SR-73 CORRIDOR PLANNING STUDY

FINAL REPORT

PROJECT NO. S-0073(30)31 | PIN NO. 13425 | FEBRUARY 2016

UDOT Keeping Utah Moving

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UDOT Keeping Utah Moving

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1. INTRODUCTION

The goal of the State Route 73 (SR-73) Corridor Planning Study (study) is to identify a recommended concept to improve transportation on SR-73 from Eagle Mountain Boulevard to the future Mountain View Corridor (Saratoga Springs 800 West), in northwestern Utah County, Utah. The resulting recommended concept will be used by the Utah Department of Transportation (UDOT) to identify a corridor to be preserved for future improvements. This study will be followed by a more in-depth environmental study process that will evaluate in more detail the impacts associated with improvements. The follow-on environmental study process will also build on and expand agency and public engagement efforts of this study. This section provides a description of the study area and the purpose and need for corridor improvements. Subsequent sections present the methodologies applied to identify and evaluate improvement recommendations for the study corridor.

1.1. Study Area

1.1.1. Study Location

This study evaluated transportation improvements to SR-73 in Cedar Valley, located west of Utah Lake in northwestern Utah County, Utah. Cedar Valley is home to the municipalities of Eagle Mountain, Cedar Fort, and Fairfield. Of these municipalities, Eagle Mountain City has the largest population and serves primarily as a bedroom community for employment centers in Utah and Salt Lake counties. Because of water and topographical features, east-west transportation connectivity between Cedar Valley and the rest of Utah County is limited. SR-73 currently operates as the primary arterial highway connecting Cedar Valley to the rest of Utah County and the Wasatch Front. Pony Express Parkway is the only other northern access to Cedar Valley and currently operates as a minor arterial.

1.1.2. Logical Termini and Independent Utility

The study corridor was defined to provide logical termini and independent utility. Logical termini are the rational end points defined for transportation analysis. These termini must be defined to allow transportation issues to be addressed on a broad scope. The logical termini for this study were defined to be Eagle Mountain Boulevard to the west and the future Mountain View Corridor (Saratoga Springs 800 West) to the east. The study corridor limits are shown in Figure 1 and described below.

Western Logical Terminus: The western terminus at Eagle Mountain Boulevard was selected based on projected traffic volumes.

Eastern Logical Terminus: The eastern terminus at 800 West in Saratoga Springs was selected to allow for a connection to the planned Mountain View Corridor.

The project study area provides for a project with independent utility. The termini allow transportation-related issues to be treated without requiring additional improvements elsewhere and without restricting consideration of other reasonably foreseeable transportation improvements. Also, because the study corridor provides a primary connection between Cedar Valley and surrounding communities, improvements to the study corridor would represent a reasonable expenditure to improve its capacity.

1.1.3. Existing Roadway

Within the study area, SR-73 is classified as a major arterial with varying lane configurations and overall roadway widths. Between Eagle Mountain Boulevard and Cedar Pass Road, SR-73 currently has two lanes with one travel lane per direction and turn lanes at cross streets. Between Cedar Pass Road and Pioneer Crossing, SR-73 currently has five lanes with two lanes per direction and a center two-way-left-turn-lane. The existing right-of-way for SR-73 is approximately 150 feet wide. Figure 2 and Figure 3 show existing cross sections and photographs for the two- and five-lane segments of the study corridor, respectively.

Figure 1: Study Area Map

Figure 2: Existing SR-73 Study Corridor – Two-Lane Segment

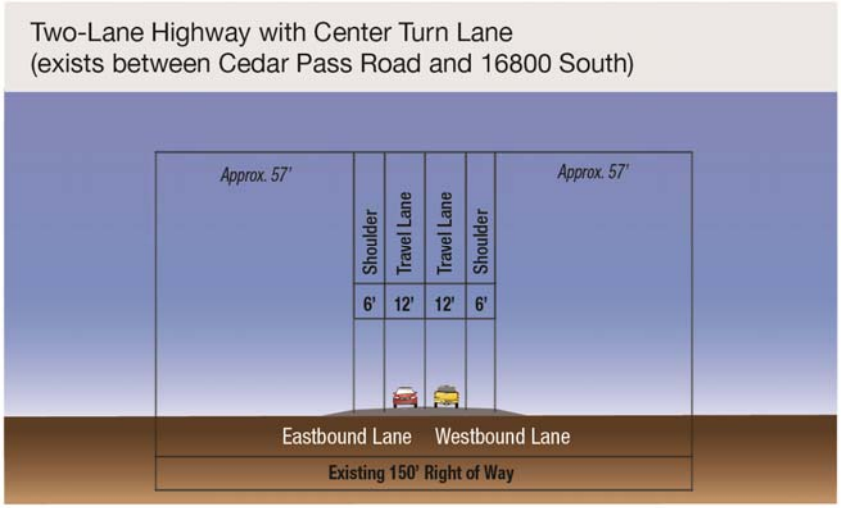
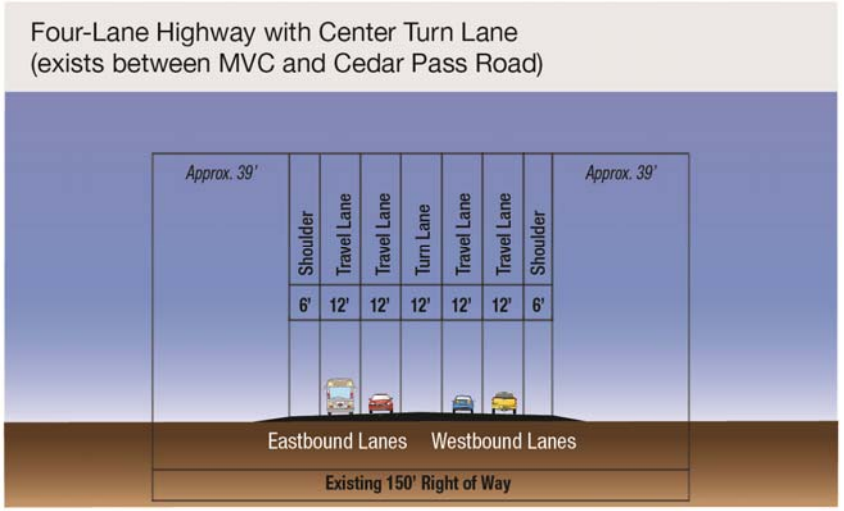


Figure 3: Existing SR-73 Study Corridor – Five-Lane Segment



1.2. Purpose and Need

1.2.1. Planning Context

Mountainland Association of Governments (MAG) is the designated Metropolitan Planning Organization (MPO) that works in partnership with UDOT, local governments, and other stakeholders to develop the regional transportation plan for the communities in its jurisdiction. MAG's jurisdiction includes communities in Utah, Summit, and Wasatch counties. As the regional MPO, MAG provides input on the decision process for highway and transit projects in Utah County. The MAG travel demand model is a tool used to forecast future travel patterns for the Wasatch Front, including Utah County and the study area. The MAG travel demand model is jointly owned and maintained by MAG and the Wasatch Front Regional Council (WFRC). Version 8.0 Beta of the travel demand model was used for this study.

The travel demand model forecasts travel conditions based on land use inputs for a 2015 base year and for future years 2024, 2034, and 2040. In consultation with local governments, MAG prepares future land use projections for each of these future years. Using these inputs, the travel demand model predicts how many person trips will be generated in the region, where those trips will be going, the mode by which they will travel, and the transportation facilities that will be used to get there. Travel forecasts are in turn used by MAG to develop the 2040 Regional Transportation Plan (RTP). The RTP documents regional 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. Based on the projected volumes for the region, the RTP currently shows the need for a freeway facility for the SR-73 study corridor.

Land use forecasts used in the MAG travel demand model consist primarily of household and employment growth. Population for the study area was estimated to increase from 21,130 in 2015 to 64,760 in 2040. Employment for the study area was estimated to increase from 840 jobs in 2015 to 15,890 jobs in 2040. Additional details about the MAG travel demand model land use assumptions and how they were used are presented in the SR-73 Corridor Traffic Study dated February 2016 (hereafter SR-73 Traffic Study).

These growth projections are anecdotally supported by the historical growth seen for the study area. Figure 4 presents a time lapsed series of Google Earth aerial photographs for the Eagle Mountain and Saratoga Springs area. These aerial photographs show impressive growth between 2002 and 2009. Although Figure 4 shows less growth between 2009 and 2013, growth patterns appear to have since picked up. For example, although building permits in Eagle Mountain dropped from 665 in 2007 to approximately 100 to 200 in follow-on years, building permits reached 489 in 2015 and are forecasted to exceed 500 in 2016. Building trends in Eagle Mountain are nearing 2007 levels and support MAG growth forecasts to triple population of the study area by the year 2040.

1.2.2. Project Need

Project needs are defined as the transportation problems that need to be addressed for the study corridor. The following primary transportation-related deficiencies were identified for the study corridor. These deficiencies summarize the need for improvements to the study corridor.

- Lack of adequate regional east-west transportation capacity
- Lack of pedestrian and bicycle facilities
- Lack of transit service availability

Transportation needs for the SR-73 study area are a result of rapidly growing population and employment in northwest Utah County. The Cedar Valley population is expected to triple to approximately 83,000 residents by 2040 (64,760 residents for the study area). The existing study corridor is not intended to accommodate the travel demands projected for this area. As growth materializes, SR-73 will struggle to serve the resulting heavy growth in transportation demands.

Figure 4: Timeline Aerials for the Study Area

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 study corridor (east ofRanches Parkway) is projected to fail sometime around 2020. The western portion of the study corridor (west of Ranches Parkway) is projected to fail sometime between 2020 and 2025 (see Section 2.3 for additional details).

The study corridor lacks pedestrian and bicycle facilities. Currently, there are no continuous east-west pedestrian or bicycle facilities in the study area. Expanded trail facilities are included in the city master plans. These trail facilities are needed to improve the availability of pedestrian and bicycle facilities as an alternative to travel by automobile.

The study corridor lacks transit service. There is currently no transit service along the study corridor. The nearest transit service includes bus service to Eagle Mountain via Pony Express Parkway. The MAG RTP includes plans for a transit facility along SR-73. Details for transit needs and planned transit facilities were not available for this study. As with pedestrian and bicycle facilities, there is a need to improve the availability of transit service as an alternative to travel by automobile.

1.2.3. Project Purpose

Project purpose refers to the goals and objectives to be achieved by improvements to the study corridor (the project). The following primary purposes were identified for improvements to the study corridor. These purposes were used as the main criteria to evaluate and screen improvement scenarios.

- Improve regional mobility by reducing roadway congestion
- Improve regional mobility and travel mode choice by supporting increased transit availability
- Improve travel mode choice by supporting increased bicycle and pedestrian options
- Support local needs and objectives

A primary purpose of the project is to improve regional mobility for automobile, transit, and freight trips by reducing roadway congestion on roadways connecting Cedar Valley to surrounding communities. Regional mobility must also be improved by supporting increased availability of transit as an alternative to automobile trips for east-west travel between Cedar Valley and surrounding communities.

Another key purpose of the project is to improve travel mode choices. In addition to increasing the availability of transit service, the project must improve the availability and quality of bicycle and pedestrian options for east-west travel connecting Cedar Valley to surrounding communities.

Finally, the project must support local economic development and growth objectives as expressed through locally adopted land-use and transportation plans and policies. This must be achieved by providing transportation improvements that complement locally established land-use plans and community objectives.

2. CONCEPT SCREENING

This study considered several improvement concepts and applied a screening process to narrow down the number of concepts that could be further evaluated as action alternatives in follow-on environmental studies. Improvement concepts for the SR-73 study corridor were evaluated using a two-step screening process that first narrowed the possible improvement concepts and then performed further analysis of the recommended improvement concept. This section presents concepts considered and the first-level of screening criteria applied to identify a recommended concept. The next section of this report considers second-level criteria considered for the recommended improvement concept. Subsequent sections present additional evaluation efforts completed, including initial stakeholder input, high level environmental reviews, and implementation considerations.

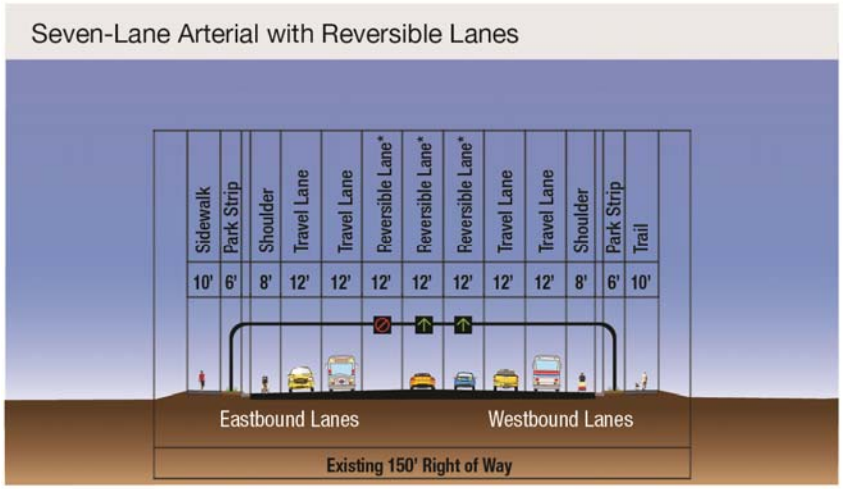
2.1. Improvement Concepts

The four main concepts considered as part of this study include reversible lanes, a system of widened and new arterials, a freeway, and a frontage road freeway system. This section describes each of these main improvement concepts and summarizes other concepts considered. Unless otherwise defined for a given improvement concept, each concept assumes the number of lanes and functional class defined in MAG's 2040 RTP. It is important to note that all improvement concepts presented here were also assumed to include trail and transit components consistent with city master plans and the RTP.

2.1.1. Reversible Lanes

The Reversible Lanes concept would include a seven-lane cross-section on SR-73 with three travel lanes per direction during off-peak operations. During peak periods, one lane per direction would be reversed to match the peak flow of traffic. This would result in four lanes in the peak flow direction and two lanes in the off-peak direction. Therefore, during the AM peak period, there would be four lanes for eastbound traffic and two lanes for westbound traffic. In the PM peak period there would be four lanes in the westbound direction and two lanes in the eastbound direction. The typical section for the Reversible Lanes Concept during PM peak period is shown in Figure 5.

Figure 5: Reversible Lanes Concept – SR-73 Typical Section

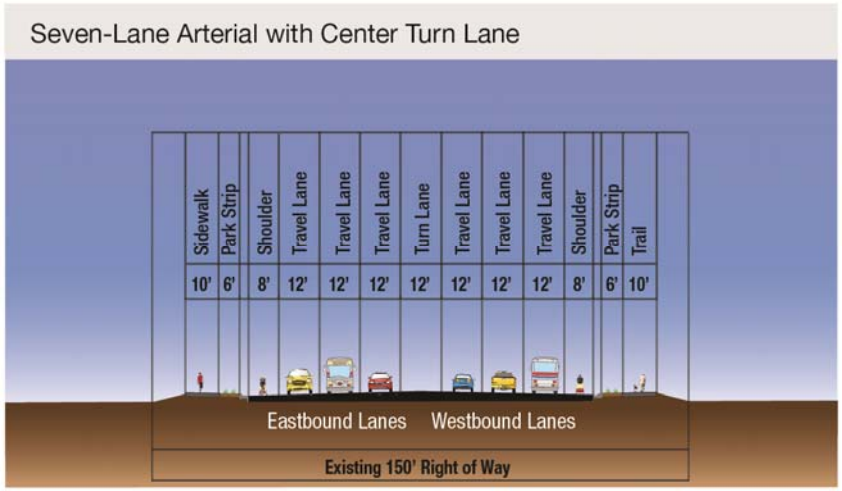


2.1.2. Widened Arterial System

The Widened Arterial System concept would include widening SR-73 and Pony Express Parkway to six-lanes with three travel lanes per direction. This concept would also include two new four-lane arterials with two travel lanes per direction, namely the Lake Mountain Expressway and the Hidden Valley Highway. The Lake Mountain Expressway 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 and on the west to Six Mile Cutoff Road. The Hidden Valley Highway would be located about one mile south of Pony Express Parkway. It would connect to the Mountain View Corridor and Redwood Road on the east and run west winding through the hills to Eagle Mountain. The SR-73 typical section for the widened arterial

system is shown in Figure 6. The approximate location of the new Lake Mountain Expressway and Hidden Valley Highway are shown schematically in Figure 13 (see Page 19).

Figure 6: Widened Arterial Concept – SR-73 Typical Section



2.1.3. Conventional Freeway

The Conventional Freeway concept would convert SR-73 to a freeway between Eagle Mountain Boulevard on the west and the Mountain View Corridor and Pioneer Crossing on the east. For this study, "Conventional Freeway" is used to differentiate this stand-alone freeway concept from the frontage roadway freeway system described in Section 2.1.4. The Conventional Freeway concept would include three lanes per travel direction east of Ranches Parkway and two lanes per travel direction west of Ranches Parkway. The typical section for the Conventional Freeway concept is shown in Figure 7. The typical section shown is for the eastern segment of the study corridor.

Interchanges for the Conventional Freeway concept were assumed for the SR-73 freeway at the following locations:

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

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

2.1.4. Frontage Road Freeway

The Frontage Road Freeway System concept is identical to the concept planned for 2100 North in Lehi, Utah. As illustrated in Figure 8 and Figure 9, this concept would include one-way frontage roads on each side of the freeway mainline lanes. The Frontage Road Freeway System concept would convert SR-73 to a freeway between Eagle Mountain Boulevard on the west and Mountain View Corridor on the east. Like the conventional freeway option, the freeway mainline for this concept would include three lanes per travel direction east of Ranches Parkway and two lanes per travel direction west of Ranches Parkway. The typical section shown in Figure 8 is for the eastern segment of the study corridor.

Unlike the Conventional Freeway concept, the Frontage Road Freeway System would include one-way frontage roads on each side of the freeway mainline lanes. Frontage roads would run the entire length of the freeway with two lanes per direction east of Ranches Parkway and one lane per direction west of Ranches Parkway.

The freeway mainline would be constructed as a grade-separated facility. The one-way frontage roads would operate as arterial streets that provide access to the local grid network and connect the freeway to cross streets at signalized intersections. Slip ramps would be constructed to provide access between the freeway mainline lanes and the frontage roads.

