City of Saratoga Springs

Transportation Master Plan

An Element of the General Plan

CITY OF

SARATOGA SPRINGS

Adopted September 2012

HORROCKS ENGINEERS

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Glossary of Terms

AASHTO	American Association of State Highways and Transportation Officials
ADA	American's with Disability Act
ADDT	Average Annual Daily Traffic
BRT	Bus Rapid Transit
C-D	Collector-Distributor
CFP	Capital Facility Plan
FHWA	Federal Highway Administration
GOPB	Governor's Office of Planning and Budget
HCM	Highway Capacity Manual
HOA	Home Owners Association
IFFP	Impact Fee Facility Plan
ITE	Institute of Transportation Engineers
LOS	Level of Service
LRTP	Long Range Transportation Plan
MAG	Mountainland Association of Governments
MAX BRT	Metro Area Transit Bus Rapid Transit
MPO	Metropolitan Planning Organization
MUTCD	Manual on Uniform Traffic Control Devices
MVC	Mountain View Corridor
SITLA	School and Institutional Trust Lands Administration
SLR	Suburban Land Reserve
SSD	Saratoga Springs Development
STIP	Statewide Transportation Improvement Program
STP	Surface Transportation Program
TAZ	Traffic Analysis Plan
TCM	Traffic Calming Measures
TIP	Transit Improvement Program
TIS	Traffic Impact Study
TMP	Transportation Master Plan
TRAX	Transit Express (light rail)
TRB	Transportation Research Board
UDOT	Utah Department of Transportation
UTA	Utah Department of Transportation

Executive Summary

Introduction

Saratoga Springs is located in northwestern Utah County and is a rapidly growing community. According to the 2010 census, the City has been one of the fastest growing cities in Utah by percent growth over the past decade. This rapid growth is expected to continue into the future. With rapid growth comes increased traffic and the potential that the roadway network in the City will fail to meet the needs of the growing population. The purpose of this document is to provide a transportation plan that will meet the needs of the residents of Saratoga Springs through the year 2040.

Existing Conditions

The City has an estimated population of approximately 20,000 residents and is the single highest growth city by percentage of new housing units in Utah. Despite this rapid growth, there remain vast amounts of land that is undeveloped. Saratoga Springs is approximately 25 percent developed.

The roadways in the City have been classified as Principal Arterials, Major Arterials, Minor Arterials, Collector Streets, and Local roads. Each of these classifications serves a specific purpose in the roadway network and each is important to a complete system. The roadway network in Saratoga Springs is operating at acceptable levels under the existing conditions with all roadways and traffic signals performing at Level of Service (LOS) D or better as shown in **section 3.0**.

Alternative modes of transportation are important to the City but are currently limited. There is a trails network in the City which provides pedestrian and bicycle facilities but has areas where the trails are not continuous. The transit system consists of one express bus route between Saratoga Springs and Salt Lake City.

Future Conditions

Saratoga Springs is expected to grow to a population of approximately 94,000 by the year 2040. This growth will put strain on the existing roadway network and if no improvements are made many of the roads in the City will reach LOS F. A recommended roadway network has been developed which will meet the travel demands of the future population and allow the roadways to perform at LOS D or better. This roadway network is compatible with the regional transportation planning efforts of Mountainland Association of Governments (MAG) discussed in **section 4.0**. Roadway cross-sections are presented that will meet the needs of each of the roadway functional classification providing appropriate shoulder and lane widths as well as safe and attractive side treatments.

As part of the transportation network, the trails system proposed will provide greater access to the community via bicycle and pedestrian modes of transportation. Disconnected trails will need to be connected and more trails offered to provide for better service to non-motorized traffic. Each of the road cross-sections along trails routes provides bicycle lanes for commuter and recreational bicyclists.

A new transit network, which incorporates the long range planning of MAG, will include bus routes internal to the City, more express routes, Bus Rapid Transit (BRT), light rail, and as part of the MAG "Vision", commuter rail.

Alternatives Evaluation and Recommendations

In order to provide a comprehensive roadway network to accommodate future growth, the roadway classifications in the City had to be expanded. In addition to the existing functional classifications, two new roadway types were added, Freeway and Parkway. These two classifications will assist in moving traffic efficiently through the City relieving the pressure on the arterial and collector streets.

Access management is an important part of transportation planning as it aids in allowing each roadway classification in performing its proper function. Each roadway must find a balance between providing good mobility with reasonable access to adjacent land uses. The higher the roadway classification (Freeway being the highest), the less access and greater mobility. Local streets provide the best access and the least mobility.

Safety should be the number one priority when designing and constructing roads. Wherever possible offset intersections should be avoided and driveways should be constructed that avoid the need for drivers to back out into traffic. Intersections improvements should be considered where warranted. The Manual on Uniform Traffic Control Devices (MUTCD) provides warrants for both traffic signals and stop signs. Each intersection considered for improvement should be studied using these warrants before improvements are made. In some cases it may be advantageous to consider roundabouts as an alternative to stop signs or traffic signals, this is discussed in detail in **section 4.4**. Each intersection should be considered and studied individually.

Traffic calming is a way to improve safety and livability on the local street network. Where applicable, traffic calming may be considered in response to resident requests. Each traffic calming case is different and a thorough study of the area under consideration should be performed in order to determine if traffic calming is appropriate and which type of traffic calming measure will be most effective (see **section 4.5**.

Corridor preservation techniques, discussed in **section 4.6,** should be employed to ensure that future development does not hinder the construction of a good transportation network. Some methods that may be employed to preserve right-of-way for future roads include developer incentives and agreements, exactions, fee simple acquisitions, transfer of development rights and density transfers, land use controls, and purchase of options and easements.

As the City grows and developments are planned it is important that the impacts of these developments be assessed and managed. The mechanism for ensuring such action is the Traffic Impact Study (TIS). A TIS should be required on most developments in the City prior to issuance of a building permit. A TIS will allow the City to determine site specific impacts including internal circulation, access issues, and adjacent roadway and intersection impacts. Traffic Impact Studies are discussed in detail in **section 4.7**.

Special Considerations

Several of the proposed roadways in the City deserve special consideration and are discussed in **section 4.10**. These include Mountain View Corridor Freeway, Foothill Parkway, Hidden Valley Freeway, and SR-73. Each of these roadways is unique and poses a specific set of challenges for design and construction. The Mountain View Corridor Freeway and Hidden Valley Freeway are proposed on the MAG long range transportation plan and should be the first of these major roads constructed. Foothill Parkway is a southern extension of the MAG project that will serve the residents on the south end of the City with an alternate corridor to Redwood Road for north-south traffic. SR-73 is proposed a six-lane freeway facility after the Hidden Valley Freeway is completed to allow for better east-west mobility. Each of these projects will require extensive coordination with UDOT and other agencies.

Potential Funding Sources

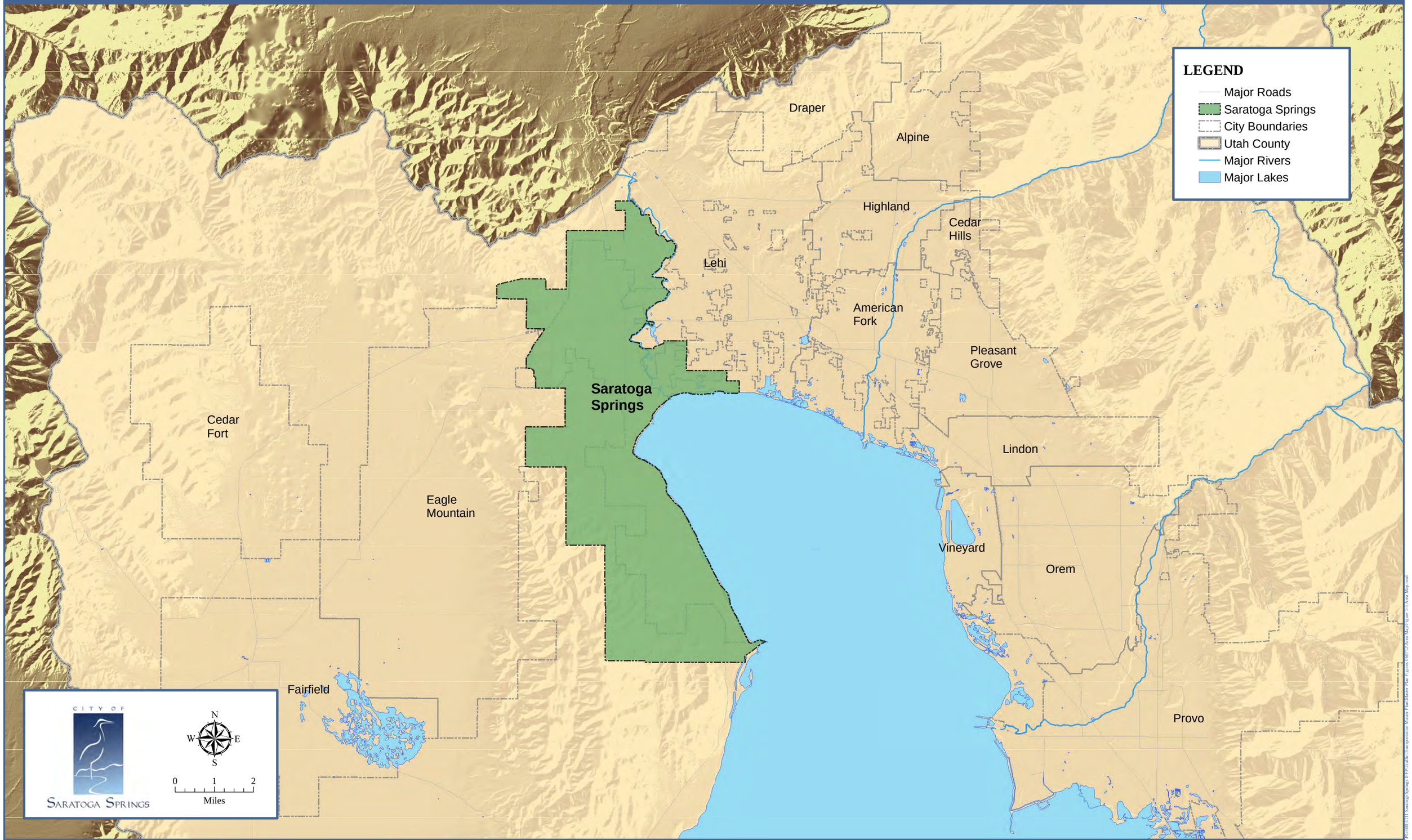
In order to keep up with the increasing transportation demand in the City, it is essential that Saratoga Springs explore and pursue multiple sources of transportation funding. The potential sources of funding available are federal funding in the form of the UDOT administered Statewide Transportation Improvement Program, state funding from fuel taxes, registration fees, driver's license fees etc., local funding from general fund revenues, and impact fees associated with development. See **section 5.0** for more details.

1.0 Introduction

The City of Saratoga Springs is an exciting new fast growing community located on the northwest shore of Utah Lake in the center of Utah's Wasatch Front Metropolitan Area (see **Figure 1-1**). The City was incorporated in December of 1997. From its very beginning, the City experienced rapid growth and continues to be one of the fastest growing communities in the state. According to the US census bureau, Saratoga Springs had grown in population from 1,003 in 2000 to 17,781 in 2010. This represents an average annual growth rate of 167 percent for the 2000 to 2010 decade. When compared to the whole of Utah County, which has an average annual growth rate of 4 percent over the same time period, it is clear that Saratoga Springs is one of the fastest growing cities in Utah County.

The last update to The Saratoga Springs General Plan, including the Transportation Element, was in October 2005. An update to the Transportation Master Plan was adopted by ordinance in August 2010. Also in 2010, the City annexed approximately 2,500 acres into its boundaries while implementing significant land use changes. As a result of this annexation, the City has updated its General Plan Land Use Map, and has commenced an update to its Capital Facility Plans as well as an evaluation of its impact fees. This resulted in an effort to provide an updated Transportation Master Plan (TMP). This update, entitled the Saratoga Springs Transportation Master Plan, is intended to enable development of the roadway portion of the Capital Facilities Plan (CFP) by providing a plan to provide capacity to accommodate the expected growth in the City's transportation system.

Figure 1-1 Area Map



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2.0 Existing Conditions

A thorough documentation of the City's existing conditions was performed in order to evaluate the City's transportation system and update the Transportation Element of the City's General Plan (TMP) to address the City's current and future needs. The data collected for this TMP update includes:

- Key roadway traffic volumes
- Socioeconomic conditions
- Land use and zoning
- Signal locations and timings
- Roadway classifications/widths/cross sections
- Public transit routes
- Bicycle/pedestrian trails

This data forms the basis for analyzing the existing transportation system as well as providing the foundation to project future traffic conditions.

2.1 Existing Socioeconomic Conditions

Socioeconomic data used in the transportation analysis was obtained from the City and Mountainland Association of Governments (MAG). The MAG travel demand model was modified to more accurately estimate the travel demand in the City. The MAG travel demand model consists of various Traffic Analysis Zones (TAZ). Each TAZ contains information on the number of households, employment opportunities, and average income levels within the TAZ. This data is used to generate trips originating in each TAZ and assigned to the roadway network where they will be attracted to a destination within another TAZ. The MAG travel demand model predicts regional travel patterns; however, the TAZ structure must be modified to more accurately reflect traffic on the local city level. The TAZ structure within the Saratoga Springs area was modified by splitting the existing large TAZ into smaller, more uniform TAZ and verifying the accuracy of the socioeconomic data contained within each TAZ.

The City's current population is estimated at around 20,000 residents[1]. The 2000 to 2010 decade saw considerable growth in Saratoga with an increase in residential housing units from 301 to 4,685 (1,456 percent). The City is issuing a number of permits for residential dwelling units monthly and is the single highest growth city by percentage of new housing units in Utah (see **Table 2-1**). As a region, the

[1] Based on 2010 US census projected to 2011

northern Utah County area has experienced rapid development and growth in recent years and this trend is projected to continue into the foreseeable future.

Table 2-1 Top Ten Utah Cities by 10 Year Housing Unit Growth Rate Percentage

	Housing Unit Count		Comparison	
City Name	***2010***	***2000***	***10 Year Chg.***	***10 Yr. % Chg.***
Saratoga Springs	**4,685**	**301**	**4,384**	**1,456**
Herriman	6,022	459	5,563	1,212
Eagle Mountain	5,546	598	4,948	827
Cedar Hills	2,441	721	1,720	239
West Haven	3,324	1,220	2,104	172
Syracuse	6,534	2,601	3,933	151
Nibley	1,451	580	871	150
Lehi	13,064	5,280	7,784	147
Spanish Valley CDP	190	78	112	144
Washington	7,546	3,199	4,347	136

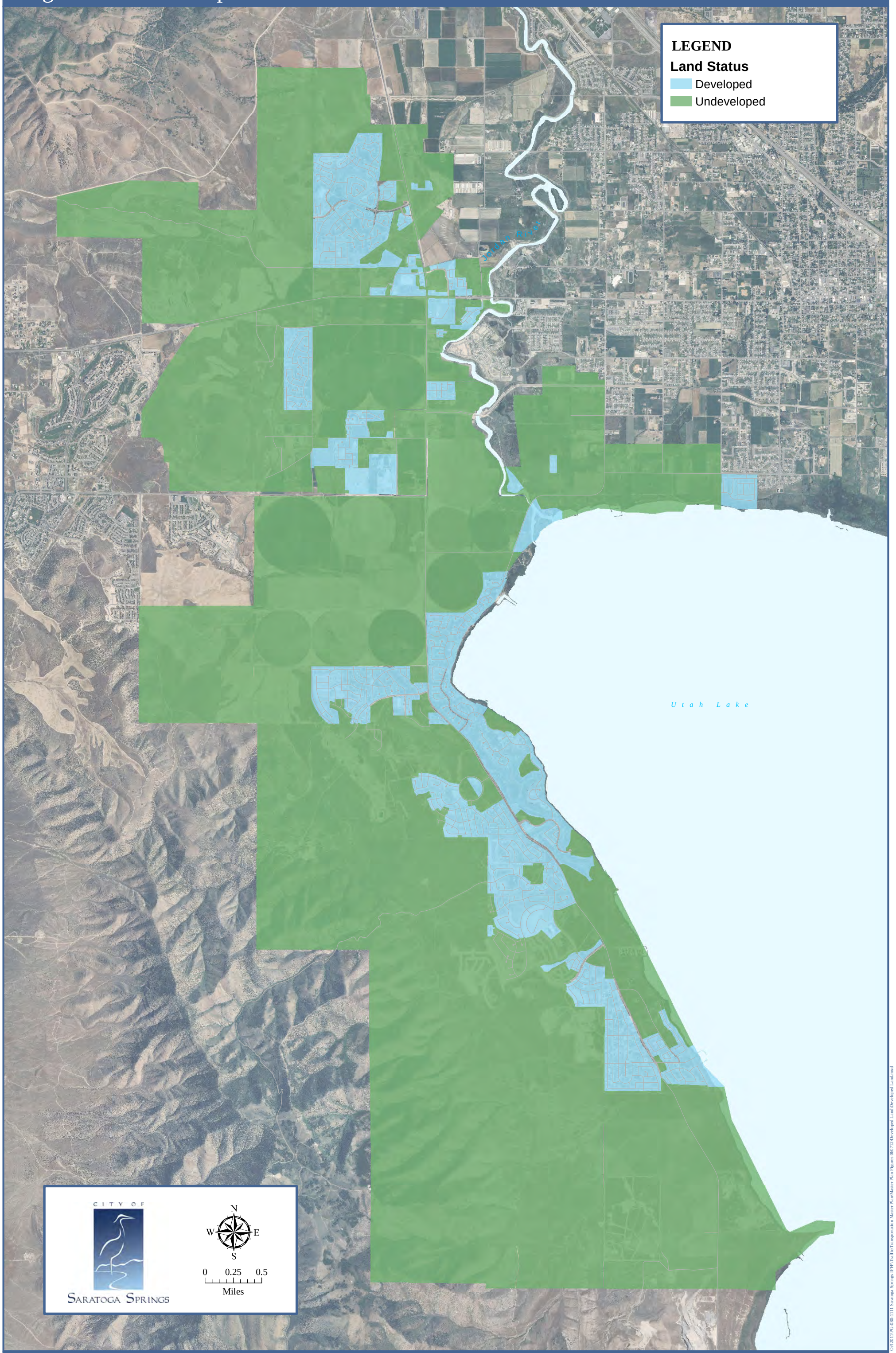
Source: 2010 State of Utah Official Census

2.2 Existing Land Use

Traffic patterns and demand are directly related to land use and development density. Only about 25 percent of the land area within the City has been developed or is under development. There are still several large parcels that remain, as well as numerous smaller tracts of land that will one day be developed. Several of the major owners of the undeveloped land in the annexation boundary of the City are:

- Corporation of the Presiding Bishop of The Church of Jesus Christ of Latter-day Saints
- Waldo Co.
- Collins Brothers Oil Co.
- Ireco Incorporated
- DCP Saratoga LLC
- School and Institutional Trust Lands Administration (SITLA)

Figure 2-1 Developed Land



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2.3 Existing Roadway Functional Classification

The roadways in Saratoga Springs have been classified as Principal Arterials, Major Arterials, Minor Arterials, Collector, and Local streets. The existing roadway network consists of several major regional Utah Department of Transportation (UDOT) roadways including SR-73 running East-West through the City connecting Eagle Mountain and Lehi, SR-68 (Redwood Road) running North-South connecting the City with Salt Lake County on the North, and SR-145 (Pioneer Crossing) which connects I-15 at American Fork Main Street to Redwood Road in Saratoga Springs. In addition to the UDOT roads, Saratoga Springs owns and maintains a number of local and regional collector streets such as Pony Express Parkway (between Redwood Road and Eagle Mountain), 800 West, and 400 North. On November 20, 2011 SR-73 from Redwood Road to the west bank of the Jordan River underwent a jurisdictional transfer (located in the appendix) where the City has taken over ownership and maintenance responsibility for this portion of the roadway from the Utah Department of Transportation (UDOT). With the exception of snow removal, the City accepted full responsibility for the roadway upon execution of the jurisdictional transfer. UDOT agreed to continue snow removal into the 2012-2013 snow season. The traffic signal located at the intersection of SR-73 and SR-68 will remain under UDOT jurisdiction. Jurisdiction of the signal at SR-73 and East Commerce Drive will be transferred from UDOT to the City on December 15, 2015. The existing roadway network including functional type is shown in **Figure 2-2**.

2.4 Existing Traffic Volumes and Level of Service

Adequacy of an existing street system can be quantified by assigning Levels of Service (LOS) to major roadways and intersections. As defined in the *Highway Capacity Manual (HCM),* a document published by the Transportation Research Board (TRB), LOS serves as the traditional form of measurement of a roadway's functionality. The TRB identifies LOS by reviewing elements such as the number of lanes assigned to a roadway, the amount of traffic using the roadway, and the amount of delay per vehicle traveling on the roadway and at the intersections. Levels of service range from A (free flow) to F (complete congestion).

2.4.1 Roadway Level of Service

Roadway LOS is used as a planning tool to quantitatively represent the ability of a particular roadway to accommodate the travel demand. The following **Table 2-2 through 2-5** were used as a guide for quantifying LOS and subsequently the conditions of each of the major roadways in the City and are based on HCM principles and regional experience. LOS D is approximately 80 percent of a roadway's capacity and is a common goal for urban streets during peak hours. After discussions with city staff it was determined that adopting the industry standard of LOS D for urbanized areas was acceptable for future planning. Attaining LOS C would be potentially cost prohibitive and may present societal impacts such as additional lanes and wider street cross-sections. LOS D suggests that for most times of the day, the roadways will be operating at well below capacity. The peak times of day will likely experience moderate congestion characterized by a higher vehicle density and slower than free flow speeds. A four lane freeway facility can accommodate 70,000 vehicles per day at LOS D, adding two additional lanes will increase this threshold by 40,000 vehicles to 110,000 vehicles per day. Arterial streets can handle

significantly less traffic at LOS D, a seven lane arterial (6 travel lanes and one center turn lane) can accommodate approximately 50 percent of the traffic of a freeway of similar lane configuration (55,000 versus 110,000). Similarly, much capacity is lost when reducing the number of arterial lanes by one in each direction, which will result in a 17,700 vehicle per day reduction in LOS D capacity. Collector streets are designed at lower speeds than arterials and are not as strictly access controlled. Again this results in a loss of capacity when compared to arterial streets. A 3 lane collector street will be able to move 1,700 less vehicles per day than a 3 lane arterial street. Removing the center turn lane on a collector will result in a loss of capacity of 1,300 vehicles per day.

Table 2-2 Freeway LOS Capacity Criteria in Vehicles per Day

Lanes	LOS C	LOS D	LOS E
4	60,000	70,000	80,000
6	95,000	110,000	140,000

Table 2-3 Arterial LOS Capacity Criteria in Vehicles per Day

Lanes	LOS C	LOS D	LOS E
3	12,400	15,100	17,700
5	28,500	32,800	40,300
7	43,000	50,500	63,400

Table 2-4 Collector LOS Capacity Criteria in Vehicles per Day

Lanes	LOS C	LOS D	LOS E
2	9,700	12,100	14,500
3	10,800	13,400	16,100

2.4.2 Intersection Level of Service

Whereas roadway LOS considers an overall picture of a roadway to estimate operating conditions, intersection LOS looks at each individual movement at an intersection and provides a much more precise method for quantifying operations. Since intersections tend to be a source of bottlenecks in the transportation network, a detailed look into the delay at each intersection should be performed on a regular basis. The methodology for calculating delay at an intersection is outlined in the *Highway Capacity Manual* and the resulting criteria for assigning LOS to signalized and un-signalized intersections are outlined in **Table 2-5 and 2-6** respectively. As in the case with roadways, LOS D is considered the industry standard for intersections in an urbanized area. LOS D at an intersection corresponds to an average control delay of 35-55 seconds per vehicle for a signalized intersection and 25-35 seconds per vehicle for an un-signalized intersection.

At a signalized intersection, the average vehicle will be stopped for less than 55 seconds. This is considered an acceptable amount of delay to experience during the times of the day when roadways are most congested. As a general rule, traffic signal cycle lengths (the length of time it takes for a traffic signal to cycle through each movement in turn) are kept below 90 seconds. An average delay of less

than 55 seconds suggests that in most cases, no vehicles will have to wait more than one cycle before proceeding through an intersection.

Un-signalized intersections are generally stop controlled. Areas where there is a predominate major street may be two-way stop controlled, meaning only the minor street traffic must stop. In cases where traffic volumes are more even or where sight distances may be limited, four-way stop controlled intersections are common. LOS for an un-signalized intersection is assigned based on the average control at the worst approach (always a stopped approach) of the intersection. An un-signalized intersection operating at LOS D means that the average vehicle waiting at one of the stop controlled approaches will wait no longer than 35 seconds before proceeding through the intersection. This delay may be caused by large volumes of traffic on the major street resulting in fewer gaps in traffic for a vehicle to turn into, or from queued vehicles waiting at the stop sign.

Table 2-5 Signalized Intersection LOS Criteria

Level of Service	Average Control Delay (sec/veh)
A	≤ 10
B	> 10 - 20
C	> 20 - 35
D	> 35 - 55
E	> 55 - 80
F	> 80

Note: LOS for signalized intersections is the average of all approaches

Table 2-6 Un-signalized Intersection LOS Criteria

Level of Service	Average Control Delay (sec/veh)
A	≤ 10
B	> 10 - 15
C	> 15 - 25
D	> 25 - 35
E	> 35 - 50
F	> 50

Note: LOS for an un-signalized intersection is for the worst approach only

Each of the eight traffic signals in the City was analyzed. These signals are all on UDOT owned roadways with the exception of the signal at Commerce Drive and SR-73. Ownership of this signal was recently transferred from UDOT to the City. Once the current warranty period expires, the City will be responsible for the maintenance of this signal (the jurisdictional transfer agreement is shown in the appendix). The existing signal locations are shown in **Figure 2-2**.

2.4.3 Existing Operating Conditions

As part of this TMP, 2010 traffic counts were collected from the Utah Department of Transportation (UDOT) which included average annual daily traffic (AADT) volumes defined in *Traffic on Utah Highways,* and manual traffic counts were also performed on many of the City owned roadways within Saratoga Springs in 2012. **Figure 2-3** illustrates Saratoga Springs' 2010-2012 traffic volumes on selected major streets and their corresponding LOS. Based on the analysis of these traffic count data, there are currently no major concerns with the Saratoga Springs roadway network or intersections because they are all operating at LOS D or better.

