SARATOGA SPRINGS

SARATOGA SPRINGS
TRANSPORTATION MASTER PLAN

HORROCKS ENGINEERS

January 2019

Executive Summary

2019 Update

The Saratoga Springs Transportation Master Plan (TMP), adopted in 2012 and amended in 2013 and 2017, was updated in 2019. All updates included reflect the current roadway configurations per UDOT, other municipalities and future developments. The following includes a summary of the 2019 update:

- **Proposed 2040 roadway network**
- **Capital Facilities Projects**
- **New Local Roadway Cross-Section**
- **New 5 Lane Cross-Section for 400 East North of Crossroads Blvd**
- **Updated Foothill Boulevard alignment**
- **Updated Transit section to include BRT**

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 26,700 residents continues to be one of the fastest growing cities in Utah. Despite this rapid growth, there remain vast amounts of land that is undeveloped.

The roadways in the City have been classified as Principal Arterials, Major Arterials, Minor Arterials, Collector Streets, Local 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 bus route from Eagle Mountain, through Saratoga Springs, to the Lehi FrontRunner station.

Future Conditions

Saratoga Springs is expected to grow to a population of approximately 79,000 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 (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 Boulevard, and Hidden Valley Highway. 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 Highway are proposed on the MAG long range transportation plan and should be the first of these major roads constructed. Foothill Boulevard 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 to allow 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.

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1.0 Introduction

1.1 2019 Update

The Saratoga Springs Transportation Master Plan (TMP), adopted in 2012 and amended in 2013 and 2017, was updated in 2019. This TMP update is not intended as a full TMP update. All updates included reflect the current roadway configurations per UDOT, other municipalities and future developments. The following includes a summary of the 2019 update:

- **Proposed 2040 roadway network**
- **Capital Facilities Projects**
- **New Local Roadway Cross-Section**
- **New 5 Lane Cross-Section for 400 East north of Crossroads Blvd**
- **Updated Foothill Boulevard alignment**
- **Updated Transit section to include BRT**

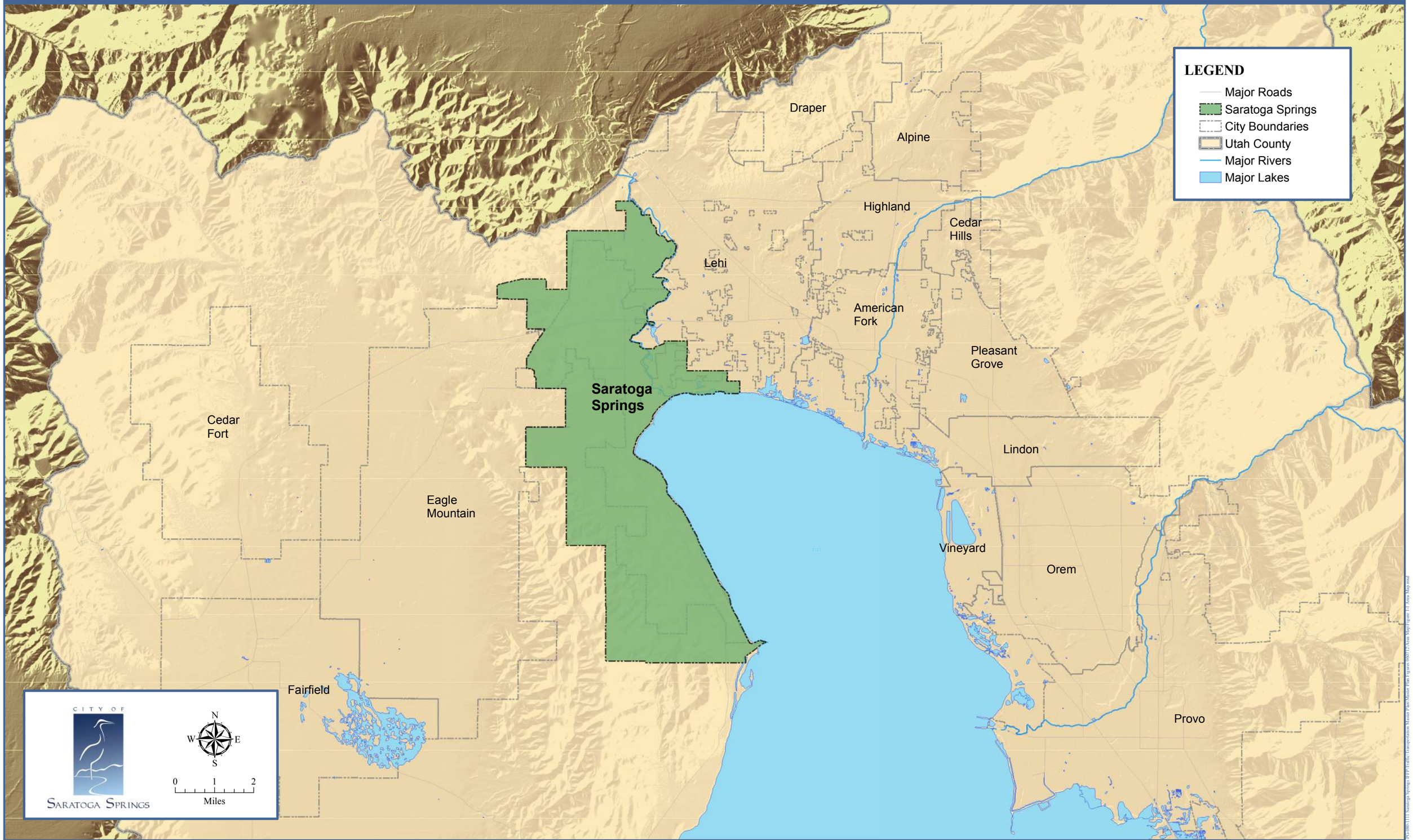
The purpose of this update is to align the TMP with the regional network plans found in the Mountainland Association of Governments (MAG) TransPlan40.

1.2 Background Information

The City of Saratoga Springs is a 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 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 current population is slightly below 27,000.

The last update to The Saratoga Springs General Plan, including the Transportation Element, was in 2012. This update (as well as minor adjustments in 2013), included 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. This TMP acts as an update to incorporate the most recent population projections as well as any changes to the Capital Facilities Plan.

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 26,700 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**). **Figure 2-1** includes the most recent active development map as of the adoption of the TMP. As a region, the northern Utah County area has experienced rapid development and growth in recent years and this trend is projected to continue into the foreseeable future. As such, **Figure 2-1** is frequently updated. Visit the City's Website

[1] Based on Utah Governor's Office of Management & Budget (GOMB)

at www.saratogaspringscity.com or contact the Planning and Zoning department directly for the most updated version.

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

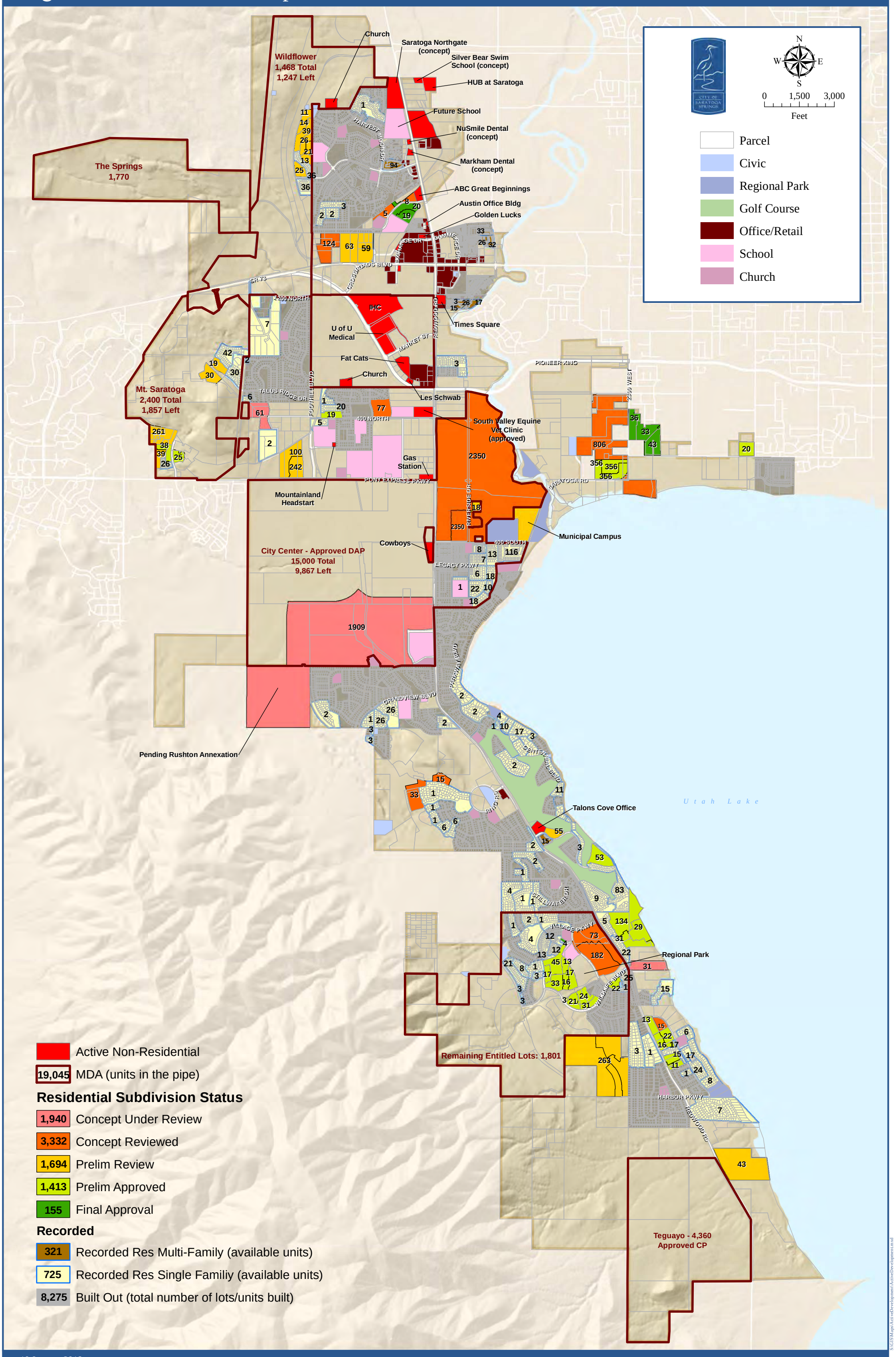
Source: 2010 State of Utah Official Census

2.2 Existing Land Use

Traffic patterns and demand are directly related to land use and development density. A small 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 Active Development



2.3 Existing Roadway Functional Classification

The roadways in Saratoga Springs have been classified as Principal Arterials, Major Arterials, Minor Arterials, Collector, Local Collector and Local streets. The existing roadway network consists of several major regional Utah Department of Transportation (UDOT) roadways including Cedar Fort Road (SR-73) running East-West connecting to Pioneer Crossing (SR-165), which connects to I-15 at American Fork Main Street, and SR-68 (Redwood Road) running North-South connecting the City with Salt Lake County on the North. 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. 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. **Table 2-2** Through **Table 2-4** 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 **Table 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, 2016 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 2016. **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