Figure 7: Conventional Freeway Concept – Typical Section

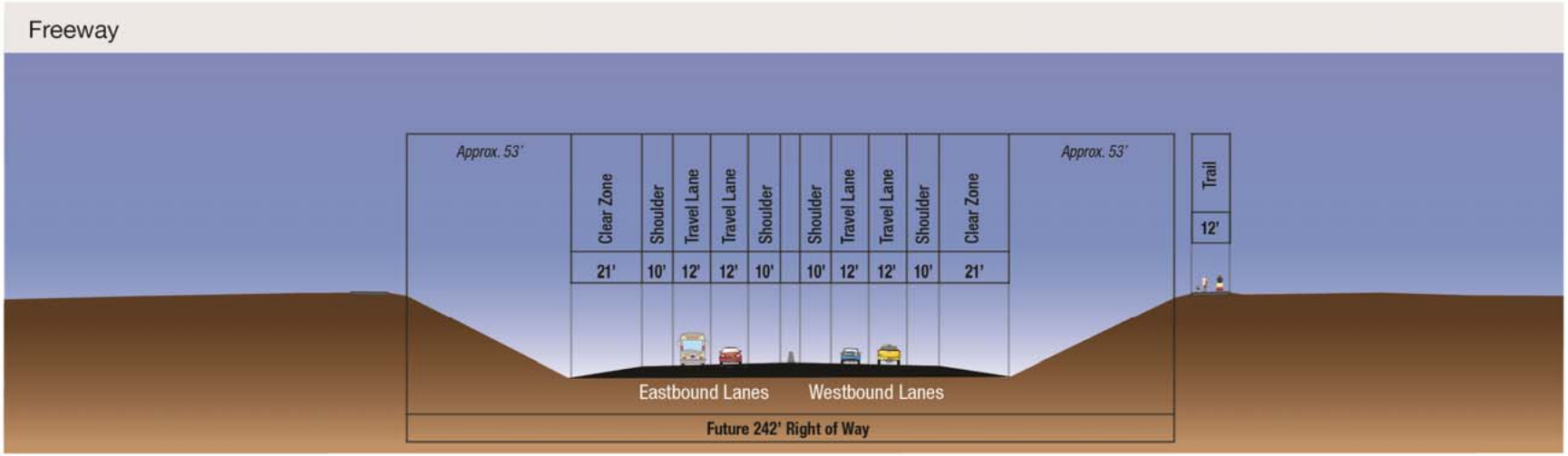


Figure 8: Frontage Road Freeway System Concept – Typical Section

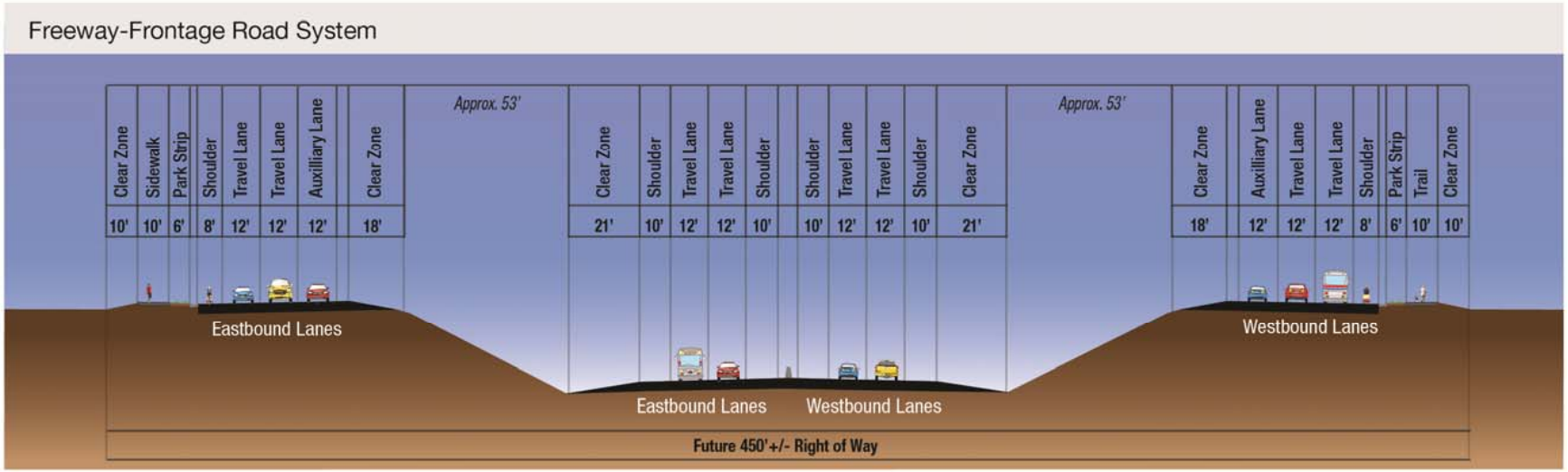
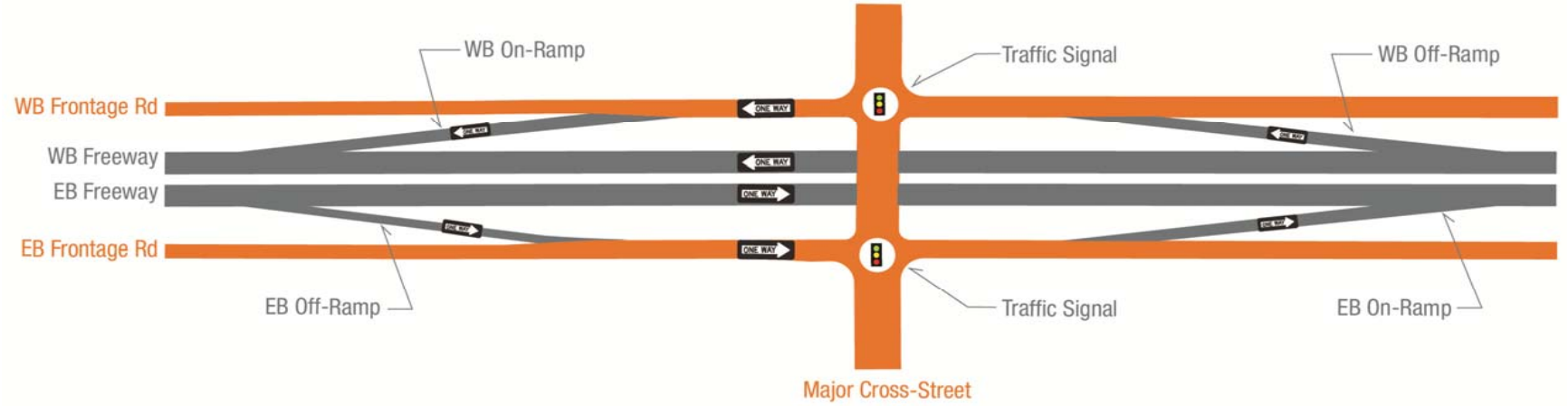


Figure 9: Frontage Road Freeway System – Plan View



In order to evaluate the traffic performance of the concepts considered in this study, slip ramps and interchanges were assumed at logical cross streets where ramps were needed based on projected traffic volumes. However, the final locations of slip ramps and cross streets will be determined in coordination with Eagle Mountain City and UDOT during the environmental study phase of the project.

2.1.5. Trail Concepts Considered

With the exception of the No Build scenario, all concepts considered as part of this study included a trail facility to accommodate bicycles and pedestrians in accordance with Eagle Mountain City's Master Plan. The location of the trail facility varies for each concept and is depicted in the typical sections (see Figure 5 through Figure 8). Additional evaluation and coordination with Eagle Mountain City is needed as part of future environmental studies to determine the final location, limits, and details of the trail facility.

2.1.6. Transit Concepts Considered

MAG has identified SR-73 as a future transit corridor for the Cedar Valley region. However, the type of transit facility needed on SR-73 (e.g. Light Rail, Bus Rapid Transit, side running/mixed-use vs. dedicated right-of-way, etc.) has not been identified by MAG or the Utah Transit Authority. This study does qualitatively evaluate how effectively each of the concepts considered accommodates a transit system along SR-73. However, the report does not consider the merits of a stand-alone transit concept nor does it evaluate transit ridership or the impact on traffic volumes resulting from implementing transit concepts. Additional analysis and coordination is needed during the environmental phase of the project to further evaluate transit options, including identifying the type of transit facility that is required/justified.

2.1.7. Lake Mountain Expressway Concept

During 2013-2014, UDOT coordinated with MAG, Eagle Mountain City, and Saratoga Springs to evaluate an alternate freeway or expressway alignment located along the base of the mountains north of SR-73 (Lake Mountain Expressway). As part of this effort, UDOT evaluated whether or not the Lake Mountain Expressway would result in a significant decrease in traffic volumes on SR-73 and thereby eliminate or reduce the need for capacity improvements to SR-73. The results of that analysis, which are not included with this report, predicted low volumes on Lake Mountain Expressway. The results showed that the this concept would not draw significant amounts of traffic away from SR-73, significantly reduce congestion or eliminate the need for a freeway on SR-73. These results indicate that the Lake Mountain Expressway concept would not meet the purpose and need criteria of this study. As a result, the Lake Mountain Expressway concept was not evaluated further as part of this study.

2.2. Evaluation (Screening) Criteria

This section presents the evaluation criteria applied for the first level of screening improvement concepts. Study improvement concepts, including no action scenarios, were evaluated based on the following criteria:

- Traffic Congestion
- Right-of-Way Requirements
- Access Impact
- Transit and Trail Compatibility

Except for traffic congestion, the evaluation criteria applied for this first level screening were primarily qualitative. This section describes each of these evaluation criteria. The application and results of these evaluation categories are presented in subsequent sections.

2.2.1. Traffic Congestion

Volume-to-capacity (v/c) ratio was the primary traffic congestion metric used to screen improvement concepts and identify a recommended improvement concept. The v/c ratio measures a roadway's ability to accommodate vehicular traffic. Traffic volumes and roadway capacities are needed to calculate v/c ratios.

Lane capacity varies by facility. Freeways have the highest capacity with up to 2,100 vehicles per hour per lane. Arterial roadway capacities can reach approximately 900 vehicles per hour per lane. Capacity is also affected by the number of lanes on a roadway. As more lanes are added to a roadway, the capacity per lane drops. Traffic capacity for various roadway types and number of lanes are coded into the travel demand model.

The travel demand model follows the process described in Section 1.2.1 to estimate the demand volume for individual roadway segments. Volumes are estimated by travel direction for morning (AM) and evening (PM) peak periods and as well as off-peak periods. Traffic volumes are summarized as Average Daily Traffic (ADT) for individual roadway segments and for the entire highway network as a whole.

By dividing the volume estimates by the associated roadway capacity, the travel demand model calculates a v/c ratio for each modeled roadway segment. For purposes of this study, the individual SR-73 segments from the travel demand model were aggregated to represent two corridor segments: the western segment from Eagle Mountain Boulevard to Ranches Parkway; and the eastern segment from Ranches Parkway to Mountain View Corridor/Saratoga Springs 800 West. Also, roadway congestion levels were defined by the v/c ratio ranges shown in Table 1. When reporting v/c ratios in this study, the maximum v/c ratio between the AM and PM peak periods was used. Additional details for the v/c analysis are presented in the SR-73 Traffic Study.

2.2.2. Right-of-Way Requirements

The right-of-way evaluation metric considered the property impacts resulting from each improvement concept. These right-of-way impacts were considered in general terms based on the typical cross-section for each improvement concept.

Table 1: Traffic Congestion Level Scale

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

Right-of-way requirements were estimated as the combination of overall roadway width requirements and how those width requirements would impact properties located along the SR-73 corridor. In other words, the right-of-way assessment considered the amount of property needs to accommodate the roadway as well as its impacts to adjacent properties. For example, although one concept might require a narrow roadway width, its right-of-way requirements may be considered more significant if its restricted access requires the acquisition of the entire property instead of only partial property acquisition of a wider roadway width.

To screen improvement concepts, right-of-way requirements were evaluated using the qualitative color scale described in Table 2. Based on this scale, green and red were used to represent relatively low and high right-of-way impacts, respectively.

2.2.3. Access Impact

State arterial roadways such as SR-73 must balance the need for reasonable access to properties with the need to preserve the smooth and safe flow of traffic. Whereas the traffic flow performance of improvement concepts were evaluated based on the congestion metrics presented earlier, access impact was used to evaluate impacts to access as a result of the improvement concept.

Table 2: Qualitative Evaluation Metrics Scale

Color Scale		Description
G		Favorable Performance
Y		Moderately Favorable Performance
R		Unfavorable Performance

Access impact considered each improvement concept's ability to provide access to properties and other transportation facilities within the study corridor. To screen improvement concepts, access impact was evaluated using the qualitative color scale described in Table 2. Based on this scale, green and red were used to represent relatively good and poor access impact, respectively.

2.2.4. Transit and Trail Compatibility

Major transportation corridors such as SR-73 must accommodate a broad range of travel modes, including public transit and active transportation modes for bicyclists and pedestrians. City master plans and the MAG RTP include transit and trail facilities along SR-73. As such, all improvement scenarios for the study corridor attempted to accommodate the planned transit and trail facilities.

The transit and trail compatibility metric was applied to evaluate each improvement concept's ability to accommodate a broad range of transportation modes. This metric considers the ability of an improvement concept to accommodate favorable transit service and trail facilities as well as the anticipated effectiveness of such a facility. For example, although a trail may be provided along a high speed roadway or freeway, such conditions may not be as inviting or accessible to pedestrian use as a trail or walkway adjacent to lower traffic speeds.

To screen improvement concepts, transit and trail compatibility was evaluated using the qualitative color scale described in Table 2. Based on

this scale, green and red were used to represent relatively good and poor transit and trail compatibility, respectively. For this study, the evaluation of this metric was limited in scope. As such, the evaluation of transit and active transportation performance metrics should be expanded in follow-on environmental studies.

2.3. Baseline (No Build) Concept

Because it forms the bases for forecasted traffic conditions, understanding of existing traffic volumes for the study corridor is essential to evaluating corridor improvement concepts. Defining future year No Build conditions is also essential to evaluating corridor improvement concepts. The future No Build analysis provides a benchmark for measuring the benefit of improvement concept scenarios. Improvement concepts can be compared to these baseline performance levels for the study corridor. This section describes traffic conditions for existing and future No Build scenarios.

2.3.1. Existing Volumes and Congestion Levels

Existing traffic volumes for the study corridor were estimated using measurements collected in May 2015 and supplemental data obtained from UDOT resources as described in the SR-73 Traffic Study. Existing traffic volumes for the study corridor are shown in Figure 10.

As shown in Figure 10, the through movements along SR-73 generally have the highest volumes for both AM and PM peak hours, with higher PM peak hour volumes than AM peak hour volumes. 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 and from Lehi Main Street.

Figure 10 also presents daily traffic volume measurements for the study corridor. As shown, the eastern segment of SR-73 carries significantly higher traffic than the western segment. The eastern segment currently carries 24,600 vehicles per day compared to 12,900 vehicles per day for the western segment.

To facilitate comparison of the various improvement concepts, the SR-73 study corridor was divided into the two segments described earlier: the western segment from Eagle Mountain Boulevard to Ranches Parkway; and the eastern segment from Ranches Parkway to Mountain View Corridor/Saratoga Springs 800 West. Because of its varied features and utility, the western segment was further divided into two sub-segments from Eagle Mountain Boulevard to Six Mile Cuttoff Road and from that point to Ranches Parkway.

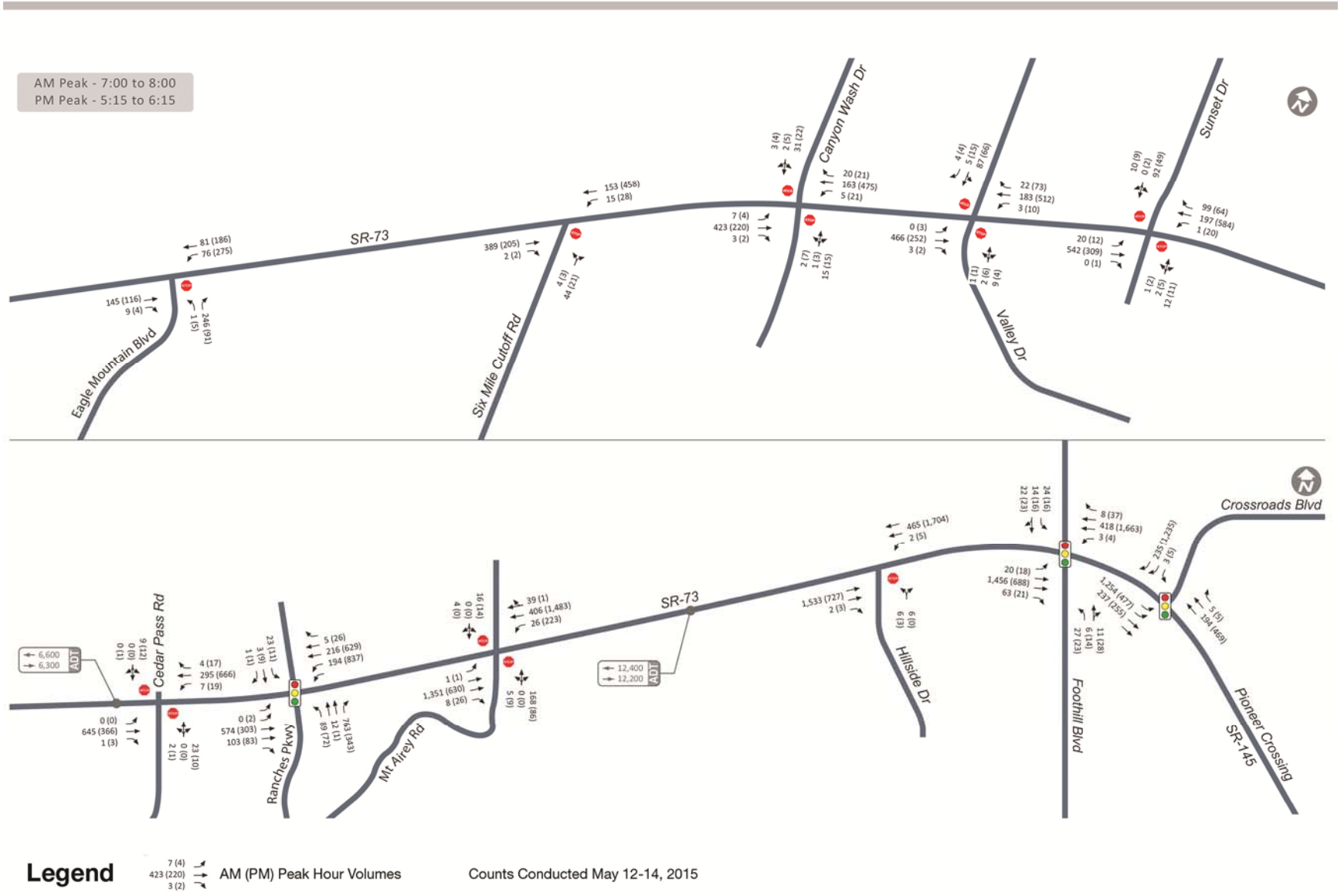
Table 3 presents the results of the traffic congestion analysis completed for existing conditions. The table presents the ADT, the highest v/c ratios for the AM or PM peak period, and the associated congestion level for the western and eastern segments of the study corridor. Note that the ADT values presented in Table 3 represent an average for a segment of SR-73, whereas the values presented in Figure 10 represent a measurement for a given point of SR-73.

Table 3: Existing ADT Volumes and Congestion Levels

Concept	Evaluation Metrics	SR-73		
		Western Segment		Eastern Segment
		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	1	1	2

Legend: Congestion Levels
1 Minimal Delay
2 Approaching Congested
3 Congested
4 Heavily Congested

Figure 10: Existing Traffic Volumes



The existing conditions traffic analysis shows that the corridor is currently performing with minimal delay along the length of the study corridor during both the AM and PM peak periods. However, the eastern segment currently performs at 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.

2.3.2. Future No Build Quantitative Evaluation

Future traffic volumes for the study corridor were forecasted for the 2040 horizon year. Future year traffic turning movement volumes were developed using the MAG travel demand model forecasts and the existing 2015 traffic volumes presented in Figure 10. The travel demand model was used to estimate the growth between the base year and the future year for segments of SR-73. This growth was then applied to the 2015 intersection traffic volumes to estimate 2040 AM and PM peak hour intersection traffic volumes.

Table 4 presents the results of the traffic congestion evaluation completed for the future 2040 No Build conditions. These results show how the study corridor is expected to operate in the future if no substantial changes are made to the current facility. For the 2040 No Build scenario, SR-73 was assumed to have two and five lanes to the west and east of Cedar Pass Road, respectively (see Section 1.1.3). Table 4 shows that by 2040, the study corridor is expected to be heavily congested with volumes ranging from 24,000 daily vehicles per day on the western segment to 54,000 vehicles per day on the eastern segment.

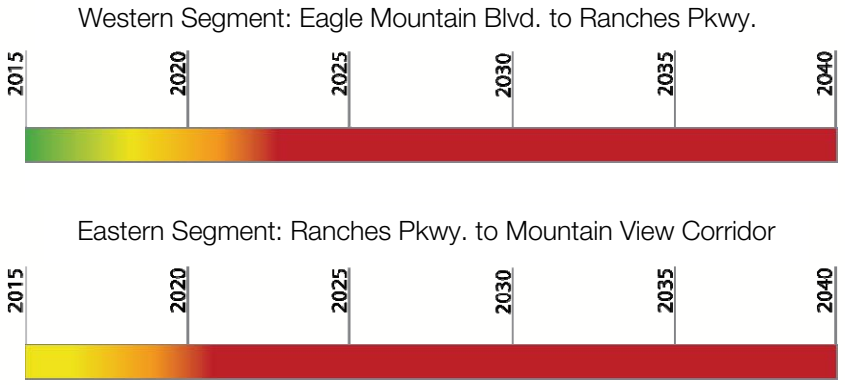
Figure 11 presents the approximate No Build congestion levels by year over the next 25 years. The color bands show the approximate time ranges for the various congestion levels. For the eastern segment of SR-73, the roadway goes from approaching congested levels (yellow) in 2015 to heavily congested (red) sometime around 2020. The onset of heavily congested levels for the western segment of SR-73 occurs around 2020 to 2025, lagging the eastern segment by about five years.