2.5 Alternative Transportation Modes

Alternative transportation modes to passenger vehicles are an important part of the overall transportation system. A complete transit system may include bus, bus rapid transit (BRT), light rail, commuter rail, and van share facilities. Non-Motorized traffic includes pedestrians, bicyclists, hikers, horse-back riders, and joggers/walkers. These modes of transport should be accommodated wherever feasible in a vibrant and sustainable transportation system.

2.5.1 Non-Motorized Traffic

Non-motorized traffic is also very important and Saratoga Springs is committed to providing a trails network for bicycle and pedestrian traffic for both recreational and other trips. Saratoga Springs is a recreational hotspot on the west side of Utah Lake due to its proximity to Utah Lake and many off-road biking and hiking trails in the western mountains.

Trails serve many purposes from recreational uses to commuting to and from work and home. They also serve a diverse group of users including children, bicyclists, walkers/joggers, and equestrian users. In November 2011, Saratoga Springs adopted their current Parks, Recreation, Trails, and Open Space Master Plan. The master plan sought to inventory the City's existing facilities as well as provide recommendations for future parks, trails, recreational programs, etc. Saratoga Springs recognized that trails are a vital portion of any good transportation network; therefore this TMP should be supplemented by the Trails portion of the Parks, Recreation, Trails, and Open Space Master Plan.

The Trails Master Plan found that approximately 71 percent of the City population uses the trails system and that the Saratoga Springs residents rate a trails system as 4 out of 5 in terms of importance to the community. 78 percent of the residents responding to a survey also noted that they would use the trails system more if it was more complete and connected. Saratoga Springs currently has approximately 11 miles of trails within the City, which corresponds to approximately 0.50 miles per 1,000 population. The existing trails are listed in **Table 2-7** and are also shown in **Figure 3-4.** The trails are classified as urban, rural, multipurpose, and wilderness. There are also a number of Home Owners Association (HOA) maintained trails within the City. These trails may connect to the overall trail network providing greater access and mobility between neighborhoods and the trail system. The Utah Lakeshore trail runs, as the name suggests, along the shores of Utah Lake in the south west area of the City. It is the longest rural trail in the City at 3.3 miles in length. The Utah Lakeshore Trail is currently not a continuous trail as its

construction has largely followed the development of the lakeshore area. The longest urban trail is the Redwood Road Trail at 2.2 miles. This trail runs adjacent to Redwood Road and was first constructed as part of the Saratoga Springs Development (SSD) project. The Parks Master Plan makes the following recommendations for trails classifications:

- Urban Trails — 12' meandering concrete trails, along arterial roadways and canal parkways, ADA accessible and provide maintenance access.
- Rural Trails — 12' concrete for lakeside and riverside access, 8' concrete in riparian areas and 12' asphalt in upland areas, ADA accessible and provide maintenance access.
- Multipurpose Trails — 12' wide soft-surface for power line corridors, mountain trails, ATV trails, and equestrian use.
- Wilderness Trails — 12' asphalt trails in developed areas and 8-10' soft-surface trails in undeveloped areas, recreational use.

Table 2-7 Existing Trails

Trail Identification	*Existing Miles*	*Trail Type*
Utah Lake Shoreline Trail	3.3	Rural Trail
Redwood Road Trail	2.2	Urban Trail
800 West Trail	0.8	Rural Trail
Jordan River Trail East	0.4	Rural Trail
Welby Jacobs Canal Trail (Aspen Hills Trail)	0.9	Rural Trail
Harbor Parkway Trail	0.4	Urban Trail
Sage Hills Trail	0.5	Urban Trail
Canal Trail (Jacob Ranch Power Trail)	0.6	Wilderness Trail
Grand View Blvd. Trail	0.7	Urban Trail
Provo River Parkway	1.1	Rural Trail
Other	0.2	Varies
Total	**11.1**	

Source: Saratoga Springs Parks, Recreation, Trails, and Open Space Master Plan 2011

2.5.2 Transit

The Utah Transit Authority (UTA) is the provider of public transportation throughout the Wasatch Front. It operates fixed route buses, express buses, BRT lines, ski buses, light rail, and commuter rail. In this capacity, UTA is responsible for the operation of the transit network in Saratoga Springs. It is the responsibility of the City to promote transit operations and planning in order to provide public transportation options to its residents.

Saratoga Springs currently has a very limited transit system. One popular express route (Route 806) currently runs from Saratoga Springs to downtown Salt Lake City. This route is scheduled to be modified in December 2012 in conjunction with the UTA FrontRunner project. The new route 806 will run from Saratoga Springs to the Lehi FrontRunner station. Maps for both the existing and future route 806 can be found in the appendix of this report.

Figure 2-2 Existing Roadway Network

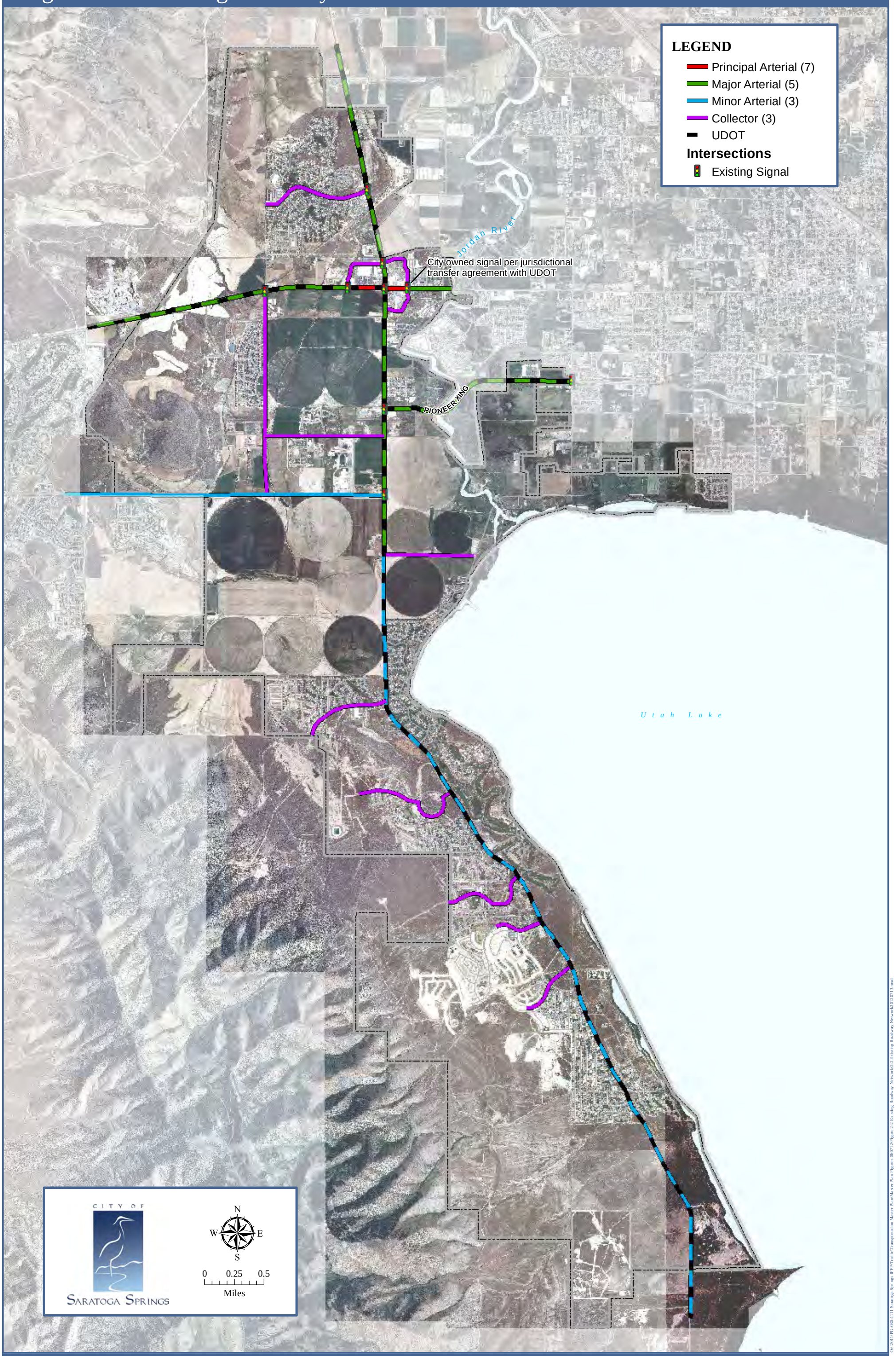
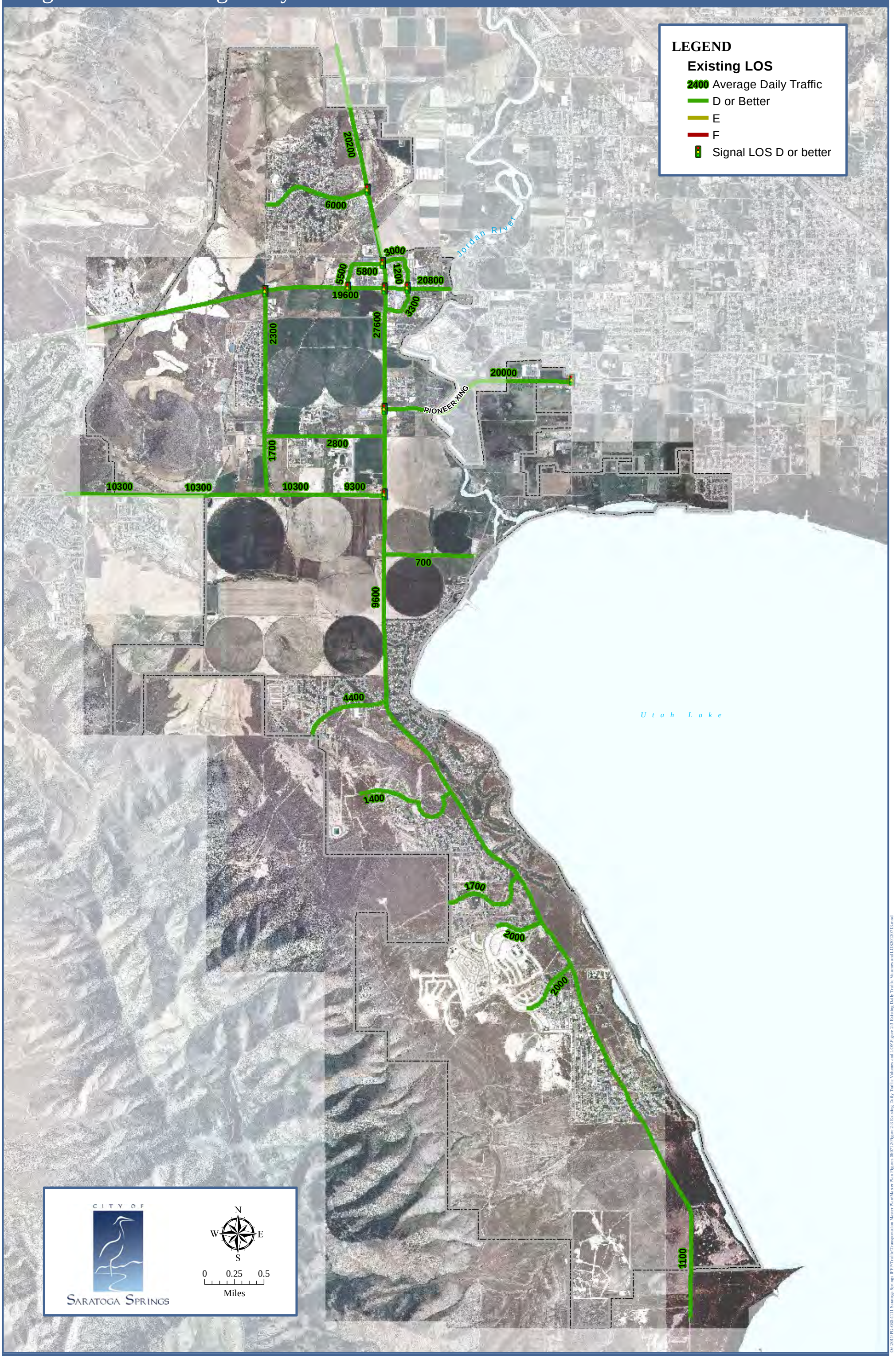


Figure 2-3 Existing Daily Traffic Volumes and LOS



3.0 Future Conditions

Future traffic patterns and the resulting operating conditions of a roadway network are directly related to land use planning and socioeconomic conditions. As traffic is not restricted to the Saratoga Springs area, and many of the roadways within the City act as regional east-west roads linking Eagle Mountain and Lehi, the socioeconomic and land use data in the neighboring cities must also be considered when projecting future traffic conditions within the City. Thus, socioeconomic information was obtained from Mountainland Association of Governments (MAG).

3.1 Future Socioeconomic Conditions

The projected socioeconomic data used in this study comes mostly from the MAG travel demand model which is based upon the best available statewide data provided by the Governor's Office of Planning and Budget (GOPB). This data was supplemented and verified using the data provided by Zion's Bank as part of the IFFP and the City planning department in the form of the adopted General Plan Land Use map and Zoning map (see **Figure 3-1**). This information is considered the best available for predicting future travel demand; however, land use planning is a dynamic process and the assumptions made in this report should be used as a guide and should not supersede other planning efforts.

Based on the current land use, zoning, demographics, and growth patterns, Saratoga Springs is expected to grow to approximately 94,000 residents by the year 2040 (**Table 3-1**). This forecasted growth will place increased pressure on the City's infrastructure including its street system. Saratoga Springs is also committed to increasing its commercial, office, and retail base providing greater opportunity for its residents to live, work, and play in the City. This growth will have considerable impact on traffic volumes. The projected traffic volumes for the planning year 2040 show a corresponding increase with traffic growth between 30 percent and 550 percent on many of the City's arterial and collector roads.

Table 3-1 Saratoga Springs City Projected Population Growth

Year	*Population*	*Population Change*	*Population Change %*
2000	1,003	-	-
2006	10,750	9,747	972%
2010	17,781	7,186	67%
2020	38,325	20,389	114%
2030	70,386	32,061	84%
2040	**94,200**	**23,814**	**34%**

Source: Governor's Office of Planning and Budget & Mountainland Association of Governments

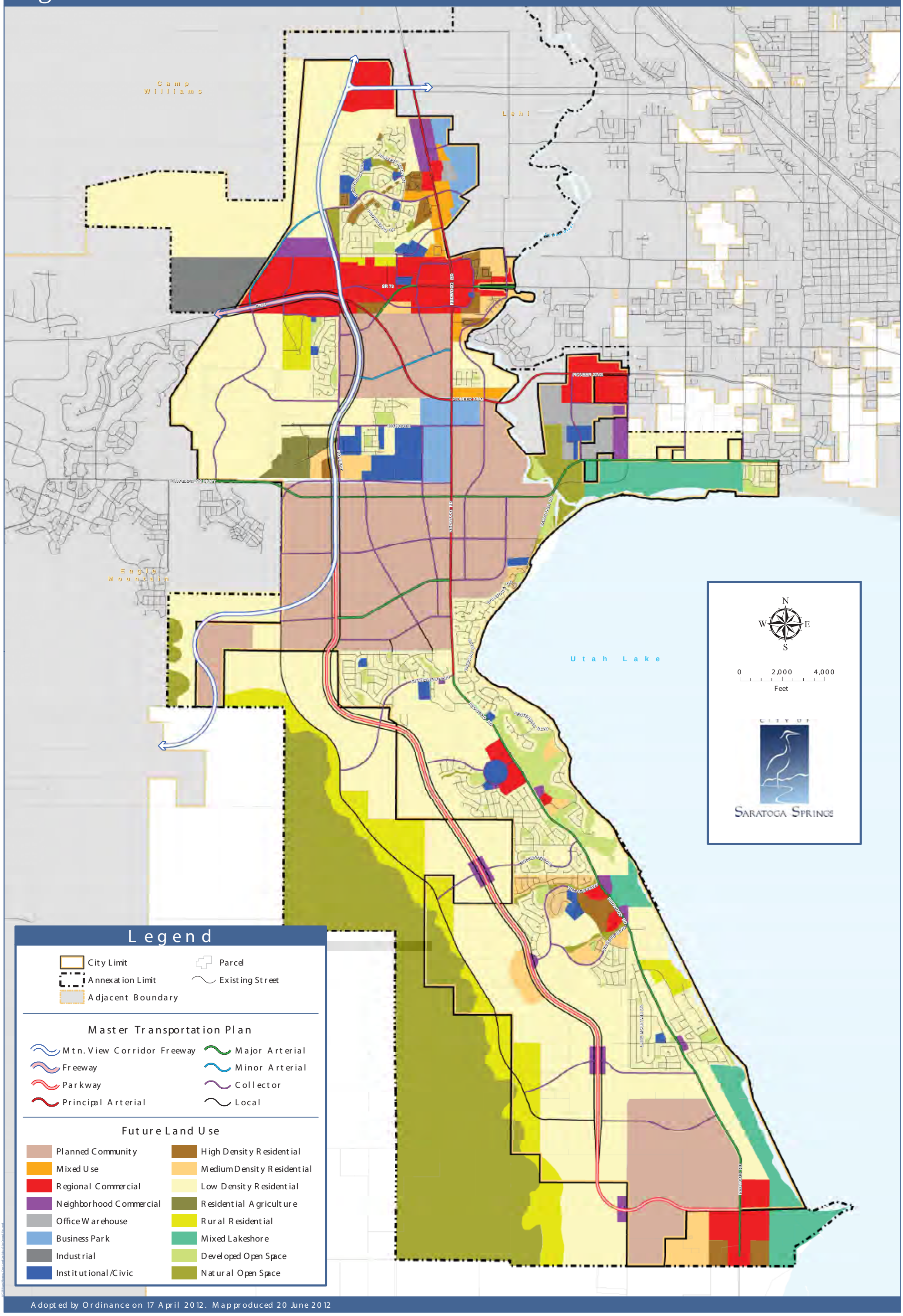
Saratoga Springs aims to plan for and encourage responsible and sustainable growth in the City. Today's transportation system should not only accommodate existing travel demands, but should also have built-in capacity to account for the demand which will be placed on the system in the future. While considering the socioeconomic data used in this report and the anticipated growth in the City, some precautions should be considered. First, the TAZ specific socioeconomic data only approximates the boundary conditions of the City and is based on data provided by MAG and the City's planning documents. Second, actual values may vary somewhat as a result of the large study area of the regional travel demand model which includes the unincorporated areas around Saratoga Springs. Therefore the recommendations in this report represent a planning level analysis and should not be used for construction of any project without review and further analysis.

As the designated Metropolitan Planning Organization (MPO) for the Utah Valley area, MAG, organized in 1972, is largely responsible for regional transportation planning in the three county region of Summit, Wasatch and Utah counties. In this capacity, MAG produces a 30 year Long Range Transportation Plan (LRTP) and a 5 year Transportation Improvement Program (TIP). Both of these products are constrained by reasonably available revenue. As a result, the LRTP does not always include the regional facility improvements which are planned by local communities. This TMP makes great efforts to supplement the regional plans produced by MAG and to provide direction for future regional planning efforts that will include Saratoga Springs City.

3.2 Future Land Use

In its General Plan Land Use Map, the City has sites planned for low, medium, and high density residential, neighborhood and regional parks, schools, commercial and office uses as well as large research and development properties. There are also a number of planned communities in the General Plan Land Use Map which are currently in the planning phase. These areas were identified and reviewed individually in addition to the MAG land use assumptions.

Figure 3-1 General Land Use Plan



Adopted by Ordinance on 17 April 2012. Map produced 20 June 2012

3.3 Travel Model Development

Projecting future travel demand is a function of projected land use and socioeconomic conditions. The MAG travel demand model was used to predict future traffic patterns and travel demand. The travel demand model was modified to reflect better accuracy through the Saratoga Springs area in by creating smaller TAZ and a more accurate and extensive roadway network. Existing conditions were simulated in the travel demand model and compared to the observed traffic count data to get a reasonable base line for future travel demand. Once this effort was completed, future land uses and socioeconomic data was input into the model to predict the roadway conditions for the design year 2040. 2040 was selected as the design year in order to be consistent with the MAG planning process. The 2040 Metropolitan Transportation Plan (available at www.mountainland.org) was adopted by the Mountainland MPO Regional Planning Committee on May 5, 2011. The transportation plan is a guide to maintain and enhance the regional transportation system for urbanized Utah County.

3.4 Projected Traffic Volumes and Conditions

The resulting outputs of the travel demand model were made up of traffic volumes on all of the classified streets in the City and surrounding area. This data was used to identify the need for future roadway improvements to accommodate the projected growth in the City. A number of modeled alternatives were reviewed by the Planning Commission and City Council to establish the recommended roadway network for 2040. The following three scenarios were analyzed in detail to assess the travel demand and resulting network performance in the City:

3.4.1 Existing Conditions

The 2010-2012 existing conditions analysis relied heavily on existing traffic count data on the major roadways in the City. This data included daily traffic volumes and peak hour traffic volumes. This analysis provided the opportunity to identify any existing deficiencies in the system and to provide a baseline for future demand. The existing roadway conditions have been previously identified in **Figure 2-3**.

3.4.2 No-Build Conditions

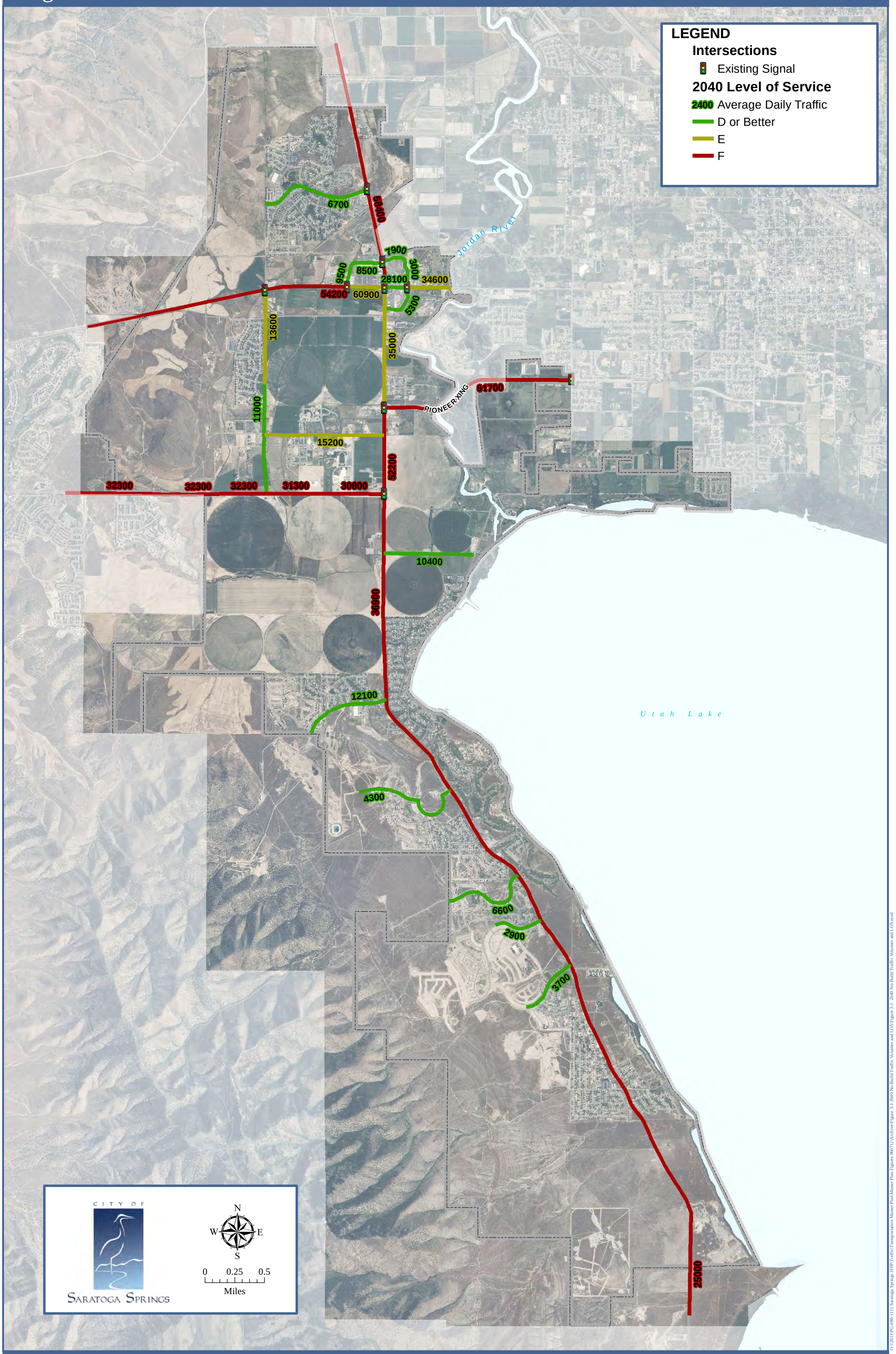
A no-build scenario is intended to show what the roadway network would be like in the future if no action is taken to improve the City roadway network. The travel demand model was again used to predict this condition by applying the future growth and travel demand to the existing roadway network. As shown in **Figure 3-2**, if no improvements are made to Saratoga Springs' transportation infrastructure, projected traffic volumes for the planning year 2040 will significantly lower the LOS of many of the major streets throughout the City. Improvements will need to be made as growth occurs in order to preserve the quality of life for Saratoga Springs' residents and to maintain an acceptable LOS on City streets and intersections. These improvements will also provide a sound street system that will support the City's growing economic base. LOS for signals is very difficult to predict so far out into the future. It is expected that the signals in the City will continue to operate at LOS D or better as traffic patterns change and new roadways are added to the network. It is recommended that the intersections

in the City be regularly monitored and signal timings adjusted as needed to maintain acceptable operating conditions.

