

Project name:
Saundersville Road/Hendersonville BUILD Grant

Project ref:

To:
Carey Barr

From:
Derek Salomonsen

CC:
Jason Weiss

Date:
July 12, 2019

Memorandum

Subject: Saundersville Road Predictive Safety Analysis

Background

AECOM is in the process of completing a Build Grant for a highway improvement project on Saundersville Rd, Winston Hills Pkwy, and US 31/Johnny Cash Pkwy located in Hendersonville, TN. As part of the grant, an economic analysis has been completed to show the benefit-cost of completing the project. Part of the economic benefit of the project will be reduced costs associated with reduced crash frequency. The purpose of this memo is to document the predictive safety analysis completed to quantify the crash reduction associated with this project.

Existing Conditions

The study area includes three existing roadway segments and three existing intersections, listed below:

- Saundersville Rd – From the proposed connector route (Saundersville Rd LIC) to Winston Hill Pkwy
 - Saundersville Rd in the study area is a 2-lane undivided major collector with a posted speed limit of 40 mph. Some portions only have one through lane with the other lane becoming a designated turn lane to Winston Hills Pkwy. The roadway has an urban typical section (curb & gutter) with pedestrian facilities to the west of Vietnam Veterans Blvd.
- Winston Hills Pkwy – From Saundersville Rd to US 31/Johnny Cash Pkwy
 - Winston Hills Pkwy in the study area is a two-lane undivided major collector with no posted speed limit (25/30 mph expected). Winston Hills Pkwy serves as a connector road for traffic from Vietnam Veterans Blvd to US 31/Johnny Cash Blvd. This segment of roadway includes one at-grade railroad crossing and four driveway access points.
- US 31/Johnny Cash Pkwy – From the proposed connector route (Saundersville Rd LIC) to Winston Hill Pkwy
 - US 31/Johnny Cash Pkwy in the study area is a 4-lane undivided principal arterial with a center two-way left turn lane (TWLTL) and a posted speed limit of 45 mph. This segment of roadway is primarily a rural typical section with some spot curb & gutter locations. US 31/Johnny Cash Blvd provides a connection between the Cities of Metro Nashville – Davidson County, Hendersonville, and Gallatin.
- The Saundersville Rd & Vietnam Veterans Blvd Off-Ramp Intersection (signalized)
- The Saundersville Rd & Winston Hills Pkwy Intersection (signalized)
- The US 31/Johnny Cash Pkwy & Winston Hill Pkwy Intersection (signalized)

The primary traffic movements in the study area consist of traffic exiting Vietnam Veterans Blvd at the Saundersville Rd off-ramp, continuing east along Saundersville Rd and taking an immediate right turn onto Winston Hills Pkwy. This movement of

traffic is the only way for vehicles from Vietnam Veterans Blvd to gain access to the commercial and residential destinations south on US 31/Johnny Cash Pkwy. A safety and operational issue exists for this flow of traffic due to the at-grade railroad crossing at Winston Hill Pkwy. When a train is present, southbound queuing on Winston Hills Pkwy is seen extending back onto Saundersville Rd and continuing onto the Vietnam Veterans Blvd off-ramp. Queue lengths have been observed to extend onto the mainline through lanes on Vietnam Veterans Blvd, which has a posted speed limit of 65 mph. **Figure 1** shows the limits of the study area.

Figure 1: Study Area



Proposed Improvements

The proposed improvements include constructing a Local Interstate Connector (LIC) on new alignment between US 31/Johnny Cash Blvd and Saundersville Rd with a design speed of 40 mph, located approximately 0.14 miles west of the Vietnam Veterans Blvd freeway interchange. A new bridge would be constructed for the railroad over the proposed connector road. The proposed typical section for the LIC is two 12-foot lanes and a 4-foot dedicated bike lane in each direction with curb and gutter. A 5-foot terrace with a 5-foot sidewalk is proposed behind each curb. The center median would vary in width from a 12-foot raised median to an 8-foot raised median under the railroad bridge. The new LIC would include pedestrian scale lighting along the entire corridor.

The new LIC would include a new signalized intersection at Saundersville Road and at US 31/Johnny Cash Pkwy. US 31/Johnny Cash Pkwy would be widened at the new LIC intersection to include the appropriate turn lanes.

The at-grade railroad crossing on Winston Hills Pkwy would be permanently closed and there will be no connection between Saundersville Rd and US 31/Johnny Cash Pkwy. This will result in eliminating the existing intersection of Saundersville Rd and Winston Hills Pkwy.

Methodology

The predictive safety analysis was completed using the FHWA's Interactive Highway Safety Design Model (IHSDM). Two scenario models were created for a comparison of crash expectancy:

- **2024 to 2055 No-Build:** Existing roadway geometry/configuration, forecasted 2024, 2040, and 2055 traffic volumes (from *Saundersville Road Local Interstate Connector Traffic Forecast Report, Ragan-Smith Associates, Sept, 2017*).
- **2024 to 2055 Proposed:** Proposed roadway geometry/configuration, forecasted 2024, 2040, and 2055 traffic volumes.

IHSDM has the ability to report the following results:

- **Predicted Number of Crashes:** The predicted number of crashes (PNC) is calculated by the model using equations derived from nationwide studies of similar roadway types.
- **Expected Number of Crashes:** The expected number of crashes (ENC) provides a more “realistic” result by accounting for crash history of the project roadways. The ENC is a modification to the PNC using crash history and the Empirical Bayes formula.

While the ENC is the most accurate method of predictive crash analysis, it does not allow for an “apples-to-apples” comparison when comparing an existing roadway/intersection (with crash history) and a proposed roadway/intersection (with no crash history). Because of this, the analysis included only the PNC for each scenario.

Results

The results of the predictive safety analysis are below.

Annual Crash Frequency (Crashes/Year)			
	Fatal/Injury	PDO	Total
Predicted Crashes (No-Build)	8.77	19.15	27.92
Predicted (Proposed)	10.48	22.61	33.10
Crash Reduction	-1.72	-3.47	-5.18

It was found that crashes increased in the study area over the observed study period primarily due to the introduction of two new signalized intersections. One intersection is eliminated in the proposed scenario, but the increase of predicted crashes at the two new signalized intersections outweighs the benefit of the this and the new connector road.

IHSDM reports are attached along with a more details breakdown of the results.

		Fatal/Injury Crashes		Property Damage Only Crashes		All Crashes	
		Annual	Study Period (2024 - 2055)	Annual	Study Period (2024 - 2055)	Annual	Study Period (2024 - 2055)
No-Build Alternative							
Segments	Saundersville Rd	0.26	8.11	0.60	18.50	0.86	27.47
	Winston Hill Rd	0.34	10.68	0.78	24.28	1.13	36.09
	US 31/Main St	1.49	46.34	3.82	118.46	5.32	170.11
Total Segment Crashes		2.10	65.13	5.20	161.24	7.30	233.68
Intersections	Saundersville Rd & Winston Hill Rd	1.52	47.08	3.39	105.17	4.91	157.16
	Saundersville Rd & Off-Ramp	0.95	29.59	2.75	85.36	3.71	118.66
	US 31 & Winston Hill Rd	4.20	130.05	7.80	241.77	11.99	383.81
Total Intersection Crashes		6.67	206.72	13.94	432.29	20.61	659.62
Total Network Crashes		8.77	271.85	19.15	593.54	27.92	893.30
Build Alternative							
Segments	Saundersville Rd	0.51	15.70	1.23	38.11	1.74	55.55
	Saundersville Rd LIC	0.34	10.40	0.87	26.98	1.21	38.60
	US 31/Main St	1.32	40.98	3.36	104.13	4.68	149.79
Total Segment Crashes		2.16	67.09	5.46	169.23	7.62	243.94
Intersections	Saundersville Rd & Saundersville Rd LIC	1.60	49.48	3.62	112.20	5.22	166.90
	Saundersville Rd & Off-Ramp	1.13	35.14	3.11	96.46	4.25	135.85
	US 31 & Winston Hill Rd	2.28	70.61	4.15	128.63	6.43	205.66
	US 31 & Saundersville Rd LIC	3.31	102.70	6.27	194.45	9.59	306.74
Total Intersection Crashes		8.32	257.93	17.15	531.75	25.47	815.15
Total Network Crashes		10.48	325.02	22.61	700.97	33.10	1059.09
Crash Reduction							
Segments		-0.06	-1.96	-0.26	-7.98	-0.32	-10.26
Intersections		-1.65	-51.21	-3.21	-99.45	-4.86	-155.52
Total Network Crashes		-1.72	-53.17	-3.47	-107.44	-5.18	-165.79

Interactive Highway Safety Design Model

Crash Prediction Evaluation Report

June 25, 2019

Disclaimer

The Interactive Highway Design Model (IHSDM) software is disseminated under the sponsorship of the Department of Transportation in the interest of information exchange. The United States Government assumes no liability for its content or use thereof. This document does not constitute a standard, specification, or regulation.

The United States Government does not endorse products or manufacturers. Trade and manufacturers' names may appear in this software and documentation only because they are considered essential to the objective of the software.

Limited Warranty and Limitations of Remedies

This software product is provided "as-is," without warranty of any kind-either expressed or implied (but not limited to the implied warranties of merchantability and fitness for a particular purpose). The FHWA do not warrant that the functions contained in the software will meet the end-user's requirements or that the operation of the software will be uninterrupted and error-free.

Under no circumstances will the FHWA be liable to the end-user for any damages or claimed lost profits, lost savings, or other incidental or consequential damages rising out of the use or inability to use the software (even if these organizations have been advised of the possibility of such damages), or for any claim by any other party.

Notice

The use of the IHSDM software is being done strictly on a voluntary basis. In exchange for provision of IHSDM, the user agrees that the Federal Highway Administration (FHWA), U.S. Department of Transportation and any other agency of the Federal Government shall not be responsible for any errors, damage or other liability that may result from any and all use of the software, including installation and testing of the software. The user further agrees to hold the FHWA and the Federal Government harmless from any resulting liability. The user agrees that this hold harmless provision shall flow to any person to whom or any entity to which the user provides the IHSDM software. It is the user's full responsibility to inform any person to whom or any entity to which it provides the IHSDM software of this hold harmless provision.

Table of Contents

Report Overview	1
Section Types	2
Section 1 Evaluation	2

List of Tables

Table Evaluation Highway - Homogeneous Segments (Section 1)	4
Table Evaluation Intersection (Section 1)	5
Table Predicted Highway Crash Rates and Frequencies Summary (Section 1)	6
Table Predicted Crash Frequencies and Rates by Highway Segment/Intersection (Section 1)	7
Table Predicted Crash Frequencies and Rates by Horizontal Design Element (Section 1)	7
Table Predicted Crash Frequencies by Year (Section 1)	8
Table Predicted Crash Severity by Urban Arterial (Section 1)	9
Table Predicted Five Lane or Fewer Crash Type Distribution (Section 1)	10
Table Evaluation Message	11

List of Figures

Figure Crash Prediction Summary (Section 1)	3
---	---

Report Overview

Report Generated: Jun 25, 2019 2:33 PM

Report Template: System: Multi-Page, 508 Compliant [System] (mlcpm4, Jun 20, 2019 12:11 PM)

Evaluation Date: Tue Jun 25 14:28:16 CDT 2019

IHSDM Version: v14.1.0 (Mar 12, 2019)

Crash Prediction Module: v9.1.0 (Mar 12, 2019)

User Name: salomonsend

Organization Name: AECOM

Phone: 608-828-8203

E-Mail: derek.salomonsen@aecom.com

Project Title: Saundersville Road/Hendersonville BUILD grant - No-Build

Project Comment: Created Mon Jun 24 11:15:36 CDT 2019

Project Unit System: U.S. Customary

Highway Title: No-Build - Alignment Saundersville Rd_Study Location

Highway Comment: Copied from BIULD - Alignment Saundersville Rd_Study Location (v1)

Highway Version: 1

Evaluation Title: Saundersville Rd - No-Build

Evaluation Comment: Created Tue Jun 25 14:27:51 CDT 2019

Minimum Location: 19+28.080

Maximum Location: 30+70.389

Policy for Superelevation: AASHTO 2011 U.S. Customary

Calibration: HSM Configuration

Crash Distribution: HSM Configuration

Model/CMF: HSM Configuration

First Year of Analysis: 2024

Last Year of Analysis: 2055

Empirical-Bayes Analysis: None

First Year of Observed Crashes:

Last Year of Observed Crashes:

Section Types

Section 1 Evaluation

Section: Section 1

Evaluation Start Location: 19+28.080

Evaluation End Location: 30+70.389

Area Type: Suburban

Functional Class: Arterial

Type of Alignment: Undivided, Multilane

Model Category: Urban/Suburban Arterial

Calibration Factor: 3SG=1.0; 4U=1.0;

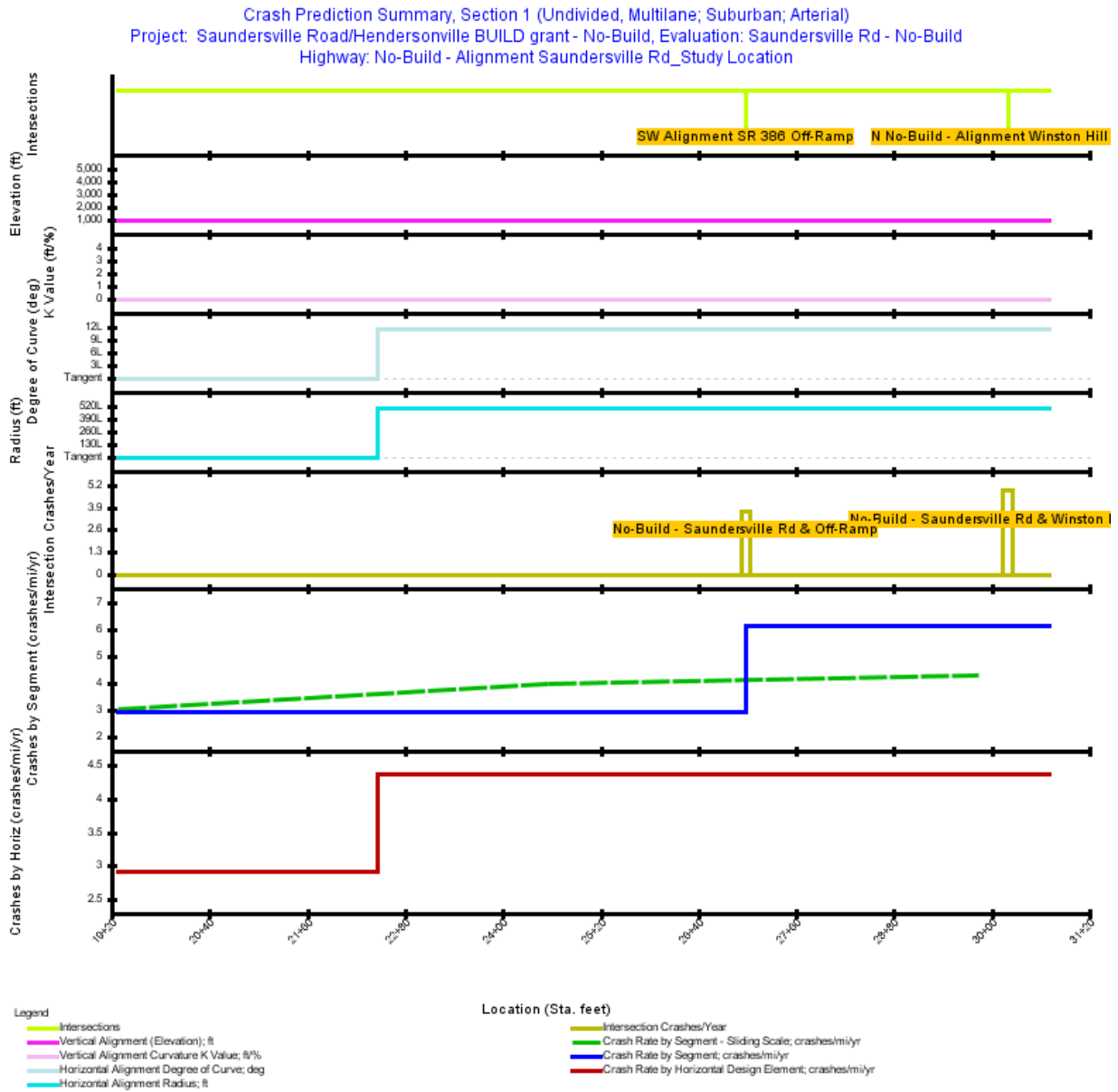


Figure 1. Crash Prediction Summary (Section 1)

Table 1. Evaluation Highway - Homogeneous Segments (Section 1)

Seg. No.	Type	Start Location (Sta. ft)	End Location (Sta. ft)	Length (ft)	Length (mi)	AADT	Number Major Commercial Driveways	Number Minor Commercial Driveways	Number Major Industrial/Institutional	Number Minor Industrial/Institutional	Number Major Residential Driveways	Number Minor Residential Driveways	Number Other Driveways	Lighting	Automated Speed Enforcement	Density (fixed objects/mi)	Median Width (ft)	Type	Effective Median Width (ft)	Speed Level	Number Rail Highway Crossings	Average Shoulder Width (ft)	Average Lane Width (ft)
1	4U	19+28.080	22+47.005	318.93	0.0604	2024: 9,000; 2025: 9,145; 2026: 9,290; 2027: 9,435; 2028: 9,580; 2029: 9,725; 2030: 9,870; 2031: 10,015; 2032: 10,160; 2033: 10,305; 2034: 10,450; 2035: 10,595; 2036: 10,740; 2037: 10,885; 2038: 11,030; 2039: 11,175; 2040: 11,320; 2041: 11,517; 2042: 11,714; 2043: 11,912; 2044: 12,109; 2045: 12,306; 2046: 12,504; 2047: 12,701; 2048: 12,898; 2049: 13,096; 2050: 13,293; 2051: 13,490; 2052: 13,688; 2053: 13,885; 2054: 14,082; 2055: 14,280	0	0	0	0	0	0	0	false	false	0.0	0.00	None	0.00	Intermediate/High	0	2.00	12.00
2	4U	22+47.005	26+00.000	352.99	0.0669	2024: 9,000; 2025: 9,145; 2026: 9,290; 2027: 9,435; 2028: 9,580; 2029: 9,725; 2030: 9,870; 2031: 10,015; 2032: 10,160; 2033: 10,305; 2034: 10,450; 2035: 10,595; 2036: 10,740; 2037: 10,885; 2038: 11,030; 2039: 11,175; 2040: 11,320; 2041: 11,517; 2042: 11,714; 2043: 11,912; 2044: 12,109; 2045: 12,306; 2046: 12,504; 2047: 12,701; 2048: 12,898; 2049: 13,096; 2050: 13,293; 2051: 13,490; 2052: 13,688; 2053: 13,885; 2054: 14,082; 2055: 14,280	0	0	0	0	0	0	0	false	false	0.0	0.00	None	0.00	Intermediate/High	0	2.00	12.00
3	4U	26+00.000	26+99.080	99.08	0.0188	2024: 9,000; 2025: 9,145; 2026: 9,290; 2027: 9,435; 2028: 9,580; 2029: 9,725; 2030: 9,870; 2031: 10,015; 2032: 10,160; 2033: 10,305; 2034: 10,450; 2035: 10,595; 2036: 10,740; 2037: 10,885; 2038: 11,030; 2039: 11,175; 2040: 11,320; 2041: 11,517; 2042: 11,714; 2043: 11,912; 2044: 12,109; 2045: 12,306; 2046: 12,504; 2047: 12,701; 2048: 12,898; 2049: 13,096; 2050: 13,293; 2051: 13,490; 2052: 13,688; 2053: 13,885; 2054: 14,082; 2055: 14,280	0	0	0	0	0	0	0	false	false	0.0	0.00	None	0.00	Intermediate/High	0	4.00	12.00
4	4U	26+99.080	30+70.389	371.31	0.0703	2024: 15,400; 2025: 15,720; 2026: 16,041; 2027: 16,361; 2028: 16,682; 2029: 17,003; 2030: 17,323; 2031: 17,644; 2032: 17,965; 2033: 18,285; 2034: 18,606; 2035: 18,926; 2036: 19,247; 2037: 19,568; 2038: 19,888; 2039: 20,209; 2040: 20,530; 2041: 21,008; 2042: 21,486; 2043: 21,964; 2044: 22,442; 2045: 22,920; 2046: 23,398; 2047: 23,876; 2048: 24,354; 2049: 24,832; 2050: 25,310; 2051: 25,788; 2052: 26,266; 2053: 26,744; 2054: 27,222; 2055: 27,700	0	0	0	0	0	0	0	false	false	0.0	0.00	None	0.00	Intermediate/High	0	6.00	12.00

Table 2. Evaluation Intersection (Section 1)

Inter. No.	Title	Location (Station)	Major AADT	Minor AADT	Legs	Traffic Control	Intersection Type	Approach w/Left Turn Lanes	Approach w/Right Turn Lanes	Approach w/o Right Turn on Red	Pedestrian Volume (crossings/day)	Lighted at Night	Red Light Camera	School Near by	Number of Bus Stops	Number of Alcohol Sales Establishments	Max Lanes Crossed	Replaced with Roundabout
1	No-Build - Saundersville Rd & Winston Hill Pkwy	30+20.00	2024: 18,990; 2025: 19,320; 2026: 19,651; 2027: 19,981; 2028: 20,312; 2029: 20,643; 2030: 20,973; 2031: 21,304; 2032: 21,635; 2033: 21,965; 2034: 22,296; 2035: 22,626; 2036: 22,957; 2037: 23,288; 2038: 23,618; 2039: 23,949; 2040: 24,280; 2041: 24,742; 2042: 25,204; 2043: 25,666; 2044: 26,128; 2045: 26,590; 2046: 27,052; 2047: 27,514; 2048: 27,976; 2049: 28,438; 2050: 28,900; 2051: 29,362; 2052: 29,824; 2053: 30,286; 2054: 30,748; 2055: 31,210	2024: 15,400; 2025: 15,720; 2026: 16,041; 2027: 16,361; 2028: 16,682; 2029: 17,003; 2030: 17,323; 2031: 17,644; 2032: 17,965; 2033: 18,285; 2034: 18,606; 2035: 18,926; 2036: 19,247; 2037: 19,568; 2038: 19,888; 2039: 20,209; 2040: 20,530; 2041: 21,008; 2042: 21,486; 2043: 21,964; 2044: 22,442; 2045: 22,920; 2046: 23,398; 2047: 23,876; 2048: 24,354; 2049: 24,832; 2050: 25,310; 2051: 25,788; 2052: 26,266; 2053: 26,744; 2054: 27,222; 2055: 27,700	3	Signalized	Three-Legged Signalized	0	0	1	0	true	false	false	0	0	4	false
2	No-Build - Saundersville Rd & Off-Ramp	26+98.25	2024: 6,860; 2025: 7,043; 2026: 7,227; 2027: 7,411; 2028: 7,595; 2029: 7,778; 2030: 7,962; 2031: 8,146; 2032: 8,330; 2033: 8,513; 2034: 8,697; 2035: 8,881; 2036: 9,065; 2037: 9,248; 2038: 9,432; 2039: 9,616; 2040: 9,800; 2041: 10,101; 2042: 10,403; 2043: 10,705; 2044: 11,006; 2045: 11,308; 2046: 11,610; 2047: 11,911; 2048: 12,213; 2049: 12,515; 2050: 12,816; 2051: 13,118; 2052: 13,420; 2053: 13,721; 2054: 14,023; 2055: 14,325	2024: 15,400; 2025: 15,720; 2026: 16,041; 2027: 16,361; 2028: 16,682; 2029: 17,003; 2030: 17,323; 2031: 17,644; 2032: 17,965; 2033: 18,285; 2034: 18,606; 2035: 18,926; 2036: 19,247; 2037: 19,568; 2038: 19,888; 2039: 20,209; 2040: 20,530; 2041: 21,008; 2042: 21,486; 2043: 21,964; 2044: 22,442; 2045: 22,920; 2046: 23,398; 2047: 23,876; 2048: 24,354; 2049: 24,832; 2050: 25,310; 2051: 25,788; 2052: 26,266; 2053: 26,744; 2054: 27,222; 2055: 27,700	3	Signalized	Three-Legged Signalized	0	0	2	0	true	false	false	0	0	4	false

