Final Report

Master Transportation Plan

Prepared for

West Jordan

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GLOSSARY

Access Management refers to providing and managing access to land development while maintaining traffic flow and being attentive to safety issues.

Arterial Streets are provided to service primarily through-traffic movement. While some land-access service may be accommodated, it is a minor function, and all traffic controls and the facility design are intended to provide efficient through movement.

Average Annual Daily Traffic (AADT) is the average of 24-hour counts collected every day in the year.

Average Daily Traffic (ADT) is the average of 24-hour counts collected over a number of days greater than 1 but less than a year.

Average Weekday Traffic (AWDT) is the average of 24-hour counts collected on weekdays.

Average Weekend Traffic (AWET) is the average of 24-hour counts collected on weekends.

Bus Rapid Transit (BRT) is bus service with a higher level of service that may include items ranging from traffic signal priority for buses to exclusive bus-only travel lanes.

Collector Streets are intended to serve both through and land-access functions in relatively equal proportions. For long through trips, such facilities are usually inefficient, though they are frequently used for shorter through movements associated with the distribution and collection portion of trips.

Cross-section is the description of the geometric characteristics of a roadway such as the number and width of lanes, the width of shoulders, sidewalks, the presence of on-street parking, cross-slope, etc.

Design Hour Volume (DHV) is the projected hourly volume that is used for design. Typically the 30th highest hourly volume occurring during the entire year is used as the DHV.

Environmental Impact Statement is the environmental study for large projects required by the federal government before allocating federal funding.

Functional Classification refers to the categories highways are grouped in depending upon the character of the service they provide. Typical functional classifications are Principal Arterials, Minor Arterials, Major Collectors, Minor Collectors, and Local streets.

High-Occupancy Vehicle (HOV) Vehicles containing multiple occupants, typically 2 or more.

Institute of Transportation Engineers (ITE) is an international individual member educational and scientific association made up of transportation engineering and planning professionals.

Intelligent Transportation Systems (ITS) is the integration of information collections and communication technology in transportation systems.

Intermodal refers to interaction of different transportation modes such as vehicles, transit, bicycles and walking.

Kiss-and-Ride This term originated due to the tendency of some spouses to drop off or pick one another up at locations such as their work or at a transit stop.

Level of Service (LOS) qualitatively measures both the operating conditions within a traffic system and how these conditions are perceived by drivers and passengers. The level of service is given by a letter grade ranging from A to F, with A representing the best conditions and F being the worst.

Local Streets primarily serve land-access functions. Their design and control facilitates the movement of vehicles onto and off the street system from land parcels. Through movement is difficult and is discouraged by both the design and control of the facility.

Manual on Uniform Traffic Control Devices (MUTCD) A handbook produced by the Federal Highway Administration giving guidelines as to how various traffic control devices and methods should be used.

Mountain View Corridor (MVC) A proposed freeway on the western edge of Salt Lake County that would connect to I-80 in the north and Utah County in the south. (Formerly known as the Western Transportation Corridor).

Peak Hour Volume (PHV) is the maximum number of vehicles that pass a point on a highway or travel through an intersection during a period of 60 consecutive minutes.

Progression is being able to pass through several intersections without hitting a red light.

Statewide Access Management Program is a program being developed by the Utah Department of Transportation (UDOT) to establish access management guidelines along UDOT roadways. Currently this plan is still in draft form and has not been adopted as policy.

Traffic Analysis Zones (TAZ) are the neighborhood level pieces that comprise a travel demand model, each of which contains its corresponding land use, socio-economic, and demographic information along with access to the surrounding street network.

Transit Oriented Development (TOD) is the type of land uses and development design near transit systems that promotes increased use of those systems.

Transportation Management is changing travel demand and increasing the efficiency of the transportation system to meet the increased transportation demand without building new roads.

Transportation Systems Management (TSM) is methods to improve the efficiency of existing facilities through better management of vehicles and the roadway.

Travel Demand Management (TDM) is the establishment of policies and guidelines aimed at reducing the amount of traffic demand on roadways within an area in order to offset increasing traffic volumes and congestion due to growth in population and vehicle usage.

Travel Demand Modeling is the process of projecting traffic volumes due to development and population growth within an area for some future horizon year.

Variable Message Signs are the computer-controlled signs located over freeways or major arterials that are used to alert drivers to traffic congestion or incidents.

Vehicle Miles of Travel (VMT) is a measure of travel along a section of road or within a large area and is determined by the product of the traffic volume and the length of roadway in miles.

Volume to Capacity (V/C) A roadway segment or intersection has a theoretical maximum amount of traffic that can efficiently pass along the road or through the intersection over a given period of time. The volume is the actual amount of traffic traveling along the roadway during that same period of time. The ratio of the actual volume divided by the capacity is the volume to capacity (V/C) ratio. A ratio greater than 1 indicates that traffic volumes are heavier than can adequately be handled by the roadway or intersection and excessive congestion and delays will occur.

Wasatch Front Regional Council (WFRC) is a voluntary association of municipalities and counties within Davis, Morgan, Salt Lake, Tooele, and Weber Counties whose general purpose is to provide cooperation and coordination among member entities regarding transportation, planning, and growth issues. The Council is made up of 18 elected officials from member municipalities and counties.

EXECUTIVE SUMMARY

This Master Transportation Plan (MTP) is intended to be a useful tool to aid West Jordan City in taking a proactive effort in planning and maintaining the overall transportation network within their city. The first West Jordan Master Transportation Plan was completed in 1998 and this Plan represents the update to that plan. The process of preparing the West Jordan Transportation Master Plan was broken into four primary phases:

1. **Initiate Project and Develop Database** – The initial stage of work dealt with organizing the project and the Technical Advisory Committee and assembling existing conditions data including mapping data, previous reports, traffic counts, and accident histories.

2. **Analysis** – The second phase of the project included the analysis of the existing data and the development of estimated future traffic volumes using a travel demand model.

3. **Develop Master Plan** – This phase of the project represented the majority of work. The future roadway network for motorized vehicles was developed along with networks for transit, bicycles, and pedestrians. The residential traffic management plan was prepared including traffic calming.

4. **Approve Document** – The final phase of the plan preparation was to prepare a Capital Facilities Plan for potential projects, to write the plan, and to prepare additional tables and graphics. The completed draft document was then compiled and presented for comment to interested parties. The plan was then revised based on comments and the final plan was then presented to the City Council for adoption.

Throughout the entire plan preparation process, a public involvement plan was implemented with regular meetings of the Transportation Advisory Committee (TAC).

Public Involvement

A vital component in preparing this Master Transportation Plan has been seeking input from the citizens of West Jordan. A variety of different methods were utilized to acquire public opinion on the plan each of which are presented below and then discussed in more detail.

- **Open Houses** – Members of the master plan consultant team attended or sponsored public open houses at three different times throughout the study process. Two of the open houses were sponsored by the General Plan update while the other was sponsored by this plan.

- **Resident Survey** – A survey form was distributed throughout the city by inclusion in water bills that asked residents about their transportation concerns and provided and opportunity for them to share their comments. Nearly 2,400 survey forms were received providing illumination into citizen opinions.

- **Public Meetings** – Public meetings were held at the conclusion of the study process to present the plan to the General Plan Committee, Planning Commission, and the City Council.

Street System

Streets and highways provide for two distinct and very different functions: mobility and land access. Both functions are vital and no trip is made without both. Highway facilities are classified by the relative amounts of through and land-access service they provide. There are three primary classifications:

1. **Local Streets** – These facilities primarily serve land-access functions. Their design and control facilitates the movement of vehicles onto and off the street system from land parcels. Through movement is difficult and is discouraged by both the design and control of the facility.

2. **Collectors –** These facilities, the "middle" classification, are intended to serve both through and land-access functions in relatively equal proportions. For long through trips, such facilities are usually inefficient, though they are frequently used for shorter through movements associated with the distribution and collection portion of trips.

3. **Arterials** – These facilities are provided to service primarily through-traffic movement. While some land-access service may be accommodated, it is clearly a minor function, and all traffic controls and the facility design are intended to provide efficient through movement.

4. **Freeways and Expressways** – These facilities are provided to service long distance trips between cities and states. No land access service is provided by these facilities.

There are also ways to subdivide each of these major classifications. Arterials are often divided into major and minor categories. In West Jordan collectors are divided into major and minor categories with major collectors having higher carrying capacity than minor collectors[1].

Cross-Sections

The cross-section standards presented in this plan are similar to those in use by West Jordan prior to this update. The pavement width is the same with the changes coming in additional width for the side treatments to allow for wider sidewalks and park strips on arterial streets and major collectors. There are five functional classifications in this plan, which will be used in new construction in previously undeveloped areas. In-fill and redevelopment construction, as determined by city staff, the Planning Commission, and the City Council will be built to match existing cross-sections.

The additional width required on arterial streets and major collectors constructed in previously undeveloped areas can be obtained by one of two methods: the city may acquire the property or the city may obtain a sidewalk easement for the use of property. Generally, an easement will be obtained west of 4800 West while the property will be obtained for roads east of 4800 West.

[1] *Traffic Engineering*, McShane and Roess, Englewood Cliffs, New Jersey, 1990, p. 38

The new arterial street cross-section is 20 feet wider than the typical 106-foot right-of-way. The additional 20 feet will allow for 10-foot park strips and sidewalks. The new major collector cross-section is 10 feet wider than the typical 80-foot right-of-way. The additional 10 feet will allow for 10-foot park strips.

High capacity UDOT facilities such as the Bangerter Highway or the proposed Mountain View Corridor have separate functional classifications and are not described in detail here. The roadway classifications described here are only those municipal streets that fall under the jurisdiction of West Jordan City. A summary of these classifications and their cross-section geometry is shown in Table 3.1.2.

Table ES.1 **West Jordan City Cross-Sections**

Classification	# of Lanes[1]	Total Width	Pavement Width	Park Strip Width	Sidewalk Width
Local Street	2	50’	25'	5'	5'
Residential Collector	2	60’	35'	5'	5'
Minor Collector	2	66’	41'	5'	5'
Major Collector	3	90'	55'	10'	5'
Arterial	5	126'	81'	10'	10'

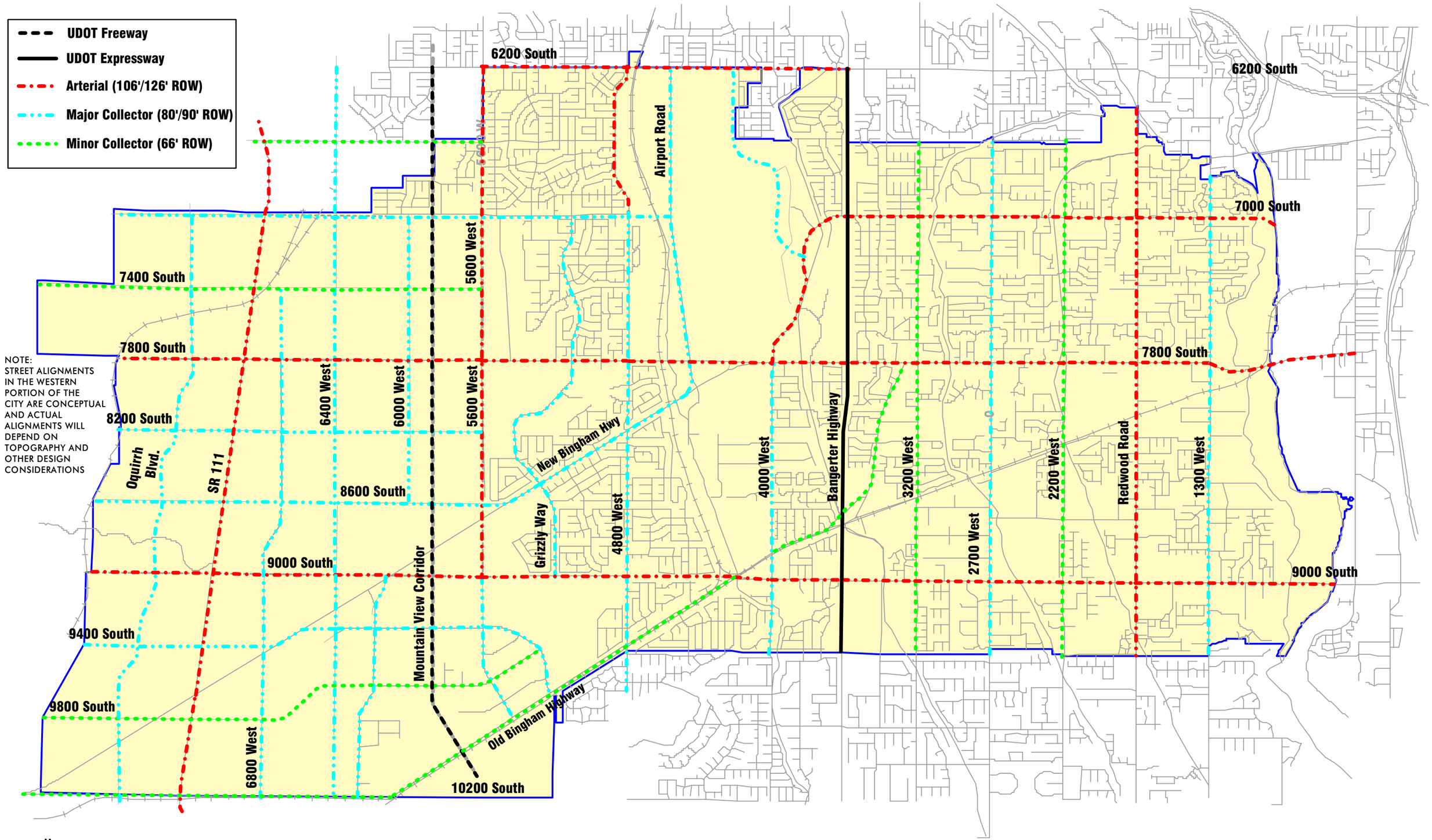
[1]*Number of Lanes includes a center two-way-left-turn-lane if the number is odd.*

Transportation Improvement Plan

One of the fundamental purposes of this Master Transportation Plan is to outline the changes and improvements to the citywide transportation infrastructure over the next thirty years. The existing roadway network and traffic conditions served as the starting point in this process. The majority of the new streets to be constructed are in the western portion of the city. For the most part the arterials and collectors in the eastern portion of the city are built out to their ultimate condition, although many are expected to experience traffic volumes at or above their capacity in the future.

Cost estimates for the construction of new roadways were produced for each functional classification. All of the arterial and collector street segments in the City were ranked by their 2030 volume to capacity ratio as generated by the travel demand model. New street segments were assigned an estimated construction cost in current year (2002) dollars. This list represents all of the new arterial and collector streets to be constructed in West Jordan over the next thirty years. Figure ES.1 shows the future roadway network by functional classification.

All of these future roadway projects were assigned to one of three general time periods: 2002 to 2010, 2010 to 2020, and 2020 to 2030 based on the expected population and development growth West Jordan will experience over the same time periods. Generally, new roadway construction progresses from east to west. A map showing the time period for these projects is shown in Figure ES.2 and a list of each project and their associated costs is given in Table ES.2.



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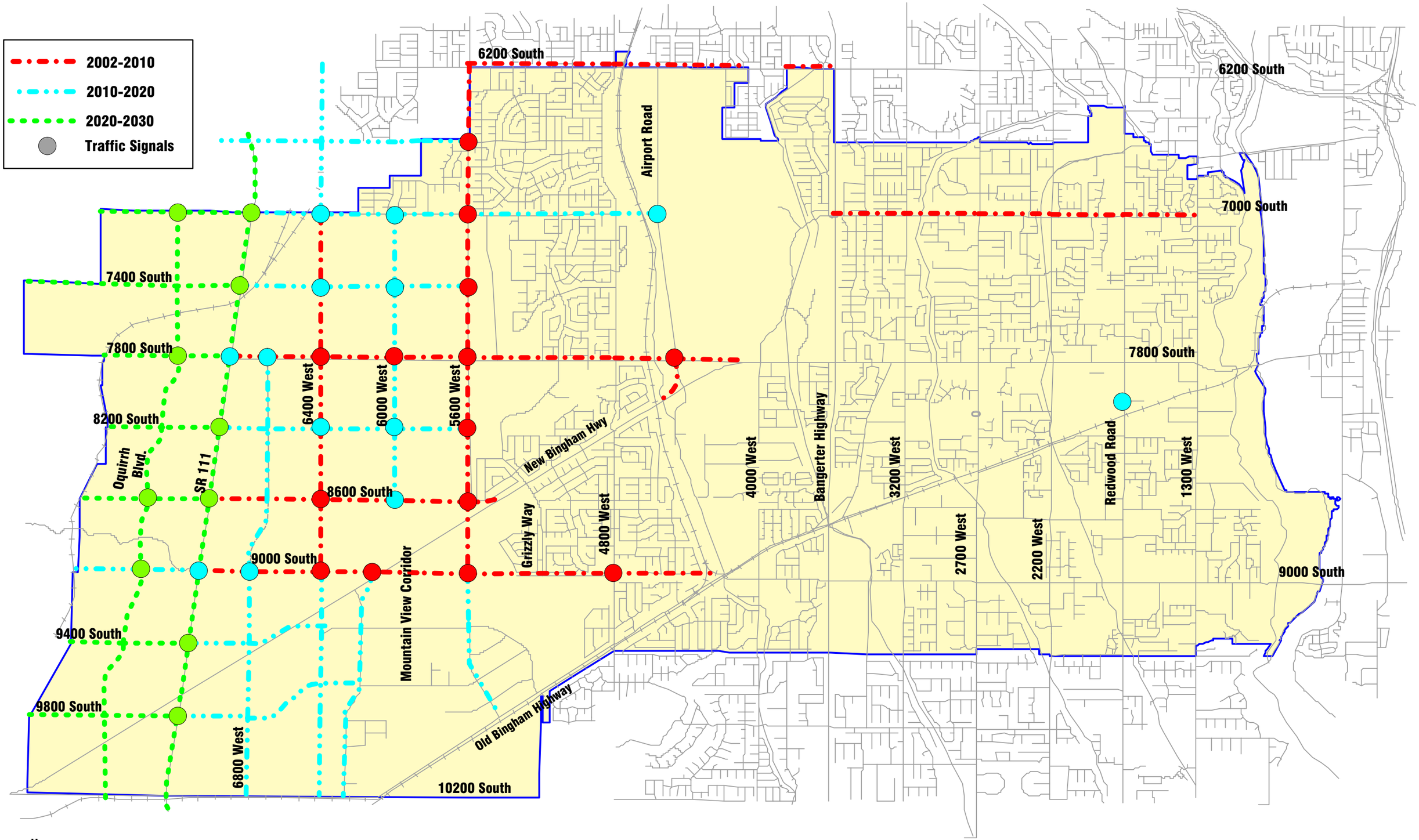
Future Roadway Network

NORTH

Figure ES.1



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Capital Facilities Plan (2002-2030)

NORTH

Figure ES.2

Table ES.2 Capital Facilities Plan

	Street	From	To	Cost per mile	Segment Length (mi.)	Segment Cost	Phase
Arterials							
1	7000 South	Redwood Road	Bangerter Highway	$12,000,000	2	$24,000,000	1
2	6200 South (1/2)	Bangerter Highway	5600 West	$2,671,572	2.25	$6,011,036	1
3	9000 South	Bangerter Highway	5600 West	$5,343,143	0.5	$2,671,572	1
4	9000 South	5600 West	SR-111	$4,232,327	1.9	$8,041,422	1
5	7800 South	4000 West	5600 West	$5,343,143	2	$10,686,287	1
6	5600 West	North City Boundary	7000 South	$4,232,327	1	$4,232,327	1
7	5600 West	7000 South	7800 South	$4,232,327	1	$4,232,327	1
8	5600 West	7800 South	9000 South	$4,232,327	1.5	$6,348,491	1
9	7800 South	5600 West	SR-111	$5,343,143	1.625	$8,682,608	1
10	6200 South (1/2)	5600 West	SR-111	$2,671,572	1.25	$3,339,465	2
11	9000 South	SR-111	West City Boundary	$4,232,327	0.875	$3,703,287	2
					Arterials Total	**$81,948,823**	
Collectors							
12	6400 West	7000 South	7800 South	$2,029,783	0.5	$1,014,891	1
13	6400 West	7800 South	9000 South	$2,029,783	2	$4,059,566	1
14	8600 South	5600 West	SR-111	$2,029,783	1.75	$3,552,120	1
15	5600 West	9000 South	Old Bingham Highway	$2,029,783	1	$2,029,783	2
16	6600 South	5600 West	West City Boundary	$1,230,434	0.375	$461,413	2
17	6000/6200 West	7000 South	7800 South	$2,029,783	1	$2,029,783	2
18	6000/6200 West	7800 South	9000 South	$2,029,783	1.75	$3,552,120	2
19	6000/6200 West	9000 South	10200 South	$2,029,783	0.5	$1,014,891	2
20	7000 South	Grizzly Way	5600 West	$2,001,055	0.625	$1,250,659	2
21	7000 South	5600 West	SR-111	$2,029,783	1.5	$3,044,674	2
22	10200 South (1/2)	6000 West	SR-111	$615,217	1.5	$922,826	2
23	8200 South	5600 West	6400 West	$1,230,434	0.75	$922,826	2
24	9800 South	6000/6200 West	SR-111	$1,230,434	1.25	$1,538,043	2
25	9400 South	Bagley Park Road	SR-111	$1,230,434	1	$1,230,434	2
26	7400 South	5600 West	SR-111	$1,230,434	1.625	$1,999,455	2
27	6800 West	7800 South	9000 South	$2,029,783	1.5	$3,044,674	2
28	6800 West	9000 South	10200 South	$2,029,783	1	$2,029,783	2
29	8200 South	6400 West	SR-111	$2,029,783	0.7	$1,420,848	2
30	8200 South	SR-111	West City Boundary	$2,029,783	0.8	$1,623,826	3
31	7800 South	SR-111	West City Boundary	$2,029,783	1	$2,029,783	3
32	Oquirrh Blvd	6400 South	9000 South	$2,029,783	3.75	$7,611,686	3
33	Oquirrh Blvd	9000 South	South City Boundary	$2,029,783	1.75	$3,552,120	3
34	9800 South	SR-111	West City Boundary	$1,230,434	1	$1,230,434	3
35	9400 South	SR-111	West City Boundary	$2,029,783	1	$2,029,783	3
36	7000 South	SR-111	West City Boundary	$2,029,783	1	$2,029,783	3
37	10200 South (1/2)	SR-111	West City Boundary	$615,217	1	$615,217	3
38	8600 South	SR-111	West City Boundary	$2,029,783	1.5	$3,044,674	3
					Phase 1	$83,532,649	
					Phase 2	$33,534,964	
					Phase 3	$23,767,307	
					Total	**$140,834,921**	

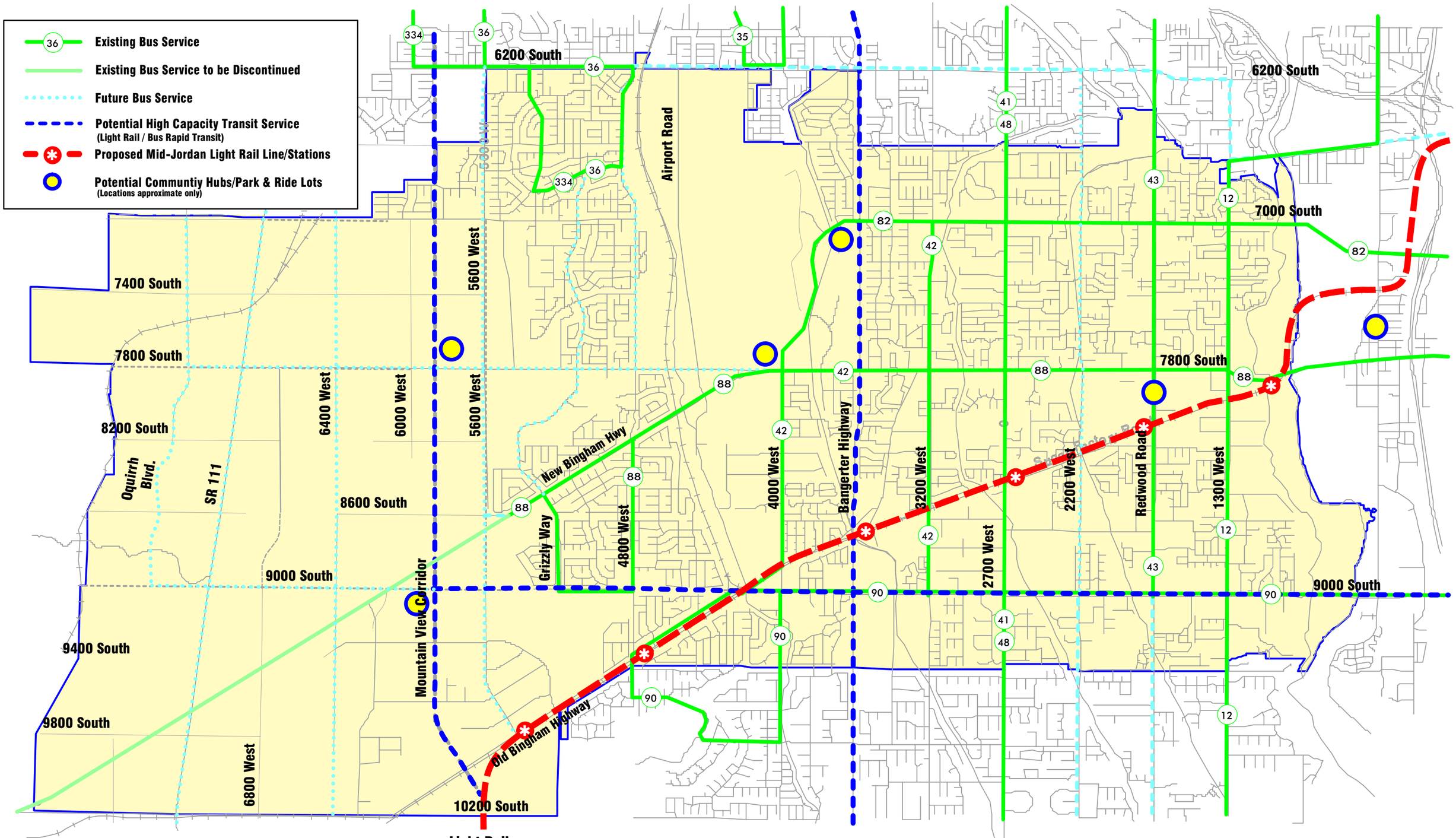
Public Transportation

An effective and efficient transit system is going to be an increasingly vital component of the overall transportation network in West Jordan as the City continues to grow. Proper transit planning and design not only requires that the transit facilities themselves be considered but also the adjacent land uses and corridors. There are many opportunities for transit service enhancements in West Jordan. A large part of future transit service in West Jordan will be the Mid-Jordan light rail line that will run along the existing rail corridor within the city. Environmental work for this line is currently underway with service expected to begin between 2007 and 2010.

The Wasatch Front Regional Council's Long Range Plan calls for increased bus service throughout Salt Lake County. As new roads are built and the population expands, it will be necessary for UTA to provide service to these new corridors, such as 5600 West, which will be an arterial street and will likely be close to the Mountain View Corridor, which may also be a transit corridor. Other existing facilities could use an immediate service increase, such as 7800 South, which currently only has peak period service. This corridor should receive bus service all day, as is done on 7000 South and 9000 South, as soon as possible. Figure ES.3 shows future transit corridors in West Jordan.

Recommended Bike Paths

The map of the proposed bicycle and trail facilities network is shown in Figure ES.4. All of the proposed street cross-sections allow for the addition of bicycle lanes. Before a bicycle lane can be installed on a roadway, the roadway itself must be complete along the entire extent of the bicycle path. Missing shoulders and incomplete segments pose a serious hazard to bicyclists. An example of a good facility for bike lanes is Grizzly Way, which could immediately support a bike lane from 7000 South to 9000 South.

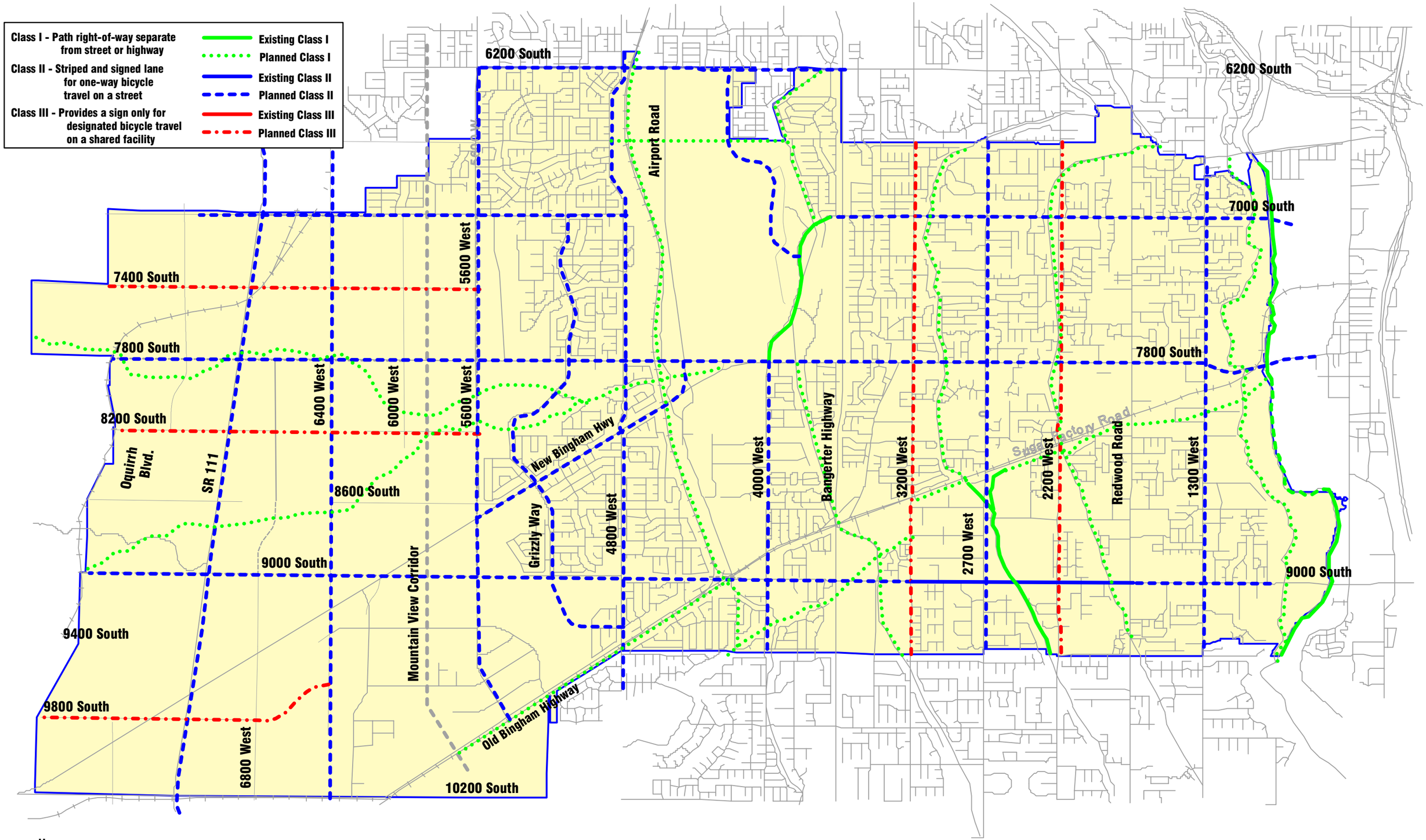


West Jordan Master Transportation Plan

Existing & Future Transit Service

NORTH

Figure ES.3



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Recommended Trails/Bicycle Routes

NORTH

Figure ES.4

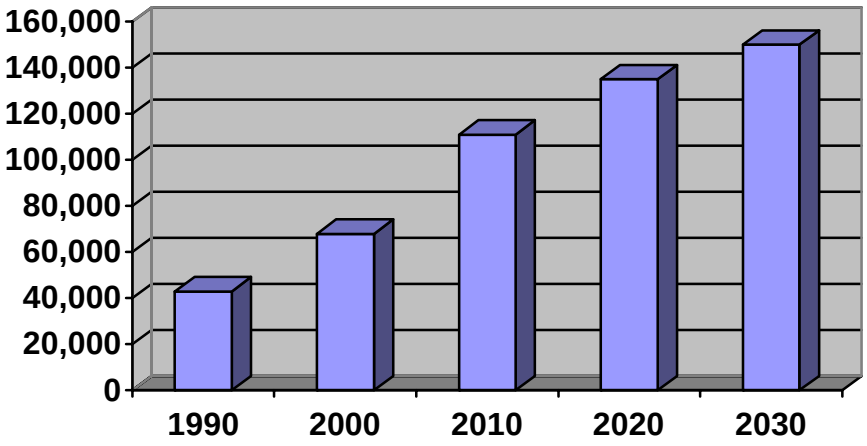
Chapter 1
INTRODUCTION

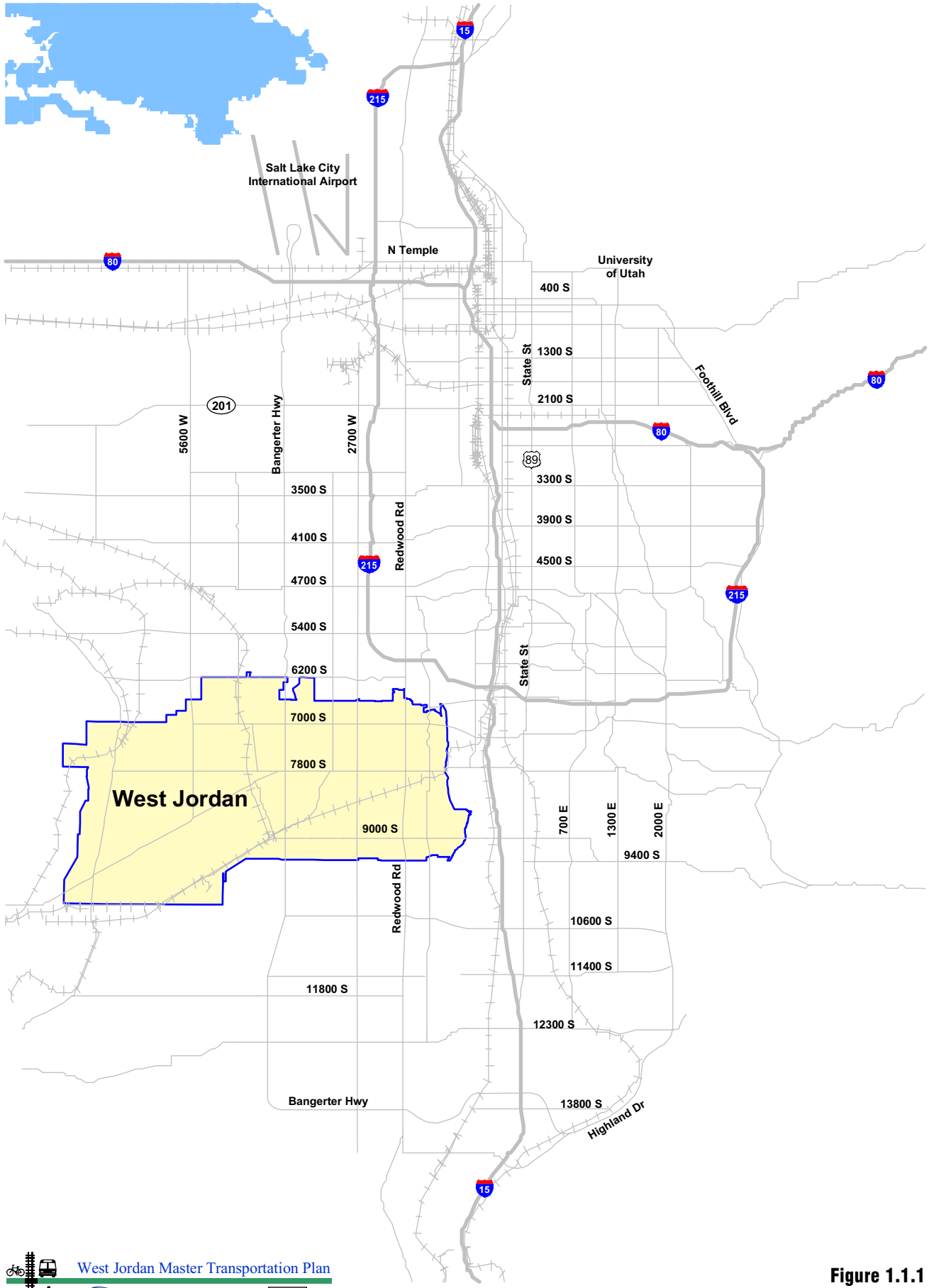
1.1 OVERVIEW

West Jordan City is a rapidly growing community located in the southwestern portion of the Salt Lake Valley. West Jordan is bordered on the north by Kearns, Taylorsville, and Salt Lake County; on the south by South Jordan; on the east by Murray, Midvale and Sandy; and on the west by the Oquirrh Mountains. Within the city there is a mix of residential, commercial, and industrial development as well as a great deal of undeveloped land, particularly in the western portion of the city. A map of West Jordan City and the surrounding area is shown in Figure 1.1.1.

West Jordan and the surrounding communities have experienced a significant amount of growth and development over the last several years, and this growth is expected to continue in the future, as shown in the figure below. According to the United States Census Bureau the population of West Jordan was just under 43,000 in 1990. The population in 2000 was just over 68,000 for an increase of about 59 percent. The Wasatch Front Regional Council (WFRC) estimates that the city population will be around 111,000 by the year 2010 which would be an increase of about 63 percent over the 2000 census numbers. By the year 2020 the population is projected to be around 135,000 and up to 150,000 by the year 2030. Growth forecasts developed by West Jordan City are similar to those of the WFRC that show a build-out population of 170,000 to 180,000 people, which may be realized within or shortly after the 27-year planning horizon. In order to keep pace with this growth, a comprehensive transportation plan must be developed and regularly maintained. This plan must incorporate the goals of West Jordan City regarding the transportation systems within their jurisdiction as well as those regional facilities maintained by UDOT, UTA, Salt Lake County, and neighboring communities.

West Jordan Population Growth





West Jordan Master Transportation Plan

Figure 1.1.1
West Jordan Vicinity Map

This Master Transportation Plan (MTP) contains an analysis of the existing transportation network and conditions. An analysis of the future transportation network is also included in Chapter 4 for the horizon year 2030. Any major UDOT projects and improvements within the City, such as the Mountain View Corridor, are reflected in this future network. A list of recommended improvements and projects is provided in Chapter 11 to aid West Jordan in planning for their own future transportation projects as well as in working with other agencies such as UDOT or neighboring cities. This Master Transportation Plan is intended to be a useful tool to aid West Jordan City in taking a proactive effort in planning and maintaining the overall transportation network within their city.

1.2 WEST JORDAN TRANSPORTATION HISTORY

West Jordan was one of the earliest Utah pioneer settlements after the founding of Salt Lake City. The community's roots begin in the later part of 1849 when some pioneers began spreading out in the Salt Lake valley. West Jordan's original unofficial area included most of the valley on the West Side of the Jordan River, and about a three-mile strip on the east side of the river past State Street in an area now occupied by Midvale, Sandy and the former Crescent area.

It was 10 January 1941 before the town of West Jordan, with a population of less than 2,000, was officially incorporated. In the late 1960s the community began growing at such a rate it became one of the fastest growing small communities in the United States. By 1990 the population had reached 42,912.

The city’s first Master Transportation Plan was adopted in 1998. The city intends to update the plan every five years. This plan will be the first update to the original plan.

1.3 TRANSPORTATION GOALS

This plan sets forth a number of transportation goals for the city. Each of these goals is listed below. Throughout the plan at the end of most chapters the goal(s) dealing with that chapter are listed along with the corresponding policies and implementation measures to be utilized in achieving that goal.

GOAL: TO PROVIDE SAFE AND EFFICIENT MOVEMENT OF TRAFFIC ON CITY STREETS.

GOAL: TO DEVELOP A TRANPORTATION MANAGEMENT PROGRAM.

GOAL: TO ESTABLISH A MULTI-MODAL TRANSPORTATION SYSTEM

GOAL: TO ENCOURAGE THE USE OF BICYCLE TRANSPORTATION SYSTEMS.

GOAL: TO ENCOURAGE THE USE OF PEDESTRIAN TRANSPORTATION SYSTEMS.

GOAL: TO SUPPORT RESIDENTIAL TRAFFIC CALMING.

GOAL: TO IMPROVE THE AESTHETIC QUALITY OF THE CITY'S STREETS.

Chapter 2
MASTER PLAN PROCESS

This chapter briefly details the process by which the West Jordan Master Transportation Plan was prepared and by which comments were received from city staff and the public.

2.1 WORK FLOW

The process of preparing the West Jordan Transportation Master Plan was broken into four primary phases as described below.

1. **Initiate Project and Develop Database** – The initial stage of work dealt with organizing the project and the Technical Advisory Committee and assembling existing conditions data including mapping data, previous reports, traffic counts, and accident histories.

2. **Analysis** – The second phase of the project included the analysis of the existing data and the development of estimated future traffic volumes using a travel demand model.

3. **Develop Master Plan** – This phase of the project represented the majority of work. The future roadway network for motorized vehicles was developed along with networks for transit, bicycles, and pedestrians. The residential traffic management plan was prepared including traffic calming.

4. **Approve Document** – The final phase of the plan preparation was to prepare a Capital Facilities Plan for potential projects, to write the plan, and to prepare additional tables and graphics. The completed draft document was then compiled and presented for comment to interested parties. The plan was then revised based on comments and the final plan was then presented to the City Council for adoption.

Throughout the entire plan preparation process, a public involvement plan was implemented with regular meetings of the Transportation Advisory Committee. Each of these is discussed in more detail in the following sections.

2.2 PUBLIC INVOLVEMENT

A vital component in preparing this Master Transportation Plan has been seeking input from the citizens of West Jordan. A variety of different methods were utilized to acquire public opinion on the plan each of which are presented below and then discussed in more detail.

- **Open Houses** – Members of the master plan consultant team attended or sponsored public open houses at four different times throughout the study process. Two of the open houses were sponsored by the General Plan update while the other two were sponsored by this plan.

- **Resident Survey** – A survey form was distributed throughout the city by inclusion in water bills that asked residents about their transportation concerns and provided and opportunity for them to share their comments. Nearly 2,400 survey forms were received providing illumination into citizen opinions.

- **Public Meetings** – Public meetings were held at the conclusion of the study process to present the plan to the General Plan Committee, Planning Commission, and the City Council.

2.2.1 Open Houses

Open houses were generally held at the beginning of the plan process. These meetings were to gauge citizen sentiment and to identify transportation issues to be addressed. The final set of public meetings was held with elected and appointed officials as part of the process of adopting the plan to receive comments from both the officials and the public on the draft plan. Based on these comments the plan was revised before presentation to the City Council for adoption.

Representatives of the transportation plan consultant team participated in two different sets of public meetings for the General Plan. The first set of meetings was held on three consecutive nights from March 12-14, 2002 at various locations throughout the city. At these meetings the consultant team attended and observed the presentations made regarding parks, land use, and other issues as well as listened to comments made by members of the public regarding transportation.

A public open house was held at City Hall on the evening of Wednesday June 26, 2002. This open house was advertised in the West Jordan City newsletter the week prior to the meeting. The purpose of this preliminary open house was to gain input from the public as to what problems and deficiencies in the transportation system are of most concern to them. Several display boards were presented showing the current transportation conditions and services throughout West Jordan. Several members of the consultant team and West Jordan City staff attended the meeting and were available to answer questions and document the items of concern given by those that attended the open house. Many comments were documented covering a wide range of issues from capacity concerns to safety issues to transit deficiencies. These comments are summarized in the appendix.

The second set of meetings as part of the General Plan update process was held on four nights between September 25, 2002 and October 8, 2002. At these meetings the consultant team brought display materials illustrating existing and future transportation systems and traffic conditions and was on hand to answer questions and respond to comments from the public.

2.2.2 Resident Survey

A survey questionnaire was prepared and mailed to all West Jordan residents in their utility bills throughout the month of July 2002. This survey contained several questions regarding various transportation issues in the City such as transit usage, bicycle and pedestrian access, safety, etc. The purpose of these questions again was to gain input regarding what existing problems are of most concern to residents as well as to gain information to aid in the planning of future projects.

A total of nearly 2,400 surveys were received which provided some valuable information regarding some transportation system problems. The questions and corresponding responses are also shown in the appendix along with additional written comments comprising approximately 30 pages.

2.2.3 Public Meetings

As part of the adoption process, public meetings were held with the General Plan Committee on August 13, 2003. The Transportation Master Plan was presented to the Planning Commission on September 3, 2003, which recommended the plan for approval on September 17. The plan was then presented to the City Council on October 21, 2003 when it was unanimously approved. These were all public meetings with attendance and opportunity to comment by interested citizens.

2.3 TRANSPORTATION PLAN UPDATE TEAM

A Transportation Advisory Committee (TAC) was formed to provide the project team with direction and input during the plan development process. The committee generally met monthly to review master plan items and to share their opinions. The TAC was comprised of approximately 10 members representing both governments and private citizens. There was representation from the Community Development, Public Safety, and Engineering Departments of West Jordan City as well as UDOT Region 2. UTA personnel were also included in project mailings and review of the master plan document. A member of both the Planning Commission and General Plan Committee were also on the TAC to provide valuable community input. The individual members of the consultant team and the TAC are presented below.

City Project Manager

Greg Davenport, P.E.	City Staff Engineer

Consultant Project Manager

David Goeres, P.E./Ivan Hooper, P.E.	Wilbur Smith Associates

Transportation Advisory Committee

James Woodruff, P.E.	City Engineer
Tom Burdett	Community Development Director
Craig Hinckley	City Long Range Planner
Matt Jarman	City GIS Administrator
Bonnie Fernandez	General Plan Committee Member
Nola Duncan	Planning Commission Member
Reed Scharman	City Fire Marshall
Chris Siavrakas, P.E.	UDOT Region 2 Traffic Engineer
G.J. LaBonty	UTA Planner

Consultant Team Members

Ron Holmes, P.E.	Wilbur Smith Associates
Carol Levine	Wilbur Smith Associates
Gary Thurgood	Wilbur Smith Associates
Rose Moesinger	Wilbur Smith Associates

Matt Riffkin, P.E.	Interplan
Connie Douglas	Interplan
Richard Chong	Richard D. Chong Architect

2.4 MASTER PLAN UPDATE CYCLE

This report is the first update of the original Master Transportation Plan that was prepared in April of 1998. The plan should be updated approximately every five years. This will ensure that the plan will remain current and reflect the needs of the city. It will also enable the city to adjust the capital facilities plan so that the most important projects are at the top of the list.

Chapter 3
EXISTING TRANSPORTATION SYSTEM

3.1 FUNCTIONAL CLASSIFICATION SYSTEM

Streets and highways provide for two distinct and very different functions: mobility and land access. Both functions are vital and no trip is made without both. Highway facilities are classified by the relative amounts of through and land-access service they provide. There are four primary classifications:

1. **Local Streets** – These facilities primarily serve land-access functions. Their design and control facilitates the movement of vehicles onto and off the street system from land parcels. Through movement is difficult and is discouraged by both the design and control of the facility.

2. **Collectors –** These facilities, the "middle" classification, are intended to serve both through and land-access functions in relatively equal proportions. For long through trips, such facilities are usually inefficient, though they are frequently used for shorter through movements associated with the distribution and collection portion of trips.

3. **Arterials** – These facilities are provided to service primarily through-traffic movement. While some land-access service may be accommodated, it is clearly a minor function, and all traffic controls and the facility design are intended to provide efficient through movement.

4. **Freeways and Expressways** – These facilities are provided to service long distance trips between cities and states. No land access service is provided by these facilities[1].

There are also ways to subdivide each of these major classifications. Arterials are often divided into major and minor categories. In West Jordan collectors are divided into major and minor categories with major collectors having higher carrying capacity than minor collectors.

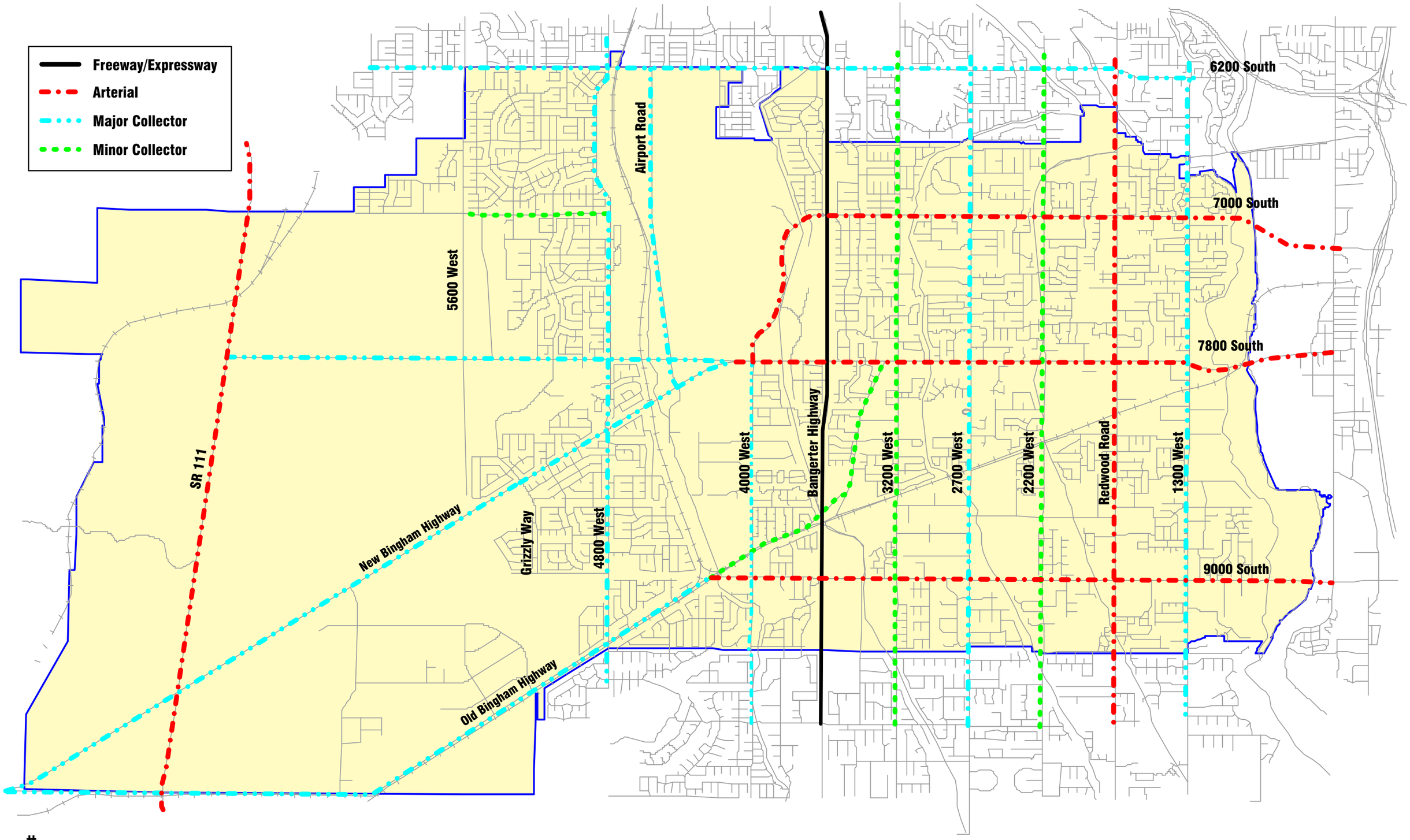
A more detailed description of the characteristics of the different functional classifications of highways is found in Table 3.1.1 on the following page. A map of the existing roadway network and functional classifications is shown in Figure 3.1.1. The recommended roadway classifications from the 1998 Transportation Master Plan are shown in Figure 3.1.2. These previous functional classifications are somewhat changed in this update.