3.4.3 Recommended 2040 Roadway Conditions

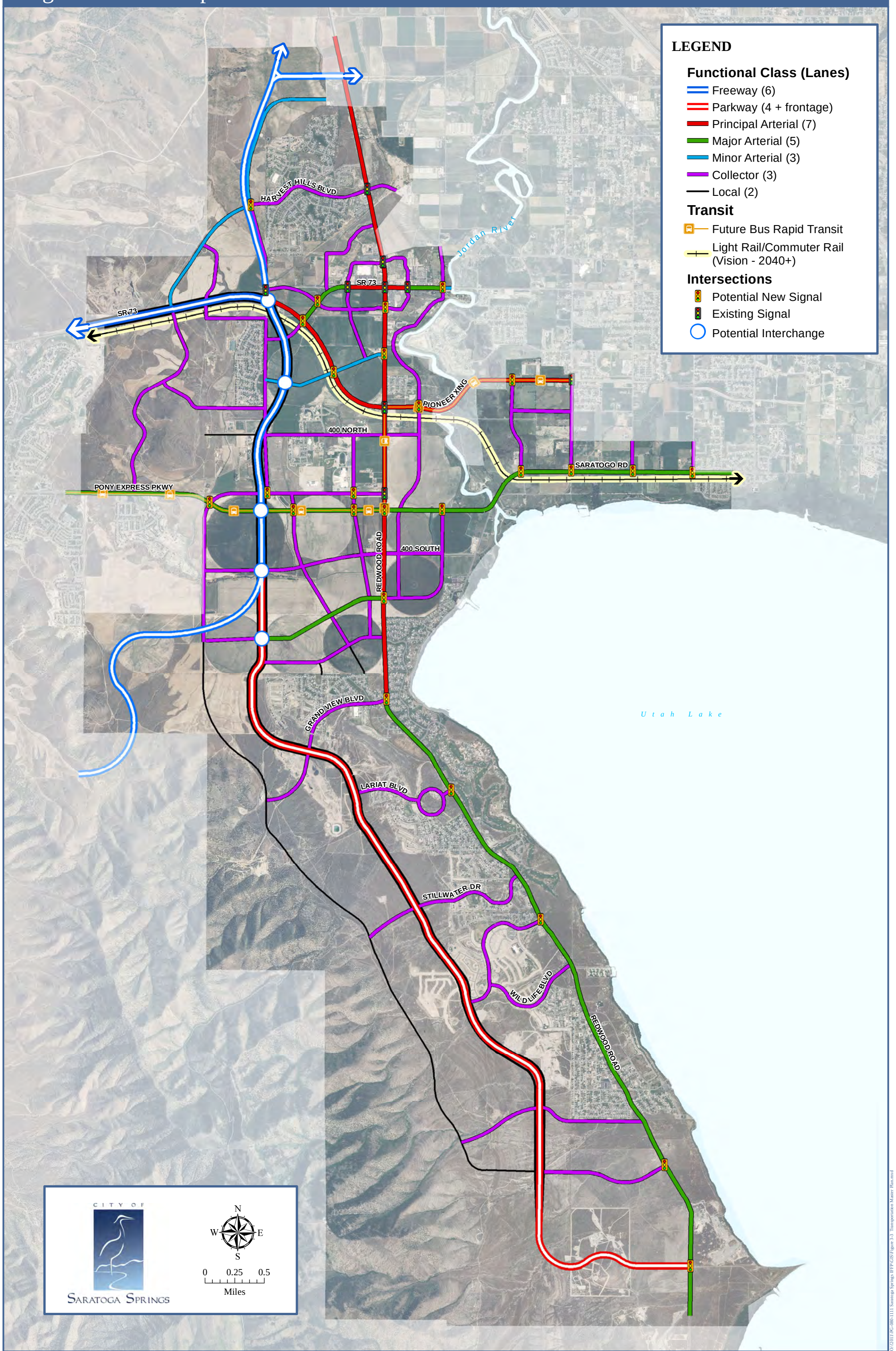
Areas of future concern in Saratoga Springs' street system were identified using traffic models of existing and projected traffic volumes to evaluate existing and projected level of service conditions. A recommended roadway network was created for the planning year 2040. This network was developed through a series of iterations with input from City staff, planning commission and city council. The final recommended roadway network seeks to balance accommodating demand through the year 2040 with fiscal responsibility while also considering the planning efforts of MAG and the neighboring cities. Many of the major land owners and neighboring jurisdictions to the City, including Suburban Land Reserve (SLR), Inc., SITLA, Lehi City, Eagle Mountain City, and UDOT were consulted and their input welcomed and considered during this planning process. The culmination of this analysis as well as the efforts of the Planning Commission and City Council is shown as a recommended 2040 roadway network in **Figure 3-3**. It is expected that the roadway network recommended in this document will perform at an acceptable LOS through the planning year 2040. This will help in preserving the quality of life and economic vitality of the City. The specific details of the recommended roadway network are discussed more extensively in **Section 4.0**.

Figure 3-2 2040 No-Build Traffic Volumes and LOS



O:\2011\PG-089-1111 Saratoga Springs IFFP\Traffic\Transportation Master Plan\Master Plan Figures 060712\Archive\Figure 3-1 2040 No-Build Traffic Volumes and LOS\Figure 3-1 2040 No-Build Traffic Volumes and LOS.mxd

Figure 3-3 Transportation Master Plan



3.5 Alternative Transportation Modes

Accommodating alternative modes of transportation than the passenger vehicle is a vital consideration when planning a livable and sustainable community. As a vibrant and growing city it is important for Saratoga Springs to continue to plan for improved transit, trails, and pedestrian facilities. These facilities, whilst improving the overall quality of life in the City, will also aid in relieving congestion and increasing the lifespan of the City's roadway network.

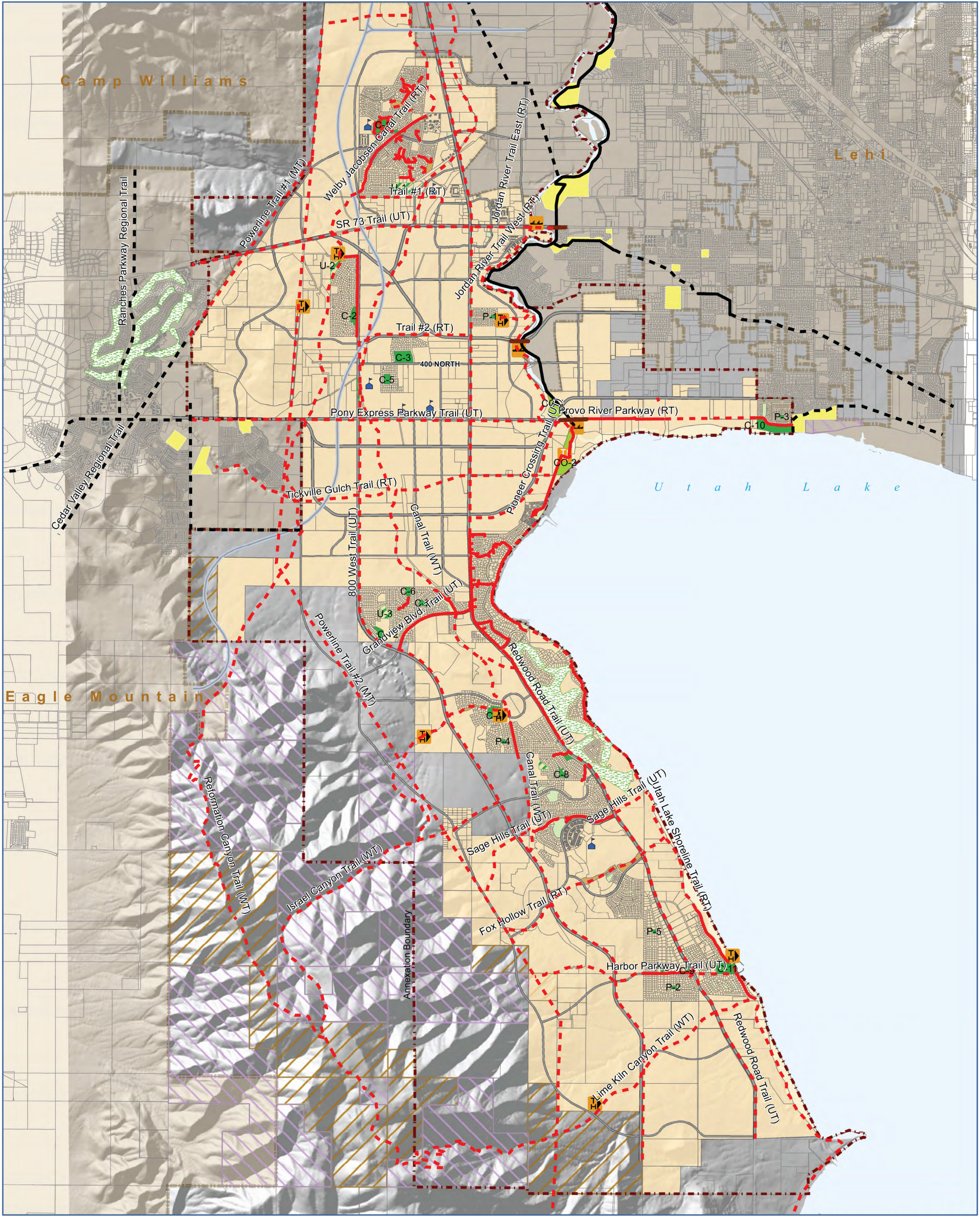
3.5.1 Non-Motorized Traffic

Pedestrian safety is an important feature of the TMP. The recommended typical roadway sections include an 8 foot wide side-walk (5 foot on collector and local streets) with park strips varying from 9 to 16 feet. These figures are based on the classification of the roadway and serve to provide a buffer for pedestrians from vehicular traffic creating a more sustainable and walkable community.

The Parks, Recreation, Trails, and Open Space Master Plan should be used to guide the transportation planning efforts in terms of trails and pedestrian facilities in the future. Specifically, the trails portion of the master plan includes several recommendations, which are reiterated in the TMP as priorities for the future planning in the City. The recommendations in the Trails Master Plan can be categorized into two main ideas:

- Completing the existing trails network by filling in existing gaps
- Constructing new trails in areas where the trails system is not connected because growth has not occurred there yet

In order to create a more connected and complete trails system each of the non-local roads that appear on both the Transportation Master Plan and the Trails Master Plan (shown in **Figure 3-4**) will include a 5' bicycle lane on each side of the road. This will provide a system where bicyclists and pedestrians can be separated, an important and desirable safety enhancement. The Trails Master Plan recommends that an additional 60 miles of trails be constructed in the future to maintain the existing 0.62 miles per 1,000 population ratio in 2040. The design guidelines set forth in the Trails Master Plan should be followed when planning and constructing the additional trails. **Table 3-2** lists the proposed trail network for 2040. The largest project on the list is the construction of 8.2 miles of additional urban trail completing the Redwood Road Trail. This will extend the trail from its existing location adjacent to the Saratoga Springs Development to the City limits in both the north and south directions along Redwood Road. The largest completely new trail on the plan is the Powerline #2 trail at 6.1 miles. This is a multipurpose trail that will follow the power corridor on the west edge of the City. The largest rural trail project is the 800 West trail extension intended to add 7.3 miles to the existing trail which will continue the trail south along the future Foothill Parkway. There are also 7 miles of additional trail planned for the Canal wilderness trail.



0 0.25 0.5 1 1.5 2 2.5 Miles

Legend

Trails

- Existing Trailhead
- Proposed Trailhead
- Proposed Canoe Put In/Take Out
- Existing
- Proposed
- Existing (Lehi/Eagle Mtn.)
- Proposed (Lehi/Eagle Mtn.)
- Proposed Bridge

Trail Types: MT - Multi-purpose Trail, RT - Rural Trail, UT - Urban Trail, WT - Wilderness Trail

- Schools
- County Park
- Golf Course
- Open Space
- Private Park (HOA)
- Unconstructed City Park
- Public Park
- Parks Outside of City
- Federal Land
- Utah Dept. of Natural Resources
- Annexation Boundary

Community Parks

C-1	Harvest Hills Park
C-2	Sunrise Meadows Park
C-3	Neptune Park
C-4	Jacob's Ranch Trialhead
C-5	Sunset Haven Park
C-6	Pondside Park (Benches)
C-7	Saratoga Hills Park
C-8	Summerhill Park
C-9	Wayman Park
C-10	Loch Lomond Park/Wetlands
C-11	Marina Park
C-12	Benches Nature Park

Pocket Parks

P-1	Dalmore Meadows Park
P-2	Mountain Moon Park
P-3	Loch Lomond Park
P-4	Jacob's Ranch Park
P-5	Lake Vista Park
P-6	Panarama Park

Unconstructed City Parks

U-1	Shay Park
U-2	Sunrise Meadows Park
U-3	Benches

County Parks

CO-1	RC Airplane Park
CO-2	Inlet Park

Note: Park names are for ease of discussion only. Official park names are in process.

Figure 3-4 Existing and Planned City Trails

Saratoga Springs Parks, Recreation, Trails, and Open Space Master Plan

15 Nov 2011

LANDMARK DESIGN

N

Table 3-2 2040 Proposed Trail Network

Trail Identification	*Existing Miles*	*Proposed Miles*	*Total Miles*	*Trail Type*
Utah Lake Shoreline Trail	3.3	4.0	7.3	Rural Trail
Redwood Road Trail	2.2	8.2	10.4	Urban Trail
800 West Trail	0.8	7.3	8.1	Rural Trail
Jordan River Trail East	0.4		0.4	Rural Trail
Jordan River Trail West		2.1	2.1	Rural Trail
Welby Jacobs Canal Trail	0.9	3.4	4.3	Rural Trail
SR 73 Trail		2.6	2.6	Urban Trail
Powerline Trail #1		1.4	1.4	Multipurpose Trail
Powerline Trail #2		6.1	6.1	Multipurpose Trail
Lime Kiln Canyon Trail		1.8	1.8	Wilderness Trail
Harbor Parkway Trail	0.4	1.4	1.8	Urban Trail
Sage Hills Trail	0.5	1.2	1.7	Urban Trail
Fox Hollow Trail		1.8	1.8	Rural Trail
Israel Canyon Trail		0.3	0.3	Wilderness Trail
Reformation Canyon Trail		0.5	0.5	Wilderness Trail
Canal Trail	0.6	7.0	7.6	Wilderness Trail
Grand View Blvd. Trail	0.7		0.7	Urban Trail
Pony Express Parkway Trail		2.8	2.8	Urban Trail
Pioneer Crossing Trail		1.3	1.3	Urban Trail
Tickville Gulch Trail		2.3	2.3	Rural Trail
Trail #1		0.8	0.8	Rural Trail
Trail #2		1.0	1.0	Rural Trail
Provo River Parkway	1.1	0.8	1.9	Rural Trail
Other	0.2	2.4	2.6	
Total	**11.1**	**60.5**	**71.6**	

Source: Saratoga Springs Parks, Recreation, Trails, and Open Space Master Plan 2011

3.5.2 Transit

Saratoga Springs does not and is not likely to operate and maintain its own transit system. The combined efforts of UTA, MAG, and the City will largely dictate the nature of a future expanded transit system. The City should be actively involved in promoting transit as a viable and attractive alternative transportation mode in the City. These planning and lobbying efforts will assist in procuring the necessary funding and support to develop, implement, and maintain a sustainable transit system.

The existing UTA bus line Route 806 Eagle Mountain/Saratoga Springs to SLC Express is unlikely to continue to meet the growing needs of the City in the future and may be supplemented by an additional express bus specifically between Saratoga Springs and Salt Lake City. As more population floods into the City in the future, the need for an express bus for commuters travelling to and from the south end of

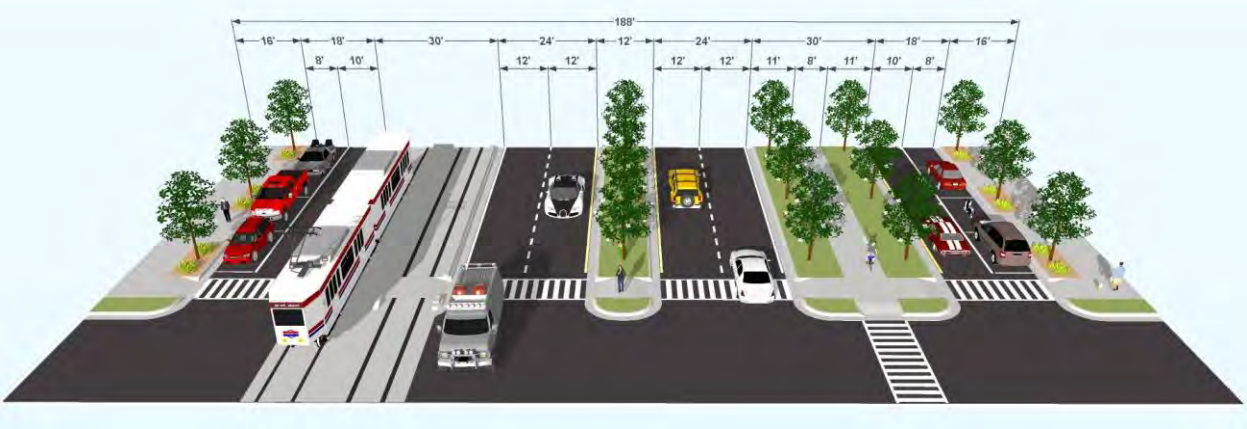
Utah County (Orem-Provo) should also be considered. Additional bus routes will likely be added by UTA as the city expands and should be restricted to collectors and arterial streets.

Due to the relatively large distances between the residential developments to the north and south and the commercial/retail center at Commerce Drive, a local bus system connecting these two areas may be beneficial as time progresses and population increases. This would allow those who prefer public transit to commute from the residential south to either work or shop in the commercial/retail district. As more commercial/retail zones develop in the City, further local bus routes should be considered linking these areas. A local bus system also allows more flexibility for captive riders (those with no other means of transportation) to live, play, and work/shop at a greater distance increasing their housing and employment options.

The MAG regional transit plan for 2040 was released in May 2011 and shows a planned Bus Rapid Transit (BRT) line providing a transit connection from Eagle Mountain to Lehi by the year 2030. BRT is a relatively new public transportation alternative in Utah. In July 2008, UTA opened its first MAX BRT line. The line currently operates along 3500 South between the 3300 South Light Rail station and Magna. BRT is often referred to as light rail with rubber tires as it can and often does operate in a dedicated guide way, separate from traffic. BRT offers limited stops and traffic signal priority, significantly decreasing route travel times. In the immediate future, UTA will begin operating additional BRT routes along 5600 West in Salt Lake County and along University Parkway on Orem. Several other BRT routes are identified in the MAG regional transit plan including one in Saratoga Springs. The MAG transit plan can be seen in **Figure 3-6**.

Light Rail (TRAX) has been operating in Salt Lake County for more than a decade. There are currently three lines in operation with two more under construction and are expected to open before 2015. There are no existing or under construction TRAX lines in Utah County. According the MAG regional plan, the first TRAX line in Utah County will be an extension of the planned Draper line (expected to be completed in 2015) and is not anticipated to come online before 2030. Due to the importance of a transit network to Saratoga Springs, and at the request of several major land holders in the City, a TRAX line is being proposed as part of the TMP. This line will connect the Draper line extension to Saratoga Springs. The City is committed to promoting this TRAX line and coordinating with landowners, UTA and MAG to implement this transit improvement. **Figure 3-5** shows a concept design for the Pioneer Crossing Extension including a TRAX line and frontage roads. The four lane mainline would consist of 12' travel lanes (2 in each direction) separated by a 12' landscaped median. To the left of the travel lanes, (in the case of the Pioneer Crossing extension the south side) is a 30' right-of-way reserved for light rail TRAX trains or commuter rail (FrontRunner). This would be room enough to provide one track in each direction. An 8' trail is provided on the north side of the road (right in the diagram) in another 30' right-of-way. On each side of the road is an 18' frontage road with on street parking what will provide access to adjacent properties.

Figure 3-5 Concept Pioneer Crossing Extension Cross-Section

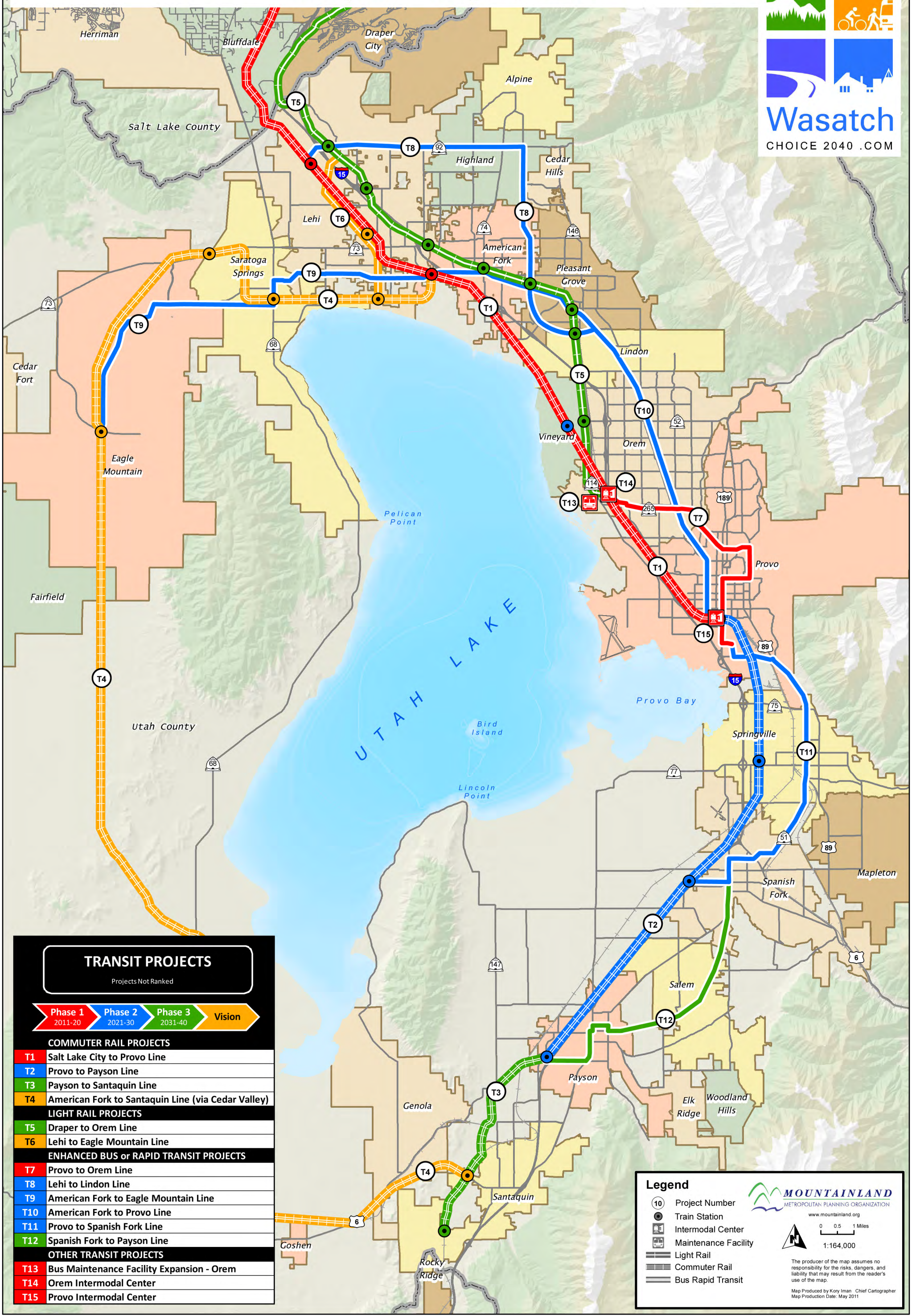


The most recent addition to the Utah statewide transportation system is UTA's FrontRunner commuter rail line. The line connects Salt Lake, Davis, and Weber counties with stations in Salt Lake City, Woods Cross, Farmington, Layton, Clearfield, Roy, and Ogden. Each station has a connection to the TRAX and bus networks. FrontRunner is a push/pull locomotive system, which can travel up to 79 mile per hour. Construction is currently underway on an extension to the line (scheduled to open early 2013) that will expand the service from Salt Lake City to Provo. Future planned expansions will add service to Brigham City in the north and Payson in the South. Part of the MAG *Vision* plan which extends beyond 2040 includes a FrontRunner line connecting Saratoga Springs, Eagle Mountain, Cedar Fort, and Fairfield to the Lehi and Santaquin planned FrontRunner stations.

An essential consideration of a good transportation system is the ability to seamlessly transfer from one transportation mode to the next. This could be from car to commuter rail, bike to bus, or foot to light rail. Each of these transfers must be accomplished efficiently in order for a transit system to be attractive to users. One way to accomplish exceptional connectivity is with an intermodal center. Intermodal centers are transit hubs where multiple modes of transportation converge and passengers enter using one form of transportation and leave by another. Transfers can occur between as many modes as the physical space can permit. As part of the TRAX line proposal, the City is also planning an intermodal hub close to the Pioneer Crossing Extension that may provide a connection to each of the transportation modes planned in the City.

Figure 3-6 Transit Projects - 2040 Metropolitan Transportation Plan

Adopted: May 5, 2011



4.0 Alternatives Evaluation and Recommendations

After evaluating the existing and future conditions, several recommendations to meet future travel demand are outlined in this section.

4.1 Roadway Functional Classification

A major reason for transportation planning is to provide adequate transportation solutions for connectivity with the surrounding region while at the same time preserving the quality of life of the residents in the City. The key to maintaining this balance exists in the ability to adequately plan for major corridors that minimize through traffic in neighborhoods, while at the same time coordinating land use and transportation plans that capitalize on the efficient movements of people and goods. To accomplish this objective, this TMP defines a hierarchy of streets known as a Functional Classification of Streets. The following street classifications have been selected by Saratoga Springs for inclusion in the TMP:

- Freeway
- Parkway
- Principal Arterial
- Major Arterial
- Minor Arterial
- Collector
- Local Road

Each of these roadway classifications has a specific purpose and function. Access and mobility are competing functions. This recognition is fundamental to the design of roadway systems that preserve public investments, contribute to traffic safety, reduce fuel consumption and vehicle emissions, and do not become functionally obsolete. Suitable functional design of the roadway system also preserves the private investment in residential and commercial development.

A typical trip on an urban street system can be described as occurring in identifiable steps. These steps can be sorted into a definite hierarchy with respect to how the competing functions of mobility and access are satisfied. For example, the primary purpose of an arterial street is to move large volumes of traffic at higher speeds and provide access to collector roads and higher density retail and commercial land uses. Some key arterial streets that currently traverse the City of Saratoga Springs include Redwood Road, Pioneer Crossing, and SR-73. At the low end of the hierarchy are local streets that provide good access to abutting properties, but provide limited opportunity for through movement.

Collector roads provide a transition between arterials and local roadways by providing both access and traffic moving capacity. Examples of existing collector roads within the City include Harvest Hills Blvd or Parkway Blvd. Collector type facilities serve moderate traffic volumes at moderate speeds. At the highest end of the hierarchy are freeway facilities that provide good mobility by limiting and controlling access to the roadway, thereby reducing conflicts that slow the flow of through traffic.

Roadway specialization simply means using each individual street facility to perform the desired mix of functions of access or movement. This is accomplished by classifying highways with respect to the amount of access or mobility they are to provide and then identifying and using the most effective facility to perform that function.

