STATE OF FLORIDA DEPARTMENT OF TRANSPORTATION

TECHNICAL REPORT COVERSHEET

650-050-38
ENVIRONMENTAL
MANAGEMENT
08/22

DESIGN TRAFFIC TECHNICAL MEMORANDUM

Florida Department of Transportation

District One

State Road (SR) 70 PD&E Study

Limits of Project: County Road (CR) 29 to Lonesome Island Road

Highlands County, Florida

Financial Management Number: 414506-5-22-01

ETDM Number: 14364

Date: November 2018

The environmental review, consultation, and other actions required by applicable federal environmental laws for this project are being, or have been, carried out by the Florida Department of Transportation (FDOT) pursuant to 23 U.S.C. § 327 and a Memorandum of Understanding dated May 26, 2022 and executed by the Federal Highway Administration and FDOT.

DESIGN TRAFFIC TECHNICAL MEMORANDUM

Florida Department of Transportation
District 1

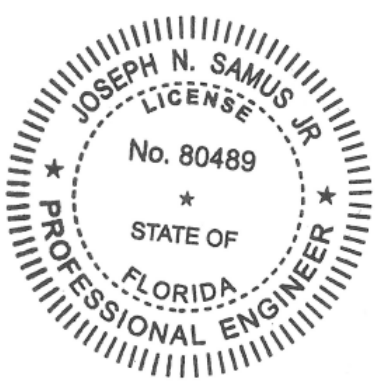
State Road 70
from County Road 29 to Lonesome Island Road
Highlands County, Florida

Financial Project Number: 414506-5-22-01

The environmental review, consultation, and other actions required by applicable federal environmental laws for this project are being, or have been, carried out by FDOT pursuant to 23 U.S.C. § 327 and a Memorandum of Understanding dated December 14, 2016 and executed by FHWA and FDOT.

Prepared by:
H.W. Lochner, Inc.
4350 West Cypress St, Suite 800
Tampa, FL 33607

November 2018



This item has been digitally signed and sealed by Joseph N. Samus, Jr, PE on the date adjacent to the seal.

Joseph N Samus

Digitally signed by Joseph N Samus
Date: 2020.12.07 16:20:52 -05'00'

Printed copies of this document are not considered signed and sealed and the signature must be verified on any electronic copies.

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1.0 Introduction

1.1 PROJECT DESCRIPTION

The Florida Department of Transportation (FDOT) is conducting a roadway capacity improvement project along SR 70 from CR 29 to Lonesome Island Road in Highlands County. This improvement project involves widening SR 70 from an existing two-lane undivided facility to a four-lane divided roadway. SR 70 is a principal arterial and the primary east-west highway for the Lake Placid/southern Highlands County area, providing regional access to employment centers, agricultural lands, and residential areas across the state. SR 70 is a designated hurricane evacuation route and part of the SIS highway network. The project is approximately 4.3 miles in length. The SR 70 study area map is shown in **Figure 1**. This effort supplements the efforts of the SR 70 Project Development and Environment (PD&E) Study (FPID No. 414506-1-22-01) completed by the FDOT, District 1 in March 2017. The SR 70 PD&E Study, hereinafter referred to as the "SR 70 Western Study", Design Traffic Technical Memorandum (DTTM) can be found in **Appendix A**.

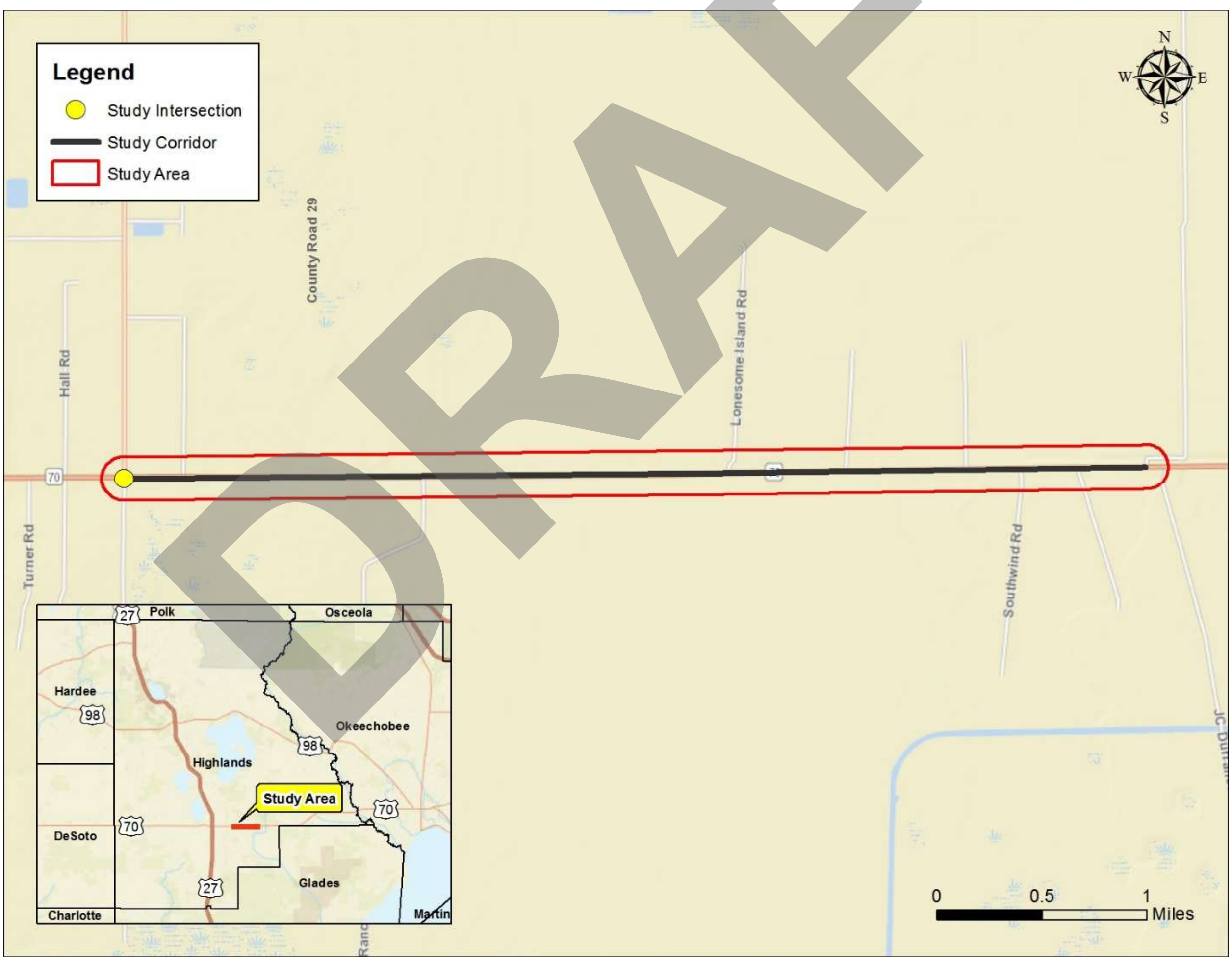

Figure 1 – SR 70 Study Area Map

1.2 PURPOSE

The purpose of this project is to improve operational conditions for emergency evacuations along the SR 70 corridor from CR 29 to Lonesome Island Road. As stated in the SR 70 Western Study, the Florida Division of Emergency Management's Statewide Regional Evacuation Study Program determined that SR 70, within the study area, is a critical segment with significant queues experienced during emergency evacuations.

This memorandum documents the comparison of the SR 70 Western Study with updated traffic data and the development of design traffic for the existing (2018), opening (2025), interim (2035), and design (2045) years within the study area of SR 70 from CR 29 to Lonesome Island Road. The purpose of this memorandum is to justify the widening of SR 70 within the study area from an undivided two-lane typical section to a divided four-lane typical section.

2.0 Existing Conditions

2.1 HURRICANE EVACUATION

A Florida Statewide Regional Evacuation Study was conducted in 2010 for the Central Florida Region by the Florida Division of Emergency Management, the Division of Community Planning, the FDOT, and Central Florida Regional Planning Council. As part of this study, SR 70 from US 27 to CR 721 was identified as a critical facility in the event of a level D evacuation. The US 27 and CR 721 intersections were also identified amongst the highest vehicle queue segments in the Central Florida Region for a level D evacuation. The Evacuation Transportation Analysis Report from the study can be found in **Appendix B**.

2.2 ROADWAY CHARACTERISTICS

SR 70 within the limits of the study area functions as a two-lane rural principle arterial and hurricane evacuation route with a posted speed limit of 60 miles per hour (mph). SR 70 is a Strategic Intermodal System (SIS) highway facility, serves as part of the emergency evacuation route network, and facilitates east-west freight and people mobility. Roadway characteristics for SR 70 that within the study area are included in **Table 1**. There is only one significant one-leg stop controlled intersection within the study area at the cross street of SR 70 and CR 29.

Table 1 – Roadway Characteristics

Description	County Roadway ID	Begin Milepost	End Milepost	Speed Limit (MPH)	Functional Classification
SR 70	09060000	15.657	22.034	60	Rural Principal Arterial

2.3 VALIDATION OF TRAFFIC FACTORS

Based on the *FDOT Project Traffic Forecasting Handbook*, a standard K factor of 9.5 percent is used for arterials in a rural area. This is consistent with the K factor utilized in the SR 70 Western Study and is recommended for the SR 70 study corridor.

Historical directional (D) factors and 24-hour bi-directional counts collected on August 15, 2017 were obtained from FDOT Florida Traffic Online (2017), and can be found in **Appendix C**, to verify the recommended D factor of 58.83% along SR 70 from the SR 70 Western Study. **Table 2** and **Table 3** summarize the historical and field measured D factors observed along SR 70, east of US 27 since 2015, respectively. A recommended D factor of 58.83% remains reasonable for the SR 70 study corridor since it lies between the historical and field measured D factors.

Table 2 – Historical D Factors

Year	D Factor (%)
2015	59.2
2016	59.9
2017	60.1
Average	**59.7**

Table 3 – 2017 Field Measured D Factors

Peak Hour	D Factor (%)	Directionality
AM	56.4	Westbound
PM	52.3	Westbound

Along SR 70, east of US 27, a truck (T) factor of 21.9% was observed for all three years of 2015 to 2017 from FDOT Florida Traffic Online (2017). Assuming that the design hour truck (DHT) factor is one-half of the T factor, the DHT factor for SR 70 would be 11.0%. The recommended DHT factor of 14.0% from the SR 70 Western Study is slightly higher than the observed DHT factor. Therefore, a new DHT of 11.0% is recommended for the SR 70 study corridor.

The design traffic factors, summarized in **Table 4**, are recommended for the SR 70 study corridor.

Table 4 – Recommended Design Traffic Factors

Factor	Value (%)	Consistency with the Western Study
Standard K Factor	9.5	Same
D Factor	58.83	Same
DHT Factor	11.0	Updated

2.4 VALIDATION OF GROWTH RATE

In order to update the existing traffic volumes from the SR 70 Western Study from 2015 to 2018, an annual growth rate needs to be established for the study corridor. The historical annual average daily traffic (AADT), the model volumes, and the Bureau of Economic and Business Research (BEBR) estimated population growth rate were compared to determine the growth rate for the study corridor. The Western Study assumed a 2.0% annual growth rate for the SR 70 corridor.

Historical AADT data was gathered from FDOT Florida Traffic Online (2017) for SR 70, east of US 27. **Table 5** shows the historical annual growth rate from 2015 to 2017. An overall growth rate of 3.64% was observed for the study corridor.

Table 5 – Historical AADT Growth

Year	AADT	Annual Growth Rate
2015	4,100	3.64%
2016	4,300	
2017	4,400	

The latest available version of the District 1 Regional Planning Model (D1RPM), Version 1.0.3 with base year 2010 was examined for the study corridor. The maximum observed model volumes along SR 70 from CR 29 to Lonesome Island Road were compared between the 2010 base and 2040 horizon outputs and are summarized in **Table 6**. The model indicates an annual growth rate of 3.17% for the study corridor.

Table 6 – D1RPM AADT Growth

Year	AADT	Annual Growth Rate
2010	4,000	3.17%
2040	7,800	

Data was obtained from the BEBR "Projections of Florida Population by County, 2020-2045" and is summarized in **Table 7**.

Table 7 – Highlands County BEBR Population Forecast

BEBR Base Year		Population	Annual Growth Rate
2017		102,138	-
BEBR 2045 Forecast	Low	98,000	-0.14%
	Medium	118,200	0.56%
	High	143,500	1.45%

The historical AADT growth rate of 3.64% and model AADT growth rate of 3.17% are both greater than the "High" growth rate of 1.45% projected for Highlands County based on the BEBR data. Therefore, a recommended growth rate of 3.0% is reasonable based upon the historical, model, and BEBR "High" growth rates. This results in a higher growth rate than the 2.0% from the SR 70 Western Study.

2.5 TRAFFIC VOLUMES

The existing year (2018) design hour volumes were developed by applying a 3.0% annual growth rate directly to the SR 70 Western Study existing (2015) turning movement volumes. **Figure 2** shows the existing (2018) AM and PM peak hour turning movement volumes, along with the existing lane geometry for the study corridor.

2.6 OPERATIONAL ANALYSES

Intersection and arterial operational analysis was conducted along SR 70 from CR 29 to Lonesome Island Road for the existing year (2018). Highway Capacity Software (HCS7) was utilized to conduct Highway Capacity Manual 6th Edition (HCM6E) two-way stop control analysis and directional two-lane highway segment analysis, and can be found in **Appendix D**. The results of the existing year (2018) intersection analysis at SR 70 and CR 29 for the AM and PM peak hours are shown in **Table 8**. The results of the analysis indicate that the SR 70 and CR 29 intersection currently meets the level of service (LOS) standard C, as defined for non-urbanized areas in the *FDOT 2013 Quality/Level of Service Handbook*, for each of the analysis hours.

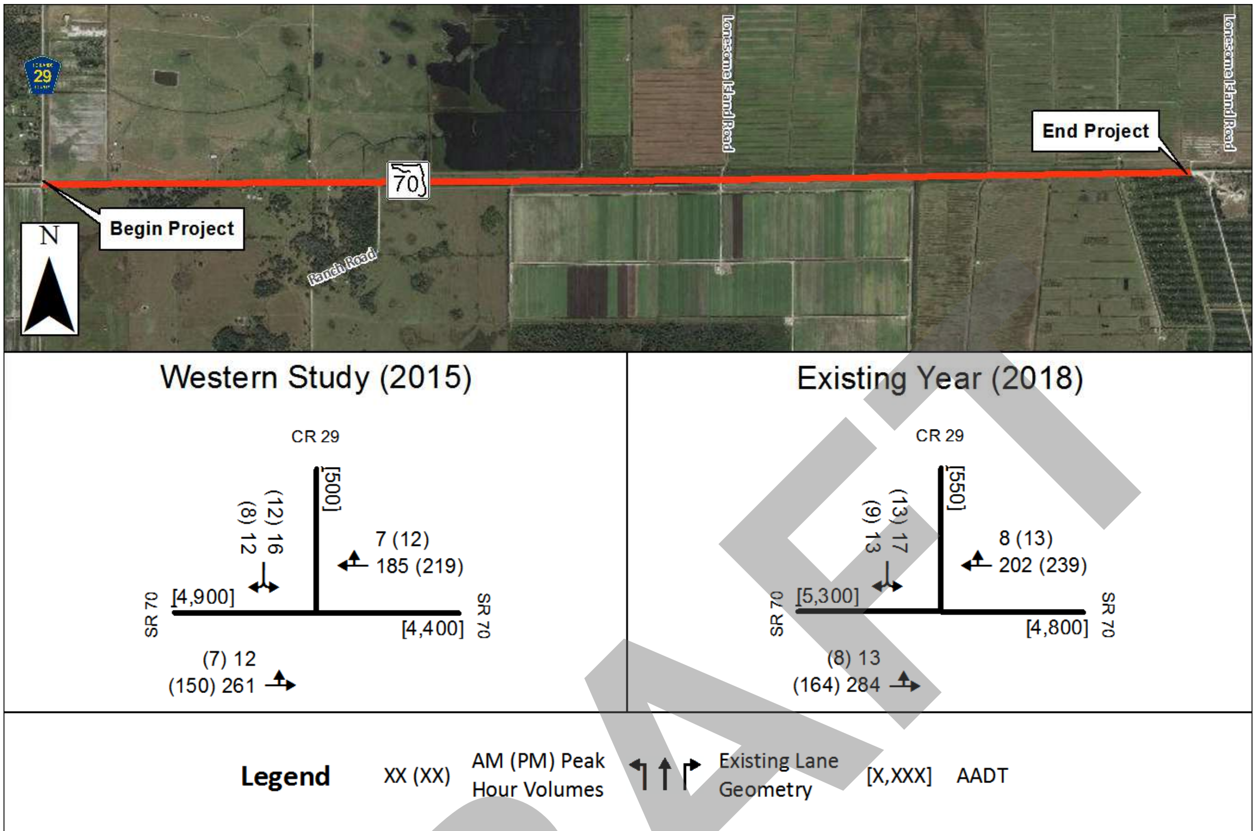

Figure 2 – Existing (2018) Lane Geometry and Design Traffic Volumes

Table 8 – Existing Year (2018) Intersection Analysis

Approach	Movement	AM Peak Hour		PM Peak Hour	
		Delay (s/veh)	LOS	Delay (s/veh)	LOS
Eastbound	Left Turn	7.8	A	7.9	A
	Through	0.0	A	0.0	A
	Total	0.4	A	0.4	A
Westbound	Total	0.0	A	0.0	A
Southbound	Total	11.7	B	11.2	B

The results of the existing year (2018) arterial analysis along SR 70 from CR 29 to Lonesome Island Road for the AM and PM peak hours are shown in **Table 9**. The results of the analysis indicate that the SR 70 corridor from CR 29 to Lonesome Island Road currently meets the FDOT LOS standard C for non-urbanized areas for each of the analysis hours.

Table 9 – Existing Year (2018) Arterial Analysis

Direction	AM Peak Hour		PM Peak Hour	
	Volume to Capacity (v/c)	LOS	Volume to Capacity (v/c)	LOS
Eastbound	0.19	B	0.11	B
Westbound	0.13	B	0.16	B

2.7 CRASH DATA AND SAFETY ANALYSIS

Crash data along SR 70 from CR 29 to Lonesome Island Road for the years 2013 through 2017 was obtained from Signal Four Analytics and spot-verified against the crash long forms for accuracy. **Figure 3** shows the collision diagram for the study corridor by crash type. **Table 10** details the total number of crashes within the project area separated by crash type, crash severity, lighting conditions, and weather conditions. A total of 37 crashes were reported during the five year period, for an average of seven crashes per year. With 37 total crashes and an average AADT of 4,280 over five years, the results show that the project area has a crash rate of 1.102 crashes per million miles driven, which corresponds to 1.604 times the statewide average of 0.687 crashes per million miles driven for similar facility types. A detailed description of the crash data and the statewide average crash rates for rural segments can be found in **Appendix E**.

The most common crash type was hitting an animal, followed by hitting the guardrail. Twelve of the 37 crashes occurred in the dark without lighting, including a collision with a bicyclist. While unsignalized, nine crashes occurred along the corridor at the intersection of SR 70 and Lonesome Island Road. An analysis of this intersection may lead to the need for additional safety measures to be taken at this location.

Two of the crashes within the five year study period resulted in fatalities. The first of these fatalities was the result of a vehicle colliding with a bicycle just west of Lonesome Island Road. The second occurred when a vehicle drifted over the roadway centerline in the rain, striking another vehicle.

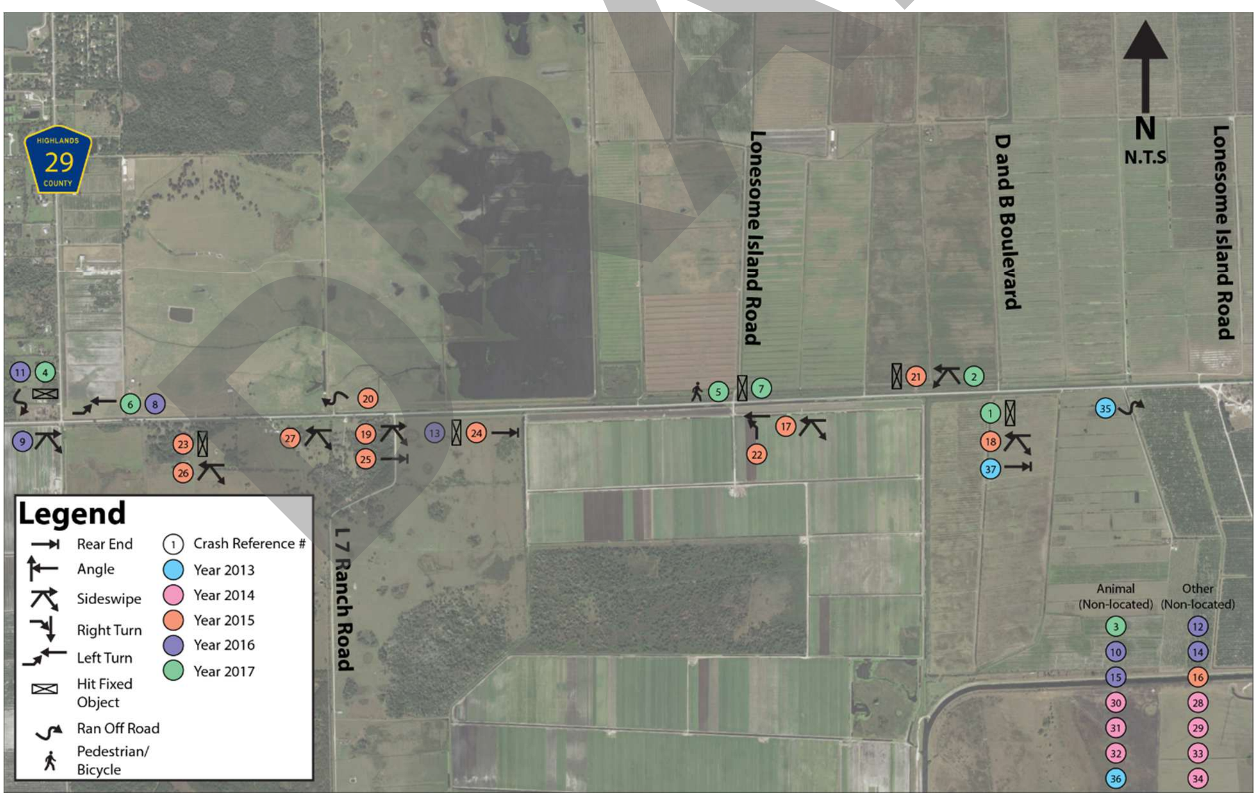

Figure 3 – Collision Diagram

Table 10 – Summary Crash Data (2013 to 2017)

Crash Data	Years					Total Crashes	Average Per Year	Percentage of Total Crashes
	2013	2014	2015	2016	2017			
Crash Type								
Animal	1	3	0	2	1	7	1.4	18.9%
Guardrail	0	0	2	1	3	6	1.2	16.2%
Rear End	1	0	2	1	0	4	0.8	10.8%
Sideswipe, Opposite Direction	0	0	4	0	0	4	0.8	10.8%
Other	0	2	0	2	0	4	0.8	10.8%
Sideswipe, Same Direction	0	0	1	1	1	3	0.6	8.1%
Other Non-Fixed Object	0	2	1	0	0	3	0.6	8.1%
Angle	0	0	1	0	1	2	0.4	5.4%
Ran Off Road	1	0	1	0	0	2	0.4	5.4%
Ran into Canal	0	0	0	1	0	1	0.2	2.7%
Bicycle	0	0	0	0	1	1	0.2	2.7%
Total	***3***	***7***	***12***	***8***	***7***	***37***	***7.4***	***100.0%***
Crash Severity								
Property Damage Only	1	4	8	6	4	23	4.6	62.2%
Minor Injury	0	2	1	0	1	4	0.8	10.8%
Moderate Injury	1	0	0	2	1	4	0.8	10.8%
Severe Injury	1	1	2	0	0	4	0.8	10.8%
Fatal	0	0	1	0	1	2	0.4	5.4%
Total	***3***	***7***	***12***	***8***	***7***	***37***	***7.4***	***100.0%***
Lighting Conditions								
Daylight	1	4	9	5	4	23	4.6	62.2%
Dark, Not Lighted	2	3	1	3	3	12	2.4	32.4%
Dusk	0	0	1	0	0	1	0.2	2.7%
Dawn	0	0	1	0	0	1	0.2	2.7%
Total	***3***	***7***	***12***	***8***	***7***	***37***	***7.4***	***100.0%***
Weather Conditions								
Clear	1	3	7	7	5	23	4.6	62.2%
Cloudy	2	3	2	1	2	10	2.0	27.0%
Rain	0	1	3	0	0	4	0.8	10.8%
Total	***3***	***7***	***12***	***8***	***7***	***37***	***7.4***	***100.0%***

Four of the crashes within the five year study period resulted in severe injury. These crashes were the result of the following circumstances:

- A vehicle drifted over to the other side of the roadway and collided with an oncoming vehicle, causing both vehicles to strike the guardrail.
- A motorcyclist struck a vehicle carrying a trailer while it was turning left onto Lonesome Island Road, which resulted in serious injury to the motorcyclist.

- As a freight truck slowed down due to a vehicle turning left onto Lonesome Island Road, another freight truck rear ended it, resulting in serious injury of the at fault driver.
- A vehicle ran over a wooden post in the middle of the roadway, causing it to flip up, strike the front left driver's window, and causing pieces of glass to fly into the driver's eyes, causing severe injury to the driver.

Many crashes were also related to vehicles drifting over the roadway centerline or being run off the road/into the guardrail while attempting to avoid another vehicle or obstacle. Of these crash types, some resulted in injury while others did not. Also, two narratives mention vehicles losing control after driving through standing water.

3.0 Development of Future Traffic

Future year design hour traffic volumes were developed using the Standard K and D-factors used in the existing conditions analysis. The same annual growth rate of 3.0% used to develop the existing year (2018) design hour turning movement volumes was used in the development of design year AADT's. The FDOT's TURNS5 spreadsheet was used to develop the turning movement volumes for the AM and PM peak hours and can be found in **Appendix F**. In order to quantify the benefit of the proposed improvements, both no-build and build conditions were assessed using the same forecasted traffic volume, as was also assumed for the SR 70 and CR 29 intersection in the SR 70 Western Study. The future design hour traffic volumes and AADT's for the opening year (2025), the interim year (2035), and the design year (2045) can be found in **Figure 4**.

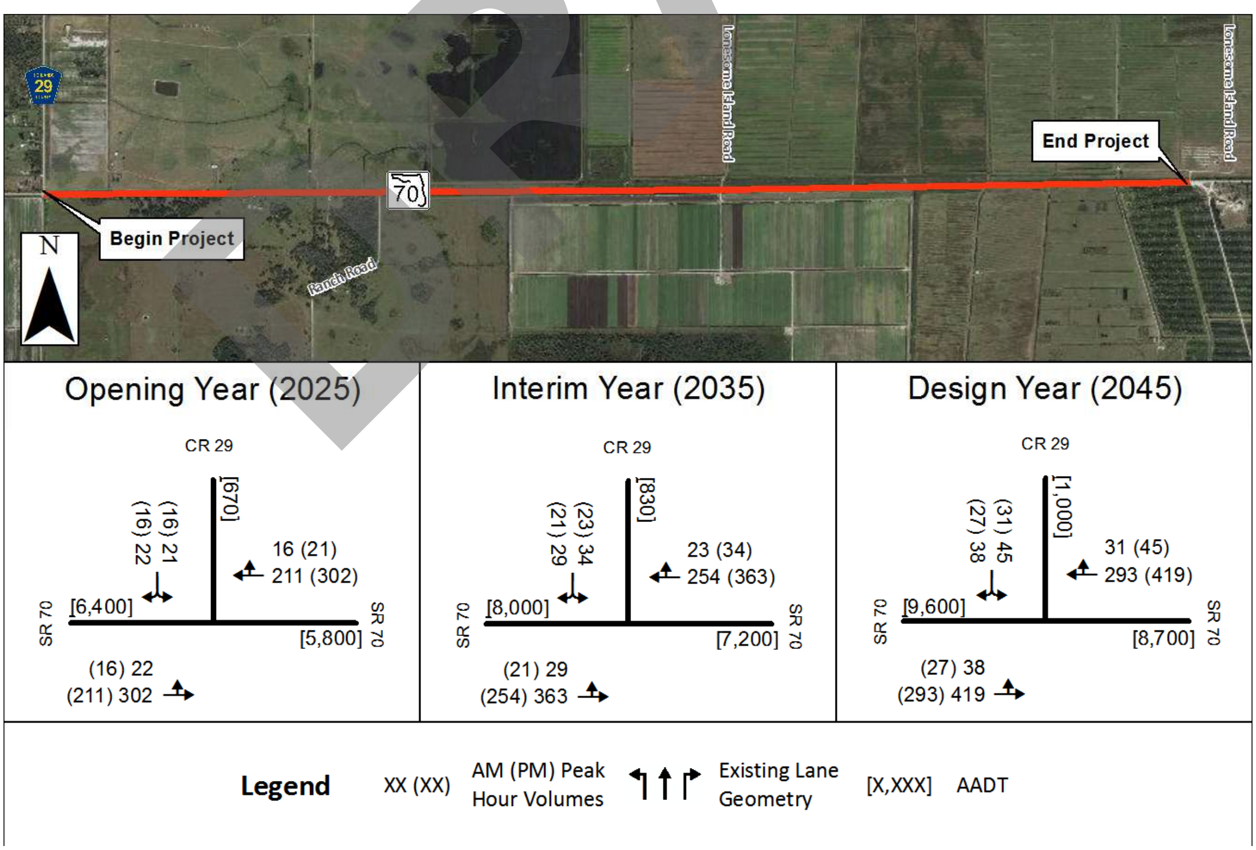

Figure 4 – Future Design Traffic Volumes

4.0 Future Conditions

4.1 NO-BUILD OPERATIONAL ANALYSES

Intersection and arterial operational analysis was conducted along SR 70 from CR 29 to Lonesome Island Road for the opening year (2025), interim year (2035), and design year (2045) under No-Build conditions. HCS7 was utilized to conduct HCM6E two-way stop control analysis and directional two-lane highway segment analysis, and can be found in **Appendix G**. The results of the future year intersection analyses at SR 70 and CR 29 under No-Build conditions are shown in **Table 11**. The results of the analyses indicate that the SR 70 and CR 29 intersection is expected to meet the FDOT LOS standard C for non-urbanized areas under No-Build conditions through the design year (2045).

Table 11 – Future Year No-Build Intersection Analyses

Approach	Movement	AM Peak Hour		PM Peak Hour	
		Delay (s/veh)	LOS	Delay (s/veh)	LOS
Opening Year (2025)					
Eastbound	Left Turn	7.9	A	8.2	A
	Through	0.0	A	0.0	A
	Total	0.7	A	0.7	A
Westbound	Total	0.0	A	0.0	A
Southbound	Total	12.0	B	12.2	B
Interim Year (2035)					
Eastbound	Left Turn	8.1	A	8.4	A
	Through	0.0	A	0.0	A
	Total	0.8	A	0.8	A
Westbound	Total	0.0	A	0.0	A
Southbound	Total	14.1	B	13.9	B
Design Year (2045)					
Eastbound	Left Turn	8.2	A	8.7	A
	Through	0.0	A	0.0	A
	Total	1.0	A	1.0	A
Westbound	Total	0.0	A	0.0	A
Southbound	Total	16.7	C	16.0	C

The results of the future year arterial analyses along SR 70 from CR 29 to Lonesome Island Road under No-Build conditions are shown in **Table 12**. The results of the analyses indicate that the SR 70 corridor from CR 29 to Lonesome Island Road is expected to meet the FDOT LOS standard C for non-urbanized areas under No-Build conditions through the design year (2045).

Table 12 – Future Year No-Build Arterial Analysis

Direction	AM Peak Hour		PM Peak Hour	
	Volume to Capacity (v/c)	LOS	Volume to Capacity (v/c)	LOS
Opening Year (2025)				
Eastbound	0.21	B	0.14	B
Westbound	0.14	B	0.21	B
Interim Year (2035)				
Eastbound	0.25	B	0.18	B
Westbound	0.18	B	0.25	B
Design Year (2045)				
Eastbound	0.30	B	0.21	B
Westbound	0.21	B	0.30	B

4.2 ALTERNATIVE DEVELOPMENT

Based on the results of the No-Build operational analyses, SR 70 from CR 29 to Lonesome Island Road is expected to meet the FDOT LOS standard C for non-urbanized areas through the design year (2045) and does not require any operational improvements. However, capacity improvements are proposed to widen SR 70 from CR 29 to Lonesome Island Road from a two-lane undivided facility to a four-lane divided roadway. The proposed improvements along SR 70 from CR 29 to Lonesome Island Road are shown in **Figure 5**.

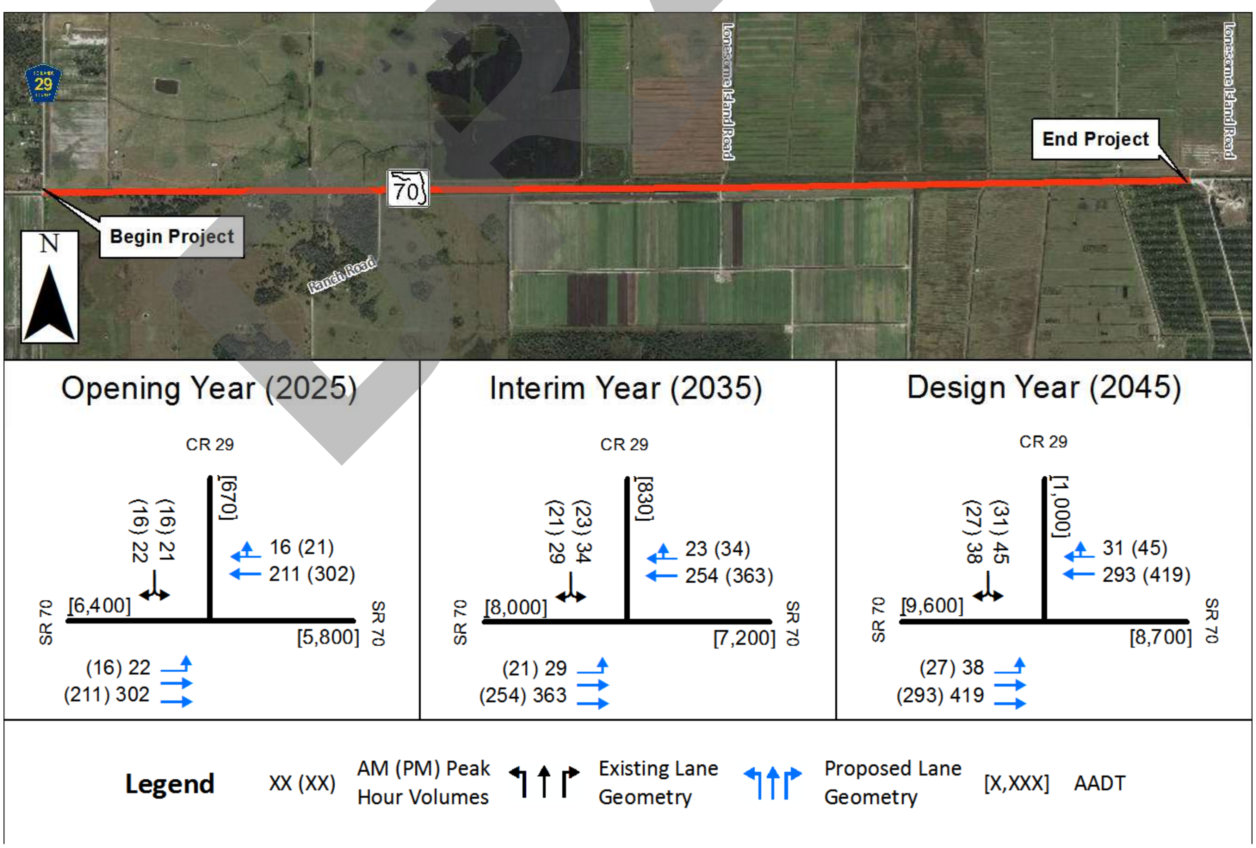

Figure 5 – Build Alternative

This widening is proposed as an initiative to improve operations along SR 70 during emergency evacuations. Highlands County is part of the Rural Area of Critical Economic Concern (RACEC) or Rural Area of Opportunity program defined by the state of Florida legislature to encourage and facilitate the location and expansion of major economic development projects of significant scale in such rural communities.

Furthermore, the Highway Safety Manual (HSM) predictive method was used to analyze SR 70 as a two-lane, undivided rural segment for the No-Build condition and as a multi-lane, divided rural segment for the Build condition. The predicted crash frequency by crash severity type for each condition in the design year (2045) is summarized in **Table 13**. An overall 60 percent decrease in crash frequency is anticipated with the implementation of the build condition. The predicted crash frequency calculations for the No-Build and Build conditions can be found in **Appendix H** and **Appendix I**, respectively.

Table 13 – Design Year (2045) Predicted Crash Frequency

Severity	No-Build Crash Frequency	Build Crash Frequency	Percent Difference
Fatal and Injury	3.83	2.50	-35%
Property Damage Only	8.11	2.23	-73%
Total	**11.94**	**4.73**	**-60%**

4.3 BUILD OPERATIONAL ANALYSES

Intersection and arterial operational analysis was conducted along SR 70 from CR 29 to Lonesome Island Road for the opening year (2025), interim year (2035), and design year (2045) under the proposed Build conditions. HCS7 was utilized to conduct HCM6E two-way stop control analysis and directional two-lane highway segment analysis, and can be found in **Appendix J**. The results of the future year intersection analyses at SR 70 and CR 29 under the proposed Build conditions are shown in **Table 14**. The results of the analyses indicate that the SR 70 and CR 29 intersection is expected to meet the FDOT LOS standard C for non-urbanized areas under the proposed Build conditions through the design year (2045).

The results of the future year arterial analyses along SR 70 from CR 29 to Lonesome Island Road under the proposed Build conditions are shown in **Table 15**. The results of the analyses indicate that the SR 70 corridor from CR 29 to Lonesome Island Road is expected to meet the FDOT LOS standard C for non-urbanized areas under the proposed Build conditions through the design year (2045).

4.4 NOISE ANALYSIS

The existing year (2018), opening year (2025), and design year (2045) AADT and design traffic factor information for the No-Build and Build conditions for Noise Analysis, as per the FDOT Noise Policy (Part 2, Chapter 17 of the PD&E Manual), can be found in **Appendix K**.

4.5 AIR QUALITY ANALYSIS

The opening year (2025) and design year (2045) traffic data for No-Build and Build conditions for the intersection with the greatest peak hour volumes for Air Quality Analysis, as per the FDOT Air Quality Policy (Part 2, Chapter 16 of the PD&E Manual), can be found in **Appendix L**.

Table 14 – Future Year Build Intersection Analyses

Approach	Movement	AM Peak Hour		PM Peak Hour	
		Delay (s/veh)	LOS	Delay (s/veh)	LOS
Opening Year (2025)					
Eastbound	Left Turn	7.9	A	8.2	A
	Through	0.0	A	0.0	A
	Total	0.5	A	0.6	A
Westbound	Total	0.0	A	0.0	A
Southbound	Total	10.5	B	10.8	B
Interim Year (2035)					
Eastbound	Left Turn	8.1	A	8.5	A
	Through	0.0	A	0.0	A
	Total	0.6	A	0.6	A
Westbound	Total	0.0	A	0.0	A
Southbound	Total	11.4	B	11.6	B
Design Year (2045)					
Eastbound	Left Turn	8.3	A	8.7	A
	Through	0.0	A	0.0	A
	Total	0.7	A	0.7	A
Westbound	Total	0.0	A	0.0	A
Southbound	Total	12.3	B	12.5	B

Table 15 – Future Year Build Arterial Analysis

Direction	AM Peak Hour		PM Peak Hour	
	Volume to Capacity (v/c)	LOS	Volume to Capacity (v/c)	LOS
Opening Year (2025)				
Eastbound	0.09	A	0.06	A
Westbound	0.06	A	0.09	A
Interim Year (2035)				
Eastbound	0.11	A	0.08	A
Westbound	0.08	A	0.11	A
Design Year (2045)				
Eastbound	0.13	A	0.09	A
Westbound	0.09	A	0.13	A

5.0 Summary

The FDOT is conducting a roadway capacity improvement project to widen SR 70 from CR 29 to Lonesome Island Road from a two-lane undivided facility to a four-lane divided roadway. A DTTM was prepared to compare the SR 70 Western Study, completed in March 2017, with updated traffic data and to analyze the traffic operations along SR 70 with the proposed improvements. Based on the operational analyses of the existing and future traffic conditions documented in this DTTM, the following conclusions have been drawn:

- Within the study area, SR 70 has been identified as a critical facility for hurricane evacuations.
- Currently, SR 70 from CR 29 to Lonesome Island Road operates at a LOS B during the AM and PM peak hours.
- Review of recent crash data revealed that hitting an animal was the most common crash type, followed by hitting the guardrail.
- From 2013 to 2017, there were two fatal crashes, accounting for 5.4% of the total crashes. One fatality involved a bicyclist and the other occurred as a result of the driver running off the road.
- The SR 70 study corridor contains a crash rate 1.604 times that of the statewide average for similar facilities.
- If no improvements are implemented, SR 70 from CR 29 to Lonesome Island Road is projected to continue to operate at a LOS B in the design year (2045), while CR 29 will operate slightly worse as it approaches SR 70 at LOS C.
- The proposed widening of SR 70 from CR 29 to Lonesome Island Road, along with the incorporation of a median, has the potential to reduce fatal and injury crashes by 35%, property damage crashes by 73%, and all crashes by 60%.
- The proposed Build condition is anticipated to operate at a LOS A through the design year (2045), with LOS B operation along CR 29.

Appendix A:
SR 70 PD&E Study DTTM

Design Traffic Technical Memorandum

DRAFT FINAL

State Road 70 PD&E Study

From West of Placid Lakes Boulevard/S. Jefferson Avenue to East of County Road 29

Highlands County, Florida

Prepared for:
Florida Department of Transportation
District One
District Environmental Management Office
801 North Broadway
Bartow, Florida 33831-1249

March 2017

Design Traffic Technical Memorandum

DRAFT FINAL

State Road 70 PD&E Study

From West of Placid Lakes Boulevard/S. Jefferson Avenue to East of County Road 29

Highlands County, Florida

Submitted by:
Kisinger Campo and Associates
in association with
H.W. Lochner, Inc.

March 2017

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Executive Summary

The Florida Department of Transportation (FDOT) is conducting a Project Development and Environment (PD&E) Study to improve and preserve mobility along the SR 70 study corridor. The project is located within Highlands County, Florida.

Project Description

This roadway capacity improvement project entails widening SR 70 from Jefferson Avenue to CR 29 in Highlands County from a two-lane undivided facility to a four-lane divided roadway. SR 70 is a principal arterial and the primary east-west highway for the Lake Placid/southern Highlands County area, providing regional access to employment centers, agricultural lands, and residential areas across the state. SR 70 is a designated hurricane evacuation route and a part of the Strategic Intermodal System (SIS) highway network. The project is approximately 7 miles in length. Existing right-of-way along the corridor ranges from approximately 80 feet between Jefferson Avenue to east of Monroe Street, approximately 200 feet east of Monroe Street to east of L7 Ranch Road, and approximately 100 feet east of L7 Ranch Road to CR 29. Additional right-of-way will likely be needed to accommodate the proposed widening, particularly at the eastern and western ends of the corridor; however, the specific right-of-way requirements will be determined during the PD&E Study.

The widening of SR 70 is identified in the Capital Improvement Element of the Highlands County 2030 Comprehensive Plan and adopted in the Heartland 2040 Long Range Transportation Plan and Heartland Draft Transportation Improvement Plan. The PD&E study for this project is also identified in the State Transportation Improvement Program and the 2024 - 2040 SIS Long Range Cost Feasible Plan [including the First Five-Year Plan (FY 2014/2015 - FY 2018/2019)]. The project is additionally identified in the FY 2015 - FY 2019 FDOT Work Program with $1.7 million programmed in FY 2015 for the PD&E Study. Additionally, the widening of SR 70 from Jefferson Avenue to CR 29 is classified as a high priority investment in the Florida Freight Mobility and Trade Plan: Investment Element - Project list. Planning consistency will be achieved prior to submittal of the final environmental document to the Office of Environmental Management (OEM) and issuance of Location and Design Concept Acceptance (LDCA). Further, SR 70 is included as a four-lane facility throughout all of Highlands County in the Florida Department of Transportation's 2035 Strategic Intermodal System Cost Feasible Plan.

Purpose

The purpose of this project is to improve operational conditions for emergency evacuations along the SR 70 corridor from Jefferson Avenue to CR 29. The Florida Division of Emergency Management's Statewide Regional Evacuation Study Program determined the segment of SR 70 between US 27 to east of the end project limit at CR 29 to be a critical segment with the longest vehicle queues among all roadways in the Central Florida region during emergency evacuations.

Conclusion

Crash analysis along the study corridor showed that more than one-third of the crashes were one vehicle crashes (24 crashes out of 63 total crashes). These crashes involved vehicles crashing into a fixed object, or animal or running into a ditch as a major contributor. Also, it was noted that excessive speeds along the study corridor might have also contributed for crash rates being higher than statewide average crash rates along similar corridors. Implementation of design components to reduce travel speeds and make travelers aware that they are approaching a signalized intersection near US 27 can be achieved by installing signal warning signs or beacons. Widening the study corridor to four lanes should also be considered as a high percentage (14% during peak hour) of truck traffic utilizes this section of the SR 70 corridor.

Hurricane evacuation transportation analysis shows that widening the study corridor to four lanes will reduce the queues along the study corridor from east of US 27 to CR 29 which were observed under No Build conditions.

Intersection Analysis - Design hour traffic evaluation under existing conditions and future Design year (2040) No Build conditions showed that all of the intersections along the SR 70 study corridor operate under acceptable LOS conditions. A Build alternative analysis was also conducted for the Design year (2040) which also shows that the intersections along the SR 70 study corridor will operate under acceptable LOS conditions.

Arterial Analysis - Evaluation of segment LOS conditions showed that under existing (2015) conditions, the segment of SR 70 from Old SR 8 (North) to US 27 operates at LOS D which is worse than acceptable LOS conditions (LOS C). Under future No Build conditions, the segments along SR 70 from Old SR 8 (North) to CR 29 operate at LOS D conditions. This indicates that the study corridor will require capacity improvements to make the corridor operate at acceptable LOS conditions (LOS C). The Build conditions segment analysis showed that the proposed lane addition (2 to 4 lanes) will make the corridor operate at LOS A conditions.

The crash and hurricane evacuation analyses also indicate that a widening of the corridor will be needed. Highlands County is part of the Rural Area of Critical Economic Concern (RACEC) or Rural Area of Opportunity program defined by the state of Florida legislature to encourage and facilitate the location and expansion of major economic development projects of significant scale in such rural communities.

Therefore, widening the study corridor to four lanes should be considered as an alternative after carefully evaluating other PD&E elements.

Introduction

The Florida Department of Transportation (FDOT) is conducting a Project Development and Environment (PD&E) Study to improve and preserve mobility along the SR 70 study corridor. The project is located within Highlands County, Florida.

Project Description

This roadway capacity improvement project entails widening SR 70 from Jefferson Avenue to CR 29 in Highlands County from a two-lane undivided facility to a four-lane divided roadway. SR 70 is a principal arterial and the primary east-west highway for the Lake Placid/southern Highlands County area, providing regional access to employment centers, agricultural lands, and residential areas across the state. SR 70 is a designated hurricane evacuation route and a part of the SIS highway network. The project is approximately 7 miles in length. Existing right-of-way along the corridor ranges from approximately 80 feet between Jefferson Avenue to east of Monroe Street, approximately 200 feet east of Monroe Street to east of L7 Ranch Road, and approximately 100 feet east of L7 Ranch Road to CR 29. Additional right-of-way will likely be needed to accommodate the proposed widening, particularly at the eastern and western ends of the corridor; however, the specific right-of-way requirements will be determined during the PD&E Study.

