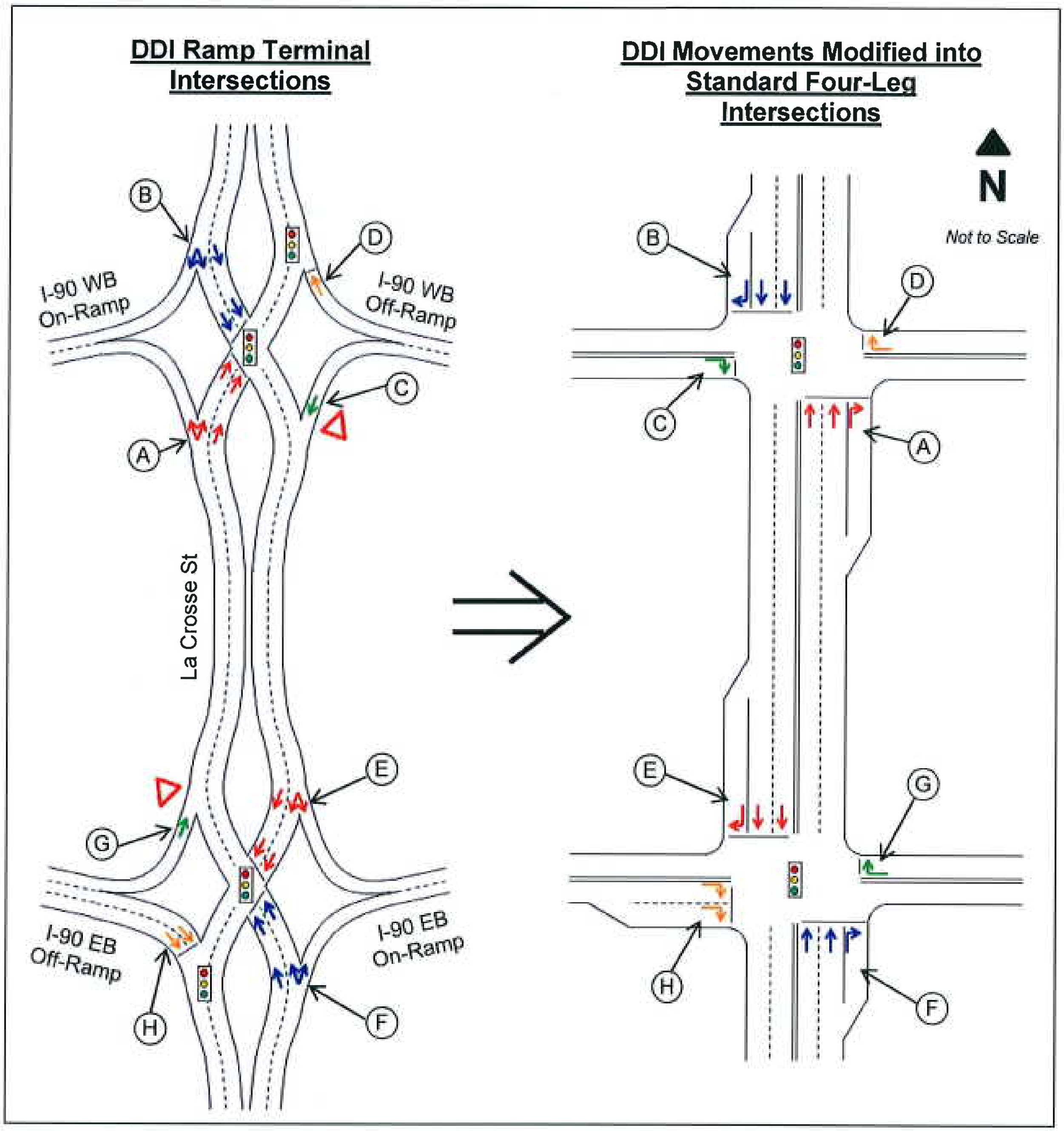
Introduction

This document presents a proposed methodology for analyzing a Diverging Diamond Interchange (DDI) for the I-90 Exit 59 (La Crosse Street) Interchange Options Study. The approved Methods & Assumptions document for the project specifies that analysis of interchanges will be conducted with the Highway Capacity Software (HCS) 2010 Streets module. The Federal Highway Agency (FHWA) has indicated that HCS 2010 is the preferred traffic analysis tool for this project. Four initial concepts for the I-90 Exit 59 interchange were presented to the Study Advisory Committee (SAT) on March 28th, 2013 and a DDI was included as one of the concepts. The procedures documented in this memorandum were developed in response to known challenges of analyzing DDIs in HCS 2010 based on discussions with the software developer, McTrans.

Proposed DDI Analysis Methodology

The proposed analysis methodology for DDIs includes manipulation of the intersection movements at a DDI to analyze the ramp terminal intersections as standard four-leg intersections in HCS 2010. The proposed methodology involves manipulating the movements at the DDI ramp terminal intersections of the proposed DDI concept to conform to the analysis methodology of HCS 2010 while mimicking similar operational elements of the DDI ramp terminal intersection. **Figure 1** expresses the proposed manipulation of the DDI ramp terminal movements into a format with standard four-leg intersections. The modified standard four-leg configuration shown in **Figure 1** would have split-phase operations for northbound and southbound traffic and allow for coordination of the ramp terminal intersections with signals north and south of the interchange.

Figure 1. Manipulation of DDI Movements into Standard Four-Leg Intersections



The following presents details of the proposed manipulation of intersection movements for the westbound ramp terminal intersection shown in **Figure 1** from the DDI configuration to a standard four-leg intersection configuration. Manipulation of intersection movements for the eastbound ramp terminal intersection would follow similar methodology.

- The DDI westbound ramp terminal intersection would operate as a two-phase signal. The northbound crossover movement (A) and westbound off-ramp left-turn movement (C) would travel through the intersection during the first phase (phase 2). The southbound crossover movement (B) and westbound off-ramp right-turn movement (D) would travel through the intersection during the second phase (phase 6).

- The two-phase operations of the DDI would be modified to two-phase operations with a four-leg intersection configuration. For example, at the westbound ramp terminal intersection:
    - The northbound crossover movement (A) of the DDI would be treated as a northbound through movement in the four-leg intersection configuration.
    - The northbound left-turn movement of the DDI in advance of the crossover would be treated as a northbound right-turn movement in the four-leg intersection configuration.
        - The value for right-turn-on-red (RTOR) for the northbound right turns would be set to zero. This assumes that all northbound right turns would only be able to turn during the northbound green signal indication. This assumption is conservative since these vehicles would be able to make this turning maneuver during a northbound red signal indication in the DDI configuration, while the northbound queue of the crossover movement does not extend to the turning movement location. However, due to the unknown percentage of time that the northbound through movement would extend beyond the turning movement location, it was assumed that no vehicles would be able to turn right on red.
    - The southbound crossover movement (B) of the DDI would be treated as a southbound through movement in the four-leg intersection configuration.
    - The southbound right-turn movement of the DDI in advance of the crossover would be treated as a southbound right-turn movement in the four-leg intersection configuration.
        - The value for right-turn-on-red (RTOR) for the southbound right turns would be set to zero. This assumes that all southbound right turns would only be able to turn during the southbound green signal indication. This assumption is conservative since these vehicles would be able to make this turning maneuver during a southbound red signal indication in the DDI configuration, while the southbound queue of the crossover movement does not extend to the turning movement location. However, due to the unknown percentage of time that the southbound through movement would extend beyond the turning movement location, it was assumed that no vehicles would be able to turn right on red.
    - The westbound off-ramp left-turn movement (C) of the DDI would be treated as an eastbound right-turn movement in the four-leg intersection configuration.
        - This movement would be treated as an eastbound right-turn movement at a signal with RTOR allowed. The value of RTOR would be based on the 'RTOR Reduction' factor shown in the HCM 2000 report obtained from Synchro traffic analysis software (Synchro would be used to code the modified four-leg configuration and obtain the RTOR value for this movement).
    - The westbound off-ramp right-turn movement (D) of the DDI would be treated as a westbound right-turn movement in the four-leg intersection configuration.

        - RTOR for the westbound right-turn movement would be restricted in the DDI configuration; therefore, the RTOR of the westbound right-turn movement four-leg configuration would be set to '0'.
    - In the modified version of the four-leg intersection the northbound (A) and eastbound (C) movements would travel through the intersection during the same phase (phase 2). This would be consistent with the overlapping northbound crossover movement (A) and westbound off-ramp left-turn movement (C) of the DDI.
    - In the modified version of the four-leg intersection the southbound (B) and westbound (D) movements would travel through the intersection during the same phase (phase 6). This would be consistent with the overlapping southbound crossover movement (B) and westbound off-ramp right-turn movement (D) of the DDI.

The following presents specific details of coding elements in HCS 2010 Streets to model the westbound ramp terminal intersection shown in **Figure 1** as a standard four-leg intersection of the DDI intersection. Manipulation of intersection movements for the eastbound ramp terminal intersection would follow similar methodology.