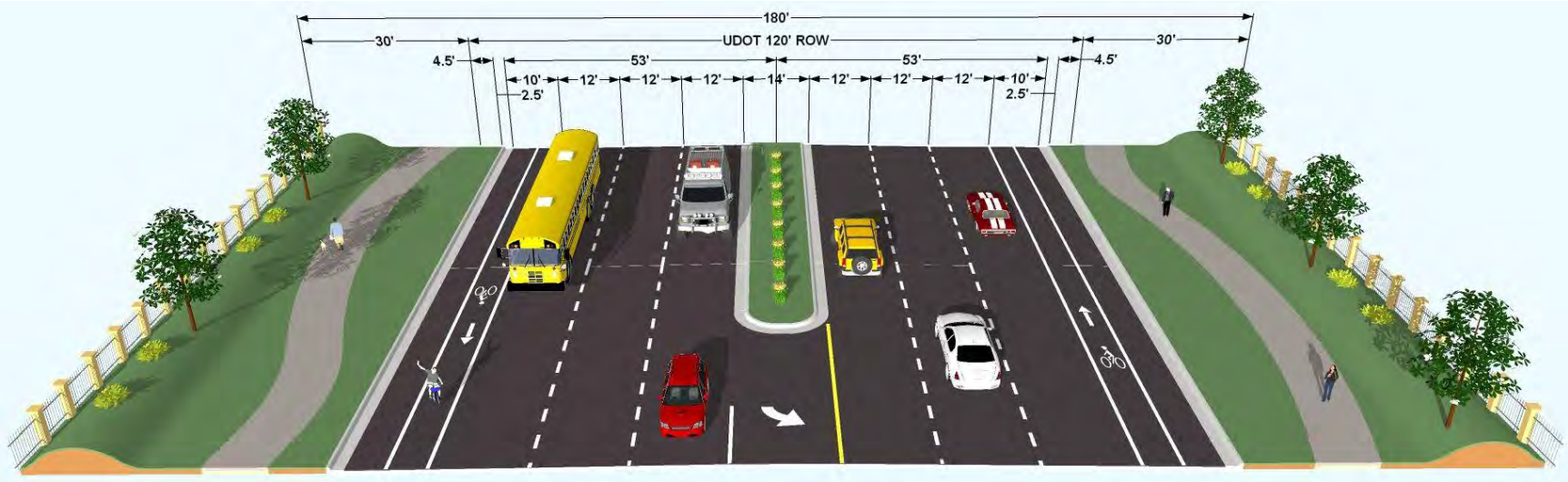
Many of the major streets in Saratoga Springs pass through residential areas with homes fronting the roadways. The typical street section (or street width) has been designed to lessen the impacts of needed roadway widening improvements to these homes. The typical cross-sections and configurations showing total right-of-way width, pavement width, number of travel lanes, and side treatments (such as sidewalk and park strip) are illustrated in **Figure 4-1**.

Impacts to adjacent properties can be limited by applying minimal typical sections to stretches of roadway between intersections. Typically, intersections are choke points in a traffic system. Capacity can be maximized by providing sufficient left and right turn pockets to accommodate at least the average expected peak hour queue as well as lane widths at intersections. Treatments at intersections are discussed further in the section below entitled Intersection Improvements. Pedestrian and bicycle traffic should also be considered in the design of major roadways as discussed below.

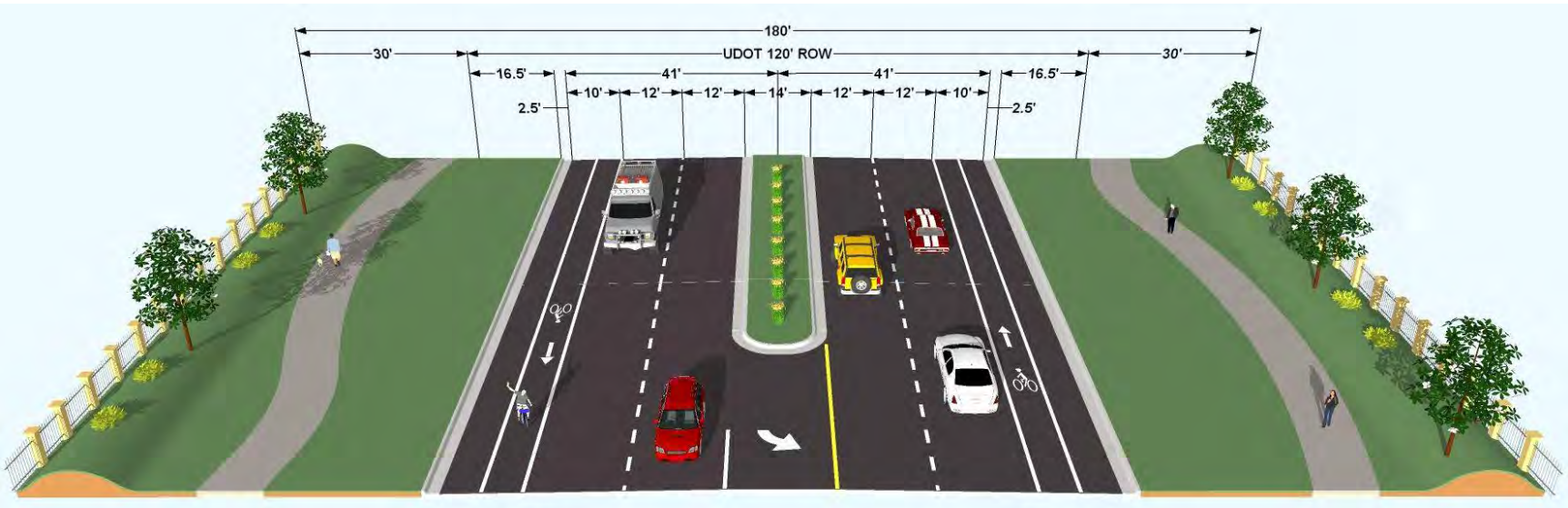
The major arterial roadways that service vehicles traveling to and from Eagle Mountain and east Utah County are predominantly used by through travelling traffic that do not originate or terminate their trips in Saratoga Springs. These high traffic volumes will continue to strain Saratoga Springs' east-west traffic facilities, particularly as population continues to increase in Lehi and Eagle Mountain.

Figure 4-1 Roadway Typical Sections

7-Lane Principal Arterial



5-Lane Major Arterial



3-Lane Minor Arterial

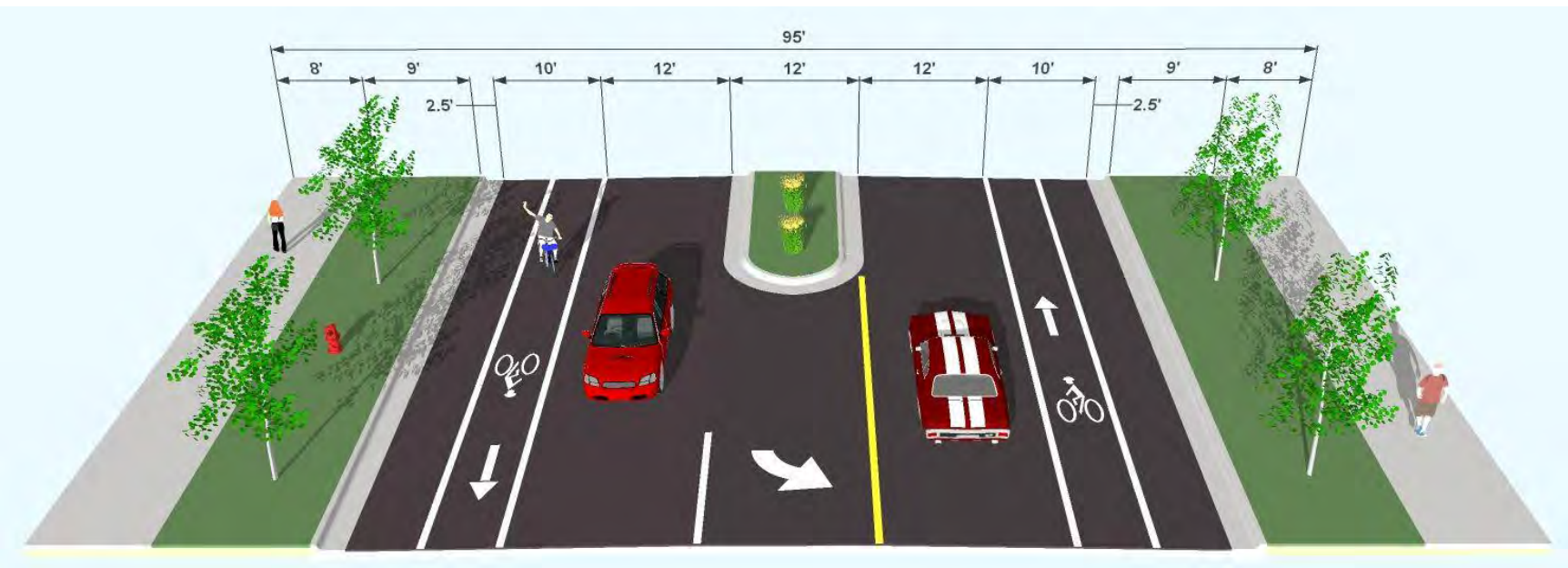
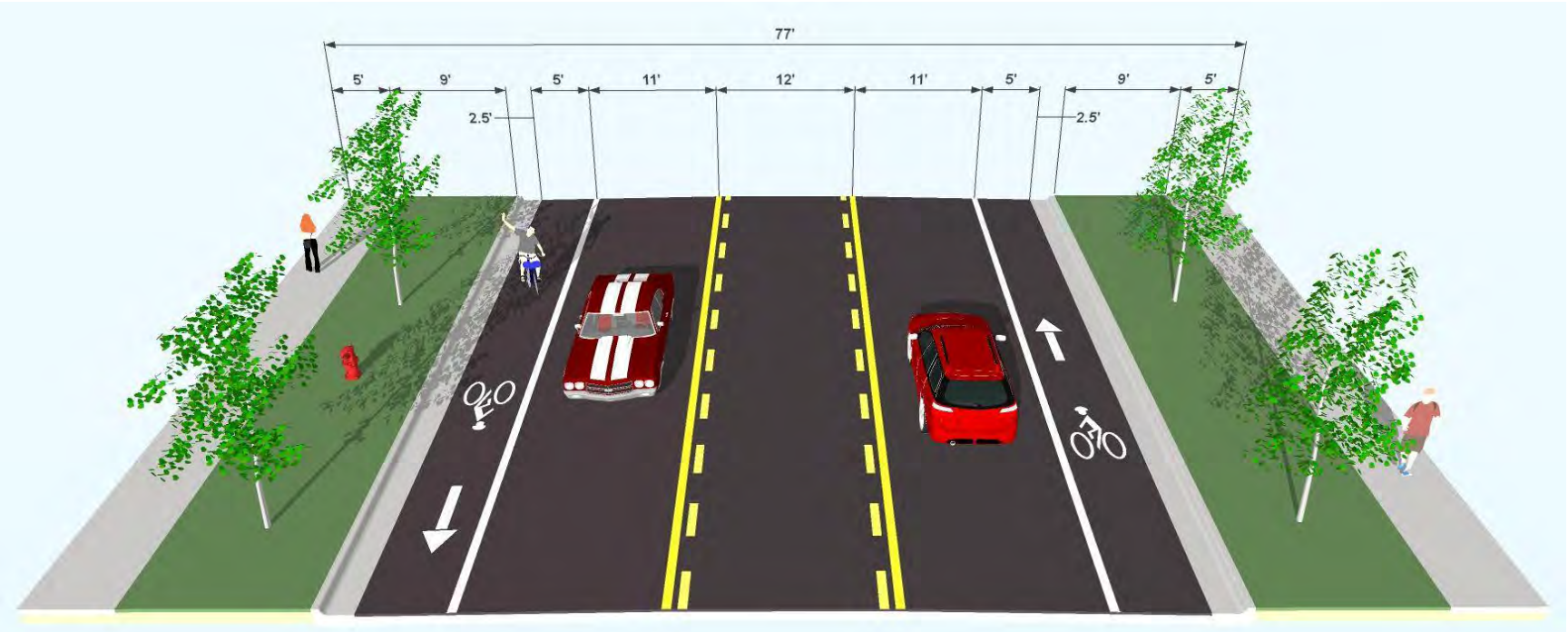
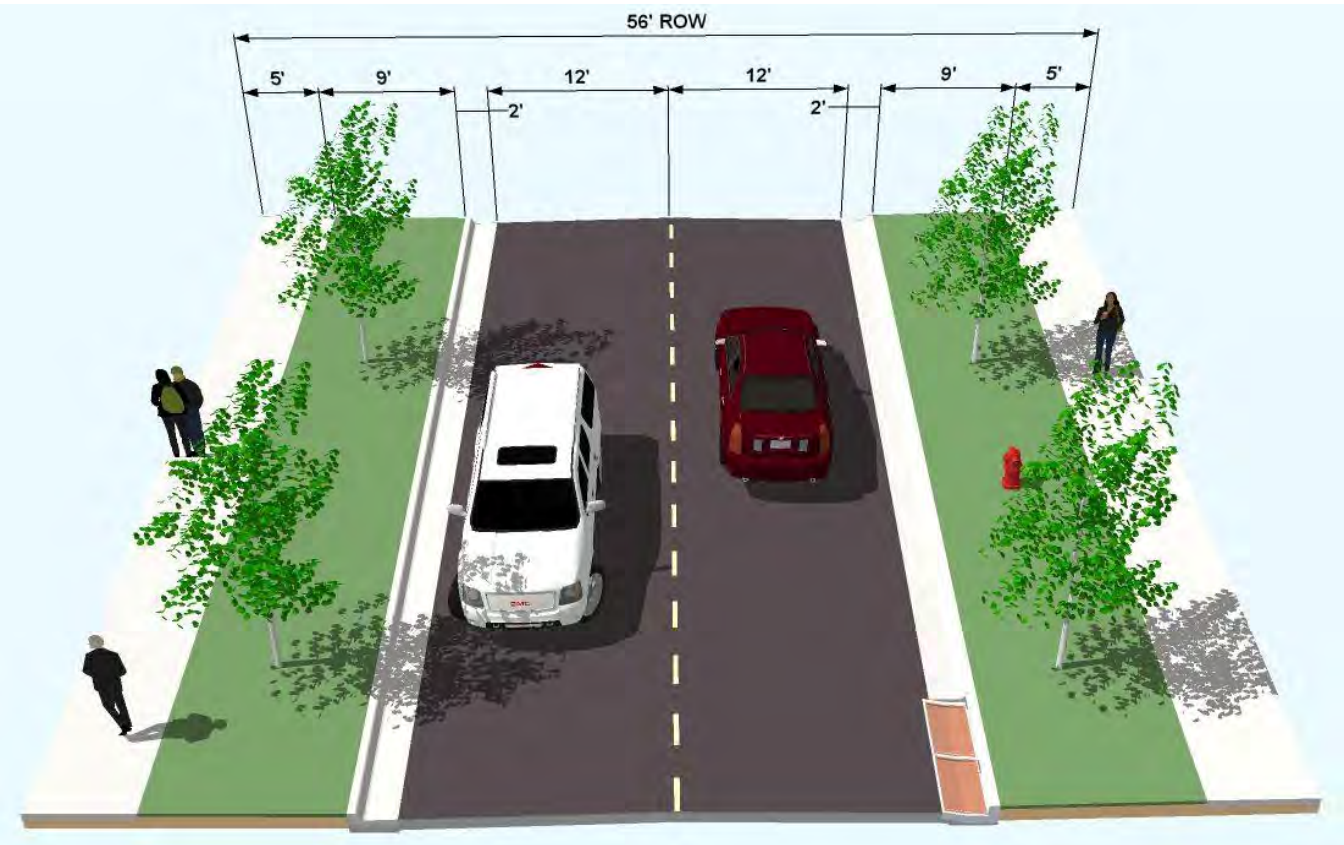


Figure 4-1 Continued

3-Lane Collector



Local Street



4.2 Access Management

Access management is the practice of coordinating the location, number, spacing, and design of access points to minimize site access conflicts and maximize the traffic capacity and safety of a roadway. Uncoordinated growth along major travel corridors often results in strip development and a proliferation of access points. In many of these instances, each individual development along the corridor has its own access driveway. Numerous access points along major travel corridors create unnecessary conflicts between turning and through traffic which causes delays and accidents. Numerous benefits are derived from controlling the location and number of access points to a roadway. Those benefits include:

- Improving overall roadway safety
- Reducing the total number of vehicle trips
- Decreasing interruptions in traffic flow
- Minimizing traffic delays and congestion
- Maintaining roadway capacity
- Extending the useful life of roads
- Avoiding costly highway projects
- Improving air quality
- Encouraging compact development patterns
- Improving access to adjacent land uses
- Enhancing pedestrian and bicycle facilities

4.2.1 Principles of Access Management

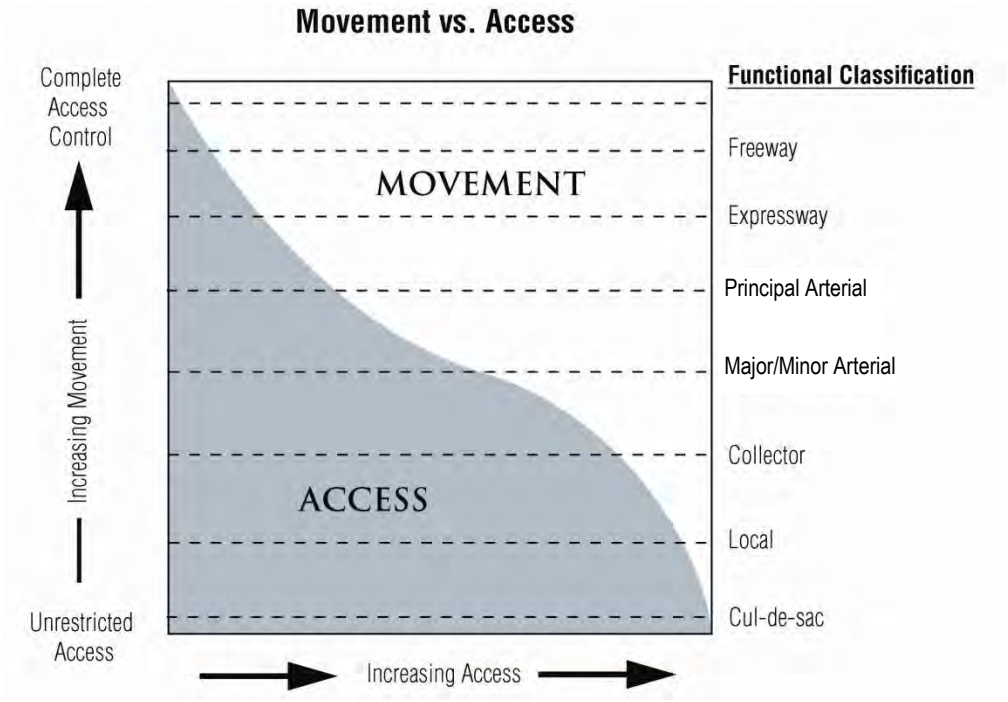
Constantly growing traffic congestion, concerns over traffic safety, and the ever increasing cost of upgrading roads have generated interest in managing the access to not only the highway system, but to surface streets as well. Access management is the process that provides access to land development while simultaneously preserving the flow of traffic on the surrounding road system in terms of safety, capacity, and speed. Access management attempts to balance the need to provide good mobility for through traffic with the requirements for reasonable access to adjacent land uses.

Arguably the most important concept in understanding the need for access management is to insure the movement of traffic and access to property is not mutually exclusive. No facility can both move traffic efficiently and provide unlimited access at the same time. **Figure 4-2** shows the relationship between mobility, access, and the functional classification of streets. The extreme examples of this concept are freeways and cul-de-sacs. Freeways move traffic very well with few opportunities for access, while the cul-de-sac has unlimited opportunities for access, but doesn't move traffic very well. In many cases, accidents and congestion are the result of streets trying to serve both mobility and access at the same time.

A good access management program will accomplish the following:

- Limit the number of conflict points at driveway locations
- Separate conflict areas
- Reduce the interference of through traffic
- Provide sufficient spacing for at-grade, signalized intersections
- Provide adequate on-site circulation and storage

Figure 4-2 Mobility vs. Access by Functional Classification



Access management attempts to put an end to the seemingly endless cycle of road improvements followed by increased access, increased congestion, and the need for more road improvements.

Poor planning and inadequate control of access can quickly lead to an unnecessarily high number of direct accesses along roadways. The movements that occur on and off roadways at driveway locations, when those driveways are too closely spaced, can make it very difficult for through traffic to flow smoothly at desired speeds and levels of safety. The American Association of State Highways and Transportation Officials (AASHTO) state that "the number of accidents is disproportionately higher at driveways than at other intersections…thus their design and location merits special consideration." Studies have shown that anywhere between 50 and 70 percent of all crashes that occur on the urban street system are access related.

Fewer direct accesses, greater separation of driveways, and better driveway design and location are the basic elements of access management. There is less occasion for through traffic to brake and change lanes in order to avoid turning traffic when these techniques are implemented uniformly and comprehensively.

Consequently, with good access management, the flow of traffic will be smoother and average travel speeds higher, with less potential for crashes. Before and after analyses by the Federal Highway Administration (FHWA), show that routes with well managed access can experience 50 percent fewer accidents than comparable facilities with no access controls.

Through the development review and approval process, the City will evaluate proposed access points using the principles described above.

4.2.2 Roadway Network and Access Management Standards

The access management concepts and standards presented below are consistent with guidelines established by the Federal Highway Administration (FHWA), the American Association of State Highway and Transportation Officials (AASHTO), the Transportation Research Board (TRB), and the Institute of Transportation Engineers (ITE).

There are a number of access management techniques that can be used to preserve or enhance the capacity of a roadway. Specific techniques for managing access are discussed in this section and illustrated with examples. Not all techniques will apply to every situation. Some of them are more appropriate to less developed rural areas of the City, whereas others are more appropriate in the urban areas. In the urban areas, the techniques can be applied when existing sites are redeveloped or when negotiations with landowners are successful. Therefore, it is up to the City to determine what will work best based in each situation.

4.2.2.1 Number of Access Points

Controlling the number of access points or driveways from a site to a roadway reduces potential conflicts between cars, pedestrians, and bicycles. Each parcel should normally be allowed one access point and commercial properties should be required to share access where possible. Provisions can be made in the local land use regulations to allow for more than one access point where special circumstances would require additional accesses.

4.2.2.2 Spacing of Access Points

Establishing a minimum distance between access points reduces the number of points a driver has to observe and reduces the opportunity for conflicts. Spacing requirements should be based on the classification and design speed of the road, the existing and projected volume of traffic as a result of the proposed development, and the physical conditions of the site. Minimum spacing standards should be applied to both residential and commercial/industrial developments.

To ensure efficient traffic flow, new signals should be limited to locations where the progressive movement of traffic will not be impeded significantly. Uniform, or near uniform, spacing of signals is essential for the progression of traffic. As a minimum, signals should be spaced no closer than one-quarter mile (1,320 feet) on any street. On principal arterial streets, signaled should be placed no closer than one-half mile (2,640 feet).

Un-signalized accesses are far more common than signalized accesses. They affect all kinds of activity, not merely large activity centers. Traffic operational factors lead towards wider spacing of driveways (especially medium- and higher-volume driveways) include weaving and merging distances, stopping sight distance, acceleration rates, and storage distance for back-to-back left turns. From a spacing perspective, these driveways should be treated the same as public streets. Sound traffic engineering criteria indicates that 500 feet or more should be provided between full-movement un-signalized accesses.

Restricted access movement (i.e., right-in/right-out access) can provide for additional access to promote economic development with minimum impact to the roadway facility. This type of access should be spaced to allow for a minimum of traffic conflicts and provide distance for deceleration and acceleration of traffic in and out of the access. Restricting access on roads may create double frontage lots. This can be mitigated through landscape buffering. The UDOT recommended access spacing requirements are based on the functional classification of the roadway facility and are shown in **Table 4-1.**

Table 4-1 Access Spacing Based on Functional Classification

Functional Classification	Minimum Signal Spacing (ft.)*	Minimum Un-signalized Full-Movement Access Spacing (ft.)*	Minimum Right-In/Right-Out Access Spacing (ft.)*	Residential Driveways Permitted
Principal Arterial	2,640	660	350	No
Major Arterial	2,640	660	330	No
Minor Arterial	1,320	500	250	No
Collector	1,320	500	250	Discouraged
Residential Local	NA	125	100	Yes

*Distances to be measured from center of driveway to center of driveway

4.3 Safety

One of the main goals of the TMP and long term transportation planning in general is to envision traffic growth and provide for adequate facilities as the need arises. Constructing these future facilities to make possible safe operations is of equal importance. As a result, all of these facilities should be constructed and maintained to applicable design and engineering standards such as those set forth in Saratoga Springs City ordinances, the American Association of State Highway Transportation Officials (AASHTO) "Policy on Geometric Design of Highways and Streets," and the Manual on Uniform Traffic Control Devices (MUTCD). This includes implementing applicable Americans with Disabilities Act (ADA) standards and school zone treatments.

4.3.1 Driveways

One safety item that deserves attention is the interaction of driveways on collector and arterial streets. Where accesses do exist on these roadways, sufficient space should be provided to allow vehicles to turn around on site so that they always exit the driveway facing the street. For example, private

residences ought to have circular type driveways in order to safely enter and exit the driveway with ease. Backing maneuvers into busy streets can be very dangerous as this is not a typical action drivers expect. On-street parking on busy streets should be parallel to traffic where possible as opposed to perpendicular to traffic to avoid dangerous backing maneuvers into traffic.

4.3.2 Offset Intersections

Offset intersections often have negative impacts on traffic flow and can potentially create capacity problems at intersections where the left turn storage areas overlap, forcing queued vehicles into through traffic lanes. Aligning access on both sides of the street will minimize conflict points in the roadway and provided safer and more efficient traffic flow. Offset intersections should be avoided wherever possible.

4.4 Intersection Improvements

As traffic volumes increase throughout the community, intersection design will become more critical. Proper intersection design will typically facilitate larger traffic flows without widening existing roadway cross-sections. This can minimize impacts to adjacent properties. Therefore, emphasis was placed on identifying critical intersections during the traffic modeling process.

Intersections are a critical element to future functionality. Intersections should provide sufficient turn lanes and adequate queuing lengths. In the future, many intersections throughout the City may require signalization in order to maintain a desirable LOS (see **Figure 3-3**). Stop signs and traffic signals should not be used where not warranted. Studies have shown that in areas where there forms of control have been installed, and not warranted, that the motoring public will disregard the control measure and therefore the right-of-way assignments at that location. This disregard for traffic control devices causes hazardous locations and a general disregard for other traffic control measures in the area.