The widening of SR 70 is identified in the Capital Improvement Element of the Highlands County 2030 Comprehensive Plan and adopted in the Heartland 2040 Long Range Transportation Plan and Heartland Draft Transportation Improvement Plan. The PD&E study for this project is also identified in the State Transportation Improvement Program and the 2024 - 2040 SIS Long Range Cost Feasible Plan [including the First Five-Year Plan (FY 2014/2015 - FY 2018/2019)]. The project is additionally identified in the FY 2015 - FY 2019 FDOT Work Program with $1.7 million programmed in FY 2015 for the PD&E Study. Additionally, the widening of SR 70 from Jefferson Avenue to CR 29 is classified as a high priority investment in the Florida Freight Mobility and Trade Plan: Investment Element - Project list. Planning consistency will be achieved prior to submittal of the final environmental document to the Office of Environmental Management (OEM) and issuance of Location and Design Concept Acceptance (LDCA). Further, SR 70 is included as a four-lane facility throughout all of Highlands County in the Florida Department of Transportation's 2035 Strategic Intermodal System Cost Feasible Plan.

Purpose

The purpose of this project is to improve operational conditions for emergency evacuations along the SR 70 corridor from Jefferson Avenue to CR 29. The Florida Division of Emergency Management's Statewide Regional Evacuation Study Program determined the segment of SR 70 between US 27 to east of the end project limit at CR 29 to be a critical segment with the longest vehicle queues among all roadways in the Central Florida region during emergency evacuations. **Appendix A** presents the excerpts from Florida Statewide Regional Evacuation Study Program - Evacuation Transportation Analysis, Volume 4-7, Florida Division of Emergency Management, Central Florida Regional Planning Council, September 2010.

Vicinity of the Study Corridor

The number of roadway lanes and signalized intersection locations in the vicinity of the study corridor are shown in **Figure 1-2**. The only signalized intersection along SR 70 within the project limits is located at the US 27 intersection. The next closest signalized intersections are approximately 30 miles due east and west of the US 27 intersection. A flashing beacon is located at the intersection of CR 721, which is approximately 15 miles due east of the US 27 intersection.

Figure 1-1: Project Location Map

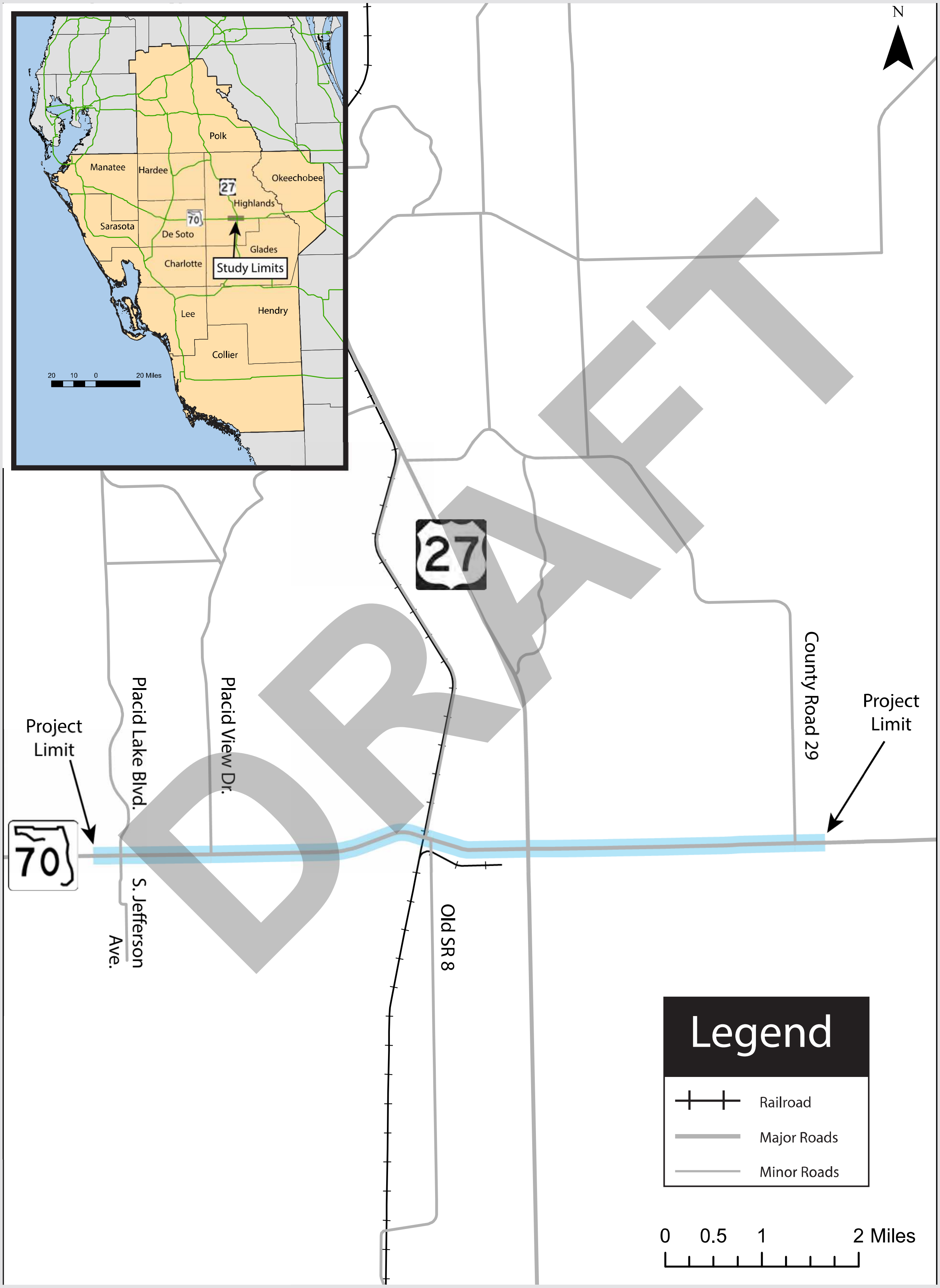
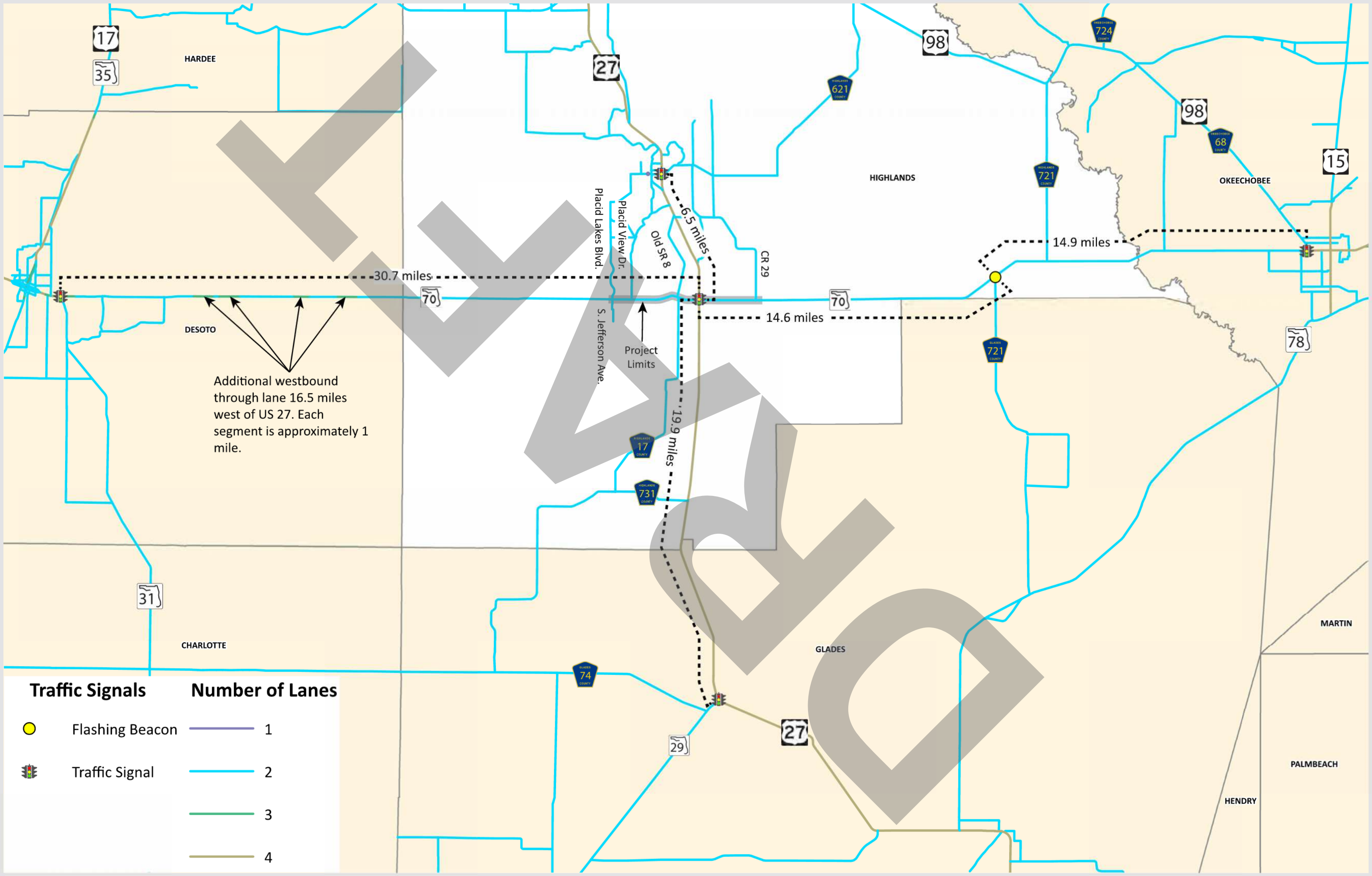


Figure 1-2: Project Vicinity - Number of Lanes and Signalized Intersection Locations



Existing (2015) Conditions

Roadway Characteristics

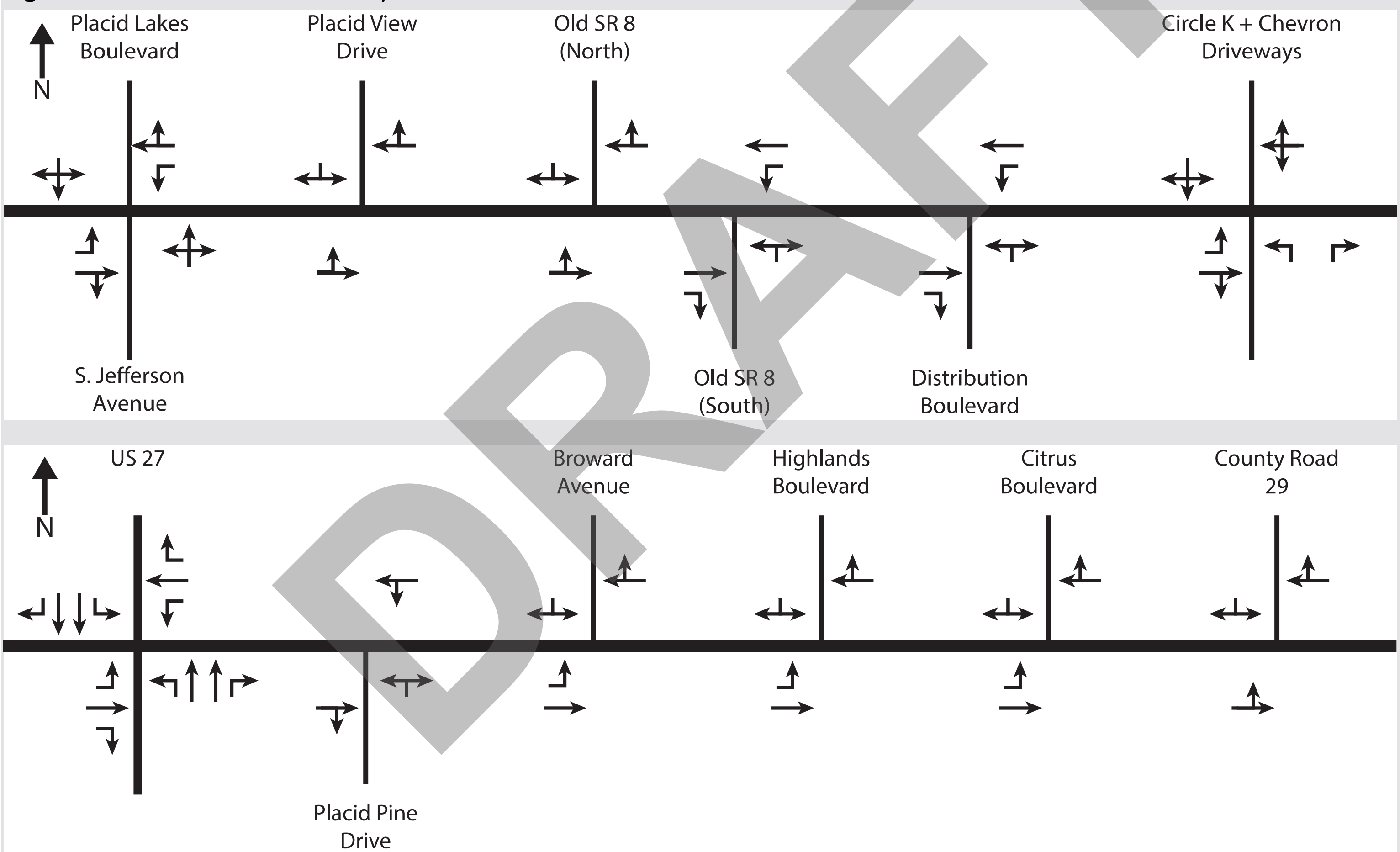
The SR 70 study corridor is a two-lane roadway throughout the project limits, which spans from west of Placid Lakes Boulevard/S. Jefferson Avenue to east of CR 29, a length of approximately 7 miles. It is a Strategic Intermodal System (SIS) Highway facility, serves as part of an emergency evacuation route network, and facilitates the east-west movement of freight and people.

The only major intersection within the project limits is the SR 70 and US 27 intersection. This is also the only signalized intersection within the project limits.

Typical Section

The existing typical section for SR 70 is a two-lane undivided rural roadway with one 12-foot lane in each direction and open ditches. In general, the posted speed limit along the study corridor is 60 miles per hour (MPH). Reduced speed limit signs are in place within the proximity of US 27 signalized intersection. The posted speed limit transitions from 60 MPH to 55 MPH to 45 MPH and back to 60 MPH from west of Old SR 8 (North) to west of Highlands Boulevard. **Figure 2-1** illustrates the existing (2015) intersection lane geometry for SR 70 throughout the study limits.

Figure 2-1: SR 70 Lane Geometry



Traffic Factors

The SR 70 study corridor is located in a rural area; therefore, a standard K factor of 9.5% was used as recommended in the *FDOT Project Traffic Forecasting Handbook* (2014).

A three year historical average (2012-2014) from *2014 Florida Traffic Information (FTI)* was used to calculate the peak hour Directional Factor (D). The D was also calculated using the tube counts (both 24 hour and 72 hour) collected for this study. **Table 2-1** shows a summary of the peak hour D calculations. A peak directional factor (D) of 58.83% was used for the entirety of the SR 70 corridor - this factor is within the suggested D factor range for rural arterial in the F*DOT Project Traffic Forecasting Handbook* (51.1% to 79.6%).

Table 2-1: Summary of Peak Hour Directional Factor (D)

Location	2014 Florida Traffic Information (FTI)			Tube Counts
	2012	2013	2014	2015
SR 70 west of Jefferson Avenue	58.00%	59.10%	59.40%	56.45%
SR 70 west of US 27	58.00%	59.10%	59.40%	52.58%
SR 70 east of US 27	58.00%	59.10%	59.40%	55.88%
SR 70 east of CR 29	N/A	N/A	N/A	55.83%
Yearly Average (D)	**58.00%**	**59.10%**	**59.40%**	**55.19%**
Average (D)	**58.83%**			**55.19%**

Note: Average D_{30} from FTI and tube counts were kept separate for calculating overall average

The Design Hour Truck (DHT) percentage was calculated from the average of the available Daily Truck percentage (T_{24}) from 2014 FTI. DHT was also calculated from turning movement volume count data collected for this study. **Table 2-2a** and **Table2-2b** shows the T_{24} and DHT (which is assumed as half of T_{24}) calculations from 2014 FTI data and DHT calculated from field collected turning movement count data for this study. A DHT percentage of 14.0 percent was used along SR 70 and at US 27 north and south of SR 70. An average of AM and PM peak hour truck percentages from the turning movement count data (collected for this study) was calculated. This showed that all the cross streets south of SR 70 carried approximately 2 percent truck traffic and all the cross streets north of SR 70 carried approximately 5 percent truck traffic. Therefore, a DHT percentage of 2.0 percent was used at all other cross streets south of SR 70 and a DHT percentage of 5.0 percent was used at all other cross streets north of SR 70.

Table 2-2a:Truck Percentages Summary - (T_{24}) and DHT

Location	2012	2013	2014
SR 70 west of Jefferson Avenue	29.20%	29.20%	29.20%
SR 70 west of US 27	28.30%	27.60%	27.60%
SR 70 east of US 27	21.10%	18.10%	18.10%
US 27 north of SR 70	30.20%	29.00%	29.00%
US 27 south of SR 70	30.30%	30.80%	30.40%
Average (T_{24})	**27.82%**	**26.94%**	**26.86%**
Overall Average (T_{24})	**27.21%**		
DHT	**14%**		

Source: 2014 FTI

Table 2-2b:Truck Percentages Summary - DHT

Location	2015 DHT
SR 70	14%
US 27 north and south of SR 70	14%
Cross Streets (south of SR 70)	2%
Cross Streets (north of SR 70)	5%

Source: 2015 TMV counts

Table 2-3 shows the recommended peak hour factors for this study.

Table 2-3:Recommended Peak Hour Factors

Factors	Standard K	D	DHT
Recommended	9.5%	58.83%	14.0%

Note: A DHT of 2% & 5% was used for all the cross streets south and north of SR 70 Study Corridor, respectively. A DHT of 14% was used for US 27 north and south of SR 70 Study Corridor.

Traffic Volumes

Traffic data collected for this project includes 24-hour bi-directional approach counts, 72-hour vehicle classification counts, and 2 hour turning movement volume counts (TMCs). All counts were collected in June/July of 2015. **Table 2-4** shows a summary of existing AADTs, **Figure 2-2** shows locations where counts were collected and 2015 Average Annual Daily Traffic (AADT) and **Figure 2-2a** shows existing (2015) turning movement volumes. The existing year (2015) design hour volumes were calculated using the formula: AADT x standard K x D. These design hour volumes were then converted to turning movement volumes by applying the existing unbalanced turn percentages at each study intersection. The resulting turn volumes were then balanced between adjacent intersections.

Appendix B shows the raw traffic volumes collected, traffic factor calculations, seasonally adjusted AADTs and TMCs and TMCs balanced to adjacent intersection locations for the 2015 existing year.

Table 2-4:Summary of Existing AADTs

Count Location Site	Count Type	Seasonal Factor	Axle Factor	NB/EB Approach	SB/WB Approach	2015 AADT
SR 70 west of Placid Lakes Boulevard	24 Hour Class	1.10	1.00	1,682	1,582	3,600
SR 70 west of US 27	72 Hour Class	1.04	1.00	2,480	2,274	4,900
SR 70 east of US 27	72 Hour Class	1.04	1.00	2,096	1,927	4,200
SR 70 east of CR 29	24 Hour Class	1.08	1.00	2,089	2,024	4,400
Placid Lakes Boulevard north of SR 70	24 Hour Class	1.10	1.00	328	310	700
Park Land Drive south of SR 70	24 Hour Class	1.10	1.00	116	107	200
Placid View Drive north of SR 70	24 Hour Class	1.10	1.00	212	184	400
Old SR 8 (north) north of SR 70	24 Hour Class	1.07	1.00	455	487	1,000
Old SR 8 (south) south of SR 70*	24 Hour Class	1.07	1.00	241	219	460
Distribution Boulevard south of SR 70	24 Hour Class	1.08	1.00	59	25	100
Glades Electric north of SR 70	24 Hour Class	1.07	1.00	94	49	200
Andersons south of SR 70	24 Hour Class	1.07	1.00	63	69	100
US 27 north of SR 70	72 Hour Class	1.04	1.00	3,661	3,465	7,400
US 27 south of SR 70**	72 Hour Class	1.04	1.00	3,622	3,548	7,200
Myers Road north of SR 70	24 Hour Class	1.08	1.00	17	9	30
Placid Pine Drive south of SR 70	24 Hour Class	1.07	1.00	62	29	100
North Edge Street north of SR 70	24 Hour Class	1.08	1.00	31	30	100
Ekhoff Lane north of SR 70	24 Hour Class	1.08	1.00	10	18	30
Broward Avenue north of SR 70	24 Hour Class	1.08	1.00	102	81	200
Highlands Boulevard north of SR 70	24 Hour Class	1.08	1.00	172	177	400
Citrus Boulevard north of SR 70	24 Hour Class	1.08	1.00	14	35	100
Bear Road north of SR 70	24 Hour Class	1.08	1.00	98	83	200
CR 29 north of SR 70	24 Hour Class	1.08	1.00	227	212	500

Notes:
**2014 counts from the FTI site projected to year 2015 was used.*
***2014 counts from the telemetered FTI site was used.*

Figure 2-2: Annual Average Daily Traffic (AADT) Volumes and Turning Movement Volume Count Locations

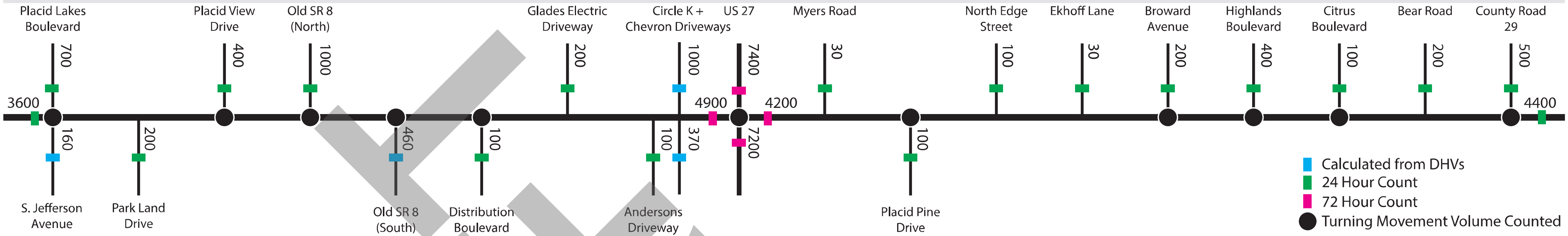
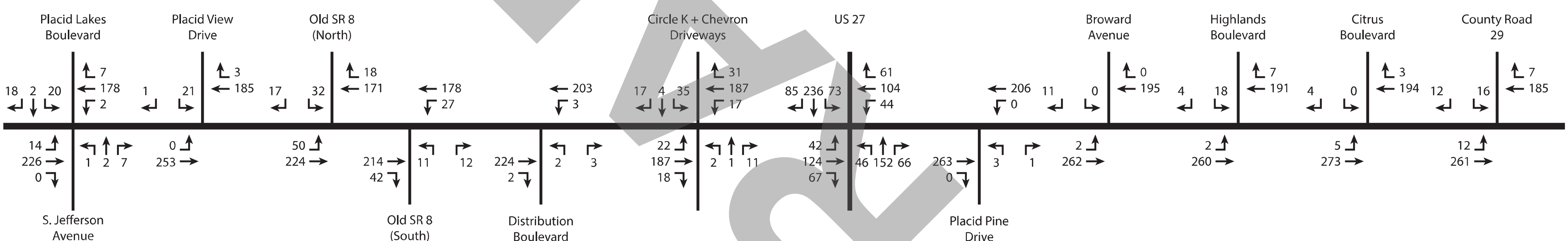
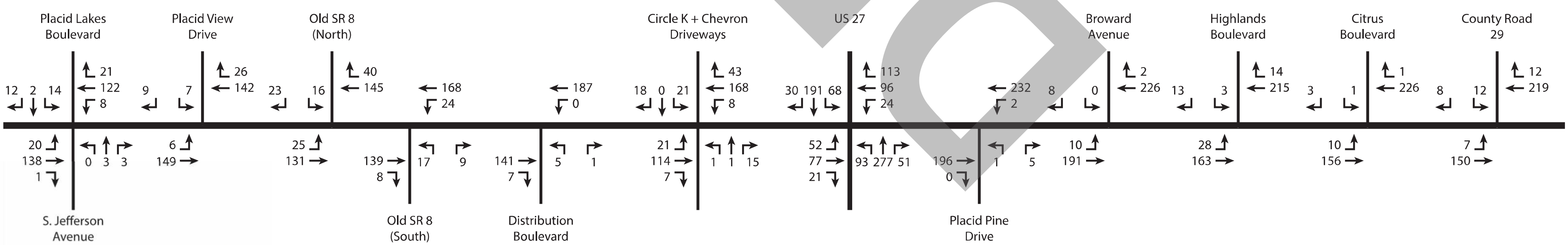


Figure 2-2a: Existing (2015) Turning Movement Volumes

2015 AM



2015 PM



Existing (2015) Intersection Level of Service Analysis

Level of Service Standards

On April 18, 2012, a FDOT memorandum was issued that states the LOS standard for all FDOT facilities is LOS D within urbanized areas and LOS C in non-urbanized areas. Based on 2010 census data, SR 70 does not pass through urbanized areas. For this reason, the minimum LOS standard for the entire SR 70 study area under existing conditions is LOS C. The FDOT memorandum is shown in **Appendix C**.

Existing Conditions Analysis

Intersection level of service for existing (2015) conditions was estimated using Synchro (Version 9). AM peak hour and PM peak hour analyses were performed under existing conditions. The analysis results for the intersection within the project limits are summarized in **Table 2-5** (LOS and Delay). Segment analysis was conducted using HighPlan and the results are summarized in **Table 2-6**.

The Synchro outputs for intersection analysis and associated queues and HighPlan outputs are included in **Appendix D**.

Table 2-5: LOS and Delay (2015)

SR 70 Intersection	Existing (2015)			
	AM Peak Hour		PM Peak Hour	
	Delay (sec/veh)	LOS	Delay (sec/veh)	LOS
S. Jefferson Ave/Placid Lakes Boulevard*	11.5	B	10.6	B
Placid View Drive*	11.8	B	9.9	A
Old SR 8 (North)*	12.2	B	10.2	B
Old SR 8 (South)*	10.8	B	10.5	B
Distribution Blvd*	10.4	B	10.4	B
Chevron/Circle K Driveways*	12.1	B	10.7	B
US 27	**23.5**	**C**	**24.3**	**C**
Placid Pine Drive*	11.4	B	9.8	A
Broward Ave*	9.5	A	9.6	A
Highlands Blvd*	11.7	B	10.1	B
Citrus Blvd*	9.4	A	10.1	B
CR 29*	11.2	B	10.8	B

* Unsignalized intersection, worst approach delay used.

Table 2-6: Arterial LOS(2015)

Corridor	From	To	Segment Length (Miles)	Percentage Time Spent Following (Sec)	Average Speed (mph)	LOS
SR 70	S. Jefferson Avenue/ Placid Lakes Boulevard	Old SR 8 (North)	3.2	51.2	58.7	C
	Old SR 8 (North)	US 27	1.1	68.5	46.4	D
	US 27	Highlands Boulevard	1.3	65.6	46.7	D
	Highlands Boulevard	CR 29	1.5	64.9	56.7	C

Safety Considerations

Data Collection

Crash data within the project limits was collected for the years 2009 through 2013. The crash data was obtained from the FDOT Crash Analysis Report System (CARS) database, which includes information regarding the number and types of crashes, the locations of the crashes, and the number of resulting injuries and fatalities. The FDOT CARS database contains only crashes reported to state or local law enforcement and does not include any unreported minor crashes.

Segments and Spots

Crash analyses were conducted for the years 2009 through 2013, the five most recent years of data at the time of this analysis. Segment crash analysis for State Road 70 was broken down into the following segments:

- Segment 1: State Road 70 from West of S. Jefferson Avenue to West of US 27 (MP 10.170 - 14.443)
- Segment 2: State Road 70 from East of US 27 to CR 29 (MP 14.537 - 17.302)

The spot analysis for this study included only the signalized intersection:

- Spot 1: SR 70 at US 27 (MP 14.443 - 14.537)

Crash History

The crash data collected within the project limits showed 63 crashes for the five-year study period. These 63 crashes involved 1 fatality and 38 injuries. More detailed information on the crashes, including yearly totals and averages, are provided in **Table 3-1**.

Table 3-1: Crash History Overview

Crash Summary	2009	2010	2011	2012	2013	Total	Average
Fatal Crashes	0	0	1	0	0	**1**	**0**
Total Fatalities	0	0	1	0	0	**1**	**0**
Injury Crashes	8	3	4	1	5	**21**	**4**
Total Injuries	12	3	13	1	9	**38**	**8**
Property Damage Only Crashes	12	10	5	5	9	**41**	**8**
Crash Totals	***20***	***13***	***10***	***6***	***14***	***63***	***13***

Crash Location Density and Crash Types

Based on crash location density mapping, as shown in **Figure 3-1**, a high number of crashes (23 crashes) are clustered at the SR 70 at US 27 signalized intersection when compared to any other locations along the study corridor. Crash density mapping also shows clusters of crashes near Old State Road 8 (7 crashes) and Placid Pine Drive (4 crashes). An examination of crash types along the segments show that a majority of crashes were either because of colliding with an animal or with fixed objects. An examination of spot crashes shows that a majority of crashes were rear end crashes.

As a majority of segment crashes were because of the vehicle colliding with an animal or fixed object, an examination of number of vehicles involved in the crash was performed. This showed that more than one-third of the crashes (24 crashes) were 1 vehicle crashes. **Figure 3-2** shows one vehicle and multi-vehicle crash type plots.

Figure 3-1: Crash Locations Map

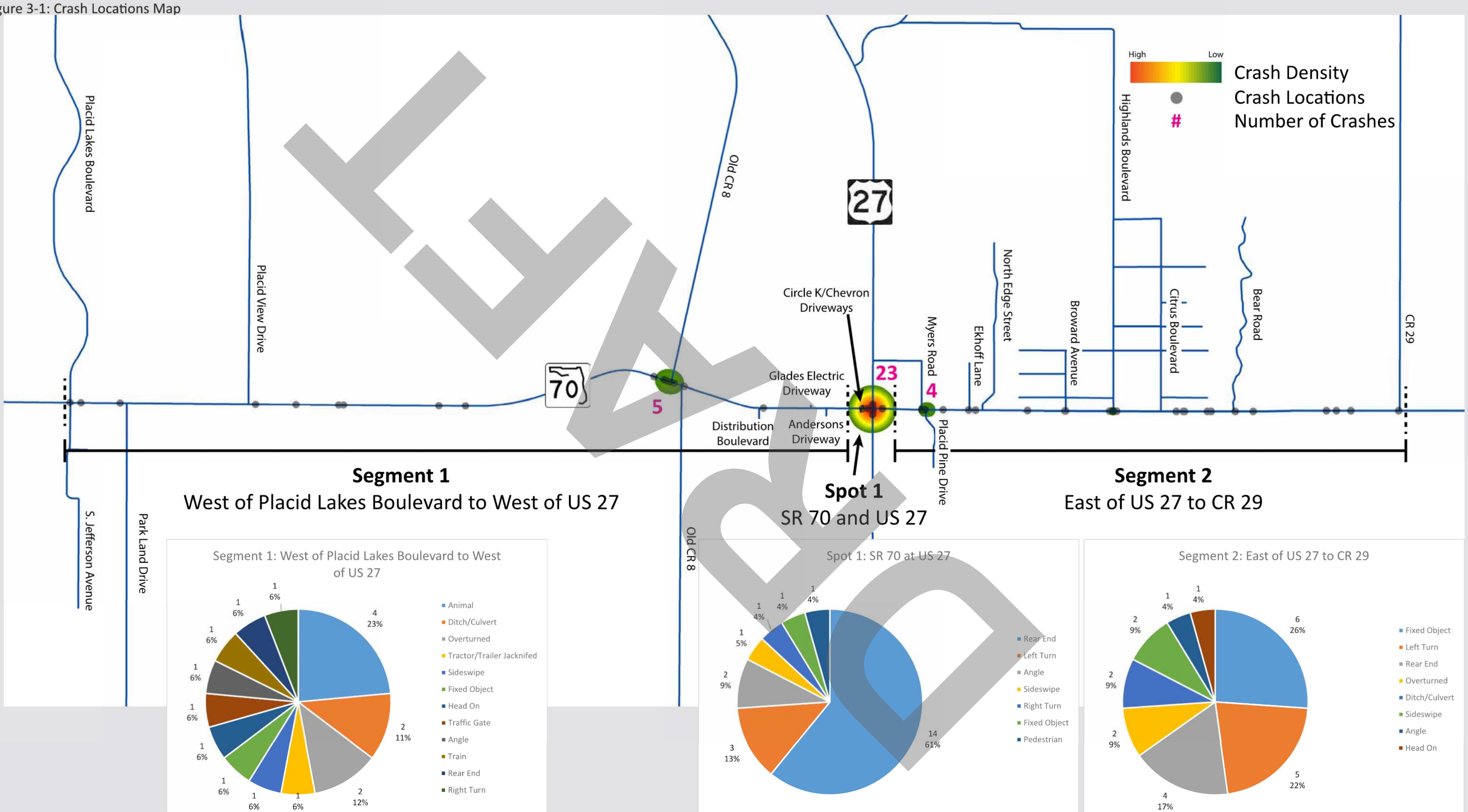
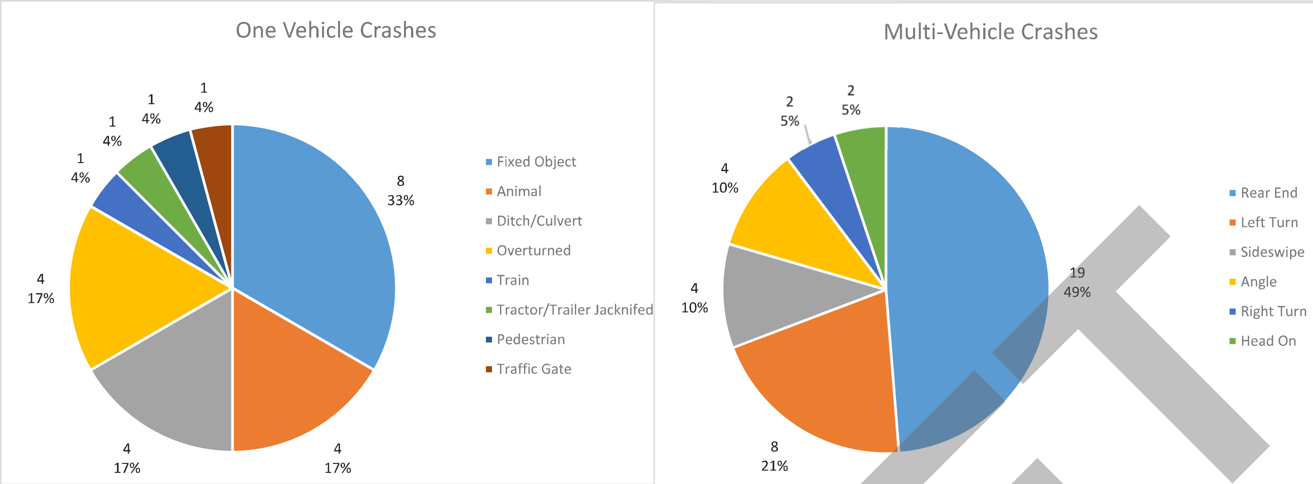


Figure 3-2: One Vehicle & Multi-Vehicle Crashes by Type (2009-2013)



Crash Ratios

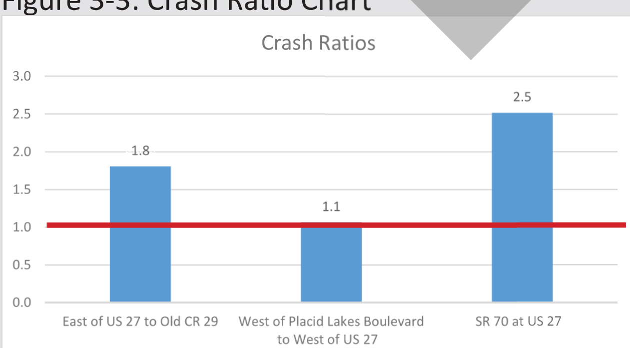
Crash ratios are calculated by dividing the actual crash rate of a spot or segment by the statewide average crash rate for the same type of roadway facility. Crash rates for spots represent the number of crashes per million vehicles entering an intersection and for segments represent the number of crashes per million vehicle miles traveled. Crash ratios larger than 1.00 indicate locations where the actual crash rate exceeds the statewide average crash rate, and therefore signify locations that should be investigated for potential safety issues. The values used to calculate these crash ratios are provided in **Appendix E**. The five-year average crash ratios for the study area are shown in **Table 3-2** and on **Figure 3-3**. Crash ratios larger than 1.00 are indicated in bold italic text in **Table 3-2**.

As summarized in **Table 3-2**, the spot and segment crash ratios indicate that, on average, the crashes along the project corridor are higher than that of the statewide average for similar roadways.

Table 3-2: Crash Ratio Summary

CRASH SUMMARY	Crash Spot/Segment	Crash Ratios					
		2009	2010	2011	2012	2013	Average
Spots	SR 70 at US 27	***5.8***	***1.8***	***1.2***	***1.5***	***2.3***	***2.5***
Segments	West of Placid Lakes Boulevard to west of US 27	***1.7***	***1.6***	0.7	0.3	***1.1***	***1.1***
	East of US 27 to CR 29	***2.1***	***2.1***	***2.6***	0.7	***1.6***	***1.8***

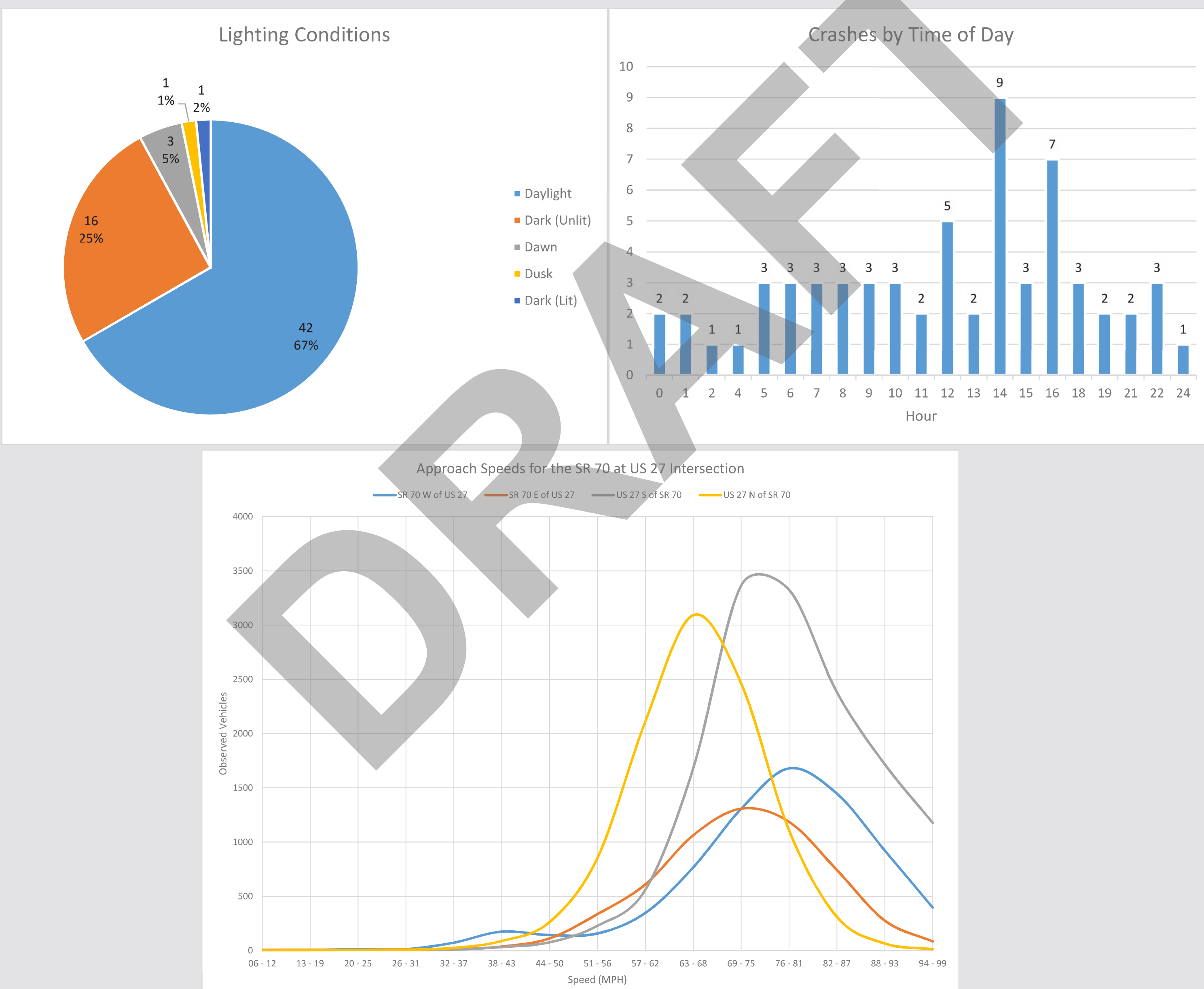
Figure 3-3: Crash Ratio Chart



Conclusion

Crash factors such as lighting conditions, crashes by time of day and approach speeds for the SR 70 at US 27 intersection were examined to determine the reason for crash rates being higher than the statewide average. The lighting conditions, crashes by time of day and approach speeds plot from the 72 hour count data are shown in **Figure 3-4**. The lighting condition along the roadway is a concern. However, it does not appear to be a major crash factor. The time of day plot showed that the crashes were higher between 2:00 PM and 4:00 PM, but not during dark conditions. Speed plots showed that the traffic is traveling at speeds that are higher than posted speeds along SR 70 (posted speed 55 MPH) and US 27 (posted speed 45 MPH) . The excessive traveling speeds might be a reason for crash rates higher than the statewide average. Implementing design components to reduce travel speeds and make travelers aware that they are approaching the signalized intersection at US 27 could be achieved by installing signal warning signs or beacons. These signs could reduce speed related crashes at the US 27 intersection.

Figure 3-4: Lighting Conditions, Time of Day and Approach Speeds



Future Conditions Analysis

Traffic Forecasting Parameters

The traffic factors used for future volumes development are listed below:

- The standard K factor for rural areas, which is 9.5 percent
- The D factor obtained from averaging the available FTI D factors in the study area, which is 58.83 percent
- A design hour truck percentage of 14 percent

These traffic factors are the same as the traffic factors used for existing (2015) conditions as no major changes in land use conditions were forecasted along the vicinity of the study corridor.

Development of Future Traffic Volumes (No-Build)

Future year traffic volume were developed after examining the following data sources:

- Historical Traffic
- Travel Demand Model Forecasts
- Population Projections/Estimates

Historical Traffic - An examination of historical traffic trend showed that the AADT volumes along the SR 70 study corridor and US 27 showed minimal to no growth over the past six years (2009-2014).

Travel Demand Model Forecasts - Highlands County Travel Demand Model with a validation year of 2006 and year 2035 needs model was also examined. The model forecasts showed yearly growth rate of 11% to 13% along SR 70 corridor east of US 27 and a 4% growth along SR 70 corridor west of US 27. However, the high yearly growth rate east of US 27 along SR 70 study corridor was determined to be an anomaly after examining the external station data from the neighboring county travel models.

Population Projections/Estimates - Population projections from Bureau of Economic and Business Research (BEBR) were also examined. BEBR Bulletin 175, June 2016 showed a population estimate of 100,748 for the year 2015 and a population projection of 120,227 for the year 2040. The population grows at a rate of 1% per year based on 2015 estimate and 2040 projection.

A summary of projections is listed below:

- Historical traffic data showed minimum to no growth.
- Travel demand model forecasts showed a significant growth because of the underlying socioeconomic data which was projected for a base year of 2006 and future year of 2035. These projections were made before the economic downturn.
- The latest BEBR Population Projections/Estimates showed that population of Highlands County will have an annual growth of 1.0 percent.

Based on the above observations, plus keeping in mind the continuity of SR 70 corridor from the west coast to the east coast of Florida, a significant portion of regional trips will traverse the study corridor. Therefore, it was determined that an annual growth rate of 2.0 percent should be used for future traffic volume development.

Appendix F presents the historical traffic trends analyses, growth rates determination memo, BEBR Bulletin 175, June 2016 - Highlands County population projections and raw 2040 turning movement volume calculations.

The future year design hour volumes were calculated using the formula: AADT x standard K x D. These design hour volumes were converted to turning movement volumes by applying the existing unbalanced turn percentages at each study intersection. These unbalanced turning movement volumes were then balanced/smoothed between adjacent intersections prior to performing operational analyses.

Figures 4-1 and **Figure 4-1a** shows the 2020 No-Build Condition AADT, AM and PM peak hour turning movement volumes along the study corridor.

Figures 4-2 and **Figure 4-2a** shows the 2030 No-Build Condition AADT, AM and PM peak hour turning movement volumes along the study corridor.

Figures 4-3 and **Figure 4-3a** shows the 2040 No-Build Condition AADT, AM and PM peak hour turning movement volumes along the study corridor.

Future Conditions Analysis

The calculated turning movement volumes and adjusted/balanced intersection turning movement volumes for the year 2040 are presented in **Appendix G** in stick figure format. Year 2020 and 2030 design hour volumes were calculated via weighted averages of existing (2015) and 2040 volumes, and are also presented in **Appendix G**.

Development of Future Traffic Volumes (Build)

The proposed Build condition for SR 70 is a four-lane divided facility with median openings. The proposed median opening locations are shown in **Figure 4-4a** and **Figure 4-4b**. The study corridor will be redesignated as Access Class 3 facility under the proposed Build condition and will adhere to minimum spacing requirements included in Florida Administrative Code (F.A.C) Chapter 14-97. The Build condition turning movement volumes were developed by redistributing No-Build turning movement volumes and proposed median opening locations.

Figures 4-5 shows the 2040 Build condition AM and PM peak hour turning movement volumes along the study corridor.