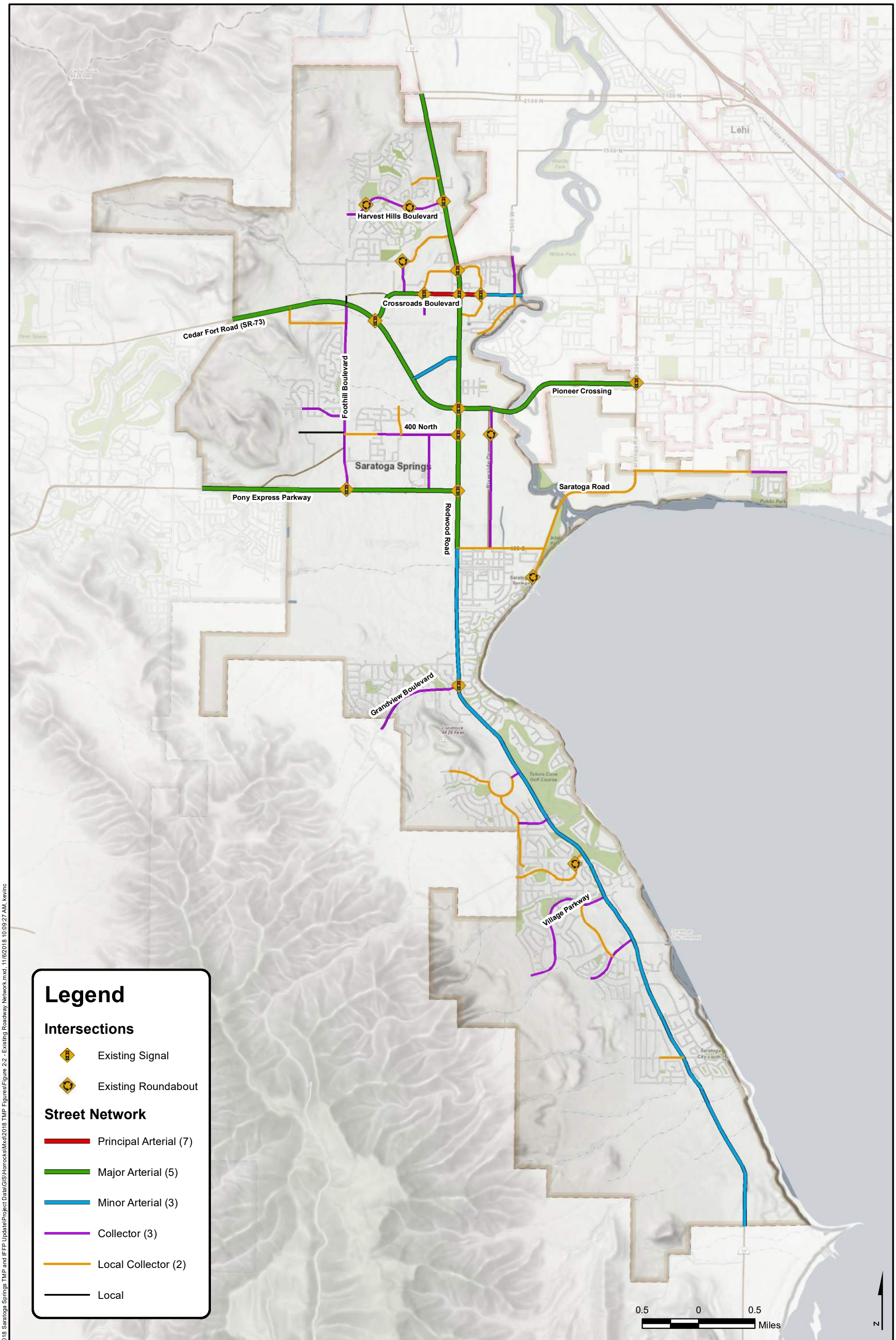
Non-motorized traffic is also very important and Saratoga Springs is committed to providing a trails network for bicycle and pedestrian traffic for both recreational and other trips. Saratoga Springs is a recreational hotspot on the west side of Utah Lake due to its proximity to Utah Lake and many off-road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

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. Route 806 runs from Eagle Mountain, through Saratoga Springs, to the Lehi FrontRunner station. Maps for the existing route 806 can be found in the appendix of this report.



HORROCKS ENGINEERS

2162 West Grove Parkway
Suite 400
Pleasant Grove, UT 84062
(801) 763-5100

Existing Roadway Network

Saratoga Springs Transportation Master Plan

DATE 11/6/2018

DRAWN KJC

Figure 2-2

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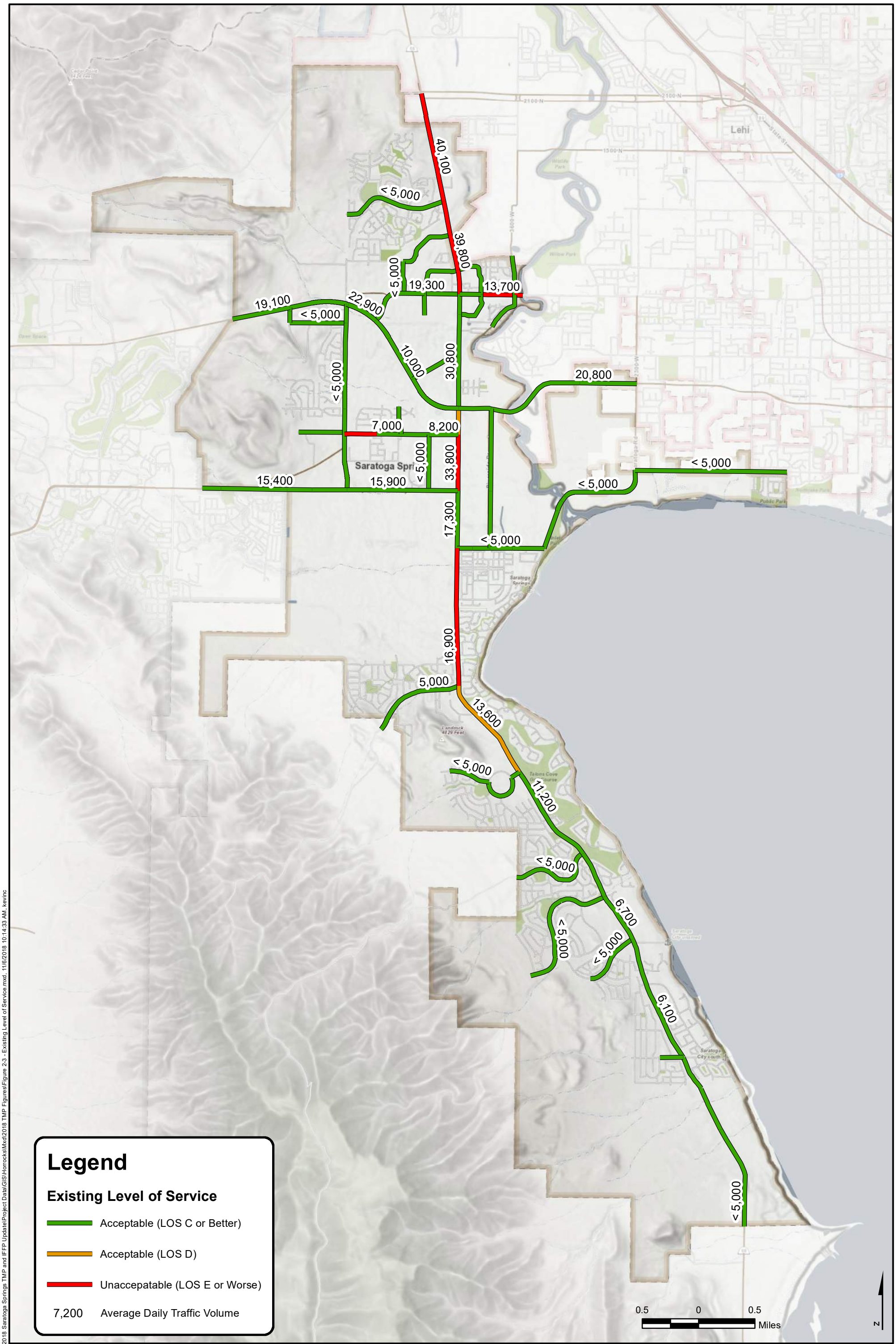

2162 West Grove Parkway
Suite 400
Pleasant Grove, UT 84062
(801) 763-5100

Existing Level of Service

Saratoga Springs Transportation Master Plan

DATE 11/6/2018

DRAWN KJC

Figure 2-3

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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. The general plan land use map is periodically updated. The most recent version as of adoption is included in **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. As **Figure 3-1** is frequently updated, an interactive map can be found on the city's website www.saratogaspringscity.com or the Planning and Zoning Department can be contacted with questions regarding the General Plan.

Based on the current land use, zoning, demographics, and growth patterns, Saratoga Springs is expected to grow to approximately 79,000 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 of up to 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	65%
2020	33,514	15,733	88%
2030	58,496	24,982	75%
2040	**78,987**	**20,491**	**35%**

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

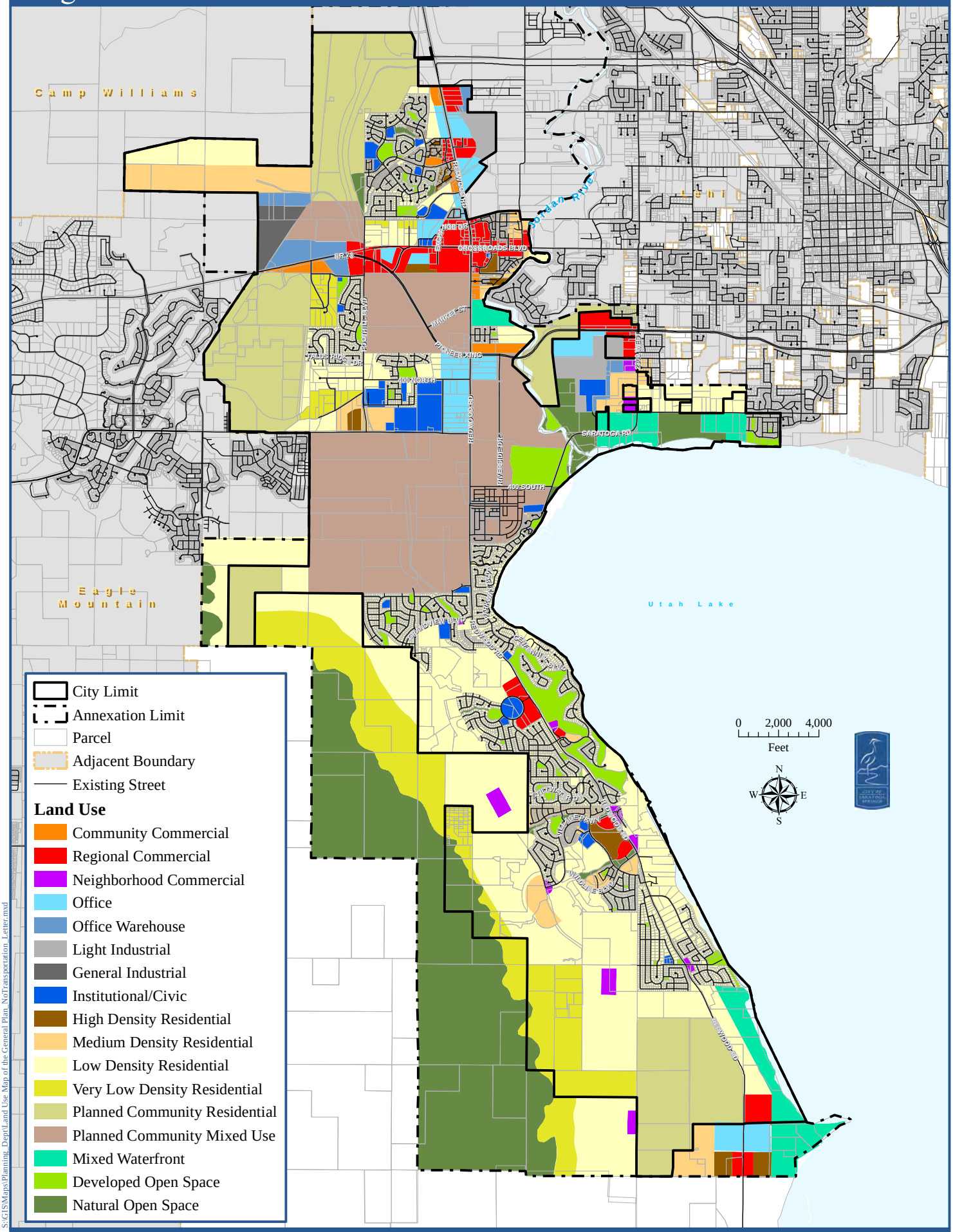
Saratoga Springs aims to plan for and encourage responsible and sustainable growth in the City. Today's transportation system should not only accommodate existing travel demands, but should also have built-in capacity to account for the demand which will be placed on the system in the future. While considering 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 as shown in **Figure 3-1**, 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. The general plan and land use is continually updated and the most up to date general plan can be found on the City website at the following link: http://www.saratogaspringscity.com/196/General-Master-Plans

Figure 3-1 General Land Use Plan



S:\GIS\Maps\Planning_Dept\Land Use Map of the General Plan_NoTransportation_Letter.mxd

10 September 2018

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. TransPlan40 (available at www.mountainland.org) was adopted by the Mountainland MPO Regional Planning Committee in 2015. 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. 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 2016 existing conditions analysis relied heavily on new 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

