APPENDIX A CHAPTERS 1 AND 2 SUPPORTING DOCUMENTATION

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2015-2040 Regional Transportation Plan Dixie Metropolitan Planning Organization	The Dixie Transportation Planning Office Five County Association of Governments	Michael Heaps Horrocks Engineers 2162 W. Grove Parkway, Suite 400 Pleasant Grove, Utah 84602
Washington City Active Transportation Plan Maps	Washington City	Nicole Tolley Horrocks Engineers 2162 W. Grove Parkway, Suite 400 Pleasant Grove, Utah 84602
Concept Evaluation Memo	Horrocks Engineers	Nicole Tolley Horrocks Engineers 2162 W. Grove Parkway, Suite 400 Pleasant Grove, Utah 84602
Main Street Alignment Memo	Horrocks Engineers	Nicole Tolley Horrocks Engineers 2162 W. Grove Parkway, Suite 400 Pleasant Grove, Utah 84602

TRAFFIC REPORT

PREPARED BY
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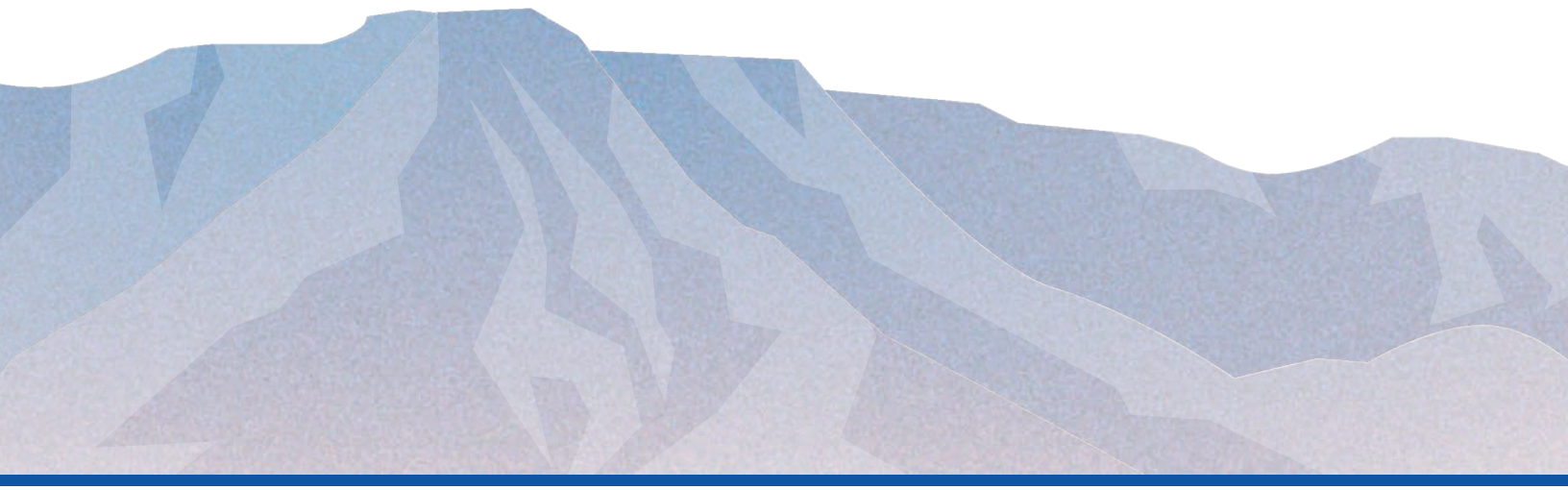

The environmental review, consultation, and other actions required by applicable Federal environmental laws for this project are being, or have been, carried out by UDOT pursuant to 23 USC 327 and a Memorandum of Understanding dated January 17, 2017, and executed by FHWA and UDOT.

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To:	Exit 11 EIS Project Team	Memorandum
From:	Horrocks Traffic Group	
Date:	November 20, 2018	
Subject:	Milepost 11 EIS Traffic Analysis	

PURPOSE

This memorandum describes the traffic analyses performed in support of the I-15 Milepost 11 Interchange Environmental Impact Statement (EIS). The memorandum details data collection efforts, roadway configurations, study methodology, model calibration and traffic operations for 2017 existing and 2040 future no-build conditions and 2040 build conditions for the six alternatives outlined in Chapter 2 of the EIS document.

STUDY METHODOLOGY

Data Collection

Data collected for the project included roadway geometry, signal timings, field visits to observe traffic conditions, roadway and intersection volumes, speeds, travel times and vehicle classification information. Data was obtained from the UDOT Performance Measurement Systems (PeMS) and automatic traffic recorders; pneumatic tube counts performed by Washington City, origin-destination information collected using Bluetooth technology, and both manual and video intersection turning movement counts. PM peak hour turning movement counts were performed at the following intersections:

- Green Spring Drive & Buena Vista Blvd
- Green Spring Drive & I-15 Single Point Urban Interchange (SPUI)
- Green Spring Drive & Telegraph Street
- 850 North & 3050 East
- 700 West & Telegraph Street
- Main Street & Telegraph Street
- 300 East & Telegraph Street
- Washington Parkway & Telegraph Street
- Washington Parkway & 1100 East
- Washington Parkway & I-15 Southbound Ramps
- Washington Parkway & I-15 Northbound Ramps
- Washington Parkway & Buena Vista Blvd
- Main Street & Buena Vista Blvd

Figure 1 - Study Area

In addition to the intersections, counts were performed at business accesses along Red Cliffs Drive, Telegraph Street, Green Spring Drive, and 3050 East in the study area.

Traffic Analysis Software

The basic tools used for the traffic analysis included the Dixie Metropolitan Planning Organization (DMPO) Regional Travel Demand Model (TDM) and Vissim traffic simulation software from the PTV Group.

The TDM predicts future travel demand based on projections of land use, socioeconomic patterns, and transportation system characteristics. The model is run using the TP+/Cube software (currently version 6.4.3).

Vissim is a microscopic traffic analysis and simulation software program that is used to perform detailed traffic operations analysis and is based on Highway Capacity Manual (HCM) methodology.

The following table details the analysis type and use of each of the software packages.

Table 1 - Traffic Software

Software Package	Use/Analysis Type	Output/Performance Measure
Dixie Cube Travel Demand Model v2.0	Development of future travel demand	Daily and peak hour turning movement volumes
VISSIM v9.0-11	Basic Freeway Segments, Weaving Areas	Density, Speed, Percent of Traffic Demand Served
	Ramp Junctions (Merges/Diverges)	Density, Speed, Percent of Traffic Demand Served, # of Lane Changes
	Ramp Terminal Intersections, Adjacent Intersections	LOS, Queue Length
	Overall Roadway Network System	Travel Time, Delay, Vehicle Miles Traveled

Regional Travel Demand Model Overview

The DMPO maintains a travel demand-forecasting model for Washington County. The TDM predicts future travel demand based on projections of land use, socioeconomic patterns, and transportation system characteristics. The model is run using the TP+/Cube software. References to "the model" in this report refer to the scripts and data maintained by Dixie MPO, not to the Cube software. At the time of this study, the Dixie MPO official version of the TDM is 2.0, which is calibrated to represent 2014 base year travel conditions and 2040 projected travel conditions.

Specific inputs to the model include socioeconomic forecasts and transportation system data. The socioeconomic data includes population, households, employment, and average household income. Household data is further classified by household size, number of workers, and average income. Employment data is classified into twelve categories, which include two for public schools. The transportation system data includes both roadway and transit networks. The roadway network includes freeways, arterial routes and collector routes. The transit network includes local bus routes. Much of the socioeconomic data comes from the Utah Governor's Office of Management and Budget (GOMB). Transportation system data comes from the DMPO.

The DMPO model uses the traditional four-step modeling process consisting of trip generation, trip distribution, mode split, and trip assignment. It includes an auto ownership model to better estimate trip generation and mode split. The model provides a feedback loop during trip distribution, allowing traffic congestion to influence trip distribution patterns.

Existing socioeconomic and transportation system data were used to create a base-year (2017) model. Future year forecasts are prepared by running the model using future year socioeconomic and transportation system data. The planning year 2040 is the future forecast year used in the MP 11 EIS traffic operations analyses.

Travel Demand Model Modifications and Improvements

Traffic Analysis Zones (TAZs) are small, geographical areas in the model which specify socioeconomic data such as population, households, and employment. The model uses the information in each TAZ for trip generation, trip distribution, and mode split. Trips generated by each TAZ are assigned to the roadway network. The model then uses the roadway network in an iterative process to assign routes for each trip destination. The original TAZs from the DMPO TDM are well suited for regional traffic forecasts, but often do not provide adequate detail for smaller-scale studies. Smaller TAZs can provide a better loading of traffic onto the roadway network. For these reasons, some of the original TAZs within and adjacent to the EIS study area were split into smaller zones. In most instances, the TAZs were split along barriers such as existing or planned roads, rivers, and/or major land-use changes. After the splits, the socioeconomic data from the original TAZs were re-distributed into the new zones. It was assumed that variables such as income and household size for the smaller TAZs were the same as the original TAZs**.**

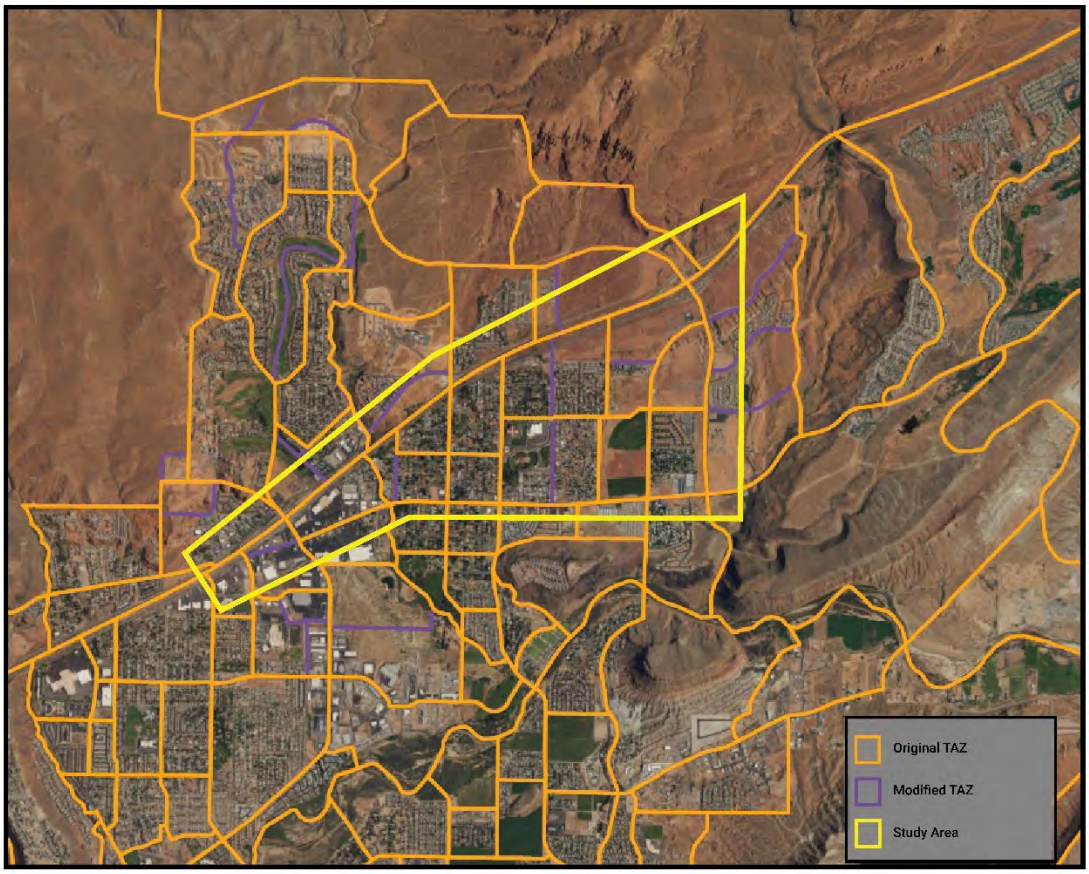


Figure 2 - Traffic Analysis Zones

2040 Volume Development

The existing 2017 traffic volumes (adjusted for weekly and seasonal variations) along with the 2017 and 2040 model output data were used for calculating the projected future 2040 volumes per the methodology described in the UDOT document "Utah Travel Demand Forecasting," which follows Chapter 8 of the National Cooperative Highway Research Program's (NCHRP) Report 255. This process involves comparing the 2017 model volumes with actual 2017 count data. The difference between the two volumes is used to make an adjustment to the 2040 volumes. This helps to correct for errors in the model where it might be over-predicting or under-predicting volumes.

Vissim Model Overview

Model Limits - The Vissim model includes the following corridors:

- → **I-15** extending east past the Washington Parkway (Exit 13) Interchange and west past the Green Spring Drive (Exit 10) SPUI.
- → **Red Cliffs Drive/Telegraph Street** between the Mall Drive crossing on the west end to just east of Washington Parkway.
- → **Washington Parkway** between north of Buena Vista Boulevard to Telegraph Street.
- → **Green Spring Drive/3050 East** beginning north of Buena Vista Boulevard and ending south of 850 East.
- → **Buena Vista Boulevard** between Washington Parkway on the east side to the Mall Drive crossing on the west side.

Geometry - Roadway geometric features such as the number of lanes, lane widths, and grades were input into the Vissim model based on aerial photography, CADD files, and field visits.

Analysis Period - Traffic was modeled for 2-hour periods in the PM between 4:00 PM to 6:00 PM. Daily counts collected using pneumatic tubes showed the AM peak hour traffic to be much lower than PM peak hour traffic therefore only PM peak hour analysis was performed for the study.

Vehicle Composition - The vehicle composition, including truck percentages used for the model's vehicle inputs, was determined using a combination of manual traffic counts at the study intersections and PEMS data for mainline I-15. Details of the vehicle composition used for the analysis is contained in the appendix.

Routing - Origin-Destination pairs used to route vehicles through the model's network were determined using primarily Bluetooth data collected in the study area. Turning movement ratios were used in areas that were not included in the O-D data collection area.

Signal Timing - Existing conditions were modeled with signal timings obtained from the UDOT Signal Group. Future conditions were modeled with the same general signal timing parameters, but with optimized phasing.

Vissim Model Calibration

For this project, version 9.0-11 of the Vissim microsimulation software was used to model traffic in the study area. A model of the existing geometry and traffic volumes was prepared in order to replicate the typical traffic conditions. The Vissim software is based on two different driving behavior models, the Wiedemann-74 and Wiedemann-99 methodologies. The Wiedemann-74 model is used primarily in urban traffic conditions, and the Wiedemann-99 model is used for inter-urban motorway or freeway conditions. In the study area both types of roadway behavior is present, therefore both methodologies are used. Default Parameters for the Wiedemann-74 methodology are presented in Table 2. Default parameters for Wiedemann-99 are presented in Table 3.

Table 2 - Wiedemann-74 Model Parameters

Model Parameter	Value
Average standstill distance	6.56
Additive part of safety distance	2.00
Multiplicative part of safety distance	3.00

Table 3 - Wiedemann-99 Model Parameters

Model Parameter	Value
CC-0; Standstill distance	4.92
CC-1; Headway time	0.90
CC-2; 'Following' variation	13.12
CC-3; Threshold for entering 'Following'	-8.00
CC-4; Negative 'Following' threshold	-0.35
CC-5; Positive 'Following' threshold	0.35
CC-6; Speed dependency for oscillation	11.44
CC-7; Oscillation acceleration	0.82
CC-8; Standstill acceleration	11.48
CC-9; Acceleration with 50 mph	4.92

Criteria used in calibrating the Vissim model was taken from Federal Highway Administration's (FHWA) Traffic Analysis Toolbox Volume III: Guidelines for Applying Traffic Microsimulation Modeling Software (FHWA, 2004). The calibration uses the GEH statistic to compare observed vs modeled volume flow. The formula used to calculate the GEH statistic is:

$$GEH = \sqrt{\frac{(E-V)^2}{(E+V)/2}}$$

where E equals the modeled volumes and V equals the observed volume.

Based on FHWA's document the following calibration criteria and targets were used:

Table 4 - Calibration Criteria

Criteria and Measure	Calibration Acceptance Targets	Condition Met?
Hourly Flows, Model Versus Observed		
Within 400 veh/hr, for Flow >2700 veh/hr	> 85% of cases	Yes
Sum of All Link Flows	Within 5% of sum of all link counts	Yes
GEH Statistic < 5 for Individual Link Flows	> 85% of cases	Yes
GEH Statistic for Sum of All Link Flows	GEH < 4 for sum of all link counts	Yes
Travel Times, Model Versus Observed		
Travel Times Within 15%	> 85% of cases	Yes
Visual Audits		
Individual Link Speeds: Visually Acceptable Speed-Flow Relationship	To analyst's satisfaction	Yes
Bottlenecks: Visually Acceptable Queueing	To analyst's satisfaction	Yes

The Vissim model was calibrated by testing various combinations of driver behavior parameter adjustments against field measurements and observations. Initial model runs with default values showed congestion levels below what was observed in the field. Queues, particularly around the Green Spring Drive/Telegraph Street intersection were much lower than field observations. The Vissim Wiedemann-74 default parameters were adjusted up until the model generally matched observed conditions. No adjustments were made to the Wiedemann-99 parameters. The following table details the revised Wiedemann-74 parameters:

Table 5 – Revised Wiedemann-74 model parameters

Model Parameter	Original Value	Adjusted Value
Average standstill distance	6.56	6.56
Additive part of safety distance	2.00	2.75
Multiplicative part of safety distance	3.00	3.75

Based on the comparison of the Vissim model outputs to field measurements (travel times, traffic flows, and speeds) the Vissim model meets the calibration targets and accurately represents PM peak hour conditions for the existing 2017 analysis.

Measures of Effectiveness

The primary measure of effectiveness (MOE) used for this study was Level of Service (LOS). LOS is a term used to describe the traffic operations of an intersection, based on congestion and delay, and a freeway, based on density. LOS ranges from A (almost no congestion or delay) to F (traffic demand exceeds capacity and the intersection experiences long queues and delay). LOS D is generally acceptable for urbanized intersections and was used for this analysis. LOS E is the threshold when the intersection reaches capacity. The delay criteria used to assign a letter grade to an intersection for signalized and unsignalized intersections is shown in the table below.

Table 6 - Highway Capacity Manual Intersection LOS Criteria

Level of Service		Traffic Conditions	Average Control Delay (sec/veh)	
			Signalized	Unsignalized
Acceptable	A	Free Flow Operations / Insignificant	0 ≤ 10	0 ≤ 10
	B	Smooth Operations / Short Delays	10 ≤ 20	10 ≤ 15
	C	Stable Operations / Acceptable Delays	20 ≤ 35	15 ≤ 25
	D	Approaching Unstable Operations / Tolerable Delays	35 ≤ 55	25 ≤ 35
Unacceptable	E	Unstable Operations / Significant Delays Begin	55 ≤ 80	35 ≤ 50
	F	Very Poor Operations / Excessive Delays Occur	> 80	> 50

The following table details the LOS thresholds for freeway segments based on the number of passenger cars per mile per lane (pc/mi/ln):

Table 7 - Highway Capacity Manual Interstate LOS Criteria

Level of Service		Traffic Conditions	Freeway Density (pc/mi/ln)	
			Basic Segment	Weave Segment
Acceptable	A	Free Flow Operations / Insignificant	0 ≤ 10	0 ≤ 10
	B	Smooth Operations / Short Delays	10 ≤ 15	10 ≤ 20
	C	Stable Operations / Acceptable Delays	15 ≤ 25	20 ≤ 28
	D	Approaching Unstable Operations / Tolerable Delays	25 ≤ 35	28 ≤ 35
Unacceptable	E	Unstable Operations / Significant Delays Begin	35 ≤ 50	35 ≤ 43
	F	Very Poor Operations / Excessive Delays Occur	> 50	> 43

Another MOE used in the traffic analysis was queueing. The analysis identified the average and 95th percentile queue length for each movement at the study intersections. Queue length is used to identify issues such as queuing between intersections and queues that exceed their available storage.

TRAFFIC OPERATIONS ANALYSIS

The following sections detail the results of the traffic analysis using the study methodology detailed above.

Travel Demand

Average Weekday Daily Traffic (2017 & 2040)

Average weekday daily traffic (AWDT) volumes for both the existing 2017 observed conditions and the 2040 projected conditions are shown in Figure 3.

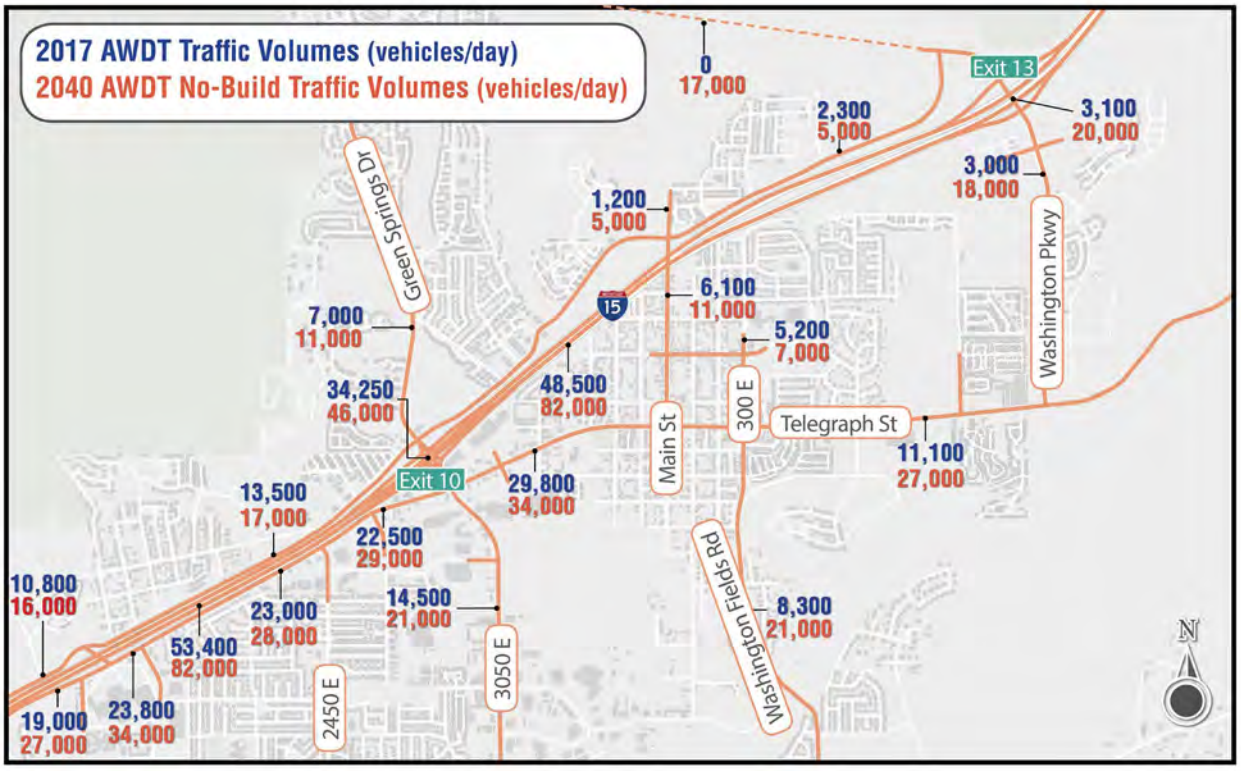


Figure 3 - AWDT Traffic Volumes

Intersection Turning Movement Volumes

Figures 4 and 5 detail the 2017 and 2040 PM peak hour turning movement volumes at the study intersections that were used to perform the traffic operations analysis.

Origin Destination

Using Bluetooth technology, trip origin destination percentages between key origins and destinations within the study area such as between residential areas and retail/commercial areas, were collected. The origin destinations and a data table displaying the trip percentage between various origin destination pairs is displayed in Figure 6 and Table 8.

2017 INTERSECTION VOLUMES – PM PEAK HOUR

5 Telegraph St & 700 W

Telegraph			700 W	
140	50	50		50
				765
				60
120				360
925				30
320				80

6 Telegraph St & Main St

Telegraph			Main St	
70	20	60		50
				745
				30
100				60
895				30
40				20

7 Telegraph St & 300 E

Telegraph			300 E	
110	60	30		20
				475
				150
140				240
575				60
260				130

8 Telegraph St & Washington Pkwy

Telegraph		Washington Pkwy	
130	20		30
			435
150			
485			

9 1100 E & Washington Pkwy

1100 E			Washington Pkwy	
160	120	0		10
				0
				10
160				10
0				130
20				10

10 Washington Pkwy & NB Ramps

NB Ramps		Washington Pkwy	
130	30		
10			140
150			160

11 Washington Pkwy & SB Ramps

SB Ramps		Washington Pkwy	
10	80		50
			80
			120
			30

12 Washington Pkwy & Buena Vista Blvd

Buena Vista		Washington Pkwy	
90			80

13 Buena Vista Blvd & Main St

Buena Vista			Main St	
30	20	10		10
				60
				10
20				140
60				40
160				20

1 Buena Vista Blvd & Green Spring Dr

Buena Vista			Green Spring	
60	240	10		10
				170
				160
80				440
220				330
380				250

2 Exit 10 SPUI

NB Ramp			Green Spring	SB Ramp
90	550	140		130
				350
200				490
640				690
				430

3 Telegraph St & Green Spring Dr

Telegraph			Green Spring	
310	680	550		530
				550
				260
400				120
840				680
120				250

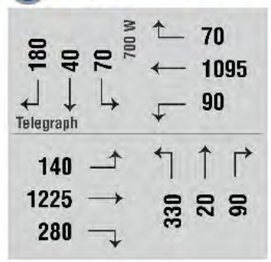
4 850 N & 3050 E

850 N		3050 E	
190	870		
200			150
100			850

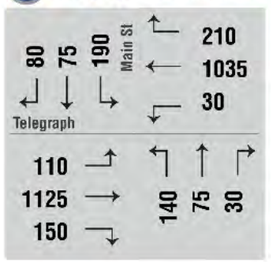
Figure 4 – 2017 Intersection Volumes

2040 INTERSECTION VOLUMES – PM PEAK HOUR

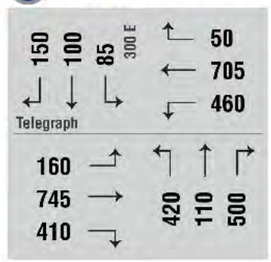
5 Telegraph St & 700 W



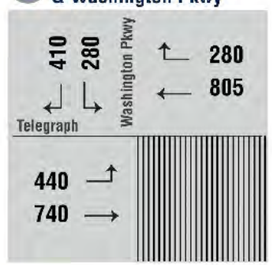
6 Telegraph St & Main St



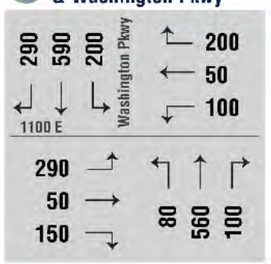
7 Telegraph St & 300 E



8 Telegraph St & Washington Pkwy

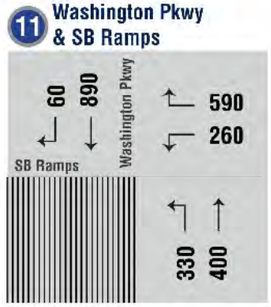


9 1100 E & Washington Pkwy



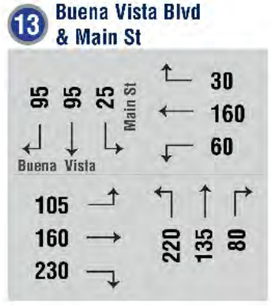
10 Washington Pkwy & NB Ramps

11 Washington Pkwy & SB Ramps

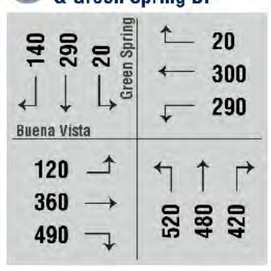


12 Washington Pkwy & Buena Vista Blvd

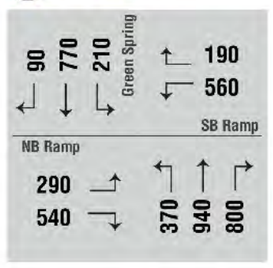
13 Buena Vista Blvd & Main St



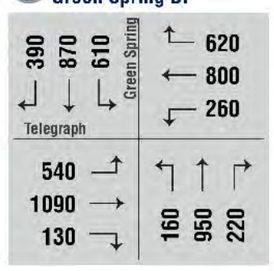
1 Buena Vista Blvd & Green Spring Dr



2 Exit 10 SPUI



3 Telegraph St & Green Spring Dr



4 850 N & 3050 E

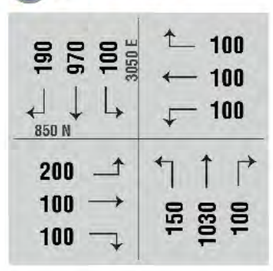


Figure 5 – 2040 Intersection Volumes

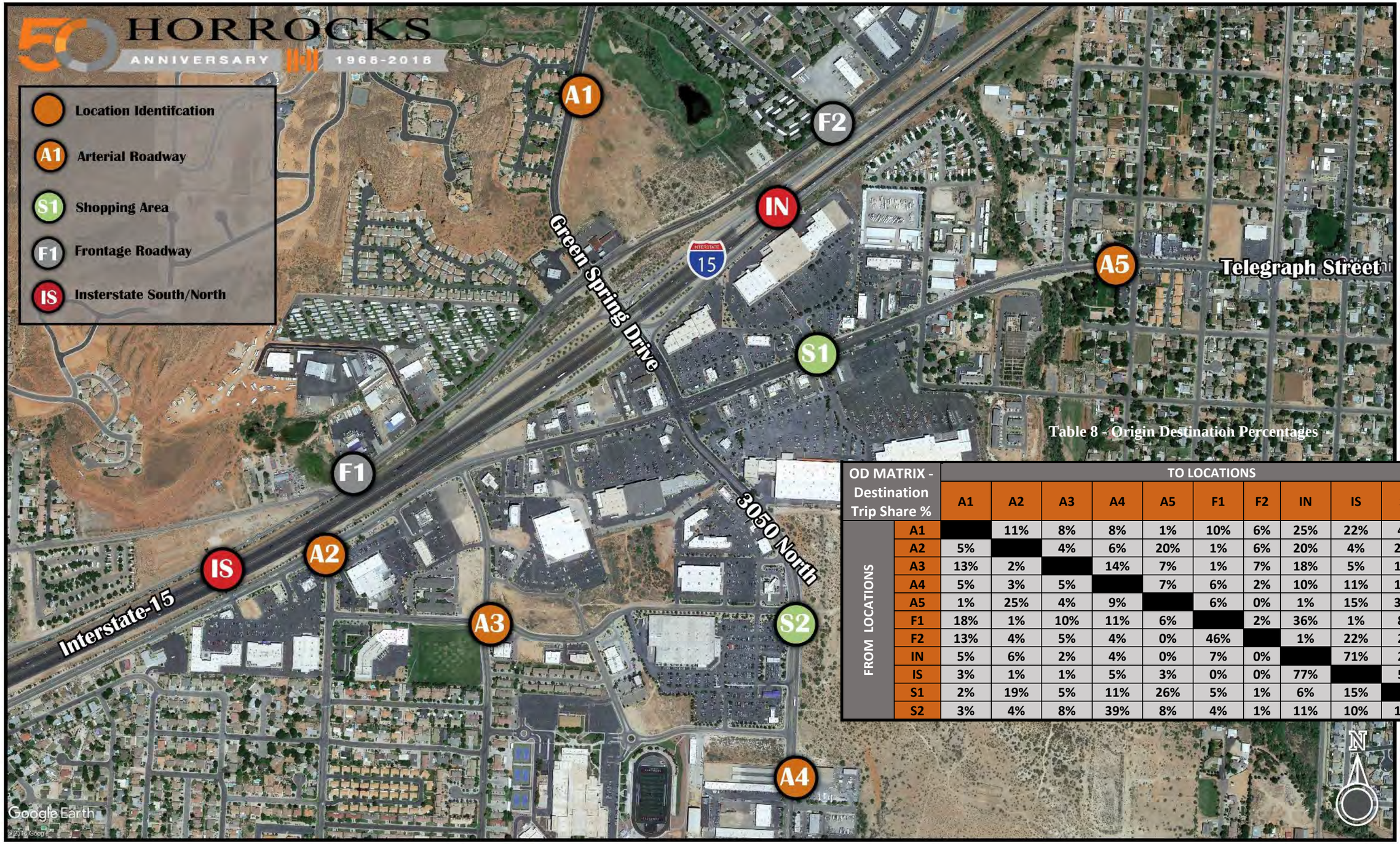


Table 8 - Origin Destination Percentages

OD MATRIX - Destination Trip Share %		TO LOCATIONS										
		A1	A2	A3	A4	A5	F1	F2	IN	IS	S1	S2
FROM LOCATIONS	A1		11%	8%	8%	1%	10%	6%	25%	22%	4%	6%
	A2	5%		4%	6%	20%	1%	6%	20%	4%	26%	7%
	A3	13%	2%		14%	7%	1%	7%	18%	5%	15%	17%
	A4	5%	3%	5%		7%	6%	2%	10%	11%	11%	40%
	A5	1%	25%	4%	9%		6%	0%	1%	15%	30%	8%
	F1	18%	1%	10%	11%	6%		2%	36%	1%	8%	6%
	F2	13%	4%	5%	4%	0%	46%		1%	22%	2%	2%
	IN	5%	6%	2%	4%	0%	7%	0%		71%	2%	4%
	IS	3%	1%	1%	5%	3%	0%	0%	77%		5%	5%
	S1	2%	19%	5%	11%	26%	5%	1%	6%	15%		10%
	S2	3%	4%	8%	39%	8%	4%	1%	11%	10%	12%	

Figure 6 - Origin Destination Locations

No Build Traffic Operations

The calibrated Vissim model was run under existing (2017) and 2040 PM peak hour no-build (no interchange at MP 11) conditions in order to assess the current/future traffic operations and determine the impacts of not making any modifications to the study area other than those already included in local and regional long range transportation plans. The following sections detail the operations analysis for the study intersections and I-15.

Intersection Operations

Table 9 details the intersection delay and corresponding LOS for each of the study intersections:

Table 9 - Intersection LOS and Delay

Intersection	2017 PM Peak Hour		2040 N0-build PM Peak Hour	
	Total Delay (sec)	LOS	Total Delay (sec)	LOS
Buena Vista Blvd/Green Spring Drive	24	C	34	C
Green Spring Drive/I-15 SPUI Interchange	28	C	95	F
Green Spring Drive/Telegraph Street	60	E	127	F
850 N/3050 East	10	B	38	D
700 West/Telegraph Street	32	C	26	C
Main Street/Telegraph Street	10	B	17	B
300 East/Telegraph Street	14	B	63	E
Washington Parkway/Telegraph Street	8	A	25	D
Washington Parkway/1100 East	2	A	14	B
Washington Parkway/I-15 Northbound Ramps	9	A	15	B
Washington Parkway/I-15 Southbound Ramps	8	A	21	C
Washington Parkway/ Buena Vista Boulevard	2	A	15	C
Main Street/Buena Vista Boulevard	12	B	13	B

The following figure details the maximum queues experienced at the various intersection approaches around the Green Spring SPUI interchange under 2017 and 2040 No-build PM peak hour conditions.

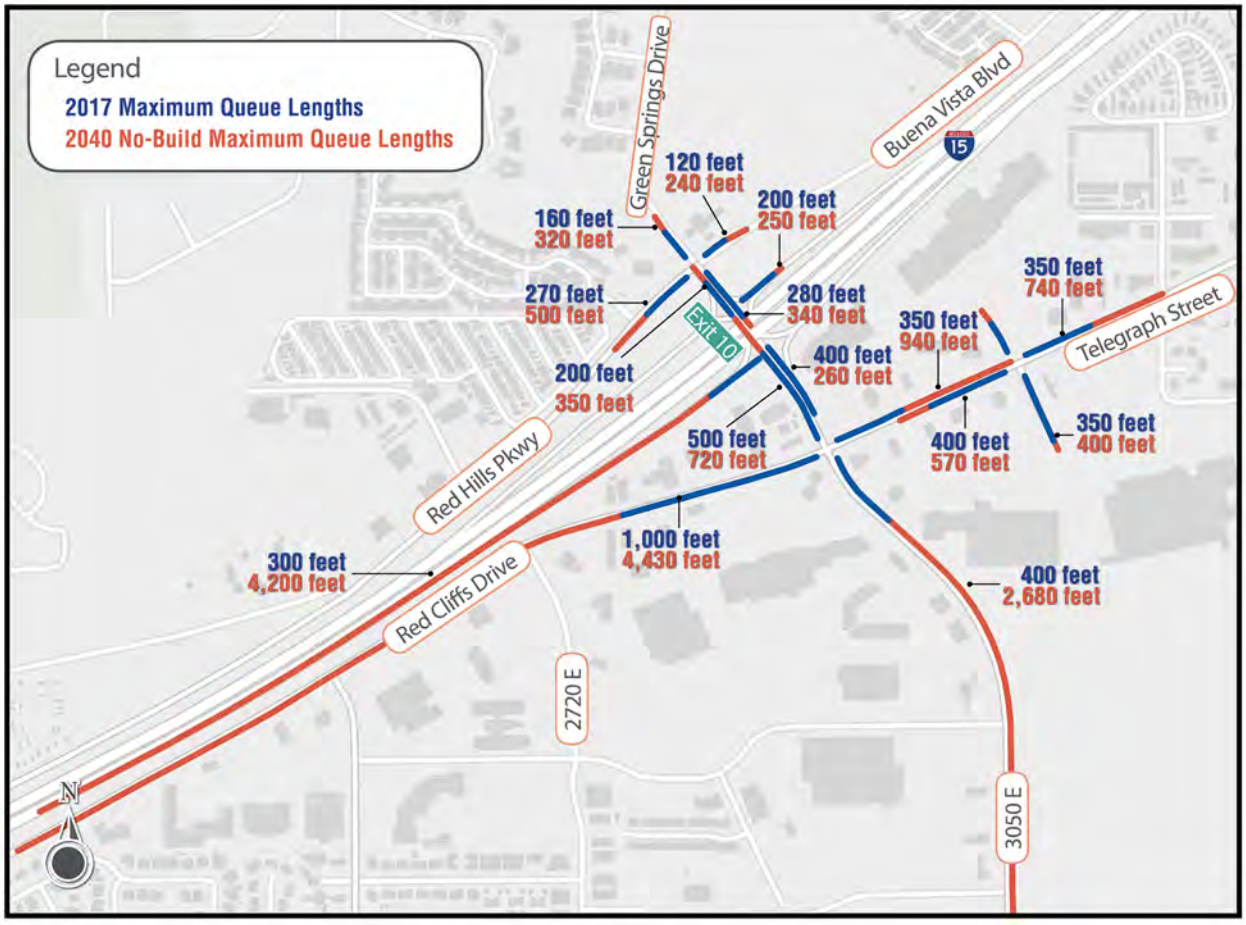


Figure 7 - Queue Lengths

Freeway Operations

Table 10 details the freeway density and corresponding LOS for the various freeway segments on northbound and southbound I-15 between Exit 10 and Exit 13.

Table 10 - Interstate LOS

Interstate PM Peak Hour					
Segment	Type	Average Density (pc/hr/ln)	2107 LOS	Average Density (pc/hr/ln)	2040 LOS
I-15 Northbound					
I-15 NB - South of Green Spring Dr	Basic	14	B	36	E
I-15 NB - Green Spring Dr Exit Ramp	Diverge	15	B	74	F
I-15 NB - Between Green Spring Dr Ramps (3-Lane Section)	Merge	9	A	16	B
I-15 NB - Between Green Spring Dr Ramps (2-Lane Section)	Basic	13	B	14	B
I-15 NB - Green Spring Dr Entrance Ramp	Merge	18	B	19	B
I-15 NB - Green Spring Dr to Washington Parkway	Basic	17	B	19	C
I-15 NB - Washington Parkway Exit Ramp	Diverge	17	B	20	B
I-15 NB - Between Washington Parkway Ramps	Basic	16	B	17	B
I-15 NB - Washington Parkway Entrance Ramp	Merge	13	B	16	B
I-15 NB - North of Washington Parkway	Basic	13	B	16	B
I-15 Southbound					
I-15 SB - North of Washington Parkway	Basic	21	C	24	C
I-15 SB - Washington Parkway Exit Ramp	Diverge	18	B	23	C
I-15 SB - Between Washington Parkway Ramps	Basic	17	B	18	B
I-15 SB - Washington Parkway Entrance Ramp	Merge	16	B	17	B
I-15 SB - Washington Parkway to Green Springs	Basic	19	C	20	C
I-15 SB - Green Spring Dr Exit Ramp	Diverge	18	B	19	B
I-15 SB - Between Green Spring Dr Ramps (2-Lane Section)	Basic	15	B	16	B
I-15 SB - Between Green Spring Dr Ramps (3-Lane Section)	Basic	13	B	15	B
I-15 SB - Green Spring Dr Entrance Ramp	Merge	12	B	17	B
I-15 SB - South of Green Spring Dr	Basic	13	B	17	B

No-Action (No Build) Traffic Analysis Summary

2017 Existing Traffic Conditions Summary

Under current 2017 conditions during the PM peak period the Green Spring Drive/Telegraph Street intersection operates at LOS E with several movements operating at LOS F. The congestion at the intersection often spills back into the Exit 10 SPUI, across adjacent business accesses, and occasionally into the signal at the 700 West (Walmart) access and the 850 North signal near Costco.

Although the overall intersection delay at the Buena Vista/Green Spring Drive intersection is LOS C, the close spacing with the Exit 10 SPUI does not allow enough storage space to accommodate the longer queues that are experienced during peak travel times causing NB approach queues to extend back into the Exit 10 SPUI.

The long delays and queues experienced at the Green Spring Drive/Telegraph Street intersection, the close intersection spacing along Green Spring Drive between Buena Vista Boulevard, the Exit 10 SPUI, and Telegraph Street, poor lane utilization at several movements, and side friction caused by business access all compile to create congested conditions around the Exit 10 area.

2040 Traffic Conditions Summary

Traffic at the Green Spring Drive/Telegraph Street intersection is expected to increase by over 25% between 2017-2040 causing already congested conditions to further deteriorate. The intersection is expected to operate at LOS F in 2040, with extensive queues that extend through the Exit 10 SPUI and up the exit ramp into I-15 northbound mainline traffic causing LOS F conditions at the SPUI and I-15. The remaining three approaches are also expected to experience long delays with queues extending west near the Mall Drive crossing, east past the 700 West (Walmart) signal, and south beyond the 850 North signal.

ALTERNATIVES DEVELOPMENT

As part of the MP 11 EIS alternatives development, 47 different improvement concepts were developed that were a combination of expanding the capacity of the existing roadway network, adding new capacity to the network, or making the network operate more efficiently. The 47 concepts were evaluated based on their ability to solve the study area operational problems discussed under the No-build analysis above. Eventually, the 47 concepts were refined and consolidated into six viable build alternatives. (See Chapter 2 of the EIS for a complete description of the alternatives development and evaluation process). The six alternatives are:

1. Alternative 1: Northbound Green Spring Drive Widening
2. Alternative 2: One-way Frontage Roads (between Exit 10 and Exit 13)
3. Alternative 3: Grade Separation (elevate Telegraph Street over the 700 West and Green Spring Drive intersections)
4. Alternative 4: Main Street Interchange
5. Alternative 5: 300 East Interchange
6. Alternative 6: Thru-turns (at Green Spring Drive/Telegraph Street intersection)

Evaluation

Each of the six alternatives were evaluated based on their ability to meet the study's Purpose and Need which is defined in the EIS as:

- Maintain the operations and safety of I-15 between Exit 10 and Exit 13 (measured by traffic queuing onto mainline I-15 from the exit ramps); and
- Enhance the mobility and safety of the transportation system in Washington City's primary business district (measured by traffic congestion, LOS, queuing, and travel delay on surface streets).

