Nebo Transportation Study

Mountainland Association of Governments

Carter Burgess

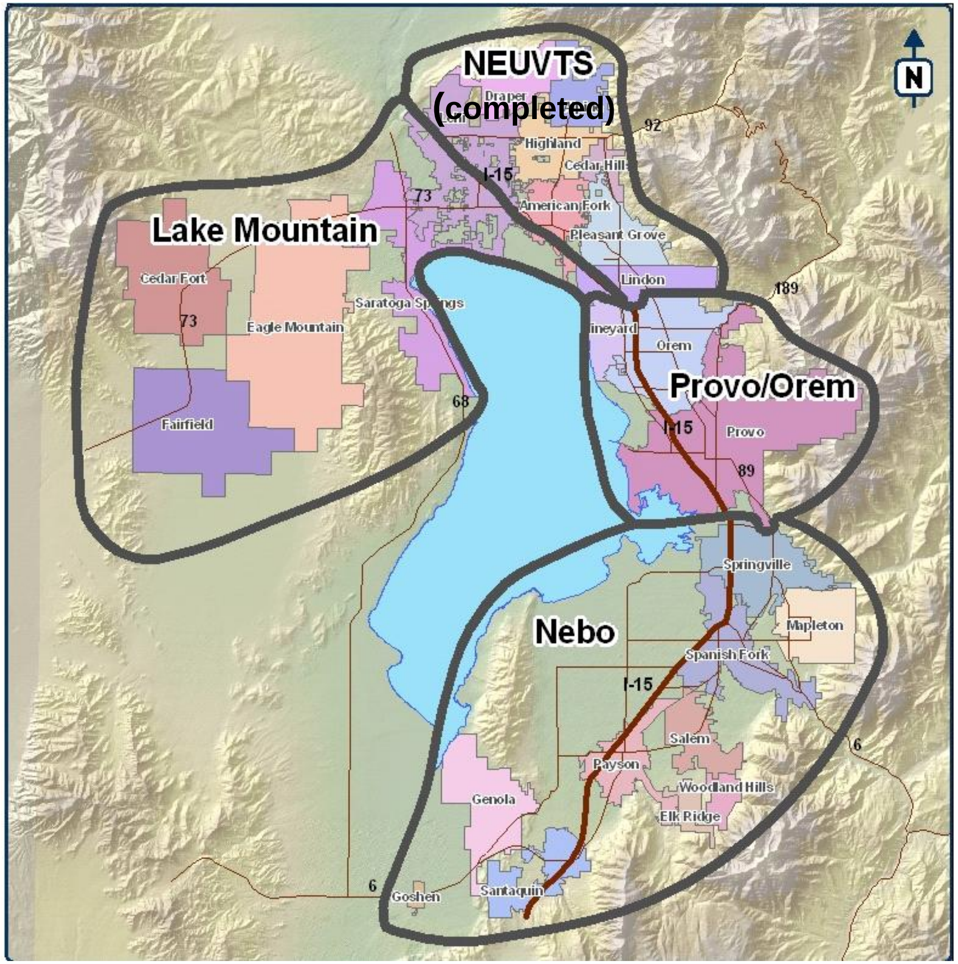
InterPlan Co.
Transportation Planning

Utah Valley Transportation Studies
nebo transportation study

Introduction

- Four MAG initiated projects: Nebo, Lake Mountain, Provo/Orem and Northeast Utah Valley Transportation Study (NEUVTS)
- NEUVTS completed in September, 2005
- Studies address Regional Transportation Plan options and recommendations

Study Areas Map



Carter Burgess

InterPlan Co. Transportation Planning

Utah Valley Transportation Studies
nebo transportation study

Study Goals and Objectives

- Identify transportation needs through the year 2030+
- Evaluate multi-modal options
- Develop additional Transportation Plan options
- Minimize costs and impacts of improvements with early coordination

Carter Burgess

InterPlan Co. Transportation Planning

Utah Valley Transportation Studies
nebo transportation study

Area Studies Schedule

2005

November
- Project Initiation
- First TAC Meetings

December
- TAC Meetings #2

2006

January
- Analyze Alternatives and prepare preliminary Recommendations

February
- TAC Meetings #3
- Presentation of Initial Findings

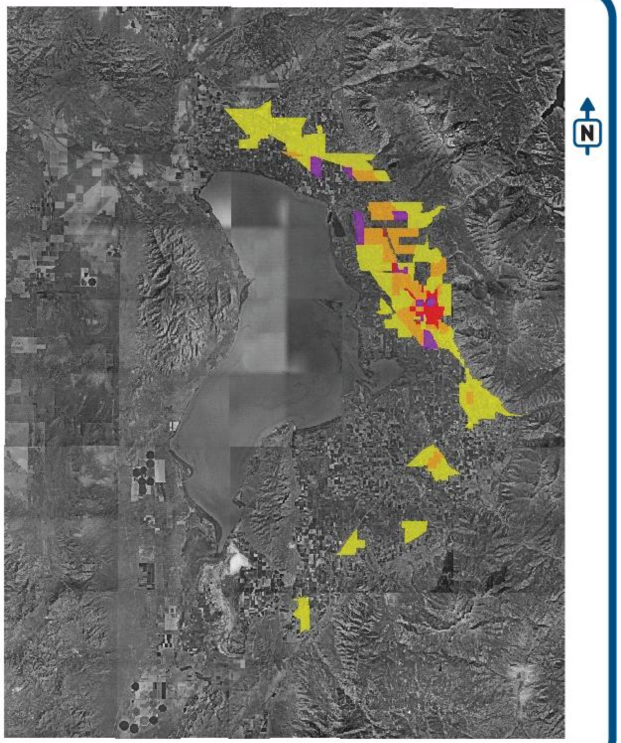
March
- TAC Meetings #4
- Refinement of Initial Findings

April
- Presentation of Recommendations

May
Final Recommendations

Development Patterns - 1993 & 2004

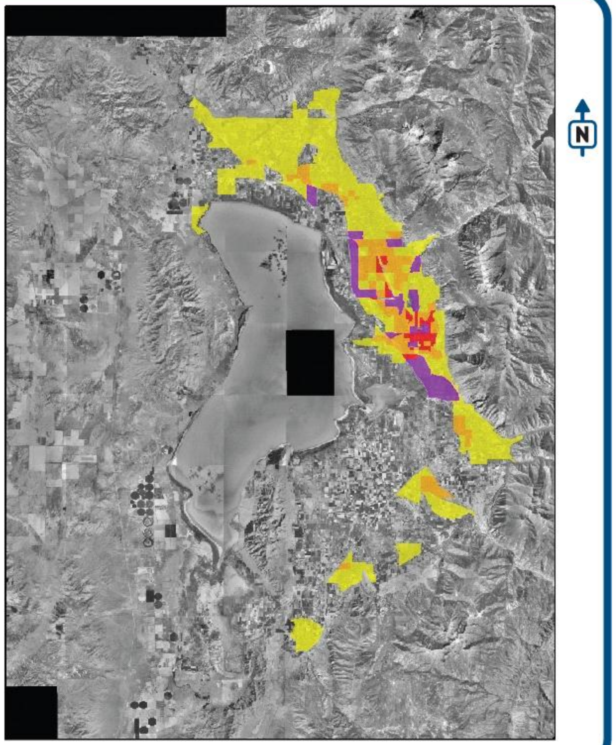
Regional Density - 1993



LEGEND

Low Density Medium Density High Density Employment Centers

Regional Density - 2004



LEGEND

Low Density Medium Density High Density Employment Centers

Carter::Burgess

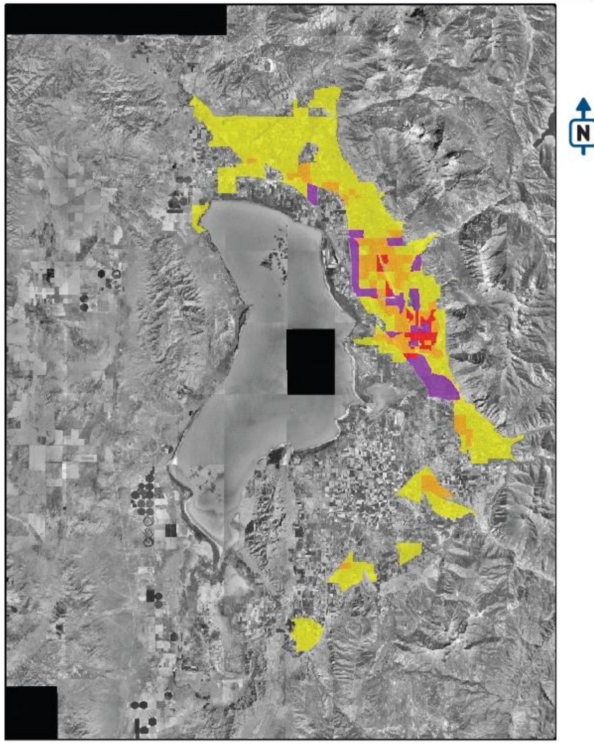
InterPlan Co. Transportation Planning

Utah Valley Transportation Studies

nebo transportation study

Development Patterns - 2004 & 2015

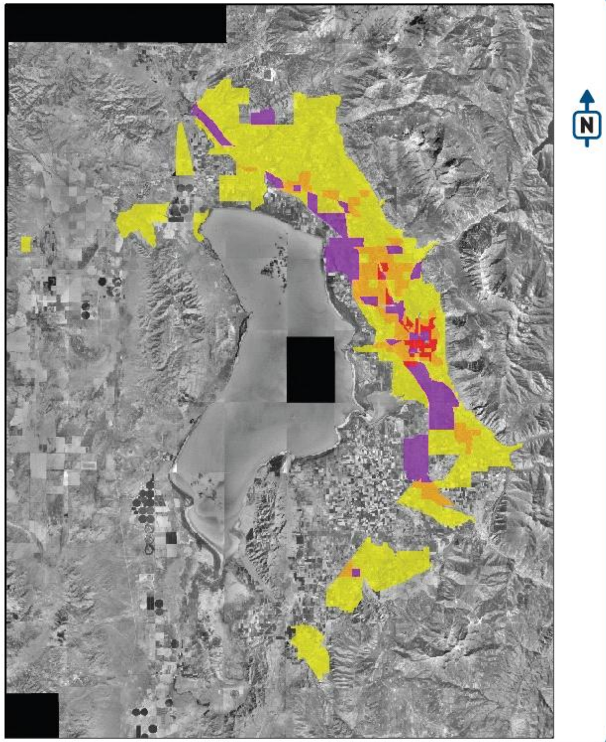
Regional Density - 2004



LEGEND

Low Density, Medium Density, High Density, Employment Centers

Regional Density - 2015



LEGEND

Low Density, Medium Density, High Density, Employment Centers

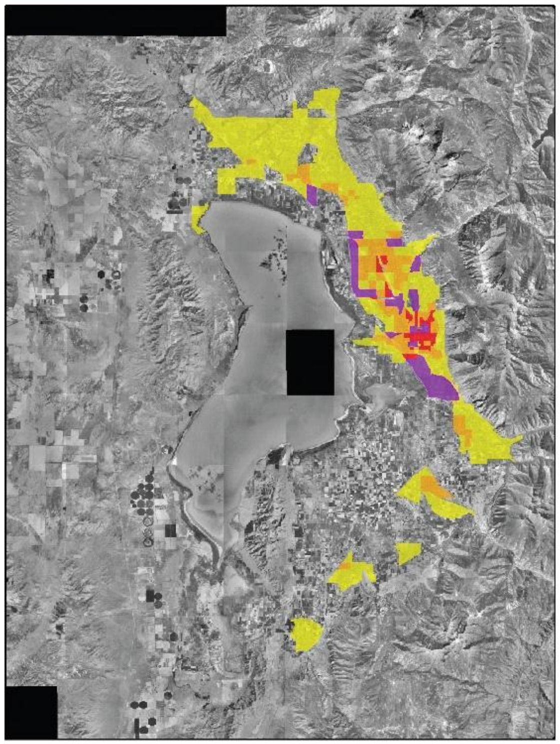
Carter::Burgess

InterPlan Co. Transportation Planning

Utah Valley Transportation Studies
nebo transportation study

Development Patterns - 2004 & 2030

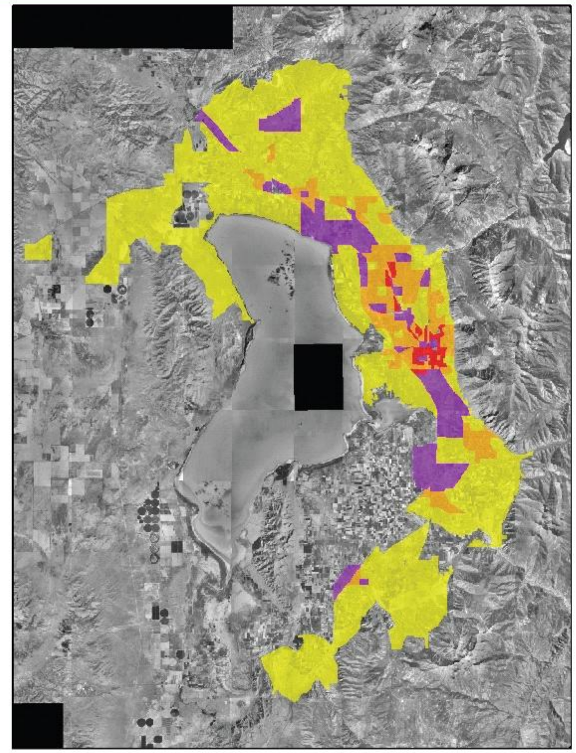
Regional Density - 2004



LEGEND

Low Density | Medium Density | High Density | Employment Centers

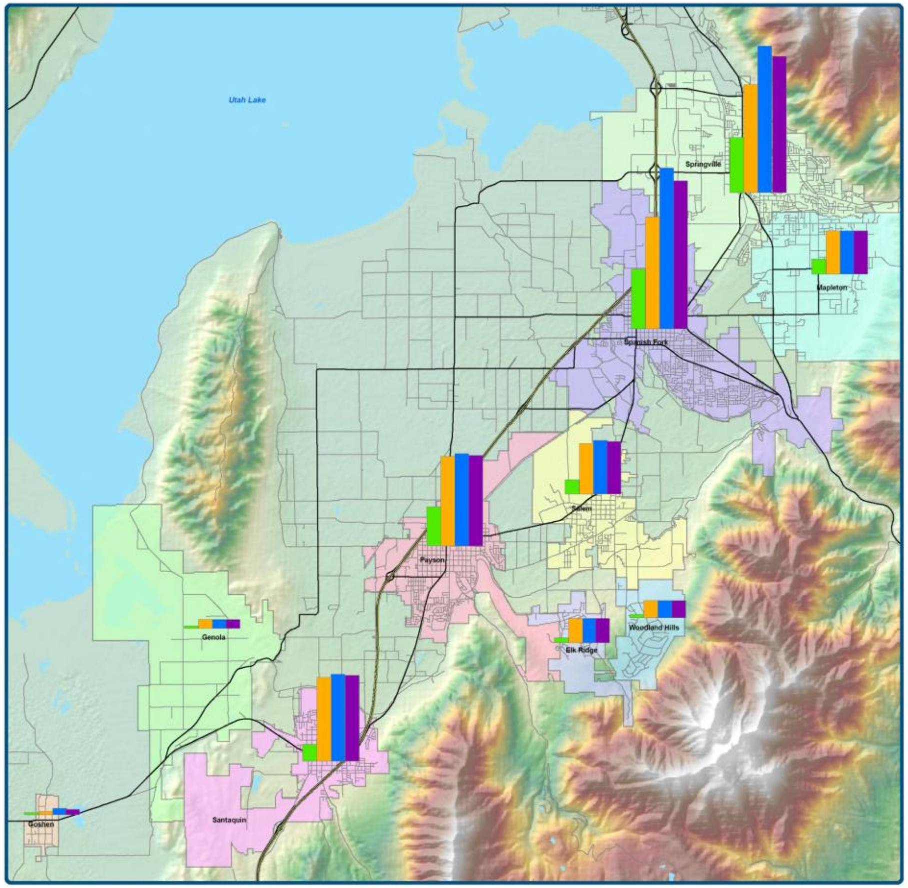
Regional Density - 2030



LEGEND

Low Density | Medium Density | High Density | Employment Centers

Nebo City Population Projections

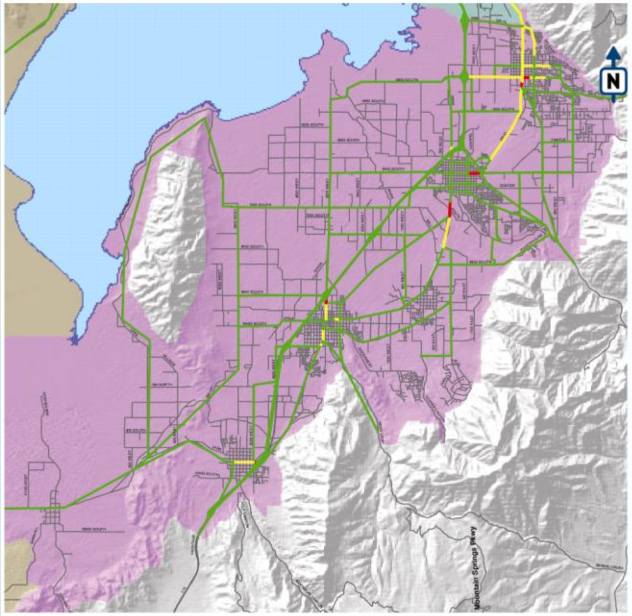


- 2001
- MAG
- City
- Controlled

2030 Study Control Totals			
Elk Ridge	9,431	Salem	20,497
Genola	3,491	Santaquin	33,444
Goshen	2,220	Spanish Fork	57,563
Mapleton	16,841	Springville	53,021
Payson	35,310	Woodland Hills	6,610
		Study Area	**238,428**

Nebo Level of Service (LOS)

Level of Service (LOS) - 2001

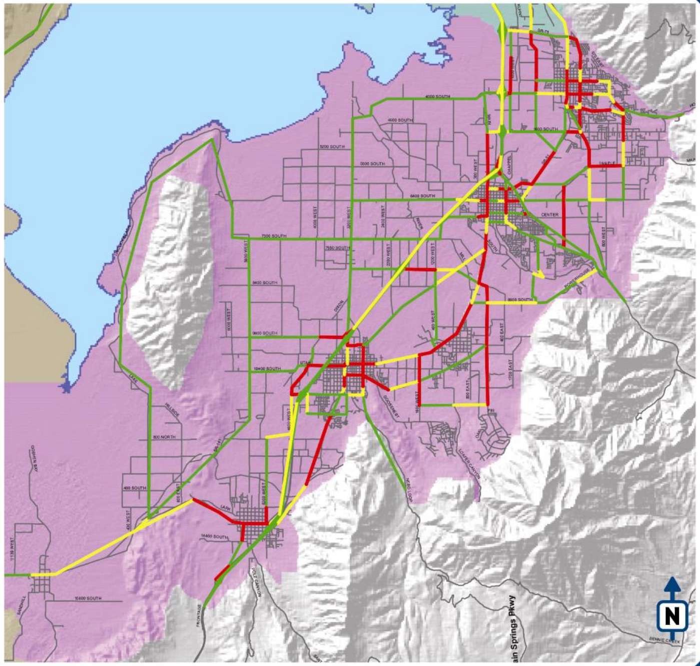


LEGEND

PM Volume to Capacity Ratio

0.00 - 0.80 | 0.81 - 1.00 | 1.01 - 5.00

Non-Controversial Projects
Level of Service (LOS) - 2030

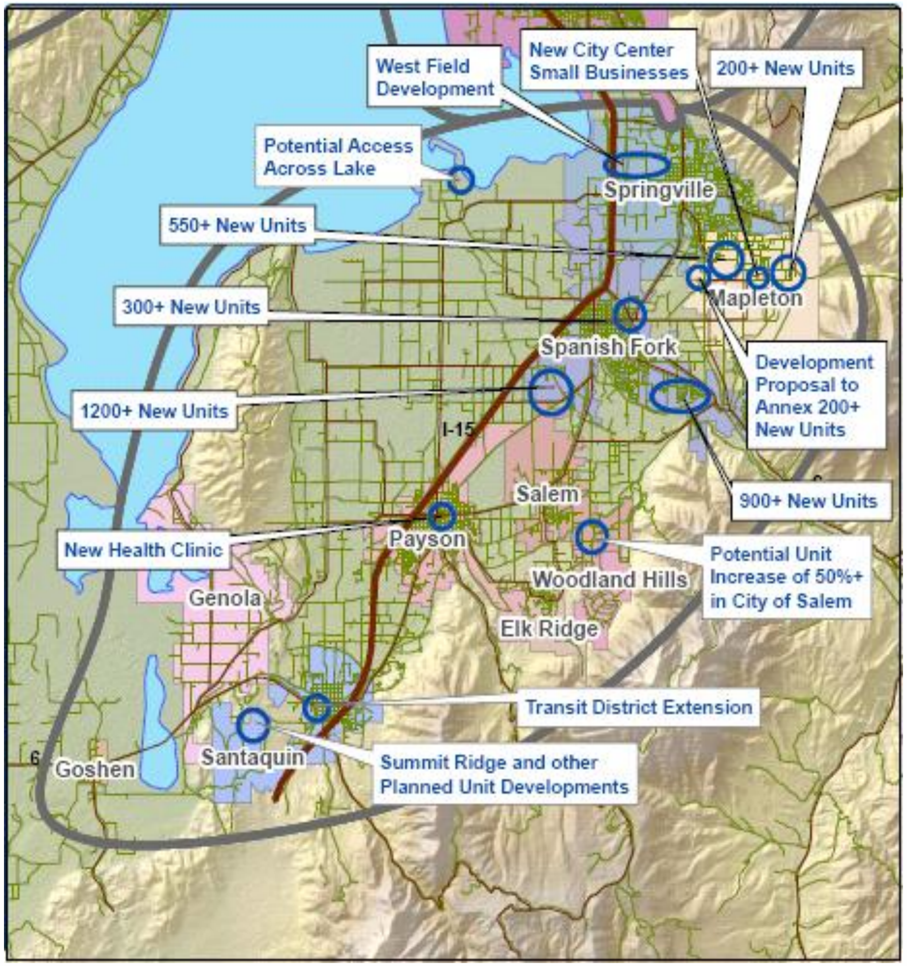


LEGEND

PM Volume to Capacity Ratio

0.00 - 0.80 | 0.81 - 1.00 | 1.01 - 5.00

Nebo Study Area Issues



- Access to Highway 6
- New Access to I 15
- Connectivity to northern communities
- Dispersed development patterns
- Rural preservation
- Main Street preservation
- Planning for trails and alternative modes
- Access to and across Utah Lake (Goshen Bay and Provo Bay)
- Transit district extension to communities south of Payson and Salem

Putting Traffic Problems in Perspective

- The increase in population in the Nebo Area has been greater over the past 10 years than the increase in population in the Lake Mountain Area including Saratoga Springs and Eagle Mountain. Population projections anticipate growth in the Nebo Area to remain higher than Lake Mountain over the next 20 years.

- Traffic volumes on I-15 in the Nebo Area have more than doubled over the past 20 years and are expected to double again over the next 25 years.

- A 21 minute trip from Santaquin City Hall to the base of Hobble Creek Canyon will increase to 59 minutes if no improvements are made but will continue to increase to 34 minutes if all of the non-controversial improvements are made.

- A 26 minute trip from downtown Salem to the BYU campus will take 73 minutes if no improvements are made, but will increase to 37 minutes if all of the non-controversial improvements are made.

Summary of Conclusions

- The Nebo Region is a Rural Bedroom Community which will Grow to Become More Self-Sufficient
- I-15 Capacity Has Served Growth Well, but Will Run Out by 2030 even after Improvements
- Growth in the Nebo Area has been Staggering and will Continue in the Long Term

Deliverables

- Prioritized Transportation Plan for the Nebo Area
- Prioritized Corridor Preservation Projects
- Identified “Visionary” Transportation Projects

Next Steps

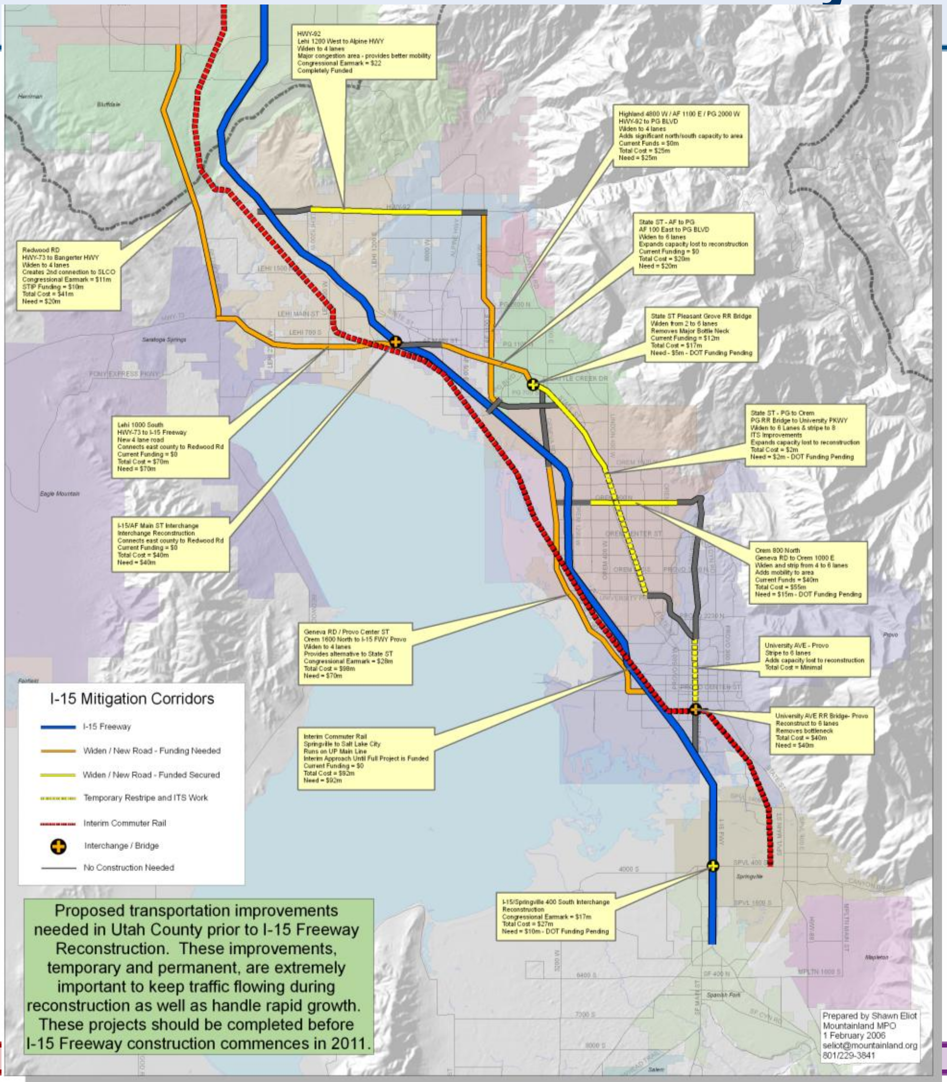
- Analyze mobility options
- Identify capital projects
- Community outreach
- Final Recommendations

Immediate Steps

- Make Priority Projects Part of Legislative Program for I-15 Reconstruction Impacts
- Seek Funding to Meet Transportation Needs
- Update Regional Transportation Plan in 2007

I-15 FWY Reconstruction Projects

I-15 Freeway Reconstruction 2011-2015



Carter::Burgess

InterPlan Co. Transportation Planning

Utah Valley Transportation Studies
nebo transportation study

Funded I-15 FWY Reconstruction Projects

Funded I-15 Freeway Mitigation Projects

- **HWY-92, Lehi to Highland - Widen to 4 lanes**
  Total Cost $22m - **Funded by Congressional Earmark**
- **Pleasant Grove / State ST RR Bridge Replacement**
  Total Cost $17m - **STIP Funding $12m – DOT Anticipating $5m**
- **I-15 / Springville 400 South Interchange Reconstruction**
  Total Cost $27m - **Congressional Earmark $17m – DOT Anticipating $10m**
- **State ST – Pleasant Grove to Lindon**
  Total Cost $2m – **DOT Anticipating $2m**
- **Orem 800 North, Orem 400 West to Orem 1000 East – Widen to 6 lanes**
  Total Cost $55m - **STIP Funded $40m - DOT Anticipating $15m**
- **Various Temporary Striping Projects** (to be funded with DOT and I-15 project funds)

Unfunded I-15 FWY Reconstruction Projects

Unfunded I-15 Freeway Mitigation Highway Projects

#	Project	2006	2007	2008	2009	2010	Funding
1	**Redwood RD** Bangerter HWY to HWY-73 Saratoga Springs Widen to 4 lanes	EA Work = $2m	PE/ROW = $6m	Construction = $33m Earmark = $3m - STIP = $10m - Gap = $20m			Funding Gap = $20m Earmark Funds = $11m STIP Funds = $10m Total Cost = $41m
2	**Lehi 1000 South & I-15** HWY-73 to I-15 AF **AF Main ST Interchange** New 4 lane road/reconstruct interchange	EIS Work = $4m	PE/ROW = $17m	Construction = $89m			Funding Gap = $110m Current Funding = $0m Total Cost = $110m
3	**Geneva RD/Provo Center ST** Orem 1600 North to I-15 FWY, Provo Widen to 4 lanes	EIS Work = $2m	PE/ROW = $15m	Construction = $81m Earmark = $11m - Funding Gap = $70m			Funding Gap = $70m Earmark Funds = $28m Total Cost = $98m
4	**State ST – AF to PG** AF 100 East to PG BLVD Widen to 6 lanes	EA Work = $2m	PE/ROW = $3m	Construction = $15m			Funding Gap = $20m Current Funding = $0m Total Cost = $20m
5	**University Ave RR Bridge** Provo 400 South to Provo 900 South Reconstruct to 6 lanes	EA Work = $1m	PE/ROW = $6m	Construction = $33m			Funding Gap = $40m Current Funding = $0m Total Cost = $40m
6	**Highland 4800 West/ AF 1100 East/PG 2000 West** HWY-92 to PG BLVD Widen to 4 lanes	EA Work = $2m	PE/ROW = $4m	Construction = $19m			Funding Gap = $25m Current Funding = $0m Total Cost = $25m
	STIP Funds	$0	$0	$10	$0	$0	Funding Gap = $285m Earmarks = $39m STIP Funds = $10m Total Cost = $334m
	Congressional Earmarks	$4m	$21m	$12m	$12m	$0	
	Funding Gap	**$9m**	**$30m**	**$86m**	**$98m**	**$62**	

Unfunded I-15 Freeway Mitigation Transit Projects

#	Project	2006	2007	2008	2009	2010	Funding
7	**Interim Commuter Rail Springville to SLC** Could lead into future Commuter Rail System	EA Work = $2m	PE/ROW = $14m	Construction = $76m			Funding Gap = $92m Current Funding = $0m Total Cost = $92m

Nebo Area Transportation Study

September 2006

Prepared for:

MOUNTAINLAND ASSOCIATION OF GOVERNMENTS
Serving Summit, Utah and Wasatch Cities & Counties

Prepared by:

InterPlan Co.
Transportation Planning

Carter::Burgess

Table of Contents

Chapter 5. Alternatives Analysis and Transportation Solutions

Chapter 6. Recommended Next Steps

Appendices

Chapter One

1. Study Methodology

The Nebo Area Transportation Study area, located in southern Utah County is home to some of the fastest growing cities in Utah. Its proximity to the employment centers of Provo and Orem along with its rural setting and large areas of undeveloped land make the Nebo area a prime target for explosive population growth. In fact, since 1990, this area of Utah County has increased in population by over 100 percent, and population projections indicate a continuation of this trend. The area transportation network is directly impacted by growth like this and determining future travel demands is paramount to maintaining the quality of life for which this area is so well known.

The Mountainland Association of Governments initiated this study with two primary objectives: first, to work with local governments to identify future transportation problems in the Nebo area of Utah County; and second, to define transportation projects and strategies that will satisfy projected travel demand in the study area in both the short and long terms. Projects identified as high priority will be included in the Mountainland Association of Governments' (MAG) Regional Transportation Plan (RTP). The Nebo Area Transportation Study was done concurrently with studies for two other regions in Utah County, the Lake Mountain area located in northwestern Utah County, and the Provo/Orem area. In the fall of 2005, InterPlan completed the Northeast Utah Valley Transportation Study (NEUVTS) studying the area east of the I-15 freeway between Lehi and Lindon. Collectively, these studies have been referred to as "the quadrant studies."

…since 1990, this area of Utah County has increased in population by over 100 percent.

MAG contracted with a consultant team consisting of Carter-Burgess and InterPlan Co. to supply technical support to MAG staff. A Technical Advisory Committee (TAC) was assembled to provide direction and oversight to the process. The TAC included representation from cities within the study area and MAG, met on a monthly basis from October 2005 through May 2006, and was instrumental in weighing the impacts of various alternatives and developing the recommended alternative, presented later in this document. The TAC also offered guidance on topics such as:

- Population and employment projections
- Analysis of RTP projects
- 2030 alternative transportation network development
- Alternative cross-section development
- Access control policies

Agendas from each TAC meeting are included in Appendix A.

In order to accomplish the first objective, identifying future transportation problems in the study area, the project team examined population and employment projections previously done by MAG staff. Through city staff input, revisions to socioeconomic data were made to reflect more recent growth and development trends. This updated data was used for travel demand modeling throughout the rest of the study.

Travel demand modeling is done by transportation planning agencies to determine the number of vehicles on roads and transit usage in the region for a specified future year. The model determines trips based on land uses and where people live, work, shop, recreate, and other destinations. Initial modeling efforts focused on establishing existing and future travel patterns of vehicle trips that originate in the study area. This gave the project team important information related to where people were traveling to, whether north into Salt Lake County or other areas north, or to the Provo/Orem area, etc. In addition, in order to identify future transportation problems, a set of analysis scenarios was developed, including a no-build scenario, a RTP scenario, and a "non-controversial projects" scenario. All are detailed later in this chapter.

Modeling of these future scenarios indicated that traffic congestion issues were to be anticipated in each of the model scenarios. In order to address the second goal of the project, to identify projects and strategies to solve those issues, the Technical Advisory Committee began examining specific transportation improvements. These improvements included widening existing roads, providing better connections between existing facilities, and identifying access management policies and related transportation facility improvements. Transit improvements were also included in the analysis to the extent that improvements could be modeled and as per recommendations of an on-going Utah County Transit study. At the same time, planning-level potential alignments were drawn in order to have a better understanding of possible property impacts of some of these improvements. Using measures of effectiveness such as vehicle hours of travel and travel time index, both packages of projects and individual projects were compared and chosen to be included in the preferred alternative. Finally, phasing of improvements was considered related to the timing of population growth and the relative need for individual projects over time.

The above is intended only to give a brief summary of the study methodology and the process undertaken over the course of the project. Each of these steps is discussed in more detail later in this document. Specifically, elements addressed in further chapters include:

- Existing and future conditions related to socioeconomic data, land use, travel characteristics, local and regional planning efforts
- Problem identification
- Alternatives analysis including the Locally Preferred Alternative

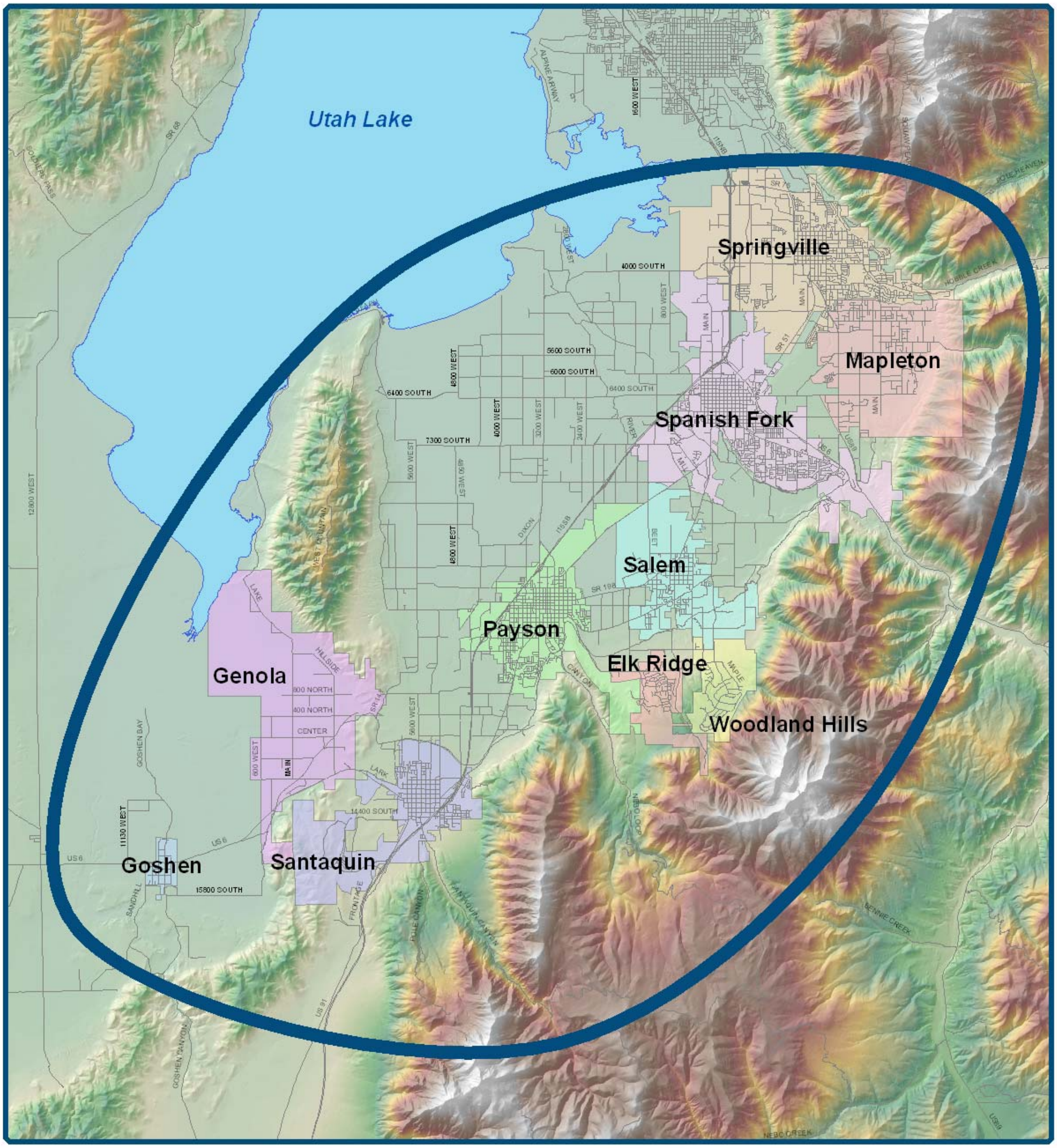
In addition to the Technical Advisory Committee, presentations were made to local elected and appointed officials at key times during the study. These times corresponded to a mid-point in the study where problems were identified and alternative solutions were actively being investigated as well as a completion of the technical results in order to understand the political feasibility of the preferred alternative and phased recommendations. Presentations were made in lieu of a formal stakeholder committee in order to maintain an openness of the process to general citizens while also targeting the input of key decision makers at the local level.

1.1 Study Area

The Nebo Transportation Study Area is displayed in Figure 1.1. It runs from the city of Springville in the north extending south to the Goshen Valley. The eastern Wasatch Front Mountains are excluded from the study. Cities within the Nebo study area include Elk Ridge, Payson, Mapleton, Santaquin, Woodland Hills, Genola, Salem, Springville, Spanish Fork, and the Town of Goshen. Utah County also participated in the study.

Utah Valley Transportation Studies
nebo transportation study

Figure 1.1
Study Area



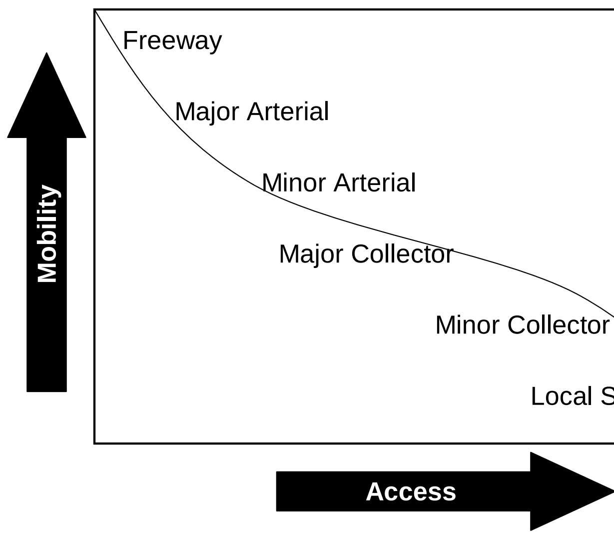
Legend

Study Area

1.2 Transportation Systems Analyzed

The transportation system that was examined during this process was the existing functional classification network. The functional class network is the foundation of the transportation system, moving people and goods into, out of, and throughout the region. It includes freeways, expressways, arterials, and collector roads under the jurisdiction of the state, county, and local entities. Generally, a road's functional classification is determined by whether its purpose is to provide access or mobility. Those roads at the smaller end of the functional class system move traffic more slowly but provide greater access, such as to local roads or to residential or small commercial properties. On the other end of the scale, expressways provide greater mobility as they move more traffic at greater speeds, but with more limited accesses such as driveways and intersections. This concept is illustrated in Figure 1.2. Figure 1.3, Roadway Functional Class, depicts the existing road network for the incorporated and unincorporated jurisdictions of the Nebo Study Area. Local streets feed into a grid of collector and arterial streets. One freeway serves north-south travel and connects to six principle arterials associated with five development centers.

Figure 1.2: Access and Mobility by Functional Classification

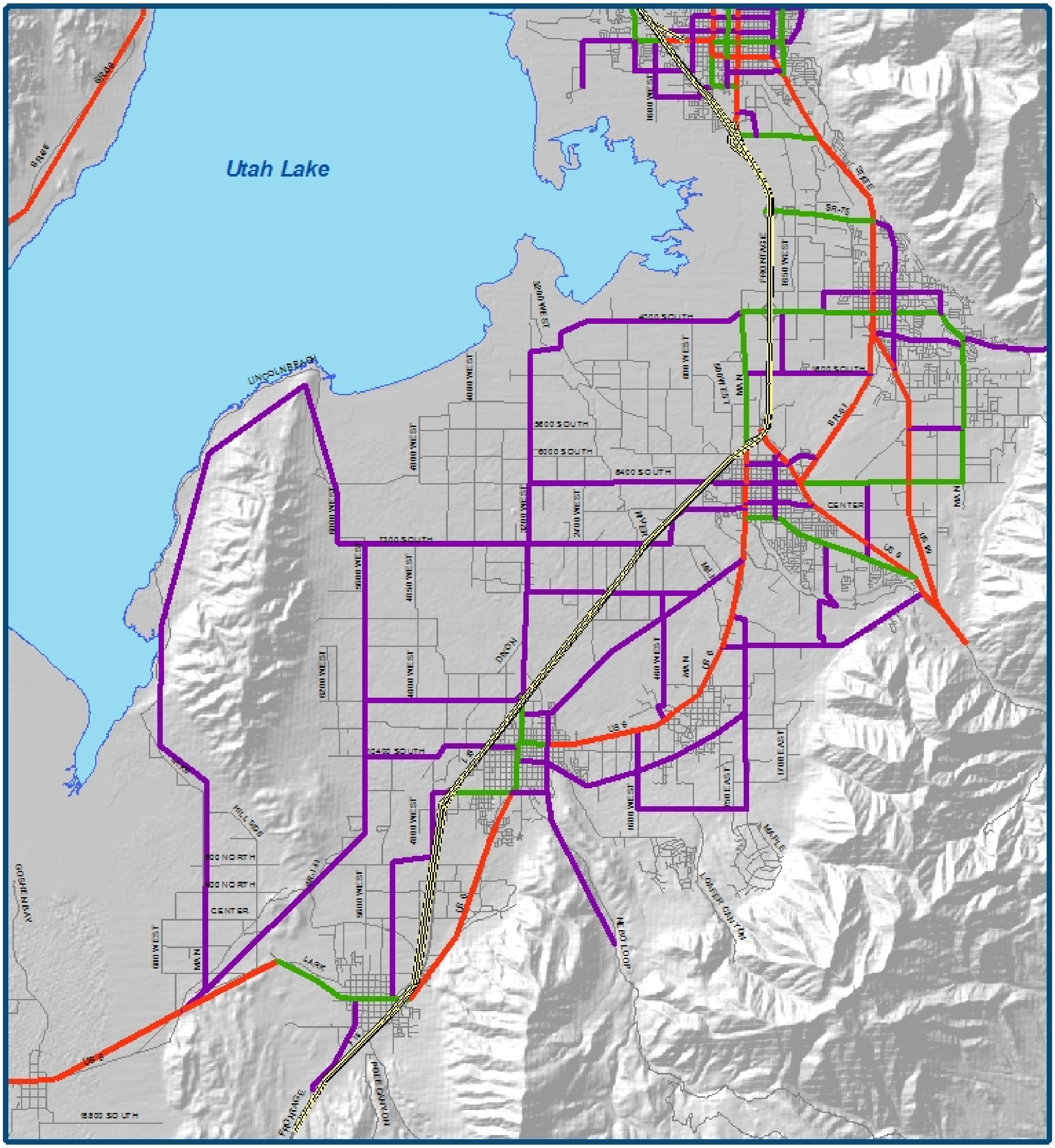


Transportation projects that would help to meet projected travel demand in the year 2030 were considered during this process. These projects included those already part of the region's Long Range Transportation Plan, as well as other new improvements that were suggested by city representatives. These projects were discussed and debated by the study's TAC and were considered with respect to how "controversial" they were between cities. This process is discussed in more detail later in this chapter and each of these projects is detailed in Chapter 5 of this document.

