

COMPREHENSIVE SAFETY ACTION PLAN



CHAPTER 4 *HIGH INJURY NETWORK*

INTRODUCTION

To build on the analysis covered in the preceding chapter, **Chapter 4** will provide details on the decision-making analysis conducted to aid in project selection and prioritization: High Injury Network. The crash analysis displays traffic safety concerns in the City of Guthrie and specific safety emphasis areas of concern. This chapter will filter down the locations that are experiencing high numbers of fatal and severe injury crashes and prioritize corridors needing safety countermeasures.

What is the High Injury Network?

Critical Crash Rate Method

High Injury Network Results



What is the High Injury Network?

The high injury network (HIN) is a network of road segments in the City that experience a higher-than-average rate of crashes resulting in fatal, severe, and minor injuries (KABs). The HIN is a key component of Vision Zero, aiming to provide safe mobility for roadway users. Through analyzing crash data, functional classifications, and traffic volumes, the HIN targets the roadways and intersections where a disproportionately high number of KABs occur to provide the most significant impact on road safety.

This network is meant to assist Guthrie in prioritizing future transportation projects and investments. Identifying road segments with the most severe and frequent crashes is the first step in developing countermeasures and policy recommendations to improve safety for all.

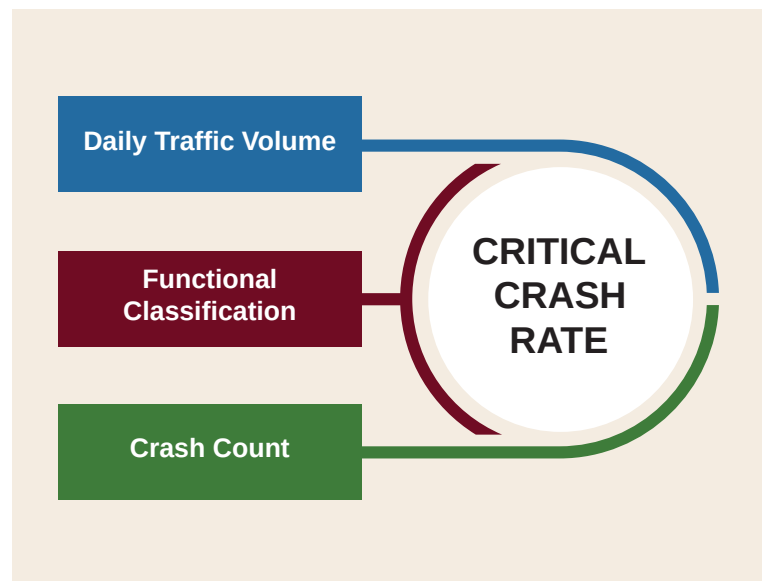
Critical Crash Rate Method

Calculating critical crash rates involves comparing roadway segments of similar functional classes and contexts, normalized by vehicle miles traveled (VMT). If the observed crash rate on a segment exceeds the expected crash rate, this means the segment has a critical crash rate and is flagged to potentially be added to the HIN. These steps are further detailed in **Chapter 4** of the Highway Safety Manual (pages 4-41 – 4-45; Section 4.4.2.5).

Since the critical crash rate method requires several intermediate calculations to arrive to the final crash rate, an ArcGIS Pro model was created to complete these calculations for each segment on Guthrie's network.

The critical crash rate was calculated for each segment in the City's network using the following three steps:

Figure 17. High Injury Network Data Inputs



1. Assigning Data to Road Segments

Calculating the critical crash rate requires three data inputs: roadway functional classification, daily traffic volumes, and weighted crash counts. Crashes were weighted by severity to ensure that areas with fatal crashes were prioritized in the development of the HIN. The critical crash rate compares road segments of the same functional classification and normalizes daily traffic volumes to evenly evaluate roads against others of a similar function.

