SR-73 Corridor Traffic Study

MP 29.7 (Eagle Mountain Blvd) to MP 35.4 (Foothill Blvd)

January 2016

UDOT

Keeping Utah Moving

SR-73 Corridor Traffic Study

1.0 Introduction

Utah State Route 73 (SR-73) serves as the primary roadway arterial connecting the Cedar Valley (west of Utah Lake) with the rest of the Wasatch Front. Cedar Valley contains the municipalities of Eagle Mountain, Cedar Fort, and Fairfield. Eagle Mountain is by far the largest in population and primarily serves as a bedroom community with residents commuting to employment centers in the Salt Lake and Utah valleys. Due to topographical constraints, roadway connectivity between Cedar Valley and Utah Valley is limited. Pony Express Parkway is the only other roadway accessing northern Cedar Valley and currently operates as a minor arterial. As the Cedar Valley population is expected to triple to approximately 83,000 residents by 2040, SR-73 as it currently exists through Eagle Mountain will be hard pressed to serve the resulting heavy growth in traffic demands. This report describes a traffic study to evaluate the future of the SR-73 corridor and includes the analysis of various build concepts under future traffic conditions.

The following sections describe the analysis methodology, an analysis of current and future conditions given the current configuration of SR-73, an analysis of potential concepts for SR-73 improvements and how they fare in meeting future traffic demands, a possible lane configuration of the recommended concept, and a phasing analysis to determine the approximate timeframe of when improvements will be needed.

2.0 Analysis Methodology

The methodologies and tools used in performing the analysis of SR-73 are described in this section. Analysis tools key to the development of this study are the MAG travel demand model and the VISSIM micro-simulation software. The use of these tools, along with descriptions of some of the measures of effectiveness used for the study are described in this section.

2.1 MAG Travel Demand Model

The MAG travel demand model is a tool used to predict future travel patterns and traffic volumes for the Wasatch Front area. It is jointly owned and maintained by the Wasatch Front Regional Council (WFRC) and the Mountainland Association of Governments (MAG), which are the Metropolitan Planning Organizations for the Wasatch Front. MAG is responsible for Utah County and WFRC covers Weber, Davis, and Salt Lake Counties. Version 8.0 Beta of the travel model was used for this study.

The travel model has two primary inputs: land use data and transportation system data. The land use data consists of residential and employment data for the entire region. This data is prepared in geographic blocks call Traffic Analysis Zones (TAZs). There are over 600 TAZs in Utah County and over 37 zones in the northern Eagle Mountain area. The transportation system data consists of roadway and transit networks. The travel model inputs are prepared for a base year, which in this case was 2015, and for future years, which in this case were 2024, 2034, and 2040. In consultation with the cities, MAG prepares future land use projections for each of these years. These projections are used by MAG to develop the Regional Transportation Plan (RTP), which is the plan for the development of the future transportation system and includes a list of projects that will be built by each of the future horizon years.

Using these inputs, the travel model predicts how many person trips will be generated in the region, where those trips will be going, the mode by which they will be made, and the transportation facilities that will be used to get there.

To improve the model's accuracy in the study area modifications were made to the area's TAZs. As a high growth area, there are new roadways planned by Saratoga Springs and Eagle Mountain that don't match up well with the existing TAZ structure. TAZs were split along these new and planned roadways throughout northern Eagle Mountain and western Saratoga Spring to allow for better refinement of travel patterns. A total of 29 TAZs were modified resulting in more than 55 TAZs. Household and employment reassignment to the new TAZ structure was completed by MAG. A map showing the TAZ modifications and a table of resulting household and employment projections can be found in Appendix A.

Land use data in the model consists primarily of household and employment growth as spread out among the region's various TAZs. To better understand land use growth in the study area, TAZs for the northern Eagle Mountain area were aggregated into five districts, as shown in Figure 1. Estimated population and employment numbers for each district for 2015 and 2040 are shown in Table 1. The northern Eagle Mountain area population is expected to triple by 2040, increasing from 21,130 in 2015 to 64,760 in 2040 (a 279% increase). Area employment is expected to increase from only 840 jobs in 2015 to approximately 15,890 jobs in 2040. Significant growth can be found in all districts.

Figure 1 also provides a visualization of projected changes in population between 2015 and 2040. Population growth per district between 2015 and 2040 is represented by the intensity of the blue colors, i.e. a darker blue represents more population growth for that district. As to be expected due to topography, most of the population growth occurs south of SR-73 in districts 3 through 5.

Table 1 – Study Area Population and Employment Growth

District	Population				Employment			
	2015	2040	Growth	% Growth	2015	2040	Growth	% Growth
1	1,740	7,100	5,360	308%	30	2,450	2,420	>500%
2	100	3,080	2,980	>500%	10	4,870	4,860	>500%
3	5,570	18,390	12,820	230%	150	4,400	4,250	>500%
4	4,570	13,130	8,560	187%	250	3,480	3,230	>500%
5	9,150	23,060	13,910	152%	400	690	290	73%
Total	**21,130**	**64,760**	**43,630**	**206%**	**840**	**15,890**	**15,050**	**>500%**

Source: MAG 2014

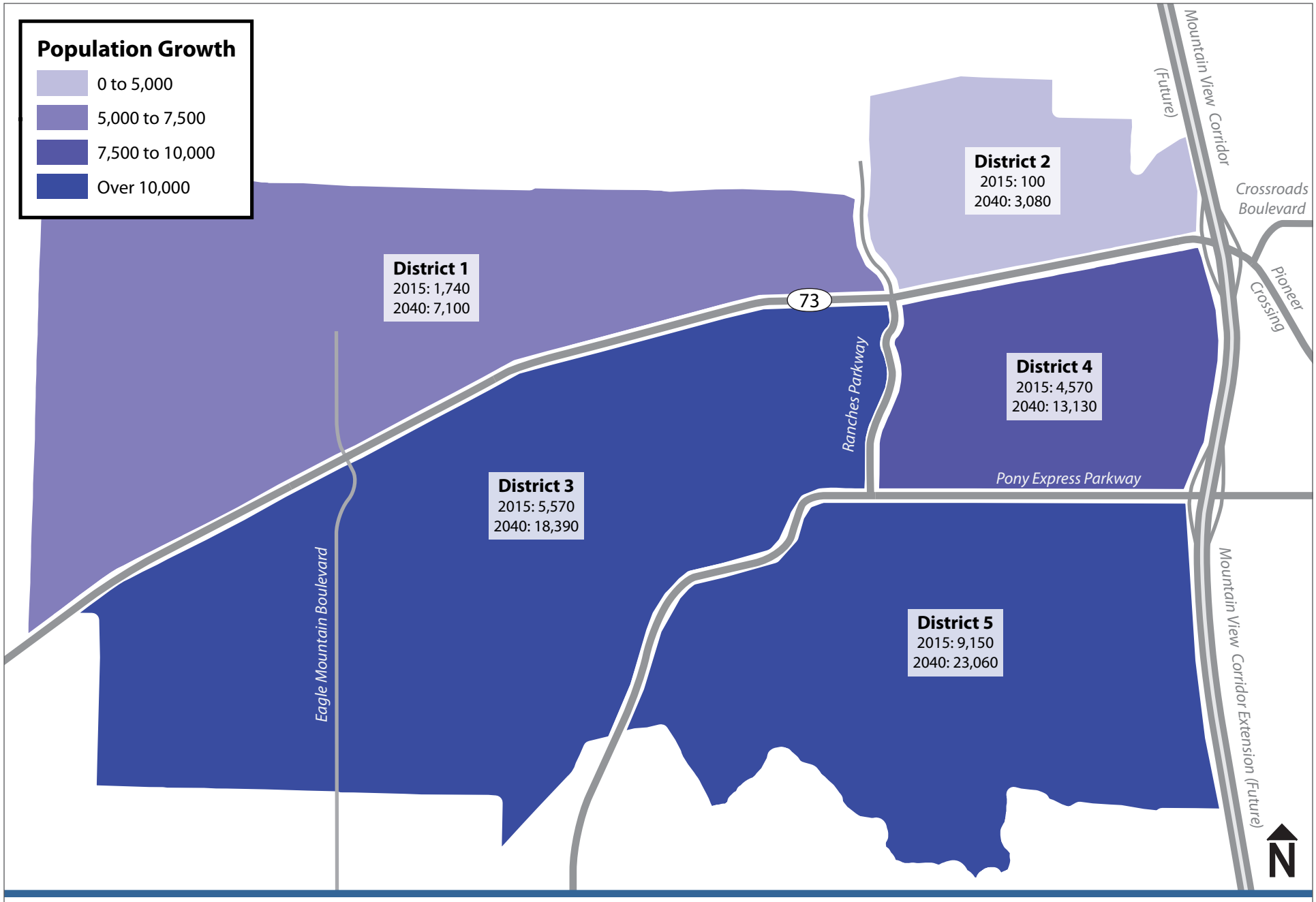

Figure 1 – Study Area Population Growth 2015-2040

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2.2 VISSIM Micro-Simulation Model

VISSIM is a micro-simulation model used for performing complex traffic operations analyses. VISSIM is developed by PTV and widely used in Utah and throughout the world. Micro-simulation models individually simulate each vehicle in the model area and the interaction between them, which makes them very powerful in their capabilities to analyze a wide range of roadway and intersection possibilities. Traffic volumes and traffic control devices such as traffic signals and stop signs are coded into the model, which is then run. VISSIM is a stochastic model, which means that each run of the model with a different random seed value produces different results. Therefore, for this study each VISSIM model was run ten times and the results averaged together.

VISSIM was used in this study to analyze the recommended improvement concept, which included a determination of the number of lanes required to meet the 2040 demand and the associated vehicle storage requirements to accommodate the expected queue lengths.

2.3 Measure of Effectiveness

The primary measure of effectiveness used for this study is the volume-to-capacity (v/c) ratio. To calculate v/c ratios both traffic volumes and roadway capacities are needed.

Lane capacity varies by facility type and is an input into the travel demand model. Freeways have the highest capacity with up to 2100 vehicles per hour per lane. Arterial roadway capacities can reach up to around 900 vehicles per hour per lane. Capacity is also affected by the number of lanes on a facility. As more lanes are added to a roadway, the capacity per lane drops.

The travel demand model estimates the demand volume for each link in the model network by travel direction for both the AM and PM peak periods, as well as off-peak periods. These volumes are then adjusted based on actual average daily volumes for roadways as reported by UDOT. This adjustment attempts to correct discrepancies between actual and modeled volumes and are applied to all future year analyses. Traffic volumes, as Average Daily Traffic (ADT), are summarized on the segment level for the entire highway network.