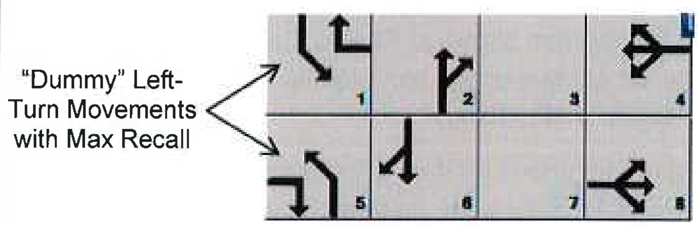
- To model split-phase operations for the major street (northbound and southbound movements) in HCS 2010 Streets the following coding elements would be needed. Additionally, the diagrams shown in **Figure 2** supplement the coding elements listed below.
    - Artificial ("dummy") northbound and southbound left-turn movements would be added with protected phasing. These movements would not serve any of the DDI traffic. The added left-turn phases would be phase 5 for the northbound left-turn movement and phase 1 for the southbound left-turn movement.
    - The eastbound and westbound right-turn movements would be overlapped with the northbound and southbound left-turn movements.
    - The southbound left-turn movement would be set to a lagging left-turn phase so that the northbound and southbound left-turn movements would not need to have a green signal indication simultaneously.
    - The Recall Mode for the northbound and southbound left-turn movements would be set to 'Max'.
    - The Phase Split times for the northbound and southbound left-turn movements (phases 5 and 1, respectively) would be set to the optimum phase split times for the northbound and southbound movements. The combined split times for the northbound and southbound left-turn movements would equal the cycle length of the signal, leaving no remaining time for the overlapping phase where northbound and southbound through traffic would travel through the intersection simultaneously.
    - Eastbound and westbound phases (phases 8 and 4, respectively) would be required to be included to meet the criteria for signal timings in HCS 2010 Streets. These phases would have a green signal indication simultaneously for 1 second and effectively serve as the Red time for the previous split that serves southbound traffic (labeled as "Dummy" All Red Phase in **Figure 2**). To counter the additional 1 second of green time given to the eastbound and westbound right-turn movements, each of these movements would be given an additional 0.5 seconds of "Start-Up Lost Time". Each of these right-turn movements would experience the extra 0.5 seconds of "Start-Up Lost Time" during the "Dummy" All Red Phase and during their normal

phase of operation (Phase 1 or 5), totaling 1 second of additional "Start-Up Lost Time" over the course of 1 signal cycle for the eastbound and westbound right-turn movements.

- The Demand for the northbound and southbound left-turn movements would be set to '1' in order for phases 1 and 5 to be given a green signal indication (otherwise, all of the time would be given to the phase where northbound and southbound traffic move through the intersection simultaneously).

Figure 2. Sample HCS 2010 Streets Phasing for the Westbound Ramp Terminal Intersection

Movement Phases



Operational Phases and Times

Green	42.0	0.0	38.0	1.0
Yellow	4.0	0.0	4.0	0.0
Red	1.0	0.0	0.0	0.0

Phase 1 Lagging

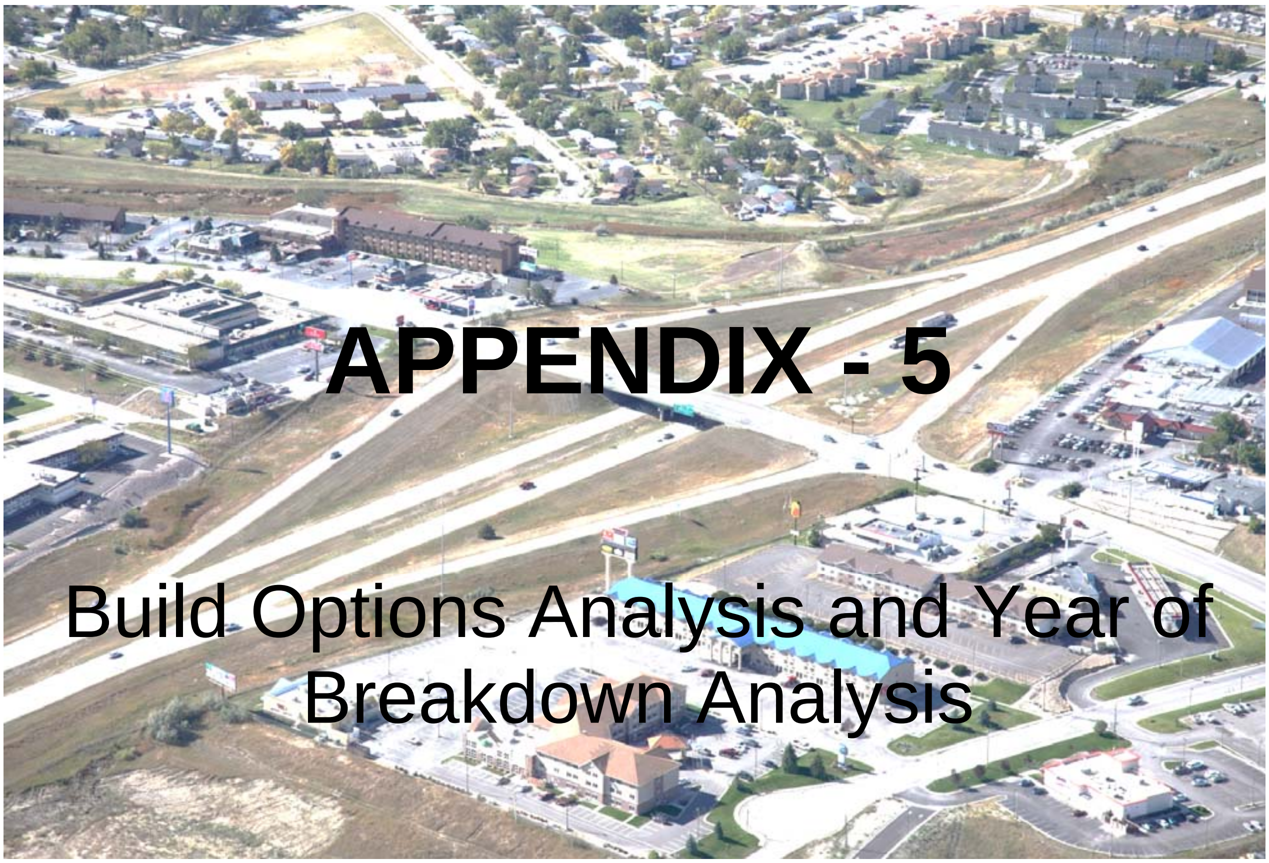
"Dummy" All Red Phase

- The following coding elements would also be included in HCS 2010 Streets to mimic the movements of the DDI.
  - The Arrival Type for the eastbound and westbound right-turn movements would be '3', representing random arrivals from the freeway. The Arrival Type for the northbound and southbound approaches would be '4', representing coordination of signals. However, the arrival patterns of the northbound and southbound movements would be dictated by the signal timings at upstream intersections and the

coded Arrival Type for the northbound and southbound approaches would not have any impact on the operations at these intersections.

- The signal would operate with a 90-second cycle length to match the signal timings at the adjacent La Crosse Street signals at Disk Drive and Eglin Street.
- Phases 1 and 5 would operate with 4 seconds of yellow and 1 second of all red.
- The speed limit would be set to 25 mph to account for lower speeds through the crossover and channelized turn movements. The exception to this would be for the southbound approach that arrives from outside of the DDI and would be set to the speed limit of La Crosse Street, 35 mph.

As mentioned previously, the modified standard four-leg configuration would have split-phase operations at the ramp terminal intersections for northbound and southbound traffic and allow for coordination of the ramp terminal intersections with signals north and south of the interchange. The signal offsets values at the ramp terminals would be based on the turn patterns at each intersection to maximize platooning of traffic through the two signals. Signal offsets at intersections adjacent to the ramp terminals would be based on the offsets established at the ramp terminal intersections.



APPENDIX - 5

Build Options Analysis and Year of Breakdown Analysis

HDR | ONE COMPANY *Many Solutions*℠

Memo

To:	I-90 Exit 59 (La Crosse Street) Interchange Options Study Advisory Team		
From:	Brian Ray Mike Forsberg	Project:	I-90 Exit 59 (La Crosse Street) Interchange Options Study Project PL 0100(89) 3616 P, PCN 03KM
CC:	File		
Date:	October 29, 2013	Job No:	183454

RE: I-90 Exit 59 (La Crosse Street) Interchange Build Options Analysis and Year of Breakdown Analysis

Introduction

Four conceptual interchange options for the I-90 Exit 59 (La Crosse Street) interchange were presented to the Study Advisory Team on March 28th, 2013. Three of these interchange options were selected for further evaluation during a Study Advisory Team (SAT) meeting held on September 13th, 2013. These options included the following interchange types:

- Option 1 – Diamond Interchange
- Option 2 – Single Point Urban Interchange (SPUI)
- Option 3 – Diverging Diamond Interchange (DDI)

Concept build options are presented in **Figures 1 through 6**. A brief overview of each option is presented in the following sections.

The original scope of services includes traffic analysis of the build options for year 2035 traffic conditions. During the September SAT meeting, it was decided to further evaluate the three build options to determine the approximate year of breakdown for each option.

The purpose of this memo is to provide the results of the concept build options traffic analysis for year 2035 traffic conditions and provide supplemental information on the approximate year of breakdown for each of the concept build options.

Build Options Analysis – Year 2035

Traffic analysis of the three build options was completed for year 2035 AM and PM peak hour traffic conditions. This analysis was completed using Highway Capacity Software (HCS) 2010, as outlined in the *I-90 Exit 59 (La Crosse Street) Interchange Options Study Methods & Assumptions Meeting Document*. This included the methodology developed for analyzing the DDI configuration in HCS that was accepted by the SAT. The following sections summarize year 2035 operational results for free-flow areas within the study area and at the La Crosse Street interchange for each of the three build options. Output reports from HCS of the build options are located in the appendix.

I-90 Free-Flow Analysis

The locations of ramp junctions at the La Crosse Street interchange are the same for each of the three build options. Additionally, each build option includes construction of a full auxiliary lane on I-90 westbound between La Crosse Street and Haines Avenue.

Free-flow operational results from HCS are the same for each of the three build options. Free-flow operational results for year 2035 build conditions with Option 1 geometry at the La Crosse Street interchange are shown in **Figure 7**. All free-flow areas are expected to operate at level of service (LOS) 'C' or better during the peak hours of year 2035 build conditions for all three build options.