Table 3. Predicted Highway Crash Rates and Frequencies Summary (Section 1)

First Year of Analysis	2024
Last Year of Analysis	2055
Evaluated Length (mi)	0.2163
Average Future Road AADT (vpd)	14,537
Predicted Crashes	
Total Crashes	303.28
Fatal and Injury Crashes	87.52
Property-Damage-Only Crashes	215.76
Percent of Total Predicted Crashes	
Percent Fatal and Injury Crashes (%)	29
Percent Property-Damage-Only Crashes (%)	71
Predicted Crash Rate	
Crash Rate (crashes/mi/yr)	43.8072
FI Crash Rate (crashes/mi/yr)	12.6416
PDO Crash Rate (crashes/mi/yr)	31.1657
Predicted Travel Crash Rate	
Total Travel (million veh-mi)	36.73
Travel Crash Rate (crashes/million veh-mi)	8.26
Travel FI Crash Rate (crashes/million veh-mi)	2.38
Travel PDO Crash Rate (crashes/million veh-mi)	5.87

Table 4. Predicted Crash Frequencies and Rates by Highway Segment/Intersection (Section 1)

Segment Number/Intersection Name/Cross Road	Start Location (Sta. ft)	End Location (Sta. ft)	Length (mi)	Total Predicted Crashes for Evaluation Period	Predicted Total Crash Frequency (crashes/yr)	Predicted FI Crash Frequency (crashes/yr)	Predicted PDO Crash Frequency (crashes/yr)	Predicted Crash Rate (crashes/mi/yr)	Predicted Travel Crash Rate (crashes/million veh-mi)	Predicted Intersection Travel Crash Rate (crashes/million veh)
1	19+28.080	22+47.005	0.0604	5.645	0.1764	0.0552	0.1212	2.9203	0.70	
2	22+47.005	26+00.000	0.0669	6.248	0.1952	0.0611	0.1342	2.9203	0.70	
3	26+00.000	26+99.080	0.0188	1.754	0.0548	0.0171	0.0377	2.9203	0.70	
No-Build - Saundersville Rd & Off-Ramp	26+98.250			118.656	3.7080	0.9546	2.7534			0.48
4	26+99.080	30+70.389	0.0703	13.823	0.4320	0.1283	0.3037	6.1426	0.80	
No-Build - Saundersville Rd & Winston Hill Pkwy	30+20.000			157.156	4.9111	1.5186	3.3925			0.40
All Segments			0.2163	27.469	0.8584	0.2617	0.5967	3.9678	0.75	
All Intersections				275.812	8.6191	2.4732	6.1459			0.43
Total			0.2163	303.281	9.4775	2.7350	6.7426	43.8072		

Table 5. Predicted Crash Frequencies and Rates by Horizontal Design Element (Section 1)

Title	Start Location (Sta. ft)	End Location (Sta. ft)	Length (mi)	Total Predicted Crashes for Evaluation Period	Predicted Total Crash Frequency (crashes/yr)	Predicted FI Crash Frequency (crashes/yr)	Predicted PDO Crash Frequency (crashes/yr)	Predicted Crash Rate (crashes/mi/yr)	Predicted Travel Crash Rate (crashes/million veh-mi)
Tangent	19+28.080	22+47.005	0.0604	5.645	0.1764	0.0552	0.1212	2.9203	0.70
Simple Curve 1	22+47.005	30+70.389	0.1559	21.824	0.6820	0.2065	0.4755	4.3735	0.75

Table 6. Predicted Crash Frequencies by Year (Section 1)

Year	Total Crashes	FI Crashes	Percent FI (%)	PDO Crashes	Percent PDO (%)
2024	6.76	1.95	28.831	4.81	71.169
2025	6.91	1.99	28.834	4.92	71.166
2026	7.07	2.04	28.837	5.03	71.163
2027	7.22	2.08	28.839	5.14	71.161
2028	7.37	2.13	28.842	5.25	71.158
2029	7.53	2.17	28.844	5.36	71.156
2030	7.68	2.22	28.846	5.47	71.154
2031	7.84	2.26	28.848	5.58	71.152
2032	7.99	2.31	28.850	5.69	71.150
2033	8.15	2.35	28.852	5.80	71.148
2034	8.31	2.40	28.853	5.91	71.147
2035	8.46	2.44	28.854	6.02	71.146
2036	8.62	2.49	28.855	6.13	71.145
2037	8.78	2.53	28.856	6.25	71.144
2038	8.94	2.58	28.857	6.36	71.143
2039	9.10	2.62	28.858	6.47	71.142
2040	9.26	2.67	28.858	6.58	71.142
2041	9.49	2.74	28.860	6.75	71.140
2042	9.72	2.81	28.861	6.92	71.139
2043	9.96	2.87	28.863	7.08	71.138
2044	10.20	2.94	28.864	7.25	71.136
2045	10.43	3.01	28.864	7.42	71.136
2046	10.67	3.08	28.865	7.59	71.135
2047	10.91	3.15	28.866	7.76	71.134
2048	11.15	3.22	28.866	7.93	71.134
2049	11.39	3.29	28.866	8.10	71.134
2050	11.63	3.36	28.866	8.27	71.134
2051	11.87	3.43	28.866	8.44	71.134
2052	12.11	3.50	28.865	8.61	71.135
2053	12.35	3.56	28.864	8.79	71.136
2054	12.60	3.64	28.863	8.96	71.136
2055	12.84	3.71	28.863	9.13	71.138
Total	303.28	87.52	28.857	215.76	71.143
Average	9.48	2.73	28.857	6.74	71.143

Note: *Fatal and Injury Crashes* and *Property Damage Only Crashes* do not necessarily sum up to *Total Crashes* because the distribution of these three crashes had been derived independently.

Table 7. Predicted Crash Severity by Urban Arterial (Section 1)

Seg. No.	Type	Fatal (K) Crashes (crashes)	Incapacitating Injury (A) Crashes (crashes)	Non-Incapacitating Injury (B) Crashes (crashes)	Possible Injury (C) Crashes (crashes)	No Injury (O) Crashes (crashes)
2	USAIntersection	0.1135	2.3542	9.0637	19.0159	88.1093

Table 8. Predicted Five Lane or Fewer Crash Type Distribution (Section 1)

Element Type	Crash Type	FI Crashes	Percent FI (%)	PDO Crashes	Percent PDO (%)	Total Crashes	Percent Total (%)
Highway Segment	Collision with Animal	0.00	0.0	0.00	0.0	0.01	0.0
Highway Segment	Collision with Bicycle	0.05	0.0	0.00	0.0	0.05	0.0
Highway Segment	Collision with Fixed Object	0.85	0.5	3.31	1.8	4.15	2.2
Highway Segment	Collision with Other Object	0.03	0.0	0.12	0.1	0.15	0.1
Highway Segment	Other Single-vehicle Collision	0.51	0.3	0.66	0.4	1.17	0.6
Highway Segment	Collision with Pedestrian	0.24	0.1	0.00	0.0	0.24	0.1
Highway Segment	Total Single Vehicle Crashes	1.69	0.9	4.09	2.2	5.77	3.1
Highway Segment	Angle Collision	1.21	0.7	1.95	1.1	3.16	1.7
Highway Segment	Driveway-related Collision	0.00	0.0	0.00	0.0	0.00	0.0
Highway Segment	Head-on Collision	0.52	0.3	0.06	0.0	0.57	0.3
Highway Segment	Other Multi-vehicle Collision	0.38	0.2	1.20	0.7	1.57	0.9
Highway Segment	Rear-end Collision	3.42	1.9	7.59	4.1	11.01	6.0
Highway Segment	Sideswipe, Opposite Direction Collision	0.55	0.3	0.47	0.3	1.01	0.5
Highway Segment	Sideswipe, Same Direction Collision	0.62	0.3	3.74	2.0	4.36	2.4
Highway Segment	Total Multiple Vehicle Crashes	6.69	3.6	15.01	8.1	21.70	11.8
Highway Segment	Total Highway Segment Crashes	8.38	4.5	19.09	10.3	27.47	14.9
Intersection	Collision with Animal	0.00	0.0	0.02	0.0	0.03	0.0
Intersection	Collision with Bicycle	1.71	0.9	0.00	0.0	1.71	0.9
Intersection	Collision with Fixed Object	2.60	1.4	7.17	3.9	9.77	5.3
Intersection	Non-Collision	0.83	0.5	0.11	0.1	0.94	0.5
Intersection	Collision with Other Object	0.36	0.2	0.55	0.3	0.92	0.5
Intersection	Other Single-vehicle Collision	0.18	0.1	0.14	0.1	0.32	0.2
Intersection	Collision with Parked Vehicle	0.00	0.0	0.01	0.0	0.01	0.0
Intersection	Collision with Pedestrian	0.00	0.0	0.00	0.0	0.00	0.0
Intersection	Total Intersection Single Vehicle Crashes	5.69	3.1	8.01	4.3	13.71	7.4
Intersection	Angle Collision	12.01	6.5	20.51	11.1	32.52	17.6
Intersection	Head-on Collision	1.63	0.9	2.01	1.1	3.64	2.0
Intersection	Other Multi-vehicle Collision	2.44	1.3	19.91	10.8	22.35	12.1
Intersection	Rear-end Collision	23.55	12.8	54.90	29.7	78.45	42.5
Intersection	Sideswipe	3.26	1.8	3.22	1.7	6.48	3.5
Intersection	Total Intersection Multiple Vehicle Crashes	42.90	23.2	100.55	54.5	143.45	77.7
Intersection	Total Intersection Crashes	48.60	26.3	108.56	58.8	157.16	85.1
	Total Crashes	56.97	30.9	127.65	69.1	184.62	100.0

Note: *Fatal and Injury Crashes* and *Property Damage Only Crashes* do not necessarily sum up to *Total Crashes* because the distribution of these three crashes had been derived independently.

Table 9. Evaluation Message

Start Location (Sta. ft)	End Location (Sta. ft)	Message
30+20.000	30+20.000	for intersection #1 (30+20.000 to 30+20.000), minor road traffic volume (16,682 vpd) for 2028 is not within the model limit (16,400 vpd) for reliable results for intersection type 3SG
30+20.000	30+20.000	for intersection #1 (30+20.000 to 30+20.000), minor road traffic volume (17,003 vpd) for 2029 is not within the model limit (16,400 vpd) for reliable results for intersection type 3SG
30+20.000	30+20.000	for intersection #1 (30+20.000 to 30+20.000), minor road traffic volume (17,323 vpd) for 2030 is not within the model limit (16,400 vpd) for reliable results for intersection type 3SG
30+20.000	30+20.000	for intersection #1 (30+20.000 to 30+20.000), minor road traffic volume (17,644 vpd) for 2031 is not within the model limit (16,400 vpd) for reliable results for intersection type 3SG
30+20.000	30+20.000	for intersection #1 (30+20.000 to 30+20.000), minor road traffic volume (17,965 vpd) for 2032 is not within the model limit (16,400 vpd) for reliable results for intersection type 3SG
30+20.000	30+20.000	for intersection #1 (30+20.000 to 30+20.000), minor road traffic volume (18,285 vpd) for 2033 is not within the model limit (16,400 vpd) for reliable results for intersection type 3SG
30+20.000	30+20.000	for intersection #1 (30+20.000 to 30+20.000), minor road traffic volume (18,606 vpd) for 2034 is not within the model limit (16,400 vpd) for reliable results for intersection type 3SG
30+20.000	30+20.000	for intersection #1 (30+20.000 to 30+20.000), minor road traffic volume (18,926 vpd) for 2035 is not within the model limit (16,400 vpd) for reliable results for intersection type 3SG
30+20.000	30+20.000	for intersection #1 (30+20.000 to 30+20.000), minor road traffic volume (19,247 vpd) for 2036 is not within the model limit (16,400 vpd) for reliable results for intersection type 3SG
30+20.000	30+20.000	for intersection #1 (30+20.000 to 30+20.000), minor road traffic volume (19,568 vpd) for 2037 is not within the model limit (16,400 vpd) for reliable results for intersection type 3SG
30+20.000	30+20.000	for intersection #1 (30+20.000 to 30+20.000), minor road traffic volume (19,888 vpd) for 2038 is not within the model limit (16,400 vpd) for reliable results for intersection type 3SG
30+20.000	30+20.000	for intersection #1 (30+20.000 to 30+20.000), minor road traffic volume (20,209 vpd) for 2039 is not within the model limit (16,400 vpd) for reliable results for intersection type 3SG
30+20.000	30+20.000	for intersection #1 (30+20.000 to 30+20.000), minor road traffic volume (20,530 vpd) for 2040 is not within the model limit (16,400 vpd) for reliable results for intersection type 3SG
30+20.000	30+20.000	for intersection #1 (30+20.000 to 30+20.000), minor road traffic volume (21,008 vpd) for 2041 is not within the model limit (16,400 vpd) for reliable results for intersection type 3SG
30+20.000	30+20.000	for intersection #1 (30+20.000 to 30+20.000), minor road traffic volume (21,486 vpd) for 2042 is not within the model limit (16,400 vpd) for reliable results for intersection type 3SG
30+20.000	30+20.000	for intersection #1 (30+20.000 to 30+20.000), minor road traffic volume (21,964 vpd) for 2043 is not within the model limit (16,400 vpd) for reliable results for intersection type 3SG
30+20.000	30+20.000	for intersection #1 (30+20.000 to 30+20.000), minor road traffic volume (22,442 vpd) for 2044 is not within the model limit (16,400 vpd) for reliable results for intersection type 3SG
30+20.000	30+20.000	for intersection #1 (30+20.000 to 30+20.000), minor road traffic volume (22,920 vpd) for 2045 is not within the model limit (16,400 vpd) for reliable results for intersection type 3SG

Start Location (Sta. ft)	End Location (Sta. ft)	Message
30+20.000	30+20.000	for intersection #1 (30+20.000 to 30+20.000), minor road traffic volume (23,398 vpd) for 2046 is not within the model limit (16,400 vpd) for reliable results for intersection type 3SG
30+20.000	30+20.000	for intersection #1 (30+20.000 to 30+20.000), minor road traffic volume (23,876 vpd) for 2047 is not within the model limit (16,400 vpd) for reliable results for intersection type 3SG
30+20.000	30+20.000	for intersection #1 (30+20.000 to 30+20.000), minor road traffic volume (24,354 vpd) for 2048 is not within the model limit (16,400 vpd) for reliable results for intersection type 3SG
30+20.000	30+20.000	for intersection #1 (30+20.000 to 30+20.000), minor road traffic volume (24,832 vpd) for 2049 is not within the model limit (16,400 vpd) for reliable results for intersection type 3SG
30+20.000	30+20.000	for intersection #1 (30+20.000 to 30+20.000), minor road traffic volume (25,310 vpd) for 2050 is not within the model limit (16,400 vpd) for reliable results for intersection type 3SG
30+20.000	30+20.000	for intersection #1 (30+20.000 to 30+20.000), minor road traffic volume (25,788 vpd) for 2051 is not within the model limit (16,400 vpd) for reliable results for intersection type 3SG
30+20.000	30+20.000	for intersection #1 (30+20.000 to 30+20.000), minor road traffic volume (26,266 vpd) for 2052 is not within the model limit (16,400 vpd) for reliable results for intersection type 3SG
30+20.000	30+20.000	for intersection #1 (30+20.000 to 30+20.000), minor road traffic volume (26,744 vpd) for 2053 is not within the model limit (16,400 vpd) for reliable results for intersection type 3SG
30+20.000	30+20.000	for intersection #1 (30+20.000 to 30+20.000), minor road traffic volume (27,222 vpd) for 2054 is not within the model limit (16,400 vpd) for reliable results for intersection type 3SG
30+20.000	30+20.000	for intersection #1 (30+20.000 to 30+20.000), minor road traffic volume (27,700 vpd) for 2055 is not within the model limit (16,400 vpd) for reliable results for intersection type 3SG

Interactive Highway Safety Design Model

Crash Prediction Evaluation Report

June 25, 2019

Disclaimer

The Interactive Highway Design Model (IHSDM) software is disseminated under the sponsorship of the Department of Transportation in the interest of information exchange. The United States Government assumes no liability for its content or use thereof. This document does not constitute a standard, specification, or regulation.

The United States Government does not endorse products or manufacturers. Trade and manufacturers' names may appear in this software and documentation only because they are considered essential to the objective of the software.

Limited Warranty and Limitations of Remedies

This software product is provided "as-is," without warranty of any kind-either expressed or implied (but not limited to the implied warranties of merchantability and fitness for a particular purpose). The FHWA do not warrant that the functions contained in the software will meet the end-user's requirements or that the operation of the software will be uninterrupted and error-free.

Under no circumstances will the FHWA be liable to the end-user for any damages or claimed lost profits, lost savings, or other incidental or consequential damages rising out of the use or inability to use the software (even if these organizations have been advised of the possibility of such damages), or for any claim by any other party.

Notice

The use of the IHSDM software is being done strictly on a voluntary basis. In exchange for provision of IHSDM, the user agrees that the Federal Highway Administration (FHWA), U.S. Department of Transportation and any other agency of the Federal Government shall not be responsible for any errors, damage or other liability that may result from any and all use of the software, including installation and testing of the software. The user further agrees to hold the FHWA and the Federal Government harmless from any resulting liability. The user agrees that this hold harmless provision shall flow to any person to whom or any entity to which the user provides the IHSDM software. It is the user's full responsibility to inform any person to whom or any entity to which it provides the IHSDM software of this hold harmless provision.

Table of Contents

Report Overview	1
Section Types	2
Section 1 Evaluation	2

List of Tables

Table Evaluation Highway - Homogeneous Segments (Section 1)	4
Table Evaluation Intersection (Section 1)	5
Table Predicted Highway Crash Rates and Frequencies Summary (Section 1)	6
Table Predicted Crash Frequencies and Rates by Highway Segment/Intersection (Section 1)	7
Table Predicted Crash Frequencies and Rates by Horizontal Design Element (Section 1)	7
Table Predicted Crash Frequencies by Year (Section 1)	8
Table Predicted Five Lane or Fewer Crash Type Distribution (Section 1)	9

List of Figures

Figure Crash Prediction Summary (Section 1)	3
---	---

Report Overview

Report Generated: Jun 25, 2019 2:34 PM

Report Template: System: Multi-Page, 508 Compliant [System] (mlcpm4, Jun 20, 2019 12:11 PM)

Evaluation Date: Tue Jun 25 14:28:59 CDT 2019

IHSDM Version: v14.1.0 (Mar 12, 2019)

Crash Prediction Module: v9.1.0 (Mar 12, 2019)

User Name: salomonsend

Organization Name: AECOM

Phone: 608-828-8203

E-Mail: derek.salomonsen@aecom.com

Project Title: Saundersville Road/Hendersonville BUILD grant - No-Build

Project Comment: Created Mon Jun 24 11:15:36 CDT 2019

Project Unit System: U.S. Customary

Highway Title: No-Build - Alignment US 31_Main St

Highway Comment: Copied from BUILD - Alignment US 31_Main St (v1)

Highway Version: 1

Evaluation Title: US 31/Main St - No-Build

Evaluation Comment: Created Tue Jun 25 14:28:26 CDT 2019

Minimum Location: 27+38.280

Maximum Location: 46+33.461

Policy for Superelevation: AASHTO 2011 U.S. Customary

Calibration: HSM Configuration

Crash Distribution: HSM Configuration

Model/CMF: HSM Configuration

First Year of Analysis: 2024

Last Year of Analysis: 2055

Empirical-Bayes Analysis: None

First Year of Observed Crashes:

Last Year of Observed Crashes:

Section Types

Section 1 Evaluation

Section: Section 1

Evaluation Start Location: 27+38.280

Evaluation End Location: 46+33.461

Area Type: Suburban

Functional Class: Arterial

Type of Alignment: Undivided, Multilane

Model Category: Urban/Suburban Arterial

Calibration Factor: 4SG=1.0; 5T=1.0;

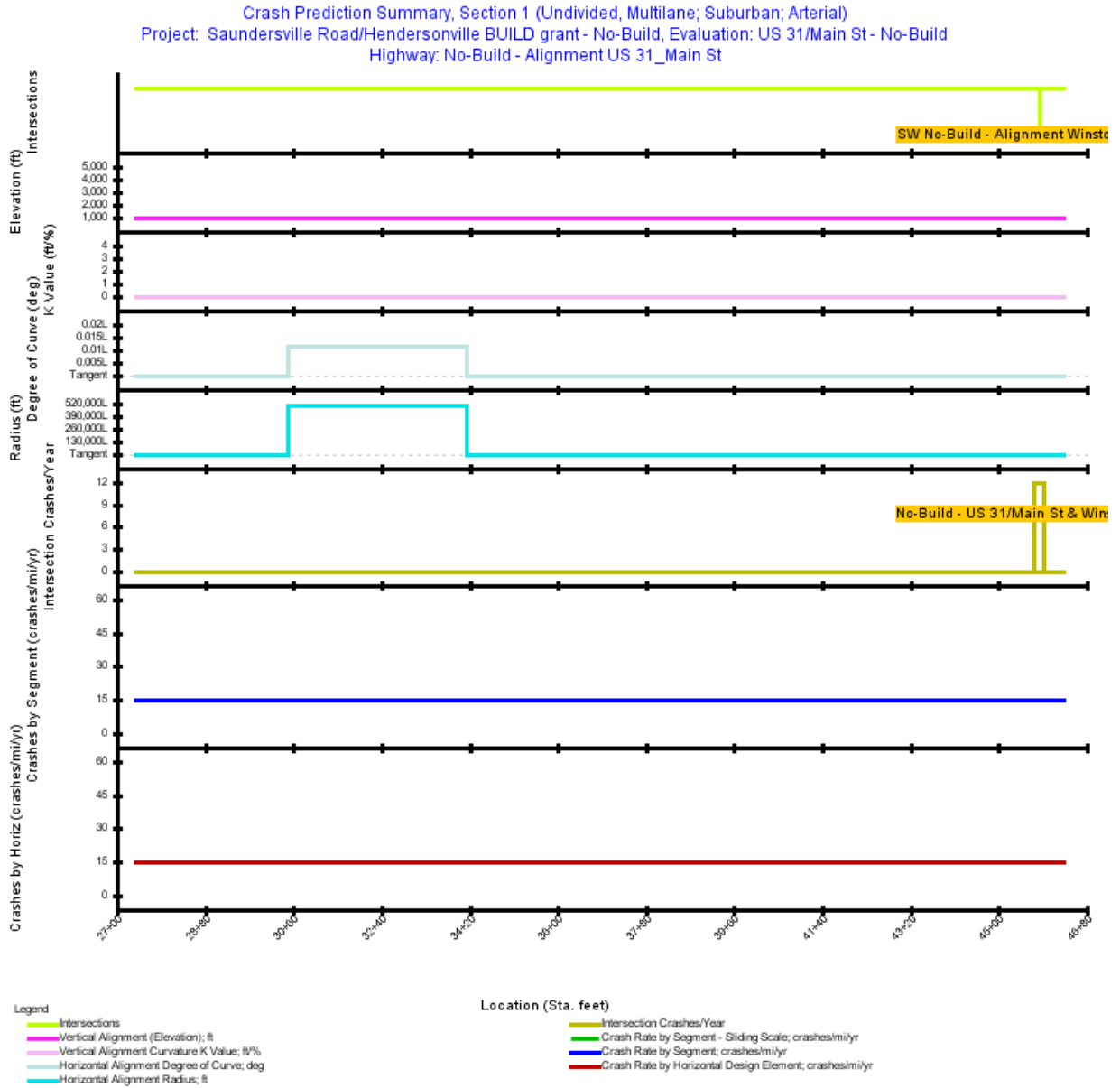


Figure 1. Crash Prediction Summary (Section 1)

