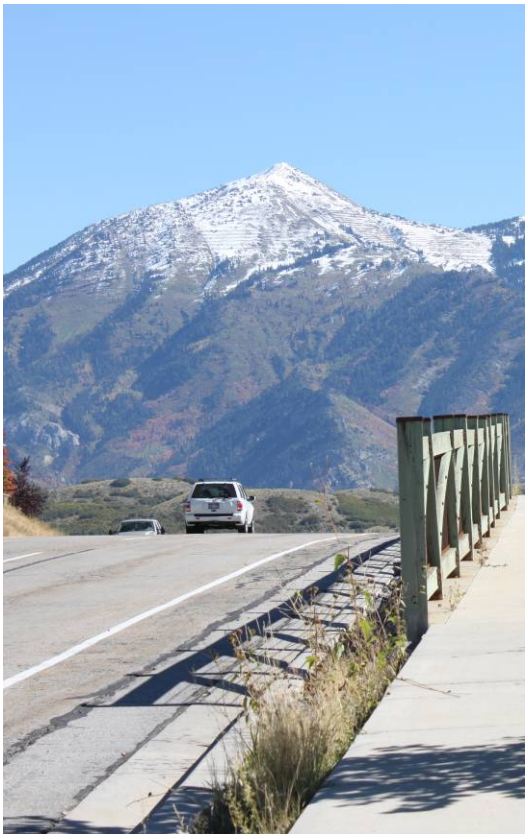
DRAPER CITY MASTER TRANSPORTATION PLAN

EFFECTIVE DATE NOVEMBER 2011

DRAPER CITY



November, 2011 Project 110262

InterPlan
Transportation Planning

7719 South Main Street
Midvale, Utah 84047

Table of Contents

I. Introduction 1

Background 1

Purpose of this Plan 2

Draper City Goals and Objectives 3

Development of the Master Transportation Plan 4

Citizen Transportation Committee (CTC) 4

II. Existing Conditions 7

Demographics 7

Peer City Comparison 10

Existing Land Use 12

Alternative Travel Modes 16

Bus Routes 16

Pedestrian and Bicycle 17

Areas of Concern 18

Draperville 19

Highland Drive 19

Traverse Ridge Road 20

West Side Circulation/Bangerter Access Plan 21

Street Standards 21

Connectivity 22

III. Future Conditions 23

Future Land Use 23

Draper City General Plan 25

Development Scenario 26

Regional Plans 28

Wasatch Front Regional Council Long Range Transportation Plan 29

Utah Department of Transportation Plans 31

Level of Service Evaluation 32

Existing Level of Service 32

Future Level of Service 34

Functional Classification 36

On-Street Parking 37

Future Alternative Travel Modes 38

Transit 38

Walkability 38

Pedestrian and Bicycle 39

IV. Recommendations 41

Street Standards 41

Clear Zones 42

Local Streets – 60 feet 42

Minor Collectors – 66 feet 43

Major Collectors - 74 feet 45

Minor Arterials – 80 feet and 100 feet 47

Arterials 49

Access Management 52

Traffic Calming 55

Traffic Calming Alternatives 55

Traffic Calming Device Implementation Process 58

Traffic Calming Considerations 59

Transit 60
Commuter Rail 60
Light Rail 61
Bus Routes 62
Pedestrian/ Bicycle 63
Truck Routes 66
V. Capital Facilities Plan 67
VI. Areas of Concern 73
Incorporate Existing Area Plans Into the Master Transportation Plan 73
Draperville and Downtown 73
Highland Drive and Traverse Ridge Road 73
West Side Access 74
Signals, Roundabouts and Special Intersections 74
Roundabouts 76
Special Intersections 77
VII. Addendum Chapter - Impacts from Proposed New High School 81
Description of New High School 81
New High School Traffic Distribution 82
Impacts to Functional Class System 82
Major Intersections of Concern 84
Local Street Intersections of Concern 86
VII. Appendix 87

List of Figures and Tables

Figure 1- 1: Citizen Transportation Committee Members 5
Figure 2- 1: Draper Population Growth 8
Figure 2- 2: 2000 Census Population 10
Figure 2- 3: 2000 Census Place of Work 11
Figure 2- 4: 2000 Census Travel Time to Work 11
Figure 2- 5: 2000 Census Alternative Travel Modes to Work 12
Figure 2- 6: Existing Land Use 13
Figure 2- 7: Traffic Analysis Zones in Draper City 14
Figure 2- 8: Existing Bus Service 16
Figure 2- 9: Existing Bicycle Facilities 17
Figure 2- 10: Transportation Areas of Concern 18
Figure 3- 1: Draper City General Plan 24
Figure 3- 2: Land Use and Corresponding Trip Rates for Development Scenario 25
Figure 3- 3: Land Use and Corresponding Trip Rates for Development Scenario 26
Figure 3- 4: Wasatch Front Growth in Population and Vehicle Miles Traveled 29
Figure 3- 5: WFRC RTP Final Highway Projects 30
Figure 3- 6: 2005 Model Level of Service 5:00 to 6:00 pm 33
Figure 3- 7: 2030 No-Build Model Level of Service 5:00 to 6:00 pm 34
Figure 3- 8: 2030 Improved Model Level of Service 5:00 to 6:00 pm 35
Figure 3- 9: Functional Classification of Streets 36
Figure 3- 10: Functional Classification General Characteristics 37
Figure 3- 11: Pedestrian Facilities in Draper 40
Figure 4- 1: Cross Section, Valley Local Street 43

Figure 4- 2: Cross Section, Mountain Local Street 43
Figure 4- 3: Planned Minor Collectors 44
Figure 4- 4: Cross Section, Commercial Minor Collector 45
Figure 4- 5: Cross Section, Residential Minor Collector 45
Figure 4- 6: Cross Section, Major Collector 46
Figure 4-7: Planned Major Collectors 46
Figure 4-8: Planned Minor Arterials 47
Figure 4- 9: Cross Section, Minor Arterial (four lane) 48
Figure 4- 10: Cross Section, Minor Arterial (five lane) 48
Figure 4- 11: Planned Arterials 49
Figure 4- 12: Cross Section, Arterial 50
Figure 4- 13: Cross Section, Highland Drive Arterial A 50
Figure 4- 14: Cross Section, Highland Drive Arterial B 50
Figure 4- 15: Full Function Classification System 51
Figure 4- 16: Access Management Spacing 54
Figure 4- 17: Traffic Calming, Crosswalk Striping 55
Figure 4- 18:Traffic Calming, Raised Crosswalk 56
Figure 4- 19: Traffic Calming, Center Island 57
Figure 4- 20: Traffic Calming, Bulb Outs 57
Figure 4- 21: Future Draper Transit Component 62
Figure 4- 22: Master Transportation Plan, Bike Component 65
Figure 4- 23: Truck Routes 66
Figure 5- 1: Improvements by phase 69
Figure 5- 2: Improvements by Phase 70
Figure 5- 3: Improvements with 2005 and 2030 Estimated Daily Traffic 71
Figure 6- 1: Current and Future Controlled Intersections 75
Figure 6- 2: Which type of intersection do you prefer? 76
Table 6- 1: Major Intersections of Concern 77
Figure 6- 3: Specific Intersection Lane Configuration 79
Figure 7- 1: 2018 Change in Daily Traffic Volumes with New High School 83

Table 2- 1: Top Ten Utah City Population Growth 8
Table 2- 2: Draper City Household Data 9
Table 2- 3: Employment Growth in Draper City 9
Table 2- 4: 2005 Draper City Socioeconomics 15
Table 3- 1: Assumed Greenfield Development Densities 25
Table 3- 2: WFRC RTP East West Highway Project Descriptions 30
Table 3- 3: WFRC RTP North South Highway Project Descriptions 31
Table 4-1: Geometric Design of Driveway Access 52
Table 4- 2: Draper City Minimum Access Spacing Standards 53
Table 6- 1: Major Intersections of Concern 77

I. Introduction

This 2011 version of the Draper Master Transportation Plan provides minor updates to the 2007 plan such as, an addendum chapter addressing impacts of the proposed new high school, updated discussion of the west Bangerter area, and graphical and textual updates based on advancements to the transportation network since 2007.

Background

Draper City is located along the Wasatch Front in southern Salt Lake County. Draper City also includes part of Utah County known as Traverse Ridge. Neighboring cities include Alpine, Lehi and Highland to the south and east, Sandy to the north, South Jordan and Riverton to the west, and Bluffdale to the southwest. To the east and northeast lie foothills and mountains administered by the United States Forest Service.

Draper is divided by Interstate 15 (I-15) running north-south through the city. Other major north-south routes include 300 East, 700 East, 1300 East, and Highland Drive. Major east-west routes include 11400 South, 12300 South, Bangerter Highway, Traverse Ridge Road, and 13800 South. Draper City is scheduled to receive the Utah Transit Authority's (UTA) light rail as soon as 2014 and commuter rail as early as 2012. UTA currently serves Draper with bus routes through the city. Draper City has an extensive pedestrian, bicycle and equestrian trail plan that serves the city in a transportation capacity as well as in a recreational capacity.

Draper hills looking west

Purpose of this Plan

The purpose of the Draper City Master Transportation Plan is to create a transportation plan that will help meet the transportation goals of the City and allow future development to enhance the positive aspects of Draper while minimizing any negative aspects. In the last few decades, Draper City has seen significant population growth and consequently this growth has put increased pressure on the City's transportation system. This plan responds to the increased travel demand while retaining the small town character and feel of the city. As part of the City's General Plan, the Master Transportation Plan guides city government, staff and residents as future growth and needs are encountered. The Master Transportation Plan should be viewed as a component of the Draper City General Plan. As such, the Master Transportation Plan supplements, but does not replace various elements of the General Plan such as aesthetic and streetscape standards which remain vital to the character and identity of Draper City.

There are many reasons that precipitated the development of the 2007 Master Transportation Plan. Some are:

- Most of the previous five year Capitol Improvement Plan projects are now complete;
- Recent and planned developments are having and will have high traffic impacts;
- To remain current with regional issues; and
- To identify and respond to known "hotspot" transportation areas.

This plan has been organized into five chapters which cover the components of the transportation plan. Chapter I is the introduction which covers Draper City goals and includes a high level view of transportation issues and challenges. Chapter II reviews Draper City's existing conditions and compares Draper to identified peer cities for comparisons. Chapter III attempts to look at the future transportation conditions that Draper City will likely encounter. Chapter IV presents the Master Transportation Plan and makes transportation implementation recommendations. Chapter V proposes funding and a Capital Facilities Plan. Chapter VI addresses several specific areas of concern, and an appendix has been provided to include supporting technical details.

The current road network has been studied to address the needs and concerns of Draper City. Road cross sections and routes have been updated to reflect the needs of future traffic volumes while still maintaining the quality of life that Draper citizens have come to know.

To accommodate the future proposed commuter rail and light rail lines, this plan addresses the integration of the transit system into the community. Additional bus routes have been suggested so that full use of the fixed guideway system can be utilized. Bicycle and pedestrian access has been studied as well. Bicycle and pedestrian routes are a key part of any successful transportation plan.

Draper City Vision

Draper City is a city that has a small town feel that is rich in rural heritage and has the convenience of metropolitan opportunities. The citizens of Draper want to manage the continuing growth within the city to maintain the high quality of life that the citizens have come to know. A well performing transportation system is a major component to this vision. The 2007 Draper Master Transportation Plan looks to satisfy the people's goals and objectives.

300 East at 13700 South looking north

Draper City Goals and Objectives

Mission Statement

Draper City is a community that preserves its unique identity and heritage, and provides protection and services for its citizens.

Values

Unity
Neighbors work together to build a strong community.

Respect
Citizens have tolerance, understanding and sensitivity to one another's differences.

Quality of Life
Citizens of all ages feel safe, have places to gather, and enjoy traditions, events and culture.

Environment
Draper is clean, pleasant, pastoral, has a small-town feeling and sense of identity.

Pride
Citizens are proud to call Draper "home," and are involved in community well-being.

Adopted by Resolution No. 99-12, April 6, 1999

Development of the Master Transportation Plan

1300 East at planned UTA crossing

Many different planning groups were involved in the process of creating this 2007 Master Transportation Plan. Groups with different interests and backgrounds came together to make sure this plan was well balanced and not lacking vital components. Master Plan development groups included:

- Draper City Staff
- Citizen Transportation Committee
- Consultants from InterPlan Co. and Lochner Engineering

A public open house was held on September 25, 2007. The purpose of the open house was to let the public evaluate and make comment on various concepts of the Draper City Master Transportation Plan. The City Council and Planning Commission also reviewed and acted on the Master Transportation Plan through a joint study meeting and a formal public hearing process.

Citizen Transportation Committee (CTC)

The Citizen Transportation Committee was selected by the City Council in July 2007. Membership on the CTC was designed to include a cross section of citizen and business owner interests across the community with representation across various modes of travel, geographic locations, development interests and other factors. Selection of the CTC represented a delicate balance where a broad cross section of the community was asked to participate in focused and productive planning sessions that could best represent the needs of the entire City. Members volunteered to serve over an approximate six month period and attend 3-4 afternoon meetings. Members of the CTC are shown in the following table.

At the onset of the process of creating a transportation plan, the Citizen Transportation Committee was asked to discuss transportation problems in the City and to develop transportation goals for the City of Draper. The members advanced four goals which became the guiding principles when the Draper City Master Transportation Plan was developed. The goals and related objectives were presented to the City Council and Planning Commission and received broad support as high level concepts.

1300 East, Pioneer Road (12400 South) Roundabout

Figure 1- 1: Citizen Transportation Committee Members

Group or Description	Name
Chamber Of Commerce	Bill Rappleye
Draper City Council	Jeff Stenquist
Draper City Police	Sergeant Scott Peck
Draper City Staff	Jillian Rolfe
Draper City Staff	Grant Crowell
Draper City Staff	Brien Maxfield
Draper City Staff	Dave Decker
Draper Community Foundation	Nick Ramond
Draper Crossing Guards	Carolyn Tolman
Draper Parks & Trails Committee	Kent Player
Draper Planning Commission	Marsha Vawdrey
Draper Resident	Larry Jensen
Draper Resident	Lyn Kimball
Draper Visual Arts Foundation	Jean Hendrickson
Draper Youth Council	Clint Rasmussen
Draperville Area Resident	Sonya Davis
Goodwood BBQ	Chris Hatanelas
Ivory Homes	Chris Gamvroulas
Ivory Homes	Brad Mackay
South Mountain/Suncrest Resident	Ken Murdock

Citizen Transportation Committee Goals

Goal Number 1: Draper City shall create an inter-connected street system.

Objective

The inter-connected street system shall:

- Enhance connectivity
- Coordinate with adjacent communities
- Provide a grid of alternative routes
- Serve to disperse traffic

Goal Number 2: Draper City shall provide multi-modal transportation opportunities.

Objective

The multi-modal transportation system shall include:

- Tying into the regional transit system of TRAX and commuter rail
- Providing a regional example of successful bicycle opportunities
- Creating a more walkable city
- Providing an interconnected system of trails for regional activity centers

Residential street in Draper

Goal Number 3: Draper City shall provide a transportation system which compliments land uses in the City.

Objective

Complimenting land uses includes:

- Providing street cross sections which vary by adjacent land use
- Providing street cross sections which maintain and enhance the character of historic areas

Goal Number 4: Draper City shall create a transportation system for the future.

Objective

Creating a transportation system for the future means:

- Providing a network for all modes of travel
- Considering options for future generations and future transportation demands
- Considering funding in the development of plans.

II. Existing Conditions

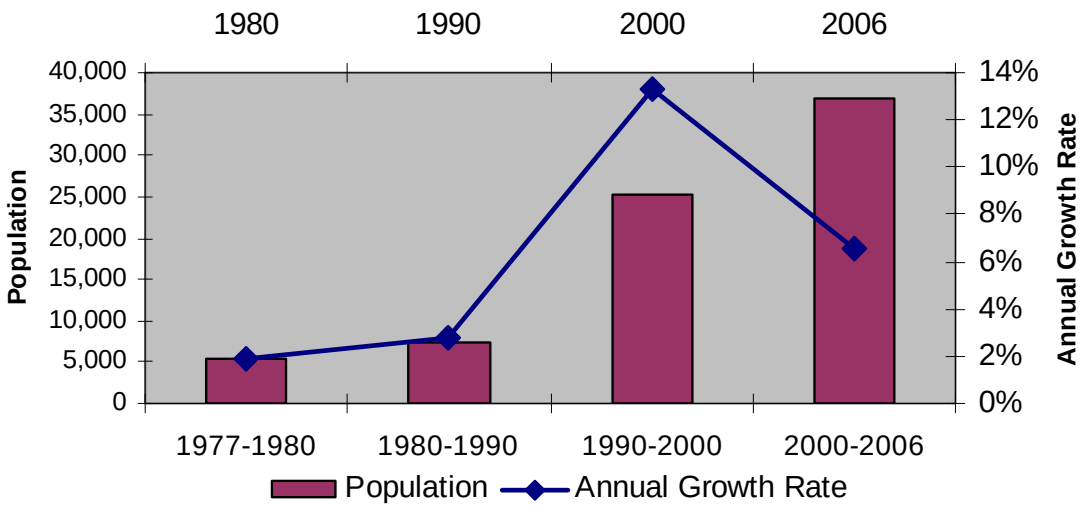
Development in Draper City is characteristic of explosive suburban development. What were once farmlands have been converted to single family housing with convenient transportation access to a thriving central city in the booming metropolitan area of Salt Lake. More recent development has offered a mix of residential and commercial land uses and has threatened the sustainability of a transportation system largely relying on private automobiles.

Demographics

Draper City has experienced significant population growth over the last 16 years, like many cities along the Wasatch Front. This growth has transformed Draper from a rural agricultural community to a suburban city located in a growing metropolitan region. Figure 2-1 shows Draper's population (including the Utah State Prison) and the compound annual growth rate from 1977 through 2006.

Draper City Hall on Pioneer Road (12400 South)

Figure 2- 1: Draper Population Growth



Source: US Census Bureau, US Census Bureau Population Estimates Program

Draper's population grew fastest between 1990 and 2000 with the population increasing from 7,257 to 25,220. During this period Draper's population increased at an annual rate of 13.3 percent which made it the second fastest growing community in Utah behind Cedar Hills. Since 2000, population growth has moderated to 6.6 percent annual growth but the city's population still increased by 11,653 people. In Utah, this growth ranked sixth in absolute population change between 2000 and 2006. In other words, Draper is home to more new residents during that period, regardless of city size, than every city in Utah except West Jordan, St. George, Lehi, South Jordan and Herriman. Table 2-1 lists the top ten Utah cities for new residents from 2000 to 2006.

Table 2- 1: Top Ten Utah City Population Growth

Utah City	2000	2006	New Residents	Annual Growth Rate
West Jordan	68,336	94,309	25,973	5.5%
St. George	49,663	67,614	17,951	5.3%
Lehi	19,028	36,021	16,993	11.2%
South Jordan	29,437	44,009	14,572	6.9%
Herriman	1,523	14,643	13,120	45.8%
Draper	25,220	36,873	11,653	6.6%
West Valley City	108,896	119,841	10,945	1.6%
Murray	34,024	44,844	10,820	4.7%
Holladay	14,561	25,308	10,747	9.7%
Riverton	25,011	35,543	10,532	6.0%

Source: US Census Bureau, Population Estimates Program

Comparing the number of new people to the rate of change is important when planning transportation, but the evolution of household number and size has even greater

meaning. The 11,653 new residents of Draper includes non-drivers and people under 16 years old. Because of this, households are a better indicator of trips. Interestingly, during the last three decades, the growth in households has outpaced population growth in Draper. One reason we have such growth in the number of households is because the number of people per household has decreased from 3.73 in 1980 to 3.40 in 2000. The smaller household phenomenon is consistent with the rest of the state and the entire nation, and likely related to societal changes. Table 2-2 provides the household data for Draper City.

Table 2- 2: Draper City Household Data

	1980	1990	2000
Persons per Household	3.73	3.54	3.4
Number of Households	1,216	1,373	6,305

Source: US Census Bureau

When studying the demands on a city's transportation system, one must also examine employment. Employment, as well as population and households, increased significantly since the mid-1990s. The total number of jobs available in Draper City increased 240% in the ten years from 4,912 in 1995 to 12,010 in 2004. The number of establishments, or employers, increased at an even higher rate from 334 work sites to 1,229. Table 2-3 provides the employment change from 1995 through 2004.

Table 2- 3: Employment Growth in Draper City

Year	Number of Employers	Number of Jobs
1995	334	4,912
1996	401	6,376
1997	535	8,133
1998	586	9,184
1999	628	10,574
2000	750	10,850
2001	890	9,774
2002	953	10,559
2003	1,111	11,475
2004	1,229	12,010
Ten Year Change	368%	240%

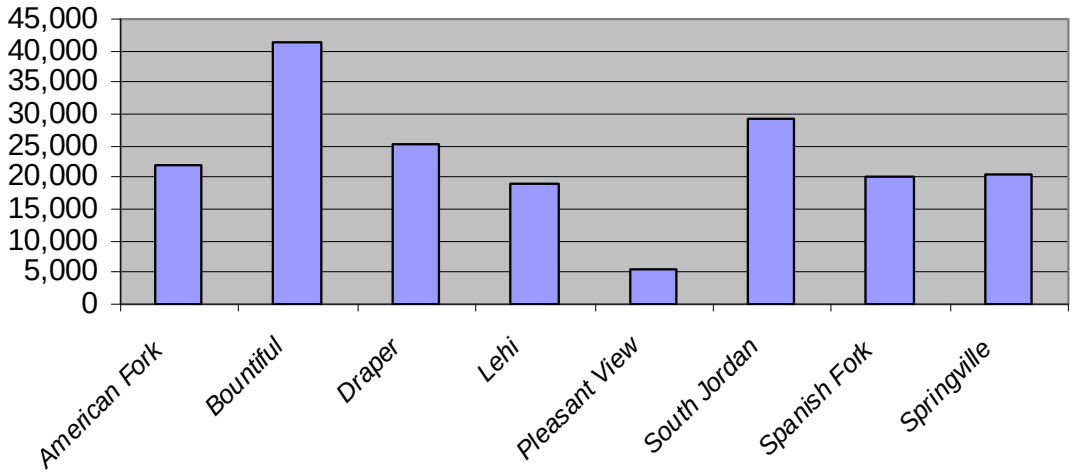
Source: The Changing Economic Structure and Current Baseline of Draper City, Bureau of Economic and Business Research.

Peer City Comparison

In addition to describing the growth trends and demographic conditions in Draper City, it is often useful to compare the city to similar cities throughout Utah. Seven cities were selected as "peer cities" due to similar characteristics of population size, location on the fringe of the suburban boundary, historically strong residential growth, and on-going or projected strong employment growth. Reviewing transportation data from peer cities is a useful way of presenting available data in the context of other areas so that discussion and presentation is simplified. The following lists the peer cities to Draper which share these characteristics. The 2000 Census population of these cities is shown in Figure 2-3.

County	Peer Cities
Salt Lake County	South Jordan
Utah County	American Fork, Lehi, Spanish Fork, Springville
Weber County	Pleasant View
Davis County	Bountiful

Figure 2- 2: 2000 Census Population

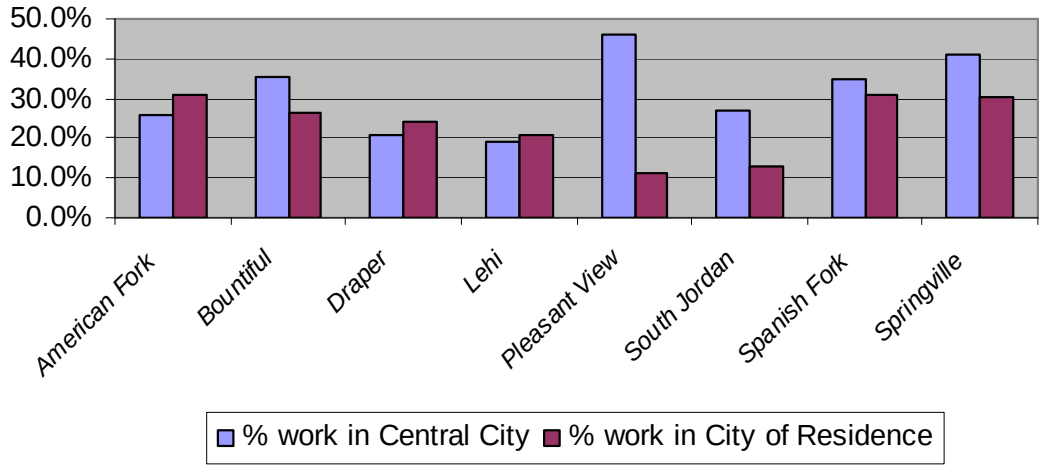


Although the population in many of these cities, including Draper, has grown substantially over the past seven years since the Census, a variety of transportation related aspects can generally be expected to change more slowly and provide a useful way to compare the status of the Draper City transportation system to other peer cities.

Place of work provides an indication of the job/housing balance of an area as well as its function as a "bedroom" community. Figure 2-4 displays the percent of workers in the 2000 Census who worked in either the central city of the metropolitan area (Salt Lake, Ogden, or Provo-Orem for the respective peer cities). In this respect, Draper City is more of a bedroom community than most of the peer cities, with notable exceptions of

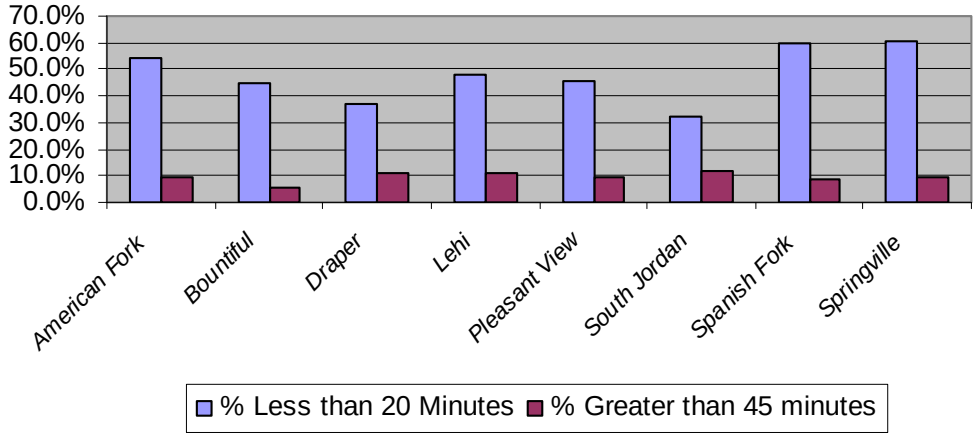
Pleasant View and South Jordan which employ a much lower percent of workers within the city and a higher percent of workers in the central city.

Figure 2- 3: 2000 Census Place of Work



Having employment opportunities nearby, within a reasonable commute, adds to the quality of life of a community. Although people commute long distances by choice, there is a trade-off between the value of time spent traveling and other values such as land costs, leisure time, etc. Bedroom communities will often display greater percentages of persons making longer commutes and lower percentages of persons making short commutes. According to Figure 2-5, with the exception of South Jordan, Draper residents have the lowest percent of workers commuting less than 20 minutes to work and are tied with Lehi for the highest percent of workers commuting greater than 45 minutes to work.

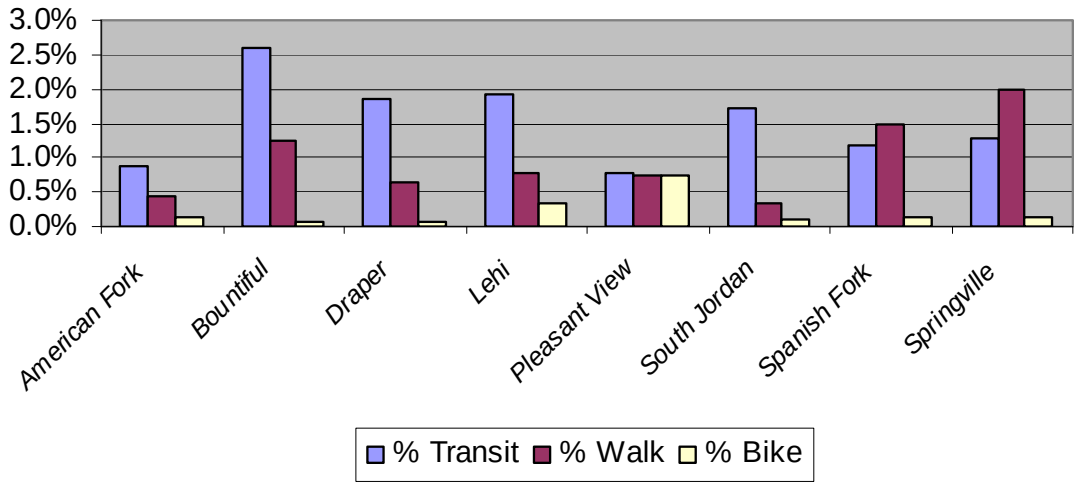
Figure 2- 4: 2000 Census Travel Time to Work



Finally, mode choice is an important transportation indicator. Many people value a balanced transportation system where there are choices between a variety of travel modes. Across the United States, a trend of ever increasing percentages of workers driving in

single occupant vehicles has created inefficiencies in the use of the roadway and transit system such that traffic congestion is a growing concern. Unfortunately, the age of the 2000 Census reflects only the infancy of TRAX light rail transit and likely displays lower transit ridership than what might be observed today. Despite this, Figure 2-6 displays the relatively high transit ridership in Draper as compared with peer cities although relatively lower percentages of active transportation modes involving walking or bicycling.

Figure 2- 5: 2000 Census Alternative Travel Modes to Work

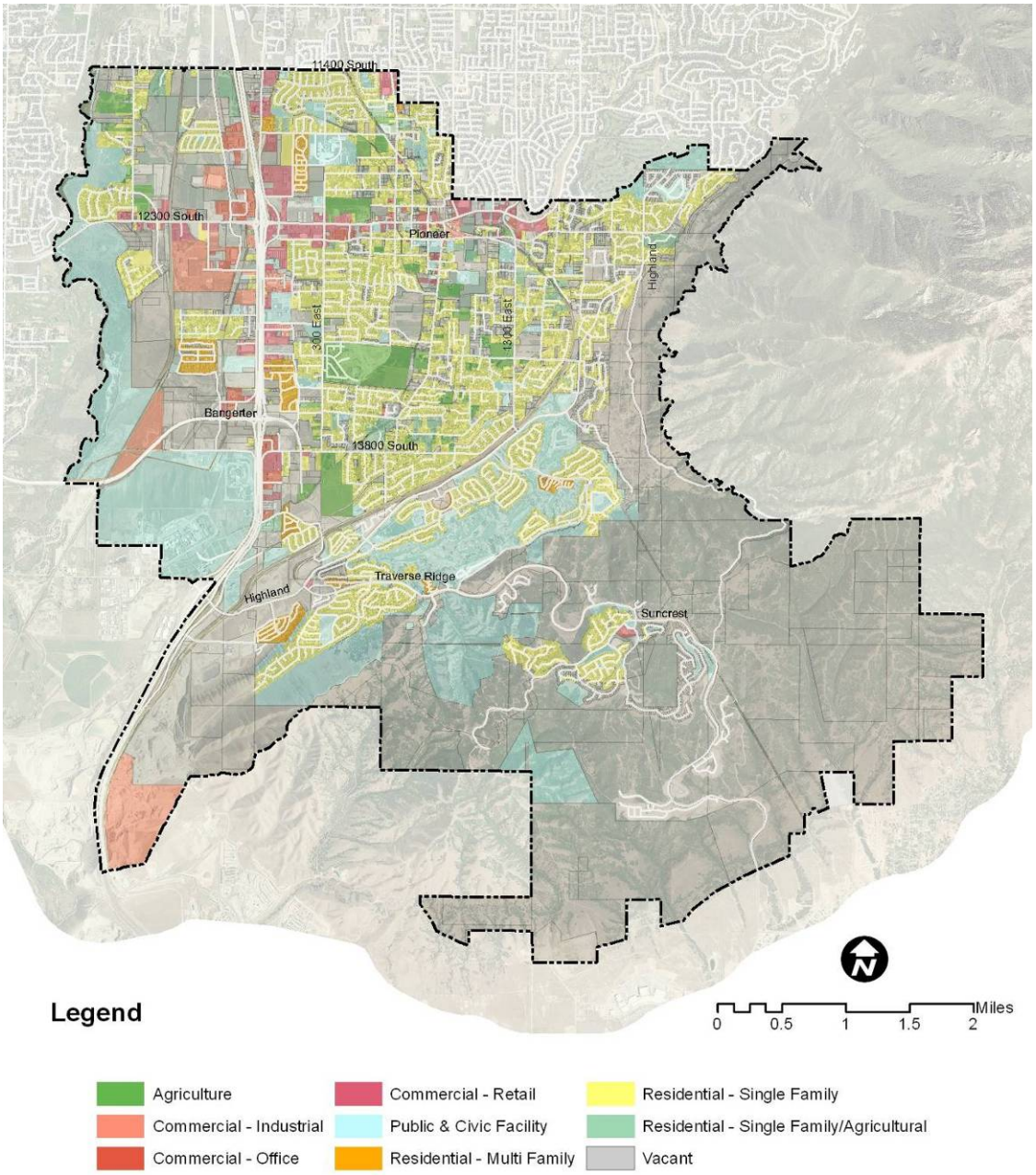


While these comparisons with peer cities do not provide clear conclusions about the nature of transportation problems in Draper City, they acknowledge that Draper residents and businesses may choose to relocate to a number of comparable areas throughout the greater Wasatch Front. Draper must maintain competitiveness in these transportation related areas just as the City must be competitive in its tax structure, development incentive structure, park and recreational system, etc. City staff should provide similar Census based comparisons at the year 2010 Census and provide a status report to the City leaders.

Existing Land Use

Existing land use in Draper is consistent with the transition from a rural agricultural community to a suburban city. In 2004, vacant land accounted for half of all land use, followed by public, residential, commercial, and agriculture in order of total acres. The Utah State Prison accounted for the high share of public land, approximately 18 percent of the acreage in the City. As the community has grown, agricultural land has either been developed or taken out of production so that it is currently vacant. Vacant land was scattered through out the city, however, the largest concentration of vacant land was west of I-15 and along the hillsides. Residential areas developed primarily east of I-15 with commercial land uses situated on 12300 South or along I-15. Figure 2-6 illustrates land use within Draper as of 2004.

Figure 2- 6: Existing Land Use

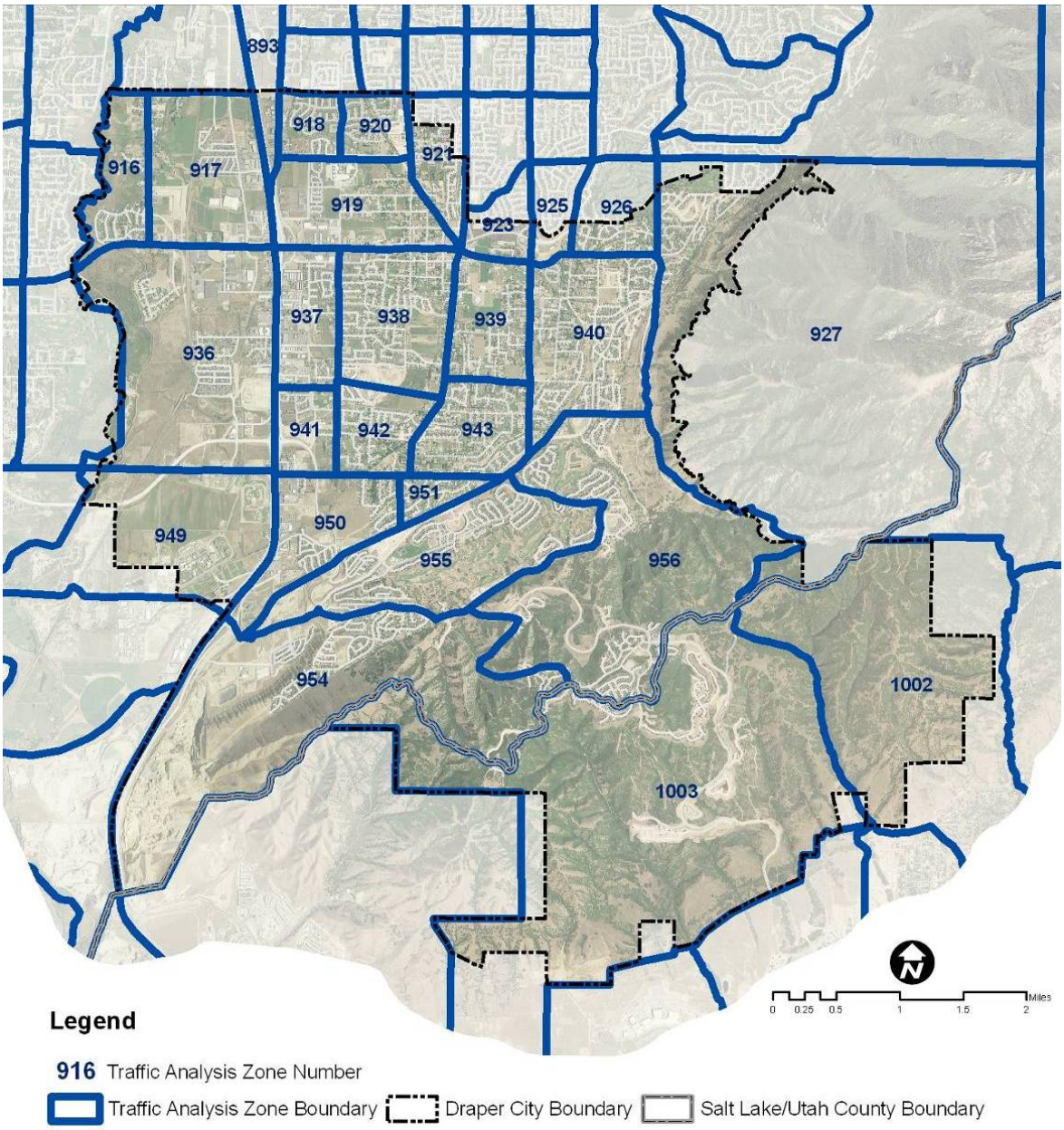


Source: Draper City

Transportation planning depends on estimating land uses in addition to demographic changes. This information is used in a computer modeling tool, known as the Travel Demand Model, which forecasts trips to and from destinations based on smaller regions known as traffic analysis zones (TAZs). The traffic analysis zones are geographically smaller than a municipality and are similar in size to census block groups. Traffic analysis zones were defined by the Wasatch Front Regional Council. For the travel demand

model, the existing land use by TAZ was used to estimate 2005 population and employment numbers for TAZs within Draper City. Figure 2-7 shows the TAZs within Draper City.

Figure 2- 7: Traffic Analysis Zones in Draper City



Providing an exact count of people, households, and jobs is often a challenging task. The US Census, Utah Governor's Office of Planning and Budget, The Bureau of Economic and Business Research and Draper City all contributed data used in this Master Transportation Plan. Table 2-4 summarizes the 2005 Draper City population, household, and employment values used for the travel model. These were developed in conjunction

with Draper City, and employment estimates are consistent with those cited in *The Changing Economic Structure and Current Baseline of Draper City, 2006*. Traffic Analysis Zones that are partially located within Draper City used the developed demographics for the portion of the TAZ within Draper, and a percentage of the base model demographics based upon land for the area outside Draper. For this reason, total traffic zone values overstate incorporated Draper City totals due to the inclusion of traffic zones which include both Draper and adjacent city estimates.

Table 2- 4: 2005 Draper City Socioeconomics

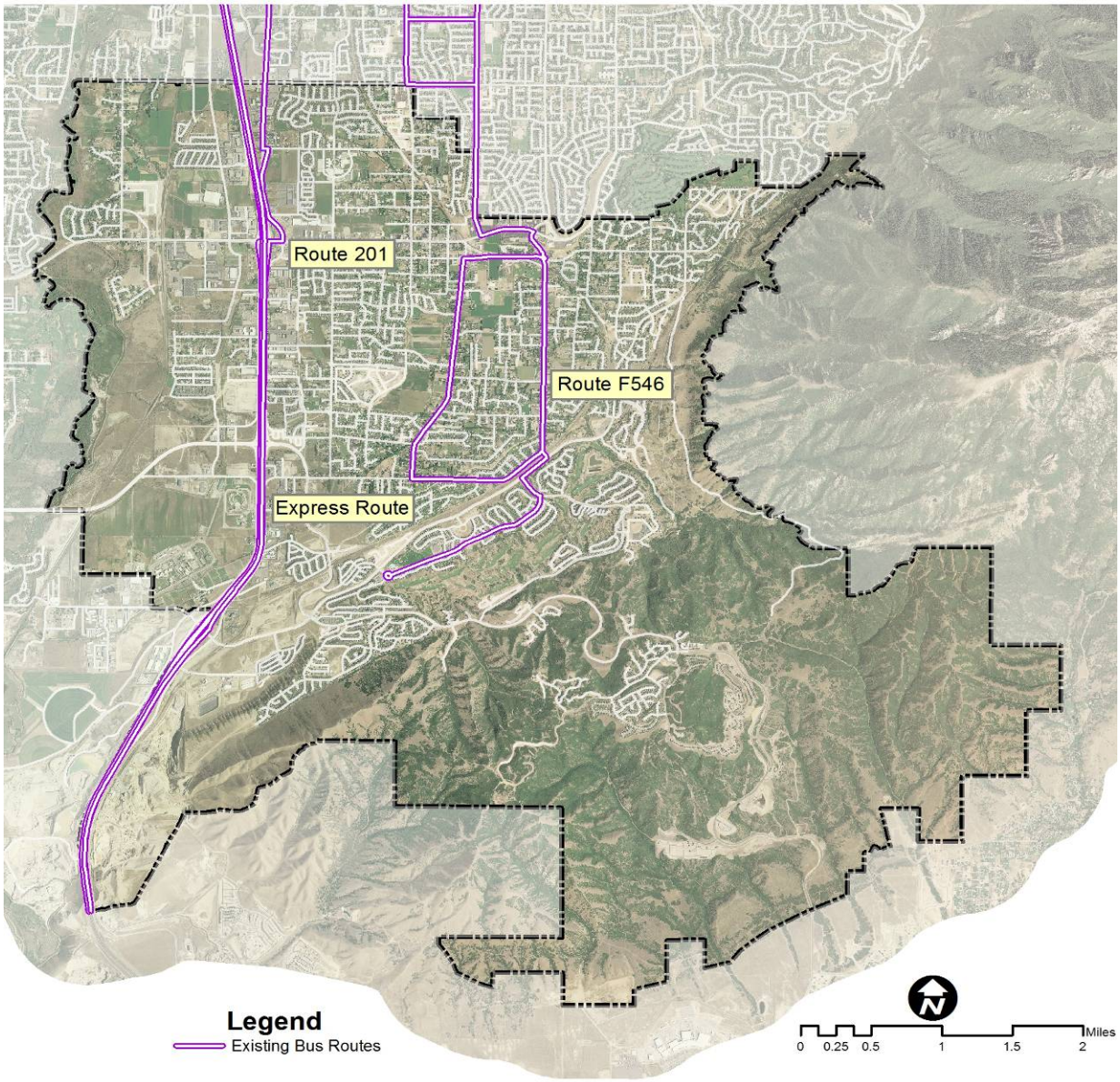
TAZ	Households	Population	Employment
893	0	0	96
916	250	823	89
917	452	1,487	1,235
918	480	1,579	206
919	616	2,027	1,101
920	530	1,744	142
921	333	1,096	65
923	50	165	496
925	14	46	194
926	189	622	3
927	279	918	61
936	560	1,842	2,149
937	306	1,007	1,180
938	920	3,027	479
939	279	918	51
940	958	3,152	27
941	736	2,421	158
942	403	1,326	34
943	447	1,471	18
949	0	0	1,677
950	475	1,563	614
951	135	444	0
954	1,246	4,099	1,435
955	1,445	4,754	191
956	1,083	3,563	262
1002	0	0	0
1003	833	2,741	45
Total	**13,019**	**42,833**	**12,008**

Alternative Travel Modes

Bus Routes

Bus service in Draper is provided by the Utah Transit Authority (UTA). Existing UTA bus routes in Draper consist of an express route to Utah County and bus routes F546 and 201. These routes connect parts of Draper to the nearest TRAX station located at approximately 10000 South in Sandy. Bus routes are subject to ongoing refinements and the most current bus routing information in available from UTA.

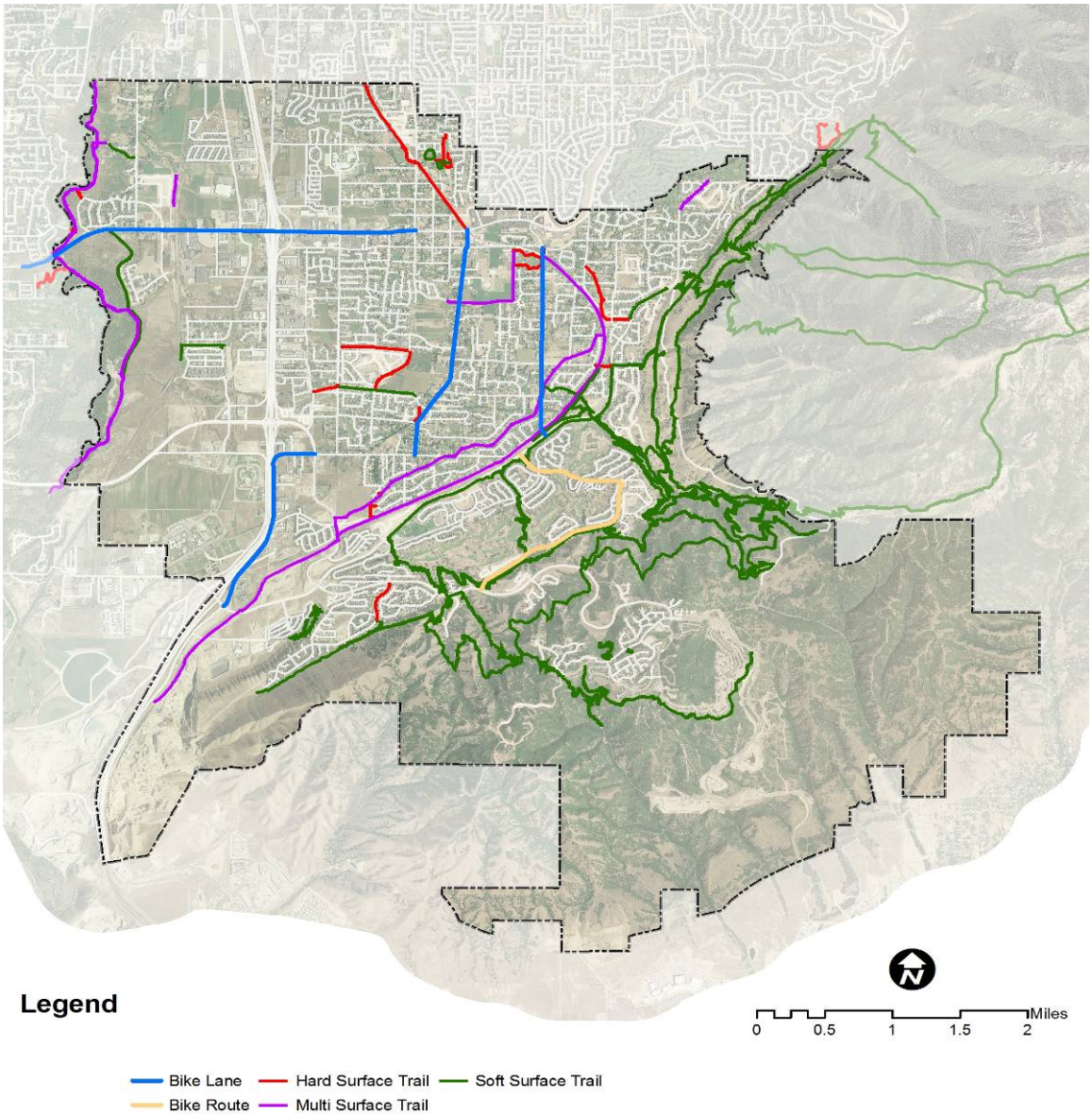
Figure 2- 8: Existing Bus Service



Pedestrian and Bicycle

Within Draper City there are many different types of pedestrian and bicycle facilities. Bike lanes, bike routes, hard surface and soft surface trails all make up the existing pedestrian network. Currently the main bike routes in Draper lie on 12300 South, 1300 East and Fort Street. A pedestrian and bicycle network allows shorter distance trips, such as children's trips to school, to be taken off of the highway network and moved to the pedestrian network. In addition, bicycle and pedestrian facilities offer a wide range of recreational opportunities and may add to the quality of life. The main bike lanes are on Highland Drive and Traverse Ridge Road. Figure 2-9 represents the existing pedestrian facilities in Draper City.

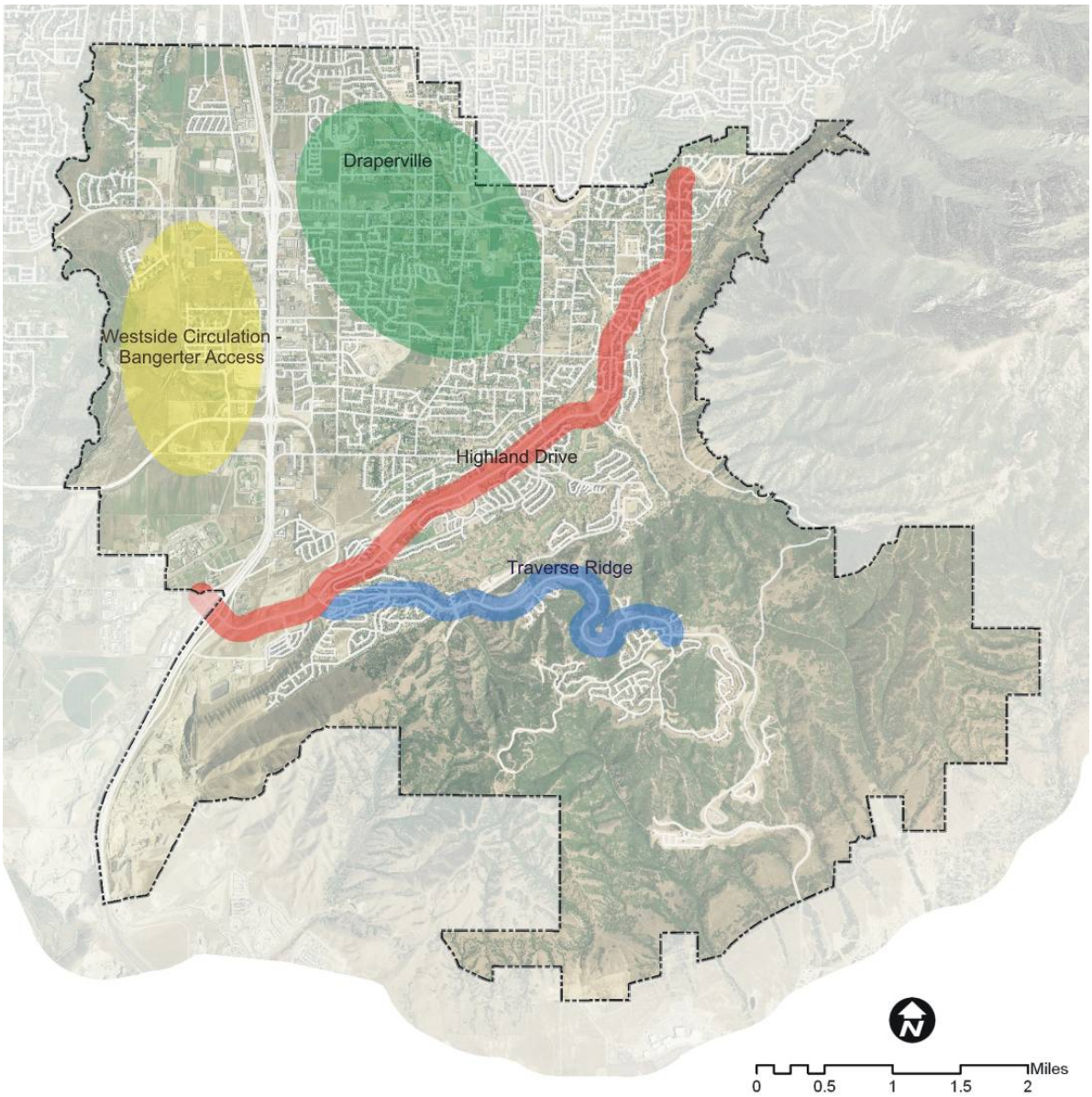
Figure 2- 9: Existing Bicycle Facilities



Areas of Concern

The CTC and Draper City identified several "hot spot" areas within Draper where transportation issues are of particular concern. These areas have diverse transportation problems that range from cut-through traffic to insufficient transportation infrastructure to meet the growing transportation demand. The specific areas and issues are summarized below and shown in Figure 2-10. In addition to these broad areas, several intersections have been identified by staff as requiring detailed analysis. These "hot spot" intersections are addressed in later chapters.