La Crosse Street at Adjacent Intersections

Operational results at the La Crosse Street study intersections adjacent to the I-90 interchange (La Crosse Street/Disk Drive and La Crosse Street/Eglin Street) are shown in **Figures 7 through 9** for each of the build options. In all three build options, the La Crosse Street study intersections adjacent to the I-90 interchange are expected to operate at LOS 'C' or better during the peak hours of year 2035 build conditions. Movements at the Disk Drive and Eglin Street intersections with La Crosse Street are expected to have some deviation in operations based on the interchange type at La Crosse Street/I-90, which are reflected in the overall intersection LOS shown in **Figures 7 through 9**.

The eastbound approach at La Crosse Street/Eglin Street would exceed the minimum allowable LOS defined in the *I-90 Exit 59 (La Crosse Street) Interchange Options Study Methods & Assumptions Meeting Document* (LOS 'C' for the overall intersection and LOS 'D' for an intersection movement is the minimum allowable LOS). This approach is expected to operate at LOS 'E' during the AM and PM peak hours in all three build options. This is a low volume approach for private businesses and currently operates at LOS 'E'. Additional access points on La Crosse Street are currently provided for these businesses that offer alternate means of access to La Crosse Street and may result in lower delays than those reported. No geometric modifications are proposed at this intersection to mitigate the reported LOS 'E' operations at the eastbound approach.

The following locations would exceed the available storage.

- Westbound left-turn movement at La Crosse Street/Eglin Street. This movement is expected to exceed the available storage of the dedicated left-turn lane during portions of the PM peak hour in all three build options. The lane adjacent to the dedicated left-turn lane is a shared left-turn/through lane that provides excess storage for left-turning vehicles. Left-turn queues are not expected to have an impact on operations at upstream intersections.
- Southbound left-turn movement at La Crosse Street/Eglin Street. This movement is expected to exceed the available storage of the left-turn lane during portions of the PM peak hour with build options 1 and 3. This left-turn lane is within a two-way left-turn lane (TWLTL) and queues exceeding the storage that is striped for this movement are likely to be contained within the TWLTL with little impact to through traffic in the adjacent lane. Left-turn queues are not expected to have an impact on operations at upstream intersections.

Option 1 – Diamond Interchange

Option 1 proposes a diamond interchange at the I-90/La Crosse Street interchange. This option would provide an additional northbound left-turn lane at the westbound ramp terminal intersection.

The outside (right) northbound left-turn lane at the I-90 westbound ramp terminal intersection would extend through the upstream signal at the I-90 eastbound ramp terminal. This option would also include dual eastbound right-turn lanes at the I-90 eastbound ramp terminal intersection.

Operational results of the diamond interchange option for the AM and PM peak hours of year 2035 at the La Crosse Street study intersections are shown in **Figure 7**. All La Crosse Street study intersections are expected to operate at LOS 'C' or better during the peak hours of year 2035 build conditions for the diamond option.

The southbound left-turn movement at La Crosse Street/I-90 Eastbound Ramps is expected to exceed its available storage during portions of the PM peak hour. The amount of storage provided for this movement would be limited to approximately 150 feet as a result of the storage needed for the northbound left-turn movement at the La Crosse Street/I-90 Westbound Ramp Terminal intersection. Left-turn queues are not expected to have an impact on operations at upstream intersections.

Option 2 – Single Point Urban Interchange (SPUI)

Option 2 proposes a SPUI at the I-90/La Crosse Street interchange. This option would provide dual left-turn lanes for the eastbound, westbound and northbound approaches. This option would also provide 'free' (yield control) for all right-turn movements at the interchange.

Operational results of the SPUI interchange option for the AM and PM peak hours of year 2035 at the La Crosse Street study intersections are shown in **Figure 8**. All La Crosse Street study intersections are expected to operate at LOS 'C' or better during the peak hours of year 2035 build conditions for the SPUI option. There are no locations where available storage is expected to be exceeded.

Option 3 – Diverging Diamond Interchange (DDI)

Option 3 proposes a DDI at the I-90/La Crosse Street Interchange. This option would provide crossover intersections at the I-90 eastbound and westbound ramp terminal intersections and 'free' (yield control) for all interchange left-turn movements. This option would also provide dual eastbound right-turn lanes at the I-90 eastbound ramp terminal intersection.

Operational results of the DDI interchange option for the AM and PM peak hours of year 2035 at the La Crosse Street study intersections are shown in **Figure 9**. All La Crosse Street study intersections are expected to operate at LOS 'C' or better during the peak hours of year 2035 build conditions for the DDI option. There are no locations where available storage is expected to be exceeded.

Build Options Analysis Summary

Freeway and intersection operations are expected to operate at LOS 'C' or better for each of the build options in year 2035.

Year of Breakdown Analysis

A year of breakdown analysis was completed for each of the build options as supplemental information. This information can be used to identify the point of operational failure of each build option based on future year projected volumes.

Volumes were developed in five-year increments beyond year 2035 through year 2065 (approximately 50 years into the future). Volumes were developed using a straight line growth rate from the balanced year 2012 volumes and year 2035 volumes.

The year of breakdown analysis indicates when La Crosse Street study intersections or adjacent freeway junctions would exceed the minimum allowable LOS defined in the *I-90 Exit 59 (La Crosse Street) Interchange Options Study Methods & Assumptions Meeting Document* for each of the build options (LOS 'C' for the overall intersection and LOS 'D' for an intersection movement is the minimum allowable LOS). This analysis also indicates when La Crosse Street study intersections would reach failure for each of the build options. For purposes of the year of breakdown analysis, failure was defined by an overall intersection at LOS 'E' or LOS 'F' movement. Failure would result in significant delays at the intersection and likely impact operations at upstream locations. PM peak hour volumes are higher than AM peak hour volumes for all movements at La Crosse Street study intersections. Therefore, the analysis results reflect operations during the PM peak hour.

I-90 Ramp Junctions at La Crosse Street

Year of breakdown analysis was completed for the ramp junctions of the La Crosse Street interchange. This analysis indicates:

- The I-90 eastbound diverge to La Crosse Street would reach LOS 'D' in year 2055. This ramp junction would operate at LOS 'D' in year 2065.
- The I-90 eastbound merge from La Crosse Street would operate at LOS 'C' in year 2065.
- The I-90 westbound diverge to La Crosse Street would reach LOS 'D' in year 2065.
- The I-90 westbound weave between La Crosse Street and Haines Avenue would reach LOS 'D' in year 2065.

La Crosse Street Intersections

La Crosse Street study intersections are expected to exceed the minimum allowable LOS or reach failure at different points in time. **Table 1** provides a summary of when each La Crosse Street study intersection would exceed the minimum allowable LOS for each build option. **Table 2** provides a summary of when each La Crosse Street study intersection would reach failure, as defined above, for each build option.

Table 1. Build Options Year of Breakdown – Exceeding Minimum Allowable LOS [1]

Intersection	Option 1 – Diamond	Option 2 – SPUI	Option 3 – DDI
La Crosse/Eglin	Existing (2012) [2]	Existing (2012) [2]	Existing (2012) [2]
La Crosse/I-90 Eastbound Ramps	2050	2045	2055 [3]
La Crosse/I-90 Westbound Ramps	2045		2065 [4]
La Crosse/Disk	2045	2045	2045

[1] The years shown represent when either the overall intersection would operate at LOS 'D' or a movement would operate at LOS 'E' during the PM peak hour.

[2] The eastbound approach of La Crosse Street/Eglin Street currently operates at LOS 'E'. A second movement would operate at LOS 'E' or worse in year 2040.

[3] Overall intersection LOS 'C'; Highest delay movement = 43 seconds/vehicle; Volume-to-Capacity ratio (v/c) exceeds 1.00 for multiple movements, so by definition of the Highway Capacity Manual (HCM) these movements are LOS 'F'; Overall intersection LOS 'D' by year 2060.

[4] 95th percentile queue for the southbound approach would extend through the intersection at Disk Drive, impacting operations at this location. This queue would begin to impact Disk Drive in year 2055.

Table 2. Build Options Year of Breakdown – Failure [1]

Intersection	Option 1 – Diamond	Option 2 – SPUI	Option 3 – DDI
La Crosse/Eglin	2040	2045	2045
La Crosse/I-90 Eastbound Ramps	2060	>2065 [2]	2055 [3]
La Crosse/I-90 Westbound Ramps	2050		2065
La Crosse/Disk	2045	2050	2045

[1] The years shown represent when either the overall intersection would operate at LOS 'E' or a movement would operate at LOS 'F' during the PM peak hour.

[2] Overall intersection LOS 'D', highest delay movement = 62 seconds/vehicle in year 2065.

[3] Overall intersection LOS 'C'; Highest delay movement = 43 seconds/vehicle; v/c exceeds 1.00 for multiple movements, so by definition of the Highway Capacity Manual (HCM) these movements are LOS 'F'.

