APPENDIX D8: SALT LAKE CITY

Safety Summary

Tech Memo #1 Safety Analysis

Case Study Project Information Sheets

Case Study Project Location Map

Equity Index Map

SALT LAKE CITY SAFETY SUMMARY

Salt Lake City Geographic Focus Area

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.

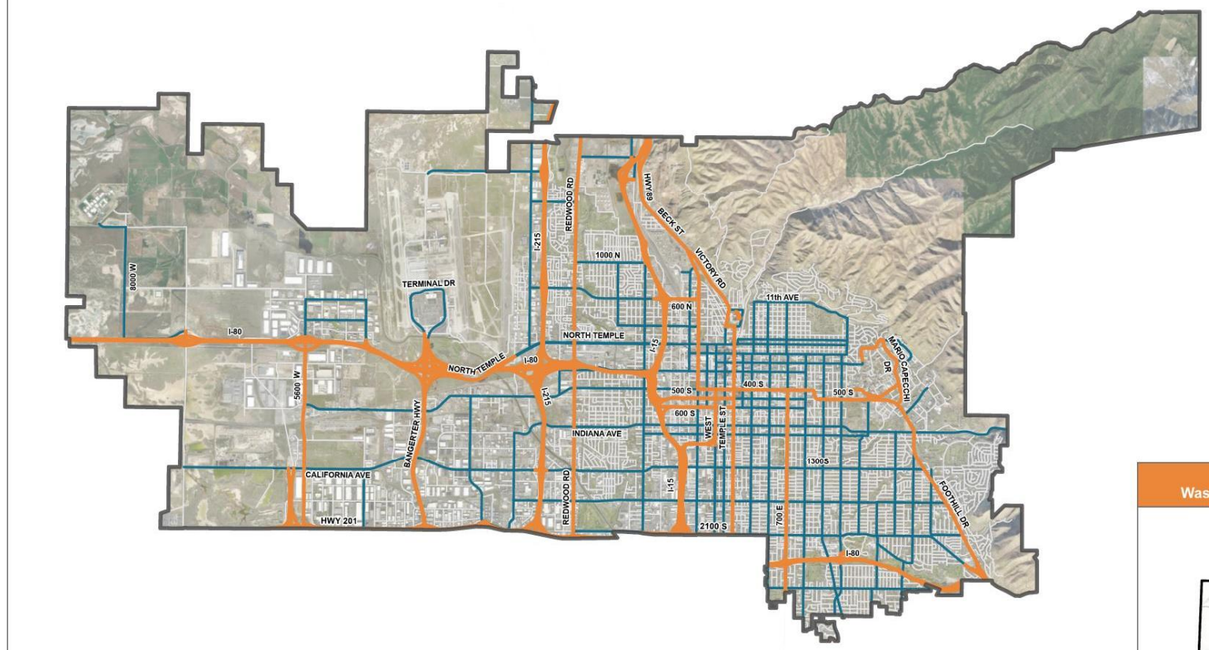
The CSAP will ***analyze*** safety needs, ***identify*** high-risk locations and factors contributing to crashes, and ***prioritize*** strategies to address them.

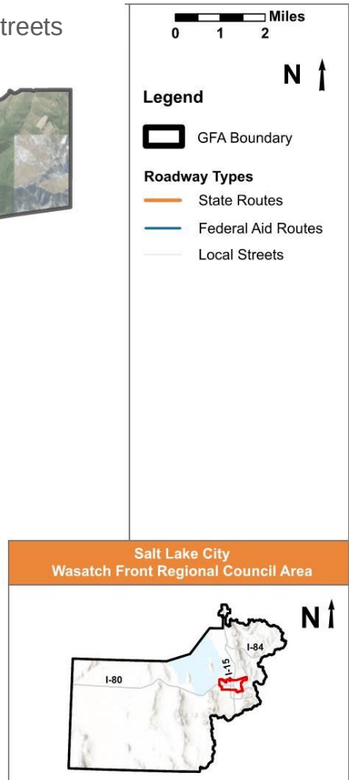
The CSAP will meet eligibility requirements that allow local jurisdictions to apply for **Implementation Grants** from the United States Department of Transportation (USDOT) Safe Streets and Roads for All (SS4A) discretionary grant program. The grant program was established by the Bipartisan Infrastructure 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

Local Streets: Other non-UDOT / non-Federal Aid roadways, primarily collectors, and residential streets





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:

1. Leadership Commitment
   - ❑ Governing body publicly commit to a zero fatalities and serious injury goal
2. Plan Development
   - ❑ Committee charged with plan development, implementation, and monitoring
3. Development Activities
   - ❑ Engagement with public and relevant stakeholders
4. Equity
   - ❑ Data-driven, inclusive, and representative processes
5. Policies, Plans, Guidelines, and/or Standards
   - ❑ Assessment policies, plans, guidelines, and/or standards
6. Progress
   - ❑ Description on how progress will be measured over time

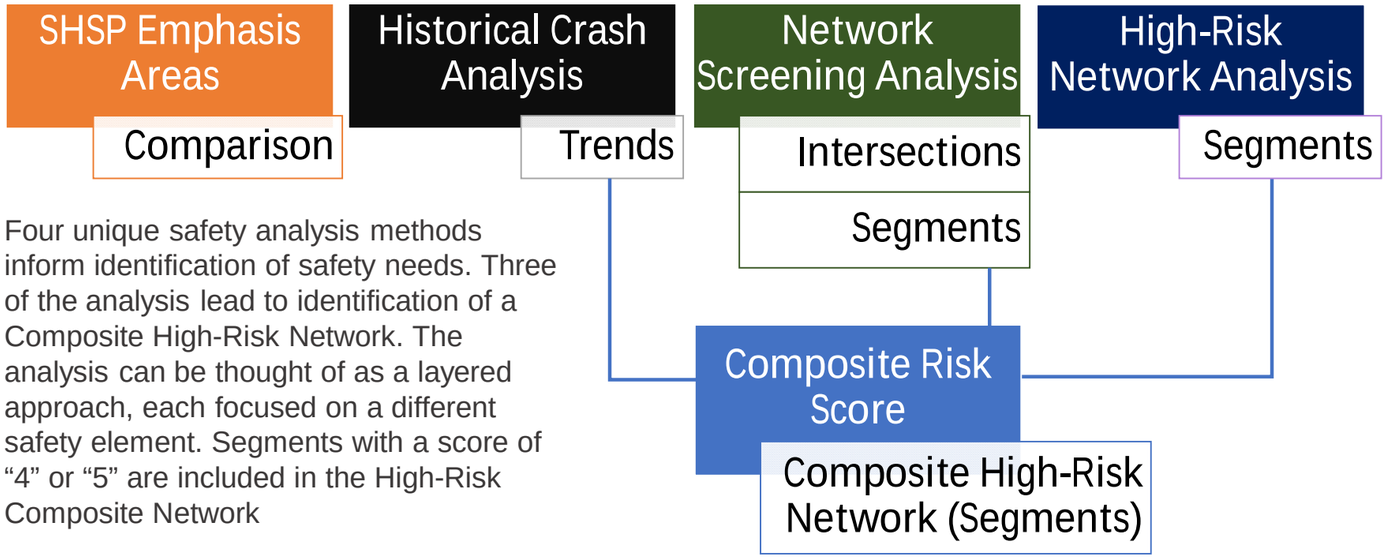
Safe System Approach

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. Three of the analysis lead to identification of a Composite High-Risk Network. The analysis can be thought of as a layered approach, each focused on a different safety element. 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 ≥ 3 Crashes	1
Network Screening Analysis	Positive CCR Differential	1
High-Risk Network Analysis	Crash Profile Risk Score ≥ 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 **Salt Lake City** GFA.

- Intersections
- Pedestrian
- Speed-Related
- Roadway Departure
- Motorcycle

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, Roadway Departure, and Speed-Related emphasis areas within the **Salt Lake City** GFA, Pedestrian and Motorcycle are also identified as top emphasis areas.

Inclusion of Pedestrian emphasis area in the top-5 is unique to **Salt Lake City** GFA. Pedestrian rank 2nd highest in the **Salt Lake City** GFA, while this emphasis area ranks 7th at the Regional and 9th Statewide levels.

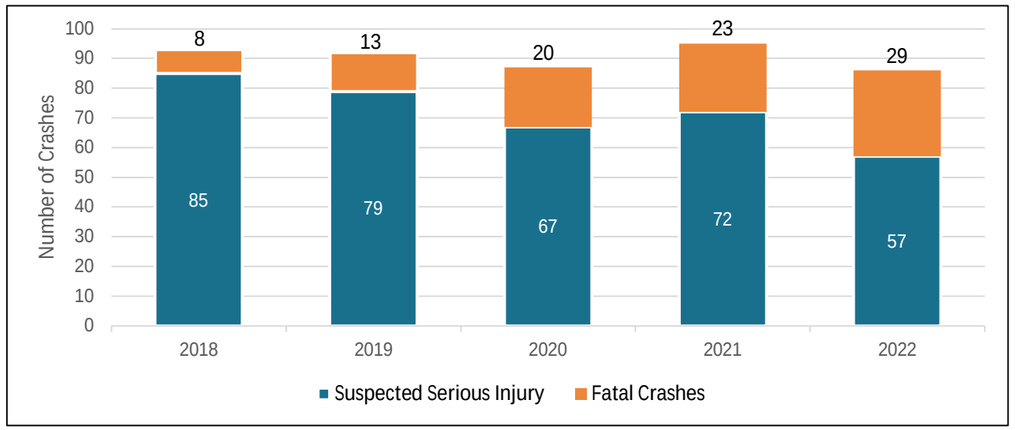
Strategic Highway Safety Plan Emphasis Area Comparison

Category	Utah SHSP Safety Emphasis Area	Statewide Totals		WFRC Totals		Salt Lake City 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	54	8	-4
	Older Driver	1,508	6	700	6	47	9	-3
	Speed-Related	2,133	**3**	936	3	108	3	0
	Aggressive Driving	555	11	297	10	31	10	0
	Distracted Driving	718	10	286	11	25	12	-1
	Impaired Driving	1,184	8	623	8	61	7	1
	No Safety Restraints	1,542	**5**	599	9	68	6	3
Roadway	Intersection	3,567	**1**	2,163	1	259	1	0
	Roadway Departure	2,931	**2**	1,014	2	84	4	-2
Special Users	Motorcycle	1,457	7	750	5	76	5	0
	Pedestrian	912	9	636	7	130	2	5
	Bicycle*	280	12	167	12	30	11	1

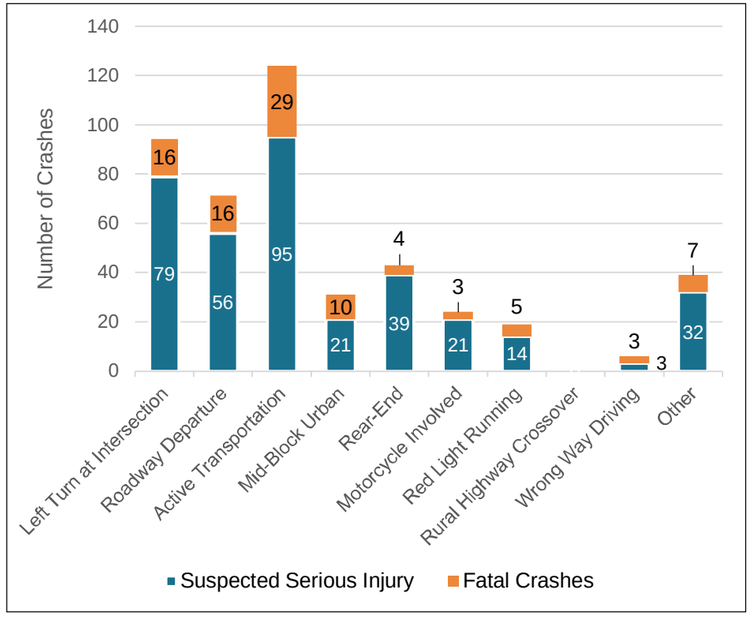
*While Bicycles are not one of the eleven Utah SHSP emphasis areas, they are included as part of the CSAP safety analysis.

5-Year Historical Crash Trends in the Salt Lake City GFA

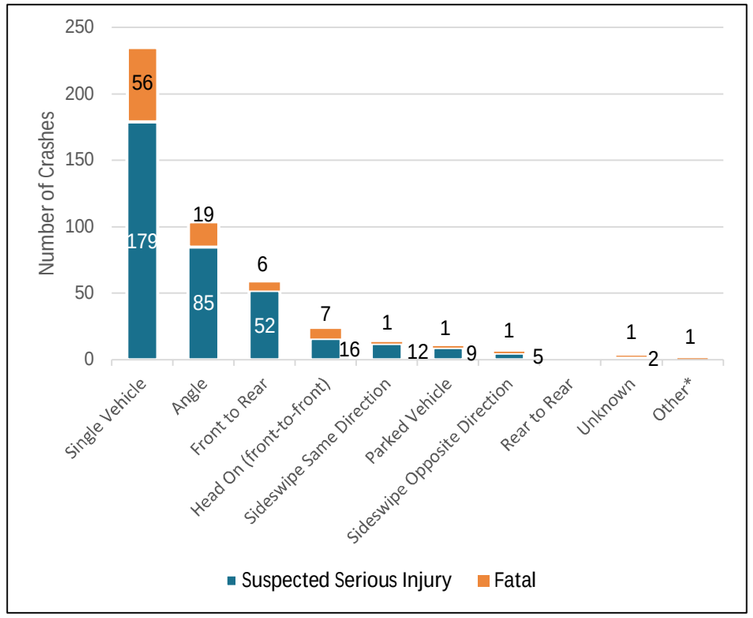
Route Type	State Route		Federal Aid Route		Local Street		Overall Total		% of WFRC
Crash Severity	Crashes		Crashes		Crashes		Crashes		%
	#	%	#	%	#	%	#	%	
Fatal	56	0%	31	0%	6	0%	**93**	**0.4%**	**0.1%**
Suspected Serious Injury	182	1%	150	2%	28	1%	**360**	**1.7%**	**0.2%**
Suspected Minor Injury	1,280	10%	1,260	19%	363	16%	**2,903**	**13.5%**	**1.6%**
Possible Injury	2,646	21%	1,685	25%	406	17%	**4,737**	**22.0%**	**2.6%**
No Injury / Property Damage Only	8,289	67%	3,650	54%	1,527	66%	**13,466**	**62.5%**	**7.5%**
Route Total	**12,453**	**100%**	**6,776**	**100%**	**2,330**	**100%**	**21,559**	**100%**	**12.0%**



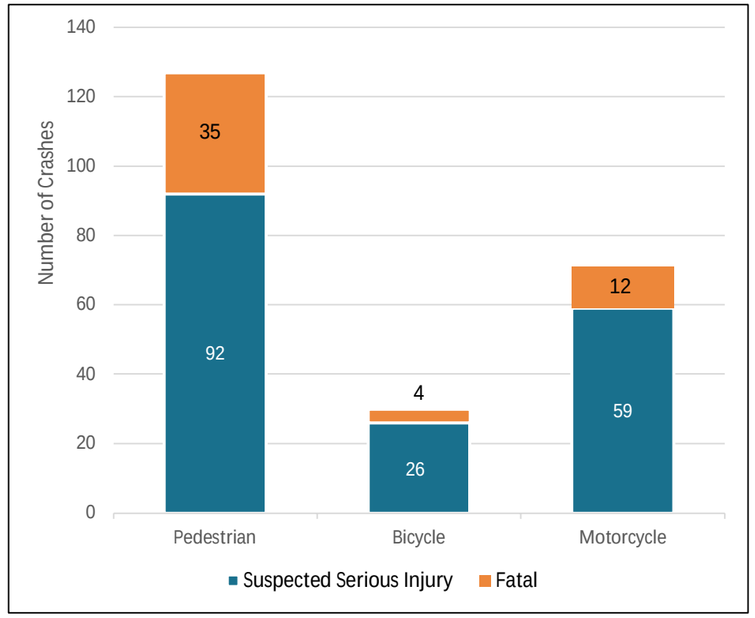
Annual Fatal and Serious Injury Crashes (2018-2022)



Crash Type



Manner of Collision



Active Transportation

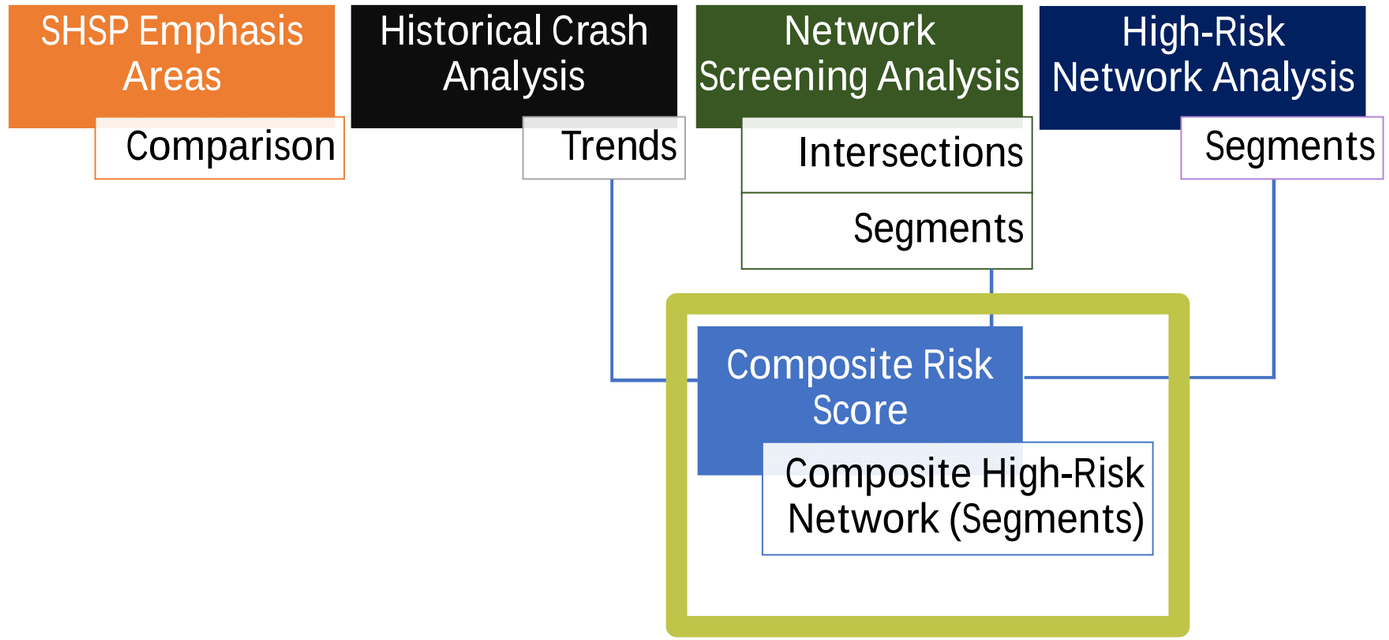
Composite High-Risk Roadway Network

Each of the completed safety analysis methodologies identified segments or intersections that are **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 Composite High-Risk Network. These represent the top 10% of State Route and Federal Aid Route segments for the entire WFRC area.

The Composite High Risk Network map on page 8 includes State Route and Federal Aid Route segments with a score of "4" or higher.

A list of locally-owned and maintained Federal Aid Route segments in the **Salt Lake City** GFA Composite High-Risk Network is included on the next page. Streets operated and maintained by local agencies are an emphasis of the SS4A program.



Analysis	Composite High Risk Score Element	Value
Historical Crash Analysis	Segment 5-Year Crash Totals ≥ 3 Crashes	1
Network Screening Analysis	Positive Local CCR Differential	1
High Risk Network Analysis	Crash Profile Risk Score ≥ 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
Composite 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											
5600 West (SR-172)	I-80 to 2100 South	Other Principal Arterial	Salt Lake City	3.0	X	X	X	X		X	
Bangerter Highway (SR-154)	I-80 to 2100 South	Other Principal Arterial	Salt Lake City	3.0	X	X	X	X		X	
Redwood Road (SR-68)	North GFA Extent to 2100 South	Other Principal Arterial	Salt Lake City	6.7	X	X	X	X	X	X	
Victory Road	Everatt Avenue to Zane Avenue	Other Principal Arterial	Salt Lake City	3.0	X	X	X	X		X	
300 West	Victory Road to 400 South	Other Principal Arterial	Salt Lake City	3.0	X	X	X	X		X	
State Street	North Temple to 2100 South	Other Principal Arterial	Salt Lake City	3.2	X	X	X	X	X	X	
700 East	400 South to 2700 South	Other Principal Arterial	Salt Lake City	3.5	X	X	X	X		X	
600 North	I-15 to 400 West	Other Principal Arterial	Salt Lake City	0.6	X	X	X	X	X	X	
400 South/Foothill Blvd	300 West to I-80	Other Principal Arterial	Salt Lake City	8.5	X	X	X	X	X	X	
500 South	500 West to State Street	Other Principal Arterial	Salt Lake City	1.0	X	X	X	X		X	
600 South	500 West to Sate Street	Other Principal Arterial	Salt Lake City	1.0	X	X	X	X		X	
North Campus Drive	Federal Way to Federal Heights Drive	Minor Arterial	Salt Lake City	0.5	X	X	X	X		X	
Mario Capecchi Drive	North Campus Drive to 500 South	Minor Arterial	Salt Lake City	1.3	X	X	X	X		X	
Federal Aid Routes											
2300 N	Redwood Rd to 1100 W	Minor Arterial	Salt Lake City	1.0	X	X	X	X		X	
700 N	Mormon Dr to Riverside Dr	Minor Arterial	Salt Lake City	0.5	X	X		X	X	X	
Terminal Dr	3800 W to Crossbar Rd	Minor Collector	Salt Lake City	1.0	X	X	X	X		X	
5600 W	Amelia Earhart Dr to I-80	Major Collector	Salt Lake City	0.3	X	X	X	X		X	

State Route and Federal Aid segments in the **Salt Lake City 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 or for coordination with UDOT. Each of these segments are shown on the map on page 8.

Composite Risk Score

Composite 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: *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											
North Temple St	900 W to I-15	Minor Arterial	Salt Lake City	0.3	X	X	X	X		X	
1 st St	4th Ave to 3rd Ave	Major Collector	Salt Lake City	0.1			X	X	X	X	
700 E	Bueno Ave to Linden Ave	Minor Arterial	Salt Lake City	0.3	X	X	X	X		X	
900 E	500 S to 600 S	Major Collector	Salt Lake City	0.2	X	X	X		X	X	
1300 E	700 S to Parkway Ave	Minor Arterial	Salt Lake City	2.5	X	X	X	X		X	
800 S	Jeremy St to West Temple	Minor Arterial	Salt Lake City	1.1	X	X		X	X	X	
900 W	700 S to 2100 S	Major Collector	Salt Lake City	2.0	X	X	X	X	X	X	
1300 S	1100 W to 1900 E	Minor Arterial	Salt Lake City	4.0	X	X	X	X		X	
300 W	1300 S to 1400 S	Minor Arterial	Salt Lake City	0.2	X	X		X	X	X	
West Temple St	1300 S to Andrew Ave	Major Collector	Salt Lake City	0.3			X	X	X	X	
1700 S	400 E to Foothill Dr	Major Collector	Salt Lake City	3.2	X	X	X	X		X	
2100 S	State St to Oneida	Minor Arterial	Salt Lake City	4.0	X	X	X	X		X	
Parleys Way	Maywood Dr to Wilshire Cir	Minor Arterial	Salt Lake City	0.1	X	X	X	X		X	
Highland Dr	Parkway Ave to 3010 S	Minor Arterial	Salt Lake City	1.0	X	X	X	X	X	X	
2700 S	1100 E to Elizabeth St	Major Collector	Salt Lake City	0.1	X	X	X		X	X	
2700 S	Berkely Cir to Vimont Ave	Major Collector	Salt Lake City	0.2	X	X	X		X	X	

Federal Aid segments in the **Salt Lake City 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.

Composite Risk Score

Composite High-Risk Network (Segments)

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

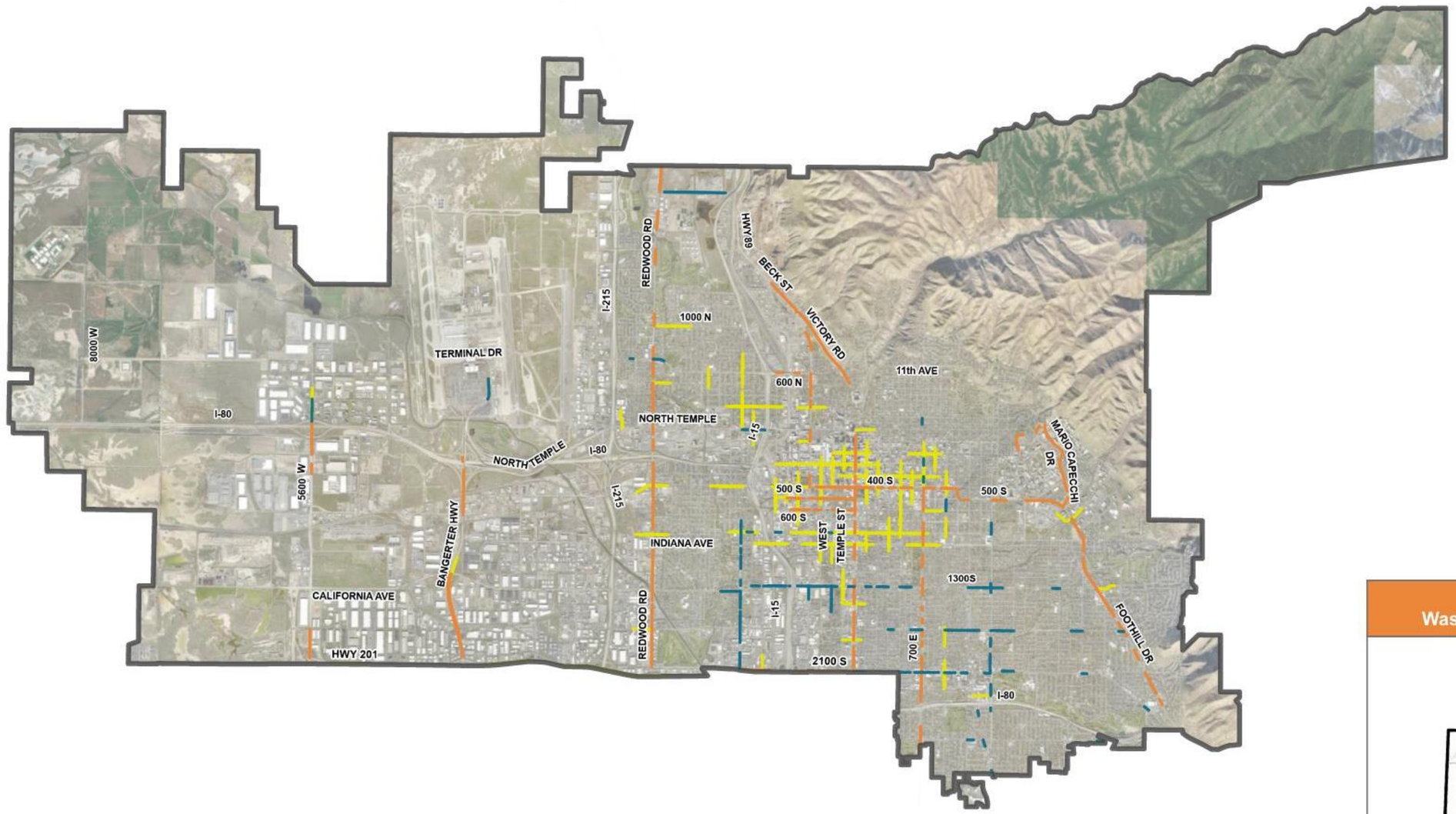
Facility	Limits	Functional Classification	City	Length (miles)	RISK TYPE: *usRAP- Pedestrian Star Rating*	*usRAP - Bicycle Star Rating*	*usRAP- Vehicle Star Rating*	Crash Profile Risk Score	CCR Differential Analysis	Significant Crashes	Local Street Risk Assessment
Local Streets					Local Street Risk Assessment						
400 South	1600 West to 300 West	Minor Arterial	Salt Lake City	2.1							X
700 East	South Temple to 400 South	Minor Arterial	Salt Lake City	0.6							X
800 South	1000 West to 800 West	Minor Arterial	Salt Lake City	0.3							X
400 West	700 North to 900 South	Major Collector/Local	Salt Lake City	2.4	The Local Street Risk Assessment considered factors such as locations of crashes, proximity to schools, and hard-braking.						X
1700 South	Redwood Road to Pioneer Road	Major Collector	Salt Lake City	1.0							X
900 South	900 West to 800 East	Major Collector	Salt Lake City	2.6							X
300 South	1000 East to 600 West	Local	Salt Lake City	2.3							X
West Temple	200 North to 400 South	Minor Arterial	Salt Lake City	0.9							X
200 South	800 East to 600 West	Major Collector	Salt Lake City	2.1							X
200 West	North Temple To 1000 South	Major Collector	Salt Lake City	1.7							X

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

Composite High-Risk Network (Segments)

Composite High-Risk Roadway Network



Miles
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Legend

GFA Boundary

Composite High-Risk Network

State Routes

Federal Aid Routes

Local Streets

Salt Lake City
Wasatch Front Regional Council Area

Composite Risk Score

Composite 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 **Salt Lake City** 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.

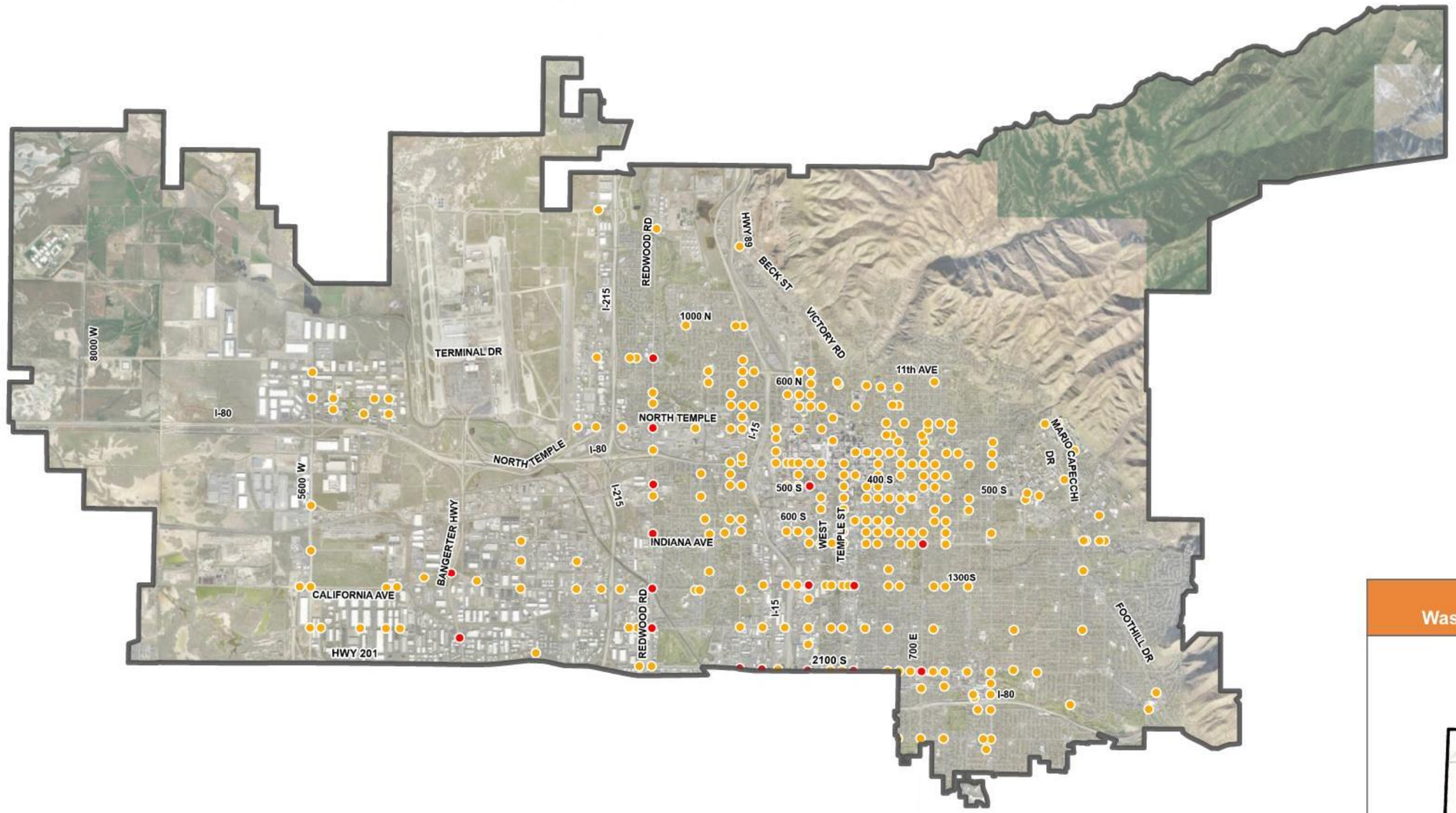
Signalized and unsignalized intersections in the **Salt Lake City** GFA with a positive Critical Crash Rate Differential (rate exceeds expected rate) are mapped on page 10.