[1] *Engineering*, McShane and Roess, Englewood Cliffs, New Jersey, 1990, p. 38.

Table 3.1.1 Functional Classification Descriptions

Characteristic	Functional Classification				
	Freeway and Expressway	Arterial	Major Collector	Minor Collector	Local Street
Function	Traffic movement	Traffic movement, land access	Traffic movement, land access	Collect and distribute traffic between streets and arterials, land access	Land access
Typical % of Surface Street System Mileage	Not applicable	5-10%	10-20%	5-10%	60-80 %
Continuity	Continuous	Continuous	Continuous	Not necessarily continuous	None
Spacing	4 miles	1-2 miles	½-1 mile	½ mile or less	As needed
Typical % of Surface Street System Vehicle-Miles Carried	Not applicable	40-65%	10-20%	5-15%	10-25 %
Direct Land Access	None	Limited: major generators only	Restricted: some movements prohibited; number and spacing of driveways controlled	Safety controls access; limited regulation	Safety controls access
Minimum Roadway Intersection Spacing	1 mile	½ mile	¼ mile	300 feet	300 feet
Speed Limit	55-75 mph	40-50 mph in fully developed areas	30-40 mph	25-35 mph	25 mph
Parking	Prohibited	Prohibited	Generally prohibited	Limited	Permitted
Comments	Supplements capacity of arterial street system & provides high-speed mobility	Backbone of street system			Through traffic should be discouraged; Subject to traffic calming

Source: Entranco



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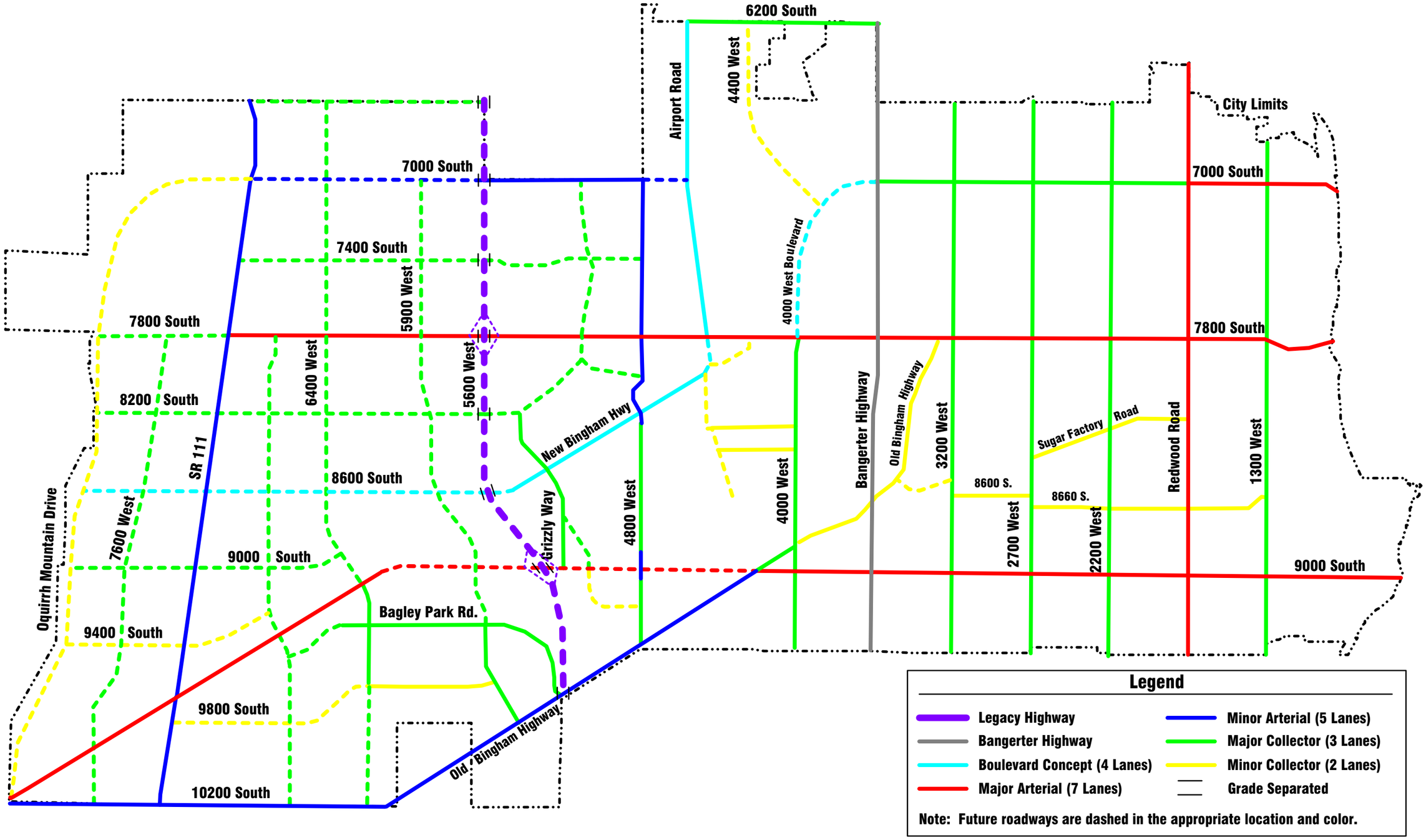
Existing Roadway Functional Classifications

NORTH

Figure 3.1.1



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1998 Master Plan Recommended Roadway Classification

NORTH

Figure 3.1.2

3.2 STREET JURISDICTIONS

Some of the existing streets in West Jordan fall under the jurisdiction of the Utah Department of Transportation (UDOT); meaning UDOT controls and maintains these facilities. State roads are generally some of the busiest roads in a community and are typically continuous across several cities. Some of the authority and responsibility that they have over their facilities are:

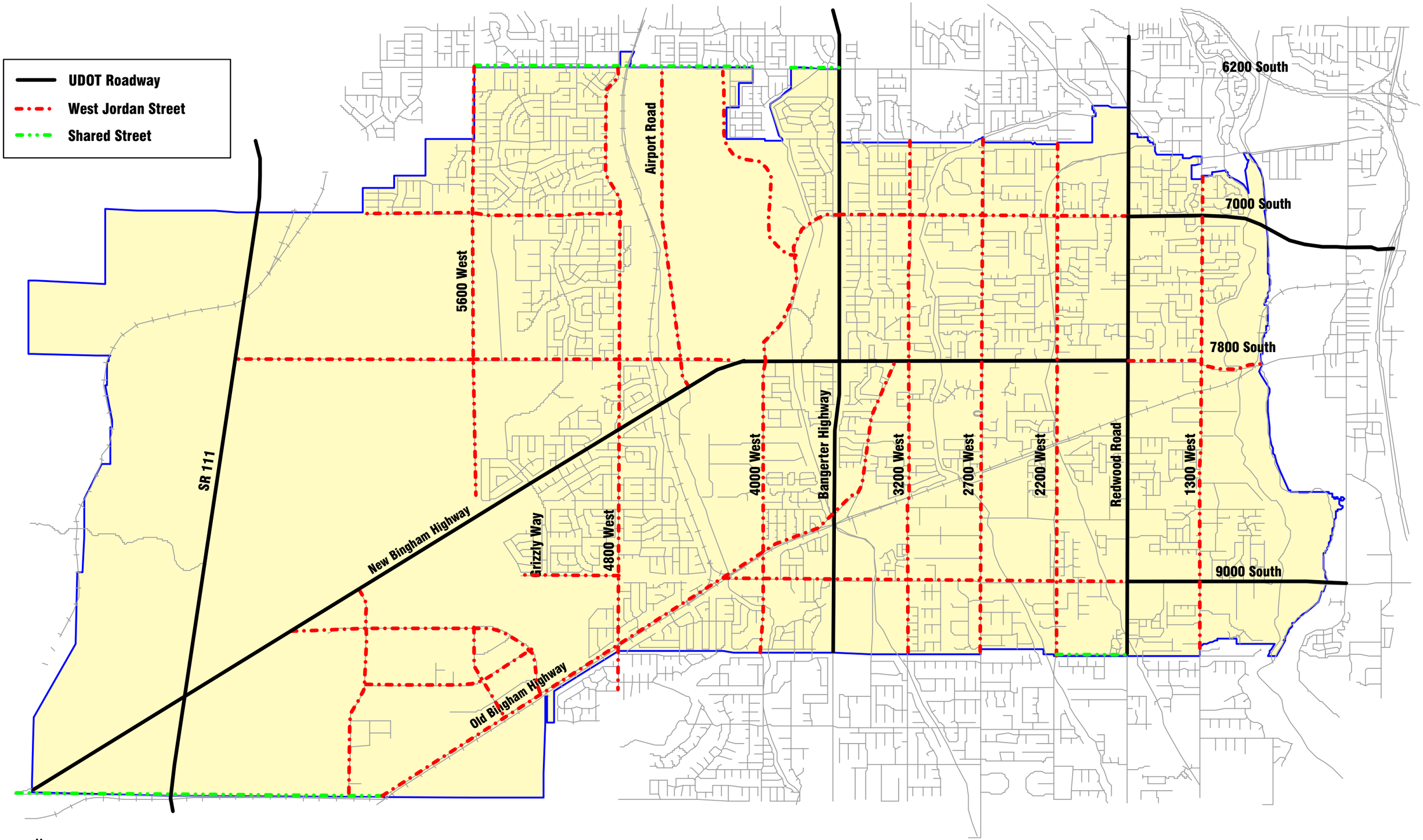
- UDOT must approve any additional access points onto state roads that may be requested by developers.
- UDOT develops and controls the traffic signal timing along state roads.
- UDOT is responsible for the capacity of state roads, which may include widening of roads or intersections improvements, although they will generally coordinate these activities with the city.
- UDOT is also responsible for the maintenance of these roadways so they provide snow removal, repair cracks, and perform all other roadway maintenance or repair tasks.

Most other roadways within West Jordan come under the jurisdiction of the City or they may share jurisdiction with a neighboring community for streets traveling along City borders. Figure 3.2.1 shows the various jurisdictions each arterial or collector falls under for the future recommended street network.

3.3 PEDESTRIAN AND BICYCLE FACILITIES

Currently there are few bicycle facilities other than the existing street network. There are striped bicycle lanes along the shoulders of 9000 South between Redwood Road and 2700 West and a multi-use trail along Jordan Landing Boulevard.

An inventory of the existing arterials and collectors was made in order to identify locations where there are discontinuous sections of sidewalk such as along undeveloped parcels. A cost estimate for the construction of curb, gutter and sidewalk along all of these areas was calculated and is included in the Capital Facilities Plan.



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Existing Street Jurisdictions

NORTH

Figure 3.2.1

3.4 EXISTING TRAFFIC CONDITIONS

3.4.1 Traffic Volumes

Existing traffic volumes were collected and compiled for use in the analysis of existing traffic conditions. Average Daily Traffic (ADT) volumes were obtained from UDOT's *Traffic on Utah's Highways* document for the state roads within West Jordan. The 1995 and 2000 ADT volumes as well as the associated percentage growth for the various roadway segments are shown in Figure 3.4.1.

Peak hour intersection turning movement counts that have been performed recently for various commercial and residential developments were provided by West Jordan City. These various counts performed between 1999 and 2002 were then factored up with a growth rate to estimate the existing (2002) peak hour traffic volumes at the various intersections. Several afternoon peak hour turning movement counts were also conducted by Wilbur Smith at various intersections in the City. These peak hour traffic volumes were used in the analysis of existing conditions as well as in the modeling of the future traffic volumes and conditions. PM peak hour turning movement counts were performed by Wilbur Smith Associates personnel in June or November 2002 at the following intersections:

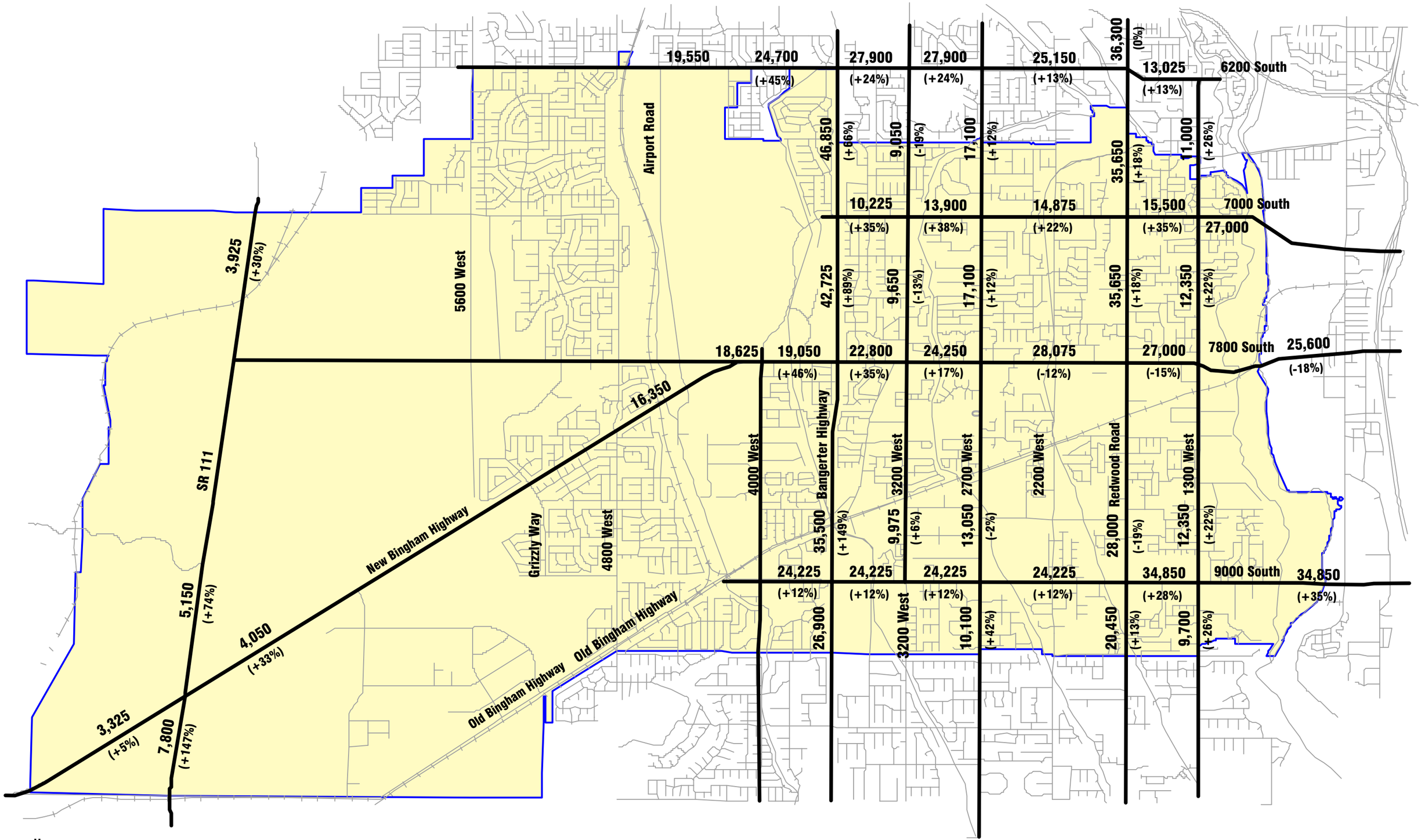
- 7000 South & Redwood Road
- 7800 South & 4000 West
- 7800 South & Bangerter Highway
- 7800 South & 2700 West
- 7800 South & Redwood Road
- 9000 South & 2700 West
- 9000 South & 1300 West
- Sugar Factory Road & 2200 West

A complete list of intersection turning movement volumes can be found in the appendix.

3.4.2 Volume-to-Capacity Analysis

A capacity analysis for the major streets and intersections in West Jordan was performed using the traffic modeling software Synchro™. The operational quality of an urban or suburban corridor is typically determined by the major signalized intersections that lie along that corridor. These intersections represent the "bottlenecks" because of the delays associated with traffic conflicts and signal timing and phasing. If the efficiency of the intersections is improved, the efficiency of the corridor is improved.

A given intersection has a certain volume of traffic that can pass through the intersection during a certain time period given the lane geometry, signal timing and phasing, etc. This volume threshold is referred to as the capacity. By knowing the actual number of vehicles passing through the intersection over that same time period a ratio can be calculated by dividing the actual volume by the capacity. This is known as the volume to capacity (V/C) ratio or the intersection capacity utilization (ICU). A volume to capacity ratio of 1.00 means the volume is equal to the capacity. This ratio is a good measure of how much traffic is passing through an intersection in relation to the capacity and how much more traffic the intersection can handle before significant congestion and delays begin to occur. The existing volume-to-capacity ratios for the major streets are shown in Figure 3.4.2.



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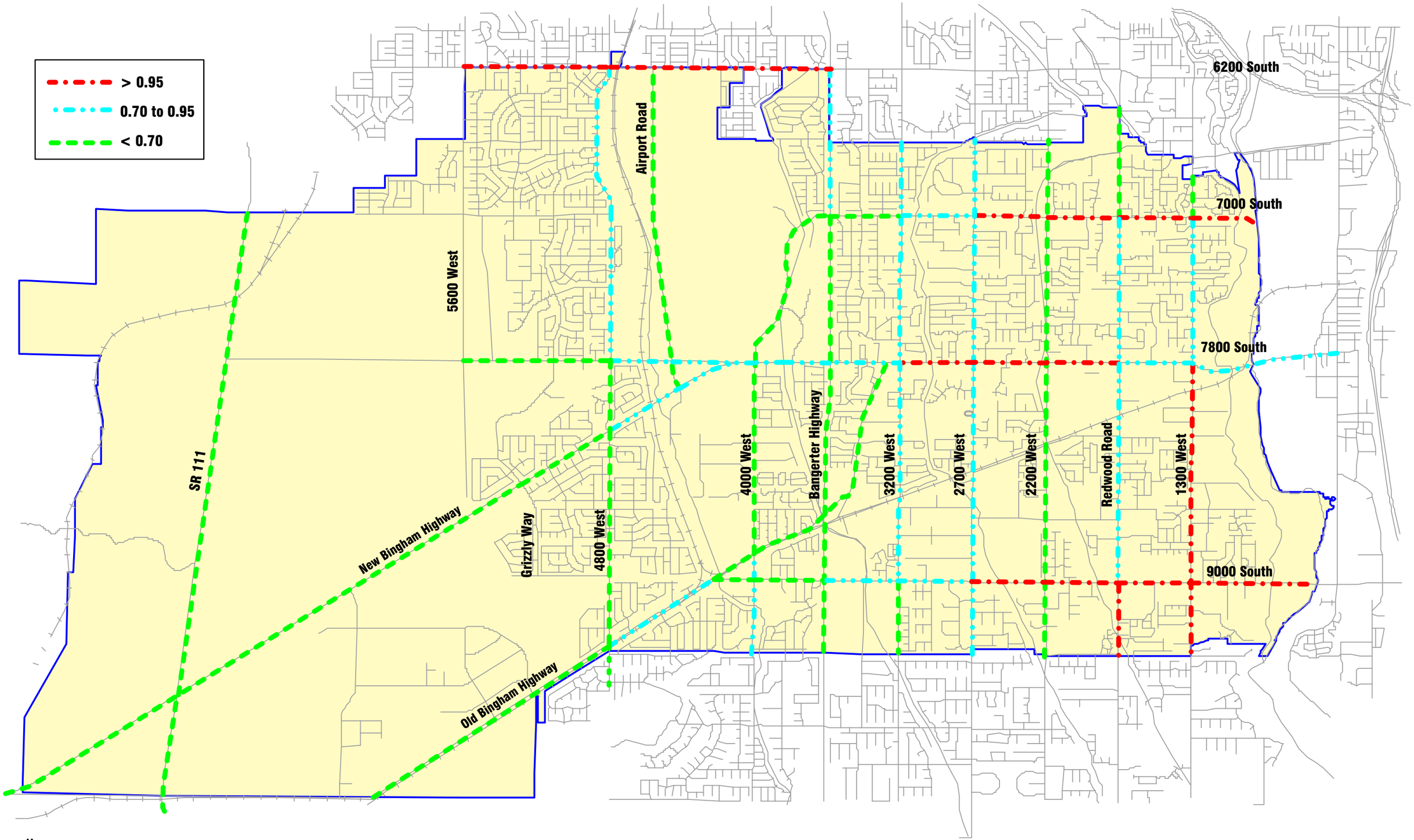
2000 Average Daily Traffic Volumes

(Change from 1995 UDOT Volumes +/- %)

NORTH

Figure 3.4.1



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Existing Volume to Capacity (V/C) Ratios

NORTH

Figure 3.4.2

3.5 TRAFFIC SIGNAL INVENTORY

An inventory of all the existing traffic signals was taken in June 2002. At that time there were 36 traffic signals in West Jordan at the major intersections along the arterial and collector streets. A map showing these existing traffic signals is shown in Figure 3.5.1. Traffic signals on the state highway system are maintained by the Utah Department of Transportation, while those on other streets are maintained by Salt Lake County.

3.6 INTERSECTION ACCIDENT ANALYSIS

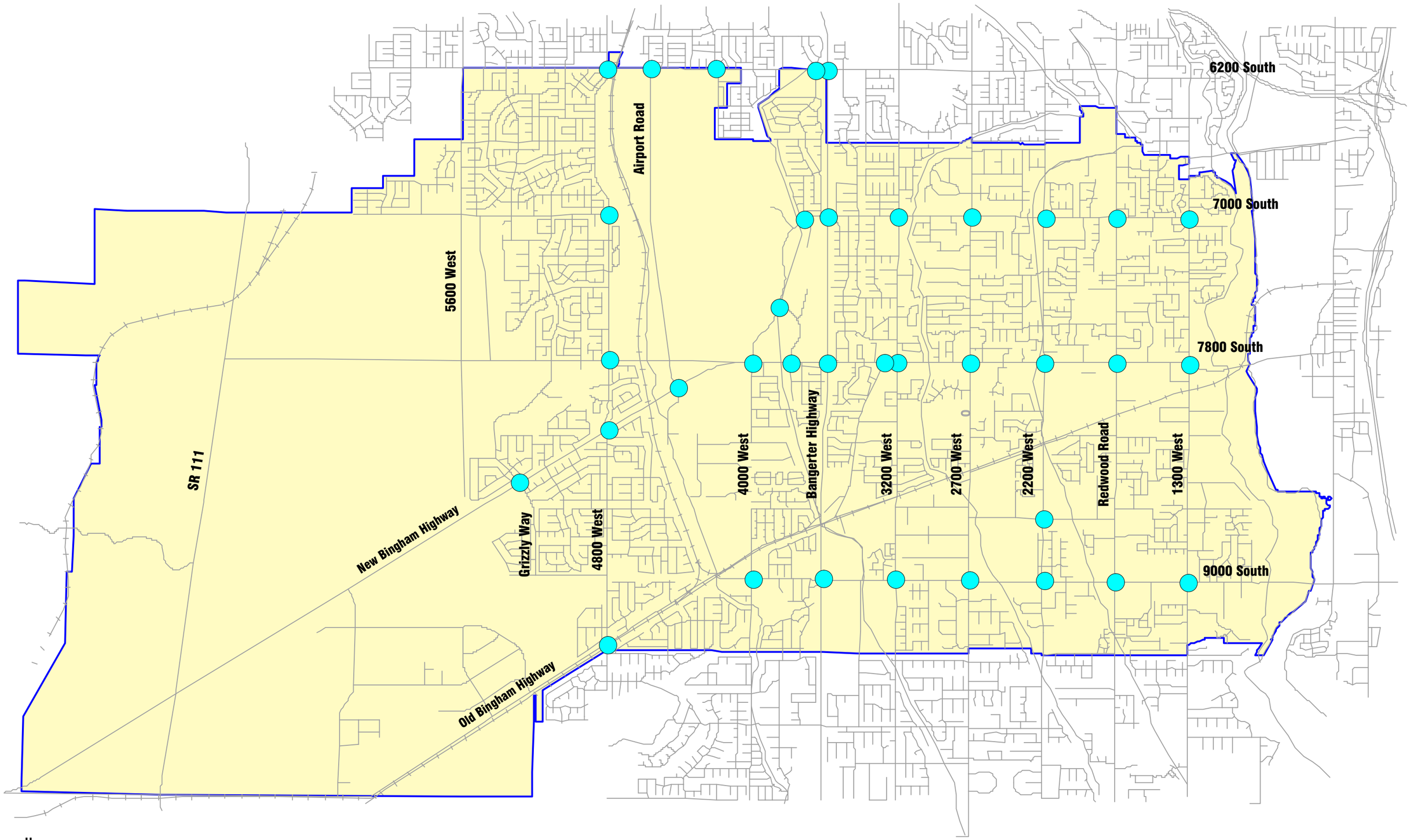
Accident and safety analysis can be quite thorough and intensive, which is outside the scope of this report. The accident analysis given here is quite preliminary and macroscopic in scale. The purpose of this section is to give the City a guide as to which intersections may warrant further analysis and study in the future. Such studies could evaluate specific intersections in much more detail as well as using other criteria such as types of accidents or time periods. For each type of accident there are several probable causes that may have contributed to the accident. For each probable cause there are several countermeasures that are intended to reduce the probability of those types of accidents occurring in the future. Each countermeasure can be evaluated in terms of the expected overall or percent reduction in accidents at that location.

Accident data was obtained from the West Jordan City Police Department from the beginning of 1999 through the end of 2001. This data provided a summary of the accidents at each of the major intersections in the city over the full three years. A list of all the accidents involving bicyclists or pedestrians was also produced by the Police Department. There are typically five different ways that accidents at intersections can be summarized:

- Type of accident
- Severity
- Contributing circumstances
- Environmental conditions
- Time periods

Due to the nature of the information supplied by the Police Department and the purposes of this report it was determined that the intersections would be evaluated by summarizing the accidents in terms of accident severity. This is a common way of summarizing accidents rates at intersections as well as along highways and streets.

By knowing the number of accidents per year as well as the yearly traffic volume traveling through an intersection an accident rate can be calculated for each intersection. Accident rates represent the total number of accidents occurring for every million vehicles passing through the intersection. Accident rates allow the comparison of many intersections in order to identify those intersections that are more dangerous, or that tend to have more accidents than others relative to the total volume.



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Existing Traffic Signals

NORTH

Figure 3.5.1

These rates can also be broken down in terms of fatalities, injuries, and property damage only-types of accidents. Typically a weighting factor is used for each of these types of rates based on their severity. There are no absolute weighting criteria but a typical scale gives a weighting factor of 1 for property damage only, 3 for injuries, and 8 for fatalities. Each of the categorical accident rates are multiplied by the weighting factor and summed up to determine a composite score for each location. The higher the score, the more dangerous that intersection is. The ten intersections with the highest composite score are shown in Table 3.6.1. The complete data and calculations are found in the Appendix.

Table 3.6.1 – Accident Data for the Ten Most Dangerous Intersections

Weighting Factor	1	3	8		
Intersection	Property-Only	Injury	Fatal	Total Rate	Composite Score
Old Bingham & 4000 W.	1.99	1.61	0.00	3.66	6.82
7800 S. & Airport Rd.	1.11	1.05	0.00	2.16	4.26
7000 S. & 1300 W.	0.69	0.86	0.06	1.64	3.72
New Bingham & 4800 W.	1.23	0.76	0.00	1.99	3.50
Old Bingham & 4800 W.	1.16	0.56	0.00	1.72	2.83
7800 S. & 1300 W.	0.83	0.52	0.00	1.37	2.39
9000 S. & Bangerter Hwy.	0.61	0.56	0.00	1.22	2.29
7800 S. & 2700 W.	1.00	0.43	0.00	1.46	2.26
9000 S. & 4000 W.	0.72	0.47	0.00	1.22	2.13
7000 S. & 3200 W.	0.38	0.56	0.00	0.94	2.05

Note: Accident Rates are given in terms of number of accidents per 1 million vehicles entering through the intersection.

Once these ten intersections were identified they were evaluated in more detail to determine types of accidents and possible causes. Some of these intersections have had changes in traffic control devices either during this accident study period or since then. In some cases these recent improvements may reduce the number of accidents at that location which could be evaluated after a sufficient amount of time has passed. The results of any safety improvements or countermeasures must be evaluated over time to know of their effects. Each of these intersections and some accident reduction countermeasures are given below. Some types of studies that would be useful for a more detailed analysis of each location are also given in the table.

Table 3.6.2 – Possible Causes and Mitigation Measures

Intersection	Probable Cause	General Countermeasure	Additional Procedures that May Be Performed
Old Bingham Hwy. & 4000 West	Restricted sight distance, Skewed intersection	[1]Four-way stop, Remove obstacles Provide turn lanes Warning signs Reduce speed limit	Roadway inventory study Sight distance study Spot speed study
7800 South & Airport Road	Excessive speed on approaches, Large total intersection volume, Restricted sight distance	[1]Four-way stop (Probably warrant signal in future), Provide turn lanes	Roadway inventory study Sight distance study Spot speed study Delay study
7000 South & 1300 West	Large volume of left turns, Large total volume, Absence of Left turn phase, Excessive speed on approaches	Provide N/S left-turn phases	Volume study Traffic Conflict study Roadway Inventory study Capacity study Travel Time and Delay study Spot Speed study
New Bingham Hwy. & 4800 West	Large volume of turns, Lack of adequate gaps, Restricted sight distance	[1]Traffic signal, Turn lanes	Volume study Traffic Conflict study Roadway Inventory study Capacity study Travel Time and Delay study Spot Speed study Gap study
Old Bingham Hwy. & 4800 West	Large volume of turns, Lack of adequate gaps, Restricted sight distance	[1]Traffic signal, Turn lanes	Volume study Traffic Conflict study Roadway Inventory study Capacity study Travel Time and Delay study Spot Speed study Gap study
7800 South & 1300 West	Large volume of left turns, Large total intersection volume	[2]Widen 7800 South	Volume study Traffic Conflict study Roadway Inventory study Capacity study Travel Time and Delay study
9000 South & Bangerter Hwy.	Driver behavior problem	Increased enforcement of red light running and very aggressive driving	Volume study Traffic Conflict study
7800 South & 2700 West	Large total intersection volume, Absence of N/S left-turn phase and N/S right-turn lanes	Provide N/S left-turn phase, Provide N/S right-turn lanes,	Volume study Roadway Inventory study Traffic Conflict study Capacity study Travel Time and Delay study

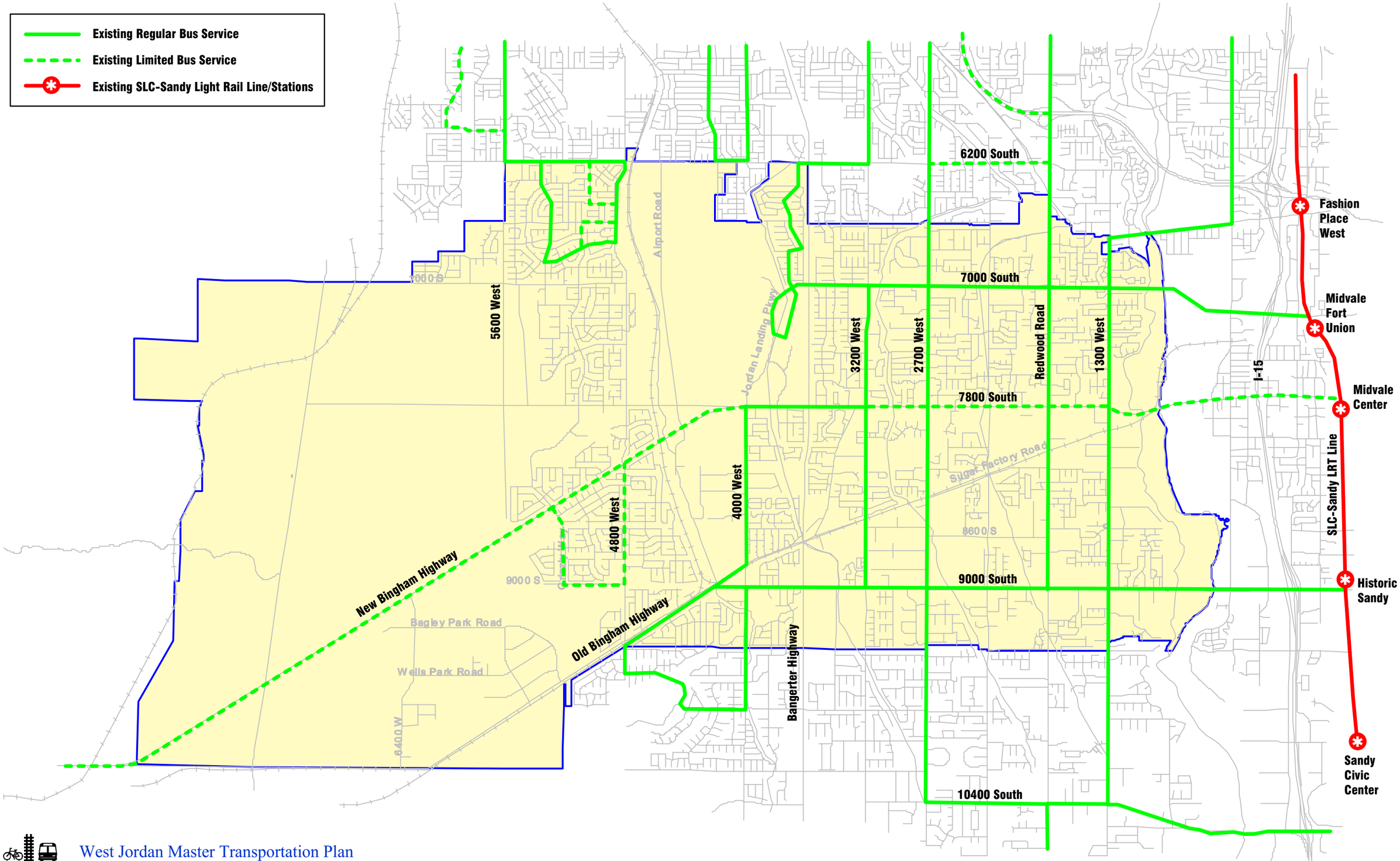
Intersection	Probable Cause	General Countermeasure	Additional Procedures that May Be Performed
9000 South & 4000 West	Large volume of left turns, Large total intersection volume, Absence of left-turn phases, Poor visibility of signals	Provide left-turn phases, Install overhead signal mast arms with 12-in. lenses	Volume study Roadway Inventory study Traffic Conflict study Capacity study Travel Time and Delay study Traffic Control Device study
7000 South & 3200 West	Large volume of left turns, Large total intersection volume, Absence of left-turn phases, Absence of N/S turn lanes	Provide left-turn phases, Provide N/S turn lanes	Volume study Roadway Inventory study Traffic Conflict study Capacity study Travel Time and Delay study

[1]Indicates improvement measure has been implemented recently.
[2]Indicates improvement will be constructed in near future.

A compilation entitled *Intersection Safety Briefing Sheets* produced jointly by the Federal Highway Administration (FHWA), the Advocates for Highway and Auto Safety, and the Institute of Transportation Engineers (ITE) gives some excellent guidelines on various intersection safety related topics. This document discusses various topics related to safety problems, their causes, and effects of various mitigation efforts. This is an excellent resource in understanding intersection safety for all individuals concerned with traffic safety, not just traffic engineering professionals.

3.7 TRANSIT SERVICE

UTA currently operates bus service in West Jordan along most of the arterials and major collectors. East-west routes run along 7000 South, 7800 South, and 9000 South all connect to the TRAX light rail stations adjacent to those facilities in Midvale and Sandy. North-south routes connect to either TRAX stations that are farther north or into downtown Salt Lake City. Regular routes in the city typically operate at 30 to 60-minute headways on weekdays and Saturdays from early morning to early evening. Redwood Road is only street in West Jordan with Sunday bus service, which operates on 60-minute headways from the late morning and throughout the afternoon. Limited service in the city operates only on weekday mornings and afternoons. A map showing the existing transit service in the city is shown in Figure 3.7.1.



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Existing Transit Service

Figure 3.7.1

Chapter 4
PROPOSED STREET SYSTEM

4.1 TRAVEL DEMAND MODELING PROCESS

Travel demand modeling is a process that involves forecasting future year traffic volumes based on estimates of future year population, employment, and other land use and demographic variables. Since travel in West Jordan City is dependant upon the location of households, jobs, and shopping locations within the entire metropolitan area, the regional travel model used by the Wasatch Front Regional Council (WFRC) was used and adjusted for the specific growth projections in West Jordan City. This model divides the large Wasatch Front area into smaller Traffic Analysis Zones (TAZs).

Traffic Analysis Zones (TAZs) are the neighborhood level pieces that comprise a travel demand model, each of which contains its corresponding land use, socio-economic, and demographic information along with access to the surrounding street network.

4.1.1 Land Use

West Jordan City has enjoyed strong and steady population growth over the past 30 years. Much of the past growth has been in the form of single-family residential development. Particularly in recent years, the growth in single-family residential development has diversified to include multiple family developments of apartment buildings and mixed use residential. This growth is projected to continue over the next 30 years. Figure 4.1.1 below illustrates historical and projected future population growth of West Jordan City based on projected city land-uses.

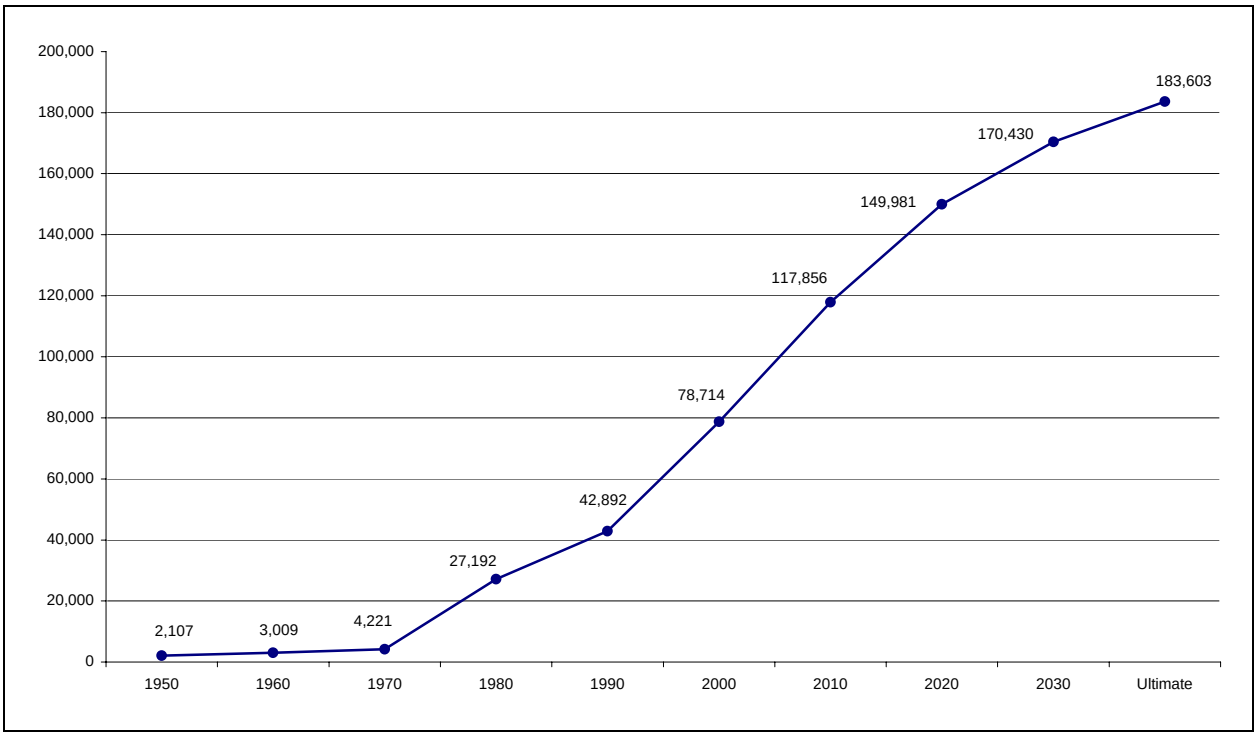


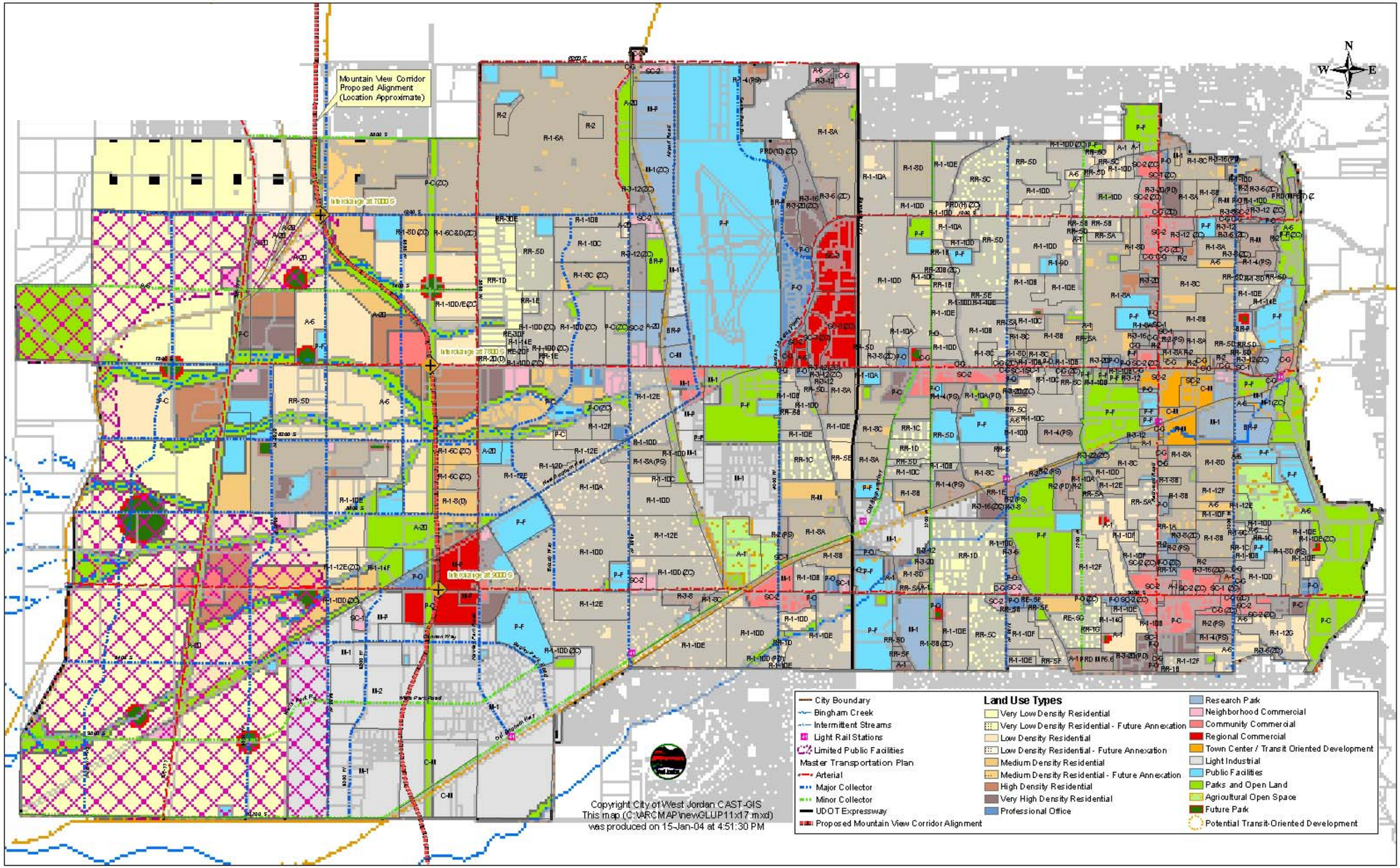
Figure 4.1.1 – Historical and Projected West Jordan City Population

In addition to the population growth commercial services have followed as West Jordan currently has major commercial nodes along most of the arterial routes such as Redwood Road, 9000 South, and Bangerter Highway. The Jordan Landing development is a major retail center that is expected to continue to grow in the near future. With the development of Jordan Landing, West Jordan has become a major regional retail attraction and stands poised to continue to attract additional employment growth.

The WFRC travel demand model uses more land use information than many other types of travel demand programs. In order to run the model with the most accurate demographic and socio-economic data available West Jordan City planners assisted InterPlan in reviewing their newest proposed land use plan based on housing types and densities, areas of existing and proposed commercial, industrial, office, and retail, and public properties such as water and sewer plants, public parks and open spaces. InterPlan met with the West Jordan planning department on two occasions to review assumptions made for the travel demand modeling process and the City made the final decisions of estimated population, employment, workers and dwelling units for future projections. With the geographical location of West Jordan and the growth of surrounding cities it is estimated that West Jordan City will be nearly 100% built-out by approximately 2038. The future land use zoning for West Jordan City is shown in Figure 4.1.2.

4.1.2 Socio-Economic Data/Traffic Analysis Zones

Using the WFRC travel demand model requires many types of socio-economic data input. While land use information from West Jordan City was applied in determining the overall number of dwelling units, population, and persons employed, further breakdown was necessary for the travel modeling process. Dwelling units/households were broken down into the number of persons residing in the unit for up to six persons, (i.e. HH1, HH2, etc.) and trip rates were based on a cross classification of the number of people living in each dwelling unit and the number of automobiles owned in each dwelling unit. For the application of the travel model, the number of dwelling units refers to the number of households living separately, which may account for small semantic differences from census bureau or other information. The numbers of persons employed were broken into three types of employment; retail, industrial, or other. Additional inputs for the travel model include number of persons who work in and/or outside of West Jordan (workers) and the average dwelling unit or household income. Traffic Analysis Zones in West Jordan did not necessarily coincide with City boundaries requiring data inputs for the zones on the City boundary fringes to be adjusted accordingly. Data inputs were adjusted based on West Jordan City forecasts and WFRC forecasts for the corresponding cities sharing the traffic zone. The percent that each traffic zone is developed in 2010, 2020, and 2030 is shown in Figures 4.1.3 through 4.1.5, which are followed by Table 4.1.1 that shows the population, employment, and dwelling units for each of those years by TAZ.



West Jordan Master Transportation Plan

Wilbur Smith Associates

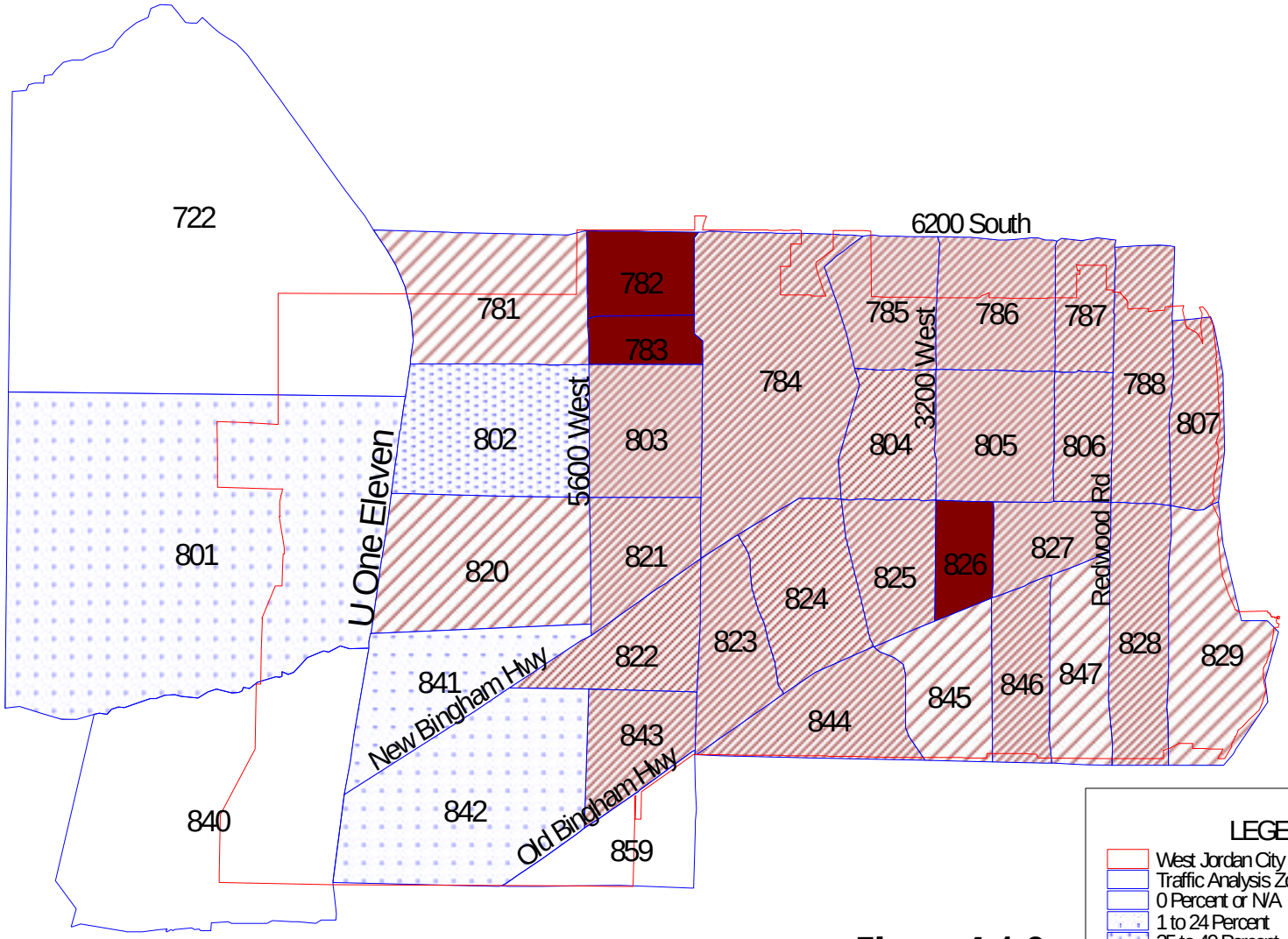
InterPlan Co.