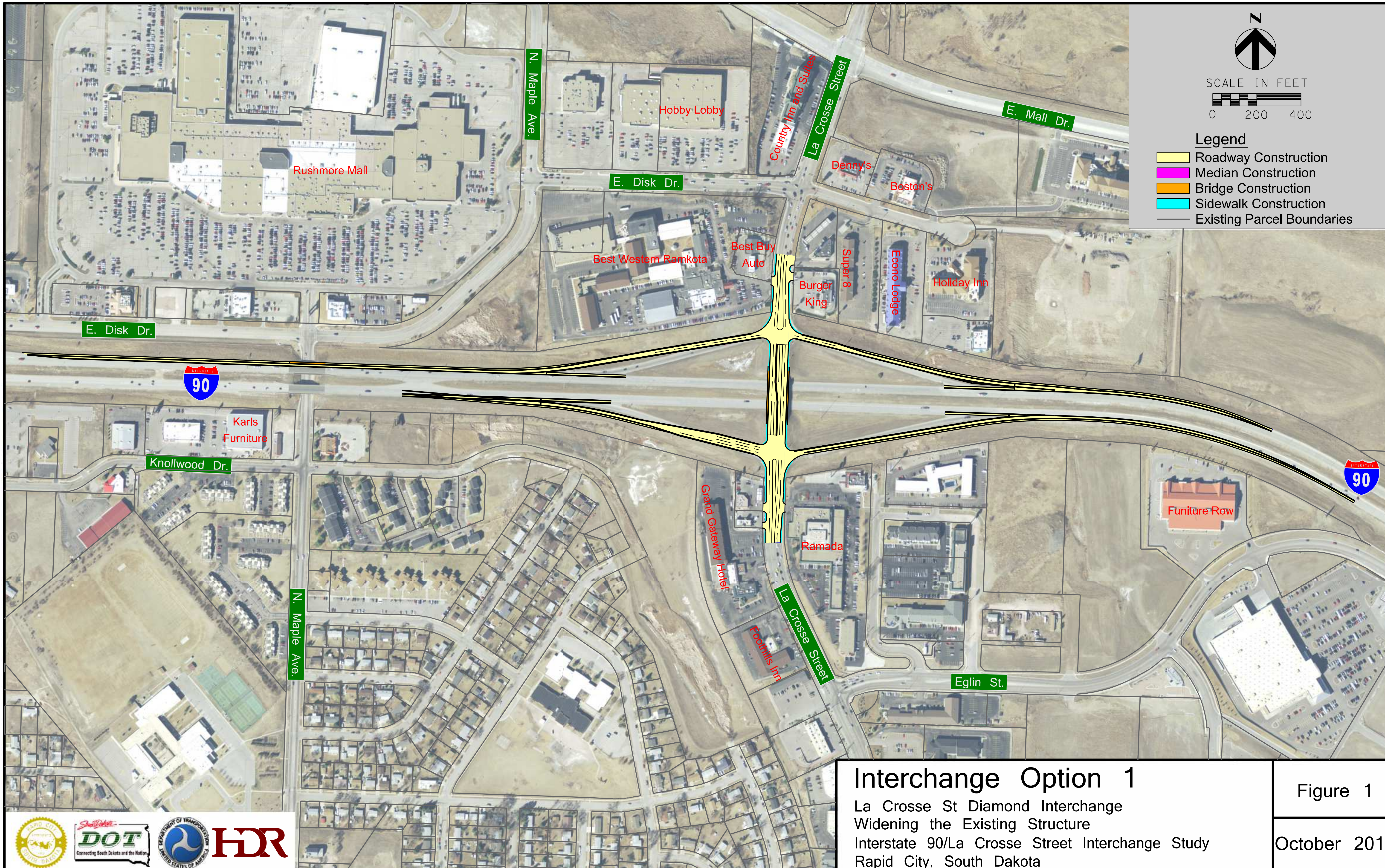
As ramp terminal intersections exceed the minimum allowable LOS queues extend beyond their available storage. This will likely impact operations at upstream locations and may cause intersections to exceed the minimum allowable LOS or fail prior to the years shown in **Tables 1 and 2**.

It is important to note that the yield control right turns from the I-90 off ramps onto La Crosse Street in Option 2 were removed from the analysis based on the methodology presented in the HCM. Including these right turns in the analysis using a similar methodology as that used to analyze the yielding lefts in the DDI would cause the SPUI to fail at an earlier date. This would be the result of the high volume eastbound right turns and limited gaps in traffic as a result of high volume through traffic on La Crosse Street. Addition of a second eastbound right-turn lane at the SPUI, similar to that in the Diamond and DDI options, would likely mitigate early failure of the SPUI.

The intersection at La Crosse Street/Disk Drive would reach failure around years 2045/2050 with the existing intersection geometry. Failure at this intersection may result in queues extending to the interchange, causing additional delays at the interchange. This may cause the interchange to fail before the years listed in **Table 2**.

Year of Breakdown Summary

The diamond interchange in Option 1 would reach failure before the SPUI or DDI. The diamond interchange would fail in year 2050, with failure at the westbound ramp terminal. The SPUI would fail sometime after year 2065. The DDI would fail in year 2055, with failure at the eastbound ramp terminal. However, this is the result of movements with a v/c greater than 1; the highest reported delay at this intersection would be 43 seconds/vehicle.

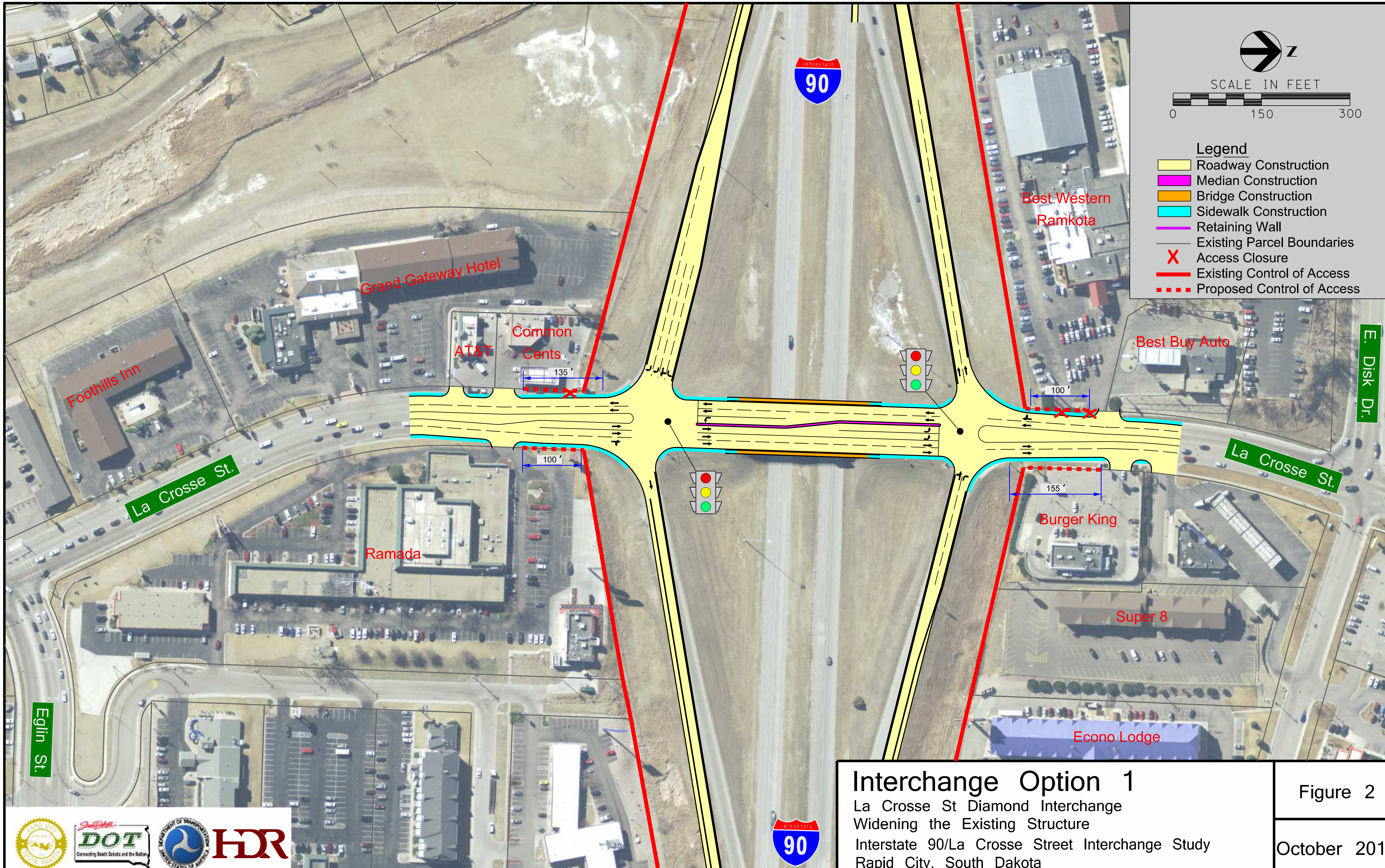


Interchange Option 1

La Crosse St Diamond Interchange
Widening the Existing Structure
Interstate 90/La Crosse Street Interchange Study
Rapid City, South Dakota

