

2002 Washoe Freeway Corridor Study Update: Planning and Environmental Linkages



November 2014

Executive Summary

The Washoe County Freeway Corridor Study - Update 2014 employs planning-level analysis for previously recommended freeway improvements within the Reno/Sparks metropolitan area. This planning analysis utilizes updated travel forecasts that consider the infrastructure improvements made and economic changes that have occurred since the 2002 study was published. The corridor study includes both Interstate 80 and US Highway 395/Interstate 580. This planning analysis was undertaken by identifying improvements made since the 2002 study, examining existing conditions, and projecting future conditions and their impacts on the transportation system. This provides for a determination about the necessity for previously identified and not yet implemented congestion mitigation strategies based on the new predicted volumes.

There are three other important distinctions between this update and the previous study. First, the operational analysis in this study better aligns with the state of transportation planning practice in light of Planning and Environmental linkage (PEL) processes since 2002. Caution was exercised to avoid performing detailed and costly analysis that should only be performed at a project level after other environmental criteria have been appropriately addressed. More detail on the evolution of PEL and its relevancy to planning level studies is provided in the body of this report. Secondly, the updated study considers new infrastructure connections under construction or planned that were not contained in the Regional Transportation Plan and could not be considered at the time of the 2002 study. Specifically, the updated study includes a consideration of the potential diversion of traffic after the Southeast Connector and the Pyramid Connector are open to traffic. Finally, new recommendations that include congestion mitigation strategies beyond the freeway widenings previously identified are discussed and next steps for environmental considerations are offered.

The **Study Area** covers the metropolitan limits of Reno and Sparks, Nevada. The portion of the I-80 corridor under study extends from the East Verdi Interchange to Vista Boulevard in Sparks. The portion of the US-395/I-580 corridor under study extends from Mount Rose Highway in the south to Cold Springs in the north.

Existing Conditions provide the fundamental foundation for this evaluation. Several freeway segments evaluated under the historical growth scenario fail to meet adopted public policy for operational performance (LOS E) in the next ten years. These segments are:

I-80 Eastbound

- Wells to US395 Off – F
- Rock On to Pyramid – E
- Pyramid Off to On - E

I-80 Westbound

- Pyramid Off to On – E
- Virginia to Keystone - F

US-395 Northbound

- Virginia 1 On Ramp – E
- Virginia 1 to Moana – E
- Moana Off Ramp – F
- Moana Off to On – E
- Moana to Plumb – F
- Airport On Ramp – F

US-395 Southbound

- Golden Valley Off Ramp - E
- Virginia On Ramp - E
- Parr Off Ramp - E
- Parr On Ramp - E
- McCarran Off Ramp - E

- Clear Acre On Ramp - F
- I-80 Off Ramp - F
- Glendale Off Ramp - E
- Glendale to Mill - E

Establishing **Future Conditions** within this evaluation methodology reflects the necessary flexibility required to best understand the full range of potential actions. In order to forecast future freeway operations, the Washoe County Freeway Corridor Study- Update 2014 developed three travel forecast scenarios as delineated in the traffic forecasting methodology memorandum depicted in its entirety in the body of this report. Some context for that methodology, which was developed with direction from NDOT and Washoe RTC, is provided as part of this executive summary.

The **Planning and Environmental Linkages (PEL)** framework enhances the effectiveness of transportation planning. This emerging and guiding framework for transportation planning continues undergoing substantial evolution since the Linking Planning and NEPA initiative was established with SAFETEA-LU in 2005. As the environmental streamlining initiative continued to be implemented at the federal, state, and local level, the PEL program was established. PEL improves the timely delivery of transportation initiatives by making explicit the relationships and practices of transportation planning and NEPA assessment / evaluation in project development. There is a reasonable likelihood that initiatives identified with this planning effort will utilize federal funding resources and be involved in an environmental review with potential NEPA implications. The implications of PEL requirements for travel forecasting and transportation planning in relation to NEPA environmental review processes are noted throughout this report. This will provide a succinct accounting of emerging best practices and suggestions for enhanced PEL integration into transportation planning. This approach integrates the Federal Highway Administrations suggested best practices.

PEL connects the long-range transportation planning and the requirements of the National Environmental Policy Act so that planning decisions can be carried forward into project development.

“Develop procedures and guidance for environment linkages during planning, including analysis methods, procedures for involving key stakeholders, and 'handing off' planning products to project development staff, documented in agency publications such as: Corridor, metropolitan, or sub-area plan guidebooks.” (FHWA PEL Website).

The following provides a **Summary of Findings and Recommendations** that are further detailed in the following report. These findings and recommendations are emblematic of where information, analysis, and conceptualization of potential remedies should be as transportation planning transitions to project development.

- Near term traffic growth is not expected to significantly exacerbate current congestion, but existing congestion does justify moving forward with the project identified in the 2018-22 time frame of the 2035 RTP (i.e. replacing the southbound lane on US 395 north of I-80).
- The short term concepts delineated in this report are consistent with the existing 2035 RTP. Implementation of both of them at the earliest opportunity will yield immediate benefits by reducing existing congestion and improving travel times.
- Any future system wide evaluations should focus on existing and potential future congestion and other operational deficiencies while employing PEL principles. This approach should avoid recommending solutions that may impede future environmental evaluations.
- Infrastructure improvements, operational improvements, and other alternatives that would trigger a more in depth environmental evaluation should be presented in future system wide evaluations, but care must be taken in how those potentialities are identified and communicated.
- A comprehensive PEL strategy should be developed. This approach will identify potential solutions intended to mitigate future congestion associated with travel volumes while accounting for underlying growth and land use assumptions in the travel demand model. A PEL approach will ensure this initiative will account for and document all the elements potentially needed for transitioning from planning to project development and potential environmental processes. The minimum limits of such a study should be the Virginia Street Interchange to the west, the Rock Blvd Interchange to the east, The McCarran/Clear Acre Interchange to the north, and the Mill Street interchange to the south.
- Any future environmental study in the proximity to the I-80/US 395 system to system Interchange should consider the environmental justice issues associated with potential operational improvement benefits derived from ramp closures at nearby service Interchanges.

- Considering the significant change in social and economic dynamics experienced over the last decade, the new household survey should be completed at the earliest opportunity available. Projections from models utilizing previous household survey data In comparison to observed travel dynamics over the last decade are not reasonably comparable.
- Construction of the Pyramid Connector will place additional burden on the US 395 corridor contributing to location specific congestion. Mitigation strategies need to be developed before this connection is made. The best way to evaluate all potential solutions is a PEL planning process with detailed documentation leading to project development and an environmental study. This should be initiated as soon as practicable.

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1. STUDY OVERVIEW

The Washoe County Freeway Corridor Needs Assessment Report is a planning level analysis that provides an assessment of the existing and future conditions in comparison to the ones analyzed under the 2002 Washoe County Freeway corridor study. The purpose of this report is to assess the viability of the improvements proposed by the 2002 study using new forecasting scenarios and propose updates if needed to the 2035 Regional Transportation Plan.

1.1 Study Area Characteristics

The study area for this update to the 2002 study focuses on the urbanized portions of the freeway system. The portion of the I-80 corridor under study extends from the Robb Drive Interchange to Vista Boulevard in Sparks. East Verdi Road, Mogul Road, and West Fourth Street are more suited to rural context assessments which often have different PEL conditions. Therefore the I-80 corridor segments identified for this study includes the following interchanges, from west to east:

- Robb Drive
- West McCarran Boulevard
- Keystone Avenue
- Virginia Street
- Wells Avenue
- US-395
- East Fourth Street
- Rock Boulevard
- Pyramid Way
- East McCarran Boulevard
- Sparks Boulevard
- Vista Boulevard

The portion of the US-395/I-580 corridor under study incorporates similar PEL logic concerning urban and rural contexts. This study includes freeway segments from Mt. Rose Highway to Stead Boulevard as part of the urban extents of the region. Red Rock Road and Cold Springs Drive require assessment utilizing rural planning approaches. The portion of the I-580/US-395 corridor including the following interchanges:

- Mount Rose Highway
- South Virginia Street (Exit 58)
- Damonte Ranch Parkway
- South Meadows Parkway
- South Virginia Street (Exit 61)
- Del Monte Lane
- Meadowood (Proposed)
- South Virginia Street/Kietzke Lane (Exit 63)
- Moana Lane
- Plumb Lane/Villanova Drive
- Mill Street
- Glendale Avenue
- Interstate 80
- Oddie Boulevard
- McCarran Boulevard
- Clear Acre Lane (Slip ramp)
- Sutro Street (Proposed)
- Parr Boulevard
- North Virginia Street
- Golden Valley Road
- Lemmon Drive
- Stead Boulevard

In addition to I-80 and US-395/I-580, major arterial roadways in the study area include McCarran Boulevard, Pyramid Way (State Route 445), Virginia Street (Business Route 395), and East Fourth Street (Business Route 80). The Reno-Tahoe International Airport is located less than one mile east of US-395 in the southern portion of the study area, and the Union Pacific Railroad line closely parallels the south side of I-80 along the length of the corridor.

The I-80 corridor contains a range of land uses and densities. The area between the western end of the corridor and Robb Drive is largely rural and currently undeveloped. East of Robb Drive, residential density increases and some commercial uses appear. From McCarran Boulevard in the west to the eastern end of the corridor, land uses include a mix of residential, commercial, office, and industrial, with some gaming facilities. The densest development occurs just east of the I-80/US-395/I-580 system interchange, known locally as the Spaghetti Bowl. South of the I-80 corridor, many industrial, distribution, and warehousing uses are located in proximity to the Union Pacific Railroad line.

The portion of US-395/I-580 between the north end of the corridor and Lemmon Drive is mostly rural and undeveloped. South of Lemmon Drive, residential densities increase and some industrial uses, research institutions, and government facilities begin to appear. At McCarran Boulevard, densities increase further and commercial and office uses begin to appear. South of I-80, residential uses give way to gaming, government facilities, commercial uses, manufacturing, and Reno-Sparks Indian Colony land. Near Villanova Drive/Plumb Lane, which provides access to the Reno/Tahoe International Airport, single-family and multi-family residential uses reappear and continue to be seen all the way to the southern end of the study corridor, mixed first with commercial uses and then with agriculture and undeveloped land.

1.2 Study Rational

This updated freeway study recognizes the changed conditions from that of the original 2002 study and analysis. One of the major assumptions in the 2002 study was that the rate of population and employment growth in Washoe County would continue according to recent historical trends. Rates often do remain constant but are influenced by a host of changing variables. The rates from the 2002 study resulted in predicting significant increases in vehicle miles traveled within the region. However, as identified in the *A New Direction: Our Changing Relationship with Driving and the Implications for America's Future* (2013, U.S. PIRG Education Fund & Frontier Group) the trend since 2004 has been an overall reduction in vehicle miles traveled. Specifically, assumptions used to predict travel demand in the 2002 study were based on approved development expected in the region and the sustaining of overall travel behavior. For example, more than 18,000 new homes and 15,000 jobs in the Spanish Springs Valley area to the northeast of downtown Reno were projected to generate more than 200,000 average daily trips. Additionally, a 14,000-acre industrial park is planned in Storey County, which neighbors Washoe County to the east was projected to create between 5,000 and 10,000 new jobs by 2015. This study update was conducted based on actual economic performance and resulting travel behavior since 2002 and in recognition that corresponding traffic volumes on the freeway system mirrored national trends by not increasing as projected. Further, these volumes have not returned to the levels that existed in 2002.

1.3 Study Process

The 2014 update to the 2002 Washoe County Freeway Corridor Study was undertaken to assess previously identified roadway improvements in light of the infrastructure improvements already made and new travel forecasts in light of the changing economy. The study was performed in four phases. **Phase one** began with the creation of a traffic forecasting committee and identification of stakeholder agencies including the Nevada Department of Transportation, the City of Reno, the City of Sparks, Washoe County, the Regional Transportation Commission (RTC), and the Federal Highway Administration. Meetings with the traffic forecasting committee and stakeholder agencies established:

- The goals of the study
- The work plan
- Lines of responsibility
- Collection of resource materials
- Proposed forecasting methodologies

These study elements recognized the region's travel demand model was under revision and potentially unavailable until beyond the end of the study. The committee agreed to a multiple scenario forecasting approaches focused on providing decision makers the capacity to assess congestion mitigation strategies depending on when and where travel demand increase will occur. This mutually agreed upon plan was submitted and approved in accordance with the NDOT travel forecasting policy. Ultimately this served as the foundation for the congestion assessment and demonstration of effective inter-agency coordination.

Phase two began with an analysis of existing conditions in the study area. Data collection during this phase of the study served as a foundation for the congestion assessment and targeted:

- An economic assessment of the I-80 corridor regionally to better understand the nature and growth potential of the through traffic on the freeway system
- An economic assessment of Washoe County focusing on business growth
- The industrial land use study conducted by Truckee Meadows Regional Planning Association
- Products assembled for the 2035 Regional Transportation Plan, including existing reports, traffic counts, and level-of service analyses, and proposed improvements
- Field reviews
- Traffic counts, vehicle classification data, and travel speed profiles

During **phase three** of the study, the original list of corridor study improvements were reviewed to determine which had been constructed since the original report was published and which were still listed in the 2035 RTP. As the congestion analyses were performed, new forecasts were compared to 2002 forecasts. When current forecasts equaled or exceeded the 2002 forecasts within specific freeway segments, 2002 study improvement recommendations were considered as the initial planning-level perspective for addressing congestion.

During **phase four** of the study, the following areas of congestion were identified requiring further evaluation at the project development level to determine if the strategies identified in the 2002 study are the most appropriate for congestion mitigation:

1.4 2002 Washoe Freeway Corridor Study Reconsidered

The Washoe County Freeway Corridor Study identified freeway improvements needed within the Reno/Sparks metropolitan area between 2002 and 2030. The corridor study included both Interstate 80 and US Highway 395/Interstate 580. This analysis was undertaken by examining existing conditions, projecting future conditions and their impacts on the transportation system, identifying improvements, and evaluating the effect of alternative investment strategies. At the time of its publication the 2002 Washoe Freeway Corridor study represented a comprehensive, state-of-the-practice document for transportation planning. The analysis depicted existing conditions and provided the best available estimates of future travel considering historical trends and locally approved land use development plans. The study served as a foundation for improvements to the freeway system that have materialized in the decade that followed. These improvement included modifications to the system to system Interchange of I-80 and US 395/I-580, the improvements to I-580 northbound between Moana lane and I-80, and the recently completed I-80 design build project. Each of these projects have contributed to reduced delay and improved operations on the freeway system and in each case existing congestion was mitigated. In the case of the system to system Interchange improvements, however, an unintended consequence has been to exacerbate congestion on US

Components of PEL

- Preliminary Purpose & Need (can include Goals & Objectives) Stakeholder and Public input
- Development of a reasonable range of alternatives
- Environmental Setting
- Screening Criteria
- Preliminary screening and elimination of unreasonable alternatives
- Identify additional investigations, coordination, and proposed mitigations for use by the future project team

395 southbound due to the reduction of through travel lanes from 3 lanes to 2 lanes. The updated study is intended to focus on areas of current congestion that were not previously evident, as well as re-evaluate the necessity of mitigation strategies predicated on future congestion contained in the 2002 study in light of new travel forecasts. Many of these potential future actions will require both federal funding assistance and engaging in National Environmental Policy Act activities. The Planning and Environmental Linkages (PEL) initiative assists with these efforts by helping make the transition between planning and project development a more cohesive process. This current update study provides key components for PEL: draft screening criteria and the development of a reasonable range of alternatives.

The study defined short-, mid-, and long-term transportation investments supporting existing population and projected growth by considering a set of transportation improvements prior to formulation of a set of recommended strategies:

1. Base Case Alternative—Projects programmed as a result of the I-80/I-580/US-395 Spaghetti Bowl Interchange Feasibility Study, which identified projects that have already been designed and will be completed by Fiscal Year 2005. This alternative was considered to be the no-build condition and the reference point for evaluation of all other alternatives.

2. 2030 Regional Transportation Plan—The Regional Road System elements of the 2030 Regional Transportation Plan were considered to be the given background for freeway system planning. This alternative relies mainly on alternative transportation modes, TSM/TDM strategies, widening of arterials, and facility access controls. The Washoe County Freeway Corridor Study considered the non-freeway elements of the 2030 RTP, including the Sun Valley Connector and the Outer Ring Road, to be the given background for its freeway analysis.

3. Freeway Reliever Route Alternatives—Five arterial street segments were identified with the potential to provide freeway congestion relief. While these roadways could form a valuable component of an ITS/freeway management system during incidents, the analysis did not assume these roads to be a significant freeway system component during a typical peak hour over and above 2030 RTP forecasted utilization.

4. Freeway System Management Alternatives—Two techniques that were determined to have potential for improving freeway operations included ramp metering and intelligent transportation systems (ITS). High-Occupancy Vehicle lanes, reversible lanes, and transit operations on the freeway system were considered but dismissed from further study due to the likelihood that these measures would not significantly alleviate freeway congestion in Washoe County.

Figures 1 and 2 show lane configuration identified in the 2002 Washoe Freeway Corridor Study for I-80 and I-580/US 395 respectively. Figures 3 and 4 show the project initiative results of from 2002 to 2013 for I-80 and I-580/US 395 respectively. The projected lane requirements for the year 2030 in Figures 1 and 2 were identified for each freeway segment in the study area using corridor simulation (CORSIM) analysis. CORSIM is micro-simulation software developed as a scientific tool to study travel flow dynamics. A micro-simulation simulates the actions and interactions of each individual simulated vehicle on a coded roadway network. These interactions are measured and accumulated into a range of measures of effectiveness (MOEs). MOEs roughly correlate to levels of service (LOS) indicators generated with Highway Capacity Manual methodologies. However, PEL guidance indicate level of effort distinctions between planning and project development should lead to LOS indicators for planning and MOE indicators for project development.