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																						
400 E & 300 S	Salt Lake City	4	20.6	67	0	0	2	2	0	3	0	0	0	0	0	0	0	1	0	0	0	0
Redwood Rd & California Ave	Salt Lake City	93	0.6	2624	2	1	19	25	46	66	14	5	4	1	0	0	1	2	0	0	1	1
Redwood Rd & 700 N	Salt Lake City	68	0.4	881	0	4	13	16	35	40	12	3	8	0	0	0	1	3	1	4	2	0
Redwood Rd & Indiana Ave	Salt Lake City	54	0.4	598	0	2	12	10	30	26	10	3	10	1	0	0	0	4	0	2	2	1
900 W & 2100 S	Salt Lake City	40	0.3	1276	1	0	12	9	18	15	11	1	5	0	1	0	0	5	2	0	0	2
State St & 2100 S	Salt Lake City	84	0.3	1722	1	3	12	21	47	54	16	5	7	0	0	0	0	2	0	1	3	1
Redwood Rd & 400 S	Salt Lake City	54	0.3	1581	1	2	15	13	23	28	19	0	4	0	0	0	0	3	0	1	2	1
Redwood Rd & 1700 S	Salt Lake City	69	0.3	884	0	3	15	21	30	47	14	1	7	0	0	0	0	0	0	2	3	2
300 W & 2100 S	Salt Lake City	50	0.2	551	0	2	9	12	27	17	20	0	4	0	0	0	1	8	0	1	1	0
Redwood Rd & North Temple St	Salt Lake City	55	0.2	2529	2	3	13	14	23	17	25	0	8	1	1	0	0	2	1	2	4	0
Unsignalized Intersections																						
7200 W & 2100 S	Salt Lake City	5	15.1	26	0	0	0	2	3	2	3	0	0	0	0	0	0	0	0	0	0	0
800 E & 300 S	Salt Lake City	12	13.2	95	0	0	1	6	5	11	1	0	0	0	0	0	0	0	0	0	0	0
800 E & 700 S	Salt Lake City	5	6.4	37	0	0	1	1	3	5	0	0	0	0	0	0	0	0	0	0	0	1
1200 W & 700 S	Salt Lake City	6	6.1	48	0	0	1	2	3	3	0	0	1	2	0	0	0	0	0	0	1	0
Concord St & 500 S	Salt Lake City	4	5.3	56	0	0	1	3	0	2	0	0	2	0	0	0	0	0	0	0	2	0
Arapeen Dr & Arapeen Dr	Salt Lake City	3	5.0	13	0	0	0	1	2	1	0	0	2	0	0	0	0	0	0	0	0	0
2400 W & North Temple St	Salt Lake City	10	4.9	73	0	0	2	2	6	4	5	0	0	0	0	0	0	1	0	0	0	0
Concord St & 300 S	Salt Lake City	3	3.9	3	0	0	0	0	3	1	0	0	0	2	0	0	0	0	0	0	0	2
4650 W & 1730 S	Salt Lake City	3	2.7	24	0	0	1	0	2	3	0	0	0	0	0	0	0	0	0	0	0	0
500 E & 300 S	Salt Lake City	15	2.0	131	0	0	4	3	8	8	3	0	3	1	0	0	0	0	0	2	1	1

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



Miles
0 1 2

N

Legend

GFA Boundary

Critical Crash Rate Differential (> 1.0)

- Signalized
- Unsignalized

Salt Lake City
Wasatch Front Regional Council Area

Network Screening Analysis

- Intersections
- Segments

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 Streets Risk Assessment
Federal Aid Routes									
Amelia Earhart Drive	5600 West to Wright Brothers Drive	Salt Lake City	X	X	X				
5600 West	Amelia Earhart Drive to Harold Gatty Drive	Salt Lake City	X	X					
5600 West	I-80 to Amelia Earhart Drive	Salt Lake City	X	X	X				
Wright Brothers Drive	Amelia Earhart Drive to Harold Gatty Drive	Salt Lake City	X						
Wright Brothers Drive	Douglas Corrigan Way to Amelia Earhart Dri	Salt Lake City	X	X	X				
Harold Gatty Drive	5600 West to Wright Brothers Drive	Salt Lake City	X						
1400 South	West GFA Extents to 5500 West	Salt Lake City	X						
Terminal Drive	Crossbar Road to Crossbar Road	Salt Lake City	X	X	X				
4000 West / 2100 North	SLC Airport to I-215	Salt Lake City	X	X					
2200 West	North Temple to North GFA Extents	Salt Lake City	X						
2300 North	Redwood Road to 1100 West	Salt Lake City	X	X	X				
Warm Springs Road	2180 North to North GFA Extents	Salt Lake City	X	X					
1000 North	Redwood Road to 900 West	Salt Lake City		X	X				
700 North / 600 North	2200 West to 1200 West	Salt Lake City	X	X					
700 North / 600 North	1200 West to I-15	Salt Lake City	X						
900 West	700 South to 1000 North	Salt Lake City	X						
900 West	South GFA Extents to 700 South	Salt Lake City	X	X	X				

A list of Federal Aid segments in the **Salt Lake City GFA** identified from each of the safety analysis methods is listed in the table at left. 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 18 through 22 depict each of these segments identified by the respective analysis.

Composite Risk Score

High-Risk Network

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 Streets Risk Assessment
Federal Aid Routes									
Indiana Avenue	Pioneer Road to Redwood Road	Salt Lake City	X						
Gladiola Street	California Avenue to 500 South	Salt Lake City	X						
500 South / 400 South	2650 West to 900 West	Salt Lake City	X	X					
700 South / 500 South	4050 West to 2650 West	Salt Lake City	X						
300 North / East Capitol Boulev	State Street to Columbus Street	Salt Lake City	X		X				
2100 South	Redwood Road to 900 West	Salt Lake City	X						
2100 South	3230 West to Pioneer Road	Salt Lake City	X						
Pioneer Road	3230 West to California Avenue	Salt Lake City	X						
1700 South	Pioneer Road to Riverside Drive	Salt Lake City	X						
1700 South	Riverside Drive to Edison Drive	Salt Lake City	X		X				
1700 South	Edison Drive to Foothill Drive	Salt Lake City	X	X	X				
1400 South	West GFA Extents to Bangerter Highway	Salt Lake City	X						
California Avenue	Bangerter Highway to Pioneer Road	Salt Lake City	X	X					
California Avenue	Pioneer Road to 1100 West	Salt Lake City	X						
California Avenue / 1300 South	1100 West to Foothill Drive	Salt Lake City	X	X	X				
Medical Drive South	Mario Capecchi Drive to Medical Drive North	Salt Lake City	X		X				
Wakara Way	500 South to Chipetta Way	Salt Lake City	X						

A list of Federal Aid segments in the **Salt Lake City GFA** identified from each of the safety analysis methods is listed in the table at left. 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 18 through 22 depict each of these segments identified by the respective analysis.

Composite Risk Score

High-Risk Network

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 Streets Risk Assessment
Federal Aid Routes									
400 South	1300 East to University Street	Salt Lake City	X						
I Street	South Temple to 11th Avenue	Salt Lake City			X				
3rd Avenue	I Street to Virginia Street	Salt Lake City			X				
400 West	200 South to Panther Way	Salt Lake City	X						
North Temple	2400 West to 1000 West	Salt Lake City	X	X					
North Temple	1000 West to I-15	Salt Lake City	X	X	X				
North Temple	I-15 to State Street	Salt Lake City	X						
200 West	North Temple to 600 South	Salt Lake City	X						
West Temple	North Temple to 400 S	Salt Lake City	X	X					
South Temple	400 West to University Street	Salt Lake City	X	X					
300 East	South Temple to 100 South	Salt Lake City	X						
200 East	South Temple to 600 South	Salt Lake City	X						
100 South	West Temple to 800 East	Salt Lake City	X						
200 South	West Temple to 900 East	Salt Lake City	X						
700 East	South Temple to 600 South	Salt Lake City	X	X	X				
400 South	700 West to 300 West	Salt Lake City	X						
500 South	State Street to 700 E	Salt Lake City	X						

A list of Federal Aid segments in the **Salt Lake City GFA** identified from each of the safety analysis methods is listed in the table at left. 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 18 through 22 depict each of these segments identified by the respective analysis.

Composite Risk Score

High-Risk Network

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 Streets Risk Assessment
Federal Aid Routes									
600 South	State Street to 700 East	Salt Lake City	X						
900 East	South Temple to Elgin Avenue	Salt Lake City	X	X	X				
1100 East	South Temple to 3000 South	Salt Lake City	X		X				
1300 East	South Temple to Elgin Avenue	Salt Lake City	X	X	X				
100 South	1100 East to North Campus Drive	Salt Lake City	X						
Guardsman Way	500 South to Sunnyside Avenue	Salt Lake City	X						
800 South, Sunnyside Avenue,	900 West to East GFA Extents	Salt Lake City	X						
1500 East	900 South to 2100 South	Salt Lake City	X		X				
2100 East	Foothill Drive to Parkway Avenue	Salt Lake City	X		X				
2000 East	Parkway Avenue to Atkin Avenue	Salt Lake City	X	X	X				
Parleys Canyon Boulevard	Ram Boulevard to Parkway Avenue	Salt Lake City			X				
Parleys Way	2100 South to Wilshire Circle	Salt Lake City	X	X	X				
2700 South	500 East to 2300 East	Salt Lake City	X	X	X				
Imperial Street	2700 South to Atkin Avenue	Salt Lake City	X	X	X				
2100 South	State Street to Foothill Drive	Salt Lake City	X	X	X				
300 West	400 South to 2100 South	Salt Lake City	X	X					
West Temple	900 South to 2100 South	Salt Lake City			X				

A list of Federal Aid segments in the **Salt Lake City GFA** identified from each of the safety analysis methods is listed in the table at left. 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 18 through 22 depict each of these segments identified by the respective analysis.

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 Streets Risk Assessment
Federal Aid Routes									
West Temple	400 South to North Temple	Salt Lake City				X			
North Temple	2400 West to State Street	Salt Lake City				X			
South Temple	800 East to Virginia Street	Salt Lake City				X			
700 North / 600 North	I-80 to I-15	Salt Lake City				X			
100 South	West Temple to North Campus Drive	Salt Lake City				X			
200 South	Orange Street to 900 East	Salt Lake City				X			
South Temple	400 West to State Street	Salt Lake City				X			
2200 West	North Temple to 470 North	Salt Lake City				X			
400 West	200 South to 900 North	Salt Lake City				X			
300 North / East Capitol Boulev	State Street to Columbus Street	Salt Lake City				X			
Terminal Drive*	Crossbar Road to Crossbar Road	Salt Lake City				X			
2100 South	State Street to Foothill Drive	Salt Lake City				X			
1100 West / Warm Springs Roa	2180 North to North GFA Extents	Salt Lake City				X			
5600 West	Amelia Earhart Drive to Harold Gatty Drive	Salt Lake City				X			
Parleys Way	I-18 to 2100 South	Salt Lake City				X			
Emigration Canyon Road	Crestwood Drive to East GFA Extents	Salt Lake City				X			
900 West	South GFA Extents to 700 South	Salt Lake City				X			

A list of Federal Aid segments in the **Salt Lake City GFA** identified from each of the safety analysis methods is listed in the table at left. 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 18 through 22 depict each of these segments identified by the respective analysis.

Composite Risk Score

High-Risk Network

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 Streets Risk Assessment
Federal Aid Routes									
1700 South	Riverside Drive to 200 East	Salt Lake City				X			
1400 South	7200 West to 5600 West	Salt Lake City				X			
1300 South / California Avenue	1100 West to 200 East	Salt Lake City				X			
300 E	800 S to 700 S	Salt Lake City					X	X	
Medical East Dr	Medical Dr N to 60 S	Salt Lake City					X	X	
500 E	400 S to 300 S	Salt Lake City					X	X	
700 S	Bangerter Hwy to Iron Rose Pl	Salt Lake City					X	X	
500 N	Columbus St to De Soto St	Salt Lake City					X	X	
900 W	Folsom Ave to South Temple	Salt Lake City					X	X	
West Temple St	1400 S to Albermarle Ave	Salt Lake City					X	X	
300 E	2100 S to Redondo Ave	Salt Lake City					X	X	
Main St	Harrison Ave to 1300 S	Salt Lake City					X	X	
Highland Dr	Wilmington Ave to 2100 S	Salt Lake City					X	X	

A list of Federal Aid segments in the **Salt Lake City GFA** identified from each of the safety analysis methods is listed in the table at left. 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 18 through 22 depict each of these segments identified by the respective analysis.

Network Screening – Segments (Local Streets)

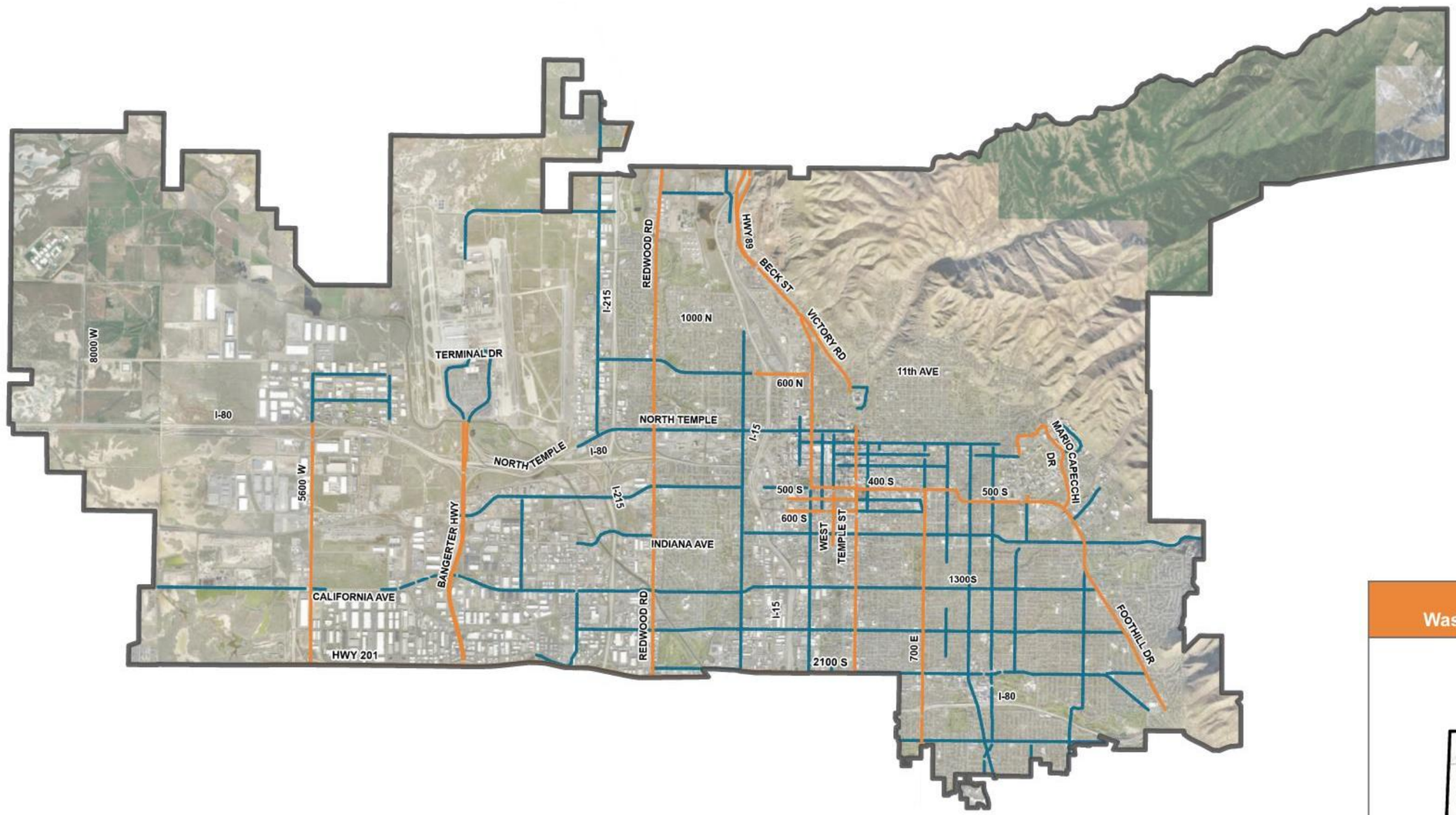
			RISK TYPE						
Facility	Limits	City	*usRAP- Pedestrian Star Rating*	*usRAP - Bicycle Star Rating*	*usRAP- Vehicle Star Rating*	*Crash Profile Risk Score*	CCR Differential Analysis	Significant Crashes	Local Streets Risk Assessment
Local Streets									
Stringham Ave	Parleys Way to Foothill Dr	Salt Lake City					X	X	
500 N	Walnut Dr to 1465 W	Salt Lake City					X	X	
300 N	Vine St to Center St	Salt Lake City					X	X	
400 E	600 S to 500 S	Salt Lake City					X	X	
300 S	300 E to 400 E	Salt Lake City					X	X	
400 E	400 S to 300 S	Salt Lake City					X	X	
300 S	Denver St to 500 E	Salt Lake City					X	X	
600 E	Park St to 900 S	Salt Lake City					X	X	
Connor Rd	Pollock Rd to Stover St	Salt Lake City					X	X	
Concord St	Arapahoe Ave to 600 S	Salt Lake City					X	X	

A list of Local Street segments in the **Salt Lake City GFA** identified from Network Screening, applying Critical Crash Rate (CCR) and Significant Crashes (three or more crashes over 5-year period), is shown at left.

Composite Risk Score

High-Risk Network

usRAP Pedestrian Star Rating - Segments



Miles
0 1 2

N

Legend

GFA Boundary

Pedestrian Star Rating (1-2)

State Routes

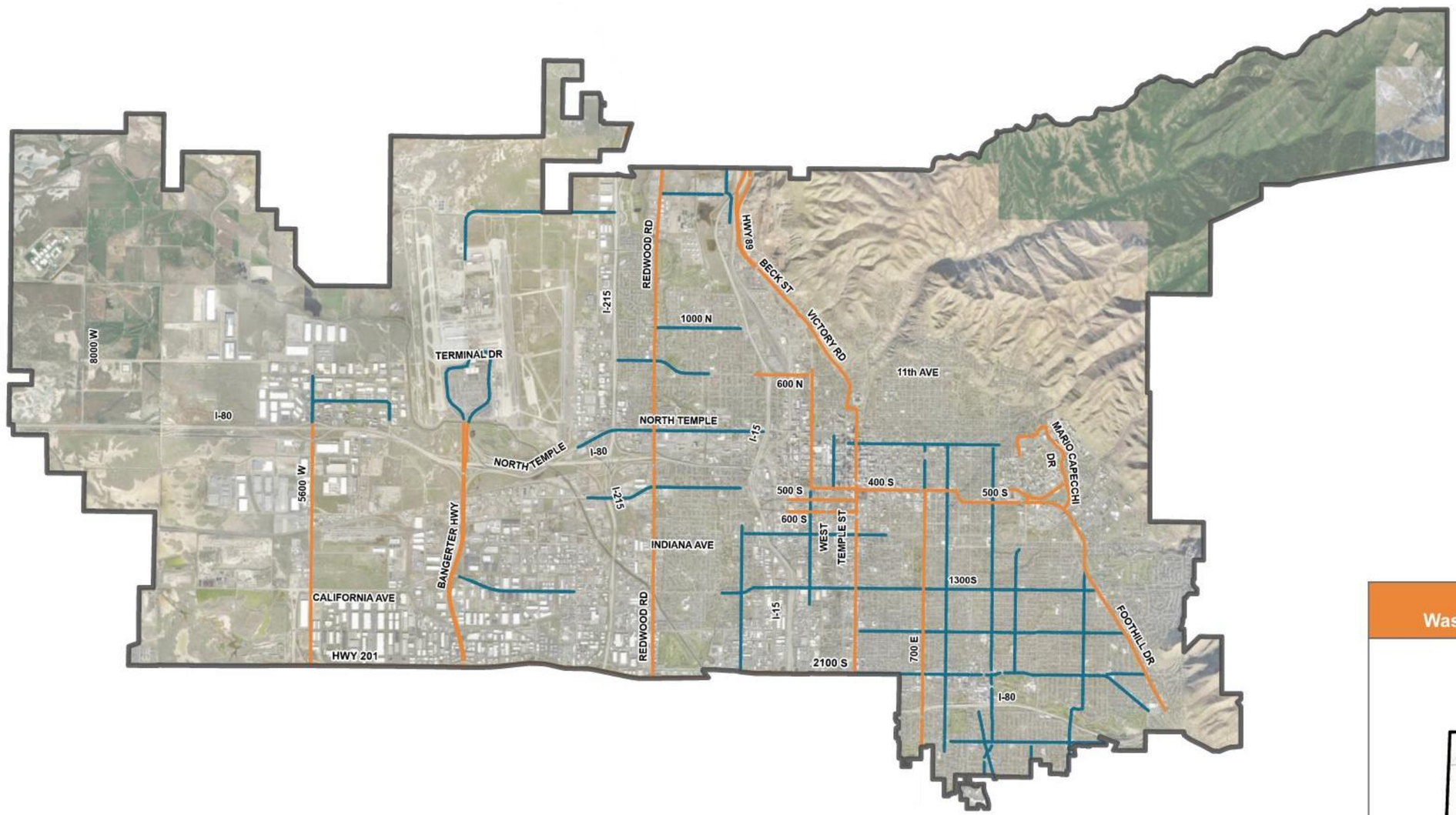
Federal Aid Routes

Salt Lake City
Wasatch Front Regional Council Area

High-Risk Network Analysis

State Route and Federal Aid Segments	Local Street Segments

usRAP Bicycle Star Rating - Segments



Miles
0 1 2

N

Legend

GFA Boundary

Bicycle Star Rating (1-2)

State Routes

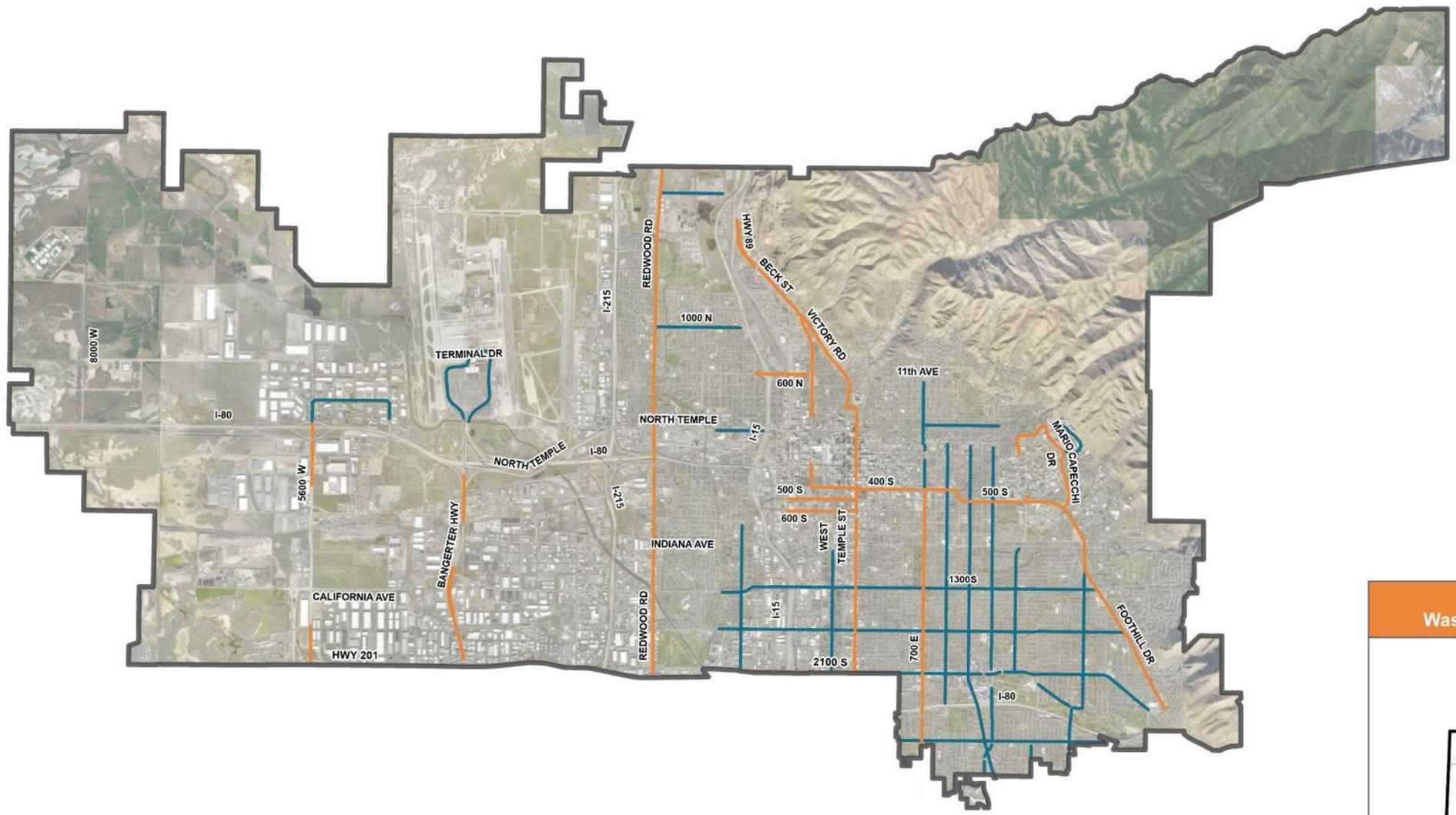
Federal Aid Routes

Salt Lake City
Wasatch Front Regional Council Area

High-Risk Network Analysis

State Route and Federal Aid Segments	Local Street Segments

usRAP Vehicle Star Rating - Segments



Miles
0 1 2

N

Legend

GFA Boundary

Vehicle Star Rating (1-2)

State Routes

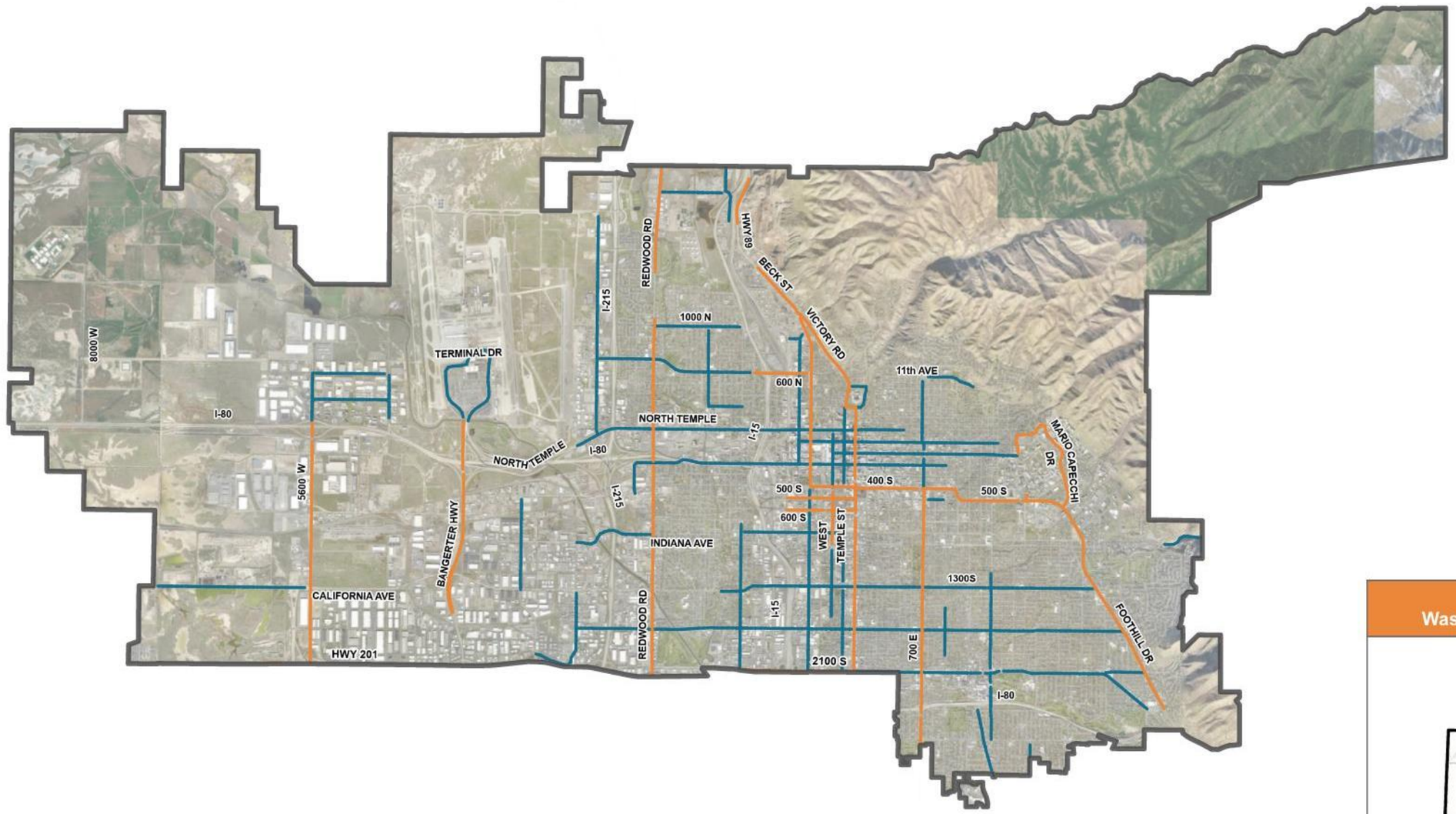
Federal Aid Routes

Salt Lake City
Wasatch Front Regional Council Area

High-Risk Network Analysis

State Route and Federal Aid Segments	Local Street Segments

Crash Profile Risk - Segments



Miles
0 1 2

N

Legend

GFA Boundary

Crash Profile Risk (> 20)

State Routes

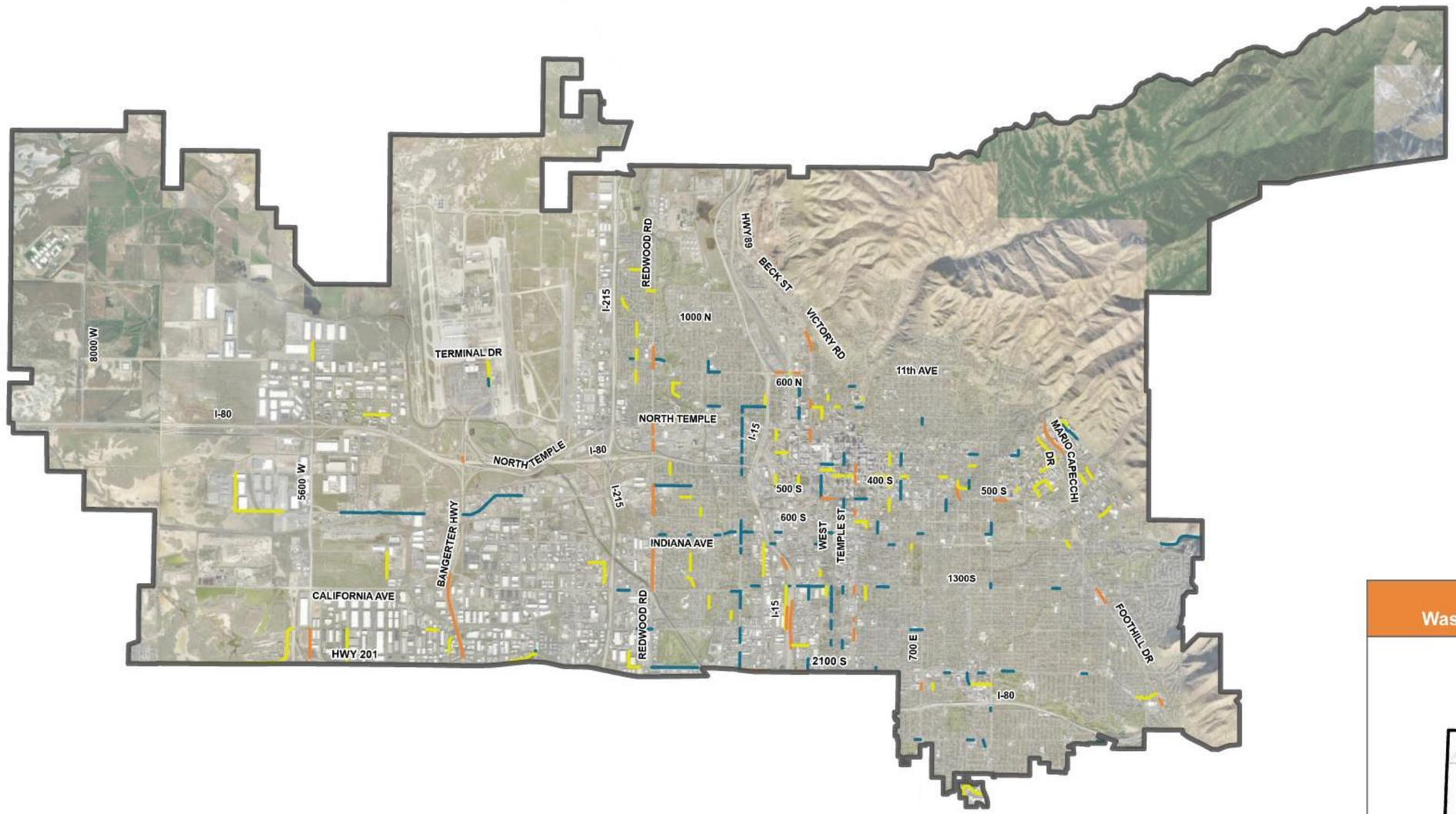
Federal Aid Routes

Salt Lake City
Wasatch Front Regional Council Area

High-Risk Network Analysis

State Route and Federal Aid Segments	Local Street Segments

Network Screening - Segments



Miles
0 1 2

N

Legend

GFA Boundary

Critical Crash Rate Differential (> 0.0)

State Routes

Federal Aid Routes

Local Streets

Salt Lake City
Wasatch Front Regional Council Area

High-Risk Network Analysis

State Route and Federal Aid Segments	Local Street Segments

SALT LAKE CITY TECH MEMO #1 SAFETY ANALYSIS

TECHNICAL MEMORANDUM #1

APPENDIX A8 - SALT LAKE CITY 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.

