

APPENDIX D2: WESTERN WEBER COUNTY

Safety Summary

Tech Memo #1 Safety Analysis

Case Study Project Information Sheets

Case Study Project Location Map

Equity Index Map

WESTERN WEBER COUNTY SAFETY SUMMARY

CSAP OVERVIEW

“A plan to provide local governments the means to make strategic roadway safety improvements”

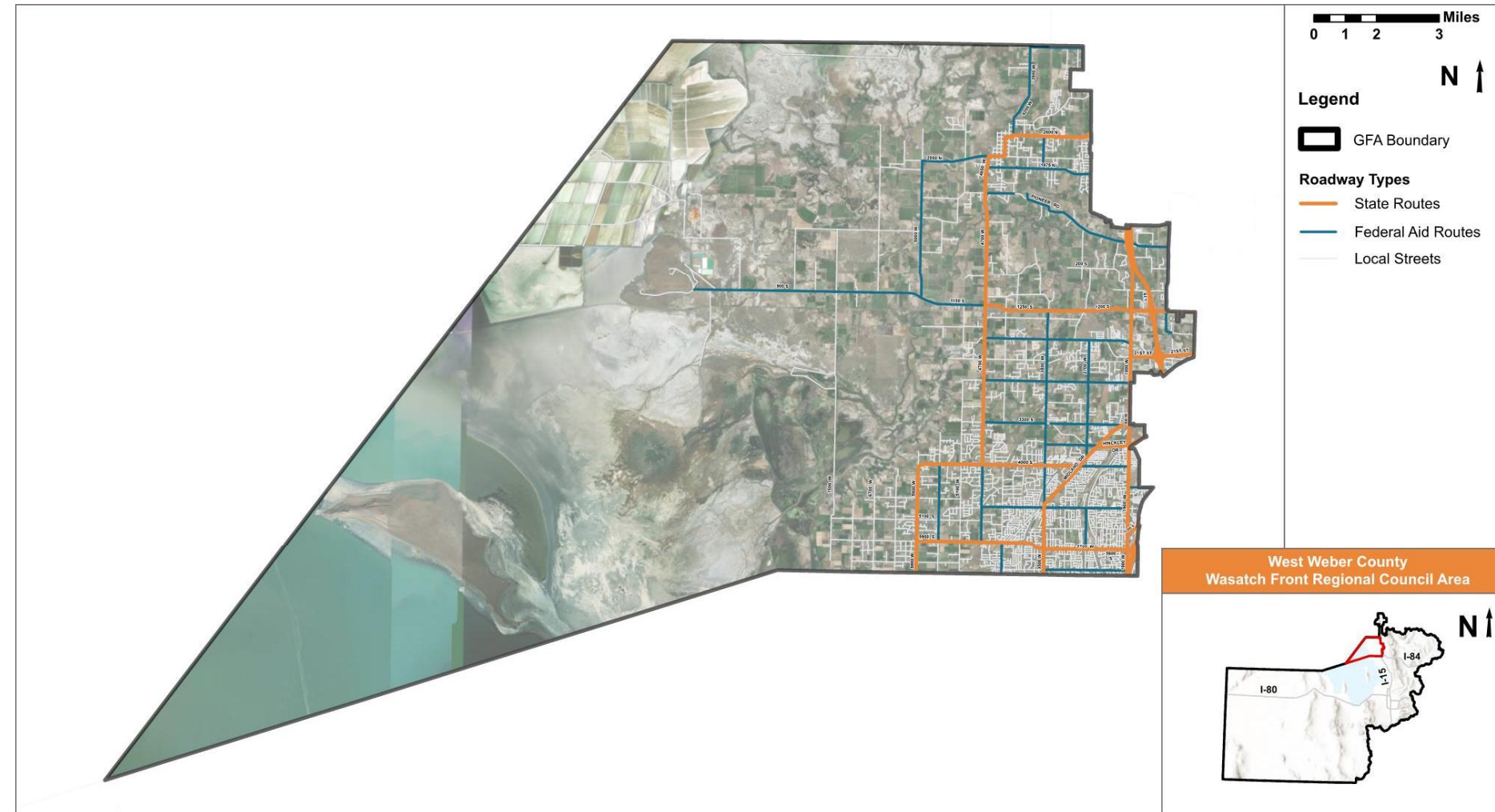
Wasatch Front Regional Council (WFRC) is preparing a regional Comprehensive Safety Action Plan (CSAP). The CSAP will present a **holistic, well-defined strategy to reduce roadway fatalities and serious injuries** in the Wasatch Front region.

The CSAP will **analyze** safety needs, **identify** high-risk locations and factors contributing to crashes, and **prioritize** strategies to address them.

The CSAP will meet eligibility requirements that allow local jurisdictions to apply for **Implementation Grants** from the United States Department of Transportation (USDOT) Safe Streets and Roads for All (SS4A) discretionary grant program. The grant program was established by the Bipartisan Infrastructure Law (BIL) with \$5 billion in appropriated funds, 2022-2026. A Safety Action Plan must include the following elements, as specified by FHWA to satisfy eligibility requirements to apply for an implementation grant:

State Route: Roadways owned, operated, and maintained by UDOT

Federal-Aid Route: Non-UDOT roadways eligible for federal funding – typically minor arterials and collectors



Self-Certification Checklist

Plan must include the following:

Safety Analysis

- Existing conditions and historical trends
- Crashes by location, severity, and contributing factor
- Systemic and specific safety needs
- Geospatial identification of higher risk locations

Identification of comprehensive set of projects and strategies

...And must complete 4 of the 6 elements to the right:

- | | |
|---|--|
| <p>1. Leadership Commitment</p> <ul style="list-style-type: none"> <input type="checkbox"/> Governing body publicly commit to a zero fatalities and serious injury goal | <p>4. Equity</p> <ul style="list-style-type: none"> <input type="checkbox"/> Data-driven, inclusive, and representative processes |
| <p>2. Plan Development</p> <ul style="list-style-type: none"> <input type="checkbox"/> Committee charged with plan development, implementation, and monitoring | <p>5. Policies, Plans, Guidelines, and/or Standards</p> <ul style="list-style-type: none"> <input type="checkbox"/> Assessment policies, plans, guidelines, and/or standards |
| <p>3. Development Activities</p> <ul style="list-style-type: none"> <input type="checkbox"/> Engagement with public and relevant stakeholders | <p>6. Progress</p> <ul style="list-style-type: none"> <input type="checkbox"/> Description on how progress will be measured over time |

Safe System Approach

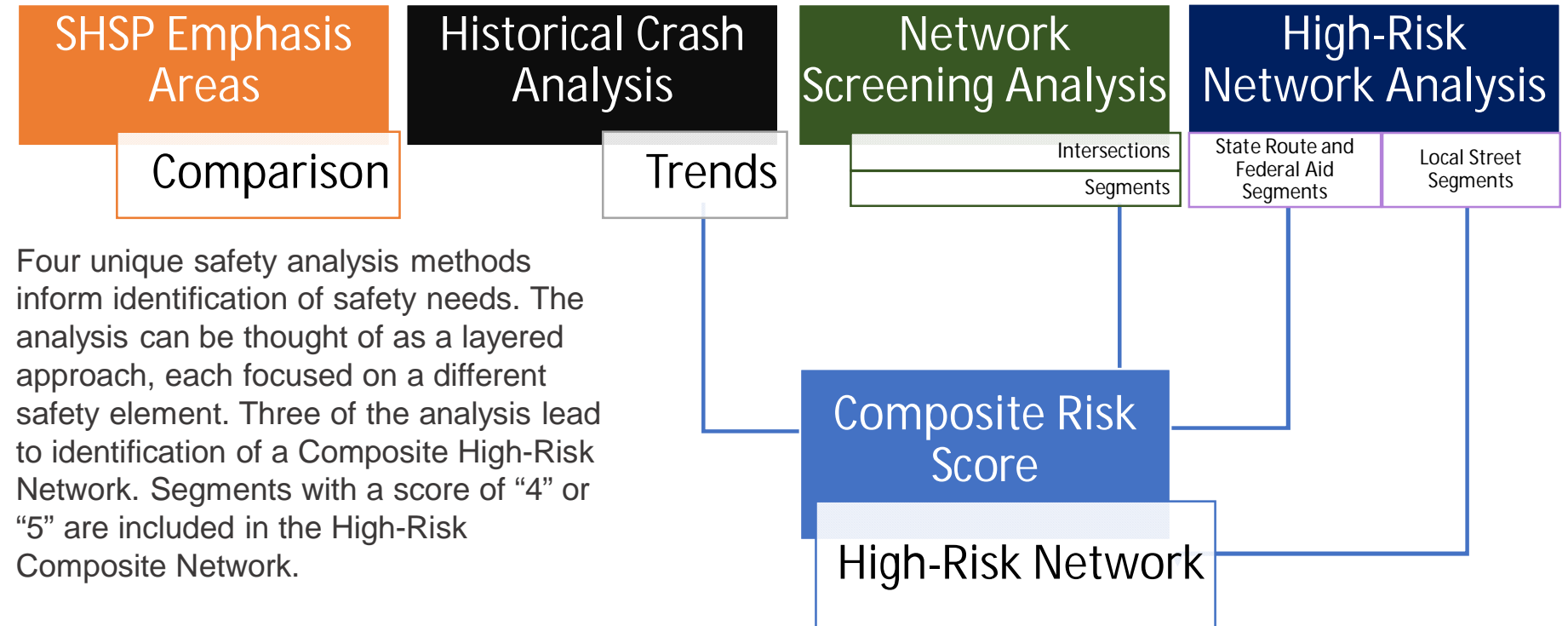
Implementing a Safe System Approach requires moving away from traditional safety paradigms.

- ❑ The Safe System approach seeks to prevent death and serious injuries.
- ❑ The Safe System approach designs for human mistakes and limitations.
- ❑ The Safe System approach focuses on speed management and strategies to reduce system kinetic energy.
- ❑ The Safe System approach aims to share responsibility among system users, managers, and others.
- ❑ The Safe System approach proactively identifies and addresses risks



Traditional Approach to Safety	Safe System Approach Paradigm
Prevent crashes	Prevent death and serious injury
Improve human behavior	Design for human mistakes/limitations
Control speeding	Reduce system kinetic energy
Individuals are responsible	Share responsibility
React based on crash history	Proactively identify and address risks

Safety Analysis Methodology



Four unique safety analysis methods inform identification of safety needs. The analysis can be thought of as a layered approach, each focused on a different safety element. Three of the analysis lead to identification of a Composite High-Risk Network. Segments with a score of “4” or “5” are included in the High-Risk Composite Network.

Analysis	Composite High Risk Score Element	Value
Historical Crash Analysis	Segment 5-Year Crash Totals \geq 3 Crashes	1
Network Screening Analysis	Positive CCR Differential	1
High-Risk Network Analysis	Crash Profile Risk Score \geq 20	1
	usRAP Vehicle Star Rating = 1-2 Stars	1
	usRAP Pedestrian Star Rating = 1-2 Stars	0.5
	usRAP Bicycle Star Rating = 1-2 Stars	0.5
Total Possible Composite Risk Score		5

Strategic Highway Safety Plan (SHSP) Emphasis Area Comparison

Based on a comparison of fatal and serious injuries for each Utah SHSP emphasis area, the following emphasis areas should be considered when developing safety improvement projects specific to the **Western Weber County** GFA.

- Intersections
- Teen Driver
- Older Driver
- Motorcycle
- Roadway Departure

Intersection, Roadway Departure, and Speed-Related emphasis areas rank highest in terms of number of fatal and serious injuries at the Statewide and WFRC Levels.

In addition to Intersection and Roadway Departure emphasis areas within the **Western Weber County** GFA, Teen Driver, Older Driver, and Motorcycle are also identified as top emphasis areas.

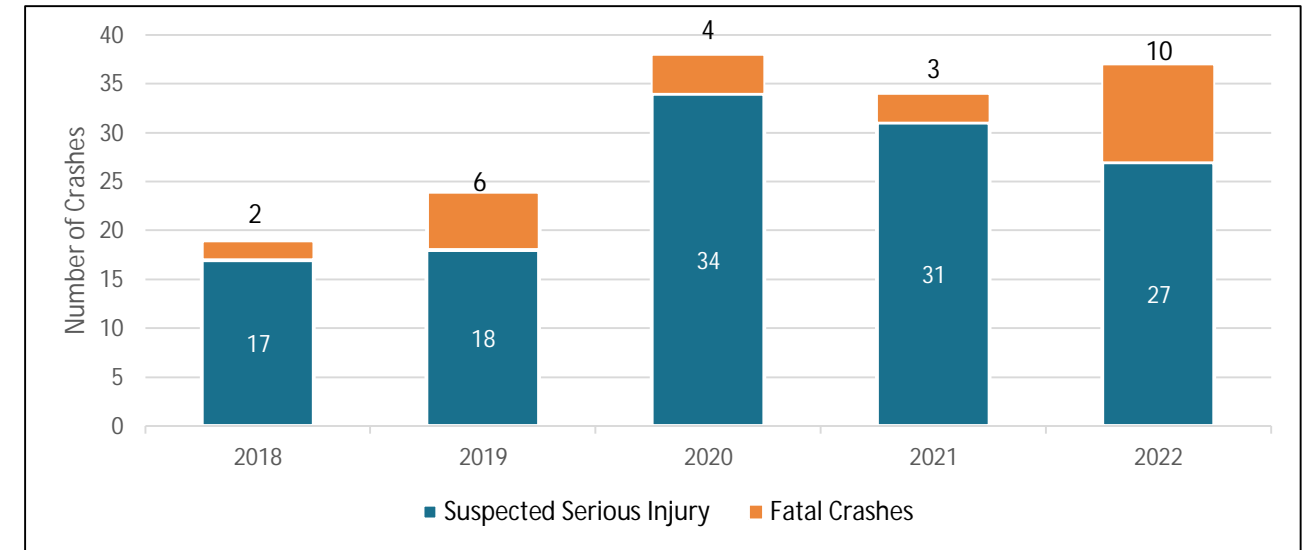
Strategic Highway Safety Plan Emphasis Area Comparison

Category	Utah SHSP Safety Emphasis Area	Statewide Totals		WFRC Totals		Western Weber County Totals		
		Fatal and Serious Injury	Rank	Fatal and Serious Injury	Rank	Fatal and Serious Injury	Rank	Change in Rank From WFRC
Driver	Teen Driver	1,640	4	751	4	37	2	2
	Older Driver	1,508	6	700	6	37	3	3
	Speed-Related	2,133	3	936	3	11	10	-7
	Aggressive Driving	555	11	297	10	7	11	-1
	Distracted Driving	718	10	286	11	7	11	0
	Impaired Driving	1,184	8	623	8	19	7	1
	No Safety Restraints	1,542	5	599	9	22	6	3
Roadway	Intersection	3,567	1	2,163	1	95	1	0
	Roadway Departure	2,931	2	1,014	2	23	5	-3
Special Users	Motorcycle	1,457	7	750	5	30	4	1
	Pedestrian	912	9	636	7	14	8	-1
	Bicycle*	280	12	167	12	13	9	3

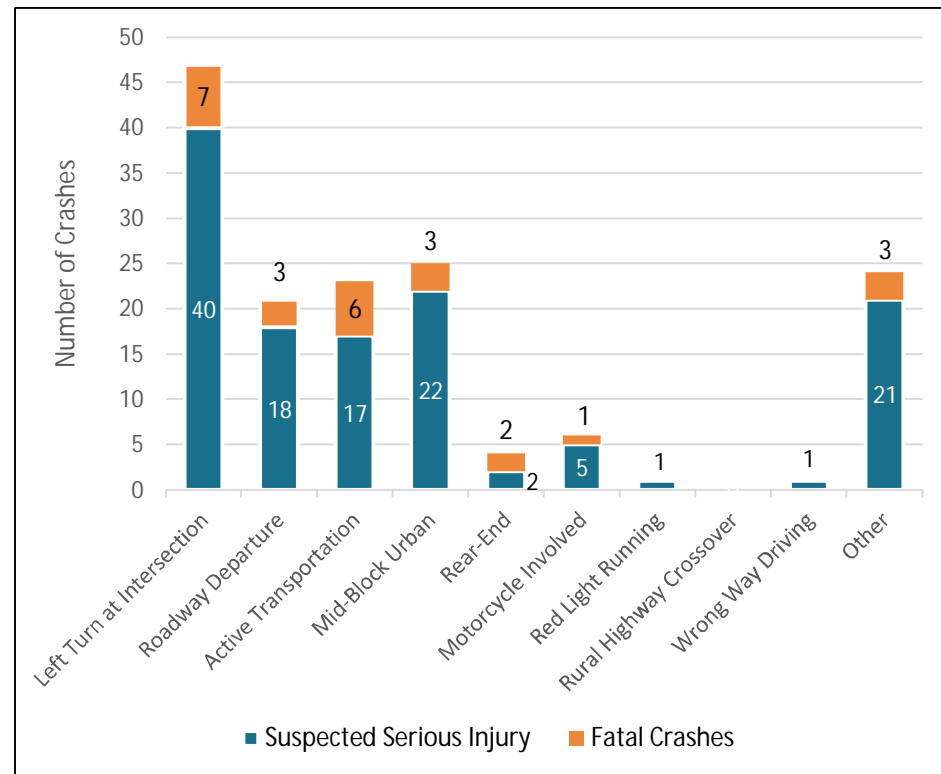
*While Bicycles are not one of the eleven Utah SHSP emphasis areas, they are included as part of the CSAP safety analysis.

5-Year Historical Crash Trends in Western Weber County GFA

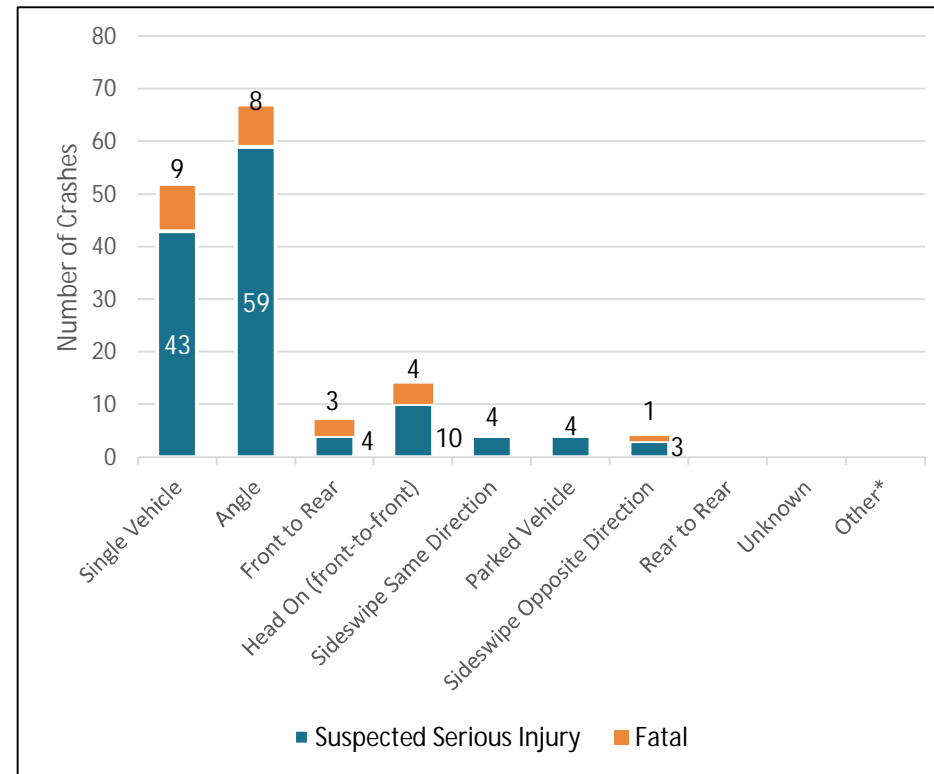
Route Type	State Route		Federal Aid Route		Local Street		Overall Total		% of WFRC
Crash Severity	Crashes		Crashes		Crashes		Crashes		%
	#	%	#	%	#	%	#	%	
Fatal	20	0%	3	0%	2	0%	25	0.4%	< 0.1%
Suspected Serious Injury	92	2%	23	2%	12	2%	127	2.1%	0.1%
Suspected Minor Injury	582	13%	137	14%	65	9%	784	12.7%	0.4%
Possible Injury	859	19%	193	20%	96	14%	1,148	18.7%	0.6%
No Injury / Property Damage Only	2,926	65%	633	64%	511	74%	4,070	66.1%	2.3%
Route Total	4,479	100%	989	100%	686	100%	6,154	100%	3.4%



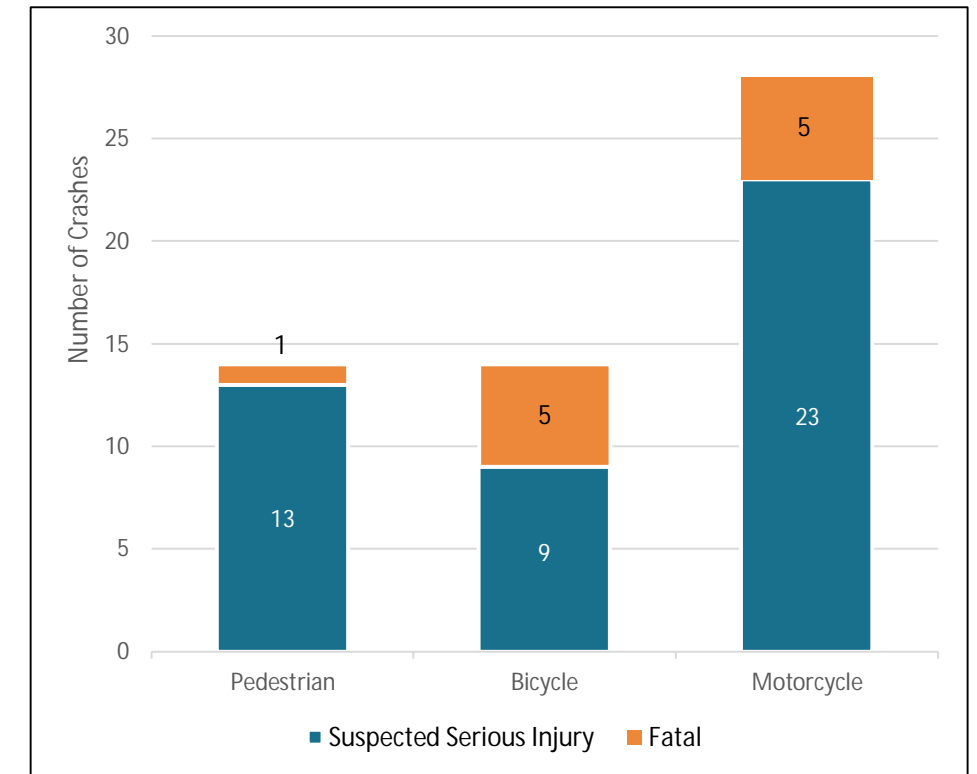
Annual Fatal and Serious Injury Crashes (2018-2022)



Crash Type



Manner of Collision



Active Transportation

Historical Crash Analysis
Trends

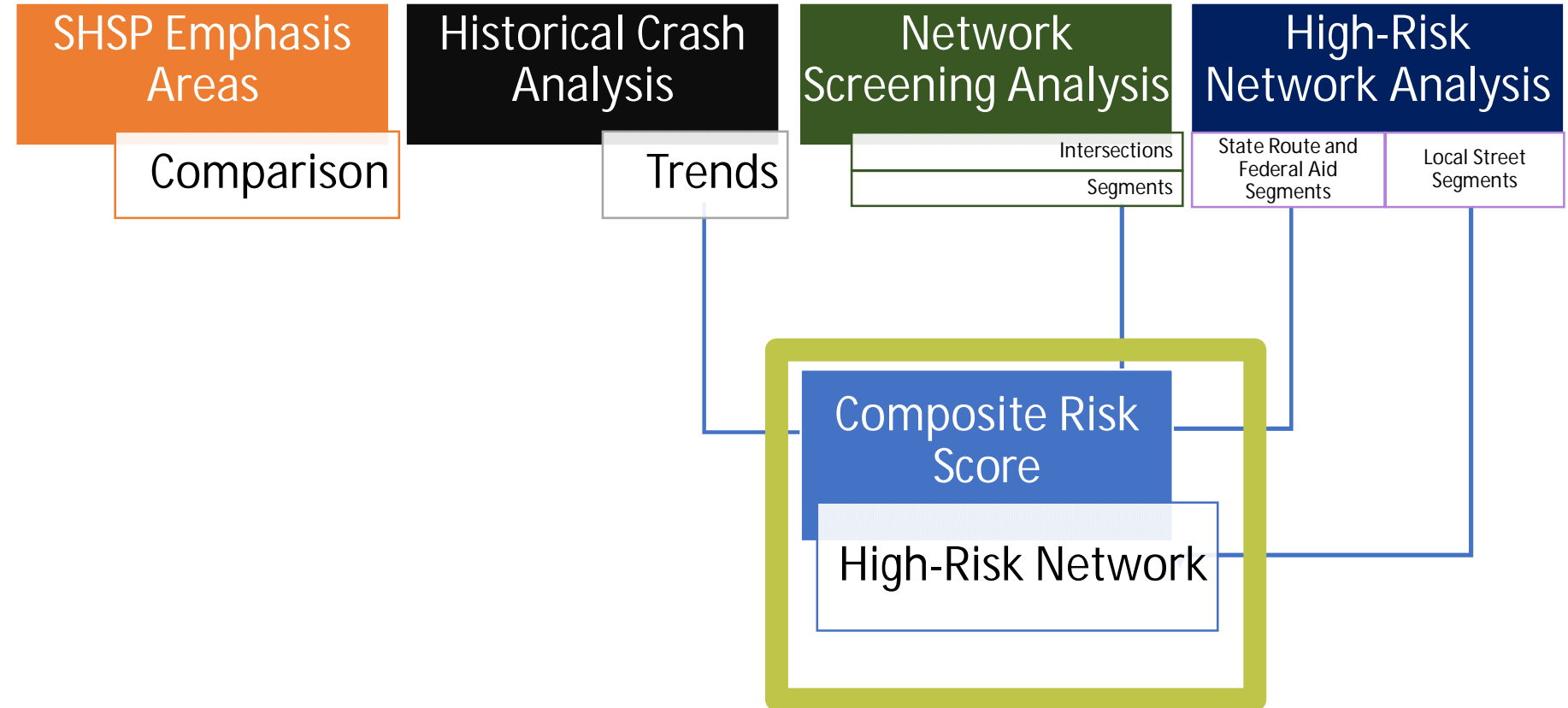
Composite High-Risk Roadway Network

Each of the completed safety analysis methodologies identified segments or intersections that may be **candidates for safety improvements** to reduce fatalities and serious injury crashes.

