Spanish Fork City

Transportation and Traffic Circulation Element of the General Plan

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Prepared by

HORROCKS ENGINEERS

Table of Contents

List of Figures

List of Tables

Executive Summary

Spanish Fork City is located in southern Utah County and is situated near the junction of I-15 and US-6. Some of its neighboring cities include Springville, Mapleton, Salem and Payson. Spanish Fork City has a considerable amount of open space to be developed, both within the city limits and within the surrounding areas that the City plans to annex from the County in the future. Due to the rural nature of these open areas, the City has great potential for growth. Similar to the overall growth in Utah County, Spanish Fork has also experienced rapid residential and commercial growth in recent years. The City is expected to continue to grow from a population of approximately 28,800 in 2008 to approximately 61,900 people by the year 2040.

Due to this expansive growth, many of the transportation facilities throughout the City are experiencing increasing congestion and may soon become obsolete and in need of improvements. Other new transportation facilities will be needed on the outskirts of the City as a result of new growth in those areas. The location of Spanish Fork City also dictates that in addition to serving the transportation needs of the City itself, the transportation system must also accommodate the transportation demands from adjacent communities such as Payson, Salem, Mapleton, etc.

Recognizing the need to update the Transportation and Traffic Circulation Element of the General Plan (TTE) to accommodate the future development throughout and around the City, travel demands that will result from the planned land uses outlined in the City's General Plan have been modeled and documented. The results of that modeling process were used to make recommendations regarding future transportation improvements. This TTE is a culmination of the master plan update process and is intended to guide the City's transportation system for the next several years.

This TTE discusses the various elements of transportation in Spanish Fork City, including traffic volumes and conditions, roadway functional classification, typical street sections, alternative transportation modes, traffic signals, access management, corridor preservation, capital improvements, and more. Important items from the TTE are summarized in the following paragraphs.

Roadway Elements

To accommodate the growth that will occur throughout the City and simultaneously maintain the quality of life desired by the city residents, several revisions were made to the City's existing plan. The updated recommended roadway plan (Figure 11) outlines the recommended roadway functional classifications, number of lanes, typical cross-sections, and right-of-way required to accommodate future traffic in the year 2040 on each roadway throughout the City. In addition, this plan also demonstrates the locations for recommended intersections improvements. This TTE also:

- Outlines new typical cross-sections to be applied to each roadway functional classification;

- Provides recommendations on how to ensure safety is a primary goal in the design and operations of the City's roadways;
- Discusses the implementation of different traffic calming measures;
- Describes proper access management guidelines and procedures;
- Expounds on traffic impact study requirements for developers; and
- Summarizes the practice of preserving future transportation corridors, coordinating with other agencies, and implementing impact fees for developers.

Alternative Transportation Elements

To provide a well-balanced transportation system in Spanish Fork City, transportation alternatives to the automobile need to be encouraged and developed. As the City grows and develops, alternative transportation elements such as public transit and bicycle/pedestrian facilities will play an increasing role in the overall transportation system. This TTE discusses future opportunities to encourage alternative modes of transportation throughout the City including car pooling, park-and-ride lots, local Utah Transit Authority (UTA) bus routes, bus rapid transit, commuter rail transit, and trail plans.

Other Transportation Related Elements

In addition to the roadway and alternative transportation elements, this TTE addresses other transportation related elements such as safety, traffic calming, access management, and corridor preservation.

One of the main goals of the TTE is to envision traffic growth and provide for adequate facilities as the need arises; constructing these facilities to make possible safe operations is of equal importance. As a result, all of the City's transportation facilities should be constructed and maintained to applicable design and engineering standards.

There are several types of traffic calming measures that can be implemented to reduce speeds on residential roadways. In summary, those measures include the use of traffic control devices, actual street modification, and ultimately route modification where deemed necessary. There are appropriate situations and locations where traffic calming can be used; however, the City must be cautious and organized in developing and implementing a traffic calming program, or more problems could result than are solved. The general approach involves conducting an engineering study to determine the nature and extent of the traffic problems with recommendations for traffic calming measures to address the identified problems. Once a traffic calming measure is selected, it should be implemented on a temporary basis and monitored to evaluate the success of the treatment. Details of the different types and implementation of traffic calming measures are outlined in this TTE.

Access management principles include controlling the location, amount, spacing, and type of driveways and intersections on arterial and collector streets. Managing access design will minimize traffic conflicts and maximize the capacity of major travel routes. This TTE provides access management guidelines for the City to use as more developments arise.

Corridor preservation allows a city to identify and protect land from development that will be needed for future transportation corridors. There are new roads being recommended throughout the City that will be needed to accommodate future transportation demands. Through corridor preservation practices such as exactions, developer incentives and agreements, fee simple acquisitions, transfer of development rights and/or densities, land use controls, and purchases of options and easements land that will be needed for future transportation facilities can be preserved and protected from development. By preserving these corridors now, the City will ultimately lower the cost of implementing these facilities in the future as right-of-way for the facilities will have already been secured.

Transportation Improvement Program

Regardless of improvements or enhancements to alter transportation modes, private single-occupant vehicles will remain as the predominant form of transportation in Spanish Fork City for the foreseeable future. As such, most of the recommended improvements involve roadway infrastructure that are anticipated to accommodate future traffic demand projections and maintain acceptable operating conditions.

As development continues throughout Spanish Fork City, the TTE should be consulted to identify improvements that may benefit from work or funds required by individual developers. This would ensure that the correct amount of right-of-way is preserved. In addition, this would assist in identifying projects that the developer may be required to construct or contribute to as part of his or her required on- and/or off-site improvements. However, several projects are not anticipated to be part of any new developments or will not be able to wait for development to occur before the improvements are needed. These projects may not be able to benefit from private funding sources and the City will have to come up with other funding alternatives for these projects.

A Transportation Improvement Program (TIP) must be reviewed and updated on a continual basis in order to work as designed. The TIP should be modified by deleting projects that have been completed or are no longer considered a priority, as well as adding new projects that were not previously identified. A good time for an annual review and update is in January as this provides sufficient time for any changes to the TIP to be incorporated into the budget planning process for that year. Continual maintenance is critical for the TIP to remain effective over time.

1.0 Introduction

Spanish Fork City is located in southern Utah County and is situated near the junction of I-15 and US-6. Some of its neighboring cities include Springville, Mapleton, Salem and Payson. A vicinity map of the City can be seen in Figure 1. Spanish Fork City has a considerable amount of open space to be developed, both within the city limits and within the surrounding areas that the City plans to annex from the County in the future. Due to the rural nature of these open areas, the City has great potential for growth. Similar to the overall growth in Utah County, Spanish Fork has also experienced rapid residential and commercial growth in recent years. The City is expected to continue to grow from a population of approximately 28,800 in 2008 to approximately 61,900 people by the year 2040. Population data was provided by Spanish Fork City.

Due to this expansive growth, many of the transportation facilities throughout the City are experiencing increasing congestion and may soon become obsolete and in need of improvements. Other new transportation facilities will be needed on the outskirts of the City as a result of new growth in those areas. The location of Spanish Fork City also dictates that in addition to serving the transportation needs of the City itself, the transportation system must also accommodate the transportation demands from adjacent communities such as Payson, Salem, Mapleton, etc.

Spanish Fork City recognizes the need to update the Transportation and Traffic Circulation Element of the General Plan (TTE) to accommodate the future travel demand throughout the City that will result from the planned land uses outlined in the City's General Plan. This TTE is a culmination of the master plan update process and is intended to guide the City's transportation system for the next several years.

This TTE discusses the various elements of the transportation in Spanish Fork City, including traffic volumes and conditions, roadway functional classification, typical street sections, alternative transportation modes, traffic signals, access management, corridor preservation, and capital improvements.

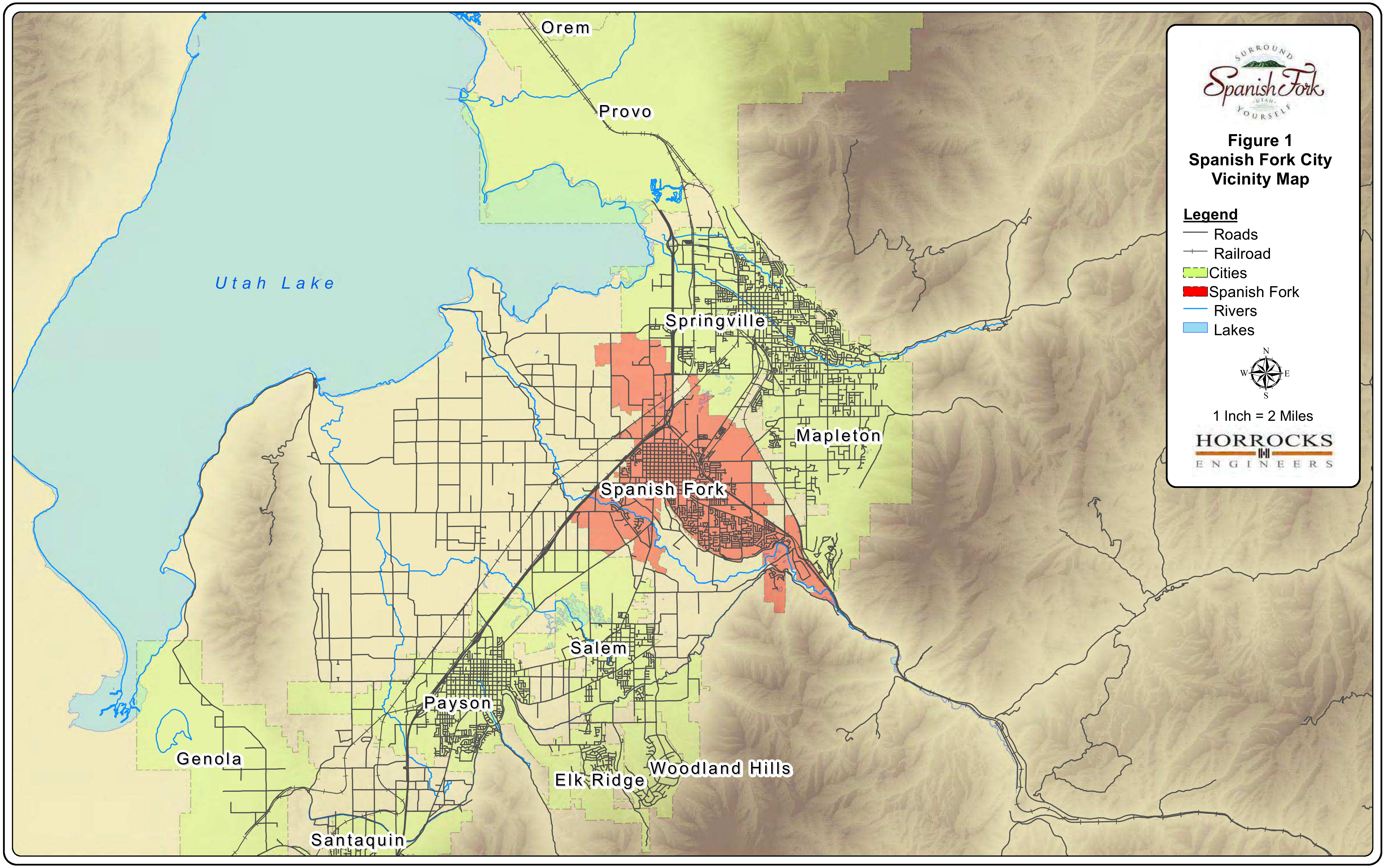

Figure 1
Spanish Fork City
Vicinity Map
Legend
Roads
Railroad
Cities
Spanish Fork
Rivers
Lakes
N
W
E
S
1 Inch = 2 Miles
HORROCKS
ENGINEERS
Spanish Fork
SURROUND YOURSELF
UTAH
Orem
Provo
Utah Lake
Springville
Mapleton
Spanish Fork
Salem
Payson
Genola
Elk Ridge
Woodland Hills
Santaquin

2.0 Transportation Goals and Policies

This section of the TTE outlines the general transportation desires of the Spanish Fork community. This section assists City leaders, planners, engineers, and land developers in developing transportation guidelines, standards, and solutions that reflect the unique characteristics of Spanish Fork City. City staff and leaders can use these goals and policies to evaluate transportation alternatives that may not be specifically addressed in the City's TTE and assure that any recommended alternatives be in harmony with the City's transportation needs and desires. The City's Transportation Goals and Policies are outlined as follows:

Safe Transportation System

Background:

Automobile accidents are one of the leading causes of injury and death in the United States. While we often freely accept the trade-off of increased exposure to accidents versus travel conveniences when we use automobiles, there is an inherent trust in the public infrastructure to provide reliable safety standards.

Goal:

Set safety of the transportation system as a high priority and work diligently to meet applicable safety standards.

Policies and Implementation:

A. Policy: Require all major subdivision developments to provide multiple entrances for emergency vehicles.

   Implementation: To be implemented through the Planning Department during the site plan review process.

B. Policy: Widen, improve, or replace bridges that are presently obstacles to traffic flow and safety.

   Implementation: To be implemented through a review of all existing bridges by the Engineering Department in order to determine if each structure meets safety standards.

C. Policy: Protect pedestrian crossings for children, particularly near schools and recreation areas. Encourage development of school routing plans and recreation plans which minimize vehicle/pedestrian conflicts.

Implementation: To be implemented through an annual review of the safe walking routes with the School District, PTA, City Public Works, and Engineering Department. The Engineering and Planning Departments will work with the School District to plan future school locations and walking routes within the existing municipal and annexation policy declaration boundaries consistent with the transportation system.

D. Policy: Establish speed limits based on traffic engineering analysis. Enforce speed limits, especially near schools and in residential areas.

Implementation: To be implemented by the Engineering Department completing a speed study for areas of concern and the Spanish Fork City Police Department enforcing safe speeds. A logical progression of speed limit areas should be maintained throughout the City such that similar areas and street types are consistent in speed limitations.

E. Policy: Improve guidance of traffic on streets through striping, raised medians and islands, reduction of roadside obstructions, and other traffic engineering solutions.

Implementation: To be implemented by the Engineering Department through review of intersections and developments that are problem areas for possible traffic channelization solutions.

F. Policy: Require all roadway features to meet minimum design standards established by the American Association of State Highway and Transportation Officials (AASHTO). All signs, pavement markings, and traffic signals must meet standards established by the Manual of Uniform Traffic Control Devices (MUTCD).

Implementation: To be implemented through the design review process conducted by the City's Engineering Department.

G. Policy: Upgrade or install pedestrian safety features at intersections and crossings areas as deemed necessary by City Staff which may include but are not limited to:

a. Warning lights and audible signals at high volume intersections
b. ADA ramps at all crossing areas
c. Street lights on both sides of the street at mid-block crossings and flashing beacons where feasible (note: mid-block crossings should be minimized.)
d. Raised median pedestrian refuge where feasible on roadways with four or more lanes
e. Stricter enforcement of jay-walking through signage and increased monitoring
f. Optimal sidewalk conditions for walking and wheelchairs through repairing cracks and bumps, minimizing slopes, and maintaining visibility at corners

<u>Implementation:</u> To be implemented through regular review of pedestrian facilities by City Staff.

H. <u>Policy:</u> Abide by UDOT Manual and Specifications on School Crossing Zones, Supplement of Part VII of the MUTCD.

<u>Implementation:</u> To be implemented through the design review process with the City's Engineering Department.

I. <u>Policy:</u> Establish pedestrian safety features specifically aimed at school routes.

<u>Implementation:</u> To be implemented by establishing safe walking programs with the School District, developing safe walking routes and plans, and then educating children as to the optimal safe routes to travel to school.

Circulation Flow

Background:

Many cities throughout the Wasatch Front have established their street networks on a grid system. In order to provide proper circulation flow on these grid systems, a hierarchy of roadway functional classifications should be established. Continuity in the defined functional classification of roadways should occur between jurisdictions. Discontinuity in the functionality of each roadway causes confusion and congestion throughout the entire street network. Each roadway should serve a distinct function and purpose.

Goal:

Design transportation facilities to assure efficient traffic flow throughout the City with compatible connections to regional transportation systems.

Policies and Implementation:

A. <u>Policy:</u> The Spanish Fork City's TTE is designed to have a hierarchy of streets compatible with the land use the street system serves.

<u>Implementation:</u> To be implemented by abiding by the hierarchy of streets identified in the TTE (Figure 12). Right-of-way for all streets (Figure 13 and Figure 14) shall be designed for all traffic to be served according to what the land uses dictate.

B. <u>Policy:</u> The principle function of arterial streets is to move large volumes of through traffic on a continuous route over a substantial distance. To ensure that arterial streets function properly, access management principles and standards (as outlined in Chapter 0), as well as parking restrictions, should be implemented and enforced.

<u>Implementation:</u> To be implemented through the Planning and Engineering Departments.

C. Policy: The street system shall include a hierarchy of vehicle usage. The TTE will require trucks to stay on designated truck routes, which are primarily limited to arterial streets.

Implementation: To be implemented by passing a truck route ordinance mandating trucks to travel on designated truck routes and that roadway designs provide adequate turning radii at intersections based on the specific roadway classifications (Table 16). In addition, the Engineering Department shall develop a signage system that will inform heavy vehicle operators to drive on designated truck routes. The Planning Department shall ensure that land uses requiring truck delivery be located along roadways that can accommodate trucks.

D. Policy: Minimize traffic speeds on local streets by providing direct routes to collector streets. In addition, street designs should be compatible with street functions.

Implementation: To be implemented by requiring that major housing units, commercial developments, and major public buildings have access onto arterial and collector roads to minimize their impacts on the community. In addition, this policy shall be implemented by mandate through ordinance requiring a traffic impact study on these types of developments. Both the Planning and Engineering Departments should work with all new developments during the review process to ensure efficient design in conformance to the standards set in the City's TTE.

E. Policy: The established hierarchy of streets shall be followed by classifying all new roads according to their function and purpose.

Implementation: To be implemented by the Planning and Engineering Departments.

F. Policy: Provide for internal circulation to occur within the City by designing a functional hierarchy of streets to assist in dispersing traffic. This hierarchy of streets should incorporate a broad network of arterial streets with smaller internal networks of collector and local roads.

Implementation: To be implemented through the Planning and Engineering Departments by establishing a series of roadways within commercial districts to allow for the dispersal of traffic thereby reducing congestion. Residential subdivisions should have a minimum of two access connections to neighboring subdivisions or streets. Residential areas should be interconnected with adjacent neighborhoods to prevent children from traveling on arterial and collector streets to reach nearby neighborhoods and schools.

G. Policy: The City's circulation system shall be designed to accommodate the regional transportation.

Implementation: To be implemented through the Engineering Department, who will be responsible for receiving updated information regarding projected traffic volumes and regional transportation plans within the City at least annually, or as available, from both MAG and UDOT.

Level of Service

Background:

Level of Service (LOS) is a traffic engineering term for describing and measuring the level of travel delay experienced by vehicles. LOS ranges from free-flow traffic conditions (LOS A) to extremely congested travel (LOS F). Since traffic and overall travel is generally most congested at morning and afternoon peak periods, typical practice generally allows for some driver discomfort during these peak periods while providing better LOS throughout the remainder of the day.

Goal:

Improve traffic flow and circulation to major activity centers in the City. Provide a street system that operates at a functional Level of Service (LOS) standard during peak-hour periods.

Policies and Implementation:

A. Policy: Provide a street system that operates at a minimum of LOS C (average travel speeds about 40 percent of free-flow speeds) on arterial streets. A minimum LOS of LOS C should be provided at all intersections during the peak hour (an average delay of less than 35 seconds per vehicle at signalized intersections and less than 25 seconds per vehicle at unsignalized intersections). Where achieving this LOS standard is not possible or feasible, the City Engineer may grant exceptions where associated negative impacts are minimized.

   Implementation: To be implemented by adhering to the year by year improvement project list in an effort to reduce congestion on arterial streets and at intersections.

B. Policy: Improve the efficiency of streets and reduce potential traffic conflicts through the use of improved or new signals, signing, pavement markings, and street lighting.

   Implementation: To be implemented by adhering to the year by year improvement project list that improves signals, signs, pavement markings, and street lighting.

C. Policy: Work with employment agencies to explore non-traditional methods for reducing traffic volume through travel demand management and system management strategies.

   Implementation: To be implemented through the development of programs that address a balance of land uses with differing peak traffic periods, provide incentives for rideshare systems, and mandate flex-time work schedules, parking management, telecommuting and transit ridership incentives. Such programs could be implemented through the Engineering and Planning Departments as development warrants.

D. Policy: Plan future streets for the width necessary to serve projected traffic at a reasonable LOS. Require development to protect, preserve, and acquire needed street width. Figure 13 and Figure 14 show the desired typical cross-sections for the different roadway classifications.

Implementation: To be implemented by the Engineering Department by mandating a Traffic Impact Study (TIS) be performed for every new development that would generate more than 100 peak-hour trips. Table 1 outlines some examples of minimum thresholds for different land uses that would require a TIS to be performed. Traffic impact fees will be collected directly proportional to the impact of a development on the collector and arterial roadways.

Table 1 Examples of Land Use Thresholds that Require Traffic Impact Studies

Land Use	Size of Development that Generates ≥ 100 Peak-Hour Trips
Residential (Single Family Homes)	100 Units
Residential (Apartments)	160 Units
Residential (Condos/Townhomes)	190 Units
Residential (Mobile Home Park)	170 Units
Shopping Center	27,000 Sq. Ft. of GLA
Fast-Food Restaurant with Drive-In	3,000 Sq. Ft. of GFA
Gas Station with Convenience Store	8 Fueling Positions
Bank with Drive-In	4,000 Sq. Ft. of GFA
General Office	67,000 Sq. Ft. of GFA
Medical/Dentist Office	29,000 Sq. Ft. of GFA
Research and Development Facility	93,000 Sq. Ft. of GFA
Light Industrial/Warehousing	180,000 Sq. Ft. of GFA
Manufacturing Plant	137,000 Sq. Ft. of GFA
Park-and-Ride Lot with Bus Service	120 Parking Spaces

The ITE *Trip Generation Manual* (8^{th} Edition) was used to estimate these thresholds.
GLA = Gross Leasable Area.
GFA = Gross Floor Area.

Quality Image through Streetscape Design

Background:

The sense of community is often defined by both the driver's seat vision as people pass through an area as well as the resident's vision of people working and living in an area. As communities grow, they should establish a vision to define a unique and positive image of and for the community.

Goal:

Consider aesthetics in the design of each of the different roadway classifications to enhance the overall image of the City.

Policies and Implementation:

A. Policy: Where practical, require all new developments to plant trees in the park strips as part of the landscaping. Identify main thoroughfares where landscaping beautification may be beneficial and center median landscaping could be used. Explore alternative landscaping options for better visibility and safety. Coordinate with Public Works to ensure maintenance needs are addressed. Use flexible street design to accommodate existing mature trees.

B. Policy: Require all new developments to plant trees and landscape the medians and park strips and to provide for water and other maintenance needs of the landscaped areas. A list of trees approved by the City is available on the City website (www.spanishfork.org).

C. Policy: Work with UDOT to ensure that City landscaping goals can be met on State Highways.

D. Policy: Create a list of approved park strip trees to ensure that tree roots do not create maintenance problems.

E. Policy: Upgrade and beautify sidewalks and other walkways to create a functional, but aesthetically pleasing pedestrian streetscape. Create pedestrian rest stops with places for park benches and additional landscaping. Explore alternatives for standard waste receptacles.

F. Policy: Streetscape design should reflect and enhance the adjacent land use. Size and type of trees and width of park strips should vary according to need.

Multi-Modal Approach

Background:

The private automobile is presently the most common and often convenient form of transportation. Many believe that a continuation of infrastructure investment in the private automobile will create a continuing spiral of automobile dominance and traffic congestion problems as well as secondary problems of air pollution, noise, and infrastructure costs. Yet, the most cost effective solution to many traffic problems lies in adding new highway capacity to meet that demand.

