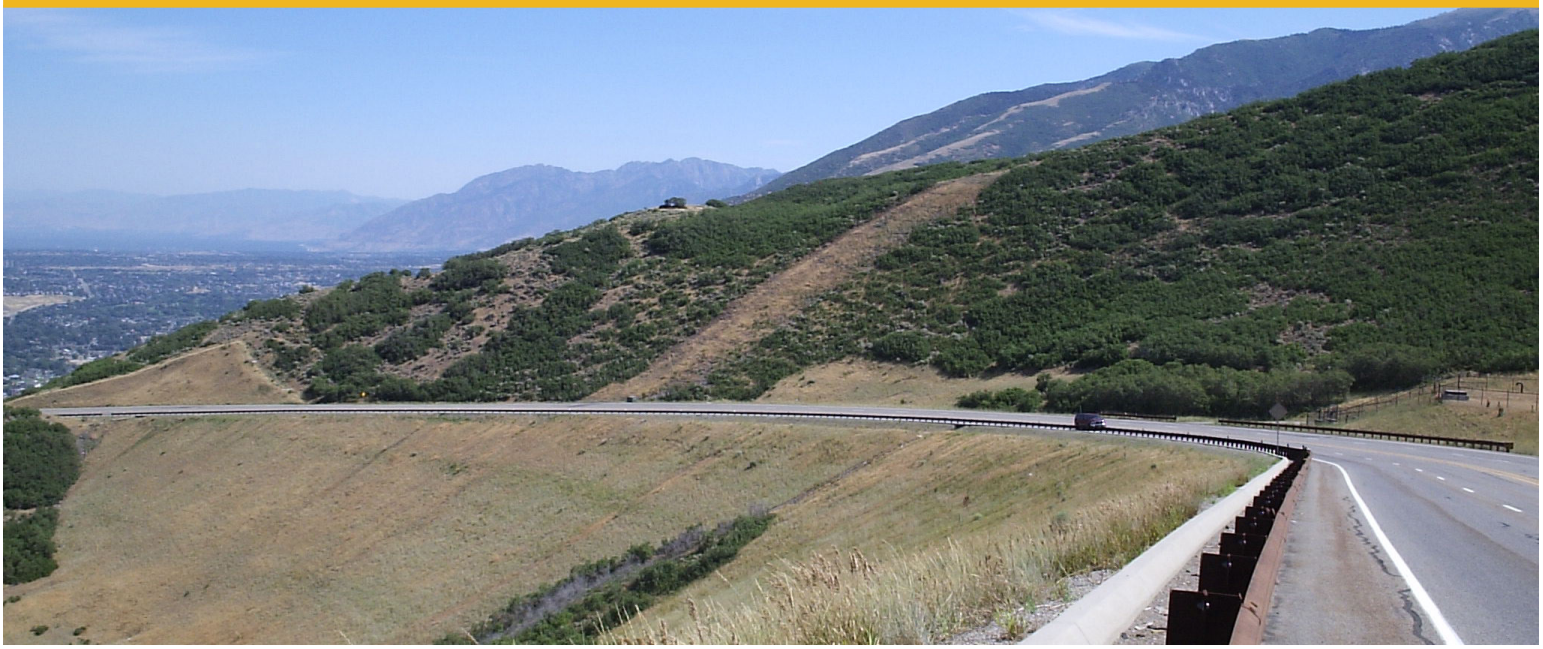
DRAPER CITY

Draper City Master Transportation Plan

NOVEMBER 2019



Parametrix

Master Transportation Plan

Prepared for

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KEY TERMS

AASHTO	American Association of State Highway and Transportation Officials
ACS	American Community Survey
BRT	bus rapid transit
CFP	Capital Facilities Plan
CTC	Citizen Transportation Committee
FrontRunner	commuter rail
HAWK	high-intensity activated crosswalk beacon
I-15	Interstate 15
ITE	Institute of Transportation Engineers
LEHD	Longitudinal Employer-Household Dynamics
LODES	LEHD Origin-Destination Employment Statistics
LOS	Level of Service
MTP	Master Transportation Plan
MUTCD	Manual on Uniform Traffic Control Devices
NACTO	National Association of City Transportation Officials
NAICS	North American Industry Classification System
NCHRP	National Cooperative Highway Research Program
NHTSA	National Highway Traffic Safety Administration
OPM	Office of Personnel Management
QCEW	Quarterly Census for Employment and Wages
RTP	Regional Transportation Plan
SE	socioeconomic
TAZ	traffic analysis zone
TDM	Travel Demand Model
TRAX	light rail
UDOT	Utah Department of Transportation
UP	Union Pacific railroad
UTA	Utah Transit Authority
VMT	vehicle miles traveled
WFRC	Wasatch Front Regional Council
WFRC-MAG	Wasatch Front Regional Council-Mountainland Association of Governments

1. INTRODUCTION

1.1 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 City 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 hills looking west

Transit service options available within Draper City include Utah Transit Authority's (UTA) light rail TRAX Blue Line and UTA's FrontRunner commuter rail. UTA also provides Draper City with bus services and routes located throughout 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.

1.2 Purpose of this Plan

The purpose of the Draper City Master Transportation Plan (MTP) 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 City 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 several reasons that precipitate the necessity of a Master Transportation Plan such as:

- The completion of several Capital Facilities Plan projects;
- Transportation challenges due to major changes within the city, such as the pending relocation of Utah State Prison and the future development of the former prison site;
- Anticipation of traffic impacts as a result of current and future developments;

- The need to remain current with regional issues; and
- The need to identify and respond to known "hotspot" transportation areas.

This plan has been organized into six chapters which cover the components of the transportation plan. Chapter 1 is an introduction, which covers Draper City goals, and includes a high-level view of transportation issues and challenges. Chapter 2 reviews Draper City's existing conditions and compares Draper City to identified peer cities for comparisons. Chapter 3 reviews future transportation scenarios that Draper City will likely encounter. Chapter 4 presents the Master Transportation Plan and makes transportation implementation recommendations. Chapter 5 proposes funding and details a Capital Facilities Plan. Chapter 6 addresses several specific areas of concern. In addition to these chapters, 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 City citizens have come to know.

The utilization of all other existing commuter options, such as commuter rail, light rail, bus, pedestrian facilities, and bicycle facilities was also studied to assess additional needs of Draper City citizens. The accommodation and support of all forms of transportation is a key part of any successful transportation plan.

1.3 Draper City Vision

Draper City is a city that has a small-town feel, is rich in rural heritage, and has the convenience of metropolitan opportunities. Citizens of Draper City want to manage continuing growth within the city so that they can maintain the high quality of life that they have grown accustomed to. An efficient and well-performing transportation system is a major component of this vision, and the 2019 Draper City Master Transportation Plan will outline necessary steps to satisfy these 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 City is clean, pleasant, pastoral, has a small-town feeling and sense of identity.
- Pride
  - Citizens are proud to call Draper City "home," and are involved in community well-being.

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

1.4 Citizen Transportation Committee

Draper City's Citizen Transportation Committee (CTC) was organized in 2007 to assist with the creation of the 2007 Master Transportation Plan. The committee was tasked with identifying transportation concerns within Draper City, and with the development of objectives and goals to address these issues. These goals are carried forward into the 2019 Master Transportation Plan.

1300 East, Pioneer Road (12400 South) Roundabout

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 City

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.

2. EXISTING CONDITIONS

2.1 Introduction

The existing conditions assessment is the foundation for the development a transportation plan. This chapter examines the demographic profile of Draper City and its implications to the transportation plan. A comparative analysis of peer cities is also included to provide insight to where Draper City sits among its peers. And finally, existing transportation networks for all modes and existing land use in the city are recorded.

2.2 Demographics

Draper City has experienced tremendous growth over the last two and a half decades, see Figure 2-1. The largest population growth occurred between 1990 and 2000 with an average annual growth rate of approximately 13 percent, adding about 18,000 new residents during the decade. The following decade, 2000 to 2010, Draper City grew and average of five percent annually, adding approximately 17,000 new residents in the decade.

Draper City continues to grow today, although with a lower growth rate, which may reflect the supply of developable land decreasing. The change between 2010 and 2016, which is the most recent data available, was approximately two percent. Draper City grew by approximately 4,000 residents during this period.

Draper City Hall on Pioneer Road (12400 South)

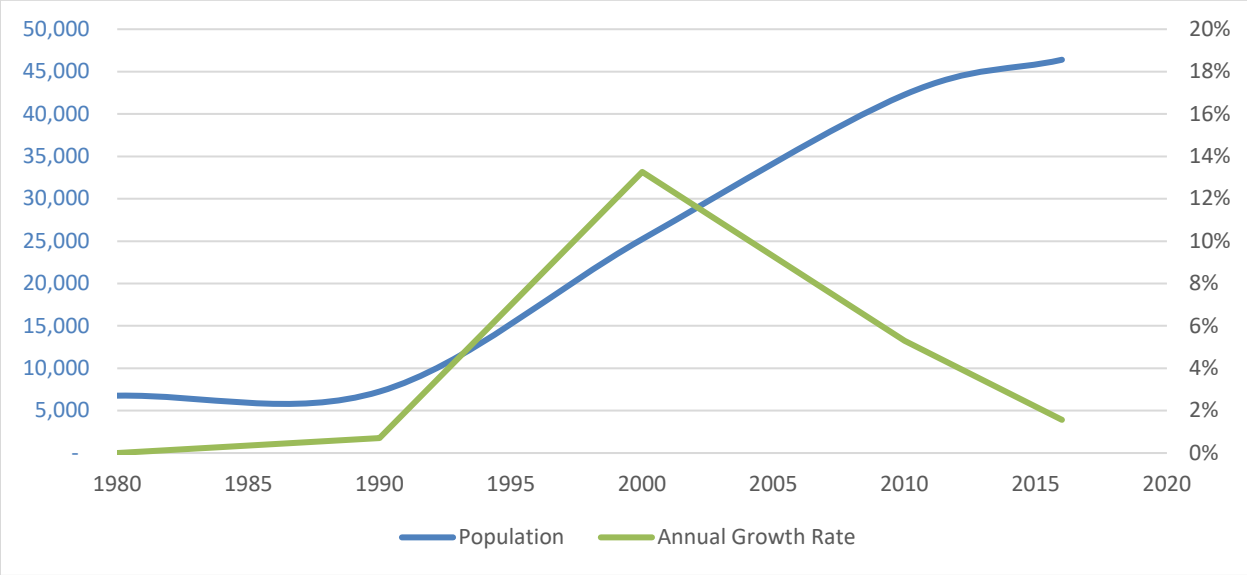


Figure 2-1. Draper City Population and Annualized Growth Rate 1980-2016
Source: 1980 – 2010 United States Decennial Census, American Community Survey 5-Year Estimate 2012-2016

The Draper City population pyramid illustrates a common Utah trend: a relatively high number of children compared to rest of the population, except for children under 10 years old, see Figure 2-2. Age groups between 35 years old and 49 years old are also disproportionally higher than other groups. The Draper City population pyramid also suggests a recent slowing or decreasing birthrate. It is also possible that new households from immigration are households with fewer young children.

The age distribution of a population is important to a transportation plan because of the variation in mobility needs for different age groups. For example, children are inherently dependent on others for mobility. Similarly, older population groups become more dependent on others for mobility in a car-oriented community as the ability to drive safely diminishes.

For Draper City, the long-term shift to an aging population means the need to address mobility constraints for residents will grow. Strategies may include changing building patterns or promoting other transportation modes. Providing alternatives to single occupant vehicles will improve mobility in addition to reducing single-occupant vehicle miles traveled (VMT).

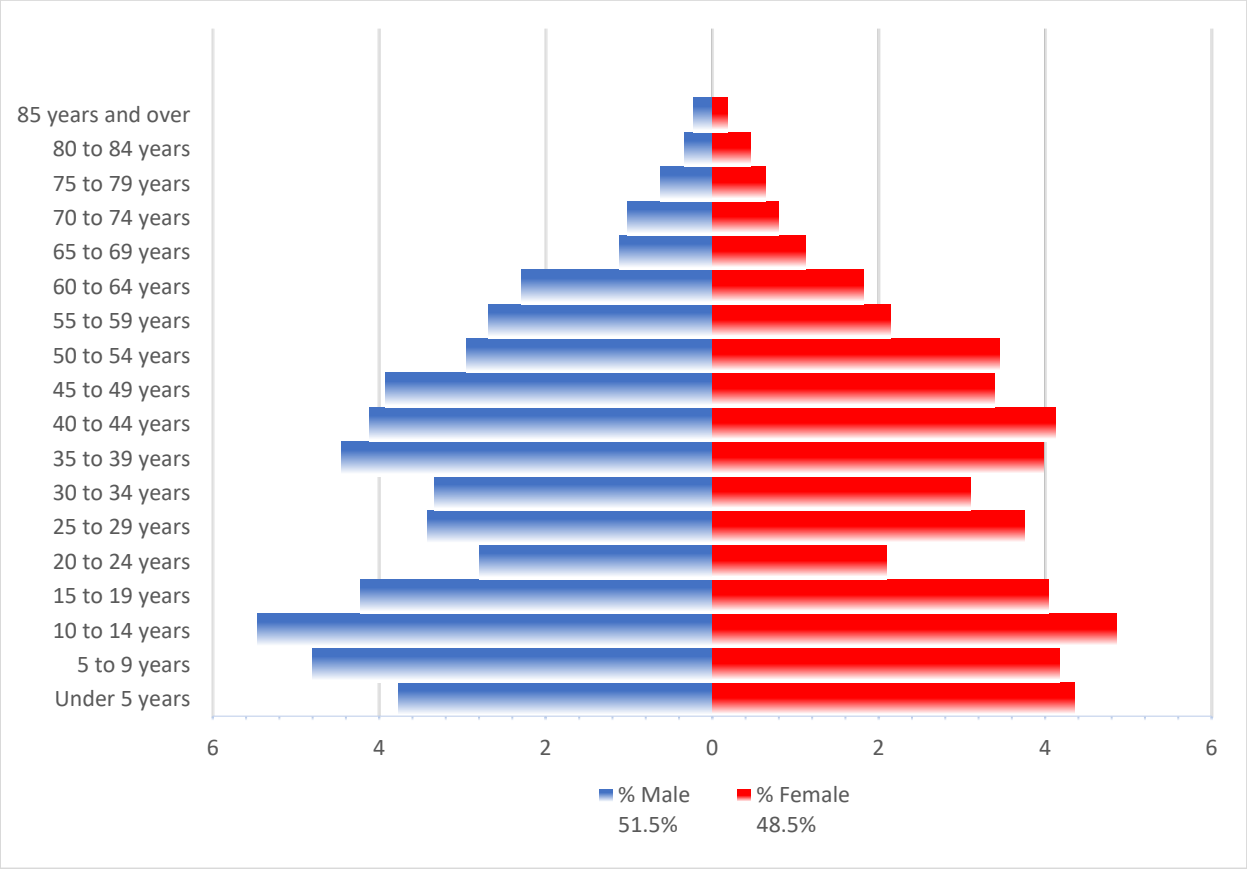


Figure 2-2. Draper City Population Distribution by Age and Sex
Source: American Community Survey 5-Year Estimate 2012-2016

While population demographics are important components to a city transportation plan, household and housing data depict a clearer picture of potential impacts to the transportation system as not all residents are drivers. Trip generation is predicted based on the number and size of households for traffic modeling purposes.

There were approximately 14,500 households in Draper City (ACS 2012-2016). These households are comprised of approximately 11,000 family households, which include married-couple and non-married couple families, 2,000 nonfamily households, and 1,500 other family households with either a male or female head of household, see Figure 2-3. The average number of persons per household was 3.2.