Figure 2- 10: Transportation Areas of Concern



Draperville

Draperville is a region of Draper City within its historic core. In this undefined area, streets generally follow the traditional grid layout. Homes and businesses are generally smaller and older. Draperville residents have voiced concerns regarding cut-through traffic within the neighborhood. The area is bounded by commercial land uses to the south and west and the UTA rail line to the east. The continued commercial development around the Draper Peaks and 700 East areas has threatened the quiet character of the Draperville residential areas and has created transportation concerns for residents in this area.

Highland Drive

Highland Drive is a well known north/south route currently extending from 2100 South in Sugar House, becoming 2000 East at I-215, and terminating at 9800 South in Sandy. Additional sections have been built south of 9800 south, but current obstacles exist at Dimple Dell Regional Park and the Hidden Valley Golf Course before it recommences at Draper's northern boundary. From there, at approximately 12000 South and 2000 East, it extends south and westward in Draper to connect to I-15 at the 14600 South interchange.

Highland Drive is planned as a four-lane arterial through Draper City. The existing transportation plan has three distinct cross sections that vary from a 106 foot right-of-way to a 120 foot right-of-way. The wider cross-sections incorporate a sloped median in place of a center turn lane. Although Highland Drive is planned to be a four lane arterial, the initial construction was a three lane facility within a 72 foot right-of-way north of Apple Orchard Lane.

Highland Drive at Pioneer Road (12400 South) looking south and north

There are two "hot spot" issues on Highland Drive. The CTC identified a future connection north to Sandy across the Hidden Valley Country Club as the highest priority to improve north-south road connectivity within Draper. There have also been concerns about previous cross-sections that incorporate a sloped median that hinder left-turn access to potential commercial development along Highland Drive.

Traverse Ridge Road

Suncrest made a major investment in Draper City when constructing the Traverse Ridge Road. This road crosses Traverse Ridge, a major east/west geographical obstacle between southern Salt Lake County and northern Utah County. This four lane facility climbs 1,300 feet over its 4.2 mile length. While not only connecting the two counties, it provides access to hundreds of acres of residential neighborhoods serviced by commercial and business usage in the lower parts of the community.

A portion of Traverse Ridge Road

With the rapid development of the SunCrest development there have been issues with the existing roadway cross-section due to the steep grades and high percent of heavy vehicles. Future cross sections should address both the short term construction traffic (trucks) and longer term development capacity needs. Safety concerns have been a particular issue for trucks traveling down Traverse Ridge Road, crossing Highland Drive, and continuing down Bangerter Parkway. It is unclear whether truck safety issues are short term issues, due primarily to the strong construction in the area, or long term issues related to geometric issues of the road construction.

West Side Circulation/Bangerter Access Plan

Interstate 15 creates a physical barrier separating east from west Draper. Traditionally, the west lands were less residential than eastern Draper regions and also less-intensively farmed due to different irrigation provisions. With its geographical west boundary being the Jordan River, and being further bisected by the UP rail line, this region has significant transportation limitations.

200 West at 13490 South looking north

With the construction of the Bangerter Highway and the widening of 12300 South, access has improved and development pressure has increased on remaining undeveloped/under-developed lands on Draper's west side. As a result, the existing plan needs additional attention and refinement based on evolving pressures and land use plans. Major components of the west side transportation system include:

- Lone Peak Parkway,
- Galena Park Boulevard,
- Future access to Bangerter Highway via 200 West and/or a new access located further west,
- FrontRunner commuter rail access,
- Potential private development of the State Prison properties, and
- Spin-off development of the recent IKEA store.

Street Standards

A continuing concern in Draper, and a common theme in many developing cites, is a review of street standards to ensure that they reflect the attitudes of the Draper residents in terms of their balance between quiet residential communities and a functional transportation system. While connectivity was a strong goal of the transportation system, the aesthetics of a rural, pastoral setting are also valued. The Draper City engineering and consultants have worked together to create road cross sections which balance the needs of emergency vehicles, which often push for wider pavements, while remaining cognizant of potential traffic calming and neighborhood traffic management issues which seek to reduce local street speeds, often through restricted pavement width.

A sub-group of the CTC spent time addressing the strategic needs of Draper City cross sections and provided priorities which varied by functional classification. On Local

streets, the CTC prioritized aesthetics and pedestrian access. On Minor Collector streets, the CTC addressed similar priorities and added parking as another priority issue. On Major Collector streets, the CTC began to value turn lanes as a means of reducing traffic delays even at the expense of the lower functioning road priorities. On Arterial streets, the CTC prioritized traffic flow and travel lanes and saw pedestrian access as a much lower priority. Aesthetics remained a priority on all streets, but was not the top priority on the higher functioning roadways.

Connectivity

The CTC addressed connectivity as both a problem and a long term goal. They cited the barrier that I-15 creates for east-west connectivity to motor vehicles as well as bicycles and pedestrians. North-south connectivity was also expressed as a significant concern with examples of 300 East dead-ending at the Juan Diego School, Fort Street dead-ending at Pioneer Road, Highland Drive dead-ending at the Draper-Sandy border, and 700 East not connecting south through the heart of Draper. As a goal, the CTC expressed the need for both higher functioning roads to provide the necessary through traffic capacity to serve the City's growth as well as the need to provide continuous bicycle linkages to areas to the north. On lower functioning roads, the CTC expressed the need to provide a distributed network of many streets providing redundant access so that the traffic burden would not be excessive on any single street.

III. Future Conditions

Future conditions in any region experiencing the type of growth seen in Draper City will always be difficult to forecast. However, having clearly defined goals, strong analysis tools, and grass roots identification of known deficiencies facilitates the ability of elected officials, city staff, residents and businesses to better prepare for the coming challenges and opportunities.

Future Land Use

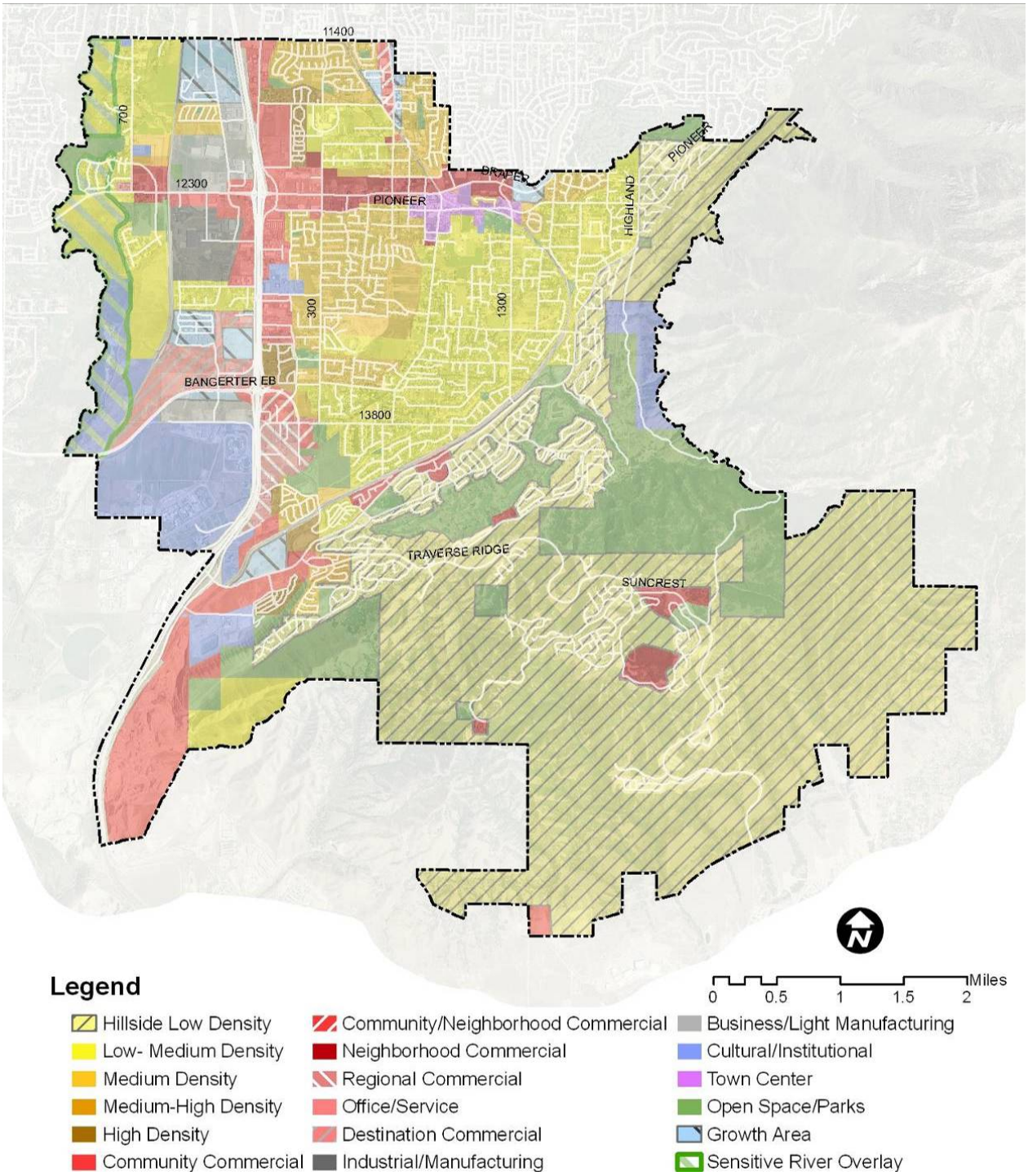
As can be seen today, the Draper City General Plan anticipates that the majority of the land within the city in the future will be residential. The General Plan provides for additional residential development throughout the city, with infill development on larger residential/agricultural lots that are currently developed.

Existing land use patterns not withstanding, Draper actively seeks growth of commercial land uses for its future. Much of the employment growth is projected to occur west of I-15 in areas designated as commercial/growth areas as seen with the recent arrival of IKEA. Employment pockets are also planned along Bangerter Parkway, and along Highland Drive from Bangerter Parkway to I-15 and the County line with the existing gravel pit transitioning to commercial uses once mineral extraction has finished. The city is also planning for a mixed used "Town Center" in the area surrounding City Hall and the planned TRAX stop at 12400 South.

Highland Drive

Although Draper is planning for additional residential and commercial development, the city has plans to preserve considerable amounts of land for open space or cultural uses.

Figure 3- 1: Draper City General Plan

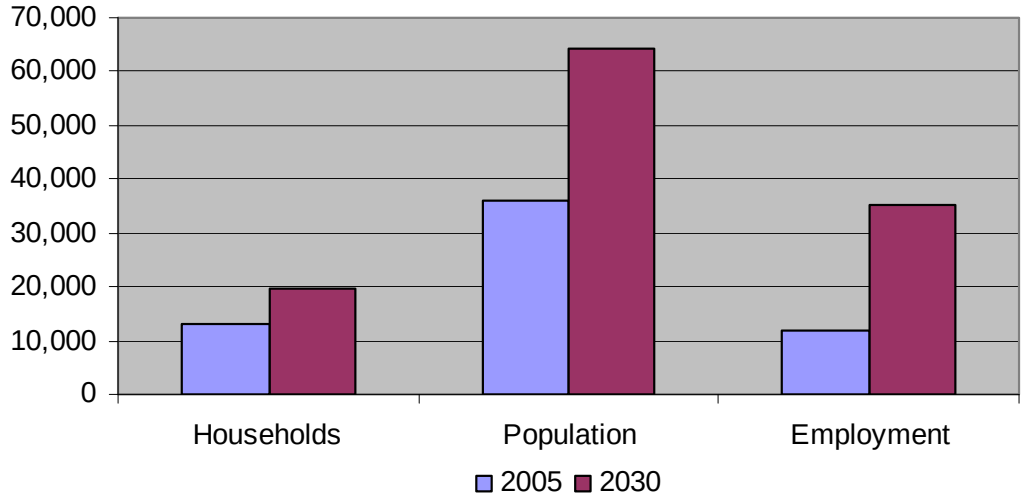


Draper City General Plan

The Draper City General Plan was used as the basis to develop future population and employment projections for the city. Future population, household, and employment figures were described in the previous chapter. These demographic forecasts were developed through an iterative process between Draper City and InterPlan. The future population, household, and employment data were used to estimate future transportation demand within the city by distributing the resulting new trips based on the General Plan.

Table 3-1 provides the 2030 population, household, and employment forecasts. As illustrated in the general plan for land use, these numbers reflect large increases in commercial land uses.

Figure 3- 2: Land Use and Corresponding Trip Rates for Development Scenario



Source: Draper City, InterPlan

Table 3- 1: Assumed Greenfield Development Densities

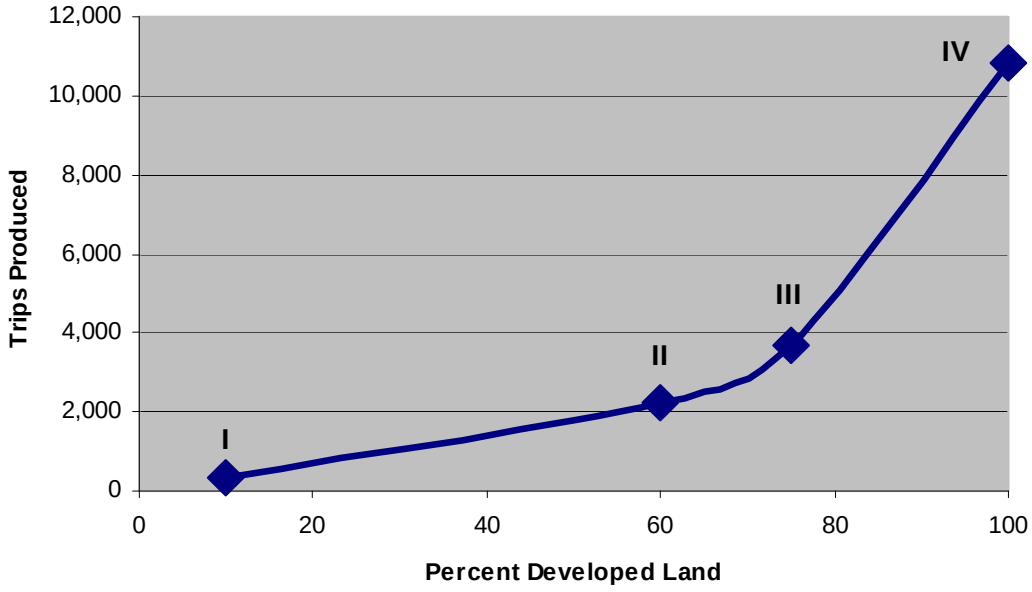
Residential Development	Units/Acre	Employment Development	Jobs/Acre
Hillside low density	.35	Neighborhood commercial	10
Low density	1.5	Community- neighborhood commercial	12
Medium density	3	Community commercial	13
Medium-high density	6	Regional commercial	16
High density	12	Destination commercial	16
Mixed use	20	Office	40
		Mixed use (town center- growth area)	12
		Industrial manufacturing	10
		Public- civic	3

Porter Rockwell Trail at 1300 East

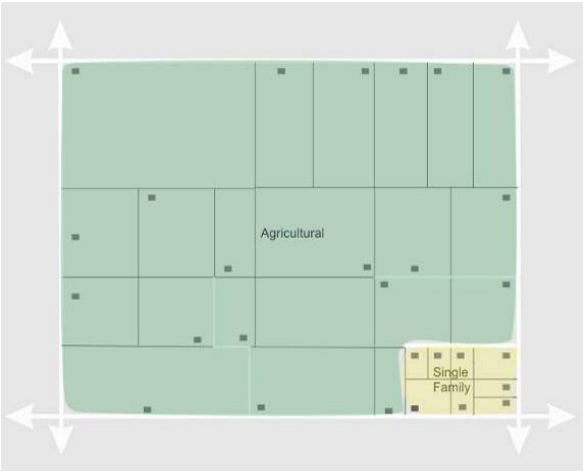
Development Scenario

The anticipated future growth will have a significant impact on traffic within Draper City. Although Draper is at more than 50% build out, the number of vehicle trips will more than double when Draper reaches build out due to the nonlinear nature of vehicle trip growth. The following figures provide a conceptual illustration of the effect of development on the number of vehicle trips based upon *Institute of Transportation Engineers (ITE), Trip Generation User's Guide 2003* trip rates. These illustrations are conceptual only and do not represent specific parcels in Draper, but do represent the nature of past and projected future development in the City.

Figure 3- 3: Land Use and Corresponding Trip Rates for Development Scenario

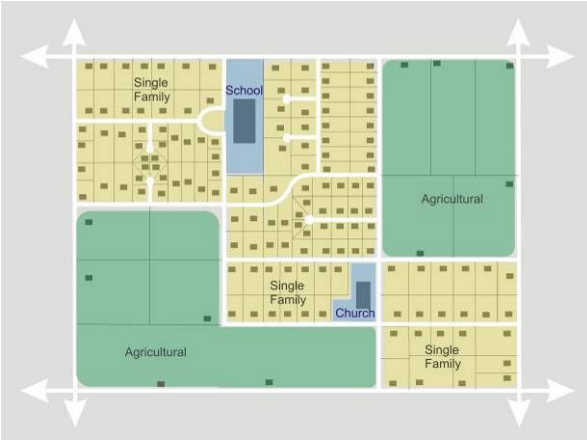


In the following scenarios, an approximate quarter section of land is developed over time. As the use of the land changes, the number of trips generated by those land uses also changes. During early phases of development, much of the land is used for single family residential and non-commercial agricultural purposes. Over time, land uses intensify to more single and multi-family residential and commercial uses.



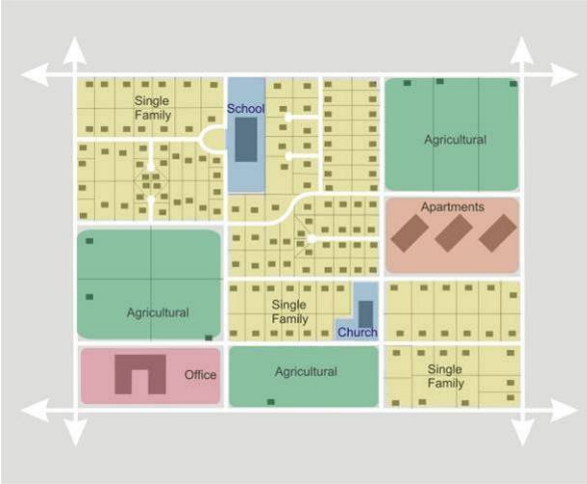
Development Phase I – 10% Developed

Land Use	Description	Trips per Day
Farm	22 Farms	258
Single Family	8 Homes	101
Total Trips per Day		359



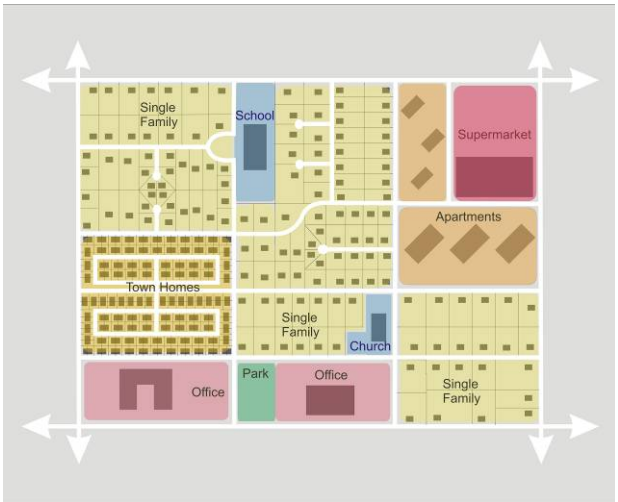
Development Phase II– 60% Developed

Land Use	Description	Trips per Day
Farm	11 Farms	134
Single Family	139 Homes	1,407
School	1 w/ 400 students	516
Church	1 w/ 20,000sq/ft	182
Total Trips per Day		2,239



Development Phase III– 80% Developed

Land Use	Description	Trips per Day
Farm	5 Farms	61
Single Family	143 Homes	1,444
Apartment	125 Apartments	901
School	1 w/ 500 students	645
Church	1 w/ 20,000sq/ft	182
Office	1 w/ 25,000 sq/ft	458
Total Trips per Day		3,691



Development Phase IV– Fully Developed

Land Use	Description	Trips per Day
Single Family	143 Homes	1,444
Townhouse	200 Townhomes	1,173
Apartment	170 Apartments	1,172
School	1 w/ 600 students	774
Church	1 w/ 20,000sq/ft	182
Office	2 w/ 35,000 sq/ft	1,188
Supermarket	1 w/ 55,000 sq/ft	5,073
Total Trips per Day		11,006

The planned future land use is critical to the development of this Master Transportation Plan. For purposes of evaluation and planning, transportation engineers have defined a unit of measure as a vehicle trip. A trip is a one-direction vehicle movement with either the origin or the destination (exiting or entering) inside the study site. *(Source: Institute of Transportation* Engineers *(ITE), Trip Generation User's Guide 2003.)* In general terms, any time a vehicle passes through a driveway a trip is registered. Single family residential units typically generate 9.6 additional trips per day per residence. A shopping center development averages 42.9 trips per day per 1000 square developed feet whereas an office park generates 12.8 trips per day per 1000 square feet. As shown in the previous scenario, land use dictates trips and thus the transportation needs of the future.

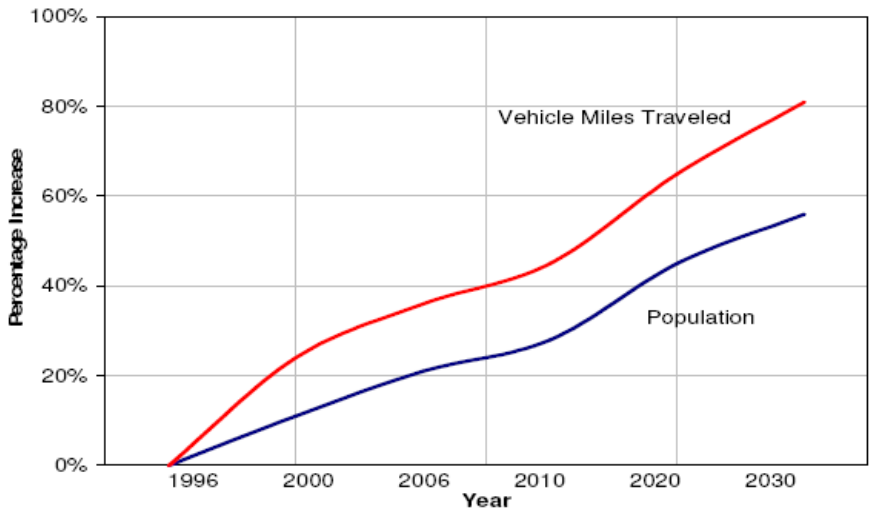
As shown by this scenario, the type of land use dictates the number of trips generated. Trip generation, population, household and employment forecasts are used in this plan to anticipate future roadway needs. These forecasts are also compared to regional and state plans to insure that Draper's Master Transportation Plan complements and takes advantage of current and future road connections.

Regional Plans

The forecasting and planning undertaken by Draper City is complemented region-wide by state and regional agencies such as the Wasatch Front Regional Council (WFRC), the Utah Department of Transportation (UDOT), and the Utah Transit Authority (UTA).

Many of Draper's experiences regarding roads and transit are also experienced throughout the Wasatch Front. In general, a growing population grows at a rate below the rate of vehicle road usage. This is due to growing dual income earners, "soccer moms", and an overall increasing complexity in our travel patterns as an area grows. Historically, vehicle trips and miles traveled have grown at a rate greater than 1.5 times the rate of population growth. However, this divergence is projected to slow in the future.

Figure 3- 4: Wasatch Front Growth in Population and Vehicle Miles Traveled



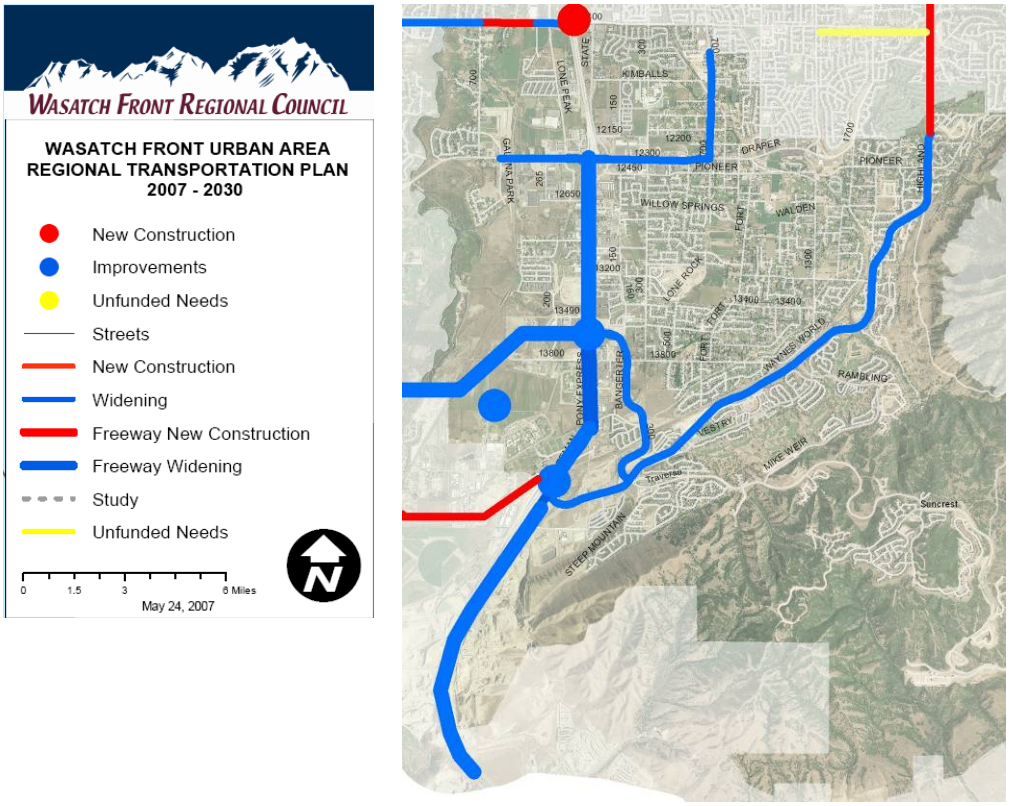
Source: WFRC Regional Transportation Plan (RTP), 2007-2030 Figure 1-1

Wasatch Front Regional Council Long Range Transportation Plan

The Wasatch Front Regional Council (WFRC) is the designated Metropolitan Planning Organization for the greater Wasatch Front Region. As such, the WFRC is required by the federal government to develop and approve a Regional Transportation Plan which is updated every four years. This plan usually covers a time span of 30 years and governs regionally significant highway and transit development across the urbanized areas of Salt Lake, Davis and Weber Counties. The most recent Regional Transportation Plan for the Wasatch Front Regional Council area was adopted in May 2007.

To address future state roadway needs, the WFRC has identified several sections of roads, administered by Utah State and local governments, for which planned improvements exist. The following portion of the WFRC map locates those in or near to Draper.

Figure 3- 5: WFRC RTP Final Highway Projects



Two abbreviated tables of the WFRC projects shown in this map are provided in the following tables. Close coordination for this plan has occurred with the WFRC, UDOT, UTA, and the neighboring cities to Draper such as Sandy, South Jordan, Riverton, Bluffdale, Lehi, and Highland.

Table 3- 2: WFRC RTP East West Highway Project Descriptions

WFRC Reference Number	Roadway	From	To	Description
38.	11400 South	700 West	Redwood Road	will be widened and constructed across the Jordan River before 2015. Four lanes with a center turn lane on a 106 ft. right-of-way will be provided. Could be re-striped to 6 lanes in future if necessary. A Class 2 bike route will be provided.
244.	12300 South/ 12600 South	700 East	700 West	will be widened from 4 to 6 lanes with a center turn lane on a 106 ft. right-of-way between 2016 and 2025. A Class 2 bike route will be provided.
246.	Bangerter Highway Interchange	I-15		will be upgraded to a freeway-to-freeway interchange between 2016 and 2025. No bike route is planned.

Table 3- 3: WFRC RTP North South Highway Project Descriptions

WFRC Reference Number	Roadway	From	To	Description
221a.	I-15	12300 South	Bangerter Highway	will be widened from 7 lanes and an HOV to 8 lanes and an HOV lane on 260 ft. of right-of-way between 2016 and 2025. No bike route is planned.
221b	I-15	Bangerter Highway	Utah County Line	will be widened from 6 or 7 lanes and an HOV to 10 lanes and an HOV lane on 260 ft. of right-of-way between 2016 and 2025. No bike route is planned.
36.	I-15 Interchange	11400 South		will be constructed on 260 ft. of right-of-way before 2015. This freeway interchange will relieve congestion at neighboring interchanges. Currently an Environmental Impact Statement is underway. No bike route is planned.
53.	I-15 Interchange	14600 South		will be upgraded on 260 ft. of right-of-way between 2016 and 2025. No bike route is planned. A transit project is planned in this corridor.
46.	Porter Rockwell Road	I-15	Mountain View Corridor	will be constructed as 4 lanes with a center turn lane on a 167 ft. right-of-way between 2026 and 2030. A Class 1 bike route will be provided on part of the route.
59a.	700 East	Carnation Drive (10142 South)	12300 South	will be widened from 2 to 4 lanes with a center turn lane on a 106 ft. right-of-way before 2015. Could be re-striped to 6 lanes in the future if necessary. A Class 2 bike route will be provided.
65b.	Highland Drive	10600 South	Draper City Limits	will be constructed as 4 lanes with a median on a 106 ft. right-of-way between 2016 and 2025. Could be re-striped to 6 lanes in the future if necessary. A Class 2 bike route will be provided.
65c.	Highland Drive	Draper City Limits	Traverse Ridge Road	will be widened from 2 to 4 lanes with a median on a 106 ft. right-of-way between 2026 and 2030. Could be re-striped to 6 lanes in the future if necessary. A Class 2 bike route will be provided.
66.	Highland Drive Connector	Traverse Ridge Road	14600 South	will be widened from 2 to 4 lanes with a median on a 106 ft. right-of-way between 2016 and 2025. Could be re-striped to 6 lanes in the future if necessary. A Class 2 bike route will be provided.
65d.	Highland Drive	Traverse Ridge Road	13800 South	will be widened from 2 to 4 lanes with a median on a 106 ft. right-of-way between 2026 and 2030. Could be re-striped to 6 lanes in the future if necessary. A Class 3 bike route will be provided.

Items currently in UDOT State Transportation Improvement Plan are highlighted in green.

Utah Department of Transportation Plans

After being identified on the WFRC RTP, a project may be placed on UDOT's Statewide Transportation Improvement Program or STIP. The STIP is managed by Utah's Department of Transportation, Systems Planning and Programming Division and is a five year plan of highway and transit projects for the State of Utah. Projects in the STIP need to be financially constrained and have specific funding identified for the proposed improvement. The STIP is maintained annually and includes transportation projects on the state, city and county highway systems as well as projects in the national parks, national forests and Indian reservations. These projects use various federal, state, and local funding programs.

Once on the STIP, a project undergoes environmental review and the design and purchase of the right of way can begin. At every step of the way, participation by key stakeholders and the general public is a crucial component to a successful project that meets a community transportation need.

Level of Service Evaluation

Regional forecasts and plans assist with the development of Draper's Master Transportation Plan. The Travel Demand Model was used to generate a picture of how many cars will utilize current and future roads based on the growth forecasts of Draper City and its neighbors. The Model was also used to predict how well the street network performed.

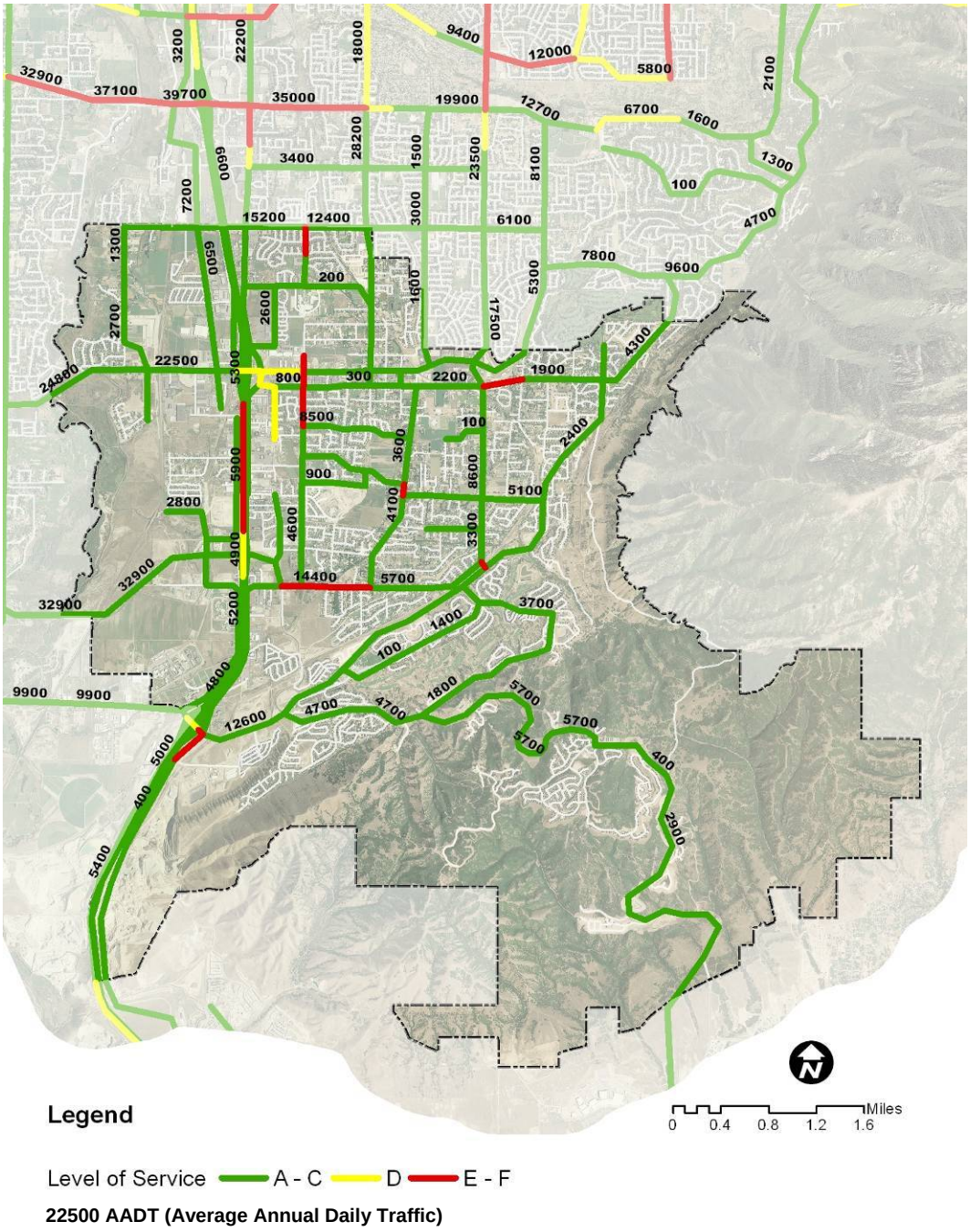
Level of Service is used to evaluate how well a roadway or intersection operates and is expressed as a letter grade from "A" to "F" similar to letter grades in school. Level of Service (LOS) A represents traffic volumes that permit free vehicle movement with little to no congestion and Level of Service F is traffic where conditions are very congested and vehicles may experience severe delay. Some congestion occurs at a level of Service D, but the transportation system is assumed to be adequate (not failing) at this level. Planning in Draper City has been performed to strive for a Level of Service D in the peak traffic hours for year 2030. Since roads cannot be scaled to exactly fit demand, level of service D is a planning goal, but this goal may vary on a street-by-street basis.

Existing Level of Service

The Travel Demand Model is used to predict future traffic and level of service. It can also be used to quantify current conditions. The comparison between current and future traffic is used in this study because congestion is not just dependent on the number of vehicles using a road. The number of lanes, the capacity, speed and number of intersections and driveways also determine the LOS experienced by motorists.

In the 2005 Travel Demand Model (the most current version), there is little modeled traffic congestion other than on roads that access I-15 and Bangerter Highway such as 12300 South and 13800 South. Figure 3-6 is a map of 2005 Level of Service for Draper for the five pm to six pm hour. Green roads have little or no traffic congestion, corresponding to LOS A, B or C, yellow roads have "peak hour" traffic congestion, and red roads have significant traffic congestion. By "peak hour" traffic congestion, we mean these roads have congestion mostly during the peak travel times, in this map from five pm to six pm, but also experienced to a lesser degree from seven to nine am and from four to five and six to seven pm. During other portions of the day, the yellow roads operate at LOS A, B or C.

Figure 3- 6: 2005 Model Level of Service 5:00 to 6:00 pm



Roads beyond Draper's boundaries are shown for assistance in comparison. These roads also display that the resulting level of service was derived from travel modeling which is regional in nature.

Future Level of Service

Year 2030 roadway traffic volumes were forecast for all functionally classified roads within Draper using the Wasatch Front Regional Council- Mountainland Association of Governments (WFRC-MAG) travel demand model version 6.0 and the demographic projections developed by Draper City and InterPlan.

Figure 3- 7: 2030 No-Build Model Level of Service 5:00 to 6:00 pm

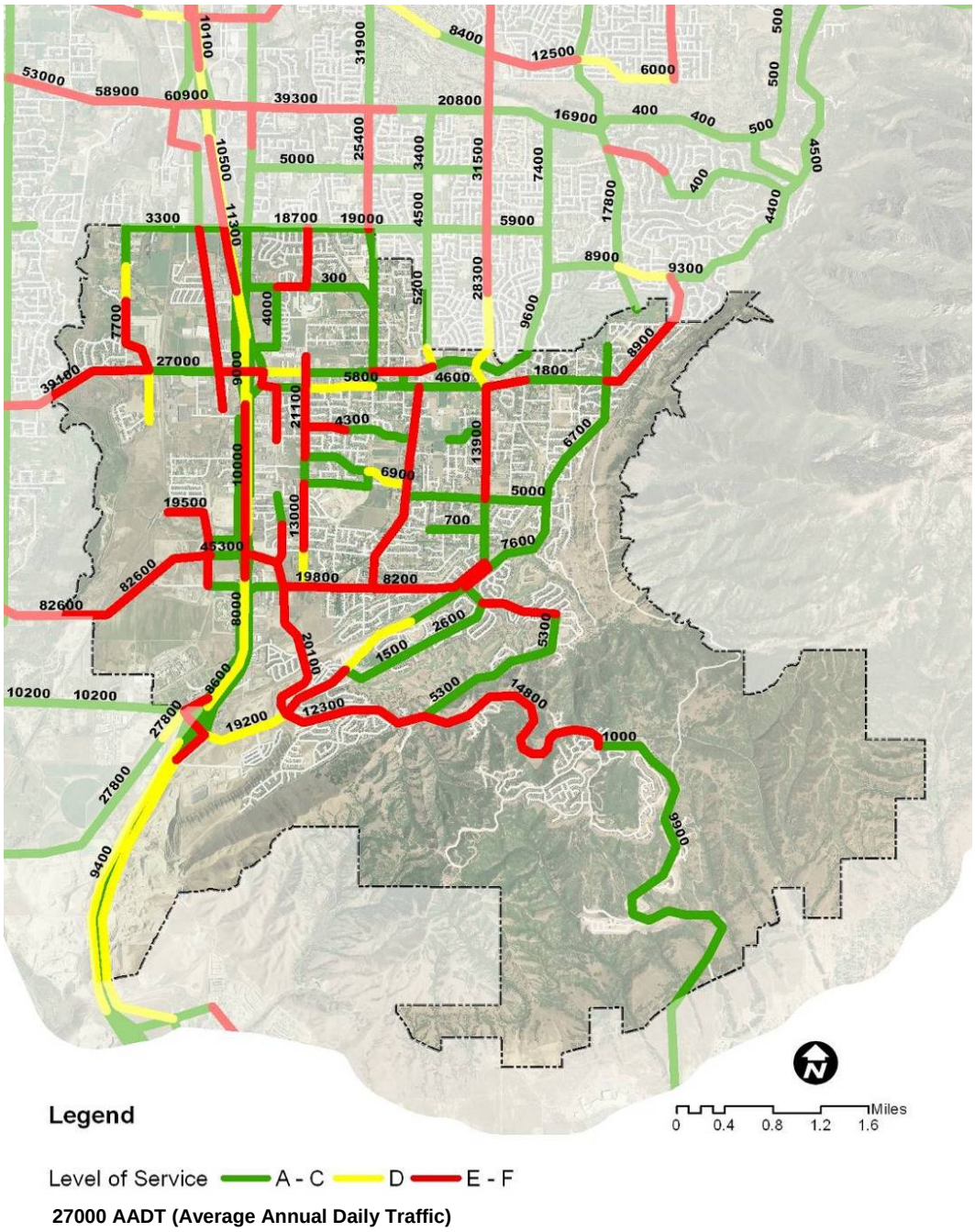
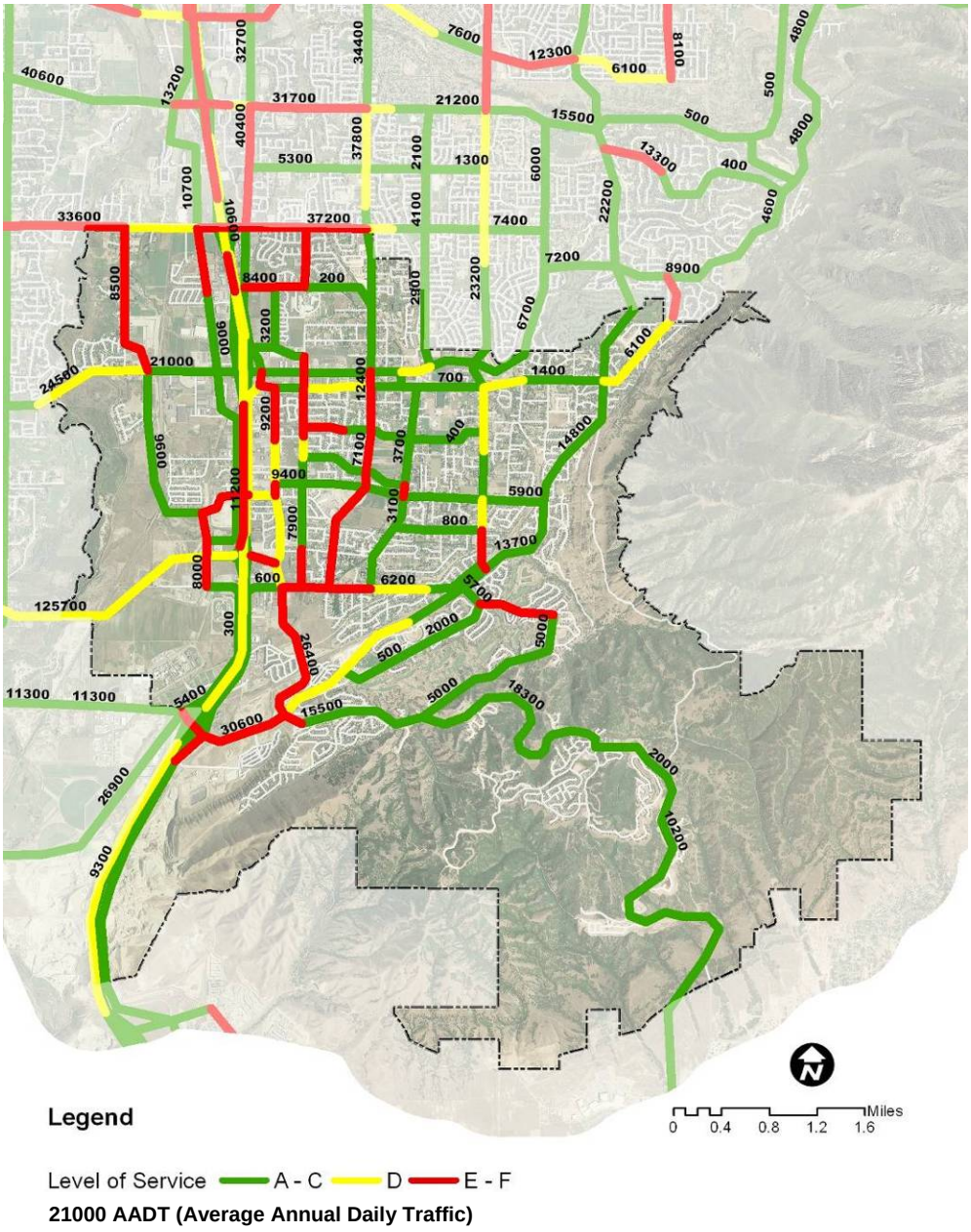


Figure 3-7 illustrates traffic conditions for the year 2030 if no roadways are widened and no new roads constructed. Due to the non-linear nature of traffic growth, without capacity improvements most of the major roadways within Draper will be severely congested by 2030. This network is referred to as "2030 No-Build". In addition to roads with LOS D or worse in 2005, large sections of Lone Peak Parkway, 300 East, Fort Street, 1300 East, Bangerter and 13800 South will also experience significant traffic congestion in twenty years.

A "2030 Improved" scenario portrays conditions with the capacity improvements included in the 2003 Master Transportation Plan.

Figure 3- 8: 2030 Improved Model Level of Service 5:00 to 6:00 pm



Even with the improvements outlined in this plan, Lone Peak Parkway, 300 East, Fort Street, 1300 East, Bangerter and 13800 South are projected to experience heavy traffic congestion. Congestion in 2030, although less severe than under the no build, 2030 scenario, is significantly worse than 2005. In the 2030 Improved roadway network, 150 East, 700 East, and Highland Drive are forecast to have more congestion than 2030 No-Build due to improved road connectivity and the capacity of feeder roads. Figure 3-8 presents the projected Level of Service for the 2030 Improved, or 2003 Master Transportation Plan network. Recommendations for the development of this plan build on those improvements which were included in previous plans. In addition to the capitol projects included in this plan, improvements to critical intersections, as discussed in later chapters, help to mitigate traffic congestion problems.

Functional Classification

A Functional Classification of Streets is used to group roadways into classes according to the character of traffic they are intended to serve. The classes are based upon the degree of mobility (speed and trip length) and land access that they permit. Roadway functional classifications are generally comprised of a mix of arterials, collectors, and local streets. Arterials are designed to serve higher volumes of traffic at higher speeds, while collectors are designed to balance land access with traffic speeds and traffic capacity. Local streets are intended to provide low speed access to individual properties. Figure 3-9 summarizes the hierarchy of the functional classification of streets based upon mobility and access.

Figure 3- 9: Functional Classification of Streets

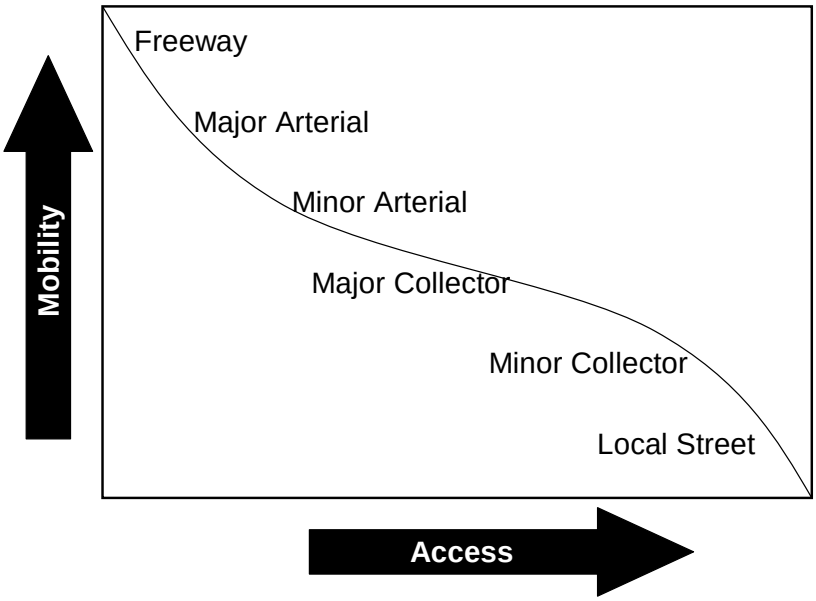


Figure 3-10 provides general characteristics for traffic operations of each functional classification. The definitions outlined include speed, average trip length, accident rate, and access control. Access control refers to the number of intersections, driveways, etc.,

interrupting the roadway. These issues will be discussed in greater detail in Chapter 4 regarding plan recommendations.

Figure 3- 10: Functional Classification General Characteristics

Functional Group	Speed (mph)	Average Trip Length (miles)	Expected Accident Rate (accidents per million vehicle miles)	Access Control
Arterial	45+	3-15	3-6	Significant
Major Collector	35-45	1-5	5-8	Moderate
Minor Collector	25-35	< 2	6-12	Minimal
Local	<30	< 0.5	Varies	None

Note: There are large variations in the ranges presented as these reflect guidelines for design and evaluation and are not rigid standards.

On-Street Parking

Parking vehicles on the roadway, whether overnight or during the day, is an additional component of the Transportation Plan which relates to the streets' functional classification. In Draper, residential parking more commonly utilizes on-street parking than commercial parking because Draper's ordinances require commercial development to provide off-street or parking lot storage of cars.

300 East at 12600 South looking south

On-street parking impacts a street's functionality both negatively and positively. On narrow roads, on-street parking, particularly if permitted on both sides, may obstruct through traffic movement. Parked cars can decrease safety on the roadway if a high volume of drivers are pulling into and leaving parking spaces. Parked cars, especially near intersections but also near driveways, reduce visibility and can hamper safe navigation of the streets both for drivers and pedestrians/bicyclists.

On-street parking may also have benefits for a road's aesthetics and safety. Parked cars provide a buffer for pedestrians and residents between the road and sidewalks and front

yards. On wider roads, parked cars serve to connect the two sides of the road, creating a more neighborhood appearance. On-street parking can also serve as a "traffic calmer" (discussed further in the next section), slowing traffic down as cars are forced to maneuver between vehicles on the side of the road. Although Draper City standards generally allow on-street parking on local streets, local ordinances may place a variety of restrictions to on-street parking as problems arise.

Future Alternative Travel Modes

Transit

Future alternative travel modes in Draper City include bus, TRAX light rail and FrontRunner, commuter rail. Three phases (two phases of light rail and one phase of commuter rail) of rail service are scheduled to provide service to Draper City and beyond. Light rail sections within Draper are scheduled for completion by approximately the year 2015. Commuter rail is expected to be completed by the year 2012. Draper's Master Transportation Plan for Transit is discussed in the next chapter of this report.