RICHARD D CHONG AND ASSOCIATES

General Land Use Plan

NORTH

Figure 4.1.2



LEGEND

- West Jordan City Boundary
- Traffic Analysis Zone
- 0 Percent or N/A
- 1 to 24 Percent
- 25 to 49 Percent
- 50 to 74 Percent
- 75 to 99 Percent
- 100 Percent

Figure 4.1.3
2010 Population Build-out by TAZ

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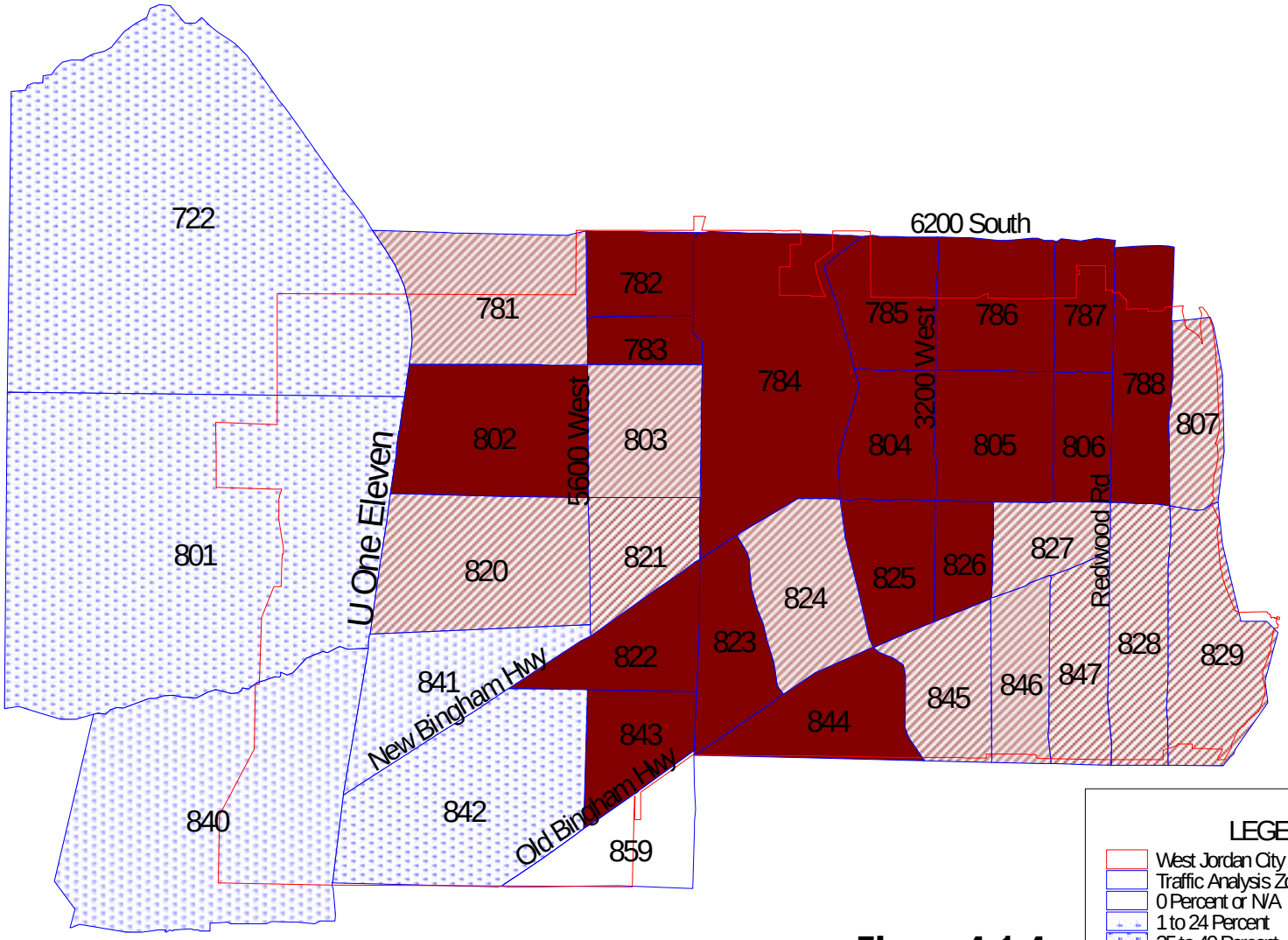

LEGEND

- West Jordan City Boundary
- Traffic Analysis Zone
- 0 Percent or N/A
- 1 to 24 Percent
- 25 to 49 Percent
- 50 to 74 Percent
- 75 to 99 Percent
- 100 Percent

Figure 4.1.4
2020 Population Build-out by TAZ

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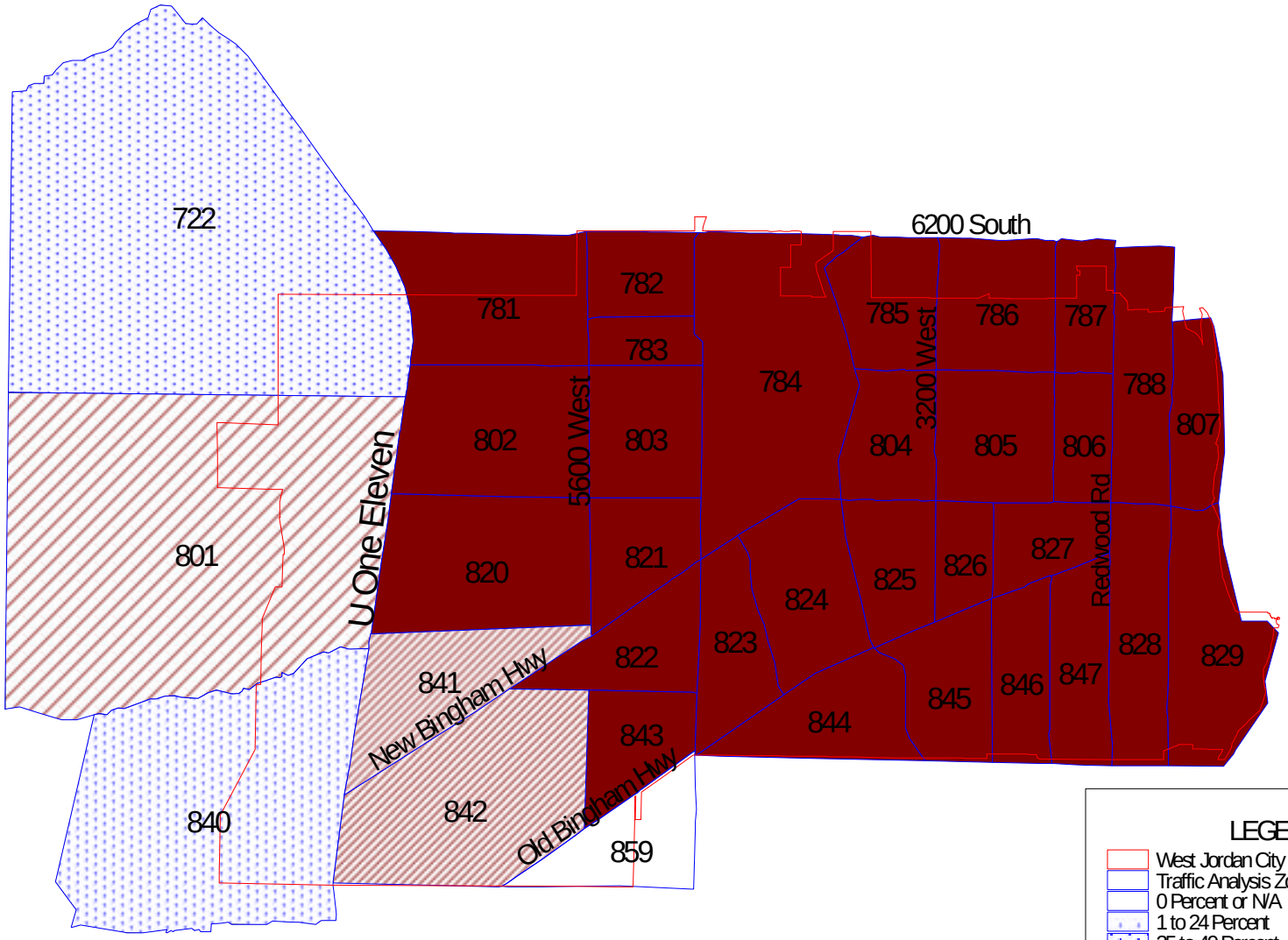

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Figure 4.1.5
2030 Population Build-out by TAZ

Table 4.1.1 Population and Employment by TAZ

TAZ	2000			2010			2020			2030		
	Pop.	Emp.	D.U.	Pop.	Emp.	D.U.	Pop.	Emp.	D.U.	Pop.	Emp.	D.U.
788	5314	987	1948	6251	1337	2061	6580	1671	2169	6580	1671	2169
807	1613	289	617	1562	697	498	1666	1531	531	2082	1612	664
828	4087	2510	1288	6268	4690	2204	6686	4690	2351	8357	4690	2938
829	2811	1665	884	1983	2528	624	3173	3202	999	3966	3370	1249
786	4220	65	1099	2629	0	691	2768	0	727	2768	0	727
787	1976	587	554	1440	921	438	1515	970	462	1515	970	462
805	5014	709	1268	5621	774	1524	6245	774	1694	6245	774	1694
806	2998	1158	870	2952	1328	991	3473	1682	1166	3473	1770	1166
826	1858	302	608	2768	545	835	2768	691	835	2768	727	835
827	1588	661	491	2868	524	971	3632	698	1231	3824	698	1295
845	1936	1248	522	2499	2196	786	3332	2440	1048	4165	2440	1310
846	1441	983	411	2599	562	879	2945	702	997	3465	702	1172
847	2091	1461	852	4153	1536	1437	5883	1707	2036	6921	1707	2395
722	0	59	0	0	0	0	1105	0	285	1768	0	457
781	431	1	172	5687	0	1673	7583	0	2230	9479	0	2788
782	4446	52	1321	7140	99	2131	7140	99	2131	1740	99	2131
801	1	0	1	1680	0	451	2520	0	676	4200	8	1127
802	6	0	2	3473	0	1039	11577	296	3464	11577	710	3464
820	4	57	2	6183	105	1835	9275	524	2753	12367	734	3670
840	43	8	21	0	0	0	1501	0	383	2401	0	612
841	3	38	1	709	219	203	1772	438	509	5317	876	1526
842	0	443	0	357	4556	97	892	6835	241	2676	10252	724
859	959	49	328	0	1735	0	0	2106	0	0	2478	0
783	2718	32	807	4599	0	1386	4599	0	1386	4599	0	1386
784	1821	56	537	5194	3192	2032	5771	5746	2257	5771	6385	2257
785	5206	562	1400	4062	75	1142	4514	94	1269	4514	94	1269
803	981	28	376	4509	0	1258	5411	594	1509	6012	594	1677
804	3014	426	790	3699	2522	1115	4110	3152	1239	4110	3152	1239
821	483	14	185	3046	1138	865	3655	1442	1039	4062	1518	1154
822	1963	388	502	3784	584	1088	4730	1168	1360	4730	1558	1360
823	3307	715	948	4283	408	1181	4759	611	1312	4759	815	1312
824	2496	520	714	3356	2544	997	3775	2862	1121	4195	3180	1246
825	3926	637	1228	5274	704	1605	5860	906	1784	5860	1006	1784
843	0	1541	0	1952	1890	558	2169	2430	620	2169	2700	620
844	2652	565	774	5276	2786	1857	6595	3157	2322	6595	3715	2322
Taz Total	71407	18816	55697	117856	40464	36454	149981	53217	46135	170430	61002	52202
WJ City Forecasts	68336*	NA	NA	104211	NA	NA	132750	NA	NA	169104	NA	NA

Source: 2000 data from the WFRC. Future years estimated by InterPlan using control totals developed by West Jordan City planning staff. Note traffic zone boundaries do not match City boundaries and are approximate only.
** US 2000 Census data http://factfinder.census.gov/servlet/BasicFactsServlet*

4.1.4 Trip Distribution & Assignment

After ensuring the socio-economic data inputs for the travel demand model process were as accurate as possible the next step was to perform the trip generation. Trip generation entails taking the socio-economic data and determining how many vehicle trips might be generated based on each type of data input during different times of the day. These trips are then distributed onto the street network of West Jordan and the surrounding cities. Trip distribution relies on the theory of the "gravity model" where the origin and destination of trips produced in each zone are linked to trips attracted in another zone based on the relative size of trip attractions and inversely related to the distance (measured in highway travel times) between the trip production and the trip attraction.

Once the trips have been distributed so that each trip origin has an accompanying trip destination, the evaluation of mode choice is begun. Mode choice refers to what type of transportation mode each of the various trips is using to get from their origin to their destination, be it automobile, bus, bicycle, etc. In a large suburban area such as West Jordan the vast majority of trips are made using automobiles. The mode choice component of the travel model relies on a "nested logit" probability function. Various efforts are underway to improve the capabilities of the mode choice component of the regional travel model, but analysis at the Master Transportation Plan level are sufficient using the regional model as completed by the end of year 2002.

Traffic assignment is the final portion of the travel modeling process, which takes all of the resulting data from the previous steps and places it into a "loaded" street network. Traffic volumes are placed into the loaded network in four periods of the day, AM, PM, evening and other. The AM, PM, and evening periods are each approximately four hours long and the off peak periods are approximately twelve hours in length. Traffic assignment is an iterative process of determining the shortest travel path from origin to destination based on the theory that an equilibrium of paths can be created such that aggregate travel times cannot be improved by drivers switching to an alternate travel route. Traffic assignment results in the future year travel forecasts for each road in West Jordan and the entire region.

With much of the Salt Lake Valley population and employment growth occurring to the southwest West Jordan and its transportation network will certainly be influenced by surrounding cities and their development. Table 4.1.2 illustrates the population and employment growth of West Jordan in comparison to other cities within Salt Lake County.

Another influence to West Jordan City in the future years may come from a potential development directly to the west. Kennecott Land Company owns approximately 90,000 acres in the Oquirrh Mountains in western Salt Lake County and eastern Tooele County. With the phase-out of the copper mining operation this land will be available for re-use and possibly multi-use development. Land use patterns and the transportation facilities needed to serve any kind of development in this area will directly impact West Jordan. The details of development of the Kennecott Land are presently being evaluated and are not available to the public. However, large land development possibilities exist which would rely on extensive mass transit improvements and additional highway capacity of major east-west travel routes such as 9000 South and 7800 South. Changes in land use in the western regions of Salt Lake County should

be closely monitored by West Jordan especially with respect to traffic and other infrastructure changes.

Table 4.1.2 Population and Employment Growth in the Salt Lake Valley

City	2000 Population	Projected 2030 Population	% Population Growth	2000 Employment	Projected 2030 Employment	% Growth
Bluffdale	4,685	48,473	935%	2,162	227	-90%
Draper	25,436	40,072	58%	10,740	25,539	138%
Herriman	1,680	17,052	915%	744	14	-98%
Holladay	14,551	17,299	19%	7,022	14,507	107%
Midvale	27,039	37,026	37%	14,345	29,767	108%
Murray	33,911	41,725	23%	17,422	52,135	199%
Riverton	25,140	74,963	198%	11,253	16,283	45%
Salt Lake City	181,456	187,546	3%	90,187	399,646	343%
Sandy	88,259	123,292	40%	44,232	76,695	73%
South Jordan	29,461	81,626	177%	13,583	33,270	145%
South Salt Lake	22,153	22,962	4%	10,121	41,835	313%
Taylorsville	57,878	72,185	25%	30,145	32,680	8%
West Jordan	68,216	149,525	119%	33,934	50,864	50%
West Valley	108,823	148,647	37%	50,957	120,115	136%

Source: 2000 population and employment data from the U.S. Census Bureau website: http://factfinder.census.gov. Projected 2030 population and employment from Wasatch Front Regional Council website: http://www.wfrc.org/resources/sedata.

4.1.5 West Jordan Trips

Traffic with a destination or origin in West Jordan City was taken from the 2030 travel model, see Table 4.1.3. It appears that the freeways, Bangerter Highway and the proposed Mountain View Corridor serve larger volumes of regional traffic than local traffic, especially toward the city limits. Other regional arterials such as Redwood Road and 9000 South carry larger percentages of regional traffic than more centralized arterials, although with increased congestion regional traffic will find alternative routes like 7000 South and 7800 South. The more internal arterials and/or collectors, such as Jordan Landing, 8600 South, and others will carry more local than regional traffic. Arterials and collectors connecting cities north-south and east-west, experience increased regional traffic closer to the city limits, but still serve primarily local traffic. With growth in West Jordan and the Salt Lake Valley occurring north to south, the largest regional traffic growth percentages will occur in the south. While residential growth is occurring primarily in the west, employment opportunities will largely remain centralized, indicating that regional traffic growth will continue to occur in the east more so than in the west.

Table 4.1.3 Traffic on West Jordan Streets with an Origin/Destination in West Jordan

Street	Range	
	% at City Boundary	% at Middle
Freeway/ Expressway		
Bangerter Highway	57% North - 40% South	50%
Mountain View Corridor (MVC)	30%	30%
Arterial		
Redwood Road	73% North – 40% South	65%
9000 South	66% East – 90% West	75%
7800 South	85% East – 90% West	92%
7000 South (East City Limits to Bangerter)	80% East	87%
Jordan Landing	N/A	95%
SR-111	44% North – 32% South	35% - 44%
6200 South (Redwood to WTC)	60% East – 90% West	80%
5600 West (North City Limits to 9000 S)	90% North – 80% South	80%
Collectors		
Oquirrh Boulevard	35% North – 25% South	55%
New Bingham Highway (7800 S to 5600 W)	N/A	88%
Old Bingham Highway	N/A	55%
Airport Road	N/A	70%
8600 South (5600 W to West City Limits)	N/A	78%
8600 South (East City Limits to 2700 West)	N/A	100%
7800 South (WTC to West City Limits)	N/A	90%
7000 South (SR-111 to West City Limits)	N/A	85%
6600 South (5600 W to SR-111)	N/A	98%
6400 West	N/A	30% - 80%
6200 South (WTC to SR-111)	45% West	90%
6000/ 6200 West	N/A	80%
5600 West (9000 S to Old Bingham Hwy)	N/A	70%
4800 West (North City Limits to 9000 S)	90%	86%
4000 West	N/A	97%
3200 West	75% North – 70% South	85%
2200 West	46% North – 55% South	85%
2700 West (North City Limits to 9000 S)	88% North – 60% South	65% - 80%
2700 West (9000 S to South City Limits)	N/A	70%
1300 West	58% North – 25% South	87%

4.2 CROSS SECTIONS

The cross-section standards presented in this plan are similar to those in use by West Jordan prior to this update. The pavement width is the same with the changes coming in additional width for the side treatments to allow for wider sidewalks and park strips on arterial streets and major collectors. There are five functional classifications in this plan, which will be used in new construction in previously undeveloped areas. In-fill construction, as determined by city staff, the Planning Commission, and the City Council will be built to match existing cross-sections.

Cross-Section is the description of the geometric characteristics of a roadway such as the number and width of lanes, the width of shoulders, sidewalks, the presence of on-street parking, cross-slope, etc.

The additional width required on arterial streets and major collectors constructed in previously undeveloped areas can be obtained by one of two methods: the city may acquire the property or the city may obtain a sidewalk easement for the use of property. Generally, an easement will be obtained for roads west of 4800 West while the property will be obtained for roads east of 4800 West.

The new arterial street cross-section is 20 feet wider than the typical 106-foot right-of-way. The additional 20 feet will allow for 10-foot park strips and sidewalks. The new major collector cross-section is 10 feet wider than the typical 80-foot right-of-way. The additional 10 feet will allow for 10-foot park strips.

High capacity UDOT facilities such as the Bangerter Highway or the proposed Mountain View Corridor have separate functional classifications and are not described in detail here. The roadway classifications described here are only those municipal streets that fall under the jurisdiction of West Jordan City. A summary of these classifications and their cross-section geometry is shown in Table 3.1.2.

Table 4.2.1 West Jordan City Cross-Sections

Classification	# of Lanes[1]	Total Width	Pavement Width	Park Strip Width	Sidewalk Width
Local Street	2	50’	25'	5'	5'
Residential Collector	2	60’	35'	5'	5'
Minor Collector	2	66’	41'	5'	5'
Major Collector	3	90'	55'	10'	5'
Arterial	5	126'	81'	10'	10'

[1]*Number of Lanes includes a center two-way-left-turn-lane if the number is odd.*

4.2.1 Neighborhood Streets

There are two typical cross-sections falling under the neighborhood street category: the residential collector and the local street. The residential collector has a 60-foot right-of-way while the local street has a 50-foot right-of-way. Both types have one lane in each direction, but

the residential collector provides narrow shoulders and slightly wider sidewalks and park strips. Homes typically face these types of streets and in spite of the narrow shoulder on-street parking is usually permitted due to the nature of the street. On-street parking actually acts as a natural traffic calming measure on neighborhood streets such as these. These two cross-sections are shown in detail in Figure 4.2.1.

The residential collector typically traverses an entire subdivision and should always connect to either a collector or arterial street or similar roadways in other subdivisions. A residential collector will generally be over 1,000 feet long and fairly continuous with few sharp curves. An optional trail easement may be acquired next to the street. City staff will work with developers proposing new subdivisions to determine which roads, if any, in a new development should be classified as residential collectors.

Local streets are the smaller, internal streets that make up the majority of the roadway system in a subdivision. Roads with a "U" shape that connect to the same road twice should usually be local streets. Cul-de-sacs should always be local streets.

Local Streets primarily serve land-access functions with limited through movement.

4.2.2 Minor Collectors

The typical minor collector has a two-lane cross-section with one lane in each direction. Wide shoulders are provided for disabled vehicle parking. On-street parking is typically allowed on all minor collectors. Typically houses will face minor collectors. An optional trail easement may be acquired next to the street. A detailed minor collector street cross-section is shown in Figure 4.2.2.

The minor collector street pavement width is large enough to accommodate one lane of traffic in each direction with a center two-way-left-turn-lane, if the wide shoulders are eliminated. This allows for some flexibility if more roadway capacity is desired in the future. Bicycle lanes can also be accommodated on minor collector streets through one of two methods, both of which involve re-striping the shoulder. The bicycle lane can utilize the entire shoulder, which will provide a wider bicycle lane and allow for a buffer between traffic, but would also result in the elimination of on-street parking, which is generally not recommended for this type of facility. The other option is to have narrower vehicle travel lanes, bicycle lanes, and shoulders to have all three components, which is generally recommended for this type of facility.

Collectors are intended to serve both through and land-access functions in relatively equal proportions.

4.2.3 Major Collectors

The typical major collector has a three-lane cross-section with one lane in each direction and a center two-way left-turn lane. Wide shoulders are provided for disabled vehicle parking. On-street parking is typically prohibited on all new major collectors. Many of the existing major collectors in the city have homes facing the street and therefore allow on-street parking. In new build areas, commercial developments near intersections or block walls are generally the only things that will face a major collector. Block walls are used along rear lot lines of residential developments. A detailed major collector street cross-section is shown in Figure 4.2.3.

The major collector street pavement width is large enough to accommodate two lanes of traffic in each direction with a center two-way-left-turn-lane, if narrower 11-foot lane widths are utilized, as opposed to the standard 12-foot. This allows for some flexibility if more lanes are desired in the future, but will result in the elimination of the shoulders. Bicycle lanes can also be accommodated on major collector streets through one of two methods, both of which involve re-striping the shoulder. The bicycle lane can utilize the entire shoulder, which will provide a wider bicycle lane and allow for a buffer between traffic. The other option is to have narrower vehicle travel lanes, bicycle lanes, and shoulders to have all three components.

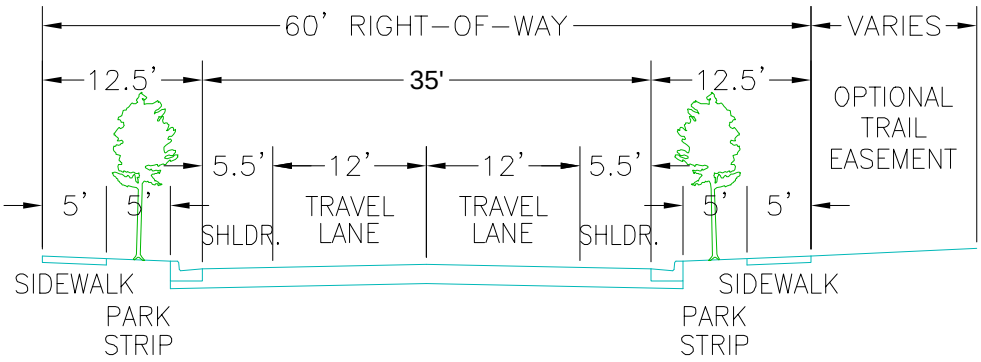
4.2.4 Arterials

Arterials primarily provide service to through-traffic movement with limited land-access service.

The typical arterial street has a five-lane cross-section with two lanes in each direction and a center two-way-left-turn-lane. Wide shoulders are provided for disabled vehicle parking. On-street parking is typically prohibited on arterial streets, although it is allowed in developed areas that have homes facing the street. Commercial developments or block walls are generally the only things that will face an arterial street. Block walls are used along rear lot lines of residential developments. A detailed typical arterial street cross-section is shown in Figure 4.2.4.

The arterial street pavement width is large enough to accommodate three lanes of traffic in each direction with a center two-way-left-turn-lane, if narrower 11-foot lane widths are utilized, as opposed to the standard 12-foot. This allows for some flexibility if more lanes are desired in the future, but will result in the elimination of the shoulders. Bicycle lanes can also be accommodated on arterial streets through one of two methods, both of which involve re-striping the shoulder. The bicycle lane can utilize the entire shoulder, which will provide a wider bicycle lane and allow for a buffer between traffic. The other option is to have narrower vehicle travel lanes, bicycle lanes, and shoulders to have all three components.

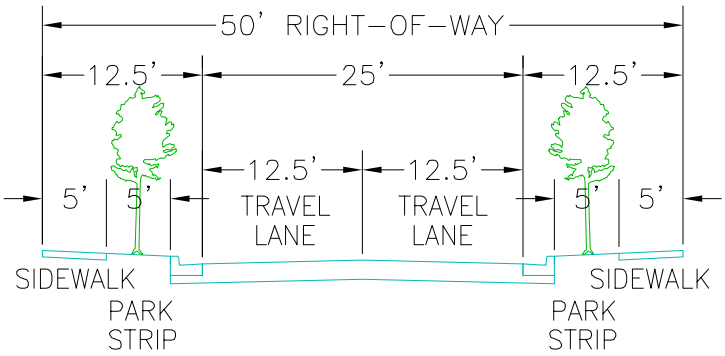
Figure 4.2.1 Neighborhood Street Cross-Sections



RESIDENTIAL COLLECTOR 60' R/W
(2 Lanes)

Issues:

- 2 Lane Cross-Section (1 Lane in Each Direction)
- Bike Lanes Typically Not Striped
- 5' Park Strip w/ Trees Every 30 feet
- 5' Sidewalk
- Optional Trail Easement
- Road has Houses Facing the Street
- Typical Capacity of 2,500 Vehicles/Day (Quality of Life not Physical Capacity)
- Posted Speed Limit is 25 mph
- Function is Access to Abutting Property and Local Traffic Movement



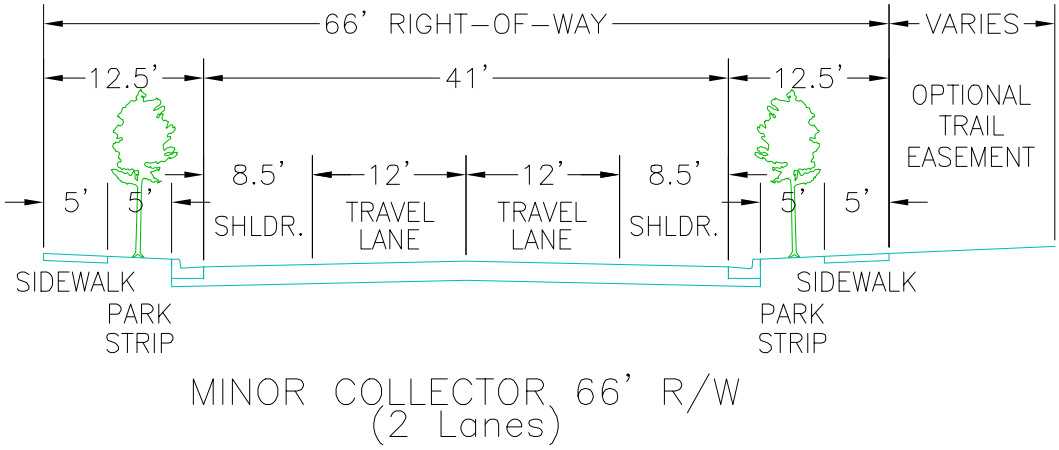
LOCAL 50' R/W
(2 Lanes)

Issues:

- 2 Lane Cross-Section (1 Lane in Each Direction)
- No Shoulder or Bike Lanes
- 5' Park Strip w/ Trees Every 30 feet
- 5' Sidewalk
- Road has Houses Facing the Street
- Typical Capacity of 1,500 Vehicles/Day (Quality of Life not Physical Capacity)
- Posted Speed Limit is 25 mph
- Function is Access to Abutting Property and Local Traffic Movement

Scale: 1" = 15'

Figure 4.2.2 Minor Collector Cross-Section

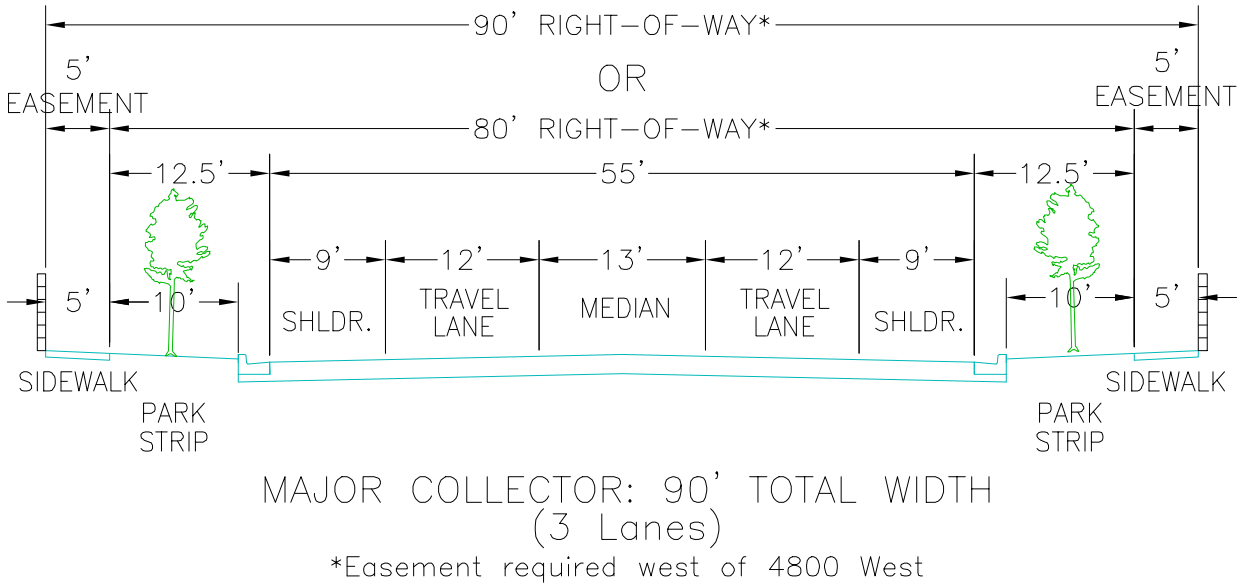


Issues:

- 2 Lane Cross-Section (1 Lane in Each Direction
- Shoulder May Be Used for Bike Lanes
- 5' Park Strip w/ Trees Every 30 feet
- 5' Sidewalk
- Optional Trail Easement
- Road has Houses Facing the Street
- Typical Capacity of 12,000 Vehicles/Day
- Typical Trip is 0.5-2 Miles in Length
- Typical Accident Rate is Approx. 5 Accidents Per Million Vehicle Miles
- Posted Speed Limit is Typically 25-35 mph
- Function is Movement to Larger Facilities and Access to Abutting Property

Scale: 1" = 15'

Figure 4.2.3 Major Collector Cross-Sections

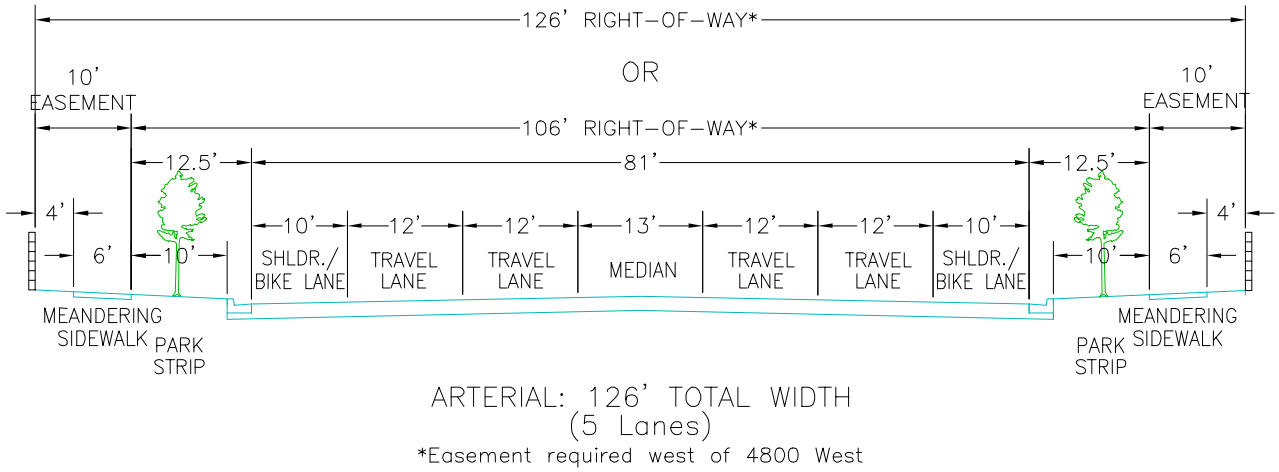


Issues:

- 3 Lane Cross-Section (1 Lane in Each Direction w/ Center Two-Way Left Turn Lane or Median)
- Shoulder May Be Used for Bike Lanes
- 10' Park Strip w/ Trees Every 30 feet
- 5' Sidewalk
- Road has Block Wall Facing the Street
- Typical Capacity of 18,000 Vehicles/Day
- Typical Trip is 0.5-2 Miles in Length
- Typical Accident Rate is Approx. 5 Accidents Per Million Vehicle Miles
- Posted Speed Limit is Typically 30-40 mph
- Function is Movement to Larger Facilities and Access to Abutting Property

Scale: 1" = 15'

Figure 4.2.4 - Arterial Cross-Section



Issues:

- 5 Lane Cross-Section (2 Lanes in Each Direction w/ Center Two-Way Left Turn Lane or Median)
- Shoulder May Be Used for Bike Lanes
- 14' Total Park Strip Width w/ Trees Every 30 feet
- 6' Meandering Sidewalk
- Road has Either Block Wall or Commercial Development Facing the Street
- Typically a Truck Route
- Typical Capacity of 36,000 Vehicles/Day
- Typical Trip is 2-5 Miles in Length
- Typical Accident Rate is Approx. 6 Accidents Per Million Vehicle Miles
- Posted Speed Limit is Typically 40-50 mph
- Function is Through Movement Primarily with Some Land Access

Scale: 1" = 20'

4.3 INTERSECTION IMPROVEMENTS

Generally the cross-sections described in the previous sections are adequate for signalized intersections. However, there are two situations in which the road needs to be wider at a signalized intersection to accommodate all of the lanes necessary for the efficient movement of traffic. These two situations are at the intersection of two arterial streets and at a signalized intersection involving a minor collector. Each of these is described in more detail below.

4.3.1 Arterial-Arterial Intersection

The typical cross-section at the intersection of two arterial streets needs to be widened or flared out to accommodate the dual left-turn lanes typical of such intersections. The pavement width, as measured from lip of gutter to lip of gutter, needs to be expanded from 81 feet to 96 feet for a net increase of 15 feet. This additional width is taken equally from both sides of the street, 7.5 feet from each. The length of the left and right turn pockets should be at least 200 feet long. When combined with the taper length, the distance from the stop bar to the beginning of the widening should be about 350 feet.

The intersection widening will also affect the park strip and sidewalk treatments depending on whether the arterials are being constructed as an in-fill project or in a previously undeveloped area. The in-fill construction with its typical 106-foot right-of-way and its 5-foot park strips and sidewalks will be widened to a 113-foot right-of-way with 6-foot sidewalks and no park strips. Using the park strip as part of the area to be widened reduces the amount of extra right-of-way needed.

The new construction in previously undeveloped areas with its 126-foot total width and its 10-foot park strips and sidewalks will not have any increase in total width. The 7.5 feet of widening can occur within the 10-foot park strip, leaving 2.5 feet to be added to the sidewalk, since 2.5 feet is too small for a park strip. These concepts are shown in Figure 4.3.1 with the top half of the page depicting in-fill construction and the bottom half showing new construction in a previously undeveloped area.

4.3.2 Minor Collector Signalized Intersection

The signalized intersection of a minor collector and an arterial or major collector also needs to be widened or flared out to accommodate the right turn lane of the minor collector. No changes are necessary to either the arterial or the major collector. The pavement width, as measured from lip of gutter to lip of gutter, needs to be expanded from 41 feet to 48 feet for a net increase of 7 feet. This additional width is taken entirely from the side of the street with the right turn pocket. No changes are required on the other side of the street. The length of the left and right turn pockets should be at least 100 feet long. When combined with the taper length, the distance from the stop bar to the beginning of the widening should be about 250 feet.

The intersection widening will affect the park strip and sidewalk treatments. The 66-foot right-of-way and its 5-foot park strips and sidewalks will be widened to a 69-foot right-of-way with a 6-foot sidewalk and no park strip on the side being widened. Using the park strip as part of the

area to be widened reduces the amount of extra right-of-way needed. This concept is shown in Figure 4.3.2.

Typically, an intersection between two minor collectors will not need to be signalized. However, it is recommended that widening take place in those locations as well. This will provide adequate capacity, regardless of the method of traffic control.

4.3.3 Intersection Radii

The radii on the corners at each intersection will vary according to the types of facilities that are crossing. The table below shows the recommended radius for each scenario. All measurements are listed for the distance in feet from the center of the curve to the top of the back of the curb (TBC).

Table 4.3.1 Intersection Corner Radii

	Arterial	Major Collector	Minor Collector	Residential Collector	Local Street
Arterial	40'	40'	35'	25'	25'
Major Collector	40'	35'	30'	25'	25'
Minor Collector	35'	30'	30'	25'	25'
Residential Collector	25'	25'	25'	25'	25'
Local Street	25'	25'	25'	25'	25'

Note: All measurements are for the TBC.

As shown in the table, larger radii are recommended for larger intersections, while smaller radii are proposed for the smaller intersections. The larger radii are necessary to accommodate truck traffic, buses, and delivery vehicles, which also allows for higher speeds around corners for passenger vehicles. In the future, West Jordan may wish to utilize even smaller corner radii on the local streets, which will act as a traffic calming device, forcing vehicles to slow down when turning a corner.

4.3.1 Typical Arterial-Arterial Intersection

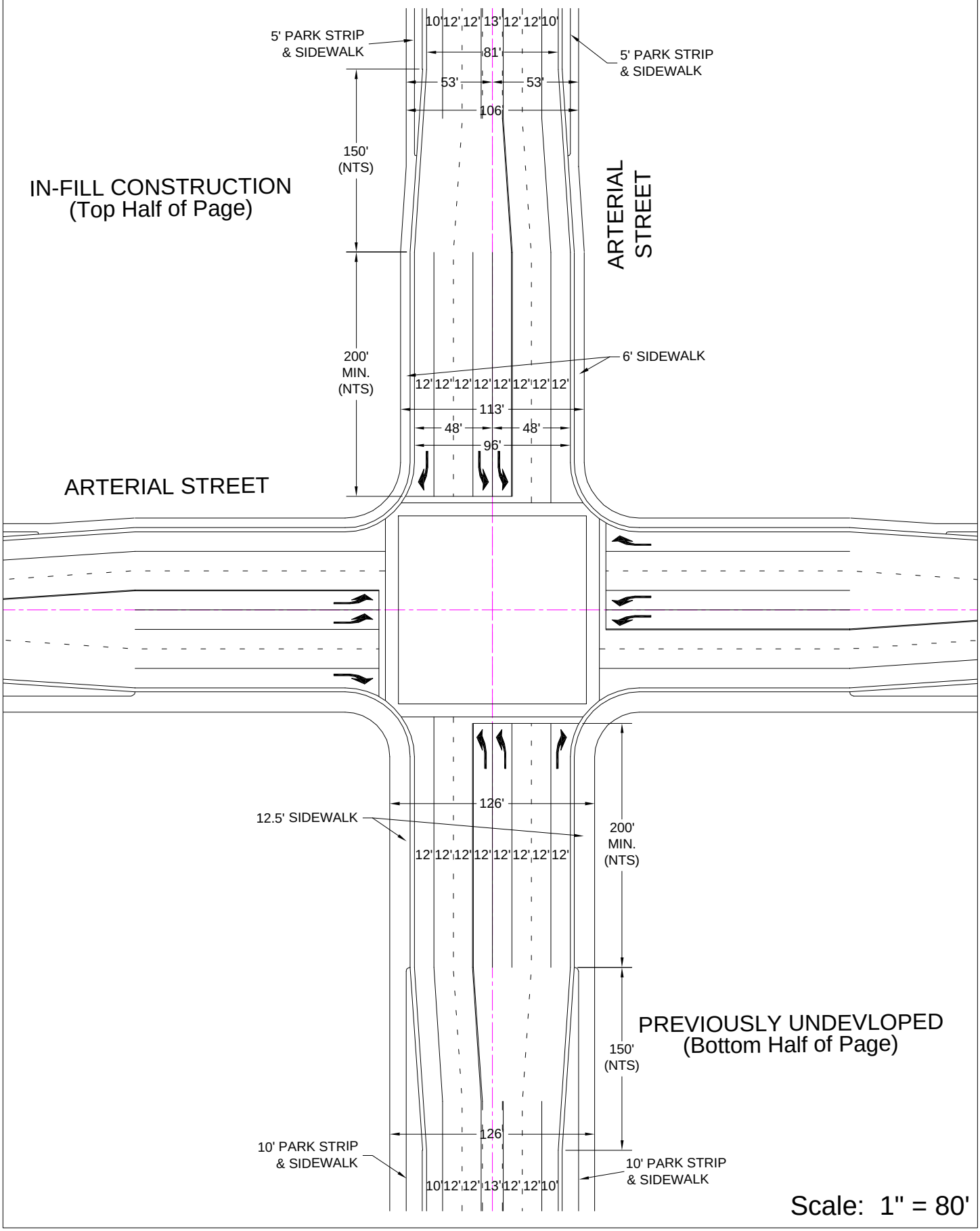
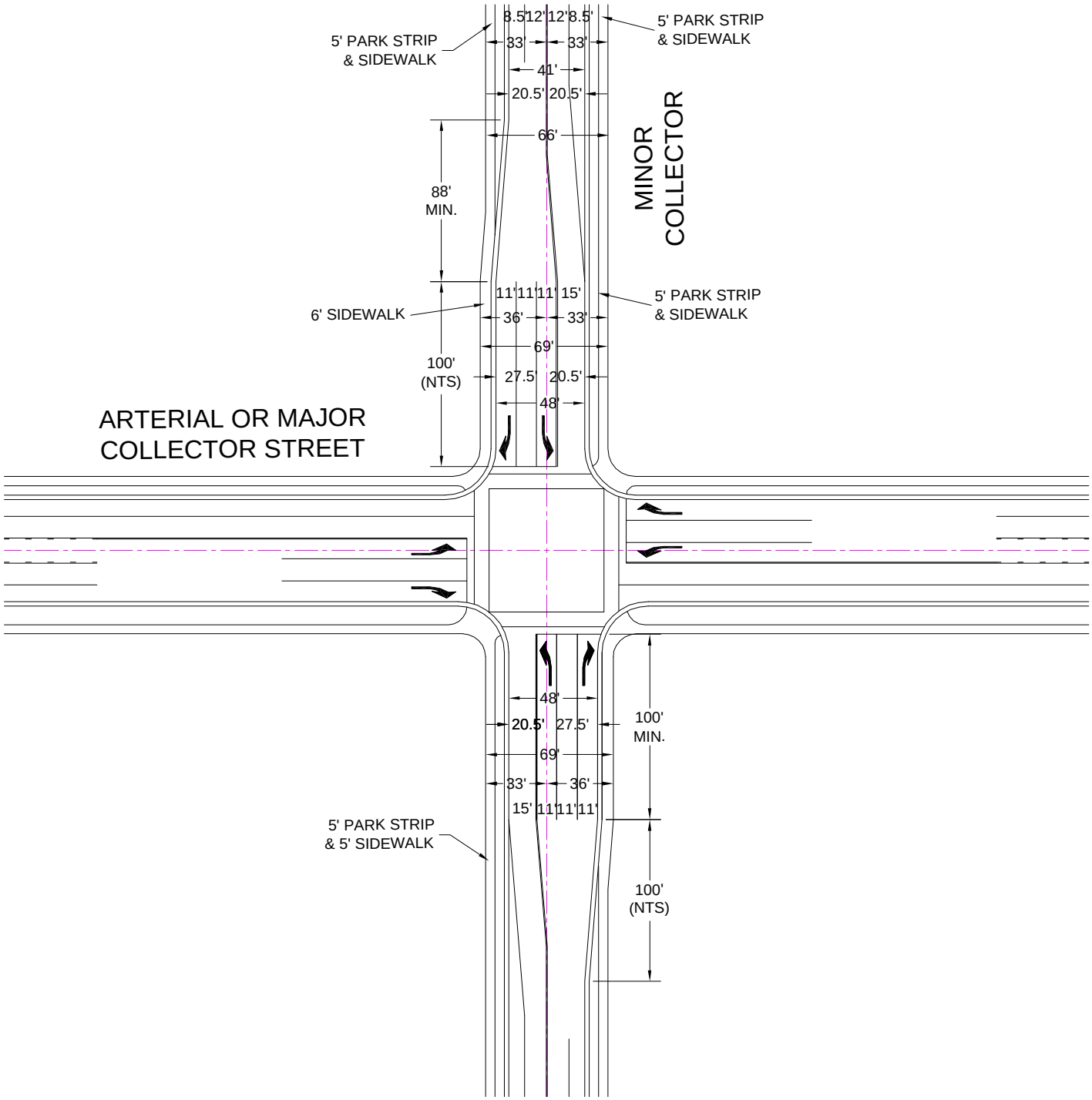


Figure 4.3.2 Typical Minor Collector Intersection



Scale: 1" = 80'

4.4 STREET NETWORK

4.4.1 Future Network

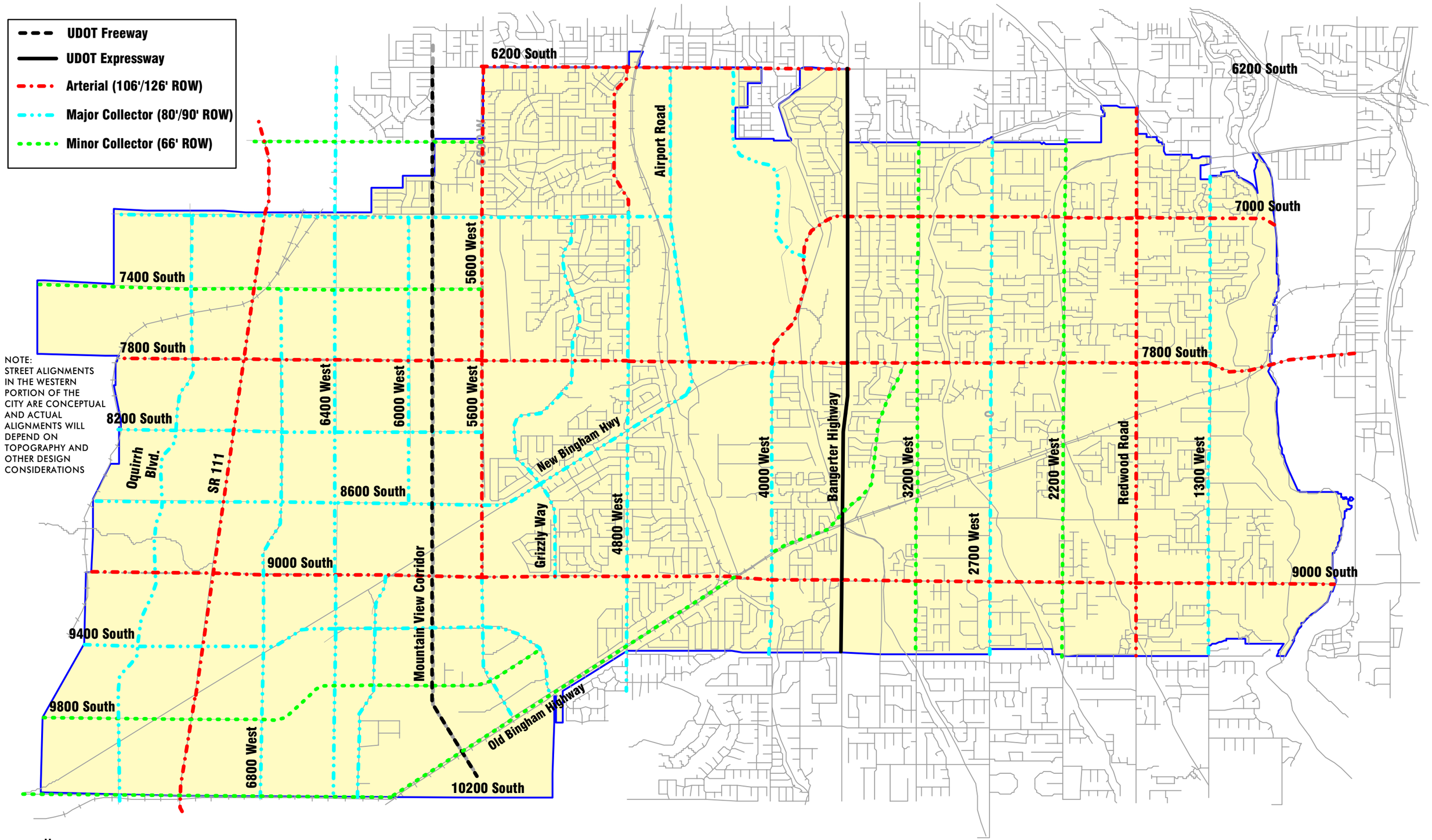
Presently the West Jordan City street network exists only to the east of State Route 111 and is only partially complete to the west of Bangerter Highway. With growing development occurring west of 5600 West, West Jordan will soon need to extend their east west and north south streets to accommodate the traffic growth as it develops in these areas. The extensions of 7800 South and 9000 South across New and Old Bingham Highway, respectively are highway improvements for which planning is already underway. With these new street extensions, it is West Jordan City's desire to maintain a half-mile grid pattern and intersections at typical ninety-degree angles. These types of improvements to the future street network will help reduce possible congestion on the major city streets by providing more alternate routes.

A preliminary network of arterial and collector streets along with their functional classifications was mapped out through meetings with the consultant team and city staff. In the future it was assumed that the Mountain View Corridor (MVC) would be built. The MVC is currently undergoing environmental study by UDOT. A goal of the City is to de-emphasize Old and New Bingham Highway and maintain a grid-system of arterials and collectors following the section and mid-section lines as much as is possible. UDOT is also very supportive of this and the City and UDOT will continue to work together on this goal. This will require the closure of some portions of Old and New Bingham Highway. This will largely be accomplished as development occurs; however, it may be necessary for the city to fill in some of the pieces since before a street can be closed the alternate route needs to be completely in place.

Mountain View Corridor (MVC) A proposed freeway on the western edge of Salt Lake County that would connect to I-80 in the north and Utah County in the south. (Formerly known as the Western Transportation Corridor).

The travel demand model was run using this preliminary roadway network and the 2030 traffic conditions, and volume-to-capacity ratios were recorded for each arterial and collector. Some changes to the preliminary functional classifications were then made, primarily in the west. For example, some streets that were initially assumed as major collector were found to function adequately as minor collectors. The result is the future (2030) recommended roadway network for West Jordan as shown in Figure 4.4.1.

The future traffic conditions along the arterial and collector streets were once again generated using the revised roadway network. These traffic volumes were then compared with the estimated capacity for each segment in order to calculate the future volume-to-capacity ratios. As can be expected, the majority of the major streets in the eastern portion of the city are expected to be at or exceeding their capacity. The volume-to-capacity ratios generally tend to improve progressively from east to west and north to south. The estimated 2030 volumes and capacities for the arterial and collector streets are shown in Table 4.4.1 followed by Figure 4.4.2, which shows the resultant volume-to-capacity ratios graphically.