2. Calculate Variables of Critical Crash Rate

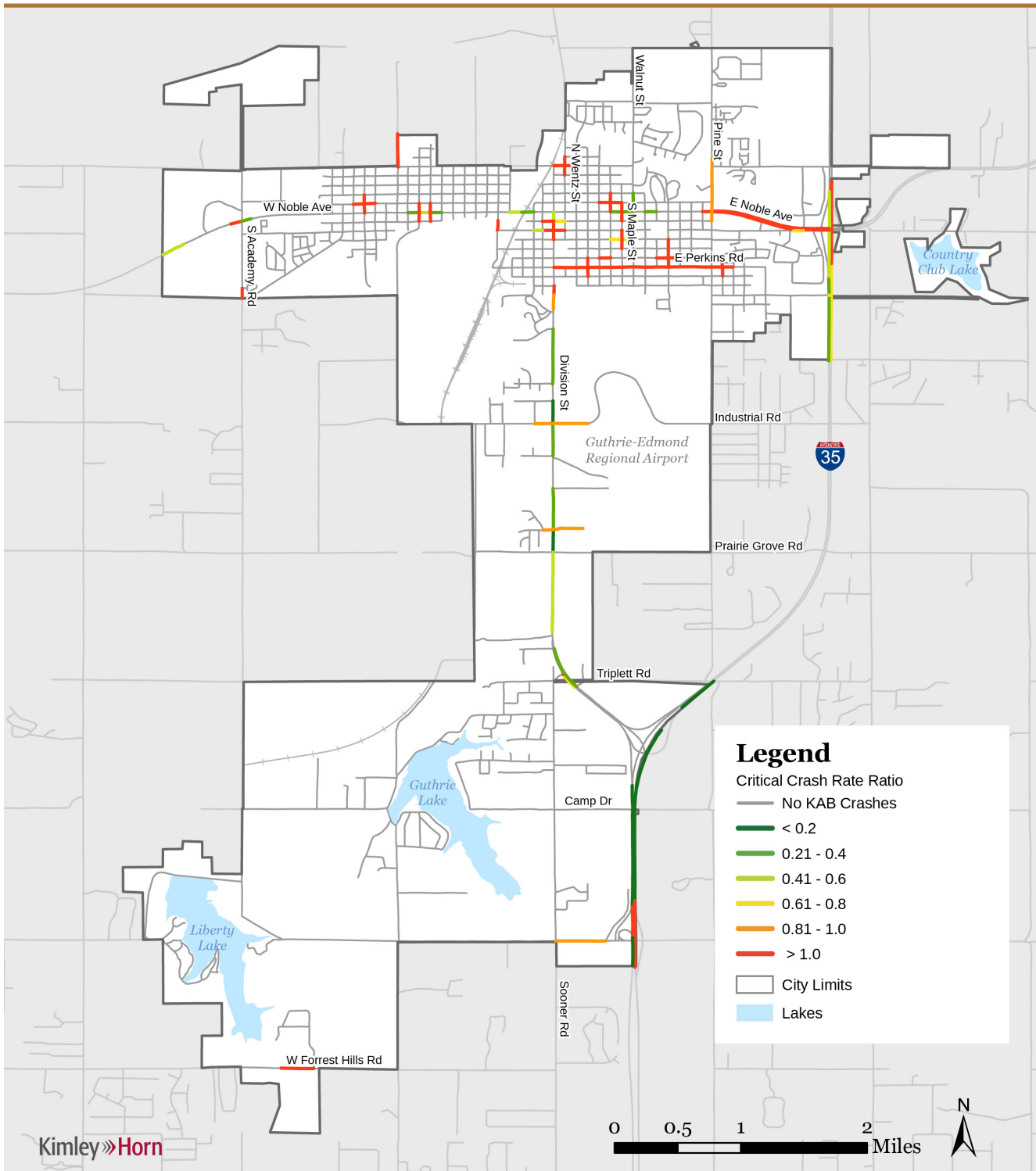
The variables of the critical crash rate were calculated using the equations specified in the FHWA Highway Safety Manual. The critical crash rate compares the difference between the observed crash rate and the expected crash rate. The observed crash rate is determined by using the existing crashes at each segment per 100 million VMT. The expected average crash rate per 100 million VMT normalizes the daily volumes for each functional class per context. After both values are calculated for a segment, the equation highlights segments that experience a higher crash rate than what is expected for a segment of its functional classification, context, traffic volume, and weighted crash counts.

3. Calculate Critical Crash Rate Ratio

Once all variables are input, a ratio is calculated to identify segments experiencing higher-than-average rates of fatal, serious, and minor injury crashes. If the ratio is greater than 1.0, or the observed critical crash rate is higher than the critical crash rate, then the segment's crash history is higher than other road segments of similar functional classification and context. Segments with a high critical crash rate ratio were considered for the HIN.

Exhibit 11 on page 46 displays the results of the critical crash rate analysis.

