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Report No. UT-24.09

IDENTIFYING TRANSIT CORRIDORS WITH GREATEST POTENTIAL TO BENEFIT FROM TRANSIT SIGNAL PRIORITY

Prepared For:

Utah Department of Transportation
Research & Innovation Division

Final Report
July 2024

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ACKNOWLEDGMENTS

The authors acknowledge the Utah Department of Transportation (UDOT) for funding this research, and the following individuals from UDOT and the Utah Transit Authority (UTA) on the Technical Advisory Committee for helping to guide the research:

- Kevin Nichol, UDOT Research Project Manager
- Peter Jager, UDOT State Safety Oversight Program Manager
- Shaina Quinn, UTA Innovative Mobility Solutions Program Manager
- Dave Beecher, UTA Senior Operations Planner
- Jenna Simkins, UTA Senior Service Planner
- Nikki Navio, Wasatch Front Regional Council Transportation Planner
- Lauren Victor, Wasatch Front Regional Council Transportation Planner

TECHNICAL REPORT ABSTRACT

1. Report No. UT-24.09	2. Government Accession No. N/A	3. Recipient's Catalog No. N/A
4. Title and Subtitle IDENTIFYING TRANSIT CORRIDORS WITH GREATEST POTENTIAL TO BENEFIT FROM TRANSIT SIGNAL PRIORITY		5. Report Date July 2024 6. Performing Organization Code N/A
7. Author(s) Michael Sheffield		8. Performing Organization Report No. N/A
9. Performing Organization Name and Address Wall Consultant Group 2139 S. 1260 W. Salt Lake City, UT 84119		10. Work Unit No. 5H092 67H 11. Contract or Grant No. 22-8689
12. Sponsoring Agency Name and Address Utah Department of Transportation 4501 South 2700 West P.O. Box 148410 Salt Lake City, UT 84114-8410		13. Type of Report & Period Covered Final Jan 2022 to Jul 2024 14. Sponsoring Agency Code UT21.604

15. Supplementary Notes

Prepared in cooperation with the Utah Department of Transportation and the U.S. Department of Transportation, Federal Highway Administration

16. Abstract

Transit signal priority (TSP) is an operational strategy that facilitates the movement of transit vehicles through signal-controlled intersections. Transit vehicle delay can occur for many reasons including traffic congestion, passenger boarding and alighting, traffic signal operations, and other factors but TSP is specifically aimed at reducing delay caused by signal operations.

Connected vehicle, or vehicle-to-everything (V2X), technology was deployed on UTA buses and at signalized intersections, thus enabling “smart” TSP on Redwood Road in Salt Lake County (Route 217) and along the UVX bus rapid transit (BRT) line in the Provo-Orem area of Utah. One way to maximize the efficiency of new V2X deployments is to consider locations where TSP will provide the greatest potential benefit to buses; that is, intersections where buses experience large amounts of delay.

This research analyzed bus AVL data recorded every 10 seconds for UTA's 17 core routes and counted how often buses stopped at signalized intersections. Results are compiled by individual intersection, transit route, and highway corridor. These findings will help inform UTA's and UDOT's prioritization scheme for new V2X deployments by providing a data-driven and needs-based approach to Utah's V2X planning and deployment practices.

17. Key Words Transit signal priority, transit vehicle delay, traffic signal operations, on-time performance.		18. Distribution Statement Not restricted. Available through: UDOT Research Division 4501 South 2700 West P.O. Box 148410 Salt Lake City, UT 84114-8410 www.udot.utah.gov/go/research		23. Registrant's Seal N/A
19. Security Classification (of this report) Unclassified	20. Security Classification (of this page) Unclassified	21. No. of Pages 96	22. Price N/A	

TABLE OF CONTENTS

LIST OF TABLES v
LIST OF FIGURES vi
LIST OF ACRONYMS vii
EXECUTIVE SUMMARY 1
1.0 INTRODUCTION 3
1.1 Problem Statement 3
1.2 Objectives 5
1.3 Outline of Report 5
2.0 LITERATURE REVIEW 6
2.1 Overview 6
2.2 Screening Methodology 6
2.2.1 Transit Operations 7
2.2.2 General Traffic Conditions 13
2.2.3 Physical Infrastructure Characteristics 14
2.2.4 Scoring 15
2.3 GPS Data 15
3.0 METHODOLOGY 17
3.1 Overview 17
3.2 Data Sources 17
3.3 Data Processing & Management 18
3.4 Analysis Methodology 21
4.0 RESULTS 23
4.1 Overview 23
4.2 Intersection Stops by Intersection 23
4.3 Intersection Stops by Route 28
4.4 Intersection Stops by Corridor 30
5.0 CONCLUSIONS 34
5.1 Summary 34
5.2 Findings 34
5.3 Limitations and Challenges 42

6.0 RECOMMENDATIONS AND IMPLEMENTATION 48
6.1 Recommendations 48
6.2 Implementation 48
REFERENCES 50
APPENDIX 54

LIST OF TABLES

Table 2-1 VDOT Transit Criteria (Heaslip et al., 2020) 7
Table 2-2 HCM LOS Criteria for Signalized Intersections (HCM, 2020) 9
Table 2-3 Analysis of Transit Delay at Signalized Intersections (Fehr & Peers, 2011) 10
Table 2-4 VDOT OTP Score (Heaslip et al., 2020) 12
Table 2-5 Walkability and Transit Dependence (Heaslip et al., 2020) 14
Table 2-6 VDOT Geometric Criteria (Heaslip et al., 2020) 15
Table 4-1 Intersection Stops by Intersection 24
Table 4-2 Intersection Stops by Route 29
Table 4-3 Intersection Stops by N/S Corridor with 4+ Intersections 31
Table 4-4 Intersection Stops by E/W Corridor with 4+ Intersections 32
Table 5-1 100 Prioritized Intersections 35
Table A-1 Intersection Stops for Each Route/Intersection Combination 54
Table A-2 Number of Intersection Stops at Core Route Intersections 66
Table A-3 Intersection Stops per N/S Corridor 80
Table A-4 Intersection Stops per E/W Corridor 84

LIST OF FIGURES

Figure 2-1 Time-space diagram for control delay (Ko et al., 2007) 8
Figure 2-2 PM peak intersection ranking and ridership delay (Fehr & Peers, 2011) 11
Figure 3-1 UTA Route 45 map and associated AVL data (UTA, 2022) 19
Figure 3-2 Example of GPS errors in the AVL data 20
Figure 3-3 Route 45 AVL data within 30 meters (UTA, 2022) 20
Figure 3-4 AVL data exclusion at bus stops 22
Figure 4-1 Salt Lake City area map 25
Figure 4-2 Utah County area map 26
Figure 4-3 Ogden area map 27
Figure 4-4 Histogram of intersection stops at core route intersections 28
Figure 5-1 Prioritized intersections in Salt Lake County 39
Figure 5-2 Prioritized intersections in Utah County 40
Figure 5-3 Prioritized intersections in Ogden area 41
Figure 5-4 Route 209 AVL and GTFS data 43
Figure 5-5 Route 45 AVL and GTFS data 43
Figure 5-6 Route 45 bus stop location discrepancy 44
Figure 5-7 Multiple approaches to same intersection on Route 200 45
Figure 5-8 Route 200 AVL data 45
Figure 5-9 Route 200 AVL data filtered to northbound travel 46

LIST OF ACRONYMS

APTA	American Public Transit Association
AVL	Automatic Vehicle Location
BRT	Bus Rapid Transit
GPS	Global Positioning System
GTFS	General Transit Feed Specification
HCM	Highway Capacity Manual
LOS	Level of Service
MBTA	Massachusetts Bay Transportation Authority
MPO	Metropolitan Planning Organization
OTP	On-Time Performance
TCRP	Transit Cooperative Research Program
UDOT	Utah Department of Transportation
UTA	Utah Transit Authority
UVX	Utah Valley Express
V2X	Vehicle-to-Everything
V/C	Volume-to-Capacity
VDOT	Virginia Department of Transportation
WFRC	Wasatch Front Regional Council

EXECUTIVE SUMMARY

Transit signal priority (TSP) is an operational strategy that facilitates the movement of transit vehicles through signal-controlled intersections. Transit vehicle delay can occur for many reasons including traffic congestion, passenger boarding and alighting, traffic signal operations, and other factors. TSP is specifically aimed at reducing delay caused by signal operations. Delay caused by signal operations accounts for an estimated 10-20 percent of overall bus travel times and 50 percent or more of all delay.

Connected vehicle, or vehicle-to-everything (V2X), technology was deployed on Utah Transit Authority (UTA) buses and at signalized intersections, thus enabling "smart" TSP on Redwood Road in Salt Lake County (Route 217) and along the UVX bus rapid transit (BRT) line in the Provo-Orem area of Utah. One way to maximize the efficiency of new V2X deployments is to consider locations where TSP will provide the greatest potential benefit to buses; that is, intersections where buses experience large amounts of delay.

Nearly 200 connected vehicle roadside units are operational on Utah roads and provide tangible benefits every day with several hundred more roadside units already planned for deployment. Until the market penetration rate of connected vehicles increases, fleets equipped with this technology (e.g., UTA buses, UDOT snowplows, and emergency response vehicles) will capture the majority of deployment benefits. Thus, the strategic deployment of connected vehicle technology will maximize benefits when transit routes with the greatest TSP potential are considered when deciding where to deploy.

UTA has 17 core bus routes with at least 15-minute frequency and all-day service as potential candidates for TSP deployment. A data-driven framework was needed to quantitatively evaluate and rank these core routes so TSP deployment benefits can be maximized, and negative impacts or ineffective deployments minimized. This research analyzed bus AVL data recorded every 10 seconds for UTA's 17 core routes and counted how often buses stopped at signalized intersections. Results were compiled by individual intersection, transit route, and roadway corridor. These results were then ranked and sorted into a list of the top 100 intersection locations where TSP would be most useful, and where it does not already exist.

These findings will help inform UTA's and UDOT's prioritization scheme for new V2X deployments by providing a data-driven and needs-based approach to Utah's V2X planning and deployment practices. The analysis framework developed in this project will not benefit UTA and UDOT alone, but transit agencies throughout the state—the Cache Valley Transit District, Park City Transit, High Valley Transit, SunTran, the Basin Transit Association, and the Cedar Area Transportation Service—as they systematically rank potential routes and corridors for TSP deployment.

1.0 INTRODUCTION

1.1 Problem Statement

Transit signal priority (TSP) is an operational strategy that facilitates the movement of transit vehicles through traffic signal-controlled intersections (Smith et al., 2005). Transit vehicle delay can occur for many reasons, such as roadway congestion, acceleration and deceleration time, passenger boarding and alighting, traffic signal operations, reentry, transit vehicles' ability to pass, stop location, roadway design, or exposure to general traffic (Ryus et al., 2013). TSP, however, is specifically aimed at reducing delay caused by signal operations. If there is little existing transit vehicle delay along a route due to signal operations, TSP will likely provide insignificant reductions in transit vehicle delay. It is estimated that delay caused by signal operations counts for 10 to 20 percent of overall bus travel times and 50 percent or more of all delay (Danaher, 2010). Creating and following a methodology to identify transit corridors that would most benefit from TSP is critical for allocating limited financial resources.

From 2010–2018, UTA's average bus speed declined by 24%, from 18.3 to 13.9 mph, while the national average over the same timeframe declined only 3.9% (Transit Center, 2021). Connected vehicle technologies have enabled the deployment of "smart" TSP to minimize traffic signal delays on Redwood Road in Salt Lake County (Route 217) and along the entire length of the new UVX bus rapid transit (BRT) line running through the Provo-Orem area of Utah. Research performed on these two bus routes concluded that implementing TSP provides meaningful and often statistically significant improvements to on-time performance (OTP), mean schedule deviation, and schedule deviation variability, with negative impacts to general traffic on Redwood Road observed, at most, every 43 minutes (Schultz et al., 2020).

A qualitative approach to identify potential transit routes for TSP has informed decision making thus far, and incorporating quantitative criteria relating to intersections, roadway, traffic, and lessons learned from Route 217 and UVX will provide a vital, data-driven framework to guide future TSP deployments. However, there is inadequate documentation to assist transit agencies in identifying corridors for TSP deployment. A Transit Cooperative Research Program (TCRP) synthesis published in 2020 of current TSP practices (National Academies of Sciences,

Engineering, and Medicine, 2020) only mentions that surveyed transit agencies use the following corridor selection criteria for TSP deployment:

- Route type
- Corridor type
- Ridership
- Bus frequency/headway
- Observed service problem
- Other

No additional details were provided. In fact, while some research merely determined whether signal timing plans could even permit shifts in green time for TSP (Boston MPO, 2018; Ali et al., 2018), no research was discovered that used the actual amount of extra green time from TSP as a factor in determining intersections at which to deploy TSP—information that greatly impacts TSP effectiveness and defines how TSP is implemented on UDOT-operated corridors.

UTA has 17 core bus routes with at least 15-minute frequency and all-day service as potential candidates for TSP deployment. A data-driven framework is needed to quantitatively evaluate and rank these core routes so TSP deployment benefits can be maximized, and negative impacts or ineffective deployments minimized. This research analyzes bus AVL data recorded every 10 seconds for UTA's 17 core routes and counts how often buses stopped at signalized intersections. These bus-stopping events are referred to as “intersection stops” in this report.

This research effort also evaluates real instances of bus delay at signalized intersections instead of relying on results generated from a simulation. The provision and utilization of 10-second AVL data is a significant improvement over commonly practiced methods today that use simulations or indirect means of assessing delay and TSP viability at new locations. The results produced in this research are used to rank intersections, bus routes, and roadway corridors by the number of intersection stops to prioritize locations for new TSP deployments.

1.2 Objectives

TSP on Route 217 and UVX improves bus performance with minimal impacts to general traffic, and new routes need to be identified for future TSP deployments. This research quantifies how often buses stop at a given intersection and identifies intersections, bus routes, and roadway corridors that experience the most delay. Large amounts of delay suggest that TSP can improve transit operations, so the research results are used to rank locations with the greatest potential to benefit from future TSP deployments. The specific objectives of this study are to:

- Conduct a review of applicable TSP literature
- Define the experiment design and data sources
- Directly measure bus delay using AVL data and counting the number of intersection stops
- Rank intersections by delay or frequency of intersection stops
- Adjust rankings based on metrics such as bus traversal frequency, number of routes passing through the intersection, and bus stop location
- Apply this framework to determine which core routes or corridors have the greatest potential to benefit from TSP
- Prepare a final report with conclusions and an implementation plan

1.3 Outline of Report

This report is organized into the following chapters:

1. Introduction
2. Literature Review
3. Methodology
4. Results
5. Conclusions
6. Recommendations and Implementation

2.0 LITERATURE REVIEW

2.1 Overview

This chapter presents the findings from the TSP literature review. It explores how agencies determine where to deploy TSP. Methods vary widely from using qualitative engineering judgment to quantitatively satisfying numerous screening criteria. All transportation projects should be consistent with transportation goals and TSP projects are no different. TSP goals typically include reduced travel time and improved OTP. Many agencies have developed a process to identify locations for TSP deployment that provide a favorable environment for TSP to achieve these goals.

Transit Signal Priority: A Planning and Implementation Handbook provides excellent guidance on important issues to consider when deploying TSP. Chapter 4 specifically discusses why TSP should be implemented, who should be involved, what TSP will do, where TSP should be implemented, and how TSP will work (Smith et al., 2005). This literature review primarily addresses current practices for determining where TSP should be implemented.

2.2 Screening Methodology

The purpose of applying a screening methodology in the TSP planning process is to facilitate TSP deployment where positive impacts are likely to be maximized while minimizing negative impacts. Ideally, the screening methodology will assess the potential viability of TSP at a given location and will result in a ranked list where the highest ranked intersection indicates the location with the most favorable conditions and greatest net benefit. This ranking methodology allows a systematic use of funding to improve TSP efficiency.

This section describes various methods and metrics discovered in the literature that are used to implement a screening methodology. Screening criteria can be organized into three primary categories: transit operations, general traffic conditions, and physical infrastructure, each of which is discussed below with its own respective metrics. Also examined in this section is various approaches to scoring and ranking potential deployment locations.

2.2.1 Transit Operations

TSP can only be effective at locations where buses experience delay caused by signalized intersections. This is known as control delay. Consequently, best practice should include the evaluation of how much control delay buses experience at a given intersection. However, most transit systems do not have good information on the impact of control delay on their operations (Smith et al., 2005). This knowledge gap is evidently still present today as documented methods to evaluate bus control delay rarely involve a direct measurement of bus trajectory data despite advances in automatic vehicle location (AVL) penetration rates and data management practices. Instead, indirect measures of bus control delay—conventional bus performance metrics and results from traffic simulations—dominate the literature and standard practice.

To illustrate this knowledge gap, research for New Jersey Transit to determine which intersections are good candidates for TSP revealed that potential for improvement was not used as a transit criterion due to lack of objective methodology or existing data source (Hedden et al., 2009). More recently, the Virginia Department of Transportation (VDOT) published research to assess TSP viability at intersections and used schedule adherence, frequency, global positioning system (GPS)/AVL capabilities, number of passengers, transit level of service (LOS), and bus stop placement as transit criteria (Heaslip et al., 2020). This is shown in Table 2-1 with the corresponding weight and scoring descriptions.

Table 2-1 VDOT Transit Criteria (Heaslip et al., 2020)

Transit Criterion		**Schedule Adherence (OTP)**	**Transit Frequency**	**GPS/AVL**	**Number of Passengers**	**Transit LOS**	**Bus Stop Placement**
Weight		5	4	4	3	3	3
Score	3	< 80%	Over 30 buses/hr	81-100% installed	Over 750 passengers/hr	LOS E, F (>4.25)	81-100% far side
	2	80-89%	21-30 buses/hr	51%-80% installed	501-750 passengers/hr	LOS C, D (>2.75-4.25)	51-80% far side
	1	90-94%	11-20 buses/hr	≤ to 50% installed	251-500 passengers/hr	LOS B (> 2.00-2.75)	1-50% far side
	0	95-100%	10 buses/hr or fewer	Not installed	250 passengers/hr or fewer	LOS A (≤ 2.00)	0% far side

Finally, TCRP Synthesis 149 published in 2020 titled *Transit Signal Priority: Current State of the Practice* surveyed transit agencies and highlights a disagreement between standard and best practices. Among respondents that currently have TSP, 77% indicated that Route Type was a criterion used in selecting corridors for TSP deployment. Additional criteria include Corridor Type – 38%, Ridership – 35%, Bus Frequency/Headway – 31%, and Observed Service Problem – 23% (National Academies of Sciences, Engineering, and Medicine, 2020). This demonstrates that many agencies might view TSP as a tool to improve service rather than a tool to solve an observable service problem like delay at signalized intersections. The following subsections provide details and examples from the literature of various transit operations metrics used in TSP planning.

Delay

Delay for a given vehicle is the difference between its travel time and the travel time of a vehicle traveling at free flow speed. Control delay is the portion of the total delay attributed to traffic signal operation for signalized intersections. Figure 2-1 shows a time-space diagram illustrating the relationship between free flow speed and control delay.

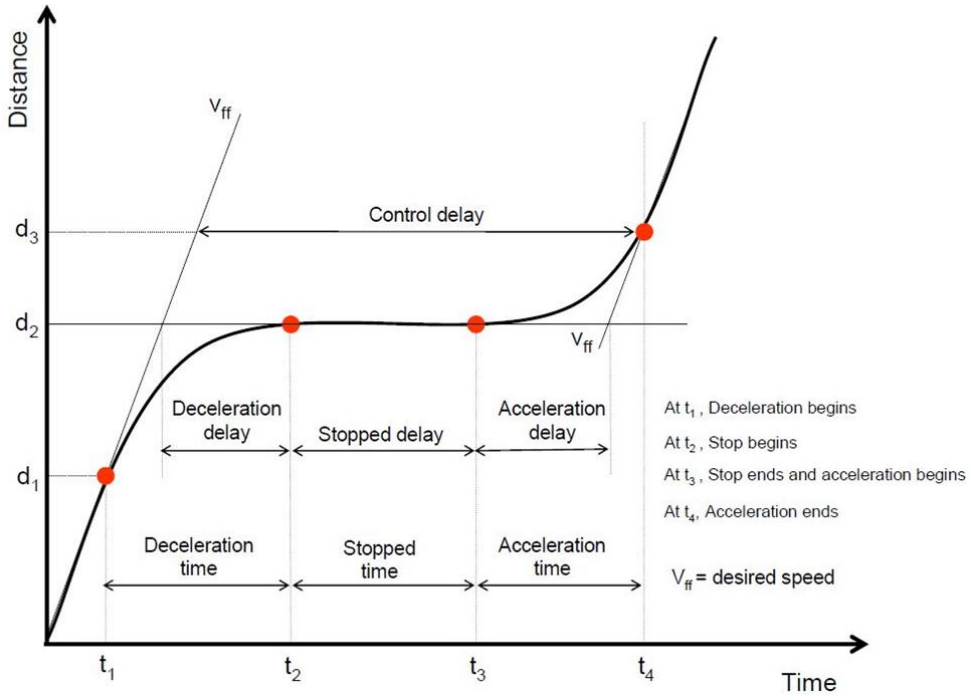

Figure 2-1 Time-space diagram for control delay (Ko et al., 2007)

Understanding the amount of bus control delay is critical to determining where TSP might provide the greatest benefit. Furthermore, control delay is such a critical metric that the Highway Capacity Manual (HCM) uses it to define signalized LOS, as shown in Table 2-2.

Table 2-2 HCM LOS Criteria for Signalized Intersections (HCM, 2020)

Level of Service	Average Control Delay (seconds/vehicle)	Description
A	≤ 10	Free flow
B	> 10 – 20	Stable flow (slight delay)
C	> 20 – 35	Stable flow (acceptable delays)
D	> 35 – 55	Approaching unstable flow (tolerable delay)
E	> 55 – 80	Unstable flow (intolerable delay)
F	> 80	Forced flow (congested, and queues fail to clear)

Using low-resolution GPS data to estimate control delay is not a novel endeavor and several studies use bus AVL data in their evaluations. However, documented use of this data outside of simulations to inform future TSP deployment locations is rare.

A study for UC Davis used a VISSIM simulation to rank intersections by total average delay at the intersection. The average delay at a given intersection was multiplied by the number of buses traveling through the intersection to provide total transit vehicle delay and then multiplied by the number of passengers to provide total passenger delay, each of which were used to rank the intersections in the study (Fehr & Peers, 2011). Table 2-3 shows the results and intersection ranking for these three metrics and Figure 2-2 illustrates the results of the intersection ranking based on ridership delay for the PM peak.

Table 2-3 Analysis of Transit Delay at Signalized Intersections (Fehr & Peers, 2011)

	Intersection	Total Transit Vehicle Delay		Total Passenger Delay		Total Average Delay	
		Sum of All Peak Hours (sec.)	Rank	Sum of All Peak Hours (min.)	Rank	Sum of All Peak Hours (sec.)	Rank
1	Russell/Howard	3758.9	1	4,195.1	2	94.0	17
2	Russell/Anderson	3428.0	2	6,356.3	1	107.1	8
3	Anderson/Covell	2327.8	3	2,936.0	7	101.0	10
4	Russell/B St.	2151.1	4	2,749.5	8	107.6	7
5	Russell/Sycamore	1558.5	5	2,611.4	11	111.3	5
6	Anderson/Villanova	1513.1	6	2,215.6	12	72.2	31
7	Anderson/8th	1447.3	7	2,702.0	9	83.5	25
8	5th/F St.	1408.6	8	1,617.2	17	111.9	4
9	Cowell/Research Park West	1305.0	9	3,299.3	5	110.1	6
10	5th/Pole Line	1284.1	10	1,694.1	16	99.6	12
11	Cowell/Pole Line	1271.8	11	853.0	21	75.3	30
12	5th/L St.	1266.8	12	1,701.2	15	97.6	16
13	Richards/Olive	1238.0	13	3,574.3	3	103.0	9
14	Russell/Arthur	1206.0	14	1,788.3	13	75.4	29
15	Cowell/Drew	1202.4	15	2,645.6	10	98.1	15
16	Anderson/Rutgers	1183.5	16	1,705.9	14	76.8	27
17	Richards/1st	1120.8	17	3,145.7	6	99.4	14
18	5th/G St.	1106.4	18	1,209.8	19	138.3	1
19	Cowell/Valdora	1062.0	19	1,584.2	18	88.0	24
20	1st/D St.	1012.1	20	3,509.6	4	92.0	20
21	Covell/Pole Line	963.3	21	581.9	22	111.9	3
22	Mace/2nd	898.9	22	518.5	23	112.7	2
23	Mace/Chiles	847.4	23	420.3	24	99.5	13
24	8th/F St.	775.9	24	992.7	20	93.2	18
25	Covell/F St.	605.1	25	300.0	29	100.8	11
26	Mace/Cowell	600.2	26	375.6	25	91.9	21
27	Pole Line/Loyola	553.4	27	331.5	26	92.2	19
28	F St./14th	450.1	28	286.4	30	76.6	28
29	Mace/Alhambra	428.7	29	146.2	32	47.5	33
30	Covell/Sycamore	385.4	30	323.5	27	91.2	23
31	Covell/Shasta	327.4	31	310.9	28	91.4	22
32	Covell/John Jones	298.5	32	162.2	31	82.6	26
33	Covell/J St.	277.0	33	128.8	33	50.3	32
34	Covell/Alhambra	188.0	34	68.8	34	38.7	34

Notes:

Candidate Corridor #1: Russell Boulevard - Sycamore Lane to Howard Way

Candidate Corridor #2: Richards Boulevard/Cowell Boulevard - First Street to Pole Line Road

Total transit delay calculated by multiplying the number of transit vehicles passing through each intersection by the average delay at each intersection.