Figure 1

October 2013



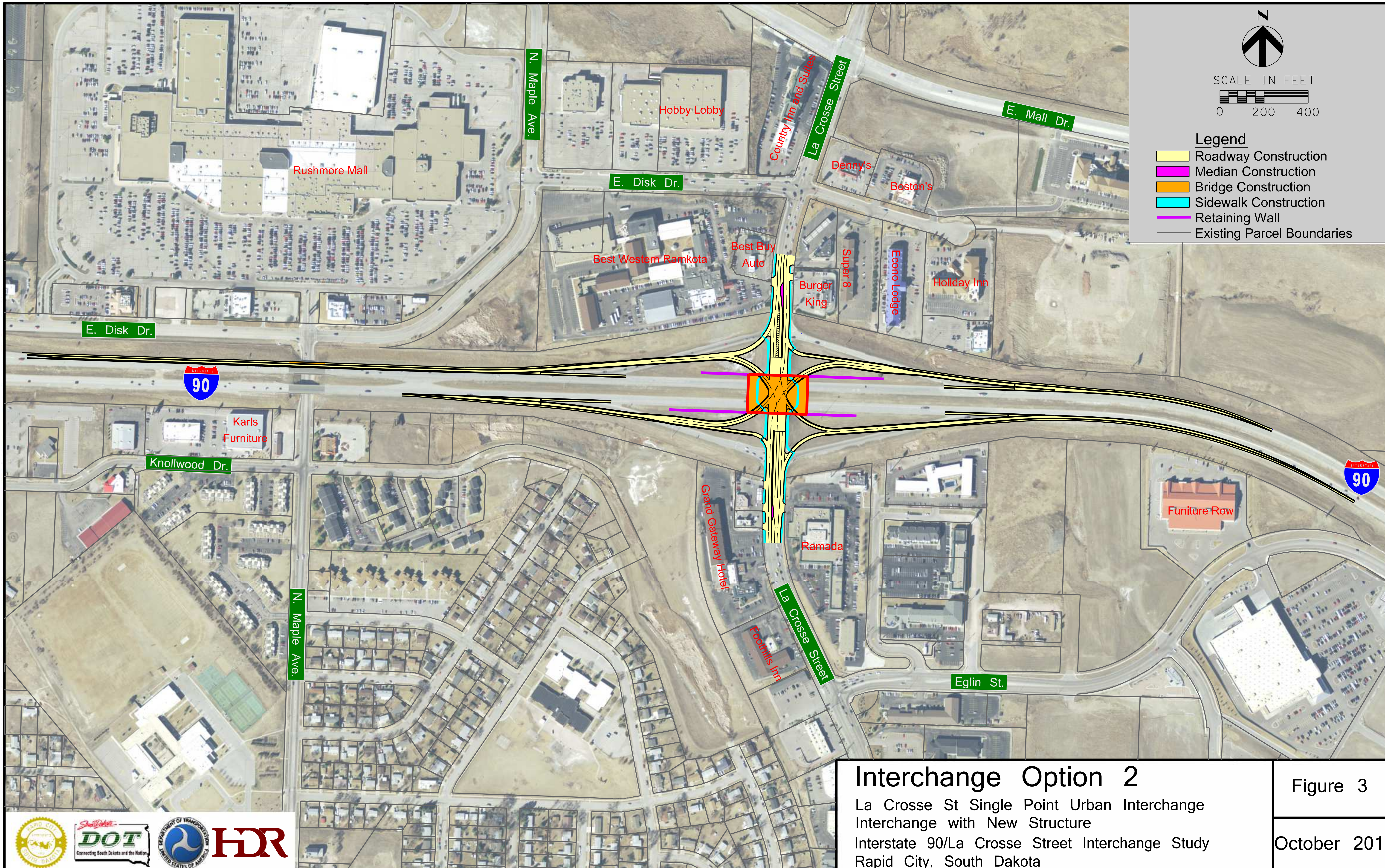
Interchange Option 1

La Crosse St Diamond Interchange
Widening the Existing Structure

Interstate 90/La Crosse Street Interchange Study
Rapid City, South Dakota

Figure 2

October 2013

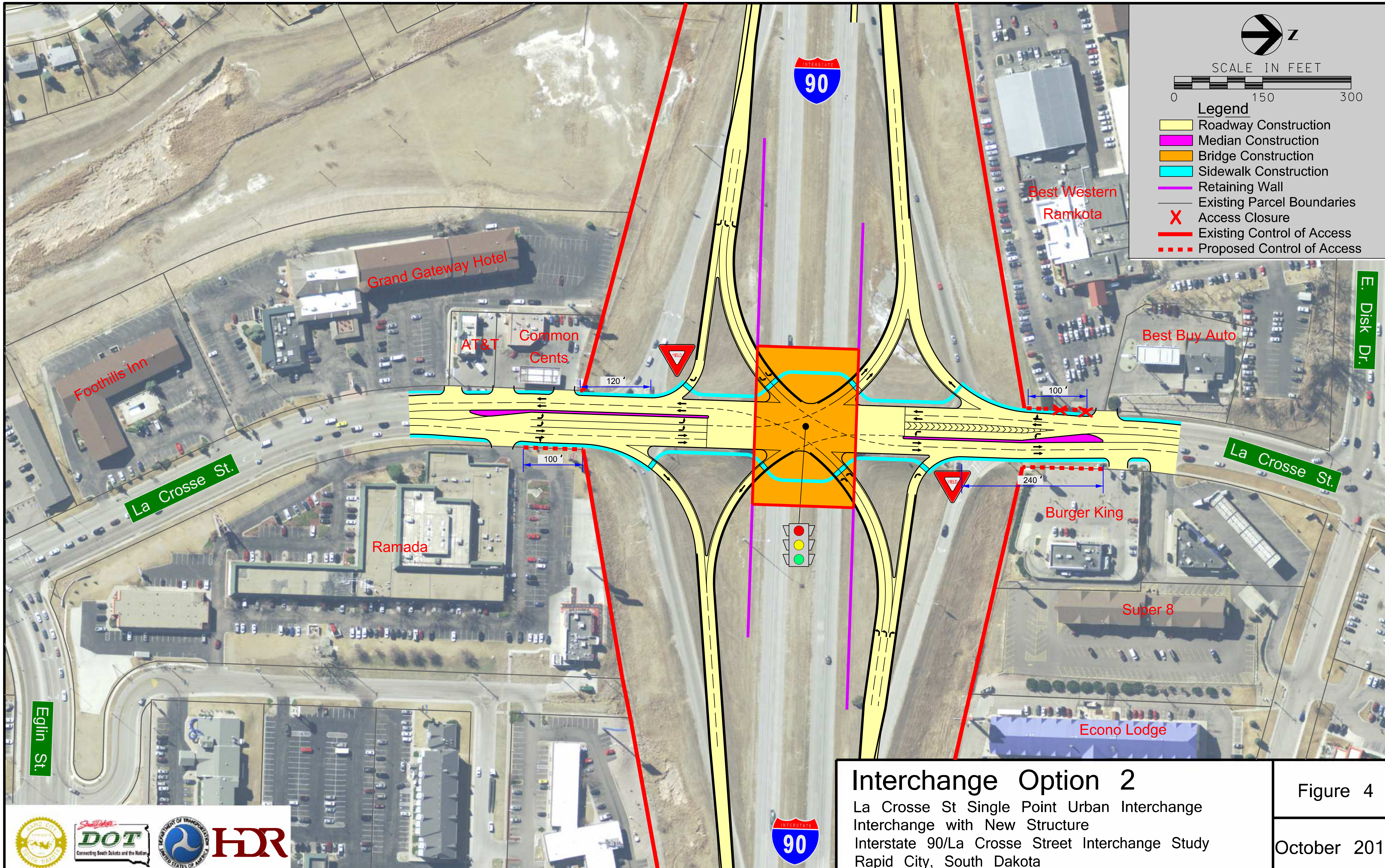


Interchange Option 2

La Crosse St Single Point Urban Interchange
Interchange with New Structure
Interstate 90/La Crosse Street Interchange Study
Rapid City, South Dakota

Figure 3

October 2013

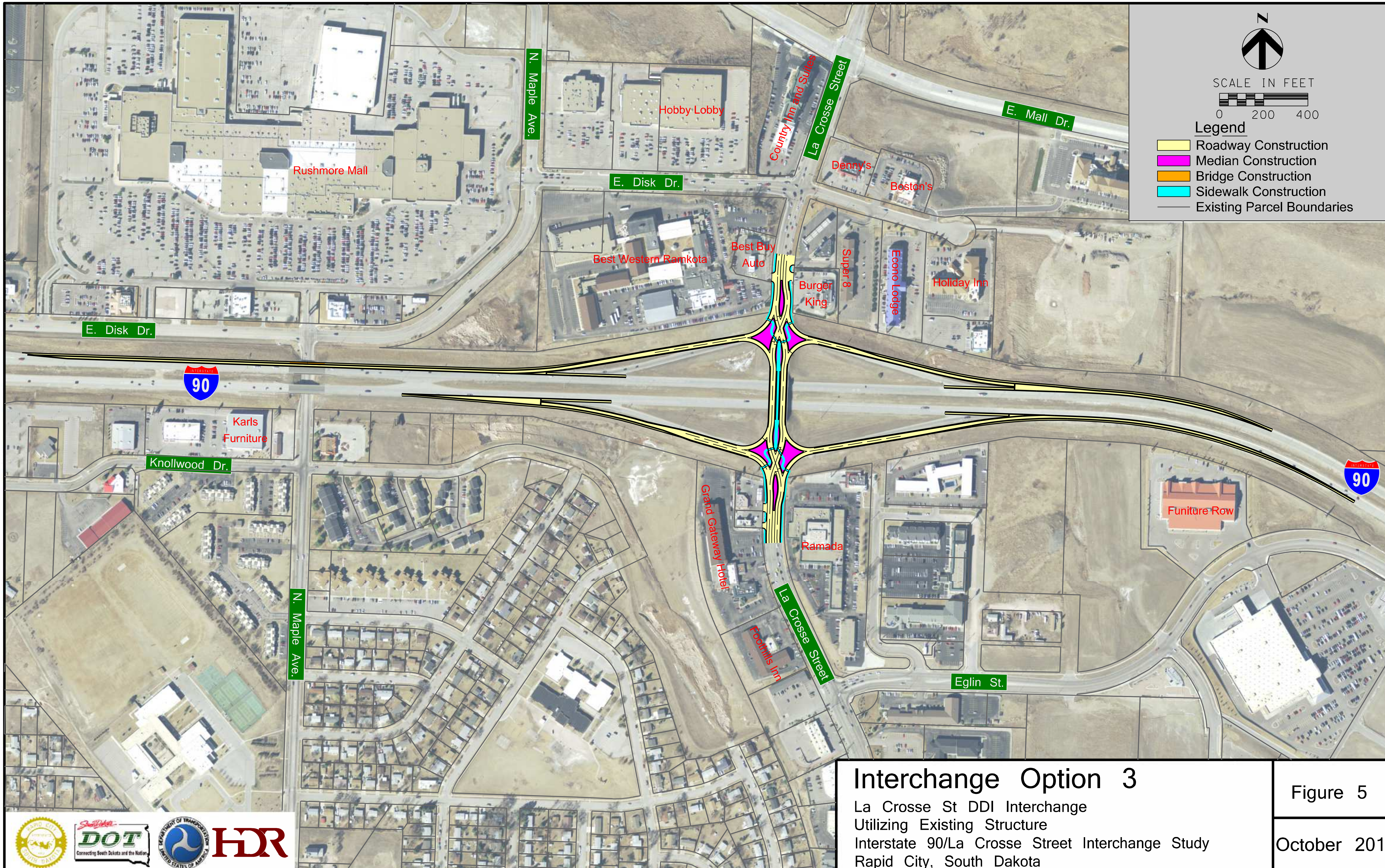


Interchange Option 2

La Crosse St Single Point Urban Interchange
Interchange with New Structure
Interstate 90/La Crosse Street Interchange Study
Rapid City, South Dakota