Goal:

Provide a balanced multi-modal approach to transportation problems which considers mass transit, car pools, and other alternative modes to the single occupant automobile.

Policies and Implementation:

A. Policy: Encourage transit and multi-modal facilities by improving bus stops with shelters and benches at all major stops, incorporating lighting and other safety considerations into the design of bus stops where possible, coordinating bus stop locations with crosswalks and other pedestrian features, working with UTA and the City to provide bus turnouts where adequate shoulder width is not provided for buses to pull over out of traffic, and prioritizing a list of pedestrian ramps that do not meet ADA requirements in order to fix them in a timely manner.

B. Policy: Require developers of new commercial centers to consider transit and other multi-modal service to the center in their design of parking facilities, roadways, and pedestrian access.

C. Policy: Work with UTA to establish new transit routes throughout the City and to develop bus stop and park-and-ride requirements for office and commercial land uses.

D. Policy: Support implementation of park-and-ride lots and encourage the development of high frequency, express transit services.

E. Policy: Be responsive to businesses that support home shopping, home banking, electronic neighborhood meetings, and other alternatives to travel. This practice could be encouraged by providing these services with tax incentives.

Pedestrian and Non-Motorized Circulation

Background:

The scale of a community is best expressed and further enhanced through short, slow-speed trips within the City as opposed to trips which go through the City. Pedestrian and bicycle travel should be supported as alternatives to the private automobile.

Goal:

Support and encourage cyclists, pedestrians and other non-motorized travel within the City. Coordinate with adjacent jurisdictions to offer continuous routes for travel and recreation between communities.

Policies and Implementation:

A. Policy: A balance between cyclist and pedestrian trails to satisfy both the transportation and recreational needs of residents should be provide through the following implementations:

   a. Improve cyclist and pedestrian access to parks, recreation centers, schools, and other activity destinations through requiring developers to provide land for these trails.

   b. Require sidewalks or trails of sufficient width on both sides of all roads unless facilities for other modes of transportation are planned. This standard should be vigorously enforced on arterial roadways and within commercial areas with exceptions granted on a case by case basis.

   c. Create and maintain a pedestrian and non-motorized trail master plan.

d. Work closely with the school district in reviewing locations for future schools to minimize the necessity of children crossing arterial roads or railroads.

B. Policy: Alternative modes of transportation should be encouraged through carefully developed support systems such as:

a. Working with local businesses to offer better access for bicycles and improved security for storage.

b. Encouraging businesses to provide lockers and showers for employees who walk or use non-motorized travel.

c. Offering low-cost or free helmets, baskets, and other accessories to encourage bicycle use.

d. Developing bike-and-ride facilities at bus stops and car pool lots.

e. Reducing bike/pedestrian conflicts through measures such as wider sidewalks and dedicated bike paths/lanes where feasible.

f. Creating continuous bicycle paths/routes between residential and commercial areas.

g. Connecting bicycle/pedestrian paths with adjacent communities and coordinating standards.

C. Policy: Encourage pedestrian traffic in commercial areas by carefully planning commercial sites to minimize separation between major destinations.

D. Policy: Maintain safety and accessibility of pedestrian walkways by developing a maintenance program for sidewalk cleaning, clearance, and snow removal with clear division of City and citizens responsibilities.

E. Policy: Develop educational programs aimed at increasing public knowledge of pedestrian safety issues.

Traffic Calming Design

Background:

Traffic calming design encourages the reduction of speeds and vehicle volumes through the manipulation of roadway design elements. Design elements include roadway width, alignment of streets, and connectivity to adjacent streets. Traffic calming is most effective on residential streets due to their function.

Goal:

Encourage slow speeds through residential neighborhoods by implementing traffic calming techniques where necessary.

Policies and Implementation:

A. Policy: Residential streets should be designed to avoid excessive speeds by implementing traffic calming objectives that include:

   a. Varying street widths and patterns to encourage or discourage through traffic where appropriate.

   b. Balancing traffic calming measures with safety and maintenance issues.

   c. Maintaining traffic connections that do not over utilize residential routes.

   d. Using right-in and right-out intersections where appropriate.

   e. Establishing a City-wide traffic calming plan including justification, warrants, standards, and specifications for the various traffic calming measures.

B. Policy: Local neighborhood streets should provide vehicular and pedestrian access to all land parcels. With the movement of through traffic being a secondary function of local roadways, these roadways should be designed to be curvilinear in nature. The following design criteria should be implemented to residential roadways:

   a. Residential street alignments should avoid being straight for more than 1,000 feet.

   b. Residential Sub-Local Road typical cross-sections shall be restricted to a maximum length of 1,300 feet and shall be connected at both ends to either a Residential Local Road or Collector Road (Road cross sections can be seen in Figure 14).

   c. The maximum length of a cul-de-sac shall be 400 feet measured from the nearest right-of-way line of the adjoining street to the center of the cul-de-sac, and the minimum radius of the cul-de-sac shall be 62 feet at the property line.

Design Circulation and Street Pattern to Support the General Plan Land Use Goals

Background:

A relationship exists between the type of land uses and the volume of traffic that travels on streets. Therefore, circulation and street patterns need to be designed to be congruent to existing and future land use goals.

Goal:

Design and plan the City's transportation system to assist in implementing the General Plan's Land Use Goals.

Policies and Implementation:

A. Policy: Low speed and minimal traffic in residential neighborhoods improves the quality of life. Thus, vehicular traffic should be minimized on these streets through the use of traffic calming measures where necessary.

B. Policy: Large retail developments should be confined on arterial streets, which are designed to facilitate large traffic volumes. Zoning and other land use regulatory tools should restrict commercial developments to property facing arterial streets.

C. Policy: Land use and transportation elements should be carefully coordinated to ensure complimentary goals and policies.

Preserve Air Quality and Energy

Background:

An efficient transportation system will decrease the amount of pollution and consumption of energy that is associated with most forms of transportation today; hence, an efficient street network that reduces the amount of time vehicles idle at intersections is in the best interest of residents of Spanish Fork City. In addition, non-motorized travel should be encouraged.

Goal:

Where possible, the transportation plan should investigate innovative methods of preserving air quality and conserving valuable energy resources.

Policies and Implementation:

A. Policy: Improve intersection design and traffic signal timing plans to reduce vehicular stop time at major intersections throughout the City. Where possible, coordinate traffic signals along arterials to reduce delay experienced by through traffic.

B. Policy: Create a street system that moves automobile traffic efficiently through City streets by:

   a. Securing right-of-way that will be necessary for future traffic volumes.

   b. Imposing traffic impact fees on developments that are proportionate to the traffic impacts that they will produce.

   c. Encouraging mixed use developments to decrease vehicle trips during peak hours.

C. Policy: Encourage other methods of travel within the City by constructing trails and larger sidewalks.

D. Policy: Encourage public awareness and participation in emission reduction programs.

Corridor Preservation

Background:

Corridor preservation allows a city to identify and protect from developing land that will be needed for future transportation corridors.

Goal:

Where possible, the transportation plan should investigate innovative methods for preserving land for future transportation corridors.

Policies and Implementation:

A. Policy: Preserve future corridor locations and secure right-of-way using innovative methods including exactions, developer incentives and agreements, fee simple acquisitions, transfer of development rights and/or densities, land use controls, and purchase of options and easements.

3.0 Existing Conditions

A thorough documentation of the existing conditions was performed in order to evaluate the City's transportation system and update the TTE to address the City's current and future needs. The data collected for this TTE update includes key roadway traffic volumes, socio-economic conditions, land use and zoning, signal locations and timings, roadway classifications/widths/cross sections, public transit routes, and bicycle/pedestrian/equestrian trails. This data forms the basis for analyzing the existing transportation system as well as providing the foundation to project future traffic conditions.

Socio-economic Conditions

Socio-economic data used in the transportation analysis was obtained from both the City and the Mountainland Association of Governments (MAG). The MAG travel demand model was modified to more accurately estimate the travel demand throughout the City. The MAG travel demand model consists of various Traffic Analysis Zones (TAZ) that each contains associated information regarding land use type and quantity. This data is used to predict the amount of traffic traveling to and from each zone. In order to more accurately model the traffic demand throughout Spanish Fork City, the TAZ from MAG's model were divided into smaller zones. MAG's traffic model predicts travel demand on a regional basis; however, these smaller TAZ on the City level need to be more accurately depicted in the traffic model by dividing up MAG's larger TAZ. These newly divided up TAZ can be seen in Figure 2. The corresponding socio-economic data for each of these zones can be found in Table 2.

In the time between the first publication of this document and this update, MAG has released a new version of the travel demand model (version 7.0). This version of the model provides greater accuracy of the road networks and allows for the analysis of a 2040 horizon year rather than 2030. It was decided that this new model would be used for the update to the TTE and therefore the TAZ needed to be split into smaller zones using the new 2040 socio-economic data. These new TAZ do not match the TAZ splits for the 2008 existing conditions and therefore Figure 3 is provided showing the new TAZ splits for the version 7 travel demand model.

Land Use

Traffic volumes and patterns are directly related to land use and development density. In order to develop an accurate travel demand model and calibrate that model to the existing traffic conditions throughout the City, a thorough review of the existing land uses is essential. This includes identifying and quantifying the locations and amounts of the various land uses throughout the City. Existing land uses were reviewed with the City Staff to ensure that the latest land use conditions were being used in the model.

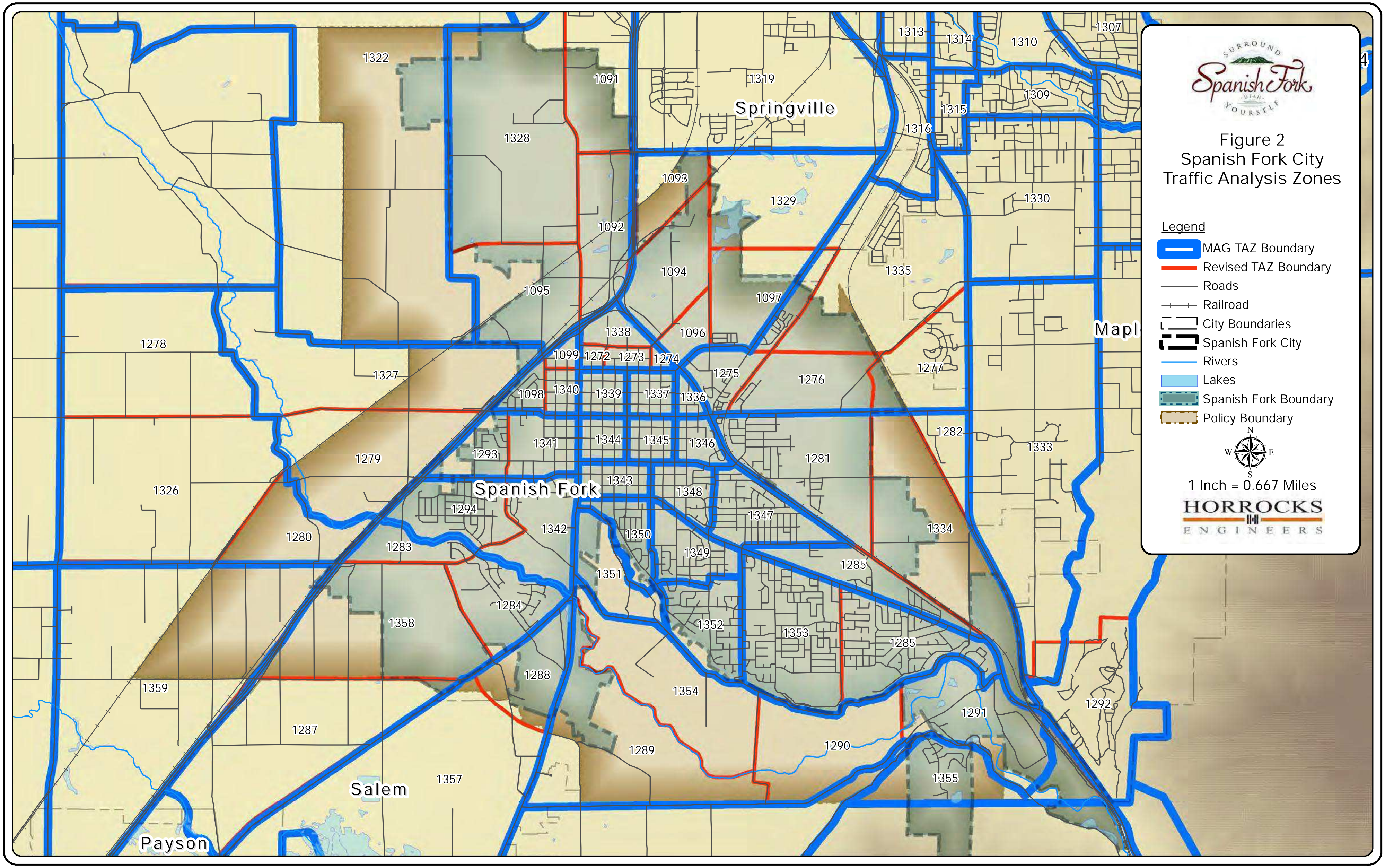
Figure 2
Spanish Fork City
Traffic Analysis Zones
Spanish Fork
SURROUND YOURSELF
UTAH
Legend
MAG TAZ Boundary
Revised TAZ Boundary
Roads
Railroad
City Boundaries
Spanish Fork City
Rivers
Lakes
Spanish Fork Boundary
Policy Boundary
N
S
E
W
1 Inch = 0.667 Miles
HORROCKS
ENGINEERS
Springville
Spanish Fork
Salem
Payson
Mapl
1322
1091
1319
1313
1314
1310
1307
1309
1315
1316
1328
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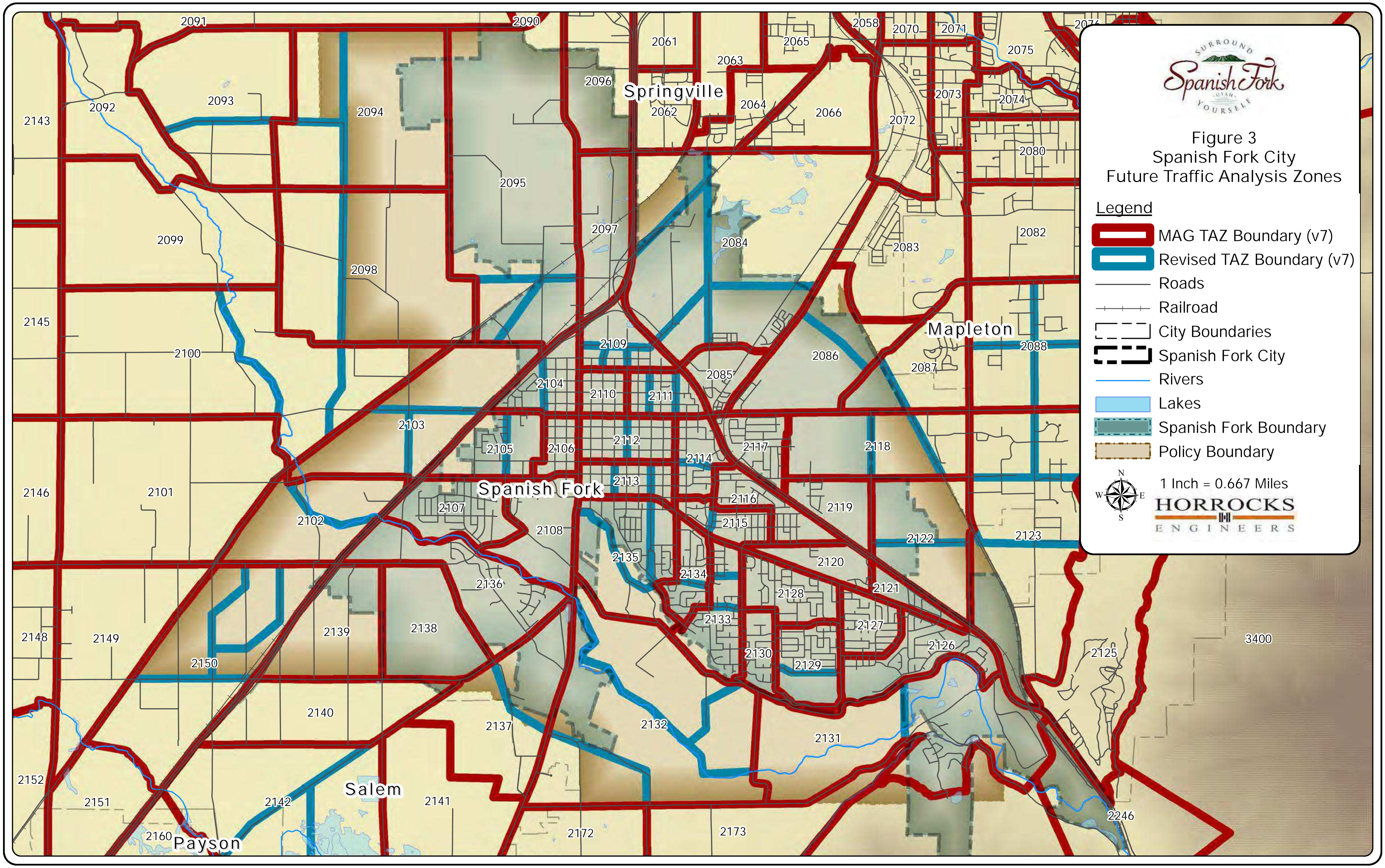

Figure 3
Spanish Fork City
Future Traffic Analysis Zones
Legend
MAG TAZ Boundary (v7)
Revised TAZ Boundary (v7)
Roads
Railroad
City Boundaries
Spanish Fork City
Rivers
Lakes
Spanish Fork Boundary
Policy Boundary
1 Inch = 0.667 Miles
HORROCKS ENGINEERS
Springville
Mapleton
Spanish Fork
Salem
Payson
2058
2061
2062
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2065
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2152
2160
2172
2173
2246
3400

Table 2 Existing (2008) Socio-Economic Conditions

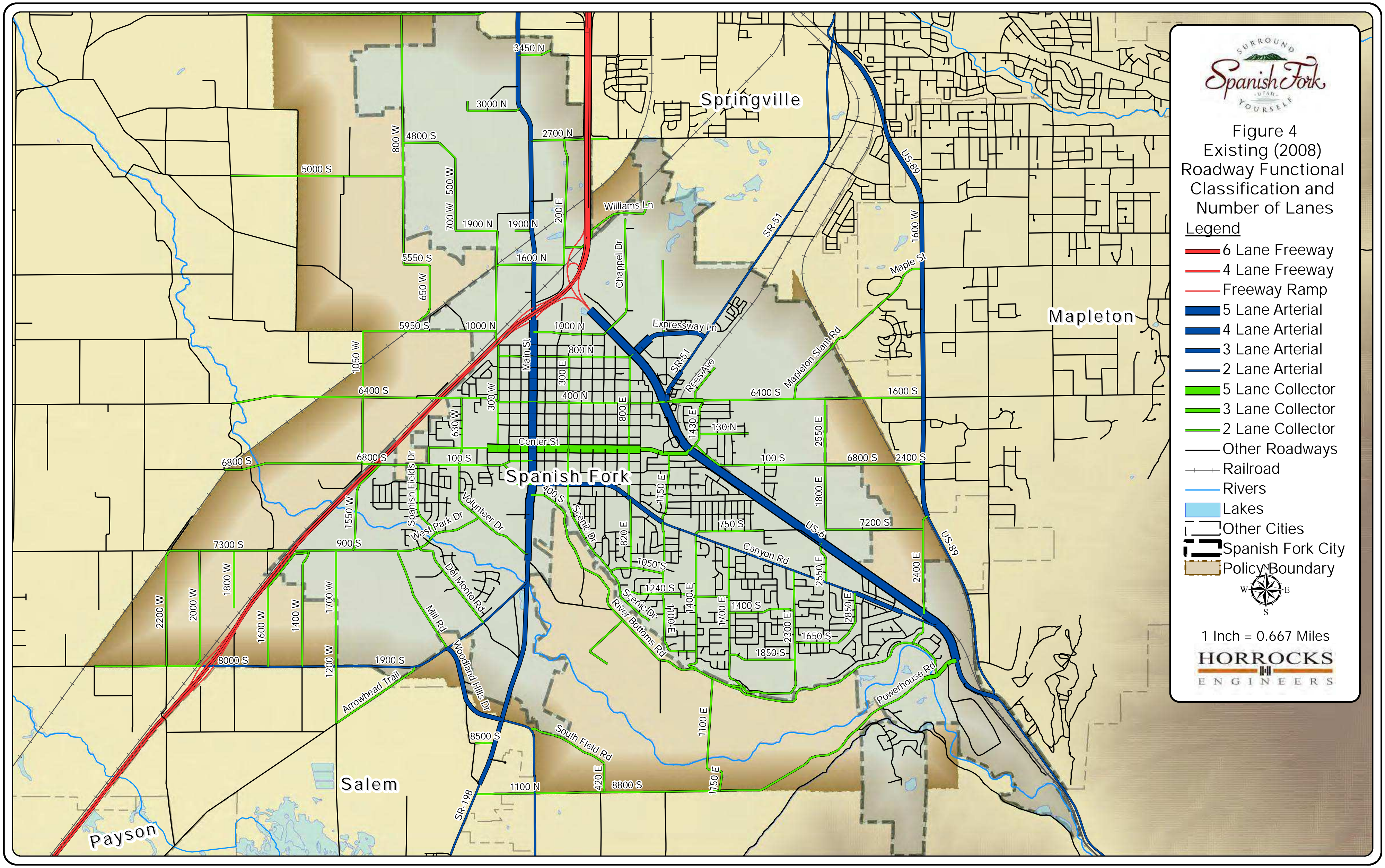
TAZ Number	Population (persons)	Employment (jobs)	Dwelling Units (units)
1328	116	1,464	35
1091	0	1,046	0
1092	0	1,046	0
1093	0	40	0
1094	0	560	0
1095	173	627	53
1096	0	480	0
1097	377	80	130
1329	42	160	14
1335	713	322	252
1278	183	5	57
1327	107	0	33
1098	551	43	193
1099	122	259	43
1340	551	130	193
1338	0	837	0
1272	94	279	33
1273	439	140	154
1274	94	140	33
1339	752	250	291
1337	1,020	82	343
1336	496	346	171
1275	714	29	252
1276	89	59	31
1277	268	176	94
1326	234	6	72
1279	73	0	22
1293	778	456	259
1341	778	848	259
1344	791	655	279
1345	791	26	293
1346	774	38	270
1281	376	82	94
1334	187	40	48
1282	141	31	35
1280	57	2	18
1294	494	275	175

Table 2 Existing (2008) Socio-Economic Conditions Continued

TAZ Number	Population (persons)	Employment (jobs)	Dwelling Units (units)
1283	121	69	37
1342	405	511	144
1343	818	109	318
1348	1,341	82	428
1347	2,801	377	683
1285	235	51	59
1351	126	207	48
1350	818	40	248
1349	1,551	130	391
1358	183	68	55
1284	182	138	55
1288	107	116	34
1287	121	69	37
1357	248	78	78
1289	310	56	98
1354	124	9	38
1352	1,693	26	409
1353	2,940	115	755
1286	2,182	86	561
1290	124	9	39
1291	62	111	20
1292	0	44	0
TOTAL:	**28,867**	**13,560**	**8,764**

Existing Roadway Functional Classification

Prior to this TTE update, Spanish Fork City had classified its streets as either arterials, collectors, or other roads. Figure 4 depicts the existing classification of each roadway along with its corresponding number of lanes.