Total passenger delay calculated by multiplying the number of passengers by the average delay at each intersection.

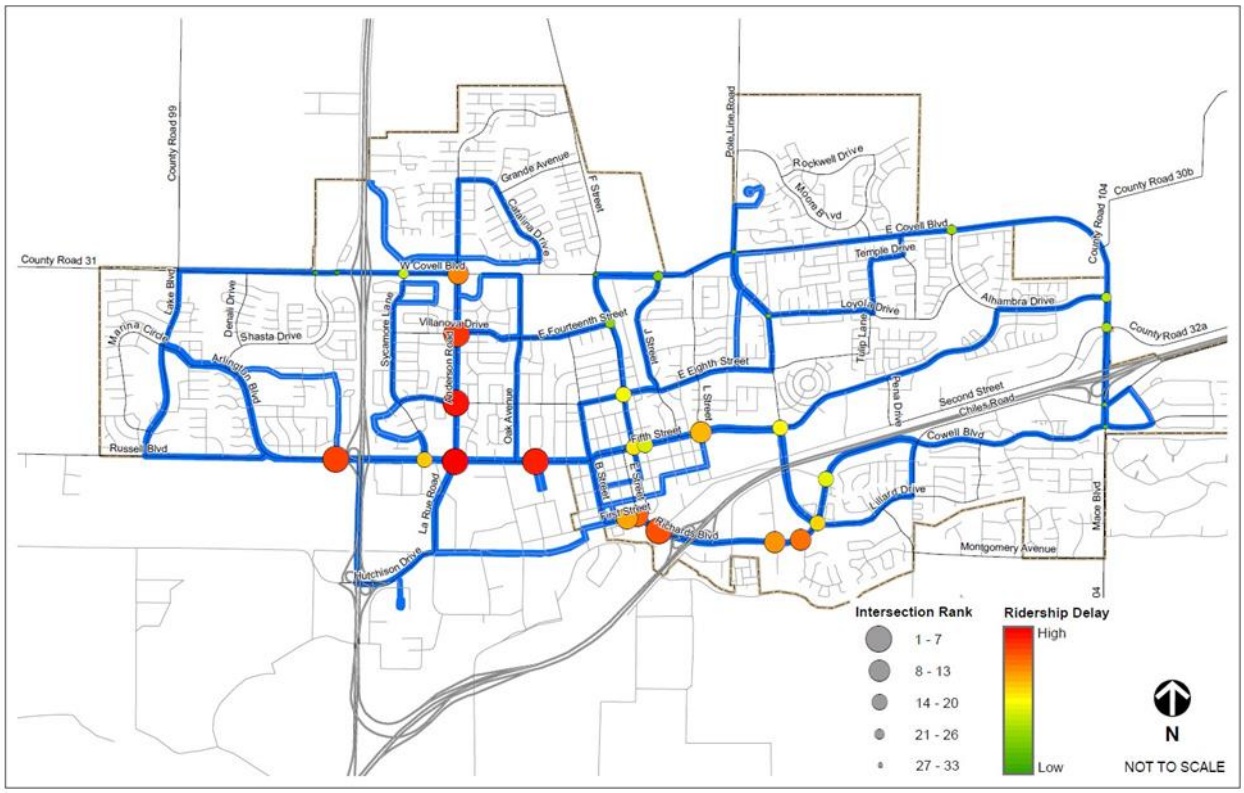

Figure 2-2 PM peak intersection ranking and ridership delay (Fehr & Peers, 2011)

Speed

Delay causes reduction in speed, which is often attributed to congestion, the presence of traffic control devices, or bad weather. Bus delay at signalized intersections will be manifest through speeds lower than free flow speed, a term used to describe the speed at which a vehicle would travel on a given roadway if there were no congestion or other adverse conditions. For transit vehicles, however, reduced speed is common due to frequent stops to load and unload passengers, which makes bus free flow speed difficult to measure. Bus speed approaching a signalized intersection might be impacted by departing a nearside stop, a passenger's call to alight at a far-side stop, congestion, or control delay itself. Although it was not stated in the report, these challenges associated with determining bus free flow speed might be why the UC Davis study previously mentioned used average delay at each intersection multiplied by the number of transit vehicles instead of directly measuring transit vehicle delay.

Montgomery County, MD, used bus speed as a screening criterion where average bus approach speeds would have to be less than 10 mph to satisfy this screening criterion (SWAI, 2018). A subsequent study used the ratio of bus speed to the speed limit of the approach with a threshold of 0.25 used to satisfy the criterion and indicate that signal delay occurred (Xiao et al., 2021).

Portland's Enhanced Transit Candidates program unconventionally defines "peak delay" as the difference between the 90th and 10th percentile operating speeds, which is a way to assess the consistency, or variability, in bus speed (Portland, 2018). Similarly, UDOT evaluated travel time using the 95-percent prediction interval, or the difference between the 97.5th and 2.5th percentile travel times (Sheffield et al., 2021).

Schedule Adherence

A 2020 TCRP Research Report titled *Minutes Matter: A Bus Transit Service Reliability Guidebook* conducted an extensive literature review and identified TSP as the most referenced treatment implemented to improve service consistency and reduce performance variability (Danaher et al., 2020). One example of using schedule adherence in the screening process is shown in Table 2-4 where VDOT assigned higher scores to routes with poorer OTP (Heaslip et al., 2020).

Table 2-4 VDOT OTP Score (Heaslip et al., 2020)

Score	OTP
3	< 80%
2	80 – 89%
1	90 – 94%
0	95 – 100%

Route Type and Frequency

Route type was used by several studies in their location prioritization scheme for TSP. Specifically, BRT and other high-frequency routes are consistently prioritized for TSP implementation. In fact, route type was by far the most common criteria used to identify corridors for TSP deployment (National Academies of Sciences, Engineering, and Medicine, 2020).

A different, but related, characteristic of transit operations is route frequency. Including transit frequency as a screening criterion is aimed at increasing the utilization of TSP as intersections with more frequent bus traversals are also likely to receive more frequent requests for TSP. However, there is a concern that frequently serving TSP will negatively impact general traffic operations. To mitigate this risk, a common strategy to limit TSP requests is to enforce a lockout restriction—the reservice cycle setting in the controller—which denies TSP requests until a certain amount of time or number of "clean" cycles occur, thus enabling sufficient recovery time following TSP service.

At high-frequency locations, especially where transit routes cross one another and serving TSP to one route reduces green time of conflicting routes, strategies using passive priority may yield more favorable results when prioritizing buses at signalized intersections. Passive TSP strategies include fixed signal timing that favors the movement of a transit vehicle, shorter cycle lengths, or a dedicated right-of-way for transit vehicles (Ryus et al., 2013; Smith et al., 2005). A set of TSP deployment guidelines addressed this by allowing TSP if the cross-street bus frequency was ten buses or fewer per hour, per direction (Xiao et al., 2021).

2.2.2 General Traffic Conditions

Metrics associated with general traffic conditions, or non-transit operations, can also be used to identify prioritized locations for TSP. However, traffic simulation results are practically the exclusive source of general traffic condition data used to prioritize TSP locations. Complex and detailed analyses can be performed using simulations at the macro- and microscopic level, so it is easy to see why this tool is a favorite choice among practitioners. Indeed, detailed information about specific vehicles within the simulation model, such as buses, can be obtained

with relative ease. The v/c ratio metric is popular for evaluating general traffic conditions because it is one of the primary outputs of traffic simulations, but it is very rare to calculate it using field data.

Pedestrian Considerations

To ride transit, individuals must be pedestrians at some point along their journey, yet the inclusion of pedestrian-centric metrics are very rare in the literature. A VDOT research report did, however, include such a metric by considering the walkability of an area and the percent of the population that is transit-dependent (Heaslip et al., 2020). This is shown in Table 2-5 with the corresponding weight and scoring descriptions.

Table 2-5 Walkability and Transit Dependence (Heaslip et al., 2020)

Pedestrian Criterion		**Walk Score**	**Transit-Dependent Population**
Weight		3	2
Score	3	90-100: "walker's paradise"	26-100
	2	70-89: most errands can be accomplished on foot	11-25
	1	50-69: some amenities within walking distance	1-10
	0	0-49: car-dependent	0

2.2.3 Physical Infrastructure Characteristics

Many agencies use readily available information about physical infrastructure characteristics along a route or at specific locations to assess potential TSP deployment locations. For example,

Table 2-6 shows that VDOT used physical roadway characteristics such as dedicated right-of-way for transit vehicles, number of lanes per direction, and vertical alignment when assessing the suitability of TSP at new locations.

Table 2-6 VDOT Geometric Criteria (Heaslip et al., 2020)

Geometric Criterion		Dedicated Right-of-Way	Number of Lanes per Direction	Vertical Alignment
Weight		5	3	2
Score	3	Physically separated dedicated right-of-way	Two and above	Uphill, equal to or greater than 5%
	2	Partial physically separated dedicated right-of-way	One plus left/right-turn pockets or two-way left-turn lane	Uphill, 2 to 4.9%
	1	Dedicated right-of-way not physically separated	One with shoulder	Uphill, under 2% but not level
	0	Shared right-of-way	One	Level grade or downhill

2.2.4 Scoring

Research published by VDOT defined a TSP Viability Index, which calculates a weighted sum from a combination of weights and scores for each criterion.

$$TSP_{VI} = \frac{\sum_{i=1}^{19} Weight_i \times Score_i}{50}$$

Where: TSP_{VI} = the TSP Viability Index for the corridor/project in question, $Weight_i$ = the weight assigned for each criteria variable *i* (where 5 is the most viable TSP solution and 1 is the least viable TSP solution), $Score_i$ = the evaluation score for the criteria variable *i* in the corridor being examined (from 3 to 0, explained in following sections), and 50 = the sum of the weights

The weight (1-5) represents the influence of the criterion on the viability of successful TSP implementation while the score (0-3) represents either how much a criterion would affect the ease of implementing TSP or potential for improvement from TSP (Heaslip et al., 2020).

2.3 GPS Data

In the 1990s, a combination of GPS and dead reckoning were increasingly used in transit AVL systems since GPS alone was limited to an accuracy of about 100 meters for non-military uses (Okunieff, 1997). The United States stopped degrading GPS accuracy for civil and

commercial uses on May 1, 2000 (NOAA, 2021). Following this decision and the resulting increase in positional accuracy for non-military and non-government uses, GPS became more integrated into the transportation industry. In 2009, the American Public Transportation Association (APTA) estimated that about half of the nation's transit buses were using GPS to trigger automated stop announcements (APTA, 2009). Nevertheless, there is a clear delay that occurred in adopting GPS to improve traffic operations despite its widespread deployment for navigational purposes.

Although few examples using real data to measure intersection delay were found, one study determined that GPS data with sampling intervals ranging from 1 to 10 seconds are sufficient for calculating intersection control delays (Wang et al., 2016). However, actual bus trajectory data were used in research performed at Purdue University to evaluate bus control delay with the consideration that higher sampling intervals of 1 to 3 seconds is ideal for accurate estimates of control delay. To address this, the research discarded bus trips with an average reporting frequency greater than 5 seconds (Mathew et al., 2022).

3.0 METHODOLOGY

3.1 Overview

When the scope of this research was being developed, bus AVL data were recorded whenever a bus arrived at and departed from a bus stop. This event-based system would not have been conducive to an evaluation of delay at signalized intersections, which requires a continuous stream of data independent from the geographic event triggers (i.e., bus stops). Fortunately, bus AVL data recorded every 10 seconds became available in time for this research and these data were used to directly measure bus delay at signalized intersections. This chapter covers the following sections:

- Data sources
- Data processing and management
- Analysis methodology

3.2 Data Sources

The following three data sources were used to perform this analysis:

- Bus AVL data supplied by UTA
- UTA's General Transit Feed Specification (GTFS) feed
- Traffic signal metadata supplied by UDOT

UTA provided bus AVL data recorded every 10 seconds along core routes from August 1 to August 31, 2022. The data elements used in this analysis are the timestamp, route, trip direction, latitude, longitude, bearing, and speed.

UTA's GTFS feed was utilized to determine the location of bus stops for each bus route and direction. Specifically, the routes.txt, stop_times.txt, stops.txt, and trips.txt files were used to make this determination. The shapes.txt file of the GTFS feed was also used to identify the travel path of each bus route by direction.

Traffic signal metadata—Signal ID, name of street that runs north-south, name of street that runs east-west, latitude, and longitude—were used to identify signalized intersections along each bus route included in the analysis and classify results by corridor.

3.3 Data Processing & Management

Several software applications were used to process the data and prepare it for analysis. ArcGIS Pro was used for spatial analysis and visualization, and R was used to manage and process the AVL dataset. The raw AVL data for the 17 core routes included in this analysis consisted of 15,116,925 records. As discussed in the literature review, simulated data are frequently used to assess bus performance with TSP. In theory, actual field data should mimic simulated data, but this is not the case in reality, and several steps were taken to account for errors in the AVL data, remove outliers, and address the subtleties and inconsistencies in the data. These steps resulted in a smaller dataset that was ultimately used in the analysis and provided for a more uniform and automated approach to the analysis.

Many routes have alternative schedules and travel paths, while some may not even run at all during the weekends. To normalize and simplify the analysis, only weekday AVL data were included in the analysis, which excluded 2,150,850 weekend records.

Several times a year, UTA has a change day where changes to routes and schedules are made all at the same time. The August 7, 2022 change day impacted several core routes and even resulted in realignment of segments of some routes. Only AVL data from after the August 2022 change day were included in the analysis, which caused an additional exclusion of 2,253,374 records. After these two system-wide filters were applied to the data, 10,712,701 records remained, but the need for route-specific filters was also identified.

The AVL data often indicated incorrectly that the bus was operating on a route when in fact it was not. The bus may have been traveling to or from the route or operating on other routes entirely, but for unknown reasons the on-board computer did not always correctly indicate the route field in the AVL data. To illustrate, Figure 3-1 shows a map of Route 45 in the top section and locations of the Route 45 AVL records in the bottom section. This side-by-side display clearly shows that many GPS coordinates records are not actually on Route 45.

Figure 3-1 UTA Route 45 map and associated AVL data (UTA, 2022)

Although most AVL locations and travel paths are aligned with actual roads, there are records with inaccurate locations as evidenced by the string of points in the bottom-right corner of Figure 3-1. Figure 3-2 also shows these points with a satellite imagery basemap to highlight their location in the foothills and not on a road.

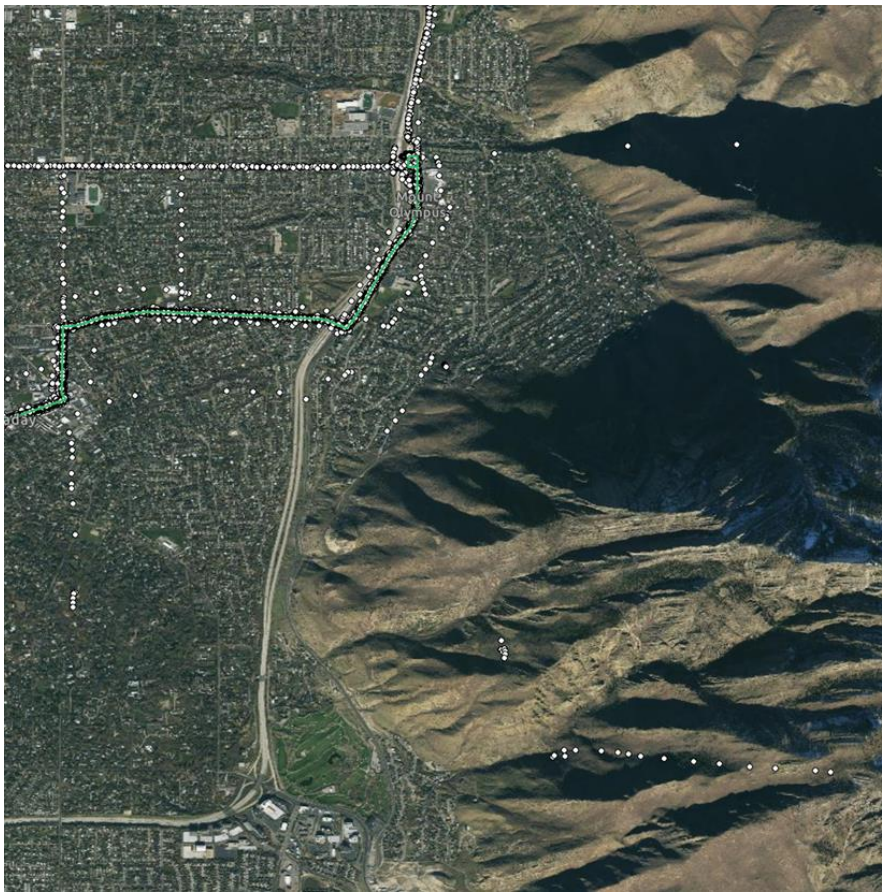

Figure 3-2 Example of GPS errors in the AVL data

To overcome the erroneous route indication and GPS errors in the AVL data, only records within 30 meters of the indicated route were included in the analysis. As an example, Figure 3-3 shows Route 45 and the Route 45 AVL data that were within 30 meters of the route.

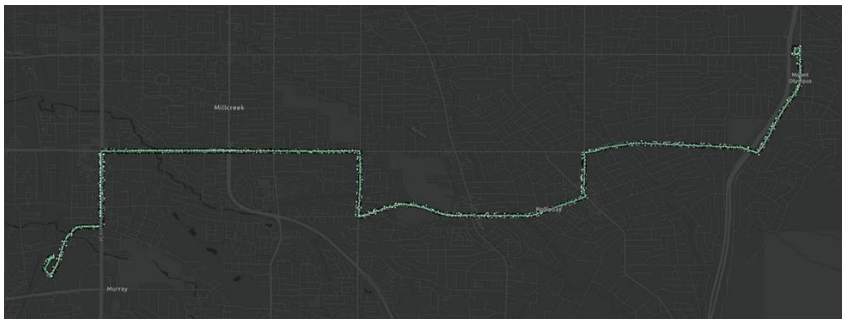

Figure 3-3 Route 45 AVL data within 30 meters (UTA, 2022)

3.4 Analysis Methodology

This research measures bus delay at signalized intersections, but the 10-second recording frequency of the AVL data is not granular enough to enable a true measure of control delay, which was depicted graphically in Figure 2-1 back in Chapter 2 of this report. Of the four red points in that figure, the first and the last points, [d_1, t_1] and [d_3, t_4], respectively, are needed to measure control delay, which corresponds to the time spent approaching an intersection at a speed less than the free flow speed. In a simulation, the locations and speeds of all vehicles in the traffic stream are known; free flow speed can easily be calculated and each point in the chart can be identified precisely for the transit vehicle, an obvious demonstration of why simulations are often used. The 10-second AVL data might produce one or more points along this trajectory, but assumptions about free flow speed and deviations from the time deceleration begins and acceleration ends would inevitably result in an unreliable calculation of control delay.

The most recognizable and irrefutable condition of delay at a signalized intersection is when the vehicle is stopped. Acknowledging the limitation of 10-second AVL data, buses were considered "stopped" when the recorded speed was less than or equal to 1 mph. Thus, the number of AVL records when buses were stopped at an intersection was used to quantify bus delay at signalized intersections.

In an effort to prevent counting instances when buses stop for reasons not attributable to control delay, two important spatial limitations were imposed. First, when the intersection approach had an upstream limit of 100 meters from the intersection itself. Second, AVL data within 15 meters of bus stops were excluded, which is shown in Figure 3-4.

Figure 3-4 AVL data exclusion at bus stops

The top portion of Figure 3-4 shows all AVL data for a single direction of travel with records of stopped buses colored red and moving buses colored green. A bus icon represents a nearside bus stop with a blue area highlighting the 15-meter buffer used to exclude stopped buses believed to be at the bus stop. It is understood that buses may have come to a stop within this buffer without actually stopping at the bus stop to load or unload passengers, but without the status of the bus door (i.e., open or closed), imposing this buffer around bus stops was the best way to exclude buses stopped at bus stops from the evaluation. The middle portion of Figure 3-4 removes the green, moving data points to more easily illustrate the locations of stopped buses and the bottom portion of Figure 3-4 shows stopped buses outside the 15-meter bus stop buffer.

4.0 RESULTS

4.1 Overview

This chapter summarizes bus delay evaluation results for signalized intersections on UTA core routes. Delay was calculated by considering AVL records that met the following criteria:

- Bus is operating on a core route
- Location is within 30 meters of the route's path as indicated by the GTFS feed
- Location is upstream from and within 100 meters of a signalized intersection
- Location is not within 15 meters of a bus stop
- Speed is less than or equal to 1 mph

Counts were obtained for every combination of route and intersection with a full table of results in Table A-1 of the Appendix. Data were aggregated and analyzed by intersection, route, and corridor, with discussions about each provided in the subsequent sections.

4.2 Intersection Stops by Intersection

Evaluating intersection stops by intersection provides insight into what intersections are causing the most delay to transit buses, which is a strong indication of a favorable TSP deployment candidate. Table 4-1 lists the 25 intersections with the greatest number of intersection stops. Maps of Salt Lake County, Utah County, and the Ogden area are illustrated respectively in Figure 4-1, Figure 4-2, and Figure 4-3. The histogram in Figure 4-4 illustrates the expectedly skewed distribution of intersection stops for all 473 intersections along core routes.

Several intersections have considerably more bus intersection stops than the rest, which, in some cases can be attributed to the number of core routes passing through. For example, the 9th-ranked intersection—State Street and 200 South in Salt Lake City—has five routes that pass through it, which cause it to be the 127th-ranked intersection in terms of number of intersection stops per route. Thus, Table 4-1 also contains columns for the number of routes that pass through the intersection, the number of stopping events per route, and the associated rank out of all 473 intersections. Table A-2 in the Appendix shows all 473 study intersections.