Table 1. Evaluation Highway - Homogeneous Segments (Section 1)

Seg. No.	Type	Start Location (Sta. ft)	End Location (Sta. ft)	Length (ft)	Length (mi)	AADT	Number Major Commercial Driveways	Number Minor Commercial Driveways	Number Major Industrial/Institutional	Number Minor Industrial/Institutional	Number Major Residential Driveways	Number Minor Residential Driveways	Number Other Driveways	Lighting	Automated Speed Enforcement	Density (fixed objects/mi)	Median Width (ft)	Type	Effective Median Width (ft)	Speed Level	Number Rail Highway Crossings	Average Shoulder Width (ft)	Average Lane Width (ft)	
1	ST	27+38.280	30+49.687	311.41	0.0590	2024: 27,900; 2025: 28,346; 2026: 28,793; 2027: 29,240; 2028: 29,687; 2029: 30,134; 2030: 30,581; 2031: 31,028; 2032: 31,475; 2033: 31,921; 2034: 32,368; 2035: 32,815; 2036: 33,262; 2037: 33,709; 2038: 34,156; 2039: 34,603; 2040: 35,050; 2041: 35,660; 2042: 36,270; 2043: 36,880; 2044: 37,490; 2045: 38,100; 2046: 38,710; 2047: 39,320; 2048: 39,930; 2049: 40,540; 2050: 41,150; 2051: 41,760; 2052: 42,370; 2053: 42,980; 2054: 43,590; 2055: 44,200	0	0	0	0	0	0	0	0	true	false	0.0	0.00	None	0.00	Intermediate/High	0	4.00	10.00
2	ST	30+49.687	34+13.535	363.85	0.0689	2024: 27,900; 2025: 28,346; 2026: 28,793; 2027: 29,240; 2028: 29,687; 2029: 30,134; 2030: 30,581; 2031: 31,028; 2032: 31,475; 2033: 31,921; 2034: 32,368; 2035: 32,815; 2036: 33,262; 2037: 33,709; 2038: 34,156; 2039: 34,603; 2040: 35,050; 2041: 35,660; 2042: 36,270; 2043: 36,880; 2044: 37,490; 2045: 38,100; 2046: 38,710; 2047: 39,320; 2048: 39,930; 2049: 40,540; 2050: 41,150; 2051: 41,760; 2052: 42,370; 2053: 42,980; 2054: 43,590; 2055: 44,200	0	0	0	0	0	0	0	0	true	false	0.0	0.00	None	0.00	Intermediate/High	0	4.00	10.00
3	ST	34+13.535	46+33.461	1,219.93	0.2311	2024: 27,900; 2025: 28,346; 2026: 28,793; 2027: 29,240; 2028: 29,687; 2029: 30,134; 2030: 30,581; 2031: 31,028; 2032: 31,475; 2033: 31,921; 2034: 32,368; 2035: 32,815; 2036: 33,262; 2037: 33,709; 2038: 34,156; 2039: 34,603; 2040: 35,050; 2041: 35,660; 2042: 36,270; 2043: 36,880; 2044: 37,490; 2045: 38,100; 2046: 38,710; 2047: 39,320; 2048: 39,930; 2049: 40,540; 2050: 41,150; 2051: 41,760; 2052: 42,370; 2053: 42,980; 2054: 43,590; 2055: 44,200	0	0	0	0	0	0	0	0	true	false	0.0	0.00	None	0.00	Intermediate/High	0	4.00	10.00

Table 2. Evaluation Intersection (Section 1)

Inter. No.	Title	Location (Sta. ft)	Major AADT	Minor AADT	Legs	Traffic Control	Intersection Type	Approaches w/Left Turn Lanes	Approaches w/Right Turn Lanes	Approaches w/o Right Turn on Red	Pedestrian Volume (crossings /day)	Lighted at Night	Red Light Camera	School Near by	Number of Bus Stops	Number of Alcohol Sales Establishments	Max Lanes Crossed	Replaced with Roundabout
1	No-Build - US 31/Main St & Winston Hill Rd	45+83.000	2024: 27,900; 2025: 28,346; 2026: 28,793; 2027: 29,240; 2028: 29,687; 2029: 30,134; 2030: 30,581; 2031: 31,028; 2032: 31,475; 2033: 31,921; 2034: 32,368; 2035: 32,815; 2036: 33,262; 2037: 33,709; 2038: 34,156; 2039: 34,603; 2040: 35,050; 2041: 35,660; 2042: 36,270; 2043: 36,880; 2044: 37,490; 2045: 38,100; 2046: 38,710; 2047: 39,320; 2048: 39,930; 2049: 40,540; 2050: 41,150; 2051: 41,760; 2052: 42,370; 2053: 42,980; 2054: 43,590; 2055: 44,200	2024: 18,990; 2025: 19,320; 2026: 19,651; 2027: 19,981; 2028: 20,312; 2029: 20,643; 2030: 20,973; 2031: 21,304; 2032: 21,635; 2033: 21,965; 2034: 22,296; 2035: 22,626; 2036: 22,957; 2037: 23,288; 2038: 23,618; 2039: 23,949; 2040: 24,280; 2041: 24,742; 2042: 25,204; 2043: 25,666; 2044: 26,128; 2045: 26,590; 2046: 27,052; 2047: 27,514; 2048: 27,976; 2049: 28,438; 2050: 28,900; 2051: 29,362; 2052: 29,824; 2053: 30,286; 2054: 30,748; 2055: 31,210	4	Signalized	Four-Legged Signalized	0	0	0	15	true	false	false	0	0	6	false

Table 3. Predicted Highway Crash Rates and Frequencies Summary (Section 1)

First Year of Analysis	2024
Last Year of Analysis	2055
Evaluated Length (mi)	0.3589
Average Future Road AADT (vpd)	35,438
Predicted Crashes	
Total Crashes	553.92
Fatal and Injury Crashes	182.07
Property-Damage-Only Crashes	371.85
Percent of Total Predicted Crashes	
Percent Fatal and Injury Crashes (%)	33
Percent Property-Damage-Only Crashes (%)	67
Predicted Crash Rate	
Crash Rate (crashes/mi/yr)	48.2264
FI Crash Rate (crashes/mi/yr)	15.8519
PDO Crash Rate (crashes/mi/yr)	32.3745
Predicted Travel Crash Rate	
Total Travel (million veh-mi)	148.57
Travel Crash Rate (crashes/million veh-mi)	3.73
Travel FI Crash Rate (crashes/million veh-mi)	1.23
Travel PDO Crash Rate (crashes/million veh-mi)	2.50

Table 4. Predicted Crash Frequencies and Rates by Highway Segment/Intersection (Section 1)

Segment Number/Intersection Name/Cross Road	Start Location (Sta. ft)	End Location (Sta. ft)	Length (mi)	Total Predicted Crashes for Evaluation Period	Predicted Total Crash Frequency (crashes/yr)	Predicted FI Crash Frequency (crashes/yr)	Predicted PDO Crash Frequency (crashes/yr)	Predicted Crash Rate (crashes/mi/yr)	Predicted Travel Crash Rate (crashes/million veh-mi)	Predicted Intersection Travel Crash Rate (crashes/million veh)
1	27+38.280	30+49.687	0.0590	27.952	0.8735	0.2456	0.6279	14.8106	1.15	
2	30+49.687	34+13.535	0.0689	32.660	1.0206	0.2870	0.7336	14.8106	1.15	
3	34+13.535	46+33.461	0.2310	109.502	3.4219	0.9621	2.4598	14.8106	1.15	
No-Build - US 31/Main St & Winston Hill Rd	45+83.000			383.811	11.9941	4.1951	7.7990			0.55
All Segments			0.3589	170.114	5.3161	1.4947	3.8214	14.8106	1.15	
All Intersections				383.811	11.9941	4.1951	7.7990			0.55
Total			0.3589	553.925	17.3102	5.6898	11.6204	48.2264		

Table 5. Predicted Crash Frequencies and Rates by Horizontal Design Element (Section 1)

Title	Start Location (Sta. ft)	End Location (Sta. ft)	Length (mi)	Total Predicted Crashes for Evaluation Period	Predicted Total Crash Frequency (crashes/yr)	Predicted FI Crash Frequency (crashes/yr)	Predicted PDO Crash Frequency (crashes/yr)	Predicted Crash Rate (crashes/mi/yr)	Predicted Travel Crash Rate (crashes/million veh-mi)
Tangent	27+38.280	30+49.687	0.0590	27.952	0.8735	0.2456	0.6279	14.8106	1.15
Simple Curve 1	30+49.687	34+13.535	0.0689	32.660	1.0206	0.2870	0.7336	14.8106	1.15
Tangent	34+13.535	46+33.461	0.2310	109.502	3.4219	0.9621	2.4598	14.8106	1.15

Table 6. Predicted Crash Frequencies by Year (Section 1)

Year	Total Crashes	FI Crashes	Percent FI (%)	PDO Crashes	Percent PDO (%)
2024	12.87	4.17	32.409	8.70	67.591
2025	13.13	4.26	32.436	8.87	67.564
2026	13.38	4.34	32.463	9.04	67.537
2027	13.63	4.43	32.489	9.21	67.511
2028	13.89	4.52	32.516	9.37	67.484
2029	14.15	4.60	32.542	9.54	67.458
2030	14.40	4.69	32.568	9.71	67.432
2031	14.66	4.78	32.593	9.88	67.406
2032	14.92	4.87	32.619	10.05	67.381
2033	15.18	4.96	32.644	10.22	67.356
2034	15.44	5.04	32.669	10.40	67.331
2035	15.70	5.13	32.694	10.57	67.306
2036	15.97	5.22	32.719	10.74	67.281
2037	16.23	5.31	32.744	10.92	67.256
2038	16.49	5.41	32.768	11.09	67.232
2039	16.76	5.50	32.792	11.26	67.208
2040	17.02	5.59	32.816	11.44	67.184
2041	17.39	5.71	32.849	11.68	67.151
2042	17.76	5.84	32.881	11.92	67.119
2043	18.13	5.97	32.913	12.16	67.087
2044	18.50	6.09	32.944	12.40	67.056
2045	18.87	6.22	32.975	12.65	67.025
2046	19.24	6.35	33.006	12.89	66.994
2047	19.62	6.48	33.037	13.14	66.963
2048	19.99	6.61	33.067	13.38	66.933
2049	20.37	6.74	33.097	13.63	66.903
2050	20.75	6.87	33.127	13.88	66.873
2051	21.13	7.01	33.156	14.12	66.844
2052	21.51	7.14	33.185	14.37	66.815
2053	21.89	7.27	33.214	14.62	66.786
2054	22.28	7.41	33.243	14.87	66.757
2055	22.66	7.54	33.271	15.12	66.729
Total	553.92	182.07	32.870	371.85	67.130
Average	17.31	5.69	32.870	11.62	67.130

Note: *Fatal and Injury Crashes* and *Property Damage Only Crashes* do not necessarily sum up to *Total Crashes* because the distribution of these three crashes had been derived independently.

Table 7. Predicted Five Lane or Fewer Crash Type Distribution (Section 1)

Element Type	Crash Type	FI Crashes	Percent FI (%)	PDO Crashes	Percent PDO (%)	Total Crashes	Percent Total (%)
Highway Segment	Collision with Animal	0.08	0.0	0.96	0.2	1.05	0.2
Highway Segment	Collision with Bicycle	1.97	0.4	0.00	0.0	1.97	0.4
Highway Segment	Collision with Fixed Object	2.08	0.4	15.09	2.7	17.17	3.1
Highway Segment	Collision with Other Object	0.03	0.0	1.20	0.2	1.23	0.2
Highway Segment	Other Single-vehicle Collision	3.04	0.5	2.40	0.4	5.44	1.0
Highway Segment	Collision with Pedestrian	3.78	0.7	0.00	0.0	3.78	0.7
Highway Segment	Total Single Vehicle Crashes	10.98	2.0	19.65	3.5	30.63	5.5
Highway Segment	Angle Collision	1.84	0.3	6.05	1.1	7.90	1.4
Highway Segment	Driveway-related Collision	0.00	0.0	0.00	0.0	0.00	0.0
Highway Segment	Head-on Collision	0.77	0.1	0.41	0.1	1.18	0.2
Highway Segment	Other Multi-vehicle Collision	0.66	0.1	2.98	0.5	3.64	0.7
Highway Segment	Rear-end Collision	31.17	5.6	66.81	12.1	97.99	17.7
Highway Segment	Sideswipe, Opposite Direction Collision	0.15	0.0	0.92	0.2	1.07	0.2
Highway Segment	Sideswipe, Same Direction Collision	2.25	0.4	25.45	4.6	27.70	5.0
Highway Segment	Total Multiple Vehicle Crashes	36.85	6.7	102.63	18.5	139.48	25.2
Highway Segment	Total Highway Segment Crashes	47.83	8.6	122.28	22.1	170.11	30.7
Intersection	Collision with Animal	0.01	0.0	0.03	0.0	0.04	0.0
Intersection	Collision with Bicycle	5.66	1.0	0.00	0.0	5.66	1.0
Intersection	Collision with Fixed Object	3.44	0.6	13.02	2.4	16.46	3.0
Intersection	Non-Collision	0.65	0.1	0.51	0.1	1.16	0.2
Intersection	Collision with Other Object	0.33	0.1	1.05	0.2	1.38	0.2
Intersection	Other Single-vehicle Collision	0.18	0.0	0.34	0.1	0.53	0.1
Intersection	Collision with Parked Vehicle	0.01	0.0	0.01	0.0	0.02	0.0
Intersection	Collision with Pedestrian	0.74	0.1	0.00	0.0	0.74	0.1
Intersection	Total Intersection Single Vehicle Crashes	11.02	2.0	14.96	2.7	25.99	4.7
Intersection	Angle Collision	42.76	7.7	57.24	10.3	100.00	18.1
Intersection	Head-on Collision	6.04	1.1	7.04	1.3	13.08	2.4
Intersection	Other Multi-vehicle Collision	6.78	1.2	49.50	8.9	56.28	10.2
Intersection	Rear-end Collision	55.45	10.0	113.31	20.5	168.76	30.5
Intersection	Sideswipe	12.20	2.2	7.51	1.4	19.71	3.6
Intersection	Total Intersection Multiple Vehicle Crashes	123.22	22.2	234.61	42.4	357.82	64.6
Intersection	Total Intersection Crashes	134.24	24.2	249.57	45.1	383.81	69.3
	Total Crashes	182.07	32.9	371.85	67.1	553.92	100.0

Note: *Fatal and Injury Crashes* and *Property Damage Only Crashes* do not necessarily sum up to *Total Crashes* because the distribution of these three crashes had been derived independently.

Interactive Highway Safety Design Model

Crash Prediction Evaluation Report

June 25, 2019

Disclaimer

The Interactive Highway Design Model (IHSDM) software is disseminated under the sponsorship of the Department of Transportation in the interest of information exchange. The United States Government assumes no liability for its content or use thereof. This document does not constitute a standard, specification, or regulation.

The United States Government does not endorse products or manufacturers. Trade and manufacturers' names may appear in this software and documentation only because they are considered essential to the objective of the software.

Limited Warranty and Limitations of Remedies

This software product is provided "as-is," without warranty of any kind-either expressed or implied (but not limited to the implied warranties of merchantability and fitness for a particular purpose). The FHWA do not warrant that the functions contained in the software will meet the end-user's requirements or that the operation of the software will be uninterrupted and error-free.

Under no circumstances will the FHWA be liable to the end-user for any damages or claimed lost profits, lost savings, or other incidental or consequential damages rising out of the use or inability to use the software (even if these organizations have been advised of the possibility of such damages), or for any claim by any other party.

Notice

The use of the IHSDM software is being done strictly on a voluntary basis. In exchange for provision of IHSDM, the user agrees that the Federal Highway Administration (FHWA), U.S. Department of Transportation and any other agency of the Federal Government shall not be responsible for any errors, damage or other liability that may result from any and all use of the software, including installation and testing of the software. The user further agrees to hold the FHWA and the Federal Government harmless from any resulting liability. The user agrees that this hold harmless provision shall flow to any person to whom or any entity to which the user provides the IHSDM software. It is the user's full responsibility to inform any person to whom or any entity to which it provides the IHSDM software of this hold harmless provision.

Table of Contents

Report Overview	1
Section Types	2
Section 1 Evaluation	2

List of Tables

Table Evaluation Highway - Homogeneous Segments (Section 1)	4
Table Evaluation Intersection (Section 1)	5
Table Predicted Highway Crash Rates and Frequencies Summary (Section 1)	6
Table Predicted Crash Frequencies and Rates by Highway Segment/Intersection (Section 1)	7
Table Predicted Crash Frequencies and Rates by Horizontal Design Element (Section 1)	7
Table Predicted Crash Frequencies by Year (Section 1)	8
Table Predicted Five Lane or Fewer Crash Type Distribution (Section 1)	9
Table Evaluation Message	10

List of Figures

Figure Crash Prediction Summary (Section 1)	3
---	---

Report Overview

Report Generated: Jun 25, 2019 2:33 PM

Report Template: System: Multi-Page, 508 Compliant [System] (mlcpm4, Jun 20, 2019 12:11 PM)

Evaluation Date: Tue Jun 25 14:24:34 CDT 2019

IHSDM Version: v14.1.0 (Mar 12, 2019)

Crash Prediction Module: v9.1.0 (Mar 12, 2019)

User Name: salomonsend

Organization Name: AECOM

Phone: 608-828-8203

E-Mail: derek.salomonsen@aecom.com

Project Title: Saundersville Road/Hendersonville BUILD grant - No-Build

Project Comment: Created Mon Jun 24 11:15:36 CDT 2019

Project Unit System: U.S. Customary

Highway Title: No-Build - Alignment Winston Hill Pkwy

Highway Comment: Imported from Winston Hill Pkwy.xml

Highway Version: 1

Evaluation Title: Winston Hill Pkwy - No-Build

Evaluation Comment: Created Tue Jun 25 14:23:27 CDT 2019

Minimum Location: 50+00.000

Maximum Location: 57+92.479

Policy for Superelevation: AASHTO 2011 U.S. Customary

Calibration: HSM Configuration

Crash Distribution: HSM Configuration

Model/CMF: HSM Configuration

First Year of Analysis: 2024

Last Year of Analysis: 2055

Empirical-Bayes Analysis: None

First Year of Observed Crashes:

Last Year of Observed Crashes:

Section Types

Section 1 Evaluation

Section: Section 1

Evaluation Start Location: 50+00.000

Evaluation End Location: 57+92.479

Area Type: Suburban

Functional Class: Arterial

Type of Alignment: Undivided, Two Lane

Model Category: Urban/Suburban Arterial

Calibration Factor: 2U=1.0; 3SG=1.0; 4SG=1.0;

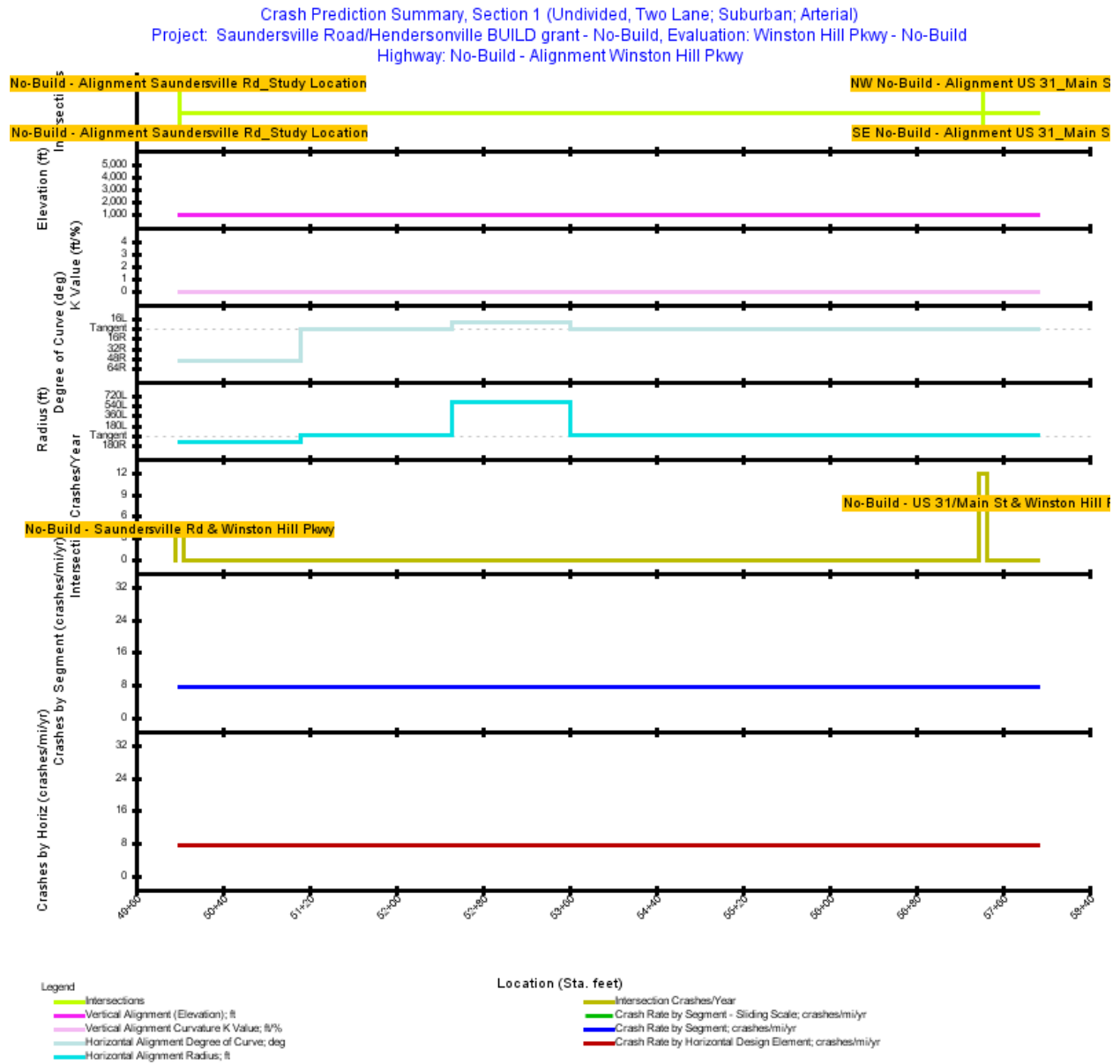


Figure 1. Crash Prediction Summary (Section 1)