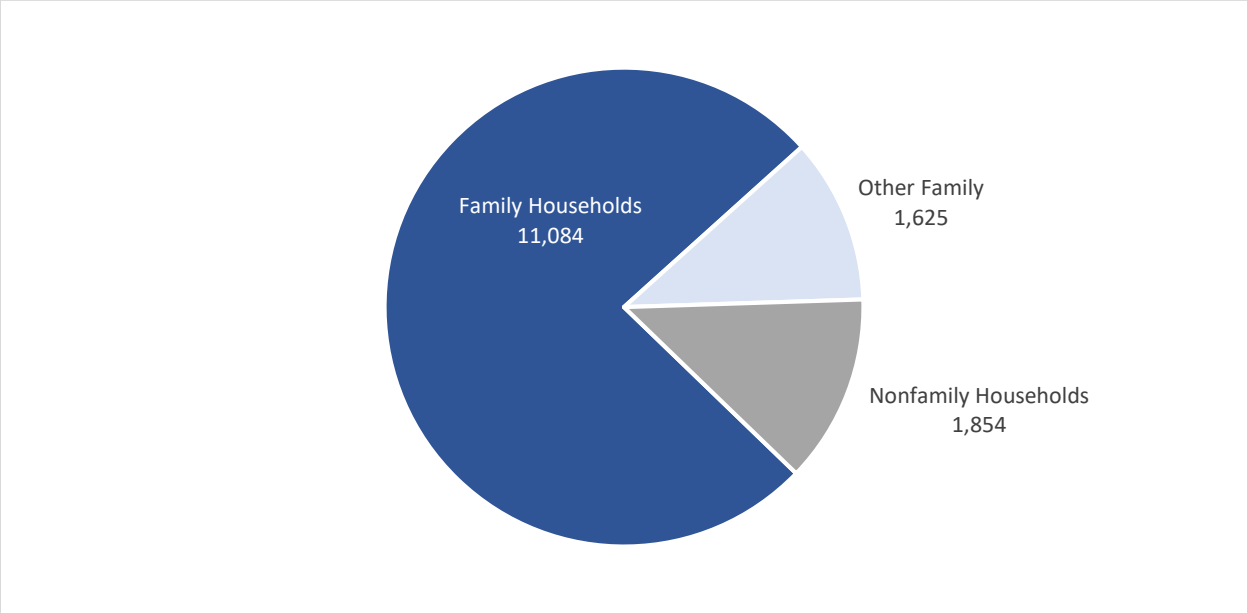


Figure 2-3. Draper City Households
Source: American Community Survey 5-Year Estimate 2012-2016

2.2.1 Employment

Data for Draper City employment are derived from Unemployment Insurance Wage Records, Office of Personnel Management (OPM), and the Quarterly Census for Employment and Wages (QCEW). Data are consolidated in Longitudinal Employer-Household Dynamics (LEHD) Origin-Destination Employment Statistics (LODES), a product of the United States Census.

There were approximately 29,500 jobs in Draper City as of 2015, the most recent year of data availability. This is an increase of approximately 9,000 jobs from 2010, see Figure 2-4.

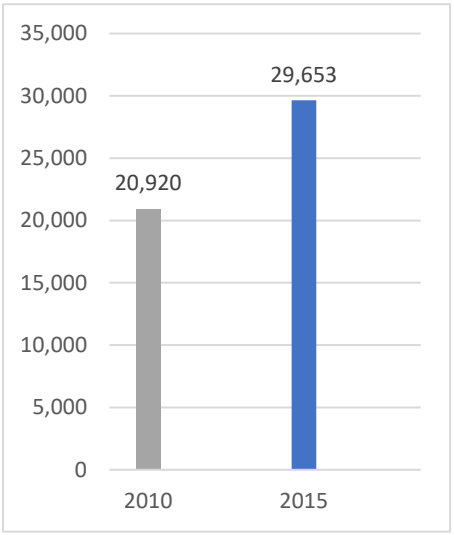


Figure 2-4. Total Jobs in Draper City
Source: LEHD Statistics, 2016

Approximately 2,500 of the jobs in Draper City were held by residents of Draper City. Approximately 27,000 jobs were held by workers commuting into the city. Approximately 17,500 Draper City residents hold jobs outside the city, see Figure 2-5. Note that this figure depicts the general commuter travel to, from or within the city but does not indicate actual direction of movement.

Figure 2-5. Work Trips To, From, and Within Draper City in 2015
Source: LODES Employment Statistics, 2016

Though traditionally thought of as a bedroom community, overall, Draper City imports more workers daily than it exports to other cities. This pattern is historically consistent looking back to 2002, see Figure 2-6. Draper City job net inflow is about 10,000 workers. This may be related to the increased commercial and retail space in Draper City in the past two decades. Major commercial developments have arisen along 12300 South, Bangerter Highway, and near the Frontrunner station.

While existing employment conditions and worker origin is not directly reflective of the health of place, the regional transportation system is burdened as greater volumes of people commute to jobs farther from their homes. This, in effect, places an increased burden on the Draper City transportation network.

The high rate of worker inflow may mean that transit or other modes of transportation could effectively provide mobility for a meaningful number of commuters in areas where jobs are concentrated. A greater mode share of transit users among workers who commute would improve the quality of commute for those workers in addition to potentially impacting roadway congestion. Effectively providing transit for outflow workers is fiscally more challenging due to the low-density of residential development in the city. Density is explored further in Section 2.4.

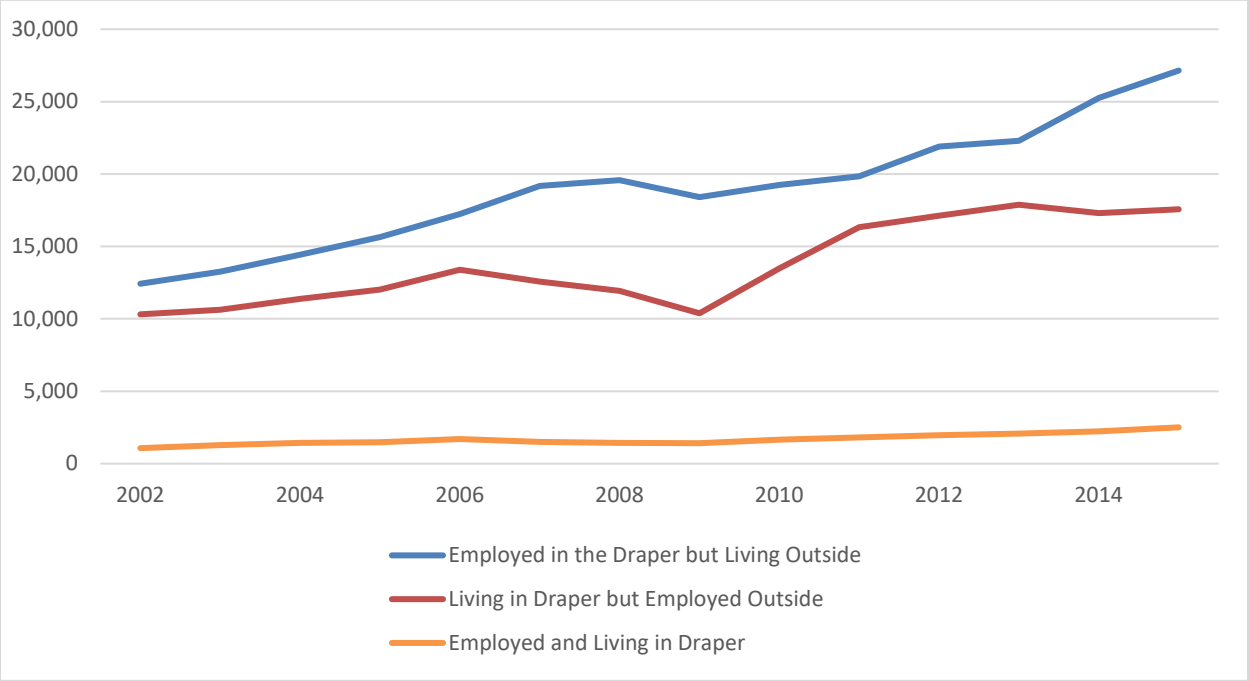


Figure 2-6. Work Trips To, From, and Within Draper City 2002 to 2015
Source: LODES Employment Statistics, 2002 to 2016

Figure 2-7 shows Draper City job distribution based on the North American Industry Classification System (NAICS) index. These jobs are those that were physically located within city limits. Recall that as of 2015, about 12 percent of jobs in Draper City were held by residents of Draper City and that the city is a net importer of workers. This may explain the high number of retail workers that surpass other sectors. Retail workers are almost double the count of many other sectors.

Most industry sectors experienced strong increases from 2010 to 2015. Some of these sectors include Professional, Scientific, and Technical Services; Finance and Insurance; Wholesale Trade; Manufacturing; and Healthcare and Social Assistance. Industry sectors including management, mining, and agriculture experienced smaller growth during the same period. Utilities was the single industry sector to see a decline in workers from 2010 to 2015.

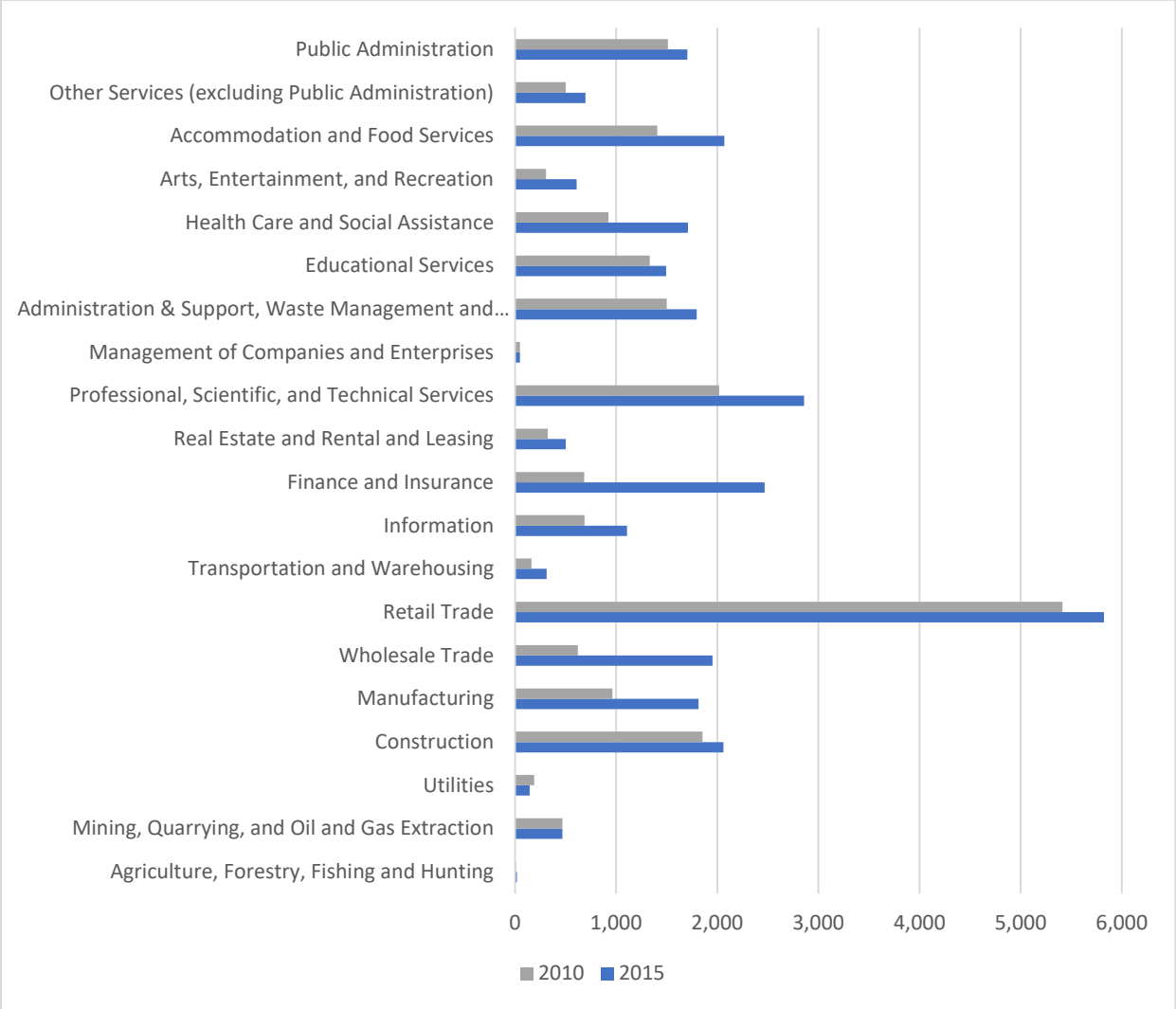


Figure 2-7. Draper City Jobs by NAICS Industry Sector
Source: LEHD Statistics, 2016

Data from the American Community Survey (ACS) provide typical work commute mode and length of trip for Draper City residents. Figure 2-8 compares means of transportation to work for residents. Approximately 76 percent of working Draper City residents drove alone to work, while 11 percent worked at home, seven percent carpooled, three percent took transit, and two percent walked. Less than one percent of Draper City residents rode a bicycle to work. A high percentage of single-occupant vehicle trips to work is consistent with a growing suburban community and may be viewed as an opportunity to implement measures that encourage other modes of transportation to work as a means to combat traffic congestion and delay.

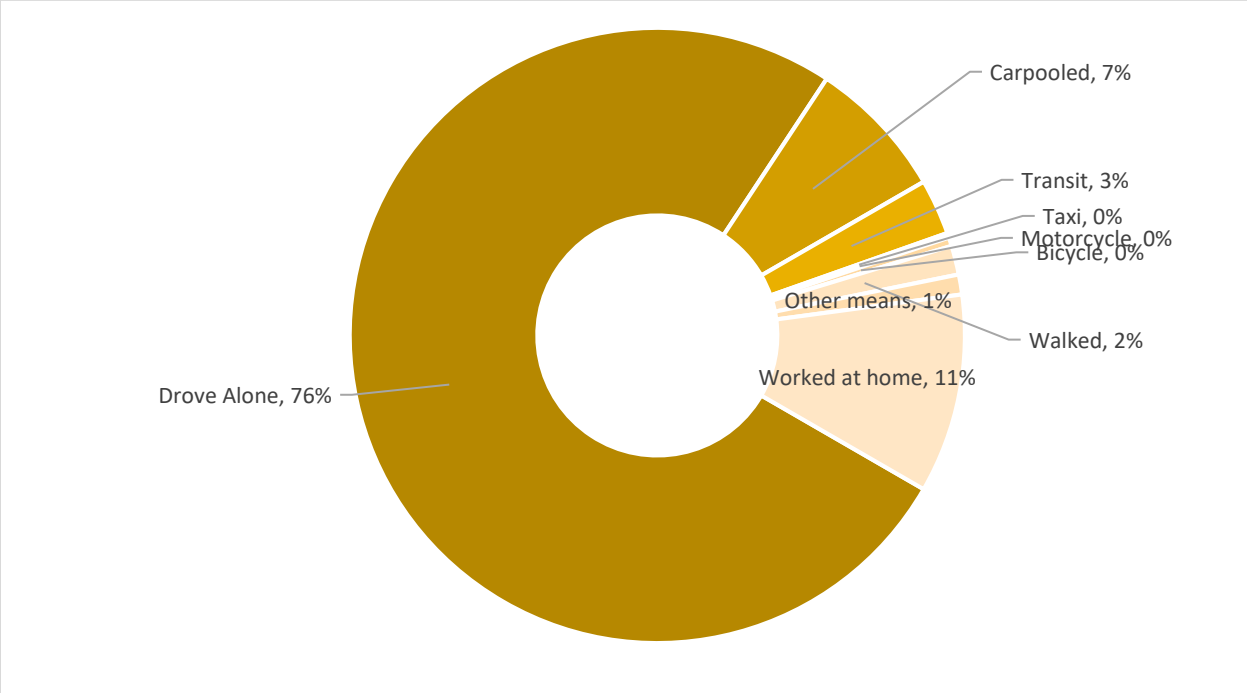


Figure 2-8. Means of Transportation to Work
Source: American Community Survey 5-Year Estimate 2012-2016

The bulk of residents, approximately 44 percent, spend 15 to 30 minutes traveling to work one way. Approximately 32 percent of residents have a commute longer than 30 minutes. Roughly a quarter of residents, approximately 24 percent, have a commute that is less than 15 minutes. Additional travel time estimates are shown in Figure 2-9.