Table 4-1 Intersection Stops by Intersection

Signal ID	Street N/S	Street E/W	City	Intersection Stops		Intersection Stops per Route		
				Total	Rank	# of Routes	Total	Rank
7047	Mario Capecchi Dr (SR-282)	North Campus Dr (SR-282) / Medical Dr	Salt Lake City	27,515	1	4	6,878.8	15
6319	400 W	University Pkwy	Orem	22,308	2	1	22,308.0	1
6411	University Ave (US-189)	700 N	Provo	18,728	3	1	18,728.0	2
6417	University Ave (US-189)	University Pkwy	Provo	16,979	4	1	16,979.0	3
6324	State St (US-89)	University Pkwy	Orem	15,256	5	2	7,628.0	10
7086	Redwood Rd (SR-68)	North Temple	Salt Lake City	12,070	6	3	4,023.3	54
6405	University Ave (US-189)	300 S (US-89)	Provo	11,444	7	2	5,722.0	21
1205	400 W	North Temple	Salt Lake City	10,673	8	2	5,336.5	28
7140	State St (SR-186)	200 S	Salt Lake City	10,228	9	5	2,045.6	127
6317	I-15 SPUI	University Pkwy	Orem	10,193	10	1	10,193.0	4
7157	State St (US-89)	4500 S (SR-266)	Murray	9,904	11	3	3,301.3	71
6404	University Ave (US-189)	920 S	Provo	9,524	12	2	4,762.0	38
7104	Redwood Rd (SR-68)	4100 S	West Valley City/Taylorsville	9,483	13	2	4,741.5	39
1021	300 W	1300 S	Salt Lake City	9,409	14	1	9,409.0	5
7287	2700 W	3500 S (SR-171)	West Valley City	9,354	15	1	9,354.0	6
7102	Redwood Rd (SR-68)	3500 S (SR-171)	West Valley City	9,243	16	2	4,621.5	40
7128	300 W	200 S	Salt Lake City	9,182	17	3	3,060.7	80
7155	State St (US-89)	3300 S (SR-171)	South Salt Lake	8,769	18	2	4,384.5	49
7043	Mario Capecchi Dr (SR-282)	South Campus Dr (SR-282)	Salt Lake City	8,578	19	2	4,289.0	52
7138	State St (SR-186)	South Temple	Salt Lake City	8,414	20	2	4,207.0	53
4105	Wasatch Blvd	3900 S	Millcreek	8,274	21	3	2,758.0	87
6628	900 E	University Pkwy	Provo	8,098	22	1	8,098.0	7
6402	University Ave (US-189)	East Bay Blvd	Provo	7,796	23	1	7,796.0	8
6435	Freedom Blvd	University Pkwy	Provo	7,647	24	1	7,647.0	9
7125	300 W	North Temple	Salt Lake City	7,508	25	3	2,502.7	97

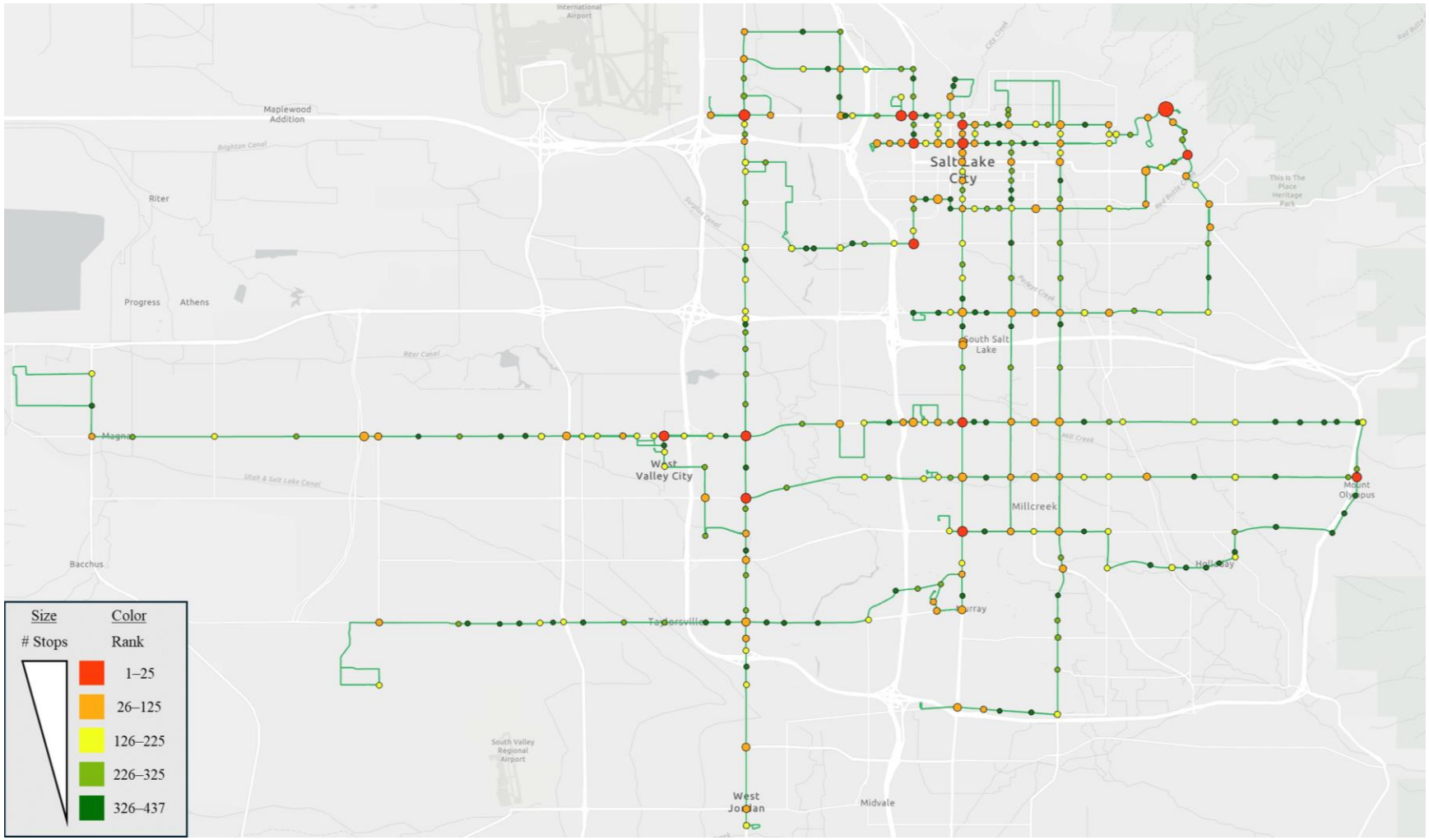

Figure 4-1 Salt Lake City area map

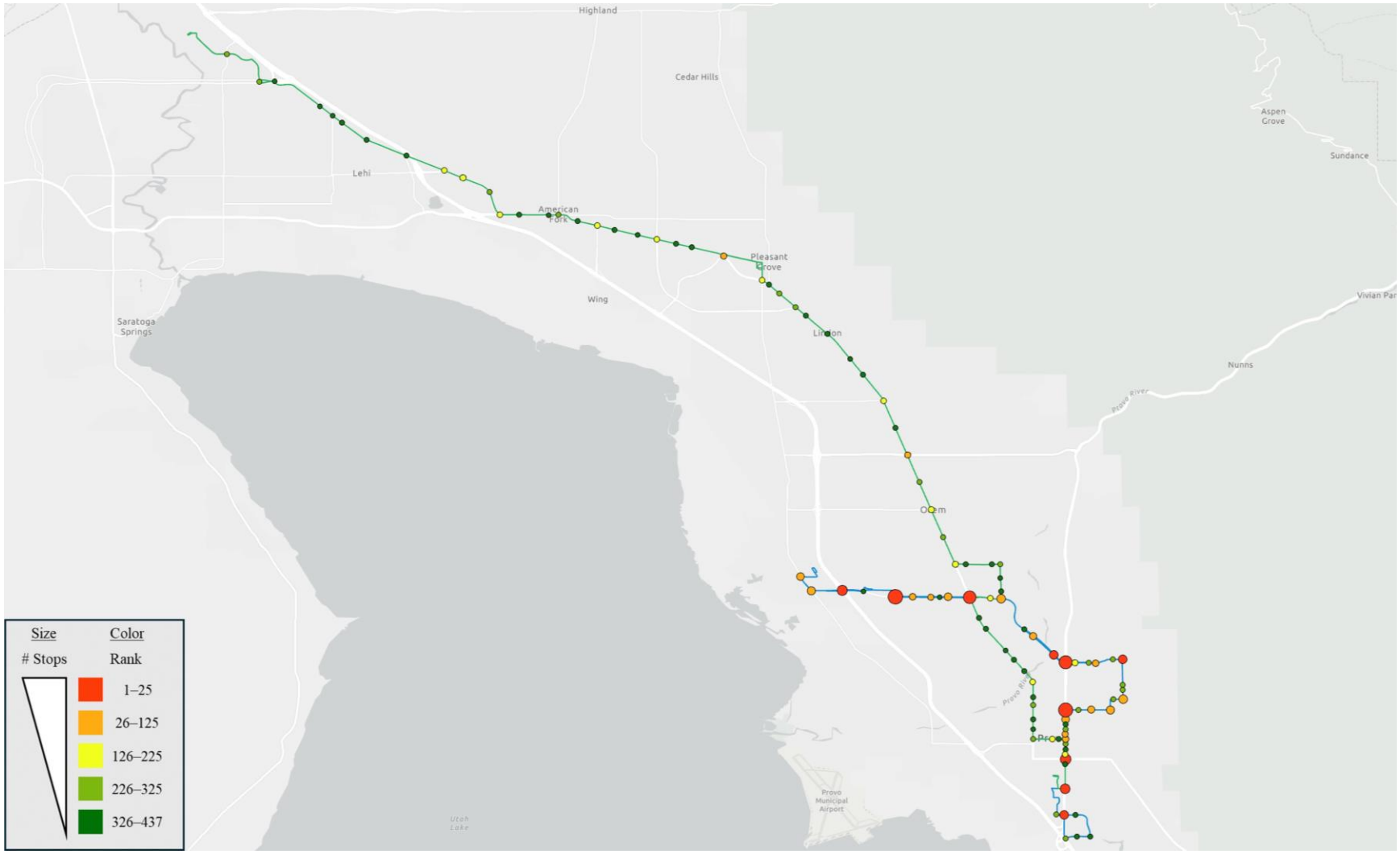

Figure 4-2 Utah County area map

Figure 4-3 Ogden area map

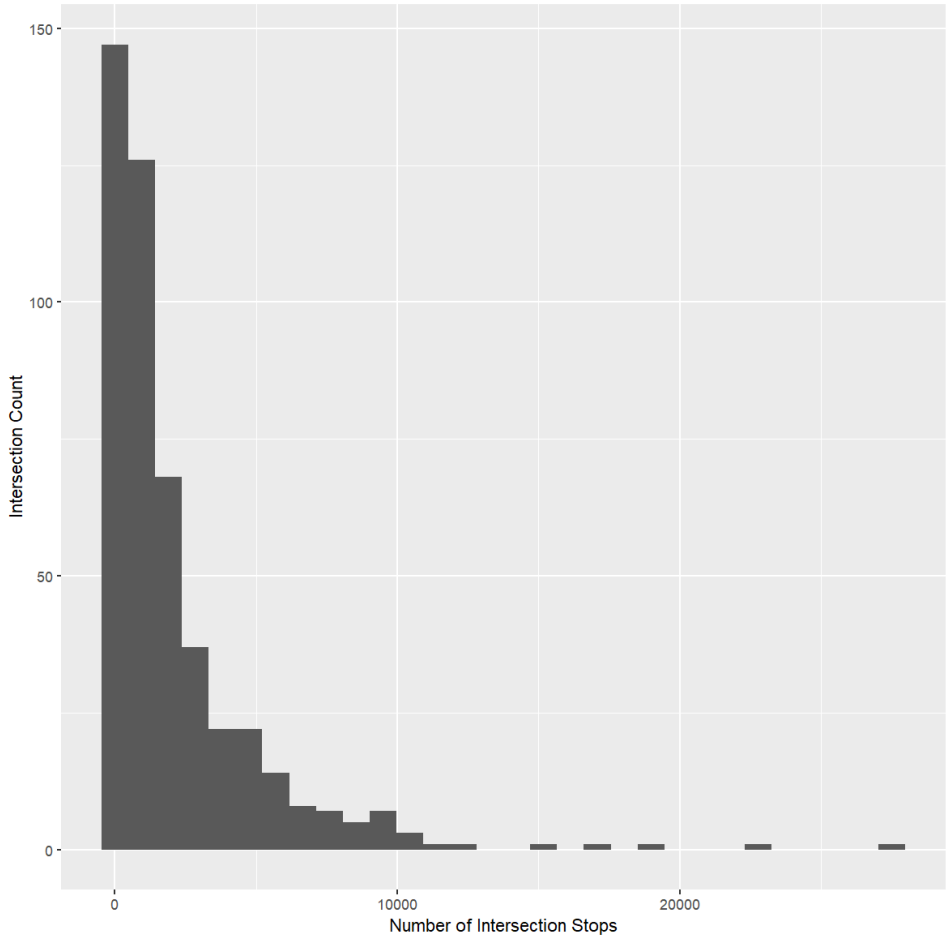

Figure 4-4 Histogram of intersection stops at core route intersections

4.3 Intersection Stops by Route

Evaluating intersection stops by route provides insight into how much delay is occurring at intersections for the route as a whole. These results enable the objective prioritization of one route over another, which easily enables intersections along poorly performing routes to be prioritized for TSP deployment. However, routes that traverse more signalized intersections and routes with more trips per day, all else equal, will likely have more intersection stops. Indeed, total intersection stops has a positive correlation with the number of signalized intersections along the route and the number of trips.

For each of the 17 core routes, Table 4-2 shows the total number of intersection stops, the average number of intersection stops per intersection, the average number of intersection stops per trip, and each of their associated rankings.

Table 4-2 Intersection Stops by Route

Route	Intersection Stops		Intersection Stops per Intersection		Intersection Stops per Trip	
	Total	Rank	Total	Rank	Total	Rank
UVX	200,780	1	4,364.8	1	44.8	1
200	92,890	2	2,444.5	2	39.1	3
9	76,754	3	2,132.1	4	31.8	4
35	71,707	4	2,313.1	3	29.5	6
209	71,319	5	1,658.6	9	29.6	5
217	65,288	6	1,865.4	6	27.1	7
1	62,528	7	1,454.1	11	26.1	8
850	55,806	8	845.5	15	24.6	9
21	51,970	9	1,998.8	5	21.7	10
205	50,219	10	1,091.7	13	44.3	2
39	47,336	11	1,753.2	7	19.6	11
33	34,560	12	1,570.9	10	14.0	16
2	34,249	13	1,712.5	8	14.2	15
612	34,148	14	1,004.4	14	16.9	13
45	19,124	15	765.0	17	16.3	14
54	18,954	16	824.1	16	17.0	12
603	17,436	17	1,162.4	12	7.1	17

It is important to note the consistencies and inconsistencies in Table 4-2, which is more easily accomplished with the color-coded rankings of the three metrics. One consistency is that UVX ranks first in all three metrics. The high number of intersection stops is expected because it runs about twice as many trips as any other route. For both directions combined, UVX has 249 total trips each day while most other core routes have between 126 and 137. Yet, UVX still ranks first in the average number of intersection stops per intersection and per trip. This is surprising since TSP is already implemented along this route. While outside the scope of this research, this highlights an opportunity to review the TSP along this route and improve its effectiveness[1].

[1] The UVX route traverses 46 signalized intersections. Over 33 percent of all UVX intersection stops occur at just 4 intersections, or about 8.7 percent of the intersections. These four intersections are SIG #6319 University Pkwy & 400 W, SIG #6324 University Pkwy & State St (US-89), SIG #6417 University Pkwy & University Ave (US-189), and SIG #6411 University Ave (US-189) & 700 N.

The phase insertion TSP strategy should be considered by UDOT signal engineers at intersections with particularly large delay. Larger values for allowable extra TSP green time should also be considered. While the rankings of each metric are about the same for a given route, there are two routes that lack this general consistency more so than others: Route 850 and Route 205.

Route 850 ranks 8th for total number of intersection stops and 9th for intersection stops per trip, but 15th for intersection stops per intersection. This can be attributed to the fact that Route 850 is the longest of all core routes and traverses 66 signalized intersections, more than any other core route (the next closest are UVX and Route 205, each traversing 46 signalized intersections). Thus, Route 850 performs comparatively well with less delay at intersections than most core routes.

Route 205 has similar ranks for total number of intersection stops (10th) and stops per intersection (13th) but ranks 2nd for intersection stops per trip. For both directions combined, Route 205 has 63 total trips each day. Of all core routes, only Route 54 has fewer trips per day with 62, yet it only experiences an average of 17 intersection stops per trip, close to one-third of that which is experienced by Route 205.

Finally, the top 10 routes with the most intersection stops are also the top 10 routes with the most stops per trip. This is an important overlap that suggests greater need along these routes, referred to hereafter as the Top 10 Routes.

4.4 Intersection Stops by Corridor

Evaluating intersection stops by corridor provides an understanding of which corridors can be favorable for TSP deployment. There are several benefits to deploying TSP on a corridor basis. First, general traffic conditions will usually be more similar along a given roadway corridor than along a given transit route. This more uniform condition of general traffic suggests a more uniform need for TSP, compared to a route-level deployment that may operate on both major arterials and smaller, local roads. Corridor-level deployments can also be used by other vehicle-to-everything (V2X)-equipped vehicles seeking preferential treatment, such as

snowplows and emergency response vehicles that are more likely to travel along a specific roadway corridor than follow a meandering transit route.

Furthermore, the same corridor, or even segment of a corridor, might be traversed by many transit routes. For example, Redwood Road in Salt Lake County has seven core routes that either travel on or through it, even though only one route (Route 217) operates the length of the corridor. Deploying TSP on this route would most obviously benefit Route 217, but it would also benefit the other six core routes that interact with Redwood Road. One caveat is that buses need to be equipped with V2X hardware to request TSP, which demonstrates an opportunity and need to increase the V2X penetration rate within the UTA fleet.

Partial results of the corridor analysis are contained in Table 4-3 and Table 4-4 for north-south and east-west corridors, respectively. It is important to note that corridors are also grouped by UDOT Region. As an example, there are 46 intersections with a north-south corridor designation of "State St (US-89)," yet it would be inappropriate to consider all 46 intersections as a single north-south corridor. Upholding the concept that a corridor requires there to be more than one intersection, only corridors with four or more intersections are included in the result tables in this section. The tabulated results for all corridors can be found in the Appendix in Table A-3 and Table A-4 for north-south and east-west corridors, respectively.

Table 4-3 Intersection Stops by N/S Corridor with 4+ Intersections

N/S Street		Signalized Intersections		Intersection Stops		Intersection Stops per Signal	
	Region	Total	Rank	Total	Rank	Total	Rank
Redwood Rd (SR-68)	2	38	1	97,815	1	2,574.1	35
Washington Blvd	1	29	2	32,422	8	1,118.0	80
900 E	2	23	5	50,857	4	2,211.2	44
State St (US-89)	2	23	5	78,905	3	3,430.7	15
State St (US-89)	3	23	5	35,713	7	1,552.7	65
500 E	2	17	6	31,282	9	1,840.1	56
University Ave (US-189)	3	15	7	83,164	2	5,544.3	7
300 W	2	14	8	41,242	6	2,945.9	24
1300 E	2	9	11	17,452	16	1,939.1	53
Harrison Blvd	1	9	11	11,714	21	1,301.6	71
Main St	2	9	11	18,829	14	2,092.1	48
West Temple	2	8	12	21,610	13	2,701.3	29

500 W	3	7	14	4,506	46	643.7	103
700 E	2	7	14	24,529	11	3,504.1	13
200 E	2	6	17	11,003	22	1,833.8	57
300 E	2	6	17	1,783	72	297.2	120
Mario Capecchi Dr (SR-282)	2	6	17	45,275	5	7,545.8	3
1100 E	2	5	22	4,954	44	990.8	84
500 W	2	5	22	6,265	34	1,253.0	73
900 W	2	5	22	13,876	18	2,775.2	28
State St (SR-186)	2	5	22	26,168	10	5,233.6	8
Wasatch Blvd	2	5	22	10,035	24	2,007.0	51
200 W	2	4	31	5,068	41	1,267.0	72
2100 E	2	4	31	6,052	36	1,513.0	66
2200 W	2	4	31	7,279	29	1,819.8	58
2300 E	2	4	31	4,918	45	1,229.5	74
2700 W	2	4	31	12,296	19	3,074.0	22
400 W	2	4	31	17,564	15	4,391.0	10
700 W	2	4	31	6,031	37	1,507.8	68
800 E	3	4	31	8,353	28	2,088.3	49
900 E	3	4	31	16,426	17	4,106.5	11

Table 4-4 Intersection Stops by E/W Corridor with 4+ Intersections

E/W Street		Signalized Intersections		Intersection Stops		Intersection Stops per Signal	
	Region	Total	Rank	Total	Rank	Total	Rank
3300 S (SR-171)	2	26	1	55,744	3	2,144.0	53
3500 S (SR-171)	2	22	2	58,254	2	2,647.9	38
3900 S	2	18	4	44,049	6	2,447.2	46
University Pkwy	3	18	4	115,243	1	6,402.4	6
200 S	2	16	5	55,425	4	3,464.1	27
2100 S	2	15	6	34,435	7	2,295.7	49
5400 S	2	14	8	16,094	13	1,149.6	83
US-89 (State St)	3	14	8	8,978	23	641.3	118
North Temple	2	13	10	48,673	5	3,744.1	23
South Temple	2	13	10	32,186	8	2,475.8	45
4500 S (SR-266)	2	10	12	25,839	11	2,583.9	40
900 S	2	10	12	18,728	12	1,872.8	63
100 S	2	8	14	12,824	18	1,603.0	69
1300 S	2	8	14	15,323	15	1,915.4	61
800 S	2	7	16	14,205	17	2,029.3	58
Murray-Holladay Rd	2	7	16	5,452	38	778.9	107
600 N	2	6	17	7,310	28	1,218.3	79

1700 S	2	5	20	4,759	43	951.8	92
400 S	2	5	20	15,827	14	3,165.4	32
California Ave	2	5	20	7,094	29	1,418.8	74
100 N	3	4	30	6,665	30	1,666.3	67
25th St	1	4	30	824	117	206.0	165
26th St	1	4	30	6,319	34	1,579.8	70
2700 S	2	4	30	3,369	60	842.3	100
500 S	2	4	30	11,001	20	2,750.3	36
5415 S (SR-173)	2	4	30	978	108	244.5	160
700 N	3	4	30	31,125	9	7,781.3	4
800 S	3	4	30	3,385	58	846.3	98
Main St	3	4	30	2,559	69	639.8	119
Washington Blvd	1	4	30	5,892	36	1,473.0	72

5.0 CONCLUSIONS

5.1 Summary

The results of this research will directly impact UTA's prioritization scheme, the strategic deployment of V2X technology, and choices about where to prioritize limited TSP corridor funding. UTA is in the process of developing a TSP Master Plan, but there is an important element that is missing: determining which locations should be prioritized for TSP. The results of this research will fill this knowledge gap and will guide UTA's prioritization strategy.

Prioritizing transit is an important way to achieve the UDOT vision of "Keeping Utah Moving." On average, each one of UTA's core transit bus routes transports over 2,100 passengers each day. Reducing transit travel delay will save time for thousands of people every day. These research results will simultaneously help UDOT focus corridor and V2X deployment funding where prioritized transit routes operate.

Finally, the analysis framework developed in this project will not benefit UTA and UDOT alone, but transit agencies throughout the state—the Cache Valley Transit District, Park City Transit, High Valley Transit, SunTran, the Basin Transit Association, and the Cedar Area Transportation Service—as they systematically rank potential routes and corridors for TSP deployment. This chapter contains discussions on the findings produced by this research and the limitations and challenges that exist.

5.2 Findings

One of the challenges with transit operations that TSP can directly overcome is delay caused by buses stopping at signalized intersections. A strategic, needs-based approach to prioritizing intersections for TSP will help maximize the return on investment from limited V2X deployment resources.

Prioritizing intersections based on total number of intersection stops has value because it directly addresses the problem by prioritizing locations where buses stop most often. However, buses also need to be equipped with V2X hardware to request TSP. A scattered TSP deployment

at intersections with the most delay may result in an equipped bus passing through few equipped intersections on its route. Such a solution would not help late buses along other segments of its route and strengthens the argument for prioritizing intersections on bus routes with the greatest need. A scattered deployment would also prevent other V2X users, such as snowplows and emergency response vehicles, from requesting lifesaving preemption along the corridors they travel. That fact adds further support for prioritizing intersections on roadway corridors with the greatest need.

Fortunately, there is considerable overlap between intersections, bus routes, and roadway corridors with large amounts of transit delay. Beginning arbitrarily with the top 250 intersections with the most stops, we compare them with the 346 intersections traversed by the Top 10 Routes (the top 10 routes for both intersection stops and intersection stops per trip). This comparison yields 200 intersections that are part of both.

Of these 200 intersections, some are already equipped from previous efforts by UDOT, UTA, and the Wasatch Front Regional Council (WFRC), the metropolitan planning organization whose jurisdiction covers Salt Lake County. This list of 200 is further reduced to 91 by removing the already-equipped intersections on Route 217, UVX, Route 35, Route 33, Route 200, Route 850, and OGX.

To obtain a final prioritized list of 100 intersections, 9 additional locations are needed. Route 9 experiences the most intersection delay of all unequipped core routes, so the final 9 intersections are selected from this route. Following this method, the list of the 100 prioritized intersections is shown in Table 5-1 with new rankings by number of intersection stops. Maps of these 100 locations are shown in Figure 5-1 for Salt Lake County, Figure 5-2 for Utah County, and Figure 5-3 for the Ogden area. The locations of existing V2X deployments are also shown in these maps with solid black circles.