4.4.1 Stop Sign Warrants

The MUTCD should be used as the standard for determining how and when a stop sign is installed. As stated in the MUTCD, "Stop signs should be used if engineering judgment indicates that one or more of the following conditions exist:

- Intersection of a less important road with a main road where application of the normal right-of-way rule would not be expected to provide reasonable compliance with the law;
- Street entering a through highway or street;
- Un-signalized intersection in a signalized area; and
- High speeds, restricted view, or crash records indicate a need for control by the stop sign.

The number of vehicles that are required to stop should be minimized if at all possible to preserve capacity and functionality of the roadway network; therefore, when deciding which road to stop, the street carrying the lowest volume of traffic should be chosen. Less restrictive traffic control such as a yield sign can be used as an alternative to stop signs if at all possible to minimize delays. Yield signs should also be installed per the MUTCD guidelines. Stop signs should not be used to control speed, but

to designate right-of-way at intersecting roadways. Multi-way stop control may be used as a safety measure at intersections where the volume of traffic is approximately equal for all approaches and where safety is of concern, or as an interim measure where a traffic signal is justified and has yet to be installed. Engineering judgment and the guidelines outlined in the MUTCD should be used to determine the appropriate application of stop and yield signs.

4.4.2 Traffic Signal Warrants

Traffic signals should not be installed unless at least one or more of the eight traffic signal warrants (as outlined in the MUTCD) have been met. Even if warrants are met for a particular intersection, justification for should still be based on information obtained through engineering studies and comparisons with the requirements set forth in the MUTCD. As stated in the MUTCD, "the satisfaction of a traffic signal warrant or warrants shall not in itself require the installation of a traffic control signal." The eight warrants outlined in the MUTCD include the following:

- Warrant 1: Eight-Hour Vehicular Volume
- Warrant 2: Four-Hour Vehicular Volume
- Warrant 3: Peak Hour
- Warrant 4: Pedestrian Volume
- Warrant 5: School Crossing
- Warrant 6: Coordinated Signal System
- Warrant 7: Crash Experience
- Warrant 8: Roadway Network

4.4.3 Roundabout Intersections

Many communities in the United States are beginning to embrace the concept of roundabouts. A roundabout is an intersection control measure used successfully in Europe and Australia for many years. A roundabout is composed of a circular, raised, center island with deflecting islands on the intersecting streets to direct traffic movement around the circle. Traffic circulates in a counter-clockwise direction making right turns onto the intersecting streets. There are no traffic signals; rather, entering traffic yields to vehicles already in the roundabout.

Advantages of roundabouts include reduced traffic delays, increased safety and reduced right-of-way requirements. They can reduce delays compared to a signalized intersection due to the stop phase being eliminated. At the same time, roundabouts can improve safety because the number of potential impact points, and the number of conflict points the driver must monitor, are both substantially reduced over a conventional four-way intersection. Properly designed roundabouts can also accommodate emergency vehicles, trucks, and snow plowing equipment.

Unlike the typical New England "traffic circle" or "rotary," design standards for roundabouts are very specific and the Federal Highway Administration (FHWA) has prepared a design guide for modern roundabouts in the United States. Development of a roundabout will only occur as a result of an intersection study performed by a qualified Traffic Engineer and when the minimum capacity and design

criteria are met. The FHWA has determined that the maximum flow rate that a roundabout can accommodate depends on the geometric elements (circle diameter, number of lanes, etc.), the circulating flow (vehicles going around the circle), and entry flow (vehicles entering the circle). A single lane roundabout can accommodate up to 1,800 vehicles per hour and a double lane roundabout can accommodate up to 3,400 vehicles per hour. **Figure 4-3** shows an example of a typical single lane roundabout design.

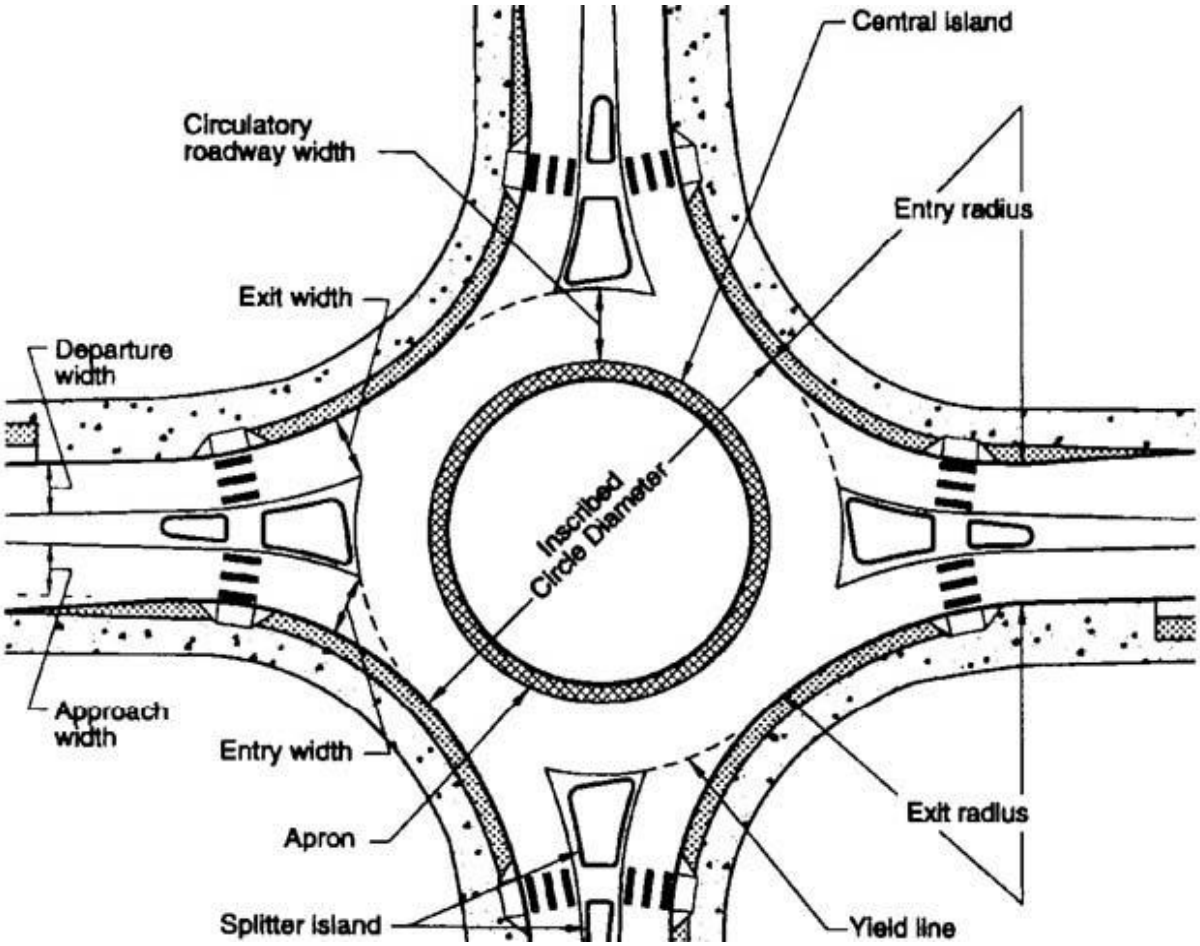


Figure 4-3 Typical Roundabout Design

The National Transportation Research Board examined traffic delays before and after roundabouts were installed at eight intersections in the United States. The study determined that delays (the time spent stopped and moving up to the intersection) decreased on average by 78 percent and 76 percent during the AM Peak Hour and PM Peak Hour, respectively. The results indicate that roundabouts can reduce congestion in certain circumstances. In addition, the FHWA studied safety characteristics of a sample of eleven roundabouts in the United States. The agency determined that the number of personal injury accidents and property damage-only accidents decreased 51 percent and 29 percent, respectively, after roundabouts replaced conventional intersections. Roundabouts are an appropriate solution for certain problem intersections in the region.

There are numerous reasons for selecting a roundabout as a preferred alternative, with each reason carrying its own considerations and trade-offs. Below are some potential applications or roundabouts[2]:

- New Residential Subdivisions
  Developers have begun to use roundabouts in residential subdivisions with increasing frequency. Roundabouts provide a variety of operational and aesthetic benefits and create a sense of place that is attractive to developers and homeowners.
- Urban Centers
  Roundabouts may be considered an optimal choice in situations where existing or planned access-management strategies along a corridor facilitate U-turn movements at nearby intersections.
- Suburban Municipalities and Small Towns
  Smaller municipalities are often ideal locations to consider roundabouts. Right-of-way is often less constrained, traffic volumes are lower, and the aesthetic opportunities for landscaping and gateway treatments are enticing. Existing operational and/or safety deficiencies can also often be addressed.
- Rural Settings and Small Communities
  Safety may often be the driving factor over capacity in making a roundabout an appealing choice. Within small communities along an extended highway, a roundabout is ideal for supporting speed reductions.
- Schools
  Roundabouts may be an optimal choice for intersection control in the vicinity of schools. One primary benefit is the reduction of vehicle speeds in and around the roundabout. Roundabouts improve pedestrian crossing opportunities, providing mid-block refuge and the ability for pedestrians to focus on one direction of traffic at a time.
- Interchanges
  Situations where an intersection ramp terminal has the potential for a high proportion of left-turn flows from the off-ramps and to the on-ramps may be ideal candidate for a roundabout.
- Commercial Developments
  Roundabouts in commercial developments provide for a central focus point for a development and enhance aesthetic qualities. They are also capable of processing high volumes of traffic.
- Unusual Geometry
  Intersections with unusual geometric configurations, intersection angles, or more than four legs are often difficult to manage operationally. Roundabouts are a proven traffic control device in such situations, effectively managing traffic flows without the need for costly expenditures on unique signal controller equipment or unusual signal timing.
- Closely Spaced Intersections
  Roundabouts balance traffic flows and manage queue lengths between closely spaced intersections.

[2] Source: NCHRP Report 672, Roundabouts: An Informational Guide Second Edition

The City of Saratoga Springs will consider roundabouts as an intersection alternative at specific locations pending more detailed traffic analysis as needs arise through the development process.

4.5 Traffic Calming

Street patterns are typically developed in response to the desires of the community at the time of construction. In Utah, the history of using a grid system for planning and development purposes started long ago and has proven efficient for moving people and goods throughout a network of surface streets. However, the nature of a grid system with wide and often long, straight roads can result in excessive speeds. For that reason, traffic calming measures (TCMs) can be implemented to reduce speeds on residential roadways. Saratoga Springs is an exception to the Utah grid system and as such has fewer problems with long, wide, straight street sections that can contribute to high speeds and unsafe conditions. Traffic Calming is however still applicable to many neighborhood or local streets and should be at least given consideration on the City's local and residential streets on a case by case basis where applicable. It is strongly recommended that as the City grows and traffic calming becomes a more pressing issue, the City implements a Traffic Calming Program for dealing with traffic calming requests and addressing issues relating to traffic calming as they arise.

The Institute of Transportation Engineers (ITE) has established a definition for traffic calming that reads "Traffic calming is the combination of mainly physical measures that reduce the negative effects of motor vehicle use, alter driver behavior and improve conditions for non-motorized street users." Altering driver behavior includes lowering of speeds, reducing aggressive driving, and increasing respect for non-motorized street users.

4.5.1 Types of Traffic Calming Measures

There are several types of TCMs that can be grouped into three categories depending on the level of control or effect on traffic flow and speeds. Category One measures are the least restrictive, while Category Three are the most dramatic. These categories are outlined in further detail below. Several factors can influence the choice of TCMs used including the location, street classification, street geometry, adjacent land uses, public transit needs, budget, climate, aesthetics, and community preferences.

4.5.1.1 Category One – Traffic Control Devices

Traffic control devices consist of signs, signals, and pavement markings to regulate, warn, guide, and provide information to drivers. Examples include regulator signs (i.e., speed limit signs), warning signs (i.e., pedestrian warning signs), traffic signals, etc. Often traffic control devices are overused as TCMs. Though the function of traffic calming devices is often similar to that of TCMs, specific traffic control devices should not be overused to communicate different purposes. One of the primary purposes of traffic control devices is to inform drivers of traffic laws and specific right-of-ways in order to maintain order and safety. Overuse of such traffic control devices diminishes their intended purpose. For example, the MUTCD states that "stop signs should not be used for speed control." When used

following the guidelines outlined in the MUTCD, traffic control devices can assist as part of roadway/intersection designs to calm traffic where necessary.

4.5.1.2 Category Two – Street Modification

Street modification TCMs include actions that physically alter the vertical or horizontal alignment of the roadway. Vertical changes include speed humps, speed tables, raised intersections, etc. Horizontal changes include chicanes and lateral shifts. Other street modifications TCMs include constrictions (i.e., narrowing, pinch points, islands, chokers, etc.), narrow pavement widths (i.e., medians, edge treatments, bulb-outs, etc.), entrance features, roundabouts, small corner radii, street closures, and streetscaping (i.e., surface textures and colors, landscaping, street trees, street furniture, etc.). **Figure 4-4** shows an example of a speed table. **Figure 4-5** is an example of a chicane used for traffic calming. **Figure 4-6** shows a partial road closure.

Figure 4-4 Speed Table

Figure 4-5 Chicane

Figure 4-6 Partial Road Closure Traffic Calming Measure

4.5.1.3 Category Three – Route Modification

Route modifications consist of altering available routes of traffic flow. Examples include one-way streets, diverters, closures, and turn prohibitions. Instead of attempting to alter drivers' behavior (Categories One and Two), route modification TCMs attempt to alter drivers' routes altogether.

4.5.1.4 Streetscaping

Streetscaping includes the planning and placement of items such as street furniture, lighting, art, trees, landscaping, and side treatments along streets and intersections. Although streetscaping can be implemented without traffic calming, TCMs need a certain element of streetscaping to be functional. Streetscaping softens the appearance of speed humps or tables and enhances the aesthetics of roundabouts and constrictions, etc. Landscaping and other roadside treatments make street closures more effective and safer by highlighting the presence of the measure.

4.5.1.5 Other Considerations

Spacing is an important consideration for TCMs. If TCMs are too far apart (greater than 600 to 1000 feet), speeding can occur between the measures. TCMs should be spaced 200 to 300 feet apart so vehicles will not have sufficient distance to accelerate between measures.

Other considerations when deciding which TCMs to install include snow removal maintenance and emergency vehicle access. Some TCMs may decrease the efficiency of both snow removal and/or emergency vehicle access, for example speed humps or tables, etc.

4.5.1.6 Installation of Traffic Calming Measures

When deciding to implement TCMs, the decision should be based on engineering merits of a TCM application, as opposed to public clamor. An engineering study that documents the need for such measures and the nature of the traffic problem via speed and volume measurements should be the determining factor.

The next step should be to propose TCMs that are capable of solving the problem and matching the terrain, climate and nature of the street in question. One or several measures could then be implemented on a temporary basis subject to performance evaluations and neighborhood review. Before implementing these improvements on a more permanent basis, the final step would be to compare the before and after studies for speed and volume changes to see if the TCMs have performed as expected.

In order to make any of the TCMs effective, traffic calming must be community based and as wide spread as possible. For example, the repercussions of traffic calming on one street can result in higher speeds on adjacent streets due to a shift in travel patterns. The need for a community based traffic calming plan is fundamental to the quality of life for the citizens of the community; hence, a more detailed and formal traffic calming plan should be implemented that more specifically addresses appropriate applications, suggests warrants for the installation of different TCMs, and outlines suitable installation procedures of different TCMs.

It is recommended that Saratoga Springs City develops a traffic calming plan and as the City begins to implement TCMs, the latest engineering information should be consulted to ensure that the plan contains the latest and best recommendations. ITE is the definitive resource on traffic calming issues and produces a significant amount of literature on the subject. A complete discussion on the latest TCMs and related issues can be found at http://www.ite.org/traffic/index.asp.

4.6 Corridor Preservation

Corridor preservation is an important transportation planning tool that agencies should use and apply to all future transportation corridors. There are several new transportation facilities that have been identified in the TMP. In planning for these future facilities, corridor preservation techniques should be employed. The main purposes of corridor preservation are to:

- Preserve the viability of future options,
- Reduce the cost of these options, and
- Minimize environmental and socio-economic impacts of future implementation.

Corridor preservation seeks to preserve the right-of-way needed for future transportation facilities and prevent development which might be incompatible with these facilities. This is primarily accomplished by the community's ability to apply land use controls such as zoning and approval of developments. Adoption of the TMP by Saratoga Springs City is a commitment to citizens and future leaders in the community that the identified future corridors will be the ultimate location for transportation facilities.

Perhaps, the most important elements of corridor preservation are ensuring that the corridors are preserved in the correct location and that they meet the applicable design and right-of-way standards for the type of facility being preserved. As the master plan does not define the exact alignment of each future corridor, it becomes the responsibility of the City to make sure that the corridors are correctly preserved. This will have to be accomplished through the engineering and planning reviews done within the City as development and annexation requests are approved that involve properties within or adjacent to the future corridors.

4.6.1 Corridor Preservation Techniques

Some examples of specific corridor preservation techniques that may be most beneficial and easily implemented include the following:

- Developer Incentives and Agreements: Public agencies can offer incentives in the form of tax abatements, density credits, or timely site plan approvals to developers who maintain property within proposed transportation corridors in an undeveloped state.
- Exactions: As development proposals are submitted to the City for review, efforts should be made to exact land identified within the future corridors. Exactions are similar to impact fees, except they are paid with land rather than cash.

- Fee Simple Acquisitions: This will most likely consist of hardship purchases or possible city acquisition of property identified within the corridors. Parcels obtained in fee title can later be sold at market value to the owner of the transportation facility when construction begins.
- Transfer of Development Rights and Density Transfers: Government entities can provide incentives for developers and landowners to participate in corridor preservation programs using the transfer of development rights and density transfers. This is a powerful tool in that there seldom is any capital cost to local governments.
- Land Use Controls: This method allows government entities to use police power to regulate intensity and types of land use. Zoning ordinances are the primary controls over land use and the most important land use tools available for use in corridor preservation programs.
- Purchase of Options and Easements: Options and easements allow government agencies to purchase interests in property that lies within highway corridors without obtaining full title of the land. Usually, easements are far less expensive than fee title acquisitions.

4.7 Traffic Impact Studies

As growth occurs throughout the City, the City will evaluate the impacts of proposed developments on the surrounding transportation networks prior to giving approval to build. This will be accomplished by requiring that a Traffic Impact Study (TIS) be performed for any development in the City based on City staff recommendations. A TIS will allow the City to determine the site specific impacts of a development including internal site circulation, access issues, and adjacent roadway and intersection impacts. In addition, a TIS will assist in defining possible impacts to the overall transportation system in the vicinity of the development. The area and items to be evaluated in a TIS include key intersections and roads as determined by the City Engineer on a case by case basis. Other items that should be included in a TIS include:

- A description of the project site and study area boundaries including a site plan and study area map showing the proposed project access locations and connections to the adjacent road network.
- A description of existing and proposed land uses within the study area including a discussion of the project land use.
- A description of existing and proposed key roadways and intersections in the study area including lane configurations and traffic controls.
- A discussion of trip generation, distribution, and assignment methodologies and assumptions.
- A level of service (LOS) and capacity analysis of existing traffic levels and conditions for key roadway segments and intersections.
- A LOS and capacity analysis of background traffic levels and conditions (existing traffic plus additional traffic projected from normal growth rates and from other known developments in the study area at the time of completion) for key roadway segments and intersections.
- A LOS and capacity analysis of background plus project traffic levels and conditions (background traffic plus projected traffic associated with the proposed project) for key roadway segments and intersections.

- A safety analysis for key roadways and intersections including applicable accident histories.
- Any applicable yield sign, stop sign, multi-way stop signs, and traffic signal warrant analyses.
- A determination of the street system's ability to accommodate projected traffic levels.
- An identification of impacts to the existing street system as a result of the project.
- A discussion of improvements to be implemented as part of the project to accommodate project traffic such as roadway and intersection widening to provide exclusive turn lanes or modifications to traffic controls.
- A discussion of mitigation measures to be implemented to restore or improve traffic operations to an acceptable LOS on any key roadway segments or at key intersections within the study area.

Each TIS will be conducted by a qualified Traffic Engineer chosen by the City at the developer cost. The City Engineer will determine the scope of each TIS, based on the UDOT Traffic Impact Study Requirements found in the appendix of this report, and will review its contents once complete and provide comments. Upon receiving approval from the City Engineer, the TIS requirement related to the development will be satisfied. If a developer feels that his or her project does not meet the requirements to have a TIS completed, then the developer will need to provide documentation stating his or her case which will be reviewed by the City Engineer.

4.8 Agency Coordination

As many of the roads in Saratoga Springs City are either owned by or connect into roads that are owned by other agencies such as UDOT, neighboring cities, and Utah County, a close working relationship should be maintained between these different jurisdictions and the City to ensure that roadway projects are not only coordinated but consistent.

4.9 Planned Roadway Improvements

A number of roadway improvements have been recommended to occur between now and the year 2040. These recommendations are based on travel demand volume predictions and available capacity of each roadway. Each of these improvements should be implemented as a result of increasing traffic volumes due to future development. **Table 4-2** outlines these recommended improvements. This table will be regularly updated by the City as plans for development change and become adopted.

Table 4-2 Saratoga Springs City Recommended Transportation Improvements

Type of Improvement	Roadway or Location	Future Functional Type	From	To
Future Interchange	Pony Express/MVC	Diamond		
Future Interchange	1000 South/Foothill Parkway	Diamond		
Future Interchange	MVC/800 North	Diamond		
Future	MVC/SR-73/Pioneer	System to System		

Type of Improvement	Roadway or Location	Future Functional Type	From	To
Interchange	Extension			
Future Interchange	MVC/Hidden Valley	System to System		
New Alignment	Stillwater Dr	Collector	Existing Road	Bonneville Local Road
New Alignment	Wildlife Blvd	Collector	Existing Road	New Parkway
New Alignment	Lariat Blvd	Collector	Existing Road	Existing Road
New Alignment	Bonneville Collector	Collector	Pony Express Pkwy	Bonneville Local Road
New Alignment	400 North	Collector	Redwood Road	New Jordan River Collector
New Alignment	West Side Collector	Collector	SR-73	Pony Express Pkwy
New Alignment	Commerce Dr Southwest	Collector	SR-73	New Minor Arterial
New Alignment	200 West	Collector	Pony Express Pkwy	Approx. 1000 South
New Alignment	600 West	Collector	Pony Express Pkwy	Approx. 1000 South
New Alignment	600 North	Collector	800 West	West Side Collector
New Alignment	400 West	Collector	1200 North	Redwood Road
New Alignment	800 West	Collector	SR-73	Harvest Hills Blvd
New Alignment	1000 South	Collector	Bonneville Collector	Foothill Parkway
New Alignment	1100 South	Collector	Foothill Parkway	Redwood Road
New Alignment	South Collector	Collector	Redwood Road	Bonneville Local Road
New Alignment	600 South	Collector	Redwood Road	Saratoga Road
New Alignment	2900 West	Collector	Saratoga Road	Pioneer Crossing
New Alignment	Harvest Hills Blvd	Collector	Redwood Road	East City Limits
New Alignment	400 South	Collector	Redwood Road	West City Limits
New Alignment	Jordan River Collector	Collector	600 South	SR-73
New Alignment	South Collector	Collector	Redwood Road	Foothill Parkway
New Alignment	1200 South	Collector	Foothill Parkway	Redwood Road
New Alignment	Village Parkway	Collector	Existing Road	Foothill Parkway
New Alignment	Grandview Blvd	Collector	Existing Road	Bonneville Local Road
New Alignment	7750 North	Collector	Existing Road	2600 West
New Alignment	SR-73 Connector	Collector	Pioneer Crossing Extension	800 West

Type of Improvement	Roadway or Location	Future Functional Type	From	To
New Alignment	Hillside Drive	Collector	SR-73	New Arterial
New Alignment	2100 North	Freeway	MVC Freeway	East City Limits
New Alignment	MVC	Freeway	Hidden Valley	North City Limits
New Alignment	Hidden Valley	Freeway	MVC	West City Limits
New Alignment	1000 South	Major Arterial	Foothill Parkway	Redwood Road
New Alignment	SR-73	Major Arterial	Commerce Road (West)	Pioneer Crossing Extension
New Alignment	New Pony Express Pkwy	Major Arterial	Pony Express Pkwy	Saratoga Road
New Alignment	800 North	Minor Arterial	MVC Freeway	Redwood Road
New Alignment	2000 North Arterial	Minor Arterial	SR-73	West City Limits
New Alignment	MVC	Parkway	Hidden Valley	Redwood Road
New Alignment	Pioneer Crossing Extension	Principal Arterial	Redwood Road	MVC Freeway
New Signal	800 North/Pioneer Extension			
New Signal	SR-73/Pioneer Extension			
New Signal	Redwood/Pony Express			
New Signal	Redwood/Commerce Dr South			
New Signal	New Pony Express/Pony Express			
New Signal	Redwood/600 South			
New Signal	New Pony Express/200 West			
New Signal	Pony Express/200 West			
New Signal	New Pony Express/600 West			
New Signal	Pony Express/800 West			
New Signal	Redwood/Grandview			
New Signal	Redwood/Foothill Parkway			
New Signal	Redwood/South Collector			
New Signal	Redwood/Village			
New Signal	Redwood/Lariat			
New Signal	SR-73/Riverside			

Type of Improvement	Roadway or Location	Future Functional Type	From	To
New Signal	Pioneer/Jordan Collector			
New Signal	Pioneer/2600 West			
New Signal	Harvest Hills/2000 N Arterial			
New Signal	SR-73 Connector/1200 North			
New Signal	Redwood/1000 North			
New Signal	Saratoga/400 East			
New Signal	Saratoga/2300 West			
New Signal	Saratoga/2500 West			
New Signal	Saratoga/1600 West			
New Signal	Saratoga/1000 West			
Widening	400 North	Collector	800 West	Redwood Road
Widening	Pony Express Parkway	Collector	800 West	Redwood Road
Widening	1200 North	Collector	Redwood Road	New SR-73 Alignment
Widening	1200 North	Collector	SR-73	800 West
Widening	2300 West	Collector	Saratoga Road	7750 North
Widening	7750 North	Collector	2600 West	2300 West
Widening	400 South	Collector	Redwood Road	New Collector
Widening	Riverside Drive	Collector	SR-73	North City Limit
Widening	1700 West	Collector	Saratoga Road	North City Limit
Widening	SR-73	Freeway	New MVC	West City Limits
Widening	Redwood Road	Major Arterial	Grandview Blvd	South City Limits
Widening	SR-73	Major Arterial	Commerce Road (East)	East City Limits
Widening	Pony Express Parkway	Major Arterial	800 West	West City Limits
Widening	Saratoga Road	Major Arterial	Jordan River	East City Limits
Widening	Redwood Road	Principal Arterial	North City Limits	Grandview Blvd
Widening	Pioneer Crossing	Principal Arterial	Redwood Road	East City Limits

4.10 Special Considerations

A few specific locations on Saratoga Springs City's street network may require some unique improvements to resolve traffic issues at these sites. These areas are identified below along with the unique characteristics of each location.