To provide focused information for jurisdictional decisions regarding **prioritization of safety improvements**, an analysis was performed to identify overlapping segments from each of the analysis methodologies. A **composite score**, from zero to five, was assigned to each State Highway or Federal Aid Route segment in the region. State Route or Federal Aid Route segments with a score of “4” or higher are included in the High-Risk Network. These represent the top 10% of State Route and Federal Aid Route segments for the entire WFRC area.

State Route and Federal Aid segments in the **Western Weber County GFA** that scored “4” or higher, and included in the Composite High-Risk Network, are listed in the table on page 6 and page 7. The table also lists streets identified through a separate Local Street Risk Assessment.

The Composite High Risk Network map on page 8 includes State Route and Federal Aid Route segments with a score of “4” or higher. The map also shows local streets identified through a separate Local Street Risk Assessment.



Analysis	Composite High Risk Score Element	Value
Historical Crash Analysis	Segment 5-Year Crash Totals \geq 3 Crashes	1
Network Screening Analysis	Positive Local CCR Differential	1
High Risk Network Analysis	Crash Profile Risk Score \geq 20	1
	usRAP Vehicle Star Rating = 1-2 Stars	1
	usRAP Pedestrian Star Rating = 1-2 Stars	0.5
	usRAP Bicycle Star Rating = 1-2 Stars	0.5
Total Possible Composite Risk Score		5

Composite Risk Score
High-Risk Network (Segments)

Composite High-Risk Network (State Route/Federal Aid) and Local Street Risk Network

Facility	Limits	Functional Classification	City	Length (miles)	RISK TYPE							
					usRAP- Pedestrian Star Rating	usRAP - Bicycle Star Rating	usRAP- Vehicle Star Rating	Crash Profile Risk Score	CCR Differential Analysis	Significant Crashes	Local Street Risk Assessment	
State Route												
4275 West / 2600 North (SR-13)	4275 West to 4200 West	Minor Arterial	Plain City	0.2	X	X	X	X	X	X		
4700 West	1850 North to Silver Wolfer Run	Minor Arterial	Plain City	0.2	X	X	X	X	X	X		
1200 South	4700 West to East GFA Extent	Other Principal Arterial	Plain City	5.0	X	X	X	X			X	
21st Street	I-15 to East GFA Extents	Minor Arterial	West Haven	5.0	X	X	X	X			X	
1900 West	1200 South to South GFA Extent	Other Principal Arterial	West Haven, Roy	0.6	X	X	X	X	X	X		
Riverdale Road	1900 West to East GFA Extent	Other Principal Arterial	Roy	0.3	X	X	X	X			X	
5600 South	1500 West to 1900 West	Other Principal Arterial	Roy	2.0	X	X		X	X	X		
2500 West	South GFA Extent to 4800 South	Other Principal Arterial	Roy	1.5	X	X	X	X	X	X		
Midland Drive	3800 West to 2550 South	Other Principal Arterial	Roy	2.9	X	X	X	X			X	
4000 South	5900 West to 5500 West	Minor Arterial	Hooper	0.5	X	X	X		X	X		
4700 West	2550 South to 2400 South	Minor Arterial	Unincorporated	0.2	X	X		X	X	X		

State Route segments in the **Western Weber County GFA Composite High-Risk Network** are shown on the left. Each of these segments received a composite risk score of “4” or higher. These segments provide a focus for coordination with UDOT. Each of these segments are shown on the map on page 8.

Composite Risk Score

High-Risk Network (Segments)



Composite High-Risk Network (State Route/Federal Aid) and Local Street Risk Network, Cont'd

Facility	Limits	Functional Classification	City	Length (miles)	RISK TYPE						Local Street Risk Assessment
					usRAP- Pedestrian Star Rating	usRAP - Bicycle Star Rating	usRAP- Vehicle Star Rating	Crash Profile Risk Score	CCR Differential Analysis	Significant Crashes	
Federal Aid Routes											
1975 N	1900 N to 4700 W	Major Collector	Plain City	3.0	X	X		X	X	X	
1200 W	Bill Bailey St to 1100 W	Minor Arterial	Marriott-Slaterville	1.5	X	X	X	X	X	X	
2550 S	3500 W to 1900 W	Major Collector	West Haven	2.0	X	X	X	X		X	
Local Streets											
					Local Street Risk Assessment						
1100 West/Wilson Lane	Excalibur to 1900 South	Local	West Haven	0.5	The Local Street Risk Assessment considered factors such as locations of crashes, proximity to schools, and hard-braking.					X	
6000 South	1900 West to 3100 West	Minor Collector	Roy	1.5						X	
4000 South	SR-108 to 1800 West	Major Collector	Roy	1.4						X	
3100 West	5400 South to 6000 South	Local	Roy	0.7						X	
4800 South	I-15 to 4500 West	Minor Collector	Roy	3.6						X	
4400 South	1700 West to 2675 West	Local	Roy	1.1						X	
2700 West	5400 South to 5600 South	Major Collector	Roy	0.2						X	
5200 South	1750 West to 2675 West	Local	Roy	0.3						X	
2550 South	1700 West to 2000 West	Minor Arterial	West Haven	0.4						X	
3300 South	SR-108 to 3500 West	Minor Collector	West Haven	1.8						X	

Federal Aid segments in the **Western Weber County GFA** Composite High-Risk Network are listed at left. Each of these segments received a composite risk score of "4" or higher. These segments provide a focus for local jurisdictions. Each of these segments are shown on the map on page 8.

Local Streets are also listed at left. These segments were identified through a separate analysis that considered factors such as crash location, proximity to schools, and hard braking.

Composite Risk Score
High-Risk Network (Segments)

Composite High-Risk Roadway Network



Legend

GFA Boundary

Composite High-Risk Network

- State Routes
- Federal Aid Routes
- Local Streets

**West Weber County
Wasatch Front Regional Council Area**



Composite Risk Score

High-Risk Network (Segments)

Network Screening - Intersections

Network Screening is one of the inputs to the Composite High-Risk Roadway Network. Network screening is based on Critical Crash Rate Differential analysis as documented in the Highway Safety Manual. This analysis identified intersections where historical crash rates exceed those which can be expected for similar facilities.

A list of the top 10 intersections on State Routes, Federal Aid Routes, and Local (Non-Federal Aid) Streets in the **Western Weber County** GFA are listed at right, along with their associated number of crashes.

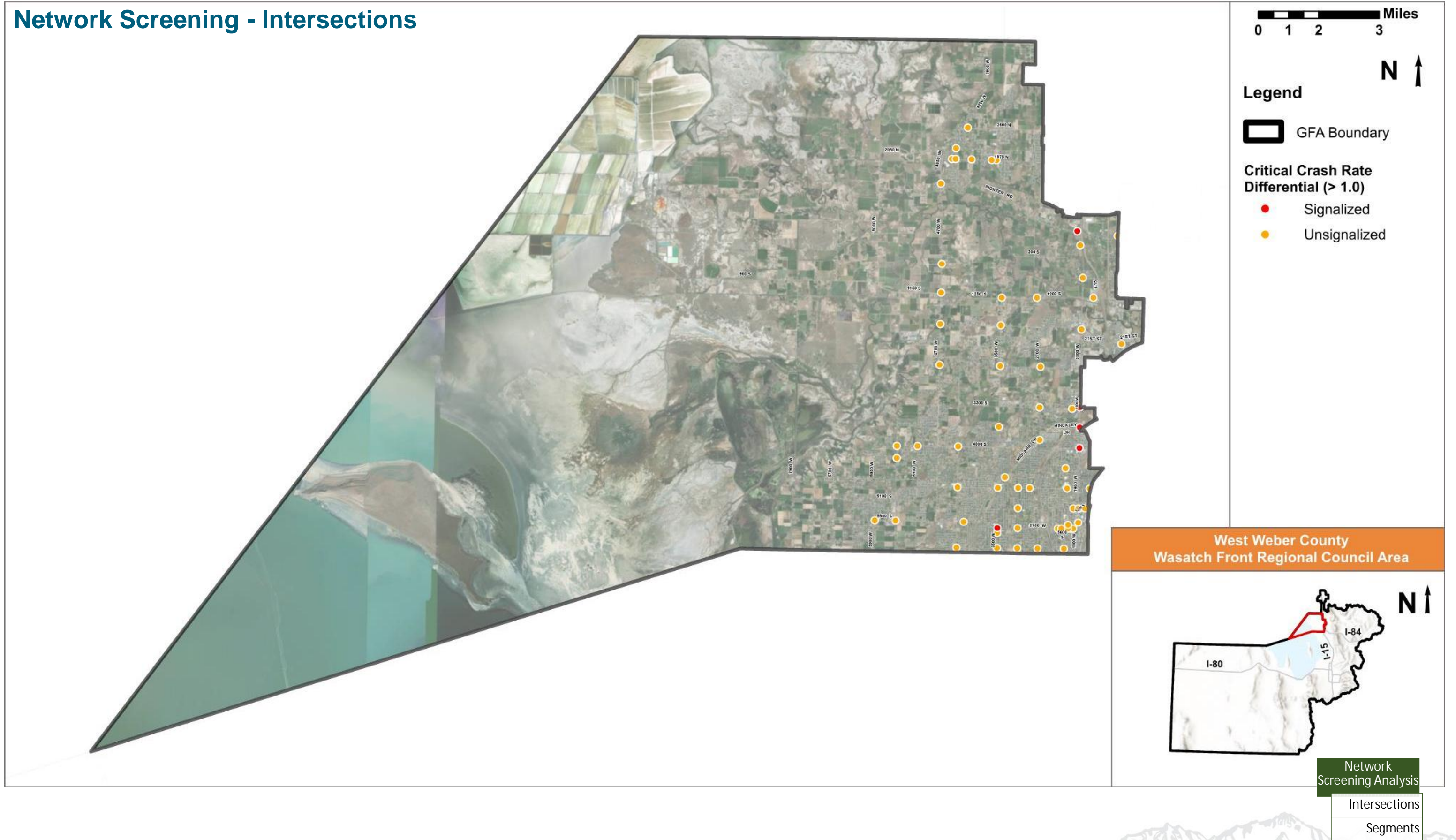
For each intersection, the Critical Crash Rate (CCR) Differential and Equivalent Property Damage Only (EDPO) value is listed. These intersections represent those with the highest potential for safety improvements and can be considered as project candidate locations.

Signalized and unsignalized intersections in the **Western Weber County** GFA with a positive Critical Crash Rate Differential (rate exceeds expected rate) are mapped on page 10.

Intersection	City	Crashes	Critical Crash Rate Differential	EPDO ¹	Fatal	Suspected Serious Injury	Suspected Minor Injury	Possible Injury	No Injury/PDO	Angle	Front to Rear	Head On	Parked Vehicle	Single Vehicle	Rear to Rear	Rear to Side	Sideswipe (Same Direction)	Sideswipe (Opposite Direction)	Other/Unknown	Pedestrian	Bicycle	Motorcycle	
Signalized Intersections																							
1900 W & Pioneer Rd	Marriott-Slat	56	1.6	1280	1	0	9	14	32	28	17	3	4	0	0	0	1	3	0	0	1	4	
1900 W & Midland Dr	Unincorporated	94	0.5	2732	2	5	10	18	59	45	32	7	3	0	0	0	3	4	0	1	0	3	
3500 W & 5600 S	Roy	99	0.3	1165	0	4	20	26	49	64	17	5	8	0	0	0	1	3	1	3	1	0	
1900 W & Hinckley Dr	Roy	75	0.1	1347	0	7	21	17	30	51	17	3	2	0	0	0	1	1	0	1	0	3	
1900 W & 4000 S	Roy	65	0.0	444	0	0	10	16	39	13	43	2	2	1	0	0	1	2	1	0	1	0	
1900 W & 5600 S	Roy	124	0.0	995	0	1	21	32	70	66	36	6	3	0	0	0	1	11	1	2	0	2	
2475 W & Hinckley Dr	West Haven	49	0.0	354	0	0	9	11	29	13	20	2	9	0	0	0	1	3	1	0	0	1	
1900 W & 2550 S	West Haven	68	-0.1	425	0	0	9	16	43	29	20	6	5	0	0	0	3	5	0	1	0	0	
1100 W & 21st St	West Haven	59	-0.1	685	0	3	11	11	34	25	17	1	6	1	0	0	3	3	3	4	0	0	
2825 W & Midland Dr	Roy	63	-0.1	909	0	4	17	11	31	34	23	2	2	0	0	0	1	1	0	0	0	1	
Unsignalized Intersections																							
Airport Rd & 4400 S St	Roy	4	17.8	4	0	0	0	0	4	2	0	0	2	0	0	0	0	0	0	0	0	0	0
2700 W & 3300 S	West Haven	14	4.5	67	0	0	2	1	11	11	1	0	1	0	0	0	0	0	1	0	0	0	
4425 W & 2200 N	Plain City	11	2.4	53	0	0	1	2	8	11	0	0	0	0	0	0	0	0	0	0	0	0	
4700 W & 1500 N	Plain City	19	2.3	207	0	1	4	1	13	16	3	0	0	0	0	0	0	0	0	0	0	0	
5100 W & 4000 S	West Haven	13	1.6	45	0	0	1	1	11	11	1	0	0	0	0	0	0	0	1	0	0	0	
3500 W & 2550 S	Unincorporated	26	1.2	202	0	1	0	8	17	23	1	1	0	0	0	0	0	0	1	0	0	0	
2100 W & 5500 S	Roy	3	1.1	3	0	0	0	0	3	3	0	0	0	0	0	0	0	0	0	0	0	0	
Bouwhuis Dr & Midland Dr	West Haven	30	0.9	166	0	0	3	7	20	23	2	0	4	0	0	0	0	0	1	0	0	0	
5500 W & 4000 S	Hooper	13	0.9	66	0	0	2	1	10	4	4	1	3	0	0	0	0	1	0	0	1	0	
1100 W & 2100 S	West Haven	22	0.8	84	0	0	0	6	16	8	9	0	3	0	0	0	0	1	1	1	0	0	
1. Equivalent Property Damage Only Crashes																							

= 90 - 100% probability that crash type is over-represented
 = 80 - 90% probability that crash type is over-represented
 = 70 - 80% probability that crash type is over-represented

Network Screening - Intersections



Supporting Information



High-Risk Roadway Segments (Federal Aid Routes)

Facility	Limits	City	RISK TYPE						
			usRAP- Pedestrian Star Rating	usRAP - Bicycle Star Rating	usRAP- Vehicle Star Rating	Crash Profile Risk Score	CCR Differential Analysis	Significant Crashes	Local Street Risk Assessment
Federal Aid Routes									
4000 North	3900 West to East GFA Extents	Unincorporated	X	X	X				
4200 West / 3900 West	2600 North to 4000 North	Plain City	X						
Plain City Road	2800 West to East GFA Extents	Plain City	X		X				
3600 West	Silver Wolf Run to 2600 North	Plain City	X		X				
Silver Wolf Run	1900 North (West) to 1900 North (East)	Plain City	X	X					
1900 North	Silver Wolf Run to East GFA Extents	Plain City	X	X					
2800 North	4200 West to Gravel Road	Plain City	X						
2050 North / 2150 North	5900 West to 4650 West	Plain City	X						
5900 West	1150 South to 2050 North	Unincorporated	X						
900 South	9350 West to 5900 West	Unincorporated	X	X					
11500 South	5900 West to 4700 West	Hooper	X						
400 North	1600 West to 1200 West	West Point	X	X	X				
1200 West	17th Street to North GFA Boundary	Syracuse	X	X	X				
1800 South	4700 West to 1900 West	Ogden	X		X				
2550 South	4701 West to 1900 West	West Haven	X	X	X				

Federal Aid Route segments in the **Western Weber County GFA** identified from the safety analysis methods are listed at left. These include the top-10 segments from each analysis. An “x” is placed to identify the analysis that flagged the segment:

- **usRAP** Star Ratings (Vehicle, Bicycle, Pedestrian)
- **Crash Profile** Risk Score
- **Network Screening**, applying Critical Crash Rate (CCR) and Significant Crashes (three or more crashes over 5-year period)

The maps on page 16 through 20 map each of these segments as identified by the respective analysis.

Composite Risk Score
High-Risk Network (Segments)



High-Risk Roadway Segments (Federal Aid Routes)

– Cont'd

Facility	Limits	City	RISK TYPE						
			usRAP- Pedestrian Star Rating	usRAP - Bicycle Star Rating	usRAP- Vehicle Star Rating	Crash Profile Risk Score	CCR Differential Analysis	Significant Crashes	Local Street Risk Assessment
Federal Aid Routes									
3300 South	4300 West to 2700 West	Ogden	X		X				
5500 West	5500 South to 4000 South	Hooper	X		X				
3500 West	2550 South to 1200 South	Ogden	X						
4800 South	4700 West to 3100 West	Hooper	X						
Silver Wolf Run / 1900 North	4650 West to East GFA Extents	Farr West				X			
400 North	I-15 to 1200 West	Marriott-Slaterville				X			
4800 South	4700 West to 3900 West	Roy				X			
1500 South	4700 West to Pioneer Road	Ogden				X			
900 South / 1150 South	Little Mountain Training Annex to 4700 West					X			
2550 South	5900 West to 1900 West	Ogden				X			
1200 West	17th Street to Bill Bailey Street	Unincorporated				X			
3600 West	Silver Wolf Run to 2600 North	Plain City				X			
1800 South	5900 West to 1900 West	Ogden				X			
3300 South	4700 West to 2700 West	West Haven				X			
2150 North	5900 West to 4700 West	Plain City				X			

Composite Risk Score

High-Risk Network (Segments)



High-Risk Roadway Segments (Federal Aid Routes) – Cont'd

Facility	Limits	City	RISK TYPE						
			usRAP- Pedestrian Star Rating	usRAP - Bicycle Star Rating	usRAP- Vehicle Star Rating	Crash Profile Risk Score	CCR Differential Analysis	Significant Crashes	Local Street Risk Assessment
Federal Aid Routes									
5900 West	1150 South to 2150 North	Ogden				X			
Pioneer Rd	2200 W to 2000 W	Marriott-Slaterville					X	X	
4800 S	2700 W to 2675 W	Roy					X	X	
2550 S	2050 W to 1900 W	West Haven					X	X	
4800 S	3500 W to 3350 W	Roy					X	X	
1975 N	4600 W to 4500 W	Plain City					X	X	
1975 N	3475 N to Silver Wolf Run	Plain City					X	X	
1200 W	1450 S to 1200 S	Marriott-Slaterville					X	X	
2550 S	1900 W to 1760 W	West Haven					X	X	
4800 S	Midland Dr to 3500 W	Roy					X	X	
1200 W	1450 S to 1100 W	Marriott-Slaterville					X	X	

Composite Risk Score

High-Risk Network (Segments)



Network Screening – Segments (Local Streets)

Facility	Limits	City	RISK TYPE						
			usRAP- Pedestrian Star Rating	usRAP - Bicycle Star Rating	usRAP- Vehicle Star Rating	Crash Profile Risk Score	CCR Differential Analysis	Significant Crashes	Local Street Risk Assessment
Local Streets									
5200 S	2000 W to 1950 W	Roy					X	X	
2100 S	Shadybrook Ln to 1100 W	West Haven					X	X	
5700 S	2000 W to 1900 W	Roy					X	X	
Commerce Way	Scott Ln to 1900 W	West Haven					X	X	
2000 W	5125 S to 5075 S	Roy					X	X	
4975 W	Haven Rd to 4890 W	West Haven					X	X	
7500 W	5100 S to North Fork Weber River	Hooper					X	X	
2275 W	4975 S to 4900 S	Roy					X	X	
5100 W	4600 S to 4525 S	West Haven					X	X	
5100 W	3000 S to 2550 S	Unincorporated					X	X	

Local Street segments in the **Western Weber GFA** identified from **Network Screening**, applying Critical Crash Rate (CCR) and Significant Crashes (three or more crashes over 5-year period), are listed at left.

Composite Risk Score

High-Risk Network (Segments)

usRAP Bicycle Star Rating - Segments



- Legend**
-  GFA Boundary
 - Bicycle Star Rating (1-2)**
 -  State Routes
 -  Federal Aid Routes

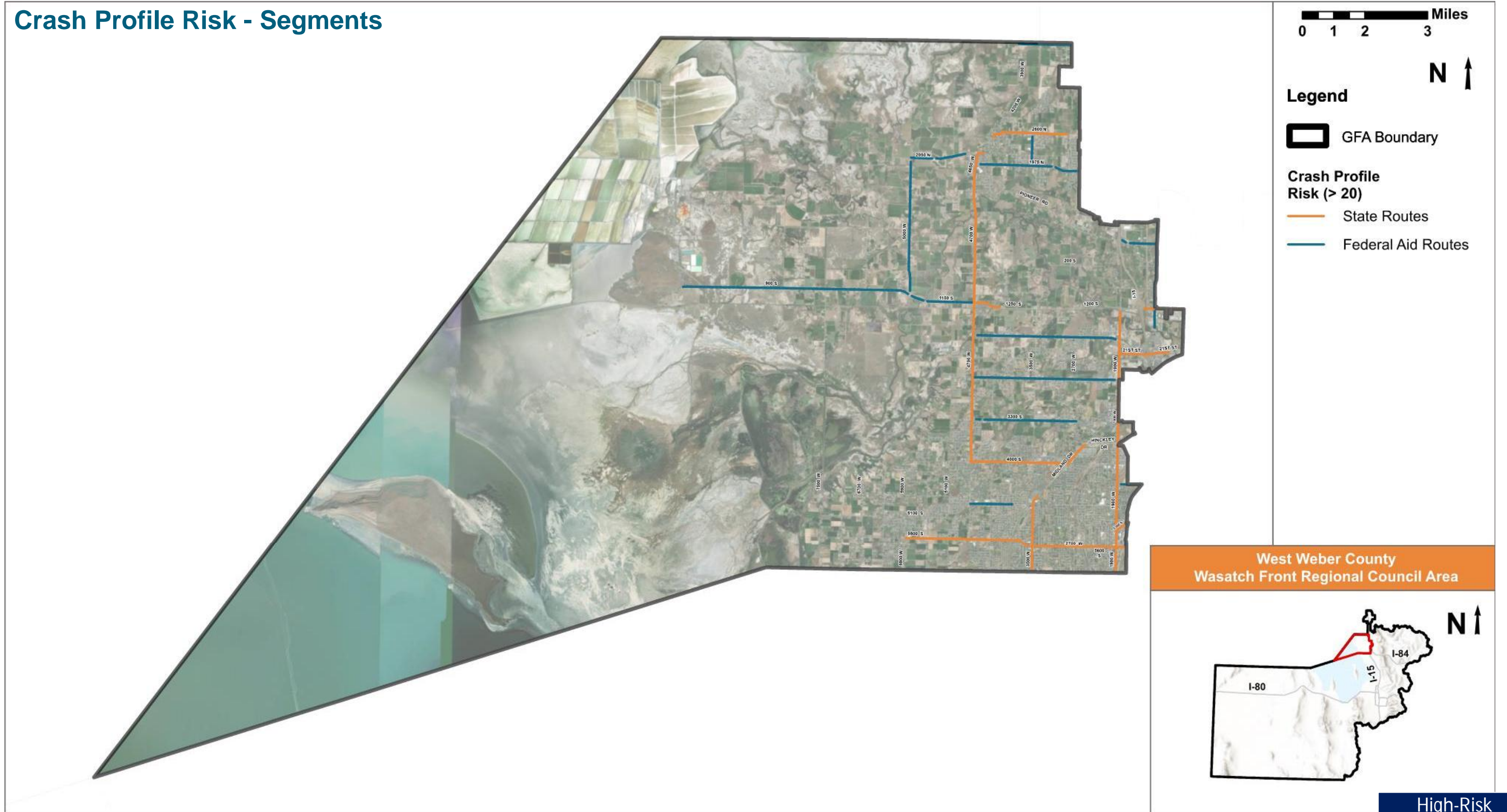
West Weber County
Wasatch Front Regional Council Area



High-Risk Network Analysis

State Route and Federal Aid Segments	Local Street Segments
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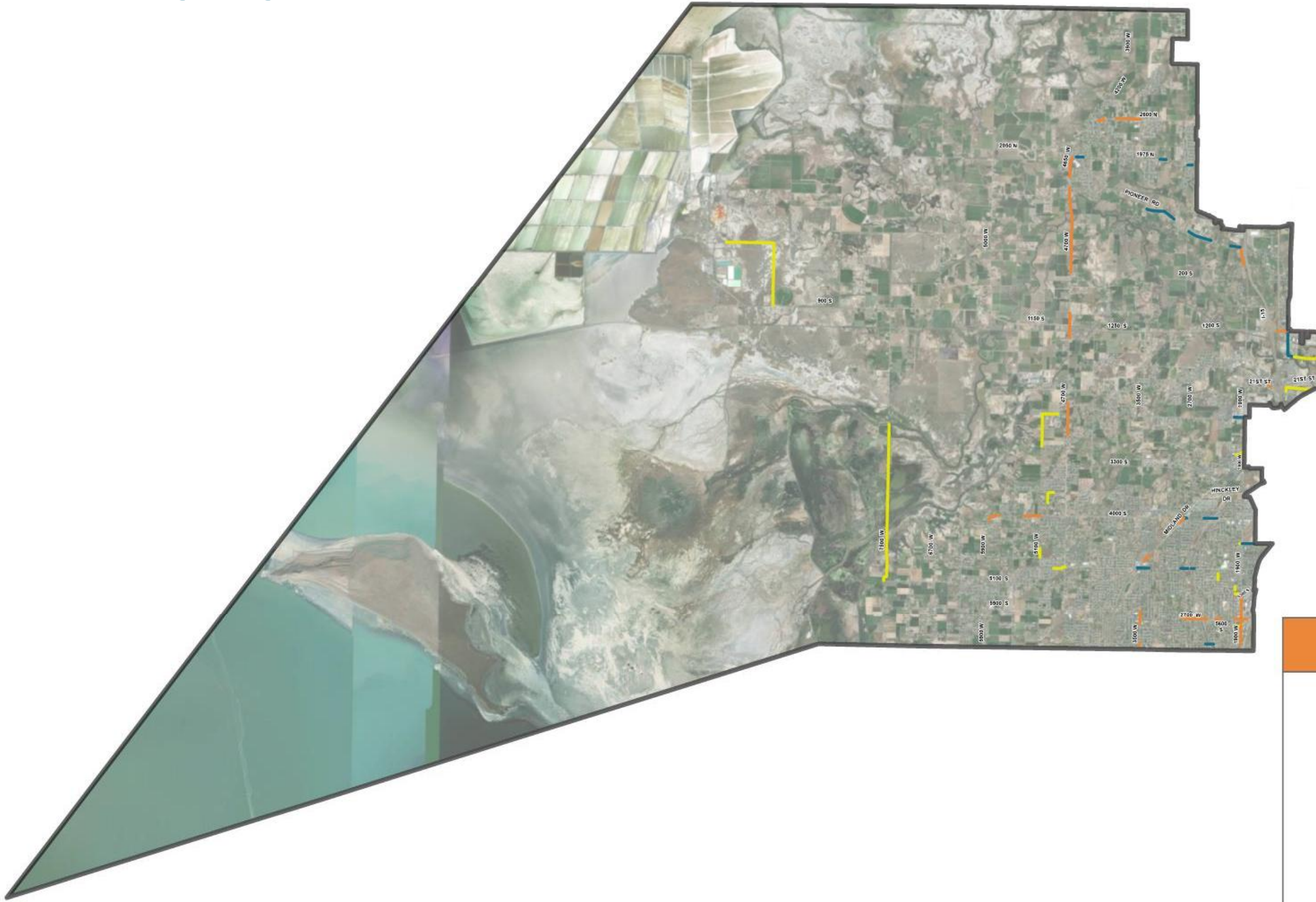
Crash Profile Risk - Segments



**High-Risk
Network Analysis**

State Route and Federal Aid Segments	Local Street Segments
--	--------------------------

Network Screening - Segments



Legend

GFA Boundary

Critical Crash Rate Differential (> 0.0)

State Routes

Federal Aid Routes

Local Streets

West Weber County
Wasatch Front Regional Council Area



High-Risk
Network Analysis

State Route and Federal Aid Segments Local Street Segments

WESTERN WEBER COUNTY TECH MEMO #1

SAFETY ANALYSIS

TECHNICAL MEMORANDUM #1

APPENDIX A2 - WESTERN WEBER COUNTY GEOGRAPHIC FOCUS AREA ANALYSIS

September 2023

Statutory Notice

23 U.S.C. § 409: US Code - Section 409: Discovery and admission as evidence of certain reports and surveys

Notwithstanding any other provision of law, reports, surveys, schedules, lists, or data compiled or collected for the purpose of identifying, evaluating, or planning the safety enhancement of potential accident sites, hazardous roadway conditions, or railway- highway crossings, pursuant to sections 130, 144, and 148 of this title or for the purpose of developing any highway safety construction improvement project which may be implemented utilizing Federal-aid highway funds shall not be subject to discovery or admitted into evidence in a Federal or State court proceeding or considered for other purposes in any action for damages arising from any occurrence at a location mentioned or addressed in such reports, surveys, schedules, lists, or data.