Transit is an important part of the MAG's future transportation choices. As a result, the existing and planned transit system was also considered when identifying projects to satisfy future travel demand. Existing transit facilities include bus service as well as park and ride facilities. In the current transportation plan, transit plans focus on commuter rail connecting Utah and Salt Lake Counties, and a doubling of the bus services in the study area.

Utah Valley Transportation Studies
nebo transportation study

Figure 1.3
Existing Functional Class



Legend

Interstate — Principal Arterial — Minor Arterial — Collector — Existing Roads

1.3 Analysis Years

The study team made comparative evaluations of roadway and transit conditions under different scenarios, and at different points in time, based on projected population and land use as defined by the cities. The purpose of reviewing conditions at various times was twofold. First, final recommendations, dependent on the projected need and cost, are based on implementation years 2015, 2030 and 2030+. Second, it was beneficial for committee members and other stakeholders to see the growth patterns and explore the potential of multi-modal options to address some of the issues. Consultants provided the TAC summaries of data and measures of effectiveness using detailed mapping, tables, and other graphics.

> *It was beneficial for committee members and other stakeholders to see the growth patterns and explore the potential of multi-modal options to address issues.*

Committee members were asked to consider street networks including area interstate or freeway segments, state roads, and local roads for the current year 2005 and for future years 2015 and 2030. Transportation system scenarios were modeled in an iterative process and presented to the TAC to develop a transportation system that best met study goals. Each meeting involved review of increasingly refined scenarios until agreement was reached on the best scenario to meet this goal. Scenarios included combinations of interstate, roadway, and transit improvement projects and various phasing options.

1.4 Mapping

All mapping data was provided by the Mountainland Association of Governments and map development was conducted by Carter-Burgess and InterPlan. Additional layers needed throughout the course of the project for location maps, study areas, existing land use data, aerial photography, and environmental constraints data were developed by Carter-Burgess or were made available by MAG.

1.5 Existing Plans and Studies

The following transportation plans and studies were part of the analysis and helped provide background for determining the scope and approach for the project.

- **General Plans.** City General Plans were consulted for land use and transportation conditions and to help determine future trends. In most cases, the evaluation of land use plans consisted of reviewing zoning maps, consulting with cities concerning existing and planned development, and incorporating negotiated changes into the model. The General Plans of the Nebo Transportation Study area include:
    - The Utah County General Plan was approved April 6, 1999, (with updates through 2003). In it, Objectives 15, 16, and 17 fully cover transportation services and systems including integration with other governmental entities. Recent land use updates also address cluster zoning and density**.** The Utah County Land Use Ordinance was updated July, 2005 and is the implementing ordinance of the General Plan. [1]
    - The Springville City Master Transportation Plan, adopted 2005, was reviewed in detail.
    - The Spanish Fork City Master Road Plan

[1] Title 17, Chapter 27a, of the Utah Code Annotated 1953, and as these apply to LUDMA, Land Use Development and Management Act.

- The Santaquin City Long Range Master Plan, April 2005
- The Payson City General Plan, November 2003

- **I-15 Corridor Environmental Impact Statement, Utah County (I-15 Corridor EIS)**. This study evaluates 65 miles of I-15 transportation to address population growth, travel demand, and system interconnectivity. Transit needs, a proposed collector-distributor, and new interchange locations are being evaluated for the Nebo area.

- **Mountain View Corridor (MVC).** The Mountain View Corridor EIS specifically addresses transportation needs in the western portions of Salt Lake County and northern Utah County.

- **I-15 Corridor Management Plan.** The I-15 Corridor Management Plan evaluated options for additional interchanges and access to I-15 through Utah County. Recommendations included widening of I-15 and frontage roads.

- **Inter-Regional Corridor Alternatives Analysis (IRCAA).** The IRCAA study looked at a comprehensive transportation network for the 120 miles from Brigham City in the north to Payson in the south. Additionally, issues and observations raised during the IRCAA study have been important to consider for the quadrant studies.

- **Northeast Utah Valley Transportation Study (NEUVTS)** The NEUVTS study is the first of the quadrant studies to be completed. A report documenting the findings of the study was published in September 2005 and some or all of the elements are expected to be incorporated in MAG's updated RTP in 2006.

- **The Mountainland Association of Governments 2030 Long Range Transportation Plan (LRTP).** The LRTP (renamed the RTP) consists of local and regional projects and is updated every four years to include multi-modal projects identified to meet a 30-year forecasted travel demand. It includes the local and regional roadway and transit projects identified by MAG in cooperation with the Utah Department of Transportation and the Utah Transit Authority. The most recent update was approved in February 2005.

  Selection of RTP projects is largely justified by travel demand modeling and forecasting, which is based on population and employment data. Additional analysis and planning for the RTP is required because amended population data shows significantly higher growth in all four study areas of Utah County than what was planned for in the February RTP report.[2]

- **The Mountainland Association of Governments Transportation Improvement Program (TIP).** The Transportation Improvement Plan (TIP) is a five year program of projects taken from the RTP. Projects in the first three years of the TIP have identified funding sources that can be obligated for activities from preliminary engineering to implementation; projects in the last two years are referred to as "Concept Development" (CD) and are moved into the three-year section when project details are more finalized and funding is available.

---

[2]Provided by the State of Utah Governor's Office of Planning and Budget, 2005.

1.6 Proposed Analysis Scenarios

This Nebo Transportation Study uses the elements of the Regional Transportation Plan as a beginning point to select projects for further evaluation and modification. The project development process included collaboration with city and county stakeholders in the area and the Utah Department of Transportation. Local stakeholders were brought together to evaluate and select transportation projects within their communities. This included consensus-based meetings with technical and policy committees to verify future travel needs within each municipality, identify controversial and non-controversial projects, and determine how to structure model runs.

Further analysis considered project viability and reflected regional development scenarios or phasing. The committees used the same process to review and incorporate the Transportation Improvement Program, city land use and transportation plans, and regional transit projects.

Analysis scenarios included:

- A "No Build" scenario where all projects included in the RTP were built *outside* of the study area but none are built within the study area.
- An RTP scenario which assumed all RTP projects were built both within and outside of the study area. This also included "controversial" projects.
- A "non-controversial projects" scenario that was chosen by the TAC from the RTP projects. These were projects that were considered by the sponsors to be relatively easy to implement and without much controversy at the city or regional level. Obviously, most projects will engender some amount of debate at the local and neighborhood level.
- Additional individual projects on a phased development basis.

Transportation network alternatives were evaluated with respect to several different performance measures, discussed below. Care was given in choosing the measures used so that they would be effective means of relaying relatively technical information to a wide range of audiences. For example, the performance measures needed to be able to be graphically represented in charts or graphs so that they would be quickly and easily understood and compared. They also needed to be understood in a non-technical way, so that they would be meaningful to all interested groups, including elected officials, city staff, and area residents.

Alternatives were compared based on several transportation performance measures or analysis tools.

- Level of service (LOS) – standard measurement used by engineers that identifies the amount of congestion on a given roadway. Level of service is given grades of A through F, with A being free-flow conditions and F being highly congested, "parking lot" conditions.
- Vehicle Hours of Travel (VHT) – a calculation of the total time all vehicles spend on the transportation network. This measure is easily obtained from the regional travel demand model and helps to identify area-wide congestion changes.
- Vehicle Miles of Travel (VMT) – similar to VHT, this refers to a calculation of the total miles traveled by all vehicles on the transportation network. It is also an output of the travel demand model.
- Travel Time Index (TTI) – refers to a measure of congestion determined by dividing the time it takes to travel a given road segment at the peak hour by the free-flow travel time for that segment.

Chapter Two

2. Existing Conditions Analysis

By having a clear picture of existing conditions, it is easier to more accurately predict future trends. Socioeconomic data including population and employment as well as generalized land use in the study area are discussed here. Also included is information regarding existing travel characteristics of the region, including study area mode choice and travel patterns, and community and environmental fatal flaw impact analysis.

2.1 Socioeconomic Data

Population and employment and their projected trends are key elements of the transportation planning process. Determining the location and extent of residential development is one of the many challenges of transportation planning. This section offers an examination of the existing population and employment for the Nebo area. Future conditions are discussed in Chapter 3.

2.1.1 Population

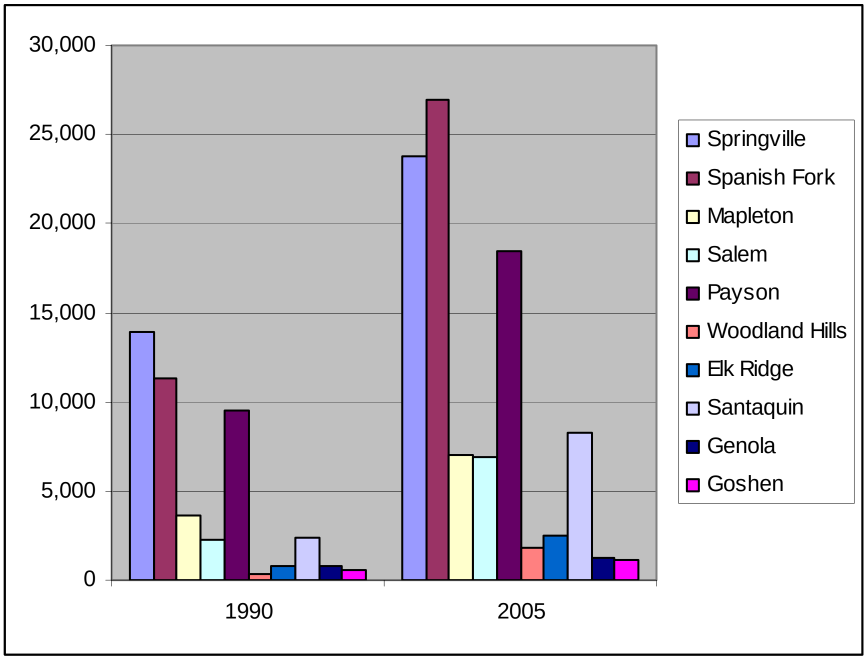
The Nebo Transportation Study area has experienced exceptional growth since 1990, with several municipalities more than doubling in population between 1990 and 2005. Population growth by city is shown in Table 2.1 and Figure 2.1. Data reflected in this table and figure is based on traffic analysis zones (TAZ). Boundaries of TAZs do not necessarily match city boundaries, so that some population that lives in one city may actually appear as population in a TAZ that is associated with an adjacent city. However, these differences are minimal and the relative population growth by city is accurately reflected.

Table 2.1: Population Growth by City, 1990-2005

City	1990	2005	% Increase: 1990-2005	AARC* 1990-2005
Springville	13,950	23,810	70.7%	4.7%
Spanish Fork	11,272	26,973	139.3%	9.3%
Mapleton	3,572	7,048	97.3%	6.5%
Salem	2,284	6,917	202.8%	13.5%
Payson	9,510	18,484	94.4%	6.3%
Woodland Hills	301	1,814	502.7%	33.5%
Elk Ridge	771	2,503	224.6%	15.0%
Santaquin	2,386	8,316	248.5%	16.6%
Genola	803	1,233	53.5%	3.6%
Goshen	578	1,125	94.6%	6.3%
Total	**45,427**	**98,223**	**116.2%**	**7.7%**

*Average Annual Rate of Change
Source: 1990 US Census data and city estimates.

Figure 2.1: Population Growth by City, 1990-2005



Source: 1990 US Census data and city estimates.

The overall growth rate for the municipalities within the Nebo area is 116 percent over the past 15 years. Rates varied broadly between municipalities from 54 percent in Genola to 503 percent in Woodland Hills. Spanish Fork has the largest population in the area with almost 27,000 people and Springville is a close second with nearly 24,000 individuals. However, no city within the Nebo approaches the population of Provo and Orem to the north. Notwithstanding the sizeable percentage increase in a small community such as Woodland Hills, the most significant growth in numbers of individuals occurred in the larger cities within the Nebo study area such as Springville, Spanish Fork, and Payson as illustrated in Table 2.1 and Figure 2.1.

2.1.2 Employment

In spite of strong job growth since 1990, the Nebo area is not a major employment center. The total number of jobs in 2005 totaled 24,375 while the population was 98,223. That equates to about 2.5 jobs for every 10 people. Such limited opportunity for employment compels many to travel outside the area for work.

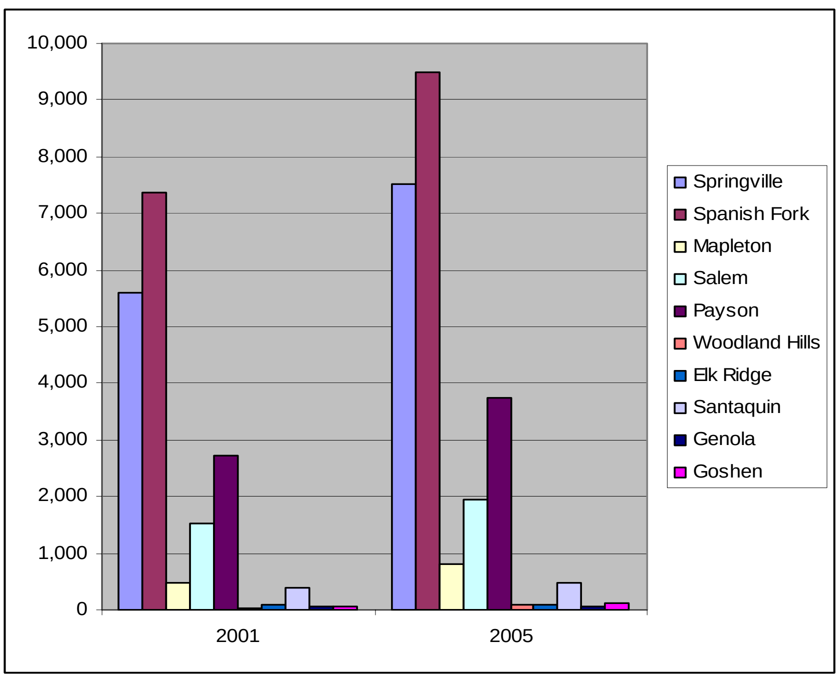
Because employment data prior to 2001 for much of the study area is incomplete, Table 2.2 and Figure 2.2 show employment growth by city between 2001 and 2005.

Table 2.2: Employment Growth by City, 2001-2005

City	2001	2005	% Increase: 2001-2005	AARC*: 2001-2005
Springville	5,612	7,513	33.9%	8.5%
Spanish Fork	7,375	9,503	28.9%	7.2%
Mapleton	474	816	72.2%	18.1%
Salem	1,529	1,944	27.1%	6.8%
Payson	2,728	3,746	37.3%	9.3%
Woodland Hills	43	103	139.5%	34.9%
Elk Ridge	81	86	6.2%	1.6%
Santaquin	394	493	195.2%	15.0%
Genola	59	66	11.9%	3.0%
Goshen	73	105	43.8%	11.0%
Total	**18,368**	**24,375**	**32.7%**	**8.2%**

*Average Annual Rate of Change
Source: MAG and city estimates

Figure 2.2: Employment Growth by City, 2001-2005



Source: MAG and city estimates

The disparity between jobs and population is important to transportation planning because the farther people need to travel from their homes to their jobs, the greater the impact each of those people will have on the transportation network. This is especially true when the single-occupant vehicle is the predominant mode of transportation as it is in Utah County. More discussion of mode choice is provided later in this chapter.

The Nebo area went through a "visioning" process in 2001that offered residents an opportunity to define how and where their individual cities would develop as well as what local and regional resources they wanted to preserve. Higher density developments and preserving walkable, human-scale downtowns were among the priorities identified during this process. Implementing this "vision" for the Nebo area would provide more opportunity for transit service and use, thereby decreasing the impacts to the surrounding transportation network.

2.2 Land Use

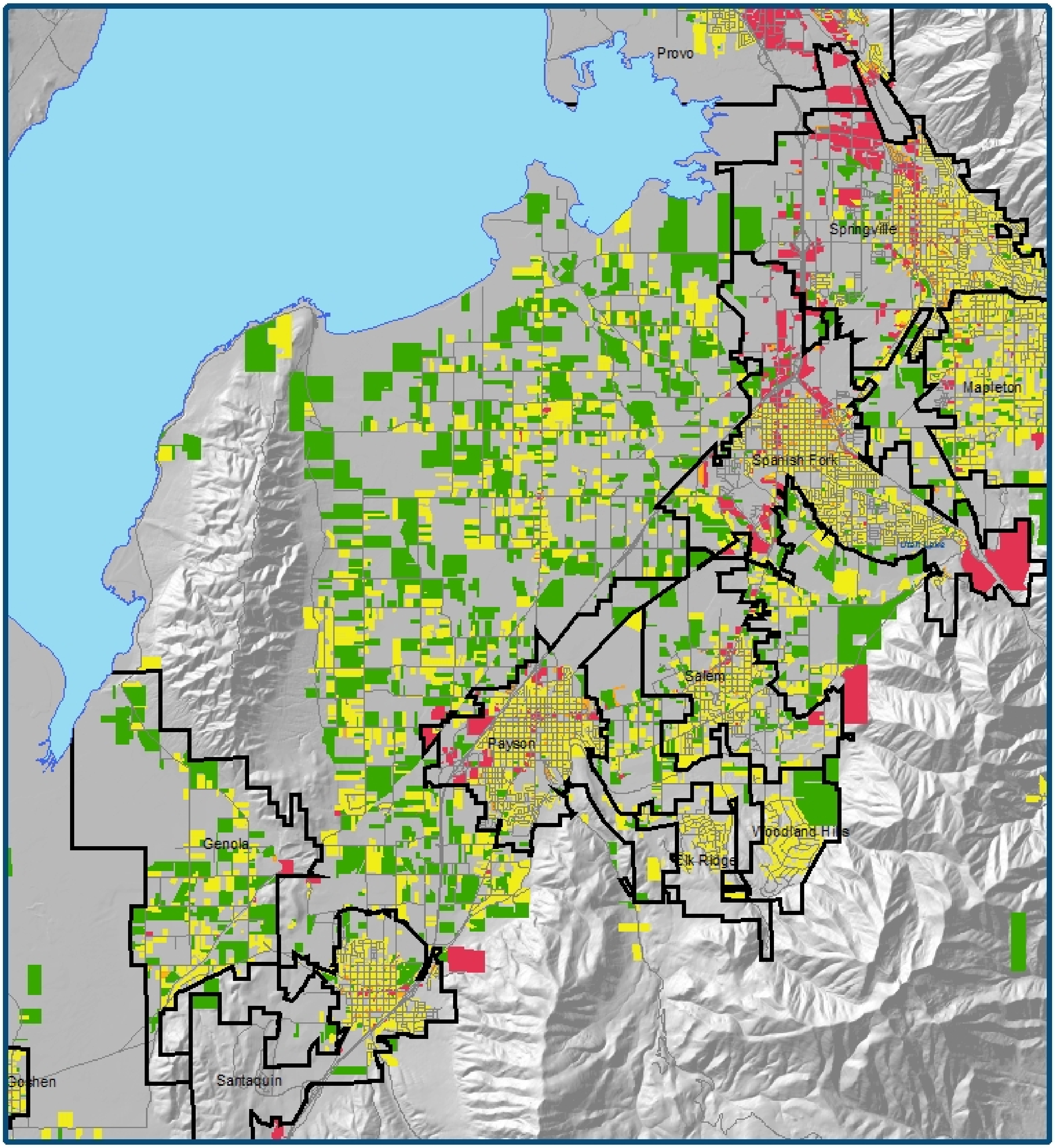
The majority of the land in the Nebo area is unincorporated and rural. There are still many operating farms and open spaces within the area. Many of the municipalities have main streets which have historically served as the heart of the community. In recent years, retail and employment has been increasingly locating in big box developments on the edges of the developed area. Farmland is typically located beyond the residential development sometimes within city limits and often in unincorporated county lands.

Higher density developments and preserving walkable, human-scale downtowns were among the priorities identified during (the Nebo visioning) process.

The development that has occurred in the study area in the recent past has been primarily low-density single-family residential in nature. The majority of people living within the Nebo area commute to another area, most frequently Provo/Orem, for work. This is particularly true of small, new communities such as Elk Ridge and Woodland Hills where almost no commercial development exists at the current time. Figure 2.3 indicates residential, commercial, and agricultural land uses within the study area. Land use data is from Utah County's GIS database.

Utah Valley Transportation Studies
nebo transportation study

Figure 2.3
Generalized Land Use



Legend

Agriculture | Single Family Residential | Multiple Family Residential | Commercial

2.3 Transportation System Data

2.3.1 Mode Choice

Mode choice refers to how people get to and from their destinations, whether by car, carpool, transit, walking, or bicycle. For existing conditions, census data provides the best information related to mode choice, but is available only for work trips. Almost all trips are made by personal vehicle. There is currently a lack of transit facilities in the Nebo area which could account, at least in part, for the high use of personal vehicles. Additionally, geography and land use patterns make transit use more difficult for trip purposes such as shopping and entertainment. Table 2.3 shows mode choice for work trips from the Nebo Area for 1990 and 2000.

Table 2.3: Mode Choice to Work, 1990 and 2000

Mode	1990		2000	
	#	%	#	%
Drove Alone	12,697	75.0%	24,201	76.8%
Carpooled	3,099	18.3%	4,732	15.0%
Transit	90	0.5%	308	1.0%
Bicycle	100	0.6%	51	0.2%
Walked	270	1.6%	475	1.5%
Other	682	4.0%	1,736	5.5%

Source: 1990 and 2000 US Census.

As Table 2.3 shows, the percent of people who drove alone to work increased between 1990 and 2000. While transit use for work trips is typically in the range of three to four percent in Wasatch Front Counties, it is significantly less within the study area. This is most likely due to the large lot, single-family residential nature of the area and that it has less transit infrastructure than in other parts of the region. In addition, the UTA service area does not cover the entire Nebo Area as UTA generally does not provide transit service south of Payson. This contributes to the low transit ridership. However, it may also be claimed that the low density land use is the cause of low transit ridership and the lack of transit service is the effect. Transit tends to have more extensive service and greater ridership in areas of higher density and with major employment centers, both of which are lacking in this area. This study did look at transit improvements to address future travel demand needs. However, as transit use is obviously a small portion of total trips in the area, it was not seen to be a panacea solution to transportation issues, and so was not a priority of the technical committee.

2.3.2 Transit Data

The Utah Transit Authority (UTA) is the exclusive provider of public transit services in Utah Valley. UTA operates eight local and county routes within Utah County and nine interregional express routes between Utah County and Salt Lake Valley. Both local and interregional transit services fulfill distinct travel needs within Utah Valley. Interregional services provide higher speed service on the I-15 HOV lanes, encourage Utah County residents to use the bus and avoid the congested freeway. As such, transit helps the state maximize its investment in the freeway system.

The local system provides connections to regional transit services and services to local destinations, especially for students, seniors, and other populations who may not have access to an automobile. Transit service in the Nebo area is limited to the cities of Springville, Spanish Fork, Salem, and Payson.

2.3.3 Travel Patterns

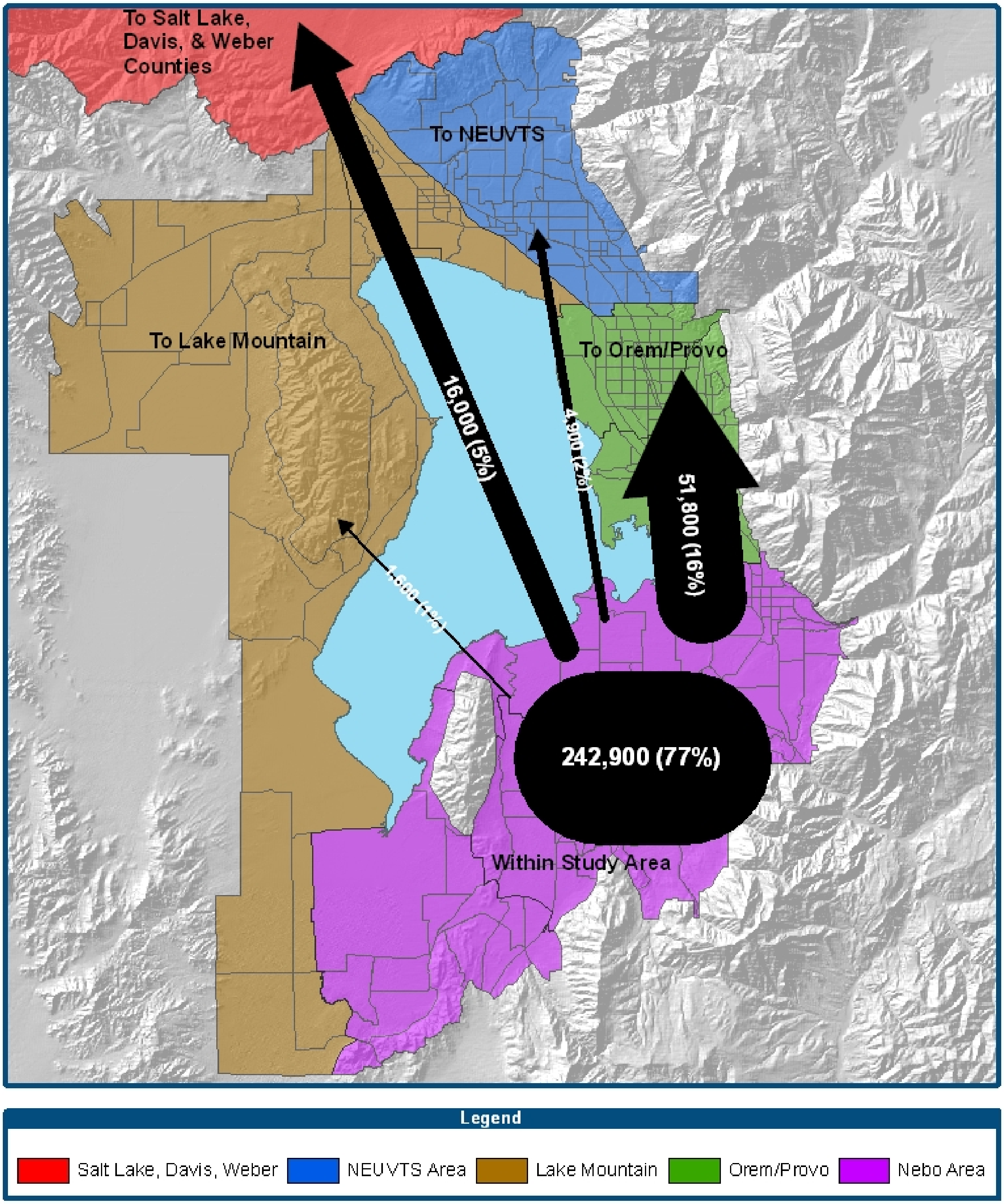
To gain a better understanding of the role of regional transportation facilities, the destinations of vehicle trips that originated in the study area were examined. This was done for all trips, regardless of their purpose, and for work trips. Figures 2.4 and 2.5 show these trip patterns.

In 2001, more than ¾ of all trips that originated in the study area stayed within the study area. About 16 percent of the trips went to the Provo/Orem area, and the remaining trips were distributed among Salt Lake and other northern counties, western Utah County, and the northeast Utah Valley study area.

Work trips that originate in the study area are somewhat more evenly distributed. Just over 1/3 (37 percent) stay within the Nebo study area, while 40 percent travel to the Provo/Orem area and 19 percent to Salt Lake County and other areas north of there. As Provo/Orem and Salt Lake City are the major employment areas for the Wasatch Front, this trip distribution is expected. This distribution of work trips is an indication of the importance of the regional transportation system in moving people to and from their jobs around the Wasatch Front.

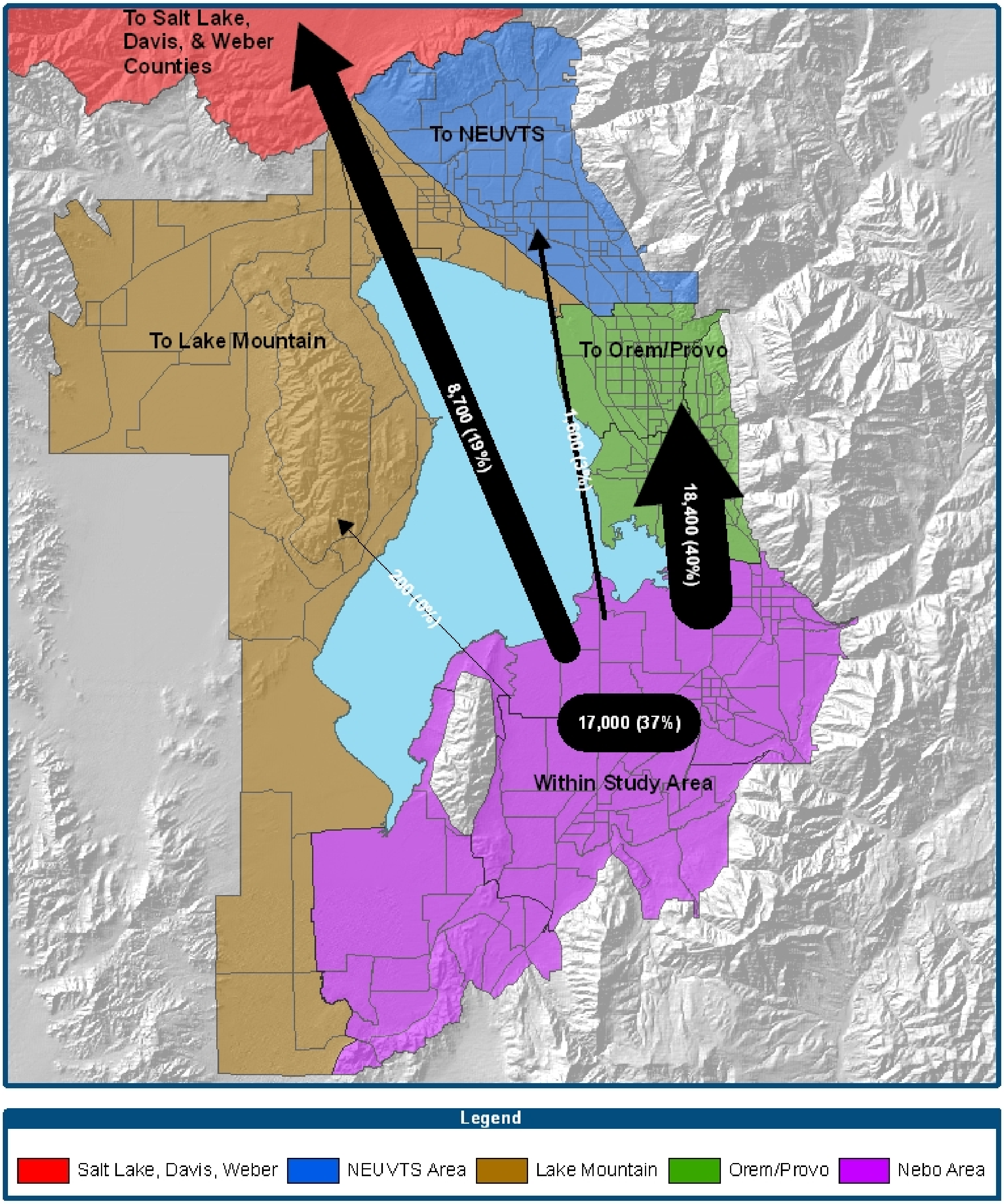
Utah Valley Transportation Studies
nebo transportation study

Figure 2.4
Total Trips from Study Area, 2001



Utah Valley Transportation Studies
nebo transportation study

Figure 2.5
Work Trips from Study Area, 2001



2.4 Existing LOS Analysis

As discussed in Chapter 1, level of service refers to a standardized measure of traffic conditions on a given roadway. Figure 2.6 shows level of service on the functional class system in the study area for 2001. Red lines indicate heavy congestion in the peak hour and green lines indicate little congestion during that time.

In 2001, there is evidence of little traffic congestion within the Nebo study area in the afternoon peak hour. Pockets of congestion are apparent near Interstate-15, south of Spanish Fork on US-6, and on SR-51 from Spanish Fork through Springville to Provo. However, overall traffic conditions in the study area are good, with few serious problems.

2.5 Other Existing Deficiencies Analysis

With the exception congestion north of Springville into the Provo/Orem area, traffic conditions tend to be relatively stable with little failure during the peak hour. However, it is important to remember that this information is from 2001 and a significant amount of development has occurred within the study area since that time.

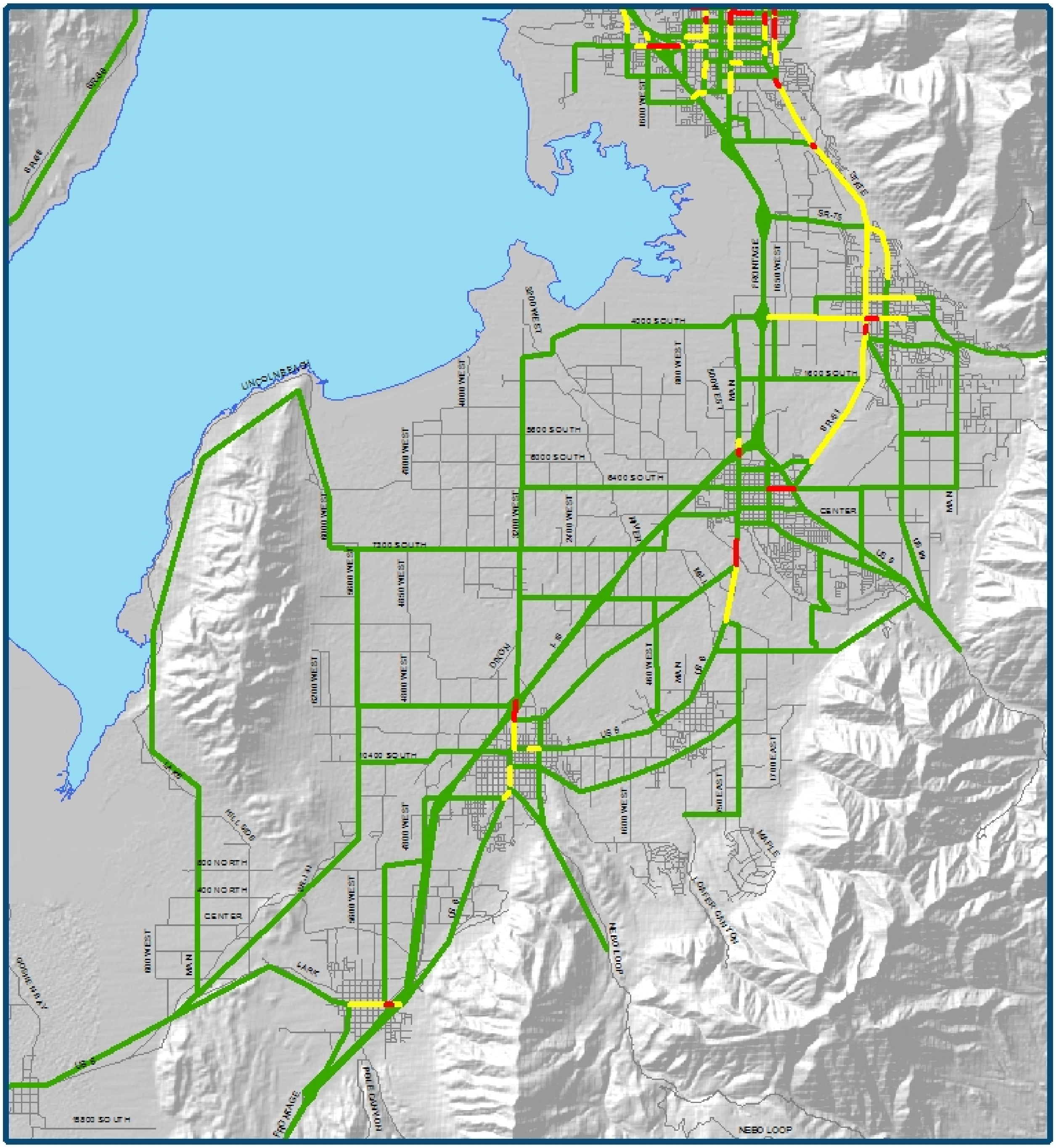
2.6 Community and Environmental Fatal Flaw Impact Analysis

Existing physical and environmental impediments to project development were evaluated by obtaining land use, land cover, and mapping data from MAG. Natural restrictions were reviewed and evaluated including: ravines, fault zone, hazard material sites, threatened and endangered species, habitat, and wetlands. The most significant constriction is the geographic location of Utah Lake between Lake Mountain on the west and the Wasatch Mountains to the east.

Considerable sensitive natural resources are associated with Utah Lake. It is an important freshwater complement to the Great Salt Lake. It is used heavily by waterfowl for production, migration, and foraging. Natural resources include but are not limited to warm water fish species, non-game fish species, cold water fish species, water fowl, shorebirds, wetlands, and marshes. Threatened or endangered species include but are not limited to the June sucker fish, Utah Lake Sculpin, and Bonneville cutthroat trout. Increased population, development, and housing all present a challenge to maintaining water quality and preventing pollutants from entering the lake shed.

Utah Valley Transportation Studies
nebo transportation study

Figure 2.6
2001 Level of Service



Legend

PM Peak Period Volume to Capacity Ratio
0.00 - 0.80 — 0.81 - 1.00 — 1.01 - 2.80 — Existing Roads

Chapter Three

3. Future Conditions Analysis

In order to plan for a transportation network that will accommodate future population growth, a careful examination of projected land use and socioeconomic conditions is important. This chapter provides a summary of population, employment, and land use in the year 2030 in the study area. The impacts of this growth on travel patterns as well as what future conditions will be with no transportation network improvements are also analyzed in detail.

3.1 Project Review Process

Review of projects and plans within the study area is especially important, given the area's high growth rates observed in the past and expected in the future. The consulting team worked closely with MAG staff as well as the technical advisory committees (TACs) in examining planned transportation projects and future socioeconomic conditions in the study area.

3.1.1 Review of Local Government Projects for Consistency with Model Data

The study team worked with local government representatives to determine whether or not planned transportation projects and expected city growth were adequately reflected in the MAG travel demand model so that modeled analysis of future conditions was as reflective of future conditions as possible. MAG staff attempts to keep the model as up-to-date as possible, although given the ever-changing nature of the cities within the region, it is difficult to always ensure the latest data is included in the model. The Nebo Area Transportation Study allowed for a fine tuning of the travel demand model for joint use by the consulting team in this study and for on-going planning efforts of MAG staff.

3.1.2 Traffic Analysis Zone Consistency with Project Phasing and Socioeconomic Data

In Utah, there is no agency or organization that is given the responsibility of monitoring population growth and development. While some cities have processes of keeping track of population growth through monitoring building permits, there are not any municipalities in Utah that determine whether growth has occurred within the traffic analysis zone where it was projected. TAZs are the geographic building block of the travel demand model and are roughly equivalent to census block groups. Without this detailed information on the extent to which development "matches" projections, cities can only guess as to specific areas of population increase and so with future transportation needs as well. Due to this uncertainty, one of the primary transportation planning tools through land use is setback requirements during development.

In any study that relies on the travel demand model, it is important to be proactive in looking at population and employment projections in great detail.

3.1.3 Revised Socioeconomic Data Process

In any study that relies on the travel demand model, it is important to be proactive in looking at population and employment projections in great detail. In Utah, population and employment projections are determined in a "top down" approach, from state to region, region to county, and county to city. However, more recent local development trends indicate greater population growth in the study area than originally projected by state and regional agencies.[1]

The consultant team worked closely with TAC members to revise city-level population and employment projections to reflect these increases. In updating land use information, city representatives considered specific development plans along with conceptual city development principles. All revisions to socioeconomic information were made prior to travel demand modeling. These revisions are used in the model in the form of updated population, household, and employment numbers and are organized by TAZ.

This process of involving municipal representatives in validating model data helped build an iterative, consensus-based decision process and became an important foundation on which to evaluate and select transportation projects. The results of these adjustments to socioeconomic projections are discussed in more detail in the next section.

3.2 Socioeconomic Data

3.2.1 Population

As with the rest of Utah County and the state as a whole, population projections for the Nebo study area show steady growth in coming decades. Existing, future, and city-revised future population numbers are shown for the study area in Table 3.1 and in Figures 3.1 and 3.2. It should be emphasized that City level projections included in this analysis are based on an aggregate of traffic analysis zones as used in the travel demand model and do not necessarily match exact City boundaries.

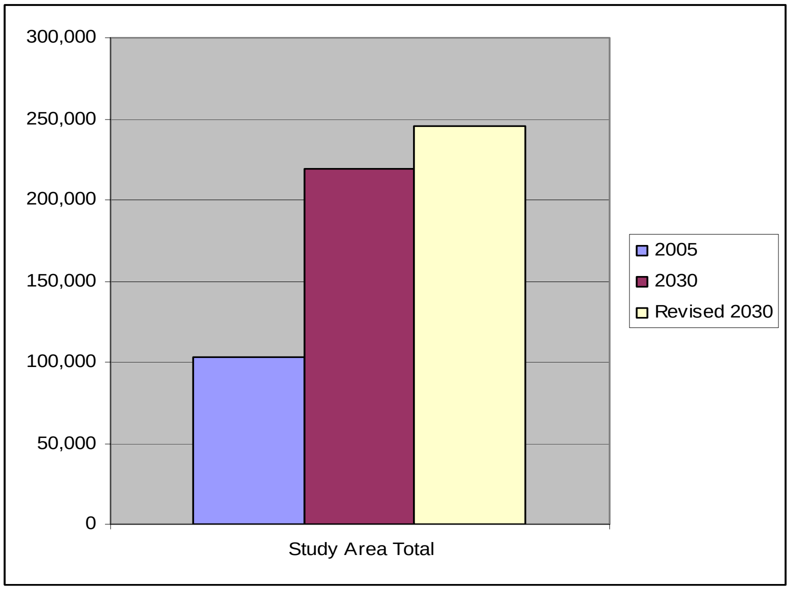
Table 3.1: Population by City: 2005, 2030

City	2005	2030	Revised 2030	% Change: 2005-2030	AARC* 2005-2030
Springville	23,810	41,916	53,021	122.7%	3.3%
Spanish Fork	26,973	43,588	57,563	113.4%	3.1%
Mapleton	7,048	16,841	16,841	138.9%	3.5%
Salem	6,917	19,644	20,497	196.3%	4.4%
Payson	18,484	34,862	35,310	91.0%	2.6%
Woodland Hills	1,814	6,610	6,610	264.4%	5.3%
Elk Ridge	2,503	9,431	9,431	276.8%	5.4%
Santaquin	8,316	32,463	33,444	302.2%	5.7%
Genola	1,233	3,491	3,491	183.1%	4.3%
Goshen	1,125	1,257	2,220	97.3%	2.8%
Unincorporated	2,904	6,569	6,697	130.6%	3.4%
Study Area Total	**101,127**	**216,672**	**245,125**	**142.4%**	**3.6%**

Source: MAG and city estimates and projections.