By simply dividing the adjusted demand volume by the associated roadway capacity, the travel demand model outputs a v/c ratio for each modeled roadway link. The individual roadway links were aggregated to create three segments: from Eagle Mountain Boulevard to Six Mile Cutoff Road, from Six Mile Cutoff Road to Ranches Parkway, and from Ranches Parking to the Mountain View Corridor / Saratoga Springs 800 West.

For the purposes of this study, congestion levels as defined by volume-to-capacity ratios are shown in Table 2. When reporting v/c ratios in this study, the maximum v/c ratio between the AM and PM peak periods is used.

Table 2 – Congestion Levels by Volume-to-Capacity Ratio

Congestion Level	v/c Ratio Range
Minimal Delay	0 to 0.7
Approaching Congested	0.7 to 0.9
Congested	0.9 to 1.0
Heavily Congested	1.0 and greater

2.4 Traffic Counts

A key component to all of the traffic analyses performed for this study was an understanding of existing traffic volumes on the corridor. Traffic volumes were collected from May 12-14, 2015. Intersection turning movement counts were performed at nine intersections along the corridor: Eagle Mountain Boulevard, Six Mile Cutoff Road, Canyon Wash Drive, Valley Drive, Sunset Drive, Cedar Pass Road, Ranches Parkway, Mt Airey Road, and Hillside Drive. The counts were collected between 7:00 AM and 9:00 AM and between 4:00 PM and 7:00 PM. The AM peak hour was determined to be from 7:00 to 8:00 AM. The PM peak hour was determined to be from 5:15 to 6:15 PM. Counts for Foothill Boulevard and Crossroads Boulevard were estimated using data from the UDOT Signal Performance Metrics website for the same time periods. To prepare the intersection volumes for use, the volumes were balanced between intersections through the project area so that the volume exiting one intersection was the same as the volume entering the adjacent intersection.

Existing traffic volumes for each analyzed intersection are shown in Figure A1. Counts were conducted May 12-14, 2015. For both AM and PM peak hours, the through movements along SR-73 have the highest volumes with the PM volumes being higher than the AM. The exception is at the intersection of SR-73 and Crossroads Boulevard / Pioneer Crossing where the major movements for this intersection are the eastbound left and the southbound right, or those traveling to/from Lehi Main Street.

Daily volume counts were conducted at two locations on SR-73: between Sunset Drive and Cedar Pass Road and between Mt Airey Drive and Hillside Drive. As expected, the highest Average Daily Traffic (ADT) on SR-73 occurs on the eastern end with 24,600 vehicles per day. The ADT east of Sunset Drive is 12,900 vehicles per day, almost half of that on the eastern end. The directional ADT for these two locations is also shown in Figure 2.

2.5 Future Traffic Volumes

Future year traffic volumes were developed using the MAG travel demand model and the balanced 2015 traffic volumes. As mentioned previously, modifications were made to the travel demand model to improve its accuracy in the study area. The modifications include TAZ splits and revisions to the highway network in the Eagle Mountain area.

After these modifications were made, the travel model was run for the base year (2015) and 2040. Future AM and PM peak hour turning movement volumes were developed using principles described in the National Highway Cooperative Research Program (NCHRP) Report 255 document. In short, the travel model was used to estimate the growth between the base year and the future year for each intersection leg for traffic into and out of the intersection. That growth was then applied to the 2015 traffic count volumes and the resulting volumes balanced to ensure the correct number of inbound and outbound vehicles on each leg of the intersection.

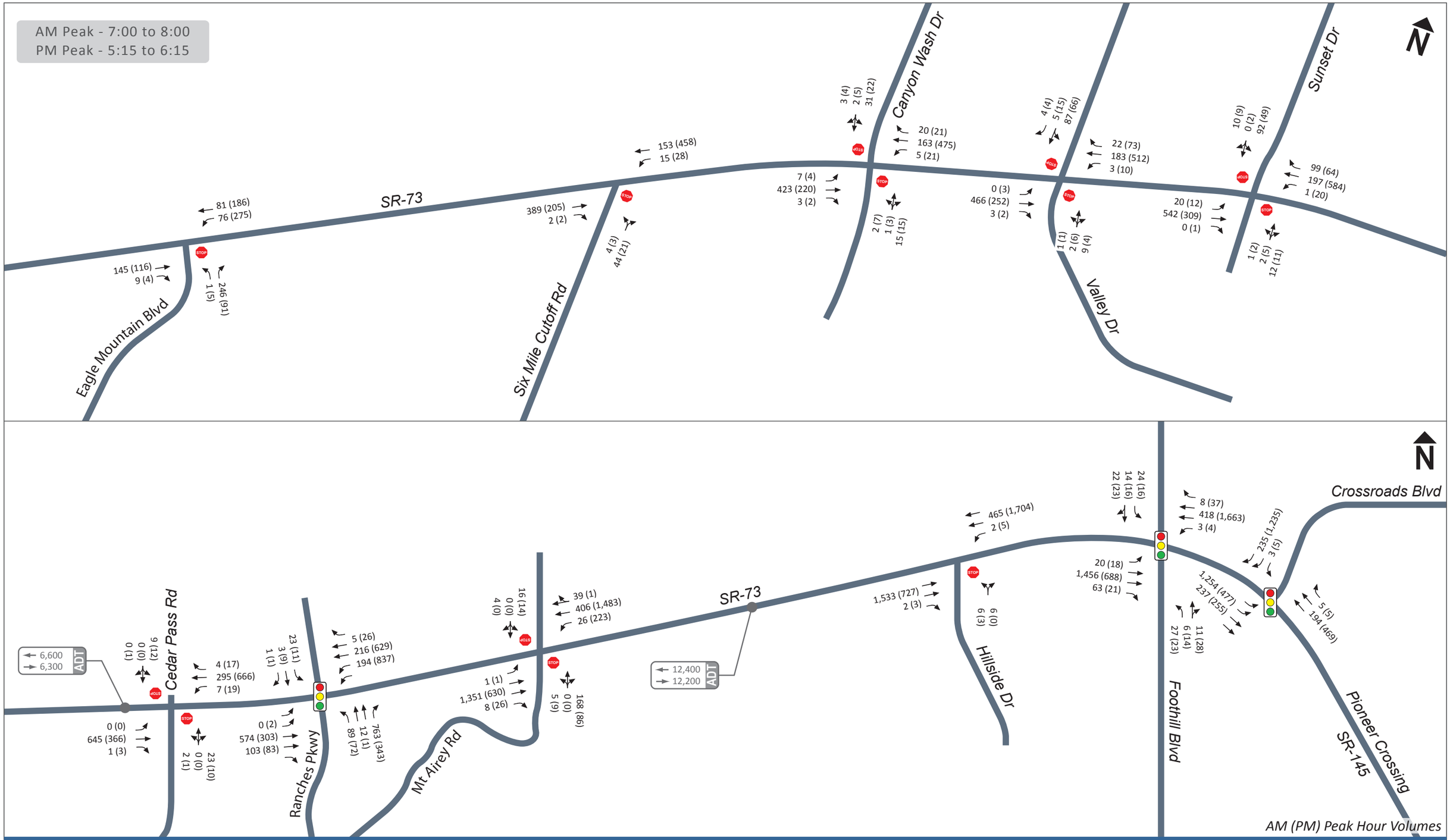

Figure 2 — Existing (2015) Weekday Peak Hour Turning Movement Volumes
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Counts conducted May 12-14, 2015

3.0 Existing and Future No Build Conditions

This section describes existing traffic operations along the SR-73 corridor and the anticipated future traffic operations if no improvements are made. For these conditions, SR-73 was analyzed as a five-lane corridor with two lanes per travel direction and center two-way-left-turn-lane on the eastern section of the roadway between Cedar Pass Road and Pioneer Crossing. On the western section of the roadway between Eagle Mountain Boulevard and Cedar Pass Road, SR-73 was analyzed as a two-lane corridor with one travel lane per direction and turn lanes at cross streets. Results of the analysis are reported in terms of v/c ratios and congestion levels for the roadway segments.

3.1 Existing Conditions

The existing conditions analysis shows that the corridor is currently performing with minimal delay (v/c ratio < 0.7) along the length of SR-73 during both the AM and PM peak periods. Table 3 lists the ADT, the highest v/c ratios (between AM and PM), and the associated congestion level for each of the three SR-73 segments. The segment of SR-73 between Ranches Parkway and the Mountain View Corridor (near the current Foothill Boulevard) has the highest v/c ratio along SR-73 with a v/c ratio of 0.72. This means that despite recent roadway improvements to SR-73 at Ranches Parkway and to the east, the roadway is approaching congested conditions.

Table 3 – Existing ADT Volumes and Congestion Levels

Year	Measure	SR-73 Segment		
		Western Section		Eastern Section
		Eagle Mtn Blvd to Six Mile Cutoff Rd	Six Mile Cutoff Rd to Ranches Pkwy	Ranches Pkwy to Mountain View Corridor
2015 (Existing)	**ADT**	**7,800**	**10,900**	**24,000**
	Max V/C	**0.44**	**0.66**	**0.72**
	Congestion Level	Minimal Delay	Minimal Delay	Approaching Congested

3.2 Future No Build Conditions

Future no build conditions show how the corridor is expected to operate in the future if no substantial changes are made to the current facility. The no build analysis provides a benchmark for measuring the benefit of potential improvement scenarios. Thus, baseline traffic operations for SR-73 can be established and all other improvement scenarios can be compared to this condition.

By 2040, all of the SR-73 segments are expected to be heavily congested with volumes ranging from 20,000 daily vehicles per day on the west to 51,000 vehicles per day on the east. Table 4 summarized the ADT and associated congestion levels by segment for 2015 and 2040.

Table 4 – No Build ADT Volumes and Congestion Levels

Year	Measure	SR-73 Segment		
		Western Section		Eastern Section
		Eagle Mtn Blvd to Six Mile Cutoff Rd	Six Mile Cutoff Rd to Ranches Pkwy	Ranches Pkwy to Mountain View Corridor
2015 (Existing)	**ADT** **Max V/C** Congestion Level	**7,800** **0.44** Minimal Delay	**10,900** **0.66** Minimal Delay	**24,000** **0.72** Approaching Congested
2040	**ADT** **Max V/C** Congestion Level	**24,000** **1.36** Heavily Congested	**40,000** **2.05** Heavily Congested	**54,000** **1.50** Heavily Congested

4.0 Improvement Concepts

Several improvement concepts were considered for the SR-73 corridor to see how they would meet the anticipated 2040 travel demand. The four concepts analyzed under 2040 conditions were: reversible lanes, widened and new arterials, a freeway without frontage roads, and freeway with frontage roads. The assumptions for each concept are detailed in this section. All roadway configurations in the study area not specifically defined for a given concept were analyzed per the number of lanes and functional class as found in the 2040 RTP.