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1. Introduction

Appendix A2 summarizes the safety analysis performed for the Western Weber County Geographic Focus Area (GFA) for the Wasatch Front Area Comprehensive Safety Action Plan (CSAP).

The analysis of available safety related data informs identification of a potential project locations that may be further considered in the development of safety related projects and project types.

1.1. Safety Analysis

The following safety analysis methodologies were completed for the Western Weber County GFA:

- Strategic Highway Safety Plan (SHSP) Emphasis Area Analysis
- Historical Crash Analysis
- Crash and Network Screening Analysis
- Roadway Characteristic Risk Analysis
 - Region-specific Risk Assessment
 - usRAP Risk Factors Analysis
 - Local Street Risk Assessment

An overview on the methodologies used to perform these safety analyses are described in Technical Memorandum #1: Safety Analysis Results Summary. **Appendix A2** summarizes the results of the analyses for the Western Weber County GFA.

1.2. Appendix Organization

This Appendix is organized into the following sections:

- **Section 1** - Introduction
- **Section 2** - Western Weber County GFA Study Area and Roadway Network.
- **Section 3** - Strategic Highway Safety Plan (SHSP) Emphasis Area Analysis.
- **Section 4** - Historical Crash Analysis
- **Section 5** - Crash and Network Screening Analysis based on Highway Safety Manual (HSM).
- **Section 6** - Roadway Characteristic Risk Analysis
- **Section 7** - Common Risk Characteristics and Composite High-Risk Roadway Network

2. Study Area

The CSAP study area includes each jurisdiction within the WFRC area. To organize the large number of jurisdictions within the WFRC area into manageable analysis areas, jurisdictions are organized into Geographic Focus Areas (GFA). The Western Weber County GFA (**Figure 2.1**) is located entirely within Weber County and includes the following agencies and jurisdictions:

- Plain City
- Marriott Slaterville
- West Haven
- Roy
- Hooper

The safety analyses presented in this Technical Memorandum are specific to the Western Weber County GFA.

Figure 2.2 highlights the roadway network within the Western Weber County GFA study area. Roadways within the study area are divided into the following three categories:

- State Routes: UDOT-maintained roads
- Federal Aid Routes: Jurisdiction-maintained roads eligible for federal funding
- Local Streets: Local Jurisdiction-maintained roads that are not Federal Aid routes.

NOTE ON CRASH DATA ANALYSIS: All crash data presented in this Technical Memorandum are specific to the Western Weber County GFA, for the years 2018-2022. Crash data was obtained from the Utah Department of Transportation.



Figure 2.1 – Western Weber County GFA Study Area

3. SHSP Emphasis Area Analysis

The SHSP emphasis area analysis ranks the frequency of fatal and serious injury crashes in the Western Weber County GFA for each of the eleven Utah SHSP emphasis areas. The rankings of the emphasis areas are compared for the Western Weber County GFA, statewide (all public roads statewide), and the WFRC study area totals. Each reported crash can have more than one emphasis area identified. The results of the SHSP emphasis area analysis are displayed in **Table 3.1**. The top five ranked emphasis areas are highlighted in the table with the top five for the Western Weber County GFA listed below:

- Intersections
- Teen Driver
- Older Driver
- Motorcycle
- Roadway Departure

Table 3.1 – SHSP Emphasis Areas Analysis

Category	Utah SHSP Safety Emphasis Area	Statewide Totals		WFRC Totals		Western Weber County Totals		
		Fatal and Serious Injury	Rank	Fatal and Serious Injury	Rank	Fatal and Serious Injury	Rank	Change in Rank From WFRC
Driver	Teen Driver	1,640	4	751	4	37	2	2
	Older Driver	1,508	6	700	6	37	3	3
	Speed-Related	2,133	3	936	3	11	10	-7
	Aggressive Driving	555	11	297	10	7	11	-1
	Distracted Driving	718	10	286	11	7	11	0
	Impaired Driving	1,184	8	623	8	19	7	1
	No Safety Restraints	1,542	5	599	9	22	6	3
Roadway	Intersection	3,567	1	2,163	1	95	1	0
	Roadway Departure	2,931	2	1,014	2	23	5	-3
Special Users	Motorcycle	1,457	7	750	5	30	4	1
	Pedestrian	912	9	636	7	14	8	-1
	Bicycle*	280	12	167	12	13	9	3

*Bicyclists aren't one of the eleven Utah SHSP emphasis areas but was included as part of the CSAP safety analysis.

4. Historical Crash Analysis

A historical crash data analysis was conducted for the most recent complete 5-year period from 2018 to 2022. This historical crash analysis is primarily focused on fatal and serious injury crashes.

4.1. Overall Crashes

Table 4.1 provides an overview of overall crashes by severity and roadway ownership within the Western Weber County GFA. The data shows the following:

- State Routes recorded 73% of the total crashes in this GFA
- State Routes recorded 20 of 25 fatal crashes in this GFA
- Federal Aid routes recorded 16% of fatal and serious injury crashes in this GFA
- Federal Aid routes recorded three of 20 fatal crashes in this GFA
- Local Streets (non-Federal Aid) recorded 11% of fatal and serious injury crashes in this GFA
- Local Streets recorded two of 20 fatal crashes in this GFA

Table 4.1 – Crashes by Severity by Roadway Ownership

Route Type	State Route		Federal Aid Route		Local Street		Overall Total		% of WFRC
	Crashes		Crashes		Crashes		Crashes		%
	#	%	#	%	#	%	#	%	
Fatal	20	0%	3	0%	2	0%	25	0.4%	< 0.1%
Suspected Serious Injury	92	2%	23	2%	12	2%	127	2.1%	0.1%
Suspected Minor Injury	582	13%	137	14%	65	9%	784	12.7%	0.4%
Possible Injury	859	19%	193	20%	96	14%	1,148	18.7%	0.6%
No Injury / Property Damage Only	2,926	65%	633	64%	511	74%	4,070	66.1%	2.3%
Route Total	4,479	100%	989	100%	686	100%	6,154	100%	3.4%

4.2. Fatal and Serious Injury Crashes by Year

Figure 4.1 through **Figure 4.5** provide an overview of fatal and serious injury crashes by year and roadway ownership for the Western Weber County GFA. The data shows the following:

- Fatal crashes have increased during the 5-year period (2018-2022), with a 5-year high of 10 fatal crashes in 2022
- Serious injury crashes have increased during the 5-year period (2018-2022), but peaked in 2022 and show a slight decrease in 2021 and 2022 (as compared to 2020)

4.3. Fatal and Serious Injury Crashes by Location

Error! Reference source not found. shows the locations of the fatal and serious injury crashes within the Western Weber County GFA. Crashes are largely focused on State Routes.

Error! Reference source not found. is a density map of fatal and serious injury crashes within the Western Weber County GFA.

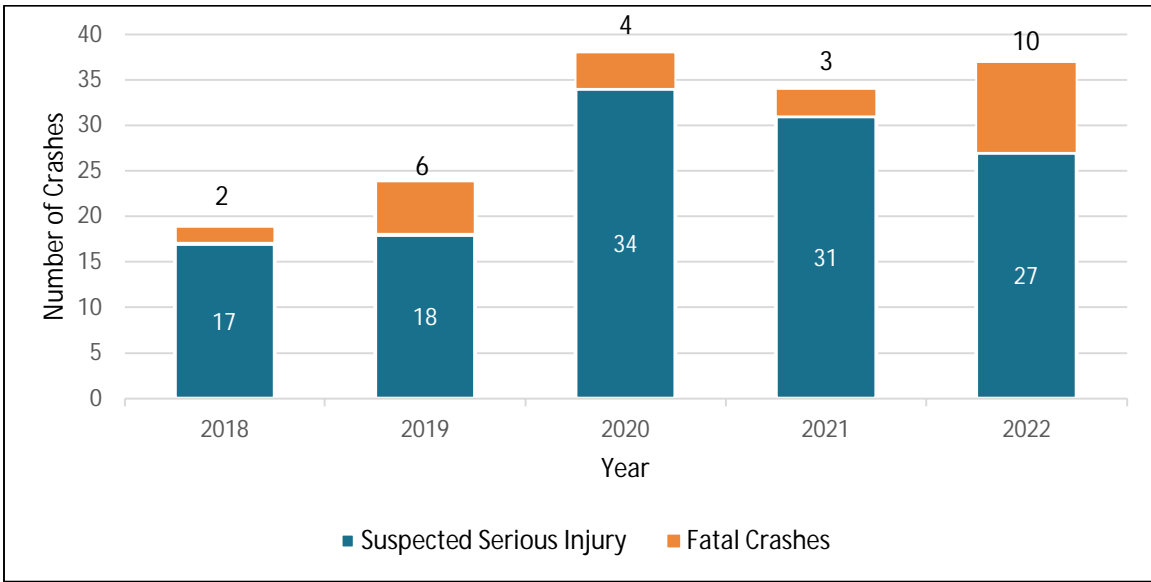


Figure 4.1 – Fatal and Serious Injury Crashes by Year

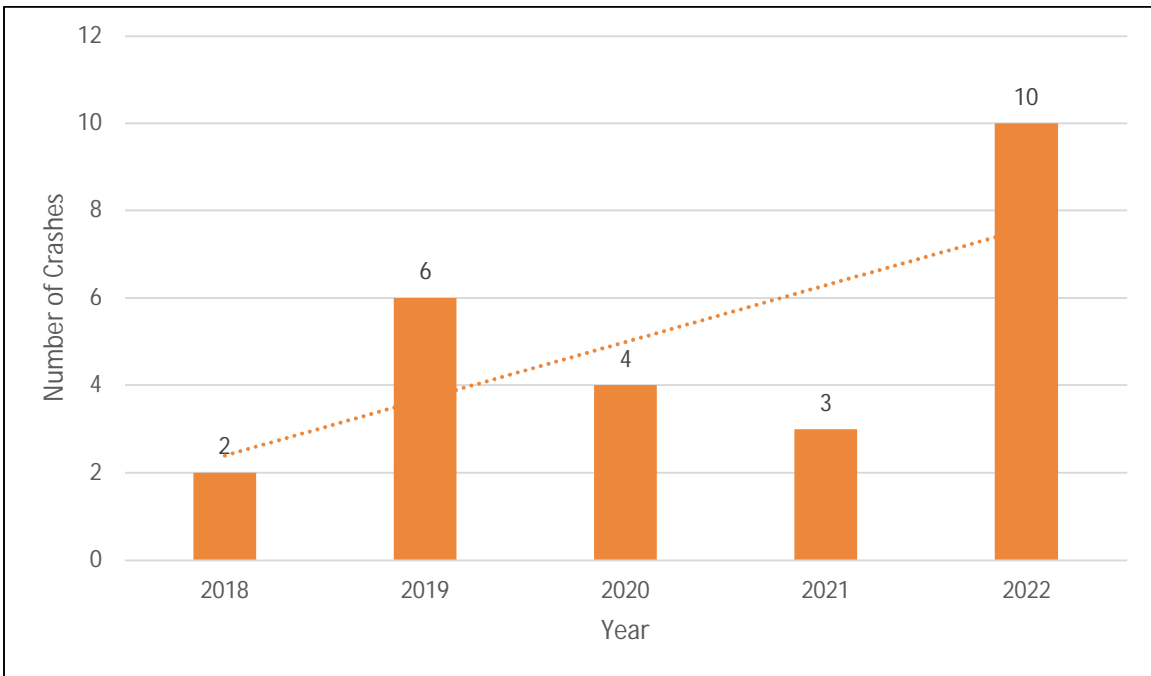


Figure 4.2 – Fatal Crashes by Year

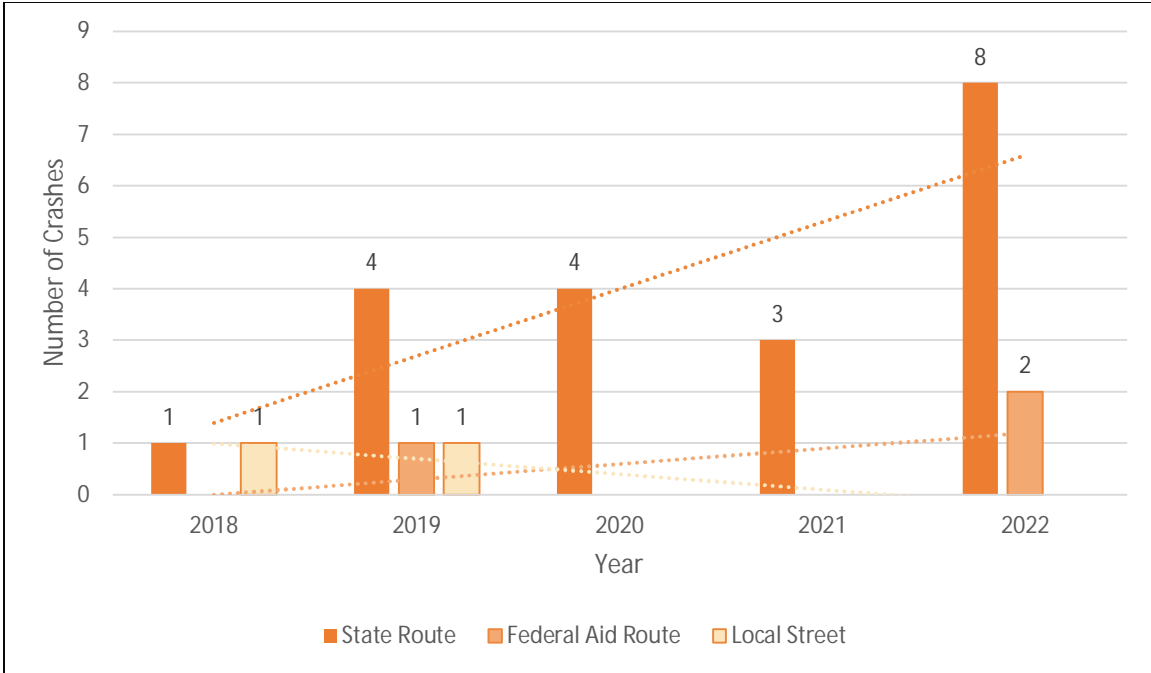


Figure 4.3 – Annual Fatal Crashes by Roadway Ownership

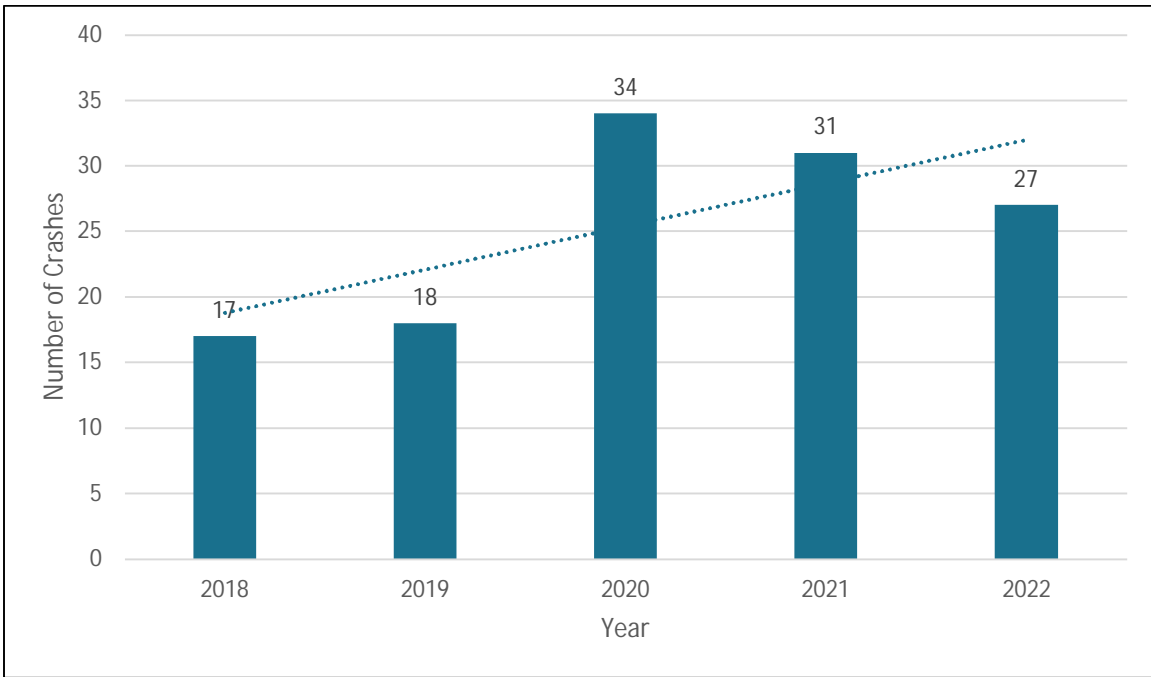


Figure 4.4 – Serious Injury Crashes by Year

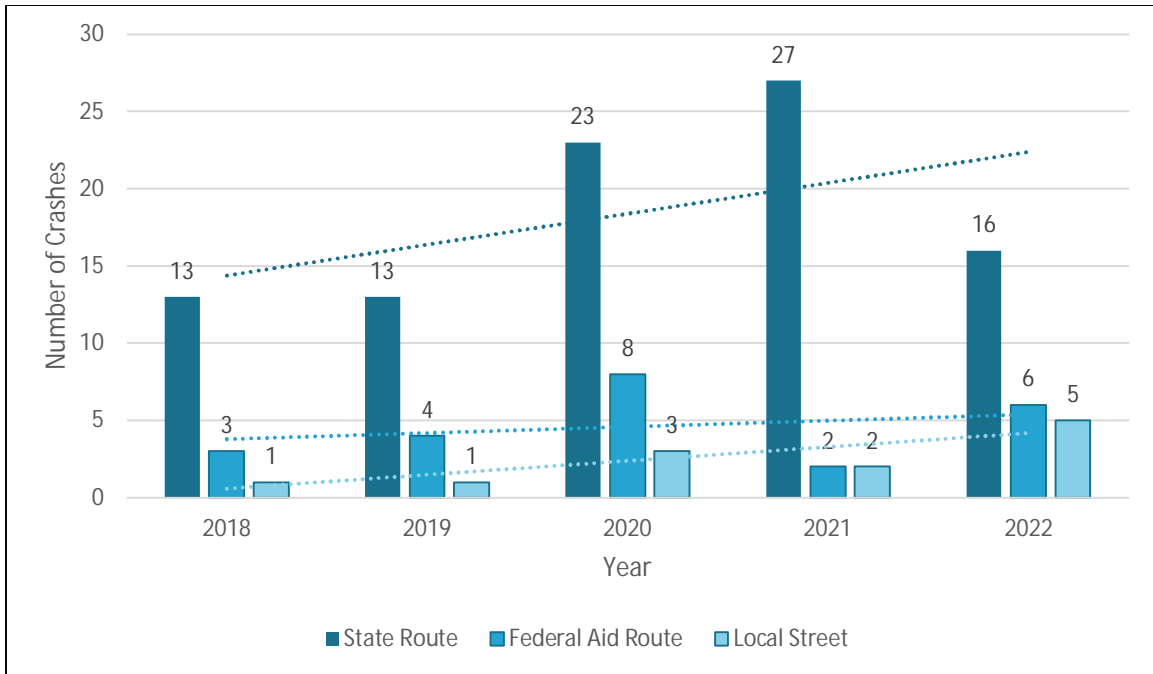


Figure 4.5 – Annual Serious Injury Crashes by Roadway Ownership

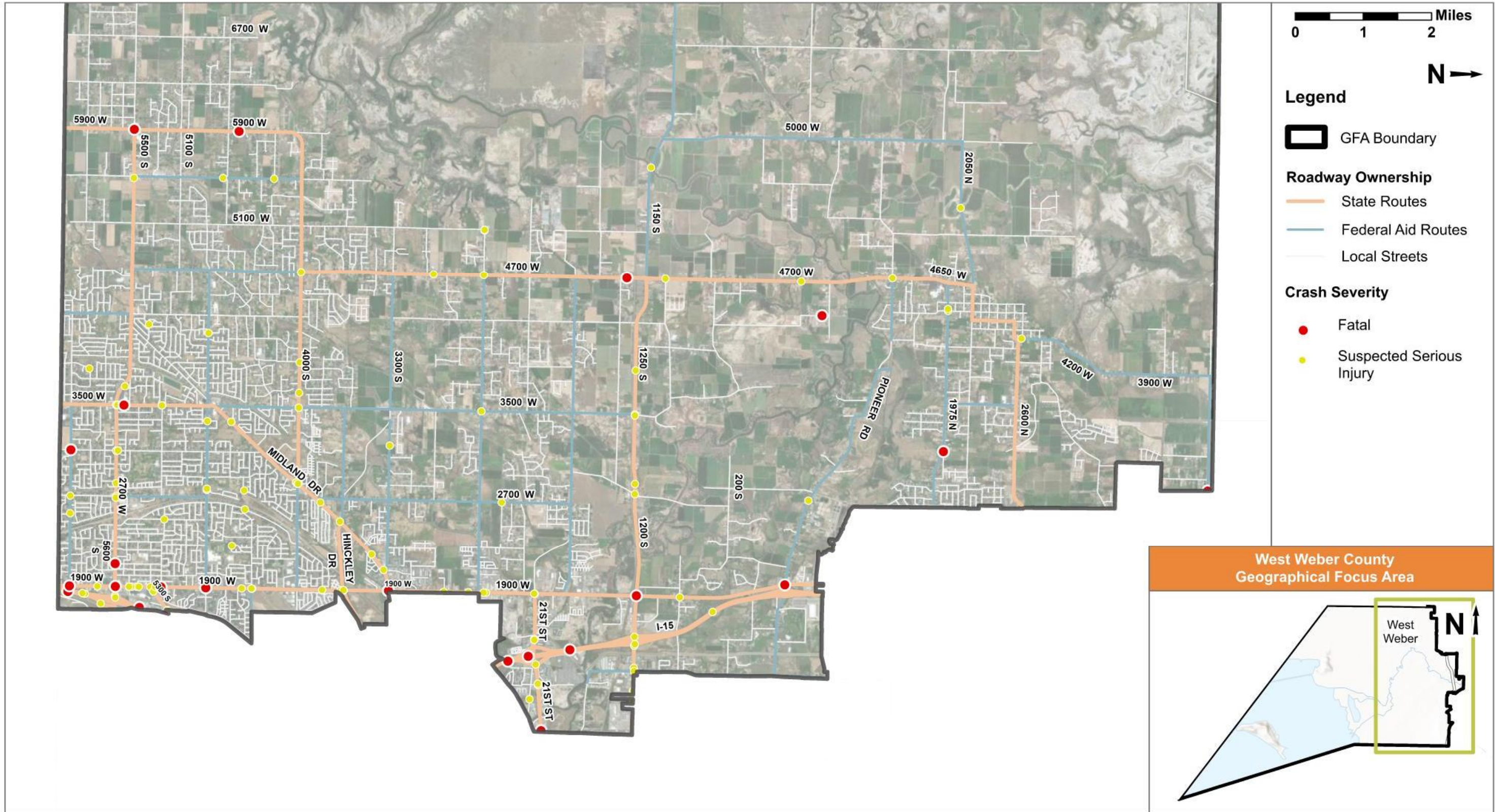


Figure 4.6 – Fatal and Serious Injury Crashes

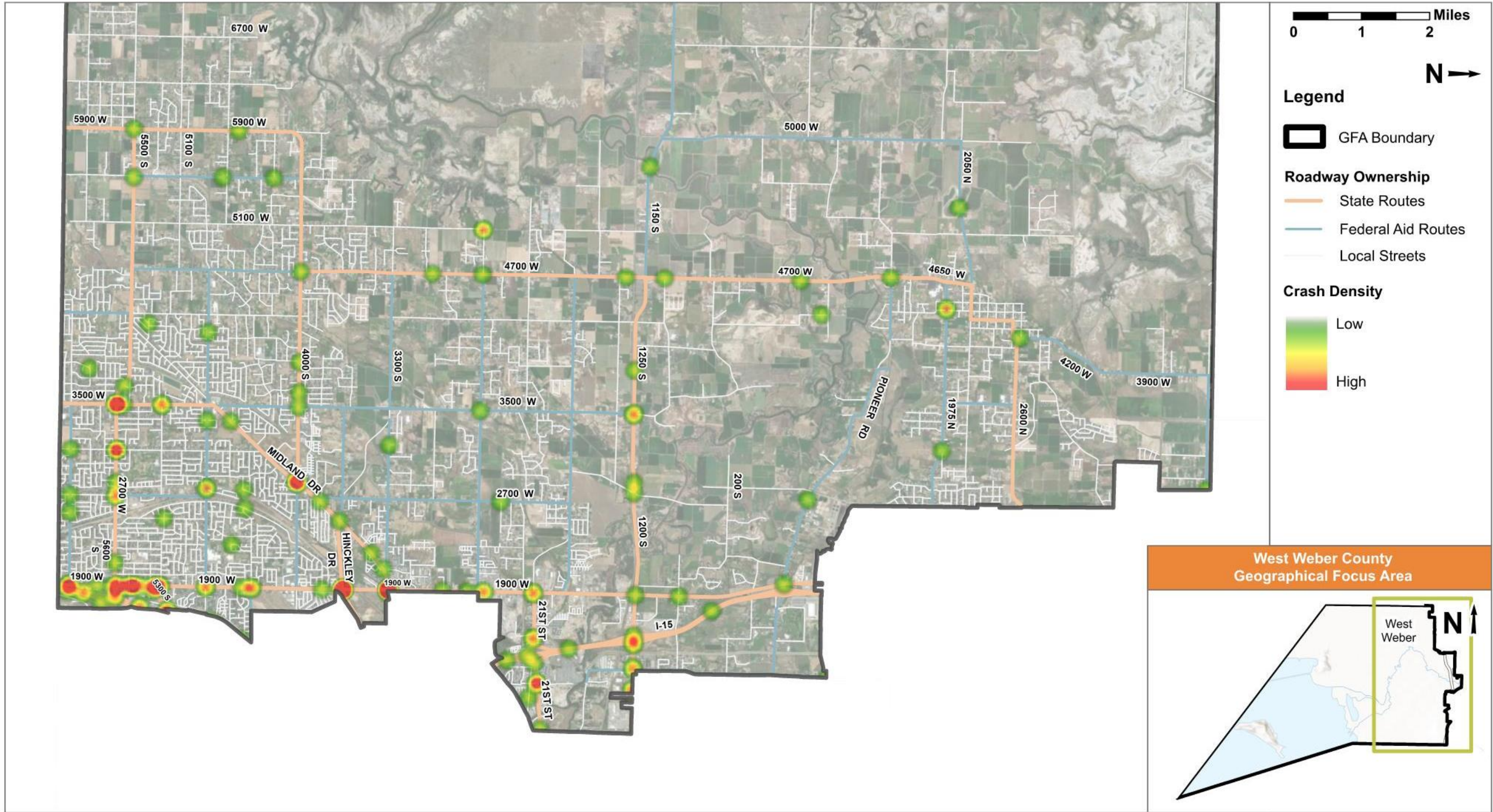


Figure 4.7 – Fatal and Serious Injury Crash Density

4.4. Fatal and Serious Injury Crashes by Crash Type

Figure 4.8 through Figure 4.10 provide an overview of fatal and serious injury crashes by crash type and roadway ownership for the Western Weber County GFA. The data shows the following:

- The Left Turn at Intersection crash type has the highest number of total fatal and serious injuries with 47 crashes
- Active Transportation crash type is the second highest number of fatal crashes with 6 crashes
- Mid-block urban is the second highest number of serious injuries; this crash type represents non intersection-related crashes that involved left-turn, angle, head-on or sideswipe in areas designed as “urban clusters” or “urban areas”.