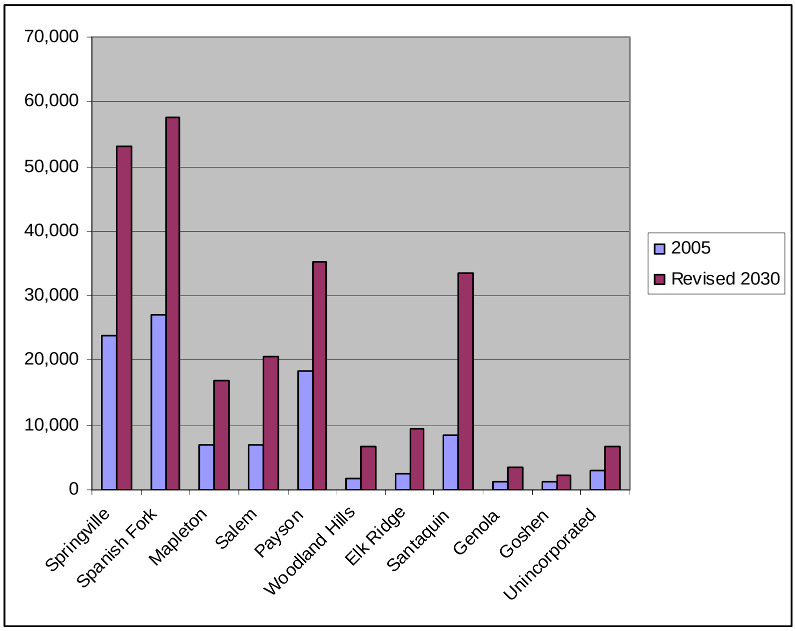
[1] Provided by the State of Utah Governor's Office of Planning and Budget.

Figure 3.1: Total Study Area Population: 2005, 2030



Source: MAG and city estimates and projections.

Figure 3.2: Study Area Population by City: 2005, 2030



Source: MAG and city estimates and projections.

Over the entire study area, population was increased by about 12 percent from original projections developed by MAG. Springville and Spanish Fork made the most significant increases to 2030 population levels, with most other cities adjusting their projections slightly. The consulting team and MAG carefully reviewed the cities' input and made additional adjustments to best reflect city projections and to not stray significantly from county-level control total forecasts.

Basing future population numbers on recent trends is difficult in high-growth areas such as this, as population growth in recent years may not be indicative of the future.

Regardless of the differences between the original and revised population projections, considerable population increases are expected in the study area to the year 2030. The impact of this growth on the transportation network is significant.

3.2.2 Employment

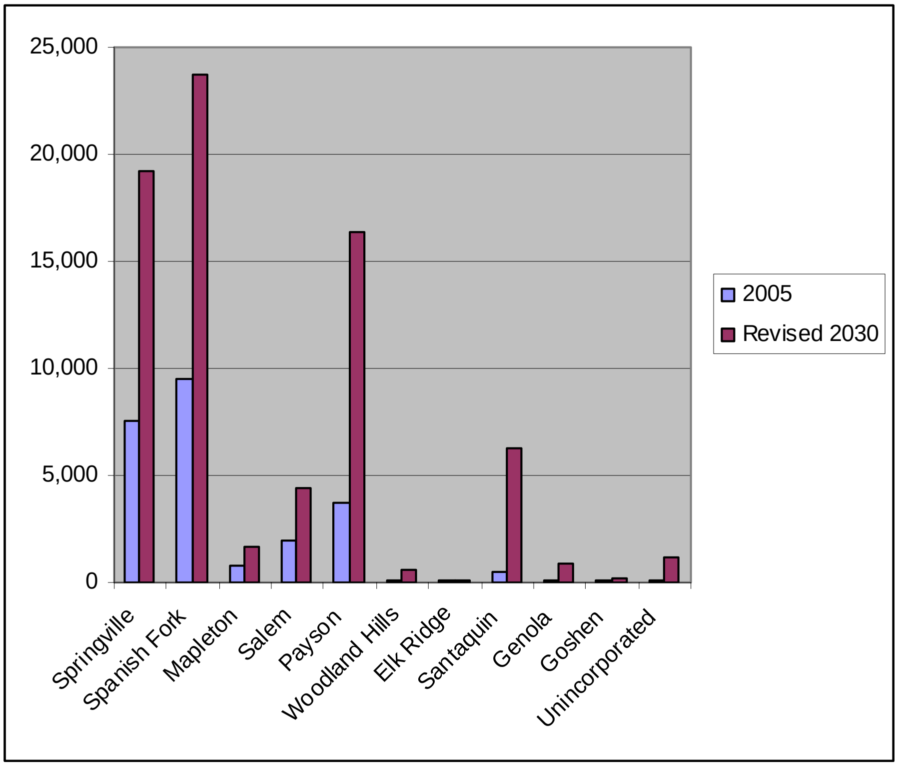
Employment within the study area is expected to increase by the year 2030, although the magnitude of that growth is considerably less than population growth. Existing and future employment for the study area is shown in Table 3.2 and Figure 3.3. Percent increases in employment numbers are exceptional. However, given that there is little existing employment in most cities, any increase in jobs creates deceptively large growth rates.

Table 3.2: Employment by City: 2005, 2030

City	2005	2030	Revised 2030	% Change: 2005-2030	AARC* 2005-2030
Springville	7,513	18,535	19,186	155.4%	3.8%
Spanish Fork	9,503	23,733	23,733	149.7%	3.7%
Mapleton	816	1,696	1,696	107.8%	3.0%
Salem	1,944	4,404	4,404	126.5%	3.3%
Payson	3,746	14,570	16,373	337.1%	6.1%
Woodland Hills	103	611	611	493.2%	7.4%
Elk Ridge	86	550	100	16.3%	0.6%
Santaquin	493	5,669	6,230	1163.7%	10.7%
Genola	66	870	870	1218.2%	10.9%
Goshen	105	241	241	129.5%	3.4%
Unincorporated	106	1,175	1,175	1008.5%	10.1%
Study Area Total	**24,481**	**72,054**	**74,619**	**204.8%**	**4.2%**

Source: MAG and city estimates and projections.

Figure 3.3: Study Area Employment by City: 2005, 2030



Source: MAG and city estimates and projections.

While employment is expected to increase in future years, it will remain a fraction of total population. However, the growth of both population and employment in the Nebo area will have significant impacts on both the local and regional transportation network.

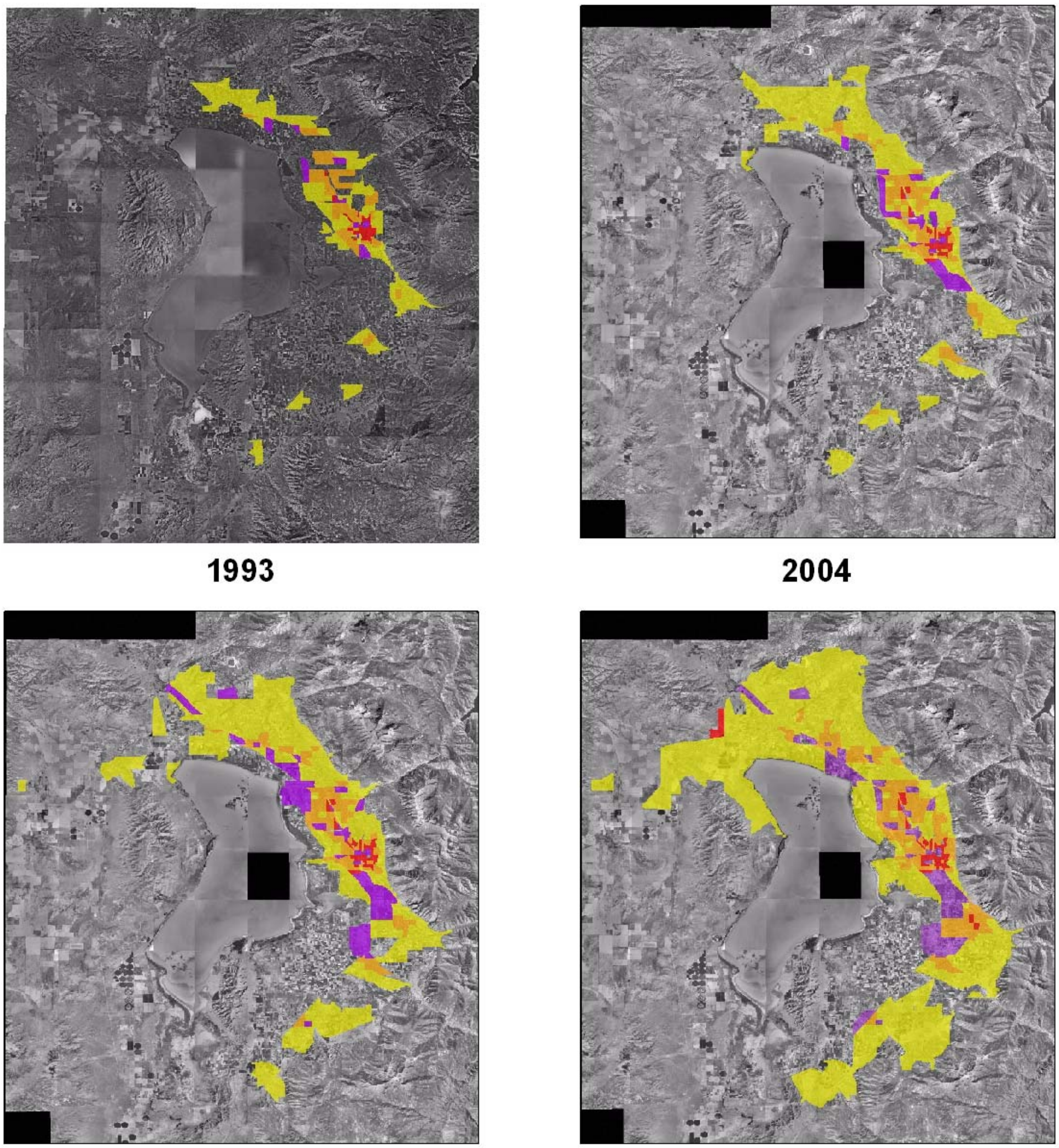
3.3 Future Land Use

Future development patterns within the study area are not expected to change dramatically in coming years. Employment numbers indicate that while most cities do anticipate adding commercial land uses in coming decades, there will continue to be more residents than jobs. As with existing land use, residential development will continue to be primarily single-family and suburban in nature causing most workers that live in the area to seek employment elsewhere.

Figure 3.4 shows the spread of development and generalized land uses over time. It is apparent that while there are additional areas of employment and commercial activity, the majority of recent and future development is low density residential land use.

Utah Valley Transportation Studies
lake mountain transportation study

Figure 3.4
Projected Growth



1993 2004 2015 2030

Legend

Low Density Medium Density High Density Employment Centers

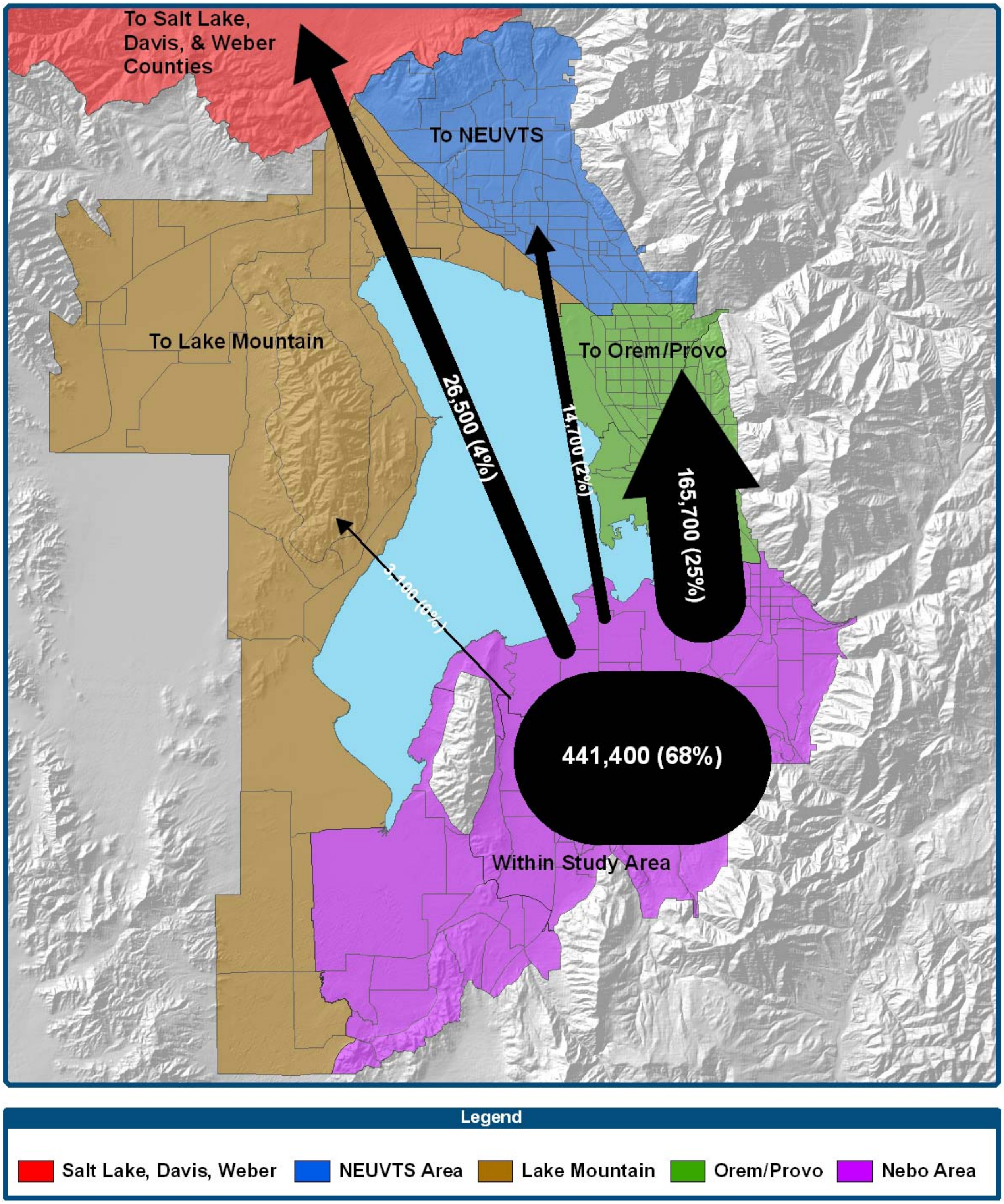
3.4 Future Travel Patterns

Overall, the proportion of all vehicle trips that start and end within the study area will decrease by 2030. Compared to over 75 percent of trips staying in the study area in 2001, only 68 percent do in 2030. Figure 3.5 shows the destinations of all trips that originate in the study area.

Work trips, however, tell a somewhat different story. In 2030, more work trips are staying within the study area and fewer trips are headed to the Provo-Orem area. In addition, proportionately fewer trips are going to Salt Lake County and other points north. These numbers point to a slightly more balanced residents/jobs picture than in other areas of Utah County. Figure 3.6 shows the destinations of work trips that originate within the study area.

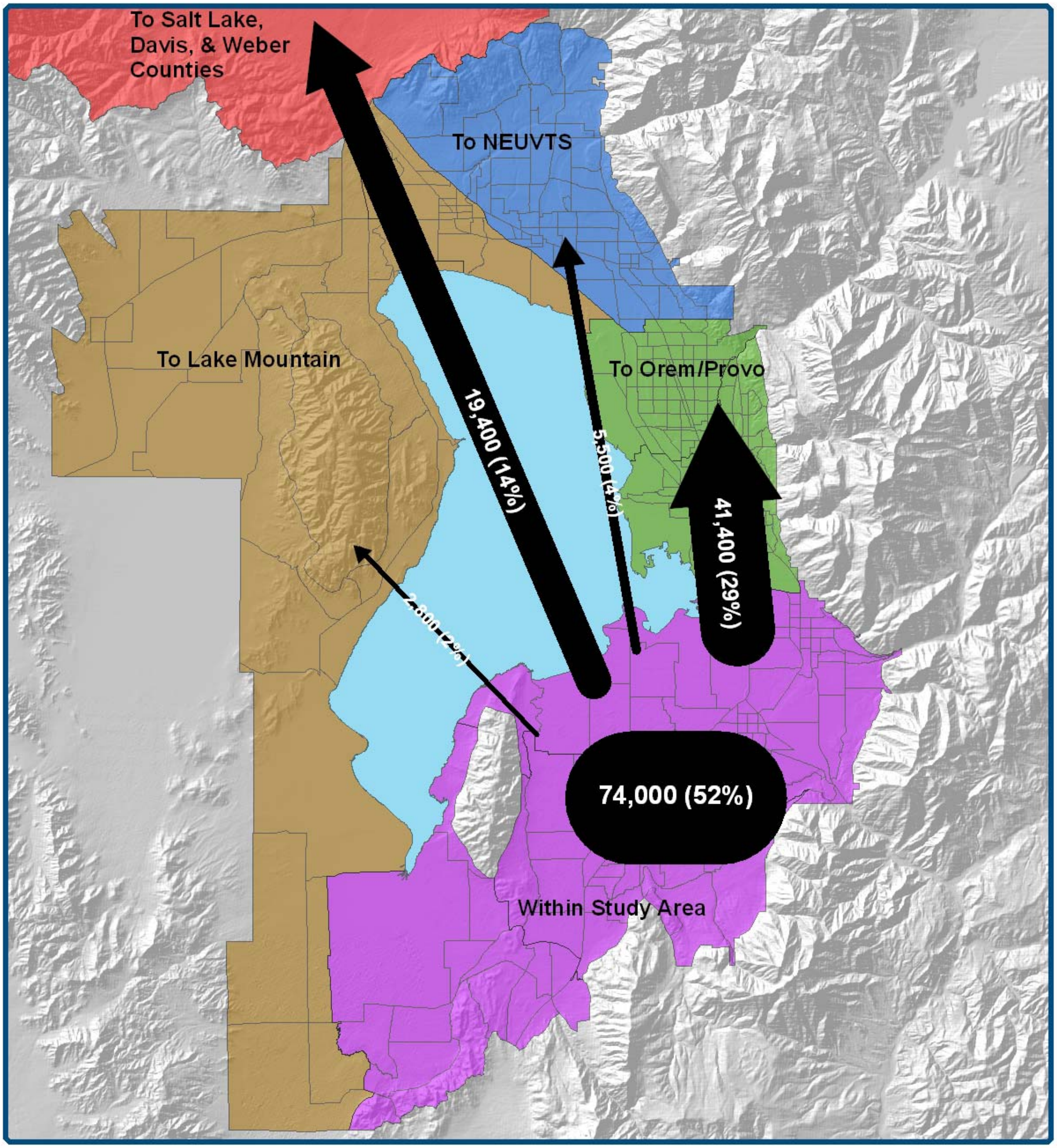
Utah Valley Transportation Studies
nebo transportation study

Figure 3.5
Total Trips from Study Area, 2030



Utah Valley Transportation Studies
nebo transportation study

Figure 3.6
Work Trips from Study Area, 2030



Legend

Salt Lake, Davis, Weber | NEUVTS Area | Lake Mountain | Orem/Provo | Nebo Area

3.5 Problem Identification

One of the first steps in this process was to determine whether or not future transportation problems should be expected based on available information. The steering committee was careful to not rely solely on socioeconomic projections or non-quantitative data, but wanted instead to measure future conditions in terms of traffic volume and network capacity and from that information, determine if problems were to be anticipated in the study area. The process that was used to determine whether or not there were problems in the future was to test a "No Build" alternative assuming projected socioeconomic conditions.

3.5.1 No Build Alternative

Using the future socioeconomic data defined earlier in this chapter, the regional travel demand model was run with a transportation network that assumed no additional projects would be built inside the study area. Outside of the study area, all projects included in MAG's 2030 Long Range Transportation Plan were assumed to be built. The No Build alternative assumed that improvements would continue in Salt Lake County and points north consistent with the Wasatch Front Regional Council Long Range Transportation Plan. In Utah County, improvements included in the adopted 2006-2010 Transportation Improvement Program (TIP) were assumed to continue as committed projects. These projects included:

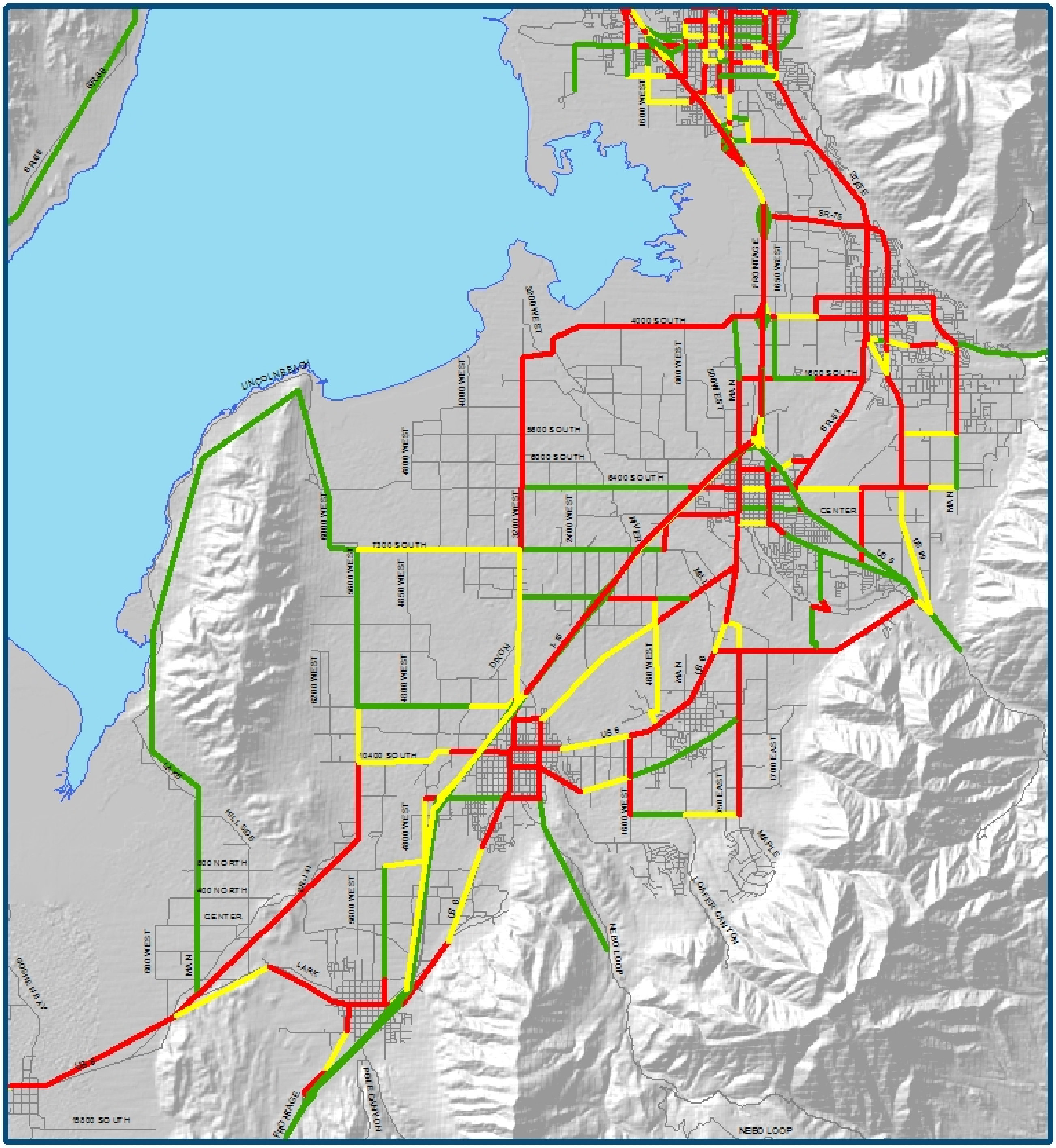
- SR-92, widened to four lanes from I-15 to Highland;
- Pleasant Grove 2000 West, extend existing road (American Fork 1100 East) from State Street to I-15;
- Springville 1400 North Interchange upgrade;
- 800 North (Orem), widened to four/six lanes from 400 West to 1000 East;
- Provo 4800 North; University Ave to Canyon Road new construction; and
- I-15 HOV lanes from Alpine to University Parkway.

3.5.1.1 No Build Alternative Level of Service

Figure 3.7 shows level of service for the No Build alternative. Volume to capacity ratios which define the level of service "grades" are consistent with those shown in Chapter 2, Existing Conditions. Again, red lines indicate heavy congestion in the peak hour and green lines indicate little congestion. As shown in Figure 3.7, significantly more congestion is expected in the study area over 2001 conditions. Particular areas of concern include roads within central city areas as well as major arterials that connect cities to each other and to the freeway system.

Utah Valley Transportation Studies
nebo transportation study

Figure 3.7
2030 No Build Level of Service



Legend

PM Peak Period Volume to Capacity Ratio
0.00 - 0.80 | 0.81 - 1.00 | 1.01 - 2.80 | Existing Roads

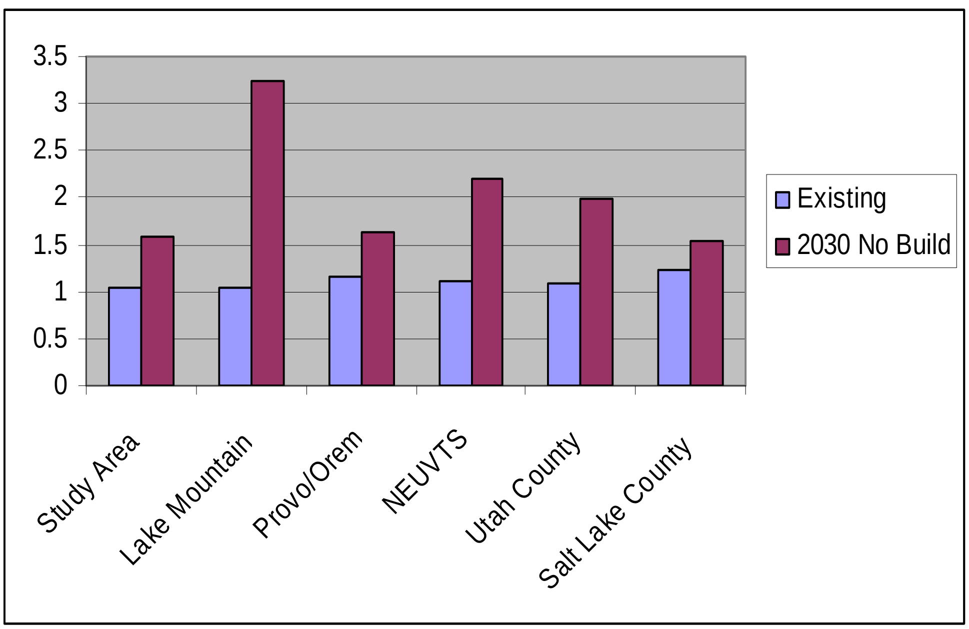
3.5.2 Comparison of Study Area to Regional Conditions

Quantifying future traffic conditions in the study area is important in determining where project priorities should be. In addition, providing a comparison to other areas offers some context to the congestion issues of the study area. Initial analysis of Nebo traffic conditions compared to other areas of Utah County reveals that:

- The increase in population in the Nebo Area has been greater over the past 10 years than the increase in population in the Lake Mountain Area including Saratoga Springs and Eagle Mountain. Population projections anticipate growth in the Nebo Area to remain higher than Lake Mountain over the next 20 years.
- Traffic volumes on I-15 in the Nebo Area have more than doubled over the past 20 years and are expected to double again over the next 25 years.
- A 21 minute trip from Santaquin City Hall to the base of Hobble Creek Canyon will increase to 59 minutes if no improvements are made but will continue to increase to 34 minutes if all of the non-controversial improvements are made.
- A 26 minute trip from downtown Salem to the BYU campus will take 73 minutes if no improvements are made, but will increase to 37 minutes if all of the non-controversial improvements are made.

The Travel Time Index (TTI) is a generally-accepted measure of an area's congestion. It is the time it takes to travel a given road segment at the peak hour divided by the free-flow travel time for that segment. A TTI of 1.0 indicates that there is little or no difference between peak period and free-flow traffic and larger numbers point to increased congestion during the peak period. Figure 3.8 shows the TTI for the study area transportation system under existing and future no build conditions and for other Utah regions. As shown in the figure, the TTI for the future no-build scenario is 1.58 in the Nebo study area. According to the definition, a TTI of 1.58 means that a trip that would take 30 minutes under free-flow conditions will take over 47 minutes during the peak hour. While figures given here are comparing system-wide delay, TTI can be compared at the corridor level as well.

Figure 3.8: Travel Time Comparison



Chapter Four

4. Travel Demand Modeling

The travel demand model was an important tool for the evaluation of various packages of proposed transportation improvements. The consultant team coordinated all model development and analysis to be consistent with the plans of each community as well as with Utah County, UDOT, UTA, and the Mountainland Association of Governments.

4.1 Model Version

The WFRC-MAG regional travel demand model version 4.2 was used for all analysis of the Nebo Transportation Study. The model uses the TP+ software from Citilabs Corporation as well as specific model scripts developed by the Wasatch Front Regional Council and Mountain Association of Governments staff. The Wasatch Front Regional Council and Mountainland Association of Governments work collaboratively on the model which covers the geographic extent of both agencies. They have worked together to develop updated and enhanced versions of the model, beta versions 4.3 and 5.0. While these later versions of the model offer improvements in such areas as managed lanes and transit/mode choice assumptions, they have not been as widely tested as the existing model. MAG recommended that for this project, version 4.2 of the model be used, a recommendation with which other transportation agencies including UTA and UDOT concurred. These organizations are confident in the process and results shown in this model version.

4.2 Quality Assurance/Quality Control

Establishing and maintaining a modeling process that provided meaningful results was of utmost importance in this planning process. Reliable output from the model depended on a quality control process that was thoughtful, ongoing, and comprehensive. In addition to internal quality control of the consultant staff, quality control between the consultant analysis and the raw travel model was important in order to allow members of the consultant team to achieve consistent results. Consistency between MAG and consultant work as well as overall quality control was accomplished in three key ways.

> *Establishing and maintaining a modeling process that provided meaningful results was of utmost importance in this planning process.*

First, socioeconomic data and land use information was examined in detail at the traffic analysis zone level. The project team worked with city staff in each city to determine future growth scenarios for population, employment, and land use. Once the cities and the team had developed a future scenario that was realistic both for the city and within the context of growth of the county, this data was entered into the model. At this point, various future transportation networks could be tested against each other and against a No Build alternative to determine the highest priority transportation projects while still ensuring that underlying socioeconomic and land use assumptions remained constant. Updates to socioeconomic and land use information was coordinated with MAG staff so that long range planning efforts could reflect updated data. Model data sets involving the revised socio-economic inputs were established early so that each subsequent model run could reference the same input data.

Second, the travel demand modeling process was a collaborative one where MAG and consultant staff worked closely together in determining and testing future transportation networks. Road improvement "packages" were discussed with MAG staff prior to modeling so that all parties were clear on what problem each package was meant to address, what issues might be present within each of the packages, etc. This collaborative process ensured that errors were minimized and that network packages made sense, addressed future problems in a realistic way, and the impacts of them were fully recognized.

Finally, the technical aspects of the travel demand model are highly detail oriented. With many scenarios to test among all the study areas, coding transportation networks necessitated keeping close track of the assumptions for each. Consultant staff coordinated with MAG staff to provide network definitions at a high, more easily understood level. In addition, specific coding assumptions were detailed in modeling logs for those working with the model at a more technical level. These modeling logs included such detail as transit line file inputs, speed and capacity class assumptions, and related details which would ensure that future model runs by MAG staff as part of the Long Range Transportation Plan could duplicate the basic results of the quad studies.

4.3 Travel Demand Model Basics

The WFRC/MAG regional travel demand model is a four-step gravity model where trips are "attracted" to destinations such as large employment, commercial, and housing centers. Data inputs and the four steps are described here in order to provide an overview of the modeling process. This summary is provided at a general level and further detail can be made available through the Mountainland Association of Governments.

> *…households with more people and/or more vehicles available tend to make more trips.*

Socioeconomic Inputs

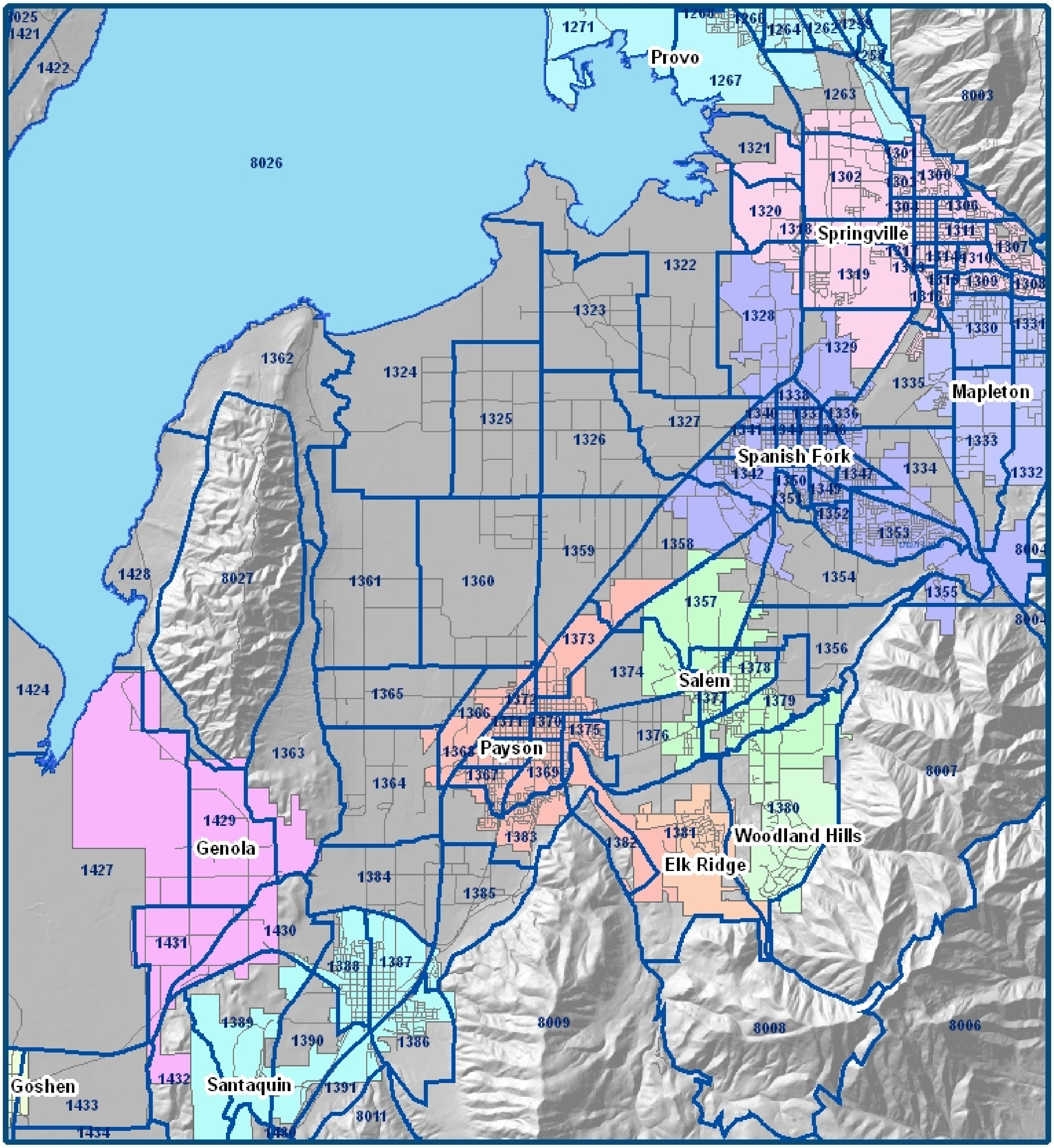
Socioeconomic data is input separate from the actual modeling framework. In other words, land use is not forecast as part of the travel model and must be forecast separately and used as model inputs. These inputs are the variables that most affect travel forecasts. Since socioeconomic data is input at the traffic analysis zone (TAZ) level, it is typically not necessary to be as precise as the actual land use variables that are approved by the City. It is more important to adequately reflect the magnitude and type of development patterns. Specific variables such as automobile ownership are derived from a logit model (probability model) within the travel model that is sensitive to detailed inputs on household size, income, street density, and other variables that are not presented in this summary. Figure 4.1 shows traffic analysis zones in the study area.

Trip Generation

Trip generation is performed in the first step of the traditional four-step travel demand modeling process. Trip generation is largely based on a regional 1993 small sample home interview survey. Trip rates generally follow cross classification rates based on household size and automobile availability so that households with more people and/or more vehicles available tend to make more trips. Trips rates are derived for trip production and attraction pairs for specific trip purposes such as Home Based Work trips, Home Based Other trips, Non-Home Based trips, and External trips.

Utah Valley Transportation Studies
nebo transportation study

Figure 4.1
Traffic Analysis Zones



Legend

TAZs | Elk Ridge | Genola | Goshen | Mapleton | Payson | Provo | Salem | Santaquin | Spanish Fork | Springville | Woodland Hills

Trip Distribution

Trip distribution is the process of matching trip productions to trip attractions. For example, "bedroom" areas, those areas with high population and dwelling units but little employment such as many areas in Utah County, will produce work trips that will be attracted to downtown areas. The regional travel model uses the TP+ software for the entire four-step travel demand process. Within TP+, trip distribution is performed using a "gravity model" that attracts a given production proportional to the relative size of the attraction in each area and inversely proportional to the distance (travel time) between the production and each attraction. Trip distribution is performed based on feedback derived from traffic assignment (to be discussed) using pre-defined time periods and other distribution variables for each trip purpose. The beta model version 5.0 varies from the traditional gravity model for work trips and uses what is called a destination choice model. Since the destination choice and the gravity model are both calibrated to the same base year trip distribution data, they will produce very similar results. However, future model versions such as 5.0 will be more sensitive to a wider range of variables such as toll roads.

Mode Choice

Trips are distributed based on highway terminal times but are later sorted to reflect actual travel modes. Travel modes are estimated using a nested logit function. The "nesting" of this probability allows for competitive trip purposes to be separated. For example, express transit riders may take express buses or rail, rail trips can be light rail or commuter rail, etc. Mode split variables have been estimated based on recent on-board transit surveys, but rely on either borrowed or estimated variables for new modes such as commuter rail, and for trip purposes other than home based work and home based college trips.

Traffic Assignment

Resulting automobile trips are assigned to each road based on the shortest travel time path to complete the trip. Assignment is developed for four specific time periods (am peak, pm peak, evening, and mid-day) which can be summed to cover the 24 hours in a day. Congested conditions are estimated based on modifications to the Bureau of Public Roads speed degradation estimates derived from the Highway Capacity Manual.

4.4 Transit Mode Split

The primary use of the travel model is the ability to forecast future traffic volumes on various roads in the region in order to assist in capital facilities planning. However, aggregate analysis can also be achieved through the travel models so that other information can be pulled from the model such as transit ridership. Transit mode split is an output of the regional travel model and it varies by the transit options that are included in the model's transportation network. Mode split for each alternative is discussed in more detail in Chapter 5 of this report, but is typically about three percent for work trips and one percent for all trips. Table 4.1 shows the transit mode split for Wasatch Front Counties for various transportation networks.

Table 4.1: Transit Mode Split

	Percent of All Trips	Percent of Work Trips
Existing (2001)	1.14%	3.75%
2030 Long Range Plan	1.57%	4.90%
2030 No Build	0.93%	2.75%

Chapter Five

5. Alternatives Analysis and Transportation Solutions

The process of choosing and analyzing alternatives of the Nebo Transportation Study involved determining a set of projects, a "package" of alternatives, that addresses travel demand to the year 2030. This chapter describes the tools that were used to differentiate between the alternatives and as a basis for comparison. Then, a description of the various alternatives is offered, followed by an evaluation of these alternatives using the analysis tools. Finally, the locally preferred alternative recommended project list is described including highway and transit projects for 2015, 2030, and beyond.

5.1 Analysis Tools

As discussed in Chapter 3, transportation network alternatives were evaluated using a consistent set of performance measures. The performance measures were chosen because they were effective ways of converting technical information to something more easily understood by a broad range of stakeholders.

Network alternatives were evaluated based on the following performance measures:

- Level of service (LOS) – standard measurement used by engineers that identifies the amount of congestion on a given roadway. Level of service is given grades of A through F, with A being free-flow conditions and F being highly congested, "parking lot" conditions.
- Vehicle Hours of Travel (VHT) – a calculation of the total time all vehicles spend on the transportation network. This measure is easily obtained from the regional travel demand model and helps to identify area-wide congestion changes.
- Vehicle Miles of Travel (VMT) – similar to VHT, this refers to a calculation of the total miles traveled by all vehicles on the transportation network. It is also an output of the travel demand model.
- Travel Time Index (TTI) – refers to a measure of congestion determined by dividing the time it takes to travel a given road segment at the peak hour by the free-flow travel time for that segment.

> *Level of service analysis for the LRTP alternative showed several areas of concern related to future travel demand.*

In addition to these performance measures, the impacts of a transportation project were also considered in the evaluation process. "Impacts" included right-of-way, cost, environmental, social, and land use. While these impacts are less quantifiable than the above performance measures, they were nevertheless important factors in the viability of alternatives. More discussion of project impacts is included in Appendix B.

5.2 Alternatives

The alternatives evaluated by the technical advisory committee ranged from a No Build transportation network to visionary packages that looked at travel demand beyond the year 2030. Each of the alternatives and alternative "packages" is described below.

5.2.1 No Build

The No Build alternative is discussed in detail in Chapter 3. It assumes that no current Long Range Transportation Plan projects are built within the study area although all LRTP projects are built outside the study area. In addition, it assumes the existing transit network within the study area. As shown in Figure 3.7 in Chapter 3, the level of service of the No Build alternative was determined to be unacceptable by the steering committee and was not further considered.

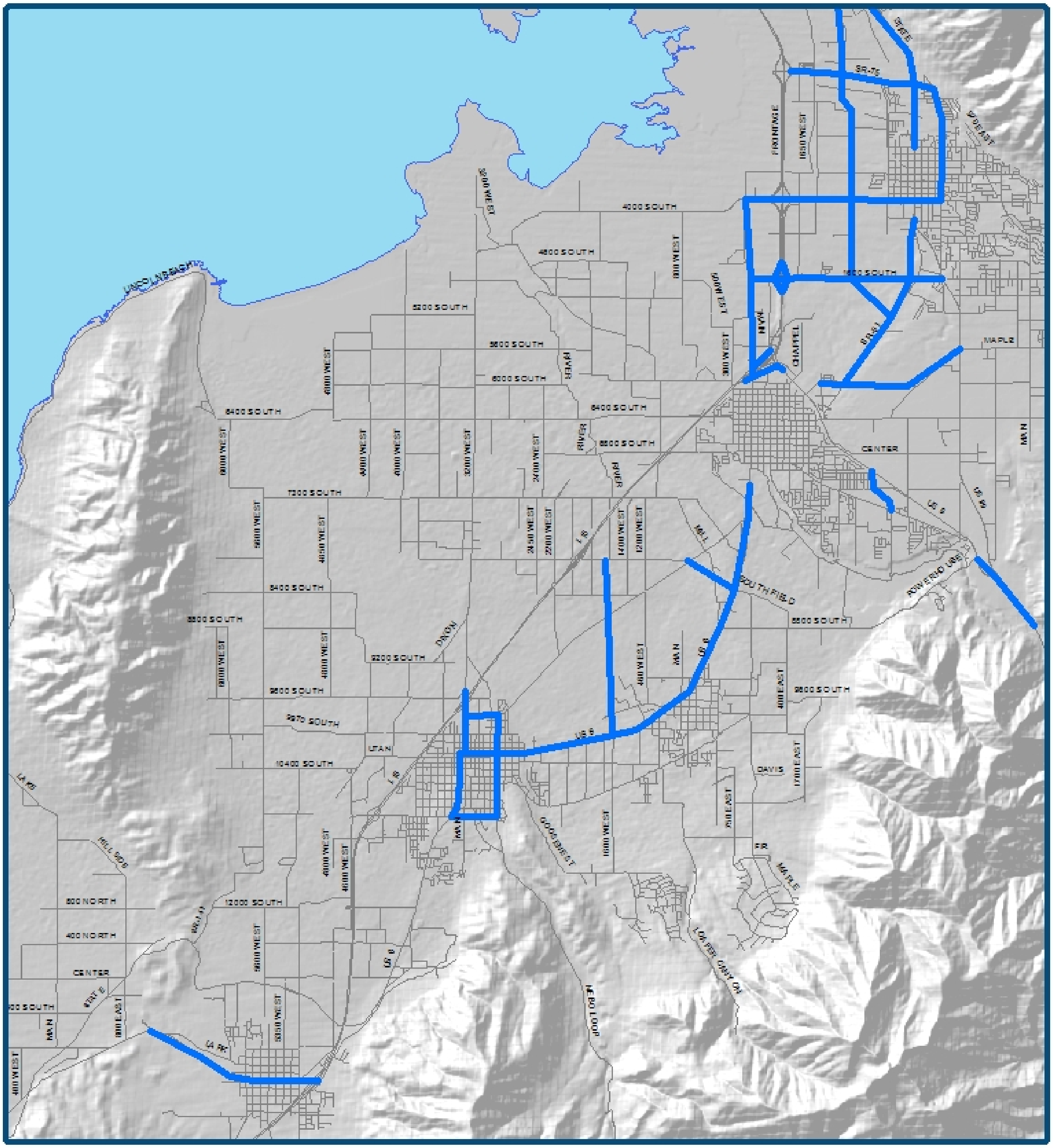
5.2.2 2030 Long Range Transportation Plan

The first build alternative considered was the existing 2030 LRTP developed by the Mountainland Association of Governments. Projects included in the current LRTP within the Nebo study area that are assumed in this alternative are shown in Figure 5.1. It assumes that LRP projects are built throughout Utah County including transit projects consisting of commuter rail, bus rapid transit between Provo and Orem, and expanded bus service county-wide.