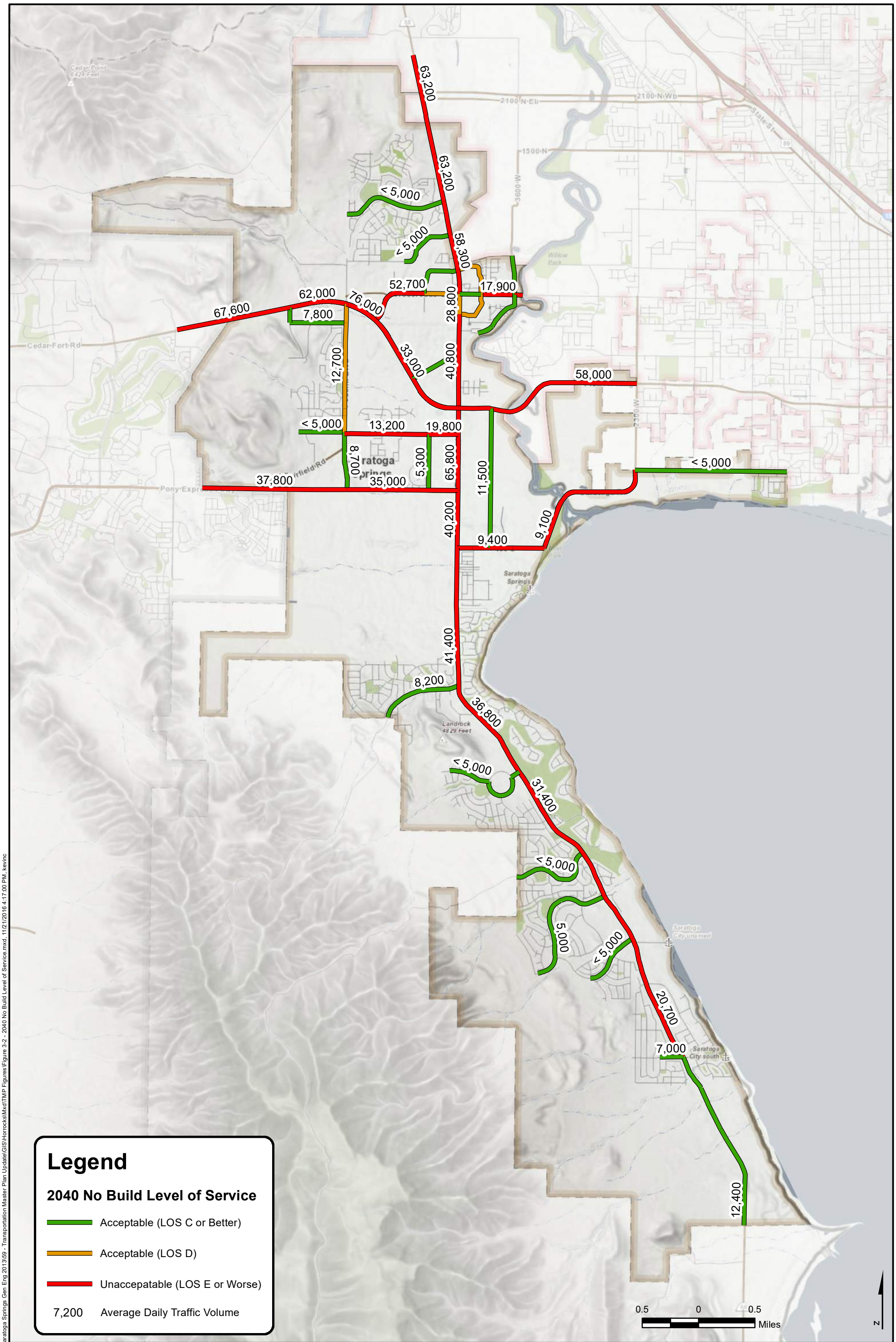
A no-build scenario is intended to show what the roadway network would be like in the future if no action is taken to improve the City roadway network. The travel demand model was again used to predict this condition by applying the future growth and travel demand to the existing roadway network. As 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. 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**.

Included in **Figure 3-3** is the Foothill Blvd. extension which will connect to the Mountain View Corridor freeway at Pony Express Parkway and end at Redwood Road at the southern border of the city. Based on traffic projections the freeway will end at Stillwater Drive and become arterial street cross-sections until it connects to Redwood Road. As part of MAG's vision plan, there is a possibility that a causeway could be built across Utah Lake connecting Saratoga Springs to Provo. This causeway would connect at Redwood Road where Foothill Blvd extension is proposed to end. As the need for the causeway is still unknown, all modeling efforts assumed the causeway would NOT be completed within the horizon year 2040. If this project were to be completed within the horizon year 2040, the entire Foothill Blvd cross-section would need to be a continual freeway leading to the causeway to accommodate the additional traffic caused by the causeway. As such, the City will acquire the right-of-way necessary for the freeway section of 200 Feet throughout the corridor.

Another Roadway included in **Figure 3-3** is Bonneville Road. The roadway will run north/south along the west benches to serve all development west of the proposed Foothill Blvd. extension. Since the traffic volumes will be minor, it is classified as a Local Road.



HORROCKS ENGINEERS

2162 West Grove Parkway
Suite 400
Pleasant Grove, UT 84062
(801) 763-5100

2040 No Build Level of Service

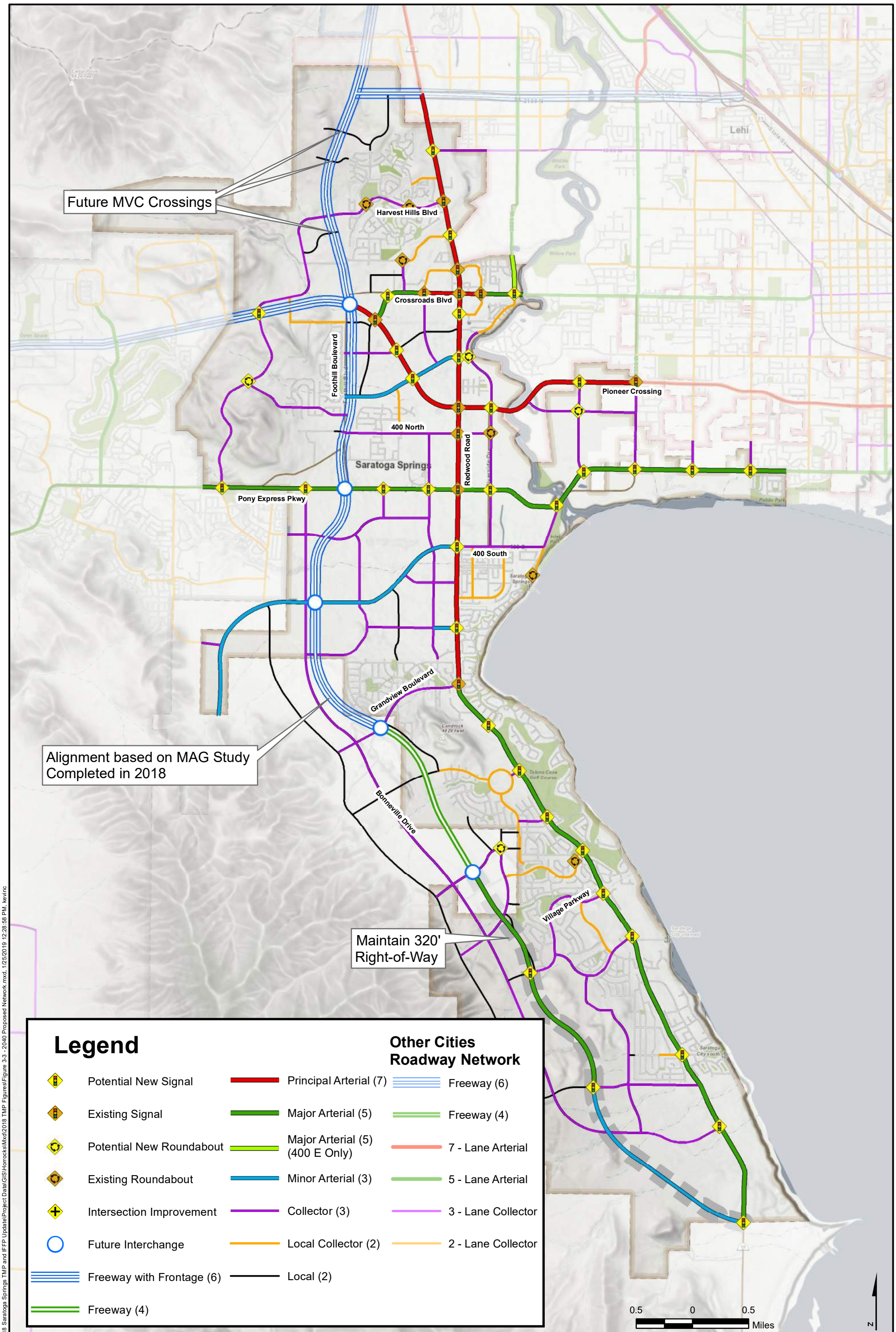
Saratoga Springs Transportation Master Plan

DATE 11/21/2016

DRAWN KJC

Figure 3-2

O:\12013\PG-163-1301 Saratoga Springs Gen Eng 2013\59 - Transportation Master Plan Update\GIS\Horrocks\Mxd\TMP Figures\Figure 3-2 - 2040 No Build Level of Service.mxd, 11/21/2016 4:17:00 PM, kevinc



O:\2018\UT-1003-1801 2018 Saratoga Springs TMP and IFFP Update\Project Data\GIS\Horrocks\Mxd\2018 TMP Figures\Figure 3-3 - 2040 Proposed Network.mxd, 1/25/2019 12:28:58 PM, kevinc

HORROCKS 50 ANNIVERSARY 1968-2018

2162 West Grove Parkway
Suite 400
Pleasant Grove, UT 84062
(801) 763-5100

2040 Proposed Network

Saratoga Springs Transportation Master Plan

DATE 1/25/2019

DRAWN

Figure 3-3

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 as a reference for the transportation planning efforts in terms of trails and pedestrian facilities in the future. The current version of this plan can be found on the city's website www.saratogaspringscity.com.

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, from Eagle Mountain/Saratoga Springs to the Lehi Frontrunner station, 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. Additional bus routes will likely be added by UTA as the city expands and should be restricted to collectors and arterial streets.

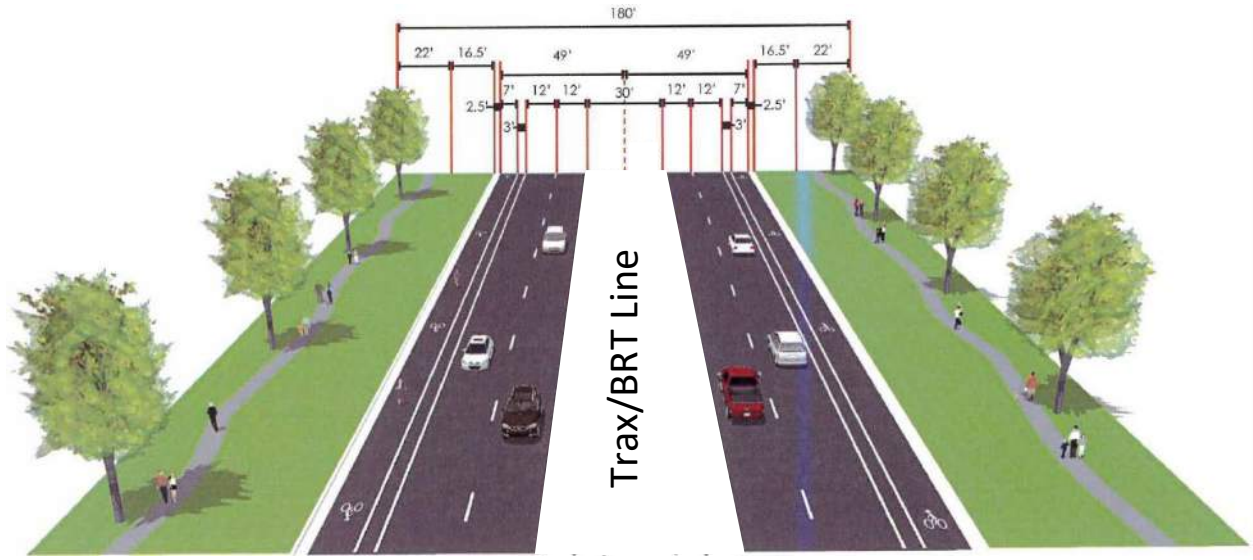
Due to the relatively large distances between the residential developments to the north and south and the commercial/retail center at Commerce Drive, a local bus system connecting these two areas may be beneficial as time progresses and population increases. This would allow those who prefer public transit 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.

Three public transit facilities considered in this Masterplan are Light Rail (TRAX), Bus Rapid Transit (BRT), and UTA's FrontRunner commuter rail line. Light Rail (TRAX) has been operating in Salt Lake County for more than a decade. There are currently four lines in operation. There are no existing or under

construction TRAX lines in Utah County. According to latest MAG TransPlan50 draft, the first TRAX line in Utah County will be an extension of the planned Draper line and is not anticipated to come online before 2040. BRT is also included in the MAG TransPlan50 draft. BRT separates bus service from the regular roadway to improve system efficiency.

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 or BRT 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 or BRT line and coordinating with landowners, UTA and MAG to implement this transit improvement. It is important to note that this is a "vision" project, meaning that the City of Saratoga Springs will continue to work with UTA and MAG to determine the best location and implementation timing for the future TRAX or BRT line. A concept design is included as part of the TMP in **Figure 3-4**. This is a concept design for the section of the TRAX or BRT line utilizing Pony Express Parkway. The roadway would consist of 12' travel lanes (2 in each direction) separated by a 30' right-of-way reserved for light rail TRAX trains, or BRT buses. This 30' right-of-way would be room enough to provide two way transit traffic. On each side of the road, a 3' buffer is provided for a 7' bike lane. A 22' right-of-way for a meandering walkway is included on both sides of the road after a 16.5' buffer. Inclusion of **Figure 3-4** in the TMP does not lock the City into this cross-section, but shows the other entities involved (MAG, UTA) that the City of Saratoga Springs is dedicated and prepared to find the best way to include TRAX and/or into its future plans.