Table 4: 2040 No Build ADT Volumes and Congestion Levels

Concept	Evaluation Metrics	SR-73		
		Western Segment		Eastern Segment
		Eagle Mtn Blvd to Six Mile Cutoff Rd	Six Mile Cutoff Rd to Ranches Pkwy	Ranches Pkwy to Mountain View Corridor
2040 No Build	ADT	24,000	40,000	54,000
	Max V/C	1.36	2.05	1.50
	Congestion	4	4	4

Legend: Congestion Levels
1 Minimal Delay
2 Approaching Congested
3 Congested
4 Heavily Congested

Figure 11: No Build – Congestion Levels Over Time



Note: Congestion levels presented using the same scale as Table 4.

2.3.3. No Build Qualitative Evaluation

The qualitative evaluation for the No Build scenario considers the performance of right-of-way requirements, access impact, and transit and trail compatibility metrics. Table 6 presents the results of this qualitative evaluation.

Table 6 also presents the congestion level for the 2040 No Build concept using the same qualitative scale. Based on the heavily congested results of the v/c analysis, congestion levels for the No Build concept were determined to be unfavorable.

The right-of-way requirements for the No Build concept were determined to be favorable. This reflects a scenario with no substantial changes to the current cross-section of the study corridor. It therefore assumes no right-of-way impacts.

The existing study corridor lacks transit service as well as pedestrian and bicycle facilities. Currently, there are no continuous east-west pedestrian or bicycle facilities in the study area. Although the city master plans and the MAG RTP include plans for expanded trail facilities and transit service along the study corridor, the No Build scenario does not include these improvements. As such, the transit and trail compatibility of the No Build concept was determined to be unfavorable.

The study corridor currently has 30 access points. Fourteen of these access points are for seven separate street intersections along the study corridor (one access point on each side of SR-73 for each intersection). The SR-73 study corridor is currently classified as a Category 5 (Regional Priority-Urban Importance) facility east of Cedar Pass and Category 4 (Regional-Rural Importance) facility west of Cedar Pass. The Category 5 segment allows for driveway access minimum spacing of 350 feet, public street minimum spacing of 660 feet, and minimum signalized intersection spacing of half mile. The Category 4 segment allows for driveway access minimum spacing of 500 feet, public street minimum spacing of 660 feet, and minimum signalized intersection spacing of half mile. Category 4 and 5 provide the highest level of access of any of the study improvement concepts. As such, the access impact of the No Build concept was determined to be favorable

Table 5: 2040 No Build Qualitative Evaluation Results

Concept	Evaluation Factors			
	Congestion	Right-of-Way	Access	Transit / Trail
No Build	R	G	G	R

Legend
G Favorable Y Moderately Favorable R Unfavorable

2.4. Concepts Evaluation Results

The four main improvement concepts were evaluated based on the same v/c ratio and qualitative evaluation criteria applied above for the No Build scenario. This section presents the results of the concept evaluation and identifies a recommended improvement concept.

2.4.1. Traffic Congestion Evaluation Results

A travel demand analysis was performed for each of the following improvements concepts for the 2040 horizon year:

- Reversible Lanes
- Widened Arterial System
- Conventional Freeway
- Frontage Road Freeway System

Segment level volumes and v/c ratios were extracted from the travel demand model and are shown in Table 6 and Table 7 for SR-73 and Pony Express Parkway, respectively. Maps showing ADT and congestion levels for each improvement concept are shown in Figure 12 through Figure 15. These figures present 2040 traffic volume and congestion conditions for SR-73 as well as surrounding roadways.

Table 6: 2040 ADT Volumes and Congestion for SR-73

Improvement Concept	Evaluation Metrics	SR-73 Western Segment: Eagle Mtn Blvd to Six Mile Cutoff Rd	SR-73 Western Segment: Six Mile Cutoff Rd to Ranches Pkwy	SR-73 Eastern Segment: Ranches Pkwy to Mountain View Corridor
No Build	ADT	24,000	40,000	54,000
	Max V/C	1.36	2.05	1.50
	Congestion	4	4	4
Reversible Lanes	ADT	28,000	49,000	64,000
	Max V/C	0.52	1.00	1.18
	Congestion	1	4	4
Widened Arterial System	ADT	28,000	48,000	67,000
	Max V/C	0.59	0.92	1.15
	Congestion	1	3	4
Conventional Freeway	ADT	31,000	57,000	91,000
	Max V/C	0.59	1.05	0.97
	Congestion*	1	4	3
Frontage Road Freeway System	ADT	30,000	58,000	97,000
	Max V/C	0.46	0.82	0.79
	Congestion	1	2	2

Legend: Congestion Levels
1 Minimal Delay
2 Approaching Congested
3 Congested
4 Heavily Congested

Table 7: 2040 ADT and Congestion for Pony Express Parkway

Improvement Concept	Evaluation Metrics	Pony Express Parkway Western Segment: Six Mile Cutoff Rd to Ranches Parkway	Pony Express Parkway Eastern Segment: Ranches Pkwy to Mountain View Corridor
No Build	ADT	43,000	46,000
	Max V/C	1.48	1.36
	Congestion	4	4
Reversible Lanes	ADT	40,000	43,000
	Max V/C	1.07	1.13
	Congestion	4	4
Widened Arterial System	ADT	40,000	39,000
	Max V/C	0.81	0.90
	Congestion	2	3
Conventional Freeway	ADT	37,000	28,000
	Max V/C	0.99	0.89
	Congestion	3	2
Frontage Road Freeway System	ADT	37,000	27,000
	Max V/C	0.93	0.81
	Congestion	3	2

Legend: Congestion Levels
1 Minimal Delay
2 Approaching Congested
3 Congested
4 Heavily Congested

Figure 12: Reversible Lanes Concept – 2040 ADT Volumes and Congestion

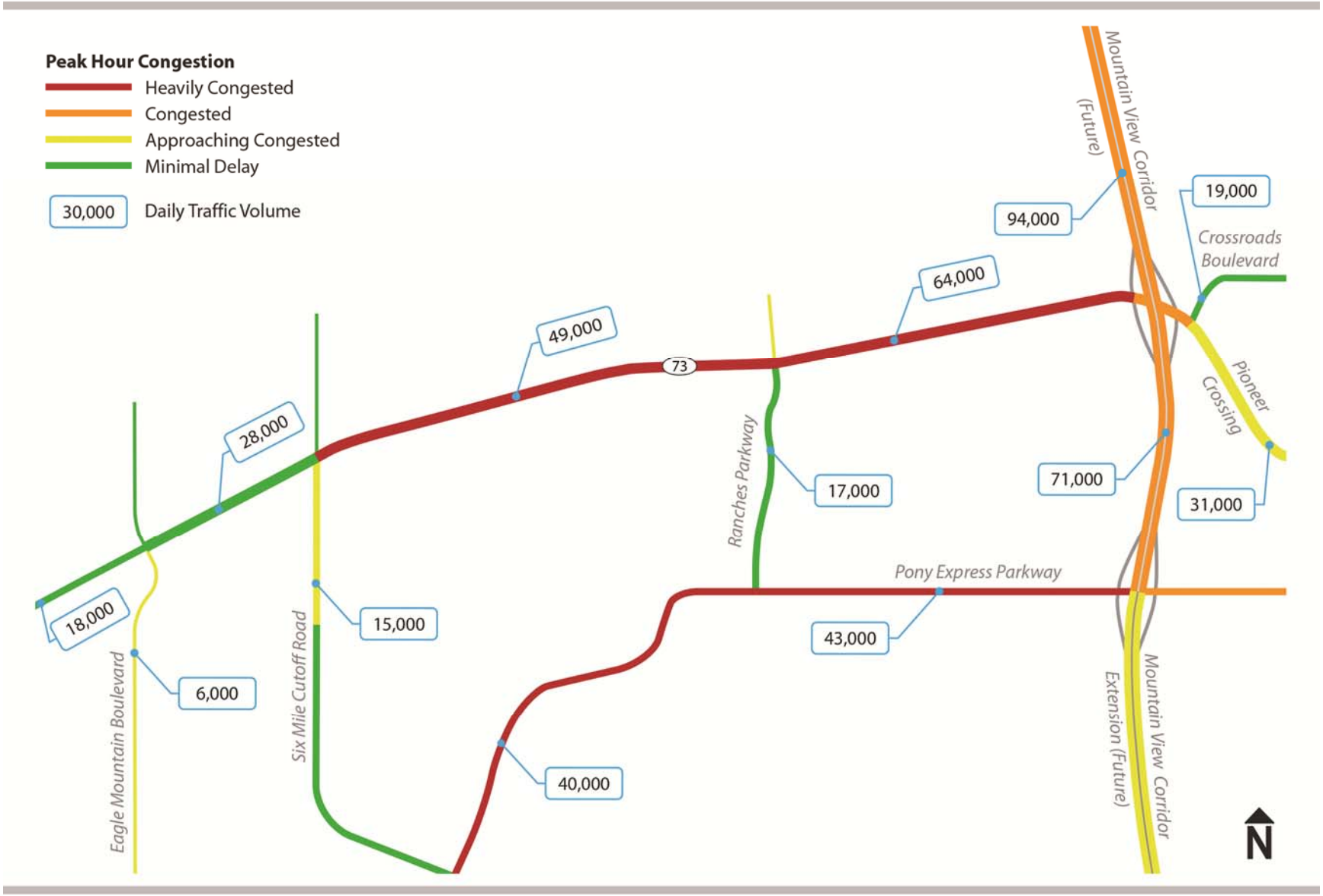


Figure 13: Widened Arterial System Concept – 2040 ADT Volumes and Congestion

Figure 14: Conventional Freeway Concept – 2040 ADT Volumes and Congestion

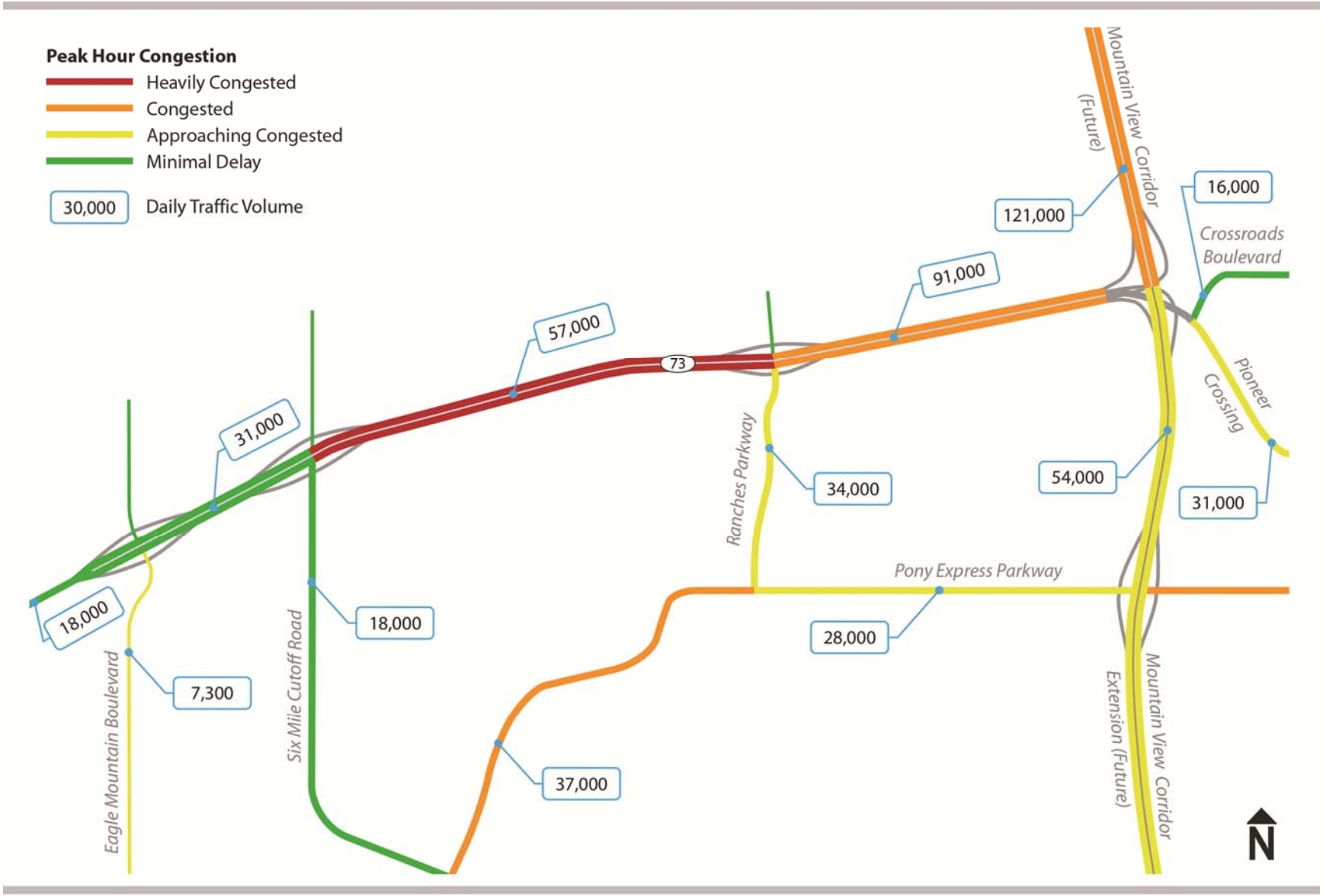
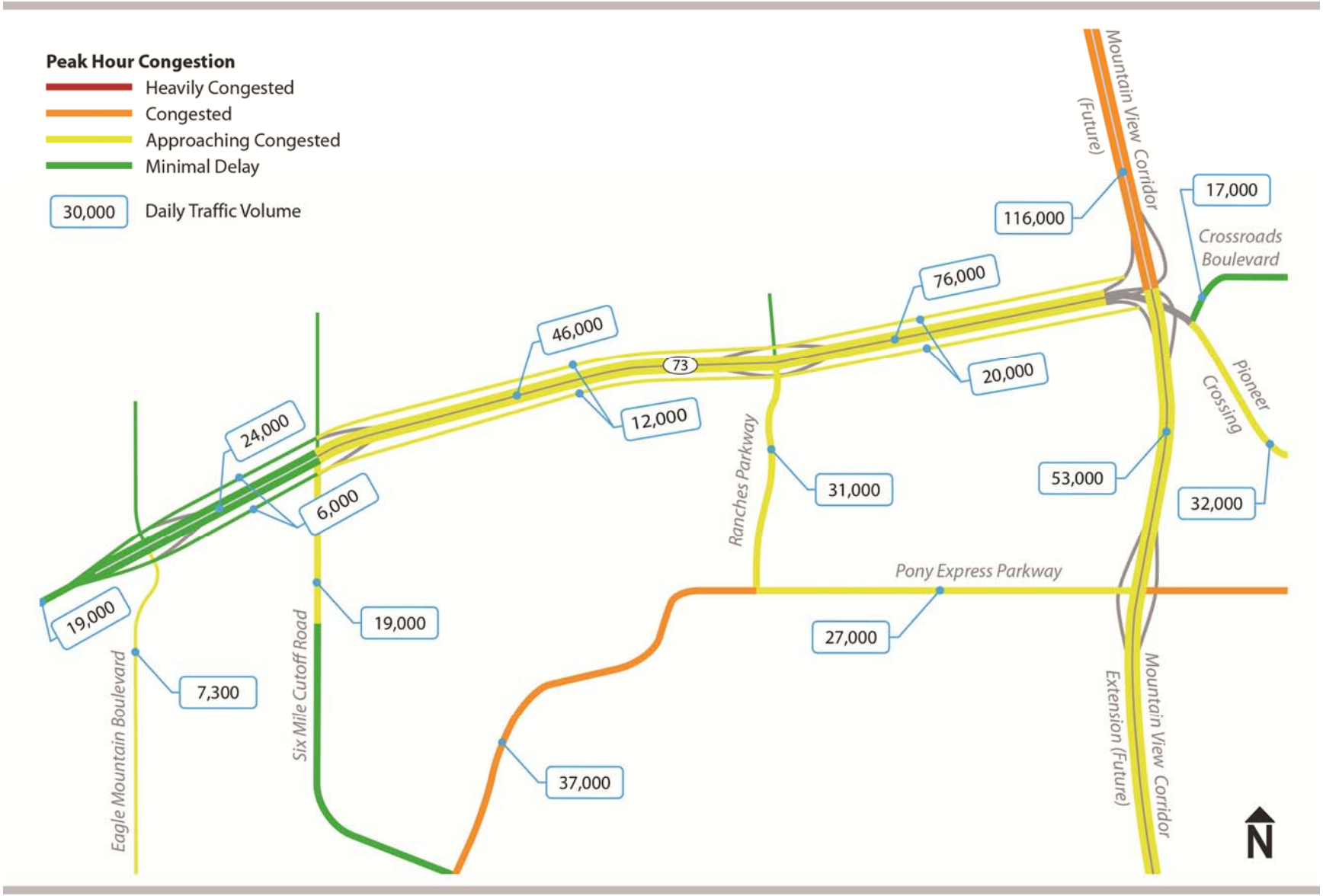


Figure 15: Frontage Road Freeway System Concept – 2040 ADT Volumes and Congestion



Results presented in Table 6 and Table 7 show that the Frontage Road Freeway System concept performs better than any of the other concepts evaluated. The results for this concept show that none of the SR-73 segments reach congested or heavily congested levels. All of the other concepts experience congested levels for one or more of the 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 Arterial System concept results in heavily congested levels for the eastern section of SR-73, while the middle segment of SR-73 operates at congested levels. The Conventional Freeway concept (freeway without frontage roads) performs well in the western segment, but is heavily congested for the segment between Six Mile Cutoff Road and Ranches Parkway.

The Frontage Road Freeway System concept also moves a larger amount of traffic volume. The No Build condition serves 54,000 vehicles per day under extremely congested conditions. The Frontage Road Freeway System serves 97,000 per day, an additional 43,000 vehicles per day representing a throughput increase of 82 percent, with significantly less congestion. The Conventional Freeway concept moves a comparable, but slightly lower, 91,000 vehicles per day.

In the Reversible Lanes and Widened Arterial System concepts, SR-73 only moves 64,000 and 67,000 vehicles per day, respectively. Most of the additional demand is served by Pony Express Parkway in both concepts with 39,000 and 43,000 vehicles per day served by the Reversible Lanes and Widened Arterial System concepts, respectively. The Lake Mountain Expressway and Hidden Valley Highway modeled for the Widened Arterial System concept provide little relief to traffic demand on SR-73 or Pony Express Parkway.

2.4.2. Right-of-Way Requirements Results

Table 8 presents the results of the right-of-way requirements evaluation for all improvement concepts. Figure 5 (page 7) shows the right-of-way requirements of the Reversible Lanes concept. This concept requires minor widening for additional traffic lanes and trail and transit facilities. As such, the right-of-way requirements were determined to be moderately favorable for the Reversible Lanes concept.

Table 8: Right-of-Way Evaluation Results

Concept	Right-of-Way
Reversible Lanes	Y
Widened Arterial System	R
Conventional Freeway	R
Frontage Road Freeway System	R

Legend
G Favorable Y Moderately Favorable R Unfavorable

Figure 6 (page 8) shows the right-of-way requirements of the Widened Arterial System concept. The SR-73 right-of-way requirements for the Reversible Lanes and Widened Arterial System concepts are the same. However, Widened Arterial System concept was determined to be undesirable because it requires right-of-way acquisitions to widen both SR-73 and Pony Express Parkway and construct new roadways for Lake Mountain Expressway and Hidden Valley Highway.

Figure 7 (page 9) shows the right-of-way requirements of the Conventional Freeway concept. Because the freeway is a no-access facility (see Section 2.4.3), this concept would result in land locking of some properties. Land locking occurs when all access to a property are taken away. As such, land locking would require acquisition of an entire parcel even if only a portion of the parcel is required to fit the freeway cross-section. As an alternative to full property acquisitions, property access to land locked properties could be provided through two-way frontage roads along each side of the freeway mainline or additional new access roads. Two-way frontage roads would have to flare out at

interchange locations to meet intersection spacing requirements. Because any of these access-driven requirements are impactful far beyond the footprint of the freeway mainline, the right-of-way requirements for the Conventional Freeway concept were determined to be unfavorable.