Level of service analysis for the LRTP alternative showed several areas of concern related to future travel demand. These included several areas in Springville, Mapleton, and Spanish Fork as well as some north/south corridors connecting Elk Ridge to Salem and Payson to Santaquin. Figure 5.2 shows level of service in the Nebo area based on the 2030 Long Range Transportation Plan.

Utah Valley Transportation Studies
nebo transportation study

Figure 5.1
2030 Long Range Plan Projects

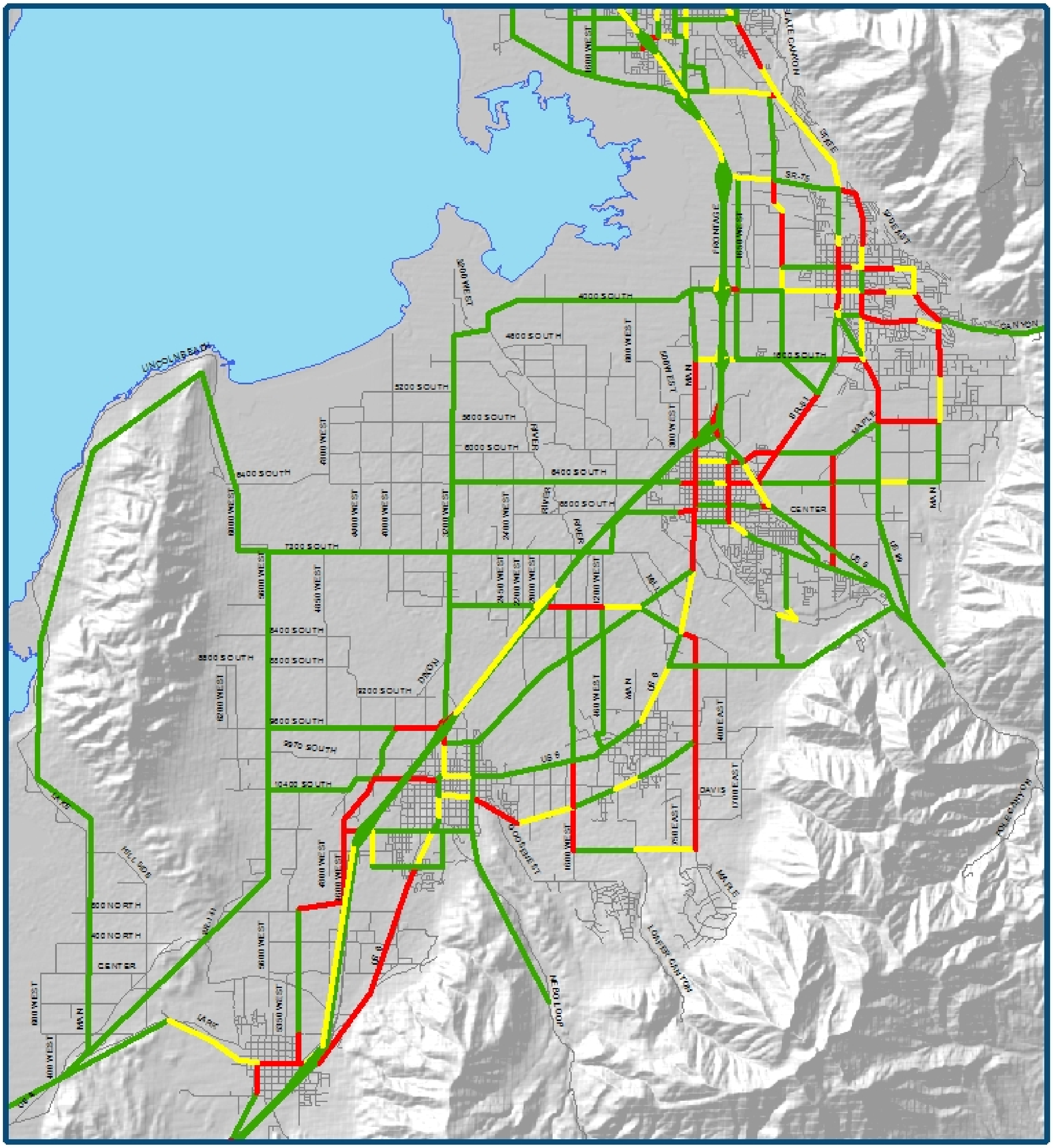


Legend

Long Range Plan Projects — Existing Roads

Utah Valley Transportation Studies
nebo transportation study

Figure 5.2
2030 Long Range Plan Level of Service



Legend

PM Peak Period Volume to Capacity Ratio
0.00 - 0.80 | 0.81 - 1.00 | 1.01 - 2.80 | Existing Roads

5.2.3 Non-controversial Projects

In addition to the concerns described above related to the 2030 LRTP alternative, the technical advisory committee wanted to give a more detailed look at the individual projects included in the plan and remove projects that were deemed to be more controversial. A list of "non-controversial" projects was chosen by the TAC from the LRTP projects. In theory, all transportation projects that are included in the Long Range Transportation Plan have been promoted by the cities that are planning for their construction or improvement and are part of city master transportation plans. However, often there are individual projects that are more important at the regional level and that may be lacking local support. Those projects that are fully supported by both local governments and MAG are called "non-controversial" projects and are a subset of the LRTP project list.

Level of service for the non-controversial projects alternative was of concern to the TAC as travel conditions in 2030 are significantly worse than in the Long Range Plan alternative.

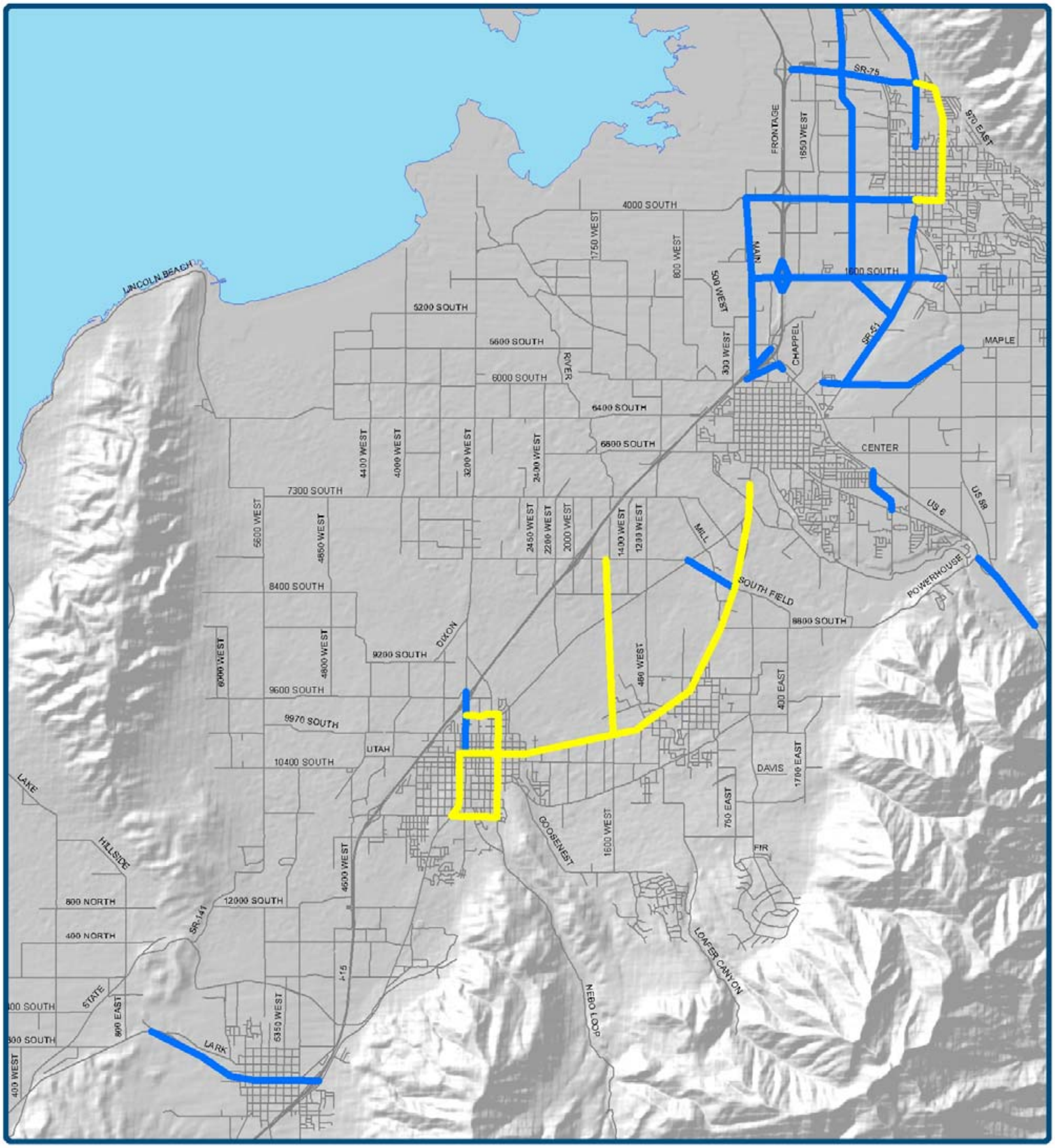
Although they are being called non-controversial projects for purposes of this planning process, it is not expected that these projects will cause no discussion or disagreement when they are more imminent. Most transportation projects provoke debate at the local level.

Non-controversial projects in the Nebo study area are shown in blue on Figure 5.3. Other projects shown in Figure 5.3 are other LRP projects as well as "vision" projects developed by the project team. Vision projects are discussed later in this chapter.

Level of service for the non-controversial projects alternative was of concern to the TAC as travel conditions in 2030 are significantly worse than in the Long Range Plan alternative. Because the Non-controversial projects alternative does not adequately address future travel demand, it was eliminated from further consideration. Figure 5.4 shows the level of service for the non-controversial projects alternative in the Nebo study area.

Utah Valley Transportation Studies
nebo transportation study

Figure 5.3
2030 Non-controversial Projects

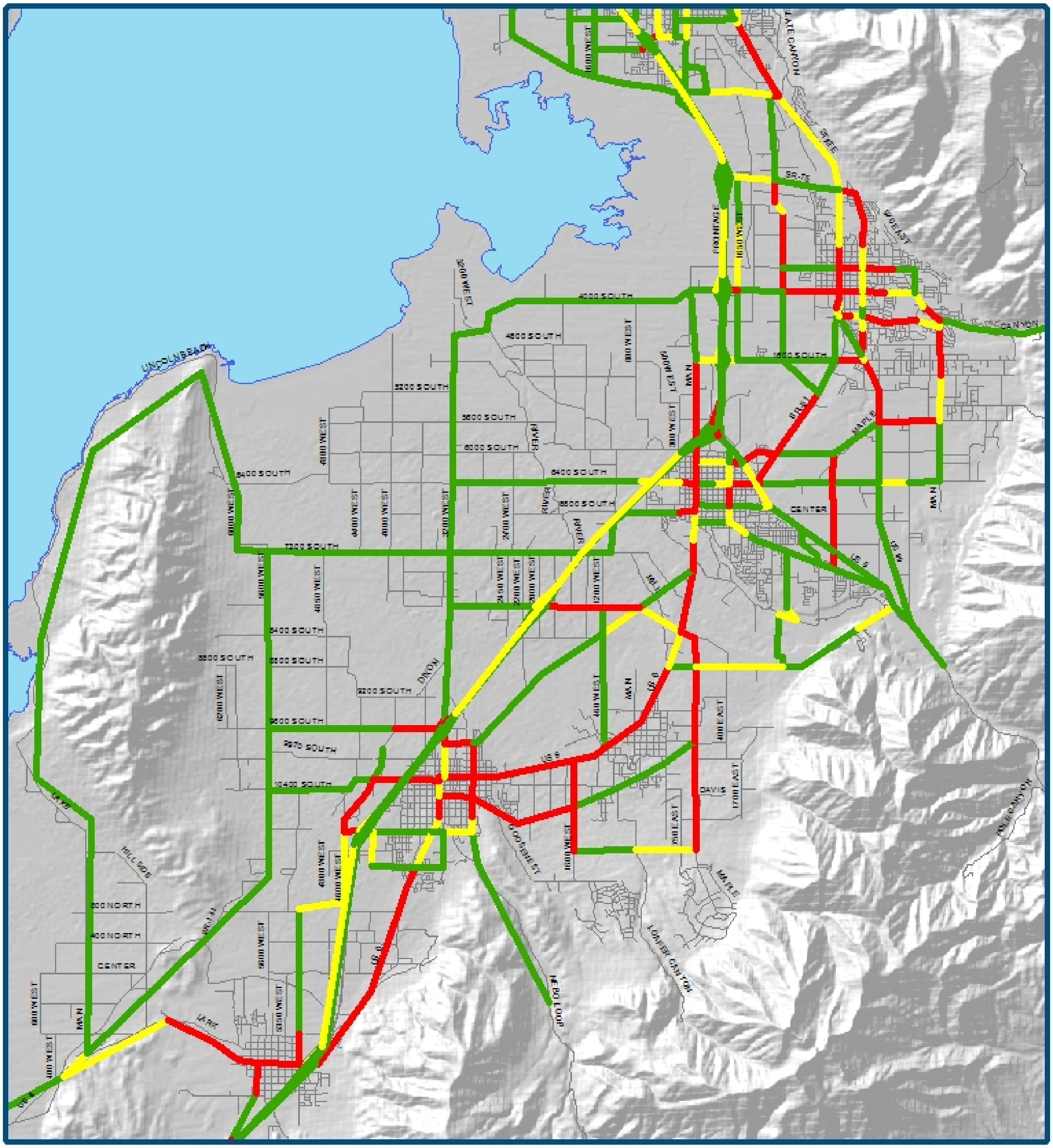


Legend

Non-controversial Long Range Plan Projects | Remaining Long Range Plan Projects

Utah Valley Transportation Studies
nebo transportation study

Figure 5.4
2030 Non-controversial Level of Service



Legend

PM Peak Period Volume to Capacity Ratio

0.00 - 0.80 | 0.81 - 1.00 | 1.01 - 5.00 | Existing Roads

5.2.4 Transportation Package Alternatives

With no viable transportation alternative, the TAC began looking at transportation projects individually with no regard as to whether they were included in the current Long Range Transportation Plan. The committee was visionary in this exercise in that they considered a range of transportation projects for implementation beyond 2030. Based on some preliminary testing of individual projects and their future volumes, "packages" of transportation projects were developed for further analysis and consideration.

Coordination with the other two quad studies was important and was considered throughout the process. The packages of projects that were developed were consistent across Utah County, using the recommendations from the Northeast Utah Valley Transportation Study along with various alternatives in the Lake Mountain and Provo-Orem quadrants. So, Package 1 is consistent among all three quadrants, as is Package 2, etc.

5.2.4.1 Package #1

The project list for the Nebo study area reflects the non-controversial project list in addition to a south county highway, among others. County-wide projects assumed in these packages are:

Nebo

- All non-controversial projects
- LRP projects except Payson 600 East, 100 West, and 800 South
- Western part of south county highway
- New project on 2600 East Mapleton
- New I-15 interchanges at Spanish Fork and South Payson

Lake Mountain

- All non-controversial projects
- Mountain View Corridor

Provo/Orem

- All non-controversial and LRP projects
- No C/D Roads
- No new I-15 interchanges

NEUV

- Study recommendations

Transit

- LRP Transit: commuter rail, Provo/Orem BRT, plus expanded bus service

5.2.4.2 Package #2

The second package of transportation alternatives for the Nebo area again includes all non-controversial projects, but also includes some major regional facilities such as the western portion of the south county highway and the east lake highway to Mountain View Corridor. Projects assumed across Utah County in Package #2 include:

Nebo

- All non-controversial projects
- Western part of south county highway
- New project on 2600 East Mapleton
- LRP projects except Payson 600 East, 100 West, and 800 South
- East Lake Highway to MVC

Lake Mountain

- All non-controversial projects
- Mountain View Corridor
- SR-73 as expressway from 2300 West to Cedar Fort
- Foothill Dr. with higher capacity
- Lehi 300W/500W interchange

Provo/Orem

- All non-controversial and LRP projects
- No C/D Roads
- No new I-15 interchanges

NEUV

- Study recommendations

Transit

- LRP Transit: commuter rail, Provo/Orem BRT, plus expanded bus service

5.2.4.3 Package #3

Package #3 again includes all non-controversial projects in the Nebo study area, in addition to a connection between Provo and Springville and the western part of a south county highway. Transportation projects in Utah County that are modeled in Package #3 include:

Nebo

- All non-controversial projects
- Western part of south county highway
- New project on 2600 East Mapleton
- West Springville connection, University Avenue extended south
- LRP projects except Payson 600 East, 100 West, and 800 South

Lake Mountain

- All non-controversial projects
- Mountain View Corridor extending south with a lake crossing

Provo/Orem

- All non-controversial and LRP projects
- No C/D Roads
- No new I-15 interchanges

NEUV

- Study recommendations

Transit

- LRP Transit: commuter rail, Provo/Orem BRT, plus expanded bus service

5.2.4.4 Package #4

Package #4 in the Nebo area is similar to #3, although replaces the Springville/Provo connection with the east bench portion of the South County Highway. Countywide projects modeled in Package #4 include:

Nebo

- All non-controversial projects
- Western part of South County Highway
- New project on 2600 East Mapleton

- LRP projects except Payson 600 East, 100 West, and 800 South
- East bench part of South County Highway

Lake Mountain

- All non-controversial projects
- Mountain View Corridor

Provo/Orem

- All non-controversial and LRP projects
- No C/D Roads
- No new I-15 interchanges

NEUV

- Study recommendations

Transit

- LRP Transit- commuter rail, Provo/Orem BRT, plus expanded bus service

5.2.4.5 Package #5

Projects in Package #5 for the Nebo study area is the highest capacity, greatest investment of all the packages. Specific projects throughout Utah County included in this package are:

Nebo

- All non-controversial projects
- Western part of South County Highway
- New project on 2600 East Mapleton
- LRP projects except Payson 600 East, 100 West, and 800 South
- East Lake highway plus east bench road plus new I-15 interchanges plus Benjamin road

Lake Mountain

- All non-controversial projects
- Mountain View Corridor
- North Utah Lake Crossing
- Foothill Dr. with higher capacity

Provo/Orem

- All non-controversial and LRP Projects
- No C/D Roads
- No new I-15 interchanges

NEUV

- Study recommendations

Transit

- Robust Transit service: commuter rail, Provo/Orem BRT, plus expanded bus service with increase routes and frequencies, plus new BRT in north and south county

5.3 Alternatives Comparison

After examining the five transportation packages for the Nebo study area and determining that none of the packages adequately addressed future concerns, the technical advisory committee decided that in order to reach consensus on a locally preferred alternative, there needed to be a more detailed comparison of individual transportation projects including those that were not fully supported by the entire TAC, the "controversial" projects. Project fact sheets that summarized future traffic volumes, environmental impacts, financial considerations including construction and right-of-way costs, and cost per annual vehicle mile traveled (VMT) were developed for each project. These project fact sheets are provided in Appendix C.

Based on the information provided in these project fact sheets, the technical advisory committee was able to determine which projects were going to be included in their final recommendations. Table 5.2 below shows the recommended projects for the Nebo study area.

Table 5.2: Nebo Recommended Projects and Impacts

Project	Length (miles)	ROW (feet)	Impacts: Properties impacted	Impacts: Structures Impacted	Impacts: Wetlands (Acres)	Construction Cost (Millions)	Right-of-way Cost (Millions)	Structure Cost (Millions)	Total Cost (Millions)	Volume Served	Cost per annual VMT
Main Street Payson	0.70	84	Supported by the Cities*			$3.21	$0.16	$0.00	$3.37	21,000	$0.46
Main Street Santaquin	1.70	84	Supported by the Cities*			$7.78	$0.40	$0.00	$8.18	39,000	$0.49
100 West Payson	0.95	106	68	34	0.00	$5.36	$0.57	$0.00	$5.93	33,000	$0.63
US-89 Provo/Springville	4.50	125	Supported by the Cities*			$30.56	$4.13	$0.00	$34.69	27,000	$0.66
1400 North Springville	1.90	106	Supported by the Cities*			$10.71	$1.14	$20.00	$31.85	25,000	$1.07
SR-51	3.10	84	Supported by the Cities*			$14.20	$0.72	$10.00	$24.92	30,000	$1.13
SR-198 Spanish Fork to Payson	6.29	106	278	72	2.80	$35.46	$3.78	$20.00	$59.24	26,000	$1.15
US-6 Spanish Fork	9.50	106	Supported by the Cities*			$53.56	$5.71	$10.00	$69.27	15,000	$1.33
950 West Springville	4.50	84	Supported by the Cities*			$20.61	$6.31	$20.00	$46.92	31,000	$1.37
Spanish Fork/Provo Connection	5.86	150	92	17	57.04	$43.75	$11.98	$20.00	$75.73	24,000	$1.41
400 East Springville	1.57	106	149	84	1.11	$8.85	$0.94	$10.00	$19.79	16,000	$1.44
400 South Springville	2.40	106	Supported by the Cities*			$13.53	$1.44	$20.00	$34.97	39,000	$1.44
Nebo Belt Route (Eastern Segment)	3.58	150	122	22	0	$38.05	$6.83	$20.00	$64.88	17,000-39,000	$1.85
1600 South Springville	2.80	84	Supported by the Cities*			$13.01	$0.65	$30.00	$43.66	25,000	$2.03
Nebo Belt Route (Western Segment)	4.41	180	76	11	23.40	$52.90	$13.25	$10.00	$76.15	23,000	$2.07
Benjamin Road	14.49	106	281	58	18.69	$80.84	$8.71	$20.00	$109.55	8,000	$2.38
Woodland Hills Dr	0.80	66	Supported by the Cities*			$2.74	$0.88	$0.00	$3.62	4,000	$2.62
Expressway Lane	1.50	84	Supported by the Cities*			$6.87	$2.10	$20.00	$28.97	15,000	$3.02
Nebo Belt Route (Center Segment)	7.92	180	184	54	0	$85.31	$21.77	$10.00	$117.08	10,000-19,000	$3.27
Elk Ridge Dr. UC8000 to SR-198	2.75	80	42	0	2.04	$12.33	$1.29	$0.00	$13.62	4,500	$3.51
East Lake Highway (Southern Segment Eastern Alignment)	11.58	150	107	11	13.94 Lake/Wetlands 61.07 Wetlands	$123.07	$23.99	$121.44	$268.50	17,000	$3.55
1600 South Springville Interchange							$0.00	$28.00	$28.00	28,000	$7.97
Spanish Fork Belt Route Interchange							$0.00	$28.00	$28.00	24,000	$8.50
Spanish Fork Center St. Interchange							$0.00	$28.00	$28.00	22,000	$11.48
12400 S. Interchange							$0.00	$28.00	$28.00	16,000	$15.85

*No impacts were quantified for those projects that are already widely supported by cities.

Projects in Table 5.2 are listed by their cost per annual vehicle miles traveled (VMT). Cost per annual VMT was determined to offer the most insight as to the effectiveness of individual projects, taking into account both traffic volume served and the cost of the project.

After "ranking" these projects by cost per annual VMT, the study team devised a strategy to determine the where projects best fit into the overall timeframe of recommendations: year 2015, 2030, and beyond 2030. This strategy centered on determining the value of drivers' time and how much time was saved by drivers if individual projects were built, thereby calculating a total value of time saved for all drivers across the transportation network. This value was discounted by seven percent to account for the time value of the investment, that money spent in the future is worth somewhat less than its value today due to inflation. For the Nebo study area, that value was over $582 billion. This value was referred to as the time/value threshold.

In assessing the recommended project list, aggregate project costs were calculated by adding each project to the cost of all of the preceding projects. When this aggregate cost reached approximately $582 billion, projects within this cost were considered for recommendation in 2015 or 2030. Projects that were over the $582 billion aggregate cost were determined to not be as cost effective because the cost of the project exceeded the time value benefit. Table 5.3 shows the aggregate cost of the recommended projects.

…projects that were deemed important for planning purposes but beyond the scope of the 2030 planning horizon were included in the Ultimate Plan project list.

The TAC then evaluated projects over the $582 billion time/value threshold and determined the projects of greatest need. These projects were grouped and determined to be the 2015 Recommended Projects list. They are indicated in red text in Table 5.3. Remaining projects above the time/value threshold became the 2030 Recommended Projects list. These are indicated in blue text in Table 5.3. Finally, projects that were deemed important for planning purposes but beyond the scope of the 2030 planning horizon were included in the Ultimate Plan project list. Those projects are indicated in purple.

In addition to the projects that fell above the time/value threshold, individual projects below the threshold were considered for addition in 2015 and 2030 projects lists. Because of the high demand and more immediate need for the Woodland Hills Drive project, it was added to the 2015 recommendations. The 1600 South Springville interchange project was added because the full value of interchanges are difficult to calculate with great accuracy due to the construction costs of the facility.

Table 5.3: Nebo Recommended Projects and Aggregate Costs

Project	Total Cost (Millions)	Volume Served	Cost per annual VMT	Aggregate Costs
Main Street Payson	$3.37	21,000	$0.46	$3.37
Main Street Santaquin	$8.18	39,000	$0.49	$11.55
100 West Payson	$5.93	33,000	$0.63	$17.48
US-89 Provo/Springville	$34.69	27,000	$0.66	$52.17
1400 North Springville	$31.85	25,000	$1.07	$84.02
SR-51	$24.92	30,000	$1.13	$108.95
SR-198 Spanish Fork to Payson	$59.24	26,000	$1.15	$168.19
US-6 Spanish Fork	$69.27	15,000	$1.33	$237.46
950 West Springville	$46.92	31,000	$1.37	$284.38
Spanish Fork/Provo Connection	$75.73	24,000	$1.41	$360.11
400 East Springville	$19.79	16,000	$1.44	$379.90
400 South Springville	$34.97	39,000	$1.44	$414.88
Nebo Belt Route (Eastern Segment)	$64.88	17,000-39,000	$1.85	$479.75
1600 South Springville	$43.66	25,000	$2.03	$523.42
Nebo Belt Route (Western Segment)	$76.15	23,000	$2.07	$599.57
Benjamin Road	$109.55	8,000	$2.38	$709.11
Woodland Hills Dr	$3.62	4,000	$2.62	$712.73
Expressway Lane	$28.97	15,000	$3.02	$741.71
Nebo Belt Route (Center Segment)	$117.08	10,000-19,000	$3.27	$858.78
Elk Ridge Dr. UC8000 to SR-198	$13.62	4,500	$3.51	$872.40
East Lake Highway (Southern Segment Eastern Alignment)	$268.50	17,000	$3.55	$1,140.90
1600 South Springville Interchange	$28.00	28,000	$7.97	$1,168.90
Payson Belt Route Interchange	$28.00	24,000	$8.50	$1,196.90
Spanish Fork Center St. Interchange	$28.00	22,000	$11.48	$1,224.90
12400 S. Interchange (north Santaquin)	$28.00	16,000	$15.85	$1,252.90

5.4 Highway and Transit Recommendations

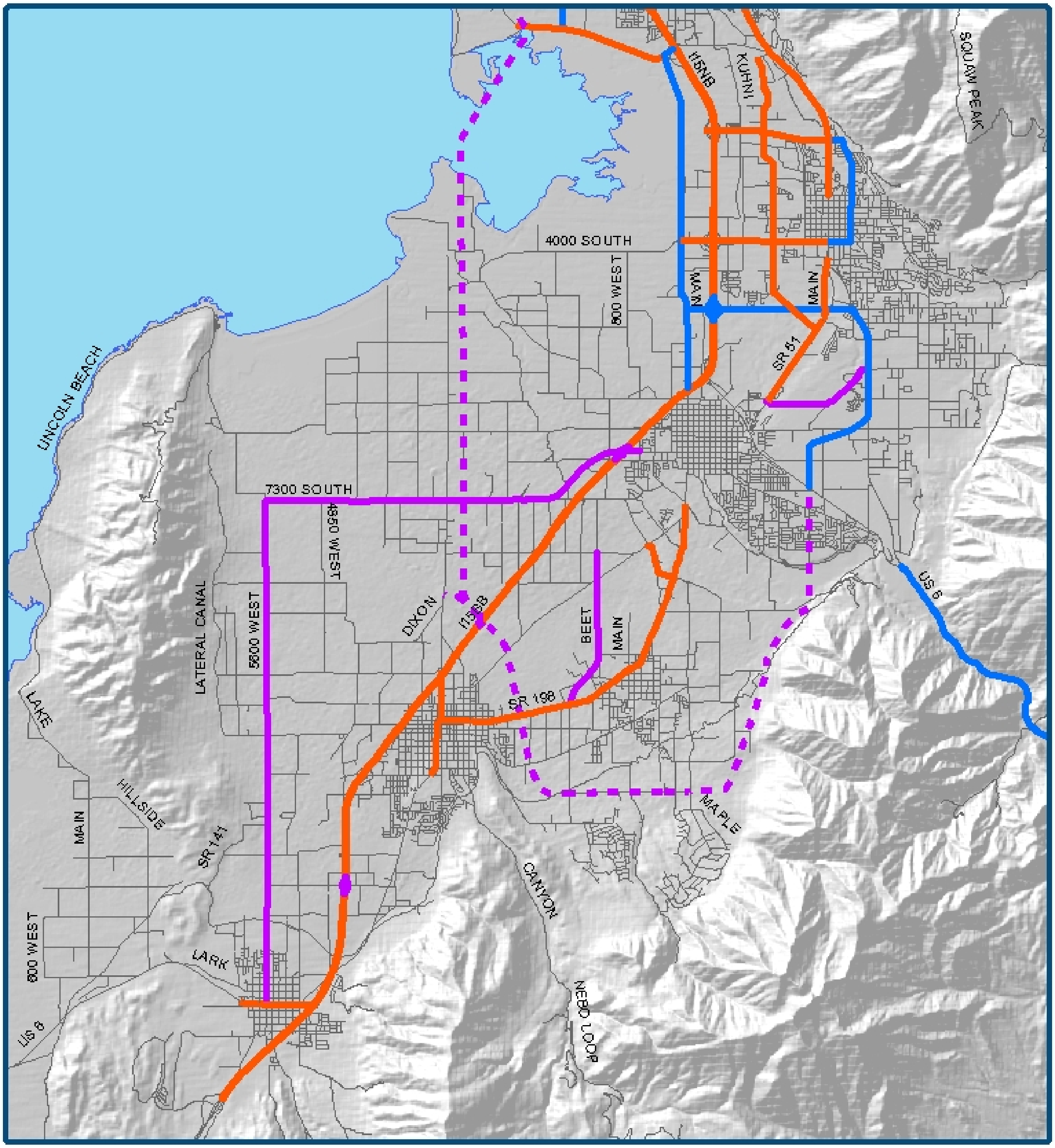
5.4.1 Study Area Recommendations

Transportation recommendations for the Nebo study area are shown by phase in Figure 5.5. Projects included in the 2015 project list focus on north-south movement and connecting cities such as Springville and Spanish Fork as well as Spanish Fork and Payson. In addition, east-west connections to I-15 near Springville are shown as 2015 priority projects. I-15 is shown in Figure 5.5 as a 2015 recommended project although improvements on I-15 are separate from the scope of the Nebo Transportation Study. The TAC felt strongly that I-15 improvements are important to the regional transportation network and that it should be indicated on the recommended projects map.

The 2030 project list includes higher-functioning facilities including US-6 in Spanish Fork Canyon, a Spanish Fork/Provo connection, and the eastern segment of a Nebo belt route. Ultimate plan projects include additional I-15 interchanges, a western segment of a Nebo belt route, East Lake Highway, and Benjamin Road.

Utah Valley Transportation Studies
nebo transportation study

Figure 5.5
Recommended Road Projects



Legend

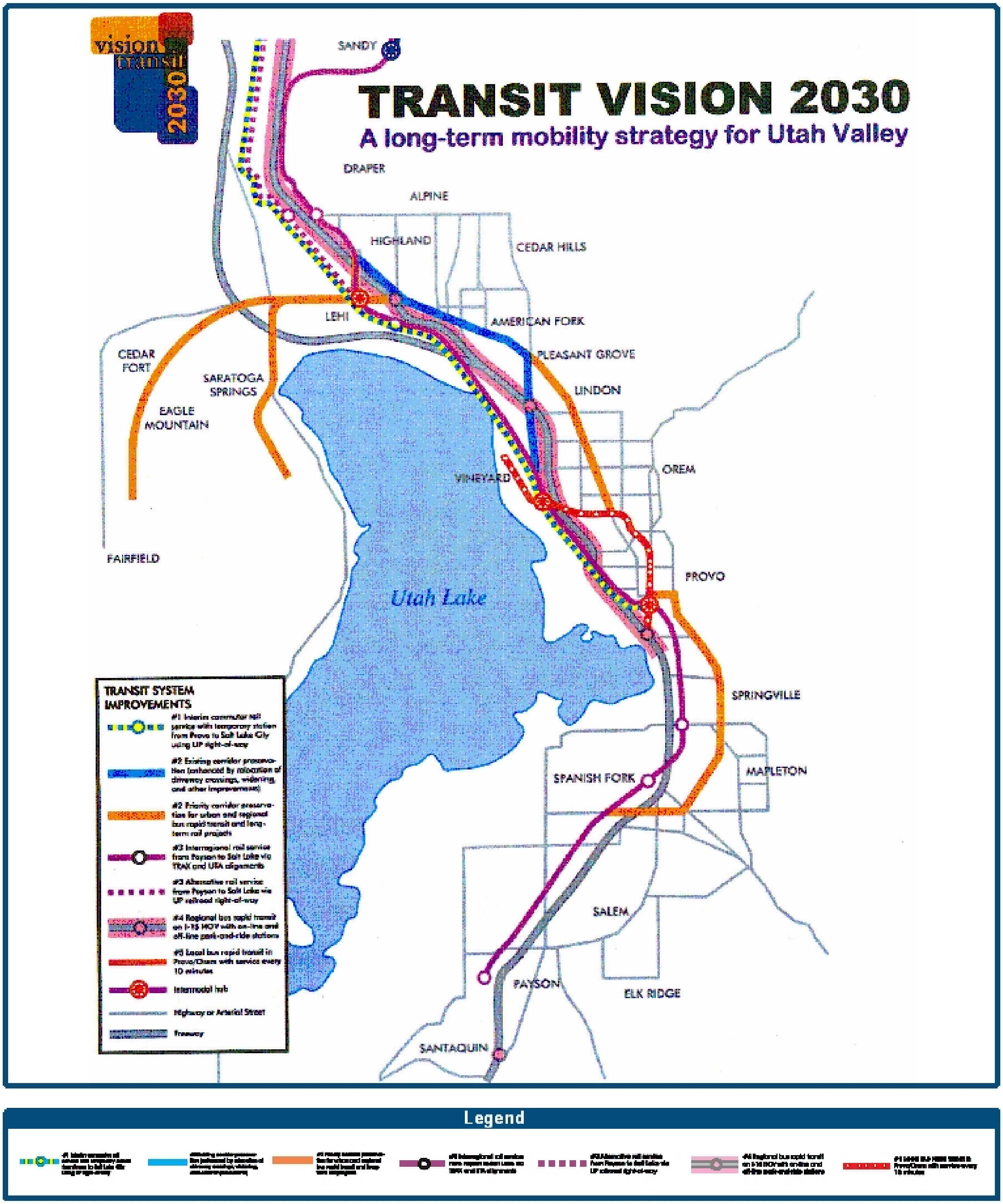
- 2015 Recommended Projects
- Recommended Long Range Plan Projects
- Ultimate Plan Projects
- Ultimate Plan Flexible Alignments

Transit recommendations for the Nebo study area reflect the transit component of the current Long Range Transportation Plan for Utah County. Regional commuter rail service from Payson to Salt Lake City is a transit priority as is expanded local bus service. In addition, the Nebo Transportation Study recommends express transit service to Santaquin as well as community connector service for easier transit access to other Utah County destinations. Figure 5.9 shows transit recommendations for Nebo study area.

5.4.2 Regional Recommendations

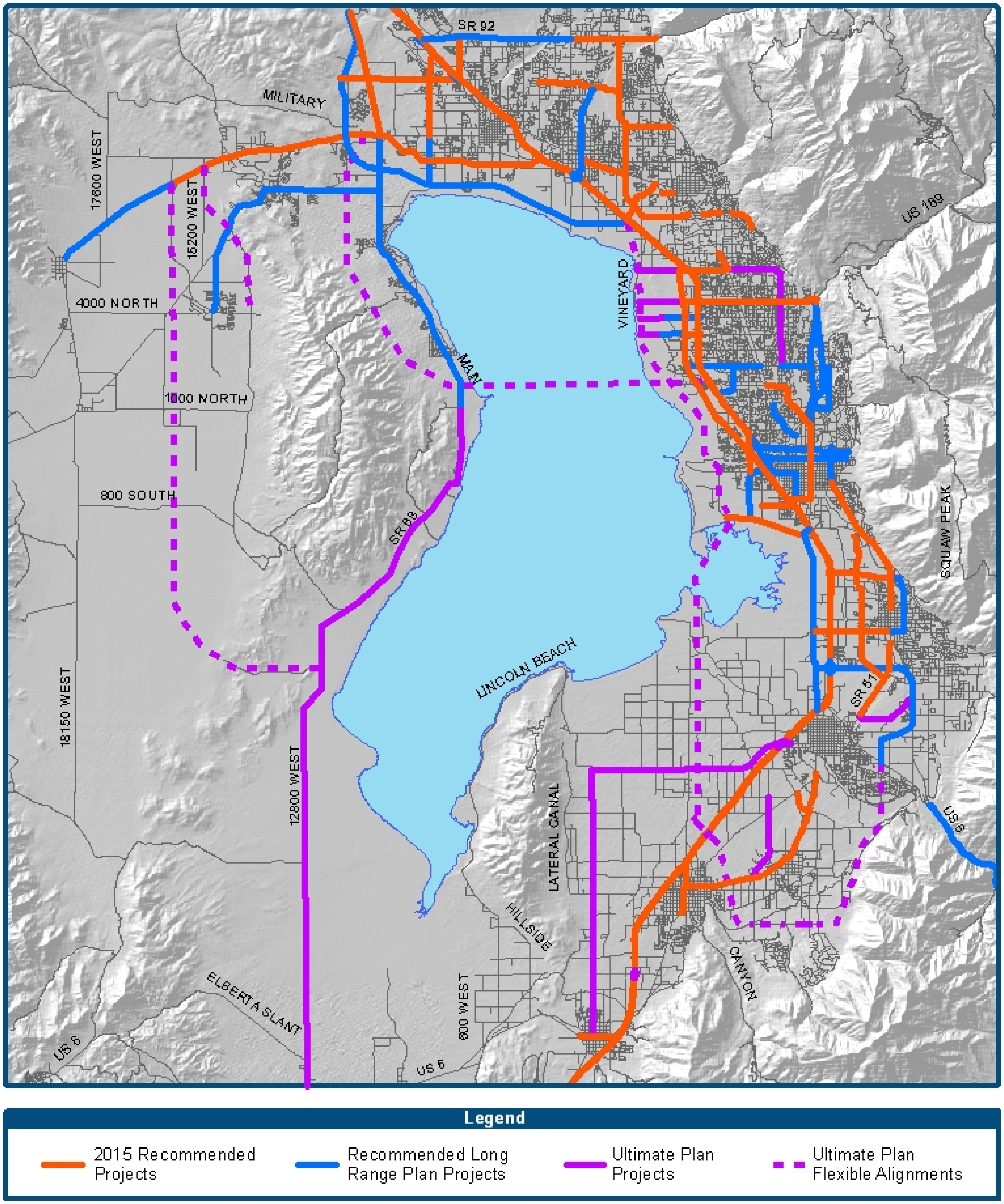
As has been discussed throughout this document, the Nebo Transportation Study was done simultaneously with two other areas in Utah County, the Lake Mountain area and the Provo-Orem area. It is important to consider the recommendations of each of these processes together, along with the recommendations of the Northeast Utah Valley Transportation Study, so that projects, phasing, and priorities are consistent countywide. Figure 5.7 shows the recommended transportation projects for Utah County by phase.

Figure 5.6
Recommended Transit Projects



Utah Valley Transportation Studies
nebo transportation study

Figure 5.7
Countywide Recommended Road Projects



Chapter Six

6. Recommended Next Steps

The MAG Nebo Transportation Study provides for a review of transportation needs and includes several recommendations for future transportation improvements to solve long-term mobility problems in the Nebo study area. Despite the wealth of information included in this plan, implementation of the study recommendations will require further action on the part of the affected municipalities. The Mountainland Association of Governments is prepared to update their Long Range Transportation Plan using the results of the Nebo Transportation Study as a starting point in order to evaluate funding and phasing options which prepare the project recommendations for programmed funding. In addition to the follow-up actions by MAG, each local government should use the Nebo Transportation Study as a starting point for planning for further transportation improvements within their community. This chapter outlines specific steps for each local government.

6.1 Elk Ridge

Elk Ridge is a small city which is affected by only a single project, the Nebo Belt Route, a "visionary" project identified for implementation beyond 2030. To that end, actions that Elk Ridge officials should undertake include:

- Define the right-of-way, corridor speed/design standards, and related attributes in coordination with Woodland Hills, Salem, Payson, and Spanish Fork. The Nebo Belt Route is envisioned as a high-speed facility with limited access and a 180 foot right-of-way. Little planning for this facility has occurred to date.
- Adopt a transportation element of a City Master Plan which defines transportation demands within and through the city.

6.2 Woodland Hills

Woodland Hills is also small city which, similar to Elk Ridge, is affected by only the Nebo Belt Route. Specific actions for Woodland Hills include:

- Define the right-of-way, corridor speed/design standards, and related attributes in coordination with Elk Ridge, Payson, Salem, and Spanish Fort. The Nebo Belt Route is envisioned as a high-speed facility with limited access and a 180 foot right-of-way. Little planning for this facility has occurred to date.
- Adopt a transportation element of a City Master Plan which defines transportation demands within and through the city.

Despite the wealth of information included in this plan, implementation of the study recommendations will require further action on the part of the affected municipalities.

6.3 Salem

Salem is affected by three projects identified in the Nebo Transportation Study. It is recommended that Salem officials:

- Coordinate the planning and funding of SR-198 through the city with UDOT. Improvements to SR-198 can be expedited as the city gains right-of-way as a condition of development.

- Work with UDOT, Payson, and Spanish Fork to develop and refine access control policies for SR-198 which is currently an Access Management Category 7 (Community Rural) facility in Salem but varies along its length. Improvements to SR-198 are proposed by the year 2015.
- Continue to advance the design and construction of Woodland Hills Drive, which is included in the Nebo Transportation Study by the year 2015 and is presently programmed by UDOT and MAG in the STIP.
- Preserve right-of-way for Elk Ridge Drive (8000 South) which is planned as a five-lane arterial connecting to SR-198 in the Ultimate Plan for the Nebo Transportation Study. This road should be preserved at a minimum 80 foot right-of-way.
- Adopt or update a Master Transportation Plan or transportation element of a City Master Plan to evaluate growth related transportation needs and define needed transportation corridors.