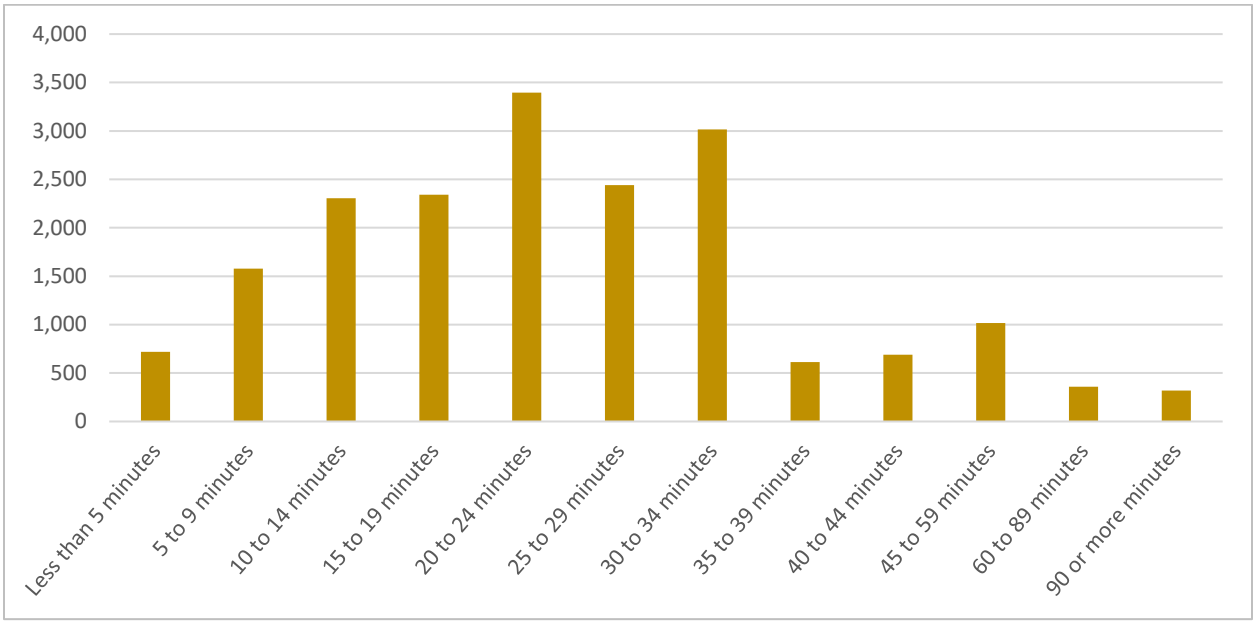


Figure 2-9. Travel Time to Work
Source: American Community Survey 5-Year Estimate 2012-2016

2.3 Peer City Comparisons

Draper City demographic and economic profiles show strong growth in the city. While this is an important component to this plan, a comparative demographic profile will illustrate existing conditions in the city as they compare to several peer cities in Utah. Seven cities were selected as peer cities that share broad similarities with Draper, see Table 2-1. These characteristics include population size, proximity to urban centers, stable residential growth, and expected future growth in both housing and jobs.

Table 2-1. Draper City Peer Cities

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

Draper City and peer cities all experienced population growth from 2010 to 2016, see Figure 2-10. The population increase of cities was roughly similar in terms of the number of people added. However, the growth rate is considerably greater in Herriman, Lehi, and South Jordan, see Figure 2-11. The higher growth rates of these cities are largely attributable to the current boom cycle and the availability of greenfield development. As the region's developable land is exhausted, Draper City and its neighbors will see currently developed land redevelop and will also experience greater demand more frequent infill development. The city's transportation network will need to respond to this in the future.

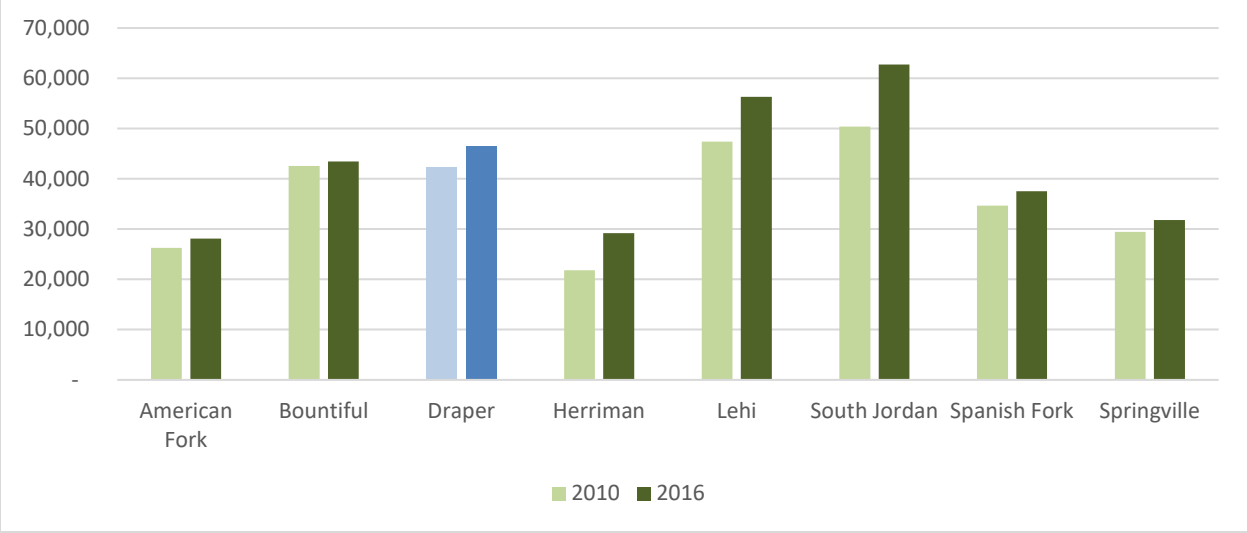


Figure 2-10. Draper City Peer City Population Change
Source: 2010 United States Decennial Census, American Community Survey 5-Year Estimate 2012-2016

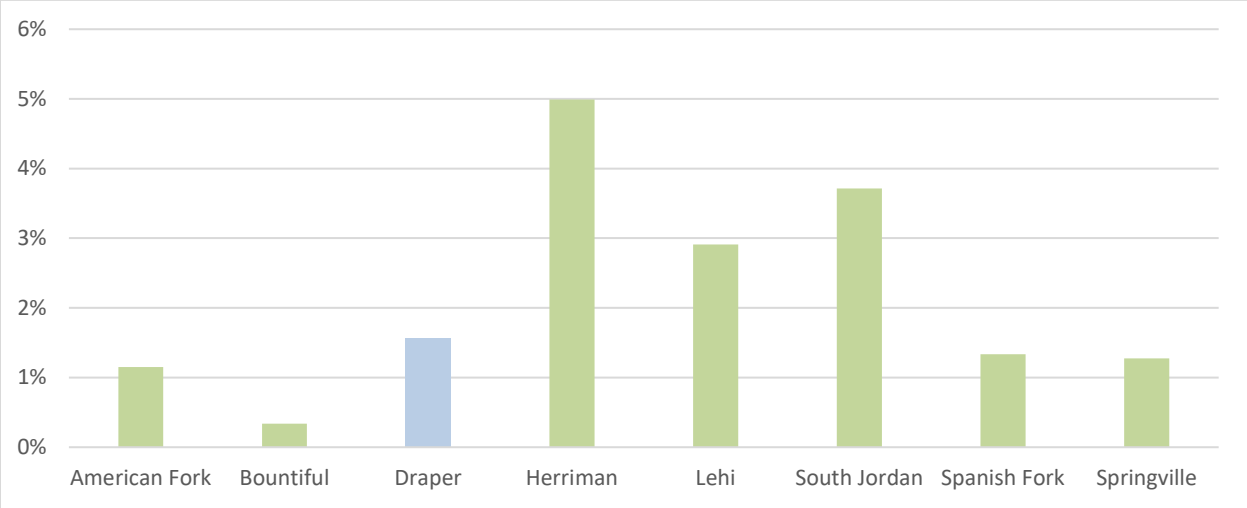


Figure 2-11. Draper City Peer City Annualized Growth Rate 2010-2016
Source: 2010 United States Decennial Census, American Community Survey 5-Year Estimate 2012-2016

Additional data from the ACS provide typical work commute mode and length of trip for Draper City residents and peer cities. Primary commute modes are shown in Figure 2-12 and Figure 2-13. A strong majority of resident workers drive alone to work. This is consistent with the dominant urban form of these communities as they are all primarily car oriented. See Figure 2-13. Although Draper City and its peer cities are predominately auto oriented, transit service and active transportation facilities are expanding as is the ease of their access. Even though alternative travel modes are used for less than 5 percent of resident work trips, Draper City has a higher alternative travel mode share than five of its peer cities. Bountiful and South Jordan both had an alternative travel mode above six percent, see Figure 2-13. Access to Frontrunner an TRAX may be a factor in these cities seeing a higher transit mode share. Draper City might presumably see its transit mode share increase as urban form patterns more effectively respond to transit accessibility. Enhancements to bicycle and pedestrian facilities may also help increase the alternative transportation mode share with improved accessibility to local jobs.

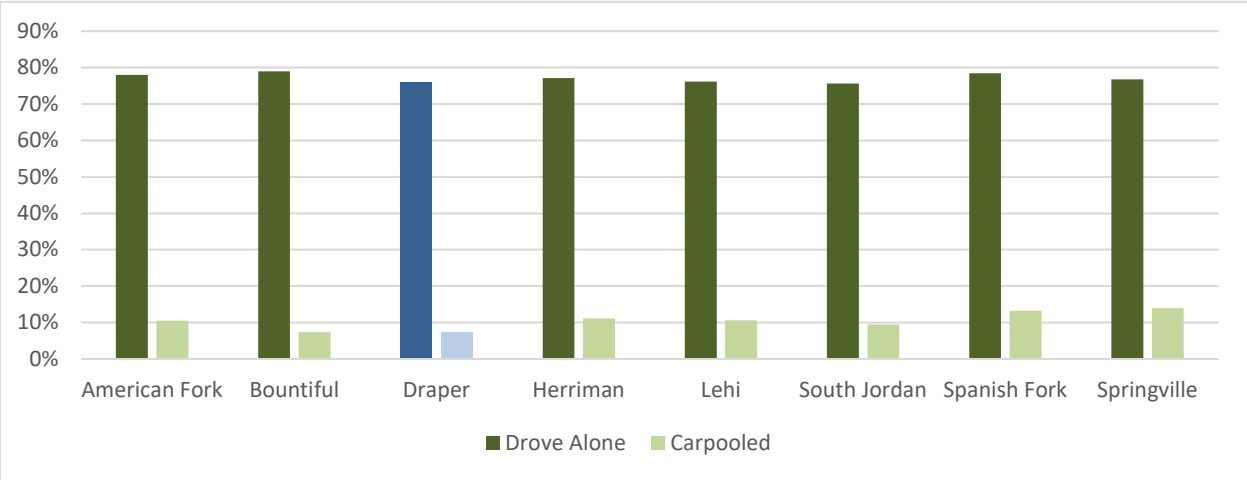


Figure 2-12. Peer City Drive Alone versus Carpool Comparison
Source: American Community Survey 5-Year Estimate 2012-2016

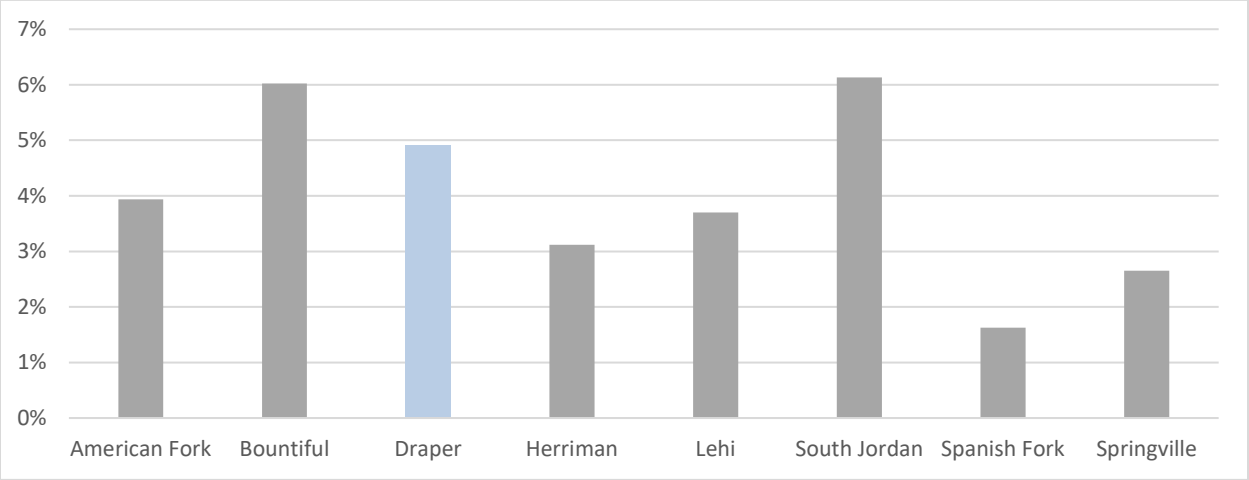


Figure 2-13. Peer City Percent Traveling to Work by Alternative Mode
Source: American Community Survey 5-Year Estimate 2012-2016

2.4 Existing Land Use

Land use in Draper City is consistent with other suburbanized areas in Utah – most uses are segregated, apart from some mixed-use zones. In Draper, The Town Center and Transit Station zones permit mixed-use development as well as moderate residential density of multi-family structures up to 35 dwelling units per acre in some areas. This differs from Multiple Use locations which allow the uses as Mixed Use but do not incorporate multiple uses per structure. Most land in Draper City zoned for residential use is reserved for low density single-family detached structures with one dwelling unit per acre or fewer. Some residential zones permit densities of up to four or twelve dwelling units per acre with dual-family and multi-family structures permitted as of right. See Figure 2-14.

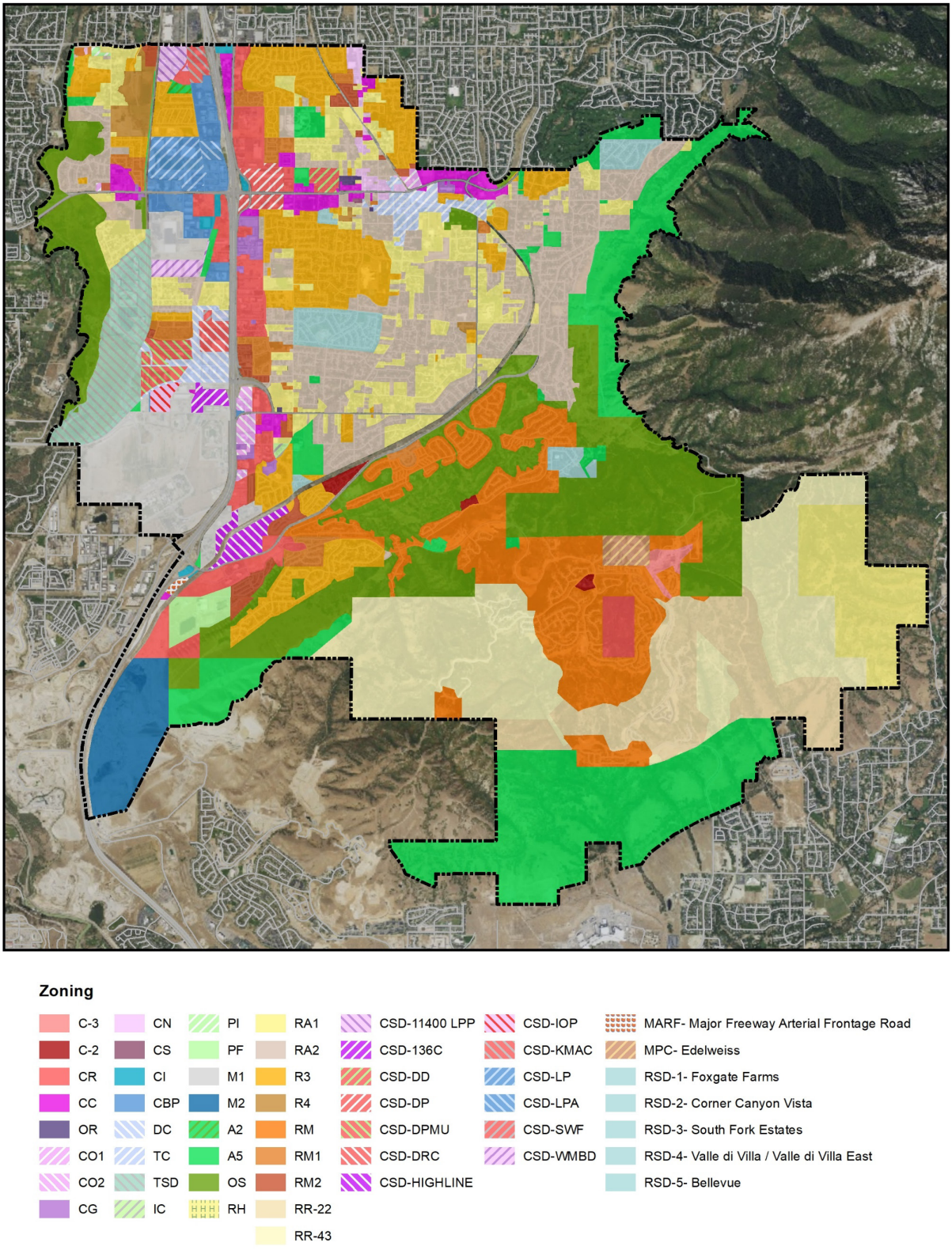


Figure 2-14. Existing Zoning
Source: Draper City

2.4.1 Traffic Analysis Zones (TAZ)

Transportation planning depends on estimating future land uses in addition to demographic changes. This information is used in a regional computer-based model, the Travel Demand Model (TDM), which forecasts trips by origin and destination. A traffic analysis zone (TAZ) is a geographical unit, geographically smaller than a municipality, and comparable in size to a census block group. Traffic analysis zones are the foundation of a TDM and were defined by the Wasatch Front Regional Council. Demographic data is aggregated to the TAZ geography and includes number of households, resident population, and number of jobs, see Figure 2-15 and Figure 2-16, respectively.