Future Conditions Analysis

Figure 4-1: Annual Average Daily Traffic Volumes (2020)

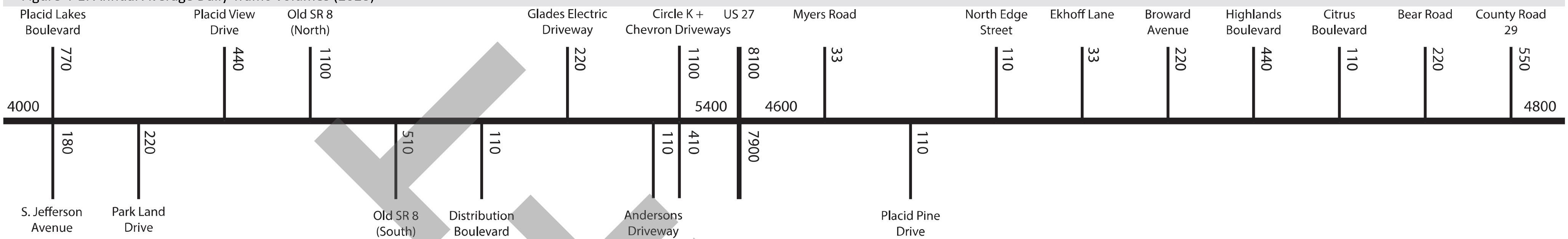


Figure 4-1a: Turning Movement Volumes (2020 No Build)

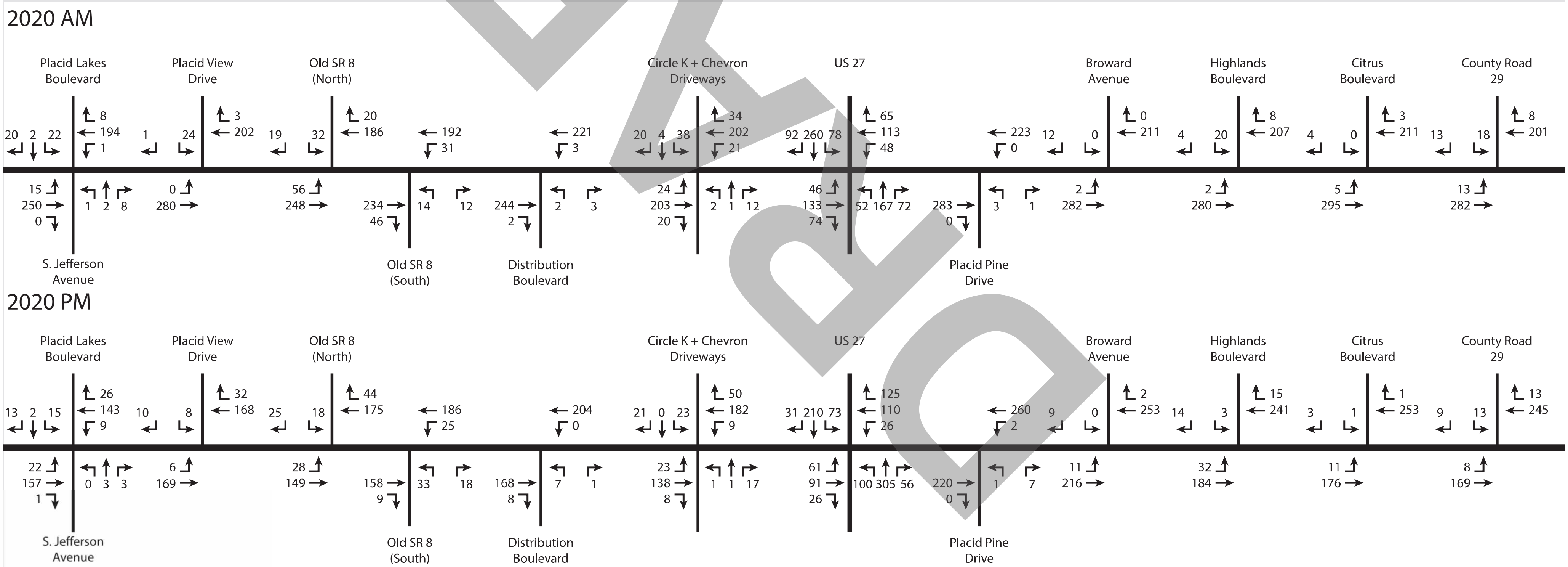


Figure 4-2: Annual Average Daily Traffic Volumes (2030)

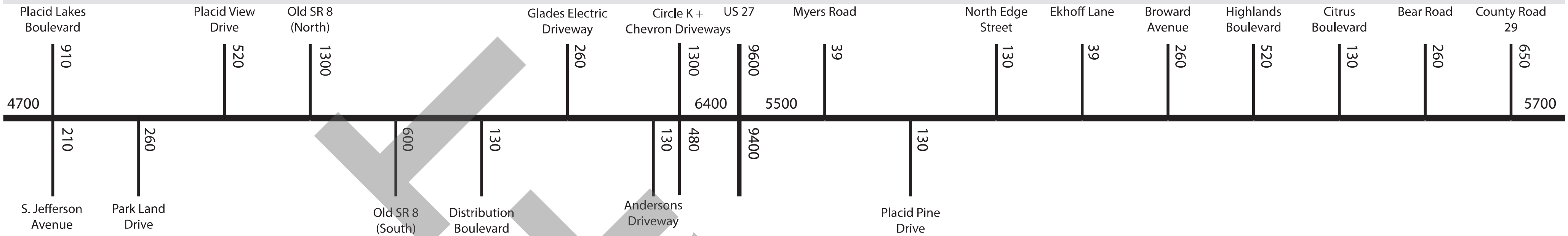
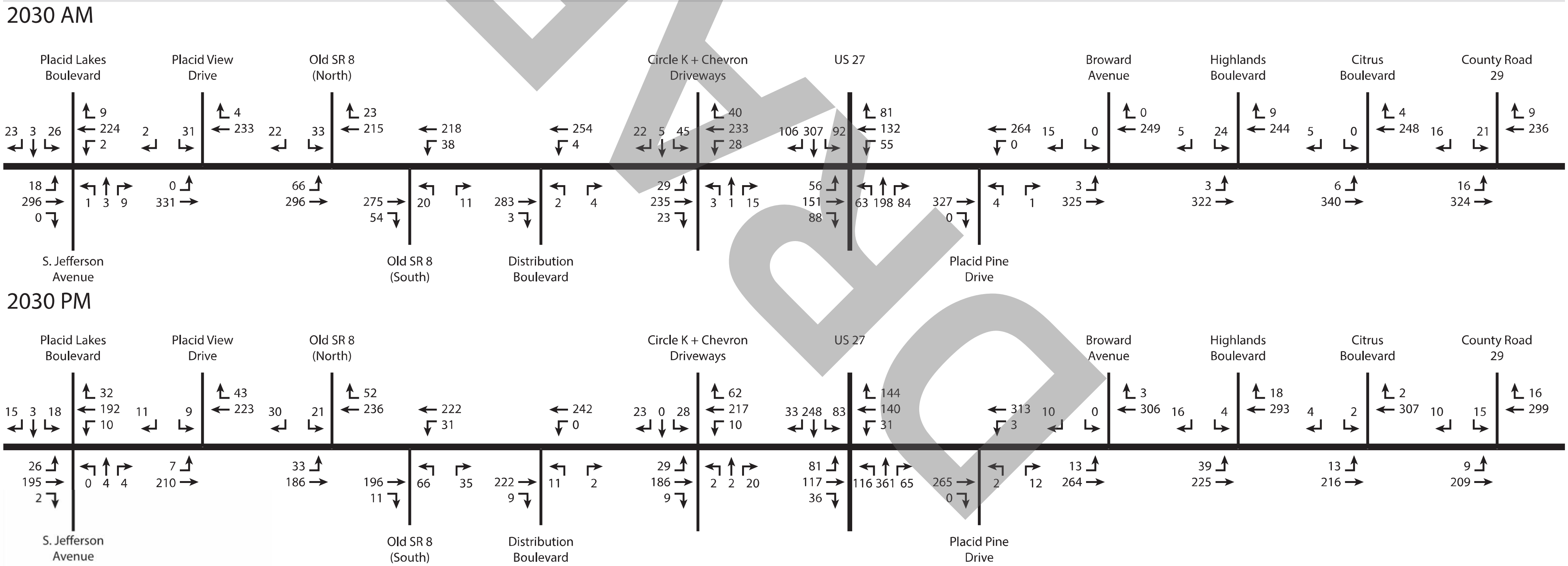


Figure 4-2a: Turning Movement Volumes (2030 No Build)



Future Conditions Analysis

Figure 4-3: Annual Average Daily Traffic Volumes (2040)

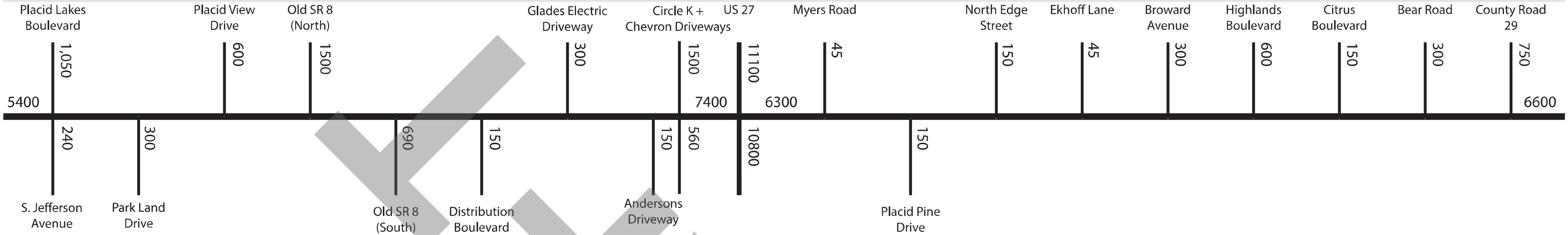
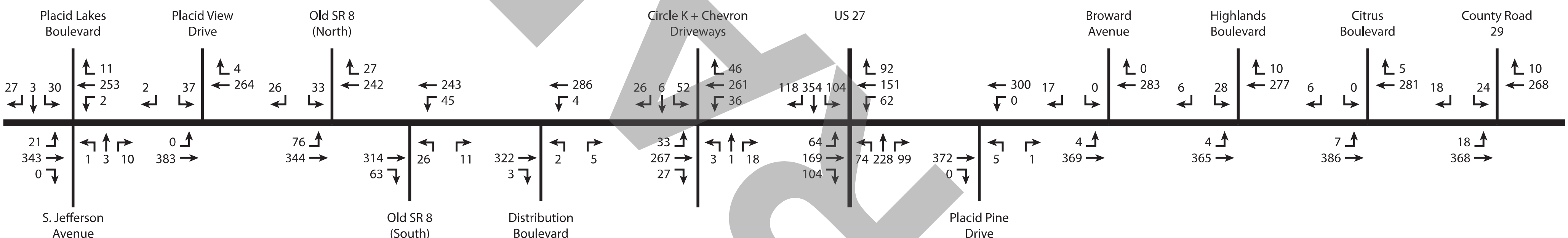


Figure 4-3a: Turning Movement Volumes (2040 No Build)

2040 AM



2040 PM

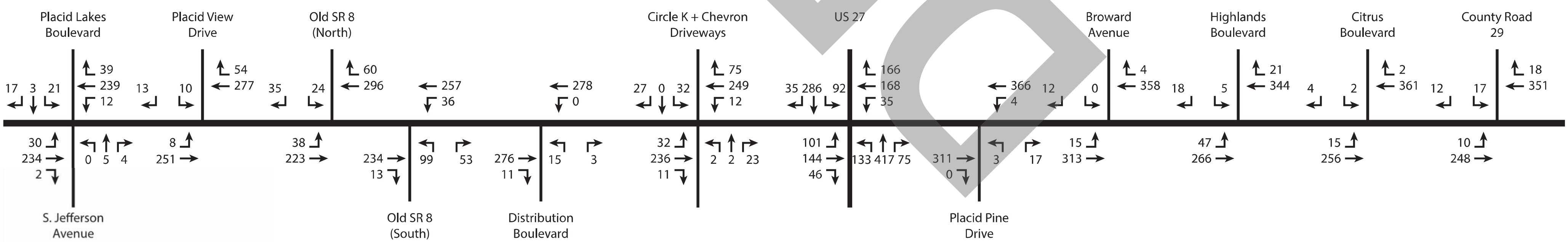


Figure 4-4a: Proposed Median Opening Locations (1 of 2)

Figure 4-4b: Proposed Median Opening Locations (2 of 2)

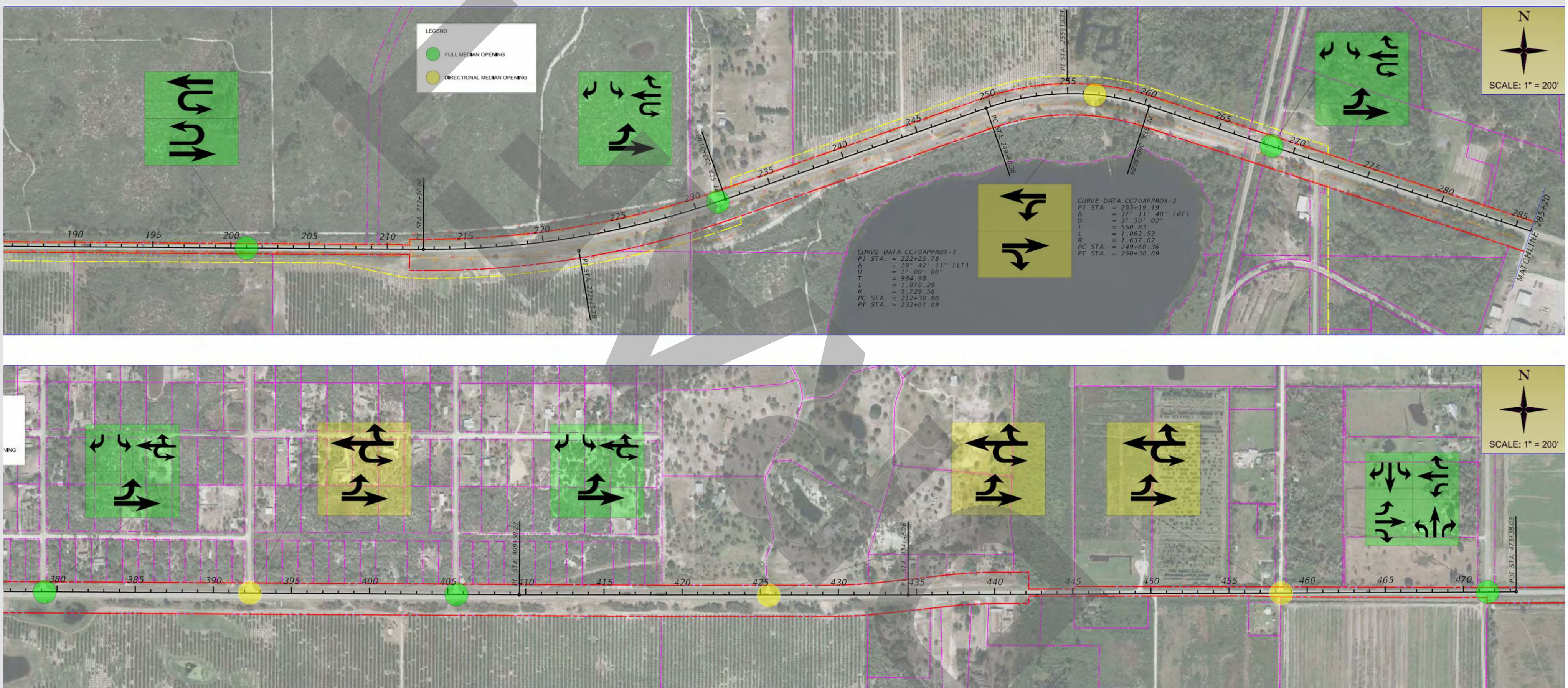
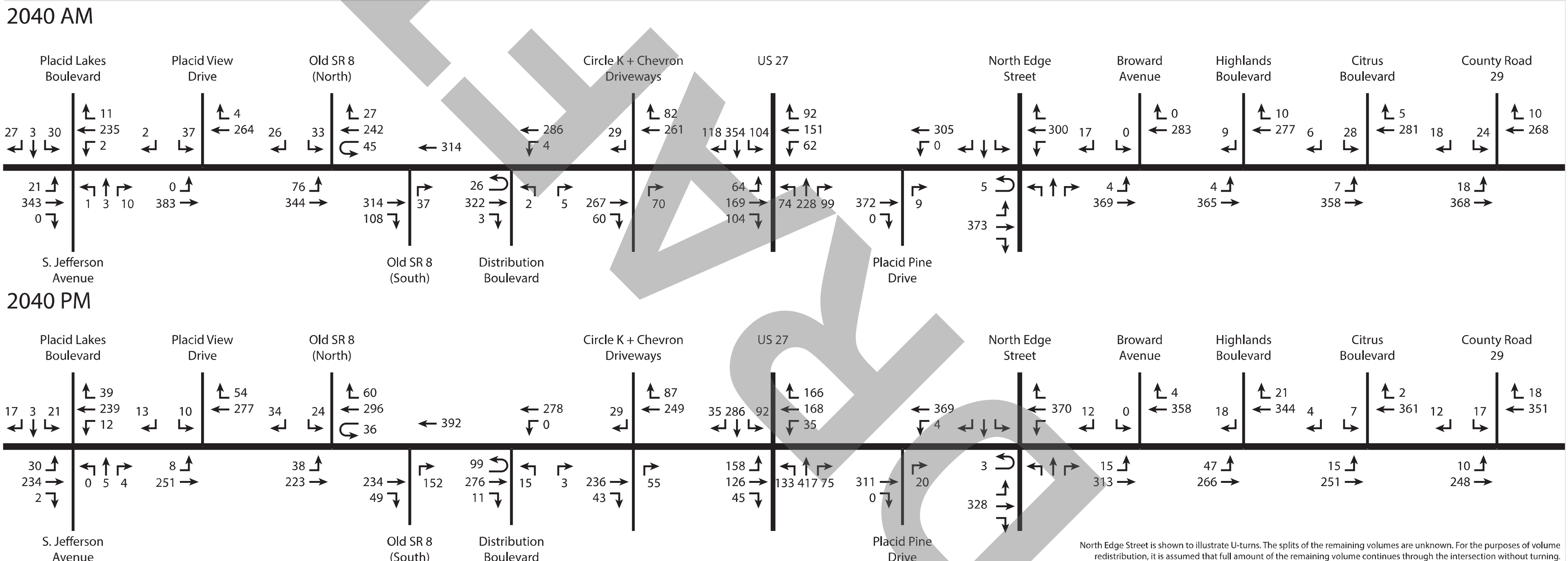


Figure 4-5: 2040 Build Turning Movement Volumes (AM and PM)



Future Traffic Conditions

Future traffic conditions were analyzed under No Build and Build conditions. The No Build alternative analysis was conducted for the Opening year (2020), Interim year (2030), and Design year (2040) per the project scope; while the Build alternative was analyzed only for the Design year (2040) because Build analysis for the Design year (2040) showed that the intersections along the corridor operate under acceptable LOS conditions, rendering it unnecessary to analyze the Build alternative in prior years.

No Build Alternative

This alternative assumes that no improvements will be made along the study corridor until Design year 2040. The lane geometry for No Build conditions is shown in **Figure 2-1**.

No Build Condition Analysis

Intersection level of service for Opening year (2020), Interim year (2030), and Design year (2040) conditions was evaluated using Synchro (Version 9). The analysis results for the intersections within the project limits are summarized in **Table 4-1** (LOS and Delay). Segment analysis was conducted using HighPlan and the results are summarized in **Table 4-2**. The Synchro outputs and HighPlan outputs are included in **Appendix H**.

All intersections along the study corridor operate under acceptable LOS conditions under the No Build alternative. However, arterial LOS conditions analysis shows the segments from Old SR 8 (North) to CR 29 operate at LOS D conditions which is worse than acceptable LOS conditions (LOS C).

Table 4-1: LOS and Delay for Future Years (No Build)

SR 70 Intersection	2020				2030				2040			
	AM Peak Hour		PM Peak Hour		AM Peak Hour		PM Peak Hour		AM Peak Hour		PM Peak Hour	
	Delay (sec/veh)	LOS	Delay (sec/veh)	LOS	Delay (sec/veh)	LOS	Delay (sec/veh)	LOS	Delay (sec/veh)	LOS	Delay (sec/veh)	LOS
S. Jefferson Ave/Placid Lakes Boulevard*	12.0	B	11.0	B	13.2	B	12.1	B	14.5	B	13.4	B
Placid View Drive*	12.4	B	10.2	B	13.4	B	10.9	B	14.8	B	11.7	B
Old SR 8 (North)*	12.7	B	10.7	B	13.9	B	11.6	B	15.1	C	12.8	B
Old SR 8 (South)*	11.3	B	11.1	B	12.5	B	12.7	B	13.9	B	15.1	C
Distribution Blvd*	10.6	B	10.8	B	10.9	B	11.6	B	11.2	B	12.6	B
Chevron/Circle K Driveways*	12.6	B	11.1	B	14.1	B	12.1	B	16.0	C	13.1	B
US 27	**23.8**	**C**	**24.6**	**C**	**24.7**	**C**	**25.5**	**C**	**25.6**	**C**	**27.4**	**C**
Placid Pine Drive*	11.7	B	9.9	A	12.7	B	10.4	B	13.8	B	11.0	B
Broward Ave*	9.6	A	9.8	A	9.8	A	10.2	B	10.1	B	10.6	B
Highlands Blvd*	12.1	B	10.4	B	13.1	B	11.0	B	14.2	B	11.9	B
Citrus Blvd*	9.5	A	10.3	B	9.8	A	11.1	B	10.0	A	11.8	B
CR 29*	11.6	B	11.1	B	12.4	B	12.0	B	13.4	B	13.0	B

* Unsignalized intersection, worst approach delay used.

Table 4-2: No Build Arterial LOS

Corridor	From	To	Segment Length (Miles)	2020			2030			2040		
				Percentage Time Spent Following (Sec)	Average Speed (mph)	LOS	Percentage Time Spent Following (Sec)	Average Speed (mph)	LOS	Percentage Time Spent Following (Sec)	Average Speed (mph)	LOS
SR 70	S. Jefferson Avenue/ Placid Lakes Boulevard	Old SR 8 (North)	3.2	53.7	58.3	C	59.0	57.8	C	62.0	57.2	C
	Old SR 8 (North)	US 27	1.1	69.7	46.1	D	71.0	45.5	D	74.2	44.9	D
	US 27	Highlands Boulevard	1.3	66.9	46.6	D	69.8	46.0	D	70.8	45.5	D
	Highlands Boulevard	CR 29	1.5	67.4	56.5	D	69.4	55.9	D	71.0	55.3	D

Future Conditions Analysis

Build Alternative

The proposed improvements include four-laning the study corridor from the existing two lanes. The proposed alternative lane geometry median openings are shown in **Figure 4-4a** and **Figure 4-4b.**

Build Conditions Analysis

Intersection level of service only for Design year (2040) conditions was evaluated using Synchro (Version 9). Only Design year (2040) conditions was analyzed because Build analysis for the Design year (2040) showed that the intersections along the corridor would operate under acceptable LOS conditions, rendering it unnecessary to analyze the Build alternative in prior years. The analysis results for the intersection within the project limits are summarized in **Table 4-3** (LOS and delay). Segment analysis was conducted using HighPlan and the results are summarized in **Table 4-4** . The analysis results for the existing condition are also included for comparison purposes. The Synchro outputs and HighPlan outputs are included in **Appendix I**.

All intersections operate under acceptable LOS conditions under the Build alternative. Arterial LOS conditions analysis shows all the segments operate at acceptable LOS conditions.

Table 4-3: LOS and Delay for Future Years (Build)

SR 70 Intersection	2040			
	AM Peak Hour		PM Peak Hour	
	Delay (sec/veh)	LOS	Delay (sec/veh)	LOS
S. Jefferson Ave/Placid Lakes Boulevard*	12.5	B	12.1	B
Placid View Drive*	12.7	B	10.6	B
Old SR 8 (North)*	14.3	B	12.2	B
Old SR 8 (South)*	9.5	A	9.9	A
Distribution Blvd*	10.4	B	13.8	B
Chevron/Circle K Driveways*	9.7	A	9.6	A
US 27	**24.5**	C	**26.3**	**C**
Placid Pine Drive*	9.5	A	9.4	A
Broward Ave*	9.3	A	9.6	A
Highlands Blvd*	9.3	A	9.6	A
Citrus Blvd*	12.5	B	12.0	B
CR 29*	12.0	B	12.2	B

* Unsignalized intersection, worst approach delay used.

Table 4-4: Build Arterial LOS (Year 2040)

Corridor	From	To	Segment Length (Miles)	Density (pc/ln/mi)	Average Speed (mph)	LOS
SR 70	S. Jefferson Avenue/ Placid Lakes Boulevard	Old SR 8 (North)	3.2	3.6	65.0	A
	Old SR 8 (North)	US 27	1.1	5.8	55.0	A
	US 27	Highlands Boulevard	1.3	4.9	55.0	A
	Highlands Boulevard	CR 29	1.5	4.6	65.0	A

Summary of Findings

Traffic operational analysis along the SR 70 study corridor was conducted to evaluate the need to widen the study corridor from a 2-lane undivided arterial facility to a 4-lane divided arterial facility. Along with the traffic operational analysis, safety and hurricane evacuation evaluations were also conducted. Hurricane evacuation transportation analysis using the Transportation Interface for Modeling Evacuations (TIME) model is shown in **Appendix J**.

Conclusion

Crash analysis along the study corridor showed that more than one-third of the crashes were one vehicle crashes (24 crashes out of 63 total crashes). These crashes involved vehicles crashing into a fixed object, or animal or running into a ditch as a major contributor. Also, it was noted that excessive speeds along the study corridor might have also contributed for crash rates being higher than statewide average crash rates along similar corridors. Implementation of design components to reduce travel speeds and make travelers aware that they are approaching a signalized intersection near US 27 can be achieved by installing signal warning signs or beacons. Widening the study corridor to four lanes should also be considered as a high percentage (14% during peak hour) of truck traffic utilizes this section of the SR 70 corridor.

Hurricane evacuation transportation analysis shows that widening the study corridor to four lanes will reduce the queues along the study corridor from east of US 27 to CR 29 which were observed under No Build conditions.

Intersection Analysis - Design hour traffic evaluation under existing conditions and future Design year (2040) No Build conditions showed that all of the intersections along the SR 70 study corridor operate under acceptable LOS conditions. A Build alternative analysis was also conducted for the Design year (2040) which also shows that the intersections along the SR 70 study corridor will operate under acceptable LOS conditions.

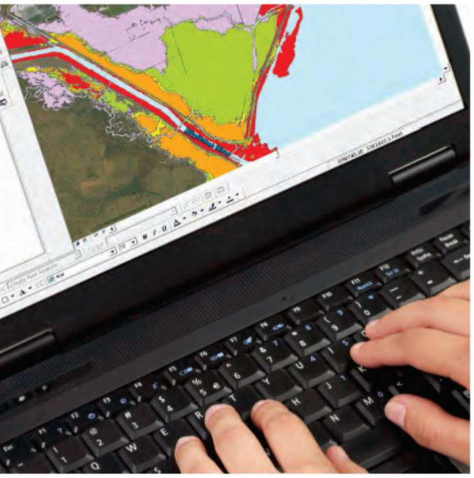
Arterial Analysis - Evaluation of segment LOS conditions showed that under existing (2015) conditions, the segment of SR 70 from Old SR 8 (North) to US 27 operates at LOS D which is worse than acceptable LOS conditions (LOS C). Under future No Build conditions, the segments along SR 70 from Old SR 8 (North) to CR 29 operate at LOS D conditions. This indicates that the study corridor will require capacity improvements to make the corridor operate at acceptable LOS conditions (LOS C). The Build conditions segment analysis showed that the proposed lane addition (2 to 4 lanes) will make the corridor operate at LOS A conditions.

The crash and hurricane evacuation analyses also indicate that a widening of the corridor will be needed. Highlands County is part of the Rural Area of Critical Economic Concern (RACEC) or Rural Area of Opportunity program defined by the state of Florida legislature to encourage and facilitate the location and expansion of major economic development projects of significant scale in such rural communities.

Therefore, widening the study corridor to four lanes should be considered as an alternative after carefully evaluating other PD&E elements.

Appendix B:
Evacuation Transportation Analysis Report

Florida Statewide Regional Evacuation Study Program



Evacuation Transportation Analysis

Volume 4-7

Florida Division of Emergency Management

Central Florida Regional Planning Council

Central Florida Region

Includes Hurricane Evacuation Study

Statewide Regional Evacuation Study Program

EVACUATION TRANSPORTATION ANALYSIS

VOLUME 4-7

CENTRAL FLORIDA REGION

Prepared for:

Central Florida Regional Planning Council
Florida Division of Emergency Management

Prepared by:

Wilbur Smith Associates

in association with:

BCC Engineering, Inc.

September 2010

Congested Roadways

A summary of the total number of evacuating vehicles for each of the operational scenarios is presented in **Table IV-25**. It is important to note that the total number of evacuating vehicles in the table below includes vehicles evacuating from all of the counties included in the operational scenario, as identified in Table IV-19. The number of counties varies by scenario, with four of the scenarios including 10 counties stretching from Collier County to Sumter County.

Table IV-25 – Total Evacuating Vehicles for Operational Scenarios

	Evacuation Level A Operational Scenario	Evacuation Level B Operational Scenario	Evacuation Level C Operational Scenario	Evacuation Level D Operational Scenario	Evacuation Level E Operational Scenario
2010	386,000	236,914	283,276	621,822	371,482
2015	366,801	270,276	880,514	396,546	380,628

Similar to the base scenarios, critical roadways were identified by reviewing roadways in the model network that have the highest vehicle queues for extended periods of time during an evacuation. Due to the nature of a major evacuation in general, nearly all roadway facilities will have extended vehicle queues at some point during the evacuation process. The point of this analysis is to identify those roadway facilities that have vehicle queues for the longest time periods during each of the evacuation scenarios. Critical roadway segments for the Central Florida region are identified in **Figures IV-14** through **IV-23** for each of the operational scenarios for 2010 and 2015.

Critical facilities for the operational scenarios vary greatly depending upon the scenario, as illustrated in the figures. For example, for the 2015 level D operational scenario, which assumes a southeast to northwest storm track west of Okeechobee City, critical facilities include US 441 and SR 70 in Okeechobee County and SR 70, US 27, and US 98 in Highlands County. In contrast, for the 2015 level C operational scenario, which assumes a west to east storm track along the I-4 corridor, the critical facilities within the Central Florida region are concentrated in Polk County.

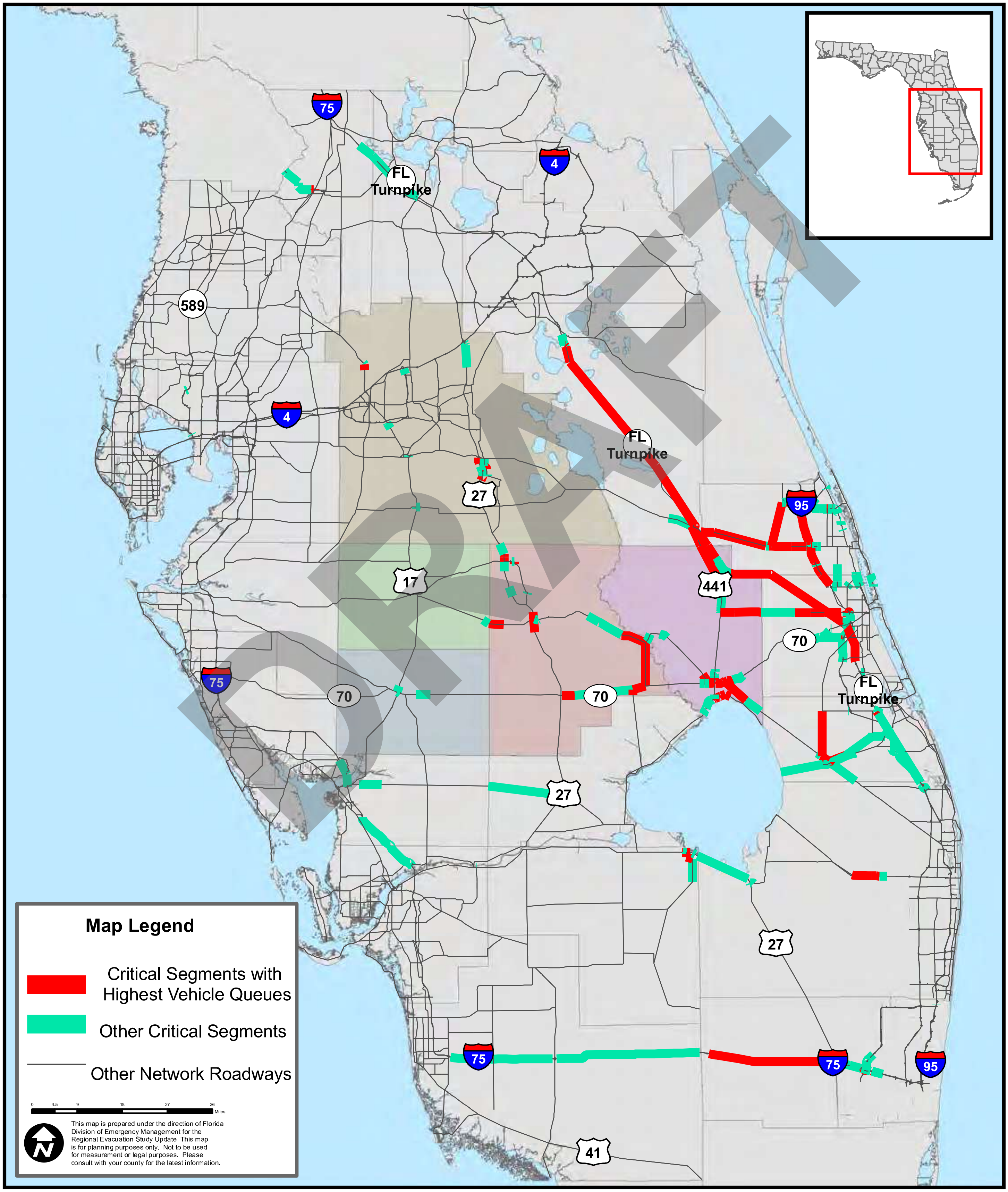
In addition to the identification of critical roadway segments, the total number of evacuating vehicles entering and exiting each county by evacuation scenario was also determined. Evacuating vehicles exiting each county by major evacuation route are identified in **Table IV-26** for 2010 and **Table IV-27** for 2015. In addition, evacuating vehicles entering each county by major evacuation route are identified in **Table IV-28** for 2010 and **Table IV-29** for 2015. Detailed volume figures for all evacuation routes in the Central Florida Region for each operational scenario are included in Volume 5-7.

The number of vehicles entering and exiting each county during an evacuation varies widely depending upon the scenario, roadway, and county. As expected, major interstates and state highways generally carry larger volumes of evacuating traffic. The vehicle flows into and out of each county also generally follow the same pattern as the critical segment figures, as locations with higher queues and congestion generally have higher traffic volumes.

STATEWIDE REGIONAL EVACUATION STUDY PROGRAM

Figure IV-22

Critical Roadway Segments with Excessive Vehicle Queues for 2015 Operational Scenario Evacuation Level D



Sources: Central Florida Regional Planning Council, Wilbur Smith Associates

Map Printed: September , 2010

Appendix C:
Florida Traffic Online (2017) Historical Data

COUNTY: 09
STATION: 0003
DESCRIPTION: SR 70, EAST OF SR 25/US 27 BAIRS DEN
START DATE: 08/15/2017
START TIME: 1000

	DIRECTION: E					DIRECTION: W					COMBINED
TIME	1ST	2ND	3RD	4TH	TOTAL	1ST	2ND	3RD	4TH	TOTAL	TOTAL
0000	3	7	4	3	17	12	7	6	2	27	44
0100	2	7	4	4	17	0	7	1	4	12	29
0200	11	7	4	4	26	7	3	4	2	16	42
0300	7	8	7	13	35	9	0	9	7	25	60
0400	3	3	15	10	31	7	5	3	7	22	53
0500	9	19	24	30	82	13	20	27	25	85	167
0600	32	27	36	39	134	25	27	36	47	135	269
0700	37	42	27	41	147	60	44	40	46	190	337
0800	40	52	38	30	160	29	42	42	35	148	308
0900	36	35	29	40	140	30	43	43	35	151	291
1000	55	41	45	39	180	42	44	47	33	166	346
1100	46	44	45	28	163	48	52	38	48	186	349
1200	52	46	45	42	185	24	64	43	35	166	351
1300	41	37	49	43	170	67	34	50	45	196	366
1400	55	43	34	27	159	46	47	49	40	182	341
1500	39	45	46	39	169	52	20	54	51	177	346
1600	42	32	45	59	178	50	46	43	56	195	373
1700	41	48	38	42	169	51	32	58	33	174	343
1800	32	28	30	28	118	37	28	47	32	144	262
1900	30	29	23	23	105	21	42	39	25	127	232
2000	23	18	29	21	91	20	28	20	11	79	170
2100	18	15	13	10	56	17	14	9	9	49	105
2200	17	12	13	7	49	3	9	9	5	26	75
2300	5	10	4	5	24	10	6	5	7	28	52
24-HOUR TOTALS:					2605					2706	5311

PEAK VOLUME INFORMATION

	DIRECTION: E		DIRECTION: W		COMBINED DIRECTIONS	
	HOUR	VOLUME	HOUR	VOLUME	HOUR	VOLUME
A.M.	745	171	645	191	700	337
P.M.	1630	193	1215	209	1215	383
DAILY	1630	193	1215	209	1215	383

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FLORIDA DEPARTMENT OF TRANSPORTATION
TRANSPORTATION STATISTICS OFFICE
2017 HISTORICAL AADT REPORT

COUNTY: 09 - HIGHLANDS

SITE: 0003 - SR 70, EAST OF SR 25/US 27   BAIRS DEN

YEAR	AADT	DIRECTION 1	DIRECTION 2	*K FACTOR	D FACTOR	T FACTOR
2017	4400 C	E 2200	W 2200	9.50	60.10	21.90
2016	4300 F	E 2100	W 2200	9.50	59.90	21.90
2015	4100 C	E 2000	W 2100	9.50	59.20	21.90
2014	4300 F	E 2100	W 2200	9.50	59.40	18.10
2013	4300 C	E 2100	W 2200	9.50	59.10	18.10
2012	4300 C	E 2100	W 2200	9.50	58.00	21.10
2011	4100 F	E 2000	W 2100	9.50	59.30	24.90
2010	4100 C	E 2000	W 2100	12.41	61.34	24.90
2009	4100 C	E 2000	W 2100	12.37	64.47	21.70
2008	4100 C	E 2000	W 2100	11.63	62.31	24.80
2007	5000 C	E 2500	W 2500	10.95	57.39	22.90
2006	4700 C	E 2400	W 2300	10.72	57.46	24.30
2005	4600 C	E 2300	W 2300	10.50	55.40	26.20
2004	5200 C	E 2500	W 2700	11.50	61.10	26.20
2003	4100 C	E 2000	W 2100	10.10	62.90	26.20
2002	4200 C	E 2200	W 2000	10.10	60.30	23.40

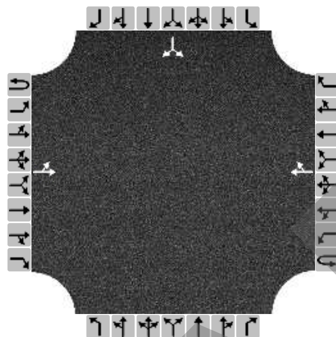
AADT FLAGS: C = COMPUTED; E = MANUAL ESTIMATE; F = FIRST YEAR ESTIMATE
S = SECOND YEAR ESTIMATE; T = THIRD YEAR ESTIMATE; R = FOURTH YEAR ESTIMATE
V = FIFTH YEAR ESTIMATE; 6 = SIXTH YEAR ESTIMATE; X = UNKNOWN
*K FACTOR: STARTING WITH YEAR 2011 IS STANDARDK, PRIOR YEARS ARE K30 VALUES

Appendix D:
Existing Year (2018) HCS7 Reports

HCS7 Two-Way Stop-Control Report

General Information		Site Information	
Analyst	Elizabeth Fernandez	Intersection	SR 70 and CR 29
Agency/Co.	H.W. Lochner	Jurisdiction	Highlands County
Date Performed	Oct 2018	East/West Street	SR 70
Analysis Year	2018	North/South Street	CR 29
Time Analyzed	AM Peak Hour	Peak Hour Factor	0.92
Intersection Orientation	East-West	Analysis Time Period (hrs)	1.00
Project Description	SR 70 from CR 29 to Lonesome Island Road		

Lanes



Major Street: East-West

Vehicle Volumes and Adjustments

Approach	Eastbound				Westbound				Northbound				Southbound			
Movement	U	L	T	R	U	L	T	R	U	L	T	R	U	L	T	R
Priority	1U	1	2	3	4U	4	5	6		7	8	9		10	11	12
Number of Lanes	0	0	1	0	0	0	1	0		0	0	0		0	1	0
Configuration		LT						TR							LR	
Volume (veh/h)		13	284				202	8						17		13
Percent Heavy Vehicles (%)		11												11		11
Proportion Time Blocked																
Percent Grade (%)													0			
Right Turn Channelized																
Median Type | Storage	Undivided															

Critical and Follow-up Headways

	EB U	EB L	EB T	EB R	WB U	WB L	WB T	WB R	NB U	NB L	NB T	NB R	SB U	SB L	SB T	SB R
Base Critical Headway (sec)		4.1												7.1		6.2
Critical Headway (sec)		4.21												6.51		6.31
Base Follow-Up Headway (sec)		2.2												3.5		3.3
Follow-Up Headway (sec)		2.30												3.60		3.40

Delay, Queue Length, and Level of Service

	EB U	EB L	EB T	EB R	WB U	WB L	WB T	WB R	NB U	NB L	NB T	NB R	SB U	SB L	SB T	SB R
Flow Rate, v (veh/h)		14													33	
Capacity, c (veh/h)		1289													569	
v/c Ratio		0.01													0.06	
95% Queue Length, Q_{95} (veh)		0.0													0.2	
Control Delay (s/veh)		7.8													11.7	
Level of Service (LOS)		A													B	
Approach Delay (s/veh)	0.4												11.7			
Approach LOS													B			

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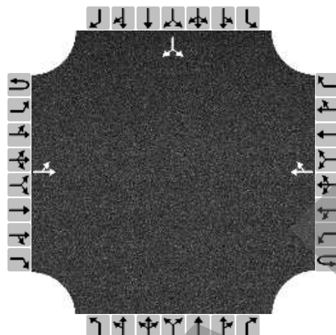
HCS7 Two-Way Stop-Control Report

General Information		Site Information	
Analyst	Elizabeth Fernandez	Intersection	SR 70 and CR 29
Agency/Co.	H.W. Lochner	Jurisdiction	Highlands County
Date Performed	Oct 2018	East/West Street	SR 70
Analysis Year	2018	North/South Street	CR 29
Time Analyzed	PM Peak Hour	Peak Hour Factor	0.92
Intersection Orientation	East-West	Analysis Time Period (hrs)	1.00
Project Description	SR 70 from CR 29 to Lonesome Island Road		

Lanes



Major Street: East-West

Vehicle Volumes and Adjustments

Approach	Eastbound				Westbound				Northbound				Southbound			
Movement	U	L	T	R	U	L	T	R	U	L	T	R	U	L	T	R
Priority	1U	1	2	3	4U	4	5	6		7	8	9		10	11	12
Number of Lanes	0	0	1	0	0	0	1	0		0	0	0		0	1	0
Configuration		LT						TR							LR	
Volume (veh/h)		8	164				239	13						13		9
Percent Heavy Vehicles (%)		11												11		11
Proportion Time Blocked																
Percent Grade (%)													0			
Right Turn Channelized																
Median Type | Storage	Undivided															

Critical and Follow-up Headways

	EB U	EB L	EB T	EB R	WB U	WB L	WB T	WB R	NB U	NB L	NB T	NB R	SB U	SB L	SB T	SB R
Base Critical Headway (sec)		4.1												7.1		6.2
Critical Headway (sec)		4.21												6.51		6.31
Base Follow-Up Headway (sec)		2.2												3.5		3.3
Follow-Up Headway (sec)		2.30												3.60		3.40

Delay, Queue Length, and Level of Service

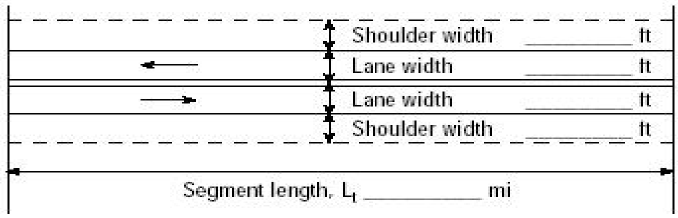
	EB U	EB L	EB T	EB R	WB U	WB L	WB T	WB R	NB U	NB L	NB T	NB R	SB U	SB L	SB T	SB R
Flow Rate, v (veh/h)		9													24	
Capacity, c (veh/h)		1239													608	
v/c Ratio		0.01													0.04	
95% Queue Length, Q_{95} (veh)		0.0													0.1	
Control Delay (s/veh)		7.9													11.2	
Level of Service (LOS)		A													B	
Approach Delay (s/veh)	0.4												11.2			
Approach LOS													B			

DIRECTIONAL TWO-LANE HIGHWAY SEGMENT WORKSHEET

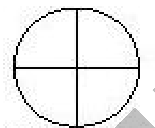
General Information		***Site Information***	
Analyst	*Elizabeth Fernandez*	Highway / Direction of Travel	*SR 70*
Agency or Company	*H.W. Lochner*	From/To	*CR 29 to Lonesome Island Road*
Date Performed	*October 2018*	Jurisdiction	*Highlands County*
Analysis Time Period	*AM Peak Hour*	Analysis Year	*2018*

Project Description: *Existing Conditions Eastbound*

Input Data



Analysis direction vol., V_d *301*veh/h
Opposing direction vol., V_o *210*veh/h
Shoulder width ft *4.0*
Lane Width ft *10.0*
Segment Length mi *2.5*



☐ Class I highway ☐ Class II highway ☑ Class III highway

Terrain ☑ Level ☐ Rolling
Grade Length mi Up/down
Peak-hour factor, PHF *0.92*
No-passing zone *0%*
% Trucks and Buses , P_T *11 %*
% Recreational vehicles, P_R *0%*
Access points *mi* *4*/mi

Average Travel Speed

	Analysis Direction (d)	Opposing Direction (o)
Passenger-car equivalents for trucks, E_T (Exhibit 15-11 or 15-12)	*1.4*	*1.5*
Passenger-car equivalents for RVs, E_R (Exhibit 15-11 or 15-13)	*1.0*	*1.0*
Heavy-vehicle adjustment factor, $f_{HV,ATS}$=1/ (1+ P_T (E_T -1)+P_R (E_R -1))	*0.958*	*0.948*
Grade adjustment factor[1], $f_{g,ATS}$ (Exhibit 15-9)	*1.00*	*1.00*
Demand flow rate[2], v_i (pc/h) $v_i=V_i$ / (PHF* $f_{g,ATS}$ * $f_{HV,ATS}$)	*342*	*241*

Free-Flow Speed from Field Measurement		**Estimated Free-Flow Speed**	
Mean speed of sample[3], S_{FM}		Base free-flow speed[4], BFFS	*60.0 mi/h*
Total demand flow rate, both directions, *v*		Adj. for lane and shoulder width,[4] f_{LS}(Exhibit 15-7)	*2.4 mi/h*
Free-flow speed, FFS=S_{FM}+0.00776(*v*/ $f_{HV,ATS}$)		Adj. for access points[4], f_A (Exhibit 15-8)	*1.0 mi/h*
Adj. for no-passing zones, $f_{np,ATS}$ (Exhibit 15-15)	*1.6 mi/h*	Free-flow speed, FFS (FSS=BFFS-f_{LS}-f_A)	*56.6 mi/h*
		Average travel speed, ATS_d=FFS-0.00776($v_{d,ATS}$ + $v_{o,ATS}$) - $f_{np,ATS}$	*50.5 mi/h*
		Percent free flow speed, PFFS	*89.2 %*

Percent Time-Spent-Following

	Analysis Direction (d)	Opposing Direction (o)
Passenger-car equivalents for trucks, E_T(Exhibit 15-18 or 15-19)	*1.1*	*1.1*
Passenger-car equivalents for RVs, E_R (Exhibit 15-18 or 15-19)	*1.0*	*1.0*
Heavy-vehicle adjustment factor, f_{HV}=1/ (1+ P_T(E_T-1)+P_R(E_R-1))	*0.989*	*0.989*
Grade adjustment factor[1], $f_{g,PTSF}$ (Exhibit 15-16 or Ex 15-17)	*1.00*	*1.00*
Directional flow rate[2], v_i(pc/h) $v_i=V_i$/(PHF*$f_{HV,PTSF}$* $f_{g,PTSF}$)	*331*	*231*
Base percent time-spent-following[4], $BPTSF_d$(%)=100(1-$e^{av_d^b}$)	*33.3*	
Adj. for no-passing zone, $f_{np,PTSF}$ (Exhibit 15-21)	*14.9*	
Percent time-spent-following, $PTSF_d$(%)=$BPTSF_d$+$f_{np,PTSF}$ *($v_{d,PTSF}$ / $v_{d,PTSF}$ + $v_{o,PTSF}$)	*42.1*	

Level of Service and Other Performance Measures

Level of service, LOS (Exhibit 15-3)	*B*
Volume to capacity ratio, *v/c*	*0.19*

Capacity, $C_{d,ATS}$ (Equation 15-12) veh/h	*1700*
Capacity, $C_{d,PTSF}$ (Equation 15-13) veh/h	*1700*
Percent Free-Flow Speed $PFFS_d$(Equation 15-11 - Class III only)	*89.2*
Bicycle Level of Service	
Directional demand flow rate in outside lane, v_{OL} (Eq. 15-24) veh/h	*327.2*
Effective width, Wv (Eq. 15-29) ft	*14.00*
Effective speed factor, S_t (Eq. 15-30)	*4.79*
Bicycle level of service score, BLOS (Eq. 15-31)	*7.89*
Bicycle level of service (Exhibit 15-4)	*F*

Notes

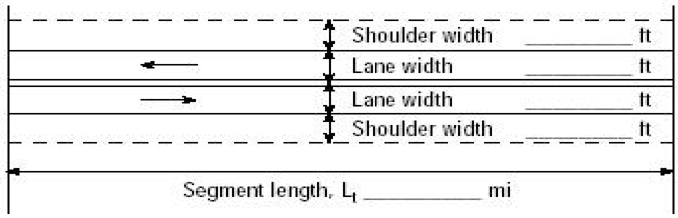
1. Note that the adjustment factor for level terrain is 1.00,as level terrain is one of the base conditions. For the purpose of grade adjustment, specific downgrade segments are treated as level terrain.
2. If v_i(v_d or v_o) >=1,700 pc/h, terminate analysis--the LOS is F.
3. For the analysis direction only and for v>200 veh/h.
4. For the analysis direction only
5. Exhibit 15-20 provides coefficients a and b for Equation 15-10.
6. Use alternative Exhibit 15-14 if some trucks operate at crawl speeds on a specific downgrade.