6.4 Spanish Fork

Spanish Fork is a major city in Utah County and arguably the anchor of the Nebo study area. A wide range of transportation improvements are planned in Spanish Fork as summarized in Table 6.1.

Table 6.1: Recommended Projects in Spanish Fork

Project	Lanes	Right-of-way (feet)	Total Length (miles)	Cost (millions)	Phase		
					2015	2030	Ultimate
SR-51	5	84	3.10	$24.92	✓		
SR-198 Spanish Fork to Payson	5	106	6.29	$59.24	✓		
Woodland Hills Dr	2	80	0.80	$3.62	✓		
1600 South Springville	5	84	2.80	$43.66		✓	
1600 South Springville Interchange	-	-	-	$28.00		✓	
Nebo Belt Route (Eastern Segment)	5	150	3.58	$64.88		✓	
Spanish Fork/Provo Connection	5	150	5.86	$75.73		✓	
US-6 Spanish Fork Canyon	5	106	9.50	$69.27		✓	
Benjamin Road	5	106	14.49	$109.55			✓
Expressway Lane	5	84	1.50	$28.97			✓
Nebo Belt Route (Center Segment)	5	180	7.97	$117.08			✓
Spanish Fork Center Street Interchange	-	-	-	$28.00			✓

To further these projects, Spanish Fork officials should:

- Update their city Master Transportation Plan to reflect the Nebo Belt Route project.
- Initiate a corridor study to examine the Nebo Belt Route project. Spanish Fork plays a pivotal roll in planning for this route through a logical terminus with US-6 which must be planned to the north and east through Mapleton and to the south and west through Salem and Woodland Hills.
- Coordinate with UDOT on the 1600 South interchange and improvements through Springville and Spanish Fork with the on-going I-15 EIS as this facility may dramatically change access to the city.
- Coordinate with UDOT regarding access control policies on SR-198, US-6, and SR-51.

- Examine the corridor right-of-way on SR-51, 1600 South, US-6 and Expressway Lane to ensure their adequacy for future traffic capacity and safety.

6.5 Payson

Several important projects from the Nebo Transportation Study affect Payson. In pursuit of implementing the recommendations of this plan, it is recommended that Nebo City officials:

- Improve Payson Main Street and 100 West by the year 2015. Neither project is programmed for funding.
- Develop conceptual designs which are sensitive to the character of the area, particularly on Main Street. Engineering cost estimates should be developed. It is possible that an 84 foot right-of-way is not sufficient to accommodate parking, traffic capacity, transit, and pedestrian needs on Main Street.
- Coordinate with UDOT regarding a 2015 project on SR-198.
- Coordinate with Salem, Elk Ridge, Woodland Hills, and Spanish Fork regarding the Nebo Belt Route.
- Coordinate with UDOT regarding the interchange with I-15 should be coordinated with UDOT and possibly considered in the ongoing I-15 EIS.
- Review wetlands concerns affecting the alignment of the Belt Route in advance of the interchange location.
- Consider updating their Master Transportation Plan to reflect the vision of the Nebo Belt Route and to provide a more context sensitive solution to traffic growth in the area.

6.6 Mapleton

Recommended next steps for Mapleton include:

- Updating the city's Master Transportation Plan. Although Mapleton has a Master Transportation Plan, this plan does not reflect the dramatic growth of the city in recent years nor the annexation areas which the city is considering.
- Pursue the planned 1600 South corridor. Specific issues in Mapleton revolve around access to the planned corridor and interchange through Springville and Spanish Fork.
- Coordinate with Spanish Fork related to planned improvements to Expressway Lane and the eastern section of the Nebo Belt Route, both included in the Ultimate Plan recommendations of the Nebo Transportation Study.

6.7 Santaquin

Santaquin City is a high growth area in the Nebo region and may become a center of growth as the west side of I-15 begins to develop. Recommendations for Santaquin City include:

> *Santaquin City is a high growth area in the Nebo region and may become a center of growth as the west side of I-15 begins to develop.*

- Define improvements to Main Street and the existing I-15 Interchange, including the potential for a round-about on the east side, in cooperation with UDOT so that plans and programs can progress.
- Coordinate the proposed north Santaquin I-15 (12400 S) interchange with the ongoing I-15 EIS.
- Coordinate with Utah County and Payson City regarding the area north and west of the present city boundary, including planning for corridor definitions and right-of-way needs on Benjamin Road.

6.8 Springville

There are a wide range of projects included in the Nebo Transportation Study which affect Springville. Most of these projects are well planned by the city, although several projects need more specific actions on the part of the city. The city should coordinate improvements with UDOT and Spanish Fork (and to a lesser extent Provo and Mapleton) as well as utility plans and needs to ensure that the projects are expedited in an efficient manner. Table 6.2 summarizes the projects in Springville City.

Table 6.2: Recommended Projects in Springville

Project	Lanes	Right-of-way (feet)	Total Length (miles)	Cost (millions)	Phase		
					2015	2030	Ultimate
1400 North Springville	5	106	1.90	$31.85	✓		
400 South Springville	5	106	2.40	$34.97	✓		
950 West Springville	5	84	4.50	$46.92	✓		
SR-51	5	84	3.10	$24.92	✓		
US-89 Provo/Springville	7	125	4.50	$34.69	✓		
1600 South Springville	5	84	2.80	$43.66		✓	
1600 South Springville Interchange	-	-	-	$28.00		✓	
Nebo Belt Route (Eastern Segment)	5	150	3.58	$64.88		✓	
Spanish Fork/Provo Connection	5	150	5.86	$75.73		✓	
400 East Springville	5	106	1.57	$19.79		✓	

Springville City has been proactive in planning for the city and has a recent and comprehensive Master Transportation Plan. Recommended actions include:

- Review and coordinate with MAG regarding north-south access through the West Fields area of Springville at either 950 West or 1200 West.
- Coordinate with UDOT on east-west access on 1400 North and 400 South as near-term funding is being procured.
- Update the city Master Transportation Plan to reflect plans for a 1600 South interchange and improvements to 1600 South railroad crossings, which are recommended in the Nebo Transportation Study.
- Coordinate these improvements with UDOT and Spanish Fork City.

6.9 Utah County

Transportation planning for growth has not been proactive in Utah County since growth pockets are encouraged to seek services from the nearest city. The Benjamin area of the county represents a potential growth area, possibly constrained by services and ground water, but in which little planning has progressed. Recommended action items for Utah County include:

- Anticipate a system of transportation infrastructure centered on improvements to Benjamin Road and a planned East Lake Highway for long-term improvements.
- Define the corridors and coordinate improvements with UDOT, Payson, and Santaquin.

Appendix A:
Technical Advisory Committee
Meeting Agendas

LAKE MOUNTAIN TECHNICAL COMMITTEE

Elk Ridge
Mayor Vernon Fritz

Genola
Mayor Neil Brown

Goshen
Mayor Marvin Jacobson

Mapleton
Matt Evans

Payson
Andy Hall

Salem
Mayor Randy Brailsford

Santaquin
Shon Fullmer

Spanish Fork
Richard Nelson

Springville
Brad Stapley

Woodland Hills
Mayor Toby Harding

Utah County
Paul Hawker

UDOT – Region 3
Brent Schvaneveldt

UTA – Timp Division
Ken Anson

Mountainland–Shawn Eliot
Nebo Study Lead

Interplan–Matt Rifkin
Nebo Study Lead

CB–Zafar Alikhan
Project Manager

NEBO

TRANSPORTATION STUDY

TECHNICAL COMMITTEE

10:00 A.M.

Monday, November 14, 2005

Spanish Fork City Office
40 South Main ST, Council Chambers
Spanish Fork, Utah

(on SW corner of Center ST and Main ST, Spanish Fork)

See map on back

Agenda

1. Introductions and Study Purpose and Need - Shawn, Mountainland MPO
2. Population and Employment Update for Travel Demand Model - Matt, InterPlan
3. Travel Trends – Matt InterPlan
4. Transportation Plan Project Review by each city/UDOT/UTA/MAG -Tech Committee
5. Questions and other business - Shawn, Mountainland MPO
6. Next meeting schedule – Matt, Interplan

Utah Valley Transportation Studies
nebo transportation study

NEBO
Technical Committee Agenda 2

NEBO TECHNICAL COMMITTEE

Elk Ridge
Mayor Vernon Fritz

Genola
Mayor Neil Brown

Goshen
Mayor Marvin Jacobson

Mapleton
Matt Evans

Payson
Chris Erb

Salem
Mayor Randy Brailsford

Santaquin
Shon Fullmer

Spanish Fork
Richard Nielson

Springville
Brad Stapley

Woodland Hills
Mayor Toby Harding

Utah County
Paul Hawker

UDOT - Region 3
Brent Schvaneveldt

UTA - Timp Division
Ken Anson

Mountainland-Shawn Eliot
Nebo Study Lead

Interplan-Matt Rifkin
Nebo Study Lead

CB-Zafar Alikhan
Project Manager

WE REQUEST YOUR PARTICIPATION

NEBO TRANSPORTATION STUDY

TECHNICAL COMMITTEE

10:00 A.M.

Monday, December 12, 2005

Payson City Office
439 West Utah AVE
Payson, Utah

(on NW corner of Utah AVE and 500 West, Payson)

See map on back

Agenda

7. Introductions – Shawn E, Mountainland MPO
8. City Revised Demographic Data - Shawn E, Mountainland MPO
9. Controversial vs. Non-Controversial Projects – Matt, InterPlan
10. City Projects / Other Ideas / Brainstorming – Matt, InterPlan
11. Questions and other business - Shawn, Mountainland MPO
12. Next meeting schedule – Matt, InterPlan

LAKE MOUNTAIN TECHNICAL COMMITTEE

Elk Ridge
Mayor Dennis Dunn

Genola
Mayor Eric Hazelet

Goshen
Mayor Dorothy Sprague

Mapleton
Matt Evans

Payson
Chris Erb

Salem
Mayor J. Lane Henderson

Santaquin
Shon Fullmer

Spanish Fork
Richard Nelson

Springville
Brad Stapley

Woodland Hills
Mayor Toby Harding

Utah County
Paul Hawker

UDOT - Region 3
Brent Schvaneveldt

UTA - Timp Division
Ken Anson

Mountainland-Shawn Eliot
Nebo Study Lead

Interplan-Matt Rifkin
Nebo Study Lead

CB-Zafar Alikhan
Project Manager

NEBO

TRANSPORTATION STUDY

TECHNICAL COMMITTEE

9:00 A.M.

Monday, February 6, 2006

Springville City Office
50 South Main Street
Springville, Utah

****This is a critical meeting. Problems will be identified and solutions discussed. It is important that your municipality be represented****

Agenda

13. Presentation of Transportation Problems – Matt Riffkin, InterPlan
14. Discussion of Transportation Projects – Matt Riffkin, InterPlan
15. Summary of Transit Needs Assessment – Chad Eccles, Mountainland MPO
16. Discussion of Next Steps – Matt Riffkin, InterPlan
17. Questions and other business – Shawn Eliot, Mountainland MPO
18. Next meeting schedule – Shawn Eliot, Mountainland MPO

NEBO TECHNICAL COMMITTEE

Elk Ridge
Raymond Brown

Genola
Mayor Eric Hazelet

Goshen
Mayor Dorothy Sprague

Mapleton
Tracy Padgett

Payson
Chris Erb

Salem
Mayor J. Lane Henderson

Santaquin
Dennis Marker

Spanish Fork
Richard Nelson

Springville
Brad Stapley

Woodland Hills
Mayor Toby Harding

Utah County
Paul Hawker

UDOT - Region 3
Brent Schvaneveldt

UTA - Timp Division
Ken Anson

Mountainland-Shawn Eliot
Nebo Study Lead

Interplan-Matt Rifkin
Nebo Study Lead

NEBO

TRANSPORTATION STUDY

TECHNICAL COMMITTEE

9:00 A.M.

Monday, March 13, 2006

Mapleton City Offices
125 West Community Center Way (400 N)
Mapleton, UT
(note city hall has moved)

****This is a critical meeting. Specific projects and their modeling results will be discussed. Now is the time to add, change or delete projects from the transportation plan. It is important that your municipality be represented****

Agenda

19. Summary of Council Presentations – Shawn Eliot, Mountainland MPO
20. Results of Project Analysis, Matt Rifkin, Interplan Co.
21. Discussion of Project Recommendations, Matt Rifkin, Interplan Co.
22. Next Steps, Matt Rifkin, Interplan Co.
23. Questions and other business – Shawn Eliot, Mountainland MPO
24. Next meeting schedule – Shawn Eliot, Mountainland MPO

NEBO TECHNICAL COMMITTEE

Elk Ridge
Raymond Brown

Genola
Mayor Eric Hazelet

Goshen
Mayor Dorothy Sprague

Mapleton
Tracy Padgett

Payson
Chris Erb

Salem
Lynn Durrant

Santaquin
Dennis Marker

Spanish Fork
Richard Nelson

Springville
Brad Stapley

Woodland Hills
Mayor Toby Harding

Utah County
Paul Hawker

UDOT - Region 3
Brent Schvaneveldt

UTA - Timp Division
Ken Anson

Mountainland-Shawn Eliot
Nebo Study Lead

Interplan-Matt Rifkin
Nebo Study Lead

NEBO

TRANSPORTATION STUDY

TECHNICAL COMMITTEE

9:00 A.M.

Tuesday, May 2, 2006

Spanish Fork City Offices
40 South Main ST
Council Chambers
Spanish Fork, UT

****This is the last meeting of the Technical Committee.
Specific projects and their modeling results will be discussed.
It is important that your municipality be represented****

Agenda

25. Updated Project Summaries
26. Areawide Summary Measures of Effectiveness
27. Recommended Plan Discussion
28. 2030 Long Range Plan
29. 2015 Priority Plan
30. Ultimate Plan
31. Council Presentations Discussion
32. Transit Summary

Appendix B:
Project Impacts and Costs
Technical Memorandum

InterPlan Co.
Transportation Planning
7719 South Main Street
Midvale, Utah 84047
(801) 307-3400 (801) 307-3451 Fax
www.interplanco.com

Technical Memorandum

To: Mountainland Association of Governments (MAG)

From: InterPlan Co.

Date: April 25, 2006

Subject: Explanation of Impacts and Costs

As part of the three quadrants studies conduct by InterPlan Co. and Carter Burgess roadway project impacts and costs were used in evaluated projects. The impacts, including: properties impacted, structures relocated, and acres of wetlands impacted and costs were displayed in the projects lists and the project fact-sheets. This memorandum is designed to serve as an explanation of how impacts were estimated and how project costs were calculated.

Impacts

Before impacts were measured a road alignment needed to be identified. In most cases the project was a widening of an existing road therefore the alignment was already defined for us. In other cases an entirely new road was planned for and the alignment needed to be determined. InterPlan worked with MAG staff and the Technical Advisory Committees (TAC) to develop alignments for new build projects such as the East Lake Highway and others.

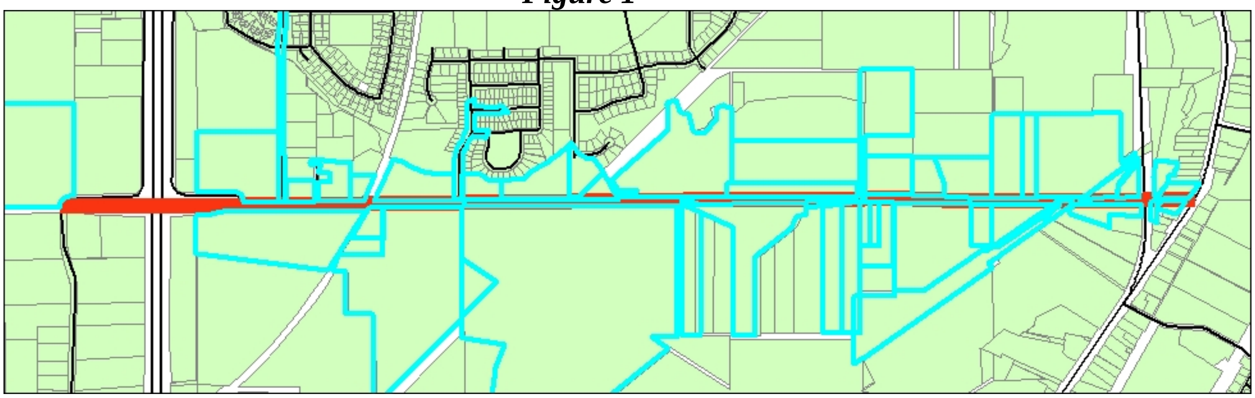
The other piece of information necessary to measure impacts was the right-of-way (ROW) for each proposed project. Without knowing how wide a road would be we have no idea how many houses it would potentially impact. Again, InterPlan along with MAG and the TAC developed right-of-ways based on the volume and speed of the roads. Right-of-ways were measured in feet and cross-sections for each possible right of way were developed an included on the project's fact-sheet.

Once an alignment and a cross-section were determined the project impacts could be measured. Geographic Information Systems (GIS) was used as a tool to measure the impacts. InterPlan collected geographic data for Utah County including: streets centerlines, land parcels, aerial photography, and National Wetlands Inventory (NWI) wetlands. This data gave us the information we needed to calculate the impacts of a project.

Properties Impacted

To calculate the properties impacted InterPlan used GIS to overlay the county parcels with the street centerline files. The project was selected and then buffered by half of the right-of-way. Half of the right-of-way was used because the street centerline is buffered on both sides. In many cases the impacts may be lessened by widening to one side of the road or the other, but for this planning study we always buffered the street centerline. All the properties with land in this buffered right-of-way were determined to be impacted and were selected. Finally the selected parcels were counted. Figure 1 is an example of properties that would be impacted by widening 1600 South in Springville.

Figure 1



Structures Relocated

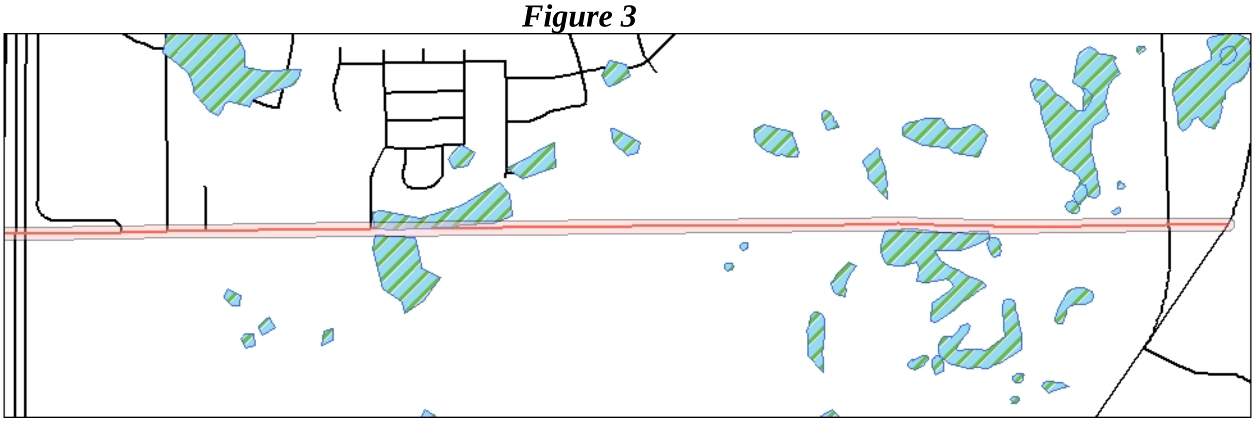
Structures relocated refer to the buildings whether they are houses or other buildings that would have to be removed to accommodate the right-of-way for a proposed road project. Again, InterPlan used GIS to layer the streets centerline over the newest aerial photographs available. We then buffered the roadway project by have of the right-of-way plus 15 feet. So a 106 foot cross-section would have been buffered on both sides by 68 feet. We added 15 feet because that is what Utah Department of Transportation (UDOT) uses to determine if a structure needs to be removed from a widening project. If the building is set back more than 15 feet from the new right-of-way then the structure is not removed, but if it is with 15 feet than it would be removed. With the road buffered correctly it is simply a matter of counting all the structures that are within that buffer. This is done be zooming in a sufficient amount to be able to see the buildings and counting how many would need to be removed. Figure 2 is an example of structures that would need to be removed along 1600 South in Springville.

Figure 2

Acres of Wetlands

Calculating acres of wetlands was done in similar fashion using GIS layers. Again InterPlan buffered the street centerline based on the proposed right-of-way. This new buffered centerline was converted to a polygon with a measured area. Then this polygon of the right-of-way was overlaid with the NWI wetlands data. Using a GIS tool to clip the NWI wetlands that are within the right-of-way polygon InterPlan created a new lay of the wetlands impacted by the proposed project. Then the acreage of the wetlands impacts was measured in GIS and entered into the table of impacts. Figure 3 is an example of NWI wetlands that would be impacted if 1600 South in Springville were widened.

Figure 3



Project Costs

Individual project costs were calculated for each project analyzed. These planning level cost estimates were calculated by decomposing total cost into construction cost, infrastructure cost (bridge, tunnel, etc.), and right-of-way cost. These three cost categories were then estimated for each project by using GIS data to determine project area, length, and river/railroad crossing that require additional infrastructure.

Construction Cost

Construction costs were developed from a spreadsheet created by Carter Burgess. This spreadsheet utilizes bid prices from 2003-2005 to estimate the cost for new road construction but does not include cost for curb/gutter or sidewalk. The new construction cost estimates are based upon an 48 inch burrow, a 12 inch granular burrow, a 10 inch untreated base course, and 10 inch plant mix for low volume roads or 11 inch Portland cement concrete for high capacity/speed facilities. Due to the imprecision of the average bid prices, construction cost estimates also include a 50% contingency. Table 1 summarizes the average material bid price used to estimate construction costs.

Table 1- Average Unit Bid Price for Construction Material

Burrow (cubic yard)	Granular Burrow (cubic yard)	Untreated Base Course (cubic yard)	Plant Mix (Ton)	Portland Cement Concrete (square yard)
$11.28	$13.64	$46.37	$36.08	$46.63

Infrastructure Cost

Infrastructure costs for each project were estimated by using Utah County GIS data. InterPlan employed railroad centerline, river, and stream GIS data along with aerials to total the number of structures need for each proposed project to cross rivers, railroads or other high capacity facilities. Table 2 summarizes the individual infrastructure costs assumed.

Table 2 – Structure Costs

At-grade railroad crossing (million)	**Grade-separated railroad crossing** (million)	**River/stream crossing** (million)	**Freeway Interchange** (million)
$2.00	$10.00	$10.00	$28.00

Right-of-Way Cost

Cost estimates for right-of-way were developed for each quad study area by using Utah County GIS parcel data. For all parcels in Utah County the GIS parcel data includes appraised improvement and land value. The average appraised land value for each study area was used as the cost for acquiring new right-of-way. For new roads that are not on existing right-of-way, the right-of-way cost was estimated from the total area of the proposed road and the respective land cost in the study area from the Utah County Assessors Office. Where proposed road are to be widened on existing right-of-way, it was assumed that the existing road has a 70 foot right-of-way. The right-of-way cost for widening roads is the cost for acquiring the land necessary for the proposed road cross-section. Table 3 summarizes the assumed right-of-way cost per acre for all study areas.

Table 3 – Average Land Cost by Study Area

Lake Mountain Study Area	**Nebo Study Area**	**Provo-Orem Study Area**
$142,214 per acre	$137,707 per acre	$380,925 per acre

Appendix C:
Project Fact Sheets

Utah Valley Transportation Studies
nebo transportation study

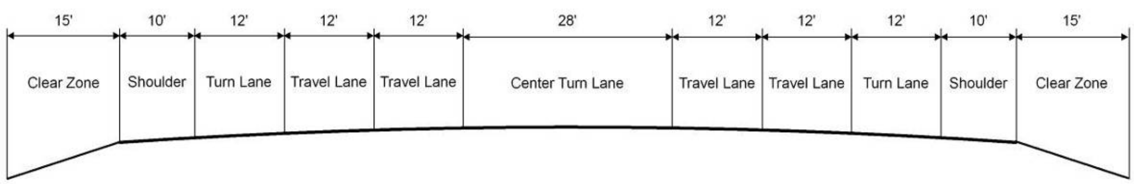
East Lake Highway (southern segment)

Description

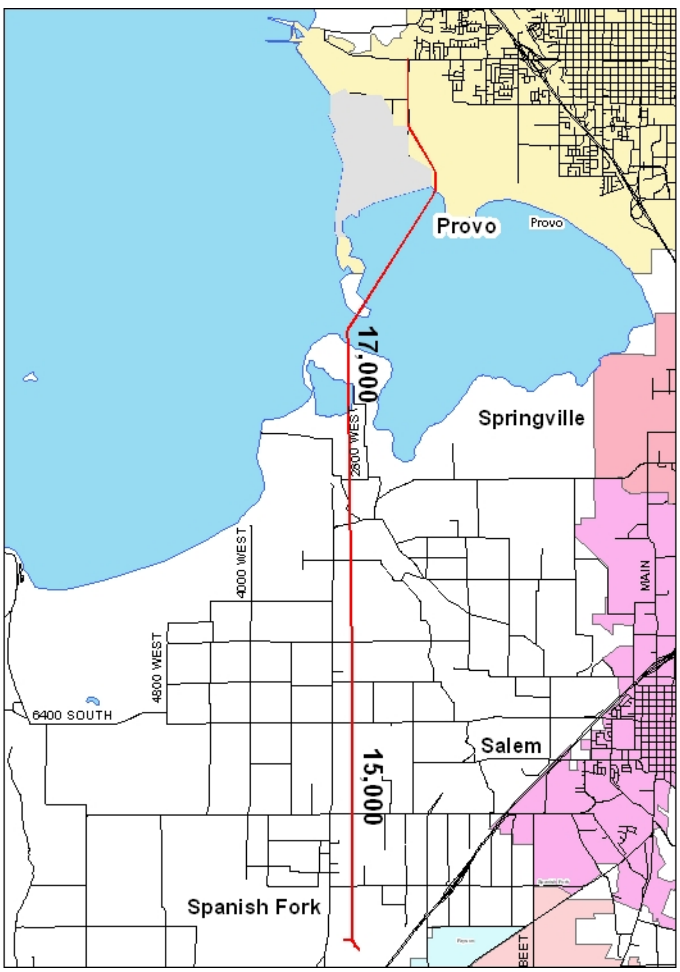
The East Lake Highway southern segment is a 11.6 mile regional arterial that provides north-south mobility between the Nebo and Provo/Orem areas. The four lane regional arterial has a 150’ cross-section, and a design speed of 50 mph or greater. The high speed/capacity of the East Lake Highway requires access be limited to major cross streets only.

Cross-section

150’ 4 Lane Regional Arterial (50 mph +)



Alignment



Future Traffic Volume

- 15,000 -17,000 vehicles a day

Impacts

- 11 structures potentially relocated
- 107 properties potentially affected
- 13.9 acres of lake/wetlands
- 61.0 acres of wetlands

Cost

- $23,990,000 for Right-of-way
- $244,510,000 for Construction
- $268,500,000 Total
- $3.55 per annual VMT (2030)

Disclaimer: All data included in this sheet is based on planning level analysis for alternative comparison and subject to vary significantly based on detailed analysis.

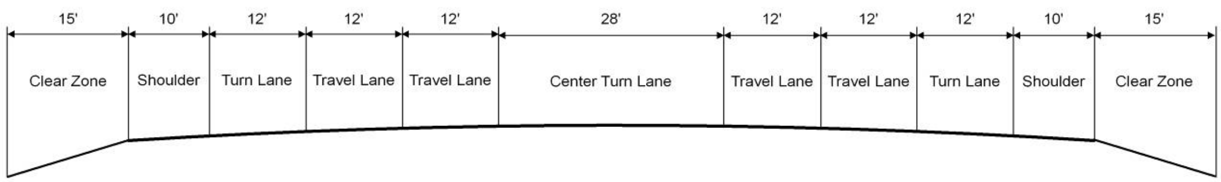
Spanish Fork – Provo Connection

Description

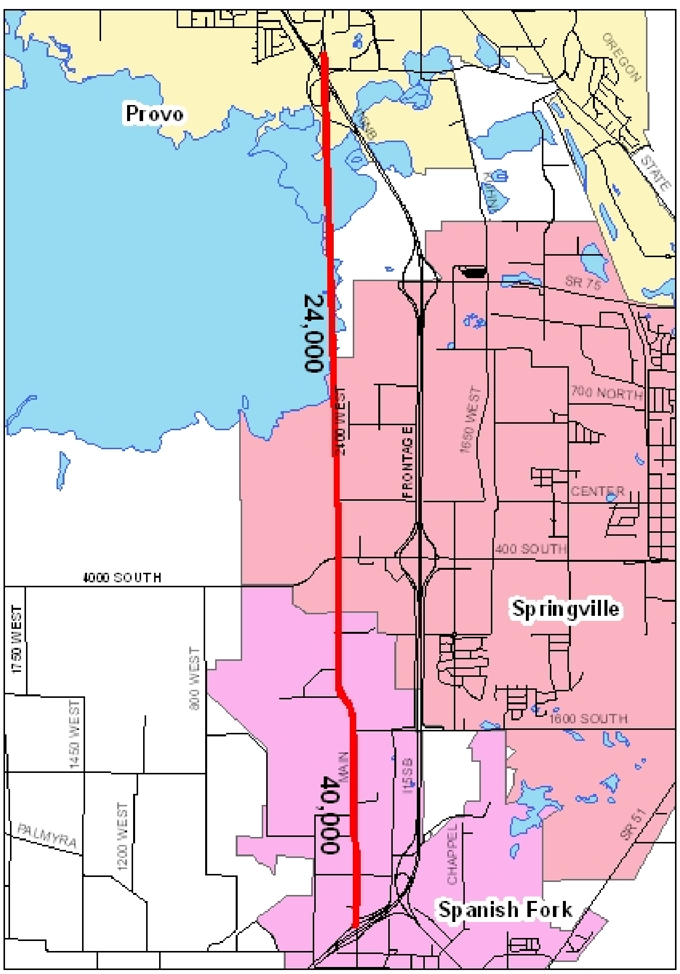
The Spanish Fork – Provo Connection is a 5.9 mile regional arterial that provides north-south mobility between the Nebo and Provo/Orem areas. The four lane regional arterial which is an extension of University Avenue and Spanish Fork Main Street has a 150' cross-section, and a design speed of 50 mph or greater. The high speed/capacity of the Spanish Fork – Provo Connection requires access be limited to major cross streets only.

Cross-section

150' 4 Lane Regional Arterial (50 mph +)



Alignment



Future Traffic Volume

- 24,000 – 40,000 vehicles a day

Impacts

- 17 structures potentially relocated
- 92 properties potentially affected
- 57.0 acres of wetlands

Cost

- $11,980,000 for Right-of-way
- $63,750,000 for Construction
- $75,730,000 Total
- $1.41 per annual VMT (2030)

Disclaimer: All data included in this sheet is based on planning level analysis for alternative comparison and subject to vary significantly based on detailed analysis.

Utah Valley Transportation Studies
nebo transportation study

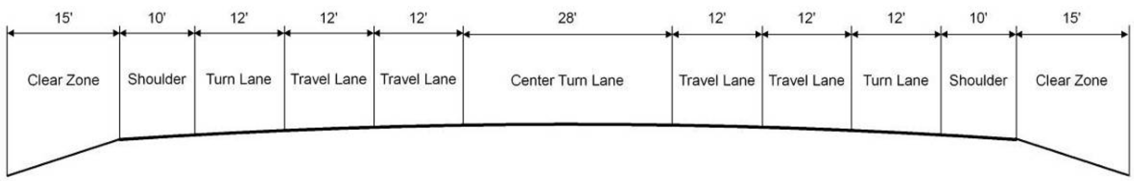
Nebo Belt Route (eastern segment)

Description

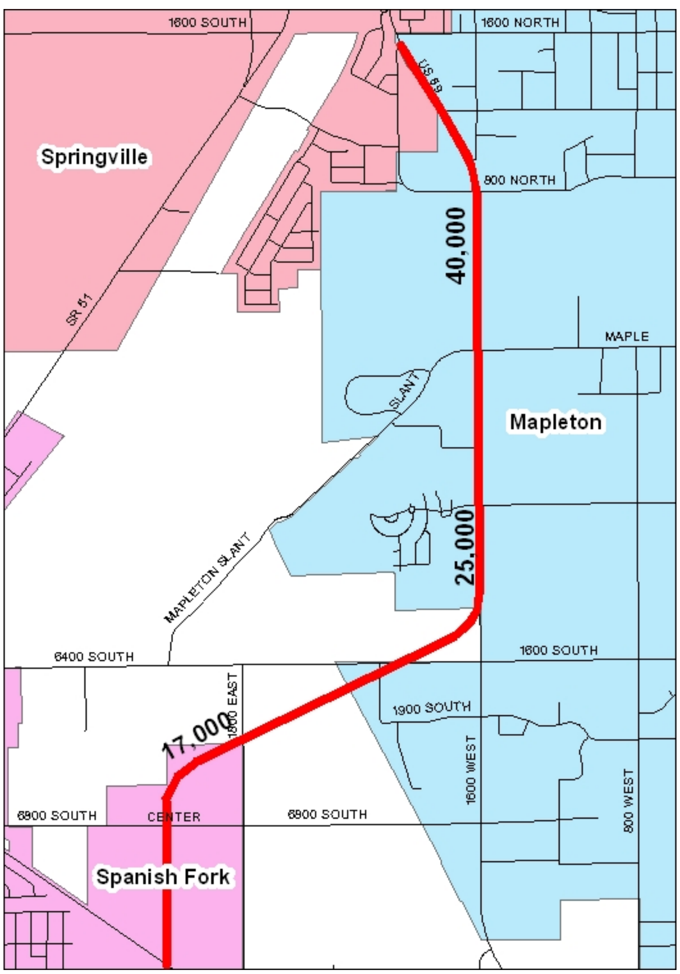
The Nebo Belt Route eastern segment is a 3.6 mile regional arterial that provides mobility benefits to Mapleton, Spanish Fork, and Springville. The four lane regional arterial has a 150’ cross-section, and a design speed of 50 mph or greater. The high speed/capacity of the Nebo Belt Route requires access be limited to major cross streets only.

Cross-section

150’ 4 Lane Regional Arterial (50 mph +)



Alignment



Future Traffic Volume

- 17,000 – 40,000 vehicles a day

Impacts

- 22 structures potentially relocated
- 122 properties potentially affected
- 0.0 acres of wetlands

Cost

- $6,830,000 for Right-of-way
- $58,500,000 for Construction
- $64,680,000 Total
- $1.85 per annual VMT (2030)

Disclaimer: All data included in this sheet is based on planning level analysis for alternative comparison and subject to vary significantly based on detailed analysis.

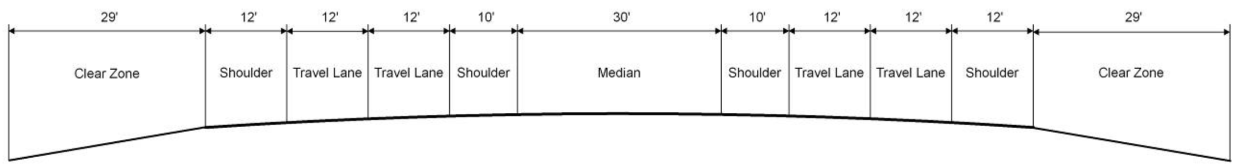
Nebo Belt Route (center segment)

Description

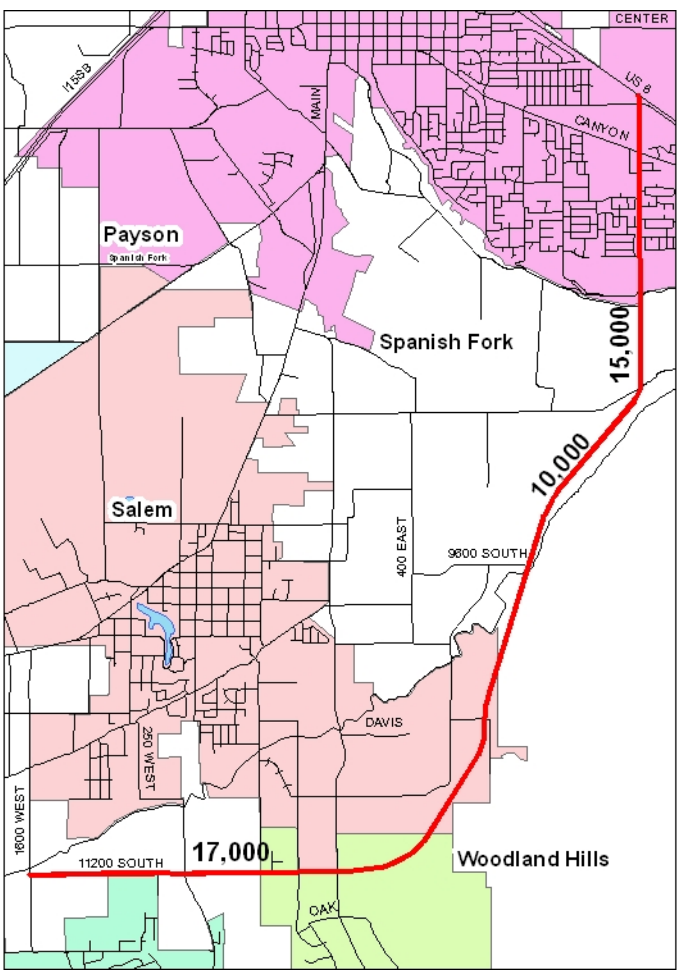
The Nebo Belt Route center segment is an 7.9 mile regional arterial/freeway that provides mobility benefits to Elk Ridge, Spanish Fork, and Woodland Hills. The four lane regional arterial/freeway has a 180' cross-section, and a design speed of 60 mph or greater. The high speed/capacity of the Nebo Belt Route requires access be limited to major cross streets only.

Cross-section

180' Regional Arterial/Freeway (60 mph +)



Alignment



Future Traffic Volume

- 10,000 – 17,000 vehicles a day

Impacts

- 54 structures potentially relocated
- 182 properties potentially affected
- 0.00 acres of wetlands

Cost

- $21,770,000 for Right-of-way
- $95,310,000 for Construction
- $117,080,000 Total
- $3.27 per annual VMT (2030)

Disclaimer: All data included in this sheet is based on planning level analysis for alternative comparison and subject to vary significantly based on detailed analysis.

Utah Valley Transportation Studies
nebo transportation study

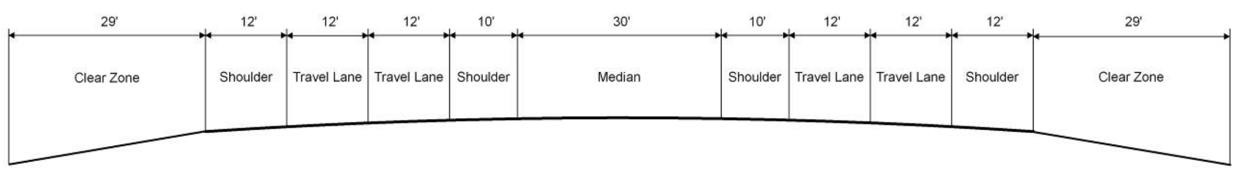
Nebo Belt Route (western segment)

Description

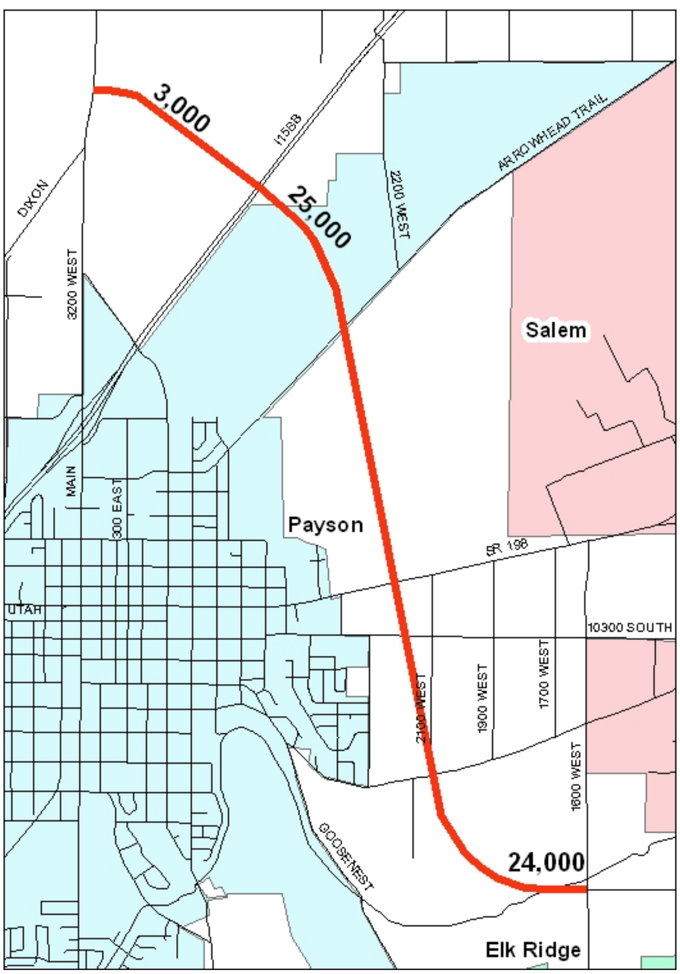
The Nebo Belt Route western segment is a 4.9 mile regional arterial/freeway that provides mobility benefits to Elk Ridge, Payson, and Woodland Hills. The four lane regional arterial/freeway has a 180’ cross-section, and a design speed of 60 mph or greater. The high speed/capacity of the Nebo Belt Route requires access be limited to major cross streets only.

Cross-section

180’ Regional Arterial/Freeway (60 mph +)



Alignment



Future Traffic Volume

- 16,000 – 25,000 vehicles a day

Impacts

- 11 structures potentially relocated
- 76 properties potentially affected
- 23.4 acres of wetland

Cost

- $13,250,000 for Right-of-way
- $62,900,000 for Construction
- $76,150,000 Total
- $2.07 per annual VMT (2030)

Utah Valley Transportation Studies
nebo transportation study

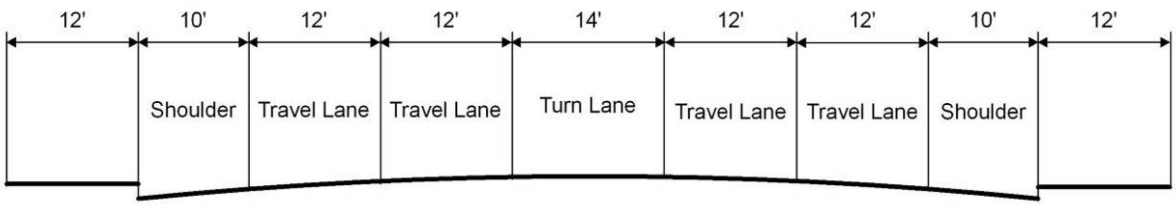
Benjamin Road

Description

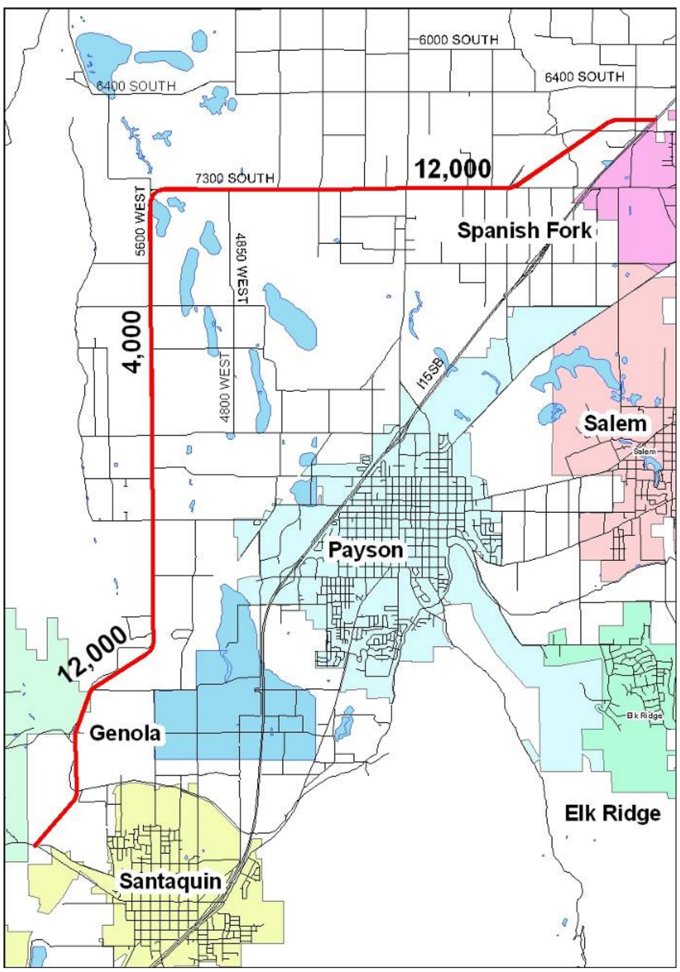
Benjamin Road is a 14.5 mile state standard arterial that provides access to Benjamin, West Payson, and Santaquin. The four lane state standard arterial has a 106’ cross-section, and a design speed of 40 - 50 mph. The speed/capacity of Benjamin Road allows for signalized and unsignalized access.