4.10.1 Mountain View Corridor (2100 North to 400 South)

Mountain View Corridor from 2100 North to 400 South runs through a substantial portion of property managed by Suburban Land Reserve, Inc. (SLR). SLR has in place a development agreement for their property in the City and has been involved in the transportation planning process as it pertains to their property. The Mountain View Corridor extension is proposed on the MAG 2020-2040 metropolitan transportation plan as part of phase 3 (2031-2040). The facility is expected to be a full freeway facility with appropriate design guidelines and interchange spacing as recommended by UDOTs access management standards. This project will need extensive environmental clearance and the City will need to coordinate with UDOT when it comes time to begin that process. It is likely that the Mountain View Corridor extension will include six, 12' wide travel lanes, three in each direction with appropriate shoulders and clearance zones. The facility will probably be posted at 65 mph consistent with other freeway facilities in the valley and the northern portion of Mountain View Corridor. It is expected that Mountain View Corridor will carry 38,000 vehicles per day in 2040. This roadway has been studied multiple times over the past few years by MAG. Three of these studies are listed below and can be accessed online at the following locations:

- MAG West Lake Vision Study
  http://mountainland.org/site/articles/view/1232
- Lake Mountain Transportation Study
  http://mountainland.org/site/articles/view/1220
- Utah County East-West Study
  http://mountainland.org/site/articles/view/1231

As an option, one-way frontage roads with slip ramps providing freeway access may be considered as an alternative to traditional diamond interchanges. This alternative will provide greater exposure to commercial development along the freeway corridor and allow for commercial strips along the length of the freeway rather than large commercial nodes at just the freeway interchanges. Another advantage of this concept has been exhibited on the Salt Lake County portion of Mountain View Corridor. This section has been phased to build the frontage road system (currently under construction) before the freeway portion is constructed. The frontage roads provide enough capacity for the immediate needs and allow for development adjacent to the corridor while also reserving enough right-of-way for the freeway section to be constructed when traffic volumes justify it in the future. **Figure 4-7** gives an example of Mountain View Corridor in Salt Lake Count and represents an idea of how the MVC extension may look in Saratoga Springs. It is anticipates that this cross-section can be constructed within a 300 foot right-of-way. The initial construction phase could include only the one-way frontage roads show in the initial construction picture. These frontage roads will accommodate near term growth and move traffic up and down the corridor for the short term. As development and population increases, the freeway section of the roadway could be completed in the preserved right-of-way between the frontage roads as shown in the full freeway build-out example.

Figure 4-7 Mountain View Corridor Extension Example

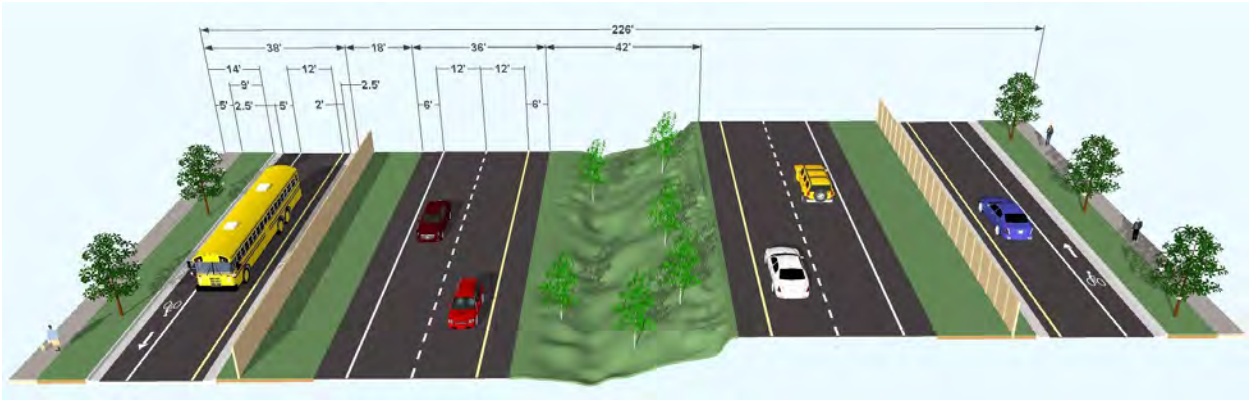
4.10.2 Foothill Parkway (400 South to Redwood Road)

Foothill Parkway from 400 South to Redwood Road will be part of the UDOT Mountain View Corridor expansion expected before 2040. The City has expressed a desire to build this facility as a 4 lane Parkway similar in design and functionality to Legacy Parkway in Davis County. The City is also planning

a frontage road system that will parallel the parkway and will allow the MVC extension to be access controlled with interchanges rather than signals. Foothill Parkway will likely be posted at 55mph. It is expected that the Foothill Parkway will carry 35,000 vehicles per day in 2040.

An important feature of the Foothill Parkway is the frontage road system. As discussed previously a one-way frontage system would allow for a strip type commercial area along the corridor rather than a node at traffic signals. This allows for commercial rather than residential land uses to be zoned immediately adjacent to what will become a major traffic facility. Also, it provides the opportunity of constructing the frontage roads to address short term capacity needs before traffic volumes dictate that the Parkway section be constructed. **Figure 4-8** shows a conceptual cross-section for the Foothill Parkway. The conceptual cross-section shows the frontage road system, which provides a buffer between the Parkway and adjacent land uses. There is also a large landscaped median intended not only to separate opposing traffic but also to provide room for capacity improvements should they be needed beyond the design year of this document.

Figure 4-8 Foothill Parkway Cross-Section



4.10.3 Hidden Valley Freeway

As population increases in Saratoga Springs and also in Eagle Mountain, the need for greater east-west mobility through the area will increase rapidly. Two major east-west facilities are planned in the TMP, the Hidden Valley Freeway and the SR-73 freeway. The preferred order of construction for these two projects is that the Hidden Valley Freeway will be constructed first as part of the Mountain View Corridor Extension. The SR-73 project will then follow as population and development dictates. It is expected that the Hidden Valley Freeway will carry 28,000 vehicles per day in 2040.

The Hidden Valley Freeway is intended as a limited access freeway facility connecting Eagle Mountain with Saratoga Springs. A system to system interchange will connect Hidden Valley Freeway with Mountain View Corridor at approximately 400 South. The Hidden Valley Freeway will likely be posted at 55mph due to topographic restrictions but will be access controlled like other freeway facilities in the county with appropriate interchange spacing in compliance with UDOT standards. **Figure 4-9** shows one alternative alignment and a cross section for the Hidden Valley Freeway. This conceptual plan does not

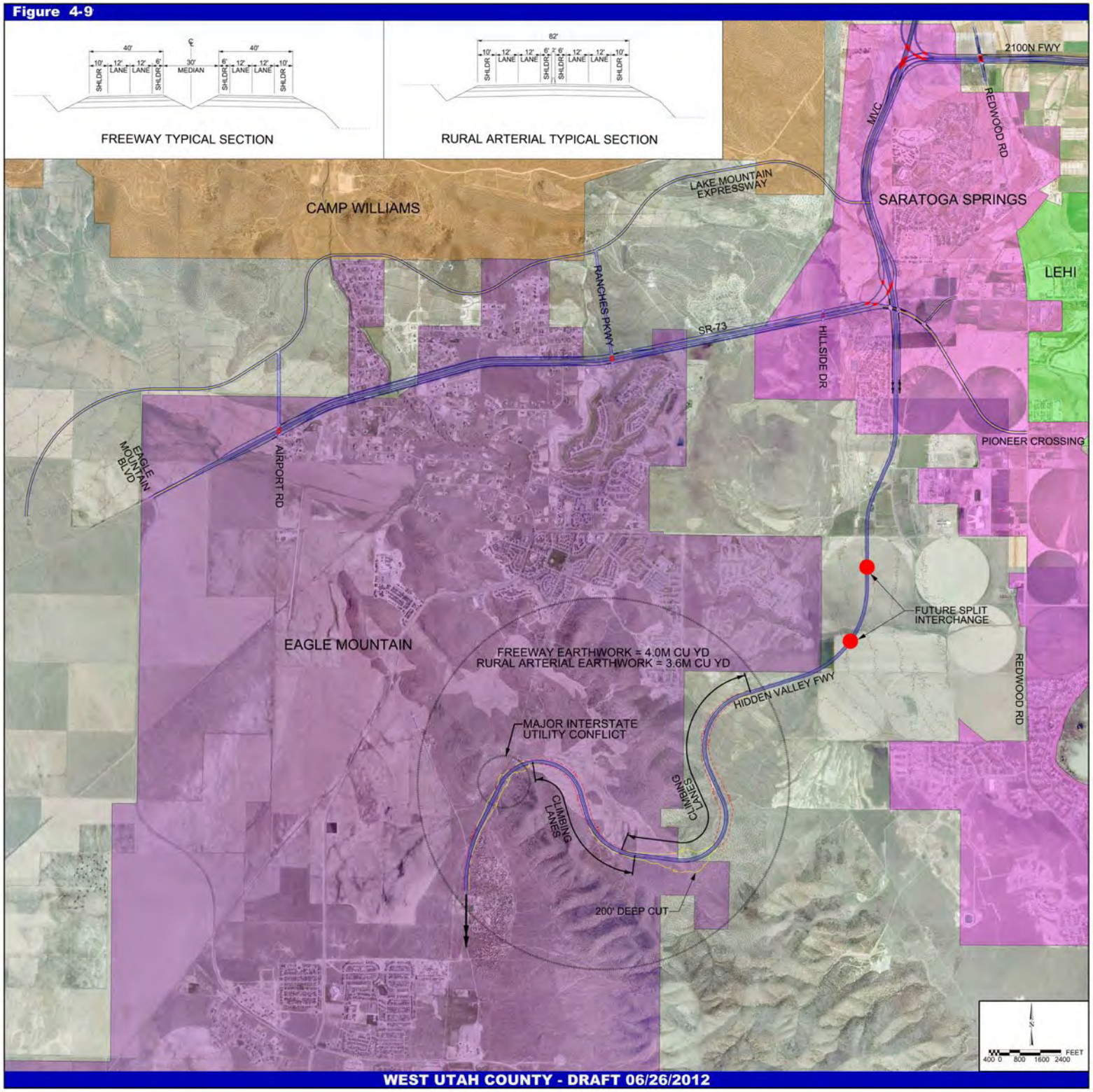
include Foothill Parkway extension although the Foothill Parkway facility would still be required as shown on the Transportation Master Plan map (**Figure 3-3**).

4.10.4 SR-73

SR-73 will eventually need to be converted to a six lane freeway facility. This improvement is a capacity improvement to east-west movement through the City. SR-73 is currently being widened from two lanes to four lanes in sections between Saratoga Springs and Eagle Mountain. Upgrading the section of roadway from the future Mountain View Corridor to approximately Ranches Parkway in Eagle Mountain is a long term planning project. Substantial environmental clearance will likely be required and it is recommended that this project be considered after the completion of the Hidden Valley Freeway. It is expected that SR-73 will carry 85,000 vehicles per day in 2040.

SR-73 has not been rigorously access controlled in the past as it was classified as a two lane rural highway. The rapid population growth in the area in recent years has necessitated and will continue to demand stricter access control. As such, many of the access points that currently exist may need to be cut off from the roadway. A potential mitigation to the removal of these access points would be to again construct a frontage road system or Collector-Distributor (C-D) road system paralleling the freeway. This would, as in the other cases previously discussed, provide greater access to properties adjacent to SR-73, provide a buffer between the freeway and adjacent land uses, and eliminate the need for large footprint interchanges by providing access via slip ramps.

Figure 4-9



WEST UTAH COUNTY - DRAFT 06/26/2012

5.0 Potential Funding Sources

Funding sources for transportation are essential if Saratoga Springs City recommended improvements are to be built. Presently there are four main sources of revenue available to Saratoga Springs City: federal funding, state funding, local general funding, and impact fees. The following paragraphs further describe these various transportation funding sources available to the City.

5.1 Federal Funding

Federal monies are available to cities and counties through the federal-aid program. The funds are administered by the Utah Department of Transportation (UDOT). In order to be eligible, a project must be listed on the five-year Statewide Transportation Improvement Program (STIP).

The Surface Transportation Program (STP) funds projects for any roadway with a functional classification of a collector street or higher as established on the Utah State Functional Classification Map (**Figure 5-1**). STP funds can be used for both rehabilitation and new construction. The Joint Highway Committee programs a portion of the STP funds for projects around the State in urban areas. Another portion of the STP funds can be used for projects in any area of the State at the discretion of the State Transportation Commission. Transportation Enhancement funds are allocated based on a competitive application process. The Transportation Enhancement Committee reviews the applications and then a portion of those are passed to the State Transportation Commission. Transportation enhancements include 12 categories ranging from historic preservation, bicycle and pedestrian facilities, and water runoff mitigation. Other federal and state trails funds are available from the Utah State Parks and Recreation Program.

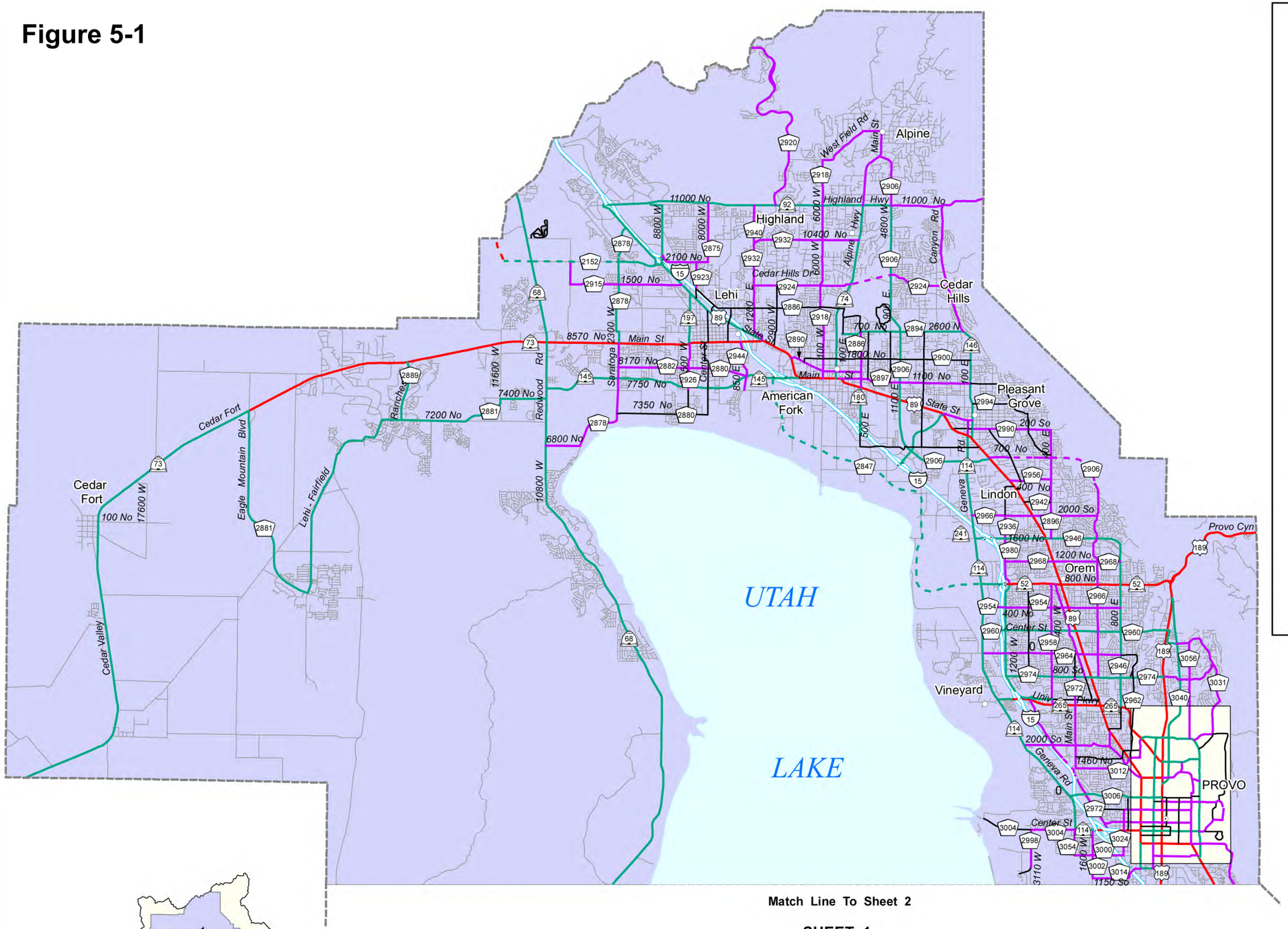
MAG accepts applications for federal funds through local and regional government jurisdictions. Transportation related projects are selected for funding every two years by the MAG Technical Advisory and Regional Planning committees. The selected projects form the Transportation Improvement Program (TIP). In order to receive funding, projects should include one or more of the following aspects:

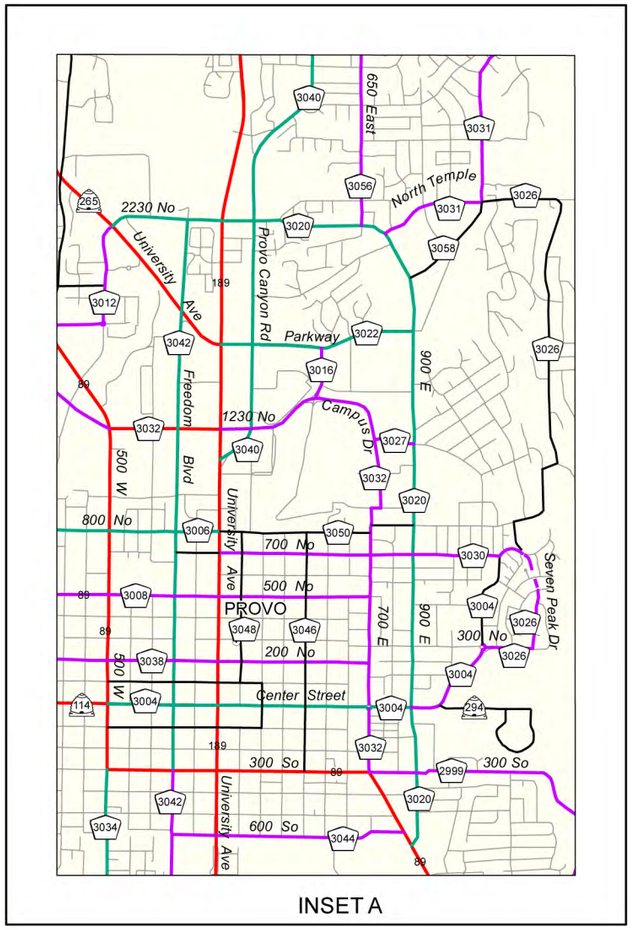
Congestion Relief – spot improvement projects intended to improve Levels of Service and/or reduce average delay along those corridors identified in the Regional Transportation Plan as high congestion areas.

- Mode Choice – projects improving the diversity and/or usefulness of travel mode other than single occupant vehicles.
- Air Quality Improvements – projects showing demonstrable air quality benefits.
- Safety – improvements to vehicular, pedestrian, and bicyclist safety.

In the most recent TIP selection process (May 2012), Saratoga Springs City applied and were awarded funding for two projects, the Utah Lakeshore Trail and Pony Express Parkway widening projects. The combined funding for these two projects exceeded $2 Million dollars and represents a concerted effort on the part of City staff and collaborating consultants to procure this funding.

Figure 5-1





INSET A

Match Line To Sheet 2

SHEET 1

Utah County

PROVO - OREM URBAN AREA FUNCTIONAL CLASS SYSTEM

Utah County, Utah

- Interstate
- Other Principal Arterial
- Minor Arterial
- Collector
- Local
- Federal Aid Urban Area Boundary

NOTE: Dashed lines indicate proposed routes

Scale

0 1 2 4 Miles

UDOT: Cartography Section

Approved 2005/ Technical Correction thru 3/1/11

5.2 State Funding

The distribution of State Class B and C Program monies is established by State Legislation and is administered by the State Department of Transportation. Revenues for the program are derived from State fuel taxes, registration fees, driver license fees, inspection fees, and transportation permits. Seventy-five percent of these funds are kept by UDOT for their construction and maintenance programs. The rest is made available to counties and cities. As many of the roads in Saratoga Springs, it is in the interests of the City that staff be aware of the procedures used by UDOT to allocate those funds and to be active in requesting the funds be made available for UDOT owned roadways in the City.

Class B and C funds are allocated to each city and county by a formula based on population, road mileage, and land area. Class B funds are given to counties, and Class C funds are given to cities and towns. Class B and C funds can be used for maintenance and construction projects; however, thirty percent of those funds must be used for construction or maintenance projects that exceed $40,000. The remainder of these funds can be used for matching federal funds or to pay the principal, interest, premiums, and reserves for issued bonds.

5.3 Local Funding

Most cities utilize general fund revenues for their transportation programs. Another option for transportation funding includes the creation of special improvement districts. These districts are organized for the purpose of funding a single specific project that benefits an identifiable group of properties. Another source of funding used by cities includes revenue bonding for projects felt to benefit the entire community.

Private interests often provide resources for transportation improvements. Developers construct the local streets within subdivisions and often dedicate right-of-way and participate in the construction of collector/arterial streets adjacent to their developments. Developers can also be considered a possible source of funds for projects through the use of impact fees. These fees are assessed as a result of the impacts a particular development will have on the surrounding roadway system, such as the need for traffic signals or street widening.

5.4 Impact Fees

Impact fees are a way for a community to obtain funds to assist in the construction of infrastructure improvements resulting from and needed to serve new growth. The premise behind impact fees is that if no new development occurred, the existing infrastructure would be adequate. Therefore, new developments should pay for the portion of required improvements that result from new growth. Impact fees are assessed for many types of infrastructure and facilities that are provided by a community, such as roadway facilities. According to state law, impact fees can only be used to fund growth related system improvements

To help fund needed roadway improvements, impact fees should be established. These fees are collected from new developments in the City to help pay for improvements that are needed to the

roadway system due to growth. At the culmination of the Transportation Master Planning process, a citywide IFFP will be developed according to state law to determine the appropriate impact fee values for the City.

Appendix

Meeting Schedule

The Planning Commission and City Council held a series of Joint Work Session Meetings to discuss the General Plan, including the Land-Use Element, Land-Use Map, and Transportation Map. These meetings occurred on January 24th and 31st, 2012, February 16th and 21st, 2012, and March 1st, 8th and 14th, 2012. Each meeting agenda was published and posted, and property owners as well as residents were allowed to attend and provide input.

On March 29th, 2012 the Planning Commission held a public hearing on this item and forwarded a positive recommendation to the City Council. Council Adopted the TMP map on April 17th.

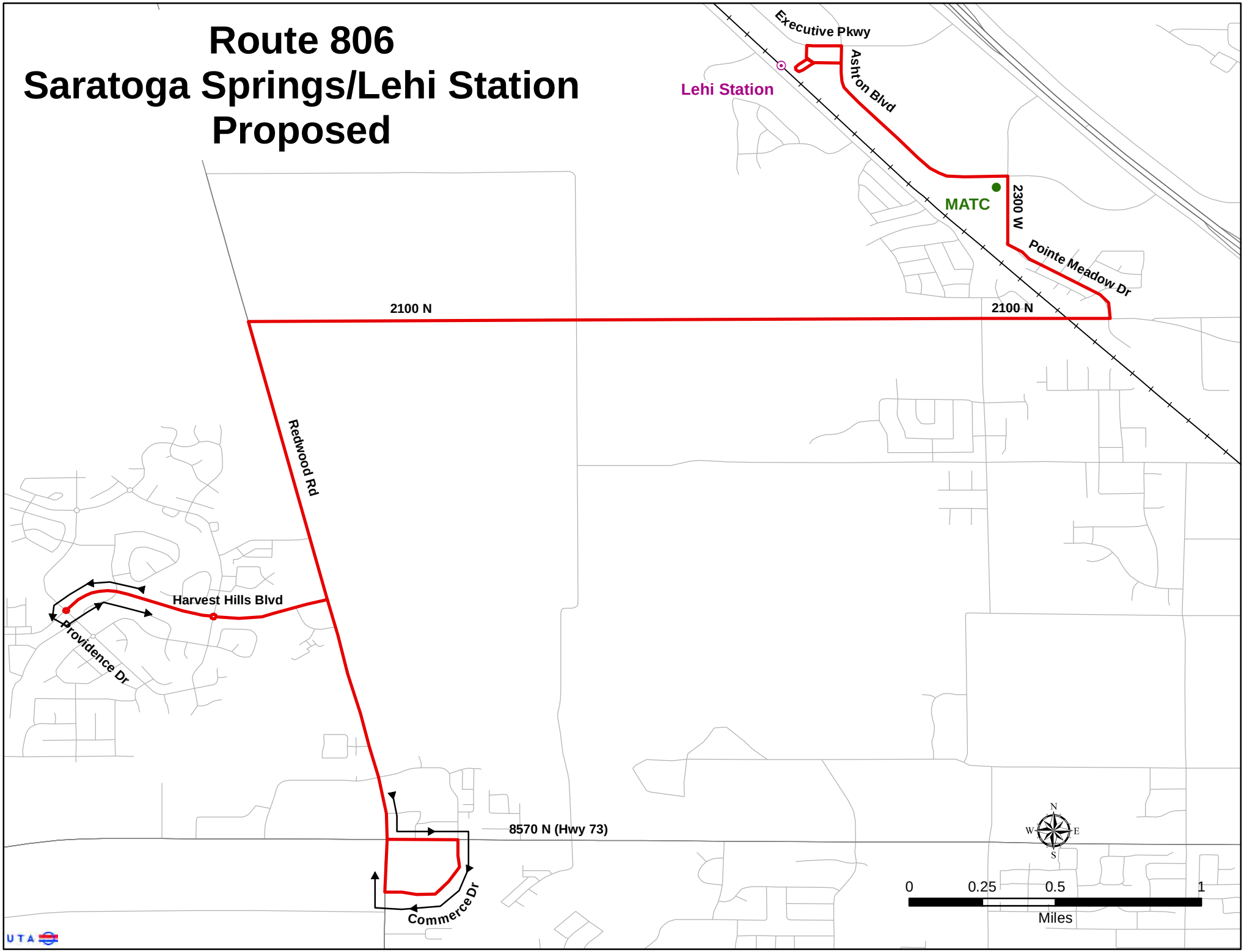
The work sessions for the Transportation element of the general plan were held on August 21st for City Council and August 23rd, for Planning Commission. PC will voted on August 23rd and sent a positive recommendation to City Council who adopted the transportation element of the general plan on September 4th.