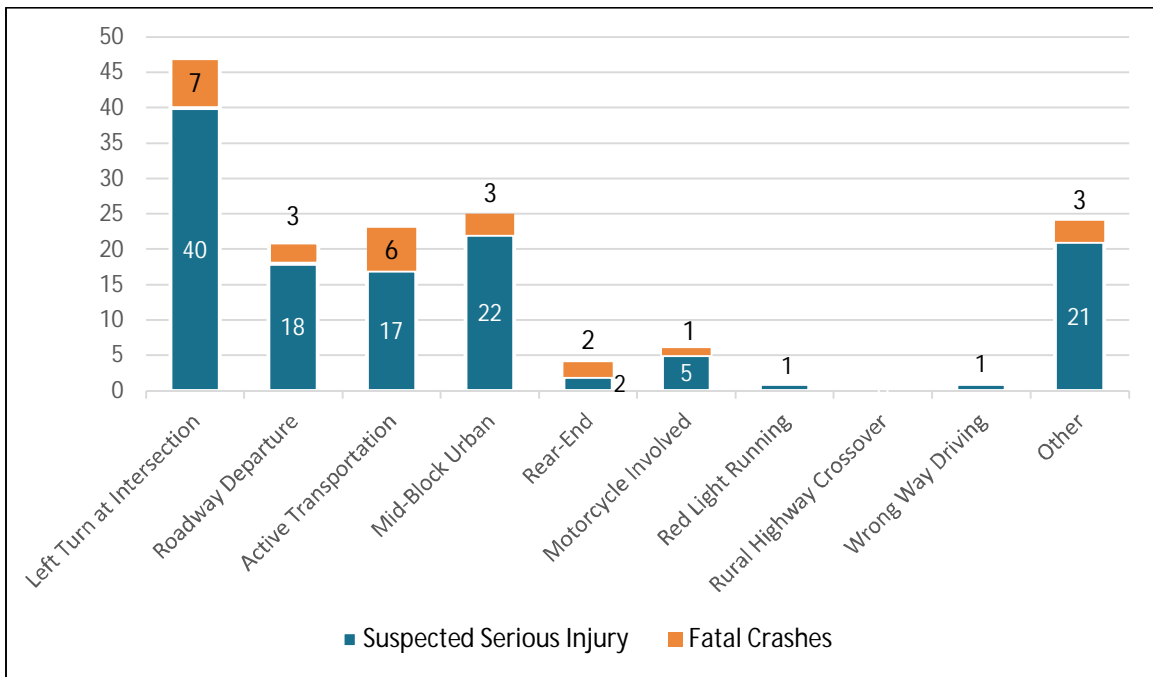


Figure 4.8 – Fatal and Serious Injury Crashes by Crash Type

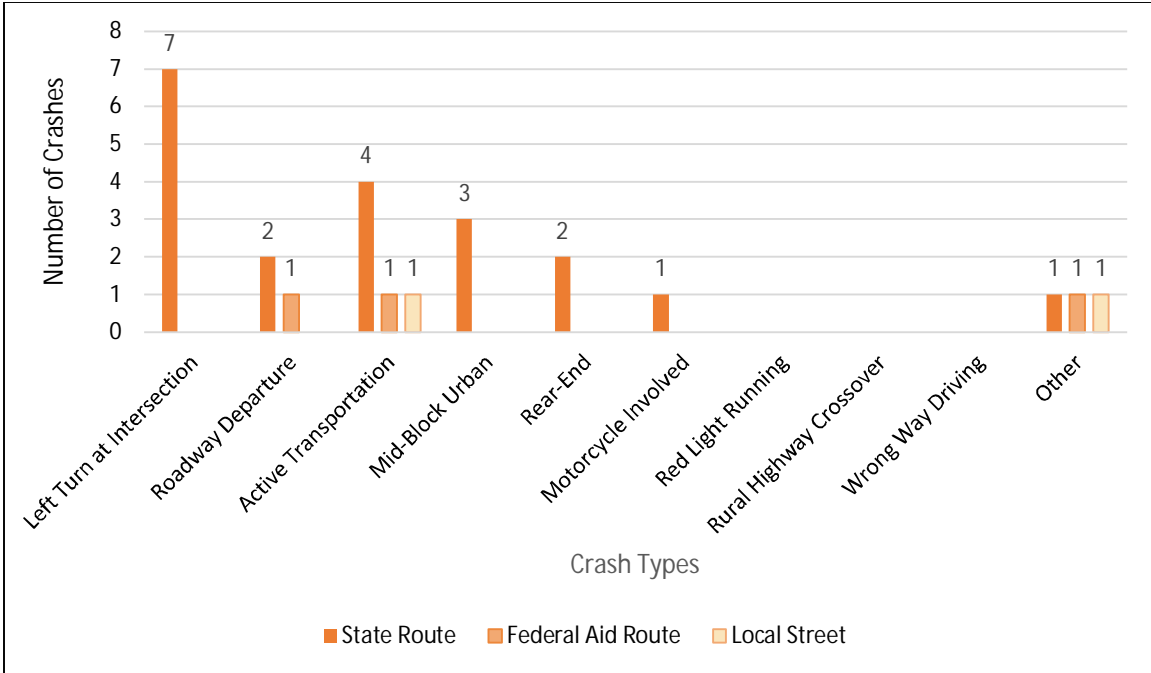


Figure 4.9 – Fatal Crashes by Crash Type and Roadway Ownership

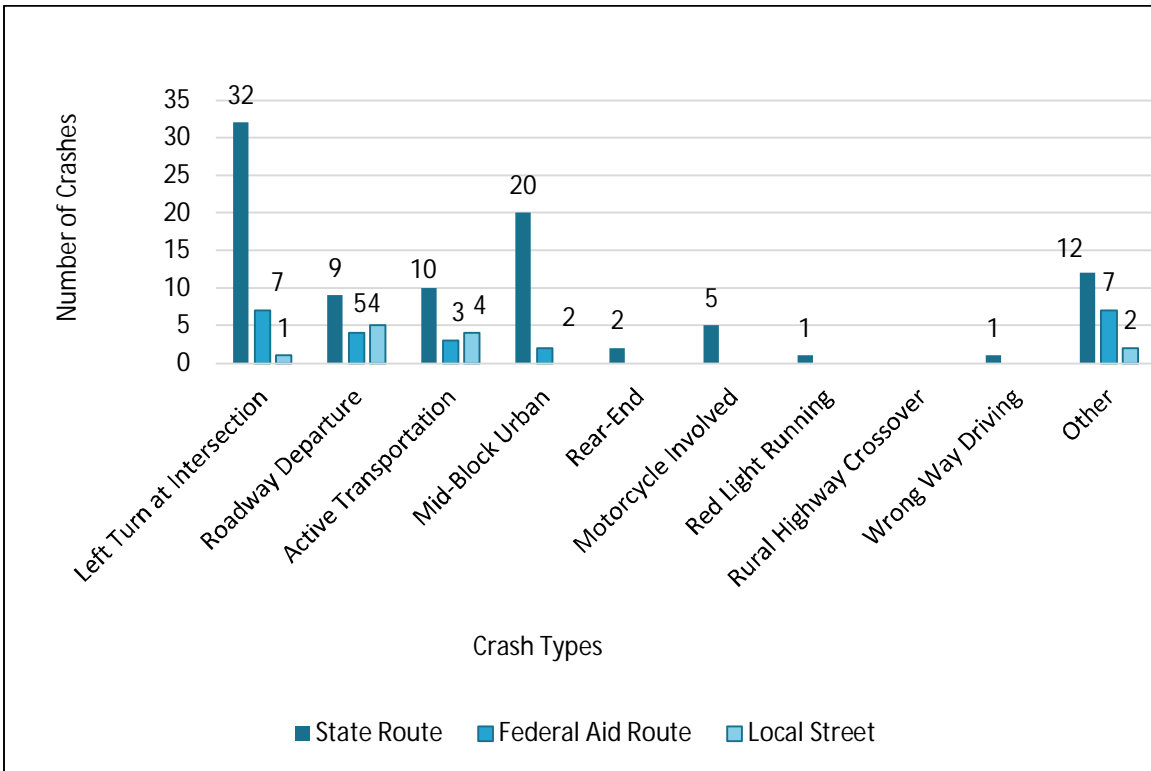


Figure 4.10 – Serious Injury Crashes by Crash Type and Roadway Ownership

4.5. Fatal and Serious Injury Vulnerable User Crashes

Figure 4.11 through Figure 4.13 provide an overview of fatal and serious injury crashes by vulnerable road user and roadway ownership for the Western Weber County GFA. The data shows the following:

- Motorcycle-related fatal and serious injury crashes (28) are double the number of pedestrian (14) or bicycle related crashes (14)
- The highest number of motorcycle crashes occurred on State Routes
- There was only one pedestrian fatal crash in the five-year period in this GFA; there were 5 bicycle fatal crashes in the five-year period, three of which occurred on State Routes, and one each on Federal Aid routes and Local Streets

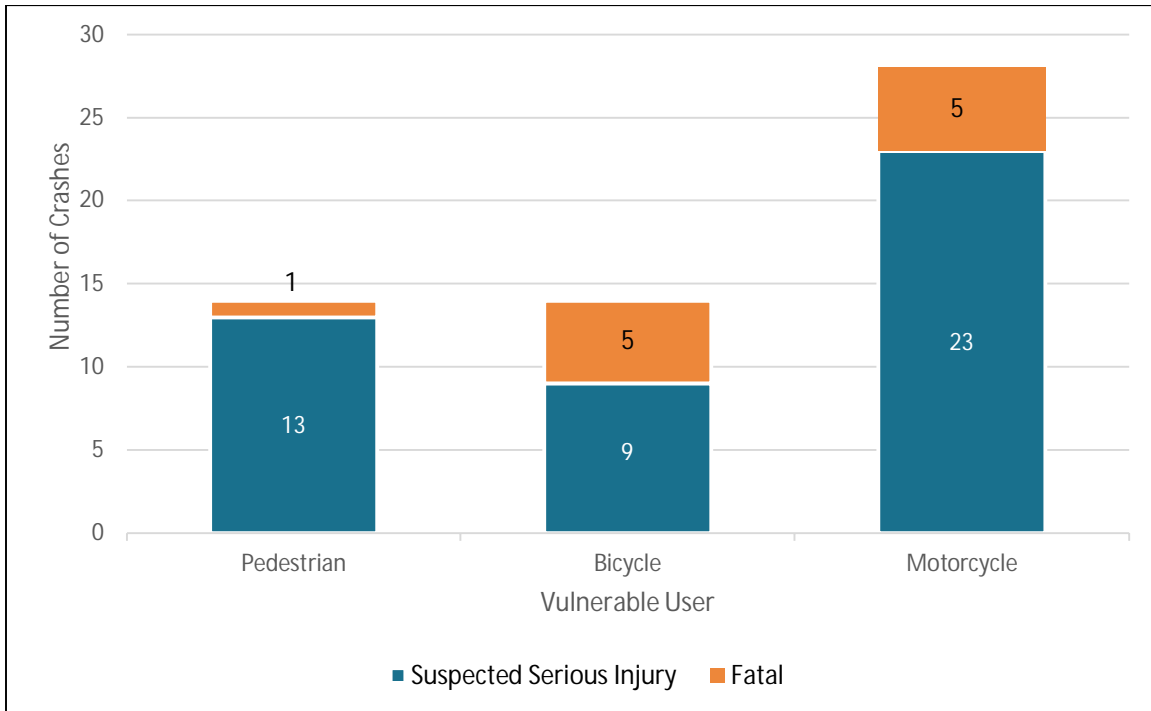


Figure 4.11 – Fatal and Serious Injury Crashes by Vulnerable User

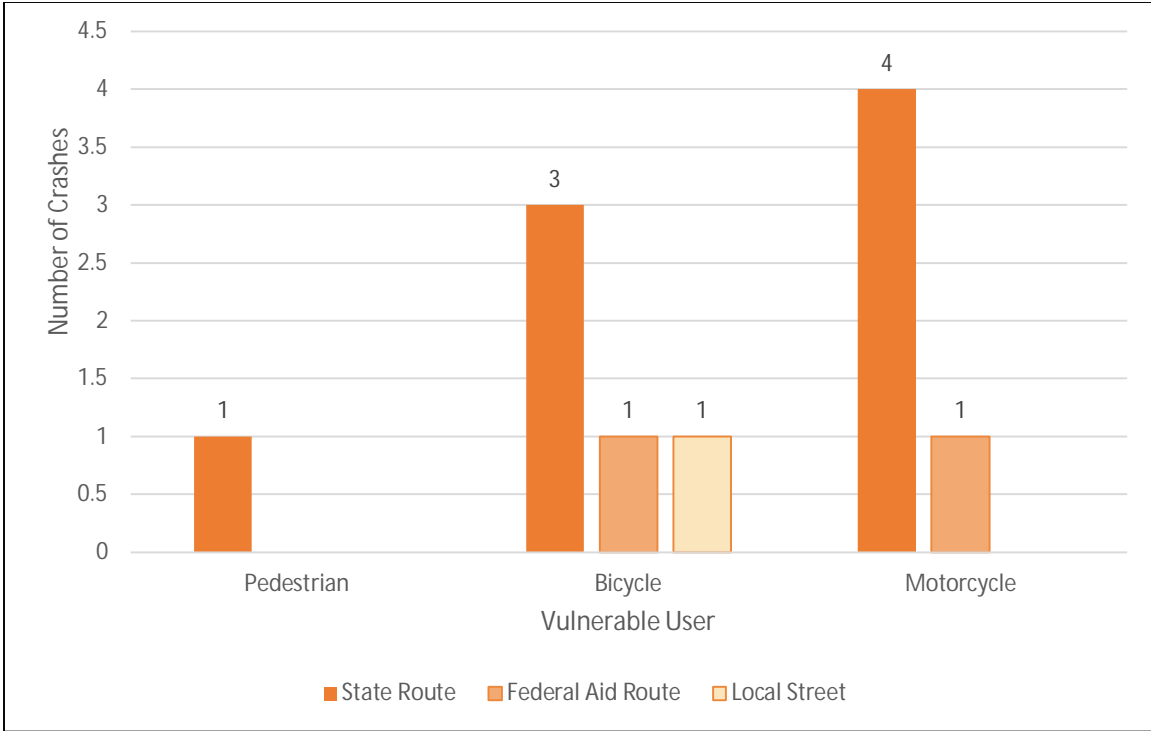


Figure 4.12 – Fatal Crashes by Vulnerable User and Roadway Ownership

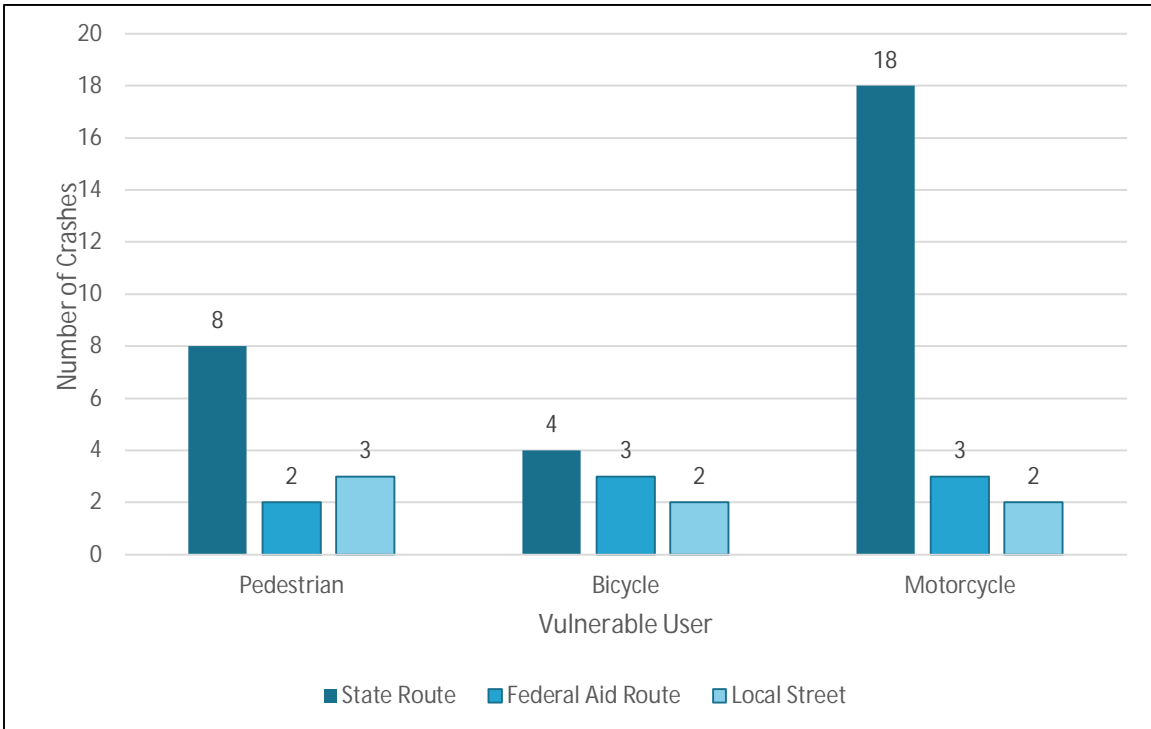


Figure 4.13 – Serious Injury Crashes by Vulnerable User and Roadway Ownership

4.6. Fatal and Serious Injury Crashes by Manner of Collision

Figure 4.14 through Figure 4.16 provide an overview of fatal and serious injury crashes by manner of collision and roadway ownership for the Western Weber County GFA. The data shows the following:

- Single vehicle and angle crash types resulted in the largest number of fatal and serious injury crashes in this GFA.
- No other crash types exceeded four fatal crashes.

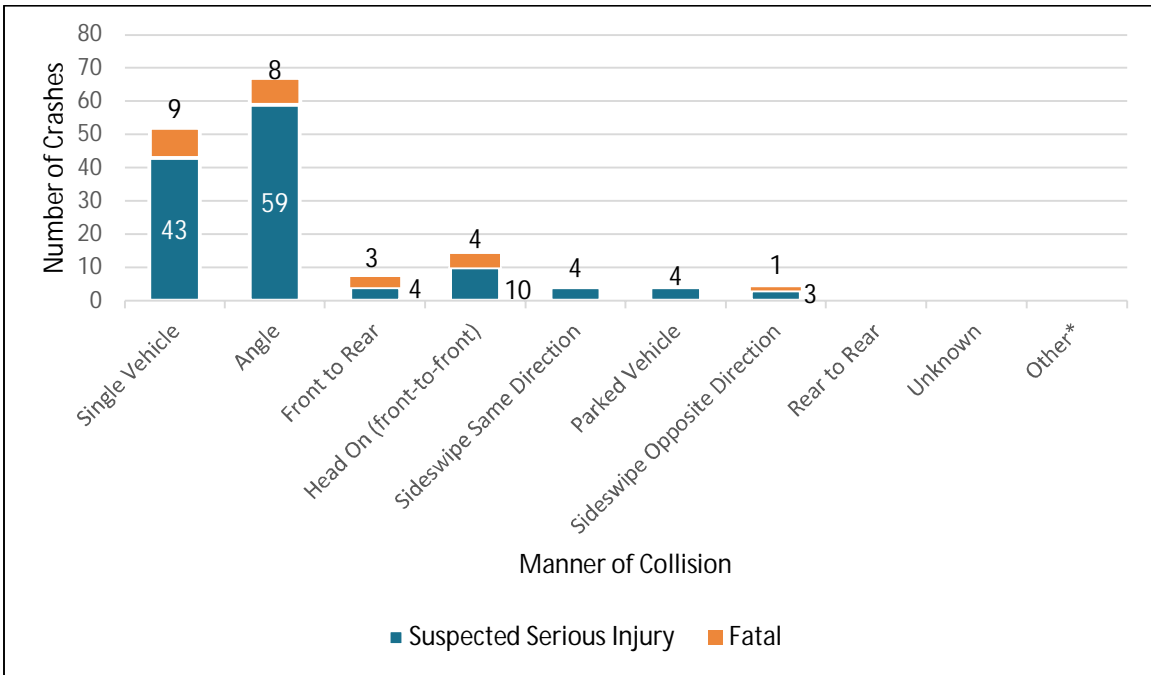


Figure 4.14 – Fatal and Serious Injury Crashes by Manner of Collision

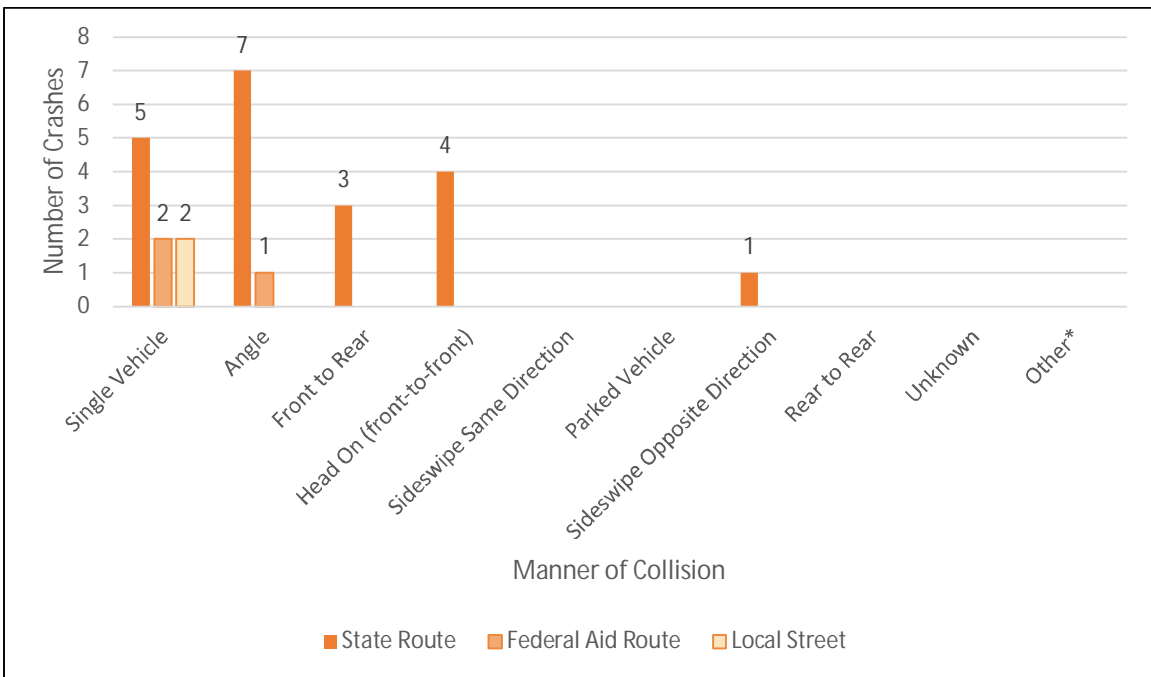


Figure 4.15 – Fatal Crashes by Manner of Collision and Roadway Ownership

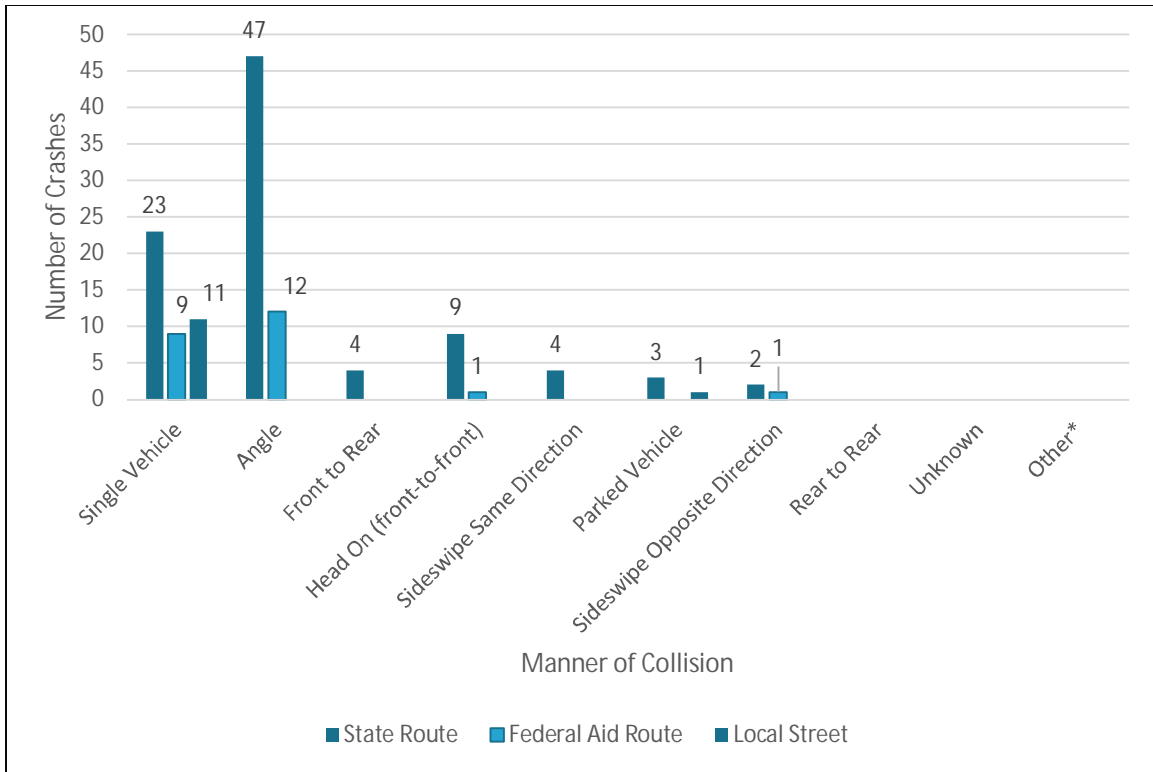


Figure 4.16 – Serious Injury Crashes by Manner of Collision and Roadway Ownership