Cross-section

106’ 4 Lane State Standard Arterial (40-50 mph)



Alignment



Future Traffic Volume

- 4,000 – 12,000 vehicles a day

Impacts

- 58 structures potentially relocated
- 281 properties potentially affected
- 18.7 acres of wetlands

Cost

- $8,710,000 for Right-of-way
- $100,840,000 for Construction
- $109,550,000 Total
- $2.38 per annual VMT (2030)

Disclaimer: All data included in this sheet is based on planning level analysis for alternative comparison and subject to vary significantly based on detailed analysis.

Utah Valley Transportation Studies
nebo transportation study

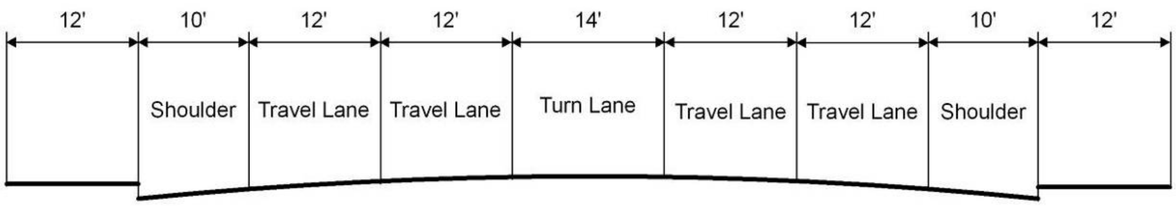
400 East – 400 South Springville

Description

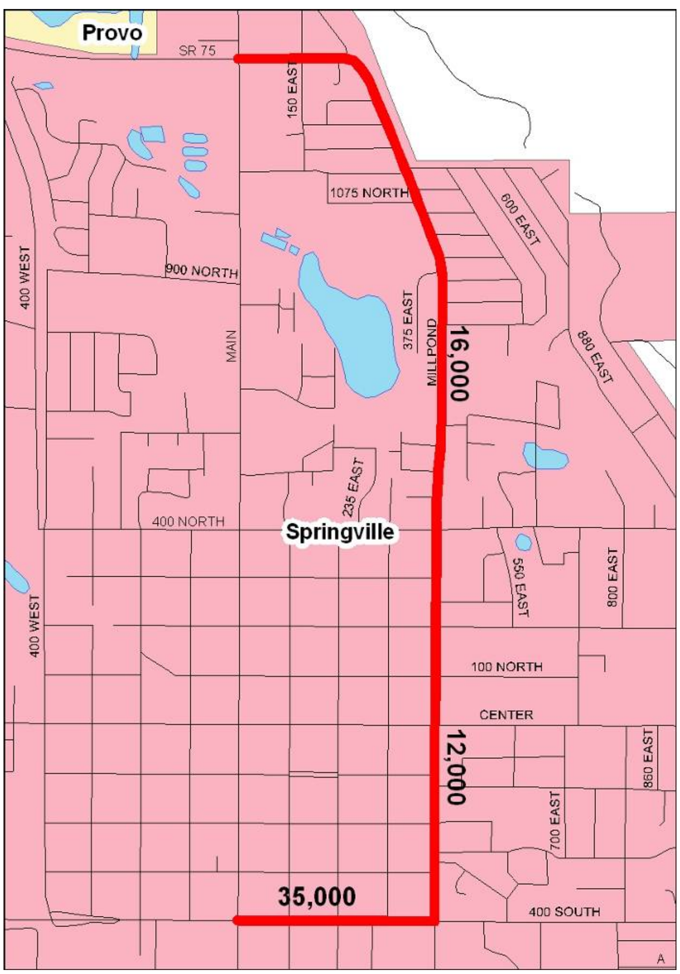
400 East – 400 South Springville is a 1.6 mile state standard arterial that provides mobility benefits to Springville and Mapleton. The four lane state standard arterial has a 106' cross-section, and a design speed of 40 – 50 mph. The speed/capacity of 400 East – 400 South Springville allows for signalized and unsignalized access.

Cross-section

106' 4 Lane State Standard Arterial (40-50 mph)



Alignment



Future Traffic Volume

- 12,000 – 35,000 vehicles a day

Impacts

- 84 structures potentially relocated
- 149 properties potentially affected
- 1.1 acres of wetlands

Cost

- $940,000 for Right-of-way
- $18,850,000 for Construction
- $19,790,000 Total
- $2.07 per annual VMT (2030)

Disclaimer: All data included in this sheet is based on planning level analysis for alternative comparison and subject to vary significantly based on detailed analysis.

Utah Valley Transportation Studies
nebo transportation study

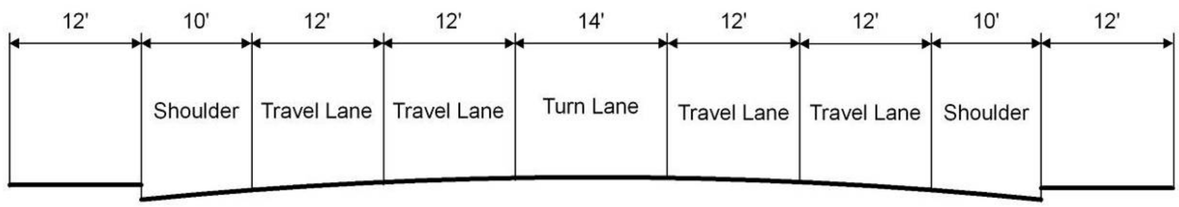
SR-198

Description

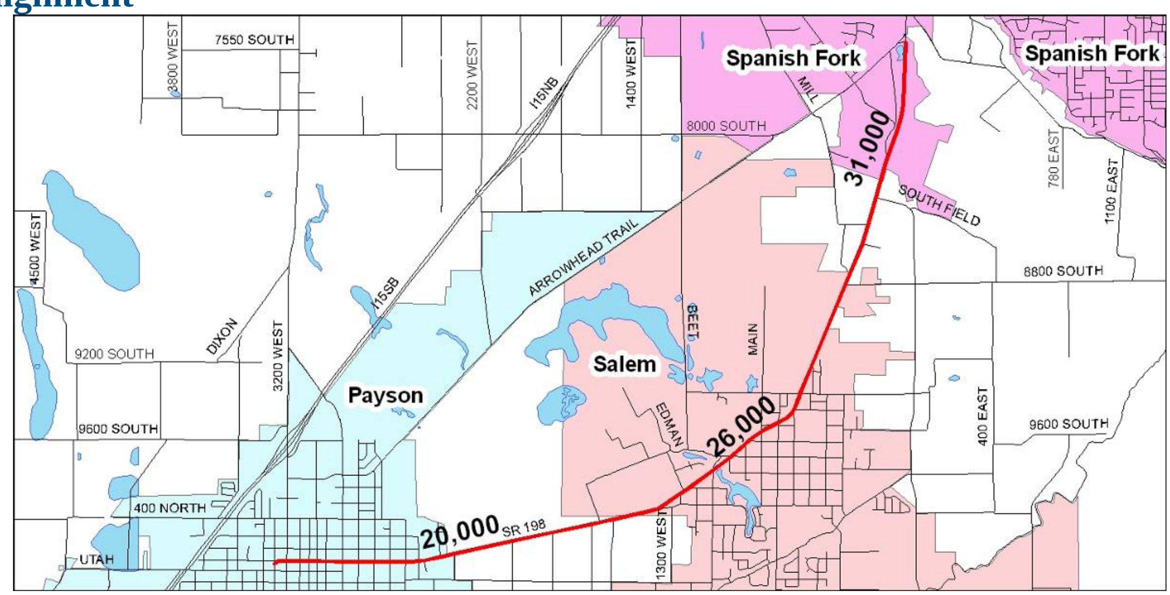
SR-198 is a 6.3 mile state standard arterial that provides mobility benefits to Payson, Salem, and Spanish Fork. The four lane state standard arterial has a 106' cross-section, and a design speed of 40 - 50 mph. The speed/capacity of SR-198 allows for signalized and unsignalized access.

Cross-section

<u>**106' 4 Lane State Standard Arterial (40-50 mph)**</u>



Alignment



Future Traffic Volume

- 20,000 – 31,000 vehicles a day

Impacts

- 72 structures potentially relocated
- 278 properties potentially affected
- 2.8 acres of wetlands

Cost

- $3,780,000 for Right-of-way
- $55,460,000 for Construction
- $59,240,000 Total
- $1.15 per annual VMT (2030)

Disclaimer: All data included in this sheet is based on planning level analysis for alternative comparison and subject to vary significantly based on detailed analysis.

Utah Valley Transportation Studies
nebo transportation study

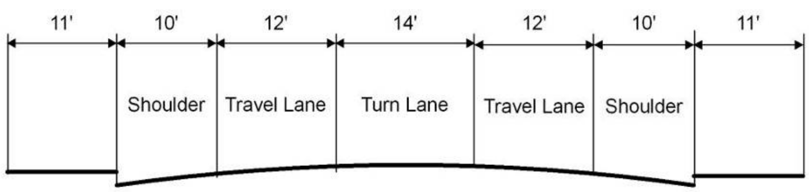
Elk Ridge Drive

Description

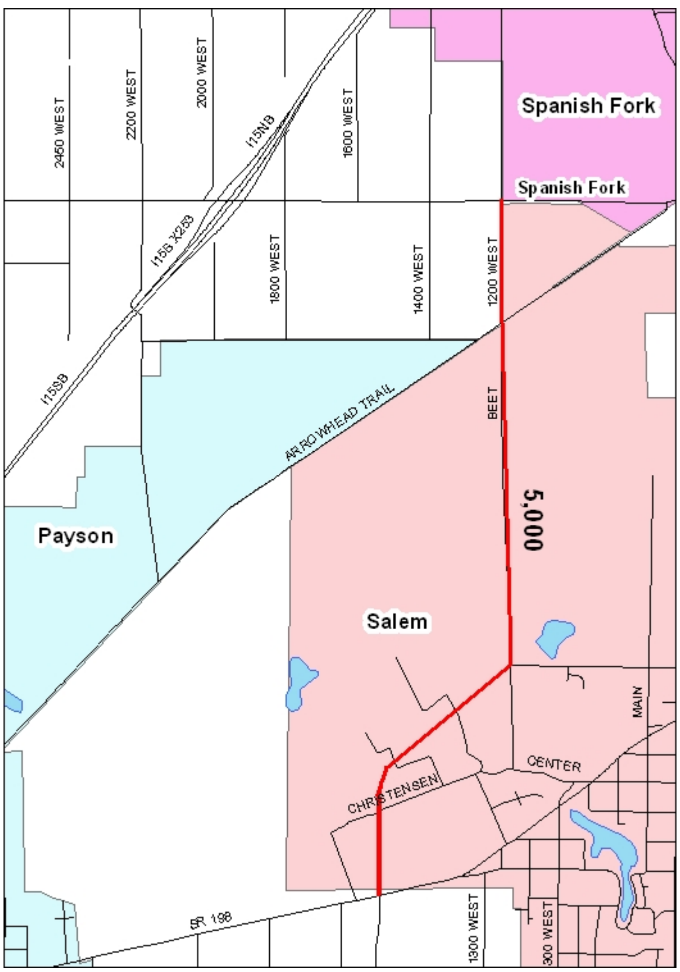
Elk Ridge Drive is a 2.75 mile community minor arterial from UC 8000 South to SR-198 that provides additional access to Elk Ridge, and Salem. The four lane community minor arterial has an 80' cross-section, and a design speed of 30 - 40 mph. The lower speed/capacity of Elk Ridge Drive allows for signalized and unsignalized access.

Cross-section

80' 3 Lane Community Minor Arterial (30-40 mph)



Alignment



Future Traffic Volume

- 5,000 vehicles a day

Impacts

- 0 structures potentially relocated
- 42 properties potentially affected
- 2.0 acres of wetlands

Cost

- $1,290,000 for Right-of-way
- $12,330,000 for Construction
- $13,620,000 Total
- $3.51 per annual VMT (2030)

Disclaimer: All data included in this sheet is based on planning level analysis for alternative comparison and subject to vary significantly based on detailed analysis.

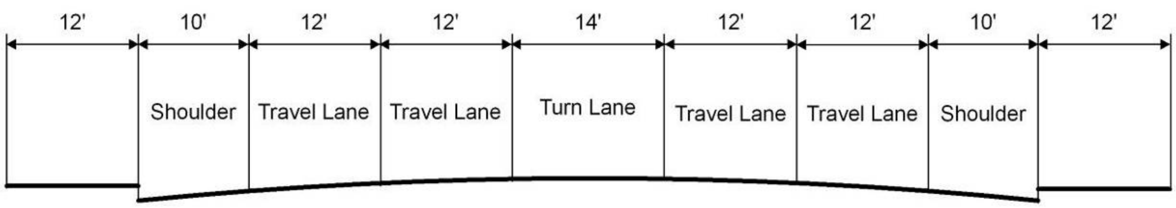
600 North – 700 North Payson

Description

600 North – 700 North Payson is a 0.5 mile state standard arterial that provides improved connectivity to Arrowhead Trail. The four lane state standard arterial has a 106’ cross-section, and a design speed of 40 - 50 mph. The speed/capacity of 600 North – 700 north allows for signalized and unsignalized access.

Cross-section

106’ 4 Lane State Standard Arterial (40-50 mph)



Alignment

Future Traffic Volume

- 14,000 vehicles a day

Impacts

- 7 structures potentially relocated
- 25 properties potentially affected
- 0 acres of wetlands

Cost

- $280,000 for Right-of-way
- $2,650,000 for Construction
- $2,930000 Total
- $1.24 per annual VMT (2030)

Disclaimer: All data included in this sheet is based on planning level analysis for alternative comparison and subject to vary significantly based on detailed analysis.

Utah Valley Transportation Studies
nebo transportation study

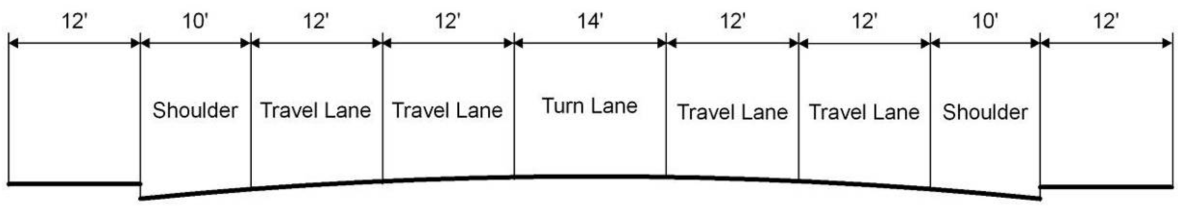
100 West Payson

Description

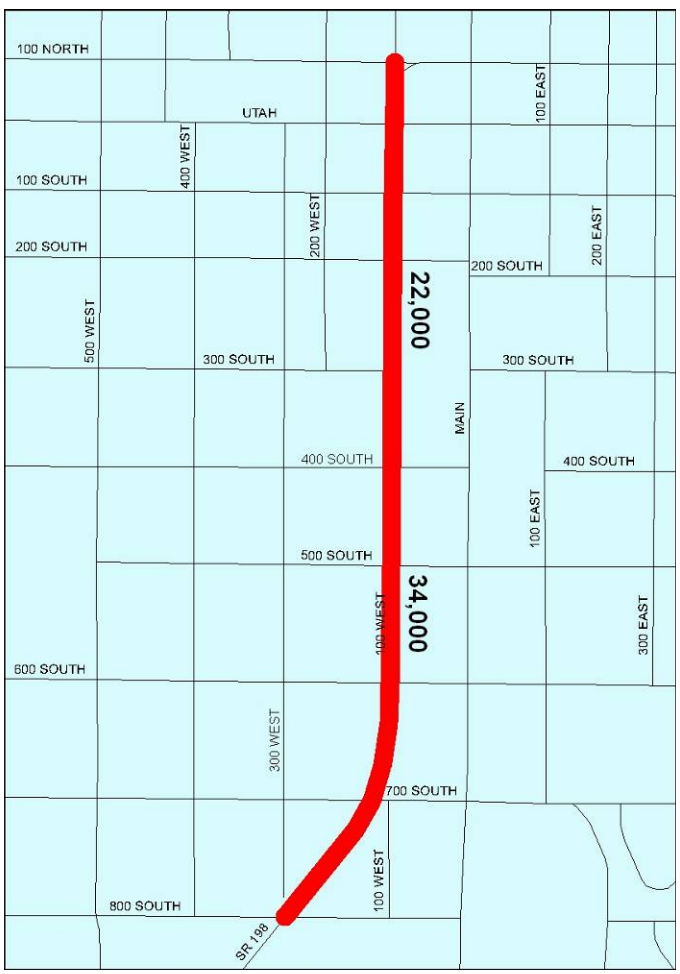
100 West Payson is a 1.0 mile state standard arterial that provides increased mobility on SR-198 through Payson. The four lane state standard arterial has a 106’ cross-section, and a design speed of 40 - 50 mph. The speed/capacity of 100 West allows for signalized and unsignalized access.

Cross-section

106’ 4 Lane State Standard Arterial (40-50 mph)



Alignment



Future Traffic Volume

- 22,000 – 34,000 vehicles a day

Impacts

- 34 structures potentially relocated
- 68 properties potentially affected
- 0 acres of wetlands

Cost

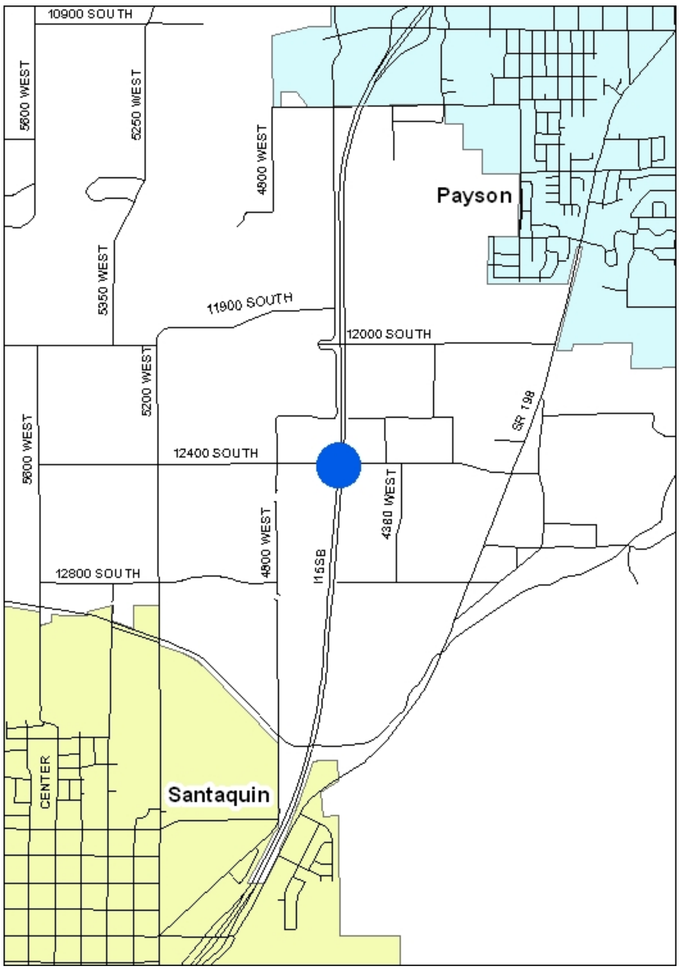
- $570,000 for Right-of-way
- $5,360,000 for Construction
- $5,930,000 Total
- $0.63 per annual VMT (2030)

Disclaimer: All data included in this sheet is based on planning level analysis for alternative comparison and subject to vary significantly based on detailed analysis.

I-15 Interchange – UC 12400 South

Description

The interchange at UC 12400 South provides additional access to I-15 for Payson, and Santaquin.



Alignment

Future Traffic Volume

- 16,000 vehicles a day

Cost

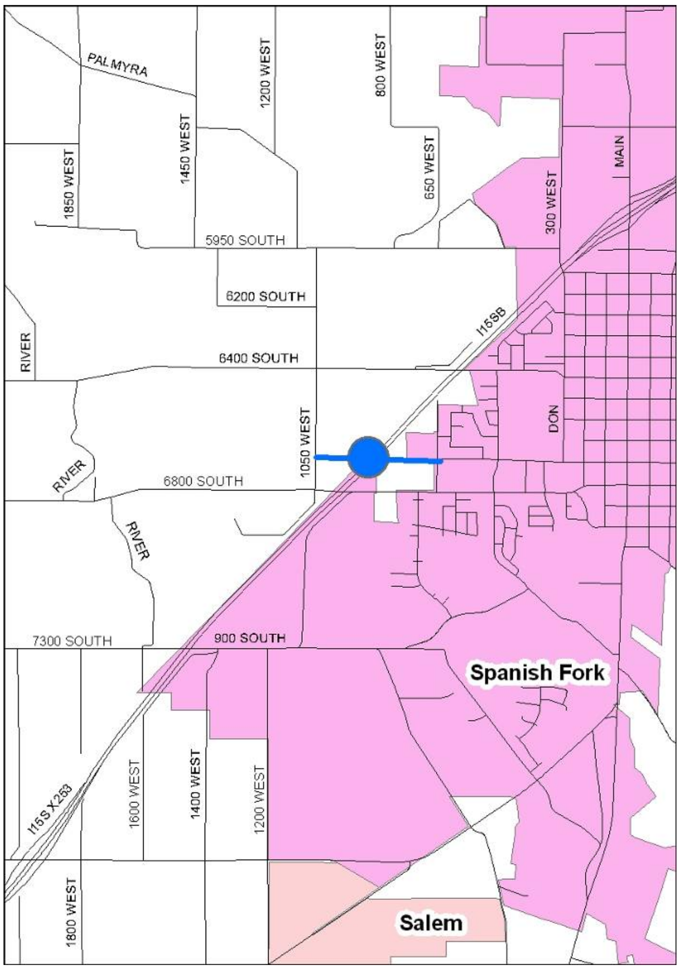
- $19,200,000 Total
- $15.85 per annual VMT (2030)

Disclaimer: All data included in this sheet is based on planning level analysis for alternative comparison and subject to vary significantly based on detailed analysis.

I-15 Interchange – Center Street Spanish Fork

Description
The interchange at Center Street provides additional access to I-15 for Spanish Fork, and the Benjamin area.

Alignment



Future Traffic Volume
- 22,000 vehicles a day

Cost
- $19,200,000 Total
- $11.48 per annual VMT (2030)

Disclaimer: All data included in this sheet is based on planning level analysis for alternative comparison and subject to vary significantly based on detailed analysis.

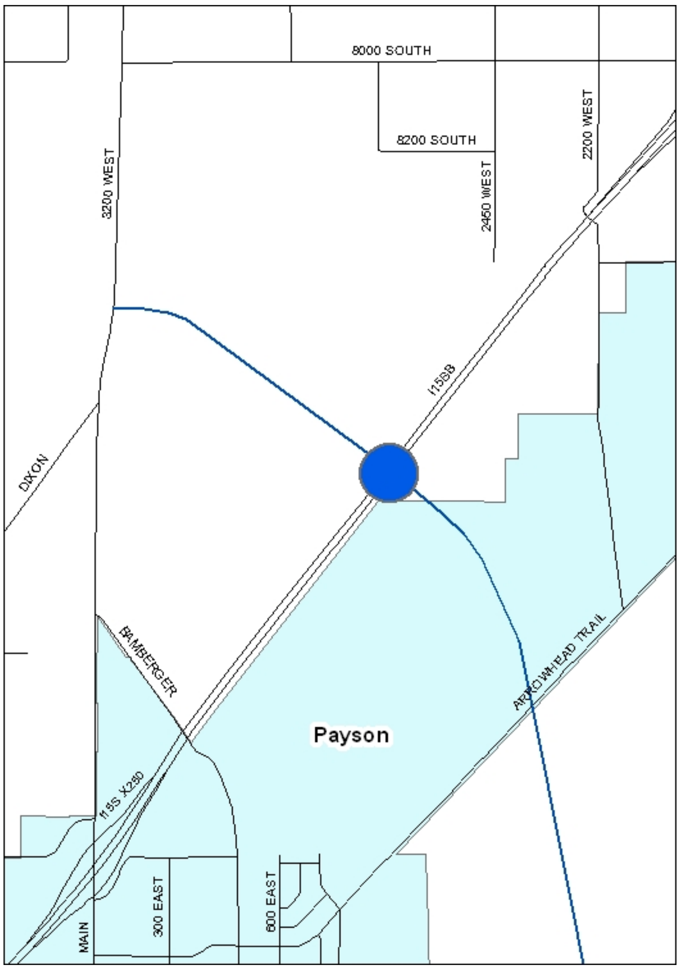
Utah Valley Transportation Studies
nebo transportation study

I-15 Interchange – Nebo Belt Route (western segment)

Description

The interchange at the Nebo Belt Route provides additional access to I-15 for Elk Ridge, Payson, and Woodland Hills.

Alignment



Future Traffic Volume

- 24,000 vehicles a day

Cost

- $19,200,000 Total
- $8.50 per annual VMT (2030)

Disclaimer: All data included in this sheet is based on planning level analysis for alternative comparison and subject to vary significantly based on detailed analysis.

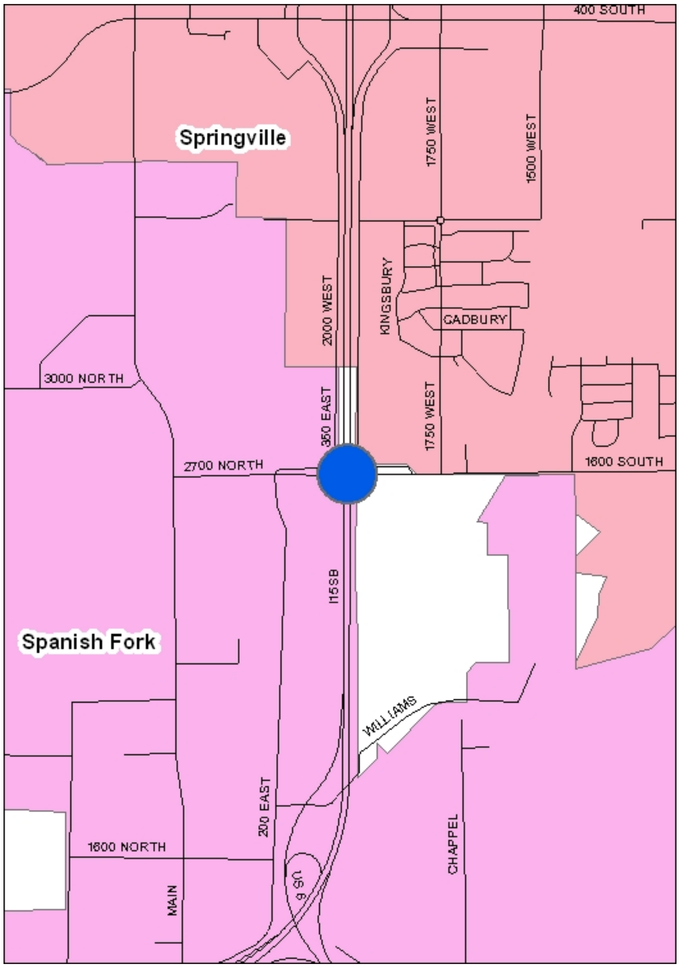
Utah Valley Transportation Studies
nebo transportation study

I-15 Interchange – 1600 South Springville

Description

The interchange at the Nebo Belt Route provides additional access to I-15 for Mapleton, Spanish Fork, and Springville.

Alignment



Future Traffic Volume

- 28,000 vehicles a day

Cost

- $19,200,000 Total
- $7.97 per annual VMT (2030)

Disclaimer: All data included in this sheet is based on planning level analysis for alternative comparison and subject to vary significantly based on detailed analysis.

Utah Valley Transportation Studies
nebo transportation study

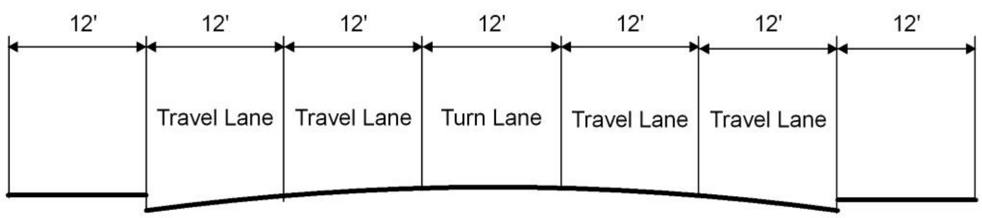
Main Street Payson

Description

Main Street Payson is a 0.7 mile community arterial that provides access to I-15. The four lane community arterial has an 84' cross-section, and a design speed of 35-45 mph. The speed/capacity of Main Street Payson allows for signalized and unsignalized access.

Cross-section

84' 4 Lane Community Arterial (35-45 mph)



Alignment

Future Traffic Volume

- 21,000 – 32,000 vehicles a day

Impacts

- Supported by Cities

Cost

- $160,000 for Right-of-way
- $3,210,000 for Construction
- $3,370,000 Total
- $0.63 per annual VMT (2030)

Disclaimer: All data included in this sheet is based on planning level analysis for alternative comparison and subject to vary significantly based on detailed analysis.

Utah Valley Transportation Studies
nebo transportation study

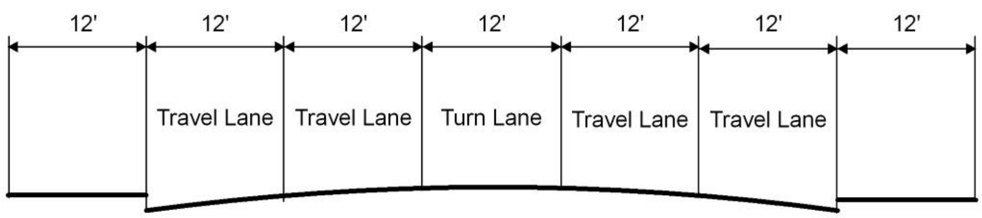
Main Street Santaquin

Description

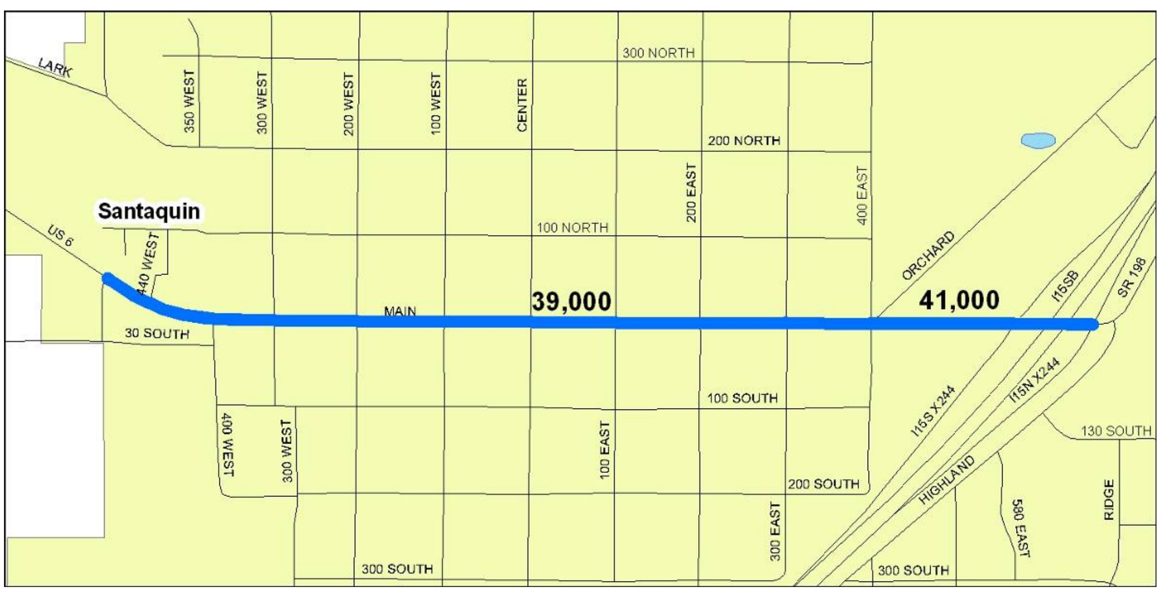
Main Street Santaquin is a 1.7 mile community arterial that provides improved access to I-15. The four lane community arterial has an 84' cross-section, and a design speed of 35-45 mph. The speed/capacity of Main Street Santaquin allows for signalized and unsignalized access.

Cross-section

84' 4 Lane Community Arterial (35-45 mph)



Alignment



Future Traffic Volume

- 39,000 – 41,000 vehicles a day

Impacts

- Supported by Cities

Cost

- $400,000 for Right-of-way
- $7,780,000 for Construction
- $8,180,000 Total
- $0.49 per annual VMT (2030)

Disclaimer: All data included in this sheet is based on planning level analysis for alternative comparison and subject to vary significantly based on detailed analysis.

Utah Valley Transportation Studies
nebo transportation study

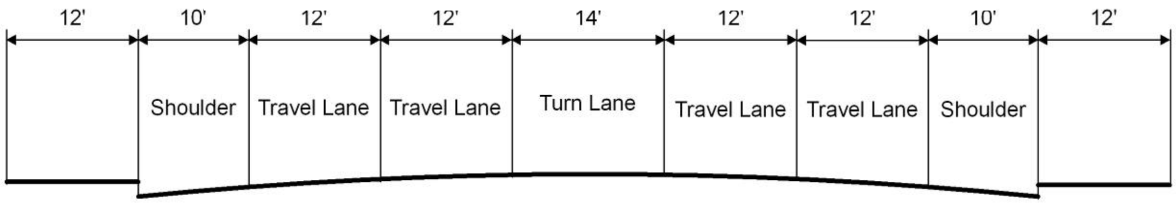
1400 North Springville

Description

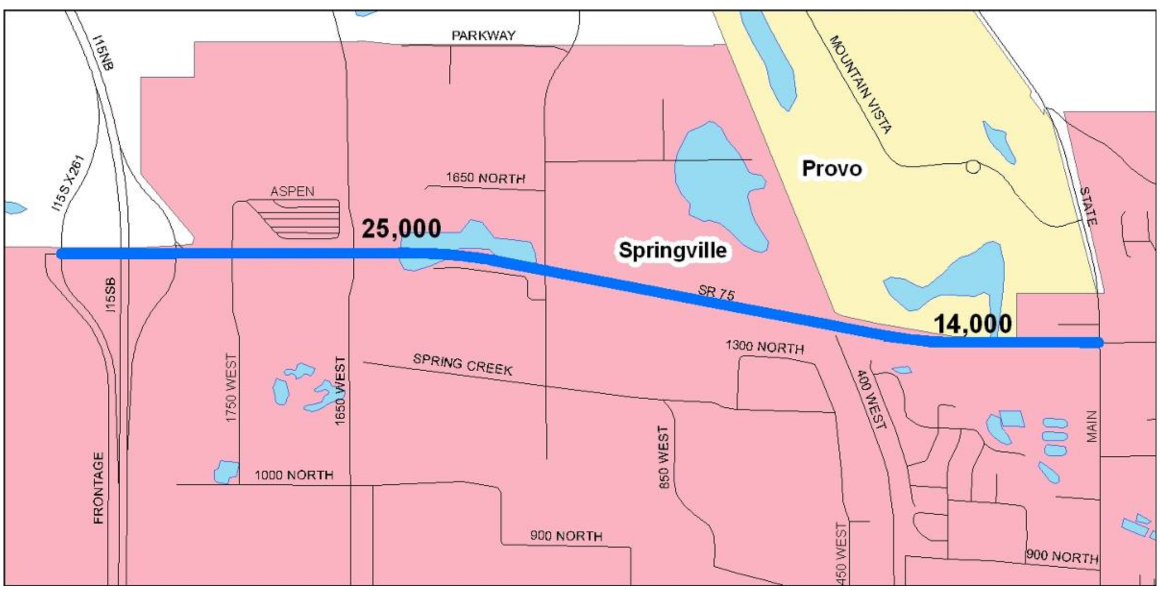
1400 North Springville is a 1.9 mile state standard arterial that provides east/west movement across railroad tracks and access to I-15. The four lane state standard arterial has a 106' cross-section, and a design speed of 40-50 mph. The speed/capacity of 1400 North requires access be limited to major cross streets only.

Cross-section

106' 4 Lane State Standard Arterial (40-50 mph)



Alignment



Future Traffic Volume

- 14,000 - 25,000 vehicles a day

Impacts

- Supported by Cities

Cost

- $1,140,00 for Right-of-way
- $30,710,000 for Construction
- $31,850,000 Total
- $1.07 per annual VMT (2030)

Disclaimer: All data included in this sheet is based on planning level analysis for alternative comparison and subject to vary significantly based on detailed analysis.

Utah Valley Transportation Studies
nebo transportation study

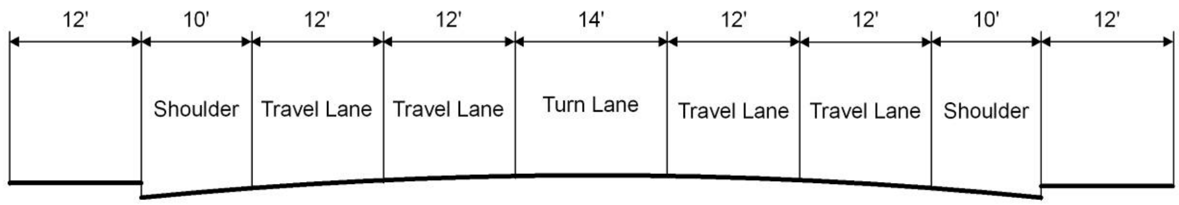
400 South Springville

Description

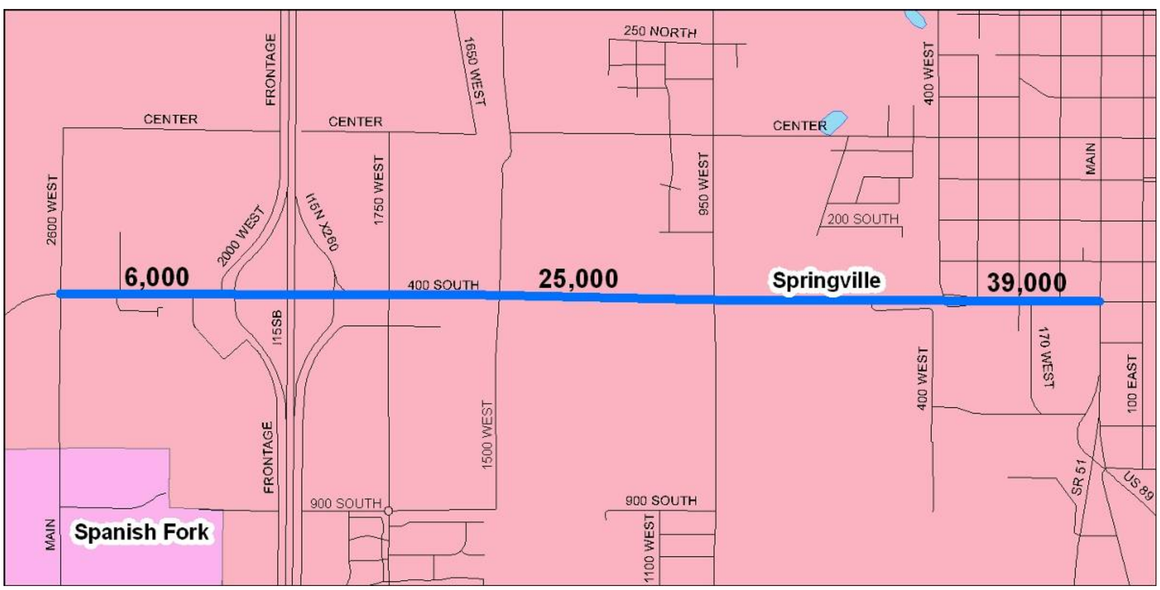
400 South Springville is a 2.4 mile state standard arterial that provides east/west movement across railroad tracks and access to I-15. The four lane state standard arterial has a 106’ cross-section, and a design speed of 40-50 mph. The speed/capacity of 400 South requires access be limited to major cross streets only. The project includes a new railroad bridge and the reconstruction of a second railroad bridge.

Cross-section

106’ 4 Lane State Standard Arterial (40-50 mph)



Alignment



Future Traffic Volume

- 6,000 - 39,000 vehicles a day

Impacts

- Supported by Cities

Cost

- $1,440,000 for Right-of-way
- $33,530,000 for Construction
- $34,970,000 Total
- $1.44 per annual VMT (2030)

Disclaimer: All data included in this sheet is based on planning level analysis for alternative comparison and subject to vary significantly based on detailed analysis.

Utah Valley Transportation Studies
nebo transportation study

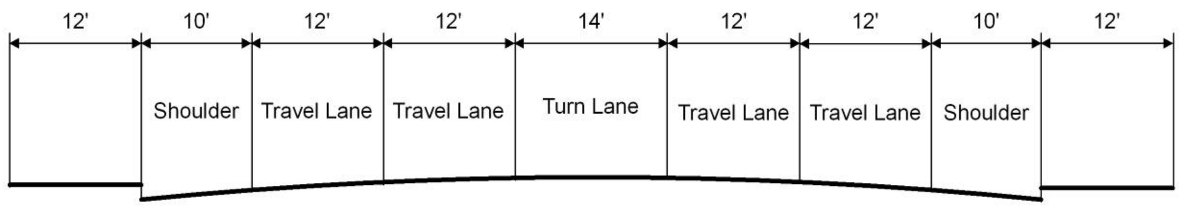
US-6 Spanish Fork Canyon

Description

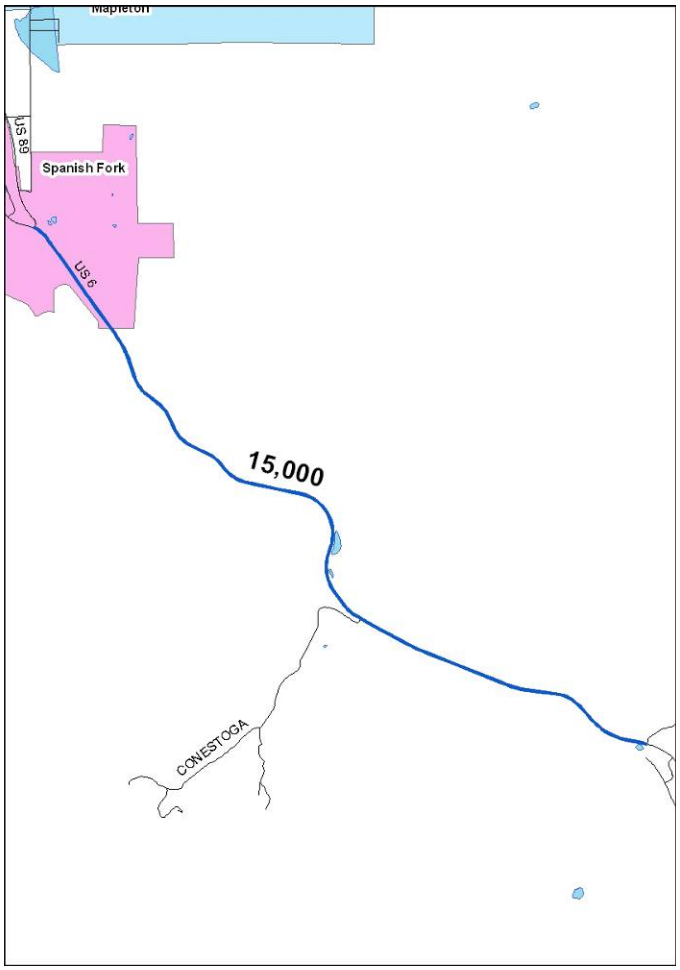
US-6 Spanish Fork Canyon is a 9.5 mile state standard arterial that provides east/west access from Spanish Fork to Carbon County. The four lane state standard arterial has a 106' cross-section, and a design speed of 50-60 mph.