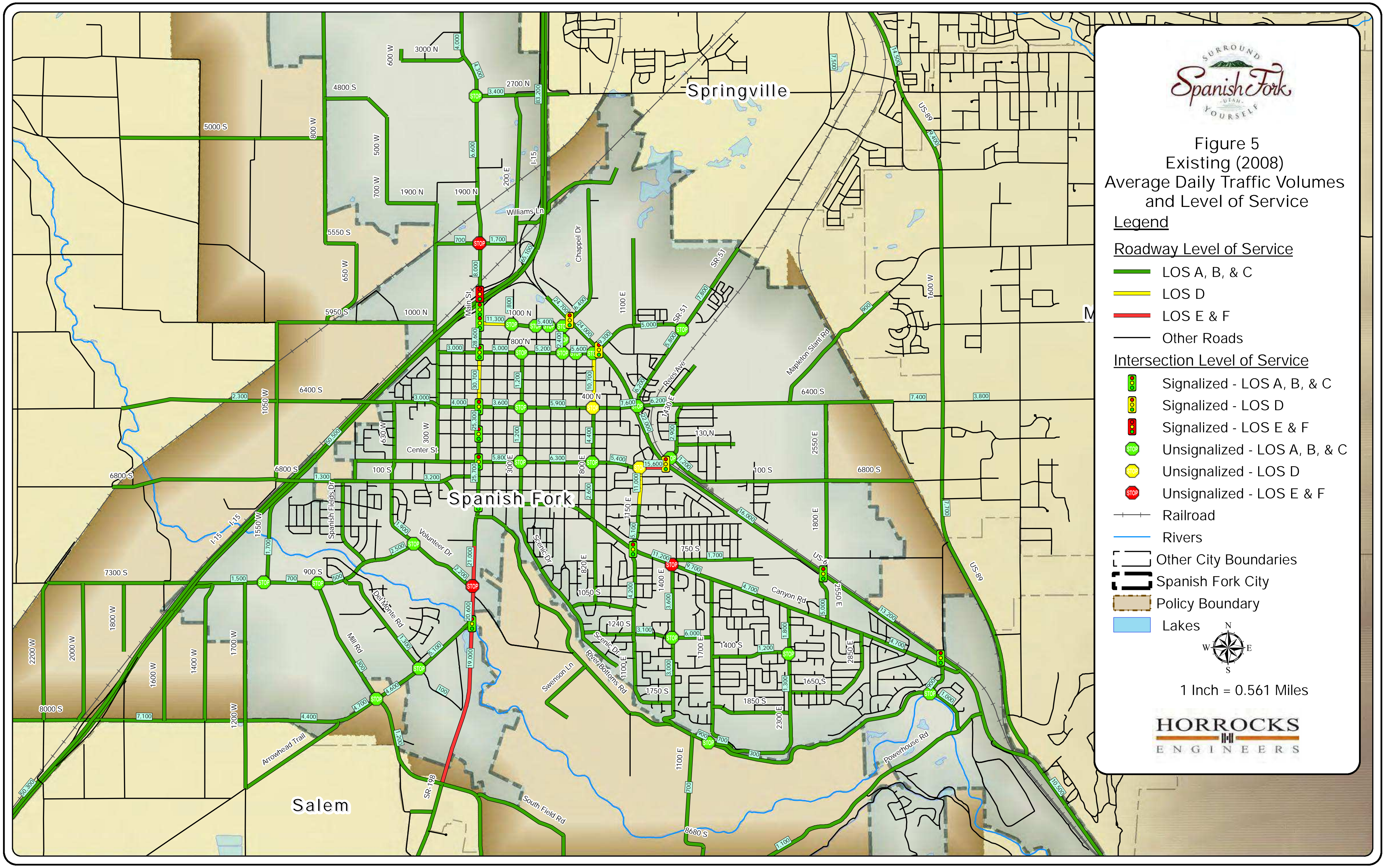
Spanish Fork
Surround Yourself
Utah
Figure 4
Existing (2008)
Roadway Functional
Classification and
Number of Lanes
Legend
6 Lane Freeway
4 Lane Freeway
Freeway Ramp
5 Lane Arterial
4 Lane Arterial
3 Lane Arterial
2 Lane Arterial
5 Lane Collector
3 Lane Collector
2 Lane Collector
Other Roadways
Railroad
Rivers
Lakes
Other Cities
Spanish Fork City
Policy Boundary
1 Inch = 0.667 Miles
HORROCKS
ENGINEERS
Springville
Mapleton
Spanish Fork
Salem
Payson
US-89
US-6
SR-51
SR-198
Center St
Main St
Expressway Ln
Canyon Rd
Mapleton Slant Rd
Maple St
Powerhouse Rd
River Bottoms Rd
Scenic Dr
South Field Rd
Woodland Hills Dr
Arrowhead Trail
Mill Rd
Del Monte Rd
Volunteer Dr
West Park Dr
Spanish Fields Dr
Chappel Dr
Williams Ln
Rees Ave
6400 S
6800 S
7300 S
8000 S
8500 S
8800 S
5000 S
4800 S
5550 S
5950 S
7200 S
3450 N
3000 N
2700 N
1900 N
1600 N
1000 N
800 N
400 N
130 N
100 S
400 S
750 S
900 S
1050 S
1240 S
1400 S
1650 S
1850 S
1900 S
1100 N
1600 S
2400 S

Traffic Volumes and Level of Service

In order to evaluate roadway capacities, calibrate the travel demand model, and identify existing deficiencies in the roadway system, existing (2006-2008) traffic volumes were collected on numerous key roadway segments. These counts were obtained from a variety of sources, including UDOT's Average Daily Traffic (ADT) volumes, traffic counts performed for previous traffic studies in the area, and manual traffic counts collected at 28 different intersections throughout the City. Where necessary, all of these counts were forecasted up to the year 2008.

A term used to describe the traffic operations on roadways and at intersections is Level of Service (LOS). While there are different methodologies available to calculate LOS, the most commonly used methods are found in the Highway Capacity Manual (HCM) published by the Transportation Research Board. The HCM defines six different levels of LOS ranging from LOS A to LOS F; for example, LOS A would represent free-flow conditions while LOS F would represent extremely congested traffic conditions. For this analysis, two different types of LOS were used to evaluate the roadway network: Roadway LOS and Intersection LOS. A discussion of these different types of LOS can be found below.

The resulting 2008 ADT and corresponding LOS for the key roadways and intersections throughout the City are shown in Figure 5.


Surround Yourself
Spanish Fork
Utah
Figure 5
Existing (2008)
Average Daily Traffic Volumes
and Level of Service
Legend
Roadway Level of Service
LOS A, B, & C
LOS D
LOS E & F
Other Roads
Intersection Level of Service
Signalized - LOS A, B, & C
Signalized - LOS D
Signalized - LOS E & F
Unsignalized - LOS A, B, & C
Unsignalized - LOS D
Unsignalized - LOS E & F
Railroad
Rivers
Other City Boundaries
Spanish Fork City
Policy Boundary
Lakes
N
W
E
S
1 Inch = 0.561 Miles
HORROCKS
ENGINEERS
Springville
Spanish Fork
Salem
I-15
US-89
US-6
SR-51
SR-198
Main St
Canyon Rd
Mapleton Slant Rd
Powerhouse Rd
Volunteer Dr
Arrowhead Trail
South Field Rd
River Bottoms Rd
Scenic Dr
Swenson Ln
Mill Rd
Del Monte Rd
Williams Ln
Chappel Dr
Reese Ave
Center St
Spanish Fields Dr
3000 N
2700 N
4800 S
5000 S
1900 N
5550 S
5950 S
1000 N
800 N
6400 S
400 N
6800 S
100 S
7300 S
900 S
750 S
1050 S
1240 S
1400 S
1650 S
1750 S
1850 S
8000 S
8680 S

Roadway Level of Service

Roadway LOS is used as a planning tool to quantitatively represent the ability for a particular roadway to accommodate the travel demand. As a general rule of thumb and based on previous experience, Table 3-8 were used to estimate the Roadway LOS based on the functional classification, number of lanes, and ADT of each roadway in question:

Table 3 Suburban Freeway LOS Capacity Criteria

Lanes	LOS C	LOS D	LOS E
4	60,000	70,000	89,000
6	95,000	110,000	140,000
8	126,000	146,000	187,000

Table 4 Urban Freeway LOS Capacity Criteria

Lanes	LOS C	LOS D	LOS E
4	63,000	73,000	90,000
6	100,000	116,000	142,000
8	133,000	154,000	189,000

Table 5 Suburban Arterial LOS Capacity Criteria

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 6 Urban Arterial LOS Capacity Criteria

Lanes	LOS C	LOS D	LOS E
3	12,900	15,600	18,300
5	30,100	34,900	42,500
7	45,200	52,700	64,000

Table 7 Suburban Collector LOS Capacity Criteria

Lanes	LOS C	LOS D	LOS E
2	9,700	12,100	14,500
3	10,800	13,400	16,100
5	23,100	26,900	33,900

Table 8 Urban Collector LOS Capacity Criteria

Lanes	LOS C	LOS D	LOS E
2	8,100	9,100	10,200
3	11,300	13,800	16,100
5	24,200	28,000	34,400

Intersection Level of Service

Intersection LOS is a more precise method for quantifying traffic operations compared to the roadway LOS methodology described above. The roadway LOS looks at the big picture, while the intersection LOS considers individual vehicular movements within an intersection. Since intersections tend to be the source of bottlenecks within our transportation networks, a detailed look into the delay experienced at each intersection is performed. The methodology for calculating this delay is outlined in the *Highway Capacity Manual* (HCM). The resulting LOS criteria for both signalized and unsignalized intersections are described in Table 9 and Table 10, respectively.

Table 9 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

Table 10 Unsignalized 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: The LOS shown on the map in Figure 5 *represents the approach with the highest delay.*

Existing Traffic Conditions

Even with the rapid growth that has occurred in Spanish Fork City in recent years, most of the roadways throughout the City are operating at acceptable LOS at the existing (2008) travel demand (Figure 5). A few areas as shown on the map are experiencing undesirable traffic congestion and delay using 2008 as the base year (it is important to maintain the current conditions as of 2008 since all projections and impacts will be measured using the data collected in the base year). Any improvements that have occurred since 2008 to the publication date are also included (Shown in *italics*):

- The traffic signal at the southbound off-ramp of I-15 and Main Street is currently operating at a peak hour LOS of LOS D for the intersection as a whole. This issue will need to be resolved by coordinating with UDOT to develop an optimal solution for both the City and the State. *This signal was updated at a part of the I-15 CORE project in 2012.*

- Main Street from approximately Woodland Hills Drive to Volunteer Drive experiences a higher demand than a facility of this size is capable of accommodating (LOS F). UDOT currently has plans to widen this arterial to a five lane cross section by the year 2010 to increase the capacity of this roadway. *The bridge that crosses the Spanish Fork River was improved and now Main Street has a five lane cross-section from Volunteer Drive to the intersection at Arrowhead Trail Road.*

- The eastbound leg of the unsignalized intersection at Volunteer Drive and Main Street can experience excessive delay during the afternoon/evening hours as a result of vehicles leaving the recreational field to the west of this intersection. This issue will be resolved with UDOT's widening of Main Street. *A signal has been added at this intersection to improve traffic flow.*

- The northbound leg of the unsignalized intersection at 1400 East and Canyon Road also experience excessive delays (LOS F) during the PM peak hour. UDOT has recently conducted a study to evaluate if a signal would be warranted at this intersection; however, traffic volumes and accident experience did not warrant the installation of a traffic signal at this time. This intersection should be monitored by both UDOT and the City to determine if any improvements can and should be done.

- Center Street from 1150 East to US-6 currently experiences a travel demand (approximately 15,600 vehicles per day) suitable for a five-lane facility. Widening of the existing three-lane cross-section of Center Street from 800 East to US-6 would provide continuity between the wide cross-section of Center Street to the west while appropriately accommodating the existing travel demand. *This project is currently in design.*

- The unsignalized intersection at Center Street and 1150 East currently operates at an overall LOS of LOS D. Widen Center Street to a five-lane cross-section in this area and allowing free movements on both the eastbound and westbound approaches would drastically reduce the overall delay in the intersection. Ultimately this intersection will most likely warrant a traffic signal in the future. *This project is currently in design.*

- The unsignalized intersection at 400 North and 800 East currently operates at an overall LOS boarder-lining between LOS C and D. This intersection could be improved by adding designated auxiliary turn lanes for each approach.

Signal Inventory

Information was compiled regarding the location of both existing and proposed future traffic signals (Figure 6). Since all of the existing traffic signals that exist throughout the City are found on UDOT maintained roadways, UDOT was contacted to obtain the current signal timings, etc. in order to accurately analyze the current traffic operations at each signal.

Roadway Inventory

The number of lanes and the current functional classification of each roadway were collected from field visits, aerial photography, the City's current TTE, and transportation plans from surrounding jurisdictions. The results of that existing roadway inventory can be seen in Figure 4.

Alternative Transportation Modes

Public transit is a form of alternative transportation within Spanish Fork City. Figure 7 shows the existing transit facilities that run through the City. As shown in the figure, there are four regional UTA bus routes that run through the City:

- South Utah County/SLC Express Route (UTA Route 805)
- South Utah County/UVU Express Route (UTA Route 808)
- Utah South County Route (UTA Route 820)
- BYU/Payson Route (UTA Route 822)

Non-motorized transportation is another important alternative mode to be considered throughout the City. Figure 8 shows the existing trail plans for the City.

Roadway Jurisdiction

The current street system in and around Spanish Fork consists of a mixture of state, county, and locally owned and operated roads (Figure 9). This mixture may present challenges when coordinating roadway maintenance and improvement programs between jurisdictions. However, by identifying the different agencies and which roadways each jurisdiction is responsible for, coordination of improvements can be enhanced.

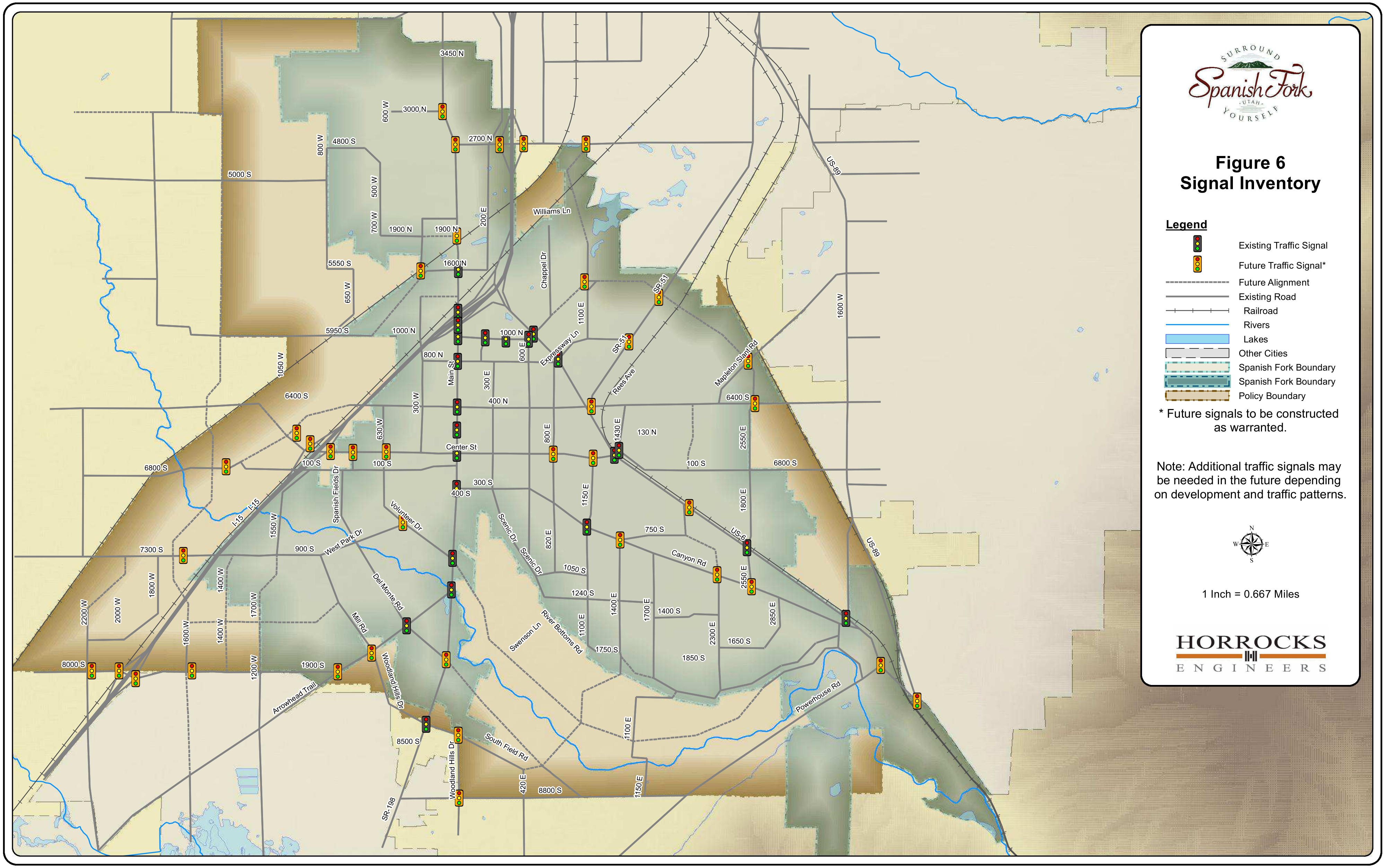
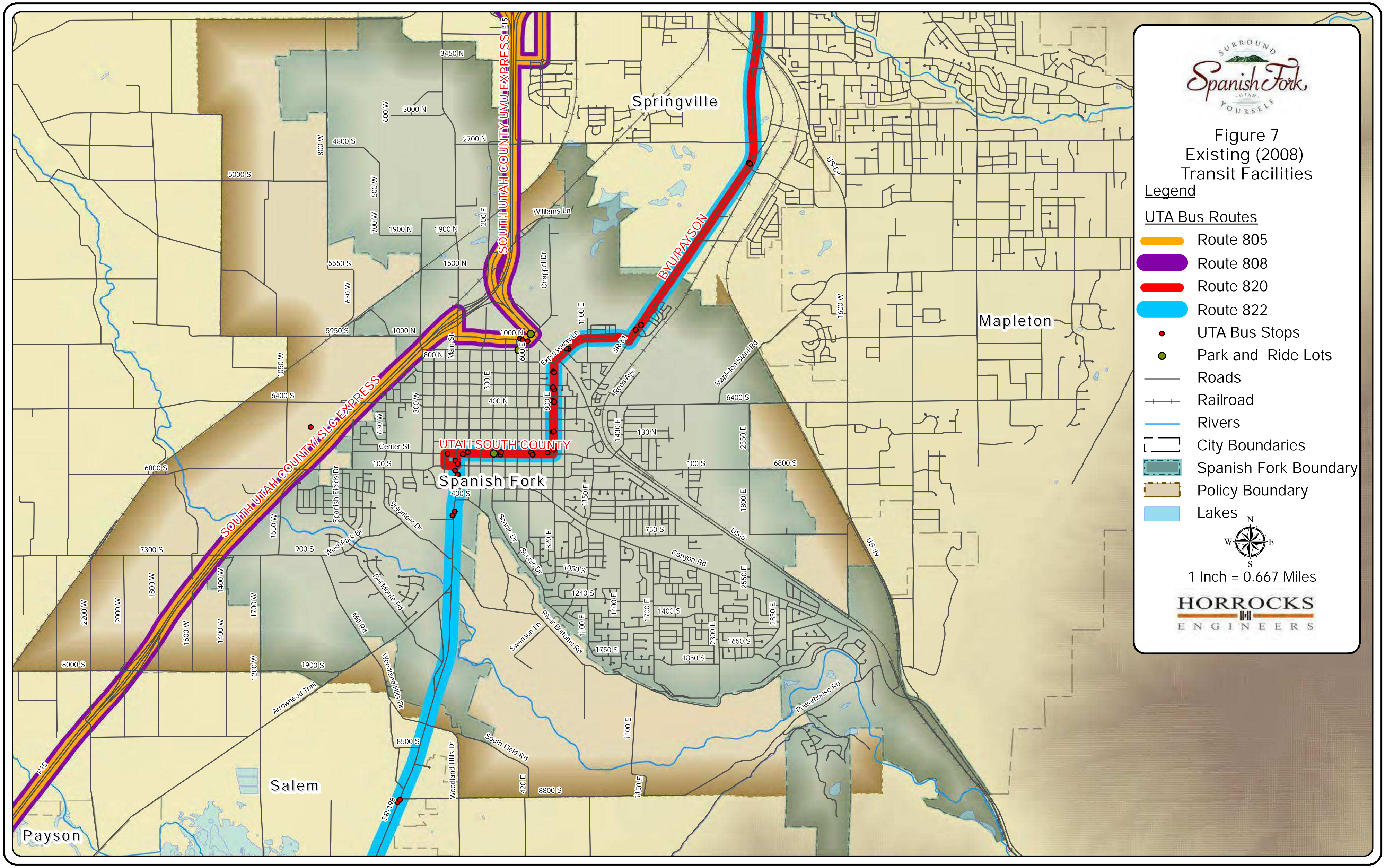
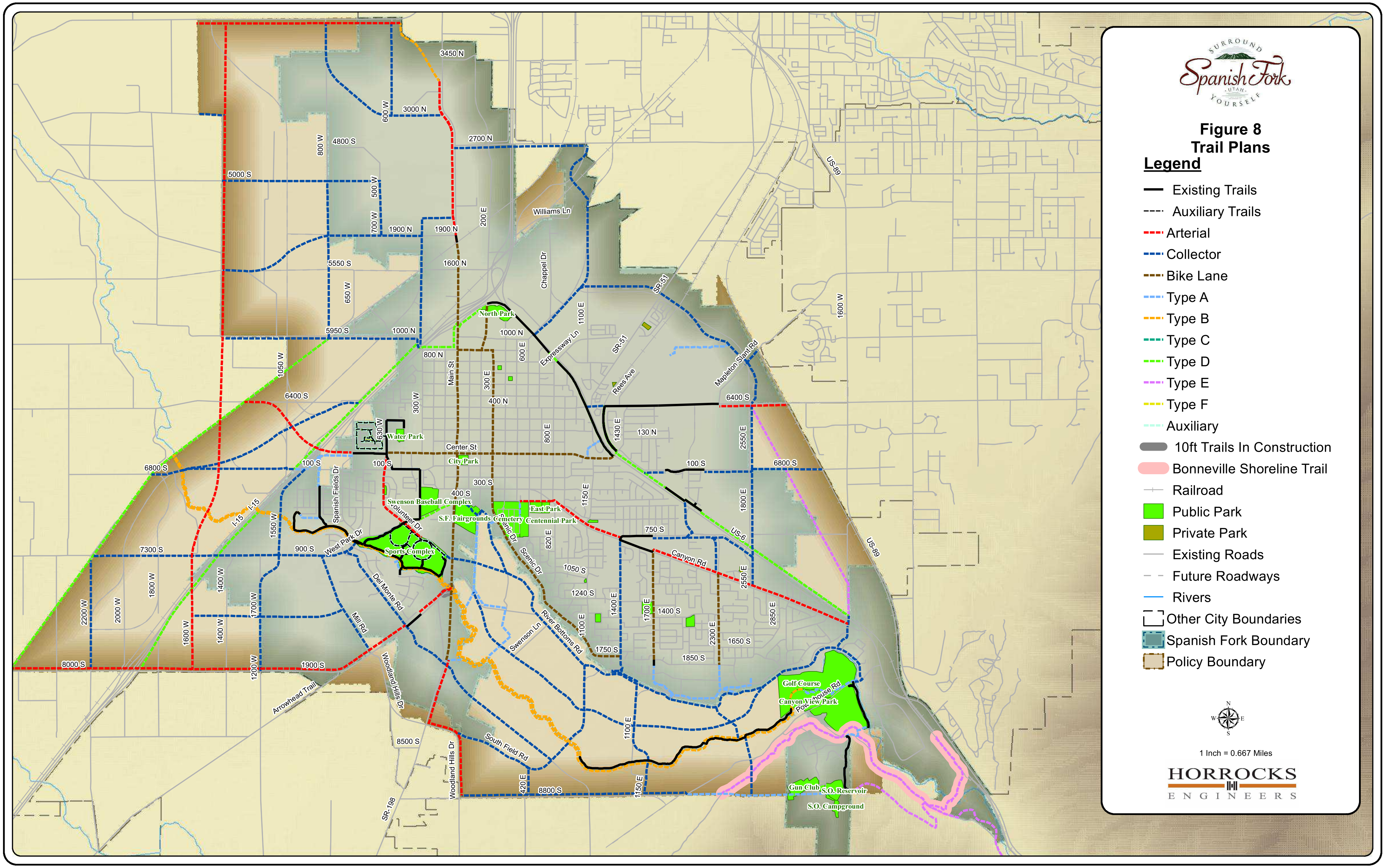
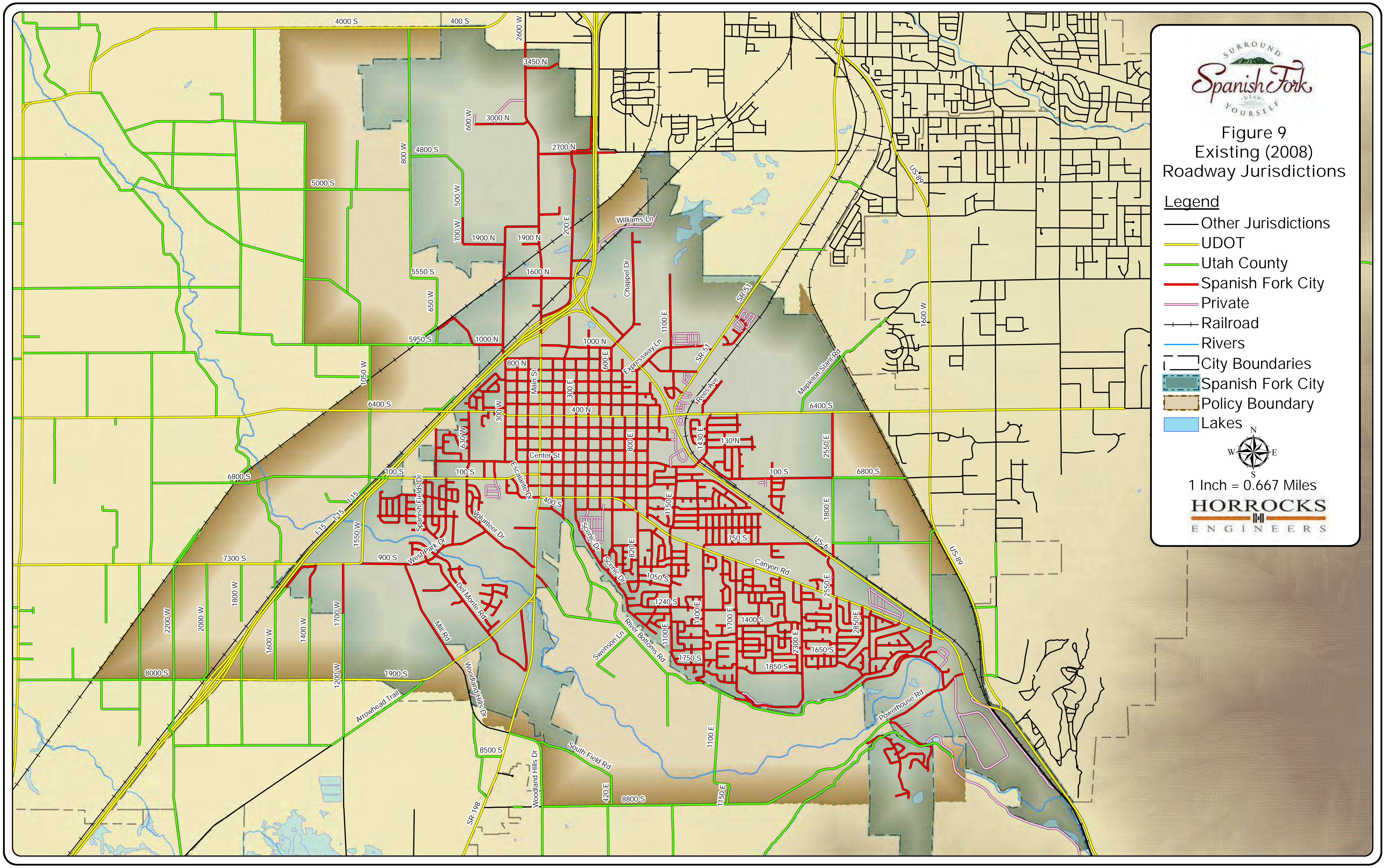