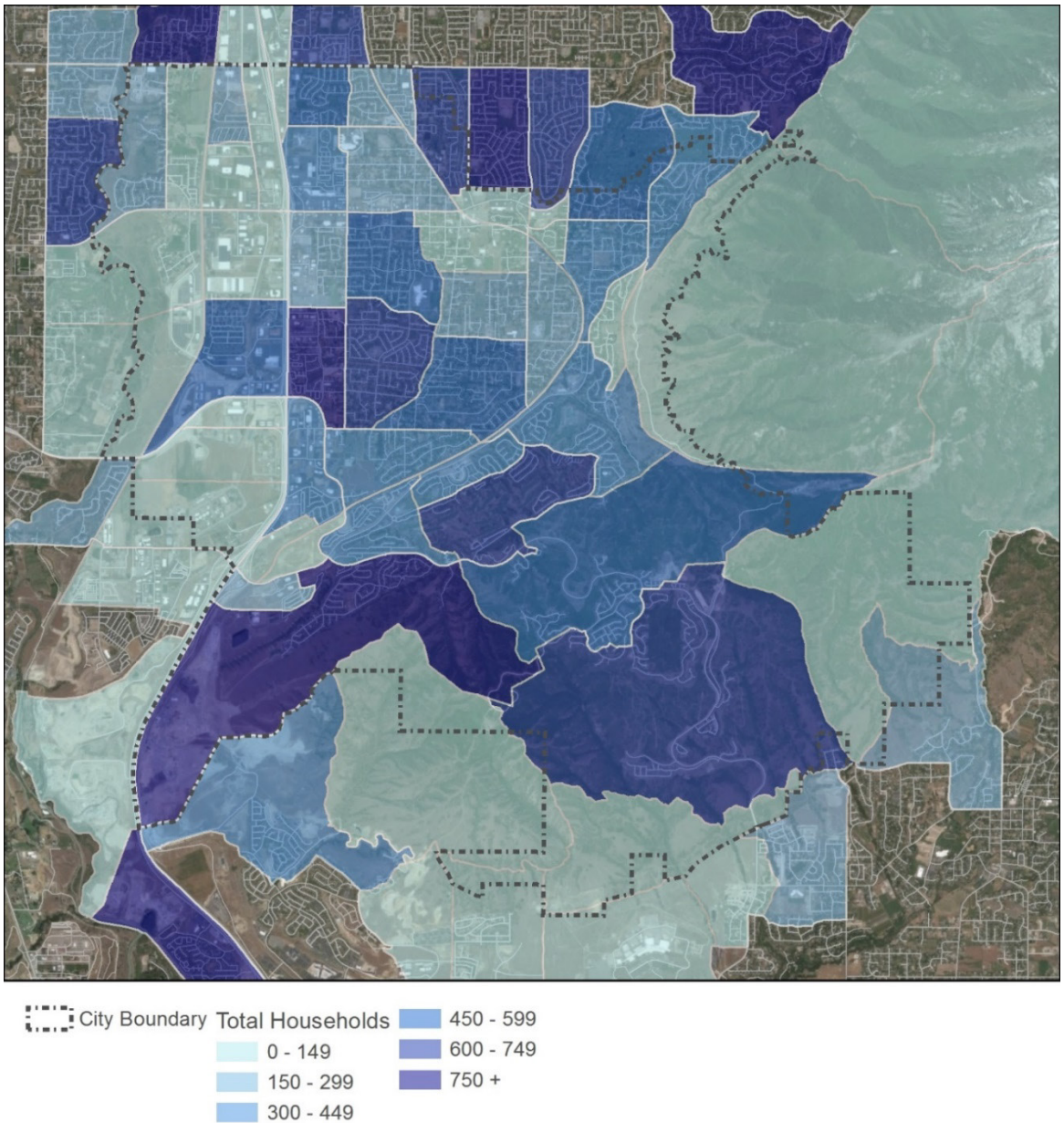


Figure 2-15. Draper City TAZ Boundaries and Total Households
Source: WFRC, Draper City

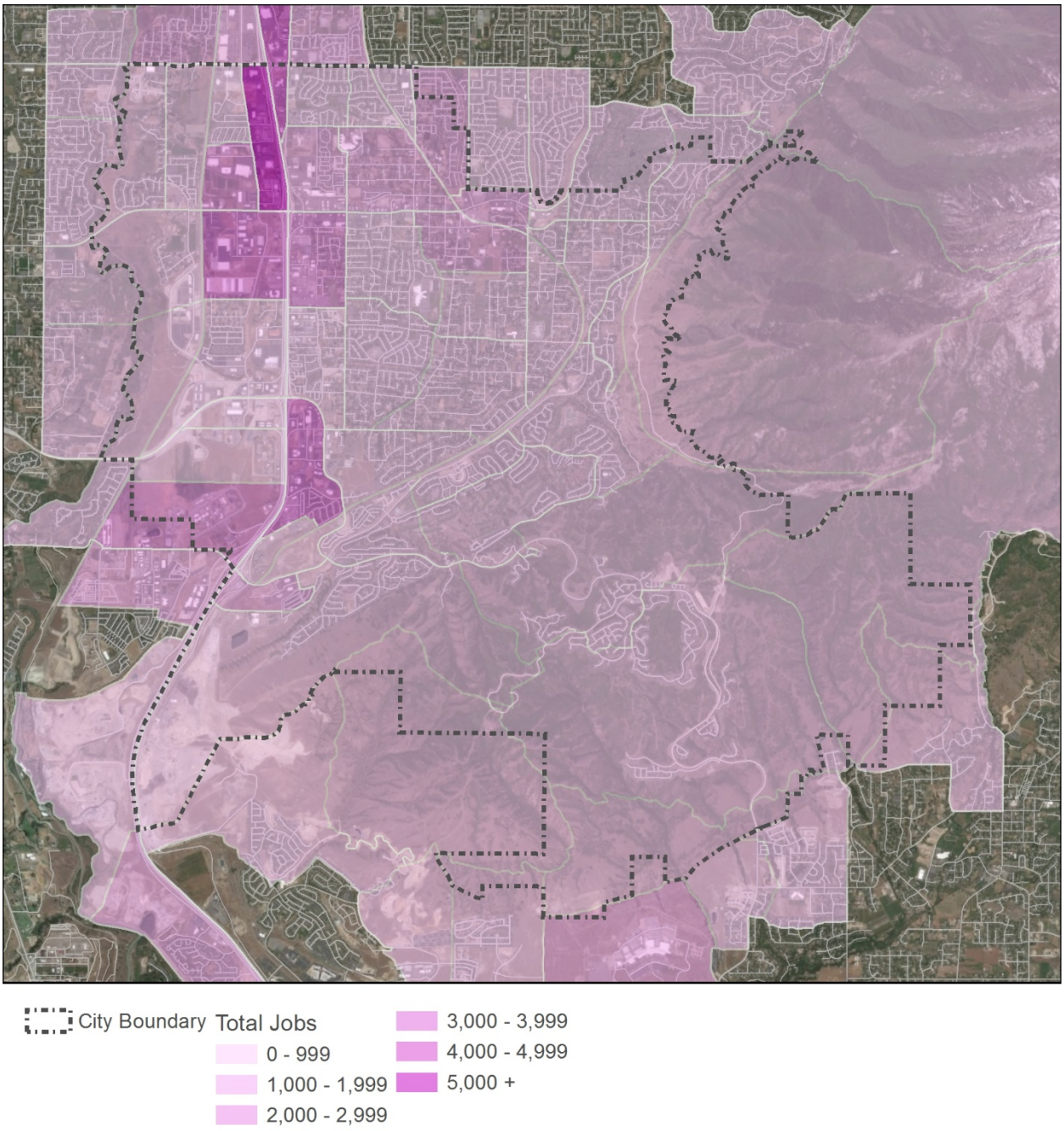


Figure 2-16. Draper City TAZ Boundaries and Total Jobs
Source: WFRC, Draper City

2.5 Alternative Travel Modes

2.5.1 Transit

Rail and bus transit modes serve Draper City and are provided by UTA, see Figure 2-17. Existing rail transit includes commuter rail (FrontRunner) and light rail (TRAX). FrontRunner was expanded to Draper City and destinations south in 2012 offering access to Ogden, Provo, and other cities along the Wasatch Front. FrontRunner currently provides service with 60 minute headways Monday through Saturday with 30 minute headways during peak travel times Monday through Friday. The TRAX Blue Line was extended to its current terminus at the Draper City Town Center in 2013. TRAX serves points north of Draper City with 15 minute headways Monday through Friday and 20 minute headways Saturday and Sunday.

The Frontrunner and TRAX lines represent major transit investment corridors in Draper City and connections to surrounding land uses are critical to maximize the value of the transit investment. All three Draper TRAX stations have direct access to the regional trail system via the Porter Rockwell Trail. Additionally, the Draper Town Center TRAX station is located within the Town Center land use designation. The Draper Frontrunner station area is designated as a Transit Station District land use. There is significant commercial office development and some multi-family residential development within a half mile of the station.

Existing bus service in Draper includes four bus routes with semi-frequent service. Bus route 871 has the most regular service with 30 minute headways all day. Bus route F514 provides 30 minute peak headways and 60 minute off-peak headways. Bus route 526 provides 3 AM trips and 3 PM trips only. The F546 is a looping route with 60 minute headways.

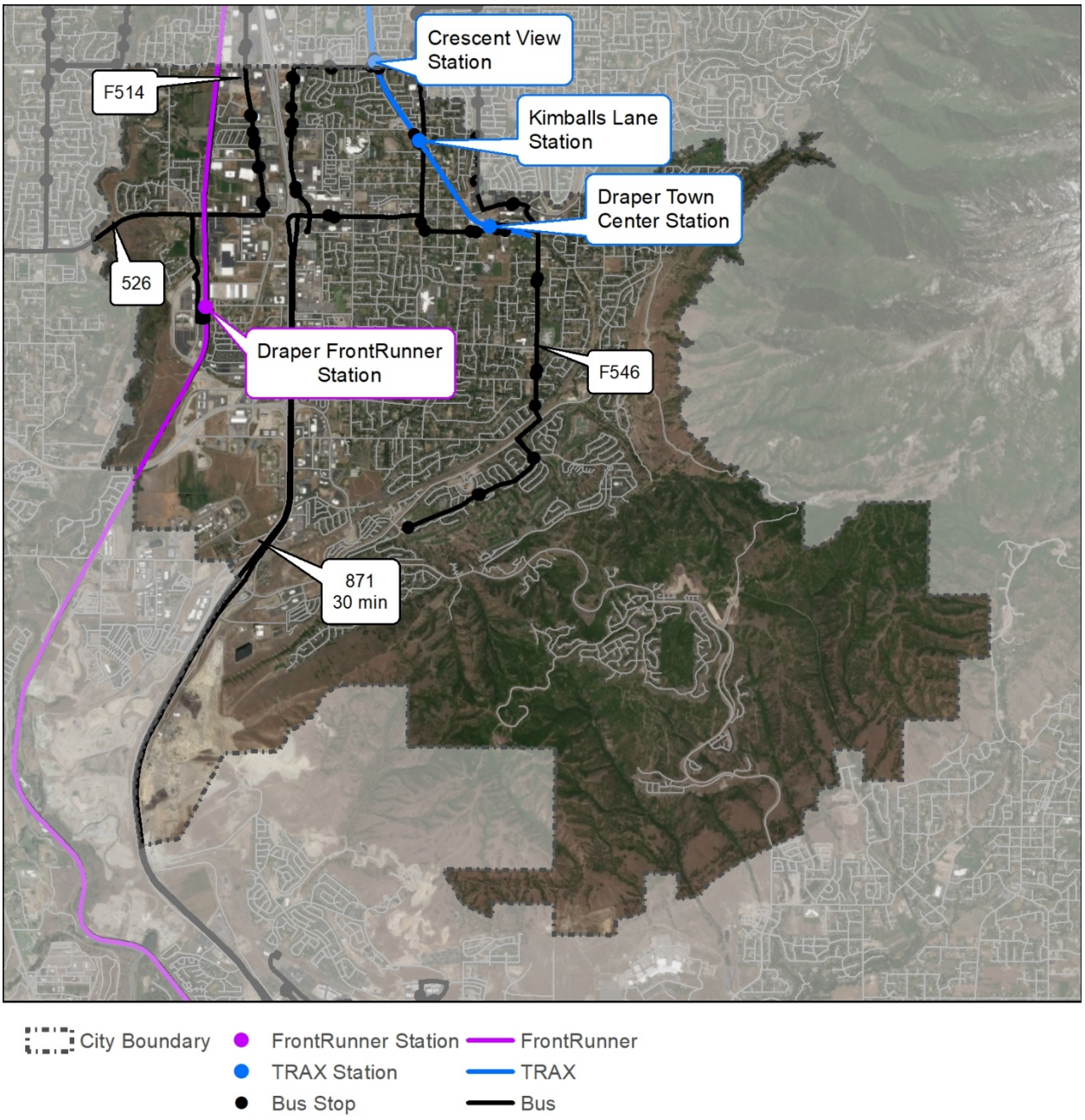


Figure 2-17. Existing Transit Service
Source: UTA, Draper City

2.5.2 Pedestrian and Bicycle

Draper City has a variety of active transportation choices and access to an extensive trail network for recreation, see Figure 2-18. Some bike routes are designated through shared-lane markings or signs but do not provide designated lanes. Trails include The Porter-Rockwell Trail, Willow Creek Trail, and Draper City Canal Trail. Conventional bike lanes are found on many north/south and east/west corridors and include: 12300 South – east/west route crossing I-15, 1300 East – north/south route with gaps, and Fort St – north/south route.