Porter Rockwell Trail at the planned UTA crossing at 1300 East

Walkability

"Bikeable" and "walkable" communities are desirable places to live, work and play, and are therefore a key component of the Draper Master Transportation Plan. Their desirability comes from two factors. First, these communities locate, within an easy and safe walk, goods and services that a community resident needs on a regular basis. These communities also make pedestrian activity possible, expanding transportation options, and creating a streetscape that better serves pedestrians, bicyclists, transit riders, and automobiles. Just as with transit, more people walking and biking means fewer trips using cars and adding to congestion on Draper's streets.

One purpose of this plan is to analyze the "walkability and bikeability" of Draper City, and in the process provide planning suggestions that will improve walking and biking in Draper City. The study assesses walking and biking within the urban environment of the city, as opposed to the surrounding system of off-road and backcountry trails. A public involvement process was at the heart of the plan development, providing opportunities for the CTC to identify walking/biking needs and concerns. This input resulted in an extensive list of proposals which were evaluated and organized as a list of recommended improvements to improve walking and biking in the city. Aggressive use of walking and biking travel modes, often called "active" transportation modes, are especially useful in promoting healthy lifestyles and serving the transportation needs of Draper's youth.

Pedestrian and Bicycle

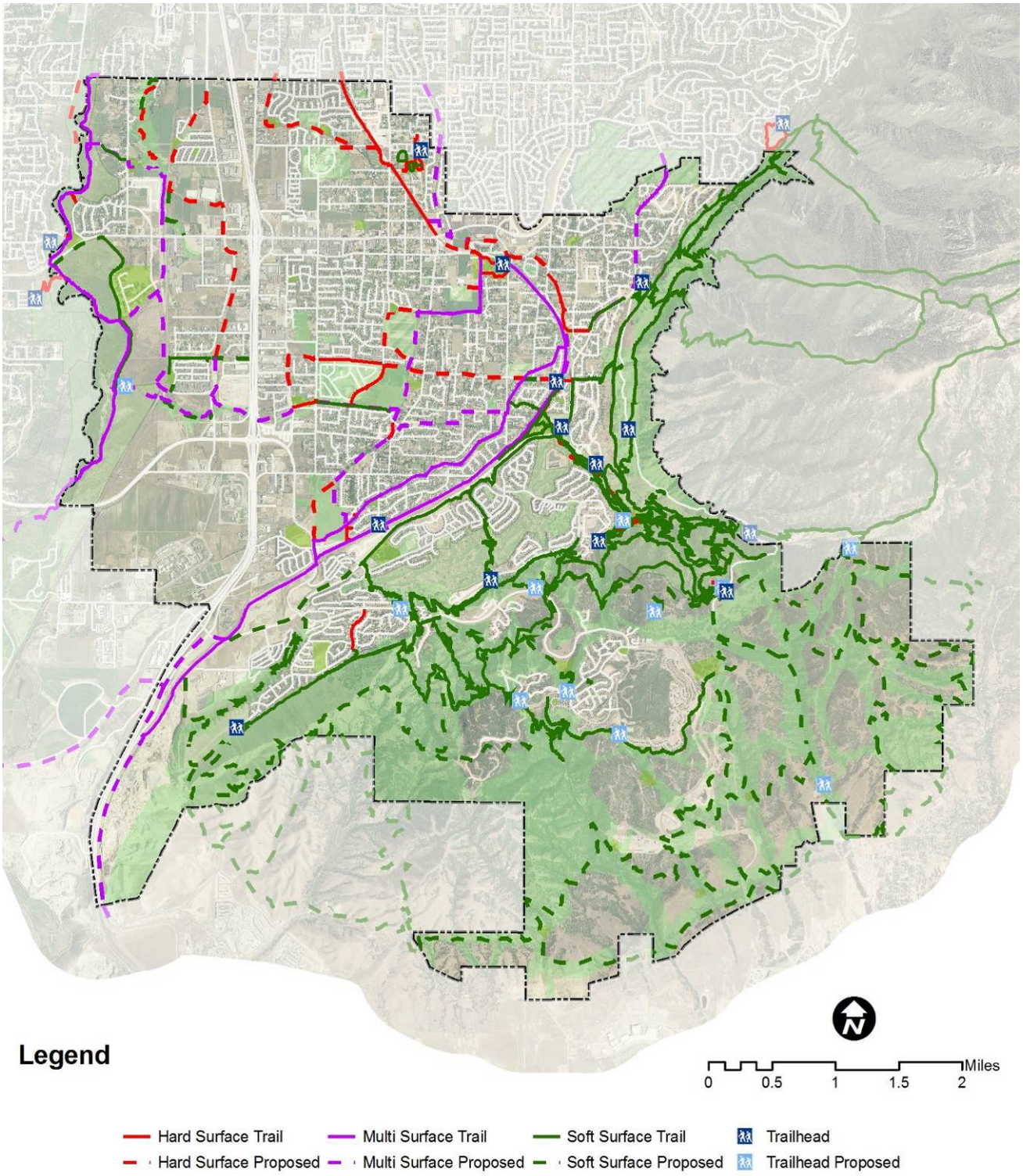
The future planned pedestrian and bicycle network in Draper is quite extensive. Draper City has planned for many of the key population centers to be connected by the trail system. A map of the pedestrian facilities is shown in Figure 3-11, Refer to the Parks and Trails Master Plan for the most current trail network plan.

Trail from Vestry Road

Bikers on Porter Rockwell Trail

Roundabout 300 East and Skate Park

Figure 3- 11: Pedestrian Facilities in Draper



IV. Recommendations

This chapter discusses Draper's street standards, which will be used for road building and reconstruction into the future. Managing access to the streets at intersections and driveways is also an important component of this Master Transportation Plan. Other mobility and safety aspects such as traffic calming, transit and pedestrian/bicycle movement are discussed.

Street Standards

Consistent with the goals of the CTC, standards have been developed in this Plan for each specific functional classification of street. These standards reflect the goals of the City and are grounded on cross sections presented in this Master Transportation Plan such that changes in a street cross section from one property to the next should not generally be necessary. All streets shall be required to meet the Draper City standard cross sections identified in this Master Transportation Plan.

Modification of these standards may be recommended on a case-by-case basis by the City Engineer based on a review of the existing and proposed function of the road, proximity to major intersections and access points, accident history in the area, transition to existing roadways, and related technical criteria. The City Engineer may require higher standards, based on best engineering judgment related to the safe operation of traffic flow. Intersections of minor collector streets and higher road classification shall be reviewed for the need for turn lanes

1300 East and 13800 South

and other geometric improvements and are prime locations where higher cross section standards may be required. The City Engineer may approve alternative standards when those standards can be demonstrated to provide a superior solution to the safe operation of traffic flow and do not compromise aesthetic advantages of the standard cross section. The City Engineer serves as a technical reference for the City, as final decisions and appeals rest with the Draper City Council based on appropriate input and the best interests of the City.

Clear Zones

A Policy on Geometric Design of Highways and Streets (commonly referred to as the "Greenbook") published by the American Association of State Highway and Transportation Officials (AASHTO) defines the clear zone as, "the unobstructed, relatively flat area provided beyond the edge of the traveled way for the recovery of errant vehicles. The clear zone includes any shoulders or auxiliary lanes." (pg 318-319) The suitable width and slope of a clear zone depends on the street classification, operating speed, urban or rural setting, environmental constraints, and the size and presence of a curb. Roadside landscaping and park strip requirements for Draper City streets should adhere to the guidelines and policies within both the AASHTO Greenbook and the most current version of the *Roadside Design Guide*, also published by AASHTO. Standards included in the *Roadside Design Guide* as they relate to shoulders and clear zone are incorporated by reference and may supersede the cross sections presented in this plan.

Local Streets – 60 feet

Local streets are designed to offer access from residences to the roadway network. Local streets serve many driveways and provide a collection point to collector or arterial roadways. Local streets should be designed to minimize speed and cut-through traffic while meeting the requirements of emergency vehicles. Local streets are typically placed with driveways on both sides and have posted speed limits of 25 miles per hour. Generally, no striping is proposed on local streets. However, the City Engineer may provide roadway striping consisting of a center yellow line and outside white lines to allow travel lanes no smaller than nine feet as a traffic calming measure. Parking may be restricted on local streets near intersections, in high density or commercial areas, where snow removal or storage issues arise, or at other locations deemed by the City.

The local street cross-section for the non-mountain areas of the city has a 60 foot right-of-way, which includes 25 feet of paved area between gutters and a 30 foot travel way. The Valley Local Street standard is shown in Figure 4-1. Mountain local streets shall consist of a 56 foot right-of-way and a 36 foot pavement width between gutters. Added pavement is necessary to accommodate snow storage and to minimize the number of larger roads which may create significant cuts and fills in the steep slopes. Sidewalks may be widened by widening the right-of-way of the mountain local road, without reduction of other cross sectional elements. Mountain local streets may be designed without park strip and sidewalk on one side where it would not serve development due to slope constraints. The Mountain Local Street standard is shown in Figure 4-2.

Figure 4- 1: Cross Section, Valley Local Street

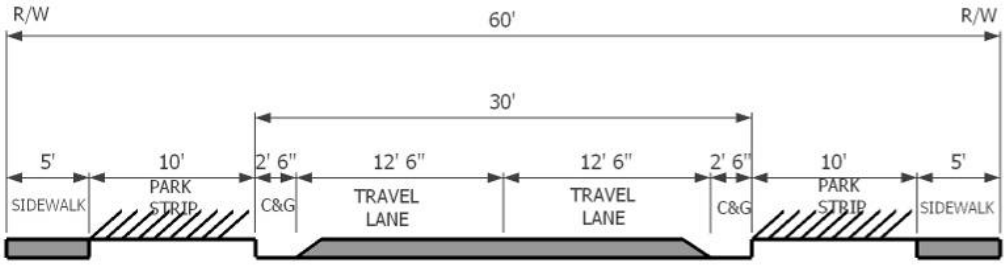
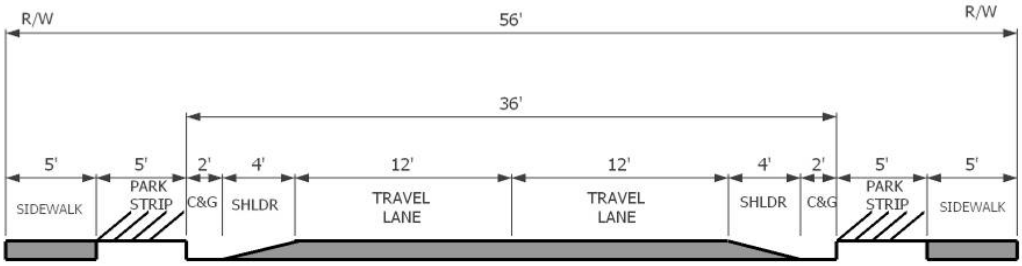


Figure 4- 2: Cross Section, Mountain Local Street



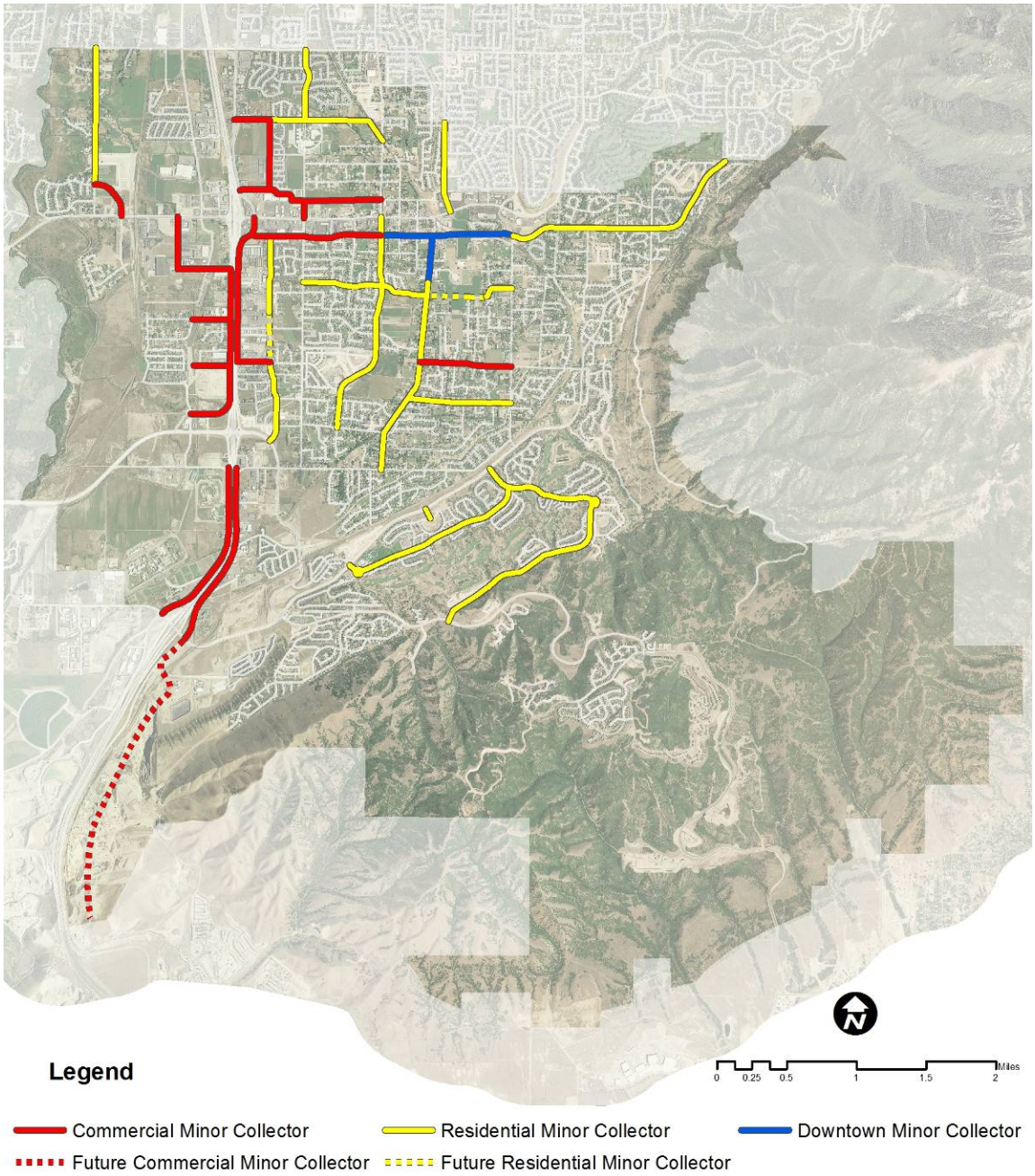
Minor Collectors – 66 feet

Minor Collector streets within Draper serve local trips and provide local access. Minor Collectors are designated as:

- commercial minor collectors,
- residential minor collectors,
- or downtown minor collectors.

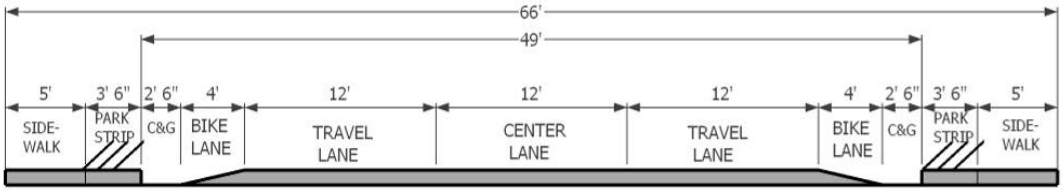
All Minor Collectors have one through travel lane in each direction, park strips/swales, and sidewalks within a 66 foot right-of-way. The sidewalks may be widened by up to three feet on each side with a corresponding reduction of the park strips. This may be necessary where a continuous sidewalk is provided between adjacent properties or in areas where a separate trail is required. Planned Minor Collectors are shown in Figure 4-3.

Figure 4- 3: Planned Minor Collectors



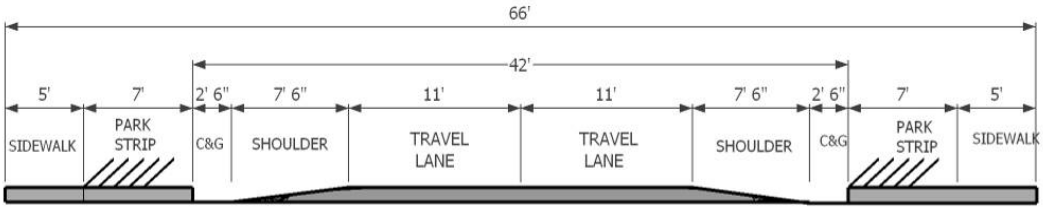
Commercial Minor Collectors allow for improved business access by incorporating a center turn lane in lieu of wide shoulders. Commercial Minor Collectors have 12-foot travel lanes, a 12-foot center turn lane, and 4-foot bike lanes/shoulders. Although the shoulders on Commercial Minor Collectors are narrower than those on other minor collector types, they allow for striped bike lanes within the four-foot shoulder. However, the narrow shoulder/bike lane does not allow for on street parking. The Commercial Minor Collector typical section is provided in Figure 4-4.

Figure 4- 4: Cross Section, Commercial Minor Collector



Residential Minor Collectors make up the majority of the minor collectors within Draper City. The Residential Minor Collector has 11-foot travel lanes, 7.5-foot shoulders, and 7-foot park strips. The wide park strips and shoulders for on-street parking do not allow for a striped bike lane. However, Residential Minor Collectors have sufficient shoulder/lane width to be designated as a bike route. Bike lanes can be accommodated on the Residential Minor Collector by modifying the shoulder or park strips. Modifications of a Residential Minor Collector to accommodate a bike lane may be recommended by the City Engineer or others.

Figure 4- 5: Cross Section, Residential Minor Collector

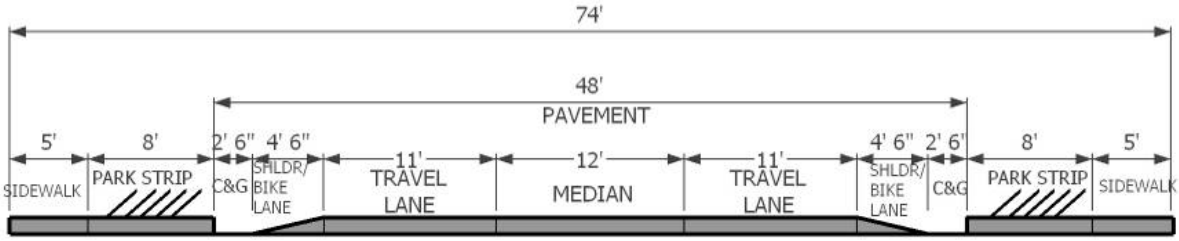


Downtown Minor Collectors are the sections of Pioneer Road and Fort Street that are within the Draper Downtown District. These minor collectors vary from the typical minor collectors. The Draper Downtown zoning ordinance should be referenced for typical sections in the downtown area.

Major Collectors - 74 feet

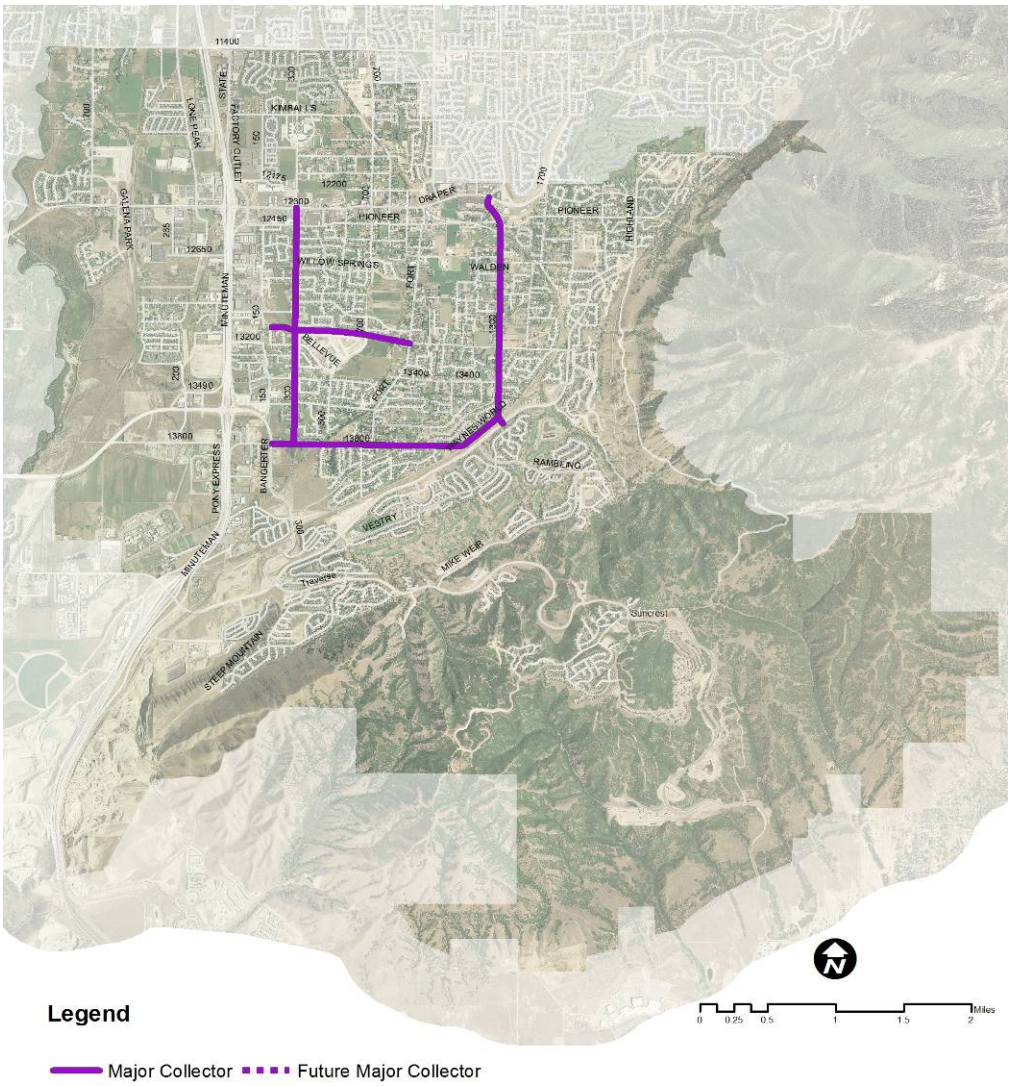
Major Collectors, like minor collectors, have only one through travel lane in each direction but Major Collectors have an additional center turn lane for use as a two-way left turn lane. The Major Collector cross section has 11-foot travel lanes in each direction, a 12-foot center-turn lane, and 4.5-foot shoulder/bike lanes. The narrow shoulder/bike lane does not permit on-street parking. The sidewalk may be widened by up to three feet on each side with a corresponding reduction of the park strip. This may be necessary where a continuous sidewalk is provided between adjacent properties or in areas where a separate trail is required. Figure 4-6 provides the typical Major Collector section.

Figure 4- 6: Cross Section, Major Collector



Planned Major Collectors within Draper are Galena Park Boulevard, 300 East, 1300 East, 13200 South and 13800 South. Figure 4-7 shows the Planned Major Collectors.

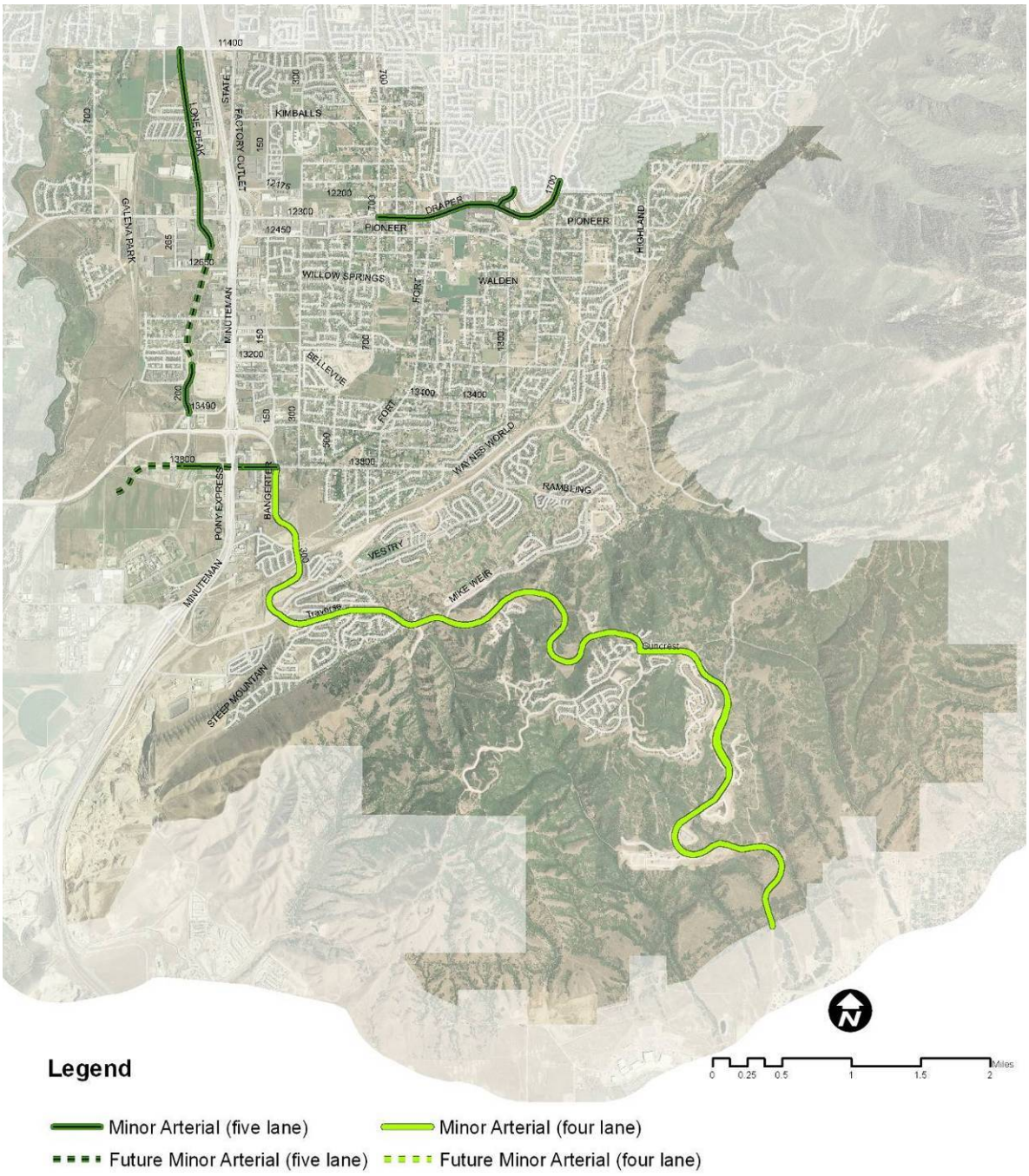
Figure 4-7: Planned Major Collectors



Minor Arterials – 80 feet and 100 feet

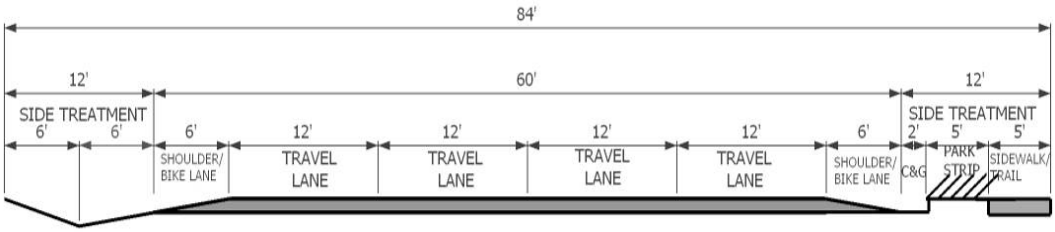
Minor Arterials balance regional travel and local access. Minor Arterials have two through travel lanes in each direction and may or may not include a center turn lane/median. Minor Arterials are designated as either a four lane or five lane Minor Arterial and may also vary case by case in their side treatment if approved by the City. Planned Minor Arterials are shown in Figure 4-8.

Figure 4-8: Planned Minor Arterials



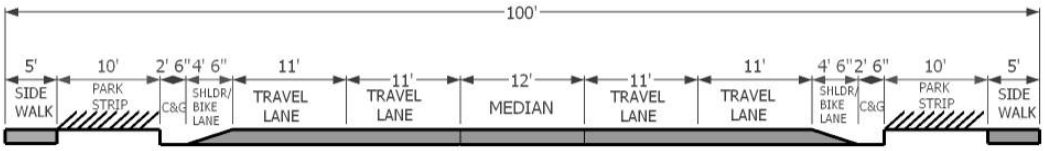
The four lane Minor Arterial has two 12-foot travel lanes in each direction, and 6-foot shoulders/bike lanes within an 84-foot right of way. They may also have curb/gutter to control drainage, park strips for landscaping and space for sidewalks or multiuse trails. The four lane Minor Arterial sections are identical to the modified collector cross sections in the previous Master Transportation Plan. Figure 4-9 provides the typical four lane Minor Arterial section.

Figure 4- 9: Cross Section, Minor Arterial (four lane)



The five lane Minor Arterial has two 11-foot travel lanes in each direction, a 12-foot center turn lane/median, and 4.5-foot shoulders/bike lanes within a 100-foot right of way. They also have curb/gutter to control drainage, park strips for landscaping and space for sidewalks or multiuse trails. The five lane Minor Arterial sections are identical to the Draper arterial sections in the previous Master Transportation Plan. Figure 4-10 provides the typical five lane Minor Arterial section.

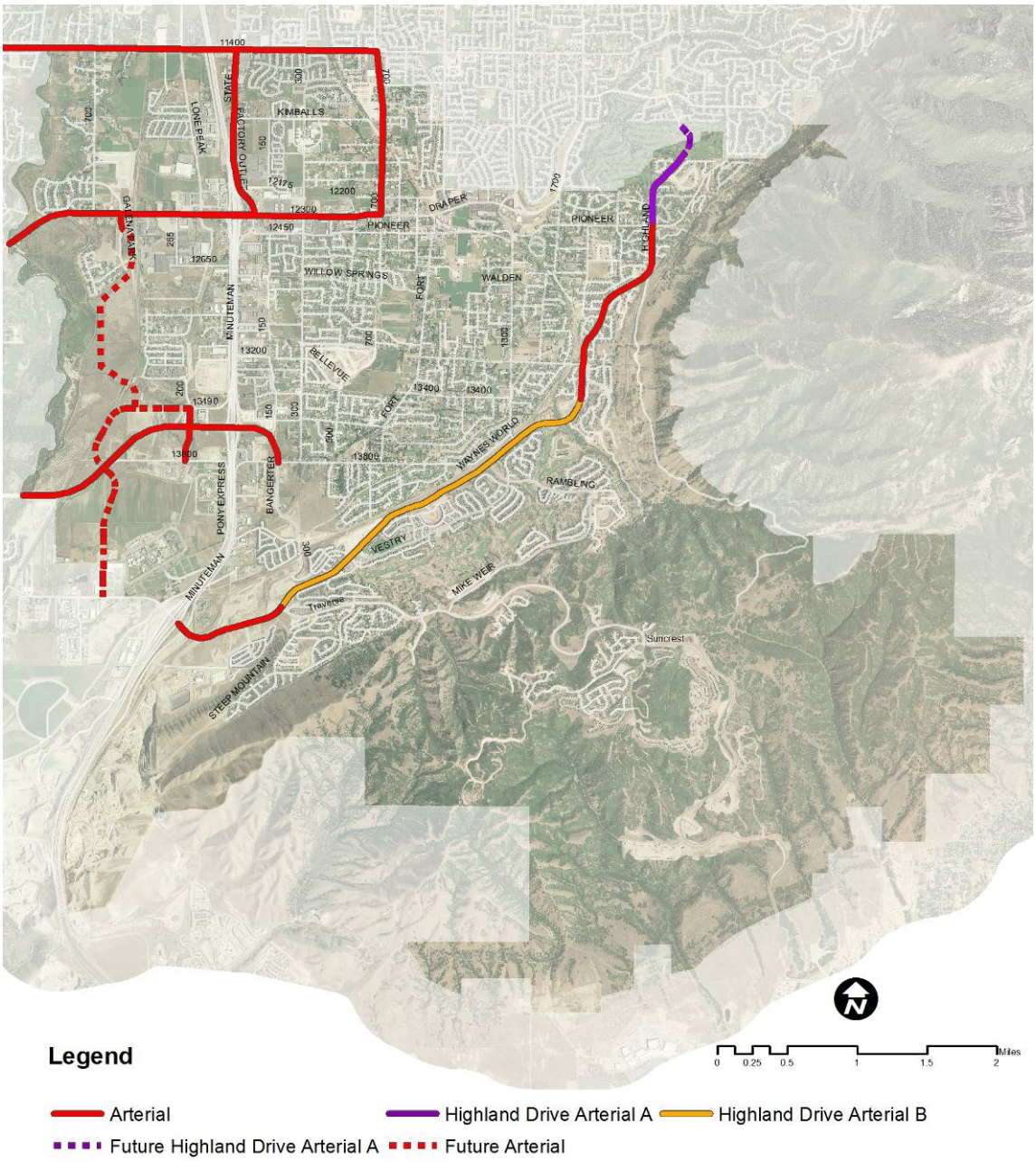
Figure 4- 10: Cross Section, Minor Arterial (five lane)



Arterials

Arterial streets are the primary regional transportation routes within Draper City. These roads have limited access, higher speeds, and traffic signals only at major cross streets. They are a mix of UDOT roads (11400 South, 12300 South, Bangerter Highway, State Street, Factory Outlet Drive, 700 East) and Draper roads (200 West, 13490 South, proposed 600 West, Highland Drive). Arterial roads within Draper are shown in Figure 4-11.

Figure 4- 11: Planned Arterials



Arterials generally have two 12-foot travel lanes in each direction, a 14-foot center turn lane and 10-foot shoulders. Their cross section may vary on a case-by-case basis, due to the differing standards of UDOT and Draper City. For example, UDOT roads, such as 12300 South and the Bangerter Highway, may have a slightly larger cross section. Portions of Draper's Highland Drive Arterial incorporate a non traversable median in place of a center turn lane. The Arterial cross-sections are unchanged from the previous Master Transportation Plan. The following figures illustrate the typical arterial cross-sections.

Figure 4- 12: Cross Section, Arterial

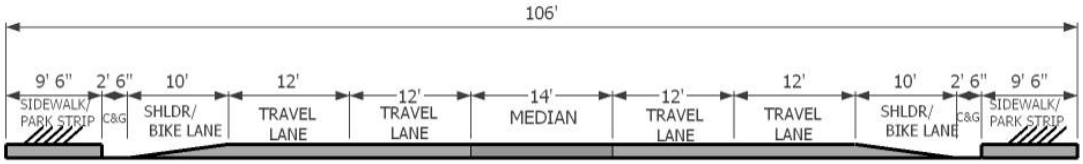


Figure 4- 13: Cross Section, Highland Drive Arterial A

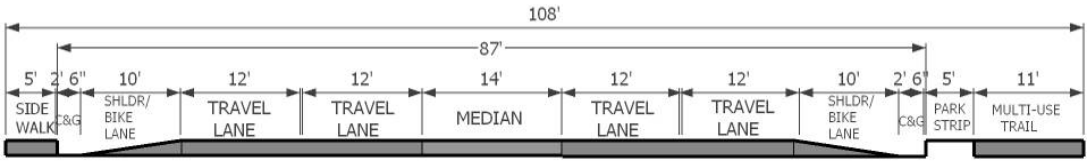


Figure 4- 14: Cross Section, Highland Drive Arterial B

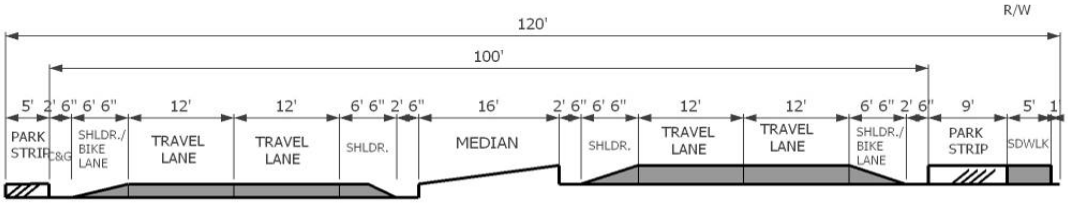
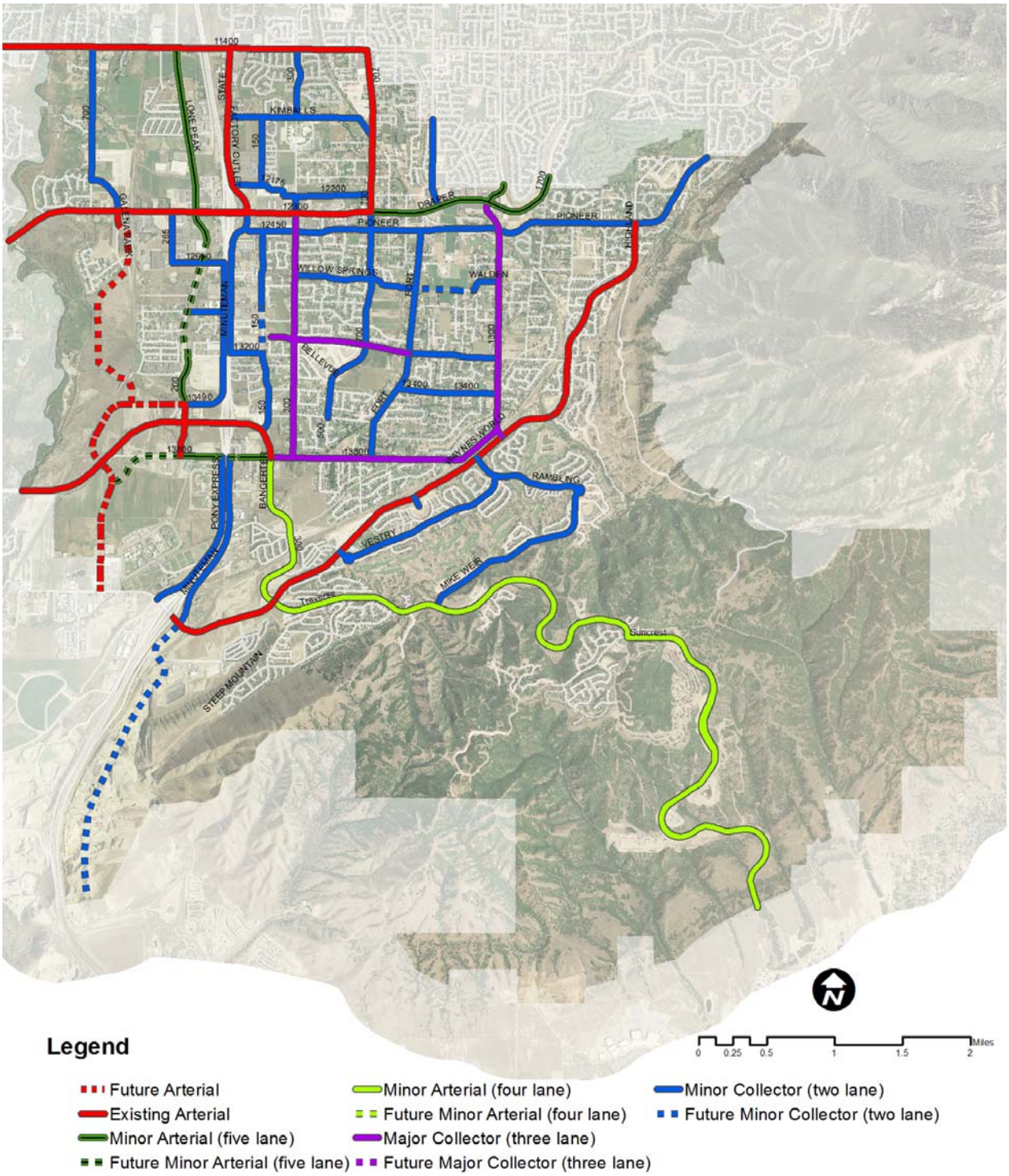


Figure 4- 15: Full Function Classification System



Access Management

Access management is a concept which has emerged over the past several decades to improve the efficiency of the roadway system. There are a variety of definitions of access management which basically involve the practice of providing access to land development with sufficient restrictions to simultaneously preserve traffic flow on the surrounding streets in terms of safety, capacity, and speed. Access management can involve the control of the location, design, and operations of driveways, median openings, and street connections to a roadway. Similar to the concept of functional classification involving the hierarchy of streets, access management typically involves greater access restrictions on the higher functioning roadways, such as Arterial roads, with little or no control on the access to lower functioning roadways, such as Local Streets.

Proper design of driveways and roadway drainage systems are an important component of access management. Design of driveways is generally addressed in the City engineering standards which define specific details for the construction of the approach in accordance with the following Draper City Engineering Road and Bridge Specifications and Plans Details:

- ST-07 – Flared Drive Approach,
- ST-08 - Flared Drive Approach Requiring Curb Cut, and
- ST-09 - Radius Drive Approach

In addition to these design specifications, Table 4-1 provides geometric standards for commercial and residential driveways.

Table 4-1: Geometric Design of Driveway Access

Land Use	**Approach Width** (feet)		**Curb Return Radius** (feet)	
	Minimum	**Maximum**	**Minimum**	**Maximum**
Residential	10	28	2.5	10
Commercial, Retail, Multi-Family	24	36	10	30

Wider driveways may be approved by the City Engineer where necessary to accommodate additional turning and/or acceptance lanes. Curb returns should generally increase as the speed on the approach street increases but may be increased based on the anticipated truck usage of the driveway.

The operations of driveways are generally approved on a case-by-case basis by the City Engineer. Driveways may restrict certain movements upon development approval of the driveway granted upon development approval, or at any time after the driveway is in operation based on engineering studies which demonstrate improved safety, capacity, or speed with a certain driveway restriction. Circuitous access to individual developments may be provided through operational restrictions of access points. Operational analysis of driveways during development approval or as part of subsequent engineering studies of a roadway shall consider the following four main principles of access management:

1. conflict elimination,
2. conflict separation,
3. removing speed differentials from travel or turn lanes, and
4. providing on-site circulation and storage.

The location of driveways will have a profound effect on the function of the roadway regardless of the design and operations of each driveway. The location of cross streets and driveways shall be a primary factor in the review of traffic impact studies presented to the City Engineer for approval of access points along with the operational factors addressed above. The Utah Department of Transportation has adopted a driveway placement policy documented in UDOT Administrative Rule R930-6. Curb cuts on all State Highways shall require a permit by UDOT in accordance with Administrative Rule R930-6 in addition to other Draper City approvals and/or conditions.

In addition to incorporating the access spacing and related permit requirements of UDOT Administrative Rule R930-6 by reference, the Master Transportation Plan has summarized the allowable access spacing on all streets in Draper City, including State Highways. Due to the range of State Highways included in Draper City's Arterial Roadway classification, Arterial street access spacing requirements are listed individually while other functional classification access spacing requirements are listed by functional classification category. Access spacing may be increased by the City Engineer based on localized conditions outlined in the four main access management principles. Requests to decrease access spacing standards may be granted by the City Engineer provided that a traffic impact study is provided by the developer documenting the preservation of safety, capacity, and speed with reduced access spacing. Table 4-2 lists the Draper City access spacing standards and Figure 4-16 illustrates spacing categories.

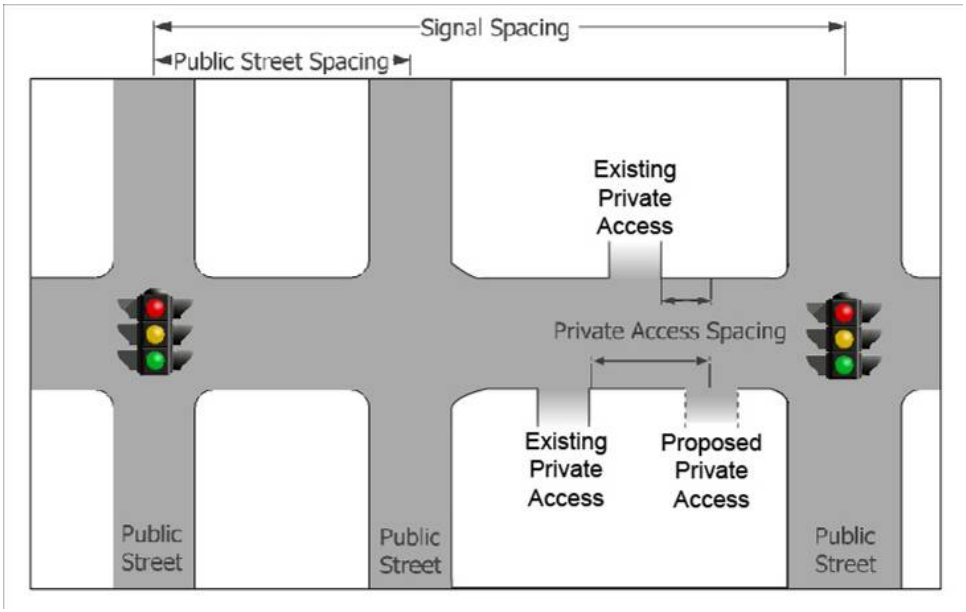
Table 4- 2: Draper City Minimum Access Spacing Standards

Roadway	From	To	Signal Spacing (feet)	Public Street Spacing (feet)	Private Access Spacing (feet)	State Hgwy
12300 South	Jordan River	Factory Outlet Dr	2640	660	500	Yes
12300 South	Factory Outlet Dr	700 East	2640	660	350	Yes
12300 South	700 East	1700 East	2640	660	200	No
11400 South	Jordan River	700 East	2640	660	200	No*
State Street	11400 South	12300 South	2640	660	350	Yes
700 East	12300 South	11400 South	2640	660	350	Yes
Bangerter Hgwy	Jordan River	Bangerter Pkwy	2640**	No Access		Yes
Bangerter Pkwy	Bangerter Hgwy	Highland Dr	2640	660	500	No
Highland Drive	14600 South	Sandy Border	2640	660	200	No
Other Arterial Streets			2640	660	200	No
Major Collector Streets			1320	660	200	No
Minor Collector Streets			1320	300	150	No
Local Streets			N.A.	150	No Minimum	No

* *Not presently on State Highway System but likely addition.*

** *R930-6 signal spacing standard, but verbal correspondence by UDOT states no new traffic signals.*

Figure 4- 16: Access Management Spacing



Access spacing, also referred to as driveway spacing, is measured from the closest edge (perpendicular tangent section) of the nearest driveway to the center of the proposed driveway. Access spacing standards allow drivers to process one decision at a time. Through proper spacing, drivers may monitor upcoming conflict points and react accordingly to each conflict. Studies show that the speed of traffic is decreased by 0.25 mph with each additional driveway (1994 Highway Capacity Manual) and that accident rates on a road increase by upwards of three percent with each new access point (TRB Access Management Manual, 2003). Application of access spacing standards shall consider driveways on the same side of the proposed driveway as well as driveways on the opposing side of the street. Opposing upstream driveways (vehicles approaching from the right of drivers in the proposed driveway) shall be carefully considered due to the conflicts presented with left turns into the proposed driveway.

12300 South approaching 300 East

Public street spacing standards govern the spacing between unsignalized public intersections, which typically accommodate higher traffic volumes than private driveways and access points. High volume private driveways with volumes generally above 5,000 vehicles per day or 100 vehicles per hour may be held to the standards of public street spacing at the discretion of the City Engineer. Issues associated with public street spacing are similar to those discussed with access spacing, although the minimum spacing standards are greater due to the expected higher traffic volumes. Private streets may be restricted to right-in and right-out operation only at the discretion of the City engineer.

The appropriate spacing of traffic signals can have profound effects on both the safety and efficiency of roadways. The placement of traffic signals is limited by the warrants outlined in the Manual of Uniform Traffic Control Devises. These warrants serve as minimum standards prior to which a traffic signal can be considered. Locations which meet minimum warrants may be restricted from the installation of a traffic signal due to the signal spacing standards in this section.

Raised medians and other conflict point elimination actions may be installed at the discretion of the City Engineer to eliminate signal warrants and promote traffic flow and safety. Studies conducted in Florida indicate that right turns plus U-turns on arterial streets reduced the crash rate by almost 20 percent as compared with direct left turns (TRB Access Management Manual, 2003). Draper City should require new development to install right turn lanes, raised medians, two-way center turn lanes, turn pockets, driveway illumination, and other measures at the discretion of the City Engineer and others to promote the safe and efficient operation of the roadway system upon requests for new access points.

Traffic Calming

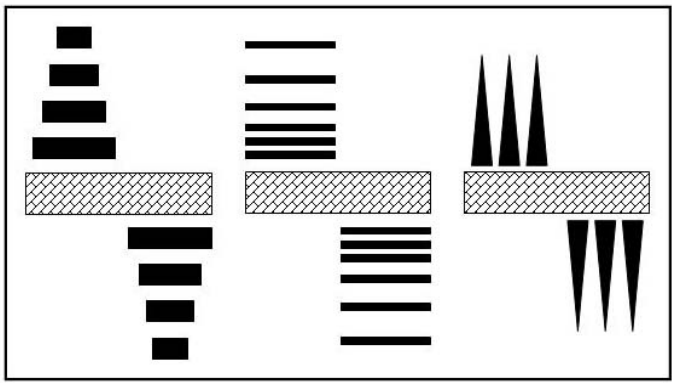
Traffic Calming Alternatives

Traffic calming exists in many forms, from small, easy, inexpensive, non-intrusive actions and projects to much more intrusive actions and larger capital improvements. Typically, traffic calming is divided into two types: measures intended to divert traffic from one route to another and those meant to slow speeding traffic. Although traffic calming tools are generally divided into these two functional groups, there is much overlap between them and measures intended to divert traffic will often slow traffic as well.

Traffic Calming Tools

Alternative one traffic calming options consist of signs, signals and markings which are designed to provide information to drivers. Speed limit signs, yield signs, roadway painting and traffic signals are all examples. The figure below represents an example of how striping might effectively slow drivers before entering a crosswalk.

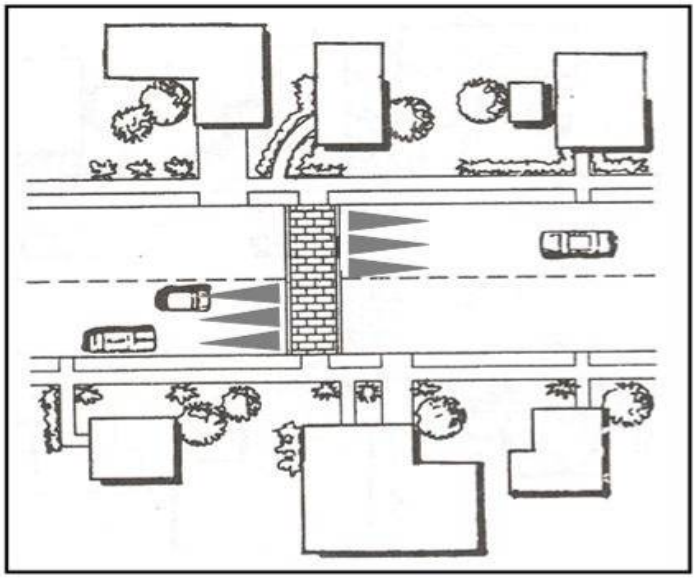
Figure 4- 17: Traffic Calming, Crosswalk Striping



Alternative two traffic calming options consist of street modifications. Street modifications are calming tools that change the vertical or horizontal physical characteristics of the roadway. Speed bumps, speed tables, islands and bulb outs are examples.

A speed table is an example of an alternative two traffic calming device. Speed tables come in a variety of forms, from raised asphalt with prominent paint markings to alternate materials such as stamped concrete, cobblestone, or brick pavers. The surface of the speed table is generally about three inches higher than the road surface, with "ramps" of about six feet in length on each side from the road surface to the table surface. The horizontal deflection of the speed tables and raised crosswalk as well as the overall increased visibility of the treatment causes drivers to reduce speeds. A conceptual drawing of a mid-block raised crosswalk is shown in the figure below.