File name: Appendix A8 - Salt Lake City - Safety Analysis.docx

Table of Contents

List of Figures

List of Tables

1. Introduction

Appendix A8 summarizes the safety analysis performed for the Salt Lake City 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 Salt Lake City GFA:

- Strategic Highway Safety Plan (SHSP) Emphasis Area Analysis
- Historical Crash Analysis
- Crash and Network Screening Analysis
- Roadway Characteristic Risk Analysis
  - Crash Profile 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 A8** summarizes the results of the analyses for the Salt Lake City GFA.

1.2. Appendix Organization

This Appendix is organized into the following sections:

- **Section 1** - Introduction
- **Section 2** - Salt Lake City 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 Salt Lake City GFA (**Figure 2.1**) is located entirely within Salt Lake County and includes the following agencies and jurisdictions:

- Salt Lake City

The safety analyses presented in this Technical Memorandum are specific to the Salt Lake City GFA.

Figure 2.2 highlights the roadway network within the Salt Lake City 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 Salt Lake City GFA, for the years 2018-2022. Crash data was obtained from the Utah Department of Transportation.

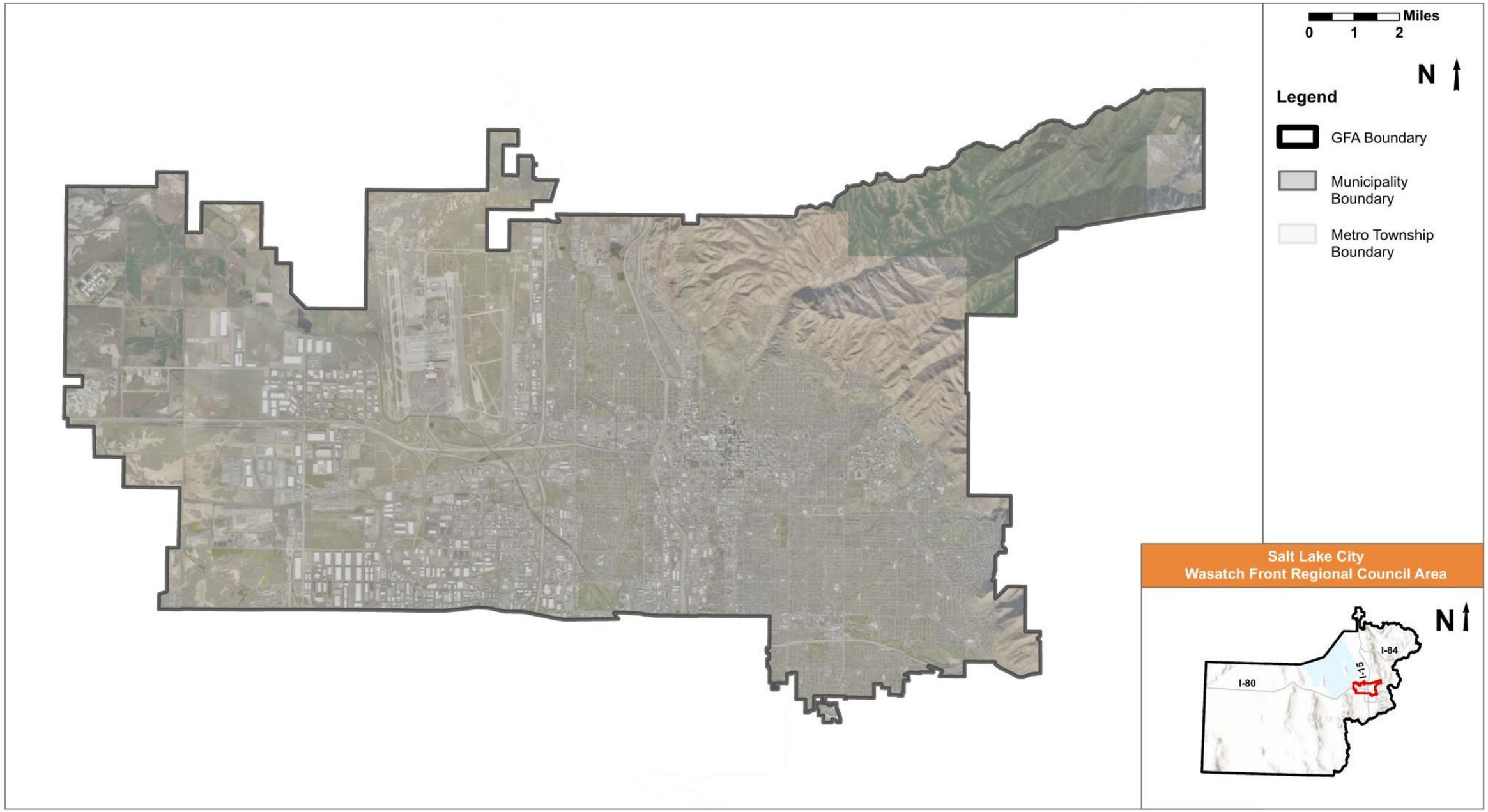


Figure 2.1 – Salt Lake City GFA Study Area

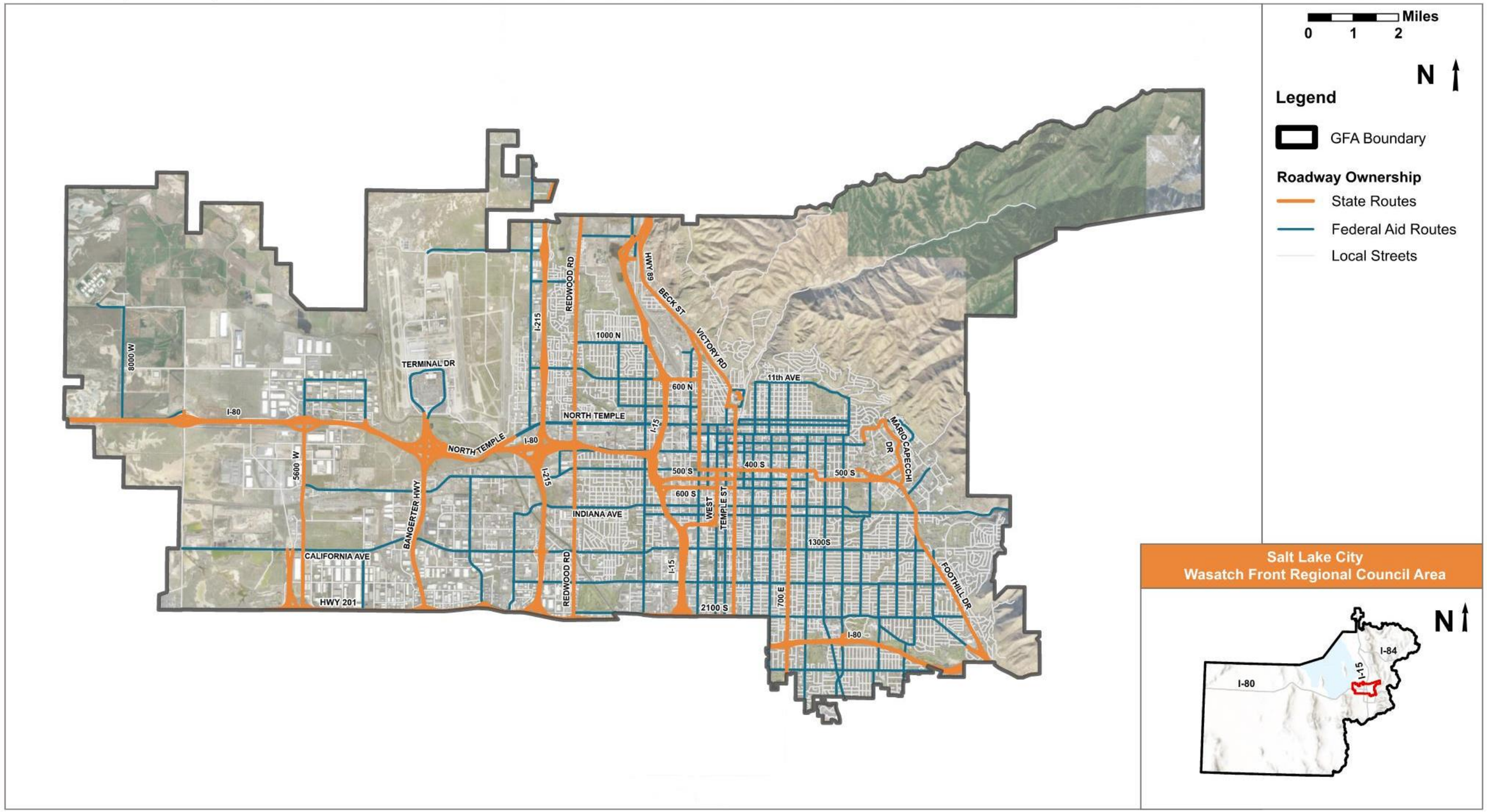


Figure 2.2 – Salt Lake City GFA Roadway Network

3. SHSP Emphasis Area Analysis

The SHSP emphasis area analysis ranks the frequency of fatal and serious injury crashes in Salt Lake City GFA for each of the eleven Utah SHSP emphasis areas. The rankings of the emphasis areas are compared for the Salt Lake City 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 Salt Lake City GFA listed below:

- Intersections
- Pedestrian
- Speed-Related
- Roadway Departure
- Motorcycle

Table 3.1 – SHSP Emphasis Areas Analysis

Category	Utah SHSP Safety Emphasis Area	Statewide Totals		WFRC Totals		Salt Lake City 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	54	8	-4
	Older Driver	1,508	6	700	6	47	9	-3
	Speed-Related	2,133	**3**	936	3	108	3	0
	Aggressive Driving	555	11	297	10	31	10	0
	Distracted Driving	718	10	286	11	25	12	-1
	Impaired Driving	1,184	8	623	8	61	7	1
	No Safety Restraints	1,542	**5**	599	9	68	6	3
Roadway	Intersection	3,567	**1**	2,163	1	259	1	0
	Roadway Departure	2,931	**2**	1,014	2	84	4	-2
Special Users	Motorcycle	1,457	7	750	5	76	5	0
	Pedestrian	912	9	636	7	130	2	5
	Bicycle*	280	12	167	12	30	11	1

**Bicycle is not 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. The following are key observations base on the historical crash analysis:

4.1. Overall Crashes

Table 4.1 provides an overview of overall crashes by severity and roadway ownership within the Salt Lake City GFA. The data shows the following:

- State Routes recorded 58% of the total crashes in this GFA
- State Routes recorded 56 of 93 fatal crashes in this GFA
- Federal Aid routes recorded 31% of fatal and serious injury crashes in this GFA
- Federal Aid routes recorded 31 of 93 fatal crashes in this GFA
- Local Streets (non-Federal Aid) recorded 11% of fatal and serious injury crashes in this GFA
- Local Streets recorded six of 93 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
Crash Severity	Crashes		Crashes		Crashes		Crashes		%
	#	%	#	%	#	%	#	%	
Fatal	56	0%	31	0%	6	0%	**93**	**0.4%**	**0.1%**
Suspected Serious Injury	182	1%	150	2%	28	1%	**360**	**1.7%**	**0.2%**
Suspected Minor Injury	1,280	10%	1,260	19%	363	16%	**2,903**	**13.5%**	**1.6%**
Possible Injury	2,646	21%	1,685	25%	406	17%	**4,737**	**22.0%**	**2.6%**
No Injury / Property Damage Only	8,289	67%	3,650	54%	1,527	66%	**13,466**	**62.5%**	**7.5%**
Route Total	**12,453**	**100%**	**6,776**	**100%**	**2,330**	**100%**	**21,559**	**100%**	**12.0%**

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 Salt Lake City GFA. The data shows:

- Fatal crashes have increased during the most recent 5-year period (2018-2022), with a high of 29 in 2022 (up from 8 in 2018)
- Serious injury crashes have generally decreased during the 5-year period (2018-2022)

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 Salt Lake City GFA.

Error! Reference source not found. is a density map of fatal and serious injury crashes within the Salt Lake City GFA.

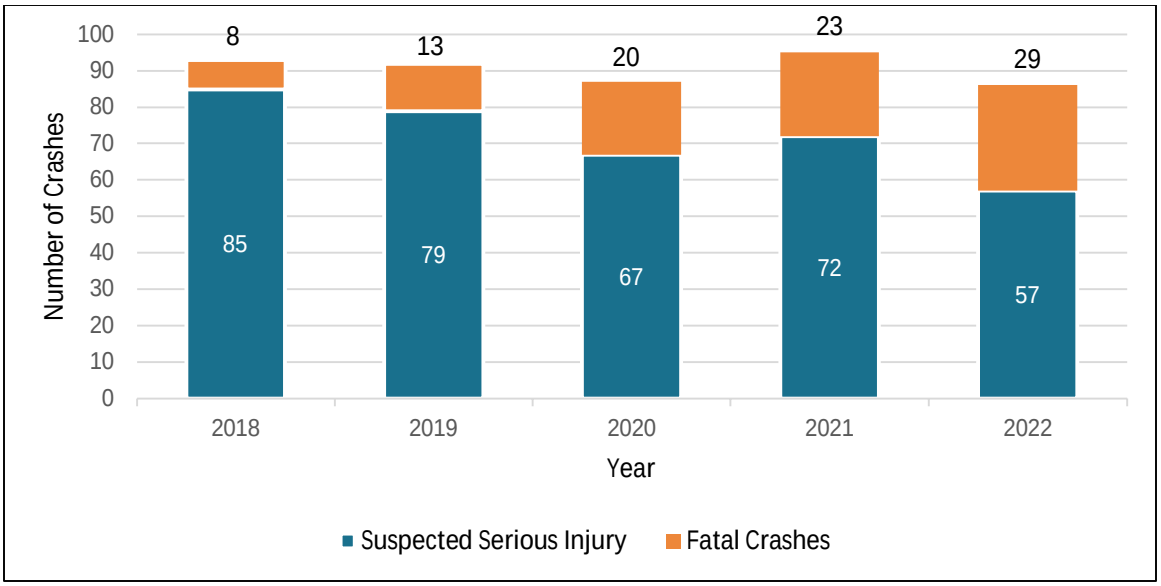


Figure 4.1 – Fatal and Serious Injury Crashes by Year

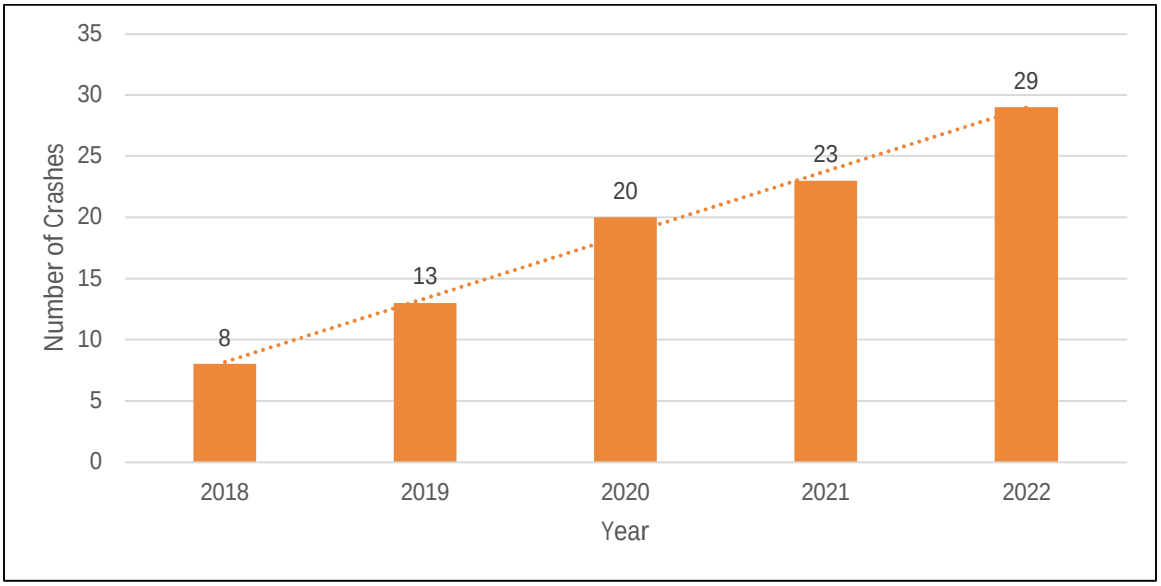


Figure 4.2 – Fatal Crashes by Year

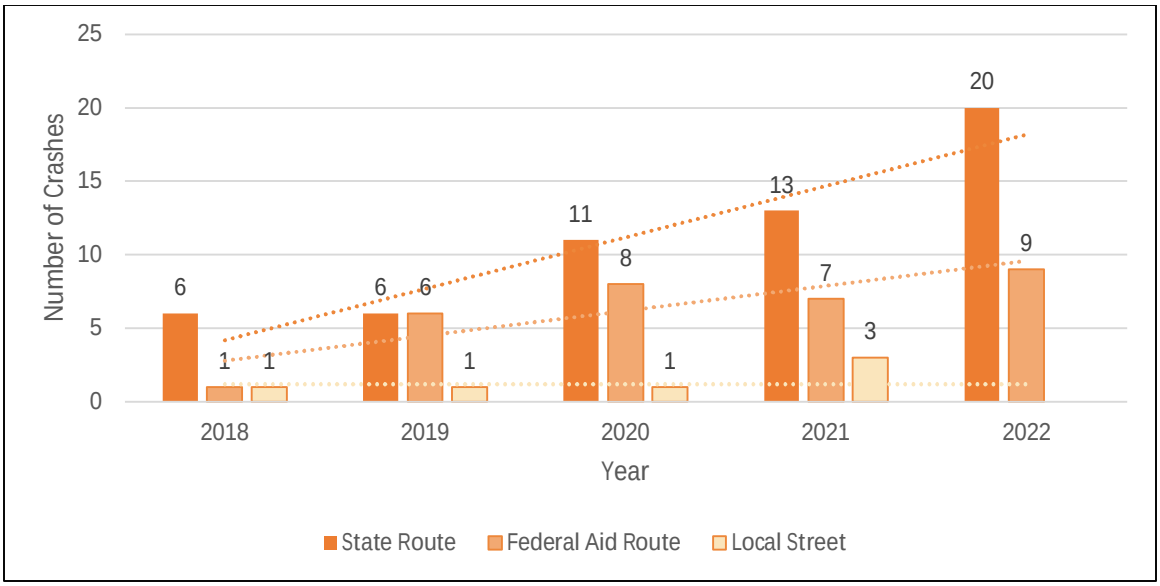


Figure 4.3 – Annual Fatal Crashes by Roadway Ownership

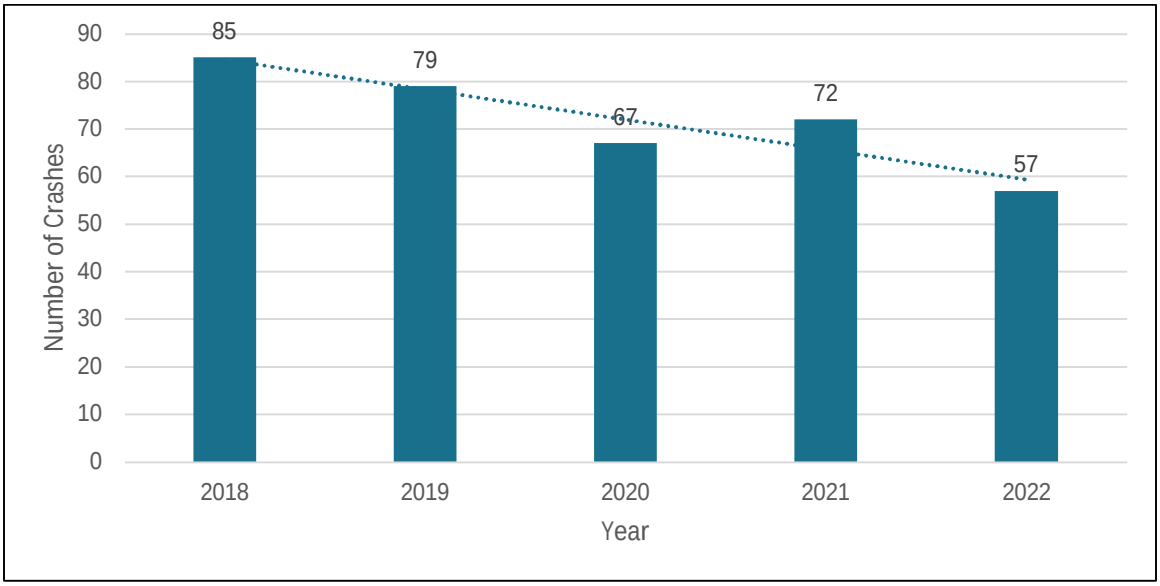


Figure 4.4 – Serious Injury Crashes by Year

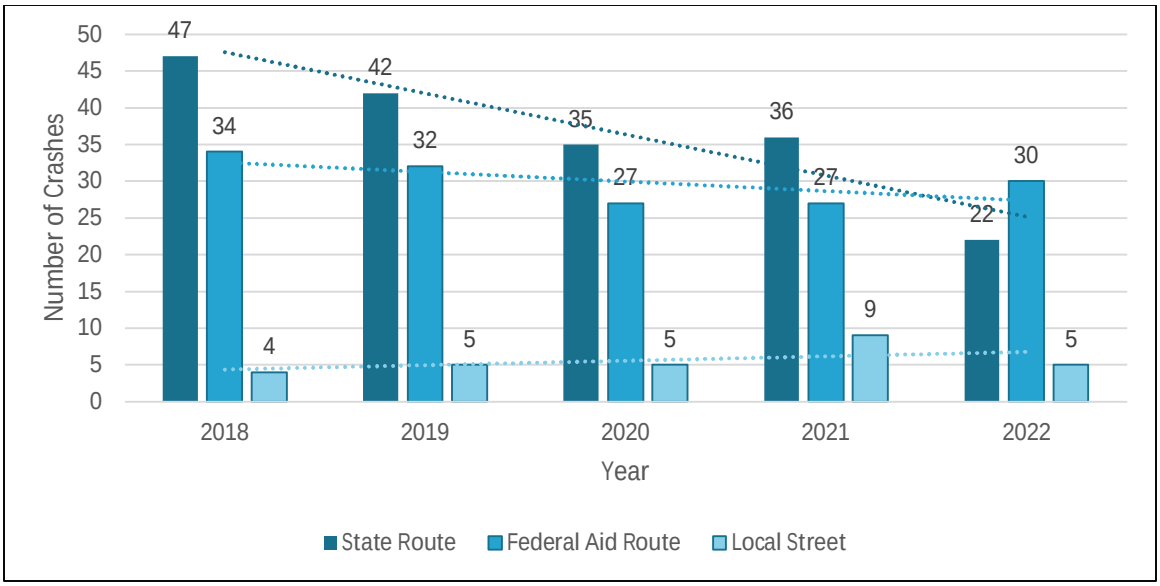


Figure 4.5 – Annual Serious Injury Crashes by Roadway Ownership

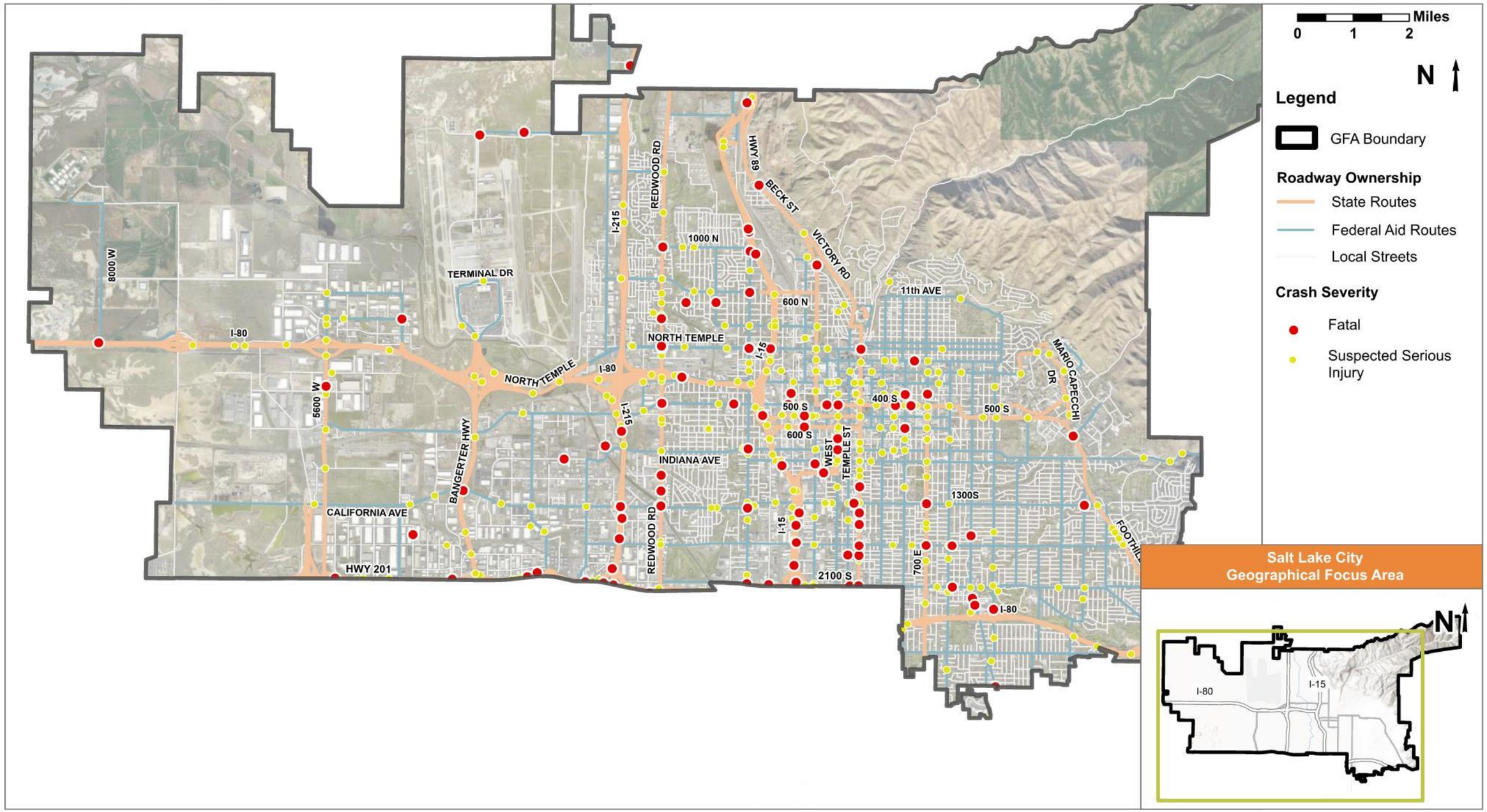


Figure 4.6 – Fatal and Serious Injury Crashes

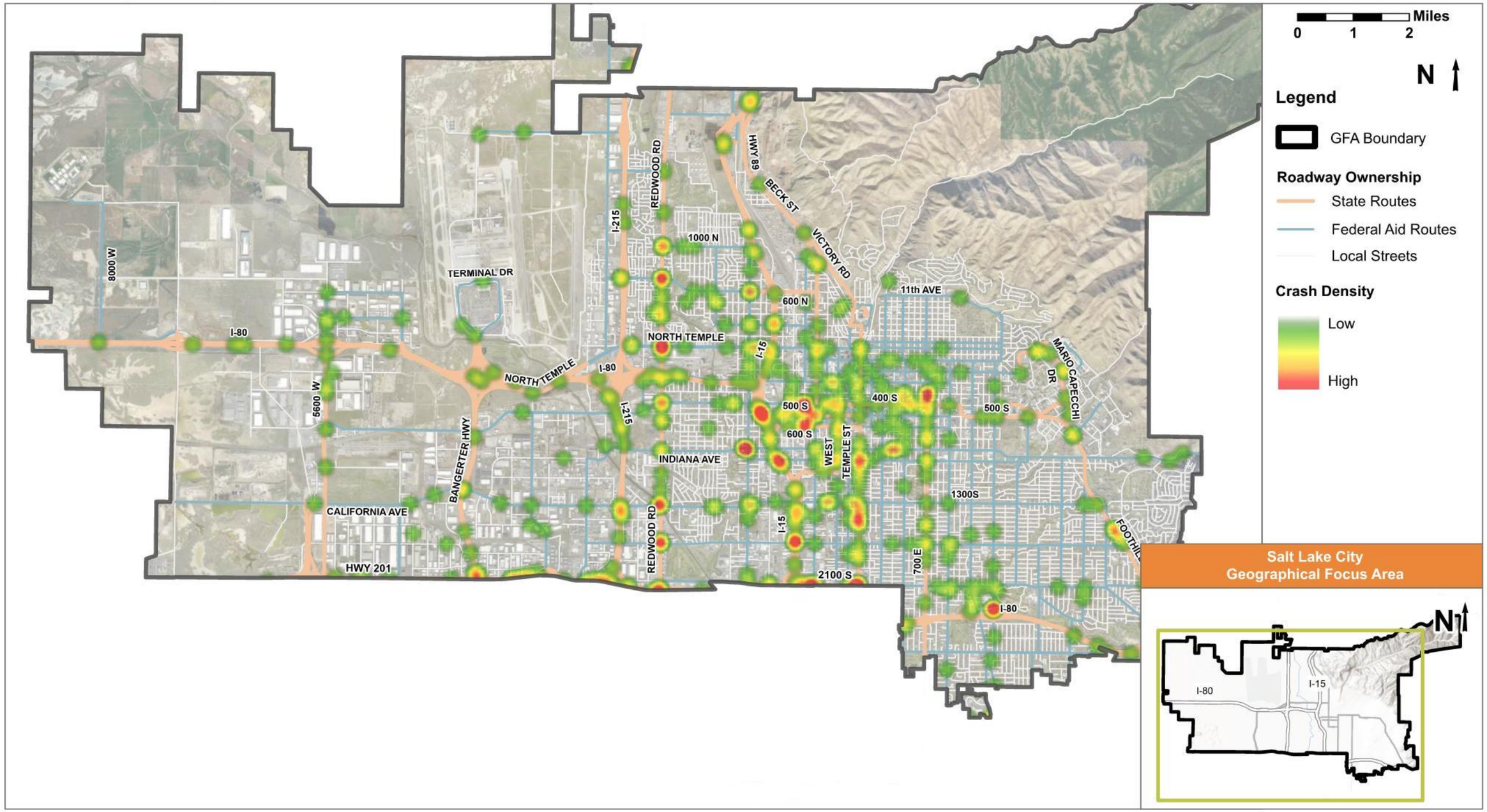


Figure 4.7 – Fatal and Serious Injury Crash Density

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 Salt Lake City GFA. The data shows:

- Active Transportation represents the most frequency crash types, with 29 fatal crashes
- Other frequency crash types are Left-Turn at Intersection and Roadway Departure