4.7. Fatal and Serious Injury Intersection Crashes

Figure 4.17 through **Figure 4.19** provide an overview of fatal and serious injury crashes by intersection and roadway ownership for the Western Weber County GFA. The data shows the following:

- Intersection involved fatal and serious injury crashes exceed that of not intersection involved crashes
- A majority occurred intersections involved and not intersection involved occurred on State Routes

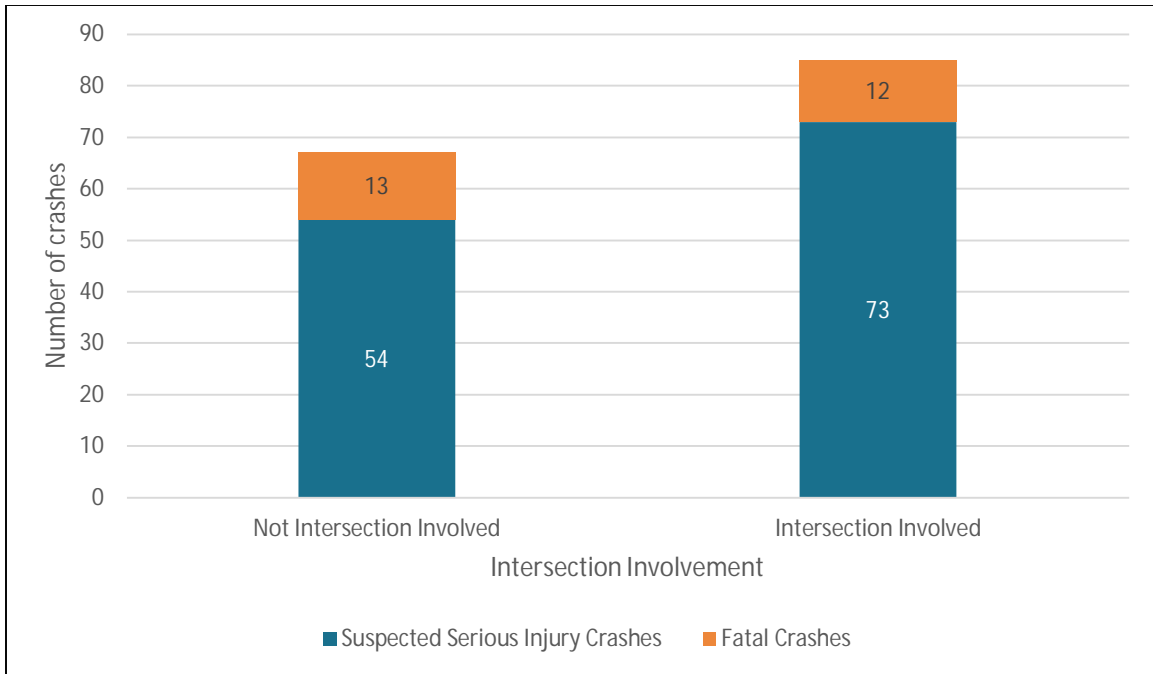


Figure 4.17 – Fatal and Serious Injury Crashes by Intersection

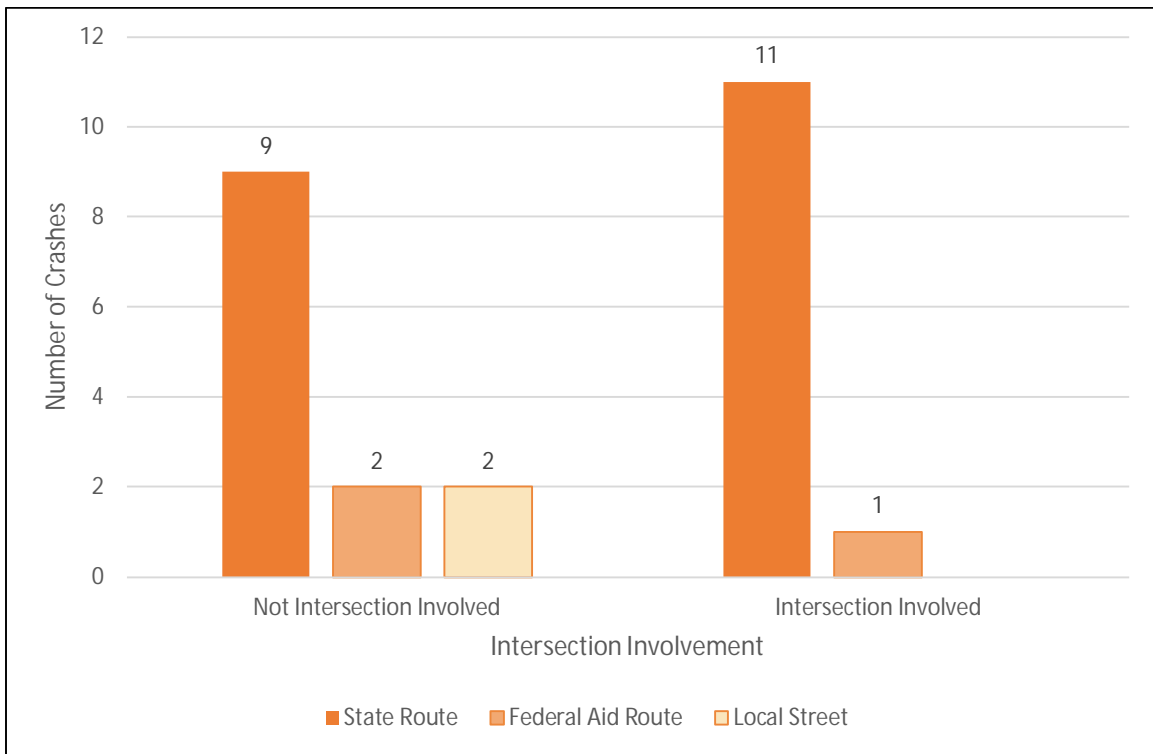


Figure 4.18 – Fatal Crashes by Intersection and Roadway Ownership

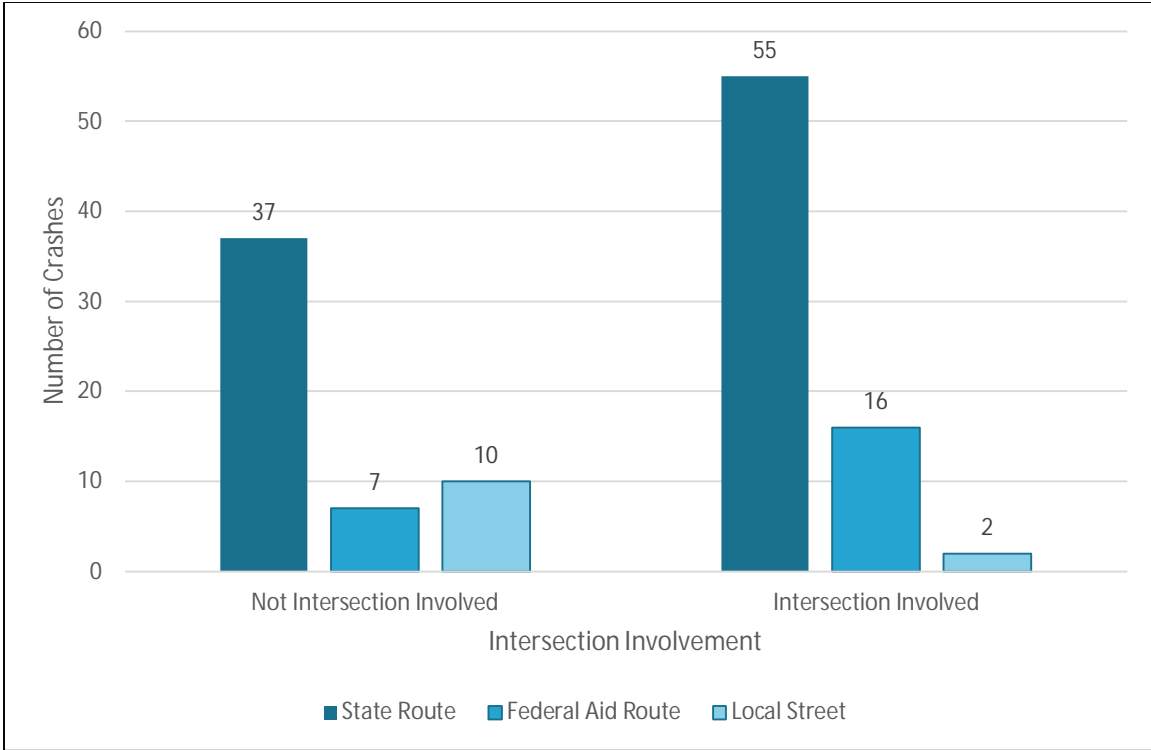


Figure 4.19 – Serious Injury Crashes by Intersection and Roadway Ownership



4.8. Fatal and Serious Injury Crashes by Functional Class

Figure 4.20 through Figure 4.22 provide an overview of fatal and serious injury crashes by functional class and roadway ownership for the Western Weber County GFA. The data shows the following:

- Principal Arterial recorded the highest total number of fatal and serious injury crashes
- Fatal crashes on Principal Arterials is double that of any other functional class including Interstate

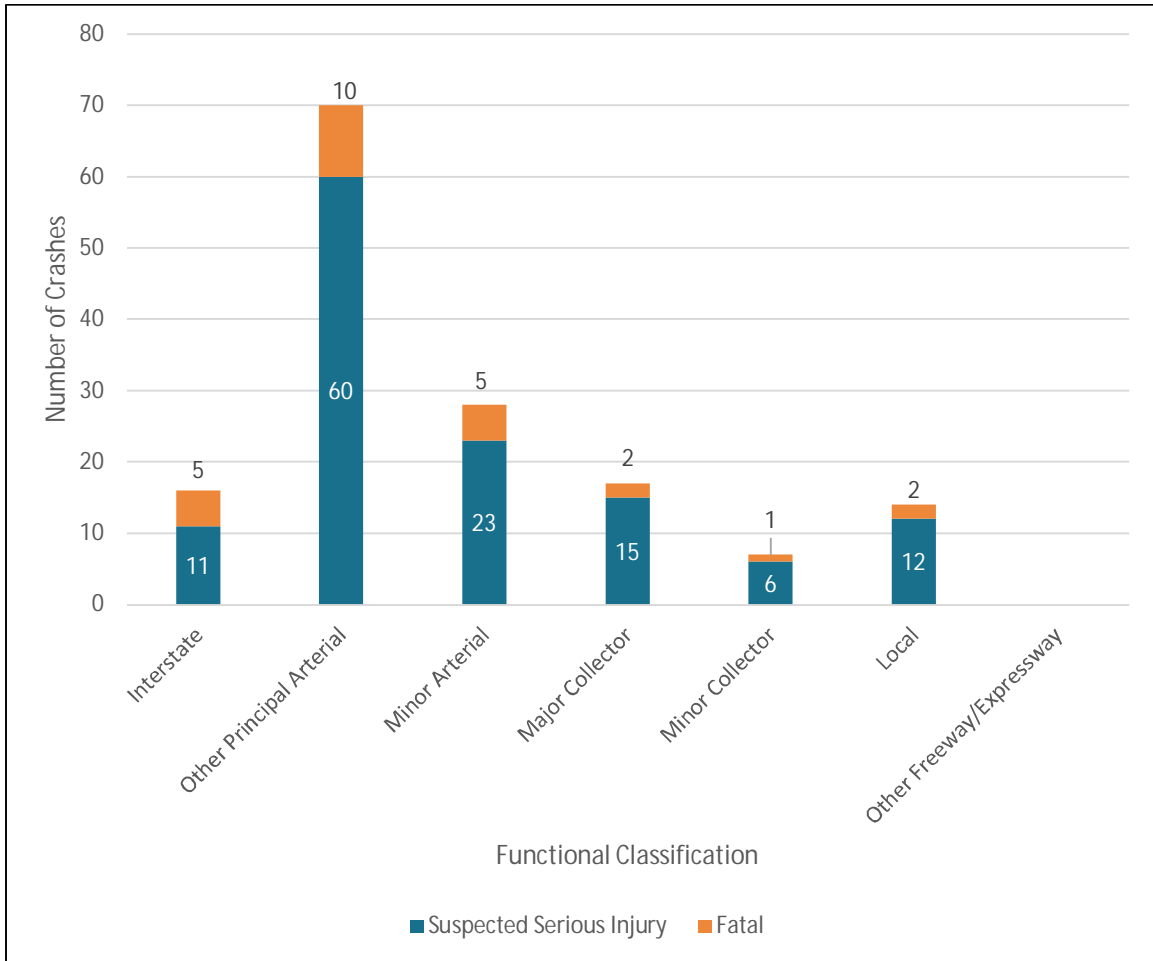


Figure 4.20 – Fatal and Serious Injury Crashes by Functional Class



Figure 4.21 – Fatal Injury Crashes by Functional Class and Roadway Ownership

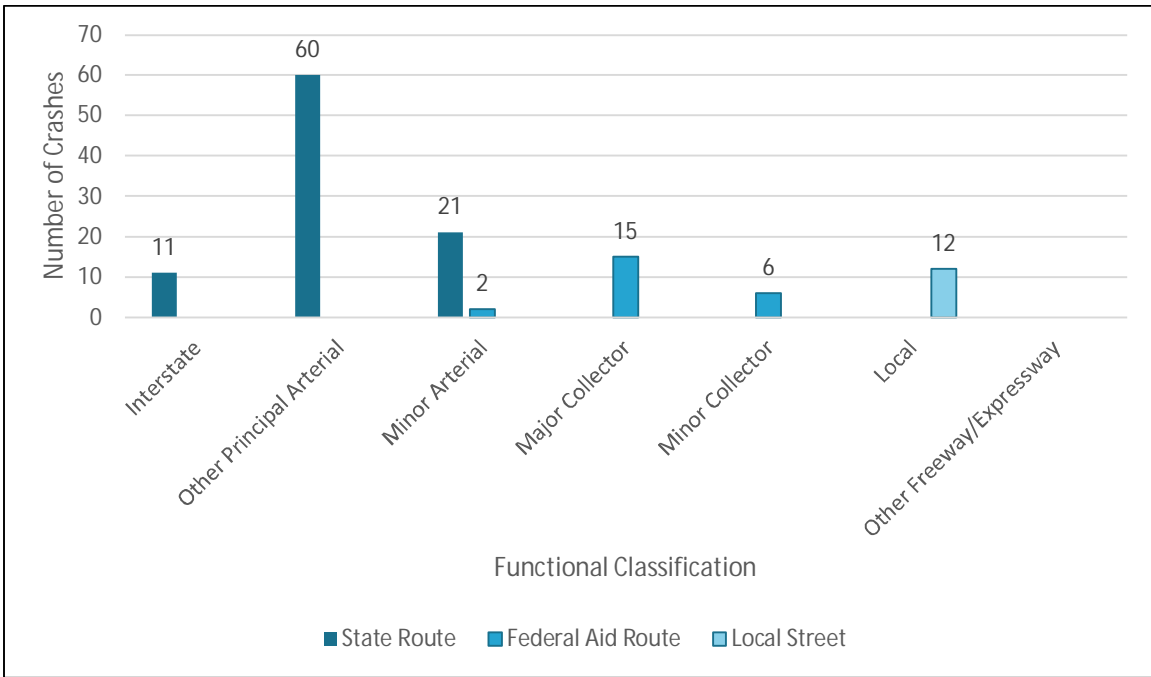


Figure 4.22 – Serious Injury Crashes by Functional Class and Roadway Ownership

4.9. Fatal and Serious Injury Crash Trees Diagrams

Fatal and serious injury crash tree diagrams were generated for the Western Weber County GFA. These crash tree diagrams are presented in **Figure 4.23** through **Figure 4.25**.

The crash trees are limited to the top 3 categories for crash type and manner of collision. Each crash tree diagram displays the total fatal and serious injury crashes (T), fatal crashes (K), and serious injury crashes (A). The data shows the following:

- State Routes recorded the highest number of crashes (73%)
- There are no rural State Route or rural Federal Aid crashes in this GFA; Local Streets had two rural crashes
- Intersection-related crashes exceed that of non-intersection on State Routes and Federal Aid routes; on Local Streets, non-intersection related crashes exceed intersection-related crashes
- Of the intersection related, Left Turn at intersection was prominent on State Routes and Federal Aid routes
- On State Routes, Mid-Block urban is a prominent crash type. This includes U-turns or left-turns not at intersections

CRASH TYPE

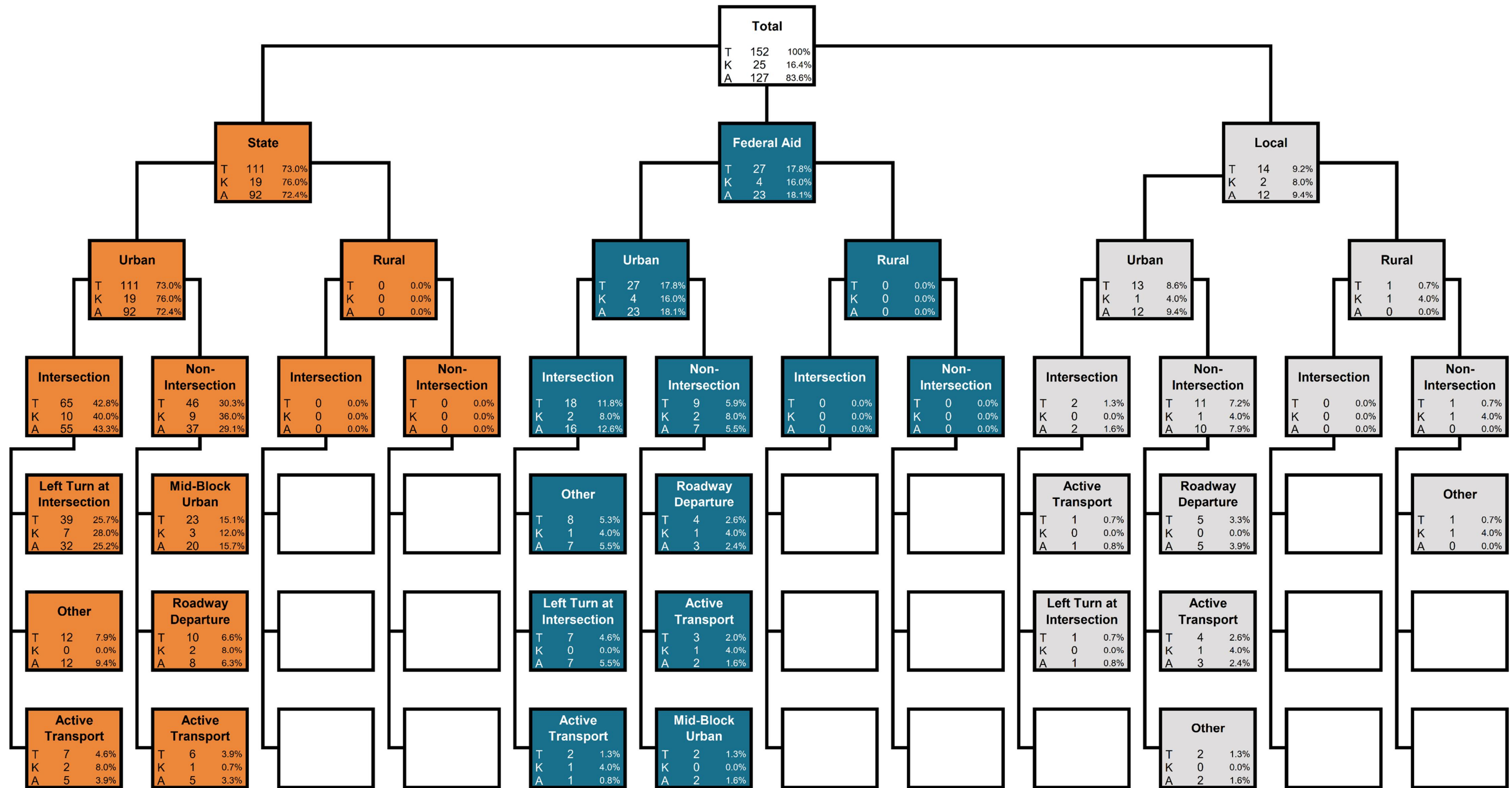


Figure 4.23 – Fatal and Serious Injury Crash Tree Diagram (Crash Type)

MANNER OF COLLISION

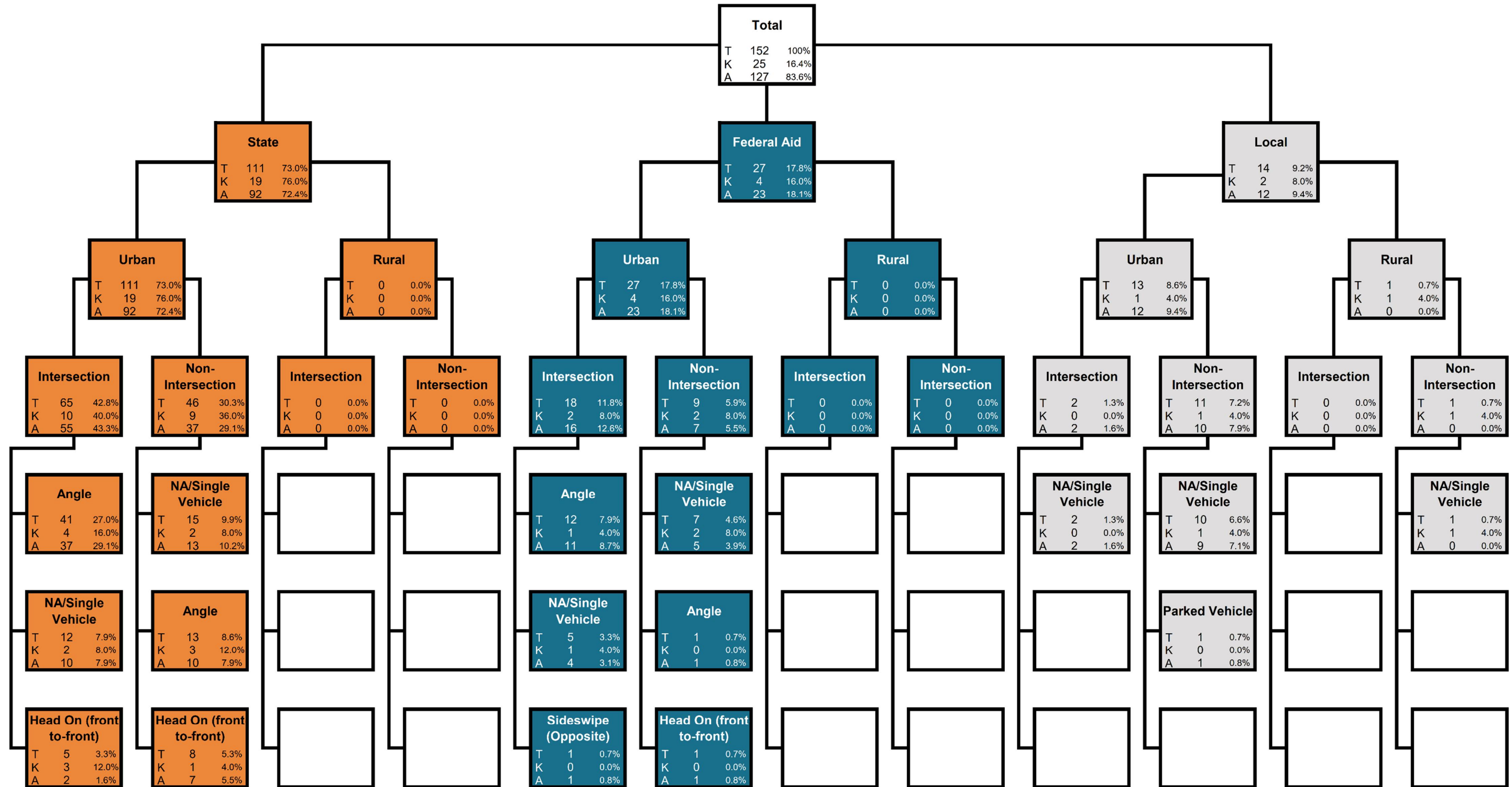


Figure 4.24 – Fatal and Serious Injury Crash Tree Diagram (Manner of Collision)