Figure 6
Signal Inventory
Legend
Existing Traffic Signal
Future Traffic Signal*
Future Alignment
Existing Road
Railroad
Rivers
Lakes
Other Cities
Spanish Fork Boundary
Spanish Fork Boundary
Policy Boundary
* Future signals to be constructed as warranted.
Note: Additional traffic signals may be needed in the future depending on development and traffic patterns.
1 Inch = 0.667 Miles
Spanish Fork
SURROUND YOURSELF
UTAH
HORROCKS
ENGINEERS
3450 N
3000 N
2700 N
4800 S
5000 S
Williams Ln
1900 N
1600 N
5550 S
5950 S
1000 N
800 N
6400 S
400 N
Center St
100 S
6800 S
300 S
400 S
7300 S
900 S
West Park Dr
Volunteer Dr
Scenic Dr
Del Monte Rd
Mill Rd
Woodland Hills Dr
Arrowhead Trail
8000 S
1900 S
8500 S
South Field Rd
8800 S
SR-198
Swenson Ln
River Bottoms Rd
1050 S
1240 S
1750 S
1850 S
1650 S
1400 S
750 S
Canyon Rd
US-6
US-89
Powerhouse Rd
Mapleton Slant Rd
Rees Ave
SR-51
Expressway Ln
Chappel Dr
130 N
6800 S
I-15
Spanish Fields Dr
Main St
600 W
800 W
500 W
700 W
650 W
200 E
1050 W
300 W
630 W
300 E
600 E
800 E
820 E
1100 E
1150 E
1430 E
1400 E
1700 E
2300 E
2550 E
1800 E
2850 E
1600 W
1550 W
1400 W
1800 W
1700 W
2200 W
2000 W
1200 W
420 E



Surround Yourself
Spanish Fork
Utah
Figure 7
Existing (2008)
Transit Facilities
Legend
UTA Bus Routes
Route 805
Route 808
Route 820
Route 822
UTA Bus Stops
Park and Ride Lots
Roads
Railroad
Rivers
City Boundaries
Spanish Fork Boundary
Policy Boundary
Lakes
N
S
E
W
1 Inch = 0.667 Miles
HORROCKS
ENGINEERS
Springville
Mapleton
Spanish Fork
Salem
Payson
SOUTH UTAH COUNTY UVU EXPRESS
SOUTH UTAH COUNTY/SLC EXPRESS
UTAH SOUTH COUNTY
BYU/PAYSON
I-15
US-89
US-6
SR-51
SR-198
3450 N
3000 N
2700 N
4800 S
5000 S
1900 N
1600 N
5550 S
5950 S
1000 N
800 N
400 N
6400 S
6800 S
Center St
100 S
400 S
7300 S
900 S
8000 S
1900 S
8500 S
8800 S
130 N
750 S
1050 S
1240 S
1400 S
1650 S
1750 S
1850 S
Williams Ln
Chappel Dr
Expressway Ln
Rees Ave
Mapleton Slant Rd
Canyon Rd
Main St
Spanish Fields Dr
Volunteer Dr
West Park Dr
Del Monte Rd
Mill Rd
Woodland Hills Dr
Arrowhead Trail
Scenic Dr
Swenson Ln
River Bottoms Rd
South Field Rd
Powerhouse Rd


Surround Spanish Fork Utah Yourself
Figure 8
Trail Plans
Legend
Existing Trails
Auxiliary Trails
Arterial
Collector
Bike Lane
Type A
Type B
Type C
Type D
Type E
Type F
Auxiliary
10ft Trails In Construction
Bonneville Shoreline Trail
Railroad
Public Park
Private Park
Existing Roads
Future Roadways
Rivers
Other City Boundaries
Spanish Fork Boundary
Policy Boundary
1 Inch = 0.667 Miles
HORROCKS
ENGINEERS
North Park
Water Park
City Park
Swenson Baseball Complex
S.F. Fairgrounds
Cemetery
East Park
Centennial Park
Sports Complex
Golf Course
Canyon View Park
Gun Club
S.O. Reservoir
S.O. Campground


Spanish Fork
Surround Yourself
Utah
Figure 9
Existing (2008)
Roadway Jurisdictions
Legend
Other Jurisdictions
UDOT
Utah County
Spanish Fork City
Private
Railroad
Rivers
City Boundaries
Spanish Fork City
Policy Boundary
Lakes
N
W
E
S
1 Inch = 0.667 Miles
HORROCKS
ENGINEERS

4.0 Future Conditions

Future travel patterns and the associated traffic conditions are a direct function of projected land use and socio-economic conditions. Thus, due to the fact that travel is not restricted to municipal boundaries, a larger area of socio-economic characteristics is used to estimate future travel in Spanish Fork City and the surrounding street systems. Future land use and socio-economic data were obtained from the Mountainland Association of Governments (MAG) and supplemented by data from Spanish Fork City.

Socio-economic Conditions

The analysis of land use and socio-economic data and projections is generally beyond the scope of this transportation study. However, since the transportation system has been planned and designed to accommodate future growth projections, a certain amount of socio-economic documentation is appropriate. The socio-economic data collected is considered to be the best available; however, land use planning is a dynamic process and the assumptions used in this report should not be used to supersede other planning efforts. Table 11-13 show the estimated socio-economic conditions such as population, employment, and dwelling units for the Traffic Analysis Zones (TAZ) within Spanish Fork City as shown in Figure 3 for the year 2040.

Spanish Fork City aspires to plan for the projected growth expected to occur throughout the City. Today's transportation system should not only accommodate existing traffic demands, but should also have capacity built in to accommodate the projected traffic needs of tomorrow. While considering the socio-economic data presented in this report and the anticipated growth to occur within the City, several precautions should be considered. First, the TAZ specific socio-economic information only approximates the Spanish Fork City boundaries based on the data provided by MAG and reviewed by the City. In addition, actual values may differ somewhat as a result of the large study area of the Regional Transportation Model which includes the unincorporated areas in and around Spanish Fork City.

MAG is largely responsible for regional transportation planning in the Utah Valley area. The primary responsibility of MAG is to act as the designated Metropolitan Planning Organization (MPO) for Summit, Utah, and Wasatch Counties. As such, MAG helps to ensure that consistent right-of-way widths and general standards are followed by all cities and counties in the region to ensure adequate regional transportation. The primary products of MAG include a 20 year Long Range Transportation Plan and a 5 year Transportation Improvement Program. Both of these products must be constrained by available (or reasonably available) revenue. As a result of this constraint, the Long Range Plan does not typically include all of the regional facility improvements which are planned by local communities.

Table 11 Future (2040) Socio-Economic Conditions Part 1

TAZ Number	Population (persons)	Employment (jobs)	Dwelling Units (units)
2084	681	745	246
2086	958	1	346
2087	876	745	316
2088	288	57	90
2093	1,168	105	385
2094	1,045	406	340
2095	38	1,491	17
2098	900	395	292
2100	1,148	135	362
2102	182	43	57
2103	453	739	140
2104	782	779	280
2105	680	645	231
2109	320	1,445	115
2111	585	252	206
2112	751	314	285
2113	483	127	158
2114	946	39	337
2115	1,092	3	280
2118	659	56	167
2122	1,012	199	256
2123	305	220	95
2129	1,272	9	330
2131	530	473	170
2132	555	430	177
2133	1,462	104	372
2134	807	22	206
2135	672	321	171
2137	1,500	334	482
2142	475	53	137
2150	353	75	117
2161	688	913	178
2251	743	311	282
2252	519	223	183
2253	362	95	118

Table 12 Future (2040) Socio-Economic Conditions Part 2

TAZ Number	Population (persons)	Employment (jobs)	Dwelling Units (units)
2254	510	2	130
2255	597	17	152
2256	439	417	149
2257	403	29	103
2258	558	0	201
2259	235	200	85
2260	483	481	173
2261	577	24	206
2262	140	631	50
2263	1,010	86	256
2264	781	153	198
2265	938	448	239
2266	5	180	2
2267	274	300	99
2268	498	58	157
2269	927	206	297
2270	108	25	34
2271	552	900	170
2272	403	312	129
2273	547	61	158
2274	914	657	285
2275	444	397	142
2276	522	44	132
2277	192	210	69
2278	360	172	92
2279	75	82	27
2280	173	189	62
2281	80	362	29
2282	498	214	175
2283	476	125	156
2284	200	22	58
2285	288	57	90
2286	517	372	161
2287	842	6	218
2288	537	712	138
2289	76	341	27
2290	284	56	89
2291	288	57	90

Table 13 Future (2040) Socio-Economic Conditions Part 3

TAZ Number	Population (persons)	Employment (jobs)	Dwelling Units (units)
2292	298	214	93
2293	507	46	167
2294	293	114	95
2295	284	110	92
2296	468	205	152
2297	246	29	77
2298	822	175	273
2299	487	104	162
2300	388	28	99
2301	3	133	1
2302	239	390	74
2303	254	197	81
2304	180	139	57
2305	349	74	116

Travel Demand Model Development

Projecting future travel demand is a function of projected land use and socio-economic conditions. MAG's regional travel demand model was used to accomplish this effort. First, the TAZ from MAG's model were divided up into smaller TAZ in order to more accurately model traffic demand within and around the City. Using existing traffic and land use data from Spanish Fork City, the travel demand model was then calibrated to accurately reflect travel conditions in Spanish Fork City. Once the travel demand model was calibrated for existing conditions, future land uses and socio-economic data were input into the model to predict future roadway traffic volumes and conditions.

Projected Traffic Volumes and Conditions

The resulting output of the travel demand model consisted of projected traffic volumes on all the major streets throughout the City. This data was used to formulate the recommended roadway improvements on individual streets. Various alternatives were modeled and analyzed to develop these recommendations. Various measures of effectiveness were considered to establish the projected traffic volumes and traffic conditions for the recommended improvements including Level of Service, delay, and overall safety. Existing (2008) and future (2040) traffic scenarios of Spanish Fork City were modeled. The following scenarios of broad alternatives are described in greater detail:

Existing Conditions

Conditions as they exist in 2008 were simulated in the travel demand model. These conditions were reviewed and compared with existing operations and traffic volumes to determine existing deficiencies, or problems that are caused by existing travel demand as opposed to growth in travel demand. Existing traffic volumes and LOS are depicted in Figure 5.

No-Build Conditions

The no-build conditions consisted of modeling the potential development and growth throughout the City. Roadways under Spanish Fork jurisdiction were not improved from the 2008 condition. Roadways falling under the jurisdiction of other agencies such as Utah County, Utah Department of Transportation (UDOT), and other surrounding cities, were improved to the 2040 condition based on MAG recommendations. The resulting traffic volumes and LOS of this option are shown in Figure 10. Obviously, this condition was never considered as a viable option from the City's standpoint since future roadway LOS is found to be unacceptable on many of the City's roadways. This broad alternative was modeled to help pinpoint various problem areas throughout the City and to demonstrate the need for traffic improvements throughout the City. The improvements recommended to resolve the problems from the no-build conditions are shown in Figure 11.

Recommended Build Conditions

A recommended build alternative (2040) was developed while attempting to balance transportation needs with realistically available funding. Figure 12 shows the anticipated traffic volumes and LOS if all the recommendations presented in the TTE are implemented. Details of these recommended improvements are outlined in Chapter 0 entitled Alternatives Evaluation and Recommendations.

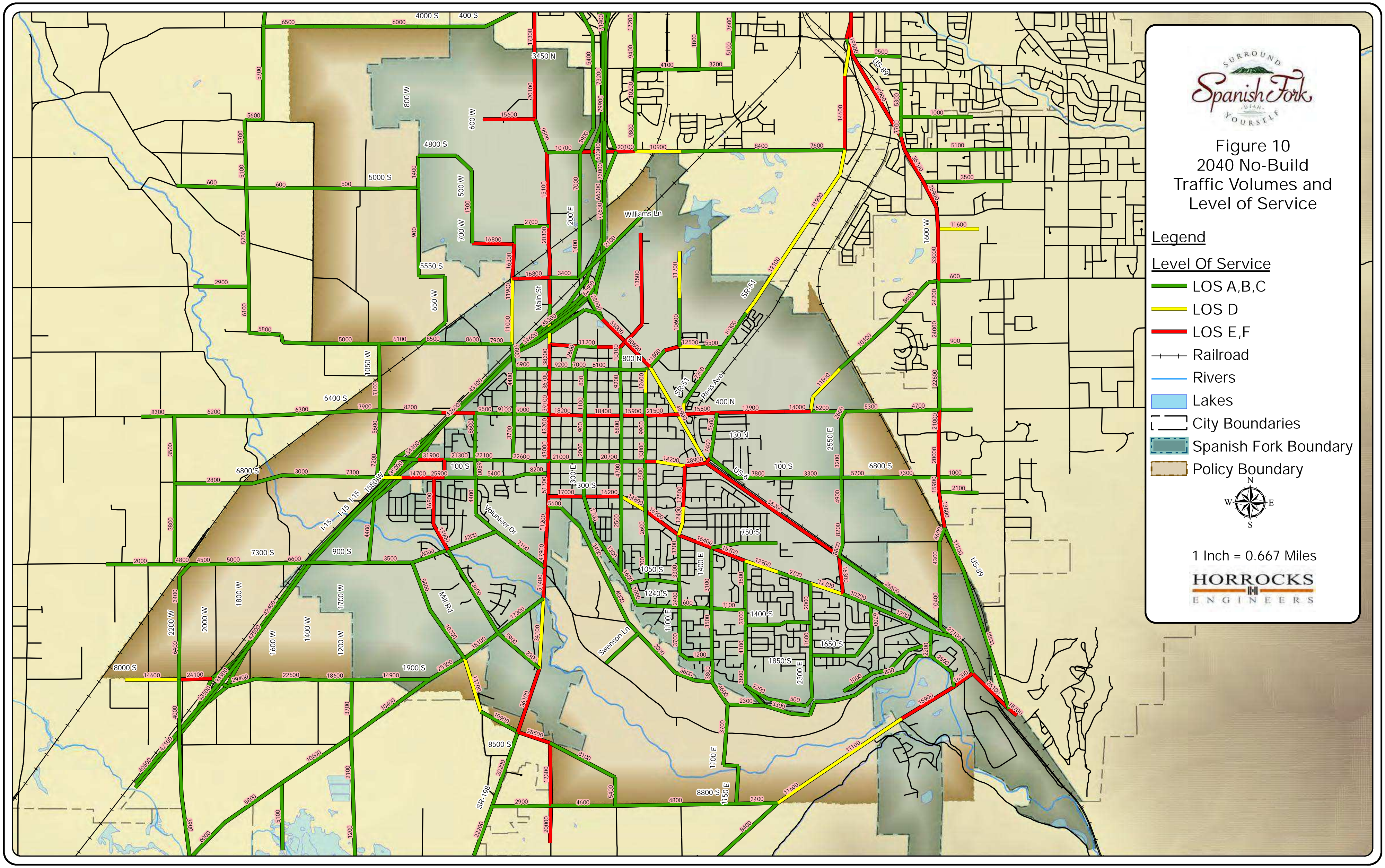


Figure 10
2040 No-Build
Traffic Volumes and
Level of Service

Approved Transportation Master Plan (03-07-17)

1 Inch = 3,600 Feet

Legend

TMP - Commuter Rail/Park & Ride
- Commuter Rail Station
- Park and Ride

TMP - Traffic Signals
- Existing
- Future
- Future 120 Ft Roundabout
- Future 140 Ft Roundabout

TMP - Improvements Required
- TMP - Improvements Required

TMP - Proposed New Alignment
- Major Arterial
- Minor Arterial
- Major Collector
- Collector
- Minor Collector
- Commercial Collector

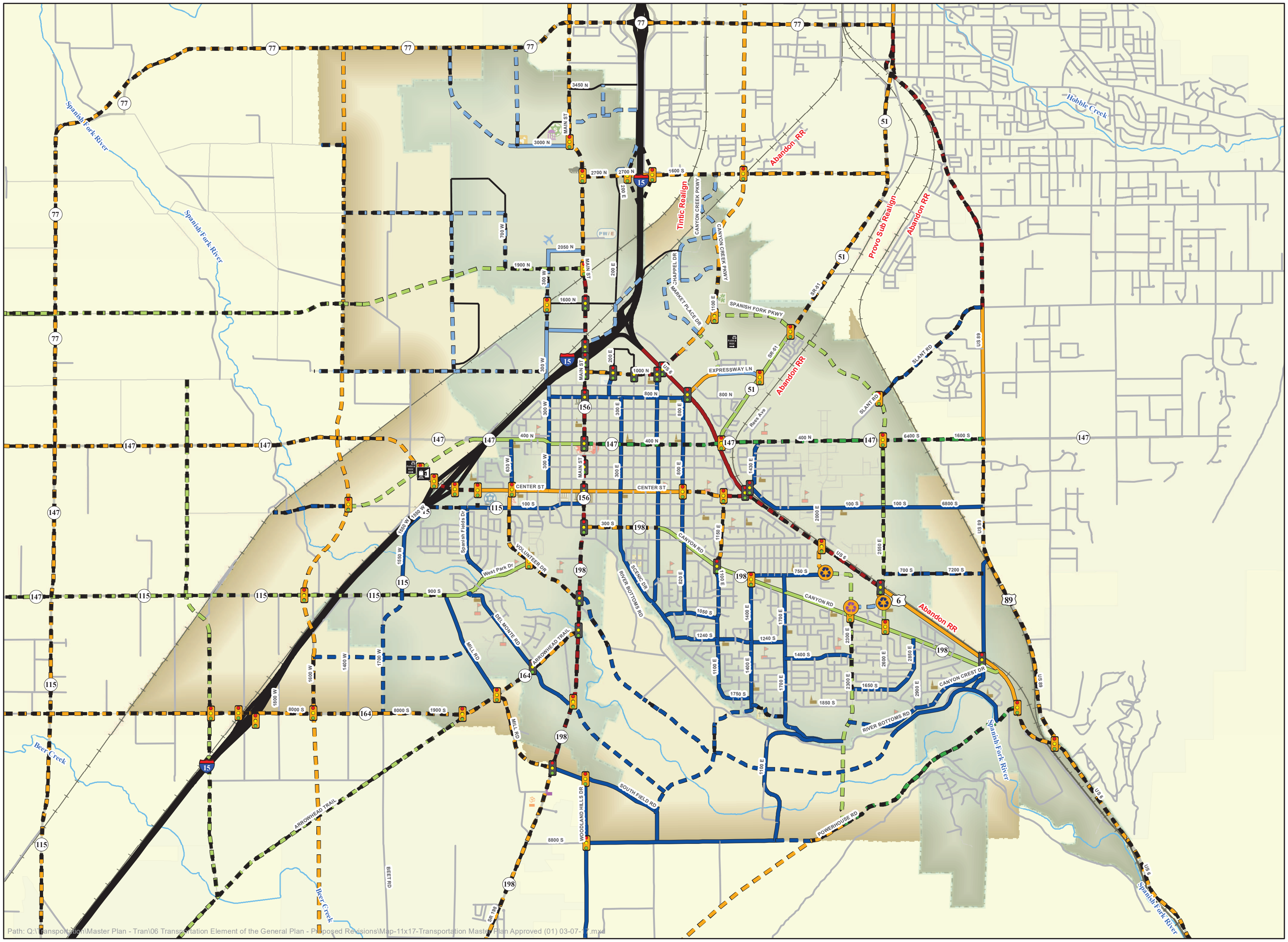
TMP - Functional Classification
- Freeway
- Major Arterial
- Minor Arterial
- Major Collector
- Collector
- Minor Collector
- Commercial Collector
- Commercial Local
- Residential Local