Table 5-1 100 Prioritized Intersections

Signal ID	Street N/S	Street E/W	City	Intersection Stops	
				Total	Rank
7047	Mario Capecchi Dr (SR-282)	North Campus Dr (SR-282) / Medical Dr	Salt Lake City	27,515	1
7086	Redwood Rd (SR-68)	North Temple	Salt Lake City	12,070	2

1205	400 W	North Temple	Salt Lake City	10,673	3
1021	300 W	1300 S	Salt Lake City	9,409	4
7128	300 W	200 S	Salt Lake City	9,182	5
7043	Mario Capecchi Dr (SR-282)	South Campus Dr (SR-282)	Salt Lake City	8,578	6
7125	300 W	North Temple	Salt Lake City	7,508	7
7135	West Temple	800 S	Salt Lake City	7,303	8
1042	Main St	200 S	Salt Lake City	6,893	9
7110	Redwood Rd (SR-68)	5400 S	Taylorsville	6,554	10
7184	700 E	900 S	Salt Lake City	6,013	11
1098	900 E	South Temple	Salt Lake City	5,959	12
1091	500 E	2100 S	Salt Lake City	5,886	13
1032	West Temple	200 S	Salt Lake City	5,298	14
7142	State St (US-89)	400 S	Salt Lake City	5,080	15
7318	900 E	4500 S (SR-266)	Millcreek	5,035	16
1177	600 W	200 S	Salt Lake City	4,898	17
1080	500 E	South Temple	Salt Lake City	4,640	18
7250	900 E	400 S	Salt Lake City	4,574	19
1229	1300 E	2100 S	Salt Lake City	4,565	20
1016	400 W	200 S	Salt Lake City	4,555	21
7187	700 E	2100 S	Salt Lake City	4,545	22
1218	900 W	North Temple	Salt Lake City	4,342	23
1107	900 E	2100 S	Salt Lake City	4,087	24
7045	Mario Capecchi Dr (SR-282)	Hospital entrance	Salt Lake City	3,964	25
1053	200 E	200 S	Salt Lake City	3,963	26
7633	Main St	300 N (SR-186)	Salt Lake City	3,817	27
7084	Redwood Rd (SR-68)	700 N	Salt Lake City	3,748	28
7348	Woodrow (120 W)	5300 S (SR-173)	Murray	3,504	29
7317	500 E	4500 S (SR-266)	Murray/Millcreek	3,464	30
1215	1950 W	North Temple	Salt Lake City	3,390	31
7046	Central Campus Dr	North Campus Dr (SR-282)	Salt Lake City	3,374	32
1019	300 W	800 S	Salt Lake City	3,308	33
7247	500 E	400 S	Salt Lake City	3,263	34
1100	900 E	200 S	Salt Lake City	3,190	35
1224	Main St	North Temple	Salt Lake City	3,162	36
1051	200 E	South Temple	Salt Lake City	3,119	37
1157	500 W	200 S	Salt Lake City	3,054	38
1116	1300 E	South Temple	Salt Lake City	3,051	39
4013	900 E	3900 S	Millcreek	2,917	40
7089	Redwood Rd (SR-68)	I-80 EB Ramps	Salt Lake City	2,916	41
4015	500 E	3900 S	South Salt Lake/Millcreek	2,877	42
1104	900 E	900 S	Salt Lake City	2,854	43

1124	Guardsman Wy	Sunnyside Ave (850 S)	Salt Lake City	2,630	44
1216	1460 W (Garside St)	North Temple	Salt Lake City	2,614	45
7004	Fashion Blvd (280 E) / I-215 S WB Ramps	Winchester (6400 S)	Murray	2,614	45
7083	Redwood Rd (SR-68)	1000 N	Salt Lake City	2,529	47
4739	Woodrow St (130 W)	Cottonwood St (5210 S)	Murray	2,502	48
1003	900 W	600 N	Salt Lake City	2,473	49
1007	900 W	California Ave	Salt Lake City	2,448	50
1121	University	100 S	Salt Lake City	2,411	51
1112	1100 E	2100 S	Salt Lake City	2,334	52
1025	200 W	200 S	Salt Lake City	2,197	53
1002	1200 W (Glendale)	California Ave	Salt Lake City	2,157	54
1094	700 E	South Temple	Salt Lake City	2,140	55
7097	Redwood Rd (SR-68)	SR-201 SPUI	Salt Lake City/West Valley City	2,135	56
7316	Main St	4500 S (SR-266)	Murray	2,085	57
1099	900 E	100 S	Salt Lake City	2,060	58
1088	500 E	900 S	Salt Lake City	1,973	59
1052	200 E	100 S	Salt Lake City	1,970	60
7112	Redwood Rd (SR-68)	I-215 S WB Off-ramp/Target	Taylorsville	1,905	61
7619	I-15 SPUI	600 N	Salt Lake City	1,897	62
1013	400 W	300 N	Salt Lake City	1,828	63
1226	1300 E	900 S	Salt Lake City	1,802	64
1222	West Temple	North Temple	Salt Lake City	1,715	65
7069	500 W	1300 S	Salt Lake City	1,713	66
7114	Redwood Rd (SR-68)	6200 S	Taylorsville	1,677	67
1101	900 E	300 S	Salt Lake City	1,589	68
1117	1300 E	100 S	Salt Lake City	1,546	69
6607	Freedom Blvd	100 N	Provo	1,504	70
1059	200 E	900 S	Salt Lake City	1,387	71
7087	Redwood Rd (SR-68)	South Temple	Salt Lake City	1,367	72
1129	2100 E	2100 S	Salt Lake City	1,362	73
1001	1200 W	600 N	Salt Lake City	1,311	74
1031	West Temple	100 S	Salt Lake City	1,284	75
1219	800 W	North Temple	Salt Lake City	1,253	76
7041	1725 E	South Campus Dr (SR-282)	Salt Lake City	1,207	77
1172	300 W	1120 S (Target)	Salt Lake City	1,192	78
1125	1700 E	2100 S	Salt Lake City	1,179	79
7273	Main St	2100 S	Salt Lake City/South Salt Lake	1,140	80
1030	West Temple	South Temple	Salt Lake City	1,130	81
7631	8400 W (SR-111)	2700 S	Salt Lake County	1,122	82
7410	Redwood Rd (SR-68)	North Star Dr / 300 N	Salt Lake City	1,112	83

7044	Mario Capecchi Dr (SR-282)	Wasatch Dr	Salt Lake City	1,109	84
1090	500 E	1700 S	Salt Lake City	1,066	85
7088	Redwood Rd (SR-68)	I-80 WB Ramps	Salt Lake City	1,055	86
1084	500 E	500 S	Salt Lake City	1,049	87
6723	Triumph Blvd (2350 W)	Ashton Blvd	Lehi	1,044	88
7042	1800 E	South Campus Dr (SR-282)	Salt Lake City	1,042	89
1077	400 E	900 S	Salt Lake City	972	90
1103	900 E	800 S	Salt Lake City	959	91
1020	300 W	900 S	Salt Lake City	705	92
1010	700 W	1300 S	Salt Lake City	640	93
1068	300 E	900 S	Salt Lake City	521	94
1028	200 W	800 S	Salt Lake City	293	95
1160	Emery St (1170 W)	California Ave	Salt Lake City	255	96
1170	800 W	1300 S	Salt Lake City	165	97
1159	1100 W (Jordan River Ped Xing)	California Ave	Salt Lake City	128	98
1046	Main St	800 S	Salt Lake City	99	99
1047	Main St	900 S	Salt Lake City	40	100

Even though corridor designation was not used in this process, these maps illustrate that the prioritized list of intersections supports a corridor-level approach to prioritization. This is partly because UTA core routes generally follow a given roadway, but also because of similar conditions along a corridor that cause bus delays. An overwhelming majority of corridors with large delay are covered by this approach, and holes in existing V2X deployments are filled in.

Some explanation is warranted as to the relationship of Figures 5-1, 5-2, and 5-3 with Figures 4-1, 4-2, and 4-3. The main difference between these sets is that the figures in Chapter 5 have an additional color category (black) representing intersections where RSUs have already been deployed. Thus, some intersections that show up in color in the Chapter 4 set of figures are represented by black dots in the Chapter 5 set. The colored dots in the Chapter 5 set of figures represent the prioritized list of 100 intersections that are not already deployed with RSUs and where large delay is observed, thus suggesting where TSP would be most useful. Those intersections retain the same color coding as their respective intersection locations in the Chapter 4 set of figures in order to make it easier for the reader to compare the figures in each chapter. Table 5-1 on the other hand uses a new color scheme specific to the prioritized list of 100 intersections.

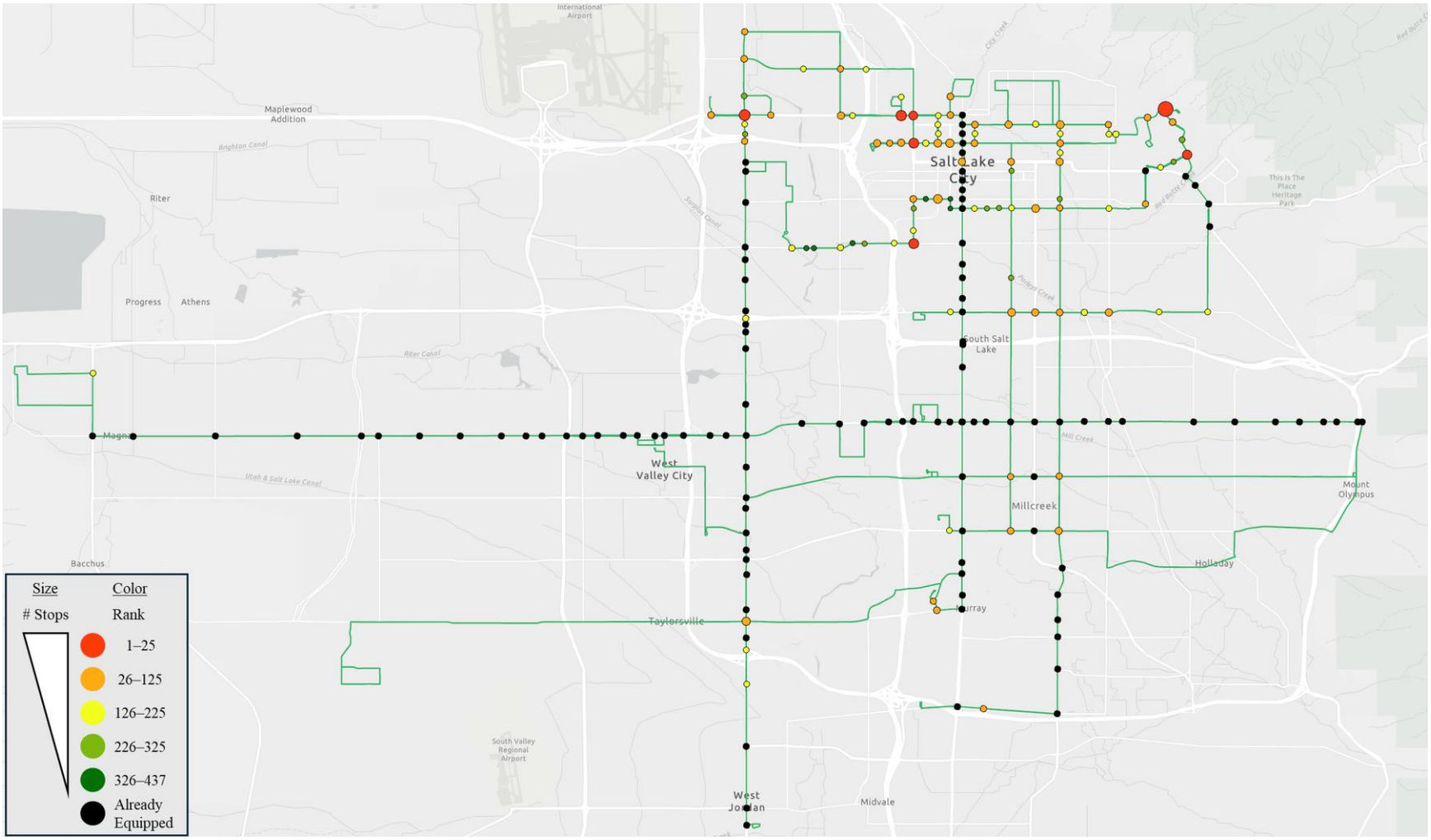

Figure 5-1 Prioritized intersections in Salt Lake County

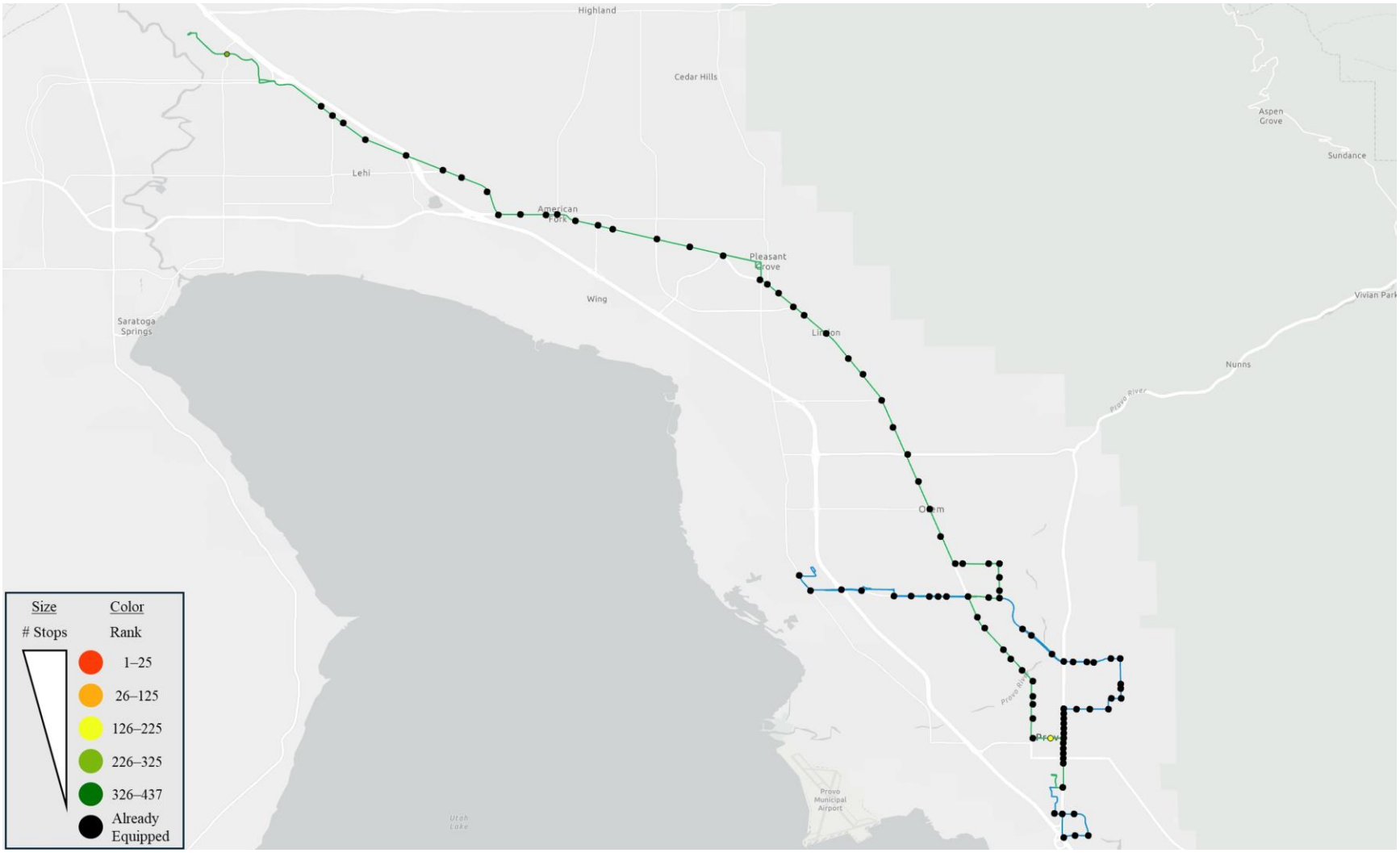

Figure 5-2 Prioritized intersections in Utah County

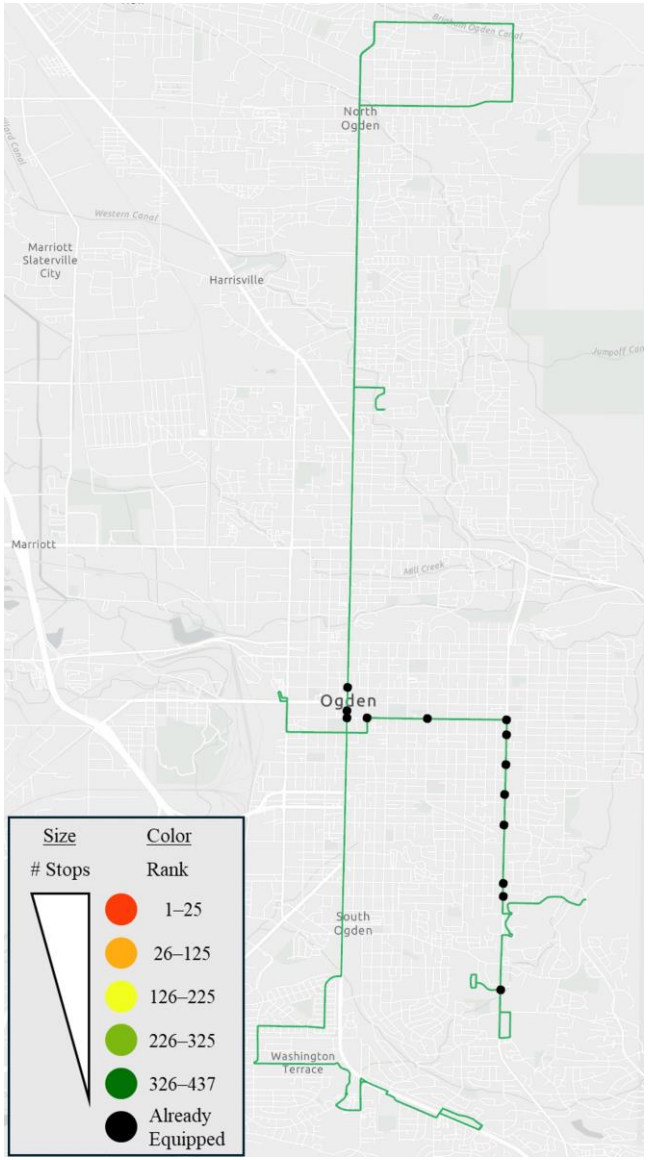

Figure 5-3 Prioritized intersections in Ogden area

5.3 Limitations and Challenges

The analysis methodology and results are accompanied by several limitations and challenges that are important to acknowledge. Some were overcome by varying degrees as they were identified, but there were others that remained as an enormous amount of manual effort would have been needed to overcome or limit their impact. Some encountered challenges were considered insignificant and are not mentioned, but the primary limitations and challenges are identified and described below. Notwithstanding, the impacts of these challenges and limitations is not believed to be significant enough to discredit the results and findings presented.

A major challenge with the analysis methodology was the discrepancy between the GTFS feed and the AVL data. Discrepancies with the greatest impact involved apparent travel deviations from the GTFS-defined route. An example of this occurred on Route 209 and is shown in Figure 5-4, which contains all of the Route 209 AVL data and the cyan-colored path of the GTFS-defined Route 209. A red dotted line was manually added to indicate the route deviation, which is clearly evident by the large number of Route 209 AVL records that deviated from the GTFS-defined path. As described in the methodology chapter, AVL records more than 30 meters from the GTFS-defined path were excluded. Buses that deviate from the GTFS-defined route may do so as a result of a crash that is blocking traffic, road construction, or because they are traveling true to their route, and it is the GTFS feed that is in error.

A similar phenomenon occurs with the locations of bus stops along the route, as shown in Figure 5-5. In this example, the AVL data for westbound Route 45 and the GTFS-defined bus stop location along this segment of the route are displayed. The white bus icon represents the GTFS-defined bus stop and each red AVL data point indicates where the AVL data recorded a speed less than or equal to 1 mph. The bus stop icon and the cluster of red data points demonstrate the discrepancy. In this case, Google Street View images were used to determine that the GTFS feed contains the incorrect stop location, an error with impacts that extend beyond this research as online mapping services also use the GTFS feed, which is shown by the Google Map screenshot in Figure 5-6.

Figure 5-4 Route 209 AVL and GTFS data

Figure 5-5 Route 45 AVL and GTFS data

Figure 5-6 Route 45 bus stop location discrepancy

Regardless of the cause, these discrepancies add unknown levels of uncertainty to the results. Persistent route deviations may severely affect the final count of intersection stops while incorrect bus stop locations would only affect the results if either the actual or erroneous bus stop were in the ingress lanes and within 100 meters of an intersection. An accurate GTFS feed would be the best way to overcome, and even eliminate, this challenge.

Another challenge occurred with the recorded values for bearing in the AVL data, which were often recorded as zero when buses were stopped. This is an issue because some bus routes make a loop and approach the same intersection from different angles. When this occurs, it is expedient that AVL records in the egress lanes are excluded so only records where buses are stopped in the ingress lanes and within 100 meters of the intersection are counted as intersection stops. For example, Route 200 loops around the State Capitol and approaches the Main Street/ 300 North signal in both the northbound and westbound directions, as shown in Figure 5-7. Figure 5-8 shows Route 200 AVL data added and colored according to bearing.

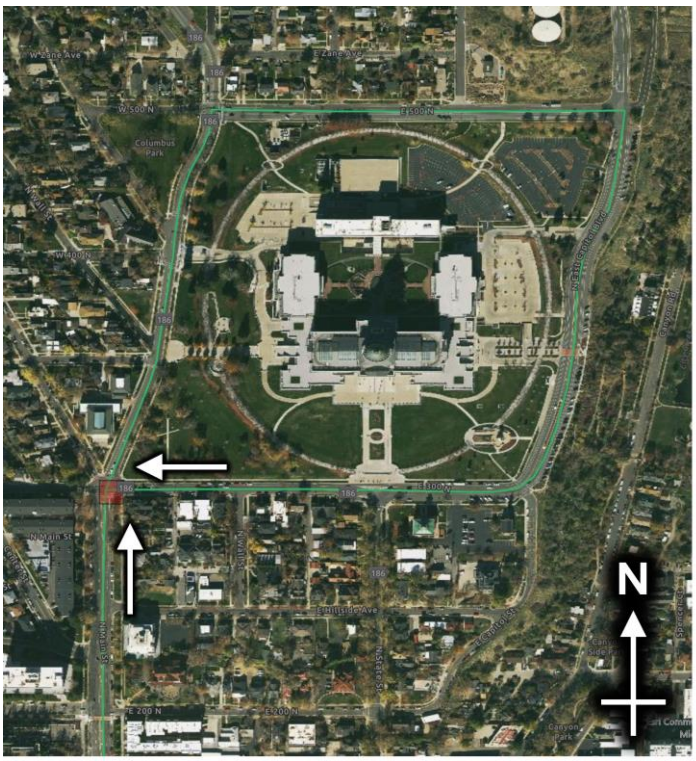

Figure 5-7 Multiple approaches to same intersection on Route 200

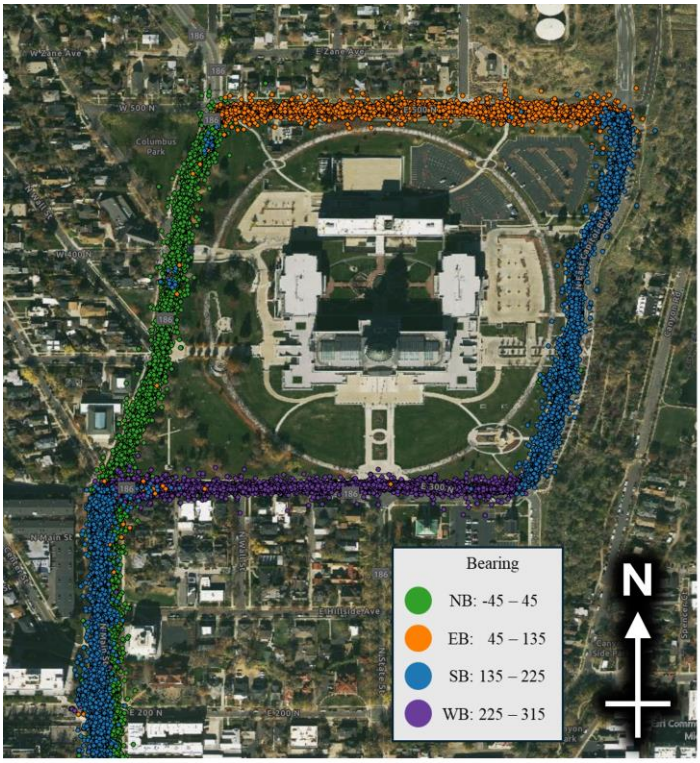

Figure 5-8 Route 200 AVL data

In Figure 5-9, the AVL data is then filtered to only display records with a speed less than or equal to 1 mph (i.e., bus is stopped) and a bearing indicating a northbound direction of travel (-45 to 45 degrees). As buses leave the intersection by making a westbound left, any records after the turn with a southbound bearing (135-225 degrees) need to be discarded. The issue is that stopped buses often record a bearing of zero, or northbound direction of travel, which would include them in the count of intersection stops at this location. This did not occur very often, but when it did, an attempt to manually exclude the egress records was made. Accordingly, it is believed that the impact of this challenge is minimal and does not have a meaningful impact on the final results of the analysis.

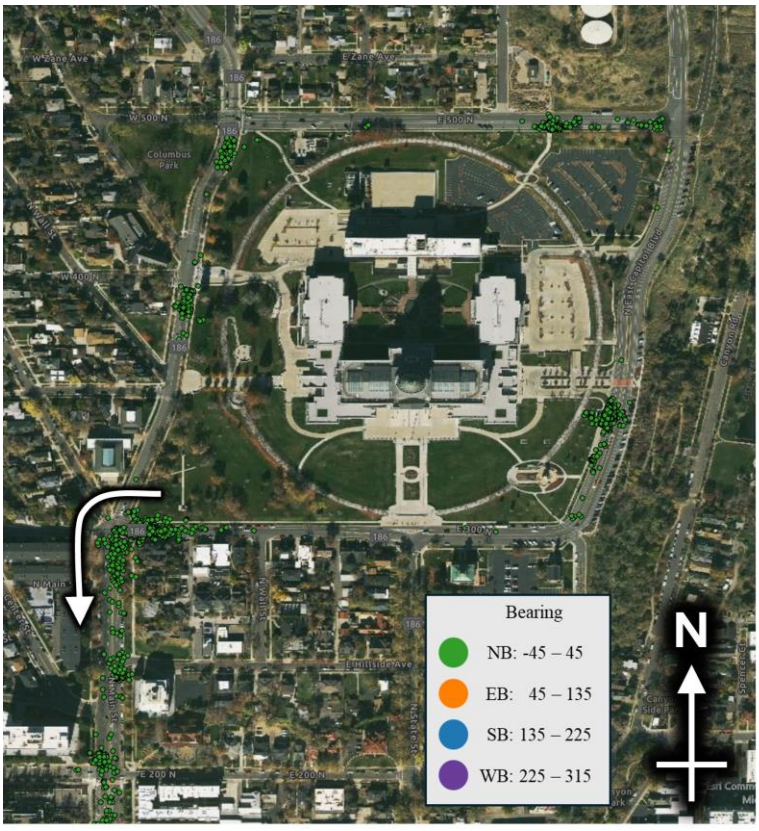

Figure 5-9 Route 200 AVL data filtered to northbound travel

An additional limitation identified in this research is the effectiveness of TSP at intersections where bus routes conflict with one another. By design, if a north-south bus route requests TSP, green time is taken from the conflicting movements. If an east-west bus route also traverses the same intersection, it would receive less green time whenever the north-south route

is served TSP. Thus, intersections with multiple routes and conflicting movements might not have as strong of a potential benefit from TSP, as indicated by the results, and might instead benefit more from passive TSP strategies, including dedicated transit lanes, queue jump lanes, and shorter cycle lengths.

6.0 RECOMMENDATIONS AND IMPLEMENTATION

6.1 Recommendations

Directly measuring bus delay at signalized intersections permits an objective and quantitative method of identifying favorable locations for TSP deployment. Based on the analysis previously discussed, feedback from the Technical Advisory Committee, and input from additional TSP stakeholders, the following recommendations have been identified:

- Use AVL data from additional time periods throughout the year to account for seasonal differences in factors such as ridership, transit operations, and congestion.
- Periodically perform this analysis anew to ensure that any trends in the aforementioned factors or changes in route alignment or stop locations are reflected in the results.
- Maintain a current GTFS feed. Errors in the feed should be proactively identified and corrected.
- Record AVL data at least every 10 seconds. Joining this AVL data with automatic passenger count data would significantly enhance the analysis and facilitate the measurement of person-delay metrics.
- Avoid the construction of nearside bus stops. Consider relocating nearside stops to midblock or far-side locations where TSP is desired.
- If TSP is permitted at intersections with a nearside stop, prevent buses from requesting TSP when doors are open and cancel any active TSP request if the doors open.
- Perform a pre-post analysis at new TSP locations to validate and refine the analysis methodology.
- Review existing TSP locations that experience large amounts of delay. Consider allowing more extra green time for TSP or the phase insertion TSP strategy.