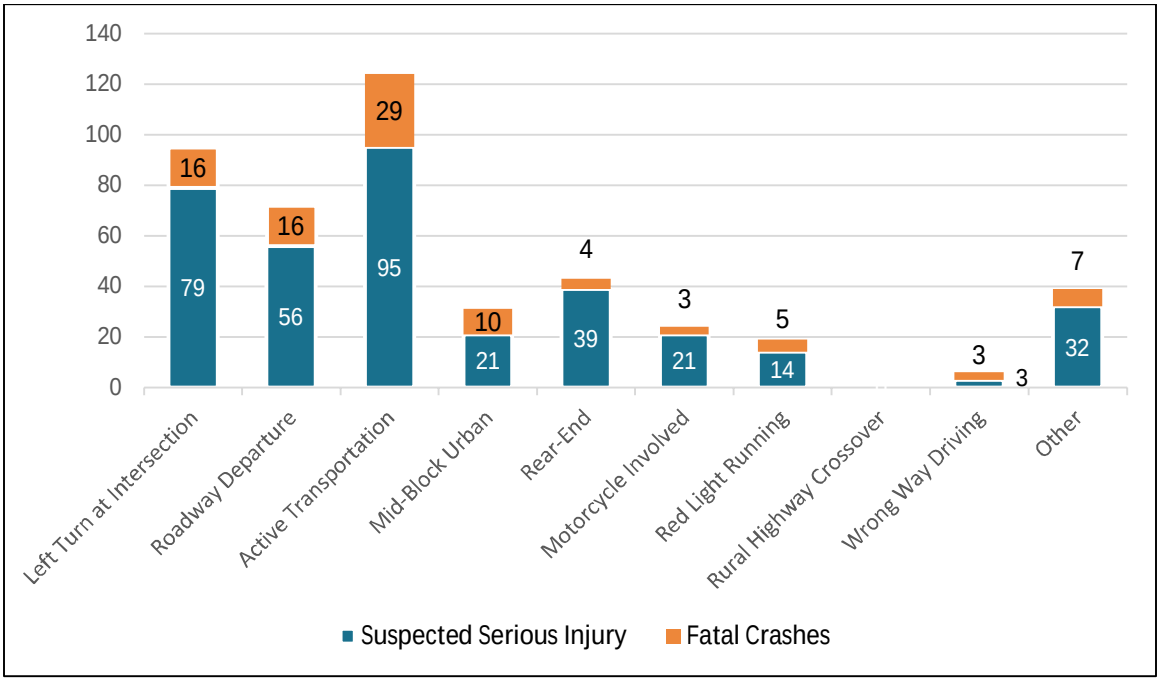


Figure 4.8 – Fatal and Serious Injury Crashes by Crash Type

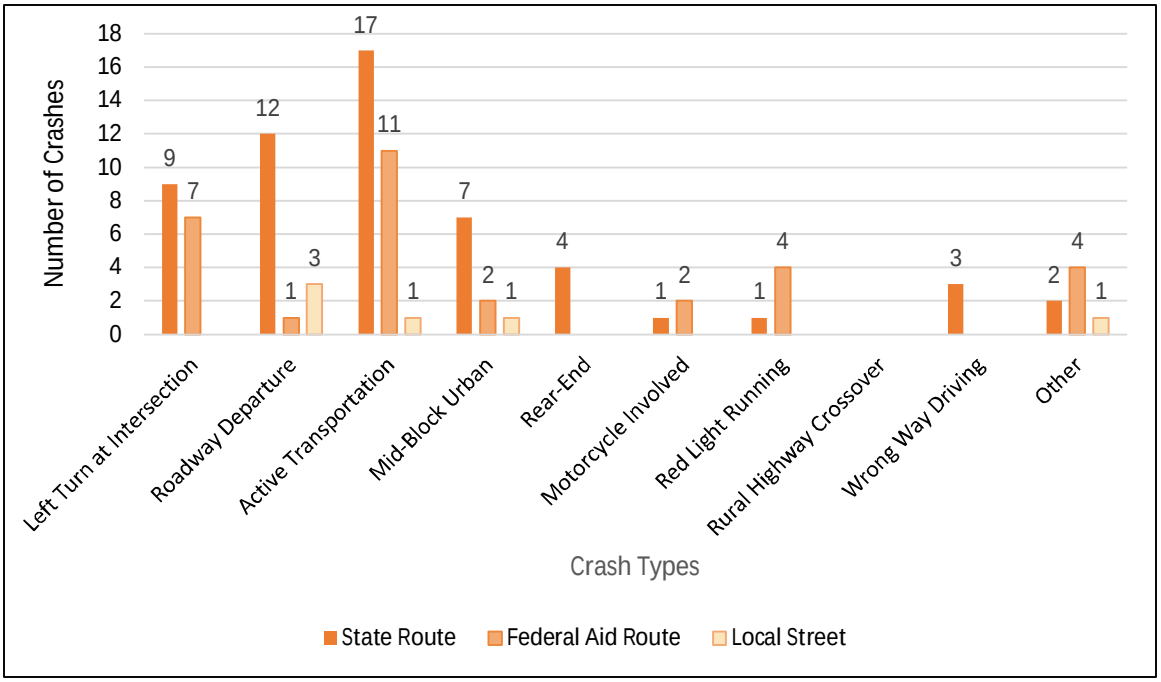


Figure 4.9 – Fatal Crashes by Crash Type and Roadway Ownership

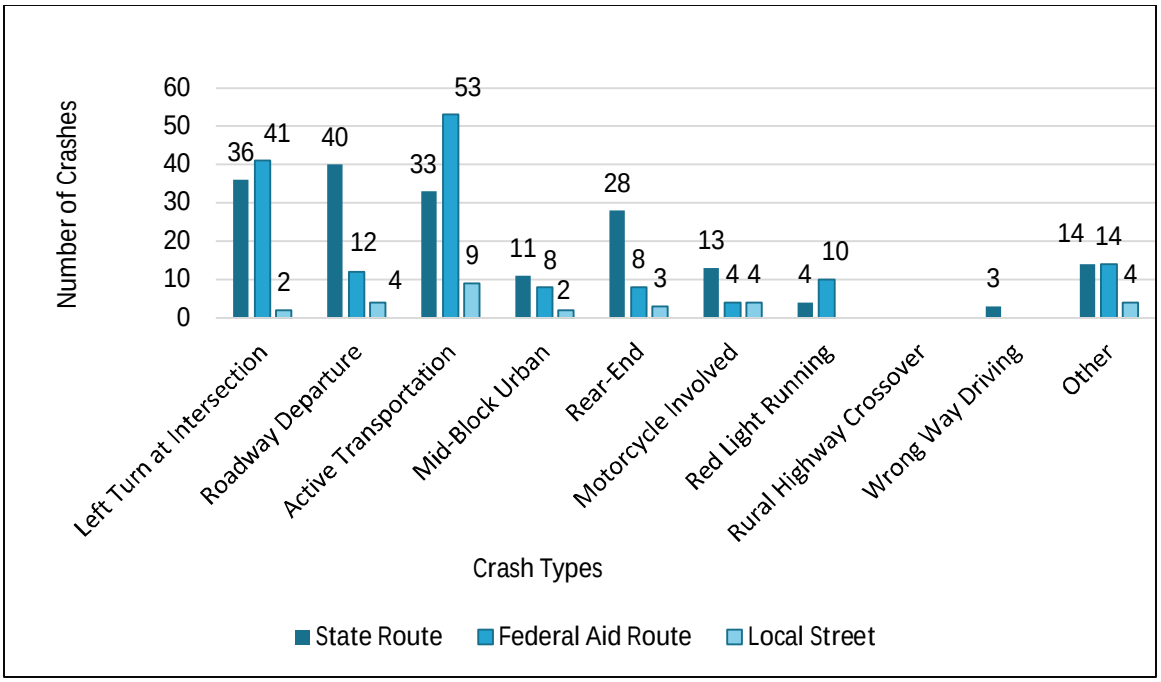


Figure 4.10 – Serious Injury Crashes by Crash Type and Roadway Ownership

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 Salt Lake City GFA. The data shows:

- There were 35 pedestrian fatal crashes and four bicycle fatal crashes in the 5-year period
- There were 92 serious injury pedestrian crashes and 26 serious injury bicycle crashes
- 18 of the pedestrian fatal crashes occurred on State Routes, 15 on Federal Aid routes, and two on Local Streets

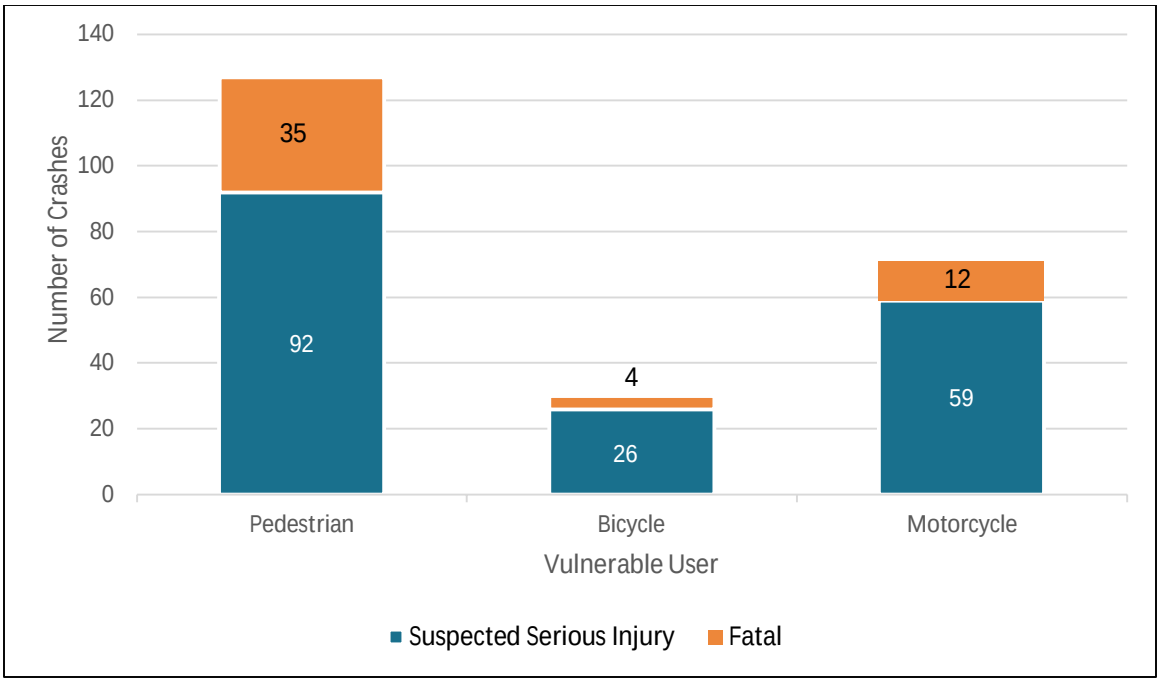


Figure 4.11 – Fatal and Serious Injury Crashes by Vulnerable User

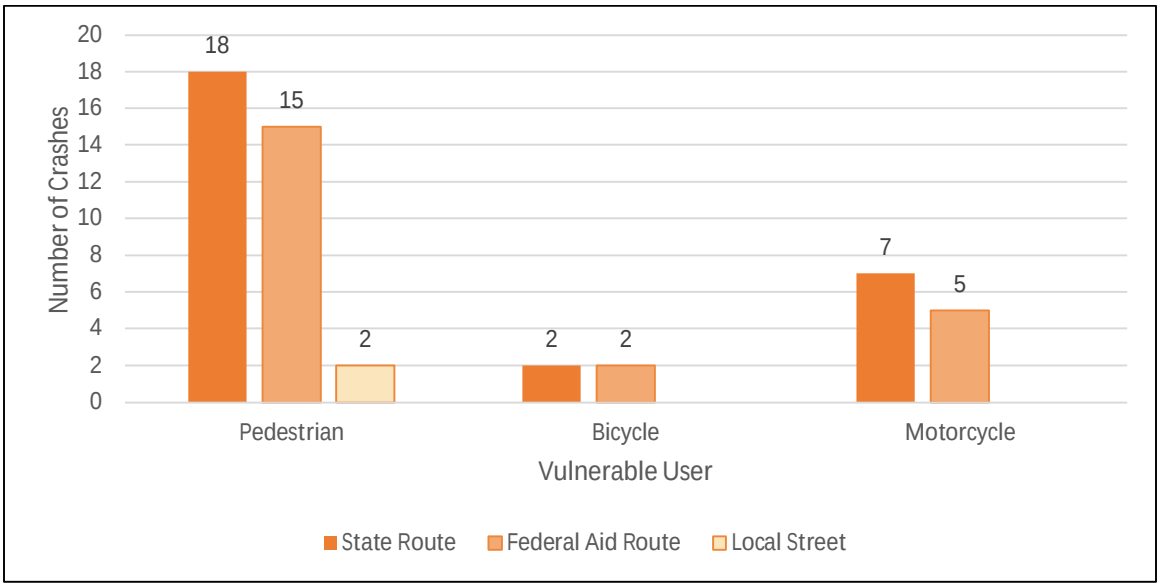


Figure 4.12 – Fatal Crashes by Vulnerable User and Roadway Ownership

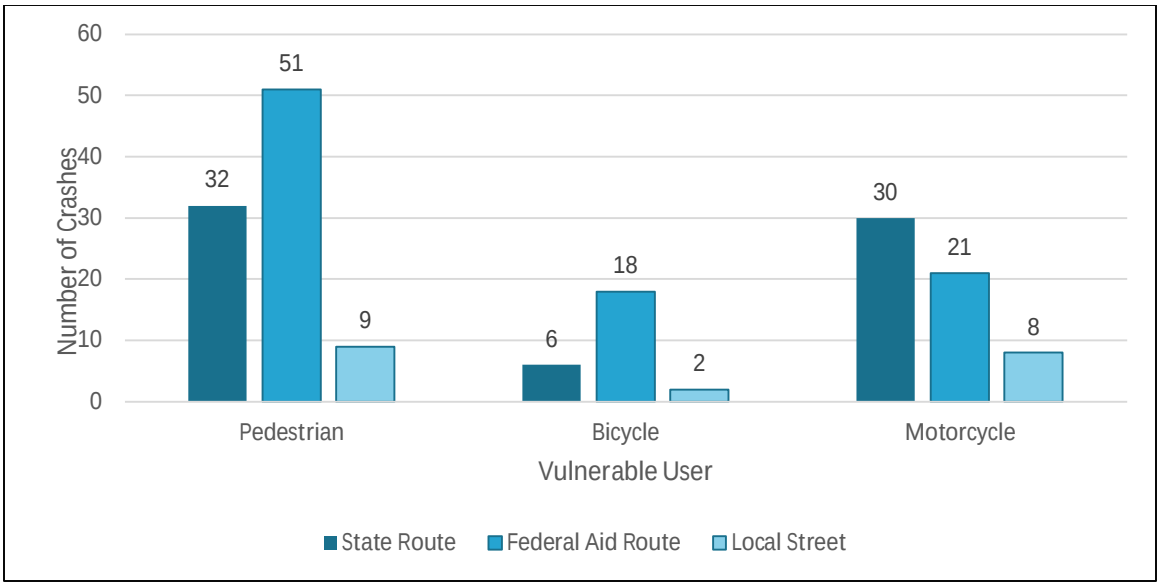


Figure 4.13 – Serious Injury Crashes by Vulnerable User and Roadway Ownership

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 Salt Lake City GFA. The data shows:

- Single vehicle crashes have the highest number of total fatal and serious injuries with 235 crashes
- 19 fatal crashes were categorized as angle crashes
- Most fatal crashes occurred on State Routes, whereas most serious injury single vehicle and angle crashes occurred on Federal Aid routes

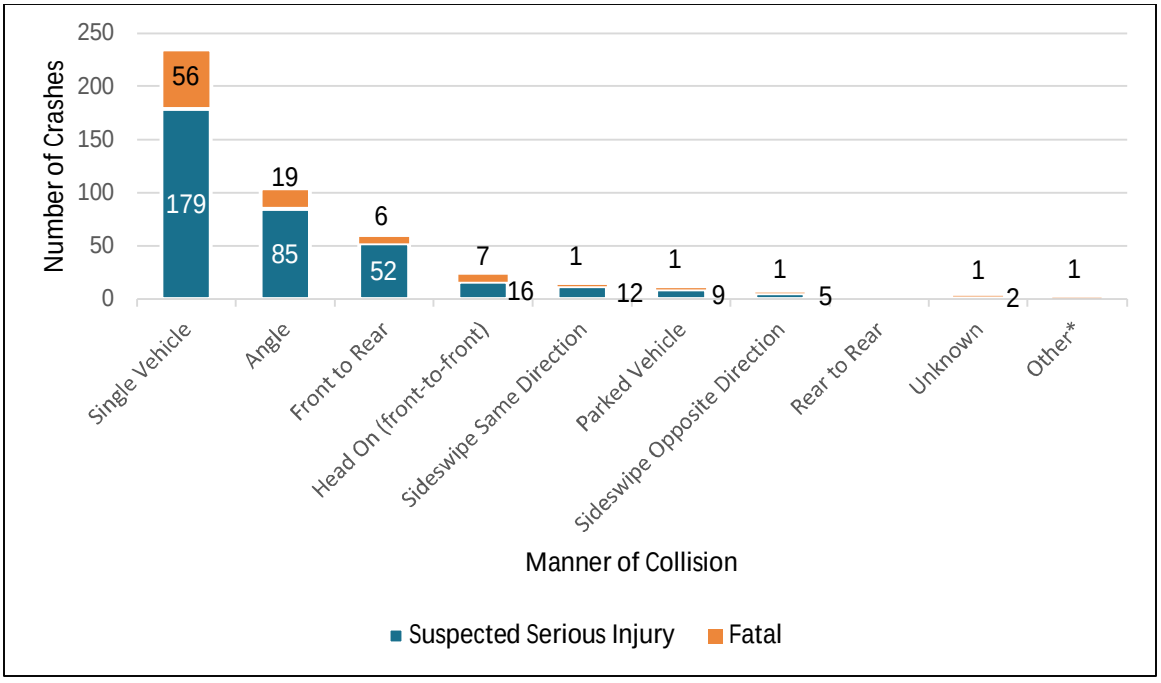


Figure 4.14 – Fatal and Serious Injury Crashes by Manner of Collision

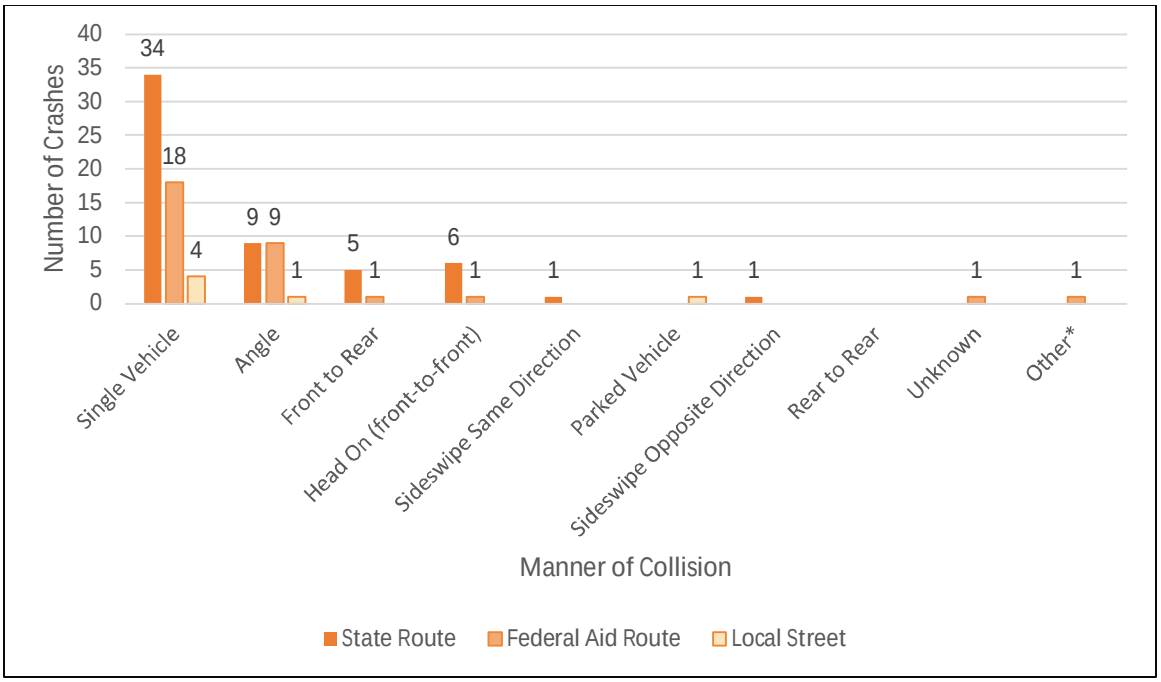


Figure 4.15 – Fatal Crashes by Manner of Collision and Roadway Ownership

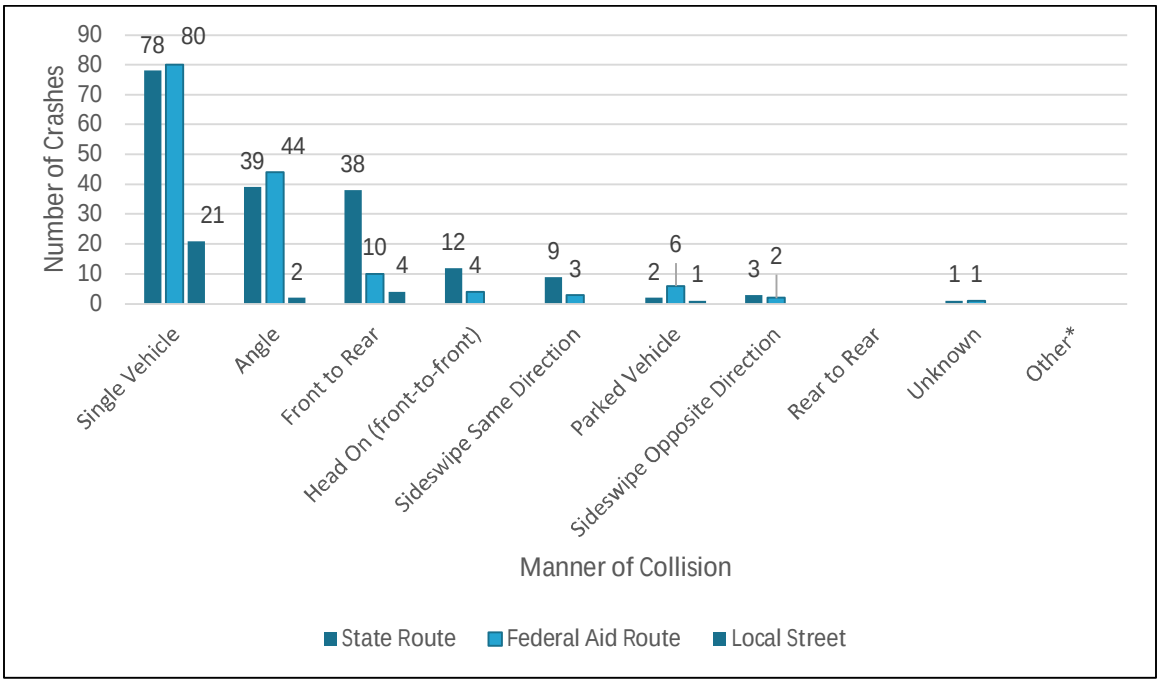


Figure 4.16 – Serious Injury Crashes by Manner of Collision and Roadway Ownership

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 Salt Lake City GFA. The data shows:

- Fatal and serious injury crashes are relatively evenly split between Intersection Involved and Not Intersection Involved
- Most Not-Intersection Involved occurred on State Routes, whereas Intersection Involved crashes was relatively evenly split between State Routes and Federal Aid routes

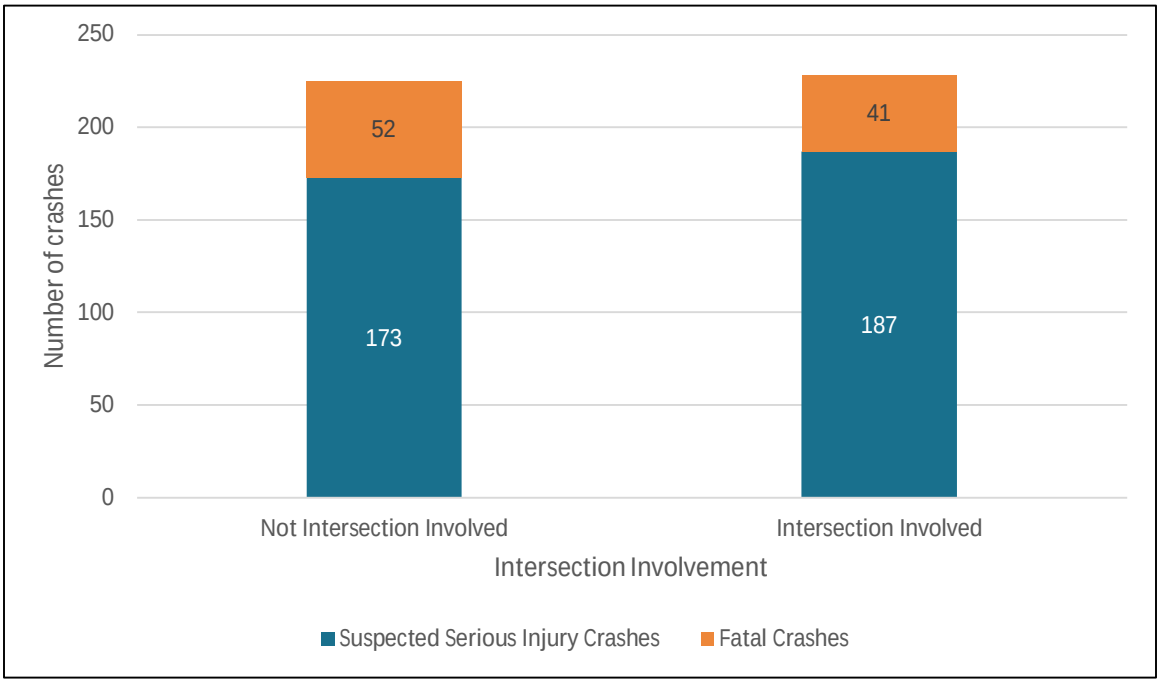


Figure 4.17 – Fatal and Serious Injury Crashes by Intersection

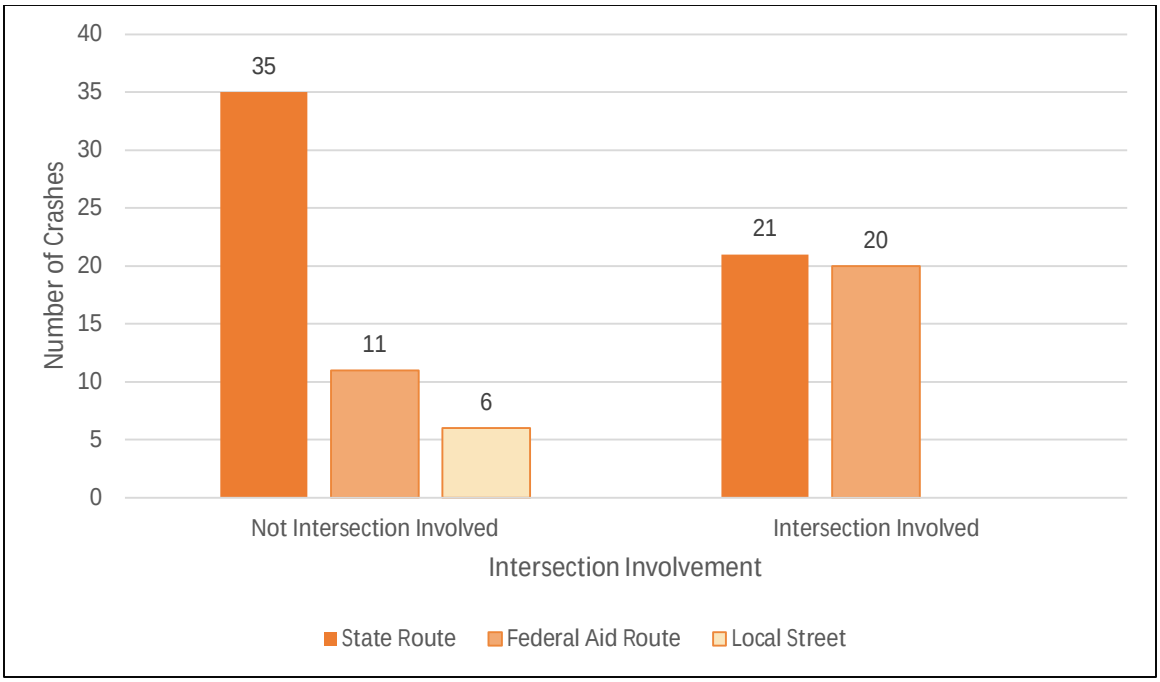


Figure 4.18 – Fatal Crashes by Intersection and Roadway Ownership

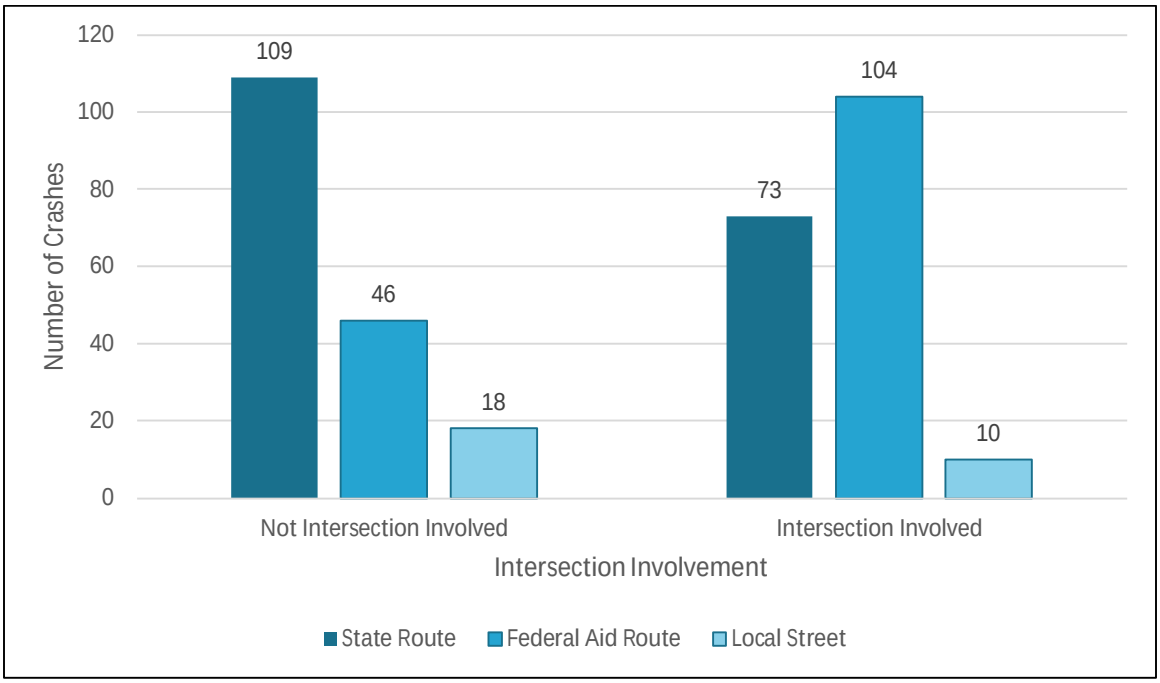


Figure 4.19 – Serious Injury Crashes by Intersection and Roadway Ownership

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 Salt Lake City GFA. The data shows:

- Most fatal crashes occurred on Principal Arterial; with fatal crashes also occurring on Minor Arterial, Major Collector, and Interstates
- A majority of the Principal Arterial fatal crashes are on State Routes; where as a majority of Minor Arterial and Major Collector crashes are on Federal Air routes