Figure 4

October 2013

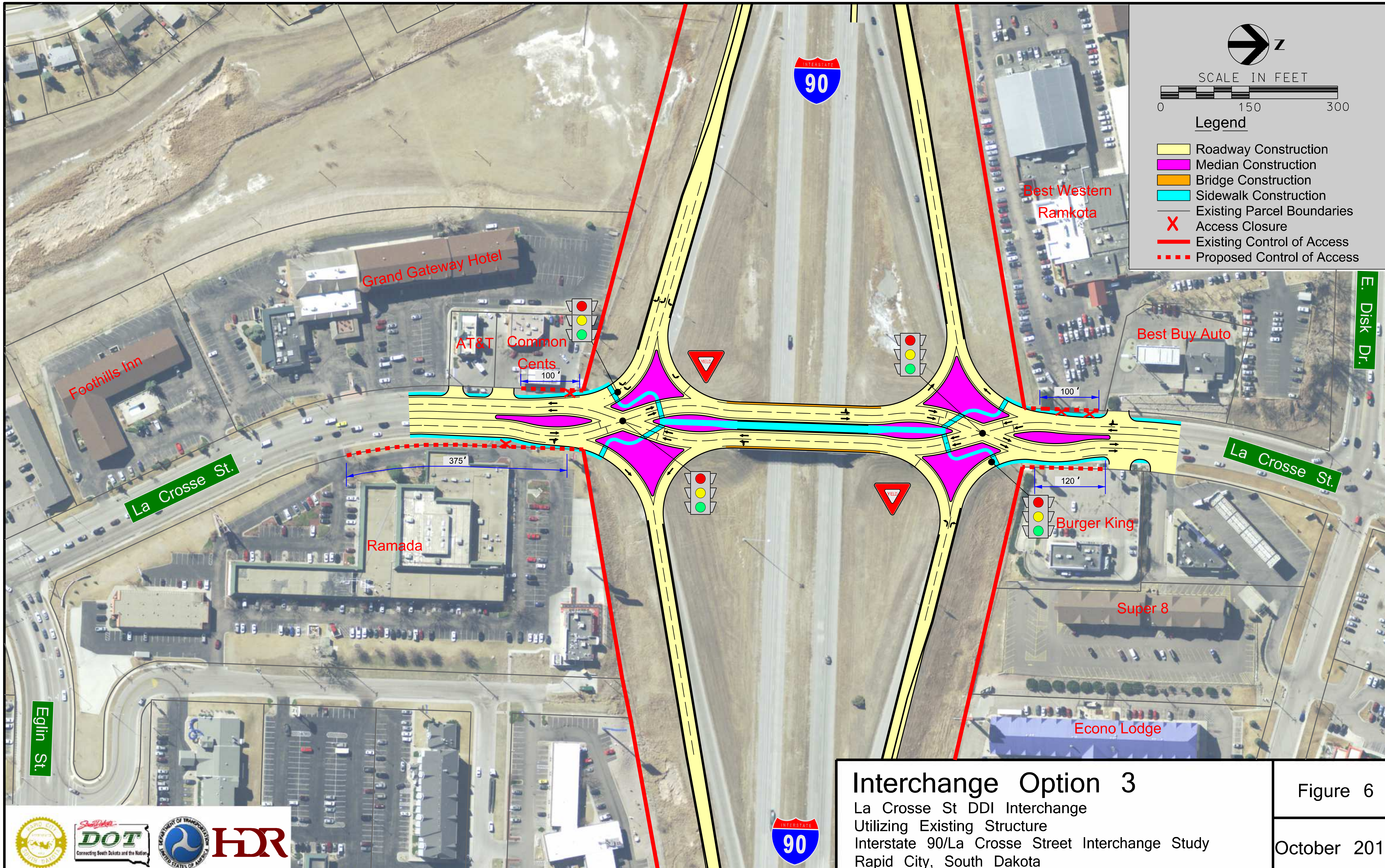


Interchange Option 3

La Crosse St DDI Interchange
Utilizing Existing Structure
Interstate 90/La Crosse Street Interchange Study
Rapid City, South Dakota

Figure 5

October 2013

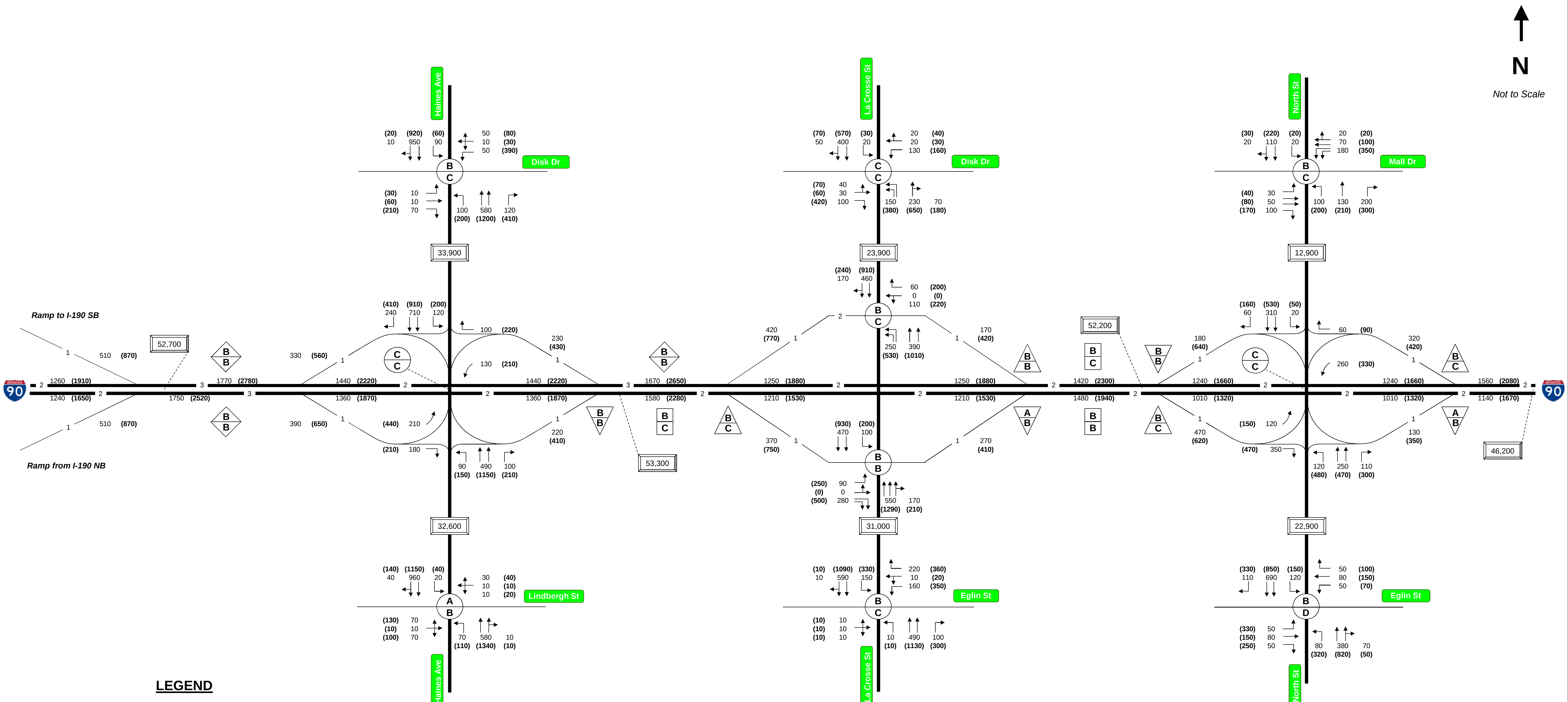


Interchange Option 3

La Crosse St DDI Interchange
Utilizing Existing Structure
Interstate 90/La Crosse Street Interchange Study
Rapid City, South Dakota

Figure 6

October 2013



LEGEND

XXX **(XXX)** AM and **(PM)** Peak Hour Volumes

—#— Number of Free-Flow Lanes

Existing Intersection Geometrics

X Average Daily Traffic (ADT)

X / X AM Peak Hour Basic Freeway Level of Service / PM Peak Hour Basic Freeway Level of Service

X / X AM Peak Hour Ramp Merge Level of Service / PM Peak Hour Ramp Merge Level of Service

X / X AM Peak Hour Ramp Diverge Level of Service / PM Peak Hour Ramp Diverge Level of Service

X / X AM Peak Hour Weaving Section Level of Service / PM Peak Hour Weaving Section Level of Service

X / X AM Peak 15-Minute Signalized Intersection Level of Service / PM Peak 15-Minute Signalized Intersection Level of Service

Note:
1. Free-flow operational results represent expected operations for all build options.