Figure 8 (page 9) shows the right-of-way requirements of the Frontage Road Freeway System concept. Based on its wide footprint, the right-of-way requirements of this concept were determined to be unfavorable. Although the freeway mainline portion of the system is a no-access facility, this concept provides property access through its one-way frontage roads. Because it includes one-way frontage roads on each side of the freeway mainline, this concept has a wider footprint than the Conventional Freeway concept. However, because the Frontage Road Freeway System provides access through its frontage roads, the overall right-of-way requirements of this concept are expected to be lower than for the Conventional Freeway concept.

2.4.3. Access Impact Results

Table 9 presents the results of the access impact evaluation for all improvement concepts. The access impact of the Reversible Lanes and Widened Arterial System concepts are the same as the No Build scenario. As such, the access impacts for these concepts were determined to be favorable. However, depending on the design and operational details, the SR-73 access for the Reversible Lane concept could be restricted to prohibit left turns during peak periods.

The Conventional Freeway concept would classify SR-73 as a Category 1: Freeway/Interstate System facility. Such a facility would have "no-access" lines which restrict access only to and from the freeway at interchanges. Interchange spacing for the freeway facility would be one to two miles. This means that many of the existing street intersections and all of the driveway access points along the study corridor would have to be closed. Restoring access to streets and driveways would require two-way frontage roads. These frontage roads would have to flare out at the interchanges to provide quarter mile spacing between the ramps and frontage road intersection. As such, the access impact of the Conventional Freeway concept was determined to be unfavorable.

Table 9: Access Impact Evaluation Results

Concept	Access Impact
Reversible Lanes	G
Widened Arterial System	G
Conventional Freeway	R
Frontage Road Freeway System	G

Legend
G Favorable Y Moderately Favorable R Unfavorable

The Frontage Road Freeway System concept would classify the freeway mainlines as a Category 1: Freeway/Interstate System facility and the one-way frontage roads as Category 10: Freeway One-Way Frontage Road facilities. Category 10 facilities allow for public street minimum spacing of 660 feet and minimum quarter mile spacing for signalized intersections. Because it maintains street access to public streets, the Frontage Road Freeway System concept was determined to be favorable. Because no driveway access is allowed onto frontage roads, access for this concept would be more restrictive than the No Build, Reversible Lanes, and Widened Arterial System concepts. However, most of the existing and planned street network could be maintained. With proper planning undeveloped properties could retain access.

2.4.4. Transit and Trail Compatibility Results

Table 10 presents the results of the transit and trail compatability evaluation for all improvement concepts. The Reversible Lanes concept could accommodate most transit service options. It would restrict center running dedicated transit facilities, but could accommodate side running dedicated lane or shared use transit facilities. The Reversible Lanes concept would also be compatible with a trail facility adjacent to the

roadway. Based on these factors, the transit and trail compatibility for the Reversible Lanes concept was determined to be moderately favorable.

The Widened Arterial System concept could accommodate most transit service options, including center or side running dedicated transit facilities. This concept would also be compatible with a trail facility adjacent to the roadway. However, because of the high levels of congestion projected for the Widened Arterial System concept, its transit and trail compatibility was determined to be moderately favorable. Traffic congestion would impact the performance of most transit service options and, as a result of aggressive driving, also create dangerous conditions for pedestrians.

The Conventional Freeway concept would provide limited access points for transit service. Although trail facilities could be placed next to the freeway, these facilities would also have limited access points and therefore accommodate primarily long distance pedestrian and bicycle travel. Based on these factors, the transit and trail compatibility for the Conventional Freeway concept was determined to be moderately favorable.

The frontage roads for the Frontage Road Freeway System concept would provide service similar to arterials. Similar to arterial concept, the Frontage Road Freeway System concept would also be compatible with a trail facility adjacent to lower speed traffic of the one-way frontage road. However, because it is less congested than the arterial concepts, its transit and trail compatibility was determined to be favorable.

Table 10: Transit and Trail Compatibility Evaluation Results

Concept	Transit and Trail Compatibility
Reversible Lanes	Y
Widened Arterial System	Y
Conventional Freeway	Y
Frontage Road Freeway System	G

Legend
G Favorable Y Moderately Favorable R Unfavorable

2.4.5. Overall Concept Evaluation Results

The results of the concept evaluation for all improvement scenarios and evaluation factors are presented in Table 11. These results show congestion levels using the same qualitative scale used for the right-of-way, access impact, and transit and trail compatibility metrics. Based on these evaluation factors, the Frontage Road Freeway System Concept was identified as the recommended concept to meet the purpose and need for study corridor improvements. Figure 16 presents an illustrative rendering of the Frontage Road Freeway System concept.

Table 11: Overall Improvement Concept Evaluation Results

Concept	Evaluation Factors*			
	Congestion	Right-of-Way	Access	Transit / Trail
No Build	R	G	G	R
Reversible Lanes	R	Y	G	Y
Widened Arterial System	R	R	G	Y
Conventional Freeway	Y	R	R	Y
Frontage Road Freeway System	G	R	G	G

Recommended Concept

Legend
G Favorable Y Moderately Favorable R Unfavorable

Figure 16: Recommended Concept Photo Simulation

Future Condition (Simulation)

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3. CONCEPT REFINEMEMENT

This section summarizes additional analysis and refinements that were performed for the recommended Frontage Road Freeway System concept. The purpose of this additional, second-level, analysis was to better define issues such as project limits, number of lanes required, and impacts to the natural and built environmental. The second-level analysis presented here for the recommended Frontage Road Freeway System concept must be expanded and refined in follow-on environmental phase studies.

3.1. Lane Configurations Analysis

Micro-simulation modeling analysis was performed for the Frontage Road Freeway System 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 needs for intersections. The resulting intersection lane configurations and approximate turning vehicle storage requirements are presented in Figure 17.

The analysis assumed slip ramps at multiple locations, including to and from the east at both Ranches Parkway and Mt Airey Road. However, because these two cross streets are closely spaced, design may not permit ramps at both locations. Mt Airey Road serves as critical relief to Ranches Parkway. Without ramps to and 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 and from the east at Ranches Parkway rather than the ramps to and from the east at Mt Airey Road. Traffic exiting the freeway and heading to the south would exit east of Mt Airey Road and have the option of turning left either at Mt Airey Road 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 study process.

3.2. Western Terminus Analysis

This section presents the analysis completed to determine the extents of the Frontage Road Freeway System concept recommended for the study corridor. As previously presented, the 2040 traffic volumes east of Six Mile Cutoff Road were projected to be 58,000 vehicles per day. This level of traffic demand exceeds the capacity of even a seven-lane roadway, but can be accommodated by a Frontage Road Freeway System (see Table 6). The 2040 traffic volumes were projected to decrease substantially west of Six Mile Cutoff Road and again west of Eagle Mountain Boulevard. The 2040 volumes between Six Mile Cutoff Road and Eagle Mountain Boulevard were projected to be approximately 30,000 vehicles per day, which could generally be accommodated by a five-lane arterial street as well as a Frontage Road Freeway System (see Table 6).

These projected 2040 traffic volumes support extending the western terminus of the Frontage Road Freeway System to, at a minimum, the Six Mile Cutoff Road. Because environmental and property impacts in the western segment of the study corridor are expected to be low, this study considered application of a Frontage Road Freeway System for the full extents of the study corridor. To consider the applicability of extending the Frontage Road Freeway System to Eagle Mountain Boulevard, the study analyzed 2050 conditions for the study corridor.

Because 2050 is beyond the horizon year for the RTP, the travel demand model used the 2040 roadway network but with 2050 population and employment projections previously prepared by MAG. Figure 18 shows the results of the projected 2050 volumes including a comparison of 2040 and 2050 daily traffic volumes for the study corridor. As shown, 2050 demands were projected to be about 49,000 vehicles per day for SR-73 between Six Mile Cutoff Road and Eagle Mountain Boulevard. This level of traffic demand exceeds the capacity of a five-lane arterial and approximately reaches the capacity of a seven-lane arterial. As such, this study recommends the limits of the Frontage Road Freeway be extended to Eagle Mountain Boulevard.

Figure 17: 2040 Lane Configuration and Storage Requirements for the Frontage Road Freeway System Concept

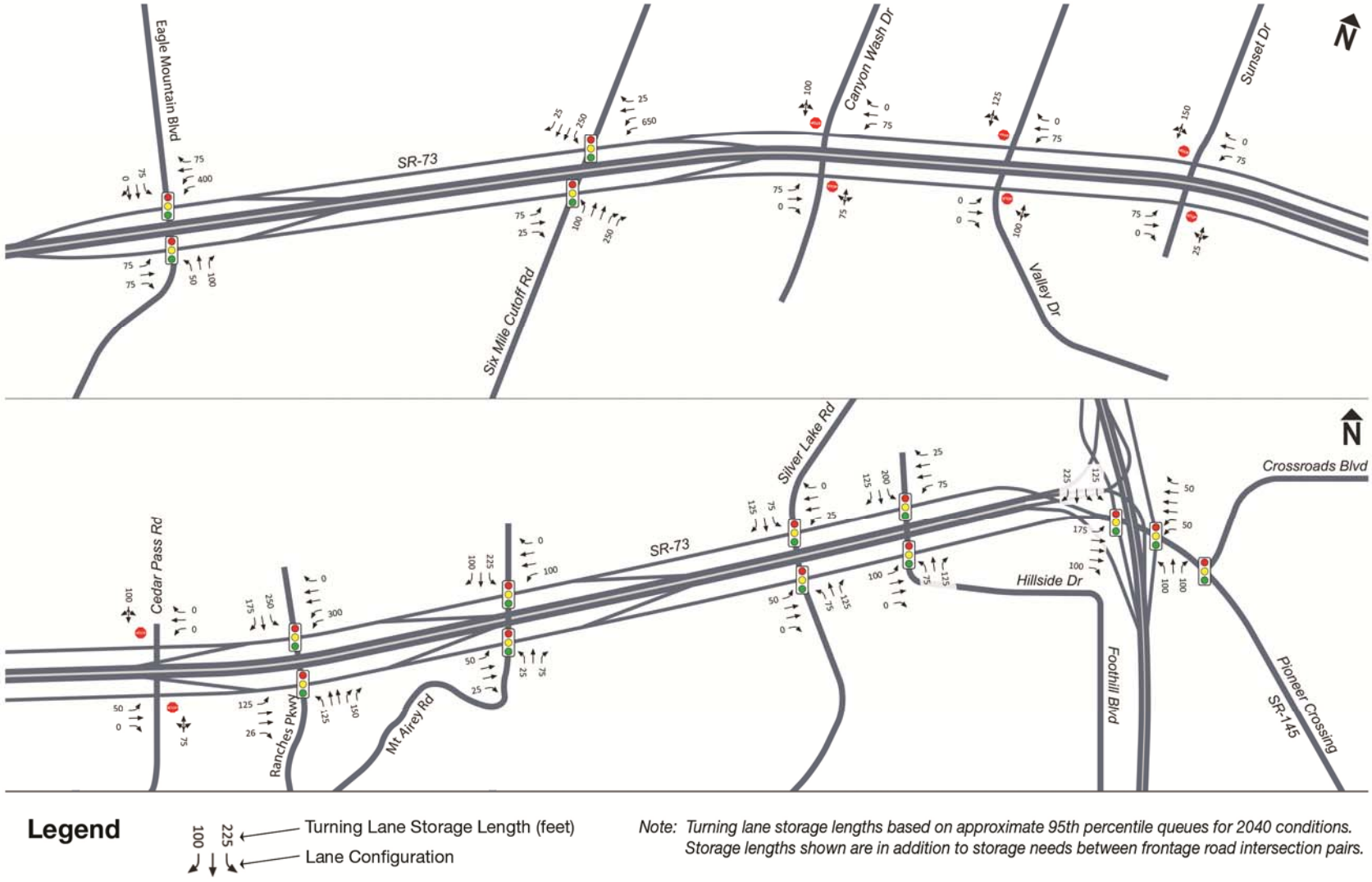
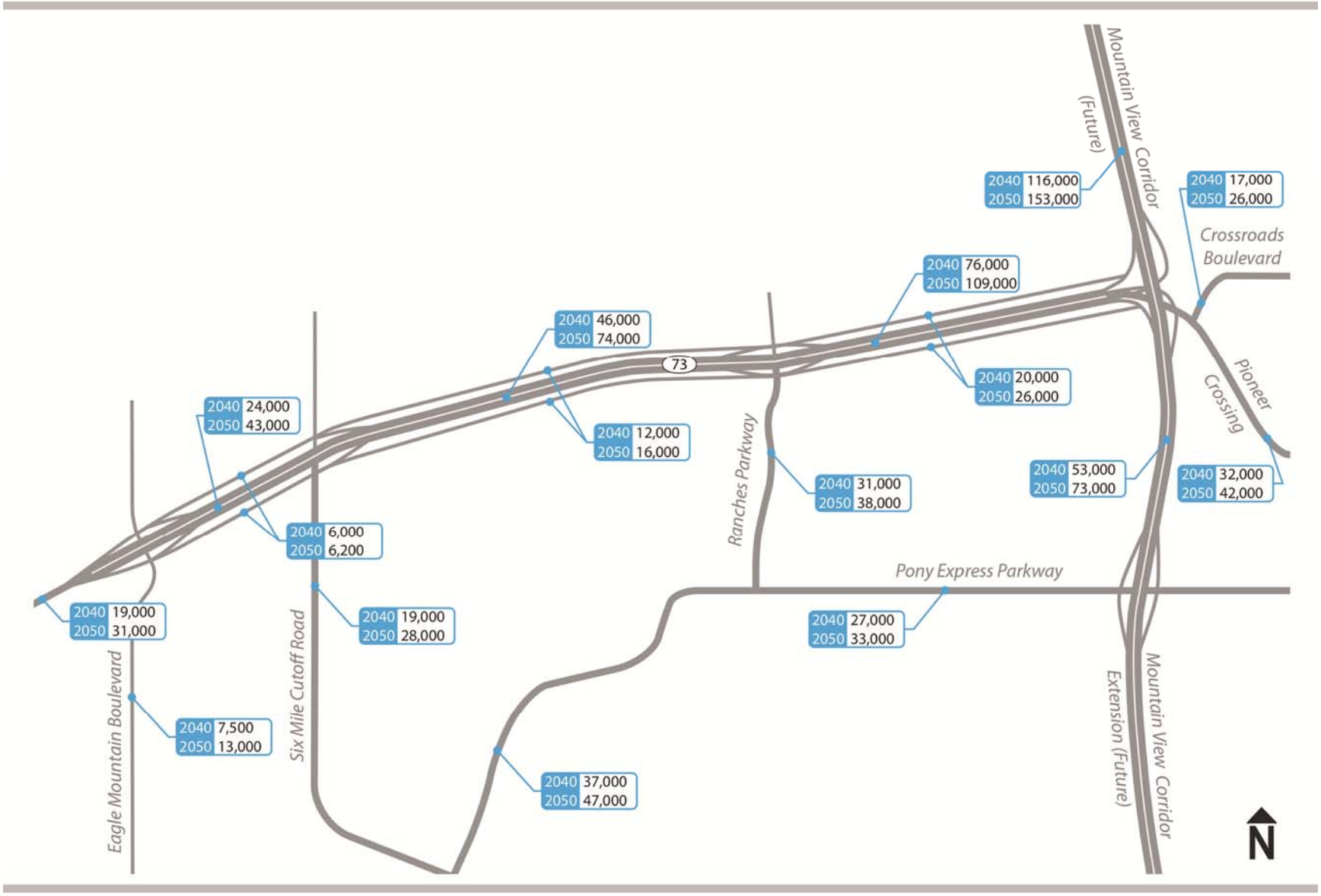


Figure 18: 2040 and 2050 Projected Daily Traffic Volumes for the Frontage Road Freeway System Concept



Based on the analysis for the western terminus and for the following reasons, this study recommends applying the Frontage Road Freeway System concept for the entire study corridor, extending from the Mountain View Corridor to Eagle Mountain Boulevard:

- It is consistent with MAG's 2040 RTP.
- It provides resiliency for growth beyond 2040, which is helpful given the uncertainty regarding the pace and geographic distribution of land use growth.
- It allows for preservation of right-of-way before development encroaches on the corridor.

Because of its regional significance, Eagle Mountain Boulevard provides a logical terminus.

3.3. Horizontal Alignment Evaluation

This study developed and evaluated various horizontal alignment scenarios for the recommended Frontage Road Freeway System concept. These alignment scenarios were developed to avoid or minimize conflicts with environmentally sensitive areas, existing utilities, and existing/planned homes, businesses, and schools. Aerial photographs of some of the conflicts considered are shown in Figure 19, Figure 20, and Figure 21. Figure 22 presents a map overview of the key conflicts considered. Three horizontal alignments were developed and a "footprint" for each alignment was defined to help evaluate the impacts associated with each alignment (see Figure 23).

All three horizontal alignments were defined to avoid impacts to the Ranches Golf Course (Figure 20), the Quester-KRG tap station (Figure 21), and the existing businesses and townhomes between Mount Airey Drive and Ranches Parkway (including Rockwell Charter School, the Maverik Gas Station, and the townhomes on the southwest corner of Mt. Airey). As a result, all three horizontal alignments are essentially the same east of Ranches Parkway.

Figure 19: Black Ridge Elementary School Adjacent to SR-73

Figure 20: Ranches Golf Course Adjacent to SR-73

Figure 21: Utility Corridor Crossing at SR-73

Below is a summary of the three alignment scenarios that were developed as part of this study.

- South Alignment. This option generally holds the existing northern right-of-way line for SR-73 and widens to the south. This alignment has the least impacts to Black Ridge Elementary School's playground (0.24 acres). However, because there are more existing homes on the south side of SR-73, the South Alignment has the highest number of residential home impacts. Impacts to the school's playground are likely to be minimal.
- North Alignment. This option generally holds the existing south right-of-way line and widens to the north. This alignments results in the highest impact to Black Ridge Elementary School's playground (0.50 acres). However, because there is currently more undeveloped land north of SR-73, the North Alignment results in lower impacts to existing neighborhoods. It is important to note that there are several planned residential developments currently in various stages of the approval process with Eagle Mountain City which are likely to affect the ultimate number of residential impacts.
- Middle Alignment. Unlike the North and South Alignment scenarios, which were intended to generally confine impacts to only one side of the highway, the Middle Alignment option widens on both sides of SR-73 in order to minimize the number of total residential takes. Although this option results in the lowest number of total property acquisitions, it results in a considerable number of partial acquisitions.

Although this study showed that the Middle Alignment had the least amount of right-of-way impact, it is important to note that there are a number of unique factors related the properties along SR-73 that make it difficult to differentiate between a total acquisition and partial acquisition. For example, during coordination meetings with Eagle Mountain City, it was noted that many of the residential properties along SR-73 west of Ranches Parkway are 0.5 acre lots (or larger) with individual septic systems. A partial acquisition could potentially result in total acquisition if the remaining lot size is not sufficient to maintain a septic field. Also, some of the existing properties along SR-73 are designated for farm animal use, and remaining lot size could impact that land use designation. For these and other reasons, additional evaluation is needed during environmental phase to further evaluate right-of-way impacts.

Although this study developed various alignment scenarios for the recommended Frontage Road Freeway System concept, no preferred alignment was identified. The objective of this study was only to investigate a range of possible alignments and to present that information to project stakeholders and the public for comment and feedback. Final determination regarding the preferred alignment will be made by UDOT as part of a future environmental study after UDOT has had additional opportunity to (1) perform a complete and thorough alternatives impacts analysis and (2) provide additional opportunities for the public to comment on those alternatives and their impacts.

3.4. Vertical Alignment Evaluation

The alignment evaluation also considered vertical alignment scenarios for the recommended improvement concept. To maintain connectivity across SR-73, the Frontage Road Freeway System requires the freeway mainline to be grade (bridge) separated at cross streets. Because of existing development along the study corridor, frontage roads would be constructed to follow the existing ground level.

Grade separation between the freeway mainline lanes and cross streets may be achieved by depressing or elevating the mainline lanes. Figure 24 illustrates depressed and elevated freeway scenarios. Because as part of the public outreach effort, stakeholders expressed a preference for a depressed freeway section, the freeway mainline was depressed where practical. However, because of utilities and drainage issues (including two existing drainage crossings atSR-73) it was not always feasible to depress the mainline freeway section. This issue can be further evaluated during the environmental study phase.

3.5. Next Steps and Future Refinements

The purpose of this study was to help UDOT and Eagle Mountain City validate and document the purpose and need for transportation improvements to SR-73 and to develop and evaluate a range of potential solutions that address those needs. One of the main goals of this study was to identify a recommended concept and then advance design sufficiently to help UDOT and Eagle Mountain City make more reliable planning decisions in light of current and projected growth for the SR-73 study corridor.