Figure 3-4 Concept Pony Express Boulevard Extension Cross-Section



The most recent addition to the Utah statewide transportation system is UTA's FrontRunner commuter rail line. The line connects Utah, Salt Lake, Davis, and Weber counties with stations in Provo, Orem, American Fork, Lehi, Draper, South Jordan, Murray, Salt Lake City, Woods Cross, Farmington, Layton, Clearfield, Roy, and Ogden. Each station has a connection other transit networks such as TRAX and bus

networks. FrontRunner is a push/pull locomotive system, which can travel up to 79 mile per hour. Future planned expansions will add service to Brigham City in the north and Payson in the South.

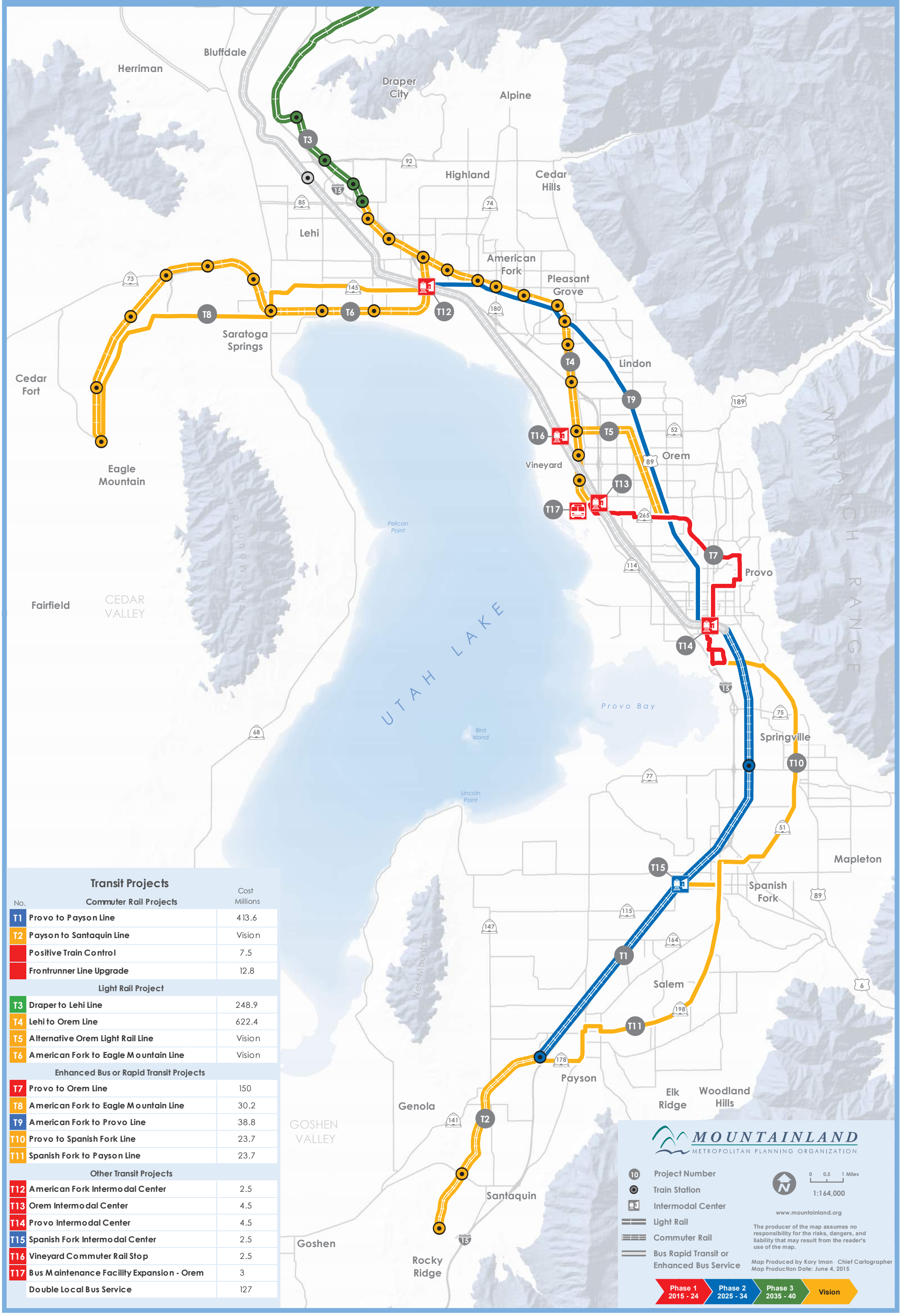
An essential consideration of a good transportation system is the ability to seamlessly transfer from one transportation mode to the next. This could be from car to commuter rail, bike to bus, or foot to light rail. Each of these transfers must be accomplished efficiently in order for a transit system 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 or BRT line proposal, the City is also planning an intermodal hub close to Pony Express Parkway that may provide a connection to each of the transportation modes planned in the City.

Transit

Figure 3-5

TransPlan40

Regional Transportation Plan
2015-2040 Plan for the Provo/Orem
Metropolitan Area



Transit Projects

No.	Commuter Rail Projects	Cost Millions
T1	Provo to Payson Line	413.6
T2	Payson to Santaquin Line	Vision
	Positive Train Control	7.5
	Frontrunner Line Upgrade	12.8
	Light Rail Project	
T3	Draper to Lehi Line	248.9
T4	Lehi to Orem Line	622.4
T5	Alternative Orem Light Rail Line	Vision
T6	American Fork to Eagle Mountain Line	Vision
	Enhanced Bus or Rapid Transit Projects	
T7	Provo to Orem Line	150
T8	American Fork to Eagle Mountain Line	30.2
T9	American Fork to Provo Line	38.8
T10	Provo to Spanish Fork Line	23.7
T11	Spanish Fork to Payson Line	23.7
	Other Transit Projects	
T12	American Fork Intermodal Center	2.5
T13	Orem Intermodal Center	4.5
T14	Provo Intermodal Center	4.5
T15	Spanish Fork Intermodal Center	2.5
T16	Vineyard Commuter Rail Stop	2.5
T17	Bus Maintenance Facility Expansion - Orem	3
	Double Local Bus Service	127

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 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**.

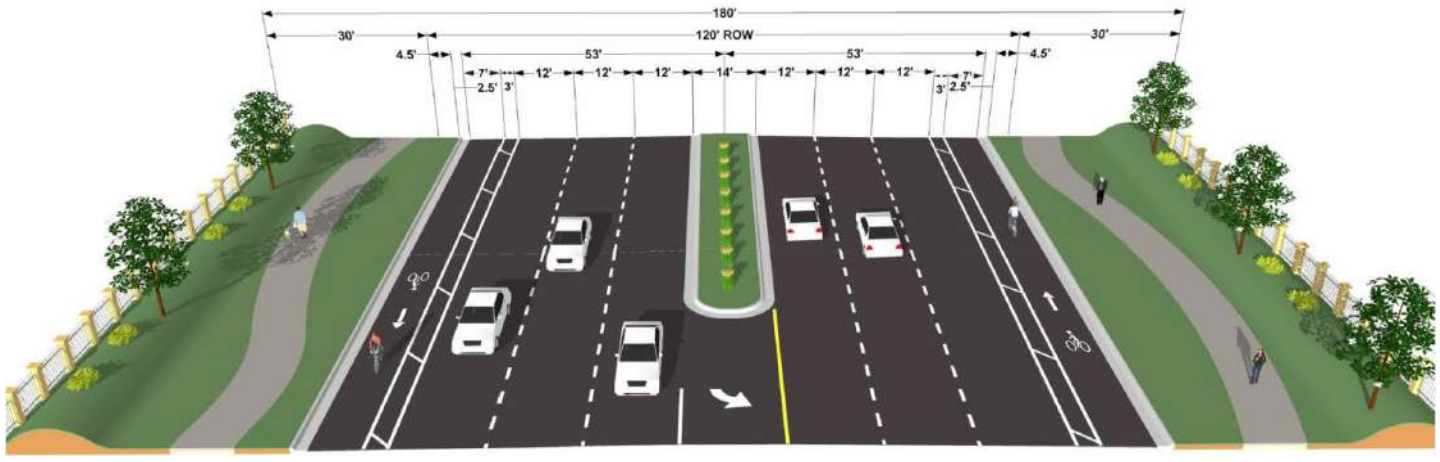
Impacts to adjacent properties can be limited by applying minimal typical sections to stretches of roadway between intersections. Typically, intersections are choke points in a traffic system. Capacity can be maximized by providing sufficient left and right turn pockets to accommodate at least the average 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 heavily 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.

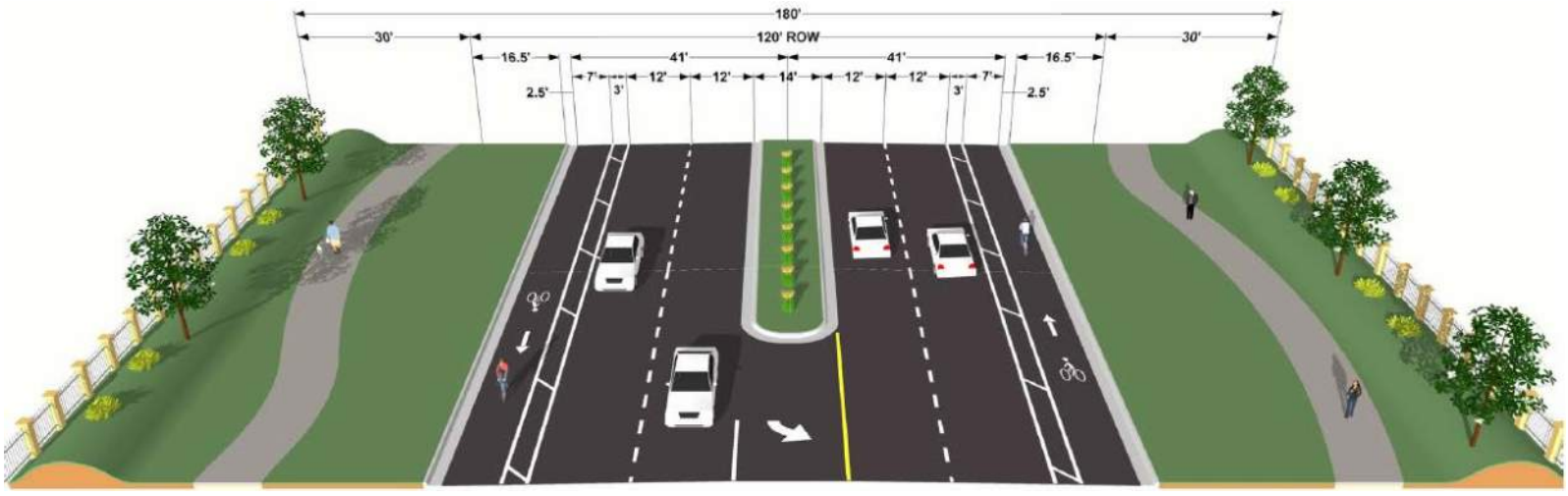
There are roadway segments along the Foothill Blvd. southern extension where larger than typical ROW is required. Although smaller roadway segments are planned, ROW for future development past 2040 may require 200 feet of ROW and are indicated in **Figure 3-3**.