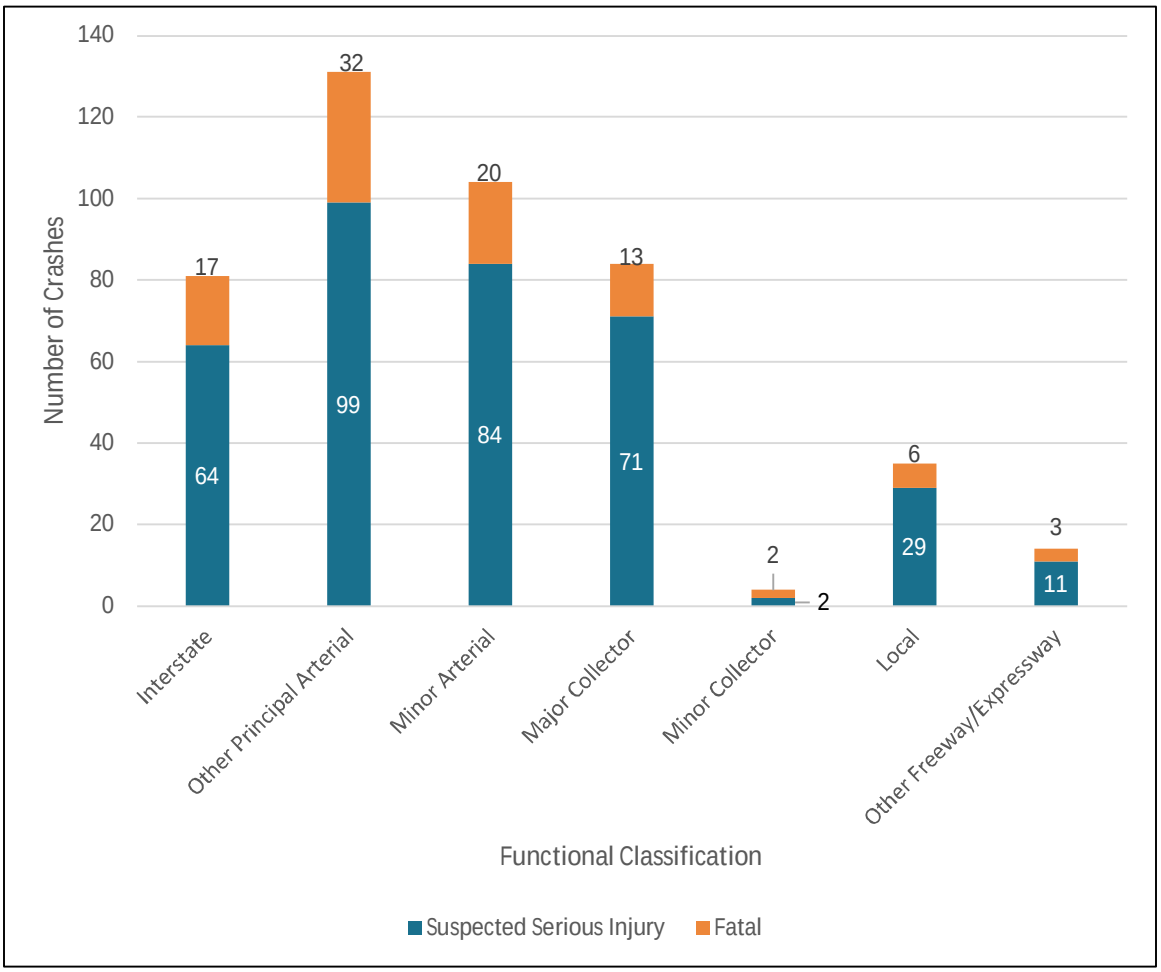


Figure 4.20 – Fatal and Serious Injury Crashes by Functional Class

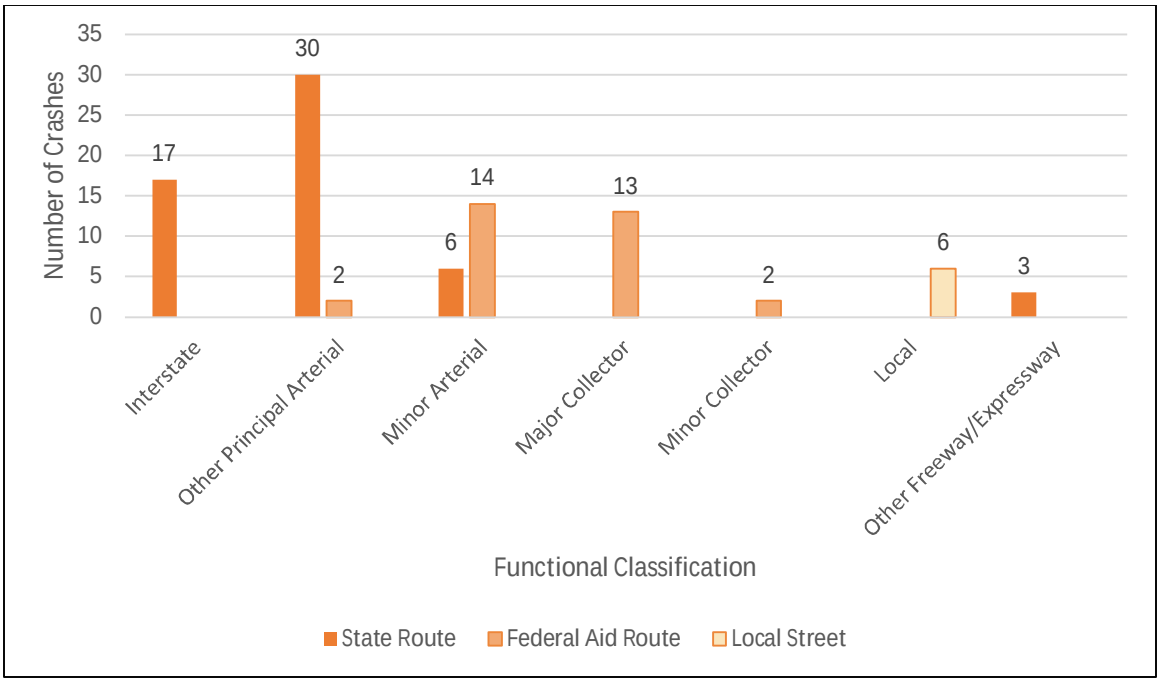


Figure 4.21 – Fatal Injury Crashes by Functional Class and Roadway Ownership

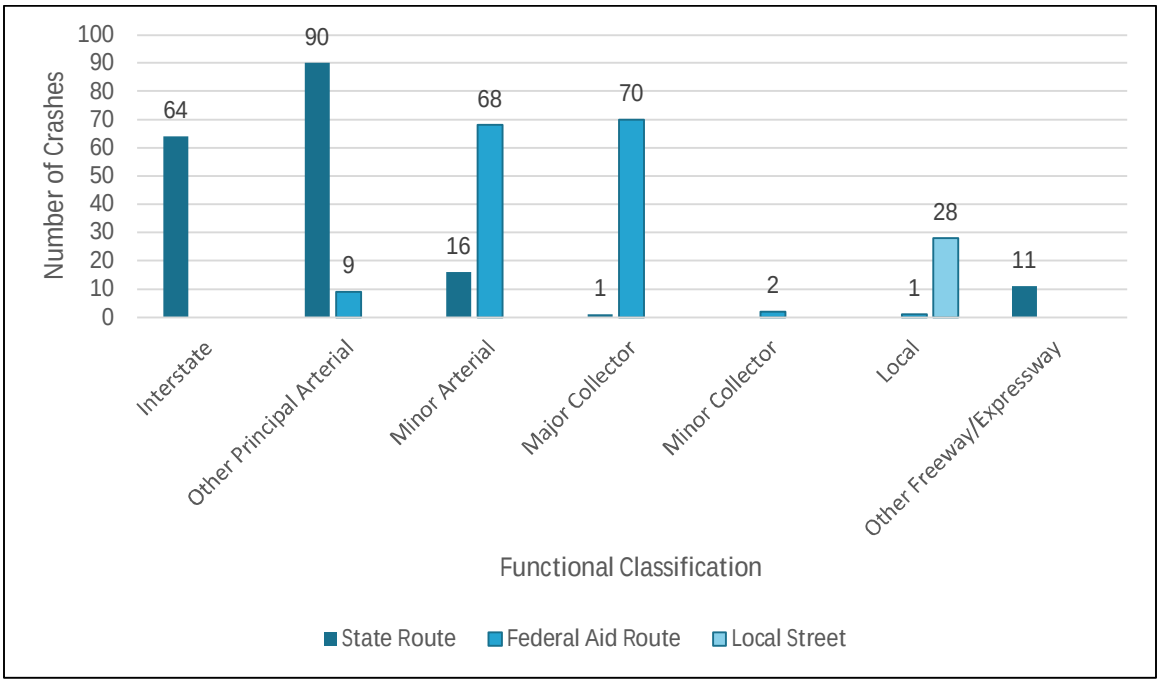


Figure 4.22 – Serious Injury Crashes by Functional Class and Roadway Ownership

4.9. Fatal and Serious Injury Crash Trees Diagrams

Fatal and serious injury crash tree diagrams were generated for the Salt Lake City GFA. These crash tree diagrams are presented in **Figure 4.25** through **Figure 4.24**.

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:

- State Routes recorded the highest number of crashes (54%) and Federal Aid routes at 40%
- There are no rural Federal Aid or Local Routes in this GFA
- Federal Aid prominent crash types are left-turn at intersection, roadway departure, and active transportation, mid-block urban, and red-light running.
- Mid-block urban includes U-turns or left-turns not at intersections
-

CRASH TYPE

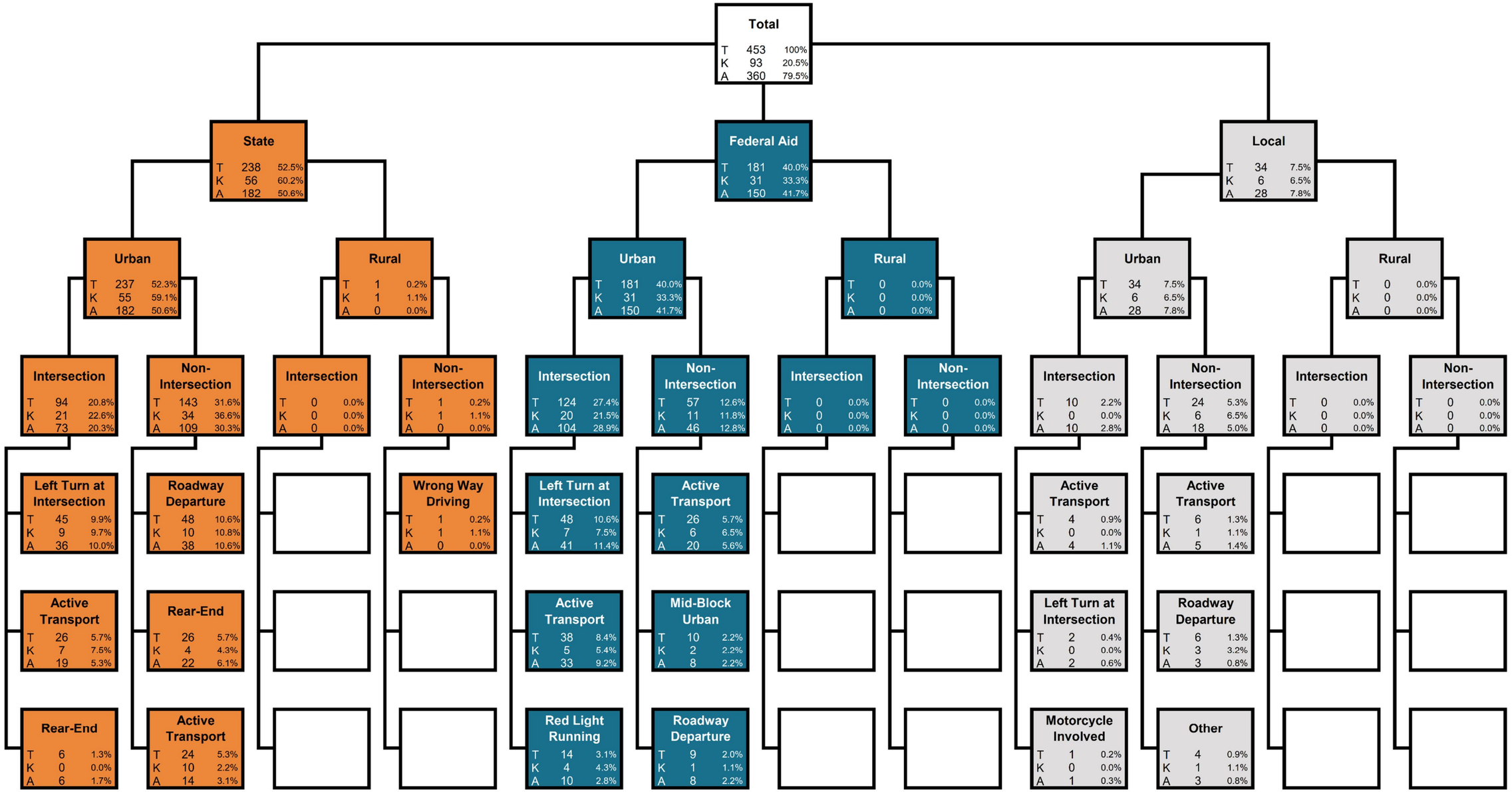


Figure 4.23 – Fatal and Serious Injury Crash Tree Diagram (Crash Type)

MANNER OF COLLISION

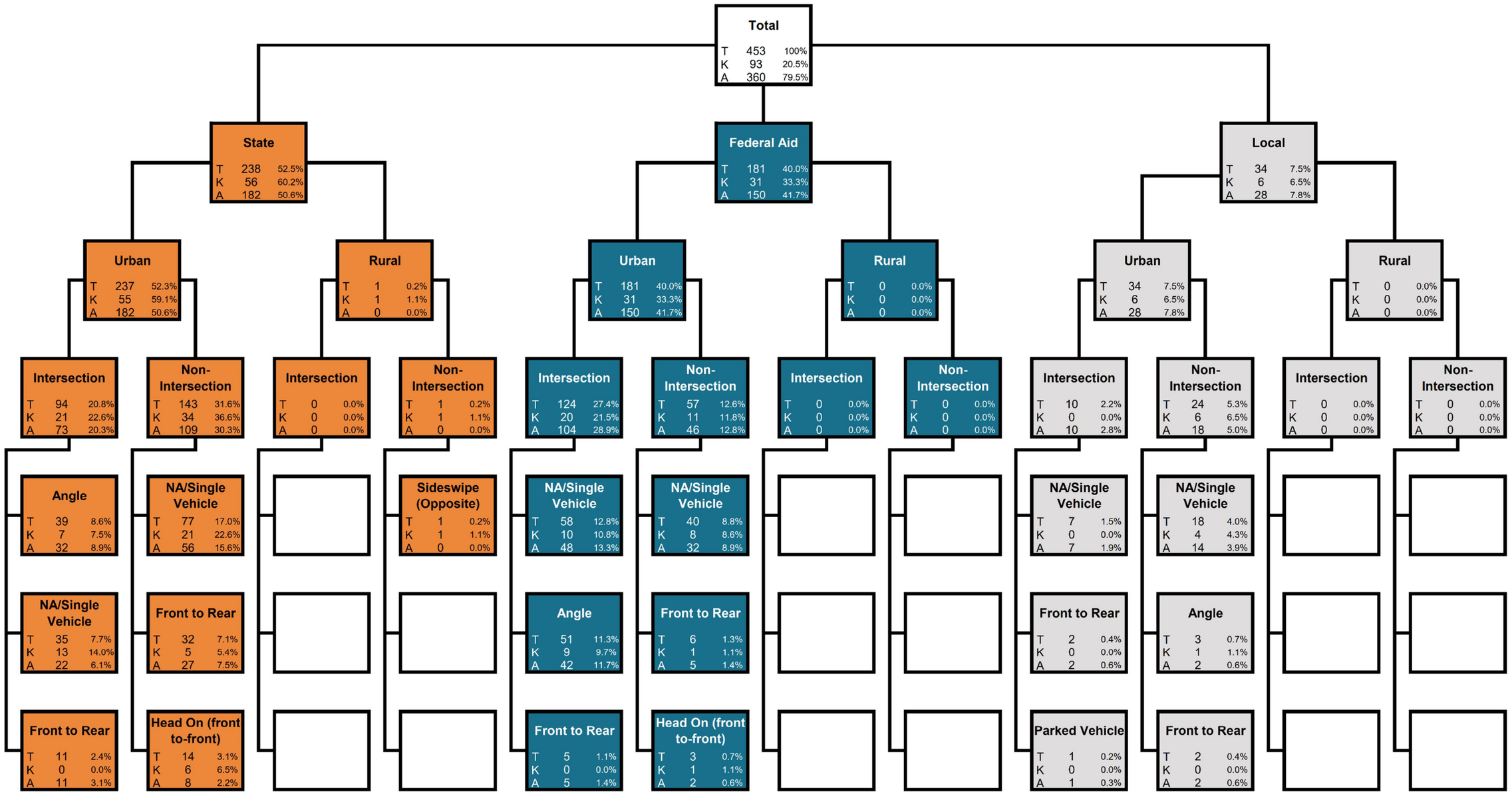


Figure 4.24 – Fatal and Serious Injury Crash Tree Diagram (Manner of Collision)

ACTIVE TRANSPORTATION

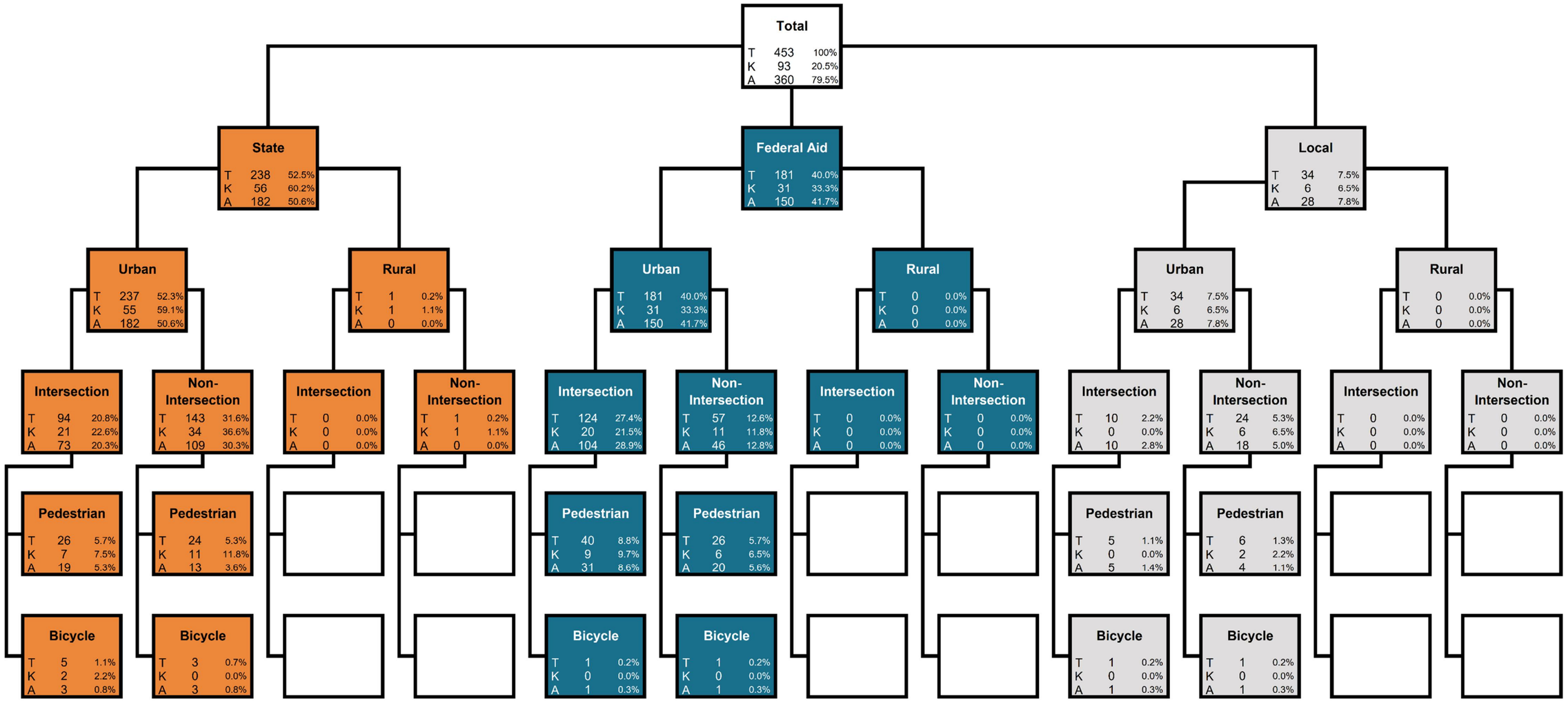


Figure 4.25 – Fatal and Serious Injury Crash Tree Diagram (Active Transportation)

5. Crash and Network Screening Analysis

A crash and network screening analysis was prepared for the Salt Lake City 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 Salt Lake City 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.

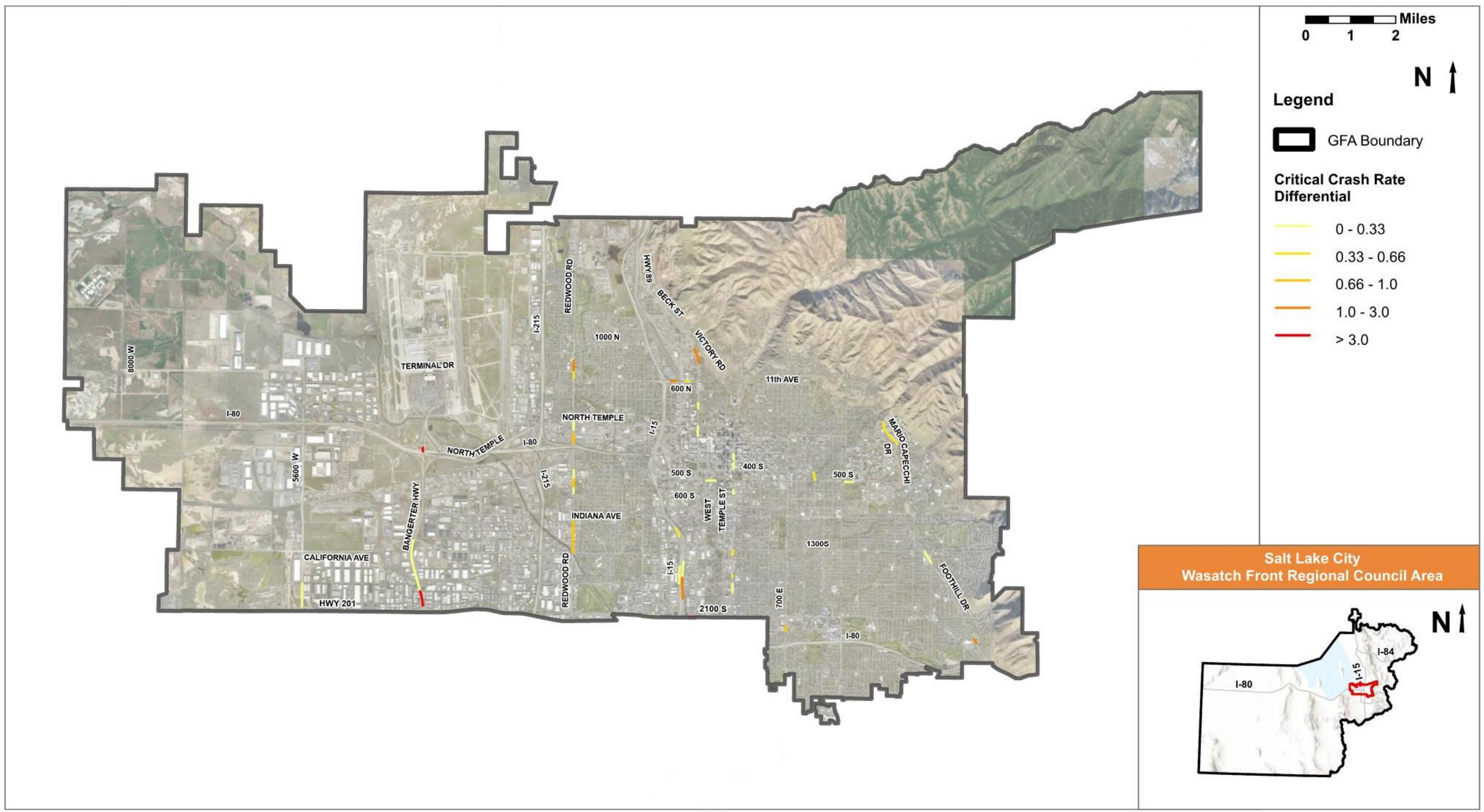


Figure 5.1 – CCR Differential – Segments (State Routes)

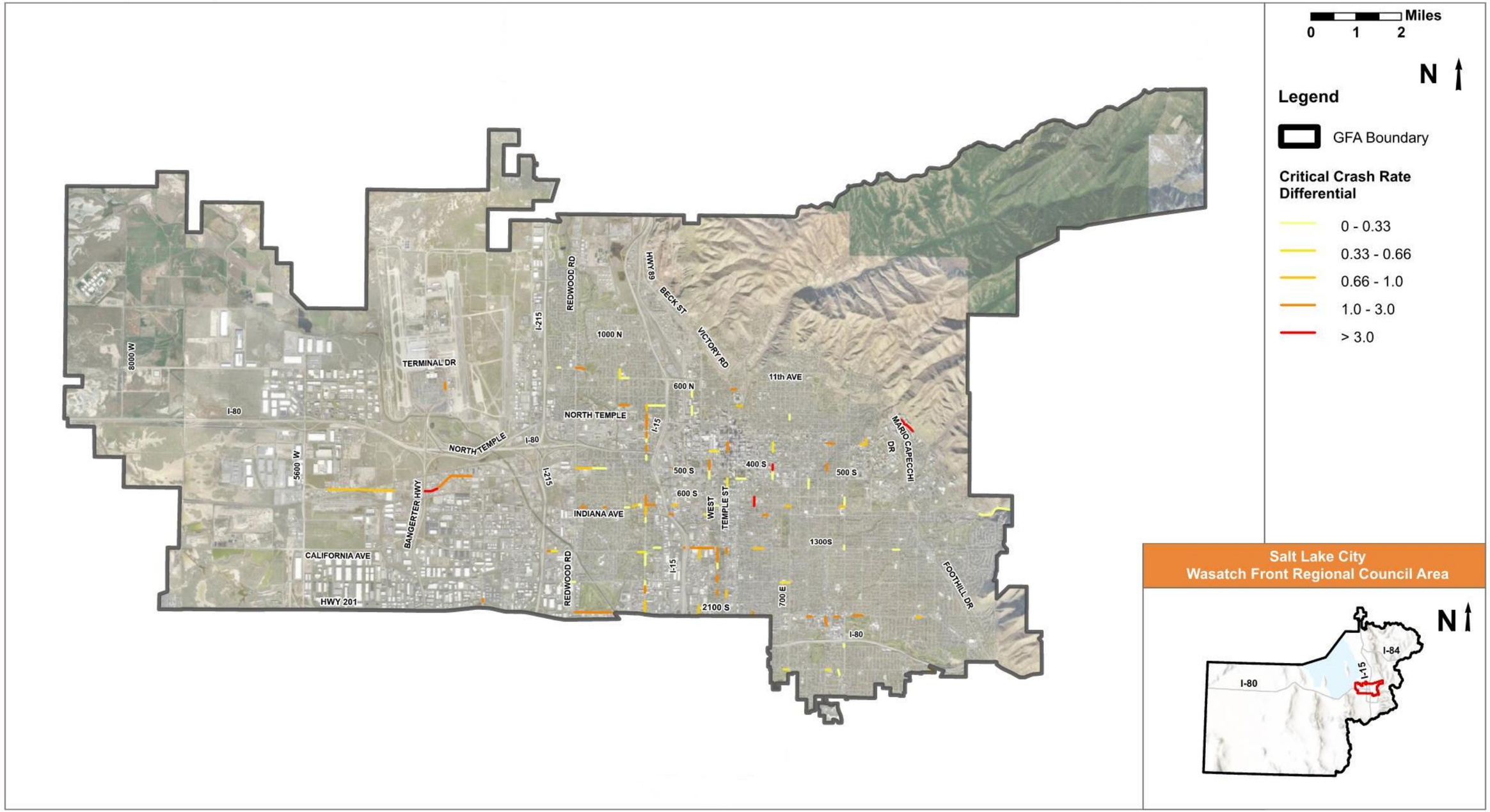


Figure 5.2 – CCR Differential – Segments (Federal Aid Routes)

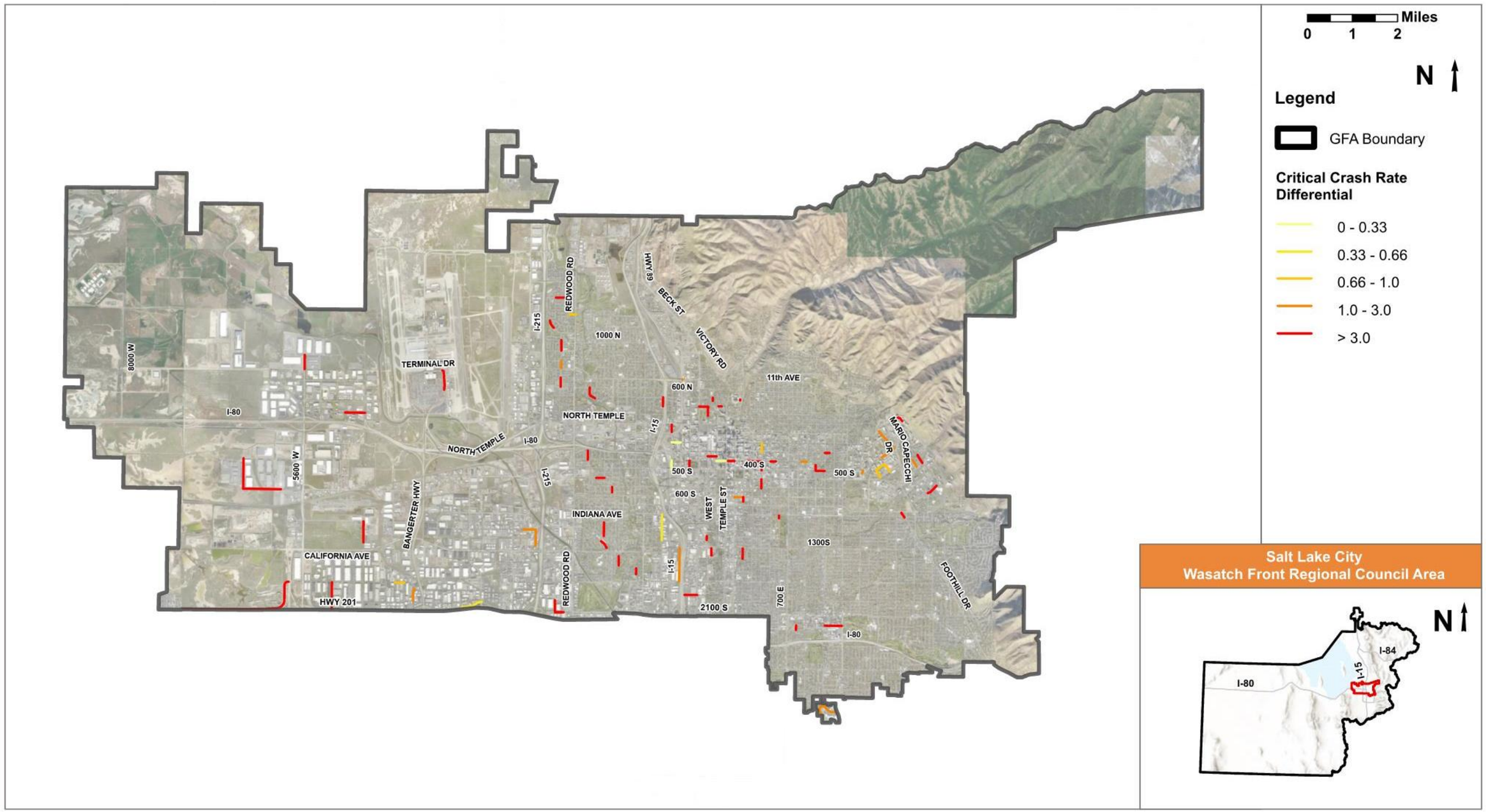


Figure 5.3 – CCR Differential – Segments (Local Routes)