Figure 4- 18:Traffic Calming, Raised Crosswalk



Source: Traffic Calming: State of the Practice

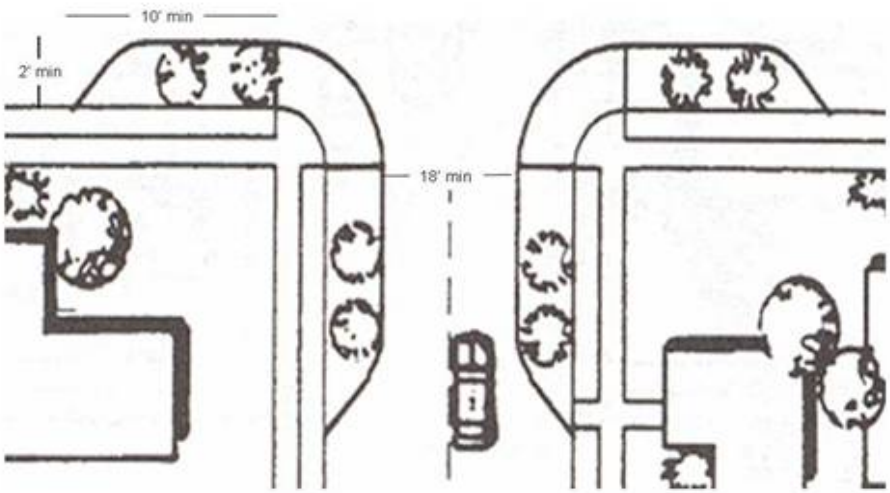
Another example of an alternative two traffic calming device is a center island. These are typically landscaped oval-shaped raised medians in the middle of the roadway. Their function is to narrow the roadway coming into an intersection so that drivers are compelled to slow down and proceed more cautiously. They tend to be more effective when they are smaller in length, as opposed to longer islands that separate traffic flow. The following figure shows a photo of an existing center median on 65 East south of Highland Drive.

Figure 4- 19: Traffic Calming, Center Island

65 East just south of Highland Drive

Intersection narrowing, or bulb outs, are another example of an alternative two traffic calming device. Bulb outs are intended to narrow the visual field of the driver at the intersection so more care is taken when proceeding through the intersection. In effect, they reduce the pavement width at the intersection and provide more pedestrian and bicycle-friendly roadways and crossings. A striped crosswalk can be added, drawing drivers' attention to the intersection. Bulb outs are shown in the Figure 4-20.

Figure 4- 20: Traffic Calming, Bulb Outs



Source: Traffic Calming: State of the Practice

Alternative three traffic calming devices are route modifications. One way streets, turn prohibitions, closures and diverters are all examples of route modifications. Route modification is a way to change traffic routing, while alternatives one and two focus on changing driver behavior. A route modification is often useful to prevent cut-through traffic.

Typical residential street in Draper

Traffic Calming Device Implementation Process

It is important when implementing traffic calming devices that the device is based on engineering standards. An engineering study that documents speed, traffic and accident data should be the determining factor in deciding when and where to implement traffic control devices and traffic calming measures. The process for implementing traffic calming devices is outlined below.

1. An engineering study to see if a calming device is necessary. This includes speed, traffic and accident data studies. Commonly accepted traffic engineering improvements, such as stop signs, yield signs, advanced warning signs, and striping consistent with the Manual of Uniform Traffic Control Devises should be applied prior to any recommendation for traffic calming.

2. An engineering study should be conducted including citizen input. Draper City should develop policies for engineering studies including speed thresholds, volume thresholds, and related data which might require the use of traffic calming devices.

3. Local Community and City Council approval. Draper City should develop policies for annual and case-by-case funding applications and related implementation.

4. Calming device implementation.

5. Studies to determine if the calming device is effective. This should include speed, traffic and accident data. Such studies should be performed both before and after the recommended action. Neighborhood meetings should also be held to gauge the local opinion of the actions' success or failure.

Traffic Calming Considerations

The following considerations should be taken into account when implementing a traffic calming device:

- All signage and pavement markings and devices should conform to the *Manual on Uniform Traffic Control Devices* standards. Where traffic calming measures are not specifically identified in the Manual, advanced warning and guide signs must meet appropriate standards for size, shape, etc.
- Draper's climate includes snow. Some traffic calming devices might not be visible during snowy conditions. Some traffic calming devices might interfere with snow plowing efforts. These considerations should be taken into account when considering and implementing traffic calming measures.
- Streetscaping is an important component to a traffic calming device. Proper streetscaping will "soften" the appearance and make them less controversial in the community.
- If traffic calming devices are spaced too far apart then speeding is likely to occur between the devices. Traffic calming devices should be spaced close enough together so vehicles will not have the distance to accelerate between the devices.
- Emergency responders should have input on proposed traffic calming devices. Slowing fire access for example, may cost lives and the input of the emergency service community related to other access points, trade-offs, or preferred options should be considered.
- Traffic calming can be most successful in either up-front neighborhood design or larger scale retrofit actions. Neighborhood design features such as long, straight roads with limited landscaping may foster higher speeds and are counter to traffic calming goals. Retrofit actions should be designed to understand and eliminate the problem and not simply move the problem to a parallel path.
- Traffic calming is continually evolving. The latest information should be considered before a traffic calming plan is developed. The Institute of Traffic Engineers produces literature that should be regularly consulted.

Transit

Public mass transit options are a key component to any city's transportation plan. Public transit provides transportation options to many segments of the community. Among these are the young, elderly and disabled. Within the coming years light rail and commuter rail will be added to the travel options available to Draper citizens.

Commuter Rail

Commuter rail is scheduled to be implemented within Draper City. A station for the commuter rail line has been proposed by UTA to be located north of Bangerter Highway on the west side of the tracks at approximately 12800 South. An action item list for the development of commuter rail is as follows:

- Confirm a station location
- Reserve the land needed for the station and parking areas
- Continue to plan and build to insure proper roadway access to the station
- Encourage transit friendly development
- Continue to work in collaboration with UTA

UTA First Ride October 25, 2007 at Woods Cross Station in Davis County

Light Rail

Light rail is scheduled to be implemented within Draper City in the near future. Light rail will be a significant addition to the transportation options in Draper. Draper City and the Utah Transit Authority (UTA) undertook a Transit Alternatives Study in October 2006. This study concentrated on four alternatives:

- Bus Rapid Transit (BRT) along State Street
- BRT along existing UTA corridor
- Light Rail Transit (LRT) along State Street
- LRT along existing UTA corridor

This study found that BRT alternatives generate approximately 3,000 new boardings per day and the LRT alternatives generate approximately twice that number. Boardings include north and southbound travelers within the study area from 10000 South to 14600 South (not all in Draper). Of the LRT boardings, excluding those from 14600 South, the existing UTA corridor generates 2,200 boardings and the State Street alignment 2,000.

The study also addressed benefits gained from transit ridership's relief of traffic congestion. Using the Travel Demand Model, it was concluded that the LRT on the UTA owned right of way reduced Vehicle Miles Traveled (VMT) by 1500 miles within the study area compared to an 800 mile reduction for the next best alternative.

While the preferred alternative, LRT along the UTA corridor, does pass through some lower density neighborhoods, it also connects retail and higher density development. For those riders who could not walk to the station, Park & Ride lots are planned for the 14600 South, Pioneer Road and 11800 South stations.

Light rail stations are to be located at 11800 South, Pioneer Road/12400 South, South Mountain, and 14600 South.

An action item list for the development of light rail is as follows:

- Continue to coordinate with UTA
- Encourage transit friendly development
- Plan for a station south of Bangerter Highway

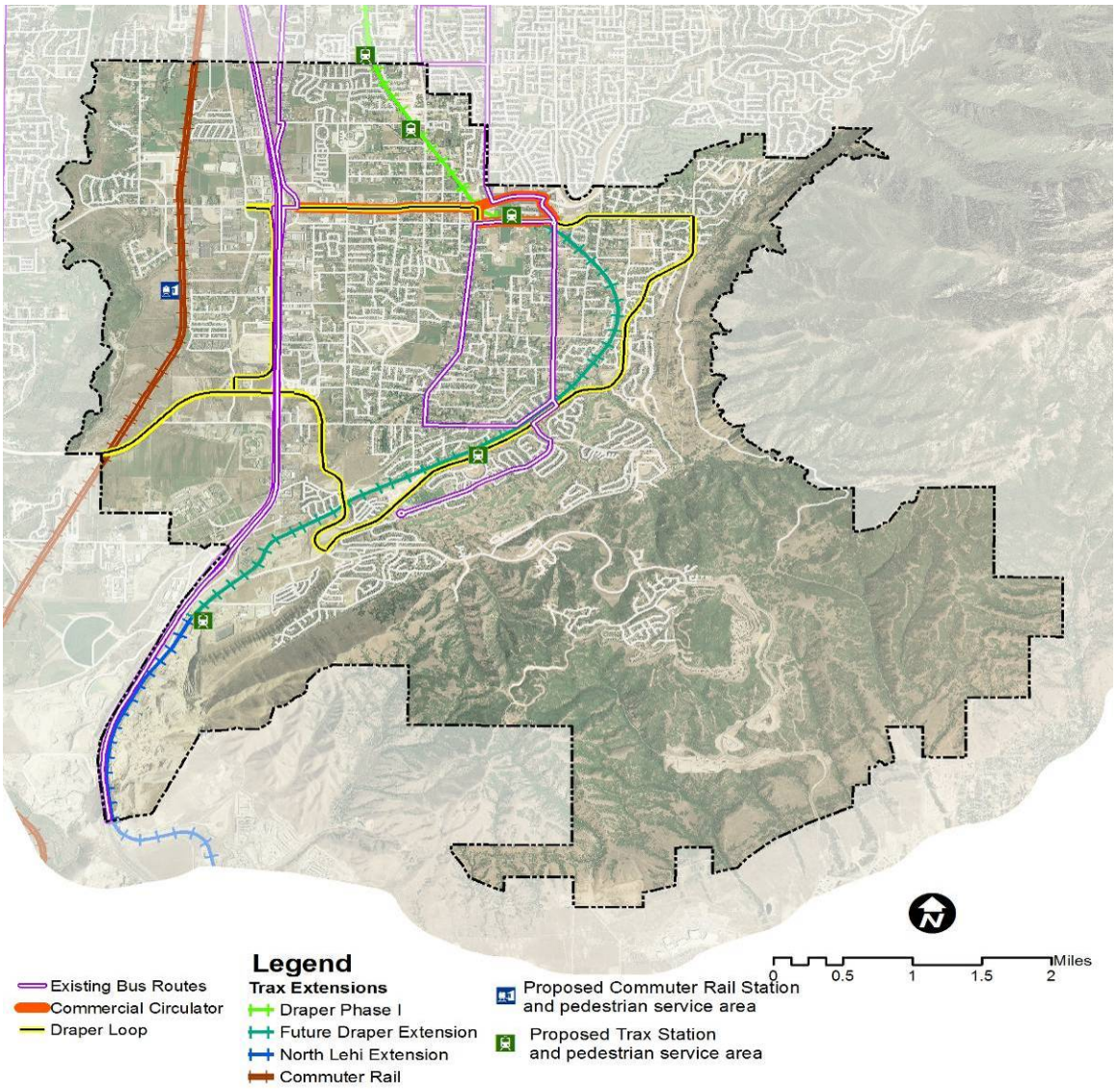
Sandy TRAX Station

Bus Routes

Bus routes are another key transportation component in the Draper MTP. In order to take full advantage of the fixed guideway systems mentioned above, two new bus routes are recommended. These bus routes should be communicated to UTA, as it is UTA's responsibility to implement new bus routes within Draper City.

- The Commercial Circulator would serve the commercial establishments on 12300 South and connect to the light rail station on 12400 South.
- The Draper Loop would provide access between the light rail line and the commuter rail line.

Figure 4- 21: Future Draper Transit Component



Pedestrian/ Bicycle

A Master Transportation Plan must outline future conditions for vehicles and transit, but an equally important component of people's ability to get from one point to another involves non-motorized travel, specifically walking and bicycling. In Draper, other modes such as equestrian and even hang gliders are used for movement, but these other modes are generally used recreationally, and while they should be mentioned, they are not the primary "drivers" of this plan. Walkability, which describes the quality of walking conditions, including safety, comfort and convenience; is very much desired in Draper. As such, the pedestrian and bicycle component of this plan offers solutions and suggestions to increase walkability and bikeability.

Draper City's Parks and Trails Committee has developed a Trails Master Plan which reserves paths, primarily off road, for recreational use. The MTP seeks to provide links between residences and those trails, primarily on the planned roadway. A system of bike routes exist beyond Draper's borders which must also be linked to the MTP. Finally, to increase walkability for local, non-recreational trips, the MTP must designate routes for biking and walking within the city.

Regional Trail in Draper

The Porter Rockwell, Draper Canal, and Jordan River Parkway Trail provide paved regional trails in Draper. These trails connect vital areas of the city and also provide critical connections to neighboring cities. These paved trails are key components to Draper's multi-modal transportation plan.

Different users of the transportation system require different facilities. Bicycle lanes offer a level of protection to bicycle users and often serve both recreational and transportation users. Bicycle lanes may be appropriate for a range of users including youth. Bicycle routes offer a lower level of protection and typically serve more experienced bicycle users. Although the bicycle system is an important component of the Draper Transportation System, it is acknowledged that added efforts that focus specifically on the bicycle component of the plan are needed. The formation of a bicycle committee or task force is a recommended action to review and adjust the details provided in this plan. The

addition of new bicycle lanes will support CTC goal number two; to provide multi-modal transportation opportunities.

Bike lanes are or will be included on the following roads:

East West	North South
12400 South	Fort Street (north section)
13200 South	Highland Drive
13800 South	700 East
Traverse Ridge Road	1300 East
11400 South	Lone Peak Parkway
14600 South (under interchange)	Minuteman Drive (south section)

The photograph below, of 1300 East, provides an example of a bike lane.

Bike Lane on 1300 East at Draper City Park

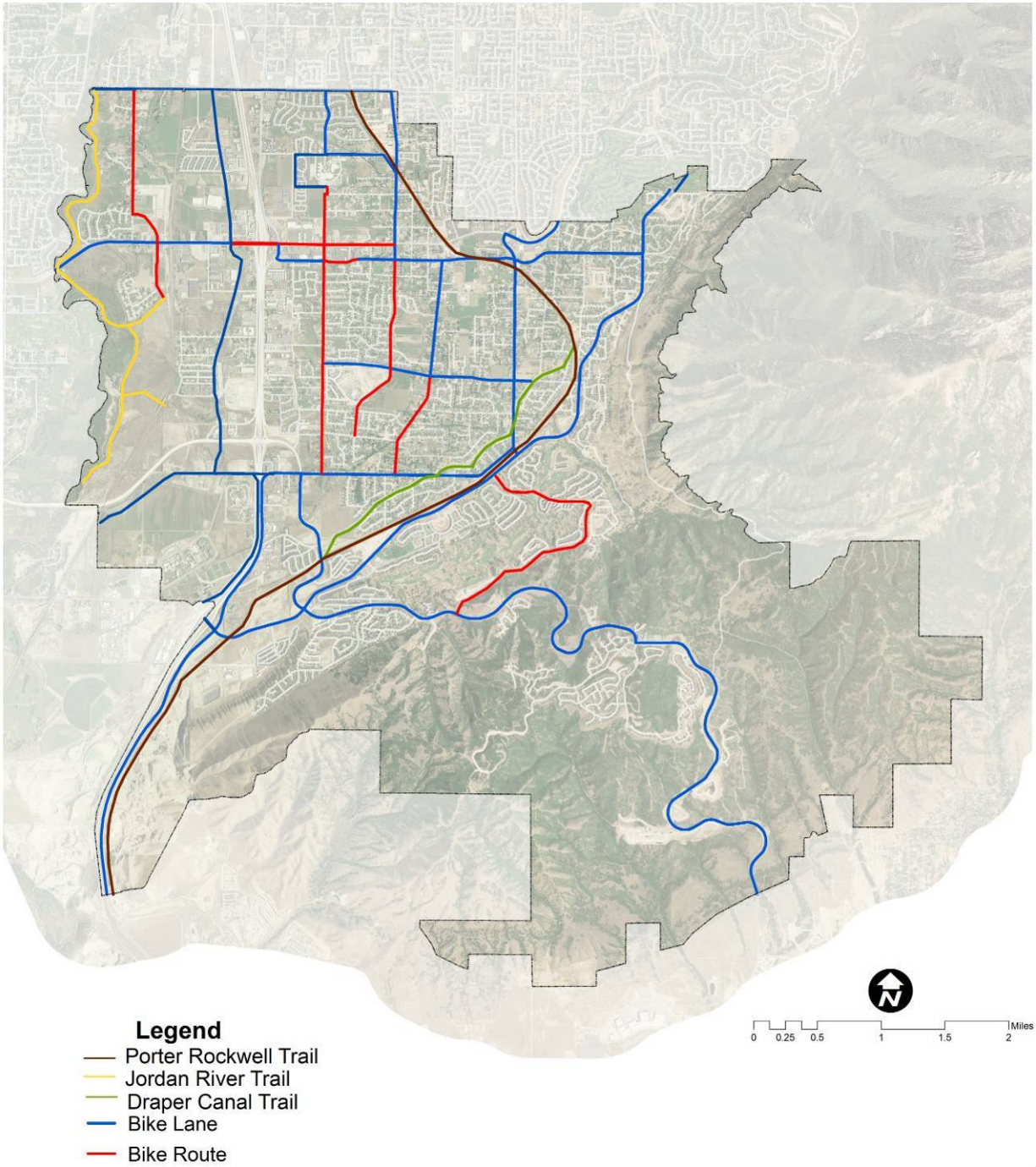
Bike routes are or will be included on the following roads:

East West	North South
12300 South	300 East
12400 South (downtown plan section)	Fort Street (south section)
	700 West/Galena Park Blvd.

The photograph below provides an example of a bike route.

Figure 4-22 represents the plan for bike lanes, bike routes and regional paved trails throughout the city. Full diagrams of bike facilities and trails are found within the Draper City Parks, Recreation, and Trails Master Plan and are incorporated into this document by reference.

Figure 4- 22: Master Transportation Plan, Bike Component

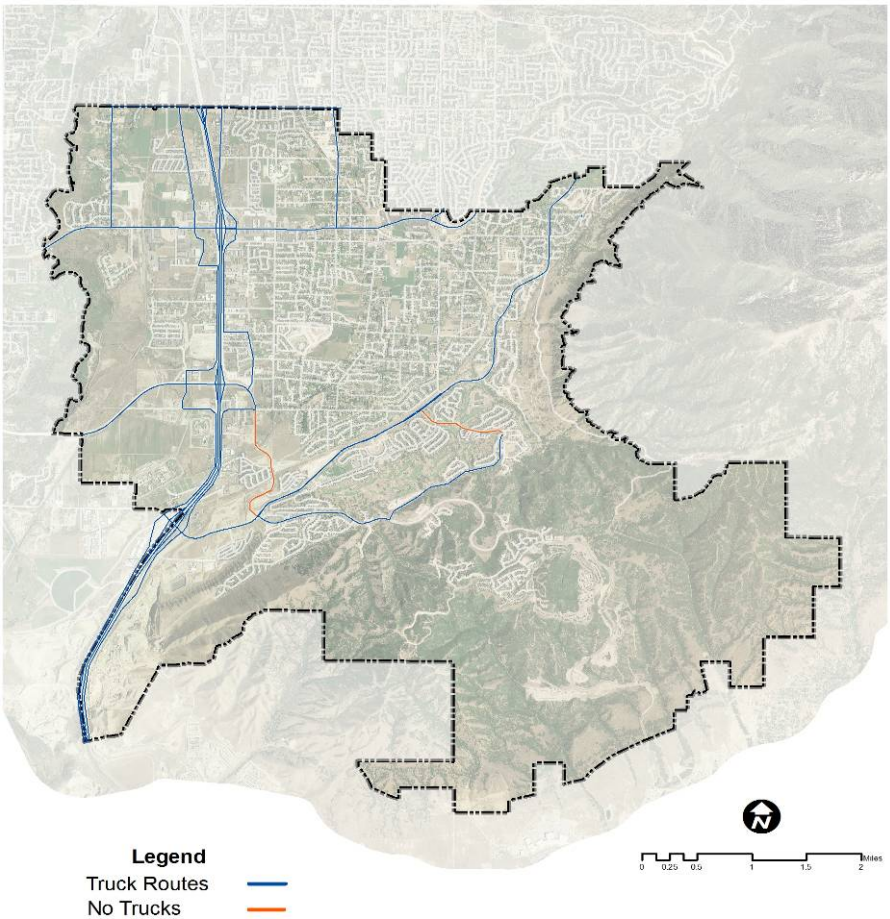


Truck Routes

Increasing safety, reducing noise levels and reducing pavement impact are all reasons cities restrict truck or heavy vehicle traffic to certain routes. Restrictions may include weight limits, minimal height clearance design standards or prohibitions on streets that primarily serve recreational or residential land uses.

Draper City adopted a truck route ordinance in March 2009 (Draper City Ordinance 879). The map below represents the preferred truck routes and truck restrictions according to Ordinance 879. Draper City has expressed concerns regarding the steep grade on both Rambling Road and Bangerter Parkway; and thus these routes are not designated for trucks. As for the designated truck routes, the city should develop a truck route sign plan to direct heavy vehicles.

Figure 4- 23: Truck Routes



V. Capital Facilities Plan

Implementing the Master Transportation Plan requires the focused effort of developer additions to the system as new development occurs, coordination with adjacent cities and agencies, and a local commitment to pay for and implement needed improvements. This section identifies the capital improvement priorities of Draper City.

The Capital Facilities Plan (CFP) identifies projects that are anticipated be needed by a particular time, and a planning level cost estimate for each improvement. The recommended improvements are separated into Phase I (0-5 years), Phase II (6-15 years) and Phase III (more than 15 years). These improvements are for collector streets and above. Local street improvements that may be required are not included in the CFP. Trails and pedestrian improvements are also not included in the CFP. Maintenance projects are also not included in the CFP, but are often addressed in roadway reconstruction which may accompany road widening or other improvements. Draper City's adoption of a financially constrained Capital Improvement Plan and related development reimbursement policies included in Section 5-15-020 of the Draper City Municipal Code (Public Improvement Installation and Financing) are not affected by the recommendations of this plan.

I-15 and Pony Express Road

Priorities identified in this Master Transportation Plan reflect those of the Citizen Transportation Committee created by Draper City to guide the development of the plan as well as Draper City staff. Priorities and phases defined by this plan are provided for information only and the City may accelerate or decelerate transportation improvements as necessary to reflect the continuous adjustment of priorities.

Cost estimates were developed assuming full reconstruction of the existing pavement section where widening was needed. The costs include road base, asphalt, curb/gutter, park strip and sidewalk. Engineering costs, utilities and contingencies were also included in the cost estimates. The cost estimates are in 2007 dollars. An inflated cost based upon the phased construction schedule is also presented. Details of the cost estimates are included in the Appendix.

Figure 5-1, located below, is the map of the planned improvements by phase. Figure 5-2 and Figure 5-3 list the projects by phase.

Figure 5- 1: Improvements by phase

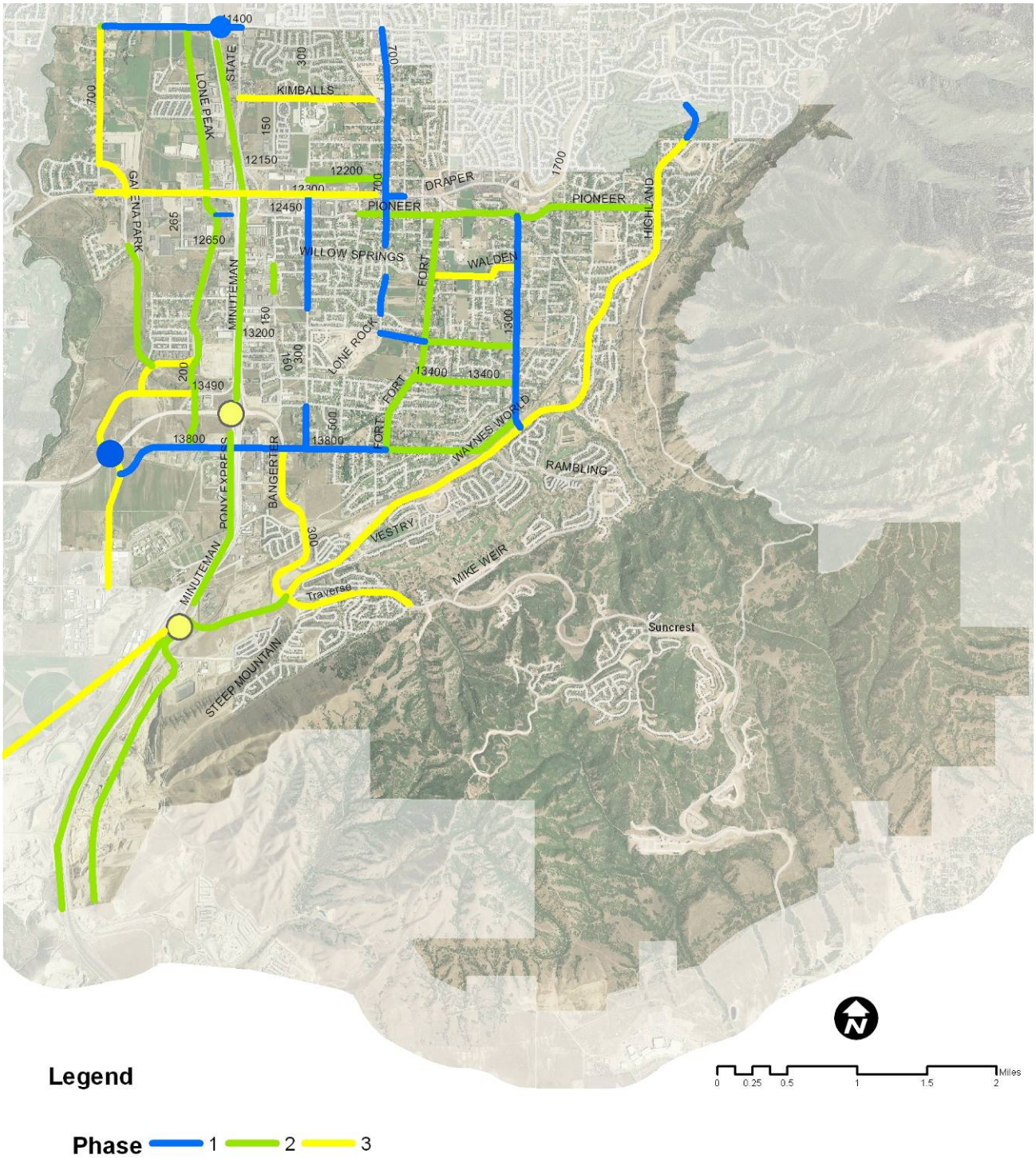


Figure 5- 2: Improvements by Phase

Draper City Capital Facilities Plan

Phase	Roadway	From	To	Proposed Improvements	Estimated Cost (Millions 2007 dollars)	Primary Funding Source	Estimated City/ Other Cost (Millions 2007)	Estimated Federal/ State Cost (Millions 2007)	Estimated Cost (Millions Inflated to Future Year)	Cost due to New Draper Development (Millions)
									2010 dollars	
1	700 East	12300 South	Whisper Bend Drive	Widen to minor collector and add curb, gutter, and sidewalk where needed	$2.3	City/Other	$2.3		$3.0	$ 2.212
1	700 East	12800 South	Drive	Build minor collector	$1.6	City/Other	$1.6		$2.1	$ 1.365
1	Highland Drive	12000 South	Sandy City	Build major collector standard through Hidden Valley Country Club	$4.9	State/Other		$4.9	$6.3	$ -
1	13800 South Overpass	Bangerter Parkway	200 West	Build/widen five lane minor arterial (including I-15 overpass)	$14.3	Fed/State/City		$14.3	$16.6	$ -
1	13800 South (13775 South)	200 West	Bangerter Highway Interchange	Build five lane minor arterial	$4.7	City/Other	$4.7		$5.4	$ 4.604
1	600 West / Bangerter Interchange			Build new interchange with Bangerter Highway	$47.0	State		$47.0	$60.0	$ -
1	13800 South	Bangerter Pkwy (150 East	300 East	Widen to three lane major collector	$0.8	City/Other	0.8	$0.0	$0.9	$ 0.331
1	13800 South	300 East	Fort Street	Widen to three lane major collector	$4.0	City/Other	$4.0		$4.6	$ 0.640
1	12300 South	700 East	800 East	Widen to minor arterial	$1.6	City/Other	$1.6		$2.0	$ 0.117
1	1300 East	12400 South	Highland Dr	Widen to three lane major collector	$7.0	City/Other	$7.0		$8.1	$ 1.874
1	300 East	12300 South	13000 South	Complete widening to three lane major collector	$3.4	City/Other	$3.4		$4.0	$ 1.330
1	300 East	Stokes Avenue	13800 South	Complete widening to three lane major collector	$1.8	City/Other	$1.8		$2.1	$ 1.464
1	12400 South - Pony Express Extensio	Lone Peak Parkway	Pony Express Road	Build minor collector	$1.1	City/Other	$1.1		$1.4	$ -
1	700 East	11400 South	12300 South	Widen to five lane arterial	$12.8	State		$12.8	$16.4	$ -
				Phase 1 Total	**$107.3**		**$28.3**	**$79.0**	**$132.9**	**$13.9**
									2015 dollars	
2	13800 South	Fort Street	1300 East	Widen to three lane major collector	$6.1	City/Other	$6.1		$10.0	$ 1.984
2	200 West	13490 South	13775 South (13800 South)	Widen to arterial	$3.7	City/Other	$3.7		$5.9	$ 1.896
2	Lone Peak Parkway	11400 South	12300 South	Widen to five lane minor arterial	$9.1	City/Other	$9.1		$14.8	$ 5.915
2	Lone Peak Parkway	12300 South	13490 South	Build/widen new five lane minor arterial	$11.2	City/Other	$11.2		$18.2	$ 8.800
2	Fort Street	12400 South	13800 South	Build/widen to minor collector	$9.4	City/Other	$9.4		$15.4	$ 3.241
2	150 East	12800 South	13000 South	Complete minor collector and add curb, gutter, and sidewalk where needed	$2.8	City/Other	$2.8		$4.6	$ 1.100
2	13200 South (Carlquist Dr.)	Fort Street	1300 East	Widen to commercial minor collector	$2.6	City/Other	$2.6		$4.3	$ -
2	12200 South	300 East	700 East	Build/widen to minor collector and add curb, gutter, and sidewalk where nee	$3.2	City/Other	$3.2		$5.2	$ 1.318
2	13400 South	Fort Street	1300 East	Build/widen to minor collector and add curb, gutter, and sidewalk where nee	$2.5	City/Other	$2.5		$4.1	$ 1.500
2	East Frontage Road	Highland Drive	Lehi	Extend minor collector through gravel pit	$6.4	City/Other	$6.4		$10.4	$ 4.424
2	Pioneer Road (12400 South)	600 East	Highland Dr	Widen to minor collector and add curb, gutter, and sidewalk where needed	$2.6	City/Other	$2.6		$4.3	$ -
2	Highland Drive	I-15	Traverse Ridge	Widen to arterial	$5.4	City/Other	$5.4		$8.8	$ 3.059
2	Galena Park Blvd.	12600 South	UPRR	Build new major arterial	$13.8	City/Other	$13.8		$22.4	$ 13.800
2	I-15	12300 South	Utah County Line	Widen	$395.0	State		$395.0	$643.0	$ -
				Phase 2 Total	**$473.8**	**$0.0**	**$78.8**	**$395.0**	**$771.4**	**$47.0**
									2020 dollars	
3	Highland Drive	Pioneer Road	Sandy City	Widen to arterial	$6.3	State/City/Oth	$6.3		$13.1	$ 4.992
3	Walden Lane	Fort St	1300 East	Build minor collector	$2.8	City/Other	$2.8		$5.8	$ 2.800
3	Traverse Ridge Road	Highland Drive	Steep Mountain Dr	Widen to four lane minor arterial	$2.1	City/Other	$2.1		$4.4	$ 1.819
3	11800 South	State Street	600 East	Complete minor collector and add curb, gutter, and sidewalk where needed	$4.0	City/Other	$4.0		$8.4	$ 3.000
3	Bangerter Parkway	13800 South	Highland Dr	Re-stripe to four lane arterial	$0.1	City/Other	$0.1		$0.2	$ 0.100
3	700 West	11400 South	12300 South	Widen to minor collector and add curb, gutter, and sidewalk	$4.8	City/Other	$4.8		$9.9	$ 2.304
3	600 West	200 West	14600 South	Build new arterial	$19.2	City/Other	$19.2		$40.0	$ 18.773
3	Highland Drive	Traverse Ridge Road	Pioneer Road	Widen to arterial	$19.9	City/Other	$19.9		$41.4	$ 8.352
3	12300 South	700 West	700 East	Widen to seven lanes	$26.0	State		$26.0	$54.0	$ -
3	Porter Rockwell Road	Mountain View Corridor	I-15	Build new five lane road	$135.0	State		$135.0	$281.0	$ -
3	I-15 / Bangerter Highway Interchange			Upgrade to freeway to freeway interchange	$90.0	State		$90.0	$187.0	$ -
3	I-15 / 14600 South Interchange			Build new interchange	$27.0	State		$27.0	$56.0	$ -
				Phase 3 Total	**$337.2**		**$59.2**	**$278.0**	**$701.2**	**$42.1**
				Total of All Projects	**$918.3**		**$166.3**	**$752.0**	**$1,605.5**	**$103.1**

Figure 5- 3: Improvements with 2005 and 2030 Estimated Daily Traffic (column headings described on page 72)

Draper City Capital Facilities Plan

Phase	Roadway	From	To	Daily Traffic (2005)	Percent of Daily Traffic from Draper (2005)	Daily Traffic from Draper (2005)	Daily Traffic (2030)	Percent of Daily Traffic from Draper (2030)	Daily Traffic from Draper (2030)	Total New Daily Traffic	Total New Daily Traffic from Draper	Percent of All Future Traffic from New Draper
1	700 East	12300 South	Whisper Bend Drive	-	0%	-	7,800	96%	7,500	7,800	7,500	96%
1	700 East	12800 South	Golden Pheasant Dr	-	0%	-	3,400	87%	2,900	3,400	2,900	85%
1	Highland Drive	12000 South	Sandy City	-	0%	-	20,300	79%	16,100	20,300	16,100	79%
1	13800 South Overpass	Bangerter Parkway	200 West	-	0%	-	10,300	98%	10,100	10,300	10,100	98%
1	13800 South (13775 South)	200 West	Bangerter Highway Interchange	-	0%	-	4,900	99%	4,800	4,900	4,800	98%
1	700 West / Bangerter Interchange			-	0%	-	20,000	100%	19,900	20,000	19,900	100%
1	13800 South	Bangerter Pkwy (150 East)	300 East	14,200	98%	13,800	25,800	98%	25,200	11,600	11,400	44%
1	13800 South	300 East	Fort Street	12,500	98%	12,200	15,000	97%	14,600	2,500	2,400	16%
1	12300 South	700 East	800 East	21,900	83%	18,200	27,400	74%	20,200	5,500	2,000	7%
1	1300 East	12400 South	Highland Dr	8,800	99%	8,700	12,700	95%	12,100	3,900	3,400	27%
1	300 East	12300 South	13000 South	15,300	100%	15,300	25,300	100%	25,200	10,000	9,900	39%
1	300 East	Stokes Avenue	13800 South	3,000	100%	3,000	16,600	100%	16,500	13,600	13,500	81%
1	12400 South - Pony Express Extensio	Lone Peak Parkway	Pony Express Road	-	0%	-	-	0%	-	-	-	0%
1	700 East	11400 South	12300 South	8,100	72%	5,900	15,500	77%	11,900	7,400	6,000	39%
2	13800 South	Fort Street	1300 East	5,500	95%	5,200	8,300	95%	7,900	2,800	2,700	33%
2	200 West	13490 South	13775 South (13800 South)	4,000	97%	3,900	8,000	100%	8,000	4,000	4,100	51%
2	Lone Peak Parkway	11400 South	12300 South	6,200	89%	5,500	22,000	90%	19,800	15,800	14,300	65%
2	Lone Peak Parkway	12300 South	13490 South	6,000	100%	6,000	28,000	100%	28,000	22,000	22,000	79%
2	Fort Street	12400 South	13800 South	3,600	100%	3,600	5,800	97%	5,600	2,200	2,000	34%
2	150 East	12800 South	13000 South	5,000	96%	4,800	8,400	96%	8,100	3,400	3,300	39%
2	13200 South (Carlquist Dr.)	Fort Street	1300 East	5,700	100%	5,700	4,300	100%	4,300	-1,400	-1,400	-33%
2	12200 South	300 East	700 East	1,000	100%	1,000	1,700	100%	1,700	700	700	41%
2	13400 South	Fort Street	1300 East	1,210	100%	1,200	3,000	100%	3,000	1,790	1,800	60%
2	East Frontage Road	Highland Drive	Lehi	8,500	76%	6,500	23,000	97%	22,400	14,500	15,900	69%
2	Pioneer Road (12400 South)	600 East	Highland Dr	12,700	100%	12,700	5,700	97%	5,500	-7,000	-7,200	-126%
2	Highland Drive	I-15	Traverse Ridge	12,200	93%	11,400	32,300	92%	29,700	20,100	18,300	57%
2	Galena Park Blvd.	12600 South	UPRR	-	0%	-	200	98%	200	200	200	100%
2	I-15	12300 South	Utah County Line	146,000	17%	24,800	240,200	20%	48,000	94,200	23,200	10%
3	Highland Drive	Pioneer Road	Sandy City	-	0%	-	10,600	79%	8,400	10,600	8,400	79%
3	Walden Lane	Fort St	1300 East	-	0%	-	400	100%	400	400	400	100%
3	Traverse Ridge Road	Highland Drive	Steep Mountain Dr	6,600	100%	6,600	49,400	100%	49,400	42,800	42,800	87%
3	11800 South	State Street	600 East	2,000	100%	2,000	8,000	100%	8,000	6,000	6,000	75%
3	Bangerter Parkway	13800 South	Highland Dr	-	0%	-	34,000	100%	34,000	34,000	34,000	100%
3	700 West	11400 South	12300 South	2,600	100%	2,600	5,000	100%	5,000	2,400	2,400	48%
3	600 West	200 West	14600 South	-	0%	-	18,000	98%	17,600	18,000	17,600	98%
3	Highland Drive	Traverse Ridge Road	Pioneer Road	10,000	82%	8,200	19,300	84%	16,300	9,300	8,100	42%
3	12300 South	700 West	700 East	25,000	78%	19,600	30,000	66%	19,700	5,000	100	0%
3	Porter Rockwell Road	Mountain View Corridor	I-15	-	0%	-	27,000	47%	12,800	27,000	12,800	47%
3	I-15 / Bangerter Highway Interchange			44,500	41%	18,200	125,200	34%	42,100	80,700	23,900	19%
3	I-15 / 14600 South Interchange			22,600	79%	17,800	52,000	68%	35,400	29,400	17,600	34%

* Some sections of roadway were not present in 2005, thus no daily traffic estimates are available

Traffic estimates used in the Capital Facilities Plan are briefly described below.

Daily Traffic (2005)

Daily Traffic (2005) is the existing, total average daily traffic (ADT) in both directions on the roadway. Daily traffic was estimated from the Wasatch Front Regional Council's (WFRC) regional travel demand model.

Percent of Daily Traffic from Draper (2005)

Percent of Daily Traffic from Draper (2005) is the percentage of existing traffic with one trip end (origin or destination) within Draper City. The Percent of Daily Traffic from Draper was estimated using the WFRC travel demand model.

Daily Traffic from Draper (2005)

Daily traffic from Draper (2005) is the estimated existing traffic volume with at least one trip end within Draper City. Daily Traffic from Draper is the product of Daily Traffic (2005) and the Percent of Daily Traffic from Draper (2005).

Daily Traffic (2030)

Daily Traffic (2030) is the future, total average daily traffic (ADT) in both directions on the roadway. Future daily traffic was estimated from the WFRC regional travel demand model.

Percent of Daily Traffic from Draper (2030)

Percent of Daily Traffic from Draper (2030) is the percentage of future traffic with one trip end (origin or destination) within Draper City. The Percent of Daily Traffic from Draper was estimated using the WFRC travel demand model.

Daily Traffic from Draper (2030)

Daily Traffic from Draper (2030) is the estimated future traffic volume with at least one trip end within Draper City. Daily Traffic from Draper is the product of Daily Traffic (2030) and the Percent of Daily Traffic from Draper (2030).

Total New Daily Traffic

Total New Daily Traffic is the forecast traffic growth and was estimated from Daily Traffic (2005) and Daily Traffic (2030).

Total New Daily Traffic from Draper

Total New Daily Traffic from Draper is the forecast traffic growth from Draper City and was estimated from Daily Traffic from Draper (2005) and Daily Traffic from Draper (2030).

Percent of New Daily Traffic from Draper

Percent of New Daily Traffic from Draper is the percentage of traffic growth from Draper City. The percent of new traffic from Draper was calculated from Total New Daily Traffic from Draper and Total New Daily Traffic

VI. Areas of Concern

Draper's goals and objectives set the tone for activity in the City. This Master Transportation Plan describes existing and future conditions and outlines specific improvements. Often, the difference between a functional system and a poorly functioning system is the attention to individual details. This chapter reviews the areas of concern initially expressed and provides traffic engineering details to supplement the Master Transportation Plan.

Incorporate Existing Area Plans Into the Master Transportation Plan

Draperville and Downtown

Draper City has been pro-active in making supplemental plans for sub-areas of its city. By gathering stakeholders and by examining specific areas, the City is able to simplify the issues and obtain action items to address unique issues. By incorporating aspects of its Downtown District Zoning Ordinance, this Master Transportation Plan includes Draperville ideas and requirements for roadways critical to historic Draper. By outlining various local and collector street standards, this plan helps to preserve the City's unique identity and heritage.

Highland Drive and Traverse Ridge Road

Another supplemental plan, the *"Analysis and Recommendations for Street Network"* by the Utah Local Technical Assistance Program, December 2004, has been utilized for Draper's transportation planning. In an effort to address the issues surrounding Highland Drive and Traverse Ridge Road, this report and *"The Changing Economic Structure and Current Baseline of Draper City"* (September 2006), were utilized.

Connecting Highland Drive to the north is a high priority capital improvement identified in this Master Transportation Plan. Funding will be derived from areas outside of

Draper, but the City's support to UDOT and efforts to assist Sandy City as the Environmental Impact Statement are prepared are critical to this project's success.

The evolving cross section alignments of Highland Drive and Traverse Ridge are an additional concern to Draper. The street standards defined in this plan address safety and consistency issues introduced as these two vital corridors are built. Highland Drive has three cross sections, which will vary in median and side treatment, based on the nature of the land uses through which it traverses. Traverse Ridge Road, classified as a four lane Minor Arterial, is slated for improvements as it joins Highland Drive. This will address safety and increased usage issues in the future.

West Side Access

In developing this Master Transportation Plan, The CTC and InterPlan specifically created a West Side Circulation/Bangerter Access Plan which was used heavily for functionally classifying new west side roadways and connections. Several north-south and east-west corridors are identified for preservation for future development. These improvements are included in the Capital Improvements Plan. This plan has been developed in concert with UDOT's plans to convert the south portion of Bangerter Highway to freeway standards and eliminate at-grade traffic signals. A new interchange at approximately Bangerter Highway and 600 West is the centerpiece of the West Side Circulation Plan. Access to the proposed commuter rail station as well as north-south access through the area has also been incorporated into the plan.

Signals, Roundabouts and Special Intersections

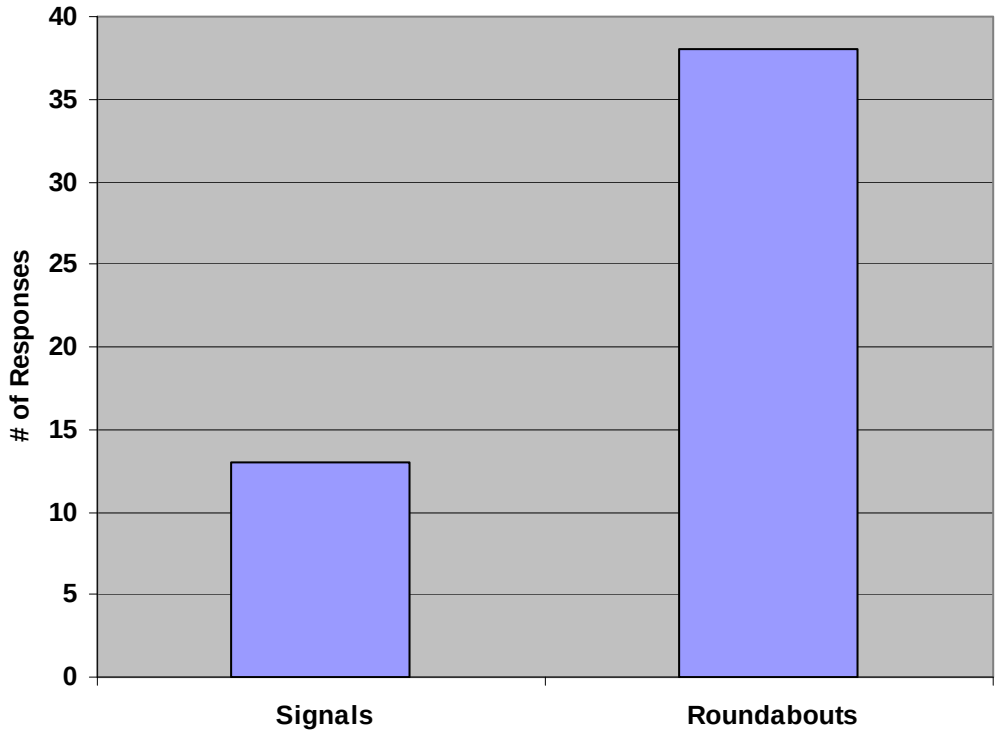
The need for roundabouts and traffic signals will increase as traffic volume throughout Draper continues to grow. The installation of traffic signals is guided by *Manual of Uniform Traffic Control Devices* (MUTCD) signal warrants. These warrants include traffic volume thresholds as well as safety, pedestrian, and "system" warrants which must be considered prior to the installation of a traffic signal. Through the travel demand modeling developed for this Plan, forecasted traffic volumes can be used to approximate the traffic volume warrant thresholds for traffic signals. Figure 6-1 displays the locations of possible future intersection controls based on signal warrants. Signal locations were identified using city plans, forecasted year 2030 volumes, and MUTCD Signal Warrant 3 (Peak Hour Warrant) estimates. Draper City should resist the implementation of traffic signals or roundabouts at locations not identified in this plan but make decisions on a case-by-case basis as issues arise.

Figure 6- 1: Current and Future Controlled Intersections

Roundabouts

In recent years, Draper has invested in roundabouts for intersections where four-way stops create delays but where signals were not desirable. In some cases intersections were re-constructed to accommodate new roundabouts and in other cases new development was required to construct roundabout intersections as part of their street network. Comments received at public open houses held in Draper indicate that residents prefer roundabouts to signals.

Figure 6- 2: Which type of intersection do you prefer?



Studies have shown that roundabouts are effective at reducing crash rates as well as delay when compared to four-way stop signs or low volume traffic signals. The primary advantage of roundabouts is that they permit low speed travel of all vehicles as opposed to stopping the travel of half (or more) of approaching vehicles. Yet, roundabouts are still relatively new and a learning curve exists for drivers and a capacity threshold is still a limiting factor. While there are numerous examples of multi-lane roundabouts across the United States and Europe, single lane roundabouts represent the most common application and the limit of what exists in Draper City today. Generally, the capacity of a single lane roundabout is approximately 3,500 vehicles per hour which would be indicative of the intersection of a street serving up to 20,000 vehicles per day (both directions) intersecting with a street serving up to 15,000 vehicles per day. When volumes on either leg of the intersection exceed this level, roundabouts often loose effectiveness and can result in increased delay and/or crash rates when compared to conventional traffic signals.

Roundabouts represent an effective traffic control solution which should be continued and expanded in Draper City. Educational campaigns such as city sponsored mail-outs encouraging drivers to approach roundabouts at appropriate speeds, yield to vehicles in the roundabout but travel through the roundabout at the appropriate speed have been suggested to improve their effectiveness. However, the decision to install a signal versus roundabout should be based on an engineering study on a case-by-case basis. Such studies should consider the capacity of roundabouts versus signals, the nature of drivers (local drivers will be more familiar with unique applications), and specific design details such as right turn lanes to optimize roundabout success. This plan has identified potential candidates for roundabouts or traffic signals as well as strict recommendations for locations of future traffic signals. It should be understood that the installation of either a signal or a roundabout will create delays to drivers and concentrate the location of crashes. For this reason, application of traffic signals or roundabouts should always be based on engineering studies.

Special Intersections

At high volume intersections between Arterials, or Arterials with Collectors, traffic volumes may warrant additional turning lanes. These intersections would require widening to accommodate exclusive right-turn lanes or dual left-turn lanes. In most cases, the need for additional turning lanes is development driven. Although the exact nature of future development is not always known, the following has been developed, based on projections of 2030 traffic growth, to suggest future lane configurations at major intersections. Figure 6-3 provides general intersection geometry for intersections that may warrant additional lanes in the future. Where appropriate, these general geometries should be accompanied by a detailed intersection study to determine the extent of required intersection widening and improvements. The Synchro files used in this analysis can be found in Appendix C.

Table 6- 1: Major Intersections of Concern

Intersection	Nature of Concern
1300 East, Wayne's World Drive & Highland Drive	Interaction with Highland Drive
1300 East & 13200 South	High volume and school location
1300 East & Pioneer Road	High peak period volume
Bangerter Parkway & 13800 South	Future high volume
Bangerter Highway & 200 West	UDOT access concerns
13490 South & 200 West	Future high volume

1300 East & Wayne's World Drive/Highland Drive

The close proximity of the intersections of Wayne's World Drive (13800 South) and Highland Drive along 1300 East is a concern. As traffic volumes in this area increase, drivers will be forced to make multiple decisions and possible lane shifts in a confined area. Such a condition often results in safety concerns as well as traffic congestion. The City should be proactive in addressing this and other safety concerns. The large number of left turns eastbound Highland Drive to 1300 East may require dual left turn lanes once a traffic signal is warranted at this location. The corresponding high traffic volume from northbound 1300 East to Wayne's World Drive may create safety and traffic congestion issues in the near future as the dual left turns must weave into a single thru lane. To improve both safety and traffic flow, a non-traversable median may be installed at the intersection of 1300 East and Wayne's World Drive. However, a raised median is viewed as a solution which may move cut-through traffic to other neighborhood streets and greatly alter traffic patterns in the area. Preference should be afforded a roundabout at 1300 East and Wayne's World Drive to offer full movements, stop signs at Wayne's World Drive, or other measures based on the conditions at the time of future analysis.

Further analysis of the East/Wayne's World Drive/Highland Drive intersections was conducted by MW Brown Engineering in December 2010. The study evaluated five design scenarios considering a range of treatment combinations including, signals, roundabouts, and stop signs. Conclusions of the study confirm the complexity of finding a design that fits within geographical constraints and also balances the needs of vehicle, pedestrians, bicycles. A brief evaluation of the pros and cons of the five MW Brown scenarios is offered in the appendix.