Cross-section

106' 4 Lane State Standard Arterial (40-50 mph)



Alignment



Future Traffic Volume

- 15,000 vehicles a day

Impacts

- Supported by Cities

Cost

- $5,710,000 for Right-of-way
- $63,560,000 for Construction
- $69,720,000 Total
- $1.33 per annual VMT (2030)

Disclaimer: All data included in this sheet is based on planning level analysis for alternative comparison and subject to vary significantly based on detailed analysis.

Utah Valley Transportation Studies
nebo transportation study

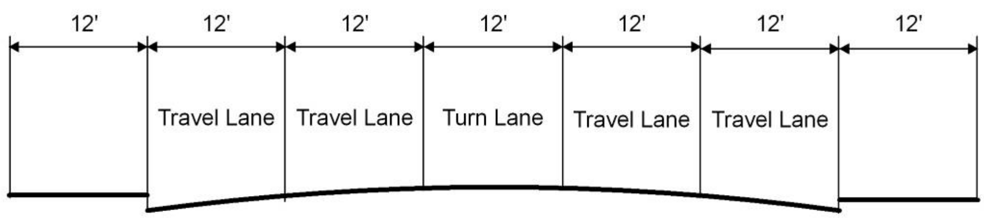
SR-51 Spanish Fork - Springville

Description

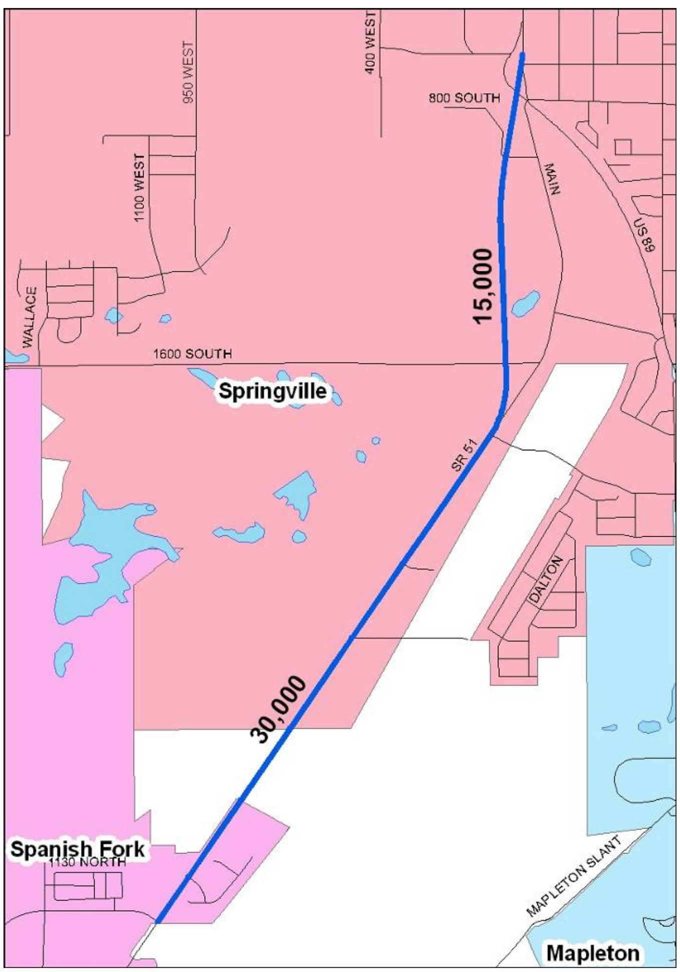
SR-51 Spanish Fork to Springville is a 3.1 mile community arterial that provides north/south mobility between Spanish Fork and Springville. The four lane community arterial has an 84' cross-section, and a design speed of 35-45 mph. The speed/capacity of US-51 allows for signalized and unsignalized access.

Cross-section

84' 4 Lane Community Arterial (35-45 mph)



Alignment



Future Traffic Volume

- 15,000 – 30,000 vehicles a day

Impacts

- Supported by Cities

Cost

- $720,000 for Right-of-way
- $24,200,000 for Construction
- $24,920,000 Total
- $1.13 per annual VMT (2030)

Disclaimer: All data included in this sheet is based on planning level analysis for alternative comparison and subject to vary significantly based on detailed analysis.

Utah Valley Transportation Studies
nebo transportation study

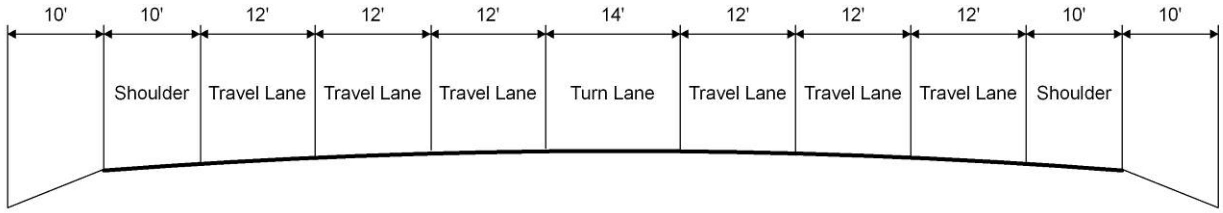
US-89 Provo - Springville

Description

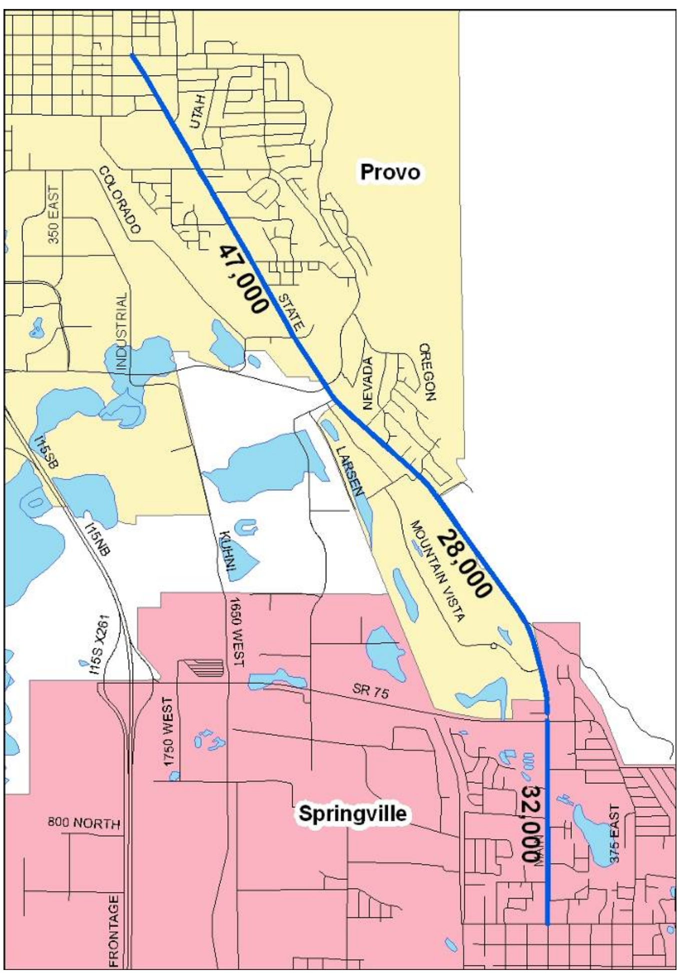
US-89 Provo to Springville is a 4.5 mile principal arterial that provides north/south mobility between Provo and Springville. The six lane principal arterial has a 125' cross-section, and a design speed of 40-50 mph. The high speed/capacity of US-51 require access be limited to major cross streets.

Cross-section

MAG 125' 6 Lane Principal Arterial (40-50 mph)



Alignment



Future Traffic Volume

- 27,000 – 47,000 vehicles a day

Impacts

- Supported by Cities

Cost

- $4,130,000 for Right-of-way
- $30,560,000 for Construction
- $34,690,000 Total
- $0.66 per annual VMT (2030)

Disclaimer: All data included in this sheet is based on planning level analysis for alternative comparison and subject to vary significantly based on detailed analysis.

Utah Valley Transportation Studies
nebo transportation study

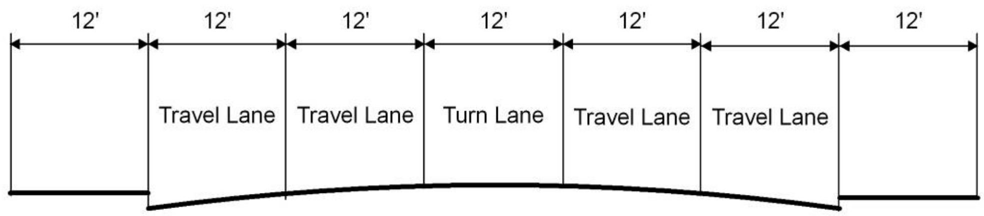
Expressway Lane

Description

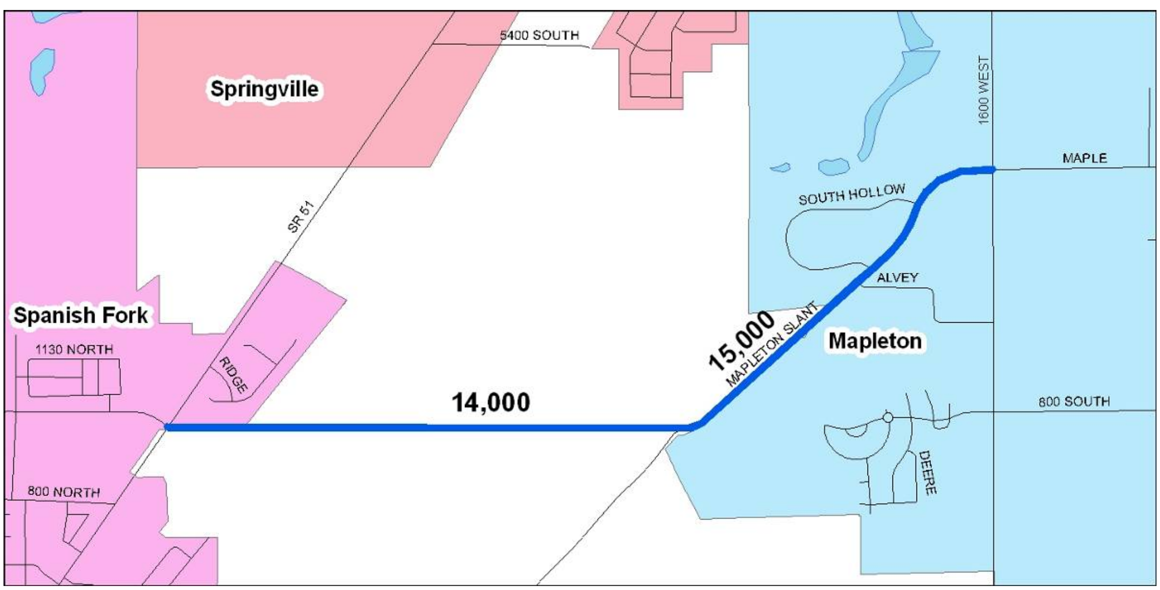
Expressway Lane is a 1.9 mile community arterial that provides additional east/west access to Mapleton and Spanish Fork. The four lane community arterial has an 84' cross-section, and a design speed of 35-45 mph. The speed/capacity of Expressway Lane allow for signalized and unsignalized access.

Cross-section

84' 4 Lane Community Arterial (35-45 mph)



Alignment



Future Traffic Volume

- 14,000 – 15,000 vehicles a day

Impacts

- Supported by Cities

Cost

- $2,100,000 for Right-of-way
- $26,870,000 for Construction
- $28,970,000 Total
- $3.02 per annual VMT (2030)

Disclaimer: All data included in this sheet is based on planning level analysis for alternative comparison and subject to vary significantly based on detailed analysis.

Utah Valley Transportation Studies
nebo transportation study

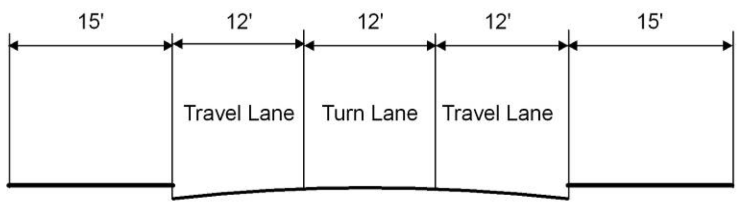
2000 East Spanish Fork

Description

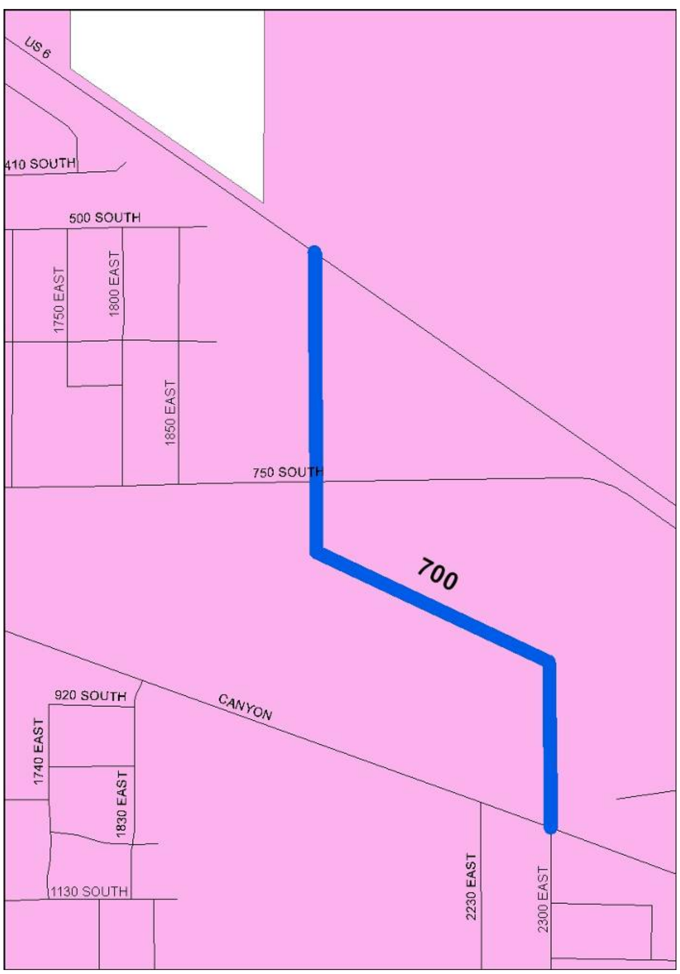
2000 East Spanish Fork is a 0.5 mile collector that provides additional connectivity between US-6 and Canyon Road. The three lane collector has an 66' cross-section, and a design speed of 30-40 mph. The speed/capacity of 2000 East allow for signalized and unsignalized access.

Cross-section

66' 3 Lane Collector (30-40 mph)



Alignment



Future Traffic Volume

- 700 vehicles a day

Impacts

- Supported by Cities

Cost

- $550,000 for Right-of-way
- $1,170,000 for Construction
- $2,260,000 Total
- $0.63 per annual VMT (2030)

Disclaimer: All data included in this sheet is based on planning level analysis for alternative comparison and subject to vary significantly based on detailed analysis.

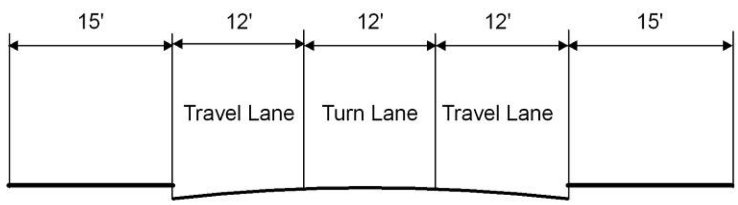
Utah Valley Transportation Studies
nebo transportation study

Woodland Hill Drive

Description
Woodland Hill Drive is a 0.8 mile collector that provides additional east/west access to Salem, and Woodland Hills. The two lane collector has a 66' cross-section, and a design speed of 30-40 mph. The speed/capacity of Woodland Hills Drive allow for signalized and unsignalized access.

Cross-section

66' 3 Lane Collector (30-40 mph)



Alignment

Future Traffic Volume
- 5,000 vehicles a day

Impacts
- Supported by Cities

Cost
- $880,000 for Right-of-way
- $2,740,000 for Construction
- $3,620,000 Total
- $2.62 per annual VMT (2030)

Disclaimer: All data included in this sheet is based on planning level analysis for alternative comparison and subject to vary significantly based on detailed analysis.

Utah Valley Transportation Studies
nebo transportation study

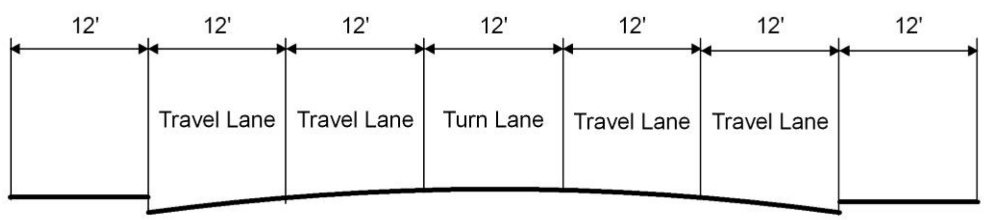
950 West Springville – Mountain Springs Parkway

Description

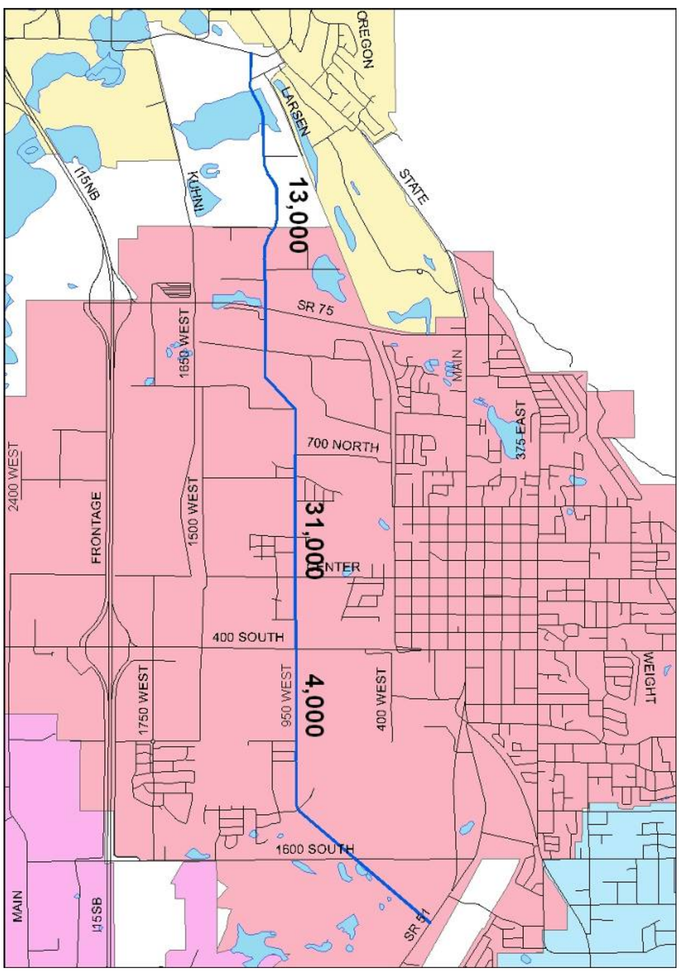
950 West Springville – Mountain Springs Parkway is a 4.5 mile community arterial that provides north/south mobility between Provo, and Springville. The four lane community arterial has an 84' cross-section, and a design speed of 35-45 mph. The speed/capacity of 950 West Springville – Mountain Springs Parkway allow for signalized and unsignalized access.

Cross-section

84' 4 Lane Community Arterial (35-45 mph)



Alignment



Future Traffic Volume

- 4,000 – 31,000 vehicles a day

Impacts

- Supported by Cities

Cost

- $6,310,000 for Right-of-way
- $40,610,000 for Construction
- $46,920,000 Total
- $1.37 per annual VMT (2030)

Disclaimer: All data included in this sheet is based on planning level analysis for alternative comparison and subject to vary significantly based on detailed analysis.

Utah Valley Transportation Studies
nebo transportation study

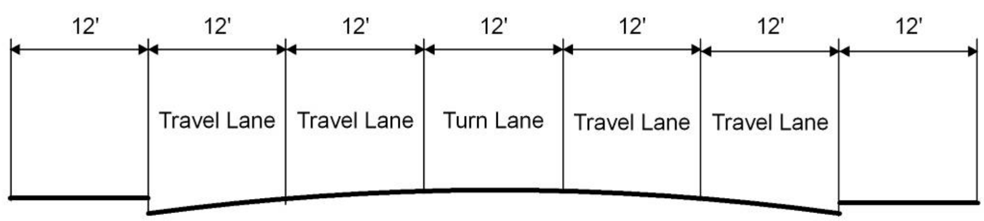
Main Street Spanish Fork

Description

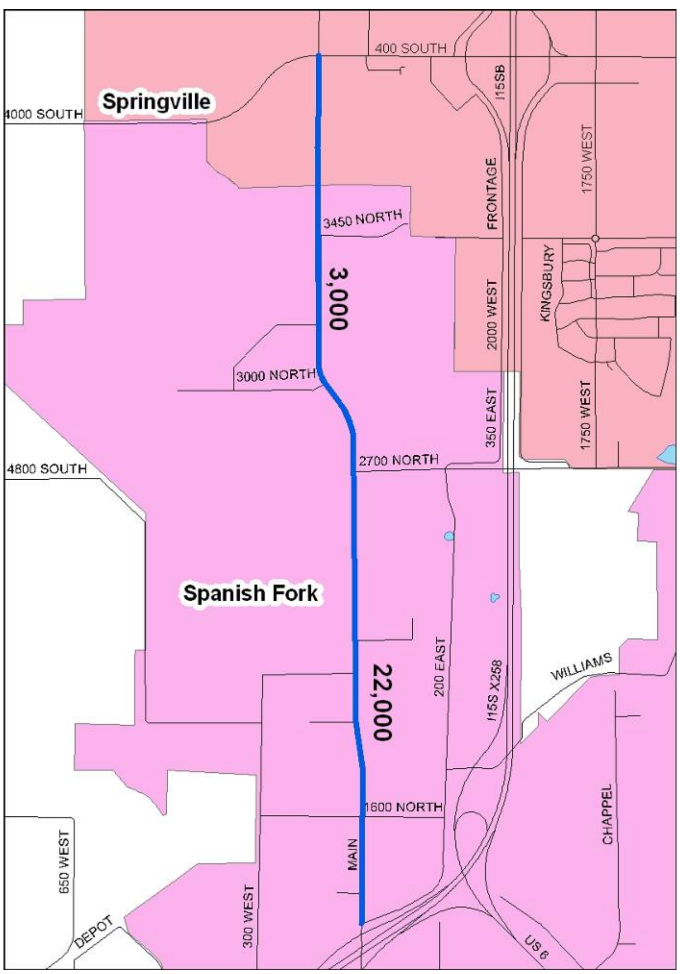
Main Street Spanish Fork is a 2.5 mile community arterial that provides north/south mobility between Spanish Fork, and Springville.   The four lane community arterial has an 84' cross-section, and a design speed of 35-45 mph. The speed/capacity of Main Street Spanish Fork allow for signalized and unsignalized access. This project is without the proposed Provo – Spanish Fork Connection.   Traffic Volumes are higher with the connection.

Cross-section

84' 4 Lane Community Arterial (35-45 mph)



Alignment



Future Traffic Volume

- 3,000 – 22,000 vehicles a day

Impacts

- Supported by Cities

Cost

- $580,000 for Right-of-way
- $23,450,000 for Construction
- $24,030,000 Total
- $2.19 per annual VMT (2030)

Disclaimer: All data included in this sheet is based on planning level analysis for alternative comparison and subject to vary significantly based on detailed analysis.

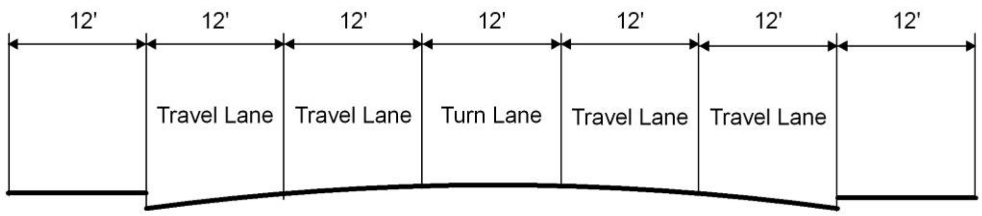
1600 South Springville

Description

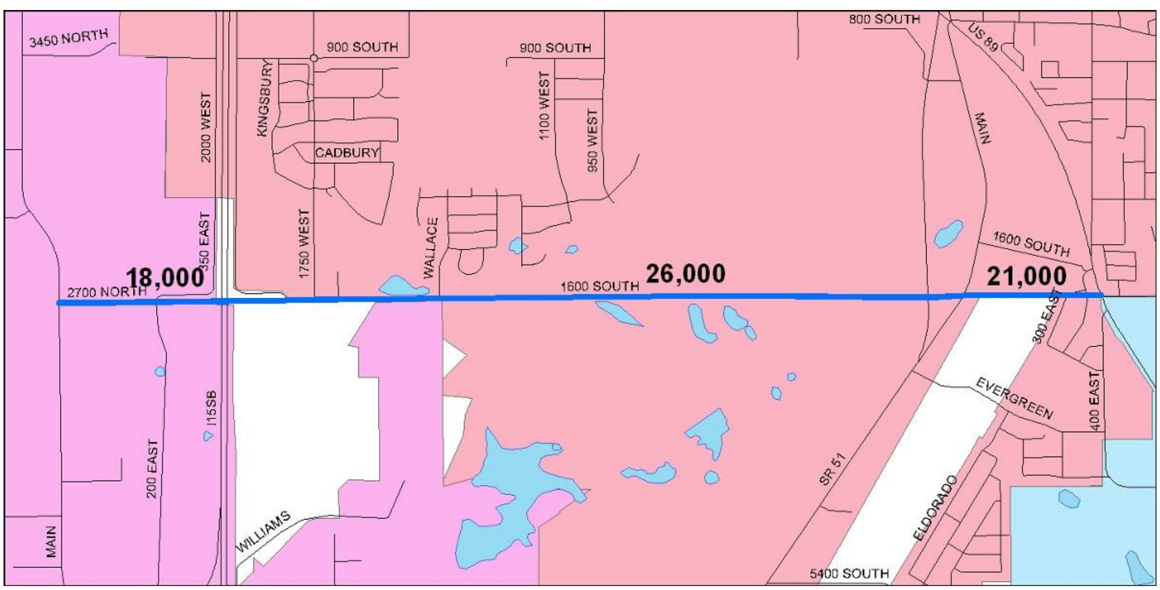
1600 South Springville is a 2.5 mile community arterial that provides access to I-15 for Mapleton, and Springville. The four lane community arterial has an 84' cross-section, and a design speed of 35-45 mph. The speed/capacity of 1600 South Springville allow for signalized and unsignalized access.

Cross-section

84' 4 Lane Community Arterial (35-45 mph)



Alignment



Future Traffic Volume

- 18,000 – 26,000 vehicles a day

Impacts

- Supported by Cities

Cost

- $650,000 for Right-of-way
- $43,010,000 for Construction
- $43,660,000 Total
- $2.62 per annual VMT (2030)

Disclaimer: All data included in this sheet is based on planning level analysis for alternative comparison and subject to vary significantly based on detailed analysis.

Appendix D:
Corridor Preservation Technical Memorandum

InterPlan Co.
7719 South Main Street
Midvale, Utah 84047
(801) 307-3400 (801) 307-3451 Fax
www.interplanco.com

Technical Memorandum

To: Mountainland Association of Governments Quadrant Studies

From: InterPlan Co.

Date: August 17, 2006

Subject: Corridor Preservation

Corridor preservation is a strategy to ensure that the network of highways, roads, and other travel ways will be available in the future to serve future development needs. For many transportation projects in urban areas, more than half the cost of the total transportation improvement is spent on right-of-way purchases which could have been avoided with early corridor preservation activities. Corridor preservation involves the application of various measures that:

- Maximize public investment by protecting corridors from unnecessary environmental, social, and economic impacts.
- Reduce the amount of developed property that needs to be purchased as part of a transportation corridor expansion.

The Utah State legislature has provided enabling legislation to counties to levy a tax for the sole purpose of corridor preservation. In their 2005 General Session, the Legislature passed Senate Bill 8 and it was signed into law. The legislation creates an opportunity for county governments to impose a fee of up to $10 per vehicle registration for the purposes of corridor preservation. These funds are to be used in the county in which they are generated and are to be held by UDOT on behalf of the local governments. The Metropolitan Planning Organizations have the opportunity, under the legislation, to prioritize the use of these funds for the purposes of corridor preservation starting January 1, 2006. The Utah County Commission has approved the use of these funds in Utah County where it is expected that total corridor preservation revenues may exceed $2.5 million per year.

As presently proposed, the county option corridor preservation fund is not a revolving loan fund (where right-of-way costs are returned to the fund when projects are implemented). As such, the corridor preservation fund would by itself be insufficient to purchase the right-of-way needs for even a handful of priority transportation corridors. While complete right-of-way purchase needs to be a “tool in our toolbox” for corridor preservation, it is only one of many tools. Like a hammer, our corridor purchase tool is appropriate for some but not all applications of corridor preservation. This Technical Memorandum provides a brief description of corridor preservation tools and their proper application.

This Technical Memorandum is offered through the Mountainland Association of Governments to describe corridor preservation tools and options. It should be noted that this memo does not supersede the legal opinions of each local government or UDOT and is provided to offer positive examples of corridor preservation activities observed in the MAG planning area and throughout Utah. Future policies of the corridor preservation fund may seek to encourage positive corridor preservation examples without judgment as to the equity of these examples from a property rights standpoint, but aimed as using right-of-way purchase as one of many corridor preservation tools.

Local governments possess the widest range of tools in their planning and zoning powers. New developments in a city or county must ask permission in the form of zoning, site plan, or other local land use approvals and requirements. This permission allows for the diligent evaluation of the health, safety, and welfare of existing and future residents of the local government. In broad terms, local governments can grant permission, deny permission, or grant permission subject to various conditions. Continuing to speak in broad terms, the court system has often limited the powers of local governments to grant approval subject to conditions where the conditions exceed the impact of the development. Therefore, many of the planning and zoning powers offered in the following section are subject to a case-by-case evaluation and should not be broadly interpreted for all applications.

Master Transportation Plans

Utah statute requires that the actions of a city, such as the approval of a new development, must be consistent with City Master Plan. A transportation element is one of several elements required to be addressed by Utah Code in a City Master Plan. Many cities have developed Master Transportation Plans as either sections of larger plans or stand-alone documents. Master Transportation Plans allow communities to define a planned transportation network including the right-of-way of future corridors. Once adopted as a plan of the community, new developments must be consistent with the Master Transportation Plan. Therefore, the Master Transportation Plan becomes a tool where new developments may be denied if they block or preclude a planned transportation facility. The Master Transportation Plan is one of the most valuable tools for corridor preservation. The MAG Quad studies provide a strong modeling basis and regional coordination for local governments to build from to adopt or amend their Master Transportation Plan. All Cities in Utah County should adopt a Master Transportation Plan and review and amend the plan on an ongoing basis. The Corridor Preservation Fund can be used for planning activities and may be eligible to assist with Master Transportation Plan development.

Official Maps

The Official Map was eliminated and recently returned to Utah Land Use Legislation as a tool to define transportation corridors at a greater level of detail. Where Master Transportation Plans may identify the general location of transportation corridors, they typically do not identify the corridors to a level of detail where individual parcel building permits would preclude a corridor. Official Maps provide local governments an added tool of identifying corridors at a parcel level of detail, but also provide for an obligation of local governments to progress on corridor purchase and not restrict development indefinitely. Local governments may have longer time frames and greater flexibility to restrict new uses of land, such as new subdivisions of new commercial site plans, than to restrict permitted but regulated uses such as building permits. Official Maps can be adopted City-wide but are more commonly the outcome of an individual corridor study. Corridor studies offer an added benefit of coordination with resource agencies and adjacent cities to better define the needs, costs, impacts, and mitigation of new transportation corridors. As such, corridor studies may offer money savings in a future National Environmental Policy Act (NEPA) environmental study, which is a prerequisite for federal actions, including federal transportation funding. Corridor studies and Official Map development are also eligible planning activities for county Corridor Preservation Funds subject to County and MPO restrictions.

Development Exactions

New developments which create the need for a community to build several miles of new street just to access the development, for example, may often be granted approval of the development subject to the requirement that the development put into service the new street. These approvals subject to a set of traded conditions are often referred to development exactions. Cities may gain an "upper hand" on this trade and still be fair and reasonable to all developments when they have strong planning and can clearly define their needs through tools such as a Master Transportation Plan. Development exactions in this sense do not mean unfair dealings with new development, but rather a community's ability to define long term planning goals and rely on each new development to contribute toward the achievement of these goals. As a traded or negotiated process, exactions are subject to the concern that all developments are not treated equally. In addition, there are examples of court rulings where the city has required unfair trades or have acted in an arbitrary manner.

Development Impact Fees

Development impact fees have been used by many local governments in Utah and legislated as a local government planning tool for approximately ten years. Utah impact fee legislation allows for the development of transportation impact fees provided that the impact is reasonably related to the development demand and the need flows from an adopted Capital Facilities Plan which identifies the costs of planned infrastructure expansion necessitated by new growth. Transportation impact fees are presently not allowed for State Highways. The assessment of impact fees allows for a means of calculating the value of exactions such that new development is not required to put in new facilities but may be required to pay a portion of the cost for new facilities to be implemented. Although impact fees are generally resisted by development interests, they are a means of taking the negotiation process away from development exactions. Impact fees play two roles in corridor preservation. First, developments may dedicate right-of-way in lieu of impact fee payments. Second, communities may collect impact fees and use the revenue to purchase and implement new transportation corridors. The studies which support the adoption of impact fees may be eligible for Corridor Preservation Funds, but are also eligible costs to be recouped by the actual impact fee.

Set-Back Requirements

Most communities require specific building setbacks from front, side, and rear property lines. These setbacks often result in a more desirable single family residential environment by reducing noise and providing safety and other benefits. Communities with large lot sizes may increase set-back requirements on major transportation corridors for the short-term purpose of maintaining property values through reducing the impacts of the transportation facility on the residential environment. In the longer term, these setbacks offer communities the ability to purchase private land which is not encumbered by buildings. Although set-back requirements reduce the need to purchase buildings, they are difficult to implement in the future since large lot developments tend to have high property values.

Density Bonuses

The ability of communities to "trade" density between developments varies based on the size of the development and communities must be conscious of the policy implications of various actions. However, like set-back requirements, density bonuses may be applied in specific applications where a development may be asked to "donate" a transportation corridor in exchange for permission to build the same number of units which would be built if the corridor remained in private ownership. This tool allows for a win-win of community and development interests, but may not create a "level playing field" of competing developments of different sizes. Density bonuses are a form of exactions where the city is more proactive in offering incentives for corridor preservation.

Access Management

In addition to planning and zoning powers, local governments and UDOT share the police powers necessary to regulate the safe use of public facilities. While there is some overlap of local government planning and police powers, there is a clear divide in the ability of UDOT to regulate the use of (State) highways and the inability of UDOT to regulate the use of land adjacent to highways. In fact, Administration Rule R930-6 describes the ability of UDOT to manage and control the access to and from the State Highway system separate from the ability of local governments to approve land use. Since the recent adoption of this rule, there have been examples of local government site plan approvals which have not been permitted for access onto the State Highway system. Therefore, State Highways allow for double protection of corridors since local governments must approve land use and UDOT must approve highway access. While access management does not gather corridor rights-of-way from private ownership and put them into public ownership, it does provide a mechanism of protecting the past investment of the transportation corridor by preserving its safety and traffic-carrying capacity function.

There are three broad aspects of access management which are employed by UDOT through Administrative Rule R930-6 and slowly gaining acceptance by a handful of local governments. While access management is often proposed as solution for previously widened corridors where retro-fit actions are more cost-effective than continual corridor widening, access management should be more widely practiced in the growth of undeveloped corridors to ensure that planned development does not result in choked or clogged facilities in the future.

Driveway Design

The design of driveways and access points can have a noticeable affect on traffic capacity and safety. High-speed corridors, for example, should be designed with appropriate corner radii to allow turns at higher speeds. Similarly, corridors with trails and bicycle lanes, effective tools in their own right for reducing the demand for highways but beyond the scope of corridor preservation, should tighten turn radii to reduce high speed conflicts between motorized and non-motorized uses. Other design criteria related to vehicle design, sight distance considerations, and various other engineering considerations should be carefully considered by UDOT and local governments but often are not given the attention of other corridor preservation techniques.

Driveway Separation

In addition to the design of driveways, the spacing of driveways is an important planning consideration. According to the AASHTO Green Book, on a per mile basis, each new driveway reduces the progressive speed on a corridor by 0.25 mile per hour. The net result of failing to restrict driveway spacing can be found on commercial corridors such as State Street where over 40 driveways per mile restrict the travel speeds by over 20 percent of the free flow speed. With the capacity of major facilities reduced by 20 percent, other facilities must carry the traffic load. It is incumbent on all communities to develop access spacing standards which balance the role of the facility to serve individual land development and land uses against the degradation of the facility's carrying capacity through the entire community. UDOT standards suggest a minimum driveway spacing of approximately 150 feet for lower functioning streets with progressively larger separation as the speed and geographic importance of the facility increases.

Signal Spacing

The single largest determinant of a facility's traffic-carrying capacity is the spacing of traffic signals. A single travel lane on a freeway, for example, can service approximately 2,000 vehicles per hour. Traffic signals essentially split green time with cross traffic and, through various inefficiencies, reduce the traffic capacity of a single travel lane to less than 900 vehicles per hour. In fact, as signals are spaced closer than approximately one-half mile, crash rates can be expected to increase and the ability to coordinate signals so that drivers may progress in a platoon dramatically decreases. Like access spacing, signal spacing must be planned based on the role of the facility in the regional network and the desired speed of that facility. As a general guideline, signals should be spaced uniformly with larger signal spacing offered for higher functioning facilities and smaller signal spacing, typically no less than one-quarter mile, can be allowed on facilities serving limited geographic areas.

All communities in Utah County should be encouraged to preserve corridors included in the MAG Long Range Transportation Plan. This plan currently anticipates transportation needs to the year 2030 and includes both near-term and longer-term transportation improvement projects. All corridor preservation actions of local governments and UDOT should be promoted for projects included in the MAG Long Range Transportation Plan. Unfortunately, the MAG Long Range Transportation Plan is required by federal guidance to be "financially constrained." As a constrained plan, it is difficult to identify corridors which might be implemented beyond the planning horizon of the plan but which still require right-of-way protection in the form of corridor preservation. The MAG Quadrant Study Ultimate Plan projects offer some guidance for longer term transportation corridors which should be preserved. Specifically, the Nebo Belt Loop and the East Lake Highway are identified as potential long range corridors which offer a dramatic improvement to the transportation network in Utah County but will require active coordination of multiple local governments. Both of these corridors were identified as having minimal residential impacts in 2006, but development may preclude these facilities by the time they offer benefit.

Appendix E:
Congestion Management System
Technical Memorandum

InterPlan Co.
7719 South Main Street
Midvale, Utah 84047
(801) 307-3400 (801) 307-3451 Fax
www.interplanco.com

Technical Memorandum

To: Mountainland Association of Governments (MAG)

From: InterPlan Co.

Date: August 17, 2006

Subject: Congestion Management System

With Utah County being one of the fastest growing areas of the country, travel demand is quickly meeting, indeed exceeding, the existing transportation network capacity in the area. In order to most effectively use the limited resources available, the Mountainland Association of Governments wants to maximize the capacity of the existing transportation network before building new capacity, and as a first step asked InterPlan to develop a list of most congested corridors. Roads on this list will become candidates for implementation of congestion management strategies as determined by the Technical Advisory Committee/Planners Advisory Committee.

In creating this list, InterPlan developed a spreadsheet with the intent of inventorying all of the major roads in Utah County as well as the roads with the highest volumes. The County was divided into the same four quadrants of the transportation studies that are currently being finalized or have been recently completed. These four areas are referred to as:

- The Lake Mountain Study Area
- The Nebo Study Area
- The Provo/Orem Study Area
- The Northeast Utah Valley Transportation Study Area

In each of these quadrants, roads with traffic volumes of at least 10,000 vehicles/day were included in the inventory. The exception is in the Lake Mountain study area where there is less infrastructure and lower traffic volumes. In this area, roads have been included that have traffic volumes less than 10,000 vehicles/day.

In order to determine capacity, a detailed inventory of each facility needed to be done, including such elements as cross-sections and lane configurations. InterPlan staff drove many of these roads to gather detailed information. Aerial photography was used to gather information for roads that weren’t manually verified.

After specific configurations for each corridor were obtained, traffic capacities were determined. Where appropriate, varying sections of the same road were calculated separately to account for changing road widths. For example, the cross-section of State Street changes from section to section; these sections were included in the inventory by segment.

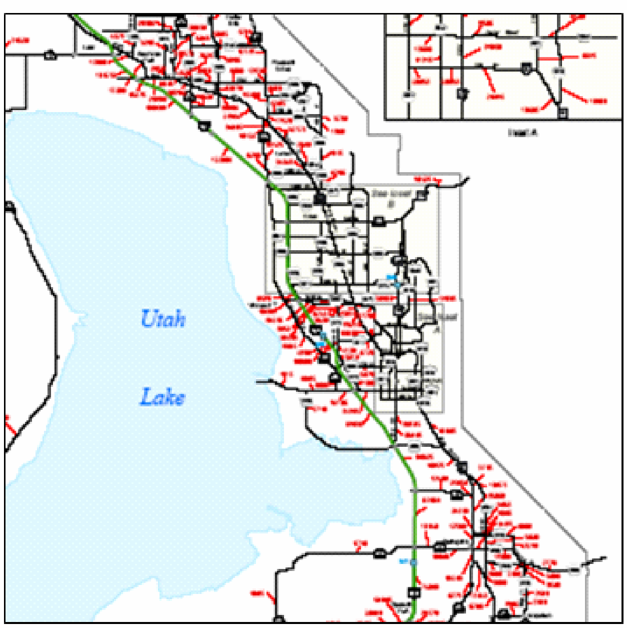
In order to determine traffic capacity, a standardized method of assigning volumes to different lane configurations was developed. These standardized capacities are shown in Table 1 below.

Table 1: Traffic Capacity by Lane Configuration

Through Lanes	Turn Lanes	Capacity
2	None	13,500
2	Right	15,500
2	Left	16,000
2	Right and Left	18,500
4	None	29,500
4	Right	33,500
4	Left	35,000
4	Right and Left	40,500
6	None	44,000
6	Right	48,500
6	Left	50,500
6	Right and Left	55,500

In determining traffic volumes, UDOT's *Traffic on Utah Highways* for 2004 used as it is the most recent widely available and consistent data across the transportation network. Figure 1 below is an example of a Traffic on Utah Highways map from the UDOT web page.