Table 1. Evaluation Highway - Homogeneous Segments (Section 1)

Seg. No.	Type	Start Location (Sta. ft)	End Location (Sta. ft)	Length (ft)	Length(mi)	AAADT	Number Major Commercial Driveways	Number Minor Commercial Driveways	Number Major Industrial/Institutional	Number Minor Industrial/Institutional	Number Major Residential Driveways	Number Minor Residential Driveways	Number Other Driveways	Lighting	Automated Speed Enforcement	Density (fixed objects/mi)	Median Width (ft)	Type	Effective Median Width (ft)	Speed Level	Number Railway Crossings	Average Shoulder Width (ft)	Average Lane Width (ft)	
1	2U	50+00.000	51+11.312	111.312	0.0211	2024: 18,990; 2025: 19,320; 2026: 19,651; 2027: 19,981; 2028: 20,312; 2029: 20,643; 2030: 20,973; 2031: 21,304; 2032: 21,635; 2033: 21,965; 2034: 22,296; 2035: 22,626; 2036: 22,957; 2037: 23,288; 2038: 23,618; 2039: 23,949; 2040: 24,280; 2041: 24,742; 2042: 25,204; 2043: 25,666; 2044: 26,128; 2045: 26,590; 2046: 27,052; 2047: 27,514; 2048: 27,976; 2049: 28,438; 2050: 28,900; 2051: 29,362; 2052: 29,824; 2053: 30,286; 2054: 30,748; 2055: 31,210	0	0	0	0	0	0	0	0	false	false	0.0	0.00	None	0.00	Low	0	8.00	12.00
2	2U	51+11.312	52+51.318	140.006	0.0265	2024: 18,990; 2025: 19,320; 2026: 19,651; 2027: 19,981; 2028: 20,312; 2029: 20,643; 2030: 20,973; 2031: 21,304; 2032: 21,635; 2033: 21,965; 2034: 22,296; 2035: 22,626; 2036: 22,957; 2037: 23,288; 2038: 23,618; 2039: 23,949; 2040: 24,280; 2041: 24,742; 2042: 25,204; 2043: 25,666; 2044: 26,128; 2045: 26,590; 2046: 27,052; 2047: 27,514; 2048: 27,976; 2049: 28,438; 2050: 28,900; 2051: 29,362; 2052: 29,824; 2053: 30,286; 2054: 30,748; 2055: 31,210	0	0	0	0	0	0	0	0	false	false	0.0	0.00	None	0.00	Low	0	8.00	12.00
3	2U	52+51.318	52+65.000	13.682	0.0026	2024: 18,990; 2025: 19,320; 2026: 19,651; 2027: 19,981; 2028: 20,312; 2029: 20,643; 2030: 20,973; 2031: 21,304; 2032: 21,635; 2033: 21,965; 2034: 22,296; 2035: 22,626; 2036: 22,957; 2037: 23,288; 2038: 23,618; 2039: 23,949; 2040: 24,280; 2041: 24,742; 2042: 25,204; 2043: 25,666; 2044: 26,128; 2045: 26,590; 2046: 27,052; 2047: 27,514; 2048: 27,976; 2049: 28,438; 2050: 28,900; 2051: 29,362; 2052: 29,824; 2053: 30,286; 2054: 30,748; 2055: 31,210	0	0	0	0	0	0	0	0	false	false	0.0	0.00	None	0.00	Low	0	8.00	12.00
4	2U	52+65.000	53+60.512	95.512	0.0181	2024: 18,990; 2025: 19,320; 2026: 19,651; 2027: 19,981; 2028: 20,312; 2029: 20,643; 2030: 20,973; 2031: 21,304; 2032: 21,635; 2033: 21,965; 2034: 22,296; 2035: 22,626; 2036: 22,957; 2037: 23,288; 2038: 23,618; 2039: 23,949; 2040: 24,280; 2041: 24,742; 2042: 25,204; 2043: 25,666; 2044: 26,128; 2045: 26,590; 2046: 27,052; 2047: 27,514; 2048: 27,976; 2049: 28,438; 2050: 28,900; 2051: 29,362; 2052: 29,824; 2053: 30,286; 2054: 30,748; 2055: 31,210	0	0	0	0	0	0	0	0	false	false	0.0	0.00	None	0.00	Low	0	2.00	12.00
5	2U	53+60.512	57+92.479	431.967	0.0818	2024: 18,990; 2025: 19,320; 2026: 19,651; 2027: 19,981; 2028: 20,312; 2029: 20,643; 2030: 20,973; 2031: 21,304; 2032: 21,635; 2033: 21,965; 2034: 22,296; 2035: 22,626; 2036: 22,957; 2037: 23,288; 2038: 23,618; 2039: 23,949; 2040: 24,280; 2041: 24,742; 2042: 25,204; 2043: 25,666; 2044: 26,128; 2045: 26,590; 2046: 27,052; 2047: 27,514; 2048: 27,976; 2049: 28,438; 2050: 28,900; 2051: 29,362; 2052: 29,824; 2053: 30,286; 2054: 30,748; 2055: 31,210	0	0	0	0	0	0	0	0	false	false	0.0	0.00	None	0.00	Low	0	2.00	12.00

Table 2. Evaluation Intersection (Section 1)

Inter . No.	Title	Location (Sta. ft)	Major AADT	Minor AADT	Legs	Traffic Control	Intersection Type	Approach es w/Left Turn Lanes	Approach es w/Right Turn Lanes	Approach es w/o Right Turn on Red	Pedestrian Volume (crossings /day)	Lighted at Night	Red Light Camera	School Near by	Number of Bus Stops	Number of Alcohol Sales Establishments	Max Lanes Crossed	Replaced with Roundabout
1	No-Build - Saundersville Rd & Winston Hill Pkwy	50+00.00	2024: 18,990; 2025: 19,320; 2026: 19,651; 2027: 19,981; 2028: 20,312; 2029: 20,643; 2030: 20,973; 2031: 21,304; 2032: 21,635; 2033: 21,965; 2034: 22,296; 2035: 22,626; 2036: 22,957; 2037: 23,288; 2038: 23,618; 2039: 23,949; 2040: 24,280; 2041: 24,742; 2042: 25,204; 2043: 25,666; 2044: 26,128; 2045: 26,590; 2046: 27,052; 2047: 27,514; 2048: 27,976; 2049: 28,438; 2050: 28,900; 2051: 29,362; 2052: 29,824; 2053: 30,286; 2054: 30,748; 2055: 31,210	2024: 15,400; 2025: 15,720; 2026: 16,041; 2027: 16,361; 2028: 16,682; 2029: 17,003; 2030: 17,323; 2031: 17,644; 2032: 17,965; 2033: 18,285; 2034: 18,606; 2035: 18,926; 2036: 19,247; 2037: 19,568; 2038: 19,888; 2039: 20,209; 2040: 20,530; 2041: 21,008; 2042: 21,486; 2043: 21,964; 2044: 22,442; 2045: 22,920; 2046: 23,398; 2047: 23,876; 2048: 24,354; 2049: 24,832; 2050: 25,310; 2051: 25,788; 2052: 26,266; 2053: 26,744; 2054: 27,222; 2055: 27,700	3	Signalized	Three-Legged Signalized	0	0	1	0	true	false	false	0	0	4	false
2	No-Build - US 31/Main St & Winston Hill Rd	57+42.00	2024: 27,900; 2025: 28,346; 2026: 28,793; 2027: 29,240; 2028: 29,687; 2029: 30,134; 2030: 30,581; 2031: 31,028; 2032: 31,475; 2033: 31,921; 2034: 32,368; 2035: 32,815; 2036: 33,262; 2037: 33,709; 2038: 34,156; 2039: 34,603; 2040: 35,050; 2041: 35,660; 2042: 36,270; 2043: 36,880; 2044: 37,490; 2045: 38,100; 2046: 38,710; 2047: 39,320; 2048: 39,930; 2049: 40,540; 2050: 41,150; 2051: 41,760; 2052: 42,370; 2053: 42,980; 2054: 43,590; 2055: 44,200	2024: 18,990; 2025: 19,320; 2026: 19,651; 2027: 19,981; 2028: 20,312; 2029: 20,643; 2030: 20,973; 2031: 21,304; 2032: 21,635; 2033: 21,965; 2034: 22,296; 2035: 22,626; 2036: 22,957; 2037: 23,288; 2038: 23,618; 2039: 23,949; 2040: 24,280; 2041: 24,742; 2042: 25,204; 2043: 25,666; 2044: 26,128; 2045: 26,590; 2046: 27,052; 2047: 27,514; 2048: 27,976; 2049: 28,438; 2050: 28,900; 2051: 29,362; 2052: 29,824; 2053: 30,286; 2054: 30,748; 2055: 31,210	4	Signalized	Four-Legged Signalized	0	0	0	15	true	false	false	0	0	6	false

Table 3. Predicted Highway Crash Rates and Frequencies Summary (Section 1)

First Year of Analysis	2024
Last Year of Analysis	2055
Evaluated Length (mi)	0.1501
Average Future Road AADT (vpd)	24,607
Predicted Crashes	
Total Crashes	577.06
Fatal and Injury Crashes	193.87
Property-Damage-Only Crashes	383.19
Percent of Total Predicted Crashes	
Percent Fatal and Injury Crashes (%)	34
Percent Property-Damage-Only Crashes (%)	66
Predicted Crash Rate	
Crash Rate (crashes/mi/yr)	120.1481
FI Crash Rate (crashes/mi/yr)	40.3643
PDO Crash Rate (crashes/mi/yr)	79.7838
Predicted Travel Crash Rate	
Total Travel (million veh-mi)	43.14
Travel Crash Rate (crashes/million veh-mi)	13.38
Travel FI Crash Rate (crashes/million veh-mi)	4.49
Travel PDO Crash Rate (crashes/million veh-mi)	8.88

Table 4. Predicted Crash Frequencies and Rates by Highway Segment/Intersection (Section 1)

Segment Number/Intersection Name/Cross Road	Start Location (Sta. ft)	End Location (Sta. ft)	Length (mi)	Total Predicted Crashes for Evaluation Period	Predicted Total Crash Frequency (crashes/yr)	Predicted FI Crash Frequency (crashes/yr)	Predicted PDO Crash Frequency (crashes/yr)	Predicted Crash Rate (crashes/mi/yr)	Predicted Travel Crash Rate (crashes/million veh-mi)	Predicted Intersection Travel Crash Rate (crashes/million veh)
No-Build - Saundersville Rd & Winston Hill Pkwy	50+00.000			157.156	4.9111	1.5186	3.3925			0.40
1	50+00.000	51+11.312	0.0211	5.070	0.1584	0.0484	0.1100	7.5147	0.84	
2	51+11.312	52+51.318	0.0265	6.376	0.1993	0.0609	0.1384	7.5147	0.84	
3	52+51.318	52+65.000	0.0026	0.623	0.0195	0.0059	0.0135	7.5147	0.84	
4	52+65.000	53+60.512	0.0181	4.350	0.1359	0.0415	0.0944	7.5147	0.84	
5	53+60.512	57+92.479	0.0818	19.673	0.6148	0.1878	0.4270	7.5147	0.84	
No-Build - US 31/Main St & Winston Hill Rd	57+42.000			383.811	11.9941	4.1951	7.7990			0.55
All Segments			0.1501	36.093	1.1279	0.3446	0.7833	7.5147	0.84	
All Intersections				540.967	16.9052	5.7137	11.1915			0.50
Total			0.1501	577.059	18.0331	6.0583	11.9748	120.1481		

Table 5. Predicted Crash Frequencies and Rates by Horizontal Design Element (Section 1)

Title	Start Location (Sta. ft)	End Location (Sta. ft)	Length (mi)	Total Predicted Crashes for Evaluation Period	Predicted Total Crash Frequency (crashes/yr)	Predicted FI Crash Frequency (crashes/yr)	Predicted PDO Crash Frequency (crashes/yr)	Predicted Crash Rate (crashes/mi/yr)	Predicted Travel Crash Rate (crashes/million veh-mi)
Simple Curve 1	50+00.000	51+11.312	0.0211	5.070	0.1584	0.0484	0.1100	7.5147	0.84
Tangent	51+11.312	52+51.318	0.0265	6.376	0.1993	0.0609	0.1384	7.5147	0.84
Simple Curve 2	52+51.318	53+60.512	0.0207	4.973	0.1554	0.0475	0.1079	7.5147	0.84
Tangent	53+60.512	57+92.479	0.0818	19.673	0.6148	0.1878	0.4270	7.5147	0.84

Table 6. Predicted Crash Frequencies by Year (Section 1)

Year	Total Crashes	FI Crashes	Percent FI (%)	PDO Crashes	Percent PDO (%)
2024	12.95	4.35	33.572	8.60	66.428
2025	13.23	4.44	33.574	8.79	66.427
2026	13.52	4.54	33.575	8.98	66.425
2027	13.80	4.63	33.577	9.17	66.423
2028	14.09	4.73	33.578	9.36	66.421
2029	14.38	4.83	33.580	9.55	66.420
2030	14.67	4.93	33.582	9.74	66.418
2031	14.96	5.03	33.584	9.94	66.416
2032	15.26	5.12	33.585	10.13	66.415
2033	15.55	5.22	33.587	10.33	66.413
2034	15.85	5.32	33.589	10.53	66.411
2035	16.15	5.42	33.591	10.72	66.409
2036	16.45	5.53	33.592	10.92	66.408
2037	16.75	5.63	33.594	11.12	66.406
2038	17.05	5.73	33.596	11.32	66.404
2039	17.36	5.83	33.598	11.53	66.402
2040	17.66	5.93	33.599	11.73	66.400
2041	18.09	6.08	33.600	12.01	66.400
2042	18.52	6.22	33.600	12.29	66.400
2043	18.95	6.37	33.600	12.58	66.400
2044	19.38	6.51	33.601	12.87	66.399
2045	19.82	6.66	33.601	13.16	66.399
2046	20.25	6.80	33.601	13.45	66.399
2047	20.69	6.95	33.602	13.74	66.398
2048	21.14	7.10	33.602	14.03	66.398
2049	21.58	7.25	33.603	14.33	66.397
2050	22.03	7.40	33.603	14.63	66.397
2051	22.48	7.55	33.604	14.92	66.396
2052	22.93	7.71	33.605	15.22	66.395
2053	23.38	7.86	33.605	15.53	66.395
2054	23.84	8.01	33.606	15.83	66.394
2055	24.30	8.17	33.607	16.13	66.393
Total	577.06	193.87	33.595	383.19	66.405
Average	18.03	6.06	33.595	11.97	66.405

Note: *Fatal and Injury Crashes* and *Property Damage Only Crashes* do not necessarily sum up to *Total Crashes* because the distribution of these three crashes had been derived independently.

Table 7. Predicted Five Lane or Fewer Crash Type Distribution (Section 1)

Element Type	Crash Type	FI Crashes	Percent FI (%)	PDO Crashes	Percent PDO (%)	Total Crashes	Percent Total (%)
Highway Segment	Collision with Animal	0.03	0.0	0.32	0.1	0.34	0.1
Highway Segment	Collision with Bicycle	0.62	0.1	0.00	0.0	0.62	0.1
Highway Segment	Collision with Fixed Object	0.71	0.1	3.66	0.6	4.37	0.8
Highway Segment	Collision with Other Object	0.01	0.0	0.06	0.0	0.07	0.0
Highway Segment	Other Single-vehicle Collision	0.24	0.0	0.78	0.1	1.02	0.2
Highway Segment	Collision with Pedestrian	1.23	0.2	0.00	0.0	1.23	0.2
Highway Segment	Total Single Vehicle Crashes	2.83	0.5	4.82	0.8	7.65	1.3
Highway Segment	Angle Collision	0.70	0.1	1.60	0.3	2.30	0.4
Highway Segment	Driveway-related Collision	0.00	0.0	0.00	0.0	0.00	0.0
Highway Segment	Head-on Collision	0.56	0.1	0.08	0.0	0.64	0.1
Highway Segment	Other Multi-vehicle Collision	0.24	0.0	1.07	0.2	1.31	0.2
Highway Segment	Rear-end Collision	5.98	1.0	15.75	2.7	21.73	3.8
Highway Segment	Sideswipe, Opposite Direction Collision	0.60	0.1	1.11	0.2	1.71	0.3
Highway Segment	Sideswipe, Same Direction Collision	0.12	0.0	0.63	0.1	0.75	0.1
Highway Segment	Total Multiple Vehicle Crashes	8.20	1.4	20.24	3.5	28.44	4.9
Highway Segment	Total Highway Segment Crashes	11.03	1.9	25.07	4.3	36.09	6.3
Intersection	Collision with Animal	0.01	0.0	0.05	0.0	0.07	0.0
Intersection	Collision with Bicycle	7.37	1.3	0.00	0.0	7.37	1.3
Intersection	Collision with Fixed Object	6.04	1.0	20.19	3.5	26.23	4.5
Intersection	Non-Collision	1.49	0.3	0.62	0.1	2.10	0.4
Intersection	Collision with Other Object	0.69	0.1	1.60	0.3	2.30	0.4
Intersection	Other Single-vehicle Collision	0.36	0.1	0.49	0.1	0.85	0.1
Intersection	Collision with Parked Vehicle	0.01	0.0	0.02	0.0	0.03	0.0
Intersection	Collision with Pedestrian	0.74	0.1	0.00	0.0	0.74	0.1
Intersection	Total Intersection Single Vehicle Crashes	16.72	2.9	22.98	4.0	39.69	6.9
Intersection	Angle Collision	54.77	9.5	77.75	13.5	132.53	23.0
Intersection	Head-on Collision	7.67	1.3	9.05	1.6	16.72	2.9
Intersection	Other Multi-vehicle Collision	9.22	1.6	69.41	12.0	78.63	13.6
Intersection	Rear-end Collision	79.00	13.7	168.21	29.1	247.21	42.8
Intersection	Sideswipe	15.46	2.7	10.72	1.9	26.18	4.5
Intersection	Total Intersection Multiple Vehicle Crashes	166.12	28.8	335.15	58.1	501.27	86.9
Intersection	Total Intersection Crashes	182.84	31.7	358.13	62.1	540.97	93.7
	Total Crashes	193.87	33.6	383.19	66.4	577.06	100.0

Note: *Fatal and Injury Crashes* and *Property Damage Only Crashes* do not necessarily sum up to *Total Crashes* because the distribution of these three crashes had been derived independently.

Table 8. Evaluation Message

Start Location (Sta. ft)	End Location (Sta. ft)	Message
50+00.000	50+00.000	for intersection #1 (50+00.000 to 50+00.000), minor road traffic volume (16,682 vpd) for 2028 is not within the model limit (16,400 vpd) for reliable results for intersection type 3SG
50+00.000	50+00.000	for intersection #1 (50+00.000 to 50+00.000), minor road traffic volume (17,003 vpd) for 2029 is not within the model limit (16,400 vpd) for reliable results for intersection type 3SG
50+00.000	50+00.000	for intersection #1 (50+00.000 to 50+00.000), minor road traffic volume (17,323 vpd) for 2030 is not within the model limit (16,400 vpd) for reliable results for intersection type 3SG
50+00.000	50+00.000	for intersection #1 (50+00.000 to 50+00.000), minor road traffic volume (17,644 vpd) for 2031 is not within the model limit (16,400 vpd) for reliable results for intersection type 3SG
50+00.000	50+00.000	for intersection #1 (50+00.000 to 50+00.000), minor road traffic volume (17,965 vpd) for 2032 is not within the model limit (16,400 vpd) for reliable results for intersection type 3SG
50+00.000	50+00.000	for intersection #1 (50+00.000 to 50+00.000), minor road traffic volume (18,285 vpd) for 2033 is not within the model limit (16,400 vpd) for reliable results for intersection type 3SG
50+00.000	50+00.000	for intersection #1 (50+00.000 to 50+00.000), minor road traffic volume (18,606 vpd) for 2034 is not within the model limit (16,400 vpd) for reliable results for intersection type 3SG
50+00.000	50+00.000	for intersection #1 (50+00.000 to 50+00.000), minor road traffic volume (18,926 vpd) for 2035 is not within the model limit (16,400 vpd) for reliable results for intersection type 3SG
50+00.000	50+00.000	for intersection #1 (50+00.000 to 50+00.000), minor road traffic volume (19,247 vpd) for 2036 is not within the model limit (16,400 vpd) for reliable results for intersection type 3SG
50+00.000	50+00.000	for intersection #1 (50+00.000 to 50+00.000), minor road traffic volume (19,568 vpd) for 2037 is not within the model limit (16,400 vpd) for reliable results for intersection type 3SG
50+00.000	50+00.000	for intersection #1 (50+00.000 to 50+00.000), minor road traffic volume (19,888 vpd) for 2038 is not within the model limit (16,400 vpd) for reliable results for intersection type 3SG
50+00.000	50+00.000	for intersection #1 (50+00.000 to 50+00.000), minor road traffic volume (20,209 vpd) for 2039 is not within the model limit (16,400 vpd) for reliable results for intersection type 3SG
50+00.000	50+00.000	for intersection #1 (50+00.000 to 50+00.000), minor road traffic volume (20,530 vpd) for 2040 is not within the model limit (16,400 vpd) for reliable results for intersection type 3SG
50+00.000	50+00.000	for intersection #1 (50+00.000 to 50+00.000), minor road traffic volume (21,008 vpd) for 2041 is not within the model limit (16,400 vpd) for reliable results for intersection type 3SG
50+00.000	50+00.000	for intersection #1 (50+00.000 to 50+00.000), minor road traffic volume (21,486 vpd) for 2042 is not within the model limit (16,400 vpd) for reliable results for intersection type 3SG
50+00.000	50+00.000	for intersection #1 (50+00.000 to 50+00.000), minor road traffic volume (21,964 vpd) for 2043 is not within the model limit (16,400 vpd) for reliable results for intersection type 3SG
50+00.000	50+00.000	for intersection #1 (50+00.000 to 50+00.000), minor road traffic volume (22,442 vpd) for 2044 is not within the model limit (16,400 vpd) for reliable results for intersection type 3SG
50+00.000	50+00.000	for intersection #1 (50+00.000 to 50+00.000), minor road traffic volume (22,920 vpd) for 2045 is not within the model limit (16,400 vpd) for reliable results for intersection type 3SG

Start Location (Sta. ft)	End Location (Sta. ft)	Message
50+00.000	50+00.000	for intersection #1 (50+00.000 to 50+00.000), minor road traffic volume (23,398 vpd) for 2046 is not within the model limit (16,400 vpd) for reliable results for intersection type 3SG
50+00.000	50+00.000	for intersection #1 (50+00.000 to 50+00.000), minor road traffic volume (23,876 vpd) for 2047 is not within the model limit (16,400 vpd) for reliable results for intersection type 3SG
50+00.000	50+00.000	for intersection #1 (50+00.000 to 50+00.000), minor road traffic volume (24,354 vpd) for 2048 is not within the model limit (16,400 vpd) for reliable results for intersection type 3SG
50+00.000	50+00.000	for intersection #1 (50+00.000 to 50+00.000), minor road traffic volume (24,832 vpd) for 2049 is not within the model limit (16,400 vpd) for reliable results for intersection type 3SG
50+00.000	50+00.000	for intersection #1 (50+00.000 to 50+00.000), minor road traffic volume (25,310 vpd) for 2050 is not within the model limit (16,400 vpd) for reliable results for intersection type 3SG
50+00.000	50+00.000	for intersection #1 (50+00.000 to 50+00.000), minor road traffic volume (25,788 vpd) for 2051 is not within the model limit (16,400 vpd) for reliable results for intersection type 3SG
50+00.000	50+00.000	for intersection #1 (50+00.000 to 50+00.000), minor road traffic volume (26,266 vpd) for 2052 is not within the model limit (16,400 vpd) for reliable results for intersection type 3SG
50+00.000	50+00.000	for intersection #1 (50+00.000 to 50+00.000), minor road traffic volume (26,744 vpd) for 2053 is not within the model limit (16,400 vpd) for reliable results for intersection type 3SG
50+00.000	50+00.000	for intersection #1 (50+00.000 to 50+00.000), minor road traffic volume (27,222 vpd) for 2054 is not within the model limit (16,400 vpd) for reliable results for intersection type 3SG
50+00.000	50+00.000	for intersection #1 (50+00.000 to 50+00.000), minor road traffic volume (27,700 vpd) for 2055 is not within the model limit (16,400 vpd) for reliable results for intersection type 3SG

Interactive Highway Safety Design Model

Crash Prediction Evaluation Report

June 25, 2019

Disclaimer

The Interactive Highway Design Model (IHSDM) software is disseminated under the sponsorship of the Department of Transportation in the interest of information exchange. The United States Government assumes no liability for its content or use thereof. This document does not constitute a standard, specification, or regulation.