Sources:
1. Traffic Volumes - HDR, October 2012
2. Traffic Capacity Analysis (Based on *2010 Highway Capacity Manual* Methodologies) - HDR, October 2013

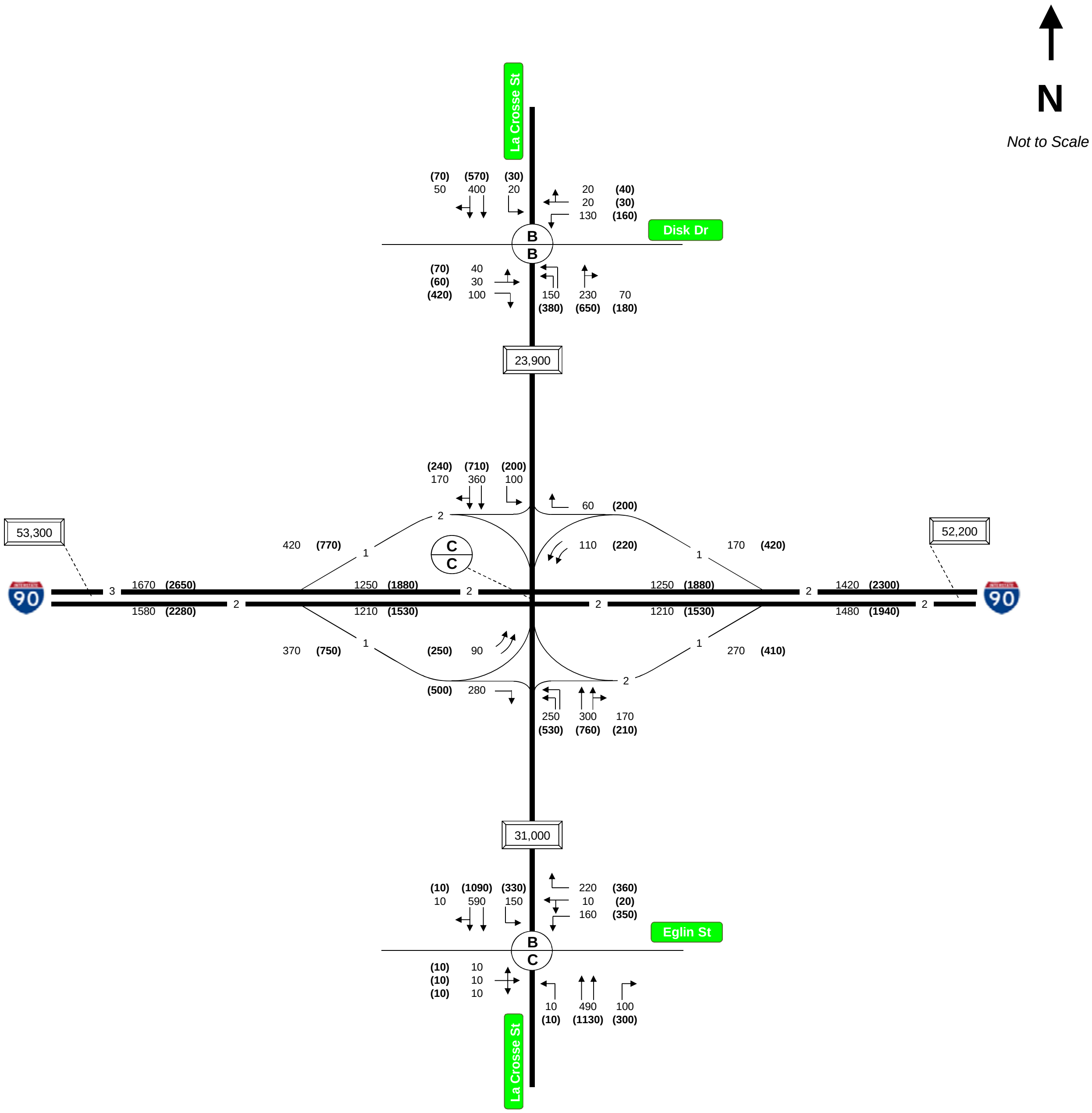
Connecting South Dakota and the Nation

Year 2035 Build Option 1 - Diamond Interchange Volumes, Geometrics and Levels of Service

I-90 Exit 59 (La Crosse Street) Interchange Options Study
Rapid City, South Dakota

Date
October 2013

Figure
7



LEGEND

XXX **(XXX)**	AM and **(PM)** Peak Hour Volumes
—#—	Number of Free-Flow Lanes
→	Intersection Geometrics
X	Average Daily Traffic (ADT)
X / X	AM Peak 15-Minute Signalized Intersection Level of Service PM Peak 15-Minute Signalized Intersection Level of Service

Note:
1. Free-flow operations are shown in Figure 7.

Sources:
1. Traffic Volumes - HDR, October 2012
2. Traffic Capacity Analysis (Based on *2010 Highway Capacity Manual* Methodologies) - HDR, October 2013

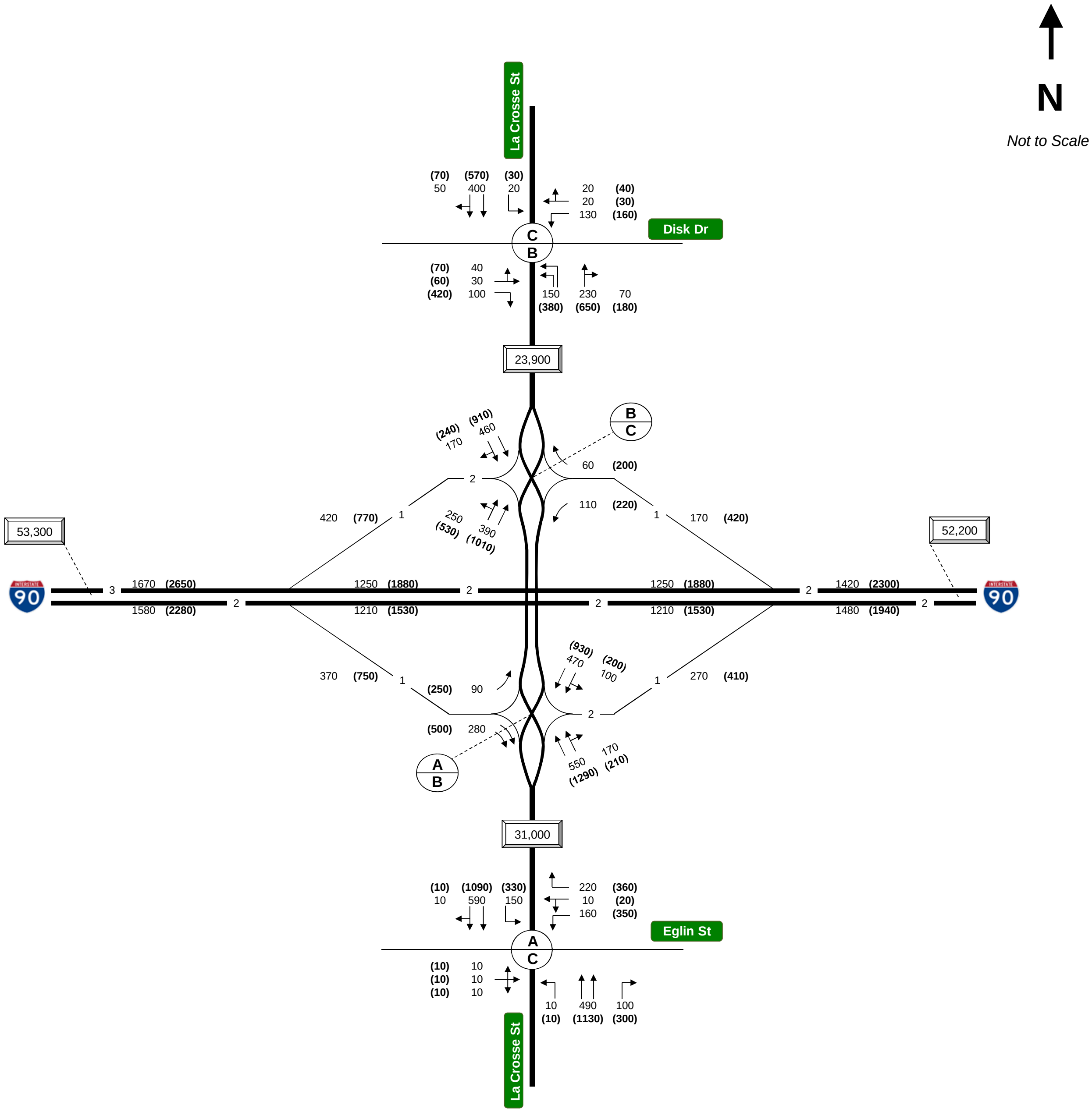
South Dakota DOT
Connecting South Dakota and the Nation

Year 2035 Build Option 2 - Single Point Urban Interchange (SPUI) La Crosse Street Volumes, Geometrics and Levels of Service

I-90 Exit 59 (La Crosse Street) Interchange Options Study
Rapid City, South Dakota

Date
October 2013

Figure
8



LEGEND

XXX **(XXX)** — AM and **(PM)** Peak Hour Volumes

—#— — Number of Free-Flow Lanes

⟶ — Intersection Geometrics

X — Average Daily Traffic (ADT)

X/X — AM Peak 15-Minute Signalized Intersection Level of Service / PM Peak 15-Minute Signalized Intersection Level of Service

Note:
1. Free-flow operations are shown in Figure 7.