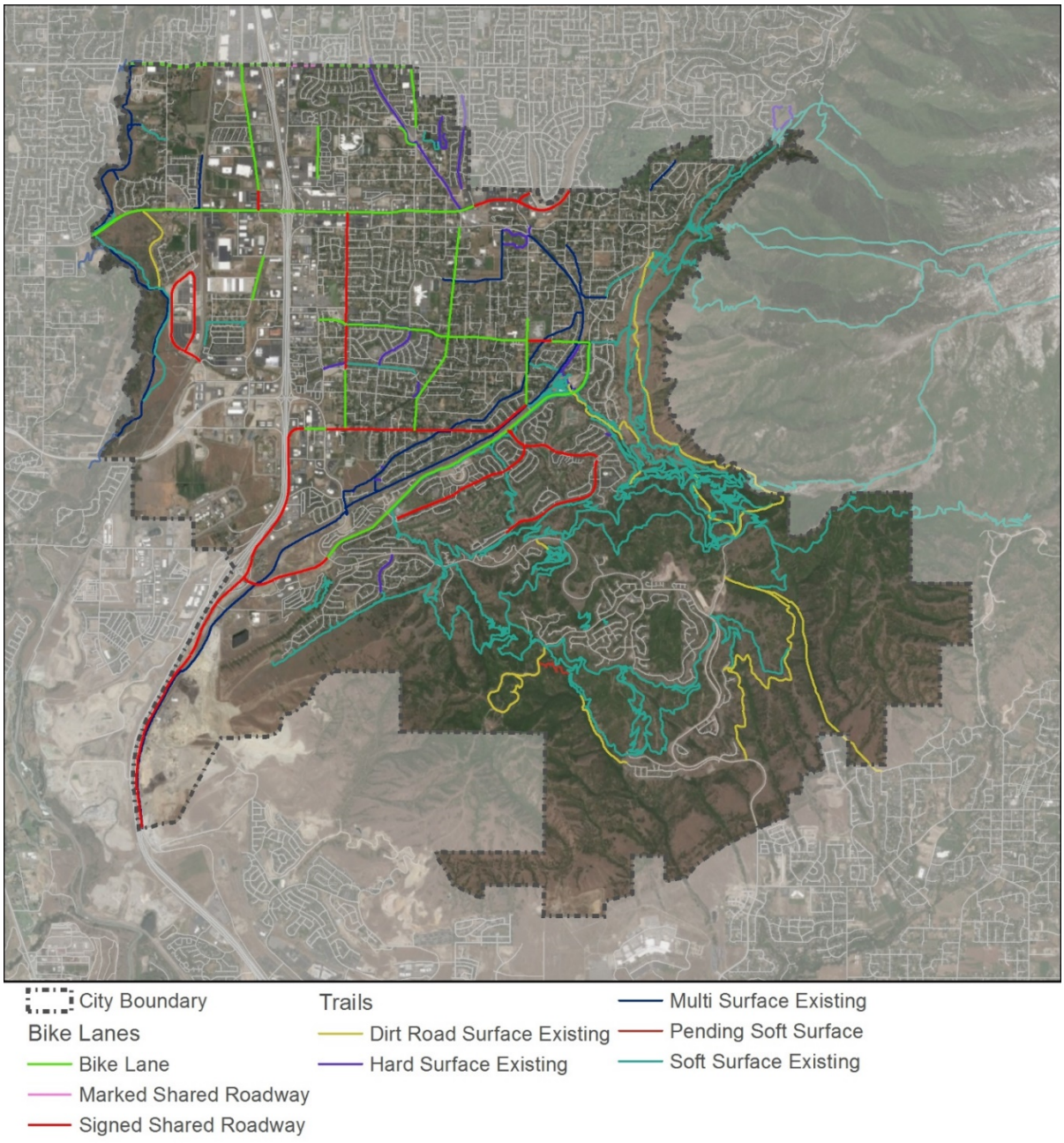


Figure 2-18. Existing Bicycle Facilities and Trails
Source: Draper City

2.6 Safety

Crash data for motor vehicles, bicycles, and pedestrians were analyzed for state-maintained and city-maintained infrastructure to pinpoint hotspot areas and crash patterns within Draper City from 2015 to 2017. The identification of crash patterns, high-risk areas, and hazardous conditions within principal intersections will allow Draper City to address overall safety for its citizens.

2.6.1 Crash Data Analysis

Figure 2-19 is a heat map showing concentration of surface street crashes throughout Draper City. Areas containing the highest concentration of crashes tend to be on state-maintained roads. These hotspot areas are along 11400 South (SR-175), 12300 South (SR-71), Bangerter Highway (SR-154).

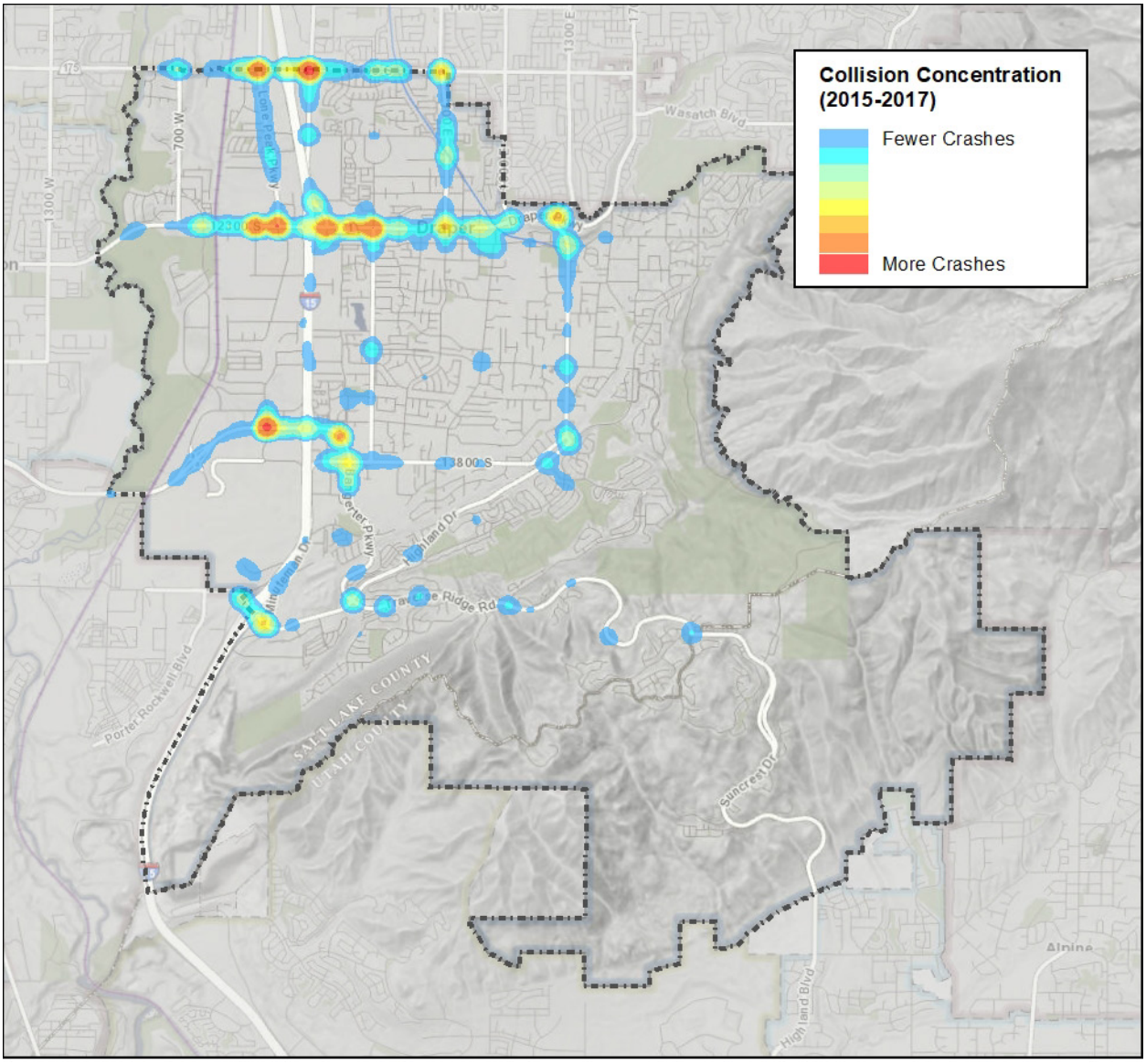


Figure 2-19. Draper City Surface Street Crash Concentration
Source: UDOT. These data may be protected under 23 USC 409

Among city-maintained facilities, the following intersections manifest the highest concentrations of crashes:

- 12300 South & 900 East.
- Draper City Parkway & 1300 East.
- Pioneer Road & 1300 East Roundabout.
- Highland Drive & 1300 East & 13800 South.
- Highland Drive at Bangerter Highway/Traverse Ridge Road.

A portion of Traverse Ridge Road

A detailed review of the crash patterns and infrastructure at these five intersections resulted in the identification of potential safety recommendations. Table 2-2 summarizes the findings of this assessment. Further detail is contained in the appendix.

Table 2-2. Draper City Analysis of Intersections with Highest Number of Crashes

Intersection	Total Crashes	Dominant Collision Type	Potential Safety Recommendations
12300 South & 900 East	35	Front to Rear	Install high-visibility signal head backplates and/or mast arms.
Draper City Parkway & 1300 East	51	Front to Rear	Install high-visibility signal head backplates. Evaluate signal timing. Implement access management at driveways north of intersection.
Pioneer Road & 1300 East Roundabout	28	Front to Rear	Conduct regular maintenance of pavement markings to ensure visibility.
Highland Drive & 1300 East & 13800 South	33	Angle	Recent lane striping and crosswalk relocations have been conducted at this intersection and the recent extension of 13200 South may have resulted in modified traffic patterns at this area. Continue to monitor to observe whether changes have a positive effect on crash patterns.
Highland Drive & Bangerter Parkway/Traverse Ridge Road	27	Angle/Front to Rear	Implement left-turn phasing for Highland Drive approaches.

Source: UDOT. These data may be protected under 23 USC 409.

2.6.2 Crash Severity

Figure 2-20 shows locations of crashes that resulted in serious injury or fatality from 2015 to 2017. Of these 33 collisions, 28 crashes resulted in serious injuries, and 5 resulted in fatalities. Though these crashes are dispersed throughout the city, many of these crashes occurred in the northern part of Draper City on roadways with direct access to I-15, such as 11400 South and 12300 South. Several locations of injury-related collisions from Figure 2-20, directly correlate with hotspot areas shown in Figure 2-19. Draper City can use these correlated areas as guidance for determining prioritization of future infrastructure safety improvements.

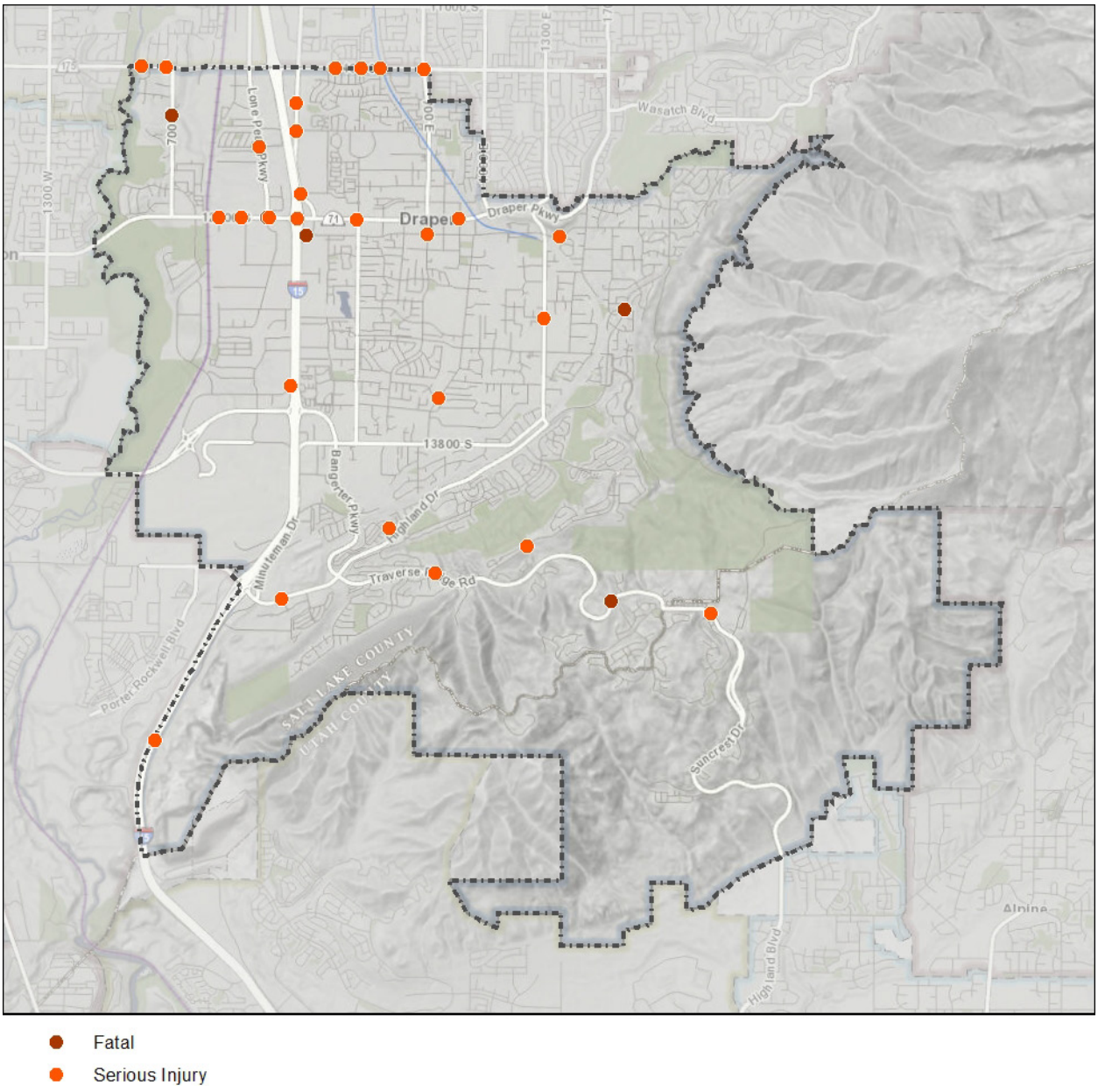


Figure 2-20. Draper City Crash Severity Map (2015-2017)
Source: UDOT. These data may be protected under 23 USC 409

2.6.3 Bicycle and Pedestrian Data

From 2015 to 2017, there were 32 crashes between bicycles and motor vehicles, and 31 crashes between pedestrians and motor vehicles. The locations of these crashes are dispersed throughout Draper City, as shown in Figure 2-21, and for the most part, correlate with hotspot areas denoted in Figure 2-19. Locations of bicycle and pedestrian crashes that do not correlate with hotspot areas can be found east of I-15, between 12300 South and 13800 South.

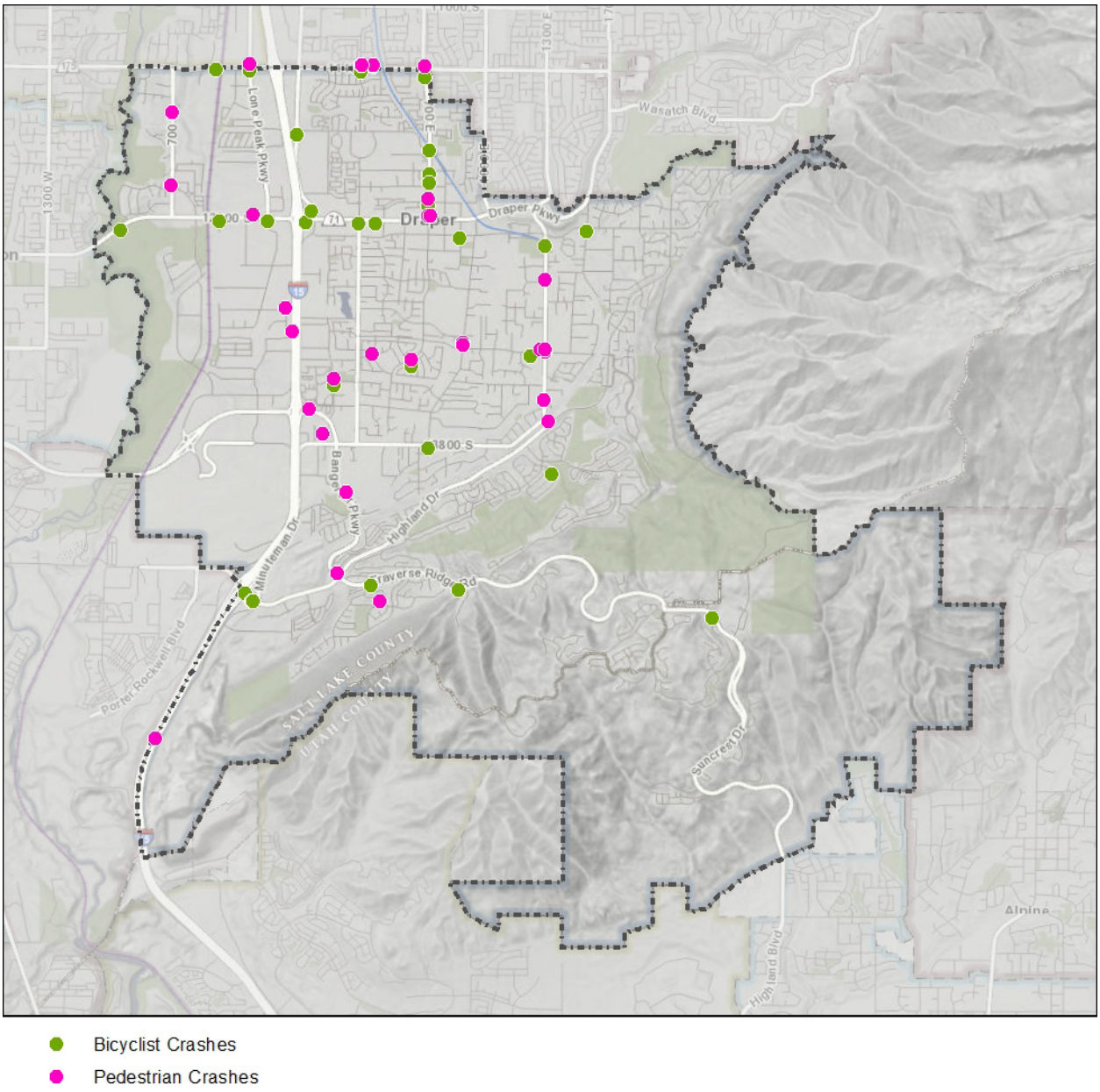


Figure 2-21. Draper City Bicycle and Pedestrian Crash Map (2015-2017)
Source: UDOT. These data may be protected under 23 USC 409

While these locations do not necessarily indicate strong crash patterns, they can be used when considering areas in which dedicated bicycle and pedestrian facilities can be installed or enhanced to improve safety conditions for these modes of travel. Recommendations to improve cyclist and pedestrian safety involve improving visibility of pedestrians and bicyclists by providing dedicated facilities to increase driver awareness. These recommendations include and are not limited to the following list:

- Installation and maintenance of dedicated bike lanes and buffer zones, sidewalks, and crosswalks.
- Dedicated pedestrian phasing.
- Installation of high-intensity activated crosswalk beacon (HAWK) signals.
- Increased lighting in heavily used bicycle and pedestrian corridors.
- Consideration of all modes of travel in longitudinal roadway and intersection design.