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Future Roadway Network

NORTH

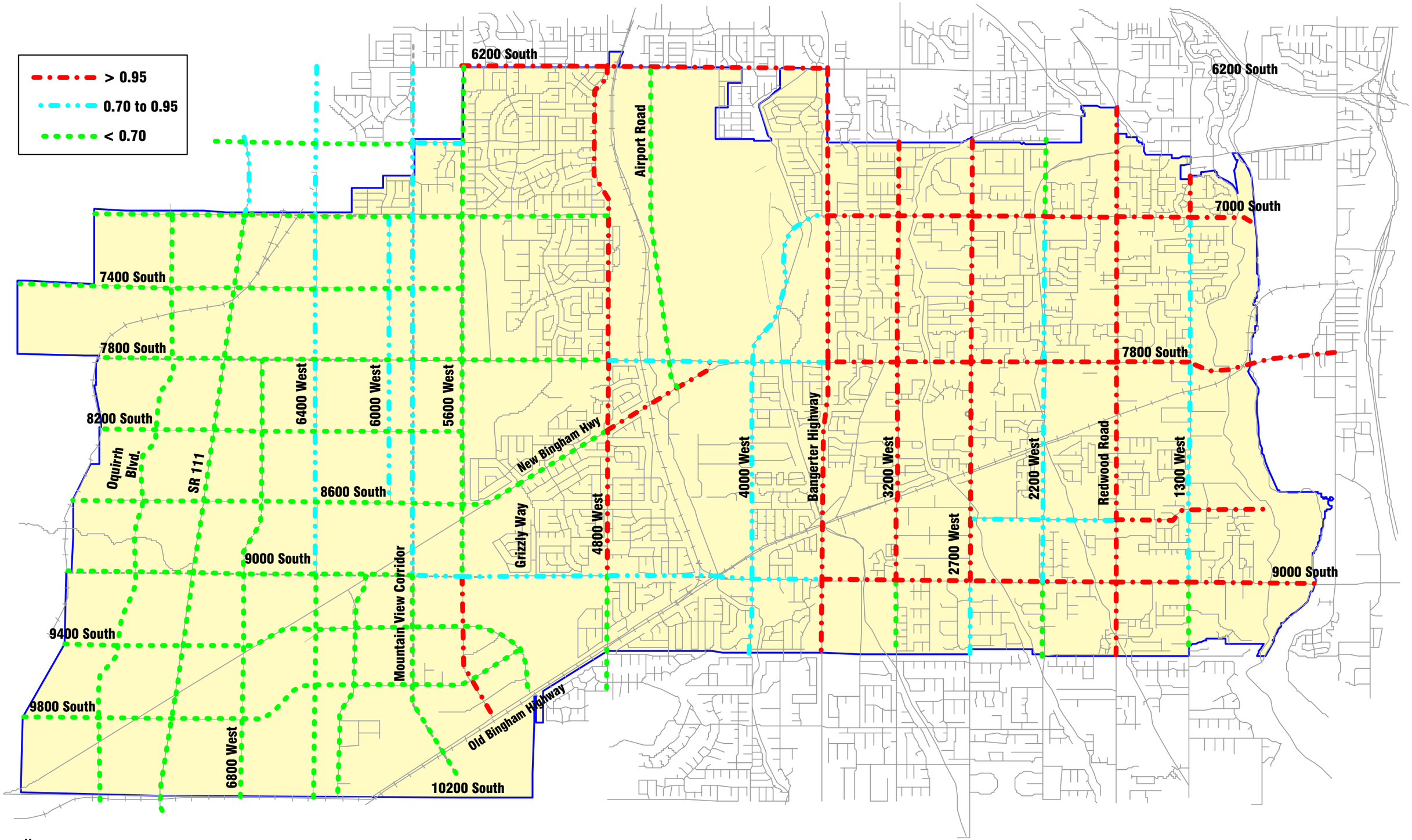
Figure 4.4.1

Table 4.4.1 West Jordan City Street Network AADT & Capacities

Street	From	To	Functional Class	2001 AADT	Estimated 2030 AADT	2030 Capacity
North-South Streets						
Oquirrh Blvd	6400 South	9000 South	Major Collector		5000	18000
Oquirrh Blvd	9000 South	South City Boundary	Major Collector		5000	18000
SR-111	North City Boundary	7000 South	Arterial	3965	26000	35000
SR-111	7000 South	7800 South	Arterial	3846	10000	35000
SR-111	7800 South	9000 South	Arterial	3846	10000	35000
SR-111	9000 South	South City Boundary	Arterial	3355	15000	35000
6800 West	7800 South	10200 South	Major Collector		3500	18000
6400 West	North City Boundary	7000 South	Major Collector		15000	18000
6400 West	7000 South	7800 South	Major Collector		15000	18000
6400 West	7800 South	9000 South	Major Collector		15000	18000
6400 West	9000 South	10200 South	Major Collector		10000	18000
6000/6200 West	7000 South	7800 South	Major Collector		15000	18000
6000/6200 West	7800 South	9000 South	Major Collector		15000	18000
6000/6200 West	9000 South	10200 South	Major Collector		12000	18000
Mountain View Corridor	North City Boundary	7800 South	Freeway		160000	180000
Mountain View Corridor	7800 South	9000 South	Freeway		155000	180000
Mountain View Corridor	9000 South	South City Boundary	Freeway		120000	180000
5600 West	North City Boundary	7000 South	Arterial	11320	20000	40000
5600 West	7000 South	7800 South	Arterial		20000	40000
5600 West	7800 South	9000 South	Arterial		20000	40000
5600 West	9000 South	South City Boundary	Major Collector		18000	18000
4800 West	North City Boundary	7000 South	Arterial	10835	20000	18000
4800 West	7000 South	7800 South	Arterial		20000	18000
4800 West	7800 South	9000 South	Major Collector		20000	18000
4800 West	9000 South	Old Bingham Highway	Major Collector		3500	18000
Airport Rd	6200 South	7800 South	Major Collector	4200	10000	18000
Jordan Landing	7000 South	7800 South	Arterial		37500	40000
4000 West	7800 South	9000 South	Major Collector		15000	18000
4000 West	9000 South	South City Boundary	Major Collector		15000	18000
Bangerter Hwy	North City Boundary	7000 South	Expressway	48035	52000	52000
Bangerter Hwy	7000 South	7800 South	Expressway	47165	52000	52000
Bangerter Hwy	7800 South	9000 South	Expressway	43000	52000	52000
Bangerter Hwy	9000 South	South City Boundary	Expressway	38300	52000	52000
3200 West	North City Boundary	7000 South	Minor Collector	8760	12000	12000
3200 West	7000 South	7800 South	Minor Collector	9100	12000	12000
3200 West	7800 South	9000 South	Minor Collector	9715	12000	12000
3200 West	9000 South	South City Boundary	Minor Collector	10035	7500	12000
2700 West	North City Boundary	7000 South	Major Collector	18831	25000	18000
2700 West	7000 South	7800 South	Major Collector	18831	22000	18000
2700 West	7800 South	9000 South	Major Collector	18831	22000	18000
2700 West	9000 South	South City Boundary	Major Collector	13128	15000	18000
2200 West	North City Boundary	7000 South	Minor Collector	1200	7500	12000
2200 West	7000 South	7800 South	Minor Collector	3840	10000	12000
2200 West	7800 South	9000 South	Minor Collector	6840	10000	12000
2200 West	9000 South	South City Boundary	Minor Collector	5160	7500	12000
Redwood Road	North City Boundary	7000 South	Arterial (State)	36535	61000	48000
Redwood Road	7000 South	7800 South	Arterial (State)	35890	57500	48000
Redwood Road	7800 South	9000 South	Arterial (State)	35890	57500	48000
Redwood Road	9000 South	South City Boundary	Arterial (State)	24755	54000	48000
1300 West	North City Boundary	7000 South	Major Collector	11060	20000	18000
1300 West	7000 South	7800 South	Major Collector	12435	15000	18000
1300 West	7800 South	9000 South	Major Collector	12435	15000	18000
1300 West	9000 South	South City Boundary	Major Collector	9775	12000	18000

Table 4.4.1 West Jordan City Street Network AADT & Capacities (cont.)

Street	From	To	Functional Class	2001 AADT	Estimated 2030 AADT	2030 Capacity
East-West Streets						
6200 South	Redwood Road	Bangerter Highway	Arterial	26705	35000	35000
6200 South	Bangerter Highway	5600 West	Arterial	22267	35000	35000
6200 South	5600 West	Mountain View Corridor	Arterial		35000	35000
6200 South	Mountain View Corridor	SR-111	Major Collector		35000	18000
6600 South	5600 West	Mountain View Corridor	Major Collector		15000	18000
6600 South	Mountain View Corridor	SR-111	Major Collector		12000	18000
6600 South	SR-111	West City Boundary	Major Collector		7500	18000
7000 South	East City Boundary	Redwood Road	Arterial	25860	50000	40000
7000 South	Redwood Road	Bangerter Highway	Arterial	20575	40000	40000
7000 South	4800 West	Mountain View Corridor	Arterial		5000	35000
7000 South	Mountain View Corridor	SR-111	Arterial		20000	35000
7000 South	SR-111	West City Boundary	Major Collector		5000	18000
7400 South	5600 West	SR-111	Major Collector		5000	18000
7800 South	East City Boundary	Redwood Road	Arterial	26475	50000	40000
7800 South	Redwood Road	Bangerter Highway	Arterial	25550	45000	40000
7800 South	Bangerter Highway	5600 West	Arterial	18965	35000	40000
7800 South	5600 West	Mountain View Corridor	Arterial	18755	25000	40000
7800 South	Mountain View Corridor	SR-111	Arterial	4000	15000	40000
7800 South	SR-111	West City Boundary	Arterial		12000	40000
8200 South	5600 West	6400 West	Major Collector		7500	18000
8200 South	6400 West	West City Boundary	Major Collector		1000	18000
8600 South	East City Boundary	Redwood Road	Minor Collector		12000	12000
8600 South	Redwood Road	2700 West	Minor Collector		10000	12000
8600 South	5600 West	West City Boundary	Major Collector		10000	18000
9000 South	East City Boundary	Redwood Road	Arterial (State)	35070	55000	48000
9000 South	Redwood Road	Bangerter Highway	Arterial (State)	24395	50000	48000
9000 South	Bangerter Highway	5600 West	Arterial (State)	19350	45000	48000
9000 South	5600 West	Mountain View Corridor	Arterial (State)		40000	48000
9000 South	Mountain View Corridor	SR-111	Arterial (State)		30000	48000
9000 South	SR-111	West City Boundary	Arterial (State)		20000	48000
9400 South	Old Bingham Highway	West City Boundary	Major Collector		5000	18000
9800 South	6000/6200 West	West City Boundary	Major Collector		5000	18000
10200 South	6000 West	SR-111	Major Collector		10000	18000
10200 South	SR-111	West City Boundary	Major Collector		3500	18000
Other Streets						
New Bingham	7800 South	4800 West	Major Collector	16470	20000	18000
New Bingham	4800 West	5600 West	Major Collector	4090	12000	18000
New Bingham	6000 West	SR-111	Minor Collector		5000	12000
New Bingham	SR-111	West City Boundary	Minor Collector		500	12000
Old Bingham	9000 South	5600 West	Minor Collector	3285	11000	12000
Old Bingham	5600 West	Mountain View Corridor	Minor Collector		11000	12000
Old Bingham	Mountain View Corridor	SR-111	Minor Collector		11000	12000



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2030 Volume-to-Capacity Ratios

NORTH

Figure 4.4.2

One street of particular concern for West Jordan City today and in the future is 9000 South. With increasing congestion and delay in traveling 9000 South during peak hour travel periods, the street serves to connect not only the surrounding cities but also the east and west side cities of the Salt Lake Valley. It is anticipated that by 2030, 9000 South will no longer function with acceptable delay even during off peak travel periods. With the recent widening of 9000 South already complete concerns have been raised that another widening would be very undesirable for West Jordan and South Jordan, as well as the Utah Department of Transportation (UDOT). Possible solutions for this potential problem might include considering grade separated over-passes at major intersections, i.e. Redwood Road and Bangerter Highway, or even another future east-west freeway corridor of which all the cities of the Salt Lake Valley could share the use. These ideas should be explored in more detail as further study will be needed.

4.4.2 Traffic Signals

Figure 4.4.3 illustrates potential future traffic signal locations at the intersections of arterial and collector streets. There will be other locations throughout the city that will warrant traffic signals in the future, such as within and around large commercial developments like Jordan Landing. It is not practical to try and predict these types of locations, and it should not be assumed that the map shows all of the traffic signals that will be constructed over the next thirty years. Prior to the installation of any traffic signal the necessary warrants will need to be met. Traffic signal warrants are the tests that determine if an intersection really needs a signal. There are 11 warrants, which are contained in the *Manual on Uniform Traffic Control Devices*, published by the Federal Highway Administration.

Left Turn Signal Criteria

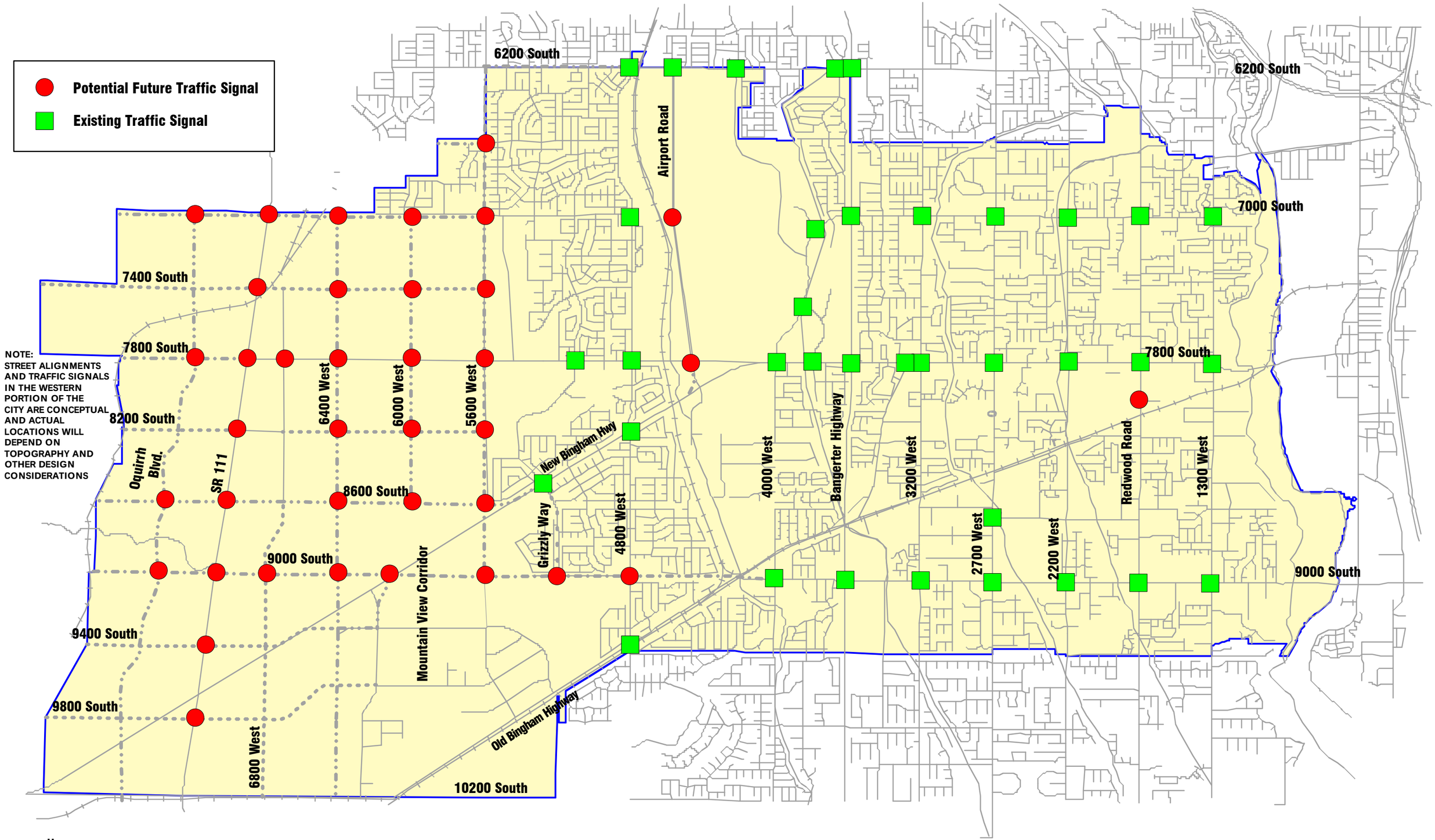
The *Highway Capacity Manual* recommends that an exclusive left-turn lanes and protected signal phasing be provided at signalized intersections under the following conditions.

1. Where fully protected left-turn phasing is to be provided, an exclusive left-turn lane should be provided.

2. A protected-permitted left turn phase should be considered where peak-hour left-turn volumes exceed 100 vehicles per hour.

3. Where left-turn volumes exceed 300 vehicles per hour, provision of a double left-turn lane should be considered.

The *Highway Capacity Manual* also suggests that a separate right-turn lane should be considered when the right-turn volume exceeds 300 vehicles per hour and the adjacent through lanes also exceed 300 vehicles per hour per lane.



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Potential Future Traffic Signal Locations

NORTH

Figure 4.4.3

4.4.3 Roundabouts

There are many locations where a roundabout may be utilized in place of a traffic signal or four-way stop. The term "modern roundabout" is used in the United States to differentiate modern roundabouts from the nonconforming traffic circles or rotaries that have been in use for many years. Roundabouts, traffic circles, and rotary intersections/interchanges are all different things although the terms are commonly, but incorrectly used interchangeably. A roundabout is a type of traffic control method while a traffic circle is a traffic calming measure. Modern roundabouts range in size with inscribed circle diameters as small as 50 ft to 500 ft. Larger roundabouts may permit faster speeds and multiple lanes with more than four entries. The following guidelines regarding modern roundabout usage and design are taken from a website called www.roundaboutsUSA.com with the help of Bill Baranowski, a Utah-based traffic engineer specializing in the use of roundabouts in the United States.

The capacity of the roundabout is analyzed based on the design parameters. Modern roundabouts are designed for minimum speed and size. The number of entry lanes depends on the future capacity needs. Generally, single-lane roundabouts experience a lower number of accidents than multi-lane roundabouts.

Where to Use Roundabouts:
Appropriate conditions for roundabout installation:

- Locations with high delays
- Locations where traffic signals are not warranted
- Four-way stop intersections
- Intersections with more than four legs
- Intersections with high left-turn flows
- Intersections with unusual geometry
- Intersections with changing traffic patterns
- Locations where storage capacities for signalized intersections are restricted
- Intersections that are important from an urban design or visual point of view

The following conditions require special design attention and hiring an experienced designer:

- Locations where there is insufficient space for an acceptable outside diameter.
- Locations where it would be difficult to provide flat (2% or less) entries into the roundabout.
- Maximum grade greater than 4% around the circle,
- A high number of pedestrians, a high percentage of large trucks, intersection junction at the top or bottom of a grade, and the close proximity of adjacent signals.

Capacity Analysis
Single lane roundabouts can be assumed to have a capacity of approximately 20,000 vehicles per day, while a two lane roundabout may have a capacity of approximately 40,000 vehicles per day. Roundabout capacity can vary greatly depending upon geometric conditions and pedestrian volumes. There are several software packages available for performing a capacity analysis for roundabouts, two of which are listed below.

- ARCADY (Assessment of Roundabout Capacity and Delay) has been developed over the last 20 years by TRL Software in England and is used for predicting capacities, queue lengths, delays and accident risk at roundabouts. ARCADY is an easy-to-use and helpful tool to aid the busy traffic engineer in designing new roundabouts as well as assessing the effects of modifying existing designs. More information on this software is available at www.trlsoftware.co.uk/USA.htm.

- RODEL Software: British method for optimum design based on 5 roundabout geometry parameters developed by Kimber. Model determines optimum geometry of entries and circle diameter to provide the highest intersection capacity. RODEL has been adopted by UDOT as their standard analysis method for multi-lane roundabouts. RODEL provides proper geometry based on traffic and site conditions. Based on extensive empirical data collected in Great Britian on hundreds of actual roundabouts. May require additional calibration to adjust for drivers in the USA. There is no web page for the RODEL software, rather interested parties are asked to email Barry Crown at RSLcrown@aol.com.

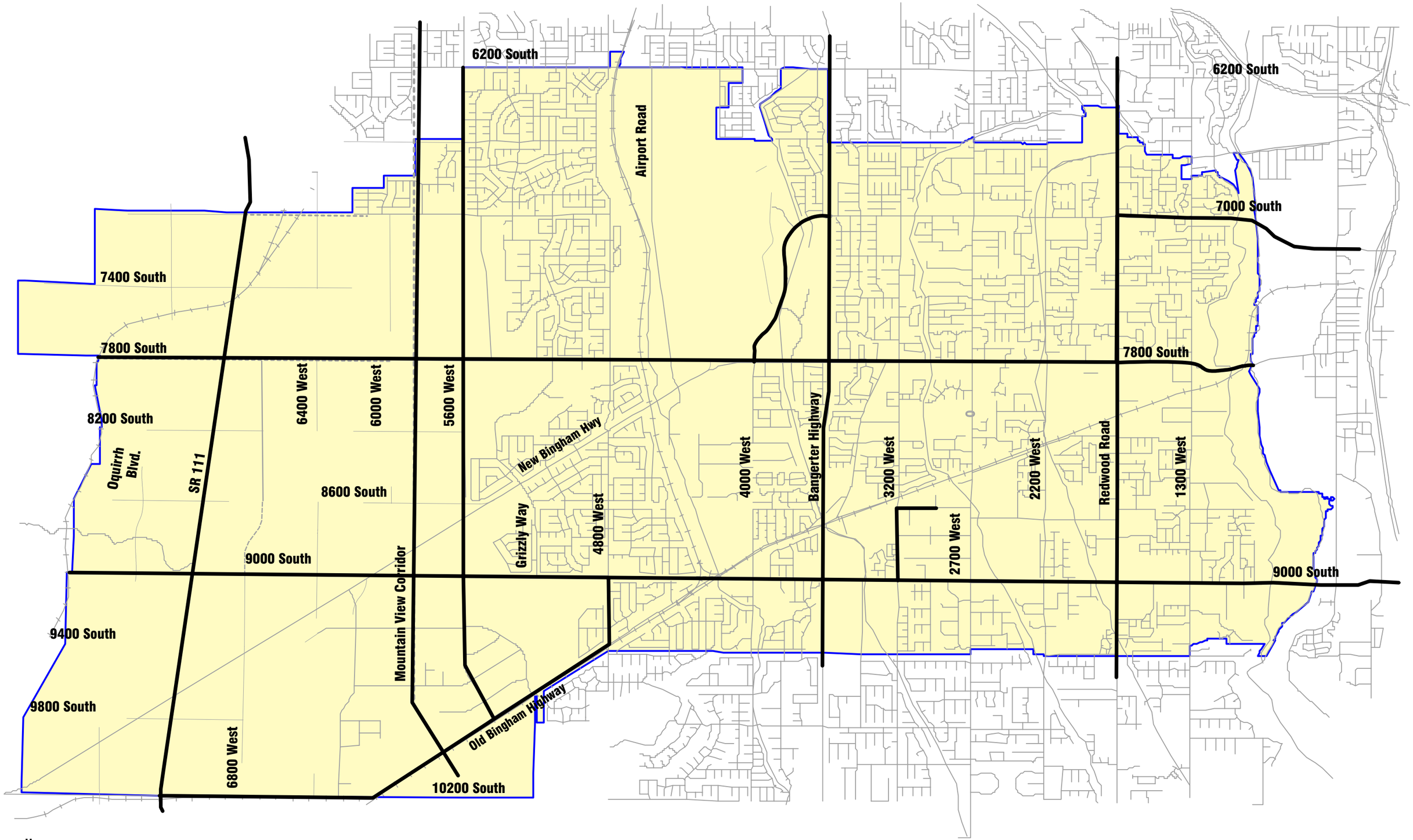
4.4.4 Truck Routes

Trucks are an important component of the transportation system of any economy and are vital to the movement of goods throughout an area. However, trucks also have some negative characteristics in terms of traffic flow, safety, and noise. In order to reduce these impacts it is recommended that trucks travel along arterials and major collectors as much as possible as opposed to minor collectors or local streets. To accomplish this goal several recommended truck routes through the City have been identified and a map showing these is given as Figure 4.4.4. The City can work with industrial or large commercial businesses that have a large amount of truck traffic to encourage their trucks to use these routes within West Jordan.

4.4.5 Street Jurisdictions

Some of the existing and proposed arterials in West Jordan fall under the jurisdiction of UDOT, meaning UDOT controls these facilities and must approve any additional access points that may be requested by developers adjacent to their roadways. Most other roadways within West Jordan come under the jurisdiction of the City or they may share jurisdiction with a neighboring community for streets traveling along City borders. Figure 4.4.5 shows the various jurisdictions each arterial or collector falls under for the future recommended street network.

Two discrepancies between an existing and a future UDOT route should be noted, that being SR-48 and SR-209. Currently SR-48 travels along New Bingham Highway in the western portion of the City up to 7800 South, then east along 7800 South over to Redwood Road. The route then travels up Redwood Road to 7000 South and then turns east towards I-15 and continues beyond the eastern boundary of West Jordan. As part of the recommended de-emphasis of the Bingham Highways and the completion of 7800 South to the west, it is recommended that 7800 South become the new route for SR-48 until at least SR-111.



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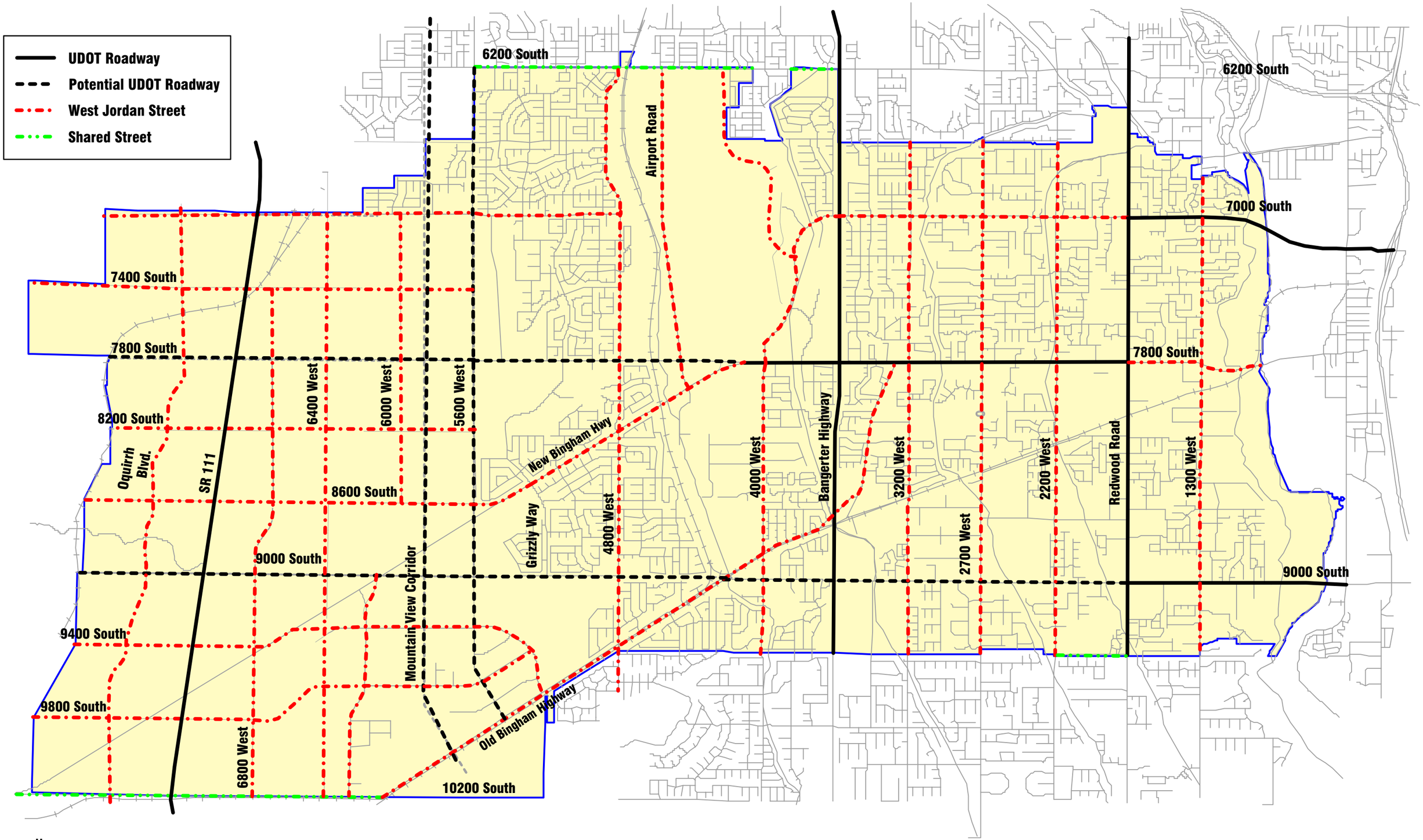
Recommended Truck Routes

NORTH

Figure 4.4.4



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Potential Street Jurisdictions

NORTH

Figure 4.4.5

SR-209 is 9000 South traveling east from Redwood Road through West Jordan into Sandy. Currently the western terminus of the state road is at Redwood Road. It would be beneficial to West Jordan if UDOT were to take ownership of the facility until at least SR-111, particularly given the large amounts of traffic that do and will utilize this facility. The City should continue to work with UDOT on both of these matters as well as the overall de-emphasis of the Bingham Highways.

4.5 ACCESS MANAGEMENT

Access management is a term that refers to providing and managing access to land development while maintaining traffic flow and being attentive to safety issues. It includes elements such as driveway spacing, signal spacing and corner clearance. Access management is a key element in transportation planning helping to make transportation corridors operate more efficiently and carry more traffic without costly road widening projects. Access management offers local governments a systematic approach to decision-making applying principles uniformly, equitably, and consistently throughout the jurisdiction.

An access management program must address the balance between access and mobility. While the functional classification of roads implies the priority of access versus mobility access management does much the same thing. Freeways move vehicles over long distances at high speeds with very controlled access and great mobility. Conversely, residential streets offer high levels of access but at low speeds and with little mobility. Access management standards must account for these different functions of various facilities. Figure 4.5.1 shows this relationship between access and mobility.

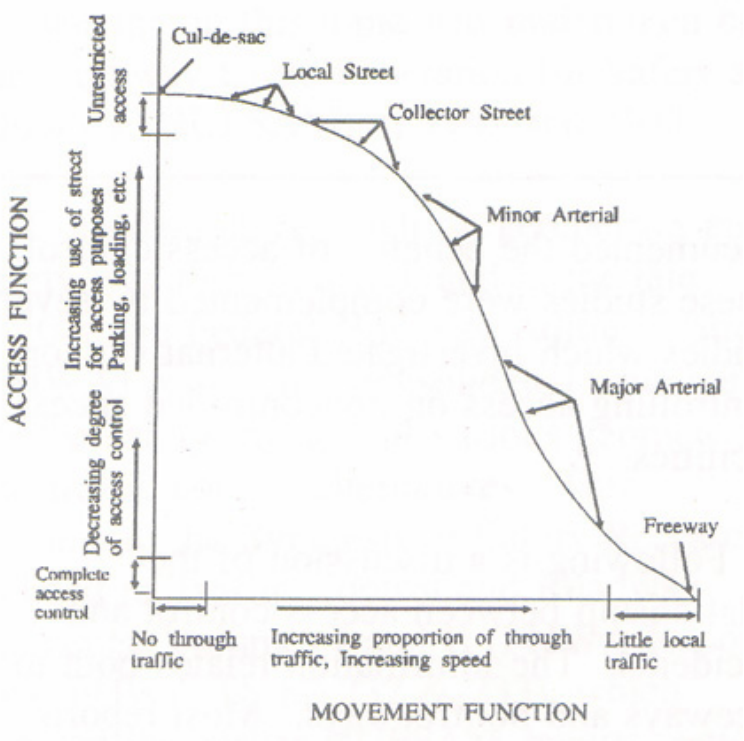


Figure 4.5.1 Access vs. Movement by Functional Classification

4.5.1 UDOT Coordination

West Jordan City must be an integral player in developing and conforming to access management standards on state highways. The reason for this is that UDOT controls the design and related standards on the state highway system while West Jordan controls the land uses that abut the state highway system. It is inappropriate for the city to approve a site plan for a given land use on a state highway within West Jordan City only to have UDOT deny the curb cuts identified as access points in the site plan. In this example, as in actual developments, there is an overlap of approvals between UDOT's curb cut permit and the city's site plan approval.

Specific state highways in West Jordan City, which require coordination with UDOT, include portions of 7000 South, 7800 South/New Bingham Highway, and 9000 South and all of Redwood Road. Other facilities such as Bangerter Highway and the Mountain View Corridor are state highways but will not allow individual property access. It is important that West Jordan City require all land developments proposed on State Highways or within 250 feet of an intersection with a state highway to coordinate with UDOT and the City prior to any initial site plan submittal or curb cut request. A coordination meeting between West Jordan City, UDOT Region 2, and the developer may be required to ensure consistency of the developer submittals and to expedite the parallel processing of UDOT and City approvals.

4.5.2 Access Management Guidelines for New Development

Table 4.5.1 shows recommended spacing standards for West Jordan city streets. These recommendations reflect those considered by UDOT for the Statewide Access Management Program and provide standards in a consistent format with UDOT draft access management standards.

Table 4.5.1 Recommended Spacing Standards by Functional Class

Functional Classification	Minimum Signal Spacing (feet)	Minimum Street Spacing (feet)	Minimum Access Spacing(1) (feet)	Minimum Interchange Crossroad Access Spacing (feet) (2)		
				A(3)	B(4)	C(5)
Freeways/ Expressways/ State Highways	Standards for freeways and state highways are determined by FHWA and UDOT. See appropriate guidance for State Highways.					
Arterials	2640	660	300	660	1320	500
Major Collectors	1320	330	150	Not Applicable		
Minor Collectors	1320	250	85	Not Applicable		

(1) Also refers to minimum corner clearance.
(2) If consistent with weaving analysis. If not, greater distance should be used.
(3) Distance from off-ramp to first right in/right out.
(4) Distance from off-ramp to first major intersection.
(5) Distance from last right in/right out to on-ramp.

The minimum street spacing refers to the minimum distance that full directional access points will be allowed. Spacing is measured from edge to edge and not from the centerline. A full

directional access point is typically a public street but may include a private driveway that allows for right and left turn access. The minimum access spacing refers to the spacing of private driveways and also applies to spacing from corners. This spacing may be limited to right-in-right-out driveways only as West Jordan may install raised medians on public streets at any time in the future in order to protect the safety of the public. These spacing requirements are shown as a standard in which developers may plan for in site design. Deviations from these standards may be required based on neighboring development plans and the specifics of each roadway or development on a case-by-case basis at the discretion of the City Engineer.

Traffic Signal Spacing

Proper intersection and traffic signal spacing is an important aspect in providing for progression along arterial and collector streets. The more uniformly spaced the traffic signals are along a corridor the better the progression will be. The proposed future roadway network in the western portion of the City will provide good intersection spacing due to the arterials and collectors being spaced one half mile apart in most cases. Along most of these streets there will eventually be traffic signals at most of the intersections of any arterials or collectors spacing them either one half or one mile apart which is ideal for good progression. It is difficult to maintain good progression if signals are spaced any more than one mile apart. Signals located less than one-half mile apart also lead to poor progression and increased driver frustration due to the delays at each intersection. Of course there will be instances when this recommended spacing is not possible, but it should be maintained as much as possible.

Progression is being able to pass through several intersections without hitting a red light.

As developments occur along these arterials and collectors it is important that driveway and intersection spacing be considered in the design of the site itself, particularly for large commercial developments. In such cases developers and the City should seek to locate the site driveway(s) at locations that will provide the best spacing between adjacent traffic signals on either side of the driveway, particularly along arterials. For example if a parcel is being developed along an arterial with traffic signals spaced one half mile apart the most desirable location for a main site driveway would be halfway between the

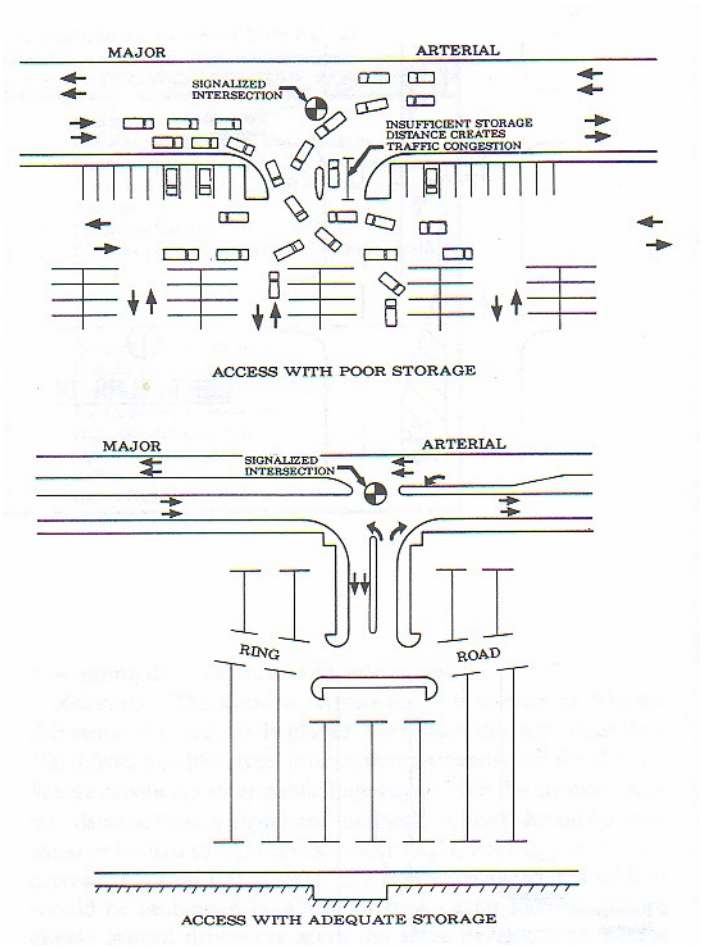


Figure 4.5.2 Poor vs. Adequate Site Storage

signalized intersections. There will be cases when a driveway to a large development will warrant a traffic signal due to the large volume of traffic generated by the development in which case proper intersection spacing is especially important.

Driveways

Many of the access management problems facing West Jordan have to do with driveway problems having to do with both spacing and design. The figure to the right shows a driveway with both poor and adequate vehicle storage. By creating a throat at driveways it is possible to increase its efficiency.

Sharing or combining driveways of adjacent parcels as well as limiting the number of accesses of developments are also principles of good access management. For example if there is a parcel being developed adjacent to another undeveloped parcel the city may wish to work with the owners of both parcels to plan for one shared driveway along the property line which would provide access to both parcels. This would allow the city to minimize the occurrence of several closely spaced driveways along an arterial or collector which would promote better traffic flow along the corridor as well as reduce the number of accidents along that corridor. A key to being able to control the number and location of site driveways is good site design and circulation within one development as well as between adjacent developments. Internal "collectors" should encourage traffic to access the adjacent street network from the parking lots at signalized intersections or driveways and vice versa.

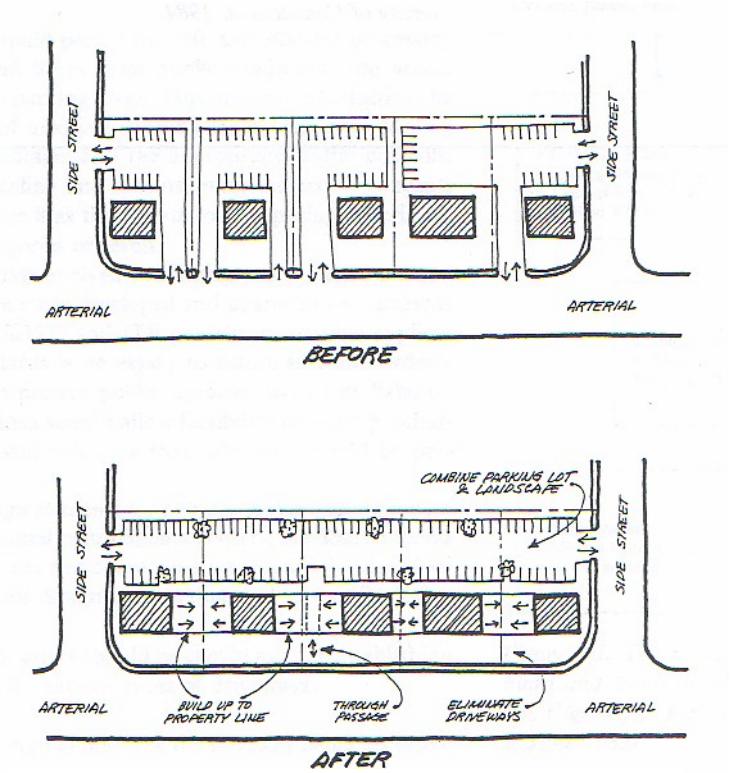


Figure 4.5.3 Shared Driveway Example

Limiting the number of driveways that any one development has on an arterial or collector would also be a good practice to improve traffic flow and safety. There are many cases in which one small commercial development or a corner gas station will have three or four driveways, which are typically more than are necessary. It is particularly important to limit the number and location of driveways at corner developments adjacent to busy intersections. In these cases driveways should be spaced as far away from the intersection as is practical so as to reduce the effects of the site traffic on the adjacent intersection.

It is very difficult from a practical and legal standpoint to remove or combine driveways of existing developments. There isn't a lot that can be done to remedy these problems without

considerable effort and expense. However, by exercising and promoting the access management guidelines discussed in this chapter in all new development and re-development areas the transportation system in West Jordan can operate more efficiently and safely in the future.

It is also recommended that driveways on opposite sides of the street be lined up opposite one another rather than offset slightly. These are good practices for residential as well as commercial developments.

4.5.3 Access Management Guidelines for Developed Areas

Introducing a "retrofit" program of access control to an existing roadway or built-out area is very difficult. Pressure from adjacent property and business owners is perhaps the most challenging obstacle of all. It can be difficult to compare the cost of economic hardship on an individual to the overall benefits to the general public. Most retrofit actions involve the application of accepted traffic engineering techniques that limit the number of conflict points, separate basic conflict areas, limit speed adjustment problems, and remove turning vehicles from the through travel lanes. Most of the information in this section was taken from the *NCHRP Report 348: Access Management Guidelines for Activity Centers* produced by the Transportation Research Board. Table 4.5.2 on the following page summarizes available access management retrofit techniques.

Table 4.5.2 Access Management Retrofit Techniques

CATEGORY A
LIMIT NUMBER OF CONFLICT POINTS

A-1. Install median barrier with no direct left-turn access
A-2. Install raised median divider with left-turn deceleration lanes
A-3. Install one-way operations on the highway
A-4. Install traffic signal at high-volume driveways
A-5. Channelize median openings to prevent left-turn ingress and/or egress maneuvers
A-6. Widen right through lane to limit right-turn encroachment onto the adjacent lane to the left
A-7. Install channelizing islands to prevent left-turn deceleration lane vehicles from returning to the through lanes
A-8. Install physical barrier to prevent uncontrolled access along property frontages
A-9. Install medial channelization to control the merge of left-turn egress vehicles
A-10. Offset opposing driveways
A-11. Locate driveway opposite a three-leg intersection or driveway and install traffic signals where warranted
A-12. Install two one-way driveways in lieu of one two-way driveway
A-13. Install two two-way driveways with limited turns in lieu of one standard two-way driveway
A-14. Install two one-way driveways in lieu of two two-way driveways
A-15. Install two two-way driveways with limited turns in lieu of two standard two-way driveways
A-16. Install driveway channelizing island to prevent left-turn maneuvers
A-17. Install driveway channelizing island to prevent driveway encroachment conflicts
A-18. Install channelizing island to prevent right-turn deceleration lane vehicles from returning to the through lanes
A-19. Install channelizing island to control the merge area of right-turn egress vehicles
A-20. Regulate the maximum width of driveways

CATEGORY B
SEPARATE BASIC CONFLICT AREAS

B-1. *Regulate minimum spacing of driveways
B-2. Regulate minimum corner clearance
B-3. Regulate minimum property clearance
B-4. *Optimize driveway spacing in the permit authorization stage
B-5. *Regulate maximum number of driveways per property frontage
B-6. Consolidate access for adjacent properties
B-7. Require highway damages for extra driveways
B-8. Buy abutting properties
B-9. Deny access to small frontage
B-10. Consolidate existing access whenever separate parcels are assembled under one purpose, plan entity, or usage
B-11. *Designate the number of driveways regardless of future subdivision of that property
B-12. Require access on collector street (when available) in lieu of additional driveway on highway

CATEGORY C
LIMIT DECELERATION REQUIREMENTS

C-1. Install traffic signals to slow highway speeds and meter traffic for larger gaps
C-2. Restrict parking on the roadway next to driveways to increase driveway turning speeds
C-3. Install visual cues of the driveway
C-4. Improve driveway sight distance
C-5. Regulate minimum sight distance
C-6. *Optimize sight distance in the permit authorization stage
C-7. Increase the effective approach width of the driveway (horizontal geometrics)
C-8. Improve the vertical geometrics of the driveway
C-9. Require driveway paving
C-10. Regulate driveway construction (performance bond) and maintenance
C-11. Install right-turn acceleration lane
C-12. Install channelizing islands to prevent driveway vehicles from backing onto the driveway
C-13. Install channelizing islands to move ingress merge point laterally away from the highway
C-14. Move sidewalk-driveway crossing laterally away from highway

CATEGORY D
REMOVE TURNING VEHICLES FROM THE THROUGH LANES

D-1. Install two-way left-turn lane
D-2. Install continuous left-turn lane
D-3. Install alternating left-turn lane
D-4. Install isolated median and deceleration lane to shadow and store left-turning vehicles
D-5. Install left-turn deceleration lane in lieu of right-angle cross-over
D-6. Instal medial storage for left-turn egress vehicles
D-7. Increase storage capacity of existing left-turn decleration lane
D-8. Increase the turning speed of right-angle median crossovers by increasing the effective approach width
D-9. Install continuous right-turn lane
D-10. Construct a local service road
D-11. *Construct a bypass road
D-12. *Reroute through traffic
D-13. Install supplementary one-way rifht-turn driveways to divided highway (non-capacity warrant)
D-14. Install supplementary access on collector street when available (non-capacity warrant)
D-15. Install additional driveway when total driveway demand exceeds capacity
D-16. Install right-turn deceleration lane
D-17. Install additional exit lane on driveway
D-18. Encourage connections between adjacent properties (even when each has highway access)
D-19. Require two-way driveway operation where internal circulation is not available
D-20. Require adequate internal design and circulation plan

Source: "Access Management for Streets and Highways," Federal Highway Administration, June 1982
*Not directly applicable for retrofit

Medians

Physical medians fully separate opposing traffic flows, clearly define where cross movements are permitted, provide space for single- and multiple-turning lanes at signalized intersections and may limit certain access points to right-turn movements only. They also provide better pedestrian protection than painted islands. They may be continuous, allow only left-turn entry (or exit) or provide full openings at specified locations. Thus, medians are generally desirable at major activity centers where a few high volume channelized driveways provide property access. They are also desirable where volume or safety considerations require restricting property access to right turns. The lists below compares raised medians to two-way left turn lanes.

Advantages

Raised Median

- Discourages strip development
- Allows better control of land uses by local government
- Reduces number of conflicting maneuvers at driveways
- Provides pedestrian refuge
- If continuous, restricts access to right turns only
- Reduces accidents in mid-block areas
- Provides positive separation of opposing traffic

Two-Way Left Turn Lane

- Makes use of "odd-lanes"
- Reduces left turns from through lanes
- Provides operational flexibility for emergencies
- Safer than roads with no left turn lanes or medians
- Facilitates detours
- Provides positive separation of opposing traffic

Disadvantages

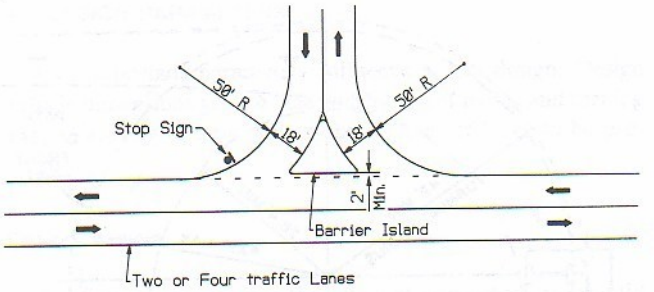
Raised Median

- Reduces operational flexibility for emergency vehicles
- Increases left turn volumes at median openings
- Increases travel time and circuity for some motorists
- May increase accidents at openings
- Limits direct access to property
- Operating speeds usually limited to 45 mph

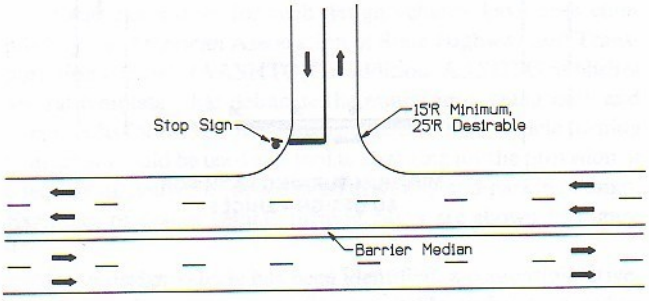
Two-Way Left Turn Lanes

- Encourages random access
- Illegally used as a passing lane
- No refuge for pedestrians
- Poor visibility of markings
- High maintenance cost
- Operate poorly under high volume of through traffic
- Allows head-on collisions

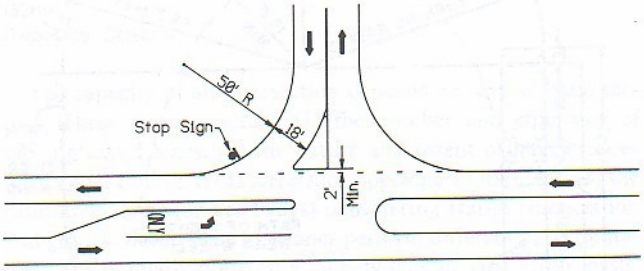
Driveway access restrictions may be required for certain access levels or road types. A review of the number and location of access drives. Safety considerations associated with intersecting traffic volumes or poor visibility are the primary reasons. Whether or not driveway restrictions such as these should be used should be evaluated on an individual basis during the planning stages of any particular development.



Left-turn restrictions—undivided roadway.



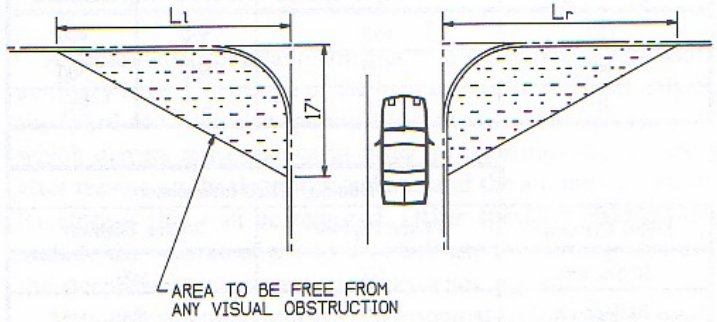
Left-turn restrictions—divided roadway.



Right turn in and out—left turn in.

Figure 4.5.4 Driveway Restriction Examples

It is essential to provide sufficient sight distance for vehicles using a driveway. The sight triangle refers to the area on the corners of the intersection that should be free from obstacles such as landscaping, signs, or street furniture. Minimum sight triangle dimensions are shown below.



POSTED SPEED (mph)	Ll (ft.)	Lr2 (ft.)	Lr4 (ft.)
30	270	190	140
35	340	230	165
40	430	280	210
45	540	340	250
50	650	400	300
55	760	460	350

NOTE: Assumes 12 foot wide traffic lanes.

Ll = Clear distance to the left.

Lr2 = Clear distance to the right - 2-lane roadway.