Sources:
1. Traffic Volumes - HDR, October 2012
2. Traffic Capacity Analysis (Based on *2010 Highway Capacity Manual* Methodologies) - HDR, October 2013

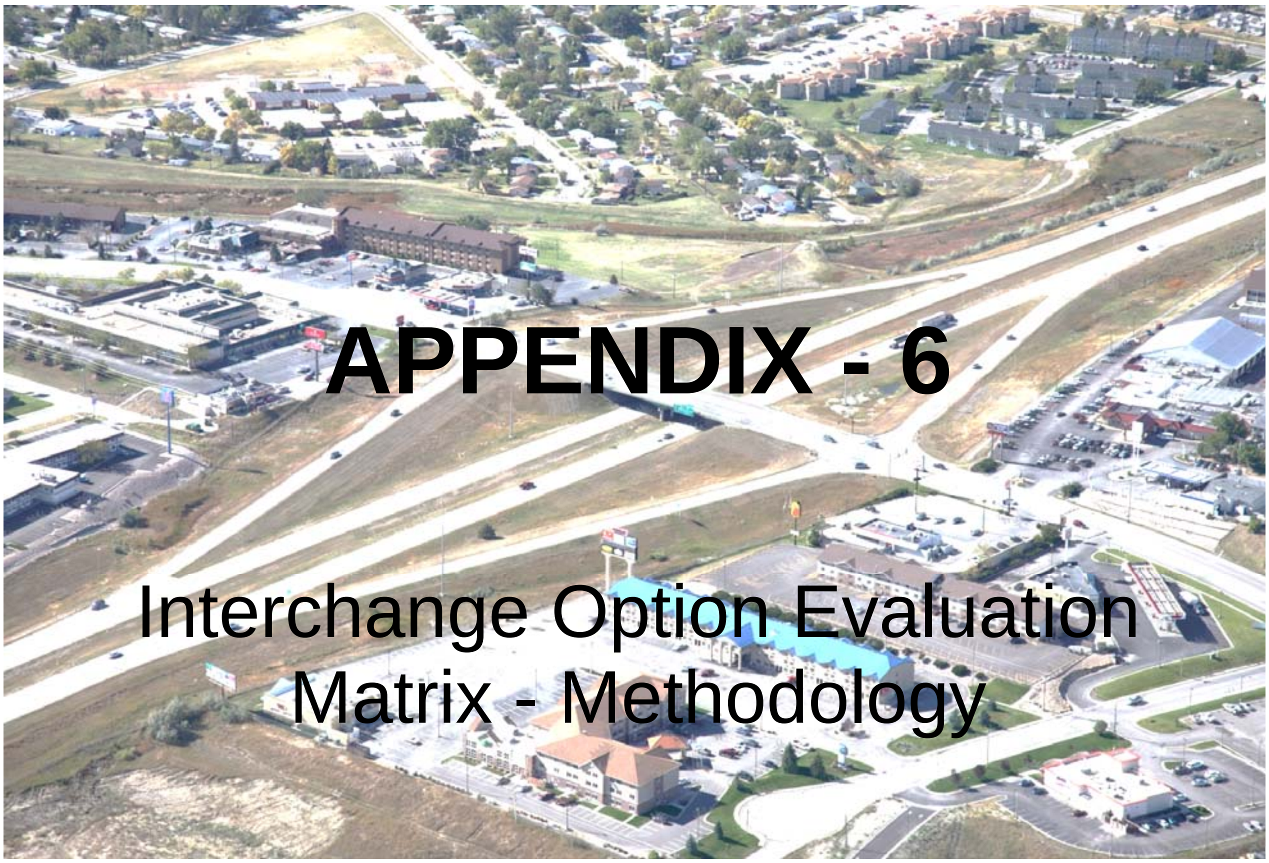
South Dakota DOT
Connecting South Dakota and the Nation

Year 2035 Alternative 3b - Diverging Diamond Interchange (DDI) La Crosse Street Volumes, Geometrics and Levels of Service

I-90 Exit 59 (La Crosse Street) Interchange Options Study
Rapid City, South Dakota

Date
February 2015

Figure
9



APPENDIX - 6

Interchange Option Evaluation Matrix - Methodology

Interchange Options Evaluation Matrix – Methodology

The following describes the methodology used to score the Interchange Options Evaluation Matrix – Weighted Scores:

Methodology:
Each interchange option was evaluated with seven criteria using a comparative scoring of 1 to 3, with a value of 1 representing the worst score and 3 representing the best. The scoring was based on both qualitative and quantitative information. A weight was assigned to each criterion to establish an overall weighted score. The following is a description of each criterion.

Driver Familiarity – This refers to the driver's familiarity with a particular interchange configuration. The option which provides the least amount of driver familiarity received a score of 1 and the option with the highest driver familiarity received a score of 3.

Maintenance of Traffic During Construction – This refers to the ability to maintain access and traffic during construction to minimize the impacts the drivers and the surrounding properties. The option which provides the least ability to maintain access and traffic during construction received a score of 1 and the option which maintains the best ability to maintain driver familiarity during construction received a score of 3.

Property Impacts – This refers to the impacts to properties, including number of closed access points, number of access points with reduced level of access and the number of potential property acquisitions. The option which has the most potential property acquisitions along with the access impacts received a score of 1 and the option with least amount of potential property impacts along with access impacts received a score of 3.

Order of Magnitude Cost - This refers to the estimated cost to construct the interchange including the cost of right-of-way. The option with the highest order of magnitude cost received a score of 1 and the property with lowest order of magnitude cost received a score of 3. If the options had similar order of magnitude costs, they received the same score.

Traffic Operations and Year of Breakdown – This refers to the traffic operations for the ramp terminal intersections, the overall interchange delay and the anticipated year of breakdown. The option with the worst overall traffic operations received a score of 1 and the option with the best overall traffic operations received a score of 3.

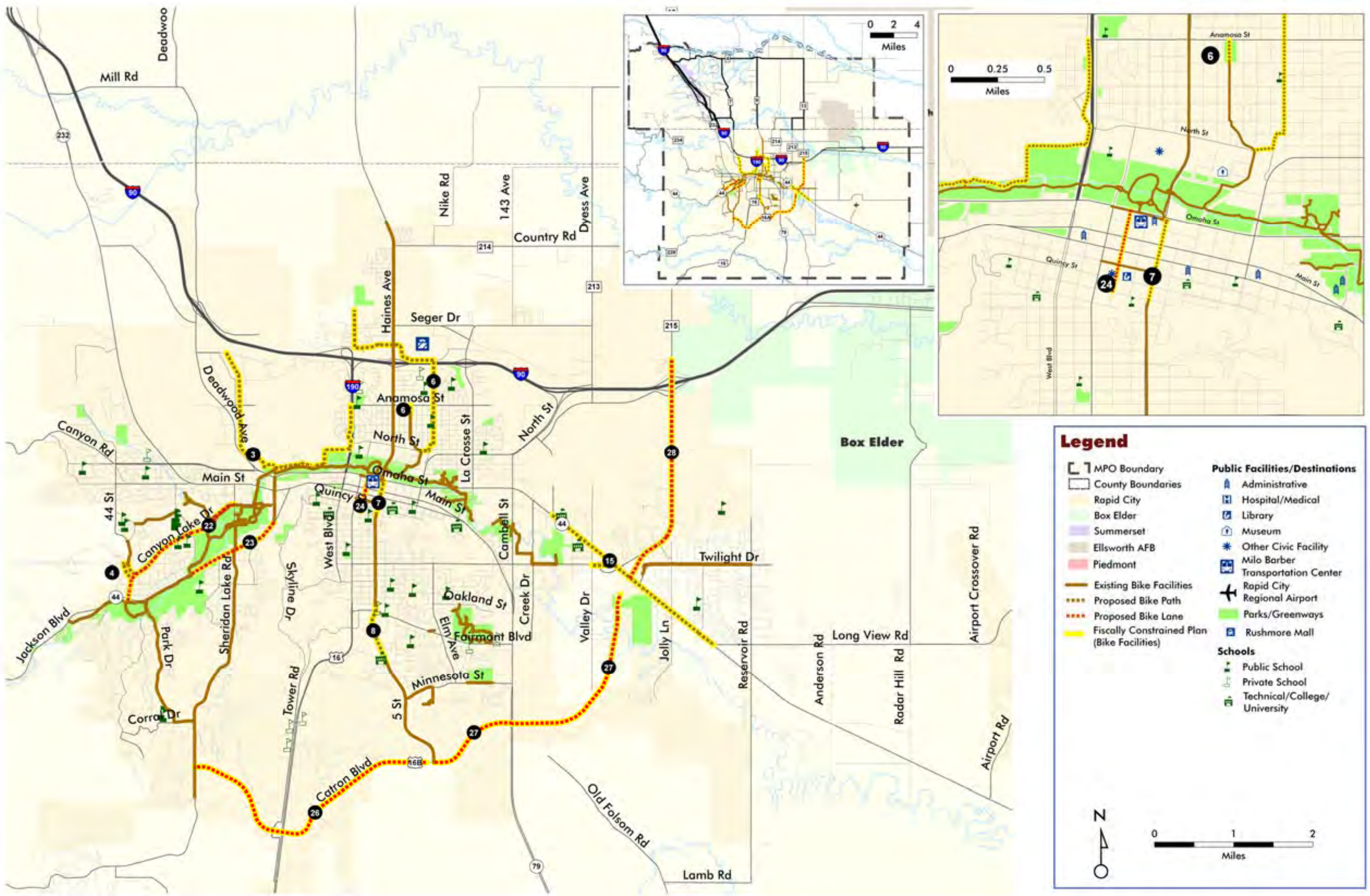
Vehicle Conflicts – This refers to the total number of vehicle conflicts in the study area and at the interchange. It also includes the number of crossing conflicts at the interchange. The number of vehicle conflicts for each option was relatively similar. Therefore, the option with the most vehicle conflicts received a score of 2 and the other two options received a score of 3.

Pedestrian Crossings at Unsignalized Locations – This refers to the number of locations where there are unsignalized pedestrian crossings at the interchange. The option with the most amount of locations of unsignalized pedestrian crossings at the interchange received a score of 1 and the option with the least amount of locations of unsignalized pedestrian crossing at the interchange received a score of 3.

APPENDIX - 7

Bicycle and Pedestrian Plan/ Transit Plan

Figure 5-3: Financially-Constrained Non-Motorized Plan



Please refer to the Map Appendix to see a larger version of this map.

Figure 6-1: Existing Fixed Bus Routes