2.7 Connectivity

Connectivity enhances a community in several ways. The Utah Street Connectivity Guide (2017) states that connectivity provides benefits to:

- Mobility.
- Transportation Choice.
- Safety.
- Infrastructure and Growth Management.
- Health.
- Economic Vitality.
- The Environment.
- Community Access.

Good connectivity is achieved through careful transportation and land use planning at three scales: regional, community, and neighborhood. The following discussion illustrates the connectivity conditions and challenges for Draper City at the regional and community scales.

2.7.1 Regional Scale

Because of its position in the southeast corner of the Salt Lake Valley, Draper City faces regional connectivity challenges from the surrounding topography. The city is adjacent to mountainous terrain on both the south and east sides which represent significant barriers in connecting with other communities. See Figure 2-22.

On the east, the closest cross-mountain route for Draper City is Big Cottonwood Canyon Road (SR-190) to Guardsman Pass which is located near Sandy City and is only open seasonally. To the south, Traverse Ridge Road connects over the mountains into Highland City and Lehi City in Utah County. However, the circuitous alignment and position of Traverse Ridge Road is such that it does not provide an attractive route for regional north-south traffic. Significant out-of-direction travel is required for most Salt Lake/Utah inter-county travelers to access the roadway. Rather, Traverse Ridge Road primarily supports small-scale connections between Draper City, Highland City, and Lehi City, such as access to schools and local commercial facilities.

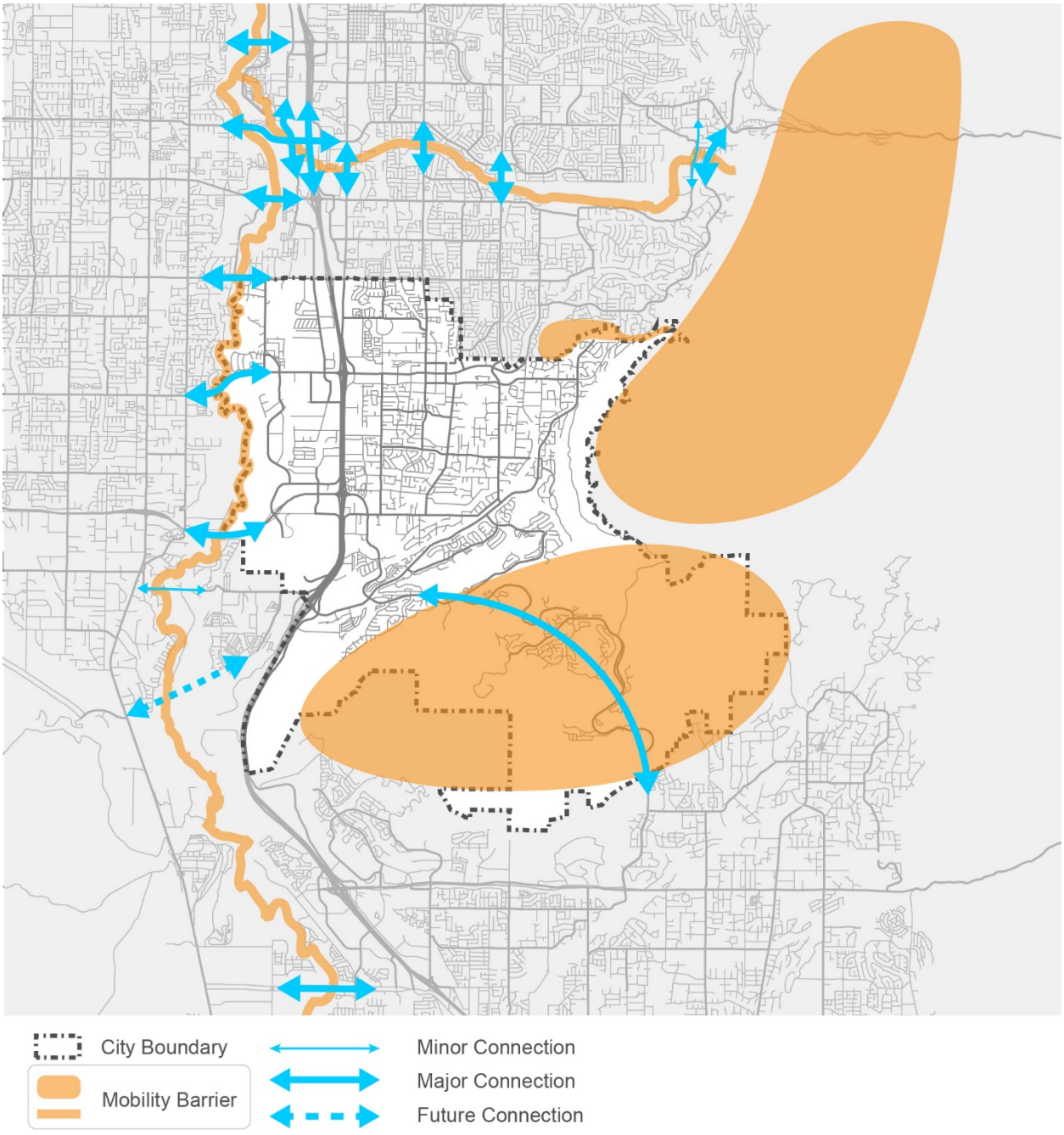


Figure 2-22. Draper City Regional-Scale Connectivity

The Dimple Dell Regional Park further influences regional north-south connectivity for Draper City. Paved bicycle or vehicular crossings of the 4.5-mile linear park are available at only a few locations. In particular, there are no crossings between 1300 East and Dimple Dell Road – a distance of almost 2.5 miles.

The Jordan River is the most significant feature influencing regional east-west connectivity. Jordan River vehicular crossings near Draper City are primarily limited to major arterial roads, although the Jordan River Parkway trail network offers a few additional river crossings for pedestrians and cyclists. There are

no roadway crossings for the 6.5-mile distance between Bangerter Highway and 2100 North in Lehi City other than the 14400 South crossing. However, the 14400 South crossing limited in throughput by the narrow, one-lane roadway section beneath the Union Pacific railroad (UP) and UTA commuter rail bridge. The upcoming construction of the Porter Rockwell Boulevard bridge will provide a major roadway alternative to 14400 South.

2.7.2 Community Scale

Several features influence community-scale connectivity in Draper City, see Figure 2-23. The UTA rail line sweeps through Draper City acting as a barrier for north-south connectivity, as well as east-west connectivity. The lack in vehicular access between Bangerter Parkway and 1300 East is the largest connectivity gap, though it is influenced by the natural slope of the land. The recent 13200 South roadway extension enhanced vehicular connectivity between 1300 East and Boulter Street. It should be noted that per the agreement with UTA to open the 13200 South vehicular crossing, the Boulter Street crossing will be closed when the rail line resumes active rail traffic.

I-15 and the UP/UTA rail lines west of I-15 offer twin connectivity barriers to east-west travel. Major arterials are the only types of roadways to cross either feature. There are no additional pedestrian or bicycle crossings of either I-15 or the rail lines.

In the south end of Draper City, the topography of Traverse Ridge creates a challenge for establishing a well-connected road network. In order to provide reasonable slopes, roadways must often follow the natural terrain, often resulting in circuitous and disconnected road networks. The lack of connectivity is also somewhat influenced by the position of the South Mountainside Golf Course which physically divides the Traverse Ridge road network.

The position of the current prison site limits connectivity in the surrounding area. The future configuration of the transportation network after the prison relocates is unknown but has the potential to greatly augment community-scale connectivity, if designed thoughtfully.

Connections from Draper City north to Sandy City are particularly limited on the east side of Relation Street/1700 East. A series of residential street disconnects and the position of the Hidden Valley Golf Course force users to travel west to 1300 East and Draper City Parkway to find roadway connectivity. Further west of this area, Sandy City installed a roadway barrier at the city boundary on Pineridge Road severing connections between residential uses in Sandy and commercial and institutional land uses in Draper City.

There are multiple local street east-west disconnects between Fort Street and 1300 East in central Draper City. The 1.7 mile stretch between Pioneer Road and 13800 South has only one east-west roadway connection at 13200 South. There are five other locations where an unfinished roadway or a barrier at a private street blocks east-west connectivity. In contrast, the adjacent area just to the west (between 300 East and Fort Street) supports four east-west roadway connections between Pioneer Road and 13800 South. These connections occur at Willow Springs Lane, Golden Pheasant Drive, 13200 South, and Stokes Avenue. The frequency of east-west connections helps provide redundant access so that the traffic burden is not excessive on any single street.

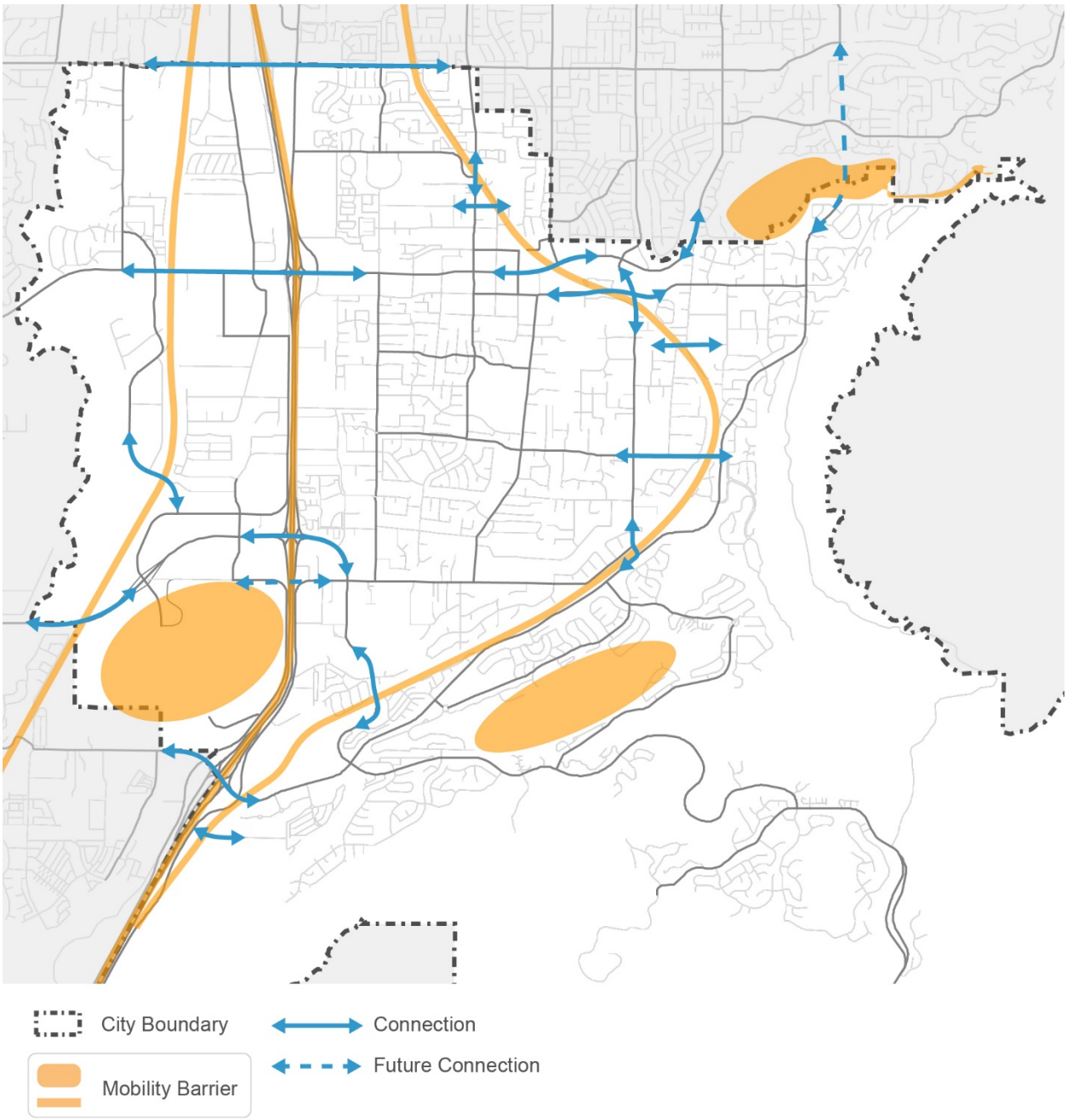


Figure 2-23. Draper City Community-Scale Connectivity

2.7.3 Transit Stations

Connectivity at transit stations is a critical component of a multi-modal transportation network. Transit stations with good connectivity increase the service area of the transit system. Roadway, sidewalk, and trail configurations directly impact the ability to access a transit station via walking. Figure 2-24 illustrates examples of high and low connectivity in the vicinity of a transit station. In each example, the areas less than a 1/4 mile walk distance (blue lines) are juxtaposed against the physical 1/4 mile radius (red circle). In the high-connectivity example, the 1/4 mile walk shed accesses about 64 percent of the area within the physical 1/4 radius.

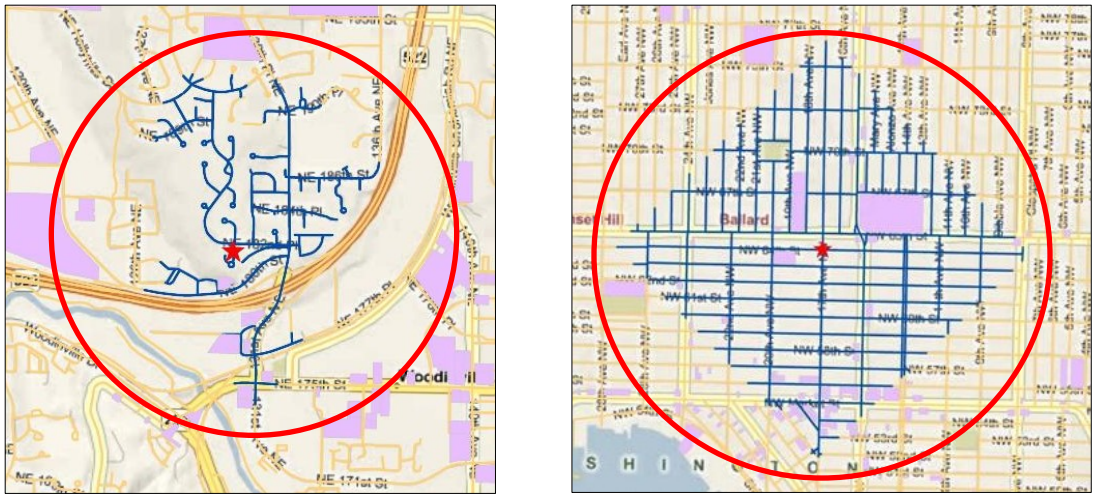


Figure 2-24. Examples of High and Low Connectivity at Transit Stations
Source: Urban Design 4 Health

Draper City has four major transit stations – three TRAX light rail station and one commuter rail station. Figure 2-25 illustrates the 1/4 mile and 1/2 mile walksheds against a 1/4 mile and 1/2 mile physical buffers. Table 2-3 compares the actual walk area capture for each station against the ideal capture goal of 64 percent. Most stations fall well below the ideal capture goal of 64 percent at either buffer distance, though the Crescent View and Kimballs Lane TRAX stations nearly meet or exceed 50 percent at the 1/2 mile buffer. The Draper City Frontrunner station walksheds have the lowest capture area of any station primarily due to the lack of immediate pedestrian connectivity east of the railroad tracks.