Figure 4-1 Roadway Typical Sections

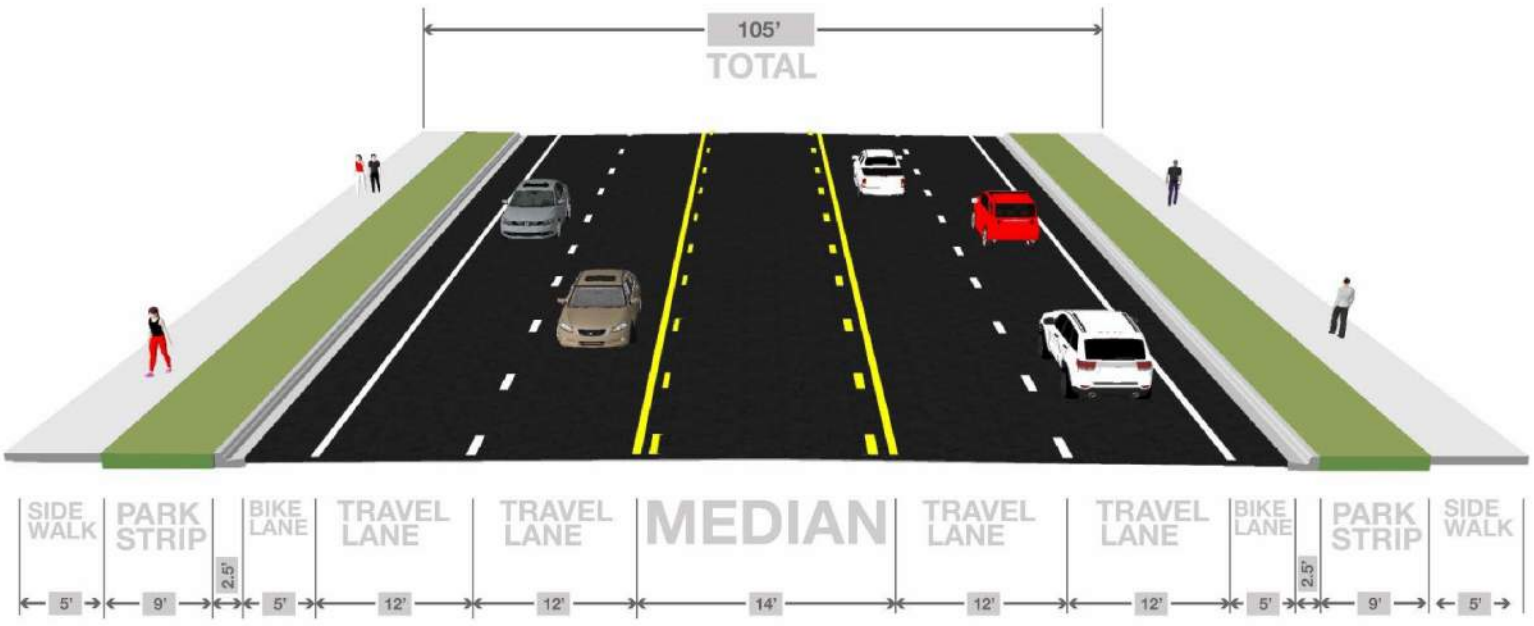
7-Lane Principal Arterial



5-Lane Major Arterial



5-Lane Major Arterial (400 E North of Crossroads Blvd. Only)



3-Lane Minor Arterial

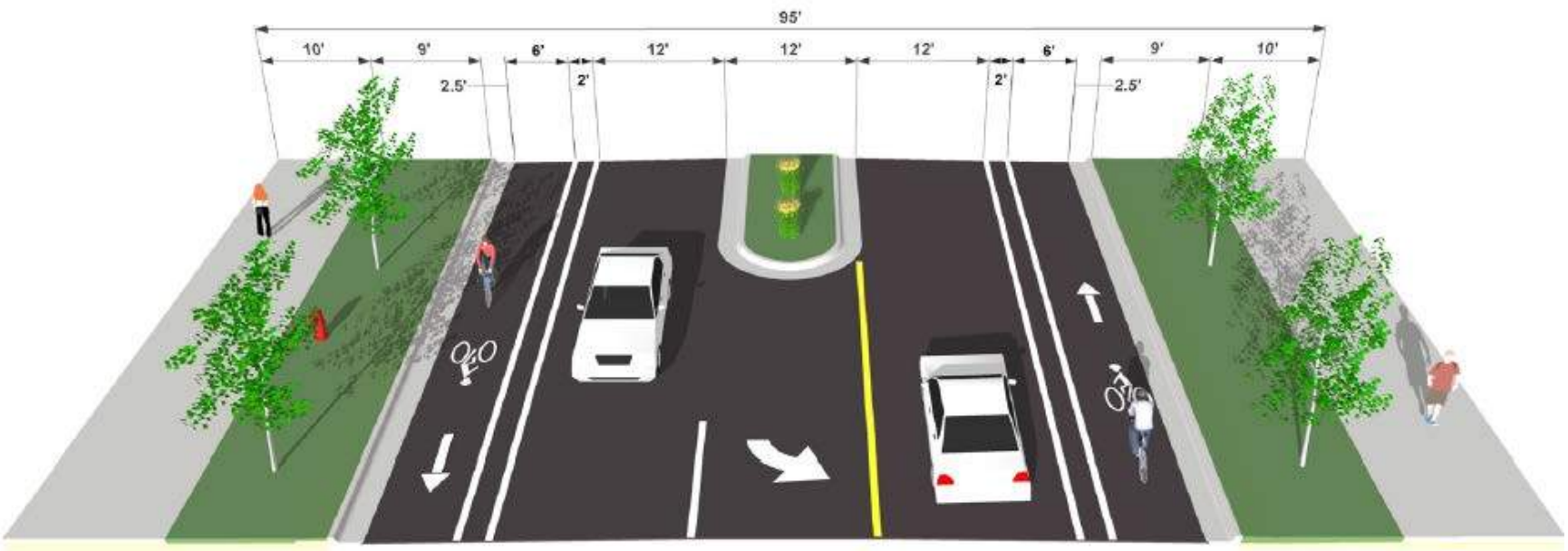
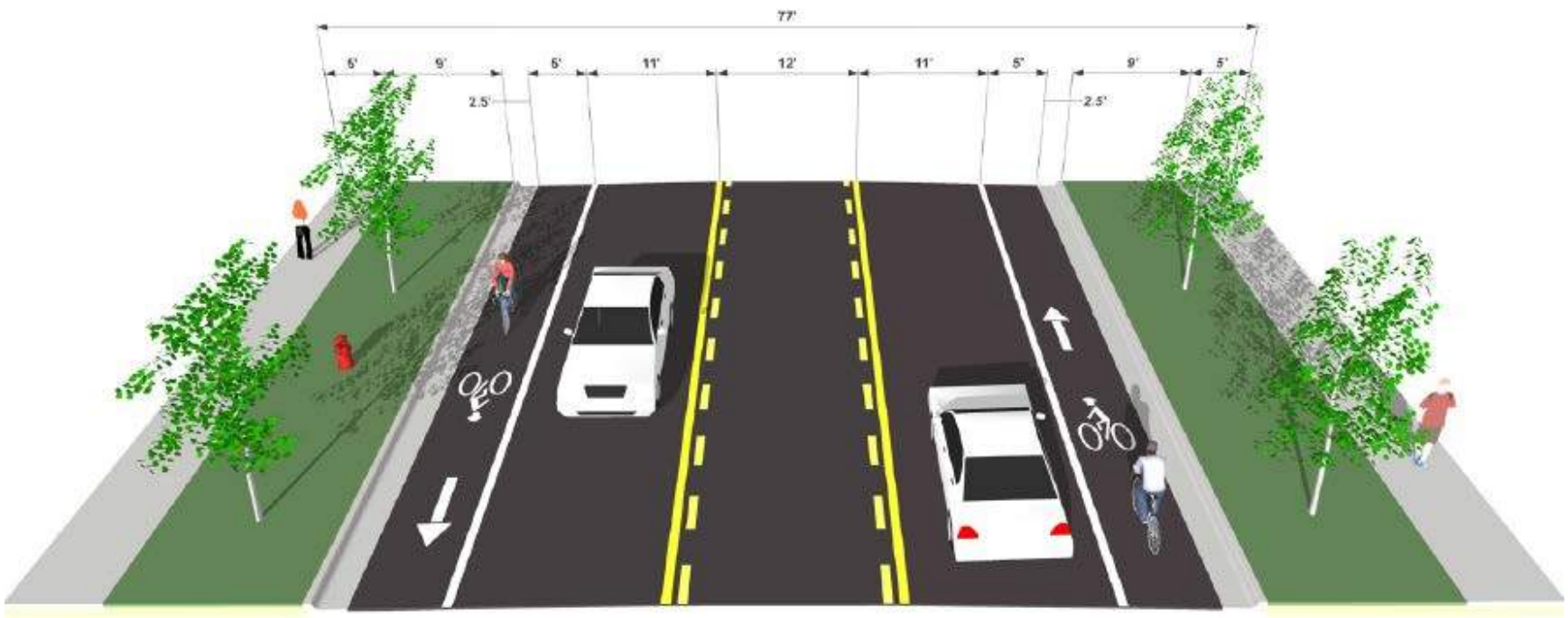
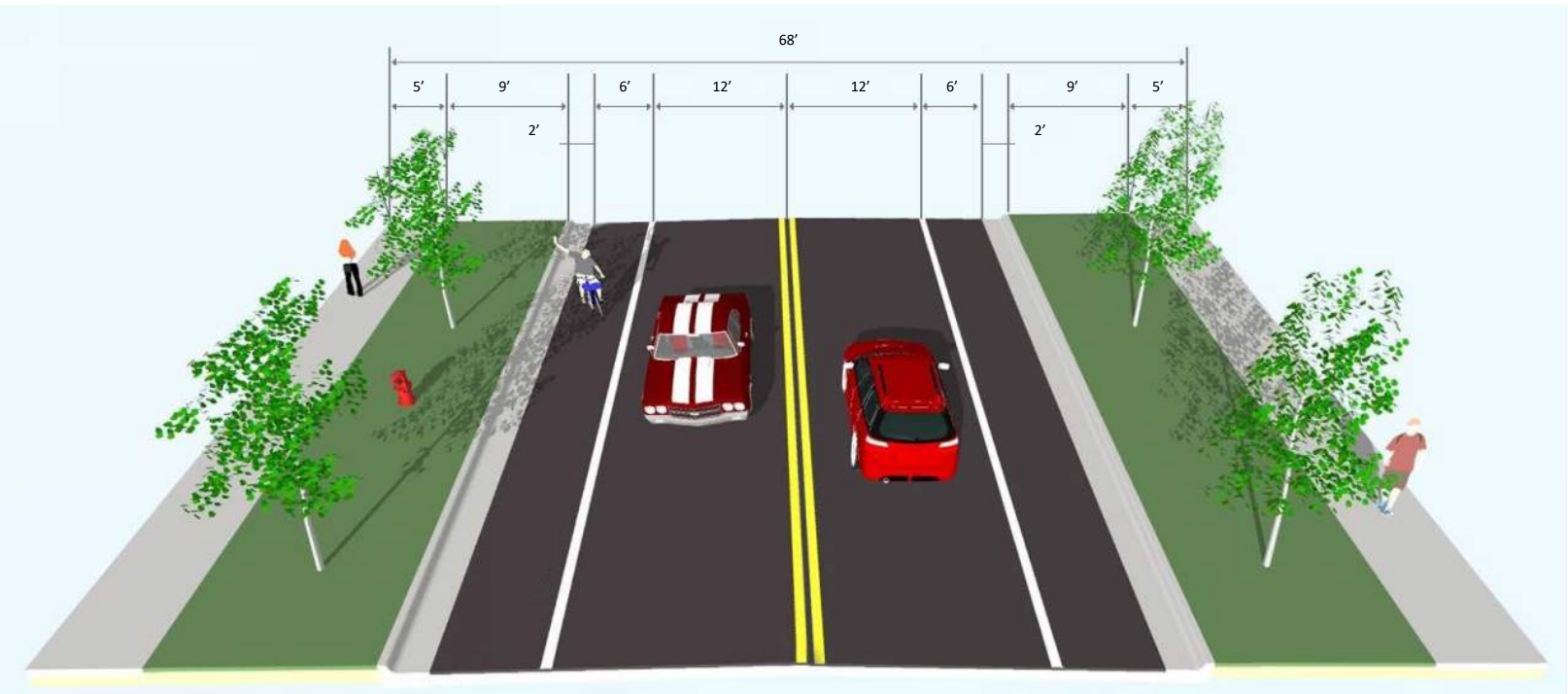


Figure 4-1 Continued

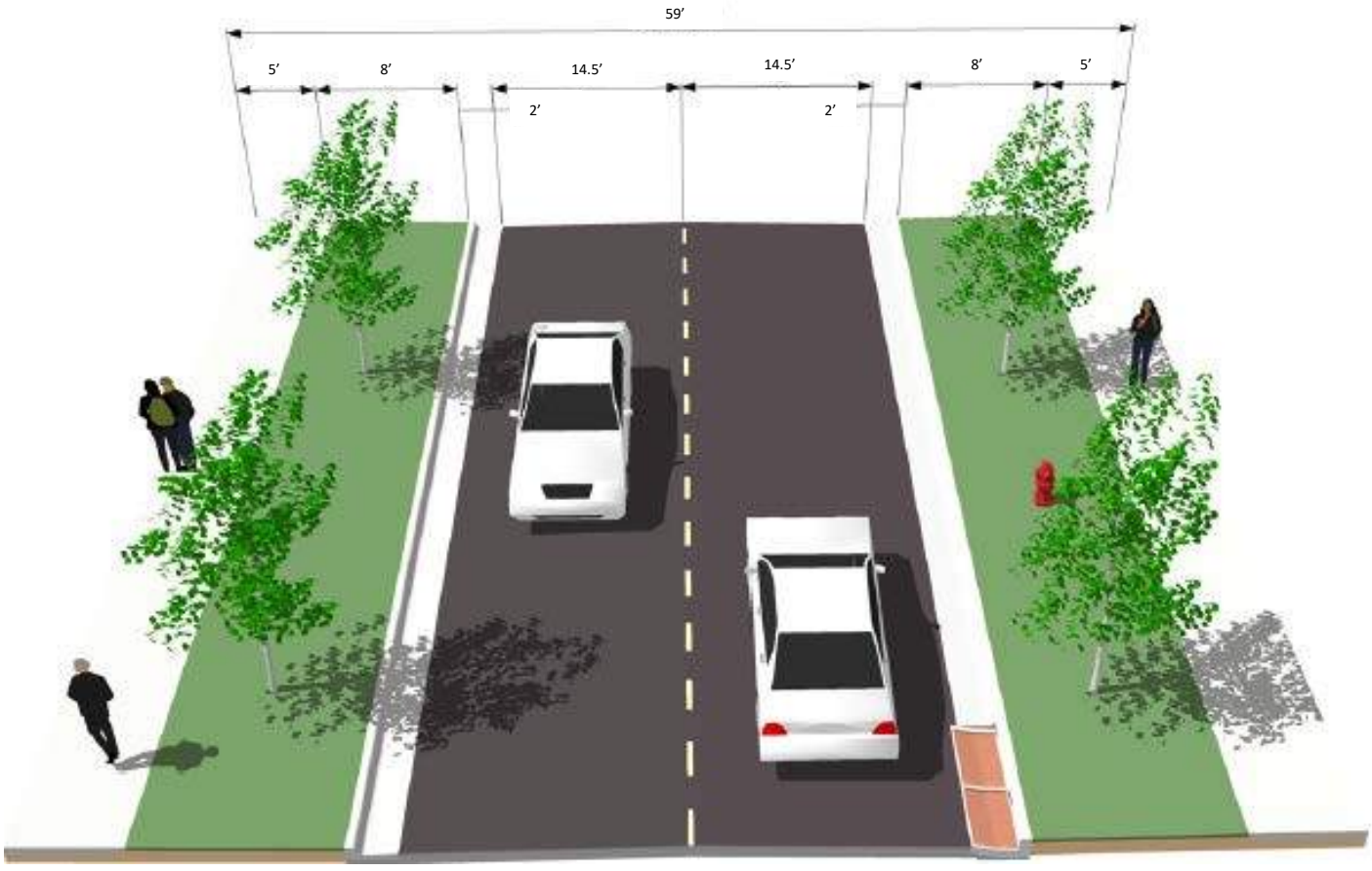
3-Lane Collector



2-Lane Local 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

All access management standards are included in this TMP as a reference. As guidelines and standards are updated frequently, the access management guidelines and standards used for development and construction are included in the Saratoga Springs Engineering Standards. Please contact the City for more information on how to access the Engineering Standards.