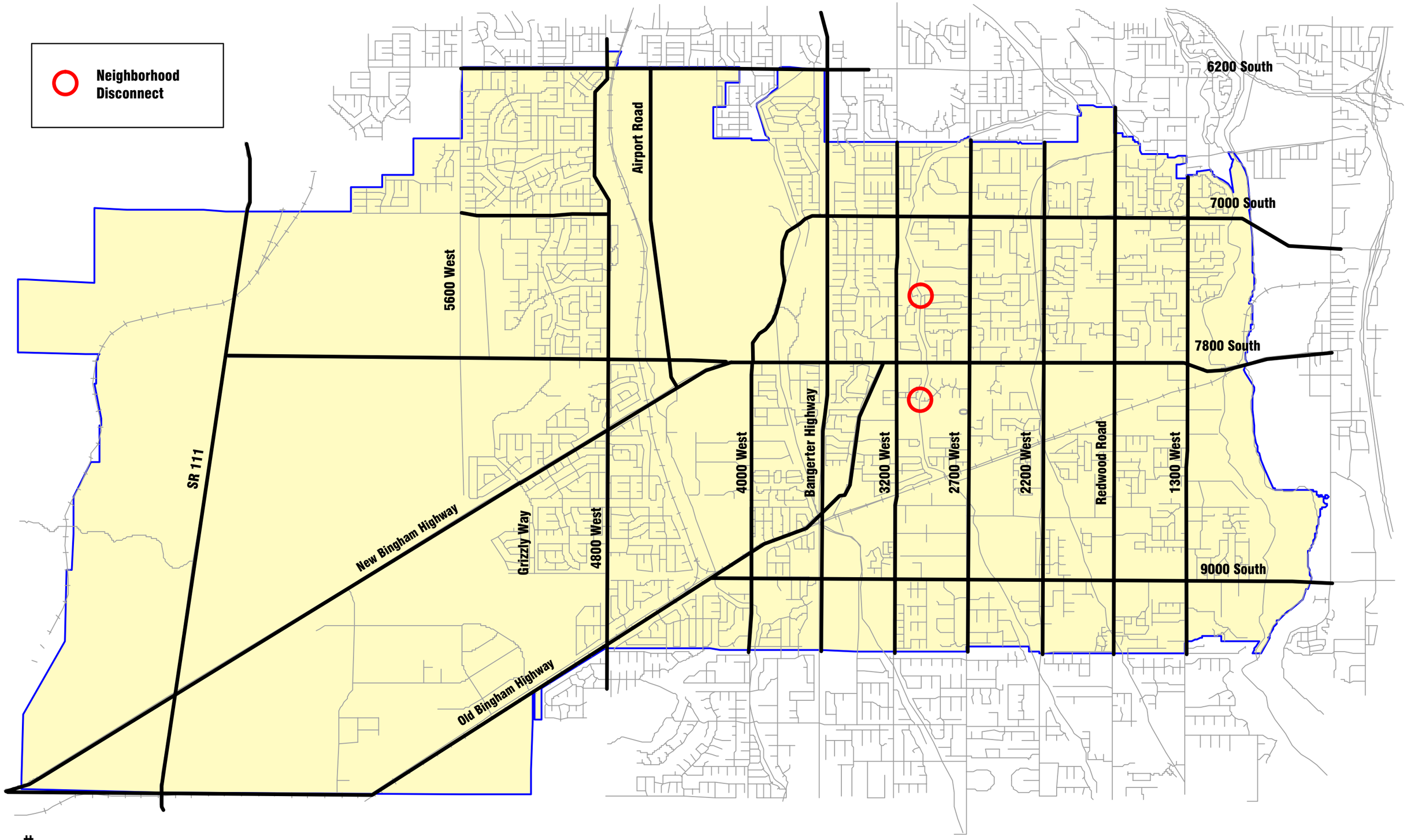
Lr4 = Clear distance to the right - 4-lane roadway.

Figure 4.5.5 Minimum Site Triangle Dimensions

4.6 NEIGHBORHOOD CONNECTIONS

A few areas in which there may be new connections constructed between neighborhoods were identified by members of the Technical Advisory Committee. These may be locations where additional bridges across a canal might be constructed or a short street segment through an undeveloped parcel between two neighborhoods. The main purpose in identifying these areas is to provide better neighborhood circulation and emergency vehicle access to certain areas throughout the city. A map showing these locations is given in Figure 4.6.1.

In addition to neighborhood disconnects across canals there are locations where concrete barriers have been utilized to limit access. An example of this is the intersection of 8750 South & 3200 West. In locations such as these it is advisable to periodically review the purpose for the barriers, and to see if they are still necessary.



West Jordan Master Transportation Plan

Wilbur Smith Associates

InterPlan Co.

RICHARD D. CHONG AND ASSOCIATES

Potential Neighborhood Connections

Figure 4.6.1

4.7 PAVEMENT MANAGEMENT SYSTEM

A pavement management system (PMS) is a decision making process or system that can help West Jordan personnel make cost-effective decisions concerning the maintenance and rehabilitation of the pavements for which they are responsible in a systematic way. The function of a pavement management system is to collect and analyze pavement condition data to improve the efficiency of decision-making and provide feedback on the consequences of decisions. This is accomplished by providing timely recommendations on treatment alternatives and locations to protect the current investment in highways and to reduce users' costs. This is typically done through the use of specialized software programs to assist in information management and decision support. Pavement management systems provide a means to organize the massive amounts of data that develops about a pavement network. When the data storage and analyses are automated, a management system stores data, retrieves data, makes multiple complex calculations quickly and efficiently, and provides results in easily understandable reports.

Pavement management systems require a large amount of data in order to function effectively. As described in the UDOT Pavement Management and Pavement Design Manual, there are three main types of data to be collected:

- **Construction history data** – Provides the age, surfacing thicknesses, and surfacing types for all sections. This data is generally best available at the Region level. Good age data is essential to the performance of computerized pavement management models, which generally rely on age as the basis for performance prediction curves.

- **Inventory data** – Information about the roads that generally remains static over time. Data items include pavement type, number of lanes, width, functional classification, and administrative items.

- **Condition data** – Systematically collected pavement condition data, as well as traffic data. This is data that is typically collected on predetermined cycles, such as every 3 years, and includes such items as traffic, pavement roughness, rut depth, skid number, cracking, weathering, bleeding, structural strength, and faulting.

This data is collected for the network to be analyzed and is broken into analysis sections, which can all be input into a pavement management software program. The software can then be utilized to develop strategies and recommendations for the pavement network.

A pavement management system can be difficult and expensive to create and maintain, but it can be an effective tool in maximizing a city budget. West Jordan has recently created a pavement management system, and it is important that the city maintain the system so that it may be a worthwhile investment in the city's ever expanding roadway network.

4.8 GOALS & POLICIES – STREET SYSTEM

GOAL: TO PROVIDE SAFE AND EFFICIENT MOVEMENT OF TRAFFIC ON CITY STREETS.

Policy 1. Maintain a street hierarchy for the City of West Jordan that promotes safe movement of people and goods. This hierarchy should be composed of the following street types.

- Local Residential Streets. Local residential streets provide vehicle and pedestrian access to all land parcels, with the movement of traffic secondary. Residential streets should be designed to minimize through traffic and to add privacy and identity to a neighborhood.

- Collector Streets. Collector streets are designed to move traffic, as well as provide some property access. They move primarily through residential areas and carry traffic from local streets to the arterial street system.

- Arterial Streets. The principal function of arterial streets is to move large volumes of through traffic on a continuous route over a substantial distance. Access and parking guidelines preserve its traffic function.

Implementation Measure. Publish a street map with residential, collector, and arterial roads defined on the map.

Implementation Measure. Develop, adopt, and regularly update a Master Transportation Plan. Such plan shall consider the proper time frame for City-sponsored widening of collector and arterial streets as well as remedies for neighborhoods disconnected by spot growth

Implementation Measure. Establish and maintain street design standards for each street classification.

Implementation Measure. Facilitate the provision of emergency services by limiting the number and length of cul-de-sacs in residential areas and by requiring multiple points of ingress and egress for all developments.

Implementation Measure. Encourage major multi-family housing developments, commercial developments, and major public facilities to have access to a collector or arterial street.

Implementation Measure. Update and properly maintain truck routes for the safe flow of goods within and through West Jordan.

Implementation Measure. Coordinate with Salt Lake City to improve transportation routes servicing Airport No. 2.

Policy 2. Develop an access management plan for the City of West Jordan

Implementation Measure. Establish minimum distances between street intersections with Arterial and Collector Streets.

Implementation Measure. Establish minimum separation between driveways that access Arterial and Collector Streets.

Implementation Measure. Establish minimum distances from intersections for driveway locations on all city streets.

Implementation Measure. In developed areas, encourage existing properties to share driveway access to Collector and Arterial Streets in order to provide increased spacing.

Implementation Measure. In developed areas, encourage existing properties to limit the number of turning movements available from driveways onto Collector and Arterial Streets.

Implementation Measure. Limit the width of driveways on Arterial and Collector streets.

Implementation Measure. Establish on-street parking standards for collector and arterial streets.

Policy 3. Maintain a minimum level of service on all streets. A daily minimum level of service "C" should be maintained on Collector Streets, a daily minimum level of service "D" on arterial streets, and a peak hour minimum level of service "E" may be accepted for up to 1 peak hour on arterial streets which also provide for an express mass transit component. (Level of service is a traffic engineering term that describes the amount of travel delay in a roadway network. Level of service "A" is the best condition with "F" being the worst.)

Implementation Measure. Require all new development with a peakhour trip generation of 100 vehicles or more to submit a Traffic Impact Study (TIS). Require developers to implement mitigation measures suggested in the study as a development requirement.

Implementation Measure. Work to coordinate traffic signal timing on Arterial Streets.

Implementation Measure. Build roads and signals as defined in the Capital Facilities Plan.

Implementation Measure. Plan future streets to serve projected demand at an established level of service.

Implementation Measure. Identify intersections and/or developments that have experienced unusual congestion or accident rates and develop and implement solutions to resolve these problems.

Implementation Measure. Establish an on-going street marking program to ensure street markings are clearly visible.

Implementation Measure. Ensure that street identification and regulatory signage is clearly visible.

Policy 4. Coordinate with state and local agencies to accomplish the goals of this Master Plan.

Implementation Measure. Work with the Utah Department of Transportation to improve signal timing, traffic flow and safety on State maintained roads in the City of West Jordan.

Implementation Measure. Coordinate with the Utah Department of Transportation and Wasatch Front Regional Council in the planning and construction of regional expressways that will directly affect West Jordan.

Implementation Measure. Coordinate with neighboring cities on improvement and maintenance of through streets and streets located along common boundaries.

Chapter 5
TRANSPORTATION MANAGEMENT

In the past the predominant solution to accommodating population and the resulting growth in transportation demands has been to increase capacity through the construction of new highways or the expansion of existing facilities. As time progresses increasing highway capacity is becoming less and less of an option due to limited right-of-way and environmental constraints. Many cities and counties are expected to continue to grow further increasing the demand placed on transportation facilities in urban and suburban areas. This is especially true of West Jordan City and the surrounding communities in the southwestern portion of the Salt Lake Valley.

Transportation Management is changing travel demand and increasing the efficiency of the transportation system to meet the increased transportation demand without building new roads.

In order to keep up with this increase in transportation demand and maintain the standard of freedom and mobility to which we are accustomed, the focus is shifting from building new roadways to improving the efficiency of the existing transportation infrastructure. There will still be new roadway projects constructed in the City but a greater emphasis will also need to be placed on methods aimed at improving efficiency. The many methods and programs that fall under the category shall be referred to in this report as Transportation Management. All of the methods that will be discussed in this chapter can be further divided into two main categories: those which aim to reduce the overall transportation demand or those which aim to effectively increase the transportation system "supply" through improved efficiency.

5.1 TRAVEL DEMAND MANAGEMENT

Travel Demand Management (TDM) programs are designed to reduce the traffic volume on streets by increasing the number of occupants in a vehicle or by reducing or changing travel patterns and behavior. TDM programs use incentives and disincentives on automobile users to promote these changes in behavior. There are many myths and misconceptions about various TDM programs, what their specific goals are and how effective they may be. It is important to understand the facts behind each type of program and what each may be expected to accomplish prior to the selection and implementation of such strategies so that the benefits of the program may be maximized. Travel Demand Management measures can be divided into three categories: Improved Alternatives, Incentives and Disincentives, and Alternative Work Arrangements. The information in this section about Travel Demand Management has been summarized from a reference manual produced by the Institute of Transportation Engineers (ITE) called *Implementing Effective Travel Demand Management Measures*[1].

[1] *Implementing Effective Travel Demand Management Measures: A Series on TDM*, Institute of Transportation Engineers, Washington D.C. June 1993.

It is not possible to include all of the information found in the reference manual in this report. A brief summary of each measure is given here but this reference manual should be referred to directly in order to obtain a more comprehensive understanding of TDM programs.

5.1.1 Improved Alternatives

Transit Service Improvements

For years, transit's major role in urban areas was to serve the more dense downtown areas. However, congestion is growing in the suburbs at a more rapid pace than in the downtowns. Transit systems are challenged with providing reasonable quality of service to the less-densely developed areas within increasing budgetary limits. At best transit can become part of the solution to suburban congestion and mobility but it will never be able to meet all the needs of less-dense areas in a cost-effective manner. The proposed Mid-Jordan light rail line with the planned stations and park-and-ride facilities will provide a great deal of transit opportunities in the area. More information about recommended transit system improvements in West Jordan can be found in the Public Transportation chapter of this report.

Carpool Programs

Carpooling is the sharing of rides of two or more people in a private vehicle and is the most prevalent alternative to driving alone. The process of grouping commuters into carpool arrangements occurs in one of three ways:

- Area-wide Programs
- Employer and Developer Programs
- Informal Arrangements

Carpooling requires that riders have similar origins, destinations, and schedules. The majority of carpools are formed between household members and neighbors (informal arrangements), but the most effective organized carpool matching programs are targeted at employment-based sites as opposed to home or school-based. Commuters traveling to and form work during peak periods represent the best market for carpooling. The work trip, however, accounts for only one-quarter to one-third of all trips in an urban area and organized carpool programs only account for one-third of all commuters that are sharing a ride. Even so, carpooling represents one of if not the program with the highest potential for reducing the overall number of trips in the area.

Vanpool Programs

Vanpools usually involve groups of 7 to 15 people and fall midway between transit and carpools in terms of carrying capacity and flexibility, economics and convenience to the user. Much like carpools, vanpools can be organized by individuals, employers, or third parties such as transit agencies or non-profit organizations. Traditionally vanpools seem most effective when serving commuters traveling longer than 20 miles one way. A high percentage of existing vanpool users tend to hold white-collar jobs and have above-average incomes which is somewhat counter-intuitive.

The effectiveness of vanpooling is viewed differently by the three primary groups concerned with such programs: society (as represented through government agencies), employers and individual travelers. In each case there are both positive and negative perceptions and

experiences with vanpools. As is the case with carpools, in order for vanpools to be successful there must be some perceived tangible benefits to be gained by the users.

Bicycle/Pedestrian Facilities and Site Improvements

Bicycling and walking are often overlooked as serious travel options in the United States. In suburban environments such as West Jordan and most other U.S. metropolitan areas these modes seem out of scale and out of place. Distances between residences and activities are discouraging to pedestrians and bikers in this environment. There may be, however, more potential to bicycling and walking than might appear at first glance, both in a direct and complementary relationship. Three important ways in which bike and walk modes might be pushed into greater service in transportation management programs are as primary modes, feeder modes (such as from home to a transit stop), and for circulation within an activity center (such as a college or business campus.)

The benefits of increased walking and bicycle use are obvious in that they replace a motorized trip with a non-motorized trip. From a standpoint of traffic congestion and highway capacity the benefits are realized in fewer overall trips as opposed to vehicle miles of travel due to the relatively short nature of the trips. In terms of air quality there are benefits but because the trips are short the primary benefit is in the elimination of vehicle trips (cold start emissions) as opposed again to an overall reduction in vehicle miles of travel.

Certainly there is much room for improvement in the bicycle facilities in particular in and around West Jordan. The proposed bicycle routes and multi-use trails given in this report will provide a substantial improvement over the existing routes available. For more information about the recommended bicycle and pedestrian improvements refer to their respective chapters in this report.

5.1.2 Incentives and Disincentives

Employer Complementary Support Measures

Complementary programs support mode shifts to ridesharing rather than causing the shift. On their own these programs do little to change the relative attractiveness of different commute modes but are an integral part of a successful TDM program. Complementary support measures can be summarized in three general categories.

1. **TDM Program Marketing**

   Information Dissemination - increases commuters' awareness of available TDM strategies, services, and incentives. Regional methods may include mass mailings, newspaper, radio or television ads, or roadside signs. Individual employment site methods generally use posters, bulletin boards or flyers distributed desk to desk. Local area information dissemination generally utilizes elements of these other two methods.

   Transportation Coordinator - reduces commuters' discomfort with trying a new commute mode; simplifies and personalizes access to information. This can be performed within transit agencies, metropolitan planning organizations, or through an employers' human resources department.

Special Promotions – encourages first-time use of alternative mode and rewards continuing ridesharers; generates excitement for TDM programs.

2. **Site Amenities and Design**
   "Rideshare Friendly" Work Site Design – eases worksite access for HOV commuters by removing physical barriers to ridesharing; can provide time saving to transit users if walking distance from stops is reduced.

   On-Site Services – minimizes commuters' true or perceived need for personal automobile for personal or business-related trips before, after, or during the work day. These services may include cafeterias and restaurants, dry cleaners, ATMs, convenience shopping or drug stores, or other personal or business-related services that commuters need to perform work-day errands.

3. **Supporting Services**
   Guaranteed Ride Home – eliminates commuters' fear of being "stranded" without transportation in the event of a personal emergency or the need to work overtime.

   Corporate Commitment – reduces ridesharing commuters' fear of ridesharing hindering their "movement up the corporate ladder" by creating a work environment in which ridesharing is promoted as acceptable. A strong commitment typically is demonstrated by an extensive package of incentives offered to commuters or ridesharing among corporate executives.

Preferential High Occupancy Vehicle (HOV) Treatments

HOV facilities can be an effective way to encourage travelers to use higher-occupancy modes of travel. UDOT has recently implemented the first significant HOV measures in Utah on the recently re-constructed portion of I-15 through the Salt Lake Valley. There is one HOV travel lane in each direction along the freeway with queue bypass lanes on the on-ramps and separate HOV on and off-ramps at 400 South for vehicles traveling to and from the south. The actual and perceived convenience of being able to use this lane during peak congestion periods is expected to be an effective incentive for people to carpool or use other HOV modes of travel, particularly as congestion increases in the general purpose lanes.

UDOT has also adopted this as their standard recommended freeway cross-section through the majority of the Wasatch Front. As freeway re-construction projects are completed in Utah County or other areas the benefits of using HOV modes of travel will be increased. It may be that the proposed Western Transportation Corridor will contain some preferential treatment for High Occupancy Vehicles. The potential for "queue-jumper lanes" at intersections for buses or in conjunction with a bus rapid transit (BRT) system are also being evaluated as part of studies currently underway. Preferential HOV facilities are best accomplished on a larger scale such as on UDOT facilities rather than at the local level.

Economic Incentives

Two key factors in a traveler's decision to use one mode over another are the relative time and cost advantages. Given the overwhelming advantage of the single-occupant vehicle in most modern suburban travel situations, incentives are critical in any attempt to shift travelers into alternative modes of travel. By increasing the cost of operating single occupant vehicles through tolls or increased parking costs and decreasing the cost of alternative modes through subsidies the more people will choose these alternative modes of travel.

This section discusses financial incentives offered directly to travelers by employers or public agencies, termed *user subsidies*. Tax incentives offered to employers or public subsidies provided to service providers to promote or provide alternatives are not discussed here.

1. **Employer/Developer-Provided Incentives**

   Transit Pass Subsidies – Employer or developer pays for or reimburses employees for part of all of the cost of transit passes.

   Vanpool Operating Subsidies – Employers may provide vehicles, underwrite insurance and capital costs or help employees arrange groups.

   Rideshare Subsidies – Generally involve a broader subsidy scheme by offering a user subsidy to any employee using a commute alternative, not just transit or vanpool riders. This more equitably implements a financial incentive by allowing employees to choose the alternative that best suits their travel needs. Subsidies can vary depending on occupancy of the alternative vehicle, number of days per week or month alternatives are used, etc.

   Travel Allowances – A monthly stipend can be provided to employees to use on whatever travel mode they wish, including driving alone. Travel allowances are most often tied to parking charges and can vary according to occupancy levels. For example, solo commuters a 50 percent parking subsidy, two-person carpools a 75 percent subsidy, three-person or more carpools and transit users a 100 percent subsidy.

   Other Financial Incentives – Additional options that provide a real, monetary incentive to using alternative travel modes that do not involve direct subsidy payments include:
   - Use of fleet vehicles for ridesharing;
   - Free or discounted fuel for pooling vehicles;
   - Free or discounted maintenance and repair for pooling vehicles;
   - Extra vacation for commute alternative users;
   - Free or discounted equipment (shoes, bicycles, helmets.)

2. **Public Agency Provided Incentives**

   Transit Fare Discounts – Public transit provided by UTA is already heavily subsidized meaning fare revenue accounts for only a fraction of the overall costs of maintaining and operating transit service in this area. Additional fare discounts for commuter riders are rare, and in fact usually services targeted at commuter users (express routes) have higher fares than regular routes.

Transit Subsidies – In some cases cities or counties match employer transit subsidies or provide free ride tickets for commuters to use transit on a trial basis.

Vanpool Start-up Subsidies – As with tickets for trial use of transit some public agencies have subsidized the start-up costs of vanpools and provided 0% or low interest loans for the purchase of vans to be used in vanpools.

Housing Subsidies – In some communities the transit agency helps people that purchase homes near transit stations or routes to obtain lower interest loans or to qualify for a higher loan limit.

Parking Supply and Pricing Management

Parking is a vital element of any TDM program and considerable recent and past research suggests the supply and price of parking may be the most potent demand management strategy. Because parking pricing is so central to traveler choices between solo driving, carpooling, transit use and walking, traffic congestion and air quality are intimately linked to parking. Therefore, planners and decision makers should examine parking policy as part of their demand management programs to maximize effectiveness. Localities can integrate parking into their demand management efforts through two broad approaches: pricing and supply management.

The best candidate localities for pricing strategies are those where some amount of parking pricing is already in place. It is difficult and generally unpopular to impose prices where public and private parking is currently free such as in West Jordan. The best candidate localities for supply strategies may be suburban communities. For this reason parking policies aimed at managing supply are recommended over those aimed at pricing in West Jordan.

In suburban areas parking supply typically exceeds demand, particularly at larger retail and commercial centers. Most municipalities have minimum parking requirements for new development based on the size and type of land use. It may also be beneficial to limit excess parking supply through maximum parking requirements, which may depend on proximity to transit or other factors.

5.1.3 Alternative Work Arrangements

Alternative work arrangements are programs that are aimed at giving employers and employees greater flexibility in scheduling work hours as well as travel to and from work. There are various types of these strategies and some are more appropriate than others depending on the application setting. These programs are recommended as some of the most feasible and preferred TDM strategies available in this area.

Variable Work Hours/Compressed Work Weeks

Work-hours management tools are aimed at spreading out peak travel demand over a larger time range rather than reduce trips or vehicle miles of travel. There are three types of variable work hours with potential application as demand management tools: staggered work hours, compressed work weeks and flextime. Staggered work hours, typically set by employers, may set start times at 15-minute increments. Compressed work weeks allow employees to work more

hours in fewer days such as the common "4/10" schedule. Finally, flextime allows employees to set their own arrival and departure time within a range acceptable to the employer. Employees and employers may find alternative work hours attractive not only to open up new transportation options but also to improve the fit between work and family responsibilities.

One significant advantage to these strategies is that they give employees greater freedom to manage their time and transportation options. Various formal and informal alternative work arrangements have been increasing in recent years in both the public and private sector. Again, it should be noted that these strategies do not reduce trips or vehicle miles of travel. The goal of these is to spread out peak traffic over a longer time period and can be very popular and successful at achieving this goal.

Telecommuting

Telecommuting is a fairly new but growing approach to reducing home-to-work trips by allowing employees to work at home one or more days per week. This trend has been facilitated by the nature of the economy and technological advances. Other benefits of telecommuting according to various studies include increased productivity and employee morale.

The prospects for telecommuting depend on the setting in which it is applied. Information industries such as accounting, data processing, programming and engineering design are more amenable to telecommuting than production lines, construction or sales. In today's workforce of information workers telecommuting may have significant application. To maximize the potential effectiveness of telecommuting as a demand management tool, localities should work with employers to ensure programs have the best possible chances at success. Successful programs should:

- Establish telecommuting as a voluntary arrangement between supervisor and employee, not an entitlement or employee benefit.
- Measure job performance by results under clearly defined tasks and deliverables.
- Ensure that telecommuters working at home agree to secure proprietary information.
- Gain agreement between the employer and employee on ownership and use of equipment and software.
- Work out utility cost implications.
- Ensure telecommuters are covered under Worker's Compensation for job-related accidents occurring when the employee is at home.
- Establish liability. Usually the employee remains liable for injuries to third parties and or members of the employee's family on the employee's premises.
- Help employees understand tax implications relating to the home work space.
- Spell out the arrangements in a Telecommuting Agreement.

Telecommuting as well as the other alternative work arrangements represents one of the most preferred TDM strategies for implementation in West Jordan.

Once again, the information regarding this section on travel demand management programs was largely taken from the reference *Implementing Effective Travel Demand Management Measures* produced by the Institute of Transportation Engineers.

5.1.4 Recommended Travel Demand Management Strategies

Of the various TDM strategies and programs discussed here there are a few that are recommended should West Jordan wish to pursue one or more TDM option. Each program has been described only briefly here and a more thorough and comprehensive evaluation of these alternatives should be the next step prior to any implementation procedures.

- **Carpool Programs** – These represent perhaps the most feasible option for reducing trips and vehicle miles of travel, particularly by commuters.

- **Alternative Work Arrangements** – Increasingly popular and relatively easy to implement are programs which allow and encourage employers and employees to shift work hours or work from home. In addition to the benefits to peak hour traffic and congestion these options also allow greater flexibility to employees to coordinate work and family responsibilities.

- **Transit Service** – The Mid-Jordan light rail line will provide a major asset to the public transportation network in the City and the surrounding area. It is recommended that West Jordan continue to work with UTA in support of this project and the accompanying support facilities such as park and ride lots and transit-oriented development.

- **Employer Complementary Support Measures** – While these programs alone do not promote the use of alternative modes of travel they are a vital component of a successful program.

5.2 TRANSPORTATION SYSTEMS MANAGEMENT

The goal of Transportation Systems Management (TSM) is to improve the efficiency of existing facilities through better management of vehicles and the roadway. Some ways in which this can be accomplished is through greater use of alternative modes of travel such as transit and bicycles. Improvements to these systems are discussed in more detail in their own chapters.

Intelligent Transportation Systems (ITS) refers to the increased use of technology and communication methods to improve traffic operations. Pavement detectors, traffic cameras and weather sensors are used to gather constant information about traffic flow conditions along corridors or at intersections. This information may be relayed to a traffic control center where operators can change traffic signal timing plans or post messages on variable message signs.

UDOT manages the Traffic Operations Center (TOC) in Salt Lake through which is provided the CommuterLink network. Through this system freeways and major corridors as well as approximately 550 signalized intersections are monitored. Users can access the CommuterLink website and obtain real-time information about construction, incidents, weather, or traffic conditions. There are over 150 cameras that are used by both the operators and website users to monitor the freeways and highways in the area. Utah was one of the first states to launch the 511 telephone information system that offers statewide road and weather conditions updates. As the

CommuterLink system continues to progress and expand it is recommended that West Jordan actively work with UDOT to include major corridors and intersections in this system.

Variable Message Signs

Variable Message Signs are the computer-controlled signs located over freeways or major arterials that are used to alert drivers to traffic congestion or incidents. There are currently no variable message signs in West Jordan operated by the TOC but ideal locations for future signs would be on major corridors such as Bangerter Highway, Redwood Road, and 9000 South. These signs should be placed in locations such that any information given by them is the most useful to allow drivers to alter routes due to congestion or delays. For example a sign could be placed on northbound Redwood Road prior to 7000 South so that delays on either I-15 or I-215 can be relayed to drivers on Redwood Road and the other freeway can easily be accessed, as shown on Figure 5.2.1. On eastbound 9000 South a sign too close to I-15 would be of little value to drivers planning on using I-15 if there are no alternates between the sign and the freeway. A sign located previous to Redwood Road and perhaps an additional sign previous to Bangerter Highway would provide the information to drivers in sufficient time to allow easy access to alternate routes.

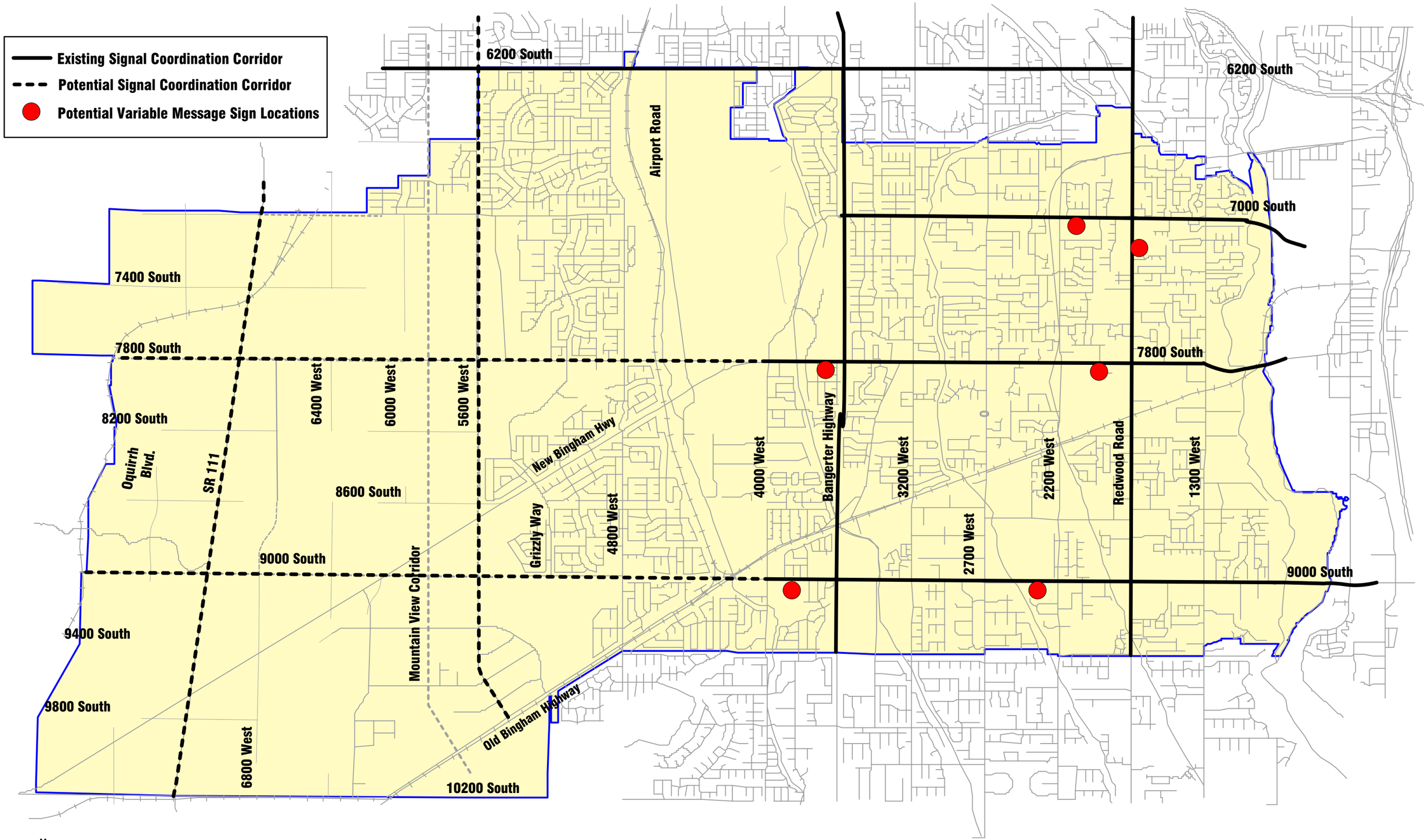
Traffic Signal Coordination

Traffic signal coordination is another ITS method that is used to improve traffic operations and efficiency. Traffic signal timing and phasing improvements generally improve all traffic flow but can also be used to favor high-occupancy vehicles or buses. Some ways in which signal timing can be used to favor transit include transit pre-emption and priority. Transit pre-emption means that as a transit vehicle approaches an intersection the signal timing is interrupted to accommodate the transit vehicle. This may interrupt the signal coordination of a corridor or network. Transit priority allows traffic signals to adjust their phasing to give priority to transit vehicles without interrupting the overall traffic signal timing plan. It is important to realize the trade-off in overall coordination when implementing transit priority.

There are two primary methods employed by UDOT for communication between traffic signals and the Traffic Operations Center. The first is via fiber optic cables, which comprise approximately 90% of the signals in the UDOT system, and the second is via spread spectrum radio signals, which comprise the remaining 10% of the system. The spread spectrum radio has a much smaller bandwidth than the fiber optics, and therefore can only be used for a few signals.

Existing coordination corridors within West Jordan are shown in Figure 5.2.1 along with potential future corridors. The existing north-south coordination corridors take precedence over the east-west corridors.

In an area such as West Jordan that is experiencing rapid growth and changes in traffic volumes and patterns it is important that traffic signal timing plans be evaluated and updated if necessary. To properly evaluate and improve the signal coordination in an area, a fair amount of data collection is necessary which is both labor intensive and costly. As UDOT is much more adequately equipped to manage such efforts West Jordan should coordinate with UDOT and TOC staff to ensure that traffic signals in the City are coordinated.



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Existing and Potential ITS Features

NORTH

Figure 5.2.1

Emergency Vehicle Signal Preemption

One of the most widely utilized ITS tools is traffic signal preemption by emergency vehicles, which is often known as Opticom, which is the trade name of the preemption equipment manufactured by 3M. Hardware is mounted on both the traffic signal mast arm and the emergency vehicle. The vehicle sends out a signal that is received by the signal, which then adjusts the signal timing and phasing to increase the likelihood of the emergency vehicle getting a green light. This tool reduces the response time for these emergency vehicles and is widely used throughout Utah, including West Jordan.

Emergency vehicle preemption is similar to preemption that is sometimes given to transit vehicles such as buses. However, transit vehicles typically have a lesser degree of preemption. They can generally only extend or shorten the green time of a cycle by a few seconds rather than completely altering the phasing or timing.

5.3 GOALS & POLICIES – TRANSPORTATION MANAGEMENT

GOAL: TO DEVELOP A TRANPORTATION MANAGEMENT PROGRAM.

Policy 1. Encourage the development of Intelligent Transportation System (ITS) programs.

Implementation Measure. Provide or improve signal coordination along arterial roadways.

Implementation Measure. Investigate potential for transit priority at intersections along major transit routes.

Implementation Measure. Identify areas that would benefit from variable message signs to inform motorists of traffic conditions and/or delays.

Implementation Measure. Identify areas where roadside emergency response facilities should be provided.

Implementation Measure. Explore the possibility of adding real time traffic conditions to the West Jordan City web site for important arterial intersections.

Policy 2. Encourage the development of Transportation Demand Management systems.

Implementation Measure. Encourage development of large commercial activity centers and high density housing near the locations of transportation hubs.

Implementation Measure. Encourage businesses to promote voluntary trip reduction through flexible time work schedules, telecommuting, and free parking for Rideshare users and on-site services for employees.

Implementation Measure. Encourage partnerships with the private sector to develop customized transportation demand management plans.

Implementation Measure. Sponsor annual awards or community recognition for employers who exceed expectations in traffic demand management.

Implementation Measure. Provide a public education program to inform residents about individual trip reduction options.

Implementation Measure. Require all traffic impact studies to include a trip reduction component wherein reasonable trip reduction and related demand management measures may be evaluated, recommended, and possibly required as a condition of development.

Chapter 6
TRANSIT SERVICE

An effective and efficient transit system is going to be an increasingly vital component of the overall transportation network in West Jordan as the City continues to grow. Proper transit planning and design not only requires that the transit facilities themselves be considered but also the adjacent land uses and corridors.

6.1 BUS SERVICE CORRIDORS

6.1.1 Local Bus Routes

The Wasatch Front Regional Council's Long Range Plan calls for increased bus service throughout Salt Lake County. There are many opportunities for transit service enhancements in West Jordan. As new roads are built and the population expands, it will be necessary for UTA to provide service to these new corridors, such as 5600 West, which will be an arterial street and will likely be close to the Mountain View Corridor, which may also be a transit corridor. Other existing facilities could use an immediate service increase, such as 7800 South, which currently only has peak period service. This corridor should receive bus service all day, as is done on 7000 South and 9000 South, as soon as possible.

It would be recommended to West Jordan City that more frequent and additional bus routes be considered and that the City meet with UTA to decide bus stop locations, frequency, better signage, and shelter alternatives. Attention should also be given to ensure that bus stops are in compliance with the Americans with Disabilities Act (ADA).

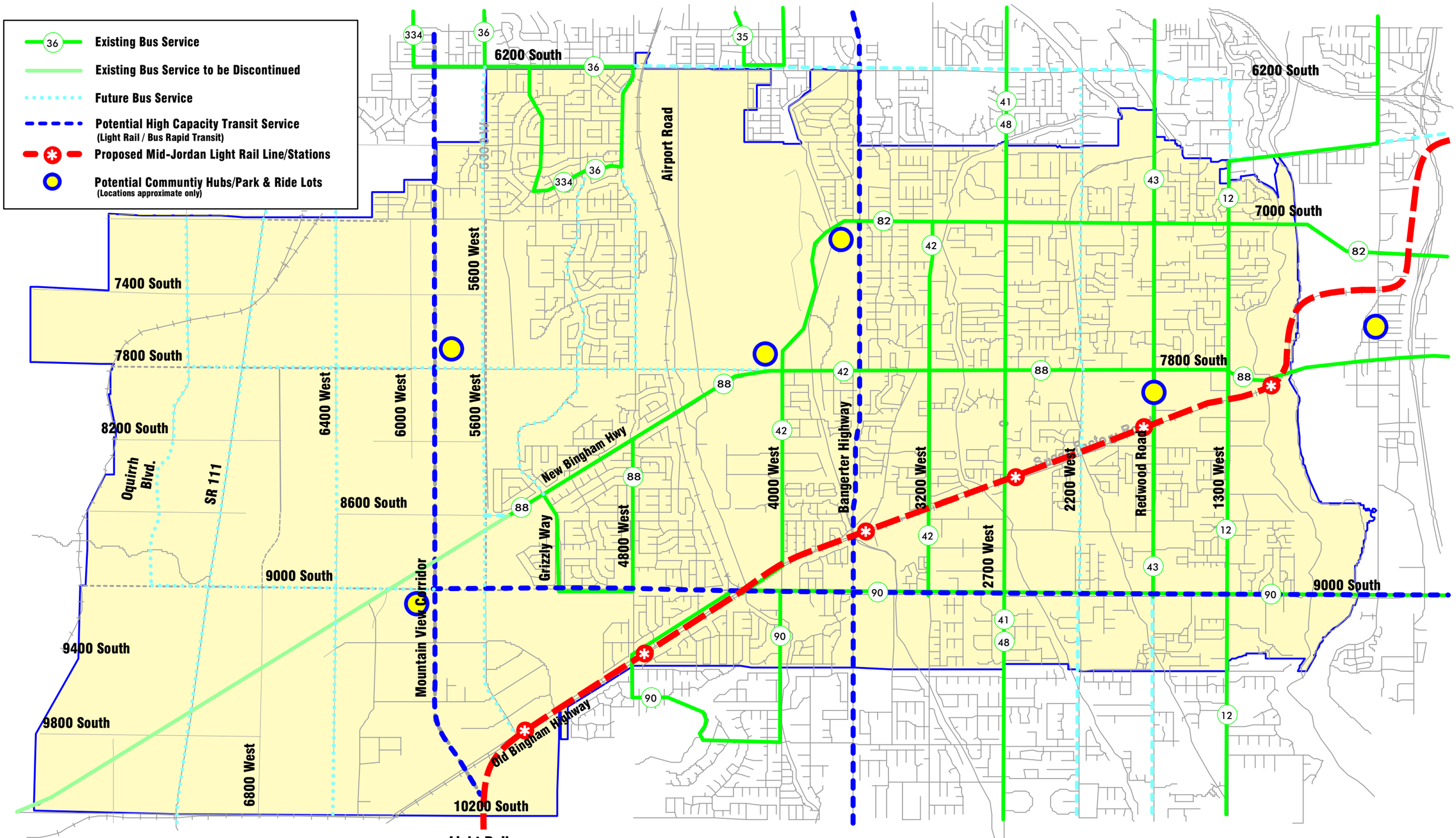
6.1.2 Bus Rapid Transit

Other enhancements to bus service will be through the implementation of Bus Rapid Transit (BRT). BRT is a way to provide a higher level of service similar to that of a rail system without the high capital costs of a rail system. There are a number of ways in which a BRT system can be implemented and by which bus service is made more efficient by reducing travel time and delay. One of the simplest forms of BRT is by providing transit priority at traffic signals. Through this technology, as buses approach an intersection, the traffic signal timing is adjusted by extending the green phase so that the bus has a greater chance of making it through the intersection without having to stop. Planning is currently underway for this type of BRT to be implemented on 3500 South in West Valley. Another BRT enhancement is to provide queue jumper lanes for buses. These are essentially right turn lanes that are available for through buses to use. The bus can then travel past the queue in the through lanes to the stop bar. This is typically used in conjunction with transit priority at the traffic signal, in which the bus gets a green light before other vehicles, so that after jumping to the front of the line the bus gets a head start.

More advanced BRT systems include exclusive bus-only travel lanes, similar to a light rail system. The system has regularly spaced bus stations and operates just like a rail system. With

their lower construction costs and lack of a fixed guideway, these systems are more flexible than traditional light rail.

There is a potential for Bus Rapid Transit in West Jordan. 9000 South should be considered as a prime BRT route, particularly in light of the extreme traffic loads that will be present on that facility in the future. Another potential BRT corridor is along the Bangerter Highway, which could be especially valuable in conjunction with east-west bus connections and park-and-ride lots. Figure 6.1.1 shows future transit corridors in West Jordan.



West Jordan Master Transportation Plan

Existing & Future Transit Service

NORTH

Figure 6.1.1

6.2 RAIL CORRIDORS

6.2.1 Mid-Jordan Light Rail Line

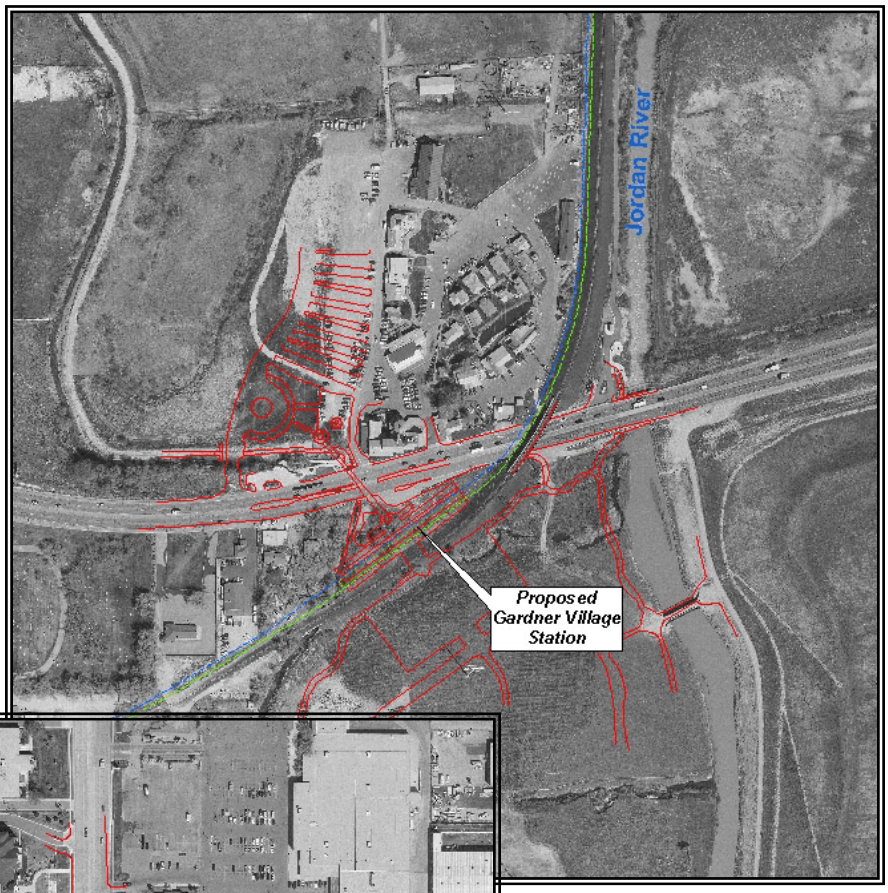
An Environmental Impact Statement (EIS) study process is underway for the Mid-Jordan light rail spur, which is proposed to run on the existing freight rail line along the old Sugar Factory railroad route to approximately 5600 West as which point it would turn south to serve the Kennecott Daybreak development. The line would primarily serve commuters traveling into downtown Salt Lake City. With six stations in West Jordan, the light rail would provide a great service in helping reduce congestion along some of the major roadways such as 9000 South, 7800 South, and 7000 South. The Mid-Jordan line would connect to the existing north-south light rail line near the Fashion Place West station in Murray near 6400 South to provide service between Salt Lake City and Sandy. In addition to this planned route, there may be the need for more rail service in West Jordan. The Administrative Draft EIS document was submitted to the Federal Transit Administration (FTA) in February of 2003. Upon review by the FTA the revised Draft EIS will be presented to the public for comment.

As mentioned, there are six proposed stations within West Jordan. These stations are located at:

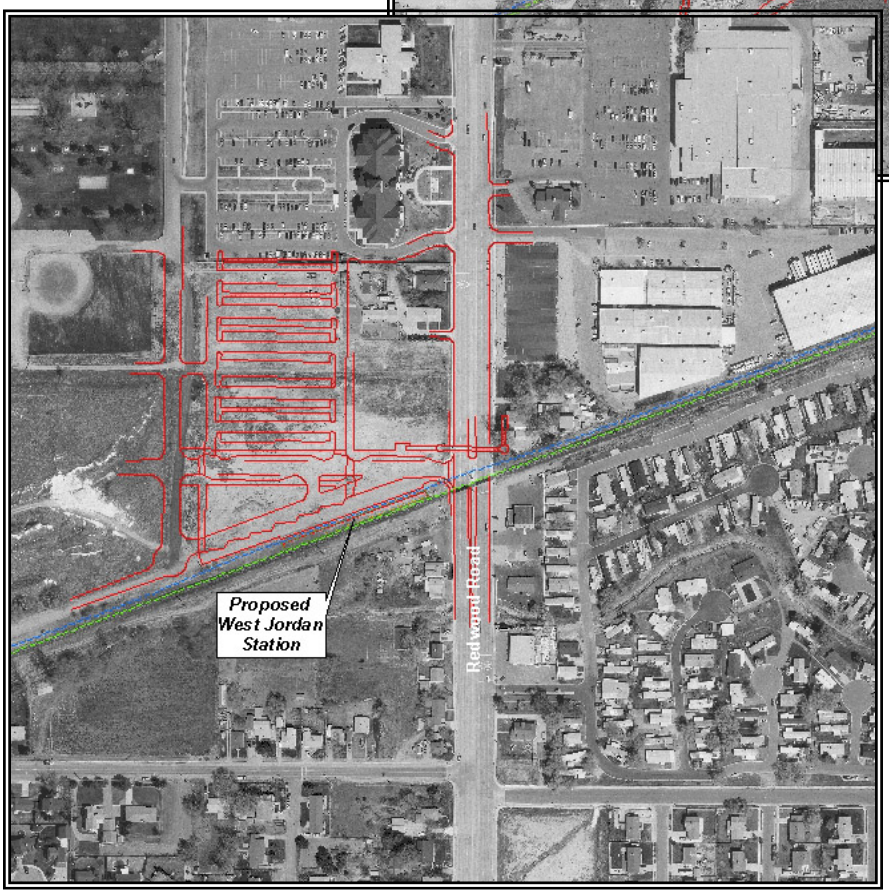
- **Gardner Village Station** – Approximately 7800 South & 1100 West
- **West Jordan Station** – Approximately 8100 South & Redwood Road
- **2700 West Station** – Approximately 8300 South & Redwood Road
- **Bangerter Station** – Approximately 8600 South & Bangerter Highway
- **4800 West Station** – Approximately 9400 South & 4800 West
- **5600 West Station** – Approximately 9800 South & 5600 West

Small sketches of each of these stations are shown in Figure 6.2.1, which was taken from the EIS website at www.westsidetransit.com. Larger sketches are contained in Appendix D.

Figure 6.2.1 Proposed Light Rail Stations

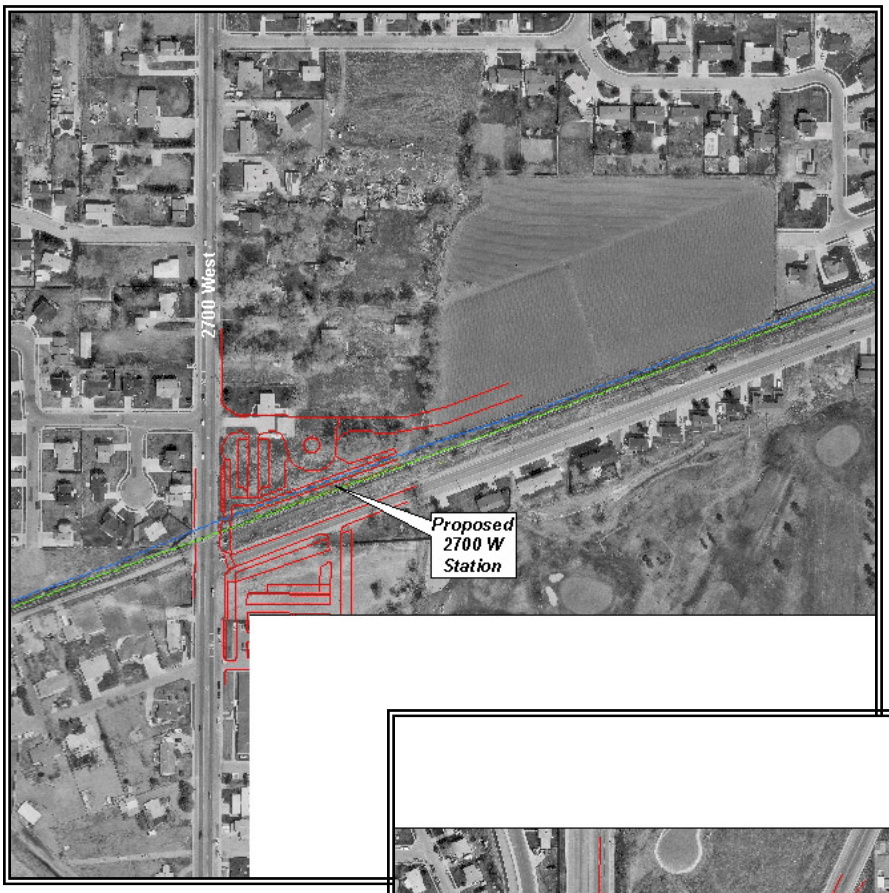


Proposed Gardner Village Station

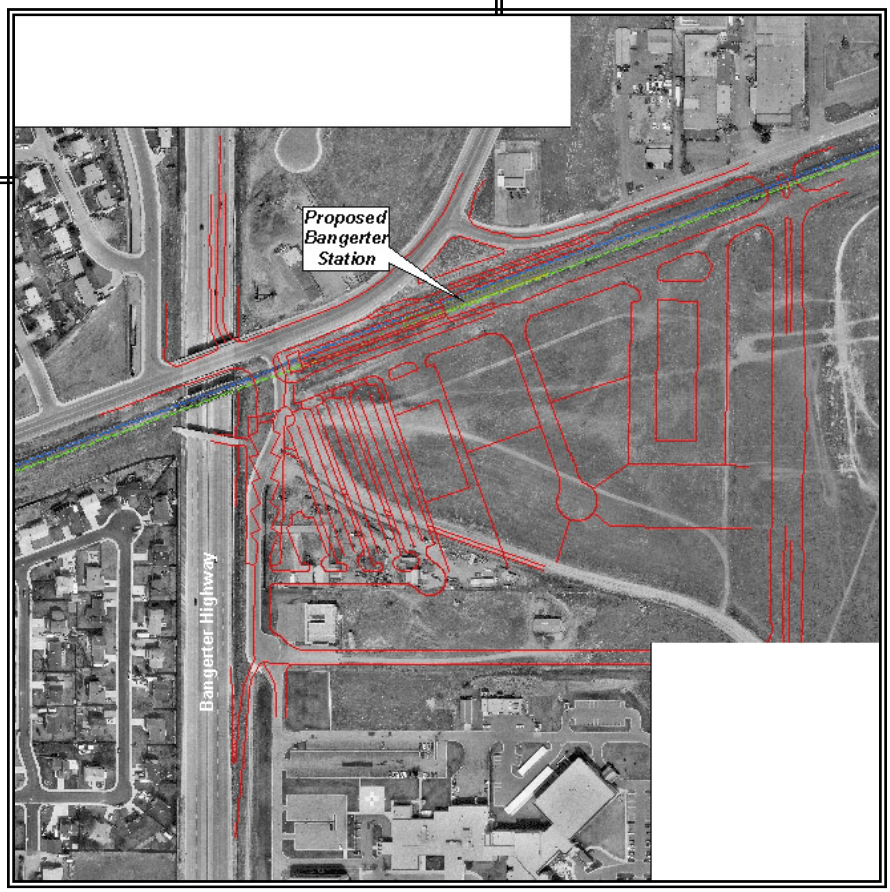


Proposed West Jordan Station

Figure 6.2.1 Proposed Light Rail Stations (cont.)