Meetings were held with land holders and adjacent municipalities to discuss the transportation element of the general plan and solicit feedback on the following days:

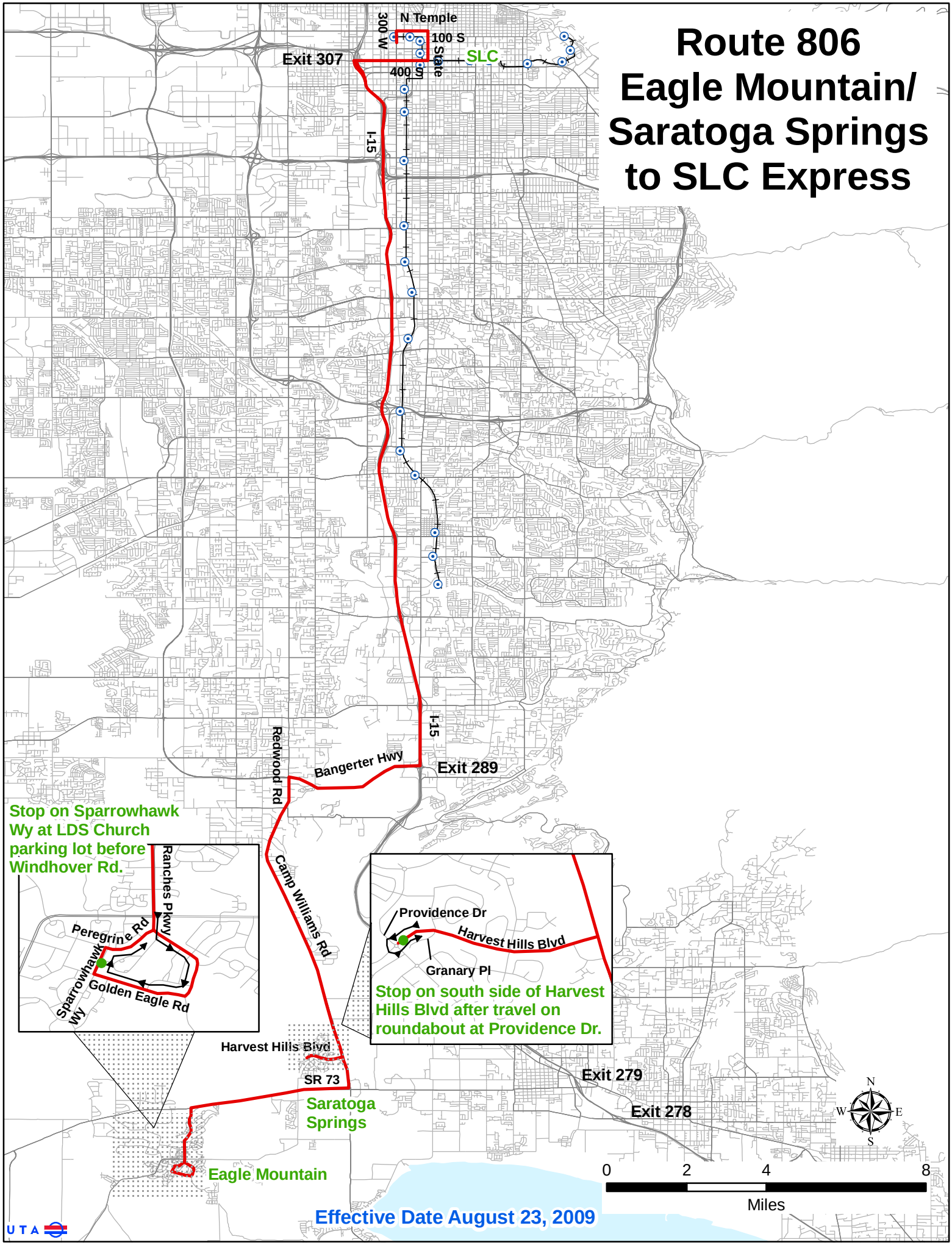
- Ray Whitchurch; IBI Group - April 3rd 2012
- Ron Phillips, Ari Bruening, Jesse Fairbanks, Robert Grow, Warren Peterson; FLR – March 23rd 2012
- Shane Marshall; UDOT Region 3 – March 23rd 2012
- Bart Cima, Scott Bolton; IBI Group – March 21st 2012
- Chris Trusty, Steve Mumford; Eagle Mountain City – March 22nd 2012
- Lorin Powell; Lehi City – March 21st 2012

In addition, Horrocks Engineers met regularly with City Staff to discuss the transportation element of the general plan and address comments or concerns.

Route 806
Saratoga Springs/Lehi Station
Proposed



Route 806 Eagle Mountain/ Saratoga Springs to SLC Express



128514

COOPERATIVE AGREEMENT
Transfer of SR-73 to S-0073(24)36
Saratoga Springs City Jurisdiction
SARATOGA SPRINGS CITY
Federal ID No. 87-0575087 71387

15719

COOPERATIVE AGREEMENT

THIS COOPERATIVE AGREEMENT, made and entered into this 30 day of Nov, 2011 by and between the **UTAH DEPARTMENT OF TRANSPORTATION**, hereinafter referred to as **"UDOT,"** and **SARATOGA SPRINGS CITY**, a municipal corporation of the State of Utah created, hereinafter referred to as the **"CITY"**,

RECITALS

WHEREAS, UDOT desires to transfer ownership and full jurisdiction of a portion of SR-73 in Saratoga Springs to the **CITY**, beginning at SR-68 (Redwood Road) and ending at the West side of the Jordan River, the City of Saratoga Springs East City Limits a distance of 0.571 + miles; and

THIS COOPERATIVE AGREEMENT is written to set out the terms and conditions under which the jurisdictional transfer shall be performed.

NOW, THEREFORE, it is agreed by and between the parties hereto as follows:

1. **UDOT** agrees to release payment in the form of a **ONE TIME LUMP SUM AMOUNT OF $27,700.00** equal to the equivalent of one (1) year of **UDOT's** maintenance and pavement preservation budget. The noted funds will be forwarded to the **CITY** at the time of jurisdictional transfer to be used at the **CITY's** discretion.

TOTAL ESTIMATED COST TO UDOT $27,700.00

2. **UDOT** further agrees to provide snow removal for SR-73 through the winter season of 2011-2012. All snow removal services will cease upon the end of season 2012. Beginning 2012-2013, all snow removal services for SR-73 will become the sole responsibility of the **CITY.** All other operations and maintenance responsibilities, services, needs and costs become the sole responsibility of the **CITY** effective upon the execution of the jurisdictional transfer. **CITY** agrees to assume ownership and all maintenance responsibilities associated with the above noted route and to relieve **UDOT** from any and all maintenance responsibilities and liability associated with said maintenance.

3. **UDOT** further agrees to continue to maintain the traffic signal located at the intersection of SR-73 and SR-68. **UDOT** further agrees to maintain the existing traffic signal located at SR-73 and East Commerce Drive until Dec. 15, 2015. The street lighting at this location will continue to be owned and maintained by the **CITY** as those responsibilities are currently defined.

COOPERATIVE AGREEMENT
Transfer of SR-73 to
Saratoga Springs City Jurisdiction
SARATOGA SPRINGS CITY
Federal ID No. 87-0575087

IN WITNESS WHEREOF, the parties hereto have caused these presents to be executed by their duly authorized officers as of the day and year first above written.

SARATOGA SPRINGS CITY, STATE OF UTAH

Mayor,
Saratoga Springs City

Saratoga Springs City Clerk

Date: November 23, 2011

UTAH DEPARTMENT OF TRANSPORTATION

Executive Director
Utah Department of Transportation

UDOT Secretary

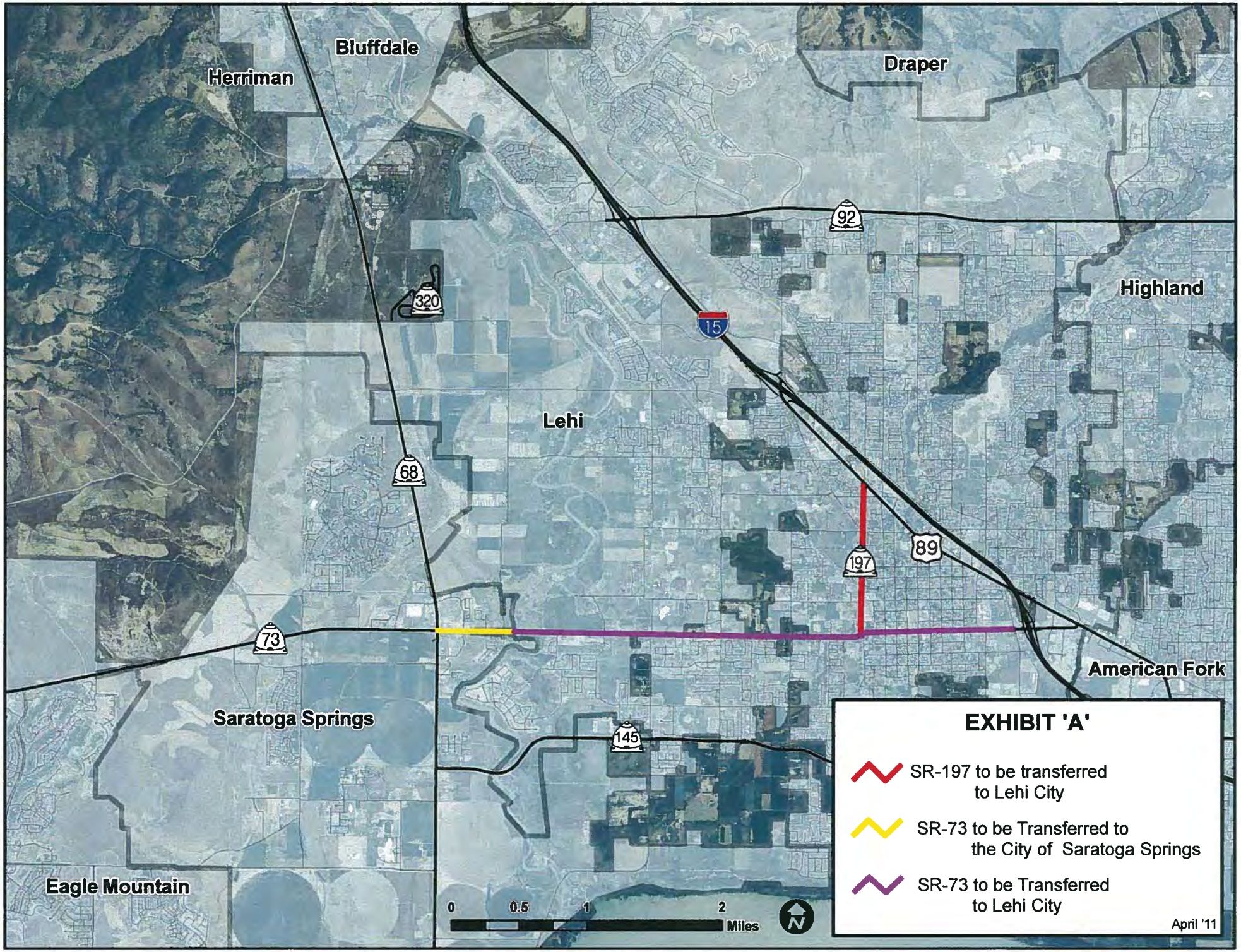
Date: _____

COMPTROLLER OFFICE

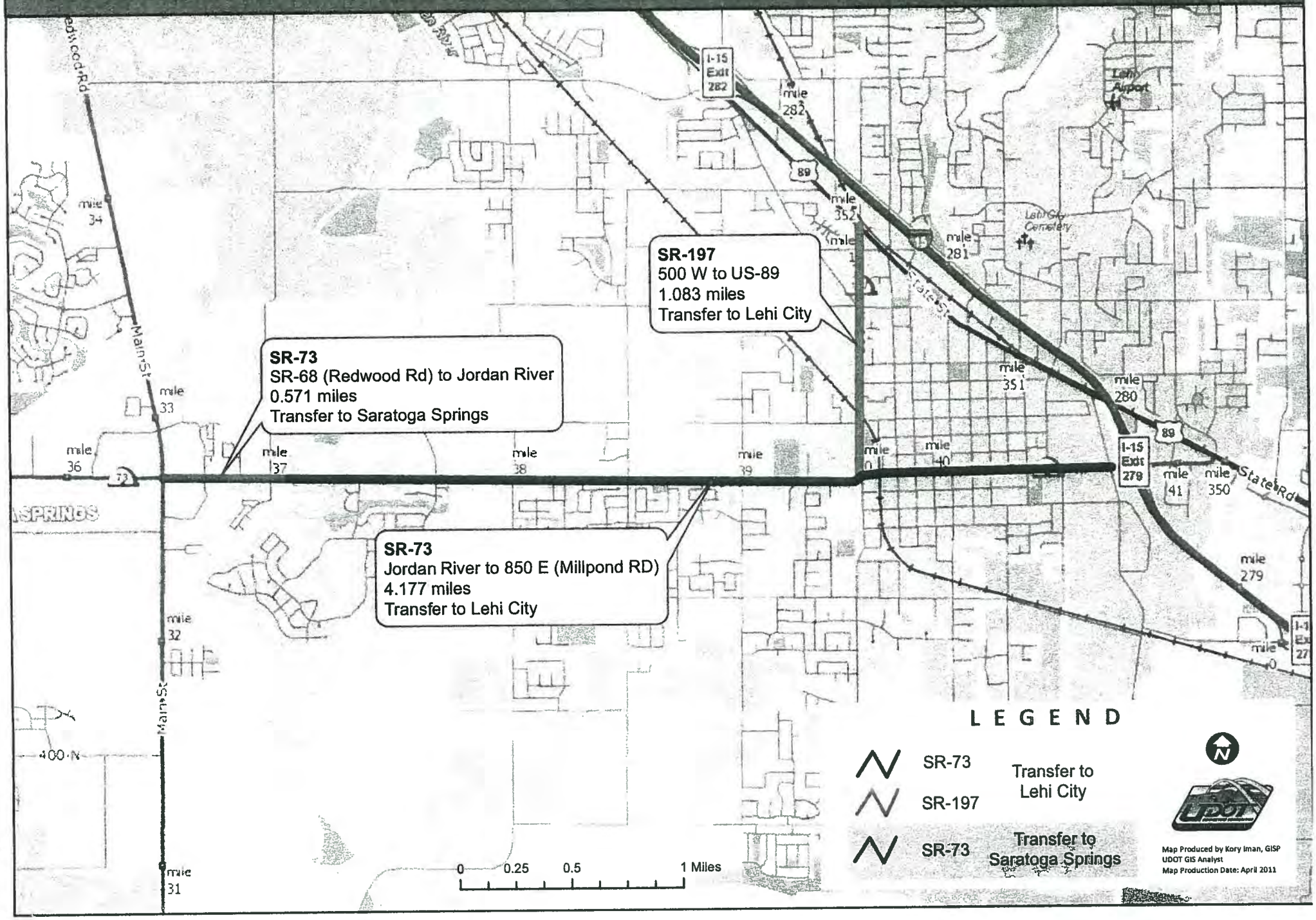
Contract Administrator

Date: 12-21-11

J11-048-SR-73 transfer Saratoga


Bluffdale
Herriman
Draper
Highland
Lehi
American Fork
Saratoga Springs
Eagle Mountain
92
320
15
68
197
89
73
145
0
0.5
1
2
Miles
N
EXHIBIT 'A'
SR-197 to be transferred to Lehi City
SR-73 to be Transferred to the City of Saratoga Springs
SR-73 to be Transferred to Lehi City
April '11

JURISDICTIONAL TRANSFER OF SR-73 & SR-197



2009-243

Corridor Preservation along Pioneer Crossing Road
from SR-68 to US-89
CITY OF SARATOGA SPRINGS
Federal ID No. 870575087
LEHI CITY
Federal ID No. 876000240
AMERICAN FORK CITY
Federal ID No. 876000209
UTAH COUNTY
Federal ID No. 876000312

098907

COOPERATIVE AGREEMENT

10610

THIS COOPERATIVE AGREEMENT, made and entered into this 12th day of May, 20 09, by and between the **UTAH DEPARTMENT OF TRANSPORTATION**, hereinafter referred to as **"UDOT"** and **CITY OF SARATOGA SPRINGS, LEHI CITY, AMERICAN FORK CITY**, and **UTAH COUNTY**, all of which are Municipal Corporations in the State of Utah, hereinafter referred to as the **"LOCAL AGENCY"**,

WITNESSETH:

WHEREAS, the parties hereto desire to establish and preserve a corridor along the proposed Pioneer Crossing Road alignment from SR-68 in Saratoga Springs to US-89 in American Fork City, Utah County, to facilitate traffic flow, to be in accordance with each **LOCAL AGENCY's** current Transportation Plan, and to be in accordance with **UDOT**'s Access Management Standards and practices. See attached map of Pioneer Crossing Road.

NOW THEREFORE, it is agreed by and between the parties hereto as follows:

1. The following intersections are identified as existing, proposed, or future traffic signal locations along Pioneer Crossing Road within the respective city limits or within Utah County:

- SR-68 (Saratoga Springs) (Proposed)
- 300 East approx. (Saratoga Springs)/ 10400 West approx. (County) (Proposed)
- 3400 West approx. (Lehi) (Proposed)
- 2300 West (Lehi)/9550 West (County) (Proposed)
- 1700 West (Lehi)/9150 West (County) (Proposed)
- 1100 West (Lehi)/8730 West (County) (Proposed)
- 500 West (Lehi)/8350 West (County) (Proposed)
- Center St. (Lehi)/8000 West (County) (Proposed)
- 300 East (Lehi) (Proposed)
- 600 East approx. (Lehi) (Future)
- 850 East/Mill Pond Road (Lehi) (Proposed)
- Vineyard Connector (American Fork) (Proposed)

- Interstate 15 SB ramps (American Fork) (Existing to be modified)
- Interstate 15 NB ramps (American Fork) (Existing to be modified)
- 600 West (American Fork) (Proposed)
- US-89 (American Fork) (Existing)

The intersections of SR-68, 1700 West, and 850 East have been identified in the Pioneer Crossing Traffic Study as locations where traffic signals will be built as part of the project, even though they have not been warranted by the normal warranting process.

The intersection of 300 East will be eliminated when the future 600 East (approx.) intersection is constructed. If there is a traffic signal at the 300 East intersection, it will be "relocated" to 600 East (approx.).

2. Proposed traffic signals listed in #1 above except for SR-68, 1700 West, and 850 East will not be installed until warranted by **UDOT**. No other access to Pioneer Crossing Road will be allowed except for the existing UTA Park and Ride facility in the northeast quadrant of the I-15/Pioneer Crossing Road interchange. This access will become a permanent right in/out only access during construction. It is understood that it may be necessary to restrict certain types of traffic movements at any intersection in order to maintain traffic flow and improve safety through the corridor as agreed upon by the parties hereto.

3. A **UDOT** Highway Access Management Standards Category 3 is established for this corridor with modifications as follows: Minimum traffic signal spacing is 2,640 feet except as noted in #1 above. All of the intersections listed above shall be prepared for signalization during construction of Pioneer Crossing Road, consisting of underground conduit and junction boxes, and may be opened to traffic without signalization.

4. Pioneer Crossing Road is hereby designated as a Limited Access facility.

5. The parties hereto shall consider the concepts contained herein during the development of any master plans in this area and work towards the common goal of this Agreement.

6. In the event there are changes in the concepts or provisions covered by this Agreement, a modification to this Agreement approved in writing by both parties hereto is required to place them in effect.

Corridor Preservation along Pioneer Crossing Road
from SR-68 to US-89
CITY OF SARATOGA SPRINGS
Federal ID No. 870575087
LEHI CITY
Federal ID No. 876000240
AMERICAN FORK CITY
Federal ID No. 876000209
UTAH COUNTY
Federal ID No. 876000312

IN WITNESS WHEREOF, the parties hereto have caused these presents to be executed by their duly authorized officers as of the day and year first above written.

ATTEST:

By: _____
Title: RECORDER
Date: 12/30/08

(IMPRESS SEAL)

CITY OF SARATOGA SPRINGS, a Municipal Corporation in the State of Utah

By: _____
Title: Mayor
Date: 12/30/08

ATTEST:

By: _____
Title: Recorder
Date: 1/20/09

(IMPRESS SEAL)

LEHI CITY, a Municipal Corporation in the State of Utah

By: _____
Title: Mayor
Date: 1-20-09

ATTEST:

By: _____
Title: CITY RECORDER
Date: 4/13/09

(IMPRESS SEAL)

AMERICAN FORK CITY, a Municipal Corporation in the State of Utah

By: _____
Title: Mayor
Date: 4/13/09

Corridor Preservation along Pioneer Crossing Road
from SR-68 to US-89
CITY OF SARATOGA SPRINGS
Federal ID No. 870575087
LEHI CITY
Federal ID No. 876000240
AMERICAN FORK CITY
Federal ID No. 876000209
UTAH COUNTY
Federal ID No. 876000312

ATTEST:

By: Linda Strickland
Title: Com Chair
Date: 5/12/09

(IMPRESS SEAL)

UTAH COUNTY, a
Municipal Corporation in the State of Utah

By:
Title: Utah County Commissioner
Date: May 12, 2009

****

RECOMMENDED FOR APPROVAL: UTAH DEPARTMENT OF TRANSPORTATION

By:
Utilities/Railroads Coordinator
Date: 5/26/09

By:
Region Director
Date: 5-26-09

APPROVED AS TO FORM:

This Form Agreement has been previously approved as to form by the office of Legal Counsel for the Utah Department of Transportation.

COMPTROLLER OFFICE

By
Contract Administrator
Date: 6/4/09

Corridor Preservation along SR-68 from
1800 North to 2600 North
LEHI CITY CORPORATION
Federal ID No. 876000240

9959

COOPERATIVE AGREEMENT

THIS AGREEMENT, made and entered into this 10th day of Feb, 20 09, by and between the **UTAH DEPARTMENT OF TRANSPORTATION**, hereinafter referred to as **"UDOT"** and **LEHI CITY**, a Municipal Corporation in the State of Utah, hereinafter referred to as the **"CITY"**,

WITNESSETH:

WHEREAS, the parties hereto desire to establish and preserve a corridor along SR-68 from 1800 North to 2600 North in Lehi City, Utah County, to facilitate traffic flow, to be in accordance with the **CITY's** Master Transportation Plan approved June 10, 2008, and to be in accordance with **UDOT**'s Access Management Standards and practices.

NOW THEREFORE, it is agreed by and between the parties hereto as follows:

1. The following locations are identified as existing, warranted/under design, or proposed traffic signal installations along SR-68 within Lehi city limits and within Saratoga Springs city limits that pertain to this agreement:

• SR-73 (Saratoga Springs)	(Existing)
• North Commerce Dr. (Saratoga Springs)	(Proposed)
• Harvest Hills Blvd. (Saratoga Springs)	(Under design)
• 1500 North (Lehi address but in Saratoga Springs)	(Proposed)
• 1900 North, approx. (Lehi)	(Proposed)
• 2100 North (Lehi)	(Proposed)
• 2350 North, approx. (Lehi)	(Proposed)
• 2600 North (Lehi)	(Under design)

2. Except for the proposed traffic signal locations, there will be no access permitted between 1900 North and 2600 North. Proposed traffic signals will not be installed until warranted by **UDOT**.

3. It is understood that it may be necessary to restrict certain types of traffic movements at any intersection or access in order to maintain traffic flow and improve safety through the corridor as agreed upon by the parties hereto. Both parties agree to the prohibition of direct access to SR-68 within Lehi's city limits.

4. Segments of the highway which are currently designated as No Access, Limited Access, or Regular Right-of-Way are unchanged by this Agreement.

5. The parties hereto shall consider the concepts contained herein during the development of any master plans in this area and work towards the common goal of this Agreement.

6. In the event there are changes in the concepts or provisions covered by this Agreement, a modification to this Agreement approved in writing by both parties hereto is required to place them in effect.

IN WITNESS WHEREOF, the parties hereto have caused these presents to be executed by their duly authorized officers as of the day and year first above written.

ATTEST:

By: Connie Ashton
Title: Recorder
Date: 1-27-09

(IMPRESS SEAL)

LEHI CITY CORPORATION, a Municipal Corporation in the State of Utah

By: Howard H. Johnson
Title: Mayor
Date: 1-27-09

****

RECOMMENDED FOR APPROVAL: UTAH DEPARTMENT OF TRANSPORTATION

By: _____
Utilities/Railroads Coordinator
Date: 2/9/09

By: _____
Region Director
Date: 2-10-09

APPROVED AS TO FORM:

This Form Agreement has been previously approved as to form by the office of Legal Counsel for the Utah Department of Transportation.

COMPTROLLER OFFICE

By Cherise Young
Contract Administrator
Date: 3/2/09

COOPERATIVE AGREEMENT

THIS COOPERATIVE AGREEMENT, made and entered into this 28th day of October, 20 08, by and between the **UTAH DEPARTMENT OF TRANSPORTATION**, hereinafter referred to as **"UDOT"** and **CITY OF SARATOGA SPRINGS**, a Municipal Corporation in the State of Utah, hereinafter referred to as the **"CITY"**,

WITNESSETH:

WHEREAS, the parties hereto desire to establish and preserve a corridor along SR-73 from 2000 West to the Jordan River in the City of Saratoga Springs, Utah County, to facilitate traffic flow, to be in accordance with the City's Transportation Master Plan adopted by ordinance 28 October 2008, and to be in accordance with UDOT's Access Management Standards and practices.

NOW THEREFORE, it is agreed by and between the parties hereto as follows:

1. The following locations are identified as existing, warranted, or proposed traffic signal installations along SR-73:

- Saratoga Parkway (1400 West) (Proposed)
- 800 West (Warranted)
- West Commerce Drive (Proposed)
- SR-68 (Existing)
- East Commerce Drive (Proposed)
- 400 East (Proposed)

The intersection of SR-73 at Foothill Blvd. is expected to be constructed as part of the Mountain View Corridor road connection with SR-73. At that time the traffic signal which will be existing at 800 West will be "relocated" to Foothill Blvd.