The alternatives were evaluated using the same methodology and software discussed in the previous sections of this memo.

ALTERNATIVES TRAFFIC ANALYSIS SUMMARY

The detailed intersection operations analyses evaluated intersection performance and LOS at the four highest volume intersections in the study area: Green Spring Drive/Buena Vista Boulevard, Green Spring Drive/Exit 10 SPUI, Green Spring Drive/Telegraph Street, and 700 West/Telegraph Street. The network AWDT volumes used in the analyses are shown in Table 11. The results of the intersection analyses are shown in Table 12. The analyses also examined queueing in the study area and these results are shown in Table 13.

CONCLUSION

Based on the analyses, Alternative 4: Main Street Interchange results in the best overall study area performance and best satisfies the study Purpose and Need. However, all build alternatives demonstrate sufficient performance improvements to the study area transportation network that they should not be eliminated based solely on traffic performance criterial alone and should be advanced for further detailed environmental resource screening.

Table 11 - ADWT 2040 Traffic Volumes

Location	Alternative Volume 2040 PM Peak Hour (ADWT)						
	No-Action	#1	#2	#3	#4	#5	#6
Green Springs Drive, at Exit 10	45,650	46,000	43,000	46,000	43,000	44,000	46,000
Red Cliff Drive & 2450 East	28,600	29,000	27,000	29,000	28,000	28,000	29,000
Green Spring Drive, south of Costco	20,500	21,000	20,000	21,000	20,000	20,000	21,000
Green Spring Drive, north of Buena Vista Boulevard	10,500	11,000	10,000	11,000	10,000	10,000	11,000
Telegraph Street, east of Walmart	38,600	39,000	33,000	39,000	38,000	36,000	39,000
Buena Vista Boulevard, north of Green Spring Drive	10,300	10,000	6,000	10,000	6,000	8,000	10,000
I-15 between Exit 10 and Exit 13	78,460	78,000	65,000	78,000	75,000	83,000	78,000
Main Street, north of Telegraph Street	10,600	11,000	8,000	11,000	17,000	8,000	11,000
Washington Fields Road, south of Telegraph Street	21,300	21,000	21,000	21,000	21,000	22,000	21,000
300 E, north of Telegraph Street	7,300	7,000	7,000	7,000	5,000	11,000	7,000
Buena Vista Boulevard, south of Washington Parkway	5,400	5,000	1,000	5,000	3,000	3,000	5,000
Washington Parkway, north of Buena Vista Boulevard	17,000	17,000	16,000	17,000	16,000	16,000	17,000
Washington Parkway, at Exit 13	19,800	20,000	16,000	20,000	17,000	17,000	20,000
Washington Parkway, north of Telegraph Street	17,900	18,000	16,000	18,000	16,000	16,000	18,000
Telegraph Street, west of Washington Parkway	27,200	27,000	23,000	27,000	24,000	24,000	27,000

Table 12 - 2040 Vehicle Delay/Level of Service

Intersection	2040 PM Peak Hour													
	No-Action		#1		#2		#3		#4		#5		#6	
	Total Delay (sec)	LOS	Total Delay (sec)	LOS	Total Delay (sec)	LOS	Total Delay (sec)	LOS	Total Delay (sec)	LOS	Total Delay (sec)	LOS	Total Delay (sec)	LOS
Buena Vista Blvd/Green Spring Drive	108	F	41	D	24	C	34	C	26	C	31	C	39	D
Green Spring Drive/I-15 SPUI Interchange	122	F	32	C	28	C	33	C	28	C	34	C	30	C
Green Spring Drive/Telegraph Street	158	F	49	D	42	D	42	D	44	D	50	D	51	D
700 West/Telegraph Street	70	E	20	C	25	C	17	B	20	C	20	C	20	C

Table 13 - 2040 Queuing

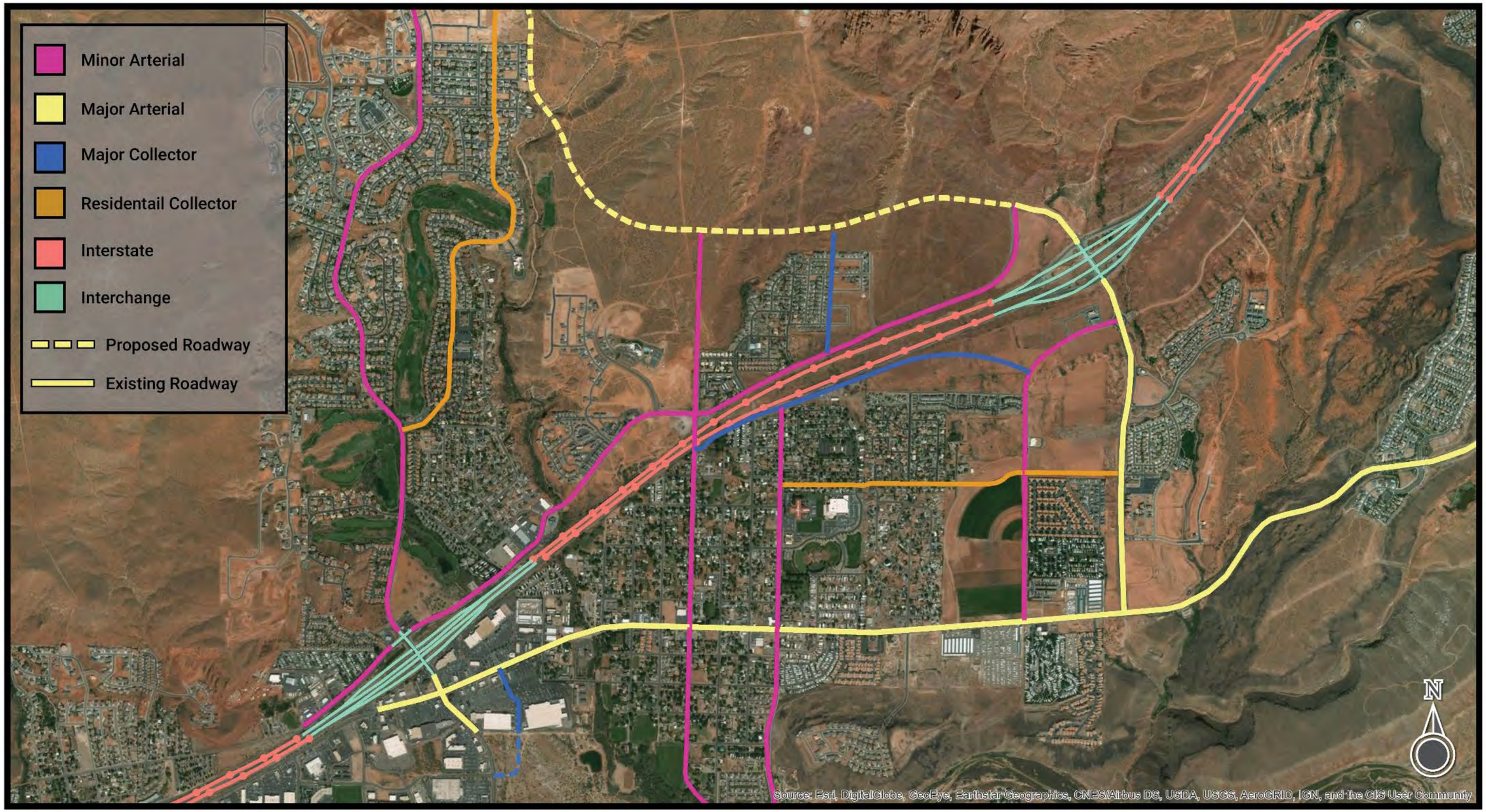
Alternative	2040 PM Peak Hour	
	Queues Extend Onto I-15	Queues Extend Into Adjacent Intersections
No-action Alternative	Yes	Yes
1: Northbound Green Spring Dr Widening	No	Yes
2: One-way Frontage Roads	No	No
3: Grade Separation	No	Yes
4: Main Street Interchange	No	No
5: 300 East Interchange	No	No
6: Thru-turns	No	Yes

APPENDICES

A. Roadway Classification
B. Traffic Observations
C. Vissim Calibration Results
D. Detailed Intersection Summaries

APPENDIX A

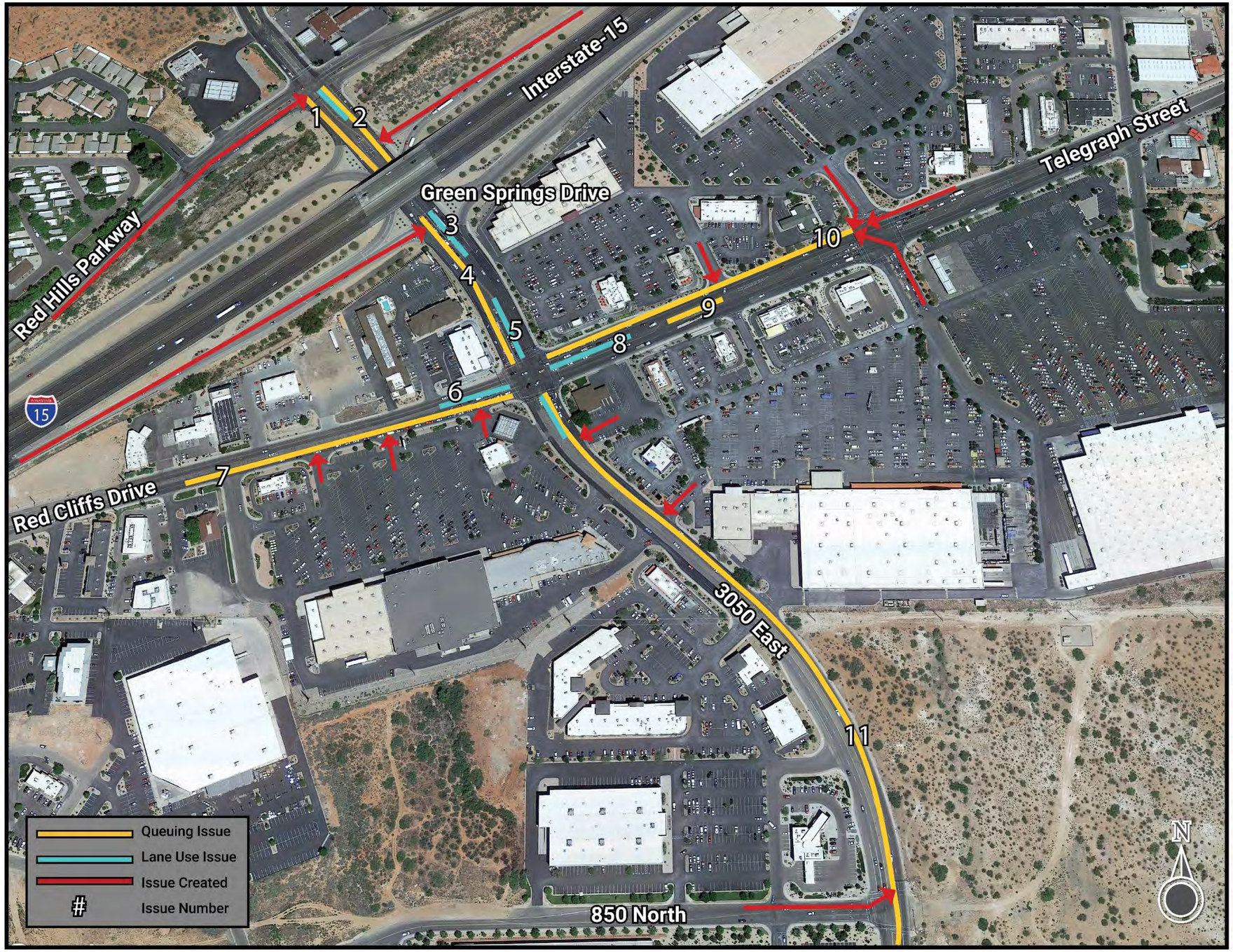
Roadway Classification



Appendix A Figure 1 - Roadway Classifications - Washington City

APPENDIX B

Traffic Observations



Appendix B Figure 1 - Traffic Operations

Traffic Observations

Appendix B Figure 1 displays issues surrounding the Green Springs Drive interchange. The issues consist of queuing and unbalanced lane use. A large portion of traffic related issues occur within this portion of the roadway network, and the issues displayed are an accumulation of a coordinated effort in data gathering and observations. Red arrows indicate oncoming traffic impeded by congested queues. The following pages contain drone footage photos that display the operations observation issues. There are two photos per issue observed.

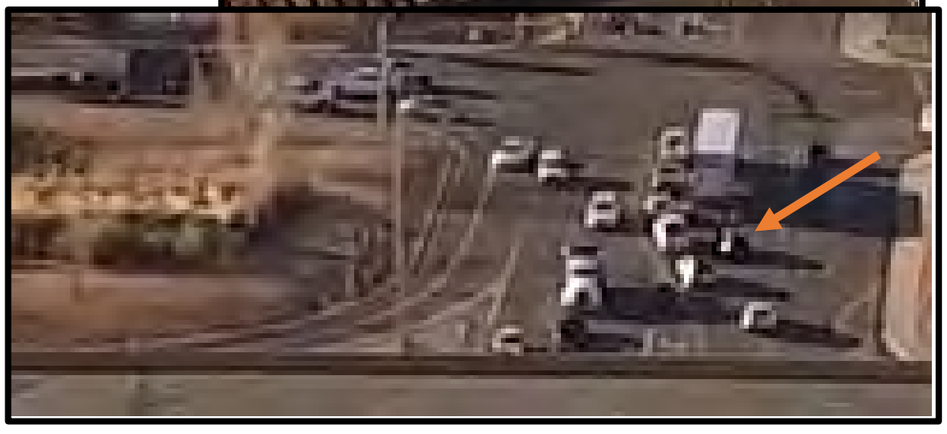
1. Southbound dual thru lanes and Interstate turn lanes queuing issue.
2. Northbound thru lanes queuing issue and inside left-turn lane is over utilized.
3. Northbound inside left-turn lane is over utilized.
4. Southbound dual thru lanes queuing issue.
5. Southbound inside left-turn lane is over utilized.
6. Westbound outside left-turn lane is over utilized.
7. Westbound dual thru lanes queuing issue.
8. Eastbound outside left-turn lane is over utilized.
9. Westbound left-turn lane queuing issue.
10. Eastbound dual thru lane queuing issue.
11. Northbound dual thru lane and left-turn lane queuing issue.

2. Green Spring Drive

Southbound dual thru lanes and Interstate turn lanes queuing issue.

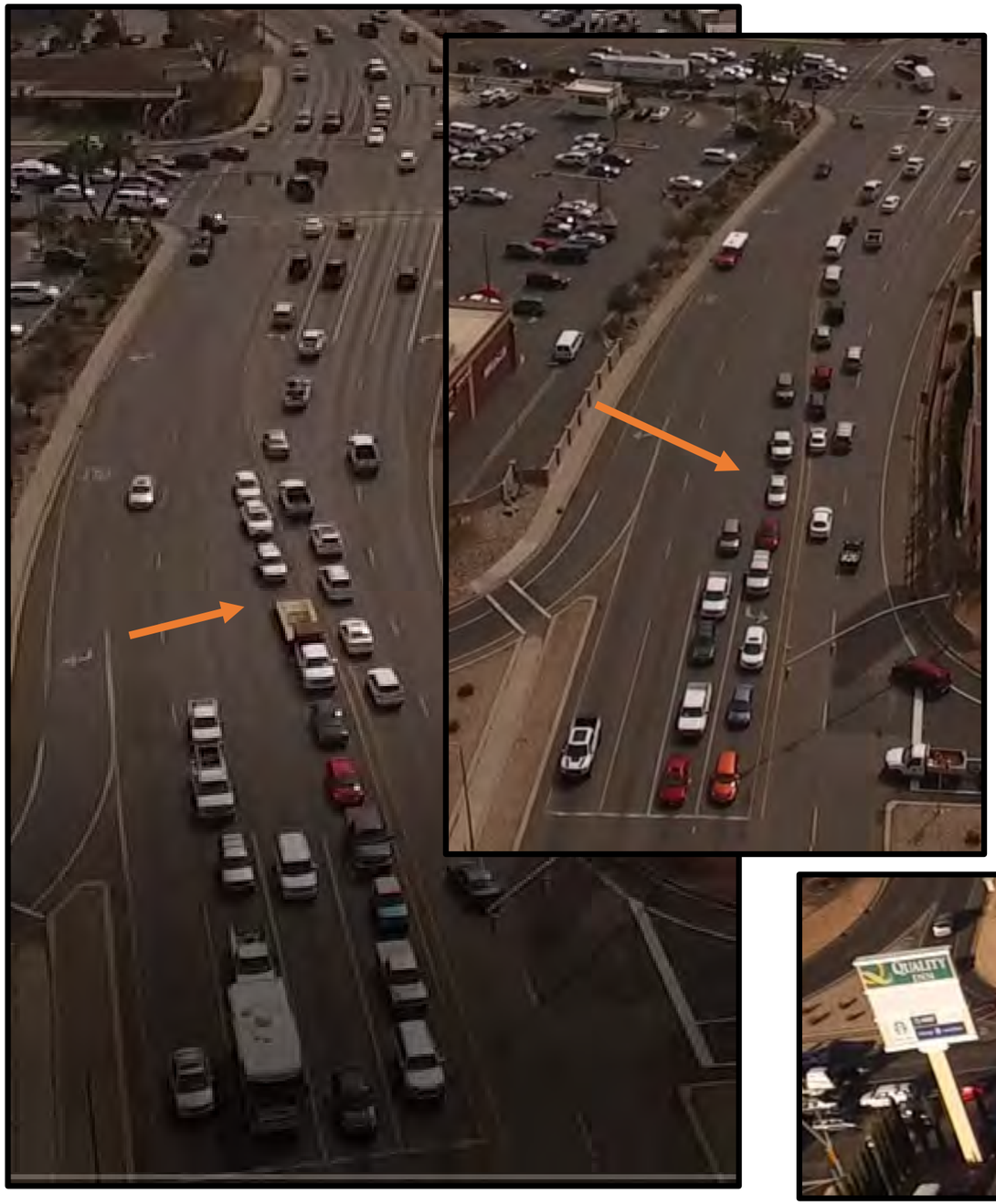
1. Green SpringDrive

Northbound thru lanes queuing issue and inside left-turn lane is over utilized.



3. Green Springs Drive

Northbound inside left-turn lane is over utilized.

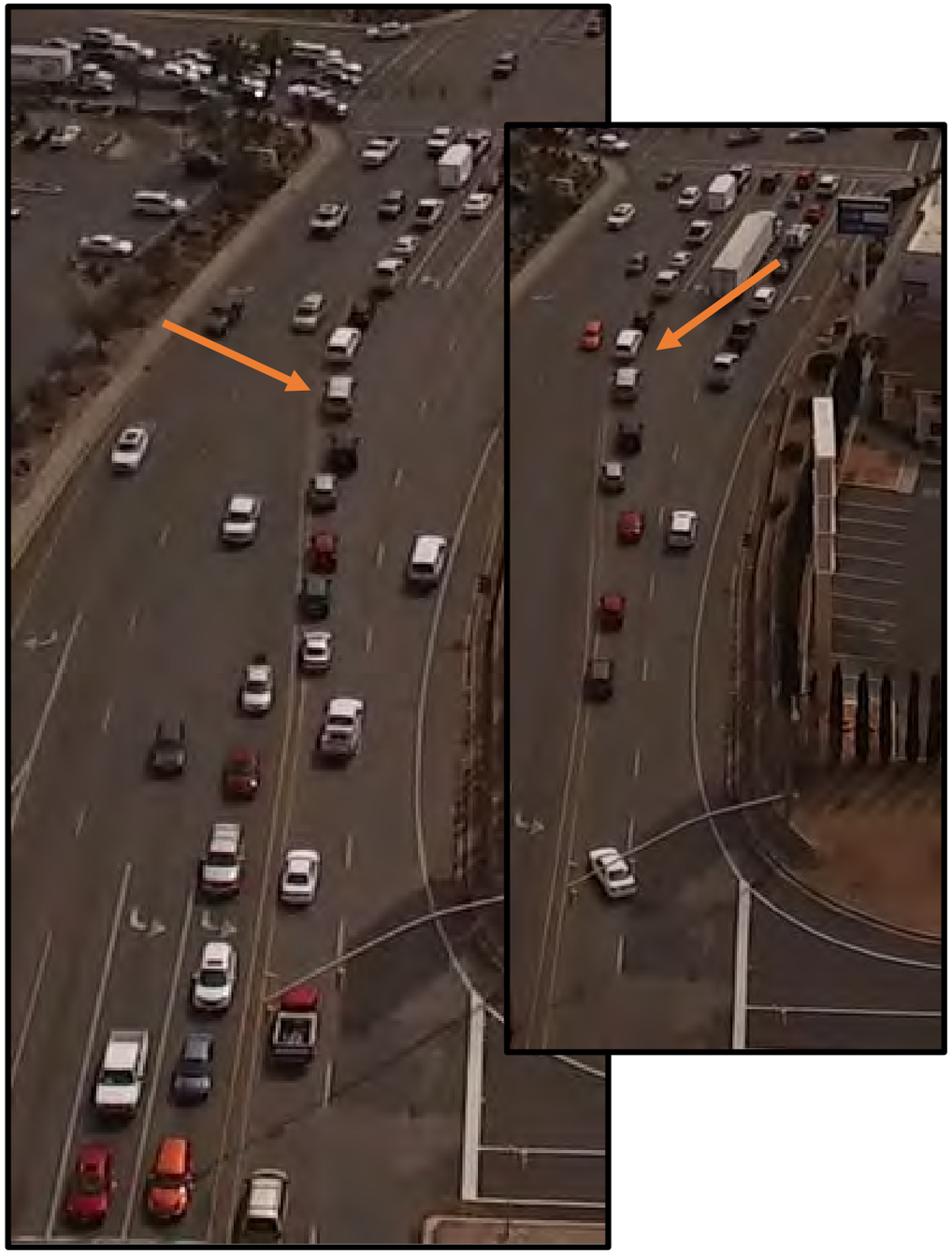


4. Green Springs Drive

Southbound dual thru lanes queuing issue.

5. Green Springs Drive

Southbound inside left-turn lane is over utilized.



6. Red Cliffs Drive

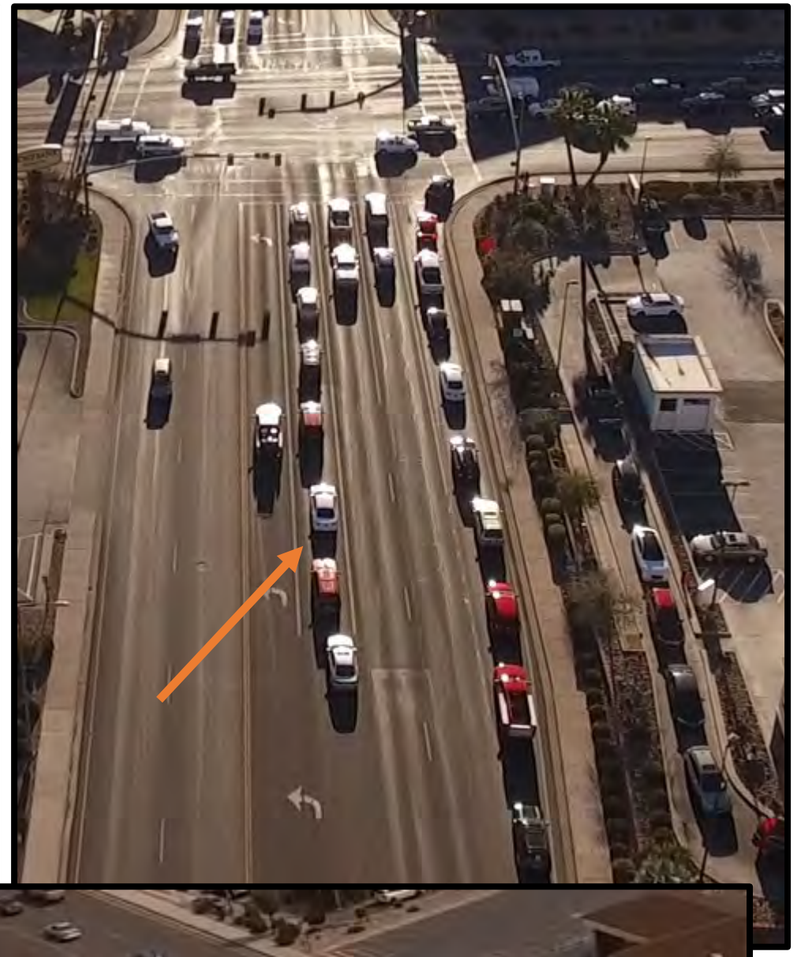
Westbound outside left-turn lane is over utilized.

7. Red Cliffs Drive

Westbound dual thru lanes queuing issue.

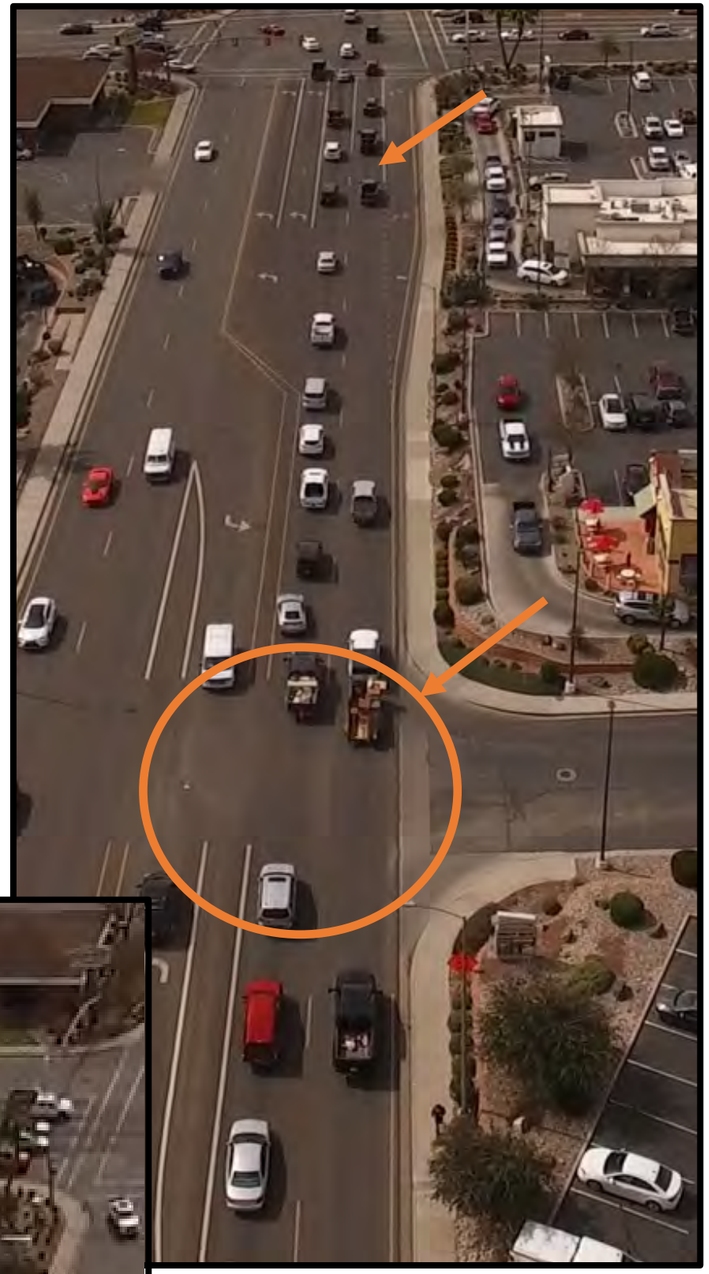
8. Telegraph Street

Eastbound outside left-turn lane is over utilized.



9. Telegraph Street

Eastbound dual thru lane queuing issue.



10. Telegraph Street

Westbound left-turn lane queuing issue.

***Orange circles indicate a potentially dangerous situation created by a congested queue and driver behavior.**

11. 3050 East

Northbound dual thru lane and left-turn lane queuing issue.

***Orange circles indicate a potentially dangerous situation created by a congested queue and driver behavior.**

APPENDIX C

Vissim Calibration Results

Volume Summary

Intersection	Movement	PM Peak Hour			<5% Difference
		Observed Volume	Modeled Volume	Percent Served	
1. Buena Vista/Green Springs	EB Left	80	84	105%	Yes
	EB Thru	220	214	97%	Yes
	EB Right	380	386	102%	Yes
	NB Left	440	451	103%	Yes
	NB Thru	330	338	102%	Yes
	NB Right	250	260	104%	Yes
	WB Left	160	163	102%	Yes
	WB Thru	170	165	97%	Yes
	WB Right	10	11	110%	No
	SB Left	10	12	120%	No
	SB Thru	240	238	99%	Yes
	SB Right	60	58	97%	Yes
	Overall	**2350**	**2380**	**101%**	**Yes**
2. Green Springs SPUI	EB Left	200	199	100%	Yes
	EB Right	640	647	101%	Yes
	NB Left	490	505	103%	Yes
	NB Thru	690	726	105%	Yes
	NB Right	430	451	105%	Yes
	WB Left	350	366	105%	Yes
	WB Right	130	125	96%	Yes
	SB Left	140	144	103%	Yes
	SB Thru	550	554	101%	Yes
	SB Right	90	90	100%	Yes
	Overall	3710	3807	103%	Yes
3. Green Springs/Telegraph Street	EB Left	400	391	98%	Yes
	EB Thru	840	822	98%	Yes
	EB Right	120	124	103%	Yes
	NB Left	120	116	97%	Yes
	NB Thru	680	747	110%	No
	NB Right	250	249	100%	Yes
	WB Left	260	267	103%	Yes
	WB Thru	550	543	99%	Yes
	WB Right	530	546	103%	Yes
	SB Left	550	555	101%	Yes
	SB Thru	680	699	103%	Yes
	SB Right	310	317	102%	Yes
	Overall	**5290**	**5376**	**102%**	**Yes**
4. 850 N/3000 East	EB Left	460	461	100%	Yes
	EB Right	70	68	97%	Yes
	NB Left	80	84	105%	Yes
	NB Thru	705	702	100%	Yes
	SB Thru	770	793	103%	Yes
	SB Right	400	412	103%	Yes
	Overall	**2485**	**2520**	**101%**	**Yes**

5. Walmart Signal/Telegraph Street	EB Left	120	117	98%	Yes
	EB Thru	925	891	96%	Yes
	EB Right	320	322	101%	Yes
	NB Left	360	355	99%	Yes
	NB Thru	30	31	103%	Yes
	NB Right	80	78	98%	Yes
	WB Left	60	51	85%	Yes
	WB Thru	765	784	102%	Yes
	WB Right	50	62	124%	No
	SB Left	50	51	102%	Yes
	SB Thru	50	50	100%	Yes
	SB Right	140	137	98%	Yes
	Overall	**2950**	**2929**	**99%**	**Yes**

6. Main Street/Telegraph Street	EB Left	100	99	99%	Yes
	EB Thru	895	891	100%	Yes
	EB Right	40	40	100%	Yes
	NB Left	60	61	102%	Yes
	NB Thru	30	30	100%	Yes
	NB Right	20	17	85%	No
	WB Left	30	29	97%	Yes
	WB Thru	745	791	106%	No
	WB Right	50	50	100%	Yes
	SB Left	60	61	102%	Yes
	SB Thru	20	20	100%	Yes
	SB Right	70	70	100%	Yes
	Overall	**2120**	**2159**	**102%**	**Yes**

7. 300 East/Telegraph Street	EB Left	140	139	99%	Yes
	EB Thru	575	568	99%	Yes
	EB Right	260	261	100%	Yes
	NB Left	240	239	100%	Yes
	NB Thru	60	58	97%	Yes
	NB Right	130	132	102%	Yes
	WB Left	150	142	95%	Yes
	WB Thru	475	491	103%	Yes
	WB Right	20	20	100%	Yes
	SB Left	30	31	103%	Yes
	SB Thru	60	60	100%	Yes
	SB Right	110	110	100%	Yes
	Overall	**2250**	**2251**	**100%**	**Yes**

8. Washington Parkway/Telegraph Street	EB Left	150	150	100%	Yes
	EB Thru	485	482	99%	Yes
	WB Thru	435	435	100%	Yes
	WB Right	30	31	103%	Yes
	SB Left	20	20	100%	Yes
	SB Right	130	136	105%	Yes
	Overall	**1250**	**1254**	**100%**	**Yes**

9. 1100 East/Washington Parkway	EB Left	160	159	99%	Yes
	EB Thru	0	0	0%	Yes
	EB Right	20	21	105%	Yes
	NB Left	40	39	98%	Yes
	NB Thru	130	131	101%	Yes
	NB Right	10	11	110%	No
	WB Left	10	9	90%	No
	WB Thru	0	0	0%	Yes
	WB Right	10	10	100%	Yes
	SB Left	0	0	0%	Yes
	SB Thru	120	125	104%	Yes
	SB Right	160	168	105%	Yes
	Overall	**660**	**673**	**102%**	**Yes**

10. Northbound Ramps/Washington Parkway	EB Left	10	9	90%	No
	EB Thru	0	0	0%	Yes
	EB Right	150	147	98%	Yes
	NB Thru	140	141	101%	Yes
	NB Right	160	159	99%	Yes
	SB Left	10	11	110%	No
	SB Thru	130	146	112%	No
	Overall	**600**	**613**	**102%**	**Yes**

11. Southbound Ramps/Washington Parkway	NB Left	120	121	101%	Yes
	NB Thru	30	29	97%	Yes
	WB Left	80	79	99%	Yes
	WB Thru	0	0	0%	Yes
	WB Right	50	52	104%	Yes
	SB Thru	80	77	96%	Yes
	SB Right	10	11	110%	No
	Overall	**370**	**369**	**100%**	**Yes**

12. Buena Vista/Washington Parkway	NB Right	90	88	98%	Yes
	WB Left	80	80	100%	Yes
	Overall	**170**	**168**	**99%**	**Yes**

13. Main Street/Buena Vista	EB Left	20	19	95%	Yes
	EB Thru	60	61	102%	Yes
	EB Right	160	157	98%	Yes
	NB Left	140	139	99%	Yes
	NB Thru	40	40	100%	Yes
	NB Right	20	18	90%	Yes
	WB Left	10	9	90%	Yes
	WB Thru	60	61	102%	Yes
	WB Right	10	10	100%	Yes
	SB Left	10	10	100%	Yes
	SB Thru	20	18	90%	Yes
	SB Right	30	40	133%	No
	Overall	**580**	**582**	**100%**	**Yes**

Travel Time Summary

Segment			Modeled Travel Time (average) (seconds)	Modeled Travel Time (average) (Minutes)	Measured Travel Time (average) (Minutes)	Travel time ratio (model/actual)	< 15%
Street	From	To					
Red Cliffs Drive/Telegraph Street EB	1680 East	Washington Parkway	432	7.20	7.96	-10%	Yes
Red Cliffs Drive/Telegraph Street WB	Washington Parkway	1680 East	384	6.40	7.05	-9%	Yes
Green Springs Drive SB	Shadow Ridge Ct	850 North	209	3.48	3.39	3%	Yes
Green Springs Drive NB	850 North	Shadow Ridge Ct	219	3.65	3.39	8%	Yes
I-15 NB: Mall Dr to Exit 13	Mall Drive Crossing	Exit 13	225	3.75	3.82	-2%	Yes
I-15 SB: Exit 13 to Mall Dr	Exit 13	Mall Drive Crossing	222	3.70	3.58	3%	Yes

APPENDIX D

Detailed Intersection Summaries

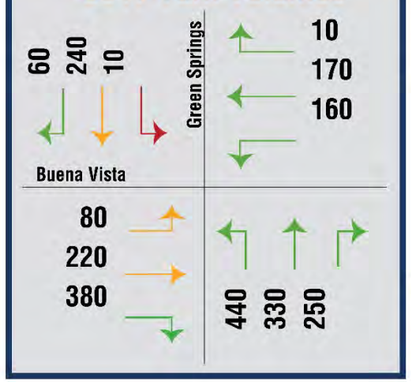
Study Intersection — Buena Vista Blvd & Green Springs Drive

2017

Buena Vista Blvd & Green Springs Drive intersection displays that nine movements will experience queue lengths that exceed vehicle storage capacity. Westbound left turn movement operates at an unacceptable LOS F.

Intersection	Movement	Control	Storage (Feet)	PM Peak Hour Input Volume	Volume	Percent Served	Total Delay (sec)	LOS	Max Queue (ft)	Exceeds Storage
#1 - Buena Vista Blvd/ Green Springs Drive	EB Left	Signal	155	80	92	115%	40	D	134	N
	EB Thru	Signal	270	220	227	103%	48	D	355	Y
	EB Right	Signal	185	380	370	97%	15	B	456	Y
	NB Left	Signal	75	440	452	103%	26	C	322	Y
	NB Thru	Signal	220	330	333	101%	5	A	258	Y
	NB Right	Signal	110	250	243	97%	7	A	329	Y
	WB Left	Signal	98	160	152	95%	33	C	184	Y
	WB Thru	Signal	140	170	191	112%	30	C	167	Y
	WB Right	Signal	75	10	10	100%	6	A	169	Y
	SB Left	Signal	145	10	15	150%	57	E	48	N
	SB Thru	Signal	230	240	243	101%	38	D	184	N
	SB Right	Signal	145	60	62	103%	28	C	197	Y
	Overall			**2350**	**2390**	**102%**	**24**	**C**	-	-

2017 Turn Volumes



Roadway Classification

Buena Vista Blvd - Minor Arterial

Red Hills Parkway - Minor Arterial

North Green Springs Drive - Minor Arterial

Green Springs Drive - Major Arterial

Lane Configuration

EB Left (1)
EB Thru (1)
EB Right (1)

NB Left (2)
NB Thru (2)
NB Right (1+1 shared)

WB Left (1)
WB Thru (1 + 1 shared right)
WB Right (1 shared thru)

SB Left (1)
SB Thru (1 + 1 shared right)
SB Right (1 shared thru)

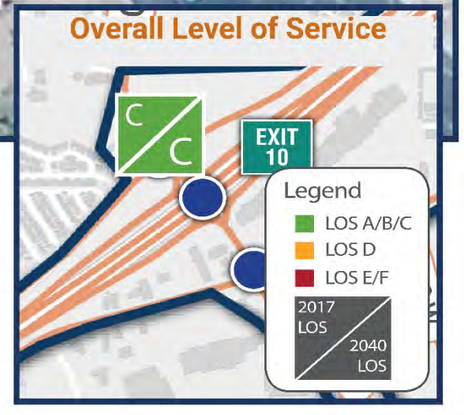
2040

Buena Vista Blvd & Green Springs Drive intersection displays that 11 movements will experience queue lengths that exceed vehicle storage capacity. The southbound left turn movement operates at an unacceptable LOS E.

Intersection	Movement	Control	Existing Storage (Feet)	PM Peak Hour Input Volume	Volume	Percent Served	Total Delay (sec)	LOS	Max Queue (ft)	Exceeds Storage
#1 - Buena Vista Blvd/ Green Springs Drive	EB Left	Signal	155	120	137	114%	36	D	270	Y
	EB Thru	Signal	270	360	353	98%	30	C	580	Y
	EB Right	Signal	185	490	503	103%	32	C	580	Y
	NB Left	Signal	75	520	474	91%	35	D	490	Y
	NB Thru	Signal	220	480	407	85%	11	B	360	Y
	NB Right	Signal	110	420	369	88%	7	A	380	Y
	WB Left	Signal	98	290	269	93%	103	F	1100	Y
	WB Thru	Signal	140	300	292	97%	39	D	320	Y
	WB Right	Signal	75	20	21	105%	32	C	320	Y
	SB Left	Signal	145	20	22	110%	22	C	50	N
	SB Thru	Signal	230	290	301	104%	44	D	260	Y
	SB Right	Signal	145	140	138	99%	40	D	270	Y
	Overall			**3450**	**3286**	**95%**	**34**	**C**	-	-

2040 Turn Volumes

Overall Level of Service



Study Intersection — Green Springs Drive SPUI

2017

Green Springs Drive SPUI intersection modeling results display that two movements will experience queue lengths that exceed vehicle storage capacity. The northbound left turn movement operates at an unacceptable LOS E.

Intersection	Movement	Control	Storage (Feet)	PM Peak Hour Input Volume	Volume	Percent Served	Total Delay (sec)	LOS	Max Queue (ft)	Exceeds Storage
#2 - Green Springs Drive SPUI	EB Left	Signal	350	200	200	100%	49	D	157	N
	EB Right	Signal	380	640	636	99%	23	C	265	N
	NB Left	Signal	190	490	472	96%	66	E	390	Y
	NB Thru	Signal	500	690	699	101%	16	B	243	N
	NB Right	Free	420	430	417	97%	2	A	67	N
	WB Left	Signal	270	350	359	103%	49	D	242	N
	WB Right	Stop	270	130	135	104%	21	C	123	N
	SB Left	Signal	100	140	146	104%	32	C	95	N
	SB Thru	Signal	210	550	542	99%	23	C	250	Y
	SB Right	Free	100	90	80	89%	1	A	0	N
	Overall			**3710**	**3686**	**99%**	**28**	**C**	-	-

2017 Turn Volumes

Roadway Classification

Interstate 15 - Interstate

Intersection - Single Point Urban Interchange

Green Springs Drive - Major Arterial

Lane Configuration

EB Left (1)
EB Thru (1)
EB Right (1)

NB Left (2)
NB Thru (2)
NB Right (1+1 shared)

WB Left (1)
WB Thru (1 + 1 shared right)
WB Right (1 shared thru)

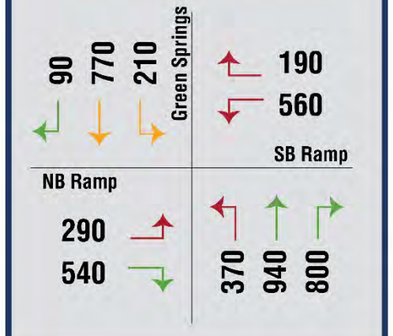
SB Left (1)
SB Thru (1 + 1 shared right)
SB Right (1 shared thru)

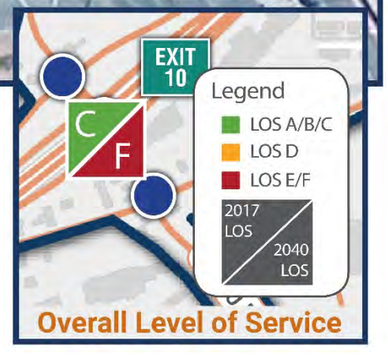
2040

Green Springs Drive SPUI modeling results display that five movements in this intersection will experience queue lengths that exceed vehicle storage capacity. Four movements operate at LOS E or worse.

Intersection	Movement	Control	Existing Storage (Feet)	PM Peak Hour Input Volume	Volume	Percent Served	Total Delay (sec)	LOS	Max Queue (ft)	Exceeds Storage
#2 - Green Springs Drive SPUI	EB Left	Signal	350	290	215	74%	249	F	140	N
	EB Right	Signal	380	540	326	60%	691	F	5030	Y
	NB Left	Signal	190	370	325	88%	61	E	240	Y
	NB Thru	Signal	500	940	858	91%	30	C	290	N
	NB Right	Free	420	800	753	94%	3	A	170	N
	WB Left	Signal	270	560	578	103%	56	E	270	Y
	WB Right	Stop	270	190	173	91%	33	C	180	N
	SB Left	Signal	100	210	208	99%	43	D	300	Y
	SB Thru	Signal	210	770	772	100%	46	D	350	Y
	SB Right	Free	100	90	83	92%	1	A	0	N
	Overall			**4760**	**4291**	**90%**	**95**	**F**	-	-

2040 Turn Volumes





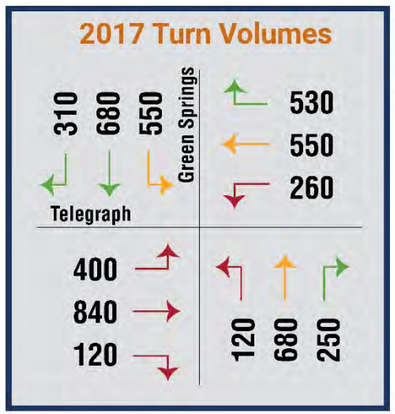
Overall Level of Service

Study Intersection — Green Springs Drive & Telegraph Street

2017

Green Springs Drive & Telegraph Street intersection modeling results display that 11 movements will experience queue lengths that exceed vehicle storage capacity. Five movements operate at an unacceptable LOS E or worse.