ACTIVE TRANSPORTATION

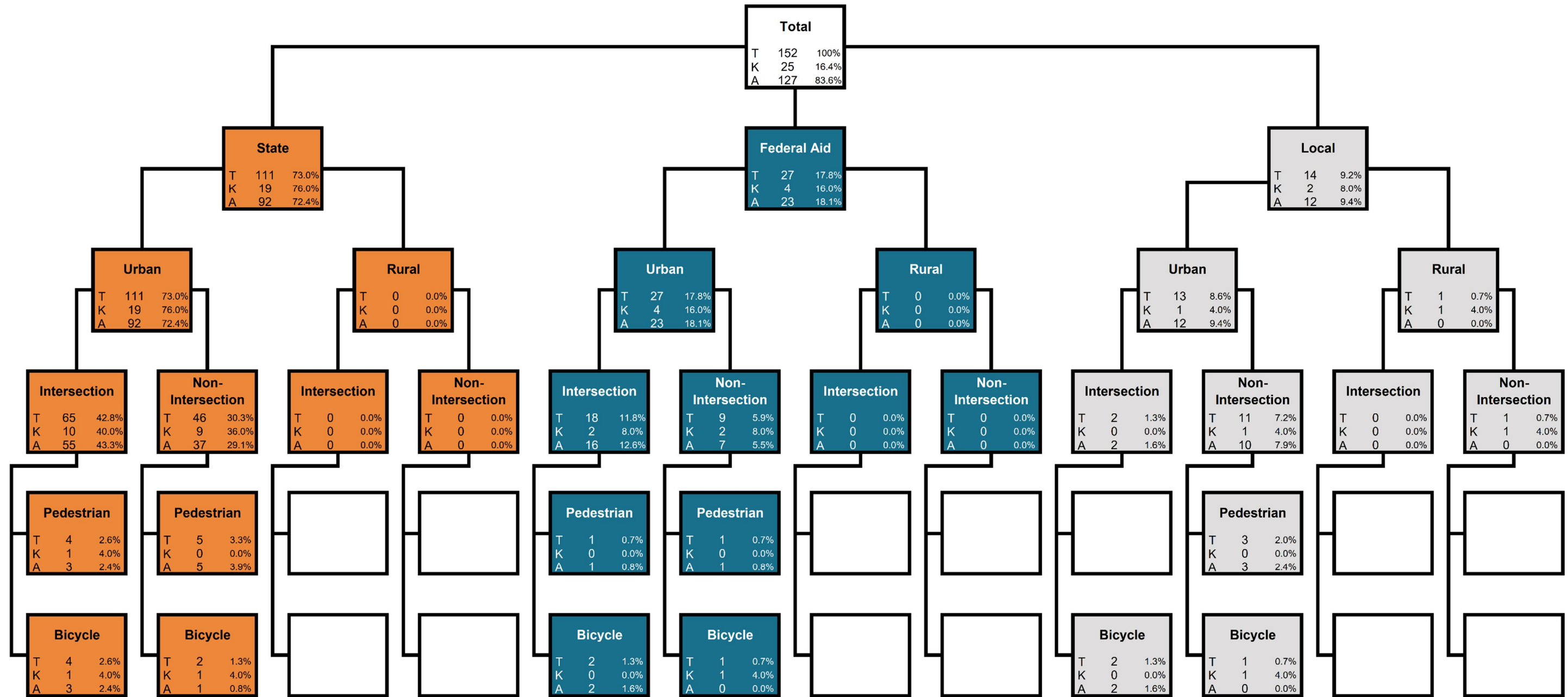


Figure 4.25 – Fatal and Serious Injury Crash Tree Diagram (Active Transportation)

5. Crash and Network Screening Analysis

A crash and network screening analysis was prepared for the Western Weber County GFA informed by four sub-analyses:

- Number of Crashes
- Critical Crash Rate (CCR)
- Probability of a Specific Crash Type Exceeding Threshold Proportion
- Equivalent Property Damage Only (EPDO)

CCR Differential by roadway ownership are mapped in the following figures:

- **Figure 5.1** – CCR Differential – Segments (State Routes)
- **Figure 5.2** – CCR Differential – Segments (Federal Aid Routes)
- **Figure 5.3** – CCR Differential – Segments (Local Routes)
- **Figure 5.4** – CCR Differential – Intersections (Signalized)
- **Figure 5.5** – CCR Differential – Intersections (Unsignalized)

A positive Local CCR Differential is an indication of a location with a potential for safety improvement (PSI).

A list of the top 10 CCR Differential segments and intersections for the Western Weber County GFA are located in **Table 5.1** and **Table 5.2** along with their associated number of crashes, probability of a specific crash type exceeding threshold proportion, and EPDO analysis results.

These locations represent those with the highest potential for safety improvements and can be considered as project candidate locations.



Figure 5.1 – CCR Differential – Segments (State Routes)



Figure 5.2 – CCR Differential – Segments (Federal Aid Routes)



Figure 5.3 – CCR Differential – Segments (Local Routes)

Table 5.1 – Crash and Network Screening Analysis Results - Segments

Facility	Limits	Functional Classification	City	Crashes	Critical Crash Rate Differential	EPDO ¹	Fatal	Suspected Serious Injury	Suspected Minor Injury	Possible Injury	No Injury/PDO	Angle	Front to Rear	Head On	Single Vehicle	Parked Vehicle	Rear to Rear	Rear to Side	Sideswipe (Same Direction)	Sideswipe (opposite Direction)	Other/Unknown	Pedestrian	Bicycle	Motorcycle
State Routes																								
4650 W (SR-134)	1850 N to Silver Wolf Run	Minor Arterial	Plain City	19	16.8	29	0	0	0	1	18	8	5	0	1	4	0	0	1	0	0	0	0	0
2575 N (SR-134)	2575 N to 2600 N	Minor Arterial	Plain City	6	14.4	27	0	0	1	0	5	1	0	0	4	0	0	0	0	1	0	0	0	0
1900 W (SR-126)	5700 S to 5600 S	Other Principal Arterial	Roy	54	6.2	338	0	0	7	13	34	30	17	1	2	0	0	0	0	4	0	1	1	1
4700 W (SR-134)	1650 N to 1850 N	Minor Arterial	Plain City	8	4.7	29	0	0	0	2	6	2	4	0	0	1	0	0	0	0	1	0	0	0
5600 S (SR-97)	2775 W to 2700 W	Minor Arterial	Roy	16	2.6	152	0	0	3	7	6	1	14	0	1	0	0	0	0	0	0	0	0	0
5600 S (SR-97)	2000 W to 1900 W	Minor Arterial	Roy	23	2.5	75	0	0	1	3	19	14	4	0	1	0	0	0	0	3	1	0	0	0
3500 W (SR-108)	5600 S to 5500 S	Other Principal Arterial	Roy	27	2.5	132	0	0	3	4	20	10	7	4	1	3	0	0	0	1	1	0	0	0
5600 S (SR-97)	2775 W to 2800 W	Minor Arterial	Roy	5	2.3	37	0	0	1	1	3	1	4	0	0	0	0	0	0	0	0	0	0	0
4700 W (SR-134)	1150 S to 900 S	Minor Arterial		6	2.2	119	0	1	0	2	3	1	3	0	0	0	0	0	0	2	0	0	0	0
1900 W (SR-126)	250 N to 400 N	Other Principal Arterial	Marriott-Slatervil	23	1.9	106	0	0	1	6	16	9	11	0	3	0	0	0	0	0	0	0	0	0
Federal Aid Routes																								
Pioneer Rd	2200 W to 2000 W	Major Collector	Marriott-Slatervil	6	4.0	27	0	0	0	2	4	4	1	0	0	0	0	0	0	1	0	0	0	0
4800 S	2700 W to 2675 W	Major Collector	Roy	8	2.5	50	0	0	1	2	5	0	5	0	3	0	0	0	0	0	0	0	0	1
2550 S	2050 W to 1900 W	Major Collector	West Haven	10	2.3	31	0	0	1	0	9	6	1	0	1	0	0	0	1	1	0	1	0	0
4800 S	3500 W to 3350 W	Major Collector	Roy	15	2.1	99	0	0	2	4	9	7	6	1	0	0	0	0	0	1	0	0	0	0
1975 N	4600 W to 4500 W	Major Collector	Plain City	6	1.5	6	0	0	0	0	6	3	2	1	0	0	0	0	0	0	0	0	0	0
1975 N	3475 N to Silver Wolf Run	Major Collector	Plain City	5	1.1	914	1	0	1	0	3	0	1	0	4	0	0	0	0	0	0	0	0	1
1200 W	1450 S to 1200 S	Major Collector	Marriott-Slatervil	4	1.1	4	0	0	0	0	4	1	2	0	0	0	0	0	0	1	0	0	0	0
2550 S	1900 W to 1760 W	Minor Arterial	West Haven	8	1.0	29	0	0	0	2	6	7	1	0	0	0	0	0	0	0	0	0	0	1
4800 S	Midland Dr to 3500 W	Minor Collector	Roy	5	1.0	37	0	0	1	1	3	2	1	0	0	0	0	0	0	2	0	0	0	0
1200 W	1450 S to 1100 W	Major Collector	Marriott-Slatervil	5	0.9	26	0	0	0	2	3	0	0	0	5	0	0	0	0	0	0	0	0	0
Local Streets																								
5200 S	2000 W to 1950 W	Local	Roy	3	7264.3	35	0	0	1	1	1	0	1	0	2	0	0	0	0	0	0	1	0	0
2100 S	Shadybrook Ln to 1100 W	Local	West Haven	3	726.3	3	0	0	0	0	3	1	0	0	2	0	0	0	0	0	0	0	0	0
5700 S	2000 W to 1900 W	Local	Roy	4	270.8	25	0	0	1	0	3	1	0	1	0	1	0	0	0	1	0	0	0	0
Commerce Way	Scott Ln to 1900 W	Local	West Haven	3	68.1	3	0	0	0	0	3	1	0	0	1	1	0	0	0	0	0	0	0	1
2000 W	5125 S to 5075 S	Local	Roy	3	14.1	24	0	0	1	0	2	0	0	0	1	1	0	0	0	1	0	0	0	0
4975 W	Haven Rd to 4890 W	Local	West Haven	3	11.6	3	0	0	0	0	3	0	0	0	3	0	0	0	0	0	0	0	0	0
7500 W	5100 S to North Fork Weber River	Local	Hooper	6	6.8	48	0	0	1	2	3	0	0	0	6	0	0	0	0	0	0	0	0	0
2275 W	4975 S to 4900 S	Local	Roy	3	4.9	24	0	0	1	0	2	1	0	0	2	0	0	0	0	0	0	0	0	1
5100 W	4600 S to 4525 S	Local	West Haven	3	4.1	3	0	0	0	0	3	0	0	0	3	0	0	0	0	0	0	0	0	0
5100 W	3000 S to 2550 S	Local		5	3.2	201	0	2	0	1	2	0	0	0	5	0	0	0	0	0	0	0	0	0

1. Equivalent Property Damage Only Crashes
 = Local CCR Differential > 3.0
 = Local CCR Differential 1.0 - 3.0
 = Local CCR Differential 0.66 - 1.0
 = Local CCR Differential 0.33 - 0.66
 = Local CCR Differential 0.0 - 0.33
 = 90 - 100% probability that crash type is over-represented
 = 80 - 90% probability that crash type is over-represented
 = 70 - 80% probability that crash type is over-represented



Figure 5.4 – CCR Differential – Intersections (Signalized)





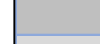

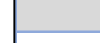



Figure 5.5 – CCR Differential – Intersections (Unsignalized)

Table 5.2 – Crash and Network Screening Analysis Results - Intersections

Intersection	City	Crashes	Critical Crash Rate Differential	EPDO ¹	Fatal	Suspected Serious Injury	Suspected Minor Injury	Possible Injury	No Injury/PDO	Angle	Front to Rear	Head On	Parked Vehicle	Single Vehicle	Rear to Rear	Rear to Side	Sideswipe (Same Direction)	Sideswipe (opposite Direction)	Other/Unknown	Pedestrian	Bicycle	Motorcycle	
Signalized Intersections																							
1900 W & Pioneer Rd	Marriott-Slat	56	1.6	1280	1	0	9	14	32	28	17	3	4	0	0	0	1	3	0	0	1	4	
1900 W & Midland Dr		94	0.5	2732	2	5	10	18	59	45	32	7	3	0	0	0	3	4	0	1	0	3	
3500 W & 5600 S	Roy	99	0.3	1165	0	4	20	26	49	64	17	5	8	0	0	0	1	3	1	3	1	0	
1900 W & Hinckley Dr	Roy	75	0.1	1347	0	7	21	17	30	51	17	3	2	0	0	0	1	1	0	1	0	3	
1900 W & 4000 S	Roy	65	0.0	444	0	0	10	16	39	13	43	2	2	1	0	0	1	2	1	0	1	0	
1900 W & 5600 S	Roy	124	0.0	995	0	1	21	32	70	66	36	6	3	0	0	0	1	11	1	2	0	2	
2475 W & Hinckley Dr	West Haven	49	0.0	354	0	0	9	11	29	13	20	2	9	0	0	0	1	3	1	0	0	1	
1900 W & 2550 S	West Haven	68	-0.1	425	0	0	9	16	43	29	20	6	5	0	0	0	3	5	0	1	0	0	
1100 W & 21St St	West Haven	59	-0.1	685	0	3	11	11	34	25	17	1	6	1	0	0	3	3	3	4	0	0	
2825 W & Midland Dr	Roy	63	-0.1	909	0	4	17	11	31	34	23	2	2	0	0	0	1	1	0	0	0	1	
Unsignalized Intersections																							
Airport Rd & 4400 S St	Roy	4	17.8	4	0	0	0	0	4	2	0	0	2	0	0	0	0	0	0	0	0	0	0
2700 W & 3300 S	West Haven	14	4.5	67	0	0	2	1	11	11	1	0	1	0	0	0	0	0	1	0	0	0	0
4425 W & 2200 N	Plain City	11	2.4	53	0	0	1	2	8	11	0	0	0	0	0	0	0	0	0	0	0	0	0
4700 W & 1500 N	Plain City	19	2.3	207	0	1	4	1	13	16	3	0	0	0	0	0	0	0	0	0	0	0	0
5100 W & 4000 S	West Haven	13	1.6	45	0	0	1	1	11	11	1	0	0	0	0	0	0	0	1	0	0	0	0
3500 W & 2550 S		26	1.2	202	0	1	0	8	17	23	1	1	0	0	0	0	0	0	1	0	0	0	0
2100 W & 5500 S	Roy	3	1.1	3	0	0	0	0	3	3	0	0	0	0	0	0	0	0	0	0	0	0	0
Bouwhuis Dr & Midland Dr	West Haven	30	0.9	166	0	0	3	7	20	23	2	0	4	0	0	0	0	0	1	0	0	0	0
5500 W & 4000 S	Hooper	13	0.9	66	0	0	2	1	10	4	4	1	3	0	0	0	0	1	0	0	1	0	0
1100 W & 2100 S	West Haven	22	0.8	84	0	0	0	6	16	8	9	0	3	0	0	0	0	1	1	1	0	0	0

1. Equivalent Property Damage Only Crashes

	= Local CCR Differential > 3.0		= 90 - 100% probability that crash type is over-represented
	= Local CCR Differential 1.0 - 3.0		= 80 - 90% probability that crash type is over-represented
	= Local CCR Differential 0.66 - 1.0		= 70 - 80% probability that crash type is over-represented
	= Local CCR Differential 0.33 - 0.66		
	= Local CCR Differential 0.0 - 0.33		

6. Roadway Characteristic Risk Analysis

A roadway characteristic risk analysis was performed using the following three sub-analysis:

- Crash Profile Risk Assessment
- usRAP Risk Assessment
- Local Street Risk Assessment

6.1. Crash Profile Risk Assessment

This risk assessment sub-analysis identifies common roadway characteristics for fatal and serious injury crashes that occurred within the WFRC study area. Based on the scoring of the various roadway characteristic risks identified from analysis of crash reports, a risk score was assigned to all state and federal aid routes within the Western Weber County GFA consistent with the methodology described in Tech Memo #1 Section 3.4. The results of the Crash Profile Risk Assessment are mapped in the following figures:

- **Figure 6.1** – Crash Profile Risk Assessment Results (State Routes)
- **Figure 6.2** – Crash Profile Risk Assessment Results (Federal Aid Routes)

Table 6.1 provides an overview of urban and rural segments with the highest risk scoring. Up to ten urban and rural segments are listed if the segment received at least 67% of the overall total risk score.

Table 6.1 – Crash Profile Risk Assessment Segments (Federal Aid Routes)

Area Type	Road Segment	Extents	Risk Score
Urban	Silver Wolf Run / 1900 North	4650 West to East GFA Extents	24
Urban	400 North	I-15 to 1200 West	23.5
Urban	4800 South	4700 West to 3900 West	20.1
Urban	1500 South	4700 West to Pioneer Road	20
Rural	900 South / 1150 South	Little Mountain Training Annex to 4700 West	22.3 to 23.5
Rural	2550 South	5900 West to 1900 West	23.4
Rural	1200 West	17th Street to Bill Bailey Street	23.2
Rural	3600 West	Silver Wolf Run to 2600 North	21.5
Rural	1800 South	5900 West to 1900 West	21.5
Rural	3300 South	4700 West to 2700 West	20.5 to 21.5
Rural	2150 North	5900 West to 4700 West	21
Rural	5900 West	1150 South to 2150 North	21

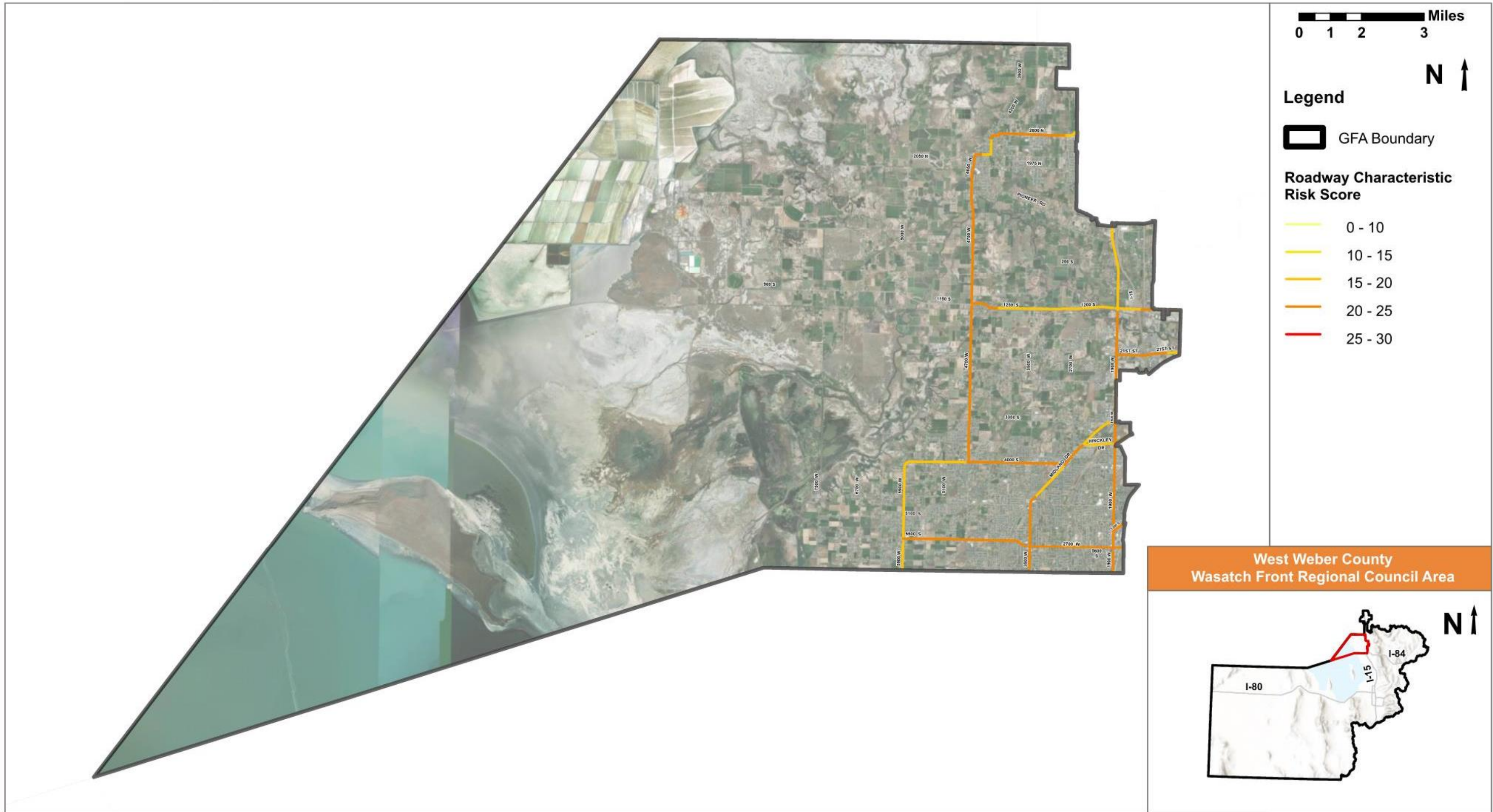


Figure 6.1 – Crash Profile Risk Assessment Results (State Routes)

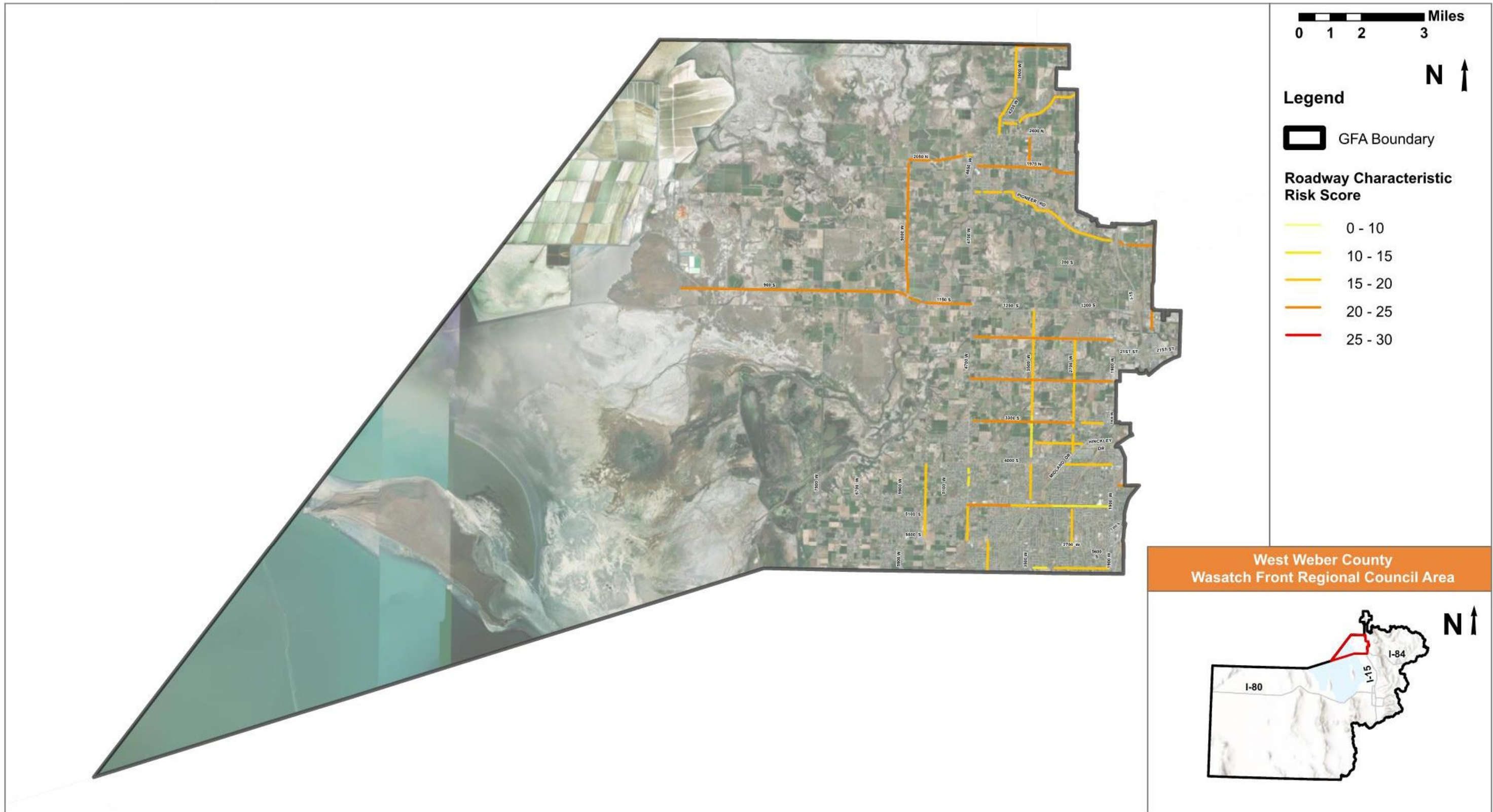


Figure 6.2 – Crash Profile Risk Assessment Results (Federal Aid Routes)

6.2. usRAP Risk Assessment

A roadway characteristic risk assessment was performed using roadway feature data collected for Utah state and federal aid routes. The risk assessment was performed using the usRAP tool. The output of the usRAP tool is a star rating or risk rating for vehicle, pedestrian, and bicyclist features. The results of the usRAP risk assessment by star rating are mapped in the following figures:

- **Figure 6.3** – Vehicle Star Rating (State Routes)
- **Figure 6.4** – Vehicle Star Rating (Federal Aid Routes)
- **Figure 6.5** – Pedestrian Star Rating (State Routes)
- **Figure 6.6** – Pedestrian Star Rating (Federal Aid Routes)
- **Figure 6.7** – Bicycle Star Rating (State Routes)
- **Figure 6.8** – Bicycle Star Rating (Federal Aid Routes)

A summary of the highest risk segments (1-2 Stars) for federal aid routes in the Western Weber County GFA are located in **Table 6.2**.