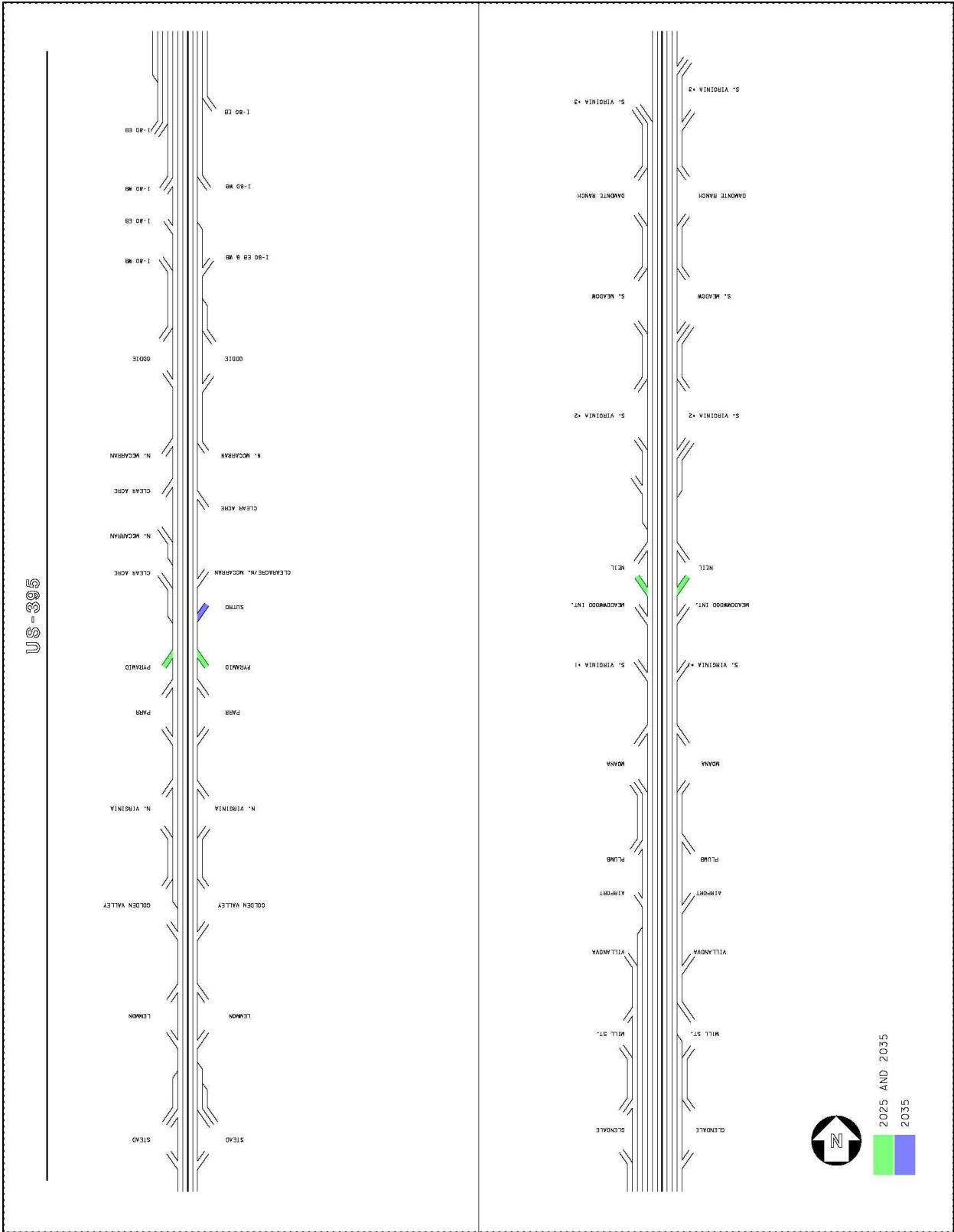


Figure 2: I-58/US 395 Lane Configurations from the 2002 Study

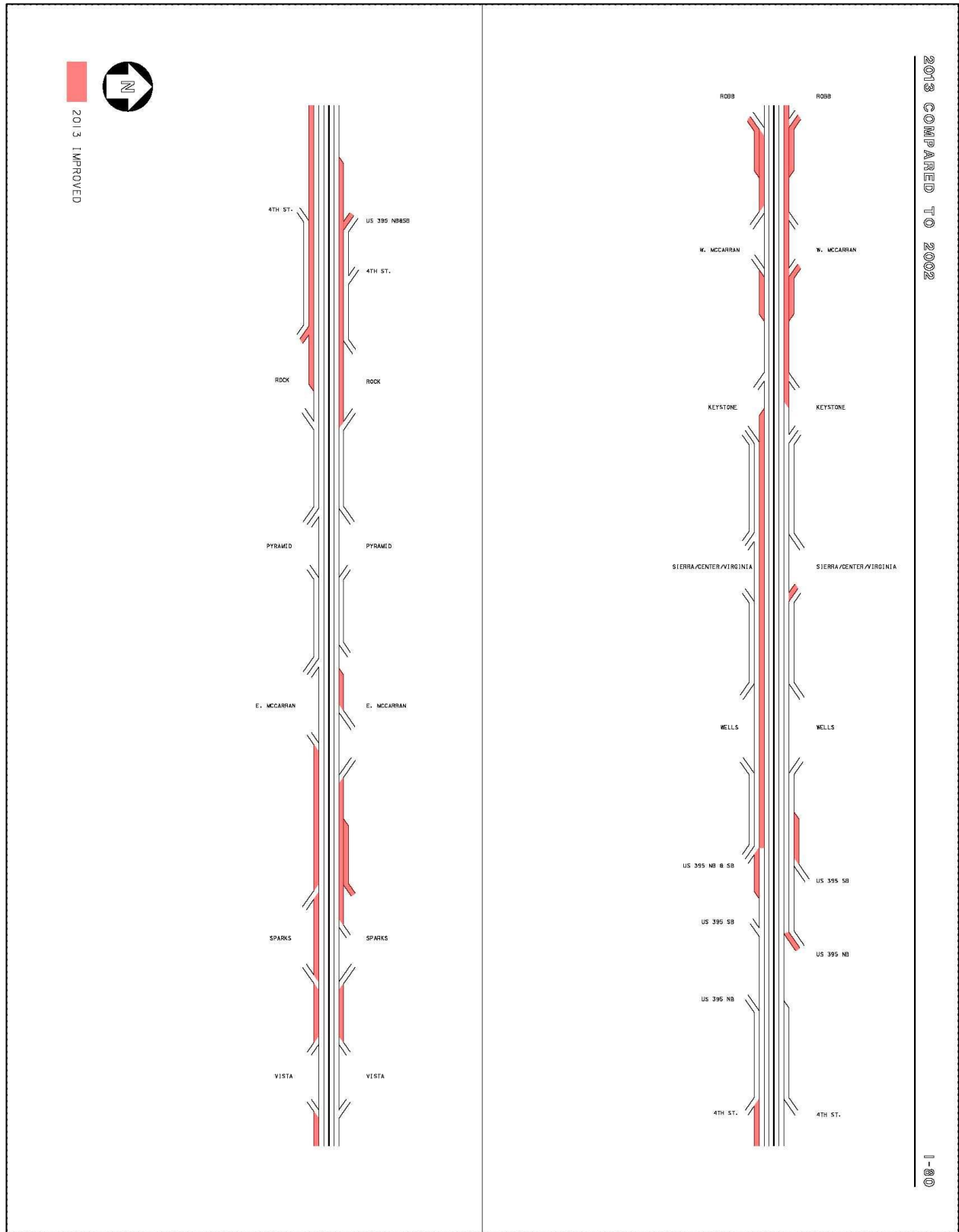


Figure 3: I-80 Lane Configuration Comparisons from 2002 to 2013

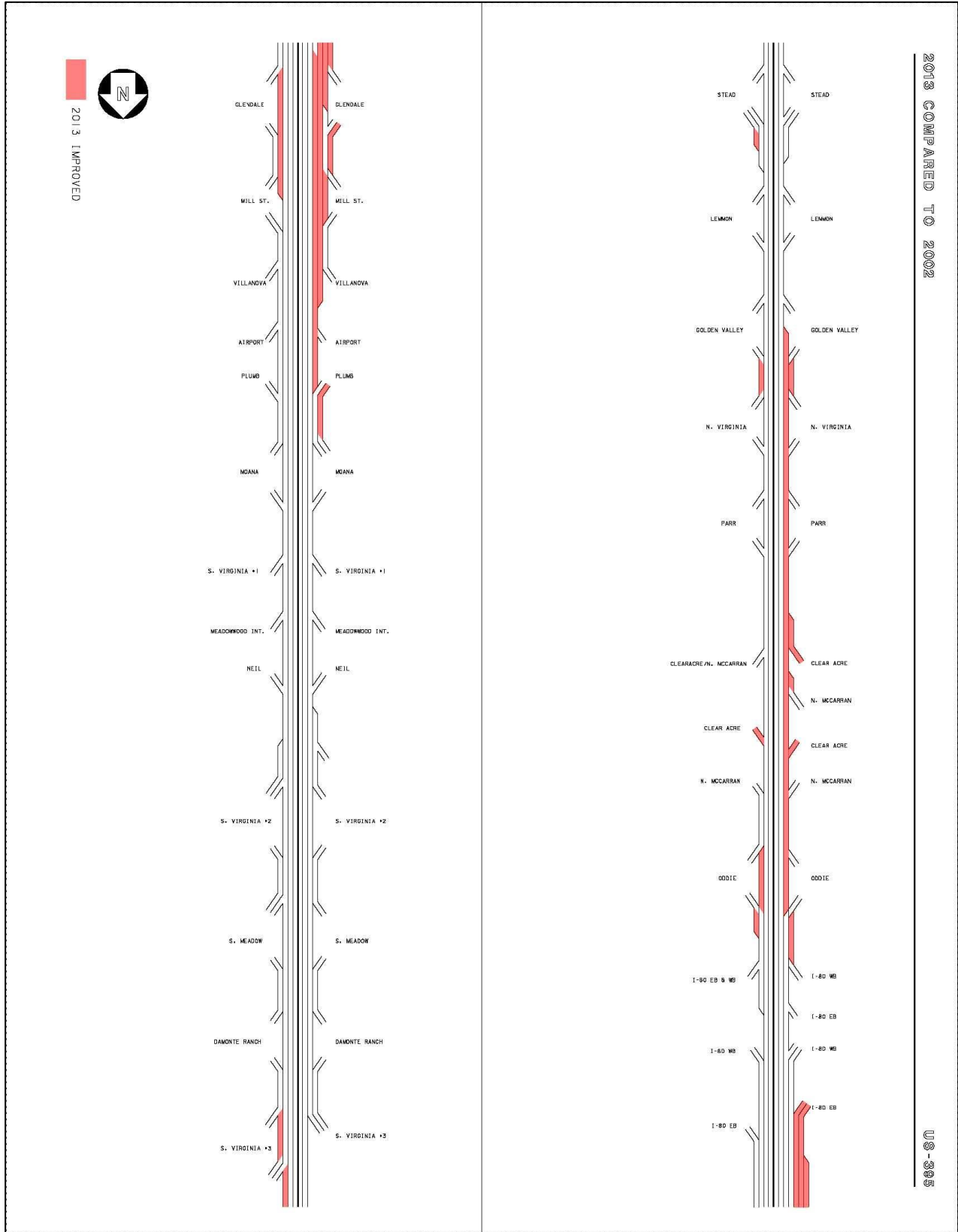


Figure 4: I-58/US 395 Lane Configuration Comparisons from 2002 to 2013

2. Current Conditions

Current conditions for freeway travel in the Truckee Meadow include improvements made since the 2002 Washoe Freeway Corridor Study. Many of these improvements were identified in that study and other improvements came from other initiatives. This discussion of current conditions focuses on travel volume trends over the last decade, operational schematics of the existing freeway system, truck use, currently planned actions for the freeway system, and other characteristics that will assist with determining updated future conditions.

Current freeway corridor conditions reflect social and economic dynamics of the early part of the 21st Century. As noted previously, national trends point to reduced vehicle miles traveled since 2002. Figure 3 shows a 13 year plot of average annual daily traffic from permanent count stations on the north, south, east, and west legs of the Washoe County freeway system. All legs remain relatively flat growth with only the south leg experiencing an overall increase.

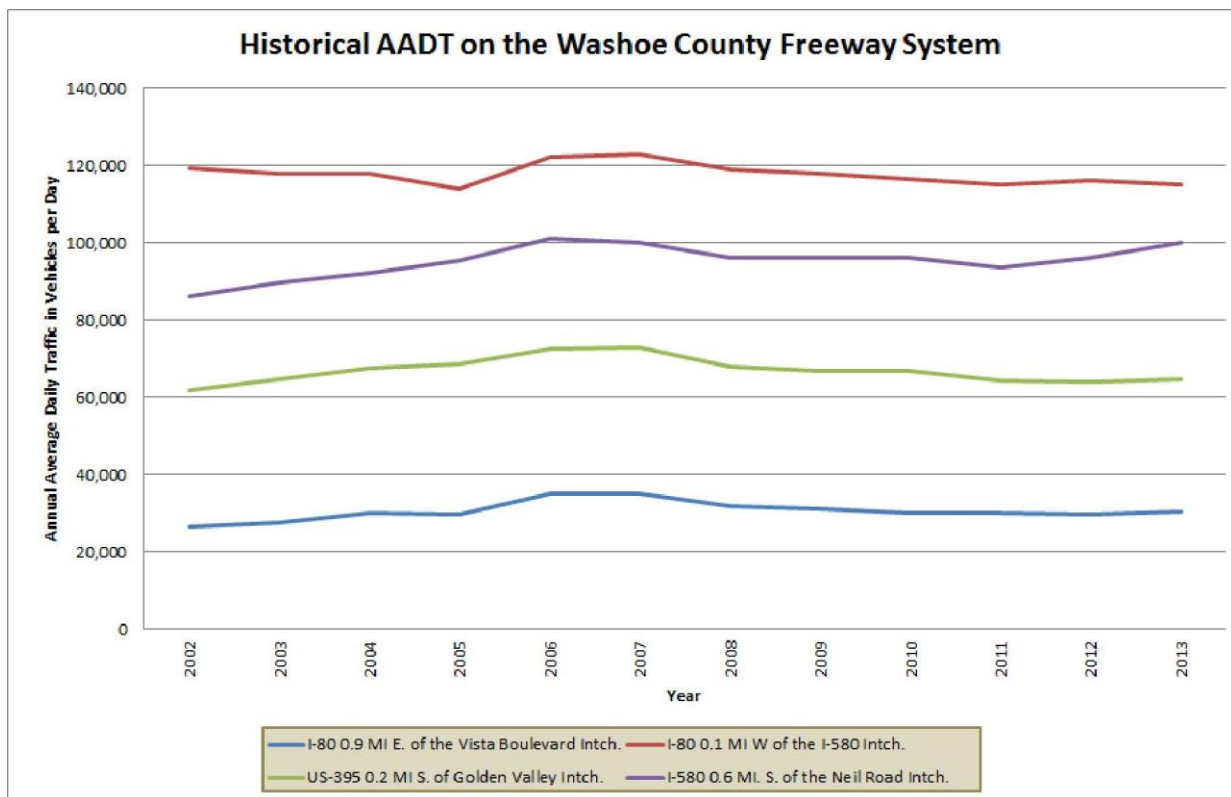


Figure 5: Washoe County Freeway Historical AADT

The following Figures 4 through 11 provide additional details

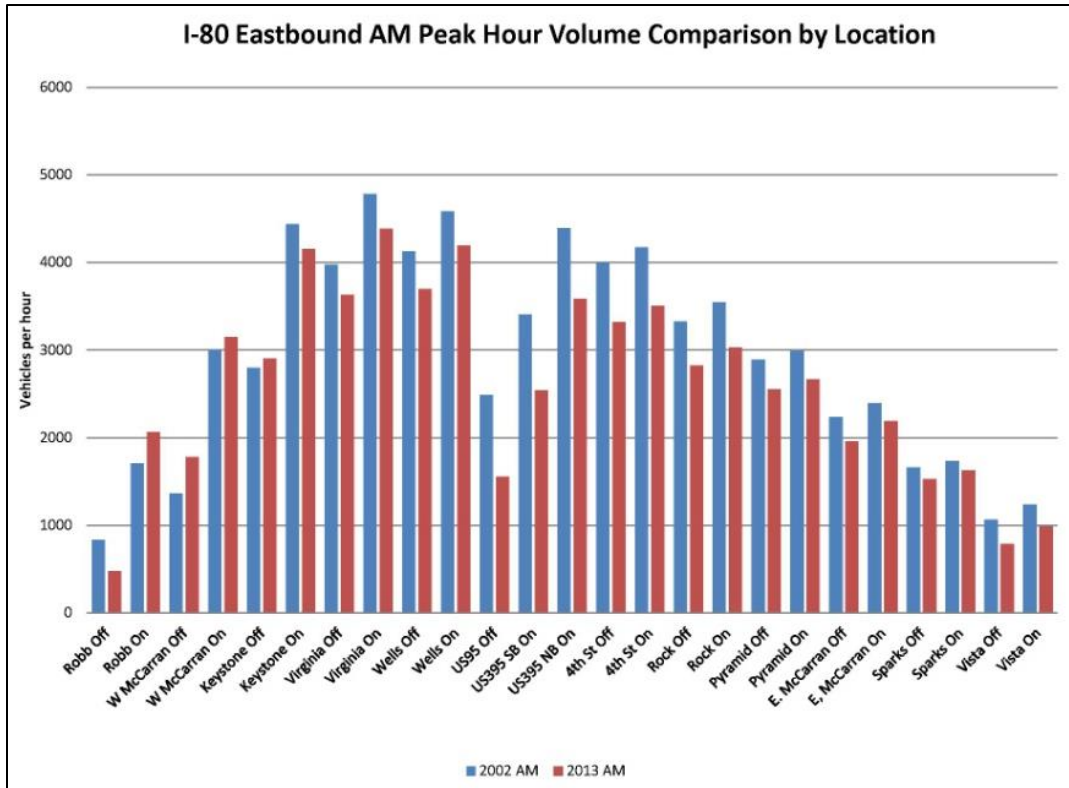


Figure 6: I-80 Eastbound AM Peak Hour Volume Comparison

The eastbound traffic on I-80 during the morning peak hour is generally lower in 2013 than in 2002 with the exception of the area west of Keystone interchange. During the afternoon peak the 2013 eastbound volumes are lower west of Rock interchange and equal or slightly higher than 2002 on the east side.