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.

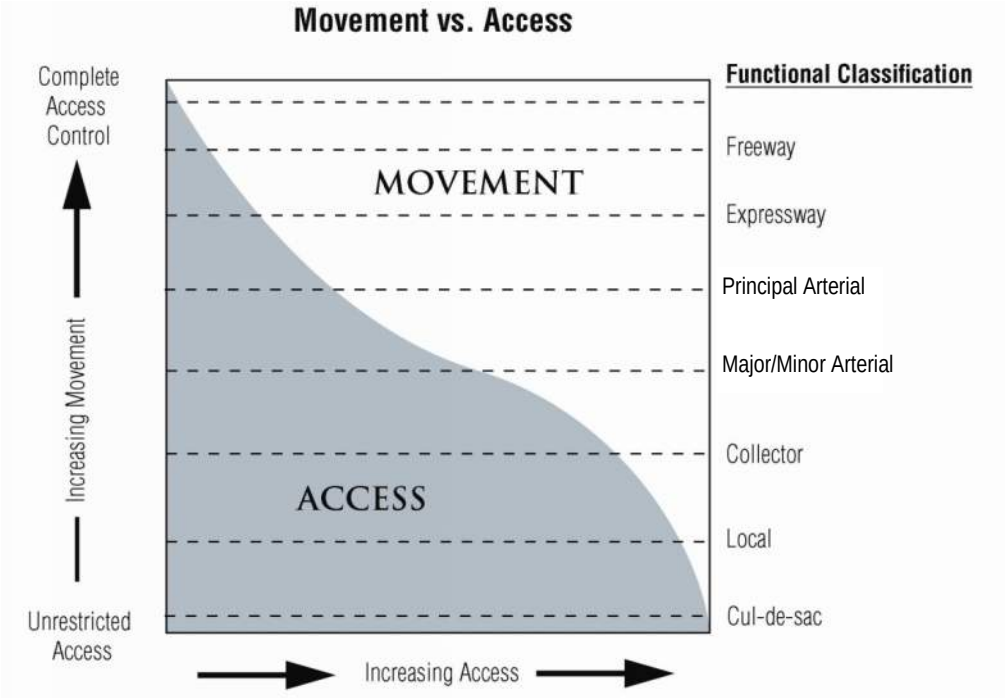
Arguably the most important concept in understanding the need for access management is to insure the movement of traffic and access to property is not mutually exclusive. No facility can both move traffic efficiently and provide unlimited access at the same time. **Figure 4-2** shows the relationship 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.

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.

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. See the City's Standard Technical Specifications for specific access management standards.

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.

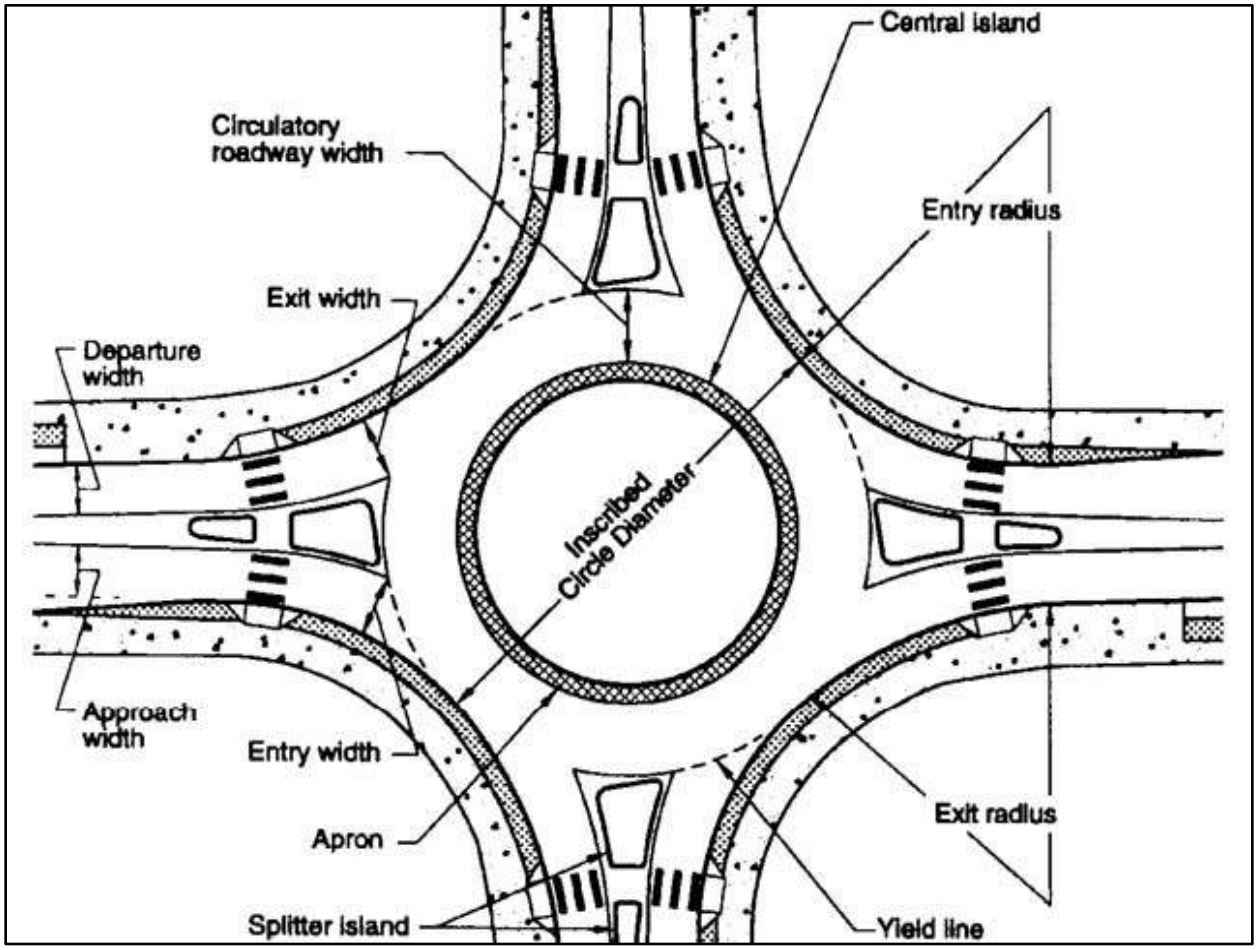


Figure 4-3 Typical Roundabout Design

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]:

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

- **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.

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.

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 and Intersection Improvements

A number of roadway and intersection 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 4-1** and Figure 4-4 outline these recommended improvements. Both **Table 4-1** and **Figure 4-4** will be regularly updated by the City as plans for development change and become adopted.

Table 4-1 Saratoga Springs City Recommended Transportation Improvements

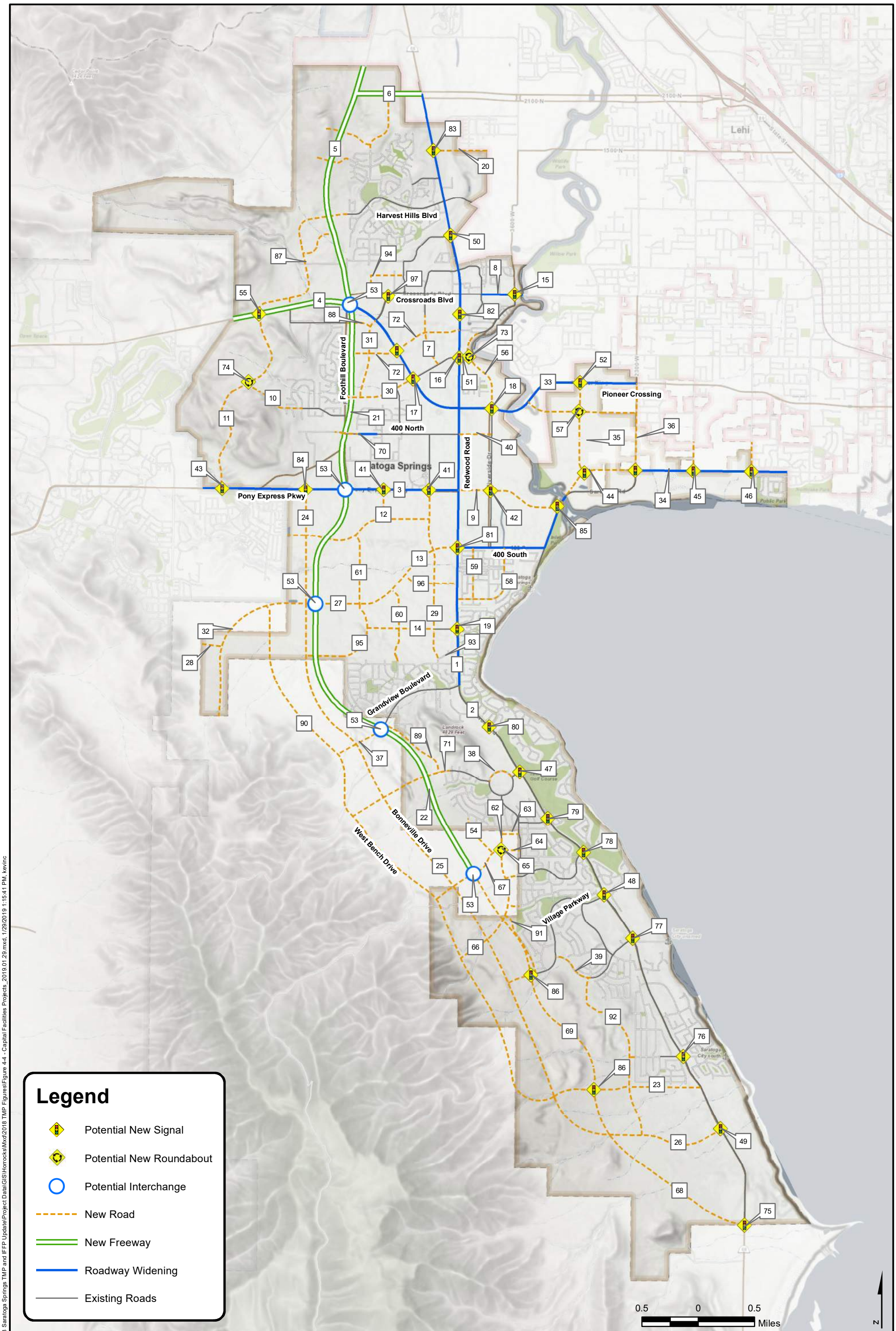
Project No.	Type of Improvement	Roadway or Location	Jurisdiction
1	Widen Arterial (7 Lanes)	Redwood Road (SR-68): Northern Border to Grandview Blvd	UDOT
2	Widen Arterial (5 Lanes)	Redwood Road (SR-68): Grandview Blvd to Southern Border	UDOT
3	Widen Arterial (5 Lanes)	Pony Express: Redwood Road to Western Border	Saratoga Springs
4	Widen to 6 Lane Freeway	Cedar Fort Road (SR-73): Mountain View Corridor Frontage to Western Border	UDOT
5	New 6 Lane Freeway	Mountain View Corridor: Northern Border to SR-73	UDOT
6	New 6 Lane Freeway	2100 North Connection: Eastern Border to Mountain View Corridor	UDOT
7	New Collector	Exchange Place: Crossroads Blvd to Market Street	Saratoga Springs
8	Widen Arterial (5 Lanes)	Crossroads Blvd: Commerce Drive to Eastern Border	Saratoga Springs
9	Widen Arterial (5 Lanes)	Pony Express Extension: Redwood Road (SR-68) to Saratoga Road	Saratoga Springs
10	New Collector (Widen Existing)	Talus Ridge Drive: Foothill Drive to Mt. Saratoga Boulevard	Saratoga Springs
11	New Collector	Mt. Saratoga Boulevard: Cedar Fort Road (SR-73) to Pony Express Parkway	Saratoga Springs
12	New Collector	400 West: Pony Express Parkway to New Road (Project 13)	Saratoga Springs
13	New Collector	New Road (Project 27) to Western Border	Saratoga Springs
14	New Collector	Redwood Road (SR-68) to New Road (Project 96)	Saratoga Springs
15	New Traffic Signal	Signal: Crossroads Blvd & Riverside Drive	Saratoga Springs
16	New Traffic Signal	Signal: Market Street & Redwood Road (SR-68)	UDOT
17	New Traffic Signal	Signal: Market Street & Pioneer Crossing (SR-145)	UDOT
18	New Traffic Signal	Signal: Riverside Drive & Pioneer Crossing (SR-145)	UDOT
19	New Traffic Signal	Signal: 800 South & Redwood Road (SR-68)	UDOT