Exhibit 11. Critical Crash Rates Results





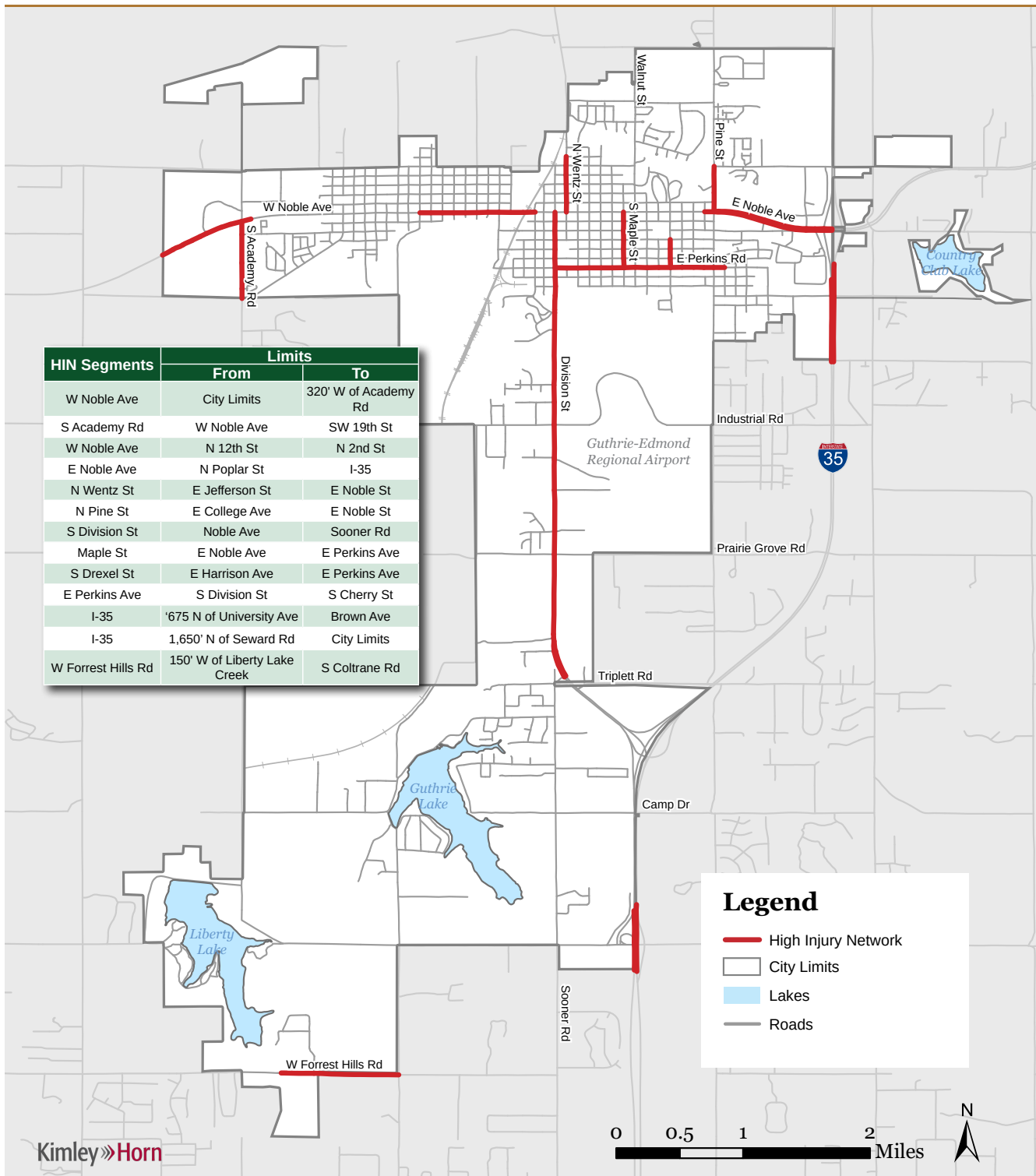
High Injury Network Results

Creating the HIN requires both a qualitative and quantitative approach. While the critical crash rate method produces results that identify segments with higher-than-average crash rates, finalizing the network requires post processing. Gaps between the remaining segments were connected to create a consistent and continuous network. Ultimately, the goal of the HIN selection process is to maximize the total fatal, severe, and minor injury crashes on the least mileage of roads on the network. The final HIN for the City of Guthrie comprises of only 8.5% of the total road network while capturing 100% of all fatal crashes and 68.6% of all fatal, suspected serious, and suspected minor injury crashes. **Table 12** and **Exhibit 12** display the HIN.

Table 12. High Injury Network Segments

HIN SEGMENTS	LIMITS		LENGTH (MILES)	CRASHES			TOTAL KABS	AADT
	FROM	TO		K	A	B		
W Noble Ave	City Limits	320' W of Academy Rd	0.63	1	2	3	6	9,700
S Academy Rd	W Noble Ave	SW 19th St	0.60	0	1	0	1	1,100
W Noble Ave	N 12th St	N 2nd St	0.73	0	0	4	4	9,700
E Noble Ave	N Poplar St	I-35	0.80	0	1	15	16	11,200
N Wentz St	E Jefferson St	E Noble Ave	0.43	1	0	0	1	3,500
N Pine St	E College Ave	E Noble Ave	0.35	0	1	8	9	4,000
S Division St	Noble Ave	Sooner Rd	3.60	1	3	18	22	13,105
Maple St	E Noble Ave	E Perkins Ave	0.43	0	0	2	2	270
S Drexel St	E Harrison Ave	E Perkins Ave	0.22	0	1	1	2	180
E Perkins Ave	S Division St	S Cherry St	1.07	1	0	1	2	420
I-35	I-35 Frontage Road Ramps	Brown Ave	0.76	0	2	1	3	38,090
I-35	I-35 Frontage Road Ramps	I-35 Frontage Road Ramps	0.52	1	1	4	6	46,300
W Forrest Hills Rd	150' W of Liberty Lake Creek	S Coltrane Rd	0.74	0	1	0	1	1,500

Exhibit 12. High Injury Network Results





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