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																								
SR-154	2100 S to 1820 S	Other Principal Arterial	Salt Lake City	23	20.0	138	0	0	1	9	13	0	17	0	0	0	0	0	0	6	0	0	0	0
SR-154	SB Ramp	Other Principal Arterial	Salt Lake City	6	4.2	99	0	1	0	0	5	0	0	0	5	0	0	0	0	1	0	0	0	1
2100 S (SR-201)	400 W to 300 W	Minor Arterial	Salt Lake City	14	3.5	160	0	1	2	1	10	3	3	0	2	0	0	0	0	6	0	1	1	1
600 N (SR-268)	I-15 to Frontage Rd	Other Principal Arterial	Salt Lake City	9	2.3	40	0	0	0	3	6	0	4	0	1	1	0	0	0	3	0	0	0	0
I-15 NB Ramp	1700 S to I-15	Other Principal Arterial	Salt Lake City	10	1.8	908	1	0	0	1	8	0	2	1	5	0	0	0	0	2	0	0	0	0
Foothill Dr (SR186)	Stingham Ave and Thunderbird Dr	Other Principal Arterial	Salt Lake City	18	1.4	71	0	0	2	1	15	1	11	0	3	1	0	0	1	1	0	0	1	0
I-15 NB Ramp	I-15 to 1700 S	Other Principal Arterial	Salt Lake City	21	1.4	94	0	0	1	5	15	0	8	0	12	0	0	0	0	1	0	0	0	0
Beck St (US-89)	800 N to 400 N	Other Principal Arterial	Salt Lake City	12	1.2	995	1	0	4	1	6	1	0	0	10	0	0	0	0	1	0	2	0	2
Redwood Rd (SR-68)	700 N to 800 N	Other Principal Arterial	Salt Lake City	13	1.1	55	0	0	1	2	10	6	3	0	0	1	0	0	0	2	1	0	0	0
Redwood Rd (SR-68)	Paxton Ave to Dalton Ave	Other Principal Arterial	Salt Lake City	15	1.0	99	0	0	2	4	9	6	3	1	2	1	0	0	0	1	1	0	0	0
Federal Aid Routes																								
300 E	800 S to 700 S	Major Collector	Salt Lake City	7	5.3	92	0	0	3	2	2	3	0	0	2	1	0	0	0	1	0	1	0	0
Medical East Dr	Medical Dr N to 60 S	Major Collector	Salt Lake City	5	4.6	5	0	0	0	0	5	1	0	0	0	3	0	1	0	0	0	0	0	0
500 E	400 S to 300 S	Major Collector	Salt Lake City	4	3.9	35	0	0	0	3	1	1	1	0	0	1	0	0	0	1	0	0	0	0
700 S	Bangerter Hwy to Iron Rose Pl	Major Collector	Salt Lake City	4	3.8	56	0	0	1	3	0	0	0	0	2	2	0	0	0	0	0	0	0	1
500 N	Columbus St to De Soto St	Major Collector	Salt Lake City	3	2.8	3	0	0	0	0	3	0	0	0	0	3	0	0	0	0	0	0	0	0
900 W	Folsom Ave to South Temple	Major Collector	Salt Lake City	9	2.8	218	0	1	4	3	1	0	6	0	2	0	0	0	0	1	0	0	1	0
West Temple St	1400 S to Albermarle Ave	Major Collector	Salt Lake City	3	2.7	24	0	0	0	2	1	0	0	1	0	2	0	0	0	0	0	0	0	0
300 E	2100 S to Redondo Ave	Major Collector	Salt Lake City	3	2.6	24	0	0	1	0	2	1	0	0	1	1	0	0	0	0	0	0	1	0
Main St	Harrison Ave to 1300 S	Major Collector	Salt Lake City	8	2.4	18	0	0	0	1	7	2	2	0	1	3	0	0	0	0	0	0	0	0
Highland Dr	Wilmington Ave to 2100 S	Major Collector	Salt Lake City	13	2.4	44	0	0	0	3	10	2	2	0	1	5	0	0	0	2	1	1	0	1
Local Streets																								
Stringham Ave	Parleys Way to Foothill Dr	Local	Salt Lake City	3	4904.5	3	0	0	0	0	3	0	0	0	0	2	0	0	0	1	0	0	0	0
500 N	Walnut Dr to 1465 W	Local	Salt Lake City	5	3840.5	903	1	0	0	1	3	0	0	0	1	4	0	0	0	0	0	1	0	0
300 N	Vine St to Center St	Local	Salt Lake City	3	1052.3	24	0	0	1	0	2	0	0	0	2	1	0	0	0	0	0	1	0	0
400 E	600 S to 500 S	Local	Salt Lake City	3	484.1	3	0	0	0	0	3	2	0	0	0	1	0	0	0	0	0	0	0	0
300 S	300 E to 400 E	Local	Salt Lake City	4	257.1	4	0	0	0	0	4	1	0	0	1	2	0	0	0	0	0	0	0	0
400 E	400 S to 300 S	Local	Salt Lake City	5	204.6	26	0	0	0	2	3	0	1	0	0	1	0	0	0	3	0	0	0	1
300 S	Denver St to 500 E	Local	Salt Lake City	3	157.8	96	0	1	0	0	2	0	0	0	1	2	0	0	0	0	0	0	0	1
600 E	Park St to 900 S	Local	Salt Lake City	3	129.0	24	0	0	0	2	1	1	0	0	1	0	0	0	0	1	0	1	0	0
Connor Rd	Pollock Rd to Stover St	Local	Salt Lake City	7	127.2	7	0	0	0	0	7	2	0	0	2	3	0	0	0	0	0	0	0	0
Concord St	Arapahoe Ave to 600 S	Local	Salt Lake City	3	90.0	117	0	1	1	0	1	0	0	0	1	2	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

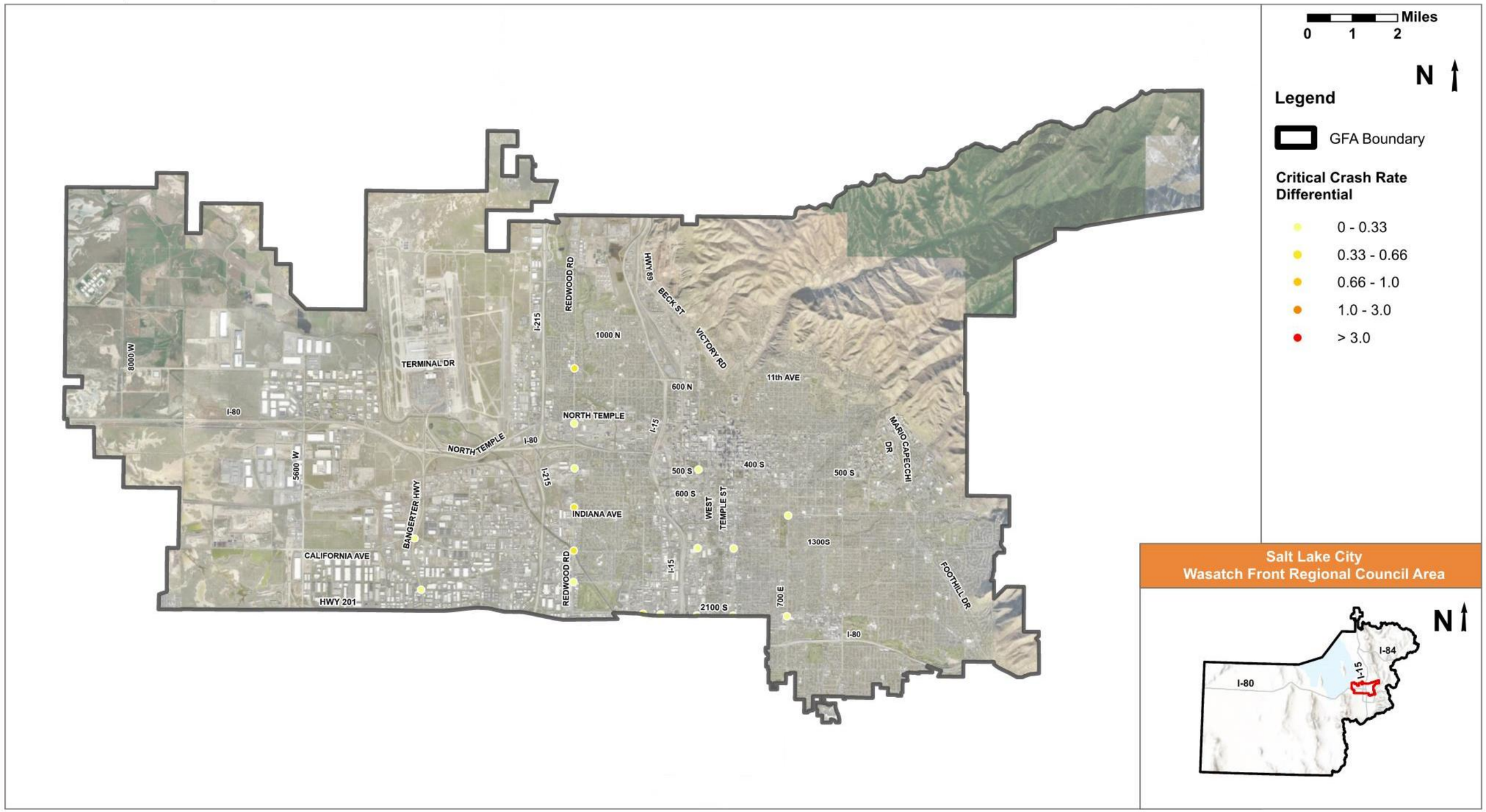


Figure 5.4 – CCR Differential – Intersections (Signalized)

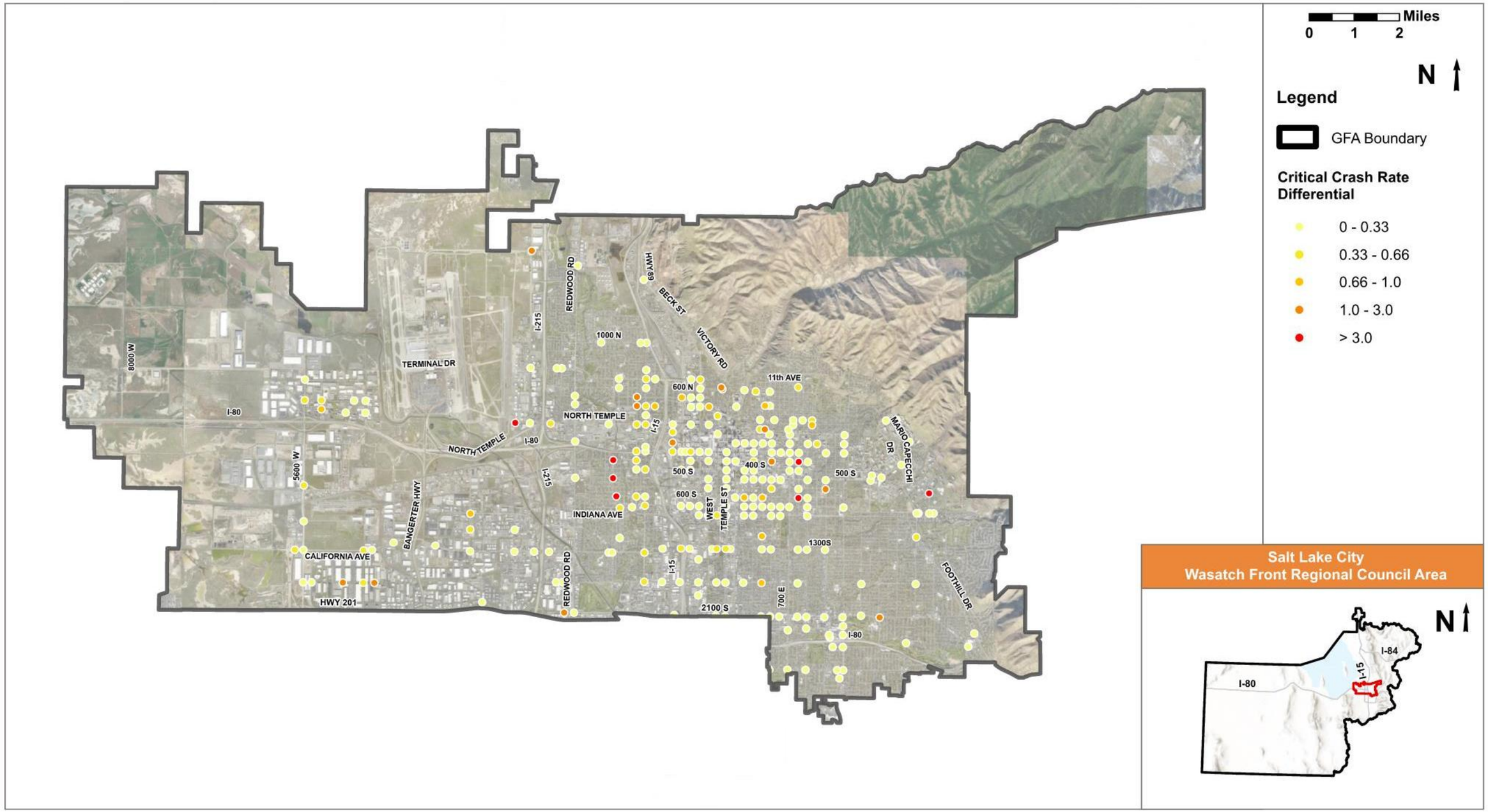


Figure 5.5 – CCR Differential – Intersections (Unsignalized)

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																						
400 E & 300 S	Salt Lake City	4	20.6	67	0	0	2	2	0	3	0	0	0	0	0	0	0	1	0	0	0	0
Redwood Rd & California Ave	Salt Lake City	93	0.6	2624	2	1	19	25	46	66	14	5	4	1	0	0	1	2	0	0	1	1
Redwood Rd & 700 N	Salt Lake City	68	0.4	881	0	4	13	16	35	40	12	3	8	0	0	0	1	3	1	4	2	0
Redwood Rd & Indiana Ave	Salt Lake City	54	0.4	598	0	2	12	10	30	26	10	3	10	1	0	0	0	4	0	2	2	1
900 W & 2100 S	Salt Lake City	40	0.3	1276	1	0	12	9	18	15	11	1	5	0	1	0	0	5	2	0	0	2
State St & 2100 S	Salt Lake City	84	0.3	1722	1	3	12	21	47	54	16	5	7	0	0	0	0	2	0	1	3	1
Redwood Rd & 400 S	Salt Lake City	54	0.3	1581	1	2	15	13	23	28	19	0	4	0	0	0	0	3	0	1	2	1
Redwood Rd & 1700 S	Salt Lake City	69	0.3	884	0	3	15	21	30	47	14	1	7	0	0	0	0	0	0	2	3	2
300 W & 2100 S	Salt Lake City	50	0.2	551	0	2	9	12	27	17	20	0	4	0	0	0	1	8	0	1	1	0
Redwood Rd & North Temple St	Salt Lake City	55	0.2	2529	2	3	13	14	23	17	25	0	8	1	1	0	0	2	1	2	4	0
Unsignalized Intersections																						
7200 W & 2100 S	Salt Lake City	5	15.1	26	0	0	0	2	3	2	3	0	0	0	0	0	0	0	0	0	0	0
800 E & 300 S	Salt Lake City	12	13.2	95	0	0	1	6	5	11	1	0	0	0	0	0	0	0	0	0	0	0
800 E & 700 S	Salt Lake City	5	6.4	37	0	0	1	1	3	5	0	0	0	0	0	0	0	0	0	0	0	1
1200 W & 700 S	Salt Lake City	6	6.1	48	0	0	1	2	3	3	0	0	1	2	0	0	0	0	0	0	1	0
Concord St & 500 S	Salt Lake City	4	5.3	56	0	0	1	3	0	2	0	0	2	0	0	0	0	0	0	0	2	0
Arapeen Dr & Arapeen Dr	Salt Lake City	3	5.0	13	0	0	0	1	2	1	0	0	2	0	0	0	0	0	0	0	0	0
2400 W & North Temple St	Salt Lake City	10	4.9	73	0	0	2	2	6	4	5	0	0	0	0	0	0	1	0	0	0	0
Concord St & 300 S	Salt Lake City	3	3.9	3	0	0	0	0	3	1	0	0	0	2	0	0	0	0	0	0	0	2
4650 W & 1730 S	Salt Lake City	3	2.7	24	0	0	1	0	2	3	0	0	0	0	0	0	0	0	0	0	0	0
500 E & 300 S	Salt Lake City	15	2.0	131	0	0	4	3	8	8	3	0	3	1	0	0	0	0	0	2	1	1

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

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 Salt Lake City 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 Segments (Federal Aid Routes)

Area Type	Road Segment	Extents	Risk Score
Urban	West Temple	400 South to North Temple	27
Urban	North Temple	2400 West to State Street	25 to 27
Urban	South Temple	800 East to Virginia Street	26.7
Urban	700 North / 600 North	I-80 to I-15	26.2 to 26.6
Urban	100 South	West Temple to North Campus Drive	23.8 to 25
Urban	200 South	Orange Street to 900 East	23 to 25
Urban	South Temple	400 West to State Street	24.8
Urban	2200 West	North Temple to 470 North	24.6
Urban	400 West	200 South to 900 North	23 to 24.6
Urban	300 North / East Capitol Boulevard / 500 North	State Street to Columbus Street	24.2
Rural	Terminal Drive*	Crossbar Road to Crossbar Road	27.1
Rural	2100 South	State Street to Foothill Drive	21.7 to 23.9
Rural	1100 West / Warm Springs Road	2180 North to North GFA Extents	23.1
Rural	5600 West	Amelia Earhart Drive to Harold Gatty Drive	23
Rural	Parleys Way	I-18 to 2100 South	22.8
Rural	Emigration Canyon Road	Cretwood Drive to East GFA Extents	22.8
Rural	900 West	South GFA Extents to 700 South	22.6
Rural	1700 South	Riverside Drive to 200 East	22.1
Rural	1400 South	7200 West to 5600 West	21.8
Rural	1300 South / California Avenue	1100 West to 200 East	21.8

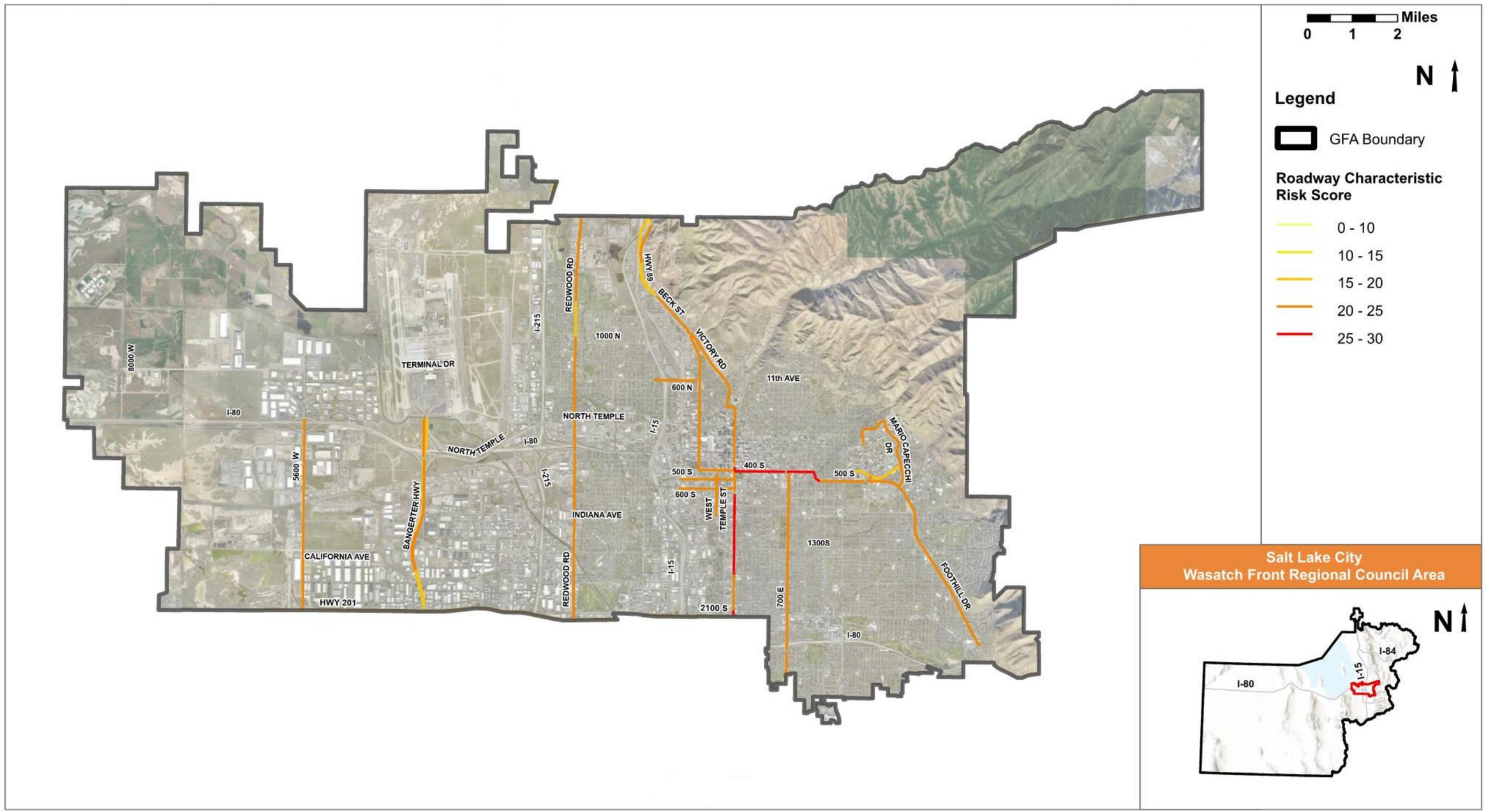


Figure 6.1 – Crash Profile Risk Assessment Results (State Routes)

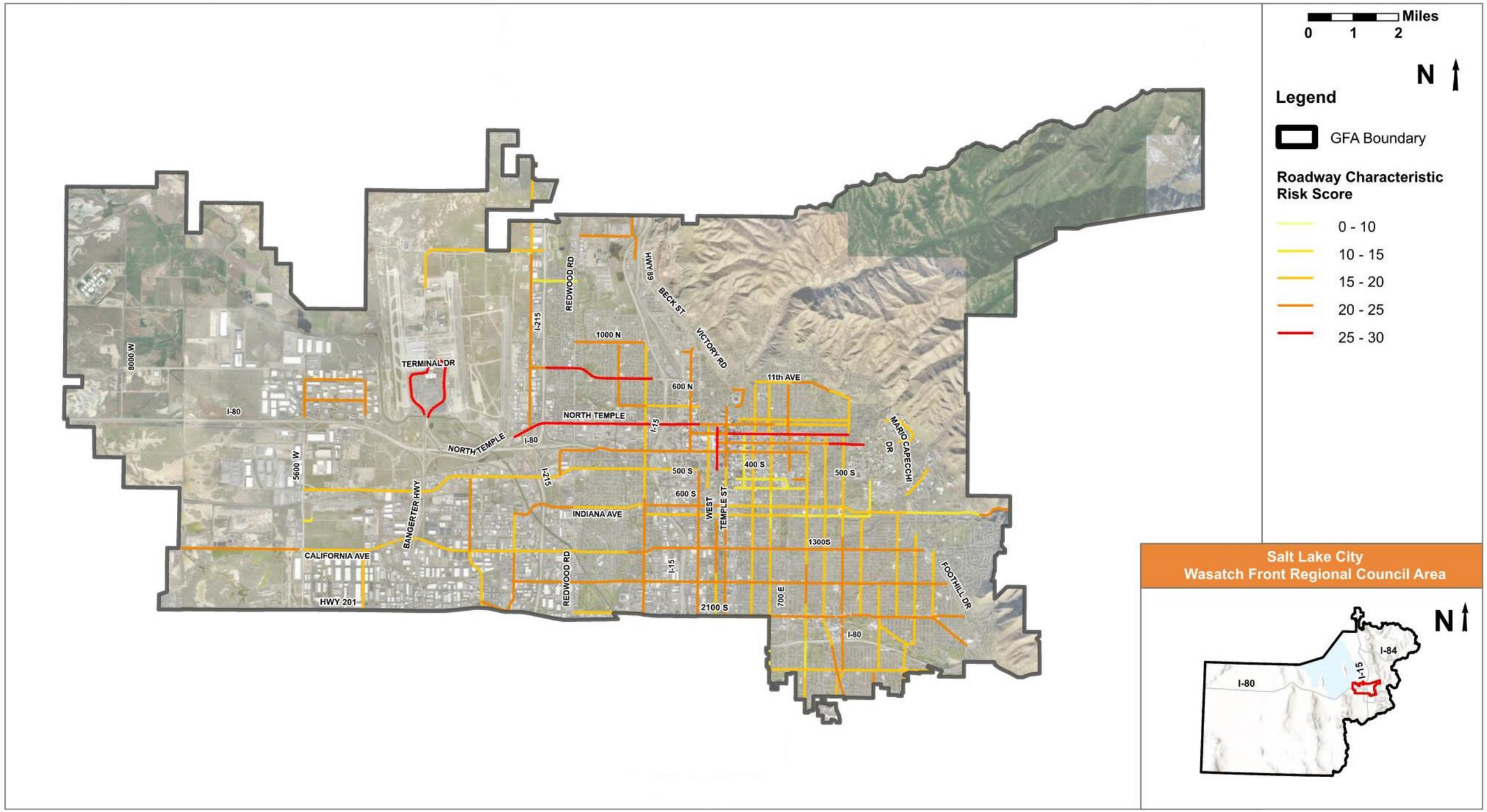


Figure 6.2 – Crash Profile Risk Assessment Results (Federal Aid Routes)

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 Salt Lake City 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
Amelia Earhart Drive	5600 West to Wright Brothers Drive	X	X	X
5600 West	Amelia Earhart Drive to Harold Gatty Drive		X	X
5600 West	I-80 to Amelia Earhart Drive	X	X	X
Wright Brothers Drive	Amelia Earhart Drive to Harold Gatty Drive		X	
Wright Brothers Drive	Douglas Corrigan Way to Amelia Earhart Drive	X	X	X
Harold Gatty Drive	5600 West to Wright Brothers Drive		X	
1400 South	West GFA Extents to 5500 West		X	
Terminal Drive	Crossbar Road to Crossbar Road	X	X	X
4000 West / 2100 North	SLC Airport to I-215		X	X
2200 West	North Temple to North GFA Extents		X	
2300 North	Redwood Road to 1100 West	X	X	X
Warm Springs Road	2180 North to North GFA Extents		X	X
1000 North	Redwood Road to 900 West	X		X
700 North / 600 North	2200 West to 1200 West		X	X
700 North / 600 North	1200 West to I-15		X	
900 West	700 South to 1000 North		X	
900 West	South GFA Extents to 700 South	X	X	X
Indiana Avenue	Pioneer Road to Redwood Road		X	
Gladiola Street	California Avenue to 500 South		X	
500 South / 400 South	2650 West to 900 West		X	X
700 South / 500 South	4050 West to 2650 West		X	
300 North / East Capitol Boulevard / 500 North	State Street to Columbus Street	X	X	
2100 South	Redwood Road to 900 West		X	
2100 South	3230 West to Pioneer Road		X	
Pioneer Road	3230 West to California Avenue		X	
1700 South	Pioneer Road to Riverside Drive		X	

Road Segment	Extents	Vehicle Risk	Pedestrian Risk	Bicycle Risk
1700 South	Riverside Drive to Edison Drive	X	X	
1700 South	Edison Drive to Foothill Drive	X	X	X
1400 South	West GFA Extents to Bangerter Highway		X	
California Avenue	Bangerter Highway to Pioneer Road		X	X
California Avenue	Pioneer Road to 1100 West		X	
California Avenue / 1300 South	1100 West to Foothill Drive	X	X	X
Medical Drive South	Mario Capecchi Drive to Medical Drive North	X	X	
Wakara Way	500 South to Chipetta Way		X	
400 South	1300 East to University Street		X	
I Street	South Temple to 11th Avenue	X		
3rd Avenue	I Street to Virginia Street	X		
400 West	200 South to Panther Way		X	
North Temple	2400 West to 1000 West		X	X
North Temple	1000 West to I-15	X	X	X
North Temple	I-15 to State Street		X	
200 West	North Temple to 600 South		X	
West Temple	North Temple to 400 S		X	X
South Temple	400 West to University Street		X	X
300 East	South Temple to 100 South		X	
200 East	South Temple to 600 South		X	
100 South	West Temple to 800 East		X	
200 South	West Temple to 900 East		X	
700 East	South Temple to 600 South	X	X	X
400 South	700 West to 300 West		X	
500 South	State Street to 700 E		X	
600 South	State Street to 700 East		X	
900 East	South Temple to Elgin Avenue	X	X	X
1100 East	South Temple to 3000 South	X	X	
1300 East	South Temple to Elgin Avenue	X	X	X
100 South	1100 East to North Campus Drive		X	
Guardsman Way	500 South to Sunnyside Avenue		X	
800 South, Sunnyside Avenue,	900 West to East GFA Extents		X	

Road Segment	Extents	Vehicle Risk	Pedestrian Risk	Bicycle Risk
1500 East	900 South to 2100 South	X	X	
2100 East	Foothill Drive to Parkway Avenue	X	X	
2000 East	Parkway Avenue to Atkin Avenue	X	X	X
Parleys Canyon Boulevard	Ram Boulevard to Parkway Avenue	X		
Parleys Way	2100 South to Wilshire Circle	X	X	X
2700 South	500 East to 2300 East	X	X	X
Imperial Street	2700 South to Atkin Avenue	X	X	X
2100 South	State Street to Foothill Drive	X	X	X
300 West	400 South to 2100 South		X	X
West Temple	900 South to 2100 South	X		

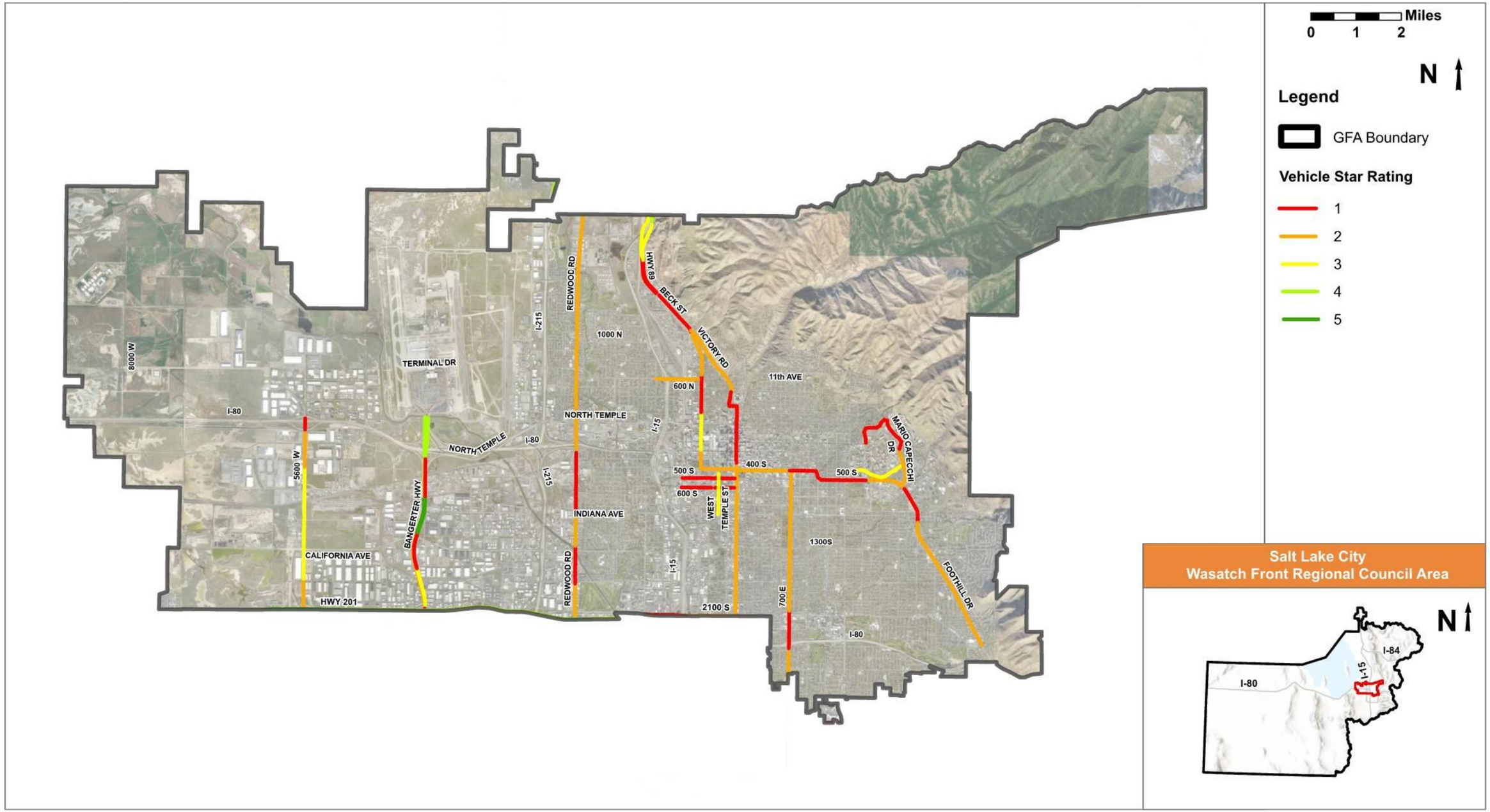


Figure 6.3 – Vehicle Star Rating (State Routes)