DIRECTIONAL TWO-LANE HIGHWAY SEGMENT WORKSHEET

General Information		Site Information	
Analyst	*Elizabeth Fernandez*	Highway / Direction of Travel	*SR 70*
Agency or Company	*H.W. Lochner*	From/To	*CR 29 to Lonesome Island Road*
Date Performed	*October 2018*	Jurisdiction	*Highlands County*
Analysis Time Period	*PM Peak Hour*	Analysis Year	*2018*

Project Description: *Existing Conditions Eastbound*

Input Data



Analysis direction vol., V_d	*177*veh/h
Opposing direction vol., V_o	*252*veh/h
Shoulder width ft	*4.0*
Lane Width ft	*10.0*
Segment Length mi	*2.5*

☐ Class I highway ☐ Class II highway ☑ Class III highway

Terrain ☑ Level ☐ Rolling

Grade Length mi	Up/down
Peak-hour factor, PHF	*0.92*
No-passing zone	*0%*
% Trucks and Buses , P_T	*11 %*
% Recreational vehicles, P_R	*0%*
Access points *mi*	*4/mi*

Average Travel Speed

	Analysis Direction (d)	Opposing Direction (o)
Passenger-car equivalents for trucks, E_T (Exhibit 15-11 or 15-12)	*1.5*	*1.4*
Passenger-car equivalents for RVs, E_R (Exhibit 15-11 or 15-13)	*1.0*	*1.0*
Heavy-vehicle adjustment factor, $f_{HV,ATS}=1/(1+P_T(E_T-1)+P_R(E_R-1))$	*0.948*	*0.958*
Grade adjustment factor[1], $f_{g,ATS}$ (Exhibit 15-9)	*1.00*	*1.00*
Demand flow rate[2], v_i (pc/h) $v_i=V_i/(PHF*f_{g,ATS}*f_{HV,ATS})$	*203*	*286*

Free-Flow Speed from Field Measurement		Estimated Free-Flow Speed	
		Base free-flow speed[4], BFFS	*60.0 mi/h*
		Adj. for lane and shoulder width,[4] f_{LS}(Exhibit 15-7)	*2.4 mi/h*
Mean speed of sample[3], S_{FM}		Adj. for access points[4], f_A (Exhibit 15-8)	*1.0 mi/h*
Total demand flow rate, both directions, *v*		Free-flow speed, FFS (FSS=BFFS-f_{LS}-f_A)	*56.6 mi/h*
Free-flow speed, FFS=S_{FM}+0.00776($v/f_{HV,ATS}$)		Average travel speed, $ATS_d=FFS-0.00776(v_{d,ATS}+v_{o,ATS})-f_{np,ATS}$	*51.3 mi/h*
Adj. for no-passing zones, $f_{np,ATS}$ (Exhibit 15-15)	*1.5 mi/h*	Percent free flow speed, PFFS	*90.6 %*

Percent Time-Spent-Following

	Analysis Direction (d)	Opposing Direction (o)
Passenger-car equivalents for trucks, E_T(Exhibit 15-18 or 15-19)	*1.1*	*1.1*
Passenger-car equivalents for RVs, E_R (Exhibit 15-18 or 15-19)	*1.0*	*1.0*
Heavy-vehicle adjustment factor, $f_{HV}=1/(1+P_T(E_T-1)+P_R(E_R-1))$	*0.989*	*0.989*
Grade adjustment factor[1], $f_{g,PTSF}$ (Exhibit 15-16 or Ex 15-17)	*1.00*	*1.00*
Directional flow rate[2], v_i(pc/h) $v_i=V_i/(PHF*f_{HV,PTSF}*f_{g,PTSF})$	*195*	*277*
Base percent time-spent-following[4], $BPTSF_d(\%)=100(1-e^{av_d^b})$	*22.9*	
Adj. for no-passing zone, $f_{np,PTSF}$ (Exhibit 15-21)	*14.8*	
Percent time-spent-following, $PTSF_d(\%)=BPTSF_d+f_{np,PTSF}*(v_{d,PTSF}/v_{d,PTSF}+v_{o,PTSF})$	*29.0*	

Level of Service and Other Performance Measures

Level of service, LOS (Exhibit 15-3)	*B*
Volume to capacity ratio, *v/c*	*0.11*

Capacity, $C_{d,ATS}$ (Equation 15-12) veh/h	*1700*
Capacity, $C_{d,PTSF}$ (Equation 15-13) veh/h	*1700*
Percent Free-Flow Speed $PFFS_d$(Equation 15-11 - Class III only)	*90.6*
Bicycle Level of Service	
Directional demand flow rate in outside lane, v_{OL} (Eq. 15-24) veh/h	*192.4*
Effective width, Wv (Eq. 15-29) ft	*14.00*
Effective speed factor, S_t (Eq. 15-30)	*4.79*
Bicycle level of service score, BLOS (Eq. 15-31)	*7.62*
Bicycle level of service (Exhibit 15-4)	*F*

Notes

1. Note that the adjustment factor for level terrain is 1.00,as level terrain is one of the base conditions. For the purpose of grade adjustment, specific downgrade segments are treated as level terrain.
2. If v_i(v_d or v_o) >=1,700 pc/h, terminate analysis--the LOS is F.
3. For the analysis direction only and for v>200 veh/h.
4. For the analysis direction only
5. Exhibit 15-20 provides coefficients a and b for Equation 15-10.
6. Use alternative Exhibit 15-14 if some trucks operate at crawl speeds on a specific downgrade.

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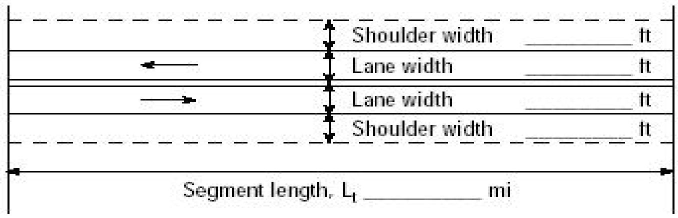
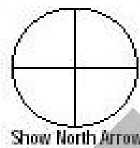
DIRECTIONAL TWO-LANE HIGHWAY SEGMENT WORKSHEET

General Information		***Site Information***	
Analyst	*Elizabeth Fernandez*	Highway / Direction of Travel	*SR 70*
Agency or Company	*H.W. Lochner*	From/To	*CR 29 to Lonesome Island Road*
Date Performed	*October 2018*	Jurisdiction	*Highlands County*
Analysis Time Period	*AM Peak Hour*	Analysis Year	*2018*

Project Description: *Existing Conditions Westbound*

Input Data





☐ Class I highway ☐ Class II highway ☑ Class III highway

Terrain ☑ Level ☐ Rolling

Grade Length mi Up/down

Peak-hour factor, PHF	*0.92*
No-passing zone	*0%*
% Trucks and Buses , P_T	*11 %*
% Recreational vehicles, P_R	*0%*
Access points *mi*	*4*/mi

Analysis direction vol., V_d	*210*veh/h
Opposing direction vol., V_o	*301*veh/h
Shoulder width ft	*4.0*
Lane Width ft	*10.0*
Segment Length mi	*2.5*

Average Travel Speed

	Analysis Direction (d)	Opposing Direction (o)
Passenger-car equivalents for trucks, E_T (Exhibit 15-11 or 15-12)	*1.5*	*1.4*
Passenger-car equivalents for RVs, E_R (Exhibit 15-11 or 15-13)	*1.0*	*1.0*
Heavy-vehicle adjustment factor, $f_{HV,ATS}=1/(1+P_T(E_T-1)+P_R(E_R-1))$	*0.948*	*0.958*
Grade adjustment factor[1], $f_{g,ATS}$ (Exhibit 15-9)	*1.00*	*1.00*
Demand flow rate[2], v_i (pc/h) $v_i=V_i/(PHF^* f_{g,ATS} {}^* f_{HV,ATS})$	*241*	*342*

Free-Flow Speed from Field Measurement		**Estimated Free-Flow Speed**	
Mean speed of sample[3], S_{FM}		Base free-flow speed[4], BFFS	*60.0 mi/h*
Total demand flow rate, both directions, *v*		Adj. for lane and shoulder width,[4] f_{LS}(Exhibit 15-7)	*2.4 mi/h*
Free-flow speed, $FFS=S_{FM}+0.00776(v/f_{HV,ATS})$		Adj. for access points[4], f_A (Exhibit 15-8)	*1.0 mi/h*
Adj. for no-passing zones, $f_{np,ATS}$ (Exhibit 15-15)	*1.4 mi/h*	Free-flow speed, FFS (FSS=BFFS-f_{LS}-f_A)	*56.6 mi/h*
		Average travel speed, $ATS_d=FFS-0.00776(v_{d,ATS}+v_{o,ATS})-f_{np,ATS}$	*50.7 mi/h*
		Percent free flow speed, PFFS	*89.5 %*

Percent Time-Spent-Following

	Analysis Direction (d)	Opposing Direction (o)
Passenger-car equivalents for trucks, E_T(Exhibit 15-18 or 15-19)	*1.1*	*1.1*
Passenger-car equivalents for RVs, E_R (Exhibit 15-18 or 15-19)	*1.0*	*1.0*
Heavy-vehicle adjustment factor, $f_{HV}=1/(1+P_T(E_T-1)+P_R(E_R-1))$	*0.989*	*0.989*
Grade adjustment factor[1], $f_{g,PTSF}$ (Exhibit 15-16 or Ex 15-17)	*1.00*	*1.00*
Directional flow rate[2], v_i(pc/h) $v_i=V_i/(PHF^*f_{HV,PTSF}{}^*f_{g,PTSF})$	*231*	*331*
Base percent time-spent-following[4], $BPTSF_d(\%)=100(1-e^{av_d^b})$	*27.1*	
Adj. for no-passing zone, $f_{np,PTSF}$ (Exhibit 15-21)	*14.9*	
Percent time-spent-following, $PTSF_d(\%)=BPTSF_d+f_{np,PTSF}{}^*(v_{d,PTSF}/v_{d,PTSF}+v_{o,PTSF})$	*33.2*	

Level of Service and Other Performance Measures

Level of service, LOS (Exhibit 15-3)	*B*
Volume to capacity ratio, *v/c*	*0.13*

Capacity, $C_{d,ATS}$ (Equation 15-12) veh/h	*1700*
Capacity, $C_{d,PTSF}$ (Equation 15-13) veh/h	*1700*
Percent Free-Flow Speed $PFFS_d$(Equation 15-11 - Class III only)	*89.5*
Bicycle Level of Service	
Directional demand flow rate in outside lane, v_{OL} (Eq. 15-24) veh/h	*228.3*
Effective width, Wv (Eq. 15-29) ft	*14.00*
Effective speed factor, S_t (Eq. 15-30)	*4.79*
Bicycle level of service score, BLOS (Eq. 15-31)	*7.71*
Bicycle level of service (Exhibit 15-4)	*F*

Notes

1. Note that the adjustment factor for level terrain is 1.00,as level terrain is one of the base conditions. For the purpose of grade adjustment, specific downgrade segments are treated as level terrain.
2. If v_i(v_d or v_o) >=1,700 pc/h, terminate analysis--the LOS is F.
3. For the analysis direction only and for v>200 veh/h.
4. For the analysis direction only
5. Exhibit 15-20 provides coefficients a and b for Equation 15-10.
6. Use alternative Exhibit 15-14 if some trucks operate at crawl speeds on a specific downgrade.

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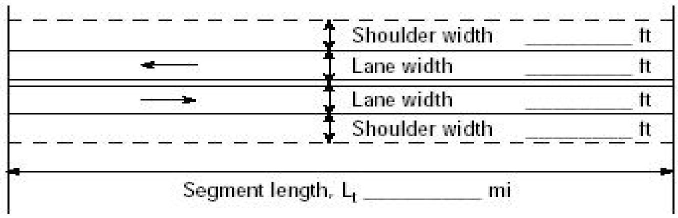
DIRECTIONAL TWO-LANE HIGHWAY SEGMENT WORKSHEET

General Information		Site Information	
Analyst	*Elizabeth Fernandez*	Highway / Direction of Travel	*SR 70*
Agency or Company	*H.W. Lochner*	From/To	*CR 29 to Lonesome Island Road*
Date Performed	*October 2018*	Jurisdiction	*Highlands County*
Analysis Time Period	*PM Peak Hour*	Analysis Year	*2018*

Project Description: *Existing Conditions Westbound*

Input Data



☐ Class I highway ☐ Class II highway ☑ Class III highway

Terrain ☑ Level ☐ Rolling

Analysis direction vol., V_d	*252*veh/h
Opposing direction vol., V_o	*177*veh/h
Shoulder width ft	*4.0*
Lane Width ft	*10.0*
Segment Length mi	*2.5*
Grade Length mi	Up/down
Peak-hour factor, PHF	*0.92*
No-passing zone	*0%*
% Trucks and Buses, P_T	*11* %
% Recreational vehicles, P_R	*0%*
Access points *mi*	*4*/mi

Average Travel Speed

	Analysis Direction (d)	Opposing Direction (o)
Passenger-car equivalents for trucks, E_T (Exhibit 15-11 or 15-12)	*1.4*	*1.5*
Passenger-car equivalents for RVs, E_R (Exhibit 15-11 or 15-13)	*1.0*	*1.0*
Heavy-vehicle adjustment factor, $f_{HV,ATS}=1/(1+P_T(E_T-1)+P_R(E_R-1))$	*0.958*	*0.948*
Grade adjustment factor[1], $f_{g,ATS}$ (Exhibit 15-9)	*1.00*	*1.00*
Demand flow rate[2], v_i (pc/h) $v_i=V_i/(PHF^* f_{g,ATS} * f_{HV,ATS})$	*286*	*203*

Free-Flow Speed from Field Measurement		Estimated Free-Flow Speed	
Mean speed of sample[3], S_{FM}		Base free-flow speed[4], BFFS	*60.0 mi/h*
Total demand flow rate, both directions, *v*		Adj. for lane and shoulder width,[4] f_{LS}(Exhibit 15-7)	*2.4 mi/h*
Free-flow speed, $FFS=S_{FM}+0.00776(v/f_{HV,ATS})$		Adj. for access points[4], f_A (Exhibit 15-8)	*1.0 mi/h*
Adj. for no-passing zones, $f_{np,ATS}$ (Exhibit 15-15)	*1.6 mi/h*	Free-flow speed, FFS ($FSS=BFFS-f_{LS}-f_A$)	*56.6 mi/h*
		Average travel speed, $ATS_d=FFS-0.00776(v_{d,ATS}+v_{o,ATS})-f_{np,ATS}$	*51.2 mi/h*
		Percent free flow speed, PFFS	*90.4 %*

Percent Time-Spent-Following

	Analysis Direction (d)	Opposing Direction (o)
Passenger-car equivalents for trucks, E_T(Exhibit 15-18 or 15-19)	*1.1*	*1.1*
Passenger-car equivalents for RVs, E_R (Exhibit 15-18 or 15-19)	*1.0*	*1.0*
Heavy-vehicle adjustment factor, $f_{HV}=1/(1+P_T(E_T-1)+P_R(E_R-1))$	*0.989*	*0.989*
Grade adjustment factor[1], $f_{g,PTSF}$ (Exhibit 15-16 or Ex 15-17)	*1.00*	*1.00*
Directional flow rate[2], v_i(pc/h) $v_i=V_i/(PHF^*f_{HV,PTSF}*f_{g,PTSF})$	*277*	*195*
Base percent time-spent-following[4], $BPTSF_d(\%)=100(1-e^{av_d^b})$	*28.3*	
Adj. for no-passing zone, $f_{np,PTSF}$ (Exhibit 15-21)	*14.8*	
Percent time-spent-following, $PTSF_d(\%)=BPTSF_d+f_{np,PTSF}*(v_{d,PTSF}/v_{d,PTSF}+v_{o,PTSF})$	*37.0*	

Level of Service and Other Performance Measures

Level of service, LOS (Exhibit 15-3)	*B*
Volume to capacity ratio, *v/c*	*0.16*

Capacity, $C_{d,ATS}$ (Equation 15-12) veh/h	*1700*
Capacity, $C_{d,PTSF}$ (Equation 15-13) veh/h	*1700*
Percent Free-Flow Speed $PFFS_d$(Equation 15-11 - Class III only)	*90.4*
Bicycle Level of Service	
Directional demand flow rate in outside lane, v_{OL} (Eq. 15-24) veh/h	*273.9*
Effective width, Wv (Eq. 15-29) ft	*14.00*
Effective speed factor, S_t (Eq. 15-30)	*4.79*
Bicycle level of service score, BLOS (Eq. 15-31)	*7.81*
Bicycle level of service (Exhibit 15-4)	*F*

Notes

1. Note that the adjustment factor for level terrain is 1.00,as level terrain is one of the base conditions. For the purpose of grade adjustment, specific downgrade segments are treated as level terrain.
2. If v_i(v_d or v_o) >=1,700 pc/h, terminate analysis--the LOS is F.
3. For the analysis direction only and for v>200 veh/h.
4. For the analysis direction only
5. Exhibit 15-20 provides coefficients a and b for Equation 15-10.
6. Use alternative Exhibit 15-14 if some trucks operate at crawl speeds on a specific downgrade.

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Appendix E:
Crash Data

Section/Roadway ID:	09060000	State Road:	SR 70
Intersecting Route:	CR 29 to Lonesome Island Road	Study Period:	1/1/2013 To: 12/31/2017
Milepost:	17.255 - 21.573	Data by:	SPM
County:	Highlands County	Date:	11/5/2018

Crash Number	Date	Day	Time	Severity		Property Damage	Crash Type	Day / Night	Wet / Dry	Contributing Cause
				Fatal	Injury					
1	11/24/2017	Fri	04:03 AM	0	0	$5,200	Hit Fixed Object	Day	Dry	Careless/ Negligent Driving
2	10/1/2017	Sun	06:21 PM	0	2	$49,000	Sideswipe, same direction	Night	Dry	No Contributing Action
3	9/30/2017	Sat	05:53 PM	0	0	$2,000	Animal (Non-Located)	Night	Dry	No Contributing Action
4	7/6/2017	Thu	03:32 PM	0	1	$5,000	Hit Fixed Object	Night	Dry	Careless/ Negligent Driving
5	4/15/2017	Sat	10:30 PM	1	3	$4,300	Pedestrian	Day	Dry	No Contributing Action
6	2/11/2017	Sat	02:00 PM	0	0	$8,000	Angle	Night	Dry	Failed to Yield Right-of-Way
7	1/26/2017	Thu	11:30 PM	0	0	$100	Hit Fixed Object	Day	Dry	Miscellaneous Contributing Cause
8	12/24/2016	Sat	11:50 AM	0	1	$12,000	Rear End	Night	Dry	No Contributing Action
9	12/21/2016	Wed	02:20 PM	0	0	$1,000	Sideswipe, same direction	Night	Dry	Miscellaneous Contributing Cause
10	11/16/2016	Wed	01:30 AM	0	0	$2,000	Animal (Non-Located)	Day	Dry	No Contributing Action
11	7/17/2016	Sun	04:30 AM	0	0	$20,200	Ran Off Road	Day	Dry	Careless/ Negligent Driving
12	7/16/2016	Sat	11:20 AM	0	0	$12,000	Other	Night	Dry	No Contributing Action
13	6/29/2016	Wed	11:01 AM	0	0	$9,000	Hit Fixed Object	Night	Dry	Careless/ Negligent Driving
14	4/6/2016	Wed	11:35 AM	0	2	$5,500	Other	Night	Dry	Other Contributing Action
15	1/10/2016	Sun	12:05 AM	0	0	$14,000	Animal (Non-Located)	Day	Dry	No Contributing Action
16	12/6/2015	Sun	12:00 AM	0	0	$5,200	Other	Night	Dry	Other Contributing Action
17	11/28/2015	Sat	06:40 PM	0	1	$13,000	Sideswipe, Opposite direction	Night	Dry	Failed to Keep in Proper Lane
18	10/16/2015	Fri	08:45 AM	0	0	$6,500	Sideswipe, Opposite direction	Night	Dry	Careless/ Negligent Driving
19	9/21/2015	Mon	09:00 AM	0	0	$3,000	Sideswipe, same direction	Night	Dry	Careless/ Negligent Driving
20	9/6/2015	Sun	09:45 PM	0	0	$2,100	Ran Off Road	Day	Water (standing /moving)	Miscellaneous Contributing Cause
21	8/23/2015	Sun	05:50 PM	0	2	$5,000	Hit Fixed Object	Night	Wet	No Contributing Action

Crash Number	Date	Day	Time	Severity		Property Damage	Crash Type	Day / Night	Wet / Dry	Contributing Cause
				Fatal	Injury					
22	8/10/2015	Mon	12:20 PM	0	2	$4,000	Angle	Night	Dry	Failed to Yield Right-of-Way
23	6/1/2015	Mon	09:30 AM	0	0	$10,400	Hit Fixed Object	Night	Dry	Careless/ Negligent Driving
24	5/12/2015	Tue	12:10 PM	0	0	$4,000	Rear End	Night	Dry	Careless/ Negligent Driving
25	4/16/2015	Thu	06:30 AM	0	0	$7,500	Rear End	Night	Dry	Careless/ Negligent Driving
26	3/27/2015	Fri	03:51 PM	1	2	$30,000	Sideswipe, Opposite direction	Night	Wet	Failed to Keep in Proper Lane
27	2/13/2015	Fri	06:00 PM	0	0	$501	Sideswipe, Opposite direction	Night	Dry	Unknown
28	11/7/2014	Fri	08:55 AM	0	1	$12,000	Other	Night	Dry	No Contributing Action
29	7/2/2014	Wed	12:00 PM	0	0	$2,000	Other	Night	Dry	Miscellaneous Contributing Cause
30	6/19/2014	Thu	09:20 PM	0	0	$11,500	Animal (Non-Located)	Day	Wet	No Contributing Action
31	5/3/2014	Sat	12:50 AM	0	1	$10,000	Animal (Non-Located)	Day	Dry	No Contributing Action
32	4/14/2014	Mon	01:00 AM	0	0	$500	Animal (Non-Located)	Day	Wet	No Contributing Action
33	3/5/2014	Wed	08:15 AM	0	1	$1,000	Other	Night	Dry	No Contributing Action
34	1/28/2014	Tue	02:30 PM	0	0	$1,500	Other	Night	Dry	Unknown
35	12/15/2013	Sun	05:37 PM	0	1	$5,000	Ran Off Road	Day	Dry	Failed to Keep in Proper Lane
36	9/15/2013	Sun	11:45 PM	0	0	$9,000	Animal (Non-Located)	Day	Dry	Careless/ Negligent Driving
37	1/1/2013	Tue	10:30 AM	0	1	$8,500	Rear End	Night	Dry	Careless/ Negligent Driving

Florida Average Crash Rates for Urban Segments Crash Rates Per Million Vehicle Miles							
CC	**Category**	**2011**	**2012**	**2013**	**2014**	**2015**	**5 Year Average**
40	One Way	*6.755*	*8.357*	*10.061*	*10.940*	*10.757*	*9.399*
10	2-3 Lanes 2wy Div Rasd	*4.545*	*4.857*	*6.004*	*6.267*	*7.535*	*5.849*
11	2-3 Lanes 2wy Div Pavd	*3.207*	*4.018*	*4.654*	*5.428*	*6.238*	*4.701*
12	2-3 Lanes 2wy Undivided	*2.238*	*2.685*	*3.198*	*3.461*	*3.452*	*2.993*
20	4-5 Lanes 2wy Div Rasd	*2.331*	*2.756*	*3.168*	*3.495*	*3.753*	*3.124*
21	4-5 Lanes 2wy Div Pavd	*3.942*	*4.665*	*5.141*	*5.795*	*6.162*	*5.145*
22	4-5 Lanes 2wy Undivided	*3.972*	*5.228*	*6.067*	*6.263*	*6.992*	*5.683*
30	6+ Lanes 2wy Div Rasd	*3.183*	*3.570*	*4.085*	*4.511*	*4.867*	*4.066*
31	6+ Lanes 2wy Div Pavd	*3.287*	*4.197*	*4.760*	*5.175*	*5.493*	*4.591*
32	6+ Lanes 2wy Undivided	*66.184*	*39.769*	*54.148*	*71.186*	*68.039*	*58.320*
1	Interstate	*0.671*	*0.771*	*0.888*	*0.907*	*0.991*	*0.850*
3	Toll Road	*0.529*	*0.609*	*0.766*	*0.761*	*0.779*	*0.695*
7	Ramp	*0.000*	*0.000*	*0.000*	*0.000*	*0.000*	*0.000*
5	Other Limited access	*1.385*	*1.873*	*1.803*	*1.928*	*2.089*	*1.799*

Florida Average Crash Rates for Rural Segments Crash Rates Per Million Vehicle Miles							
CC	**Category**	**2011**	**2012**	**2013**	**2014**	**2015**	**5 Year Average**
42	One Way	*6.835*	*9.368*	*13.940*	*3.149*	*3.624*	*4.946*
16	2-3 Lanes 2wy Div Rasd	*0.869*	*0.995*	*1.510*	*0.794*	*0.901*	*1.012*
17	2-3 Lanes 2wy Div Pavd	*1.761*	*1.705*	*1.884*	*1.755*	*1.885*	*1.808*
18	2-3 Lanes 2wy Undivided	*0.560*	*0.647*	*0.718*	*0.727*	*0.777*	*0.687*
26	4-5 Lanes 2wy Div Rasd	*0.540*	*0.605*	*0.684*	*0.643*	*0.717*	*0.641*
27	4-5 Lanes 2wy Div Pavd	*0.437*	*0.401*	*0.636*	*0.531*	*0.499*	*0.492*
28	4-5 Lanes 2wy Undivided	*0.000*	*0.000*	*0.000*	*0.000*	*0.000*	*0.000*
36	6+ Lanes 2wy Div Rasd	*1.383*	*1.386*	*1.030*	*0.369*	*0.793*	*1.054*
37	6+ Lanes 2wy Div Pavd	*0.076*	*0.060*	*0.000*	*0.000*	*0.000*	*0.093*
38	6+ Lanes 2wy Undivided	*0.000*	*0.000*	*0.000*	*0.000*	*0.000*	*0.000*
2	Interstate	*0.339*	*0.366*	*0.438*	*0.415*	*0.498*	*0.412*
4	Toll Road	*0.322*	*0.354*	*0.426*	*0.370*	*0.454*	*0.384*
8	Ramp	*0.000*	*0.000*	*0.000*	*0.000*	*0.000*	*0.000*
6	Other Limited access	*0.224*	*0.112*	*0.502*	*0.819*	*1.224*	*0.545*

Appendix F:
TURNS5 Design Hour Volumes

TURNS5 ANALYSIS SHEET - INPUT

Analyst:	H.W. Lochner
Date:	7-Jan-19
Highway:	SR 70
Intersection:	CR 29
From:	AM Peak Hour
To:	
County:	Highlands

Is the Mainline Oriented North/South?

Enter Yes or No
- ◯ Yes
- ◉ No

K Factors

Mainline	Sidestreet
9.50%	9.50%

D Factors

Mainline	
41.2%	Westbound (WB)
58.8%	Eastbound (EB)
Sidestreet	
41.2%	Northbound (NB)
58.8%	Southbound (SB)

Do you have FTSUTMS Model Year traffic from which you would like to interpolate/extrapolate for project years? (Y/N)

Enter Yes or No
- ◉ Yes
- ◯ No

If "Yes" go to cell C47 | If "No" go to cell C31

Enter Year and Growth Rates from Base Year:

	Year	*Rate* (1.0% = 0.01) Mainline	Side Street
Base	2015		
Opening	2025	3.00%	3.00%
Mid	2035		
Design	2045		

Mainline Growth Function
- ◉ Linear
- ◯ Exponential
- ◯ Decaying

Side Street Growth Function
- ◉ Linear
- ◯ Exponential
- ◯ Decaying

Enter Base Year AADTs for Volume Comparison:
(growth rates are used to calculate other project years)

From West: EB Approach	*From East: WB Approach*	*From North: SB Approach*	*From South: NB Approach*	***TOTAL***
4900	4400	500	0	9800

Enter Project and Model Years

	Year
Base	2015
Opening	2025
Mid	2035
Design	2045
Model	2040

Enter Base and Model Year AADTs for Volume Comparison:
(volumes for other project years are calculated by interpolation)

	From West: EB Approach	*From East: WB Approach*	*From North: SB Approach*	*From South: NB Approach*	***TOTAL***
2015	4900	4400	500	0	9800
2040	7300	7700	1000	0	16000

		1st Guess Turning %'s for AADT Balancing	**Actual/Counted Traffic for 2015**
(EB LT)	*West-to-North*	12%	12
(EB THRU)	*West-to-East*	88%	261
(EB RT)	*West-to-South*	0%	0
(WB LT)	*East-to-South*	0%	0
(WB THRU)	*East-to-West*	91%	185
(WB RT)	*East-to-North*	9%	7
(SB LT)	*North-to-East*	41%	16
(SB THRU)	*North-to-South*	1%	0
(SB RT)	*North-to-West*	58%	12
(NB LT)	*South-to-West*	55%	0
(NB THRU)	*South-to-North*	7%	0
(NB RT)	*South-to-East*	38%	0

(must be done manually)

Desired Closure: 0.10

TURNS5 INITIAL TURNING VOLUME SUMMARY

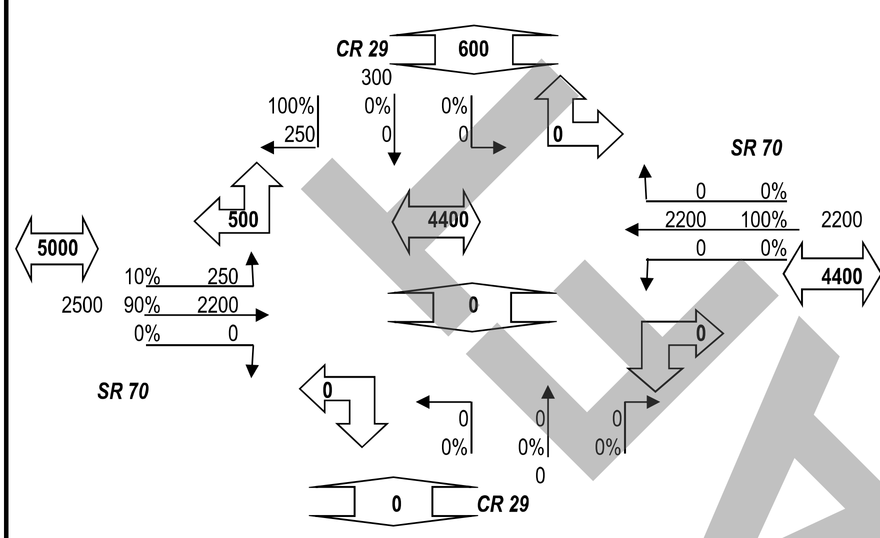
Highway:	SR 70	**County:**	Highlands
Intersection:	CR 29		
From:	AM Peak Hour	**Analyst:**	H.W. Lochner
To:	0	**Date:**	10-Oct-18

Approach-To-Approach	2015 Initial Estimate	2015 Final Estimate	2015 Turning Volume	2025 Final Estimate	2025 Calculated Volume	2035 Final Estimate	2035 Turning Volume	2045 Final Estimate	2045 Calculated Volume
West-To-North (LT)	0.12	0.102	200	0.070	200	0.050	200	0.034	100
West-To-East (Thru)	0.88	0.898	2200	0.930	2700	0.950	3200	0.966	3800
West-To-South (RT)	0.00	0.000	0	0.000	0	0.000	0	0.000	0
Total Flow From West:			**2400**		**2900**		**3400**		**3900**
East-To-South (LT)	0.00	0.000	0	0.000	0	0.000	0	0.000	0
East-To-West (Thru)	0.91	1.000	2200	0.949	2700	0.921	3200	0.900	3800
East-To-North (RT)	0.09	0.000	0	0.051	100	0.079	300	0.100	400
Total Flow From East:			**2200**		**2800**		**3500**		**4200**
North-To-East (LT)	0.41	0.000	0	0.407	100	0.613	300	0.758	400
North-To-South (Thru)	0.01	0.000	0	0.000	0	0.000	0	0.000	0
North-To-West (RT)	0.58	1.000	200	0.593	200	0.387	200	0.242	100
Total Flow From North:			**200**		**300**		**500**		**500**
South-To-West (LT)	0.55	0.000	0	0.000	0	0.000	0	0.000	0
South-To-North (Thru)	0.07	0.000	0	0.000	0	0.000	0	0.000	0
South-To-East (RT)	0.38	0.000	0	0.000	0	0.000	0	0.000	0
Total Flow From South:			**0**		**0**		**0**		**0**

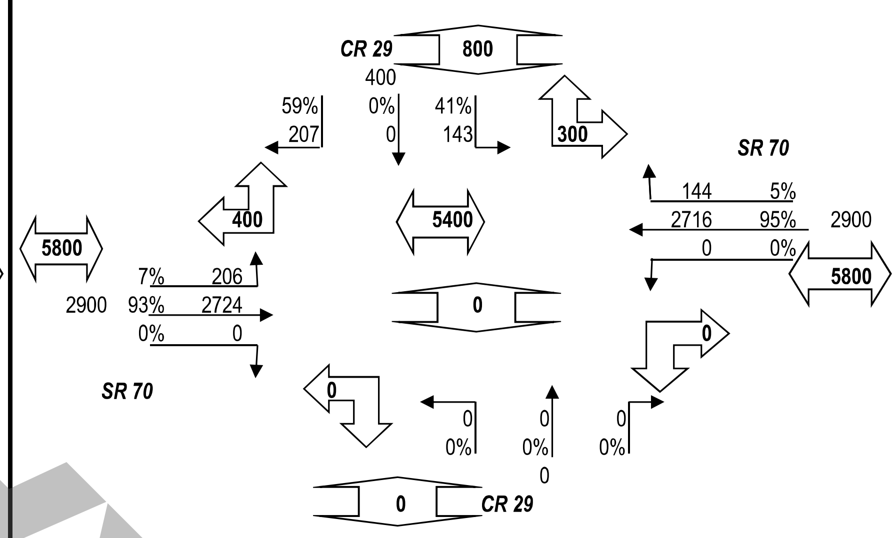
PLEASE NOTE: These are the Initial Balanced Turning Movements. They are directional.
The volumes as shown in the the output Turning Movement Diagrams have been smoothed to reflect two-way flow.

PROJECT TRAFFIC FOR SR 70 AT CR 29: AM Peak Hour

2-WAY AADT TURNING MOVEMENTS IN YEAR 2015



2-WAY AADT TURNING MOVEMENTS IN YEAR 2025



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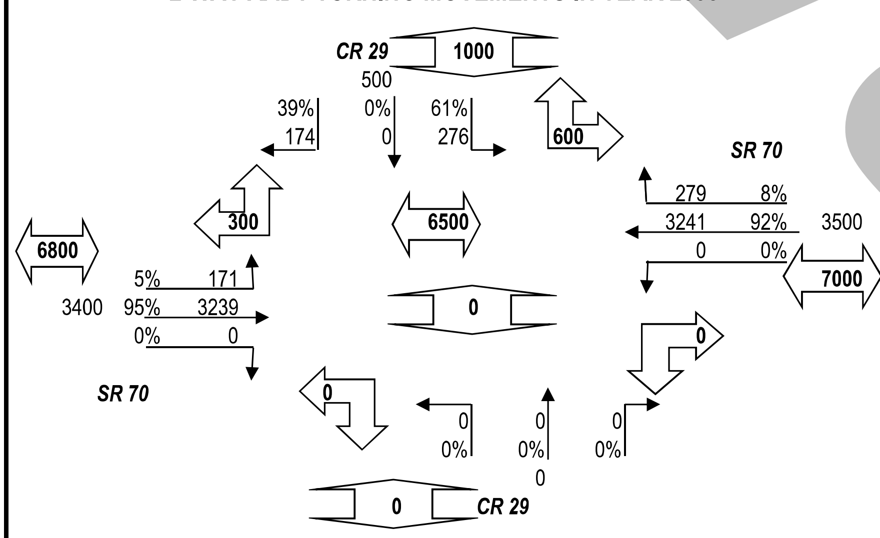

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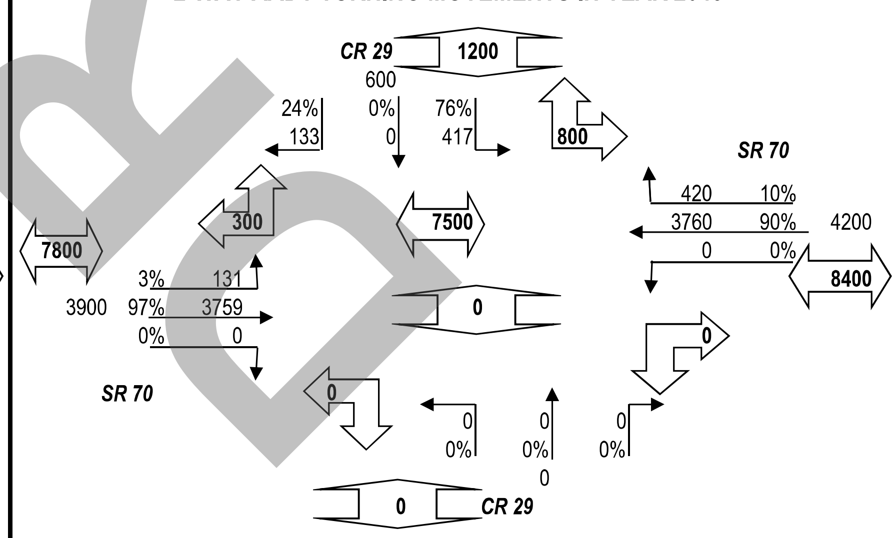
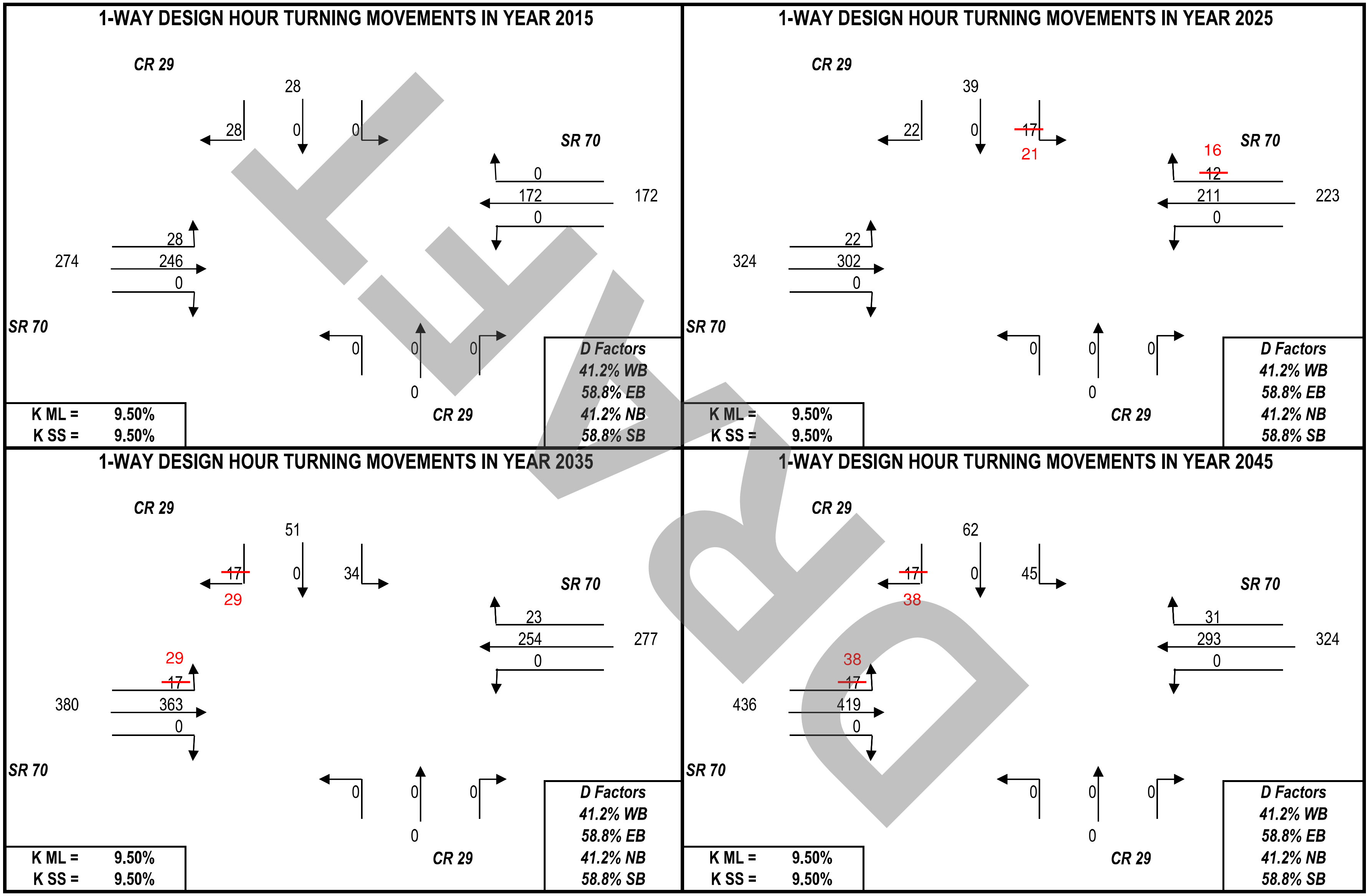


PROJECT TRAFFIC FOR SR 70 AT CR 29: AM Peak Hour



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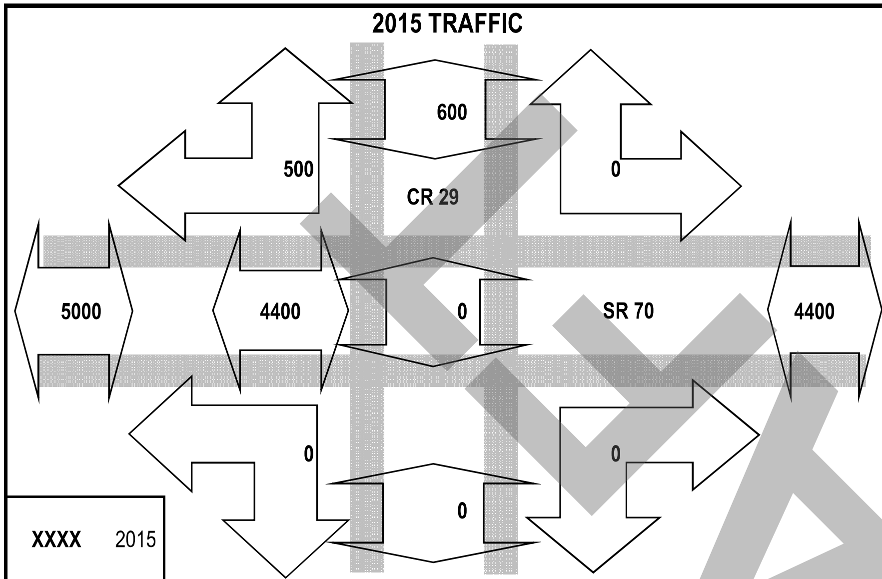
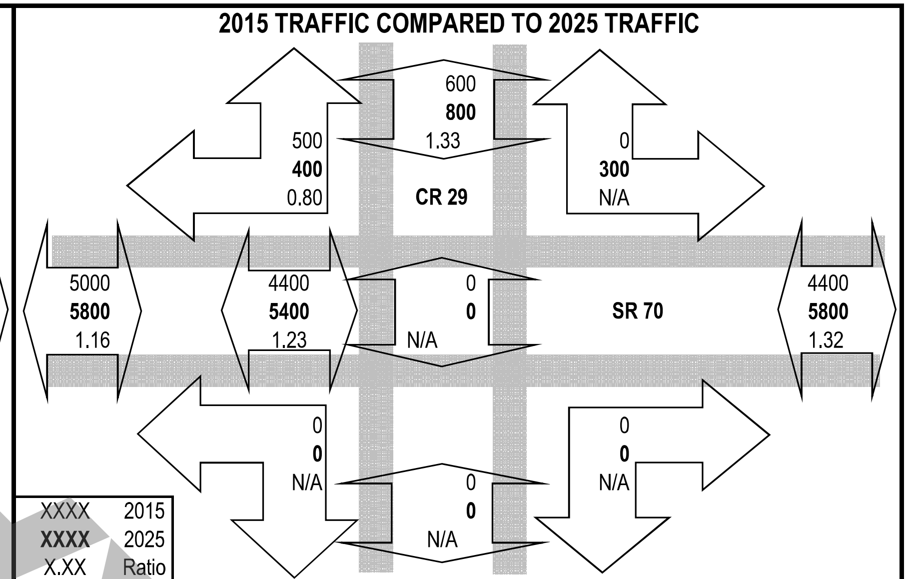
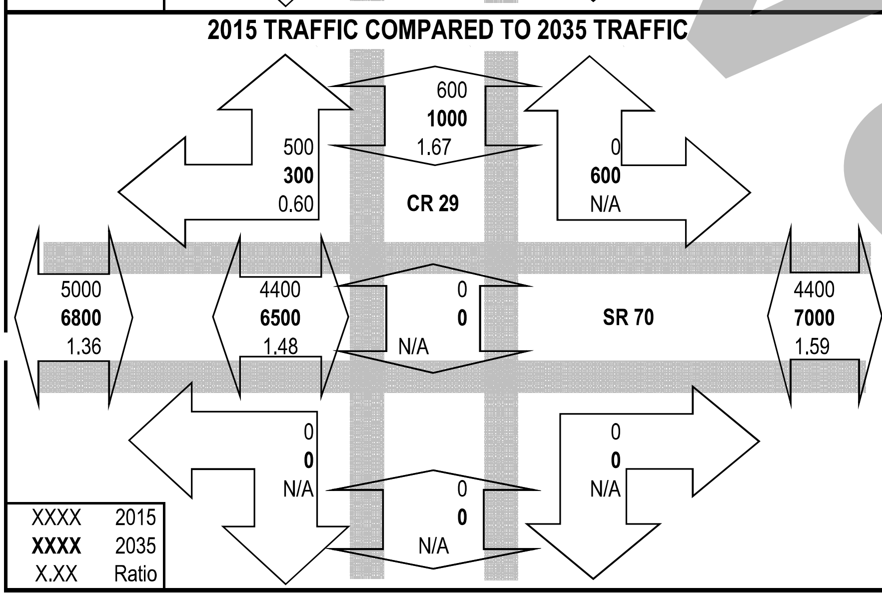
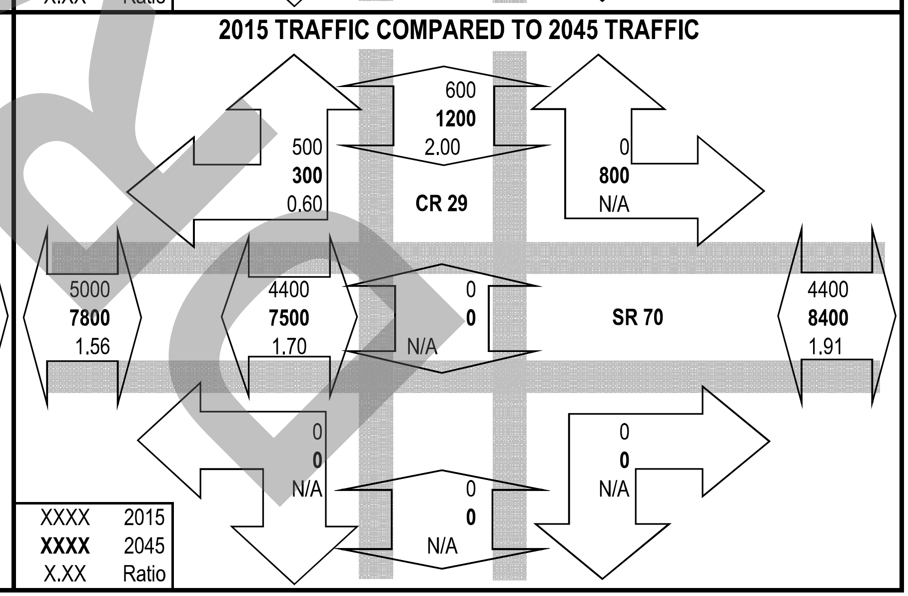
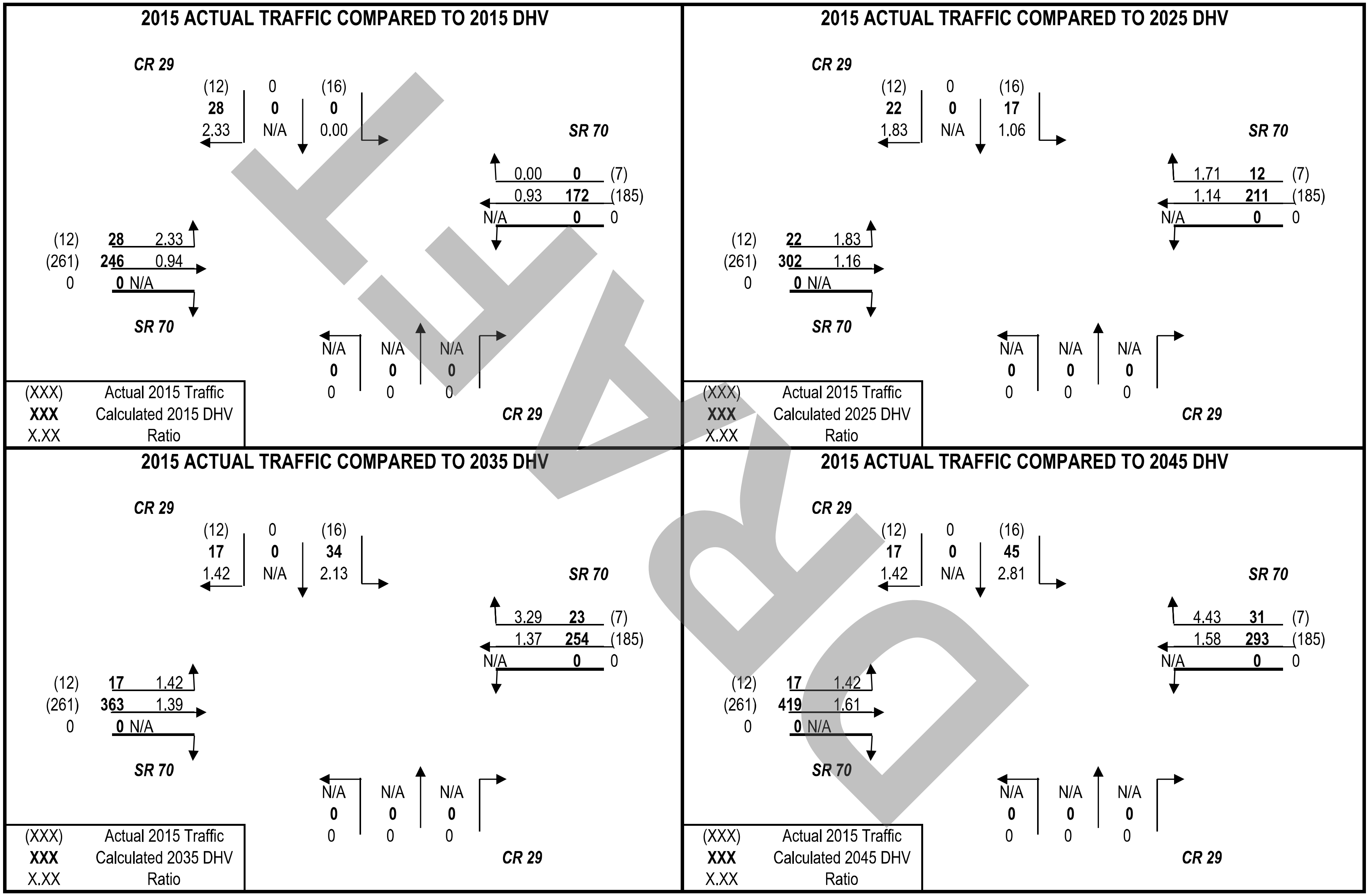








PROJECT TRAFFIC FOR SR 70 AT CR 29: AM Peak Hour



TURNS5 ANALYSIS SHEET - INPUT

Analyst:	H.W. Lochner
Date:	7-Jan-19
Highway:	SR 70
Intersection:	CR 29
From:	PM Peak Hour
To:	
County:	Highlands

Is the Mainline Oriented North/South?