Additional design refinements are needed to develop a final footprint as part of the environmental study phase. These additional refinements include:

- Exploration of additional alignment scenarios to minimize impacts to existing and planned development.
- Potential optimization of proposed cross section to minimize impacts and costs.
- Identification of storm water drainage needs, including location of potential detention ponds and outfall facilities.
- Refinement of vertical alignment.
- Coordination between UDOT and Eagle Mountain City to develop final locations of slip ramps, cross streets, and access points.

This study included key components to help strengthen the linkage between its planning efforts and the follow-on environmental document. Those key components included:

- Consideration of potential environmental impacts.
- Coordination with resources agencies.
- Public involvement effort to help validate and gather feedback about the project's purpose, need, and concepts considered.

Supplementing this planning study with the above elements is intended to help UDOT use the results of the planning study to improve and expedite the NEPA/environmental process.

Figure 22: Design Issues Map

Figure 23: Alignment Scenarios (1 of 4)

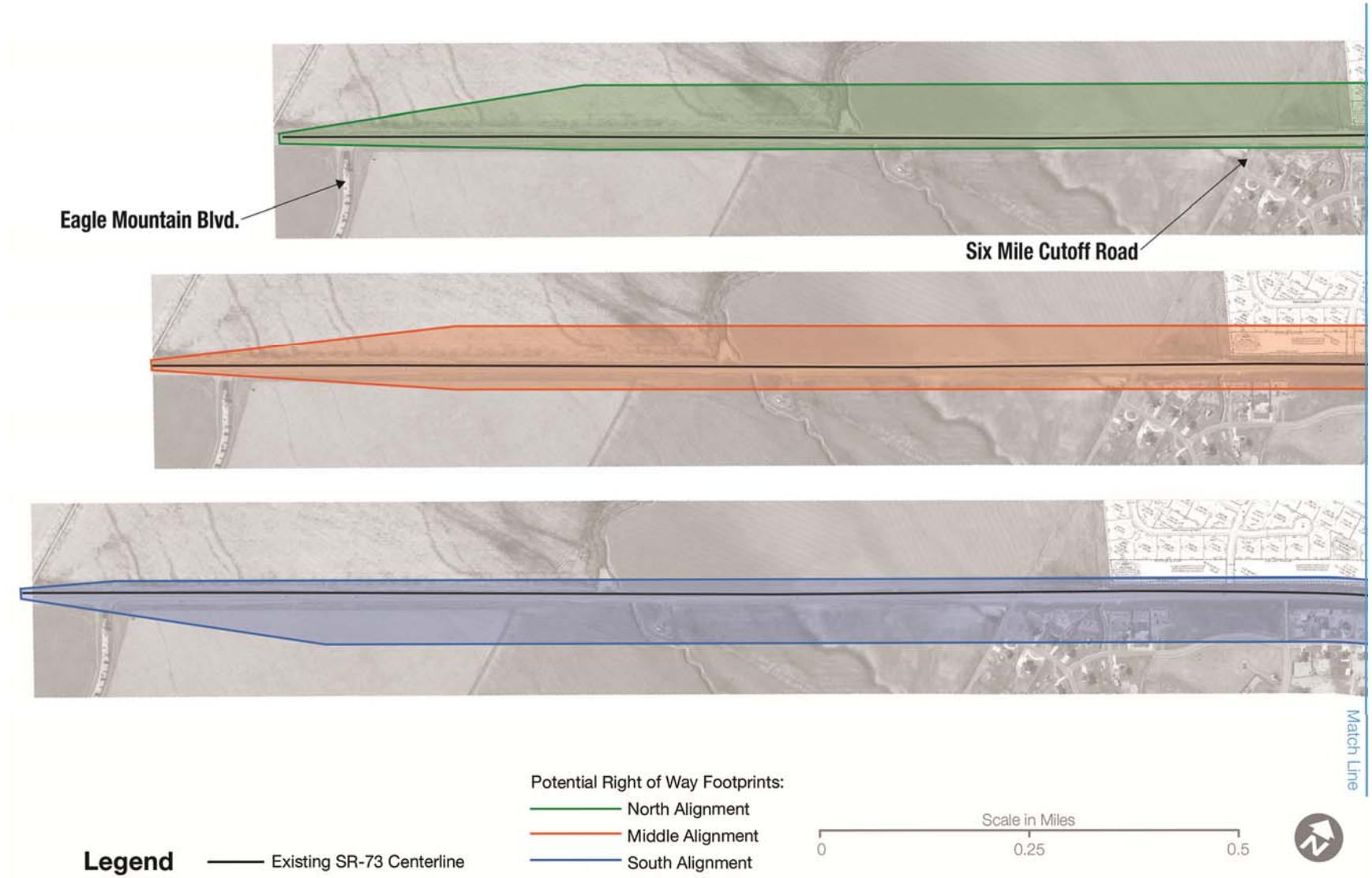


Figure 23: Alignment Scenarios (Continued; 2 of 4)

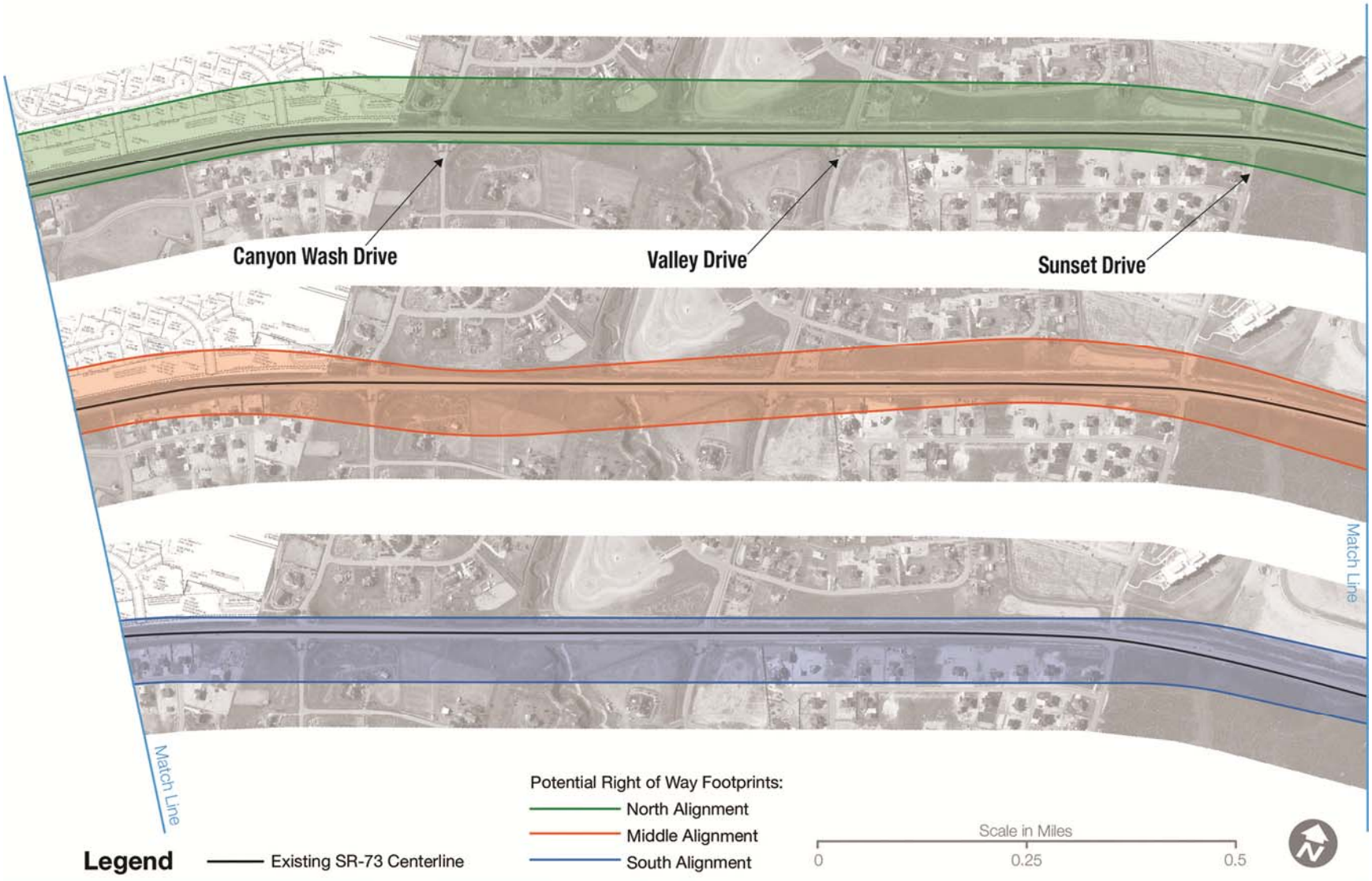


Figure 23: Alignment Scenarios (Continued; 3 of 4)

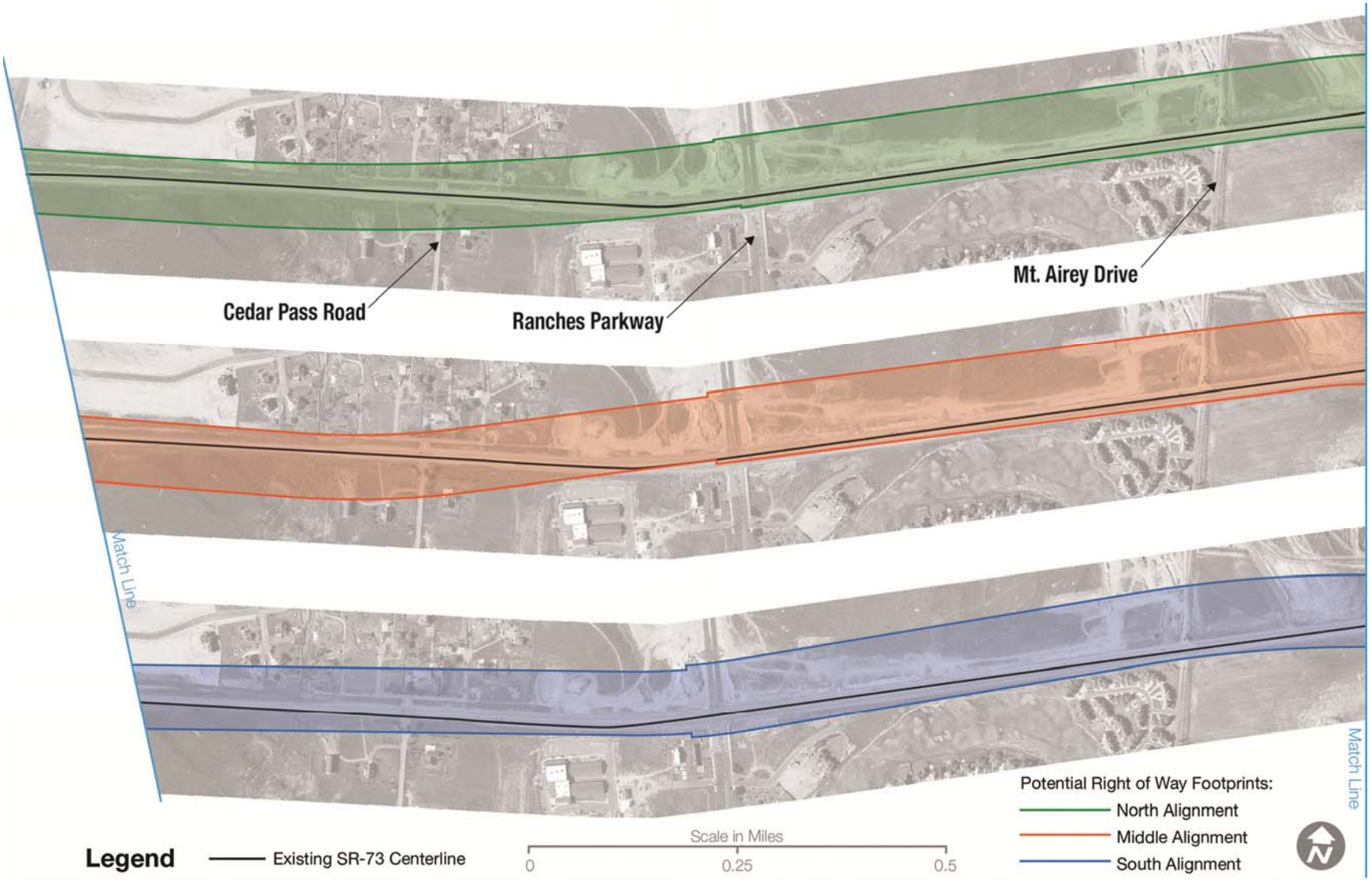


Figure 23: Alignment Scenarios (Continued; 4 of 4)

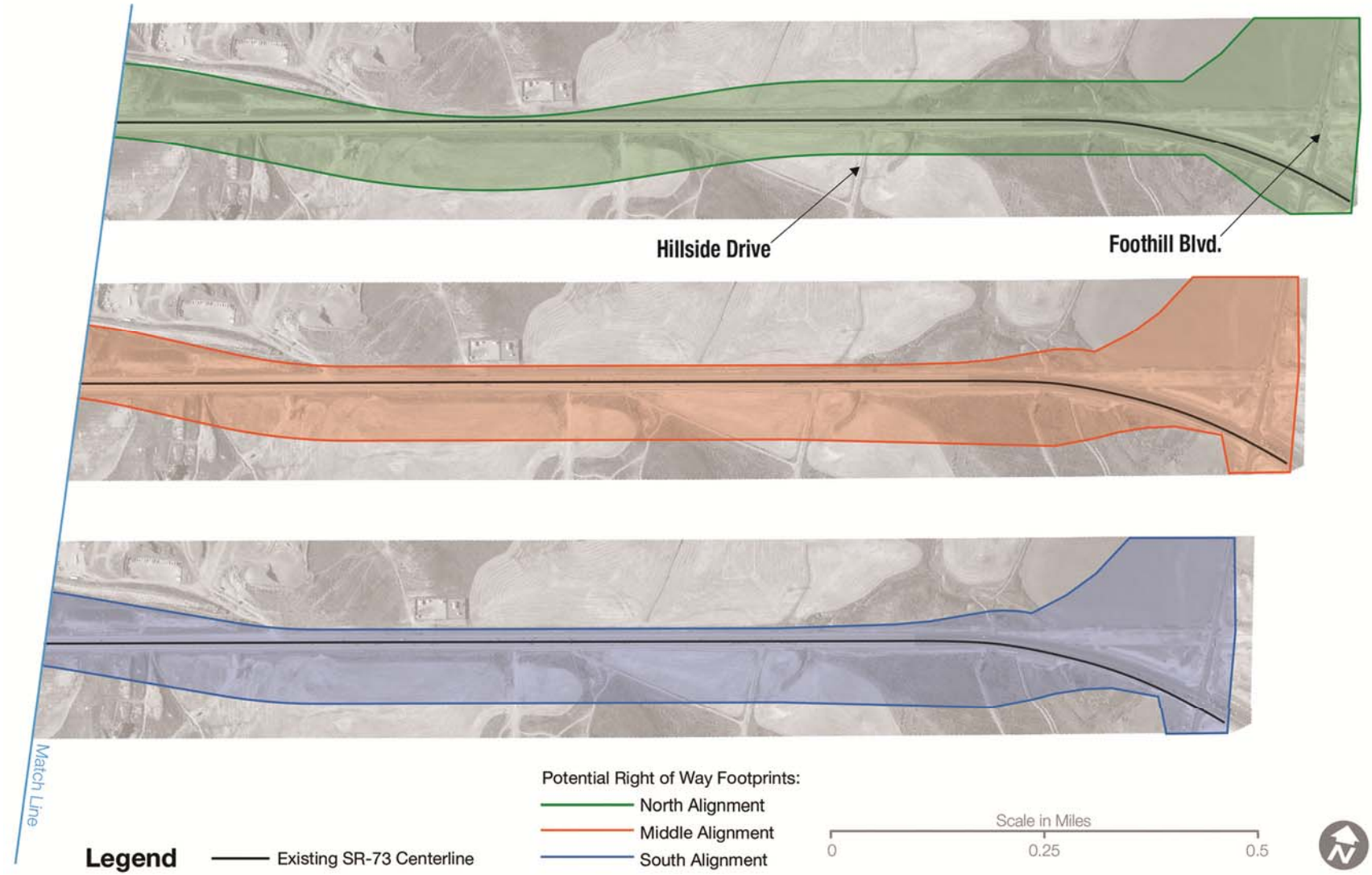
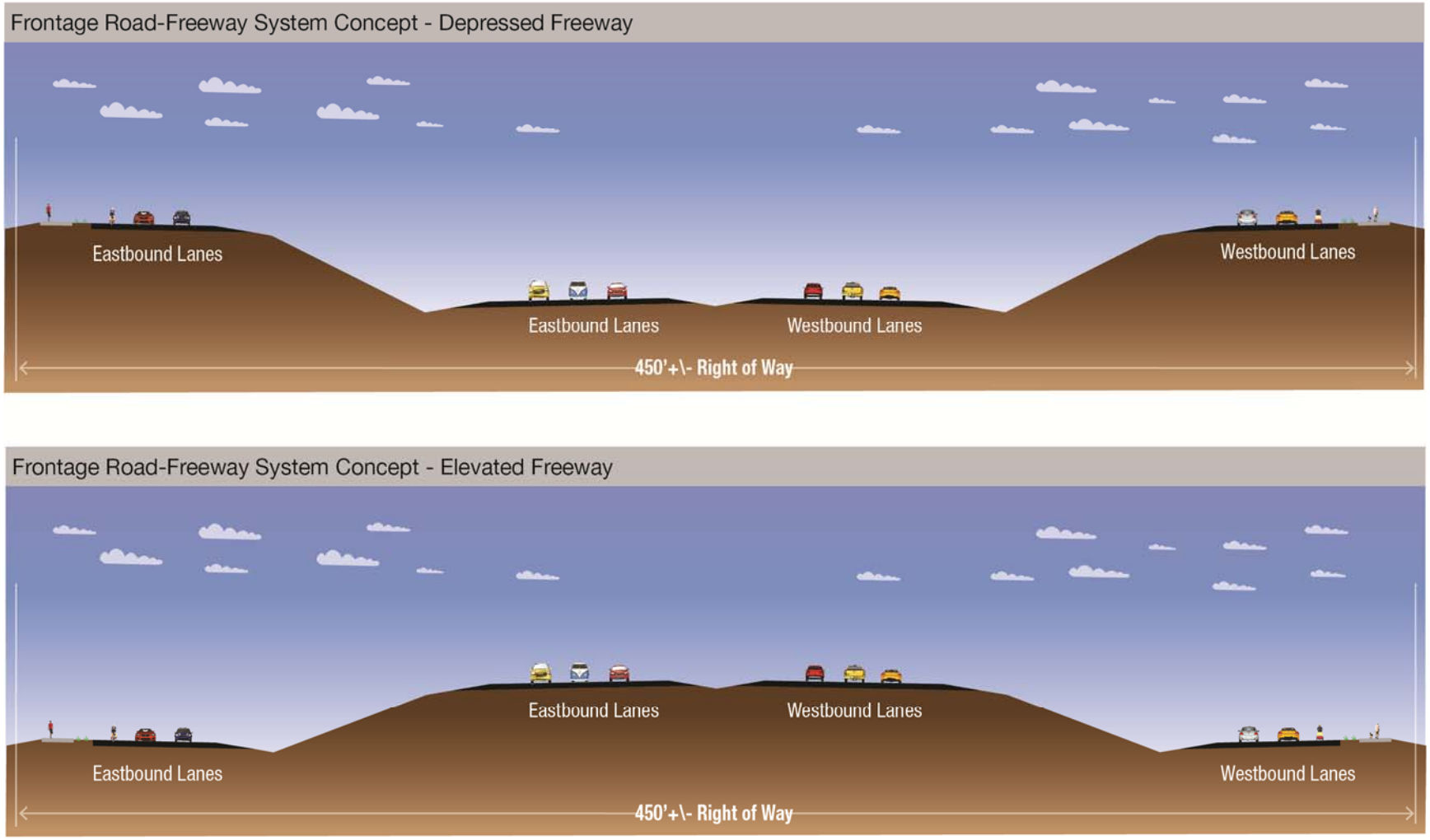


Figure 24: Depressed and Elevated Freeway Scenarios



4. PUBLIC INVOLVEMENT

Public and agency input was integral to the planning process followed for this study. As part of this study, UDOT engaged stakeholders from Eagle Mountain and Saratoga Springs to identify potential solutions to projected traffic congestion for the study corridor. The purpose of the public involvement effort was to gain input from residents, property owners, business owners, community leaders, and stakeholder groups regarding possible improvement concepts and alignments for SR-73. The study team involved the public early on in the planning process to better understand their needs, desires and concerns regarding the future of SR-73. Public engagement continued throughout the study process.