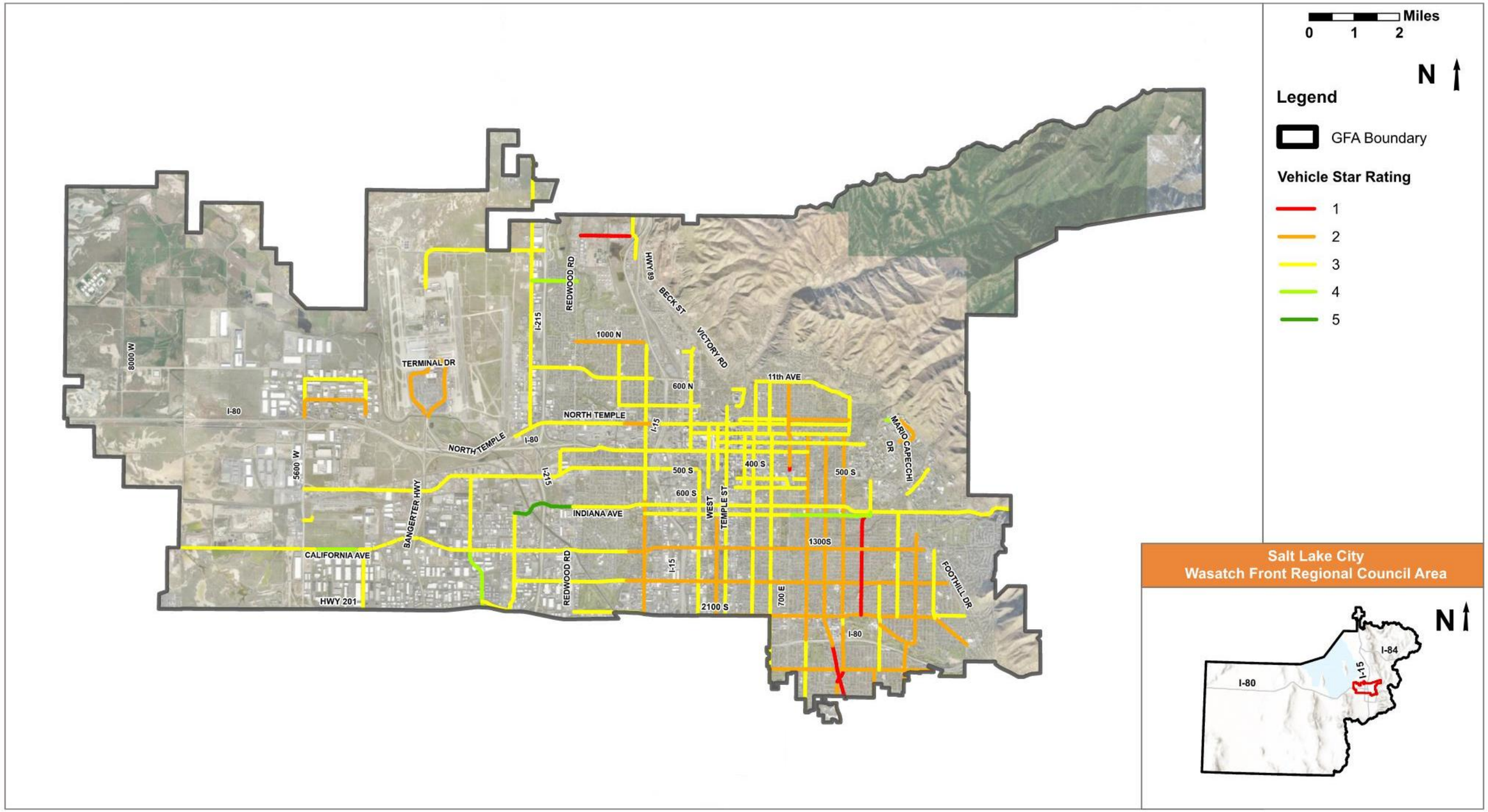


Figure 6.4 – Vehicle Star Rating (Federal Aid Routes)

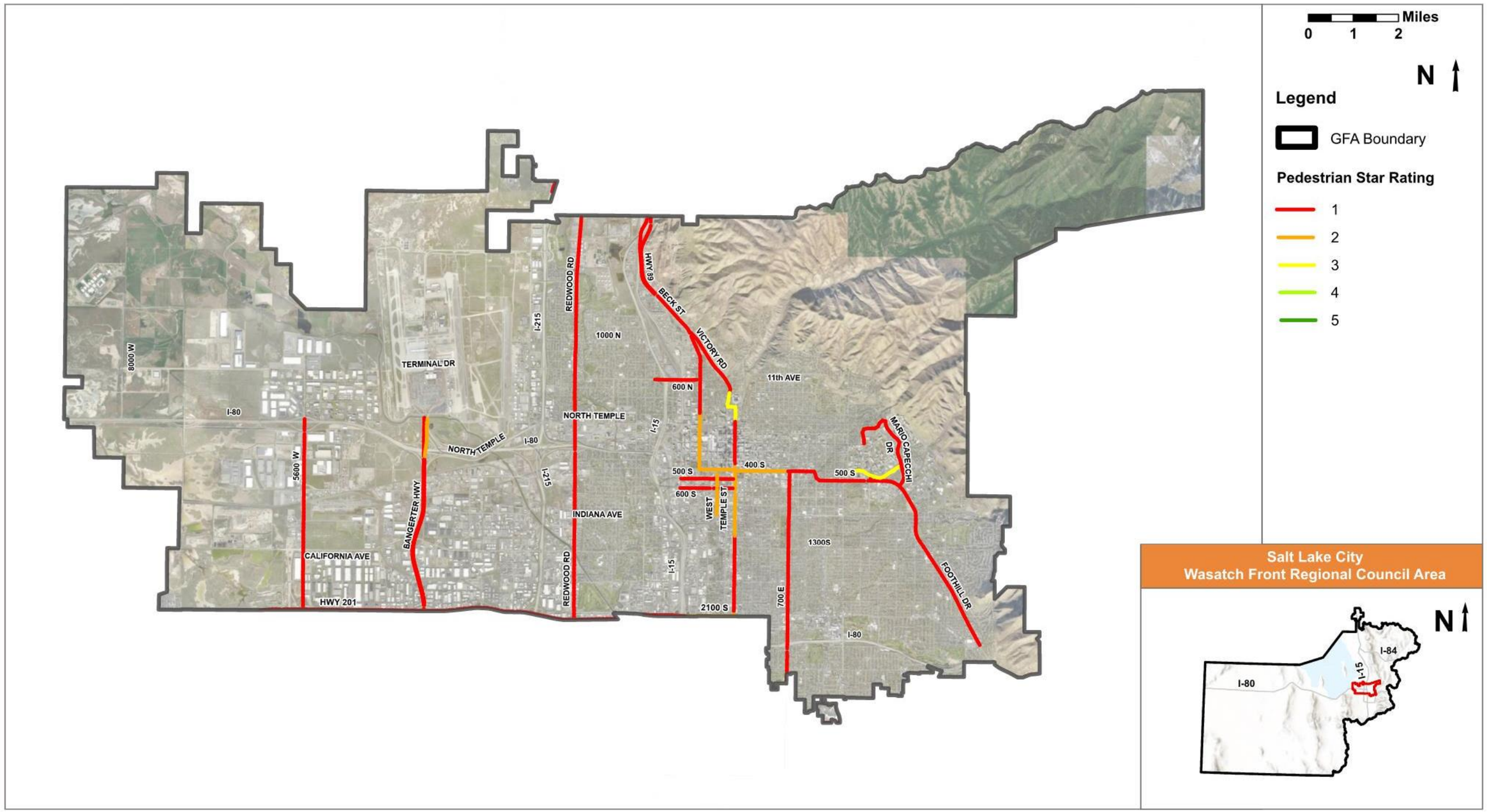


Figure 6.5 – Pedestrian Star Rating (State Routes)

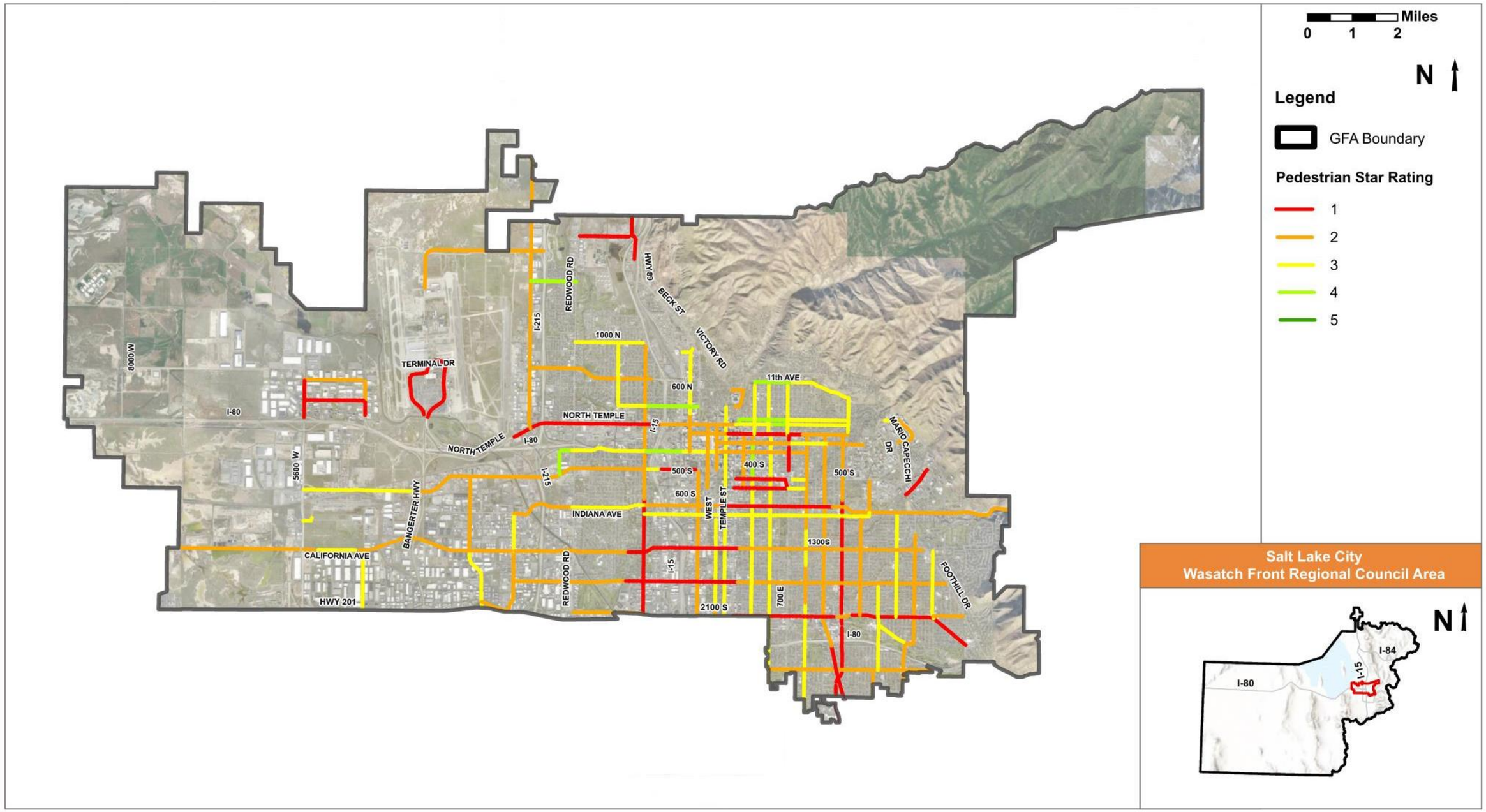


Figure 6.6 – Pedestrian Star Rating (Federal Aid Routes)

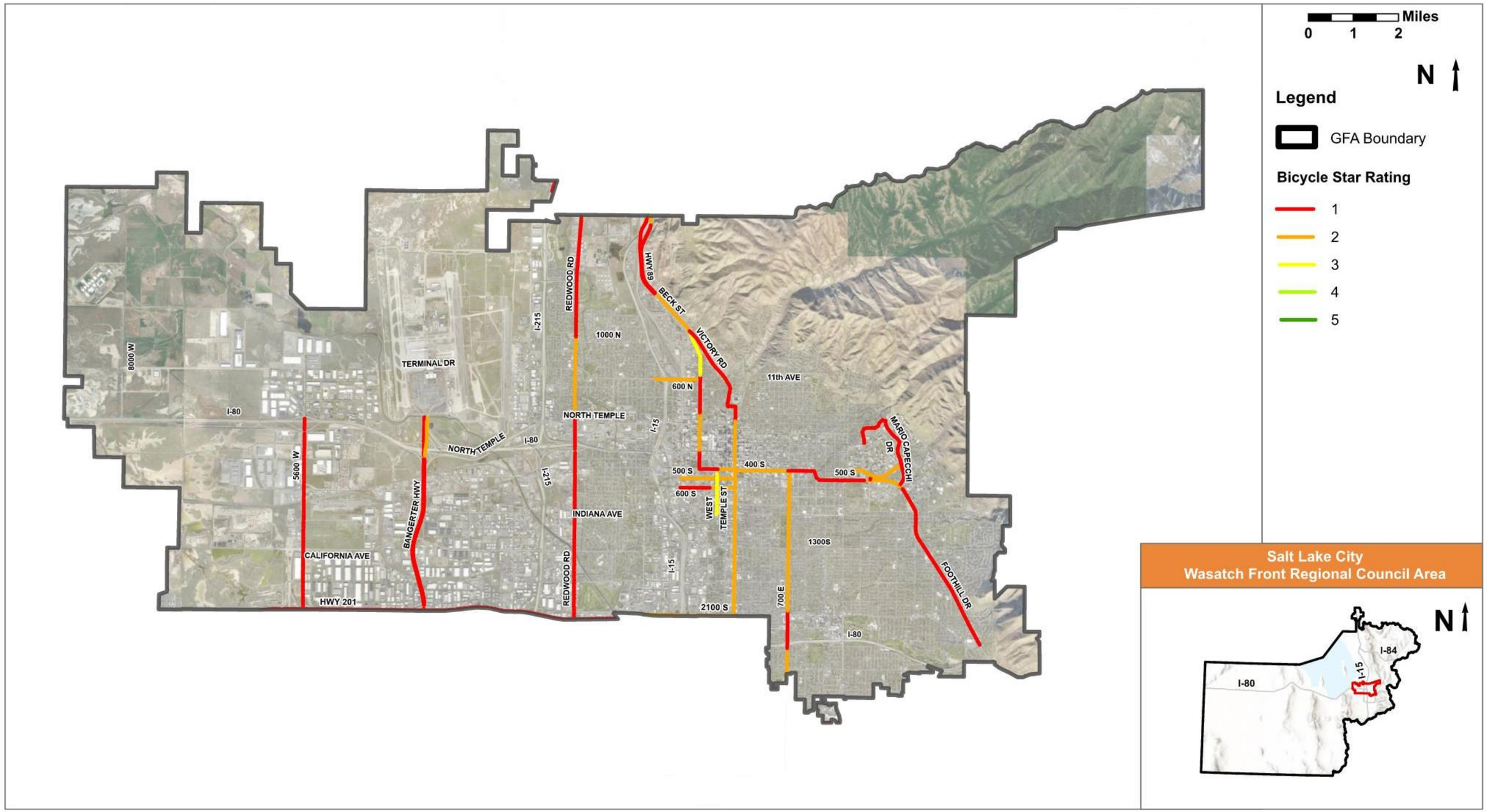


Figure 6.7 – Bicycle Star Rating (State Routes)

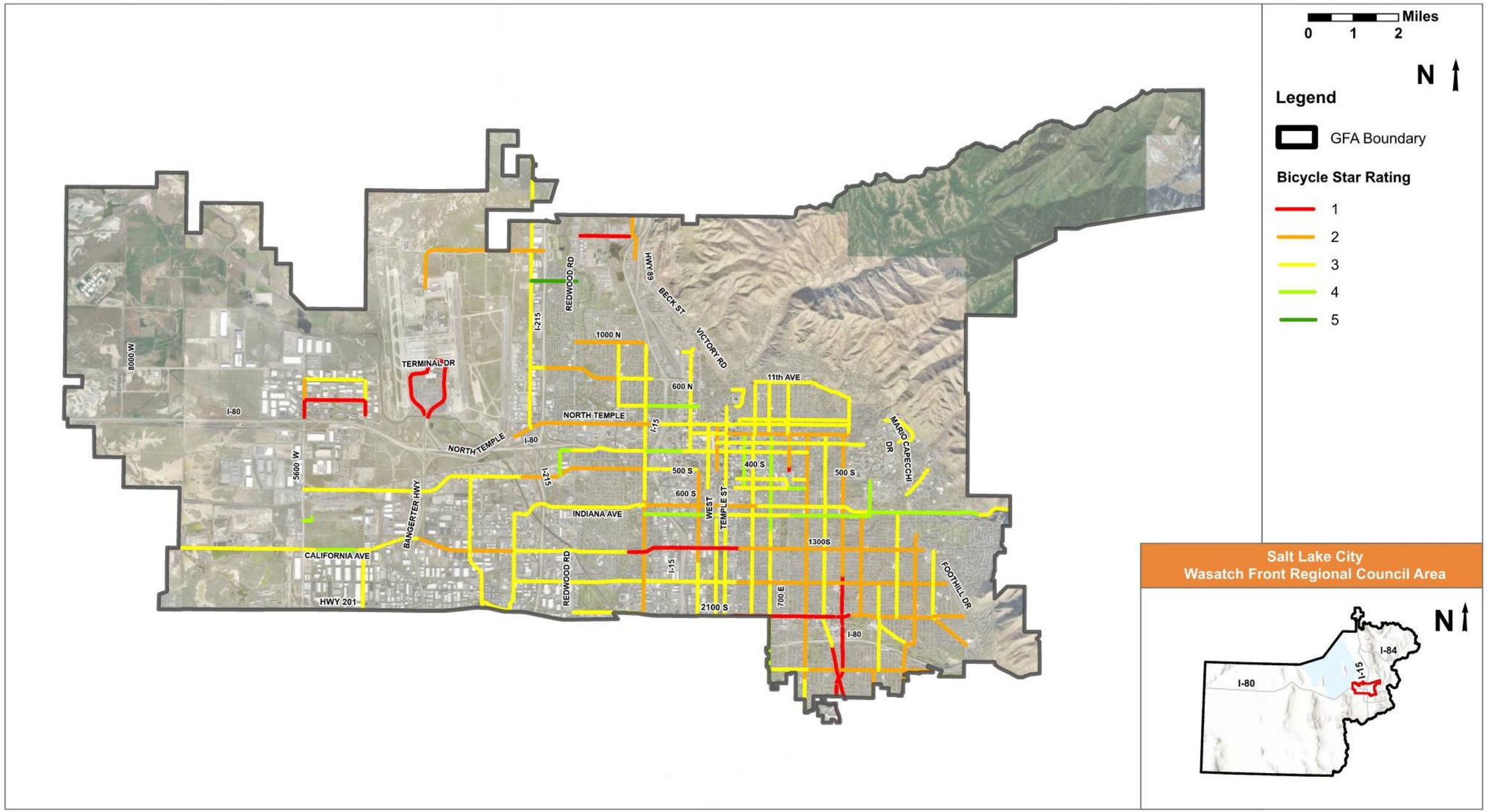


Figure 6.8 – Bicycle Star Rating (Federal Aid Routes)

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 Salt Lake City GFA.

Table 6.3 – Local Street High Priority Segments

Road Segment	Extents
400 South:	1600 West – 300 West
700 East:	South Temple – 400 South
800 South:	1000 West – 800 West
400 West:	700 North – 900 South
1700 South:	Redwood Road – Pioneer Road
900 South:	900 West – 800 East
300 South:	1000 East – 600 West
West Temple:	200 North – 400 South
200 South:	800 East – 600 West
200 West:	North Temple To 1000 South

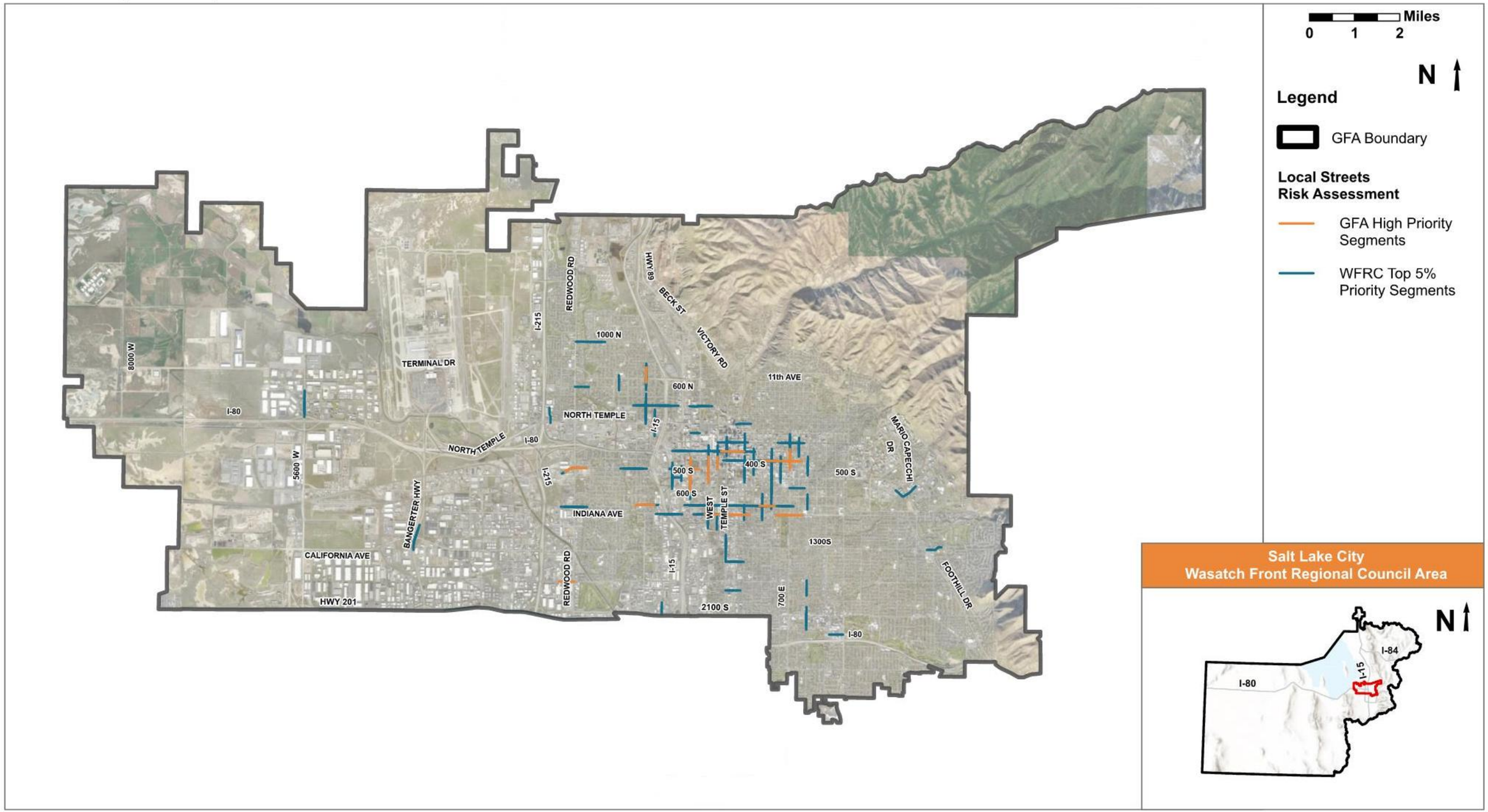


Figure 6.9 – Local Street Risk Assessment Results

7. Safety Analysis Summary

This section summarizes the safety analysis performed for the Salt Lake City 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 Salt Lake City GFA.

- Intersections
  - 50.8% of all fatal and serious injuries
- Pedestrian
  - 25.5% of all fatal and serious injuries
- Speed-Related
  - 21.2% of all fatal and serious injuries
- Roadway Departure
  - 16.5% of all fatal and serious injuries
  - 15.9% of all fatal and serious injury crashes
- Motorcycle
  - 14.9% of all fatal and serious injuries
  - 5.3% of all fatal and serious injury crashes
- Active Transportation
  - 27.4% of all fatal and serious injury crashes
- Left Turn at Intersection
  - 21.0% 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 Salt Lake City 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	Risk Type	Approach	Value
Historical Crash Analysis	Historical Crash Risk	5-Year Crash Totals ≥ 3 Crashes	1
Crash and Network Screening Analysis	Systemic Crash Risk	Positive Local CCR Differential	1
WFRC Risk Assessment	Roadway Risk	Risk Score ≥ 20	1
usRAP Risk Assessment	Vehicle Risk	Vehicle Star Rating = 1-2 Stars	1
usRAP Risk Assessment	Pedestrian Risk	Pedestrian Star Rating = 1-2 Stars	0.5
usRAP Risk Assessment	Bicycle Risk	Bicycle Star Rating = 1-2 Stars	0.5
		Total Possible Composite Risk Score	**5**

Table 7.2 – Salt Lake City 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
Federal Aid Routes											
2300 N	Redwood Rd to 1100 W	Minor Arterial	Salt Lake City	4	1.0	X	X	X	X		X
700 N	Mormon Dr to Riverside Dr	Minor Arterial	Salt Lake City	4	0.5	X	X		X	X	X
Terminal Dr	3800 W to Crossbar Rd	Minor Collector	Salt Lake City	4	1.0	X	X	X	X		X
5600 W	Amelia Earhart Dr to I-80	Major Collector	Salt Lake City	4	0.3	X	X	X	X		X
North Temple St	900 W to I-15	Minor Arterial	Salt Lake City	4	0.3	X	X	X	X		X
1st St	4th Ave to 3rd Ave	Major Collector	Salt Lake City	4	0.1			X	X	X	X
700 E	Bueno Ave to Linden Ave	Minor Arterial	Salt Lake City	4	0.3	X	X	X	X		X
900 E	500 S to 600 S	Major Collector	Salt Lake City	4	0.2	X	X	X		X	X
1300 E	700 S to Parkway Ave	Minor Arterial	Salt Lake City	4	2.5	X	X	X	X		X
800 S	Jeremy St to West Temple	Minor Arterial	Salt Lake City	4	1.1	X	X		X	X	X
900 W	700 S to 2100 S	Major Collector	Salt Lake City	5	2.0	X	X	X	X	X	X
1300 S	1100 W to 1900 E	Minor Arterial	Salt Lake City	4	4.0	X	X	X	X		X
300 W	1300 S to 1400 S	Minor Arterial	Salt Lake City	4	0.2	X	X		X	X	X
West Temple St	1300 S to Andrew Ave	Major Collector	Salt Lake City	4	0.3			X	X	X	X
1700 S	400 E to Foothill Dr	Major Collector	Salt Lake City	4	3.2	X	X	X	X		X
2100 S	State St to Oneida	Minor Arterial	Salt Lake City	4	4.0	X	X	X	X		X

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
Parleys Way	Maywood Dr to Wilshire Cir	Minor Arterial	Salt Lake City	4	0.1	X	X	X	X		X
Highland Dr	Parkway Ave to 3010 S	Minor Arterial	Salt Lake City	5	1.0	X	X	X	X	X	X
2700 S	1100 E to Elizabeth St	Major Collector	Salt Lake City	4	0.1	X	X	X		X	X
2700 S	Berkely Cir to Vimont Ave	Major Collector	Salt Lake City	4	0.2	X	X	X		X	X

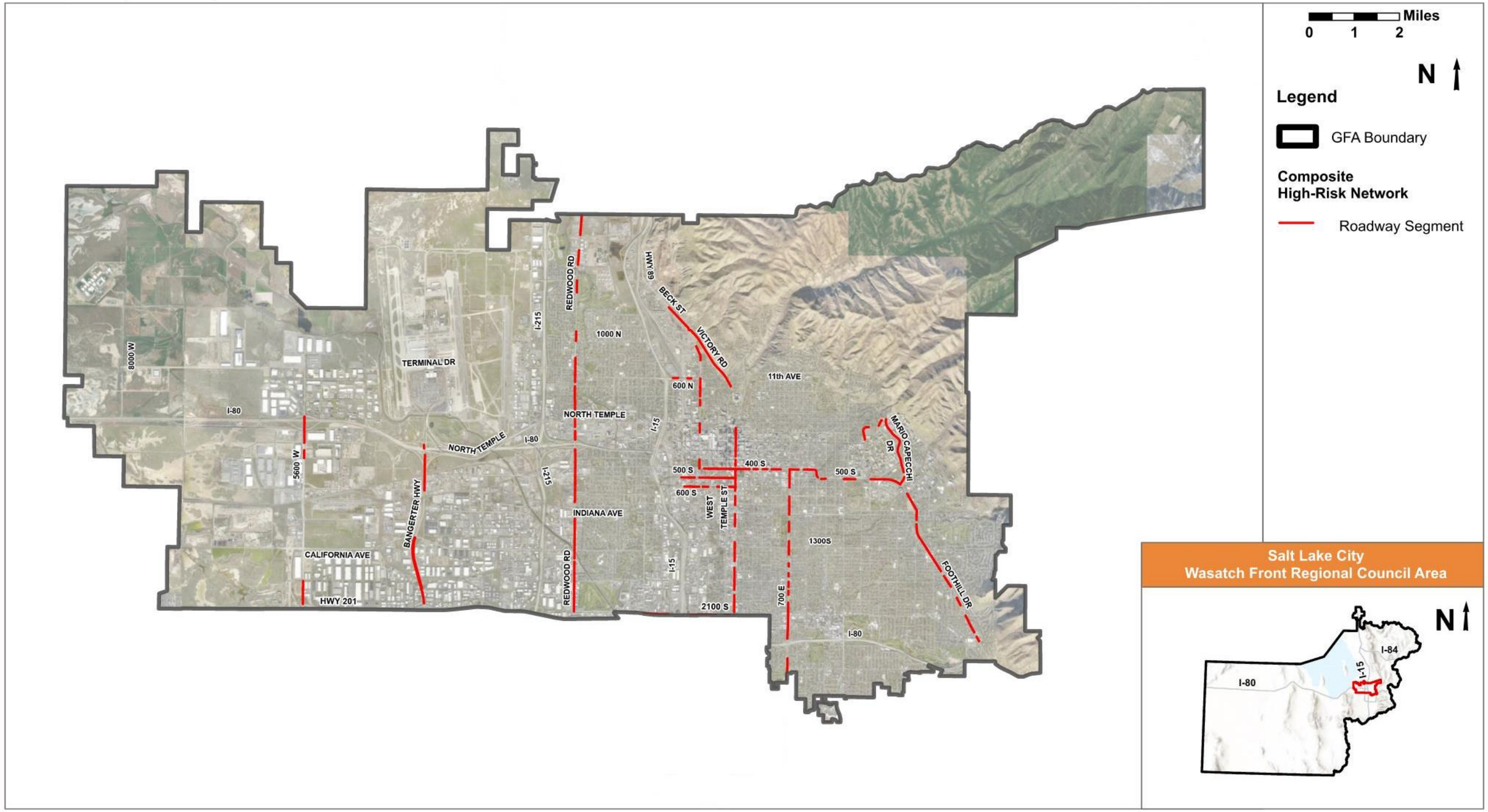


Figure 7.1 – Salt Lake City High-Risk Roadway Network (State Routes)

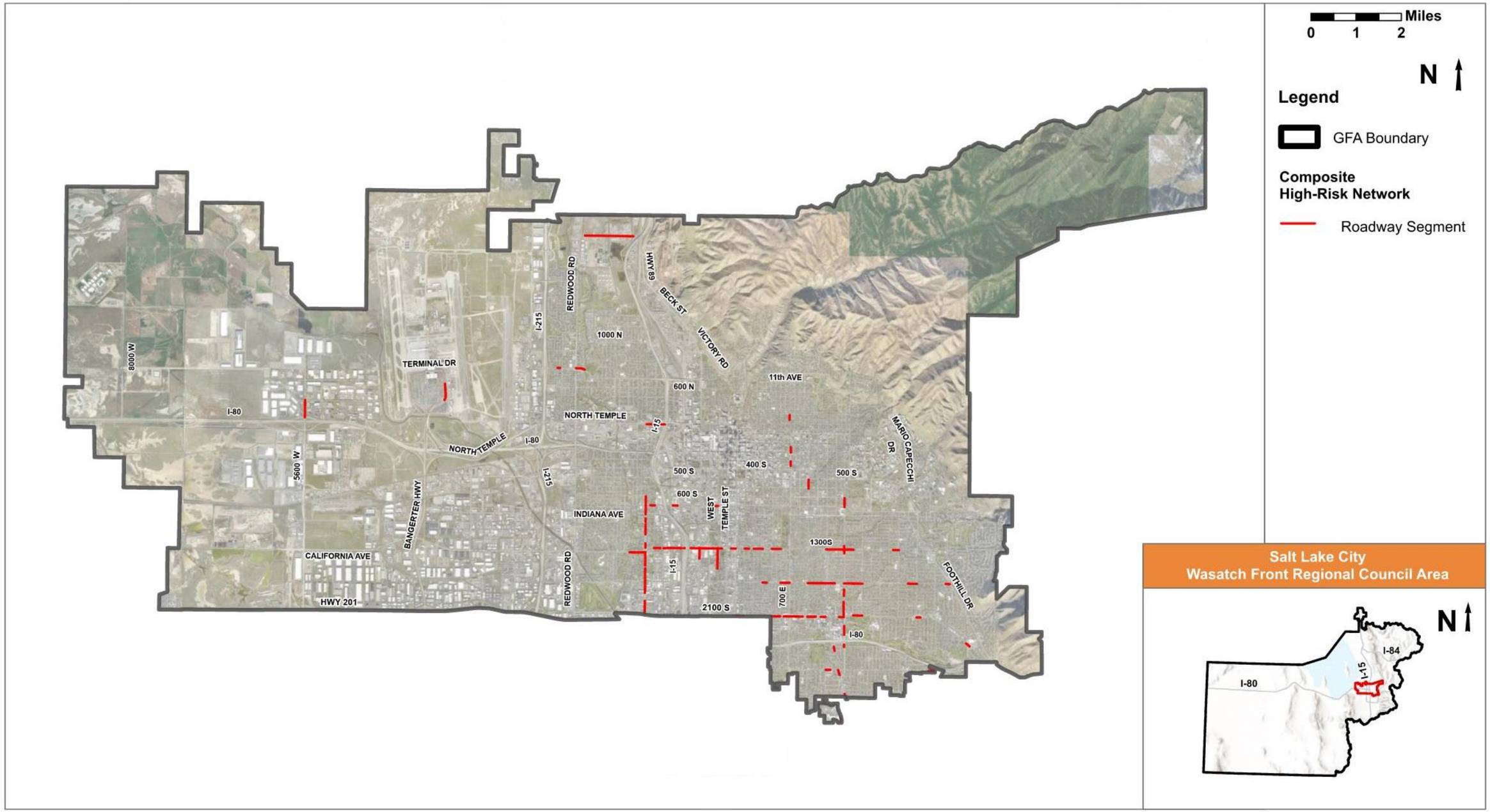


Figure 7.2 – Salt Lake City High-Risk Roadway Network (Federal Aid Routes)