The United States Government does not endorse products or manufacturers. Trade and manufacturers' names may appear in this software and documentation only because they are considered essential to the objective of the software.

Limited Warranty and Limitations of Remedies

This software product is provided "as-is," without warranty of any kind-either expressed or implied (but not limited to the implied warranties of merchantability and fitness for a particular purpose). The FHWA do not warrant that the functions contained in the software will meet the end-user's requirements or that the operation of the software will be uninterrupted and error-free.

Under no circumstances will the FHWA be liable to the end-user for any damages or claimed lost profits, lost savings, or other incidental or consequential damages rising out of the use or inability to use the software (even if these organizations have been advised of the possibility of such damages), or for any claim by any other party.

Notice

The use of the IHSDM software is being done strictly on a voluntary basis. In exchange for provision of IHSDM, the user agrees that the Federal Highway Administration (FHWA), U.S. Department of Transportation and any other agency of the Federal Government shall not be responsible for any errors, damage or other liability that may result from any and all use of the software, including installation and testing of the software. The user further agrees to hold the FHWA and the Federal Government harmless from any resulting liability. The user agrees that this hold harmless provision shall flow to any person to whom or any entity to which the user provides the IHSDM software. It is the user's full responsibility to inform any person to whom or any entity to which it provides the IHSDM software of this hold harmless provision.

Table of Contents

Report Overview **1**
Section Types **2**
 Section 1 Evaluation 2

List of Tables

Table Evaluation Highway - Homogeneous Segments (Section 1) 4
Table Evaluation Intersection (Section 1) 5
Table Predicted Highway Crash Rates and Frequencies Summary (Section 1) 6
Table Predicted Crash Frequencies and Rates by Highway Segment/Intersection (Section 1) 7
Table Predicted Crash Frequencies and Rates by Horizontal Design Element (Section 1) 7
Table Predicted Crash Frequencies by Year (Section 1) 8
Table Predicted Crash Severity by Urban Arterial (Section 1) 9
Table Predicted Five Lane or Fewer Crash Type Distribution (Section 1) 10
Table Evaluation Message 11

List of Figures

Figure Crash Prediction Summary (Section 1) 3

Report Overview

Report Generated: Jun 25, 2019 2:35 PM

Report Template: System: Multi-Page, 508 Compliant [System] (mlcpm4, Jun 20, 2019 12:11 PM)

Evaluation Date: Tue Jun 25 14:31:10 CDT 2019

IHSDM Version: v14.1.0 (Mar 12, 2019)

Crash Prediction Module: v9.1.0 (Mar 12, 2019)

User Name: salomonsend

Organization Name: AECOM

Phone: 608-828-8203

E-Mail: derek.salomonsen@aecom.com

Project Title: Saundersville Road/Hendersonville BUILD grant - BUILD

Project Comment: Created Mon Jun 24 11:15:36 CDT 2019

Project Unit System: U.S. Customary

Highway Title: BIULD - Alignment Saundersville Rd_Study Location

Highway Comment: Imported from Combined.xml

Highway Version: 1

Evaluation Title: Saundersville Rd - Build

Evaluation Comment: Created Tue Jun 25 14:30:39 CDT 2019

Minimum Location: 19+28.080

Maximum Location: 30+70.389

Policy for Superelevation: AASHTO 2011 U.S. Customary

Calibration: HSM Configuration

Crash Distribution: HSM Configuration

Model/CMF: HSM Configuration

First Year of Analysis: 2024

Last Year of Analysis: 2055

Empirical-Bayes Analysis: None

First Year of Observed Crashes:

Last Year of Observed Crashes:

Section Types

Section 1 Evaluation

Section: Section 1

Evaluation Start Location: 19+28.080

Evaluation End Location: 30+70.389

Area Type: Suburban

Functional Class: Arterial

Type of Alignment: Undivided, Multilane

Model Category: Urban/Suburban Arterial

Calibration Factor: 3SG=1.0; 4U=1.0;

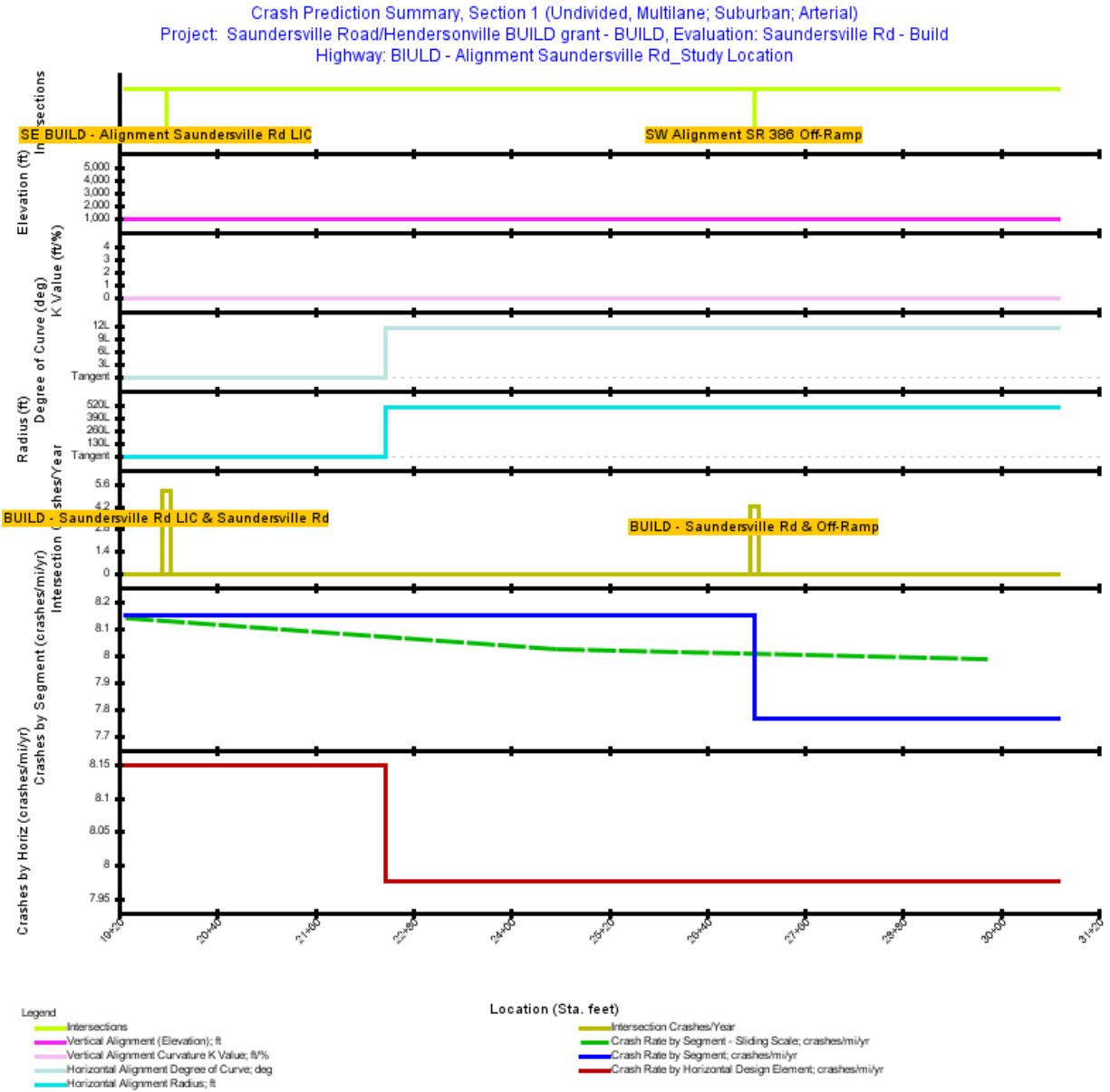


Figure 1. Crash Prediction Summary (Section 1)

Table 1. Evaluation Highway - Homogeneous Segments (Section 1)

Seg. No.	Type	Start Location (Sta. ft)	End Location (Sta. ft)	Length (ft)	Length (mi)	AADT	Number Major Commercial Driveways	Number Minor Commercial Driveways	Number Major Industrial/Institutional	Number Minor Industrial/Institutional	Number Major Residential Driveways	Number Minor Residential Driveways	Number Other Driveways	Lighting	Automated Speed Enforcement	Density (fixed objects/mi)	Median Width (ft)	Type	Effective Median Width (ft)	Speed Level	Number Rail Highway Crossings	Average Shoulder Width (ft)	Average Lane Width (ft)
1	4U	19+28.080	22+47.005	318.93	0.0604	2024: 20,370; 2025: 20,721; 2026: 21,073; 2027: 21,425; 2028: 21,777; 2029: 22,129; 2030: 22,481; 2031: 22,833; 2032: 23,185; 2033: 23,536; 2034: 23,888; 2035: 24,240; 2036: 24,592; 2037: 24,944; 2038: 25,296; 2039: 25,648; 2040: 26,000; 2041: 26,491; 2042: 26,982; 2043: 27,474; 2044: 27,965; 2045: 28,456; 2046: 28,948; 2047: 29,439; 2048: 29,930; 2049: 30,422; 2050: 30,913; 2051: 31,404; 2052: 31,896; 2053: 32,387; 2054: 32,878; 2055: 33,370	0	0	0	0	0	0	0	false	false	0.0	0.00	None	0.00	Intermediate/High	0	2.00	12.00
2	4U	22+47.005	26+99.080	452.07	0.0856	2024: 20,370; 2025: 20,721; 2026: 21,073; 2027: 21,425; 2028: 21,777; 2029: 22,129; 2030: 22,481; 2031: 22,833; 2032: 23,185; 2033: 23,536; 2034: 23,888; 2035: 24,240; 2036: 24,592; 2037: 24,944; 2038: 25,296; 2039: 25,648; 2040: 26,000; 2041: 26,491; 2042: 26,982; 2043: 27,474; 2044: 27,965; 2045: 28,456; 2046: 28,948; 2047: 29,439; 2048: 29,930; 2049: 30,422; 2050: 30,913; 2051: 31,404; 2052: 31,896; 2053: 32,387; 2054: 32,878; 2055: 33,370	0	0	0	0	0	0	0	false	false	0.0	0.00	None	0.00	Intermediate/High	0	5.00	12.00
3	4U	26+99.080	30+70.389	371.31	0.0703	2024: 18,450; 2025: 18,843; 2026: 19,237; 2027: 19,631; 2028: 20,025; 2029: 20,418; 2030: 20,812; 2031: 21,206; 2032: 21,600; 2033: 21,993; 2034: 22,387; 2035: 22,781; 2036: 23,175; 2037: 23,568; 2038: 23,962; 2039: 24,356; 2040: 24,750; 2041: 25,344; 2042: 25,938; 2043: 26,532; 2044: 27,126; 2045: 27,720; 2046: 28,314; 2047: 28,908; 2048: 29,502; 2049: 30,096; 2050: 30,690; 2051: 31,284; 2052: 31,878; 2053: 32,472; 2054: 33,066; 2055: 33,660	0	0	0	0	0	0	0	false	false	0.0	0.00	None	0.00	Intermediate/High	0	8.00	12.00

Table 2. Evaluation Intersection (Section 1)

Inter . No.	Title	Location (Sta. ft)	Major AADT	Minor AADT	Legs	Traffic Control	Intersection Type	Approach es w/Left Turn Lanes	Approach es w/Right Turn Lanes	Approach es w/o Right Turn on Red	Pedestrian Volume (crossings /day)	Lighted at Night	Red Light Camera	School Near by	Number of Bus Stops	Number of Alcohol Sales Establishments	Max Lanes Crossed	Replaced with Roundabout
1	BUILD - Saundersville Rd LIC & Saundersville Rd	19+78.00	2024: 20,370; 2025: 20,721; 2026: 21,073; 2027: 21,425; 2028: 21,777; 2029: 22,129; 2030: 22,481; 2031: 22,833; 2032: 23,185; 2033: 23,536; 2034: 23,888; 2035: 24,240; 2036: 24,592; 2037: 24,944; 2038: 25,296; 2039: 25,648; 2040: 26,000; 2041: 26,491; 2042: 26,982; 2043: 27,474; 2044: 27,965; 2045: 28,456; 2046: 28,948; 2047: 29,439; 2048: 29,930; 2049: 30,422; 2050: 30,913; 2051: 31,404; 2052: 31,896; 2053: 32,387; 2054: 32,878; 2055: 33,370	2024: 18,590; 2025: 18,913; 2026: 19,237; 2027: 19,561; 2028: 19,885; 2029: 20,208; 2030: 20,532; 2031: 20,856; 2032: 21,180; 2033: 21,503; 2034: 21,827; 2035: 22,151; 2036: 22,475; 2037: 22,798; 2038: 23,122; 2039: 23,446; 2040: 23,770; 2041: 24,224; 2042: 24,678; 2043: 25,132; 2044: 25,586; 2045: 26,040; 2046: 26,494; 2047: 26,948; 2048: 27,402; 2049: 27,856; 2050: 28,310; 2051: 28,764; 2052: 29,218; 2053: 29,672; 2054: 30,126; 2055: 30,580	3	Signalized	Three-Legged Signalized	0	0	1	15	true	false	false	0	0	6	false
2	BUILD - Saundersville Rd & Off-Ramp	26+98.250	2024: 6,860; 2025: 7,043; 2026: 7,227; 2027: 7,411; 2028: 7,595; 2029: 7,778; 2030: 7,962; 2031: 8,146; 2032: 8,330; 2033: 8,513; 2034: 8,697; 2035: 8,881; 2036: 9,065; 2037: 9,248; 2038: 9,432; 2039: 9,616; 2040: 9,800; 2041: 10,103; 2042: 10,406; 2043: 10,710; 2044: 11,013; 2045: 11,316; 2046: 11,620; 2047: 11,923; 2048: 12,226; 2049: 12,530; 2050: 12,833; 2051: 13,136; 2052: 13,440; 2053: 13,743; 2054: 14,046; 2055: 14,350	2024: 20,370; 2025: 20,721; 2026: 21,073; 2027: 21,425; 2028: 21,777; 2029: 22,129; 2030: 22,481; 2031: 22,833; 2032: 23,185; 2033: 23,536; 2034: 23,888; 2035: 24,240; 2036: 24,592; 2037: 24,944; 2038: 25,296; 2039: 25,648; 2040: 26,000; 2041: 26,491; 2042: 26,982; 2043: 27,474; 2044: 27,965; 2045: 28,456; 2046: 28,948; 2047: 29,439; 2048: 29,930; 2049: 30,422; 2050: 30,913; 2051: 31,404; 2052: 31,896; 2053: 32,387; 2054: 32,878; 2055: 33,370	3	Signalized	Three-Legged Signalized	0	0	2	5	true	false	false	0	0	4	false

Table 3. Predicted Highway Crash Rates and Frequencies Summary (Section 1)

First Year of Analysis	2024
Last Year of Analysis	2055
Evaluated Length (mi)	0.2163
Average Future Road AADT (vpd)	26,008
Predicted Crashes	
Total Crashes	358.30
Fatal and Injury Crashes	103.56
Property-Damage-Only Crashes	254.74
Percent of Total Predicted Crashes	
Percent Fatal and Injury Crashes (%)	29
Percent Property-Damage-Only Crashes (%)	71
Predicted Crash Rate	
Crash Rate (crashes/mi/yr)	51.7541
FI Crash Rate (crashes/mi/yr)	14.9587
PDO Crash Rate (crashes/mi/yr)	36.7954
Predicted Travel Crash Rate	
Total Travel (million veh-mi)	65.72
Travel Crash Rate (crashes/million veh-mi)	5.45
Travel FI Crash Rate (crashes/million veh-mi)	1.58
Travel PDO Crash Rate (crashes/million veh-mi)	3.88

Table 4. Predicted Crash Frequencies and Rates by Highway Segment/Intersection (Section 1)

Segment Number/Intersection Name/Cross Road	Start Location (Sta. ft)	End Location (Sta. ft)	Length (mi)	Total Predicted Crashes for Evaluation Period	Predicted Total Crash Frequency (crashes/yr)	Predicted FI Crash Frequency (crashes/yr)	Predicted PDO Crash Frequency (crashes/yr)	Predicted Crash Rate (crashes/mi/yr)	Predicted Travel Crash Rate (crashes/million veh-mi)	Predicted Intersection Travel Crash Rate (crashes/million veh)
1	19+28.080	22+47.005	0.0604	15.753	0.4923	0.1435	0.3488	8.1499	0.85	
BUILD - Saundersville Rd LIC & Saundersville Rd	19+78.000			166.895	5.2155	1.5961	3.6194			0.37
2	22+47.005	26+99.080	0.0856	22.329	0.6978	0.2034	0.4944	8.1499	0.85	
BUILD - Saundersville Rd & Off-Ramp	26+98.250			135.849	4.2453	1.1336	3.1116			0.38
3	26+99.080	30+70.389	0.0703	17.471	0.5460	0.1596	0.3864	7.7637	0.84	
All Segments			0.2163	55.554	1.7360	0.5066	1.2295	8.0244	0.84	
All Intersections				302.744	9.4608	2.7297	6.7311			0.37
Total			0.2163	358.298	11.1968	3.2363	7.9605	51.7541		

Table 5. Predicted Crash Frequencies and Rates by Horizontal Design Element (Section 1)

Title	Start Location (Sta. ft)	End Location (Sta. ft)	Length (mi)	Total Predicted Crashes for Evaluation Period	Predicted Total Crash Frequency (crashes/yr)	Predicted FI Crash Frequency (crashes/yr)	Predicted PDO Crash Frequency (crashes/yr)	Predicted Crash Rate (crashes/mi/yr)	Predicted Travel Crash Rate (crashes/million veh-mi)
Tangent	19+28.080	22+47.005	0.0604	15.753	0.4923	0.1435	0.3488	8.1499	0.85
Simple Curve 1	22+47.005	30+70.389	0.1559	39.801	1.2438	0.3630	0.8807	7.9758	0.84

Table 6. Predicted Crash Frequencies by Year (Section 1)

Year	Total Crashes	FI Crashes	Percent FI (%)	PDO Crashes	Percent PDO (%)
2024	8.12	2.35	28.908	5.78	71.092
2025	8.30	2.40	28.909	5.90	71.091
2026	8.47	2.45	28.910	6.02	71.090
2027	8.65	2.50	28.911	6.15	71.089
2028	8.82	2.55	28.912	6.27	71.088
2029	9.00	2.60	28.912	6.40	71.088
2030	9.17	2.65	28.913	6.52	71.087
2031	9.35	2.70	28.913	6.65	71.087
2032	9.53	2.75	28.913	6.77	71.087
2033	9.71	2.81	28.913	6.90	71.087
2034	9.88	2.86	28.913	7.03	71.088
2035	10.06	2.91	28.912	7.15	71.088
2036	10.24	2.96	28.912	7.28	71.088
2037	10.42	3.01	28.911	7.41	71.089
2038	10.60	3.06	28.910	7.54	71.090
2039	10.78	3.12	28.909	7.66	71.091
2040	10.96	3.17	28.907	7.79	71.093
2041	11.22	3.24	28.907	7.98	71.093
2042	11.48	3.32	28.907	8.16	71.094
2043	11.75	3.40	28.906	8.35	71.094
2044	12.01	3.47	28.905	8.54	71.095
2045	12.27	3.55	28.904	8.73	71.097
2046	12.54	3.62	28.902	8.91	71.098
2047	12.80	3.70	28.900	9.10	71.100
2048	13.07	3.78	28.898	9.29	71.102
2049	13.34	3.85	28.896	9.48	71.104
2050	13.61	3.93	28.894	9.68	71.106
2051	13.88	4.01	28.891	9.87	71.109
2052	14.14	4.09	28.889	10.06	71.111
2053	14.42	4.17	28.889	10.26	71.111
2054	14.71	4.25	28.890	10.46	71.110
2055	14.99	4.33	28.891	10.66	71.109
Total	358.30	103.56	28.903	254.74	71.097
Average	11.20	3.24	28.903	7.96	71.097

Note: *Fatal and Injury Crashes* and *Property Damage Only Crashes* do not necessarily sum up to *Total Crashes* because the distribution of these three crashes had been derived independently.