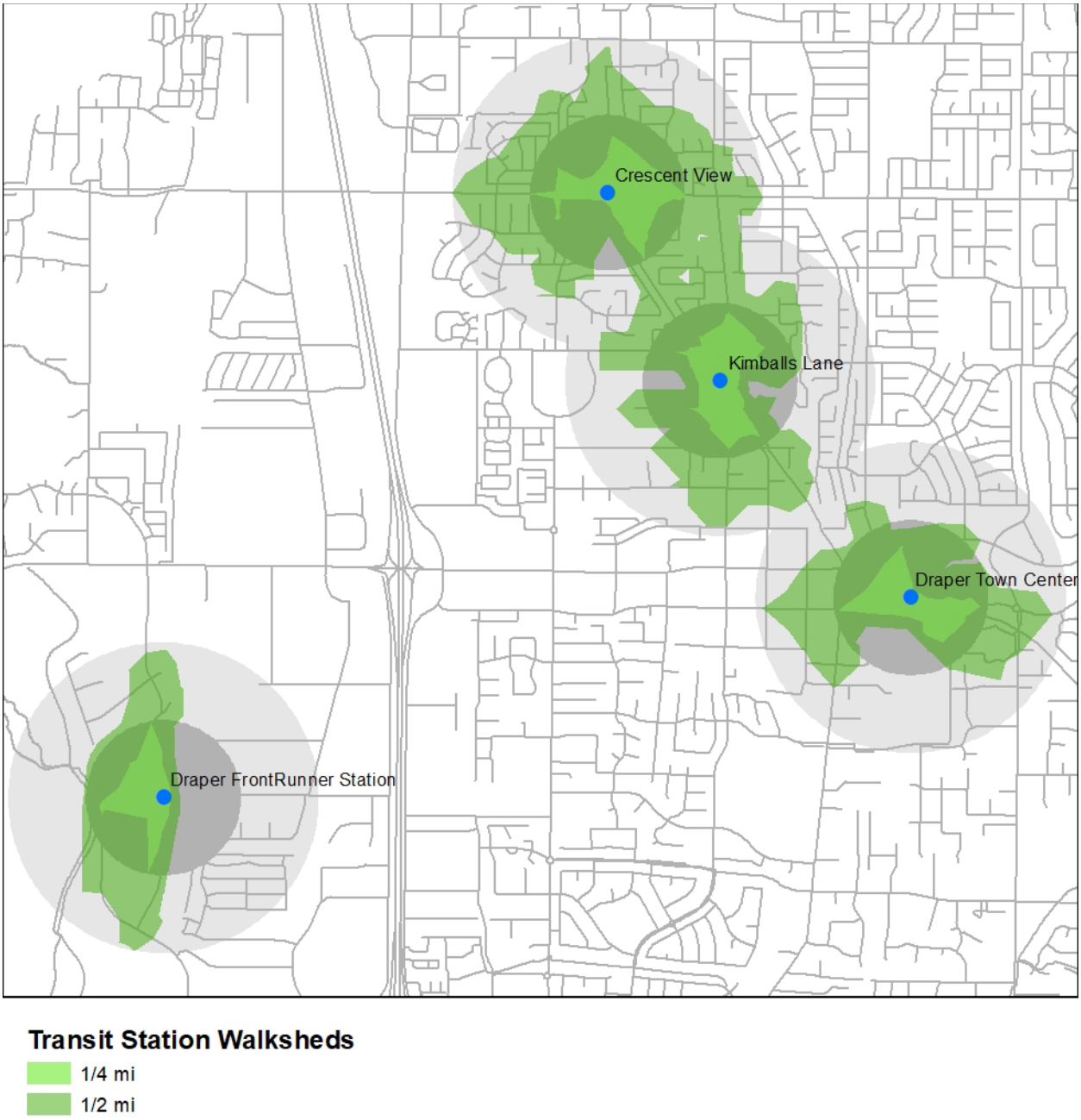


Figure 2-25. Draper City Transit Station Walksheds

Table 2-3. Draper City Transit Station Walkshed Analysis

Transit Station	Area Capture Goal	Actual Capture Area	
		1/4 Mile Radius	1/2 Mile Radius
Crescent View TRAX Station	64%	24%	58%
Kimballs Lane TRAX Station	64%	33%	49%
Draper City Town Center TRAX Station	64%	31%	38%
Draper City FrontRunner Station	64%	21%	27%

3. FUTURE CONDITIONS

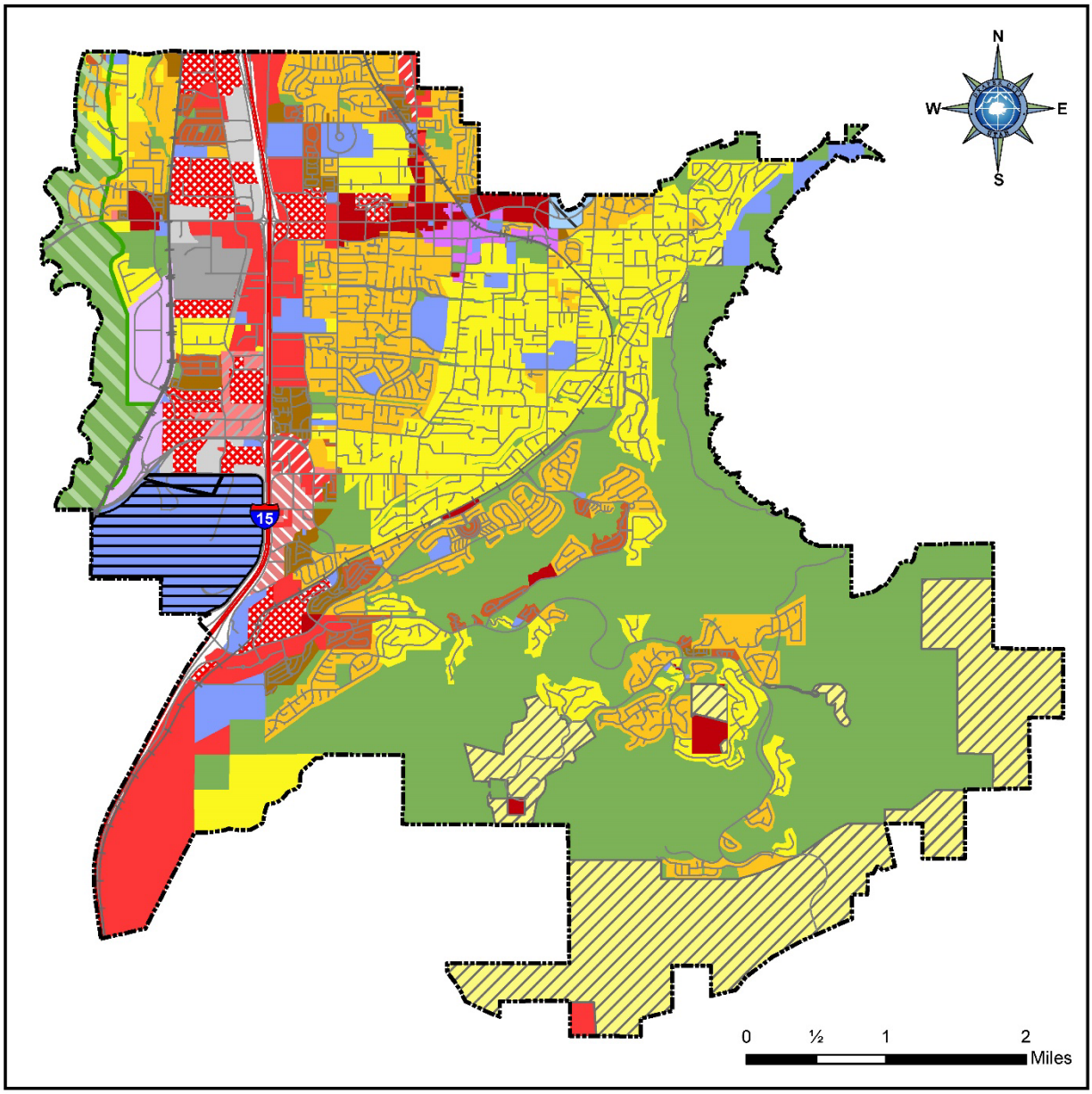
3.1 Future Land Use

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 (see Figure 3-1). Because land use plans are subject to change from time to time, refer to the official Draper City land use plan for the most up to date information.

Highland Drive

Existing land use patterns notwithstanding, Draper City actively seeks growth of commercial land uses for its future. Much of the employment growth has been experienced and is projected to continue to occur west of I-15 in areas designated as commercial/growth areas. 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 Draper City Town Center TRAX station at 12400 South. A second mixed use area "Transit Station" will surround the Draper City Station FrontRunner stop. Each of these areas is located near a major transit investment corridor or potential future corridor according to planned TRAX extension alignment options.

Although Draper City is planning for additional residential and commercial development, the city has plans to preserve considerable amounts of land for open space or cultural uses. Future use of the current Utah State Prison site is a subject of much discussion and planning efforts. The options and preferences for the prison site redevelopment are numerous and will likely be guided by the State of Utah resources.



Legend

Draper City Limits
State Prison Property

Commercial
Community Commercial
Community/Neighborhood Commercial
Neighborhood Commercial
Regional Commercial
Office/Service
Destination Commercial

Industrial / Manufacturing
Industrial/Manufacturing
Business/Light Manufacturing

Residential
Hillside Low Density (1 du/2 ac- 1 du/5 ac)
Low- Medium Density (Up to 2 du/ac)
Medium Density (2-4 du/ac)
Medium-High Density (4-8 du/ac)
High Density (8-12 du/ac)

Special Use Areas
Commercial Special District
Cultural/Institutional
Utilities
Town Center
Transit Station District
Open Space/Parks
Growth Area
Sensitive River Overlay

Figure 3-1. Draper City Future Land Use
Source: Draper City

3.1.1 Draper City General Plan

The Draper City General Plan provides the foundation for Wasatch Front Regional Council's (WFRC) socioeconomic (SE) forecasts. These forecasts were the basis for forecast revisions completed for this plan, revisions which were developed through an iterative process with Draper City. Additionally, due to the uncertainty of the future prison site redevelopment, two forecast sets were developed to bookend the potential spectrum of eventual development patterns. The first assumed development typical of the Wasatch Front and the I-15 corridor, and the second borrows from the vison of the Point of the Mountain Development Commission's preferred scenario. Figure 3-2 shows the proposed future land use of the Point of the Mountain Development Commission's preferred scenario. The future population, household, and employment data were used to estimate future transportation demand within the city using the regional travel demand model, further discussed in subsequent sections of this chapter. Figure 3-3 summarizes the 2040 population, household, and employment forecasts for both the typical conditions and the Point of the Mountain Development Commission vision as compared to 2014 base-year SE data.

Porter Rockwell Trail at 1300 East

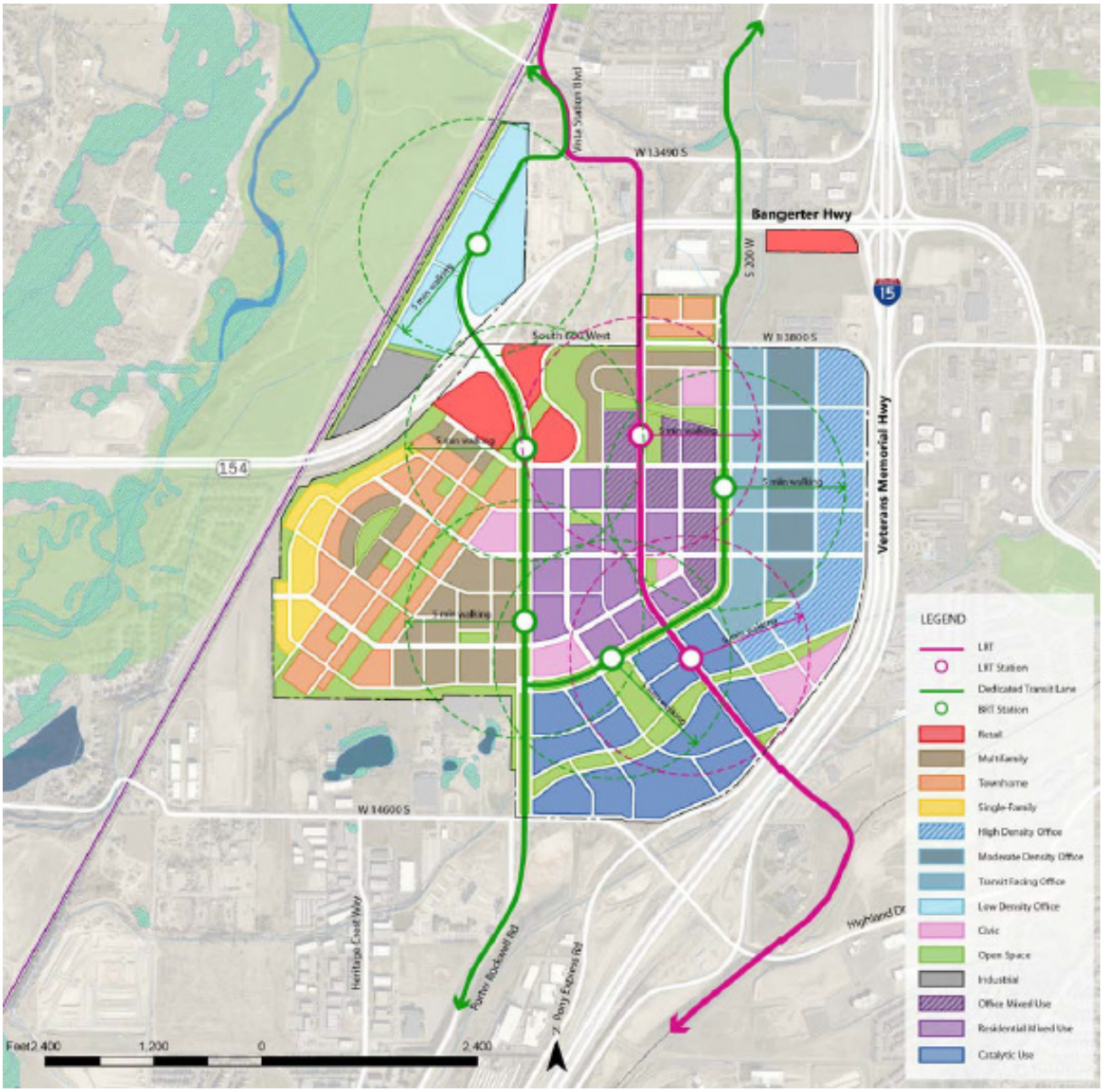


Figure 3-2. Point of the Mountain Commission Preferred Scenario Land Use Concept
Source: Point of the Mountain Commission

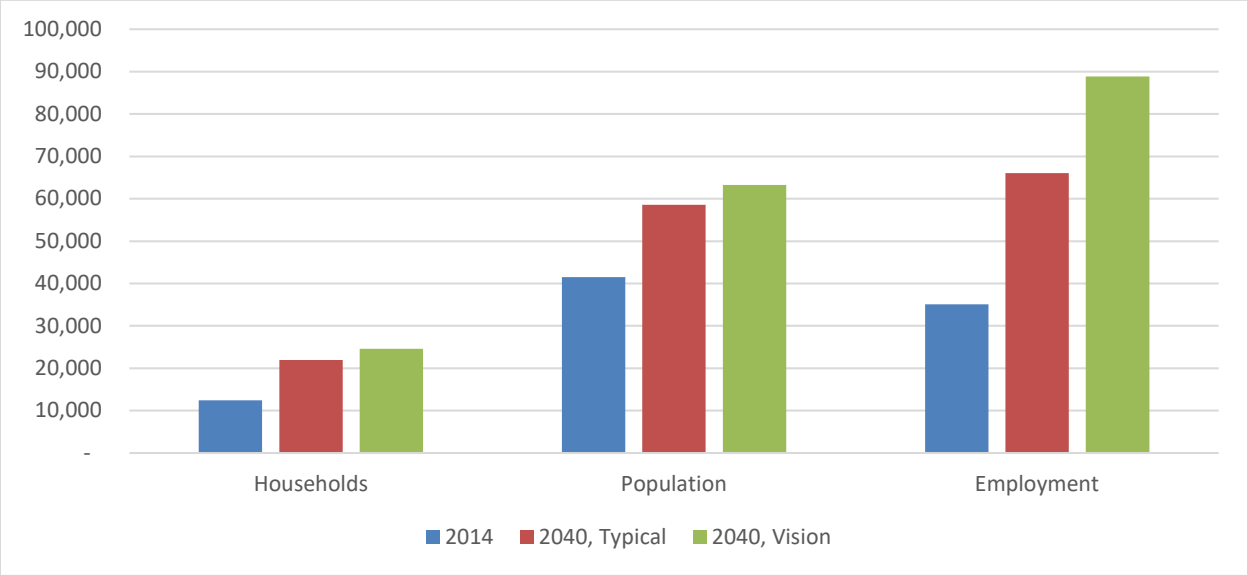


Figure 3-3. Household, Population, Employment Forecast

3.1.2 Development Scenario

The anticipated future growth will have a significant impact on traffic within Draper City. Although Draper City is at more than 50 percent built out, the number of vehicle trips will more than double when Draper City reaches build out due to the nonlinear nature of vehicle trip growth. The following figures (Figure 3-4 through Figure 3-8) provide a conceptual illustration of the effect of development on the number of vehicle trips based upon *Institute of Transportation Engineers (ITE), Trip Generation Manual 10th Edition* trip rates. These illustrations are conceptual, and do not represent specific parcels in Draper City. They do, however, represent the nature of past and projected future developments in the City.