Table 6.2 – usRAP Risk Segments (Federal Aid Route)

Road Segment	Extents	Vehicle Risk	Pedestrian Risk	Bicycle Risk
4000 North	3900 West to East GFA Extents	X	X	X
4200 West / 3900 West	2600 North to 4000 North		X	
Plain City Road	2800 West to East GFA Extents	X	X	
3600 West	Silver Wolf Run to 2600 North	X	X	
Silver Wolf Run	1900 North (West) to 1900 North (East)		X	X
1900 North	Silver Wolf Run to East GFA Extents		X	X
2800 North	4200 West to Gravel Road		X	
2050 North / 2150 North	5900 West to 4650 West		X	
5900 West	1150 South to 2050 North		X	
900 South	9350 West to 5900 West		X	X
11500 South	5900 West to 4700 West		X	
400 North	1600 West to 1200 West	X	X	X
1200 West	17th Street to North GFA Boundary	X	X	X
1800 South	4700 West to 1900 West	X	X	
2550 South	4701 West to 1900 West	X	X	X
3300 South	4300 West to 2700 West	X	X	
5500 West	5500 South to 4000 South	X	X	
3500 West	2550 South to 1200 South		X	
4800 South	4700 West to 3100 West		X	

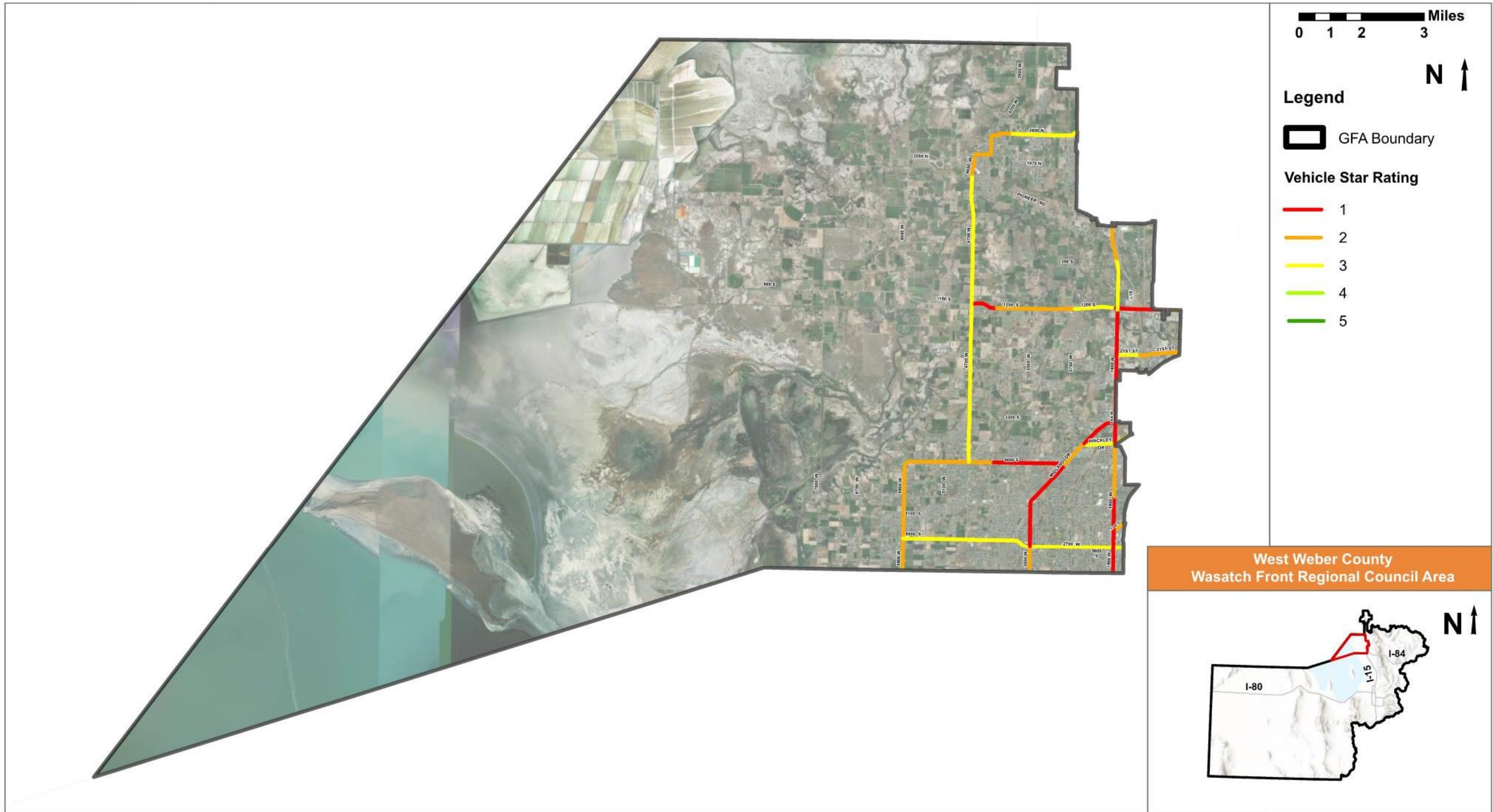


Figure 6.3 – Vehicle Star Rating (State Routes)



Figure 6.4 – Vehicle Star Rating (Federal Aid Routes)

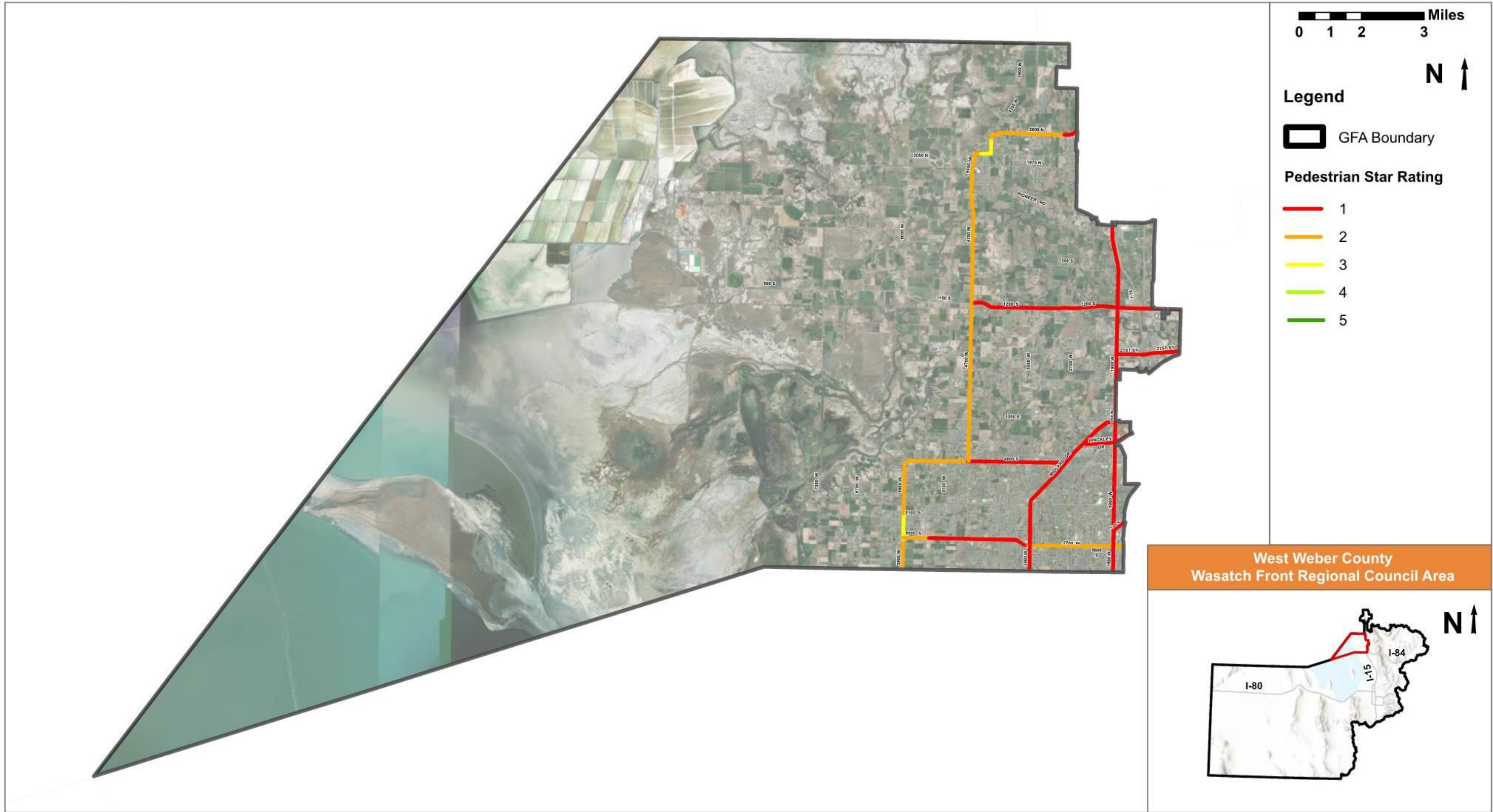


Figure 6.5 – Pedestrian Star Rating (State Routes)



Figure 6.6 – Pedestrian Star Rating (Federal Aid Routes)

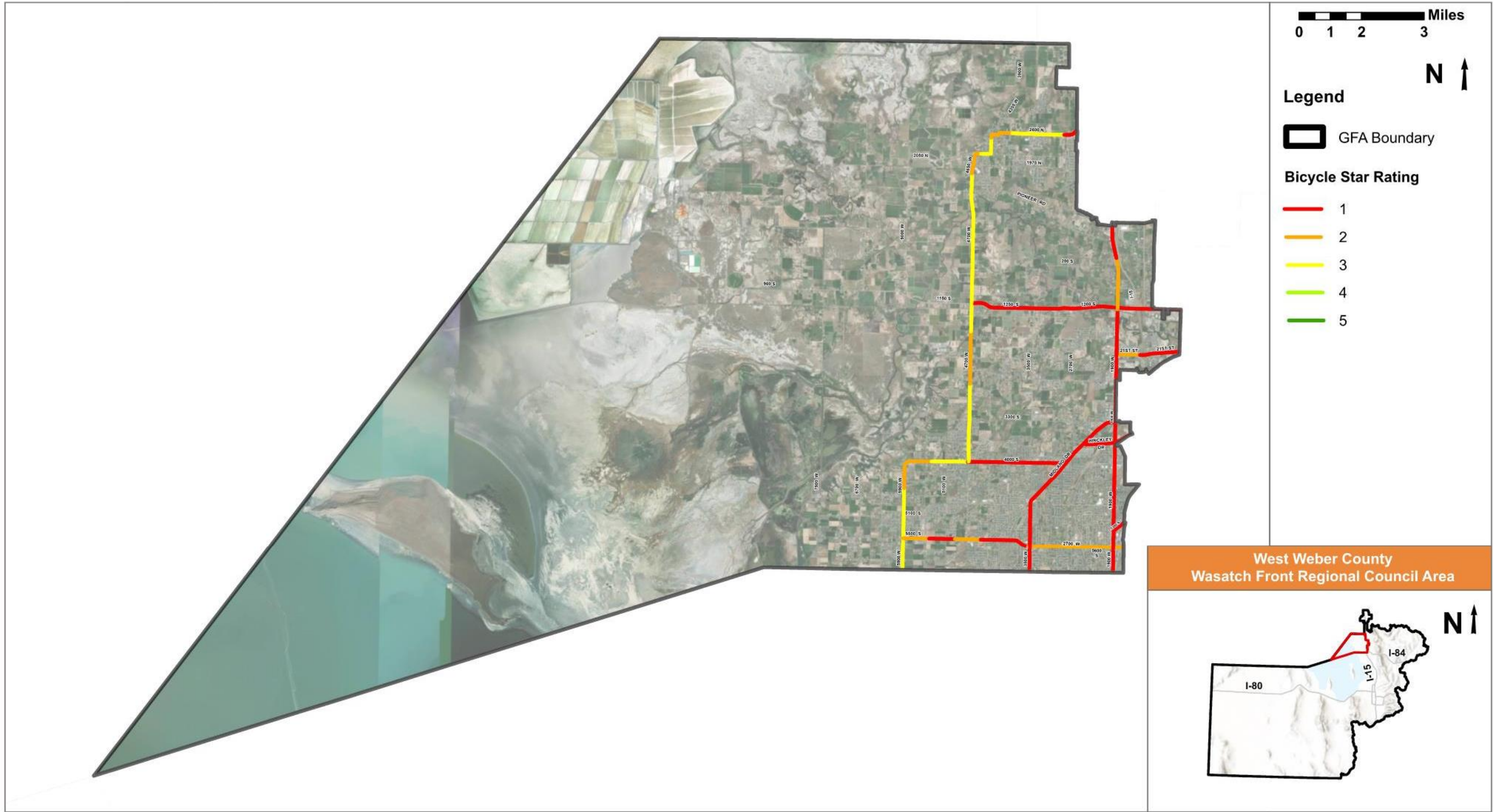


Figure 6.7 – Bicycle Star Rating (State Routes)



Figure 6.8 – Bicycle Star Rating (Federal Aid Routes)

6.3. Local Street Risk Assessment

A local street risk assessment was performed for all local roads within WFRC that are not included in the usRAP network. The results of the local street risk assessment are summarized in **Table 6.3** and **Figure 6.9**. Mapped segments include the top 5% risk segments within the WFRC study area and the top 10 segments or high priority segments within the Western Weber County GFA.

Table 6.3 – Local Street High Priority Segments

Road Segment	Extents
1100 West/Wilson Lane	Excalibur – 1900 South
6000 South	1900 West – 3100 West
4000 South	SR-108 – 1800 West
3100 West	5400 South – 6000 South
4800 South	I-15 – 4500 West
4400 South	1700 West – 2675 West
2700 West	5400 South – 5600 South
5200 South	1750 West – 2675 West
2550 South	1700 West – 2000 West
3300 South	SR-108 – 3500 West



Figure 6.9 – Local Street Risk Assessment Results

7. Safety Analysis Summary

This section summarizes the safety analysis performed for the Western Weber County GFA by identifying common risk characteristics and a composite high-risk roadway network.

7.1. Common Risk Characteristics

Based on the SHSP Emphasis Area Analysis and the Historical Crash Analysis summarized above, the following are common risk characteristics that should be considered when developing safety improvement projects specific to the Western Weber County GFA.

- Intersections
 - 57.6% of all fatal and serious injuries
- Teen Driver
 - 22.4% of all fatal and serious injuries
- Older Driver
 - 22.4% of all fatal and serious injuries
- Motorcycle
 - 18.2% of all fatal and serious injuries
 - 3.9% of all fatal and serious injury crashes
- Roadway Departure
 - 13.9% of all fatal and serious injuries
 - 13.8% of all fatal and serious injury crashes
- Active Transportation
 - 15.1% of all fatal and serious injury crashes
- Left Turn at Intersection
 - 30.9% of all fatal and serious injury crashes

7.2. Composite High-Risk Roadway Network

Each of the safety analysis methodologies completed identified segments that can be improved to reduce fatalities and serious injuries.

To identify an overall high-risk roadway network and provide focused information for jurisdictional decisions regarding prioritization of safety improvements, an analysis was performed to identify overlapping segments from each of the analysis methodologies. A composite score, from zero to five, was determined using the approach in **Table 7.1**. The high-risk roadway network is a composite of the various risks as presented in **Section 4** through **Section 6** of Tech Memo #1. The top 10% of roadway segments for the entire WFRC area are included in the Composite High-Risk Network. These segments have a composite risk value of four or higher.

The Western Weber County GFA Composite High-Risk Network for Federal Aid routes is summarized in **Table 7.2**.

The results are also mapped in **Figure 7.1** (State Routes) and **Figure 7.2** (Federal Aid Routes).

Table 7.1 – Composite High-Risk Roadway

Analysis	Approach	Value
Historical Crash Analysis	5-Year Crash Totals ≥ 3 Crashes	1
Crash and Network Screening Analysis	Positive Local CCR Differential	1
Crash Profile Risk Assessment	Risk Score ≥ 20	1
usRAP Risk Assessment - Vehicle	Vehicle Star Rating = 1-2 Stars	1
usRAP Risk Assessment – Pedestrian	Pedestrian Star Rating = 1-2 Stars	0.5
usRAP Risk Assessment - Bicycle	Bicycle Star Rating = 1-2 Stars	0.5
	Total Possible Composite Risk Score	5

Table 7.2 – Western Weber County High-Risk Roadway Network (Federal Aid Routes)

Facility	Limits	Functional Classification	City	Composite Risk Score	Length (miles)	usRAP- Pedestrian Star Rating	usRAP - Bicycle Star Rating	usRAP- Vehicle Star Rating	Crash Profile Risk Score	CCR Differential Analysis	Significant Crashes
1975 N	1900 N to 2750 W	Major Collector	Plain City	4	2.7	X	X		X	X	X
1200 W	Bill Bailey St to 1100 W	Minor Arterial	Marriott-Slaterville	5	2.7	X	X	X	X	X	X
2550 S	3500 W to 1900 W	Major Collector	West Haven	4	2.0	X	X	X	X		X



Figure 7.1 – Western Weber County High-Risk Roadway Network (State Routes)



Figure 7.2 – Western Weber County High-Risk Roadway Network (Federal Aid Routes)



**WESTERN WEBER COUNTY CASE STUDY
PROJECT INFORMATION SHEETS**

Project Description/How is safety improved?

This project improves safety through countermeasures that mitigate roadway departures, manages speed, and improves active transportation infrastructure along the corridor and at intersections. Improvements include widening narrow shoulders, speed feedback signs (school and 5500 W.), sidewalk, bicycle lanes, traffic calming by installing wider lane lines, upgraded school crossings (5900 W.) and unsignalized intersection improvements (5900 W., 5500 W., 5100 W., 4700 W. and 4300 W.).

This project description represents potential safety improvement strategies that could be implemented at this location, as well as other locations with similar conditions. Additional improvement strategies could be considered subject to engineering analysis.

Proposed Proven Safety Countermeasures



Stop-Controlled Intersection Systemic Countermeasures



Bicycle Lanes



Appropriate Speed Limits for All Road Users



Wider Edge Lines

Opinion of Probable Construction Cost

Segment Improvements

Item Description	CMF	Applicable Crashes	Quantity	Unit	Unit Price	Item Cost
Shoulder Widening on Rural Roads	0.771	All Crashes	0.54	MILE	\$ 32,000	\$ 17,280
Install Driver Feedback Speed Limit Signs	NA	All Crashes	4.00	EACH	\$ 10,000	\$ 40,000
Traffic Calming - Wider Lane Lines	0.68	All Crashes	2.04	MILE	\$ 21,000	\$ 42,840
Install Bicycle Lane	0.51 - 0.694	Bicycle	2.04	MILE	\$ 21,000	\$ 42,840
Install Sidewalk or Walkways	NA	Pedestrian	1.23	MILE	\$ 634,000	\$ 778,691
Provide 2-Ft Paved Shoulder on Rural 2-Lane Roadways	0.66 - 0.89	All Crashes	1.00	MILE	\$ 298,000	\$ 298,000
					\$	-
					\$	-
					\$	-
					\$	-
					\$	-

Intersection Improvements

Item Description	CMF	Applicable Crashes	Quantity	Unit	Unit Price	Item Cost
Systemic Low-Cost Countermeasures at Stop-Control Intersection	0.73 - 0.9	All Crashes	5.00	INT	\$ 19,000	\$ 95,000
Upgrade Existing Crosswalk to High-Visibility Crosswalk	0.6 - 0.75	Pedestrian	2.00	XING	\$ 37,000	\$ 74,000
					\$	-
					\$	-
					\$	-
					\$	-
					\$	-
					\$	-
					\$	-
					\$	-

Improvements Subtotal:	\$	1,388,651
Mobilization: (% +/-)*	10%	\$ 75,000
Traffic Control: (% +/-)	5%	\$ 69,433
Items Not Estimated / Contingency: (% +/-)	30%	\$ 416,595
Estimated Construction Cost:	\$	1,949,679

Local Match[†]: 20% \$ 495,400

[†] Toward SS4A Implementation Grants

Preconstruction Engineering/Design	12%	\$ 233,962
Utilities**		\$ -
ROW**		\$ -
Construction Engineering/Management	15%	\$ 292,452
Estimated Project Total:		\$ 2,477,000

*Mobilization is 10% +/- of the subtotal with a minimum of \$2,500 and a maximum of \$75,000

**To be evaluated during feasibility study/design

Additional Potential Improvements

Additional safety improvements could be considered that were not included due to availability of data, need for site-specific information, and/or agency/jurisdiction input. Potential additional countermeasures are listed below. Refer to the **Countermeasure Toolbox** for a complete list of safety countermeasures.

- Additional Improvements #1: Set Appropriate Speed Limits for All Road Users
- Additional Improvements #2: _____
- Additional Improvements #3: _____
- Additional Improvements #4: _____
- Additional Improvements #5: _____

Disclaimer:

Disclaimer: The cost estimates provided in this document are for comparison purposes only. Actual project costs will vary. The recommended safety improvement strategies were based on available data and reasonable engineering judgment and a more detailed assessment may suggest additional safety strategies that could be considered.

Project Description/How is safety improved?

This project improves safety through implementation of systemic countermeasures. These include adding new or widened shoulders, adding bicycle lanes, speed management through the installation of speed feedback signs, improving stop-controlled intersection (Eccles St. & Harrisville Rd.), upgrading existing "doghouse" signals to Flashing Yellow Arrow (FYA) signal heads (1200 S.), and installing additional FYA signal heads (400 N.).

This project description represents potential safety improvement strategies that could be implemented at this location, as well as other locations with similar conditions. Additional improvement strategies could be considered subject to engineering analysis.

Proposed Proven Safety Countermeasures



Appropriate Speed Limits for All Road Users



Bicycle Lanes



Stop-Controlled Intersection Systemic Countermeasures



Yellow Change Intervals

Opinion of Probable Construction Cost

Segment Improvements

Item Description	CMF	Applicable Crashes	Quantity	Unit	Unit Price	Item Cost
Install Bicycle Lane	0.51 - 0.694	Bicycle	4.38	MILE	\$ 21,000	\$ 91,980
Shoulder Widening on Rural Roads	0.771	All Crashes	2.00	MILE	\$ 32,000	\$ 64,000
Provide 2-Ft Paved Shoulder on Rural 2-Lane Roadways	0.66 - 0.89	All Crashes	0.86	MILE	\$ 298,000	\$ 256,280
Install Driver Feedback Speed Limit Signs	NA	All Crashes	8.00	EACH	\$ 10,000	\$ 80,000
						\$ -
						\$ -
						\$ -
						\$ -
						\$ -
						\$ -
						\$ -

Intersection Improvements

Item Description	CMF	Applicable Crashes	Quantity	Unit	Unit Price	Item Cost
Systemic Low-Cost Countermeasures at Stop-Control Intersection	0.73 - 0.9	All Crashes	2.00	INT	\$ 19,000	\$ 38,000
Change a permissive only to Flashing Yellow Arrow	0.5 - 0.6	Left-Turn	0.50	INT	\$ 8,000	\$ 4,000
Change a 5-section "Doghouse" to Flashing Yellow Arrow	0.75 - 0.93	Left-Turn	0.50	INT	\$ 8,000	\$ 4,000
Perform an Intersection Control Evaluation and Implement	NA	All Crashes	1.00	INT	\$ 225,000	\$ 225,000
						\$ -
						\$ -
						\$ -
						\$ -
						\$ -
						\$ -

Improvements Subtotal:	\$	763,260
Mobilization: (% +/-)*	10%	\$ 75,000
Traffic Control: (% +/-)	5%	\$ 38,163
Items Not Estimated / Contingency: (% +/-)	30%	\$ 228,978
Estimated Construction Cost:	\$	1,105,401

Local Match[†]: 20% \$ 280,800

[†] Toward SS4A Implementation Grants

Preconstruction Engineering/Design	12%	\$ 132,648
Utilities**		\$ -
ROW**		\$ -
Construction Engineering/Management	15%	\$ 165,810
Estimated Project Total:		\$ 1,404,000

*Mobilization is 10% +/- of the subtotal with a minimum of \$2,500 and a maximum of \$75,000

**To be evaluated during feasibility study/design

Additional Potential Improvements

Additional safety improvements could be considered that were not included due to availability of data, need for site-specific information, and/or agency/jurisdiction input. Potential additional countermeasures are listed below. Refer to the **Countermeasure Toolbox** for a complete list of safety countermeasures.

- Additional Improvements #1: Set Appropriate Speed Limits for All Road Users
- Additional Improvements #2: Re-Evaluate Speed Based on Roadway Context, Built Environment, and Existing Road Users
- Additional Improvements #3: _____
- Additional Improvements #4: _____
- Additional Improvements #5: _____

Disclaimer:

Disclaimer: The cost estimates provided in this document are for comparison purposes only. Actual project costs will vary. The recommended safety improvement strategies were based on available data and reasonable engineering judgment and a more detailed assessment may suggest additional safety strategies that could be considered.

Project Description/How is safety improved?

This project includes corridor access management, speed management, active transportation, and intersection improvements. Countermeasures include medians, wider shoulders and bicycle lanes, sidewalks, roundabouts (4500 W., 4425 W., & 4100 W.), unsignalized intersection improvements (3700 W. & 3600 W.) and a speed feedback sign near the school.

This project description represents potential safety improvement strategies that could be implemented at this location, as well as other locations with similar conditions. Additional improvement strategies could be considered subject to engineering analysis.