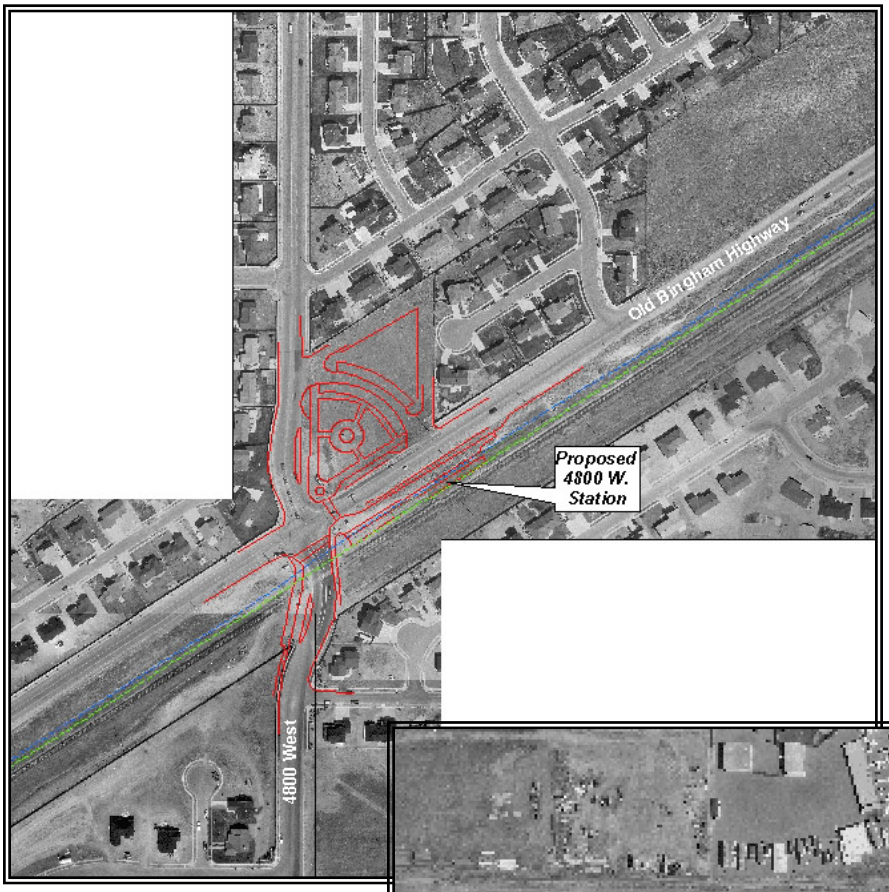


Proposed 2700 West Station

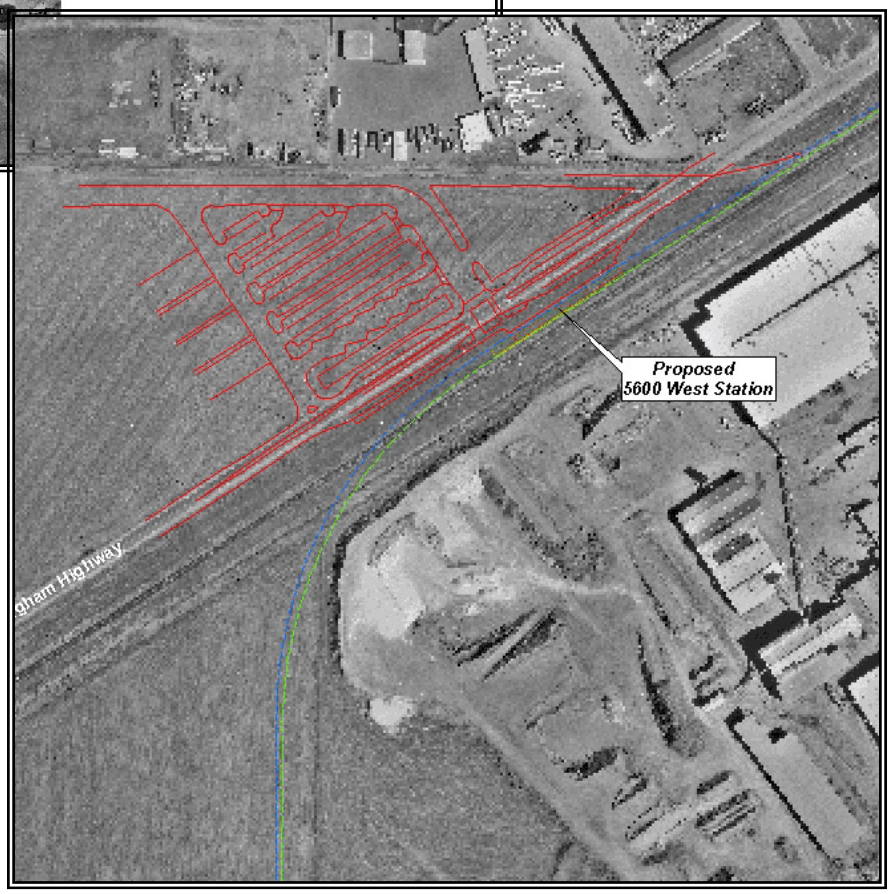


Proposed Bangerter Station

Figure 6.2.1 Proposed Light Rail Stations (cont.)



Proposed 4800 West Station



Proposed 5600 West Station

6.2.2 Other Rail Corridors

The modeling process for transit began by examining the WFRC 2030 travel model bus, light rail, and commuter rail lines throughout West Jordan and the Salt Lake Valley. With no north-south connection other than bus service on the west side of the valley, it is possible that a potential north-south rail corridor would perhaps greatly benefit the western side of the Salt Lake Valley. Four possible north-south transit rail line locations were modeled within the West Jordan 2030 travel demand forecasting model.

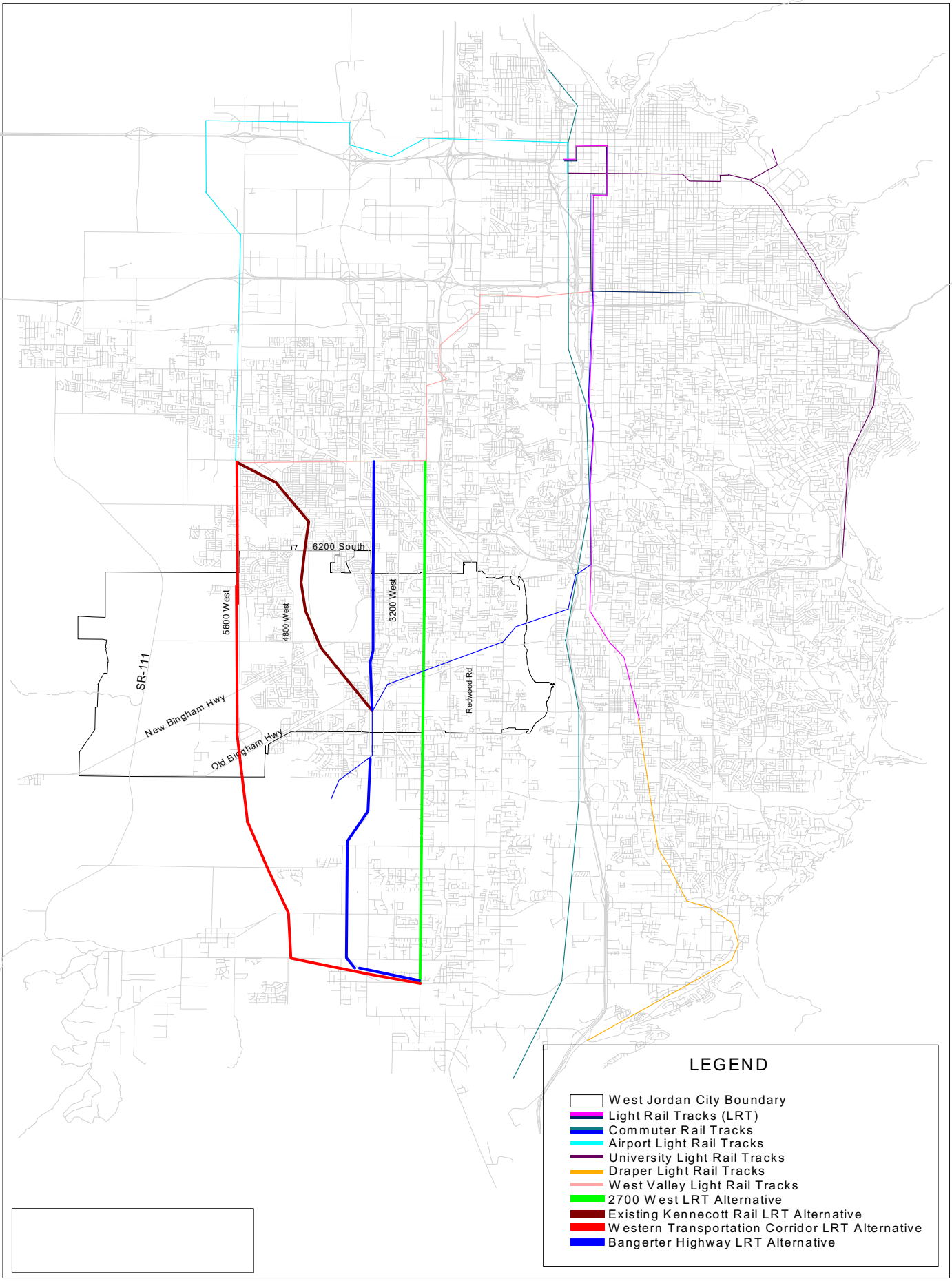
The four rail lines considered and modeled through West Jordan City were at three different locations:

- Along 2700 West as an extension of the planned West Valley spur;
- Along the existing Kennecott (Welby) rail line; and
- Along the planned Mountain View Corridor (MVC).
- Along the Bangerter Highway

Three of the four line locations were actually coded into the West Jordan 2030 travel demand forecasting model based on their locations and/or cost for constructing. While constructing a rail line along an existing rail corridor is far less costly than constructing a whole new line along an existing roadway, the 2700 West line location was coded into the travel demand forecasting model as it provided rail service to the eastern side of the City. The MVC was the second location chosen for modeling as the corridor presently is planned for construction, would have adequate right-of-way needed for the rail line and for passenger stations, and would provide service to the western side of West Jordan.

The third and final alignment modeled was at the existing Kennecott (Welby) rail line which would be near the center of West Jordan. This location was chosen over the Bangerter Highway location as it would be far less costly to construct and would be more pedestrian friendly. Due to the existing design of Bangerter Highway it would be extremely costly to construct a rail line at this location as additional right-of way would be needed for the tracks and passenger boarding stations. Another high cost to the Bangerter Highway location would include providing more frequent and safer pedestrian and bicyclist crossing facilities due to the function of the highway with its higher traffic volumes and travel speeds.

The three line locations that were coded into the West Jordan 2030 travel demand forecasting model were modeled to operate with a light rail system. The 2700 West and MVC rail lines would run from the West Valley area through Taylorsville/Kearns areas, West Jordan, South Jordan and into the Riverton/Bluffdale areas with a logical terminal location at the now developing Intel complex just north of 13400 South. The existing Kennecott rail line was modeled by WFRC along the existing corridor and connects to the MVC northern rail line in West Valley at approximately 5400 South and runs southeast to connect near 9000 South with the proposed Mid-Jordan light rail line. Figures 6.2.2 and 6.2.3 show these potential light-rail lines as modeled.



West Jordan Master Transportation Plan

Figure 6.2.2
Potential Long Range Rail Alignments-Salt Lake County

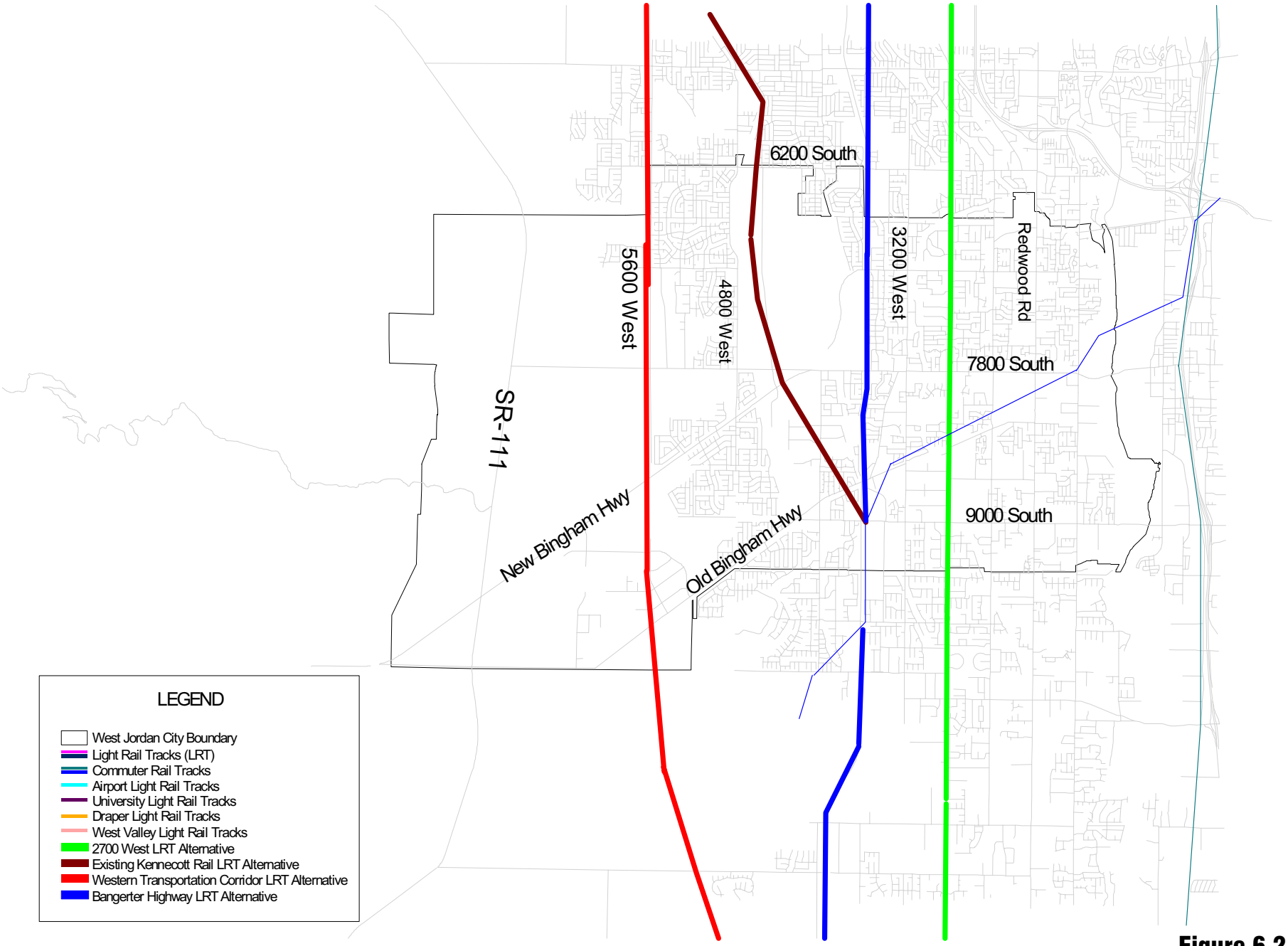


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Figure 6.2.3
Potential Long Range
Rail Alignments-West Jordan

In the transit modeling process it was necessary to assume travel speeds for the light rail trains and potential station locations along the routes. Direct walking distances were assumed within three-quarters of a mile for direct access to rail stations from bus stops and residential and non-residential traffic zones. While future park and ride lots were not identified and modeled it appears that the most potential ridership for a north south rail line would occur using the existing Kennecott rail line in connection with the Mid-Jordan light rail spur followed closely by a line located in the Mountain View Corridor. Table 6.2.1 on the following page shows the results of the ridership modeling for each of the three rail alignments.

It should be noted that the purpose of this rail transit ridership modeling is to provide West Jordan City some preliminary information regarding some transportation options that may be considered in the somewhat distant future. This information is very preliminary and is only meant to serve as the genesis of some transit developments that may not occur for 30 years or more. An important part of the ongoing environmental study for the Mountain View Corridor is analysis of transit options within the corridor. The completed study will provide valuable transit information for the city.

From the travel model and the transit modeling process it is evident that a north south rail line will only benefit West Jordan and its neighboring cities. While further study on potential transit line(s) needs to be performed, it would be advantageous for West Jordan to take the lead with UTA in investigating existing and potential future transit ridership opportunities to help alleviate congestion on West Jordan City streets now and in the future.

Table 6.2.1 West Jordan City 1990, 2000, and Projected 2030 Transit Ridership

	Percent West Jordan Transit Work Trips	West Jordan Transit Work Riders	Percent West Jordan Transit Total Trips	West Jordan Total Transit Riders	Percent Salt Lake County Transit Work Trips	Salt Lake County Transit Work Riders	Percent Salt Lake County Transit Total Trips	Salt Lake County Total Transit Riders
1990 Census	2.12 %	372	N/A	N/A	3.49 %	11,118	N/A	N/A
2000 Census	2.38 %	779	N/A	N/A	3.63 %	15,332	N/A	N/A
Long Range Plan	5.24 %	6,975	1.47 %	13,578	8.98%	86,673	2.78 %	172,160
2700 West Rail Line	5.36 %	7,135	1.50 %	13,839	9.16 %	88,369	2.81 %	174,529
Welby Rail Line	**6.45 %**	**8,588**	**1.71 %**	**15,828**	**9.45 %**	**91,208**	**2.88 %**	**178,425**
WTC Rail Line	6.14 %	8,180	1.66 %	15,334	9.30 %	89,782	2.84 %	176,509
Difference between Long Range Plan and Existing Rail Line Transit Forecasts	1.21 %	1,613	0.24 %	2,250	0.47 %	4,535	0.06 %	6,265

6.3 TRANSIT FACILITIES DESIGN GUIDELINES

Surrounding land uses have as much to do with the success of a transit system as does the characteristics of that system itself. There are several land use guidelines and recommended policies given in the UTA handbook that will encourage the development of transit-supportive facilities and systems. These include:

- Encourage mixed-use development
- Plan appropriate densities
- Create transit corridors
- Encourage appropriate land uses within transit corridors and stations
- Optimize development, redevelopment and infill opportunities
- Interconnect the street systems in communities
- Reduce parking requirements

The UTA Strategic Planning Department has produced a draft version of a handbook meant to aid community leaders, planners, developers, engineers and citizens in improving transit systems and transit-supportive developments in their communities. This document dated December 2001 is called *A Handbook of Land Use/ Transit Coordination for Wasatch Front Communities*. The information about the design of transit facilities is taken from this handbook. Each of these topics is discussed in detail in the UTA handbook, and it is recommended that this handbook be read in its entirety as there is a great deal of valuable information that cannot be covered in this report.

In addition to land use and planning information this handbook also gives some engineering guidelines regarding bus stops, park and ride lots and intersection design relative to transit users. These design considerations are applicable to city streets as well as within mixed-use and other types of developments. Various figures on the following topics were selected from the handbook and are included in the appendix:

- **Bus Turning Template** – Provides a layout of the turning path of a standard bus and the minimum radii necessary for a safe turn;
- **Intersection Design for Bus Turns** – Provides recommended curb radii and no-parking zone lengths for various intersection and on-street parking scenarios;
- **Bus Stop Dimensions** – Provides recommended dimensions for both near- and far-side bus stops as well as those with and without on street parking;
- **Bus Turnouts** – Provides recommended turnout and taper lengths for various scenarios;
- **Bus Shelter Placement** – Provides recommended bus shelter placement locations for various situations;
- **Vertical and Horizontal Clearances** – Provides recommended clearances for bus stops;
- **Pavement Composition** – Provides an illustration of various pavement sections that can be utilized at bus stops to preserve the integrity of the pavement; and
- **Park-and-Ride Layout** – Provides an example of the layout of a park-and-ride lot.

6.4 GOALS & POLICIES – PUBLIC TRANSPORTATION

GOAL: TO ESTABLISH A MULTI-MODAL TRANSPORTATION SYSTEM.

Policy 1. West Jordan will encourage a greater use of bus transportation.

Implementation Measure. Coordinate with UTA to prepare a Comprehensive Bus and Transit Plan including park and ride facilities. This plan should be designed to provide service to major activity centers (such as Salt Lake Community College), large commercial developments (such as Jordan Landing), and an inter-modal transit hub in downtown West Jordan.

Implementation Measure. Reserve land for future transit shelters and park and ride facilities as identified by UTA.

Implementation Measure. Promote construction of an inter-modal transit hub for bus service, light rail, park and ride, bicycle, and pedestrian traffic.

Implementation Measure. Encourage employer subsidies for employee transit passes.

Implementation Measure. Ensure that all bus stops are ADA compliant.

Policy 2. West Jordan will support design and construction of a light rail system to serve the City.

Implementation Measure. Work with UTA to develop a light rail system to serve the City with transit stations located at major activity centers. Such a system should extend to the north and south as well as east to west.

Implementation Measure. Assist UTA in identifying and acquiring sites for potential future light rail stations.

Chapter 7
BICYCLES

States and communities of all sizes throughout the country are undertaking significant investments in facilities to encourage bicycle and pedestrian transportation. Why should cities encourage bicycle transportation? Non-motorized travel has benefits in a number of areas, as outlined below:

1. Personal reasons

- Offers least expensive mode of travel (except for walking).
- Reduces travel time compared to walking or where parking is scarce.
- Provides door-to-door access.
- Provides cardiovascular fitness.

2. Environmental reasons

- Reduces air pollution/global warming/acid rain.
- Decreases reliance on petroleum products.
- Decreases noise pollution from automobiles.
- Decreases land area devoted to parking.
- Most energy-efficient mode of transportation.

3. Societal reasons

- Reduces vehicle trips.
- Improves public health through a cleaner environment, more exercise.
- Provides mobility for citizens without cars or those too young to drive.
- Improves overall quality of life.
- Increases 5-minute catchment area of public transit from ¼-mile by walking to 1-mile by biking.

Additionally, federal policy through the Transportation Equity Act for the 21st Century (TEA-21) legislation strongly supports such activities, and significant sources of funding for these types of projects have been made available through the Transportation Enhancement Program and, in non-attainment areas, through the Congestion Mitigation and Air Quality (CMAQ) improvement program of TEA-21.

7.1 FACILITY DESCRIPTIONS

7.1.1 Types of Bicyclists

The primary objective of the citywide trails and bikeway network is to serve the needs of all types of bicyclists. There are many types of bicyclists with varying levels of skill and willingness

to ride in traffic. These range from the experienced adult cyclist to the casual adult cyclist to the child cyclist. There are many gradations of cycling competency and confidence and just as many opinions as to what makes an ideal bike route. For example, some experienced cyclists avoid separate bike paths, preferring to share the roads with cars. Other cyclists will ride in bike lanes only if parallel residential roads are unavailable.

Children differ from adults in their trail and bikeway needs. Children approximately ten years and older are capable of walking or riding a bike by themselves for more than a few blocks. Parents are most likely to allow their children to ride only on residential streets, and to cross arterial intersections when controlled by traffic signals. As their children get older, many parents will allow them to ride on busier streets with bike lanes.

The preferences for trail and bikeway facilities of the various bicyclists are presented in Table 7.1.1. While it is not meant to imply that all bicyclists fit exactly into one of these five categories, this table illustrates the varied preferences that exist across the spectrum of cyclists. In order to serve all types of bicyclists, the network consists of major roads in West Jordan, some residential streets, and multi-use trails.

Table 7.1.1 Bicyclist User Types vs. Facility Types

		Experienced	Casual Adult	Novice Adult/ Youth	Experienced Recreational	Family Recreational
Roadways						
No Bike Lanes	Bicycle Boulevard or < 2000 VPD	✓	✓	✓	✓	✓
	≤ 13’ curb lane	✓			✓ (low ADT)	
	14’ curb lane	✓	✓		✓	
	15’+ curb lane	✓	✓		✓	
Minimum Bike Lane Width of four feet	Low ADT	✓	✓	✓	✓	
	Med. ADT	✓	✓		✓	
	High ADT	✓			✓	
Optimal Bike Lane Width of five feet or more	Low ADT	✓	✓	✓	✓	✓
	Med/High ADT	✓	✓	✓	✓	
Bike Paths						
8 feet wide – Low to High Ped volumes			✓	✓		✓
12 feet wide -High Ped. Volumes			✓	✓		✓
12 feet wide -Low Ped. Volumes		✓	✓	✓	✓	✓

VPD = Vehicles Per Day
ADT = Average Daily Traffic
Note: This table illustrates how various facility designs serve the various types of bicyclists; for the purposes of this table, bicyclists have been categorized into five general types, but this does not imply that all bicyclists would have the same preferences as one of these categories.

7.1.2 Bikeway Types

The following descriptions of bicycle-related terms are provided to assist readers who are unfamiliar with bicycle terminology. The terms bicycle and bike are interchangeable.

- **Bikeway** - A thoroughfare suitable for bicycles - it may either exist within the right-of-way of other modes of transportation, such as highways, or along a separate and independent corridor.

- **Bicycle Facilities** - A general term denoting improvements and provisions to accommodate or encourage bicycling, including parking facilities, maps, all bikeways and shared roadways.

- **Bicycle or Multi-use Path (Bike Path or Class 1)** - A bikeway physically separated from motorized vehicular traffic and either within the highway right-of-way or within an independent right-of-way. Bike path facilities are often excellent recreational routes and can be developed where right-of-way is available. Typically, bike paths are a minimum of 10 feet to 12 feet wide, with an additional graded area maintained on each side of the path.

- **Bicycle Lane (Bike Lane or Class 2)** - A portion of a roadway that has been designated by striping, signing, and pavement markings for the preferential or exclusive use of bicyclists. Bike lanes are ideal for minor thoroughfares or collectors. Under certain conditions, bike lanes may be beneficial on streets with significant traffic volumes and/or speeds. Under ideal conditions, minimum bike lane width is four feet.

- **Signed Bike Route (Class 3)** - A segment of a system of bikeways designated by appropriate directional and/or informational signs. In this plan, a Class 3 signed bike route may be a local or residential street, bicycle boulevard, an arterial with wide outside lanes, or a roadway with a paved shoulder.

- **Paved Shoulder** - The part of the highway that is adjacent to the regularly traveled portion of the highway, is on the same level as the highway, and when paved can serve as a bikeway. Paved shoulders should be at least four feet wide, and additional width is desirable in areas where speeds are high and/or a large percentage of trucks use the roadway.

- **Wide Outside Lane** - An outside (curb) lane on a roadway that does not have a striped bike lane, but is of sufficient width for a bicyclist and motorist to share the lane with a degree of separation. A width of 14 feet is recommended to safely accommodate both motor vehicles and bicycles.

- **Bicycle Boulevard** - A residential street that has been modified for bicyclist safety and access.

7.1.3 Bicycles on Sidewalks

Bicycles traveling on sidewalks is not a recommended practice and may cause significant safety hazards for both bicyclists and pedestrians. Although bicyclists and pedestrians can safely share separated trails and pathways, the shared use of a sidewalk is subject to behavior patterns not found on shared trails and pathways. First, a minimum 10-foot width is recommended for shared trails and pathways; sidewalks are not usually that wide and may also have obstructions such as posts, benches, trash containers, and newspaper racks which further reduce the travel width. Second, bicyclists are generally not expected to be on the sidewalk; consequently, pedestrians are less likely to watch for bicyclists and may be more prone to colliding with a bicycle. It is especially hazardous for persons exiting a store or business directly into the path of a bicycle. Third, intersections pose a significant hazard to bicyclists especially from right-turning vehicles; although right-turning motorists may be watching for pedestrians in the crosswalk, they may not see the bicyclist traveling at a higher and unexpected speed through the intersection.

7.1.4 Design Guidelines

There are various items to be considered when installing a bicycle lane. One of the first decisions to be made is the width of the bicycle lane. A bike lane should be at a minimum 4' wide with 5' being preferred. Generally, the higher the speed of the roadway facility the wider the bike lane needs to be. Wider lanes provide a greater feeling of comfort for the cyclists using the facility. Figure 7.1.1 illustrates bicycle lane widths versus posted vehicle speed limits.

The width of multi-use paths also needs to be considered. The use of the path and the expected volume of users need to be considered. Most pedestrians and bicyclists prefer a hard surface while equestrian users and some joggers prefer a soft surface. Wider paths are preferred when high volumes are expected. If a very high volume of users is expected, it may be necessary to separate the two travel directions by a small median. Figure 7.1.2 shows recommended path widths for various volumes of users.

When striping a bicycle lane decisions need to be made on how to handle the interaction between vehicles turning right and bicyclists. When no exclusive right turn lane for vehicles is provided, it is recommended that the bike lane be a dashed rather than solid line beginning 200' from the intersection. When exclusive right turn lanes are provided the bike lane should go between the right turn lane and the inside through lane. As the bike lane crosses the beginning of the right turn lane dashed striping should again be utilized. These concepts are illustrated in Figure 7.1.3, which shows various options for striping bicycle lanes on streets with and without on-street parking.

The striped line between the edge of the right vehicle travel lane and the bicycle lane should be 6" wide as opposed to the typical 4" wide, which serves to emphasize the importance of vehicles not crossing the line. The dashed lines used for bicycle lanes should also be 6" wide and should have short dashes about 4' long with 8' between dashes.

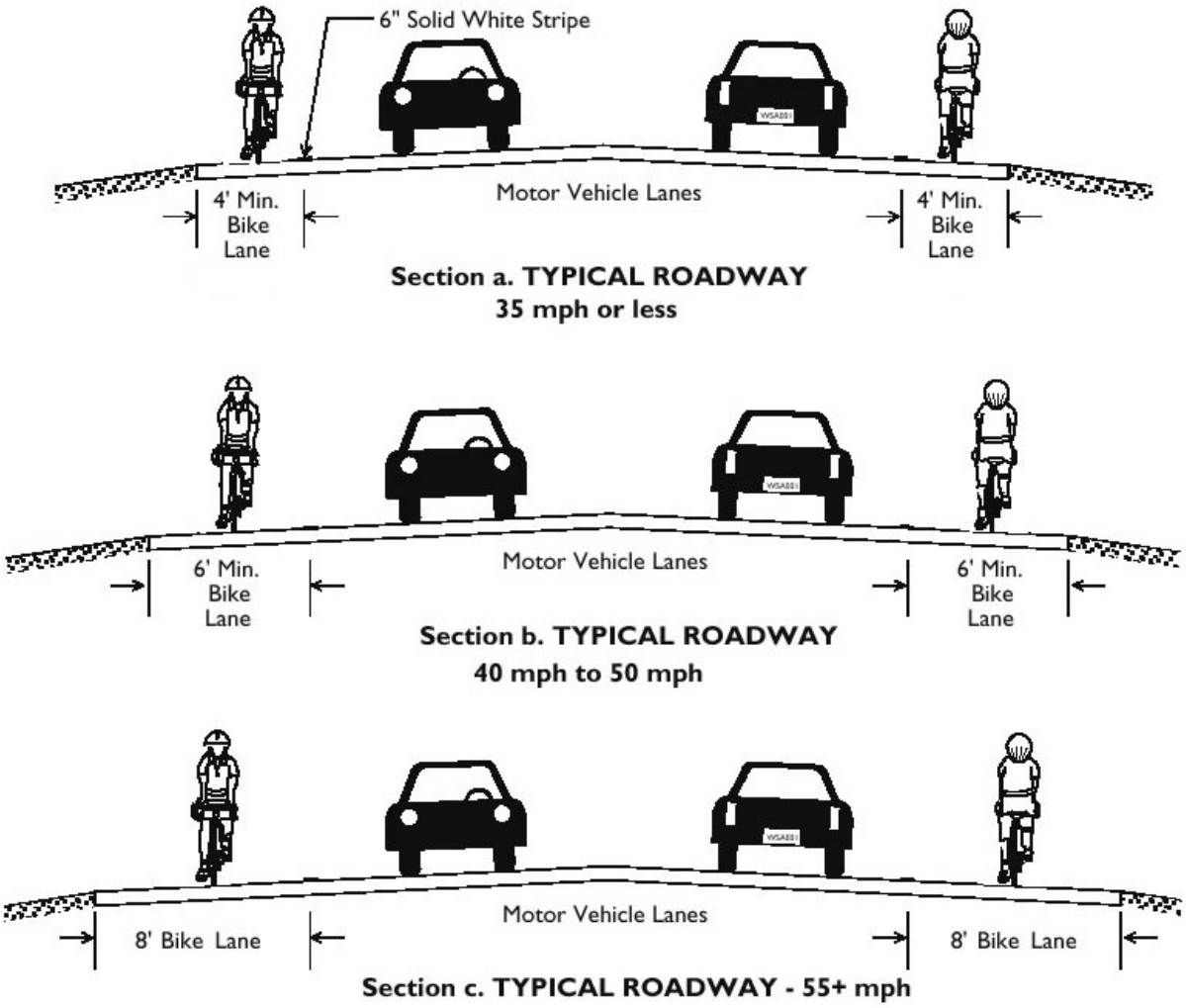
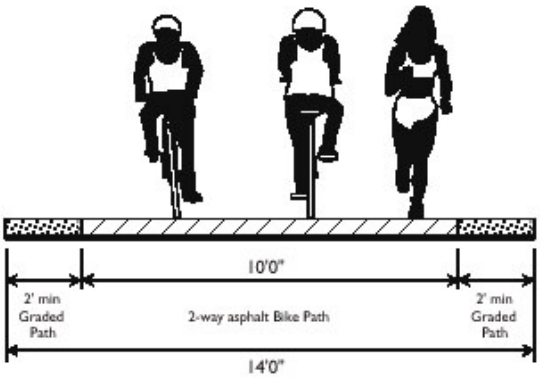
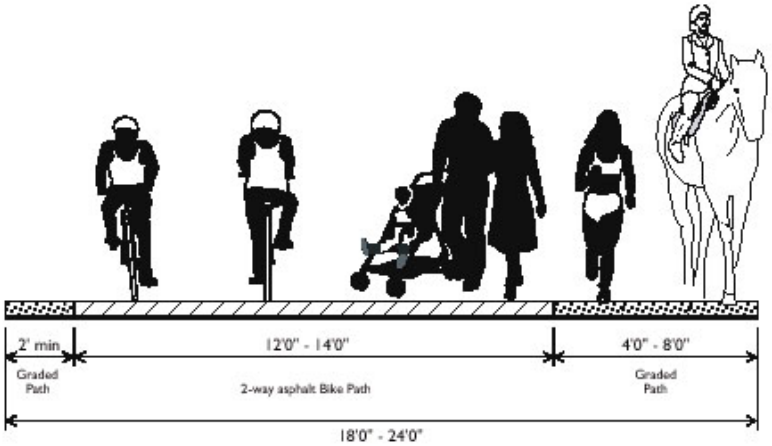


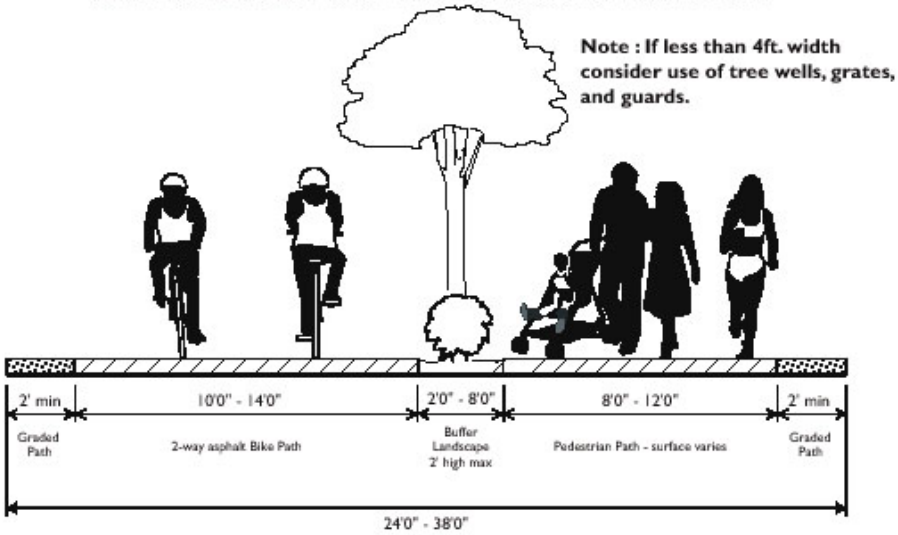
Figure 7.1.1 – Bicycle Lane Widths vs. Posted Speed Limits



1a. BIKE PATH WITH PEDESTRIAN TRAFFIC OF LESS THAN 50 PER PEAK HOUR



1b. MULTI-USE TRAIL - 50 TO 400 PEDESTRIANS PER PEAK HOUR



1c. SEPARATE PATHS FOR BIKES AND PEDESTRIANS MORE THAN 400 PEDESTRIANS PER PEAK HOUR

Figure 7.1.2 – Multi-Use Path Cross Sections

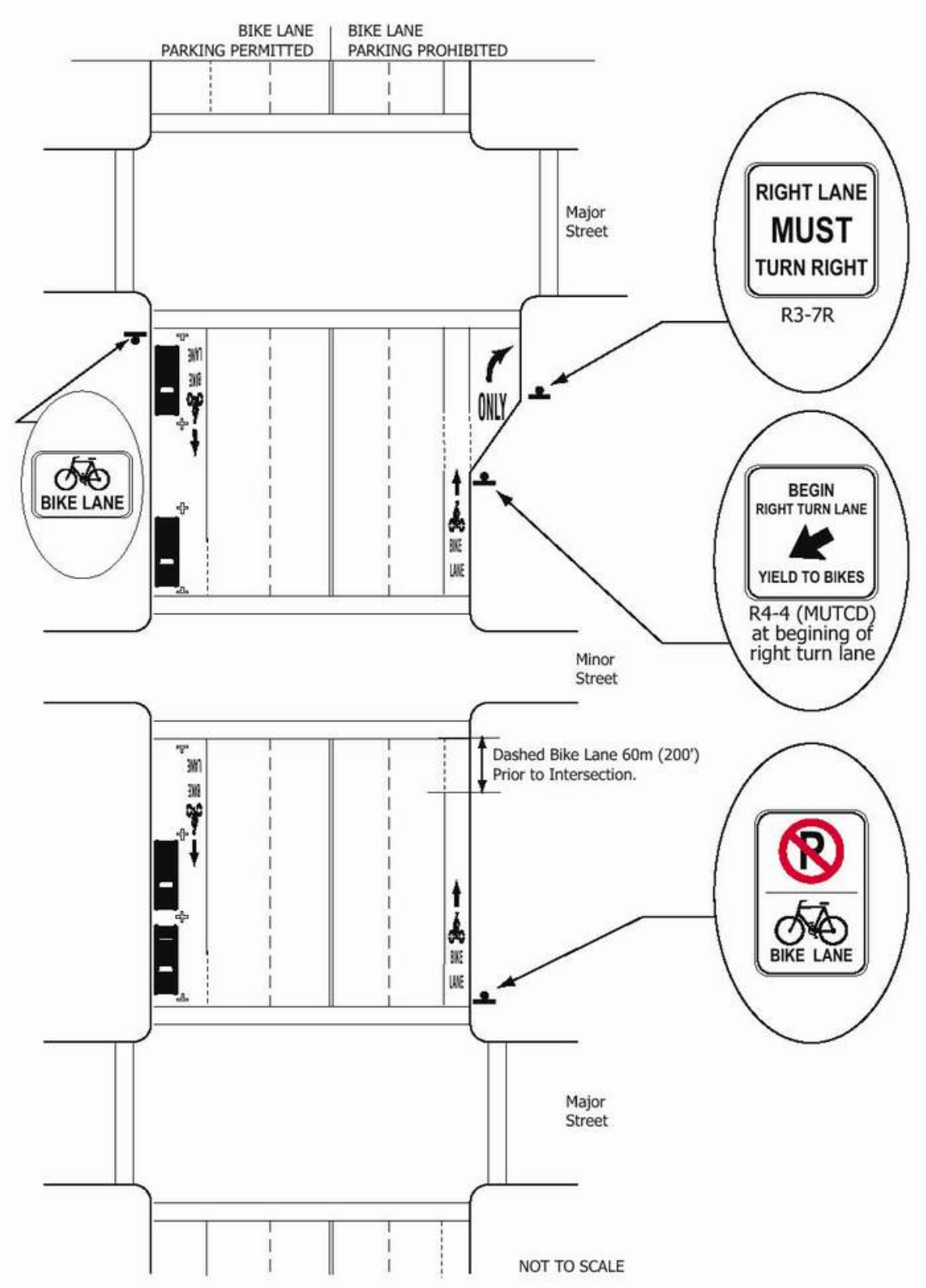


Figure 7.1.3 – Bike Lanes on Streets

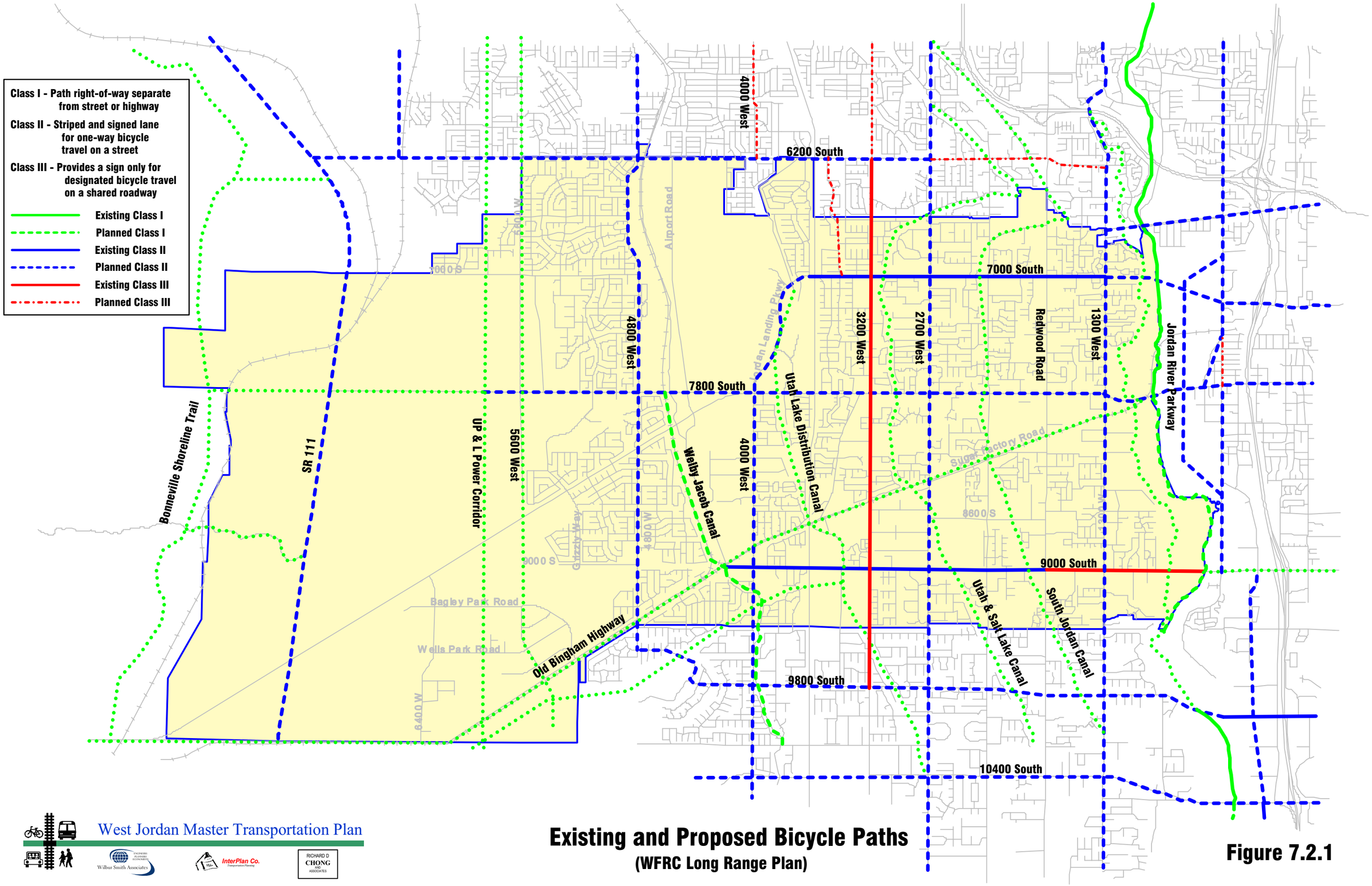
7.2 WEST JORDAN BIKE PATHS

7.2.1 WFRC Long Range Plan

The Long Range Plan of the Wasatch Front Regional Council includes a map of existing and future bicycle paths throughout Salt Lake County. A portion of this map is shown in Figure 7.2.1. The map shows Class II facilities along the major east-west streets in West Jordan and Class I facilities along the irrigation canals and the railroad tracks throughout the city. The Jordan River Parkway is shown as a Class I facility.

7.2.2 Recommended Bike Paths

The map of the proposed bicycle and trail facilities network is shown in Figure 7.2.2. All of the proposed street cross-sections allow for the addition of bicycle lanes. Before a bicycle lane can be installed on a roadway, the roadway itself must be complete along the entire extent of the bicycle path. Missing shoulders and incomplete segments pose a serious hazard to bicyclists. An example of a good facility for bike lanes is Grizzly Way, which could immediately support a bike lane from 7000 South to 9000 South.

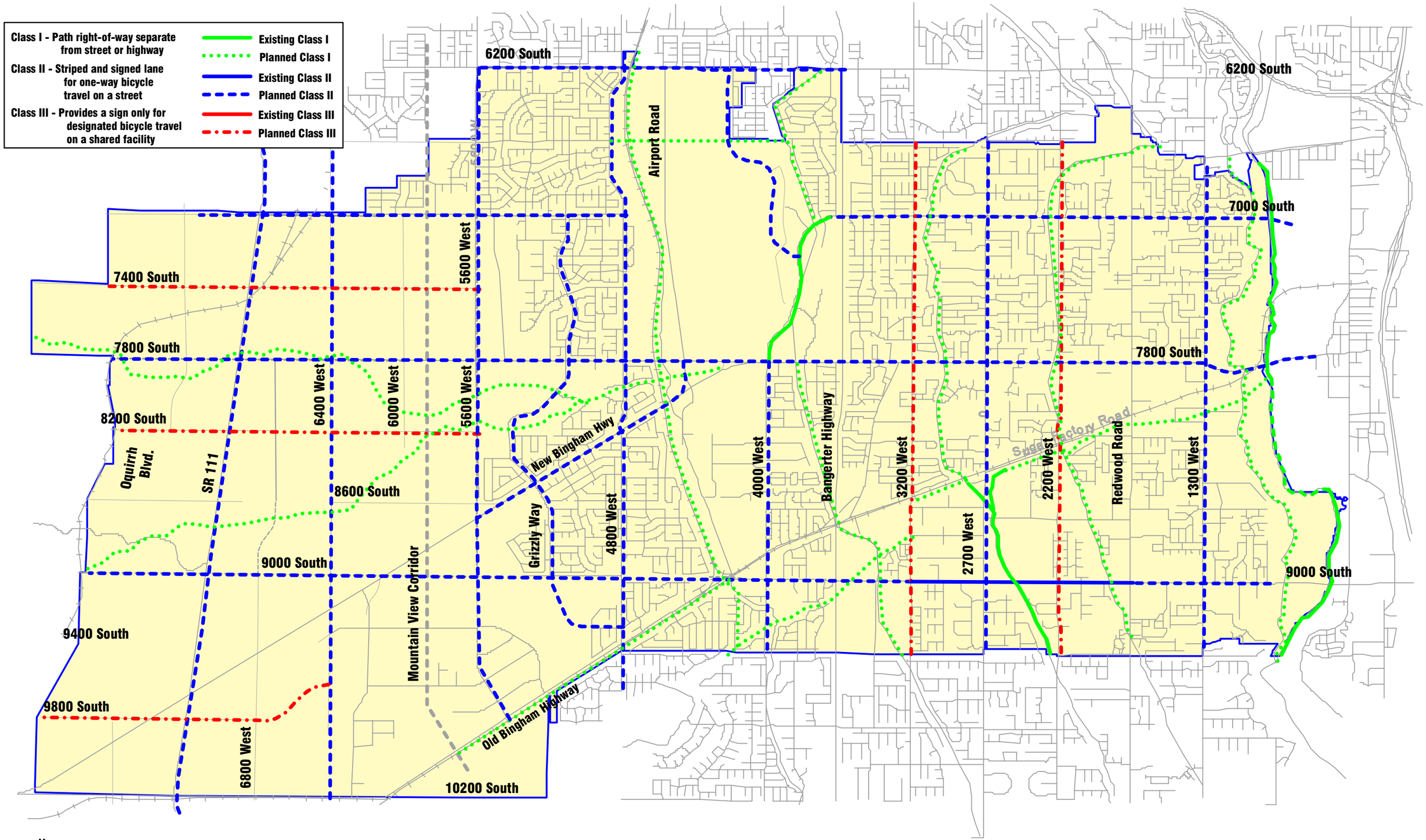


West Jordan Master Transportation Plan

Existing and Proposed Bicycle Paths

(WFRC Long Range Plan)

Figure 7.2.1



West Jordan Master Transportation Plan

Wilbur Smith Associates

InterPlan Co.

RICHARD D CHONG AND ASSOCIATES

Recommended Trails/Bicycle Routes

NORTH

Figure 7.2.2

7.3 SUPPORT PROGRAMS

Bicycle Parking

Bicycle parking facilities fall into three general categories.

- **Class I -** This is defined as protecting the entire bicycle and its components from theft, vandalism or inclement weather. It is appropriate for long-term bicycle parking such as at employment centers or transit stations. Examples are bike lockers, rooms with key access for regular bike commuters, guarded parking areas, and valet or check-in parking. A common variation of the latter examples is at schools where racks are placed within a fenced com-pound to provide more security to discourage thieves. The compound is either locked during the day or unofficially guarded by the activity within the school.
- **Class II -** This is defined as a rack to which the frame and at least one wheel can be secured with a user-provided U-lock or padlock and cable. This type of parking is appropriate for short-term parking such as at shopping areas, libraries, and other places where the typical parking duration is about two hours. Examples of racks popular with bicyclists are the inverted U-rack, or horse rail rack and the wave or ribbon rack. Increasingly popular are higher security Class II racks.
- **Class III -** These racks secure only one wheel to the rack and were (and are unfortunately) quite popular in school yards. They are never recommended except in guarded areas or locked rooms, where they are used in Class I situations.