APPENDIX

SALT LAKE CITY CASE STUDY PROJECT INFORMATION SHEETS

Salt Lake City

Project ID	Jurisdictions	Project Name
5.20.1	Salt Lake City	Redwood Road from 2300 North to 2100 South (SR 201)
5.20.2	Salt Lake City	900 West from 1000 North to SR 201
5.20.3	Salt Lake City	800 South from 1000 West to 700 East

Project Information Sheet

GFA(s):	**Salt Lake City**	**Date Prepared:**	**3/7/2024**
Project Name:	**Redwood Road from 2300 North to 2100 South (SR 201)**	**Prepared By:**	**EJS**
Jurisdiction(s):	**Salt Lake City**	**Checked By:**	**JSF**
Emphasis Areas:	**Intersections, Roadway Departures, Impaired Driving**		
Equity Priority:	**High**		

Location Description

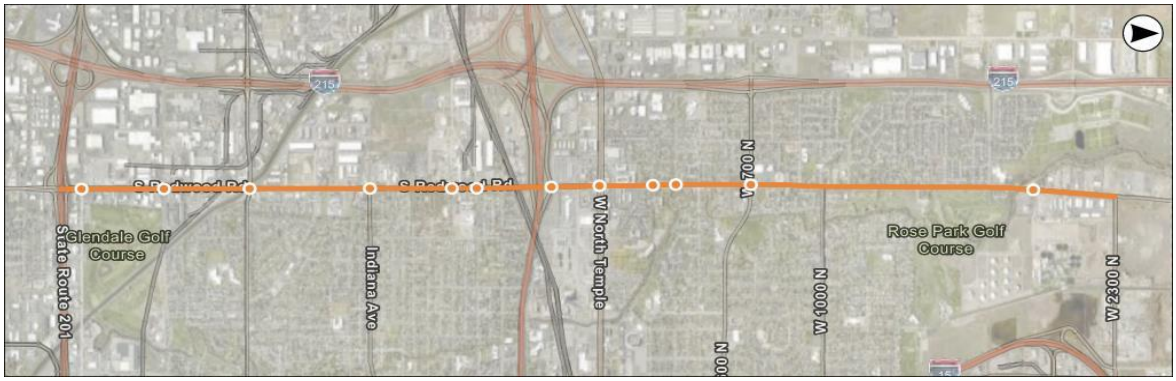
Roadway:	Redwood Road
From:	2300 North
To:	2100 South (SR 201)
Length:	6.46 miles

Key Intersection Locations:

2100 South	Indiana Avenue	South Temple	400 North
1700 South	500 South	North Temple	700 North
California Avenu	400 South	Northstar Drive	1900 North

Project Location Map

Map ID: 5.20.1



Segment Information and Safety Analysis Areas Summary

Roadway Characteristics	Value
Length (miles)	**6.46**
Average Daily Traffic (vehicles per day)	**22,227**
Functional Classification	**Other Principal Arterial**
Roadway Ownership	**State**
Urban/Rural Designation	**Urban**
Number of Key Intersections	**12**

Why Was This Location Identified?	
Composite Safety Score	✓
Historic Crashes	✓
Critical Crash Rate Differential	✓
Crash Profile Risk Score	✓
usRAP - Star Rating (Veh, Ped, Bike)	✓
Local Street Assessment	

Segment Crash History

Crash History (2018 - 2022)	# of crashes
Fatal Crashes (K)	**2**
Suspected Serious Injury Crashes (A)	**7**
Suspected Minor Injury Crashes (B)	**48**
Possible Injury Crashes (C)	**55**
No Injury/PDO Crashes (O)	**124**
Total Crashes	**236**
Total EPDO Crashes	**4,251**

What Crash Types are Over-Represented?			
Fatal	✓	Head On (HO)	✓
Serious Injury	✓	Parked Vehicle (PV)	✓
Pedestrian (Ped)		Single Vehicle	✓
Bicycle (Bike)	✓	Rear to Rear (RR)	
Motorcycle	✓	Rear to Side (RS)	
Angle	✓	Sideswipe (SS)	
Front to Rear (FR)	✓	Other/Unknown	

Intersection Crash History

									What Crash Types are Over-Represented?							
Intersections	**Signal**	**K**	**A**	**B**	**C**	**O**	**Total**	**EPDO**	K/A	Ped/Bike	Angle	FR	HO	PV	RR/RS	SS
2100 South & Redwood Road	✓	0	0	10	13	12	35	382				✓				✓
1700 South & Redwood Road	✓	0	3	21	30	47	101	1,137	✓	✓	✓					
California Avenue & Redwood Ro	✓	2	1	25	46	66	140	3,016	✓		✓		✓			
Indiana Avenue & Redwood Road	✓	0	2	10	30	26	68	777					✓	✓		
500 South & Redwood Road	✓	0	0	5	4	7	16	164					✓			
400 South & Redwood Road	✓	1	2	13	23	28	67	1,655				✓				
South Temple & Redwood Road	✓	0	0	4	11	3	18	217				✓				
North Temple & Redwood Road	✓	2	3	14	23	17	59	2,648	✓	✓		✓		✓	✓	
Northstar Drive & Redwood Road	✓	0	0	3	7	4	14	150				✓	✓			
400 North & Redwood Road		0	0	2	6	7	15	120			✓		✓			
700 North & Redwood Road	✓	0	4	16	35	40	95	1,169	✓		✓		✓			
1900 North & Redwood Road		0	0	1	2	3	6	48				✓				

Project Description/How is safety improved?

This project improves safety through installation of raised medians along the length of the corridor (excluding the existing medians at the south end of the corridor). Other improvements include installation of a bicycle lane and wider shoulder from 1100 North to 2300 North. Intersection improvements include changing existing "doghouse" type signals to flashing yellow arrows (1700 S., California Ave., 700 N., 1000 N.), changing permitted left-turn signal timing to flashing yellow arrows (500 S., Northstar Dr.), and installation additional signal heads at approaches (500 S. and Northstar Dr.). Unsignalized improvements are proposed for 1700 N., 1900 N., and 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


Bicycle Lanes


Corridor Access Management

Appropriate Speed Limits for All Road Users


Stop-Controlled Intersection Systemic Countermeasures

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	1.07	MILE	$ 21,000	$ 22,470
Shoulder Widening on Rural Roads	0.771	All Crashes	1.07	MILE	$ 32,000	$ 34,240
Install Raised Medians on Roadways with Existing TWLTL	0.29	All Crashes	4.21	MILE	$ 928,000	$ 3,906,880
Install Driver Feedback Speed Limit Signs	NA	All Crashes	6.00	EACH	$ 10,000	$ 60,000
Traffic Calming - Lane Narrowing	0.68	All Crashes	6.46	MILE	$ 39,000	$ 251,940
Install Buffered Bicycle Lane	NA	Bicycle	6.46	MILE	$ 26,000	$ 167,960
Install Sidewalk or Walkways	NA	Pedestrian	1.00	MILE	$ 634,000	$ 634,000
						$ -
						$ -
						$ -
						$ -

Intersection Improvements

Item Description	CMF	Applicable Crashes	Quantity	Unit	Unit Price	Item Cost
Adequate Number/Visibility of Signal Heads	0.85	All Crashes	2.00	INT	$ 24,000	$ 48,000
Systemic Low-Cost Countermeasures at Stop-Control Intersection	0.73 - 0.9	All Crashes	3.00	INT	$ 19,000	$ 57,000
Change a 5-section "Doghouse" to Flashing Yellow Arrow	0.75 - 0.93	Left-Turn	4.00	INT	$ 8,000	$ 32,000
Change a permissive only to Flashing Yellow Arrow	0.5 - 0.6	Left-Turn	2.00	INT	$ 8,000	$ 16,000
Protected Intersection	NA	All Crashes	1.00	INT	$ 650,000	$ 650,000
Install Pedestrian Hybrid Beacons (PHB) or HAWK	0.453	Pedestrian	1.00	EACH	$ 200,000	$ 200,000
						$ -
						$ -
						$ -
						$ -
						$ -

Improvements Subtotal:		$ 6,080,490
*Mobilization: (% +/-)**	*10%*	$ 75,000
Traffic Control: (% +/-)	*5%*	$ 304,025
Items Not Estimated / Contingency: (% +/-)	*30%*	$ 1,824,147
Estimated Construction Cost:		$ 8,283,662

Local Match†: 20% $ 2,104,200

† *Toward SS4A Implementation Grants*

Preconstruction Engineering/Design	*12%*	$ 994,039
*Utilities***		$ -
*ROW***		$ -
Construction Engineering/Management	*15%*	$ 1,242,549
Estimated Project Total:		$ 10,521,000

*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: Evaluate signalization at warranted intersections
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 Information Sheet

GFA(s):	**Salt Lake City**	**Date Prepared:**	**3/13/2024**
Project Name:	**900 West from 1000 North to SR 201**	**Prepared By:**	**MA**
Jurisdiction(s):	**Salt Lake City**	**Checked By:**	**EMF**
Emphasis Areas:	**Intersections, Roadway Departures, Impaired Driving**		
Equity Priority:	**High**		

Location Description

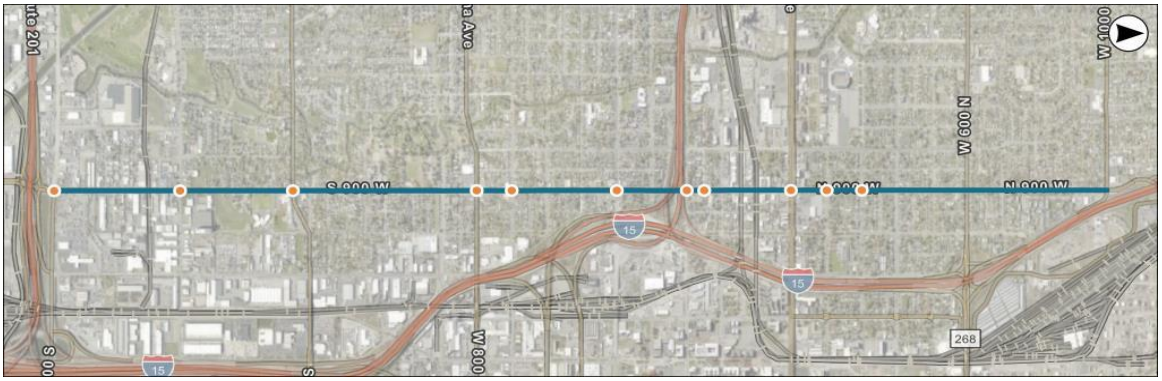
Roadway:	900 West		
From:	1000 North		
To:	SR 201		
Length:	4.51	miles	

Key Intersection Locations:

2100 South	800 South	200 South
1700 South	700 South	Euclid Avenue
California Avenu	400 South	North Temple Street

Project Location Map

Map ID: 5.20.2



Segment Information and Safety Analysis Areas Summary

Roadway Characteristics	Value
Length (miles)	**4.51**
Average Daily Traffic (vehicles per day)	**13,625**
Functional Classification	**Major Collector**
Roadway Ownership	**Federal Aid - Local**
Urban/Rural Designation	**Urban**
Number of Key Intersections	**11**

Why Was This Location Identified?	
Composite Safety Score	✓
Historic Crashes	✓
Critical Crash Rate Differential	✓
Crash Profile Risk Score	✓
usRAP - Star Rating (Veh, Ped, Bike)	✓
Local Street Assessment	

Segment Crash History

Crash History (2018 - 2022)	# of crashes
Fatal Crashes (K)	**1**
Suspected Serious Injury Crashes (A)	**3**
Suspected Minor Injury Crashes (B)	**40**
Possible Injury Crashes (C)	**45**
No Injury/PDO Crashes (O)	**91**
Total Crashes	**180**
Total EPDO Crashes	**2,663**

What Crash Types are Over-Represented?			
Fatal		Head On (HO)	✓
Serious Injury	✓	Parked Vehicle (PV)	✓
Pedestrian (Ped)		Single Vehicle	
Bicycle (Bike)		Rear to Rear (RR)	
Motorcycle		Rear to Side (RS)	
Angle	✓	Sideswipe (SS)	✓
Front to Rear (FR)	✓	Other/Unknown	

Intersection Crash History

									What Crash Types are Over-Represented?							
Intersections	**Signal**	**K**	**A**	**B**	**C**	**O**	**Total**	**EPDO**	K/A	Ped/Bike	Angle	FR	HO	PV	RR/RS	SS
2100 South & 900 West	✓	1	0	12	9	18	40	1,276	✓						✓	✓
1700 South & 900 West	✓	0	0	6	12	9	27	279			✓		✓			✓
California Avenue & 900 West	✓	1	0	7	12	15	35	1,196	✓		✓		✓			
800 South & 900 West	✓	1	0	7	5	14	27	1,115	✓	✓			✓	✓		✓
700 South & 900 West		0	0	1	2	8	11	53						✓		
400 South & 900 West	✓	0	0	7	7	20	34	255			✓	✓				
200 South & 900 West	✓	0	0	0	7	4	11	84		✓		✓				✓
Euclid Avenue & 900 West		0	0	2	2	2	6	69				✓				✓
North Temple Street & 900 West	✓	2	0	6	15	16	39	2,097	✓	✓		✓		✓		
200 North & 900 West		0	0	3	2	2	7	92			✓					
300 North & 900 West	✓	0	2	5	3	3	13	336	✓		✓					

Project Description/How is safety improved?

This project includes the following improvements along 900 W to address an overrepresentation of serious injury, angle, rear-end, parked vehicle and side-swipe collisions: Perform intersection control evaluations to evaluate roundabouts at unsignalized intersections; Implement protected or protected permitted (flashing yellow) left turn phasing for all intersection approaches where warranted; Lower speed limit from 35 mph to 30 mph; Where possible, consolidate redundant commercial driveway accesses not at intersections; Install medians and use extra right-of-way for turn storage lanes and conversion of bicycle lane into separated bicycle lane from 1000 N to 1700 S; Install speed feedback signs at multiple locations between 1000 N to 1700 S; For each mid-block or unsignalized pedestrian crossing, provide high-visibility crossing improvements, raised crossings and RRFB'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

Appropriate Speed Limits for All Road Users


Crosswalk Visibility Enhancements


Medians and Pedestrian Refuge Islands in Urban & Suburban Areas


Rectangular Rapid Flashing Beacons (RRFB)


Road Diets (Roadway Configuration)


Roundabouts

Opinion of Probable Construction Cost

Segment Improvements

Item Description	CMF	Applicable Crashes	Quantity	Unit	Unit Price	Item Cost
Corridor Access Management-Driveway Consolidation (Urban)	0.69 - 0.75	Fatal & Injury	16.00	DRIVEW	$ 7,000	$ 112,000
Install Raised Medians on Roadways with Existing TWLTL	0.29	All Crashes	4.20	MILE	$ 928,000	$ 3,897,600
Install a Separated Bicycle Lane (Cycle Track or Multi-Use Path)	NA	Bicycle	4.20	MILE	$ 553,000	$ 2,322,600
Install Driver Feedback Speed Limit Signs	NA	All Crashes	8.00	EACH	$ 10,000	$ 80,000
Install a Rectangular Rapid Flashing Beacons (RRFB)	0.526	Pedestrian	8.00	XING (2)	$ 15,000	$ 120,000
Install Raised Crosswalk	NA	Pedestrian	8.00	EACH	$ 71,000	$ 568,000
						$ -
						$ -
						$ -
						$ -
						$ -

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	7.00	INT	$ 19,000	$ 133,000
Change Permissive Left-Turn to Protected or Protected/Permissive	0.79 - 0.95	Left-Turn	20.00	INT	$ 8,000	$ 160,000
Corridor Access Management-Driveway Consolidation (Urban)	0.69 - 0.75	Fatal & Injury	8.00	DRIVEW	$ 7,000	$ 56,000
Protected Intersection	NA	All Crashes	3.00	INT	$ 650,000	$ 1,950,000
Perform an Intersection Control Evaluation and Implement	NA	All Crashes	6.00	INT	$ 225,000	$ 1,350,000
Convert Existing Intersection to Modern Roundabout	0.18 - 0.59	All Crashes	6.00	INT	$ 2,500,000	$ 15,000,000
						$ -
						$ -
						$ -
						$ -
						$ -

Improvements Subtotal:		$ 25,749,200
*Mobilization: (% +/-)**	*10%*	$ 75,000
Traffic Control: (% +/-)	*5%*	$ 1,287,460
Items Not Estimated / Contingency: (% +/-)	*30%*	$ 7,724,760
Estimated Construction Cost:		$ 34,836,420

Local Match†: 20% $ 8,848,600

† *Toward SS4A Implementation Grants*

Preconstruction Engineering/Design	*12%*	$ 4,180,370
*Utilities***		$ -
*ROW***		$ -
Construction Engineering/Management	*15%*	$ 5,225,463
Estimated Project Total:		$ 44,243,000

*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: Co-Locate Bus Stops and Pedestrian Crossings
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.

ADDITIONAL INFORMATION

This project includes the following improvements along 900 W to address an overrepresentation of serious injury, angle, rear-end, parked vehicle and side-swipe collisions:

-Perform intersection control evaluations to evaluate potential roundabout
-Implement protected or protected permitted (flashing yellow) left turn phasing for all intersection approaches where warranted
-Consider lowering the speed limit along this corridor from 35 mph to 30 mph
-Where possible, consolidate redundant commercial driveway accesses not at intersections to lower potential conflict points along the corridor.
-Install medians and use extra right-of-way for turn storage lanes and conversion of traditional bicycle lane into separated bicycle lane from 1000 N to 1700 S.
-Install speed feedback signs at multiple locations between 1000 N to 1700 S.
-For each mid-block or unsignalized pedestrian crossing between 1000 N and 1700 S, provide high-visibility crossing improvements, raised crossings and RRFB's. Although these improvements improve safety for pedestrians, they would also encourage slower travel speeds along the corridor.

The following intersection improvements are also recommended:

-2100 S/900 W: Install advanced warning on the west approach to the intersection
-1700 S/900 W: Implement protected or protected permitted (flashing yellow) left turn phasing for all approaches to the intersection where warranted.
-California Ave/900 W: Implement protected or protected permitted (flashing yellow) left turn phasing for all approaches to the intersection where warranted.
-800 S/900 W: Where possible, consolidate driveways within 100 ft of the intersection. Implement protected or protected permitted (flashing yellow) left turn phasing for all approaches to the intersection where warranted. Ensure on-street parking is not allowed within 50 ft of the intersection. Provide protected intersection improvements to improve pedestrian safety at this intersection.
-700 S/900 W: Perform intersection control evaluation for potential roundabout. Ensure on-street parking is not allowed within 50 ft of the intersection.
-400 S/900 W: Implement general intersection visibility improvements, and implement protected or protected permitted (flashing yellow) left turn phasing for all approaches to the intersection where warranted.
-200 S/900 W: Provide protected intersection and general visibility improvements at this intersection.
-Euclid Ave/900 W: Perform intersection control evaluation for potential roundabout. Provide visibility and sight distance improvements at this intersection.
-North Temple/900 W: Implement protected intersection improvements and where possible consolidate driveways within 100 ft of the intersection.
-200 N/900 W: Perform intersection control evaluation for potential roundabout.
-300 N/900 W: Implement protected or protected permitted (flashing yellow) left turn phasing for all approaches to the intersection where warranted.

Project Information Sheet

GFA(s):	**Salt Lake City**	**Date Prepared:**	**3/13/2024**
Project Name:	**800 South from 1000 West to 700 East**	**Prepared By:**	**MA**
Jurisdiction(s):	**Salt Lake City**	**Checked By:**	**EMF**
Emphasis Areas:	**Intersections, Roadway Departures, Impaired Driving**		
Equity Priority:	**High, Medium**		

Location Description

Roadway:	800 South	
From:	1000 West	
To:	700 East	
Length:	2.55	miles

Key Intersection Locations:

400 West	300 West	300 East
900 West	Main Street	600 East
500 West	200 East	400 East

Project Location Map

Map ID: 5.20.3

Segment Information and Safety Analysis Areas Summary

Roadway Characteristics	Value
Length (miles)	**2.55**
Average Daily Traffic (vehicles per day)	**14,223**
Functional Classification	**Minor Arterial**
Roadway Ownership	**Federal Aid - Local**
Urban/Rural Designation	**Urban**
Number of Key Intersections	**11**

Why Was This Location Identified?	
Composite Safety Score	
Historic Crashes	✓
Critical Crash Rate Differential	✓
Crash Profile Risk Score	✓
usRAP - Star Rating (Veh, Ped, Bike)	✓
Local Street Assessment	

Segment Crash History

Crash History (2018 - 2022)	# of crashes
Fatal Crashes (K)	**0**
Suspected Serious Injury Crashes (A)	**2**
Suspected Minor Injury Crashes (B)	**8**
Possible Injury Crashes (C)	**18**
No Injury/PDO Crashes (O)	**22**
Total Crashes	**50**
Total EPDO Crashes	**592**

What Crash Types are Over-Represented?			
Fatal		Head On (HO)	
Serious Injury	✓	Parked Vehicle (PV)	✓
Pedestrian (Ped)		Single Vehicle	
Bicycle (Bike)		Rear to Rear (RR)	
Motorcycle		Rear to Side (RS)	
Angle	✓	Sideswipe (SS)	
Front to Rear (FR)	✓	Other/Unknown	

Intersection Crash History

									What Crash Types are Over-Represented?							
Intersections	**Signal**	**K**	**A**	**B**	**C**	**O**	**Total**	**EPDO**	K/A	Ped/Bike	Angle	FR	HO	PV	RR/RS	SS
400 West & 800 South		0	0	3	5	5	13	129			✓					
900 West & 800 South	✓	1	0	7	5	14	27	1,115	✓	✓			✓	✓		✓
500 West & 800 South		0	0	5	0	1	6	112			✓					
300 West & 800 South	✓	0	2	8	7	9	26	454	✓		✓					✓
Main Street & 800 South	✓	0	0	4	1	7	12	107			✓					
200 East & 800 South	✓	0	0	2	7	4	13	128		✓	✓					
300 East & 800 South	✓	0	0	1	4	3	8	71		✓						
600 East & 800 South		0	0	3	4	7	14	119		✓	✓					
400 East & 800 South	✓	0	3	1	1	6	11	321	✓	✓	✓					✓
500 East & 800 South	✓	0	1	3	9	8	21	271			✓					
700 East & 800 South	✓	0	0	7	18	17	42	377			✓		✓			

Project Description/How is safety improved?

This project imrproves safety through systemic intersection evaluations and the following improvements along 800 S to address an overrepresentation of serious injury, angle, rear-end, and parked vehicle collisions: Perform intersection control evaluations to evaluate potential roundabouts at unsignalized intersections; Implement protected or protected permitted (flashing yellow) left turn phasing for all intersection approaches and exclusive bicycle phases where warranted; Lower speed limit from 35 mph to 30 mph; Where possible, consolidate redundant commercial driveway accesses not at intersections; Install medians and use extra right-of-way for turn storage lanes and conversion of traditional bicycle lane into a separated bicycle lane from 1000 W to 700 E; Perform a road diet to reduce the number of travel lanes from two in each direction to one in each direction.

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


Medians and Pedestrian Refuge Islands in Urban & Suburban Areas


Road Diets (Roadway Configuration)


Roundabouts

Opinion of Probable Construction Cost

Segment Improvements

Item Description	CMF	Applicable Crashes	Quantity	Unit	Unit Price	Item Cost
Corridor Access Management-Driveway Consolidation (Urban)	0.69 - 0.75	Fatal & Injury	10.00	DRIVEW	$ 7,000	$ 70,000
Install Raised Medians on Roadways with Existing TWLTL	0.29	All Crashes	2.55	MILE	$ 928,000	$ 2,366,400
Install a Separated Bicycle Lane (Cycle Track or Multi-Use Path)	NA	Bicycle	2.55	MILE	$ 553,000	$ 1,410,150
						$ -
						$ -
						$ -
						$ -
						$ -
						$ -
						$ -
						$ -

Intersection Improvements

Item Description	CMF	Applicable Crashes	Quantity	Unit	Unit Price	Item Cost
Perform an Intersection Control Evaluation and Implement	NA	All Crashes	7.00	INT	$ 225,000	$ 1,575,000
Convert Existing Intersection to Modern Roundabout	0.18 - 0.59	All Crashes	7.00	INT	$ 2,500,000	$ 17,500,000
Corridor Access Management-Driveway Consolidation (Urban)	0.69 - 0.75	Fatal & Injury	6.00	DRIVEW	$ 7,000	$ 42,000
Change Permissive Left-Turn to Protected or Protected/Permissive	0.79 - 0.95	Left-Turn	24.00	INT	$ 8,000	$ 192,000
Protected Intersection	NA	All Crashes	3.00	INT	$ 650,000	$ 1,950,000
Systemic Low-Cost Countermeasures at Stop-Control Intersection	0.73 - 0.9	All Crashes	1.00	INT	$ 19,000	$ 19,000
Install a Separate Bicycle Traffic Signal	NA	All Crashes	5.00	INT	$ 21,000	$ 105,000
						$ -
						$ -
						$ -
						$ -

Improvements Subtotal:		$ 25,229,550
*Mobilization: (% +/-)**	*10%*	$ 75,000
Traffic Control: (% +/-)	*5%*	$ 1,261,478
Items Not Estimated / Contingency: (% +/-)	*30%*	$ 7,568,865
Estimated Construction Cost:		$ 34,134,893

Local Match†: 20% $ 8,670,400

† *Toward SS4A Implementation Grants*

Preconstruction Engineering/Design	*12%*	$ 4,096,187
*Utilities***		$ -
*ROW***		$ -
Construction Engineering/Management	*15%*	$ 5,120,234
Estimated Project Total:		$ 43,352,000

*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.

ADDIONTAL INFORMATION

This project includes the following improvements along 800 S to address an overrepresentation of serious injury, angle, rear-end, and parked vehicle collisions:
-Consider lowering the speed limit along this corridor from 35 mph to 30 mph
-Where possible, consolidate redundant commercial driveway accesses not at intersections to lower potential conflict points along the corridor.
-Install medians and use extra right-of-way for turn storage lanes and conversion of traditional bicycle lane into a separated bicycle lane from 1000 W to 700 E.
-Perform a road diet to reduce the number of travel lanes from two in each direction to one in each direction.

The following intersection improvements are also recommended:
-400 W/800 S: Perform intersection control evaluation to evaluate potential roundabout.
-800 S/900 W: Where possible, consolidate driveways within 100 ft of the intersection. Implement protected or protected permitted (flashing yellow) left turn phasing for all approaches to the intersection where warranted. Ensure on-street parking is not allowed within 50 ft of the intersection. Provide protected intersection improvements to improve pedestrian safety at this intersection.
-500 W/800 S: Perform intersection control evaluation to evaluate potential roundabout, in addition to adding intersection visibility and striping improvements.
-300 W/800 S: Implement protected or protected permitted (flashing yellow) left turn phasing for all approaches to the intersection where warranted.
-Main St/800 S: Implement protected or protected permitted (flashing yellow) left turn phasing for all approaches to the intersection where warranted.
-200 E/800 S: Where possible, consolidate driveways within 100 ft of the intersection. Implement protected intersection improvements at the intersection, including providing an exclusive bicycle phase and timing for the north/south and east/west bicycle lanes..
-300 E/800 S: Implement protected intersection improvements at the intersection, including providing an exclusive bicycle phase and timing for the north/south and east/west bicycle lanes.
-600 E/800 S: Perform intersection control evaluation to evaluate potential roundabout.
-400 E/800 S: Implement protected or protected permitted (flashing yellow) left turn phasing for all approaches to the intersection where warranted. Implement protected intersection improvements at the intersection, including providing an exclusive bicycle phase and timing for the east/west bicycle lanes.
500 E/800 S: Implement protected or protected permitted (flashing yellow) left turn phasing for all approaches to the intersection where warranted. Consistent with improvements along the corridor, provide an exclusive bicycle phase and timing for the east/west bicycle lanes.
-700 E/800 S: Implement protected left turn phasing for all approaches to the intersection where warranted. Consistent with improvements along the corridor, provide an exclusive bicycle phase and timing for the east/west bicycle lanes.

SALT LAKE CITY CASE STUDY PROJECT LOCATION MAP

5.20.1

5.20.1

5.20.2

5.20.3

Legend

N

GFA Boundary

Project Roadways

State Routes

Federal Aid Routes

Local Streets

Jurisdiction Boundary

Project Intersections

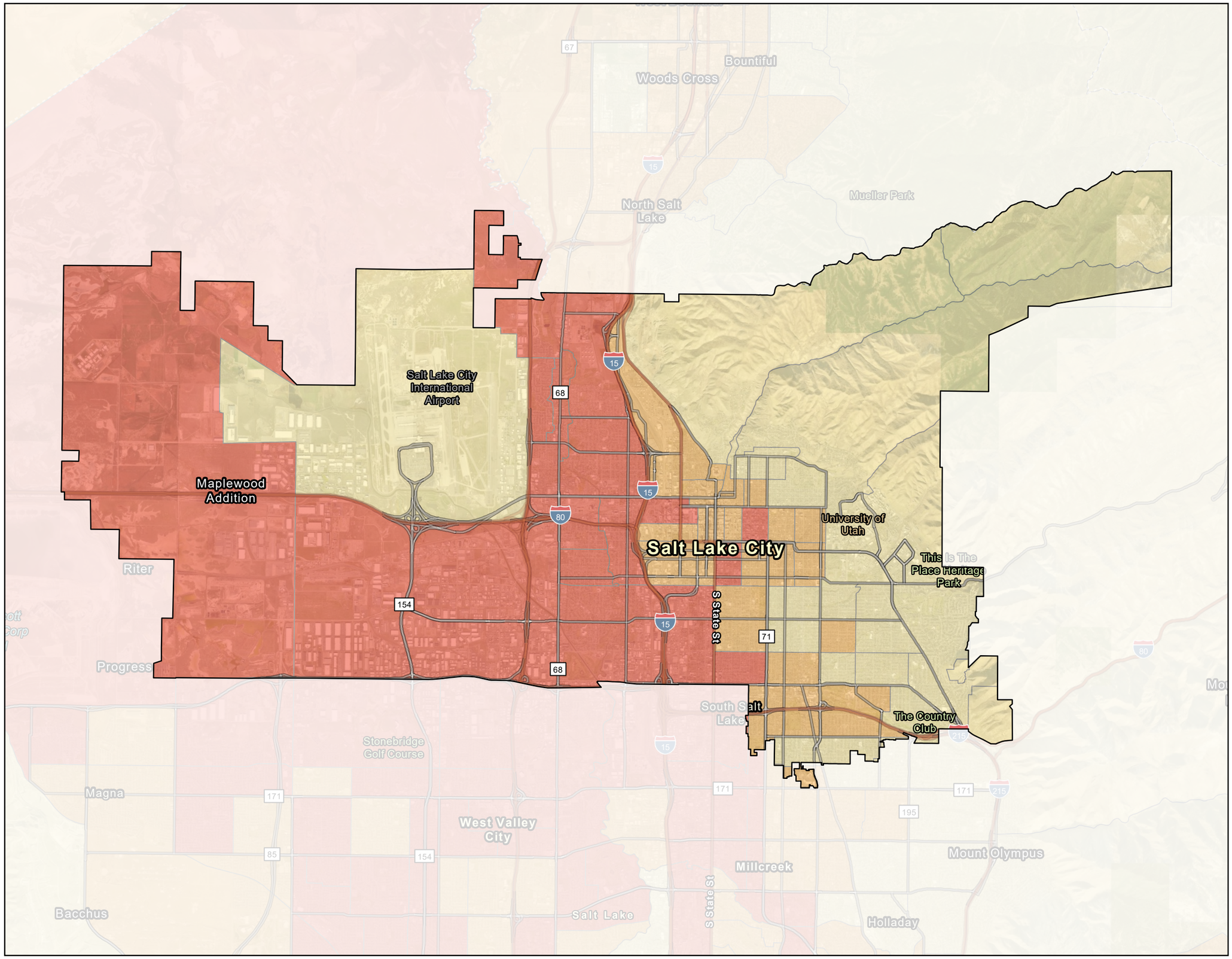
Signalized

Unsignalized

Salt Lake City
Geographical Focus Area

N

SALT LAKE CITY EQUITY INDEX MAP



Salt Lake City

Equity Need Areas

- High
- Medium
- Low