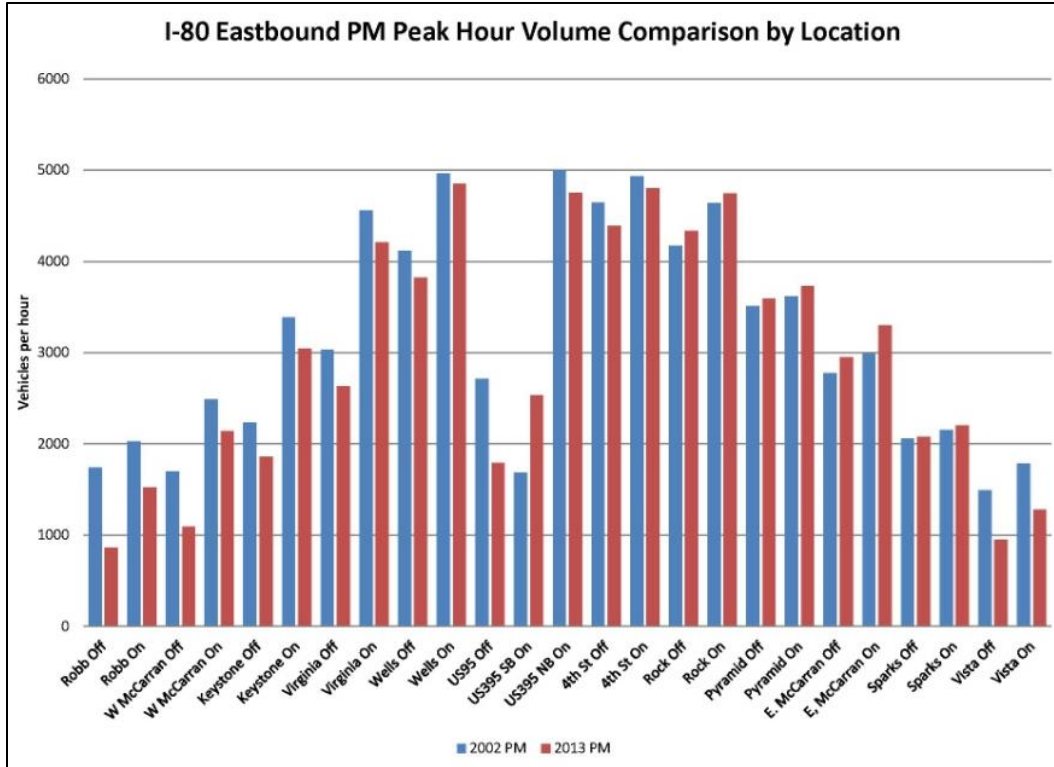


Figure 7: I-80 Eastbound PM Peak Hour Volume Comparison

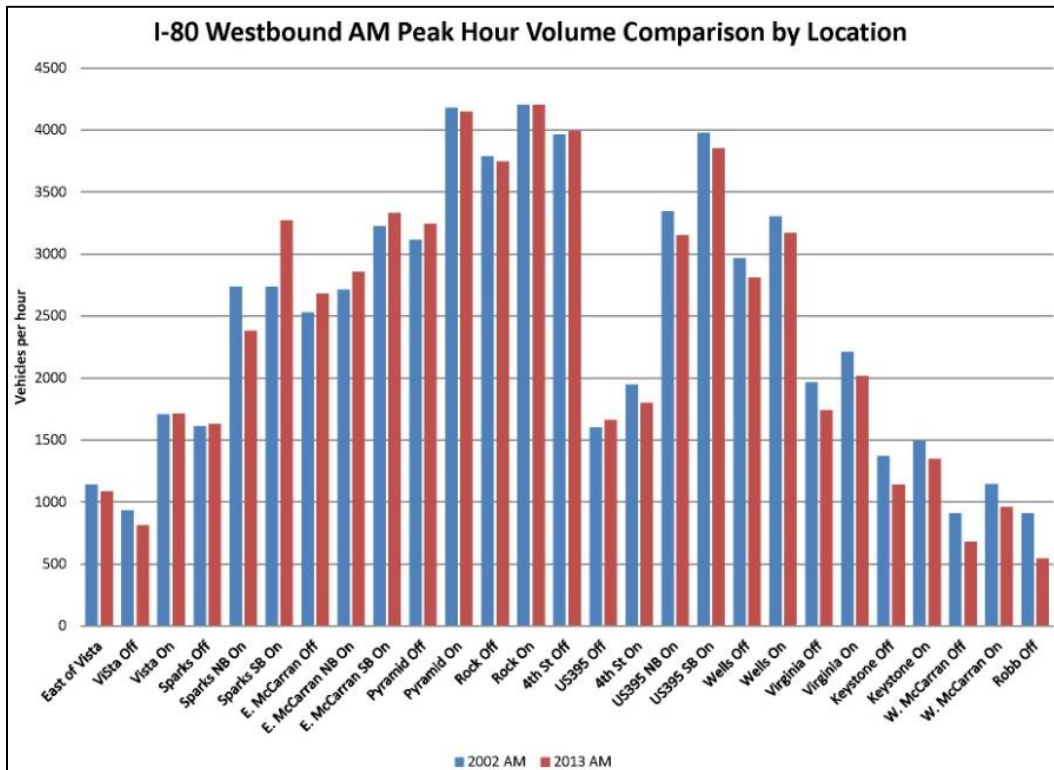


Figure 8: I-80 Westbound AM Peak Hour Volume Comparison

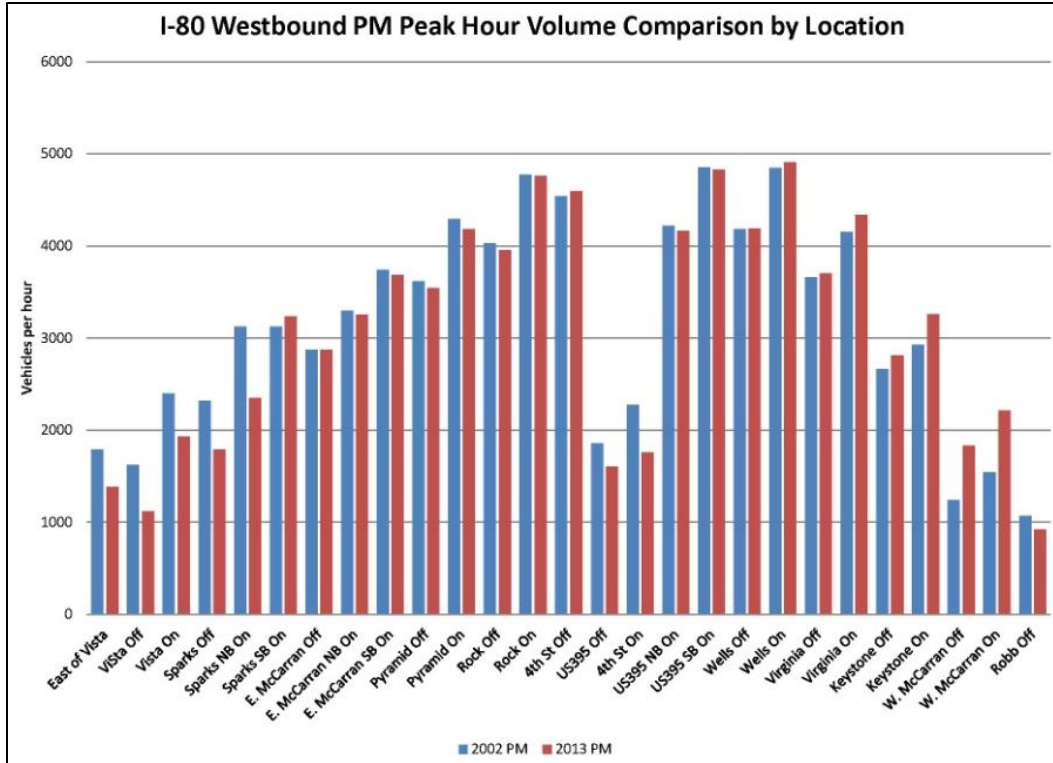


Figure 9: I-80 Westbound PM Peak Hour Volume Comparison

Currently the westbound traffic on I-80 during the morning peak hour is generally lower than in 2002 west of US-395 interchange and is equal or slightly higher on the east side. During the afternoon peak the current volume is lower than 2002 volume on the eastern side, becomes equal west of Sparks interchange and then becomes higher than 2002 east of Virginia Interchange.

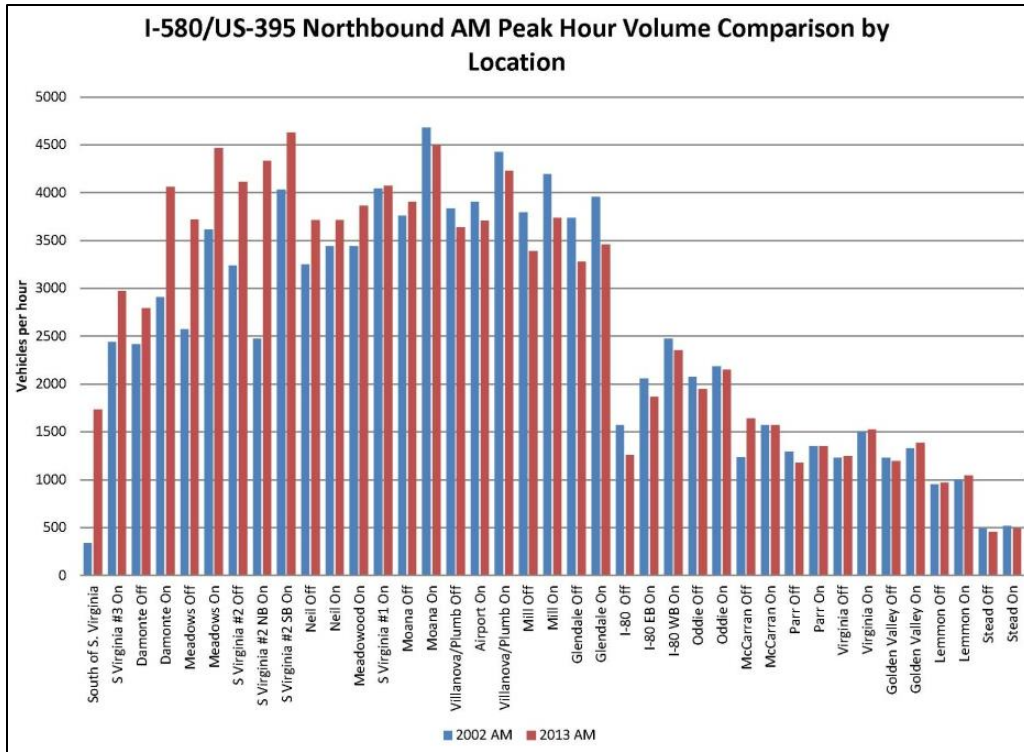


Figure 10: I-580/US 395 Northbound AM Peak Hour Volume Comparison

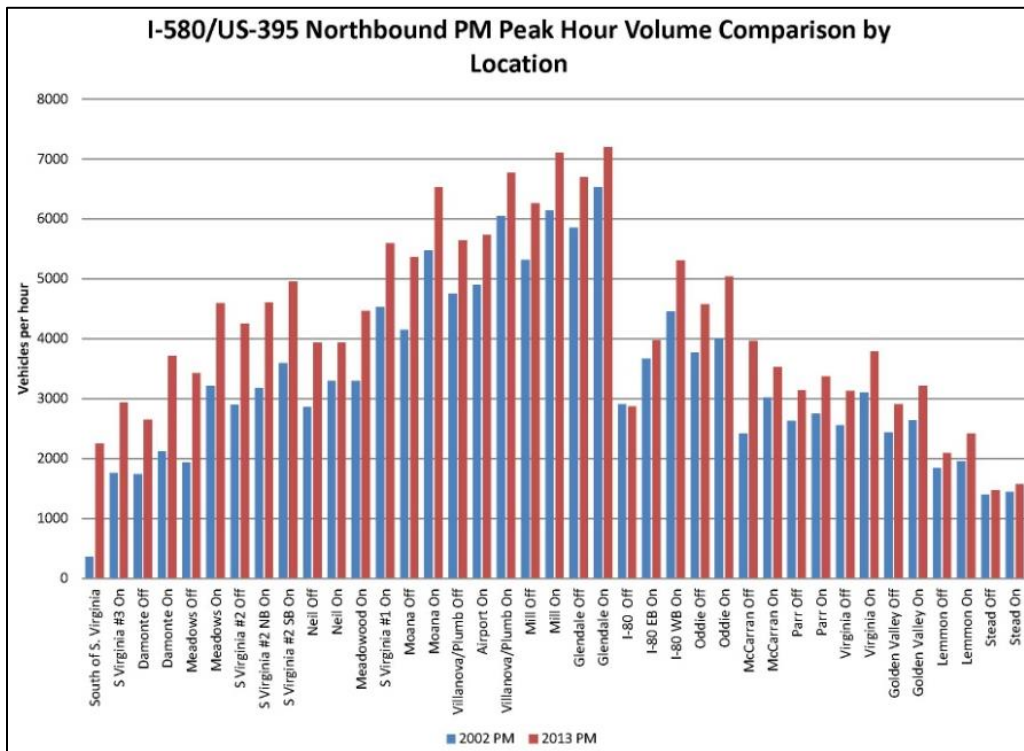


Figure 11: I-580/US 395 Northbound PM Peak Hour Volume Comparison

Except for the central area during the morning peak the current traffic volumes in the Northbound US-395 are generally higher than in 2002 during both peak periods.