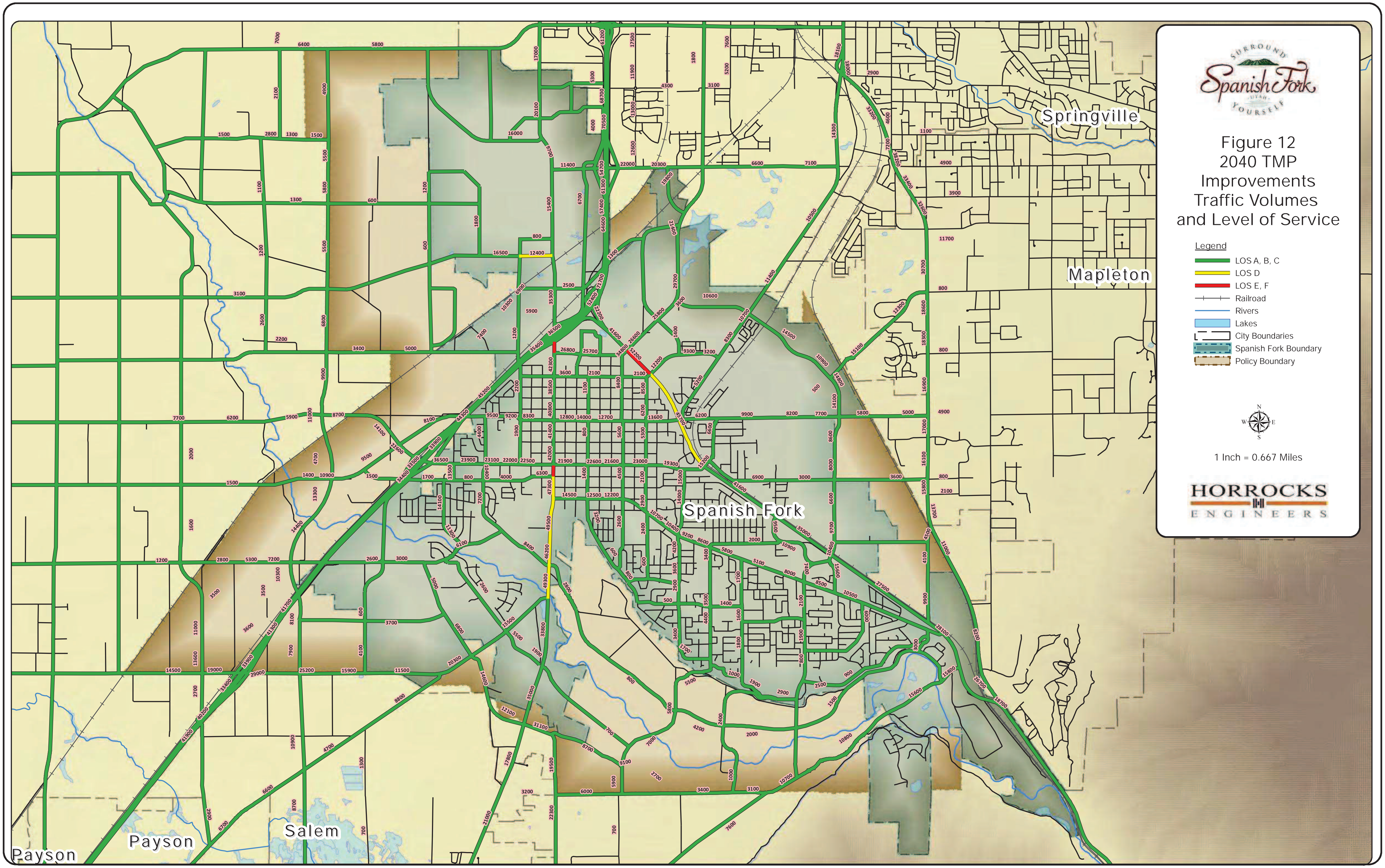
Print Date: 3/14/2017

Surround Spanish Fork Utah Yourself

GEOGRAPHIC INFORMATION SYSTEMS

Spanish Fork City GIS
40 South Main Street
Spanish Fork, UT 84660
Administrator : (801) 804-4571
Interns: (801) 804-4570
(801) 804-4572





Spanish Fork
Figure 12
2040 TMP
Improvements
Traffic Volumes
and Level of Service
Legend
LOS A, B, C
LOS D
LOS E, F
Railroad
Rivers
Lakes
City Boundaries
Spanish Fork Boundary
Policy Boundary
1 Inch = 0.667 Miles
HORROCKS
ENGINEERS
Springville
Mapleton
Spanish Fork
Salem
Payson
Payson

5.0 Alternatives Evaluation and Recommendations

Upon evaluating the existing and future conditions, several recommendations to better accommodate future traffic volumes and conditions are outlined in the following pages.

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 not imposing on the overall quality of life. 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 TTE defines a hierarchy of streets known as a Functional Classification of Streets. The functional classification scheme coincides with the surrounding areas. Spanish Fork City has defined a functional classification system consisting of the following roadway classifications:

- Major Arterial
- Minor Arterial
- Major Collector
- Minor Collector
- Commercial Local Road
- Residential Local Road
- Residential Sub-Local Road

Each of these roadway classifications has a specific purpose and function. For example, the primary purpose of an arterial street is to move traffic and serve higher density retail and commercial land uses. Long continuous routes with high traffic volumes and speeds characterize arterial roadways. On the other hand, local roads are intended to provide access to individual properties. Local roads are shorter in length with lower speeds and volumes. Collector roads provide a transition between arterials and local roadways by providing both access and traffic moving capacity. Collector type facilities serve moderate traffic volumes at moderate speeds.

Table 14 and Table 15 summarize some of the planning and design issues for each roadway classification, including right-of-way width, number of travel lanes, access control, traffic capacity, speed, trip length and an expected accident rate. In addition, Spanish Fork City has chosen typical cross-sections for each of the roadway classifications listed above. These typical cross-sections are illustrated in Figure 13 and Figure 14. Recommended functional classifications were assigned to all of the important roadways throughout the City; these recommendations can be seen in Figure 11.

Table 14 Functional Classification Planning and Design

Functional Group	Right-of-Way Width	No. of Travel Lanes	Access Control	Traffic Capacity (vehicles per day)
Major Arterial	136 feet	5 to 7	Public Streets Only	42,000 to 64,000
Minor Arterial	121 feet	3 to 5	Encourage Public Streets Only	17,800 to 42,000
Major Collector	97 feet	3	Control Driveway Spacing	<16,200
Minor Collector	88 feet	2	Control Driveway Spacing	<16,200
Commercial Local	77 feet	2	Varies	<10,000 (& varies)
Residential Local	60 feet	2	Varies	<2,000 (& varies)
Residential Sub-Local	54 feet	2	Varies	<2,000 (& varies)
Residential Sub-Local	42 feet*	2	Varies	<2,000 (& varies)

*With City Council approval

Table 15 Functional Classification Operations

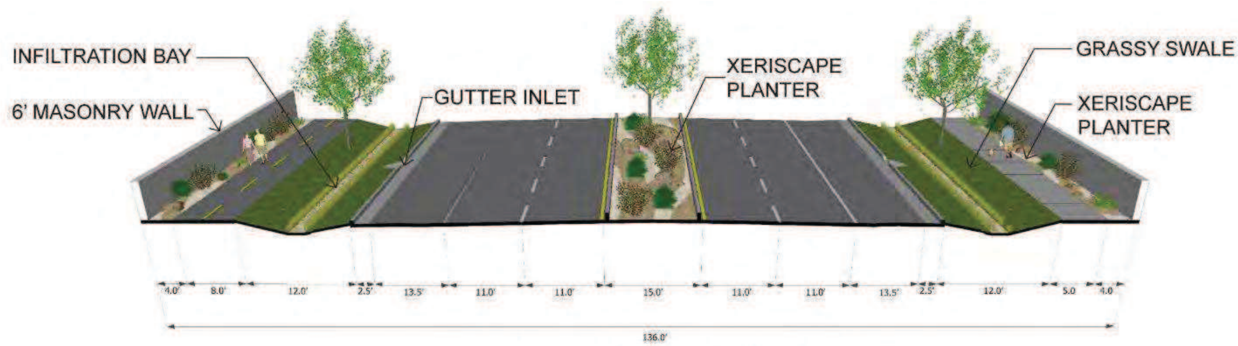
Functional Group	Speed (mph)	Typical Trip Length	Typical Accident Rate (Accidents per million vehicle miles)
Major Arterial	45+ (& varies)	3 to 15 miles	3
Minor Arterial	35 to 45 (& varies)	1 to 5 miles	6
Major Collector	25 to 40 (& varies)	<2 miles	8
Minor Collector	25 to 40 (& varies)	<2 miles	8
Commercial Local	<25 (& varies)	<0.5 miles	Varies
Residential Local	<25 (& varies)	<0.5 miles	Varies
Residential Sub-Local	<25 (& varies)	<0.25 miles	Varies
Rural Local	<25 (& varies)	Varies	Varies

At the intersections of many major and minor arterials, traffic volumes are expected to be high enough to potentially warrant additional turning lanes such as exclusive right-turn lanes or dual left-turn lanes. To accommodate these extra lanes, some localized intersection widening will be required. Where appropriate, a detailed intersection analysis should be conducted to determine the actual extent of the improvements for each intersection. Additional widening for exclusive bus turnout lanes does not appear to be necessary at this time; however, exclusive bus turnout lanes may be needed on a case by case basis to preserve roadway capacity. Unless otherwise specified by the City, bus maneuvers can be made primarily within the shoulder areas at designated bus stops.

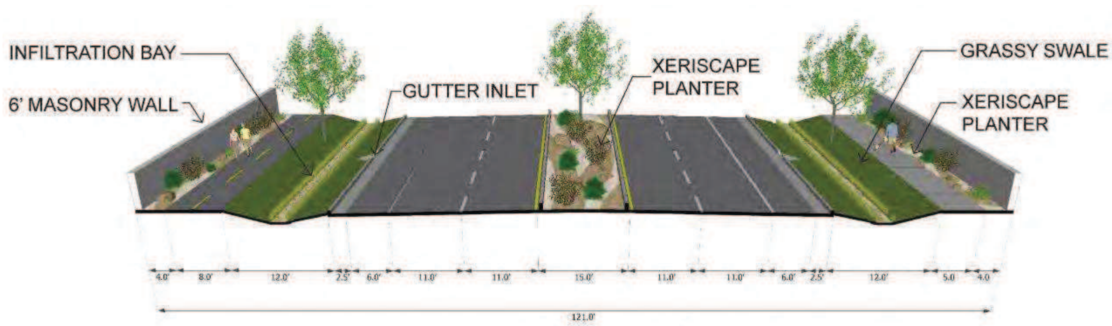
Roadway designs should provide adequate curb radii at intersections based on the specific roadway classifications of the intersecting roads. Table 16 outlines appropriate turning radii for corresponding intersecting roadway classifications.

Table 16 Intersection Curb Radii Chart

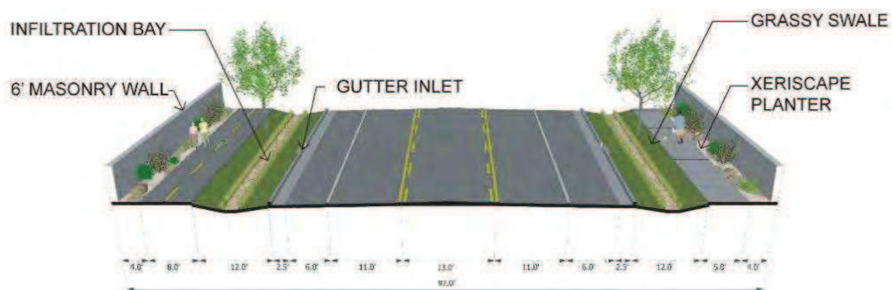
Cross Street	Major Road					
	Major Arterial	Minor Arterial	Major Collector	Minor Collector	Commercial Local	Residential Local
Major Arterial	35’	35’	35’	35’	30’	25’
Minor Arterial	35’	35’	30’	30’	30’	25’
Major Collector	35’	30’	30’	30’	30’	25’
Minor Collector	35’	30’	30’	30’	30’	25’
Commercial Local	30’	30’	30’	30’	25’	25’
Residential Local	25’	25’	25’	30’	25’	25’



MAJOR ARTERIAL STREET



MINOR ARTERIAL STREET



MAJOR COLLECTOR STREET

Figure 13 Typical Cross-Sections

Figure 14 Typical Cross-Sections

Alternative Transportation Modes

As Spanish Fork City and the surrounding areas continue to grow, roadways will become more congested due to the ever increasing number of vehicles. In an effort to help alleviate some of the congestion and reduce the number of vehicles on the roadway system, alternative modes of transportation will become increasingly important. Several recommendations for increasing and improving alternative transportation modes in Spanish Fork City are outlined in the following paragraphs:

Car Pooling

Carpooling and mass transit are both expected to provide the best opportunity for reducing the number of single occupant vehicles on the road. Utah Transit Authority (UTA) currently operates a ride share program that promotes carpooling and transit use. The City can help foster the use of UTA's program by working with UTA to disseminate information about the ride share program at public locales such as City Hall, schools, libraries, and major employment centers.

Park-and-Ride Lots

The development of convenient and accessible park-and-ride lots will also help facilitate and encourage carpooling. Figure 7 shows existing park-and-ride locations in Spanish Fork. The City should also work with UTA to develop potential informal park-and-ride lots at existing public, retail, and church parking lots. Continued coordination with UTA is necessary to adequately assess and determine future park-and-ride lot needs and locations.

The following identifies key parameters of park-and-ride lots and their users:

- Park-and-ride lots generally serve daily worker commute trips with peak traffic loads experienced in the morning and evening commute peak periods.
- Park-and-ride lots generally serve users who live within 3 miles of the lot and often within one mile of the lot. Greatest benefits can be achieved if park-and-ride lots serve users living within a quarter of a mile to allow walk access. Park-and-ride lots can draw from a larger area when located along arterial streets.
- Park-and-ride lots predominantly serve larger car pools (3 or more passengers) as well as transit trips, both of which are characterized by longer work trip lengths.
- Larger park-and-ride lots should be served by major arterial streets such as Main Street, 1000 North, and Center Street. These lots should be visible to limited access arterials such as US-6 and I-15.
- Smaller, joint use park-and-ride lots should be located on major and minor arterials where possible.

Site design of park-and-ride facilities can be described as follows:

- Public use park-and-ride lots can vary in size with regional lots varying between 1 acre and 5 acres of land, serving approximately 80 to 500 users, respectively.
- Park-and-ride lots should ideally accommodate "kiss-and-ride" users (short term parking and drop off), park-and-ride users (long term, 8 hour parking), as well as bus staging and bus turnarounds.
- Key design features should consider traffic flow, safety, security, visibility, and community acceptance (landscaping, etc.) for long term success.
- Park-and-ride lots should include bicycle storage facilities, as well as appropriate access from pedestrian and cyclist facilities.
- Reduction in parking standards and traffic impact fees should be provided for contributions to park-and-ride facilities.

UTA Bus Service

Bus service helps provide a low cost alternative travel mode for the public while benefiting communities. With the continued growth in Spanish Fork, expansion of the existing bus routes in the City is anticipated in order to meet the increasing demand for service. Currently four different regional bus routes pass through the City. Future implementation of two new local bus routes by approximately 2015 is being discussed by both UTA and the City. The first would be run along Canyon Road since it runs between some fairly extensive housing developments from the southeast of the City to Main Street. The second would run along 1900 South and Arrowhead Trail Road. Both of these new local bus routes can be seen in Figure 15. The City and UTA need to coordinate with each other to solidify these routes such that these routes provide optimum linkage between the commercial/industrial areas of the City with the residential areas of the City. Connection to the local high schools and UVU branch campus would be ideal as well.

Bus Rapid Transit

An Intercity Bus Connector is planned to be implemented in Phase I (2007-2015) of the Regional Transportation Plan. This Intercity Bus Connector will begin as an express bus that travels through Springville to connect to the Provo Intermodal Center in south Provo. Eventually, this service would evolve into Bus Rapid Transit (BRT). This service would ultimately need to connect to the proposed commuter rail station and intermodal center in Spanish Fork. A proposed alignment for this service through Spanish Fork would follow the proposed realignment of Chappel Drive to 1000 North, then down Main Street to Center Street and finally to the proposed commuter rail station at I-15 and Center Street (Figure 15). Ultimately, this service could be provided to Payson and other communities south of Spanish Fork.

Commuter Rail Transit

Through the Spanish Fork transportation planning process, a new interchange at I-15 and Center Street is recommended. This interchange is currently a part of the Regional Transportation Plan and is proposed as a Phase 2 need. The regional transportation plan shows this interchange as being under funded, with no funding source having been identified for the project. The Plan's inflated cost projection puts the future cost of the new interchange at $58 million. The regional model shows considerable congestion on Main Street in 2040 and the construction of a new interchange at Center Street would significantly improve this congestion. In addition, with a new interchange at Center Street and with the vast amount of developable land to the west of I-15, this land to the west of I-15 would be a prime location for a commuter rail station and intermodal center.

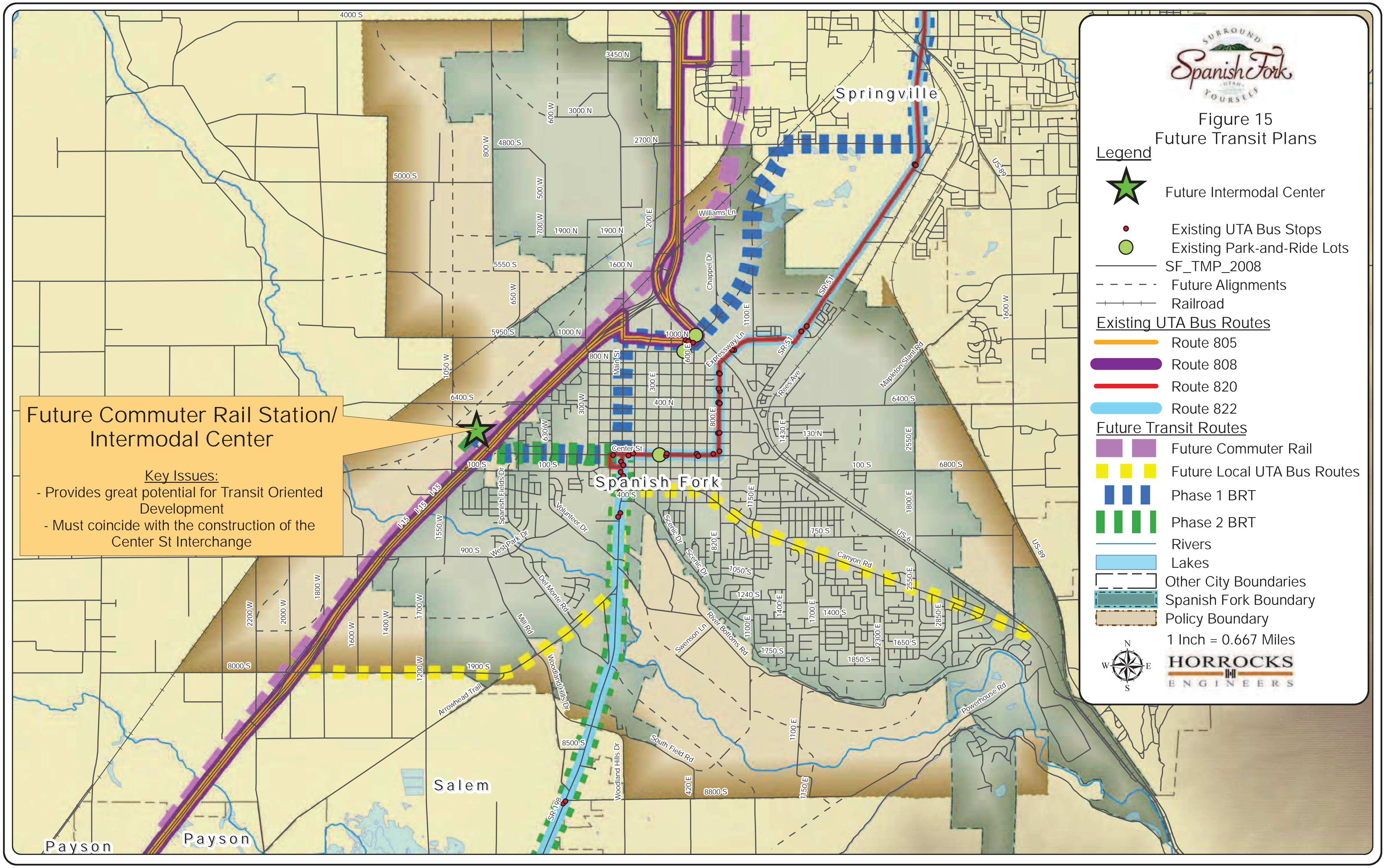
Various transit center/commuter rail studies have been conducted or are on-going in the Springville/Spanish Fork area. One area of focus for a transit center is I-15/Center Street. This would co-inside with a new I-15 interchange at Center Street. The proposed commuter rail route and stop is shown in Figure 15.

Trails Plan

Spanish Fork City's current Trails plan can be seen in Figure 8. Trails are an important element to the transportation system and improve the overall quality of life for the community. Trails throughout the City generally parallel roadways but may also follow canals, rivers, utility corridors, and natural drainage channels. These routes could be shared with pedestrians, bicyclists, and equestrians (in rural areas). The current trails plan shows the location and types of trails to be installed. Table 17 outlines the different types of trails. More specific details for these different trail types can be found in the City's standard drawings.

Table 17 Trail Type Descriptions

Type of 10' Trail	Right-of-Way (ft)	Minimum Clear Zone (ft)	Additional Notes
Along Arterial Roadways	8' (major) 8' (minor)	N/A	Trees spaced at 20 to 30 foot intervals between the street and trail per City Engineer's direction. Other landscaping as approved by City Engineer. Trail can meander within right-of-way.
Along Collector Roadways	8' (major) 8' (minor)	N/A	Trail installed parallel to roadway. Wall located on one side of the trail (4 foot gap), with a 12 foot swale on the other. Trees spaced at 35 to 40 foot intervals and 75 feet back from the right-of-way line at corners.
Along Traffic Lanes	N/A	N/A	Bicyclists would share the roadway with motorists by using the shoulder of the road. Proper signage would be needed.



Spanish Fork
UTAH
SURROUND YOURSELF
Figure 15
Future Transit Plans
Legend
Future Intermodal Center
Existing UTA Bus Stops
Existing Park-and-Ride Lots
SF_TMP_2008
Future Alignments
Railroad
Existing UTA Bus Routes
Route 805
Route 808
Route 820
Route 822
Future Transit Routes
Future Commuter Rail
Future Local UTA Bus Routes
Phase 1 BRT
Phase 2 BRT
Rivers
Lakes
Other City Boundaries
Spanish Fork Boundary
Policy Boundary
1 Inch = 0.667 Miles
HORROCKS
ENGINEERS
Future Commuter Rail Station/
Intermodal Center
Key Issues:
- Provides great potential for Transit Oriented Development
- Must coincide with the construction of the Center St Interchange
Springville
Spanish Fork
Salem
Payson
Payson
I-15
US-89
US-6
SR-51
SR-198
Center St
Williams Ln
Expressway Ln
Canyon Rd
Powerhouse Rd
Arrowhead Trail
Woodland Hills Dr
River Bottoms Rd
South Field Rd
Mapleton Slant Rd
4000 S
5000 S
6400 S
8000 S
8500 S
8800 S

Signal Inventory

As part of the recommended transportation improvements, potential locations for future signals were evaluated. These locations are shown on the Signal Inventory map (Figure 6). The need for these future traffic signals will be based primarily on the amount and timing of surrounding development. Projecting where and when development will occur is difficult; hence, each potential location will need to be monitored on a regular basis so that if MUTCD traffic signal warrants are met, the signal can be installed in a timely manner. Additional signals that are not currently shown on the map may eventually require signalization; as a result, the City should dynamically identify these locations by regularly monitoring traffic conditions.