Intersection	Movement	Control	Storage (Feet)	PM Peak Hour Input Volume	Volume	Percent Served	Total Delay (sec)	LOS	Max Queue (ft)	Exceeds Storage
#3 - Green Springs Drive/ Telegraph Street	EB Left	Signal	230	400	375	94%	122	F	244	Y
	EB Thru	Signal	485	840	834	99%	118	F	1105	Y
	EB Right	Signal	215	120	111	93%	111	F	1113	Y
	NB Left	Signal	100	120	120	100%	81	F	288	Y
	NB Thru	Signal	170	680	688	101%	48	D	538	Y
	NB Right	Signal	100	250	252	101%	33	C	405	Y
	WB Left	Signal	190	260	261	100%	58	E	218	Y
	WB Thru	Signal	450	550	557	101%	53	D	292	N
	WB Right	Signal	230	530	526	99%	16	B	388	Y
	SB Left	Signal	130	550	549	100%	48	D	511	Y
	SB Thru	Signal	440	680	705	104%	35	C	548	Y
	SB Right	Signal	130	310	283	91%	17	B	478	Y
	Overall			**5290**	**5261**	**99%**	**60**	**E**	-	-



Roadway Classification

Green Springs Drive - Major Arterial

3050 East - Major Arterial

Telegraph Street - Major Arterial

Red Cliffs Drive - Major Arterial

Lane Configuration

EB Left (1)
EB Thru (1)
EB Right (1)

NB Left (2)
NB Thru (2)
NB Right (1+1 shared)

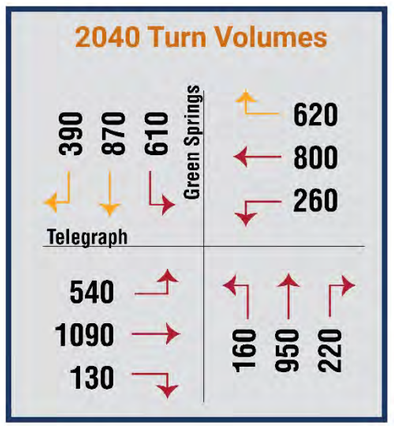
WB Left (1)
WB Thru (1 + 1 shared right)
WB Right (1 shared thru)

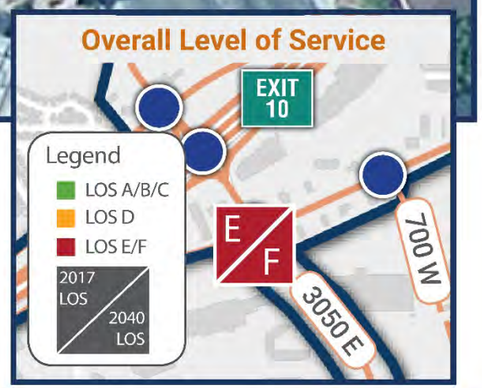
SB Left (1)
SB Thru (1 + 1 shared right)
SB Right (1 shared thru)

2040

Green Springs Drive & Telegraph Street intersection modeling results display that 13 movements will experience queue lengths that exceed vehicle storage capacity. Nine movements operate at LOS E or worse.

Intersection	Movement	Control	Existing Storage (Feet)	PM Peak Hour Input Volume	Volume	Percent Served	Total Delay (sec)	LOS	Max Queue (ft)	Exceeds Storage
#3 - Green Springs Drive/ Telegraph Street	EB Left	Signal	230	540	389	72%	306	F	5030	Y
	EB Thru	Signal	485	1090	840	77%	204	F	5030	Y
	EB Right	Signal	215	130	96	74%	194	F	5030	Y
	NB Left	Signal	100	160	155	97%	246	F	1700	Y
	NB Thru	Signal	170	950	917	97%	210	F	1690	Y
	NB Right	Signal	100	220	218	99%	194	F	1690	Y
	WB Left	Signal	190	260	267	103%	68	E	220	Y
	WB Thru	Signal	450	800	796	100%	65	E	860	Y
	WB Right	Signal	230	620	630	102%	37	D	690	Y
	SB Left	Signal	130	610	533	87%	83	F	760	Y
	SB Thru	Signal	440	870	831	96%	52	D	760	Y
	SB Right	Signal	130	390	306	78%	36	D	760	Y
	Overall			**6640**	**5978**	**90%**	**127**	**F**	-	-



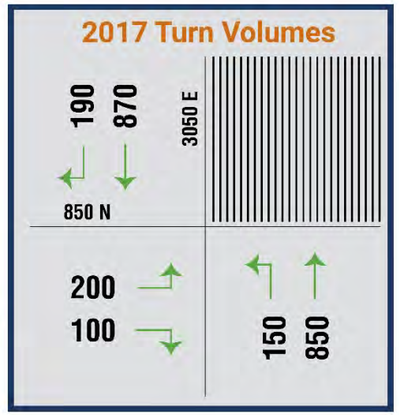


Study Intersection — 850 North & 3050 East

2017

850 North & 3000 East intersection modeling results display that five movements will experience queue lengths that exceed vehicle storage capacity. All movements operate at LOS C or better.

Intersection	Movement	Control	Storage (Feet)	PM Peak Hour Input Volume	Volume	Percent Served	Total Delay (sec)	LOS	Max Queue (ft)	Exceeds Storage
#4 - 850 North/3050 East	EB Left	Signal	100	200	182	91%	17	B	114	Y
	EB Right	Signal	100	100	122	122%	6	A	114	Y
	NB Left	Signal	100	150	146	97%	21	C	129	Y
	NB Thru	Signal	200	850	877	103%	8	A	129	N
	SB Thru	Signal	200	870	883	101%	11	B	281	Y
	SB Right	Signal	200	190	194	102%	4	A	281	Y
	Overall			**2360**	**2404**	**102%**	**10**	**B**	-	-



Roadway Classification

Green Springs Drive - Major Arterial

3050 East - Major Arterial

850 North - Minor Arterial

Lane Configuration

EB Left (1)
EB Thru (1)
EB Right (1)

NB Left (2)
NB Thru (2)
NB Right (1+1 shared)

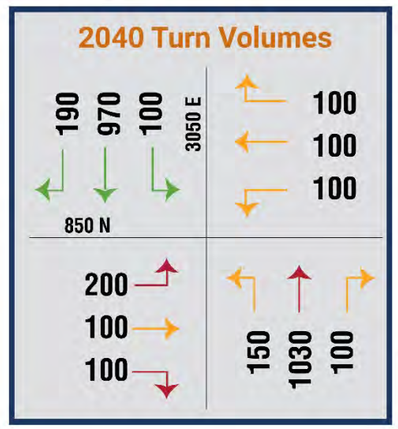
WB Left (1)
WB Thru (1 + 1 shared right)
WB Right (1 shared thru)

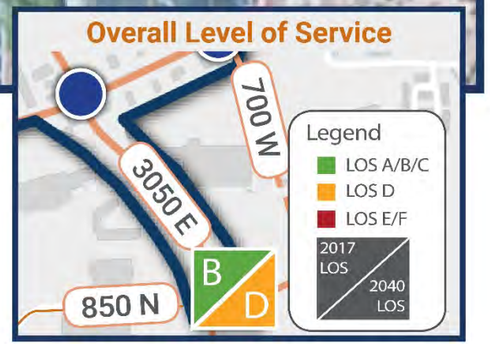
SB Left (1)
SB Thru (1 + 1 shared right)
SB Right (1 shared thru)

2040

850 North & 3000 East intersection modeling results display that nine movements will experience queue lengths that exceed vehicle storage capacity. Three movements operate at LOS F or worse.

Intersection	Movement	Control	Existing Storage (Feet)	PM Peak Hour Input Volume	Volume	Percent Served	Total Delay (sec)	LOS	Max Queue (ft)	Exceeds Storage
#4 - 850 North/3050 East	EB Left	Signal	100	200	163	82%	98	F	680	Y
	EB Thru	Signal	150	100	87	87%	36	D	660	Y
	EB Right	Signal	100	100	107	107%	56	E	680	Y
	NB Left	Signal	100	150	132	88%	43	D	800	Y
	NB Thru	Signal	200	1030	1071	104%	59	E	800	Y
	NB Right	Signal	100	100	107	107%	41	D	840	Y
	WB Left	Signal	150	100	98	98%	35	D	120	N
	WB Thru	Signal	1000	100	94	94%	35	D	120	N
	WB Right	Signal	150	100	109	109%	50	D	120	N
	SB Left	Signal	200	100	101	101%	4	A	200	Y
	SB Thru	Signal	200	970	930	96%	7	A	200	Y
	SB Right	Signal	200	190	178	94%	3	A	200	Y
	Overall			**3240**	**3177**	**98%**	**38**	**D**	-	-





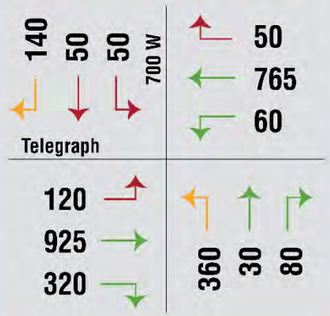
Study Intersection — 700 West & Telegraph Street

2017

700 West & Telegraph intersection modeling results display that ten movements will experience queue lengths that exceed vehicle storage capacity. Four movements operate at an unacceptable LOS E.

Intersection	Movement	Control	Storage (Feet)	PM Peak Hour Input Volume	Volume	Percent Served	Total Delay (sec)	LOS	Max Queue (ft)	Exceeds Storage
#5 – 700 West/ Telegraph Street	EB Left	Signal	170	120	105	88%	66	E	92	N
	EB Thru	Signal	400	925	916	99%	25	C	546	Y
	EB Right	Signal	200	320	310	97%	13	B	583	Y
	NB Left	Signal	175	360	366	102%	55	D	405	Y
	NB Thru	Signal	200	30	29	97%	21	C	405	Y
	NB Right	Signal	145	80	83	104%	16	B	449	Y
	WB Left	Signal	185	60	40	67%	8	A	347	Y
	WB Thru	Signal	650	765	760	99%	27	C	347	N
	WB Right	Signal	210	50	55	110%	70	E	347	Y
	SB Left	Signal	75	50	59	118%	61	E	230	Y
	SB Thru	Signal	105	50	39	78%	73	E	230	Y
	SB Right	Signal	75	140	146	104%	48	D	279	Y
	Overall			**2950**	**2908**	**99%**	**32**	**C**	-	-

2017 Turn Volumes



Roadway Classification

700 West - Major Collector

Telegraph Street - Major Arterial

Lane Configuration

EB Left (2)
EB Thru (2)
EB Right (1)

NB Left (1)
NB Thru (1)
NB Right (1)

WB Left (1)
WB Thru (1 + 1 shared right)
WB Right (1 shared thru)

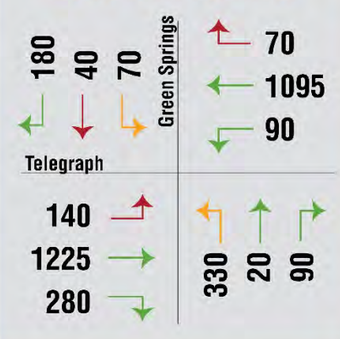
SB Left (1)
SB Thru (1 + 1 shared right)
SB Right (1 shared thru)

2040

700 West & Telegraph Street intersection modeling results display that nine movements will experience queue lengths that exceed vehicle storage capacity. Three movements operate at LOS E.

Intersection	Movement	Control	Existing Storage (Feet)	PM Peak Hour Input Volume	Volume	Percent Served	Total Delay (sec)	LOS	Max Queue (ft)	Exceeds Storage
#5 - 700 West/ Telegraph Street	EB Left	Signal	170	140	102	73%	61	E	90	N
	EB Thru	Signal	400	1225	1020	83%	24	C	690	Y
	EB Right	Signal	200	280	213	76%	13	B	730	Y
	NB Left	Signal	175	330	336	102%	50	D	330	Y
	NB Thru	Signal	200	20	21	105%	31	C	330	Y
	NB Right	Signal	145	90	94	104%	10	A	370	Y
	WB Left	Signal	185	90	62	69%	7	A	530	Y
	WB Thru	Signal	650	1095	1100	100%	16	B	530	N
	WB Right	Signal	210	70	90	129%	65	E	530	N
	SB Left	Signal	75	70	76	109%	54	D	120	Y
	SB Thru	Signal	105	40	34	85%	57	E	120	Y
	SB Right	Signal	75	180	181	101%	31	C	170	Y
	Overall			**3630**	**3329**	**92%**	**26**	**C**	-	-

2040 Turn Volumes



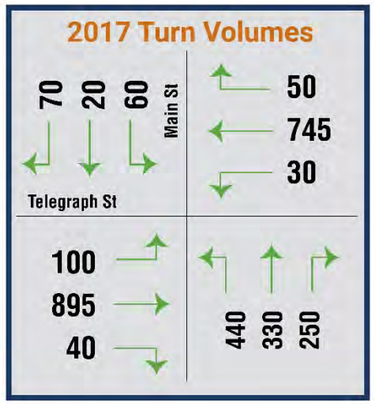
Overall Level of Service

Study Intersection — Main Street & Telegraph Street

2017

Main Street & Telegraph Street intersection modeling results display that three movements will experience queue lengths that exceed vehicle storage capacity. All movements operate at an LOS C or better.

Intersection	Movement	Control	Storage (Feet)	PM Peak Hour Input Volume	Volume	Percent Served	Total Delay (sec)	LOS	Max Queue (ft)	Exceeds Storage
#6 - Main Street/Telegraph Street	EB Left	Signal	175	100	115	115%	13	B	301	Y
	EB Thru	Signal	400	895	903	101%	7	A	301	N
	EB Right	Signal	120	40	37	93%	11	B	301	Y
	NB Left	Signal	80	60	63	105%	18	B	68	N
	NB Thru	Signal	200	30	32	107%	19	B	68	N
	NB Right	Signal	50	20	18	90%	3	A	98	N
	WB Left	Signal	175	30	35	117%	12	B	175	N
	WB Thru	Signal	400	745	710	95%	11	B	175	N
	WB Right	Signal	100	50	47	94%	14	B	175	Y
	SB Left	Signal	75	60	64	107%	23	C	68	N
	SB Thru	Signal	200	20	25	125%	6	A	68	N
	SB Right	Signal	75	70	83	119%	9	A	68	N
	Overall			**2120**	**2132**	**101%**	**10**	**B**	-	-



Roadway Classification

Main Street - Minor Arterial

Telegraph Street - Major Arterial

Lane Configuration

EB Left (1)
EB Thru (2 + 1 shared right)
EB Right (1 shared thru)

NB Left (1)
NB Thru (1 + 1 shared right)
NB Right (1 shared thru)

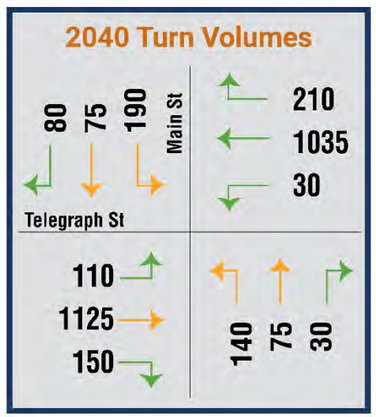
WB Left (1)
WB Thru (2 + 1 shared right)
WB Right (1 shared thru)

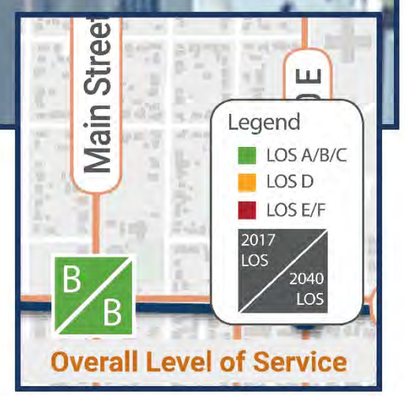
SB Left (1)
SB Thru (1 + 1 shared right)
SB Right (1 shared thru)

2040

Main Street & Telegraph Street intersection modeling results display that ten movements will experience queue lengths that exceed vehicle storage capacity. All movements operate at an acceptable LOS.

Intersection	Movement	Control	Existing Storage (Feet)	PM Peak Hour Input Volume	Volume	Percent Served	Total Delay (sec)	LOS	Max Queue (ft)	Exceeds Storage
#6 - Main Street/Telegraph Street	EB Left	Signal	175	110	110	100%	29	C	330	Y
	EB Thru	Signal	400	1125	965	86%	4	A	330	N
	EB Right	Signal	120	150	118	79%	4	A	330	Y
	NB Left	Signal	80	140	128	91%	44	D	160	Y
	NB Thru	Signal	200	75	69	92%	41	D	160	N
	NB Right	Signal	50	30	21	70%	22	C	190	Y
	WB Left	Signal	175	30	31	103%	1	A	540	Y
	WB Thru	Signal	400	1035	1074	104%	38	D	1080	Y
	WB Right	Signal	100	210	208	99%	17	B	570	Y
	SB Left	Signal	75	190	227	119%	51	D	240	Y
	SB Thru	Signal	200	75	77	103%	44	D	240	Y
	SB Right	Signal	75	80	95	119%	8	A	240	Y
	Overall			**3250**	**3123**	**96%**	**17**	**B**	-	-





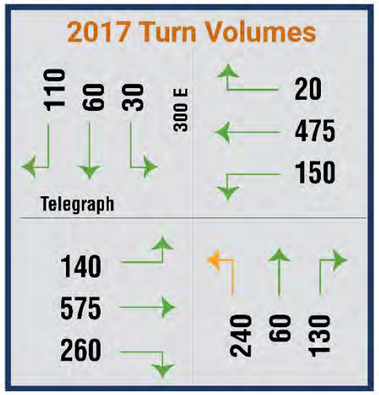
Study Intersection: 300 East & Telegraph Street

2017

300 East & Telegraph Street intersection modeling results display that seven movements will experience queue lengths that exceed vehicle storage capacity. All movements operate at LOS D or better.

Intersection	Movement	Control	Storage (Feet)	PM Peak Hour Input Volume	Volume	Percent Served	Total Delay (sec)	LOS	Max Queue (ft)	Exceeds Storage
#7 - 300 East/ Telegraph Street	EB Left	Signal	165	140	126	90%	10	B	280	Y
	EB Thru	Signal	350	575	589	102%	5	A	280	N
	EB Right	Signal	100	260	264	102%	4	A	280	Y
	NB Left	Signal	180	240	233	97%	40	D	207	N
	NB Thru	Signal	240	60	73	122%	22	C	207	N
	NB Right	Signal	160	130	132	102%	9	A	254	Y
	WB Left	Signal	150	150	145	97%	13	B	138	N
	WB Thru	Signal	350	475	458	96%	8	A	138	N
	WB Right	Signal	100	20	24	120%	3	A	138	Y
	SB Left	Signal	75	30	30	100%	34	C	185	Y
	SB Thru	Signal	180	60	74	123%	42	D	185	Y
	SB Right	Signal	75	110	107	97%	20	C	212	Y
	Overall			**2250**	**2255**	**100%**	**14**	**B**	-	-

2017 Turn Volumes



Roadway Classification

300 East - Minor Arterial

Telegraph Street - Major Arterial

Lane Configuration

EB Left (1)
EB Thru (2)
EB Right (1 shared through)

NB Left (1)
NB Thru (1)
NB Right (1+1 shared)

WB Left (1)
WB Thru (1 + 1 shared right)
WB Right (1 shared thru)

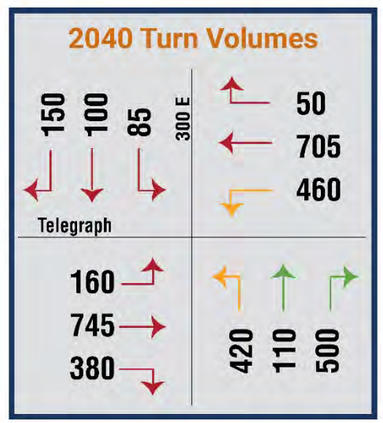
SB Left (1)
SB Thru (1 + 1 shared right)
SB Right (1 shared thru)

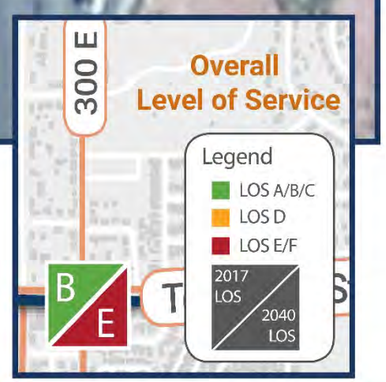
2040

300 East & Telegraph Street intersection modeling results display that 12 movements will experience queue lengths that exceed vehicle storage capacity. Seven movements operate at LOS E or worse.

Intersection	Movement	Control	Existing Storage (Feet)	PM Peak Hour Input Volume	Volume	Percent Served	Total Delay (sec)	LOS	Max Queue (ft)	Exceeds Storage
#7 - 300 East/ Telegraph Street	EB Left	Signal	165	160	130	81%	96	F	640	Y
	EB Thru	Signal	350	745	707	95%	81	F	640	Y
	EB Right	Signal	100	380	369	97%	46	D	640	Y
	NB Left	Signal	180	420	423	101%	44	D	530	Y
	NB Thru	Signal	240	110	122	111%	34	C	530	Y
	NB Right	Signal	160	500	499	100%	20	B	580	Y
	WB Left	Signal	150	460	413	90%	100	F	530	Y
	WB Thru	Signal	350	705	724	103%	60	E	530	Y
	WB Right	Signal	100	50	44	88%	46	D	530	Y
	SB Left	Signal	75	85	85	100%	91	F	460	Y
	SB Thru	Signal	180	100	85	85%	94	F	460	Y
	SB Right	Signal	75	150	122	81%	68	F	480	Y
	Overall			**3865**	**3723**	**96%**	**63**	**E**	-	-

2040 Turn Volumes





Study Intersection — Washington Parkway & Telegraph Street

Roadway Classification

Washington Parkway - Major Arterial

Telegraph Street - Major Arteria

Lane Configuration

EB Left (1)
EB Thru (2)

WB Thru (2)
WB Right (1)

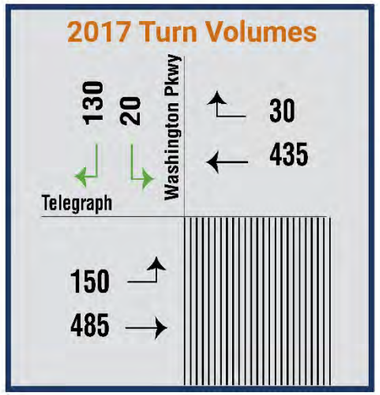
SB Left (1)
SB Right (1)

2017

Washington Parkway & Telegraph Street intersection modeling results display that no movements will experience queue lengths that exceed vehicle storage capacity. All movements operate at LOS A.

Intersection	Movement	Control	Storage (Feet)	PM Peak Hour Input Volume	Volume	Percent Served	Total Delay (sec)	LOS	Max Queue (ft)	Exceeds Storage
#8 - Washington Parkway/Telegraph Street	EB Left	Free	100	150	146	97%	3	-	43	N
	EB Thru	Free	415	485	486	100%	1	-	0	N
	WB Thru	Free	350	435	430	99%	0	-	0	N
	WB Right	Free	95	30	37	123%	1	-	0	N
	SB Left	Stop	400	20	27	135%	7	A	46	N
	SB Right	Stop	400	130	116	89%	8	A	106	N
	Overall			**1250**	**1242**	**99%**	**8**	**A**	-	-

2017 Turn Volumes

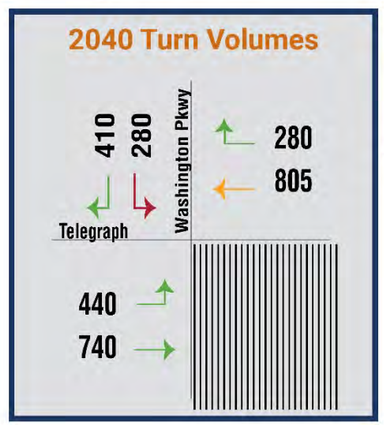


2040

Washington Parkway & Telegraph Street intersection modeling results display that four movements will experience queue lengths that exceed vehicle storage capacity. One movement operates at LOS E.

Intersection	Movement	Control	Existing Storage (Feet)	PM Peak Hour Input Volume	Volume	Percent Served	Total Delay (sec)	LOS	Max Queue (ft)	Exceeds Storage
#8 - Washington Parkway/Telegraph Street	EB Left	Signal	100	440	407	93%	22	C	350	Y
	EB Thru	Signal	415	740	699	94%	3	A	350	N
	WB Thru	Signal	350	805	821	102%	38	D	460	Y
	WB Right	Signal	95	280	289	103%	13	B	460	Y
	SB Left	Signal	400	280	281	100%	58	E	180	N
	SB Right	Signal	400	410	379	92%	30	C	490	Y
	Overall			**2955**	**2876**	**97%**	**25**	**C**	-	-

2040 Turn Volumes



Overall Level of Service

Study Intersection

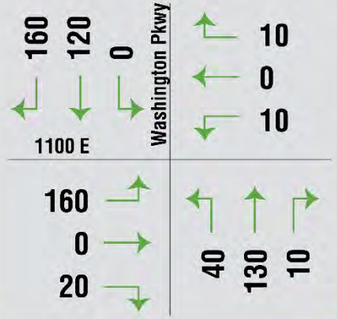
Washington Parkway & 1100 East

2017

1100 East & Washington Parkway intersection modeling results display that no movements will experience queue lengths that exceed vehicle storage capacity. All movements operate at LOS A.

Intersection	Movement	Control	Storage (Feet)	PM Peak Hour Input Volume	Volume	Percent Served	Total Delay (sec)	LOS	Max Queue (ft)	Exceeds Storage
#9 - 1100 East/ Washington Parkway	EB Left	Roundabout	300	160	167	104%	1	A	24	N
	EB Thru	Roundabout	300	0	0	0%	0	A	24	N
	EB Right	Roundabout	300	20	17	85%	0	A	24	N
	NB Left	Roundabout	200	40	43	108%	3	A	25	N
	NB Thru	Roundabout	200	130	126	97%	2	A	25	N
	NB Right	Roundabout	200	10	11	110%	0	A	25	N
	WB Left	Roundabout	150	10	13	130%	5	A	0	N
	WB Thru	Roundabout	150	0	0	0%	0	A	0	N
	WB Right	Roundabout	150	10	7	70%	0	A	0	N
	SB Left	Roundabout	500	0	0	0%	0	A	0	N
	SB Thru	Roundabout	500	120	112	93%	1	A	0	N
	SB Right	Roundabout	500	160	167	104%	1	A	0	N
	Overall			**660**	**663**	**100%**	**2**	**A**	-	-

2017 Turn Volumes



Roadway Classification

1100 East - Minor Arterial

Washington Parkway - Major Arterial

Lane Configuration

EB Left (1)
EB Thru (1)
EB Right (1)

NB Left (1)
NB Thru (1)
NB Right (1)

WB Left (1)
WB Thru (1)
WB Right (1)

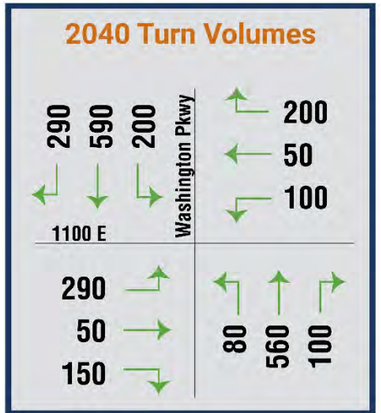
SB Left (1)
SB Thru (1)
SB Right (1)

2040

1100 East & Washington Parkway intersection modeling results display that six movements will experience queue lengths that exceed vehicle storage capacity. All movements operate at LOS C or better.

Intersection	Movement	Control	Existing Storage (Feet)	PM Peak Hour Input Volume	Volume	Percent Served	Total Delay (sec)	LOS	Max Queue (ft)	Exceeds Storage
#9 - 1100 East/ Washington Parkway	EB Left	Roundabout	300	290	301	104%	28	C	210	Y
	EB Thru	Roundabout	300	50	50	100%	19	B	210	Y
	EB Right	Roundabout	300	150	157	105%	25	C	210	Y
	NB Left	Roundabout	200	80	63	79%	26	C	130	Y
	NB Thru	Roundabout	200	560	552	99%	12	B	130	Y
	NB Right	Roundabout	200	100	95	95%	9	A	130	Y
	WB Left	Roundabout	150	100	89	89%	31	C	90	N
	WB Thru	Roundabout	150	50	58	116%	22	C	90	N
	WB Right	Roundabout	150	200	208	104%	14	B	90	N
	SB Left	Roundabout	500	200	201	101%	8	A	80	N
	SB Thru	Roundabout	500	590	565	96%	7	A	80	N
	SB Right	Roundabout	500	290	278	96%	4	A	80	N
	Overall			**2660**	**2617**	**98%**	**14**	**B**	-	-

2040 Turn Volumes



Study Intersection — Washington Parkway & I-15 NB Ramps

Roadway Classification

Northbound Ramps - Interchange

Washington Parkway - Major Arterial

Lane Configuration

EB Left (1)
EB Thru (1 + 1 shared right)
EB Right (1 + 1 shared thru)

NB Thru (2 + 1 shared right)
NB Right (1 +1 shared thru)

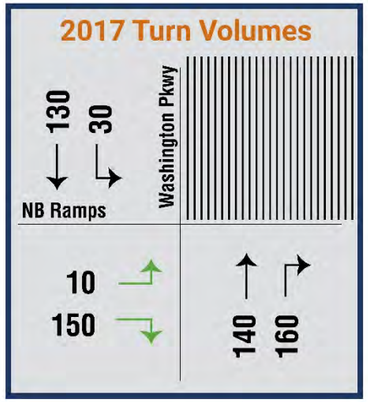
SB Left (1)
SB Thru (1)

2017

Northbound Ramps & Washington Parkway intersection modeling results display that one movements will experience queue lengths that exceed vehicle storage capacity. All movements operate at LOS A.

Intersection	Movement	Control	Storage (Feet)	PM Peak Hour Input Volume	Volume	Percent Served	Total Delay (sec)	LOS	Max Queue (ft)	Exceeds Storage
#10 - Northbound Ramps/Washington Parkway	EB Left	Stop	100	10	11	110%	7	A	66	N
	EB Thru	Stop	1000	0	0	0%	0	A	66	N
	EB Right	Stop	100	150	149	99%	9	A	105	Y
	NB Thru	Free	550	140	154	110%	0	-	0	N
	NB Right	Free	100	160	145	91%	1	-	0	N
	SB Left	Free	115	30	32	107%	3	-	26	N
	SB Thru	Free	600	130	130	100%	0	-	0	N
		Overall		**620**	**621**	**100%**	**9**	**A**	-	-

2017 Turn Volumes

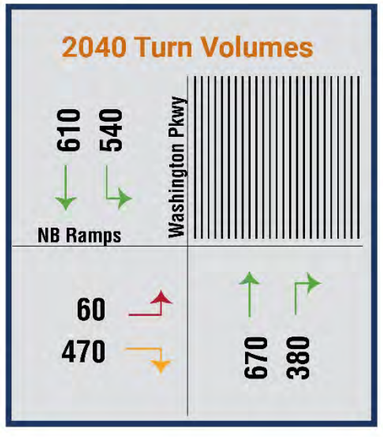


2040

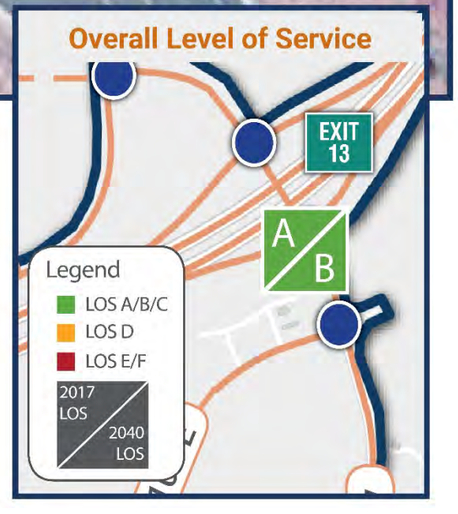
Northbound Ramps & Washington Parkway intersection modeling results display that five movements will experience queue lengths that exceed vehicle storage capacity. One movement operates at LOS E.

Intersection	Movement	Control	Existing Storage (Feet)	PM Peak Hour Input Volume	Volume	Percent Served	Total Delay (sec)	LOS	Max Queue (ft)	Exceeds Storage
#10 - Northbound Ramps/Washington Parkway	EB Left	Signal	100	60	68	113%	61	E	440	Y
	EB Thru	Signal	1000	0	0	0%	0	A	440	N
	EB Right	Signal	100	470	427	91%	39	D	440	Y
	NB Thru	Signal	550	670	664	99%	7	A	570	Y
	NB Right	Signal	100	380	390	103%	7	A	260	Y
	SB Left	Signal	115	540	519	96%	16	B	260	Y
	SB Thru	Signal	600	610	620	102%	4	A	260	N
		Overall		**2730**	**2688**	**98%**	**15**	**B**	-	-

2040 Turn Volumes



Overall Level of Service



Study Intersection — Washington Parkway & I-15 SB Ramps

2017

Southbound Ramps & Washington Parkway intersection modeling results display that no movements will experience queue lengths that exceed vehicle storage capacity. All movements operate at LOS A.

Intersection	Movement	Control	Storage (Feet)	PM Peak Hour Input Volume	Volume	Percent Served	Total Delay (sec)	LOS	Max Queue (ft)	Exceeds Storage
#11 - Southbound Ramps/Washington Parkway	NB Left	Free	150	120	133	111%	1	-	0	N
	NB Thru	Free	600	30	31	103%	0	-	0	N
	WB Left	Stop	100	80	82	103%	9	A	42	N
	WB Thru	Stop	1500	0	0	0%	0	A	42	N
	WB Right	Stop	100	50	54	108%	7	A	42	N
	SB Thru	Free	200	80	81	101%	1	-	0	N
	SB Right	Free	150	10	12	120%	2	-	0	N
	Overall			**370**	**393**	**106%**	**8**	**A**	-	-

2017 Turn Volumes

Roadway Classification

Southbound Ramps - Interchange

Washington Parkway - Major Arterial

Lane Configuration

NB Left (1)
NB Thru (1)

WB Left (1)
WB Thru (1)
WB Right (1)

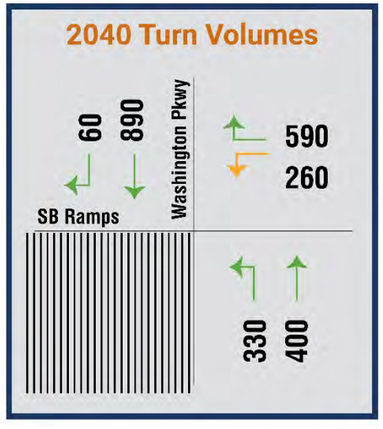
SB Thru (1 + shared right)
SB Right (1 + 1 shared thru)

2040

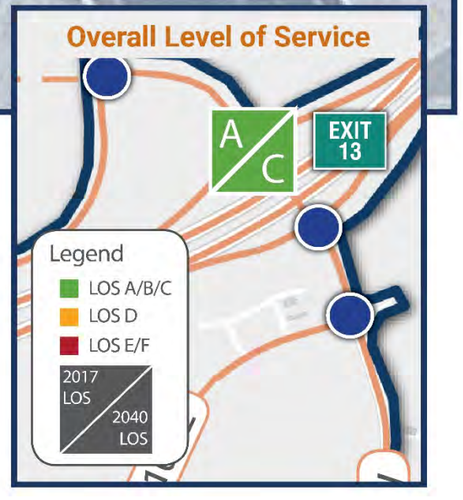
Southbound Ramps & Washington Parkway intersection modeling results display that five movements will experience queue lengths that exceed vehicle storage capacity. All movements operate at LOS D or better.

Intersection	Movement	Control	Existing Storage (Feet)	PM Peak Hour Input Volume	Volume	Percent Served	Total Delay (sec)	LOS	Max Queue (ft)	Exceeds Storage
#11 - Southbound Ramps/Washington Parkway	NB Left	Free	150	330	345	105%	23	C	230	Y
	NB Thru	Free	600	400	395	99%	8	A	230	N
	WB Left	Stop	100	260	270	104%	39	D	350	Y
	WB Thru	Stop	1500	0	0	0%	0	A	350	N
	WB Right	Stop	100	590	596	101%	28	C	350	Y
	SB Thru	Free	200	890	862	97%	17	B	410	Y
	SB Right	Free	150	60	60	100%	11	B	390	Y
	Overall			**2530**	**2528**	**100%**	**21**	**C**	-	-

2040 Turn Volumes



Overall Level of Service



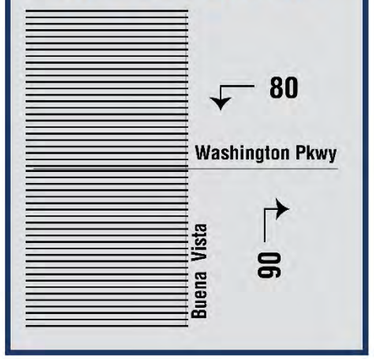
Study Intersection — Buena Vista Blvd & Washington Parkway

2017

Buena Vista Blvd & Washington Parkway intersection modeling results display that no movements will experience queue lengths that exceed vehicle storage capacity. All movements operate at LOS A.

Intersection	Movement	Control	Storage (Feet)	PM Peak Hour Input Volume	Volume	Percent Served	Total Delay (sec)	LOS	Max Queue (ft)	Exceeds Storage
#12 - Buena Vista Blvd/Washington Parkway	NB Right	Free	500	90	95	106%	-	-	0	N
	WB Left	Free	350	80	85	106%	-	-	0	N
	Overall			**170**	**180**	**106%**	**2**	**A**	**-**	**-**

2017 Turn Volumes



Roadway Classification

Buena Vista Blvd - Minor Arterial

Washington Parkway - Major Arterial

Lane Configuration

EB Thru (1)
EB Right (1)

NB Left (1)
NB Right (1)

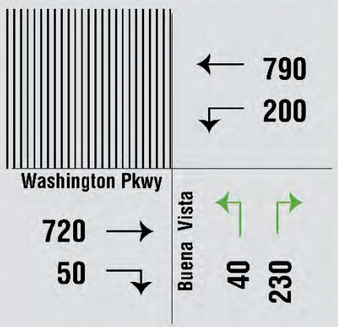
WB Left (1)
WB Thru (1)

2040

Buena Vista Blvd & Washington Parkway intersection modeling results display that no movements will experience queue lengths that exceed vehicle storage capacity. All movements operate at LOS A.

Intersection	Movement	Control	Existing Storage (Feet)	PM Peak Hour Input Volume	Volume	Percent Served	Total Delay (sec)	LOS	Max Queue (ft)	Exceeds Storage
#12 - Buena Vista Blvd/Washington Parkway	EB Thru	Free	1000	720	724	101%	0.82	-	0	N
	EB Right	Free	250	50	49	98%	1	-	0	N
	NB Left	Stop	500	40	39	98%	1	A	0	N
	NB Right	Stop	500	230	200	87%	3	A	60	N
	WB Left	Free	350	200	198	99%	3	-	80	N
	WB Thru	Free	1000	790	796	101%	1	-	0	N
	Overall			**1260**	**1233**	**98%**	**1**	**A**	**-**	**-**

2040 Turn Volumes



Overall Level of Service

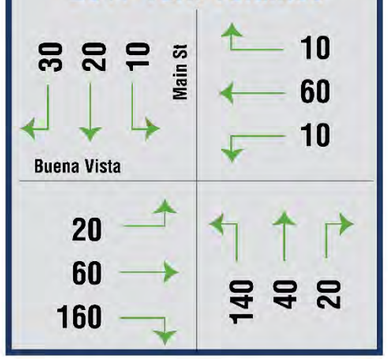
Study Intersection — Main Street & Green Springs Drive

2017

Main Street & Buena Vista Blvd intersection modeling results display that no movements will experience queue lengths that exceed vehicle storage capacity. All movements operate at LOS B or better.

Intersection	Movement	Control	Storage (Feet)	PM Peak Hour Input Volume	Volume	Percent Served	Total Delay (sec)	LOS	Max Queue (ft)	Exceeds Storage
#13 - Main Street/Buena Vista Blvd	EB Left	Stop	150	20	22	110%	10	A	67	N
	EB Thru	Stop	600	60	61	102%	12	B	67	N
	EB Right	Stop	100	160	168	105%	12	B	67	N
	NB Left	Stop	175	140	154	110%	13	B	113	N
	NB Thru	Stop	275	40	48	120%	11	B	113	N
	NB Right	Stop	175	20	18	90%	8	A	150	N
	WB Left	Stop	105	10	7	70%	10	A	85	N
	WB Thru	Stop	250	60	65	108%	9	A	85	N
	WB Right	Stop	170	10	12	120%	6	A	85	N
	SB Left	Stop	220	10	13	130%	6	A	33	N
	SB Thru	Stop	220	20	16	80%	6	A	33	N
	SB Right	Stop	120	30	48	160%	11	B	113	N
	Overall			**580**	**632**	**109%**	**12**	**B**	-	-

2017 Turn Volumes



2040

Main Street & Buena Vista Blvd intersection modeling results display that seven movements will experience queue lengths that exceed vehicle storage capacity. All movements operate at LOS C or better.