2. Proposed traffic signals listed in #1 above will not be installed until warranted by **UDOT**. Additional traffic signals along SR-73 are not anticipated at this time, but intersections other than those listed in #1 above may be considered on an individual basis and studied by **UDOT**. These intersections may include Hillside Drive (1200 West) and 400 West. Even if these intersections are studied and warranted in the future by **UDOT**, there is no guarantee they will be signalized. It is understood that it may be necessary to restrict certain types of traffic movements at any intersection or access in order to maintain traffic flow and improve safety through the corridor as agreed upon by the parties hereto.

3. The current **UDOT** Highway Access Management Standards Category from the west city limit to a point about 1500 feet west of SR-68 is 2, meaning minimum traffic signal spacing is 5,280 feet, minimum street spacing is 1,000 feet, and minimum access spacing is 1,000 feet. From a point about 1500 feet west of SR-68 to a point about 475 feet west of 9248 West (Lehi), the Access Management Standards Category is 4, meaning minimum traffic signal spacing of 2,640 feet, minimum street spacing is 660 feet, and minimum access spacing is 500 feet. Both parties will strive to maintain traffic signal, street, and access spacing according to the current Access Management Standards. Reasonable exceptions may be reviewed by both agencies and variances may be granted if approved by both agencies.

4. Segments of the highway which are currently designated as No Access, Limited Access, or Regular Right-of-Way are unchanged by this Agreement.

5. The parties hereto shall consider the concepts contained herein during the development of any master plans in this area and work towards the common goal of this Agreement.

6. In the event there are changes in the concepts or provisions covered by this Agreement, a modification to this Agreement approved in writing by both parties hereto is required to place them in effect.

IN WITNESS WHEREOF, the parties hereto have caused these presents to be executed by their duly authorized officers as of the day and year first above written.

ATTEST:

By: Dori Yates
Title: City Recorder
Date: 12/17/08

(IMPRESS SEAL)

CITY OF SARATOGA SPRINGS, a Municipal Corporation in the State of Utah

By: Timothy L. Parker
Title: Mayor
Date: 12/17/08

****

RECOMMENDED FOR APPROVAL: UTAH DEPARTMENT OF TRANSPORTATION

By: _____
Utilities/Railroads Coordinator

Date: 12/23/08

By: _____
Region Director

Date: 12-29-08

APPROVED AS TO FORM:

This Form Agreement has been previously approved as to form by the office of Legal Counsel for the Utah Department of Transportation.

COMPTROLLER OFFICE

By _____
Contract Administrator

Date: 1/7/09

9757

Corridor Preservation along SR-68 from
5200 South to 2600 North
CITY OF SARATOGA SPRINGS
Federal ID No. 870575087

COOPERATIVE AGREEMENT

THIS COOPERATIVE AGREEMENT, made and entered into this 28th day of October, 20 08, by and between the **UTAH DEPARTMENT OF TRANSPORTATION**, hereinafter referred to as **"UDOT"** and **CITY OF SARATOGA SPRINGS**, a Municipal Corporation in the State of Utah, hereinafter referred to as the **"CITY"**,

WITNESSETH:

WHEREAS, the parties hereto desire to establish and preserve a corridor along SR-68 from 5200 South to 2600 North in the City of Saratoga Springs, Utah County, to facilitate traffic flow, to be in accordance with the City's Transportation Master Plan adopted by ordinance 28 October 2008, and to be in accordance with UDOT's Access Management Standards and practices.

NOW THEREFORE, it is agreed by and between the parties hereto as follows:

1. The following locations are identified as existing, warranted, or proposed traffic signal installations along SR-68:

• Foothill Blvd. (5200 South)	(Proposed)
• Bonneville Drive (4700 South)	(Proposed)
• Harbor Park Way (4000 South)	(Proposed)
• Village Parkway (2900 South)	(Proposed)
• Ring Road, a.k.a. Lariat Blvd. (2000 South)	(Proposed)
• Grandview Blvd. (1400 South)	(Proposed)
• 800 South	(Proposed)
• Center St.	(Proposed)
• Pioneer Crossing Blvd.	(Warranted via Pioneer Crossing Traffic Study)
• South Commerce Dr.	(Proposed)
• SR-73	(Existing)
• North Commerce Dr.	(Proposed)
• Harvest Hills Blvd.	(Warranted)

The intersection of SR-68 at the east-west segment of the Mountain View corridor (2800 North) is not currently within the Saratoga Springs city boundaries but may be in the future. It is a proposed traffic signal location and is included here for information only.

2. Proposed traffic signals listed in #1 above will not be installed until warranted by **UDOT**. Additional traffic signals along SR-68 are not anticipated at this time, but intersections other than those listed in #1 above may be considered for signalization on an individual basis when studied by **UDOT**. Any intersections of this nature are not guaranteed to be signalized. It is understood that it may be necessary to restrict certain types of traffic movements at any intersection or access in order to maintain traffic flow and improve safety through the corridor as agreed upon by the parties hereto.

3. The current **UDOT** Highway Access Management Standards Category for the entire length of SR-68 within the **CITY** is 4, meaning minimum traffic signal spacing is 2,640 feet, minimum street spacing is 660 feet, minimum access spacing is 500 feet. Both parties will strive to maintain traffic signal, street, and access spacing according to the current Access Management Standards. Reasonable exceptions may be reviewed by both agencies and variances may be granted if approved by both agencies.

4. Segments of the highway which are currently designated as No Access, Limited Access, or Regular Right-of-Way are unchanged by this Agreement.

5. The parties hereto shall consider the concepts contained herein during the development of any master plans in this area and work towards the common goal of this Agreement.

6. In the event there are changes in the concepts or provisions covered by this Agreement, a modification to this Agreement approved in writing by both parties hereto is required to place them in effect.

IN WITNESS WHEREOF, the parties hereto have caused these presents to be executed by their duly authorized officers as of the day and year first above written.

ATTEST:

By: _____
Title: CITY RECORDER
Date: 12/17/08

(IMPRESS SEAL)

CITY OF SARATOGA SPRINGS, a Municipal Corporation in the State of Utah

By: _____
Title: Mayor
Date: 12/17/08

****

RECOMMENDED FOR APPROVAL: UTAH DEPARTMENT OF TRANSPORTATION

By: _____
Utilities/Railroads Coordinator

Date: 12/23/08

By: _____
Region Director

Date: 12-29-08

APPROVED AS TO FORM:

This Form Agreement has been previously approved as to form by the office of Legal Counsel for the Utah Department of Transportation.

COMPTROLLER OFFICE

By _____
Contract Administrator

Date: 1/7/09

Utah Department of Transportation
Traffic Impact Study Requirements

This memo and preceding information is prepared to assist an access permit applicant fulfilling the requirement of performing a traffic impact study when requesting access to a state highway. Each permit application is unique. The agreed requirements of traffic study and assessment may vary accordingly as agreed to by the Department and the applicant and/or their representative who will perform the traffic study.

Please refer to the Department document, *Accommodation of Utilities and the Control and Protection of State Highway Rights of Way: Section 7, State Highway Access* for full information concerning the grant of access application requirements. A downloadable copy of the document is available on the Department website at http://www.udot.utah.gov.

The following are taken from the Utah state rule 930-6, Accommodation of Utilities and the Control and protection of State Highway Rights of Way. Statements for this guideline are also added which do not appear in the Rule.

7.2.5 Preparing The Access Application

Pre-Application/Concept Meeting

Prior to submitting a permit application, contact the appropriate Department Region or District office for information about the application process and the type of information required. The applicant is advised to consult with the Region Permit Officer during a pre-application meeting to determine the appropriate access category, permit application level, and traffic impact study requirements, and scope for the project.

Permit Level

The level of application required is based upon the size and magnitude of the proposed project applying for a permit. Threshold criteria for different levels of projects have been developed to avoid placing an undue burden on applicants with small projects, while ensuring that large projects with significant impacts are thoroughly evaluated.

Four application levels have been developed based on site-generated traffic of AADT and or peak hour volumes. Each level defines specific threshold elements related to required applicant site plan elements, permitting process, permitting schedule, applicant fees, traffic study requirements, and other permit related issues. The information and level of detail required to review an application will vary according to the type and usage of the access connection requested and will be determined based on the thresholds outlines in, Table 7.2-2: Guidelines for Access Permit Levels. The Region Permit Officer, Traffic Engineer and/or designee will determine the Permit Application Level based on preliminary data supplied by the applicant.

A Traffic Impact Study (TIS) is required of all access permit applications. The purpose of the TIS is to identify system and immediate area impacts associated with the proposed connection(s). Identification of impacts and appropriate mitigation measures allows the Department to assess the existing and future system safety, performance, maintenance, and capacity needs.

Determination of the extent of the TIS study area is at the determination of the attending Region Traffic Engineer and /or other Department employees. The study area, depending on the size and

intensity of the development and surrounding development, may be identified by parcel boundary, area of immediate influence or reasonable travel time boundary. An acceptable traffic study boundary, based on travel time, may be identified as a ten or twenty minute travel time or even by market area influence.

The TIS shall, at a minimum, incorporate traffic engineering principles and the standards as presented in this Rule. Additional requirements and investigation may be imposed upon the applicant as necessary.

Likely information presented in the TIS may include, but is not limited to, site location and proposed access point(s), phased and/or full development trip generation, connection point design elements, adjacent and relevant development, existing and future traffic volumes, assessment of the system impacts, and mitigation measures as appropriate.

The applicant will be responsible for performance and delivery of an acceptable traffic impact study. The TIS should be performed by an individual or entity demonstrating capability to analyze and report mobility, traffic engineering elements, and design elements as necessary for the application study area and site design. The TIS should be prepared directly, or by direct supervision by a State of Utah Licensed Professional Engineer. The Region Traffic Engineer may waive the licensing requirement for Permit Level I and II, and may also waive the Utah Licensure requirement.

7.2.6 Application Review

For an access permit, submit one complete application with attachments to the Region Permits Officer at the appropriate Department Region Office. The Region Permits Officer is the primary contact for the applicant with the Department throughout the process. Direct inquires regarding a permit application or review, are directed to the Region Permit Officer.

7.2.11 Traffic Impact Studies

Need for Traffic Impact Study

A traffic study is necessary to identify, review, and make recommendations for mitigation of the potential impacts a development may have on the roadway system. Physical characteristics and operational characteristics of the roadway are typically identified. The Region Permits Officer and/or Region Traffic Engineer determine the need for a traffic impact study.

An applicant may be required to submit a traffic study for any proposed access or connection within an area identified by the Department. Area definition may be defined by, but not limited to, an identified safety problem, accident review, congested locations, or as a result of a change in land use and/or access in accordance with an access permit application. The study area may also be defined by a travel time boundary, area of influence, physical boundaries, or political boundaries.

Purpose of the Traffic Impact Study

TIS are intended to:

- Document whether or not the access request can meet the standards and requirements of this Rule and other applicable regulations.
- Analyze appropriate location, spacing, and design of the access connection(s) necessary to mitigate the traffic.

- Analyze operational impacts on the highway and permissible under the highway's assigned access category and in accordance with applicable requirements and standards of this Rule.
- Recommend the need for any improvements to the adjacent and nearby roadway system to maintain a satisfactory level of service and safety and to protect the function of the highway system while providing appropriate and necessary access to the proposed development.
- Assure that the internal traffic circulation of the proposed development is designed to provide safe and efficient access to and from the adjacent and nearby roadway system consistent with the purpose of this Rule.
- Analyze and recommend the means for land uses to minimize their external transportation costs to the traveling public through traffic improvements necessitated by that development as well as making the fullest use of alternative travel modes.

Traffic Impact Study Requirements

When a Traffic Impact Study is required (See Table 7.2-2), prepare the study according to the Department Traffic Impact Study Requirements. The appropriate Region Traffic Engineer in consultation with the permit applicant will determine the traffic study area limits.

All existing and proposed access points, driveways and streets, shall be identified for each site, including access on the opposite side of the site and within the influence area of the proposed site access. The influence area will be defined by the Region Traffic Engineer and/or designee. Each access will be labeled for proposed accesses as P1, P2, P3… and existing accesses as E1, E2, E3,…

Accommodation of Utilities and the Control and Protection of State Highway Rights of Way
Table 7.2-2

Guidelines for Access Permit Levels

Permit Type App. Level	**Thresholds**	**Typical Land Use Intensity Thresholds (ITE Trip Generation)**		**Traffic Impact Study Required**
I	Projected site traffic < 100 ADT **and** No proposed modifications to traffic signals or elements of the roadway	Single Family Apartment Lodging General Office Retail	< 10 units < 15 units < 11 occupied rooms < 9,000 square feet < 2,500 square feet	YES Conditions Apply
II	Projected site traffic between 100 and 3,000 ADT **or** Projected peak hour traffic < 500 **and** Minor modifications to traffic signals or elements of the roadway	Single Family Apartment Lodging General Office Retail Gas Station Fast Food Restaurant	10 to 315 units 15 to 450 units 11 to 330 occupied rooms 9,000 to 270,000 sq. ft. 2,500 to 70,000 sq. ft. 1 to 18 fueling positions 1,000 to 6, 000 sq. ft. 1,000 to 26,000 sq. ft.	YES
III	Projected site traffic between 3,000 and 10,000 ADT **or** Projected peak hour traffic between 500 and 1,200 **or** Proposed installation or modification to traffic signals or elements of the roadway, regardless of project size	Single Family Apartment Lodging General Office Retail Fast Food	315 to 1,000 units 450 to 1,500 units 330 to 1,100 occupied rooms 270,000 to 900,000 sq. ft. 70,000 to 230,000 sq. ft. 6,000 to 20, 000 sq. ft.	YES
IV	Projected site traffic > 10,000 ADT **or** Proposed installation /modification of two or more traffic signals, addition of travel lanes to State Highway or proposed modification of freeway interchange, regardless of project size	Single Family Apartment Lodging General Office Retail	> 1,000 units > 1,500 units > 1,100 occupied rooms > 900,000 square feet > 230,000 square feet	YES

Permit Level / Traffic Study level I

Project ADT < 100 trips.
No proposed modifications to traffic signals or roadway elements or geometry.

The traffic study shall, at a minimum, incorporate traffic engineering principles and standards as presented in the State Highway Access Management Rule, Department standards, and national practices. Additional requirements and investigation may be imposed upon the applicant as necessary.

The Region Permits officer and/or the Region Traffic Engineer determine the need and requirements for a traffic impact study.

1. Study Area.
   Defined by Region Permits Officer and/or Region Traffic Engineer.
   The study area, depending on the size and intensity of the development and surrounding development, may be identified by parcel boundary, area of immediate influence or reasonable travel time boundary.

   Study area may be limited to or include property frontage and include neighboring and adjacent parcels. Identify site, cross, and next adjacent up and down stream access points within access category distance of property boundaries.

2. Design year.
   Opening day of project.
3. Analysis Conditions and Period
   Identify site traffic volumes and characteristics.
   Identify adjacent street(s) traffic volume and characteristics.
4. Identify right-of-way, geometric boundaries and physical conflicts.
   Investigate existence of federal or state, no access or limited access control line.
5. Generate access point capacity analysis as necessary.
   Analyze site and adjacent road traffic for the following time periods: weekday A.M. and P.M. peak hours including Saturday peak hours. Identify special event peak hour as necessary (per roadway peak and site peak).
6. Design and Mitigation.
   Identify operational concerns and mitigation measures to ensure safe and efficient operation pursuant to appropriate state highway access category.

Permit Level / Traffic Study Level II

The traffic study shall, at a minimum, incorporate traffic engineering principles and standards as presented in the State Highway Access Management Rule, Department standards, and national practices. Additional requirements and investigation may be imposed upon the applicant as necessary.

The Region Permits officer and/or the Region Traffic Engineer determine the need and requirements for a traffic impact study.

Project ADT 100 to 500 trips.

1. Study Area.
   Defined by Region Permits Officer or Region Traffic Engineer.
   The study area, depending on the size and intensity of the development and surrounding development, may be identified by parcel boundary, area of immediate influence or reasonable travel time boundary.

   Intersection of site access drives with state highways and any signalized and unsignalized intersection within access category distance of property line. Include any identified queuing distance at site and study intersections

2. Design Year.
   Opening day of project.
3. Analysis Period.
   Identify site and adjacent road traffic for weekday A.M. and P.M. peak hours.
4. Data Collection
   Identify site and adjacent street roadway and intersection geometries.
   Identify adjacent street(s) traffic volume and characteristics.
5. Conflict / Capacity Analysis
   Diagram flow of traffic at access point(s) for site and adjacent development.
   Perform capacity analysis as determined by Region Traffic Engineer.
6. Right-of-Way Access
   Identify right-of-way, geometric boundaries and physical conflicts. Investigate existence of federal or state, no access or limited access control line.
7. Design and Mitigation
   Determine and document safe and efficient operational design needs based on site and study area data. Identify operational concerns and mitigation measures to ensure safe and efficient operation pursuant to appropriate state highway access category.

Project ADT 500 to 3,000 trips or peak hour < 500 trips.

Any proposed modification to traffic signals or roadway elements or geometry.

1. Study Area.
   Defined by Region Permits Officer or Region Traffic Engineer.
   The study area, depending on the size and intensity of the development and surrounding development, may be identified by parcel boundary, area of immediate influence or reasonable travel time boundary. An acceptable traffic study boundary, based on travel time, may be identified as a ten or twenty minute travel time or even by market area influence.

Intersection of site access drives with state highways and any signalized and unsignalized intersection within access category distance of property line. Include any identified queuing distance at site and study intersections.

2. Design Year.
   Opening day of project and five year after project completion. Document and include all phases of development (includes out pad parcels).
3. Analysis Period.
   Analyze site and adjacent road traffic for weekday A.M. and P.M. peak hours including Saturday peak hours. Identify special event peak hour as necessary (adjacent roadway peak and site peak).
4. Data Collection
   a. Daily and Turning Movement counts.
   b. Identify site and adjacent street roadway and intersection geometries.
   c. Traffic control devices including traffic signals and regulatory signs.
   d. Traffic accident data
5. Trip Generation.
   Use equations or rates available in latest edition of ITE Trip Generation. Where developed equations are unavailable for intended land use, perform trip rate study and estimation following ITE procedures or develop justified trip rate agreed to by the Department.
6. Trip Distribution and Assignment
   Document distribution and assignment of existing, site, background, and future traffic volumes on surrounding network of study area.
7. Conflict / Capacity Analysis.
   Diagram flow of traffic at access point(s) for site and adjacent development.
   Perform capacity analysis for daily and peak hour volumes
8. Traffic Signal Impacts. For modified and proposed traffic signals:
   a. Traffic Signal Warrants as identified.
   b. Traffic Signal drawings as identified.
   c. Queuing Analysis
9. Right-of-Way Access
   Identify right-of-way, geometric boundaries and physical conflicts. Investigate existence of federal or state, no access or limited access control line.
10. Design and Mitigation.
    Determine and document safe and efficient operational design needs based on site and study area data. Identify operational concerns and mitigation measures to ensure safe and efficient operation pursuant to appropriate state highway access category.

Permit Level / Traffic Study Level III

Project ADT 3,000 to10,000 trips or peak hour traffic 500 to 1,200 trips.
Proposed installation or modification to traffic signals or roadway elements or geometry, regardless of project size or trip generation.

The traffic study shall, at a minimum, incorporate traffic engineering principles and standards as presented in the State Highway Access Management Rule, Department standards, and national practices. Additional requirements and investigation may be imposed upon the applicant as necessary.

The Region Permits officer and/or the Region Traffic Engineer determine the need and requirements for a traffic impact study.

1. Study Area.
   Defined by Region Permits Officer or Region Traffic Engineer
   The study area, depending on the size and intensity of the development and surrounding development, may be identified by parcel boundary, area of immediate influence or reasonable travel time boundary. An acceptable traffic study boundary, based on travel time, may be identified as a ten or twenty minute travel time or even by market area influence.

   Intersection of site access drives with state highways and any intersection within 1/2 mile of property line on each side of project site.

2. Design Year.
   Opening day of project, five years and twenty years after opening. Document and include all phases of development (includes out pad parcels).
3. Analysis period.
   For each design year analyze site and adjacent road traffic for weekday A.M. and P.M. peak hours including Saturday peak hours. Identify special event peak hour as necessary (adjacent roadway peak and site peak).
4. Data Collection.
   a. Daily and Turning movement counts.
   b. Identify site and adjacent street roadway and intersection geometries.
   c. Traffic control devices including traffic signals and regulatory signs.
   d. Automatic continuous traffic counts for at least 48 hours.
   e. Traffic accident data.
5. Trip Generation.
   Use equations or rates available in latest edition of ITE Trip Generation. Where developed equations are unavailable for intended land use, perform trip rate study and estimation following ITE procedures or develop justified trip rate agreed to by the Department.
6. Trip Distributions and Assignment.
   Document distribution and assignment of existing, site, background, and future traffic volumes on surrounding network of study area.
7. Capacity Analysis.
   a. Level of Service (LOS) for all intersections.
   b. LOS for existing conditions, design year without project, design year with project.
8. Traffic Signal Impacts. For proposed Traffic Signals:
   a. Traffic Signal Warrants as identified.
   b. Traffic Signal drawings as identified.

c. Queuing Analysis.
d. Traffic Systems Analysis. Includes acceleration, deceleration and weaving.
e. Traffic Coordination Analysis

9. Right-of-Way Access
   Identify right-of-way, geometric boundaries and physical conflicts. Investigate existence of federal or state, no access or limited access control line.
10. Accident and Traffic Safety Analysis. Existing vs. as proposed development.
11. Design and Mitigation.
    Determine and document safe and efficient operational design needs based on site and study area data. Identify operational concerns and mitigation measures to ensure safe and efficient operation pursuant to appropriate state highway access category.

Permit Level / Traffic Study Level IV

Project ADT greater than 10,000 trips or peak hour traffic > 1,200 vehicles per hour.
Proposed installation or modification of two or more traffic signals, addition of traffic lanes or modification of freeway interchange.

The traffic study shall, at a minimum, incorporate traffic engineering principles and standards as presented in the State Highway Access Management Rule, Department standards, and national practices. Additional requirements and investigation may be imposed upon the applicant as necessary.

The Region Permits officer and/or the Region Traffic Engineer determine the need and requirements for a traffic impact study.

1. Study Area.
   Defined by Region Permits Officer or Region Traffic Engineer
   The study area, depending on the size and intensity of the development and surrounding development, may be identified by parcel boundary, area of immediate influence or reasonable travel time boundary. An acceptable traffic study boundary, based on travel time, may be identified as a ten or twenty minute travel time or even by market area influence.

   Intersection of site access drives with state highways and any intersection within 1/2 mile of property line of each side of project site and any intersection or freeway interchange impacted by more than 500 peak hour trips.

2. Design Year.
   Opening day of project, five years and twenty years after opening. Document and include all phases of development (includes out pad parcels).
3. Analysis period.
   For each design year analyze site and adjacent road traffic for weekday A.M. and P.M. peak hours including Saturday peak hours. Identify special event peak hour as necessary (adjacent roadway peak and site peak).
4. Data Collection.
   a. Daily and Turning movement counts.
   b. Identify site and adjacent street roadway and intersection geometries.
   c. Traffic control devices including traffic signals and regulatory signs.

d. Automatic continuous traffic counts for at least 48 hours.
e. Traffic accident data.

5. Trip Generation
   Use equations or rates available in latest edition of ITE Trip Generation. Where developed equations are unavailable for intended land use, perform trip rate study and estimation following ITE procedures or develop justified trip rate agreed to by the Department.

6. Trip Distributions and Assignment.
   Document distribution and assignment of existing, site, background, and future traffic volumes on surrounding network of study area.

7. Capacity Analysis.
   a. Level of Service (LOS) for all intersections.
   b. LOS for existing conditions, design year without project, design year with project.

8. Traffic Signal Impacts. For proposed traffic signals:
   a. Traffic Signal Warrants as identified.
   b. Traffic Signal drawings as identified.
   c. Queuing Analysis.
   d. Traffic Systems Analysis. Includes acceleration, deceleration and weaving.
   e. Traffic Coordination Analysis.

9. Right-of-Way Access
   Identify right-of-way, geometric boundaries and physical conflicts. Investigate existence of federal or state, no access or limited access control line.

10. Accident and Traffic Safety Analysis. Existing vs. as proposed develop.

11. Design and Mitigation.
    Determine and document safe and efficient operational design needs based on site and study area data. Identify operational concerns and mitigation measures to ensure safe and efficient operation pursuant to appropriate state highway access category.

STUDY AND REPORT FORMAT

The Traffic impact study should follow the recommended format below. Traffic impact studies shall be presented by a firm or individual recognized by the Department of Transportation as capable of performing a traffic analysis and when necessary, include engineered drawings based on Department standards drawings and specifications.

(1) INTRODUCTION AND SUMMARY

(2) PROPOSED PROJECT

(3) STUDY AREA CONDITIONS

(4) ANALYSIS OF EXISTING CONDITIONS

(5) PROJECTED TRAFFIC

(6) TRAFFIC ANALYSIS

(7) CONCLUSIONS

(8) RECOMMENDATIONS

(9) APPENDICES

a) Traffic Counts
b) Traffic Capacity Analysis
c) Accident Summary
d) Request for change of access (if applicable)

(10) FIGURES AND TABLES

The following items shall be documented in the study:

a) Site location – showing area roadways
b) Site Plan
   Identify geometric / physical concerns relating to area, site and specific access points. Include adjacent street and access points.
c) Existing roadway and traffic control features (number of lanes, lane widths, alignment, location of traffic signals, signs) Include off-system features as related to site plan and access point(s).
d) Existing daily volumes (directional if possible) and peak hour turning volumes. Discuss traffic characteristics (vehicle mix, % make-up and any special vehicle requirements).
e) Collision diagram summary.
f) Site generated trip summary. Discuss trip/vehicle make-up and any special vehicle requirements. Discuss trip reduction strategies if applicable.
g) Directional distribution of site generated traffic.
h) Assignment of Non-site related traffic (existing, background and future). Document both existing and committed development, and when appropriate other background planned development traffic. Assignment of total future non-site traffic for design year.
i) Assignment of Site Traffic
j) Traffic Capacity Analysis
   Projected levels of service without the project – coincide with development phase years.
   Projected levels of service with the project (by development phase years)
   Recommended mitigation / improvement

(Scaled schematic drawings illustrating alignment, number of lanes, lane widths, signing, pavement markings. If traffic signal modifications are proposed, signal phasing, signal head locations, lane marking shall be shown.)