4.1. Participation Methods

This study applied a variety of tools to obtain public input during the planning process, including stakeholder workshops, one-on-one meetings with the City, a public open house, individual stakeholder meetings, and a variety of public comment submission options. Most notably, the study facilitated two stakeholder workshops and a public open house at key stages during the planning process. Table 12 summarizes these key stakeholder meetings. Additional details and outcomes of these meetings are presented in subsequent sections.

Table 12: Public Meetings Schedule

Stakeholder Workshop #1	Stakeholder Workshop #2	Public Open House
Thursday, Sept. 3, 2015 4:00 to 5:00 p.m.	Thursday, Oct. 22, 2015 4:00 to 5:00 p.m.	Thursday, Nov. 18, 2015 5:30 to 7:30 p.m.
Eagle Mountain City Hall	Eagle Mountain Public Works Office	Black Ridge Elementary School in Eagle Mountain.
18 Attendees	16 Attendees	65 Attendees

4.2. Stakeholder Workshop #1

UDOT invited representative members from local stakeholder groups to participate in an initial Stakeholder Workshop for the study. Invitations were extended to 23 different stakeholder groups ranging from the area schools and districts, the surrounding city's offices, local home owner associations (HOA), property owners, School and Institutional Trust Lands Administration (SITLA), Camp Williams, the Federal Highway Administration (FHWA), Mountainland Association of Governments (MAG), and local businesses. These various stakeholder groups were selected to represent the community as a whole, to provide feedback to UDOT regarding the concepts being considered by UDOT as part of this study and also to help UDOT better define and validate the need for the project. Table 13 details the eighteen stakeholders that attended the workshop and the stakeholder groups they represented.

The workshop format consisted of a presentation style meeting with a question and answer session following the presentation. Objectives of this workshop were to present to key stakeholders a range of concepts that UDOT was evaluating as part of this study to address the purpose, development process, preliminary improvement concepts, and the preliminary evaluation of the concepts considered. The workshop also

Figure 25: Stakeholder Workshop Setting

Table 13: Stakeholder Workshop #1 Attendees

Name	Representing
Mayor Chris Pengra	Eagle Mountain
Steve Mumford	Eagle Mountain
John Linton	Eagle Mountain
Chris Trusty	Eagle Mountain
Kimber Gabryszak	Saratoga Springs
Jeremy Lapin	Saratoga Springs
Howard Anderson	Cedar Fort
Glen Tanner	Utah County
Troy Herold	SITLA
Shawn Elliot	MAG
Tim Hereth	MAG
Liz Cramer	FHWA
Scot Hazard	Property Owner
Derek Farnes	Alpine School District Transportation
Darren Beck	Rockwell Charter High School
Allen Martin	Resident
Lew Swain	Property Owner
Roger Barrus	Farmland Reserve

discussed and sought stakeholder input about community needs and opportunities to minimize negative impacts to the community.

Workshop discussions answered participant questions and identified issues for further consideration. Issues raised included the locations of intersections and interchanges, potential right-of-way impacts, concerns about noise, construction phasing, and timely land preservation to reduce impacts to developments.

4.3. Stakeholder Workshop #2

UDOT held a second Stakeholder Workshop midway through the study process. Invitations for this workshop were sent out to the same 23 stakeholder groups invited to the first workshop. Table 14 details the sixteen stakeholders that attended the second workshop and the stakeholder groups they represented.

Prior to the second workshop, the study team identified the Frontage Road Freeway System as the recommended concept based on the first level of screening and input that was collected from the first stakeholder workshop. The primary objective of the second workshop was to develop several potential alignments based on the recommended concept and present those alignments to the workshop attendees for feedback.

The format of the second workshop consisted of a presentation with a question and answer session following the presentation. The study team presented to workshop participants the conceptual north, middle, and south roadway alignments scenarios and then facilitated stakeholder discussions about the relative strengths and weaknesses of each potential alignment. Stakeholders identified the need to locate the roadway as far away as possible from the school and to impact undeveloped land (“paper lots”) over established properties. Stakeholders also raised concerns about impacting the size of parcels and, in some cases, consequently impacting their farm animal zoning designation. Overall there was a lack of stakeholder consensus for a preferred alignment.

Table 14: Stakeholder Workshop #2 Attendees

Name	Representing
Mayor Chris Pengra	Eagle Mountain
Steve Mumford	Eagle Mountain
John Linton	Eagle Mountain
Chris Trusty	Eagle Mountain
Kimber Gabryszak	Saratoga Springs
Jeremy Lapin	Saratoga Springs
Howard Anderson	Cedar Fort
Troy Herold	SITLA
Tim Hereth	MAG
Derek Farnes	Alpine School District Transportation
Darren Beck	Rockwell Charter High School
Paul Raymond	Camp Williams/Utah National Guard CPT
Earl Simmons	Camp Williams/Utah National Guard
Allen Martin	Resident
Roger Barrus	Farmland Reserve
John Barclay	Ranches HOA

4.4. Public Open House

Following technical analysis, one-on-one meetings with the local government, and consideration of stakeholder input, UDOT held a public open house to share the recommended improvement concepts and seek further input from community stakeholders. The public open house was held on November 18th, 2015 at the Black Ridge Elementary School.

The public open house format included a series of information stations staffed by UDOT and consultant study team members. Presentation materials included large-scale display boards and handouts. Sixty five stakeholders attended the public open house to learn and share opinions on the concepts considered, the recommended concept, and the alignment scenarios for the Frontage Road Freeway System concept.

Notification for the public open house included postcard invitations mailed to stakeholders along the SR-73 corridor in Eagle Mountain. Additional notifications were published in the Eagle Mountain City newsletter and social media, UDOT Region 3 social media, and an email to Saratoga Springs staff.

Attendees were invited to submit their comments at the open house or online. UDOT received 68 public comments during the study. Comments about the proposed concept reflected the following major themes:

- Questions regarding the validity of the traffic growth projections, specifically people questioning whether the study area would experience the magnitude of growth required to warrant a freeway-type facility.
- Concerns that the recommended roadway improvements would disturb the rural lifestyle of the area.
- Strong support for a bike/pedestrian trail system.
- Preference for depressed roadway whenever possible.
- Preference to avoid proximity to schools and playgrounds (see Figure 27).
- Concerns about impacting undeveloped land (“paper lots”) over established properties.

Figure 26: Public Open House

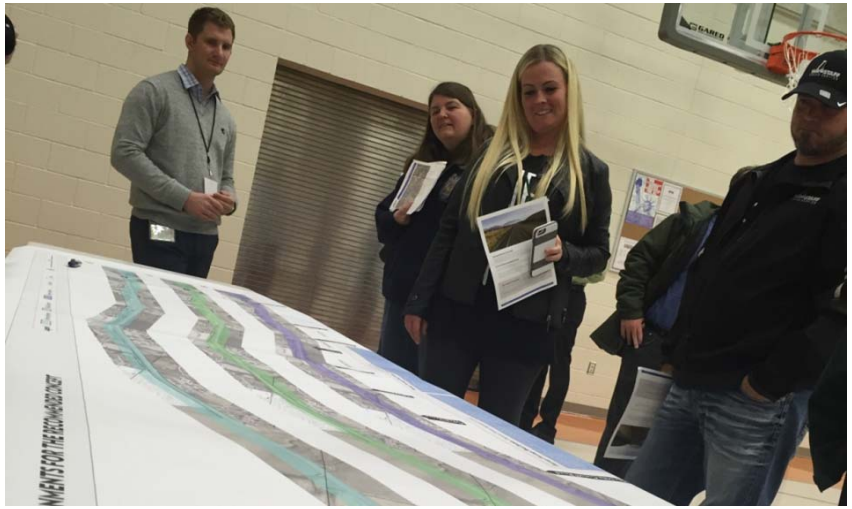


Figure 27: Black Ridge Elementary School Adjacent to SR-73

Stakeholders expressed the opinion that higher priority should be placed on avoiding impacts to currently occupied homes over proposed developments. Over half of the stakeholders expressed frustration that the right-of-way had not been preserved earlier to avoid recently built homes from being placed in close proximity to the corridor. Stakeholders also asked why previous plans to develop an east-west roadway north of SR-73 were no longer being considered.

Additional general stakeholder comments received for the SR-73 study corridor included the following:

- Concerns about the potential environmental impacts related to noise, disturbance of animal habitat, and light pollution.
- Concerns about the impacts roadway improvements might have on parcel sizes and how those impacts would relate to zoning requirements for livestock ownership.

- Questions about how the improved SR-73 corridor would tie in with the future Mountain View Corridor.
- Concerns about the need to improve SR-73 to accommodate current and future mobility needs.

A summary of comments received during the open house is included with the SR-73 Public Outreach Summary Report.

4.5. Eagle Mountain City Coordination

In addition to meeting with stakeholders as part of the workshop/open house process, UDOT and the project team met with Eagle Mountain City throughout the study development process to coordinate with the City and to understand their perspective on transportation needs and the concepts and alignments considered as part of the study.

During this process, Eagle Mountain City provided information and concerns to the study team about the different alignments and provided suggestions for adjustments to the alignments. The study team used the information provided by the City to make alterations to the alignments prior to the public open house.

4.6. One-on-One Stakeholder Outreach

Prior to and during the course of the study, UDOT and the Project team met one-on-one with various individual stakeholders to answer questions and coordinate on a wider range of topics including future development plans along the SR-73 corridor, access, right-of-way setbacks, and corridor preservation.

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5. ENVIRONMENTAL REVIEW

This study investigated the potential for environmental resources to be affected by improvements to the SR-73 study corridor. This effort provided high-level insights into potential environmental impacts that would need to be evaluated further during follow-on environmental studies. This section summarizes the resources considered, their potential impacts, and next steps to be addressed in follow-on environmental studies.

5.1. Potential Impacts Assessment

The assessment of potential environmental impacts for the study corridor was based on a desktop review of resources data available through UDOT's Utah Planning Network (UPlan) system. The consultant and UDOT team worked closely to identify potential environmental resources in the study area. In addition to UPlan, potential environmental resources were identified through reviews of aerial maps and through driving the study corridor.

UPlan's Planning and Environmental Linkages (PEL) analysis tool was used to evaluate various corridor widths along the existing SR-73 alignment. Corridor widths considered included 130 feet, 150 feet, 300 feet, and 450 feet. These various widths were used to reflect the range of right-of-way needs for the improvement concepts considered. UPlan output reports can be generated online through the PEL analysis tool.

Table 15 summarizes the resources considered and the high, medium, or low potential for each resource to become a concern and require further analysis in the environmental study phase. Potential environmental issues presented in Table 15 consider the possible impacts at a 450 foot width, which corresponds to the recommended Frontage Road Freeway System concept. A number of potentially impacted environmental resources were identified. Resources with a rating of medium or higher are described in greater detail below.

5.1.1. Air Quality Concerns

The potential for regional non-attainment for PM 2.5 creates concerns for air quality resources. Air quality is a regional issue and not specific to the project area. As such, the environmental study phase should include close coordination with MAG to consider potential air quality issues for the region.

Table 15: Resources of Potential Concern for the Study Corridor

Resource	Potential Environmental Issue	Source of Information
Stream Crossings	Low	UPlan
Canal Crossings	Low	UPlan
Water Quality	Low	UPlan
Wildlife Habitat	Low	UPlan
Hazardous Waste Sites	Low	UPlan
Air Quality Concerns	Medium	UPlan
Prime and Unique Farmland	Medium	UPlan
Bike Routes Intersected	Low	UPlan
Archaeological Sites	Low	UPlan
Environmental Justice Populations	Low	UPlan
Section 4(f) Properties	Medium	Maps
Potential Noise Impacts	Medium	Maps
Wetlands	Low	Maps

5.1.2. Prime and Unique Farmland

Approximately 70 acres of Prime and Unique Farmland were identified through the UPlan analysis. Future studies, including environmental studies, should be aware of these farmland designations and engage corresponding property owners.

5.1.3. Section 4(f) Properties

The Ranches Golf Course and the Black Ridge Elementary School playground are currently located adjacent to the SR-73 study corridor. Both of these properties may be determined to be Section 4(f) resources in the environmental study phase, should UDOT consider pursuing a full Federal NEPA environmental process. Future studies, including environmental phase studies, should be aware of this potential designation and should seek to avoid or minimize impacts to these properties.

5.1.4. Potential Noise Impacts

There are existing homes on both sides of the study corridor. Roadway widening could result in noise impacts that require mitigation. A noise analysis may be required for future studies, including environmental phase studies.

5.2. Agency Coordination

Solicitations for resource agency comments were submitted via e-mail to the U.S. Fish and Wildlife Service, the Environmental Protection Agency, the U.S. Army Corps of Engineers, and the Utah Division of Wildlife Resources. No responses were received from these agencies. Because the preliminary environmental review contained limited environmental resources, it was determined that additional coordination attempts were not needed for this study. Additional coordination with the appropriate agencies will be needed during the scoping efforts for the environmental study phase.

Because the funding status for the project is still unknown, and because UDOT is currently in the process of obtaining National Environmental Policy Act (NEPA) delegation, coordination for this project did not include the Federal Highway Administration (FHWA). The need to engage FHWA in future environmental phases depend on the status of federal NEPA delegation, the type of environmental document, and the project funding source.

5.3. Document Type Recommendations

Based on the study corridor characteristics and the preliminary environmental review completed for this study, if federal funding is anticipated for this project, it is recommended that UDOT follow this study up with an Environmental Assessment. If no federal funding is anticipated, it is recommended that UDOT pursue a Type B State Environmental Study.

6. PHASED IMPLEMENTATION

Because the costs to construct a new Frontage Road Freeway System facility are high compared to the availability of transportation funding, this study considered opportunities for implementing the SR-73 project in phases over time. A phased implementation approach would allow UDOT to add capacity in the near term while allowing future expansions with minimal "waste" (or tear-out). This section presents interim implementation solutions that would allow the recommended Frontage Road Freeway System concept to be advanced in phases. In addition to defining implementation solutions, it considers when each phase of implementation would be needed (timing of implementation) and the cost of construction for each phase.

6.1. Phased Implementation Approach

This study developed a phased approach to project implementation for the recommended Frontage Road Freeway System concept. This phased approach was guided by the following principles:

- Accommodate current traffic demands and provide additional capacity as demand increases over time.
- Minimize construction disruptions to traffic on SR-73.
- Minimize "waste" (or tear-out) for future construction expansions.
- Fit within limited (incremental) project funding levels.

To accomplish these principles, the SR-73 Frontage Road Freeway System could be constructed in two phases. The first phase would construct the westbound frontage roads and the second would construct the eastbound frontage road and the grade separated freeway mainline lanes. The phased implementation of the Frontage Road Freeway System is described below and summarized in Table 16. Implementation phases are also illustrated for the western and eastern study corridor segments in Figure 28 and Figure 29, respectively.

Table 16: Phased Implementation Approach

Phase	Description
Phase 1	• **WB Traffic:** Construct new westbound frontage road. • **EB Traffic:** Re-stripe existing SR-73 for eastbound traffic. • **Trail:** Construct sidewalk/trail along westbound frontage road. • **ROW:** Acquire and preserve right-of-way for full build-out. • **Utilities:** Relocate any utilities for full build-out.
Phase 2	• **WB Traffic:** Protect in place. • **EB Traffic:** Construct new eastbound frontage road. • **Trail:** Construct sidewalk/trail along eastbound frontage road. • **Freeway Mainline:** Remove existing SR-73 and construct freeway mainline lanes. • **Interchanges:** Construct bridges at cross streets and slip ramps.

Figure 28: Phasing Plan for the Frontage Road Freeway System – Western Segment

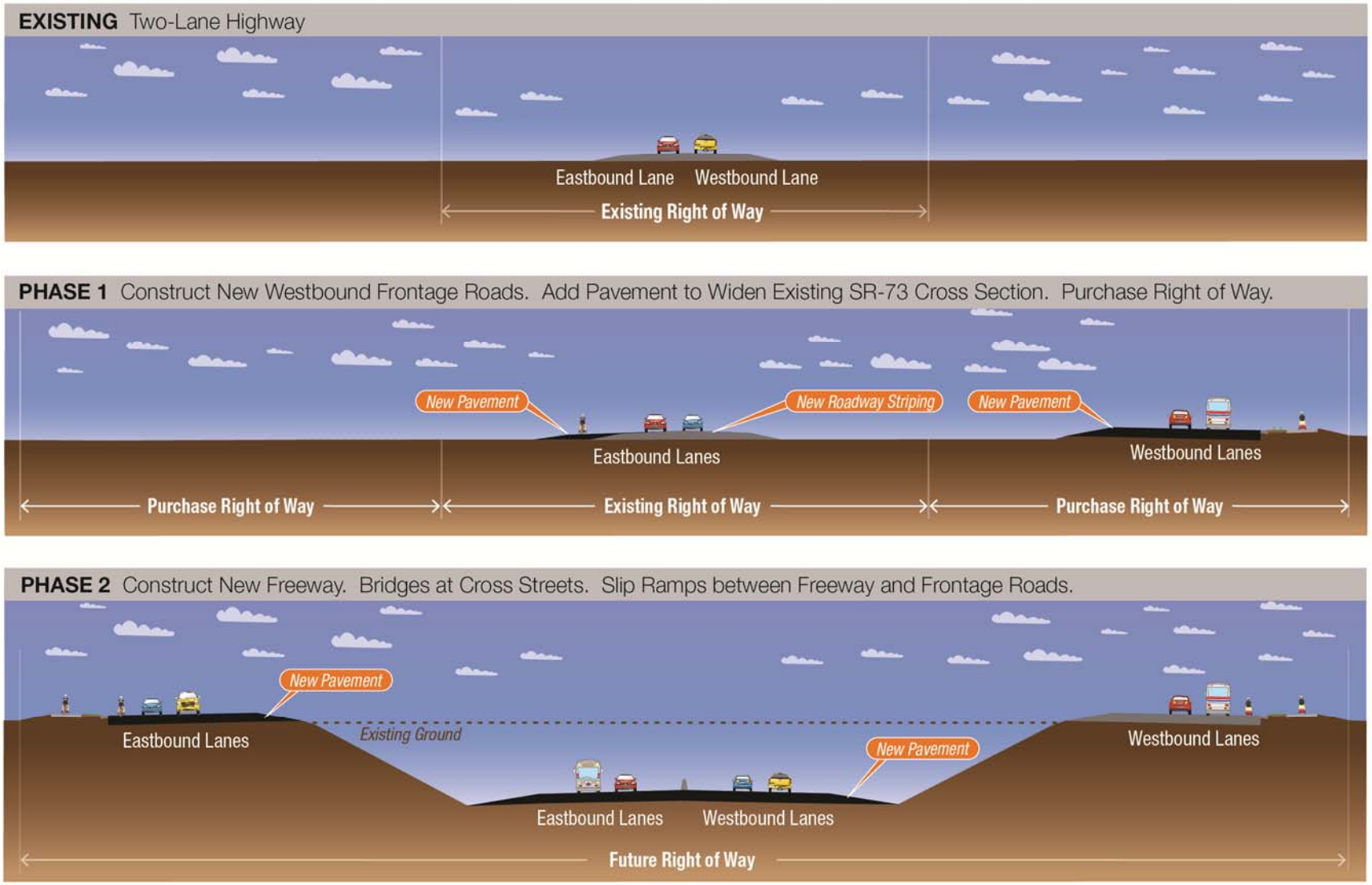
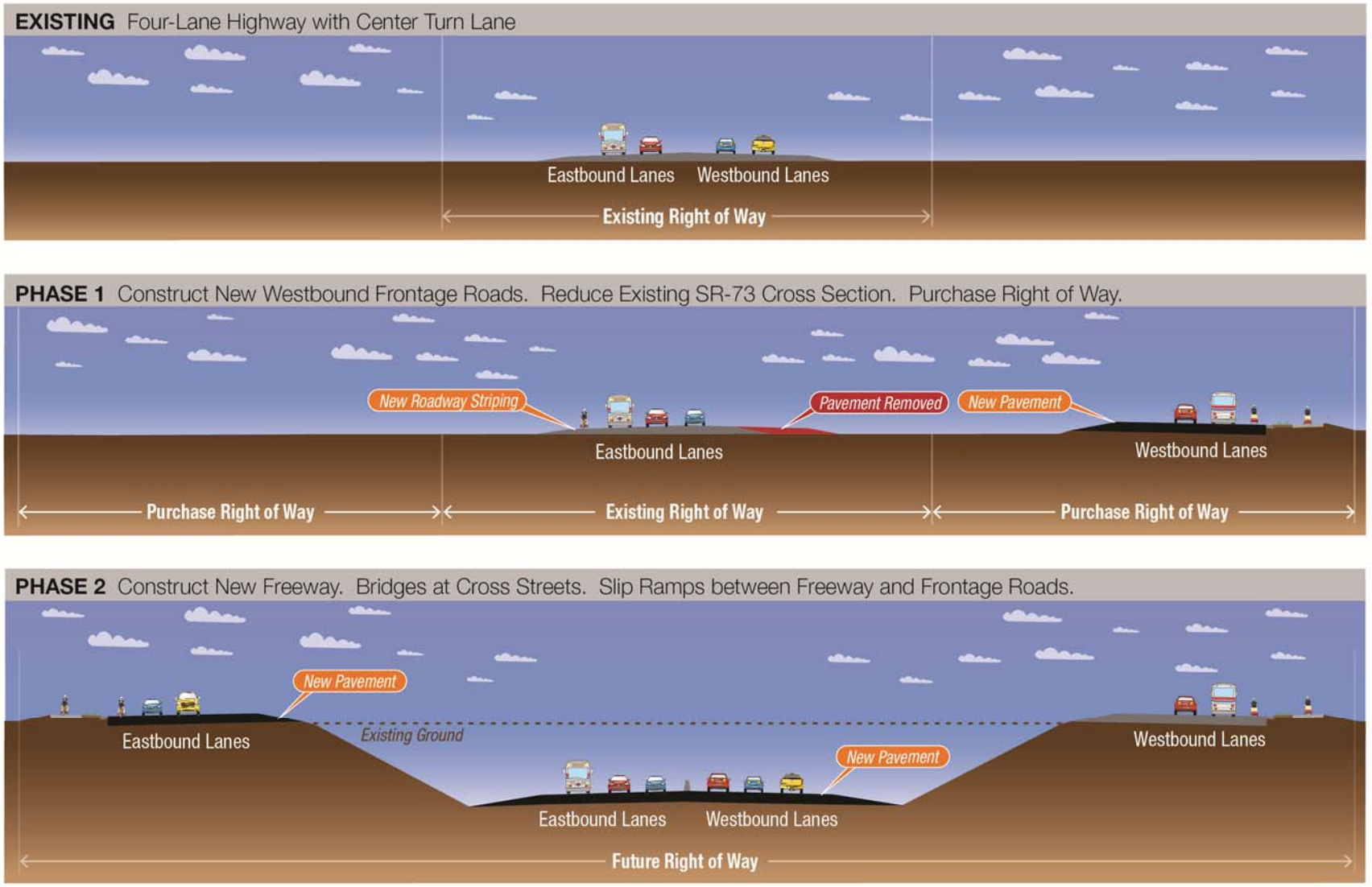