Project No.	Type of Improvement	Roadway or Location	Jurisdiction
20	New Collector	2400 North: Redwood Road (SR-68) Eastern Border	Saratoga Springs
21	New 6 Lane Freeway with Frontage	Mountain View Corridor and Foothill Boulevard Extension: Cedar Fort Freeway (SR-73) to Grandview Boulevard	UDOT
22	New 4 Lane Freeway	Foothill Boulevard: Grandview Boulevard to Summerhill Drive (approx.)	UDOT
23	New Collector	New Roadway South of Harbor Park Way: Redwood Road to West Bench Drive	Saratoga Springs
24	New Collector	Bonneville Drive: Pony Express Pkwy to 800 South	Saratoga Springs
25	New Local Road	Bonneville Drive: 800 South to Foothill Boulevard	Saratoga Springs
26	New Collector	Bonneville Drive: Foothill Boulevard to Redwood Road (SR-68)	Saratoga Springs
27	New Minor Arterial	Redwood Road (SR-68) to Foothill Boulevard	Saratoga Springs
28	New Collector	Hidden Valley Highway to West Boundary	Saratoga Springs
29	New Collector	200 West: 600 South to 1000 South	Saratoga Springs
30	New Minor Arterial	Market Street: Pioneer Crossing (SR-145) to Mountain View Corridor	Saratoga Springs
31	New Local Road	Crossroads Blvd. Extension: Pioneer Crossing (SR-145) to Market Street	Saratoga Springs
32	New Minor Arterial	Hidden Valley Highway: Foothill Boulevard to Western Border	Saratoga Springs
33	Widen Arterial (7 Lanes)	Pioneer Crossing (SR-145): Eastern Border to Cedar Fort Road (SR-73)	UDOT
34	Widen Arterial (5 Lanes)	Pony Express Extension: Saratoga Road to Eastern Border	Saratoga Springs
35	New Collector	900 East Extension: Pony Express to Pioneer Crossing (SR-175)	Saratoga Springs
36	Widen Collector	Saratoga Road: Pony Express to Pioneer Crossing (SR-175) (Saratoga Springs Portion)	Saratoga Springs
37	New Collector	Grandview Blvd: Mountain View Corridor to West Bench Drive	Saratoga Springs
38	Local Collector Connection	Ring Road: Finish loop roadway	Saratoga Springs
39	Collector Extension	Wildlife Blvd Extension to Village Parkway	Saratoga Springs

Project No.	Type of Improvement	Roadway or Location	Jurisdiction
40	New Collector	400 North: Redwood Road (SR-68) to Riverside Drive	Saratoga Springs
41	New Traffic Signal	Traffic Signals: Pony Express Pkwy at 200 West and 600 West	Saratoga Springs
42	New Traffic Signal	Traffic Signal: Pony Express Pkwy and Riverside Drive	Saratoga Springs
43	New Traffic Signal	Traffic Signal: Pony Express Pkwy and Mt. Saratoga Boulevard	Saratoga Springs
44	New Traffic Signal	Traffic Signal: Pony Express Pkwy and Saratoga Road	Saratoga Springs
45	New Traffic Signal	Traffic Signal: Pony Express Pkwy and 1700 West	Saratoga Springs
46	New Traffic Signal	Traffic Signal: Pony Express Pkwy and 1100 West	Saratoga Springs
47	New Traffic Signal	Traffic Signal: Redwood Road (SR-68) and Ring Road	UDOT
48	New Traffic Signal	Traffic Signal: Redwood Road (SR-68) and Village Pkwy	UDOT
49	New Traffic Signal	Traffic Signal: Redwood Road (SR-68) and Bonneville Drive	UDOT
50	New Traffic Signal	Traffic Signal: Aspen Hills Boulevard and Redwood Road (SR-68)	UDOT
51	New Collector	Market Street: Redwood Road (SR-68) to Riverside Drive	Saratoga Springs
52	New Traffic Signal	Traffic Signal: Pioneer Crossing (SR-145) and Saratoga Road	UDOT
53	New Interchanges	Interchange: Mountain View Corridor and Foothill Boulevard	UDOT
54	New Local Road	Cahill Avenue to Summerhill Drive	Saratoga Springs
55	New Traffic Signal	Traffic Signal: Cedar Fort Road (SR-73) & 800 West	Saratoga Springs
56	New Local Collector	Riverside Dr: End of Existing to Pioneer Crossing	Saratoga Springs
57	New Roundabout	900 East & 7750 North (Estimated)	Saratoga Springs
58	Widen to Collector (3 Lanes)	Schoolhouse Road from Redwood Road to 400 South	Saratoga Springs
59	Widen to Collector (3 Lanes)	South Highpoint Drive from 400 South to Schoolhouse Road	Saratoga Springs
60	New Local Roads	Connection Roads South of 800 South	Saratoga Springs

Project No.	Type of Improvement	Roadway or Location	Jurisdiction
61	New Collector	600 West: 400 South to 600 South	Saratoga Springs
62	New Local Road	Hunter Drive: Cimarron Ave. to Summerhill Dr.	Saratoga Springs
63	New Local Road	Honeysuckle Dr: Colt Drive to Hunter Drive	Saratoga Springs
64	New Local Road	Lily Lane: End of Existing to Hunter Drive	Saratoga Springs
65	New Roundabout	Hunter Drive & Columbine Circle	Saratoga Springs
66	New Collector	Hunter Drive: Columbine Circle to West Bench Drive	Saratoga Springs
67	New Collector	Summerhill Drive: Hunter Drive to West Bench Drive	Saratoga Springs
68	New Minor Arterial	Foothill Boulevard: New Collector (project 24) to Redwood Road	UDOT
69	New Major Arterial	Foothill Boulevard: End of Freeway (project 23) to new collector	UDOT
70	New/Widen Collector	400 North: Foothill Boulevard and Grand Sierra Way	Saratoga Springs
71	New Local Collector	Lariat Boulevard: End of Existing to West Bench Drive	Saratoga Springs
72	New Local Collector	Foothill Boulevard to Redwood Road	Saratoga Springs
73	New Roundabout	Roundabout: Market Street and Riverside Drive	Saratoga Springs
74	New Roundabout	Roundabout: Talus Ridge Drive and Mt. Saratoga Blvd.	Saratoga Springs
75	New Traffic Signal	Traffic Signal: Redwood Rd. (SR-68) & Foothill Blvd.	UDOT
76	New Traffic Signal	Traffic Signal: Redwood Rd. (SR-68) & Harbor Pkwy.	UDOT
77	New Traffic Signal	Traffic Signal: Redwood Rd. (SR-68) & Wildlife Blvd.	UDOT
78	New Traffic Signal	Traffic Signal: Redwood Rd. (SR-68) & Stillwater Dr.	UDOT
79	New Traffic Signal	Traffic Signal: Redwood Rd. (SR-68) & Fairway Blvd.	UDOT
80	New Traffic Signal	Traffic Signal: Redwood Rd. (SR-68) & Centennial Blvd.	UDOT
81	New Traffic Signal	Traffic Signal: Redwood Rd. (SR-68) & 400 South	UDOT

Project No.	Type of Improvement	Roadway or Location	Jurisdiction
82	New Traffic Signal	Traffic Signal: Redwood Rd. (SR-68) & Commerce Dr.	UDOT
83	New Traffic Signal	Traffic Signal: Redwood Rd. (SR-68) & 2400 North	UDOT
84	New Traffic Signal	Traffic Signal: Pony Express Pkwy. & Bonneville Dr.	Saratoga Springs
85	New Traffic Signal	Traffic Signal: Pony express Pkwy. & Saratoga Rd.	Saratoga Springs
86	New Traffic Signal	Traffic Signals: Foothill Boulevard at Village Parkway and Project 23	Saratoga Springs
87	New Collector	Mt. Saratoga Boulevard: Cedar Fort Road (SR-73) to connection with Harvest Hills Blvd.	Saratoga Springs
88	New Local Road	1200 North: Foothill Boulevard to Crossroads Boulevard	Saratoga Springs
89	New Local Road	Frontage Road: Lariat Boulevard to Grandview Boulevard	Saratoga Springs
90	New Local Road	West Bench Drive: Hidden Valley Highway to Project 23	Saratoga Springs
91	New Local Road	Frontage Road: Hunter Drive to Village Parkway	Saratoga Springs
92	New Collector Road	Bonneville Drive to Wildlife Boulevard	Saratoga Springs
93	New Local Road	1000 South: Redwood Road (SR-68) to 200 West	Saratoga Springs
94	New Local Road	400 West to Crossroads Boulevard	Saratoga Springs
95	New Collector	600 South to Bonneville Drive	Saratoga Springs
96	New Collector	Redwood Road to New Arterial (Project 27)	Saratoga Springs
97	New Traffic Signal	Crossroads Boulevard & 1400 North	Saratoga Springs



O:\2018\UT-1003-1801 2018 Saratoga Springs TMP and IFFP Update\Project Data\GIS\Horrocks\Mxd\2018 TMP Figures\Figure 4-4 - Capital Facilities Projects_2019.01.29.mxd, 1/29/2019 1:15:41 PM, kevinc

HORROCKS ANNIVERSARY 1968-2018

2162 West Grove Parkway
Suite 400
Pleasant Grove, UT 84062
(801) 763-5100

Capital Facilities Projects

Saratoga Springs Transportation Master Plan

DATE 1/29/2019

DRAWN

Figure 4-4

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 and Foothill Boulevard (2100 North to Grandview Boulevard)

Mountain View Corridor and Foothill Boulevard from 2100 North to Grandview Boulevard 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 and Foothill Boulevard extensions are proposed on the MAG 2020-2040 metropolitan transportation plan as part of phase 3 (2031-2040). The updated alignment for this corridor was recently updated in 2018 and is shown in **Figure 3-3**. The facility is expected to be a 6-Lane freeway facility with one-way frontage roads. This project will need extensive environmental clearance and the City will need to coordinate with UDOT when it comes time to begin that process. 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/img/transportation/Studies/West_Lake_Final.pdf
- **Lake Mountain Transportation Study**
  http://mountainland.org/img/transportation/Studies/Lake%20Mountain%20All.pdf
- **Utah County East-West Study**
  http://mountainland.org/img/transportation/Studies/East-West%20Final%20Report.pdf

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 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 4-5** gives an example of Mountain View Corridor in Salt Lake County and represents an idea of how the freeway section may look in Saratoga Springs. The initial construction phase will include the one-way frontage roads. 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 4-5 Mountain View Corridor Extension Example

4.10.1.1 Pony Express Parkway to Grandview Boulevard

The desire from the City and SLR is to continue the 6-Lane freeway with frontage roads from Pony Express Parkway to Grandview Boulevard to improve mobility and access to future development in the area. The

most recent study indicates that this section only requires a 6-Lane traditional freeway segment. Although it will be built to the same cross-section as the northern section, the funding for the frontage roads will fall upon the City. Therefore, it is recommended that the City continually coordinate with development in the area to ensure the proper funding is acquired for this section.

4.10.2 Hidden Valley Highway

As population increases in Saratoga Springs and also in Eagle Mountain, the need for greater east-west mobility through the area will increase rapidly. The Hidden Valley Highway is intended as a Minor Arterial roadway connecting Eagle Mountain with Saratoga Springs. The Hidden Valley Highway will be access controlled like other highway facilities in the county with appropriate intersection spacing in compliance with UDOT and City standards.

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.