Table 7. Predicted Crash Severity by Urban Arterial (Section 1)

Seg. No.	Type	Fatal (K) Crashes (crashes)	Incapacitating Injury (A) Crashes (crashes)	Non-Incapacitating Injury (B) Crashes (crashes)	Possible Injury (C) Crashes (crashes)	No Injury (O) Crashes (crashes)
2	USAIntersection	0.1348	2.7957	10.7636	22.5824	99.5726

Table 8. Predicted Five Lane or Fewer Crash Type Distribution (Section 1)

Element Type	Crash Type	FI Crashes	Percent FI (%)	PDO Crashes	Percent PDO (%)	Total Crashes	Percent Total (%)
Highway Segment	Collision with Animal	0.00	0.0	0.01	0.0	0.01	0.0
Highway Segment	Collision with Bicycle	0.11	0.0	0.00	0.0	0.11	0.0
Highway Segment	Collision with Fixed Object	1.24	0.6	5.50	2.5	6.74	3.0
Highway Segment	Collision with Other Object	0.04	0.0	0.20	0.1	0.24	0.1
Highway Segment	Other Single-vehicle Collision	0.74	0.3	1.09	0.5	1.84	0.8
Highway Segment	Collision with Pedestrian	0.49	0.2	0.00	0.0	0.49	0.2
Highway Segment	Total Single Vehicle Crashes	2.63	1.2	6.80	3.1	9.43	4.2
Highway Segment	Angle Collision	2.46	1.1	4.23	1.9	6.69	3.0
Highway Segment	Driveway-related Collision	0.00	0.0	0.00	0.0	0.00	0.0
Highway Segment	Head-on Collision	1.05	0.5	0.13	0.1	1.18	0.5
Highway Segment	Other Multi-vehicle Collision	0.76	0.3	2.60	1.2	3.36	1.5
Highway Segment	Rear-end Collision	6.94	3.1	16.47	7.4	23.41	10.5
Highway Segment	Sideswipe, Opposite Direction Collision	1.11	0.5	1.01	0.5	2.12	1.0
Highway Segment	Sideswipe, Same Direction Collision	1.26	0.6	8.10	3.6	9.37	4.2
Highway Segment	Total Multiple Vehicle Crashes	13.58	6.1	32.55	14.6	46.12	20.7
Highway Segment	Total Highway Segment Crashes	16.21	7.3	39.34	17.7	55.55	25.0
Intersection	Collision with Animal	0.00	0.0	0.03	0.0	0.03	0.0
Intersection	Collision with Bicycle	1.81	0.8	0.00	0.0	1.81	0.8
Intersection	Collision with Fixed Object	2.71	1.2	7.38	3.3	10.09	4.5
Intersection	Non-Collision	0.87	0.4	0.12	0.1	0.98	0.4
Intersection	Collision with Other Object	0.38	0.2	0.57	0.3	0.95	0.4
Intersection	Other Single-vehicle Collision	0.19	0.1	0.15	0.1	0.34	0.2
Intersection	Collision with Parked Vehicle	0.00	0.0	0.01	0.0	0.01	0.0
Intersection	Collision with Pedestrian	0.38	0.2	0.00	0.0	0.38	0.2
Intersection	Total Intersection Single Vehicle Crashes	6.35	2.9	8.25	3.7	14.59	6.6
Intersection	Angle Collision	12.52	5.6	21.95	9.9	34.47	15.5
Intersection	Head-on Collision	1.70	0.8	2.15	1.0	3.85	1.7
Intersection	Other Multi-vehicle Collision	2.55	1.1	21.30	9.6	23.85	10.7
Intersection	Rear-end Collision	24.55	11.0	58.73	26.4	83.29	37.4
Intersection	Sideswipe	3.40	1.5	3.44	1.5	6.84	3.1
Intersection	Total Intersection Multiple Vehicle Crashes	44.73	20.1	107.57	48.4	152.30	68.5
Intersection	Total Intersection Crashes	51.07	23.0	115.82	52.1	166.90	75.0
	Total Crashes	67.28	30.2	155.16	69.8	222.45	100.0

Note: *Fatal and Injury Crashes* and *Property Damage Only Crashes* do not necessarily sum up to *Total Crashes* because the distribution of these three crashes had been derived independently.

Table 9. Evaluation Message

Start Location (Sta. ft)	End Location (Sta. ft)	Message
19+78.000	19+78.000	for intersection #1 (19+78.000 to 19+78.000), minor road traffic volume (18,590 vpd) for 2024 is not within the model limit (16,400 vpd) for reliable results for intersection type 3SG
19+78.000	19+78.000	for intersection #1 (19+78.000 to 19+78.000), minor road traffic volume (18,913 vpd) for 2025 is not within the model limit (16,400 vpd) for reliable results for intersection type 3SG
19+78.000	19+78.000	for intersection #1 (19+78.000 to 19+78.000), minor road traffic volume (19,237 vpd) for 2026 is not within the model limit (16,400 vpd) for reliable results for intersection type 3SG
19+78.000	19+78.000	for intersection #1 (19+78.000 to 19+78.000), minor road traffic volume (19,561 vpd) for 2027 is not within the model limit (16,400 vpd) for reliable results for intersection type 3SG
19+78.000	19+78.000	for intersection #1 (19+78.000 to 19+78.000), minor road traffic volume (19,885 vpd) for 2028 is not within the model limit (16,400 vpd) for reliable results for intersection type 3SG
19+78.000	19+78.000	for intersection #1 (19+78.000 to 19+78.000), minor road traffic volume (20,208 vpd) for 2029 is not within the model limit (16,400 vpd) for reliable results for intersection type 3SG
19+78.000	19+78.000	for intersection #1 (19+78.000 to 19+78.000), minor road traffic volume (20,532 vpd) for 2030 is not within the model limit (16,400 vpd) for reliable results for intersection type 3SG
19+78.000	19+78.000	for intersection #1 (19+78.000 to 19+78.000), minor road traffic volume (20,856 vpd) for 2031 is not within the model limit (16,400 vpd) for reliable results for intersection type 3SG
19+78.000	19+78.000	for intersection #1 (19+78.000 to 19+78.000), minor road traffic volume (21,180 vpd) for 2032 is not within the model limit (16,400 vpd) for reliable results for intersection type 3SG
19+78.000	19+78.000	for intersection #1 (19+78.000 to 19+78.000), minor road traffic volume (21,503 vpd) for 2033 is not within the model limit (16,400 vpd) for reliable results for intersection type 3SG
19+78.000	19+78.000	for intersection #1 (19+78.000 to 19+78.000), minor road traffic volume (21,827 vpd) for 2034 is not within the model limit (16,400 vpd) for reliable results for intersection type 3SG
19+78.000	19+78.000	for intersection #1 (19+78.000 to 19+78.000), minor road traffic volume (22,151 vpd) for 2035 is not within the model limit (16,400 vpd) for reliable results for intersection type 3SG
19+78.000	19+78.000	for intersection #1 (19+78.000 to 19+78.000), minor road traffic volume (22,475 vpd) for 2036 is not within the model limit (16,400 vpd) for reliable results for intersection type 3SG
19+78.000	19+78.000	for intersection #1 (19+78.000 to 19+78.000), minor road traffic volume (22,798 vpd) for 2037 is not within the model limit (16,400 vpd) for reliable results for intersection type 3SG
19+78.000	19+78.000	for intersection #1 (19+78.000 to 19+78.000), minor road traffic volume (23,122 vpd) for 2038 is not within the model limit (16,400 vpd) for reliable results for intersection type 3SG
19+78.000	19+78.000	for intersection #1 (19+78.000 to 19+78.000), minor road traffic volume (23,446 vpd) for 2039 is not within the model limit (16,400 vpd) for reliable results for intersection type 3SG
19+78.000	19+78.000	for intersection #1 (19+78.000 to 19+78.000), minor road traffic volume (23,770 vpd) for 2040 is not within the model limit (16,400 vpd) for reliable results for intersection type 3SG
19+78.000	19+78.000	for intersection #1 (19+78.000 to 19+78.000), minor road traffic volume (24,224 vpd) for 2041 is not within the model limit (16,400 vpd) for reliable results for intersection type 3SG

Start Location (Sta. ft)	End Location (Sta. ft)	Message
19+78.000	19+78.000	for intersection #1 (19+78.000 to 19+78.000), minor road traffic volume (24,678 vpd) for 2042 is not within the model limit (16,400 vpd) for reliable results for intersection type 3SG
19+78.000	19+78.000	for intersection #1 (19+78.000 to 19+78.000), minor road traffic volume (25,132 vpd) for 2043 is not within the model limit (16,400 vpd) for reliable results for intersection type 3SG
19+78.000	19+78.000	for intersection #1 (19+78.000 to 19+78.000), minor road traffic volume (25,586 vpd) for 2044 is not within the model limit (16,400 vpd) for reliable results for intersection type 3SG
19+78.000	19+78.000	for intersection #1 (19+78.000 to 19+78.000), minor road traffic volume (26,040 vpd) for 2045 is not within the model limit (16,400 vpd) for reliable results for intersection type 3SG
19+78.000	19+78.000	for intersection #1 (19+78.000 to 19+78.000), minor road traffic volume (26,494 vpd) for 2046 is not within the model limit (16,400 vpd) for reliable results for intersection type 3SG
19+78.000	19+78.000	for intersection #1 (19+78.000 to 19+78.000), minor road traffic volume (26,948 vpd) for 2047 is not within the model limit (16,400 vpd) for reliable results for intersection type 3SG
19+78.000	19+78.000	for intersection #1 (19+78.000 to 19+78.000), minor road traffic volume (27,402 vpd) for 2048 is not within the model limit (16,400 vpd) for reliable results for intersection type 3SG
19+78.000	19+78.000	for intersection #1 (19+78.000 to 19+78.000), minor road traffic volume (27,856 vpd) for 2049 is not within the model limit (16,400 vpd) for reliable results for intersection type 3SG
19+78.000	19+78.000	for intersection #1 (19+78.000 to 19+78.000), minor road traffic volume (28,310 vpd) for 2050 is not within the model limit (16,400 vpd) for reliable results for intersection type 3SG
19+78.000	19+78.000	for intersection #1 (19+78.000 to 19+78.000), minor road traffic volume (28,764 vpd) for 2051 is not within the model limit (16,400 vpd) for reliable results for intersection type 3SG
19+78.000	19+78.000	for intersection #1 (19+78.000 to 19+78.000), minor road traffic volume (29,218 vpd) for 2052 is not within the model limit (16,400 vpd) for reliable results for intersection type 3SG
19+78.000	19+78.000	for intersection #1 (19+78.000 to 19+78.000), minor road traffic volume (29,672 vpd) for 2053 is not within the model limit (16,400 vpd) for reliable results for intersection type 3SG
19+78.000	19+78.000	for intersection #1 (19+78.000 to 19+78.000), minor road traffic volume (30,126 vpd) for 2054 is not within the model limit (16,400 vpd) for reliable results for intersection type 3SG
19+78.000	19+78.000	for intersection #1 (19+78.000 to 19+78.000), minor road traffic volume (30,580 vpd) for 2055 is not within the model limit (16,400 vpd) for reliable results for intersection type 3SG

Interactive Highway Safety Design Model

Crash Prediction Evaluation Report

June 25, 2019

Disclaimer

The Interactive Highway Design Model (IHSDM) software is disseminated under the sponsorship of the Department of Transportation in the interest of information exchange. The United States Government assumes no liability for its content or use thereof. This document does not constitute a standard, specification, or regulation.

The United States Government does not endorse products or manufacturers. Trade and manufacturers' names may appear in this software and documentation only because they are considered essential to the objective of the software.

Limited Warranty and Limitations of Remedies

This software product is provided "as-is," without warranty of any kind-either expressed or implied (but not limited to the implied warranties of merchantability and fitness for a particular purpose). The FHWA do not warrant that the functions contained in the software will meet the end-user's requirements or that the operation of the software will be uninterrupted and error-free.

Under no circumstances will the FHWA be liable to the end-user for any damages or claimed lost profits, lost savings, or other incidental or consequential damages rising out of the use or inability to use the software (even if these organizations have been advised of the possibility of such damages), or for any claim by any other party.

Notice

The use of the IHSDM software is being done strictly on a voluntary basis. In exchange for provision of IHSDM, the user agrees that the Federal Highway Administration (FHWA), U.S. Department of Transportation and any other agency of the Federal Government shall not be responsible for any errors, damage or other liability that may result from any and all use of the software, including installation and testing of the software. The user further agrees to hold the FHWA and the Federal Government harmless from any resulting liability. The user agrees that this hold harmless provision shall flow to any person to whom or any entity to which the user provides the IHSDM software. It is the user's full responsibility to inform any person to whom or any entity to which it provides the IHSDM software of this hold harmless provision.

Table of Contents

Report Overview	1
Section Types	2
Section 1 Evaluation	2

List of Tables

Table Evaluation Highway - Homogeneous Segments (Section 1)	4
Table Evaluation Intersection (Section 1)	5
Table Predicted Highway Crash Rates and Frequencies Summary (Section 1)	6
Table Predicted Crash Frequencies and Rates by Highway Segment/Intersection (Section 1)	7
Table Predicted Crash Frequencies and Rates by Horizontal Design Element (Section 1)	7
Table Predicted Crash Frequencies by Year (Section 1)	8
Table Predicted Five Lane or Fewer Crash Type Distribution (Section 1)	9
Table Evaluation Message	10

List of Figures

Figure Crash Prediction Summary (Section 1)	3
---	---

Report Overview

Report Generated: Jun 25, 2019 2:34 PM

Report Template: System: Multi-Page, 508 Compliant [System] (mlcpm4, Jun 20, 2019 12:11 PM)

Evaluation Date: Tue Jun 25 14:30:18 CDT 2019

IHSDM Version: v14.1.0 (Mar 12, 2019)

Crash Prediction Module: v9.1.0 (Mar 12, 2019)

User Name: salomonsend

Organization Name: AECOM

Phone: 608-828-8203

E-Mail: derek.salomonsen@aecom.com

Project Title: Saundersville Road/Hendersonville BUILD grant - BUILD

Project Comment: Created Mon Jun 24 11:15:36 CDT 2019

Project Unit System: U.S. Customary

Highway Title: BUILD - Alignment Saundersville Rd LIC

Highway Comment: Imported from Combined.xml

Highway Version: 1

Evaluation Title: Saundersville Rd LIC - Build

Evaluation Comment: Created Tue Jun 25 14:29:56 CDT 2019

Minimum Location: 10+00.000

Maximum Location: 24+36.262

Policy for Superelevation: AASHTO 2011 U.S. Customary

Calibration: HSM Configuration

Crash Distribution: HSM Configuration

Model/CMF: HSM Configuration

First Year of Analysis: 2024

Last Year of Analysis: 2055

Empirical-Bayes Analysis: None

First Year of Observed Crashes:

Last Year of Observed Crashes:

Section Types

Section 1 Evaluation

Section: Section 1

Evaluation Start Location: 10+00.000

Evaluation End Location: 24+36.262

Area Type: Suburban

Functional Class: Arterial

Type of Alignment: Divided, Multilane

Model Category: Urban/Suburban Arterial

Calibration Factor: 3SG=1.0; 4D=1.0; 4SG=1.0;

Crash Prediction Summary, Section 1 (Divided, Multilane; Suburban; Arterial)
 Project: Saundersville Road/Hendersonville BUILD grant - BUILD, Evaluation: Saundersville Rd LIC - Build
 Highway: BUILD - Alignment Saundersville Rd LIC

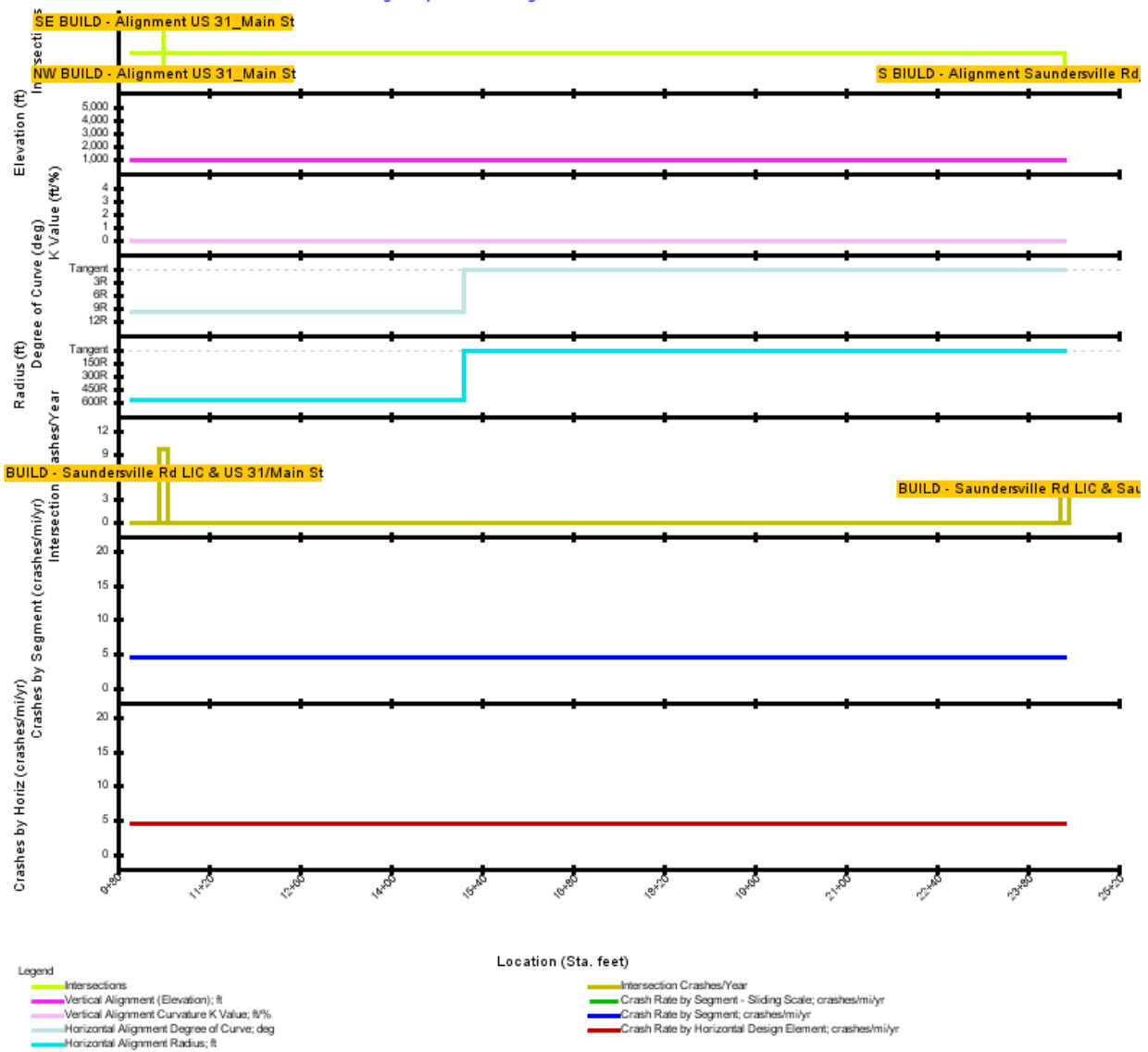


Figure 1. Crash Prediction Summary (Section 1)

Table 1. Evaluation Highway - Homogeneous Segments (Section 1)

Segment No.	Type	Start Location (Sta. ft)	End Location (Sta. ft)	Length (ft)	Length (mi)	AAADT	Number Major Commercial Driveways	Number Minor Commercial Driveways	Number Major Industrial/Institutional	Number Minor Industrial/Institutional	Number Major Residential Driveways	Number Minor Residential Driveways	Number Other Driveways	Lighting	Automated Speed Enforcement	Density (fixed objects/mi)	Median Width (ft)	Type	Effective Median Width (ft)	Speed Level	Number Rail Highway Crossings	Average Shoulder Width (ft)	Average Lane Width (ft)	
1	4 D	10+00.000	15+05.000	505.00	0.0956	2024: 18,590; 2025: 18,913; 2026: 19,237; 2027: 19,561; 2028: 19,885; 2029: 20,208; 2030: 20,532; 2031: 20,856; 2032: 21,180; 2033: 21,503; 2034: 21,827; 2035: 22,151; 2036: 22,475; 2037: 22,798; 2038: 23,122; 2039: 23,446; 2040: 23,770; 2041: 24,224; 2042: 24,678; 2043: 25,132; 2044: 25,586; 2045: 26,040; 2046: 26,494; 2047: 26,948; 2048: 27,402; 2049: 27,856; 2050: 28,310; 2051: 28,764; 2052: 29,218; 2053: 29,672; 2054: 30,126; 2055: 30,580	0	0	0	0	0	0	0	0	true	false	0.0	12.00	Non-Traversable Median	12.00	Intermediate/High	0	2.00	12.00
2	4 D	15+05.000	15+12.246	7.25	0.0014	2024: 18,590; 2025: 18,913; 2026: 19,237; 2027: 19,561; 2028: 19,885; 2029: 20,208; 2030: 20,532; 2031: 20,856; 2032: 21,180; 2033: 21,503; 2034: 21,827; 2035: 22,151; 2036: 22,475; 2037: 22,798; 2038: 23,122; 2039: 23,446; 2040: 23,770; 2041: 24,224; 2042: 24,678; 2043: 25,132; 2044: 25,586; 2045: 26,040; 2046: 26,494; 2047: 26,948; 2048: 27,402; 2049: 27,856; 2050: 28,310; 2051: 28,764; 2052: 29,218; 2053: 29,672; 2054: 30,126; 2055: 30,580	0	0	0	0	0	0	0	true	false	0.0	12.00	Non-Traversable Median	16.00	Intermediate/High	0	2.00	12.00	
3	4 D	15+12.246	16+60.000	147.75	0.0280	2024: 18,590; 2025: 18,913; 2026: 19,237; 2027: 19,561; 2028: 19,885; 2029: 20,208; 2030: 20,532; 2031: 20,856; 2032: 21,180; 2033: 21,503; 2034: 21,827; 2035: 22,151; 2036: 22,475; 2037: 22,798; 2038: 23,122; 2039: 23,446; 2040: 23,770; 2041: 24,224; 2042: 24,678; 2043: 25,132; 2044: 25,586; 2045: 26,040; 2046: 26,494; 2047: 26,948; 2048: 27,402; 2049: 27,856; 2050: 28,310; 2051: 28,764; 2052: 29,218; 2053: 29,672; 2054: 30,126; 2055: 30,580	0	0	0	0	0	0	0	true	false	0.0	12.00	Non-Traversable Median	16.00	Intermediate/High	0	2.00	12.00	
4	4 D	16+60.000	17+50.000	90.00	0.0170	2024: 18,590; 2025: 18,913; 2026: 19,237; 2027: 19,561; 2028: 19,885; 2029: 20,208; 2030: 20,532; 2031: 20,856; 2032: 21,180; 2033: 21,503; 2034: 21,827; 2035: 22,151; 2036: 22,475; 2037: 22,798; 2038: 23,122; 2039: 23,446; 2040: 23,770; 2041: 24,224; 2042: 24,678; 2043: 25,132; 2044: 25,586; 2045: 26,040; 2046: 26,494; 2047: 26,948; 2048: 27,402; 2049: 27,856; 2050: 28,310; 2051: 28,764; 2052: 29,218; 2053: 29,672; 2054: 30,126; 2055: 30,580	0	0	0	0	0	0	0	true	false	0.0	12.00	Non-Traversable Median	16.00	Intermediate/High	0	2.00	11.00	
5	4 D	17+50.000	19+00.000	150.00	0.0284	2024: 18,590; 2025: 18,913; 2026: 19,237; 2027: 19,561; 2028: 19,885; 2029: 20,208; 2030: 20,532; 2031: 20,856; 2032: 21,180; 2033: 21,503; 2034: 21,827; 2035: 22,151; 2036: 22,475; 2037: 22,798; 2038: 23,122; 2039: 23,446; 2040: 23,770; 2041: 24,224; 2042: 24,678; 2043: 25,132; 2044: 25,586; 2045: 26,040; 2046: 26,494; 2047: 26,948; 2048: 27,402; 2049: 27,856; 2050: 28,310; 2051: 28,764; 2052: 29,218; 2053: 29,672; 2054: 30,126; 2055: 30,580	0	0	0	0	0	0	0	true	false	0.0	6.00	Non-Traversable Median	10.00	Intermediate/High	0	2.00	11.00	
6	4 D	19+00.000	20+72.000	172.00	0.0326	2024: 18,590; 2025: 18,913; 2026: 19,237; 2027: 19,561; 2028: 19,885; 2029: 20,208; 2030: 20,532; 2031: 20,856; 2032: 21,180; 2033: 21,503; 2034: 21,827; 2035: 22,151; 2036: 22,475; 2037: 22,798; 2038: 23,122; 2039: 23,446; 2040: 23,770; 2041: 24,224; 2042: 24,678; 2043: 25,132; 2044: 25,586; 2045: 26,040; 2046: 26,494; 2047: 26,948; 2048: 27,402; 2049: 27,856; 2050: 28,310; 2051: 28,764; 2052: 29,218; 2053: 29,672; 2054: 30,126; 2055: 30,580	0	0	0	0	0	0	0	true	false	0.0	6.00	Non-Traversable Median	6.00	Intermediate/High	0	2.00	11.00	
7	4 D	20+72.000	24+36.262	364.26	0.0690	2024: 18,590; 2025: 18,913; 2026: 19,237; 2027: 19,561; 2028: 19,885; 2029: 20,208; 2030: 20,532; 2031: 20,856; 2032: 21,180; 2033: 21,503; 2034: 21,827; 2035: 22,151; 2036: 22,475; 2037: 22,798; 2038: 23,122; 2039: 23,446; 2040: 23,770; 2041: 24,224; 2042: 24,678; 2043: 25,132; 2044: 25,586; 2045: 26,040; 2046: 26,494; 2047: 26,948; 2048: 27,402; 2049: 27,856; 2050: 28,310; 2051: 28,764; 2052: 29,218; 2053: 29,672; 2054: 30,126; 2055: 30,580	0	0	0	0	0	0	0	true	false	0.0	6.00	Non-Traversable Median	6.00	Intermediate/High	0	2.00	12.00	