4.1 Reversible Lanes

The reversible lanes concept includes a seven-lane cross-section on SR-73 with three travel lanes per direction in off-peak operations. During peak periods, one lane per direction is reversed to match the peak flow of traffic resulting in four lanes in the peak flow direction and two lanes in the off-peak direction. Therefore, during the AM period, there were four lanes for eastbound traffic and two lanes for westbound traffic and in the PM period were four lanes in the westbound direction and two lanes in the eastbound direction.

4.2 Widened and New Arterials

The widened and new arterials concept includes widening SR-73 and Pony Express Parkway to six-lanes (three travel lanes per direction), as well as two new four-lane arterials (two travel lanes per direction). The two new arterials were the Lake Mountain Highway and the Hidden Valley Highway. The Lake Mountain Highway would run north of SR-73 along the base of the mountains and would connect on the east to the Mountain View Corridor and Harvest Hills Boulevard in Saratoga Springs and on the west to Six Mile Cutoff Road. The Hidden Valley Highway would be about one mile south of Pony Express Parkway and would connect to the Mountain View Corridor and Redwood Road on the east and run west winding through the hills to Eagle Mountain.

4.3 Freeway without Frontage Roads

The freeway without frontage roads concept converts SR-73 to a limited access freeway between Eagle Mountain Boulevard on the west and the Mountain View Corridor and Pioneer Crossing on the east. The freeway includes three lanes per travel direction east of Ranches Parkway and two lanes per travel direction west of Ranches Parkway. Four interchanges are located along SR-73:

- Eagle Mountain Boulevard
- Six Mile Cutoff Road
- Valley Road
- Ranches Parkway

All other cross streets along SR-73 are grade separated and not directly accessible from the SR-73 freeway but are accessible through the surrounding collector roadway network.

4.4 Freeway with Frontage Roads

The freeway with frontage roads concept converts SR-73 to a limited access freeway between Eagle Mountain Boulevard on the west and Mountain View Corridor on the east. The freeway includes three lanes per travel direction east of Ranches Parkway and two lanes per travel direction west of Ranches Parkway. Frontage roads run the entire length of the freeway with a two lanes per direction east of Ranches Parkway and one lane per direction west of Ranches Parkway. All cross streets along SR-73 are accessible from the frontage roads. The analysis assumed the following the locations for slip on and off ramps between the frontage roads and the freeway:

- Ramps to/from the East
  - Eagle Mountain Boulevard
  - Six Mile Cutoff Road
  - Ranches Parkway
  - Mt Airey Road
- Ramps to/from the West
  - Eagle Mountain Boulevard
  - Ranches Parkway

These assumptions were made for the purposes of this analysis. Ultimately, the geometric design and topographical constraints will determine ramp locations and levels of cross-street access (i.e. full access vs. right-in / right-out only).

5.0 Analysis Results

A travel demand analysis was performed for each of the four improvements concepts for the 2040 horizon year. Segment level volumes and v/c ratios were extracted from the travel model and are shown in Tables 5 and 6 for SR-73 and Pony Express Parkway, respectively. Maps showing ADT and the congestion levels of SR-73 as well as surrounding roadways can be found in Appendix B.

Table 5 – 2040 ADT and Congestion for SR-73

Concept	Measure	SR-73 Segment		
		Western Section		Eastern Section
		Eagle Mtn Blvd to Six Mile Cutoff Rd	Six Mile Cutoff Rd to Ranches Pkwy	Ranches Pkwy to Mountain View Corridor
No Build	**ADT** **Max V/C** Congestion Level	**24,000** **1.36** Heavily Congested	**40,000** **2.05** Heavily Congested	**54,000** **1.50** Heavily Congested
Reversible Lanes	**ADT** **Max V/C** Congestion Level	**28,000** **0.52** Minimal Delay	**49,000** **1.00** Heavily Congested	**64,000** **1.18** Heavily Congested
Widened and New Arterials	**ADT** **Max V/C** Congestion Level	**28,000** **0.59** Minimal Delay	**48,000** **0.92** Congested	**67,000** **1.15** Heavily Congested
Freeway without Frontage Roads	**ADT** **Max V/C** Congestion Level	**31,000** **0.59** Minimal Delay	**57,000** **1.05** Heavily Congested	**91,000** **0.97** Congested
Freeway with Frontage Roads	**ADT** **Max V/C** Congestion Level	**30,000** **0.46** Minimal Delay	**58,000** **0.82** Approaching Congested	**97,000** **0.79** Approaching Congested

The best performing concept is the Freeway with Frontage Roads, which is the only concept to not have any congested or heavily congested segments. All of the other concepts have congested SR-73 segments. The Reversible Lanes concept results in heavily congested levels for the segments between Six Mile Cutoff Road and Mountain View Corridor. The Widened and New Arterials concept results in heavily congested levels for the eastern section of SR-73 in 2040, while the middle segment of SR-73 is at congested levels. The Freeway without Frontage Roads concept performs better in the eastern section, but is heavily congested for the segment between Six Mile Cutoff Road and Ranches Parkway.

The Freeway with Frontage Roads concept also moves a larger amount of volume. In no build conditions only 54,000 vehicles per day are served. By improving to a freeway with frontage roads, an additional 43,000 vehicles can be served or an additional 82% for a total of 97,000 vehicles per day. The Freeway without Frontage Roads concept moves nearly as much at 91,000 vehicles per day.

In the Reversible Lanes and Widened and New Arterials concepts SR-73 only handles 64,000 to 67,000 vehicles per day, respectively. Most of the additional demand is served by Pony Express Parkway in both concepts with 39,000 to 43,000 vehicles per day. The Lake Mountain and Hidden Valley Highways modeled for the Widened and New Arterials concept do little to relieve traffic demand on SR-73 or Pony Express Parkway.

Table 6 – 2040 ADT and Congestion for Pony Express Parkway

Concept	Measure	Pony Express Parkway	
		Western Section	Eastern Section
		Six Mile Cutoff Rd to Ranches Parkway	Ranches Pkwy to Mountain View Corridor
No Build	**ADT** **Max V/C** Congestion Level	**43,000** **1.48** Heavily Congested	**46,000** **1.36** Heavily Congested
Reversible Lanes	**ADT** **Max V/C** Congestion Level	**40,000** **1.07** Heavily Congested	**43,000** **1.13** Heavily Congested
Widened and New Arterials	**ADT** **Max V/C** Congestion Level	**40,000** **0.81** Approaching Congested	**39,000** **0.90** Congested
Freeway without Frontage Roads	**ADT** **Max V/C** Congestion Level	**37,000** **0.99** Congested	**28,000** **0.89** Approaching Congested
Freeway with Frontage Roads	**ADT** **Max V/C** Congestion Level	**37,000** **0.93** Congested	**27,000** **0.81** Approaching Congested

6.0 Freeway with Frontage Roads Concept Additional Analysis

The Freeway with Frontage Roads concept was analyzed further to provide additional insight into potential construction phasing timelines and lane configurations to inform the design process. Additionally, a 2050 analysis was performed to help determine the lifespan of the concept.

6.1 Phasing Analysis

The Freeway with Frontage Roads concept allows for a phasing scenario wherein the frontage roads are constructed first and then the freeway portion of the facility can be constructed when necessitated by traffic demands. The analysis was performed in two steps:

1. No Build travel model runs were performed for 2024 and 2034 conditions for use in determining when the initial improvements will be needed and
2. Frontage road only model runs were performed for 2024, 2034, and 2040 conditions to determine when the freeway improvements will be needed.

The frontage roads only scenario assumed three travel lanes per direction along SR-73 for the eastern section between Ranches Parkway and Mountain View Corridor and two travel lanes per direction for the western section between Eagle Mountain Boulevard and Ranches Parkway. In each case this is one additional lane per direction beyond what is needed for the final configuration of the Freeway with Frontage Roads concept. This additional

lane could utilize shoulder or temporary pavement, such that when the final build out of the freeway is completed the extra lane could be removed or taken out of service.

Results from the travel demand model for No Build conditions are shown in Table 7. Due to the rapid growth in the Eagle Mountain area, SR-73 as it currently exists will fail to meet traffic demands rather quickly, especially on the eastern end. By 2024, SR-73 east of Six Mile Road becomes heavily congested with approximately 43,000 daily vehicles using this eastern section of roadway and 21,000 using the segment between Six Mile Cutoff Road and Ranches Parkway. By 2034, SR-73 between Eagle Mountain Boulevard and Six Mile Cutoff Road heavily congested with 21,000 daily vehicles.

Table 7 – No Build ADT Volumes and Congestion Levels by Year

Year	Measure	SR-73 Segment		
		Western Section		Eastern Section
		Eagle Mtn Blvd to Six Mile Cutoff Rd	Six Mile Cutoff Rd to Ranches Pkwy	Ranches Pkwy to Mountain View Corridor
2015 (Existing)	**ADT** **Max V/C** Congestion Level	**7,800** **0.44** Minimal Delay	**10,900** **0.66** Minimal Delay	**24,000** **0.72** Approaching Congested
2024	**ADT** **Max V/C** Congestion Level	**15,000** **0.81** Approaching Congested	**21,000** **1.16** Heavily Congested	**43,000** **1.18** Heavily Congested
2034	**ADT** **Max V/C** Congestion Level	**21,000** **1.18** Heavily Congested	**35,000** **1.77** Heavily Congested	**57,000** **1.38** Heavily Congested
2040	**ADT** **Max V/C** Congestion Level	**24,000** **1.36** Heavily Congested	**40,000** **2.05** Heavily Congested	**54,000** **1.50** Heavily Congested

To get a better idea of the timing of the transition between congestions levels, Figure 3 shows the approximate No Build congestion levels by year over the next 25 years. The color bands show the approximate time ranges for the various congestion levels. For the eastern section of SR-73 the roadway goes from approaching congested levels (yellow in 2015) to heavily congested sometime around 2020. The onset of heavily congested levels for the western section occurs around 2020 to 2025, lagging the eastern section by about 5 years.