Proposed Proven Safety Countermeasures



Corridor Access Management



Bicycle Lanes



Roundabouts



Stop-Controlled Intersection Systemic Countermeasures



Walkways

Opinion of Probable Construction Cost

Segment Improvements

Item Description	CMF	Applicable Crashes	Quantity	Unit	Unit Price	Item Cost
Install Bicycle Lane	0.51 - 0.694	Bicycle	2.41	MILE	\$ 21,000	\$ 50,610
Install Sidewalk or Walkways	NA	Pedestrian	1.91	MILE	\$ 634,000	\$ 1,210,940
Install Medians and Pedestrian Refuge Islands in Urban Areas	0.44	Pedestrian	2.41	LE (URBA	\$ 958,000	\$ 2,308,780
Shoulder Widening on Rural Roads	0.771	All Crashes	1.21	MILE	\$ 32,000	\$ 38,720
Provide 2-Ft Paved Shoulder on Rural 2-Lane Roadways	0.66 - 0.89	All Crashes	1.21	MILE	\$ 298,000	\$ 360,580
Install Driver Feedback Speed Limit Signs	NA	All Crashes	2.00	EACH	\$ 10,000	\$ 20,000
						\$ -
						\$ -
						\$ -
						\$ -
						\$ -

Intersection Improvements

Item Description	CMF	Applicable Crashes	Quantity	Unit	Unit Price	Item Cost
Convert Existing Intersection to Modern Roundabout	0.18 - 0.59	All Crashes	3.00	INT	\$ 2,500,000	\$ 7,500,000
Systemic Low-Cost Countermeasures at Stop-Control Intersection	0.73 - 0.9	All Crashes	2.00	INT	\$ 19,000	\$ 38,000
						\$ -
						\$ -
						\$ -
						\$ -
						\$ -
						\$ -
						\$ -
						\$ -

Improvements Subtotal:	\$ 11,527,630
Mobilization: (% +/-)*	10% \$ 75,000
Traffic Control: (% +/-)	5% \$ 576,382
Items Not Estimated / Contingency: (% +/-)	30% \$ 3,458,289
Estimated Construction Cost:	\$ 15,637,301

Local Match[†]: 20% \$ 3,972,000

[†] Toward SS4A Implementation Grants

Preconstruction Engineering/Design	12%	\$ 1,876,476
Utilities**		\$ -
ROW**		\$ -
Construction Engineering/Management	15%	\$ 2,345,595
Estimated Project Total:		\$ 19,860,000

*Mobilization is 10% +/- of the subtotal with a minimum of \$2,500 and a maximum of \$75,000

**To be evaluated during feasibility study/design

Additional Potential Improvements

Additional safety improvements could be considered that were not included due to availability of data, need for site-specific information, and/or agency/jurisdiction input. Potential additional countermeasures are listed below. Refer to the **Countermeasure Toolbox** for a complete list of safety countermeasures.

- Additional Improvements #1: Set Appropriate Speed Limits for All Road Users
- Additional Improvements #2: Targeted Enforcement and Deterrence
- Additional Improvements #3: Re-Evaluate Speed Based on Roadway Context, Built Environment, and Existing Road Users
- Additional Improvements #4: _____
- Additional Improvements #5: _____

Disclaimer:

Disclaimer: The cost estimates provided in this document are for comparison purposes only. Actual project costs will vary. The recommended safety improvement strategies were based on available data and reasonable engineering judgment and a more detailed assessment may suggest additional safety strategies that could be considered.

Project Description/How is safety improved?

This project includes the segment improvements along W 6000 S to address an overrepresentation of speeding, angle and parked vehicle crashes:

- Narrowing of the travelled way on either side of the street between S 3375 W and S 1900 W by clearly delineating/stripping the parking shoulder
- Installation of multiple speed limit feedback signs across the corridor to help drivers gauge their travelled speed against the speed limit

The following intersection improvements are recommended to address an overrepresentation of angle and pedestrian crashes:

- A variety of low-cost countermeasures, such as visibility and sight distance improvements along W 6000 S at S 3100 W, S 2700 W, and S 2200 W
- Installation of RRFB's including high visibility improvements at the intersections of S 3100 W and S 2200 W

This project description represents potential safety improvement strategies that could be implemented at this location, as well as other locations with similar conditions. Additional improvement strategies could be considered subject to engineering analysis.

Proposed Proven Safety Countermeasures



Appropriate Speed Limits for All Road Users



Crosswalk Visibility Enhancements



Rectangular Rapid Flashing Beacons (RRFB)



Wider Edge Lines

Opinion of Probable Construction Cost

Segment Improvements

Item Description	CMF	Applicable Crashes	Quantity	Unit	Unit Price	Item Cost
Traffic Calming - Lane Narrowing	0.68	All Crashes	3.01	MILE	\$ 39,000	\$ 117,390
Install Driver Feedback Speed Limit Signs	NA	All Crashes	4.00	EACH	\$ 10,000	\$ 40,000
						\$ -
						\$ -
						\$ -
						\$ -
						\$ -
						\$ -
						\$ -
						\$ -

Intersection Improvements

Item Description	CMF	Applicable Crashes	Quantity	Unit	Unit Price	Item Cost
Systemic Low-Cost Countermeasures at Stop-Control Intersection	0.73 - 0.9	All Crashes	4.00	INT	\$ 19,000	\$ 76,000
Install a Rectangular Rapid Flashing Beacons (RRFB)	0.526	Pedestrian	3.00	XING (2)	\$ 15,000	\$ 45,000
Install High-Visibility Crosswalk	0.6 - 0.75	Pedestrian	2.00	XING	\$ 36,000	\$ 72,000
Upgrade Existing Crosswalk to High-Visibility Crosswalk	0.6 - 0.75	Pedestrian	2.00	XING	\$ 37,000	\$ 74,000
Perform an Intersection Control Evaluation and Implement	NA	All Crashes	4.00	INT	\$ 225,000	\$ 900,000
Convert Existing Intersection to Modern Roundabout	0.18 - 0.59	All Crashes	4.00	INT	\$ 2,500,000	\$ 10,000,000
						\$ -
						\$ -
						\$ -
						\$ -
						\$ -

Improvements Subtotal:	\$	11,324,390
Mobilization: (% +/-)*	10%	\$ 75,000
Traffic Control: (% +/-)	5%	\$ 566,220
Items Not Estimated / Contingency: (% +/-)	30%	\$ 3,397,317
Estimated Construction Cost:	\$	15,362,927

Local Match[†]: 20% \$ 3,902,200

[†] Toward SS4A Implementation Grants

Preconstruction Engineering/Design	12%	\$ 1,843,551
Utilities**		\$ -
ROW**		\$ -
Construction Engineering/Management	15%	\$ 2,304,439
Estimated Project Total:		\$ 19,511,000

*Mobilization is 10% +/- of the subtotal with a minimum of \$2,500 and a maximum of \$75,000

**To be evaluated during feasibility study/design

Additional Potential Improvements

Additional safety improvements could be considered that were not included due to availability of data, need for site-specific information, and/or agency/jurisdiction input. Potential additional countermeasures are listed below. Refer to the **Countermeasure Toolbox** for a complete list of safety countermeasures.

- Additional Improvements #1: Set Appropriate Speed Limits for All Road Users
- Additional Improvements #2: _____
- Additional Improvements #3: _____
- Additional Improvements #4: _____
- Additional Improvements #5: _____

Disclaimer:

Disclaimer: The cost estimates provided in this document are for comparison purposes only. Actual project costs will vary. The recommended safety improvement strategies were based on available data and reasonable engineering judgment and a more detailed assessment may suggest additional safety strategies that could be considered.

Project Description/How is safety improved?

This project improves safety by installing a raised median along the entire length of the corridor. Other improvements include completing the bicycle lane where it is not present and strategic intersection upgrades at various locations. Signalized intersection improvement include upgrading existing "doghouse" signal heads to flashing yellow arrow (FYA) signal heads (4000 S.), upgrading left-turns to protected left-turn signal timing (4800 S. Hinckley, and 6000 S.), systemic stop-controlled improvements (2400 N., 5450 S., and 5200 S.), pedestrian signal at 4975 South and midblock between 5200 S. and 5300 S, evaluating the need for right-turn lanes at 5200 S.

This project description represents potential safety improvement strategies that could be implemented at this location, as well as other locations with similar conditions. Additional improvement strategies could be considered subject to engineering analysis.

Proposed Proven Safety Countermeasures



Corridor Access Management



Medians and Pedestrian Refuge Islands in Urban & Suburban Areas



Bicycle Lanes



Pedestrian Hybrid Beacons

Opinion of Probable Construction Cost

Segment Improvements

Item Description	CMF	Applicable Crashes	Quantity	Unit	Unit Price	Item Cost
Install Raised Medians on Roadways with Existing TWLTL	0.29	All Crashes	6.65	MILE	\$ 928,000	\$ 6,171,200
Install Bicycle Lane	0.51 - 0.694	Bicycle	3.50	MILE	\$ 21,000	\$ 73,500
						\$ -
						\$ -
						\$ -
						\$ -
						\$ -
						\$ -
						\$ -
						\$ -

Intersection Improvements

Item Description	CMF	Applicable Crashes	Quantity	Unit	Unit Price	Item Cost
Provide Right-Turn Lanes	0.74 - 0.86	All Crashes	2.00	LANE	\$ 150,000	\$ 300,000
Change a 5-section "Doghouse" to Flashing Yellow Arrow	0.75 - 0.93	Left-Turn	2.00	INT	\$ 8,000	\$ 16,000
Install Pedestrian Hybrid Beacons (PHB) or HAWK	0.453	Pedestrian	2.00	EACH	\$ 200,000	\$ 400,000
Change Permissive Left-Turn to Protected or Protected/Permissive	0.79 - 0.95	Left-Turn	4.00	INT	\$ 8,000	\$ 32,000
Systemic Low-Cost Countermeasures at Stop-Control Intersection	0.73 - 0.9	All Crashes	3.00	INT	\$ 19,000	\$ 57,000
						\$ -
						\$ -
						\$ -
						\$ -
						\$ -
						\$ -

Improvements Subtotal: \$ 7,049,700

Mobilization: (% +/-)* 10% \$ 75,000

Traffic Control: (% +/-) 5% \$ 352,485

Items Not Estimated / Contingency: (% +/-) 30% \$ 2,114,910

Estimated Construction Cost: \$ 9,592,095

Local Match[†]: 20% \$ 2,436,400

[†] Toward SS4A Implementation Grants

Preconstruction Engineering/Design 12% \$ 1,151,051

Utilities** \$ -

ROW** \$ -

Construction Engineering/Management 15% \$ 1,438,814

Estimated Project Total: \$ 12,182,000

*Mobilization is 10% +/- of the subtotal with a minimum of \$2,500 and a maximum of \$75,000

**To be evaluated during feasibility study/design

Additional Potential Improvements

Additional safety improvements could be considered that were not included due to availability of data, need for site-specific information, and/or agency/jurisdiction input. Potential additional countermeasures are listed below. Refer to the **Countermeasure Toolbox** for a complete list of safety countermeasures.

- Additional Improvements #1: Set Appropriate Speed Limits for All Road Users
- Additional Improvements #2: _____
- Additional Improvements #3: _____
- Additional Improvements #4: _____
- Additional Improvements #5: _____

Disclaimer:

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Project Description/How is safety improved?

This project improves safety by completing the full buildout of the roadway to include complete active transportation facilities including bicycle lanes (north side), sidewalks, and an enhanced marked pedestrian crosswalk. The project also includes systemic upgrades to the key unsignalized intersections (2700 W. & 3500 W.), including lighting.

This project description represents potential safety improvement strategies that could be implemented at this location, as well as other locations with similar conditions. Additional improvement strategies could be considered subject to engineering analysis.

Proposed Proven Safety Countermeasures



Crosswalk
Visibility
Enhancements



Lighting



Stop-Controlled
Intersection
Systemic
Countermeasures



Walkways

Opinion of Probable Construction Cost

Segment Improvements

Item Description	CMF	Applicable Crashes	Quantity	Unit	Unit Price	Item Cost
Shoulder Widening on Rural Roads	0.771	All Crashes	1.04	MILE	\$ 32,000	\$ 33,182
Install Sidewalk or Walkways	NA	Pedestrian	1.04	MILE	\$ 634,000	\$ 657,415
						\$ -
						\$ -
						\$ -
						\$ -
						\$ -
						\$ -
						\$ -
						\$ -

Intersection Improvements

Item Description	CMF	Applicable Crashes	Quantity	Unit	Unit Price	Item Cost
Systemic Low-Cost Countermeasures at Stop-Control Intersection	0.73 - 0.9	All Crashes	2.00	INT	\$ 19,000	\$ 38,000
Upgrade Existing Crosswalk to High-Visibility Crosswalk	0.6 - 0.75	Pedestrian	1.00	XING	\$ 37,000	\$ 37,000
Install Intersection Lighting	0.62 - 0.67	Nighttime	2.00	INT	\$ 31,000	\$ 62,000
Add Sidewalk	0.2	Pedestrian	1.00	INT	\$ 4,500	\$ 4,500
						\$ -
						\$ -
						\$ -
						\$ -
						\$ -
						\$ -

Improvements Subtotal:	\$	832,097
Mobilization: (% +/-)*	10%	\$ 75,000
Traffic Control: (% +/-)	5%	\$ 41,605
Items Not Estimated / Contingency: (% +/-)	30%	\$ 249,629
Estimated Construction Cost:	\$	1,198,330

Local Match[†]: 20% \$ 304,400

[†] Toward SS4A Implementation Grants

Preconstruction Engineering/Design	12%	\$ 143,800
Utilities**		\$ -
ROW**		\$ -
Construction Engineering/Management	15%	\$ 179,750
Estimated Project Total:		\$ 1,522,000

*Mobilization is 10% +/- of the subtotal with a minimum of \$2,500 and a maximum of \$75,000

**To be evaluated during feasibility study/design

Additional Potential Improvements

Additional safety improvements could be considered that were not included due to availability of data, need for site-specific information, and/or agency/jurisdiction input. Potential additional countermeasures are listed below. Refer to the **Countermeasure Toolbox** for a complete list of safety countermeasures.

- Additional Improvements #1: Set Appropriate Speed Limits for All Road Users
- Additional Improvements #2: _____
- Additional Improvements #3: _____
- Additional Improvements #4: _____
- Additional Improvements #5: _____

Disclaimer:

Disclaimer: The cost estimates provided in this document are for comparison purposes only. Actual project costs will vary. The recommended safety improvement strategies were based on available data and reasonable engineering judgment and a more detailed assessment may suggest additional safety strategies that could be considered.

Project Description/How is safety improved?

This project improves safety by installing raised medians, completing the bicycle lane where a bicycle lane is not present and strategic intersection upgrades at various locations. Signalized intersection improvement include upgrading existing "doghouse" signal heads to flashing yellow arrow (FYA) signal heads (4000 S.), upgrading left-turns to protected left-turn signal timing (4800 S. Hinckley, and 6000 S.), systemic stop-controlled improvements (2400 N., 5450 S., and 5200 S.). Pedestrian signal at 4975 South and midblock between 5200 S. and 5300 S. Evaluate the need for right-turn lanes at 5200 S.

This project description represents potential safety improvement strategies that could be implemented at this location, as well as other locations with similar conditions. Additional improvement strategies could be considered subject to engineering analysis.

Proposed Proven Safety Countermeasures



Corridor Access Management



Medians and Pedestrian Refuge Islands in Urban & Suburban Areas



Bicycle Lanes



Pedestrian Hybrid Beacons

Opinion of Probable Construction Cost

Segment Improvements

Item Description	CMF	Applicable Crashes	Quantity	Unit	Unit Price	Item Cost
Install Raised Medians on Roadways with Existing TWLTL	0.29	All Crashes	6.65	MILE	\$ 928,000	\$ 6,171,200
Install Bicycle Lane	0.51 - 0.694	Bicycle	3.50	MILE	\$ 21,000	\$ 73,500
						\$ -
						\$ -
						\$ -
						\$ -
						\$ -
						\$ -
						\$ -
						\$ -

Intersection Improvements

Item Description	CMF	Applicable Crashes	Quantity	Unit	Unit Price	Item Cost
Provide Right-Turn Lanes	0.74 - 0.86	All Crashes	2.00	LANE	\$ 150,000	\$ 300,000
Change a 5-section "Doghouse" to Flashing Yellow Arrow	0.75 - 0.93	Left-Turn	2.00	INT	\$ 8,000	\$ 16,000
Install Pedestrian Hybrid Beacons (PHB) or HAWK	0.453	Pedestrian	2.00	EACH	\$ 200,000	\$ 400,000
Change Permissive Left-Turn to Protected or Protected/Permissive	0.79 - 0.95	Left-Turn	3.00	INT	\$ 8,000	\$ 24,000
Systemic Low-Cost Countermeasures at Stop-Control Intersection	0.73 - 0.9	All Crashes	3.00	INT	\$ 19,000	\$ 57,000
						\$ -
						\$ -
						\$ -
						\$ -
						\$ -

Improvements Subtotal:	\$ 7,041,700
Mobilization: (% +/-)* 10%	\$ 75,000
Traffic Control: (% +/-) 5%	\$ 352,085
Items Not Estimated / Contingency: (% +/-) 30%	\$ 2,112,510
Estimated Construction Cost:	\$ 9,581,295

Local Match[†]: 20% \$ 2,433,800

[†] Toward SS4A Implementation Grants

Preconstruction Engineering/Design	12%	\$ 1,149,755
Utilities**		\$ -
ROW**		\$ -
Construction Engineering/Management	15%	\$ 1,437,194
Estimated Project Total:		\$ 12,169,000

*Mobilization is 10% +/- of the subtotal with a minimum of \$2,500 and a maximum of \$75,000

**To be evaluated during feasibility study/design

Additional Potential Improvements

Additional safety improvements could be considered that were not included due to availability of data, need for site-specific information, and/or agency/jurisdiction input. Potential additional countermeasures are listed below. Refer to the **Countermeasure Toolbox** for a complete list of safety countermeasures.

- Additional Improvements #1: Set Appropriate Speed Limits for All Road Users
- Additional Improvements #2: _____
- Additional Improvements #3: _____
- Additional Improvements #4: _____
- Additional Improvements #5: _____

Disclaimer:

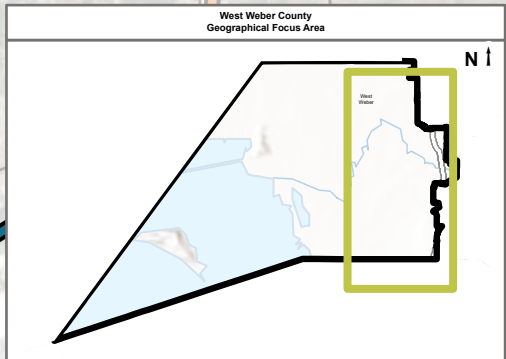
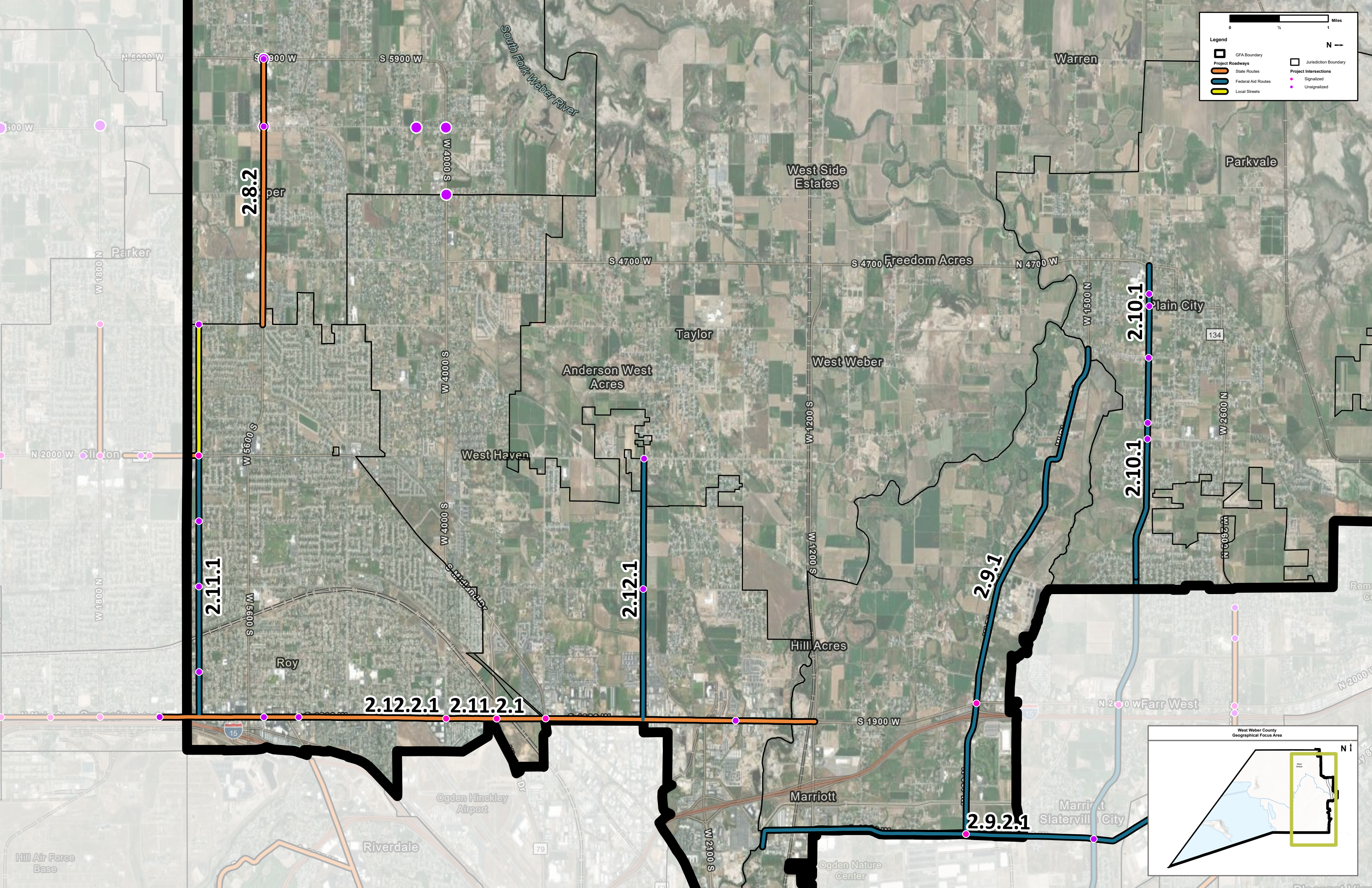
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**WESTERN WEBER COUNTY CASE STUDY
PROJECT LOCATION MAP**

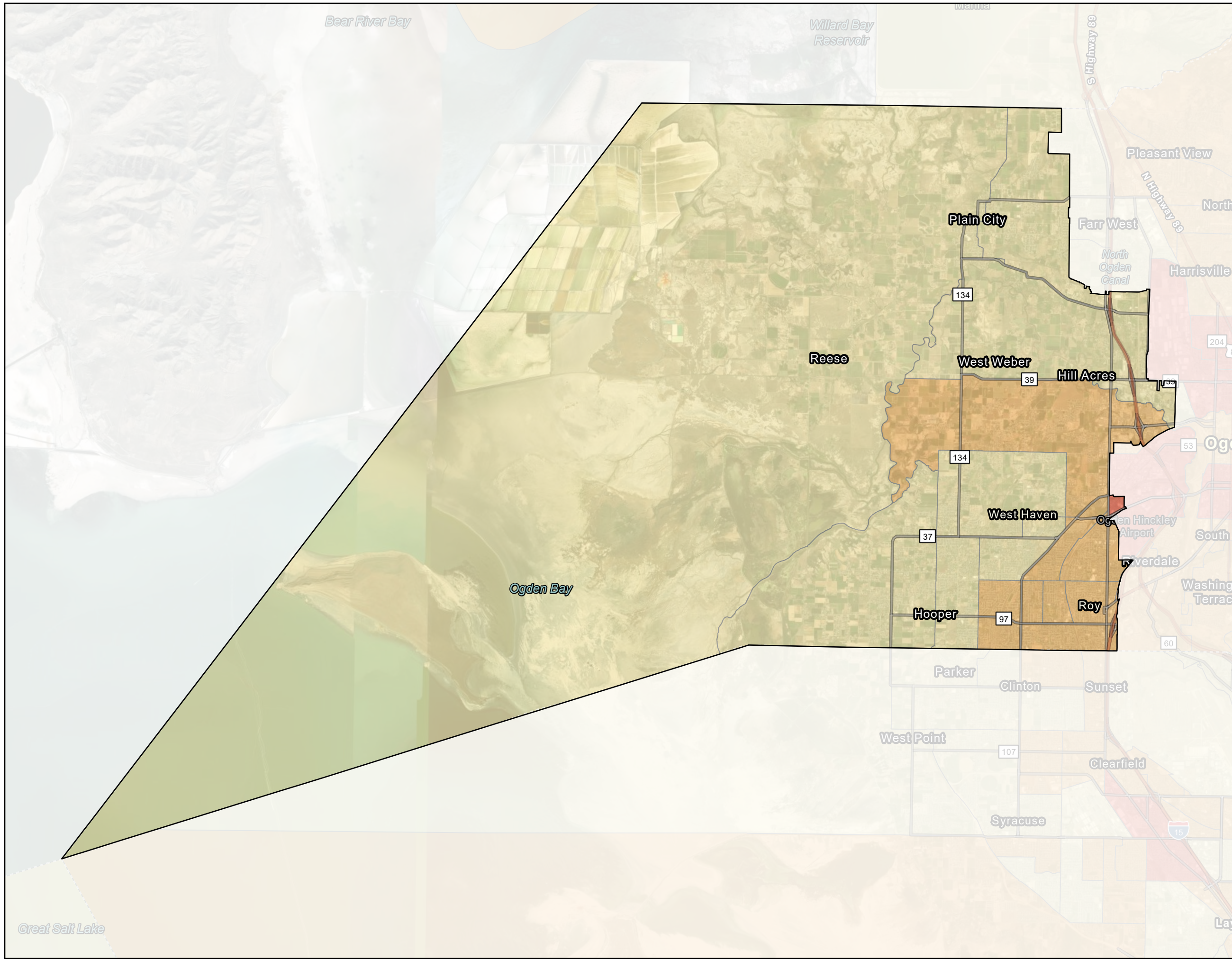
0 1/2 1 Miles

Legend

- GFA Boundary
- Project Roadways
- State Routes
- Federal Aid Routes
- Local Streets
- Jurisdiction Boundary
- Project Intersections
 - Signalized
 - Unsignalized



WESTERN WEBER COUNTY EQUITY INDEX MAP



West Weber County
Equity Need Areas
High
Medium
Low

Bear River Bay

Willard Bay Reservoir

Wanna

S Highway 89

Pleasant View

N Highway 89

North

Plain City

Farr West

North Ogden Canal

Harrisville

134

Reese

West Weber

39

Hill Acres

204

134

West Haven

Ogden Hinckley Airport

53

Og

37

South

Verdale

Ogden Bay

Hooper

97

Roy

Washing Terrace

60

Parker

Clinton

Sunset

West Point

107

Clearfield

Syracuse

15

Great Salt Lake