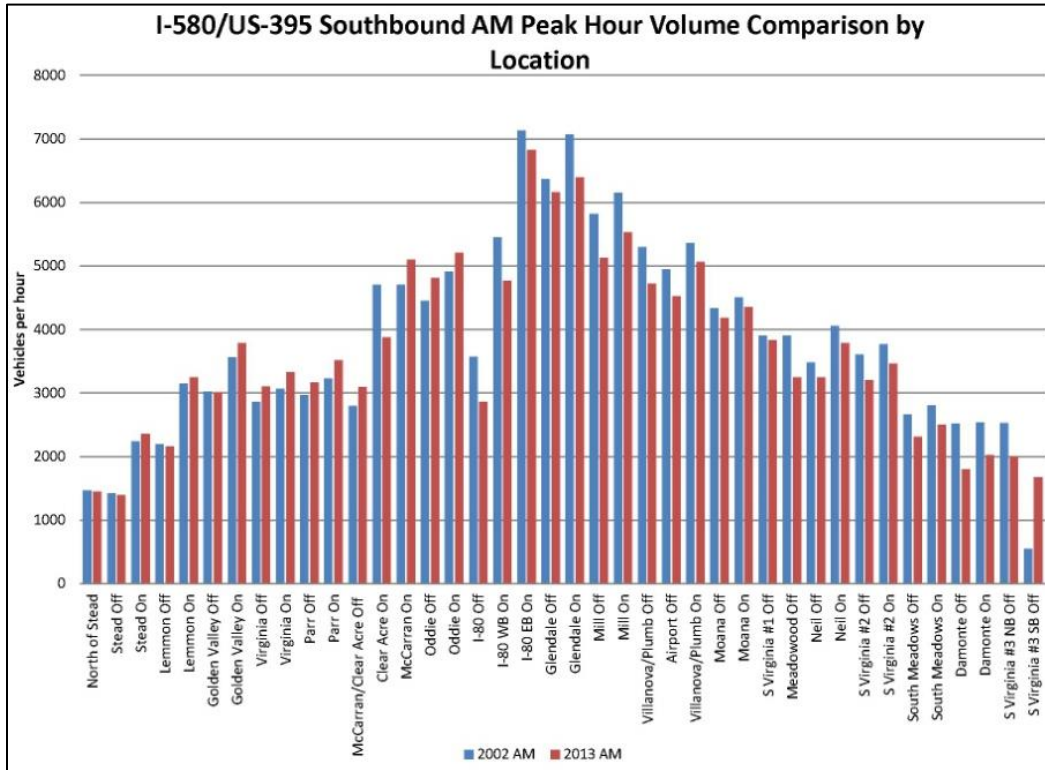


Figure 12: I-580/US 395 Southbound AM Peak Hour Volume Comparison

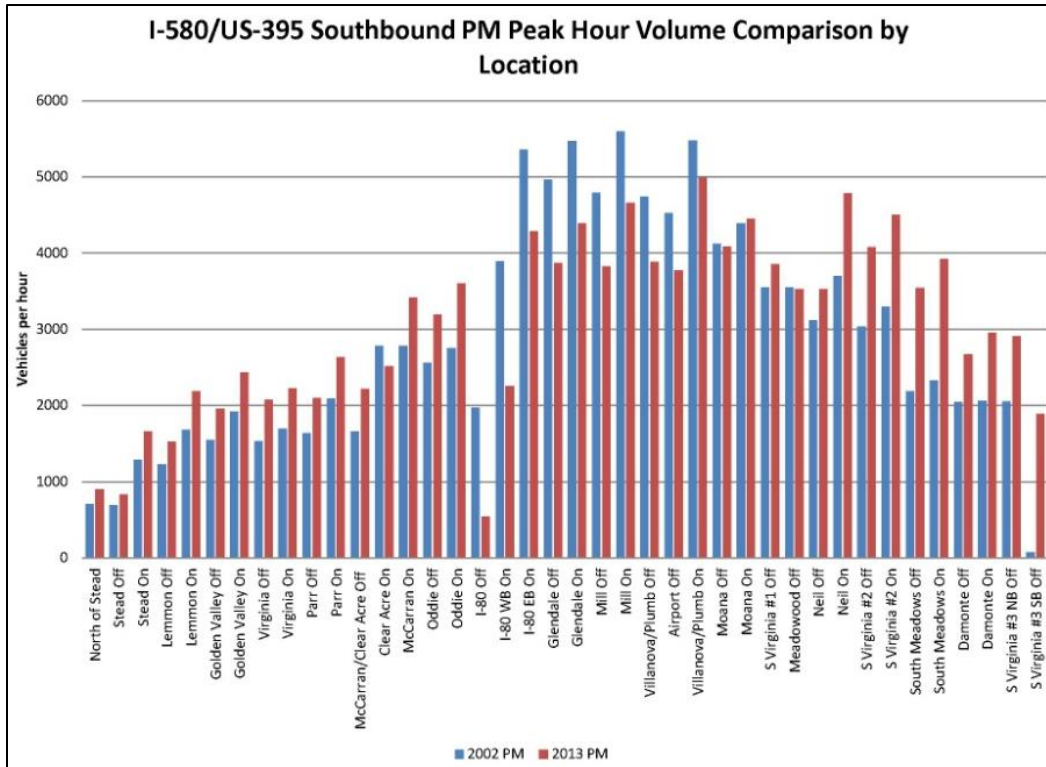


Figure 13: I-580/US 395 Southbound PM Peak Hour Volume Comparison

On the Southbound direction on US-395 during the morning peak hour the 2002 volumes appear to be higher than current volumes South of I-80 and lower north of I-80. During the afternoon peak hour, except for the central area the current volumes are higher than the 2002 volumes.

The 2035 Regional Transportation Plan identified the long term transportation investments planned in the Reno-Sparks urbanized area and Washoe County. The investments in this plan are presented in three time periods: 2013-2017, 2018-2022, and 2023-2035. The list of planned investments on the Washoe County Freeway system, within the study area, is shown in Table 1.

Table 1. 2035 RTP Projects within the Washoe County Freeway System (Source: 2035 RTP)

Project	Description	Time Period
Pyramid Hwy/Sun Valley/US 395 Connector Phase 1	Parr/Dandini service interchange improvements, design and ROW (currently in NEPA/PE)	2013-2017
US 395	I-80 to Parr Boulevard – freeway widening; planning & environmental	2013-2017
US 395/I-580/I-80	System wide ramps and freeway ITS. Freeway management/ITS	2013-2017
Pyramid Hwy/Sun Valley/US 395 Connector Phase 2	US395 to Disc Drive . New 6 lane freeway	2018-2022
Pyramid Hwy/Sun Valley/US 395 Connector Phase 1	Parr/Dandini service interchange improvements and road construction	2018-2022
US 395	I-80 to Parr Boulevard. Widen to accommodate connector traffic – additional SB lane (NEPA/PE initiated)	2018-2022
I-80	W McCarran to Vista Blvd – add lane in each direction and operational improvements	2023-2035
I-80/I-580/US 395 (Spaghetti Bowl)	I-80/I-580/US 395 interchange and northbound lanes from I-80 to McCarran Blvd – operational and capacity improvements, widen to 8 lanes	2023-2035
Pyramid Hwy/Sun Valley/US 395 Connector Phase 3	At US 395 new system ramps to and from south	2023-2035

The following pages provide schematics of the urban Washoe County freeway system.

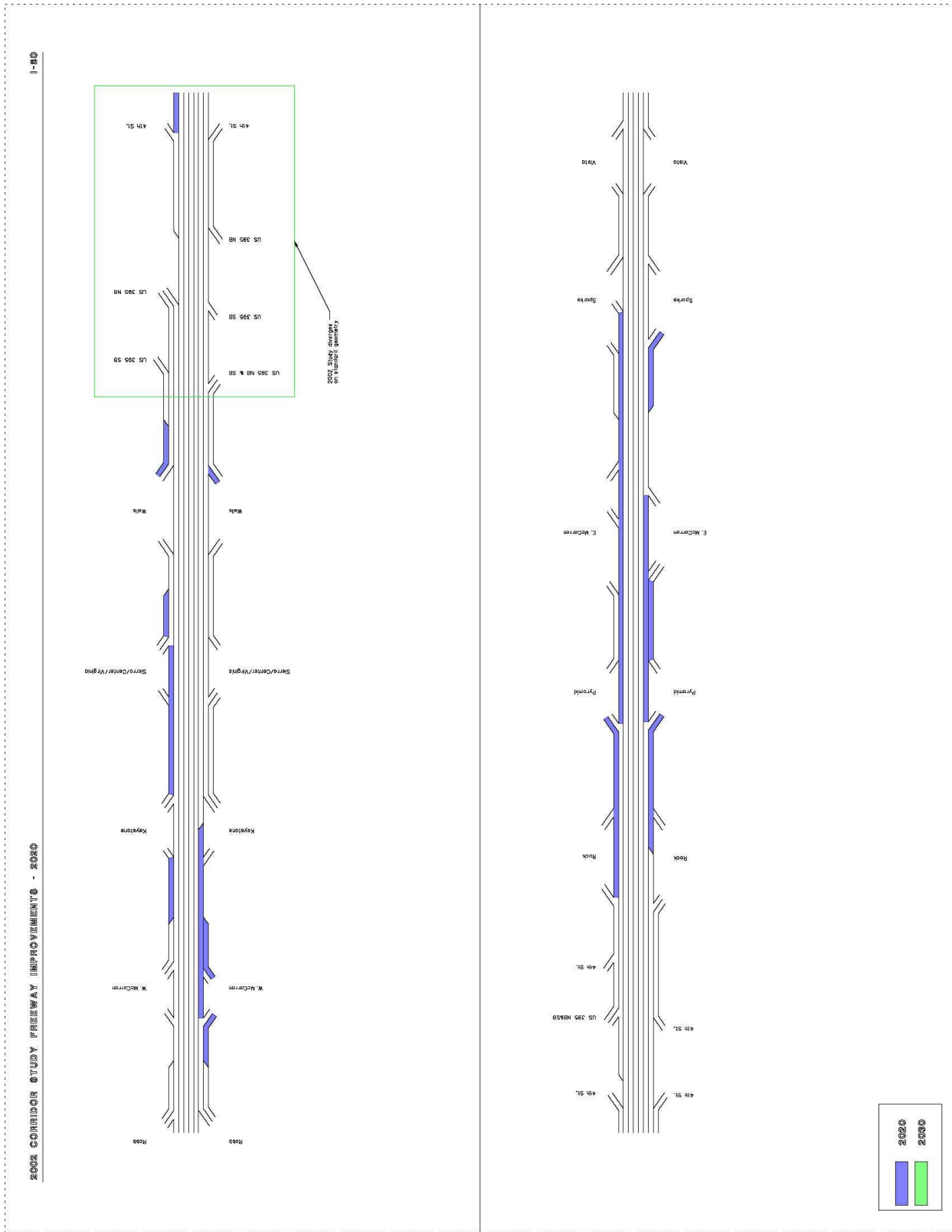


Figure 14: 2002 Washoe Freeway Corridor Study for I-80

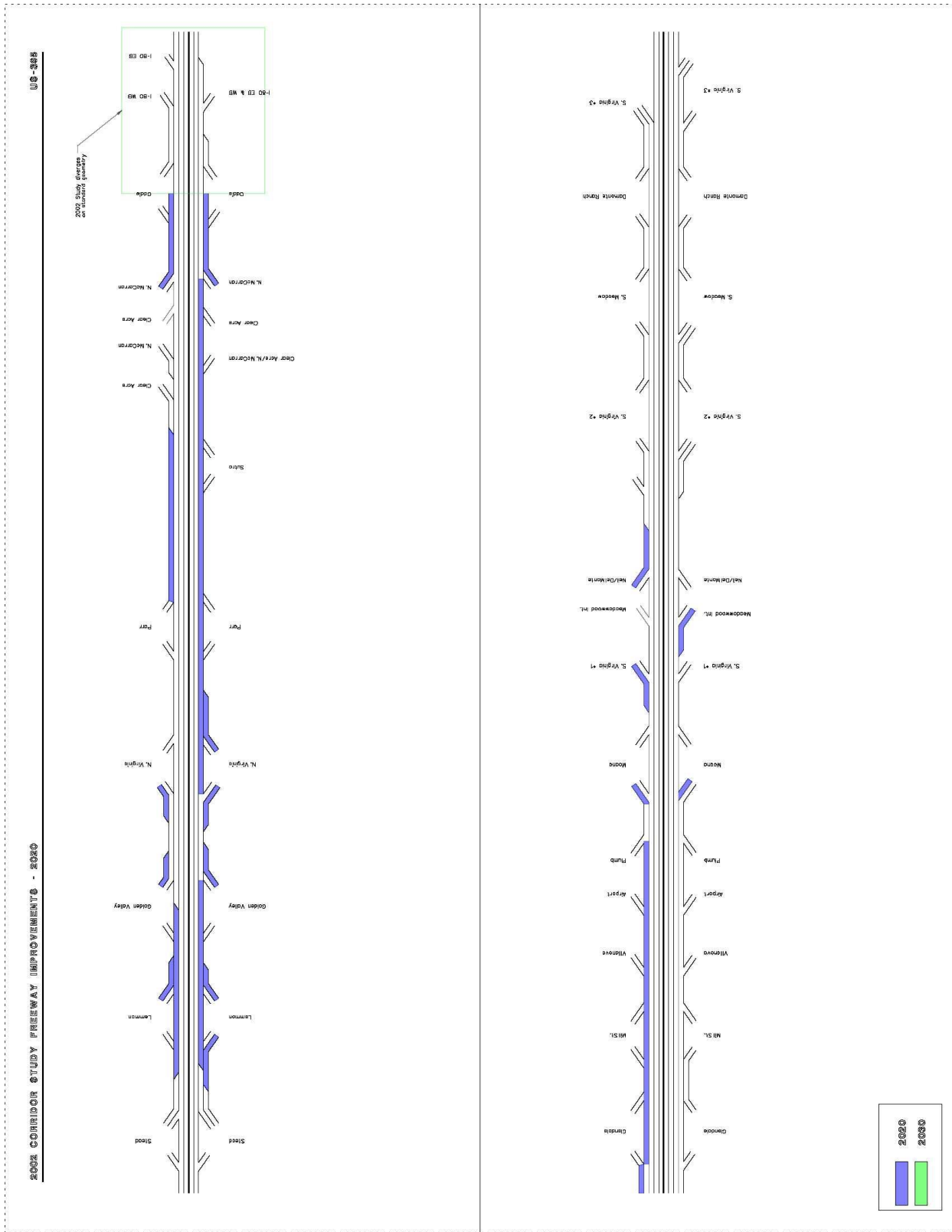


Figure 15: 2002 Washoe Freeway Corridor Study for US 395

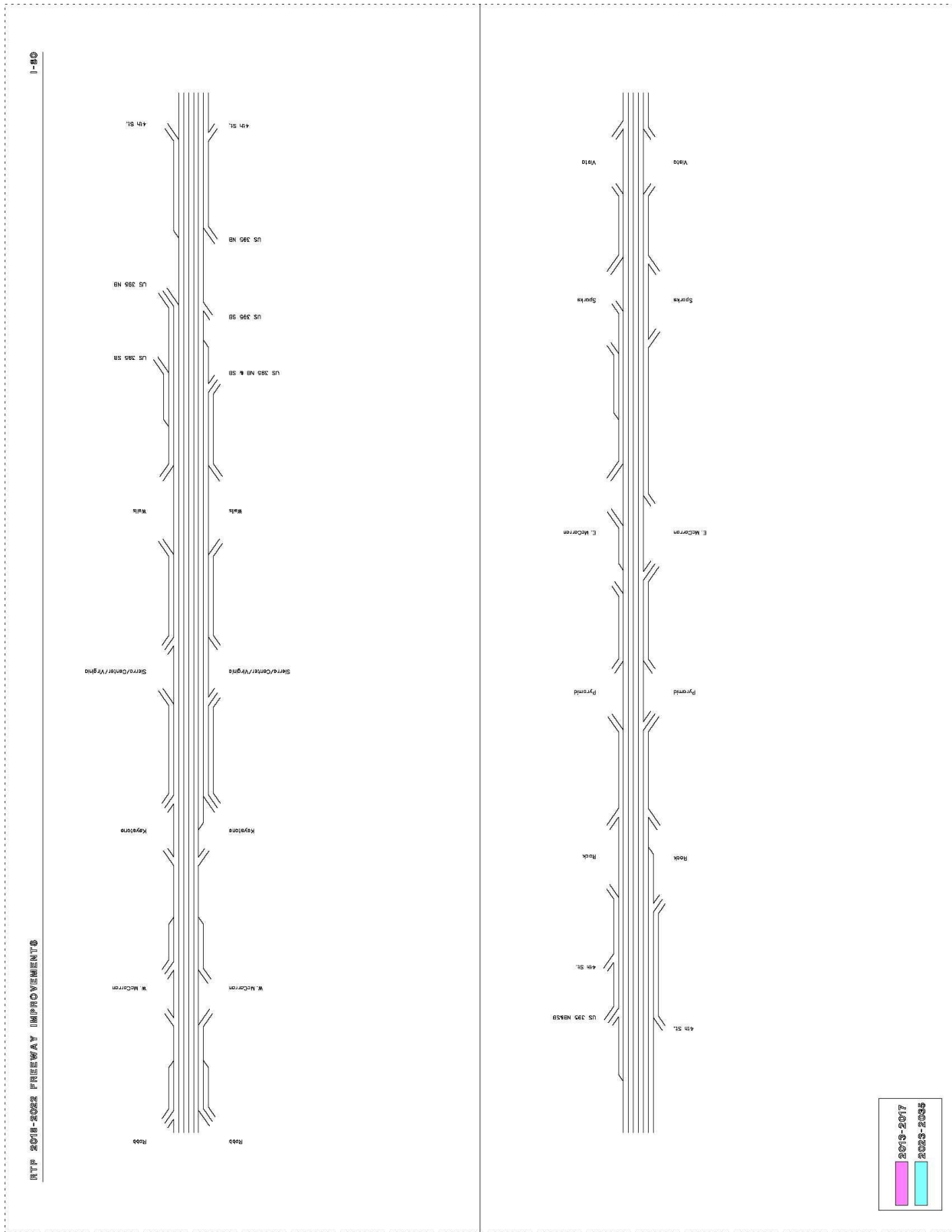


Figure 16: Regional Transportation Plan for I-80

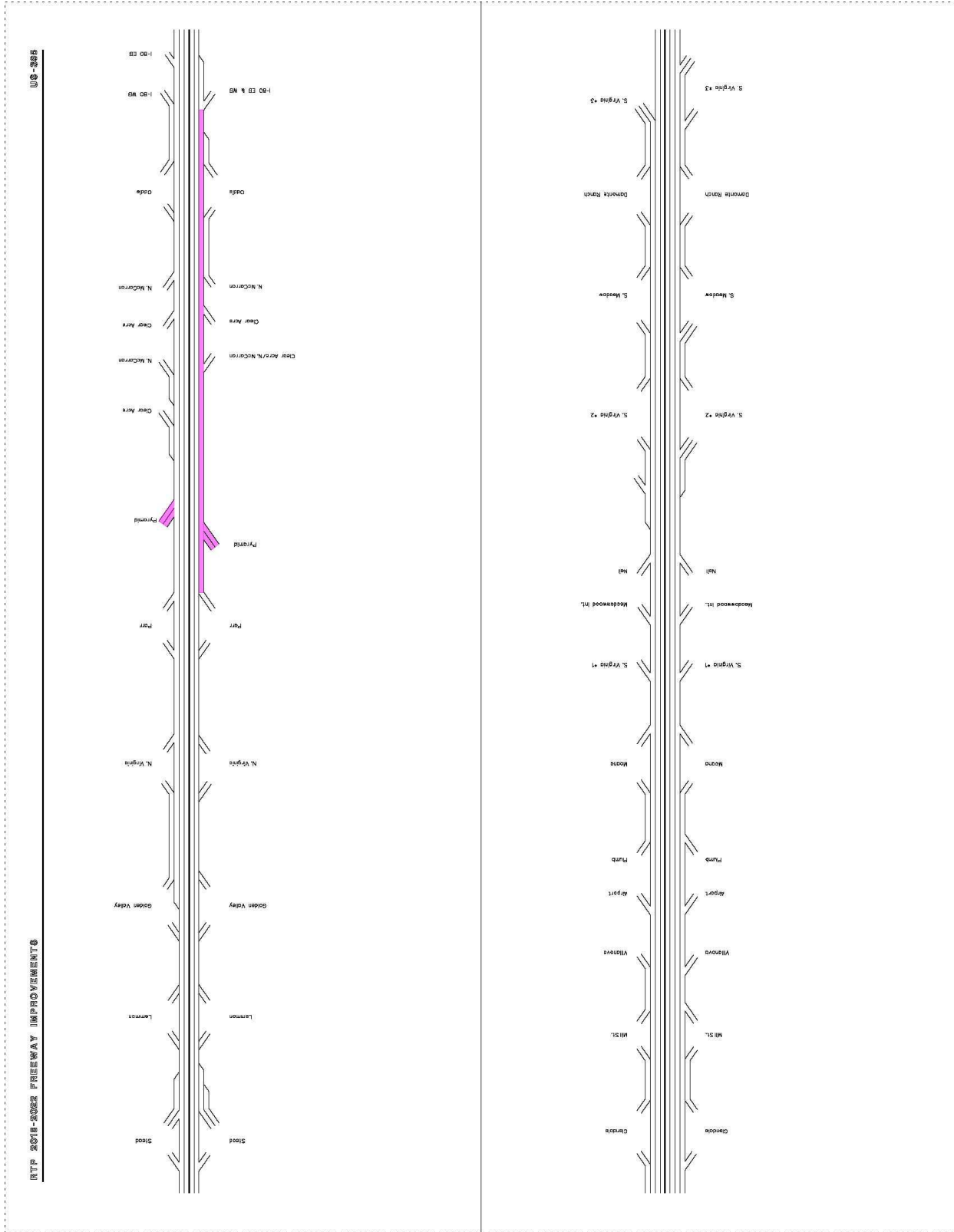


Figure 17: Regional Transportation Plan for US 395

3. Anticipated Future Conditions

Anticipating and meeting future transportation needs requires thoughtful consideration of many complex and interrelated elements. The following discussion details the considerations employed in this investigation based on the dynamic conditions of the early part of the 21st Century.