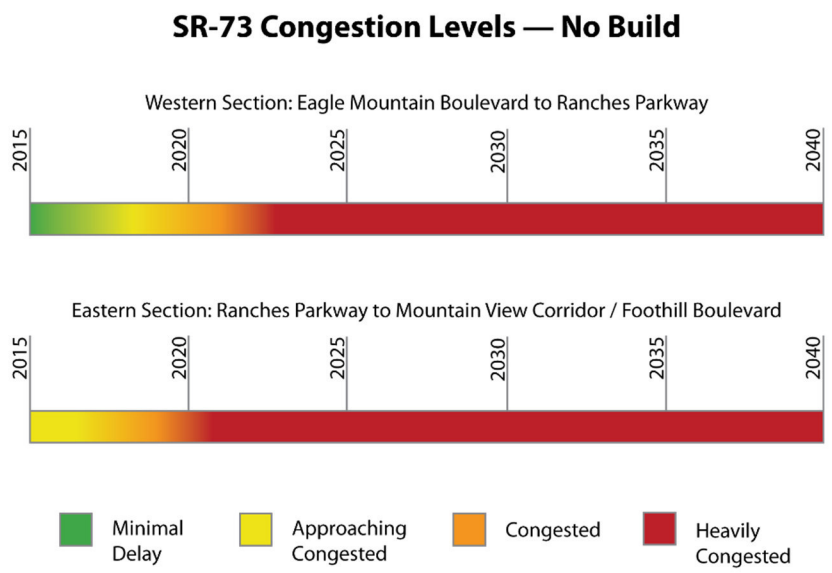

Figure 3 – SR-73 Congestion Levels over Time — No Build

The resulting congestion levels over time for the Frontage Roads Only scenario are shown in Figure 4. For the eastern section of SR-73, the construction of frontage roads delays the onset of heavily congested conditions to sometime between 2030 and 2035. This is ten years beyond the onset of congestion for no build conditions. For the western section, congested conditions occur around the year 2035, or a few years behind the western section.

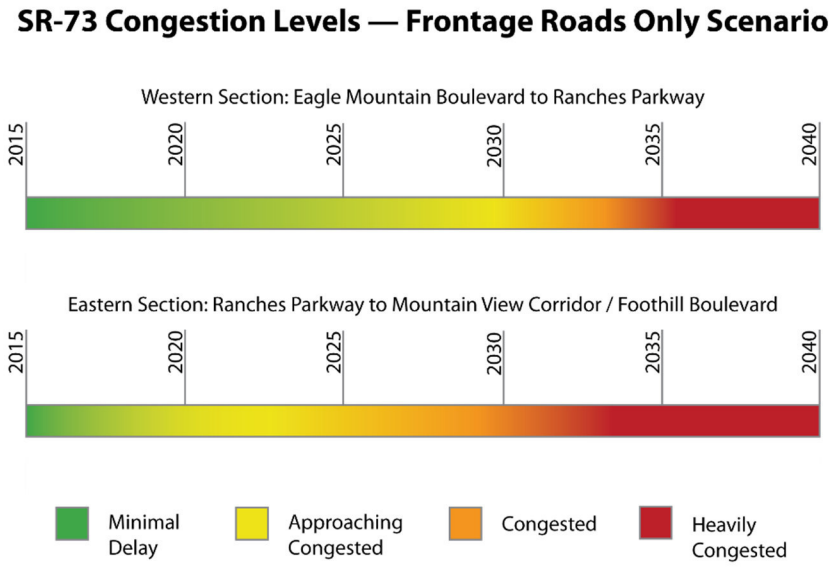

Figure 4 – SR-73 Congestion Levels over Time — Frontage Roads Only Scenario

6.2 Lane Configurations

A VISSIM analysis was performed for the Freeway with Frontage Roads concept for the 2040 horizon year. This analysis was used to determine the appropriate lane configurations for the roadways, ramps, and intersections, as well as queue storage demands. Figure 5 shows the resulting intersection lane configurations with the associated 95th percentile queues lengths, which would translate into the approximate turning vehicle storage requirements.

The Freeway with Frontage Roads concept includes three freeway lanes and two frontage road travel lanes in each direction east of Ranches Parkway and two freeway lanes and one frontage road travel lane in each direction west of Ranches Parkway.

At each cross street, turn lanes are added to handle the demand of traffic exiting the freeway and turning onto side streets. The VISSIM analysis helps determine the number of turn lanes needed as well. Since most population and employment is concentrated south of SR-73, the critical movements are the northbound right turns in the AM peak period and westbound left turns in the PM peak. To serve these heavy movements, double left and right turn lanes are necessary at the major cross streets: Eagle Mountain Boulevard, Six Mile Cutoff Road, and Ranches Parkway.

The analysis for this concept assumed slip ramps to/from the east at both Ranches Parkway and Mt Airey Rd. However, because these two cross streets are so closely spaced, design may not permit ramps at both locations. Mt Airey Road serves as critical relief to Ranches Parkway. Without ramps to/from the east at Mt Airey Road, Ranches Parkway would need to handle even more traffic. If design dictates only one set of ramps are possible, it may be preferable to forego the slips ramps to/from the east at Ranches Parkway rather than the ramps to/from the east at Mt Airey Road. Traffic exiting the freeway and heading to the south would exit east of Mt Airey and have the option of turning left either at Mt Airey or continuing through the intersection and turning left at Ranches Parkway. This configuration allows for the distribution of left turning traffic between the two cross streets. This issue will need to be further refined during the environmental process.

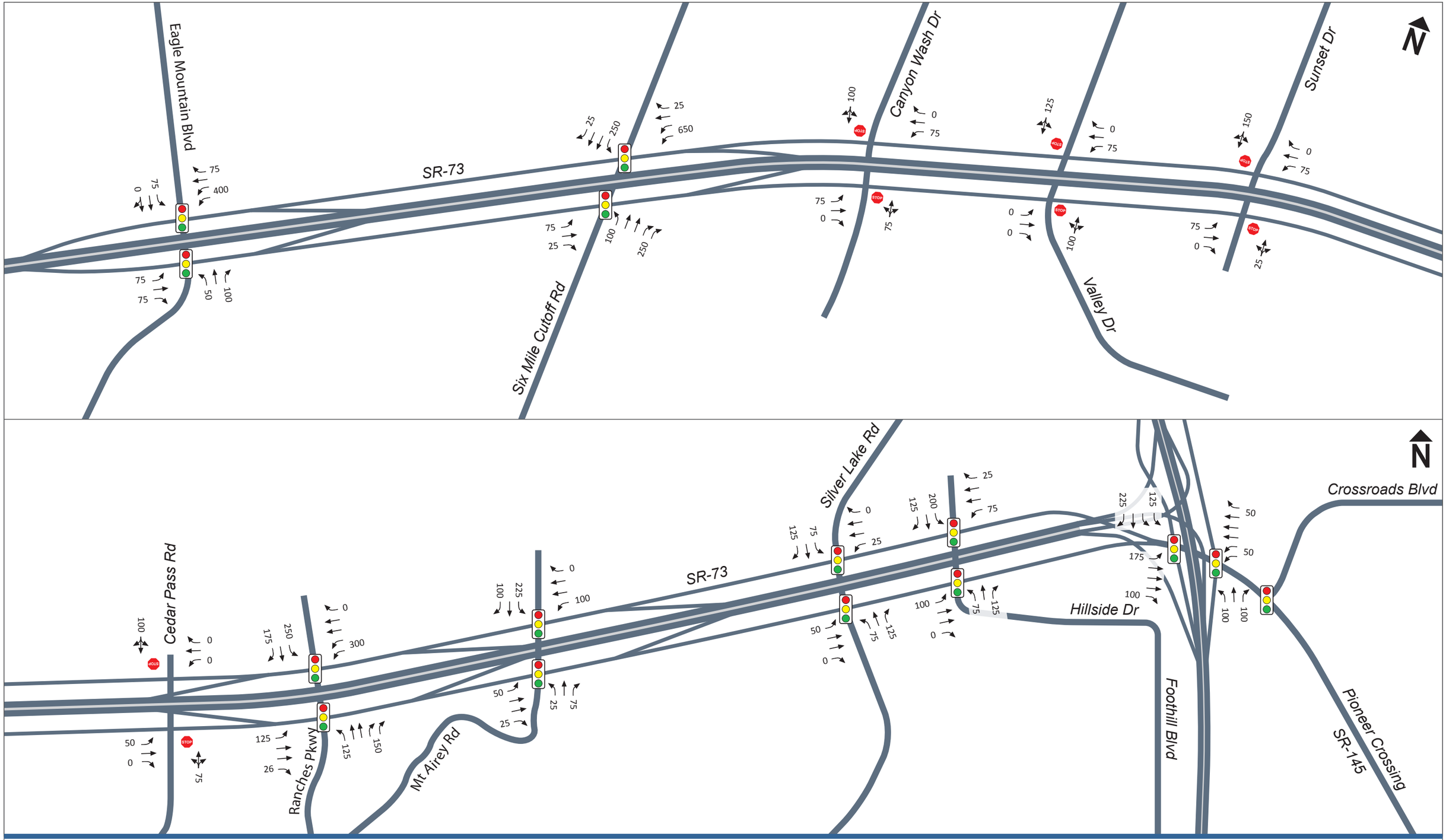

Figure 5 – 2040 Lane Configurations with 95th-Percentile Queues (feet) for Left and Right Turns – Freeway with Frontage Roads Concept
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Note: Queue length is in addition to any storage needs between frontage road intersection pairs.

6.3 2050 Analysis

An analysis was performed to see how the freeway with frontage road concept operates given rough growth assumptions for 2050. Typically, a concept is only analyzed to the horizon year of the RTP, which is 2040. However, given that this corridor is in such a high growth area of the county, it is important to see how long past the horizon year the concept can be expected to perform well. This allows for better decision making today. Because 2050 is beyond the horizon year for the RTP, the travel demand model uses the 2040 roadway network but with 2050 population and employment projections. Results from the travel demand model are shown in Table 8. A figure showing projected 2050 volumes along the SR-73 corridor and the surrounding roadway network is found in Appendix B.

Table 8 – 2050 ADT and Congestion for Freeway with Frontage Roads Concept

Year	Measure	SR-73 Segment		
		Western Section		Eastern Section
		Eagle Mtn Blvd to Six Mile Cutoff Rd	Six Mile Cutoff Rd to Ranches Pkwy	Ranches Pkwy to Mountain View Corridor
2040	ADT Max V/C Congestion Level	30,000 0.46 Minimal Delay	58,000 0.82 Approaching Congested	97,000 0.79 Approaching Congested
2050	ADT Max V/C Congestion Level	49,000 0.80 Congested	90,000 1.01 Heavily Congested	135,000 1.03 Heavily Congested

By the year 2050, SR-73 between Six Mile Cutoff Road and Mountain View Corridor reaches v/c ratios slightly above 1.0, which is within heavily congested levels. So, given projected growth and no changes to the transportation network between 2040 and 2050, additional capacity on SR-73 will be needed before 2050.