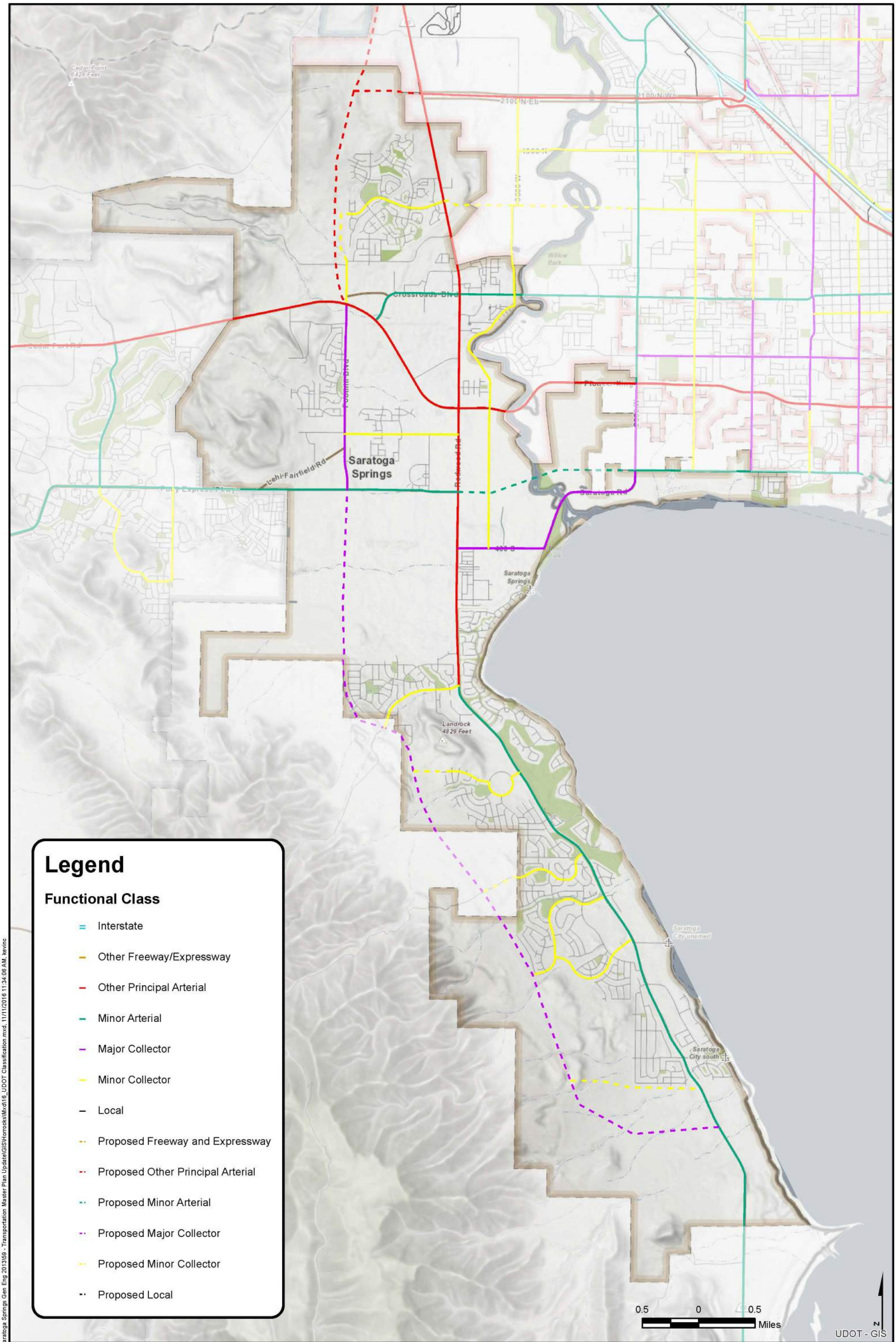
MAG accepts applications for federal funds through local and regional government jurisdictions. Transportation related projects are selected for funding every two years by the MAG Technical Advisory and Regional Planning committees. The selected projects form the Transportation Improvement Program (TIP). 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.

Since the adoption of the TMP in 2013, the City has had great success in procuring federal funding through the TIP selection process. The following lists the projects selected in the TIP process for 2014 and 2017.

- **Pony Express Parkway Widening**
- **Redwood Road Widening**
- **Redwood Road Trail**
- **Crossroads Boulevard Widening**
    - **New Bike and Pedestrian Bridge Access across the Jordan River**
- **Utah Lakeshore Trail: Saratoga Road to Loch Lohmond Subdivision**



O:\12013\PG-163-1301 Saratoga Springs Gen Eng 2013\59 - Transportation Master Plan Update\GIS\Horrocks\Mxd\16_UDOT Classification.mxd, 11/11/2016 11:34:06 AM, kevinc

HORROCKS ENGINEERS

2162 West Grove Parkway
Suite 400
Pleasant Grove, UT 84062
(801) 763-5100

UDOT Functional Classification

Saratoga Springs Transportation Master Plan

DATE 11/11/2016

DRAWN

Figure 5-1

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

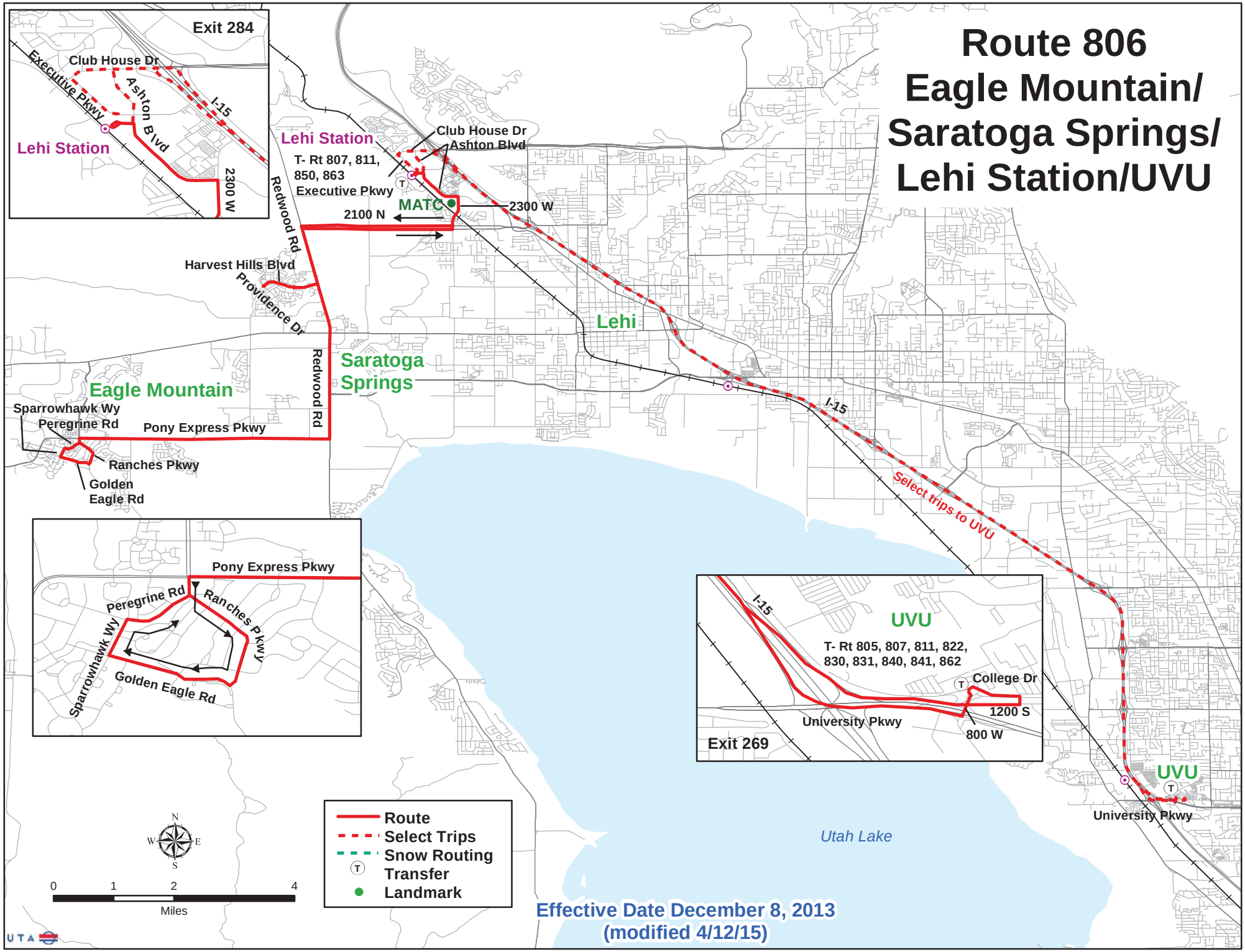
Impact fees are a way for a community to obtain funds to assist in the construction of infrastructure improvements resulting from and needed to serve new growth. The premise behind impact fees is that if no new development occurred, the existing infrastructure would be adequate. Therefore, new developments 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.

6.0 Appendix

Route 806 Eagle Mountain/ Saratoga Springs/ Lehi Station/UVU



Effective Date December 8, 2013
(modified 4/12/15)

ADDENDUM #1 TO CORRIDOR AGREEMENTS 068007 AND 098477
SR-68 WITHIN THE LIMITS OF THE CITY OF SARATOGA SPRINGS

CITY OF SARATOGA SPRINGS
Federal ID No. 87-0575087

26538

ADDENDUM #1

THIS ADDENDUM, made and entered into this 10 day of January, 20 17, by and between the **UTAH DEPARTMENT OF TRANSPORTATION**, hereinafter referred to as "**UDOT**" and the **CITY OF SARATOGA SPRINGS**, a municipal corporation in the State of Utah, hereinafter referred to as the "**CITY**".

WITNESSETH:

WHEREAS, UDOT and the **CITY** entered into agreement #068007 on 1 July 2005 and agreement #098477 on 29 October 2008 to preserve a corridor and establish a traffic signal plan and access control plan along the SR-68 within the limits of the **CITY**, to be in accordance with the **CITY's** current transportation master plan and to be in accordance with **UDOT's** current Access Management Standards and practices, and

WHEREAS, UDOT has a project under design which includes the installation of new traffic signals along SR-68, Project No. F-0068(92)26, and

WHEREAS, the **CITY** has grown in population and subdivisions have been constructed wherein local streets now connect to SR-68 since the execution of the aforementioned agreements, and

WHEREAS, this **ADDENDUM** is now written to define and update existing, warranted, and proposed traffic signal locations within the current **CITY** limits.

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

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

    - Foothill Boulevard (5200 South) (Proposed)
    - Bonneville Drive (4700 South) (Proposed)
    - Harbor Park Way (Proposed)
    - Wildlife Boulevard (Proposed)
    - Village Parkway (Proposed)
    - Stillwater Drive (Warranted, to be constructed with project)
    - Fairway Boulevard (Proposed)
    - Ring Road (Warranted, to be constructed with project)
    - Centennial Boulevard (Proposed)
    - Grandview Boulevard (Existing)
    - Parkway Boulevard (Warranted, to be constructed with project)

ADDENDUM #1 TO CORRIDOR AGREEMENTS 068007 AND 098477
SR-68 WITHIN THE LIMITS OF THE CITY OF SARATOGA SPRINGS

CITY OF SARATOGA SPRINGS
Federal ID No. 87-0575087

- 400 South (Proposed)
- Pony Express Parkway (Existing)
- 400 North (Existing)
- Pioneer Crossing (SR-145) (Existing)
- Market Street (Proposed)
- South Commerce Drive (Proposed)
- Crossroads Boulevard (Existing)
- North Commerce Drive (Existing)
- Aspen Hills Boulevard (Proposed)
- Harvest Hills Boulevard (Proposed)
- 2400 North (Proposed)

2. It is understood by both parties that the current access management category remains in place, which in part states traffic signal spacing is at least 2,640 feet except for the segment between South Commerce Drive and North Commerce Drive, which is at least 1,320 feet.

3. It is further understood by both parties that even though traffic signal spacing is as noted in #2 above, it is reasonable to compromise and make exceptions to signalize some intersections based on the **CITY'S** master plan development and traffic patterns, and without impeding acceptable traffic flow.

4. All terms and conditions of the existing **UDOT** agreements 068007 and 098477 shall remain in effect. No part of this **ADDENDUM** shall relieve the **CITY** of any responsibility or liability associated with the original agreements.

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: 1-3-2017

(IMPRESS SEAL)

City of Saratoga Springs Corporate Seal 1898 State of Utah

CITY OF SARATOGA SPRINGS
Municipal Corporation in the State of Utah

By: _____
Title: MAYOR JIM MILLER
Date: 1-3-2017

ADDENDUM #1 TO CORRIDOR AGREEMENTS 068007 AND 098477
SR-68 WITHIN THE LIMITS OF THE CITY OF SARATOGA SPRINGS

CITY OF SARATOGA SPRINGS
Federal ID No. 87-0575087

****

RECOMMENDED FOR APPROVAL: UTAH DEPARTMENT OF TRANSPORTATION

By: _____
Region Three Traffic Operations Engineer

Date: 1-10-17

By: _____
Region Three Director

Date: 1/10/17

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: 1/12/17

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.)