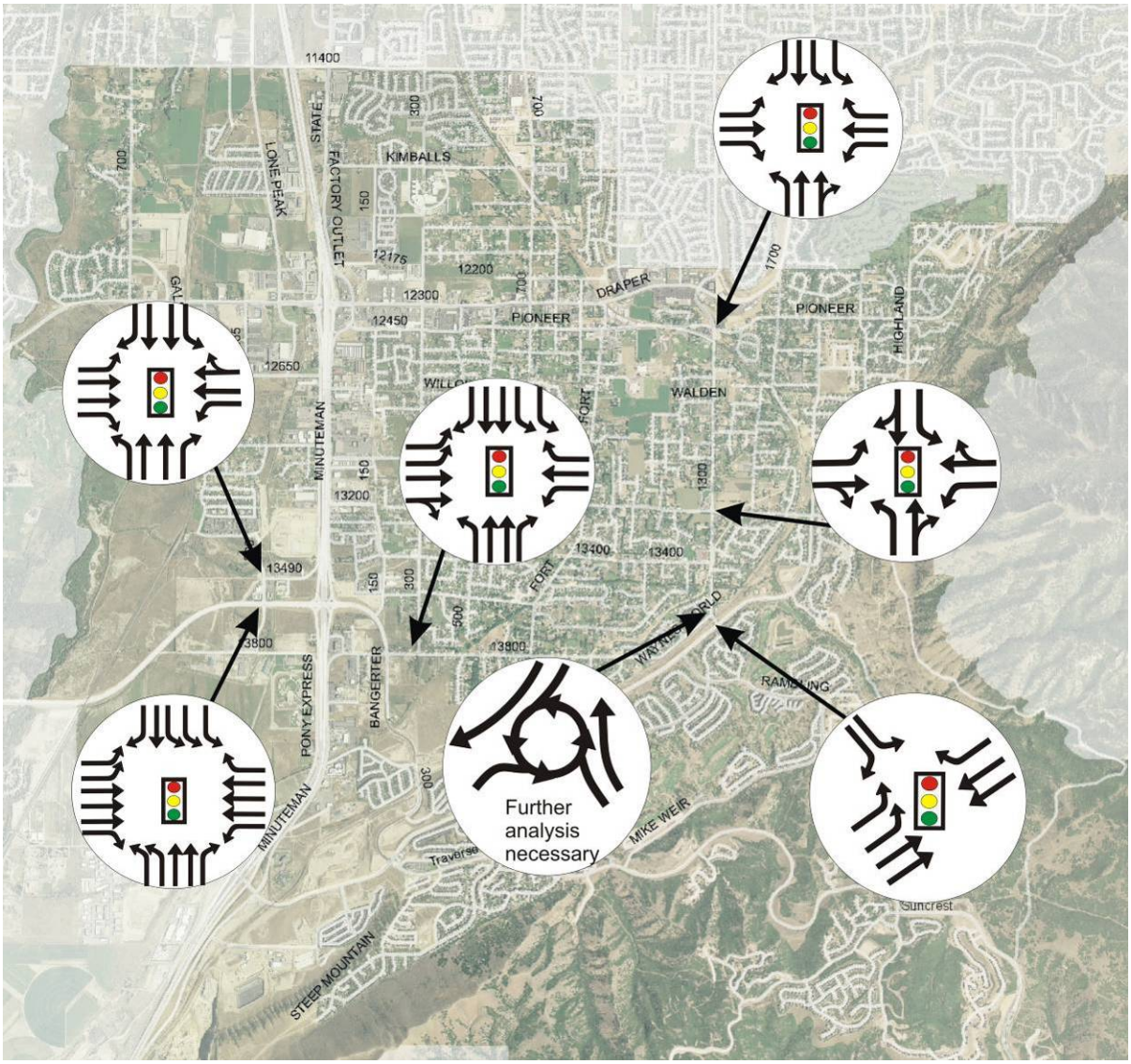
1300 East & 13200 South

The predicted traffic volumes at 1300 East and 13200 South will require additional traffic control at 1300 East and 13200 South. Preliminary analysis indicates that a roundabout will functional at Level of Service "F". As a result, it is assumed that this intersection will be signalized in the future. All approaches were assumed to have a left-turn lane and a shared right/thru lane in order to minimize intersection widening. Only the east leg of 13200 South requires widening beyond the standard cross section.

1300 East & Pioneer Drive

The anticipated future traffic volumes at this intersection will cause the roundabout to fail and make the design of a functional rotary difficult. For this analysis, it was assumed that the intersection would be signalized when the existing roundabout no longer functions at an acceptable level of service. The east and west legs of Pioneer Drive require that the intersection be widened from the typical minor collector cross section to include a left-turn lane, right-turn lane, and one thru lane. The southbound lefts from 1300 East to Pioneer Drive will likely require dual lefts to prevent queuing onto Draper Parkway. Dual lefts from southbound 1300 East will require two receiving lanes on the east leg of Pioneer Drive but one of the receiving lanes can be dropped allowing for sufficient distance for traffic to merge. Northbound 1300 East will need a left-turn lane, one thru lane, and a shared right thru to improve the northbound thru traffic. These two northbound thru lanes should be carried as far south as possible to help distribute thru traffic to both lanes.

Figure 6- 3: Specific Intersection Lane Configuration



Bangerter Parkway & 13800 South

As one of the few accesses to both I-15 and Bangerter Parkway, traffic volumes at the intersection create significant delay. Eastbound lefts from 13800 South will require dual lefts, as will southbound lefts from Bangerter Parkway to 13800 South. The southbound lefts from Bangerter Parkway will require two receiving lanes on 13800 South one of which can be dropped after allowing for sufficient distance for traffic to merge so that 13800 South conforms to the Major Collector cross section standard. Westbound lefts from 13800 South to Bangerter Parkway, and northbound lefts from Bangerter Parkway to 13800 South only need signal lefts. In addition to the left turn lanes, the east and west legs of 13800 South have one thru lane, and a right-turn lane. While the north and south legs of Bangerter Parkway have two thru lanes, and a right-turn lane.

Bangerter Highway & 200 West

Traffic volumes on Bangerter Highway are expected to increase making signalized operation of the intersection difficult. In this analysis, the best level of Service achieved was LOS "F". On 200 West, dual lefts are expected to be required for both north and southbound traffic. It was assumed that the south leg will have two thru lanes, and a right-turn lane. The north leg will also need a right turn lane, a thru lane, and a shared thru/left lane, or third left-turn lane depending on if UDOT would allow split phasing. The major concern at this intersection is the left-turn lane queuing into the intersection of 13490 South and the implementation of third left or left/thru should be determined by observed queue lengths.

13490 South & 200 West

With a new Arterial at 13490 South, the intersection of 13490 South and 200 West will still be signalized. With forecast traffic volumes, the north and south legs of 200 West should have a left-turn lane, two thru lanes, and a right-turn lane. The east and west leg of 13490 South are subject to review once development is better known. However, these east and west legs should be constructed to Arterial street standards including two thru lanes in each direction, a center left turn lane, and a right turn lane. The westbound right turn lane can be combined as a shared thru-right turn lane.

VII. Addendum Chapter - Impacts from Proposed New High School

The Canyons School District approved plans for a new high school located on 700 East between Golden Pheasant Drive and Willow Springs Lane. The anticipated change in school boundaries will shift trips to and from Alta High School in Sandy City to the New High School in Draper City. This chapter reviews the traffic impacts of the proposed high school in the context of the previous findings of the Master Transportation Plan

Description of New High School

At the time of this addendum, 12300 South is planned to serve as the northern boundary for the New High School enrollment area. Because the school will be located at the southern end of the Canyons School District, the district edges will serve as the eastern, western, and southern boundaries, which roughly coincide with Draper City and Salt Lake County boundaries. The New High School is anticipated to serve 1,200 students on opening year (2013) and grow to 1,800 students by 2018. The majority of students living in the future New High School enrollment area currently attend Alta High School in Sandy City.

Draper High School under construction

New High School Traffic Distribution

A traffic impact study (TIS) was conducted for the New Draper High School in January 2011, by Stanley Consultants. The TIS evaluated site trip distribution and concluded that high school-generated trips will distribute primarily on Carlquist Drive (13200 S) both east and west of the New High School, on 700 East, Fort Street, and on Willow Springs Lane.

Fort Street looking south at Stokes Avenue

The TIS followed a conservative (maximum traffic impact) approach in assuming all high school-generated trips were new trips to the roadway network. More likely, many trips are already existing trips, albeit to a different destination - Alta High School. Thus, it can be expected that some road segments may experience a net decrease in volume because existing trips to Alta High School will now divert to the New High School. To examine the comprehensive changes in traffic patterns, the regional travel demand model was modified to include a high school type land use at the proposed New High School location. The socioeconomic inputs for the high school were adjusted to reflect anticipated enrollment and proposed school boundaries. The model was then run for 2013 and 2018 conditions.

In the vicinity of the New High School, the model reports the largest traffic increases on 13200 South/Carlquist Drive (200-400 additional vehicles per day) and Willow Springs Lane (100-300 additional vehicles per day). Most portions of Fort Street experience overall decreases, likely due to fewer trips being made to Alta High School. Also, 700 East just north of the New High School decreases by about 100 vehicles per day.

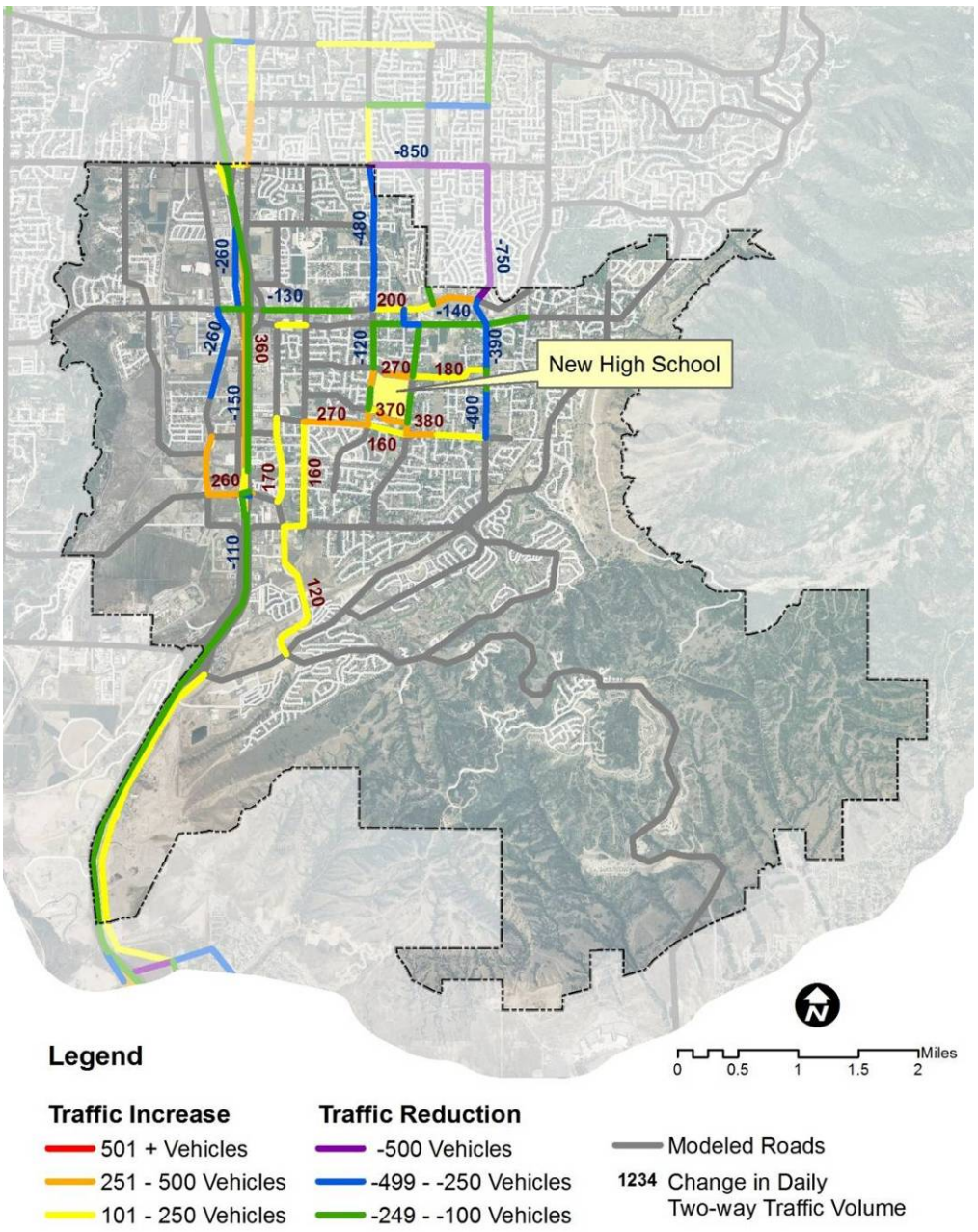
Impacts to Functional Class System

Generally, the changes in average daily traffic (ADT) volumes as a result of the New High School are insufficient to merit adjustments to roadway functional classification. When viewed in the context of daily volumes, the effect of high school traffic diminishes significantly. The impacts of high school traffic are anticipated to be most profound during the short timeframes that coincide with school in-load and out-load and any congestion problems would be better addressed though intersection "spot improvements" than a roadway reclassification.

The one exception to this pattern is the segment of 13200 South between Fort Street and 1300 East. In the 2007 Draper MTP, this segment was the only portion of 13200 South/Carlquist Drive classified as a minor collector rather than a major collector. Yet,

this segment is predicted to serve higher daily volumes than the adjacent portions of the roadway. Upgrading this segment of 13200 South from a two-lane cross-section to a three-lane cross-section would make it more consistent with the rest of 13200 South/Carlquist Drive. Additionally, the added center turn lane would reduce the level of disruption left-turning vehicles cause to through traffic. Because of limited right-of-way, the section of 13200 South between Fort Street and 1300 East should be upgraded to a Commercial Minor Collector rather than a Major Collector. This classification will allow 13200 South to feature three lanes while remaining in the 66-ft right-of-way of a minor collector and, thus, reducing impacts to adjacent properties.

Figure 7- 1: 2018 Change in Daily Traffic Volumes with New High School



Major Intersections of Concern

Traffic from the New High School results in some congestion concerns at stop-controlled intersections in the vicinity of the high school during in-load and out-load periods. In some cases, an extra turn lane will alleviate congestion. In other cases, congestion persists despite extra turn lanes, or else opportunities for intersection widening are limited by right-of-way constraints. One response in such instances is to examine the appropriateness of further traffic control devices, such as traffic signals or roundabouts.

The installation of traffic signals is guided by Manual on Uniform Traffic Control Devices 2009 Edition (MUTCD) signal warrants. These warrants include traffic volume thresholds as well as safety, pedestrian, and "system" warrants which must be considered prior to the installation of a traffic signal. This analysis evaluates congested intersections according to MUTCD Signal Warrant 3 (Peak Hour) because it is the simplest warrant to use for forecast volumes. Only after the high school is built can a full signal warrant analysis be conducted with actual volumes. Also, this analysis compares potential signal locations to those already identified earlier in the Master Transportation Plan (MTP).

While this study evaluates the appropriateness of signalization at congested intersections, it is understood that congestion issues from high school traffic occur for a relatively short period of time - perhaps 15-30 minutes during both morning in-load and afternoon out-load. A traffic signal that is installed to mitigate a peak hour problem may result in increased delay to drivers during the remaining hours of the day. Thus, Draper City will need to balance the tolerance for short-term congestion against the costs and impacts of installing traffic signals.

13200 South & 1300 East

The TIS indicates failing Level of Service (LOS) for the stop-controlled eastbound and westbound approaches during both the morning in-load and afternoon out-load periods. Since all approaches at the intersection already feature left-turn lanes, the most logical mitigation is to consider signalization. The MTP identifies the 13200 South & 1300 East intersection as a future intersection site, but not a roundabout site since future volumes will exceed roundabout capacity. Using peak hour volumes from the TIS, the peak hour signal warrant is met during the morning in-load hour in 2013 and both the morning in-load and afternoon out-load hours in 2018.

13200 South (Carlquist Drive) & Fort Street

The TIS indicates failing LOS for the stop-controlled eastbound and westbound approaches during both the morning in-load and afternoon out-load periods. The TIS specifies that adding a right-turn lane to the westbound approach on 13200 South will significantly reduce delay, but not fully mitigate failing conditions. The MTP identifies the 13200 South & Fort Street intersection as a potential traffic signal or roundabout site. Peak hour warrant analysis with TIS volumes indicates the warrant is met during the morning in-load hour in 2013 and both the morning in-load and afternoon out-load hours in 2018. The typical PM peak hour (5:00-6:00) remains well below warrant thresholds.

13800 South & 300 East

The TIS indicates failing LOS for the stop-controlled southbound approach on 300 East during the morning in-load period. With or without the high school, the TIS also forecasts failing LOS for the southbound approach during the typical PM peak hour (5:00-6:00). The TIS specifies that adding a southbound right-turn lane on 300 East mitigates the failing conditions. Additionally, restriping 13800 South, east of the intersection, to a 3-lane cross section will assist southbound left-turn movements by providing a center lane by which vehicles can conduct a two-stage left-turn movement. The MTP classifies both 300 East and 13800 South as major collectors (3-lanes), so the installation of these additional lanes conforms to ultimate build-out cross-section. Finally, the MTP identifies the 13800 South & 300 East intersection as a potential traffic signal or roundabout site. Several peak hour warrants are met by 2018 with or without the high school.

1300 East & Waynes World Drive/Highland Drive

The MTP identifies this intersection as a location of future concern. Future congestion problems are related to the anticipated large number of left turns from Highland Drive onto 1300 East and the narrow road width on 1300 East beneath the UTA bridge. The change in traffic patterns due to the New High School is not expected to significantly influence this pair of intersections. Generally, some volume reductions occur on 1300 East, Wayne's World Drive, and Highland Drive but the reductions are less than 100 vehicles per day and are not expected to influence overall performance or future mitigation measures.

Pioneer Road & 1300 East

The MTP concludes that future volumes will cause the roundabout at this intersection to fail and recommends conversion to a traffic signal when necessary. Model analysis shows that changes in traffic assignment due to the New High School result in slightly reduced daily volumes on both roads (100-400 vehicles per day). Thus, the New High School does not contribute to further problems and may slightly extend the life of the roundabout.

Pioneer Road & 300 East

The New High School traffic patterns produce mixed results at this intersection. Some approaches slightly increase in daily volumes while others slightly decrease. Overall, the increases and decreases are less than 100 vehicles per day and likely offset each other. The MTP identifies the Pioneer Road & 300 East intersection as a potential traffic signal or roundabout site. However, Draper City has indicated that right-of-way constraints at this intersection preclude installing a roundabout.

Willow Springs Lane at 700 East

Willow Springs Lane & 300 East

The New High School traffic patterns produce mixed results at this intersection. Some approaches slightly increase in daily volumes while others slightly decrease. Overall, the increases and decreases are less than 100 vehicles per day and likely offset each other. The MTP does not identify the Willow Springs Lane & 300 East intersection as a potential traffic signal or roundabout site.

Local Street Intersections of Concern

The New High School is located in a predominantly residential area of Draper City. While the New High School is serviced by several major and minor collector roadways, traffic distribution may result in some cut-through trips on the surrounding residential streets. One response to perceived cut-through traffic is to implement traffic calming procedures. However, when implemented improperly, traffic calming can have negative effects on the transportation system, such as higher mid-block vehicle speeds, slower emergency response times, or increased volumes on adjacent, parallel roads. Thus, it is recommended that traffic calming measures in response to high school cut-through traffic should only be implemented after a full review of actual high school traffic patterns and in accordance with the traffic calming guidelines and principles in this document.

Highland Drive at 1300 East

Appendix A: Summary of Comments

DRAPER CITY TRANSPORTATION MASTER PLAN QUESTIONNAIRE EXECUTIVE SUMMARY OF COMMENTS

Date of Open House – September 25, 2007
Number of Surveys Returned (60 surveys and one memo)

1. Which of the following to you value more?

- Aesthetics along a roadway - 44
- Getting home quicker - 6
- No preference selected - 9

2. Where do you see transportation problems in Draper City?

Number of Times Identified	Location
33	12300 South (I-15, State Street, 300 East, 700 East, 800 East)
8	13800 South (I-15 and Bangerter)
7	1300 East (12400 South)
6	300 East (Stokes Avenue/Channing Hall)
3	Highland Drive (speed)
2	150 East (12400 South)
1	700 East, 700 South, 300 South

3. From the project list shown on the next page, please list the top give projects that you feel are the most important.

Top Five Ranking Projects:

Arterial – 700 East, widen north of 12300 South (21)
11400 South, widen to arterial standards (8)
Minor Arterial – 1300 East, widen from Highland Drive to 12300 South (13)
13800 South, widen from I-15 to 1300 East (12)
Minor Collector - Pioneer Road, widen from 150 East to Highland Drive (8)
Fort Street, widen/construct from 12200 South to 13800 South (7)

4. Based on the information shown tonight, which of the following widening options to you prefer:

Street/Option	1 lane each direction with a center turn lane	2 lanes each direction no center turn lane	Shoulder widening only
300 East	35	4	11
Galena Park Blvd	18	3	2
1300 East	22	18	6
13800 South	35	8	3

5. Based on the information shown tonight, which intersection type do you prefer?

   Signalized – 13 Roundabout – 38

6. Do you think swales should be implemented? If so, where in Draper would swales be appropriate?

   Approximately 20 people do not want swales in Draper. A minority of individuals felt that swales add to the rural character of Draper. Some people do not have an opinion while others did not feel informed enough about swales to make a decision at this time.

7. Do you have any additional comments for the project team?

   Draper residents would like to have a workable roadway system, but not at the expense of the rural, historic feel of their surroundings. A workable roadway system means keeping the commuter and retail traffic to arterial streets and not impacting local neighborhoods or areas such as Draperville. A lot of concern was expressed about the widening of 300 East because of its proximity to a school and the number of children who might have to cross a wide street at least twice daily. Several individuals indicated that funds had just been expended to re-work 300 East and felt it was a project that should be finished. Others indicated that they would like more east/west traffic corridors since so many north/south connections have already been established.

Appendix B: Project Cost Estimates

700 East
12300 South to 12800 South
Full Roadway Reconstruction Costs

ITEM	QUANTITY	UNIT	UNIT COST	COST
ROADWAY:				
**Mobilization	8%	Lump	$ 65,398	$ 65,398
**Traffic Control	10%	Lump	$ 74,316	$ 74,316
66-foot Roadway	2000	Lin. Ft.	$ 293	$ 585,163
*Earth Work	10%	Lump	$ 58,516	$ 58,516
*Drainage	5%	Lump	$ 29,258	$ 29,258
*Landscaping, Aesthetics, Erosion Control	5%	Lump	$ 29,258	$ 29,258
*Signing & Striping	2%	Lump	$ 11,703	$ 11,703
*Lighting	1%	Lump	$ 5,852	$ 5,852
*Removals & Relocations	3%	Lump	$ 17,555	$ 17,555
*Environmental Mitigation	1%	Lump	$ 5,852	$ 5,852
			Contingency (20%)	**$ 176,574**
			Subtotal Roadway	**$ 1,060,000**

ITEM	QUANTITY	UNIT	UNIT COST	COST
RIGHT OF WAY:				
Right-of-Way Property	0.50	Acre	$ 250,000	$ 125,000
Construction Easements	1.00	Acre	$ 250,000	$ 25,000
Business Relocations	1.00	Lump	$ 350,000	$ 350,000
Residential Relocations	0.00	Lump	$ 250,000	$ -
			Contingency (20%)	**$ 25,000**
			Subtotal Right-of-way	**$ 525,000**

ITEM	QUANTITY	UNIT	UNIT COST	COST
UTILITIES:				
Power Pole Impacts	20	Each	$ 15,000	$ 300,000
*Miscellaneous Utilities	3%	Lump	$ 31,800	$ 31,800
			Contingency (20%)	**$ 66,360**
			Subtotal Utilities	**$ 399,000**

Preliminary Engineering (10% of Total Construction)	**$ 198,400**
Construction Engineering (8% of Total Construction)	**$ 158,720**
(2007) PROJECT TOTAL	**$ 2,342,000**
Inflation (5% per year for 5 years)	**$ 648,000**
(2009-2010) PROJECT TOTAL	**$ 2,990,000**

*Roadway %
**Total Construction %

Quantities shown are approximate and intended for planning purposes only. Actual quantities must be calculated based on final design of proposed improvements.

700 East
12800 South to Golden Pheasant
Full Roadway Reconstruction Costs

ITEM	QUANTITY	UNIT	UNIT COST	COST
ROADWAY:				
**Mobilization	8%	Lump	$ 45,778	$ 45,778
**Traffic Control	10%	Lump	$ 52,021	$ 52,021
66-foot Roadway	1400	Lin. Ft.	$ 293	$ 409,614
*Earth Work	10%	Lump	$ 40,961	$ 40,961
*Drainage	5%	Lump	$ 20,481	$ 20,481
*Landscaping, Aesthetics, Erosion Control	5%	Lump	$ 20,481	$ 20,481
*Signing & Striping	2%	Lump	$ 8,192	$ 8,192
*Lighting	1%	Lump	$ 4,096	$ 4,096
*Removals & Relocations	3%	Lump	$ 12,288	$ 12,288
*Environmental Mitigation	1%	Lump	$ 4,096	$ 4,096
			Contingency (20%)	**$ 123,602**
			Subtotal Roadway	**$ 742,000**

ITEM	QUANTITY	UNIT	UNIT COST	COST
RIGHT OF WAY:				
Right-of-Way Property	2.00	Acre	$ 250,000	$ 500,000
Construction Easements	0.50	Acre	$ 250,000	$ 12,500
Business Relocations	0.00	Lump	$ 350,000	$ -
Residential Relocations	0.00	Lump	$ 250,000	$ -
			Contingency (20%)	**$ 100,000**
			Subtotal Right-of-way	**$ 613,000**

ITEM	QUANTITY	UNIT	UNIT COST	COST
UTILITIES:				
Power Pole Impacts	0	Each	$ 15,000	$ -
*Miscellaneous Utilities	3%	Lump	$ 22,260	$ 22,260
			Contingency (20%)	**$ 4,452**
			Subtotal Utilities	**$ 27,000**

Preliminary Engineering (10% of Total Construction)	**$ 138,200**
Construction Engineering (8% of Total Construction)	**$ 110,560**
(2007) PROJECT TOTAL	**$ 1,631,000**
Inflation (5% per year for 5 years)	**$ 451,000**
(2009-2010) PROJECT TOTAL	**$ 2,082,000**

*Roadway %
**Total Construction %

Quantities shown are approximate and intended for planning purposes only. Actual quantities must be calculated based on final design of proposed improvements.

Highland Dr.
12000 S. to Sandy
Full Roadway Reconstruction Costs

ITEM	QUANTITY	UNIT	UNIT COST	COST
ROADWAY:				
**Mobilization	8%	Lump	$ 62,708	$ 62,708
**Traffic Control	10%	Lump	$ 71,259	$ 71,259
74-foot Roadway	1600	Lin. Ft.	$ 327	$ 523,963
*Earth Work	20%	Lump	$ 104,793	$ 104,793
*Drainage	5%	Lump	$ 26,198	$ 26,198
*Landscaping, Aesthetics, Erosion Control	5%	Lump	$ 26,198	$ 26,198
*Signing & Striping	2%	Lump	$ 10,479	$ 10,479
*Lighting	1%	Lump	$ 5,240	$ 5,240
*Removals & Relocations	2%	Lump	$ 10,479	$ 10,479
*Environmental Mitigation	1%	Lump	$ 5,240	$ 5,240
			Contingency (20%)	**$ 169,311**
			Subtotal Roadway	**$ 1,016,000**

ITEM	QUANTITY	UNIT	UNIT COST	COST
RIGHT OF WAY:				
Right-of-Way Property	3.00	Acre	$ 500,000	$ 1,500,000
Construction Easements	1.00	Acre	$ 300,000	$ 30,000
Business Relocations	0.00	Lump	$ 300,000	$ -
Residential Relocations	0.00	Lump	$ 250,000	$ -
			Contingency (20%)	**$ 300,000**
			Subtotal Right-of-way	**$ 1,830,000**

ITEM	QUANTITY	UNIT	UNIT COST	COST
UTILITIES:				
Power Pole Impacts	0	Each	$ 15,000	$ -
*Miscellaneous Utilities	3%	Lump	$ 30,480	$ 30,480
			Contingency (20%)	**$ 6,096**
			Subtotal Utilities	**$ 37,000**

Environmental and Engineering	**$ 1,788,300**
Construction Engineering (8% of Total Construction)	**$ 230,640**
(2007) PROJECT TOTAL	**$ 4,902,000**
Inflation (5% per year for 5 years)	**$ 1,355,000**
(2009-2010) PROJECT TOTAL	**$ 6,257,000**

*Roadway %
**Total Construction %

Quantities shown are approximate and intended for planning purposes only. Actual quantities must be calculated based on final design of proposed improvements.

13800 South (96 ft)
I-15 Crossing
Full Roadway Construction Costs

ITEM	QUANTITY	UNIT	UNIT COST	COST
ROADWAY:				
**Mobilization	8%	Lump	$ 210,874	$ 210,874
**Traffic Control	10%	Lump	$ 239,629	$ 239,629
96-foot Roadway	3500	Lin. Ft.	$ 543	$ 1,901,818
*Earth Work	10%	Lump	$ 190,182	$ 190,182
*Drainage	5%	Lump	$ 95,091	$ 95,091
*Landscaping, Aesthetics, Erosion Control	5%	Lump	$ 95,091	$ 95,091
*Signing & Striping	2%	Lump	$ 38,036	$ 38,036
*Lighting	1%	Lump	$ 19,018	$ 19,018
*Removals & Relocations	2%	Lump	$ 38,036	$ 38,036
*Environmental Mitigation	1%	Lump	$ 19,018	$ 19,018
			Contingency (20%)	**$ 569,359**
			Subtotal Roadway	**$ 3,417,000**

ITEM	QUANTITY	UNIT	UNIT COST	COST
RIGHT OF WAY:				
Right-of-Way Property	2.60	Acre	$ 250,000	$ 650,000
Construction Easements	1.00	Acre	$ 250,000	$ 25,000
Business Relocations	0.00	Lump	$ 300,000	$ -
Residential Relocations	0.00	Lump	$ 250,000	$ -
			Contingency (20%)	**$ 130,000**
			Subtotal Right-of-way	**$ 805,000**

ITEM	QUANTITY	UNIT	UNIT COST	COST
UTILITIES:				
Power Pole Impacts	15	Each	$ 15,000	$ 225,000
*Miscellaneous Utilities	3%	Lump	$ 102,510	$ 102,510
			Contingency (20%)	**$ 65,502**
			Subtotal Utilities	**$ 394,000**

ITEM	QUANTITY	UNIT	UNIT COST	COST
STRUCTURES:				
I 15 Overpass	25000	Sq. Ft.	$ 250	$ 6,250,000
			Contingency (20%)	**$ 1,250,000**
			Subtotal Utilities	**$ 7,500,000**

Preliminary Engineering (10% of Total Construction)	**$ 1,211,600**
Construction Engineering (8% of Total Construction)	**$ 969,280**
(2007) PROJECT TOTAL	**$ 14,297,000**
Inflation (5% per year for 3 years)	**$ 2,254,000**
(2009-2010) PROJECT TOTAL	**$ 16,551,000**

*Roadway %
**Total Construction %

Quantities shown are approximate and intended for planning purposes only. Actual quantities must be calculated based on final design of proposed improvements.

13800 South (96 ft)
13775 S.
Full Roadway Construction Costs

ITEM	QUANTITY	UNIT	UNIT COST	COST
ROADWAY:				
**Mobilization	8%	Lump	$ 162,674	$ 162,674
**Traffic Control	10%	Lump	$ 184,857	$ 184,857
96-foot Roadway	2700	Lin. Ft.	$ 543	$ 1,467,117
*Earth Work	10%	Lump	$ 146,712	$ 146,712
*Drainage	5%	Lump	$ 73,356	$ 73,356
*Landscaping, Aesthetics, Erosion Control	5%	Lump	$ 73,356	$ 73,356
*Signing & Striping	2%	Lump	$ 29,342	$ 29,342
*Lighting	1%	Lump	$ 14,671	$ 14,671
*Removals & Relocations	2%	Lump	$ 29,342	$ 29,342
*Environmental Mitigation	1%	Lump	$ 14,671	$ 14,671
			Contingency (20%)	**$ 439,220**
			Subtotal Roadway	**$ 2,636,000**

ITEM	QUANTITY	UNIT	UNIT COST	COST
RIGHT OF WAY:				
Right-of-Way Property	4.00	Acre	$ 250,000	$ 1,000,000
Construction Easements	1.00	Acre	$ 250,000	$ 25,000
Business Relocations	0.00	Lump	$ 300,000	$ -
Residential Relocations	0.00	Lump	$ 250,000	$ -
			Contingency (20%)	**$ 200,000**
			Subtotal Right-of-way	**$ 1,225,000**

ITEM	QUANTITY	UNIT	UNIT COST	COST
UTILITIES:				
Power Pole Impacts	0	Each	$ 15,000	$ -
*Miscellaneous Utilities	3%	Lump	$ 79,080	$ 79,080
			Contingency (20%)	**$ 15,816**
			Subtotal Utilities	**$ 95,000**

Preliminary Engineering (10% of Total Construction)	**$ 395,600**
Construction Engineering (8% of Total Construction)	**$ 316,480**
(2007) PROJECT TOTAL	**$ 4,669,000**
Inflation (5% per year for 3 years)	**$ 736,000**
(2009-2010) PROJECT TOTAL	**$ 5,405,000**

*Roadway %
**Total Construction %

Quantities shown are approximate and intended for planning purposes only. Actual quantities must be calculated based on final design of proposed improvements.

New Bangerter Crossing
200 West to South City Limits
Full Roadway Reconstruction Costs

ITEM	QUANTITY	UNIT	UNIT COST	COST
ROADWAY:				
**Mobilization	8%	Lump	$ 644,189	$ 644,189
**Traffic Control	10%	Lump	$ 732,033	$ 732,033
106-foot Roadway	10000	Lin. Ft.	$ 586	$ 5,856,267
*Earth Work	10%	Lump	$ 585,627	$ 585,627
*Drainage	5%	Lump	$ 292,813	$ 292,813
*Landscaping, Aesthetics, Erosion Control	5%	Lump	$ 292,813	$ 292,813
*Signing & Striping	2%	Lump	$ 117,125	$ 117,125
*Lighting	1%	Lump	$ 58,563	$ 58,563
*Removals & Relocations	1%	Lump	$ 58,563	$ 58,563
*Environmental Mitigation	1%	Lump	$ 58,563	$ 58,563
			Contingency (20%)	**$ 1,739,311**
			Subtotal Roadway	**$ 10,436,000**

ITEM	QUANTITY	UNIT	UNIT COST	COST
RIGHT OF WAY:				
Right-of-Way Property	24.00	Acre	$ 150,000	$ 3,600,000
Construction Easements	6.00	Acre	$ 150,000	$ 90,000
Business Relocations	0.00	Lump	$ 300,000	$ -
Residential Relocations	0.00	Lump	$ 200,000	$ -
			Contingency (20%)	**$ 720,000**
			Subtotal Right-of-way	**$ 4,410,000**

ITEM	QUANTITY	UNIT	UNIT COST	COST
UTILITIES:				
Power Pole Impacts	60	Each	$ 15,000	$ 900,000
*Miscellaneous Utilities	3%	Lump	$ 313,080	$ 313,080
			Contingency (20%)	**$ 242,616**
			Subtotal Utilities	**$ 1,456,000**

Preliminary Engineering (10% of Total Construction)	**$ 1,630,200**
Construction Engineering (8% of Total Construction)	**$ 1,304,160**
(2007) PROJECT TOTAL	**$ 19,237,000**
Inflation (5% per year for 5 years)	**$ 5,315,000**
(2009-2010) PROJECT TOTAL	**$ 24,552,000**

*Roadway %
**Total Construction %

Quantities shown are approximate and intended for planning purposes only. Actual quantities must be calculated based on final design of proposed improvements.

13800 South (74 ft)
150 East to 300 East
Full Roadway Reconstruction Costs

ITEM	QUANTITY	UNIT	UNIT COST	COST
ROADWAY:				
**Mobilization	8%	Lump	$ 23,602	$ 23,602
**Traffic Control	10%	Lump	$ 26,820	$ 26,820
74-foot Roadway	650	Lin. Ft.	$ 327	$ 212,860
*Earth Work	10%	Lump	$ 21,286	$ 21,286
*Drainage	5%	Lump	$ 10,643	$ 10,643
*Landscaping, Aesthetics, Erosion Control	5%	Lump	$ 10,643	$ 10,643
*Signing & Striping	2%	Lump	$ 4,257	$ 4,257
*Lighting	1%	Lump	$ 2,129	$ 2,129
*Removals & Relocations	2%	Lump	$ 4,257	$ 4,257
*Environmental Mitigation	1%	Lump	$ 2,129	$ 2,129
			Contingency (20%)	**$ 63,725**
			Subtotal Roadway	**$ 383,000**

ITEM	QUANTITY	UNIT	UNIT COST	COST
RIGHT OF WAY:				
Right-of-Way Property	0.50	Acre	$ 250,000	$ 125,000
Construction Easements	0.50	Acre	$ 250,000	$ 12,500
Business Relocations	0.00	Lump	$ 300,000	$ -
Residential Relocations	0.00	Lump	$ 250,000	$ -
			Contingency (20%)	**$ 25,000**
			Subtotal Right-of-way	**$ 163,000**

ITEM	QUANTITY	UNIT	UNIT COST	COST
UTILITIES:				
Power Pole Impacts	4	Each	$ 15,000	$ 60,000
*Miscellaneous Utilities	3%	Lump	$ 11,490	$ 11,490
			Contingency (20%)	**$ 14,298**
			Subtotal Utilities	**$ 86,000**

Preliminary Engineering (10% of Total Construction)	**$ 63,200**
Construction Engineering (8% of Total Construction)	**$ 50,560**
(2007) PROJECT TOTAL	**$ 746,000**
Inflation (5% per year for 3 years)	**$ 118,000**
(2009-2010) PROJECT TOTAL	**$ 864,000**

*Roadway %
**Total Construction %

Quantities shown are approximate and intended for planning purposes only. Actual quantities must be calculated based on final design of proposed improvements.

13800 South (74 ft)
300 East to Fort St.
Full Roadway Reconstruction Costs

ITEM	QUANTITY	UNIT	UNIT COST	COST
ROADWAY:				
**Mobilization	8%	Lump	$ 108,932	$ 108,932
**Traffic Control	10%	Lump	$ 123,786	$ 123,786
74-foot Roadway	3000	Lin. Ft.	$ 327	$ 982,430
*Earth Work	10%	Lump	$ 98,243	$ 98,243
*Drainage	5%	Lump	$ 49,122	$ 49,122
*Landscaping, Aesthetics, Erosion Control	5%	Lump	$ 49,122	$ 49,122
*Signing & Striping	2%	Lump	$ 19,649	$ 19,649
*Lighting	1%	Lump	$ 9,824	$ 9,824
*Removals & Relocations	2%	Lump	$ 19,649	$ 19,649
*Environmental Mitigation	1%	Lump	$ 9,824	$ 9,824
			Contingency (20%)	**$ 294,116**
			Subtotal Roadway	**$ 1,765,000**

ITEM	QUANTITY	UNIT	UNIT COST	COST
RIGHT OF WAY:				
Right-of-Way Property	3.00	Acre	$ 250,000	$ 750,000
Construction Easements	1.50	Acre	$ 250,000	$ 37,500
Business Relocations	0.00	Lump	$ 300,000	$ -
Residential Relocations	1.00	Lump	$ 250,000	$ 250,000
			Contingency (20%)	**$ 150,000**
			Subtotal Right-of-way	**$ 1,188,000**

ITEM	QUANTITY	UNIT	UNIT COST	COST
UTILITIES:				
Power Pole Impacts	20	Each	$ 15,000	$ 300,000
*Miscellaneous Utilities	3%	Lump	$ 52,950	$ 52,950
			Contingency (20%)	**$ 70,590**
			Subtotal Utilities	**$ 424,000**

Preliminary Engineering (10% of Total Construction)	**$ 337,700**
Construction Engineering (8% of Total Construction)	**$ 270,160**
(2007) PROJECT TOTAL	**$ 3,985,000**
Inflation (5% per year for 3 years)	**$ 629,000**
(2009-2010) PROJECT TOTAL	**$ 4,614,000**

*Roadway %
**Total Construction %

Quantities shown are approximate and intended for planning purposes only. Actual quantities must be calculated based on final design of proposed improvements.

12300 South (96 ft)
700 E. to 800 E,
Full Roadway Construction Costs

ITEM	QUANTITY	UNIT	UNIT COST	COST
ROADWAY:				
**Mobilization	8%	Lump	$ 36,150	$ 36,150
**Traffic Control	10%	Lump	$ 41,079	$ 41,079
96-foot Roadway	600	Lin. Ft.	$ 543	$ 326,026
*Earth Work	10%	Lump	$ 32,603	$ 32,603
*Drainage	5%	Lump	$ 16,301	$ 16,301
*Landscaping, Aesthetics, Erosion Control	5%	Lump	$ 16,301	$ 16,301
*Signing & Striping	2%	Lump	$ 6,521	$ 6,521
*Lighting	1%	Lump	$ 3,260	$ 3,260
*Removals & Relocations	2%	Lump	$ 6,521	$ 6,521
*Environmental Mitigation	1%	Lump	$ 3,260	$ 3,260
			Contingency (20%)	**$ 97,604**
			Subtotal Roadway	**$ 586,000**

ITEM	QUANTITY	UNIT	UNIT COST	COST
RIGHT OF WAY:				
Right-of-Way Property	0.50	Acre	$ 250,000	$ 125,000
Construction Easements	0.20	Acre	$ 250,000	$ 5,000
Business Relocations	0.00	Lump	$ 300,000	$ -
Residential Relocations	0.00	Lump	$ 250,000	$ -
			Contingency (20%)	**$ 25,000**
			Subtotal Right-of-way	**$ 155,000**

ITEM	QUANTITY	UNIT	UNIT COST	COST
UTILITIES:				
Power Pole Impacts	4	Each	$ 15,000	$ 60,000
*Miscellaneous Utilities	3%	Lump	$ 17,580	$ 17,580
			Contingency (20%)	**$ 15,516**
			Subtotal Utilities	**$ 94,000**

ITEM	QUANTITY	UNIT	UNIT COST	COST
STRUCTURES:				
**Box Culvert	1	Each	$ 435,000	$ 435,000
			Contingency (20%)	**$ 87,000**
			Subtotal Utilities	**$ 522,000**

Preliminary Engineering (10% of Total Construction)	**$ 135,700**
Construction Engineering (8% of Total Construction)	**$ 108,560**
(2007) PROJECT TOTAL	**$ 1,602,000**
Inflation (5% per year for 5 years)	**$ 443,000**
(2009-2010) PROJECT TOTAL	**$ 2,045,000**

*Roadway %
**Total Construction %

One business relocation estimated with 700 East

Quantities shown are approximate and intended for planning purposes only. Actual quantities must be calculated based on final design of proposed improvements.

1300 East (74 ft)
12400 South to Highland Dr.
Full Roadway Reconstruction Costs

ITEM	QUANTITY	UNIT	UNIT COST	COST
ROADWAY:				
**Mobilization	8%	Lump	$ 326,796	$ 326,796
**Traffic Control	10%	Lump	$ 371,359	$ 371,359
74-foot Roadway	9000	Lin. Ft.	$ 327	$ 2,947,290
*Earth Work	10%	Lump	$ 294,729	$ 294,729
*Drainage	5%	Lump	$ 147,365	$ 147,365
*Landscaping, Aesthetics, Erosion Control	5%	Lump	$ 147,365	$ 147,365
*Signing & Striping	2%	Lump	$ 58,946	$ 58,946
*Lighting	1%	Lump	$ 29,473	$ 29,473
*Removals & Relocations	2%	Lump	$ 58,946	$ 58,946
*Environmental Mitigation	1%	Lump	$ 29,473	$ 29,473
			Contingency (20%)	**$ 882,348**
			Subtotal Roadway	**$ 5,295,000**

ITEM	QUANTITY	UNIT	UNIT COST	COST
RIGHT OF WAY:				
Right-of-Way Property	0.00	Acre	$ 250,000	$ -
Construction Easements	1.00	Acre	$ 250,000	$ 25,000
Business Relocations	0.00	Lump	$ 300,000	$ -
Residential Relocations	0.00	Lump	$ 250,000	$ -
			Contingency (20%)	**$ -**
			Subtotal Right-of-way	**$ 25,000**

ITEM	QUANTITY	UNIT	UNIT COST	COST
UTILITIES:				
Power Pole Impacts	25	Each	$ 15,000	$ 375,000
*Miscellaneous Utilities	3%	Lump	$ 158,850	$ 158,850
			Contingency (20%)	**$ 106,770**
			Subtotal Utilities	**$ 641,000**

Preliminary Engineering (10% of Total Construction)	**$ 596,100**
Construction Engineering (8% of Total Construction)	**$ 476,880**
(2007) PROJECT TOTAL	**$ 7,034,000**
Inflation (5% per year for 3 years)	**$ 1,109,000**
(2009-2010) PROJECT TOTAL	**$ 8,143,000**

*Roadway %
**Total Construction %

Quantities shown are approximate and intended for planning purposes only. Actual quantities must be calculated based on final design of proposed improvements.

300 East (74 ft)
12300 South to 13000 South
Full Roadway Reconstruction Costs

ITEM	QUANTITY	UNIT	UNIT COST	COST
ROADWAY:				
**Mobilization	8%	Lump	$ 128,096	$ 128,096
**Traffic Control	10%	Lump	$ 145,563	$ 145,563
74-foot Roadway	3500	Lin. Ft.	$ 327	$ 1,146,168
*Earth Work	10%	Lump	$ 114,617	$ 114,617
*Drainage	5%	Lump	$ 57,308	$ 57,308
*Landscaping, Aesthetics, Erosion Control	5%	Lump	$ 57,308	$ 57,308
*Signing & Striping	2%	Lump	$ 22,923	$ 22,923
*Lighting	1%	Lump	$ 11,462	$ 11,462
*Removals & Relocations	3%	Lump	$ 34,385	$ 34,385
*Environmental Mitigation	1%	Lump	$ 11,462	$ 11,462
			Contingency (20%)	**$ 345,859**
			Subtotal Roadway	**$ 2,076,000**

ITEM	QUANTITY	UNIT	UNIT COST	COST
RIGHT OF WAY:				
Right-of-Way Property	0.50	Acre	$ 250,000	$ 125,000
Construction Easements	2.00	Acre	$ 250,000	$ 50,000
Business Relocations	0.00	Lump	$ 300,000	$ -
Residential Relocations	0.00	Lump	$ 250,000	$ -
			Contingency (20%)	**$ 25,000**
			Subtotal Right-of-way	**$ 200,000**

ITEM	QUANTITY	UNIT	UNIT COST	COST
UTILITIES:				
Power Pole Impacts	30	Each	$ 15,000	$ 450,000
*Miscellaneous Utilities	3%	Lump	$ 62,280	$ 62,280
			Contingency (20%)	**$ 102,456**
			Subtotal Utilities	**$ 615,000**

Preliminary Engineering (10% of Total Construction)	**$ 289,100**
Construction Engineering (8% of Total Construction)	**$ 231,280**
(2007) PROJECT TOTAL	**$ 3,412,000**
Inflation (5% per year for 3 years)	**$ 538,000**
(2009-2010) PROJECT TOTAL	**$ 3,950,000**

*Roadway %
**Total Construction %

Quantities shown are approximate and intended for planning purposes only. Actual quantities must be calculated based on final design of proposed improvements.

300 East (74 ft)
Stokes to 13800 South
Full Roadway Reconstruction Costs

ITEM	QUANTITY	UNIT	UNIT COST	COST
ROADWAY:				
**Mobilization	8%	Lump	$ 62,218	$ 62,218
**Traffic Control	10%	Lump	$ 70,702	$ 70,702
74-foot Roadway	1700	Lin. Ft.	$ 327	$ 556,710
*Earth Work	10%	Lump	$ 55,671	$ 55,671
*Drainage	5%	Lump	$ 27,836	$ 27,836
*Landscaping, Aesthetics, Erosion Control	5%	Lump	$ 27,836	$ 27,836
*Signing & Striping	2%	Lump	$ 11,134	$ 11,134
*Lighting	1%	Lump	$ 5,567	$ 5,567
*Removals & Relocations	3%	Lump	$ 16,701	$ 16,701
*Environmental Mitigation	1%	Lump	$ 5,567	$ 5,567
			Contingency (20%)	**$ 167,988**
			Subtotal Roadway	**$ 1,008,000**

ITEM	QUANTITY	UNIT	UNIT COST	COST
RIGHT OF WAY:				
Right-of-Way Property	0.50	Acre	$ 250,000	$ 125,000
Construction Easements	2.00	Acre	$ 250,000	$ 50,000
Business Relocations	0.00	Lump	$ 300,000	$ -
Residential Relocations	0.00	Lump	$ 250,000	$ -
			Contingency (20%)	**$ 25,000**
			Subtotal Right-of-way	**$ 200,000**

ITEM	QUANTITY	UNIT	UNIT COST	COST
UTILITIES:				
Power Pole Impacts	15	Each	$ 15,000	$ 225,000
*Miscellaneous Utilities	3%	Lump	$ 30,240	$ 30,240
			Contingency (20%)	**$ 51,048**
			Subtotal Utilities	**$ 307,000**

Preliminary Engineering (10% of Total Construction)	**$ 151,500**
Construction Engineering (8% of Total Construction)	**$ 121,200**
(2007) PROJECT TOTAL	**$ 1,788,000**
Inflation (5% per year for 3 years)	**$ 282,000**
(2009-2010) PROJECT TOTAL	**$ 2,070,000**

*Roadway %
**Total Construction %

Quantities shown are approximate and intended for planning purposes only. Actual quantities must be calculated based on final design of proposed improvements.

Pony Express Rd.
Lone Peak to Pony Express
Full Roadway Reconstruction Costs

ITEM	QUANTITY	UNIT	UNIT COST	COST
ROADWAY:				
**Mobilization	8%	Lump	$ 23,415	$ 23,415
**Traffic Control	10%	Lump	$ 26,607	$ 26,607
66-foot Roadway	650	Lin. Ft.	$ 327	$ 212,860
*Earth Work	10%	Lump	$ 21,286	$ 21,286
*Drainage	5%	Lump	$ 10,643	$ 10,643
*Landscaping, Aesthetics, Erosion Control	5%	Lump	$ 10,643	$ 10,643
*Signing & Striping	2%	Lump	$ 4,257	$ 4,257
*Lighting	1%	Lump	$ 2,129	$ 2,129
*Removals & Relocations	1%	Lump	$ 2,129	$ 2,129
*Environmental Mitigation	1%	Lump	$ 2,129	$ 2,129
			Contingency (20%)	**$ 63,219**
			Subtotal Roadway	**$ 380,000**

ITEM	QUANTITY	UNIT	UNIT COST	COST
RIGHT OF WAY:				
Right-of-Way Property	1.00	Acre	$ 250,000	$ 250,000
Construction Easements	1.00	Acre	$ 150,000	$ 15,000
Business Relocations	0.00	Lump	$ 300,000	$ -
Residential Relocations	0.00	Lump	$ 200,000	$ -
			Contingency (20%)	**$ 50,000**
			Subtotal Right-of-way	**$ 315,000**

ITEM	QUANTITY	UNIT	UNIT COST	COST
UTILITIES:				
Power Pole Impacts	0	Each	$ 15,000	$ -
*Miscellaneous Utilities	3%	Lump	$ 11,400	$ 11,400
			Contingency (20%)	**$ 2,280**
			Subtotal Utilities	**$ 14,000**

ITEM	QUANTITY	UNIT	UNIT COST	COST
STRUCTURES:				
**Box Culvert	1	Each	$ 172,000	$ 172,000
			Contingency (20%)	**$ 34,400**
			Subtotal Utilities	**$ 207,000**

Preliminary Engineering (10% of Total Construction)	**$ 91,600**
Construction Engineering (8% of Total Construction)	**$ 73,280**
(2007) PROJECT TOTAL	**$ 1,081,000**
Inflation (5% per year for 5 years)	**$ 299,000**
(2009-2010) PROJECT TOTAL	**$ 1,380,000**

*Roadway %
**Total Construction %

Quantities shown are approximate and intended for planning purposes only. Actual quantities must be calculated based on final design of proposed improvements.