Essentially, future transportation investigations should consider shifting economic conditions, enhanced integration of environmental and transportation planning, and the need to incorporate a spectrum of potential future conditions.

3.1 Washoe Economic Analysis

The 2002 study was conducted during a time of economic boom both nationally and in northern Nevada. In light of the economic changes that have occurred in the years since the 2002 study was published, a re-evaluation of potential growth in light of the downturns in the economy and the recent recovery was the first order of business in updating the travel demand forecasts. An economic assessment of the I-80 corridor from San Francisco, California to Cheyenne, Wyoming proved invaluable in determining growth rates at the external stations of the regional travel demand model. A focus on the Washoe economy summarized in the following text allowed for an informed understanding of the potential growth in the next 10 years.

The summary presented in the following text is based on information contained in the report titled “I-80 Corridor System Master Plan” prepared For Atkins by RCG Economics in February 2013.

A comprehensive understanding of the economy within Washoe County requires a look beyond its boundaries at least as far west as Sacramento and as far east as Elko. Sacramento sits in the crosshairs of I-80 and Interstate 5, which is the western U.S. region’s primary north-south corridor. Sacramento is home to one of the most concentrated markets in the nation and it is only expected to expand. Several primary developments could add to the capacity needs of I-80 in future years, including multi-million-dollar improvements underway at Sacramento International Airport. Because the airport services major cities across the United States, it has the potential to become an inland hub. Sacramento also has deep-water ports and the river connects to the San Francisco Bay Area. It is also anticipated that large office complexes and developments will

continue to line I-80. Both the Union Pacific (UP) and the Burlington Northern Santa Fe (BNSF) rail lines are increasing capacity in nearby Stockton, which could have an effect on cargo shipments from the airport and the ports along the Sacramento River. The expansion of the UP and BNSF railroads will undoubtedly affect the Reno/Sparks region, which both companies already serve. The population of the region has increased two-fold since 1990; between the two cities, the population is 309,000. The area quickly transformed into a logistics hub; 22 percent of its workforce is involved in the trade, transportation, and utilities sector. That industry is likely to grow – Reno-Sparks currently serves 11 western states with a total population of 73 million.

Although the terrain and existing developments limit the amount of growth, the Reno-Tahoe International Airport is a designated alternative airport for Air China cargo shipments. Also, the Tahoe-Reno Industrial Center along I-80 consists of 30,000 acres of entitled sites pre-approved for manufacturing and distribution uses. The logistics industry is likely to be the push behind Reno-Sparks growth. Because of that, major infrastructure improvements will be needed between the region and Southern California. In addition to the logistics hub, Apple announced in 2012 its plans to build a \$1 billion data center just north of I-80 and the Industrial Center. The growing industries have the potential to congest I-80 to the point that it interferes with east-west movements to the Bay Area ports and markets. Telecommunication and fiber optics services will also need to be upgraded in the near future.

Nearby Fernley, Nevada has strong potential for growth, with ample land for large-scale residential and commercial development. Fernley, considered a bedroom community to Reno, also relies heavily on the logistics industry and is home to the Crossroads Commerce Center, a 5,000-acre master-planned industrial park that is served by rail lines. Future tenants to the park could be drawn by a new I-80 interchange that provides better access to the park. Fifteen years ago, Amazon opened a 750,000-square-foot warehouse in Fernley. The city relies heavily on trucking and rail service for its economic development strategies. City officials view the extension of the Nevada Pacific Parkway – which links I-80 to Highway 50 – as a vital access improvement to the south. That critical stretch of roadway will help the labor force better access employment centers.

Gold mining is the heart of Elko, Nevada’s economy and it is critical for seamless exportation of the gold and import of equipment to keep the mines operating efficiently. Officials recently identified a gold reserve between Wells and Wendover that is estimated to contain a 30-year reserve, meaning mining will continue to dominate the town’s economy for decades to come. As an outcome to this finding, Elko will become the administrative and logistics center for future mines. The city’s strategy is to identify manufacturing components and chain companies to support the mining industry. Two industrial parks have been classified as such – a 180-acre site on the east side of town and a 1,500-acre location on the west side of town. The eastside location is in need of an I-80 interchange; the larger site has an interchange that is considered inadequate as it cannot carry the volumes and loads. Trucks working from an east side “rail port” must make their way into town on an old highway to reach I-80 because the interchange does not meet weight specifications.

The previous detailed analysis can be viewed with a SWOT (Strengths, Weaknesses, Opportunities, and Threats) Analysis. This type of analysis allows for the comparison and contrasting of multiple elements of the economy in order to develop actionable strategies for multiple initiatives.

In conclusion, cities along the I-80 corridor are in various stages of rebounding from the recession, and the logistics industry plays a significant role in each community. While rail lines and cargo ships move goods, it is clear that I-80 remains the key freeway for the trucking industry and the economic outlook appears to be brighter along the I-80 corridor between Sacramento and Elko than many other places in the United States. Table 2 provides a summary of the strengths, weaknesses, opportunities, and treats (SWOT) analysis for the Reno/Sparks Metropolitan

Area. This economic analysis demonstrates the range of analysis appropriate for PEL related activities be focusing on the broad economic dynamics and their relationship to NEPA processes and outcomes.

Differences of PEL & NEPA

- The level of effort can vary widely in PEL
- Findings in PEL are preliminary and subject to reevaluation in NEPA
- Goals & objectives play a big role in the purpose & need in PEL
- PEL does a high-level environmental review
- PEL identifies corridors not alignments
- PEL carries forward a reasonable range of corridor alternatives, even if a preferred is identified

Table 2: Economic SWOT Analysis for the Reno/Sparks Metropolitan Region

Strengths	Weaknesses	Opportunities	Threats
Economic development strategy	High unemployment	Numerous entrepreneurs: sign of future growth	Strain on public resources and education
Proximity to CA and other western markets	Under-developed clusters other than leisure and hospitality	Commercializing research: strong innovation capacity	Overly dependent upon consumption industries
Low-tax climate	Lack of entrepreneur support system	Downtown living: economic diversification and transit-oriented development	Gaming vulnerable to outside competition
Affordable housing	Reliance on consumer spending for government operations	Potential for an inland port: multimodal distribution	College graduates leaving
Affordable office space	Limited venture capital availability	Targeted growth sectors: diversification	Limited support for higher education
Research capacity	Underperforming K-12 education system		
Natural beauty			

3.2 Forecasting Scenarios Methodology

In order to forecast future freeway operations, the Washoe County Freeway Corridor Study-Update 2014 developed three travel forecast scenarios as delineated in the traffic forecasting methodology memorandum appended to this report. Context for that methodology, which was developed with direction from NDOT and Washoe RTC, is integrated into this analysis.

It was in light of this economic analysis of the corridor and the optimism for economic growth that supported an estimation of a 10 percent increase in traffic volumes on the Washoe Freeway corridor system between 2014 and 2025. More specifically the following assumptions were used in deriving the growth estimate for use in one of three traffic forecasting scenarios used in the evaluation of recommendations made in the 2002 Washoe Freeway Corridor Study:

- The economy will recover and grow slowly in the next 12 years based on the economic analysis conducted for the Reno metropolitan area and depicted in the RCG economic report.
- The population will increase in the “Reno area” at a rate consistent with the economic analysis conducted for this study and depicted on page 4-13 of the RCG economic report.
- New industry will be attracted and developed in accordance with the land use analyses conducted by Truckee Meadows Regional Planning Association in 2013/2014.

These assumptions provide the basis for the following three scenarios of how freeway traffic volumes will develop over the first half of the 21st Century.

3.2.1 Scenario 1

The operational analysis under this scenario indicates that an increase of 10% on the overall existing volumes will cause the I-80 EB to exhibit operational issues at the weaving area between Wells interchange and US 395. Additionally, the freeway volumes in this direction will approach the capacity from Rock On-ramp to Pyramid off ramp. On the westbound direction, operational issues will be exhibited at the weaving area between Virginia and Keystone interchange. Similarly to the eastbound direction the freeway volumes will approach the capacity at the Pyramid interchange area.

On I-580/US-395 Southbound the 10% increase of current volumes will cause many merge and diverge areas from Virginia Interchange in the north to Mill Interchange to the south to approach capacity. Critical is the area of Clear Acre on Ramp as well as I-80 off ramp where freeway volumes exceed the merge and diverge area capacity. On the northbound direction operational issues are expected in the area between Virginia Street and Moana Lane interchange as well as between I-80 WB on ramp and Oddie Boulevard interchange.

3.2.2 Scenario 2

The comparison of traffic volumes and operations indicates that the 2025 forecasted traffic volumes are very similar to the 10% growth scenario along the I-80. Therefore the operational issues identified are similar.

The I-580/US-395 under this scenario is experiencing a significant increase in traffic volumes in both directions. The traffic volumes of southbound US395 north of I-80, when compared to

existing, are predicted to increase up to 108% during the morning peak hour and up to 153% during the afternoon peak hour. This increase might be attributed to the opening of the Pyramid Connector and new developments planned on the north side of the urban area. The freeway ramps between Parr interchange and I-80 experience an average increase of 3000 – 4000 vph compare to the existing volumes. South of I-80 the traffic volumes are predicted to increase up to 70% during the morning peak hour and up to 65% during the afternoon peak hour. The increase in traffic under the 2025 model scenario is expected to cause operational deficiencies from Lemon Interchange to Villanova Interchange. The freeway will also approach capacity at Moana Off ramp and in the area from Neil to Virginia.

Similar increase in volumes is predicted to occur also in the Northbound direction. The highest increase is observed at Mill on ramp and Neil on ramp, where the peak hour volumes increased approximately 2000vph. Under this scenario the majority of the freeway segments from Lemon Interchange to Neil Interchange will operate under congested conditions.

3.2.3 Scenario 3

The eastbound direction for I-80 is expected to operate under congested conditions east of US395. Additionally, the traffic volumes within the weaving areas between Keystone and Virginia, Virginia and Wells, Wells and US395 will exceed the capacity. The traffic conditions for I-80 westbound are very similar to the eastbound direction. Operational deficiencies are identified in most of the segments east of Keystone Interchange.

Under this scenario the traffic volumes on US 395 will increase on average an additional 20-25% compared to the 2025 scenario. The entire US395 corridor would operate under congested conditions with the current geometry. Scenario 2 and Scenario 3 use the traffic numbers produced by the RTC travel demand model for 2025 and 2035. Peak hour volumes obtained from this model were adjusted following the methodology outlined in NCHRP Report 765 using the 2013 as a baseline year.

Volumes generated for each scenario were screened to identify the highest peak period. While for the I-80 and US 395 NB the PM peak period was identified as the highest, on US 395 Southbound the morning peak period has the highest volume north of Moana Lane. Only the

highest peak period volumes were used in the analysis to identify where operational thresholds are exceeded.

3.3 Truck Use

Classification counts obtained from the Nevada Department of Transportation were used to identify the truck percentage along the freeway system corridors. The following Table 3 indicated these percentages by location. For the purposes of this analysis these percentages were carried over unchanged into the future.

Table 3: Projected Future Truck Percentages

Section	AADT	Daily Volume		Total Truck %
		Light Trucks	Heavy Trucks	
I-80				
Garson Road to Robb Drive	33000	1244	3855	15%
Robb Drive to McCarran Avenue	50000	1177	4174	11%
McCarran Avenue to Keystone	69000	1336	4317	8%
Keystone to Wells	109000	1493	4457	5%
Wells to US 395	116000	2780	4160	6%
US 395 to Vista		2161	2180	
US 395 to 4th Street	105000	2161	2180	4%
4th to Rock	102000	2161	2180	4%
Rock to Pyramid	94000	2161	2180	5%
Pyramid to McCarran	77700	2161	2180	6%
Sparks to Vista	40000	2161	2180	11%
I-580/ S -395				
Mt Rose Highway to Neil Road	65500	2403	901	5%
Neil Road to Plumb Lane	107300	2161	2180	4%
Plumb Lane to I-80	143300	1385	2050	2%
I-80 to Lemon Valley	73000	1374	1847	4%
Lemon Valley to Red Rock	35000	719	855	4%

The following Tables 4 through 7 summarize projected future traffic operations including LOS for the urban Washoe County freeway system.

3.4 Projected Future Conditions

The developing three scenarios for potential future conditions provides an enhanced transportation planning approach to identifying future needs. The following tables summarize the range of potential future conditions to consider while transitioning planning information into program and project development activities. Tables 3 through 6 on the following pages provide the source information for the following analysis. Several freeway segments evaluated under the historical growth scenario fail to meet adopted public policy for operational performance (LOS E) in the next ten years. These segments are:

I-80 Eastbound

- Wells to US395 Off – F
- Rock On to Pyramid – E
- Pyramid Off to On - E

I-80 Westbound

- Pyramid Off to On – E
- Virginia to Keystone - F

US-395 Northbound

- Virginia 1 On Ramp – E
- Virginia 1 to Moana – E
- Moana Off Ramp – F
- Moana Off to On – E
- Moana to Plumb – F
- Airport On Ramp – F

US-395 Southbound

- Golden Valley Off Ramp - E

- Virginia On Ramp - E
- Parr Off Ramp - E
- Parr On Ramp - E
- McCarran Off Ramp - E
- Clear Acre On Ramp - F
- I-80 Off Ramp - F
- Glendale Off Ramp - E
- Glendale to Mill - E

Table 4: Eastbound Interstate 80

No.	Segment Location	Segment Type	Segment Length	Truck %	Freeway Lanes	10% PM			2025 PM			2035 PM		
						PM Volume	Density (pc/mi/ln)	LOS	PM Volume	Density (pc/mi/ln)	LOS	PM Volume	Density (pc/mi/ln)	LOS
1	Robb off to Robb On	Basic		11%	2	947	7.6	A	1156	9.3	A	1975	15.8	B
2	Robb to McCarran	Weave		11%	3		12.0	B		13.3	B		25.7	C
3	McCarran Off to On	Basic		11%	2	1204	9.7	A	1413	11.3	B	2340	18.8	C
4	McCarran On	Merge	1500	11%	2		17.0	B		17.1	B		31.8	D
5	Keystone Off Ramp	Diverge	500	8%	2	2353	23.1	C	2359	23.2	C	4008	39.6	E
6	Keystone Off to On (2 Lane)	Basic		8%	2	2048	16.2	B	1925	18.7	C	3545	31	D
7	Keystone to Virginia	Weave	1320	5%	5		15.2	B		17.9	B		n/a	F
8	Virginia Off to On	Basic		5%	4	2896	11.3	B	3054	11.9	B	4854	18.9	C
9	Virginia to Wells	Weave	1070	5%	5		22.7	C		23.1	C		n/a	F
10	Wells Off to On	Basic		5%	4	4202	16.4	B	4189	16.3	B	6383	26.1	D
11	Wells to US395 Off	Weave	1330	6%	5		n/a	F		n/a	F		n/a	F
12	US395 Off to US395 SB On	Basic		6%	3	1968	10.3	A	2623	13.7	B	5195	29.5	D
13	US395 SB On	Merge	330	6%	3		24.4	C		23.5	C		40	F
14	US395 NB On to 4th	Diverge	600	4%	4	5229	28.5	D	5547	26.2	C	8281	37	E
15	4th Off to On	Basic		4%	4	4831	18.8	C	5184	20.2	C	8068	37.3	E
16	4th to Rock	Weave	1577	4%	5		23.0	C		26.7	C		44.4	E
17	Rock Off to On (3 Lane)	Basic		4%	3	4766	25.8	C	4599	24.6	C	7268	56.8	F
18	Rock On to Pyramid	Merge	635	5%	3		35.6	E		32.6	D		51.4	F
19	Pyramid Off to On	Basic		5%	2	3952	36.3	E	3872	35	D	6446	445.6	F
20	Pyramid to McCarran	Weave	1610	6%	3		31.1	D		33	D		n/a	F
21	McCarran Off to On	Basic		6%	2	3245	26.9	D	3131	25.6	C	5208	74.5	F
22	McCarran On Ramp	Basic		6%	3		19.0	C		17.8	B		30.4	D
23	Sparks Off Ramp	Diverge	400	6%	3	3629	27.0	C	3415	25.9	C	5298	37.1	F
24	Sparks off to Sparks on	Basic		6%	3	2286	11.9	B	2068	10.8	A	3178	16.6	B
25	Sparks On Ramp	Merge	500	11%	3		16.5	B		15.5	B		20.9	C
26	Vista off to Vista on	Basic		11%	2	1041	8.3	A	887	7.1	A	1225	9.8	A