Intersection	Movement	Control	Existing Storage (Feet)	PM Peak Hour Input Volume	Volume	Percent Served	Total Delay (sec)	LOS	Max Queue (ft)	Exceeds Storage
#13 - Main Street/Buena Vista Blvd	EB Left	Signal	150	105	97	92%	14	B	260	Y
	EB Thru	Signal	600	160	146	91%	19	C	260	N
	EB Right	Signal	100	230	219	95%	12	B	260	Y
	NB Left	Signal	175	220	189	86%	11	B	200	Y
	NB Thru	Signal	275	135	141	104%	19	C	200	N
	NB Right	Signal	175	80	70	88%	15	C	240	Y
	WB Left	Signal	105	60	56	93%	13	B	170	Y
	WB Thru	Signal	250	160	158	99%	11	B	170	N
	WB Right	Signal	170	30	34	113%	5	A	170	Y
	SB Left	Signal	220	25	28	112%	12	B	60	N
	SB Thru	Signal	220	95	102	107%	9	A	60	N
	SB Right	Signal	120	95	113	119%	8	A	120	Y
	Overall			**1395**	**1353**	**97%**	**13**	**B**	-	-

2040 Turn Volumes

Roadway Classification

Main Street - Major Arterial

Buena Vista Blvd - Minor Arterial

Lane Configuration

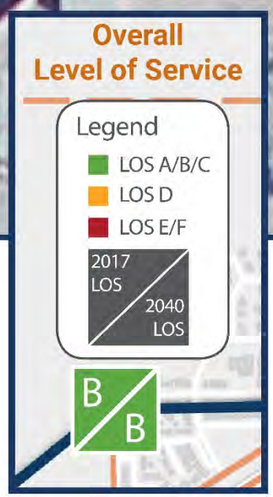
EB Left (1)
EB Thru (1 + 1 shared right)
EB Right (1 + 1 shared thru)

NB Left (1 + 1 shared thru/right)
NB Thru (1 + 1 shared left/right)
NB Right (1 +1 shared left/thru)

WB Left (1)
WB Thru (1)
WB Right (1)

SB Left (1 + 1 shared thru/right)
SB Thru (1 + 1 shared left/right)
SB Right (1 + 1 shared left/thru)

Overall Level of Service



2015-2040
REGIONAL TRANSPORTATION PLAN
DIXIE METROPOLITAN PLANNING ORGANIZATION

PREPARED BY
The Dixie Transportation Planning Office
Five County Association of Governments

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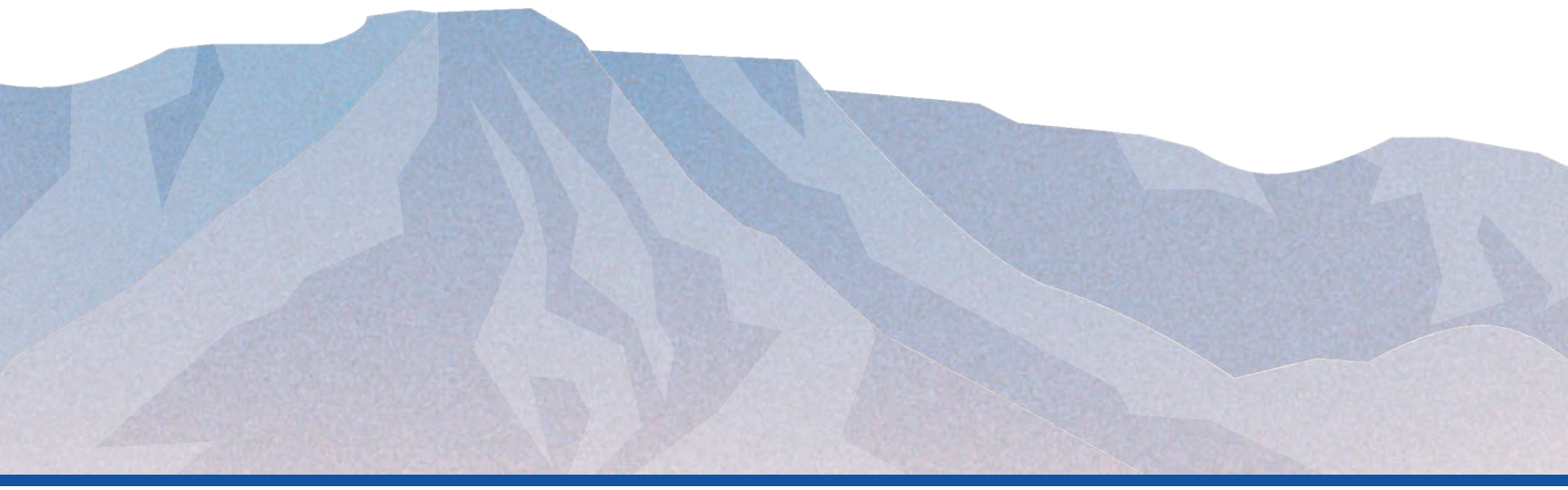
Pleasant Grove, Utah 84602



2015-2040

Regional Transportation Plan

Dixie Metropolitan Planning Organization

June 17, 2015

Prepared by:

The Dixie Transportation Planning Office
Five County Association of Governments
1070 West 1600 South, Building B
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UNIFIED TRANSPORTATION PLANNING
DIXIE
METROPOLITAN
PLANNING ORGANIZATION

TABLE OF CONTENTS

Chapter 1 – **Executive Summary**

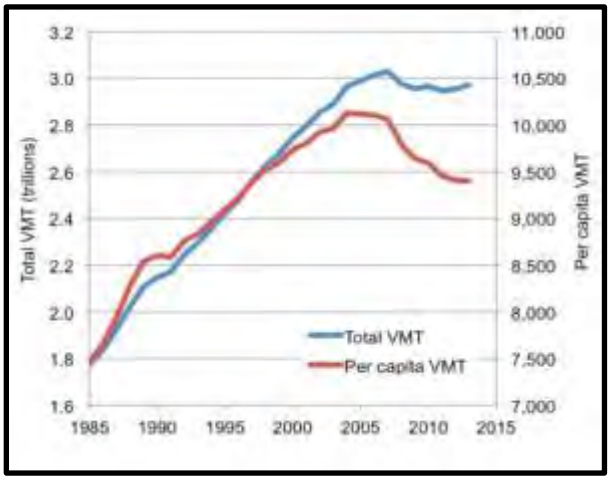
This Regional Transportation Plan (RTP) is the culmination of planning efforts undertaken by Dixie Metropolitan Planning Organization (MPO) for the Census Bureaus' designated urban areas in Washington County, Utah – including the St. George Urbanized Area and the Hurricane Urban Cluster. The RTP objective is to foster coordination of community leaders, the public, and stakeholders to plan for the transportation of people, goods, and services through goals centered on safety, air quality, congestion management, corridor preservation, public transit, pedestrian movement, and respect for environmental constraints.

The plan is updated every four years in coordination with the Utah Department of Transportation, three other MPOs in Utah, Washington County, and the cities within the urban areas noted above. Transportation planning in Washington County follows local visioning goals in collaboration with other planning efforts such as Utah's Unified Transportation Plan, Vision Dixie, the Utah Strategic Highway Safety Plan, Homeland Security plans, etc.

The cities of Ivins, Hurricane, LaVerkin, Leeds, St. George, Santa Clara, Toquerville, and Washington, are included in the planning boundary Map #2 in Appendix A.

This plan relies on principals defined in Vision Dixie, a visioning effort undertaken in 2006-08 to document the vision of Dixie's desired future development as defined by the public, elected officials, public service agencies, business interests, and other socioeconomic forces. From a transportation perspective, Vision Dixie calls for a variety of roads, transit, and pedestrian facilities, community connectivity and access to a greater variety of human services, businesses, and residential units.

Projected transportation demand in the St. George area was modeled using state-approved computer programs and verifies the Vision Dixie call for a variety of future transportation facilities.



Washington County's estimated population growth over the next 25 years combined with limited amounts of federal, state, and local funds available to accommodate their needs indicate that revenue streams will need to be incrementally increased and changed over time to generate sufficient resources to accommodate anticipated needs. The funding sources and future funding assumptions are explained in Chapter 5.

A summary of proposed transportation facilities, including a comprehensive list of road improvements over the next 25 years is noted in

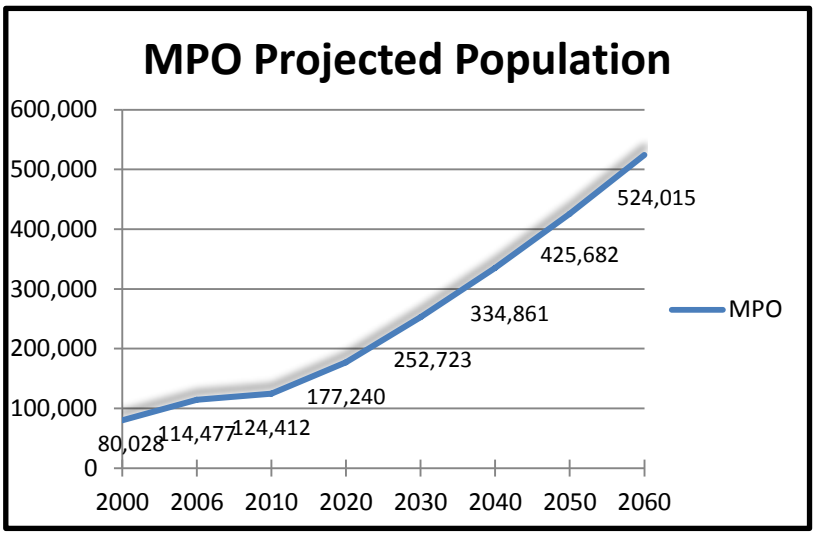
Chapter 6 and depicted on Map 1 in Appendix A. Exceptional evidence also points to the need for expanded bicycle facilities, pedestrian facilities, and regional transit systems throughout the Urbanized Area as outlined in Chapters 12 and 13.

Special attention must also be given to safety, congestion, and corridor preservation over the next 25 years. And of utmost importance is affording appropriate environmental protections of and respect for the varied "threatened and endangered species" (plant and animal) present in southwestern Utah as discussed in Chapter 11.

Taken together the chapters within the Regional Transportation Plan identify needs, issues, and potential solutions to facilitate transportation planning excellence.

Chapter 2 **–Need and Purpose**

According to the U.S. Census, the 2013 estimated population of Washington County, Utah is 147,800 people. According to the Utah Governor's Office of Economic Development (GOED), the Dixie Metropolitan Planning Organization (Dixie MPO) population is expected to grow to over 177,000 by 2020; to over 252,700 by 2030; and to 334,800 by 2040.



This 2015-2040 Regional Long-Range Transportation Plan outlines how various jurisdictions within the Dixie MPO intend to meet the area's transportation demands and needs over the next 25 years. The area has many geographical features (hills, bluffs, and rivers) that challenge the circulation of people and freight and the creation of various transportation systems. The area is also habitat to threatened and endangered plant and wildlife species and is governed by county, state, and federal regulations.

The expected population growth coupled with the community's desire to retain mobility for people, goods, and services defines the need for this plan. This plan's purpose is to outline how these needs could be addressed over the next 25 years with consideration of geography, environment, socioeconomic trends, and anticipated transportation demand (needs).

The Dixie MPO encompasses the U.S. Census Bureau defined St. George Urbanized Area and the Hurricane Urbanizing Area. The Dixie MPO planning boundary includes the cities of Hurricane, Ivins, LaVerkin, Leeds, Santa Clara, St. George, Toquerville, and Washington and immediately adjacent sections of unincorporated Washington County in southwestern Utah as illustrated in the planning boundary Map #2 in Appendix A.

The Dixie MPO was designated by the Governor September 20, 2002. In compliance with federal guidelines the Dixie MPO develops and approves processes and procedures for conducting long range

planning, identifying proposed transportation projects for consideration in the Transportation Improvement Program (TIP) and social, economic and environmental implications of the regional transportation system and the traffic growth being experienced and anticipated in the future.

On July 6, 2012, the President of the United States signed P.L. 112-141, the Moving Ahead for Progress in the 21st Century Act (MAP-21).. The $105 billion law reauthorized federal surface transportation programs through (FY) 2013 and 2014. The reauthorization has persisted through May 2015 through continuing resolutions. Reauthorization of a similar transportation bill is anticipated soon, but not in time for consideration in this plan.

MAP-21 Transforms the framework for investments to guide the growth and development of the country's vital transportation infrastructure. MAP-21 continues to focus on safety and security, and requirements for public participation. The law also includes key transit and environmental requirements with an emphasis toward developing transportation alternatives ranging from passenger rail and transit to bicycle and pedestrian paths.

Common to MAP-21 and previous Acts, is the consideration in the planning process of broad based requirements or issues. MAP-21 identifies the following goals:

1. Leverage $1.75 billion of the Transportation Infrastructure Finance and Innovation Act (TIFIA) loan program funds into $34 billion in private sector and other investments for transportation projects.
2. Develop a new transit safety program to assure safety on buses, subways, streetcar, and light-rail systems.
3. Step up safety efforts, including the fight against distracted driving, and to improve truck and motor coach safety.
4. Consolidate highway and transit programs, eliminating duplicate or outdated programs.

Chapter 3 **– Vision and Mission**

The 'Vision" is the guidepost for all efforts of the organization. At the Dixie MPO foundation are several ideologies designed to create the future of our transportation planning.

Though simply stated the 'Vision' is rooted in sound planning practice: to achieve transportation planning excellence.

"Achieve Transportation Planning Excellence"

Through "Vision Dixie", over three thousand residents created a framework in which future development and transportation can work together to create communities, and a region that preserves Southern Utah's quality of life. The "Vision" looks forward to an affordable, sustainable, and livable future.

The public preferences are summarized in a series of Vision Dixie Principles that illustrate how growth might occur as cooperative efforts are made to implement the principles identified through the process.

The Vision Dixie Principles provide a framework for voluntary implementation. Local officials have committed to work with residents to determine how these principles fit with local plans for the future.

The process was kicked off on October 18, 2006 when nearly 400 residents joined the Washington County Commission in a county wide process of workshops, technical research and analysis.

Over 1,200 residents attended workshops in the fall of 2006 to voice their preferences for how the county should grow. This input coupled with technical guidance from local planners, led to the creation of four scenarios that were unveiled at nine "Dixie Dialogue" meetings in May and June 2007. More than 500 residents attended these meetings to identify which ideas, contained in the scenarios, they favor. An additional 800 residents evaluated these scenarios on-line. Also in June 2007, an independent polling firm contacted 400 representative county residents to ask their opinions on growth issues and strategies.

Based on these citizen input initiatives, a steering committee made up of mayors from throughout the urbanizing area, established ten Vision Dixie Principles.

The Vision Dixie Principles:

Principle 1: Plan Regionally, Implement Locally

Principle 2: Maintain Air and Water Quality and Conserve Water

Principle 3: Guard our 'Signature' Scenic Landscapes

Principle 4: Provide Rich, Connected Natural Recreation and Open Space

Principle 5: Build balanced Transportation that includes a System of Public Transportation, Connected Roads, and Meaningful Opportunities to Bike and Walk.

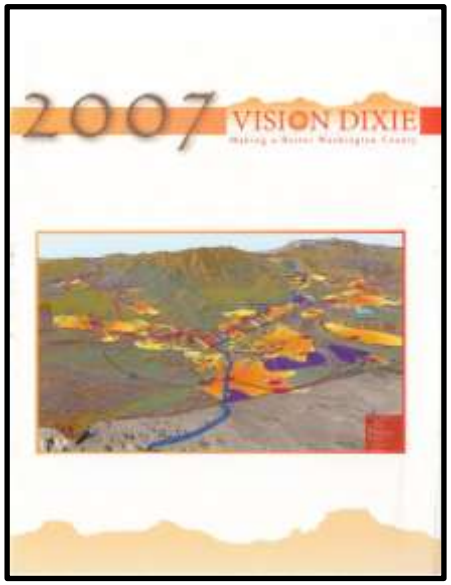
Principle 6: Get 'Centered' by Focusing Growth on Walkable, Mixed-Use Centers.

Principle 7: Direct Growth Inward.

Principle 8: Provide a Broad Range of Housing Types to Meet the Needs of All Income Levels, Family Types, and Stages of Life.

Principle 9: Reserve Key Areas for Industry to Grow the "Economic Pie".

Principle 10: Focused Public Land Conversion Should Sustain Community Goals And Preserve Critical Lands.



Because of (unique) geography, roads in Dixie have to accommodate more traffic and are susceptible to congestion. Thus, while auto use will continue to be dominant, roads will not be able to meet all our mobility needs decades into the future. Public transportation is especially important to keep us from

being overwhelmed by gridlock. Putting in place a transit backbone will help our downtowns, major centers, and Dixie University flourish, keep our air clean, and help reduce household expenses associated with day-to-day travel. (Vision Dixie 2035: Land-Use & Transportation Vision, p. 26)

A vibrant "center" includes multiple ingredients: a mix of uses, pedestrian-oriented buildings, focused density, connected streets, and context sensitive streets. (Vision Dixie 2035: Land-Use & Transportation Vision, p. 31)

Vision Dixie calls for corridor preservation for roads and transit, street connectivity, and the creation of community-friendly collector and arterial roads to reduce congestion and accommodate a growing population with the following long-term recommendations:

- Work together to identify and preserve transit corridors and potential station locations.
- Explore the creation of a transit district and a local option sales tax for transit.
- Adopt the road corridors of Utah Department of Transportation, DMPO, and Five County Association of Governments into local general plan updates. Corridor preservation should address road needs, transit needs, utilities, bicycle facilities and trails. Formalize local government ordinances and negotiation procedures to preserve corridors as development happens.
- Revise street connectivity standards in updated subdivision ordinances.
- Coordinate local street plans in sub-area plans to assure optimum connectivity.
- Coordinate local street plans between jurisdictions.
- Amend local policies and construction standards to comply with "complete streets" criteria (that include provision for pedestrians, bicycles and parking) consistent with street segments mapped in the general plan.

Vision Dixie principles 6-8 encourage "Walk-able, Mixed-Use Centers", "Directing Growth Inward," and "Enabling the Housing Market to Meet Housing Wants and Needs," with the following long-term recommendations:

1. Approximate areas for future mixed-use centers, remove zoning and subdivision barriers to mixed-use centers, and update community general plans to include these centers.
2. Include mapped priority land re-use areas in general plans to signify to developers and nearby land owners that development in those areas helps fulfill city-wide goals (of inward growth first).
3. Modify edge-of-town standards and annexation policies to encourage contiguous development and discourage leap-frog development through market-based mechanisms that charge leap-frog development consistent with its higher level of impacts (e.g., longer streets per home).
4. Amend the zoning map and ordinances to allow a greater range of (housing) densities.

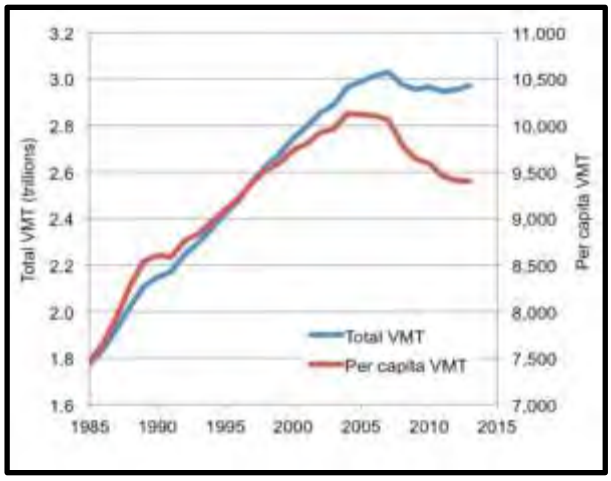
These recommendations are supported by the 2015-2040 Regional Transportation Plan.

This Vision can be realized through a strong day-by-day effort to attain goals and objectives, as stated in the Regional Transportation Plan with the mission to: "Foster coordination of community leaders, the public, and stakeholders to reach transportation goals centered around safety, air quality, congestion management, freight movement, corridor preservation, public transit, pedestrian movement, and respect for environmental constraints."

> *"Foster coordination of community leaders, the public, and stakeholders to reach transportation goals centered around safety, air quality, congestion management, freight movement, corridor preservation, public transit, pedestrian movement, and respect for environmental constraints."*

Chapter 4 – **Projected Transportation Demand**

Prior to the MPO designation, the City of St. George put in place a regional traffic model using the QRS II platform. In 2002, the MPO supported a contract to re-calibrate the model to Census 2000 data and subsequently in 2004 another MPO contract generated year 2015 and 2035 traffic projections based on updated population and employment data from the Governor's Office of Economic Development. During 2005 and 2006, several corridor studies were undertaken using the model, including SR-9 in Hurricane where a new model was created.



Because of new land use information and population assumption changes identified, these corridor "models' influenced the need to expand the regional model and to re-calibrate. The model structure added the cities of Hurricane/LaVerkin Urban Cluster, Toquerville, Leeds Town, and the four cities in the Dixie MPO Planning Boundary, Ivins, Santa Clara, St. George and Washington along with Washington County areas adjacent to the cities/towns.

A change in model platform (software) was undertaken in 2010. This change came about as a result of discussions addressing the effectiveness of the expanded QRS II Dixie Model beginning as far back as 2007-2008. The QRS II model was migrated to the CUBE model in late 2010. The change also included all of Washington County to better predict traffic movements on a county-wide basis. A rigorous effort to update socio-economic data was completed as a part of the process with input from Washington County and each of the cities/towns in the County. The CUBE model is the platform used for the State Travel Demand Model; supported by UDOT and other MPO's.

In 2013, the four Eastern communities of Hurricane, LaVerkin, Toquerville and Leeds became a part of the Dixie MPO. These communities now each have representation on both the Transportation Advisory

Committee and the Transportation Executive Council. As noted above, the four communities had already been added to the Travel Demand Model (TDM).

Also in the summer of 2013 the DMPO again commissioned an update of the Travel Demand Model. This update was to incorporate the results of the 2012 Household Travel Survey and the 2010 Census and to make the model current with updates being made to the other travel demand models throughout Utah. Socioeconomic forecasts were also refreshed based on the Governor's Office of Planning and Budget (GOPB) 2012 forecasts. Completed in October of 2013, it became Version 2 of the DMPO Travel Demand Model.

Model Structure

Travel demand models are computer-based mathematical models that use socioeconomic and roadway network and land use data to forecast traffic under various scenarios. To forecast traffic the Dixie Travel Demand Model uses the traditional 4-step process. The four basic phases are:

The 2010 DMPO US census defined population was estimated at 105,336. With a 2010 county population of 138,115 over 76 percent of the county population lives within the DMPO urbanized census boundaries. The 2010 US census population estimate for the Hurricane Urban Cluster was 16,336.

1. Trip Generation – Trip generation determines how many trips are made in a region. To simplify the process, large geographical areas are broken up into smaller areas called traffic analysis zones (TAZ). Using information from sources like the Census Bureau and city land use plans, each TAZ is given certain attributes such as the number of households, employees, and average income levels. These attributes are then used to calculate the number of trip productions and attractions for each TAZ.

2. Trip Distribution –Trip distribution determines where the trips are going. Trip productions and attractions from different TAZ's are linked together using a gravity model to form origin-destination patterns. The gravity model states that the trip attraction between two zones is proportional to the size of the zones (number of households/employees) and the distance between them.

3. Mode Choice –What modal method of reaching a trip's destination is determined in step 3. Looking at factors such as cost, convenience and travel time it is determined if the trip will be made by walking, transit or vehicle.

4. Trip Assignment – The route the trip will take to reach its destination is then determined. Link attributes contained in the highway network such as capacity and travel speed are used to determine the shortest travel path to a destination. The trips are then assigned to the roadway network.

Each step of the process is calibrated to observed travel behavior. Base model forecasts are checked against observed traffic counts to ensure reasonable accuracy. Once the model is developed so that it replicates existing travel behavior, it is then used to evaluate future scenarios and alternatives.

Socio-Economic Characteristics

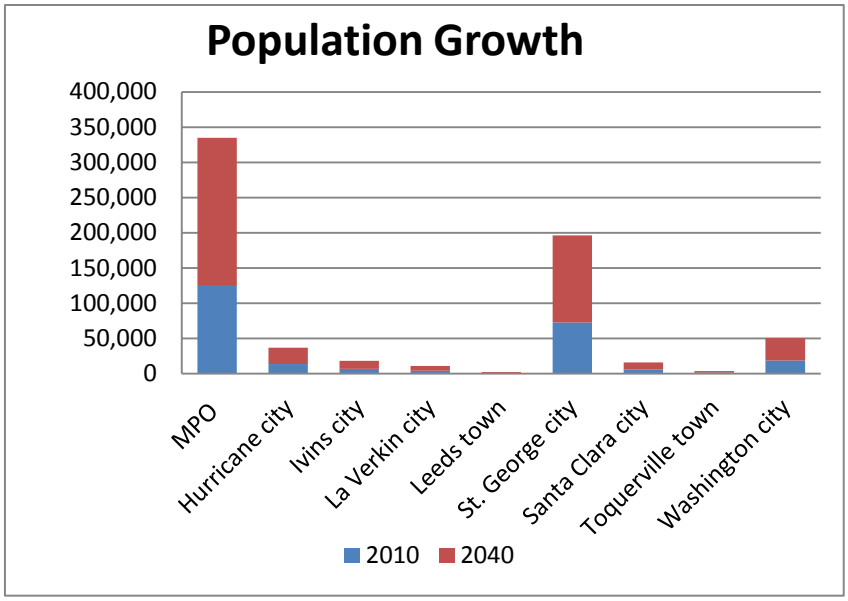


Figure 1 Population Growth - MPO Cities and Towns

The characteristics of population distribution in the MPO area are vital to the development and degree of transportation infrastructure that should be planned for over the life of the plan. Information gained from work done over the last few years helps to paint a picture of current and projected population growth. With the merging of the Hurricane Urban Cluster (population 16,336) with the DMPO Urbanized Area, the combined urban area population, based on the 2010 Census is 121,672 which means that over 88% of the county population now lives within the DMPO census defined "Urban" boundaries. Other cities and towns within the county include Apple Valley Town, Enterprise City, Hildale City, New Harmony Town, Rockville Town, Springdale Town, and Virgin Town as well as unincorporated County.

The following figures include population depictions for towns/cities within the "Planning Boundary" of the DMPO. Note that 100% of the member cities populations (124,412) live within the DMPO "Planning Boundary. The County-wide population is expected to increase from 138,115 in 2010 to 371,743 in 2040 with over 90% of the county population living within the cities of the DMPO Planning Boundary.

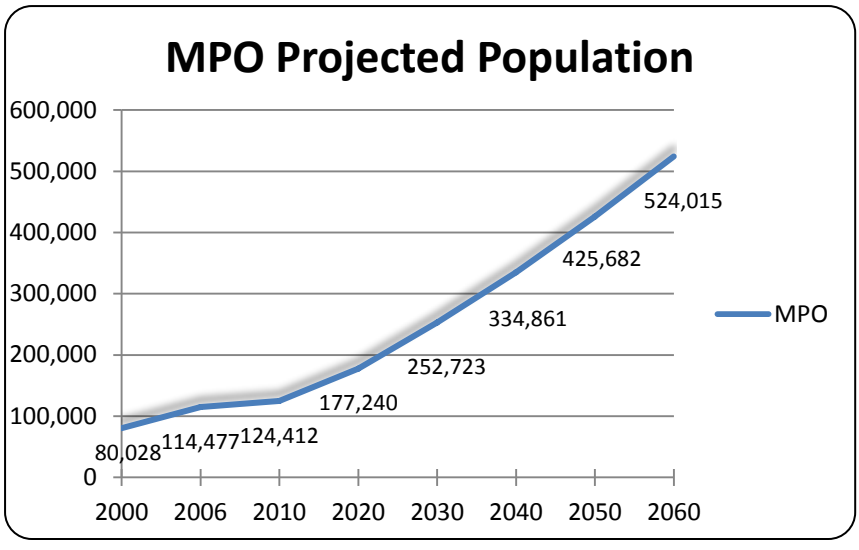


Figure 2 MPO Projected Population - MPO Cities and Towns

Note that the populations shown in Figures 1 & 2 represent the population for each of the cities that are members of the MPO. Since portions of the cities are not within the current census defined MPO urban boundary the populations shown are slightly higher than those of the urbanized area as detailed above. However, all cities represented are within the planning boundary as noted. Figure 3 represents historical population growth in Washington County.

The distribution of the current population and projected growth are illustrated on Map 3, the "Population Change Map" in Appendix A. The mapping includes a 2014 population distribution as well as identifies projected areas of growth out to 2040.

Employment and Commuting

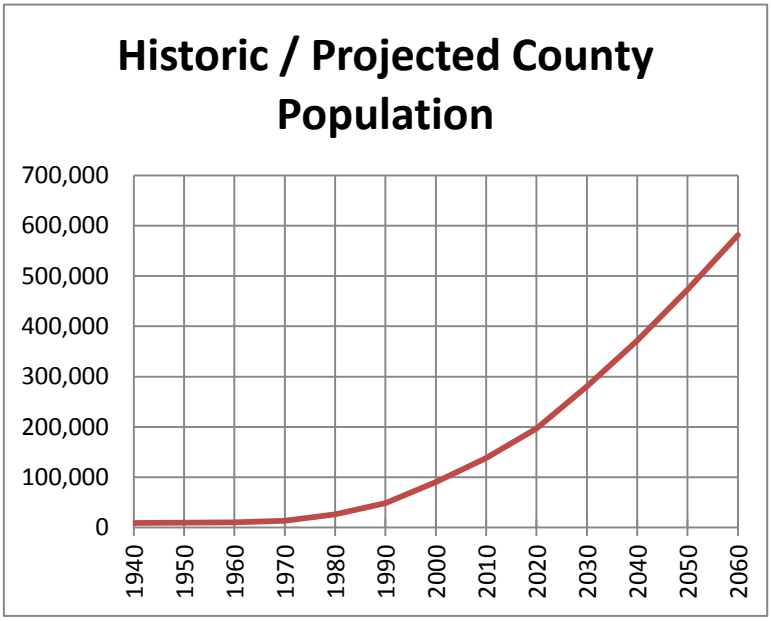


Figure 3 Historic / Projected Population - Washington County

According to the Utah Department of Workforce Services there were approximately 4,648 employment establishments operating in Washington County in 2013 (see Appendix C for table of major employers). It should be realized that companies come and go. In 2013, the number of employment centers in Washington County with more than 100 employees was 52. As is the case with many businesses, there are seasonal peaks in employment, such as the Christmas holiday season at retail establishments. The largest employer in the urbanized area is the Washington County School District. Their employees, however, and their work destinations, are spread throughout the urbanized area.

As of 2014 Washington County has experienced two full years of strong employment expansion. It is anticipated that additions to the county's employment base should continue to strengthen Washington County's numbers in the months ahead. According to the Department of Workforce Services; "in December 2013 the County's year-to-year employment gain clocked in at 5 percent, representing a net increase of roughly 2500 jobs." Leisure/hospitality services and construction were very close for the top honors with retail trade, government (including public education) and healthcare/social services all adding good numbers of new positions. As growth continues, so too will the need for adequate transportation facilities. The distribution of current employment and projected employment growth are illustrated on Map 4, the "Employment Change Map" in Appendix A.

Objectives and Goals

To plan for future transportation demands upon the transportation network, the DMPO will strive to meet necessary goals and objectives to recognize the impacts of the area growth on transportation.

Objective

To recognize population growth and land uses as the key drivers of future transportation demand.

Goals

1. Stay abreast of changes in population growth and projections in the area.
2. Be aware of changes in land development patterns and how those changes affect population growth and transportation demand.

3. Stay current on socio-economic factors and changes that may affect the demand for transportation.
4. Provide for regular updates of the Transportation Demand Model and look for opportunities to update the model within localized studies.
5. Keep up with Model platform updates and changes in technology that can improve the accuracy of the Transportation Demand Model.
6. Become more educated and efficient in the execution and use of the Transportation Demand Model in keeping the model current and useful to the DMPO and its partners.

Chapter 5 – **Financial Plan**

Current Funding Sources, Gas Taxes, Fees

Currently in the Washington County area, federal, state, and local governments as well as private developers provide funds to pay for improvements.

Federal Funds:

The current federal highway and transit bill (Moving Ahead for Progress in the 21st Century Act or MAP-21) continues to fund federal transportation programs under continuing resolutions while a new federal highway bill is anticipated within the next several months.

State Funds:

The Utah Department of Transportation receives state highway user revenues as well as state general funds for highway construction and maintenance projects. The highway user revenues sources include motor fuel taxes, special fuel taxes, vehicle registration fees, driver license fees, and other fees. General fund revenues are also used for transportation and the state has the authority to issue bonds for specific highway projects.

A portion of the state highway user funds are made available to local governments for highway construction. Seventy percent of these funds are kept by the UDOT for their construction and maintenance program. The remaining 30 percent of funds are made available to the cities and counties in the state through the Class B and C Program for road maintenance or construction.

Local Funds:

In addition to B&C funds, local governments use a variety of funding sources for transportation improvements including a quarter of a percent sales tax for transportation, development impact fees, general funds (sales and property taxes), bonding arrangements, the Local Corridor Preservation Fund (vehicle registration fees), and special service district fees.

Private Sources

Private interests may also provide transportation improvements. As developers construct the local streets within their own subdivisions, they may also be required to dedicate rights-of-way for the construction of collector and arterial streets adjacent to their developments. Developers are also considered as possible sources of funding for projects needed because of the impacts of the development, such as the need for traffic signals or arterial street widening.

Private sources may also be considered for public transit improvements which could provide benefits to their particular interests. For example, businesses or developers may be willing to or required to support capital expenses or operating costs for transit services that provide special benefits to their development such as a reduced need for parking or increased accessibility.

Following is a brief list of programs used to fund transportation projects within the Dixie MPO:

FEDERAL HIGHWAY ADMINISTRATION

- Surface Transportation Program (STP)
    - Dixie MPO cities
- Congestion Mitigation / Air Quality (CMAQ) (Available only after DMPO reaches non-attainment status)
- Interstate Maintenance (IM)
- National Highway System (NHS)
- Surface Transportation Program
- Urbanized Area
- Small Urban
- Flexible (Any-Area)
- Transportation Enhancements
- Highway Safety Improvement Program (HSIP)
- Hazard Elimination
- Railroad Crossings
- Safe Routes to School (SR2S)
- Bridge Replacement
- Off System - Local
- Off System - Optional
- Federal Lands Programs
- High Priority Projects (HPP)
- Transportation Improvement Projects (TI)
- Recreational Trails
- Transportation Alternatives Program (TAP)

FEDERAL TRANSIT ADMINISTRATION

- **(**5307) Urbanized Area Formula Grants
- (5309) Fixed Guideway Capital Investment Grants
- (5310) Services for elderly and disabled
- (5311) Formula Grants for Rural Areas
- (5340) High Density States Program

STATE OF UTAH

- State Construction
- State General Funds
- State Traffic
- Corridor Preservation Funds

LOCAL

- County (B Funds)
- City (C Funds)
- General Funds
- Transit Sales Tax
- Corridor Preservation Fund

PRIVATE

- Donations / User Fee
- Developer Funded Projects
- Public/Private Partnerships

Unified Plan Process

To create a fiscally constrained long range transportation plan, the Dixie MPO joined with the Utah Department of Transportation and others in the Utah Unified Plan Financial Working group to make common assumptions regarding current and future funding sources available for transportation. This effort projected revenues, inflation rates, estimated construction costs, and the cost of future rights-of-way. The Dixie MPO Executive Committee also examined local funding options and adopted a series of additional future funding assumptions associated with transportation. Below is a discussion of these

assumptions, an outline of current funding sources, and a policy document supporting acquisition of future federal, state, and local funding for transportation projects.

State (Future) Funding Assumptions

The Unified Plan Financial Working Group agreed on the following *state wide* revenue assumptions:

- 100% Auto Related Sales Tax- 16.6% total by FY 2017
- 75% Auto Related Sales Tax- 12.5% total by FY 2015
- $0.05 SW Fuel Tax or Equivalent, every 10 yrs starting in FY 2014 (30% to B & C Fund)
- State Wide Vehicle Registration Fee- $10 increase in FY 2018

Local (Future) Funding Assumptions

The Dixie MPO Executive Committee agreed on the following *local* revenue assumptions:

- ¼ percent Local Option Sales Tax or equivalent by 2015
- An additional $0.05 Local Option Fuel Tax or equivalent every 7 years starting in 2016
- An additional $5 Local Option Vehicle Registration Fee (or equivalent) every 10 years starting in 2018
- ¼ percent Sales Tax or equivalent for public transit

Fiscal constraints through 25-year planning phases

These future funding assumptions, taken together with existing funding sources were calculated and documented in a "Regional Transportation Plan Financial Report" as agreed upon through the Unified Plan Financial Working Group and endorsed by the Dixie MPO Transportation Executive Council.

The group projected a 4.5 percent to 5 percent annual inflation rate (a conservatively high estimate based on past experience) on all cost projections. A conservatively low 1.96 percent inflation rate was projected on revenue sources. Utah's shifting population was also figured into these assumptions based on projections by the Governors' Office of Planning and Budget. Currently the Dixie MPO is home to 6.67 percent of the state's population. GOPB projects the Dixie MPO population will reach 8.6 percent of state population by 2021 and 10.2 percent in 2030.

Federal formula funds, which represent only a small portion of an MPOs annual budget, assist MPO planning, environmental assessments and construction seed money for projects that move from the Plan to the Transportation Improvement Program. These federal dollars come from FHWA's Surface Transportation Program and FTA's Transit Programs with an approved 2% inflation rate.

Projected Transportation Revenues

The following table shows the total revenues assumed for projects in each of the three phases of the long range plan. Total expenditures are detailed in the "Project & Phasing List" in Chapter 6.

2015-2040 Long-Range Plan Total	
Total Assumptions	$1,871,919,869
Total Needs	$1,883,635,000
Total Difference	($11,715,131)

When compared with the needs list and anticipated costs in Chapter 6, these funding assumptions seem adequate in Phase 1 of the RTP. However, a re-evaluation of revenue needs may be appropriate in Phases II and III – beyond year 2025.

Chapter 6 – **Existing and Proposed Transportation Facilities**

Methodology

As discussed in Chapter 4, the Dixie MPO's CUBE modeling platform was used to analyze future traffic demand. The CUBE Model applied mathematical forecasting formulas to population, land use, socio-economic, trip generation, trip distribution, and mode choice data.

2040 Traffic Congestion No-Build Map (See Appendix A)

These forecasts were then imposed on the existing transportation networks. Then projects were conceptualized to relieve traffic congestion "hotspots" in each phase of the plan. Phase One includes the years 2015-2024. The associated project list was created to relieve the traffic demands of 2024. Phase Two includes 2025-2034 with a similar project list to relieve congestion under 2034 forecasts, and Phase Three includes the projects needed in 2035-2040.

Current Network

An inventory of the current MPO road network is best noted through use of the Traffic Congestion 2040 - No-Build map (Map 6 in Appendix A). The roads illustrated in red and black indicate areas of concern for traffic congestion in 2040. If no additional projects are built, the traffic demand in 2040 would exceed current roadway capacities on roads depicted in black. And similarly traffic demand on roads depicted in red would be at full capacity.

Future Network

The Traffic Congestion 2040 - Build map (Map 7 in Appendix A) shows areas concern for traffic congestion in the year 2040 assuming that the projects in this plan are all built at that time. Similarly the traffic demand in 2040 would exceed current roadway capacities on roads depicted in black. And similarly traffic demand on roads depicted in red would be at full capacity.

2040 Traffic Congestion Build Map (See Appendix A)

Projects and Phasing

The next several pages list a variety of transportation projects identified using the methodology outlined in chapters 2-5 above. Projects range from highway widening to bridge and overpass construction, as well as proposed new corridors. Additionally listed are UDOT projects of interest that may lie outside the MPO boundaries, but are vital connections in serving the overall traffic demand of the area (See Map 1 Projects and Phasing Map in Appendix A).