Figure 1: 2004 Traffic on Utah Highways, Central Utah County



Using the traffic volume and road capacity, a volume to capacity (V/C) ratio was calculated. Level of service is typically based on V/C as it is the best measure of congestion on a roadway or a particular time. Table 2 shows the volume, capacities, V/C ratio, and LOS for each road in the inventory. Roads indicated in red have a LOS of F and those in yellow have a LOS of D or E. Figure 2 shows the roads in Utah County by LOS. Level of service definitions assumed in Table 2 are:

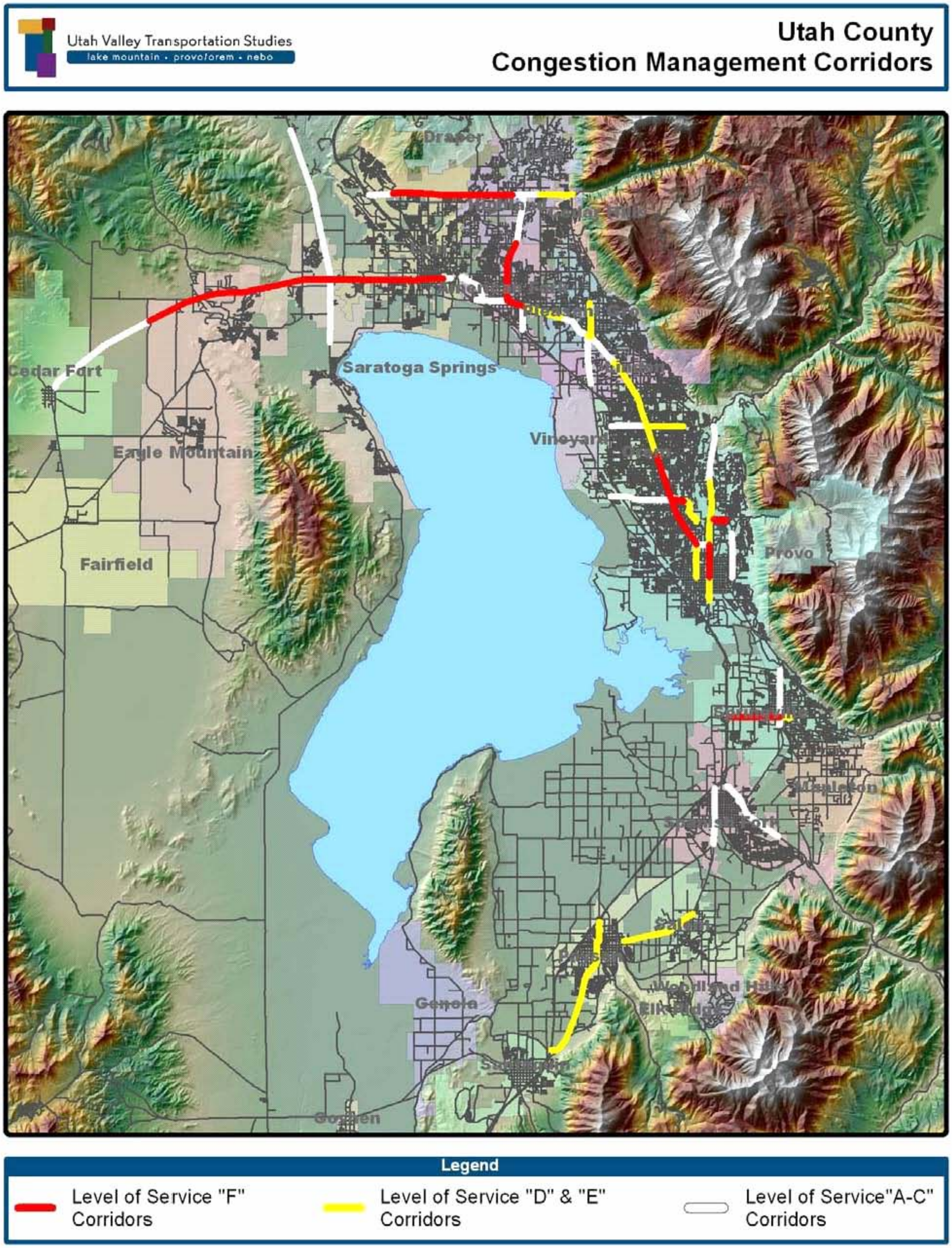
- White = Less than .75
- Yellow = .75 to .99
- Red = Equal to or greater than 1.0

Table 2: Congested Corridors in Utah County

Region	Corridor	Start	End	Volume	Capacity	V/C Ratio	LOS
Lake Mountain							
LM 1	SR-73 (east of Redwood Rd)	Redwood Rd	1700 West	21,520	13,500	1.59	F
LM 2	Main Street (in Lehi, SR-73)	780 West	Center Street	21,520	13,500	1.59	F
LM 3	SR-73 (east of Redwood Rd)	1700 West	780 West	21,520	16,000	1.35	F
LM 4	SR-73 (west of Redwood Rd)	800 West	Redwood Rd	16,400	16,000	1.03	F
LM 5	Main Street (Lehi, SR-73)	Center Street	600 East	16,400	16,000	1.03	F
LM 6	Redwood Rd (north of SR-73)	SL County	SR-73	10,010	13,500	0.74	C
LM 7	SR-73 (west of Redwood Rd)	Cedar Fort	800 West	7,955	13,500	0.59	C
LM 8	Main Street (Lehi, SR-73)	600 East	I-15	21,520	40,500	0.53	C
LM 9	Redwood Rd (south of SR-73)	SR-73	Saratoga Springs	9,660	18,500	0.52	C
NEUV							
NV1	State Street	500 East	Main Street	39,265	35,000	1.12	F
NV2	100 East/Alpine Hwy (in AmericanFork)	Main Street	1120 North	20,620	18,500	1.11	F
NV3	SR-92	6000 West	5600 West	17,225	15,500	1.11	F
NV4	SR-92	1200 East	6000 West	17,225	15,500	1.11	F
NV5	SR-92	1500 West	1200 East	17,205	15,500	1.11	F
NV6	100 East/Alpine Hwy	1120 North	97th North	20,365	18,500	1.10	F
NV7	State Street	100 East	Main Street	34,605	35,000	0.99	E
NV8	State Street (in Lindon)	400 North	1600 North	34,545	35,000	0.99	E
NV9	100 East (Pleasant Grove)	500 North	1100 North	13,230	13,500	0.98	E
NV10	100 East (in Pleasant Grove, SR-146)	State Street	Center Street	17,570	18,500	0.95	E
NV11	SR-92	4800 West	Canyon Rd	12,325	13,500	0.91	E
NV12	State Street	Proctor Ln	500 East	30,965	35,000	0.88	E
NV13	100 East (Pleasant Grove)	Center Street	500 North	15,400	18,500	0.83	D
NV14	Main Street (Am. Fork)	State Street	State Street	26,990	35,000	0.77	C
NV15	100 East/Alpine Hwy	97th North	SR-92	13,525	18,500	0.73	C
NV16	State Street	Main Street	Proctor Ln	23,355	35,000	0.67	C
NV17	State Street	400 North	100 East	32,775	50,500	0.65	C
NV18	500 East (in Am. Fork)	I-15	State Street	19,020	35,000	0.54	C
NV19	SR-92	5600 West	4800 West	17,225	35,000	0.49	B

NV20	SR-92	I-15	1500 West	17,205	35,000	0.49	B
NV21	State Street	Main Street	SR-73	17,200	35,000	0.49	B
NV22	Geneva Rd	State Street	2000 North	16,125	35,000	0.46	B
NV23	Main Street (American Fork)	I-15	State Street	15,575	35,000	0.45	B
Provo-Orem							
PO 1	University Pkwy (in Orem)	State Street	800 East	45,930	35,000	1.31	F
PO 2	State Street (in Provo)	1230 North	800 South	58,230	50,500	1.15	F
PO 3	State Street (in Orem)	Center Street	800 South	58,115	50,500	1.15	F
PO 4	University Ave (in Provo)	Center Street	400 North	44,650	40,500	1.10	F
PO 5	University Ave (in Provo)	400 North	800 North	43,825	40,500	1.08	F
PO 6	University Ave (in Provo)	800 North	1230 North	42,760	40,500	1.06	F
PO 7	2230 North (in Provo)	University Ave	650 East	15,990	16,000	1.00	F
PO 8	State Street (in Orem)	Center Street	800 North	49,210	50,500	0.97	E
PO 9	800 North (in Orem)	State Street	400 East	34,060	35,000	0.97	E
PO 10	University Ave (in Provo)	900 South	Center Street	38,515	40,500	0.95	E
PO 11	State Street (in Orem)	800 North	1600 North	47,730	50,500	0.95	E
PO 12	University Pkwy (in Orem)	800 East	2230 North	37,700	40,500	0.93	E
PO 13	State Street (in Provo)	Center Street	1230 North	36,850	40,500	0.91	E
PO 14	University Ave (in Provo)	2230 North	800 South	36,160	40,500	0.89	E
PO 15	University Ave (in Provo)	1230 North	University Pkwy	35,830	40,500	0.88	E
PO 16	University Ave (in Provo)	University Pkwy	2230 North	35,750	40,500	0.88	E
PO 17	800 North (in Orem)	400 East	800 East	27,515	35,000	0.79	D
PO 18	900 East (in Provo)	700 North	University Pkwy	25,290	35,000	0.72	C
PO 19	University Pkwy (in Orem)	I-15	State Street	39,235	55,500	0.71	C
PO 20	800 North (in Orem)	I-15	State Street	27,355	40,500	0.68	C
PO 21	University Ave (in Provo)	Canyon Road	800 North Orem	19,150	30,000	0.64	C
PO 22	900 East (in Provo)	Center Street	700 North	18,765	35,000	0.54	C
PO 23	University Ave (in Provo)	South Towne	900 South	28,445	55,500	0.51	C
PO 24	1230 North (in Provo)	State Street	University Ave	27,350	55,500	0.49	B
Nebo							
NE 1	400 South (in Springville, SR-77)	I-15	400 West	19,140	15,500	1.23	F
NE 2	400 South (in Springville, SR-77)	400 West	Main Street	18,665	18,500	1.01	F
NE 3	Main Street (in Payson)	I-15	100 North	13,305	13,500	0.99	E
NE 4	100 West (in Payson)	800 South	100 North	13,170	13,500	0.98	E
NE 5	400 South (in Springville, SR-77)	Main Street	400 East	14,455	15,500	0.93	E
NE 6	SR-198 (Payson)	South end of the road, by I-15		12,095	13,500	0.90	E
NE 7	Main Street (in Spanish Fork)	SR-164	Payson	10,560	13,500	0.78	D
NE 8	Main Street (in Spanish Fork)	I-15	400 North	28,060	40,500	0.69	C
NE 9	State Street (in Springville)	SR-75	400 North	25,650	40,500	0.63	C
NE 10	State Street (in Springville)	400 North	Center Street	24,330	40,500	0.60	C
NE 11	Main Street (in Spanish Fork)	400 North	300 South	23,875	40,500	0.59	C
NE 12	US-6 (in Spanish Fork)	I-15	400 North	20,605	35,000	0.59	C
NE 13	US-6 (in Spanish Fork)	400 North	1800 East	20,085	35,000	0.57	C
NE 14	Main Street (in Spanish Fork)	300 South	SR-164	20,720	40,500	0.51	C
NE 15	State Street (in Springville)	400 South	700 South	19,240	40,500	0.48	B
NE 16	State Street (in Springville)	Center Street	400 South	17,580	40,500	0.43	B

Figure 2


Utah Valley Transportation Studies
lake mountain • provo/orem • nebo
Utah County
Congestion Management Corridors
Saratoga Springs
Cedar Fort
Eagle Mountain
Vineyard
Fairfield
Provo
Genola
Legend
Level of Service "F" Corridors
Level of Service "D" & "E" Corridors
Level of Service"A-C" Corridors

Next Steps

The results of this congested corridor inventory are only useful to the Mountainland Association of Governments to the extent that the list helps MAG address additional capacity improvements throughout Utah County. In order to use the inventory most effectively, MAG should consider two tasks:

- Compare this list to the recommended projects lists developed during each of the four quadrant studies. Projects recommended in the quadrant studies that address projects on the congested corridor inventory should be of high priority.
- For congested corridors that do not appear on the recommended project lists from the quadrant studies, MAG, UDOT, and local governments should be looking at lower-cost, short-term solutions such as intersection improvements, access control measures and other actions.

Appendix F:
PowerPoint Presentation

Nebo Transportation Study

Mountainland Association of Governments

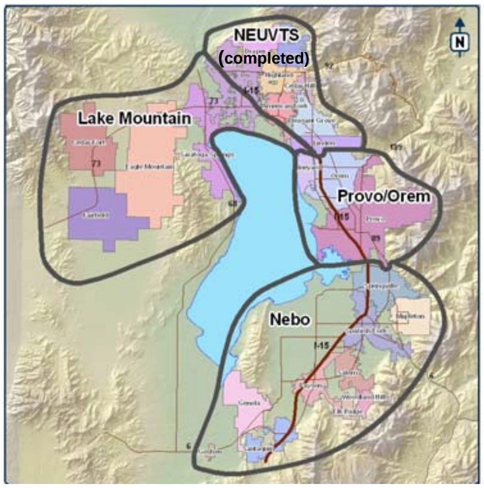
Carter::Burgess | InterPlan Co. Transportation Planning | Utah Valley Transportation Studies nebo transportation study

Introduction

- Four MAG initiated projects: Nebo, Lake Mountain, Provo/Orem and Northeast Utah Valley Transportation Study (NEUVTS)
- NEUVTS completed in September, 2005
- Studies address Regional Transportation Plan options and recommendations

Carter::Burgess | InterPlan Co. Transportation Planning | Utah Valley Transportation Studies nebo transportation study

Study Areas Map



Carter Burgess | InterPlan Co. Transportation Planning | Utah Valley Transportation Studies – nebo transportation study

Study Goals and Objectives

- Identify transportation needs through the year 2030+
- Evaluate multi-modal options
- Develop additional Transportation Plan options
- Minimize costs and impacts of improvements with early coordination

Carter Burgess | InterPlan Co. Transportation Planning | Utah Valley Transportation Studies – nebo transportation study

Area Studies Schedule

2005

November
- Project Initiation
- First TAC Meetings

December
- TAC Meetings #2

2006

January
- Analyze Alternatives and prepare preliminary Recommendations

February
- TAC Meetings #3
- Presentation of Initial Findings

March
- TAC Meetings #4
- Refinement of Initial Findings

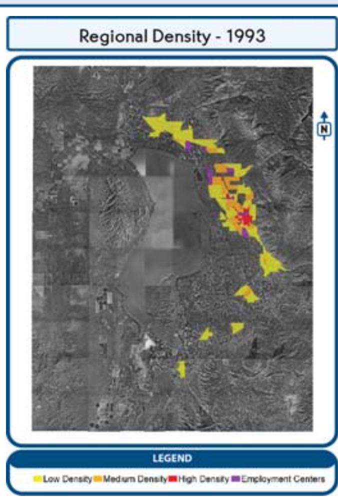
April
- Presentation of Recommendations

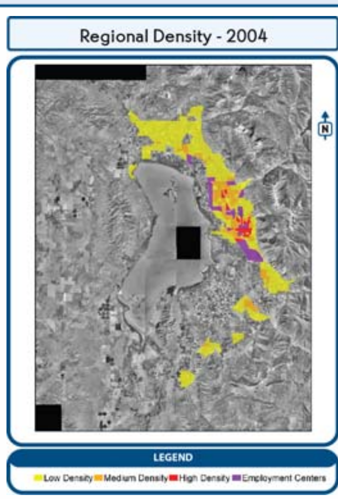
May

Final Recommendations

Carter Burgess | InterPlan Co. Transportation Planning | Utah Valley Transportation Studies nebo transportation study

Development Patterns - 1993 & 2004

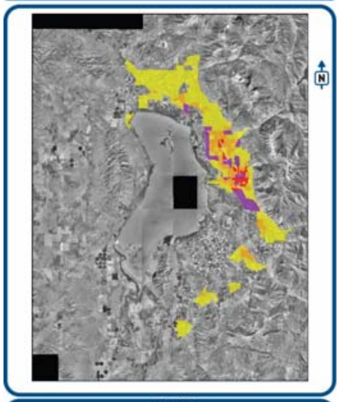




Carter Burgess | InterPlan Co. Transportation Planning | Utah Valley Transportation Studies nebo transportation study

Development Patterns - 2004 & 2015

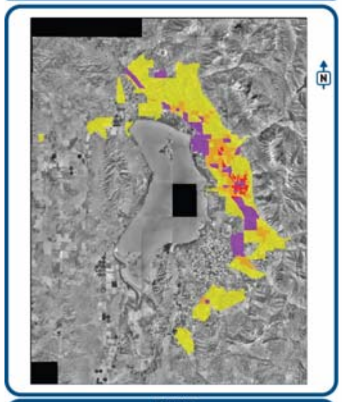
Regional Density - 2004



LEGEND

Low Density Medium Density High Density Employment Centers

Regional Density - 2015



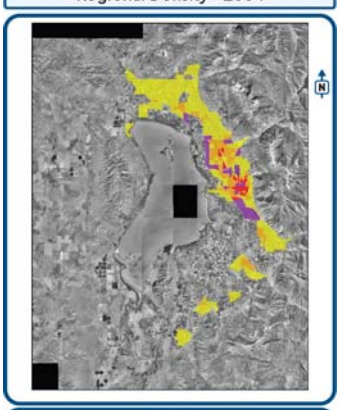
LEGEND

Low Density Medium Density High Density Employment Centers

Carter::Burgess InterPlan Co. Transportation Planning Utah Valley Transportation Studies nebo transportation study

Development Patterns - 2004 & 2030

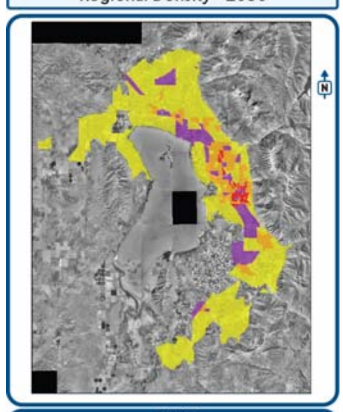
Regional Density - 2004



LEGEND

Low Density Medium Density High Density Employment Centers

Regional Density - 2030

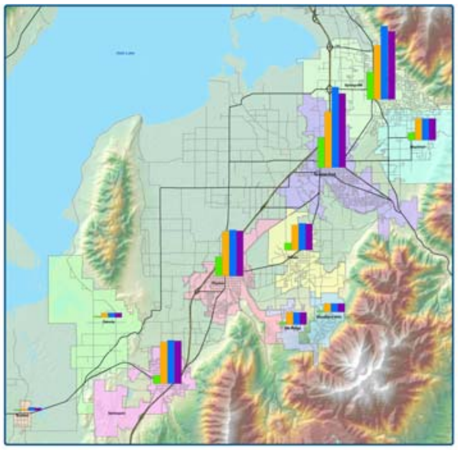


LEGEND

Low Density Medium Density High Density Employment Centers

Carter::Burgess InterPlan Co. Transportation Planning Utah Valley Transportation Studies nebo transportation study

Nebo City Population Projections

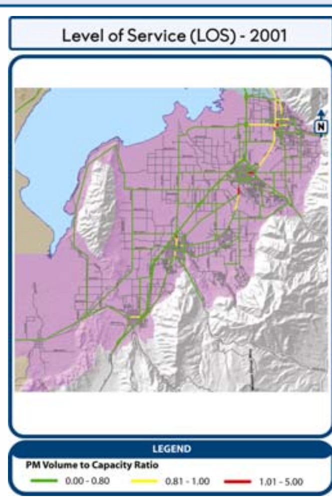


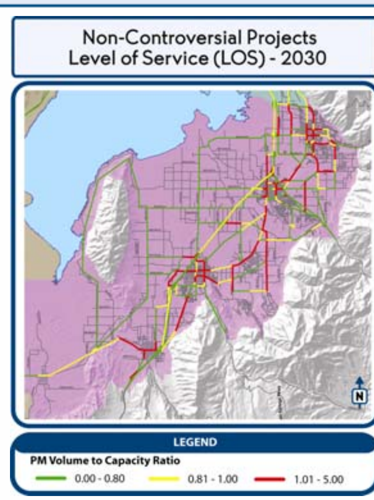
2001
MAG
City
Controlled

2030 Study Control Totals			
Elk Ridge	9,431	Salem	20,497
Genola	3,491	Santaquin	33,444
Goshen	2,220	Spanish Fork	57,563
Mapleton	16,841	Springville	53,021
Payson	35,310	Woodland Hills	6,610
		Study Area	**238,428**

Carter Burgess | InterPlan Co. Transportation Planning | Utah Valley Transportation Studies nebo transportation study

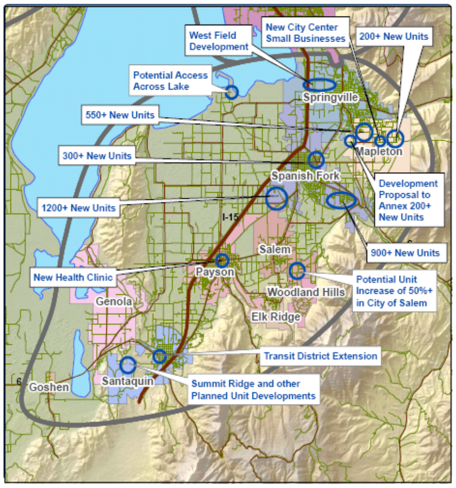
Nebo Level of Service (LOS)





Carter Burgess | InterPlan Co. Transportation Planning | Utah Valley Transportation Studies nebo transportation study

Nebo Study Area Issues



- Access to Highway 6
- New Access to I 15
- Connectivity to northern communities
- Dispersed development patterns
- Rural preservation
- Main Street preservation
- Planning for trails and alternative modes
- Access to and across Utah Lake (Goshen Bay and Provo Bay)
- Transit district extension to communities south of Payson and Salem

Carter Burgess | InterPlan Co. Transportation Planning | Utah Valley Transportation Studies nebo transportation study

Putting Traffic Problems in Perspective

- The increase in population in the Nebo Area has been greater over the past 10 years than the increase in population in the Lake Mountain Area including Saratoga Springs and Eagle Mountain. Population projections anticipate growth in the Nebo Area to remain higher than Lake Mountain over the next 20 years.
- Traffic volumes on I-15 in the Nebo Area have more than doubled over the past 20 years and are expected to double again over the next 25 years.
- A 21 minute trip from Santaquin City Hall to the base of Hobble Creek Canyon will increase to 59 minutes if no improvements are made but will continue to increase to 34 minutes if all of the non-controversial improvements are made.
- A 26 minute trip from downtown Salem to the BYU campus will take 73 minutes if no improvements are made, but will increase to 37 minutes if all of the non-controversial improvements are made.

Carter Burgess | InterPlan Co. Transportation Planning | Utah Valley Transportation Studies nebo transportation study

Summary of Conclusions

- The Nebo Region is a Rural Bedroom Community which will Grow to Become More Self-Sufficient
- I-15 Capacity Has Served Growth Well, but Will Run Out by 2030 even after Improvements
- Growth in the Nebo Area has been Staggering and will Continue in the Long Term

Deliverables

- Prioritized Transportation Plan for the Nebo Area
- Prioritized Corridor Preservation Projects
- Identified "Visionary" Transportation Projects

Carter::Burgess InterPlan Co. Transportation Planning Utah Valley Transportation Studies nebo transportation study

Next Steps

- Analyze mobility options
- Identify capital projects
- Community outreach
- Final Recommendations

Carter Burgess InterPlan Co. Transportation Planning Utah Valley Transportation Studies nebo transportation study

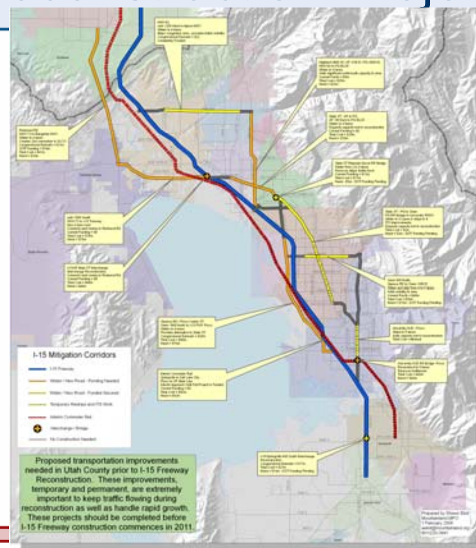
Immediate Steps

- Make Priority Projects Part of Legislative Program for I-15 Reconstruction Impacts
- Seek Funding to Meet Transportation Needs
- Update Regional Transportation Plan in 2007

Carter Burgess InterPlan Co. Transportation Planning Utah Valley Transportation Studies nebo transportation study

I-15 FWY Reconstruction Projects

I-15 Freeway Reconstruction 2011-2015



Carter Burgess | InterPlan Co. Transportation Planning | Utah Valley Transportation Studies nebo transportation study

Funded I-15 FWY Reconstruction Projects

<u>Funded I-15 Freeway Mitigation Projects</u>

- **HWY-92, Lehi to Highland - Widen to 4 lanes**
  Total Cost $22m - **Funded by Congressional Earmark**
- **Pleasant Grove / State ST RR Bridge Replacement**
  Total Cost $17m - **STIP Funding $12m – DOT Anticipating $5m**
- **I-15 / Springville 400 South Interchange Reconstruction**
  Total Cost $27m - **Congressional Earmark $17m – DOT Anticipating $10m**
- **State ST – Pleasant Grove to Lindon**
  Total Cost $2m – **DOT Anticipating $2m**
- **Orem 800 North, Orem 400 West to Orem 1000 East – Widen to 6 lanes**
  Total Cost $55m - **STIP Funded $40m - DOT Anticipating $15m**
- **Various Temporary Striping Projects** (to be funded with DOT and I-15 project funds)

Carter Burgess | InterPlan Co. Transportation Planning | Utah Valley Transportation Studies nebo transportation study

Unfunded I-15 FWY Reconstruction Projects

Unfunded I-15 Freeway Mitigation Highway Projects

#	Project	2006	2007	2008–2010	Funding
1	**Redwood RD** Bangerter HWY to HWY-73 Saratoga Springs Widen to 4 lanes	EA Work = $2m	PE/ROW = $6m	Construction = $33m Earmark = $3m - STIP = $10m - Gap = $20m	Funding Gap = $20m Earmark Funds = $11m STIP Funds = $10m Total Cost = $41m
2	**Lehi 1000 South & I-15** HWY-73 to I-15 AF **AF Main ST Interchange** New 4 lane road/reconstruct interchange	EIS Work = $4m	PE/ROW = $17m	Construction = $89m	Funding Gap = $110m Current Funding = $0m Total Cost = $110m
3	**Geneva RD/Provo Center ST** Orem 1600 North to I-15 FWY, Provo Widen to 4 lanes	EIS Work = $2m	PE/ROW = $15m	Construction = $81m Earmark = $11m - Funding Gap = $70m	Funding Gap = $70m Earmark Funds = $28m Total Cost = $98m
4	**State ST – AF to PG** AF 100 East to PG BLVD Widen to 6 lanes	EA Work = $2m	PE/ROW = $3m	Construction = $15m	Funding Gap = $20m Current Funding = $0m Total Cost = $20m
5	**University Ave RR Bridge** Provo 400 South to Provo 900 South Reconstruct to 6 lanes	EA Work = $1m	PE/ROW = $6m	Construction = $33m	Funding Gap = $40m Current Funding = $0m Total Cost = $40m
6	**Highland 4800 West/** **AF 1100 East/PG 2000 West** HWY-92 to PG BLVD Widen to 4 lanes	EA Work = $2m	PE/ROW = $4m	Construction = $19m	Funding Gap = $25m Current Funding = $0m Total Cost = $25m

	2006	2007	2008	2009	2010	Total
STIP Funds	$0	$0	$10	$0	$0	Funding Gap = $285m Earmarks = $39m STIP Funds = $10m Total Cost = $334m
Congressional Earmarks	$4m	$21m	$12m	$12m	$0	
Funding Gap	**$9m**	**$30m**	**$86m**	**$98m**	**$62**	

Unfunded I-15 Freeway Mitigation Transit Projects

#	Project	2006	2007	2008–2010	Funding
7	**Interim Commuter Rail** **Springville to SLC** Could lead into future Commuter Rail System	EA Work = $2m	PE/ROW = $14m	Construction = $76m	Funding Gap = $92m Current Funding = $0m Total Cost = $92m

Carter Burgess InterPlan Co. Transportation Planning Utah Valley Transportation Studies nebo transportation study

Nebo Transportation Study

Mountainland Association of Governments

Carter::Burgess InterPlan Co. Transportation Planning Utah Valley Transportation Studies nebo transportation study

Introduction

- Four MAG initiated "Quadrant" Studies:
  1. Nebo,
  2. Lake Mountain,
  3. Provo/Orem and
  4. Northeast Utah Valley Transportation Study (NEUVTS)
- NEUVTS completed in September, 2005
- Studies address Regional Transportation Plan options and recommendations

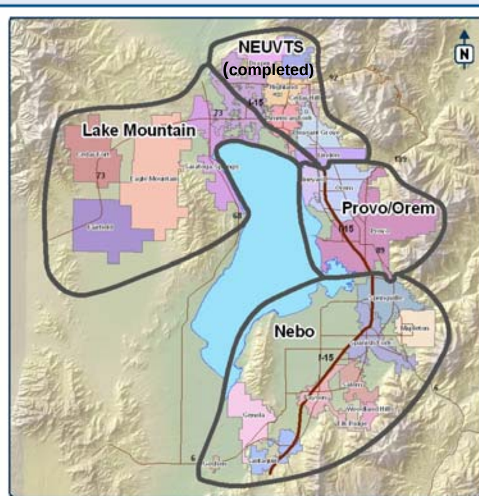
Carter::Burgess InterPlan Co. Transportation Planning Utah Valley Transportation Studies nebo transportation study

Purpose of Studies

- Identify transportation needs through the year 2030 Plus
- Evaluate multi-modal options
- Develop additional Transportation Plan options
- Minimize costs and impacts of improvements with early coordination

Carter Burgess | InterPlan Co. Transportation Planning | Utah Valley Transportation Studies nebo transportation study

Map of 4 Quadrants



Carter Burgess | InterPlan Co. Transportation Planning | Utah Valley Transportation Studies nebo transportation study

Area Studies Schedule

2005

November
- Project Initiation
- First TAC Meetings

December
- TAC Meetings #2

2006

January
- Analyze Alternatives and prepare preliminary Recommendations

February
- TAC Meetings #3
- Presentation of Initial Findings

March
- TAC Meetings #4
- Refinement of Initial Findings

April
- Presentation of Recommendations

May

Final Recommendations

Carter::Burgess InterPlan Co. Transportation Planning Utah Valley Transportation Studies nebo transportation study

Study Deliverables / Goals

- Priority Transportation Improvements to Be Implemented within Next 10 Years
- Recommended Transportation Projects to Be Implemented in Next 25 Years
- An Ultimate Plan of Transportation Improvements to Be Built as Funding Allows
- Specific Right of Way Preservation Corridors
- Next Steps to be Performed by Each Community

Carter::Burgess InterPlan Co. Transportation Planning Utah Valley Transportation Studies nebo transportation study

Study Participants

- Elk Ridge – Ray Brown
- Genola – Mayor Hazelet
- Goshen – Mayor Sprague
- Mapleton – Tracy Padgett
- Payson – Chris Erb
- Salem – Lynn Durrant
- Santaquin – Dennis Marker
- Spanish Fork – Richard Nielson
- Springville – Brad Stapley
- Woodland Hills – Mayor Harding
- Utah County – Paul Hawker
- Mountainland – Shawn Eliot
- UDOT – Brent Schvanevedlt
- UTA – Ken Anson

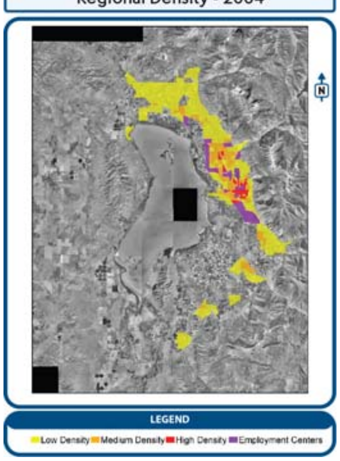
Carter::Burgess InterPlan Co. Utah Valley Transportation Studies nebo transportation study

Land Use Growth - 2004 & 2030

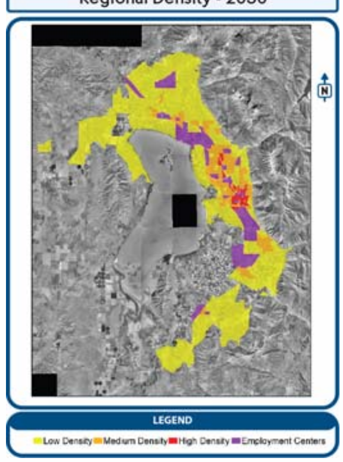
County Population 436,022

Nebo Population 101,127

Regional Density - 2004



Regional Density - 2030

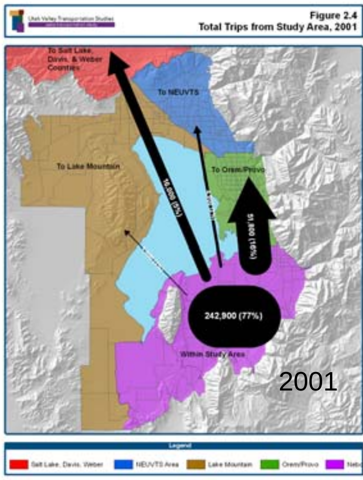


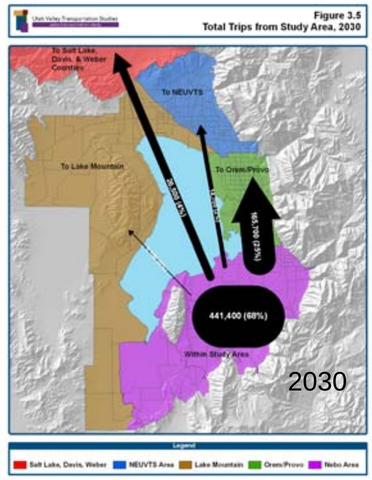
County Population 892,351

Nebo Population 255,265

Carter::Burgess InterPlan Co. Utah Valley Transportation Studies nebo transportation study

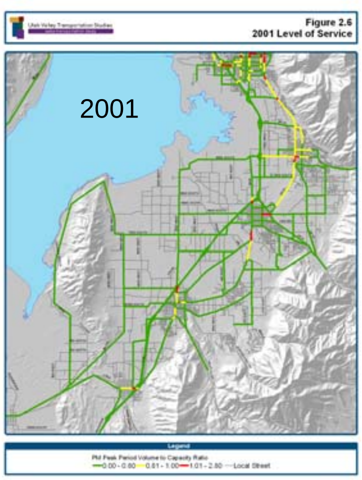
Travel Patterns – 2001 and 2030

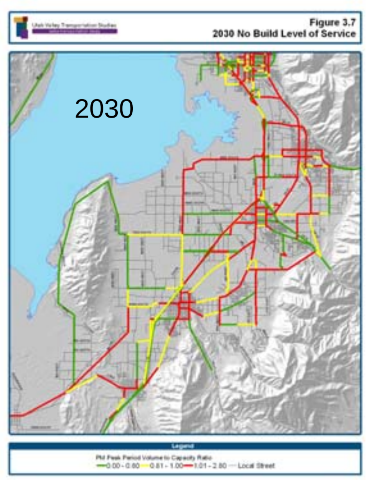




Carter::Burgess InterPlan Co. Transportation Planning Utah Valley Transportation Studies nebo transportation study

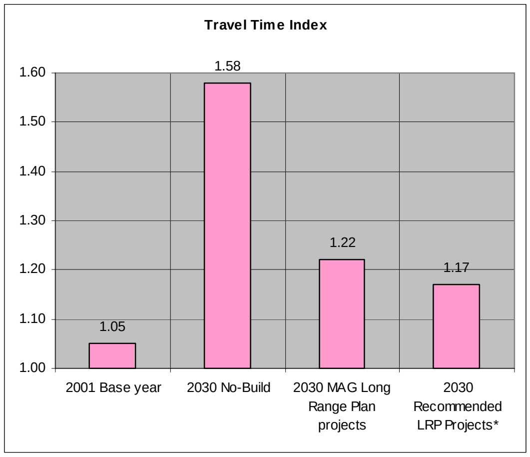
Nebo Level of Service – 2001 vs. 2030 No-Build





Carter::Burgess InterPlan Co. Transportation Planning Utah Valley Transportation Studies nebo transportation study

Travel Time Index



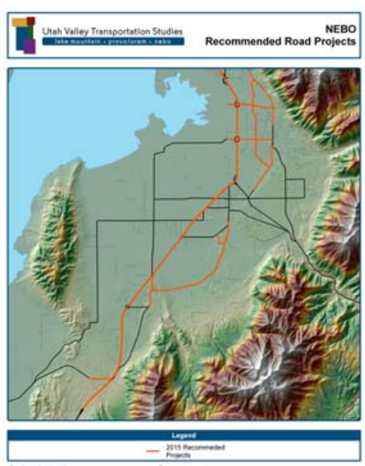
NEBO Model Option	TTI
2001 Base year	1.05
2030 No-Build	1.58
2030 MAG Long Range Plan projects	1.22
2030 Recommended LRP Projects*	1.17

Carter Burgess

InterPlan Co.

Utah Valley Transportation Studies
nebo transportation study

2015 Recommendations



Carter Burgess

InterPlan Co.

Utah Valley Transportation Studies
nebo transportation study

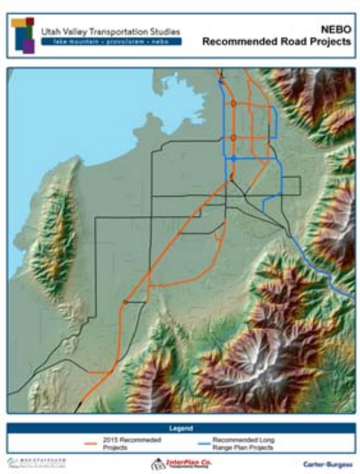
2015 Recommendations

Quad Studies Project Impacts – NEBO

Project	Length (miles)	ROW (feet)	Lanes	Construction Cost (Millions)	Right-of-way Cost (Millions)	Structure Cost (Millions)	Total Cost (Millions)	Volume Served	Cost per annual VMT	Aggregate Costs
Main Street Payson	0.70	84	5	$3.21	$0.16	$0.00	$3.37	21,000	$0.46	$3.37
Main Street Santaquin	1.70	84	5	$7.78	$0.40	$0.00	$8.18	39,000	$0.49	$11.55
100 West Payson	0.95	106	5	$5.36	$0.57	$0.00	$5.93	33,000	$0.63	$17.48
US-89 Provo/Springville	4.50	125	7	$30.56	$4.13	$0.00	$34.69	27,000	$0.66	$52.17
1400 North Springville	1.90	106	5	$10.71	$1.14	$20.00	$31.85	25,000	$1.07	$84.02
SR-51	3.10	84	5	$14.20	$0.72	$10.00	$24.92	30,000	$1.13	$108.95
SR-198 Spanish Fork to Payson	6.29	106	5	$35.46	$3.78	$20.00	$59.24	26,000	$1.15	$168.19
950 West Springville	4.50	84	5	$20.61	$6.31	$20.00	$46.92	31,000	$1.37	$215.11
400 South Springville	2.40	106	5	$13.53	$1.44	$20.00	$34.97	39,000	$1.44	$250.08
Woodland Hills Dr	0.80	66	2	$2.74	$0.88	$0.00	$3.62	4,000	$2.62	$253.70

Carter::Burgess | InterPlan Co. Transportation Planning | Utah Valley Transportation Studies nebo transportation study

2015 and 2030 Recommendations



Carter::Burgess | InterPlan Co. Transportation Planning | Utah Valley Transportation Studies nebo transportation study

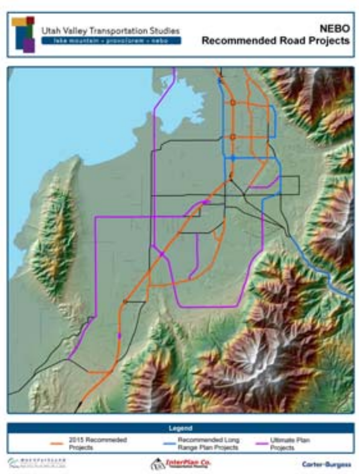
2030 Recommendations

Quad Studies Project Impacts - NEBO

Project	Length (miles)	ROW (feet)	Lanes	Construction Cost (Millions)	Right-of-way Cost (Millions)	Structure Cost (Millions)	Total Cost (Millions)	Volume Served	Cost per annual VMT	Aggregate Costs
US-6 Spanish Fork	9.50	106	5	$53.56	$5.71	$10.00	$69.27	15,000	$1.33	$69.27
Spanish Fork/Provo Connection	5.86	150	5	$43.75	$11.98	$20.00	$75.73	24,000	$1.41	$145.00
400 East Springville	1.57	106	5	$8.85	$0.94	$10.00	$19.79	16,000	$1.44	$164.80
Nebo Belt Route (Eastern Segment)	3.58	150	5	$38.05	$6.83	$20.00	$64.88	17,000-39,000	$1.85	$229.67
1600 South Springville	2.80	84	5	$13.01	$0.65	$30.00	$43.66	25,000	$2.03	$273.34
1600 South Springville Interchange					$0.00	$28.00	$28.00	28,000	$7.97	$301.34

Carter Burgess | InterPlan Co. Transportation Planning | Utah Valley Transportation Studies nebo transportation study

Ultimate Plan Recommendations



Carter Burgess | InterPlan Co. Transportation Planning | Utah Valley Transportation Studies nebo transportation study

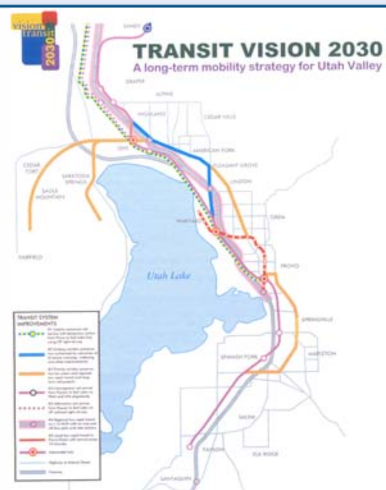
Ultimate Plan Recommendations

Quad Studies Project Impacts - NEBO

Project	Length (miles)	ROW (feet)	Lanes	Construction Cost (Millions)	Right-of-way Cost (Millions)	Structure Cost (Millions)	Total Cost (Millions)	Volume Served	Cost per annual VMT	Aggregate Costs
Nebo Belt Route (Western Segment)	4.41	180	5	$52.90	$13.25	$10.00	$76.15	23,000	$2.07	$76.15
Benjamin Road	14.49	106	5	$80.84	$8.71	$20.00	$109.55	8,000	$2.38	$185.70
Expressway Lane	1.50	84	5	$6.87	$2.10	$20.00	$28.97	15,000	$3.02	$214.67
Nebo Belt Route (Center Segment)	7.92	180	5	$85.31	$21.77	$10.00	$117.08	10,000-19,000	$3.27	$331.75
Elk Ridge Dr. UC8000 to SR-198	2.75	80	5	$12.33	$1.29	$0.00	$13.62	4,500	$3.51	$345.36
East Lake Highway (Southern Segment Eastern Alignment)	11.58	150	5	$123.07	$23.99	$121.44	$268.50	17,000	$3.55	$613.86
Spainsh Fork Belt Route Interchange					$0.00	$28.00	$28.00	24,000	$8.50	$641.86
Spanish Fork Center st. Interchange					$0.00	$28.00	$28.00	22,000	$11.48	$669.86
12400 S. Interchange (north Santaquin)					$0.00	$28.00	$28.00	16,000	$15.85	$697.86

Carter Burgess | InterPlan Co. Transportation Planning | Utah Valley Transportation Studies nebo transportation study

Transit Concepts



Carter Burgess | InterPlan Co. Transportation Planning | Utah Valley Transportation Studies nebo transportation study

Input Needed Tonight

- Your Comments and Input
- Acceptance of Recommended Plan
- Interest and Enthusiasm to Take the Next Steps to Implementation and Corridor Preservation

Carter Burgess | InterPlan Co. Transportation Planning | Utah Valley Transportation Studies nebo transportation study

What Happens Next

- Final Reports Developed and Submitted to Technical Committee
- MAG to Update Regional Transportation Plan with Study Recommendations and City Input
- Communities to Follow-Through with Corridor Preservation and Other Actions

Carter Burgess | InterPlan Co. Transportation Planning | Utah Valley Transportation Studies nebo transportation study

Questions

- Project Manager: Shawn Eliot – Mountainland
  phone: (801) 229-3841
  fax: (801) 229-3801
  email: seliot@mountainland.org

- Consultant: Matt Riffkin – InterPlan
  phone: 801-307-3400
  fax: 801-307-3451
  email: matt@interplanco.com

Carter Burgess | InterPlan Co. Transportation Planning | Utah Valley Transportation Studies nebo transportation study