6.2 Implementation

The results of this research will directly impact UTA's TSP prioritization scheme and the strategic deployment of connected vehicle technology. It will also help UDOT focus corridor

funding in places where prioritized intersections that adversely affect transit routes have been identified. Successful implementation of the findings produced by this research includes:

- UTA provides the UDOT Transportation Technology Engineer with a ranked list of prioritized intersections for TSP implementation.
- The UDOT Transportation Technology Engineer considers UTA's prioritized list when planning locations for RSU deployment.
- UTA aggressively increases OBU penetration rate on its bus fleet and schedules equipped buses on blocks with routes that intersect with equipped intersections.
- UTA develops a plan to engage with local municipalities that operate traffic signals where RSU deployment and TSP implementation is desired. The plan should address expected transit benefits, opportunity to enable signal preemption for municipal fleet vehicles (e.g., snowplows, ambulances, fire trucks, etc.), additional V2X safety benefits, deployment funding, and O&M roles and responsibilities.
- UDOT develops a plan to facilitate municipal participation in V2X deployment. This will help overcome any barriers to entry, allow municipalities to leverage the significant capabilities of UDOT's V2X Data Ecosystem, and enable V2X interoperability across jurisdictional boundaries.
- This research is distributed to all transit agencies throughout the state so they are prepared to similarly develop and provide a ranked list of locations to the UDOT Transportation Technology Engineer for future TSP deployment.

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APPENDIX

Table A-1 Intersection Stops for Each Route/Intersection Combination

Signal ID	Street N/S	Street E/W	Route	Intersection Stops
1001	1200 W	600 N	205	1,311
1002	1200 W (Glendale)	California Ave	9	2,157
1003	900 W	600 N	1	1,780
1003	900 W	600 N	205	693
1007	900 W	California Ave	9	2,448
1010	700 W	1300 S	9	640
1013	400 W	300 N	200	1,828
1016	400 W	200 S	2	2,834
1016	400 W	200 S	209	1,721
1019	300 W	800 S	9	3,308
1020	300 W	900 S	9	705
1021	300 W	1300 S	9	9,409
1025	200 W	200 S	2	860
1025	200 W	200 S	209	1,022
1025	200 W	200 S	205	315
1028	200 W	800 S	9	293
1030	West Temple	South Temple	1	1,130
1031	West Temple	100 S	1	1,284
1032	West Temple	200 S	205	1,006
1032	West Temple	200 S	1	1,716
1032	West Temple	200 S	209	676
1032	West Temple	200 S	2	1,900
1042	Main St	200 S	1	2,457
1042	Main St	200 S	2	2,256
1042	Main St	200 S	205	1,544
1042	Main St	200 S	209	636
1046	Main St	800 S	9	99
1047	Main St	900 S	9	40
1051	200 E	South Temple	209	411
1051	200 E	South Temple	1	2,708
1052	200 E	100 S	1	1,970
1053	200 E	200 S	1	2,034
1053	200 E	200 S	205	693
1053	200 E	200 S	2	1,236
1059	200 E	900 S	9	1,387
1060	200 E	2100 S	21	354
1061	300 E	South Temple	209	254
1061	300 E	South Temple	1	353
1063	300 E	200 S	205	2
1063	300 E	200 S	2	-
1068	300 E	900 S	9	521
1071	300 E	2100 S	21	43
1073	400 E	200 S	2	1
1073	400 E	200 S	205	19
1077	400 E	900 S	9	972
1078	"E" St	3rd Ave	209	543
1079	"E" St	2nd Ave	209	691

1080	500 E	South Temple	1	1,066
1080	500 E	South Temple	209	3,574
1082	500 E	200 S	2	2
1082	500 E	200 S	205	490
1083	500 E	300 S	205	507
1084	500 E	500 S	205	1,049
1085	500 E	600 S	205	789
1086	500 E	700 S	205	83
1087	500 E	800 S	205	432
1088	500 E	900 S	205	941
1088	500 E	900 S	9	1,032
1089	500 E	1300 S	205	378
1090	500 E	1700 S	205	1,066
1091	500 E	2100 S	21	2,121
1091	500 E	2100 S	205	3,765
1092	500 E	2700 S	205	553
1094	700 E	South Temple	1	2,140
1096	700 E	200 S	2	3
1098	900 E	South Temple	209	4,487
1098	900 E	South Temple	1	1,472
1099	900 E	100 S	209	2,060
1100	900 E	200 S	209	1,216
1100	900 E	200 S	2	1,974
1101	900 E	300 S	209	1,589
1102	900 E	600 S	209	65
1103	900 E	800 S	209	959
1104	900 E	900 S	209	784
1104	900 E	900 S	9	2,070
1105	900 E	1300 S	209	691
1106	900 E	1700 S	209	495
1107	900 E	2100 S	21	1,345
1107	900 E	2100 S	209	2,742
1108	900 E	2700 S	209	769
1112	1100 E	2100 S	21	2,334
1116	1300 E	South Temple	1	3,051
1117	1300 E	100 S	1	1,546
1118	1300 E	200 S	2	1,450
1121	University	100 S	1	291
1121	University	100 S	2	2,120
1123	Wolcott St	100 S	1	331
1123	Wolcott St	100 S	2	379
1124	Guardsman Wy	Sunnyside Ave (850 S)	9	2,630
1125	1700 E	2100 S	21	1,179
1127	2100 E	1300 S	21	599
1128	2100 E	1700 S	21	77
1129	2100 E	2100 S	21	1,362
1134	400 E	South Temple	1	122
1134	400 E	South Temple	209	157
1137	900 W	300 N	1	230
1138	1500 E	2100 S	21	705
1141	600 E	200 S	2	-
1142	800 E	South Temple	1	605
1145	1500 W (Cheyenne St)	400 S	9	503

1157	500 W	200 S	209	1,196
1157	500 W	200 S	2	1,858
1159	1100 W (Jordan River Ped Xing)	California Ave	9	128
1160	Emery St (1170 W)	California Ave	9	255
1165	1100 E	South Temple	1	210
1167	1000 W / American Beauty Dr	600 N	205	187
1170	800 W	1300 S	9	165
1172	300 W	1120 S (Target)	9	1,192
1177	600 W	200 S	209	1,681
1177	600 W	200 S	2	3,217
1179	1200 W	1000 N	1	170
1180	500 E	Sugar House Streetcar (2250 S)	205	24
1183	900 E	Sugarmont Dr (2225 S) / Sugar House Streetcar	209	427
1205	400 W	North Temple	200	6,257
1205	400 W	North Temple	1	4,416
1215	1950 W	North Temple	217	3,390
1216	1460 W (Garside St)	North Temple	205	939
1216	1460 W (Garside St)	North Temple	1	1,675
1218	900 W	North Temple	1	4,342
1219	800 W	North Temple	1	1,253
1220	600 W	North Temple	1	834
1221	200 W	North Temple	200	185
1221	200 W	North Temple	1	32
1222	West Temple	North Temple	200	1,661
1222	West Temple	North Temple	1	54
1224	Main St	North Temple	200	3,162
1226	1300 E	900 S	9	1,802
1229	1300 E	2100 S	21	4,565
1238	850 W (Ped Xing)	North Temple	1	410
4001	1300 E	Murray-Holladay Rd	45	1,351
4002	Highland Dr	Murray-Holladay Rd	45	2,432
4010	Highland Dr	3900 S	39	4,967
4011	2300 E	3900 S	39	2,183
4012	1100 E	3900 S	39	1,942
4013	900 E	3900 S	209	1,831
4013	900 E	3900 S	39	1,086
4014	900 E	4705 S (Walmart)	209	746
4015	500 E	3900 S	205	2,454
4015	500 E	3900 S	39	423
4016	300 E	3900 S	39	140
4017	1300 E	3900 S	39	1,141
4018	Main St	3900 S	39	974
4019	West Temple	3900 S	39	1,197
4020	210 W	3900 S	39	2,029
4097	2300 E	Phylden Dr/Laney Ave (4640 S)	45	170
4100	700 W	3900 S	39	1,503
4101	500 W	3900 S	39	753
4102	Viewmont St (2100 E)	Murray-Holladay Rd	45	114
4103	Holladay Blvd (2320 E)	Murray-Holladay Rd	45	1,201
4104	Wasatch Blvd	3800 S (Millcreek Cyn)	33	993
4105	Wasatch Blvd	3900 S	45	591
4105	Wasatch Blvd	3900 S	33	7,092
4105	Wasatch Blvd	3900 S	39	591

4107	2700 E	3900 S	39	320
4108	2000 E	3900 S	39	130
4109	1945 E	Murray-Holladay Rd	45	108
4129	Wasatch Blvd	4500 S	45	285
4161	2700 W	3800 S	39	1,326
4506	2700 W	3650 S (Lancer Wy/Valley Fair Mall)	39	1,233
4508	1300 W	4000 S	39	677
4509	2200 W	4100 S	39	5,681
4534	2700 W	Lehman Ave/Valley Fair Mall (3590 S)	35	383
4602	500 W	Vine St (5110 S)	54	348
4605	725 E	6600 S (Winchester St)	209	248
4721	Kings Row Dr (1650 E)	Murray-Holladay Rd	45	171
4726	2200 E (Fire Station/Olympus JHS)	Murray-Holladay Rd	45	75
4731	Cottonwood St (70 W)	Vine St (5100 S)	45	245
4731	Cottonwood St (70 W)	Vine St (5100 S)	54	401
4739	Woodrow St (130 W)	Cottonwood St (5210 S)	200	1,579
4739	Woodrow St (130 W)	Cottonwood St (5210 S)	45	541
4739	Woodrow St (130 W)	Cottonwood St (5210 S)	54	382
4814	2200 W	3800 S	39	887
4821	300 W	Vine St (5100 S)	54	917
4827	Wasatch Blvd	Oakview Dr (4275 S)	45	194
4865	370 E	Winchester St (6600 S)	209	41
5010	Washington Blvd	34th St	612	152
5011	Washington Blvd	Riverdale Rd (SR-26)	612	381
5013	Washington Blvd	29th St	612	285
5014	Washington Blvd	30th St (SR-79)	612	692
5015	Washington Blvd	31st St (SR-79)	612	691
5016	Washington Blvd	32nd St	612	402
5017	Washington Blvd	26th St	603	4,539
5017	Washington Blvd	26th St	612	592
5018	Washington Blvd	27th St	612	411
5019	Washington Blvd	28th St	612	386
5021	Washington Blvd	21st St	612	338
5022	Washington Blvd	22nd St	612	462
5023	Washington Blvd	23rd St	612	427
5024	Washington Blvd	24th St	612	1,449
5027	Washington Blvd	25th St	612	564
5028	Washington Blvd	20th St	612	709
5029	Washington Blvd	17th St	612	220
5030	Washington Blvd	12th St (SR-39)	612	3,933
5031	Washington Blvd	7th St	612	476
5032	Washington Blvd	2nd St	612	3,227
5037	Washington Blvd	2600 N / 2700 N (SR-134)	612	2,704
5049	Harrison Blvd	26th St	603	265
5050	Harrison Blvd	28th St	603	451
5051	Harrison Blvd	30th St (SR-79)	603	1,072
5052	Harrison Blvd	32nd St	603	246
5053	Harrison Blvd	36th St	603	479
5054	Harrison Blvd	3850 S (SR-284)	603	2,003
5055	Harrison Blvd	3950 S (SR-284)	603	3,727
5056	Harrison Blvd	42nd St	603	1,343

5059	Washington Blvd	400 N (North St)	612	2,440
5060	Washington Blvd	1700 N	612	126
5061	Washington Blvd	2000 N	612	155
5062	Washington Blvd	2550 N	612	797
5066	Wall Ave (SR-204)	25th St	603	255
5074	Washington Blvd	36th St	612	1,098
5075	Washington Blvd	40th St	612	2,074
5077	Washington Blvd	4300 S	612	2,308
5080	Adams Ave Pkwy	Washington Blvd	612	1,017
5081	Sunset Dr	Washington Blvd	612	1,868
5082	850 E (Glasmann)	Washington Blvd	612	2,420
5083	1050 E	Washington Blvd	612	587
5131	Harrison Blvd	44th St	603	2,128
5142	Washington Blvd	Larsen Ln	612	339
5504	Grant Ave	26th St	603	454
5506	Lincoln Ave	26th St	603	469
5513	Adams Ave	25th St	603	5
5515	Monroe Blvd	25th St	603	-
5778	Washington Blvd	3100 N	612	45
5925	Adams Ave Pkwy	5350 S	612	373
6016	300 E	US-89 (State St)	850	128
6017	State St (US-89)	1500 N	850	61
6020	State St (US-89)	SR-73 (Main)	850	2,082
6021	900 W	US-89 (State St)	850	2,337
6022	US-89	Pacific Dr	850	861
6023	State St (US-89)	Main St	850	1,429
6024	Center St	Main St	850	30
6025	100 E (SR-74)	Main St	850	840
6026	500 E (SR-180)	US-89 (State St)	850	1,511
6027	700 E	US-89 (State St)	850	140
6028	1100 E (AF) / 2000 W (PG) (North County Blvd / SR-129)	US-89 (State St)	850	1,639
6061	500 W	US-89 (State St)	850	76
6063	Thanksgiving Way (I-15 SB Frontage Rd)	2100 N (SR-194)	850	15
6065	300 W	US-89 (State St)	850	300
6066	850 E	US-89 (State St)	850	129
6067	100 E	US-89 (State St)	850	238
6074	300 W	Main St	850	260
6089	Ashton Blvd (1550 W)	2100 N (SR-194)	850	951
6131	Geneva / Main St (SR-114)	US-89 (State St)	850	1,794
6132	State St (US-89)	Pleasant Grove Blvd	850	2,554
6133	State St (US-89)	700 N (Lindon) / 1000 S (PG) (SR-129)	850	749
6134	1300 W	US-89 (State St)	850	337
6137	State St (US-89)	400 N	850	142
6139	State St (US-89)	700 S / 300 E	850	1,001
6141	State St (US-89)	600 N	850	146
6142	100 E	US-89 (State St)	850	215
6147	State St (US-89)	Center St	850	56
6182	860 E	US-89 (State St)	850	34
6193	1650 W	US-89 (State St)	850	100
6303	State St (US-89)	800 N (SR-52)	850	2,521
6308	State St (US-89)	400 N	850	960

6311	State St (US-89)	Center St	850	2,332
6313	State St (US-89)	400 S	850	698
6314	State St (US-89)	800 S	850	2,288
6315	Geneva Rd (SR-114)	1000 S	UVX	5,502
6316	Geneva Rd (SR-114)	University Pkwy	UVX	6,554
6317	I-15 SPUI	University Pkwy	UVX	10,193
6318	Sandhill Rd (CFI Master)	University Pkwy	UVX	81
6319	400 W	University Pkwy	UVX	22,308
6320	200 W	University Pkwy	UVX	3,702
6321	Main St	University Pkwy	UVX	2,941
6322	200 E	University Pkwy	UVX	5,438
6324	State St (US-89)	University Pkwy	UVX	11,713
6324	State St (US-89)	University Pkwy	850	3,543
6325	800 E	University Pkwy	850	2,555
6325	800 E	University Pkwy	UVX	4,595
6326	State St (US-89)	1600 S	850	373
6327	State St (US-89)	Columbia Ln	850	107
6328	680 E	University Pkwy	UVX	675
6328	680 E	University Pkwy	850	909
6330	Family Center Dr (100 E)	University Pkwy	UVX	13
6389	State St (US-89)	2000 N	850	260
6393	State St (US-89)	1600 N	850	1,656
6394	State St (US-89)	1200 N	850	394
6401	University Ave (US-189)	1860 S	UVX	948
6402	University Ave (US-189)	East Bay Blvd	UVX	7,796
6404	University Ave (US-189)	920 S	850	1,766
6404	University Ave (US-189)	920 S	UVX	7,758
6405	University Ave (US-189)	300 S (US-89)	850	1,996
6405	University Ave (US-189)	300 S (US-89)	UVX	9,448
6406	University Ave (US-189)	100 S	UVX	415
6406	University Ave (US-189)	100 S	850	21
6407	University Ave (US-189)	Center St	850	664
6407	University Ave (US-189)	Center St	UVX	353
6408	University Ave (US-189)	100 N	UVX	1,012
6408	University Ave (US-189)	100 N	850	2,993
6409	University Ave (US-189)	200 N	UVX	3,096
6410	University Ave (US-189)	500 N	UVX	5,742
6411	University Ave (US-189)	700 N	UVX	18,728
6417	University Ave (US-189)	University Pkwy	UVX	16,979
6427	University Ave (US-189)	200 S	UVX	1,855
6427	University Ave (US-189)	200 S	850	169
6435	Freedom Blvd	University Pkwy	UVX	7,647
6436	University Pkwy (SR-265)	550 W/2230 N	UVX	5,061
6442	500 W	100 N	850	1,024
6443	500 W	500 N	850	459
6444	500 W	800 N	850	892
6445	500 W	940 N	850	156
6446	500 W	Cougar Blvd (1230 N)	850	1,852
6447	State St (US-89)	Riverside Ave	850	157
6448	State St (US-89)	1720 N	850	415
6449	State St (US-89)	950 W/1850 N	850	76
6450	500 W	300 N (Bike Xing)	850	47
6461	University Pkwy (SR-265)	Plum Tree Plaza	UVX	327

6463	University Ave (US-189)	400 N (Ped Xing)	UVX	227
6464	University Ave (US-189)	300 N (Ped Xing)	UVX	789
6465	University Ave (US-189)	400 S	UVX	244
6465	University Ave (US-189)	400 S	850	165
6525	400 E	800 S	850	214
6526	700 E	800 S	850	106
6527	800 E	800 S	850	777
6528	800 E	1000 S	850	67
6530	800 E	1200 S	850	359
6607	Freedom Blvd	100 N	850	1,504
6608	100 W	100 N	850	132
6619	900 E	Campus Ln (1100 N)	UVX	524
6624	700 E	700 N	UVX	6,954
6625	900 E	900 N	UVX	7,140
6626	Campus Dr	900 N	UVX	1,036
6627	900 E	Birch Lane	UVX	664
6628	900 E	University Pkwy	UVX	8,098
6633	Canyon Rd	University Pkwy	UVX	2,442
6634	350 E	University Pkwy	UVX	551
6635	450 E	University Pkwy	UVX	3,359
6641	MTC Station	University Pkwy	UVX	947
6642	400 E	700 N	UVX	4,807
6643	200 E	700 N	UVX	636
6651	Novell Place	1860 S	UVX	119
6652	East Bay Blvd	1860 S	UVX	403
6654	180 E	East Bay Blvd	UVX	239
6655	Town Center Blvd	Town Center Dr	UVX	721
6723	Triumph Blvd (2350 W)	Ashton Blvd	850	1,044
7004	Fashion Blvd (280 E) / I-215 S WB Ramps	Winchester (6400 S)	209	2,614
7041	1725 E	South Campus Dr (SR-282)	9	1,207
7042	1800 E	South Campus Dr (SR-282)	9	1,042
7043	Mario Capecchi Dr (SR-282)	South Campus Dr (SR-282)	21	3,062
7043	Mario Capecchi Dr (SR-282)	South Campus Dr (SR-282)	9	5,516
7044	Mario Capecchi Dr (SR-282)	Wasatch Dr	21	536
7044	Mario Capecchi Dr (SR-282)	Wasatch Dr	9	573
7045	Mario Capecchi Dr (SR-282)	Hospital entrance	21	1,965
7045	Mario Capecchi Dr (SR-282)	Hospital entrance	9	1,999
7046	Central Campus Dr	North Campus Dr (SR-282)	21	1,234
7046	Central Campus Dr	North Campus Dr (SR-282)	2	471
7046	Central Campus Dr	North Campus Dr (SR-282)	9	1,192
7046	Central Campus Dr	North Campus Dr (SR-282)	1	477
7047	Mario Capecchi Dr (SR-282)	North Campus Dr (SR-282) / Medical Dr	9	8,439
7047	Mario Capecchi Dr (SR-282)	North Campus Dr (SR-282) / Medical Dr	1	4,550
7047	Mario Capecchi Dr (SR-282)	North Campus Dr (SR-282) / Medical Dr	2	6,220
7047	Mario Capecchi Dr (SR-282)	North Campus Dr (SR-282) / Medical Dr	21	8,306
7060	Bangerter Hwy (SR-154)	3500 S (SR-171)	35	5,323
7063	Bangerter Hwy (SR-154)	5400 S	54	1,158
7068	I-15 SB Off-ramp / 900 W	1000 N / I-15 SB On-ramp	1	838
7069	500 W	1300 S	9	1,713

7070	I-15 SPUI	3300 S (SR-171)	35	3,127
7073	State St (US-89)	Sugar House Streetcar (2250 S)	200	445
7080	Redwood Rd (SR-68)	Research Wy (2770 S)	217	601
7083	Redwood Rd (SR-68)	1000 N	1	2,529
7084	Redwood Rd (SR-68)	700 N	1	2,301
7084	Redwood Rd (SR-68)	700 N	205	1,447
7085	Redwood Rd (SR-68)	500 N	205	263
7085	Redwood Rd (SR-68)	500 N	1	450
7086	Redwood Rd (SR-68)	North Temple	205	2,730
7086	Redwood Rd (SR-68)	North Temple	1	5,169
7086	Redwood Rd (SR-68)	North Temple	217	4,171
7087	Redwood Rd (SR-68)	South Temple	1	388
7087	Redwood Rd (SR-68)	South Temple	205	160
7087	Redwood Rd (SR-68)	South Temple	217	819
7088	Redwood Rd (SR-68)	I-80 WB Ramps	1	429
7088	Redwood Rd (SR-68)	I-80 WB Ramps	217	487
7088	Redwood Rd (SR-68)	I-80 WB Ramps	205	139
7089	Redwood Rd (SR-68)	I-80 EB Ramps	205	620
7089	Redwood Rd (SR-68)	I-80 EB Ramps	217	1,043
7089	Redwood Rd (SR-68)	I-80 EB Ramps	1	1,253
7090	Redwood Rd (SR-68)	400 S	9	55
7090	Redwood Rd (SR-68)	400 S	1	288
7090	Redwood Rd (SR-68)	400 S	217	2,064
7091	Redwood Rd (SR-68)	500 S	217	301
7091	Redwood Rd (SR-68)	500 S	9	1,373
7092	Redwood Rd (SR-68)	Indiana Ave (840 S)	217	1,062
7093	Redwood Rd (SR-68)	California Ave	217	2,106
7094	Redwood Rd (SR-68)	1500 S	217	115
7095	Redwood Rd (SR-68)	1700 S	217	1,391
7096	Redwood Rd (SR-68)	2100 S	217	1,441
7097	Redwood Rd (SR-68)	SR-201 SPUI	217	2,135
7098	Redwood Rd (SR-68)	SR-201 EB Off-ramp/2200 S	217	225
7099	Redwood Rd (SR-68)	2320 S	217	846
7100	Redwood Rd (SR-68)	2495 S (Parkway Blvd)	217	828
7101	Redwood Rd (SR-68)	3100 S	217	1,084
7102	Redwood Rd (SR-68)	3500 S (SR-171)	217	5,163
7102	Redwood Rd (SR-68)	3500 S (SR-171)	35	4,080
7103	Redwood Rd (SR-68)	3800 S	217	422
7104	Redwood Rd (SR-68)	4100 S	39	4,972
7104	Redwood Rd (SR-68)	4100 S	217	4,511
7105	Redwood Rd (SR-68)	4200 S	217	580
7105	Redwood Rd (SR-68)	4200 S	39	433
7106	Redwood Rd (SR-68)	4445 S (SLCC / SR-292)	217	1,258
7106	Redwood Rd (SR-68)	4445 S (SLCC / SR-292)	39	2,568
7107	Redwood Rd (SR-68)	4700 S (SR-266)	217	4,607
7108	Redwood Rd (SR-68)	4800 S	217	680
7109	Redwood Rd (SR-68)	5225 S (Chateau Ave)	217	748
7110	Redwood Rd (SR-68)	5400 S	54	3,158
7110	Redwood Rd (SR-68)	5400 S	217	3,396
7111	Redwood Rd (SR-68)	5600 S	217	3,232
7112	Redwood Rd (SR-68)	I-215 S WB Off-ramp/Target	217	1,905
7113	Redwood Rd (SR-68)	I-215 S EB Off-ramp	217	312
7114	Redwood Rd (SR-68)	6200 S	217	1,677