Table 2. Evaluation Intersection (Section 1)

Inter . No.	Title	Location (Sta. ft)	Major AADT	Minor AADT	Legs	Traffic Control	Intersection Type	Approach es w/Left Turn Lanes	Approach es w/Right Turn Lanes	Approach es w/o Right Turn on Red	Pedestria n Volume (crossings /day)	Lighte d at Night	Red Light Camera	Scho ol Near by	Num ber of Bus Stops	Number of Alcohol Sales Establishments	Max Lanes Cross ed	Replaced with Roundab out
1	BUILD - Saundersville Rd LIC & US 31/Main St	10+50.00	2024: 25,790; 2025: 26,134; 2026: 26,478; 2027: 26,823; 2028: 27,167; 2029: 27,511; 2030: 27,856; 2031: 28,200; 2032: 28,545; 2033: 28,889; 2034: 29,233; 2035: 29,578; 2036: 29,922; 2037: 30,266; 2038: 30,611; 2039: 30,955; 2040: 31,300; 2041: 31,738; 2042: 32,177; 2043: 32,616; 2044: 33,054; 2045: 33,493; 2046: 33,932; 2047: 34,370; 2048: 34,809; 2049: 35,248; 2050: 35,686; 2051: 36,125; 2052: 36,564; 2053: 37,002; 2054: 37,441; 2055: 37,880	2024: 18,590; 2025: 18,913; 2026: 19,237; 2027: 19,561; 2028: 19,885; 2029: 20,208; 2030: 20,532; 2031: 20,856; 2032: 21,180; 2033: 21,503; 2034: 21,827; 2035: 22,151; 2036: 22,475; 2037: 22,798; 2038: 23,122; 2039: 23,446; 2040: 23,770; 2041: 24,224; 2042: 24,678; 2043: 25,132; 2044: 25,586; 2045: 26,040; 2046: 26,494; 2047: 26,948; 2048: 27,402; 2049: 27,856; 2050: 28,310; 2051: 28,764; 2052: 29,218; 2053: 29,672; 2054: 30,126; 2055: 30,580	4	Signalized	Four-Legged Signalized	0	0	0	5	true	false	false	0	0	6	false
2	BUILD - Saundersville Rd LIC & Saundersville Rd	24+36.259	2024: 20,370; 2025: 20,721; 2026: 21,073; 2027: 21,425; 2028: 21,777; 2029: 22,129; 2030: 22,481; 2031: 22,833; 2032: 23,185; 2033: 23,536; 2034: 23,888; 2035: 24,240; 2036: 24,592; 2037: 24,944; 2038: 25,296; 2039: 25,648; 2040: 26,000; 2041: 26,491; 2042: 26,982; 2043: 27,474; 2044: 27,965; 2045: 28,456; 2046: 28,948; 2047: 29,439; 2048: 29,930; 2049: 30,422; 2050: 30,913; 2051: 31,404; 2052: 31,896; 2053: 32,387; 2054: 32,878; 2055: 33,370	2024: 18,590; 2025: 18,913; 2026: 19,237; 2027: 19,561; 2028: 19,885; 2029: 20,208; 2030: 20,532; 2031: 20,856; 2032: 21,180; 2033: 21,503; 2034: 21,827; 2035: 22,151; 2036: 22,475; 2037: 22,798; 2038: 23,122; 2039: 23,446; 2040: 23,770; 2041: 24,224; 2042: 24,678; 2043: 25,132; 2044: 25,586; 2045: 26,040; 2046: 26,494; 2047: 26,948; 2048: 27,402; 2049: 27,856; 2050: 28,310; 2051: 28,764; 2052: 29,218; 2053: 29,672; 2054: 30,126; 2055: 30,580	3	Signalized	Three-Legged Signalized	0	0	1	15	true	false	false	0	0	6	false

Table 3. Predicted Highway Crash Rates and Frequencies Summary (Section 1)

First Year of Analysis	2024
Last Year of Analysis	2055
Evaluated Length (mi)	0.2720
Average Future Road AADT (vpd)	24,096
Predicted Crashes	
Total Crashes	512.23
Fatal and Injury Crashes	167.83
Property-Damage-Only Crashes	344.40
Percent of Total Predicted Crashes	
Percent Fatal and Injury Crashes (%)	33
Percent Property-Damage-Only Crashes (%)	67
Predicted Crash Rate	
Crash Rate (crashes/mi/yr)	58.8458
FI Crash Rate (crashes/mi/yr)	19.2802
PDO Crash Rate (crashes/mi/yr)	39.5655
Predicted Travel Crash Rate	
Total Travel (million veh-mi)	76.56
Travel Crash Rate (crashes/million veh-mi)	6.69
Travel FI Crash Rate (crashes/million veh-mi)	2.19
Travel PDO Crash Rate (crashes/million veh-mi)	4.50

Table 4. Predicted Crash Frequencies and Rates by Highway Segment/Intersection (Section 1)

Segment Number/Intersection Name/Cross Road	Start Location (Sta. ft)	End Location (Sta. ft)	Length (mi)	Total Predicted Crashes for Evaluation Period	Predicted Total Crash Frequency (crashes/yr)	Predicted FI Crash Frequency (crashes/yr)	Predicted PDO Crash Frequency (crashes/yr)	Predicted Crash Rate (crashes/mi/yr)	Predicted Travel Crash Rate (crashes/million veh-mi)	Predicted Intersection Travel Crash Rate (crashes/million veh)
1	10+00.000	15+05.000	0.0956	13.570	0.4241	0.1180	0.3061	4.4338	0.50	
BUILD - Saundersville Rd LIC & US 31/Main St	10+50.000			306.740	9.5856	3.3129	6.2727			0.47
2	15+05.000	15+12.246	0.0014	0.195	0.0061	0.0017	0.0044	4.4338	0.50	
3	15+12.246	16+60.000	0.0280	3.970	0.1241	0.0345	0.0895	4.4338	0.50	
4	16+60.000	17+50.000	0.0170	2.418	0.0756	0.0210	0.0545	4.4338	0.50	
5	17+50.000	19+00.000	0.0284	4.031	0.1260	0.0351	0.0909	4.4338	0.50	
6	19+00.000	20+72.000	0.0326	4.622	0.1444	0.0402	0.1042	4.4338	0.50	
7	20+72.000	24+36.262	0.0690	9.788	0.3059	0.0851	0.2208	4.4338	0.50	
BUILD - Saundersville Rd LIC & Saundersville Rd	24+36.259			166.895	5.2155	1.5961	3.6194			0.37
All Segments			0.2720	38.595	1.2061	0.3356	0.8704	4.4338	0.50	
All Intersections				473.635	14.8011	4.9089	9.8922			0.43
Total			0.2720	512.230	16.0072	5.2446	10.7626	58.8458		

Table 5. Predicted Crash Frequencies and Rates by Horizontal Design Element (Section 1)

Title	Start Location (Sta. ft)	End Location (Sta. ft)	Length (mi)	Total Predicted Crashes for Evaluation Period	Predicted Total Crash Frequency (crashes/yr)	Predicted FI Crash Frequency (crashes/yr)	Predicted PDO Crash Frequency (crashes/yr)	Predicted Crash Rate (crashes/mi/yr)	Predicted Travel Crash Rate (crashes/million veh-mi)
Simple Curve 1	10+00.000	15+12.246	0.0970	13.765	0.4302	0.1197	0.3104	4.4338	0.50
Tangent	15+12.246	24+36.262	0.1750	24.830	0.7759	0.2159	0.5600	4.4338	0.50

Table 6. Predicted Crash Frequencies by Year (Section 1)

Year	Total Crashes	FI Crashes	Percent FI (%)	PDO Crashes	Percent PDO (%)
2024	11.88	3.91	32.938	7.96	67.062
2025	12.11	3.99	32.929	8.12	67.071
2026	12.35	4.06	32.920	8.28	67.080
2027	12.58	4.14	32.911	8.44	67.089
2028	12.82	4.22	32.901	8.60	67.099
2029	13.06	4.30	32.892	8.76	67.108
2030	13.30	4.37	32.884	8.93	67.116
2031	13.54	4.45	32.875	9.09	67.125
2032	13.78	4.53	32.866	9.25	67.134
2033	14.03	4.61	32.858	9.42	67.142
2034	14.27	4.69	32.849	9.58	67.151
2035	14.51	4.77	32.840	9.75	67.159
2036	14.76	4.85	32.832	9.91	67.168
2037	15.01	4.93	32.824	10.08	67.176
2038	15.26	5.01	32.816	10.25	67.184
2039	15.50	5.09	32.807	10.42	67.193
2040	15.75	5.17	32.799	10.59	67.201
2041	16.09	5.28	32.784	10.82	67.216
2042	16.43	5.38	32.769	11.05	67.231
2043	16.77	5.49	32.754	11.28	67.246
2044	17.11	5.60	32.740	11.51	67.260
2045	17.46	5.71	32.725	11.74	67.275
2046	17.80	5.82	32.711	11.98	67.289
2047	18.15	5.93	32.697	12.22	67.303
2048	18.50	6.05	32.683	12.45	67.317
2049	18.85	6.16	32.669	12.69	67.331
2050	19.20	6.27	32.656	12.93	67.344
2051	19.56	6.38	32.643	13.17	67.357
2052	19.91	6.50	32.629	13.41	67.371
2053	20.27	6.61	32.616	13.66	67.384
2054	20.63	6.72	32.603	13.90	67.397
2055	20.99	6.84	32.591	14.15	67.409
Total	512.23	167.83	32.764	344.40	67.236
Average	16.01	5.25	32.764	10.76	67.236

Note: *Fatal and Injury Crashes* and *Property Damage Only Crashes* do not necessarily sum up to *Total Crashes* because the distribution of these three crashes had been derived independently.

Table 7. Predicted Five Lane or Fewer Crash Type Distribution (Section 1)

Element Type	Crash Type	FI Crashes	Percent FI (%)	PDO Crashes	Percent PDO (%)	Total Crashes	Percent Total (%)
Highway Segment	Collision with Animal	0.00	0.0	0.30	0.1	0.30	0.1
Highway Segment	Collision with Bicycle	0.19	0.0	0.00	0.0	0.19	0.0
Highway Segment	Collision with Fixed Object	0.51	0.1	3.91	0.8	4.42	0.9
Highway Segment	Collision with Other Object	0.03	0.0	0.08	0.0	0.11	0.0
Highway Segment	Other Single-vehicle Collision	0.48	0.1	0.52	0.1	1.00	0.2
Highway Segment	Collision with Pedestrian	0.72	0.1	0.00	0.0	0.72	0.1
Highway Segment	Total Single Vehicle Crashes	1.93	0.4	4.81	0.9	6.74	1.3
Highway Segment	Angle Collision	0.35	0.1	0.83	0.2	1.18	0.2
Highway Segment	Driveway-related Collision	0.00	0.0	0.00	0.0	0.00	0.0
Highway Segment	Head-on Collision	0.18	0.0	0.16	0.0	0.34	0.1
Highway Segment	Other Multi-vehicle Collision	0.42	0.1	1.64	0.3	2.06	0.4
Highway Segment	Rear-end Collision	7.33	1.4	15.25	3.0	22.59	4.4
Highway Segment	Sideswipe, Opposite Direction Collision	0.09	0.0	0.02	0.0	0.11	0.0
Highway Segment	Sideswipe, Same Direction Collision	0.44	0.1	5.14	1.0	5.58	1.1
Highway Segment	Total Multiple Vehicle Crashes	8.82	1.7	23.04	4.5	31.86	6.2
Highway Segment	Total Highway Segment Crashes	10.74	2.1	27.85	5.4	38.59	7.5
Intersection	Collision with Animal	0.01	0.0	0.05	0.0	0.06	0.0
Intersection	Collision with Bicycle	6.34	1.2	0.00	0.0	6.34	1.2
Intersection	Collision with Fixed Object	5.68	1.1	18.15	3.5	23.83	4.7
Intersection	Non-Collision	1.43	0.3	0.54	0.1	1.97	0.4
Intersection	Collision with Other Object	0.67	0.1	1.44	0.3	2.10	0.4
Intersection	Other Single-vehicle Collision	0.35	0.1	0.43	0.1	0.78	0.2
Intersection	Collision with Parked Vehicle	0.01	0.0	0.02	0.0	0.03	0.0
Intersection	Collision with Pedestrian	0.83	0.2	0.00	0.0	0.83	0.2
Intersection	Total Intersection Single Vehicle Crashes	15.31	3.0	20.63	4.0	35.93	7.0
Intersection	Angle Collision	46.20	9.0	67.90	13.3	114.10	22.3
Intersection	Head-on Collision	6.46	1.3	7.80	1.5	14.26	2.8
Intersection	Other Multi-vehicle Collision	7.89	1.5	61.04	11.9	68.93	13.5
Intersection	Rear-end Collision	68.23	13.3	149.71	29.2	217.94	42.5
Intersection	Sideswipe	13.01	2.5	9.47	1.8	22.48	4.4
Intersection	Total Intersection Multiple Vehicle Crashes	141.78	27.7	295.92	57.8	437.70	85.5
Intersection	Total Intersection Crashes	157.09	30.7	316.55	61.8	473.63	92.5
	Total Crashes	167.83	32.8	344.40	67.2	512.23	100.0

Note: *Fatal and Injury Crashes* and *Property Damage Only Crashes* do not necessarily sum up to *Total Crashes* because the distribution of these three crashes had been derived independently.

Table 8. Evaluation Message

Start Location (Sta. ft)	End Location (Sta. ft)	Message
24+36.259	24+36.259	for intersection #2 (24+36.259 to 24+36.259), minor road traffic volume (18,590 vpd) for 2024 is not within the model limit (16,400 vpd) for reliable results for intersection type 3SG
24+36.259	24+36.259	for intersection #2 (24+36.259 to 24+36.259), minor road traffic volume (18,913 vpd) for 2025 is not within the model limit (16,400 vpd) for reliable results for intersection type 3SG
24+36.259	24+36.259	for intersection #2 (24+36.259 to 24+36.259), minor road traffic volume (19,237 vpd) for 2026 is not within the model limit (16,400 vpd) for reliable results for intersection type 3SG
24+36.259	24+36.259	for intersection #2 (24+36.259 to 24+36.259), minor road traffic volume (19,561 vpd) for 2027 is not within the model limit (16,400 vpd) for reliable results for intersection type 3SG
24+36.259	24+36.259	for intersection #2 (24+36.259 to 24+36.259), minor road traffic volume (19,885 vpd) for 2028 is not within the model limit (16,400 vpd) for reliable results for intersection type 3SG
24+36.259	24+36.259	for intersection #2 (24+36.259 to 24+36.259), minor road traffic volume (20,208 vpd) for 2029 is not within the model limit (16,400 vpd) for reliable results for intersection type 3SG
24+36.259	24+36.259	for intersection #2 (24+36.259 to 24+36.259), minor road traffic volume (20,532 vpd) for 2030 is not within the model limit (16,400 vpd) for reliable results for intersection type 3SG
24+36.259	24+36.259	for intersection #2 (24+36.259 to 24+36.259), minor road traffic volume (20,856 vpd) for 2031 is not within the model limit (16,400 vpd) for reliable results for intersection type 3SG
24+36.259	24+36.259	for intersection #2 (24+36.259 to 24+36.259), minor road traffic volume (21,180 vpd) for 2032 is not within the model limit (16,400 vpd) for reliable results for intersection type 3SG
24+36.259	24+36.259	for intersection #2 (24+36.259 to 24+36.259), minor road traffic volume (21,503 vpd) for 2033 is not within the model limit (16,400 vpd) for reliable results for intersection type 3SG
24+36.259	24+36.259	for intersection #2 (24+36.259 to 24+36.259), minor road traffic volume (21,827 vpd) for 2034 is not within the model limit (16,400 vpd) for reliable results for intersection type 3SG
24+36.259	24+36.259	for intersection #2 (24+36.259 to 24+36.259), minor road traffic volume (22,151 vpd) for 2035 is not within the model limit (16,400 vpd) for reliable results for intersection type 3SG
24+36.259	24+36.259	for intersection #2 (24+36.259 to 24+36.259), minor road traffic volume (22,475 vpd) for 2036 is not within the model limit (16,400 vpd) for reliable results for intersection type 3SG
24+36.259	24+36.259	for intersection #2 (24+36.259 to 24+36.259), minor road traffic volume (22,798 vpd) for 2037 is not within the model limit (16,400 vpd) for reliable results for intersection type 3SG
24+36.259	24+36.259	for intersection #2 (24+36.259 to 24+36.259), minor road traffic volume (23,122 vpd) for 2038 is not within the model limit (16,400 vpd) for reliable results for intersection type 3SG
24+36.259	24+36.259	for intersection #2 (24+36.259 to 24+36.259), minor road traffic volume (23,446 vpd) for 2039 is not within the model limit (16,400 vpd) for reliable results for intersection type 3SG
24+36.259	24+36.259	for intersection #2 (24+36.259 to 24+36.259), minor road traffic volume (23,770 vpd) for 2040 is not within the model limit (16,400 vpd) for reliable results for intersection type 3SG
24+36.259	24+36.259	for intersection #2 (24+36.259 to 24+36.259), minor road traffic volume (24,224 vpd) for 2041 is not within the model limit (16,400 vpd) for reliable results for intersection type 3SG

Start Location (Sta. ft)	End Location (Sta. ft)	Message
24+36.259	24+36.259	for intersection #2 (24+36.259 to 24+36.259), minor road traffic volume (24,678 vpd) for 2042 is not within the model limit (16,400 vpd) for reliable results for intersection type 3SG
24+36.259	24+36.259	for intersection #2 (24+36.259 to 24+36.259), minor road traffic volume (25,132 vpd) for 2043 is not within the model limit (16,400 vpd) for reliable results for intersection type 3SG
24+36.259	24+36.259	for intersection #2 (24+36.259 to 24+36.259), minor road traffic volume (25,586 vpd) for 2044 is not within the model limit (16,400 vpd) for reliable results for intersection type 3SG
24+36.259	24+36.259	for intersection #2 (24+36.259 to 24+36.259), minor road traffic volume (26,040 vpd) for 2045 is not within the model limit (16,400 vpd) for reliable results for intersection type 3SG
24+36.259	24+36.259	for intersection #2 (24+36.259 to 24+36.259), minor road traffic volume (26,494 vpd) for 2046 is not within the model limit (16,400 vpd) for reliable results for intersection type 3SG
24+36.259	24+36.259	for intersection #2 (24+36.259 to 24+36.259), minor road traffic volume (26,948 vpd) for 2047 is not within the model limit (16,400 vpd) for reliable results for intersection type 3SG
24+36.259	24+36.259	for intersection #2 (24+36.259 to 24+36.259), minor road traffic volume (27,402 vpd) for 2048 is not within the model limit (16,400 vpd) for reliable results for intersection type 3SG
24+36.259	24+36.259	for intersection #2 (24+36.259 to 24+36.259), minor road traffic volume (27,856 vpd) for 2049 is not within the model limit (16,400 vpd) for reliable results for intersection type 3SG
24+36.259	24+36.259	for intersection #2 (24+36.259 to 24+36.259), minor road traffic volume (28,310 vpd) for 2050 is not within the model limit (16,400 vpd) for reliable results for intersection type 3SG
24+36.259	24+36.259	for intersection #2 (24+36.259 to 24+36.259), minor road traffic volume (28,764 vpd) for 2051 is not within the model limit (16,400 vpd) for reliable results for intersection type 3SG
24+36.259	24+36.259	for intersection #2 (24+36.259 to 24+36.259), minor road traffic volume (29,218 vpd) for 2052 is not within the model limit (16,400 vpd) for reliable results for intersection type 3SG
24+36.259	24+36.259	for intersection #2 (24+36.259 to 24+36.259), minor road traffic volume (29,672 vpd) for 2053 is not within the model limit (16,400 vpd) for reliable results for intersection type 3SG
24+36.259	24+36.259	for intersection #2 (24+36.259 to 24+36.259), minor road traffic volume (30,126 vpd) for 2054 is not within the model limit (16,400 vpd) for reliable results for intersection type 3SG
24+36.259	24+36.259	for intersection #2 (24+36.259 to 24+36.259), minor road traffic volume (30,580 vpd) for 2055 is not within the model limit (16,400 vpd) for reliable results for intersection type 3SG

Interactive Highway Safety Design Model

Crash Prediction Evaluation Report

June 25, 2019

Disclaimer

The Interactive Highway Design Model (IHSDM) software is disseminated under the sponsorship of the Department of Transportation in the interest of information exchange. The United States Government assumes no liability for its content or use thereof. This document does not constitute a standard, specification, or regulation.

The United States Government does not endorse products or manufacturers. Trade and manufacturers' names may appear in this software and documentation only because they are considered essential to the objective of the software.

Limited Warranty and Limitations of Remedies

This software product is provided "as-is," without warranty of any kind-either expressed or implied (but not limited to the implied warranties of merchantability and fitness for a particular purpose). The FHWA do not warrant that the functions contained in the software will meet the end-user's requirements or that the operation of the software will be uninterrupted and error-free.

Under no circumstances will the FHWA be liable to the end-user for any damages or claimed lost profits, lost savings, or other incidental or consequential damages rising out of the use or inability to use the software (even if these organizations have been advised of the possibility of such damages), or for any claim by any other party.