Conclusion

Within the next ten years, high population and employment growth in the Cedar Valley will result in heavy traffic demands for SR-73. If nothing is done to improve SR-73, the eastern portion of the roadway (east of Ranches Parkway) is projected to fail sometime between 2020 and 2025.

Four improvement concepts for SR-73 were analyzed under 2040 conditions: Reversible Lanes, Widened and New Arterials, a Freeway without Frontage Roads, and a Freeway with Frontage Roads. The Reversible Lanes and the Widened and New Arterials concepts both result in heavily congested levels for the eastern portion of SR-73. The Freeway without Frontage Roads concept fares better, but still results in congested levels for the eastern portion of the facility. The only concept with no congested or heavily congested levels along SR-73 is the Freeway with Frontages Roads. In terms of total volume, the Freeway with Frontage Roads concept also performs the best moving 97,000 vehicles per day through the eastern section of SR-73 compared to around 64,000 to 67,000 vehicles per day for the Reversible Lanes and Widened and New Arterials concepts, respectively.

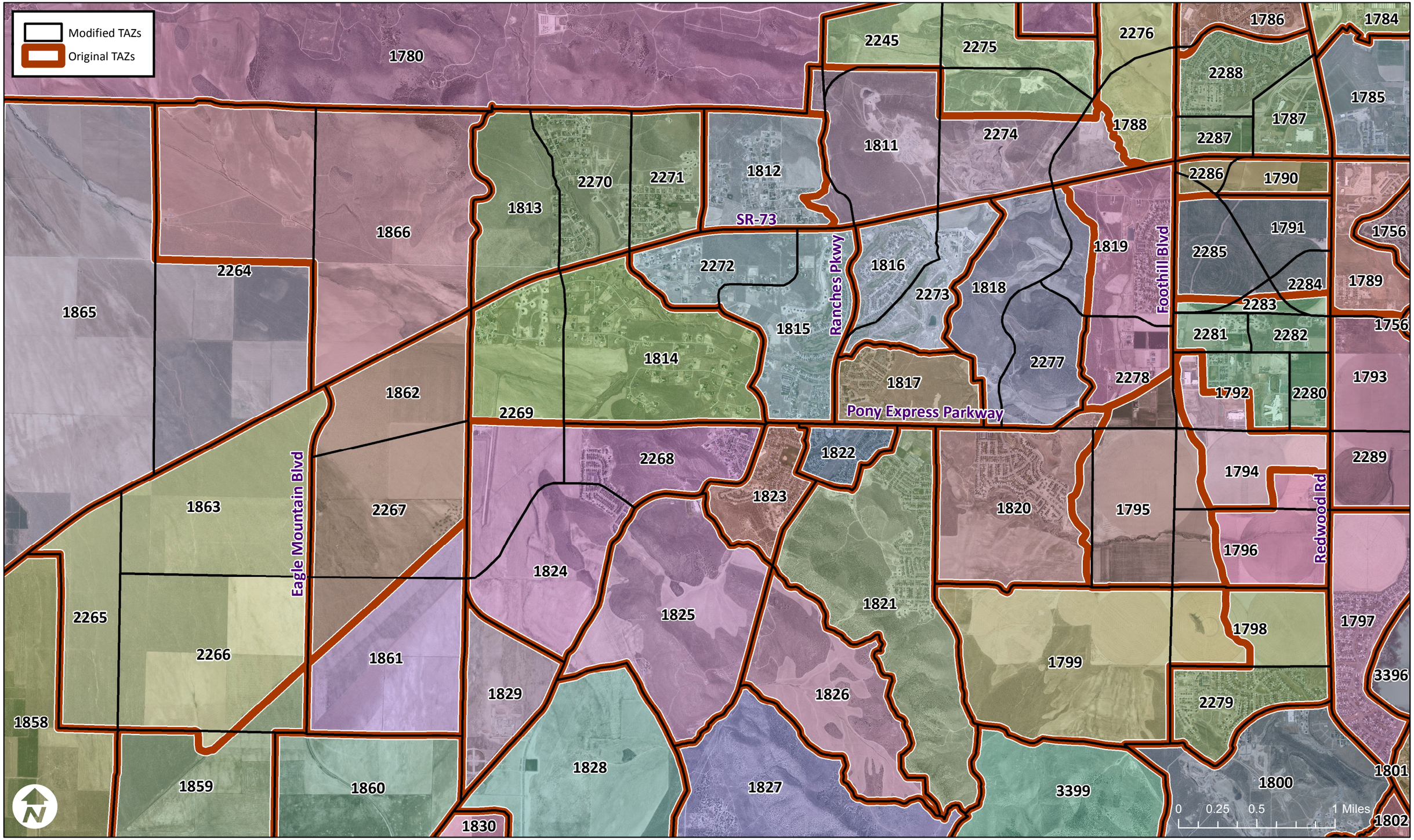
This Freeway with Frontage Roads concept allows for a phased construction approach, where the frontage roads portion can be built prior to the freeway, as is being done for Lehi 2100 North and Mountain View Corridor.

Building the frontage roads between 2020 and 2025 is expected to provide about ten years of life until they become heavily congested sometime between 2030 and 2035, at which point the freeway portion of the corridor will be needed. By 2050, the freeway with frontage roads concept reaches heavily congested levels and additional capacity in the corridor will be needed.

Appendix A

TAZ Splits and Land Use Data

SR-73 Modified Traffic Analysis Zones (TAZs)



2015 Modified TAZ Data

TAZ	TOTHH	TOTPOP	HHSIZE	AVG INCOME	ALL EMP	RETL	FOOD	MANU	WSLE	OFFI	GVED	HLTH	OTHR	AGRI	MINING	CONSTR	ENROLL K-6	ENROLL K 7-12
1786	916	3,442	3.76	54,415	173	5	0	11	12	25	-	12	54	-	-	56	-	-
1787	47	197	4.17	54,415	851	401	28	1	1	55	95	26	121	-	-	124	1,200	-
1788	27	97	3.60	59,627	-	-	-	-	-	-	-	-	-	-	-	-	-	-
1790	48	171	3.56	56,265	-	-	-	-	-	-	-	-	-	-	-	-	-	-
1791	18	52	2.84	56,265	-	-	-	-	-	-	-	-	-	-	-	-	-	-
1792	69	275	3.98	56,265	516	-	-	-	-	78	264	41	95	-	-	38	707	2,037
1793	6	10	1.60	54,415	-	-	-	-	-	-	-	-	-	-	-	-	-	-
1794	2	4	2.05	56,265	-	-	-	-	-	-	-	-	-	-	-	-	-	-
1795	-	-	0.00	56,265	-	-	-	-	-	-	-	-	-	-	-	-	-	-
1796	1	2	1.90	56,265	-	-	-	-	-	-	-	-	-	-	-	-	-	-
1798	-	-	0.00	56,265	-	-	-	-	-	-	-	-	-	-	-	-	-	-
1799	-	-	0.00	56,265	-	-	-	-	-	-	-	-	-	-	-	-	-	-
1811	-	-	0.00	59,627	21	-	-	-	-	2	1	1	3	-	-	14	-	-
1812	162	835	5.14	59,627	59	-	-	7	2	5	3	2	7	-	-	33	-	-
1813	14	58	4.28	60,510	-	-	-	-	-	-	-	-	-	-	-	-	-	-
1814	87	362	4.14	60,510	36	0	0	-	-	2	1	2	4	-	-	27	-	-
1815	609	2,147	3.53	60,510	151	42	5	1	2	16	27	7	18	-	-	33	-	458
1816	392	1,487	3.79	60,510	76	-	-	1	2	8	6	10	41	-	-	9	-	-
1818	-	-	0.00	56,265	-	-	-	-	-	-	-	-	-	-	-	-	-	-
1819	334	1,503	4.49	56,265	35	1	2	1	1	9	-	5	12	-	-	5	-	-
1820	598	2,540	4.25	56,265	12	3	7	1	0	1	-	0	1	-	-	0	-	-
1824	209	856	4.10	60,510	13	-	-	-	3	1	0	0	1	-	-	8	-	-
1859	-	-	0.00	60,510	-	-	-	-	-	-	-	-	-	-	-	-	-	-
1861	-	-	0.00	60,510	-	-	-	-	-	-	-	-	-	-	-	-	-	-
1862	-	-	0.00	60,510	-	-	-	-	-	-	-	-	-	-	-	-	-	-
1863	-	-	0.00	60,510	-	-	-	-	-	-	-	-	-	-	-	-	-	-
1865	-	-	0.00	60,510	-	-	-	-	-	-	-	-	-	-	-	-	-	-
1866	-	-	0.00	60,510	-	-	-	-	-	-	-	-	-	-	-	-	-	-
2245	-	-	0.00	59,627	-	-	-	-	-	-	-	-	-	-	-	-	-	-
2264	-	-	0.00	60,510	-	-	-	-	-	-	-	-	-	-	-	-	-	-
2265	-	-	0.00	60,510	-	-	-	-	-	-	-	-	-	-	-	-	-	-
2266	-	-	0.00	60,510	-	-	-	-	-	-	-	-	-	-	-	-	-	-
2267	-	-	0.00	60,510	-	-	-	-	-	-	-	-	-	-	-	-	-	-
2268	305	1,253	4.11	60,510	13	-	-	-	3	1	0	0	1	-	-	8	-	-
2269	72	295	4.12	60,510	16	0	0	-	-	1	1	1	2	-	-	12	-	-
2270	132	561	4.25	60,510	2	-	-	1	1	-	-	-	-	-	-	-	-	-
2271	67	282	4.24	60,510	1	-	-	0	1	-	-	-	-	-	-	-	-	-
2272	68	240	3.52	60,510	16	-	-	-	-	3	-	1	4	-	-	7	-	-
2273	129	489	3.79	60,510	65	-	-	1	1	7	5	8	36	-	-	7	-	-
2274	-	-	0.00	59,627	3	-	-	-	-	0	0	0	0	-	-	2	-	-
2275	-	-	0.00	59,627	-	-	-	-	-	-	-	-	-	-	-	-	-	-
2276	-	-	0.00	59,627	-	-	-	-	-	-	-	-	-	-	-	-	-	-
2277	-	-	0.00	56,265	-	-	-	-	-	-	-	-	-	-	-	-	-	-
2278	21	92	4.34	56,265	2	-	-	1	1	-	-	-	-	-	-	-	-	-
2279	391	1,782	4.56	56,265	15	-	-	-	-	5	-	2	6	-	-	2	-	-
2280	6	23	4.11	56,265	-	-	-	-	-	-	-	-	-	-	-	-	-	-
2281	33	131	4.01	56,265	-	-	-	-	-	-	-	-	-	-	-	-	-	-