Figure 29: Phasing Plan for the Frontage Road Freeway System – Eastern Segment



Phase 1 will include the following:

- Construct westbound frontage road including curb and gutter, park strip, and sidewalk. This road will be located on the outer (northern) edge of the right-of-way to allow future freeway mainline construction in the median. The road will be built at full build-out elevation. The road width will be constructed to minimize future tear-out. Three lanes would be required for the frontage road east of Ranches Parkway to provide the necessary capacity. Because the full build-out of the frontage road in this section is based on a two-lane section only, a design exception for shoulder width and some "throw-away" pavement would be required to provide the three westbound lanes.
- Construct signal control for existing signalized intersections.
- Limit new westbound frontage road access to meet requirements of UDOT Access Category 10: Freeway One-Way Frontage Road facilities (public street access only with minimum spacing of 660 feet and minimum quarter mile spacing for signalized intersections). Do not allow access between intersections.
- Modify and re-stripe the existing pavement on SR-73 to provide three and two eastbound lanes east and west of Ranches Parkway, respectively. Remove any existing pavement that is no longer needed.
- Acquire and preserve right-of-way for full build-out cross section.
- Relocate any utilities within the full build-out right-of-way as part of the initial phase.

Phase 2 will include the following:

- Construct eastbound frontage road and switch traffic over to new frontage road lanes.
- Remove remainder of existing SR-73 and construct freeway lanes.
- Construct bridges at cross streets.
- Construct freeway mainline lanes in the median.
- Construct slip ramps between the SR-73 freeway and the frontage roads.

Segmented Construction Option: Because there is a difference of approximately five-years between the onset of congestion for the eastern and western segments (see Figure 11), UDOT could elect to construct the SR-73 improvements in segments, building the eastern segment first, followed by the western segment later as it reaches capacity. This segmented approach could be applied to both the initial construction (phase 1) and the full build-out (phase 2). The potential benefits of using a segmented construction approach is to spread the costs of the improvements over time and potentially fit within the constraints of available transportation funds. However, if UDOT elects to construct the initial phase in segments (i.e. UDOT constructs the eastern segment first) UDOT may want to consider the following points:

- Consider acquiring the right-of-way for the entire corridor when the first initial build segment is constructed. This approach would proactively preserve the right-of way for the entire corridor and avoid the potential for development to occur within the path of the future corridor (which would drive right-of-way costs up, incur additional relocations, and potentially jeopardize the ability the construct future segments).
- Constructing the phase 1 eastern segment would require approximately half mile of tear out construction to tie improvements back to the existing portions of SR-73.
- Constructing the phase 1 eastern segment would impact connectivity of Cedar Pass Road. Further design of this intersection under this phased, segmented scenario is necessary.

6.2. Timing of Phased Implementation

Micro-simulation analysis was completed for the Frontage Road Freeway System concept to estimate when each phase of implementation would be needed. This phasing analysis was performed in two steps:

1. No Build travel model runs were performed for 2024 and 2034 conditions to determine when the initial build (Phase 1) improvements would be needed; and
2. Model runs for the initial build frontage road system were performed for 2024, 2034, and 2040 conditions to determine when the freeway mainline (Phase 2) improvements would be needed.

The No Build analysis shows the eastern segment of SR-73 going from approaching congested levels in 2015 to heavily congested levels sometime around 2020 (see Figure 11). As previously mentioned, the onset of heavily congested levels for the western segment occurs around 2020 to 2025, lagging the eastern segment by about five years. This means Phase 1 improvements to the SR-73 study corridor will be needed sometime between 2020 and 2025.

Figure 30 shows the time-lapsed performance for the initial build scenario (Phase 1). These results show that for the eastern segment of SR-73, Phase 1 improvements would adequately service forecasted traffic demands until sometime between 2030 and 2035. For the western segment of SR-73, Phase 1 improvements would meet forecasted traffic demands through approximately 2035. This means Phase 2 improvements will be needed sometime between 2030 and 2035.

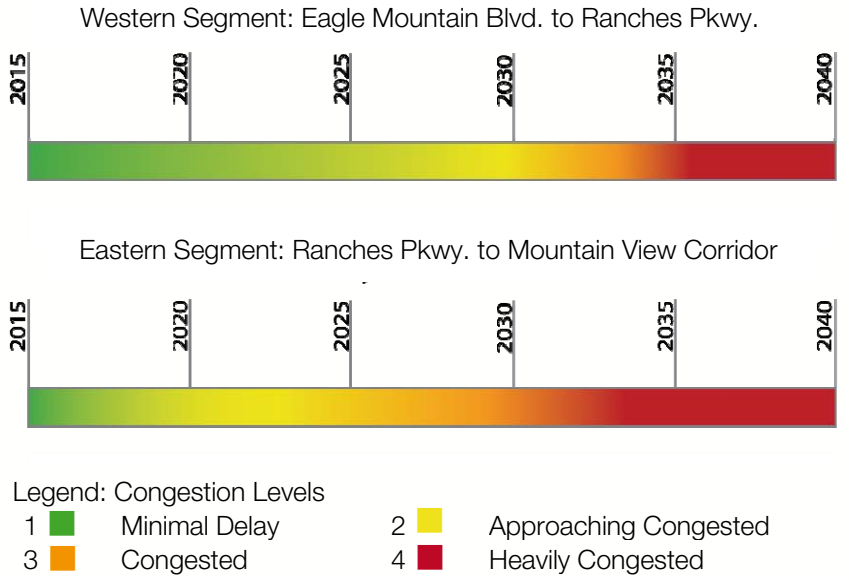
Building Phase 1 improvements sometime between 2020 and 2025 is expected to provide the SR-73 about ten years of additional life until the frontage roads become heavily congested sometime between 2030 and 2035, at which point the freeway portion of the corridor will be needed.

The timing of the construction of the system ramps between SR-73 and the MVC is highly dependent on when the MVC is constructed as well and MVC's phasing. Additional analysis of the timing of the system to system connection between MVC and SR-73 should be completed as part of future studies and in coordination with the MVC project. As a minimum, the system interchange would be needed when SR-73 is converted to a freeway system, but possibly sooner depending on MVC's timing.

6.3. Phased Construction Cost Estimate

This section presents the design and construction assumptions applied to estimate construction costs for the phased and full build-out of the SR-73 Frontage Road Freeway System. As previously mentioned, all right-of-way necessary for full build-out of the project would be acquired during the initial phase. To complete the initial phase, the westbound

Figure 30: Initial Build (Phase 1) Congestion Levels Over Time



frontage road system would be constructed offline, or away from the existing roadway alignment. Building the westbound frontage roads separately, would allow the project to add capacity to the study corridor with minimal disruption to SR-73 traffic. Once the westbound frontage road is complete, minimal construction effort will be required to transition the westbound traffic from the existing SR-73 facility to the new bifurcated configuration.

Following the completion of the westbound frontage road, the existing SR-73 facility would be used to accommodate eastbound only traffic while the new westbound frontage road would accommodate only westbound traffic. The design assumes that the existing Pioneer Crossing interchange will have been reconstructed as part of the

Mountain View Corridor. The eastbound and westbound frontage road system would tie in to the new Pioneer Crossing facility.

In addition to constructing freeway mainline lanes, the second phase of implementation would construct freeway on and off slip ramps and grade separation (bridges) for street crossings. This study assumed that the Mountain View Corridor / SR-73 system interchange would either be in place when the second phase of implementation occurs, or that it would be need to be built as part of the second phase implementation. In either case, this study assumed that the cost of the system interchange would be borne by Mountain View Corridor project, and as such, the cost estimate for this report does not include the cost the cost of the system interchange with the Mountain View Corridor.

The fully constructed SR-73 Frontage Road Freeway System was estimated to cost $396 million including $94 million for the first phase and $302 million for the second phase (see Table 17). Cost estimate were based on conceptual designs developed for the north alignment option for the SR-73 Frontage Road Freeway System. Figure 31 shows the conceptual design for the study corridor, based on this north alignment option.

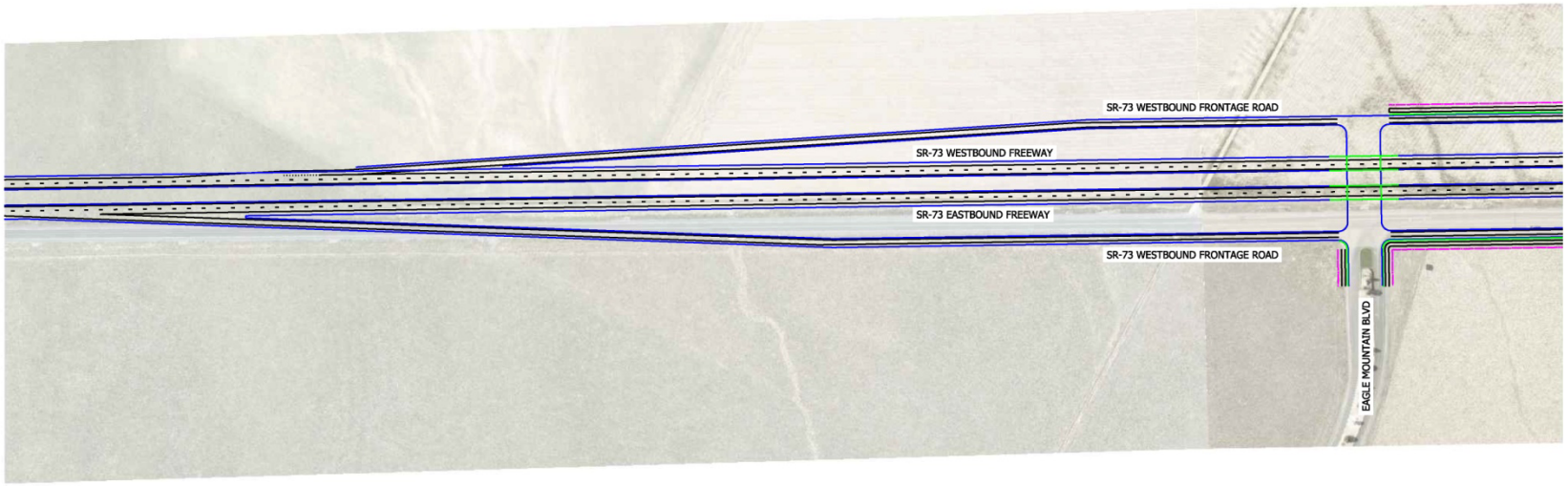
More detailed cost estimate calculations are presented in Table 18. Further details, including material quantities and unit costs, are presented in Table 19 and Table 20. These cost estimates are presented in present day values and do not account for inflation.

Finally, if Phase 1 is constructed in segments, the construction cost of the eastern segment would drop from $94 million to approximately $67 million. This number reflects the assumption that right-of-way will be acquired for the entire full-build out corridor when the first segment is constructed.

Table 17: Phased Construction Cost Summary

Phased Scenario	Cost
Phase 1: Initial Build	$94 M
Phase 2: Convert to Full-Freeway	$302 M
Total Project Cost	**$396 M**

Figure 31: Preliminary Design Concept (North Alignment) SR-73 Frontage Road Freeway System (Sheet 1 of 8)

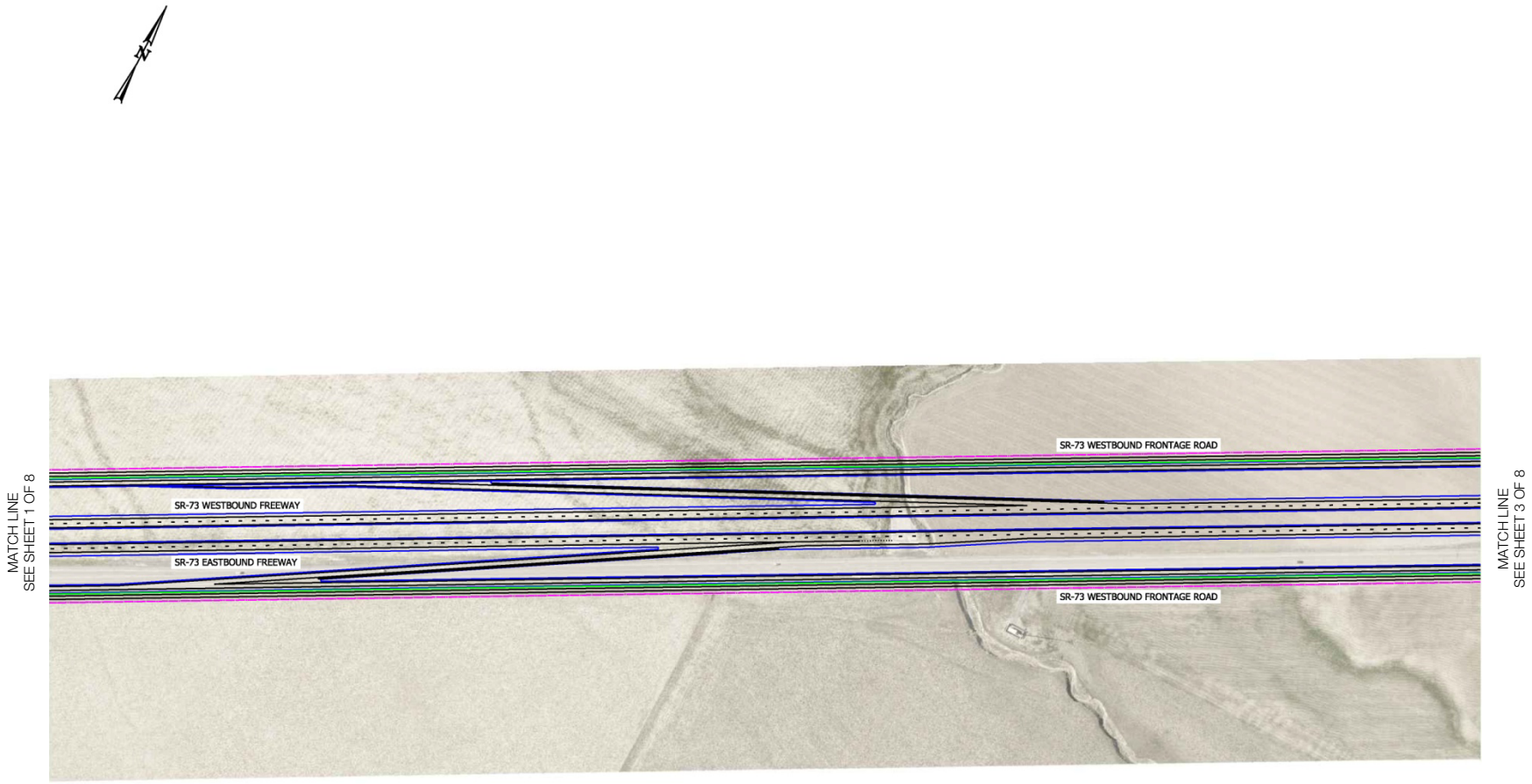


CONCEPT – NOT FOR CONSTRUCTION

150 75 0 150 300 450 600 750

Scale In Feet

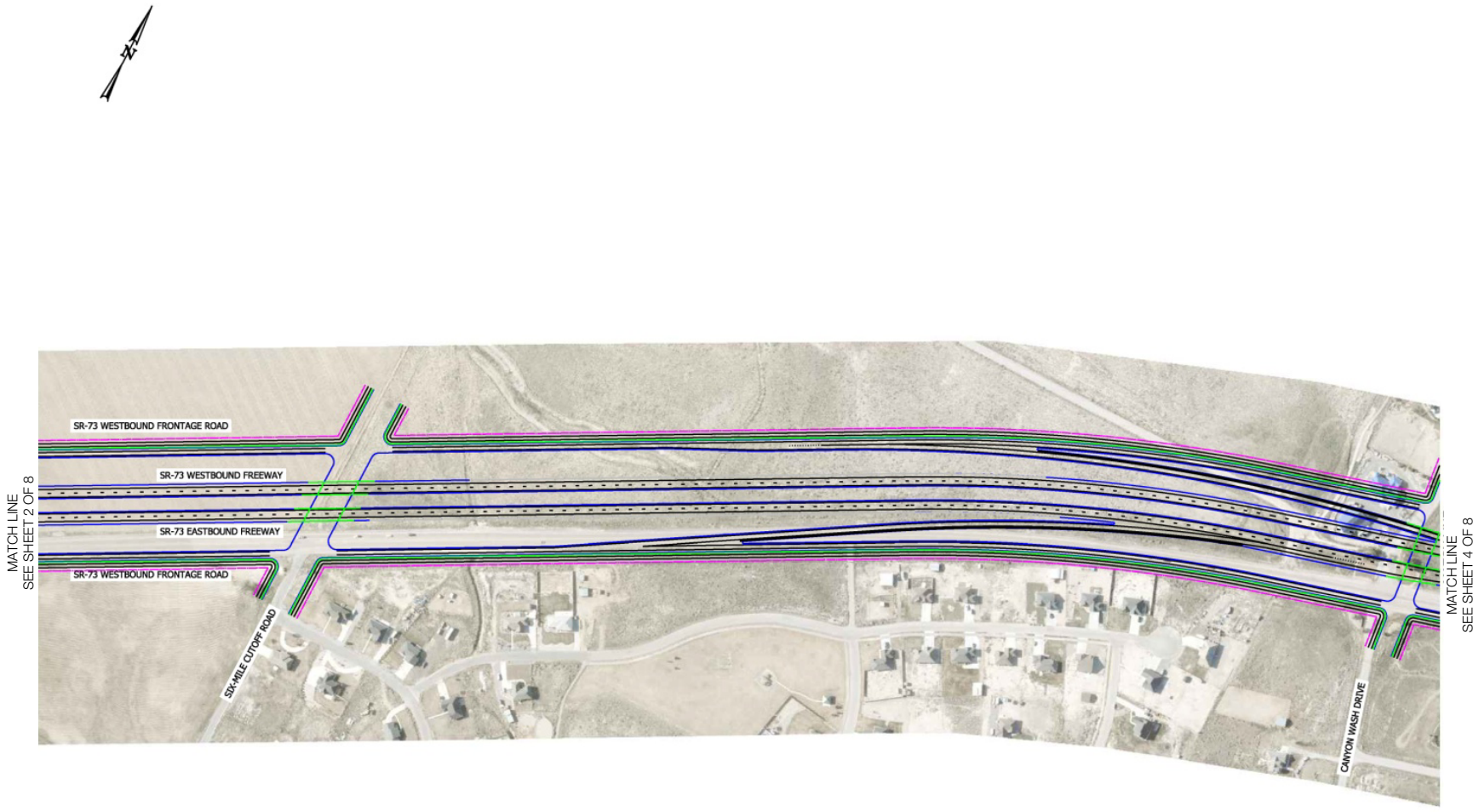
Figure 31: Preliminary Design Concept (North Alignment) SR-73 Frontage Road Freeway System (Sheet 2 of 8)