Enter Yes or No
- ◯ Yes
- ◉ No

K Factors

Mainline	9.50%
Sidestreet	9.50%

D Factors

Mainline	
58.8%	Westbound (WB)
41.2%	Eastbound (EB)
Sidestreet	
58.8%	Northbound (NB)
41.2%	Southbound (SB)

Do you have FTSUTMS Model Year traffic from which you would like to interpolate/extrapolate for project years? (Y/N)

Enter Yes or No
- ◉ Yes
- ◯ No

If "Yes" go to cell C47 If "No" go to cell C31

Enter Year and Growth Rates from Base Year:

	Year	*Rate* (1.0% = 0.01) Mainline	Side Street
Base	2015		
Opening	2025	3.00%	3.00%
Mid	2035		
Design	2045		

Mainline Growth Function
- ◉ Linear
- ◯ Exponential
- ◯ Decaying

Side Street Growth Function
- ◉ Linear
- ◯ Exponential
- ◯ Decaying

Enter Base Year AADTs for Volume Comparison:
(growth rates are used to calculate other project years)

From West: EB Approach	*From East: WB Approach*	*From North: SB Approach*	*From South: NB Approach*	***TOTAL***
4900	4400	500	0	9800

Enter Project and Model Years

	Year
Base	2015
Opening	2025
Mid	2035
Design	2045
Model	2040

Enter Base and Model Year AADTs for Volume Comparison:
(volumes for other project years are calculated by interpolation)

	From West: EB Approach	*From East: WB Approach*	*From North: SB Approach*	*From South: NB Approach*	***TOTAL***
2015	4900	4400	500	0	9800
2040	7300	7700	1000	0	16000

		1st Guess Turning %'s for AADT Balancing	**Actual/Counted Traffic for 2015**
(EB LT)	*West-to-North*	12%	7
(EB THRU)	*West-to-East*	88%	150
(EB RT)	*West-to-South*	0%	0
(WB LT)	*East-to-South*	0%	0
(WB THRU)	*East-to-West*	91%	219
(WB RT)	*East-to-North*	9%	12
(SB LT)	*North-to-East*	41%	12
(SB THRU)	*North-to-South*	1%	0
(SB RT)	*North-to-West*	58%	8
(NB LT)	*South-to-West*	55%	0
(NB THRU)	*South-to-North*	7%	0
(NB RT)	*South-to-East*	38%	0

(must be done manually)

Desired Closure: 0.10

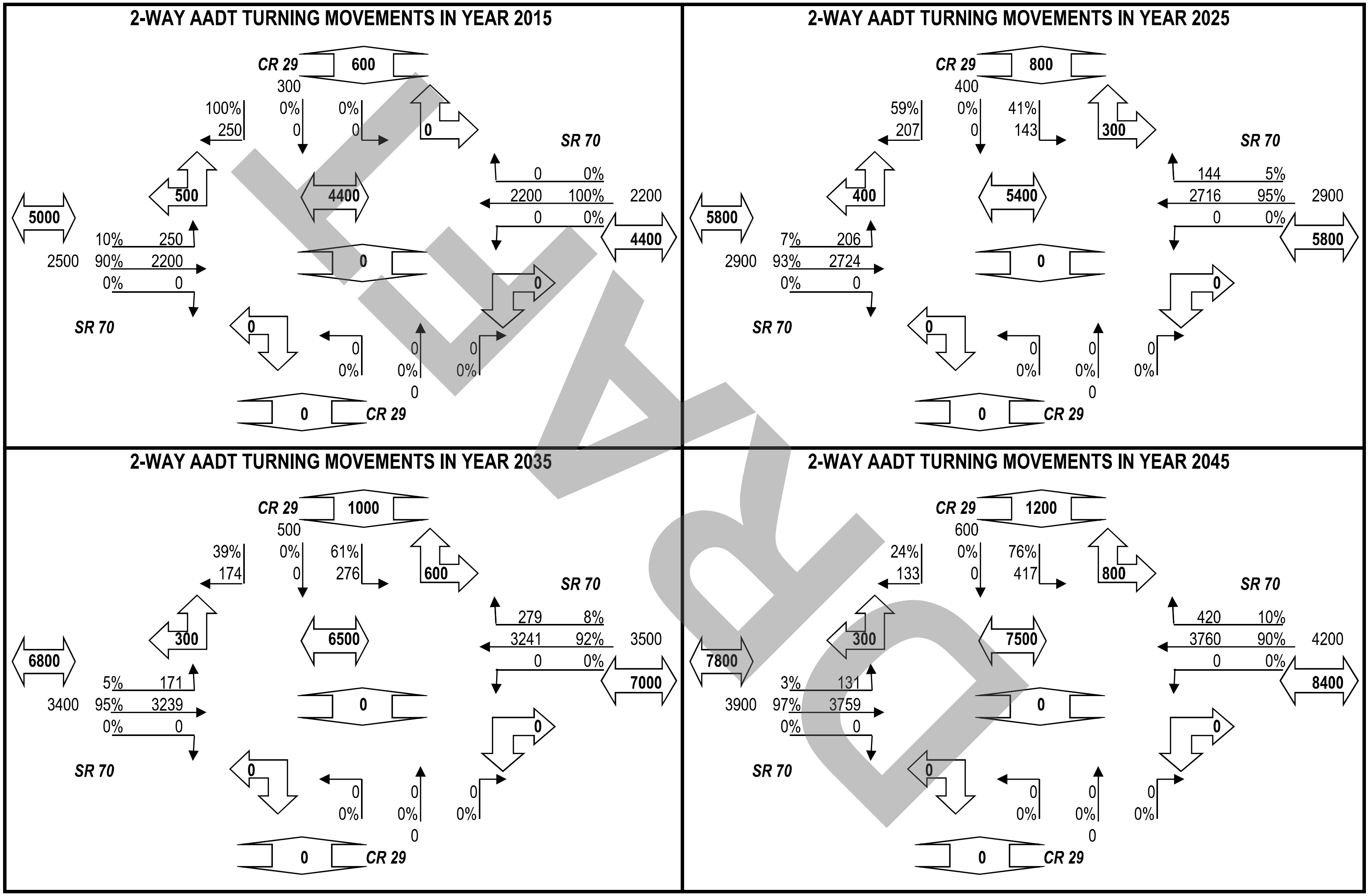
TURNS5 INITIAL TURNING VOLUME SUMMARY

Highway:	SR 70	**County:**	Highlands
Intersection:	CR 29		
From:	PM Peak Hour	**Analyst:**	H.W. Lochner
To:	0	**Date:**	10-Oct-18

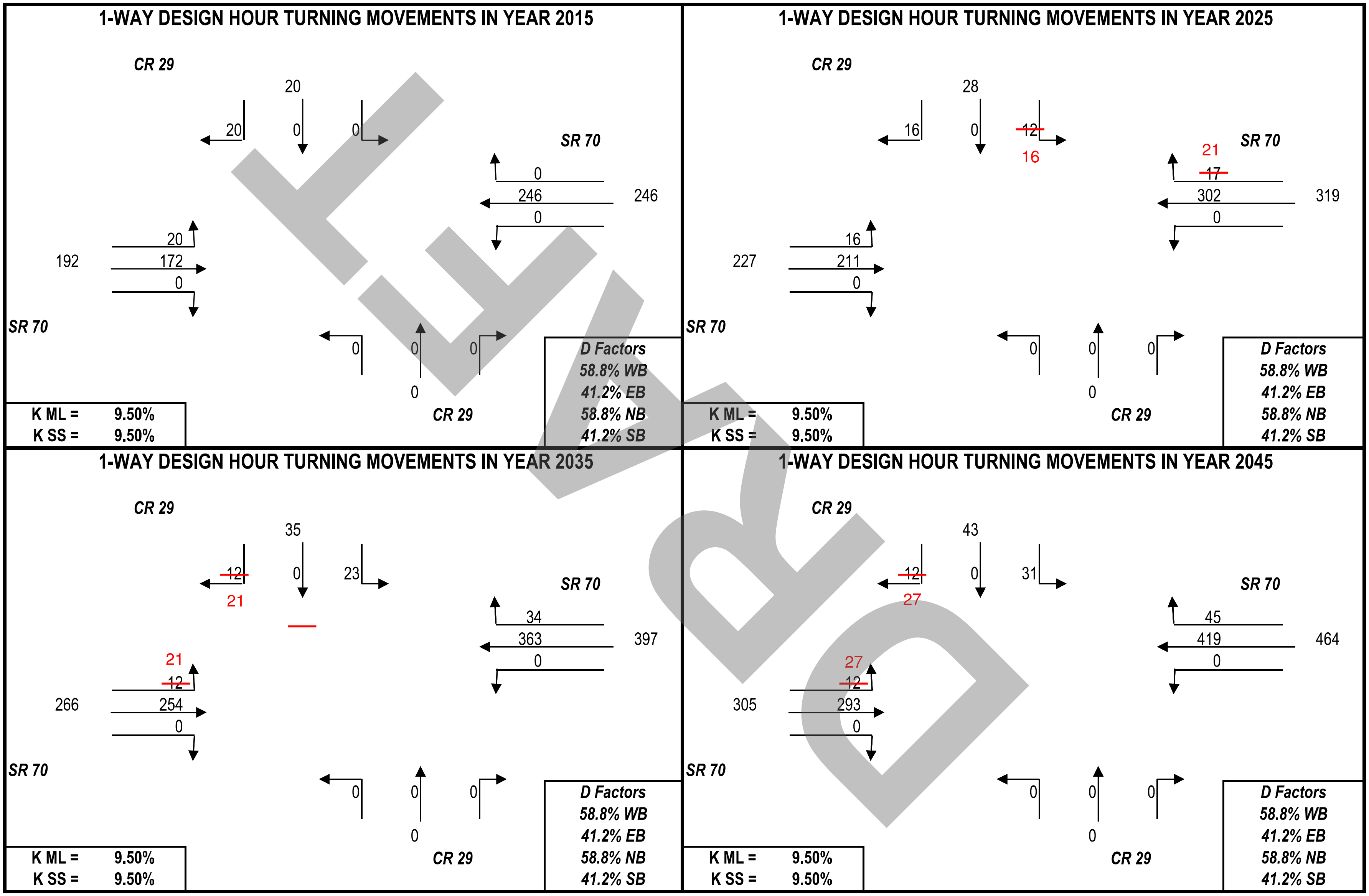
Approach-To-Approach	2015 Initial Estimate	2015 Final Estimate	2015 Turning Volume	2025 Final Estimate	2025 Calculated Volume	2035 Final Estimate	2035 Turning Volume	2045 Final Estimate	2045 Calculated Volume
West-To-North (LT)	0.12	0.102	200	0.070	200	0.050	200	0.034	100
West-To-East (Thru)	0.88	0.898	2200	0.930	2700	0.950	3200	0.966	3800
West-To-South (RT)	0.00	0.000	0	0.000	0	0.000	0	0.000	0
Total Flow From West:			**2400**		**2900**		**3400**		**3900**
East-To-South (LT)	0.00	0.000	0	0.000	0	0.000	0	0.000	0
East-To-West (Thru)	0.91	1.000	2200	0.949	2700	0.921	3200	0.900	3800
East-To-North (RT)	0.09	0.000	0	0.051	100	0.079	300	0.100	400
Total Flow From East:			**2200**		**2800**		**3500**		**4200**
North-To-East (LT)	0.41	0.000	0	0.407	100	0.613	300	0.758	400
North-To-South (Thru)	0.01	0.000	0	0.000	0	0.000	0	0.000	0
North-To-West (RT)	0.58	1.000	200	0.593	200	0.387	200	0.242	100
Total Flow From North:			**200**		**300**		**500**		**500**
South-To-West (LT)	0.55	0.000	0	0.000	0	0.000	0	0.000	0
South-To-North (Thru)	0.07	0.000	0	0.000	0	0.000	0	0.000	0
South-To-East (RT)	0.38	0.000	0	0.000	0	0.000	0	0.000	0
Total Flow From South:			**0**		**0**		**0**		**0**

PLEASE NOTE: These are the Initial Balanced Turning Movements. They are directional.
The volumes as shown in the the output Turning Movement Diagrams have been smoothed to reflect two-way flow.

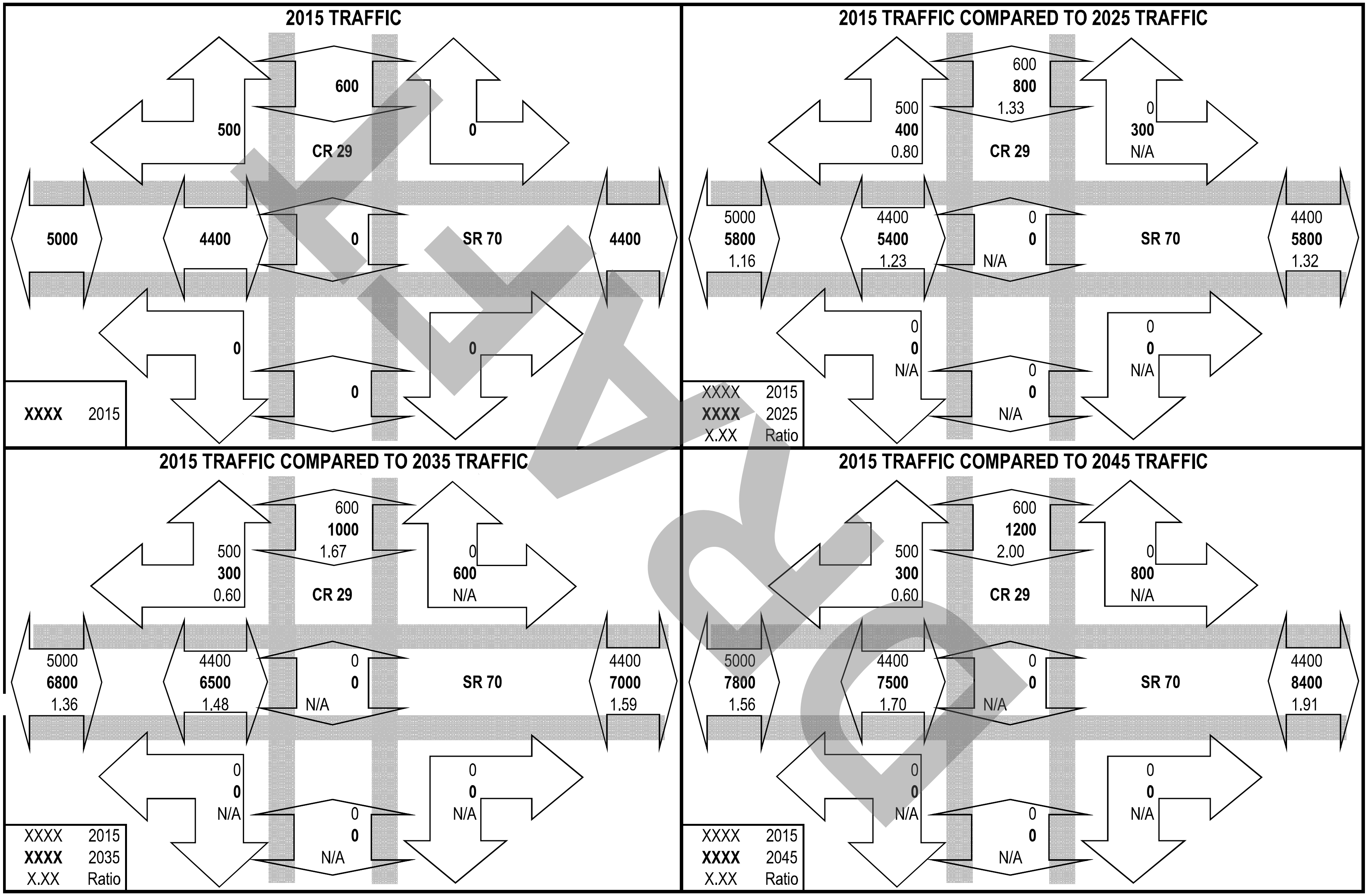
PROJECT TRAFFIC FOR SR 70 AT CR 29: PM Peak Hour



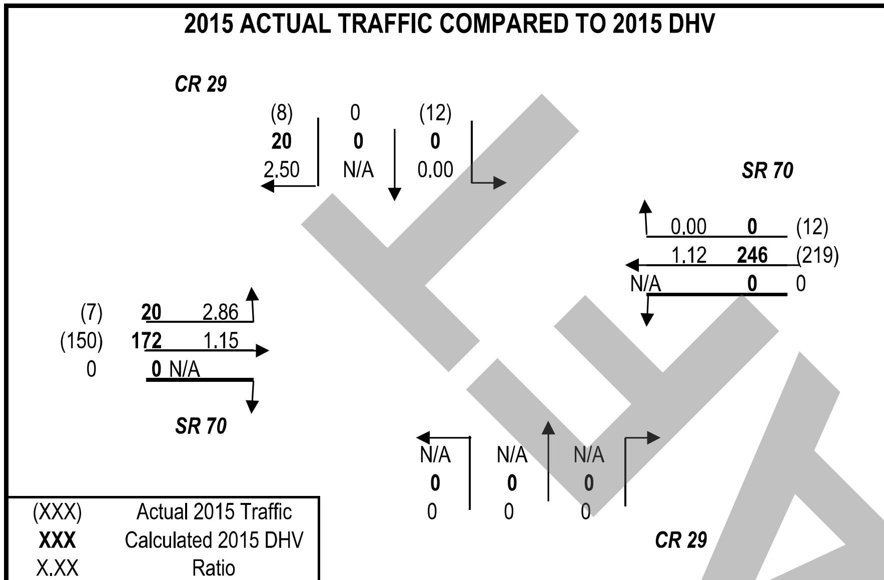
PROJECT TRAFFIC FOR SR 70 AT CR 29: PM Peak Hour

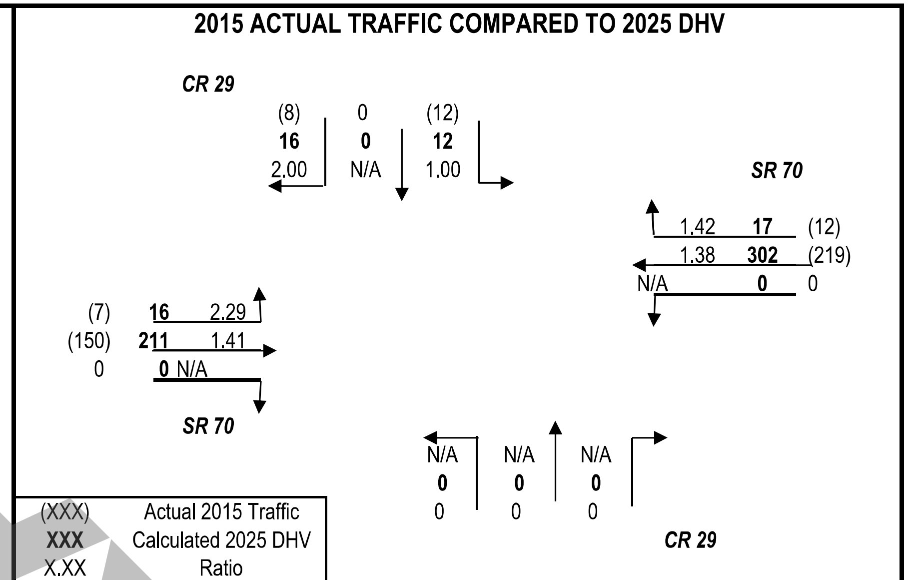


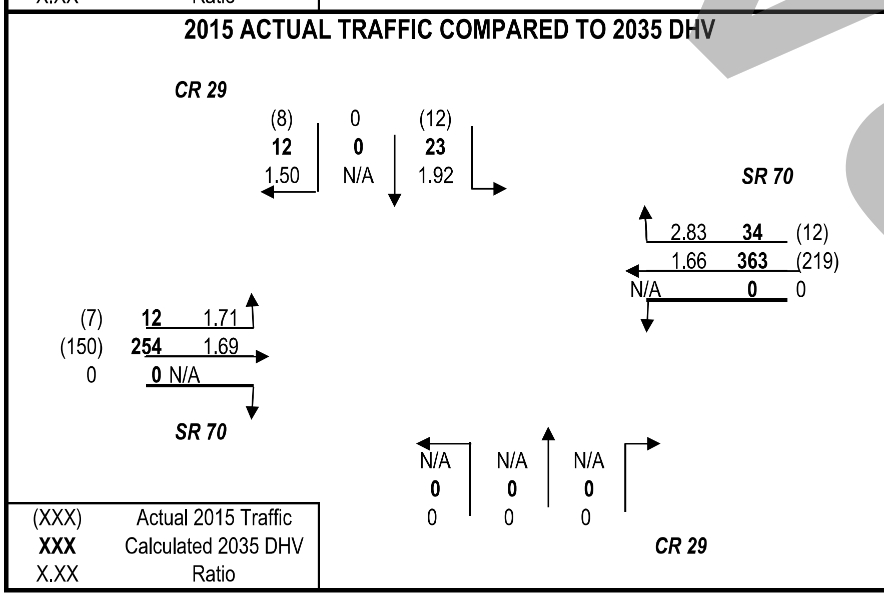
PROJECT TRAFFIC FOR SR 70 AT CR 29: PM Peak Hour

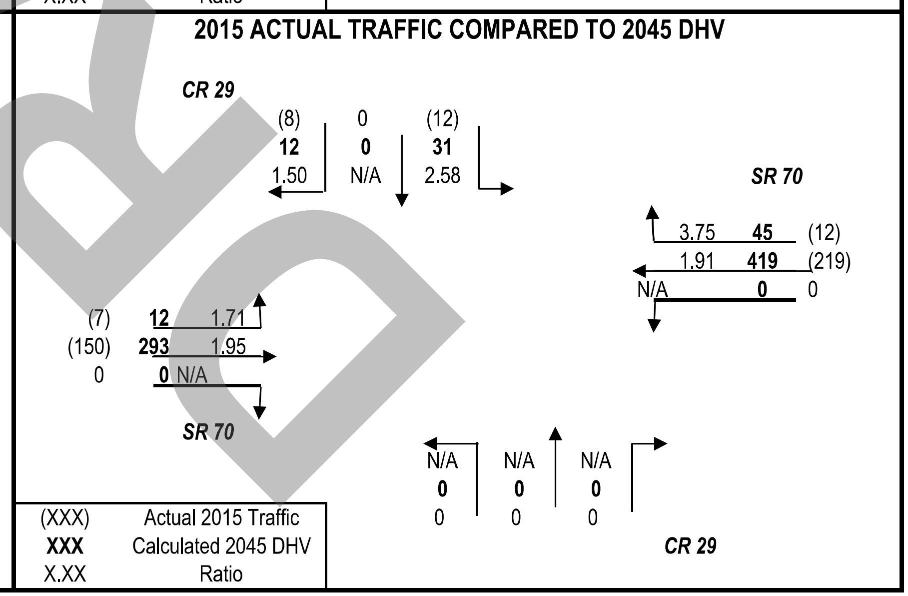


PROJECT TRAFFIC FOR SR 70 AT CR 29: PM Peak Hour







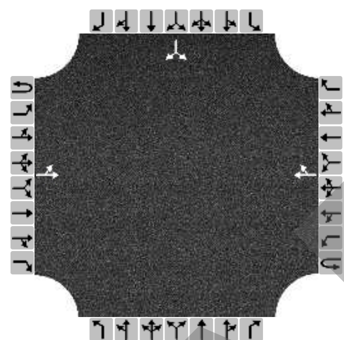


Appendix G:
No-Build HCS7 Reports

HCS7 Two-Way Stop-Control Report

General Information		Site Information	
Analyst	Elizabeth Fernandez	Intersection	SR 70 and CR 29
Agency/Co.	H.W. Lochner	Jurisdiction	Highlands County
Date Performed	Oct 2018	East/West Street	SR 70
Analysis Year	2025	North/South Street	CR 29
Time Analyzed	AM Peak Hour	Peak Hour Factor	0.92
Intersection Orientation	East-West	Analysis Time Period (hrs)	1.00
Project Description	No-Build, SR 70 from CR 29 to Lonesome Island Road		

Lanes



Vehicle Volumes and Adjustments

Approach	Eastbound				Westbound				Northbound				Southbound			
Movement	U	L	T	R	U	L	T	R	U	L	T	R	U	L	T	R
Priority	1U	1	2	3	4U	4	5	6		7	8	9		10	11	12
Number of Lanes	0	0	1	0	0	0	1	0		0	0	0		0	1	0
Configuration		LT						TR							LR	
Volume (veh/h)		22	302				211	16						21		22
Percent Heavy Vehicles (%)		11												11		11
Proportion Time Blocked																
Percent Grade (%)													0			
Right Turn Channelized																
Median Type | Storage	Undivided															

Critical and Follow-up Headways

	EB U	EB L	EB T	EB R	WB U	WB L	WB T	WB R	NB U	NB L	NB T	NB R	SB U	SB L	SB T	SB R
Base Critical Headway (sec)		4.1												7.1		6.2
Critical Headway (sec)		4.21												6.51		6.31
Base Follow-Up Headway (sec)		2.2												3.5		3.3
Follow-Up Headway (sec)		2.30												3.60		3.40

Delay, Queue Length, and Level of Service

	EB U	EB L	EB T	EB R	WB U	WB L	WB T	WB R	NB U	NB L	NB T	NB R	SB U	SB L	SB T	SB R
Flow Rate, v (veh/h)		24													47	
Capacity, c (veh/h)		1268													559	
v/c Ratio		0.02													0.08	
95% Queue Length, Q_{95} (veh)		0.1													0.3	
Control Delay (s/veh)		7.9													12.0	
Level of Service (LOS)		A													B	
Approach Delay (s/veh)	0.7												12.0			
Approach LOS													B			

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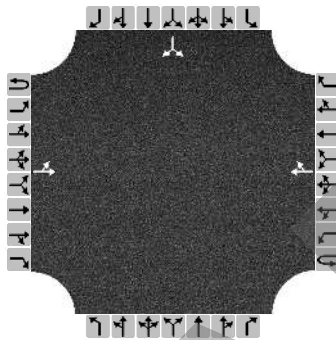
HCS7 Two-Way Stop-Control Report

General Information		Site Information	
Analyst	Elizabeth Fernandez	Intersection	SR 70 and CR 29
Agency/Co.	H.W. Lochner	Jurisdiction	Highlands County
Date Performed	Oct 2018	East/West Street	SR 70
Analysis Year	2025	North/South Street	CR 29
Time Analyzed	PM Peak Hour	Peak Hour Factor	0.92
Intersection Orientation	East-West	Analysis Time Period (hrs)	1.00
Project Description	No-Build, SR 70 from CR 29 to Lonesome Island Road		

Lanes



Vehicle Volumes and Adjustments

Approach	Eastbound				Westbound				Northbound				Southbound			
Movement	U	L	T	R	U	L	T	R	U	L	T	R	U	L	T	R
Priority	1U	1	2	3	4U	4	5	6		7	8	9		10	11	12
Number of Lanes	0	0	1	0	0	0	1	0		0	0	0		0	1	0
Configuration		LT						TR							LR	
Volume (veh/h)		16	211				302	21						16		16
Percent Heavy Vehicles (%)		11												11		11
Proportion Time Blocked																
Percent Grade (%)													0			
Right Turn Channelized																
Median Type | Storage	Undivided															

Critical and Follow-up Headways

	EB U	EB L	EB T	EB R	WB U	WB L	WB T	WB R	NB U	NB L	NB T	NB R	SB U	SB L	SB T	SB R
Base Critical Headway (sec)		4.1												7.1		6.2
Critical Headway (sec)		4.21												6.51		6.31
Base Follow-Up Headway (sec)		2.2												3.5		3.3
Follow-Up Headway (sec)		2.30												3.60		3.40

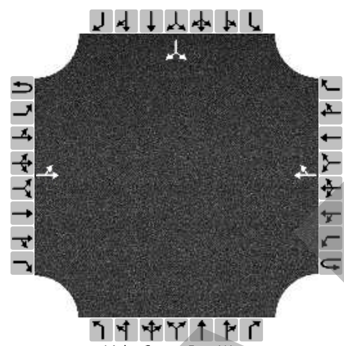
Delay, Queue Length, and Level of Service

	EB U	EB L	EB T	EB R	WB U	WB L	WB T	WB R	NB U	NB L	NB T	NB R	SB U	SB L	SB T	SB R
Flow Rate, v (veh/h)		17													35	
Capacity, c (veh/h)		1159													535	
v/c Ratio		0.02													0.07	
95% Queue Length, Q_{95} (veh)		0.0													0.2	
Control Delay (s/veh)		8.2													12.2	
Level of Service (LOS)		A													B	
Approach Delay (s/veh)	0.7												12.2			
Approach LOS													B			

HCS7 Two-Way Stop-Control Report

General Information		Site Information	
Analyst	Elizabeth Fernandez	Intersection	SR 70 and CR 29
Agency/Co.	H.W. Lochner	Jurisdiction	Highlands County
Date Performed	Oct 2018	East/West Street	SR 70
Analysis Year	2035	North/South Street	CR 29
Time Analyzed	AM Peak Hour	Peak Hour Factor	0.92
Intersection Orientation	East-West	Analysis Time Period (hrs)	1.00
Project Description	No-Build, SR 70 from CR 29 to Lonesome Island Road		

Lanes



Vehicle Volumes and Adjustments

Approach	Eastbound				Westbound				Northbound				Southbound			
Movement	U	L	T	R	U	L	T	R	U	L	T	R	U	L	T	R
Priority	1U	1	2	3	4U	4	5	6		7	8	9		10	11	12
Number of Lanes	0	0	1	0	0	0	1	0		0	0	0		0	1	0
Configuration		LT						TR							LR	
Volume (veh/h)		29	363				254	23						34		29
Percent Heavy Vehicles (%)		11												11		11
Proportion Time Blocked																
Percent Grade (%)													0			
Right Turn Channelized																
Median Type | Storage	Undivided															

Critical and Follow-up Headways

Base Critical Headway (sec)		4.1												7.1		6.2
Critical Headway (sec)		4.21												6.51		6.31
Base Follow-Up Headway (sec)		2.2												3.5		3.3
Follow-Up Headway (sec)		2.30												3.60		3.40

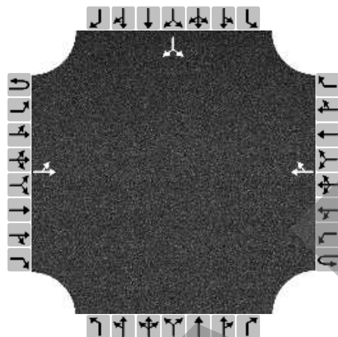
Delay, Queue Length, and Level of Service

Flow Rate, v (veh/h)		32													68	
Capacity, c (veh/h)		1210													466	
v/c Ratio		0.03													0.15	
95% Queue Length, Q_{95} (veh)		0.1													0.5	
Control Delay (s/veh)		8.1													14.1	
Level of Service (LOS)		A													B	
Approach Delay (s/veh)	0.8												14.1			
Approach LOS													B			

HCS7 Two-Way Stop-Control Report

General Information		Site Information	
Analyst	Elizabeth Fernandez	Intersection	SR 70 and CR 29
Agency/Co.	H.W. Lochner	Jurisdiction	Highlands County
Date Performed	Oct 2018	East/West Street	SR 70
Analysis Year	2035	North/South Street	CR 29
Time Analyzed	PM Peak Hour	Peak Hour Factor	0.92
Intersection Orientation	East-West	Analysis Time Period (hrs)	1.00
Project Description	No-Build, SR 70 from CR 29 to Lonesome Island Road		

Lanes


Major Street: East-West

Vehicle Volumes and Adjustments

Approach	Eastbound				Westbound				Northbound				Southbound			
Movement	U	L	T	R	U	L	T	R	U	L	T	R	U	L	T	R
Priority	1U	1	2	3	4U	4	5	6		7	8	9		10	11	12
Number of Lanes	0	0	1	0	0	0	1	0		0	0	0		0	1	0
Configuration		LT						TR							LR	
Volume (veh/h)		21	254				363	34						23		21
Percent Heavy Vehicles (%)		11												11		11
Proportion Time Blocked																
Percent Grade (%)													0			
Right Turn Channelized																
Median Type | Storage	Undivided															

Critical and Follow-up Headways

Base Critical Headway (sec)		4.1												7.1		6.2
Critical Headway (sec)		4.21												6.51		6.31
Base Follow-Up Headway (sec)		2.2												3.5		3.3
Follow-Up Headway (sec)		2.30												3.60		3.40

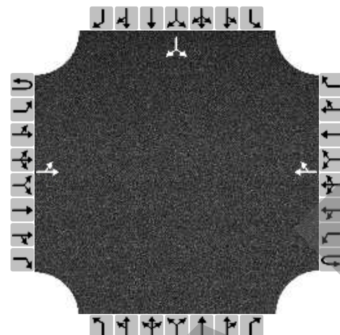
Delay, Queue Length, and Level of Service

Flow Rate, v (veh/h)		23													48	
Capacity, c (veh/h)		1082													454	
v/c Ratio		0.02													0.11	
95% Queue Length, Q_{95} (veh)		0.1													0.4	
Control Delay (s/veh)		8.4													13.9	
Level of Service (LOS)		A													B	
Approach Delay (s/veh)	0.8												13.9			
Approach LOS													B			

HCS7 Two-Way Stop-Control Report

General Information		Site Information	
Analyst	Elizabeth Fernandez	Intersection	SR 70 and CR 29
Agency/Co.	H.W. Lochner	Jurisdiction	Highlands County
Date Performed	Oct 2018	East/West Street	SR 70
Analysis Year	2045	North/South Street	CR 29
Time Analyzed	AM Peak Hour	Peak Hour Factor	0.92
Intersection Orientation	East-West	Analysis Time Period (hrs)	1.00
Project Description	No-Build, SR 70 from CR 29 to Lonesome Island Road		

Lanes



Major Street: East-West

Vehicle Volumes and Adjustments

Approach	Eastbound				Westbound				Northbound				Southbound			
Movement	U	L	T	R	U	L	T	R	U	L	T	R	U	L	T	R
Priority	1U	1	2	3	4U	4	5	6		7	8	9		10	11	12
Number of Lanes	0	0	1	0	0	0	1	0		0	0	0		0	1	0
Configuration		LT						TR							LR	
Volume (veh/h)		38	419				293	31						45		38
Percent Heavy Vehicles (%)		11												11		11
Proportion Time Blocked																
Percent Grade (%)													0			
Right Turn Channelized																
Median Type | Storage	Undivided															

Critical and Follow-up Headways

	EB U	EB L	EB T	EB R	WB U	WB L	WB T	WB R	NB U	NB L	NB T	NB R	SB U	SB L	SB T	SB R
Base Critical Headway (sec)		4.1												7.1		6.2
Critical Headway (sec)		4.21												6.51		6.31
Base Follow-Up Headway (sec)		2.2												3.5		3.3
Follow-Up Headway (sec)		2.30												3.60		3.40

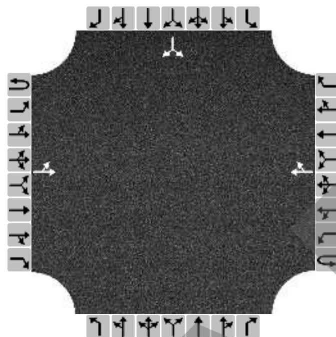
Delay, Queue Length, and Level of Service

	EB U	EB L	EB T	EB R	WB U	WB L	WB T	WB R	NB U	NB L	NB T	NB R	SB U	SB L	SB T	SB R
Flow Rate, v (veh/h)		41													90	
Capacity, c (veh/h)		1158													399	
v/c Ratio		0.04													0.23	
95% Queue Length, Q_{95} (veh)		0.1													0.9	
Control Delay (s/veh)		8.2													16.7	
Level of Service (LOS)		A													C	
Approach Delay (s/veh)	1.0												16.7			
Approach LOS													C			

HCS7 Two-Way Stop-Control Report

General Information		Site Information	
Analyst	Elizabeth Fernandez	Intersection	SR 70 and CR 29
Agency/Co.	H.W. Lochner	Jurisdiction	Highlands County
Date Performed	Oct 2018	East/West Street	SR 70
Analysis Year	2045	North/South Street	CR 29
Time Analyzed	PM Peak Hour	Peak Hour Factor	0.92
Intersection Orientation	East-West	Analysis Time Period (hrs)	1.00
Project Description	No-Build, SR 70 from CR 29 to Lonesome Island Road		

Lanes



Major Street: East-West

Vehicle Volumes and Adjustments

Approach	Eastbound				Westbound				Northbound				Southbound			
Movement	U	L	T	R	U	L	T	R	U	L	T	R	U	L	T	R
Priority	1U	1	2	3	4U	4	5	6		7	8	9		10	11	12
Number of Lanes	0	0	1	0	0	0	1	0		0	0	0		0	1	0
Configuration		LT						TR							LR	
Volume (veh/h)		27	293				419	45						31		27
Percent Heavy Vehicles (%)		11												11		11
Proportion Time Blocked																
Percent Grade (%)													0			
Right Turn Channelized																
Median Type | Storage	Undivided															

Critical and Follow-up Headways

	U	L	T	R	U	L	T	R	U	L	T	R	U	L	T	R
Base Critical Headway (sec)		4.1												7.1		6.2
Critical Headway (sec)		4.21												6.51		6.31
Base Follow-Up Headway (sec)		2.2												3.5		3.3
Follow-Up Headway (sec)		2.30												3.60		3.40

Delay, Queue Length, and Level of Service

	U	L	T	R	U	L	T	R	U	L	T	R	U	L	T	R
Flow Rate, v (veh/h)		29													63	
Capacity, c (veh/h)		1015													389	
v/c Ratio		0.03													0.16	
95% Queue Length, Q_{95} (veh)		0.1													0.6	
Control Delay (s/veh)		8.7													16.0	
Level of Service (LOS)		A													C	
Approach Delay (s/veh)	1.0												16.0			
Approach LOS													C			

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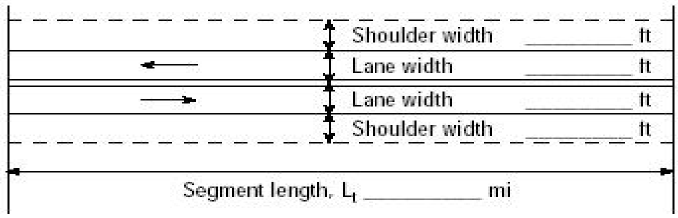
DIRECTIONAL TWO-LANE HIGHWAY SEGMENT WORKSHEET

General Information		***Site Information***	
Analyst	*Elizabeth Fernandez*	Highway / Direction of Travel	*SR 70*
Agency or Company	*H.W. Lochner*	From/To	*CR 29 to Lonesome Island Road*
Date Performed	*October 2018*	Jurisdiction	*Highlands County*
Analysis Time Period	*AM Peak Hour*	Analysis Year	*2025*

Project Description: *No-Build, Eastbound*

Input Data



☐ Class I highway ☐ Class II highway ☑ Class III highway

Terrain ☑ Level ☐ Rolling

Grade Length mi	Up/down
Peak-hour factor, PHF	*0.92*
No-passing zone	*0%*
% Trucks and Buses , P_T	*11 %*
% Recreational vehicles, P_R	*0%*
Access points *mi*	*4*/mi

Analysis direction vol., V_d	*323*veh/h
Opposing direction vol., V_o	*227*veh/h
Shoulder width ft	*4.0*
Lane Width ft	*10.0*
Segment Length mi	*2.5*

Average Travel Speed

	Analysis Direction (d)	Opposing Direction (o)
Passenger-car equivalents for trucks, E_T (Exhibit 15-11 or 15-12)	*1.3*	*1.5*
Passenger-car equivalents for RVs, E_R (Exhibit 15-11 or 15-13)	*1.0*	*1.0*
Heavy-vehicle adjustment factor, $f_{HV,ATS}=1/(1+P_T(E_T-1)+P_R(E_R-1))$	*0.968*	*0.948*
Grade adjustment factor[1], $f_{g,ATS}$ (Exhibit 15-9)	*1.00*	*1.00*
Demand flow rate[2], v_i (pc/h) $v_i=V_i/(PHF^* f_{g,ATS} * f_{HV,ATS})$	*363*	*260*

Free-Flow Speed from Field Measurement		**Estimated Free-Flow Speed**	
Mean speed of sample[3], S_{FM}		Base free-flow speed[4], BFFS	*60.0 mi/h*
Total demand flow rate, both directions, *v*		Adj. for lane and shoulder width,[4] f_{LS}(Exhibit 15-7)	*2.4 mi/h*
Free-flow speed, $FFS=S_{FM}+0.00776(v/f_{HV,ATS})$		Adj. for access points[4], f_A (Exhibit 15-8)	*1.0 mi/h*
Adj. for no-passing zones, $f_{np,ATS}$ (Exhibit 15-15)	*1.5 mi/h*	Free-flow speed, FFS (FSS=BFFS-f_{LS}-f_A)	*56.6 mi/h*
		Average travel speed, $ATS_d=FFS-0.00776(v_{d,ATS}+v_{o,ATS})-f_{np,ATS}$	*50.2 mi/h*
		Percent free flow speed, PFFS	*88.7 %*

Percent Time-Spent-Following

	Analysis Direction (d)	Opposing Direction (o)
Passenger-car equivalents for trucks, E_T(Exhibit 15-18 or 15-19)	*1.1*	*1.1*
Passenger-car equivalents for RVs, E_R (Exhibit 15-18 or 15-19)	*1.0*	*1.0*
Heavy-vehicle adjustment factor, $f_{HV}=1/(1+P_T(E_T-1)+P_R(E_R-1))$	*0.989*	*0.989*
Grade adjustment factor[1], $f_{g,PTSF}$ (Exhibit 15-16 or Ex 15-17)	*1.00*	*1.00*
Directional flow rate[2], v_i(pc/h) $v_i=V_i/(PHF^*f_{HV,PTSF}*f_{g,PTSF})$	*355*	*249*
Base percent time-spent-following[4], $BPTSF_d(\%)=100(1-e^{av_d^b})$	*36.3*	
Adj. for no-passing zone, $f_{np,PTSF}$ (Exhibit 15-21)	*14.9*	
Percent time-spent-following, $PTSF_d(\%)=BPTSF_d+f_{np,PTSF}*(v_{d,PTSF}/v_{d,PTSF}+v_{o,PTSF})$	*45.1*	

Level of Service and Other Performance Measures

Level of service, LOS (Exhibit 15-3)	*B*
Volume to capacity ratio, *v/c*	*0.21*

Capacity, $C_{d,ATS}$ (Equation 15-12) veh/h	*1700*
Capacity, $C_{d,PTSF}$ (Equation 15-13) veh/h	*1700*
Percent Free-Flow Speed $PFFS_d$(Equation 15-11 - Class III only)	*88.7*
Bicycle Level of Service	
Directional demand flow rate in outside lane, v_{OL} (Eq. 15-24) veh/h	*351.1*
Effective width, Wv (Eq. 15-29) ft	*14.00*
Effective speed factor, S_t (Eq. 15-30)	*4.79*
Bicycle level of service score, BLOS (Eq. 15-31)	*7.93*
Bicycle level of service (Exhibit 15-4)	*F*
Notes	

1. Note that the adjustment factor for level terrain is 1.00,as level terrain is one of the base conditions. For the purpose of grade adjustment, specific downgrade segments are treated as level terrain.
2. If $v_i(v_d$ or $v_o)$ >=1,700 pc/h, terminate analysis--the LOS is F.
3. For the analysis direction only and for v>200 veh/h.
4. For the analysis direction only
5. Exhibit 15-20 provides coefficients a and b for Equation 15-10.
6. Use alternative Exhibit 15-14 if some trucks operate at crawl speeds on a specific downgrade.