2015 Modified TAZ Data

TAZ	TOTHH	TOTPOP	HHSIZE	AVG INCOME	ALL EMP	RETL	FOOD	MANU	WSLE	OFFI	GVED	HLTH	OTHR	AGRI	MINING	CONSTR	ENROLL K-6	ENROLL K 7-12
2282	20	81	4.02	56,265	6	-	-	-	-	2	-	1	2	-	-	1	-	-
2283	26	92	3.54	56,265	-	-	-	-	-	-	-	-	-	-	-	-	-	-
2284	22	78	3.54	56,265	-	-	-	-	-	-	-	-	-	-	-	-	-	-
2285	2	6	3.05	56,265	-	-	-	-	-	-	-	-	-	-	-	-	-	-
2286	24	85	3.55	56,265	-	-	-	-	-	-	-	-	-	-	-	-	-	-
2287	4	18	4.27	54,415	-	-	-	-	-	-	-	-	-	-	-	-	-	-
2288	687	2,860	4.16	54,415	124	65	5	-	-	9	-	4	20	-	-	21	-	-
2289	9	22	2.49	54,415	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Total	**5,555**	**22,424**	**4.04**	**57,415**	**2,205**	**518**	**48**	**25**	**27**	**229**	**404**	**124**	**425**	**-**	**-**	**406**	**1,907**	**2,495**

2040 Modified TAZ Data

TAZ	TOTHH	TOTPOP	HHSIZE	AVG INCOME	ALL EMP	RETL	FOOD	MANU	WSLE	OFFI	GVED	HLTH	OTHR	AGRI	MINING	CONSTR	ENROLL K-6	ENROLL K 7-12
1786	1,556	5,551	3.57	54,415	1,423	215	52	9	8	355	-	166	423	-	-	195	-	-
1787	84	321	3.82	54,415	2,103	472	115	4	4	310	514	145	369	-	-	170	1,606	-
1788	330	1,076	3.26	59,268	2,024	289	132	-	-	519	290	234	520	-	-	41	-	-
1790	286	933	3.26	55,968	916	141	65	-	-	283	-	131	287	-	-	9	-	-
1791	592	2,267	3.83	55,968	785	121	56	-	-	243	-	113	246	-	-	7	-	-
1792	394	1,378	3.50	55,968	1,542	-	-	-	-	133	1,209	62	135	-	-	4	946	2,617
1793	4	9	2.25	54,415	961	94	43	-	-	263	161	125	274	-	-	-	-	-
1794	1,371	4,470	3.26	55,968	-	-	-	-	-	-	-	-	-	-	-	-	-	-
1795	605	1,972	3.26	55,968	375	13	6	-	-	24	297	11	24	-	-	1	877	-
1796	1,146	3,735	3.26	55,968	5	-	-	-	-	2	-	1	2	-	-	0	-	-
1798	671	2,550	3.80	55,968	35	2	1	-	-	13	-	6	13	-	-	0	-	-
1799	651	2,123	3.26	55,968	186	-	-	-	-	2	182	1	2	-	-	0	537	-
1811	204	664	3.25	59,268	1,224	108	49	97	157	263	147	119	263	-	-	21	-	-
1812	405	1,948	4.81	59,268	673	82	38	4	6	176	98	79	176	-	-	14	-	-
1813	199	780	3.92	60,510	588	73	33	-	-	158	87	71	156	-	-	11	-	-
1814	109	412	3.78	60,510	371	18	8	10	16	33	233	15	33	-	-	5	-	1,661
1815	885	2,951	3.33	60,510	992	144	50	5	7	217	173	100	223	-	-	75	687	588
1816	442	1,589	3.60	60,510	432	-	-	11	16	111	65	59	152	-	-	18	-	-
1818	304	992	3.26	55,968	456	30	14	5	5	63	245	29	64	-	-	2	721	-
1819	960	3,875	4.04	55,968	2,012	299	138	2	2	544	205	253	552	-	-	16	605	-
1820	1,544	5,956	3.86	55,968	33	6	3	1	1	9	-	4	9	-	-	0	-	-
1824	766	2,873	3.75	60,510	5	-	-	1	2	1	-	0	1	-	-	0	-	-
1859	13	43	3.31	60,510	-	-	-	-	-	-	-	-	-	-	-	-	-	-
1861	578	1,884	3.26	60,510	101	1	1	-	-	6	82	3	6	-	-	1	587	-
1862	106	345	3.25	60,510	938	144	66	-	-	279	-	125	279	-	-	45	-	-
1863	264	862	3.27	60,510	6	1	0	-	-	2	-	1	2	-	-	0	-	-
1865	104	339	3.26	60,510	-	-	-	-	-	-	-	-	-	-	-	-	-	-
1866	527	1,719	3.26	60,510	531	68	31	7	12	139	76	62	136	-	-	-	-	-
2245	78	254	3.26	59,268	-	-	-	-	-	-	-	-	-	-	-	-	-	-
2264	404	1,316	3.26	60,510	5	-	-	-	-	2	1	1	2	-	-	-	-	-
2265	22	72	3.27	60,510	-	-	-	-	-	-	-	-	-	-	-	-	-	-
2266	81	264	3.26	60,510	-	-	-	-	-	-	-	-	-	-	-	-	-	-
2267	558	1,818	3.26	60,510	126	17	8	1	1	38	-	17	38	-	-	6	-	-
2268	428	1,607	3.75	60,510	92	-	-	1	2	1	87	0	1	-	-	0	617	-
2269	478	1,848	3.87	60,510	1,462	170	78	103	166	362	-	162	362	-	-	59	-	-
2270	159	623	3.92	60,510	295	38	17	-	-	79	43	35	77	-	-	5	-	-
2271	95	372	3.92	60,510	395	47	22	6	9	102	56	46	100	-	-	7	-	-
2272	109	363	3.33	60,510	99	-	-	-	-	35	-	16	36	-	-	12	-	-
2273	434	1,560	3.59	60,510	370	-	-	0	1	102	59	54	138	-	-	16	-	-
2274	92	299	3.25	59,268	1,708	151	69	140	226	362	203	163	363	-	-	29	-	-
2275	242	788	3.26	59,268	7	-	-	-	-	2	1	1	2	-	-	0	-	-
2276	475	1,550	3.26	59,268	-	-	-	-	-	-	-	-	-	-	-	-	-	-
2277	264	861	3.26	55,968	82	-	-	-	-	-	82	-	-	-	-	-	-	240
2278	609	2,434	4.00	55,968	171	22	10	2	2	54	-	25	55	-	-	2	-	-
2279	455	1,892	4.16	55,968	16	-	-	-	-	6	-	3	7	-	-	0	-	-
2280	6	22	3.67	55,968	1,637	-	-	-	-	653	-	303	662	-	-	20	-	-
2281	264	969	3.67	55,968	22	-	-	-	-	9	-	4	9	-	-	0	-	-

2040 Modified TAZ Data

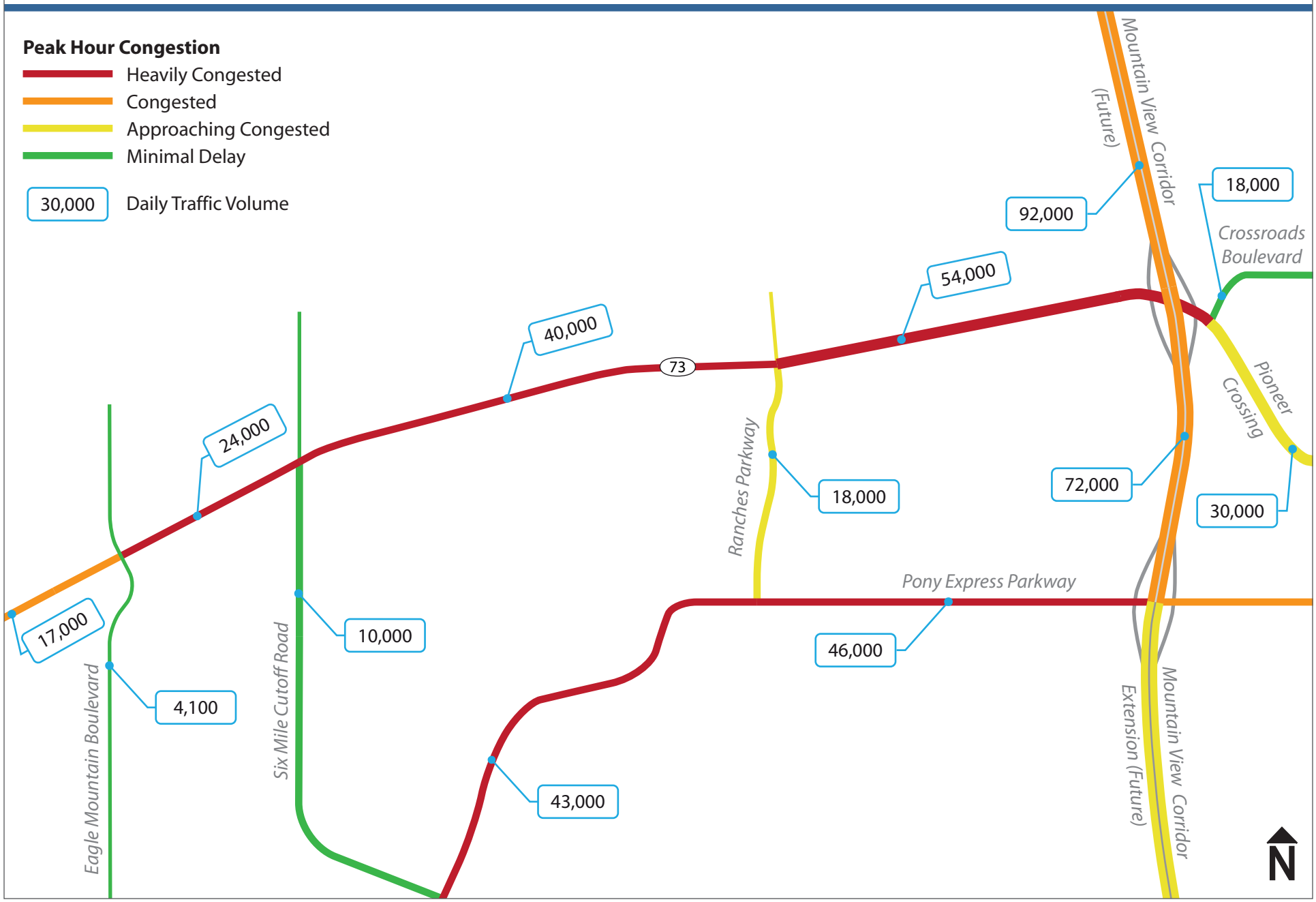
TAZ	TOTHH	TOTPOP	HHSIZE	AVG INCOME	ALL EMP	RETL	FOOD	MANU	WSLE	OFFI	GVED	HLTH	OTHR	AGRI	MINING	CONSTR	ENROLL K-6	ENROLL K 7-12
2282	229	840	3.67	55,968	928	-	-	-	-	370	-	172	375	-	-	11	-	-
2283	198	737	3.72	55,968	-	-	-	-	-	-	-	-	-	-	-	-	-	-
2284	61	234	3.84	55,968	541	86	40	-	-	166	-	77	168	-	-	5	-	-
2285	416	1,593	3.83	55,968	2,029	328	151	-	-	618	-	287	627	-	-	19	-	-
2286	63	206	3.27	55,968	261	40	19	-	-	81	-	38	82	-	-	2	-	-
2287	8	26	3.25	54,415	459	108	26	-	-	101	-	47	120	-	-	56	-	-
2288	1,113	4,291	3.86	54,415	136	69	17	-	-	15	-	7	18	-	-	9	-	-
2289	358	1,379	3.85	54,415	3	-	-	-	-	1	1	1	1	-	-	-	-	-
Total	**22,799**	**81,835**	**3.59**	**57,366**	**29,558**	**3,396**	**1,355**	**409**	**642**	**7,304**	**4,596**	**3,373**	**7,590**	**-**	**-**	**891**	**7,183**	**5,107**