Safety

One of the main goals of the TTE 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 Spanish Fork 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.

Driveways

Whenever possible, driveways on collector and arterial streets should allow should be configured to allow vehicles to turn around on site so that they always exit the driveway facing the street. 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.

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.

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 (TCM's) can be implemented to reduce speeds on residential roadways.

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

Types of Traffic Calming Measures

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

Category One – Traffic Control Devices

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

Category Two – Street Modification

Street modification TCM's include actions that physically alter the vertical or horizontal alignment of the roadway. Vertical changes include speed humps, speed tables, raised intersections, etc. Horizontal changes include chicanes and lateral shifts. Other street modifications TCM's include constrictions (i.e., narrowing, pinch points, islands, chokers, etc.), narrow pavement widths (i.e., medians, edge treatments, bulb-outs, etc.), entrance features, roundabouts, small corner radii, street closures, and streetscaping (i.e., surface textures and colors, landscaping, street trees, street furniture, etc.).

Category Three – Route Modification

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

Streetscaping

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

Other Considerations

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

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

Installation of Traffic Calming Measures

When deciding to implement TCM's, the decision should be based on engineering merits of a TCM application, as opposed to the results of a TCM popularity contest between neighborhoods. An engineering study that documents the need for such measures and the nature of the traffic problem via speed and volume measurements should be the determining factor.

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

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

As Spanish Fork City develops a traffic calming plan and implements TCM's, the latest engineering information should be consulted to ensure that the plan contains the latest and best recommendations. ITE is the definitive resource on traffic calming issues and produces a significant amount of literature on the subject. A complete discussion on the latest TCM's and related issues can be found at http://www.ite.org/traffic/index.asp.

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

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 mutually exclusive. No facility can move traffic very well and provide unlimited access at the same time. Figure 16 shows the relationship between mobility, access, and the functional classification of streets. The extreme examples of this concept are the freeways and the cul-de-sac. The freeway moves 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.

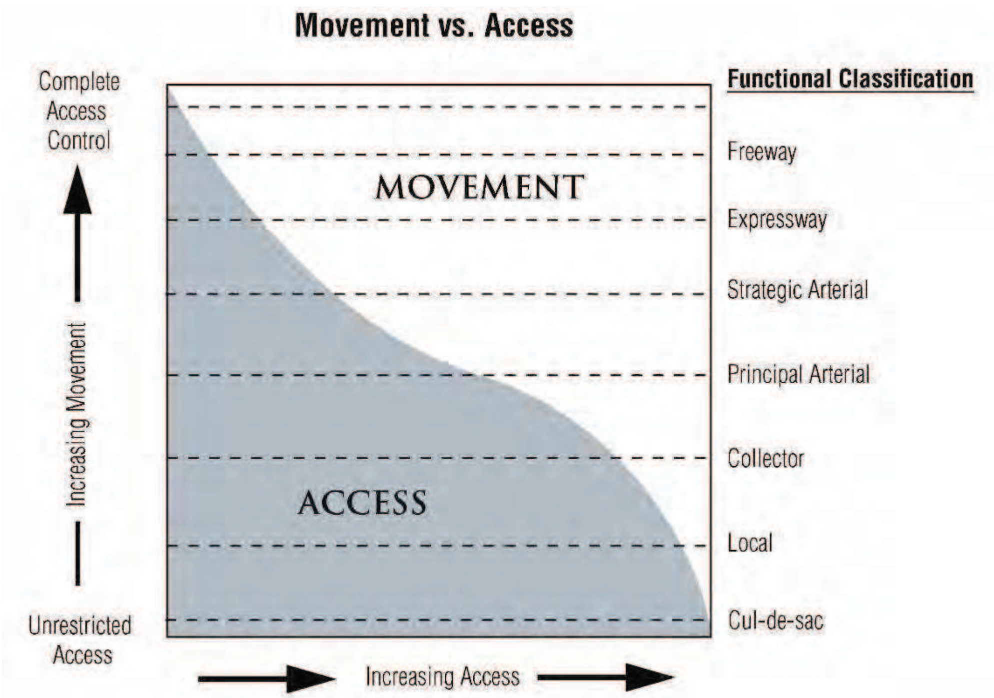


Figure 16 Mobility vs. Access by Functional Classification

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. There will definitely be less potential for accidents. According to the Federal Highway Administration (FHWA), before and after analyses show that routes with well managed access can experience 50 percent fewer accidents than comparable facilities with no access controls.

Roadway Functional Classification

Access spacing should recognize that 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. At the low end of the hierarchy are highway facilities that provide good access to abutting properties, but provide limited opportunity for through movement. Vehicles entering or exiting a roadway typically perform the ingress or egress maneuver at a very low speed, momentarily blocking through traffic and impeding the movement of traffic on the roadway. At the high end of the hierarchy are 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 the 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.

The functional system of classification divides streets into three basic classes identified as arterials, collectors, and local streets. The function of an arterial is to provide for mobility of through traffic. Access to an arterial is controlled to reduce interferences and facilitate through movement. Collector streets provide a mix for the functions of mobility and access, and therefore accomplish neither well. The predominate purpose of local streets is to provide good access. Each class of roadway has its own geometric, traffic control, and spacing requirements.

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).

Access Management Techniques

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's Planning Board to determine what will work best based in each situation.

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 shared access is required were 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. Incentives such as density bonuses or reduced frontage requirements can encourage developers to utilize access from existing side roads or to construct side roads rather than directly access an arterial or a collector road.

Spacing of Access Points

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

To ensure efficient traffic flow, new signals should be limited to locations where the progressive movement of traffic will not be impeded significantly. Uniform, or near uniform, spacing of signals is essential for the progression of traffic. As a minimum, signals should be spaced no closer than one-quarter mile (1,320 feet). It may be recommended on principal arterial streets that signals be spaced at one-third mile (1,760 feet) to one-half mile (2,640 feet).

Unsignalized driveways are far more common than signalized driveways. Traffic operational factors leading toward 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. Table 18 displays the access spacing based on functional classification.

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. The spacing requirement of accesses is based on the functional classification of the roadway facility and is shown in Table 18. Access spacing shall be measured from center of access to center of access. The spacing of right-turn accesses on each side of a divided roadway can be treated separately; however, where left-turn at median breaks are allowed, the accesses on both sides should line up or be offset from the median break by a minimum of 300 feet. On undivided roadways, access on both sides of the road should be aligned. Where this is not possible, driveways should have an offset distance based on the roadway classification (Table 19). This offset is the distance from the center of an access to the center of the next access on the opposite side of the road.

Table 18 Access Spacing Based on Functional Classification

Functional Classification	Minimum Signal Spacing (ft)*	Minimum Street Spacing (ft)*	Minimum Access Spacing (ft)**	Minimum Right-In/Right-Out Access Spacing (ft)**
Major Arterial	2,640	660	500	350
Minor Arterial	1,320	500	350	250
Major Collector	1,320	500	300	200
Minor Collector	1,320	500	300	200
Commercial Local	1,320	660	350	300
Residential Local	1,320	125	125	100
Residential Sub-Local	1,320	100	100	100

*Measured from center to center of street.
**Measured from right-of-way to curb return.

Table 19 Minimum Offset between Driveways on Opposite Sides of Undivided Roadways

Functional Classification	Minimum Offset (ft)*
Major Arterial	600 for speed ≥ 45 mph and 300 for speeds < 45 mph
Minor Arterial	220
Major Collector	200
Minor Collector	200
Commercial Local	200
Residential Local	100
Residential Sub-Local	100

*Distances in table are measured from between right-of-way lines.
Note: Values are based on TRB Access Management Guidelines.

Residential Driveways

Residential driveways do not have a minimum spacing requirement between other residential driveways. Due to lot widths and locations, sometimes driveways can be shared or have no space between them. However, the distance a residential driveway should be from an intersection is detailed in Figure 18 and Table 20 below.

Medians

Medians are used to control and manage left turns and crossing movements as well as separating traffic moving in opposite directions. Restricting left turning movements reduces the conflicts between through and turning traffic resulting in improved safety. Studies have shown that the installation of a non-traversable median will reduce crashes by 30 % over that of a two way left turn lane (TWLTL). Medians are typically used on arterial or other roadways with high volumes of traffic and four or more lanes of traffic.

The use and design of a median is determined by the characteristics of the roadway such as: traffic volumes, speed, number and configuration of lanes, right-of-way width and land uses along the roadway. The need for a median can be identified through engineering review, a traffic study assessing the impact of a proposed project, and should be considered on any roadway that has a speed limit greater than 40 MPH. Medians can improve pedestrian safety by providing a refuge area for those crossing the street. The designer should consider incorporating pedestrian refuge at all major intersection crossings.

In addition, medians are often used in commercial and residential developments to separate lanes of traffic and limit conflicts caused by left turns. Medians can also add to the overall aesthetics of a roadway corridor or a development by incorporating landscaping or other items of visual interest. A well designed roadway with good access management can be aesthetically pleasing. It provides the landscape architect greater opportunity in the development of practical and efficient landscape plans. However care should be taken to maintain sight distance around the intersection/access locations. It is therefore required that only ground cover plantings be planted within 350 feet of an intersection/access opening. Also care should be taken to select landscape materials and location of the materials that will not intrude into the roadway which could result a safety problem for the motorist. Also care should be taken in selection of trees that when mature will not be larger than a 4 inch diameter.

Continuous two way left turn lanes can reduce the conflict and delays caused by vehicles turning left through on-coming traffic. Left turn lanes also reduce accidents caused by slowing vehicles and traffic going around on the right. Two way left turn lanes should only be used to retrofit areas of existing development and shall be limited to a roadway with less than 18,000 ADT. New roads that utilize other access management techniques should not need a two way left turn lane.

Median openings are provided at all signalized at-grade intersections. They are also generally provided at unsignalized junctions of arterial and collector streets. They may be provided at driveways, where they will have minimum impact on roadway flow. The spacing of median openings for signalize driveways should reflect traffic signal coordination requirements and the storage-space needed for left turns. Minimum desired spacing of unsignalized median openings at driveways shall be based on the left turn storage requirements. Median openings for left-turn entrances (where there is no left-turn exit from the activity center) should be spaced to allow sufficient storage for left-turning vehicles.

Left-turn ingress or egress requires a median opening when traffic traveling in opposing directions is separated by a barrier median. Median widths commonly vary from 30 inches to over 30 feet. A 14 foot median is desirable in order to provide for an adequate left turn lane at intersections.

Design elements include the median width, the spacing of median openings and the geometries of median noses at opening. Typically, median widths at intersections are 30 inches formed by two 15 inch curbs back to back with a plowable (tapered) end.

Corner Clearance

Corner Clearance is the distance between a driveway and an intersection. Providing adequate corner clearance improves traffic flow and roadway safety by ensuring that the traffic turning into the driveway does not interfere with the function of the intersection. Local regulations should require that driveways be located a minimum distance from an intersection based on roadway classification or speed. Any access opening shall not be located within the functional area of the intersection as shown in Figure 17.

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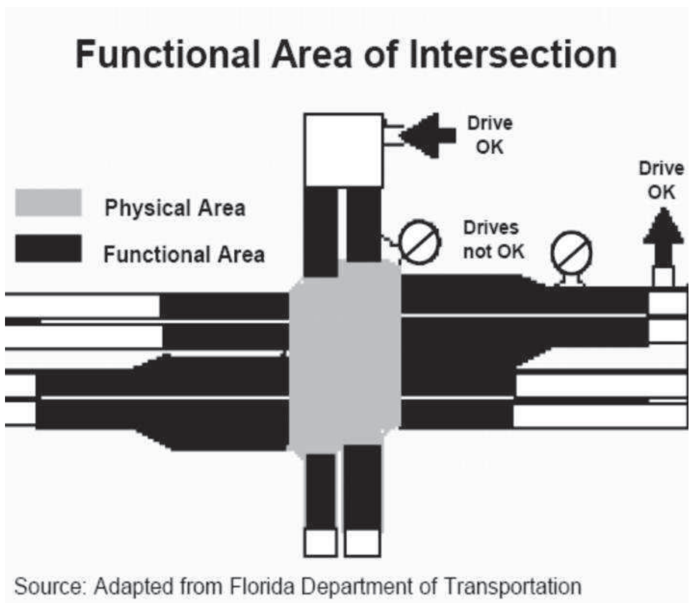


Figure 17 Functional Area of Intersections

Corner Clearance shall be based on an engineering study that includes the following distances illustrated in Figure 19 and Table 20. Figure 19 shows an example inadequate corner clearance that can inhibit roadway capacity and decrease safety. The values in Table 20 represent the absolute minimums based on national data. Table 18 above represents the minimum distances desired by Spanish Fork City.

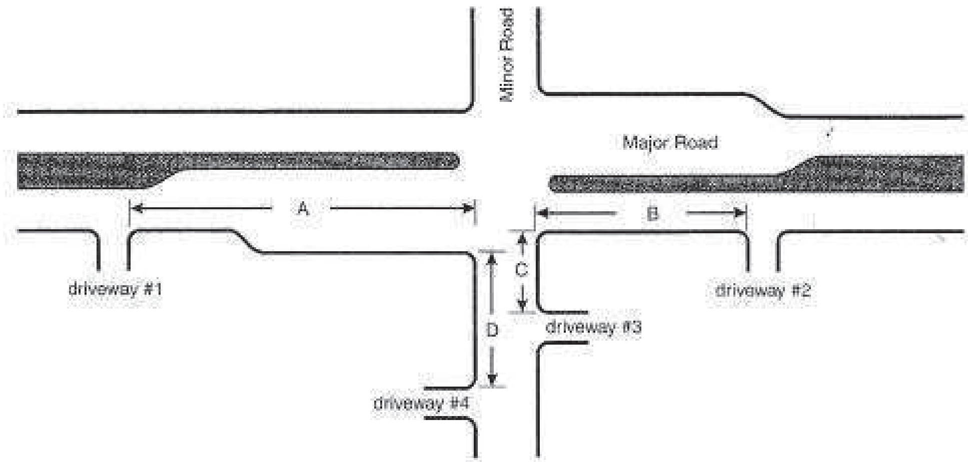


Figure 18 Corner Clearance Types

Table 20 Corner Clearance Criteria

Clearance Type	Sample Clearance Criteria
A- Approach side on the major roadway	Equal or exceed the functional distance of the intersection d1+d2+d3 (based on engineering study). d1= Distance traveled during perception d2= Distance traveled while driver decelerates to a stop d3= Storage length
B- Departure side on the major roadway	Residential Roadways 260 feet* Collector Roadways 305 feet* Arterial Roadways 380 feet*
C- Approach side on the minor roadway	Shall be a minimum of 100 feet
D- Departure side on the minor roadway	Shall be a minimum of 120 feet

* Based on a spillback rate of 15% from TRB Access Management Manual

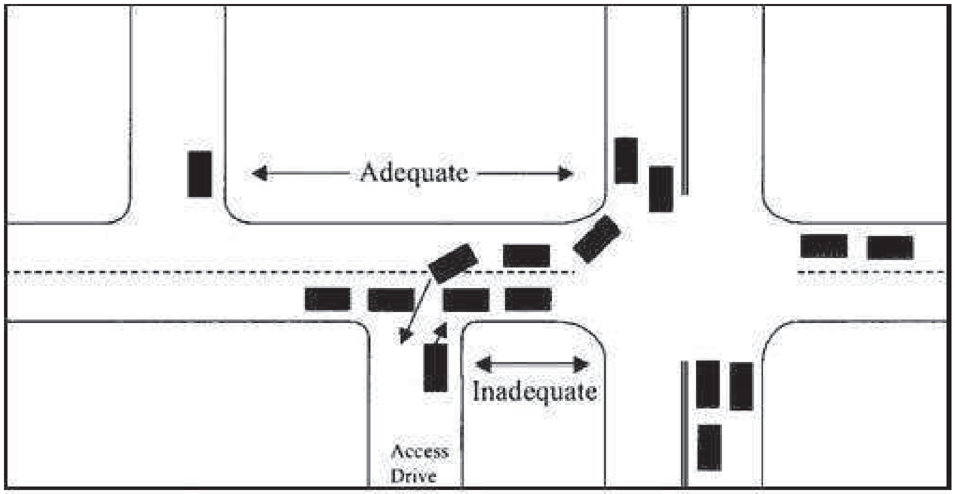


Figure 19 Inadequate Corner Clearance

Width of Access Points

Uncontrolled access is a serious hazard for vehicles entering or exiting a site, vehicles passing by a site, bicyclists and pedestrians. In addition to limiting the number of access points, the width of the access point should be restricted based on the use of the site in question. Residential driveways should be limited to a maximum width of 32 feet at the edge of pavement, including turning radii. The maximum width for a commercial or industrial site entrance with two-way traffic should be limited to 44 feet including 12' for right out 12' for left out with 16' for ingress lane and 2- 2 foot shoulders. The width of the entrance should be determined based on the type of use for the site, the type of traffic (i.e. cars vs. 18 wheel trucks), and the projected volume of traffic.

Turning Radius

The turning radius of a driveway or access road affects both the flow and safety of through traffic as well as vehicles entering and exiting the roadway. The size of the turning radius affects the speed at which vehicles can exit the flow of traffic and enter a driveway. In general, the larger the turning radius, the greater the speed at which a vehicle can turn into a site. An excessively small turning radius will require a turning vehicle to slow down significantly to make the turn, therefore backing up the traffic flow or encroaching into the other lane. An excessively large turning radius will encourage turning vehicles to travel quickly, thereby creating hazards to pedestrians. Either of these situations increases the potential for accidents.

The speed of the roadway, the anticipated type and volume of the traffic, pedestrian safety and the type of use proposed for the site should be considered when evaluating the turning radius. Proposed uses that would require deliveries by large trucks (such as major retail establishments and gas stations) should provide larger turning radii to accommodate such vehicles. Other uses such as banks, offices or areas with high pedestrian traffic could adequately be served with smaller turning radii based on the type of traffic they would generate.

Throat Length

Throat Length is the length of the driveway that is controlled internally from turning traffic measured from the intersection with the road. Driveways should be designed with adequate throat length to accommodate queuing of the maximum number of vehicles as defined by the peak period of operation in the traffic study. This will prevent potential conflicts between traffic entering the site and internal traffic flow. Inadequate throat length may cause turning traffic to back up onto the road thereby impeding traffic flow and increasing the potential for accidents. The minimum throat length for an access into a minor commercial property is 50 feet. For major commercial development FHWA recommends a minimum throat length of 150' for a major driveway entrance, with 300' desirable. Figure 20 shows both a poor and good example of driveway throat length.

Poor Throat Length **Good Throat Length**

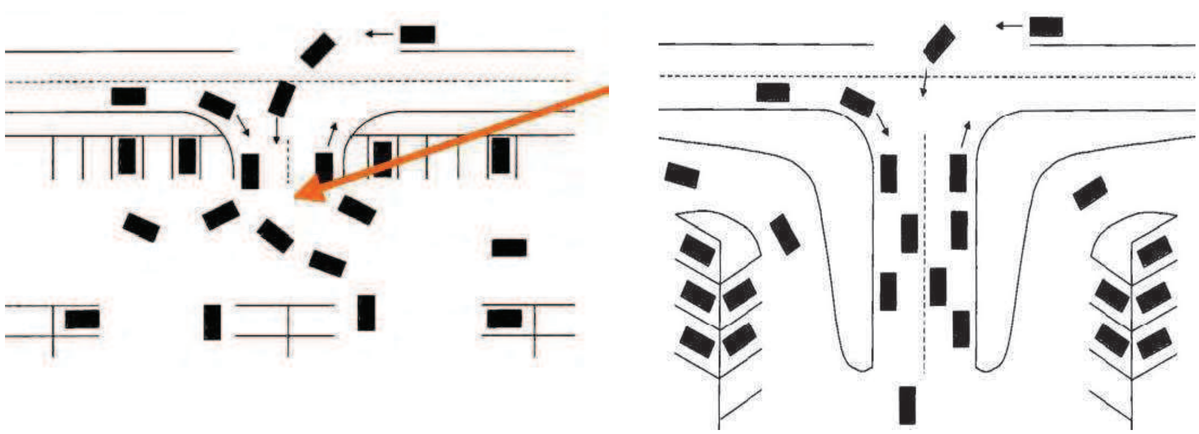


Figure 20 Driveway Throat Length Examples

Driveway Profiles

The slope of a driveway can dramatically influence its operation. Usage by large vehicles can have a tremendous effect on operations if slopes are severe. The profile, or grade, of a driveway should be designed to provide a comfortable and safe transition for those using the facility, and to accommodate the storm water drainage system of the roadway. A maximum grade of 2 percent for a minimum of 50' should be provided for commercial driveways. For street accesses and major traffic generators they shall be designed to meet street standards with no water ways crossing the opening. Table 21 gives the maximum change that can occur between the roadway cross-slope and the driveway slope.

Table 21 Maximum Change between Roadway Cross-Slope and Driveway Slope

Roadway Functional Classification	Driveway	
	High Volume	Low Volume
Major Arterial	5%	6%
Minor Arterial	6%	7%
Major Collector	7%	8%
Minor Collector	7%	8%
Commercial Local	N/A	≤10%
Residential Local	N/A	≤12%
Residential Sub-Local	N/A	≤12%

Shared Access

Access points shall be shared between adjacent parcels to minimize the potential for conflict between turning and through traffic. Shared access can be used effectively for both residential and nonresidential developments. Since the issues surrounding shared access for residential and nonresidential development are slightly different, they are discussed separately.

Residential

Residential subdivisions located along arterial or collector roadways should be required to construct an internal road system rather than be developed along the existing roadway frontage or a single access cul-de-sac. Subdivision proposals should encourage a coordinated street network by providing rights-of-way or stubs for the extension of streets to adjacent parcels. This will prevent the proliferation of driveways on arterial and collector streets and provide for an interconnected street network.

Shared driveways shall also be used to minimize the number of curb cuts in residential districts, particularly along rural arterial and collector roads. If access is necessary from an arterial or collector then shared driveways are required. Shared driveways serving more than two homes will be built to fire lane standards.

Commercial

Joint driveways providing access to adjacent developments, and interconnections between sites, are required for all development proposals on arterial and collector roadways. Interconnections between sites can eliminate the need for additional curb cuts, thereby preserving the capacity of the roadway. This is particularly important for commercial/industrial sites and should be used to encourage the development of internal or collector roadway systems servicing more than one parcel or establishment. Future roadway rights-of-way should also be provided to promote interconnected access to vacant parcels or to facilitate the consolidation of access points for existing developments.

Pedestrian access between developments will allow people to walk between establishments, thereby reducing the number of vehicle trips. Every opportunity should be taken to provide for interconnections between existing and future developments for both vehicles and pedestrians.

Alignment of Access Points

Street and driveway intersections represent points of conflict for vehicles, bicycles and pedestrians. All modes of travel should be able to clearly identify intersections and assess the travel patterns of vehicles and pedestrians through the intersection. To minimize the potential conflicts and improve safety, intersections and driveways shall be aligned opposite each other wherever possible and intersect roadways at a 90 degree angle. Good driveway alignment will provide vehicles, bicycles, and pedestrians with a clear line of sight and allow them to traverse the intersection more safely.