13200 South
700 E. to Fort
Full Roadway Reconstruction Costs

ITEM	QUANTITY	UNIT	UNIT COST	COST
ROADWAY:				
**Mobilization	8%	Lump	$ 72,045	$ 72,045
**Traffic Control	10%	Lump	$ 81,869	$ 81,869
66-foot Roadway	2000	Lin. Ft.	$ 327	$ 654,953
*Earth Work	10%	Lump	$ 65,495	$ 65,495
*Drainage	5%	Lump	$ 32,748	$ 32,748
*Landscaping, Aesthetics, Erosion Control	5%	Lump	$ 32,748	$ 32,748
*Signing & Striping	2%	Lump	$ 13,099	$ 13,099
*Lighting	1%	Lump	$ 6,550	$ 6,550
*Removals & Relocations	1%	Lump	$ 6,550	$ 6,550
*Environmental Mitigation	1%	Lump	$ 6,550	$ 6,550
			Contingency (20%)	**$ 194,521**
			Subtotal Roadway	**$ 1,168,000**

ITEM	QUANTITY	UNIT	UNIT COST	COST
RIGHT OF WAY:				
Right-of-Way Property	3.50	Acre	$ 250,000	$ 875,000
Construction Easements	1.00	Acre	$ 250,000	$ 25,000
Business Relocations	0.00	Lump	$ 350,000	$ -
Residential Relocations	0.00	Lump	$ 250,000	$ -
			Contingency (20%)	**$ 175,000**
			Subtotal Right-of-way	**$ 1,075,000**

ITEM	QUANTITY	UNIT	UNIT COST	COST
UTILITIES:				
Power Pole Impacts	30	Each	$ 15,000	$ 450,000
*Miscellaneous Utilities	3%	Lump	$ 35,040	$ 35,040
			Contingency (20%)	**$ 97,008**
			Subtotal Utilities	**$ 583,000**

Preliminary Engineering (10% of Total Construction)	**$ 282,600**
Construction Engineering (8% of Total Construction)	**$ 226,080**
(2007) PROJECT TOTAL	**$ 3,335,000**
Inflation (5% per year for 5 years)	**$ 922,000**
(2009-2010) PROJECT TOTAL	**$ 4,257,000**

*Roadway %
**Total Construction %

Quantities shown are approximate and intended for planning purposes only. Actual quantities must be calculated based on final design of proposed improvements.

700 East
11400 South to 12300South
Full Roadway Reconstruction Costs

ITEM	QUANTITY	UNIT	UNIT COST	COST
ROADWAY:				
**Mobilization	8%	Lump	$ 392,698	$ 392,698
**Traffic Control	10%	Lump	$ 446,248	$ 446,248
106-foot Roadway	6000	Lin. Ft.	$ 586	$ 3,513,760
*Earth Work	10%	Lump	$ 351,376	$ 351,376
*Drainage	5%	Lump	$ 175,688	$ 175,688
*Landscaping, Aesthetics, Erosion Control	5%	Lump	$ 175,688	$ 175,688
*Signing & Striping	2%	Lump	$ 70,275	$ 70,275
*Lighting	1%	Lump	$ 35,138	$ 35,138
*Removals & Relocations	3%	Lump	$ 105,413	$ 105,413
*Environmental Mitigation	1%	Lump	$ 35,138	$ 35,138
			Contingency (20%)	**$ 1,060,284**
			Subtotal Roadway	**$ 6,362,000**

ITEM	QUANTITY	UNIT	UNIT COST	COST
RIGHT OF WAY:				
Right-of-Way Property	4.00	Acre	$ 250,000	$ 1,000,000
Construction Easements	2.00	Acre	$ 250,000	$ 50,000
Business Relocations	0.00	Lump	$ 350,000	$ -
Residential Relocations	7.00	Lump	$ 250,000	$ 1,750,000
			Contingency (20%)	**$ 210,000**
			Subtotal Right-of-way	**$ 3,010,000**

ITEM	QUANTITY	UNIT	UNIT COST	COST
UTILITIES:				
Power Pole Impacts	70	Each	$ 15,000	$ 1,050,000
*Miscellaneous Utilities	3%	Lump	$ 190,860	$ 190,860
			Contingency (20%)	**$ 248,172**
			Subtotal Utilities	**$ 1,490,000**

Preliminary Engineering (10% of Total Construction)	**$ 1,086,200**
Construction Engineering (8% of Total Construction)	**$ 868,960**
(2007) PROJECT TOTAL	**$ 12,818,000**
Inflation (5% per year for 5 years)	**$ 3,542,000**
(2009-2010) PROJECT TOTAL	**$ 16,360,000**

*Roadway %
**Total Construction %

Quantities shown are approximate and intended for planning purposes only. Actual quantities must be calculated based on final design of proposed improvements.

11400 South
State St. to 700 West
Full Roadway Reconstruction Costs

ITEM	QUANTITY	UNIT	UNIT COST	COST
ROADWAY:				
**Mobilization	8%	Lump	$ 515,351	$ 515,351
**Traffic Control	10%	Lump	$ 585,627	$ 585,627
106-foot Roadway	8000	Lin. Ft.	$ 586	$ 4,685,013
*Earth Work	10%	Lump	$ 468,501	$ 468,501
*Drainage	5%	Lump	$ 234,251	$ 234,251
*Landscaping, Aesthetics, Erosion Control	5%	Lump	$ 234,251	$ 234,251
*Signing & Striping	2%	Lump	$ 93,700	$ 93,700
*Lighting	1%	Lump	$ 46,850	$ 46,850
*Removals & Relocations	1%	Lump	$ 46,850	$ 46,850
*Environmental Mitigation	1%	Lump	$ 46,850	$ 46,850
			Contingency (20%)	**$ 1,391,449**
			Subtotal Roadway	**$ 8,349,000**

ITEM	QUANTITY	UNIT	UNIT COST	COST
RIGHT OF WAY:				
Right-of-Way Property	5.50	Acre	$ 250,000	$ 1,375,000
Construction Easements	2.00	Acre	$ 250,000	$ 50,000
Business Relocations	0.00	Lump	$ 350,000	$ -
Residential Relocations	1.00	Lump	$ 250,000	$ 250,000
			Contingency (20%)	**$ 275,000**
			Subtotal Right-of-way	**$ 1,950,000**

ITEM	QUANTITY	UNIT	UNIT COST	COST
UTILITIES:				
Power Pole Impacts	50	Each	$ 15,000	$ 750,000
*Miscellaneous Utilities	3%	Lump	$ 250,470	$ 250,470
			Contingency (20%)	**$ 200,094**
			Subtotal Utilities	**$ 1,201,000**

Preliminary Engineering (10% of Total Construction)	**$ 1,150,000**
Construction Engineering (8% of Total Construction)	**$ 920,000**
(2007) PROJECT TOTAL	**$ 13,570,000**
Inflation (5% per year for 5 years)	**$ 3,750,000**
(2009-2010) PROJECT TOTAL	**$ 17,320,000**

*Roadway %
**Total Construction %

-Does not include I 15 crossing structure cost

Quantities shown are approximate and intended for planning purposes only. Actual quantities must be calculated based on final design of proposed improvements.

13800 South (74 ft)
Fort St. to 1300 East
Full Roadway Reconstruction Costs

ITEM	QUANTITY	UNIT	UNIT COST	COST
ROADWAY:				
**Mobilization	8%	Lump	$ 196,077	$ 196,077
**Traffic Control	10%	Lump	$ 222,815	$ 222,815
74-foot Roadway	5400	Lin. Ft.	$ 327	$ 1,768,374
*Earth Work	10%	Lump	$ 176,837	$ 176,837
*Drainage	5%	Lump	$ 88,419	$ 88,419
*Landscaping, Aesthetics, Erosion Control	5%	Lump	$ 88,419	$ 88,419
*Signing & Striping	2%	Lump	$ 35,367	$ 35,367
*Lighting	1%	Lump	$ 17,684	$ 17,684
*Removals & Relocations	2%	Lump	$ 35,367	$ 35,367
*Environmental Mitigation	1%	Lump	$ 17,684	$ 17,684
			Contingency (20%)	**$ 529,409**
			Subtotal Roadway	**$ 3,177,000**

ITEM	QUANTITY	UNIT	UNIT COST	COST
RIGHT OF WAY:				
Right-of-Way Property	5.00	Acre	$ 250,000	$ 1,250,000
Construction Easements	1.50	Acre	$ 250,000	$ 37,500
Business Relocations	0.00	Lump	$ 300,000	$ -
Residential Relocations	0.00	Lump	$ 250,000	$ -
			Contingency (20%)	**$ 250,000**
			Subtotal Right-of-way	**$ 1,538,000**

ITEM	QUANTITY	UNIT	UNIT COST	COST
UTILITIES:				
Power Pole Impacts	20	Each	$ 15,000	$ 300,000
*Miscellaneous Utilities	3%	Lump	$ 95,310	$ 95,310
			Contingency (20%)	**$ 79,062**
			Subtotal Utilities	**$ 475,000**

Preliminary Engineering (10% of Total Construction)	**$ 519,000**
Construction Engineering (8% of Total Construction)	**$ 415,200**
(2007) PROJECT TOTAL	**$ 6,125,000**
Inflation (5% per year for 5 years)	**$ 1,693,000**
(2009-2010) PROJECT TOTAL	**$ 7,818,000**

*Roadway %
**Total Construction %

Quantities shown are approximate and intended for planning purposes only. Actual quantities must be calculated based on final design of proposed improvements.

200 W.
13490 S. to 13775 S.
Full Roadway Reconstruction Costs

ITEM	QUANTITY	UNIT	UNIT COST	COST
ROADWAY:				
**Mobilization	8%	Lump	$ 128,838	$ 128,838
**Traffic Control	10%	Lump	$ 146,407	$ 146,407
106-foot Roadway	2000	Lin. Ft.	$ 586	$ 1,171,253
*Earth Work	10%	Lump	$ 117,125	$ 117,125
*Drainage	5%	Lump	$ 58,563	$ 58,563
*Landscaping, Aesthetics, Erosion Control	5%	Lump	$ 58,563	$ 58,563
*Signing & Striping	2%	Lump	$ 23,425	$ 23,425
*Lighting	1%	Lump	$ 11,713	$ 11,713
*Removals & Relocations	1%	Lump	$ 11,713	$ 11,713
*Environmental Mitigation	1%	Lump	$ 11,713	$ 11,713
			Contingency (20%)	**$ 347,862**
			Subtotal Roadway	**$ 2,088,000**

ITEM	QUANTITY	UNIT	UNIT COST	COST
RIGHT OF WAY:				
Right-of-Way Property	4.00	Acre	$ 150,000	$ 600,000
Construction Easements	2.00	Acre	$ 150,000	$ 30,000
Business Relocations	0.00	Lump	$ 300,000	$ -
Residential Relocations	0.00	Lump	$ 200,000	$ -
			Contingency (20%)	**$ 120,000**
			Subtotal Right-of-way	**$ 750,000**

ITEM	QUANTITY	UNIT	UNIT COST	COST
UTILITIES:				
Power Pole Impacts	10	Each	$ 15,000	$ 150,000
*Miscellaneous Utilities	3%	Lump	$ 62,640	$ 62,640
			Contingency (20%)	**$ 42,528**
			Subtotal Utilities	**$ 256,000**

Preliminary Engineering (10% of Total Construction)	**$ 309,400**
Construction Engineering (8% of Total Construction)	**$ 247,520**
(2007) PROJECT TOTAL	**$ 3,651,000**
Inflation (5% per year for 5 years)	**$ 1,009,000**
(2009-2010) PROJECT TOTAL	**$ 4,660,000**

*Roadway %
**Total Construction %

Quantities shown are approximate and intended for planning purposes only. Actual quantities must be calculated based on final design of proposed improvements.

Lone Peak Parkway
11400 S. to 12300 S.
Full Roadway Reconstruction Costs

ITEM	QUANTITY	UNIT	UNIT COST	COST
ROADWAY:				
**Mobilization	8%	Lump	$ 384,928	$ 384,928
**Traffic Control	10%	Lump	$ 437,418	$ 437,418
96-foot Roadway	6440	Lin. Ft.	$ 543	$ 3,499,346
*Earth Work	10%	Lump	$ 349,935	$ 349,935
*Drainage	5%	Lump	$ 174,967	$ 174,967
*Landscaping, Aesthetics, Erosion Control	5%	Lump	$ 174,967	$ 174,967
*Signing & Striping	2%	Lump	$ 69,987	$ 69,987
*Lighting	1%	Lump	$ 34,993	$ 34,993
*Removals & Relocations	1%	Lump	$ 34,993	$ 34,993
*Environmental Mitigation	1%	Lump	$ 34,993	$ 34,993
			Contingency (20%)	**$ 1,039,306**
			Subtotal Roadway	**$ 6,236,000**

ITEM	QUANTITY	UNIT	UNIT COST	COST
RIGHT OF WAY:				
Right-of-Way Property	2.00	Acre	$ 200,000	$ 400,000
Construction Easements	1.50	Acre	$ 200,000	$ 30,000
Business Relocations	0.00	Lump	$ 300,000	$ -
Residential Relocations	0.00	Lump	$ 200,000	$ -
			Contingency (20%)	**$ 80,000**
			Subtotal Right-of-way	**$ 510,000**

ITEM	QUANTITY	UNIT	UNIT COST	COST
UTILITIES:				
Power Pole Impacts	40	Each	$ 15,000	$ 600,000
*Miscellaneous Utilities	3%	Lump	$ 187,080	$ 187,080
			Contingency (20%)	**$ 157,416**
			Subtotal Utilities	**$ 945,000**

Preliminary Engineering (10% of Total Construction)	**$ 769,100**
Construction Engineering (8% of Total Construction)	**$ 615,280**
(2007) PROJECT TOTAL	**$ 9,076,000**
Inflation (5% per year for 5 years)	**$ 2,508,000**
(2009-2010) PROJECT TOTAL	**$ 11,584,000**

*Roadway %
**Total Construction %

Quantities shown are approximate and intended for planning purposes only. Actual quantities must be calculated based on final design of proposed improvements.

Lone Peak Parkway
12300 S. to 13490 S.
Full Roadway Reconstruction Costs

ITEM	QUANTITY	UNIT	UNIT COST	COST
ROADWAY:				
**Mobilization	8%	Lump	$ 422,204	$ 422,204
**Traffic Control	5%	Lump	$ 251,312	$ 251,312
96-foot Roadway	7400	Lin. Ft.	$ 543	$ 4,020,987
*Earth Work	10%	Lump	$ 402,099	$ 402,099
*Drainage	5%	Lump	$ 201,049	$ 201,049
*Landscaping, Aesthetics, Erosion Control	5%	Lump	$ 201,049	$ 201,049
*Signing & Striping	2%	Lump	$ 80,420	$ 80,420
*Lighting	1%	Lump	$ 40,210	$ 40,210
*Removals & Relocations	1%	Lump	$ 40,210	$ 40,210
*Environmental Mitigation	1%	Lump	$ 40,210	$ 40,210
			Contingency (20%)	**$ 1,139,950**
			Subtotal Roadway	**$ 6,840,000**

ITEM	QUANTITY	UNIT	UNIT COST	COST
RIGHT OF WAY:				
Right-of-Way Property	9.00	Acre	$ 200,000	$ 1,800,000
Construction Easements	1.50	Acre	$ 200,000	$ 30,000
Business Relocations	0.00	Lump	$ 300,000	$ -
Residential Relocations	0.00	Lump	$ 200,000	$ -
			Contingency (20%)	**$ 360,000**
			Subtotal Right-of-way	**$ 2,190,000**

ITEM	QUANTITY	UNIT	UNIT COST	COST
UTILITIES:				
Power Pole Impacts	10	Each	$ 15,000	$ 150,000
*Miscellaneous Utilities	3%	Lump	$ 205,200	$ 205,200
			Contingency (20%)	**$ 71,040**
			Subtotal Utilities	**$ 427,000**

Preliminary Engineering (10% of Total Construction)	**$ 945,700**
Construction Engineering (8% of Total Construction)	**$ 756,560**
(2007) PROJECT TOTAL	**$ 11,160,000**
Inflation (5% per year for 5 years)	**$ 3,084,000**
(2009-2010) PROJECT TOTAL	**$ 14,244,000**

*Roadway %
**Total Construction %

Quantities shown are approximate and intended for planning purposes only. Actual quantities must be calculated based on final design of proposed improvements.

Fort Street
12400 South to 13800South
Full Roadway Reconstruction Costs

ITEM	QUANTITY	UNIT	UNIT COST	COST
ROADWAY:				
**Mobilization	8%	Lump	$ 306,615	$ 306,615
**Traffic Control	10%	Lump	$ 348,426	$ 348,426
66-foot Roadway	12000	Lin. Ft.	$ 232	$ 2,787,410
*Earth Work	10%	Lump	$ 278,741	$ 278,741
*Drainage	5%	Lump	$ 139,371	$ 139,371
*Landscaping, Aesthetics, Erosion Control	5%	Lump	$ 139,371	$ 139,371
*Signing & Striping	2%	Lump	$ 55,748	$ 55,748
*Lighting	1%	Lump	$ 27,874	$ 27,874
*Removals & Relocations	1%	Lump	$ 27,874	$ 27,874
*Environmental Mitigation	1%	Lump	$ 27,874	$ 27,874
			Contingency (20%)	**$ 827,861**
			Subtotal Roadway	**$ 4,968,000**

ITEM	QUANTITY	UNIT	UNIT COST	COST
RIGHT OF WAY:				
Right-of-Way Property	1.00	Acre	$ 250,000	$ 250,000
Construction Easements	1.00	Acre	$ 250,000	$ 25,000
Business Relocations	2.00	Lump	$ 350,000	$ 700,000
Residential Relocations	3.00	Lump	$ 250,000	$ 750,000
			Contingency (20%)	**$ 50,000**
			Subtotal Right-of-way	**$ 1,775,000**

ITEM	QUANTITY	UNIT	UNIT COST	COST
UTILITIES:				
Power Pole Impacts	60	Each	$ 15,000	$ 900,000
*Miscellaneous Utilities	3%	Lump	$ 149,040	$ 149,040
			Contingency (20%)	**$ 209,808**
			Subtotal Utilities	**$ 1,259,000**

Preliminary Engineering (10% of Total Construction)	**$ 800,200**
Construction Engineering (8% of Total Construction)	**$ 640,160**
(2007) PROJECT TOTAL	**$ 9,443,000**
Inflation (5% per year for 5 years)	**$ 2,609,000**
(2009-2010) PROJECT TOTAL	**$ 12,052,000**

*Roadway %
**Total Construction %

Quantities shown are approximate and intended for planning purposes only. Actual quantities must be calculated based on final design of proposed improvements.

150 East
12800 S. to 13000 S.
Full Roadway Reconstruction Costs

ITEM	QUANTITY	UNIT	UNIT COST	COST
ROADWAY:				
**Mobilization	8%	Lump	$ 82,398	$ 82,398
**Traffic Control	5%	Lump	$ 49,047	$ 49,047
Curb and Gutter	5400	Lin. Ft.	$ 81	$ 436,320
66-foot Roadway	1500	Lin. Ft.	$ 232	$ 348,426
*Earth Work	10%	Lump	$ 78,475	$ 78,475
*Drainage	5%	Lump	$ 39,237	$ 39,237
*Landscaping, Aesthetics, Erosion Control	5%	Lump	$ 39,237	$ 39,237
*Signing & Striping	2%	Lump	$ 15,695	$ 15,695
*Lighting	1%	Lump	$ 7,847	$ 7,847
*Removals & Relocations	1%	Lump	$ 7,847	$ 7,847
*Environmental Mitigation	1%	Lump	$ 7,847	$ 7,847
			Contingency (20%)	**$ 222,476**
			Subtotal Roadway	**$ 1,335,000**

ITEM	QUANTITY	UNIT	UNIT COST	COST
RIGHT OF WAY:				
Right-of-Way Property	2.00	Acre	$ 250,000	$ 500,000
Construction Easements	1.00	Acre	$ 250,000	$ 25,000
Business Relocations	1.00	Lump	$ 350,000	$ 350,000
Residential Relocations	0.00	Lump	$ 250,000	$ -
			Contingency (20%)	**$ 100,000**
			Subtotal Right-of-way	**$ 975,000**

ITEM	QUANTITY	UNIT	UNIT COST	COST
UTILITIES:				
Power Pole Impacts	2	Each	$ 15,000	$ 30,000
*Miscellaneous Utilities	3%	Lump	$ 40,050	$ 40,050
			Contingency (20%)	**$ 14,010**
			Subtotal Utilities	**$ 85,000**

Preliminary Engineering (10% of Total Construction)	**$ 239,500**
Construction Engineering (8% of Total Construction)	**$ 191,600**
(2007) PROJECT TOTAL	**$ 2,827,000**
Inflation (5% per year for 5 years)	**$ 782,000**
(2009-2010) PROJECT TOTAL	**$ 3,609,000**

*Roadway %
**Total Construction %

Quantities shown are approximate and intended for planning purposes only. Actual quantities must be calculated based on final design of proposed improvements.

13200 South
Fort St to 1300 E.
Full Roadway Reconstruction Costs

ITEM	QUANTITY	UNIT	UNIT COST	COST
ROADWAY:				
**Mobilization	8%	Lump	$ 63,028	$ 63,028
**Traffic Control	10%	Lump	$ 71,623	$ 71,623
66-foot Roadway	3500	Lin. Ft.	$ 164	$ 572,985
*Earth Work	10%	Lump	$ 57,299	$ 57,299
*Drainage	5%	Lump	$ 28,649	$ 28,649
*Landscaping, Aesthetics, Erosion Control	5%	Lump	$ 28,649	$ 28,649
*Signing & Striping	2%	Lump	$ 11,460	$ 11,460
*Lighting	1%	Lump	$ 5,730	$ 5,730
*Removals & Relocations	1%	Lump	$ 5,730	$ 5,730
*Environmental Mitigation	1%	Lump	$ 5,730	$ 5,730
			Contingency (20%)	**$ 170,177**
			Subtotal Roadway	**$ 1,022,000**

ITEM	QUANTITY	UNIT	UNIT COST	COST
RIGHT OF WAY:				
Right-of-Way Property	2.00	Acre	$ 250,000	$ 500,000
Construction Easements	1.00	Acre	$ 250,000	$ 25,000
Business Relocations	0.00	Lump	$ 350,000	$ -
Residential Relocations	0.00	Lump	$ 250,000	$ -
			Contingency (20%)	**$ 100,000**
			Subtotal Right-of-way	**$ 625,000**

ITEM	QUANTITY	UNIT	UNIT COST	COST
UTILITIES:				
Power Pole Impacts	30	Each	$ 15,000	$ 450,000
*Miscellaneous Utilities	3%	Lump	$ 30,660	$ 30,660
			Contingency (20%)	**$ 96,132**
			Subtotal Utilities	**$ 577,000**

Preliminary Engineering (10% of Total Construction)	**$ 222,400**
Construction Engineering (8% of Total Construction)	**$ 177,920**
(2007) PROJECT TOTAL	**$ 2,625,000**
Inflation (5% per year for 5 years)	**$ 726,000**
(2009-2010) PROJECT TOTAL	**$ 3,351,000**

*Roadway %
**Total Construction %

Quantities shown are approximate and intended for planning purposes only. Actual quantities must be calculated based on final design of proposed improvements.

12200 South
300 East to 700 E.
Full Roadway Reconstruction Costs

ITEM	QUANTITY	UNIT	UNIT COST	COST
ROADWAY:				
**Mobilization	8%	Lump	$ 92,587	$ 92,587
**Traffic Control	10%	Lump	$ 105,212	$ 105,212
66-foot Roadway	3200	Lin. Ft.	$ 261	$ 835,019
*Earth Work	10%	Lump	$ 83,502	$ 83,502
*Drainage	5%	Lump	$ 41,751	$ 41,751
*Landscaping, Aesthetics, Erosion Control	5%	Lump	$ 41,751	$ 41,751
*Signing & Striping	2%	Lump	$ 16,700	$ 16,700
*Lighting	1%	Lump	$ 8,350	$ 8,350
*Removals & Relocations	2%	Lump	$ 16,700	$ 16,700
*Environmental Mitigation	1%	Lump	$ 8,350	$ 8,350
			Contingency (20%)	**$ 249,985**
			Subtotal Roadway	**$ 1,500,000**

ITEM	QUANTITY	UNIT	UNIT COST	COST
RIGHT OF WAY:				
Right-of-Way Property	2.00	Acre	$ 250,000	$ 500,000
Construction Easements	0.50	Acre	$ 250,000	$ 12,500
Business Relocations	0.00	Lump	$ 350,000	$ -
Residential Relocations	0.00	Lump	$ 250,000	$ -
			Contingency (20%)	**$ 100,000**
			Subtotal Right-of-way	**$ 613,000**

ITEM	QUANTITY	UNIT	UNIT COST	COST
UTILITIES:				
Power Pole Impacts	30	Each	$ 15,000	$ 450,000
*Miscellaneous Utilities	3%	Lump	$ 45,000	$ 45,000
			Contingency (20%)	**$ 99,000**
			Subtotal Utilities	**$ 594,000**

Preliminary Engineering (10% of Total Construction)	**$ 270,700**
Construction Engineering (8% of Total Construction)	**$ 216,560**
(2007) PROJECT TOTAL	**$ 3,195,000**
Inflation (5% per year for 5 years)	**$ 883,000**
(2009-2010) PROJECT TOTAL	**$ 4,078,000**

*Roadway %
**Total Construction %

Quantities shown are approximate and intended for planning purposes only. Actual quantities must be calculated based on final design of proposed improvements.

13400 South
Fort St. to 1300 East
Full Roadway Reconstruction Costs

ITEM	QUANTITY	UNIT	UNIT COST	COST
ROADWAY:				
**Mobilization	8%	Lump	$ 66,768	$ 66,768
**Traffic Control	10%	Lump	$ 75,872	$ 75,872
Curb and Gutter	2050	Lin. Ft.	$ 81	$ 165,640
66-foot Roadway	1900	Lin. Ft.	$ 232	$ 441,340
*Earth Work	10%	Lump	$ 60,698	$ 60,698
*Drainage	5%	Lump	$ 30,349	$ 30,349
*Landscaping, Aesthetics, Erosion Control	5%	Lump	$ 30,349	$ 30,349
*Signing & Striping	2%	Lump	$ 12,140	$ 12,140
*Lighting	1%	Lump	$ 6,070	$ 6,070
*Removals & Relocations	1%	Lump	$ 6,070	$ 6,070
*Environmental Mitigation	1%	Lump	$ 6,070	$ 6,070
			Contingency (20%)	**$ 180,273**
			Subtotal Roadway	**$ 1,082,000**

ITEM	QUANTITY	UNIT	UNIT COST	COST
RIGHT OF WAY:				
Right-of-Way Property	1.00	Acre	$ 250,000	$ 250,000
Construction Easements	1.00	Acre	$ 250,000	$ 25,000
Business Relocations	1.00	Lump	$ 350,000	$ 350,000
Residential Relocations	0.00	Lump	$ 250,000	$ -
			Contingency (20%)	**$ 50,000**
			Subtotal Right-of-way	**$ 675,000**

ITEM	QUANTITY	UNIT	UNIT COST	COST
UTILITIES:				
Power Pole Impacts	20	Each	$ 15,000	$ 300,000
*Miscellaneous Utilities	3%	Lump	$ 32,460	$ 32,460
			Contingency (20%)	**$ 66,492**
			Subtotal Utilities	**$ 399,000**

Preliminary Engineering (10% of Total Construction)	**$ 215,600**
Construction Engineering (8% of Total Construction)	**$ 172,480**
(2007) PROJECT TOTAL	**$ 2,545,000**
Inflation (5% per year for 5 years)	**$ 704,000**
(2009-2010) PROJECT TOTAL	**$ 3,249,000**

*Roadway %
**Total Construction %

Quantities shown are approximate and intended for planning purposes only. Actual quantities must be calculated based on final design of proposed improvements.

East Frontage Road
Highland Dr. to Lehi
Full Roadway Reconstruction Costs

ITEM	QUANTITY	UNIT	UNIT COST	COST
ROADWAY:				
**Mobilization	8%	Lump	$ 271,974	$ 271,974
**Traffic Control	10%	Lump	$ 309,061	$ 309,061
66-foot Roadway	9400	Lin. Ft.	$ 261	$ 2,452,867
*Earth Work	10%	Lump	$ 245,287	$ 245,287
*Drainage	5%	Lump	$ 122,643	$ 122,643
*Landscaping, Aesthetics, Erosion Control	5%	Lump	$ 122,643	$ 122,643
*Signing & Striping	2%	Lump	$ 49,057	$ 49,057
*Lighting	1%	Lump	$ 24,529	$ 24,529
*Removals & Relocations	2%	Lump	$ 49,057	$ 49,057
*Environmental Mitigation	1%	Lump	$ 24,529	$ 24,529
			Contingency (20%)	**$ 734,330**
			Subtotal Roadway	**$ 4,406,000**

ITEM	QUANTITY	UNIT	UNIT COST	COST
RIGHT OF WAY:				
Right-of-Way Property	1.00	Acre	$ 250,000	$ 250,000
Construction Easements	1.00	Acre	$ 250,000	$ 25,000
Business Relocations	0.00	Lump	$ 350,000	$ -
Residential Relocations	0.00	Lump	$ 250,000	$ -
			Contingency (20%)	**$ 50,000**
			Subtotal Right-of-way	**$ 325,000**

ITEM	QUANTITY	UNIT	UNIT COST	COST
UTILITIES:				
Power Pole Impacts	30	Each	$ 15,000	$ 450,000
*Miscellaneous Utilities	3%	Lump	$ 132,180	$ 132,180
			Contingency (20%)	**$ 116,436**
			Subtotal Utilities	**$ 699,000**

Preliminary Engineering (10% of Total Construction)	**$ 543,000**
Construction Engineering (8% of Total Construction)	**$ 434,400**
(2007) PROJECT TOTAL	**$ 6,408,000**
Inflation (5% per year for 5 years)	**$ 1,771,000**
(2009-2010) PROJECT TOTAL	**$ 8,179,000**

*Roadway %
**Total Construction %

Quantities shown are approximate and intended for planning purposes only. Actual quantities must be calculated based on final design of proposed improvements.

Pioneer Rd.
600 East to Highland Dr.
Full Roadway Reconstruction Costs

ITEM	QUANTITY	UNIT	UNIT COST	COST
ROADWAY:				
**Mobilization	8%	Lump	$ 110,626	$ 110,626
**Traffic Control	10%	Lump	$ 125,712	$ 125,712
66-foot Roadway	3000	Lin. Ft.	$ 335	$ 1,005,695
*Earth Work	10%	Lump	$ 100,570	$ 100,570
*Drainage	5%	Lump	$ 50,285	$ 50,285
*Landscaping, Aesthetics, Erosion Control	5%	Lump	$ 50,285	$ 50,285
*Signing & Striping	2%	Lump	$ 20,114	$ 20,114
*Lighting	1%	Lump	$ 10,057	$ 10,057
*Removals & Relocations	1%	Lump	$ 10,057	$ 10,057
*Environmental Mitigation	1%	Lump	$ 10,057	$ 10,057
			Contingency (20%)	**$ 298,691**
			Subtotal Roadway	**$ 1,793,000**

ITEM	QUANTITY	UNIT	UNIT COST	COST
RIGHT OF WAY:				
Right-of-Way Property	0.00	Acre	$ 200,000	$ -
Construction Easements	1.00	Acre	$ 200,000	$ 20,000
Business Relocations	0.00	Lump	$ 350,000	$ -
Residential Relocations	0.00	Lump	$ 250,000	$ -
			Contingency (20%)	**$ -**
			Subtotal Right-of-way	**$ 20,000**

ITEM	QUANTITY	UNIT	UNIT COST	COST
UTILITIES:				
Power Pole Impacts	20	Each	$ 15,000	$ 300,000
*Miscellaneous Utilities	3%	Lump	$ 53,790	$ 53,790
			Contingency (20%)	**$ 70,758**
			Subtotal Utilities	**$ 425,000**

Preliminary Engineering (10% of Total Construction)	**$ 223,800**
Construction Engineering (8% of Total Construction)	**$ 179,040**
(2007) PROJECT TOTAL	**$ 2,641,000**
Inflation (5% per year for 5 years)	**$ 730,000**
(2009-2010) PROJECT TOTAL	**$ 3,371,000**

*Roadway %
**Total Construction %

Quantities shown are approximate and intended for planning purposes only. Actual quantities must be calculated based on final design of proposed improvements.

Highland
I-15 to Traverse Ridge
Roadway Widening Costs

ITEM	QUANTITY	UNIT	UNIT COST	COST
ROADWAY:				
**Mobilization	8%	Lump	$ 196,496	$ 196,496
**Traffic Control	10%	Lump	$ 223,291	$ 223,291
120-foot Roadway	4700	Lin. Ft.	$ 393	$ 1,845,377
*Earth Work	5%	Lump	$ 92,269	$ 92,269
*Drainage	5%	Lump	$ 92,269	$ 92,269
*Landscaping, Aesthetics, Erosion Control	5%	Lump	$ 92,269	$ 92,269
*Signing & Striping	2%	Lump	$ 36,908	$ 36,908
*Lighting	1%	Lump	$ 18,454	$ 18,454
*Removals & Relocations	2%	Lump	$ 36,908	$ 36,908
*Environmental Mitigation	1%	Lump	$ 18,454	$ 18,454
			Contingency (20%)	**$ 530,538**
			Subtotal Roadway	**$ 3,184,000**

ITEM	QUANTITY	UNIT	UNIT COST	COST
RIGHT OF WAY:				
Right-of-Way Property	0.00	Acre	$ 250,000	$ -
Construction Easements	1.00	Acre	$ 250,000	$ 25,000
Business Relocations	0.00	Lump	$ 350,000	$ -
Residential Relocations	0.00	Lump	$ 250,000	$ -
			Contingency (20%)	**$ -**
			Subtotal Right-of-way	**$ 25,000**

ITEM	QUANTITY	UNIT	UNIT COST	COST
UTILITIES:				
Power Pole Impacts	70	Each	$ 15,000	$ 1,050,000
*Miscellaneous Utilities	3%	Lump	$ 95,520	$ 95,520
			Contingency (20%)	**$ 229,104**
			Subtotal Utilities	**$ 1,375,000**

Preliminary Engineering (10% of Total Construction)	**$ 458,400**
Construction Engineering (8% of Total Construction)	**$ 366,720**
(2007) PROJECT TOTAL	**$ 5,410,000**
Inflation (5% per year for 5 years)	**$ 1,495,000**
(2009-2010) PROJECT TOTAL	**$ 6,905,000**

*Roadway %
**Total Construction %

Quantities shown are approximate and intended for planning purposes only. Actual quantities must be calculated based on final design of proposed improvements.

Galena Park Blvd
12600 South to UPRR
Full Roadway Reconstruction Costs

ITEM	QUANTITY	UNIT	UNIT COST	COST
ROADWAY:				
**Mobilization	8%	Lump	$ 515,351	$ 515,351
**Traffic Control	10%	Lump	$ 585,627	$ 585,627
106-foot Roadway	8000	Lin. Ft.	$ 586	$ 4,685,013
*Earth Work	10%	Lump	$ 468,501	$ 468,501
*Drainage	5%	Lump	$ 234,251	$ 234,251
*Landscaping, Aesthetics, Erosion Control	5%	Lump	$ 234,251	$ 234,251
*Signing & Striping	2%	Lump	$ 93,700	$ 93,700
*Lighting	1%	Lump	$ 46,850	$ 46,850
*Removals & Relocations	1%	Lump	$ 46,850	$ 46,850
*Environmental Mitigation	1%	Lump	$ 46,850	$ 46,850
			Contingency (20%)	**$ 1,391,449**
			Subtotal Roadway	**$ 8,349,000**

ITEM	QUANTITY	UNIT	UNIT COST	COST
RIGHT OF WAY:				
Right-of-Way Property	12.00	Acre	$ 150,000	$ 1,800,000
Construction Easements	2.00	Acre	$ 150,000	$ 30,000
Business Relocations	0.00	Lump	$ 350,000	$ -
Residential Relocations	0.00	Lump	$ 250,000	$ -
			Contingency (20%)	**$ 366,000**
			Subtotal Right-of-way	**$ 2,196,000**

ITEM	QUANTITY	UNIT	UNIT COST	COST
UTILITIES:				
Power Pole Impacts	45	Each	$ 15,000	$ 675,000
*Miscellaneous Utilities	3%	Lump	$ 250,470	$ 250,470
			Contingency (20%)	**$ 185,094**
			Subtotal Utilities	**$ 1,111,000**

Preliminary Engineering (10% of Total Construction)	**$ 1,165,600**
Construction Engineering (8% of Total Construction)	**$ 932,480**
(2007) PROJECT TOTAL	**$ 13,755,000**
Inflation (5% per year for 5 years)	**$ 3,801,000**
(2009-2010) PROJECT TOTAL	**$ 17,556,000**

*Roadway %
**Total Construction %

Quantities shown are approximate and intended for planning purposes only. Actual quantities must be calculated based on final design of proposed improvements.

Highland
Pioneer to Sandy
Roadway Widening Costs

ITEM	QUANTITY	UNIT	UNIT COST	COST
ROADWAY:				
**Mobilization	8%	Lump	$ 288,460	$ 288,460
**Traffic Control	10%	Lump	$ 327,795	$ 327,795
110-foot Roadway	0	Lin. Ft.	$ 542	$ -
Widening	4500	Lin. Ft.	$ 422	$ 1,898,295
*Earth Work	5%	Lump	$ 94,915	$ 94,915
*Drainage	5%	Lump	$ 94,915	$ 94,915
*Landscaping, Aesthetics, Erosion Control	5%	Lump	$ 94,915	$ 94,915
*Signing & Striping	2%	Lump	$ 37,966	$ 37,966
*Lighting	1%	Lump	$ 18,983	$ 18,983
*Removals & Relocations	2%	Lump	$ 37,966	$ 37,966
*Environmental Mitigation		Lump	$ 1,000,000	$ 1,000,000
			Contingency (20%)	**$ 778,842**
			Subtotal Roadway	**$ 4,674,000**

ITEM	QUANTITY	UNIT	UNIT COST	COST
RIGHT OF WAY:				
Right-of-Way Property	1.00	Acre	$ 250,000	$ 250,000
Construction Easements	1.00	Acre	$ 250,000	$ 25,000
Business Relocations	0.00	Lump	$ 350,000	$ -
Residential Relocations	0.00	Lump	$ 250,000	$ -
			Contingency (20%)	**$ 50,000**
			Subtotal Right-of-way	**$ 325,000**

ITEM	QUANTITY	UNIT	UNIT COST	COST
UTILITIES:				
Power Pole Impacts	10	Each	$ 15,000	$ 150,000
*Miscellaneous Utilities	3%	Lump	$ 140,220	$ 140,220
			Contingency (20%)	**$ 58,044**
			Subtotal Utilities	**$ 349,000**

Preliminary Engineering (10% of Total Construction)	**$ 534,800**
Construction Engineering (8% of Total Construction)	**$ 427,840**
(2007) PROJECT TOTAL	**$ 6,311,000**
Inflation (5% per year for 5 years)	**$ 1,744,000**
(2009-2010) PROJECT TOTAL	**$ 8,055,000**

*Roadway %
**Total Construction %

Quantities shown are approximate and intended for planning purposes only. Actual quantities must be calculated based on final design of proposed improvements.

Walden Lane
Fort St. to 1300 East
Full Roadway Reconstruction Costs

ITEM	QUANTITY	UNIT	UNIT COST	COST
ROADWAY:				
**Mobilization	8%	Lump	$ 59,238	$ 59,238
**Traffic Control	10%	Lump	$ 67,316	$ 67,316
66-foot Roadway	2300	Lin. Ft.	$ 232	$ 534,254
*Earth Work	10%	Lump	$ 53,425	$ 53,425
*Drainage	5%	Lump	$ 26,713	$ 26,713
*Landscaping, Aesthetics, Erosion Control	5%	Lump	$ 26,713	$ 26,713
*Signing & Striping	2%	Lump	$ 10,685	$ 10,685
*Lighting	1%	Lump	$ 5,343	$ 5,343
*Removals & Relocations	2%	Lump	$ 10,685	$ 10,685
*Environmental Mitigation	1%	Lump	$ 5,343	$ 5,343
			Contingency (20%)	**$ 159,943**
			Subtotal Roadway	**$ 960,000**

ITEM	QUANTITY	UNIT	UNIT COST	COST
RIGHT OF WAY:				
Right-of-Way Property	3.00	Acre	$ 250,000	$ 750,000
Construction Easements	1.00	Acre	$ 250,000	$ 25,000
Business Relocations	0.00	Lump	$ 350,000	$ -
Residential Relocations	1.00	Lump	$ 250,000	$ 250,000
			Contingency (20%)	**$ 150,000**
			Subtotal Right-of-way	**$ 1,175,000**

ITEM	QUANTITY	UNIT	UNIT COST	COST
UTILITIES:				
Power Pole Impacts	10	Each	$ 15,000	$ 150,000
*Miscellaneous Utilities	3%	Lump	$ 28,800	$ 28,800
			Contingency (20%)	**$ 35,760**
			Subtotal Utilities	**$ 215,000**

Preliminary Engineering (10% of Total Construction)	**$ 235,000**
Construction Engineering (8% of Total Construction)	**$ 188,000**
(2007) PROJECT TOTAL	**$ 2,773,000**
Inflation (5% per year for 5 years)	**$ 767,000**
(2009-2010) PROJECT TOTAL	**$ 3,540,000**

*Roadway %
**Total Construction %

Quantities shown are approximate and intended for planning purposes only. Actual quantities must be calculated based on final design of proposed improvements.

Traverse Ridge
Highland to Steep Mountain
Full Roadway Reconstruction Costs

ITEM	QUANTITY	UNIT	UNIT COST	COST
ROADWAY:				
**Mobilization	8%	Lump	$ 94,408	$ 94,408
**Traffic Control	10%	Lump	$ 107,281	$ 107,281
74-foot Roadway	2600	Lin. Ft.	$ 327	$ 851,439
*Earth Work	10%	Lump	$ 85,144	$ 85,144
*Drainage	5%	Lump	$ 42,572	$ 42,572
*Landscaping, Aesthetics, Erosion Control	5%	Lump	$ 42,572	$ 42,572
*Signing & Striping	2%	Lump	$ 17,029	$ 17,029
*Lighting	1%	Lump	$ 8,514	$ 8,514
*Removals & Relocations	2%	Lump	$ 17,029	$ 17,029
*Environmental Mitigation	1%	Lump	$ 8,514	$ 8,514
			Contingency (20%)	**$ 254,901**
			Subtotal Roadway	**$ 1,530,000**

ITEM	QUANTITY	UNIT	UNIT COST	COST
RIGHT OF WAY:				
Right-of-Way Property	0.00	Acre	$ 250,000	$ -
Construction Easements	1.00	Acre	$ 250,000	$ 25,000
Business Relocations	0.00	Lump	$ 300,000	$ -
Residential Relocations	0.00	Lump	$ 250,000	$ -
			Contingency (20%)	**$ -**
			Subtotal Right-of-way	**$ 25,000**

ITEM	QUANTITY	UNIT	UNIT COST	COST
UTILITIES:				
Power Pole Impacts	10	Each	$ 15,000	$ 150,000
*Miscellaneous Utilities	3%	Lump	$ 45,900	$ 45,900
			Contingency (20%)	**$ 39,180**
			Subtotal Utilities	**$ 236,000**

Preliminary Engineering (10% of Total Construction)	**$ 179,100**
Construction Engineering (8% of Total Construction)	**$ 143,280**
(2007) PROJECT TOTAL	**$ 2,114,000**
Inflation (5% per year for 5 years)	**$ 585,000**
(2009-2010) PROJECT TOTAL	**$ 2,699,000**

*Roadway %
**Total Construction %

Quantities shown are approximate and intended for planning purposes only. Actual quantities must be calculated based on final design of proposed improvements.

11800 South
State St. to 600 East
Full Roadway Reconstruction Costs

ITEM	QUANTITY	UNIT	UNIT COST	COST
ROADWAY:				
**Mobilization	8%	Lump	$ 85,555	$ 85,555
**Traffic Control	10%	Lump	$ 97,221	$ 97,221
Curb and Gutter	1500	Lin. Ft.	$ 81	$ 121,200
66-foot Roadway	2800	Lin. Ft.	$ 232	$ 650,396
*Earth Work	10%	Lump	$ 77,160	$ 77,160
*Drainage	5%	Lump	$ 38,580	$ 38,580
*Landscaping, Aesthetics, Erosion Control	5%	Lump	$ 38,580	$ 38,580
*Signing & Striping	2%	Lump	$ 15,432	$ 15,432
*Lighting	1%	Lump	$ 7,716	$ 7,716
*Removals & Relocations	2%	Lump	$ 15,432	$ 15,432
*Environmental Mitigation	1%	Lump	$ 7,716	$ 7,716
			Contingency (20%)	**$ 230,997**
			Subtotal Roadway	**$ 1,386,000**

ITEM	QUANTITY	UNIT	UNIT COST	COST
RIGHT OF WAY:				
Right-of-Way Property	4.50	Acre	$ 250,000	$ 1,125,000
Construction Easements	1.00	Acre	$ 250,000	$ 25,000
Business Relocations	0.00	Lump	$ 350,000	$ -
Residential Relocations	1.00	Lump	$ 250,000	$ 250,000
			Contingency (20%)	**$ 225,000**
			Subtotal Right-of-way	**$ 1,625,000**

ITEM	QUANTITY	UNIT	UNIT COST	COST
UTILITIES:				
Power Pole Impacts	20	Each	$ 15,000	$ 300,000
*Miscellaneous Utilities	3%	Lump	$ 41,580	$ 41,580
			Contingency (20%)	**$ 68,316**
			Subtotal Utilities	**$ 410,000**

Preliminary Engineering (10% of Total Construction)	**$ 342,100**
Construction Engineering (8% of Total Construction)	**$ 273,680**
(2007) PROJECT TOTAL	**$ 4,037,000**
Inflation (5% per year for 5 years)	**$ 1,116,000**
(2009-2010) PROJECT TOTAL	**$ 5,153,000**

*Roadway %
**Total Construction %

Quantities shown are approximate and intended for planning purposes only. Actual quantities must be calculated based on final design of proposed improvements.

Galena Park Blvd
Ione peak to 13490 S
Full Roadway Reconstruction Costs

ITEM	QUANTITY	UNIT	UNIT COST	COST
ROADWAY:				
**Mobilization	8%	Lump	$ 101,924	$ 101,924
**Traffic Control	10%	Lump	$ 115,822	$ 115,822
74-foot Roadway	3200	Lin. Ft.	$ 327	$ 1,047,925
*Earth Work	10%	Lump	$ 104,793	$ 104,793
*Drainage	5%	Lump	$ 5,240	$ 5,240
*Landscaping, Aesthetics, Erosion Control	5%	Lump	$ 262	$ 262
*Signing & Striping	2%	Lump	$ 5	$ 5
*Lighting	1%	Lump	$ 0	$ 0
*Removals & Relocations	1%	Lump	$ 0	$ 0
*Environmental Mitigation	1%	Lump	$ 0	$ 0
			Contingency (20%)	**$ 275,194**
			Subtotal Roadway	**$ 1,652,000**

ITEM	QUANTITY	UNIT	UNIT COST	COST
RIGHT OF WAY:				
Right-of-Way Property	2.50	Acre	$ 150,000	$ 375,000
Construction Easements	0.50	Acre	$ 150,000	$ 7,500
Business Relocations	0.00	Lump	$ 350,000	$ -
Residential Relocations	0.00	Lump	$ 250,000	$ -
			Contingency (20%)	**$ 75,000**
			Subtotal Right-of-way	**$ 458,000**

ITEM	QUANTITY	UNIT	UNIT COST	COST
UTILITIES:				
Power Pole Impacts	45	Each	$ 15,000	$ 675,000
*Miscellaneous Utilities	3%	Lump	$ 49,560	$ 49,560
			Contingency (20%)	**$ 144,912**
			Subtotal Utilities	**$ 870,000**

Preliminary Engineering (10% of Total Construction)	**$ 298,000**
Construction Engineering (8% of Total Construction)	**$ 238,400**
(2007) PROJECT TOTAL	**$ 3,517,000**
Inflation (5% per year for 5 years)	**$ 972,000**
(2009-2010) PROJECT TOTAL	**$ 4,489,000**

*Roadway %
**Total Construction %

Quantities shown are approximate and intended for planning purposes only. Actual quantities must be calculated based on final design of proposed improvements.

700 West
11400 South to 12300 South
Full Roadway Reconstruction Costs

ITEM	QUANTITY	UNIT	UNIT COST	COST
ROADWAY:				
**Mobilization	8%	Lump	$ 173,749	$ 173,749
**Traffic Control	10%	Lump	$ 197,442	$ 197,442
66-foot Roadway	6800	Lin. Ft.	$ 232	$ 1,579,532
*Earth Work	10%	Lump	$ 157,953	$ 157,953
*Drainage	5%	Lump	$ 78,977	$ 78,977
*Landscaping, Aesthetics, Erosion Control	5%	Lump	$ 78,977	$ 78,977
*Signing & Striping	2%	Lump	$ 31,591	$ 31,591
*Lighting	1%	Lump	$ 15,795	$ 15,795
*Removals & Relocations	1%	Lump	$ 15,795	$ 15,795
*Environmental Mitigation	1%	Lump	$ 15,795	$ 15,795
			Contingency (20%)	**$ 469,121**
			Subtotal Roadway	**$ 2,815,000**

ITEM	QUANTITY	UNIT	UNIT COST	COST
RIGHT OF WAY:				
Right-of-Way Property	2.30	Acre	$ 200,000	$ 460,000
Construction Easements	2.00	Acre	$ 200,000	$ 40,000
Business Relocations	0.00	Lump	$ 350,000	$ -
Residential Relocations	0.00	Lump	$ 250,000	$ -
			Contingency (20%)	**$ 92,000**
			Subtotal Right-of-way	**$ 592,000**

ITEM	QUANTITY	UNIT	UNIT COST	COST
UTILITIES:				
Power Pole Impacts	30	Each	$ 15,000	$ 450,000
*Miscellaneous Utilities	3%	Lump	$ 84,450	$ 84,450
			Contingency (20%)	**$ 106,890**
			Subtotal Utilities	**$ 642,000**

Preliminary Engineering (10% of Total Construction)	**$ 404,900**
Construction Engineering (8% of Total Construction)	**$ 323,920**
(2007) PROJECT TOTAL	**$ 4,778,000**
Inflation (5% per year for 5 years)	**$ 1,321,000**
(2009-2010) PROJECT TOTAL	**$ 6,099,000**

*Roadway %
**Total Construction %

Quantities shown are approximate and intended for planning purposes only. Actual quantities must be calculated based on final design of proposed improvements.