Appendix B

Concept Volume and Congestion Figures

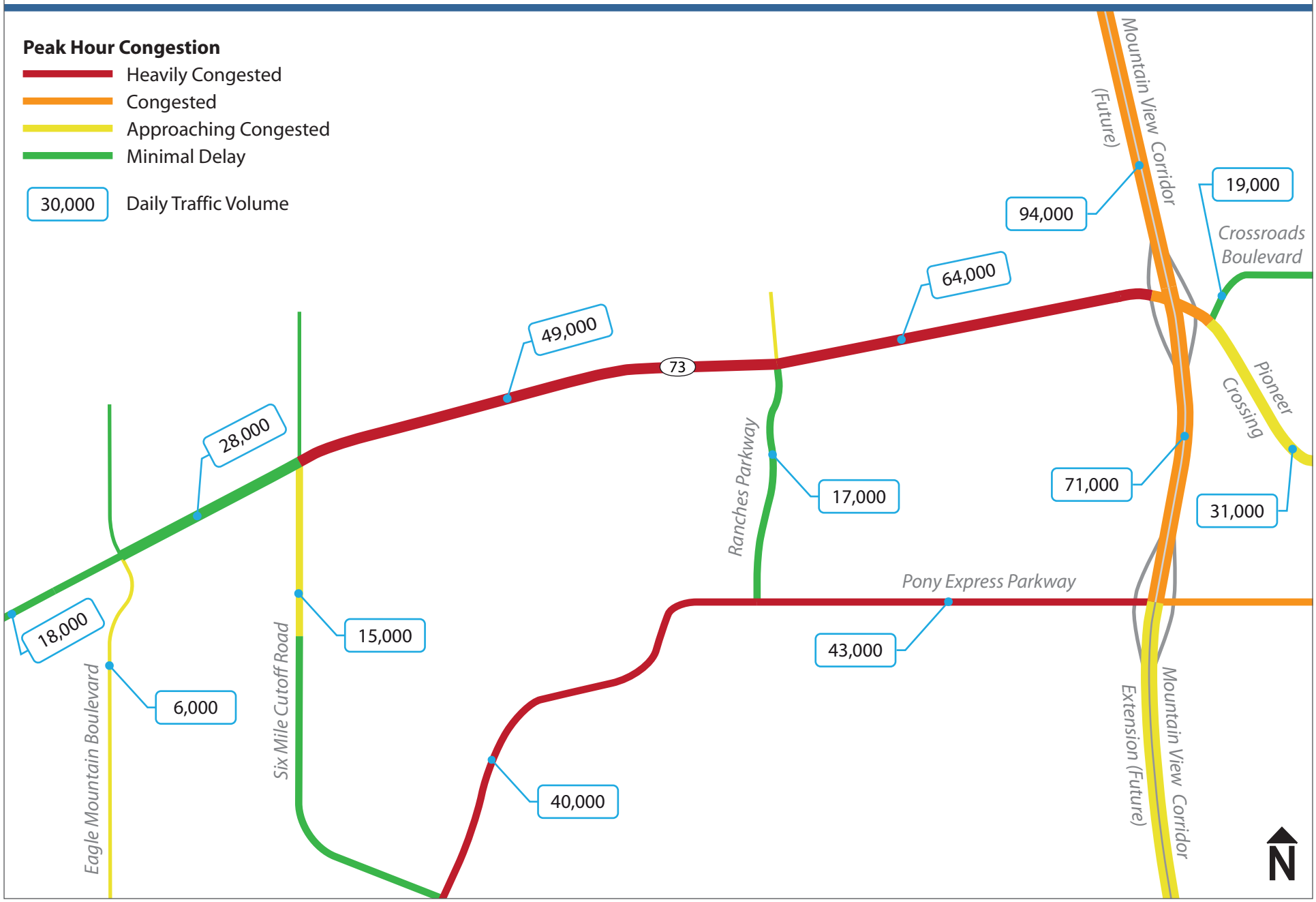
No Build Concept

2040 Average Daily Traffic Volumes and Congestion



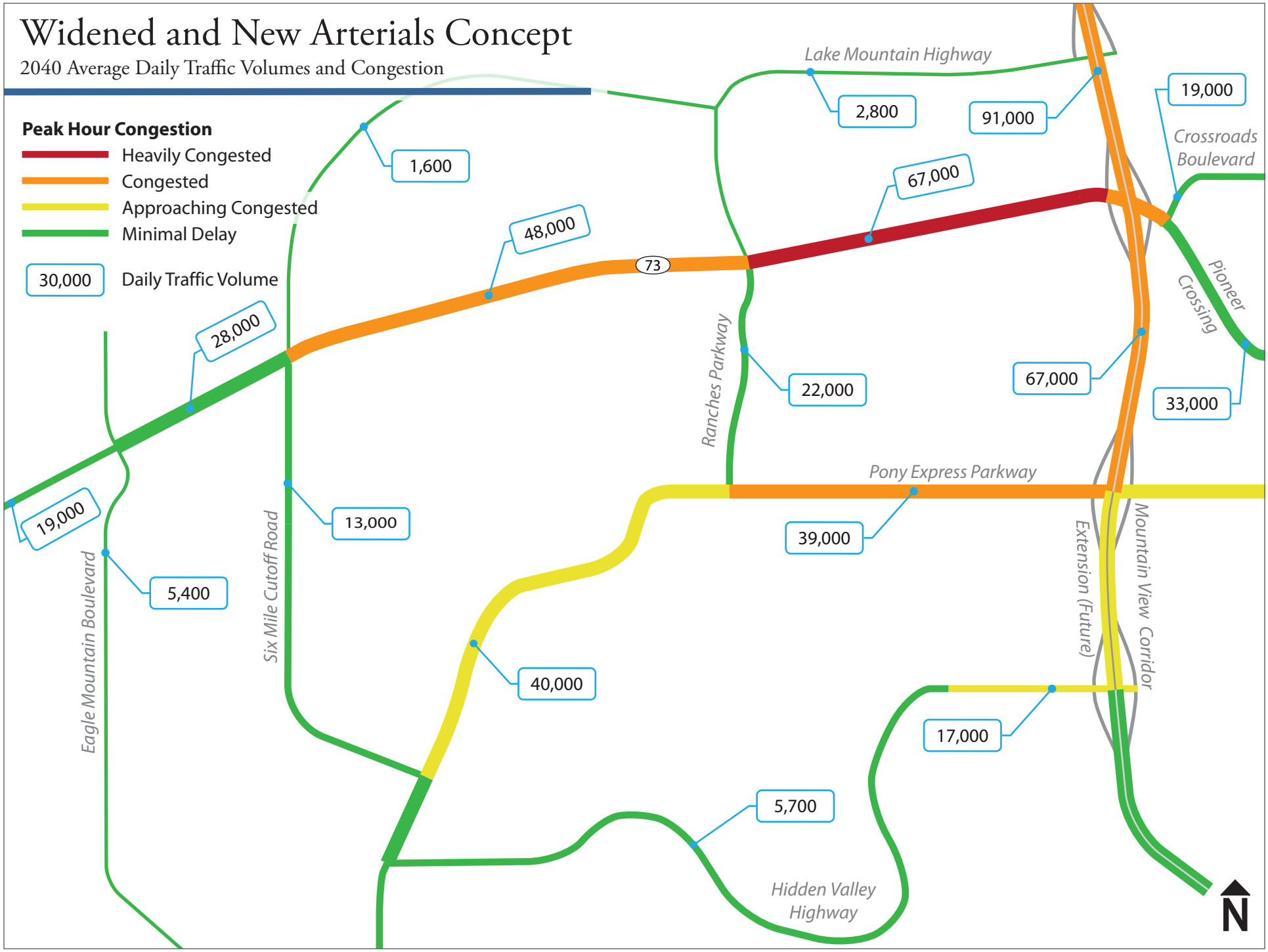
Reversible Lanes Concept

2040 Average Daily Traffic Volumes and Congestion



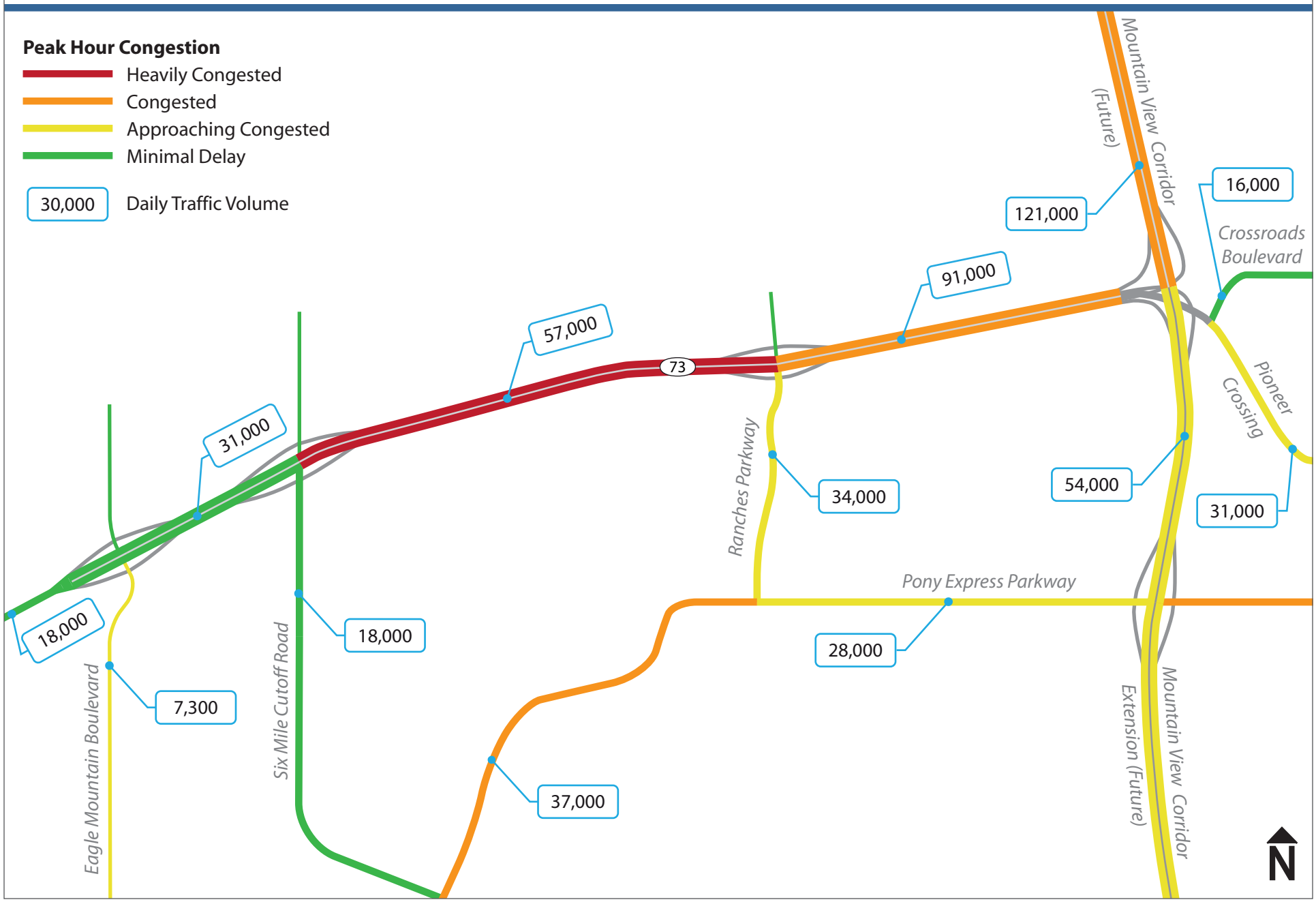
Widened and New Arterials Concept

2040 Average Daily Traffic Volumes and Congestion