Sight Distance

Sight distance is the length of the road that is visible to the driver. A minimum safe sight distance should be required for access points based on the roadway classification. The American Association of State Highway and Transportation Officials (AASHTO) publication, *A Policy on Geometric Design of Highways and Streets* contains recommendations for sight distance based on the roadway design speed and grade. Providing sufficient intersection sight distance at the driveway point for vehicles using a driveway to see oncoming traffic and judge the gap to safely make their movement is essential. Vehicles should be able to enter and leave the property safely. Intersection sight distance varies, depending on the design speed of the roadway to be entered, and assumes a passenger car can turn right or left into a two-lane highway and attain 85 percent of the design speed without being overtaken by an approaching vehicle that reduces speed to 85 percent of the design speed. Table 22 gives intersection sight distance requirements for passenger cars. Sight distances should be adjusted with crossroad grade in accordance with AASHTO policies.

Table 22 Intersection/Driveway Sight Distance

Posted Speed Limit (mph)	Sight Distance Required (ft)*
30	335
35	390
40	445
45	500
50	555
55	610
60	665
65	720

*Based on a 2 lane roadway (for other lane configurations, refer to AASHTO for adjustments). Drivers' eye setback is assumed to be 15 feet measured from the edge of traveled way.

Normally, intersection sight distance will govern the required sight distance for the driveway but it is also important to verify that the main roadway have sufficient stopping sight distance. For example, a driver of a vehicle approaching an intersection should have an unobstructed view of the entire intersection including any traffic control devices and sufficient length along the intersecting highway to permit the driver to anticipate and avoid potential collisions. The safe stopping sight distance should be reviewed to make sure that the approaching vehicle has a clear view of the roadway in the area of the access. Sight distance may be more of a consideration in rural areas because of higher speeds and rolling/hilly terrain. The stopping sight distance will be greater for a roadway with a high speed and a downgrade as vehicles will take longer to stop in such a circumstance. Table 23 gives the safe stopping sight distance that should be provided for a driver on the roadway to have a clear view of the access/driveway. In making this determination for stopping sight distance, it should be assumed that the approaching driver's eye is 3.5 feet above the roadway surface and that the object to be seen is 2 feet above the surface of the road.

Table 23 Safe Stopping Sight Distances on Grades

Design Speed (mph)	Safe Stopping Sight Distance (ft)			
	Downhill Grades		Uphill Grades	
	-3%	-6%	3%	6%
25	158	165	147	143
30	205	215	200	184
35	257	271	237	229
40	315	333	289	278
45	378	400	344	331
50	446	474	405	388
55	520	553	469	450

Turning Lanes

Turning lanes remove the turning traffic from the through travel lanes. Left turning lanes are used to separate the left turning traffic from the through traffic. Right turn lanes reduce traffic delays caused by the slowing of right turning vehicles. Designated right or left turn lanes are generally used in high traffic situations on arterial and collector roadways. A traffic impact study will identify the need for and make recommendations on the design of turning lanes or tapers based on the existing traffic volumes, speed, and the projected impacts of the proposed use. Right-of-way needs at individual intersections are unique to each intersection. Prior to programming roadway widening projects it is important to examine the traffic operations at intersections since the right-of-way requirements are typically greater at intersections.

Storage Length

The length of the turning lane shall be a minimum of 100 feet and at an unsignalized intersection it shall be a minimum length to accommodate 2- 25 foot vehicles based on the number of vehicles likely to arrive in a 2 minute period at peak hour. For signalized intersections, the storage length shall be 1 ½ times the average number of vehicles that would queue per cycle during the peak hour based on design year volumes.

Lane Width

Turning lanes shall normally be a minimum of 12 feet in width. Any exception will require approval from the City Engineer. For right turn lanes, provide an additional 12 feet of pavement to accommodate the lane.

Left-turn Lanes

The provision of left-turn lanes is essential from both capacity and safety standpoints where left turns would otherwise share the use of a through lane. Shared use of a through lane will dramatically reduce capacity, especially when opposing traffic is heavy. Left-turn lanes should always be provided at a signalized intersection.

Right-turn Lanes

Right-turn lanes remove the speed differences in the main travel lanes, thereby reducing the frequency and severity of rear-end collisions. They also increase capacity of signalized intersections and may allow more efficient traffic signal phasing.

Length of Auxiliary Lanes

A separate turning lane consists of a taper plus a full width auxiliary lane. The design of turn lanes is based primarily on the speed at which drivers will turn into the lane, the speed to which drivers must reduce in order to turn into the driveway after traversing the deceleration lane, and the amount of vehicular storage that will be required. Other special considerations include the volume of trucks that will use the turning lane and the steepness of an ascending or descending grade.

The total length of an auxiliary lane is made up of the storage length plus the distance necessary to come to a stop from the prevailing speed of the road and the taper distance (which both vary based on speed). A taper length of 50 ft for speeds below 45 mph, 75 ft for speeds of 45 to 50 mph, and 100 ft for speeds over 50 mph is typical. If a two-lane turn lane is to be provided, it is recommended that a 10:1 taper be used to develop the dual lanes. The taper will allow for additional storage during short duration surges in traffic volumes. The length needed for a vehicles to come to a stop from either the design speed or an average running speed of a roadway are shown in Table 24. These deceleration lengths assume the roadway is on a 2 percent or less vertical grade. The storage distance plus the deceleration distance and taper distance will result in the total length of an auxiliary lane (Figure 21).

Table 24 Deceleration Length

Speed (mph)	Deceleration Length (ft)*
30	170
35	220
40	275
45	340
50	410
55	485
60	510
65	570

*Assume the roadway is on a 2 percent or less vertical grade.

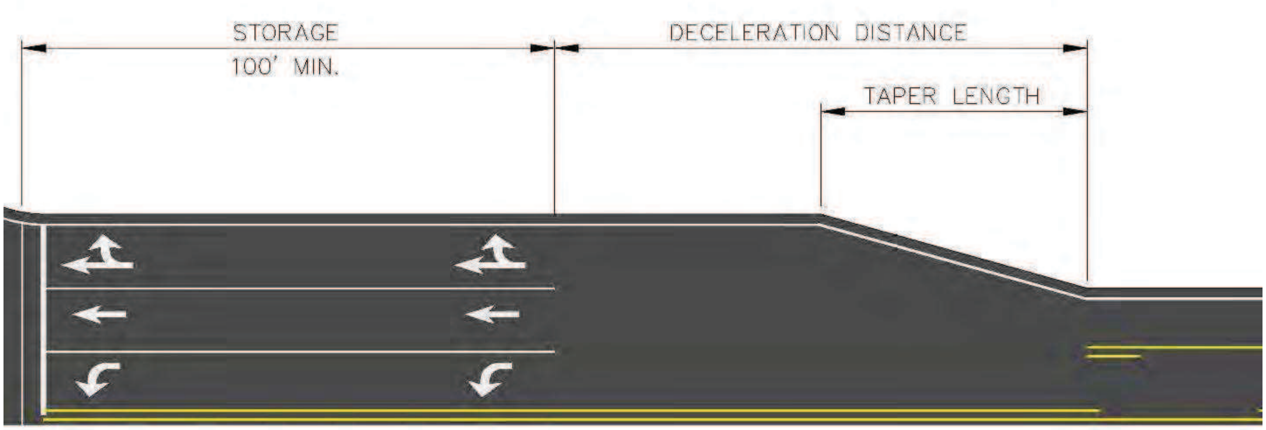


Figure 21 Auxiliary Lane Length

Pedestrian and Bicycle Access

A key aspect of access management is reducing the number of vehicle trips. This can be accomplished by providing safe and appealing pedestrian access within developments and between adjacent developments.

All new development and redevelopment of existing sites should address pedestrian and bicycle access to and within the site. Sidewalks should be provided in all urban residential subdivisions and in or adjacent to commercial or industrial developments. Sidewalks and other pedestrian facilities should comply with the Americans with Disabilities Act (ADA) Standards for Accessible Design. Crosswalks should be clearly marked and located in appropriate areas. Paint or paving materials can be used to delineate crosswalks. In addition to traditional brick, an alternative involves imprinting the asphalt with a brick design and then painting the crosswalk.

Parking lot designs need to address pedestrian access to the site and circulation within the site. Five foot wide sidewalks or striped pedestrian crossings should be provided from adjacent sites through parking lots to promote safe pedestrian access. Safe and appealing pedestrian circulation systems allow people to park their cars once and walk to different establishments, resulting in an overall reduction in the number of vehicle trips. Joint and cross access between developments can provide opportunities for shared parking.

Grade Separations

Interchanges in an access management context provide several important functions. Interchanges enable the signal green time to be maximized along expressways and principal arterials. They also allow access to large activity centers where such access might be precluded by traffic signal spacing criteria.

More specifically, a grade separated interchange may be appropriate in the following situations:

1. where two expressways cross, or where an expressway crosses arterial roads;
2. where principal arterials cross and the resulting available green time for any route would be less than 40 to 50 percent;
3. where an existing at-grade signalized intersection along an arterial roadway operates at level of service (LOS) F, and there is no reasonable improvement that can be made to provide sufficient capacity;
4. where a history of accidents indicates a significant reduction in accidents can be realized by constructing a grade separation;
5. where a new at-grade signalized intersection would result in LOS E in urban and suburban settings and LOS D in rural settings;
6. when the location to be signalized does not meet the signal spacing criteria and signalization of the access point would impact the progressive flow along the roadway, and there is no other reasonable access to a major activity center;
7. where a major public street at-grade intersection is located near a major traffic generator, and effective signal progression for both the through and generated traffic cannot be provided; and
8. where the activity center is located along a principal arterial, where either direct access or left turns would be prohibited by the access code, or would otherwise be undesirable.

Minimum interchange spacing along various roadways should be as shown in Table 25. Spacing may be closer where access is provided to or from collector-distributor roads. Privately-developed interchanges should become part of a regional transportation plan to ensure they are consistent with local and regional plans.

Table 25 Minimum Interchange Spacing Guidelines

Functional Classification	Minimum Interchange Spacing for Urban/Suburban Areas (miles)	Minimum Interchange Spacing for Rural Areas (miles)
Freeway	1	3
Expressway	1	2
Principal Arterial	1	2

Roundabouts

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 should only occur as a result of an intersection study by a qualified Traffic Engineer and when the minimum capacity and design criteria can be met. The FHWA has determined that the maximum flow rate that can be accommodated at a roundabout depends on the geometric elements (circle diameter, number of lanes), 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 22 shows an example of a typical single lane roundabout design.

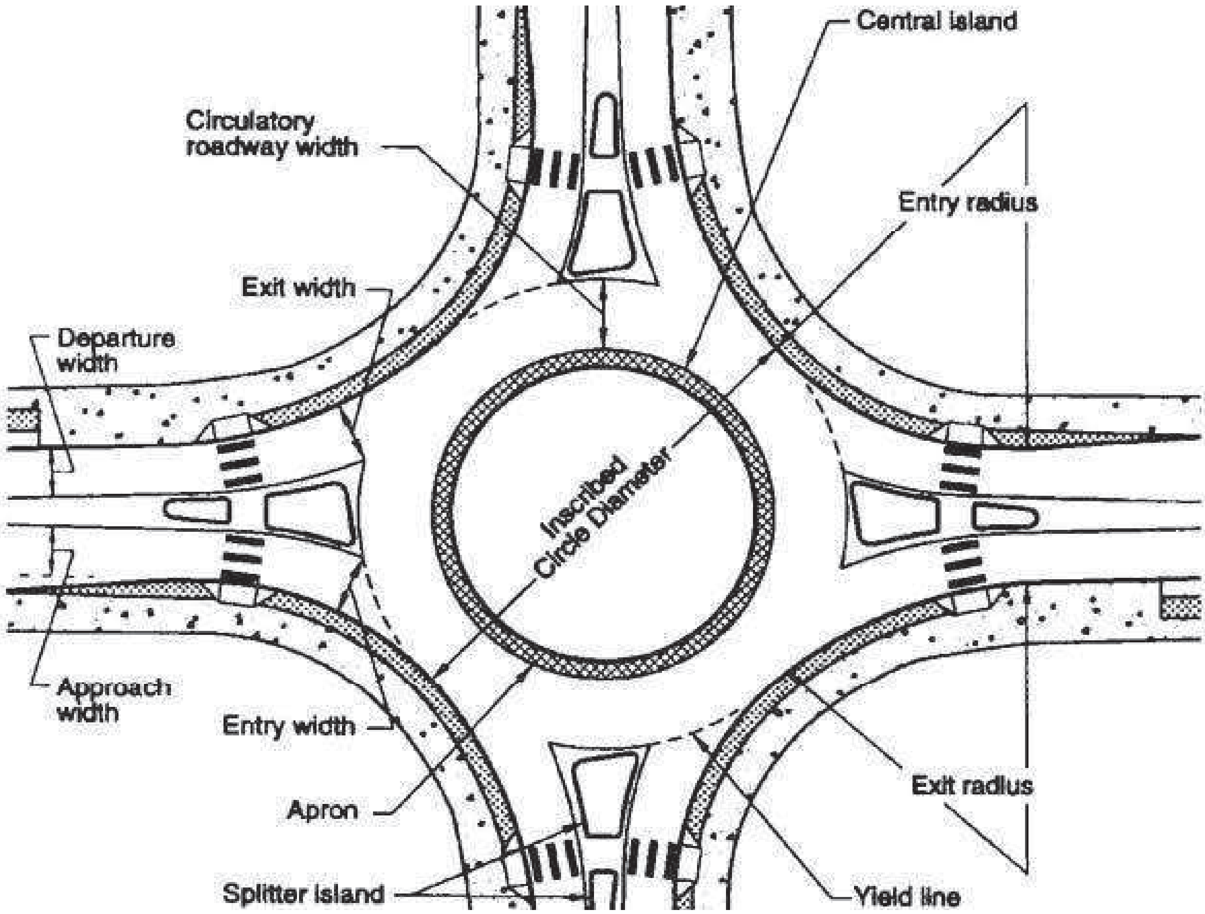


Figure 22 Typical Roundabout Design

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 may be an appropriate solution for certain problem intersections in the region.

Stop Sign and Traffic Signal Warrants

Stop signs and traffic signals should not be used where not warranted. Studies have shown that in areas where these 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.

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;
- Unsignalized 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 decide 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.

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

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 TTE. 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 TTE by Spanish Fork 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.

In order to ensure an adequate amount of right-of-way is preserved for each proposed roadway in the TTE, a 'full build out' scenario based on Spanish Fork City's proposed General Plan was studied. This analysis allows decision makers to see where and what type of facilities would be needed when Spanish Fork City expands to its maximum land use capacity based on the general plan. This information can then be used for corridor preservation but should not be considered as an immediate need within the TTE.

As with the 2040 condition, the full build out condition required modifications to the socioeconomic data collected from MAG. The city provided the proposed 2011 general plan land use data as well as population and household size projections for the full build out condition. This information was used as the socio-economic inputs to the travel demand model and was assigned to the TAZ structure for the version 7 travel demand model. Table 26 shows the socioeconomic data for each TAZ used for the general plan full build out scenario.

Table 26 General Plan SE Data

TAZ Number	Population (persons)	Employment (jobs)	Dwelling Units (units)
2084	661	1,843	220
2086	2,342	0	653
2087	876	745	316
2088	288	57	90
2093	1,168	105	385
2094	392	342	109
2095	0	9,534	0
2098	446	945	124
2100	1,148	135	362
2102	164	32	46
2103	2,220	700	618
2104	1,284	729	358
2105	1,553	768	433
2109	0	799	0
2111	1,114	214	310
2112	1,699	351	473
2113	757	205	211
2114	1,307	66	364
2115	1,789	3	498
2118	1,073	52	299
2122	1,499	199	418
2123	305	220	95
2129	954	9	266
2131	900	1,803	251
2132	2,668	611	743
2133	1,333	93	371
2134	634	21	177
2135	863	431	240
2137	1,794	682	556
2142	475	53	137
2150	1,323	1,760	368
2161	688	914	178
2251	1,870	242	521
2252	736	299	205
2253	682	124	190

TAZ Number	Population (persons)	Employment (jobs)	Dwelling Units (units)
2254	398	2	111
2255	495	16	138
2256	259	379	72
2257	324	26	90
2258	1,236	0	377
2259	404	337	113
2260	328	361	91
2261	1,215	24	339
2262	113	447	31
2263	1,347	80	375
2264	126	215	35
2265	3,349	665	933
2266	0	1,670	0
2267	0	3,939	0
2268	498	59	157
2269	1,864	345	519
2270	1,213	19	338
2271	0	2,761	0
2272	637	378	177
2273	547	61	158
2274	1,053	2,061	323
2275	1,786	143	498
2276	522	44	132
2277	2,523	914	703
2278	395	160	110
2279	55	232	15
2280	172	1,724	62
2281	55	232	15
2282	759	172	211
2283	549	205	153
2284	200	22	58
2285	288	57	90
2286	708	315	197
2287	842	6	218
2288	95	196	27
2289	76	341	27
2290	284	57	89
2291	288	57	90

TAZ Number	Population (persons)	Employment (jobs)	Dwelling Units (units)
2292	298	214	93
2293	507	46	167
2294	131	114	36
2295	284	111	92
2296	468	205	152
2297	143	29	40
2298	822	175	273
2299	163	2,226	45
2300	354	25	99
2301	0	1,109	0
2302	1,178	587	328
2303	1,244	469	351
2304	134	138	37
2305	539	1,582	150

No-Build Conditions

As with the no-build condition associated with the 2040 horizon year scenario, a no-build condition consisting of modeling the potential development and growth throughout the City without making improvements to City owned roads was developed. Roads owned by other agencies were improved based on MAG recommendations. The resulting traffic volumes and LOS of this option are shown in Figure 23.

Recommended Build Conditions

A recommended build alternative based on a full build out of the City was developed for the purpose of identifying areas for corridor preservation. Figure 24 shows the recommended corridor preservation areas throughout Spanish Fork City. Figure 25 shows the anticipated traffic volumes and LOS if all the recommended corridors are preserved and roadways constructed when the City reaches full build out.

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.

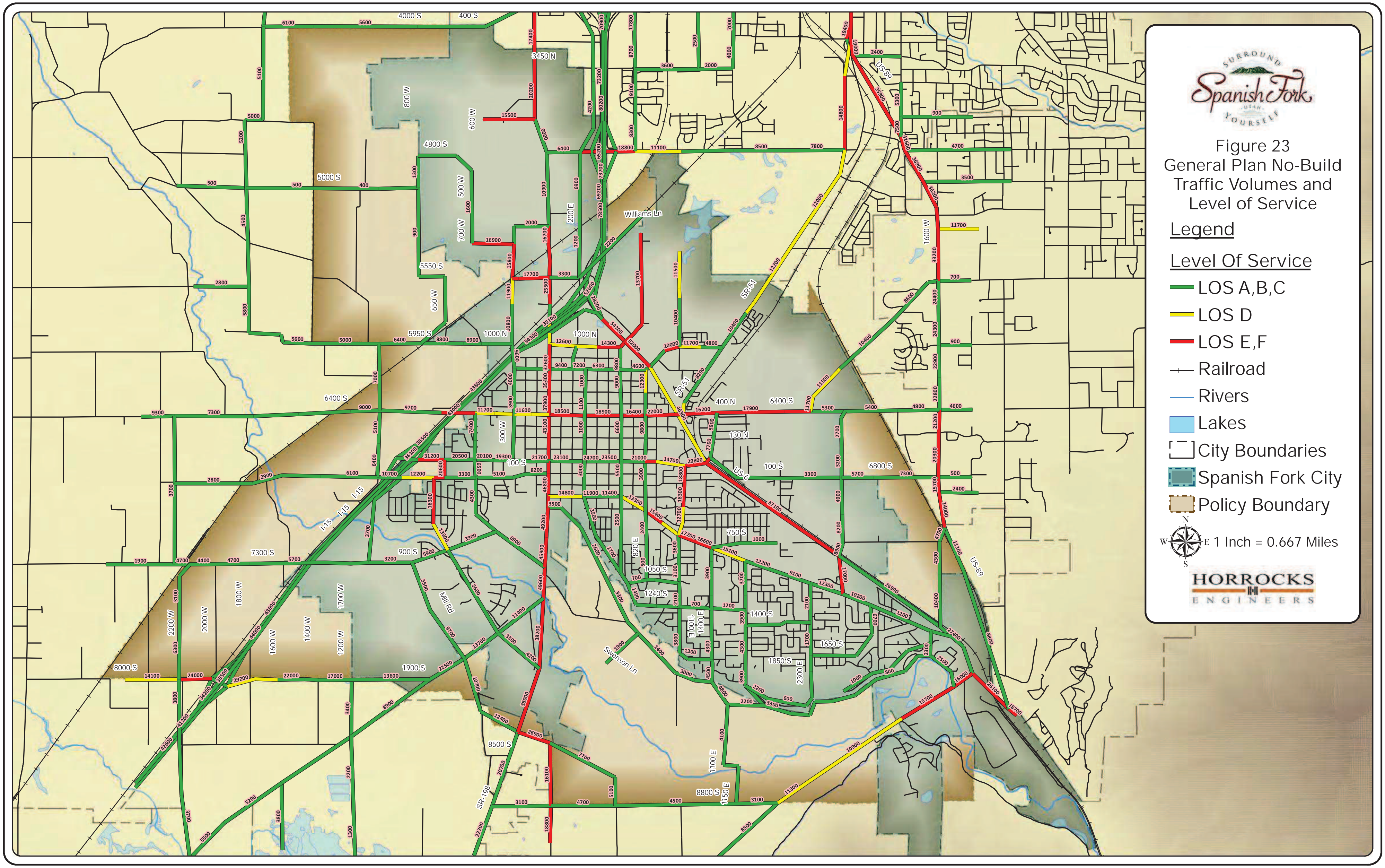
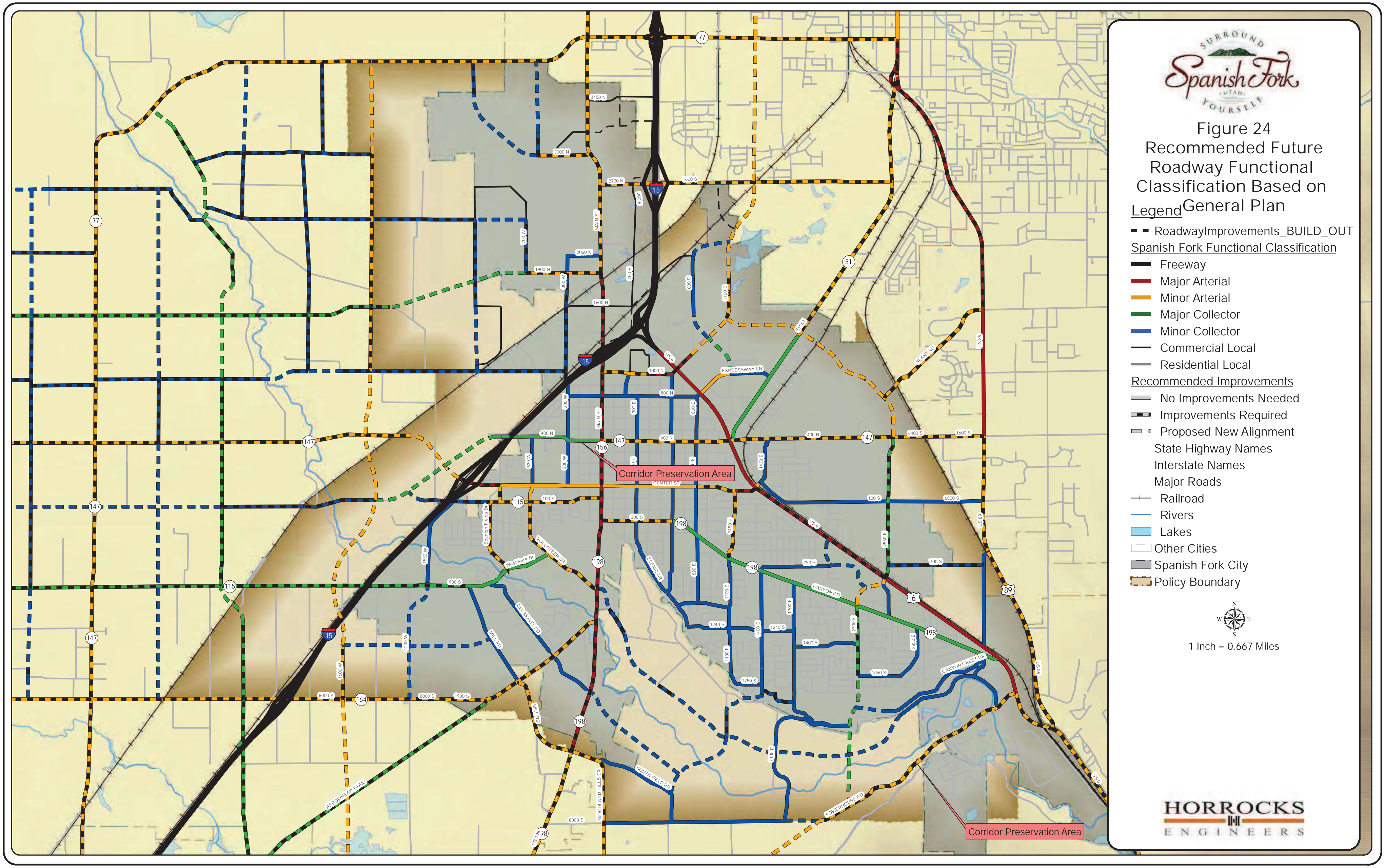
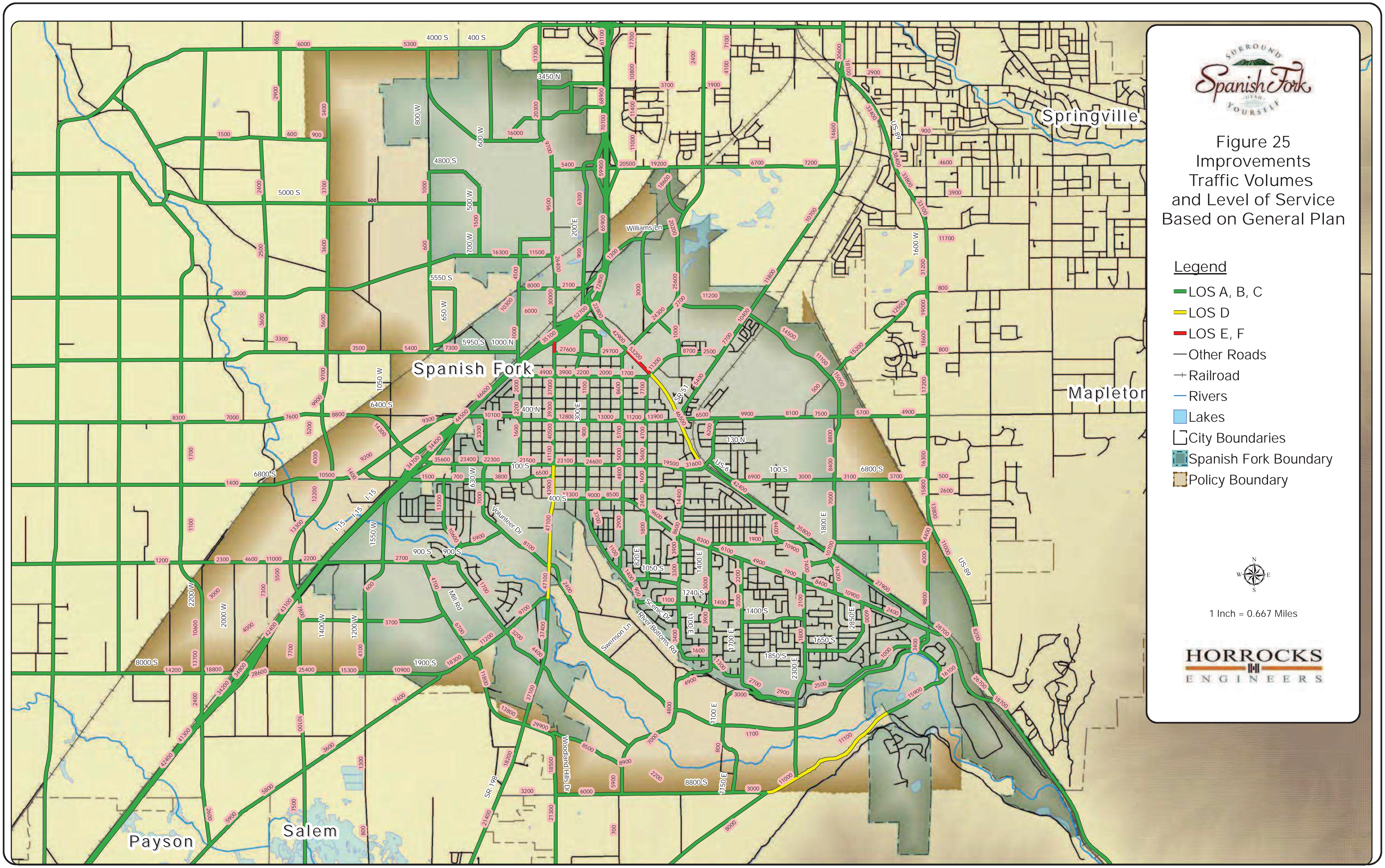