Regional Transportation Plan -- Projects & Phasing -- 2015 - 2040

Project #	Route	Category	City	Length	Project Description	Project Concept	Estimated Cost in 2015 dollars
Phase One (2015-2024)							
1	3184	Regional	I	3	Old Highway 91 , Kayenta Parkway to Pioneer Parkway (3-Lane Section)	Reconstruction	$2,900,000
2		Regional	I	1.5	Red Mountain Blvd. (200 East) , Old Highway 91 to Center Street	Reconstruction	$2,300,000
3		Regional	SC	0.7	Red Mountain Drive , Pioneer Parkway to Western Corridor	New Construction	$1,843,000
4		Regional	I	0.9	Snow Canyon State Park Access Road	Reconstruction	$400,000
5	Old 91	Regional	I	1.0	Santa Clara Drive , Swiss Village to 200 E	Reconstruction	$4,200,000
6		Regional	SG	3.0	Plantations Drive , construct from Sunbrook Drive to Dixie Drive	New Construction	$10,000,000
7	SR-8	State	UD OT	1.5	Sunset Blvd , widen to 6-lanes past Valley View Dr	Minor Widen/Striping	$500,000
8		Regional	SG	2.3	Indian Hills Drive widen to 3 lanes	Widen/Reconstruct	$3,476,000
9	SR-18	State	UD OT	0.5	Bluff Street & Sunset Grade Separated Intersection	New Construction	$20,000,000
10	SR-18	State	UD OT	1.2	Bluff Street & St. George Blvd Intersection Improvements & SR-18 Widening	Widen/Reconstruct	$38,300,000
11		Regional	SG	0.3	Airport Road from old airport to Black ridge Drive	New Construction	$1,250,000
12	SR-18	State	UD OT	2.0	SR-18 , St. George Blvd. to Main Street	Widen/Reconstruct	$16,800,000
13		Regional	SG	2.8	Astragulus Dr from So. Pkwy Exit 1 to So. Pkwy Exit 3	New Construction	$10,080,000
14	I-15	State	UD OT	1.0	I-15 Brigham Road to Dixie Drive, Southbound Widening	Widening	$25,000,000
15		Regional	SG		100 South , Widen from 700 East to Bluff St	Re-Striping	$250,000
16		Regional	SG		700 South , Widen from 700 East to Bluff St	Re-Striping	$250,000
17	SR-34	State	UD OT	0.3	St. George Blvd. Widening from 900 East to 1000 East	Widening	$2,500,000
18		Regional	SG	0.5	400 South Trail & Underpass , DSC 700 East to DSC Health Science Building	New Construction	$2,500,000
19		Regional	SG	4.5	River Road , Widening/intersection improvements, Blvd. to 700 S	Widening	$5,000,000

20		Regional	SG		River Road , Widening/intersection improvements, Riverside Dr to Bundy Ln	Widening	$5,000,000
21		Regional	SG	1.3	River Road , widen to 5-lane section from Ft. Pierce Drive to Brigham Road	Widen/Reconstruct	$3,500,000
22	I-15	State	UD OT	2.3	I-15 MP8-10 Aux lanes and Mall Drive Underpass	Widen/Reconstruct	$57,000,000
23		Regional	SG	0.58	Commerce Drive - extend road from 1630 East to Price City Hills Road	New Construction	$4,176,000
24		Regional	SG	1.71	Horseman Park Road - extend road from River Road to Price City Hills Road	Widen/Reconstruct	$7,000,000
25		Regional	SG	0.5	Red Hills Parkway (SG, W), 2000 East to Green Springs	Widen/Reconstruct	$3,600,000
26		Regional	SG	1.81	Little Valley Road , extend road to Price City Hills Road and widen	New Construction	$3,000,000
27		Regional	SG	2.7	Price City Hills Road Phase 1 - construct new road from 2450 South to River Road	New Construction	$19,440,000
28		Regional	SG	0.3	450 N from 2450 E to 2860 E	New Construction	$1,080,000
29	I-15	State	UD OT	1.0	I-15 MP 10 Thru Turns at Green Springs	Reconstruction	$2,700,000
30		Regional	W	1.0	Green Springs and Telegraph Intersection Improvements	Widen/Reconstruct	$2,200,000
31		Regional	SG	2.0	3000 East from **700** South to 2450 South - 5 Lane Road	Widen/Reconstruct	$300,000
32		Regional	W	0.2	Wal-Mart / Home Depot Connection between Washington & St. George	New Construction	$922,000
33		Regional	SG	2.24	2450 South - extend & improve road to Crimson Ridge Dr	New Construction	$3,000,000
34		Regional	**SG,** W	2.3	3650 South from **3000 East (SG)** to Southern Corridor	New Construction	$5,353,000
35		Regional	W	1.3	Merrill Road Extend to Washington Fields Rd	Widen/Reconstruct	$2,433,000
36	I-15	State	UD OT	1.0	I-15 Milepost 11 Interchange	New Construction	$30,000,000
37		Regional	W	0.9	Washington Fields Road , **2000 South** to 3650 South (Phase IV A & B)	Widen/Reconstruct	$5,960,000
38		Regional	SG	1.5	Airport Parkway from North Airport Access to Airport Loop Road	New Construction	$5,400,000
39		Regional	W	1	Washington Fields Road , Warner Valley Road to Airport Rd (Phase VII)	New Construction	$4,005,000
40	SR-7	State	UD OT	4.0	So. Parkway Segment IIIb, Warner Valley Road to Washington Dam Road (1st Barrel)	New Construction	$22,000,000
41		Regional	H		Purgatory Road - Environmental Study	Environmental	$540,000
42		Regional	H	1.5	Purgatory Road , Extend to Washington Dam Rd	New Construction	$11,664,000
43	SR-9	State	UD OT	2.0	So. Parkway Segment VI , Interchange at Telegraph & SR-9	Interchange	$12,390,000
44	SR-9	State	UD OT		SR-9 I-15 to Southern Parkway, Environmental Document	Environmental	$2,000,000
45	SR-9	State	UD OT		So. Parkway Segment VI, I-15 to 5300 W - Widen and Improve to Freeway Standards	New Construction	$16,600,000
46		Regional	H	3.6	Turf Sod Road from 4300 West to Southern Parkway	New Construction	$7,200,000
47	SR-7	State	UD OT		So. Parkway Segment IVb, Sand Hollow to 3000 S (1st Barrel)	New Construction	$30,000,000
48		Regional	H	2.24	2770 West (SR-9 to 600 North)	New Construction	$3,500,000

49	SR-7	State	UDOT		So. Parkway Segment V, 3000 S to SR-9 (1st Barrel)	New Construction	$50,770,000
50		Regional	H	0.6	2300 South from 700 West to 4800 West (Phase I-III)	New Construction	$30,700,000
51		Regional	H	2.5	3000 South from 1150 West to 3400 West	New Construction	$4,000,000
52		Regional	H	2.3	1300 West Street from 600 North to 1500 South	New Construction	$11,943,000
53		Regional	H	0.1	1150 West Street , from 600 North to 100 South	Widen/Reconstruct	$1,954,000
54		Regional	H	2.2	700 West from 600 North to Airport Road	Widen/Reconstruct	$12,263,000
55		Regional	SG		Traffic Control Center ITS	ITS	$500,000
56		**TBD**	**TBD**	8.0	Northern Washington Parkway Corridor , Red Hills Parkway to MP 13 - Environmental	Environmental	$5,000,000
57		Regional	MPO	1.5	Active Transportation Improvements - Phase I	New Construction	$3,000,000
58		Regional	H	2.46	3400 West from Sand Hollow Reservoir to SR-9	New Construction	$4,200,000

Phase One (2015 to 2024)	**Total Funding Needs:**	$543,842,000
	Funding Assumptions:	$530,651,455
	Remainder / **(Overage)**	($13,190,545)

Project #	Route	Category	City	Length	Project Description	Project Concept	Estimated Cost in 2015 dollars
Phase Two (2025-2034)							
1	3184	Regional	I	3.0	Old Highway 91 , 200 E to Shivwits Reservation 5-Lane	Reconstruction	$5,000,000
2		Regional	I	3.0	Western Corridor North , Old Highway 91 to Snow Canyon Parkway	New Construction	$29,400,000
3		Regional	SC	1.5	Santa Clara Dr to Western Corridor Connector Road	New Construction	$2,000,000
4		Regional	SC	1.5	South Hills Collector A from Clary Hills Dr to Plantations Dr	New Construction	$2,500,000
5		Regional	SG	1.5	Plantation Drive/Western Corridor - Old Hwy 91 to Sunbrook	New Construction	$40,944,000
6	SR-18	State	UDOT	6.0	SR-18 , Red Hills Parkway to Winchester Hills	Widen/Reconstruct	$58,800,000
7		Regional	SG	0.5	Temple Trail Drive Phase 2 - Construct new road from Indian Hills Drive to Dixie Drive	New Construction	$2,700,000
8		Regional	SG	1.1	Temple Trail Drive, Phase I from **Old** Airport to Indian Hills Drive	New Construction	$5,250,000

9		Regional	SG	2.7	Hidden Valley Drive Frontage Road - new road on east side of I-15 from MP 2 to MP 4	New Construction	$19,440,000
10	I-15	State	UD OT	12.0	I-15 SPUI at MP 4, and Lane Widening from **MP 4 to MP 5**	Widen	**$69,400,000**
11		Regional	SG	0.5	Man O War I-15 Crossing between Pioneer Rd to Hidden Valley Dr	New Construction	$30,000,000
12		Regional	SG	1.8	Quality Drive from Commerce Dr to Hidden Valley Rd	New Construction	$6,480,000
13		Regional	SG	3.0	400 East I-15 Ped Tunnel Crossing	New Construction	$4,000,000
14		Regional	SG	0.5	1450 South Extension over the Virgin River to Riverside Drive	New Construction	$20,000,000
15		Regional	SG	2.7	White Dome Frontage Road - new road from Southern Parkway to airport	New Construction	$5,832,000
16		**TBD**	**TBD**		Northern Washington Parkway Corridor , Red Hills Parkway to MP 13 - Phase I	New Construction	$47,000,000
17		Regional	SG	1.9	River Road , Widen to 5-lane section from Enterprise Dr to So. Pkwy	Widening	$6,840,000
18		Regional	SG	3.0	Cottonwood Springs Dr from Red Hills Pkwy to Washington Parkway	New Construction	$7,200,000
19		Regional	SG		1630 East, Extend from **Commerce** Dr to Southern Parkway	New Construction	$5,000,000
20		Regional	SG	1.0	Horseman Park Road - extend road from Price City Hills Road to West Airport Rd	New Construction	$3,600,000
21		Regional	SG	2.6	South Frontage Rd from White Dome Frontage Rd to Desert Canyon Dr	New Construction	$9,360,000
22		Regional	SG	4.3	Airport Loop Road from Washington Fields Rd to 1630 E	New Construction	$18,056,000
23		Regional	W	0.6	Main Street from I-15 Frontage Road to Washington Parkway	New Construction	$1,752,000
24		Regional	W	0.7	Extend Main Street to 100 East, south of 400 South	New Construction	$1,925,000
25		Regional	SG/W	0.9	Crimson Ridge Dr (SG/W) from 3000 East to Washington Fields Road	New Construction	$3,136,000
26		Regional	W	0.8	Washington Fields Road from 3650 South to Stucki Farms (Phase VB)	Widen	$2,269,000
27		Regional	W	1.1	Washington Fields Road from Stucki Farms to Warner Valley Road (Phase VIB)	Widen	$3,068,000
28	SR-7	State	UD OT	4.0	So. Parkway Segment IIIa (SG & W), Airport to Warner Valley Road (2nd Barrel)	New Construction	$22,420,000
29		Regional	SG	1.5	So. Pkwy East Frontage Road from Deseret Canyon Dr to So. Pkwy Interchange 9	New Construction	$5,400,000
30	I-15	State	UD OT	3.0	I-15 Corridor Lane Widening, **MP 4** to MP 16	Widen/Reconstruct	**$112,900,000**
31		Regional	W	0.9	Washington Dam Road , 1900 East to East City Limits	Widen/Reconstruct	$3,244,000
32	SR-7	State	UD OT	4.0	So. Parkway Segment IIIb, Warner Valley Rd. to Washington Dam Rd. (2nd Barrel)	New Construction	$27,330,000
33		Regional	W	3.0	Long Valley Road , construct road from SR-7 Interchange 11 to Interchange 12	New Construction	$8,884,000
34	**I-15**	**State**	**UD OT**	**1.7**	**Initial SR-9 Interchange Modifications**	**Reconstruction**	**$23,400,000**
35		Regional	W	1.5	Warner Valley Road from Purgatory to the road through Warner Valley	New Construction	$10,447,000
36	SR-7	State	UD OT		So. Parkway Segment IVa, Wash. Dam Rd to Sand Hallow (2nd barrel)	New Construction	$14,750,000

37		Regional	H	1.2	4300 West from SR-9 to Southern Parkway	New Construction	$24,863,000
38	SR-9	State	UD OT		So. Parkway Segment VI, 5300 W to So. Pkwy - Widen/Improve to Freeway Standards	New Construction	$21,700,000
39		Regional	H	0.4	130 North from 3400 West to 3700 West	New Construction	$500,000
40		Regional	H	1.3	200 North from **2260** West to 3400 West	New Construction	$5,000,000
41		Regional	H	5.5	3000 West from 150 South to Rlington Parkway	New Construction	$13,900,000
42	SR-7	State	UD OT		So. Parkway Segment IVb, Sand Hallow to 3000 S (2nd Barrel)	New Construction	$20,060,000
43	SR-7	State	UD OT		So. Parkway Segment V, 3000 S to SR-9 (2nd Barrel)	New Construction	$18,880,000
44		Regional	H	4.6	2750 West from 150 South to 3000 West	New Construction	$10,800,000
45		Regional	H	2.7	1300 South from 200 West to 3000 West	New Construction	$5,800,000
46		Regional	H	6.8	Rlington Parkway from 400 South to 4700 South	New Construction	$17,800,000
47		Regional	H	1.3	1150 West from 100 South to 1500 South (Phase II)	Reconstruction	$5,000,000
48, 49		**TBD**	**TBD**	3.3	**Construct Toquerville Bypass or Widen/Reconstruct SR-17 from MP 1.1 to I-15**	**Add Capacity/Safety**	$30,300,000
50		Regional	SG		Traffic Control Center ITS	ITS	$500,000
51		Regional	MPO	1.5	Active Transportation Improvements - Phase II	New Construction	$3,000,000
Phase Two (2025-2034)						**Funding Needs:**	$817,830,000
						Funding Assumptions:	$826,089,633
						Remainder / (Overage)	$8,259,633

Project #	**Route**	**Category**	**City**	**Length**	**Project Description**	**Project Concept**	**Estimated Cost in 2015 dollars**
Phase Three (2035-2040)							
1		Regional	I	1.1	Kwavasa Drive in Kayenta	New Construction	$6,254,000
2		Regional	SG	10.0	Western Corridor, MP 2**, Sun River to Plantation Drive** (1st Barrel)	New Construction	$83,000,000
3		Regional	SG	2.6	Green Valley Drive - extend road to Western Corridor	New Construction	$18,720,000
4		Regional	SC	1.5	Pioneer Parkway , Lava Flow Drive to Red Mountain Drive	Widen/Reconstruct	$10,800,000
5		Regional	SG	1.9	Navajo Drive - extend road to Western Corridor	New Construction	$9,450,000
6		Regional	SG	1.9	Dixie Dr - Widen to 7-lane section from Plantations Dr to Blackridge	New Construction	$8,000,000

7		Regional	SG	1.2	Red Hills Parkway - Increase capacity between SR-18 and Northern Corridor	Widen/Reconstruct	$10,080,000
8		**TBD**	**TBD**		Northern Washington Parkway Corridor , Red Hills Parkway to MP 13 - Phase II	New Construction	$47,000,000
9		Regional	W		Washington Fields Dr - Widen from Warner Valley to 3650 S	Widening	$5,000,000
10	I-15	State	UDOT	3.0	I-15 Widening in Southbound direction from MP 16-13	Widen/Reconstruct	$6,000,000
11		Regional	W	5.1	Roadway through Warner Valley from Warner Valley Road to Southern Parkway	New Construction	$14,859,000
12	I-15	State	UDOT		Leeds North Interchange @ MP 23.7	Interchange Upgrade	$25,000,000
13	I-15	State	UDOT		I-15 MP Exit 16 to Exit 27 Widening	Widening	$159,600,000
14		Regional	**H, L**	5.6	Babylon Road	New Construction	$36,900,000
15		Regional	H	2.7	3300 South from Rlington Parkway to 3000 West	New Construction	$6,700,000
16		Regional	H	2.6	1500 South from 700 West to 3000 West	New Construction	$6,600,000
17	SR-9	State	UDOT		SR-9 , increase capacity from SR-59 to Southern Parkway	Widen/Reconstruct	$20,000,000
18		Regional	**T, L**	2.5	Toquerville to Leeds Connector Road	New Construction	$12,000,000
19		Regional	H	2.0	1500 West from 1300 South to 3000 South	New Construction	$6,000,000
20		Regional	H	7.0	1150 West from 1500 South to **4700** South (Phase III)	New Construction	$11,000,000
21	SR-9	State	UDOT		SR-9 (LV), Widen from SR-17 to La Verkin eastern city limit	New Construction	$10,500,000
22	SR-59	State	UDOT		SR-59 from MP 20.9 to 22.10, from Big Plain Junction to SR-9	Widening	$5,000,000
23		Regional	SG		Traffic Control Center ITS	ITS	$500,000
24		Regional	MPO	1.5	Active Transportation Improvements - Phase III	New Construction	$3,000,000
Phase Three (2035-2040)						**Funding Needs:**	$521,963,000
						Funding Assumptions:	$515,178,781
						Remainder	($6,784,219)

2015-2040 Long-Range Plan Totals

Total Assumptions	$1,871,919,869
Total Needs	$1,883,635,000
Total Difference	($11,715,131)

Chapter 7 – **Safety Management**

Introduction

The Dixie MPO is committed to excellence in transportation planning. One area of planning which has, is, and will be given a lot of attention is 'Safety Management'. On the pages to follow, data and information will be presented that illustrates issues related to 'Safety and Security' as well as 'Traffic Safety'. Some ways those issues can be mitigated through objective identification and specific strategies or projects intended to lessen their impact are also presented.

The UDOT has put significant efforts into safety related data and campaigns. That information is used as a part of the Dixie MPO planning effort. For more information on the UDOT campaign, please refer to the UDOT web site at http://www.udot.utah.gov/main/f?p=100:pg:0:::T,V:2956,

Safety Performance Measures

As of 2015, the Federal Highway Administration is drafting a set of performance measures to aid MPOs in planning and goal setting activities as long-range plans are drafted. The generally agreed upon performance measure for "Safety" involves a look at "Serious Injury and Fatal Crashes," combined with the goal of reducing the number and rate of these crashes over time. The Utah Unified Transportation Planning Group and the Utah Department of Transportation agree with this general guidance.

Consideration of projects that increase safety or that may lead to the reduction of serious injury and fatal crashes is integrated into the Dixie MPO project selection process. Furthermore, the MPO annually reviews the Utah Safety Index Map to identify potential projects for the Highway Safety Improvement Program.

State Safety Leadership Team

UDOT's Office of Traffic and Safety is facilitating an on-going safety plan and strategy in cooperation with many local, regional, state, and federal partners. Each MPO in Utah is a member of this leadership team. One of the most visible projects has been the "ZERO Fatalities: A Goal We Can All Live With" program. Receiving national attention, this icon is fast becoming known throughout the entire state.

The primary program goals and objectives endorsed by the team and MPO boards will rely on education, outreach, and multi-agency partnering to accomplish them. Current Emphasis Areas include increasing use of safety restraints, improving intersection safety, and reducing aggressive driving, distracted driving, drowsy driving, truck safety, pedestrian and bicycle safety, and impaired driving. Various safety groups and governmental agencies have partnered on this statewide media campaign.

Continuing Safety Areas include enhancement of child safety, older driver safety and transit system safety. Ongoing planning to improve pedestrian safety, bicycle safety, motorcycle safety, younger driver safety, and rural road safety will be coincided with increasing work zone safety and promoting safer truck travel. Special areas that may be visited and promoted periodically include enhancement of safety management systems, crash data systems, and emergency services capabilities.

UDOT, in conjunction with several road safety partners has created initiatives to promote road safety in Utah. One of those initiatives is the Utah Comprehensive Safety Plan. As noted on UDOT's website: "The Utah Comprehensive Safety Plan was developed by the Utah Safety Leadership Team, which consists of approximately 20 different private and governmental groups (including UDOT) interested in promoting roadway safety. The plan outlines a number of different roadway safety emphasis areas and notes what needs to be done from an engineering, education, and enforcement standpoint to achieve a reduction in fatalities for each emphasis area. Implementation and evaluation of the plan are also discussed." This plan can be accessed from the UDOT link noted above. Additionally, the State Freight Plan, addressed in Chapter 15 focuses on the safe movement of freight through the state.

Traffic Safety

As the fast growing area in and around the Dixie MPO develops, the number and frequency of traffic accidents will likely increase. Information available to the MPO identifies location and the major contributing factor to the accident as well as the severity of the accident and what injury resulted. Serious and fatal crash information is displayed in Map 5 - Traffic Crashes (Appendix A).

The UDOT has provided crash data by county which includes severity and contributing characteristics of the crashes. The chart below illustrates the incidence of severe injury and fatal crashes in Washington County between 2010 and 2014 (Note: an accident can have multiple contributing factors for example a single vehicle accident can have a DUI, Younger Driver, Overturn, Aggressive Driving and Night Dark Conditions all in a single accident). Additionally, severe and fatal crashes and locations are illustrated on Map 5 "Traffic Crashes" of Appendix A.

Washington County – Serious Injury and Fatal Crashes by Contributing Factor, 2010-2014

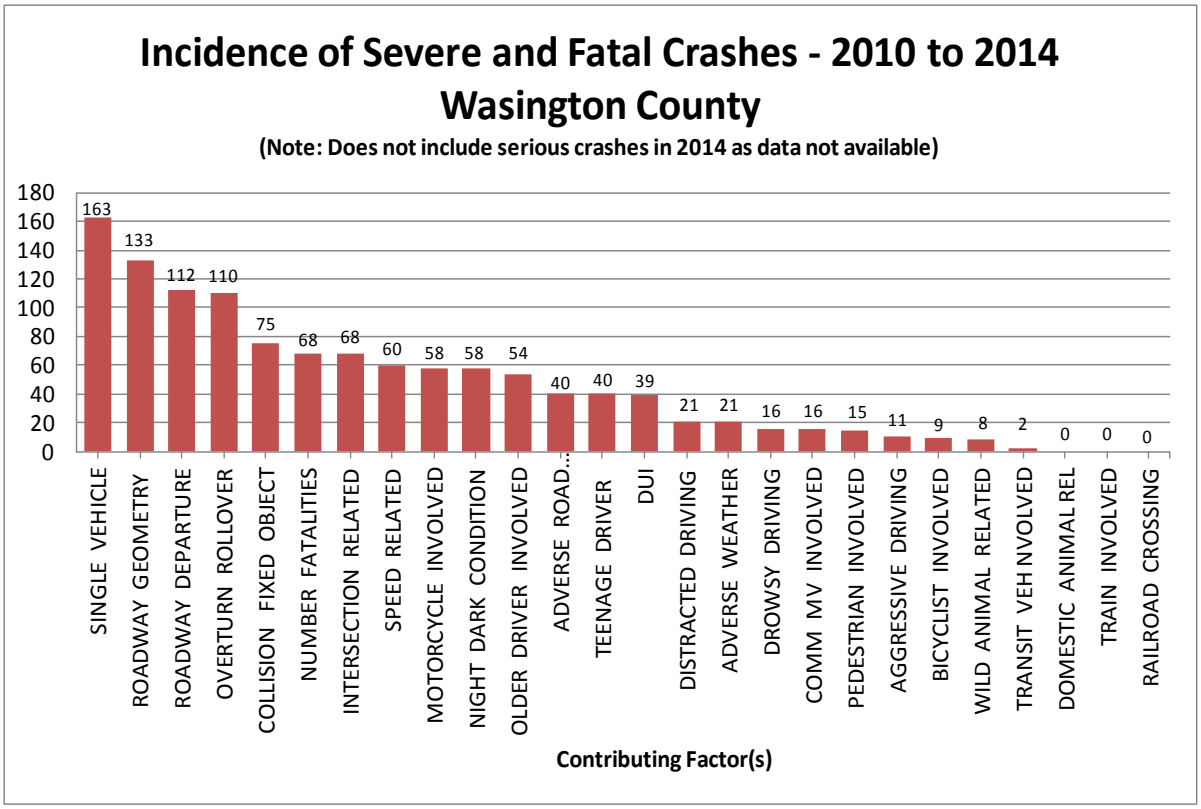


Figure 4 - Incidence of Severe and Fatal Crashes - 2010 - 2014 - Source: UDOT, protected under 23 USC 409

An analysis completed by Cambridge Systematics shows several contributing factors to crashes in Washington County. Common crash factors for our area include: multiple vehicles, intersection related crashes, aggressive driving/speeding, young drivers, single vehicle crashes, older drivers, roadway departure crashes, improper use of safety equipment, distracted driving, CMV involved crashes, overturn/rollover, crashes in work zones, and impaired driving.

From that analysis several possible focus areas were identified. The following are areas that will be given greater review:

Roadway Departures

The 2012 statistics from the Fatality Analysis Reporting System (FARS) show that nationally, there were 30,800 fatal crashes resulting in 33,561 fatalities. 54% of the fatalities were in rural areas while 46 % were in urban areas. The fatality rate per 100 million vehicle miles traveled was 2.4 times higher in rural areas than in urban areas (1.86 and 0.77, respectively).

Nearly 36 percent of the fatal crashes were single-vehicle Run-Off-the-Road (ROR) crashes on various road types.

For two-lane, undivided, non-interchange, non-junction roadways exclusively, there were 8,901 (24 percent) single-vehicle ROR crashes recorded. There are more than twice as many ROR fatal crashes on rural roads than on urban roads, partly due to the higher speeds on rural roads and the greater mileage and lack of additional lanes and median separation.

Some of the most prevalent contributing factors are listed below with a brief explanation of the problem. Objectives and strategies to address these factors also follow.

Restraint Use

More than half (52%)of the passenger vehicle occupants killed in traffic crashes in 2012 were unrestrained and 79% of passengers who were totally ejected were killed. NHTSA estimates that 12,174 lives were saved in 2012 by the use of seat belts.

Intersection Accidents

Intersections constitute only a small part of the overall highway system, yet intersection-related crashes constitute a higher percent of all crashes within urban areas (Kuciemba and Cirillo, 1992). Crashes are concentrated at intersections primarily because this is the point where traffic movements most frequently conflict with one another as illustrated in Figure 5. Good geometric design combined with good traffic control can result in an intersection that operates efficiently and safely.

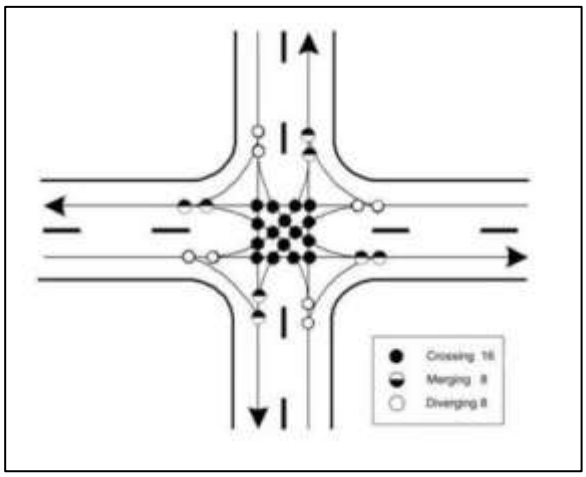


Figure 5 Intersection Conflict Point Diagram

Aggressive Driving

While estimates of the problem vary, perceptions among both law enforcement and drivers are that aggressive driving is becoming more prevalent. According to a National Highway Transportation Safety Administration (NHTSA) survey about aggressive driving attitudes and behaviors, more than 60 percent of drivers see unsafe driving by others, including speeding, as a major personal threat to themselves and their families. More than half admitted to driving aggressively on occasion. The Surface Transportation Policy Project estimated that aggressive actions contributed to 56 percent of all fatal crashes. However, without a clear definition of aggressive driving, these broad assertions are difficult to support.

Older Drivers

Between 2012 and 2050, the United States will experience considerable growth in its older population. In 2050, the population aged 65 and over is projected to be 83.7 million, almost double it estimate population of 43.1 million in 2012, according to the US Census Bureau. By 2030, one in five Americans will be age 65 or older. In 2012, there were 5560 people 65 and older killed and 214,000 injured in motor vehicle crashes. These older people made up 17 percent of all traffic fatalities during the year. As people age, a decline in sensory, cognitive, or physical functioning can make them less safe drivers, as well as more vulnerable to injury once in a crash. Yet older Americans depend on automobiles for meeting their transportation needs.

The real safety concern for the older driver arises when one also takes into consideration their increased likelihood of being injured or killed in a crash. The older population traffic fatality rate per 100,000 U.S. residents was 12.9 in 2012 as compared to 18.7 in 2003.

Objectives & Strategies

The Dixie MPO is focusing on the above contributing factors because of the impacts they pose in our area. Although these factors pose significant concerns it is possible to help alleviate those concerns through the adoption and implementation of objectives and strategies addressing each area. The listing below includes strategies which if implemented will help the Dixie MPO to address each focus area:

Roadway Departures (RD)

RD1 Keep vehicles from encroaching on the roadside

- Install shoulder, edge-line, or mid-lane rumble strips where needed
- Provide improved highway geometry for horizontal curves
- Provide enhanced pavement markings
- Provide skid-resistant pavement surfaces
- Apply shoulder treatments
- Eliminate shoulder drop-offs
- Widen and/or pave shoulders
- Add medians or median separation where appropriate

RD2 Minimize the likelihood of crashing into objects or overturning if vehicles travel off the shoulder

- Design safer slopes and ditches to prevent rollovers
- Provide appropriate clear zones
- Remove/relocate objects in hazardous locations
- Delineate trees or utility poles with retro-reflective tape

RD3 Reduce the severity of the crash

- Improve design of roadside hardware
- Improve design and application of barrier and attenuation

Intersections

Un-signalized

I.1 Management of access points near un-signalized intersections

- Implement driveway closures/relocations
- Implement driveway turn restrictions

I.2 Reduce the frequency and severity of intersection conflicts through geometric design improvements

- Provide left-turn lanes at intersections
- Provide bypass lanes at T-intersections (Hi-T designs)
- Provide deceleration lanes and right-turn lanes at intersections
- Provide right-turn acceleration lanes at intersections
- Provide full-width paved shoulders in intersection areas
- Restrict or eliminate turning maneuvers by use of medians
- Restrict or eliminate turning maneuvers by providing channelization or closing median openings
- Close or relocate “high-risk” intersections
- Reduce lane off-sets through intersections
- Improve pedestrian and bicycle facilities to reduce conflicts between motorists and non-motorists

I.3 Improve sight distance at un-signalized intersections

- Clear sight triangles on stop- or yield-controlled approaches to intersections

- Clear sight triangles in the medians of divided highways near intersections
- Eliminate parking that restricts sight distance

I.4 Improve driver awareness of intersections as viewed from the intersection approach for both daytime and night time driving

- Improve visibility of intersections by providing enhanced signing and delineation
- Improve visibility of the intersection by providing lighting
- Provide stop bars on minor road approaches
- Install larger regulatory and warning signs at intersections

I.5 Choose appropriate intersection traffic control to minimize crash frequency and severity

- Provide all-way stop-control at appropriate intersections
- Eliminate all-way stop control where not warranted
- Provide roundabouts at appropriate locations

I.6 Improve driver compliance with traffic control devices and traffic laws at intersections

- Provide targeted public information and education on safety problems at specific intersections

I.7 Reduce operating speeds on specific intersection approaches

- Post appropriate speed limit on intersection approaches

I.8 Guide motorists more effectively through complex intersections

- Provide turn path markings
- Provide lane assignment signing or marking at complex intersections
- Meet or exceed MUTCD signing and striping requirements

Signalized intersection

I.8 Reduce frequency and severity of intersection conflicts through traffic control and operational improvements

- Restrict or eliminate turning maneuvers
- Employ signal coordination
- Improve operation of pedestrian and bicycle facilities at signalized intersections
- Remove unwarranted signals
- Provide advance intersection warnings where needed on higher speed road

I.9 Reduce frequency and severity of intersection conflicts through geometric improvements

- Provide/improve left-turn channelization
- Provide/improve right-turn channelization
- Improve geometry of pedestrian and bicycle facilities
- Reduce un-necessary delays
- Reduce lane off-sets through the intersection
- Improve night-time signing and visibility

I.10 Improve sight distance at signalized intersections

- Clear sight triangles
- Avoid curved approach roads
- Adjust median landscaping to allow for proper sight distance
- Add back plates to enhance contrast between signals and their surroundings
- Add supplemental signal heads to enhance signal visibility

Aggressive Driving

AD.1 Deter aggressive driving in specific populations, including those with a history of such behavior, and at specific locations

- Conduct educational and public information campaigns

AD.2 Improve the driving environment to eliminate or minimize the external triggers of aggressive drivers

- Change or mitigate the effects of identified elements in the environment
- Reduce nonrecurring delays and provide better information about these delays

Older Drivers

OD.1 Plan for an aging population

- Establish a broad-based coalition to plan to address older adults' transportation needs

OD.2 Improve the roadway and driving environment to better accommodate the special needs of older drivers

- Provide advance warning signs
- Provide advance-guide and street name signs
- Provide all-red clearance intervals at signalized intersections
- Provide more protected left turn signal phases at high-volume intersections
- Provide offset left-turn lanes at intersections
- Improve lighting at intersections, horizontal curves, and railroad grade crossings
- Increase overall sign size (letters and numbers)
- Use higher reflective sign sheeting to provide improved recognition
- Encourage compliance with new retro-reflectivity standards
- Improve roadway delineation
- Replace painted channelization with raised channelization
- Reduce intersection skew angle
- Improve traffic control at work zones

OD.3 Reduce the risk of injury and death to older drivers and passengers involved in crashes

- Increase seatbelt use by older drivers and passengers through public education campaigns
- Provide "mature driver" stickers for all drivers over 65

Chapter 8 – **Security**

The world has come to understand, since September 11, 2001, that our security is of utmost importance. We are fortunate to have a very active and comprehensive Emergency Management Office in Washington County

Washington County Emergency Management

The Washington County Emergency Management Office has developed an Emergency Management Plan and is currently working on an update of that plan. The plan includes a County response to a variety of emergency situations which may occur in and around our communities. An evacuation Annex portion of the plan identifies procedures to coordinate evacuation needs during times of a natural, man-made, technological, Homeland Security emergencies or disaster.

The portion of the Washington County Emergency Management Plan as it relates to transportation coordination and which is referred to as the Evacuation Annex is summarized below

Assumptions

Highway and roadway evacuation capacities may be reduced significantly because of overload, accidents, stalled vehicles, road construction, and weather conditions, or by the event itself, which may either directly or indirectly impact the integrity of our infrastructure.

Preparation

Evaluate and establish potential evacuation routes, identify congestion points (areas under construction and repair, etc.).

Response

Identify as closely as possible the specific number of people to be evacuated, and provide the means of transportation if necessary. In any event define the routes to be taken and identify shelter sites which are available.

Direction and Control

The ultimate authority for protective action decision-making in Washington County rests with the Board of County Commissions or their designated representative(s).

Responsibilities

Washington County Council on Aging

Provides a Transportation Branch Director to coordinate essential services as a staff member of the Emergency Operation Center and supplies transportation resources needed.

Evacuation planning also will include consideration of:

1. The area to be evacuated.

2. Pick-up points where persons without private transportation will gather for evacuation by public transport.

3. Designated evacuation routes to be used by all vehicles during the evacuation.

4. Location of traffic control points.

5. Safe areas or buildings which provide some temporary measure of protection for evacuees from an actual or threatening disaster.

6. Location of reception centers where evacuees will be sent prior to moving to shelters or mass care shelters.

7. Designated mass care shelters that provide emergency sheltering and feeding of large numbers of evacuees.

8. Location of medical aid stations on evacuation routes, at temporary safe areas, and mass care shelters.

9. The time available for a reasonably risk-free evacuation.

10. Any personal belongings for the evacuated public.

Coordination with professional emergency managers

It is important to reach out to potential partners and develop a relationship in order to develop and foster a solid and lasting relationship. Building a network of professionals that work in the areas of security and emergency management that coordinates on a routine basis, regardless of whether a specific project is being developed, is critical to being able to smoothly incorporate these partners when beginning a new project.

The Washington County Emergency Management Office has worked diligently over the years to coordinate with all emergency management professionals.

Objective and Goals

To help to maintain a safe and secure environment the DMPO will work towards meeting goals in cooperation with the Washington County Emergency Management Office and as stated below.

Objective

Work within existing networks to support the efforts of the Washington County Emergency Management Office.

Goals

1 Become more aware of the efforts of the Washington County Emergency Management Office.

2 Use the County Emergency Management contact list to begin a dialogue regarding evacuation planning for applicable projects.

3 Work with emergency managers to identify the best evacuation routes through the transportation network.

Chapter 9 – **Congestion Management**

The DMPO recognizes the value in understanding how project development impacts congestion/delay time. This brief analysis identifies some of the impacts associated with congestion.

There are many ways to describe congestion on a transportation network. For this plan, the total vehicle hours were compared on the entire transportation system in the model year 2040 in both the build (meaning all potential projects have been constructed) and no-build (meaning no potential projects have been constructed) scenarios. A reduction in congestion is realized by building the projects shown in the 'Projects & Phasing list' in Chapter 6 and illustrated in the "Network Travel Time" chart.

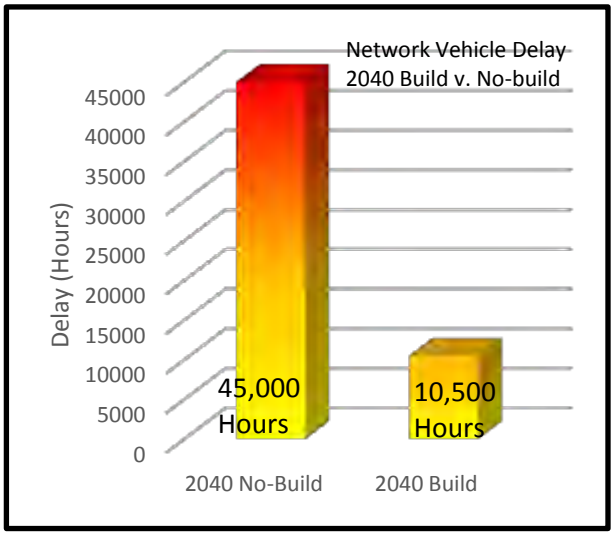


Figure 6: Network Travel time

The "Network Vehicle Delay" chart compares total network travel time per day in year 2040 for the build *v.* no-build alternatives. There will be 45,000 delay hours per day in the no-build scenario where current capacities are maintained but not expanded. This is compared to the 10,500 vehicle hours if all the projects are built. Thus the build scenario represents a total savings of 34,500 hours per day leading up to and beyond 2040.

The 2040 Daily Travel Times shown in Table 9, assumes a snapshot in time in 2040. It shows a No Build scenario resulting in 264,905 daily network travel time hours, or an 11% increase in hours above the Build scenario of 236,795 hours of daily travel time.

The "Cost Benefit Analysis" table, Table 11, shows the total time saved (in hours) of the build scenario, (building all projects in the long range plan) over the 25-year plan time period. It assumes two scenarios, hourly delay cost of $20 and of $30, with both showing a positive ratio over 1.0: 1.87 at $20 and 2.80 at $30

In summary, managing congestion on a network with limited capacity growth due to topography constraints puts heavy pressure on decision makers to make every attempt to implement the projects in this plan to serve the population and travel demand expected in year 2040. The mix of highway, public and private transit, and bicycle pedestrian facilities will help maintain the quality of life and economic growth of Utah's Dixie.

Table 9 - Daily Travel Times

2040 Daily Network

Condition	*Travel Time (hours)*
No Build	264,905
Build	236,795

Table 11 – 25-Year Cost Benefit Analysis

Total Time Saved (hrs)	Cost Benefit ($20/Hr)	Cost Benefit ($30/Hr)	Total Estimated Roadway Improvement Cost	Cost to Benefit Ratio ($20/hr)	Cost to Benefit Ratio ($30/hr)
164,350,000	**$3,287,000,000**	**$4,930,500,000**	**$1,761,710,000**	**1.87**	**2.80**

Objectives and Goals

With these factors in mind, the Dixie MPO recognizes the potential for extreme traffic congestion and will strive to support congestion reducing efforts.

Objective

The Dixie MPO will encourage the reduction and management of traffic congestion through the implementation of useful transportation tools as well as construction of appropriate infrastructure.

Goals

1. Support the use of transportation tools including ITS Message Boards, the Traffic Control Center (TOC), Traffic Management efforts, Ramp Metering, Reversible Lanes, Cross-over left turn lanes and other state of the art tools.
2. Support the use of appropriate Transit Projects including the implementation of a Bus Rapid Transit (BRT) line.
3. Support the funding and construction of Transportation infrastructure projects aimed at reducing congestion.
4. Encourage and recommend congestion reducing tools in each new project.
5. Use the Travel Demand Model to identify congestion delay and measure the reduction progress.

Chapter 10 – Corridor Preservation

Corridor preservation is the practice of purchasing anticipated rights of way years ahead of planned transportation projects as an effort to reduce overall costs. Some estimates indicate that the early and well planned purchase of transportation corridors can result in cost savings of one-fifth or one-sixth of the amount that would be needed if the purchase were put off. The degree of importance for corridor preservation increases in areas like the Dixie MPO where high population growth is anticipated.

The Dixie MPO encourages all municipalities to anticipate and address corridor preservation needs within their own boarders – and utilize the Washington County Corridor Preservation Fund: In 2009, the Washington County Board of Commissioners implemented a "$10 per vehicle" annual registration fee to endow a corridor preservation fund that is administered by the county-wide Council of Governments (COG).
The COG is made up of elected leaders from throughout Washington County which meets at least annually to review a list of priority projects and program funds from the Local Transportation Corridor Preservation Fund.

The Local Transportation Corridor Preservation Fund Act is accumulating about $1.2 million of revenues annually for acquisition of rights-of-way. A portion of these corridor preservation funds are also available for transportation planning studies outside the MPO area.

In order for a project to receive funding, it must be on the COG project priority list. Currently, a number of projects have benefited from preservation funds including the 600 North project in Hurricane, the Bluff Street Widening project in St. George, and a future widening of State Route 9 in Hurricane.

The current list of prioritized projects is shown below.

NAME OF ROADWAY

2015 Alphabetical Listing

1400 West - Between 1300 South & 600 North - Hurricane
3000 East Widening - St. George
3050 East / 850 North Home Depot / Walmart Connection - St. George City - (to be ADDED)
400 South & 200 East Intersection Roundabout - Ivins (to be REMOVED)
600 North Street - 200 West to SR-9 - Hurricane
900 East - Virgin River Crossing, also knowns as Heritage Bridge - St. George
Airport Bypass Road (700 West, 1500 South, 2060 South, & 1150 West) - Hurricane
Apple Valley Gateway - Apple Valley
Bluff Street - St. George
Bridge Road - Relocate/rebuild historic bridge - Rockville
Dixie Springs Drive & 300 South St. - Hurricane
Extension of Washington Dam Road to Southern Parkway - Washington City & Washington County
Hurricane Valley to Leeds Connection - Hurricane
Indian Hills Drive - St. George

Kwavasa Drive (600 West) - Ivins (to be ADDED)
Kolob Road Intersection with SR-9 - Relocation / rebuild - Virgin
Leeds North Interchange Feasibility Study - Leeds
Mall Drive - Bridge over Virgin River and Underpass at I-15 - St. George
Merrill Road - Washington City
Mile Post 11 New Freeway Interchange - Washington City (to be ADDED)
North Airport Loop Road - St. George and Washington City
Purgatory Road - From SR-9 to Washington Dam Road - Hurricane and Washington City
Southern Parkway - UDOT
SR-17 - LaVerkin through Toquerville - UDOT
SR-17 Bypass - Toquerville
SR-18 - I-15 along Bluff Street to Veyo - UDOT
SR-34 - St. George Boulevard - I-15 to Bluff Street - UDOT
SR-9 Shoulder Widening - I-15 to Southern Parkway - UDOT
SR-9 Southern Parkway Interchange to Zion - UDOT
SR-9 to SR-59 Connection - through Sheep Bridge Road or Rockville / Smithsonion Butte
Toquerville to Leeds Connection
Washington Parkway - through Red Cliffs Desert Reserve - Washington City , St. George, & County
Western Corridor - 100' Corridor from Snow Canyon Parkway through Ivins/Santa Clara
Western Corridor - Sun River to Santa Clara

Objectives and Goals

It is of critical importance to preserve transportation corridors now and in the future; the DMPO will work towards meeting goals and objectives to assist this worthy cause.

Objective

Coordinate with the COG to edit its list of priority projects and select right-of-way acquisitions that maximize the effective use of the Washington County Corridor Preservation Fund.

Goals

1. Encourage all municipalities to anticipate and address corridor preservation needs within their own boarders.
2. Assist with the efforts of Washington County Public Works in preparing the Annual Master Priority Corridor Preservation Project List.
3. Make DMPO members aware of, and provide reminders and assistance in making proper use of the Preservation Fund.
4. Become more aware of project needs and look for opportunities to preserve important transportation corridors through the use of the Fund.
5. Work with DMPO partners to identify opportunities for corridor preservation.

Chapter 11 – **Environmental Mitigation**

The Dixie MPO recognizes that transit, road, and trail projects all bring positive and negative impacts on natural and built environments. Therefore the MPO strives to establish steering and stakeholder committees to guide early corridor planning studies. Committees are comprised of resource agencies, land managers, environmental groups, developers, and others who consider impacts to air quality, farmland, fish and wildlife, historical/archeological resources, geologic hazards, floodplains, water quality, and wetlands.

While corridor planning requires only a broad consideration of potential environmental impacts – a more detailed analysis is required as each project advances into the Environmental Assessment (EA) or Environmental Impact Statement (EIS) phase prior to project construction. Following is a discussion of potential environmental issues that require analysis of impact, concern, avoidance, or mitigation remedies:

Impacts

Farmland Impacts

Preservation of farmland is increasingly difficult in the Dixie Region. The shrinking availability of land, incentives to sell and give way to development, and the area's harsh desert environment are combining to reduce the supply of farmable land within the Dixie MPO planning boundary. Incentives for jurisdictions to protect and preserve farm environments may not be strong enough to overcome these market forces that are driving a growth in population and consuming once farmable land for commercial and residential use.

Fish and Wildlife Impacts

The following table presents federally threatened and endangered species, and State sensitive species found throughout the Dixie Region. Although these species are identified for long range planning purposes and early corridor preservation studies, a more detailed investigation of impacts, avoidance, or mitigation is required at the Environmental Assessment or Environmental Impact Statement stages of environmental analysis.

Federally Listed Species in Washington County, Utah

Threatened(T), Endangered(E), and Candidate(C) Species

This list was compiled using known species occurrences and species observations from the Utah Natural Heritage Program's Biodiversity Tracking and Conservation System (BIOTICS); other federally listed species likely occur in Utah Counties. This list includes both current and historic records. (Last updated on January 12, 2012)**.

Common Name	Scientific Name	Status
Plants		
Siler Pincushion Cactus	Pediocactus sileri	Threatened
Shivwits or Shem Milkvetch	Astragalus ampullarioides	Endangered
Holmgren Milkvetch	Astragalus holmgreniorum	Endangered
Gierisch Mallow	Sphaeralcea gierischii	Candidate
Dwarf Bearclaw-poppy	Arctomecon humilis	Endangered
Reptiles/Amphibians/Fish		
Virgin Chub	Gila seminuda	Endangered
Woundfin	Plagopterus argentissimus	Endangered Candidate
Relict Leopard Frog	Rana onca	Extirpated
Desert Tortoise	Gopherus agassizii	Threatened
Birds		
Greater Sage-grouse	Centrocercus urophasianus	Candidate
Yellow-billed Cuckoo	Coccyzus americanus	Candidate
Mexican Spotted Owl	Strix occidentalis lucida	Threatened
Southwestern Willow Flycatcher	Empidonax traillii extimus	Endangered
Mammals		
Utah Prairie-dog	Cynomys parvidens	Threatened
Gray Wolf	Canis lupus	Endangered Threatened
Brown (Grizzly) Bear	Ursus arctos	Extirpated

** Created by the Utah Division of Wildlife Resources - January 12, , 2012

Note: Please contact the U.S. Fish and Wildlife Service (801-975-3330) for the purpose of consultation under the Endangered Species Act.

Historical/Archeological Impacts

Historical and archeological sites are other components that are not easily measured, but add character and quality of life in the Dixie Region. Avoidance, mitigation, and restorations are options to consider as planned solutions reach the environmental analysis phase.

Although the Dixie Region has not been completely surveyed for archaeological resources, the MPO boundary areas are likely to contain numerous archaeological sites.

The ancestral Southern Paiute are believed to have moved into this region sometime between AD 1000 and 1300. They were hunters and gatherers who practiced a seasonal round of resource collection and processing over a broad and diverse landscape. In southern Utah, however, some Southern Paiute groups became small-scale farmers and diverted water from the Virgin and Santa Clara Rivers and other smaller streams to cultivate garden plots. Euro-American explorers to this region, including Dominquez and Escalante in 1776 and Jedidiah Smith in the 1820s, reported seeing irrigation ditches and small check dams constructed by the Southern Paiute to divert water from the rivers and streams onto their fields of corn, beans, and squash. A Southern Paiute site, located on private land near the study area, was excavated by archaeologists from Brigham Young University in the 1980s. This site contained evidence of maize cultivation that dated to AD 1700 and 1830 (Allison 1988).