Bicycle Parking Needs

Secure bike parking is a necessity for promoting utilitarian bicycle use. People will not cycle to shop, to work, or to school without a safe place to store their bicycle, particularly if the bicycle is an expensive one. The type of bicycle parking provided should meet the needs of the potential users. i.e. Class I parking should be provided for commuters or locations where bicycles will be left for long periods of time.

The City should inspect sites, determine the amount of parking needed, install additional racks and implement a process for the timely review of additional needs and installation of racks. All City buildings should have bicycle parking for employees and, as needed, for customers. At locations downtown with heavy bike parking demand, the single rack on the sidewalk may not provide sufficient capacity. In these cases, consideration should be given to placing racks in an on street parking space or within a nearby parking garage.

The School Districts should inventory the bicycle racks at the schools to determine their current parking capacity, and whether additional capacity, higher security racks or cages, and storage lockers for bike accessories are needed. The League of American Bicyclists recommends that schools have one (1) bike parking space for every 12 students, and one (1) high security (Class I) rack per 30 employees (see next section).

Special Events-The city should identify sites and require promoters of special downtown events to provide free valet bicycle parking during the event.

Parking Ordinances

One way to ensure that bicycle parking is installed where needed is to require it to be installed by property owners or developers. The City does have a bicycle parking ordinance, requiring the installation of bicycle parking spaces equal to 5% of the vehicular parking spaces. This requirement provides an opportunity to add to the City's overall bicycle parking capacity, and ensure that each development's bicycle parking demand is met.

The City may consider revising the bicycle parking ordinance to one that targets different uses and requires both long-term and short-term parking. The table on the following page includes bicycle parking requirement recommendations as developed by the League of American Bicyclists. While West Jordan may not need an ordinance as detailed as this one, it provides an example of the bicycle parking requirements for all types of land uses.

A bicycle parking requirement should be considered for the following development project types and uses:

- New commercial buildings
- Existing buildings undergoing major renovations
- Building change of use
- City-owned and leased buildings
- City-owned parking lots and privately owned parking lots

Bicycle parking requirements should ideally address short-term and long-term parking needs. Short-term bicycle parking is usually targeted to customers, who generally use the parking for less than two hours. Often Class II racks, defined as racks to which the frame and at least one wheel can be secured with a U-lock or padlock and cable, are used for this type. Long-term parking is geared toward people who will be using the parking for 2 hours to a full day, which are often employees. This parking, because it is used for longer periods, should be higher security, such as a locker or an enclosed bicycle cage. This class of bicycle parking is called Class I. Table 7.3.1 presents some recommended bicycle parking requirements.

Table 7.3.1 Bicycle Parking Requirement Recommendations

Use	Required Number of Bicycle Spaces[1][2]
Residential (such as apartments & townhouses)	
• General, multi-dwelling	1 Class I/3 units + 1 Class II/15 units.
• Primarily for students & low-income families, multi-dwelling	1 Class I/2 units + 1 Class II/15 units
• Primarily for residents 62 and older, multi-dwelling	1 Class I/30 units + 1 Class II/30 units
Schools	
• Elementary, middle & high schools	1 Class I/30 employees[3] + 1 spot/12 students (50% Class I and 50% Class II)
• Colleges - Student residences	1 Class I/4.5 beds + 1 Class I/30 employees
• Academic buildings and other university facilities	1 Class I/30 employees + 1 spot/9 student seats (25% Class I and 75% Class II)
Park-and-Ride Lots/Parking Garages	7% of auto parking (75% Class I & 25% Class II)
Transit Centers	5% of daily boardings (75% Class I and 25% Class II)
Cultural/Recreational (includes libraries, theaters, museums, & religious institutions)	1 Class I/30 employees + (1 Class II 1500 sq. ft. or 1 Class II/60 seats (whichever is greater)
Parks/Recreational Fields	1 Class I/30 employees + 1 Class II/9 users during peak daylight times of peak season
Retail Sales/Shopping Center/ Financial Institutions/Supermarkets	1 Class I/30 employees + 1 Class II/6000 sq. ft.
Office Buildings/Offices	1/6000 sq. ft. (75% Class I & 25% Class II)
Hotels/Motels/Bed-&-Breakfasts	1 Class I/30 rooms + 1 Class I/30 employees
Hospitals	1 Class I/30 employees + 1 Class II/45 beds
Restaurants	1 Class I/30 employees + 1 Class II/3000 sq. ft.
Industrial	1 Class I/30 employees or 1 Class I/15,000 sq. ft. (whichever is greater) + 1 Class II/15,000 sq. ft.
Day Care Facilities	1 Class I/30 employees + 1 Class II/75 children
Auto-Oriented Services	1 Class I/30 employees
Other Uses	Same as most similar use listed

Notes

(1) For cities with less than 2% bicycle commuter rate. Pro-rate for cities with higher commute rates.
(2) The minimum number of required Class II Bicycle parking spaces is 4, except when the code would require 1 or less in which case 2 bicycle spaces must be provided.
(3) Employees = maximum number of employees on duty at any one time.
Source: League of American Bicyclists, 1994.

Showers and Lockers

Showers and storage for clothing encourage bicycle commuting and, depending on the length of the commute, may make the difference as to whether biking to work is feasible. Showers and lockers also provide benefit to all employees who run, walk or cycle during lunch breaks. Showers are increasingly common in new office buildings and employment centers along with

full fitness centers as they can attract tenants and employees. Clothes storage facilities can be individual lockers or a closet shared by all employees.

Some employers have showers available for their employees due to the nature of their business such as hospitals and colleges/schools with locker rooms. However, in general, few shower facilities exist for employees in the City of West Jordan. No public showers are available for bicycle commuters.

Currently, there are no existing requirements regarding the provision of shower/locker facilities in new non-residential development. The city may wish to consider incorporating a requirement or standard in the zoning ordinance that showers/locker facilities be included in new buildings. As an alternative to making this requirement, developers or companies that provide such facilities could also be eligible for a reduction in the parking requirement or some other incentive included in an overall Travel Demand Management Program. Small businesses should be exempt from any proposed requirement. However, they could be encouraged to share shower facilities with other businesses or arrange for their employees to use other facilities.

Bicycle Education

Bicycle education includes programs addressing bicycling safety as well as promoting bicycle use. Education programs should be tailored to target specific audiences such as adult cyclists, elementary school students, junior and high school students, motorists and the general public. Bicycle safety education programs can be disseminated in numerous formats. The two basic categories are *informational*, such as posters, brochures, videos, and classroom presentations, or *hands-on*, such as off-street practice and escorted on-street training rides. Informational programs are intended to develop awareness and provide knowledge. Hands-on programs are designed to change behavior and/or develop skills. *Comprehensive* programs employ both presentation and practice. While the most effort is currently aimed at children, there is still room for improvement.

7.4 BICYCLE EDUCATION PROGRAMS

Bicycle education includes programs and other forms of outreach to encourage safety among riders and motorists and promote bicycle use. In addition, informational materials should include a map of bike routes and trails as well as information on road rules, use on transit, parking and services for bicycles (like bike shops). The most useful information on bicycle education programs can be found through review of existing programs in other cities. The Internet, cycling organizations, and cycling magazines are good sources for contact information.

Programs Implemented in Other Communities

- Cops on Bikes (Currently exists in West Jordan)
- Bicycle Rodeos
- Bicycle Licensing
- Speed Reduction Safety Programs
- Bike-to-Work/School Week Programs
- Classroom instruction in conjunction with driver's education classes
- City sponsored "Fitness Day"
- Charity Rides
- Trails and Bikeways Column in local newspaper
- "Bicycle Your Child to Work" Day
- "Adopt a Bike Lane/Trail" Program

Curriculum and Programs to Buy

There are numerous education programs and materials available for purchase, some of which are listed in the appendix of this report.

7.5 IMPLEMENTATION

7.5.1 Improvement Prioritization

Determine priority for improvements and projects by working within the priority guidelines of the Bicycle plan. Improvements can be made to segments of a network as a whole or to specific spots. Improvements can be made to the network by adding a new route or path or installing directional and safety signage or systematic installation of bike parking.

"Spot improvements" is a large category that includes many different types of safety and access improvements that significantly improve the safety, convenience, travel time, ambiance and/or overall utility of a bicycle route. A spot improvement is generally limited to a specific location or intersection, as opposed to those that are applied to an entire segment. Examples of spot improvements include:

- Improving site specific hazards such as railroad tracks or unsafe drainage grates.
- Providing a signal or other device to help bicyclists cross an arterial (exact device to be determined during implementation phase).
- Bicycle/pedestrian overcrossings needed above a freeway or other barrier

In addition, a system for the City to identify and address hazardous surface conditions or bikeway maintenance needs should be developed in a way that maximizes public input and City resources.

Five main categories can be used in prioritizing bikeway projects. Each category is scored on a three-part scale of High, Medium and Low. The highest scoring projects were then considered the High Priority projects.

The five criteria used to prioritize the projects are:

- **Accident history:** Safety for all users of the system is paramount. Projects that directly or indirectly improve safety are rated higher than others are.
- **High bicyclist demand:** Projects that serve the highest numbers of bicyclists (existing or future) are rated higher than others.
- **Serves a School:** Projects which serve schools are rated higher than other routes.
- **Closure of a gap in the bicycle network:** Connectivity is important and projects that enable direct travel are given higher priority.
- **Ease of Implementation:** Projects which can be implemented quickly and with little controversy should be given higher priority.

The projects that comprise the City's Bicycle network can then be rated using these criteria. The projects scoring in the top 25 to 30 percent are considered the High Priority projects with an approximately equal number of projects assigned to the low and medium tiers.

It is recommended that as projects are implemented and in response to changing conditions, the decision-makers will re-assess these priorities annually and revise them as needed. The projects

within the "High" priority category have not been rated relative to each other at this time. Depending on the success of grant applications, there may be enough funds to implement all the high priority projects within five to ten years. The decision of which project to proceed with first will depend on the specifics of the funding availability and project readiness. If an objective basis is needed to determine which project within the high priority tier to proceed with first, then the high priority projects can be rated with a more quantitative methodology. All other projects can be considered to be in a second lower priority tier.

7.5.2 Funding Sources

Identify federal, state, and local agencies that provide relevant funding, as well as grants that may be available through private foundations or NGOs.

Traditional Funding Sources

This section outlines the most probable funding sources to implement the recommended bikeway projects. While some funding sources are dedicated to the City, many are competitive. Also, the City may receive funding for roadway projects that can be used to implement some bikeway projects in this Plan. The most likely funding opportunities for bicycle improvement projects in the City are:

- Transportation Development Act (TDA) Article 3 funds
- Bicycle Transportation Account (BTA)
- Air Quality Management District funds - Transportation Fund for Clean Air (TFCA)
- Surface Transportation Program of the Transportation Equity Act of the 21st Century (TEA-21) - This is often used to fund projects with bicycle components. In fact, bicycle facilities enable the project to score higher.
- Office of Traffic Safety (OTS) - This funding source is often used for bicycle and pedestrian safety projects. It can be used for traffic calming programs as well.
- Transportation Enhancements of TEA -21 (TEA)
- Transportation for Livable Communities (TLC)
- Safe Routes to School (SR2S)

Non-Traditional Funding Sources

In addition to the sources listed above there are several non-traditional funding sources that might be available for the long-term implementation of project and program recommendations. The following paragraphs briefly describe several of the unusual or innovative ways that communities have funded parts of their bicycle programs.

Grant and Foundation Opportunities - Private foundations provide excellent opportunities for funding specific capital projects or single event programs. To qualify for these types of funds, the City must have an established non-profit group acting in its behalf, must exist. In general, private foundations are initially established for specific purposes, e.g. children and youth needs,

promotion of certain professional objectives, educational opportunities, the arts, and community development. There are four types of foundations:

- Independent Foundations
- Company-Sponsored Foundations
- Operating Foundations
- Community Foundations

In general, private foundations prefer to fund programs that are special in nature such as conferences or children's education events, rather than programs viewed as city responsibilities such as constructing and maintaining roadways.

Adopt-A-Trail/Path Programs - Modeled upon the program of highway maintenance contributions, this program would post signs to indicate which individual or group has contributed to the development, installation or maintenance of a particular bike facility.

Memorial Funds - These programs are advertised as potential donor projects to be funded via on-going charitable contributions or funds left to a particular project through a will. Most memorial projects include the location of a memorial plaque at a location specific to the improvement or at a scenic vista point.

Revenue-Producing Operations - As part of the development of a trail or bike path, plans can specifically include the location of a revenue-producing operation adjacent to the proposed improvement. For example, bicycle rental facilities, food and drink establishments, bike storage facilities and equipment centers, and/or equestrian centers would be appropriate uses. The on-going lease revenues from these operations could then be used for trail/path maintenance.

7.5.3 Maintenance

Maintenance is necessary to keep the bikeway network effective. It is recommended that there be a maintenance program to keep the network in good repair and should include replacing signage, repainting of striping and pavement markings, sweeping bike lanes and repairing or replacing drainage grates.

7.6 GOALS & POLICIES – BICYCLES

GOAL: TO ESTABLISH A MULTI-MODAL TRANSPORTATION SYSTEM.

Policy 1. West Jordan will encourage a greater use of pedestrian and bicycle transportation facilities.

Implementation Measure. Coordinate the Master Trails Plan and the Master Bicycle Plan with a Comprehensive Bus and Transit Plan. These plans should provide access points where pedestrians, bicyclists, and transit riders will meet.

Implementation Measure. Provide facilities for pedestrian or bicyclists to store bikes and gear at transit stops.

Implementation Measure. Consider the allowance of smaller corner radii on streets that are designed to enhance pedestrian circulation such as in Transit Oriented Development zones or near high pedestrian traffic generators.

Implementation Measure. Improve pedestrian access to multi modal facilities.

GOAL: TO ENCOURAGE THE USE OF BICYCLE TRANSPORTATION SYSTEMS.

Policy 1. West Jordan will work to improve current bicycle transportation facilities.

Implementation Measure. Update the Bicycle & Pedestrian Master Plan.

Implementation Measure. Make all streets in the City bicycle friendly with bike lanes or wide curb lanes, regular sweeping and elimination of hazards and barriers.

Implementation Measure. Establish and maintain a safe, direct, and convenient network of bicycle routes to major activity centers and the regional trails network.

Implementation Measure. Link bicycle routes to the inter-modal hub(s), park-and-ride facilities, bus routes, and future light rail stations.

Implementation Measure. Encourage businesses to provide facilities for storing bicycles (bike racks, etc.) for employees and visitors, as well as providing showers and clothing lockers. Consider code requirement for showers, clothing lockers, and bicycle parking for all new developments based on land use, size, and auto parking facilities.

Implementation Measure. Provide bicycle parking facilities at inter-modal hubs, park-and-ride facilities, and future light rail stations.

Implementation Measure. Include bicycle route creation costs as part of the Capital Facilities Plan.

Implementation Measure. Reduce conflicts and increase safety for pedestrians and bicyclists at railroad crossings.

Implementation Measure. Upgrade existing class II bicycles routes to class III standards.

Implementation Measure. Promote bicycle safety educations programs targeted at adult cyclists, elementary school students, junior and high school students, motorists, and the general public.

Implementation Measure. Encourage enforcement efforts on the most common motorist and bicyclist violations.

Chapter 8
PEDESTRIANS

Walking is the oldest form of transportation; the first cities were based on walking as the predominant mode of travel. Walking is also the cheapest, healthiest, and, to a large number of people, the most enjoyable.

The elements of walkable communities are:

- A compact, urban space
- Shopping and employment close to housing
- Inviting public spaces that promote and stimulate social interaction
- Urban design that preserves/enhances the natural environment
- Human-scaled roadways that are not intimidating to walk on or to cross
- Sufficient parking without being a sea of asphalt which can be created by:
  - On-street parking with sidewalks
  - Parking lots broken into sections by rows of landscaping and by sidewalks, which reduces the conflict between pedestrians and automobiles. At a minimum, developers should create parking lots that are walkable by painting or building walkways crisscrossing the lots
- An additional element in creating a walkable community is the integration of the transportation infrastructure, e.g. walk to transit stop, take transit, walk to destination, return via transit

8.1 DESIGN CONSIDERATIONS

Pedestrian design standards are not as fully developed in the field of traffic engineering as are roadway and bicycle facility standards. However, there are isolated examples of cities with adopted pedestrian plans and design guidelines, such as Portland, Oregon, and Cambridge, Massachusetts. Additionally, the Americans with Disability Act (ADA) has led to the formation of many guidelines that affect pedestrian facilities.

In designing for pedestrian circulation and access, the following issues should be considered. It is also important to note that there are differences between walking and bicycling in the design of facilities. These design considerations are listed here to ensure that the differences between walking and bicycling are taken into account.

Table 8.1.1 Design Considerations for Pedestrian Facilities

Issue	Pedestrian	Bicycling
Surface	Practically speaking, surface can vary considerably from concrete or asphalt to cobblestone to crushed granite; ADA rules will also apply.	Asphalt or concrete; Decorative pavers if installed appropriately but are usually cost-prohibitive
Design Speed	Typically 2 to 4 mph Pedestrian phasing timed at between 2.5 fps (1.7 mph) and 4 fps (2.7 mph)	20 mph level; 30 mph w/grade.
Stopping Distance	5 feet	15 mph: 75 ft. (level) 30 mph: 260 ft. (5% grade)
Location	Sidewalks in urban/suburban areas. Shoulder or edge of roadway in rural areas.	Shoulder or bike lane, travel lane if not. Sidewalk OK if age 12 or under
Parking	n/a	Needed
Grades	Stairs OK ADA also requires ramps.	Stairs not OK-ADA usually governs - 8.25% maximum grade for ramps

Mixed-use trails need special consideration because by definition they accommodate more than one mode, all with varying speeds: pedestrians, joggers, bicyclists, roller bladers, children on tricycles, etc. In general, the more varied the users, the wider the trail should be, with the optimum design being separate trails for slower users and faster users. Figure 7.2.2 in Chapter 7 – Bicycles shows recommended trails and bike routes throughout West Jordan.

Traffic Calming

Traffic calming provides many benefits to pedestrians and to the creation of livable neighborhoods. Traffic calming and slower traffic enhances pedestrian safety by:

- Decreasing the chances of a car-pedestrian collision;
- Reducing the severity of injuries should a collision occur;
- Making it easier and less intimidating for pedestrians to cross streets.

Traffic calming and slower traffic encourage more walking and bicycling by improving the ambiance of the neighborhood and more livable streets by:

- Producing less traffic noise; and
- Reducing the level of air pollution.

8.2 TRADITIONAL NEIGHBORHOOD DESIGN

Essential Characteristics of Traditional Neighborhood Design

Traditional Neighborhood Design (TND) contains the essential characteristics that make a community pedestrian-friendly and walkable[1]:

- Medium to high densities of land use.
- Dense development around transit stops with easy access to those stops.
- Mix of land uses.
- Street-oriented buildings (no farther than 25 feet from street edge).
- Proper height to width ratio for street enclosures (1:1 to 1:3).
- Short to medium block lengths (300 to 500 feet).
- Comfortable and safe places to wait.
- Transit routes every half-mile.
- Two or four lane streets with rare exceptions.
- Continuous sidewalks wide enough for couples.
- Safe pedestrian crossings.
- Appropriate buffering from traffic (on-street parking, park-rows, street trees).

Traffic Engineering Features of Traditional Neighborhood Design

The information presented in this section was culled from a number of sources including Walter Kulash[2], and ITE[3],[4].

Street Layout - The traditional street layout consisted of a dense network of highly connected streets. This usually manifested itself in a grid pattern of streets, where there are multiple available routes for a given trip. There are always alternate routes available if the primary route for a trip is unavailable.

Street Cross Section - Residential streets in traditional neighborhoods are typically no greater than two travel lanes plus on-street parking, with the maximum pavement width of 32 feet or less. TND calls for a street right-of-way sufficient to contain this street cross-section, but not intended to accommodate a wider pavement at later stages. For most collectors, a right-of-way width of 70 feet can accommodate the TND street. In the TND concept hierarchy of streets is

[1] Reid Ewing, *Pedestrian- and Transit Friendly Design*, International City/County Management Association March 1996
[2] Walter Kulash, *Why TND Traffic Systems Work*, June 28, 1998
[3] Institute of Transportation Engineers, Traditional Neighborhood Development Street Design Guidelines Recommended Practice, 1999
[4] C. Rick Chellman, P.E., *The Design of New Urbanist Streets*, prepared for the Urban Land Institute, April 2000

reduced or nonexistent - either eliminating or greatly reducing the "hierarchy" of conventional functional classifications that are assigned to streets.

In the conventional system, the base of the hierarchy is local streets, intended for immediate property access. The next level is the collector, intended to gather traffic from local streets and feed it to the arterial system. The final level is the arterial street, intended for longer distance mobility and not intended to serve as immediate access to properties (although this function is almost inevitable).

On-Street Parking - On-street parallel parking in a TND is permitted on virtually all streets. The parking serves as a buffer to pedestrians on the sidewalk, and increases the parking supply itself, although this source of supply serves only a small part of the overall parking need in a business district.

Short Traffic Signal Cycles - Traffic signal lengths of no greater than 60 seconds are compatible with TND. Short traffic signals are pedestrian-friendly. They also create more frequent gaps in traffic for mid-block pedestrian crossings.

Two-phase Signals - These are signals that simply turn green for the entire approach, with no turn arrows. These are possible where there is a dense street network, because there is a much greater choice of locations for left-turn movements. The Conventional Suburban Development concept concentrates left-turn movements at a few major intersections, creating the need for multiphase signals. Two-phase signals convey a sense of small scale, to both drivers and pedestrians that contrasts strongly to heavy-duty multiphase sequences. Two-phase operation permits a greatly reduced cycle time.

Curb Radii - Greatly reduced curb radii at intersections are found in a TND, typically 10 feet or less, which reduces the speed of turning automobiles and also greatly reduces the curb-to-curb walking distance required for pedestrians crossing the street.

Alleys - The TND concept frequently includes alleys serving the rear of all properties. These alleys eliminate the need for curb cuts for driveways in the streets, and permit continuity of buildings along a block front. Curb continuity further increases the amount of on-street parking that can be obtained in the design. Alleys are also intended to provide a utility corridor, thereby removing utilities, particularly power lines, from the streetscape.

Intersection Level of Service - Traditional considerations include vehicular capacity, travel speed (and therefore travel time) and safety. The following should also be considered: Pedestrians, bicycles, overall neighborhood ambiance. It should be noted that TND has superior traffic capacity; large streets have an inherent deficiency of scale. A network of small connected streets has more traffic capacity than the same street area arranged in a sparse hierarchy of large streets. Some other features, while not directly related to traffic, are highly characteristic of TNDs:

Traffic Calming - Traffic calming are techniques that are used to ameliorate the negative effects of post-War suburban sprawl, with wide streets and designs for unimpeded traffic flow. This

document will not repeat the many traffic calming strategies, but recommended traffic calming design guides are included in the references.

Street Trees - Trees are very effective traffic calming devices in addition to the unparalleled beauty that they add to the community. Trees can also serve to create a frame around a street, and such "outdoor rooms" are recognized as being very conducive to enhancing the non-motorist environment. Trees are usually located within the buffer planting strips of six and more feet in width. In commercial areas, trees are usually located in tree wells in sidewalks that are usually eight to ten feet wide.

8.3 PEDESTRIAN DESIGN GUIDELINES

The following guidelines for sidewalks and associated pedestrian features are based on guidelines that conform to the Americans with Disabilities Act (ADA).[5] [6]

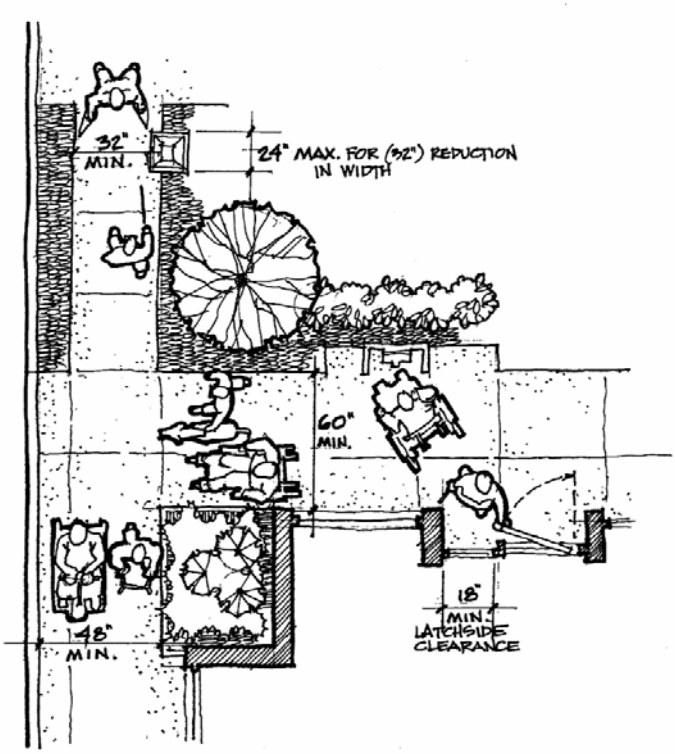
Sidewalks

There are several components to good sidewalk design. Each component is discussed individually below:

Sidewalk Surface - Sidewalks and shared-use paths should meet the "stable, firm, and slip-resistant…" criteria established in accessibility standards. The Access Board's "Technical Assistance Bulletin #4, Surfaces" contains additional information on the performance requirements for walking surfaces on an accessible route.

Sidewalk Width – (Measured from back of curb)

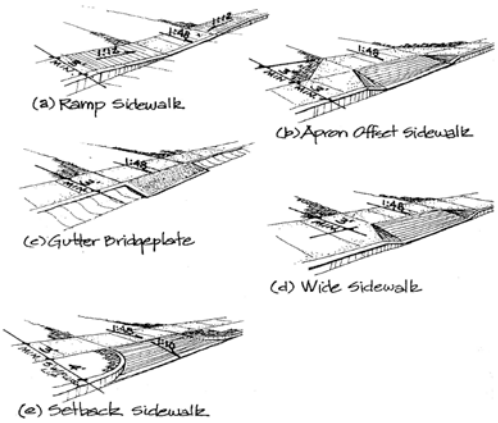
- 36 inches (915mm) is the minimum accessible width
- 32 inches (815 mm)is the minimum accessible width at choke points
- 48 inches (1220mm)is the minimum width for an ambulatory person to pass a non-ambulatory person, with constricted movement
- 60 inches (1525 mm) is recommended as the minimum width adjacent to a curb
- 60 inches (1525 mm) is the minimum width needed for two



[5] FHWA, *A Design Guide - Sidewalks, Street Crossings a*
[6] FHWA, - *Designing Sidewalks and Trails for Access Pa*

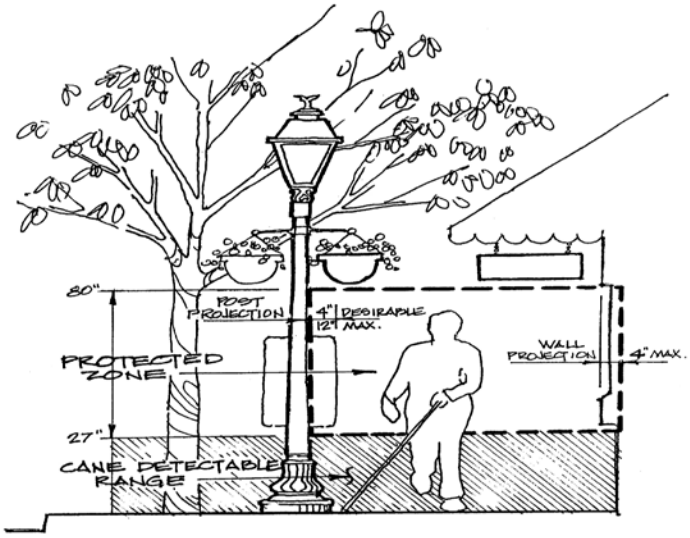
wheelchairs to pass each other and/or to allow for the wheel chair to have maneuvering space - such as through doorways, or to use public telephones

- 64 inches (1625 mm) is recommended for two able bodied persons to pass each other comfortably
- 96 inches (8 feet) (2.4m) is preferred in areas with heavy pedestrian volumes to allow comfortable passing for three persons
- Note additional width is needed for street furniture (parking meters, planters, mailboxes, bus shelters, bike racks, etc.) and to allow for driveway aprons



Sidewalk Cross Slope

- Maximum of 1:48 (2 percent)
- At driveways, locate the sidewalks such that the driveway apron does not prevent the provision of a minimum width of 36 inches with a cross slope no more than 2 percent
- At the intersection of two sidewalks, note that the running slope of one sidewalk is the cross slope of the other



Sidewalk Street Furniture

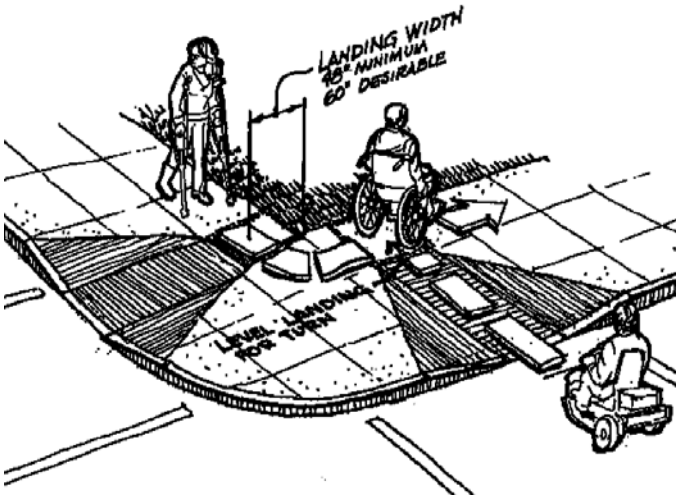
- Shall not protrude into the aforementioned widths
- Heights of fixed objects shall be detectable by pedestrians with vision impairments: leading edges should be mounted at or below 27 inches above the sidewalk so as to be detected by a cane
- Minimum height of objects placed on sidewalks outside the circulating zone so as not to be walked into, e.g. bike racks, is not specified in ADA or ADAAG. It is recommended that the minimum height be 30 inches

Running Slope

- On a new site, design features can be manipulated to limit walkway running slope to 1:20 (5%)

- Ramped segments are added where necessary with handrails and landings at or below the 1:12 (8.33%) slope specified in accessibility standards for ramps
- These slopes will not be consistently possible to achieve along public sidewalks and shared-use paths, where running slope is tied to roadway gradient and underlying terrain
- Nevertheless, running slope should be kept to the minimum feasible consistent with these factors
- Artificial slopes should not be added as landscaping features
- Meandering walkways that add significantly to the travel distance should not be designed on a primary circulation route

Curb Ramp Standards - Curb ramps are required whenever a new or altered pedestrian walkway crosses a curb to a street OR whenever a new or altered street intersects a pedestrian walkway. An alternative to curb ramps is a raised crosswalk.



- Width: 36" minimum
- Running Slope: 1:12 (8.33 %) maximum (alterations 1:10 or 10 % for 6 inch rise or 1:8 or 12 % for a 3 inch rise)
- NOTE of caution: slopes that are too gradual are difficult to detect by pedestrians with visual impairments and a tactile feature should be included. In California, a 24 inch wide detectable arming material where sidewalks enter roadway without an intervening curb face (slopes of 1:15 or less)
- Level Landing: ramp must connect to route with maximum cross slope of 2 % and at least 36 inches wide
- Transition: curb ramp to gutter must be flush - no lips, i.e. maximum vertical change of 1/4 inch (6 mm)
- Landing width of 48 inches - 10 percent maximum slope
- Landing width of 36-48 inches -8.3 % maximum slope
- Location within intersection: must be within crosswalks
- Two perpendicular ramps are preferred to one diagonal ramp
- Diagonal ramps must have 48 inch bottom landing located within the space created between the extension of the curb lines and the curb radius
- NOTE: smaller curb radii can be critical factor in providing the two perpendicular ramps within the crosswalks instead of one diagonal ramp

- Smaller curb radii also help pedestrians with visual impairments differentiate between parallel and perpendicular traffic

Crosswalks

Design - A standard crosswalk is ten feet wide with two parallel 12-inch white stripes. In school zones, a zebra crosswalk is used and the crosswalk is marked with a W66 school crossing sign. Otherwise a W54 pedestrian warning sign may be used.

W54 Pedestrian Warning Sign

Zebra crosswalk - Diagonally or longitudinally striped lines may be used to mark the crosswalk. Typically longitudinal zebra crosswalks are used in school zones. These lines are 24 inches wide spaced 24 inches apart within the area that would otherwise mark the crosswalk.

Supplementary devices - In-pavement flashing lights, otherwise known as in-roadway warning lights, are a special type of highway traffic signal installed in the roadway surface to warn road users that they are approaching a condition on or adjacent to the roadway that might not be readily apparent and might require the road users to slow down and/or come to a stop.

According the *Manual of Uniform Traffic Control Devices 2000*, if used, in-roadway warning lights at crosswalks:

- Shall not exceed a height of 19 mm (0.75 in) above the roadway surface.
- Shall be installed only at marked crosswalks with applicable warning signs. They shall not be used at crosswalks controlled by YIELD signs, STOP signs, or traffic control signals.
- Shall be installed along both sides of the crosswalk and shall span its entire length.
- Shall initiate operation based on pedestrian actuation and shall cease operation at a predetermined time after the pedestrian actuation or, with passive detection, after the pedestrian clears the crosswalk. In-Roadway Warning Lights at crosswalks may use pedestrian detectors to determine the duration of the operation instead of ceasing operation after a predetermined time.
- Shall display a flashing yellow signal indication when actuated. The flash rate for In-Roadway Warning Lights at crosswalks shall be at least 50, but not more than 60, flash periods per minute. The flash rate shall not be between 5 and 30 flashes per second to avoid frequencies that might cause seizures.

Raised crosswalks - Raised crossings, in which the sidewalks are continued across an intersection at curb height, requiring vehicles to ramp up and down, can provide the benefits of a ramp-free connection to the street. Raised crossings (also known as speed tables) are now being

designed as traffic-calming measures in many communities and can be useful in making narrow sidewalks accessible without the installation of curb ramps.

However, a means of discriminating between the sidewalk and the street - typically, a tactile surface treatment - should be provided for pedestrians with vision impairments so that they are aware of leaving the protection of the sidewalk. Uncurbed transitions between sidewalk and street make it difficult for pedestrians with vision impairments to identify the boundary between pedestrian and vehicular areas. Detectable warning surfaces (see ADAAG 4.29.2) placed at the edge of the walkway adjacent to the street can provide information about the presence of a crosswalk, replacing the cues once provided by raised curbs. Audible locator tones installed in pedestrian pushbuttons may also be useful in identifying intersections.

Signalized Intersections

Actuated Pedestrian Signals - These signals can be timed to change automatically as a pedestrian reaches the crossing, or change when the pedestrian pushes an activation button. Unlike pre-set signals, real-time signals respond to immediate pedestrian needs.

Signal timing - Pedestrian phases should provide 2.5 feet per second for slower pedestrians (elderly, disabled, etc.) where appropriate, whereas 4 feet per second is utilized for most intersections.

Countdown signals - Instead of a flashing red hand, countdown signals provide information on the number of seconds remaining to cross.

"Ped scramble" - These signals include an all-way red phase for motor vehicles that allows pedestrians to cross in every direction, eliminating conflicts between pedestrians and turning vehicles. Ped scrambles are typically used in busy downtown districts.

Accessible signals - These may include audible signals for blind pedestrians, wheel chair detectors and pavement symbols, and/or foot-pedal pedestrian activated signals for pedestrians with limited use of the upper body.

8.4 GOALS & POLICIES – PEDESTRIANS

GOAL: ENCOURAGE THE USE OF PEDESTRIAN TRANSPORTATION SYSTEMS.

Policy 1. Encourage increased pedestrian traffic.

Implementation Measure. Keep the Master Trails Plan up to date.

Implementation Measure. Complete and beautify those portions of the Jordan River Parkway that are located in the city.

Implementation Measure. Include trail costs as part of the Capital Facilities Plan.

Implementation Measure. Consider pedestrian overpasses at major crossings of Arterial Streets.

Implementation Measure. Encourage pedestrian friendly streets through regular sweeping, maintenance, safer crosswalks, pedestrian islands, removal of obstacles, and adopt a trail programs.

Implementation Measure. Program traffic signals to allow adequate time for pedestrians to cross intersections.

Implementation Measure. Ensure ADA compliance of existing and future pedestrian routes.

Implementation Measure. Identify areas where there are gaps in the sidewalk system and prioritize projects to fill those gaps.

Implementation Measure. Identify funding sources for trail, school and general walking route improvements

Policy 2. Identify and maintain safe school walking routes.

Implementation Measure. Enforce speed limits near schools.

Implementation Measure. Maintain safe crossings at collector and arterial streets.

Implementation Measure. Collaborate with the Jordan School District to reduce the number of future school crossings of arterial and collector streets.

Implementation Measure. Clearly identify school crossing zones.

Implementation Measure. Assist the Jordan School District in developing and maintaining safe school walking routes.

Chapter 9
RESIDENTIAL TRAFFIC MANAGEMENT

Traffic management refers to methods by which driver's actions are altered through the use of either procedural/administrative techniques or physical roadway modification techniques, which utilize a variety of physical devices to alter the geometry of the street, along with more traditional traffic engineering techniques. The intent is to change the character of streets, improve pedestrian safety, and encourage drivers to obey speed limits. A successful traffic management plan is generally not a single device, but rather a series of integrated improvements to slow traffic and, if desired, to direct traffic to more appropriate routes.

There are numerous traffic management tools available, which can be divided into two main types, those that deal with procedural/administrative techniques and those that deal with physical modification techniques. The appendix contains descriptions the numerous traffic management devices available, which will help citizens better understand the potential benefits and drawbacks of the various traffic management measures.

9.1 WEST JORDAN TRAFFIC MANAGEMENT PROGRAM

Introduction

This program is an adaptation of a successful Salt Lake City program. Its goal is to encourage cooperation between city staff and local neighborhoods so as to provide a safe, livable street environment.

Traffic Management

Traffic management is the combination of physical, education, and enforcement measures to reduce the negative impacts of motor vehicle use, alter driver behavior, and improve the safety conditions for non motorized traffic in residential neighborhoods. Effective use of traffic management measures will improve the quality of life in West Jordan.

Research has shown that no one measure will solve all of a neighborhood's traffic problems. Each residential neighborhood has its own unique set of problems that must be analyzed for possible traffic management measures. The traffic management "tool box" provided in sections 9.1 and 9.2 of this chapter suggests possible management measures and their applicable uses.

What is considered a Traffic Problem?

The most common problems reported on residential streets relate to excessive speed or increased volume.

Vehicles traveling faster than the street's design speed may not be able to stop for a crossing pedestrian or bicycle. They may lose control around a curve, or they may just annoy neighbors with increased noise emissions. The distance from the edge of the travel lane to a sidewalk or residence increases the neighborhood discomfort for speeders.

Vehicles seeking to find the quickest route to their destinations may use a residential street to bypass an expected delay. Excessive volume on a street wears out the road, increases noise levels, and increases the chances of accidents. Through traffic should be concentrated on collector roads that are designed to more comfortably handle the impact.

What are the Solutions?
The easiest response is to encourage citizens to use city streets for the purpose they were intended. West Jordan has three classifications of streets, residential, collector, and arterial.

Residential Streets – Residential streets provide direct access for residences and businesses which they serve. Traffic flow is not as important as property access. Most local streets have a speed limit of 25 mph.

Collector Streets – Collector streets provide traffic a link between arterials and residential streets. Access is restricted at locations. Traffic flow is as important as property access. Most collector streets have a speed limit of 35 mph.

Arterial Streets – Arterial streets provide through traffic movement across long distances. These streets are typically the widest in the city. Traffic flow is more important than property access. Most arterial streets have a speed limit of 40 + mph.

If possible, West Jordan wishes to use traffic management measures to encourage motorists to use residential streets to access their residence, collector streets to access arterial streets, and arterial streets to travel long distances. It is not the intent of West Jordan to move a traffic problem from one residential street to another. For a list of possible traffic management measures and their possible application in West Jordan see Table 9.1.1.

How do I Participate?

1. Application
An application is attached to this document. Copies can also be obtained from the Engineering Division office at 8000 South Redwood Road, or from the city web site at www.wjordan.com. To demonstrate neighborhood support and agreement for a traffic management request, a complete application must contain signatures from ten households living in the area where the perceived traffic problem exists.

2. Eligibility and Priority
Traffic management requests will be reviewed upon receipt to determine eligibility and priority. Traffic management plans will be developed on a priority basis.

Upon receipt of the application, a city staff member will contact the applicant to discuss the problem, determine project boundaries, and to review the Transportation Management Plan process. The city staff member will then collect the neighborhood traffic data for input into an eligibility and priority formula. The formula is based on traffic volumes, vehicular speeds, presence or lack of sidewalks, pedestrian generators, bike routes and transit service. The formula produces a numerical score to determine the requests' eligibility and priority. Applications must

achieve a score of at least 80 points to be considered eligible for the Transportation Management Plan (TMP). Plans will be developed for eligible applications in a priority manner based on the numerical score. The request with the highest score will be given top priority.

Each application will be placed into one of the following three categories based on its TMP score.

a. Active Projects – City staff will work with the neighborhood to create a Traffic Management Plan. This plan will include traffic management measures to address the neighborhood's traffic problems. Staff will work with as many of the highest priority projects as resources allow. As work on one project is completed, work will begin on the next highest priority project.

b. Eligible Projects – Request in this category meet program eligibility but are not the highest priority project. While waiting to become an active project, neighborhoods will be provided with information on the Pace Car program as well as other self-help solutions that may ease neighborhood traffic problems.

c. Not Program eligible – Requests in this category do not meet eligibility requirements. However, these neighborhoods will be provided information on the Pace Car program as well as other self-help solutions that may ease neighborhood traffic problems. Petitioners may resubmit in the future if they sense the problem has grown or when new issues arise.

Each applicant will be notified of their requests score, category and priority.

3. Traffic Management Plan Development

An initial meeting will be held with residents, business owners and property owners identified in the study boundaries. City staff will also invite the City Council Member for the area. The purpose of the meeting is to seek input on the neighborhood's traffic issue(s) and to create a Neighborhood Traffic Committee (NTC). The NTC will serve as a critical link between city staff and the neighborhood during the traffic management plan development.

Using input received from the public meeting and the NTC, city staff will create a draft plan to address the neighborhood's traffic issue(s). The plan may include alternatives for addressing the issue.

A second meeting will be held with the neighborhood to discuss the proposed plan. The plan, along with a meeting invitation will be mailed to the residents, business owners, and property owners identified in the study boundaries. Comments on the plan will be taken at the meeting or can be submitted to the Engineering Division. Comments must be received on or before the meeting date so they can be discussed at the meeting.

4. Testing the Plan

City staff will mail a letter, ballot, and the plan to all property/business owners within the project boundaries. The letter will describe the TMP process to date and outline the proposed plan. The

ballot will request support or opposition to the proposed plan. One vote per residence, business or property owner will be counted.

The plan will proceed to testing if a majority of the ballots returned are in favor of the plan. If at least 80 percent of the ballots returned and a simple majority of all distributed ballots in the project area are in favor of the plan it may skip testing and proceed to funding, design, and construction.

Testing allows the neighborhood to experience first hand the effectiveness of the plan. If the measures are not functioning satisfactory to staff or the NTC, the test may be revised or discontinued. During testing staff will collect and analyze new traffic data. If the results of the testing show the measures to be ineffective or cause negative impacts to surrounding residential neighborhoods staff may modify the plan following consultation with the NTC or the entire neighborhood as deemed appropriate. At the conclusion of the testing period all test measures will be removed.

Following testing, staff will prepare and mail a news letter to all residencies, businesses, or property owners within the project boundaries. The news letter will summarize the results of testing, describe funding options and include a ballot requesting support or opposition to construction of the tested plan. One vote per residence, business or property owner will be counted. If at least 67 percent of the returned ballots are in favor of the plan, it will proceed to funding, design, and construction. If not, staff will meet with the NTC to decide whether to revise the plan or discontinue the traffic management request.

5. Funding, Design, and Construction

Once the plan has received final endorsement of the neighborhood and staff, the city will prepare a cost estimate and proposed schedule for the project design and construction. Design and construction will proceed as determined by availability of funds.

Modifications to Constructed Measures

City staff will consider a request for removal or modification of existing traffic management measures if a petition is submitted with the signatures of a majority of the residents, business, or property owners within the original project area. Staff will organize a neighborhood meeting to discuss the request. A mailing providing the results of the meeting and ballot, if appropriate, will follow. To be approved for removal or modification at least 67 percent of the returned ballots must be in favor of the request. All costs incurred for removal or modification will be borne by the neighborhood. However, if the city finds a traffic management measure must be removed or modified for technical or safety reasons, the city will pay all costs incurred.

Funding Options

An approved TMP project will likely have funding implications. Funding for all TMP projects must be obtained before engineering design and construction begins. The following is a list of funding options available for TMP projects:

1. Traffic Management Plan Funds: Each year the City Council will consider funding a "pool" of funds, as recommended by the City Administration, in the City's Capital Improvement

Program for implementing approved TMP projects. When available, these funds will be utilized to fund TMP projects.

2. Neighborhood Matching Grant Funds: Neighborhoods may apply for partial funding of approved TMP projects through the Neighborhood Matching Grant program. Under this program up to $5,000 of matching funds are available per project and require a match of 50 percent match in cash or labor. Each funding application will compete with other projects throughout the city for available funding. The City Council considers and approves funding for projects as part of the annual budget process.

3. 100 Percent Neighborhood Funding: Any approved TMP project can be funded 100 percent through neighborhood funding sources. Neighborhoods may collect monies in any manner they deem equitable to pay for the cost of the project.

TRAFFIC MANAGEMENT REQUEST FORM

We, the undersigned, request a traffic study at the location listed below. These signatures indicate our commitment to work with West Jordan City staff in creating safer neighborhood streets.

	Signature	Address	Phone (daytime)
1.			
2.			
3.			
4.			
5.			
6.			
7.			
8.			
9.			
10.			

Neighborhood Contact: _____ Day Phone:_____

Location of Concern: _____

What particular concerns do you have at this location?

_____

_____

_____

_____

_____

Application Date: _____ Posted Speed Limit: _____ mph

Is this a designated bus route? Yes ____ No ____
Is this a designated safe school walking route? Yes ____ No ____
Is this a designated bike route? Yes ____ No ____
Is there a park, school, or other pedestrian destination on this street? Yes ____ No ____
Are sidewalks constructed on this street? Yes ____ No ____

Thank you for taking time to complete this form. Please mail it to City Engineer, 8000 South Redwood Road West Jordan, Utah 84084. When it is received by the City you will notified of the study schedule.

9.2 TRAFFIC MANAGEMENT PLANNING

An important part of traffic management is planning new subdivisions in a manner by which future traffic management measures will not be necessary. This can be done by anticipating traffic problems and implementing traffic calming measures during construction to prevent them.

9.2.1 Anticipating Problems

The majority of neighborhood traffic problems have to do with speeding traffic and cut-through traffic. New neighborhoods will be developed within a grid system of generally four blocks to a side. Within this square there should be at least one residential collector road that crosses the square in both directions (horizontally and vertically). These roads should not run along a straight line but should provide access throughout the subdivision. As access is improved, there will be less need for anyone to cut through a neighborhood.

To control speed on neighborhood streets it is important that streets not be too straight. A long, straight street is an invitation to speed. Continuous streets need to be broken up with curves or traffic calming measures. The minimum radius of a curve with a 25 mph design speed is approximately 165 feet while the minimum radius for a 30 mph curve is about 295 feet. A 200-foot radius curve would function as an effective maximum acceptable curve for maintaining low speeds. Therefore, there should not be either a straight street or a curved street with a radius greater than 200 feet much more than 500 feet long. Anything longer should require a traffic calming device as part of the proposed subdivision.

Traffic calming measures should generally be spaced no more than 500 feet apart. For example, if there is a street segment that is 1,200 feet long that is either straight or doesn't have small enough curves, a total of three traffic calming devices would be required.

9.2.2 Implementation Measures

Any of the traffic calming devices detailed in the appendix could be utilized in new construction; however, it is recommended that vertical deflection devices not be used in this scenario due to their impact on emergency vehicles. This leaves the horizontal shifts as the primary method of traffic calming in new subdivisions. Developers will work with city staff to choose the traffic calming device that best fits their situation and that complements their development.

9.3 GOALS & POLICIES – RESIDENTIAL TRAFFIC CALMING

GOAL: SUPPORT RESIDENTIAL TRAFFIC CALMING.

Policy 1. Encourage the use of traffic calming devices in new development.

Implementation Measure. Develop a traffic calming "toolbox" of available physical traffic calming measures for use in new development and encourage developers to utilize them.

Implementation Measure. Evaluate the effectiveness of traffic calming measures placed in new subdivisions and use information gained in development of future Master Transportation Plans.

Implementation Measure. Vary street widths and patterns to either encourage or discourage through traffic where appropriate and to ensure safe speeds on local streets.

Policy 2. Discourage speeding in residential neighborhoods.

Implementation Measure. Develop a traffic management program for use in residential neighborhoods. Such a plan will provide a rating system for the evaluation of future traffic calming projects as well as a discussion of funding options.

Implementation Measure. Explore the use of non-physical methods of traffic calming. Such methods may include a pace car program, neighborhood speed watch, adopt a cross walk, or "the walking school bus".

Implementation Measure. Set up a Transportation Advisory Board to assist the city in identifying neighborhood traffic problems.

Policy 3. Educate residents about the benefits of traffic management.

Implementation Measure. Create pamphlets that answer common traffic management questions (such as warrants for stop signs and signals, traffic calming techniques, transportation demand management strategies, etc.)

Implementation Measure. Provide information on the City's web site relating to current traffic calming projects so residents can track the status of a request via the internet.

Implementation Measure. Sponsor a quarterly "Ask the Traffic Engineer" newspaper question and answer column.

Chapter 10
ENVIRONMENT

10.1 AIR QUALITY

Motor vehicle emissions represent a large proportion of air pollution emissions in the region. Depending on the pollutant, motor vehicles may represent as high as 85 percent of the air pollution or as low as less than 30 percent of the air pollution. Industrial sources typically represent another large proportion of air pollution emissions. In addition, area-wide sources consisting of a wide range of dispersed sources such as lawn mowers, household painting supplies, barbeques, off-road construction equipment, etc. are also represent a growing concern for air quality planners. This report focuses on air pollution issues associated with the transportation system in West Jordan City.

The Environmental Protection Agency has identified six criteria pollutants in which they have established a National Ambient Air Quality Standard. These national standards establish levels in which certain pollutants may be in the atmosphere until they are considered a health based problem. Lower concentrations of these pollutants are thereby established to not represent a health risk. Each of these six "criteria" pollutants as well as greenhouse gases and air toxins are discussed.

National Ambient Air Quality Standards have been established for Lead, Nitrogen Oxide, and Sulfur Dioxide. These pollutants are given relatively minor attention since none of these pollutants are presently a problem in West Jordan City. Lead has been a problem in many areas until the common use of lead free gasoline. Motor vehicles, nor other sources, are presently contributors to lead pollution of the air. Nitrogen Oxide is generally a regional air pollution problem in which the Salt Lake Urban Area has never had a violation of the national standards. While motor vehicle emissions probably contribute as much as 50 percent of the Nitrogen Oxide emissions, there are no concerns with Nitrogen Oxide as a local air pollutant. Sulfur Dioxide is primarily an industrial pollutant which is relatively unaffected by motor vehicles. There has been a Sulfur Dioxide problem in the past in Salt Lake County.