Figure 23
General Plan No-Build
Traffic Volumes and
Level of Service


Surround Yourself
Spanish Fork
Utah
Figure 24
Recommended Future Roadway Functional Classification Based on General Plan
Legend
RoadwayImprovements_BUILD_OUT
Spanish Fork Functional Classification
Freeway
Major Arterial
Minor Arterial
Major Collector
Minor Collector
Commercial Local
Residential Local
Recommended Improvements
No Improvements Needed
Improvements Required
Proposed New Alignment
State Highway Names
Interstate Names
Major Roads
Railroad
Rivers
Lakes
Other Cities
Spanish Fork City
Policy Boundary
N
S
E
W
1 Inch = 0.667 Miles
HORROCKS
ENGINEERS
Corridor Preservation Area
Corridor Preservation Area


Spanish Fork
Surround Yourself
Utah
Figure 25
Improvements
Traffic Volumes
and Level of Service
Based on General Plan
Legend
LOS A, B, C
LOS D
LOS E, F
Other Roads
Railroad
Rivers
Lakes
City Boundaries
Spanish Fork Boundary
Policy Boundary
1 Inch = 0.667 Miles
HORROCKS
ENGINEERS
Springville
Mapleton
Spanish Fork
Payson
Salem
4000 S
400 S
3450 N
4800 S
5000 S
5550 S
5950 S
1000 N
6400 S
6800 S
400 N
130 N
100 S
400 S
900 S
1050 S
1240 S
1400 S
1650 S
1850 S
1900 S
8000 S
8800 S
Williams Ln
Volunteer Dr
Mill Rd
Swenson Ln
Scenic Dr
River Bottoms Rd
Woodland Hills Dr
SR-198
SR-51
US-6
US-89
I-15
800 W
600 W
500 W
700 W
650 W
1050 W
630 W
1550 W
1400 W
1200 W
2000 W
2200 W
1600 W
200 E
300 E
820 E
1400 E
1100 E
1700 E
2300 E
2850 E
1800 E
1150 E

Traffic Impact Studies

As growth occurs throughout the City, the City needs to evaluate the impacts of proposed developments on the surrounding transportation networks prior to giving approval to build. This can be accomplished by requiring that a Traffic Impact Study (TIS) be performed for any development that will generate in excess of 100 peak-hour trips. Examples of different land uses that will generate in excess of 100 peak-hour trips can be seen in Table 1. 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 and 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.

A TIS may be required for developments that do not meet the trip generation threshold (≥ 100 peak-hour trips) if there are unique or controversial issues associated with the project that the City feels should be addressed. These projects will be identified and evaluated on a case by case basis.

Agency Coordination

As many of the roads in Spanish Fork 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.

Impact Fees

Impact fees are a way for a community to obtain funds to assist in the constructions of infrastructure improvements that are needed to serve new growth. The premise behind impact fees is that if no new development was allowed, the existing infrastructure would adequately serve the existing level of development in the City. Therefore, new development should pay for the fraction of improvements that are required because of new growth. Impact fees are assessed for many types of infrastructure and facilities that are provided by a community such as roads, sewer, water, parks, and trails. According to state law, impact fees cannot be used to correct existing deficiencies in a system, only to fund growth related capital improvements.

There are many ways to quantify the impact of new growth on the transportation system in Spanish Fork City. One way to assess the impact is to consider all the needed transportation improvements and then eliminate the cost of those improvements that are necessary to correct existing deficiencies. Another way to assess the impacts of new growth is to estimate the amount of total traffic growth on each road which is projected to occur due to new development and then apply this percentage to the total cost of all needed improvements thus identifying the cost of the improvements that are eligible for funding through impact fees. The recommended improvements outlined in the TTE can be used to identify growth related improvements and form the basis for a comprehensive impact fee program.

6.0 Potential Funding Sources

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

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. 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.

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.

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.

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.

7.0 Recommended Transportation Improvement Program

One of the main purposes of the TTE is to recommend a street classification system that will serve Spanish Fork City's transportation needs for the next 20 years. Designating a roadway functional classification system allows the City to preserve the necessary right-of-way along individual roadway corridors for the future upgrade of the existing infrastructure to the master planned standard. After evaluating the roadway network and projecting future travel demands on each of those roadways, a recommended roadway functional classification was developed (Figure 11).

Regardless of improvements or enhancements to alter transportation modes, private single-occupant vehicles will remain as the predominant form of transportation in Spanish Fork City for the foreseeable future. As such, most of the recommended improvements involve roadway infrastructure that are anticipated to accommodate future traffic demand projections and maintain acceptable operating conditions.

As development continues throughout Spanish Fork City, the TTE should be consulted to identify improvements that may benefit from work or funds required by individual developers. This would ensure that the correct amount of right-of-way is preserved. In addition, this would assist in identifying projects that the developer may be required to construct or contribute to as part of his or her required on- and/or off-site improvements. However, several projects are not anticipated to be part of any new developments or will not be able to wait for development to occur before the improvements are needed. These projects may not be able to benefit from private funding sources and the City will have to come up with other funding alternatives for these projects.

As a final recommendation, A Transportation Improvement Program (TIP) must be reviewed and updated on a continual basis in order to work as designed. The TIP should be modified by deleting projects that have been completed or are no longer considered a priority, as well as adding new projects that were not previously identified. A good time for an annual review and update is in January as this provides sufficient time for any changes to the TIP to be incorporated into the budget planning process for that year. Continual maintenance is critical for the TIP to remain effective over time. Figure 26 and Table 27 display and list the roadway projects included in the 2040 TIP. The project numbers shown in Figure 26 correspond to the projects numbers listed in Table 27.

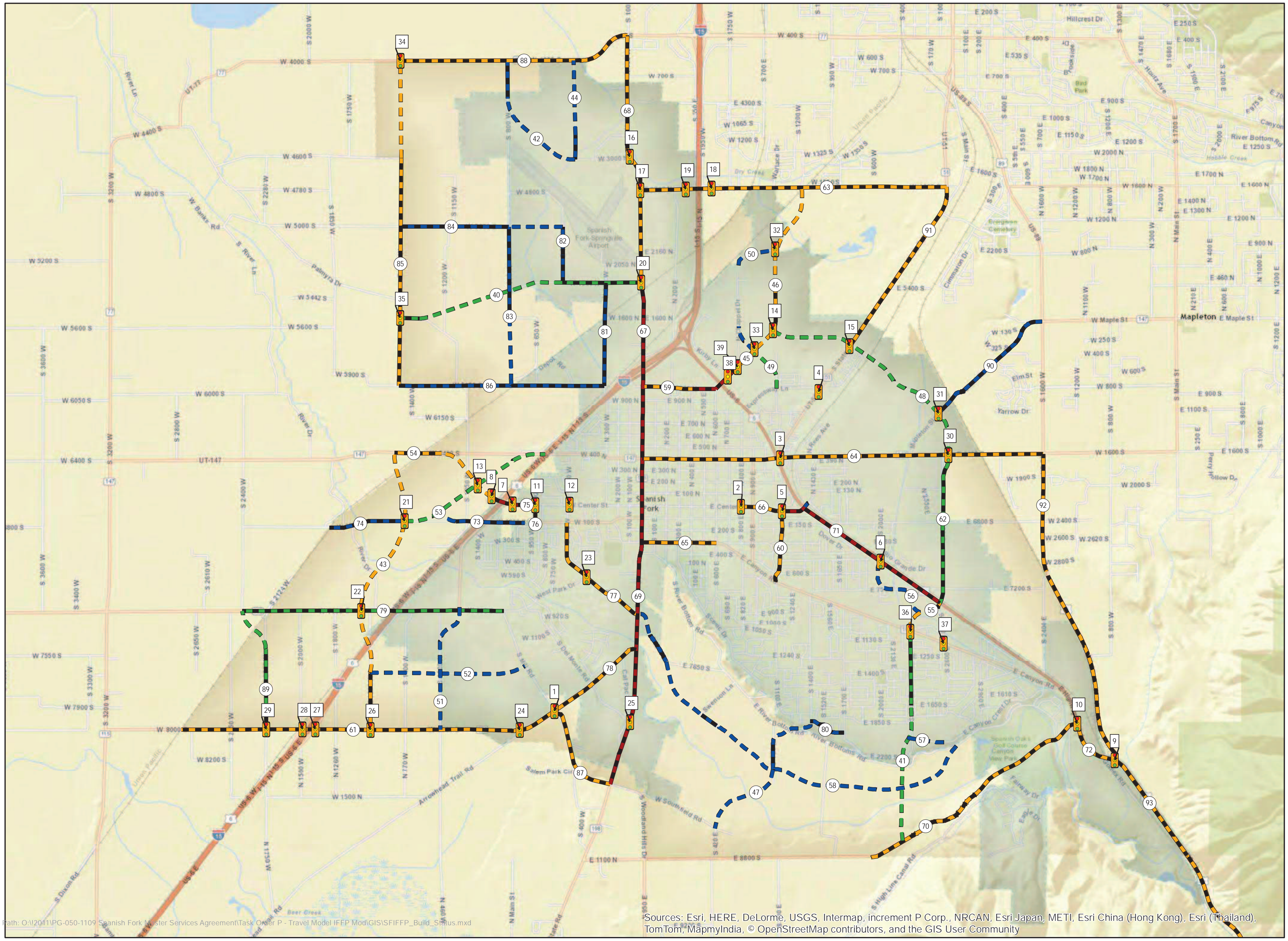
Figure 26
Capital Improvement Projects

1 Inch = 3,580 Feet

Legend

- Future Traffic Signal
- Freeway
- Major Arterial
- Minor Arterial
- Major Collector
- Minor Collector
- Commercial Local
- Residential Local
- New Road
- Improvements Required
- Spanish Fork Boundary
- Policy Boundary
- 67 Roadway Project*
- 25 Signal Project*

* Corresponds to Table 27 in the Transportation and Traffic Circulation Element of the General Plan



Print Date: 8/29/2014

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GEOGRAPHIC INFORMATION SYSTEMS

Spanish Fork City GIS
40 South Main Street
Spanish Fork, UT 84660
Administrator : (801) 804-4571
Interns: (801) 804-4570
(801) 804-4572

Table 27 2040 Transportation Improvement Program

Spanish Fork City 2040 Transportation Improvement Program (TIP)						
Ref	**Type**	**Location**	**From**	**To**	**Classification**	**Jurisdiction**
1	Future Signal	Mill Rd./Arrowhead Tr. (SR-164)				SF/UDOT
2	Future Signal	Center Street/800 East				SF
3	Future Signal	400 North (SR-147)/SR-51				SF/UDOT
4	Future Signal	Expressway Lane/SR-51				SF/UDOT
5	Future Signal	Center Street/1150 East				SF
6	Future Signal	US-6/2000 East				SF/UDOT
7	Future Signal	Center Street/I-15 NB Ramp				SF/UDOT
8	Future Signal	Center Street/I-15 SB Ramp				SF/UDOT
9	Future Signal	US-6/US-89				SF/UDOT
10	Future Signal	Powerhouse Rd/US-6				SF/UDOT
11	Future Signal	Center Street/920 West				SF
12	Future Signal	Center Street/630 West				SF
13	Future Signal	Center Street/1050 West				SF
14	Future Signal	Northeast Pkwy/1100 East				SF
15	Future Signal	Northeast Pkwy/SR-51				SF/UDOT
16	Future Signal	3000 North/Main Street				SF/UDOT
17	Future Signal	2700 North/Main Street				SF/UDOT

Spanish Fork City 2040 Transportation Improvement Program (TIP)						
Ref	**Type**	**Location**	**From**	**To**	**Classification**	**Jurisdiction**
18	Future Signal	2700 North/I-15 NB Ramp				SF/UDOT
19	Future Signal	2700 North/I-15 SB Ramp				SF/UDOT
20	Future Signal	1900 North/Main Street				SF
21	Future Signal	100 South/1600 West				SF/UDOT
22	Future Signal	900 South/1600 West				SF
24	Future Signal	1900 S/Arrowhead Tr. (SR-164)				SF/UDOT
25	Future Signal	Del Monte Rd/Main Street (SR-198)				SF/UDOT
26	Future Signal	1900 South/1600 West				SF/Utah County
27	Future Signal	1900 South/I-15 NB Ramp				SF/UDOT
28	Future Signal	1900 South/I-15 SB Ramp				SF/UDOT
29	Future Signal	1900 South/2200 West				SF/Utah County
30	Future Signal	400 North (SR-147)/2550 East				SF/UDOT
31	Future Signal	Northeast Pkwy/Slant Road				SF
32	Future Signal	2100 North/1100 East				SF
33	Future Signal	800 East/Chappel Drive				SF
34	Future Signal	SR-77/1600 West				SF
35	Future Signal	1600 North/1600 West				SF
36	Future Signal	Canyon Road (SR-198)/2300 East				SF/UDOT
37	Future Signal	Canyon Road (SR-198)/2600 East				SF/UDOT

Spanish Fork City 2040 Transportation Improvement Program (TIP)						
Ref	**Type**	**Location**	**From**	**To**	**Classification**	**Jurisdiction**
38	Future Signal	Kirby Lane/Chappel Drive				SF
39	Future Signal	1150 North/Chappel Drive				SF
40	New Roadway	1900 North	Main Street	1600 West	Major Collector	SF
41	New Roadway	2300 East	Canyon Road (SR-198)	Powerhouse Road	Major Collector	SF
42	New Roadway	1000 West	SR-77	600 West	Minor Collector	SF
43	New Roadway	1600 West	400 North	1900 South	Minor Arterial	SF
44	New Roadway	600 West	SR-77	3000 North	Minor Collector	SF
45	New Roadway	Chappel Drive (Extension)	US-6	1100 East	Major/Minor Arterial	SF
46	New Roadway	1100 East (Extension)	Northeast Pkwy	2700 North	Minor Arterial	SF/ Springville
47	New Roadway	1400 East (Extension)	1750 South	South Field Road	Minor Collector	SF
48	New Roadway	Northeast Pkwy	400 North (SR-147)	1100 East	Major Collector	SF/UDOT
49	New Roadway	New Road	Expressway Lane	Chappel Drive	Major Collector	SF
50	New Roadway	800 East Connectors	Chappel Drive	1100 East	Minor Collector	SF
51	New Roadway	1200 West	900 South	1900 South	Minor Collector	SF
52	New Roadway	1300 South	Mill Road	1600 West	Minor Collector	SF
53	New Roadway	400 North to 100 South	I-15	1600 West	Major Collector	SF
54	New Roadway	Center Street to 400 North	I-15	2200 West	Minor Arterial	SF/UDOT
55	New Roadway	2300 East (Extension)	Canyon Road (SR-198)	US-6	Minor Arterial	SF
56	New Roadway	New Road	US-6	2300 East (Extension)	Minor Collector	SF

Spanish Fork City 2040 Transportation Improvement Program (TIP)						
Ref	**Type**	**Location**	**From**	**To**	**Classification**	**Jurisdiction**
57	New Roadway	Canyon Crest Dr. (Extension)	2550 East	2300 East	Minor Collector	SF
58	New Roadway	Volunteer Drive	Main Street (SR-198)	River Bottom Road	Minor Collector	SF
59	Improvements	1000 North	Main Street	US-6	Major/Minor Arterial	SF/UDOT
60	Improvements	1150 East	Center Street	Canyon Rd (SR-198)	Minor Arterial	SF/UDOT
61	Improvements	1900 South (SR-164)	Arrowhead Trail	SR-147	Minor Collector	SF/UDOT
62	Improvements	2550 East	400 South (SR-147)	US-6	Major Collector	SF/UDOT
63	Improvements	2700 North	Main Street	SR-51	Minor Arterial	SF/UDOT/ Springville
64	Improvements	400 North (SR-147)	Main Street	US-89	Minor Arterial	SF/UDOT
65	Improvements	Canyon Road (SR-198)	Main Street	600 East	Minor Arterial	SF/UDOT
66	Improvements	Center Street	800 East	US-6	Major/Minor Arterial	SF/UDOT
67	Improvements	Main Street	1900 North	1000 North	Major Arterial	SF/UDOT
68	Improvements	Main Street	SR-77	1900 North	Minor Arterial	SF
69	Improvements	Main Street	1000 North	Woodland Hills Drive	Major Arterial	UDOT
70	Improvements	Powerhouse Road	US-6	8800 South	Minor Arterial	SF/UDOT
71	Improvements	US-6	Center Street	2550 East	Major Arterial	UDOT
72	Improvements	US-6	Powerhouse Road	US-89	Minor Arterial	UDOT
73	Improvements	100 South (SR-115)	Spanish Fields Road	1200 West	Minor Collector	SF/UDOT
74	Improvements	100 South	1600 West	2400 West	Minor Collector	SF
75	Improvements	Center Street	920 West	I-15	Major Arterial	SF/UDOT

Spanish Fork City 2040 Transportation Improvement Program (TIP)						
Ref	**Type**	**Location**	**From**	**To**	**Classification**	**Jurisdiction**
76	Improvements	920 West	Center Street	100 South	Minor Arterial	SF
77	Improvements	Volunteer Drive	100 South	Main Street (SR-198)	Minor Arterial	SF
78	Improvements	Arrowhead Trail (SR-164)	Main Street (SR-198)	1900 South	Minor Arterial	SF/UDOT
79	Improvements	900 South (SR-115)	Mill Road	2400 West	Major Collector	SF/UDOT
80	Improvements	1750 South	1400 East	1700 East	Collector	SF
81	Improvements	300 West	1900 North	1000 North	Minor Collector	SF
82	Improvements	700 West	2300 North	1900 North	Minor Collector	SF
83	Improvements	1000 West	2300 North	1000 North	Minor Collector	SF
84	Improvements	2300 North	300 West	1600 West	Minor Collector	SF
85	Improvements	1600 West	SR-77	1000 North	Minor Arterial	SF
86	Improvements	1000 North	300 West	1600 West	Minor Collector	SF
87	Improvements	Mill Road	Arrowhead Trail	Main Street (SR-198)	Minor Arterial	SF
88	Improvements	SR-77	Main Street	1600 West	Minor Arterial	SF/UDOT
89	Improvements	2200 West	900 South	1900 South	Major Collector	SF
90	Improvements	Slant Road	US-89	Northeast Pkwy	Minor Collector	SF/Mapleton
91	Improvements	SR-51	Northeast Pkwy	SR-77	Minor Arterial	SF/ UDOT/ Springville
92	Improvements	US-89	400 North	US-6	Minor Arterial	UDOT
93	Improvements	US-6	US-89 and US-6 Intersection	Southbound	Minor Arterial	UDOT