7115	Redwood Rd (SR-68)	7000 S	217	5,144
7116	Redwood Rd (SR-68)	7800 S	217	5,039
7122	300 W	600 N	205	934
7123	300 W	500 N	205	157
7124	300 W	300 N	205	529
7125	300 W	North Temple	1	1,159
7125	300 W	North Temple	200	4,045
7125	300 W	North Temple	205	2,304
7126	300 W	South Temple	205	665
7127	300 W	100 S	205	288
7128	300 W	200 S	2	4,680
7128	300 W	200 S	209	3,085
7128	300 W	200 S	205	1,417
7135	West Temple	800 S	9	7,303
7137	State St (SR-186)	North Temple	200	485
7138	State St (SR-186)	South Temple	200	4,736
7138	State St (SR-186)	South Temple	209	3,678
7139	State St (SR-186)	100 S	200	1,449
7139	State St (SR-186)	100 S	209	1,106
7140	State St (SR-186)	200 S	209	1,478
7140	State St (SR-186)	200 S	2	2,788
7140	State St (SR-186)	200 S	205	1,426
7140	State St (SR-186)	200 S	200	2,178
7140	State St (SR-186)	200 S	1	2,358
7141	State St (SR-186)	300 S	200	4,486
7142	State St (US-89)	400 S	200	5,080
7143	State St (US-89)	500 S	200	1,541
7144	State St (US-89)	600 S	200	3,624
7145	State St (US-89)	700 S	200	849
7146	State St (US-89)	800 S	200	1,811
7147	State St (US-89)	900 S	200	912
7147	State St (US-89)	900 S	9	1,549
7148	State St (US-89)	1300 S	200	1,728
7149	State St (US-89)	1700 S	200	1,730
7150	State St (US-89)	1910 S (Westminster Ave)	200	271
7151	State St (US-89)	2100 S	200	3,309
7151	State St (US-89)	2100 S	21	3,063
7152	State St (US-89)	I-80 WB Ramps	200	5,393
7153	State St (US-89)	I-80 EB Ramps	200	5,362
7154	State St (US-89)	2700 S	200	925
7155	State St (US-89)	3300 S (SR-171)	33	3,793
7155	State St (US-89)	3300 S (SR-171)	200	4,976
7156	State St (US-89)	3900 S	200	3,038
7156	State St (US-89)	3900 S	39	3,610
7157	State St (US-89)	4500 S (SR-266)	200	4,094
7157	State St (US-89)	4500 S (SR-266)	205	3,217
7157	State St (US-89)	4500 S (SR-266)	45	2,593
7158	State St (US-89)	4800 S	45	533
7158	State St (US-89)	4800 S	200	1,187
7159	State St (US-89)	Vine St	200	669
7159	State St (US-89)	Vine St	45	1,906
7160	State St (US-89)	5300 S (SR-173)	200	5,164
7164	State St (US-89)	6400 S (Winchester)	209	5,444

7184	700 E	900 S	9	6,013
7187	700 E	2100 S	21	4,545
7191	700 E	3300 S (SR-171)	33	4,533
7192	700 E	3900 S	39	5,273
7193	700 E	4500 S (SR-266)	45	2,022
7203	900 E	5110 S (Arrowhead Ln)	209	86
7204	900 E	5600 S	209	1,109
7205	900 E	5900 S (Vine St)	209	575
7206	900 E	6600 S (Winchester St)	209	2,115
7211	900 E	Van Winkle (SR-71 / SR-152)	209	4,555
7216	Guardsman Wy/1580 E (SR-282)	500 S	9	6,737
7217	Mario Capecchi Dr (SR-282)	Foothill Blvd (SR-186)	21	3,480
7218	Foothill Blvd (SR-186)	Wakara Wy	21	1,229
7219	Foothill Blvd (SR-186)	Sunnyside Ave (850 S)	21	3,948
7229	Redwood Rd (SR-68)	8020 S (Rosa Parks Dr)	217	2,236
7236	3030 W (Beaver St)	3500 S (SR-171)	35	1,597
7240	Mario Capecchi Dr (SR-282)	1900 E	9	287
7240	Mario Capecchi Dr (SR-282)	1900 E	21	342
7247	500 E	400 S	205	3,263
7250	900 E	400 S	209	4,574
7256	3900 W / 3856 W	5400 S	54	21
7260	2200 W	4465 S (SLCC, SR-292)	39	516
7269	8400 W (SR-111)	3500 S (SR-171)	35	2,983
7271	300 W	2100 S	21	215
7272	West Temple	2100 S	21	207
7273	Main St	2100 S	21	1,140
7275	8000 W	3500 S (SR-171)	35	823
7276	7200 W	3500 S (SR-171)	35	1,141
7277	6400 W	3500 S (SR-171)	35	862
7278	5200 W	3500 S (SR-171)	35	91
7279	4800 W	3500 S (SR-171)	35	1,025
7280	4400 W	3500 S (SR-171)	35	277
7281	4155 W	3500 S (SR-171)	35	250
7282	4000 W	3500 S (SR-171)	35	2,200
7283	3600 W	3500 S (SR-171)	35	1,197
7284	3450 W	3500 S (SR-171)	35	1,698
7285	3200 W	3500 S (SR-171)	35	2,938
7286	Market St (2820 W)	3500 S (SR-171)	35	1,926
7287	2700 W	3500 S (SR-171)	35	9,354
7288	I-215 W SB Ramps / 2400 W	3500 S (SR-171)	35	1,481
7289	2200 W and I-215 W NB Off-ramp	3500 S (SR-171)	35	1,968
7290	1940 W / 1950 W	3500 S (SR-171)	35	50
7291	900 W	3300 S (SR-171)	35	4,383
7292	700 W	3300 S (SR-171)	35	2,065
7293	500 W	3300 S (SR-171)	35	397
7294	300 W	3300 S (SR-171)	35	6,233
7295	West Temple	3300 S (SR-171)	33	3,476
7296	Main St	3300 S (SR-171)	33	619
7297	300 E	3300 S (SR-171)	33	470
7298	500 E	3300 S (SR-171)	33	758
7298	500 E	3300 S (SR-171)	205	3,048
7299	900 E	3300 S (SR-171)	209	4,473

7299	900 E	3300 S (SR-171)	33	910
7300	1100 E	3300 S (SR-171)	33	431
7301	1300 E	3300 S (SR-171)	33	575
7302	Highland Dr	3300 S (SR-171)	33	1,993
7303	2000 E	3300 S (SR-171)	33	1,177
7304	2300 E	3300 S (SR-171)	33	1,560
7305	2700 E	3300 S (SR-171)	33	415
7306	2940 E	3300 S (SR-171)	33	381
7307	3175 E	3300 S (SR-171)	33	198
7308	3300 E	3300 S (SR-171)	33	199
7309	I-215 E SB Ramps	3300 S (SR-171)	33	310
7310	I-215 E NB On-ramp / Wasatch Blvd	3300 S (SR-171)	33	2,106
7316	Main St	4500 S (SR-266)	205	2,085
7317	500 E	4500 S (SR-266)	45	154
7317	500 E	4500 S (SR-266)	205	3,310
7318	900 E	4500 S (SR-266)	45	937
7318	900 E	4500 S (SR-266)	209	4,098
7319	1100 E	4500 S (SR-266)	45	37
7320	1300 E	4500 S (SR-266)	45	1,971
7323	2300 E	4500 S (SR-266)	45	1,005
7324	2700 E	4500 S (SR-266)	45	139
7325	5600 W	5400 S	54	3,339
7326	Northwest Ave (4725 W)	5415 S (SR-173)	54	267
7327	4220 W	5415 S (SR-173)	54	115
7328	4015 W	5400 S	54	1,593
7329	3600 W TSC - Flex Lanes	5400 S	54	411
7330	3200 W TSC - Flex Lanes	5400 S	54	648
7331	2700 W TSC - Flex Lanes	5400 S	54	575
7332	2200 W	5400 S	54	195
7333	1900 W	5400 S	54	435
7334	Canal Rd (1300 W)	5400 S	54	297
7335	700 W	5300 S / 5400 S (SR-173)	54	1,823
7338	900 E	5400 S	209	617
7347	1070 W	5400 S	54	89
7348	Woodrow (120 W)	5300 S (SR-173)	200	3,504
7372	400 W	600 N	205	508
7381	5600 W	3500 S (SR-171)	35	4,606
7384	I-215 E SB Ramps	3900 S	39	781
7385	Wasatch Blvd	I-215 NB Off-ramp (4100 S)	45	289
7400	1500 W	5400 S	54	162
7410	Redwood Rd (SR-68)	North Star Dr / 300 N	205	455
7410	Redwood Rd (SR-68)	North Star Dr / 300 N	1	657
7426	Atwood Blvd (300 E)	4500 S (SR-266)	45	60
7426	Atwood Blvd (300 E)	4500 S (SR-266)	205	117
7464	4420 W	5415 S (SR-173)	54	51
7502	1200 W	3300 S (SR-171)	35	567
7503	2100 E	Foothill Dr (SR-186)	21	4,014
7539	SR-85 (Mountain View)	3500 S (SR-171)	35	7,221
7571	200 W	3300 S (SR-171)	33	2,361
7605	Redwood Rd (SR-68)	4610 S (Conifer Wy)/SLCC (SR-292)	217	269
7610	4800 W	5415 S (SR-173)	54	545
7619	I-15 SPUI	600 N	205	1,897

7631	8400 W (SR-111)	2700 S	35	1,122
7632	8400 W (SR-111)	3100 S	35	339
7633	Main St	300 N (SR-186)	200	3,817
7634	5600 W	6200 S	54	2,024
7638	200 E	3300 S (SR-171)	33	210
7642	State St (US-89)	Kensington Ave (1500 S)	200	621
7647	Columbus St (SR-186)	500 N	200	176
7648	Columbus St (SR-186)	400 N / W Capitol St / State Capitol	200	145
7657	State St (US-89)	5150 S (Intermountain Dr)	200	468

Table A-2 Number of Intersection Stops at Core Route Intersections

Signal ID	N/S Street	E/W Street	City	Intersection Stops		Intersection Stops per Route		
				Total	Rank	Number of Routes	Total	Rank
7047	Mario Capecchi Dr (SR-282)	North Campus Dr (SR-282) / Medical Dr	Salt Lake City	27,515	1	4	6,878.8	15
6319	400 W	University Pkwy	Orem	22,308	2	1	22,308.0	1
6411	University Ave (US-189)	700 N	Provo	18,728	3	1	18,728.0	2
6417	University Ave (US-189)	University Pkwy	Provo	16,979	4	1	16,979.0	3
6324	State St (US-89)	University Pkwy	Orem	15,256	5	2	7,628.0	10
7086	Redwood Rd (SR-68)	North Temple	Salt Lake City	12,070	6	3	4,023.3	54
6405	University Ave (US-189)	300 S (US-89)	Provo	11,444	7	2	5,722.0	21
1205	400 W	North Temple	Salt Lake City	10,673	8	2	5,336.5	28
7140	State St (SR-186)	200 S	Salt Lake City	10,228	9	5	2,045.6	127
6317	I-15 SPUI	University Pkwy	Orem	10,193	10	1	10,193.0	4
7157	State St (US-89)	4500 S (SR-266)	Murray	9,904	11	3	3,301.3	71
6404	University Ave (US-189)	920 S	Provo	9,524	12	2	4,762.0	38
7104	Redwood Rd (SR-68)	4100 S	West Valley City/Taylorsville	9,483	13	2	4,741.5	39
1021	300 W	1300 S	Salt Lake City	9,409	14	1	9,409.0	5
7287	2700 W	3500 S (SR-171)	West Valley City	9,354	15	1	9,354.0	6
7102	Redwood Rd (SR-68)	3500 S (SR-171)	West Valley City	9,243	16	2	4,621.5	40
7128	300 W	200 S	Salt Lake City	9,182	17	3	3,060.7	80
7155	State St (US-89)	3300 S (SR-171)	South Salt Lake	8,769	18	2	4,384.5	49
7043	Mario Capecchi Dr (SR-282)	South Campus Dr (SR-282)	Salt Lake City	8,578	19	2	4,289.0	52
7138	State St (SR-186)	South Temple	Salt Lake City	8,414	20	2	4,207.0	53
4105	Wasatch Blvd	3900 S	Millcreek	8,274	21	3	2,758.0	87
6628	900 E	University Pkwy	Provo	8,098	22	1	8,098.0	7
6402	University Ave (US-189)	East Bay Blvd	Provo	7,796	23	1	7,796.0	8
6435	Freedom Blvd	University Pkwy	Provo	7,647	24	1	7,647.0	9
7125	300 W	North Temple	Salt Lake City	7,508	25	3	2,502.7	97
7135	West Temple	800 S	Salt Lake City	7,303	26	1	7,303.0	11
7539	SR-85 (Mountain View)	3500 S (SR-171)	West Valley City	7,221	27	1	7,221.0	12
6325	800 E	University Pkwy	Orem	7,150	28	2	3,575.0	62
6625	900 E	900 N	Provo	7,140	29	1	7,140.0	13

6624	700 E	700 N	Provo	6,954	30	1	6,954.0	14
1042	Main St	200 S	Salt Lake City	6,893	31	4	1,723.3	156
7216	Guardsman Wy/1580 E (SR-282)	500 S	Salt Lake City	6,737	32	1	6,737.0	16
7156	State St (US-89)	3900 S	South Salt Lake/Millcreek	6,648	33	2	3,324.0	69
6316	Geneva Rd (SR-114)	University Pkwy	Orem	6,554	35	1	6,554.0	17
7110	Redwood Rd (SR-68)	5400 S	Taylorsville	6,554	35	2	3,277.0	72
7151	State St (US-89)	2100 S	Salt Lake City/South Salt Lake	6,372	36	2	3,186.0	76
7294	300 W	3300 S (SR-171)	South Salt Lake	6,233	37	1	6,233.0	18
7184	700 E	900 S	Salt Lake City	6,013	38	1	6,013.0	19
1098	900 E	South Temple	Salt Lake City	5,959	39	2	2,979.5	83
1091	500 E	2100 S	Salt Lake City	5,886	40	2	2,943.0	84
6410	University Ave (US-189)	500 N	Provo	5,742	41	1	5,742.0	20
4509	2200 W	4100 S	Taylorsville/West Valley City	5,681	42	1	5,681.0	22
6315	Geneva Rd (SR-114)	1000 S	Orem	5,502	43	1	5,502.0	23
7164	State St (US-89)	6400 S (Winchester)	Murray	5,444	44	1	5,444.0	24
6322	200 E	University Pkwy	Orem	5,438	45	1	5,438.0	25
7152	State St (US-89)	I-80 WB Ramps	South Salt Lake	5,393	46	1	5,393.0	26
7299	900 E	3300 S (SR-171)	Millcreek	5,383	47	2	2,691.5	89
7153	State St (US-89)	I-80 EB Ramps	South Salt Lake	5,362	48	1	5,362.0	27
7060	Bangerter Hwy (SR-154)	3500 S (SR-171)	West Valley City	5,323	49	1	5,323.0	29
1032	West Temple	200 S	Salt Lake City	5,298	50	4	1,324.5	188
7192	700 E	3900 S	South Salt Lake/Millcreek	5,273	51	1	5,273.0	30
7160	State St (US-89)	5300 S (SR-173)	Murray	5,164	52	1	5,164.0	31
7115	Redwood Rd (SR-68)	7000 S	West Jordan	5,144	53	1	5,144.0	32
5017	Washington Blvd	26th St	Ogden	5,131	54	2	2,565.5	92
7142	State St (US-89)	400 S	Salt Lake City	5,080	55	1	5,080.0	33
6436	University Pkwy (SR-265)	550 W/2230 N	Provo	5,061	56	1	5,061.0	34
7116	Redwood Rd (SR-68)	7800 S	West Jordan	5,039	57	1	5,039.0	35
7318	900 E	4500 S (SR-266)	Millcreek	5,035	58	2	2,517.5	96
4010	Highland Dr	3900 S	Holladay/Millcreek	4,967	59	1	4,967.0	36
1177	600 W	200 S	Salt Lake City	4,898	60	2	2,449.0	98
6642	400 E	700 N	Provo	4,807	61	1	4,807.0	37
1080	500 E	South Temple	Salt Lake City	4,640	62	2	2,320.0	108
7107	Redwood Rd (SR-68)	4700 S (SR-266)	Taylorsville	4,607	63	1	4,607.0	41
7381	5600 W	3500 S (SR-171)	West Valley City	4,606	64	1	4,606.0	42

7250	900 E	400 S	Salt Lake City	4,574	65	1	4,574.0	43
1229	1300 E	2100 S	Salt Lake City	4,565	66	1	4,565.0	44
1016	400 W	200 S	Salt Lake City	4,555	68	2	2,277.5	111
7211	900 E	Van Winkle (SR-71 / SR-152)	Murray	4,555	68	1	4,555.0	45
7187	700 E	2100 S	Salt Lake City	4,545	69	1	4,545.0	46
7191	700 E	3300 S (SR-171)	South Salt Lake	4,533	70	1	4,533.0	47
7141	State St (SR-186)	300 S	Salt Lake City	4,486	71	1	4,486.0	48
7291	900 W	3300 S (SR-171)	South Salt Lake	4,383	72	1	4,383.0	50
1218	900 W	North Temple	Salt Lake City	4,342	73	1	4,342.0	51
1107	900 E	2100 S	Salt Lake City	4,087	74	2	2,043.5	128
7503	2100 E	Foothill Dr (SR-186)	Salt Lake City	4,014	75	1	4,014.0	55
6408	University Ave (US-189)	100 N	Provo	4,005	76	2	2,002.5	133
7045	Mario Capecchi Dr (SR-282)	Hospital entrance	Salt Lake City	3,964	77	2	1,982.0	135
1053	200 E	200 S	Salt Lake City	3,963	78	3	1,321.0	189
7219	Foothill Blvd (SR-186)	Sunnyside Ave (850 S)	Salt Lake City	3,948	79	1	3,948.0	56
5030	Washington Blvd	12th St (SR-39)	Ogden	3,933	80	1	3,933.0	57
7106	Redwood Rd (SR-68)	4445 S (SLCC / SR-292)	Taylorsville	3,826	81	2	1,913.0	141
7633	Main St	300 N (SR-186)	Salt Lake City	3,817	82	1	3,817.0	58
7298	500 E	3300 S (SR-171)	South Salt Lake	3,806	83	2	1,903.0	143
7084	Redwood Rd (SR-68)	700 N	Salt Lake City	3,748	84	2	1,874.0	145
5055	Harrison Blvd	3950 S (SR-284)	Ogden	3,727	85	1	3,727.0	59
6320	200 W	University Pkwy	Orem	3,702	86	1	3,702.0	60
7144	State St (US-89)	600 S	Salt Lake City	3,624	87	1	3,624.0	61
7348	Woodrow (120 W)	5300 S (SR-173)	Murray	3,504	88	1	3,504.0	63
7217	Mario Capecchi Dr (SR-282)	Foothill Blvd (SR-186)	Salt Lake City	3,480	89	1	3,480.0	64
7295	West Temple	3300 S (SR-171)	South Salt Lake	3,476	90	1	3,476.0	65
7317	500 E	4500 S (SR-266)	Murray/Millcreek	3,464	91	2	1,732.0	153
1215	1950 W	North Temple	Salt Lake City	3,390	92	1	3,390.0	66
7046	Central Campus Dr	North Campus Dr (SR-282)	Salt Lake City	3,374	93	4	843.5	251
6635	450 E	University Pkwy	Provo	3,359	94	1	3,359.0	67
7325	5600 W	5400 S	West Valley City/Salt Lake County	3,339	95	1	3,339.0	68
1019	300 W	800 S	Salt Lake City	3,308	96	1	3,308.0	70
7247	500 E	400 S	Salt Lake City	3,263	97	1	3,263.0	73
7111	Redwood Rd (SR-68)	5600 S	Taylorsville	3,232	98	1	3,232.0	74
5032	Washington Blvd	2nd St	Ogden	3,227	99	1	3,227.0	75
1100	900 E	200 S	Salt Lake City	3,190	100	2	1,595.0	163
1224	Main St	North Temple	Salt Lake City	3,162	101	1	3,162.0	77
7070	I-15 SPUI	3300 S (SR-171)	South Salt Lake	3,127	102	1	3,127.0	78

1051	200 E	South Temple	Salt Lake City	3,119	103	2	1,559.5	167
6409	University Ave (US-189)	200 N	Provo	3,096	104	1	3,096.0	79
1157	500 W	200 S	Salt Lake City	3,054	105	2	1,527.0	170
1116	1300 E	South Temple	Salt Lake City	3,051	106	1	3,051.0	81
7269	8400 W (SR-111)	3500 S (SR-171)	Salt Lake County	2,983	107	1	2,983.0	82
6321	Main St	University Pkwy	Orem	2,941	108	1	2,941.0	85
7285	3200 W	3500 S (SR-171)	West Valley City	2,938	109	1	2,938.0	86
4013	900 E	3900 S	Millcreek	2,917	110	2	1,458.5	175
7089	Redwood Rd (SR-68)	I-80 EB Ramps	Salt Lake City	2,916	111	3	972.0	234
4015	500 E	3900 S	South Salt Lake/Millcreek	2,877	112	2	1,438.5	179
1104	900 E	900 S	Salt Lake City	2,854	113	2	1,427.0	181
5037	Washington Blvd	2600 N / 2700 N (SR-134)	North Ogden	2,704	114	1	2,704.0	88
1124	Guardsman Wy	Sunnyside Ave (850 S)	Salt Lake City	2,630	115	1	2,630.0	90
1216	1460 W (Garside St)	North Temple	Salt Lake City	2,614	117	2	1,307.0	191
7004	Fashion Blvd (280 E) / I-215 S WB Ramps	Winchester (6400 S)	Murray	2,614	117	1	2,614.0	91
7159	State St (US-89)	Vine St	Murray	2,575	118	2	1,287.5	192
7139	State St (SR-186)	100 S	Salt Lake City	2,555	119	2	1,277.5	194
6132	State St (US-89)	Pleasant Grove Blvd	Pleasant Grove	2,554	120	1	2,554.0	93
7083	Redwood Rd (SR-68)	1000 N	Salt Lake City	2,529	121	1	2,529.0	94
6303	State St (US-89)	800 N (SR-52)	Orem	2,521	122	1	2,521.0	95
4739	Woodrow St (130 W)	Cottonwood St (5210 S)	Murray	2,502	123	3	834.0	256
1003	900 W	600 N	Salt Lake City	2,473	124	2	1,236.5	196
7147	State St (US-89)	900 S	Salt Lake City	2,461	125	2	1,230.5	198
1007	900 W	California Ave	Salt Lake City	2,448	126	1	2,448.0	99
6633	Canyon Rd	University Pkwy	Provo	2,442	127	1	2,442.0	100
5059	Washington Blvd	400 N (North St)	Ogden/Harrisville	2,440	128	1	2,440.0	101
4002	Highland Dr	Murray-Holladay Rd	Holladay/Millcreek	2,432	129	1	2,432.0	102
5082	850 E (Glasmann)	Washington Blvd	South Ogden	2,420	130	1	2,420.0	103
1121	University	100 S	Salt Lake City	2,411	131	2	1,205.5	201
7090	Redwood Rd (SR-68)	400 S	Salt Lake City	2,407	132	3	802.3	259
7571	200 W	3300 S (SR-171)	South Salt Lake	2,361	133	1	2,361.0	104
6021	900 W	US-89 (State St)	American Fork	2,337	134	1	2,337.0	105
1112	1100 E	2100 S	Salt Lake City	2,334	135	1	2,334.0	106
6311	State St (US-89)	Center St	Orem	2,332	136	1	2,332.0	107
5077	Washington Blvd	4300 S	South Ogden/Washington Terrace	2,308	137	1	2,308.0	109

6314	State St (US-89)	800 S	Orem	2,288	138	1	2,288.0	110
7229	Redwood Rd (SR-68)	8020 S (Rosa Parks Dr)	West Jordan	2,236	139	1	2,236.0	112
7282	4000 W	3500 S (SR-171)	West Valley City	2,200	140	1	2,200.0	113
1025	200 W	200 S	Salt Lake City	2,197	141	3	732.3	271
4011	2300 E	3900 S	Holladay/Millcreek	2,183	142	1	2,183.0	114
1002	1200 W (Glendale)	California Ave	Salt Lake City	2,157	143	1	2,157.0	115
1094	700 E	South Temple	Salt Lake City	2,140	144	1	2,140.0	116
7097	Redwood Rd (SR-68)	SR-201 SPUI	Salt Lake City/West Valley City	2,135	145	1	2,135.0	117
5131	Harrison Blvd	44th St	Ogden	2,128	146	1	2,128.0	118
7206	900 E	6600 S (Winchester St)	Murray	2,115	147	1	2,115.0	119
7093	Redwood Rd (SR-68)	California Ave	Salt Lake City	2,106	149	1	2,106.0	121
7310	I-215 E NB On-ramp / Wasatch Blvd	3300 S (SR-171)	Millcreek	2,106	149	1	2,106.0	121
7316	Main St	4500 S (SR-266)	Murray	2,085	150	1	2,085.0	122
6020	State St (US-89)	SR-73 (Main)	Lehi	2,082	151	1	2,082.0	123
5075	Washington Blvd	40th St	South Ogden	2,074	152	1	2,074.0	124
7292	700 W	3300 S (SR-171)	South Salt Lake	2,065	153	1	2,065.0	125
1099	900 E	100 S	Salt Lake City	2,060	154	1	2,060.0	126
4020	210 W	3900 S	South Salt Lake/Millcreek	2,029	155	1	2,029.0	129
6427	University Ave (US-189)	200 S	Provo	2,024	157	2	1,012.0	227
7634	5600 W	6200 S	Salt Lake County/West Valley City/West Jordan	2,024	157	1	2,024.0	130
7193	700 E	4500 S (SR-266)	Murray/Millcreek	2,022	158	1	2,022.0	131
5054	Harrison Blvd	3850 S (SR-284)	Ogden	2,003	159	1	2,003.0	132
7302	Highland Dr	3300 S (SR-171)	Millcreek	1,993	160	1	1,993.0	134
1088	500 E	900 S	Salt Lake City	1,973	161	2	986.5	231
7320	1300 E	4500 S (SR-266)	Millcreek	1,971	162	1	1,971.0	136
1052	200 E	100 S	Salt Lake City	1,970	163	1	1,970.0	137
7289	2200 W and I-215 W NB Off-ramp	3500 S (SR-171)	West Valley City	1,968	164	1	1,968.0	138
4012	1100 E	3900 S	Millcreek	1,942	165	1	1,942.0	139
7286	Market St (2820 W)	3500 S (SR-171)	West Valley City	1,926	166	1	1,926.0	140
7112	Redwood Rd (SR-68)	I-215 S WB Off-ramp/Target	Taylorsville	1,905	167	1	1,905.0	142
7619	I-15 SPUI	600 N	Salt Lake City	1,897	168	1	1,897.0	144
5081	Sunset Dr	Washington Blvd	South Ogden	1,868	169	1	1,868.0	146
6446	500 W	Cougar Blvd (1230 N)	Provo	1,852	170	1	1,852.0	147
1013	400 W	300 N	Salt Lake City	1,828	171	1	1,828.0	148
7335	700 W	5300 S / 5400 S (SR-173)	Murray	1,823	172	1	1,823.0	149