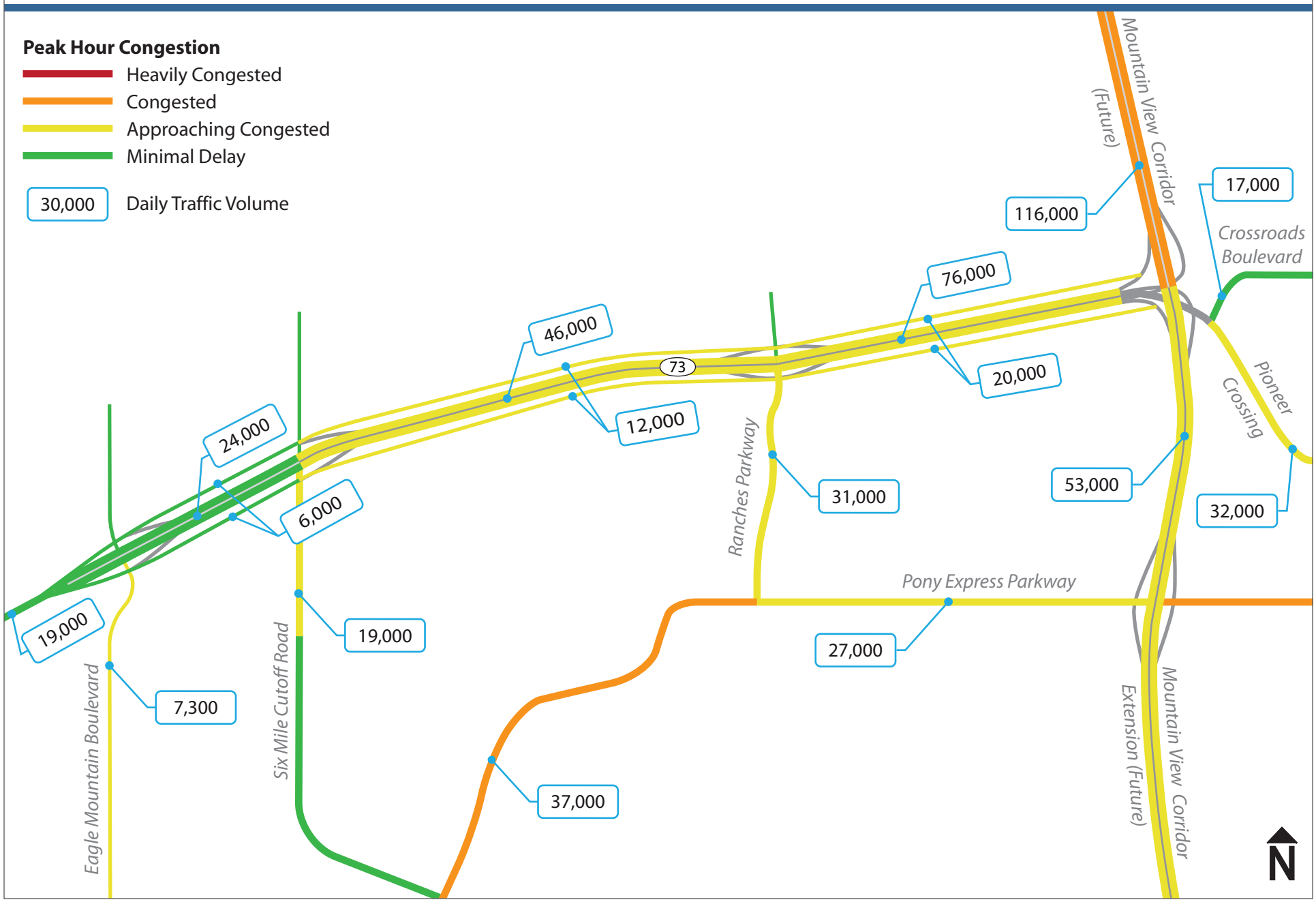
Freeway without Frontage Roads Concept

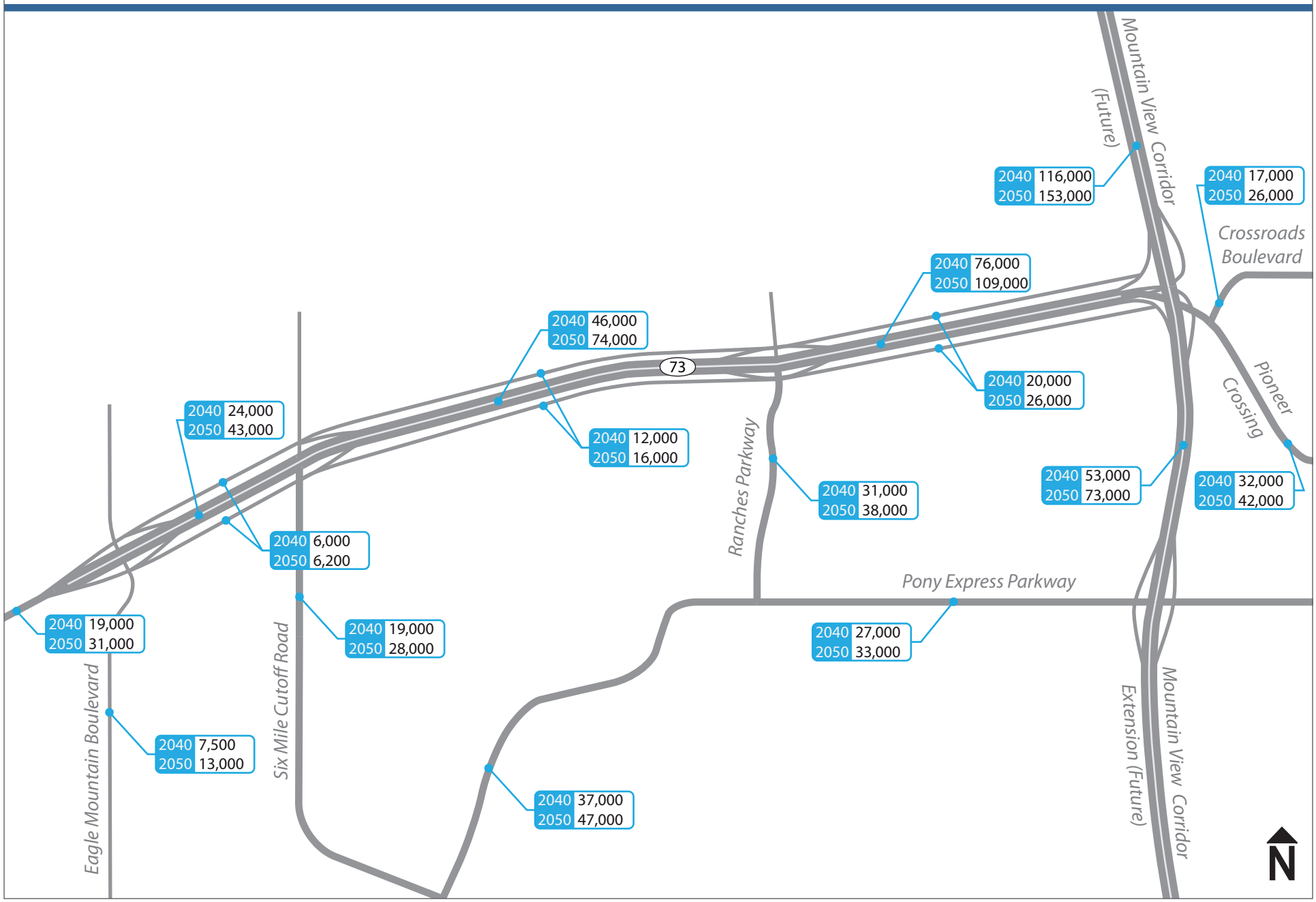
2040 Average Daily Traffic Volumes and Congestion



Freeway with Frontage Roads Concept

2040 Average Daily Traffic Volumes and Congestion



2040 and 2050 Average Daily Traffic Volumes

SR-73 Corridor Study – Freeway with Frontage Roads Concept