CONCEPT – NOT FOR CONSTRUCTION

150 75 0 150 300 450 600 750
Scale In Feet

Figure 31: Preliminary Design Concept (North Alignment) SR-73 Frontage Road Freeway System (Sheet 3 of 8)



CONCEPT – NOT FOR CONSTRUCTION

150 75 0 150 300 450 600 750

Scale In Feet

Figure 31: Preliminary Design Concept (North Alignment) SR-73 Frontage Road Freeway System (Sheet 4 of 8)

CONCEPT – NOT FOR CONSTRUCTION

150 75 0 150 300 450 600 750
Scale In Feet

Figure 31: Preliminary Design Concept (North Alignment) SR-73 Frontage Road Freeway System (Sheet 5 of 8)

CONCEPT – NOT FOR CONSTRUCTION

150 75 0 150 300 450 600 750
Scale In Feet

Figure 31: Preliminary Design Concept (North Alignment) SR-73 Frontage Road Freeway System (Sheet 6 of 8)

Figure 31: Preliminary Design Concept (North Alignment) SR-73 Frontage Road Freeway System (Sheet 7 of 8)

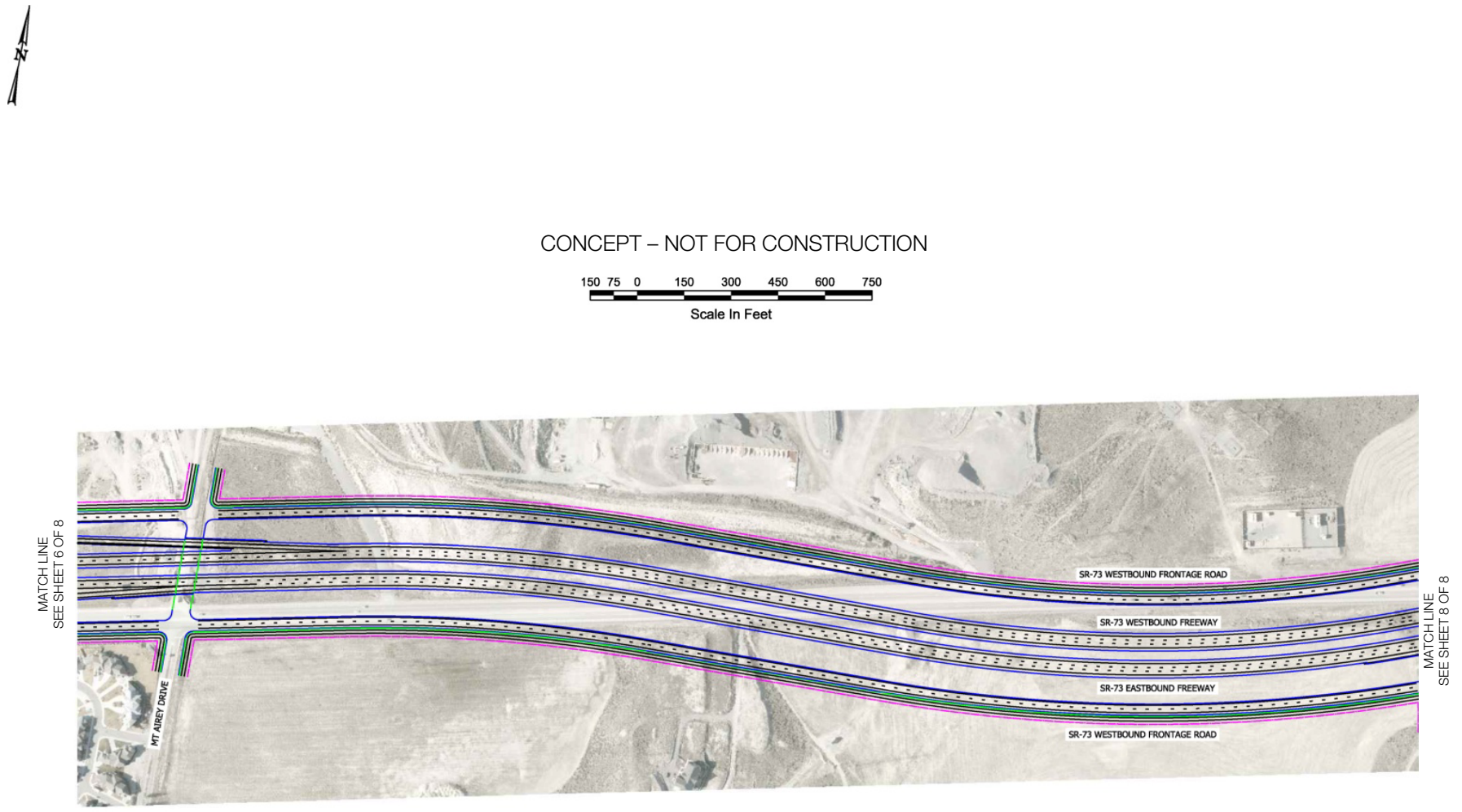


Figure 31: Preliminary Design Concept (North Alignment) SR-73 Frontage Road Freeway System (Sheet 8 of 8)

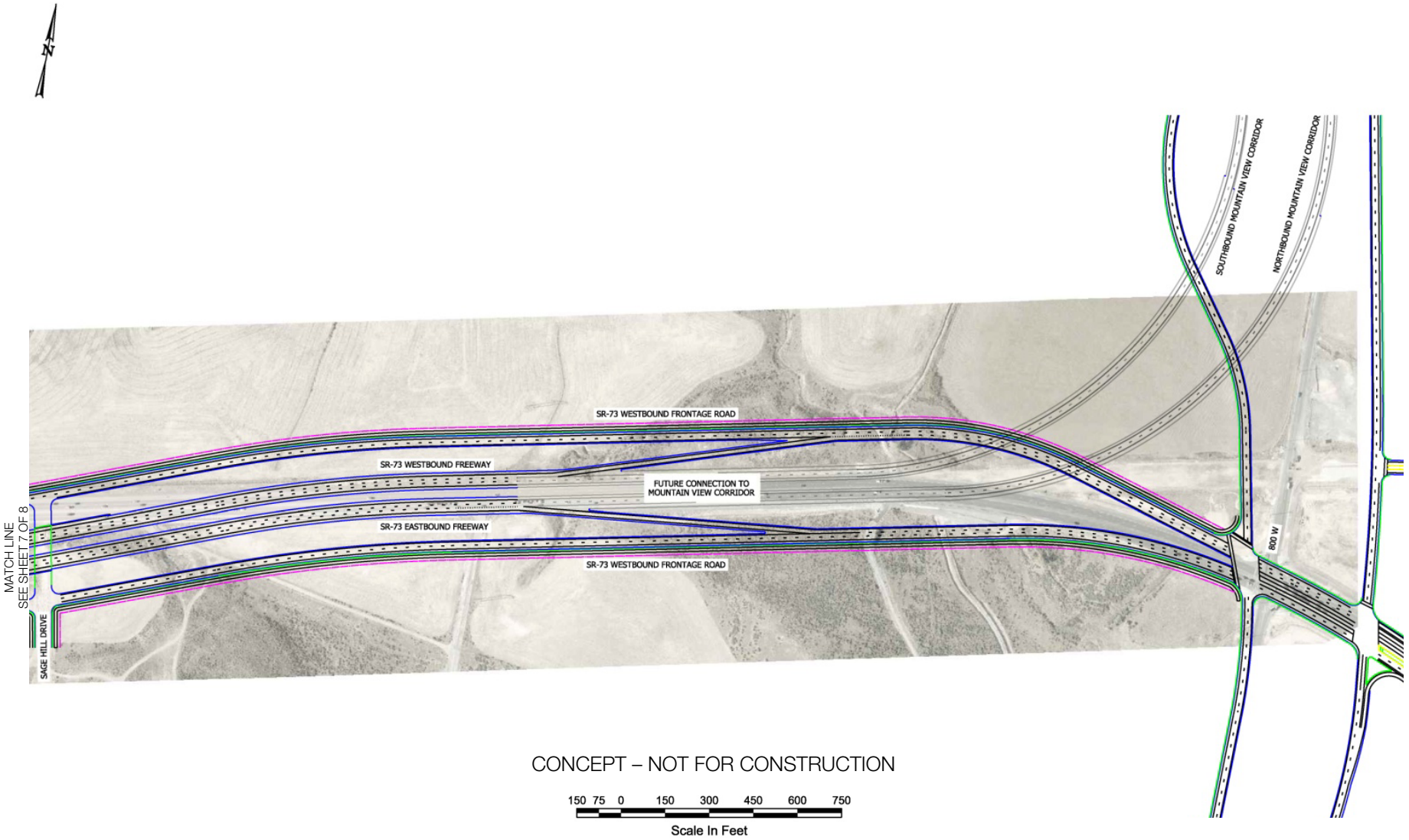


Table 18: Summary of Estimated Project Cost Calculations for the Frontage Road Freeway System Concept

Cost Item	Initial Build Cost*	Final Build Cost**	TOTAL COST
Roadway	$12,760,000	$139,170,000	**$151,930,000**
Drainage	$2,530,000	$15,170,000	**$17,700,000**
Structures	$2,070,000	$27,100,000	**$29,170,000**
Major Utility Relocations*	$11,060,000		**$11,060,000**
Minor Utility Impacts	$850,000	$1,680,000	**$2,530,000**
Mobilization	$1,970,000	$11,560,000	**$13,530,000**
Signals/ATMS/Signing/Striping	$2,370,000	$2,730,000	**$5,100,000**
MOT/Traffic Control	$1,130,000	$6,740,000	**$7,870,000**
Environmental and Design	$5,210,000	$23,810,000	**$29,020,000**
UDOT Oversight and Public Involvement	$2,430,000	$13,830,000	**$16,260,000**
Right-of-Way*	$41,210,000		**$41,210,000**
Project Contingency	$10,590,000	$60,440,000	**$71,030,000**
Total Estimated Project Costs	$94,180,000	$302,230,000	**$396,410,000**

*Initial Build includes the following: 1) Existing SR-73 used for eastbound traffic. 2) ROW purchased for full build out (major utility relocations and right-of-way acquisition assumed to occur in the initial build). 3) Construct westbound frontage road to carry westbound traffic. 4) Increase capacity to three lanes each direction 5) Revise intersection configuration to tie into new alignments. This phase of construction does not include bridges.

**Final Build includes the following: 1) Construct functioning Frontage Road Freeway System per typical section. 2) Construct grade separated freeway section. 3) Reconfigure major intersections at cross streets. 4) Construct slip ramps. 5) Construct eastbound frontage road & remove existing SR-73 paving that was used in initial build. 5) Construct bridges. “Initial Build” construction is not included in the “Final Build” estimates.

Table 19: Phase 1 (Initial Build) Estimated Project Cost for the Frontage Road Freeway System

Construction Item	Unit	Unit Price	Quantity	Total Cost
Asphalt Pavement	Square Feet		1,199,470	
Bituminous Wearing Course	Ton	$75	7,747	$580,993
Hot Mix Asphalt	Ton	$75	46,479	$3,485,960
Untreated Base Course	Cubic Yards	$27	44,425	$1,199,470
Granular Borrow	Cubic Yards	$19	44,425	$844,071
Concrete Pavement	Square Feet			
PCCP-10" Thick	Square Feet	$25	0	$0
LCB	Cubic Yards	$50	0	$0
Untreated Base Course	Cubic Yards	$27	0	$0
Granular Borrow	Cubic Yards	$19	0	$0
Earthwork				
Roadway Excavation	Cubic Yards	$7	451,410	$3,159,870
Borrow	Cubic Yards	$7	195,136	$1,365,952
Barriers				
Concrete Barrier	Feet	$29	1,700	$49,300
Crash Cushion	Each	$20,000	2	$40,000
Structures				
Bridge	Square Feet	$150	0	$0
Ret Wall	Square Feet	$75	23,960	$1,797,000
Soundwall	Feet	$50	5,422	$271,100
Sign Structure	Each	$200,000	0	$0
Utilities*				
Eagle Mountain Water Line	Lump	$500,000	1	$500,000
Util Station Relocation Questar	Lump	$100,000	1	$100,000
Questar Intermediate High Pressure Relocation	Feet	$100	29,040	$2,904,000
Questar High Pressure Relocation	Feet	$260	29,040	$7,550,400
Miscellaneous				
Sidewalk	Square Feet	$5	299,178	$1,495,890
Curb & Gutter	Feet	$18	29,852	$537,336
Traffic Signals	Each	$180,000	7	$1,260,000
ATMS	Lump	$700,000	1	$700,000
Striping	Feet	$1	221,619	$177,295
Percentage Based Bid Items				
Mobilization	Percent	6	1	$1,963,546
MOT/Traffic Control	Percent	4	1	$1,120,745
Drainage	Percent	9	1	$2,521,677
Utility Impacts	Percent	3	1	$840,559
Signing	Percent	1	1	$224,149
Env/Design	Percent	15	1	$5,203,397
UDOT Oversight/PI	Percent	7	1	$2,428,252
Project Contingency	Percent	25	1	$10,580,241
			2016 Construction Total (Rounded)	**$52,910,000**

ROW Acquisition*	Unit	Average Unit Cost	Initial Quantity	Initial Phase Cost
Single Family Residence	Square Feet	$6	1,571,482	$9,036,022
Residential Lot	Square Feet	$15	162,623	$2,439,345
Vacant or Undeveloped	Square Feet	$4	5,587,218	$19,555,263
Other	Square Feet	$2	1,092,964	$2,459,169
Indirect ROW Costs	Each	$10,000	85	$850,000
Right of Way Contingency	Percent	20%		$6,867,960
			2016 Right of Way Total (Rounded)	**$41,210,000**

Initial Build - Construct new frontage road and utilize existing SR-73	**$94,120,000**
Final Build - Construct new freeway and second frontage road	**$302,190,000**
Grand Total	**$396,310,000**

*Major Utility relocation and Right-of-Way assumed to occur in the initial build.

Table 20: Phase 2 (Final Build) Estimated Project Cost for the Frontage Road Freeway System

Construction Item	Unit	Unit Price	Quantity	Final Phase Cost
Asphalt Pavement	Square Feet		1,300,266	
Bituminous Wearing Course	Ton	$75	8,398	$629,816
Hot Mix Asphalt	Ton	$75	50,385	$3,778,898
Untreated Base Course	Cubic Yards	$27	48,158	$1,300,266
Granular Borrow	Cubic Yards	$19	48,158	$915,002
Concrete Pavement	Square Feet		3,097,212	
PCCP-10" Thick	Square Feet	$25	3,094,723	$77,368,075
LCB	Cubic Yards	$50	28,678	$1,433,894
Untreated Base Course	Cubic Yards	$27	37,855	$1,022,080
Granular Borrow	Cubic Yards	$19	114,712	$2,179,520
Earthwork				0
Roadway Excavation	Cubic Yards	$7	3,261,125	$22,827,875
Borrow	Cubic Yards	$7	3,314,146	$23,199,022
Barriers				0
Concrete Barrier	Feet	$29	30,264	$877,656
Crash Cushion	Each	$20,000	16	$320,000
Structures				0
Bridge	Square Feet	$150	86,828	$13,024,200
Ret Wall	Square Feet	$75	131,503	$9,862,692
Soundwall	Feet	$50	16,064	$803,200
Sign Structure	Each	$200,000	17	$3,400,000
Miscellaneous				0
Sidewalk	Square Feet	$5	327,629	$1,638,145
Curb & Gutter	Feet	$18	33,300	$599,400
Traffic Signals	Each	$180,000	7	$1,260,000
ATMS	Lump	$500,000	1	$500,000
Remove Asphalt	Square Yard	$4	267,912	$1,071,648
Striping	Feet	$1	592,037	$473,630
Percentage Based Bid Items				
Mobilization	Percent	6	1	$11,553,531
MOT/Traffic Control	Percent	4	1	$6,739,401
Drainage	Percent	9	1	$15,163,652
Utility Impacts	Percent	1	1	$1,678,552
Signing	Percent	0	1	$492,229
Env/Design	Percent	12	1	$23,808,408
UDOT Oversight/PI	Percent	7	1	$13,824,188
Project Contingency	Percent	25	1	$60,436,245
			2016 Construction Total (Rounded)	**$302,190,000**
			Initial Build - Construct new frontage road and utilize existing SR-73	**$94,120,000**
			Final Build - Construct new freeway and second frontage road	**$302,190,000**
			Grand Total	**$396,310,000**

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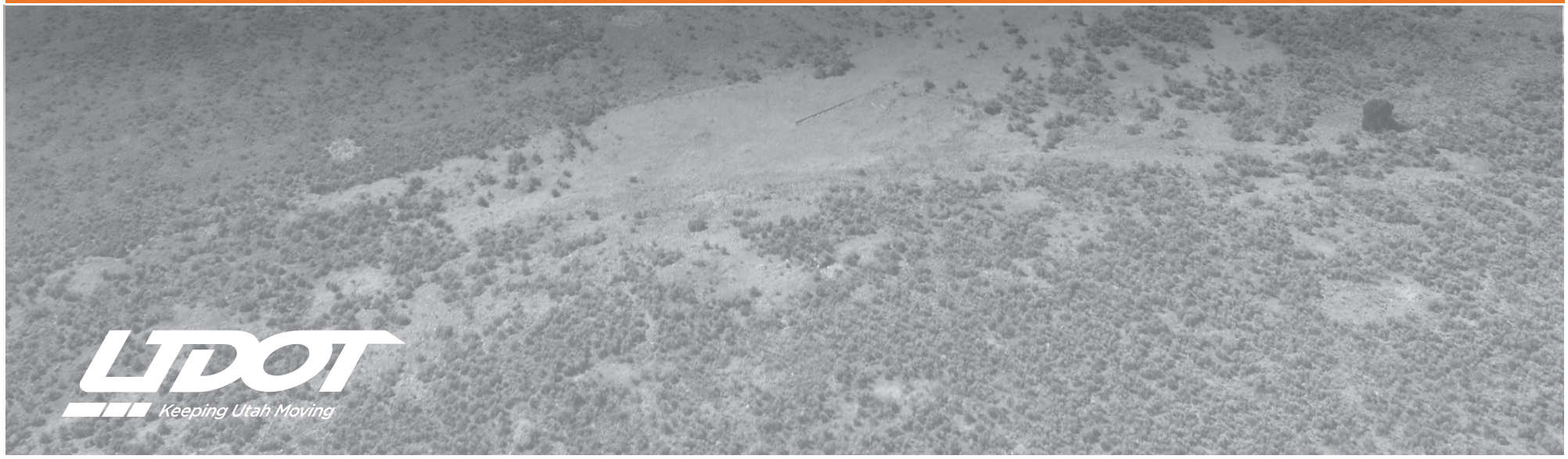
UDOT
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