Notice

The use of the IHSDM software is being done strictly on a voluntary basis. In exchange for provision of IHSDM, the user agrees that the Federal Highway Administration (FHWA), U.S. Department of Transportation and any other agency of the Federal Government shall not be responsible for any errors, damage or other liability that may result from any and all use of the software, including installation and testing of the software. The user further agrees to hold the FHWA and the Federal Government harmless from any resulting liability. The user agrees that this hold harmless provision shall flow to any person to whom or any entity to which the user provides the IHSDM software. It is the user's full responsibility to inform any person to whom or any entity to which it provides the IHSDM software of this hold harmless provision.

Table of Contents

Report Overview	1
Section Types	2
Section 1 Evaluation	2

List of Tables

Table Evaluation Highway - Homogeneous Segments (Section 1)	4
Table Evaluation Intersection (Section 1)	5
Table Predicted Highway Crash Rates and Frequencies Summary (Section 1)	6
Table Predicted Crash Frequencies and Rates by Highway Segment/Intersection (Section 1)	7
Table Predicted Crash Frequencies and Rates by Horizontal Design Element (Section 1)	7
Table Predicted Crash Frequencies by Year (Section 1)	8
Table Predicted Five Lane or Fewer Crash Type Distribution (Section 1)	9

List of Figures

Figure Crash Prediction Summary (Section 1)	3
---	---

Report Overview

Report Generated: Jun 25, 2019 2:35 PM

Report Template: System: Multi-Page, 508 Compliant [System] (mlcpm4, Jun 20, 2019 12:11 PM)

Evaluation Date: Tue Jun 25 14:32:01 CDT 2019

IHSDM Version: v14.1.0 (Mar 12, 2019)

Crash Prediction Module: v9.1.0 (Mar 12, 2019)

User Name: salomonsend

Organization Name: AECOM

Phone: 608-828-8203

E-Mail: derek.salomonsen@aecom.com

Project Title: Saundersville Road/Hendersonville BUILD grant - BUILD

Project Comment: Created Mon Jun 24 11:15:36 CDT 2019

Project Unit System: U.S. Customary

Highway Title: BUILD - Alignment US 31_Main St

Highway Comment: Imported from USH 31_Johnny Cash Pkwy.xml

Highway Version: 1

Evaluation Title: US 31/Main St - Build

Evaluation Comment: Created Tue Jun 25 14:31:21 CDT 2019

Minimum Location: 27+38.280

Maximum Location: 46+33.461

Policy for Superelevation: AASHTO 2011 U.S. Customary

Calibration: HSM Configuration

Crash Distribution: HSM Configuration

Model/CMF: HSM Configuration

First Year of Analysis: 2024

Last Year of Analysis: 2055

Empirical-Bayes Analysis: None

First Year of Observed Crashes:

Last Year of Observed Crashes:

Section Types

Section 1 Evaluation

Section: Section 1

Evaluation Start Location: 27+38.280

Evaluation End Location: 46+33.461

Area Type: Suburban

Functional Class: Arterial

Type of Alignment: Undivided, Multilane

Model Category: Urban/Suburban Arterial

Calibration Factor: 4SG=1.0; 5T=1.0;

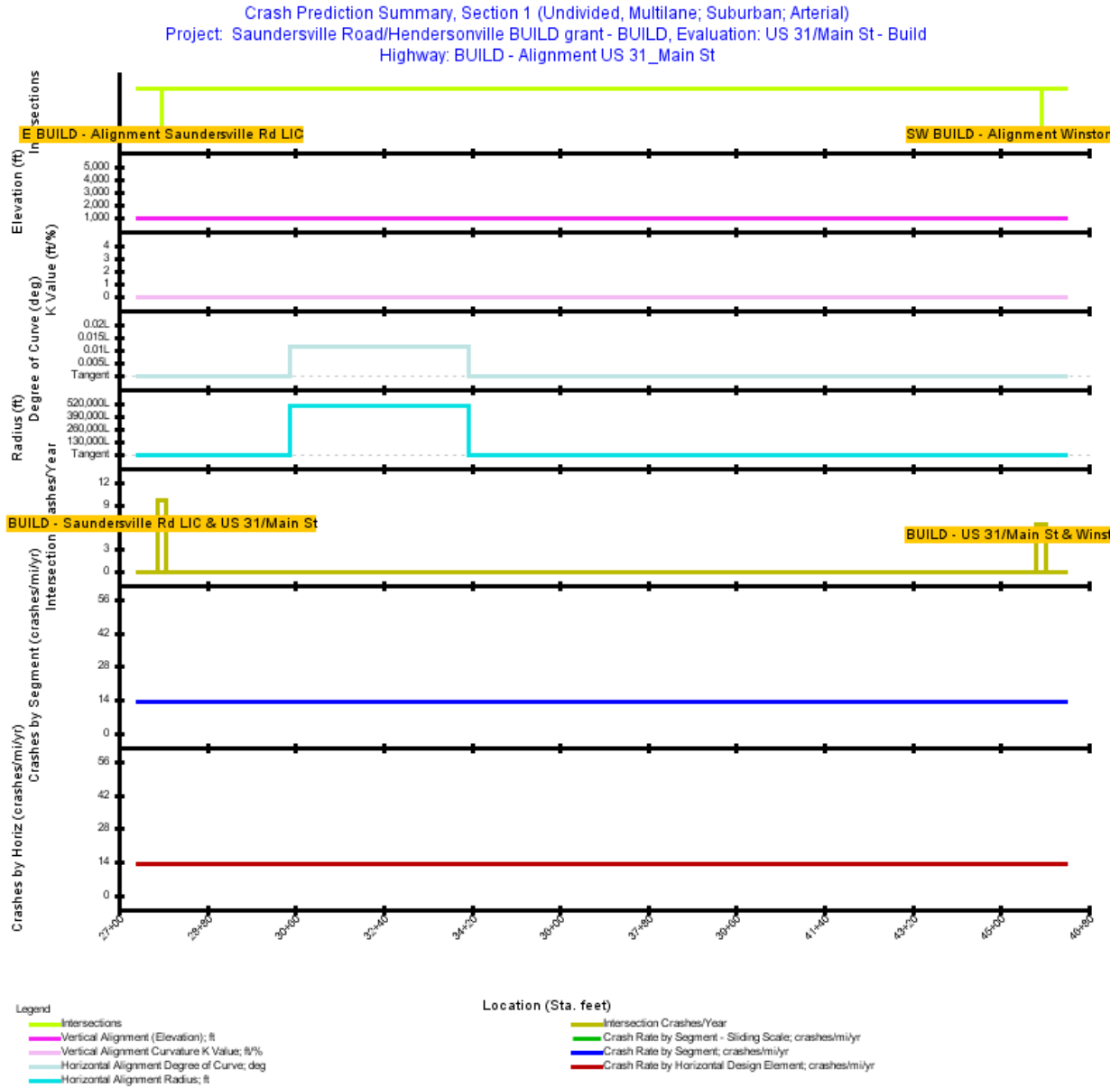


Figure 1. Crash Prediction Summary (Section 1)

Table 1. Evaluation Highway - Homogeneous Segments (Section 1)

Seg. No.	Type	Start Location (Sta. ft)	End Location (Sta. ft)	Length (ft)	Length (mi)	AADT	Number Major Commercial Driveways	Number Minor Commercial Driveways	Number Major Industrial/Institutional	Number Minor Industrial/Institutional	Number Major Residential Driveways	Number Minor Residential Driveways	Number Other Driveways	Lighting	Automated Speed Enforcement	Density (fixed objects/mi)	Median Width (ft)	Type	Effective Median Width (ft)	Speed Level	Number Rail Highway Crossings	Average Shoulder Width (ft)	Average Lane Width (ft)	
1	ST	27+38.280	30+49.687	311.41	0.0590	2024: 25,790; 2025: 26,134; 2026: 26,478; 2027: 26,823; 2028: 27,167; 2029: 27,511; 2030: 27,856; 2031: 28,200; 2032: 28,545; 2033: 28,889; 2034: 29,233; 2035: 29,578; 2036: 29,922; 2037: 30,266; 2038: 30,611; 2039: 30,955; 2040: 31,300; 2041: 31,738; 2042: 32,177; 2043: 32,616; 2044: 33,054; 2045: 33,493; 2046: 33,932; 2047: 34,370; 2048: 34,809; 2049: 35,248; 2050: 35,686; 2051: 36,125; 2052: 36,564; 2053: 37,002; 2054: 37,441; 2055: 37,880	0	0	0	0	0	0	0	0	true	false	0.0	0.00	None	0.00	Intermediate/High	0	4.00	10.00
2	ST	30+49.687	34+13.535	363.85	0.0689	2024: 25,790; 2025: 26,134; 2026: 26,478; 2027: 26,823; 2028: 27,167; 2029: 27,511; 2030: 27,856; 2031: 28,200; 2032: 28,545; 2033: 28,889; 2034: 29,233; 2035: 29,578; 2036: 29,922; 2037: 30,266; 2038: 30,611; 2039: 30,955; 2040: 31,300; 2041: 31,738; 2042: 32,177; 2043: 32,616; 2044: 33,054; 2045: 33,493; 2046: 33,932; 2047: 34,370; 2048: 34,809; 2049: 35,248; 2050: 35,686; 2051: 36,125; 2052: 36,564; 2053: 37,002; 2054: 37,441; 2055: 37,880	0	0	0	0	0	0	0	0	true	false	0.0	0.00	None	0.00	Intermediate/High	0	4.00	10.00
3	ST	34+13.535	46+33.461	1,219.93	0.2311	2024: 25,790; 2025: 26,134; 2026: 26,478; 2027: 26,823; 2028: 27,167; 2029: 27,511; 2030: 27,856; 2031: 28,200; 2032: 28,545; 2033: 28,889; 2034: 29,233; 2035: 29,578; 2036: 29,922; 2037: 30,266; 2038: 30,611; 2039: 30,955; 2040: 31,300; 2041: 31,738; 2042: 32,177; 2043: 32,616; 2044: 33,054; 2045: 33,493; 2046: 33,932; 2047: 34,370; 2048: 34,809; 2049: 35,248; 2050: 35,686; 2051: 36,125; 2052: 36,564; 2053: 37,002; 2054: 37,441; 2055: 37,880	0	0	0	0	0	0	0	0	true	false	0.0	0.00	None	0.00	Intermediate/High	0	4.00	10.00

Table 2. Evaluation Intersection (Section 1)

Inter . No.	Title	Locatio n (Sta. ft)	Major AADT	Minor AADT	Legs	Traffic Control	Intersection Type	Approach es w/Left Turn Lanes	Approach es w/Right Turn Lanes	Approach es w/o Right Turn on Red	Pedestria n Volume (crossings /day)	Lighte d at Night	Red Light Camera	Scho ol Near by	Num ber of Bus Stops	Number of Alcohol Sales Establishments	Max Lanes Cross ed	Replaced with Roundab out
1	BUILD - US 31/Main St & Winston Hill Rd	45+83.000	2024: 25,790; 2025: 26,134; 2026: 26,478; 2027: 26,823; 2028: 27,167; 2029: 27,511; 2030: 27,856; 2031: 28,200; 2032: 28,545; 2033: 28,889; 2034: 29,233; 2035: 29,578; 2036: 29,922; 2037: 30,266; 2038: 30,611; 2039: 30,955; 2040: 31,300; 2041: 31,738; 2042: 32,177; 2043: 32,616; 2044: 33,054; 2045: 33,493; 2046: 33,932; 2047: 34,370; 2048: 34,809; 2049: 35,248; 2050: 35,686; 2051: 36,125; 2052: 36,564; 2053: 37,002; 2054: 37,441; 2055: 37,880	2024: 2,250; 2025: 2,286; 2026: 2,323; 2027: 2,360; 2028: 2,397; 2029: 2,434; 2030: 2,471; 2031: 2,508; 2032: 2,545; 2033: 2,581; 2034: 2,618; 2035: 2,655; 2036: 2,692; 2037: 2,729; 2038: 2,766; 2039: 2,803; 2040: 2,840; 2041: 2,890; 2042: 2,941; 2043: 2,992; 2044: 3,042; 2045: 3,093; 2046: 3,144; 2047: 3,194; 2048: 3,245; 2049: 3,296; 2050: 3,346; 2051: 3,397; 2052: 3,448; 2053: 3,498; 2054: 3,549; 2055: 3,600	4	Signalized	Four-Legged Signalized	0	0	0	15	true	false	false	0	0	6	false
2	BUILD - Saundersville Rd LIC & US 31/Main St	27+88.000	2024: 25,790; 2025: 26,134; 2026: 26,478; 2027: 26,823; 2028: 27,167; 2029: 27,511; 2030: 27,856; 2031: 28,200; 2032: 28,545; 2033: 28,889; 2034: 29,233; 2035: 29,578; 2036: 29,922; 2037: 30,266; 2038: 30,611; 2039: 30,955; 2040: 31,300; 2041: 31,738; 2042: 32,177; 2043: 32,616; 2044: 33,054; 2045: 33,493; 2046: 33,932; 2047: 34,370; 2048: 34,809; 2049: 35,248; 2050: 35,686; 2051: 36,125; 2052: 36,564; 2053: 37,002; 2054: 37,441; 2055: 37,880	2024: 18,590; 2025: 18,913; 2026: 19,237; 2027: 19,561; 2028: 19,885; 2029: 20,208; 2030: 20,532; 2031: 20,856; 2032: 21,180; 2033: 21,503; 2034: 21,827; 2035: 22,151; 2036: 22,475; 2037: 22,798; 2038: 23,122; 2039: 23,446; 2040: 23,770; 2041: 24,224; 2042: 24,678; 2043: 25,132; 2044: 25,586; 2045: 26,040; 2046: 26,494; 2047: 26,948; 2048: 27,402; 2049: 27,856; 2050: 28,310; 2051: 28,764; 2052: 29,218; 2053: 29,672; 2054: 30,126; 2055: 30,580	4	Signalized	Four-Legged Signalized	0	0	0	5	true	false	false	0	0	6	false

Table 3. Predicted Highway Crash Rates and Frequencies Summary (Section 1)

First Year of Analysis	2024
Last Year of Analysis	2055
Evaluated Length (mi)	0.3589
Average Future Road AADT (vpd)	31,481
Predicted Crashes	
Total Crashes	662.19
Fatal and Injury Crashes	221.20
Property-Damage-Only Crashes	441.00
Percent of Total Predicted Crashes	
Percent Fatal and Injury Crashes (%)	33
Percent Property-Damage-Only Crashes (%)	67
Predicted Crash Rate	
Crash Rate (crashes/mi/yr)	57.6525
FI Crash Rate (crashes/mi/yr)	19.2582
PDO Crash Rate (crashes/mi/yr)	38.3943
Predicted Travel Crash Rate	
Total Travel (million veh-mi)	131.98
Travel Crash Rate (crashes/million veh-mi)	5.02
Travel FI Crash Rate (crashes/million veh-mi)	1.68
Travel PDO Crash Rate (crashes/million veh-mi)	3.34

Table 4. Predicted Crash Frequencies and Rates by Highway Segment/Intersection (Section 1)

Segment Number/Intersection Name/Cross Road	Start Location (Sta. ft)	End Location (Sta. ft)	Length (mi)	Total Predicted Crashes for Evaluation Period	Predicted Total Crash Frequency (crashes/yr)	Predicted FI Crash Frequency (crashes/yr)	Predicted PDO Crash Frequency (crashes/yr)	Predicted Crash Rate (crashes/mi/yr)	Predicted Travel Crash Rate (crashes/million veh-mi)	Predicted Intersection Travel Crash Rate (crashes/million veh)
1	27+38.280	30+49.687	0.0590	24.613	0.7692	0.2172	0.5519	13.0412	1.14	
BUILD - Saundersville Rd LIC & US 31/Main St	27+88.000			306.740	9.5856	3.3129	6.2727			0.47
2	30+49.687	34+13.535	0.0689	28.758	0.8987	0.2538	0.6449	13.0412	1.14	
3	34+13.535	46+33.461	0.2310	96.420	3.0131	0.8509	2.1622	13.0412	1.14	
BUILD - US 31/Main St & Winston Hill Rd	45+83.000			205.663	6.4270	2.2776	4.1494			0.51
All Segments			0.3589	149.790	4.6810	1.3220	3.3590	13.0412	1.14	
All Intersections				512.403	16.0126	5.5905	10.4221			0.49
Total			0.3589	662.193	20.6935	6.9125	13.7811	57.6525		

Table 5. Predicted Crash Frequencies and Rates by Horizontal Design Element (Section 1)

Title	Start Location (Sta. ft)	End Location (Sta. ft)	Length (mi)	Total Predicted Crashes for Evaluation Period	Predicted Total Crash Frequency (crashes/yr)	Predicted FI Crash Frequency (crashes/yr)	Predicted PDO Crash Frequency (crashes/yr)	Predicted Crash Rate (crashes/mi/yr)	Predicted Travel Crash Rate (crashes/million veh-mi)
Tangent	27+38.280	30+49.687	0.0590	24.613	0.7692	0.2172	0.5519	13.0412	1.14
Simple Curve 1	30+49.687	34+13.535	0.0689	28.758	0.8987	0.2538	0.6449	13.0412	1.14
Tangent	34+13.535	46+33.461	0.2310	96.420	3.0131	0.8509	2.1622	13.0412	1.14

Table 6. Predicted Crash Frequencies by Year (Section 1)

Year	Total Crashes	FI Crashes	Percent FI (%)	PDO Crashes	Percent PDO (%)
2024	16.00	5.28	32.971	10.73	67.029
2025	16.28	5.37	32.997	10.91	67.003
2026	16.55	5.47	33.023	11.09	66.977
2027	16.83	5.56	33.048	11.27	66.952
2028	17.10	5.66	33.074	11.45	66.926
2029	17.38	5.75	33.099	11.63	66.901
2030	17.66	5.85	33.124	11.81	66.876
2031	17.93	5.95	33.149	11.99	66.851
2032	18.21	6.04	33.174	12.17	66.826
2033	18.49	6.14	33.199	12.35	66.802
2034	18.77	6.24	33.223	12.54	66.777
2035	19.06	6.34	33.247	12.72	66.753
2036	19.34	6.43	33.271	12.90	66.729
2037	19.62	6.53	33.295	13.09	66.705
2038	19.91	6.63	33.319	13.27	66.681
2039	20.19	6.73	33.342	13.46	66.658
2040	20.48	6.83	33.366	13.64	66.634
2041	20.85	6.96	33.395	13.88	66.605
2042	21.22	7.09	33.424	14.13	66.576
2043	21.59	7.22	33.453	14.37	66.547
2044	21.97	7.36	33.482	14.61	66.518
2045	22.34	7.49	33.510	14.86	66.490
2046	22.72	7.62	33.538	15.10	66.462
2047	23.10	7.75	33.566	15.35	66.434
2048	23.48	7.89	33.594	15.59	66.406
2049	23.86	8.02	33.621	15.84	66.379
2050	24.25	8.16	33.648	16.09	66.352
2051	24.63	8.29	33.675	16.34	66.325
2052	25.01	8.43	33.702	16.58	66.298
2053	25.40	8.57	33.729	16.83	66.271
2054	25.79	8.70	33.755	17.08	66.245
2055	26.18	8.84	33.781	17.33	66.219
Total	662.19	221.20	33.404	441.00	66.596
Average	20.69	6.91	33.404	13.78	66.596

Note: *Fatal and Injury Crashes* and *Property Damage Only Crashes* do not necessarily sum up to *Total Crashes* because the distribution of these three crashes had been derived independently.

Table 7. Predicted Five Lane or Fewer Crash Type Distribution (Section 1)

Element Type	Crash Type	FI Crashes	Percent FI (%)	PDO Crashes	Percent PDO (%)	Total Crashes	Percent Total (%)
Highway Segment	Collision with Animal	0.08	0.0	0.90	0.1	0.98	0.1
Highway Segment	Collision with Bicycle	1.74	0.3	0.00	0.0	1.74	0.3
Highway Segment	Collision with Fixed Object	2.00	0.3	14.07	2.1	16.08	2.4
Highway Segment	Collision with Other Object	0.03	0.0	1.12	0.2	1.14	0.2
Highway Segment	Other Single-vehicle Collision	2.92	0.4	2.24	0.3	5.16	0.8
Highway Segment	Collision with Pedestrian	3.33	0.5	0.00	0.0	3.33	0.5
Highway Segment	Total Single Vehicle Crashes	10.10	1.5	18.33	2.8	28.42	4.3
Highway Segment	Angle Collision	1.61	0.2	5.26	0.8	6.87	1.0
Highway Segment	Driveway-related Collision	0.00	0.0	0.00	0.0	0.00	0.0
Highway Segment	Head-on Collision	0.68	0.1	0.36	0.1	1.03	0.2
Highway Segment	Other Multi-vehicle Collision	0.58	0.1	2.59	0.4	3.17	0.5
Highway Segment	Rear-end Collision	27.25	4.1	58.04	8.8	85.29	12.9
Highway Segment	Sideswipe, Opposite Direction Collision	0.13	0.0	0.80	0.1	0.93	0.1
Highway Segment	Sideswipe, Same Direction Collision	1.97	0.3	22.11	3.3	24.08	3.6
Highway Segment	Total Multiple Vehicle Crashes	32.21	4.9	89.16	13.5	121.37	18.3
Highway Segment	Total Highway Segment Crashes	42.30	6.4	107.49	16.2	149.79	22.6
Intersection	Collision with Animal	0.01	0.0	0.04	0.0	0.05	0.0
Intersection	Collision with Bicycle	7.56	1.1	0.00	0.0	7.56	1.1
Intersection	Collision with Fixed Object	4.68	0.7	17.56	2.7	22.25	3.4
Intersection	Non-Collision	0.89	0.1	0.69	0.1	1.57	0.2
Intersection	Collision with Other Object	0.45	0.1	1.41	0.2	1.87	0.3
Intersection	Other Single-vehicle Collision	0.25	0.0	0.46	0.1	0.72	0.1
Intersection	Collision with Parked Vehicle	0.01	0.0	0.02	0.0	0.03	0.0
Intersection	Collision with Pedestrian	0.80	0.1	0.00	0.0	0.80	0.1
Intersection	Total Intersection Single Vehicle Crashes	14.65	2.2	20.19	3.0	34.84	5.3
Intersection	Angle Collision	56.99	8.6	76.45	11.5	133.44	20.2
Intersection	Head-on Collision	8.05	1.2	9.40	1.4	17.45	2.6
Intersection	Other Multi-vehicle Collision	9.03	1.4	66.11	10.0	75.14	11.3
Intersection	Rear-end Collision	73.91	11.2	151.33	22.9	225.24	34.0
Intersection	Sideswipe	16.26	2.5	10.03	1.5	26.29	4.0
Intersection	Total Intersection Multiple Vehicle Crashes	164.24	24.8	313.32	47.3	477.56	72.1
Intersection	Total Intersection Crashes	178.90	27.0	333.51	50.4	512.40	77.4
	Total Crashes	221.20	33.4	441.00	66.6	662.19	100.0

Note: *Fatal and Injury Crashes* and *Property Damage Only Crashes* do not necessarily sum up to *Total Crashes* because the distribution of these three crashes had been derived independently.