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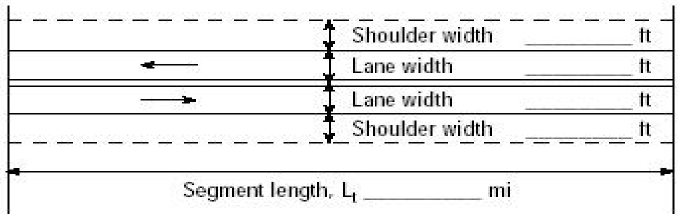
DIRECTIONAL TWO-LANE HIGHWAY SEGMENT WORKSHEET

General Information		***Site Information***	
Analyst	*Elizabeth Fernandez*	Highway / Direction of Travel	*SR 70*
Agency or Company	*H.W. Lochner*	From/To	*CR 29 to Lonesome Island Road*
Date Performed	*October 2018*	Jurisdiction	*Highlands County*
Analysis Time Period	*PM Peak Hour*	Analysis Year	*2025*

Project Description: *No-Build, Eastbound*

Input Data



☐ Class I highway ☐ Class II highway ☑ Class III highway

Terrain ☑ Level ☐ Rolling

Grade Length mi Up/down

Analysis direction vol., V_d	*227*veh/h
Opposing direction vol., V_o	*323*veh/h
Shoulder width ft	*4.0*
Lane Width ft	*10.0*
Segment Length mi	*2.5*
Peak-hour factor, PHF	*0.92*
No-passing zone	*0%*
% Trucks and Buses , P_T	*11 %*
% Recreational vehicles, P_R	*0%*
Access points *mi*	*4*/mi

Average Travel Speed

	Analysis Direction (d)	Opposing Direction (o)
Passenger-car equivalents for trucks, E_T (Exhibit 15-11 or 15-12)	*1.5*	*1.3*
Passenger-car equivalents for RVs, E_R (Exhibit 15-11 or 15-13)	*1.0*	*1.0*
Heavy-vehicle adjustment factor, $f_{HV,ATS}=1/(1+P_T(E_T-1)+P_R(E_R-1))$	*0.948*	*0.968*
Grade adjustment factor[1], $f_{g,ATS}$ (Exhibit 15-9)	*1.00*	*1.00*
Demand flow rate[2], v_i (pc/h) $v_i=V_i/(PHF*f_{g,ATS}*f_{HV,ATS})$	*260*	*363*

Free-Flow Speed from Field Measurement		**Estimated Free-Flow Speed**	
Mean speed of sample[3], S_{FM}		Base free-flow speed[4], BFFS	*60.0 mi/h*
Total demand flow rate, both directions, *v*		Adj. for lane and shoulder width,[4] f_{LS}(Exhibit 15-7)	*2.4 mi/h*
Free-flow speed, $FFS=S_{FM}+0.00776(v/f_{HV,ATS})$		Adj. for access points[4], f_A (Exhibit 15-8)	*1.0 mi/h*
Adj. for no-passing zones, $f_{np,ATS}$ (Exhibit 15-15)	*1.4 mi/h*	Free-flow speed, FFS (FSS=BFFS-f_{LS}-f_A)	*56.6 mi/h*
		Average travel speed, $ATS_d=FFS-0.00776(v_{d,ATS}+v_{o,ATS})-f_{np,ATS}$	*50.4 mi/h*
		Percent free flow speed, PFFS	*89.0 %*

Percent Time-Spent-Following

	Analysis Direction (d)	Opposing Direction (o)
Passenger-car equivalents for trucks, E_T(Exhibit 15-18 or 15-19)	*1.1*	*1.1*
Passenger-car equivalents for RVs, E_R (Exhibit 15-18 or 15-19)	*1.0*	*1.0*
Heavy-vehicle adjustment factor, $f_{HV}=1/(1+P_T(E_T-1)+P_R(E_R-1))$	*0.989*	*0.989*
Grade adjustment factor[1], $f_{g,PTSF}$ (Exhibit 15-16 or Ex 15-17)	*1.00*	*1.00*
Directional flow rate[2], v_i(pc/h) $v_i=V_i/(PHF*f_{HV,PTSF}*f_{g,PTSF})$	*249*	*355*
Base percent time-spent-following[4], $BPTSF_d(\%)=100(1-e^{av_d^b})$	*29.2*	
Adj. for no-passing zone, $f_{np,PTSF}$ (Exhibit 15-21)	*14.9*	
Percent time-spent-following, $PTSF_d(\%)=BPTSF_d+f_{np,PTSF}*(v_{d,PTSF}/v_{d,PTSF}+v_{o,PTSF})$	*35.3*	

Level of Service and Other Performance Measures

Level of service, LOS (Exhibit 15-3)	*B*
Volume to capacity ratio, *v/c*	*0.14*

Capacity, $C_{d,ATS}$ (Equation 15-12) veh/h	*1700*
Capacity, $C_{d,PTSF}$ (Equation 15-13) veh/h	*1700*
Percent Free-Flow Speed $PFFS_d$(Equation 15-11 - Class III only)	*89.0*
Bicycle Level of Service	
Directional demand flow rate in outside lane, v_{OL} (Eq. 15-24) veh/h	*246.7*
Effective width, Wv (Eq. 15-29) ft	*14.00*
Effective speed factor, S_t (Eq. 15-30)	*4.79*
Bicycle level of service score, BLOS (Eq. 15-31)	*7.75*
Bicycle level of service (Exhibit 15-4)	*F*
Notes	

1. Note that the adjustment factor for level terrain is 1.00,as level terrain is one of the base conditions. For the purpose of grade adjustment, specific downgrade segments are treated as level terrain.
2. If v_i(v_d or v_o) >=1,700 pc/h, terminate analysis--the LOS is F.
3. For the analysis direction only and for v>200 veh/h.
4. For the analysis direction only
5. Exhibit 15-20 provides coefficients a and b for Equation 15-10.
6. Use alternative Exhibit 15-14 if some trucks operate at crawl speeds on a specific downgrade.

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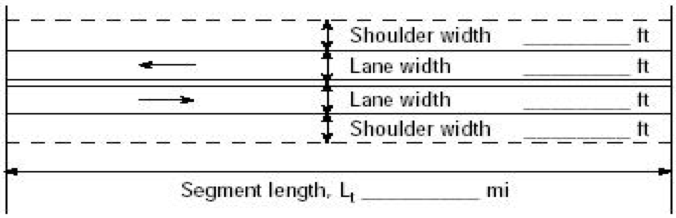
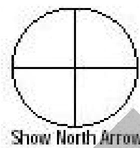
DIRECTIONAL TWO-LANE HIGHWAY SEGMENT WORKSHEET

General Information		***Site Information***	
Analyst	*Elizabeth Fernandez*	Highway / Direction of Travel	*SR 70*
Agency or Company	*H.W. Lochner*	From/To	*CR 29 to Lonesome Island Road*
Date Performed	*October 2018*	Jurisdiction	*Highlands County*
Analysis Time Period	*AM Peak Hour*	Analysis Year	*2025*

Project Description: *No-Build, Westbound*

Input Data





☐ Class I highway ☐ Class II highway ☑ Class III highway

Terrain ☑ Level ☐ Rolling

Analysis direction vol., V_d	*227*veh/h
Opposing direction vol., V_o	*323*veh/h
Shoulder width ft	*4.0*
Lane Width ft	*10.0*
Segment Length mi	*2.5*
Grade Length mi	Up/down
Peak-hour factor, PHF	*0.92*
No-passing zone	*0%*
% Trucks and Buses , P_T	*11 %*
% Recreational vehicles, P_R	*0%*
Access points *mi*	*4*/mi

Average Travel Speed

	Analysis Direction (d)	Opposing Direction (o)
Passenger-car equivalents for trucks, E_T (Exhibit 15-11 or 15-12)	*1.5*	*1.3*
Passenger-car equivalents for RVs, E_R (Exhibit 15-11 or 15-13)	*1.0*	*1.0*
Heavy-vehicle adjustment factor, $f_{HV,ATS}=1/(1+P_T(E_T-1)+P_R(E_R-1))$	*0.948*	*0.968*
Grade adjustment factor[1], $f_{g,ATS}$ (Exhibit 15-9)	*1.00*	*1.00*
Demand flow rate[2], v_i (pc/h) $v_i=V_i/(PHF^* f_{g,ATS} * f_{HV,ATS})$	*260*	*363*

Free-Flow Speed from Field Measurement		**Estimated Free-Flow Speed**	
Mean speed of sample[3], S_{FM}		Base free-flow speed[4], BFFS	*60.0 mi/h*
Total demand flow rate, both directions, *v*		Adj. for lane and shoulder width,[4] f_{LS}(Exhibit 15-7)	*2.4 mi/h*
Free-flow speed, $FFS=S_{FM}+0.00776(v/f_{HV,ATS})$		Adj. for access points[4], f_A (Exhibit 15-8)	*1.0 mi/h*
Adj. for no-passing zones, $f_{np,ATS}$ (Exhibit 15-15)	*1.4 mi/h*	Free-flow speed, FFS $(FSS=BFFS-f_{LS}-f_A)$	*56.6 mi/h*
		Average travel speed, $ATS_d=FFS-0.00776(v_{d,ATS}+v_{o,ATS})-f_{np,ATS}$	*50.4 mi/h*
		Percent free flow speed, PFFS	*89.0 %*

Percent Time-Spent-Following

	Analysis Direction (d)	Opposing Direction (o)
Passenger-car equivalents for trucks, E_T(Exhibit 15-18 or 15-19)	*1.1*	*1.1*
Passenger-car equivalents for RVs, E_R (Exhibit 15-18 or 15-19)	*1.0*	*1.0*
Heavy-vehicle adjustment factor, $f_{HV}=1/(1+P_T(E_T-1)+P_R(E_R-1))$	*0.989*	*0.989*
Grade adjustment factor[1], $f_{g,PTSF}$ (Exhibit 15-16 or Ex 15-17)	*1.00*	*1.00*
Directional flow rate[2], v_i(pc/h) $v_i=V_i/(PHF^*f_{HV,PTSF}^* f_{g,PTSF})$	*249*	*355*
Base percent time-spent-following[4], $BPTSF_d(\%)=100(1-e^{av_d^b})$	*29.2*	
Adj. for no-passing zone, $f_{np,PTSF}$ (Exhibit 15-21)	*14.9*	
Percent time-spent-following, $PTSF_d(\%)=BPTSF_d+f_{np,PTSF}*(v_{d,PTSF}/v_{d,PTSF}+v_{o,PTSF})$	*35.3*	

Level of Service and Other Performance Measures

Level of service, LOS (Exhibit 15-3)	*B*
Volume to capacity ratio, *v/c*	*0.14*

Capacity, $C_{d,ATS}$ (Equation 15-12) veh/h	*1700*
Capacity, $C_{d,PTSF}$ (Equation 15-13) veh/h	*1700*
Percent Free-Flow Speed $PFFS_d$(Equation 15-11 - Class III only)	*89.0*
Bicycle Level of Service	
Directional demand flow rate in outside lane, v_{OL} (Eq. 15-24) veh/h	*246.7*
Effective width, Wv (Eq. 15-29) ft	*14.00*
Effective speed factor, S_t (Eq. 15-30)	*4.79*
Bicycle level of service score, BLOS (Eq. 15-31)	*7.75*
Bicycle level of service (Exhibit 15-4)	*F*
Notes	

1. Note that the adjustment factor for level terrain is 1.00,as level terrain is one of the base conditions. For the purpose of grade adjustment, specific downgrade segments are treated as level terrain.
2. If v_i(v_d or v_o) >=1,700 pc/h, terminate analysis--the LOS is F.
3. For the analysis direction only and for v>200 veh/h.
4. For the analysis direction only
5. Exhibit 15-20 provides coefficients a and b for Equation 15-10.
6. Use alternative Exhibit 15-14 if some trucks operate at crawl speeds on a specific downgrade.

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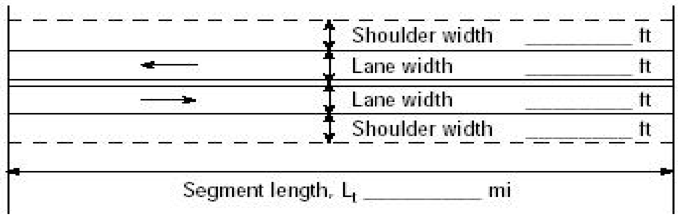
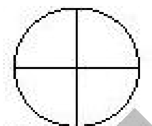
DIRECTIONAL TWO-LANE HIGHWAY SEGMENT WORKSHEET

General Information		Site Information	
Analyst	*Elizabeth Fernandez*	Highway / Direction of Travel	*SR 70*
Agency or Company	*H.W. Lochner*	From/To	*CR 29 to Lonesome Island Road*
Date Performed	*October 2018*	Jurisdiction	*Highlands County*
Analysis Time Period	*PM Peak Hour*	Analysis Year	*2025*

Project Description: *No-Build, Westbound*

Input Data





☐ Class I highway ☐ Class II highway ☑ Class III highway

Terrain ☑ Level ☐ Rolling

Grade Length mi Up/down

Analysis direction vol., V_d	*323*veh/h
Opposing direction vol., V_o	*227*veh/h
Shoulder width ft	*4.0*
Lane Width ft	*10.0*
Segment Length mi	*2.5*
Peak-hour factor, PHF	*0.92*
No-passing zone	*0%*
% Trucks and Buses , P_T	*11 %*
% Recreational vehicles, P_R	*0%*
Access points *mi*	*4*/mi

Average Travel Speed

	Analysis Direction (d)	Opposing Direction (o)
Passenger-car equivalents for trucks, E_T (Exhibit 15-11 or 15-12)	*1.3*	*1.5*
Passenger-car equivalents for RVs, E_R (Exhibit 15-11 or 15-13)	*1.0*	*1.0*
Heavy-vehicle adjustment factor, $f_{HV,ATS}=1/ (1+ P_T (E_T -1)+P_R (E_R -1))$	*0.968*	*0.948*
Grade adjustment factor[1], $f_{g,ATS}$ (Exhibit 15-9)	*1.00*	*1.00*
Demand flow rate[2], v_i (pc/h) $v_i=V_i / (PHF^* f_{g,ATS} {}^* f_{HV,ATS})$	*363*	*260*

Free-Flow Speed from Field Measurement		Estimated Free-Flow Speed	
Mean speed of sample[3], S_{FM}		Base free-flow speed[4], BFFS	*60.0 mi/h*
Total demand flow rate, both directions, *v*		Adj. for lane and shoulder width,[4] f_{LS}(Exhibit 15-7)	*2.4 mi/h*
Free-flow speed, $FFS=S_{FM}+0.00776(v/ f_{HV,ATS})$		Adj. for access points[4], f_A (Exhibit 15-8)	*1.0 mi/h*
Adj. for no-passing zones, $f_{np,ATS}$ (Exhibit 15-15)	*1.5 mi/h*	Free-flow speed, FFS (FSS=BFFS-f_{LS}-f_A)	*56.6 mi/h*
		Average travel speed, $ATS_d=FFS-0.00776(v_{d,ATS} + v_{o,ATS}) - f_{np,ATS}$	*50.2 mi/h*
		Percent free flow speed, PFFS	*88.7 %*

Percent Time-Spent-Following

	Analysis Direction (d)	Opposing Direction (o)
Passenger-car equivalents for trucks, E_T(Exhibit 15-18 or 15-19)	*1.1*	*1.1*
Passenger-car equivalents for RVs, E_R (Exhibit 15-18 or 15-19)	*1.0*	*1.0*
Heavy-vehicle adjustment factor, $f_{HV}=1/ (1+ P_T(E_T-1)+P_R(E_R-1))$	*0.989*	*0.989*
Grade adjustment factor[1], $f_{g,PTSF}$ (Exhibit 15-16 or Ex 15-17)	*1.00*	*1.00*
Directional flow rate[2], v_i(pc/h) $v_i=V_i/(PHF^*f_{HV,PTSF}{}^* f_{g,PTSF})$	*355*	*249*
Base percent time-spent-following[4], $BPTSF_d(\%)=100(1-e^{av_d^b})$	*36.3*	
Adj. for no-passing zone, $f_{np,PTSF}$ (Exhibit 15-21)	*14.9*	
Percent time-spent-following, $PTSF_d(\%)=BPTSF_d+f_{np,PTSF} {}^*(v_{d,PTSF} / v_{d,PTSF} + v_{o,PTSF})$	*45.1*	

Level of Service and Other Performance Measures

Level of service, LOS (Exhibit 15-3)	*B*
Volume to capacity ratio, *v/c*	*0.21*

Capacity, $C_{d,ATS}$ (Equation 15-12) veh/h	*1700*
Capacity, $C_{d,PTSF}$ (Equation 15-13) veh/h	*1700*
Percent Free-Flow Speed $PFFS_d$(Equation 15-11 - Class III only)	*88.7*
Bicycle Level of Service	
Directional demand flow rate in outside lane, v_{OL} (Eq. 15-24) veh/h	*351.1*
Effective width, Wv (Eq. 15-29) ft	*14.00*
Effective speed factor, S_t (Eq. 15-30)	*4.79*
Bicycle level of service score, BLOS (Eq. 15-31)	*7.93*
Bicycle level of service (Exhibit 15-4)	*F*
Notes	

1. Note that the adjustment factor for level terrain is 1.00,as level terrain is one of the base conditions. For the purpose of grade adjustment, specific downgrade segments are treated as level terrain.
2. If v_i(v_d or v_o) >=1,700 pc/h, terminate analysis--the LOS is F.
3. For the analysis direction only and for v>200 veh/h.
4. For the analysis direction only
5. Exhibit 15-20 provides coefficients a and b for Equation 15-10.
6. Use alternative Exhibit 15-14 if some trucks operate at crawl speeds on a specific downgrade.

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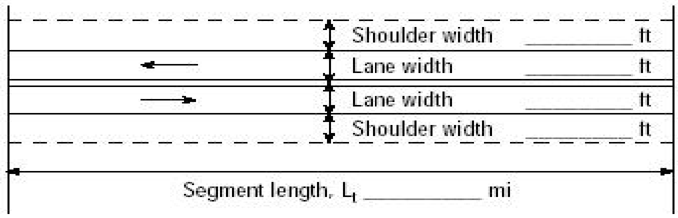
DIRECTIONAL TWO-LANE HIGHWAY SEGMENT WORKSHEET

General Information		***Site Information***	
Analyst	*Elizabeth Fernandez*	Highway / Direction of Travel	*SR 70*
Agency or Company	*H.W. Lochner*	From/To	*CR 29 to Lonesome Island Road*
Date Performed	*October 2018*	Jurisdiction	*Highlands County*
Analysis Time Period	*AM Peak Hour*	Analysis Year	*2035*

Project Description: *No-Build, Eastbound*

Input Data



☐ Class I highway ☐ Class II highway ☑ Class III highway

Terrain ☑ Level ☐ Rolling

Analysis direction vol., V_d	*397*veh/h
Opposing direction vol., V_o	*277*veh/h
Shoulder width ft	*4.0*
Lane Width ft	*10.0*
Segment Length mi	*2.5*
Grade Length mi	Up/down
Peak-hour factor, PHF	*0.92*
No-passing zone	*0%*
% Trucks and Buses, P_T	*11* %
% Recreational vehicles, P_R	*0%*
Access points *mi*	*4*/mi

Average Travel Speed

	Analysis Direction (d)	Opposing Direction (o)
Passenger-car equivalents for trucks, E_T (Exhibit 15-11 or 15-12)	*1.3*	*1.4*
Passenger-car equivalents for RVs, E_R (Exhibit 15-11 or 15-13)	*1.0*	*1.0*
Heavy-vehicle adjustment factor, $f_{HV,ATS}=1/(1+P_T(E_T-1)+P_R(E_R-1))$	*0.968*	*0.958*
Grade adjustment factor[1], $f_{g,ATS}$ (Exhibit 15-9)	*1.00*	*1.00*
Demand flow rate[2], v_i (pc/h) $v_i=V_i/(PHF*f_{g,ATS}*f_{HV,ATS})$	*446*	*314*

Free-Flow Speed from Field Measurement		**Estimated Free-Flow Speed**	
Mean speed of sample[3], S_{FM}		Base free-flow speed[4], BFFS	*60.0 mi/h*
Total demand flow rate, both directions, *v*		Adj. for lane and shoulder width,[4] f_{LS}(Exhibit 15-7)	*2.4 mi/h*
Free-flow speed, $FFS=S_{FM}+0.00776(v/f_{HV,ATS})$		Adj. for access points[4], f_A (Exhibit 15-8)	*1.0 mi/h*
Adj. for no-passing zones, $f_{np,ATS}$ (Exhibit 15-15)	*1.5 mi/h*	Free-flow speed, FFS (FSS=BFFS-f_{LS}-f_A)	*56.6 mi/h*
		Average travel speed, $ATS_d=FFS-0.00776(v_{d,ATS}+v_{o,ATS})-f_{np,ATS}$	*49.2 mi/h*
		Percent free flow speed, PFFS	*87.0 %*

Percent Time-Spent-Following

	Analysis Direction (d)	Opposing Direction (o)
Passenger-car equivalents for trucks, E_T(Exhibit 15-18 or 15-19)	*1.0*	*1.1*
Passenger-car equivalents for RVs, E_R (Exhibit 15-18 or 15-19)	*1.0*	*1.0*
Heavy-vehicle adjustment factor, $f_{HV}=1/(1+P_T(E_T-1)+P_R(E_R-1))$	*1.000*	*0.989*
Grade adjustment factor[1], $f_{g,PTSF}$ (Exhibit 15-16 or Ex 15-17)	*1.00*	*1.00*
Directional flow rate[2], v_i(pc/h) $v_i=V_i/(PHF*f_{HV,PTSF}*f_{g,PTSF})$	*432*	*304*
Base percent time-spent-following[4], $BPTSF_d(\%)=100(1-e^{av_d^b})$	*43.1*	
Adj. for no-passing zone, $f_{np,PTSF}$ (Exhibit 15-21)	*14.2*	
Percent time-spent-following, $PTSF_d(\%)=BPTSF_d+f_{np,PTSF}*(v_{d,PTSF}/v_{d,PTSF}+v_{o,PTSF})$	*51.4*	

Level of Service and Other Performance Measures

Level of service, LOS (Exhibit 15-3)	*B*
Volume to capacity ratio, *v/c*	*0.25*

Capacity, $C_{d,ATS}$ (Equation 15-12) veh/h	*1700*
Capacity, $C_{d,PTSF}$ (Equation 15-13) veh/h	*1700*
Percent Free-Flow Speed $PFFS_d$(Equation 15-11 - Class III only)	*87.0*
Bicycle Level of Service	
Directional demand flow rate in outside lane, v_{OL} (Eq. 15-24) veh/h	*431.5*
Effective width, Wv (Eq. 15-29) ft	*14.00*
Effective speed factor, S_t (Eq. 15-30)	*4.79*
Bicycle level of service score, BLOS (Eq. 15-31)	*8.04*
Bicycle level of service (Exhibit 15-4)	*F*

Notes

1. Note that the adjustment factor for level terrain is 1.00,as level terrain is one of the base conditions. For the purpose of grade adjustment, specific downgrade segments are treated as level terrain.
2. If v_i(v_d or v_o) >=1,700 pc/h, terminate analysis--the LOS is F.
3. For the analysis direction only and for v>200 veh/h.
4. For the analysis direction only
5. Exhibit 15-20 provides coefficients a and b for Equation 15-10.
6. Use alternative Exhibit 15-14 if some trucks operate at crawl speeds on a specific downgrade.

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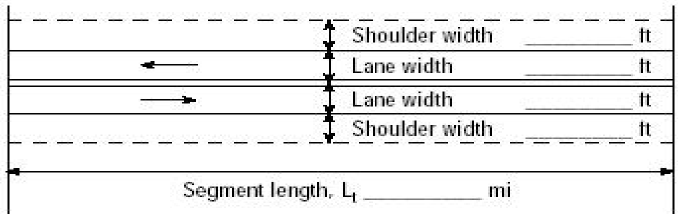
DIRECTIONAL TWO-LANE HIGHWAY SEGMENT WORKSHEET

General Information		Site Information	
Analyst	*Elizabeth Fernandez*	Highway / Direction of Travel	*SR 70*
Agency or Company	*H.W. Lochner*	From/To	*CR 29 to Lonesome Island Road*
Date Performed	*October 2018*	Jurisdiction	*Highlands County*
Analysis Time Period	*PM Peak Hour*	Analysis Year	*2035*

Project Description: *No-Build, Eastbound*

Input Data



☐ Class I highway ☐ Class II highway ☑ Class III highway

Terrain ☑ Level ☐ Rolling

Grade Length mi Up/down

Analysis direction vol., V_d	*277*veh/h
Opposing direction vol., V_o	*397*veh/h
Shoulder width ft	*4.0*
Lane Width ft	*10.0*
Segment Length mi	*2.5*
Peak-hour factor, PHF	*0.92*
No-passing zone	*0%*
% Trucks and Buses , P_T	*11* %
% Recreational vehicles, P_R	*0%*
Access points *mi*	*4*/mi

Average Travel Speed

	Analysis Direction (d)	Opposing Direction (o)
Passenger-car equivalents for trucks, E_T (Exhibit 15-11 or 15-12)	*1.4*	*1.3*
Passenger-car equivalents for RVs, E_R (Exhibit 15-11 or 15-13)	*1.0*	*1.0*
Heavy-vehicle adjustment factor, $f_{HV,ATS}=1/(1+P_T(E_T-1)+P_R(E_R-1))$	*0.958*	*0.968*
Grade adjustment factor[1], $f_{g,ATS}$ (Exhibit 15-9)	*1.00*	*1.00*
Demand flow rate[2], v_i (pc/h) $v_i=V_i/(PHF^* f_{g,ATS} * f_{HV,ATS})$	*314*	*446*

Free-Flow Speed from Field Measurement		Estimated Free-Flow Speed	
Mean speed of sample[3], S_{FM}		Base free-flow speed[4], BFFS	*60.0 mi/h*
Total demand flow rate, both directions, *v*		Adj. for lane and shoulder width,[4] f_{LS}(Exhibit 15-7)	*2.4 mi/h*
Free-flow speed, $FFS=S_{FM}+0.00776(v/f_{HV,ATS})$		Adj. for access points[4], f_A (Exhibit 15-8)	*1.0 mi/h*
Adj. for no-passing zones, $f_{np,ATS}$ (Exhibit 15-15)	*1.2 mi/h*	Free-flow speed, FFS ($FSS=BFFS-f_{LS}-f_A$)	*56.6 mi/h*
		Average travel speed, $ATS_d=FFS-0.00776(v_{d,ATS}+v_{o,ATS})-f_{np,ATS}$	*49.5 mi/h*
		Percent free flow speed, PFFS	*87.4 %*

Percent Time-Spent-Following

	Analysis Direction (d)	Opposing Direction (o)
Passenger-car equivalents for trucks, E_T(Exhibit 15-18 or 15-19)	*1.1*	*1.0*
Passenger-car equivalents for RVs, E_R (Exhibit 15-18 or 15-19)	*1.0*	*1.0*
Heavy-vehicle adjustment factor, $f_{HV}=1/(1+P_T(E_T-1)+P_R(E_R-1))$	*0.989*	*1.000*
Grade adjustment factor[1], $f_{g,PTSF}$ (Exhibit 15-16 or Ex 15-17)	*1.00*	*1.00*
Directional flow rate[2], v_i(pc/h) $v_i=V_i/(PHF^*f_{HV,PTSF}*f_{g,PTSF})$	*304*	*432*
Base percent time-spent-following[4], $BPTSF_d(\%)=100(1-e^{av_d^b})$	*36.2*	
Adj. for no-passing zone, $f_{np,PTSF}$ (Exhibit 15-21)	*14.2*	
Percent time-spent-following, $PTSF_d(\%)=BPTSF_d+f_{np,PTSF}*(v_{d,PTSF}/v_{d,PTSF}+v_{o,PTSF})$	*42.1*	

Level of Service and Other Performance Measures

Level of service, LOS (Exhibit 15-3)	*B*
Volume to capacity ratio, *v/c*	*0.18*

Capacity, $C_{d,ATS}$ (Equation 15-12) veh/h	*1700*
Capacity, $C_{d,PTSF}$ (Equation 15-13) veh/h	*1700*
Percent Free-Flow Speed $PFFS_d$(Equation 15-11 - Class III only)	*87.4*
Bicycle Level of Service	
Directional demand flow rate in outside lane, v_{OL} (Eq. 15-24) veh/h	*301.1*
Effective width, Wv (Eq. 15-29) ft	*14.00*
Effective speed factor, S_t (Eq. 15-30)	*4.79*
Bicycle level of service score, BLOS (Eq. 15-31)	*7.85*
Bicycle level of service (Exhibit 15-4)	*F*
Notes	

1. Note that the adjustment factor for level terrain is 1.00,as level terrain is one of the base conditions. For the purpose of grade adjustment, specific downgrade segments are treated as level terrain.
2. If v_i(v_d or v_o) >=1,700 pc/h, terminate analysis--the LOS is F.
3. For the analysis direction only and for v>200 veh/h.
4. For the analysis direction only
5. Exhibit 15-20 provides coefficients a and b for Equation 15-10.
6. Use alternative Exhibit 15-14 if some trucks operate at crawl speeds on a specific downgrade.

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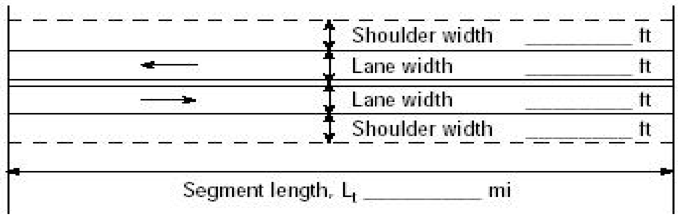
DIRECTIONAL TWO-LANE HIGHWAY SEGMENT WORKSHEET

General Information		Site Information	
Analyst	*Elizabeth Fernandez*	Highway / Direction of Travel	*SR 70*
Agency or Company	*H.W. Lochner*	From/To	*CR 29 to Lonesome Island Road*
Date Performed	*October 2018*	Jurisdiction	*Highlands County*
Analysis Time Period	*AM Peak Hour*	Analysis Year	*2035*

Project Description: *No-Build, Westbound*

Input Data



☐ Class I highway ☐ Class II highway ☑ Class III highway

Terrain ☑ Level ☐ Rolling

Grade Length mi	Up/down
Peak-hour factor, PHF	*0.92*
No-passing zone	*0%*
% Trucks and Buses , P_T	*11 %*
% Recreational vehicles, P_R	*0%*
Access points *mi*	*4*/mi

Analysis direction vol., V_d	*277*veh/h
Opposing direction vol., V_o	*397*veh/h
Shoulder width ft	*4.0*
Lane Width ft	*10.0*
Segment Length mi	*2.5*

Average Travel Speed

	Analysis Direction (d)	Opposing Direction (o)
Passenger-car equivalents for trucks, E_T (Exhibit 15-11 or 15-12)	*1.4*	*1.3*
Passenger-car equivalents for RVs, E_R (Exhibit 15-11 or 15-13)	*1.0*	*1.0*
Heavy-vehicle adjustment factor, $f_{HV,ATS}=1/(1+P_T(E_T-1)+P_R(E_R-1))$	*0.958*	*0.968*
Grade adjustment factor[1], $f_{g,ATS}$ (Exhibit 15-9)	*1.00*	*1.00*
Demand flow rate[2], v_i (pc/h) $v_i=V_i/(PHF*f_{g,ATS}*f_{HV,ATS})$	*314*	*446*

Free-Flow Speed from Field Measurement		Estimated Free-Flow Speed	
Mean speed of sample[3], S_{FM}		Base free-flow speed[4], BFFS	*60.0 mi/h*
Total demand flow rate, both directions, *v*		Adj. for lane and shoulder width,[4] f_{LS}(Exhibit 15-7)	*2.4 mi/h*
Free-flow speed, $FFS=S_{FM}+0.00776(v/f_{HV,ATS})$		Adj. for access points[4], f_A (Exhibit 15-8)	*1.0 mi/h*
Adj. for no-passing zones, $f_{np,ATS}$ (Exhibit 15-15)	*1.2 mi/h*	Free-flow speed, FFS $(FSS=BFFS-f_{LS}-f_A)$	*56.6 mi/h*
		Average travel speed, $ATS_d=FFS-0.00776(v_{d,ATS}+v_{o,ATS})-f_{np,ATS}$	*49.5 mi/h*
		Percent free flow speed, PFFS	*87.4 %*

Percent Time-Spent-Following

	Analysis Direction (d)	Opposing Direction (o)
Passenger-car equivalents for trucks, E_T(Exhibit 15-18 or 15-19)	*1.1*	*1.0*
Passenger-car equivalents for RVs, E_R (Exhibit 15-18 or 15-19)	*1.0*	*1.0*
Heavy-vehicle adjustment factor, $f_{HV}=1/(1+P_T(E_T-1)+P_R(E_R-1))$	*0.989*	*1.000*
Grade adjustment factor[1], $f_{g,PTSF}$ (Exhibit 15-16 or Ex 15-17)	*1.00*	*1.00*
Directional flow rate[2], v_i(pc/h) $v_i=V_i/(PHF*f_{HV,PTSF}*f_{g,PTSF})$	*304*	*432*
Base percent time-spent-following[4], $BPTSF_d(\%)=100(1-e^{av_d^b})$	*36.2*	
Adj. for no-passing zone, $f_{np,PTSF}$ (Exhibit 15-21)	*14.2*	
Percent time-spent-following, $PTSF_d(\%)=BPTSF_d+f_{np,PTSF}*(v_{d,PTSF}/v_{d,PTSF}+v_{o,PTSF})$	*42.1*	

Level of Service and Other Performance Measures

Level of service, LOS (Exhibit 15-3)	*B*
Volume to capacity ratio, *v/c*	*0.18*

Capacity, $C_{d,ATS}$ (Equation 15-12) veh/h	*1700*
Capacity, $C_{d,PTSF}$ (Equation 15-13) veh/h	*1700*
Percent Free-Flow Speed $PFFS_d$(Equation 15-11 - Class III only)	*87.4*
Bicycle Level of Service	
Directional demand flow rate in outside lane, v_{OL} (Eq. 15-24) veh/h	*301.1*
Effective width, Wv (Eq. 15-29) ft	*14.00*
Effective speed factor, S_t (Eq. 15-30)	*4.79*
Bicycle level of service score, BLOS (Eq. 15-31)	*7.85*
Bicycle level of service (Exhibit 15-4)	*F*
Notes	

1. Note that the adjustment factor for level terrain is 1.00,as level terrain is one of the base conditions. For the purpose of grade adjustment, specific downgrade segments are treated as level terrain.
2. If v_i(v_d or v_o) >=1,700 pc/h, terminate analysis--the LOS is F.
3. For the analysis direction only and for v>200 veh/h.
4. For the analysis direction only
5. Exhibit 15-20 provides coefficients a and b for Equation 15-10.
6. Use alternative Exhibit 15-14 if some trucks operate at crawl speeds on a specific downgrade.

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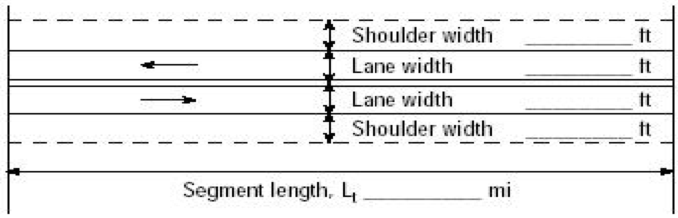
DIRECTIONAL TWO-LANE HIGHWAY SEGMENT WORKSHEET

General Information		***Site Information***	
Analyst	*Elizabeth Fernandez*	Highway / Direction of Travel	*SR 70*
Agency or Company	*H.W. Lochner*	From/To	*CR 29 to Lonesome Island Road*
Date Performed	*October 2018*	Jurisdiction	*Highlands County*
Analysis Time Period	*PM Peak Hour*	Analysis Year	*2035*

Project Description: *No-Build, Westbound*

Input Data



☐ Class I highway ☐ Class II highway ☑ Class III highway

Terrain ☑ Level ☐ Rolling

Grade Length mi	Up/down
Peak-hour factor, PHF	*0.92*
No-passing zone	*0%*
% Trucks and Buses, P_T	*11 %*
% Recreational vehicles, P_R	*0%*
Access points *mi*	*4*/mi

Analysis direction vol., V_d	*397*veh/h
Opposing direction vol., V_o	*277*veh/h
Shoulder width ft	*4.0*
Lane Width ft	*10.0*
Segment Length mi	*2.5*

Average Travel Speed

	Analysis Direction (d)	Opposing Direction (o)
Passenger-car equivalents for trucks, E_T (Exhibit 15-11 or 15-12)	*1.3*	*1.4*
Passenger-car equivalents for RVs, E_R (Exhibit 15-11 or 15-13)	*1.0*	*1.0*
Heavy-vehicle adjustment factor, $f_{HV,ATS}=1/(1+P_T(E_T-1)+P_R(E_R-1))$	*0.968*	*0.958*
Grade adjustment factor[1], $f_{g,ATS}$ (Exhibit 15-9)	*1.00*	*1.00*
Demand flow rate[2], v_i (pc/h) $v_i=V_i/(PHF^* f_{g,ATS} {}^* f_{HV,ATS})$	*446*	*314*

Free-Flow Speed from Field Measurement		**Estimated Free-Flow Speed**	
Mean speed of sample[3], S_{FM}		Base free-flow speed[4], BFFS	*60.0 mi/h*
Total demand flow rate, both directions, *v*		Adj. for lane and shoulder width,[4] f_{LS}(Exhibit 15-7)	*2.4 mi/h*
Free-flow speed, $FFS=S_{FM}+0.00776(v/f_{HV,ATS})$		Adj. for access points[4], f_A (Exhibit 15-8)	*1.0 mi/h*
Adj. for no-passing zones, $f_{np,ATS}$ (Exhibit 15-15)	*1.5 mi/h*	Free-flow speed, FFS (FSS=BFFS-f_{LS}-f_A)	*56.6 mi/h*
		Average travel speed, $ATS_d=FFS-0.00776(v_{d,ATS}+v_{o,ATS})-f_{np,ATS}$	*49.2 mi/h*
		Percent free flow speed, PFFS	*87.0 %*

Percent Time-Spent-Following

	Analysis Direction (d)	Opposing Direction (o)
Passenger-car equivalents for trucks, E_T(Exhibit 15-18 or 15-19)	*1.0*	*1.1*
Passenger-car equivalents for RVs, E_R (Exhibit 15-18 or 15-19)	*1.0*	*1.0*
Heavy-vehicle adjustment factor, $f_{HV}=1/(1+P_T(E_T-1)+P_R(E_R-1))$	*1.000*	*0.989*
Grade adjustment factor[1], $f_{g,PTSF}$ (Exhibit 15-16 or Ex 15-17)	*1.00*	*1.00*
Directional flow rate[2], v_i(pc/h) $v_i=V_i/(PHF^*f_{HV,PTSF}{}^* f_{g,PTSF})$	*432*	*304*
Base percent time-spent-following[4], $BPTSF_d(\%)=100(1-e^{av_d^b})$	*43.1*	
Adj. for no-passing zone, $f_{np,PTSF}$ (Exhibit 15-21)	*14.2*	
Percent time-spent-following, $PTSF_d(\%)=BPTSF_d+f_{np,PTSF}{}^*(v_{d,PTSF}/v_{d,PTSF}+v_{o,PTSF})$	*51.4*	

Level of Service and Other Performance Measures

Level of service, LOS (Exhibit 15-3)	*B*
Volume to capacity ratio, *v/c*	*0.25*

Capacity, $C_{d,ATS}$ (Equation 15-12) veh/h	*1700*
Capacity, $C_{d,PTSF}$ (Equation 15-13) veh/h	*1700*
Percent Free-Flow Speed $PFFS_d$(Equation 15-11 - Class III only)	*87.0*
Bicycle Level of Service	
Directional demand flow rate in outside lane, v_{OL} (Eq. 15-24) veh/h	*431.5*
Effective width, Wv (Eq. 15-29) ft	*14.00*
Effective speed factor, S_t (Eq. 15-30)	*4.79*
Bicycle level of service score, BLOS (Eq. 15-31)	*8.04*
Bicycle level of service (Exhibit 15-4)	*F*
Notes	

1. Note that the adjustment factor for level terrain is 1.00,as level terrain is one of the base conditions. For the purpose of grade adjustment, specific downgrade segments are treated as level terrain.
2. If $v_i(v_d$ or $v_o)$ >=1,700 pc/h, terminate analysis--the LOS is F.
3. For the analysis direction only and for v>200 veh/h.
4. For the analysis direction only
5. Exhibit 15-20 provides coefficients a and b for Equation 15-10.
6. Use alternative Exhibit 15-14 if some trucks operate at crawl speeds on a specific downgrade.

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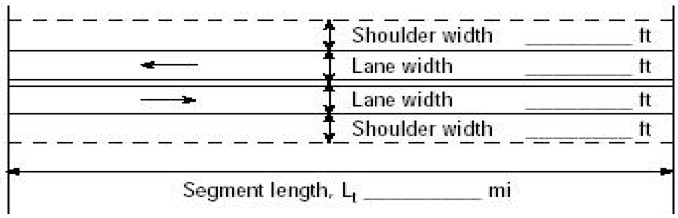
DIRECTIONAL TWO-LANE HIGHWAY SEGMENT WORKSHEET

General Information		***Site Information***	
Analyst	*Elizabeth Fernandez*	Highway / Direction of Travel	*SR 70*
Agency or Company	*H.W. Lochner*	From/To	*CR 29 to Lonesome Island Road*
Date Performed	*October 2018*	Jurisdiction	*Highlands County*
Analysis Time Period	*AM Peak Hour*	Analysis Year	*2045*

Project Description: *No-Build, Eastbound*

Input Data



☐ Class I highway ☐ Class II highway ☑ Class III highway

Terrain ☑ Level ☐ Rolling

Analysis direction vol., V_d	*464*veh/h
Opposing direction vol., V_o	*324*veh/h
Shoulder width ft	*4.0*
Lane Width ft	*10.0*
Segment Length mi	*2.5*
Grade Length mi	Up/down
Peak-hour factor, PHF	*0.92*
No-passing zone	*0%*
% Trucks and Buses , P_T	*11 %*
% Recreational vehicles, P_R	*0%*
Access points *mi*	*4*/mi

Average Travel Speed

	Analysis Direction (d)	Opposing Direction (o)
Passenger-car equivalents for trucks, E_T (Exhibit 15-11 or 15-12)	*1.2*	*1.3*
Passenger-car equivalents for RVs, E_R (Exhibit 15-11 or 15-13)	*1.0*	*1.0*
Heavy-vehicle adjustment factor, $f_{HV,ATS}=1/(1+P_T(E_T-1)+P_R(E_R-1))$	*0.978*	*0.968*
Grade adjustment factor[1], $f_{g,ATS}$ (Exhibit 15-9)	*1.00*	*1.00*
Demand flow rate[2], v_i (pc/h) $v_i=V_i/(PHF^* f_{g,ATS} * f_{HV,ATS})$	*516*	*364*

Free-Flow Speed from Field Measurement		**Estimated Free-Flow Speed**	
Mean speed of sample[3], S_{FM}		Base free-flow speed[4], BFFS	*60.0 mi/h*
Total demand flow rate, both directions, *v*		Adj. for lane and shoulder width,[4] f_{LS}(Exhibit 15-7)	*2.4 mi/h*
Free-flow speed, $FFS=S_{FM}+0.00776(v/f_{HV,ATS})$		Adj. for access points[4], f_A (Exhibit 15-8)	*1.0 mi/h*
Adj. for no-passing zones, $f_{np,ATS}$ (Exhibit 15-15)	*1.4 mi/h*	Free-flow speed, FFS (FSS=BFFS-f_{LS}-f_A)	*56.6 mi/h*
		Average travel speed, $ATS_d=FFS-0.00776(v_{d,ATS}+v_{o,ATS})-f_{np,ATS}$	*48.4 mi/h*
		Percent free flow speed, PFFS	*85.5 %*

Percent Time-Spent-Following

	Analysis Direction (d)	Opposing Direction (o)
Passenger-car equivalents for trucks, E_T(Exhibit 15-18 or 15-19)	*1.0*	*1.1*
Passenger-car equivalents for RVs, E_R (Exhibit 15-18 or 15-19)	*1.0*	*1.0*
Heavy-vehicle adjustment factor, $f_{HV}=1/(1+P_T(E_T-1)+P_R(E_R-1))$	*1.000*	*0.989*
Grade adjustment factor[1], $f_{g,PTSF}$ (Exhibit 15-16 or Ex 15-17)	*1.00*	*1.00*
Directional flow rate[2], v_i(pc/h) $v_i=V_i/(PHF^*f_{HV,PTSF}^* f_{g,PTSF})$	*504*	*356*
Base percent time-spent-following[4], $BPTSF_d(\%)=100(1-e^{av_d^b})$	*48.8*	
Adj. for no-passing zone, $f_{np,PTSF}$ (Exhibit 15-21)	*13.7*	
Percent time-spent-following, $PTSF_d(\%)=BPTSF_d+f_{np,PTSF}*(v_{d,PTSF}/v_{d,PTSF}+v_{o,PTSF})$	*56.8*	

Level of Service and Other Performance Measures

Level of service, LOS (Exhibit 15-3)	*B*
Volume to capacity ratio, *v/c*	*0.30*

Capacity, $C_{d,ATS}$ (Equation 15-12) veh/h	*1700*
Capacity, $C_{d,PTSF}$ (Equation 15-13) veh/h	*1700*
Percent Free-Flow Speed $PFFS_d$(Equation 15-11 - Class III only)	*85.5*
Bicycle Level of Service	
Directional demand flow rate in outside lane, v_{OL} (Eq. 15-24) veh/h	*504.3*
Effective width, Wv (Eq. 15-29) ft	*14.00*
Effective speed factor, S_t (Eq. 15-30)	*4.79*
Bicycle level of service score, BLOS (Eq. 15-31)	*8.11*
Bicycle level of service (Exhibit 15-4)	*F*
Notes	

1. Note that the adjustment factor for level terrain is 1.00,as level terrain is one of the base conditions. For the purpose of grade adjustment, specific downgrade segments are treated as level terrain.
2. If v_i(v_d or v_o) >=1,700 pc/h, terminate analysis--the LOS is F.
3. For the analysis direction only and for v>200 veh/h.
4. For the analysis direction only
5. Exhibit 15-20 provides coefficients a and b for Equation 15-10.
6. Use alternative Exhibit 15-14 if some trucks operate at crawl speeds on a specific downgrade.