New Bangerter Crossing
200 West toSouth City Limits
Full Roadway Reconstruction Costs

ITEM	QUANTITY	UNIT	UNIT COST	COST
ROADWAY:				
**Mobilization	8%	Lump	$ 644,189	$ 644,189
**Traffic Control	10%	Lump	$ 732,033	$ 732,033
106-foot Roadway	10000	Lin. Ft.	$ 586	$ 5,856,267
*Earth Work	10%	Lump	$ 585,627	$ 585,627
*Drainage	5%	Lump	$ 292,813	$ 292,813
*Landscaping, Aesthetics, Erosion Control	5%	Lump	$ 292,813	$ 292,813
*Signing & Striping	2%	Lump	$ 117,125	$ 117,125
*Lighting	1%	Lump	$ 58,563	$ 58,563
*Removals & Relocations	1%	Lump	$ 58,563	$ 58,563
*Environmental Mitigation	1%	Lump	$ 58,563	$ 58,563
			Contingency (20%)	**$ 1,739,311**
			Subtotal Roadway	**$ 10,436,000**

ITEM	QUANTITY	UNIT	UNIT COST	COST
RIGHT OF WAY:				
Right-of-Way Property	24.00	Acre	$ 150,000	$ 3,600,000
Construction Easements	6.00	Acre	$ 150,000	$ 90,000
Business Relocations	0.00	Lump	$ 300,000	$ -
Residential Relocations	0.00	Lump	$ 200,000	$ -
			Contingency (20%)	**$ 720,000**
			Subtotal Right-of-way	**$ 4,410,000**

ITEM	QUANTITY	UNIT	UNIT COST	COST
UTILITIES:				
Power Pole Impacts	60	Each	$ 15,000	$ 900,000
*Miscellaneous Utilities	3%	Lump	$ 313,080	$ 313,080
			Contingency (20%)	**$ 242,616**
			Subtotal Utilities	**$ 1,456,000**

Preliminary Engineering (10% of Total Construction)	**$ 1,630,200**
Construction Engineering (8% of Total Construction)	**$ 1,304,160**
(2007) PROJECT TOTAL	**$ 19,237,000**
Inflation (5% per year for 5 years)	**$ 5,315,000**
(2009-2010) PROJECT TOTAL	**$ 24,552,000**

*Roadway %
**Total Construction %

Quantities shown are approximate and intended for planning purposes only. Actual quantities must be calculated based on final design of proposed improvements.

Highland
Traverse to Pioneer
Roadway Widening Costs

ITEM	QUANTITY	UNIT	UNIT COST	COST
ROADWAY:				
**Mobilization	8%	Lump	$ 929,748	$ 929,748
**Traffic Control	10%	Lump	$ 1,056,532	$ 1,056,532
120-foot Roadway	14300	Lin. Ft.	$ 399	$ 5,708,393
106-foot Roadway	7700	Lin. Ft.	$ 393	$ 3,023,277
*Earth Work	5%	Lump	$ 436,583	$ 436,583
*Drainage	5%	Lump	$ 436,583	$ 436,583
*Landscaping, Aesthetics, Erosion Control	5%	Lump	$ 436,583	$ 436,583
*Signing & Striping	2%	Lump	$ 174,633	$ 174,633
*Lighting	1%	Lump	$ 87,317	$ 87,317
*Removals & Relocations	2%	Lump	$ 174,633	$ 174,633
*Environmental Mitigation	1%	Lump	$ 87,317	$ 87,317
			Contingency (20%)	**$ 2,510,320**
			Subtotal Roadway	**$ 15,062,000**

ITEM	QUANTITY	UNIT	UNIT COST	COST
RIGHT OF WAY:				
Right-of-Way Property	0.00	Acre	$ 250,000	$ -
Construction Easements	1.00	Acre	$ 250,000	$ 25,000
Business Relocations	0.00	Lump	$ 350,000	$ -
Residential Relocations	0.00	Lump	$ 250,000	$ -
			Contingency (20%)	**$ -**
			Subtotal Right-of-way	**$ 25,000**

ITEM	QUANTITY	UNIT	UNIT COST	COST
UTILITIES:				
Power Pole Impacts	70	Each	$ 15,000	$ 1,050,000
*Miscellaneous Utilities	3%	Lump	$ 451,860	$ 451,860
			Contingency (20%)	**$ 300,372**
			Subtotal Utilities	**$ 1,803,000**

Preliminary Engineering (10% of Total Construction)	**$ 1,689,000**
Construction Engineering (8% of Total Construction)	**$ 1,351,200**
(2007) PROJECT TOTAL	**$ 19,931,000**
Inflation (5% per year for 5 years)	**$ 5,507,000**
(2009-2010) PROJECT TOTAL	**$ 25,438,000**

*Roadway %
**Total Construction %

Quantities shown are approximate and intended for planning purposes only. Actual quantities must be calculated based on final design of proposed improvements.

Appendix C: Intersection Analysis

7: 1300 East & Highland Drive

Movement	SEL	SER	NEL	NET	SWT	SWR
Lane Configurations	1>	1	2	2	2	1
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0	4.0	4.0	4.0	4.0
Lane Util. Factor	1.00	0.95	0.97	0.95	0.95	1.00
Frt	0.91	0.85	1.00	1.00	1.00	0.85
Flt Protected	0.98	1.00	0.95	1.00	1.00	1.00
Satd. Flow (prot)	1657	1504	3433	3539	3539	1583
Flt Permitted	0.98	1.00	0.95	1.00	1.00	1.00
Satd. Flow (perm)	1657	1504	3433	3539	3539	1583
Volume (vph)	200	1000	450	700	650	50
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	217	1087	489	761	707	54
RTOR Reduction (vph)	85	355	0	0	0	41
Lane Group Flow (vph)	492	372	489	761	707	13
Turn Type		Perm	Prot			Perm
Protected Phases	6		7	4	8	
Permitted Phases		6				8
Actuated Green, G (s)	23.5	23.5	16.3	36.5	15.7	15.7
Effective Green, g (s)	24.0	24.0	16.8	38.0	17.2	17.2
Actuated g/C Ratio	0.34	0.34	0.24	0.54	0.25	0.25
Clearance Time (s)	4.5	4.5	4.5	5.5	5.5	5.5
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	568	516	824	1921	870	389
v/s Ratio Prot	c0.30		c0.14	0.22	c0.20	
v/s Ratio Perm		0.25				0.01
v/c Ratio	0.87	0.72	0.59	0.40	0.81	0.03
Uniform Delay, d1	21.5	20.1	23.6	9.3	24.9	20.1
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	16.1	8.5	3.1	0.6	5.8	0.0
Delay (s)	37.6	28.5	26.7	9.9	30.7	20.1
Level of Service	D	C	C	A	C	C
Approach Delay (s)	32.5			16.5	30.0	
Approach LOS	C			B	C	

Intersection Summary			
HCM Average Control Delay	25.9	HCM Level of Service	C
HCM Volume to Capacity ratio	0.77		
Actuated Cycle Length (s)	70.0	Sum of lost time (s)	12.0
Intersection Capacity Utilization	72.5%	ICU Level of Service	C
Analysis Period (min)	15		
c Critical Lane Group			

\\Server10-06\projects\070168_Draper MTP\Synchro\Highland & 1300 East2.sy7
InterPlan Co.

5: 1300 East & Wayne's World

Movement	SBL	SBR	NWL	NWR	NEL	NER
Lanes	2	1	0	2	0	1
Sign Control	Free		Free		Stop	
Grade	0%		0%		0%	
Volume (veh/h)	800	100	0	500	0	200
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	870	109	0	543	0	217
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type					None	
Median storage veh)						
Upstream signal (ft)			284			
pX, platoon unblocked						
vC, conflicting volume			978		1141	435
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol			978		1141	435
tC, single (s)			4.1		6.8	6.9
tC, 2 stage (s)						
tF (s)			2.2		3.5	3.3
p0 queue free %			100		100	62
cM capacity (veh/h)			701		194	569

Direction, Lane #	SB 1	SB 2	SB 3	NW 1	NW 2	NE 1
Volume Total	435	435	109	272	272	217
Volume Left	0	0	0	0	0	0
Volume Right	0	0	109	0	0	217
cSH	1700	1700	1700	1700	1700	569
Volume to Capacity	0.26	0.26	0.06	0.16	0.16	0.38
Queue Length 95th (ft)	0	0	0	0	0	45
Control Delay (s)	0.0	0.0	0.0	0.0	0.0	15.2
Lane LOS						C
Approach Delay (s)	0.0			0.0		15.2
Approach LOS						C

Intersection Summary			
Average Delay	1.9		
Intersection Capacity Utilization	26.2%	ICU Level of Service	A
Analysis Period (min)	15		

\\Server10-06\projects\070168_Draper MTP\Synchro\Highland & 1300 East2.sy7
InterPlan Co.

3: 132 South & 1300 East

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	1	1>	0	1	1>	0	1	1>	0	1	1>	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0		4.0	4.0		4.0	4.0		4.0	4.0	
Lane Util. Factor	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	
Frt	1.00	0.87		1.00	0.88		1.00	0.99		1.00	0.99	
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1770	1623		1770	1639		1770	1853		1770	1846	
Flt Permitted	0.73	1.00		0.71	1.00		0.13	1.00		0.34	1.00	
Satd. Flow (perm)	1368	1623		1316	1639		242	1853		629	1846	
Volume (vph)	42	10	62	18	6	26	30	682	24	54	1104	70
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	46	11	67	20	7	28	33	741	26	59	1200	76
RTOR Reduction (vph)	0	61	0	0	26	0	0	1	0	0	2	0
Lane Group Flow (vph)	46	17	0	20	9	0	33	766	0	59	1274	0
Turn Type	Perm			Perm			Perm			Perm		
Protected Phases		4			8			2			6	
Permitted Phases	4			8			2			6		
Actuated Green, G (s)	7.9	7.9		7.9	7.9		79.0	79.0		79.0	79.0	
Effective Green, g (s)	7.9	7.9		7.9	7.9		79.0	79.0		79.0	79.0	
Actuated g/C Ratio	0.08	0.08		0.08	0.08		0.83	0.83		0.83	0.83	
Clearance Time (s)	4.0	4.0		4.0	4.0		4.0	4.0		4.0	4.0	
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)	114	135		110	136		201	1543		524	1537	
v/s Ratio Prot		0.01			0.01			0.41			c0.69	
v/s Ratio Perm	c0.03			0.02			0.14			0.09		
v/c Ratio	0.40	0.12		0.18	0.07		0.16	0.50		0.11	0.83	
Uniform Delay, d1	41.3	40.3		40.5	40.1		1.5	2.3		1.5	4.3	
Progression Factor	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	
Incremental Delay, d2	2.3	0.4		0.8	0.2		0.4	0.3		0.1	3.9	
Delay (s)	43.6	40.7		41.3	40.3		1.9	2.5		1.6	8.2	
Level of Service	D	D		D	D		A	A		A	A	
Approach Delay (s)		41.8			40.7			2.5			7.9	
Approach LOS		D			D			A			A	

Intersection Summary			
HCM Average Control Delay	8.6	HCM Level of Service	A
HCM Volume to Capacity ratio	0.79		
Actuated Cycle Length (s)	94.9	Sum of lost time (s)	8.0
Intersection Capacity Utilization	78.0%	ICU Level of Service	D
Analysis Period (min)	15		
c Critical Lane Group			

\\Server10-06\projects\070168_Draper MTP\Synchro\1300 E & 132 South.sy7
InterPlan Co.

1: Pioneer & 1300 East

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	1	1	1	1	1	1	1	2>	0	2	1	1
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0		4.0	4.0	4.0
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.95		0.97	1.00	1.00
Frt	1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00		1.00	1.00	0.85
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00		0.95	1.00	1.00
Satd. Flow (prot)	1770	1863	1583	1770	1863	1583	1770	3532		3433	1863	1583
Flt Permitted	0.46	1.00	1.00	0.22	1.00	1.00	0.19	1.00		0.95	1.00	1.00
Satd. Flow (perm)	864	1863	1583	414	1863	1583	362	3532		3433	1863	1583
Volume (vph)	298	601	462	10	126	324	294	759	10	902	582	60
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	324	653	502	11	137	352	320	825	11	980	633	65
RTOR Reduction (vph)	0	0	138	0	0	289	0	1	0	0	0	39
Lane Group Flow (vph)	324	653	364	11	137	63	320	835	0	980	633	26
Turn Type	pm+pt		Perm	Perm		Perm	pm+pt			Prot		Perm
Protected Phases	7	4			8		5	2		1	6	
Permitted Phases	4		4	8		8	2					6
Actuated Green, G (s)	33.5	33.5	33.5	16.5	16.5	16.5	36.0	23.5		27.5	38.5	38.5
Effective Green, g (s)	35.0	35.0	35.0	18.0	18.0	18.0	38.0	25.0		28.0	40.0	40.0
Actuated g/C Ratio	0.35	0.35	0.35	0.18	0.18	0.18	0.38	0.25		0.28	0.40	0.40
Clearance Time (s)	4.5	5.5	5.5	5.5	5.5	5.5	4.5	5.5		4.5	5.5	5.5
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0		3.0	3.0	3.0
Lane Grp Cap (vph)	420	652	554	75	335	285	321	883		961	745	633
v/s Ratio Prot	0.10	c0.35			0.07		0.13	0.24		c0.29	0.34	
v/s Ratio Perm	0.17		0.23	0.03		0.04	c0.25					0.02
v/c Ratio	0.77	1.00	0.66	0.15	0.41	0.22	1.00	0.95		1.02	0.85	0.04
Uniform Delay, d1	26.8	32.5	27.4	34.5	36.3	35.0	25.7	36.8		36.0	27.3	18.3
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00		1.00	1.00	1.00
Incremental Delay, d2	8.5	35.6	2.8	0.9	0.8	0.4	49.1	18.4		34.1	9.0	0.0
Delay (s)	35.4	68.1	30.2	35.4	37.1	35.4	74.8	55.2		70.1	36.2	18.3
Level of Service	D	E	C	D	D	D	E	E		E	D	B
Approach Delay (s)		48.1			35.9			60.6			55.3	
Approach LOS		D			D			E			E	

Intersection Summary			
HCM Average Control Delay	52.4	HCM Level of Service	D
HCM Volume to Capacity ratio	1.01		
Actuated Cycle Length (s)	100.0	Sum of lost time (s)	12.0
Intersection Capacity Utilization	95.3%	ICU Level of Service	F
Analysis Period (min)	15		
c Critical Lane Group			

\\Server10-06\projects\070168_Draper MTP\Synchro\1300 E & Pioneer.sy7
InterPlan Co.

1: 138th & Bangerter Parkway

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	2	2>	0	1	1	1	1	2	1	2	2	1
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0		4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Lane Util. Factor	0.97	0.95		1.00	1.00	1.00	1.00	0.95	1.00	0.97	0.95	1.00
Frt	1.00	0.99		1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85
Flt Protected	0.95	1.00		0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (prot)	3433	3496		1770	1863	1583	1770	3539	1583	3433	3539	1583
Flt Permitted	0.95	1.00		0.60	1.00	1.00	0.16	1.00	1.00	0.95	1.00	1.00
Satd. Flow (perm)	3433	3496		1126	1863	1583	297	3539	1583	3433	3539	1583
Volume (vph)	841	175	16	347	186	784	23	1650	325	784	1164	418
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	914	190	17	377	202	852	25	1793	353	852	1265	454
RTOR Reduction (vph)	0	4	0	0	0	0	0	0	46	0	0	214
Lane Group Flow (vph)	914	203	0	377	202	852	25	1793	307	852	1265	240
Turn Type	Prot			pm+pt		Free	pm+pt		Perm	Prot		Perm
Protected Phases	7	4		3	8		5	2		1	6	
Permitted Phases				8		Free	2		2			6
Actuated Green, G (s)	28.5	19.6		40.9	16.0	146.8	60.1	53.8	53.8	27.5	75.0	75.0
Effective Green, g (s)	29.0	21.1		42.9	17.5	146.8	63.1	56.3	56.3	28.0	77.5	77.5
Actuated g/C Ratio	0.20	0.14		0.29	0.12	1.00	0.43	0.38	0.38	0.19	0.53	0.53
Clearance Time (s)	4.5	5.5		4.5	5.5		4.5	6.5	6.5	4.5	6.5	6.5
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	678	502		440	222	1583	196	1357	607	655	1868	836
v/s Ratio Prot	c0.27	0.06		0.15	c0.11		0.01	c0.51		c0.25	0.36	
v/s Ratio Perm				0.10		c0.54	0.05		0.19			0.15
v/c Ratio	1.35	0.40		0.86	0.91	0.54	0.13	1.32	0.51	1.30	0.68	0.29
Uniform Delay, d1	58.9	57.1		46.8	63.9	0.0	25.1	45.3	34.6	59.4	25.5	19.3
Progression Factor	1.00	1.00		1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	166.3	0.5		15.1	36.3	1.3	0.3	149.8	3.0	146.3	2.0	0.9
Delay (s)	225.2	57.7		61.9	100.2	1.3	25.4	195.1	37.6	205.7	27.5	20.1
Level of Service	F	E		E	F	A	C	F	D	F	C	C
Approach Delay (s)		194.3			31.2			167.5			85.2	
Approach LOS		F			C			F			F	

Intersection Summary			
HCM Average Control Delay	115.9	HCM Level of Service	F
HCM Volume to Capacity ratio	1.26		
Actuated Cycle Length (s)	146.8	Sum of lost time (s)	16.0
Intersection Capacity Utilization	115.1%	ICU Level of Service	H
Analysis Period (min)	15		
c Critical Lane Group			

\\Server10-06\projects\070168_Draper MTP\Synchro\Bangertert Parkway & 138th.sy7
InterPlan Co.

4: Bangerter & 200 West

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	2	3	1	1	3	1	2	2	1	3	1	1
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Lane Util. Factor	0.97	0.91	1.00	1.00	0.91	1.00	0.97	0.95	1.00	0.94	1.00	1.00
Frt	1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (prot)	3433	5085	1583	1770	5085	1583	3433	3539	1583	4990	1863	1583
Flt Permitted	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (perm)	3433	5085	1583	1770	5085	1583	3433	3539	1583	4990	1863	1583
Volume (vph)	394	5520	123	88	7765	716	226	14	188	603	42	219
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	428	6000	134	96	8440	778	246	15	204	655	46	238
RTOR Reduction (vph)	0	0	12	0	0	100	0	0	101	0	0	104
Lane Group Flow (vph)	428	6000	122	96	8440	678	246	15	103	655	46	134
Turn Type	Prot		Perm	Prot		pm+ov	Prot		Over	Prot		Over
Protected Phases	7	4		3	8	1	5	2	3	1	6	7
Permitted Phases			4			8						
Actuated Green, G (s)	19.5	131.0	131.0	15.5	127.0	147.5	18.9	16.5	15.5	20.5	18.1	19.5
Effective Green, g (s)	20.0	134.0	134.0	16.0	130.0	151.0	19.4	18.0	16.0	21.0	19.6	20.0
Actuated g/C Ratio	0.10	0.65	0.65	0.08	0.63	0.74	0.09	0.09	0.08	0.10	0.10	0.10
Clearance Time (s)	4.5	7.0	7.0	4.5	7.0	4.5	4.5	5.5	4.5	4.5	5.5	4.5
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	335	3324	1035	138	3225	1197	325	311	124	511	178	154
v/s Ratio Prot	c0.12	c1.18		0.05	c1.66	0.06	0.07	0.00	0.06	c0.13	c0.02	0.08
v/s Ratio Perm			0.08			0.37						
v/c Ratio	1.28	1.81	0.12	0.70	2.62	0.57	0.76	0.05	0.83	1.28	0.26	0.87
Uniform Delay, d1	92.5	35.5	13.3	92.1	37.5	12.2	90.5	85.7	93.1	92.0	86.0	91.2
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	146.1	363.5	0.1	14.2	728.6	0.6	9.7	0.3	34.3	141.2	3.5	37.9
Delay (s)	238.6	399.0	13.4	106.3	766.1	12.8	100.2	85.9	127.5	233.2	89.4	129.2
Level of Service	F	F	B	F	F	B	F	F	F	F	F	F
Approach Delay (s)		380.6			696.4			111.7			199.8	
Approach LOS		F			F			F			F	

Intersection Summary			
HCM Average Control Delay	533.8	HCM Level of Service	F
HCM Volume to Capacity ratio	2.10		
Actuated Cycle Length (s)	205.0	Sum of lost time (s)	16.0
Intersection Capacity Utilization	191.1%	ICU Level of Service	H
Analysis Period (min)	15		
c Critical Lane Group			

\\Server10-06\projects\070168_Draper MTP\Synchro\Bangerter.sy7
InterPlan Co.

6: 13490 South & 200 West

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	1	1	1	1	1>	0	1	2	1	1	2	1
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0	4.0	4.0	4.0		4.0	4.0	4.0	4.0	4.0	4.0
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00		1.00	0.95	1.00	1.00	0.95	1.00
Frt	1.00	1.00	0.85	1.00	0.99		1.00	1.00	0.85	1.00	1.00	0.85
Flt Protected	0.95	1.00	1.00	0.95	1.00		0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (prot)	1770	1863	1583	1770	1841		1770	3539	1583	1770	3539	1583
Flt Permitted	0.56	1.00	1.00	0.32	1.00		0.42	1.00	1.00	0.32	1.00	1.00
Satd. Flow (perm)	1049	1863	1583	598	1841		778	3539	1583	592	3539	1583
Volume (vph)	205	302	33	322	200	17	26	575	473	4	448	252
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	223	328	36	350	217	18	28	625	514	4	487	274
RTOR Reduction (vph)	0	0	27	0	5	0	0	0	342	0	0	182
Lane Group Flow (vph)	223	328	9	350	230	0	28	625	172	4	487	92
Turn Type	pm+pt		Perm	pm+pt			Perm		Perm	Perm		Perm
Protected Phases	7	4		3	8			2			6	
Permitted Phases	4		4	8			2		2	6		6
Actuated Green, G (s)	24.3	13.8	13.8	26.0	14.9		18.6	18.6	18.6	18.6	18.6	18.6
Effective Green, g (s)	24.8	14.3	14.3	27.0	15.4		19.1	19.1	19.1	19.1	19.1	19.1
Actuated g/C Ratio	0.44	0.25	0.25	0.47	0.27		0.34	0.34	0.34	0.34	0.34	0.34
Clearance Time (s)	4.0	4.5	4.5	4.5	4.5		4.5	4.5	4.5	4.5	4.5	4.5
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0		3.0	3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	589	467	397	522	497		261	1186	530	198	1186	530
v/s Ratio Prot	0.07	0.18		c0.14	0.12			c0.18			0.14	
v/s Ratio Perm	0.09		0.01	c0.18			0.04		0.11	0.01		0.06
v/c Ratio	0.38	0.70	0.02	0.67	0.46		0.11	0.53	0.32	0.02	0.41	0.17
Uniform Delay, d1	10.4	19.4	16.1	10.4	17.3		13.1	15.3	14.1	12.7	14.6	13.4
Progression Factor	1.00	1.00	1.00	1.00	1.00		1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	0.4	4.7	0.0	3.4	0.7		0.8	1.7	1.6	0.2	1.1	0.7
Delay (s)	10.8	24.2	16.1	13.8	18.0		13.9	17.0	15.8	12.9	15.7	14.1
Level of Service	B	C	B	B	B		B	B	B	B	B	B
Approach Delay (s)		18.6			15.5			16.4			15.1	
Approach LOS		B			B			B			B	

Intersection Summary			
HCM Average Control Delay	16.3	HCM Level of Service	B
HCM Volume to Capacity ratio	0.58		
Actuated Cycle Length (s)	57.0	Sum of lost time (s)	8.0
Intersection Capacity Utilization	65.3%	ICU Level of Service	C
Analysis Period (min)	15		
c Critical Lane Group			

\\Server10-06\projects\070168_Draper MTP\Synchro\Bangerter.sy7
InterPlan Co.

Appendix D: Review of MW Brown Intersection Analysis

Scenario 1: Roundabout at Wayne's World Intersection

Pros	Cons
Traffic	
Roundabout results in fewer stops at Waynes World intersection and less backing into Highland Drive	Less capacity beneath railroad bridge
Improved flow for EB and NB traffic at Waynes World Drive intersection	
Bicycles	
Bicycles can still use shoulders beneath bridge	Bicycles have to navigate roundabout
Pedestrians	
	Crossing on 1300 East moved to north side of intersection meaning pedestrians have to cross two roads
	Dual road crossing results in significant interruption of major trail

See MW Brown Engineering report for detailed graphics of scenarios

Scenario 2: Roundabout at Highland Drive Intersection

Pros	Cons
Traffic	
Increased capacity beneath railroad bridge	No direct left turn from Waynes World Drive onto 1300 East. Movements diverted to Highland Drive, increasing volumes at the roundabout.
Increased capacity at Highland Drive intersection	Extra lanes beneath railroad bridge create very short weaving distance between Highland Drive and Waynes World drive. Weaving compounded by double-lane roundabout configuration
Free-flow traffic from Waynes World Drive onto southbound 1300 East	
Improved flow for NB traffic at Waynes World Drive (only stopped for pedestrian crossings)	
Decreased backing into Highland Drive	
Bicycles	
	Bicycles must navigate a double lane roundabout at Highland Drive
	Shoulders beneath railroad bridge eliminated creating unfriendly bicycle environment for critical bike route across railroad tracks
Pedestrians	
Signalized crossing of 1300 East	Pedestrians must cross the free-flow right turn lane from Waynes World Drive

See MW Brown Engineering report for detailed graphics of scenarios

Scenario 3: Three Signals at Wayne's World Intersection

Pros	Cons
Traffic	
Increased capacity beneath railroad bridge	Extra lanes beneath railroad bridge create very short weaving distance between Highland Drive and Waynes World drive.
Improved flow for NB traffic at Waynes World Drive (only stopped for pedestrian crossings)	Short merge distance for NB traffic north of Waynes World Drive
Improved flow for EB traffic at Waynes World Drive due to exclusive signal phase	Coordination of both future signals could be difficult
Decreased backing into Highland Drive	
Bicycles	
	Shoulders beneath railroad bridge eliminated creating unfriendly bicycle environment for critical bike route across railroad tracks
Pedestrians	
Signalized crossing of 1300 East	

See MW Brown Engineering report for detailed graphics of scenarios

Scenario 4: Three-Way Stop and Restriping for Two Lanes Under the Railroad Bridge

Pros	Cons
Traffic	
Increased capacity beneath railroad bridge	Extra lanes beneath railroad bridge create very short weaving distance between Highland Drive and Waynes World drive.
Improved flow for EB traffic at Waynes World Drive due to all-way stop configuration	Does not address backing to Highland Drive
	All-way stop configurations generally less efficient than two-way stop of signalized intersections
Bicycles	
	Shoulders beneath railroad bridge eliminated creating unfriendly bicycle environment for critical bike route across railroad tracks
Pedestrians	
Pedestrian crossing remains on south side of Waynes World Drive intersection	

See MW Brown Engineering report for detailed graphics of scenarios

Scenario 5: Three-Way Stop with Islands and Restriping

Pros	Cons
Traffic	
Increased capacity beneath railroad bridge	Extra lanes beneath railroad bridge create very short weaving distance between Highland Drive and Waynes World drive.
Improved flow for NB traffic at Waynes World Drive (only stopped for pedestrian crossings)	Short merge distance for NB traffic north of Waynes World Drive
Improved flow for EB traffic at Waynes World Drive due to all-way stop configuration	
Decreased backing into Highland Drive	
Free-flow right-turn onto Highland Drive decreases backing to Waynes World Drive	
Bicycles	
	Shoulders beneath railroad bridge eliminated creating unfriendly bicycle environment for critical bike route across railroad tracks
Pedestrians	
Pedestrian crossing remains on south side of Waynes World Drive intersection	Potential pedestrian-vehicle right of way confusion at free-flow northbound lane on 1300 East presents a serious safety concern