As part of the NEPA process, consultation will be required with Native American tribes that may have an interest in the study area. Final determination of tribes to include in the consultation process will be made during the NEPA process. The tribes with interest in the study area include the Hopi Tribe; the Navajo Nation; the Paiute Indian Tribe of Utah and its Shivwits, Cedar, Indian Peak, and Kanosh Bands; the Uintah/Ouray Ute; the Las Vegas Paiute; the Moapa Paiute; and the Kaibab Paiute.

Few surveys of historic resources have occurred within the study area. Historic resources in the study area relate to the 18th and 19th century Euro-American explorations. In 1776, two Franciscan priests from New Mexico, Dominquez and Escalante, traveled through southern Utah looking for an overland route to the Spanish colonies in California. This travel route came to be known as the Old Spanish Trail. The main branch of the Old Spanish Trail followed the Santa Clara River south from Mountain Meadows and then veered to the west over the low pass of Utah Hill (old Highway 91). In 2001, the Old Spanish Trail was designated as a National Historic Trail.

By the early 1850s, the first colonies were being established by members of the Church of Jesus Christ of Latter-day Saints (Mormons) in southern Utah. Some of the structures built by these colonies may be found in the study area; these structures include irrigation systems along the Santa Clara and Virgin Rivers and sites associated with stock animals.

Geologic Hazards

The geologic diversity within the State of Utah is well known and much of that diversity and topographical constraint exists in Dixie. The region is not immune to earthquakes, rock fall, landslides or volcanoes. Due to recent area events, rock fall hazards have become an increasing concern for area planners and constructors. Rock fall information can be

obtained by visiting the Utah Geological Survey website (http://www.geology.utah.gov/utahgeo/hazards/landslide/index.htm). The MPO encourages transportation solutions to take in to account the known geologic hazards in plans, designs, and construction to prevent, avoid, or mitigate as much as possible current, ongoing, and future geologic events.

Water-body and Floodplain Modification

Washington County in cooperation with FEMA and other agencies has produced an updated floodplain plan to deal with the aftermath of the January 2005 Flood in Dixie and to prevent and control floodwaters in future significant storm events. This plan is available at the offices of Washington County. Recently FEMA has developed new Digital Flood Insurance Maps that greatly assist planning around and through flood plain areas. These and other maps are available at the FEMA web site or through any of the Washington County City offices that participate in the Federal Flood Insurance Program. There is also the newly formed Washington County Flood Control Authority which is a intergovernmental body that now deals with regional flood control issues within the county. Transportation needs solutions/projects must be planned designed and built with these requirements and conditions in mind.

Water Quality Impacts

Water quality can be greatly impacted by the amount of hard surfaces (including roadways) in a region. Hard surfaces lead to polluted runoff instead of the water table's natural percolation cycle. Most of the larger communities within the MPO boundaries participate in the Utah Pollutant Discharge Elimination System (UPDES) programs. These programs administered through the Utah Department of Environmental Quality (DEQ) are designed to reduce or eliminate pollutants from surface runoff in conjunction with the EPA Clean Water Act.

Wetland Impacts

Wetlands provide an invaluable resource to our ecosystem. Section 404 of the Clean Water Act protects wetlands from development without a permit issued by the Army Corps of Engineers. Designing the roadways to protect the wetlands within the Dixie Region is in accordance with the requirements of the Clean Water Act and leads to a more sustainable community. A local office of the Army Corps of Engineers has been established and is available for further information.

Climate Change

While local discussions of climate change effects are minimal within the Dixie MPO more and more attention is being directed within the state concerning this issue. MPO executives and planners regularly discuss flood control plans and recognize the need to construct roads and bridges to accommodate heavy runoff volumes and to facilitate the local needs for drainage; however climate change may also have an effect on this and other aspects of transportation. Flooding events in 2005 and 2011 stimulated local awareness of potential hydrology concerns in a changing environment and validated the need to over-plan bridge facilities and other flood treatments within the flood plains and waterways of Southwestern Utah. Changes in temperature, precipitation and extreme weather events have the potential to negatively affect the populations throughout the MPO.

A document titled "Climate Change and Public Health in Utah" provides an accessible overview and description of the influence of environmental factors on climate change and health in Utah. Many identified indicators could have an effect on how transportation is looked at and planned in the future.

Air Quality

Washington County, Utah, is currently considered an attainment area as defined by the Clean Air Act and therefore is not regulated by the EPA or the Utah Division of Air Quality. However, proper planning will be required if the region reaches non-attainment status in the coming years or if EPA regulations are tightened. In non-attainment status, plans to reduce personal automobile dependency would become vital. Although there are many sources of air pollution, including ambient air moving in from other parts of the region, auto emissions, vapor gases, and dust are common contributors to air pollution locally. Mode/trip decisions, reducing single occupancy vehicles, improving traffic flow and recovering gaseous vapors are some of the ways to protect the quality of air. These and other strategies will be looked at and recommended to local governments for their consideration and adoption. The Dixie area has been growing rapidly for many years and will continue to grow to build out conditions, and must look seriously at protecting its air shed quality.

The MPO anticipates continued growth in vehicle miles of travel, and the associated congestion and traffic delays. Some societal tendencies are catching hold toward the use of energy efficient vehicles, and alternate modes of transportation such as bicycles, but the potential for air quality problems, especially for Ozone, is real for Utah's Dixie.

Ozone is the primary cause of summer air pollution. It is formed when volatile organic compounds (VOCs) and nitrogen oxides (NOx) mix with sunlight and heat. Ozone is a mix of chemicals emitted mainly from vehicle tailpipes, diesel engines and other smoke emitting plants. Often referred to as "smog" is a problem when temperatures are high and daylight hours are long. On hot summer days it can lead to shortness of breath, chest pains and lung inflammation.

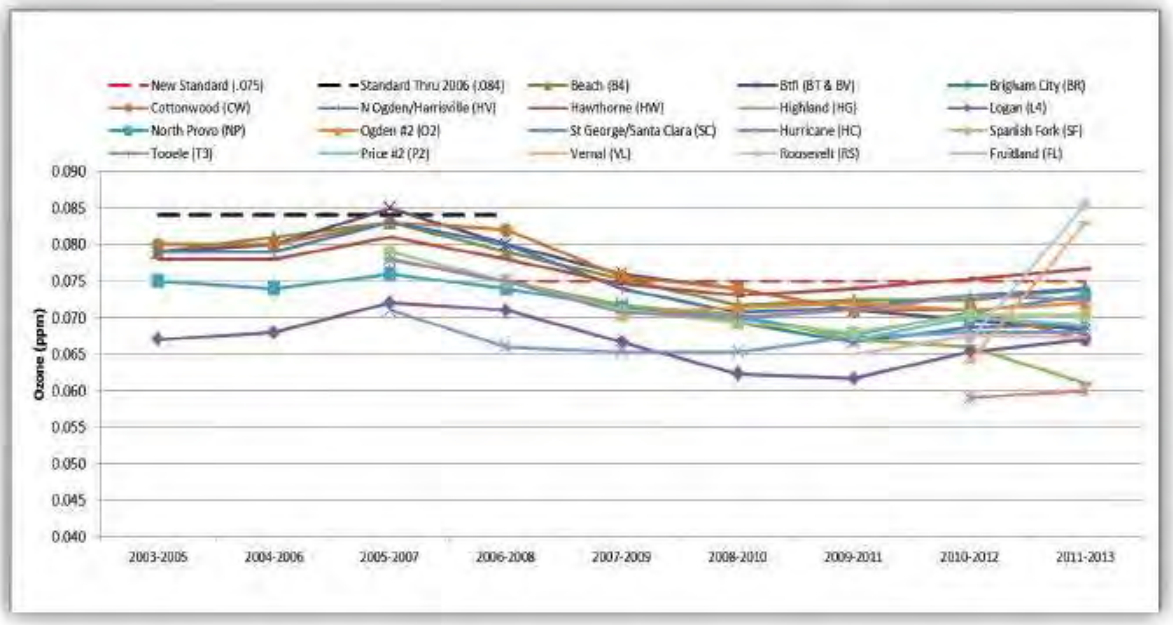
The consequences of allowing air quality to deteriorate to the point of exceeding pollutant standards, is costly. Besides the human health impacts and costs that are well documented, once an area is labeled a `non attainment' area for pollutants, meaning it cannot maintain air quality to acceptable standards, federally funded improvements to transportation systems are restricted. Additional state and federal regulatory actions are then placed over an area increasing the cost to do business, to plan, and to implement projects. Needed federal funding may also be curtailed or withheld if attainment measures are not met.
The DAQ has conducted a summer ozone study in 2012, titled "2012 Utah Ozone Study" and is involved in the Western Air Quality Studies in looking at ozone transport and background values. One of the conclusions in the 2012 study suggests that there is broad regional transport of ozone. The study noted that "high ozone concentrations in rural Utah were potentially influenced by regional transport of ozone, springtime emissions of biogenic volatile organic compounds, stratospheric ozone intrusion and wildfire smoke." For the full study visit the DAQ Division of Air Quality web site.

The Division of Air Quality and the Department of Environmental Quality have offered to help the Dixie area avoid this situation, or postpone it for as long as feasible, and will encourage Congress to deal more fairly with areas that are experiencing ambient Ozone from outside sources. DAQ strongly recommends that the Dixie area do all that it possibly can on a voluntary basis in taking reasonable and cost effective measures to protect the air shed.

The State Division of Air Quality (DAQ) reports the status of local air quality. DAQ staff reported that an air quality monitoring station was in place in St. George from July of 1995, through the end of 1997. According to data gathered during that period, although no pollutants exceeded the current standards

at that time, new Ozone standards that were being implemented by the EPA were approached during April/May of 1996 and 1997. In 2008, another air quality monitoring station was established in Santa Clara with similar results as illustrated in the graph below. Currently the Santa Clara monitoring station has been replaced with a station in Hurricane City as the DAQ continues to monitor air quality in the area. Much of the data is available on the DAQ website at: http://www.airquality.utah.gov/news.htm. The DAQ has also published its Annual Monitoring Plan for 2014 which includes the Hurricane monitoring station (HC) as part of the program. The State has future plans to start monitoring for ozone at a location in Iron County that is yet to be determined.

Figure 3-Year Average 4th Highest 8-Hour Ozone Concentration



DAQ staff made recommendations to the DTAC to consider developing a voluntary action plan to protect the air shed. Air shed protection is managed at the county level by DAQ.

To be proactive, the DTAC prepared a draft protection plan, and facilitated a locally funded short term Ozone study. SECOR, an air quality-engineering firm, was chosen from a number of submitted proposals and began monitoring from a station placed on Washington County Annex property near the location of the original DAQ monitoring site. Data from this six-month study, conducted from May 2002, through October 2002, did not exceed the then current Ozone standards. However, the Ozone levels were slightly higher when compared to the 1995 - 97 DAQ data. Also, data available from a permanent monitoring site in Mesquite, Nevada shows very similar Ozone concentrations to St. George, according to SECOR. These studies, together with other data from the southwestern region of the US, show that Ozone levels approaching .08 ppm are prevalent regardless of urbanized status. The results of the SECOR study is available for review at the Dixie Transportation Planning Office, Five County Association of Governments, 1070 W. 1600 S., St. George, UT 84770.

Ozone standards were changed in 2010, but subsequently stayed on appeal of a law suit.

In January 2010 EPA proposed stricter standards for smog. As part of EPA's extensive review of the science, the Clean Air Scientific Advisory Committee (CASAC) was asked for further interpretation of the epidemiological and clinical studies they used to make their recommendation. To ensure EPA's decision is grounded on the best science, EPA is said to have reviewed the input CASAC provided before the new standard is selected. Given this ongoing scientific review, EPA intended to set a final standard in the range recommended by the CASAC by the end of July, 2011.

EPA was under a court order to propose a new standard by Dec. 1, 2014. On December 17, 2014, a proposed rule for National Ambient Air Quality Standards for Ozone was published. As of this writing, EPA has held three public hearings and received comments until March 17, 2015. This proposed rule is scheduled to be finalized by Oct. 1, 2015. EPA is proposing to revise the primary standard level to within the range of 65 -70 ppb and the secondary standard to within the same range.

According to the rule, by October 1, 2016, the state will recommend the designation for all areas of the state. By June 1, 2017,EPA responds to the states' initial recommendations and identifies where the agency intends to modify the recommendations. By October 1, 2017 EPA will issue final area designations. By 2020 to 2021 the state is to complete development of implementation plans outlining how they will reduce pollution to meet the standards. Between 2020 to 2037, the state would be required to meet the primary standard, with deadlines depending on the severity of an area's ozone problem. The Clean Air Act does not specify a deadline for the state to meet secondary standards. The state and EPA determine that date through the implementation planning process.

The DAQ has commented that: "in a nutshell, any change to any level in the proposed range will likely result in the violation of the standards and a designation of a non-attainment status for the bulk of the state."

The standard levels of acceptable Ozone were .075 ppm prior to the 2010 proposal. The proposed rule change would bring that level down to .065 ppm to .070 ppm. At the lower levels, if approved, it is projected that the MPO and surrounding areas will likely become non-attainment. According to DAQ information, regional Ozone levels close to the new standard are being seen at monitoring sites throughout the southern Utah region, from Four Corners, into the Grand Canyon, Zion National Park, Dixie and southern Nevada. DAQ also suggests that a local condition is occurring in springtime such that when vegetation begins to green up and temperatures are rising, the combination of emissions of nitrogen oxides (N Ox) and volatile organic compounds (VOC) contribute to ozone formation, and should be included in the scope of emissions inventory and non regulatory monitoring efforts.

Action Plan

The DAQ will continue non regulatory air pollution monitoring in Dixie with the intent of determining local pollution levels for several pollutants, but to especially focus on Ozone. The geographic scope will be the entire County of Washington.

Guidelines are available under EPA's Ozone Flex Program for areas concerned about potential future non attainment of either the 1 hour or 8 hour ozone standards, to achieve emission reductions, secure public health benefits, and accrue possible credits to future planning efforts, to the extent allowed by the Clean Air Act and EPA guidance or rules. The Ozone Flex Air Program is a voluntary approach to maintain attainment of the NAAQS for ground-level Ozone. Implementation of voluntary control measures in the Flex plans may help areas to avoid violating the 8-hour ozone air quality standard,

improve air quality, and provide public health benefits. More work and investigation will be needed here to determine if this program would be appropriate for the MPO area.

Prevailing Winds in Dixie tend to move from the southwest in a northeasterly direction, almost on a daily basis. This air movement helps to change the air, to `refresh it', on a regular basis. However, the same prevailing winds are likely to carry contaminated air from nearby urban areas like, Las Vegas, or even from the Los Angeles Basin, into and through Dixie. Truckers who drive the I-15 Corridor on a regular basis are convinced of this relationship. Of course, anyone may have an opinion, but empirical results would be needed to determine the relationship and to affect public policy. Efforts are being made by the DAQ and others to document these ozone transport relationships. Lack of empirical results may limit the ability to change community health standards by affecting public policy. The DMPO partners agree to:

- Cooperate and coordinate with DAQ and other local stakeholders in developing and Implementing a regional scope of work for non regulatory monitoring in Utah's Dixie
- Encourage use of mobile monitoring equipment to help determine local and regional Ambient source contributions
- Participate in pollutant source inventorying and sharing other data, as needed (See Appendix C for typical pollution source list)

Traffic Congestion is a contributing factor to the level of air quality due to an increase in pollutants, as vehicles progress slowly and are queued up at intersections for long cycle lengths. Vehicles that are idling emit more pollutants than when operating at optimum speed, which is around 30mph. Delay time at specific intersections as well as along routes is an indicator of Congestion. Another indicator may be average road link speeds that fall below 15 mph. If feasible, speed data may be available or determined that will be useful in making traffic flow impact decisions. The Dixie MPO and its partners recommend the following (non-prioritized) transportation strategies for local government consideration and action:

- Encourage Intersection Flow improvements & Traffic Signal synchronization
- Consider one way streets where feasible
- Maintain capacity, speed, and function of arterial /collector roads & corridors
- Encourage business and industry to establish Flexible employee work hours
- Encourage placement of fiber conduit in all new construction or rehabilitation projects for future ITS strategies
- Encourage municipal purchase of unused buried conduit
- Support mobility management efforts such as van pooling
- Plan appropriately to reduce overall delay hours
- Improve transit operations to provide more opportunities to leave vehicles at home
- Continue to maintain and update the Traffic Demand Model in providing useful data pertinent to air quality
- Encourage local governments to prepare corridor management plans and signal coordination plans to reduce delays and congestion.

Municipal Corporation Policy varies throughout Dixie as to visible efforts to improve air quality. St. George City for example, has executed resolutions such as tree planting, especially in parking lots, which reduces vapor emissions from automobile gas tanks; encourages non polluting industry; supports and operates public transit; and has had a goal of having a bicycle/pedestrian trail within 15 minutes of

every home. Communities in the region are all actively supporting paths and trails and their connectivity. The Dixie MPO encourages the following, (non-prioritized), strategies for local government support and action:

- Landscaping/tree planting strategies, especially for parking lots
- Fleet Vehicle fueling in cool hours of the day
- Covering all solvent tanks or open storage of vaporous gases/liquid
- Encourage non polluting industry
- Encourage any polluting industry to apply modern emissions technology
- Encourage Volatile Organic Compounds (VOC) recovery at all fueling stations
- Encourage fleet vehicle preventive care as recommended by manufacturers
- Encourage and support van and car-pooling of employees -
- Support regional Public Transit
- Encourage fleets that use alternative fuels (incentives available)
- Support Walk-able Communities and neighborhoods (land use, zoning, codes)
- Support MPO Long Range Plans, Policy, and Standards in local development decisions
- Encourage all municipalities to implement a "Complete Streets" plan and policy
- Investigate the possibility of providing free vehicle emissions testing to help concerned citizens reduce vehicle emissions

Private/Public Partnerships can go a long way in encouraging business and citizen contributions to air quality protection. Encourage the Chambers of Commerce to partner with local business, colleges, and industry to support similar protection measures as listed above.

Dixie MPO Work Plan:

1. Participate with DAQ and local partners in non regulatory monitoring
2. Create Public/Private Education Program
   Distribute information to and through:
   - Chamber of Commerce members
   - Municipalities
   - Washington County
   - Public Agencies
   - Schools, College
   - Neighborhood organizations
   - Coverage in local newspapers
   - Newsletters
3. Include Air Quality Protection strategies in the Long Range Transportation Plan
4. ITS technology should be reviewed and appropriate, effective tools implemented when feasible and affordable.
5. Assist DAQ in emissions inventory of sources of potential pollutants
6. Seek voluntary action consistent with prevention or control of related emissions
7. Seek funding for local action planning from the Environmental Protection Agency

Air Quality Task Force:

The Southern Utah Air Quality Task Force was formed in 1996. The first challenge was to address fugitive dust issues in the St. George area. Since its creation the Task Force has been encouraged to

address many additional air quality matters such as air quality monitoring, agricultural and range fire smoke, motor vehicle emissions, and application of pesticides and herbicides. Many have been concerned about the potential for transfer of air pollution from the Los Angeles and Las Vegas areas.

The purpose of the Task Force is:

- To work together to prevent future non-compliance with air quality
- To support and conduct non-partisan research, education, and informational activities to increase public awareness of air quality concerns and solutions
- To achieve communication within industry, communities and government representatives; and to sustain air quality values

The goal of the Task Force has been to encourage community awareness and involvement. They currently meet monthly and hold an annual Air Quality Summit to educate the public and community leaders about air quality issues affecting this area. The group generally meets the third Wednesday of every month at 10:00 a.m. at the Association of General Contractors of Utah office in St. George.

Integration of NEPA into the Planning Process

While the above elements are important components of the natural and built environment in the Dixie Region, and each deserves their own thoughtful and comprehensive analysis. This plan does not attempt to perform a comprehensive Environmental Analysis or Environmental Impact Statement as regulated by National Environmental Policy Act (NEPA). At this point, projects included in this plan are for planning and modeling purposes only. Some projects amount to little more than a proposed line on a map. It is not intended to identify specific alignments for planned corridors. When a formal proposal is made, the NEPA process will follow.

Unified and Cooperative Planning Processes

In 2009, public and private planners throughout Utah began creating the unified planning tool "U-Plan" – a web-based information platform designed to allow road and utility planners to jointly access information on rights-of-way, infrastructure lines, environmental concern areas, habitat areas, and other built and natural resources. The Dixie MPO views U-Plan as an integral tool within the transportation planning process and encourages outside agencies to participate.

Objective and Goals

The Dixie MPO recognizes that there are many environmental challenges throughout its planning boundary that must be considered when planning and constructing regional transportation corridors. As a result, a number of strategies have been identified throughout this chapter.

Objective

The DMPO understands the need to consider these environmental challenges in the planning stages and will strive to incorporate environmental solutions into its planning process.

Goals

1. To support the environmental processes associated with requirements for federally funded projects.
2. To become more aware of the historical and geological issues of the area.
3. Commission necessary studies and investigations to support the planning process.
4. Stay abreast of changes in environmental requirements throughout the planning area and specifically those related to air quality with special emphasis on ozone.
5. Support the plans, strategies, and Task Force identified in this chapter.
6. Be committed to the DMPO work plan as described above.

Chapter 12 – **Active Transportation**

As stated in the Chapter 3 above, pedestrian and bicycle facilities are an integral part of the area's transportation system. Active transportation provides a myriad of economic, environmental and social benefits for the region. Vision Dixie calls for the implementation of "complete streets" criteria to ensure streets and roads accommodate all users including drivers, transit riders, pedestrians, and bicyclists, as well as for older people, children, and people with disabilities. Complete Street designs are also intended to improve motorist attitude and behavior toward other street users.

In Spring 2014, Dixie MPO Staff and the Technical Advisory Committee acknowledged that there was a need to develop a more safe, attractive, and better connected system of pedestrian and bicycle infrastructure. The region already includes an extensive array of trails, and some shared roadways and bike lanes. However, walking and cycling for transportation purposes is often inconvenient and unsafe, as the current transportation system lacks meaningful connections to destinations.

Acknowledging the need for better planning, the Dixie MPO Commissioned a *Dixie MPO Active Transportation Master Plan* to identify projects and policies in the region that will create a transportation network conducive to cycling and walking. With the assistance of Alta Planning and Design, the Dixie MPO developed a master plan and formed a Steering Committee comprised of the following entities to guide the process in developing the plan:

- St George City
- Hurricane City
- Washington City
- Ivins City
- Santa Clara City
- UDOT
- Southern Utah Bicycle Alliance
- Southwest Utah Public Health Department
- Dixie State University
- Washington County School District

The Bicycle/Pedestrian Plan recommends a network of connected bikeways and improved sidewalk connections, with estimated costs and potential funding sources for each project. Facility types include sidewalks, bike lanes, shared roadways, and shared use paths, and various crossing improvements. Map 8 in Appendix A shows existing facilities and potential projects listed in the DMPO Active Transportation Master Plan as adopted by the DMPO Transportation Executive Commission in the spring of 2015. In addition to projects, the plan includes a description of potential policies and programs that can be

implemented to improve active transportation conditions in the region. Potential programs and policies include: education and awareness campaigns, sidewalk infill programs, bicycle parking policy and development regulations, among others.

The Dixie MPO will recommend incorporating the MPO Active Transportation Master Plan into each municipality's transportation plan, including coordinating with municipalities in the region to ensure the Active Transportation Master Plan is in accordance with existing transportation plans. The Dixie MPO will continue to utilize the Active Transportation Steering Committee to coordinate the implementation of bicycle and pedestrian activities throughout the region.

Objectives and Goals:

Objective
Improve conditions to make cycling and walking for transportation more safe, attractive, and convenient

Goals

1. Facilitate the appropriate design, construction, and maintenance of bicycle and pedestrian facilities.
2. Support a multimodal transportation system for all new construction and reconstruction projects.
3. Encourage policies and programs that improve bicycle and pedestrian safety.

Chapter 13 – **Transit Service**

SunTran provides transit service for the City of St. George and Ivins, currently operating fixed bus routes and paratransit (ADA) service between 6:00 AM and 8:00 PM Monday through Saturday. There is no service on Sundays or major holidays. The system consists of six fixed bus routes, four of which operate on 40 minute headways with two operating on 80 minute headways. SunTran has experienced significant ridership growth since its inception in 2003 (See graph below). Areas being served by transit include: downtown St. George, Red Cliffs Mall, Dixie State College, the Dixie Center, the Dixie Downs area, Bloomington and Ivins City. Map 9 in Appendix A shows the six existing fixed SunTran routes, as well as potential routes for expansion.

SunTran continues to grow substantially in ridership and several studies and plans point to the need for expanded and improved transit service in the Dixie region to develop a more balanced transportation system and provide a greater range of transportation choices, particularly for those with limited mobility. In a recent onboard transit survey, 90% of respondents stated it was important to expand SunTran service to new places in the area. This survey also indicated that the majority of SunTran riders rely on the service to meet their daily transportation needs, with 76% of respondents stating that they did not have another option (besides riding SunTran) for making their trip.

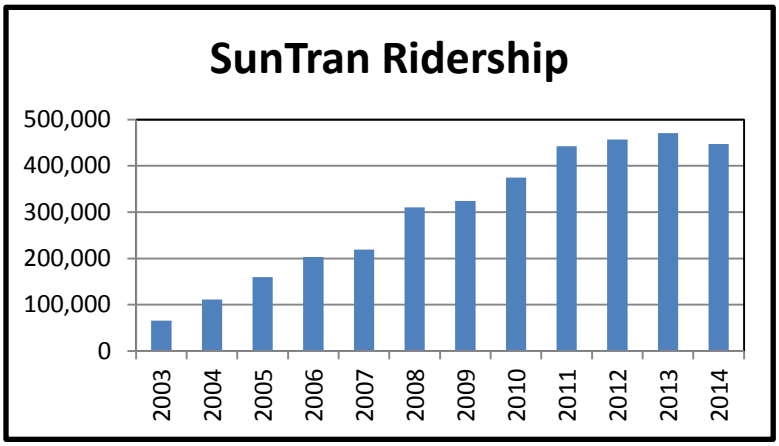
Potential Transit Expansion Areas

In January 2015 transit service was expanded to Ivins and Bloomington. This expansion was accomplished through an inter-local agreement with Ivins and St George City, operator of SunTran. Studies have identified the following additional areas/corridors in the region to be in need of transit service.

Hurricane and Zion National Park Corridor

The *Dixie Bus Rapid Transit Feasibility Study* (BRT study) and the *Hurricane to Zion Canyon Transit Study* both point to the potential short term and long term viability of transit service in this corridor. The BRT study evaluated the potential for long-term feasibility of transit service between central St George City and Hurricane City and central St George City and the airport. The study suggests that when the service area reaches 252,000 people and 143,000 jobs, BRT service will be viable. However, conventional bus service should be implemented to serve existing demand. Map 9 (Appendix A) displays potential alignments for these routes.

The *Hurricane to Zion Canyon Transit Study* evaluates and recommends transit service between Hurricane and Zion National Park. After analyzing demand in the corridor, the study recommends implementing fixed-route transit service with 60 minute headways. The study emphasizes that transit would only be viable in this corridor provided that a transit connection is also provided between St George and Hurricane.



The next step toward implementing transit in this corridor is to provide an implementation plan for transit service in the short term, which identifies service characteristics, fare structure, and funding, given resources that are available at the present time. This service is likely to be provided initially through an inter-local agreement with St George City, Hurricane, Springdale, and other communities in the corridor.

Washington City

A concept route to Washington City was presented in the *Dixie MPO Regional Transit Study*. In 2014, Washington City began the process of formulating an agreement with SunTran to institute a fixed route that connects to the existing bus system with complementary para-transit service. SunTran management is currently working with Washington City to determine which route would best serve the community. A potential route is displayed on Map 9 (Appendix A). The Dixie MPO recently provided assistance to the stakeholders in the process by utilizing the Regional Travel Demand Model to estimate ridership of two route alternatives to inform the process. Similar to Ivins City, initial service to Washington City is likely to be provided through an inter-local agreement with St George City.

Santa Clara City

Due to budget constraints, service to Ivins City was initially instituted without service to Santa Clara City, which the bus passes through on the route. However service to this community would benefit a large population of residents, not currently being served. The Dixie MPO will support coordination between Ivins, St George City, and Santa Clara City to provide public transit service to Santa Clara City, given adequate funding and public support.

St George Airport

As noted above, a bus rapid transit line, servicing St George Airport is a viable service in the long term. However, in the short term interim bus service should be provided to begin phasing toward a BRT line.

Other Transit Improvements

The *St George Urbanized Area Short Range and Long Range Transit Plan*, completed in 2006 identifies a service plan, which includes providing service to Middleton and Bloomington Hills, while modifying other routes. St. George City and the Dixie MPO will partner in 2015 to update the 2006 plan to reflect current needs for the system and recommend improvements that would improve transit level of service, while offering a plan to sustain the service. In addition to servicing new areas, consideration should be given to provide more frequent and direct service to reduce travel time. In addition to a service plan that recommends specific routes, the plan should include a capital, institutional and financial plan. Some of these elements can draw upon the findings of the *Dixie MPO Regional Transit Study*. The plan should take into account the financial assumptions of the Dixie MPO for additional transit funding, including ¼% sales tax by 2020.

Coordination with other modes

As regional transit service is improved and expanded, coordination with other modes of transportation is essential to offering alternative transportation options. Every trip on fixed-route public transportation begins and ends with another mode, whether it be cycling, walking or driving. Due to additional demand, SunTran has recently purchased additional capacity on its bicycle racks. SunTran Management indicates that demand for wheel chair users on transit has also risen substantially in recent years. In addition, SunTran is working with a Bus Shelter work group to improve conditions for passengers at bus stops. The *Southwest Utah Coordinated Human Service Public Transportation Plan* identifies the need for a last mile study to identify needed improvements for transit users on roadways near transit. Furthermore, as transit expands to Hurricane, Zion National Park and the Airport, consideration for Park-and-ride locations should be given.

Improved connections to inter-city bus and shuttle services are necessary to connect residents with the greater region. Greyhound, St George Shuttle, Aztec Shuttle, and St George Express currently offer service to Salt Lake City, Las Vegas and other nearby cities. However, these services are not well-connected to SunTran. Coordination with each entity is needed to improve the experience of transit users.

Coordination among providers to match users to the appropriate transit service or services is the focus of the Five County AOG Mobility Management Program. The Five County Regional Mobility Council guides this program, while coordinating human service and public transportation services throughout the region. The Dixie MPO will continue to support mobility management efforts to coordinate and expand services to meet the needs of seniors, persons with disabilities, and low income individuals, as well as the greater community. The *Southwest Utah Coordinated Human Service Public Transportation Plan* includes mobility management and other strategies to meet these needs.

Funding and Governance for expanded transit service

Public Transportation cannot be provided without adequate financing. Additional funding is necessary to implement any expansion of the current transit system, including those listed above. In 2012, a *Dixie MPO Regional Transit Study* was completed to evaluate the governance and funding options available to the Dixie region for expansion and diversification of transit service. The study includes a case study of six transit organizations of similar size to illustrate the variety of governance and funding options for public transportation.

The study recommends a phased approach toward developing a regional transit service, beginning with improved service in St George and initial service to adjacent cities through inter-local agreements, followed by the establishment of a Regional Transit District, which is supported with a dedicated multi-jurisdictional funding for transit. This is only possible through public support, which should be gauged throughout the process.

As noted above, the first phase is currently being implemented through inter-local agreements in Ivins, with the initial phases of such agreements occurring in Washington City and the Hurricane/Zion Corridor. The Dixie MPO Transportation Executive Committee (DTEC) has officially endorsed the financial assumption that ¼% sales tax will be implemented by 2020. This assumption is contingent upon public support. The Dixie MPO will support the region's communities as they plan for improved regional transit service.

Objectives and Goals

Objective

Enhance and expand public transportation to build a more balanced transportation system

Goals

1. Provide technical assistance to SunTran and cities in the region to plan for and implement expanded transit service
2. Support efforts to develop a regional transit district or authority
3. Identify sustainable funding sources for public transportation and assist with procuring funds
4. Support the mobility management program to coordinate transportation services and meet the needs of residents with limited mobility

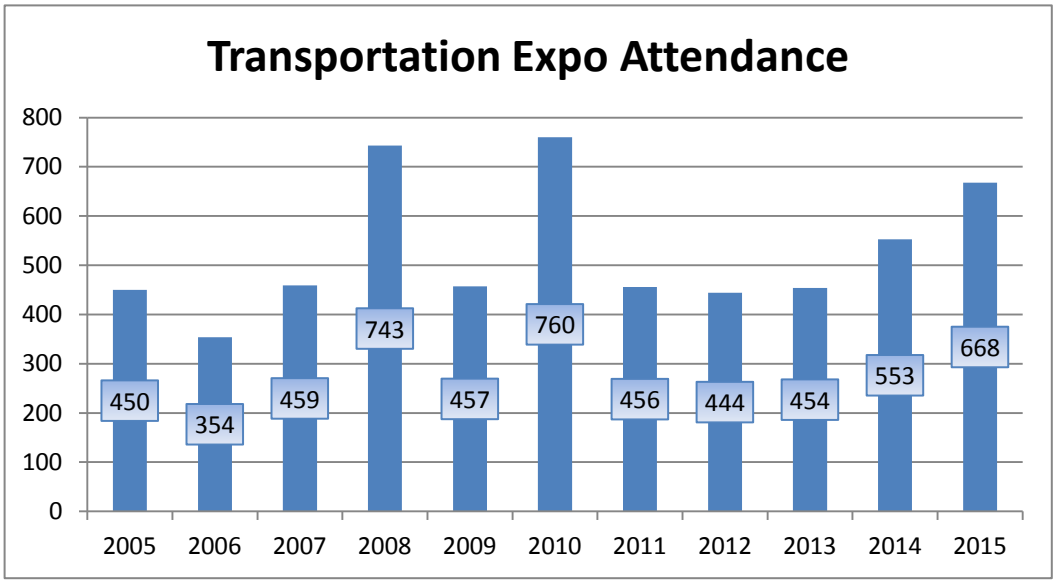
Chapter 14 – **Public Involvement**

Commitment to Public Involvement

The International Association of Public Participation defines five levels of public involvement in the International Association of Public Participation Spectrum of Public Participation. These five levels are 1) Inform, 2) Consult, 3) Involve, 4) Collaborate, and 5) Empower.

Public involvement is vital as the Dixie MPO plans transportation facilities through 2040. The MPO uses a web site, legal notices of meetings, news releases and a variety of news letters to **inform** constituents of meetings, studies, plans, and opportunities to become involved in the planning process.

The MPO also sponsors an annual "Dixie Transportation Expo" to gather public comments and respond to inquiries, consult with citizen groups, and collaborate with them to realize potential solutions. An estimated 500 to 700 people attend the "Expo" annually and comment on individual projects, plans, studies, environmental issues, future initiatives, etc. as transportation plans are laid and as projects move forward through the process from concept to construction. The "Expo" is typically scheduled the second Tuesday of each February.



In some areas, the MPO has also found ways to empower citizen committees to directly influence plans for the future. The Vision Dixie process discussed earlier in this document was based on citizen input and attempts to capture the public's vision for the metropolitan area of the future – and then plan to that vision. The bicycle/pedestrian trail section of this plan was also reviewed and expanded through the efforts of a citizen's committee. In addition, the Southern Utah Truckers Association has given comments about roadway improvements that can be made to help freight move more smoothly through our communities.

Moving forward, the MPO is committed to include public involvement initiatives in its decision-making efforts, to communicate public concerns to MPO voting members, and to educate the public on MPO deliberation, options, strategies, and plans of regional significance.

Public Comments:

Public comments from the 2015 Transportation Expo and in the advertised public comment phase of this plan are noted in Appendix D of this plan.

Chapter 15 – **Freight**

As a small MPO, the Dixie MPO has a seat on the State-wide Freight Mobility Group. The group is charged with the drafting of a State-wide Freight Plan including a Primary Freight Network Map. That plan is the backbone of this chapter and the map is found here as Map 11 (Appendix A). The state-wide plan is being drafted and currently includes the information below:

Purpose of Freight Planning

The primary purpose of the freight planning effort is to guide cost effective capital and operating investments in the state freight system to ensure maximum benefit and efficient movement of goods. This plan makes a case for the importance of investing federal and state funds in freight priority projects and programs through the following: an overview of the essential role of freight to our economy; a discussion on the condition and performance of Utah's transportation's assets and system; and a summary of the policies, strategies, and institutions that support freight.

This chapter incorporates key points, findings, and projects from Utah's Unified Transportation Plan 2015-2040, and the Dixie MPO Long-Range Plan. Please refer to Chapter Four of this plan and the State Freight Plan for demographic, population and other specific information

Utah's Freight Employment

There are a variety of jobs within the transportation industry here in Utah. Notice in the following table that the highest paying jobs are located in the pipeline industry, but it also has the fewest people employed. The highest numbers of jobs are in the trucking industry, but they also have the second lowest annual income.

Table 2.1 – 2013 Freight Employment and Salary by Transportation Industry

Industry	Number Employed		Average Annual Salary	
Aviation		6,066		$65,232
Railroad		1,582		$69,084
Pipeline		265		$107,016
Trucking		20,191		$41,808
Warehousing		8,283		$38,040
	Total	**36,387**	**Average**	**$64,236**

Source: Utah Department of Workforce Services, 2015.

Trucking

According to FHWA's Highway Statistics 2008, Utah has the highest percentage of truck traffic in the U.S. at 23 percent, while the average is 12 percent nationwide. Utah businesses have quick access to competitive trucking services to meet any logistics needs across the continent.

Utah's Primary Freight Network (Highways)

Originally defined in 2005 as Utah Primary Freight Corridors, Utah has amended the name to be consistent with MAP-21 and to distinguish between highway and railroad corridors. Utah's PFN highways consist of Interstate Routes, Critical Rural Freight Routes, Critical Urban Freight Routes, and Energy Routes. The following table shows the number of miles by route type in Utah.

Table 3.1 – Utah's Primary Freight Network Highway Mileage 2015

Route Type	Mileage
Interstate Routes	936.8

Critical Rural Freight Routes	710.7
Critical Urban Freight Routes	89.2
Energy Routes	255.2
Total	**1,991.9**

Map #11 shows Utah's PFN highways.

The PFN highways are statewide and include routes within the boundaries of the four MPOs, which include Cache MPO, Dixie MPO, Mountainland Association of Governments (MAG), and the Wasatch Front Regional Council (WFRC). Only 14 percent of Utah's PFN highways are located within the MPO areas. The following table shows the route types and number of miles by MPO.

Table 3.2 – Metropolitan Planning Organizations and PFN Highways

Route Type	Cache	Dixie	MAG	WFRC
Interstate Routes	0	28.1	44.3	113.8
Critical Rural Freight Routes	0	0	5.7	0
Critical Urban Freight Routes	30.0	25.9	6.6	27.3
Energy Routes	0	0	0	0
Total Route Miles	**30.0**	**54.0**	**56.6**	**141.1**

There are four main grants or loan programs that are available to Utah counties and incorporated municipalities for highway related infrastructure improvements. While these programs do not specifically identify the use of these funds for freight improvements, it does not prohibit them either. The four main programs include the following:

Class B & C Road Funds
State Infrastructure Bank Loan Fund
UDOT Flexible Match on Federal-Aid Projects
Off-System Bridge Soft Match Credit Program

Strengths & Needs

As one of the first states to identify its PFN highways way back in 2005, Utah early on focused its research and improvement funding on those routes with the highest truck traffic volumes. Over the last decade UDOT has conducted extensive outreach and research with the trucking industry including the Southern Utah Truckers Association (SUTA). Many of the system improvement projects across the state and most of the projects in Washington County had direct input from SUBA and have been included on the State Freight Project List – excerpt shown below:

County	Jurisdiction	Route	Project Name and Location	Length	Improvement Type	Est. Cost in Millions*
Tooele	TRPO	I-80	I-80, Widen from 4 lanes to 6 lanes from SR-36 to SR-201	2.6	Widening	NA
Tooele	UDOT	SR-36	SR-36 MP 62.9 to MP 65.8, from SR-138 to I-80	2.9	Widening	$13
Tooele	UDOT	I-80	I-80 at MP 94.5, Midvalley Highway Interchange (refer to local plan)	NA	New Interchange	$39
Tooele	UDOT	I-80	I-80 at MP 98.7, SR-36	NA	Interchange Upgrade	$38
Uintah	UDOT	US-40	US-40 Widen EB and add center turn lane from MP 121.7 to MP 124.9, Gusher	3.2	Passing Lanes	$12
Utah	MAG	I-15	I-15 Draper 12300 S. to Lehi Main St. Reconstruct Freeway and Interchanges	11.7	Reconstruction	$429
Utah	MAG	SR-75	I-15 FWY to Springville Main St	1.9	Widening	$38
Utah	MAG	US-6	Powerhouse Rd to Diamond Fork Rd	0.5	Widening	$16
Wasatch	UDOT	US-40	US-40 Widen WB from MP 35.1 to MP 39.0, West of Strawberry Reservoir	3.9	Passing Lanes	$11
Wasatch	UDOT	US-189	US-189 MP 19.4 to MP 25.5, Wallsburg to Charleston	6.1	Widening	$27
Wasatch	WRPO	US-189	US-40 Widen to 5 lanes from US-189 (HUB) to Mill Road	1.5	Widening	$6
Wasatch	WRPO	US-40/189	US-40/189 Interchange at SR-32/River Road (Exit 12)	NA	New Interchange	$25
Washington	DMPO	SR-9	SR-9 Interchange at Telegraph, Sr. Parkway Segment VI	NA	New Interchange	$12
Washington	DMPO	I-15	I-15 Add Auxiliary Lanes from MP 8 to MP 10 and Mall Drive Underpass	2.3	Widening	$57
Washington	DMPO	I-15	I-15 Widen SB lanes from Brigham Road to Dixie Drive	1.1	Widening	$25
Washington	UDOT	SR-59	SR-59 Widen travel lane in each direction from MP 2.0 to MP 3.5	1.5	Passing Lanes	$4
Washington	UDOT	SR-59	SR-59 Widen travel lane in each direction from MP 8.2 to MP 9.1	0.9	Passing Lanes	$2
Washington	UDOT	SR-59	SR-59 Widen NB from MP 12.3 to MP 12.7	0.4	Widening	$2
Washington	UDOT	SR-59	SR-59 Widen travel lane in each direction from MP 13.0 to MP 14.1	1.1	Passing Lanes	$3
Washington	UDOT	SR-59	SR-59 Widen SB from 1 lane to 2 from MP 15.7 to MP 17.0	1.3	Passing Lanes	$3
Washington	UDOT	SR-59	SR-59 Widen SB from MP 17.3 to MP 17.8	0.5	Passing Lanes	$1
Weber	WFRC	Local	Pioneer Road (400 N), Restripe from 2 lanes to 4 lanes from I-15 to 1200 West	0.9	Corridor Improvements	$0
Weber	WFRC	I-15	I-15 Interchange at 24th Street	NA	Interchange Upgrade	$45

*Estimated Cost represents planning level costs in 2015 dollars

The PFN is generally in good shape but does have some roadway improvement needs. Please refer to the State of Utah Freight Plan for further detail.

Strategic Goals with Objectives

Dixie MPO's three strategic goals are as follows:

1. Zero Crashes, Injuries, and Fatalities
   - Dixie MPO is committed to safety, and we won't rest until we achieve zero crashes, zero injuries, and zero fatalities.
2. Preserve Infrastructure
   - We believe good roads cost less, and through proactive preservation we maximize the value of our infrastructure investment for today and the future.
3. Optimize Mobility
   - Dixie MPO optimizes traffic mobility by adding roadway capacity and incorporating innovative design and traffic management strategies.