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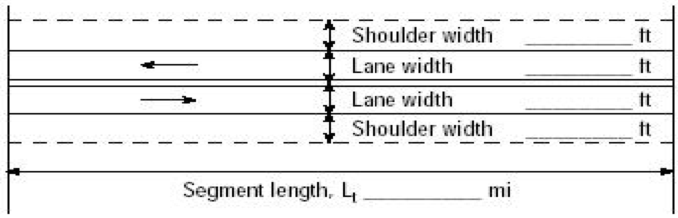
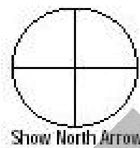
DIRECTIONAL TWO-LANE HIGHWAY SEGMENT WORKSHEET

General Information		Site Information	
Analyst	*Elizabeth Fernandez*	Highway / Direction of Travel	*SR 70*
Agency or Company	*H.W. Lochner*	From/To	*CR 29 to Lonesome Island Road*
Date Performed	*October 2018*	Jurisdiction	*Highlands County*
Analysis Time Period	*PM Peak Hour*	Analysis Year	*2045*

Project Description: *No-Build, Eastbound*

Input Data





☐ Class I highway ☐ Class II highway ☑ Class III highway

Terrain ☑ Level ☐ Rolling

Analysis direction vol., V_d	*324*veh/h
Opposing direction vol., V_o	*464*veh/h
Shoulder width ft	*4.0*
Lane Width ft	*10.0*
Segment Length mi	*2.5*
Grade Length mi	Up/down
Peak-hour factor, PHF	*0.92*
No-passing zone	*0%*
% Trucks and Buses , P_T	*11 %*
% Recreational vehicles, P_R	*0%*
Access points *mi*	*4*/mi

Average Travel Speed

	Analysis Direction (d)	Opposing Direction (o)
Passenger-car equivalents for trucks, E_T (Exhibit 15-11 or 15-12)	*1.3*	*1.2*
Passenger-car equivalents for RVs, E_R (Exhibit 15-11 or 15-13)	*1.0*	*1.0*
Heavy-vehicle adjustment factor, $f_{HV,ATS}=1/(1+P_T(E_T-1)+P_R(E_R-1))$	*0.968*	*0.978*
Grade adjustment factor[1], $f_{g,ATS}$ (Exhibit 15-9)	*1.00*	*1.00*
Demand flow rate[2], v_i (pc/h) $v_i=V_i/(PHF* f_{g,ATS} * f_{HV,ATS})$	*364*	*516*

Free-Flow Speed from Field Measurement		Estimated Free-Flow Speed	
Mean speed of sample[3], S_{FM}		Base free-flow speed[4], BFFS	*60.0 mi/h*
Total demand flow rate, both directions, *v*		Adj. for lane and shoulder width,[4] f_{LS}(Exhibit 15-7)	*2.4 mi/h*
Free-flow speed, $FFS=S_{FM}+0.00776(v/ f_{HV,ATS})$		Adj. for access points[4], f_A (Exhibit 15-8)	*1.0 mi/h*
Adj. for no-passing zones, $f_{np,ATS}$ (Exhibit 15-15)	*1.1 mi/h*	Free-flow speed, FFS $(FSS=BFFS-f_{LS}-f_A)$	*56.6 mi/h*
		Average travel speed, $ATS_d=FFS-0.00776(v_{d,ATS}+v_{o,ATS})-f_{np,ATS}$	*48.7 mi/h*
		Percent free flow speed, PFFS	*86.0 %*

Percent Time-Spent-Following

	Analysis Direction (d)	Opposing Direction (o)
Passenger-car equivalents for trucks, E_T(Exhibit 15-18 or 15-19)	*1.1*	*1.0*
Passenger-car equivalents for RVs, E_R (Exhibit 15-18 or 15-19)	*1.0*	*1.0*
Heavy-vehicle adjustment factor, $f_{HV}=1/(1+P_T(E_T-1)+P_R(E_R-1))$	*0.989*	*1.000*
Grade adjustment factor[1], $f_{g,PTSF}$ (Exhibit 15-16 or Ex 15-17)	*1.00*	*1.00*
Directional flow rate[2], v_i(pc/h) $v_i=V_i/(PHF*f_{HV,PTSF}* f_{g,PTSF})$	*356*	*504*
Base percent time-spent-following[4], $BPTSF_d(\%)=100(1-e^{av_d^b})$	*41.6*	
Adj. for no-passing zone, $f_{np,PTSF}$ (Exhibit 15-21)	*13.7*	
Percent time-spent-following, $PTSF_d(\%)=BPTSF_d+f_{np,PTSF}*(v_{d,PTSF}/v_{d,PTSF}+v_{o,PTSF})$	*47.3*	

Level of Service and Other Performance Measures

Level of service, LOS (Exhibit 15-3)	*B*
Volume to capacity ratio, *v/c*	*0.21*

Capacity, $C_{d,ATS}$ (Equation 15-12) veh/h	*1700*
Capacity, $C_{d,PTSF}$ (Equation 15-13) veh/h	*1700*
Percent Free-Flow Speed $PFFS_d$(Equation 15-11 - Class III only)	*86.0*
Bicycle Level of Service	
Directional demand flow rate in outside lane, v_{OL} (Eq. 15-24) veh/h	*352.2*
Effective width, Wv (Eq. 15-29) ft	*14.00*
Effective speed factor, S_t (Eq. 15-30)	*4.79*
Bicycle level of service score, BLOS (Eq. 15-31)	*7.93*
Bicycle level of service (Exhibit 15-4)	*F*

Notes

1. Note that the adjustment factor for level terrain is 1.00,as level terrain is one of the base conditions. For the purpose of grade adjustment, specific downgrade segments are treated as level terrain.
2. If v_i(v_d or v_o) >=1,700 pc/h, terminate analysis--the LOS is F.
3. For the analysis direction only and for v>200 veh/h.
4. For the analysis direction only
5. Exhibit 15-20 provides coefficients a and b for Equation 15-10.
6. Use alternative Exhibit 15-14 if some trucks operate at crawl speeds on a specific downgrade.

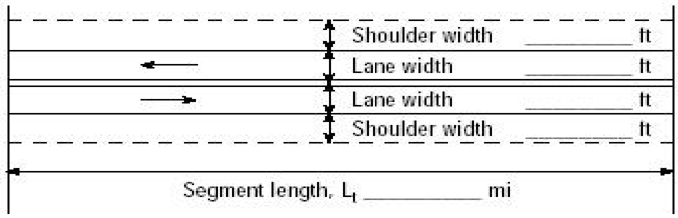
 *HCS*TM TwoLane Version 7.6 Generated: 10/9/2018 11:36 AM

DIRECTIONAL TWO-LANE HIGHWAY SEGMENT WORKSHEET

General Information		***Site Information***	
Analyst	*Elizabeth Fernandez*	Highway / Direction of Travel	*SR 70*
Agency or Company	*H.W. Lochner*	From/To	*CR 29 to Lonesome Island Road*
Date Performed	*October 2018*	Jurisdiction	*Highlands County*
Analysis Time Period	*AM Peak Hour*	Analysis Year	*2045*

Project Description: *No-Build, Westbound*

Input Data



Analysis direction vol., V_d *324*veh/h

Opposing direction vol., V_o *464*veh/h

Shoulder width ft *4.0*

Lane Width ft *10.0*

Segment Length mi *2.5*

☐ Class I highway ☐ Class II highway ☑ Class III highway

Terrain ☑ Level ☐ Rolling

Grade Length mi Up/down

Peak-hour factor, PHF *0.92*

No-passing zone *0%*

% Trucks and Buses , P_T *11 %*

% Recreational vehicles, P_R *0%*

Access points *mi* *4*/mi

Average Travel Speed

	Analysis Direction (d)	Opposing Direction (o)
Passenger-car equivalents for trucks, E_T (Exhibit 15-11 or 15-12)	*1.3*	*1.2*
Passenger-car equivalents for RVs, E_R (Exhibit 15-11 or 15-13)	*1.0*	*1.0*
Heavy-vehicle adjustment factor, $f_{HV,ATS}=1/(1+P_T(E_T-1)+P_R(E_R-1))$	*0.968*	*0.978*
Grade adjustment factor[1], $f_{g,ATS}$ (Exhibit 15-9)	*1.00*	*1.00*
Demand flow rate[2], v_i (pc/h) $v_i=V_i/(PHF^* f_{g,ATS} * f_{HV,ATS})$	*364*	*516*

Free-Flow Speed from Field Measurement		**Estimated Free-Flow Speed**	
Mean speed of sample[3], S_{FM}		Base free-flow speed[4], BFFS	*60.0 mi/h*
Total demand flow rate, both directions, *v*		Adj. for lane and shoulder width,[4] f_{LS}(Exhibit 15-7)	*2.4 mi/h*
Free-flow speed, $FFS=S_{FM}+0.00776(v/f_{HV,ATS})$		Adj. for access points[4], f_A (Exhibit 15-8)	*1.0 mi/h*
Adj. for no-passing zones, $f_{np,ATS}$ (Exhibit 15-15)	*1.1 mi/h*	Free-flow speed, FFS (FSS=BFFS-f_{LS}-f_A)	*56.6 mi/h*
		Average travel speed, $ATS_d=FFS-0.00776(v_{d,ATS}+v_{o,ATS})-f_{np,ATS}$	*48.7 mi/h*
		Percent free flow speed, PFFS	*86.0 %*

Percent Time-Spent-Following

	Analysis Direction (d)	Opposing Direction (o)
Passenger-car equivalents for trucks, E_T(Exhibit 15-18 or 15-19)	*1.1*	*1.0*
Passenger-car equivalents for RVs, E_R (Exhibit 15-18 or 15-19)	*1.0*	*1.0*
Heavy-vehicle adjustment factor, $f_{HV}=1/(1+P_T(E_T-1)+P_R(E_R-1))$	*0.989*	*1.000*
Grade adjustment factor[1], $f_{g,PTSF}$ (Exhibit 15-16 or Ex 15-17)	*1.00*	*1.00*
Directional flow rate[2], v_i(pc/h) $v_i=V_i/(PHF^*f_{HV,PTSF}*f_{g,PTSF})$	*356*	*504*
Base percent time-spent-following[4], $BPTSF_d(\%)=100(1-e^{av_d^b})$	*41.6*	
Adj. for no-passing zone, $f_{np,PTSF}$ (Exhibit 15-21)	*13.7*	
Percent time-spent-following, $PTSF_d(\%)=BPTSF_d+f_{np,PTSF}*(v_{d,PTSF}/v_{d,PTSF}+v_{o,PTSF})$	*47.3*	

Level of Service and Other Performance Measures

Level of service, LOS (Exhibit 15-3)	*B*
Volume to capacity ratio, *v/c*	*0.21*

Capacity, $C_{d,ATS}$ (Equation 15-12) veh/h	*1700*
Capacity, $C_{d,PTSF}$ (Equation 15-13) veh/h	*1700*
Percent Free-Flow Speed $PFFS_d$(Equation 15-11 - Class III only)	*86.0*
Bicycle Level of Service	
Directional demand flow rate in outside lane, v_{OL} (Eq. 15-24) veh/h	*352.2*
Effective width, Wv (Eq. 15-29) ft	*14.00*
Effective speed factor, S_t (Eq. 15-30)	*4.79*
Bicycle level of service score, BLOS (Eq. 15-31)	*7.93*
Bicycle level of service (Exhibit 15-4)	*F*
Notes	

1. Note that the adjustment factor for level terrain is 1.00,as level terrain is one of the base conditions. For the purpose of grade adjustment, specific downgrade segments are treated as level terrain.
2. If v_i(v_d or v_o) >=1,700 pc/h, terminate analysis--the LOS is F.
3. For the analysis direction only and for v>200 veh/h.
4. For the analysis direction only
5. Exhibit 15-20 provides coefficients a and b for Equation 15-10.
6. Use alternative Exhibit 15-14 if some trucks operate at crawl speeds on a specific downgrade.

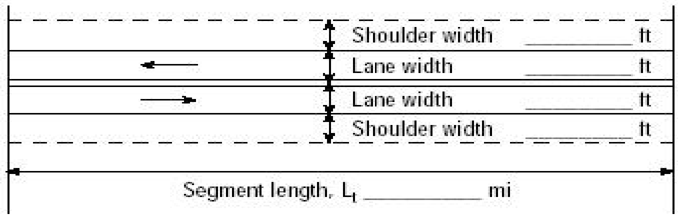
 HCS™ TwoLane Version 7.6 Generated: 10/9/2018 11:41 AM

DIRECTIONAL TWO-LANE HIGHWAY SEGMENT WORKSHEET

General Information		**Site Information**	
Analyst	*Elizabeth Fernandez*	Highway / Direction of Travel	*SR 70*
Agency or Company	*H.W. Lochner*	From/To	*CR 29 to Lonesome Island Road*
Date Performed	*October 2018*	Jurisdiction	*Highlands County*
Analysis Time Period	*PM Peak Hour*	Analysis Year	*2045*

Project Description: *No-Build, Westbound*

Input Data



☐ Class I highway ☐ Class II highway ☑ Class III highway

Terrain ☑ Level ☐ Rolling

Grade Length mi	Up/down
Peak-hour factor, PHF	*0.92*
No-passing zone	*0%*
% Trucks and Buses , P_T	*11 %*
% Recreational vehicles, P_R	*0%*
Access points *mi*	*4*/mi

Analysis direction vol., V_d	*464*veh/h
Opposing direction vol., V_o	*324*veh/h
Shoulder width ft	*4.0*
Lane Width ft	*10.0*
Segment Length mi	*2.5*

Average Travel Speed

	Analysis Direction (d)	Opposing Direction (o)
Passenger-car equivalents for trucks, E_T (Exhibit 15-11 or 15-12)	*1.2*	*1.3*
Passenger-car equivalents for RVs, E_R (Exhibit 15-11 or 15-13)	*1.0*	*1.0*
Heavy-vehicle adjustment factor, $f_{HV,ATS}$=1/ (1+ P_T(E_T-1)+P_R(E_R-1))	*0.978*	*0.968*
Grade adjustment factor[1], $f_{g,ATS}$ (Exhibit 15-9)	*1.00*	*1.00*
Demand flow rate[2], v_i (pc/h) $v_i=V_i$ / (PHF* $f_{g,ATS}$ * $f_{HV,ATS}$)	*516*	*364*

Free-Flow Speed from Field Measurement		**Estimated Free-Flow Speed**	
Mean speed of sample[3], S_{FM}		Base free-flow speed[4], BFFS	*60.0 mi/h*
Total demand flow rate, both directions, *v*		Adj. for lane and shoulder width,[4] f_{LS}(Exhibit 15-7)	*2.4 mi/h*
Free-flow speed, FFS=S_{FM}+0.00776(*v*/ $f_{HV,ATS}$)		Adj. for access points[4], f_A (Exhibit 15-8)	*1.0 mi/h*
Adj. for no-passing zones, $f_{np,ATS}$ (Exhibit 15-15)	*1.4 mi/h*	Free-flow speed, FFS (FSS=BFFS-f_{LS}-f_A)	*56.6 mi/h*
		Average travel speed, ATS_d=FFS-0.00776($v_{d,ATS}$ + $v_{o,ATS}$) - $f_{np,ATS}$	*48.4 mi/h*
		Percent free flow speed, PFFS	*85.5 %*

Percent Time-Spent-Following

	Analysis Direction (d)	Opposing Direction (o)
Passenger-car equivalents for trucks, E_T(Exhibit 15-18 or 15-19)	*1.0*	*1.1*
Passenger-car equivalents for RVs, E_R (Exhibit 15-18 or 15-19)	*1.0*	*1.0*
Heavy-vehicle adjustment factor, f_{HV}=1/ (1+ P_T(E_T-1)+P_R(E_R-1))	*1.000*	*0.989*
Grade adjustment factor[1], $f_{g,PTSF}$ (Exhibit 15-16 or Ex 15-17)	*1.00*	*1.00*
Directional flow rate[2], v_i(pc/h) $v_i=V_i$/(PHF*$f_{HV,PTSF}$* $f_{g,PTSF}$)	*504*	*356*
Base percent time-spent-following[4], $BPTSF_d$(%)=100(1-$e^{av_d^b}$)	*48.8*	
Adj. for no-passing zone, $f_{np,PTSF}$ (Exhibit 15-21)	*13.7*	
Percent time-spent-following, $PTSF_d$(%)=$BPTSF_d$+$f_{np,PTSF}$ *($v_{d,PTSF}$ / $v_{d,PTSF}$ + $v_{o,PTSF}$)	*56.8*	

Level of Service and Other Performance Measures

Level of service, LOS (Exhibit 15-3)	*B*
Volume to capacity ratio, *v/c*	*0.30*

Capacity, $C_{d,ATS}$ (Equation 15-12) veh/h	*1700*
Capacity, $C_{d,PTSF}$ (Equation 15-13) veh/h	*1700*
Percent Free-Flow Speed $PFFS_d$(Equation 15-11 - Class III only)	*85.5*
Bicycle Level of Service	
Directional demand flow rate in outside lane, v_{OL} (Eq. 15-24) veh/h	*504.3*
Effective width, Wv (Eq. 15-29) ft	*14.00*
Effective speed factor, S_t (Eq. 15-30)	*4.79*
Bicycle level of service score, BLOS (Eq. 15-31)	*8.11*
Bicycle level of service (Exhibit 15-4)	*F*
Notes	

1. Note that the adjustment factor for level terrain is 1.00,as level terrain is one of the base conditions. For the purpose of grade adjustment, specific downgrade segments are treated as level terrain.
2. If v_i(v_d or v_o) >=1,700 pc/h, terminate analysis--the LOS is F.
3. For the analysis direction only and for v>200 veh/h.
4. For the analysis direction only
5. Exhibit 15-20 provides coefficients a and b for Equation 15-10.
6. Use alternative Exhibit 15-14 if some trucks operate at crawl speeds on a specific downgrade.

Appendix H:

HSM Predictive Method Computations - 2045 No Build

Instructions

Highway Safety Manual 1st Edition, Volume 2, Chapter 10 -- Predictive Method for Rural Two-Lane, Two-Way Roads -- Analysis Spreadsheet Summary

Overview

This spreadsheet has been developed to demonstrate the predictive models for rural two-lane highways as contained in the new Highway Safety Manual. The content was developed for training purposes and all users should verify that the answers they obtain with these worksheets correctly represent their target analysis.

The page tabs shown at the bottom of this file represent the various analyses that can be performed using this spreadsheet tool and the HSM predictive methods. A user can evaluate an individual road segment or intersection as well as analyze multiple road segments and intersections. If more than one segment type requires analysis, the user should create a blank worksheet and then copy the contents of the segment worksheet into the blank sheet and name the worksheet accordingly.

The current contents of this spreadsheet include the following:

Worksheet Name	**Contents**
Instructions	Current worksheet displaying overview, summary of spreadsheet worksheets, and description of color coding included in the worksheets.
Segment 1	Analysis for the rural 2-lane segments that uses lookup tables from exhibits included in the worksheet "Segment Tables." The associated HSM worksheets are 1A, 1B, 1C, 1D, and 1E.
Segment 2	Duplicate segment worksheet for additional highway segments.
Segment Tables	Includes segment tables used for analysis of HSM-provided crash trends as well as locally-derived crash information. These are HSM Tables 10-3, 10-4, and 10-12. This worksheet also includes tables used for CMF calculations. These tables include Table 10-8, 10-9, and 10-10.
Intersection 1	Analysis for the rural 2-lane intersections that uses lookup tables from exhibits included in the worksheet "Intersection Tables." The associated HSM worksheets are 2A, 2B, 2C, 2D, and 2E.
Intersection 2	Duplicate intersection worksheet for additional highway segments.
Intersection Tables	Includes intersection tables used for analysis of HSM-provided crash trends as well as locally-derived crash information. These are HSM Tables 10-5, 10-6, and 10-15. This worksheet also includes tables used for CMF calculations. These tables include Tables 10-13 and 10-14.
Rural 2-lane Site Total	Analysis for site-specific EB analysis using results from the rural 2-lane segment as well as rural 2-lane intersection worksheets. This analysis can be performed if the analyst knows the exact location of historic crashes within the study limits. The associated HSM worksheets are 3A and 3B.
Rural 2-lane Project Total	Analysis for project-specific EB analysis using results from the rural 2-lane segment as well as rural 2-lane intersection worksheets. This analysis can be performed if the analyst has historic crash data, but does not know the exact location within the project limits at which the crashes occurred. The associated

Color Coding in the Worksheets

The worksheets include three specific color options to help users identify locations where input data is required. In some cases, the shaded cells require the user to input specific numbers. In other cases the input is restricted to a select set of options included in pull-down lists. The respective color coding is as follows:

Color Used	**Type of Information Required from User**
(yellow)	Required input information as identified in the HSM.
(blue)	Input data required from the user but restricted to options provided in pull-down boxes.
(orange)	Optional input information that can be used to supplement the analysis if this information is available. This optional input information is reserved for locally-derived crash information. If the analyst elects to use this option so as to improve analysis for local crash distribution trends, each of the Exhibits with the locally-derived input also includes a pull-down box where the analyst should indicate they are using locally derive crash information. The worksheets will then use the local values instead of the HSM default values.

Spreadsheet developed by:

Karen Dixon, Ph.D., P.E.
Oregon State University
School of Civil & Construction Engineering
220 Owen Hall
Corvallis, OR 97330

Email: karen.dixon@oregonstate.edu
Phone: 541-737-6337

Segment 1 2045 No Build

Worksheet 1A -- General Information and Input Data for Rural Two-Lane Two-Way Roadway Segments

General Information		Location Information	
Analyst	SPM	Roadway	SR 70
Agency or Company	H.W. Lochner	Roadway Section	MP 17.255 - 21.573
Date Performed	11/07/18	Jurisdiction	Highlands County, Florida
		Analysis Year	2045

Input Data		Base Conditions	Site Conditions				
Length of segment, L (mi)		--	4.3				
AADT (veh/day)	$AADT_{MAX}$ = 17,800 (veh/day)	--	8,700				AADT OK
Lane width (ft)		12	11				
Shoulder width (ft)		6	Right Shld:	4	Left Shld:	4	
Shoulder type		Paved	Right Shld:	Paved	Left Shld:	Paved	
Length of horizontal curve (mi)		0	0.0				
Radius of curvature (ft)		0	0				**Radius Value OK**
Spiral transition curve (present/not present)		Not Present	Not Present				
Superelevation variance (ft/ft)		< 0.01	0				
Grade (%)		0	0				
Driveway density (driveways/mile)		5	3				
Centerline rumble strips (present/not present)		Not Present	Not Present				
Passing lanes [present (1 lane) /present (2 lane) / not present)]		Not Present	Not Present				
Two-way left-turn lane (present/not present)		Not Present	Not Present				
Roadside hazard rating (1-7 scale)		3	4				
Segment lighting (present/not present)		Not Present	Not Present				
Auto speed enforcement (present/not present)		Not Present	Not Present				
Calibration Factor, Cr		1	1.00				

Worksheet 1B -- Crash Modification Factors for Rural Two-Lane Two-Way Roadway Segments

(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)
CMF for Lane Width	CMF for Shoulder Width and Type	CMF for Horizontal Curves	CMF for Super-elevation	CMF for Grades	CMF for Driveway Density	CMF for Centerline Rumble Strips	CMF for Passing Lanes	CMF for Two-Way Left-Turn Lane	CMF for Roadside Design	CMF for Lighting	CMF for Automated Speed Enforcement	Combined CMF
CMF 1r	*CMF 2r*	*CMF 3r*	*CMF 4r*	*CMR 5r*	*CMF 6r*	*CMF 7r*	*CMF 8r*	*CMF 9r*	*CMF 10r*	*CMF 11r*	*CMF 12r*	*CMF comb*
from Equation 10-11	from Equation 10-12	from Equation 10-13	from Equations 10-14, 10-15, or 10-16	from Table 10-11	from Equation 10-17	from Section 10.7.1	from Section 10.7.1	from Equation 10-18 & 10-19	from Equation 10-20	from Equation 10-21	from Section 10.7.1	(1)x(2)x … x(11)x(12)
1.03	1.09	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.07	1.00	1.00	1.194

Worksheet 1C -- Roadway Segment Crashes for Rural Two-Lane Two-Way Roadway Segments

(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Crash Severity Level	**N spf rs**	**Overdispersion Parameter, k**	**Crash Severity Distribution**	**N spf rs by Severity Distribution**	**Combined CMFs**	**Calibration Factor, Cr**	**Predicted average crash frequency, N**
	from Equation 10-6	from Equation 10-7	from Table 10-3 (proportion)	(2)TOTAL x (4)	(13) from Worksheet 1B		(5)x(6)x(7)
Total	9.995	0.05	1.000	9.995	1.19	1.00	11.939

Segment 1 2045 No Build

Fatal and Injury (FI)	--	--	0.321	3.208	1.19	1.00	3.832
Property Damage Only (PDO)	--	--	0.679	6.787	1.19	1.00	8.106

Worksheet 1D -- Crashes by Severity Level and Collision Type for Rural Two-Lane Two-Way Roadway Segments

(1)	(2)	(3)	(4)	(5)	(6)	(7)
Collision Type	**Proportion of Collision Type$_{(TOTAL)}$**	**$N_{predicted\ rs\ (TOTAL)}$ (crashes/year)**	**Proportion of Collision Type$_{(FI)}$**	**$N_{predicted\ rs\ (FI)}$ (crashes/year)**	**Proportion of Collision Type$_{(PDO)}$**	**$N_{predicted\ rs\ (PDO)}$ (crashes/year)**
	from Table 10-4	$(8)_{TOTAL}$ from Worksheet 1C	from Table 10-4	$(8)_{FI}$ from Worksheet 1C	from Table 10-4	$(8)_{PDO}$ from Worksheet 1C
Total	1.000	11.939	1.000	3.832	1.000	8.106
		$(2)x(3)_{TOTAL}$		$(4)x(5)_{FI}$		$(6)x(7)_{PDO}$
			SINGLE-VEHICLE			
Collision with animal	0.121	1.445	0.038	0.146	0.184	1.492
Collision with bicycle	0.002	0.024	0.004	0.015	0.001	0.008
Collision with pedestrian	0.003	0.036	0.007	0.027	0.001	0.008
Overturned	0.025	0.298	0.037	0.142	0.015	0.122
Ran off road	0.521	6.220	0.545	2.089	0.505	4.094
Other single-vehicle collision	0.021	0.251	0.007	0.027	0.029	0.235
Total single-vehicle crashes	0.693	8.273	0.638	2.445	0.735	5.958
			MULTIPLE-VEHICLE			
Angle collision	0.085	1.015	0.100	0.383	0.072	0.584
Head-on collision	0.016	0.191	0.034	0.130	0.003	0.024
Rear-end collision	0.142	1.695	0.164	0.628	0.122	0.989
Sideswipe collision	0.037	0.442	0.038	0.146	0.038	0.308
Other multiple-vehicle collision	0.027	0.322	0.026	0.100	0.030	0.243
Total multiple-vehicle crashes	0.307	3.665	0.362	1.387	0.265	2.148

Worksheet 1E -- Summary Results for Rural Two-Lane Two-Way Roadway Segments

(1)	(2)	(3)	(4)	(5)
Crash severity level	**Crash Severity Distribution (proportion)**	**Predicted average crash frequency (crashes/year)**	**Roadway segment length (mi)**	**Crash rate (crashes/mi/year)**
	(4) from Worksheet 1C	(8) from Worksheet 1C		(3)/(4)
Total	1.000	11.9	4.3	2.8
Fatal and Injury (FI)	0.321	3.8	4.3	0.9
Property Damage Only (PDO)	0.679	8.1	4.3	1.9

Segment 1 2045 No Build

Supplemental CMF Calculations for Shoulders:

Calculated Right Shoulder Width (CMF_{wra}) :	1.15	Calculated Left Shoulder Width (CMF_{wra}) :	1.15
Calculated Right Shoulder Type (CMF_{tra}) :	1.00	Calculated Left Shoulder Type (CMF_{tra}) :	1.00
Computed Right Shoulder CMF_{2r} :	1.09	Computed Left Shoulder CMF_{2r} :	1.09

Supplemental CMF Calculations for Horizontal Curves:

Adjusted Curve Radius (if less than 100 ft):	0
Adjusted Curve Length (if less than 100 ft):	0
Numeric Value for S:	0
Calculated Horizonatal Curve CMF:	1.000
Adjusted Horizontal Curve CMF:	1.000

Tables Affiliated with Crash Modification Factors:

Table 10-8: CMF for Lane Width on Roadway Segments (CMF_{ra})

	AADT (veh/day)		
Lane Width (ft)	**< 400**	**400 to 2000**	**> 2000**
9	1.05	3.38	1.50
9.5	1.04	2.93	1.40
10	1.02	2.47	1.30
10.5	1.02	1.85	1.18
11	1.01	1.22	1.05
11.5	1.01	1.11	1.03
12	1.00	1.00	1.00

Note: The collision types related to lane width to which this CMF applies include single-vehicle run-off-the-road and multiple-vehicle head-on, opposite-direction sideswipe, and same-direction sideswipe crashes.

Table 10-9: CMF for Shoulder Width on Roadway Segments (CMF_{wra})

	AADT (veh/day)		
Shoulder Width (ft)	**< 400**	**400 to 2000**	**> 2000**
0	1.10	3.18	1.50
1	1.09	2.72	1.40
2	1.07	2.26	1.30
3	1.05	1.98	1.23
4	1.02	1.69	1.15
5	1.01	1.35	1.08
6	1.00	1.00	1.00
7	0.99	0.70	0.94
8	0.98	0.41	0.87

Note: The collision types related to shoulder width to which this CMF applies include single-vehicle run-off-the-road and multiple-vehicle head-on, opposite-direction sideswipe, and same-direction sideswipe crashes.

Tables Affiliated with Crash Statistics:

Table 10-3: Distribution for Crash Severity Level on Rural Two-Lane Two-Way Roadway Segments plus Locally-Derived Values

Crash severity level		Percentage of total roadway segment crashes	
Locally-Derived Values?	No	HSM-Provided Values	Locally-Derived Values
Fatal		1.3	
Incapacitating Injury		5.4	
Nonincapacitating Injury		10.9	
Possible Injury		14.5	
Total Fatal Plus Injury		32.1	0.0
Property Damage Only		67.9	100.0
TOTAL		100.0	100.0

Note: HSM-provided crash severity data based on HSIS data for Washington (2002-2006)

Table 10-4: Default Distribution by Collision Type for Specific Crash Severity Levels on Rural Two-Lane Two-Way Roadway Segments plus Locally-Derived Values

Collision type		Percentage of total roadway segment crashes by crash severity level					
		HSM-Provided Values			Locally-Derived Values		
Locally-Derived Values?	No	Total fatal and injury	Property damage	TOTAL (all severity levels combined)	Total fatal and injury	Property damage only	TOTAL (all severity levels combined)
SINGLE-VEHICLE CRASHES							
Collision with animal		3.8	18.4	12.1			
Collision with bicycle		0.4	0.1	0.2			
Collision with pedestrian		0.7	0.1	0.3			
Overturned		3.7	1.5	2.5			
Ran off road		54.5	50.5	52.1			
Other single-vehicle crash		0.7	2.9	2.1			
Total single-vehicle crashes		63.8	73.5	69.3	0.0	0.0	0.0
MULTIPLE-VEHICLE CRASHES							
Angle collision		10.0	7.2	8.5			
Head-on collision		3.4	0.3	1.6			
Rear-end collision		16.4	12.2	14.2			
Sideswipe collision		3.8	3.8	3.7			
Other multiple-vehicle collision		2.6	3.0	2.7			
Total multiple-vehicle crashes		36.2	26.5	30.7	0.0	0.0	0.0
TOTAL CRASHES		100.0	100.0	100.0	0.0	0.0	100.0

Note: HSM-provided values based on crash data for Washington (2002-2006); includes approximately 70 percent opposite-direction sideswipe and 30 percent same-direction sideswipe collisions.

Table 10-12: Nighttime Crash Proportions for Unlighted Roadway Segments plus Locally-Derived Values

Roadway Type	HSM Default Values			Locally Derived Values		
	Locally-Derived Values?	No				
	Proportion of total nighttime crashes by severity level		Proportion of crashes that occur at night	Proportion of total nighttime crashes by severity level		Proportion of crashes that occur at night
	Fatal and Injury p_{inr}	PDO p_{pnr}	p_{nr}	Fatal and Injury p_{inr}	PDO p_{pnr}	p_{nr}
2U	0.382	0.618	0.370			

Note: HSM-provided values based on HSIS data for Washington (2002-2006)

Tables Affiliated with Crash Modification Factors:

Table 10-10: Crash Modification Factors for Shoulder Types and Shoulder Widths on Roadway Segments (CMF_{tra})

	Shoulder width (ft)								
Shoulder Type	**0**	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**
Paved	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Gravel	1.00	1.00	1.01	1.01	1.01	1.02	1.02	1.02	1.02
Composite	1.00	1.01	1.02	1.02	1.03	1.04	1.04	1.05	1.06
Turf	1.00	1.01	1.03	1.04	1.05	1.07	1.08	1.10	1.11

Note: The values for composite shoulders in this exhibit represent a shoulder for which 50 percent of the shoulder width is paved and 50 percent of the shoulder width is turf.

Rural 2-Lane Site Total

Worksheet 3A -- Predicted and Observed Crashes by Severity and Site Type Using the Site-Specific EB Method

(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Site type	**Predicted average crash frequency (crashes/year)**			**Observed crashes,** $N_{observed}$ (crashes/year)	**Overdispersion Parameter, k**	**Weighted adjustment, w**	**Expected average crash frequency,**
	$N_{predicted}$ (TOTAL)	$N_{predicted}$ (FI)	$N_{predicted}$ (PDO)			Equation A-5 from Part C Appendix	Equation A-4 from Part C Appendix
ROADWAY SEGMENTS							
Segment 1 2045 No Build	11.939	3.832	8.106				
COMBINED (sum of column)	11.939	3.832	8.106		--	--	

Worksheet 3B -- Site-Specific EB Method Summary Results

(1)	(2)	(3)
Crash severity level	$N_{predicted}$	$N_{expected}$
Total	$(2)_{COMB}$ from Worksheet 3A	$(8)_{COMB}$ from Worksheet 3A
	11.939	
Fatal and Injury (FI)	$(3)_{COMB}$ from Worksheet 3A	$(3)_{TOTAL} * (2)_{FI} / (2)_{TOTAL}$
	3.832	
Property Damage Only (PDO)	$(4)_{COMB}$ from Worksheet 3A	$(3)_{TOTAL} * (2)_{PDO} / (2)_{TOTAL}$
	8.106	

Appendix I:
HSM Predictive Method Computations - 2045 Build

Instructions

Highway Safety Manual 1st Edition, Volume 2, Chapter 11-- Predictive Method for Rural Multilane Highways -- Analysis Spreadsheet Summary

Overview

This spreadsheet has been developed to demonstrate the predictive models for rural multilane highways as contained in the new Highway Safety Manual. The content was developed for training purposes and all users should verify that the answers they obtain with these worksheets correctly represent their target analysis.

The page tabs shown at the bottom of this file represent the various analysEs that can be performed using this spreadsheet tool and the HSM predictive methods. A user can evaluate an individual road segment or intersection as well as analyze multiple road segments and intersections. If more than one segment type (such as rural divided) needs analysis, the user should create a blank worksheet and then copy the contents of the associated sheet (in this example the rural divided sheet) into the blank sheet and name the file accordingly.

The current contents of this spreadsheet include the following:

Worksheet Name	Contents
Instructions	Current worksheet displaying overview, summary of spreadsheet worksheets, and description of color coding included in the worksheets.
Rural Divided Multilane Seg	Analysis for the rural divided multilane segment analysis includes AADT specific Table 11-16. The associated HSM worksheets are Worksheets 1A, 1B(a), 1C(a), 1D(a), and 1E.
Rural Undivided Multilane Seg	Analysis for the rural undivided multilane segment analysis includes AADT specific Tables 11-11 and 11-12. The associated HSM worksheets are Worksheets 1A, 1B(b), 1C(b), 1D(b), and 1E.
Segment Tables	Worksheet shows exhibits for use by the segment worksheets. These exhibits are independent and do not depend on input values. This worksheet includes exhibits that summarize crash information and can be modified for locally-derived conditions. These are Tables 11-4, 11-6, 11-15, and 11-19. Tables specific to CMFs are also included. The CMF tables in this worksheet are 11-13, 11-14, 11-17, and 11-18.
Rural Multilane Intersection	Analysis for the rural multilane intersection analysis includesTables 11-9 and 11-24. The associated HSM worksheets are Worksheets 2A, 2B, 2C, 2D, and 2E.
Intersection Tables	Tables 11-9 and 11-24 are intersection exhibits for estimating crash distributions and can be modified for locally-derived conditions if this information is available.
Rural Multilane Site Total	Analysis for site-specific EB analysis using results from the rural divided and undivided segment as well as rural intersection multilane worksheets.This analysis can be performed if the analyst knows the exact location of historic crashes within the study limits. The associated HSM worksheets are Worksheets 3A and 3B.

Color Coding in the Worksheets

The worksheets include three specific color options to help users identify locations where input data is required. In some cases, the shaded cells require the user to input specific numbers. In other cases the input is restricted to a select set of options included in pull-down lists. The respective color coding is as follows:

Color Used	Type of Information Required from User
	Required input information as identified in the HSM.
	Input data required from the user but restricted to options provided in pull-down boxes.
	Optional input information that can be used to supplement the analysis if this information is available. This optional input information is reserved for locally-derived crash informatic If the analyst elects to use this option so as to improve analysis for local crash distribution trends, each of the Exhibits with the locally-derived input also includes a pull-down box where the analyst should indicate they are using locally derive crash information. The worksheets will then use the local values instead of the HSM default values.

Spreadsheet developed by:

Karen Dixon, Ph.D., P.E.
Oregon State University
School of Civil & Construction Engineering
220 Owen Hall
Corvallis, OR 97330

Email: karen.dixon@oregonstate.edu
Phone: 541-737-6337

Instructions

Rural Multilane Project Total	Analysis for project-specific EB analysis using results from the rural divided and undivided segment as well as rural intersection multilane worksheets. This analysis can be performed if the analyst has historic crash data, but does not know the exact location within the project limits at which the crashes occurred. The associated HSM worksheets are Worksheets 4A and 4B.
Construction	Data in this worksheet has been used to help define the pull-down options in the analysis worksheets. There is no need for a user to work within this worksheet, but the worksheet should be retained so that the other worksheets can continue to use the options included in this sheet.

Instructions

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Divided Segment 1 2045

Worksheet 1A -- General Information and Input Data for Rural Multilane Roadway Segments

General Information		Location Information	
Analyst	SPM	Roadway	SR 70
Agency or Company	H.W. Lochner	Roadway Section	MP 17.255 - 21.573
Date Performed	11/07/18	Jurisdiction	Highlands County, Florida
		Analysis Year	2045

Input Data		Base Conditions	Site Conditions	
Roadway type (divided / undivided)		Undivided	Divided	
Length of segment, L (mi)		--	4.3	
AADT (veh/day)	$AADT_{MAX}$ = 89,300 (veh/day)	--	8,700	AADT OK
Lane width (ft)		12	12	
Shoulder width (ft) - right shoulder width for divided [if differ for directions of travel, use average width]		8	8	
Shoulder type - right shoulder type for divided		Paved	Composite	
Median width (ft) - for divided only		30	40	
Side Slopes - for undivided only		1:7 or flatter	Not Applicable	
Lighting (present/not present)		Not Present	Not Present	
Auto speed enforcement (present/not present)		Not Present	Not Present	
Calibration Factor, Cr		1.00	0.68	

Worksheet 1B (a) -- Crash Modification Factors for Rural Multilane Divided Roadway Segments

(1)	(2)	(3)	(4)	(5)	(6)
CMF for Lane Width	CMF for Right Shoulder Width	CMF for Median Width	CMF for Lighting	CMF for Automated Speed Enforcement	Combined CMF
CMF 1rd	*CMF 2rd*	*CMF 3rd*	*CMF 4rd*	*CMF 5rd*	*CMF comb*
from Equation 11-16	from Table 11-17	from Table 11-18	from Equation 11-17	from Section 11.7.2	(1)*(2)*(3)*(4)*(5)
1.00	1.00	0.99	1.00	1.00	0.99

Worksheet 1C (a) -- Roadway Segment Crashes for Rural Multilane Divided Roadway Segments

(1)	(2)			(3)	(4)	(5)	(6)	(7)
Crash Severity Level	**SPF Coefficients**			**N spf rd**	**Overdispersion Parameter, k**	**Combined CMFs**	**Calibration Factor, Cr**	**Predicted average crash frequency, $N_{predicted\ rs(d)}$**
	from Table 11-5					(6) from Worksheet 1B (a)		
	a	b	c	from Equation 11-9	from Equation 11-10			(3)*(5)*(6)
Total	-9.025	1.049	1.549	7.023	0.049	0.99	0.68	4.728
Fatal and Injury (FI)	-8.837	0.958	1.687	3.713	0.043	0.99	0.68	2.499
Fatal and Injury[a] (FI[a])	-8.505	0.874	1.740	2.415	0.041	0.99	0.68	1.626
Property Damage Only (PDO)	--	--	--	--	--	--	--	$(7)_{TOTAL} - (7)_{FI}$ 2.229

NOTE: [a] Using the KABCO scale, these include only KAB crashes. Crashes with severity level C (possible injury) are not included.

Worksheet 1D (a) -- Crashes by Severity Level and Collision Type for Rural Multilane Divided Roadway Segments

(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
Collision Type	**Proportion of Collision Type(TOTAL)**	**$N_{predicted\ rs(d)\ (TOTAL)}$ (crashes/year)**	**Proportion of Collision Type(FI)**	**$N_{predicted\ rs(d)\ (FI)}$ (crashes/year)**	**Proportion of Collision Type (FI[a])**	***N predicted rs* (FI[a]) (crashes/year)**	**Proportion of Collision Type (PDO)**	**$N_{predicted\ rs(d)\ (PDO)}$ (crashes/year)**
	from Table 11-6	$(7)_{TOTAL}$ from Worksheet 1C (a)	from Table 11-6	$(7)_{FI}$ from Worksheet 1C (a)	from Table 11-6	$(7)_{FI}$[a] from Worksheet 1C (a)	from Table 11-6	$(7)_{PDO}$ from Worksheet 1C (a)
Total	1.000	4.728	1.000	2.499	1.000	1.626	1.000	2.229

		$(2)*(3)_{TOTAL}$		$(4)x(5)_{FI}$		$(6)*(7)_{FI}$ [a]		$(8)*(9)_{PDO}$
Head-on collision	0.006	0.028	0.013	0.032	0.018	0.029	0.002	0.004
Sideswipe collision	0.043	0.203	0.027	0.067	0.022	0.036	0.053	0.118
Rear-end collision	0.116	0.548	0.163	0.407	0.114	0.185	0.088	0.196
Angle collision	0.043	0.203	0.048	0.120	0.045	0.073	0.041	0.091
Single-vehicle collision	0.768	3.631	0.727	1.817	0.778	1.265	0.792	1.765
Other collision	0.024	0.113	0.022	0.055	0.023	0.037	0.024	0.053

NOTE: [a] Using the KABCO scale, these include only KAB crashes. Crashes with severity level C (possible injury) are not included.

Worksheet 1E -- Summary Results for Rural Multilane Roadway Segments

(1)	(2)	(3)	(4)
Crash severity level	**Predicted average crash frequency (crashes/year)**	**Roadway segment length (mi)**	**Crash rate (crashes/mi/year)**
	(7) from Worksheet 1C (a) or (b)		(2)/(3)
Total	4.7	4.3	1.1
Fatal and Injury (FI)	2.5	4.3	0.6
Fatal and Injury[a] (FI[a])	1.6	4.3	0.4
Property Damage Only (PDO)	2.2	4.3	0.5

NOTE: [a] Using the KABCO scale, these include only KAB crashes. Crashes with severity level C (possible injury) are not included.

<u>Tables Affiliated with CMFs for Specific Segment AADT values:</u>

Table 11-16: CMF for Lane Width on Divided Roadway Segments (CMF_{RA})

	AADT (veh/day)		
Lane Width (ft)	**< 400**	**400 to 2000**	**> 2000**
9	1.03	2.18	1.25
9.5	1.02	1.96	1.20
10	1.01	1.74	1.15
10.5	1.01	1.43	1.09
11	1.01	1.11	1.03
11.5	1.01	1.06	1.02
12	1.00	1.00	1.00

Note: The collision types related to lane width to which this CMF applies include run-off-the-road, head-on crashes, and sideswipes.

Tables Affiliated with Crash Statistics:

Table 11-4: Distribution of Crashes by Collision Type and Crash Severity Level for Undivided Roadway Segments

Collision type		**Proportion of crashes by collision type and crash severity level**							
		HSM-Provided Values				**Locally-Derived Values**			
Locally-Derived Values?	No	Total	Fatal and injury	Fatal and injury [a]	PDO	Total	Fatal and injury	Fatal and injury [a]	PDO
Head-on		0.009	0.029	0.043	0.001				
Sideswipe		0.098	0.048	0.044	0.120				
Rear-end		0.246	0.305	0.217	0.220				
Angle		0.356	0.352	0.348	0.358				
Single		0.238	0.238	0.304	0.237				
Other		0.053	0.028	0.044	0.064				
SV run-off-rd, Head-on, Sideswipe		0.270							

NOTE: [a] Using the KABCO scale, these include only KAB crashes. Crashes with severity level C (possible injury) are not included.

Table 11-6: Distribution of Crashes by Collision Type and Crash Severity Level for Divided Roadway Segments

Collision type		**Proportion of crashes by collision type and crash severity level**							
		HSM-Provided Values				**Locally-Derived Values**			
Locally-Derived Values?	No	Total	Fatal and injury	Fatal and injury [a]	PDO	Total	Fatal and injury	Fatal and injury [a]	PDO
Head-on		0.006	0.013	0.018	0.002				
Sideswipe		0.043	0.027	0.022	0.053				
Rear-end		0.116	0.163	0.114	0.088				
Angle		0.043	0.048	0.045	0.041				
Single		0.768	0.727	0.778	0.792				
Other		0.024	0.022	0.023	0.024				
SV run-off-rd, Head-on, Sideswipe		0.500							

NOTE: [a] Using the KABCO scale, these include only KAB crashes. Crashes with severity level C (possible injury) are not included.

Table 11-15: Night-time Crash Proportions for Unlighted Roadway Segments

Roadway Type		**HSM-Provided Values**			**Locally-Derived Values**		
Locally-Derived Values?	No	**Proportion of total night-time crashes by severity level**		**Proportion of crashes that occur at night**	**Proportion of total night-time crashes by severity level**		**Proportion of crashes that occur at night**
		Fatal and injury, p_{inr}	PDO, p_{pnr}	p_{nr}	Fatal and injury, p_{inr}	PDO, p_{pnr}	p_{nr}
4U		0.361	0.639	0.255			

Table 11-19: Night-time Crash Proportions for Unlighted Roadway Segments

Roadway Type		**HSM-Provided Values**			**Locally-Derived Values**		
Locally-Derived Values?	No	**Proportion of total night-time crashes by severity level**		**Proportion of crashes that occur at night**	**Proportion of total night-time crashes by severity level**		**Proportion of crashes that occur at night**
		Fatal and injury, p_{inr}	PDO, p_{pnr}	p_{nr}	Fatal and injury, p_{inr}	PDO, p_{pnr}	p_{nr}
4D		0.323	0.677	0.426			

Tables Affiliated with Crash Modification Factors:

Table 11-13: CMF for Collision Types Related to Shoulder Types and Shoulder Widths (CMF_{TRA})

Shoulder Type	Shoulder width (ft)										
	0	1	2	3	4	5	6	7	8	9	10
Paved	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Gravel	1.00	1.00	1.01	1.01	1.01	1.02	1.02	1.02	1.02	1.03	1.03
Composite	1.00	1.01	1.02	1.02	1.03	1.04	1.04	1.05	1.06	1.07	1.07
Turf	1.00	1.01	1.03	1.04	1.05	1.07	1.08	1.10	1.11	1.13	1.14

Note: The values for composite shoulders in this exhibit represent a shoulder for which 50 percent of the shoulder width is paved and 50 percent of the shoulder width is turf.