Table 5: Westbound Interstate 80

No.	Segment Location	Segment Type	Segment Length	Truck %	Freeway Lanes	10%			2025 Model			2035 Model		
						PM Volume	Density (pc/mi/ln)	LOS	PM Volume	Density (pc/mi/ln)	LOS	PM Volume	Density (pc/mi/ln)	LOS
1	Vista off to On	Basic		11%	2	1234	9.9	A	1423	11.4	B	1763	14.1	B
2	Vista on to Sparks Off	Weave		11%	3		14.9	B		13.4	B		18.7	C
3	Sparks Off to Sparks On	Basic		11%	2	1969	15.8	B		136.3	B	2349	18.9	C
4	Sparks NB On Ramp	Basic		11%	3	2582	13.8	B	2256	12.1	B	3202	17.1	B
5	Spark SB On Ramp	Merge	1500	6%	3	2582	10.3	B	2256	8.3	A	3202	14.8	B
6	McCarran Off to NB On	Basic		6%	2	3163	26.8	D	2909	24.1	C	4184	42.9	E
7	McCarran NB On Ramp	Merge	1000	6%	2	3163	26.2	C	2909	23.7	C	4184	36.2	F
8	McCarran SB On to Pyramid Off	Weave	1050	6%	3		28.9	D		28.7	D		n/a	F
9	Pyramid Off to On	Basic		6%	2	3895	35.6	E	3615	31.5	D	5855	138.1	F
10	Rock Off Ramp	Diverge	350	5%	3	4603	29.8	D	4238	28.2	D	6453	41.1	F
11	Rock Off to On	Basic		5%	3	4348	23.1	C	3880	20.3	C	5854	35.5	E
12	4th Street Off Ramp	Diverge	900	4%	4	5234	19.4	B	4876	18.6	B	7151	27.2	C
13	4th Street to US395 Off	Diverge	850	4%	4	5057	25	C	4555	22.5	C	6967	34.5	D
14	US 395 to 4th Street	Basic		4%	2	1768	13.7	B	1863	14.4	B	4016	37	E
15	4th Street On	Merge	1100	4%	2		15.6	B		15.2	B		35.7	F
16	US 395 NB On Ramp	Merge		4%	4	4579	0.54	n/a	4689	0.55	n/a	7497	0.88	n/a
17	US395 SB On Ramp	Merge	805	6%	4	4579	22.7	C	4689	25.4	C	7497	33.5	F
18	Wells Off to On	Basic		5%	3	4607	24.9	C	4573	24.6	C	6674	46.2	F
19	Wells to Virginia	Weave	710	5%	4		29.8	D		n/a	F		n/a	F
20	Virginia Off to On	Basic		5%	3	4073	21.4	C	4376	23.3	C	5650	33.4	D
21	Virginia to Keystone	Weave	1500	5%	4		n/a	F		n/a	F		n/a	F
22	Keystone Off to On	Basic		5%	3	3095	16.1	B	3227	16.8	B	4102	21.6	C
23	Keystone On Ramp	Merge	520	5%	3		22.6	C		26.2	C		31.8	D
24	McCarran Off Ramp	Diverge	1200	8%	3	3584	20.1	C	4063	21.8	C	5057	28	F
25	McCarran Off to on	Basic		8%	3	2014	10.5	A	2706	14.1	B	3130	16.3	B
26	McCarran On Ramp	Merge	930	8%	3		14	B		18.4	B		18.4	B
27	Robb Off Ramp	Diverge	1500	8%	4	2438	9.9	A	3220	5.3	A	3368	2.7	A
28	Robb Off to Robb On	Basic		8%	3	1015	5.3	A	1427	7.4	A	1273	6.6	A

Table 6: Southbound Interstate 580/U. S. 395

No.	Segment Location	Segment Type	Segment Length	Truck %	Freeway Lanes	10%			2025			2035		
						PM Volume	Density (pc/mi/ln)	LOS	PM Volume	Density (pc/mi/ln)	LOS	PM Volume	Density (pc/mi/ln)	LOS
1	Stead Off Ramp	Diverge	600	4%	2	1598	14.4	B	1463	15.4	B	3311	31.3	D
2	Stead Off to On	Basic		4%	2	1531	11.9	B	1426	11.1	B	2812	22.2	C
3	Stead On Ramp	Merge	1500	4%	2		4.1	A		3.5	A		10.5	B
4	Stead to Lemmon	Basic		4%	2	2592	20.2	C	2528	19.7	C	3276	26.9	D
5	Lemmon Off Ramp	Diverge	350	4%	2		26.5	C		25.9	C		33.2	D
6	Lemmon Off to On	Basic		4%	2	2376	18.4	C	2319	18.0	B	3075	24.7	C
7	Lemmon On Ramp	Merge	850	4%	2		31.3	D		35.0	D		47.3	F
8	Lemmon to Golden Valley	Basic		4%	2	3576	30.5	D	4022	37.1	E	5452	86.6	F
9	Golden Valley Off Ramp	Diverge	300	4%	2		36.6	E		40.9	E		54.9	F
10	Golden Valley Off to On	Basic		4%	2	3318	27.3	D	3349	27.7	D	4547	48.0	F
11	Golden Valley to Virginia	Weave	2500	4%	3		32.5	D		41.6	E		N/A	F
12	Virginia Off to On	Basic		4%	2	3418	28.5	D	4212	40.6	E	6390	333.9	F
13	Virginia On Ramp	Merge	450	4%	2		35.0	E		42.7	F		64.0	F
14	Virginia to Parr	Basic		4%	2	3660	31.6	D	4524	47.5	F	6934	N/A	F
15	Parr Off Ramp	Diverge	500	4%	2		35.6	E		44.1	F		67.7	F
16	Parr Off to On	Basic		4%	2	3480	29.3	D	3549	30.1	D	4937	60.0	F
17	Parr On Ramp	Merge	400	4%	2		37.1	E		56.8	F		74.6	F
18	Pyramid On Ramp	Merge	450	4%	2					46.2	F		71.3	F
19	Pyramid to McCarran	Basic		4%	2				7334	58.3	F	10208	N/A	F
20	Parr to McCarran	Basic		4%	2	3866	34.6	D						
21	Sutro Off	Diverge	400	4%	2								77.4	F
22	McCarran Off Ramp	Diverge	400	4%	2		38.5	E		49.3	F	8343	59.1	F
23	McCarran Off to On	Basic		4%	2	3406	28.4	D	8068	N/A	F	8739	N/A	F
24	Clear Acre On Ramp	Merge	650	4%	2		38.8	F		72.1	F		78.2	F
25	Oddie Off Ramp	Diverge	400	4%	3	5608	34.0	D	8384	59.5	F	9527	70.7	F
26	Oddie Off to On	Basic		4%	3	5289	29.8	D	7731	69.1	F	8891	140.7	F
27	Oddie On Ramp	Merge	1500	4%	3		28.8	D		45.8	F		58.1	F
28	I-80 Off Ramp	Diverge	520	2%	3	5724	39.1	F	7987	54.6	F	9385	68.3	F
29	I-80 Off to On 2 Lane	Basic		2%	2	3143	25.1	C	5316	74.8	F	6552	465.4	F

Table 6: Southbound Interstate 580/U. S. 395 (Continued)

No.	Segment Location	Segment Type	Segment Length	Truck %	Freeway Lanes	10%			2025			2035			
						PM Volume	Density (pc/mi/ln)	LOS	PM Volume	Density (pc/mi/ln)	LOS	PM Volume	Density (pc/mi/ln)	LOS	
30	I-80 WB On Ramp	Merge		2%	3										
31	I-80 EB On Ramp	Merge		2%	4										
32	Glendale Off Ramp	Diverge	340	2%	4	7505	37.3	E	8882	44.4	F	10069	53.4	F	
33	Glendale Off to On	Basic		2%	4	6774	27.8	D	7920	35.4	E	8817	43.7	E	
34	Glendale to Mill	Weave	730	2%	5		35.3	E		44.6	E		N/A	F	
35	Mill Off to On 3 Lane	Basic		2%	3	5640	32.5	D	6700	45.0	F	7493	60.4	F	
36	Villanova Off Ramp	Diverge	350	2%	4	6085	32.0	D	7561	40.0	E	8914	46.0	F	
37	Villanova to Airport	Basic		2%	4	5197	20.1	C	6368	25.5	C	7678	33.6	D	
38	Airport Off Ramp	Diverge	250	2%	4		25.4	C		30.4	D		36.3	E	
39	Airport to Plumb	Basic		2%	4	4978	19.2	C	6155	24.4	C	7405	31.7	D	
40	Plumb On Ramp	Merge	550	2%	4		24.6	C		28.3	D		32.2	D	
41	Moana Off Ramp	Diverge	580	4%	3	5567	27.5	C	6686	36.9	E	7862	78.1	F	
42	Moana Off to On	Basic		4%	3	4494	23.9	C	5299	29.9	D	6062	37.4	E	
43	Moana On Ramp	Merge	630	4%	3		28.6	D		26.1	C		30.9	D	
44	Virginia 1 Off Ramp	Diverge	550	4%	3	4890	30.0	D	4414	26.8	C	5145	30.7	D	
45	Meadowood Off Ramp	Diverge	550	4%	3	4239	26.4	C	4326	26.8	C	4766	28.9	D	
46	Meadowood to Neil	Basic		4%	3	3878	20.2	C	3998	20.9	C	4439	23.6	C	
47	Neil Off Ramp	Diverge	300	4%	3					25.1	C		27.6	C	
48	Neil On Ramp	Merge	450	4%	3		34.5	D		41.1	E		46.4	F	
49	Neil to Virginia 2	Basic		4%	3	5261	29.8	D	5969	36.7	E	6709	46.7	F	
50	Virginia 2 Off Ramp	Diverge	1200	5%	3		26.1	C		29.2	D		35.9	F	
51	Virginia 2 Off to On	Basic		5%	3	4484	25.8	C	5088	28.4	D	5716	34.0	D	
52	Virginia 2 to Meadows	Weave	1650	5%	4		29.4	D		34.7	D		n/a	F	
53	Meadows Off to On	Basic		5%	3	3896	20.4	C	3572	18.6	C	3661	19.1	C	
54	Damonte Off to On	Basic		5%	3	2935	15.2	B	2912	15.1	B	3738	19.5	C	
55	Virginia 3 NB Off Ramp	Diverge	600	5%	4		12.9	B		17.0	B		22.7	C	
56	Virginia 2 SB Off Ramp	Diverge	1500	5%	3	3203	14.2	B	4150	18.8	B	4474	20.4	C	
57	After Virginia 3	Basic		5%	3	2078	10.8	A	3128	16.2	B	3430	17.8	B	

Table 7: Northbound Interstate 580/U. S. 395

No.	Segment Location	Segment Type	Segment Length	Truck %	Freeway Lanes	10%			2025			2035		
						PM Volume	Density (pc/mi/ln)	LOS	PM Volume	Density (pc/mi/ln)	LOS	PM Volume	Density (pc/mi/ln)	LOS
1	Before Virginia 3	Basic		5%	2	2472	19.3	C	3405	28.6	D	3247	26.7	D
2	Virginia 3 to Damonte	Weave	1750	5%	4		17.2	B			C		28.5	D
3	Damonte Off to On	Basic		5%	3	2914	15.1	B	3473	18.0	C	4181	22.1	C
4	Damonte On Ramp	Basic		5%	4	4086	15.9	B	5064	19.8	C	6438	26.4	D
5	Meadows Off Ramp	Diverge	1500	5%	4		9.9	A		14.4	B		21.5	C
6	Meadows Off to On	Basic		5%	3	3770	19.7	C	4697	25.5	C	5851	35.4	E
7	Meadows to Virginia 2	Weave	2250	5%	4		29.8	D		37.4	E		43.9	E
8	Virginia 2 Off to NB On	Basic		5%	3	4678	25.3	C	5712	34.0	D	6418	42.3	E
9	Virginia 2 NB On Ramp	Basic		5%	4	5060	19.8	C	6059	24.4	C	6770	28.3	D
10	Virginia 2 SB On Ramp	Merge	550	5%	4		23.3	C		28.6	D		32.4	D
11	Virginia 2 to Neil 3 Lane	Basic		5%	3	5454	31.5	D	6666	46.0	F	7531	64.3	F
12	Neil Off Ramp	Diverge	650	5%	3		32.6	D		40.5	F		48.9	F
13	Neil Off to On	Basic		5%	3	4327	23.0	C	4937	27.2	D	5532	32.2	D
14	Neil On Ramp	Merge	950	5%	3					39.2	E		43.3	F
15	Neil to Meadowood	Basic		4%	3				6201	39.5	E	6914	50.3	F
16	Meadowood On Ramp	Merge	550	4%	3		29.5	D		32.3	D		47.9	F
17	Meadowood to Virginia 1	Basic		4%	3	4907	26.8	D	6728	46.5	F	7616	65.7	F
18	Virginia 1 On Ramp	Merge	700	4%	3		37.4	E		44.1	F		53.4	F
19	Virginia 1 to Moana	Basic		4%	3	6158	38.6	E	7277	57.0	F	8343	95.3	F
20	Moana Off Ramp	Diverge	500	4%	3		36.8	F		47.8	F		58.2	F
21	Moana Off to On	Basic		4%	3	5904	35.7	E	6561	43.9	E	7412	60.2	F
22	Moana to Plumb	Weave	1000	4%	5		n/a	F		n/a	F		n/a	F
23	Plumb to Airport	Basic		2%	4	6201	25.0	C	8657	42.9	E	9695	56.8	F
24	Airport On Ramp	Merge	400	2%	4		34.1	F		31.4	D		37.7	F
25	Airport to Villanova	Basic		2%	4	6305	25.2	C	8753	43.0	E	9791	56.8	F
26	Mill Off Ramp	Diverge	1300	2%	6	7453	16.9	B	10231	26.9	C		28.3	D
27	Mill Off to On	Basic		2%	6	6891	17.6	B	9278	24.6	C	11052	31.4	D
28	Mill to Glendale	Weave	1400	2%	7		31.1	D		n/a	F		n/a	F
29	Glendale Off to On	Basic		2%	6	7369	18.9	C	9466	25.2	C	10856	30.6	D

Table 7: Northbound Interstate 580/U. S. 395 (Continued)

No.	Segment Location	Segment Type	Segment Length	Truck %	Freeway Lanes	10%			2025			2035		
						PM Volume	Density (pc/mi/ln)	LOS	PM Volume	Density (pc/mi/ln)	LOS	PM Volume	Density (pc/mi/ln)	LOS
30	Glendale On Ramp	Merge	1500	2%	7		14.6	B		18.3	B		21.0	C
31	I-80 EB Off Ramp	Diverge		2%	6									
32	I-80 WB Off Ramp	Diverge		2%	4									
33	I-80 Off to EB On	Basic		2%	3	3155	16.6	B	5421	30.5	D	6578	43.2	E
34	I-80 EB On Ramp	Merge	500	2%	3		28.7	D		37.9	F		47.8	F
35	I-80 WB to Oddie	Weave	950	4%	4	4371	38.9	E	6329	n/a	F	7661	n/a	F
36	Oddie Off to On	Basic		4%	3	5031	27.8	D	6542	43.6	E	8775	128.0	F
37	Oddie On Ramp	Merge	650	4%	3		32.2	D		47.3	F		60.1	F
38	McCarran Off Ramp	Diverge	550	4%	3	5544	33.8	D	7639	50.5	F	9039	64.2	F
39	Clear Acre Off Ramp	Diverge	450	4%	3	4362	29.2	D	6000	36.5	F	6443	39.8	F
40	Clear off to McCarran On	Basic		4%	3	3304	17.1	B	4852	26.4	D	5080	28.1	D
41	McCarran On Ramp	Merge	1500	4%	3		19.0	B		35.1	F		39.2	F
42	McCarran On to Clear Acre On	Basic		4%	3	3881	20.2	C	6350	41.0	E	6917	49.7	F
43	Clear Acre On Ramp	Merge	1500	4%	3		18.7	B		47.7	F		60.8	F
44	Clear Acre to Pyramid	Basic		4%	3				8341	95.2	F	9874	745.7	F
45	Pyramid Off Ramp	Diverge	500	4%	3					11.7	F		64.7	F
46	Pyramid to Parr	Basic		4%	3				5867	41.0	E	7905	75.1	F
47	Clear Acre to Parr	Basic		4%	3	4042	21.1	C						
48	Parr Off Ramp	Diverge	420	4%	3		26.9	C		35.9	E		54.3	F
49	Parr Off to On	Basic		4%	3	3459	17.9	B	4855	26.4	D	5913	35.8	E
50	Parr On Ramp	Merge	460	4%	3		22.7	C		39.2	E		52.0	F
51	Parr to Virginia	Basic		4%	3	3711	19.2	C	6209	39.2	E	8105	83.3	F
52	Virginia Off Ramp	Diverge	340	4%	3		25.3	C		38.5	F		57.0	F
53	Virginia Off to On	Basic		4%	3	3441	17.8	B	5843	35.0	E	7630	66.1	F
54	Virginia to Golden Valley	Weave	1400	4%	4		24.5	C		n/a	F		n/a	F
55	Golden Off to On 2 Lane	Basic		4%	2	3200	26.0	D	4970	61.2	F	6492	472.3	F
56	Golden Valley On Ramp	Merge	640	4%	2		32.6	D		48.7	F		61.1	F