APPENDIX A – Maps – Maps Included at Back of Printed Document

- Map 1. 2015-2040 Projects and Phasing
  - Map A. 2015-2040 Projects and Phasing 1a
  - Map B. 2015-2040 Projects and Phasing 1b
  - Map C. 2015-2040 Projects and Phasing 1c
  - Map D. 2015-2040 Projects and Phasing 1d
- Map 2. MPO Planning Boundary
- Map 3. 2015-2040 Dot Density Population Change
- Map 4. 2015-2040 Dot Density Employment Change
- Map 5. Traffic Crashes (2010-2014)
- Map 6. Traffic Congestion 2040 No-Build
- Map 7. Traffic Congestion 2040 Build
- Map 8. Active Transportation Master Plan
- Map 9. Transit Services
- Map 10. Functional Classification
- Map 11. Primary Freight Corridors

Appendix B

POTENTIAL FUNDING SOURCES

Funding sources for transportation improvement projects are needed if the recommended projects of the Transportation Plan are to be built. In the Washington County area, federal, state, and local governments as well as private developers provide funds to pay for improvements.

Federal Funds:

The prior federal highway and transit bill SAFETEA-LU (Safe, Accountable, Flexible, and Efficient Transportation Equity Act: A Legacy for Users) continues to fund federal transportation programs under continuing resolutions. And a new federal highway bill is anticipated within the next several months.

State Funds:

The Utah Department of Transportation receives state highway user revenues as well as state general funds for highway construction and maintenance projects. The highway user revenues sources include motor fuel taxes, special fuel taxes, vehicle registration fees, driver license fees, and other fees. General funds include sales taxes and other taxes. In addition, the state has the authority to issue bonds for specific highway projects.

A portion of the state highway user funds are made available to local governments for highway construction. Seventy-five percent of these funds are kept by the UDOT for their construction and maintenance program. The remaining 25 percent are made available to the cities and counties in the state through the Class B and C Program.

Class B and C funds are allocated to each city and county by a formula based on population and road mileage. These funds can be used for either maintenance or construction of highways, although at least 30 percent of the funds must be used for construction projects or for maintenance projects that cost over $40,000.

Safe Sidewalks Program has also been established by the legislature to fund the construction of sidewalks on roads on the state system. The money is distributed through a formula based partially on miles of state road in each UDOT Region. Each city and county located in the region submits projects to the UDOT Region office, which then prioritizes them. A statewide committee then makes the final project selection.

Local Funds:

Local government agencies have a variety of funding sources available to them for transportation improvements. The primary source is from the general fund of the cities and counties. These general funds can be used for construction of new roads or the upgrading or maintenance of existing ones. Transportation projects, however, must compete with the other needs of the city or county for the use of these funds.

Local governments have several other options for improving their transportation systems. Most of these options involve some kind of bonding arrangement, either through the creation of a redevelopment district, a more traditional special improvement district organized for a specific project benefiting an identifiable group of properties, or through general obligation bonding arrangements for projects felt to be beneficial to the entire entity issuing the bonds.

The Local Corridor Preservation Fund allows the Washington County AOG to collect vehicle registration fees of $10 per vehicle for transportation corridor preservation. The Utah Department of Transportation has responsibility for seeing that the major requirements of the legislation are met, such as compliance with federal property acquisition procedures, and a locally adopted access management plan, or ordinance.

Private Sources

Private interests often provide sources of funding for transportation improvements. Developers construct the local streets within subdivisions and often dedicate right-of-way for and participate in the construction of collector and arterial streets adjacent to their developments. Developers should also be considered as a possible source of funds for projects needed because of the impacts of the development, such as the need for traffic signals or arterial street widening.

Private sources also need to be considered for transit improvements which will provide benefits to them. For example, businesses or developers may be willing to support either capital expenses or operating costs for transit services which provide them with special benefits, such as a reduced need for parking or increased accessibility to their development. Following is a brief list of programs used to fund transportation projects within the Dixie MPO:

FEDERAL HIGHWAY ADMINISTRATION

- Surface Transportation Program (STP)
- Congestion Mitigation / Air Quality (CMAQ)
- Available only after DMPO reaches non-attainment status
- Interstate Maintenance (IM)
- National Highway System (NHS)
- Surface Transportation Program
- Urbanized Area
- Small Urban
- Flexible (Any-Area)
- Transportation Enhancements
- Highway Safety Improvement Program (HSIP)
- Hazard Elimination
- Railroad Crossings
- Safe Routes to School (SR2S)
- Bridge Replacement
- Off System - Local
- Off System - Optional
- Federal Lands Programs
- High Priority Projects (HPP)
- Transportation Improvement Projects (TI)
- Recreational Trails

FEDERAL TRANSIT ADMINISTRATION

- **(5307)** Block Grant Funds
- **(5309)** Discretionary Funds
- **(5310)** Services for elderly and disabled
- **(5311)** Grants Outside Urban Area
- **(5340)** High Density States Program
- **(5316)** Job Access/Reverse Commute
- **(5317)** New Freedom Program

STATE OF UTAH

- State Construction
- State General Funds
- State Traffic
- Corridor Preservation Funds

LOCAL

- County (B Funds)
- City (C Funds)
- General Funds
- Transit Sales Tax
- Corridor Preservation Fund

PRIVATE

- Donations / User Fee
- Developer Funded Projects
- Public/Private Partnerships

Appendix C

Typical Sources of N Ox and VOC:

Aircraft Purge Systems
Chemical Milling
Cold Solvents
Construction Equipment
Boiler Systems
Dip Tanks
Fueled Engines, mobile and stationary
Engine Test Facilities
Fueling Stations
Fueling Equipment
Fuel Tanks, mobile and stationary
Generators
Landscaping Equipment, engines
Paint Strippers
Painting Operations
Wastewater Treatment Plants

Sources of Air Quality Programs, Regulations, and Information:

Department of Environmental Quality, State of Utah
Division of Air Quality, DEQ, State of Utah
Environmental Protection Agency
The Ozone Flex Program: Voluntary Strategies to Reduce Smog (June 21, 2001)

Major Employers 2014 - Washington County

Major Employers 2014 - Washington County

Rank	Company	Industry	Size
1	Washington County School District	Public Education	3,000-3,999
2	Intermountain Healthcare	Health Care	2,000-2,999
3	Wal-Mart	Warehouse Clubs and Supercenters	1,000-1,999
4	Dixie State University	Higher Education	1,000-1,999
5	St. George City	Local Government	500-999
6	Skywest Airlines	Air Transportation	500-999
7	United States Government	Federal Government	500-999
8	Washington County	Local Government	250-499
9	Andrus Trucking	General Freight Trucking, Long Distance	250-499
10	City of Washington	Local Government	250-499
11	Caption Call	Interpretation Services	250-499

12	Costco	Warehouse Clubs and Supercenters	100-249
13	Red Rock Canyon School	Residential Care Facilities	100-249
14	Tuachan Center for the Arts	Entertainment Facilities	100-249
15	Lin's Supermarket	Grocery Stores	100-249
16	Red Mountain Spa	Accommodations	100-249
17	Allconnect	Telephone Call Centers	100-249
18	Home Depot	Home Improvement Centers	100-249
19	Stephen Wade Auto Center	Automobile Dealers	100-249
20	Red Lobster/Olive Garden	Full-Service Restaurants	100-249
21	Harmons	Grocery Stores	100-249
22	RAM Manufacturing	Fabricated Metal Product Manufacturing	100-249
23	Hurricane City	Local Government	100-249
24	Orgill	Hardware Wholesalers	100-249
25	State of Utah	State Government	100-249
26	Xanterra Parks and Resorts	Accommodations	100-249
27	Cinnamon Hills Youth Crisis Center	Residential Care Facilities	100-249
28	Diamond Ranch Academy	Residential Care Facilities	100-249
29	Sunroc Corp	Ready-Mix Concrete	100-249
30	Entrada at Snow Canyon	Golf Courses	100-249
31	Wendy's	Fast Food Restaurants	100-249
32	Wilson Electronics	Communications Equipment Manufacturing	100-249
33	Boulevard Furniture	Furniture Stores	100-249
34	Express Services	Temporary Help Services	100-249
35	Target	Discount Department Stores	100-249
36	Central Utah Medical Clinic	Health Care	100-249
37	Albertsons	Grocery Stores	100-249
38	Interstate Rock Products	Heavy Construction	100-249
39	Wittwer Management	Accommodations	100-249
40	Smith's Marketplace	Grocery Stores	100-249
41	Red Cliffs Health and Rehabilitation	Nursing Care Facilities	100-249
42	Subway	Fast Food Restaurants	100-249
43	Lowe's Home Improvement	Home Improvement Centers	100-249
44	Maverik Country Stores	Gasoline Stations and Convenience Stores	100-249
45	Southwest Center	Outpatient Care Centers	100-249
46	Deseret Laboratories	Pharmaceutical Manufacturing	100-249
47	Kolob Care and Rehabilitation	Nursing Care Facilities	100-249
48	Danville Services	Health Care	100-249
49	Wells Fargo Bank	Banking	100-249
50	Zions Bank	Banking	100-249
51	Megaplex Theatres	Theaters	100-249
52	Staheli Laundry Services	Linen Supply	100-249
53	Second Nature Entrada	Child and Youth Services	100-249

Source : Business Resource Center at Dixie State University; Updated July 2014 by BRC; Data Source UDWS

Appendix D

Public Comments On
2015-2040 Regional Transportation Plan
(May 2015)

General Comments Received

Gary Zabriskie

The plan looks like it covers all facets of transportation in the MPO area.

Bryan Thiriot

Recommend that the MPO and St. George City consider an additional I-15 Freeway Interchange at 700 South in St. George. In addition to reducing traffic at Exit's 6 and 8 in St. George City and reducing traffic congestion on surface streets, the traffic feature would also create a quicker and more efficient emergency route to the Dixie Regional Medical Center on River Road and 700 South.

MPO Response to I-15 Interchange at 700 South, St. George

Traffic volumes on the planned transportation system through 2040 do not show a capacity need for an additional freeway interchange at 700 South in St. George within the current traffic demand model – which is based on forecasts of population growth and future land-use calculations. However, further analysis of this solution may be appropriate as the project *"700 South, Widen from 700 East to Bluff St."* is considered during Phase I of this long-range plan. Further analysis may also be warranted as this Regional Transportation Plan is updated in 2019 to include growth forecasts through 2050.

Toquerville Bypass Comments Received

David Pope

The Toquerville bypass project needs to be moved up on the plan. There is safety issues with having tourist traffic and semi's going through the small main highway is dangerous. There have been several deadly accidents in the area between the post office and Diamond G Ranch. There are many blind areas on that stretch of road that make it dangerous for vehicles to pull out on the main highway. A bypass road would reduce traffic significantly through the town, and prevent many future accidents in the area. For emergency management concerns, having a bypass will give the town alternate evacuation routes that will prevent a bottleneck scenario.

Sandy Cordova

I am a resident of Toquerville and have been for 36 years. I live on the Toquerville blvd and feel the need to express to you the need for this bypass route. In the 16 years that I have lived on the boulevard there has been several things that have concerned me. There is a LOT of traffic that
rolls through on this small city road. Because of the heavy amounts of traffic I have put up a fence to keep my children and animals safe. Diesels come barreling through town and shake my windows as they shift down to slow down, sometimes not even slowing down. People from out of town take their time coming up the twist from LaVerkin then speed through town to get to the highway. This is a regular occurrence... being slowed by the Zion traffic between LaVerkin and Toquerville then being left in their dust as they hit the boulevard and speed through town.

I know that there is a bypass route located #48 on Phase two of the plans, but would like to ask that it be moved forward to phase one. Last night was a great example of the dangers of having all of this traffic forced through our small neighborhood. The police were chasing a car, bumping him left and right with helicopter flying closely above. The car was all over the road and went up into someone's lot (two doors down) before the police rammed him into the side of the bridge. Had this bypass route been there this chase would've likely been taken down this route away from the residents keeping us and our children safe. There are a lot of questionable people that ride through SR-9, I'm sure you are aware. Keeping them off of our boulevard will not only keep us safe but it will help us to keep our home-town feel.

Scenic drivers are welcome! Come on in and see how beautiful Toquerville is, but please keep the diesels, excess Zion traffic, drug smugglers, and craziness out of town.
Thank you for considering the urgency of this.

Sandy Cordova

Clarissa Chamberlain Nuckles

I'm writing to you concerning the Toquerville Bypass road. As someone who grew up in Toquerillve, on Toquer Blvd, and hopes to move back and raise my own family there someday, it is of the utmost importance to me and my family that the bypass be moved up to as soon as possible. I've always felt that way, but after last night's incident (the high-speed chase that ended on Toquerville Blvd), I felt the need to share my opinion. I really appreciate everything you do to keep our county looking and functioning so well. Please do what you can to move up this project and make it happen as soon as possible so that we can stop worrying about our children playing in the front yard so much because of fast cars, traffic, and so many strangers brought to town on the road.

Katrina Lantz

Please place a high priority on completing the Toquerville bypass road. Yesterday a high speed police chase that began in Kanab ended with a crash through our town. A bypass road would help the citizens so

much by cutting down the noise and danger to pedestrians of huge semi trucks, charter buses, and trailers that regularly zip through our main street. The sooner, the safer! Thank you!
Let's get the traffic off our little city road!

All my best,

Katrina Lantz
280 N. Hillside Dr.
Toquerville, UT 84774
805-279-8221

Jennifer

Dear Myron Lee, Dixie MPO:
Please place a high priority on completing the Toquerville bypass road. Yesterday a high speed police chase that began in Kanab ended with a crash through our town. A bypass road would help the citizens so much by cutting down the noise and danger to pedestrians of huge semi trucks, charter buses, and trailers that regularly zip through our main street. The sooner, the safer!

Thank you!

Let's get the traffic off our little city road!

Kay Chamberlain

The members of the community of Toquerville would like to see the SR-17--Toquerville Bypass project moved to a Phase one project. With the visitation to Zion Park increasing rapidly every year, the traffic through Toquervilee is becoming more and hazardous, with most cars traveling 45-50 mph in a residential neighborhood. Even more annoying is the noise. Residents cannot even hear each other's speech, during summer months, while outside or with the windows open in our homes. The safety is a concern for not only children, but adults crossing the street. Please make it a priority!!

Karlene Young

We would sure like to see a bypass road in Toquerville sooner than 10-20 years. This is a small town and the steady stream of tourists and large trucks are unbearable. We had a high speed chase end here last night! Please help us get the main stream of traffic off of our Main Street.

Sincerely,

Karlene Young

Waren S. Wright

I expect you folk are doing the best job you can under the circumstances. Planning for transportation is always playing catch-up, and funding for such always a black hole. It is very difficult to do the sensible thing (especially here in Utah it seems), when the making of money and desire of prestige is always first and foremost with those of influence.

The only thing I have to suggest (and have been harping on for the past 15 years), is for the State of Utah, and particularly her in Washington County, is to stop priming the Growth/Promotion Pump and inviting the world to move here. A reduction in a 2% annual population increase would make a world of difference in dealing with these problems. I ask you, why do you want Utah and (where I live), the St. George Metro-area, to grow faster than it needs to? That always falls on deaf ears I know!

Renee Garner

Toquerville has planned and worked toward the construction of a by-pass road west of city center for more than ten years. The city has contracted easements from most or all of the property owners involved so the process will be a painless as possible. Five Counties did an independent study on the concept just a year or two ago and estimated the cost would be less than the planned road expansion of SR-17. It would be a matter of transferring the expenditure of funds from one Utah Department of Transportation entity to another rather than a large new cost to be managed.
Toquerville greatly needs this by-pass road sooner rather than later. The Water Conservancy District is making plans for a reservoir here. We are hoping for some possible commercial development and growth in conjunction with that. The by-pass road is the center piece of our commercial development plan.
Please consider the benefit this would have on the area as Toquerville is the northern gateway road to Zion Park.

Thank you,

Renee Garner

Jeanie

The Toquerville bypass is urgently needed. It's heavily trafficked and the cars just speed by. It's a real safety issue. There is no safe way to cross this street. It's a real danger for everyone, people and animals included. I've personally witnessed children nearly being run over. It's terrifying! We live on the blvd. and the noise level is deafening. We literally can not be in the front yard and hear each other talk because of all the traffic. Our windows rattle when the big trucks whiz by. We thought it was bad windows so we replaced them all and they still rattle! It's just not safe. I hope you consider building the bypass sooner than later.

Jeff and Shay Meyers

We are responding to the Toquerville bypass plan that is on the future agenda for the transportation needs of Washington County. As a resident of Toquerville I am in favor of moving the bypass plan along as

quickly as possible. We are owners of a historic pioneer home on the Boulevard in Toquerville where we reside. The heavy truck traffic and traffic flow in general takes a tremendous toll on the historic structures of our community. Our home, as well as many others, is built of adobe and rock. The vibration that occurs form the traffic erodes the mortar that holds these homes together. We have had to reface the outside of our home twice because of the cracks that occur. We are excited to know that there is a better option for traffic flow and home preservation. We hope that the bypass project will be considered for approval sooner than later to perserve these historic homes. It will also provide a safer environment for the children that walk to the bus stops along this busy highway.

Thank you for your consideration.

Sincerely,

Jeff and Shay Meyers

Randy and Jane Scott

Re: Toquerville Bypass
Toquerville residents have wanted a bypass for years, in fact, they've been talking about it for the past 45 years. As residents living just one house down the block off Toquer Blvd. for the past 27 years, we can attest to the traffic noise, and also to the concerns we have for people crossing the street- especially children and the elderly. Can you imagine cars, trucks and semi-trucks loaded up barreling down your neighborhood street at 40 mph? Even though the city fathers years ago made the decision to have the highway run through town, the times have definitely changed, with millions of cars traveling to and from Zion National Park and other destinations. We are a main road to Zion from the north via I-15. These travelers and other commuters and commercial vehicles would appreciate not having to slow down to go through town, and it would be much faster for them. We hope that you will choose to speed up the time frame for this project.

Thank you.
Randy and Jane Scott

David Pope

The Toquerville bypass project needs to be moved up on the plan. There is safety issues with having tourist traffic and semi's going through the small main highway is dangerous. There have been several deadly accidents in the area between the post office and Diamond G Ranch. There are many blind areas on that stretch of road that make it dangerous for vehicles to pull out on the main highway. A bypass road would reduce traffic significantly through the town, and prevent many future accidents in the area. For emergency management concerns, having a bypass will give the town alternate evacuation routes that will prevent a bottleneck scenario.

Phone Calls Received

The following individuals called during the public comment period of the Long-Range Plan to express their support for moving the Toquerville bypass project from Phase 2 to Phase 1 of the Plan:

- Marian Bates
- Leanne Bates
- Ester Dehart
- Ray McQuivy
- Alex Chamberlain
- Shea Meyers
- Tammy Young
- Linda Olves
- Lynn Olves
- Willis'
- Kay Chamberlin
- Heather Crochet
- Morgan Jensen
- Polk Family
- Kim Robins

MPO Response to Toquerville Bypass Comments

The Toquerville Bypass Road is currently listed on the Toquerville City Master Transportation Plan as an alternate route to the current State Route 17 that connects Interstate Highway 15 through Toquerville to LaVerkin City and eventually Zion National Park. Both Toquerville City and the Utah Department of Transportation (UDOT) are aware of the safety and economic development benefits of a bypass noted in the comments above. Toquerville City is actively acquiring rights-of-way to build the bypass. And UDOT has expressed a willingness to do a jurisdictional transfer (trade) of State Route 17 for a bypass road, once that road is built (directing traffic away from the rural section of Toquerville).

The Dixie MPO Long-Range Plan primarily examines transportation capacity issues. A capacity analysis based on the MPO's Travel Demand Model indicates a current traffic volume of 5,700 vehicles per day on State Route 17, with an expected 14,700 vehicles per day by 2040 – indicating that a capacity project will be needed at some point in Phase 2 of the Long Range Plan.

As the need for maintenance or reconstruction/widening of SR-17 approaches, and as the City continues to obtain and preserve rights-of-way for the bypass, Toquerville City and UDOT are encouraged to closely coordinate their respective plans to find mutually beneficial solutions. Since neither entity has sufficient financial resources to accelerate the project form Phase 2 (2025-2034) of the Long Range Plan to Phase 1 (2015-2024) based solely on a "capacity" need, opportunities should also be sought to identify "safety" or "economic development" funds that may be available for that purpose. Those funding mechanisms are not identified in this plan.

Comments Received from Lisa Rutherford

Dixie MPO 2015-2040 Draft Regional Transportation Plan Public Comment
Lisa Rutherford, Ivins, Utah

As a citizen who attempts to study transportation issues in our area, I have reviewed the extensive 70-page plan and offer the following comments for the public record. First, let me say that Dixie MPO has put together a lot of information and has provided a fairly comprehensive document with much for citizens to consider and digest. The draft plan seems to cover the relevant points of concern to a citizen such as myself but in some cases left me with more questions than answers. Here are my main concerns that I will provide more on in my comments:

- The plan does not put enough focus on public transportation although it references the importance of public transportation for a sustainable future several times.
- The plan lacks specifics on traffic accidents - specifics that citizens need to understand our current situation. Figures provided don't make sense.
- Network Vehicle Delay does not provide enough information to citizens to know what improvements have been achieved with the road work already done in our area.
- Population numbers used in this plan to justify future traffic projections do not jibe with population figures in other studies including the earlier Horrocks 2011 study.
- Washington County major growth areas south of I-15 make expensive highway projects to the north questionable, particularly when earlier studies (Washington Parkway Cost/Benefit Study) indicate they will not relieve congestion very much on main arteries.
- Cost/benefit information for the "build scenario" does not provide enough detail for citizens to understand if the process was objective.
- The plan lacks adequate details about possible funding options for public transportation - information that is readily available in other studies and could have been included in the current draft plan in greater detail for citizens' benefit.
- Not enough work is being done to deal with potential air quality issues (e.g., ozone) in our county.
- The plan fails to prove that planned road projects will achieve desired results.
- Public process may be flawed by transportation entities being more focused on achieving their plans than listening to citizens' concerns.

The 2015-2040 plan references the 2006-2008 Vision Dixie process – a countywide public planning process in which approximately 3,000 citizens participated. The plan even states clearly the Vision Dixie transportation principle: Build balanced transportation that includes a system of public transportation, connected roads, and meaningful opportunities to bike and walk. I applaud Dixie MPO's effort to highlight Vision Dixie, but as I read the plan I kept asking one question. If a system of public transportation is listed first in the Vision Dixie principle, why does it seem to end up last on the list of topics when it comes to getting real results and get little attention in the draft report? We see lots of road construction but not much with regard to public transportation other than Ivins recently coming on board with a SunTran route. Several studies have been done over the past five years, so you and others in the transportation field get credit for that. I think that Dixie MPO wants to do what's right by Vision Dixie for our future needs, but perhaps too much pressure is on them by local leaders and citizens to focus on the other transportation areas: roads, biking, walking. In fact, the plan clearly states: "Thus, while auto use will continue to be dominant, roads will not be able to meet all our mobility needs decades into the future. Public transportation is especially important to keep us from being overwhelmed by gridlock."

I plan to address the public transportation issue in some detail because I feel it's so very important for the

future of our area given the challenges we face in an area with geological beauty that draws visitors and new residents but also constrains roads. First, let's consider some of the information pertaining to our current traffic situation and the 2015-2040 plans for dealing with and, if not correcting, at least alleviating the problems.

"For this plan, the total vehicle hours were compared on the entire transportation system in the model year 2040 in both the build (meaning all potential projects have been constructed) and no-build (meaning no potential projects have been constructed) scenarios." DixieMPO's CUBE modeling platform, used to analyze future traffic demand to project future congestion based on "Network Vehicle Delay," compared the "…total network travel time per day in the no-build scenario where current capacities are maintained but not expanded. This is compared to the 10,500 vehicle hours if all the projects are built. Thus the build scenario represents a total savings of 34,500 hours per day leading up to and beyond 2040." The plan provides much more detail on this but this is it in a nutshell. It does not compare the vehicle hours prior to road work I've witnessed over my 15 years in Washington County, so we have no way of knowing what goals have been achieved in that regard. As taxpayers, it would be nice to know if we're getting some results from all the money we've poured into UDOT over the past. We should also remember that these are just models based on future population projections, which, by the way have been all over the place based on past population projections. The earlier Horrocks study utilized a population projection of approximately 550,000 by 2040. The 5 County Association of Governments' 2012 projection for Washington County's 2040 population is 371,743 (same as the 2015-2040 plan) – 178,257 less than the Horrock study. How reliable are the study's traffic projections at this point? The Horrocks study and the draft transportation plan currently under review show the majority of the future growth – however much that might be – occurring south of I-15 not in the northern part of our county.

The draft plan references an analysis completed by Cambridge Systematics. That analysis shows contributing factors in severe and fatal crashes in Washington County which include "multiple vehicles." However, factors on a plan chart provided by UDOT (Figure 4) make no reference to "multiple vehicle" crashes but include such factors as single vehicle, roadway geometry, roadway departure, overturn rollover, intersection related, speed related, motorcycle involved, older driver involved, teenage driver involved, DUI, distracted driving, adverse weather, etc. Nowhere is a "total" number of crashes shown on Figure 4 or in the associated text. 163 "single vehicle" crashes is the highest figure. The UDOT chart makes no reference to "multiple vehicle" crashes. With no crash "total" provided, we cannot know the number of "multiple vehicle" crashes and are left to wonder what the number is. There's also no way to know how these different factors relate since that level of detail is not provided. When all the crashes on the chart are added together, the total number of crashes comes to 1139, but that total includes all "single vehicle" as well as other categories related to those incidents such as "single vehicle, DUI," I assume. As I reviewed the chart and the accompanying information which seemed lacking in necessary detail, I began to wonder:

How many of the single vehicle crashes involved older drivers?
How many of the roadway departures crashes involved impaired driving versus improper use of safety equipment?
How many of the single vehicle crashed involved young drivers?

The information provided not only omitted information (multiple vehicle crashes) but also left many unanswered questions.

Additionally, the map that shows serious and fatal accidents does not provide enough detail to citizens to determine if the tax money used for new and completed road work has either helped or not helped with overall accident numbers. The crash chart covers 2010-2014 and a lot of work has been done during that time, but what were the crash patterns and numbers before then. Are we getting the bang for our buck that we should as taxpayers? It's true that with growth we will see an increase in overall numbers as the

plan notes, but there should be some improvement that can be clearly quantified.

Interestingly, although aggressive driving and speeding are seen as increasing problems by both drivers and law enforcement, only 60 speed-related crashes are shown on the chart. Since we don't know what the total number of crashes really is, it's difficult to evaluate this figure. It also makes me wonder because I see very few people ever driving the speed limit. If the posted speed is 40, then people drive 45 to 55 or more. So it's difficult to believe that more crashes are not speed related.
Aggressive driving crashes numbered 11 on the UDOT chart, which is interesting since the plan states that "The Surface Transportation Policy Project estimated that aggressive actions contributed to 56 percent of all fatal crashes." Given the 11 crashes noted, we are way below that 56 percent, but given what is being witnessed nationally, this warrants attention by law enforcement. Defining "aggressive driving" is part of the problem. If more people drive that way, it may not be considered aggressive in the future? Who knows?

There are some suggestions made about how to prevent accidents such as "keep vehicles from encroaching on the roadside" which makes me wonder about Red Hills Parkway which was expanded a few years ago but where people park alongside the road even with available nearby parking possibly because those who park in the south parking lots would risk their lives crossing the road where speeds reach 45-50 on the 40-mph posted road. There seems to be a disconnect between what Dixie MPO advises and what's actually being done.

The plan provides an extensive list of objectives and strategies for dealing with the causes of crashes. Most seem reasonable and are achievable "physical" fixes, but all will come with costs even on existing roads. Some, however, will be more challenging such as: "Deter aggressive driving in specific populations, including those with a history of such behavior, and at specific locations." They have a few ideas listed to achieve the goal of stopping aggressive driving, but from what I've witnessed no matter how "convenient" they make streets for drivers, there are those who will feel it's just not fast or convenient enough.

As for dealing with aging drivers, several objectives and strategies are listed but public transportation is not on the list. As a person who will be 68 this year, I wonder how many more years I will want to drive and what my options will be then. If a good public transportation system were available that could get me from Ivins out to Springdale and Zion Park, what a better option that would be than trying to drive that hour-long drive. Many others may feel the same. Seniors are included in "transit dependent populations" according to the 2010 Hurricane to Zion Canyon Transit Study. Traditional fixed-route transit systems may need some additional paratransit service to get some more elderly or disabled citizens to pick up points, but our area already has paratransit services that may be able to support this effort. Again, public transportation could serve an important role in our community with a high number of aging citizens.

The plan includes a "Cost Benefit Analysis" table showing the total time saved in hours with the build scenario, assuming two scenarios which incorporate an hourly delay cost of $20 and of $30. According to their cost-benefit calculations, both show a positive ratio over 1.0 with - 1.87 and 2.80, respectively. Cost-benefit analysis has become the darling of project justification over many years, but according to easy-to-access online studies and articles the process can be flawed. One notes there is no algorithm to tell us what should count as a cost or a benefit making for a subjective process rather than objective. In fact, a study from San Jose State University Department of Economics notes that care must be taken to not double count the benefits. In an effort to support the need for these projects, has that been done?

In summary, given the vehicle load challenges facing Washington County with projected growth and the plan's earlier statement that road building will not solve our transportation problems, it's appropriate to look at the mass public transportation and work to understand how that might help relieve congestion and

provide options for drivers and those who are unable to drive to move around Washington County. Whether one uses it or not, public transportation would provide overall benefits for all in Washington County.

There have been efforts in the past few years to move along with better public transportation in Washington County, but it's been a slow, grinding process that seems to have lacked real public and political support. The Dixie MPO Regional Transit Study was done in 2012. Prior to 2012 the Hurricane to Zion Canyon Transit Study was completed in 2010 and the Coordinated Human Services Transit Plan followed in 2013. The current plan under review and out for public comment does address public transportation but not to the level of the other reports just noted. In fact, out of seventy pages, the plan allots a mere two pages to public transportation with some minor references scattered here and there.

The 2012 Dixie MPO Regional Transit Study states, "The purpose of this study was to evaluate the governance and funding options available to the Dixie region as it seeks to expand and diversify transit service." The study evaluated several funding options that might help to enlarge the current system provided by SunTran and operated by the City of St. George and, at that time, limited to its boundaries. As noted, the system was recently extended to include Ivins City this year. The 2012 study, notes an expansion will require additional funding but the plan states that "Existing federal formula funding is available and may go unused unless additional local match funding can be generated. Additional local funding could be contributed by outlying jurisdictions – such as Ivins, Santa Clara and Washington – as transit is extended into their respective communities." The plan now under review notes that, "…the first phase is currently being implemented through inter-local agreements in Ivins, with the initial phases of such agreements occurring in Washington City and the Hurricane/Zion Corridor. The Dixie MPO Transportation Executive Committee (DTEC) has officially endorsed the financial assumption that ¼% sales tax will be implemented by 2020. This assumption is contingent upon public support. The Dixie MPO will support the region's communities as they plan for improved regional transit service." The 2012 study noted, "…with SunTran's existing governance these jurisdictions would have limited decision-making power over the level of transit service in their communities. Therefore, many officials and stakeholders have expressed interest in the consideration of a new governance and funding structure for operating regional public transportation." Although no specifics are provided, perhaps these new inter-local agreements will help to iron out some of the prior governance deficiencies and will make other cities more willing to participate since the governance structure did not facilitate shared decision making. If other jurisdictions provide funding for transit they should surely have some decision-making power concerning the level of service for their communities

Although not under review at this time, I reference the 2012 Dixie MPO Regional Transit because it is unfortunate that the information in that study seems to have been lost in this new plan under review. Dixie MPO's earlier study provided comparison information between six different areas that provide public transportation and much more detail concerning possible funding options. The current plan under review prefers to say "here's the problem" and "here are the roads we plan to build to deal with the problem" while admitting openly that more roads will not solve our problems.

To help identify possible funding, six areas were studied for the 2012 transit report and included California, Arizona, Idaho, Colorado, Montana and Utah's existing transit system. These were compared to the existing St. George SunTran system. The time period studied was 2000-2010. Many of the areas studied had smaller population growth over the study period than St. George, while spending more on their public transportation and moving more people on their existing roads. The urbanized area populations studied ranged from 57,000 to just over 200,000 compared to St. George's nearly 63,000 at that time. 8.11 to 24.07 annual riders per capita were moved by the various areas studied compared to SunTran's 5.46 annual riders per capita. Total riders ranged from 555,550 to 2,074,580 compared to SunTran's 342,154. 2010 budgets ranged from $2.5-$9.8 in the areas reviewed versus SunTran's $1

million. Three of the studied systems for towns of similar size to St. George provided significant local dedicated funds.

In fact, Table 2-3 in the 2012 study shows that the transit systems studied were able to fully leverage their 5307 funds (http://www.fta.dot.gov/grants/13093_3561.html) doing so through various local, state and other sources while also leveraging additional federal funds. The earlier study notes that Utah has several dedicated taxing options to fund a regional transit service. Additionally, several options exist for local governments to raise revenue. Communities along the Wasatch Front have used several tax options to generate revenue for public transportation and transit systems. The average for all taxing entities in Washington County for the 2012 study was 6.16% with an average of 6.07% if Springdale is excluded due to their 1.60% Resort Community tax. The average sales and use taxes for all State of Utah taxing agencies was 6.4%. Communities that assess Mass Transit (MT) (Utah Code §59-12-2213) and Additional Mass Transit taxes (MA) (Utah Code §59-12-2214) had an average combined tax rate with both MT and MA of 6.8%. If at that time, Ivins, Santa Clara, St. George and Washington City had initiated similar taxes, their respective tax rates would have reached the 6.8% level.

The 2012 study recommends the MA tax as an option for St. George to help fund public transit and is the recommended option for long-term transit funding of a transit system, but the study clearly states:

"While the MA tax is also an option for St. George to assist in funding public transit, it is recommended that this funding mechanism be reserved for the future as a dedicated funding source to assist in funding projects or services related to the airport."

Given the need for public transit and the heartburn that many citizens still have over the St. George Airport and money spent there, is it wise to dedicate money to the St. George Airport when that money could be used for more necessary public transit, which to date has been overlooked, given what many other communities have achieved?

The 2012 study does list several other funding options in additional to the Mass Transit and Additional Mass Transit taxes:

- Mass Transit Fixed Guideways Tax (MF)(§59-12-2216): County Option including cities and towns
- County Option Transportation (CT) (§59-12-2217): County Option including cities and towns
- County Airport, highway, Public Transit (HH) (§59-12-2218): A portion of this tax could be dedicated to fund a regional transit system. It is currently in place and does not require voter approval or an additional tax increase.

The 2012 study makes it clear that as "…transit service expands and becomes regional, a dedicated revenue and funding source is mandatory." It is advised that of the options available a combined Mass Transit Tax and Additional Mass Transit Tax, authorized under Utah Code §59-12, seems the most viable option, but both taxes may not be necessary depending on the size and type of service. Apparently, the Highway Tax currently imposed by potential participating cities was, at the time, earmarked for other projects and, hence, not helpful.

There is more in the 2012 study regarding taxes that might be used and many of the potential participating entities already assess these taxes. It's clear from the study that short-term, interim funding options will be essential to taking full advantage of federal funding and extending services. Many of the funding options presented in the 2012 report are already being assessed by the potential participating entities. Allocation of the tax money for public transit would be needed. In addition to the aforementioned taxes, a

long list of tourism taxes were presented. Many are existing taxes so there would be no tax increase, but a discussion of re-prioritizing public service needs would be required. Given the demands and benefits that tourism brings to our county and the need for low-income service workers tourism generates, it seems reasonable that some of these funds should be re-prioritized for this purpose. Additionally, other areas studied generate funding through contracts with local colleges and/or university and some minor funding through sponsorships and service agreements.

There is one source for funding capital improvements called the Permanent Community Impact Fund Board (CIB) program. This program provides low interest loans and/or grants to state agencies and state subdivisions for public facility funding. A Capital Improvements List at the county level is maintained and projects must be on the list to be eligible, unless there's a qualified emergency need. Regional transit system projects could be added each year.

The U.S. Department of Transportation, Federal Transit Administration (FTA) at the time of the report (2012) sponsored two types of grant programs: Formula Grant Programs and Discretionary Grant Programs (http://www.fta.dot.gov/grants/13093.html). It appears that these may have expired in 2012 and would not apply to new projects. It's unfortunate that advantage was not taken prior to 2012. Projects already in the system apparently still receive funds.

Alternative financing options for capital projects include: general obligation bonds, lease revenue bonds and sales tax revenue bonds. Tax Increment Financing (TIF) or Special Assessment Areas is also available for a regional transportation system.

Section 4.6 of the study "Most Promising Funding Sources" notes the following for short-term and long-term funding strategies.
For short-term funding the following are suggested:

- The Highway Tax (HT) §59-12-2215 can be used for the construction and maintenance of highways and to fund a system for public transit.
- Class B & C Road funds can be used for roadway improvements and appurtenances, which may include planning for public transit impacts.
- Interested Cities may fund transit services in the short-term through an appropriation of sales tax revenues from its general fund.
- Appropriation of Revenues Attributable to Growth: Another alternative to funding transit in the short-term consists of a combination of the above options with a contribution of a percentage of the funds only attributable to growth.

For long-term funding the study recommends a Dedicated Transit Oriented Tax.

It's clear from the 2012 study and others that much has been done to identify problems and solutions regarding the mass transit issue and much ground work has been established. What seems lacking is the real will to make it happen. The draft plan under review does citizens a disservice by not providing details of these earlier studies for citizens to consider.

While considering the costs of a public transportation system and funding options, it's important to recognize the real demand. The Southwest Utah Coordinated Human Service Public Transportation Plan of 2013 provides much information to support the need. The plan's purpose was to identify the target population and strategies to meet the needs and coordinate available and potential resources. The target population includes seniors, people with disabilities, and low income individuals, many with limited mobility and special transportation needs.

First on the plan's list of six options was a fixed-route transportation system. Currently a majority of mobility-limited individuals in our county rely on family or friends to meet nearly all their transportation needs. Some feel compelled to drive even if they feel it's unsafe to do so. Services do exist to assist with this mobility-limited population but the system is somewhat disjointed. Schedules and eligibility requirements for using services can be very confusing. Some operate during unpredictable times which creates difficulties for those planning a trip. Additionally, due to limited service area, systems are unable to meet transportation needs of the majority in the region. It's important to note that a Department of Workforce Service (DWS) representative has pointed out that many low income individuals cannot get to a job due to lack of transportation services. What cost to our community's economy results? Even if individuals can get to work via friends and family, low to moderate wages often make owning and operating a vehicle prohibitive.

Several surveys have been done to determine how to best serve this sub-set of our Washington County community. A SunTran on-board survey revealed that work was the most common destination. A significant number of respondents indicated that they were travelling to school, shopping, social, medical, and other destinations. The majority of SunTran survey respondents who utilize Dixie Care-and-Share services saw expansion of routes as the most important bus improvement for them. Expansion of the service area is seen as essential and the study recommended the development of inter-local agreements with adjacent communities before pursuing the establishment of a regional transit district or authority.

One particularly interesting and fairly consistent finding in the surveys is that current SunTran users would like transportation to expand to Walmart. This raises a question for me regarding funding. If "sponsorship" has been a source of funding in other areas studies, what opportunities are there for partnering with Walmart to help with system expansion? If, indeed, Walmart would stand to generate additional revenue by having more customers added, should they be approached about helping to make this expansion possible? The Walmart Foundation giving may exclude such arrangements but shouldn't they at least be approached (http://foundation.walmart.com/)? It seems we should leave no stone unturned.

The 2013 plan notes, as did the 2012 report, that leveraging federal funds is critical to doing more with less. Given that some of the federal money that was available then may not be available now, what have the roadblocks been to moving more quickly on getting some of this money? The 2013 plan also notes that more frequent communication with county commissioners and other local officials is needed. Has this been a big part of the hold up? I do know that Hurricane's Mayor Bramall is a huge proponent of public transportation and has been a force over the last year or so for stepping up the discussion. If others in our leadership community are not willing to get on board, however, Mayor Bramall cannot do it alone. Having been in the nursing home business, Mayor Bramall recognizes and has stated often, and I paraphrase: None of us knows when we may be disabled but we all know we will get old unless we face death early. Given that, how many of us may at some time in the future wish this area had planned better for effective mass transit?

AIR QUALITY

A good deal of the 2015-2040 Draft Regional Transportation Plan deals with air quality issues. This is a good thing, but points to the fact that as Washington County grows, if poor decisions are made, we will very likely be dealing with some very serious issues. Although the plan provides some focus on air quality, there seems to be quite a bit of contradiction between what the plan says and what DixieMPO really does.

Washington County is not regulated by the EPA or Utah Division of Air Quality (DAQ) because it's currently considered an attainment area under the Clean Air Act. However, already there are concerns by

the National Parks Conservation Association about air quality and haze affecting Zion Park and summer ozone is the primary cause of pollution in our area. Formed when volatile organic compounds (VOCs) and nitrogen oxides (NOx) mix with sunlight and heat, ozone can lead to shortness of breath, chest pains and lung inflammation. With the high numbers of retired seniors already here and still flocking to our area, what health challenges – and costs! – will they face if this is not resolved by proper transportation planning? With ozone being a mix of chemicals, many coming from tailpipes, increased numbers of cars, if emissions are not improved considerably, will exacerbate the problem. With St. George recently eliminated from AARP's list of "10 most affordable" retirement locations, perhaps the steady flow of seniors will abate, but our transportation planning should not rest on that assumption when it comes to air quality. Public transportation which would help serve the transportation needs of our seniors would also help their health by eliminating extra vehicles on our roads which cause ozone creation.

Health concerns are not the only problem we might face. If Washington County were to become a non-attainment area for pollutants, federally funded improvements to transportation systems might be restricted. Resulting additional regulatory actions would add to the cost of doing business and planning/implementing projects. The draft report indicates that the Division of Air Quality and the Department of Environmental Quality have offered help to avoid potential problems. The Dixie Transportation Advisory Committee or "DTAC" agreed to draft a protection plan and conduct a locally funded short term ozone study, but a review of many meeting minutes in 2011, 2012, 2013, 2014 and early 2015 shows no reference to such an activity. Minutes I've reviewed show that the focus continues to be on bike and walking trails and roads.

The transportation plan under review states that Dixie MPO's DTAC worked with SECOR, an air quality-engineering firm to monitor ozone levels. A study I was able to locate at http://www.airquality.utah.gov/Public-Interest/Current-Issues/Ozone/2012_Utah_Ozone_Study.pdf, dated January 2013, revealed eighteen monitoring sites; one named Badger Springs was located at the foothills of Beaver Dam Wash Mountains. Ozone exceeded 75 ppb at Badger Springs on ten days, making it one of the highest ozone sites in Utah despite its remote location. Interestingly but perhaps not surprising, the February 2013 DTAC meeting minutes made no note of this study or the results.

The draft report clearly states, "…the potential for air quality problems, especially for Ozone, is real for Utah's Dixie." If true, why is not more effort being put into this? Apparently a multi-agency team is apparently being established according to the draft plan to develop a scope of work for DAQ's monitoring in Dixie. According to the DAQ's website monitoring information: "PM2.5 and PM10 monitoring at Hurricane (HC) started on January 1, 2014, in order to establish a 3-year baseline record of particulate levels in the St. George MSA." Other than this reference, the DAQ Annual Monitoring Plan for 2014 made no reference to Washington County of any significance. However, I have to say that the website is not a user-friendly website where citizens can get information easily, and the information is cryptic, to say the least, with most of it being numbers that only a person in their field would be able to decipher so perhaps I missed something. (http://www.airmonitoring.utah.gov/network/AnnualMonitoringPlan2014.pdf).

The current standard is 75 parts per billion (one which the SECOR study reveals was already being surpassed in 2013 at the Badger Spring/Beaver Dam Wash monitoring site), which is too weak to protect public health according to many in medical and religious communities across the nation, while political and business leaders argue that the new proposed standard in the range of 65-70 ppb would put undue demands on business and hurt economies and is too stringent. But here's an interesting thing; on March 4, 2015, Robert V. Percival spoke at the University of Utah's College of Law. His presentation was titled "Why America's Century-Old Quest for Clean Air May Usher in a New Era of Global Environmental Cooperation." He's been the principal author of the leading U.S. environmental law casebook, *Environmental Regulation: Law, Science & Policy* for more than two decades, has worldwide experience

in the area of environmental law having lectured in 26 countries on six continents and currently works in China. One of Mr. Percival's main point was that although industry, trade groups and politicians argue that stricter enforcement of air standards will harm business' bottom line, past experience shows that "net benefits" result and economic growth continues. Example, cries of doom from the regulated auto industry were not realized; regulation was not the death knell for them.