7146	State St (US-89)	800 S	Salt Lake City	1,811	173	1	1,811.0	150
1226	1300 E	900 S	Salt Lake City	1,802	174	1	1,802.0	151
6131	Geneva / Main St (SR-114)	US-89 (State St)	Pleasant Grove	1,794	175	1	1,794.0	152
7149	State St (US-89)	1700 S	Salt Lake City	1,730	176	1	1,730.0	154
7148	State St (US-89)	1300 S	Salt Lake City	1,728	177	1	1,728.0	155
7158	State St (US-89)	4800 S	Murray	1,720	178	2	860.0	247
1222	West Temple	North Temple	Salt Lake City	1,715	179	2	857.5	248
7069	500 W	1300 S	Salt Lake City	1,713	180	1	1,713.0	157
7284	3450 W	3500 S (SR-171)	West Valley City	1,698	181	1	1,698.0	158
7114	Redwood Rd (SR-68)	6200 S	Taylorsville	1,677	182	1	1,677.0	159
7091	Redwood Rd (SR-68)	500 S	Salt Lake City	1,674	183	2	837.0	254
6393	State St (US-89)	1600 N	Orem	1,656	184	1	1,656.0	160
6028	1100 E (AF) / 2000 W (PG) (North County Blvd / SR-129)	US-89 (State St)	American Fork/Pleasant Grove	1,639	185	1	1,639.0	161
7236	3030 W (Beaver St)	3500 S (SR-171)	West Valley City	1,597	186	1	1,597.0	162
7328	4015 W	5400 S	Salt Lake County/Taylorsville	1,593	187	1	1,593.0	164
1101	900 E	300 S	Salt Lake City	1,589	188	1	1,589.0	165
6328	680 E	University Pkwy	Orem	1,584	189	2	792.0	261
7304	2300 E	3300 S (SR-171)	Millcreek	1,560	190	1	1,560.0	166
1117	1300 E	100 S	Salt Lake City	1,546	191	1	1,546.0	168
7143	State St (US-89)	500 S	Salt Lake City	1,541	192	1	1,541.0	169
6026	500 E (SR-180)	US-89 (State St)	American Fork	1,511	193	1	1,511.0	171
6607	Freedom Blvd	100 N	Provo	1,504	194	1	1,504.0	172
4100	700 W	3900 S	South Salt Lake/Millcreek	1,503	195	1	1,503.0	173
7288	I-215 W SB Ramps / 2400 W	3500 S (SR-171)	West Valley City	1,481	196	1	1,481.0	174
1118	1300 E	200 S	Salt Lake City	1,450	197	1	1,450.0	176
5024	Washington Blvd	24th St	Ogden	1,449	198	1	1,449.0	177
7096	Redwood Rd (SR-68)	2100 S	Salt Lake City	1,441	199	1	1,441.0	178
6023	State St (US-89)	Main St	American Fork	1,429	200	1	1,429.0	180
7095	Redwood Rd (SR-68)	1700 S	Salt Lake City	1,391	201	1	1,391.0	182
1059	200 E	900 S	Salt Lake City	1,387	202	1	1,387.0	183
7087	Redwood Rd (SR-68)	South Temple	Salt Lake City	1,367	203	3	455.7	324
1129	2100 E	2100 S	Salt Lake City	1,362	204	1	1,362.0	184
4001	1300 E	Murray-Holladay Rd	Holladay/Millcreek	1,351	205	1	1,351.0	185
5056	Harrison Blvd	42nd St	Ogden	1,343	206	1	1,343.0	186
4161	2700 W	3800 S	West Valley City	1,326	207	1	1,326.0	187
1001	1200 W	600 N	Salt Lake City	1,311	208	1	1,311.0	190

1031	West Temple	100 S	Salt Lake City	1,284	209	1	1,284.0	193
1219	800 W	North Temple	Salt Lake City	1,253	210	1	1,253.0	195
4506	2700 W	3650 S (Lancer Wy/Valley Fair Mall)	West Valley City	1,233	211	1	1,233.0	197
7218	Foothill Blvd (SR-186)	Wakara Wy	Salt Lake City	1,229	212	1	1,229.0	199
7041	1725 E	South Campus Dr (SR-282)	Salt Lake City	1,207	213	1	1,207.0	200
4103	Holladay Blvd (2320 E)	Murray-Holladay Rd	Holladay	1,201	214	1	1,201.0	202
4019	West Temple	3900 S	South Salt Lake/Millcreek	1,197	216	1	1,197.0	204
7283	3600 W	3500 S (SR-171)	West Valley City	1,197	216	1	1,197.0	204
1172	300 W	1120 S (Target)	Salt Lake City	1,192	217	1	1,192.0	205
1125	1700 E	2100 S	Salt Lake City	1,179	218	1	1,179.0	206
7303	2000 E	3300 S (SR-171)	Millcreek	1,177	219	1	1,177.0	207
7063	Bangerter Hwy (SR-154)	5400 S	Taylorsville	1,158	220	1	1,158.0	208
4017	1300 E	3900 S	Millcreek	1,141	222	1	1,141.0	210
7276	7200 W	3500 S (SR-171)	Salt Lake County/West Valley City	1,141	222	1	1,141.0	210
7273	Main St	2100 S	Salt Lake City/South Salt Lake	1,140	223	1	1,140.0	211
1030	West Temple	South Temple	Salt Lake City	1,130	224	1	1,130.0	212
7631	8400 W (SR-111)	2700 S	Salt Lake County	1,122	225	1	1,122.0	213
7410	Redwood Rd (SR-68)	North Star Dr / 300 N	Salt Lake City	1,112	226	2	556.0	300
7044	Mario Capecchi Dr (SR-282)	Wasatch Dr	Salt Lake City	1,109	228	2	554.5	301
7204	900 E	5600 S	Murray	1,109	228	1	1,109.0	214
5074	Washington Blvd	36th St	Ogden/South Ogden	1,098	229	1	1,098.0	215
7101	Redwood Rd (SR-68)	3100 S	West Valley City	1,084	230	1	1,084.0	216
5051	Harrison Blvd	30th St (SR-79)	Ogden	1,072	231	1	1,072.0	217
1090	500 E	1700 S	Salt Lake City	1,066	232	1	1,066.0	218
7092	Redwood Rd (SR-68)	Indiana Ave (840 S)	Salt Lake City	1,062	233	1	1,062.0	219
7088	Redwood Rd (SR-68)	I-80 WB Ramps	Salt Lake City	1,055	234	3	351.7	354
1084	500 E	500 S	Salt Lake City	1,049	235	1	1,049.0	220
6723	Triumph Blvd (2350 W)	Ashton Blvd	Lehi	1,044	236	1	1,044.0	221
7042	1800 E	South Campus Dr (SR-282)	Salt Lake City	1,042	237	1	1,042.0	222
6626	Campus Dr	900 N	Provo	1,036	238	1	1,036.0	223
7279	4800 W	3500 S (SR-171)	West Valley City	1,025	239	1	1,025.0	224
6442	500 W	100 N	Provo	1,024	240	1	1,024.0	225
5080	Adams Ave Pkwy	Washington Blvd	South Ogden/Washington Terrace	1,017	242	1	1,017.0	226

6407	University Ave (US-189)	Center St	Provo	1,017	242	2	508.5	310
7105	Redwood Rd (SR-68)	4200 S	Taylorsville	1,013	243	2	506.5	313
7323	2300 E	4500 S (SR-266)	Holladay	1,005	244	1	1,005.0	228
6139	State St (US-89)	700 S / 300 E	Pleasant Grove	1,001	245	1	1,001.0	229
4104	Wasatch Blvd	3800 S (Millcreek Cyn)	Millcreek	993	246	1	993.0	230
4018	Main St	3900 S	South Salt Lake/Millcreek	974	247	1	974.0	232
1077	400 E	900 S	Salt Lake City	972	248	1	972.0	234
6308	State St (US-89)	400 N	Orem	960	249	1	960.0	235
1103	900 E	800 S	Salt Lake City	959	250	1	959.0	236
6089	Ashton Blvd (1550 W)	2100 N (SR-194)	Lehi	951	251	1	951.0	237
6401	University Ave (US-189)	1860 S	Provo	948	252	1	948.0	238
6641	MTC Station	University Pkwy	Provo	947	253	1	947.0	239
7122	300 W	600 N	Salt Lake City	934	254	1	934.0	240
7154	State St (US-89)	2700 S	South Salt Lake	925	255	1	925.0	241
4821	300 W	Vine St (5100 S)	Murray	917	256	1	917.0	242
6444	500 W	800 N	Provo	892	257	1	892.0	243
4814	2200 W	3800 S	West Valley City	887	258	1	887.0	244
7277	6400 W	3500 S (SR-171)	West Valley City	862	259	1	862.0	245
6022	US-89	Pacific Dr	American Fork	861	260	1	861.0	246
7145	State St (US-89)	700 S	Salt Lake City	849	261	1	849.0	249
7099	Redwood Rd (SR-68)	2320 S	West Valley City	846	262	1	846.0	250
6025	100 E (SR-74)	Main St	American Fork	840	263	1	840.0	252
7068	I-15 SB Off-ramp / 900 W	1000 N / I-15 SB On-ramp	Salt Lake City	838	264	1	838.0	253
1220	600 W	North Temple	Salt Lake City	834	265	1	834.0	256
7100	Redwood Rd (SR-68)	2495 S (Parkway Blvd)	West Valley City	828	266	1	828.0	257
7275	8000 W	3500 S (SR-171)	Salt Lake County	823	267	1	823.0	258
5062	Washington Blvd	2550 N	North Ogden	797	268	1	797.0	260
1085	500 E	600 S	Salt Lake City	789	270	1	789.0	263
6464	University Ave (US-189)	300 N (Ped Xing)	Provo	789	270	1	789.0	263
7384	I-215 E SB Ramps	3900 S	Salt Lake County	781	271	1	781.0	264
6527	800 E	800 S	Orem	777	272	1	777.0	265
1108	900 E	2700 S	Salt Lake City	769	273	1	769.0	266
4101	500 W	3900 S	South Salt Lake/Millcreek	753	274	1	753.0	267
6133	State St (US-89)	700 N (Lindon) / 1000 S (PG) (SR-129)	Lindon/Pleasant Grove	749	275	1	749.0	268
7109	Redwood Rd (SR-68)	5225 S (Chateau Ave)	Taylorsville	748	276	1	748.0	269
4014	900 E	4705 S (Walmart)	Murray/Millcreek	746	277	1	746.0	270

6655	Town Center Blvd	Town Center Dr	Provo	721	278	1	721.0	272
7085	Redwood Rd (SR-68)	500 N	Salt Lake City	713	279	2	356.5	351
1123	Wolcott St	100 S	Salt Lake City	710	280	2	355.0	352
5028	Washington Blvd	20th St	Ogden	709	281	1	709.0	273
1020	300 W	900 S	Salt Lake City	705	283	1	705.0	275
1138	1500 E	2100 S	Salt Lake City	705	283	1	705.0	275
6313	State St (US-89)	400 S	Orem	698	284	1	698.0	276
5014	Washington Blvd	30th St (SR-79)	Ogden	692	285	1	692.0	277
1079	"E" St	2nd Ave	Salt Lake City	691	288	1	691.0	280
1105	900 E	1300 S	Salt Lake City	691	288	1	691.0	280
5015	Washington Blvd	31st St (SR-79)	Ogden	691	288	1	691.0	280
7108	Redwood Rd (SR-68)	4800 S	Taylorsville	680	289	1	680.0	281
4508	1300 W	4000 S	Taylorsville/West Valley City	677	290	1	677.0	282
7126	300 W	South Temple	Salt Lake City	665	291	1	665.0	283
6627	900 E	Birch Lane	Provo	664	292	1	664.0	284
7330	3200 W TSC - Flex Lanes	5400 S	Taylorsville	648	293	1	648.0	285
4731	Cottonwood St (70 W)	Vine St (5100 S)	Murray	646	294	2	323.0	361
1010	700 W	1300 S	Salt Lake City	640	295	1	640.0	286
6643	200 E	700 N	Provo	636	296	1	636.0	287
7240	Mario Capecchi Dr (SR-282)	1900 E	Salt Lake City	629	297	2	314.5	363
7642	State St (US-89)	Kensington Ave (1500 S)	Salt Lake City	621	298	1	621.0	288
7296	Main St	3300 S (SR-171)	South Salt Lake	619	299	1	619.0	289
7338	900 E	5400 S	Murray	617	300	1	617.0	290
1061	300 E	South Temple	Salt Lake City	607	301	2	303.5	366
1142	800 E	South Temple	Salt Lake City	605	302	1	605.0	291
7080	Redwood Rd (SR-68)	Research Wy (2770 S)	West Valley City	601	303	1	601.0	292
1127	2100 E	1300 S	Salt Lake City	599	304	1	599.0	293
5083	1050 E	Washington Blvd	South Ogden	587	305	1	587.0	294
7205	900 E	5900 S (Vine St)	Murray	575	308	1	575.0	297
7301	1300 E	3300 S (SR-171)	Salt Lake City/Millcreek	575	308	1	575.0	297
7331	2700 W TSC - Flex Lanes	5400 S	Taylorsville	575	308	1	575.0	297
7502	1200 W	3300 S (SR-171)	West Valley City	567	309	1	567.0	298
5027	Washington Blvd	25th St	Ogden	564	310	1	564.0	299
1092	500 E	2700 S	Salt Lake City	553	311	1	553.0	302
6634	350 E	University Pkwy	Provo	551	312	1	551.0	303
7610	4800 W	5415 S (SR-173)	Salt Lake County	545	313	1	545.0	304
1078	"E" St	3rd Ave	Salt Lake City	543	314	1	543.0	305

7124	300 W	300 N	Salt Lake City	529	315	1	529.0	306
6619	900 E	Campus Ln (1100 N)	Provo	524	316	1	524.0	307
1068	300 E	900 S	Salt Lake City	521	317	1	521.0	308
7260	2200 W	4465 S (SLCC, SR-292)	Taylorsville	516	318	1	516.0	309
7372	400 W	600 N	Salt Lake City	508	319	1	508.0	311
1083	500 E	300 S	Salt Lake City	507	320	1	507.0	312
1145	1500 W (Cheyenne St)	400 S	Salt Lake City	503	321	1	503.0	314
1106	900 E	1700 S	Salt Lake City	495	322	1	495.0	315
1082	500 E	200 S	Salt Lake City	492	323	2	246.0	386
7137	State St (SR-186)	North Temple	Salt Lake City	485	324	1	485.0	316
5053	Harrison Blvd	36th St	Ogden	479	325	1	479.0	317
5031	Washington Blvd	7th St	Ogden	476	326	1	476.0	318
7297	300 E	3300 S (SR-171)	South Salt Lake	470	327	1	470.0	319
5506	Lincoln Ave	26th St	Ogden	469	328	1	469.0	320
7657	State St (US-89)	5150 S (Intermountain Dr)	Murray	468	329	1	468.0	321
5022	Washington Blvd	22nd St	Ogden	462	330	1	462.0	322
6443	500 W	500 N	Provo	459	331	1	459.0	323
5504	Grant Ave	26th St	Ogden	454	332	1	454.0	325
5050	Harrison Blvd	28th St	Ogden	451	333	1	451.0	326
7073	State St (US-89)	Sugar House Streetcar (2250 S)	South Salt Lake	445	334	1	445.0	327
6406	University Ave (US-189)	100 S	Provo	436	335	2	218.0	393
7333	1900 W	5400 S	Taylorsville	435	336	1	435.0	328
1087	500 E	800 S	Salt Lake City	432	337	1	432.0	329
7300	1100 E	3300 S (SR-171)	Salt Lake City/Millcreek	431	338	1	431.0	330
1183	900 E	Sugarmont Dr (2225 S) / Sugar House Streetcar	Salt Lake City	427	340	1	427.0	332
5023	Washington Blvd	23rd St	Ogden	427	340	1	427.0	332
7103	Redwood Rd (SR-68)	3800 S	West Valley City	422	341	1	422.0	333
6448	State St (US-89)	1720 N	Provo	415	343	1	415.0	335
7305	2700 E	3300 S (SR-171)	Millcreek	415	343	1	415.0	335
5018	Washington Blvd	27th St	Ogden	411	345	1	411.0	337
7329	3600 W TSC - Flex Lanes	5400 S	Taylorsville	411	345	1	411.0	337
1238	850 W (Ped Xing)	North Temple	Salt Lake City	410	346	1	410.0	338
6465	University Ave (US-189)	400 S	Provo	409	347	2	204.5	400
6652	East Bay Blvd	1860 S	Provo	403	348	1	403.0	339
5016	Washington Blvd	32nd St	Ogden	402	349	1	402.0	340
7293	500 W	3300 S (SR-171)	South Salt Lake	397	350	1	397.0	341
6394	State St (US-89)	1200 N	Orem	394	351	1	394.0	342

5019	Washington Blvd	28th St	Ogden	386	352	1	386.0	343
4534	2700 W	Lehman Ave/Valley Fair Mall (3590 S)	West Valley City	383	353	1	383.0	344
5011	Washington Blvd	Riverdale Rd (SR-26)	Ogden	381	355	1	381.0	346
7306	2940 E	3300 S (SR-171)	Millcreek	381	355	1	381.0	346
1089	500 E	1300 S	Salt Lake City	378	356	1	378.0	347
5925	Adams Ave Pkwy	5350 S	Washington Terrace	373	358	1	373.0	349
6326	State St (US-89)	1600 S	Orem	373	358	1	373.0	349
6530	800 E	1200 S	Orem	359	359	1	359.0	350
1060	200 E	2100 S	Salt Lake City	354	360	1	354.0	353
4602	500 W	Vine St (5110 S)	Murray	348	361	1	348.0	355
5142	Washington Blvd	Larsen Ln	Ogden/Harrisville	339	363	1	339.0	357
7632	8400 W (SR-111)	3100 S	Salt Lake County	339	363	1	339.0	357
5021	Washington Blvd	21st St	Ogden	338	364	1	338.0	358
6134	1300 W	US-89 (State St)	Pleasant Grove	337	365	1	337.0	359
6461	University Pkwy (SR-265)	Plum Tree Plaza	Provo	327	366	1	327.0	360
4107	2700 E	3900 S	Holladay/Millcreek	320	367	1	320.0	362
7113	Redwood Rd (SR-68)	I-215 S EB Off-ramp	Taylorsville	312	368	1	312.0	364
7309	I-215 E SB Ramps	3300 S (SR-171)	Millcreek	310	369	1	310.0	365
6065	300 W	US-89 (State St)	Lehi	300	370	1	300.0	367
7334	Canal Rd (1300 W)	5400 S	Taylorsville/Murray	297	371	1	297.0	368
1028	200 W	800 S	Salt Lake City	293	372	1	293.0	369
7385	Wasatch Blvd	I-215 NB Off-ramp (4100 S)	Salt Lake County	289	373	1	289.0	370
7127	300 W	100 S	Salt Lake City	288	374	1	288.0	371
4129	Wasatch Blvd	4500 S	Salt Lake County	285	376	1	285.0	373
5013	Washington Blvd	29th St	Ogden	285	376	1	285.0	373
1134	400 E	South Temple	Salt Lake City	279	377	2	139.5	422
7280	4400 W	3500 S (SR-171)	West Valley City	277	378	1	277.0	374
7150	State St (US-89)	1910 S (Westminster Ave)	Salt Lake City	271	379	1	271.0	375
7605	Redwood Rd (SR-68)	4610 S (Conifer Wy)/SLCC (SR-292)	Taylorsville	269	380	1	269.0	376
7326	Northwest Ave (4725 W)	5415 S (SR-173)	Salt Lake County	267	381	1	267.0	377
5049	Harrison Blvd	26th St	Ogden	265	382	1	265.0	378
6074	300 W	Main St	American Fork	260	384	1	260.0	380
6389	State St (US-89)	2000 N	Orem	260	384	1	260.0	380
1160	Emery St (1170 W)	California Ave	Salt Lake City	255	386	1	255.0	382
5066	Wall Ave (SR-204)	25th St	Ogden	255	386	1	255.0	382
7281	4155 W	3500 S (SR-171)	West Valley City	250	387	1	250.0	383
4605	725 E	6600 S (Winchester St)	Murray	248	388	1	248.0	384

5052	Harrison Blvd	32nd St	Ogden	246	389	1	246.0	386
6654	180 E	East Bay Blvd	Provo	239	390	1	239.0	387
6067	100 E	US-89 (State St)	Lehi	238	391	1	238.0	388
1137	900 W	300 N	Salt Lake City	230	392	1	230.0	389
6463	University Ave (US-189)	400 N (Ped Xing)	Provo	227	393	1	227.0	390
7098	Redwood Rd (SR-68)	SR-201 EB Off-ramp/2200 S	West Valley City	225	394	1	225.0	391
5029	Washington Blvd	17th St	Ogden	220	395	1	220.0	392
1221	200 W	North Temple	Salt Lake City	217	396	2	108.5	434
6142	100 E	US-89 (State St)	Pleasant Grove	215	398	1	215.0	395
7271	300 W	2100 S	Salt Lake City/South Salt Lake	215	398	1	215.0	395
6525	400 E	800 S	Orem	214	399	1	214.0	396
1165	1100 E	South Temple	Salt Lake City	210	401	1	210.0	398
7638	200 E	3300 S (SR-171)	South Salt Lake	210	401	1	210.0	398
7272	West Temple	2100 S	Salt Lake City/South Salt Lake	207	402	1	207.0	399
7308	3300 E	3300 S (SR-171)	Millcreek	199	403	1	199.0	401
7307	3175 E	3300 S (SR-171)	Millcreek	198	404	1	198.0	402
7332	2200 W	5400 S	Taylorsville	195	405	1	195.0	403
4827	Wasatch Blvd	Oakview Dr (4275 S)	Millcreek	194	406	1	194.0	404
1167	1000 W / American Beauty Dr	600 N	Salt Lake City	187	407	1	187.0	405
7426	Atwood Blvd (300 E)	4500 S (SR-266)	Murray	177	408	2	88.5	442
7647	Columbus St (SR-186)	500 N	Salt Lake City	176	409	1	176.0	406
4721	Kings Row Dr (1650 E)	Murray-Holladay Rd	Holladay/Millcreek	171	410	1	171.0	407
1179	1200 W	1000 N	Salt Lake City	170	412	1	170.0	409
4097	2300 E	Phylden Dr/Laney Ave (4640 S)	Holladay	170	412	1	170.0	409
1170	800 W	1300 S	Salt Lake City	165	413	1	165.0	410
7400	1500 W	5400 S	Taylorsville	162	414	1	162.0	411
6447	State St (US-89)	Riverside Ave	Provo	157	416	1	157.0	413
7123	300 W	500 N	Salt Lake City	157	416	1	157.0	413
6445	500 W	940 N	Provo	156	417	1	156.0	414
5061	Washington Blvd	2000 N	North Ogden	155	418	1	155.0	415
5010	Washington Blvd	34th St	Ogden	152	419	1	152.0	416
6141	State St (US-89)	600 N	Lindon	146	420	1	146.0	417
7648	Columbus St (SR-186)	400 N / W Capitol St / State Capitol	Salt Lake City	145	421	1	145.0	418
6137	State St (US-89)	400 N	Lindon	142	422	1	142.0	419
4016	300 E	3900 S	South Salt Lake/Millcreek	140	424	1	140.0	421
6027	700 E	US-89 (State St)	American Fork	140	424	1	140.0	421