Table 7: Northbound Interstate 580/U. S. 395 (Continued)

No.	Segment Location	Segment Type	Segment Length	Truck %	Freeway Lanes	10%			2025			2035		
						PM Volume	Density (pc/mi/ln)	LOS	PM Volume	Density (pc/mi/ln)	LOS	PM Volume	Density (pc/mi/ln)	LOS
57	Golden Valley to Lemmon	Basic		4%	2	3540	30.0	D	5365	80.8	F	6760	n/a	F
58	Lemmon Off Ramp	Diverge	460	4%	2		34.6	D		52.4	F		66.0	F
59	Lemmon Off to On	Basic		4%	2	2299	17.8	B	3478	29.2	D	4459	45.8	F
60	Lemmon On Ramp	Merge	550	4%	2		25.3	C		35.8	E		44.9	F
61	Lemmon to Stead	Basic		4%	2	2658	20.8	C	3846	34.3	D	4876	57.8	F
62	Stead Off Ramp	Diverge	1300	4%	3		18.5	B		30.0	D		40.1	F
63	Stead Off to On	Basic		4%	2	1615	12.5	B	2741	21.5	C	3944	35.8	E
64	Stead On Ramp	Merge	650	4%	2		16.7	B		26.4	C		39.0	F
65	After Stead	Basic		4%	2	1734	13.4	B	2828	22.3	C	4277	41.9	E

4. Recommended Strategies to Meet Future Needs

This concluding chapter details the implications of this planning study for transitioning into program and project development. Recommended potential improvements represent the outcome of planning level analysis of planning level data. Further, this analysis draws on the coordination between agencies and stakeholders that ensure the work done to this point supports further efforts

Planning and Environmental Linkages (PEL) is a coordinated approach between transportation planning and the environmental review process. The PEL approach concerns not only the improved linkage of these two somewhat independent processes, but also the systematic integration of environmental review elements into planning. The overarching goals of PEL include creating a seamless decision-making process that minimizes duplication of effort, promoting long-term environmental stewardship, and reducing cost and delay from planning through project delivery. The PEL approach is intended to establish coordination early - starting with transportation problem identification in planning and continuing through the rest of the project delivery process in such a way that environmental, community, and economic issues and concerns are appropriately considered and addressed. PEL lays the foundation for a broad consensus on goals and priorities when developing solutions for the complex issues surrounding the management and construction of the transportation system.

while meeting the requirements of the National Environmental Policy Act.

4.1 Summary of Findings and Recommendations

The most significant finding in this update is that as a result of significant investment in infrastructure and operational improvements, the Washoe Freeway corridor system is operating much better than it was when the 2002 study was completed. These improvements included ITS deployment in the form of ramp metering and use of Dynamic Message Signs to inform the motoring public. The construction of additional lanes on I-80 as part of a design build project and on I-580 northbound between Moana and I-80 have significantly improved travel times in the most heavily congested segments. Additionally, a new Interchange configuration at Moana lane and a new Interchange at Meadowood Mall have improved freeway operations near those locations.

The short term solutions recommended in this report address the most significant areas of current congestion, they do not contaminate any potential future footprint, they are included in the recently adopted 2035 Regional Transportation Plan, and they ought to be advanced at the earliest opportunity.

Although total VMT has decreased on the system since 2002 that trend is expected to reverse and increased traffic is anticipated both in the near term and the long term. However, considering the travel demand model is predicting traffic growth in future years that is not consistent with what might be expected based on historical trends, it is highly recommended the new household survey programed in the Washoe RTC UPWP be completed at the earliest opportunity and the land use in the TRIC be update to include trip generations associated with the new Tesla plant.

It is clear that regardless of the origination of other travel demand, the completion of the pyramid connector will place additional burden on the US 395 corridor and that location specific congestion mitigation strategies need to be developed before that event occurs. The best way to evaluate all potential solutions is in the context of an environmental study that ought to be initiated as soon as practicable.

4.2 Early Action Plan

The analysis of existing conditions revealed a need for improvements that could be implemented in the next five years for a reasonable cost, that require no additional right-of-way, and that have little or no environmental impact. The most significant improvement of this nature is detailed later in this section under the title Southbound US 395 restoration of through lanes north of I80.

For other recommended congestion mitigation strategies that will address current and future traffic congestion in the Spaghetti Bowl Interchange area and that will potentially have a more significant environmental impact it is recommended that the appropriate agencies begin the Environmental Process as soon as practicable and to ensure these projects are implemented by the target year(s) it will be necessary to begin the environmental review process within the next two years.

4.3 Early Action Plan – Short Term Concepts

A principle aim of this study was to identify strategies that support immediate action while ensuring the equally important strategies for longer-term actions are supported. The following

discussion details three potential early actions for translating planning analysis into programmatic project development.

4.3.1 Southbound US 395 North of I-80: Restoration of Historic Through Lanes

The southbound US 395 general purpose lanes are reduced from 3 to 2 lanes within the I-80 Interchange, which contributes to the morning peak hour congestion north of the I-80 Interchange. The third general purpose lane is re-established with the westbound I-80 entrance ramp, but it is heavily used for weaving and speed change between I-80 and Mill Street and isn't fully restored until just south of the Mill Street off-ramp. The fourth auxiliary lane developed with the eastbound I-80 entrance ramp contributes to the friction that exists between I-80 and Mill Street due to a gap or discontinuity in this lane within the Mill Street Interchange. Field observations have noted vehicles slowing in the fourth auxiliary lane and prematurely weaving into the third lane within this segment of the corridor. This adversely impacts safety and the flow of traffic on both southbound I-580 and eastbound I-80. Adding to these operational issues is the short weave located between the Glendale Avenue on-ramp and Mill Street off-ramp followed immediately by the fourth auxiliary lane drop beyond the Mill Street exit. Additionally, the non-standard taper type Plumb Lane on-ramp merges abruptly with the steady stream of traffic in the fourth auxiliary lane before the lane is dropped shortly after the merge at the Moana Lane off-ramp. All of these factors adversely impact this heavily congested segment of the corridor and contribute to the delays that affect both I-580 and I-80 traffic and results in a higher accident rate.

Four alternatives that would reduce the impacts of these concerns were developed in an NDOT scoping report (Atkins, September 2012). The purpose of the proposed alternatives is to alleviate congestion and improve safety and mobility on the southbound segment of US 395 within the I-80 interchange influence area from Clear Acre to Moana Lane. The original number three I-580 southbound general purpose lane needs to be restored from the I-580 southbound exit to I-80 to the Mill Street interchange, and operational improvements are needed to accommodate numerous weaving movements between five closely spaced interchanges. Auxiliary lanes along this freeway section were identified as immediate priorities in the Washoe County Freeway Corridor

Study of 2002. The NDOT Road Safety Reassessment Report of 2010 identified the I-80 eastbound to US 395 southbound entrance movement through the Glendale Avenue interchange to the Mill Street interchange as having existing road safety issues and an immediate priority for mitigation.

These alternatives are contained within the existing right of way and are believed to be within the guidelines for categorical exclusions. One of the alternatives originally developed by Atkins and presented in the scoping report for the I-580 rehabilitation was submitted to NDOT as part of the base project scope. This alternative addresses the auxiliary lane gap through the Mill Street interchange and only requires a modification to the existing striping with short extensions of the existing upstream lane and shoulder width design exceptions. The other three alternatives were presented as additional scope elements requiring more funding than was available for the pavement rehabilitation project and are being presented here as a practical solution that conform with the description to improve this portion of the freeway system contained in the FY 2018-2022 time frame of the 2035 RTP:

These alternatives are contained within the existing right of way and are believed to be within the guidelines for categorical exclusions. Three alternatives are presented as potential solutions.

Alternative 1 restores the third lane through the I-80 interchange to provide continuity in the general purpose lanes through the project limits and restores the 12' lane widths. It also moves the short weave and associated friction from the freeway to an adjacent frontage road between Glendale Avenue and Mill Street within NDOT right of way, increases the available weave distance and provides a slip ramp from the freeway to the frontage road for the southbound Mill Street exit. The immediate merge following the short weave between Glendale Avenue and Mill Street due to the auxiliary lane discontinuity/gap within the Mill Street interchange is mitigated by a combination of the frontage road operational improvements and the southern terminus of the auxiliary lanes that are developed with the restoration of the third lane through the I-80 interchange.

Alternative 2 is a variation to Alternative 1 that only addresses the short weave between Glendale Avenue and Mill Street and the auxiliary lane discontinuity/gap within the Mill Street

interchange. This is accomplished by providing the same operational improvements mentioned in Alternative 1, with the exception of those associated with the restoration of the third lane through the I-80 interchange. If this variation is implemented, it is recommended that improvements between Glendale Avenue and Villanova Drive be designed to accommodate the full 5 lane configuration in the future. This lane configuration is compatible with the Washoe RTC Regional Transportation Plan northbound and southbound 10 lane segment and could be designed to accommodate future Alternative 1 improvements to restore the third lane through the I-80 interchange.

Alternative 3 eliminates the non-standard taper type merge from the Plumb Lane on-ramp to I-580 by providing a dedicated auxiliary lane between the southbound Plumb Lane on-ramp and the southbound Moana Lane off-ramp and extending the existing auxiliary lane beyond the Moana Lane interchange with a southern terminus at the new southbound Meadowood Mall Way off-ramp. The extension of the southbound auxiliary lane from Moana Lane to Meadowood Mall Way is mirrored in the northbound direction providing an auxiliary lane between the new northbound on-ramp from Meadowood Mall Way to the northbound off-ramp at Moana Way. The extension to the Meadowood Mall Way on and off-ramps from Moana Lane can be accomplished within the existing freeway pavement footprint with 12' lanes and shoulder width and horizontal stopping sight distance design exceptions.

The proposed I-580 improvements are not expected to substantially impact cultural resources, hazardous materials sites, or natural resources based on initial inspection. However, the proposed alternative improvements to address the operational and safety issues southbound from the I-80 interchange will be subject to compliance with the National Environmental Policy Act (NEPA) of 1969 (42 USC 4321, et seq.). The following mitigation measures are recommended to further reduce potential effects of the project:

- Consult with FHWA early to receive concurrence on the categorical exception classification.
- Conduct cultural resource surveys and consult with the State Historic Preservation Office and the Reno-Sparks Indian Colony.
- Stake cultural sites for avoidance during construction.

- Contact the EPA/NDEP to assess the current status of hazardous material sites and determine whether additional site investigation is warranted prior to beginning work.
- Conduct jurisdiction delineation of the Truckee River and submit to the U.S. Army Corps of Engineers for concurrence.
- Consult with the U.S. Army Corps of Engineers on the type of Clean Water Act permit required for the selected alternative. Other agencies may have permitting authority as well, depending on the selected alternative.
- Use best management practices to minimize and avoid adverse impacts on water quality
- Conduct informal consultation with the U.S. Fish and Wildlife Service under Section 7 of the Endangered Species Act.
- Consider measures to control dust and incorporate into the final design and construction specifications.
- Conduct a noise analysis as required by 23CFR772 for all Federal or Federal-aid Highway projects.
- Remove all construction materials used for this project as soon as work schedules permit.

Costs for the alternatives are broken out as follows:

- Alternative 1 – I-80 to Airport Exit operational improvements: \$60,250,000
- Alternative 2 – Glendale Avenue to Villanova Drive operational improvements: \$26,960,000
- Alternative 3 – Plumb Lane to Meadowood Mall Way operational and safety improvements: \$6,980,000

The cost for the alternatives includes the construction cost and allowances for erosion, traffic control, mobilization, time-related overhead, engineering and contingencies. An escalation to the year 2014 has been added to all Cost Wizard estimates. Adding either design alternative 1 or 2 will have a much larger impact on the schedule. Both of these alternatives will require additional design time due to the amount of widening and structural work. These will also require much more environmental coordination with FHWA and other regulatory agencies. These additions have the potential of adding up to a year in design and extending the construction into a third or fourth construction season. This could result in construction not beginning until the 2015

construction season and possibly finishing in 2019, although alternative project delivery methods or contract incentives could expedite the schedule.

4.3.2 Southbound US 395 Queuing Issue at Clear Acre/McCarran

Current physical and operational conditions produce reoccurring queuing and congestion at Clear Acre and McCarran going southbound. Recommended early actions to address these conditions at Clear Acre and McCarran to the Spaghetti Bowl on US395 southbound include the following alternatives.

Alternative 1-To remove the slope paving at the McCarran structure southbound to the abutment and tieback with soil nails to accommodate a new structural section to be determined by the Materials Division, but for estimating purposes we will be using 16” of Type Class B Aggregate Base, and 11” of PCCP. The lane will be 12’ wide with an additional 10’ shoulder that will be approximately 1500’ in length that will tie into the on ramp of the McCarran southbound on-ramp. This alternative will allow three lanes of traffic to flow smoothly from the north valleys to Oddie Boulevard pushing the queuing and weaving point to the Oddie Interchange southbound off-ramp.

Alternative 2- To modify the striping and request a Design exception for reduced shoulder widths on the inside shoulder and outside shoulder to accommodate 3 (three) full lanes of traffic plus the merge traffic from the Oddie Boulevard southbound on-ramp traffic that will carry this traffic through the “Pinch Point” on the 9th Street & I-80 west off-ramp Grade Separation.

4.3 Funding Plan

The recommended freeway improvements are already included within the 2035 Regional Transportation Plan (RTP), adopted by the Regional Transportation Commission (RTC) on April 19, 2013. The RTP includes a funding plan and phasing priorities for street and highway improvements within Washoe County. The Phasing Plan identifies \$ 177,700,000 for implementing -improvements to I-80 and US-395/I-580 during the FY 2018-2022 timeframe. This funding would be sufficient to implement the project identified as Southbound US 395

restoration of through lanes north of I80 and the other operational improvements suggested as well.

The 2035 RTP additionally identifies \$ 1,724,900,000 for funding improvements to I-80 and US-395/I-580 during the FY 2023-2035 timeframe. This commitment will finance the projects listed in the 2035 RTP for this time frame.

The 2035 RTP funding plan also identified additional I-80 and US-395/I-580 improvements during the FY 2023-2035 timeframe that indicates a shortfall of \$ 2,436,500,000 required for these unmet needs that will need to be addressed in future updates to the RTP.

4.4 Project Delivery

The Washoe County Freeway Corridor Study is a planning-level analysis that identifies freeway improvements needed within the Reno/Sparks metropolitan area in order to mitigate existing congestion and to address future congestion as traffic volumes increase. Projects identified by the study must now be moved forward at the discretion of the responsible agencies.

In many cases projects identified as being high-priority for near-term implementation will require additional definition, programming of funds within the Transportation Improvement

Program, design, study of environmental impacts, right-of-way acquisition if required, and construction. This project delivery process typically takes four to ten years to accomplish, depending on the complexity of the project, right-of-way

Linking planning and NEPA can be generally defined as a partial assimilation of systems and facility planning with project-level decisions that are subject to NEPA. In this context, the planning process is called upon to strategically assess the presence of sensitive natural and human resources as well as the potential impacts to such resources. At the same time, planning is infused with NEPA-like elements and processes (such as the development of a Public Involvement Plan, Problem Statement, etc.), thus potentially laying some of the groundwork for NEPA decision-making. Ideally, planning processes and decisions are based upon an adequate amount of rigor, documentation, and coordination with resource agencies and potential lead Federal agencies to minimize repetition during the subsequent NEPA process.

requirement, and environmental review. Given the relatively long lead time required for project delivery, the project development effort initiated by this study needs to be continuously carried forward to meet the mobility needs of Washoe County residents.

4.5 Conclusions

This reevaluation of the 2002 Washoe Freeway Corridor Study in light of current conditions has produced invaluable insights. The following discussion highlights the conclusions and insights gained from this update to the 2002 Washoe County Freeway Study.