Adding to the problem is that regional ozone levels found at several monitoring sites throughout the southern Utah region – from the Four Corners area, into the Grand Canyon, Zion National Park, Washington County and Southern Nevada – show levels close to the new standard. The draft study plan states, "Efforts are being made by the DAQ and others to document these ozone transport relationships. Postponing empirical results may compromise community health standards and be against the operating values agreed to by DMPO partners." DixieMPO should keep this in mind as you do your planning and not let political pressures drive decisions.

The plan offers eleven strategies for local government consideration and action. One references public transportation (Improve transit operations to provide more opportunities to leave vehicles at home) but it's near the bottom of the list. The idea of auto emission checks is nowhere on the list.

SPECIFIC PROJECTS

There are many specific projects listed in the draft report, too many to deal with here, but I will address two. One project – Bluff Street – affects many people currently and the other – Northern Corridor (aka Washington Parkway) – is a future project fraught with many obstacles and for good reason. In fact, these two projects are connected by virtue of the fact that the Northern Corridor/WP is justified as a means of relieving congestion on other main roads such as Bluff. Will that really happen is the question.

BLUFF STREET

Bluff Street is a problem, but are the plans for dealing with it adequate or realistic? Are they based on good, sound information and data? A March 2012 letter to UDOT from local architect Richard Kohler (http://www.kohler-architecture.com/Home.html), also formerly involved in highway planning, challenged the idea that the Stakeholder Group meetings held to review this project for expanding the Bluff Street/Sunset Blvd intersection were useful but, rather, asserted that they were woefully inadequate. In fact, there's even accusation that the information recorded from those meetings was "willfully distorted" in UDOT's effort to argue their position most effectively. Three workgroup meetings were held with UDOT's own presentations occupying a majority of the time. Additionally, documents that should have been "public" – specifically a "traffic comparisons" tabulation table document – were not accurate and apparently contained engineering design and evaluation errors. According to Mr. Kohler's letter, this is an effort "to mislead the public by failing to disclose the ever-changing nature and uncertainly surrounding the moving target of the project's future traffic capacity projections."

Following 2012, Mr. Kohler and others, specifically a local businessman Gilbert Jennings who helped develop Sunset Corners, a business area at Bluff Street and Sunset Blvd, met with UDOT and others to further discuss the intersection options. Mr. Kohler, Mr. Jennings and business owners in the affected area have continued to work the issue with some good results. But, here is my concern. If UDOT, MPO and others are encouraging public involvement but perhaps don't really even want input from someone with Mr. Kohler's knowledgeable background, what does this say about their "public comment" efforts? As noted by Mr. Kohler, UDOT and others seem to choose to ignore traffic "fall off" that has occurred due to road projects that have already occurred and which make their earlier traffic projections suspect at this point. However, because UDOT is already so entrenched in these projects, they've been reluctant to pull back and re-evaluate at this point. Apparently, now, UDOT has put this project on hold for further discussion. Would this have happened had the people pushing for this change been Joe or Jane Blow rather than an influential businessman, Mr. Jennings, and Mr. Kohler, who is very persistent and

knowledgeable?

Mr. Kohler's letter and backup information support the idea of a roundabout at the Bluff Street/Sunset intersection as the most effective way of handling projected traffic at lower cost rather than the "fly over" and "jug handle" concepts proposed by UDOT. I do not specifically subscribe to his plan but have seen the effective use of roundabouts elsewhere, and if traffic can be moved at less cost, I am in favor.

Although the transportation plan under review talks about "hourly delay cost" and presents a 25-year cost benefit analysis to justify the plan's projects, no discussion about the costs to businesses such as those in the Sunset Corners area affected by proposed intersection changes is presented. Is it a fair analysis to exclude these concerns? Also, I've seen many transportation plans offered over my fifteen years in Washington County and Bluff Street has been a topic on most of those. Why was a business center such as Sunset Corners given the go ahead for development if traffic concerns would be a challenge for them and their business visibility in the future? Were the developers given adequate information pertaining to future transportation plans to help them make their decision to build?

If UDOT and the MPO plan for excessive traffic volumes on Bluff Street (65,000 cars), well over what good engineering practice would predict according to Mr. Kohler, it would likely have a very negative impact on Bluff Street's current businesses. The investment capital that would normally be used to update and improve individual businesses along Bluff Street would disappear because the projected 65,000 cars a day can only be carried on a freeway, and freeways do not allow ready access to businesses. There's the possibility that the freeway-size road could create blight in this area.

My point in presenting this information is to question the "citizen" process. In this particular instance, as in other citizen processes I've witnessed locally, the effort seems to be to "convince" citizens of the preferred plan by the entity conducting the meeting rather than actually wanting to engage the public in meaningful discourse and sharing of ideas for planning purposes.

According to the draft plan's map showing "Traffic Congestion 2040 No-Build" scenario, Bluff Street's traffic congestion gets a "between .9-1.2" rating from I-15 to St. George Blvd. and an "above 1.2" rating from St. George Blvd to Sunset Blvd. Traffic congestion ratings range from "below .6" (best) to "above 1.2" (worst) on the plan's range scale. So, Bluff Street's ratings are at the high end in the No-Build scenario, but even after planned improvements and much money spent, Bluff Street is still not at the lowest end.

In the plan's "Traffic Congestion 2040 Build" scenario, Bluff Street's traffic congestion is "between .9-1.2" and "between .6-.9" for the areas between I-15 and Sunset Blvd. Nowhere does Bluff Street get the best rating of "below .6" so even with all the money spent on road improvements, there will be delays, and after 2040, with population growth, will future citizens be back in the same predicament we are today?

NORTHERN CORRIDOR (aka Washington Parkway)
This is a contentious project that would go through the Red Cliffs Desert Reserve (aka tortoise reserve). The project appears on the Dixie MPO "Project & Phasing 2015-2040 Phase One (2015-2024)" costing $5 million just for environmental work. It then appears on the Phase Two (2025-2034) list costing $47 million. The Red Cliffs Desert Reserve was established in the mid 90s along with the Habitat Conservation Plan (HCP) (up for renewal in 2016) to preserve the prime Mojave desert tortoise habitat area and allow development in areas outside the reserve. In 2009, an Omnibus Bill was passed by Congress that established the Red Cliffs NCA and gave direction for management, including provisions for a road. For the last several years the BLM has been reviewing and rewriting their Resource Management Plan (RMP) which is supposed to include several options for a road. Of course, the county

really only desires one route, and that's the heart of the problem.

February 5, 2014 Five County Association of Governments meeting minutes provide some interesting details including information from a handout at the meeting from Utah's Senator Orrin Hatch dealing with the road. From the meeting minutes, the second paragraph in Senator Hatch's letter reads:

"Although the Law stated that there be at least one alternative and the current iteration of the draft does include one alternative, the law did not intend that the BLM include one alternative and then discard the idea of building the Northern Transportation Route (NTR). The law clearly intended that the NTR be built and should, therefore, be included in all of the alternatives, or, at least, the preferred alternative."

While Senator Hatch may have his take on what the law "intended" here is what is clearly stated in Section 1974 of the Law. The purpose of the NCA is "to conserve, protect, and enhance for the benefit and enjoyment of present and future generations the ecological, scenic, wildlife, recreational, cultural, historical, natural, educational, and scientific resources of the National Conservation Area; and to protect each species that is located in the NCA and listed as a threatened or endangered species on the list of threatened species or the list of endangered species published under section 4(c)(1) of the ESP of 1973." It's difficult to understand how a road through the heart of the reserve could live up to this although UDOT and Dixie MPO had a study conducted several years ago to help bolster their position. It seems obvious that a road through the reserve would result in more noise, more people, more garbage and – worst of all – more fire potential to decimate the tortoise population. So far the desert tortoise has not been listed as "endangered" and is still listed as "threatened." It's possible that the tortoise could be listed at "endangered" if someone or some group chose to do so, which might put additional restrictions on the area.

Section 1977 of the 2009 Omnibus Bill references the travel plan (part of the RMP) and the need to have the decision in "consultation with appropriate Federal agencies, State, tribal, and local government entities, and the public." According to the February 2014 meeting minutes, Dixie MPO and Washington County are very concerned about not being properly included in the BLM's Resource Management Plan process. I hope that consultation with local government entities and the public will be more than just conferring with those in positions of power in our area since they all seem to be more concerned with moving traffic than with honoring the agreement (HCP) that created the area to protect the tortoises and other threatened and/or endangered species. In fact, it's clearly stated in the February 2014 meeting minutes, "The County is working diligently to preserve the Northern Transportation Route to make sure that the road can be constructed sometime in the future." However, average citizens may not be so taken with this idea.

A Spectrum poll conducted in 2009 asking citizens if a road should be built through the Reserve resulted in 30.9% voting yes, 64.4% voting no and 4.7% didn't care. Although 447 respondents may not be a huge group, a 64.4% vote against the road in what's viewed as a conservative paper in our area is meaningful. Most Spectrum polls don't seem to get more than a couple of hundred respondents.

As a citizen of Washington County and a believer that once an agreement is made it should be held to, I think it is very dishonorable of the county commissioners and other politicians to be pushing for a road that may essentially negate the Habitat Conservation Plan. Comments made by Washington County Commissioner Alan Gardner at the November 2009 HCAC meeting (http://www.redcliffsdesertreserve.com/wp-content/uploads/2010/01/Minutes-HCAC-11-24-09-approved.pdf) assert that St. George Mayor McArthur and Washington City's mayor insisted on the preferred road route being included in the Omnibus lands bill or they would oppose the bill. This was fourteen years after they apparently agreed to the creation of the HCP.

It's clear from the current Dixie MPO transportation plan's population growth projections, employment location projections and previous studies that the proposed contentious Northern Corridor will not provide the congestion relief that some hope it would. It will, however, cost taxpayers and result in costly lawsuits given the details surrounding this project.

A 2011 report, Washington Parkway Cost/Benefit Study, conducted by Horrocks Engineering for DixieMPO indicated that of the six options studied for a corridor, "Option #3 provided the highest benefit relative to its cost with respect to traffic congestion relief. None of the options reduced traffic on Bluff St., St. George Blvd. and Red Cliffs Dr. to the point that congestion on these corridors was eliminated. However, Option #3 did show the largest overall trip reductions that would make them more manageable." Option 3 is the preferred route that appears on the 2015-2040 draft transportation plan under review. This project appears on the draft plan's Phase Two (2025-2034) list costing $47 million. However, the 2011 Washington Parkway Cost/Benefit Study shows the preferred Option 3 costing $56 million. So, apparently over these four years, the cost of the project has gone done? I find that difficult to believe.

As mentioned on page 1 of these comments, 2040 population projections according to a 2012 study are down 178,257 from an earlier Horrocks study and growth/employment projections focus on areas south of I-15. How reliable are the study's traffic projections at this point that warrant this road?

Plan charts are provided to support the fact that population and employment numbers are driving transportation projects, but when reviewed, the charts show that by far the majority of population growth and employment areas will be in the St. George, Washington and Hurricane areas of Washington County, south of I-15, which is nothing new given the growth already witnessed. The employment chart shows even more dramatically how future employment growth will be concentrated in these areas. There is some population growth in the Ivins, Santa Clara and Ledges area projected, but much less than the high-growth areas identified, which makes spending our money on the contentious and questionable Northern Corridor even more suspect.

As noted in the earlier section about the Bluff Street improvements, the 2040 No-Build versus the 2040 Build maps show no significant improvement with or without the Northern Corridor. With Mr. Kohler's assertions that traffic "fall off" has already occurred due to earlier projects, what additional fall off will result from all the other projects on the Dixie MPO list and eliminate the need for this road? I guess the main question I have is: Who are we building this road for and why are all taxpayers being asked to assume this cost?"

PUBLIC PROCESS
From the draft plan: "Moving forward, the MPO is committed to include public involvement initiatives in its decision-making efforts, to communicate public concerns to MPO voting members, and to educate the public on MPO deliberation, options, strategies, and plans of regional significance." I sincerely hope this is true. One thing kept recurring to me during my review of the draft plan: the need for increased attention to public transportation to help alleviate future congestion, maintain air quality and honor the promises made to protect our special areas while serving the needs of the most vulnerable and needy our community. In closing, here's something to think about:

Back in the early part of the 20th Century, GM managed to eradicate streetcars from the landscape in their never-ending promotion of the motor car. Perhaps now is the time to get back on board with public transportation and give it the money needed to make it work.

MPO Response to Lisa Rutherford Comments

- The plan does not put enough focus on public transportation although it references the importance of public transportation for a sustainable future several times.
    - **Chapter 13 references several stand-alone public transit studies still in effect and ongoing. References to a new study planned in 2015 were added to this chapter.**
- The plan lacks specifics on traffic accidents - specifics that citizens need to understand our current situation. Figures provided don't make sense.
    - **Chapter 7 recommends several "emphasis areas" where available data supports potential safety improvements as transportation projects advance from "plan" status to "design" status. Chart description in this chapter updated.**
- Network Vehicle Delay does not provide enough information to citizens to know what improvements have been achieved with the road work already done in our area.
    - **Chapter 9 uses "Network Vehicle Delay" charts to compare total network travel time per day in year 2040 for the build v. no-build alternatives. The no-build alternative includes all roadwork improvements completed through the spring of 2015.**
- Population numbers used in this plan to justify future traffic projections do not jibe with population figures in other studies including the earlier Horrocks 2011 study.
    - **Population projections from the Utah Governor's Office of Economic Development became available after the 2011 study. This plan uses the most recent projections available.**
- Washington County major growth areas south of I-15 make expensive highway projects to the north questionable, particularly when earlier studies (Washington Parkway Cost/Benefit Study) indicate they will not relieve congestion very much on main arteries.
    - **The Washington Parkway Cost/Benefit Study indicates the project will not "eliminate" congestion, but that "Option 3 did show the largest overall trip reductions that would make (congestion) more manageable."**
- Cost/benefit information for the "build scenario" does not provide enough detail for citizens to understand if the process was objective.
    - **No response**
- The plan lacks adequate details about possible funding options for public transportation - information that is readily available in other studies and could have been included in the current draft plan in greater detail for citizens' benefit.
    - **Chapter 13 references several stand-alone public transit studies still in effect and ongoing.**
- Not enough work is being done to deal with potential air quality issues (e.g., ozone) in our county.
    - **Chapter 11 of the Long-Range Plan has been updated to reflect newly available data from the Utah State Department of Air Quality.**
- The plan fails to prove that planned road projects will achieve desired results.
    - **No response.**
- Public process may be flawed by transportation entities being more focused on achieving their plans than listening to citizens' concerns.
    - **The 2015 Dixie Transportation Expo drew over 660 visitors. Over 270 participants filled out comment surveys as summarized in the "2015 Dixie Regional Project Survey Report" below. All public comments are welcomed and valued by the MPO staff. Public comments typically span a wide range of approach and thought.**

WASHINGTON CITY ACTIVE TRANSPORTATION PLAN MAPS

PREPARED BY
Washington City

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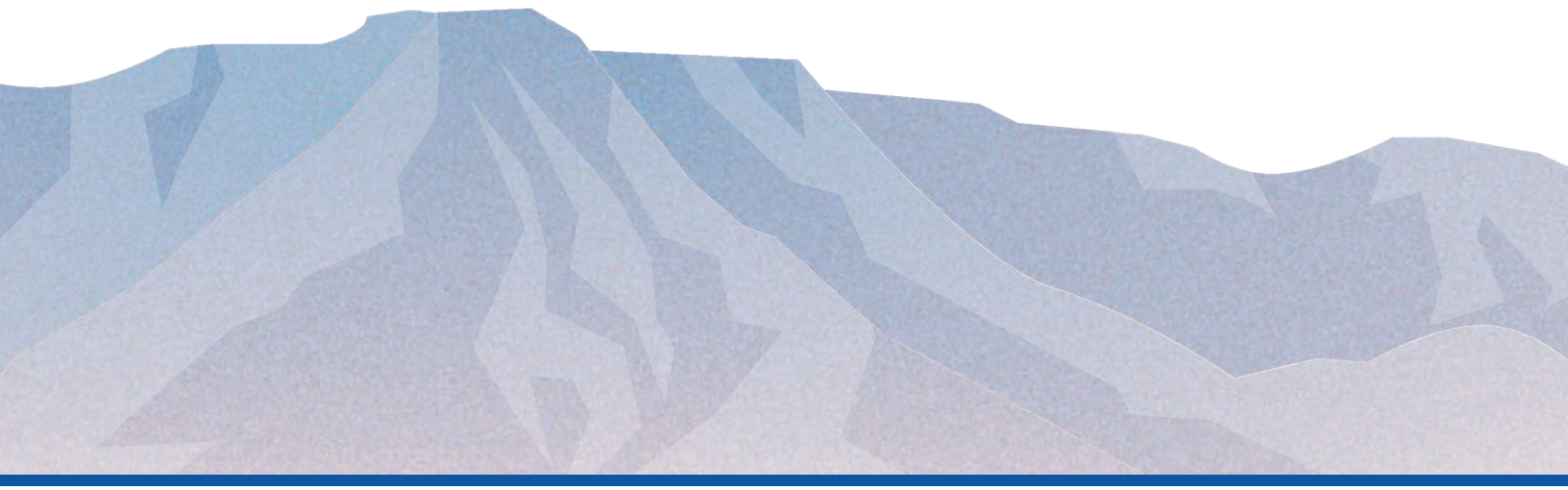
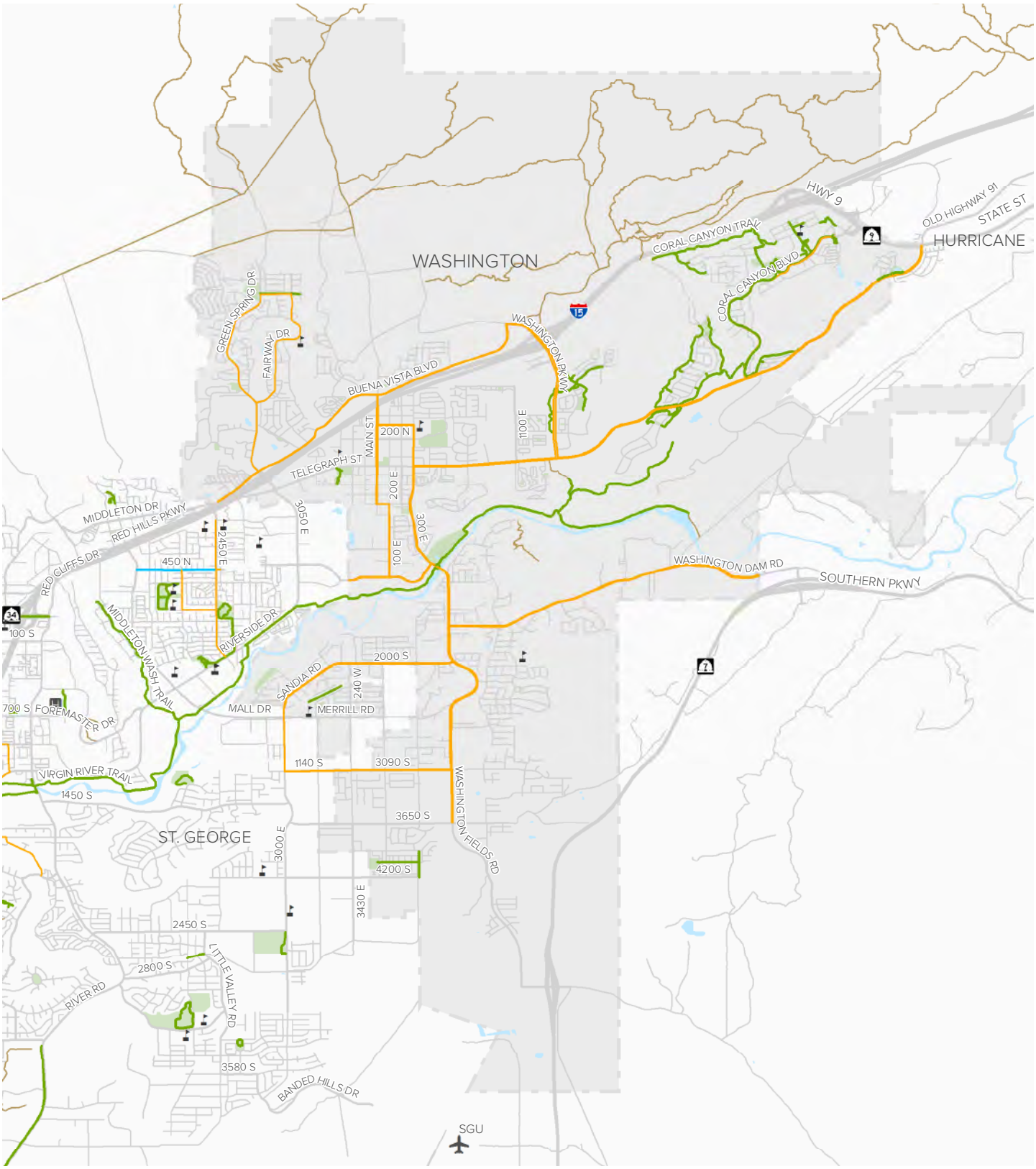




Map 1.1:

Existing Active Transportation Network

Washington City
Active Transportation Plan

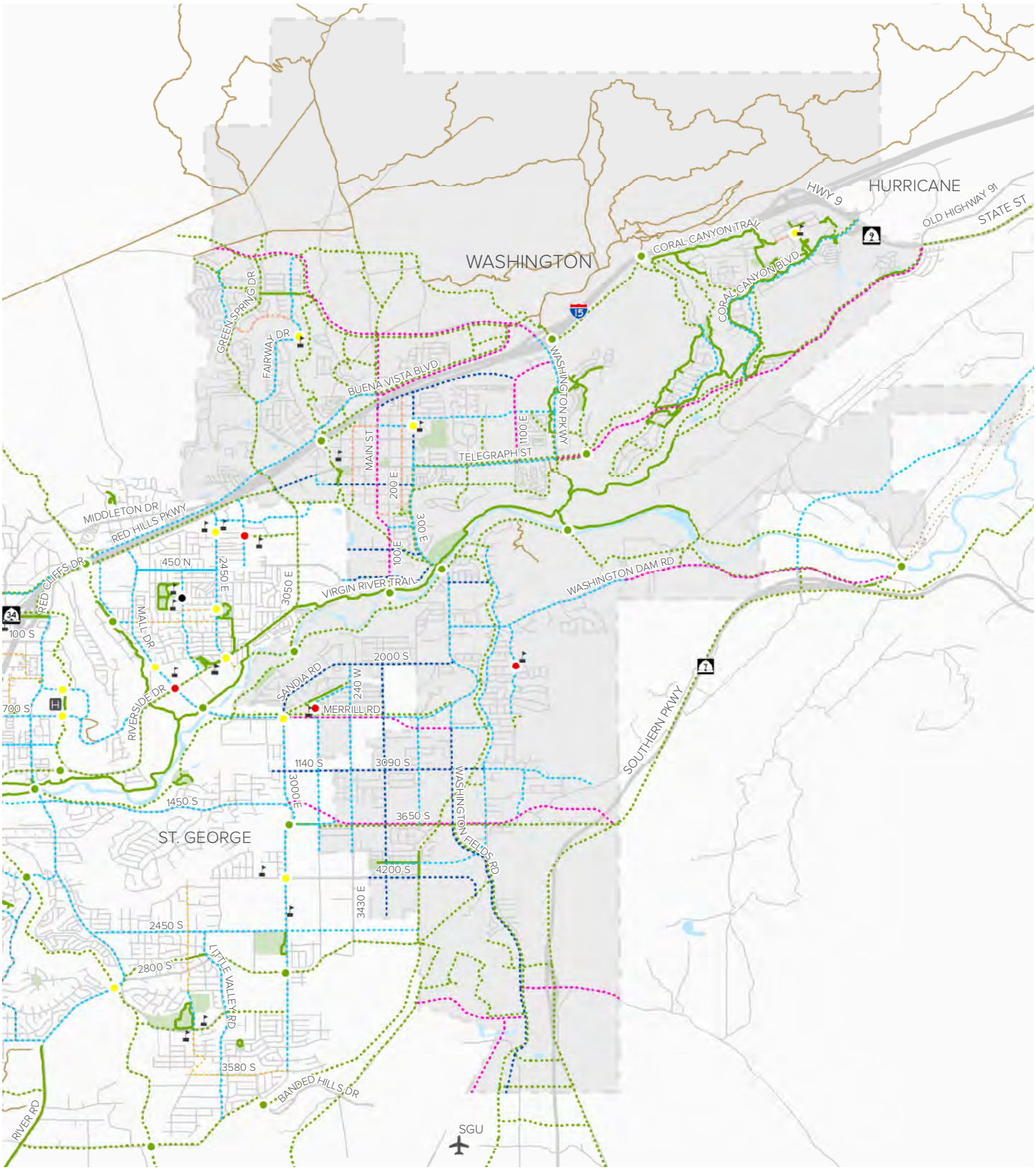
Existing Facilities
- Shared Use Path
- Unpaved Trail
- Bike Lane
- Bike Route

Base Data
- School
- Hospital
- Water
- Park
- Washington City Limits

MILES
0 1 2

3 MIN 6 MIN 12 MIN BIKE RIDE
10 MIN 20 MIN 40 MIN WALK

Data provided by Washington City, AGRC, UDOT, Dixie MPO.
Map produced January 2017.



Map 4.1:

Recommended Future Facilities

Washington City Active Transportation Plan

Recommended Facilities

- Shared Use Path
- Unpaved Trail
- Separated Bike Lane
- Buffered Bike Lane
- Bike Lane
- Bicycle Boulevard
- Sidewalk
- Bridge or Undercrossing
- Crossing Beacon
- Intersection Improvement
- Misc. Improvement

Existing Facilities

- Shared Use Path
- Unpaved Trail
- Bike Lane

Base Data

- School
- Hospital
- Water
- Park
- Washington City Limits

0 — 1 — 2 MILES

3 MIN / 10 MIN — 6 MIN / 20 MIN — 12 MIN BIKE RIDE / 40 MIN WALK

Data provided by Washington City, AGRC, City of St. George, UDOT, Dixie MPO. Map produced May 2017.

CONCEPT EVALUATION MEMO

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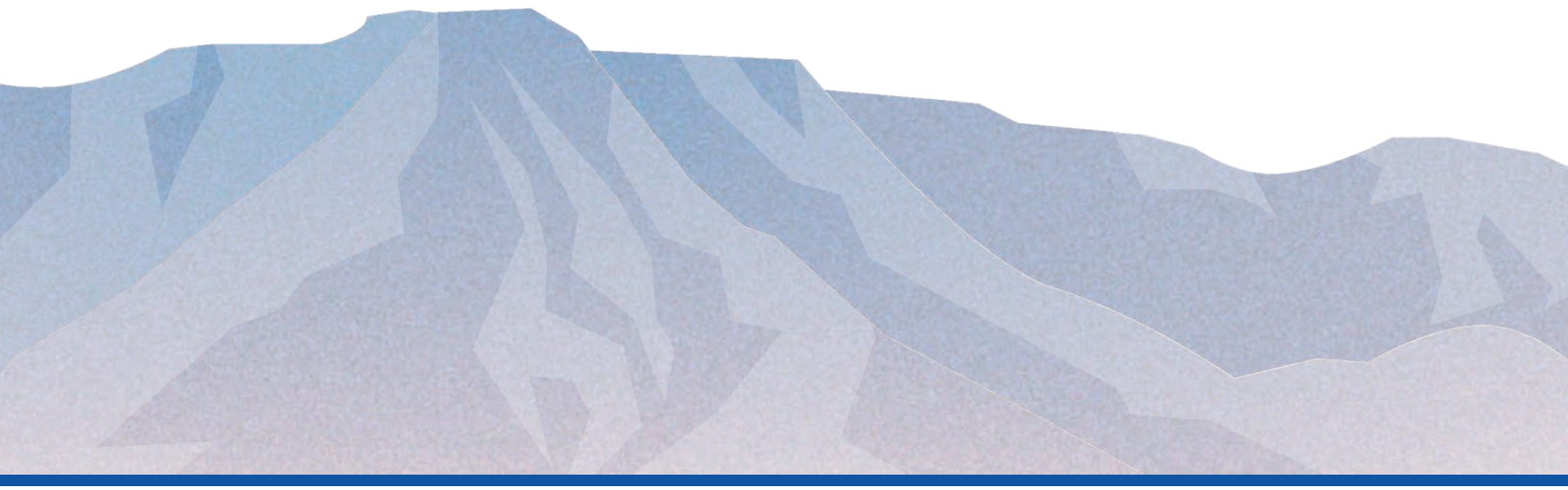

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To: Project File

From: Study Team

Date: June 19, 2018

Memorandum

Subject: I-15 Milepost 11 EIS Concept Evaluation
UDOT Project No.: F-I15-1(166)11
PIN: 14560

The Utah Department of Transportation (UDOT), in conjunction with Washington City, is preparing an Environmental Impact Statement (EIS) to evaluate the current and future transportation and safety needs at Interstate 15 (I-15)/Green Spring Drive Interchange (Exit 10) and the surrounding roadway system in Washington City, Utah. This area currently experiences traffic congestion which is projected to increase in the future. The purpose of the study is to identify the best solution to improve existing and future traffic congestion within the study area while taking into account any potential impacts to the natural and built environment.

As part of the EIS a wide range of alternatives were considered. Prior to defining the alternatives, multiple transportation concepts were identified through a variety of methods including: past transportation studies, the Community Coordination Team (CCT), the study team, Washington City, and public/stakeholder input. These efforts resulted in development of approximately 46 transportation concepts that could be organized into three categories of (1) Expanding existing roadway capacity, (2) Adding roadway capacity, and (3) Increasing transportation efficiency.

To further refine these concepts into a practicable amount, the study team passed them through a series of questions:

1. Is the concept a new idea? (not on an existing transportation plan)
2. Can the concept be designed and constructed to reasonable and current engineering standards?
3. Does the concept provide a measurable transportation benefit?

These efforts resulted in a remainder of 13 concepts that could be combined into six build alternatives. A copy of the spreadsheet used to track the concepts through this process is attached.

I-15 Milepost 11 Interchange
Concept Evaluation

CATEGORY	CONCEPT	CONCEPT DESCRIPTION	CRITERIA				MOVE FORWARD FOR FURTHER STUDY
			NEW IDEA NOT ON EXISTING PLANS (DMPO & WASHINGTON CITY) AND/OR ASSUMED IN BASE MODEL Is the concept a new idea? (not on existing transportation plans)	ENGINEERING FEASIBILITY (DESIGN AND SAFETY STANDARDS) Can the concept be designed and constructed to reasonable and current engineering standards?	PROVIDES TRANSPORTATION BENEFIT Does the concept provide a measurable transportation benefit? STAND ALONE (Move forward if concept can get within 10% of intersection capacity)	PROVIDES TRANSPORTATION BENEFIT Does the concept provide a measurable transportation benefit? COMBINE WITH OTHER CONCEPTS/ALTERNATIVES (Move forward as a component of larger alternative)	
EXPAND EXISTING CAPACITY (Remodel)	1	Thru-turns at Green Spring Dr/Buena Vista Blvd intersection (eliminate lefts)	Y	Y	Y	Y	Y
	2	Thru-turns at Green Spring Dr/Telegraph St intersection (eliminate lefts)	Y	Y	N	Y	Y
	3	Add dedicated Right Turn Lane for SB Green Spring Dr at Buena Vista Blvd	Y	Y	N	Y	Y
	4	Widen the intersection of Telegraph St/Green Spring Dr (Dual Rights, Triple Lefts, Triple thru lanes, etc.)	Y	Y	Y	Y	Y
	5	Convert the Exit 10 interchange to a DDI	Y	N			N
	6	Expand Main St underpass roadway	N (Washington)				N
	7	Relocate Buena Vista Blvd at Green Spring Dr (shift the intersection further north behind gas stations)	Y	Y	Y	Y	Y
	8	Widen Telegraph St to 7 lanes	Y	Y	N	Y	Y
	9	Widen Green Spring Dr/3050 E to 7 lanes	Y	Y	N	Y	Y
	10	Increase turn lane storage pn Green Spring Dr between Telegraph St & Buena Vista Blvd	Y	Y	N	Y	Y
	11	Widen/improve Telegraph St/Wal-Mart intersection	Y	Y	N	Y	N
ADD NEW CAPACITY (Add-on)	12	One-Way Frontage Road System between Exit 10 & Exit 13 interchanges	Y	Y	N	Y	N
	13	Two-Way Frontage Roads between Exit 13 and 300 E	N (Washington)				N
	14	New road between Green Spring Dr & Main St behind Home Depot/Walmart (400 S extension)	Y	Y	N	Y	Y
	15	Better access and circulation through the commercial areas at Exit 10	Y	Y	N	N	N
	16	Grade separate Green Spring Dr/Telegraph St (Telegraph over)	Y	Y	Y	Y	Y
	17	Grade separate Buena Vista Blvd/Green Spring Dr (Buena Vista over)	Y	N			N
	18	Exit 10 hook ramp (similar to Exit 4 to Walmart)	Y	Y	N	N	N
	19	Exit 10 slip ramps for NB & SB I-15 access	Y	Y	N	N	N
	20	Construct new road from 840 S to 750 N (StG)	N (St. George)				N
	21	Connect Main St to 35 W	N (Washington)				N
	22	Extend Washington Pkwy from Telegraph St to Southern Pkwy through Hell Hole Wash	Y	N			N
	23	New Interchange at Main St	Y	Y	N	Y	Y
	24	New interchange at 300 E	Y	Y	N	Y	Y
	25	Convert Mall Drive underpass into an interchange	Y	N	N	N	N
	26	Extend Bulloch St from Exit 13 to provide Community Center access	N (Washington)				N
	27	New connection between 3050 E and Costco/Home Depot	N (Washington & St. George)				N
	28	New underpass at 300 E	Y	Y	N	N	N

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CATEGORY	CONCEPT	CONCEPT DESCRIPTION	CRITERIA				MOVE FORWARD FOR FURTHER STUDY
			NEW IDEA NOT ON EXISTING PLANS (DMPO & WASHINGTON CITY) AND/OR ASSUMED IN BASE MODEL Is the concept a new idea? (not on existing transportation plans)	ENGINEERING FEASIBILITY (DESIGN AND SAFETY STANDARDS) Can the concept be designed and constructed to reasonable and current engineering standards?	PROVIDES TRANSPORTATION BENEFIT Does the concept provide a measurable transportation benefit? STAND ALONE (Move forward if concept can get within 10% of intersection capacity)	PROVIDES TRANSPORTATION BENEFIT Does the concept provide a measurable transportation benefit? COMBINE WITH OTHER CONCEPTS/ALTERNATIVES (Move forward as a component of larger alternative)	
	29	Western connection from Green Spring Dr to Red Hills Pkwy	Y	Y	N	N	N
	30	Provide more connections to the Exit 13 interchange (additional side streets, extension of existing side streets, etc. to provide more direct access to Exit 13)	Y	Y	N	N	N
	31	CFI at Green Springs/Telegraph	Y	N			N
	32	Flyover from north of Buena Vista to south of Telegraph St	Y	N	N	N	N
	33	Convert Exit 10 to a roundabout style interchange that incorporates the frontage roads	Y	Y	N	N	N
	34	Extend 200 S to Albertson Drive	N (Similar to Concept 14)				N
INCREASE EFFICIENCY (Rearrange)	35	Raised medians along Telegraph St & Green Spring Dr	Y	Y	N	Y	Y
	36	Truck restrictions/Dedicated Truck routes (dedicated delivery times allowed for truck traffic)	Y	Y	N	N	N
	37	Increase bike and pedestrian facilities (widen roads, increase trail connectivity, bike trail through Millcreek, bike route at 200 S)	N (Washington Active Transportation Plan)				N
	38	Bike and Pedestrian Overpass/underpass across I-15	Y	Y	N	N	N
	39	Expanded Bus system (Expand SunTrans routes into Washington)	N (DMPO's Master Transit Plan)				N
	40	Connect/Increase circulation within parking lots of commercial centers (Roundabouts at 700 W & Walmart/Home Depot)	N (Assumed in base model)				N
	41	Improve traffic signal timing/synchronization	N (Assumed in base model)				N
	42	Contraflow/Alternating lanes	Y	N			N
	43	Zoning changes	N (Out of study's control)				N
	44	Add new traffic signals (2720 E/Red Cliffs Dr, 500 W/Telegraph St)	N (Assumed in based model)				N
	45	Improve access control on Telegraph St, Red Hills Pkwy/Buena Vista Blvd, Red Cliffs Dr, 3050 E (address unsafe/difficult accesses)	N (Assumed in base model)				N
	46	Eliminate pedestrian movements through Green Springs/Telegraph (provide grade-separated crossings)	Y	N			N

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MAIN STREET ALIGNMENT MEMO

PREPARED BY
Horrocks Engineers

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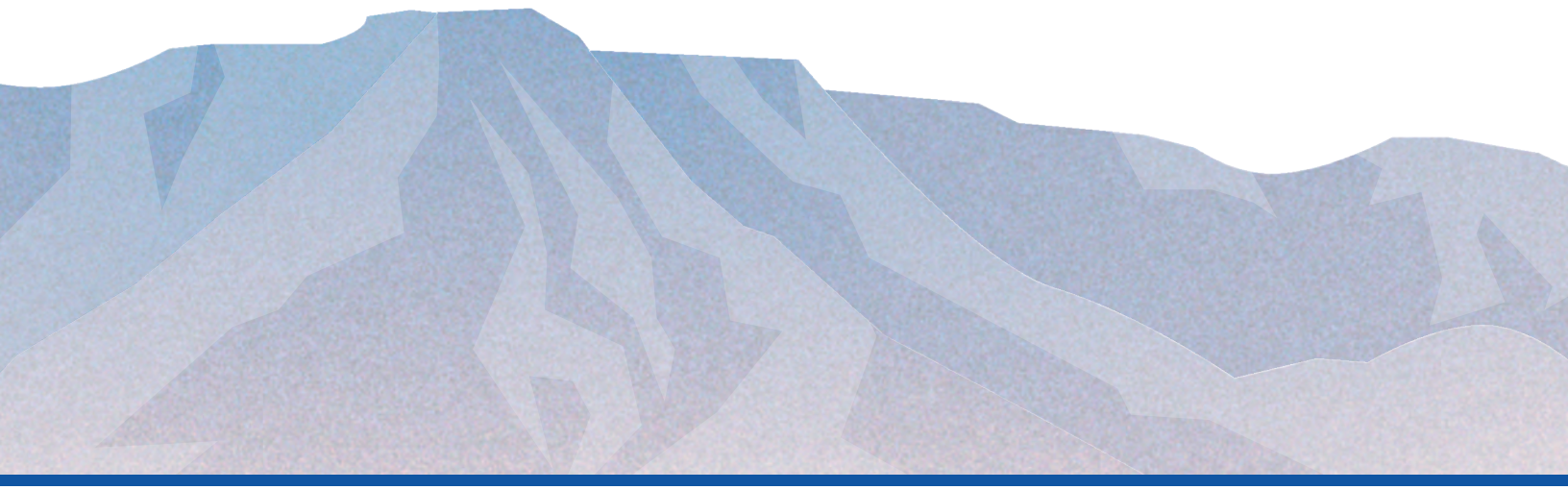

To: I-15 Milepost 11 Interchange Project File

From: Lee Cabell, P.E.
Horrocks Engineers

Date: July 18, 2019

Subject: Main Street Alignment

HORROCKS ENGINEERS

Memorandum

Purpose and Introduction

Near the north edge of the study area, Main Street currently intersects with Buena Vista Boulevard and then continues north. Under the Preferred Alternative, Main Street would be realigned to the west and would connect to Brio Parkway at Buena Vista Boulevard. Brio Parkway passes through the Brio neighborhood where there are several side streets and crosswalks which residents, including elderly residents and children, use to access the clubhouse on the east side of Brio Parkway. During the public comment period for the Draft Environmental Impact Statement (DEIS), Brio residents raised concerns regarding potential pedestrian safety issues. The purpose of this memo is to document the reasons and decisions behind the Main Street alignment as shown in the Preferred Alternative for the I-15 MP 11 (DEIS).

Traffic Operations Analyses

As part of the 2040 PM peak hour traffic operations analyses for the proposed new interchange on Main Street, a queueing analysis was performed. The results of this analysis indicate that utilization of the existing Main Street alignment provides insufficient distance between the proposed I-15 southbound ramps and Buena Vista Boulevard intersections to accommodate the expected queueing that would occur. Specifically queues on the Main Street northbound approach to Buena Vista Boulevard would extend back through the southbound off-ramp intersection and queues from the southbound approach to the off-ramp intersection would extend back through the Buena Vista Boulevard intersection. During the PM peak hour, the 95% queue length on northbound Main Street approaching Buena Vista Boulevard is 425 feet. This length exceeds the available 200 feet between intersections under the existing Main Street alignment. The queueing overflow also increases the risk of crashes.

Interchange Design and Safety Criteria

The Federal Highway Administration (FHWA) has identified 13 controlling design criteria from the AASHTO Green Book that they have determined are of substantial importance to the operational and safety performance of any highway such that special attention should be paid to them in design decisions. FHWA requires a formal written design exception if design criteria on the National Highway System, in this case I-15, are not met for any of these 13 criteria. Of the 13 criteria, sight distance is the one most likely to be affected by using the existing Main Street alignment.

Though actual stopping sight distance on the ramps can be provided, AASHTO intersection sight distance criteria for maneuvers at the proposed I-15 southbound off-ramp intersection may not be able to be obtained using the existing Main Street alignment. Specifically, vehicles turning left from the off-ramp intersection to proceed south on Main Street may not have adequate turning sight distance to determine if westbound vehicles on Buena Vista Boulevard are making a left turn to proceed south on Main Street

or are continuing west. Assuming a 35 mph design speed, the required sight distance for vehicles turning left from the southbound off-ramp is 665 feet. Since there would only be approximately 230 feet between the off-ramp and Buena Vista Boulevard intersections, if the Buena Vista Boulevard left turning vehicles have a green indication and can make a left turn, there is not enough sight distance for the off-ramp vehicles to make the left turn and accelerate to speed on Main Street without impeding the vehicles coming from Buena Vista Boulevard. Furthermore, for the off-ramp left turning vehicles to see this far back to the east on Buena Vista Boulevard would require them to turn their heads approximately 36 degrees back over their shoulder. This angle exceeds the AASHTO recommendation of ±15 degrees beyond perpendicular for drivers to safely look back over their shoulders. The intersection of the southbound ramps and Main Street would be skewed 21 degrees more than the AASHTO recommended skew angle. This condition would only apply if the off-ramp intersection is stop controlled. If both intersections are signal controlled, then it may be possible to synchronize the timing of the signals such that this potential conflict could be eliminated.

Environmental Resources

Implementing an interchange using the existing Main Street alignment would likely require the relocation of the Washington City power substation located in the southeast quadrant of the Main Street and Buena Vista Boulevard intersection. It is estimated that the cost to relocate this substation could be in the range of $1.5-$3.0 Million based on similar projects in the area and the average cost of new substations of similar size that have recently been constructed in Washington County.

To address the intersection spacing concerns, the Buena Vista Boulevard intersection could be moved several feet to the north. However, this would cause several residential relocations at the La Venida Apartments and the Brio subdivisions.

Conclusion

Due to the potential queueing problems, sight distance concerns, impacts to the power substation, and several residential relocations, the alignment of Main Street for the Preferred Alternative in the EIS was moved to the northwest on the north side of I-15 to connect to Buena Vista Boulevard at Brio Pkwy. This alignment change avoids the potential operational, safety, and environmental issues discussed in this memo and, in the opinion of the study team, results in the best overall interchange configuration, design, and operation.