7324	2700 E	4500 S (SR-266)	Holladay/Salt Lake County	139	425	1	139.0	423
6608	100 W	100 N	Provo	132	426	1	132.0	424
4108	2000 E	3900 S	Holladay/Millcreek	130	427	1	130.0	425
6066	850 E	US-89 (State St)	Lehi	129	428	1	129.0	426
1159	1100 W (Jordan River Ped Xing)	California Ave	Salt Lake City	128	430	1	128.0	428
6016	300 E	US-89 (State St)	American Fork	128	430	1	128.0	428
5060	Washington Blvd	1700 N	North Ogden/Weber County	126	431	1	126.0	429
6651	Novell Place	1860 S	Provo	119	432	1	119.0	430
7094	Redwood Rd (SR-68)	1500 S	Salt Lake City	115	434	1	115.0	432
7327	4220 W	5415 S (SR-173)	Salt Lake County	115	434	1	115.0	432
4102	Viewmont St (2100 E)	Murray-Holladay Rd	Holladay	114	435	1	114.0	433
4109	1945 E	Murray-Holladay Rd	Holladay	108	436	1	108.0	435
6327	State St (US-89)	Columbia Ln	Orem	107	437	1	107.0	436
6526	700 E	800 S	Orem	106	438	1	106.0	437
6193	1650 W	US-89 (State St)	Pleasant Grove	100	439	1	100.0	438
1046	Main St	800 S	Salt Lake City	99	440	1	99.0	439
7278	5200 W	3500 S (SR-171)	West Valley City	91	441	1	91.0	440
7347	1070 W	5400 S	Taylorsville/Murray	89	442	1	89.0	441
7203	900 E	5110 S (Arrowhead Ln)	Murray	86	443	1	86.0	443
1086	500 E	700 S	Salt Lake City	83	444	1	83.0	444
6318	Sandhill Rd (CFI Master)	University Pkwy	Orem	81	445	1	81.0	445
1128	2100 E	1700 S	Salt Lake City	77	446	1	77.0	446
6061	500 W	US-89 (State St)	Lehi	76	448	1	76.0	448
6449	State St (US-89)	950 W/1850 N	Provo	76	448	1	76.0	448
4726	2200 E (Fire Station/Olympus JHS)	Murray-Holladay Rd	Holladay	75	449	1	75.0	449
6528	800 E	1000 S	Orem	67	450	1	67.0	450
1102	900 E	600 S	Salt Lake City	65	451	1	65.0	451
6017	State St (US-89)	1500 N	Lehi	61	452	1	61.0	452
6147	State St (US-89)	Center St	Lindon	56	453	1	56.0	453
7464	4420 W	5415 S (SR-173)	Salt Lake County	51	454	1	51.0	454
7290	1940 W / 1950 W	3500 S (SR-171)	West Valley City	50	455	1	50.0	455
6450	500 W	300 N (Bike Xing)	Provo	47	456	1	47.0	456
5778	Washington Blvd	3100 N	North Ogden	45	457	1	45.0	457
1071	300 E	2100 S	Salt Lake City	43	458	1	43.0	458
4865	370 E	Winchester St (6600 S)	Murray	41	459	1	41.0	459
1047	Main St	900 S	Salt Lake City	40	460	1	40.0	460
7319	1100 E	4500 S (SR-266)	Millcreek	37	461	1	37.0	461

6182	860 E	US-89 (State St)	American Fork	34	462	1	34.0	462
6024	Center St	Main St	American Fork	30	463	1	30.0	463
1180	500 E	Sugar House Streetcar (2250 S)	Salt Lake City/South Salt Lake	24	464	1	24.0	464
7256	3900 W / 3856 W	5400 S	Taylorsville	21	465	1	21.0	465
1073	400 E	200 S	Salt Lake City	20	466	2	10.0	468
6063	Thanksgiving Way (I-15 SB Frontage Rd)	2100 N (SR-194)	Lehi	15	467	1	15.0	466
6330	Family Center Dr (100 E)	University Pkwy	Orem	13	468	1	13.0	467
5513	Adams Ave	25th St	Ogden	5	469	1	5.0	469
1096	700 E	200 S	Salt Lake City	3	470	1	3.0	470
1063	300 E	200 S	Salt Lake City	2	471	2	1.0	471
1141	600 E	200 S	Salt Lake City	0	473	1	0.0	473
5515	Monroe Blvd	25th St	Ogden	0	473	1	0.0	473

Table A-3 Intersection Stops per N/S Corridor

Street N/S	Region	Signalized Intersections		Intersection Stops		Intersection Stops per Signal	
		Total	Rank	Total	Rank	Total	Rank
Redwood Rd (SR-68)	2	38	1	97,815	1	2,574.1	35
Washington Blvd	1	29	2	32,422	8	1,118.0	80
900 E	2	23	5	50,857	4	2,211.2	44
State St (US-89)	2	23	5	78,905	3	3,430.7	15
State St (US-89)	3	23	5	35,713	7	1,552.7	65
500 E	2	17	6	31,282	9	1,840.1	56
University Ave (US-189)	3	15	7	83,164	2	5,544.3	7
300 W	2	14	8	41,242	6	2,945.9	24
1300 E	2	9	11	17,452	16	1,939.1	53
Harrison Blvd	1	9	11	11,714	21	1,301.6	71
Main St	2	9	11	18,829	14	2,092.1	48
West Temple	2	8	12	21,610	13	2,701.3	29
500 W	3	7	14	4,506	46	643.7	103
700 E	2	7	14	24,529	11	3,504.1	13
200 E	2	6	17	11,003	22	1,833.8	57
300 E	2	6	17	1,783	72	297.2	120
Mario Capecchi Dr (SR-282)	2	6	17	45,275	5	7,545.8	3
1100 E	2	5	22	4,954	44	990.8	84
500 W	2	5	22	6,265	34	1,253.0	73
900 W	2	5	22	13,876	18	2,775.2	28
State St (SR-186)	2	5	22	26,168	10	5,233.6	8
Wasatch Blvd	2	5	22	10,035	24	2,007.0	51
200 W	2	4	31	5,068	41	1,267.0	72
2100 E	2	4	31	6,052	36	1,513.0	66
2200 W	2	4	31	7,279	29	1,819.8	58
2300 E	2	4	31	4,918	45	1,229.5	74
2700 W	2	4	31	12,296	19	3,074.0	22
400 W	2	4	31	17,564	15	4,391.0	10
700 W	2	4	31	6,031	37	1,507.8	68
800 E	3	4	31	8,353	28	2,088.3	49
900 E	3	4	31	16,426	17	4,106.5	11
1200 W	2	3	38	2,048	66	682.7	98
2700 E	2	3	38	874	97	291.3	122
400 E	2	3	38	1,271	84	423.7	114
5600 W	2	3	38	9,969	25	3,323.0	19
700 E	3	3	38	7,200	31	2,400.0	42
8400 W (SR-111)	2	3	38	4,444	47	1,481.3	69
Highland Dr	2	3	38	9,392	26	3,130.7	21

"E" St	2	2	56	1,234	85	617.0	104
100 E	3	2	56	453	117	226.5	131
200 E	3	2	56	6,074	35	3,037.0	23
2000 E	2	2	56	1,307	83	653.5	100
300 W	3	2	56	560	112	280.0	123
400 E	3	2	56	5,021	43	2,510.5	37
4800 W	2	2	56	1,570	78	785.0	92
600 W	2	2	56	5,732	38	2,866.0	27
800 W	2	2	56	1,418	81	709.0	95
Adams Ave Pkwy	1	2	56	1,390	82	695.0	97
Bangerter Hwy (SR-154)	2	2	56	6,481	33	3,240.5	20
Columbus St (SR-186)	2	2	56	321	124	160.5	138
Foothill Blvd (SR-186)	2	2	56	5,177	40	2,588.5	34
Freedom Blvd	3	2	56	9,151	27	4,575.5	9
Geneva Rd (SR-114)	3	2	56	12,056	20	6,028.0	6
I-15 SPUI	2	2	56	5,024	42	2,512.0	36
I-215 E SB Ramps	2	2	56	1,091	91	545.5	109
University Pkwy (SR-265)	3	2	56	5,388	39	2,694.0	30
100 E (SR-74)	3	1	162	840	100	840.0	89
100 W	3	1	162	132	139	132.0	139
1000 W / American Beauty Dr	2	1	162	187	135	187.0	134
1050 E	1	1	162	587	110	587.0	106
1070 W	2	1	162	89	149	89.0	149
1100 E (AF) / 2000 W (PG) (North County Blvd / SR-129)	3	1	162	1,639	74	1,639.0	61
1100 W (Jordan River Ped Xing)	2	1	162	128	142	128.0	142
1200 W (Glendale)	2	1	162	2,157	64	2,157.0	46
1300 W	2	1	162	677	106	677.0	99
1300 W	3	1	162	337	123	337.0	119
1460 W (Garside St)	2	1	162	2,614	57	2,614.0	33
1500 E	2	1	162	705	105	705.0	96
1500 W	2	1	162	162	138	162.0	137
1500 W (Cheyenne St)	2	1	162	503	114	503.0	110
1650 W	3	1	162	100	147	100.0	147
1700 E	2	1	162	1,179	89	1,179.0	78
1725 E	2	1	162	1,207	86	1,207.0	75
180 E	3	1	162	239	132	239.0	130
1800 E	2	1	162	1,042	93	1,042.0	82
1900 W	2	1	162	435	118	435.0	113
1940 W / 1950 W	2	1	162	50	153	50.0	153
1945 E	2	1	162	108	146	108.0	146
1950 W	2	1	162	3,390	50	3,390.0	16
200 W	3	1	162	3,702	48	3,702.0	12

210 W	2	1	162	2,029	67	2,029.0	50
2200 E (Fire Station/Olympus JHS)	2	1	162	75	151	75.0	151
2200 W and I-215 W NB Off-ramp	2	1	162	1,968	68	1,968.0	52
2700 W TSC - Flex Lanes	2	1	162	575	111	575.0	107
2940 E	2	1	162	381	122	381.0	118
300 E	3	1	162	128	142	128.0	142
3030 W (Beaver St)	2	1	162	1,597	75	1,597.0	62
3175 E	2	1	162	198	134	198.0	133
3200 W	2	1	162	2,938	54	2,938.0	26
3200 W TSC - Flex Lanes	2	1	162	648	107	648.0	101
3300 E	2	1	162	199	133	199.0	132
3450 W	2	1	162	1,698	73	1,698.0	60
350 E	3	1	162	551	113	551.0	108
3600 W	2	1	162	1,197	88	1,197.0	77
3600 W TSC - Flex Lanes	2	1	162	411	119	411.0	115
370 E	2	1	162	41	154	41.0	154
3900 W / 3856 W	2	1	162	21	157	21.0	157
400 W	3	1	162	22,308	12	22,308.0	1
4000 W	2	1	162	2,200	63	2,200.0	45
4015 W	2	1	162	1,593	76	1,593.0	63
4155 W	2	1	162	250	130	250.0	128
4220 W	2	1	162	115	144	115.0	144
4400 W	2	1	162	277	126	277.0	124
4420 W	2	1	162	51	152	51.0	152
450 E	3	1	162	3,359	52	3,359.0	18
500 E (SR-180)	3	1	162	1,511	79	1,511.0	67
5200 W	2	1	162	91	148	91.0	148
600 E	2	1	162	-	162	-	162
6400 W	2	1	162	862	98	862.0	87
680 E	3	1	162	1,584	77	1,584.0	64
7200 W	2	1	162	1,141	90	1,141.0	79
725 E	2	1	162	248	131	248.0	129
800 E	2	1	162	605	109	605.0	105
8000 W	2	1	162	823	102	823.0	91
850 E	3	1	162	129	140	129.0	140
850 E (Glasmann)	1	1	162	2,420	60	2,420.0	40
850 W (Ped Xing)	2	1	162	410	120	410.0	116
860 E	3	1	162	34	155	34.0	155
900 W	3	1	162	2,337	62	2,337.0	43
Adams Ave	1	1	162	5	160	5.0	160
Ashton Blvd (1550 W)	3	1	162	951	95	951.0	85
Atwood Blvd (300 E)	2	1	162	177	136	177.0	135

Campus Dr	3	1	162	1,036	94	1,036.0	83
Canal Rd (1300 W)	2	1	162	297	125	297.0	121
Canyon Rd	3	1	162	2,442	59	2,442.0	39
Center St	3	1	162	30	156	30.0	156
Central Campus Dr	2	1	162	3,374	51	3,374.0	17
Cottonwood St (70 W)	2	1	162	646	108	646.0	102
East Bay Blvd	3	1	162	403	121	403.0	117
Emery St (1170 W)	2	1	162	255	129	255.0	127
Family Center Dr (100 E)	3	1	162	13	159	13.0	159
Fashion Blvd (280 E) / I-215 S WB Ramps	2	1	162	2,614	57	2,614.0	33
Geneva / Main St (SR-114)	3	1	162	1,794	71	1,794.0	59
Grant Ave	1	1	162	454	116	454.0	112
Guardsman Wy	2	1	162	2,630	55	2,630.0	31
Guardsman Wy/1580 E (SR-282)	2	1	162	6,737	32	6,737.0	5
Holladay Blvd (2320 E)	2	1	162	1,201	87	1,201.0	76
I-15 SB Off-ramp / 900 W	2	1	162	838	101	838.0	90
I-15 SPUI	3	1	162	10,193	23	10,193.0	2
I-215 E NB On-ramp / Wasatch Blvd	2	1	162	2,106	65	2,106.0	47
I-215 W SB Ramps / 2400 W	2	1	162	1,481	80	1,481.0	70
Kings Row Dr (1650 E)	2	1	162	171	137	171.0	136
Lincoln Ave	1	1	162	469	115	469.0	111
MTC Station	3	1	162	947	96	947.0	86
Main St	3	1	162	2,941	53	2,941.0	25
Market St (2820 W)	2	1	162	1,926	69	1,926.0	54
Monroe Blvd	1	1	162	-	162	-	162
Northwest Ave (4725 W)	2	1	162	267	127	267.0	125
Novell Place	3	1	162	119	143	119.0	143
SR-85 (Mountain View)	2	1	162	7,221	30	7,221.0	4
Sandhill Rd (CFI Master)	3	1	162	81	150	81.0	150
Sunset Dr	1	1	162	1,868	70	1,868.0	55
Thanksgiving Way (I-15 SB Frontage Rd)	3	1	162	15	158	15.0	158
Town Center Blvd	3	1	162	721	103	721.0	93
Triumph Blvd (2350 W)	3	1	162	1,044	92	1,044.0	81
US-89	3	1	162	861	99	861.0	88
University	2	1	162	2,411	61	2,411.0	41
Viewmont St (2100 E)	2	1	162	114	145	114.0	145
Wall Ave (SR-204)	1	1	162	255	129	255.0	127
Wolcott St	2	1	162	710	104	710.0	94
Woodrow (120 W)	2	1	162	3,504	49	3,504.0	14
Woodrow St (130 W)	2	1	162	2,502	58	2,502.0	38

Table A-4 Intersection Stops per E/W Corridor

Street E/W	Region	Signalized Intersections		Intersection Stops		Intersection Stops per Signal	
		Total	Rank	Total	Rank	Total	Rank
3300 S (SR-171)	2	26	1	55,744	3	2,144.0	53
3500 S (SR-171)	2	22	2	58,254	2	2,647.9	38
3900 S	2	18	4	44,049	6	2,447.2	46
University Pkwy	3	18	4	115,243	1	6,402.4	6
200 S	2	16	5	55,425	4	3,464.1	27
2100 S	2	15	6	34,435	7	2,295.7	49
5400 S	2	14	8	16,094	13	1,149.6	83
US-89 (State St)	3	14	8	8,978	23	641.3	118
North Temple	2	13	10	48,673	5	3,744.1	23
South Temple	2	13	10	32,186	8	2,475.8	45
4500 S (SR-266)	2	10	12	25,839	11	2,583.9	40
900 S	2	10	12	18,728	12	1,872.8	63
100 S	2	8	14	12,824	18	1,603.0	69
1300 S	2	8	14	15,323	15	1,915.4	61
800 S	2	7	16	14,205	17	2,029.3	58
Murray-Holladay Rd	2	7	16	5,452	38	778.9	107
600 N	2	6	17	7,310	28	1,218.3	79
1700 S	2	5	20	4,759	43	951.8	92
400 S	2	5	20	15,827	14	3,165.4	32
California Ave	2	5	20	7,094	29	1,418.8	74
100 N	3	4	30	6,665	30	1,666.3	67
25th St	1	4	30	824	117	206.0	165
26th St	1	4	30	6,319	34	1,579.8	70
2700 S	2	4	30	3,369	60	842.3	100
500 S	2	4	30	11,001	20	2,750.3	36
5415 S (SR-173)	2	4	30	978	108	244.5	160
700 N	3	4	30	31,125	9	7,781.3	4
800 S	3	4	30	3,385	58	846.3	98
Main St	3	4	30	2,559	69	639.8	119
Washington Blvd	1	4	30	5,892	36	1,473.0	72
1860 S	3	3	38	1,470	91	490.0	129
300 N	2	3	38	2,587	67	862.3	96
300 S	2	3	38	6,582	31	2,194.0	51
3800 S	2	3	38	2,635	65	878.3	95
500 N	2	3	38	1,046	103	348.7	147
600 S	2	3	38	4,478	46	1,492.7	71
Center St	3	3	38	3,405	57	1,135.0	84
South Campus Dr (SR-282)	2	3	38	10,827	21	3,609.0	25

1000 N	2	2	63	2,699	64	1,349.5	75
1000 S	3	2	63	5,569	37	2,784.5	35
2100 N (SR-194)	3	2	63	966	109	483.0	130
28th St	1	2	63	837	115	418.5	138
30th St (SR-79)	1	2	63	1,764	87	882.0	94
3100 S	2	2	63	1,423	93	711.5	112
32nd St	1	2	63	648	129	324.0	152
36th St	1	2	63	1,577	89	788.5	105
400 N	3	2	63	1,102	101	551.0	125
400 S	3	2	63	1,107	100	553.5	124
4100 S	2	2	63	15,164	16	7,582.0	5
4800 S	2	2	63	2,400	74	1,200.0	80
500 N	3	2	63	6,201	35	3,100.5	33
5300 S (SR-173)	2	2	63	8,668	24	4,334.0	13
5600 S	2	2	63	4,341	47	2,170.5	52
6200 S	2	2	63	3,701	55	1,850.5	65
6600 S (Winchester St)	2	2	63	2,363	75	1,181.5	82
700 S	2	2	63	932	110	466.0	133
900 N	3	2	63	8,176	26	4,088.0	15
East Bay Blvd	3	2	63	8,035	27	4,017.5	16
I-80 EB Ramps	2	2	63	8,278	25	4,139.0	14
I-80 WB Ramps	2	2	63	6,448	33	3,224.0	31
Sugar House Streetcar (2250 S)	2	2	63	469	138	234.5	161
Sunnyside Ave (850 S)	2	2	63	6,578	32	3,289.0	29
Vine St (5100 S)	2	2	63	1,563	90	781.5	106
100 S	3	1	182	436	141	436.0	135
1000 N / I-15 SB On-ramp	2	1	182	838	114	838.0	101
1120 S (Target)	2	1	182	1,192	97	1,192.0	81
1200 N	3	1	182	394	146	394.0	141
1200 S	3	1	182	359	151	359.0	146
12th St (SR-39)	1	1	182	3,933	50	3,933.0	19
1500 N	3	1	182	61	179	61.0	179
1500 S	2	1	182	115	175	115.0	175
1600 N	3	1	182	1,656	88	1,656.0	68
1600 S	3	1	182	373	150	373.0	145
1700 N	1	1	182	126	174	126.0	174
1720 N	3	1	182	415	144	415.0	139
17th St	1	1	182	220	165	220.0	164
1900 E	2	1	182	629	130	629.0	120
1910 S (Westminster Ave)	2	1	182	271	160	271.0	157
200 N	3	1	182	3,096	62	3,096.0	34
200 S	3	1	182	2,024	82	2,024.0	59
2000 N	1	1	182	155	170	155.0	170

2000 N	3	1	182	260	162	260.0	159
20th St	1	1	182	709	124	709.0	113
21st St	1	1	182	338	154	338.0	150
22nd St	1	1	182	462	140	462.0	134
2320 S	2	1	182	846	113	846.0	99
23rd St	1	1	182	427	143	427.0	137
2495 S (Parkway Blvd)	2	1	182	828	116	828.0	102
24th St	1	1	182	1,449	92	1,449.0	73
2550 N	1	1	182	797	118	797.0	103
2600 N / 2700 N (SR-134)	1	1	182	2,704	63	2,704.0	37
27th St	1	1	182	411	145	411.0	140
29th St	1	1	182	285	159	285.0	156
2nd Ave	2	1	182	691	126	691.0	115
2nd St	1	1	182	3,227	61	3,227.0	30
300 N (Bike Xing)	3	1	182	47	180	47.0	180
300 N (Ped Xing)	3	1	182	789	119	789.0	104
300 N (SR-186)	2	1	182	3,817	52	3,817.0	21
300 S (US-89)	3	1	182	11,444	19	11,444.0	2
3100 N	1	1	182	45	181	45.0	181
31st St (SR-79)	1	1	182	691	126	691.0	115
34th St	1	1	182	152	171	152.0	171
3650 S (Lancer Wy/Valley Fair Mall)	2	1	182	1,233	95	1,233.0	77
3800 S (Millcreek Cyn)	2	1	182	993	107	993.0	91
3850 S (SR-284)	1	1	182	2,003	83	2,003.0	60
3950 S (SR-284)	1	1	182	3,727	54	3,727.0	24
3rd Ave	2	1	182	543	134	543.0	126
400 N (North St)	1	1	182	2,440	73	2,440.0	47
400 N (Ped Xing)	3	1	182	227	163	227.0	162
400 N / W Capitol St / State Capitol	2	1	182	145	173	145.0	173
4000 S	2	1	182	677	127	677.0	116
40th St	1	1	182	2,074	81	2,074.0	57
4200 S	2	1	182	1,013	105	1,013.0	89
42nd St	1	1	182	1,343	94	1,343.0	76
4300 S	1	1	182	2,308	76	2,308.0	48
4445 S (SLCC / SR-292)	2	1	182	3,826	51	3,826.0	20
4465 S (SLCC, SR-292)	2	1	182	516	136	516.0	128
44th St	1	1	182	2,128	79	2,128.0	55
4500 S	2	1	182	285	159	285.0	156
4610 S (Conifer Wy)/SLCC (SR-292)	2	1	182	269	161	269.0	158
4700 S (SR-266)	2	1	182	4,607	44	4,607.0	11
4705 S (Walmart)	2	1	182	746	122	746.0	110
5110 S (Arrowhead Ln)	2	1	182	86	177	86.0	177
5150 S (Intermountain Dr)	2	1	182	468	139	468.0	132

5225 S (Chateau Ave)	2	1	182	748	121	748.0	109
5300 S / 5400 S (SR-173)	2	1	182	1,823	86	1,823.0	66
5350 S	1	1	182	373	150	373.0	145
550 W/2230 N	3	1	182	5,061	41	5,061.0	9
5900 S (Vine St)	2	1	182	575	133	575.0	123
600 N	3	1	182	146	172	146.0	172
6400 S (Winchester)	2	1	182	5,444	39	5,444.0	7
700 N	2	1	182	3,748	53	3,748.0	22
700 N (Lindon) / 1000 S (PG) (SR-129)	3	1	182	749	120	749.0	108
700 S / 300 E	3	1	182	1,001	106	1,001.0	90
7000 S	2	1	182	5,144	40	5,144.0	8
7800 S	2	1	182	5,039	42	5,039.0	10
7th St	1	1	182	476	137	476.0	131
800 N	3	1	182	892	111	892.0	93
800 N (SR-52)	3	1	182	2,521	71	2,521.0	43
8020 S (Rosa Parks Dr)	2	1	182	2,236	77	2,236.0	50
920 S	3	1	182	9,524	22	9,524.0	3
940 N	3	1	182	156	169	156.0	169
950 W/1850 N	3	1	182	76	178	76.0	178
Ashton Blvd	3	1	182	1,044	104	1,044.0	88
Birch Lane	3	1	182	664	128	664.0	117
Campus Ln (1100 N)	3	1	182	524	135	524.0	127
Columbia Ln	3	1	182	107	176	107.0	176
Cottonwood St (5210 S)	2	1	182	2,502	72	2,502.0	44
Cougar Blvd (1230 N)	3	1	182	1,852	85	1,852.0	64
Foothill Blvd (SR-186)	2	1	182	3,480	56	3,480.0	26
Foothill Dr (SR-186)	2	1	182	4,014	48	4,014.0	17
Hospital entrance	2	1	182	3,964	49	3,964.0	18
I-215 NB Off-ramp (4100 S)	2	1	182	289	157	289.0	154
I-215 S EB Off-ramp	2	1	182	312	156	312.0	153
I-215 S WB Off-ramp/Target	2	1	182	1,905	84	1,905.0	62
Indiana Ave (840 S)	2	1	182	1,062	102	1,062.0	87
Kensington Ave (1500 S)	2	1	182	621	131	621.0	121
Larsen Ln	1	1	182	339	153	339.0	149
Lehman Ave/Valley Fair Mall (3590 S)	2	1	182	383	147	383.0	142
North Campus Dr (SR-282)	2	1	182	3,374	59	3,374.0	28
North Campus Dr (SR-282) / Medical Dr	2	1	182	27,515	10	27,515.0	1
North Star Dr / 300 N	2	1	182	1,112	98	1,112.0	85
Oakview Dr (4275 S)	2	1	182	194	166	194.0	166
Pacific Dr	3	1	182	861	112	861.0	97
Phylden Dr/Laney Ave (4640 S)	2	1	182	170	167	170.0	167
Pleasant Grove Blvd	3	1	182	2,554	70	2,554.0	42
Plum Tree Plaza	3	1	182	327	155	327.0	151

Research Wy (2770 S)	2	1	182	601	132	601.0	122
Riverdale Rd (SR-26)	1	1	182	381	148	381.0	143
Riverside Ave	3	1	182	157	168	157.0	168
SR-201 EB Off-ramp/2200 S	2	1	182	225	164	225.0	163
SR-201 SPUI	2	1	182	2,135	78	2,135.0	54
SR-73 (Main)	3	1	182	2,082	80	2,082.0	56
Sugarmont Dr (2225 S) / Sugar House Streetcar	2	1	182	427	143	427.0	137
Town Center Dr	3	1	182	721	123	721.0	111
Van Winkle (SR-71 / SR-152)	2	1	182	4,555	45	4,555.0	12
Vine St	2	1	182	2,575	68	2,575.0	41
Vine St (5110 S)	2	1	182	348	152	348.0	148
Wakara Wy	2	1	182	1,229	96	1,229.0	78
Wasatch Dr	2	1	182	1,109	99	1,109.0	86
Winchester (6400 S)	2	1	182	2,614	66	2,614.0	39
Winchester St (6600 S)	2	1	182	41	182	41.0	182