- Near term traffic growth is not expected to significantly exacerbate current congestion, but existing congestion does justify moving forward with the project identified in the 2018-22 time frame of the 2035 RTP (i.e. replacing the southbound lane on US 395 north of I-80).
- The short term concepts delineated in this report are consistent with the existing 2035 RTP. Implementation of both of them at the earliest opportunity will yield immediate benefits by reducing existing congestion and improving travel times.
- Any future system wide evaluations should focus on existing and potential future congestion and other operational deficiencies while employing PEL principles. This approach should avoid recommending solutions that may impede future environmental evaluations.
- Infrastructure improvements, operational improvements, and other alternatives that would trigger a more in depth environmental evaluation should be presented in future system wide evaluations, but care must be taken in how those potentialities are identified and communicated.
- A comprehensive PEL strategy should be developed. This approach will identify potential solutions intended to mitigate future congestion associated with travel volumes while accounting for underlying growth and land use assumptions in the travel demand model. A PEL approach will ensure this initiative will account for and document all the elements potentially needed for transitioning from planning to project development and potential environmental processes. The minimum limits of such a study should be the Virginia Street Interchange to the west, the Rock Blvd Interchange to the east, The McCarran/Clear Acre Interchange to the north, and the Mill Street interchange to the south.
- Any future environmental study in the proximity to the I-80/US 395 system to system Interchange should consider the environmental justice issues associated with potential operational improvement benefits derived from ramp closures at nearby service Interchanges.
- Considering the significant change in social and economic dynamics experienced over the last decade, the new household survey should be completed at the earliest opportunity available. Projections from models utilizing previous household survey data In

comparison to observed travel dynamics over the last decade are not reasonably comparable.

- Construction of the Pyramid Connector will place additional burden on the US 395 corridor contributing to location specific congestion. Mitigation strategies need to be developed before this connection is made. The best way to evaluate all potential solutions is a PEL planning process with detailed documentation leading to project development and an environmental study. This should be initiated as soon as practicable.

Memo

To:	Randy Travis, NDOT Traffic Information Chief		
From:	Jim Dodson, P.E. Vice President	Email:	Jim.Dodson@atkinsglobal.com
Phone:	775-828-1622	Date:	May 5, 2014
Ref:	Project #100028030	cc:	Coy Peacock, NDOT I80 Project Mngr.
Subject:	I-80 CSMP traffic forecasting methodology memorandum		

This traffic forecasting methodology memorandum is submitted for your review and approval in accordance with NDOT TP 1-11-3 dated June 2013, and the NDOT Traffic Forecasting guidelines dated May 2012.

Background: In April 2012 NDOT contracted with Atkins, North America to develop an I-80 Corridor System Master Plan (I-80 CSMP) as part of a multi-state corridor study. Included in the scope of work was a specific task that called for an evaluation of the recommendations made in the "2002 Washoe Freeway Corridor study" in light of changes in physical, operational, and regulatory frameworks that have occurred since that study was conducted. A subsequent amendment to the original scope of work for the I-80 CSMP also requires an additional planning-level assessment of the portion of the Washoe Freeway system on US 395 north of I-80 in light of the implications associated with the construction of the Pyramid connector that was not part of the original 2002 study. This memorandum explains Atkins' proposed approach to developing the travel forecasts to be used in our planning evaluation of the 2002 operational study recommendations. Additionally these forecasts will be used to identify potential impacts associated with the opening of the pyramid connector. We acknowledge the NDOT guide to travel forecasting recommends development of design hourly volumes (DHV). However, the 2002 study we are evaluating used a.m. and p.m. peak hours for analysis purposes. Our new traffic forecasts will also use these traffic values rather than DHV in recognition that the development of DHV does not have utility in our analysis.

Planning and Environmental Linkages (PEL):

The guiding framework for transportation planning continues to undergo a substantial evolution since the Linking Planning and NEPA initiative established with SAFETEA-LU in 2005. As the environmental streamlining initiative continued to be implemented at the federal, state, and local level, the PEL program was established. PEL continues to improve the timely delivery of transportation initiatives by making explicit the relationships and practices of transportation planning and NEPA assessment/evaluation in project development. Many of these emerging relationships and practices have important implications for the work suggested in this I-80 CSMP traffic forecasting methodology memorandum and beyond. There is a likelihood that initiatives identified with this planning effort will utilize federal funding resources and be involved in an environmental review with potential NEPA implications. Therefore, Atkins suggests this forecasting work be undertaken with attention to PEL requirements.

Data Sources:

- 2002 Washoe Freeway Corridor Study final report
- RCG Economics "I80 Corridor System Master Plan" economics analysis dated February 2013
- 2013 (or most recent prior year if 2013 unavailable) NDOT ATR's In Washoe County Urban
- 2013 (or most recent prior year if 2013 unavailable) NDOT short term count locations on I-80, I-580, and US 395 within the project limits
- 2013 (or most recent prior year if 2013 unavailable) NDOT vehicle classification data for Washoe urban locations
- 2014 Washoe Regional Travel Demand model
- Most recent Highway Capacity Manual urban truck characteristics assumptions



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Other information applying to all scenarios:

Project limits: I-80 from the east Verdi Interchange to the Vista Interchange and I-580/US395 from the Mt. Rose highway Interchange to the Cold Springs Interchange

Forecast years:

- Opening year: There is no “opening year” because we are not identifying or recommending infrastructure improvements. Instead we will be evaluating the need for previously identified capacity improvement projects from the 2002 operational study based on forecasted travel in 2025 and 2035. Any additional detailed capacity analysis needs identified in the task evaluating the impacts of the Pyramid Connector will be based on traffic volumes associated with that eventuality regardless of the construction year and so an opening year is not relevant for that evaluation either.
- Base year: 2010 is the base year in the travel demand model, but it will be adjusted to 2013 as described in methodology for the scenarios where the travel demand model is used. Year 2013 is the base year for all three forecast scenarios.
- Horizon years: 2025 and 2035 are the horizon years in the travel demand model and will be the horizon years in the forecast scenarios.

New count data to be collected: None

Forecast scenario #1 – Historical growth 2025:

The following assumptions are used in this scenario:

- The economy will recover and grow slowly in the next 12 years based on the economic analysis conducted for the Reno metropolitan area and depicted in the RCG report listed in data sources.
- The population will increase in the “Reno area” at a rate consistent with the economic analysis conducted for this study and depicted on page 4-13 of the RCG report listed in data sources.
- New industry will be attracted and developed in accordance with the land use analyses conducted by Truckee Meadows Regional Planning Association in 2013/2014.
- Between 2013 and 2025 traffic will increase on the existing Washoe Freeway system at approximately half the “average” 30 year population growth rate.
- Empirical evidence shows traffic decreased on the Washoe freeway system between 2000 and 2013 despite an increase in population. However, it is assumed that lack of growth in traffic during this period can be attributed to a severe downturn in the economy in addition to changes in demographics that influenced driver behavior. The assumption that traffic will now grow in a manner that indirectly correlates to new population growth is predicated on the assumption that new demographic driver behaviour is stabilizing and new economic growth will begin to align with the new population growth resulting in additional work trips to/from newly developed industrial land accessed by the freeway system.
- The 10 % total growth estimate between 2013 and 2025 for this scenario is based on approximately half the “average” 30 year population growth rate from the RCG report. Average for 30 years is calculated as $(2.0+1.7+1.4)/3=1.7$; this value was then divided by 2 assuming traffic on the freeway will grow at 1/2 the population growth rate = .85 per year; and $.85 \times 12$ (12 is the number of years between end of 2013 and end of 2025) is approximately equal to 10 %.
- Because we are using the “highest observed hourly volumes” regardless of day of week or month of year we will use the ATR data to verify the observed volumes reasonably reflect highest day of week and month of year. Consequently, the “balanced 2013 freeway volumes for both a.m. and p.m. peak hours” do not require adjustment for day of week or month of year.



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Methodology for this scenario:

- Populate spreadsheets with “highest observed” 2013 a.m. and p.m. peak hour volumes from NDOT count stations. Where 2013 values are not available the most recent previous year will be used as best available and in consideration of the minimal changes in volumes in the corridors in the past 5 years.
- Using ATR data as control points and giving primary consideration to mainline volumes “balance” the 2013 volumes by adjusting ramp volumes to create the “balanced 2013 freeway volumes for both a.m. and p.m. peak hours”.
- Increase the “balanced 2013 freeway volumes for both a.m. and p.m. peak hours” by 10% to create the “balanced 2025 freeway volumes for both a.m. and p.m. peak hours”. The use of a 10 % increase over 2103 volumes to derive 2025 estimates for this scenario was agreed to by NDOT and Washoe RTC representatives at a June 2013 meeting at NDOT.

Intended uses of data from this scenario:

- Evaluate recommended freeway improvements presented in the 2035 Washoe RTP for time periods 2013-2017 and 2018- 2022 to determine if they are required at the forecasted traffic volumes.
- Provide guidance to the NDOT scoping team and NDOT Project Management Division by identifying areas of current and near term capacity issues that may require further detailed operational analysis.
- Evaluate recommended freeway improvements presented in the operational 2002 Washoe Freeway corridor study to determine if they are required at these volumes.

Forecast scenario #2 – Adjusted Travel demand model 2025:

The following assumptions are used in this scenario:

- The network in the Washoe Regional travel demand model for 2025 includes the Pyramid Connector and Southeast Connector as open to traffic.

Methodology for this scenario:

- Calculate the model growth rate between 2010 and 2025.
- Using the calculated average annual growth rate between 2010 and 2025 from the model, increase the 2010 a.m. and p.m. model hourly volumes to create 2013 a.m. and p.m. model hourly volumes.
- Compare the 2013 model volumes to the “balanced 2013 freeway volumes for both a.m. and p.m. peak hours” as calculated in forecast scenario 1 and determine the absolute difference.
- Adjust the 2025 model output using the absolute difference derived from comparison of 2013 ground counts to 2013 model volumes.
- Giving primary consideration to mainline volumes “balance” the 2025 volumes by adjusting ramp volumes to create the “adjusted and balanced 2025 freeway volumes for both a.m. and p.m. peak hours”.

Intended uses of data from this scenario:

- Evaluate recommended freeway improvements presented in the 2035 Washoe RTP for time periods 2013-2017 and 2018- 2022 to determine if they are required at the forecasted traffic volumes.
- Evaluate recommended freeway improvements presented in the operational 2002 Washoe Freeway corridor study to determine if they are required at these volumes.



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Forecast scenario #3 – Adjusted Travel demand model 2035:

The following assumptions are used in this scenario:

- The network in the Washoe Regional travel demand model for 2035 includes the Pyramid Connector and Southeast Connector as open to traffic.

Methodology for this scenario:

- Calculate the model growth rate between 2025 and 2035.
- Using the calculated average annual growth rate between 2025 and 2035 from the model, increase the “adjusted and balanced 2025 freeway volumes for both a.m. and p.m. peak hours” from scenario 2 to create adjusted 2035 freeway volumes for both a.m. and p.m. peak hours”.
- Giving primary consideration to mainline volumes “balance” the 2035 volumes by adjusting ramp volumes to create the “adjusted and balanced 2035 freeway volumes for both a.m. and p.m. peak hours”.

Intended uses of data from this scenario:

- Evaluate recommended freeway improvements presented in the 2035 Washoe RTP for time periods 2013-2017, 2018- 2022, and 2023-2035 to determine if they are required at the forecasted traffic volumes.
- Evaluate recommended freeway improvements presented in the 2002 Washoe Freeway corridor study to determine if they are required at these volumes.
- Identify areas of congestion that may not have been identified in the 2002 study and that may exist in consideration of additional traffic in the corridor between I-80 and Parr Blvd upon the completion and opening of the Pyramid Connector.
- Identify congestion mitigation strategies not previously discussed in the 2002 study in the context of the evolution in environmental guidance not previously available.



Memo

To:	Coy Peacock, NDOT Planning		
From:	Jim Dodson, Vice President	Email:	Jim.Dodson@atkinsglobal.com
Phone:	775-828-1622	Date:	11/14/14
Ref:	100028030	cc:	Emily Kubovchik
Subject:	2002 Washoe Freeway Corridor Study Update		

The following replies have been prepared in response to comments received from NDOT partner agency staff who reviewed the draft report titled "2002 Washoe Freeway Corridor study update."

Comment

(1) Recommend Section 3.1 Washoe Economic Analysis include anticipated impacts of known and future Tahoe-Reno Industrial Center employment/freight generators.

Response

The economic study already does address the traffic generation impacts of the known TRIC employment and freight generators in general terms. Further, these impacts were considered both in the historical growth scenario and the travel forecasting that used the travel demand model. Because the economic study was completed well before the TESLA announcement that particular development was not addressed specifically. However, development of that nature was considered and discussed generally.

Comment

(2) Table 1, Pg 17: Pyramid Hwy/Sun Valley/US 395 Connector Ph 2 - 6 lane facility? Just 2x checking.

Response

The depiction of this information was taken directly from the approved Washoe 2035 RTP.

Comment

(3) Figure 12, Pg 18: Hasn't the WB Sparks to McCarran improvement already occurred? I believe the crack and seat addressed this improvement. Sparks EB is a triple left with the #3 lanes being a shared left thru and right. Maybe a paragraph or two of what recommended segments have been completed from the 202 Washoe Freeway Corridor Study.

Response

Figure 12 is from the 2002 study and is intended to offer a frame of reference for improvements recommended in that work. Many of those improvements have indeed been constructed and the new lane configurations were accounted for in the current and future congestion



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assessments. New graphics depicting the changes since 2002 were added to the report.

Comment

(4) Figure 14, Page 20: I find it interesting that there are no interchange recommendations. Vista EB is close to capacity, although the LOS report doesn't reflect this. Sparks Blvd EB is a triple left with the #3 lane being a shared left thru and right. Without improvements to the Spaghetti Bowl I suspect the SEC will become a popular alternate route.

Response

The information in Figure 14 is from the Washoe 2035 RTP and reflects the contents of that document. No interchange improvements are depicted in the areas mentioned because the need for them was not identified in the 2035 RTP. The scope of work for the operational component of the I-80 part of the freeway system was to review the 2002 study to determine if the travel forecasts and remedial actions identified in that study were valid in light of changing conditions since that time. The study team was not directed to identify new congestion mitigation strategies beyond that scope for I-80. However, this comment illustrates that the effort for identifying potential new interchanges reflects the impetus for planning and environmental linkages (PEL). PEL works to ensure transportation initiatives likely to use Federal funding meet NEPA requirements. While operational observations inform the need for more detailed and focused planning, they should be considered carefully before beginning project development without thorough PEL documentation.

Comment

(5) Table 3, Pg 28: Why do the truck percentages remain constant throughout Sparks? Looks odd.

Response

The truck percentages shown are 5% from Rock to Pyramid, 6% from Pyramid to McCarran, and 11 % from Sparks to Vista. However, because there is no classification data available east of 4th street, the truck volume was held at the higher number to be on the more conservative side.

Comment

(6) 3.5 Project Future Conditions, Pg 29-30: How was the LOS calculated? Did NDOT use the existing coordinated signal timing or were the interchanges optimized? Coordinated timing could adversely impact the LOS determination.



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Response

The analysis was performed only for the freeway segments and did not include freeway ramp terminal intersections; no signal timing required. Ramp volumes were obtained from NDOT counts.

Comment

(7) 4.1 Summary of Findings and Recommendations: Just an observation. Moana DD has a tremendous amount of delay today. Looking at the LOS report the interchange operates at E & F. I'm not sure it's an improvement.

Response

Agreed, the Moana Interchange does have considerable delay. In contrast, the freeway congestion in this area is considerably improved since the 2002 study, and freeway congestion is the focus of both reports. Ultimately the freeway has improved.

Comment

(8) 4.1 Summary of Findings and Recommendations: There is so much being said about TESLA. There are RUMORS about even larger industrial type facilities being built in the TRIC area. Don't lose sight of that and the impacts to the east Truckee river canyon.

Response

The report addresses the impacts of TRIC based on historical information which has consistently included industrial manufacturing land uses. Careful consideration was given to all economic information available during the course of the study. Current economic activity, including the new TESLA manufacturing operations are in line with historical land use projections although on a longer than projected implementation timeline. Future project specific strategies certainly must consider the source and validity of trip generations associated with any industrial or other development.

Comment

(9) Entire Report: A lot of acronyms. Suggest having a table for political types reading through the doc. I'm certain your board members would be reading the doc. We have had success with our council.

Response

Where appropriate acronyms have been eliminated or clarified in the body of the report.

Comment

(10) Reference Report Page: There are quite a few studies and reports referenced. Suggest adding a page at the end on the doc for listing the



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reports and where someone interested could look at the referenced material.

Response

Any interested person can easily obtain any of the reports referenced by contacting the NDOT Planning Division.

Comment

(11) Observation: Did I miss it or was there very little discussion on the Spaghetti Bowl. 4.2 Early Action Plan has a fifty thousand view but really doesn't pave a clear path to the meat of the problem. I for one think this should be the #1 priority with all that's occurring in N NV. Couple this with I-11 and we'll have a parking lot.

Response

The level of analysis for the Spaghetti Bowl early action items is consistent with PEL and what is appropriate for a planning initiative and documentation. The next iteration in the process is to advance the recommendations made in our report to the project development stage. This will include additional PEL activity, such as agency, public, and stakeholder consultations and an initial statement of purpose and need that will improve the likelihood of achieving a favorable Record of Decision in any future environmental work in the corridor.

I-11 is a recent example of a PEL approach to transportation planning. This long range plan provided documentation of the planning process including the agency, public, and stakeholder consultations and an initial statement of purpose and need. When economic, social, and other national interests warrant I-11 between Southern and Northern Nevada, this document will provide the PEL for bridging to project development. At that time routes and connectivity in Northern Nevada will be considered. Impacts and remediation for the Spaghetti Bowl associated with I-11 will be identified at that time.