Ozone is commonly called "smog" and represents a regional air pollution problem in the Salt Lake Valley. Ozone occurs in the summer months during periods of long days and hot weather. Ozone is formed through the emission of pre-cursor pollutants that react in sunlight to form ground level ozone. Ozone in the stratosphere is unrelated to ground level ozone. Ground level ozone can cause lung damage to people with existing respiratory problems as well as people that participate with prolonged outdoor exposure or exercise. Emissions from motor vehicles can be as high as 50 percent of the precursor emissions that form ozone. Area-wide sources, including local forest fires, are difficult to control and represent a sizeable component of ozone precursor pollutants.

In the past, ozone was a significant problem in the Salt Lake Valley. National measures that have improved motor vehicle emissions controls and reduced the volatility of gasoline have

played a significant role in reducing ozone in the Salt Lake Valley. It is expected that national motor vehicle emissions controls will continue to be improved, offsetting the growth in vehicle miles in the local area. A maintenance plan for ozone is presently in place by the Department of Environmental Quality, Division of Air Quality of the State of Utah. Locally, West Jordan can do relatively little to improve ozone beyond its participation in programs that reduce vehicle miles of travel and support for vehicle inspection and maintenance programs. Ozone exposure in West Jordan is expected to be similar to the entire county, with no major concentrations or localized ozone problems.

PM10 consists of particulate matter of 10 microns or smaller. Like ozone, PM10 has been a problem in the Salt Lake Valley in the past, but there have been no violations of the national PM10 standard in approximately 10 years. The Utah Division of Air Quality is working on developing a maintenance plan. PM10 is a very visible air pollution problem common during periods of winter temperature inversions. While winter inversions, in the absence of PM10, are visually impacting, the presence of PM10 has been linked to increased health risks to a large portion of the population, including children and elderly. In addition to PM10, there is a growing concern for smaller particles called PM2.5 (particulate matter of 2.5 microns or smaller) and the Environmental Protection Agency may create national standards.

Particulate matter problems, either PM10 or a different particle size, are formed through both direct emissions of small dust particles as well as chemical reactions of precursor pollutants that form particles. West Jordan can play a significant role in decreasing direct fugitive dust emissions through the continued paving of dirt and gravel roads or dirt and gravel shoulders. Localized street sweeping of paved roads has also been shown to reduce PM10 emissions in other areas across the country. West Jordan should monitor the location of bus transfer points, such as the planned Light Rail Station on Redwood Road and 7800 South, as diesel vehicles may contribute to a potential localized PM10 problem.

Unfortunately, despite a few local controls, PM10 is generally a regional issue in the Salt Lake Valley characterized during periods of prolonged winter inversions. Regional measures to reduce vehicle miles of travel will be important throughout the Salt Lake Valley, including West Jordan City. In many areas of the country, particularly in the West, it is suspected that particulate matter emissions will be more difficult to control than conventional “tailpipe” emissions. Many of the PM10 controls in the past have either come from tailpipe or smoke stack controls. These controls are expected to have a declining benefit in the future. Locally, shifts in the economy from mining and manufacturing may represent a potential advantage in reducing PM10 pollution.

Carbon monoxide has historically been the largest motor vehicle related air pollution problem. Carbon monoxide is formed through incomplete combustion. Indoor carbon monoxide problems may be linked to space heaters, woodstoves, furnaces, and other combustion devices. The national standard for carbon monoxide is much lower than the localized indoor concentrations that often cause fatalities, but have been shown to contribute towards a range of respiratory related problems. Carbon monoxide has been a problem in Salt Lake City in the past during periods of cold temperatures and stagnant air (similar to PM10 episodes).

Motor vehicle controls have played a significant role in increasing the efficiency of cars and reducing carbon monoxide violations. There have been no violations in Salt Lake County outside of Salt Lake City of the carbon monoxide standard and no violations within Salt Lake City for the past 10 years. However, as suburban intersection volumes grow, localized carbon monoxide may be an issue.

Local traffic engineering controls that minimize stopped delay and slow travel speeds will help to reduce carbon monoxide concentrations. These controls may include added travel lanes and turn lanes that generally foster more efficient traffic flow. In addition to traffic flow improvements, other measure to separate potential receptors from roadways such as moving sidewalks further from roads and increasing the setback of adjacent properties will also lessen the exposure of short term carbon monoxide concentrations.

No carbon monoxide modeling has been developed to support the transportation plan and no localized problems are expected. However, the following intersections warrant particular attention through traffic engineering controls:

- 90th South and Redwood Road,
- 70th South and Redwood Road,
- 7800 South and Redwood Road,
- 90th South and Bangerter Highway,
- 70th South and Bangerter Highway,
- 7800 South and Bangerter Highway,
- 90th South and Western Transportation Corridor Ramps,
- 7800 South and Western Transportation Corridor Ramps, and
- Large parking lots such as Jordan Landing and large stations of the proposed TRAX expansion.

Unlike carbon monoxide, which represents a very localized problem of a few blocks or less, or ozone, which represents a regional problem at the county or metropolitan area level, greenhouse gases have been a growing global concern. There are no national programs to reduce greenhouse gases other than broad goals and targets. Automobiles contribute to carbon dioxide, and there are few programs either in place of planned to reduce these emissions beyond the general goals to reduce vehicle miles of travel and improve automobile efficiency.

Finally, there are a variety of air toxins that are controlled by the Environmental Protection Agency. The Utah Division of Air Quality plays an important role in controlling air toxins at the smoke stack level. There are no additional controls which are necessary at the tailpipe level to reduce or offset an outside increase of air toxins.

10.2 NOISE

Like air pollution, noise may be a significant external cost to the use of private automobiles. Noise levels associated with automobiles are affected by four factors including the following:

- Traffic volume – higher traffic volumes result in greater noise levels,
- Traffic speed – higher traffic speeds result in greater noise levels,
- Percent trucks – more trucks also result in greater noise levels, and
- Separation of receptors – noise concentrations will be greatest closest to the source.

Different land uses are sensitive to noise in different ways. For example, residential uses may be a significant concern in areas of high concentrations of noise while regional retail facilities may be unaffected by noise levels. Furthermore, other issues such as the quality of construction or the use of air conditioning may affect the ability of a residential use, or even a sensitive use such as a hospital, to locate along a busy street.

The goal of transportation planning in West Jordan is not necessarily to reduce noise from the transportation system, but to locate land uses that are compatible with the resulting transportation noise. Specific planning measures that should be considered include the following:

- Minimize residential or sensitive land uses adjacent to high speed arterial streets such as the Western Transportation Corridor or Bangerter Highway.
- Separate or mitigate the impacts of noise on residential or sensitive land uses from other arterial streets such as the west side of 9000 South and 7800 South.
- Route trucks away from residential areas, including the residential sections of 7000 South.

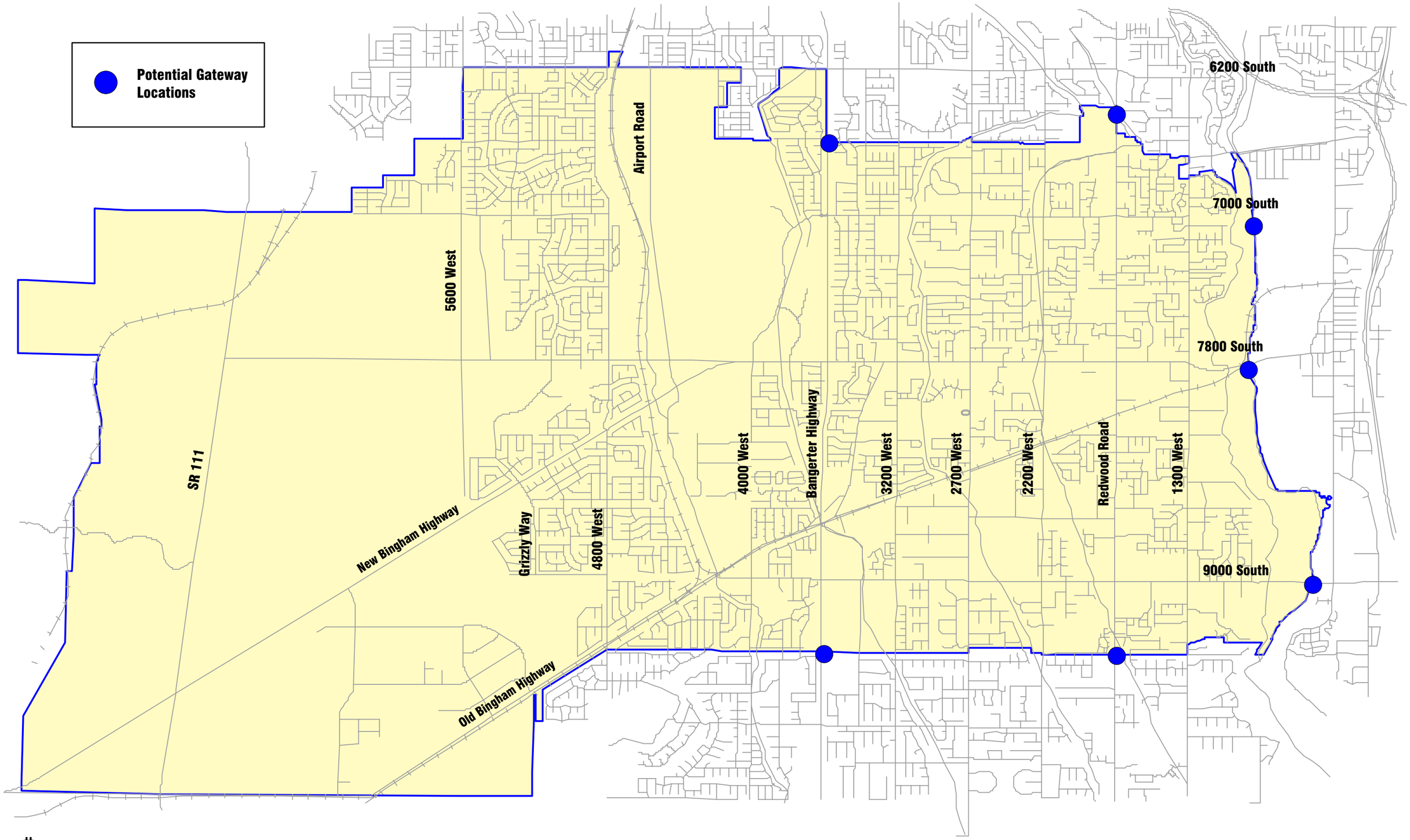
West Jordan City should be sensitive to the noise concerns of planned land uses adjacent to road widening or new construction projects. UDOT presently has a noise policy that attempts to quantify a minimum threshold of noise levels that must be present, the cost effectiveness of reducing noise below that threshold, and the overall neighborhood acceptance of noise mitigation measures when compared to possible impacts on the view shed. Noise mitigation is a difficult issue and it is best to address this issue at the planning level as opposed to the mitigation level. West Jordan should review the UDOT noise mitigation policy and develop an internal policy consistent with the need to address noise issues within the City.

Chapter 11
AESTHETIC QUALITY

11.1 MONUMENT SIGNS

In order to enhance and define the image of West Jordan City there are various aesthetic strategies that can be utilized with respect to the transportation system. A first opportunity is to identify the City's boundaries with monument signs at key gateway locations, as is done in many other cities. The City has had a Steering Committee addressing this issue that has recommended a monument sign design, which has recently been implemented at various locations throughout the city. A couple of them are shown in Figure 11.1.1. On the next page, Figure 11.1.2 indicates recommended locations for gateway monuments. In the future, additional monuments may be desired along the proposed Mountain View Corridor. For greater impact, it is recommended that they are lighted, especially in fall and winter months that are darker during morning and evening commutes.

Figure 11.1.1 West Jordan Monument Signs



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Potential Monument Sign Locations

NORTH

Figure 11.1.2

11.2 STREETSCAPES

Another strategy is to create streetscapes that can enhance the character of the city. This can be done through the use of landscaped medians and park strips and attractive street furniture.

In order to accentuate the downtown/civic center area around City Hall Redwood Road, which could have a landscaped median with left turn pockets in the center and ten-foot landscaped easements on either side of the right-of-way. Low maintenance ground cover is recommended as median landscaping along with columnar trees. Pedestrian scale lighting could be provided at the sidewalks and provide roadway lighting in the median. This would clearly define the city center both in the nature of its landscape treatment, the raised median, which then separates it as an identifiable place along Redwood Road coupled with the urban design enhancements and the more intense nature of the development. This concept is illustrated in Figures 11.2.1 and 11.2.2.

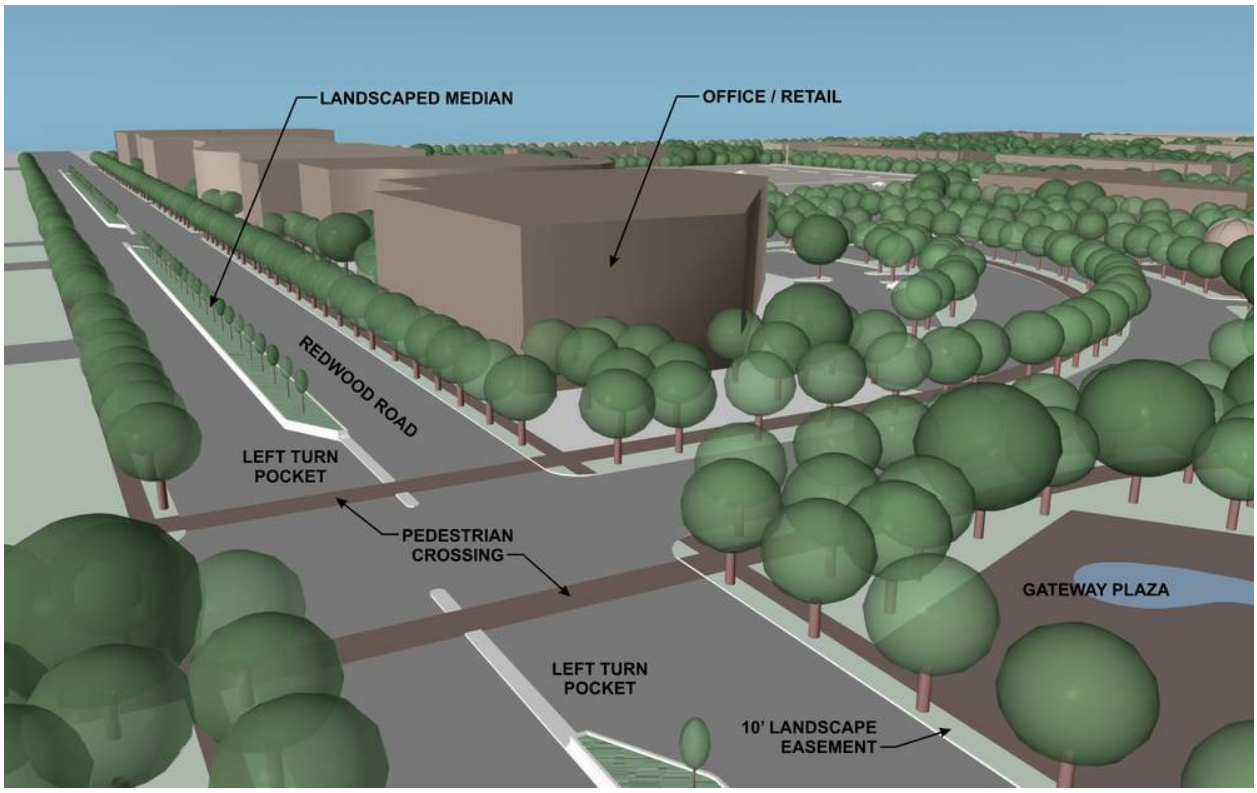


Figure 11.2.1 Redwood Road Streetscape

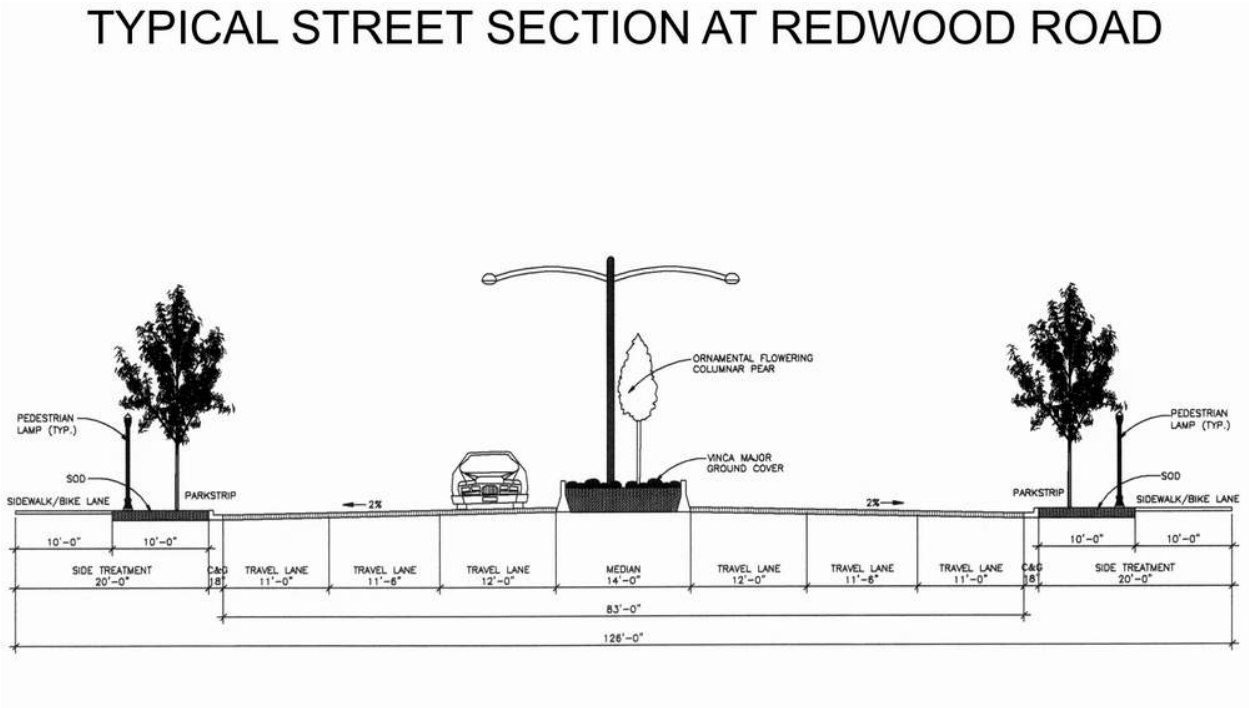


Figure 11.2.2 Possible Streetscaping Concept along Redwood Road

A strong network of pedestrian and bicycle linkages are also important to connect the neighborhoods and districts to the multi-modal transportation system particularly within transit oriented development districts. The pedestrian network should be perceived to be direct, secure, pleasant, and desirable to use. Pedestrian scale lighting should be provided as opposed to the street oriented vehicular lighting that is taller than the trees and casts shadows. The quality of the light is important and should not be mercury vapor, which is not very warm nor flattering and distorts the color perception. Safe desirable seating areas should be provided at congregation areas, waiting areas and areas that the city wants to promote for community interaction. These seating areas should be placed in eddies or alcoves adjacent to the walkways so as to not restrict the walkway but allow observation by passersby and the people using the seating areas to watch the activities on the street and or the pedestrian way. It is recommended that the benches provided require minimal maintenance and discourage people from sleeping on them. A trash receptacle should be provided in order to keep the area neat and clean and shade of some sort be provided either by a tree or as a canopy. Pedestrian lights should be placed nearby for security particularly during the winter season, which has an early sunset. Potential resting area/bench plan and elevations are shown in Figures 11.2.3 and 11.2.4. It is also possible to combine street furniture with transit stops as shown in Figure 11.2.5.

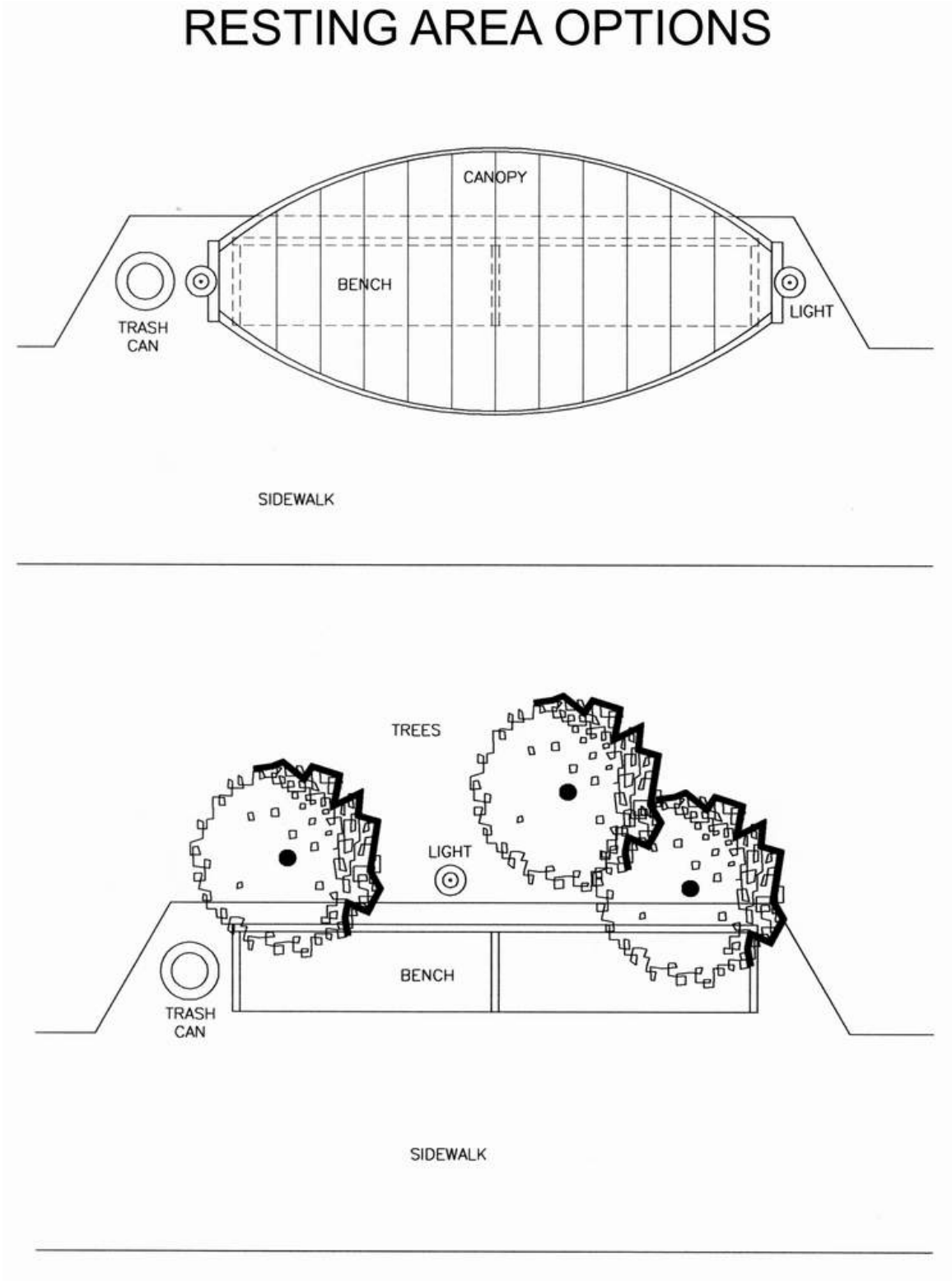


Figure 11.2.3 Resting Area Options

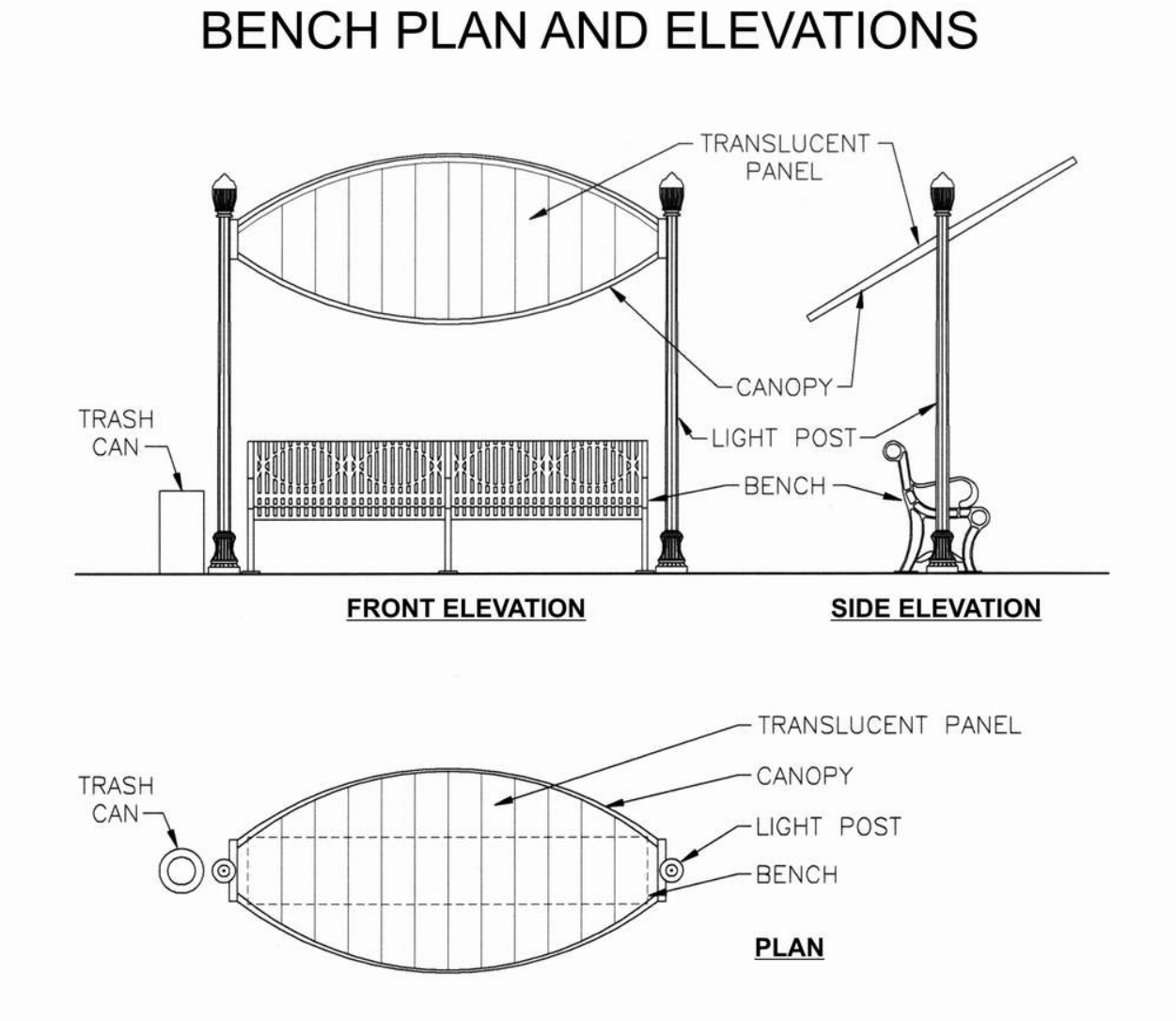


Figure 11.2.4 Bench Plan and Elevations

Figure 11.2.5 Street Furniture & Transit Stop

11.3 GOALS & POLICIES – URBAN DESIGN

GOAL **IMPROVE THE AESTHETIC QUALITY OF THE CITY'S STREETS.**

Policy 1. Improve the appearance of streets by encouraging landscaping and better urban design

Implementation Measure. Adopt streetscape standards that encourage low maintenance, water efficient, landscaping.

Implementation Measure. Encourage landscaped berming and increased setbacks on high volume roads.

Implementation Measure. Provide attractive, landscaped entry treatments at all gateways to the city and provide urban design enhancements to create a "city center."

Implementation Measure. Require developers to include street furniture amenities (benches, trash receptacles, newspaper stands, etc.) according to an adopted city streetscape plan.

Implementation Measure. Strictly enforce sign ordinance provisions relating to illegal sign posting on city streets.

Policy 2. Improve the quality of lighting on West Jordan streets.

Implementation Measure. Develop a street lighting plan that will provide beauty and safer neighborhoods.

Implementation Measure. Maintain city standards for decorative street lighting.

Implementation Measure. Coordinate the installation of all underground utilities with road construction to ensure cost effective capital project programming, minimize damage to new streets, and minimize disruption to the transportation system.

Chapter 12
TRANSPORTATION IMPROVEMENT PLAN

12.1 TRANSPORTATION IMPROVEMENT PLAN

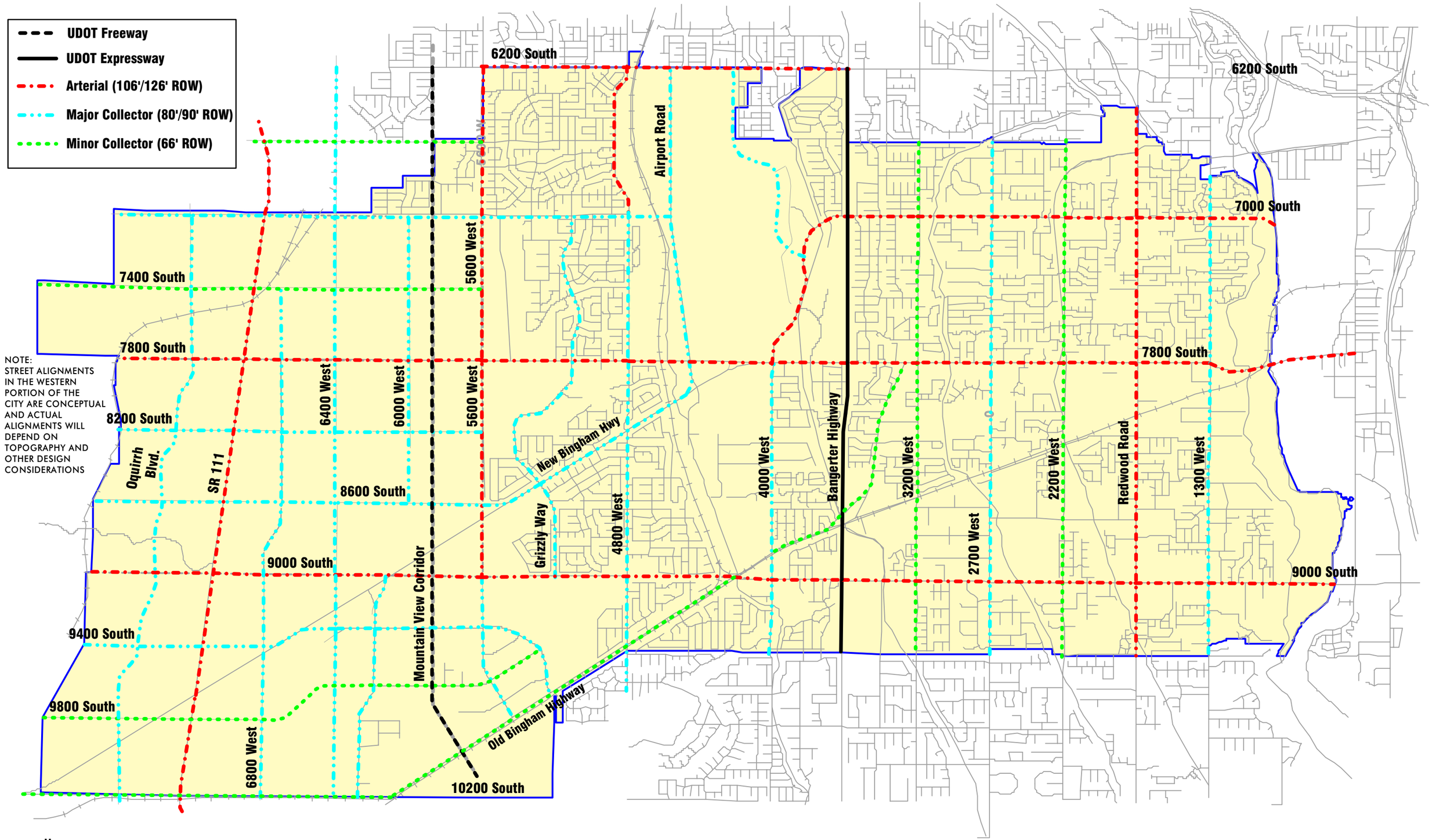
One of the fundamental purposes of this Master Transportation Plan is to outline the changes and improvements to the citywide transportation infrastructure over the next thirty years. The existing roadway network and traffic conditions served as the starting point in this process. The majority of the new streets to be constructed are in the western portion of the city. For the most part the arterials and collectors in the eastern portion of the city are built out to their ultimate condition, although many are expected to experience traffic volumes at or above their capacity in the future.

12.2 CAPITAL FACILITIES

Cost estimates for the construction of new roadways were produced for each functional classification. All of the arterial and collector street segments in the City were ranked by their 2030 volume to capacity ratio as generated by the travel demand model. New street segments were assigned an estimated construction cost in current year (2002) dollars. This list represents all of the new arterial and collector streets to be constructed in West Jordan over the next thirty years. As mentioned earlier many of the arterial and collector street segments in the eastern portion of the City are expected to be exceeding their capacity but no widening projects were included in the Capital Facilities Plan with the exception of 7000 South from 1300 West to Bangerter Highway. For the purposes of this report it was assumed that the arterials and collectors shown on this list would be entirely funded by the City. Any construction on state highways (such as the Western Transportation Corridor) was assumed to be funded entirely by the state or federal government. All streets with a functional classification below that of a minor collector (such as residential collectors or local streets) were assumed to be funded entirely by the developer. Figure 12.2.1 shows the future roadway network by functional classification.

Volume to Capacity (V/C) Ratio is the ratio of the traffic volume on a facility divided by the capacity of that facility. A ratio greater than 1 indicates that traffic volumes are heavier than can adequately be handled by the roadway or intersection and that congestion and delays will occur.

All of these future roadway projects were assigned to one of three general time periods: 2002 to 2010, 2010 to 2020, and 2020 to 2030 based on the expected population and development growth West Jordan will experience over the same time periods. Generally, new roadway construction progresses from east to west. A map showing the time period for these projects is shown in Figure 12.2.2 and a list of each project and their associated costs is given in Table 12.2.1. A cost estimate was also generated for the construction of new traffic signals associated with these new roadway segments. The estimated construction time period of these signals is also shown in Figure 12.2.1 and a summary of the total number and costs for new signals is given in Table 12.2.2. This estimate as to the number of new signals is based on the functional classification of the proposed roadways and does not include any additional signals that may be warranted in the future at other locations, particularly in the eastern portion of the City.



West Jordan Master Transportation Plan

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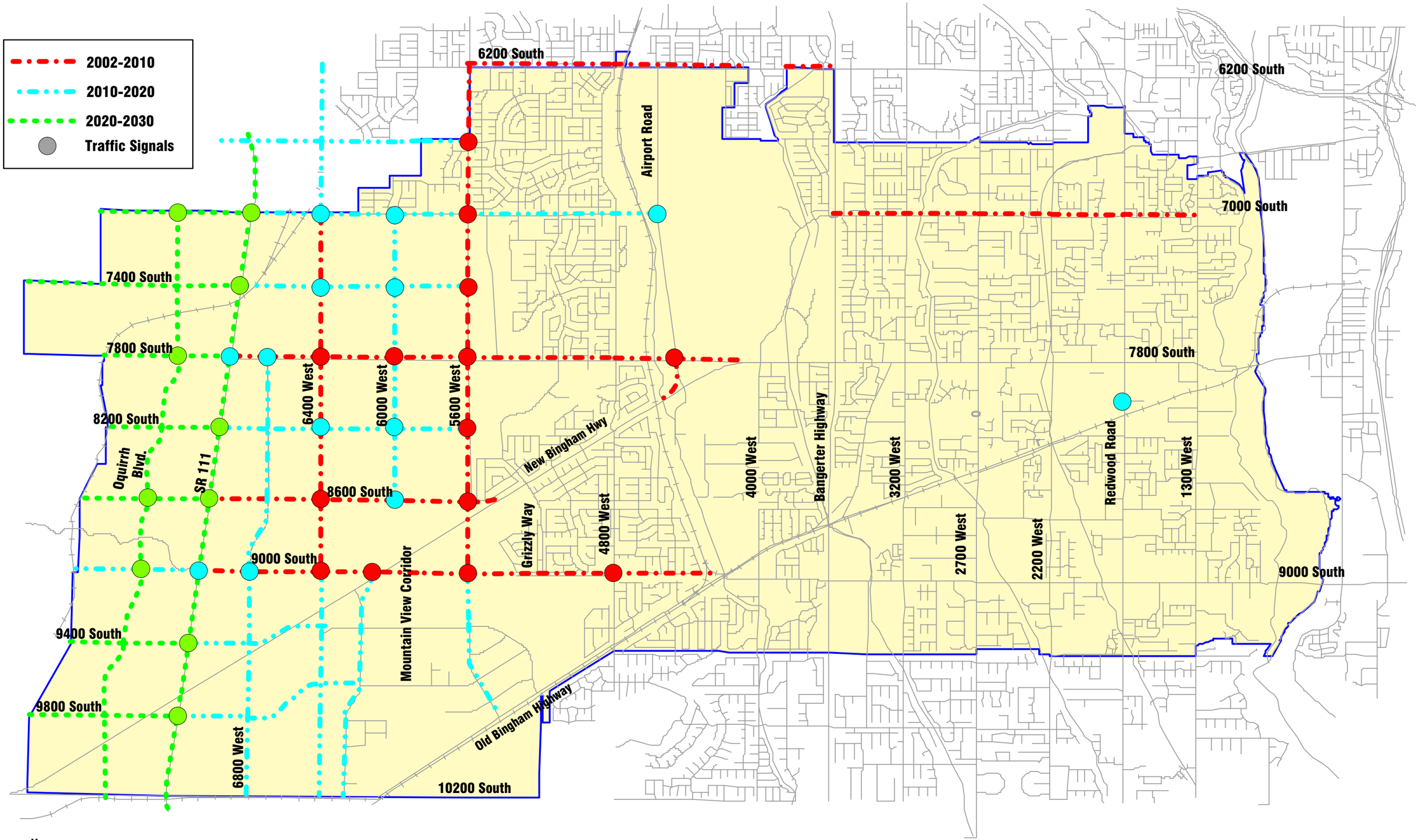
Future Roadway Network

NORTH

Figure 12.2.1



West Jordan Master Transportation Plan

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Capital Facilities Plan (2002-2030)

NORTH

Figure 12.2.2

Table 12.2.1 Capital Facilities Plan

	Street	From	To	Cost per mile	Segment Length (mi.)	Segment Cost	Phase
Arterials							
1	7000 South	Redwood Road	Bangerter Highway	$12,000,000	2	$24,000,000	1
2	6200 South (1/2)	Bangerter Highway	5600 West	$2,671,572	2.25	$6,011,036	1
3	9000 South	Bangerter Highway	5600 West	$5,343,143	0.5	$2,671,572	1
4	9000 South	5600 West	SR-111	$4,232,327	1.9	$8,041,422	1
5	7800 South	4000 West	5600 West	$5,343,143	2	$10,686,287	1
6	5600 West	North City Boundary	7000 South	$4,232,327	1	$4,232,327	1
7	5600 West	7000 South	7800 South	$4,232,327	1	$4,232,327	1
8	5600 West	7800 South	9000 South	$4,232,327	1.5	$6,348,491	1
9	7800 South	5600 West	SR-111	$5,343,143	1.625	$8,682,608	1
10	6200 South (1/2)	5600 West	SR-111	$2,671,572	1.25	$3,339,465	2
11	9000 South	SR-111	West City Boundary	$4,232,327	0.875	$3,703,287	2
					Arterials Total	**$81,948,823**	
Collectors							
12	6400 West	7000 South	7800 South	$2,029,783	0.5	$1,014,891	1
13	6400 West	7800 South	9000 South	$2,029,783	2	$4,059,566	1
14	8600 South	5600 West	SR-111	$2,029,783	1.75	$3,552,120	1
15	5600 West	9000 South	Old Bingham Highway	$2,029,783	1	$2,029,783	2
16	6600 South	5600 West	West City Boundary	$1,230,434	0.375	$461,413	2
17	6000/6200 West	7000 South	7800 South	$2,029,783	1	$2,029,783	2
18	6000/6200 West	7800 South	9000 South	$2,029,783	1.75	$3,552,120	2
19	6000/6200 West	9000 South	10200 South	$2,029,783	0.5	$1,014,891	2
20	7000 South	Grizzly Way	5600 West	$2,001,055	0.625	$1,250,659	2
21	7000 South	5600 West	SR-111	$2,029,783	1.5	$3,044,674	2
22	10200 South (1/2)	6000 West	SR-111	$615,217	1.5	$922,826	2
23	8200 South	5600 West	6400 West	$1,230,434	0.75	$922,826	2
24	9800 South	6000/6200 West	SR-111	$1,230,434	1.25	$1,538,043	2
25	9400 South	Bagley Park Road	SR-111	$1,230,434	1	$1,230,434	2
26	7400 South	5600 West	SR-111	$1,230,434	1.625	$1,999,455	2
27	6800 West	7800 South	9000 South	$2,029,783	1.5	$3,044,674	2
28	6800 West	9000 South	10200 South	$2,029,783	1	$2,029,783	2
29	8200 South	6400 West	SR-111	$2,029,783	0.7	$1,420,848	2
30	8200 South	SR-111	West City Boundary	$2,029,783	0.8	$1,623,826	3
31	7800 South	SR-111	West City Boundary	$2,029,783	1	$2,029,783	3
32	Oquirrh Blvd	6400 South	9000 South	$2,029,783	3.75	$7,611,686	3
33	Oquirrh Blvd	9000 South	South City Boundary	$2,029,783	1.75	$3,552,120	3
34	9800 South	SR-111	West City Boundary	$1,230,434	1	$1,230,434	3
35	9400 South	SR-111	West City Boundary	$2,029,783	1	$2,029,783	3
36	7000 South	SR-111	West City Boundary	$2,029,783	1	$2,029,783	3
37	10200 South (1/2)	SR-111	West City Boundary	$615,217	1	$615,217	3
38	8600 South	SR-111	West City Boundary	$2,029,783	1.5	$3,044,674	3
					Phase 1	$83,532,649	
					Phase 2	$33,534,964	
					Phase 3	$23,767,307	
					Total	**$140,834,921**	

Table 12.2.2 New Traffic Signals by Phase

	Number of Traffic Signals	Total Cost
Phase 1	14	$2,100,000
Phase 2	14	$2,100,000
Phase 3	10	$1,500,000
Total	**38**	**$5,700,000**

One of the major goals of West Jordan is to promote a grid system of arterials and collectors as development progresses to the west. The City would also like to de-emphasize the Old and New Bingham Highways and even perhaps close some portions or re-align others to maintain proper geometric design of the new arterials or collectors and their intersections. This will be a challenging and evolutionary process but can be done if the City, UDOT, and potential developers work together and maintain a firm commitment to this goal.

In this proposed grid system arterials are typically spaced 1 to 1½ miles apart with major and minor collectors spaced ½ mile apart in between the arterials all of which are aligned along section lines or mid-section lines. There are some limitations and variations to this desired spacing due to existing roadways and land uses. 9000 South, 7800 South, and to some degree 7000 South are proposed to be the east-west arterials through the City. The extension of 9000 South and 7800 South due west to the western boundary of the City is a vital component to the promotion of the grid system and the de-emphasis of the Bingham Highways. It is not practical or even possible to try and reduce the traffic along the Bingham Highways until there is an alternate route through the City to SR-111, such as 9000 South.

The north-south arterials are Redwood Road, 5600 West, and SR-111 in addition to Bangerter Highway and the Western Transportation Corridor. Oquirrh Mountain Drive (or Boulevard) is currently the only north-south collector planned west of SR-111. The alignment shown in this plan is only conceptual, and the actual alignment will depend largely upon the topography of the foothills and the location of development. All of the east-west arterials and collectors are planned to extend straight west beyond Oquirrh Mountain Drive to the western boundary of the City as much as is possible.

A proposed bicycle and trails network was also produced as part of the Master Transportation Plan. The costs for bicycle lanes along arterials or collectors were included in the calculations of the various street projects mentioned above. A draft version of the West Jordan City Parks, Recreation & Trails Master Plan also recommends several multi-use trails on separate rights-of-way such as along canals or washes. These additional trails were included in the recommended bicycle and trail network shown in this report. Cost estimates for these multi-use trails were produced and a summary of these trails is shown in Table 12.2.3.

Table 12.2.3 Multi-Use Path Project List

Trail	Description	Length (ft.)	Length (mi.)	Cost
Jordan River Parkway	Multi-use, paved asphalt	5,867	1.11	$123,987
North Jordan Canal	Multi-use, unpaved gravel	20,321	3.85	$165,667
South Jordan Canal	Multi-use, unpaved gravel	24,035	4.55	$195,945
Bingham Creek	Multi-use, paved asphalt	18,632	3.53	$393,748
Utah and Salt Lake Canal	Multi-use, unpaved gravel	15,533	2.94	$126,633
Utah Lake Irrigation Canal	Multi-use, unpaved gravel	20,372	3.86	$166,082
7000 South	Multi-use, paved asphalt	4,223	0.80	$89,244
Cougar Lane to Skyview Basin	Multi-use, paved asphalt	5,710	1.08	$120,669
Provo Reservoir Canal	Multi-use, unpaved gravel	22,383	4.24	$182,477
5800 West Utility Corridor	Multi-use, paved asphalt	23,792	4.51	$502,794
5800 West Utility Corridor	Unpaved equestrian	23,792	4.51	$356,880
Barney's Wash South	Multi-use, paved asphalt	23,277	4.41	$491,910
Barney's Wash North	Multi-use, paved asphalt	22,808	4.32	$481,999
Barney's Wash North	Unpaved equestrian	22,808	4.32	$342,120
	Totals	**253,553**	**48.02**	**$3,740,154**

An inventory of the existing arterials and collectors was made in order to identify locations where there are discontinuous sections of sidewalk such as along undeveloped parcels. Most of these missing sections are found along the north-south running collectors in the eastern half of the city. A cost estimate for the construction of curb, gutter and sidewalk along all of these areas was calculated and is shown in Table 12.2.4.

Table 12.2.4 Curb, Gutter and Sidewalk Sections to be Completed

Street	East side	Length (ft)	West side	Length (ft)
1300 West	7300 to 7350	300	6800 to 7000	1320
	7500 to 7800	1980	7400 to 7500	660
	8000 to 8800	5280	9100 to 9400	1775
	9200 to 9400	985		
2200 West	6400 to 6700	325	7400 to 7800	2275
	8300 to 8600	1300	8300 to 8500	1600
	9000 to 9050	365	9000 to 9100	500
2700 West	7900 to 8050	1360	9300 to 9400	755
	8100 to 8400	1640		
	8550 to 8600	460		
3200 West	7000 to 7550	3775		
4000 West	8900 to Old Bingham	315	8700 to Old Bingham	1050
	Old Bingham to 9000	520	Old Bingham to 9000	500
	9050 to 9400	1900	9000 to 9050	900
Airport Rd.	7800 to 7850	500	7800 to 7850	500
4800 West	7400 to 7800*	7085	8100 to New Bingham	
	8900 to 9000*			
	9300 to Old Bingham	740		
	Subtotal	28,830		11,835
			Total Length (ft)	**40,665**
			Cost per linear foot	**$41.12**
			Total Cost	**$1,672,029**

**Half-width street exists.*

12.3 FUNDING SOURCES

12.3.1 Federal Funding Sources

Most federal transportation funds are allocated through provisions in the Transportation Equity Act for the 21st Century (TEA-21).

Surface Transportation Program

STP funds are flexible in that states and local governments can use the funding for projects on federal-aid highways, bridge projects on public roads, and transit capital projects. In Utah, STP funds are distributed on an annual basis through the Metropolitan Planning Organizations which in Salt Lake County is the Wasatch Front Regional Council. A committee, on which every city has a vote, allocates funding to projects. Fifty percent of STP funds are distributed based on population, 30% are distributed statewide, 10% are distributed based on priority of safety projects, and 10% are allocated to transportation enhancements funds.

Congestion Mitigation/Air Quality Program

The CM/AQ program funds projects in air quality non-attainment and maintenance areas for ozone, carbon monoxide, and small particulate matter (PM-10) that aim to reduce vehicle emissions. Examples of these projects include bicycle trails that demonstrate a reduction in vehicle miles of travel (VMT) and projects to improve intersection delay. Like STP funds, CM/AQ funds are also administered by the Wasatch Front Regional Council.

Transportation Enhancements

Transportation Enhancement funding is available for activities that are designed to "strengthen the cultural, aesthetic, and environmental aspects of the Nation's intermodal transportation system." Funds from this program go to local governments to implement projects such as restoring historic transportation facilities, bicycle and pedestrian facilities, landscaping and scenic beautification, and mitigating water pollution from highway runoff. Transportation Enhancements are funded through the Enhancements Committee of the Utah Department of Transportation.

12.3.2 State Funding Sources

Several sources of transportation funding are programmed at the state level. Some of these sources are eligible for use on roads other than State Highways, while others must be used only on State Highways.

B&C Road Funds

Class B&C road funds are distributed by the State to cities and counties for the construction and maintenance of public highways, roads or streets that are maintained to certain minimum standard and over which a normal two-wheel drive vehicle would be able to travel. Included in the list of permissible uses of these funds are equipment purchase, sidewalks, curb, gutter, and federal matching grants, among many others.

High Hazard Elimination Projects

This funding source applies to State Highways only and includes a variable amount of money that is competitive on a statewide basis. Requests should be submitted to the UDOT

Headquarters Traffic and Safety Division. Accident rates, cost estimates, traffic volumes, and other information are evaluated on a formula basis and improvements are ranked statewide.

Spot Improvement Funds

Similar to High Hazard Elimination projects, spot improvements are funded statewide and are only eligible for State Highways. These projects are generally smaller in scale than High Hazard Elimination Projects and are also requested, evaluated, and coordinated at the UDOT Headquarters Traffic and Safety Division.

Signing and Striping Improvements

Direct requests for speed limit signs, animal crossing signs, and related small scale striping and signing changes on State Highways can be made directly to UDOT Region 2. These projects can generally be absorbed within short term programming at the region and can be requested via phone call, email, or regular mail. Specific requests that include schematic design drawings, quantity estimates, and other justification data might be more readily funded.

Drainage and Maintenance Requests

Similar to signing and striping, requests to address drainage and other maintenance issues on State Highways should be made directly to the Maintenance Area at the Region.

12.3.3 Local Funding Sources

The 2002-2003 budget for the City of West Jordan includes two primary categories for transportation costs including both capital maintenance costs. The first is using money from the General Fund, which for transportation is primarily money from Class C road funds. The second is from the Capital Projects Fund, which for road projects is primarily money from road impact fees. Currently the city has allocated 25% of sales tax revenue to the Capital Projects Fund; however this money is not always used for transportation projects and may be adjusted by the City Council. The 2002-2003 budget assumes revenues of $2.7 million from Class C road funds and $790,000 from road impact fees.

While general fund appropriations are important in funding transportation priorities, the bulk of local capital projects funding will be through development impact fees and sales tax revenue. Local funding also includes the portion of the Statewide Gas Tax distributed to cities in the form of Class C road funds. Class C road funds are distributed at an existing rate of 25% of (net) gas tax revenue (since transfers to other purposes are diverted from the gross total) based on a ratio of population, road mileage, and land area. Class C road funds are typically used for maintenance projects and spot improvements rather than large-scale capital projects.

Local general fund and other local contributions to transportation have been utilized somewhat inconsistently based on need and political will. According to more regional trends by the WFRC, local contributions to transportation can be expected to exceed the present level of Class B&C revenue.