See MW Brown Engineering report for detailed graphics of scenarios

Appendix E: Enlarged Graphics

Figure 2- 6: Existing Land Use

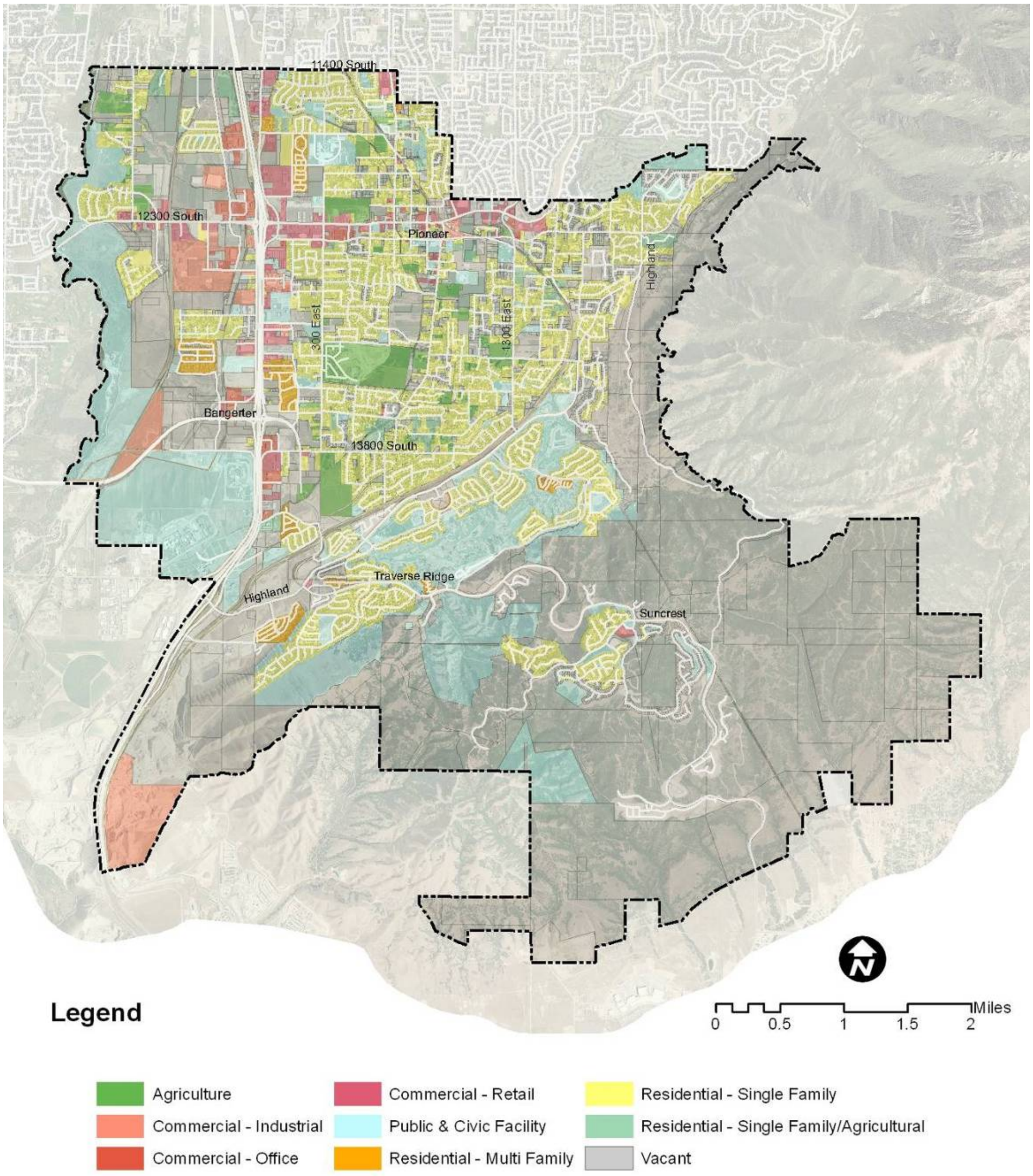


Figure 2- 9: Existing Bicycle Facilities

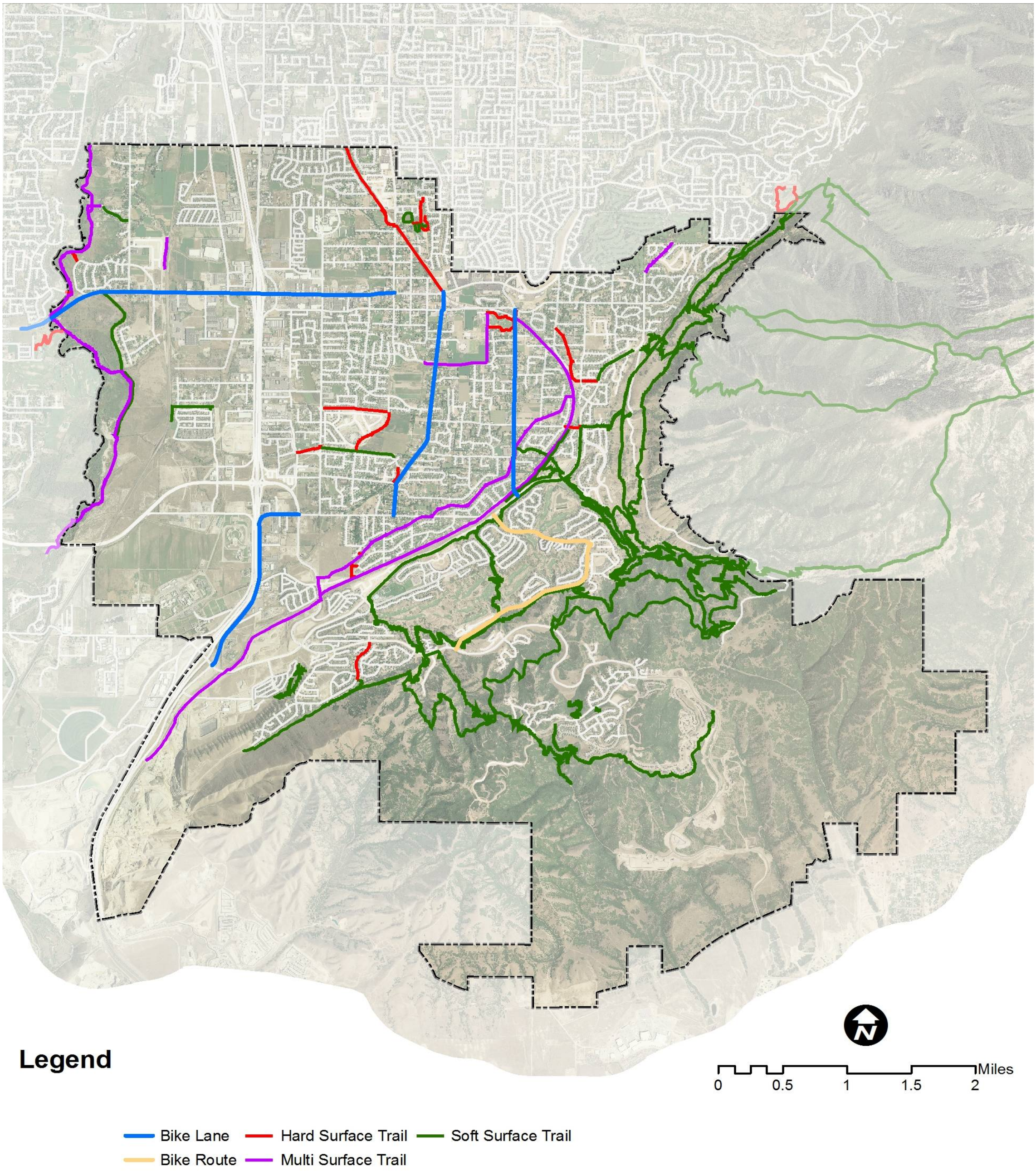


Figure 3- 1: Draper City General Plan

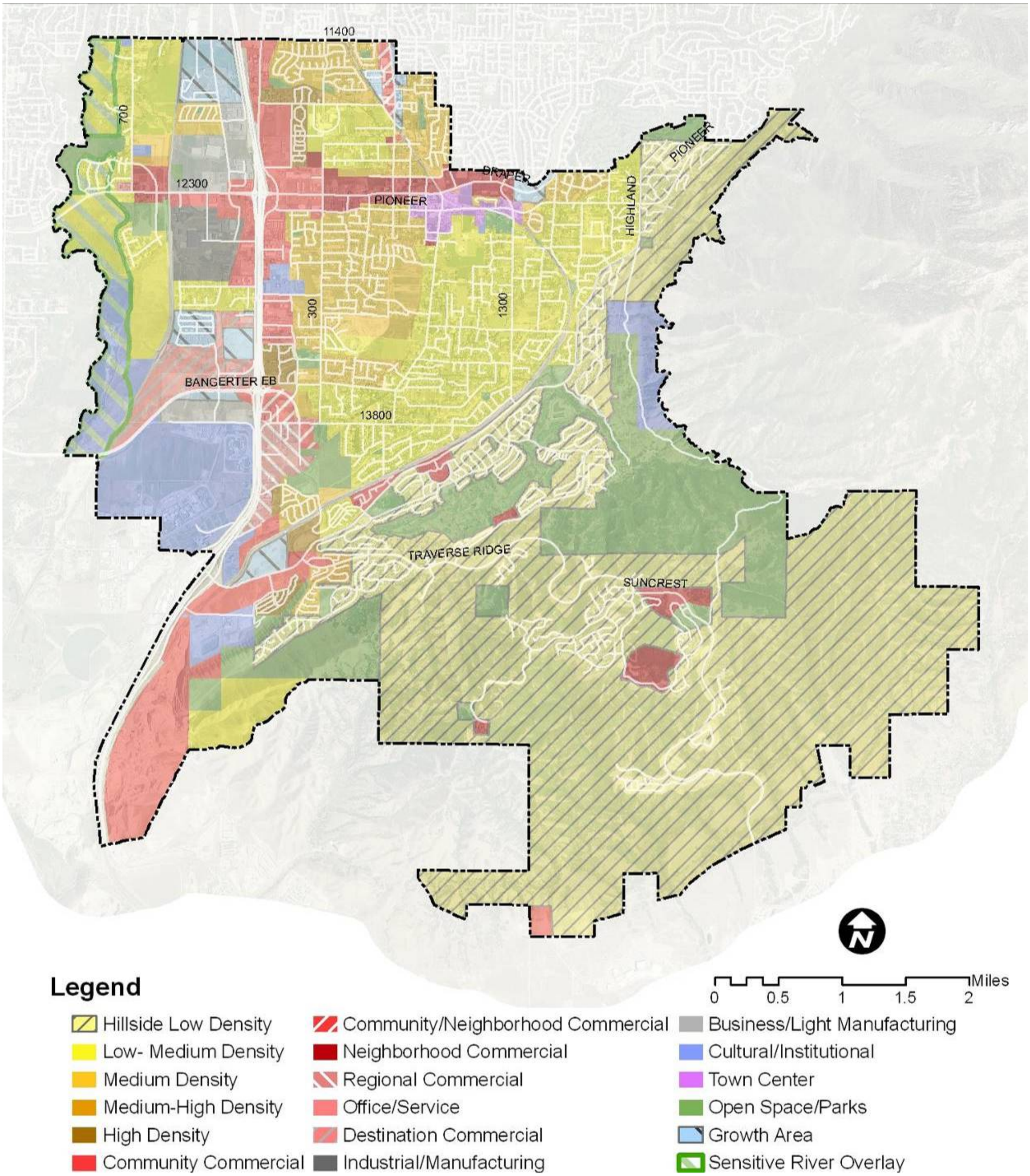


Figure 3- 2: 2005 Model Level of Service 5:00 to 6:00 pm

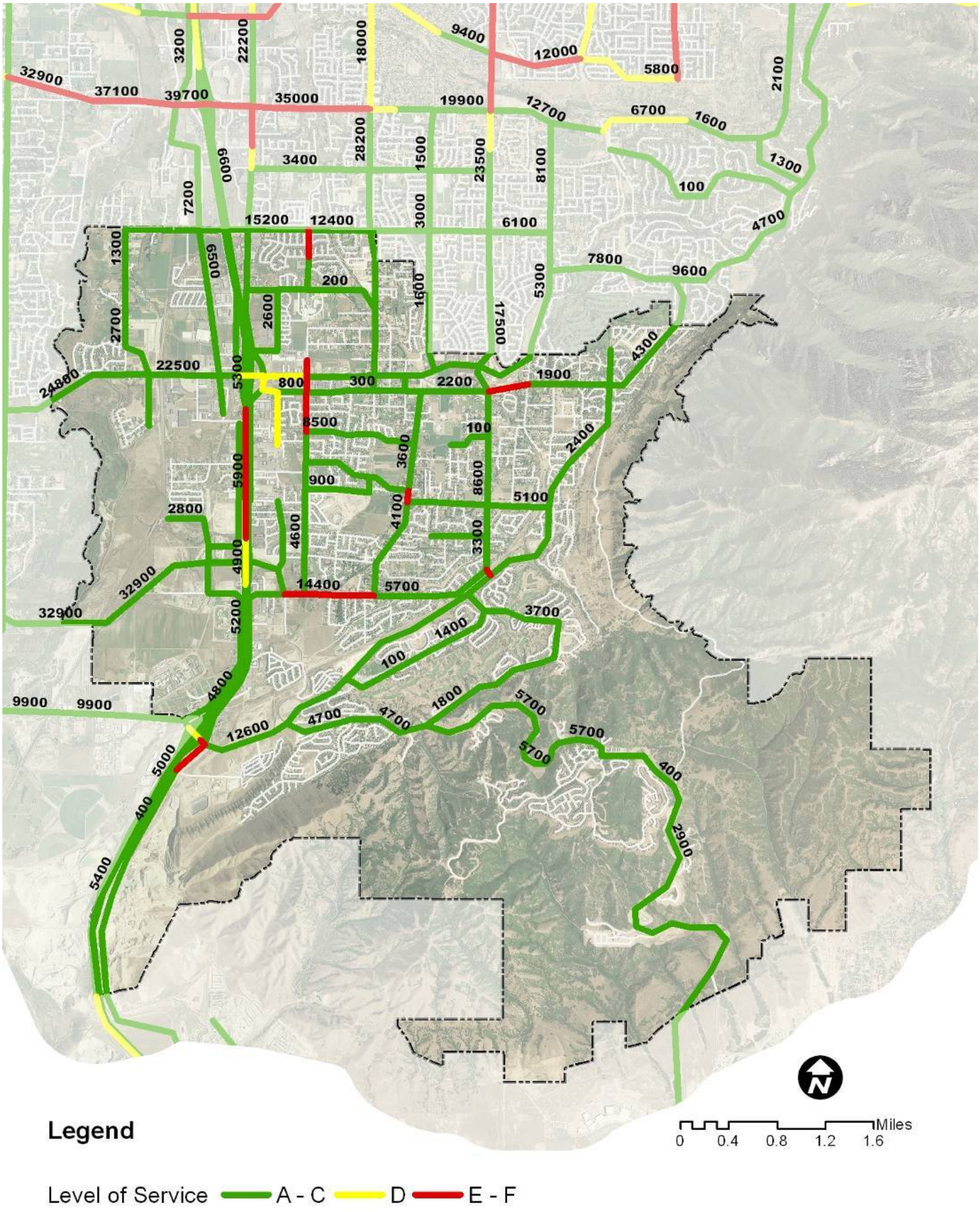


Figure 3- 3: 2030 No-Build Model Level of Service 5:00 to 6:00 pm

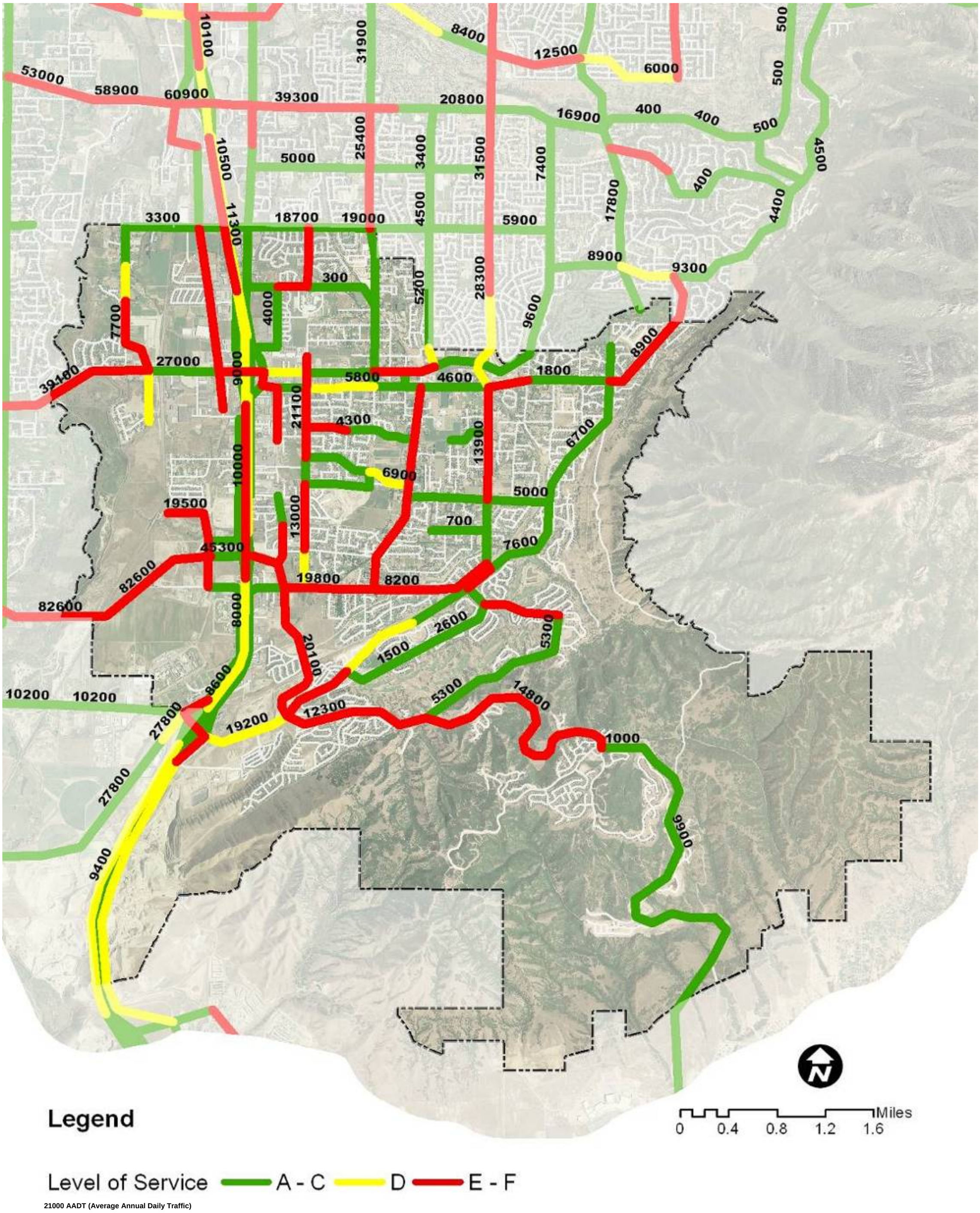


Figure 3- 4: 2030 Improved Model Level of Service 5:00 to 6:00 pm

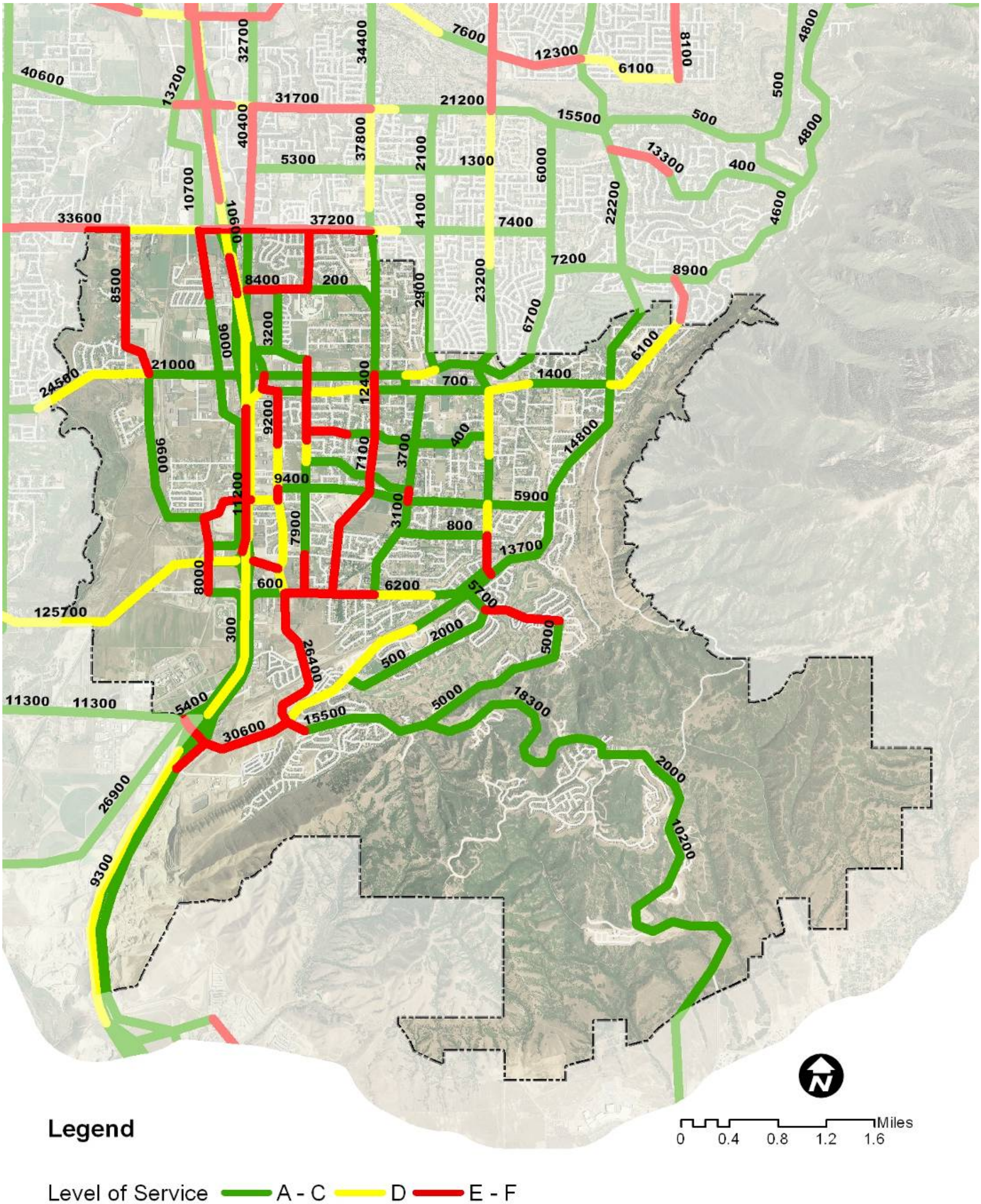


Figure 3- 5: Pedestrian Facilities in Draper

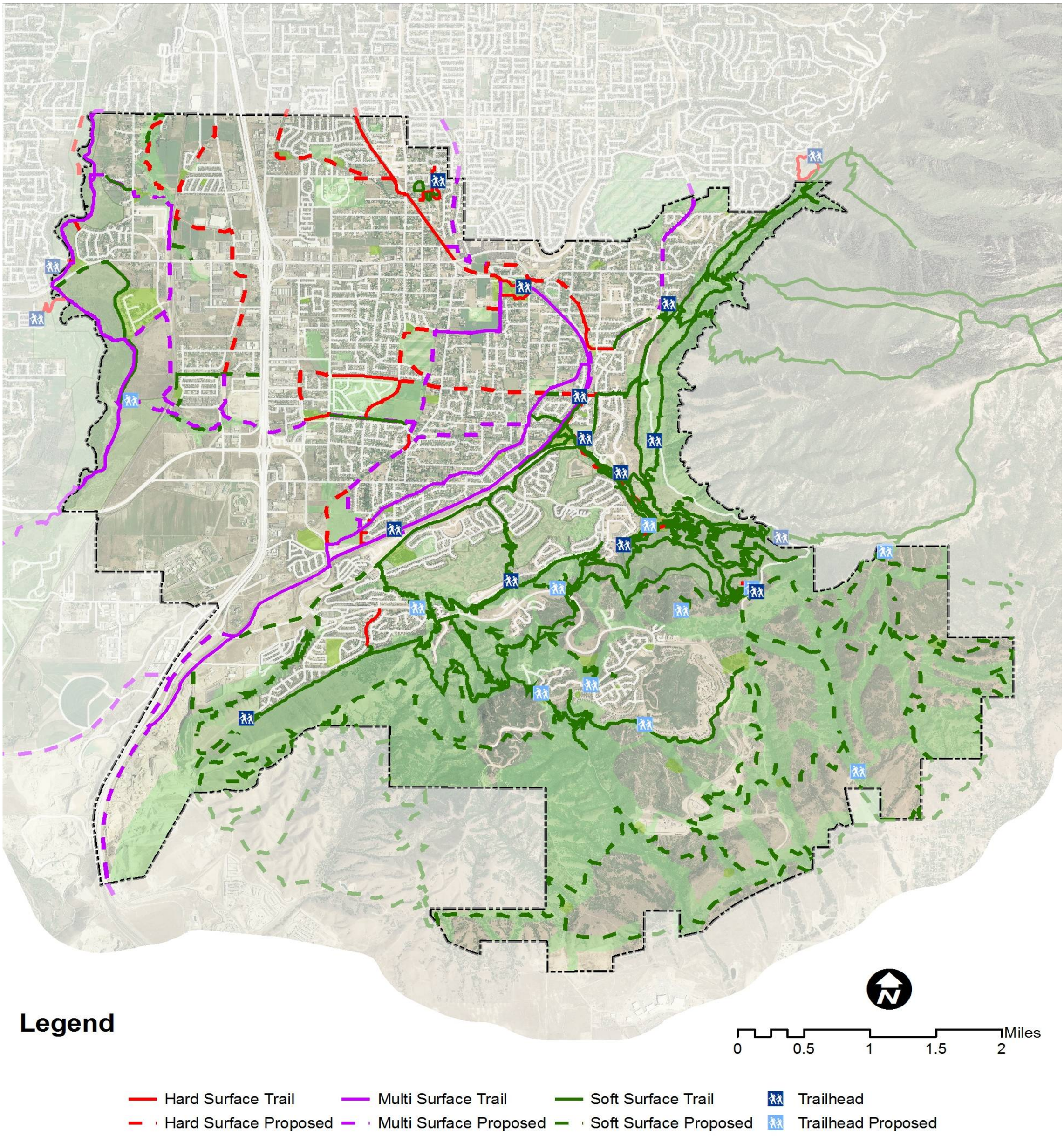


Figure 4- 1: Planned Minor Collectors

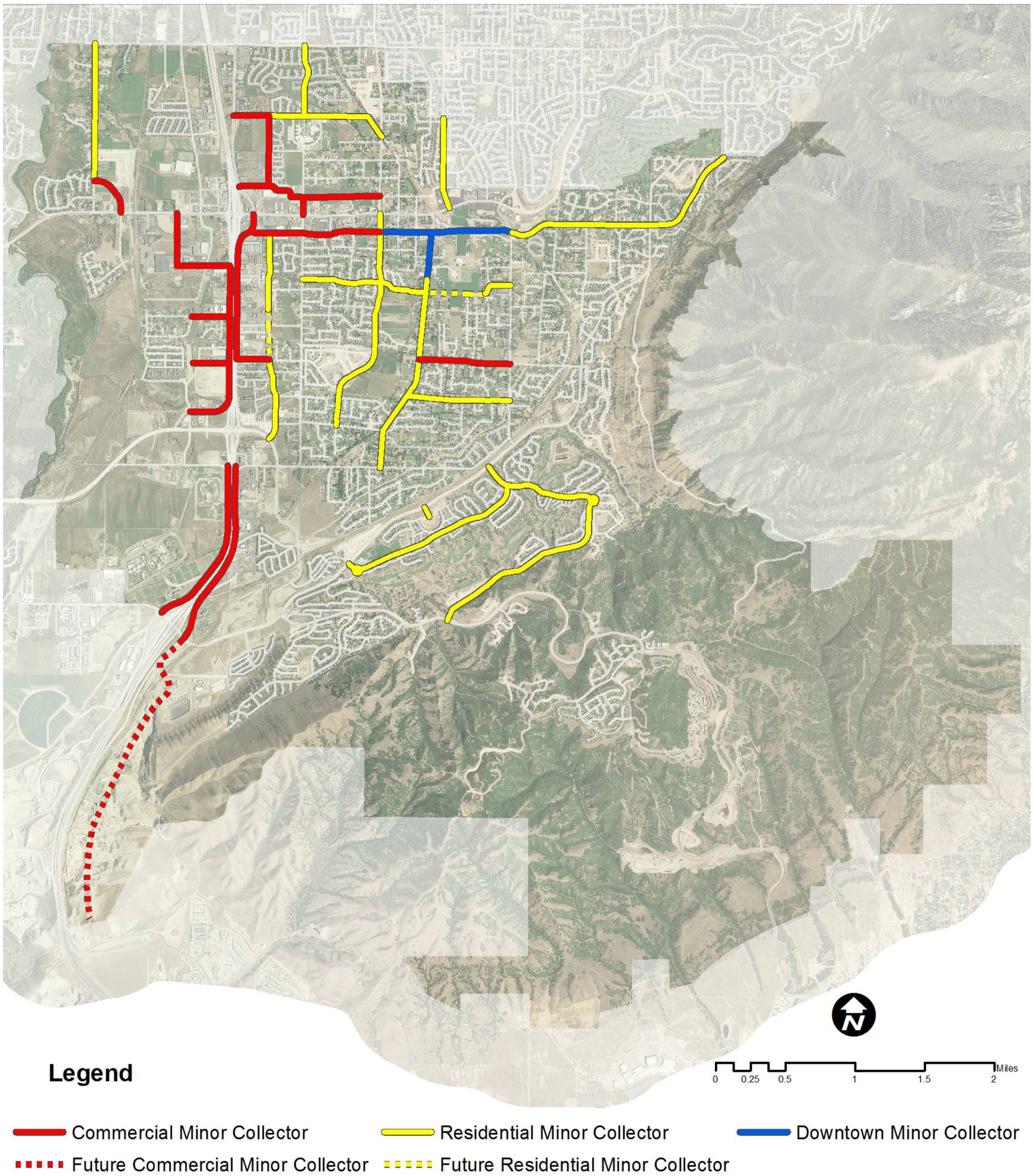


Figure 4- 2: Cross Section, Commercial Minor Collector

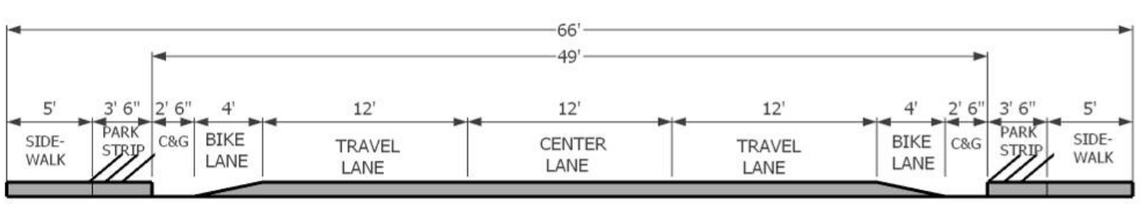


Figure 4- 3: Cross Section, Residential Minor Collector

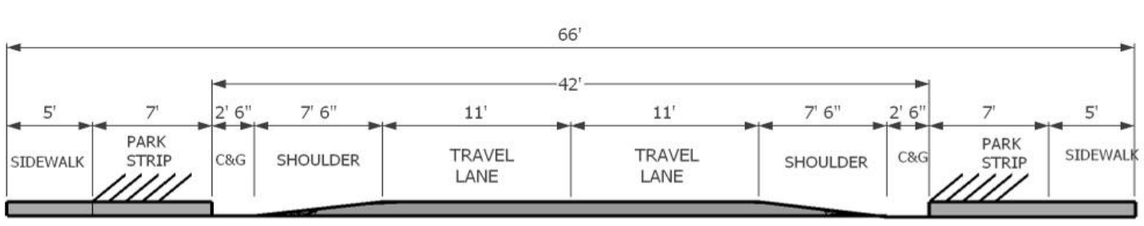


Figure 4-4: Planned Major Collectors

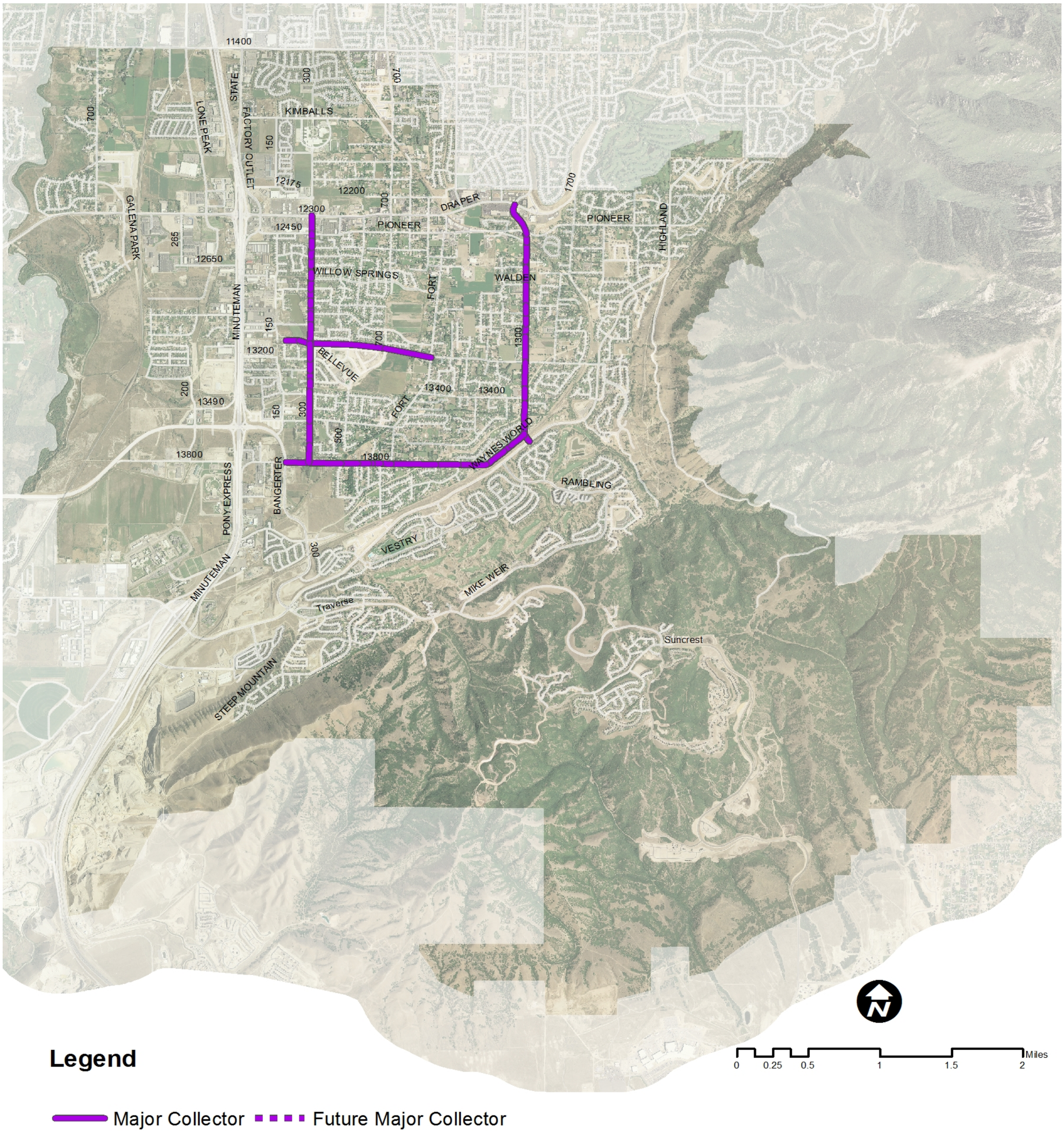


Figure 4- 5: Cross Section, Major Collector

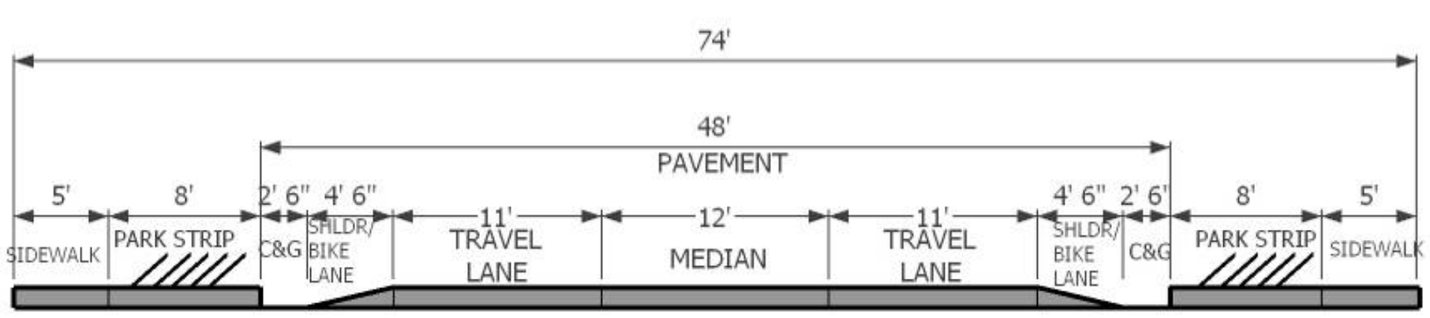


Figure 4-6: Planned Minor Arterials

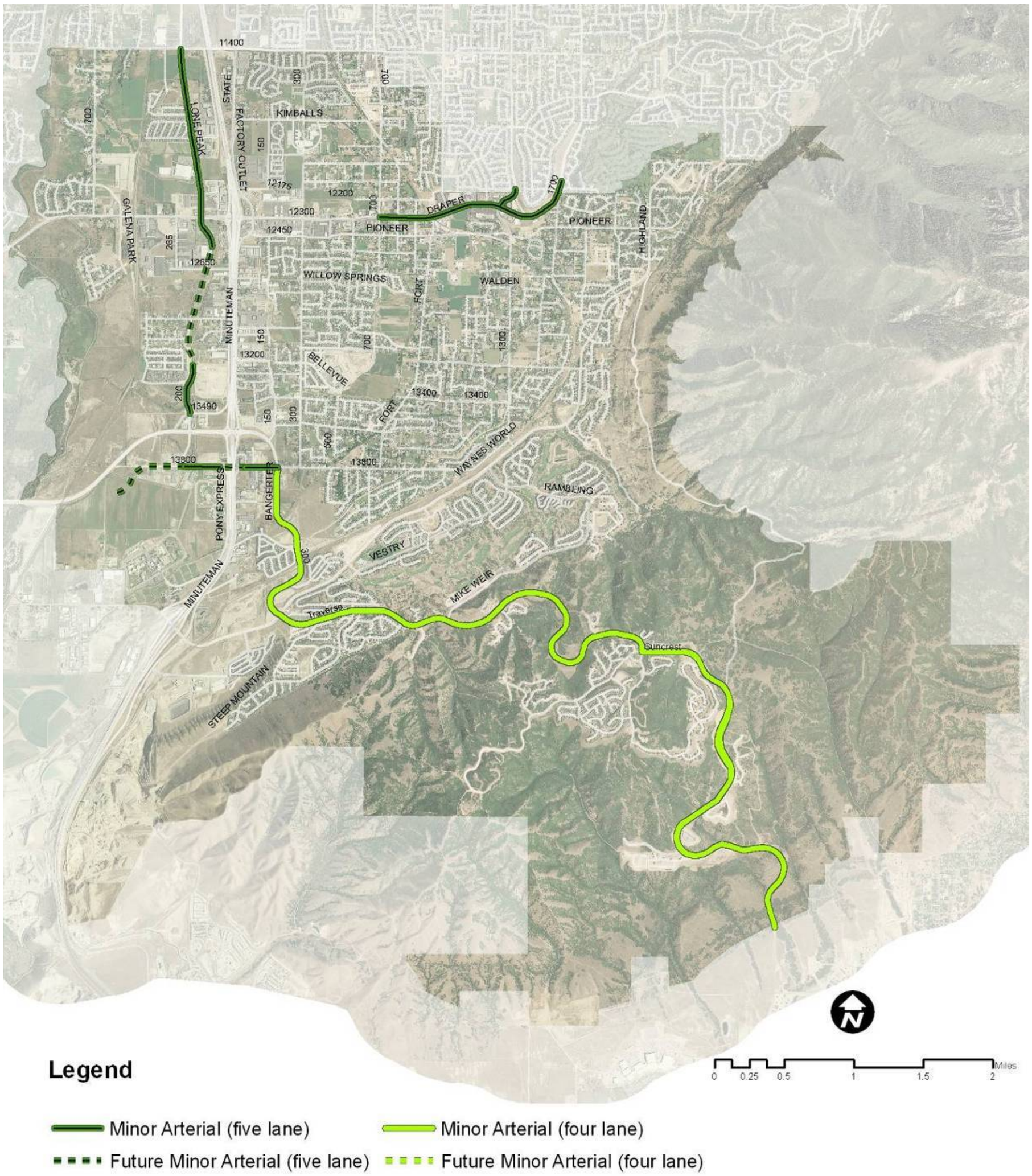


Figure 4- 7: Cross Section, Minor Arterial (four lane)

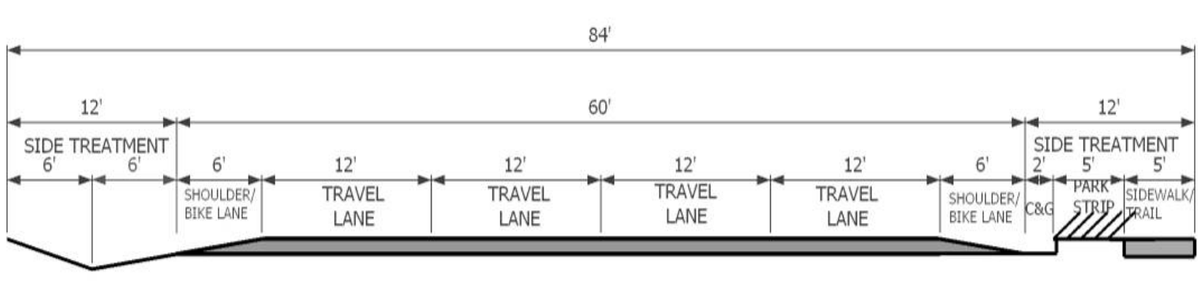


Figure 4- 8: Cross Section, Minor Arterial (five lane)

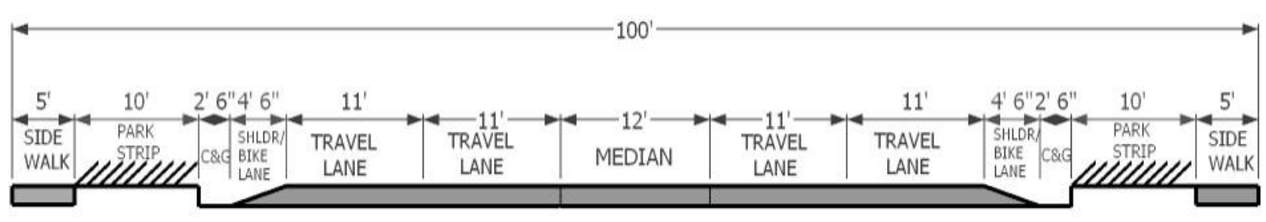


Figure 4- 9: Planned Arterials

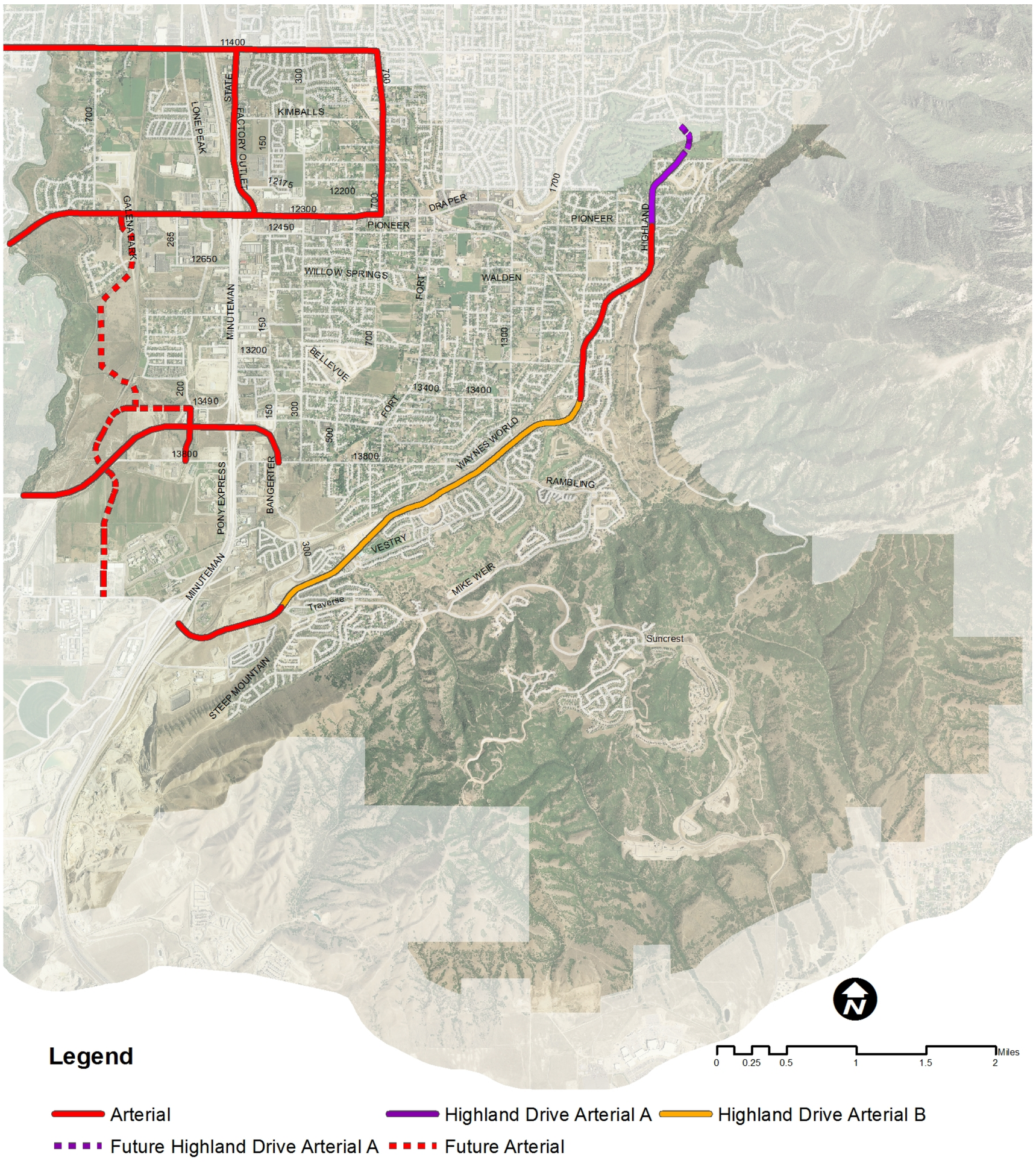


Figure 4- 10: Cross Section, Arterial

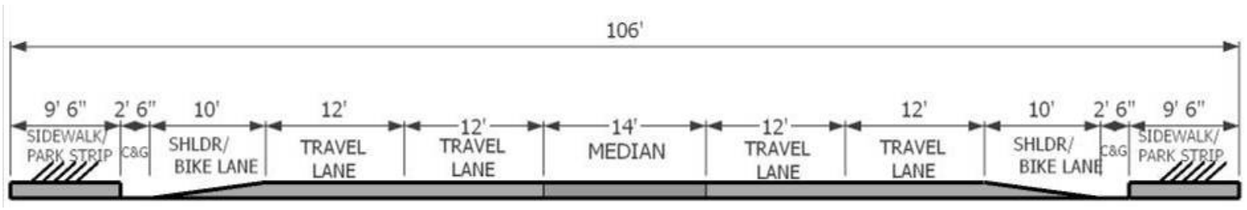


Figure 4- 11: Cross Section, Highland Drive Arterial A

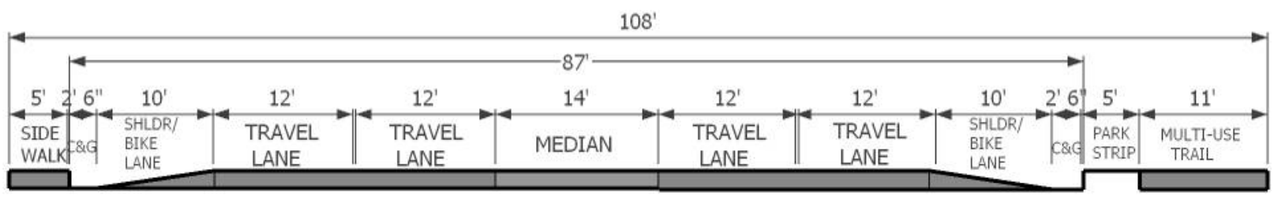


Figure 4- 12: Cross Section, Highland Drive Arterial B

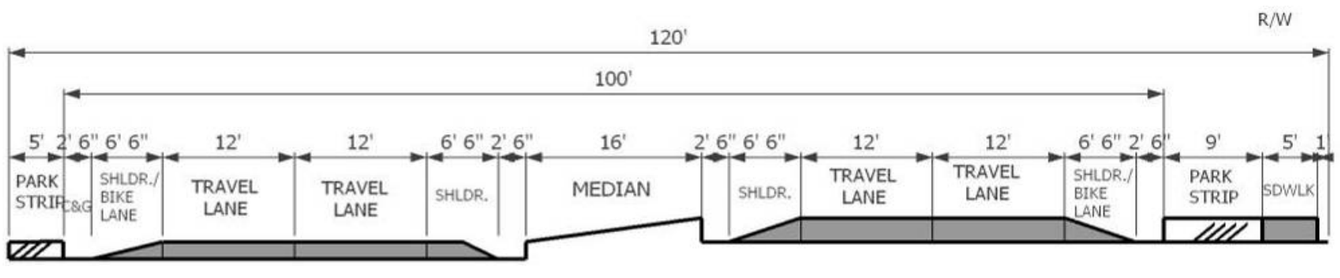


Figure 4- 13: Full Function Classification System

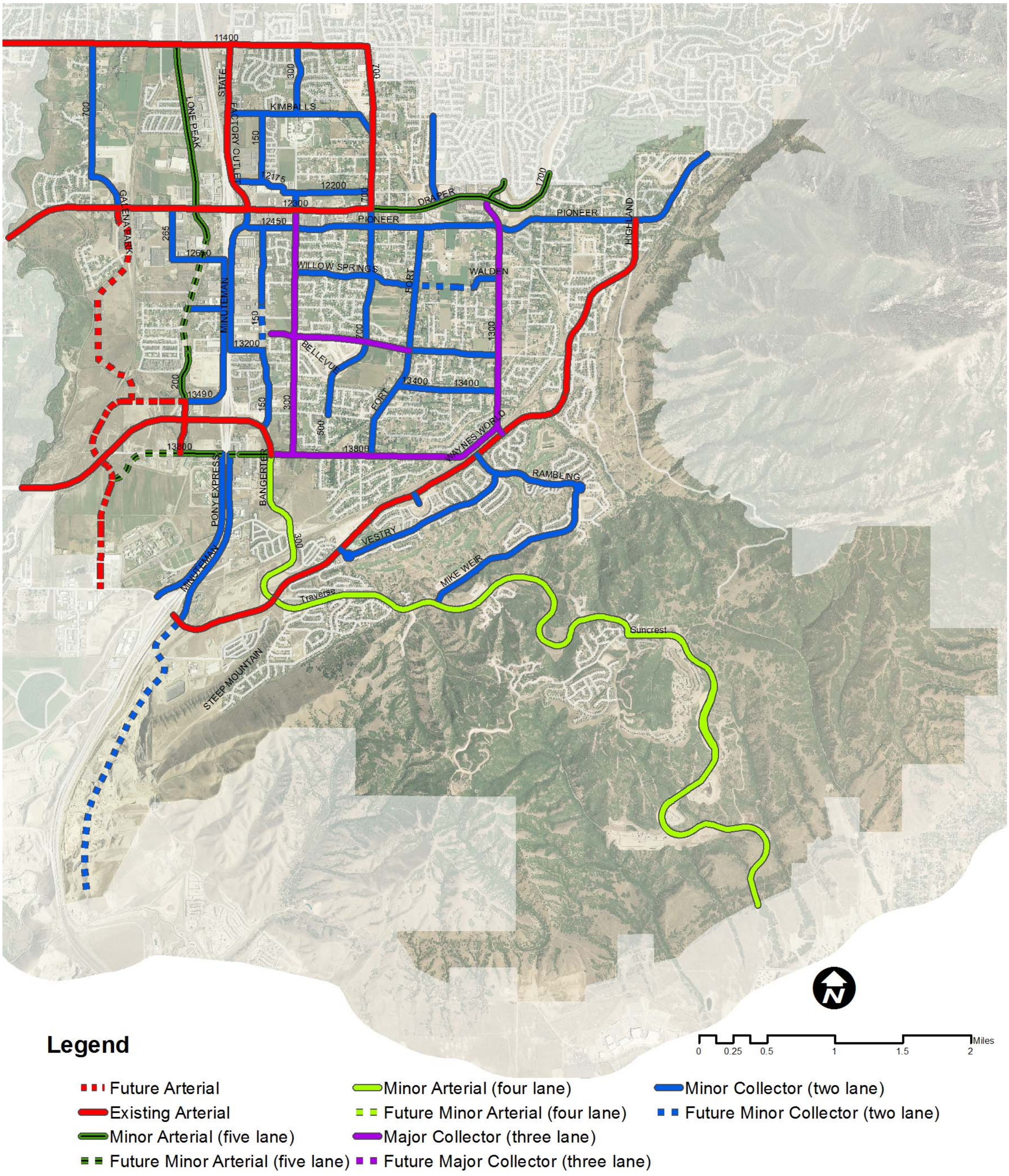


Figure 4- 14: Future Draper Transit Component

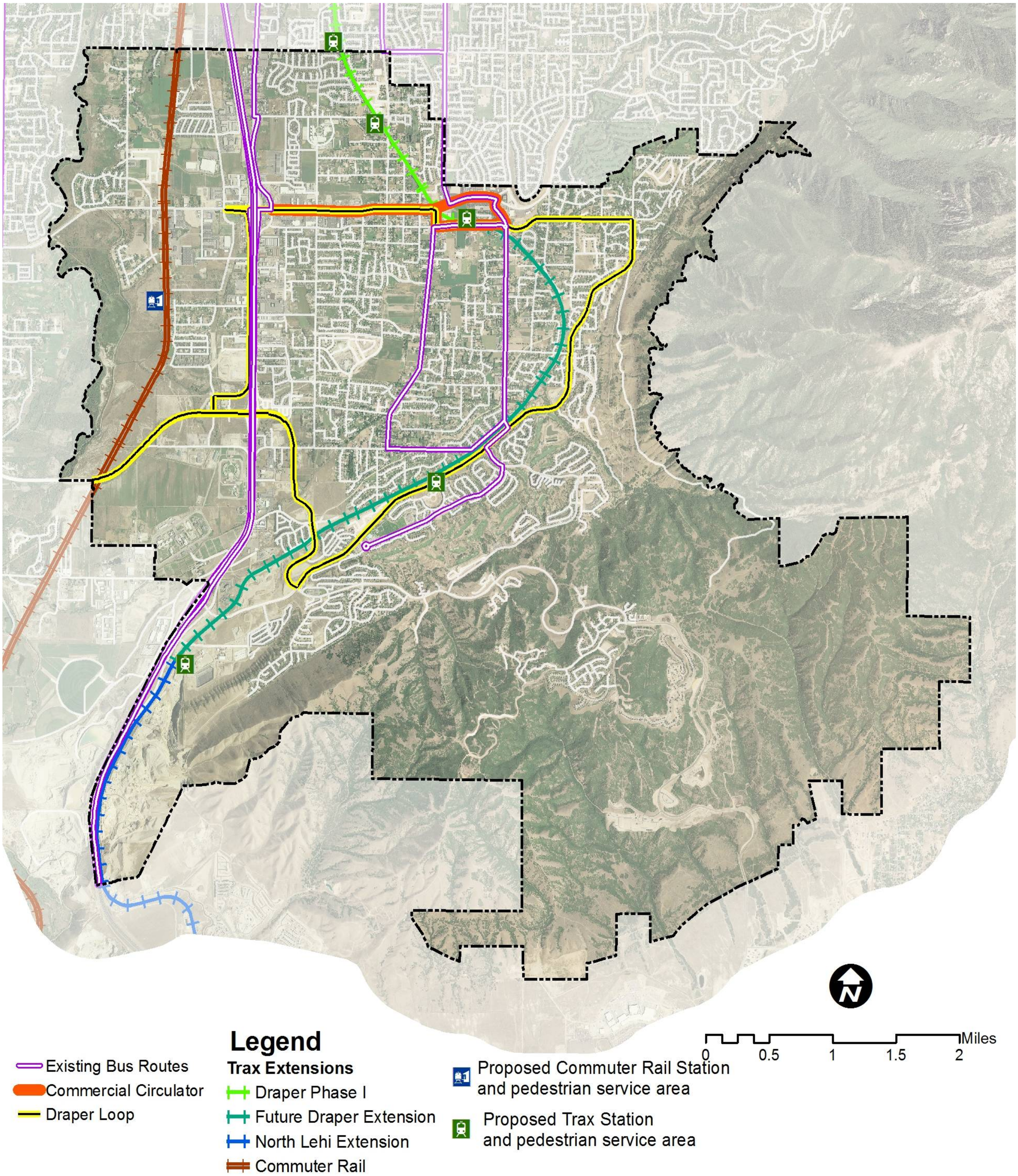


Figure 4- 15: Master Transportation Plan, Bike Component

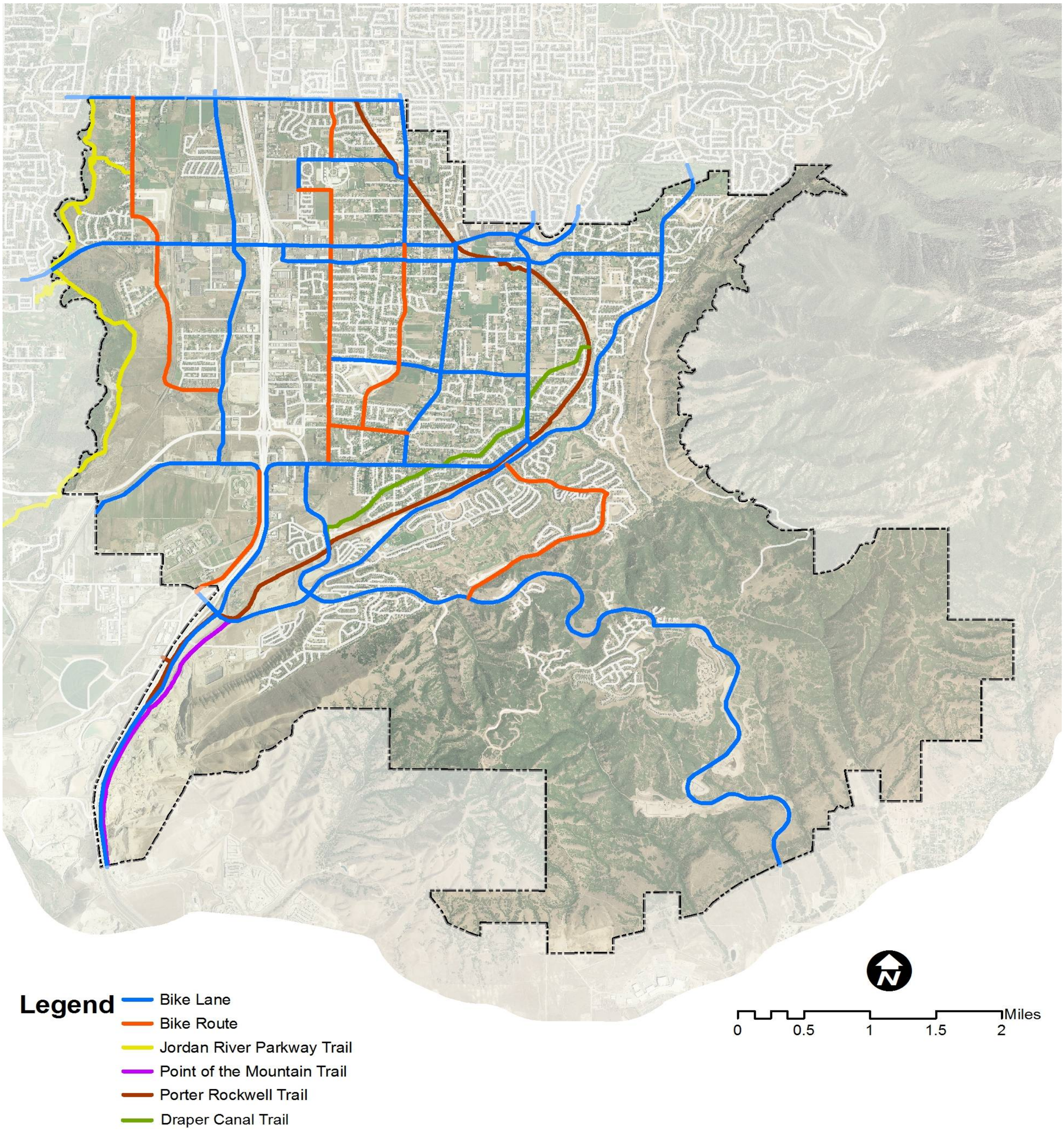


Figure 4- 16: Truck Routes

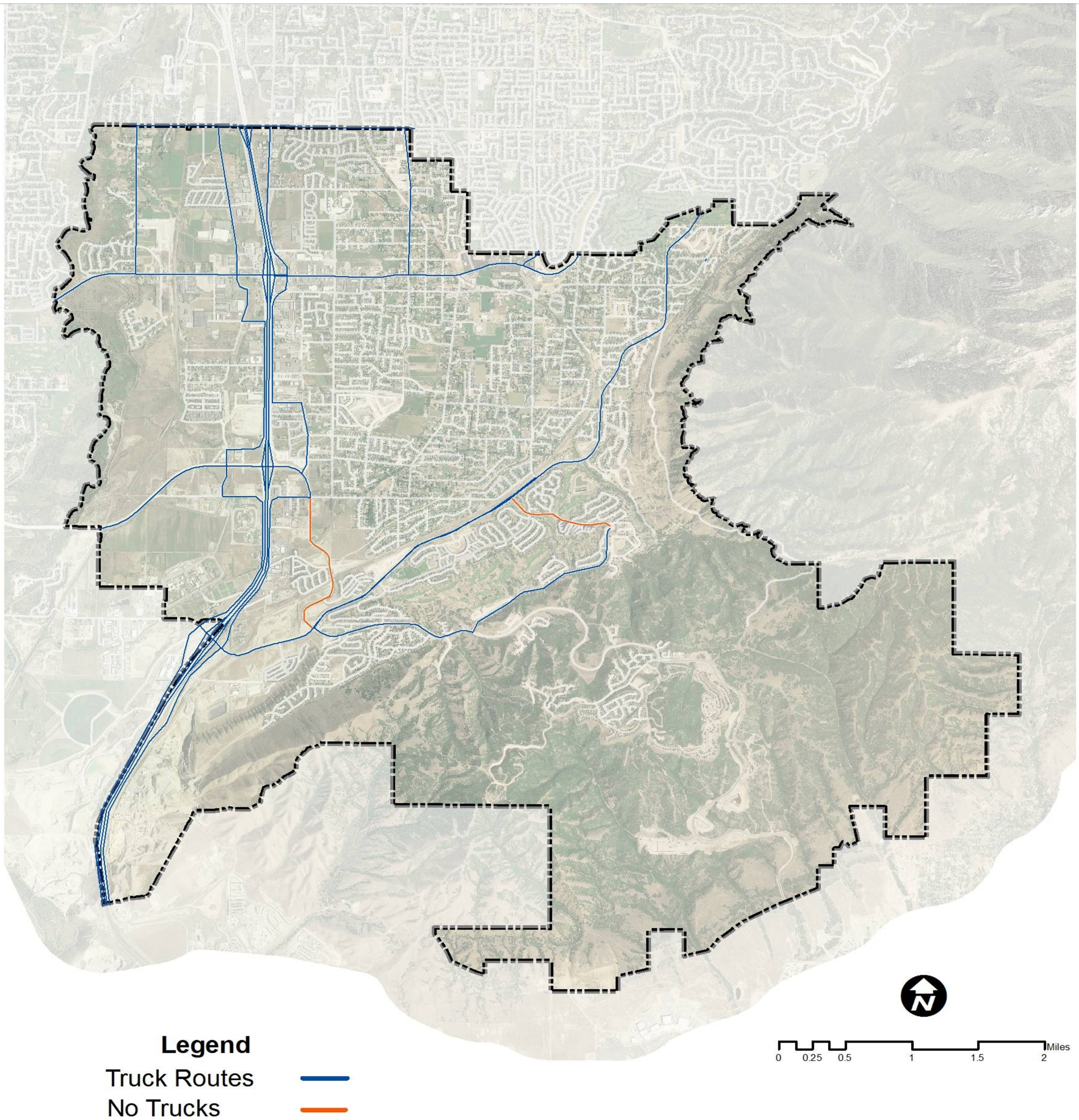


Figure 5- 1: Improvements by phase

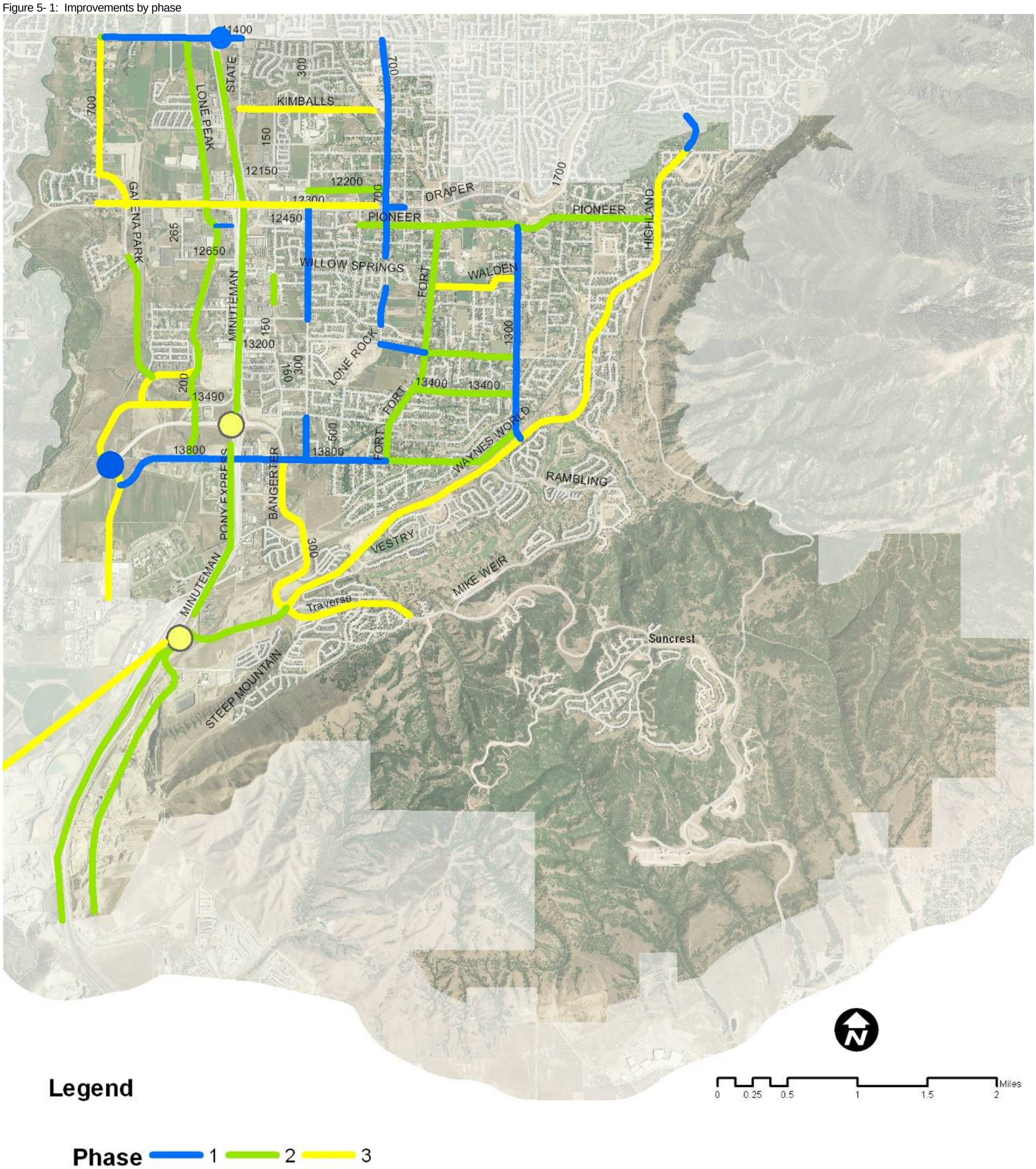


Figure 6- 1: Current and Future Controlled Intersections

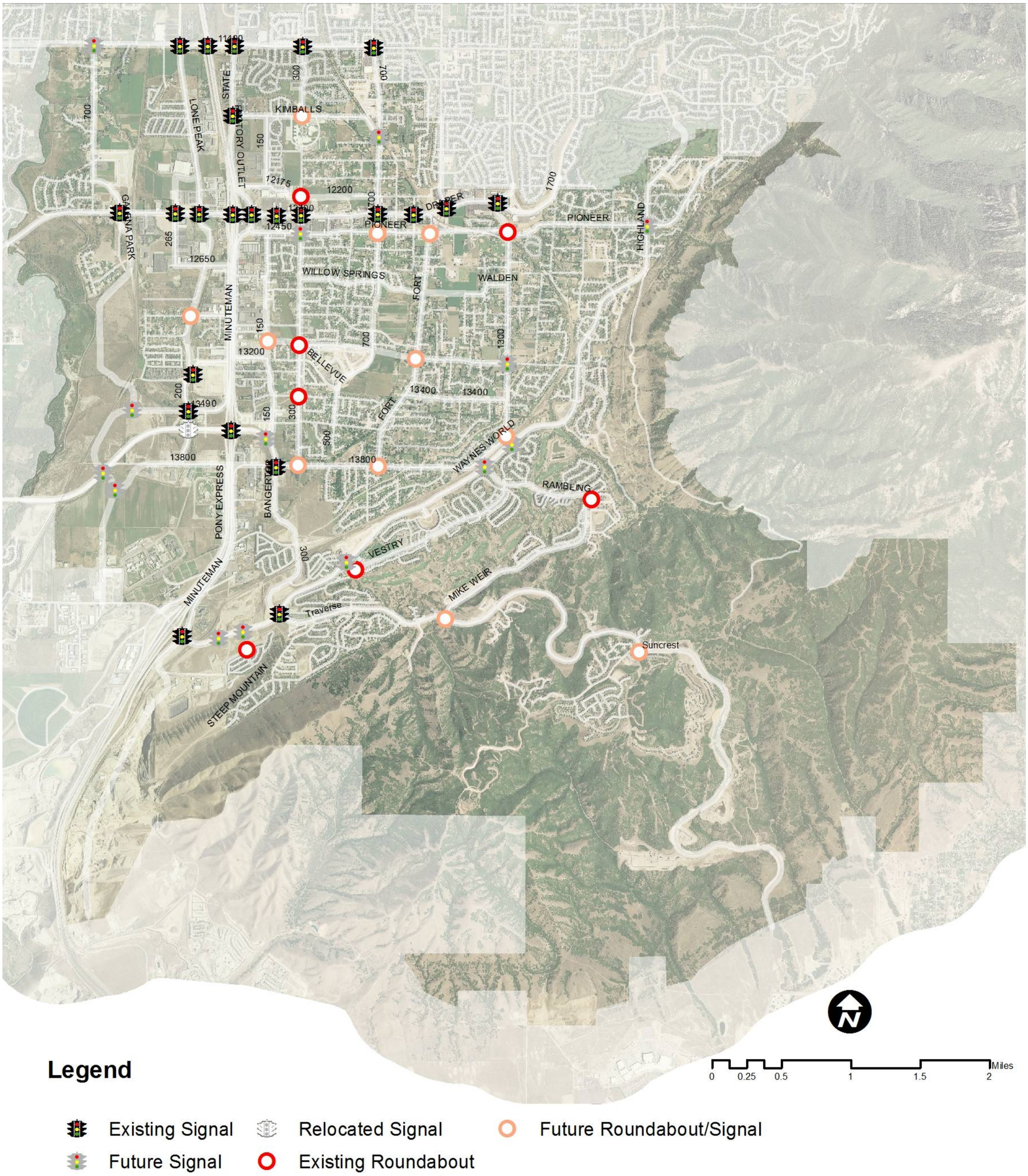
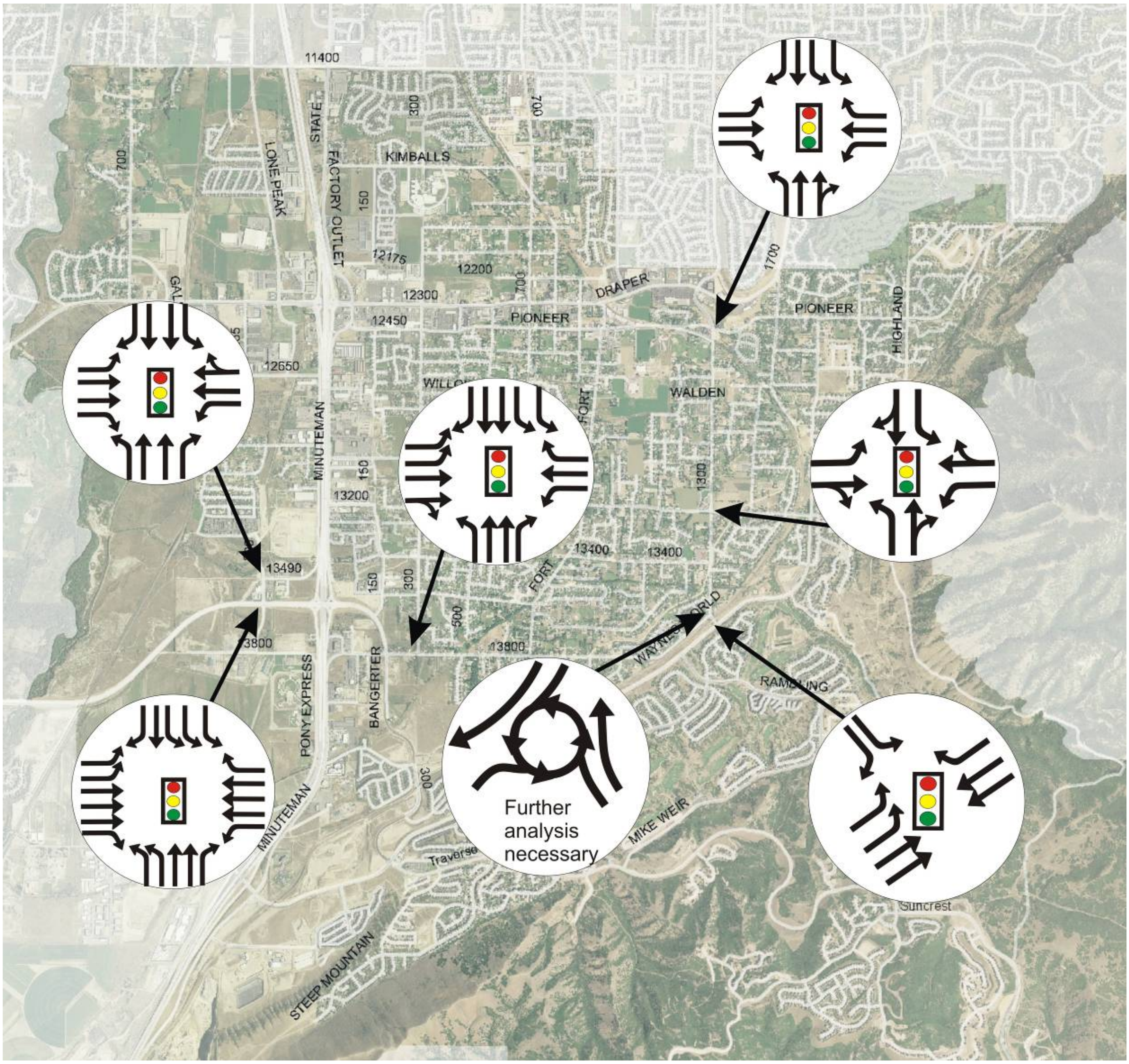



Figure 6- 2: Specific Intersection Lane Configuration