Table 11-14: CMF for Side Slope on Undivided Roadway Segments (CMF_{3ru})

1:2 or Steeper	1:3	1:4	1:5	1:6	1:7 or Flatter
1.18	1.15	1.12	1.09	1.05	1.00

Table 11-17: CMF for Right Shoulder Width on Divided Roadway Segments ($CMF2_{rd}$)

Average Shoulder Width (ft)	CMF
0	1.18
1	1.16
2	1.13
3	1.11
4	1.09
5	1.07
6	1.04
7	1.02
8	1.00
9	1.00
10	1.00

Table 11-18: CMF for Median Width on Divided Roadway Segments without a Median Barrier($CMF3_{rd}$)

Median Width (ft)	CMF
10	1.04
20	1.02
30	1.00
40	0.99
50	0.97
60	0.96
70	0.96
80	0.95
90	0.94
100	0.94

Rural Multilane Site Total

Worksheet 3A -- Predicted and Observed Crashes by Severity and Site Type Using the Site-Specific EB Method

(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Site type	**Predicted average crash frequency (crashes/year)**			**Observed crashes,** $N_{observed}$ (crashes/year)	**Overdispersion Parameter, k**	**Weighted adjustment, w**	**Expected average crash frequency,**
	$N_{predicted}$ (TOTAL)	$N_{predicted}$ (FI)	$N_{predicted}$ (PDO)			Equation A-5 from Part C Appendix	Equation A-4 from Part C Appendix
ROADWAY SEGMENTS							
Divided Segment 1 2045	4.728	2.499	2.229				
COMBINED (sum of column)	4.728	2.499	2.229	0	--	--	

Worksheet 3B -- Site-Specific EB Method Summary Results

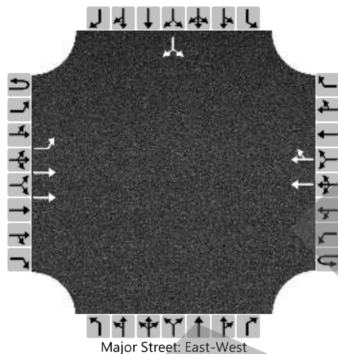
(1)	(2)	(3)
Crash severity level	$N_{predicted}$	$N_{expected}$
Total	$(2)_{COMB}$ from Worksheet 3A	$(8)_{COMB}$ from Worksheet 3A
	4.7	
Fatal and injury (FI)	$(3)_{COMB}$ from Worksheet 3A	$(3)_{TOTAL} * (2)_{FI} / (2)_{TOTAL}$
	2.5	
Property damage only (PDO)	$(4)_{COMB}$ from Worksheet 3A	$(3)_{TOTAL} * (2)_{PDO} / (2)_{TOTAL}$
	2.2	

Appendix J:
Build HCS7 Reports

HCS7 Two-Way Stop-Control Report

General Information		Site Information	
Analyst	Elizabeth Fernandez	Intersection	SR 70 and CR 29
Agency/Co.	H.W. Lochner	Jurisdiction	Highlands County
Date Performed	Oct 2018	East/West Street	SR 70
Analysis Year	2025	North/South Street	CR 29
Time Analyzed	AM Peak Hour	Peak Hour Factor	0.92
Intersection Orientation	East-West	Analysis Time Period (hrs)	1.00
Project Description	Build, SR 70 from CR 29 to Lonesome Island Road		

Lanes



Vehicle Volumes and Adjustments

Approach	Eastbound				Westbound				Northbound				Southbound			
Movement	U	L	T	R	U	L	T	R	U	L	T	R	U	L	T	R
Priority	1U	1	2	3	4U	4	5	6		7	8	9		10	11	12
Number of Lanes	0	1	2	0	0	0	2	0		0	0	0		0	1	0
Configuration		L	T				T	TR							LR	
Volume (veh/h)	0	22	302				211	16						21		22
Percent Heavy Vehicles (%)	3	11												11		11
Proportion Time Blocked																
Percent Grade (%)													0			
Right Turn Channelized																
Median Type | Storage	Left Only								1							

Critical and Follow-up Headways

Base Critical Headway (sec)		4.1												7.5		6.9
Critical Headway (sec)		4.32												7.02		7.12
Base Follow-Up Headway (sec)		2.2												3.5		3.3
Follow-Up Headway (sec)		2.31												3.61		3.41

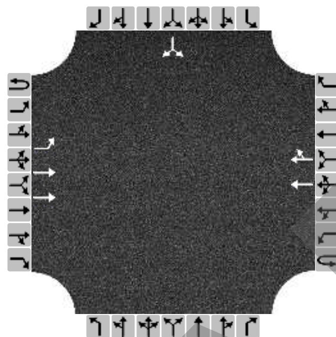
Delay, Queue Length, and Level of Service

Flow Rate, v (veh/h)		24													47	
Capacity, c (veh/h)		1253													699	
v/c Ratio		0.02													0.07	
95% Queue Length, Q_{95} (veh)		0.1													0.2	
Control Delay (s/veh)		7.9													10.5	
Level of Service (LOS)		A													B	
Approach Delay (s/veh)	0.5												10.5			
Approach LOS													B			

HCS7 Two-Way Stop-Control Report

General Information		Site Information	
Analyst	Elizabeth Fernandez	Intersection	SR 70 and CR 29
Agency/Co.	H.W. Lochner	Jurisdiction	Highlands County
Date Performed	Oct 2018	East/West Street	SR 70
Analysis Year	2025	North/South Street	CR 29
Time Analyzed	PM Peak Hour	Peak Hour Factor	0.92
Intersection Orientation	East-West	Analysis Time Period (hrs)	1.00
Project Description	Build, SR 70 from CR 29 to Lonesome Island Road		

Lanes



Major Street: East-West

Vehicle Volumes and Adjustments

Approach	Eastbound				Westbound				Northbound				Southbound			
Movement	U	L	T	R	U	L	T	R	U	L	T	R	U	L	T	R
Priority	1U	1	2	3	4U	4	5	6		7	8	9		10	11	12
Number of Lanes	0	1	2	0	0	0	2	0		0	0	0		0	1	0
Configuration		L	T				T	TR							LR	
Volume (veh/h)	0	16	211				302	21						16		16
Percent Heavy Vehicles (%)	3	11												11		11
Proportion Time Blocked																
Percent Grade (%)													0			
Right Turn Channelized																
Median Type | Storage	Left Only								1							

Critical and Follow-up Headways

Base Critical Headway (sec)		4.1												7.5		6.9
Critical Headway (sec)		4.32												7.02		7.12
Base Follow-Up Headway (sec)		2.2												3.5		3.3
Follow-Up Headway (sec)		2.31												3.61		3.41

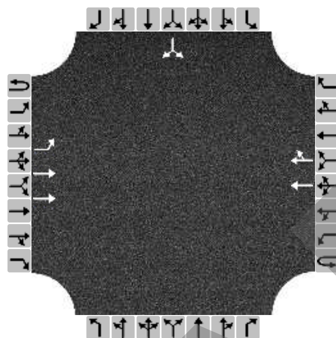
Delay, Queue Length, and Level of Service

Flow Rate, v (veh/h)		17													35	
Capacity, c (veh/h)		1142													654	
v/c Ratio		0.02													0.05	
95% Queue Length, Q_{95} (veh)		0.0													0.2	
Control Delay (s/veh)		8.2													10.8	
Level of Service (LOS)		A													B	
Approach Delay (s/veh)	0.6												10.8			
Approach LOS													B			

HCS7 Two-Way Stop-Control Report

General Information		Site Information	
Analyst	Elizabeth Fernandez	Intersection	SR 70 and CR 29
Agency/Co.	H.W. Lochner	Jurisdiction	Highlands County
Date Performed	Oct 2018	East/West Street	SR 70
Analysis Year	2035	North/South Street	CR 29
Time Analyzed	AM Peak Hour	Peak Hour Factor	0.92
Intersection Orientation	East-West	Analysis Time Period (hrs)	1.00
Project Description	Build, SR 70 from CR 29 to Lonesome Island Road		

Lanes



Major Street: East-West

Vehicle Volumes and Adjustments

Approach	Eastbound				Westbound				Northbound				Southbound			
Movement	U	L	T	R	U	L	T	R	U	L	T	R	U	L	T	R
Priority	1U	1	2	3	4U	4	5	6		7	8	9		10	11	12
Number of Lanes	0	1	2	0	0	0	2	0		0	0	0		0	1	0
Configuration		L	T				T	TR							LR	
Volume (veh/h)	0	29	363				254	23						34		29
Percent Heavy Vehicles (%)	3	11												11		11
Proportion Time Blocked																
Percent Grade (%)													0			
Right Turn Channelized																
Median Type | Storage	Left Only								1							

Critical and Follow-up Headways

Base Critical Headway (sec)		4.1												7.5		6.9
Critical Headway (sec)		4.32												7.02		7.12
Base Follow-Up Headway (sec)		2.2												3.5		3.3
Follow-Up Headway (sec)		2.31												3.61		3.41

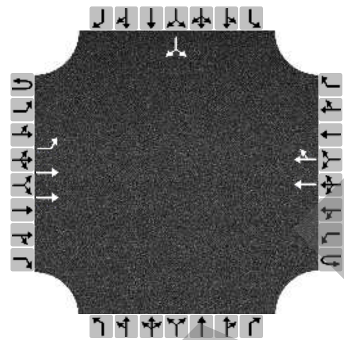
Delay, Queue Length, and Level of Service

Flow Rate, v (veh/h)		32													68	
Capacity, c (veh/h)		1194													633	
v/c Ratio		0.03													0.11	
95% Queue Length, Q_{95} (veh)		0.1													0.4	
Control Delay (s/veh)		8.1													11.4	
Level of Service (LOS)		A													B	
Approach Delay (s/veh)	0.6												11.4			
Approach LOS													B			

HCS7 Two-Way Stop-Control Report

General Information		Site Information	
Analyst	Elizabeth Fernandez	Intersection	SR 70 and CR 29
Agency/Co.	H.W. Lochner	Jurisdiction	Highlands County
Date Performed	Oct 2018	East/West Street	SR 70
Analysis Year	2035	North/South Street	CR 29
Time Analyzed	PM Peak Hour	Peak Hour Factor	0.92
Intersection Orientation	East-West	Analysis Time Period (hrs)	1.00
Project Description	Build, SR 70 from CR 29 to Lonesome Island Road		

Lanes



Vehicle Volumes and Adjustments

Approach	Eastbound				Westbound				Northbound				Southbound			
Movement	U	L	T	R	U	L	T	R	U	L	T	R	U	L	T	R
Priority	1U	1	2	3	4U	4	5	6		7	8	9		10	11	12
Number of Lanes	0	1	2	0	0	0	2	0		0	0	0		0	1	0
Configuration		L	T				T	TR							LR	
Volume (veh/h)	0	21	254				363	34						23		21
Percent Heavy Vehicles (%)	3	11												11		11
Proportion Time Blocked																
Percent Grade (%)													0			
Right Turn Channelized																
Median Type | Storage	Left Only								1							

Critical and Follow-up Headways

	EB U	EB L	EB T	EB R	WB U	WB L	WB T	WB R	NB U	NB L	NB T	NB R	SB U	SB L	SB T	SB R
Base Critical Headway (sec)		4.1												7.5		6.9
Critical Headway (sec)		4.32												7.02		7.12
Base Follow-Up Headway (sec)		2.2												3.5		3.3
Follow-Up Headway (sec)		2.31												3.61		3.41

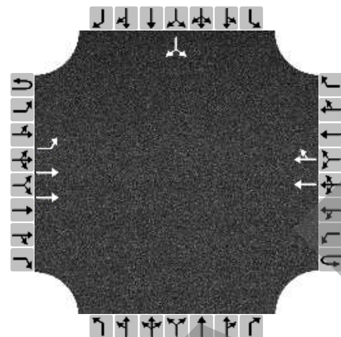
Delay, Queue Length, and Level of Service

	EB U	EB L	EB T	EB R	WB U	WB L	WB T	WB R	NB U	NB L	NB T	NB R	SB U	SB L	SB T	SB R
Flow Rate, v (veh/h)		23													48	
Capacity, c (veh/h)		1063													592	
v/c Ratio		0.02													0.08	
95% Queue Length, Q_{95} (veh)		0.1													0.3	
Control Delay (s/veh)		8.5													11.6	
Level of Service (LOS)		A													B	
Approach Delay (s/veh)	0.6												11.6			
Approach LOS													B			

HCS7 Two-Way Stop-Control Report

General Information		Site Information	
Analyst	Elizabeth Fernandez	Intersection	SR 70 and CR 29
Agency/Co.	H.W. Lochner	Jurisdiction	Highlands County
Date Performed	Oct 2018	East/West Street	SR 70
Analysis Year	2045	North/South Street	CR 29
Time Analyzed	AM Peak Hour	Peak Hour Factor	0.92
Intersection Orientation	East-West	Analysis Time Period (hrs)	1.00
Project Description	Build, SR 70 from CR 29 to Lonesome Island Road		

Lanes



Major Street: East-West

Vehicle Volumes and Adjustments

Approach	Eastbound				Westbound				Northbound				Southbound			
Movement	U	L	T	R	U	L	T	R	U	L	T	R	U	L	T	R
Priority	1U	1	2	3	4U	4	5	6		7	8	9		10	11	12
Number of Lanes	0	1	2	0	0	0	2	0		0	0	0		0	1	0
Configuration		L	T				T	TR							LR	
Volume (veh/h)	0	38	419				293	31						45		38
Percent Heavy Vehicles (%)	3	11												11		11
Proportion Time Blocked																
Percent Grade (%)													0			
Right Turn Channelized																
Median Type | Storage	Left Only								1							

Critical and Follow-up Headways

	U	L	T	R	U	L	T	R	U	L	T	R	U	L	T	R
Base Critical Headway (sec)		4.1												7.5		6.9
Critical Headway (sec)		4.32												7.02		7.12
Base Follow-Up Headway (sec)		2.2												3.5		3.3
Follow-Up Headway (sec)		2.31												3.61		3.41

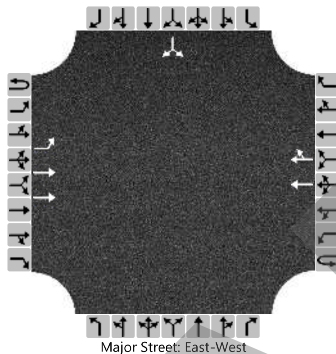
Delay, Queue Length, and Level of Service

	U	L	T	R	U	L	T	R	U	L	T	R	U	L	T	R
Flow Rate, v (veh/h)		41													90	
Capacity, c (veh/h)		1141													585	
v/c Ratio		0.04													0.15	
95% Queue Length, Q_{95} (veh)		0.1													0.5	
Control Delay (s/veh)		8.3													12.3	
Level of Service (LOS)		A													B	
Approach Delay (s/veh)	0.7												12.3			
Approach LOS													B			

HCS7 Two-Way Stop-Control Report

General Information		Site Information	
Analyst	Elizabeth Fernandez	Intersection	SR 70 and CR 29
Agency/Co.	H.W. Lochner	Jurisdiction	Highlands County
Date Performed	Oct 2018	East/West Street	SR 70
Analysis Year	2045	North/South Street	CR 29
Time Analyzed	PM Peak Hour	Peak Hour Factor	0.92
Intersection Orientation	East-West	Analysis Time Period (hrs)	1.00
Project Description	Build, SR 70 from CR 29 to Lonesome Island Road		

Lanes



Vehicle Volumes and Adjustments

Approach	Eastbound				Westbound				Northbound				Southbound			
Movement	U	L	T	R	U	L	T	R	U	L	T	R	U	L	T	R
Priority	1U	1	2	3	4U	4	5	6		7	8	9		10	11	12
Number of Lanes	0	1	2	0	0	0	2	0		0	0	0		0	1	0
Configuration		L	T				T	TR							LR	
Volume (veh/h)	0	27	293				419	45						31		27
Percent Heavy Vehicles (%)	3	11												11		11
Proportion Time Blocked																
Percent Grade (%)													0			
Right Turn Channelized																
Median Type | Storage	Left Only								1							

Critical and Follow-up Headways

Base Critical Headway (sec)		4.1												7.5		6.9
Critical Headway (sec)		4.32												7.02		7.12
Base Follow-Up Headway (sec)		2.2												3.5		3.3
Follow-Up Headway (sec)		2.31												3.61		3.41

Delay, Queue Length, and Level of Service

Flow Rate, v (veh/h)		29													63	
Capacity, c (veh/h)		996													541	
v/c Ratio		0.03													0.12	
95% Queue Length, Q_{95} (veh)		0.1													0.4	
Control Delay (s/veh)		8.7													12.5	
Level of Service (LOS)		A													B	
Approach Delay (s/veh)	0.7												12.5			
Approach LOS													B			

HCS7 Multilane Highway Report

Project Information

Analyst	Elizabeth Fernandez	Date	October 2018
Agency	H.W. Lochner	Analysis Year	2025
Jurisdiction	Highlands County	Time Period Analyzed	AM Peak Hour
Project Description	Build, Eastbound		

Direction 1 Geometric Data

Direction 1	Eastbound		
Number of Lanes (N), ln	2	Terrain Type	Level
Segment Length (L), ft	-	Percent Grade, %	-
Measured or Base Free-Flow Speed	Base	Grade Length, mi	-
Base Free-Flow Speed (BFFS), mi/h	60.0	Total Ramp Density (TRD), ramps/mi	0.00
Lane Width, ft	12	Left-Side Lateral Clearance (LC_R), ft	6
Median Type	Divided	Total Lateral Clearance (TLC), ft	12.00
Access Point Density, pts/mi	4.0	Free-Flow Speed (FFS), mi/h	59.0

Direction 1 Adjustment Factors

Driver Population	All Familiar	Final Speed Adjustment Factor (SAF)	1.000
Driver Population SAF	1.000	Final Capacity Adjustment Factor (CAF)	1.000
Driver Population CAF	1.000		

Direction 1 Demand and Capacity

Volume(V) veh/h	323	Heavy Vehicle Adjustment Factor (f_{HV})	0.901
Peak Hour Factor	0.92	Flow Rate (V_p), pc/h/ln	195
Total Trucks, %	11.00	Capacity (c), pc/h/ln	2180
Single-Unit Trucks (SUT), %	-	Adjusted Capacity (c_{adj}), pc/h/ln	2180
Tractor-Trailers (TT), %	-	Volume-to-Capacity Ratio (v/c)	0.09

Direction 1 Speed and Density

Lane Width Adjustment (f_{LW})	0.0	Average Speed (S), mi/h	59.0
Total Lateral Clearance Adj. (f_{LLC})	0.0	Density (D), pc/mi/ln	3.3
Median Type Adjustment (f_M)	0.0	Level of Service (LOS)	A
Access Point Density Adjustment (f_A)	1.0		

Direction 1 Bicycle LOS

Flow Rate in Outside Lane (v_{OL}),veh/h	176	Effective Speed Factor (S_t)	4.94
Effective Width of Volume (W_v), ft	18	Bicyle LOS Score (BLOS)	5.47
Average Effective Width (W_e), ft	24	Bicycle Level of Service (LOS)	E

HCS7 Multilane Highway Report

Project Information

Analyst	Elizabeth Fernandez	Date	October 2018
Agency	H.W. Lochner	Analysis Year	2025
Jurisdiction	Highlands County	Time Period Analyzed	PM Peak Hour
Project Description	Build, Eastbound		

Direction 1 Geometric Data

Direction 1	Eastbound		
Number of Lanes (N), ln	2	Terrain Type	Level
Segment Length (L), ft	-	Percent Grade, %	-
Measured or Base Free-Flow Speed	Base	Grade Length, mi	-
Base Free-Flow Speed (BFFS), mi/h	60.0	Total Ramp Density (TRD), ramps/mi	0.00
Lane Width, ft	12	Left-Side Lateral Clearance (LC_R), ft	6
Median Type	Divided	Total Lateral Clearance (TLC), ft	12.00
Access Point Density, pts/mi	4.0	Free-Flow Speed (FFS), mi/h	59.0

Direction 1 Adjustment Factors

Driver Population	All Familiar	Final Speed Adjustment Factor (SAF)	1.000
Driver Population SAF	1.000	Final Capacity Adjustment Factor (CAF)	1.000
Driver Population CAF	1.000		

Direction 1 Demand and Capacity

Volume(V) veh/h	227	Heavy Vehicle Adjustment Factor (f_{HV})	0.901
Peak Hour Factor	0.92	Flow Rate (V_p), pc/h/ln	137
Total Trucks, %	11.00	Capacity (c), pc/h/ln	2180
Single-Unit Trucks (SUT), %	-	Adjusted Capacity (c_{adj}), pc/h/ln	2180
Tractor-Trailers (TT), %	-	Volume-to-Capacity Ratio (v/c)	0.06

Direction 1 Speed and Density

Lane Width Adjustment (f_{LW})	0.0	Average Speed (S), mi/h	59.0
Total Lateral Clearance Adj. (f_{LLC})	0.0	Density (D), pc/mi/ln	2.3
Median Type Adjustment (f_M)	0.0	Level of Service (LOS)	A
Access Point Density Adjustment (f_A)	1.0		

Direction 1 Bicycle LOS

Flow Rate in Outside Lane (v_{OL}),veh/h	123	Effective Speed Factor (S_t)	4.94
Effective Width of Volume (W_v), ft	18	Bicyle LOS Score (BLOS)	5.29
Average Effective Width (W_e), ft	24	Bicycle Level of Service (LOS)	E

HCS7 Multilane Highway Report

Project Information

Analyst	Elizabeth Fernandez	Date	October 2018
Agency	H.W. Lochner	Analysis Year	2025
Jurisdiction	Highlands County	Time Period Analyzed	AM Peak Hour
Project Description	Build, Westbound		

Direction 1 Geometric Data

Direction 1	Westbound		
Number of Lanes (N), ln	2	Terrain Type	Level
Segment Length (L), ft	-	Percent Grade, %	-
Measured or Base Free-Flow Speed	Base	Grade Length, mi	-
Base Free-Flow Speed (BFFS), mi/h	60.0	Total Ramp Density (TRD), ramps/mi	0.00
Lane Width, ft	12	Left-Side Lateral Clearance (LC_R), ft	6
Median Type	Divided	Total Lateral Clearance (TLC), ft	12.00
Access Point Density, pts/mi	4.0	Free-Flow Speed (FFS), mi/h	59.0

Direction 1 Adjustment Factors

Driver Population	All Familiar	Final Speed Adjustment Factor (SAF)	1.000
Driver Population SAF	1.000	Final Capacity Adjustment Factor (CAF)	1.000
Driver Population CAF	1.000		

Direction 1 Demand and Capacity

Volume(V) veh/h	227	Heavy Vehicle Adjustment Factor (f_{HV})	0.901
Peak Hour Factor	0.92	Flow Rate (V_p), pc/h/ln	137
Total Trucks, %	11.00	Capacity (c), pc/h/ln	2180
Single-Unit Trucks (SUT), %	-	Adjusted Capacity (c_{adj}), pc/h/ln	2180
Tractor-Trailers (TT), %	-	Volume-to-Capacity Ratio (v/c)	0.06

Direction 1 Speed and Density

Lane Width Adjustment (f_{LW})	0.0	Average Speed (S), mi/h	59.0
Total Lateral Clearance Adj. (f_{LLC})	0.0	Density (D), pc/mi/ln	2.3
Median Type Adjustment (f_M)	0.0	Level of Service (LOS)	A
Access Point Density Adjustment (f_A)	1.0		

Direction 1 Bicycle LOS

Flow Rate in Outside Lane (v_{OL}),veh/h	123	Effective Speed Factor (S_t)	4.94
Effective Width of Volume (W_v), ft	18	Bicyle LOS Score (BLOS)	5.29
Average Effective Width (W_e), ft	24	Bicycle Level of Service (LOS)	E

HCS7 Multilane Highway Report

Project Information

Analyst	Elizabeth Fernandez	Date	October 2018
Agency	H.W. Lochner	Analysis Year	2025
Jurisdiction	Highlands County	Time Period Analyzed	PM Peak Hour
Project Description	Build, Westbound		

Direction 1 Geometric Data

Direction 1	Westbound		
Number of Lanes (N), ln	2	Terrain Type	Level
Segment Length (L), ft	-	Percent Grade, %	-
Measured or Base Free-Flow Speed	Base	Grade Length, mi	-
Base Free-Flow Speed (BFFS), mi/h	60.0	Total Ramp Density (TRD), ramps/mi	0.00
Lane Width, ft	12	Left-Side Lateral Clearance (LC_R), ft	6
Median Type	Divided	Total Lateral Clearance (TLC), ft	12.00
Access Point Density, pts/mi	4.0	Free-Flow Speed (FFS), mi/h	59.0

Direction 1 Adjustment Factors

Driver Population	All Familiar	Final Speed Adjustment Factor (SAF)	1.000
Driver Population SAF	1.000	Final Capacity Adjustment Factor (CAF)	1.000
Driver Population CAF	1.000		

Direction 1 Demand and Capacity

Volume(V) veh/h	323	Heavy Vehicle Adjustment Factor (f_{HV})	0.901
Peak Hour Factor	0.92	Flow Rate (V_p), pc/h/ln	195
Total Trucks, %	11.00	Capacity (c), pc/h/ln	2180
Single-Unit Trucks (SUT), %	-	Adjusted Capacity (c_{adj}), pc/h/ln	2180
Tractor-Trailers (TT), %	-	Volume-to-Capacity Ratio (v/c)	0.09

Direction 1 Speed and Density

Lane Width Adjustment (f_{LW})	0.0	Average Speed (S), mi/h	59.0
Total Lateral Clearance Adj. (f_{LLC})	0.0	Density (D), pc/mi/ln	3.3
Median Type Adjustment (f_M)	0.0	Level of Service (LOS)	A
Access Point Density Adjustment (f_A)	1.0		

Direction 1 Bicycle LOS

Flow Rate in Outside Lane (v_{OL}),veh/h	176	Effective Speed Factor (S_t)	4.94
Effective Width of Volume (W_v), ft	18	Bicyle LOS Score (BLOS)	5.47
Average Effective Width (W_e), ft	24	Bicycle Level of Service (LOS)	E

HCS7 Multilane Highway Report

Project Information

Analyst	Elizabeth Fernandez	Date	October 2018
Agency	H.W. Lochner	Analysis Year	2035
Jurisdiction	Highlands County	Time Period Analyzed	AM Peak Hour
Project Description	Build, Eastbound		

Direction 1 Geometric Data

Direction 1	Eastbound		
Number of Lanes (N), ln	2	Terrain Type	Level
Segment Length (L), ft	-	Percent Grade, %	-
Measured or Base Free-Flow Speed	Base	Grade Length, mi	-
Base Free-Flow Speed (BFFS), mi/h	60.0	Total Ramp Density (TRD), ramps/mi	0.00
Lane Width, ft	12	Left-Side Lateral Clearance (LC_R), ft	6
Median Type	Divided	Total Lateral Clearance (TLC), ft	12.00
Access Point Density, pts/mi	4.0	Free-Flow Speed (FFS), mi/h	59.0

Direction 1 Adjustment Factors

Driver Population	All Familiar	Final Speed Adjustment Factor (SAF)	1.000
Driver Population SAF	1.000	Final Capacity Adjustment Factor (CAF)	1.000
Driver Population CAF	1.000		

Direction 1 Demand and Capacity

Volume(V) veh/h	397	Heavy Vehicle Adjustment Factor (f_{HV})	0.901
Peak Hour Factor	0.92	Flow Rate (V_p), pc/h/ln	240
Total Trucks, %	11.00	Capacity (c), pc/h/ln	2180
Single-Unit Trucks (SUT), %	-	Adjusted Capacity (c_{adj}), pc/h/ln	2180
Tractor-Trailers (TT), %	-	Volume-to-Capacity Ratio (v/c)	0.11

Direction 1 Speed and Density

Lane Width Adjustment (f_{LW})	0.0	Average Speed (S), mi/h	59.0
Total Lateral Clearance Adj. (f_{LLC})	0.0	Density (D), pc/mi/ln	4.1
Median Type Adjustment (f_M)	0.0	Level of Service (LOS)	A
Access Point Density Adjustment (f_A)	1.0		

Direction 1 Bicycle LOS

Flow Rate in Outside Lane (v_{OL}),veh/h	216	Effective Speed Factor (S_t)	4.94
Effective Width of Volume (W_v), ft	18	Bicyle LOS Score (BLOS)	5.58
Average Effective Width (W_e), ft	24	Bicycle Level of Service (LOS)	F

HCS7 Multilane Highway Report

Project Information

Analyst	Elizabeth Fernandez	Date	October 2018
Agency	H.W. Lochner	Analysis Year	2035
Jurisdiction	Highlands County	Time Period Analyzed	PM Peak Hour
Project Description	Build, Eastbound		

Direction 1 Geometric Data

Direction 1	Eastbound		
Number of Lanes (N), ln	2	Terrain Type	Level
Segment Length (L), ft	-	Percent Grade, %	-
Measured or Base Free-Flow Speed	Base	Grade Length, mi	-
Base Free-Flow Speed (BFFS), mi/h	60.0	Total Ramp Density (TRD), ramps/mi	0.00
Lane Width, ft	12	Left-Side Lateral Clearance (LC_R), ft	6
Median Type	Divided	Total Lateral Clearance (TLC), ft	12.00
Access Point Density, pts/mi	4.0	Free-Flow Speed (FFS), mi/h	59.0

Direction 1 Adjustment Factors

Driver Population	All Familiar	Final Speed Adjustment Factor (SAF)	1.000
Driver Population SAF	1.000	Final Capacity Adjustment Factor (CAF)	1.000
Driver Population CAF	1.000		

Direction 1 Demand and Capacity

Volume(V) veh/h	277	Heavy Vehicle Adjustment Factor (f_{HV})	0.901
Peak Hour Factor	0.92	Flow Rate (V_p), pc/h/ln	167
Total Trucks, %	11.00	Capacity (c), pc/h/ln	2180
Single-Unit Trucks (SUT), %	-	Adjusted Capacity (c_{adj}), pc/h/ln	2180
Tractor-Trailers (TT), %	-	Volume-to-Capacity Ratio (v/c)	0.08

Direction 1 Speed and Density

Lane Width Adjustment (f_{LW})	0.0	Average Speed (S), mi/h	59.0
Total Lateral Clearance Adj. (f_{LLC})	0.0	Density (D), pc/mi/ln	2.8
Median Type Adjustment (f_M)	0.0	Level of Service (LOS)	A
Access Point Density Adjustment (f_A)	1.0		

Direction 1 Bicycle LOS

Flow Rate in Outside Lane (v_{OL}),veh/h	151	Effective Speed Factor (S_t)	4.94
Effective Width of Volume (W_v), ft	18	Bicyle LOS Score (BLOS)	5.40
Average Effective Width (W_e), ft	24	Bicycle Level of Service (LOS)	E

HCS7 Multilane Highway Report

Project Information

Analyst	Elizabeth Fernandez	Date	October 2018
Agency	H.W. Lochner	Analysis Year	2035
Jurisdiction	Highlands County	Time Period Analyzed	AM Peak Hour
Project Description	Build, Westbound		

Direction 1 Geometric Data

Direction 1	Westbound		
Number of Lanes (N), ln	2	Terrain Type	Level
Segment Length (L), ft	-	Percent Grade, %	-
Measured or Base Free-Flow Speed	Base	Grade Length, mi	-
Base Free-Flow Speed (BFFS), mi/h	60.0	Total Ramp Density (TRD), ramps/mi	0.00
Lane Width, ft	12	Left-Side Lateral Clearance (LC_R), ft	6
Median Type	Divided	Total Lateral Clearance (TLC), ft	12.00
Access Point Density, pts/mi	4.0	Free-Flow Speed (FFS), mi/h	59.0

Direction 1 Adjustment Factors

Driver Population	All Familiar	Final Speed Adjustment Factor (SAF)	1.000
Driver Population SAF	1.000	Final Capacity Adjustment Factor (CAF)	1.000
Driver Population CAF	1.000		

Direction 1 Demand and Capacity

Volume(V) veh/h	277	Heavy Vehicle Adjustment Factor (f_{HV})	0.901
Peak Hour Factor	0.92	Flow Rate (V_p), pc/h/ln	167
Total Trucks, %	11.00	Capacity (c), pc/h/ln	2180
Single-Unit Trucks (SUT), %	-	Adjusted Capacity (c_{adj}), pc/h/ln	2180
Tractor-Trailers (TT), %	-	Volume-to-Capacity Ratio (v/c)	0.08

Direction 1 Speed and Density

Lane Width Adjustment (f_{LW})	0.0	Average Speed (S), mi/h	59.0
Total Lateral Clearance Adj. (f_{LLC})	0.0	Density (D), pc/mi/ln	2.8
Median Type Adjustment (f_M)	0.0	Level of Service (LOS)	A
Access Point Density Adjustment (f_A)	1.0		

Direction 1 Bicycle LOS

Flow Rate in Outside Lane (v_{OL}),veh/h	151	Effective Speed Factor (S_t)	4.94
Effective Width of Volume (W_v), ft	18	Bicyle LOS Score (BLOS)	5.40
Average Effective Width (W_e), ft	24	Bicycle Level of Service (LOS)	E

HCS7 Multilane Highway Report

Project Information

Analyst	Elizabeth Fernandez	Date	October 2018
Agency	H.W. Lochner	Analysis Year	2035
Jurisdiction	Highlands County	Time Period Analyzed	PM Peak Hour
Project Description	Build, Westbound		

Direction 1 Geometric Data

Direction 1	Westbound		
Number of Lanes (N), ln	2	Terrain Type	Level
Segment Length (L), ft	-	Percent Grade, %	-
Measured or Base Free-Flow Speed	Base	Grade Length, mi	-
Base Free-Flow Speed (BFFS), mi/h	60.0	Total Ramp Density (TRD), ramps/mi	0.00
Lane Width, ft	12	Left-Side Lateral Clearance (LC_R), ft	6
Median Type	Divided	Total Lateral Clearance (TLC), ft	12.00
Access Point Density, pts/mi	4.0	Free-Flow Speed (FFS), mi/h	59.0

Direction 1 Adjustment Factors

Driver Population	All Familiar	Final Speed Adjustment Factor (SAF)	1.000
Driver Population SAF	1.000	Final Capacity Adjustment Factor (CAF)	1.000
Driver Population CAF	1.000		

Direction 1 Demand and Capacity

Volume(V) veh/h	397	Heavy Vehicle Adjustment Factor (f_{HV})	0.901
Peak Hour Factor	0.92	Flow Rate (V_p), pc/h/ln	240
Total Trucks, %	11.00	Capacity (c), pc/h/ln	2180
Single-Unit Trucks (SUT), %	-	Adjusted Capacity (c_{adj}), pc/h/ln	2180
Tractor-Trailers (TT), %	-	Volume-to-Capacity Ratio (v/c)	0.11

Direction 1 Speed and Density

Lane Width Adjustment (f_{LW})	0.0	Average Speed (S), mi/h	59.0
Total Lateral Clearance Adj. (f_{LLC})	0.0	Density (D), pc/mi/ln	4.1
Median Type Adjustment (f_M)	0.0	Level of Service (LOS)	A
Access Point Density Adjustment (f_A)	1.0		

Direction 1 Bicycle LOS

Flow Rate in Outside Lane (v_{OL}),veh/h	216	Effective Speed Factor (S_t)	4.94
Effective Width of Volume (W_v), ft	18	Bicyle LOS Score (BLOS)	5.58
Average Effective Width (W_e), ft	24	Bicycle Level of Service (LOS)	F

HCS7 Multilane Highway Report

Project Information

Analyst	Elizabeth Fernandez	Date	October 2018
Agency	H.W. Lochner	Analysis Year	2045
Jurisdiction	Highlands County	Time Period Analyzed	AM Peak Hour
Project Description	Build, Eastbound		

Direction 1 Geometric Data

Direction 1	Eastbound		
Number of Lanes (N), ln	2	Terrain Type	Level
Segment Length (L), ft	-	Percent Grade, %	-
Measured or Base Free-Flow Speed	Base	Grade Length, mi	-
Base Free-Flow Speed (BFFS), mi/h	60.0	Total Ramp Density (TRD), ramps/mi	0.00
Lane Width, ft	12	Left-Side Lateral Clearance (LC_R), ft	6
Median Type	Divided	Total Lateral Clearance (TLC), ft	12.00
Access Point Density, pts/mi	4.0	Free-Flow Speed (FFS), mi/h	59.0

Direction 1 Adjustment Factors

Driver Population	All Familiar	Final Speed Adjustment Factor (SAF)	1.000
Driver Population SAF	1.000	Final Capacity Adjustment Factor (CAF)	1.000
Driver Population CAF	1.000		

Direction 1 Demand and Capacity

Volume(V) veh/h	464	Heavy Vehicle Adjustment Factor (f_{HV})	0.901
Peak Hour Factor	0.92	Flow Rate (V_p), pc/h/ln	280
Total Trucks, %	11.00	Capacity (c), pc/h/ln	2180
Single-Unit Trucks (SUT), %	-	Adjusted Capacity (c_{adj}), pc/h/ln	2180
Tractor-Trailers (TT), %	-	Volume-to-Capacity Ratio (v/c)	0.13

Direction 1 Speed and Density

Lane Width Adjustment (f_{LW})	0.0	Average Speed (S), mi/h	59.0
Total Lateral Clearance Adj. (f_{LLC})	0.0	Density (D), pc/mi/ln	4.7
Median Type Adjustment (f_M)	0.0	Level of Service (LOS)	A
Access Point Density Adjustment (f_A)	1.0		

Direction 1 Bicycle LOS

Flow Rate in Outside Lane (v_{OL}),veh/h	252	Effective Speed Factor (S_t)	4.94
Effective Width of Volume (W_v), ft	18	Bicyle LOS Score (BLOS)	5.66
Average Effective Width (W_e), ft	24	Bicycle Level of Service (LOS)	F

HCS7 Multilane Highway Report

Project Information

Analyst	Elizabeth Fernandez	Date	October 2018
Agency	H.W. Lochner	Analysis Year	2045
Jurisdiction	Highlands County	Time Period Analyzed	PM Peak Hour
Project Description	Build, Eastbound		

Direction 1 Geometric Data

Direction 1	Eastbound		
Number of Lanes (N), ln	2	Terrain Type	Level
Segment Length (L), ft	-	Percent Grade, %	-
Measured or Base Free-Flow Speed	Base	Grade Length, mi	-
Base Free-Flow Speed (BFFS), mi/h	60.0	Total Ramp Density (TRD), ramps/mi	0.00
Lane Width, ft	12	Left-Side Lateral Clearance (LC_R), ft	6
Median Type	Divided	Total Lateral Clearance (TLC), ft	12.00
Access Point Density, pts/mi	4.0	Free-Flow Speed (FFS), mi/h	59.0

Direction 1 Adjustment Factors

Driver Population	All Familiar	Final Speed Adjustment Factor (SAF)	1.000
Driver Population SAF	1.000	Final Capacity Adjustment Factor (CAF)	1.000
Driver Population CAF	1.000		

Direction 1 Demand and Capacity

Volume(V) veh/h	324	Heavy Vehicle Adjustment Factor (f_{HV})	0.901
Peak Hour Factor	0.92	Flow Rate (V_p), pc/h/ln	196
Total Trucks, %	11.00	Capacity (c), pc/h/ln	2180
Single-Unit Trucks (SUT), %	-	Adjusted Capacity (c_{adj}), pc/h/ln	2180
Tractor-Trailers (TT), %	-	Volume-to-Capacity Ratio (v/c)	0.09

Direction 1 Speed and Density

Lane Width Adjustment (f_{LW})	0.0	Average Speed (S), mi/h	59.0
Total Lateral Clearance Adj. (f_{LLC})	0.0	Density (D), pc/mi/ln	3.3
Median Type Adjustment (f_M)	0.0	Level of Service (LOS)	A
Access Point Density Adjustment (f_A)	1.0		

Direction 1 Bicycle LOS

Flow Rate in Outside Lane (v_{OL}),veh/h	176	Effective Speed Factor (S_t)	4.94
Effective Width of Volume (W_v), ft	18	Bicyle LOS Score (BLOS)	5.47
Average Effective Width (W_e), ft	24	Bicycle Level of Service (LOS)	E

HCS7 Multilane Highway Report

Project Information

Analyst	Elizabeth Fernandez	Date	October 2018
Agency	H.W. Lochner	Analysis Year	2045
Jurisdiction	Highlands County	Time Period Analyzed	AM Peak Hour
Project Description	Build, Westbound		

Direction 1 Geometric Data

Direction 1	Westbound		
Number of Lanes (N), ln	2	Terrain Type	Level
Segment Length (L), ft	-	Percent Grade, %	-
Measured or Base Free-Flow Speed	Base	Grade Length, mi	-
Base Free-Flow Speed (BFFS), mi/h	60.0	Total Ramp Density (TRD), ramps/mi	0.00
Lane Width, ft	12	Left-Side Lateral Clearance (LC_R), ft	6
Median Type	Divided	Total Lateral Clearance (TLC), ft	12.00
Access Point Density, pts/mi	4.0	Free-Flow Speed (FFS), mi/h	59.0

Direction 1 Adjustment Factors

Driver Population	All Familiar	Final Speed Adjustment Factor (SAF)	1.000
Driver Population SAF	1.000	Final Capacity Adjustment Factor (CAF)	1.000
Driver Population CAF	1.000		

Direction 1 Demand and Capacity

Volume(V) veh/h	324	Heavy Vehicle Adjustment Factor (f_{HV})	0.901
Peak Hour Factor	0.92	Flow Rate (V_p), pc/h/ln	196
Total Trucks, %	11.00	Capacity (c), pc/h/ln	2180
Single-Unit Trucks (SUT), %	-	Adjusted Capacity (c_{adj}), pc/h/ln	2180
Tractor-Trailers (TT), %	-	Volume-to-Capacity Ratio (v/c)	0.09

Direction 1 Speed and Density

Lane Width Adjustment (f_{LW})	0.0	Average Speed (S), mi/h	59.0
Total Lateral Clearance Adj. (f_{LLC})	0.0	Density (D), pc/mi/ln	3.3
Median Type Adjustment (f_M)	0.0	Level of Service (LOS)	A
Access Point Density Adjustment (f_A)	1.0		

Direction 1 Bicycle LOS

Flow Rate in Outside Lane (v_{OL}),veh/h	176	Effective Speed Factor (S_t)	4.94
Effective Width of Volume (W_v), ft	18	Bicyle LOS Score (BLOS)	5.47
Average Effective Width (W_e), ft	24	Bicycle Level of Service (LOS)	E

HCS7 Multilane Highway Report

Project Information

Analyst	Elizabeth Fernandez	Date	October 2018
Agency	H.W. Lochner	Analysis Year	2045
Jurisdiction	Highlands County	Time Period Analyzed	PM Peak Hour
Project Description	Build, Westbound		

Direction 1 Geometric Data

Direction 1	Westbound		
Number of Lanes (N), ln	2	Terrain Type	Level
Segment Length (L), ft	-	Percent Grade, %	-
Measured or Base Free-Flow Speed	Base	Grade Length, mi	-
Base Free-Flow Speed (BFFS), mi/h	60.0	Total Ramp Density (TRD), ramps/mi	0.00
Lane Width, ft	12	Left-Side Lateral Clearance (LC_R), ft	6
Median Type	Divided	Total Lateral Clearance (TLC), ft	12.00
Access Point Density, pts/mi	4.0	Free-Flow Speed (FFS), mi/h	59.0

Direction 1 Adjustment Factors

Driver Population	All Familiar	Final Speed Adjustment Factor (SAF)	1.000
Driver Population SAF	1.000	Final Capacity Adjustment Factor (CAF)	1.000
Driver Population CAF	1.000		

Direction 1 Demand and Capacity

Volume(V) veh/h	464	Heavy Vehicle Adjustment Factor (f_{HV})	0.901
Peak Hour Factor	0.92	Flow Rate (V_p), pc/h/ln	280
Total Trucks, %	11.00	Capacity (c), pc/h/ln	2180
Single-Unit Trucks (SUT), %	-	Adjusted Capacity (c_{adj}), pc/h/ln	2180
Tractor-Trailers (TT), %	-	Volume-to-Capacity Ratio (v/c)	0.13

Direction 1 Speed and Density

Lane Width Adjustment (f_{LW})	0.0	Average Speed (S), mi/h	59.0
Total Lateral Clearance Adj. (f_{LLC})	0.0	Density (D), pc/mi/ln	4.7
Median Type Adjustment (f_M)	0.0	Level of Service (LOS)	A
Access Point Density Adjustment (f_A)	1.0		

Direction 1 Bicycle LOS

Flow Rate in Outside Lane (v_{OL}),veh/h	252	Effective Speed Factor (S_t)	4.94
Effective Width of Volume (W_v), ft	18	Bicyle LOS Score (BLOS)	5.66
Average Effective Width (W_e), ft	24	Bicycle Level of Service (LOS)	F

Appendix K:
Noise Analysis

TRAFFIC DATA FOR NOISE STUDIES - SUMMARY OUTPUT
FDOT DISTRICT 1

Federal Aid Number(s):	
FPID Number(s):	414506-5-22-01
State/Federal Route No.:	SR 70
Road Name:	Fritz Street
Project Description:	SR 70 PD&E Study
Segment Description:	SR 70 from CR 29 to Lonesome Island Road
Section Number:	9060000
Mile Post To/From:	17.255 to 19.805

Existing Facility:

Year:	**2018**	D =	**58.83%**	%
		T24 =	**22.00%**	% of 24 Hour Volume
		Tpeak =	**11.00%**	% of Design Hour Volume
		MT =	**3.00%**	% of Design Hour Volume
LOS C Peak Hour Directional Volume:	**670**	HT =	**8.00%**	% of Design Hour Volume
Demand Peak Hour Volume:	**268**	B =	**0.11%**	% of Design Hour Volume
Posted Speed:	**60**	MC =	**0.10%**	% of Design Hour Volume

No Build Alternative (Design Year):

Year:	**2045**	D =	**58.83%**	%
		T24 =	**22.00%**	% of 24 Hour Volume
		Tpeak =	**11.00%**	% of Design Hour Volume
		MT =	**3.00%**	% of Design Hour Volume
LOS C Peak Hour Directional Volume:	**670**	HT =	**8.00%**	% of Design Hour Volume
Demand Peak Hour Volume:	**486**	B =	**0.11%**	% of Design Hour Volume
Posted Speed:	**60**	MC =	**0.10%**	% of Design Hour Volume

Build Alternative (Design Year):

Year:	**2045**	D =	**58.83%**	%
		T24 =	**22.00%**	% of 24 Hour Volume
		Tpeak =	**11.00%**	% of Design Hour Volume
		MT =	**3.00%**	% of Design Hour Volume
LOS C Peak Hour Directional Volume:	**1530**	HT =	**8.00%**	% of Design Hour Volume
Demand Peak Hour Volume:	**486**	B =	**0.11%**	% of Design Hour Volume
Posted Speed:	**60**	MC =	**0.10%**	% of Design Hour Volume

I certify that the above information is accurate and appropriate for use with the traffic noise analysis

Prepared By: Elizabeth Fernandez ______________ Date: 1/7/2019
Print Name Signature

I have reviewed and concur that the above information is appropriate for use with the traffic noise analysis

FDOT Reviewer: ______________ Date: ______________
Print Name Signature

FDOT TRAFFIC DATA FOR NOISE STUDIES - DETAILED OUTPUT

Prepared By: Elizabeth Fernandez **Date:** 1/7/2019 **Approved for Use By:** **Date:**

Federal Aid Number(s): **Section Number:** 9060000

FPID Number(s): 414506-5-22-01 **Mile Post To/From:** 17.255 to 19.805

State/Federal Route No.: SR 70

Road Name: Fritz Street

Project Description: SR 70 PD&E Study

Segment Description: SR 70 from CR 29 to Lonesome Island Road

Note: Data sheets are to be completed for each segment having a change in traffic parameters (i.e., volume posted speed, typical section)

Demand Peak Hour/LOS C	Peak or Off-Peak Direction	Vehicle Type	Existing Year: 2018 Posted Speed: 60 Number of Travel Lanes: 2	No Build (Design Year) Year: 2045 Posted Speed: 60 Number of Travel Lanes: 2	Build (Design Year) Year: 2045 Posted Speed: 60 Number of Travel Lanes: 4
			Number of Vehicles	Number of Vehicles	Number of Vehicles
See Columns to Right > for Which Volumes To Use (Demand or LOS C)			Use Demand Volumes	Use Demand Volumes	Use Demand Volumes
Demand Peak Hour	Peak Direction	Autos	237	430	430
		Med Trucks	8	15	15
		Heavy Trucks	21	39	39
		Buses	1	1	1
		Motorcycles	1	1	1
		Total	268	486	486
	Off-Peak Direction	Autos	165	301	301
		Med Trucks	6	10	10
		Heavy Trucks	15	27	27
		Buses	1	1	1
		Motorcycles	1	1	1
		Total	188	340	340
LOS C	Peak Direction	Autos	594	594	1358
		Med Trucks	20	20	46
		Heavy Trucks	54	54	122
		Buses	1	1	2
		Motorcycles	1	1	2
		Total	670	670	1530
	Off-Peak Direction	Autos	594	594	1358
		Med Trucks	20	20	46
		Heavy Trucks	54	54	122
		Buses	1	1	2
		Motorcycles	1	1	2
		Total	670	670	1530

Appendix L:
Air Quality Analysis

PD&E

TRAFFIC DATA FOR AIR STUDY SCREENING TEST

DATE: 16-Oct-18

PREPARED BY: H. W. Lochner

Financial Project Number(s): 414506-5-22-01

Work Program Item No.: 414506-5

Federal Aid Numbers (s):

Project Description: SR 70 from CR 29 to Lonesome Island Road PD&E Study

NOTE: The most congested intersection is the intersection with the highest total volume and lowest departure speeds and it could be two different intersections based on the "Build" vs. "No-Build" alternatives. The traffic volumes are to be the vph of the most congested leg approaching the intersection. The speeds are to be the approach speed for the most congested leg no closer than 152.4 m (500') from the intersection.

OPENING YEAR: 2025

	"Build"	"No-Build"
Signalized Intersection:	SR 70 and CR 29	SR 70 and CR 29
Design or Peak Hour Traffic for most congested leg:	324 vph	324 vph
Specify leg:	Eastbound	Eastbound
Approach Speed:	60 mph	60 mph

DESIGN YEAR: 2045

	"Build"	"No-Build"
Signalized Intersection:	SR 70 and CR 29	SR 70 and CR 29
Design or Peak Hour Traffic for most congested leg:	464 vph	464 vph
Specify leg:	Westbound	Westbound
Approach Speed:	60 mph	60 mph