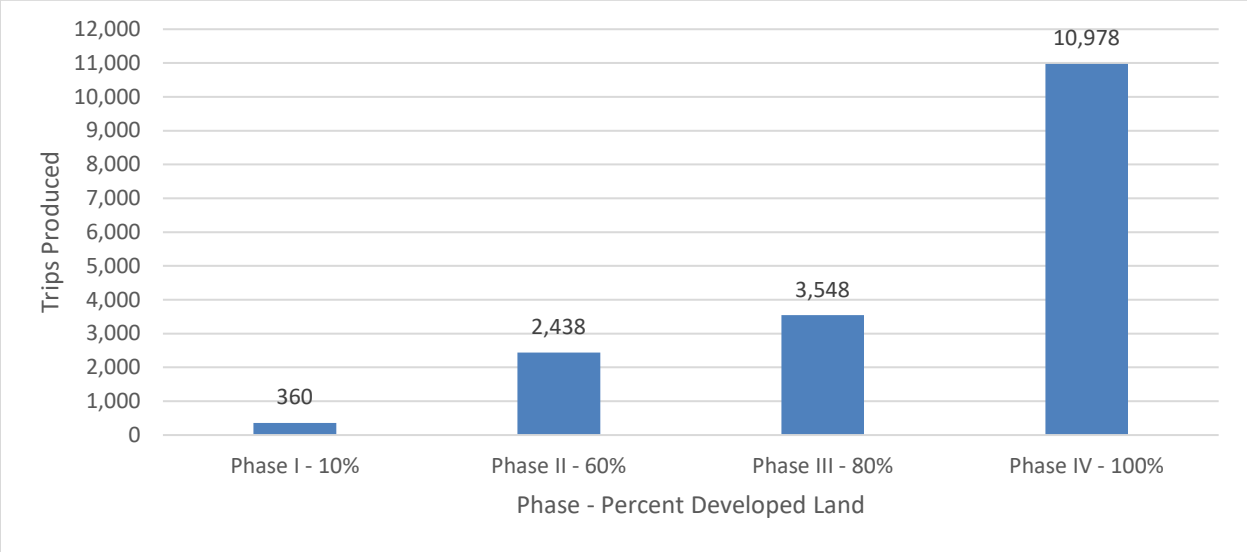


Figure 3-4. Land Use and Corresponding Trip Rates for Development Scenario

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 generate more single and multi-family residential and commercial uses.

Development Phase I – 10% Developed

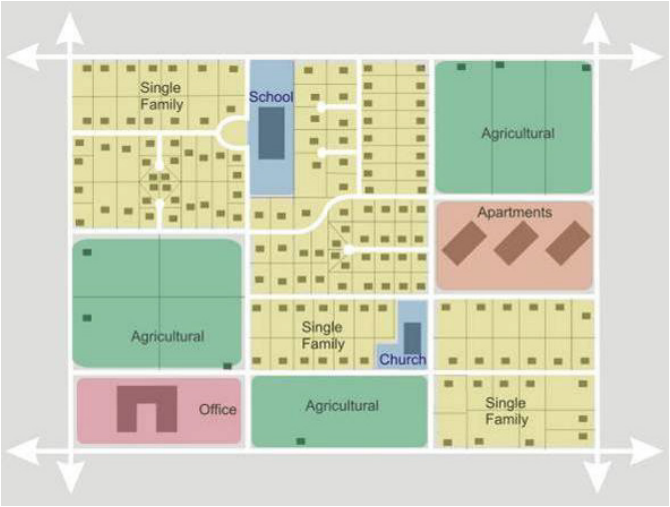
Land Use	Description	Trips Per Day
Farm	22 Farms	258
Single Family	8 Homes	102
	Total Trips Per Day	**360**

Figure 3-5. Development Phase I

Development Phase II – 60% Developed

Land Use	Description	Trips Per Day
Farm	11 Farms	134
Single Family	139 Homes	1,408
School	400 students	756
Church	1 at 20,000sq/ft	140
	Total Trips Per Day	**2,438**

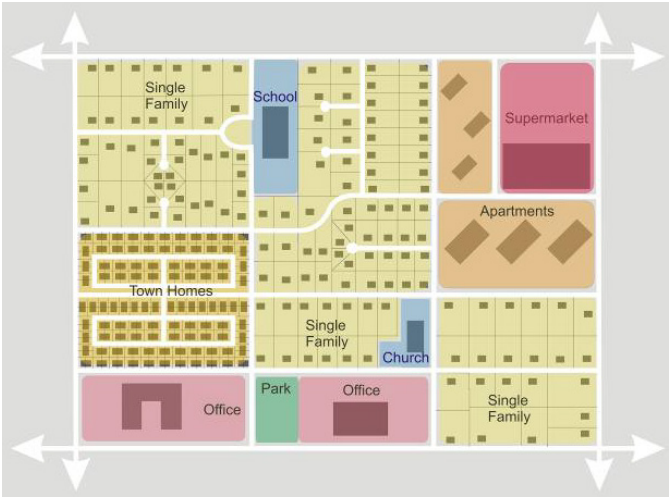
Figure 3-6. Development Phase II



Development Phase III – 80% Developed

Land Use	Description	Trips Per Day
Farm	5 Farms	61
Single Family	143 Homes	1,445
Apartment	125 Apartments	680
School	500 Students	945
Church	1 at 20,000 sq/ft	140
Office	1 at 25,000 sq/ft	277
	Total Trips Per Day	**3,548**

Figure 3-7. Development Phase III



Development Phase IV – Fully Developed

Land Use	Description	Trips Per Day
Single Family	143 Homes	1,445
Townhouse	200 Townhomes	1,471
Apartment	170 Apartments	925
School	600 Students	1,134
Church	1 at 20,000 sq/ft	140
Office	2 at 35,000 sq/ft	751
Supermarket	1 at 55,000 sq/ft	5,112
	Total Trips Per Day	**10,978**

Figure 3-8. Development Phase IV

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: ITE, Trip Generation User's Guide 2003.)* In general terms, any time a vehicle passes through a driveway, a trip is registered. Detached single-family residential units typically generate 9.4 trips per day per residence. A shopping center development averages 37.8 trips per day per 1,000 square developed feet, whereas an office park generates 11.1 trips per day per 1,000 square feet. As shown in the previous scenario, land use dictates the number of generated 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 ensure that Draper City's Master Transportation Plan complements and takes advantage of current and future road connections.

3.2 Regional Plans

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

Many of Draper City's experiences regarding roads and transit are also experienced throughout the Wasatch Front. Population projections indicate that the Wasatch Front Region will increase from approximately 1,700,000 persons in 2015 to 2,300,000 persons in 2040. Vehicle trips and VMT is expected to grow at a rate greater than 1.5 times the rate of population growth across the region.

3.2.1 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 (RTP) 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 RTP for the Wasatch Front Regional Council area was adopted in May 2019.

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 map shows the location of these planned highway projects within Draper as detailed by the 2019-2050 WFRC RTP. Projects are separated by planned phase with Phase 1 projects (2019-2030), Phase 2 projects (2031-2040), and Phase 3 projects (2041-2050). Future transit projects are also shown. See Figure 3-9.

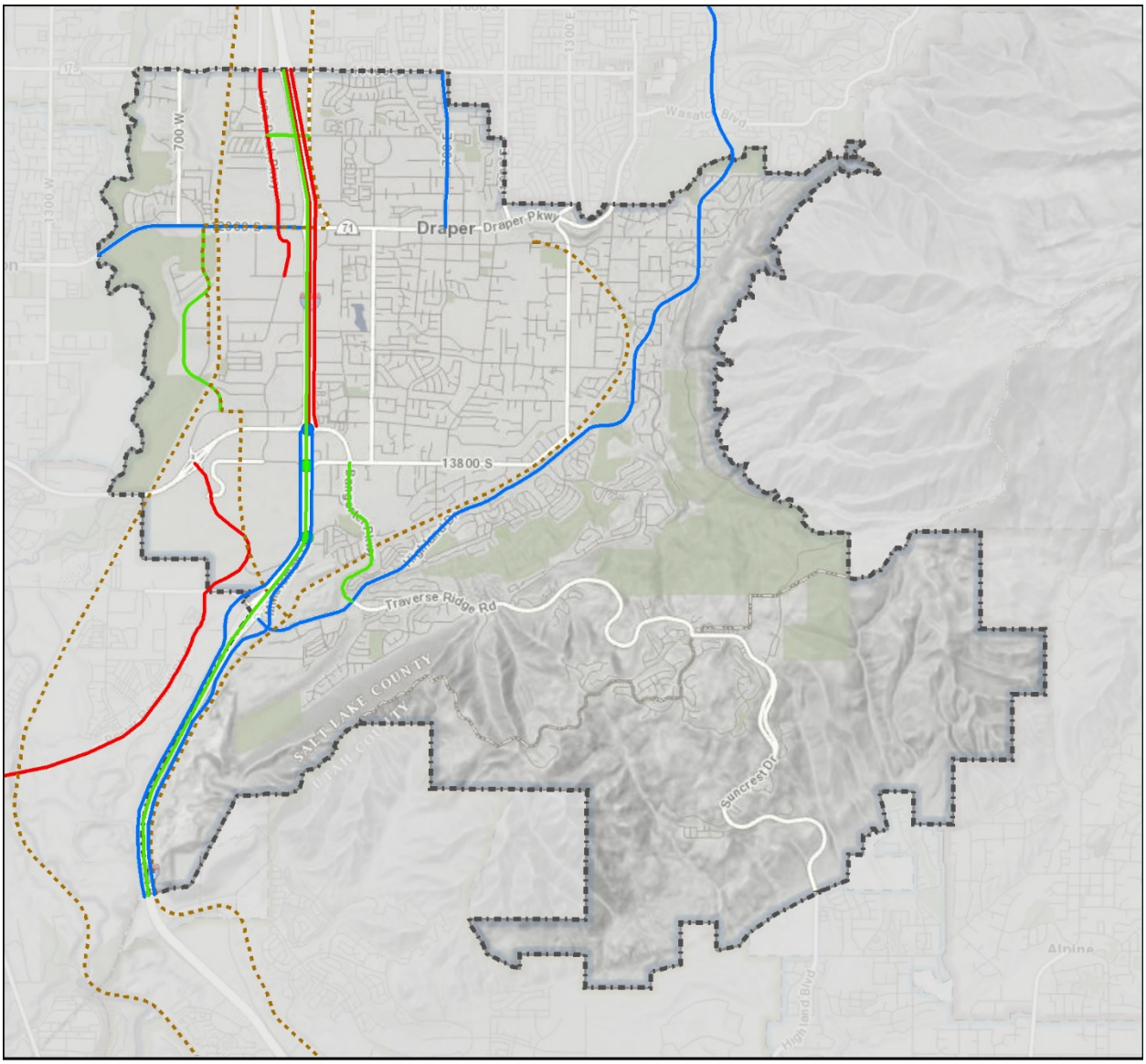


Figure 3-9. WFRC RTP Projects by Phase
Source: WFRC

The WFRC projects shown in Figure 3-9 are detailed in Table 3-1 and Table 3-2. Close coordination for this plan has occurred with the WFRC, UDOT, UTA, and the neighboring cities to Draper City such as Sandy, South Jordan, Riverton, Bluffdale, Lehi, and Highland.

Table 3-1. WFRC RTP Highway Project Descriptions

WFRC Reference No. (Phase)	Roadway	From	To	Description
R-S-64 (3)	11800 South	Lone Peak Parkway	State Street	New Construction. 3 lanes to be built between 2041-2050.
R-S-65 (2)	12300 South/ 12600 South	Redwood Road	I-15	Widen from 4 to 6 lanes with a center turn lane on a 100 ft. right-of-way between 2031 and 2040. A priority bike route will be provided
R-S-124 (1)	Porter Rockwell Road	Geneva Collector	14600 South/I-15	Widening. Widen from 2 lanes to 4 lanes with a center turn lane on a 167 ft. right-of-way between 2019 and 2030. A priority bike route will be provided on part of the route.
R-S-129 (1)	600 West	Bangerter Highway	14600 South	New Construction. 2 lanes on 70 ft. right-of-way. To be built between 2019 and 2030. No bike lanes are planned for this route.
R-S-130 (3)	Galena Park Boulevard	12300 South	13490 South	Widen from 2 to 4 lanes on 89 ft. right-of-way between 2041 and 2050. Base/Priority bike routes.
R-S-131 (1)	Lone Peak Parkway	11400 South	12650 South	Widen from 2 to 4 lanes on 99 ft right-of-way between 2019 and 2030. Priority bike routes
R-S-133 (1)	I-15 Northbound	Bangerter Highway	2100 South	Widening I-15 from 4+HOT NB to 5+HOT NB. To be built between 2019 and 2030.
R-S-134 (1)	I-15 Collectors and Distributors (Northbound)	Bangerter Highway	I-215	New Construction of I-15 Collector/Distributor system Northbound to be built between 2019 and 2030.
R-S-135 (2)	I-15 Frontage Roads (Northbound and Southbound)	Utah County Line	Bangerter Highway	New Construction. 4 lane frontage roads on both sides of I-15 to be built between 2031-2040.
R-S-136 (3)	I-15 HOT with Ramps and Reversible Lanes	Utah County Line	Davis County Line	Widening of I-15 with an additional HOT lane in both directions and HOT ramps. To be built between 2041 and 2050.
R-S-147 (2)	Highland Drive	Draper City Limit	14600 South	Widen from 2 to 4 lanes on 114 ft right-of-way between 2031 and 2040. Priority bike routes.
R-S-148 (3)	Bangerter Parkway	Highland Drive	13800 South	Widen from 2 to 4 lanes on 110 ft right-of-way between 2041 and 2050. Base bike routes.
R-S-149 (2)	700 East	11400 South	12300 South	Widen from 2 to 4 lanes on 110 ft right-of-way between 2031 and 2040. Priority bike routes.
R-S-158 (2)	Highland Drive	9800 South	Draper City Limit	New Construction. 4 lanes on 106 ft. right-of-way. To be built between 2031 and 2040. Priority bike routes.
R-S-204 (2)	Bangerter Highway Interchange	I-15	---	Interchange Improvements between 2031 and 2040. No bike route is planned.
R-S-205 (3)	13800 South Overpass	I-15	---	New Construction. 2 lanes. To be built between 2041 and 2050. Priority bike lanes.
R-S-206 (3)	Southfork Drive Overpass	I-15	---	New Construction. Grade Separated Crossing. 2 lanes. To be built between 2041 and 2050.

Source: WFRC

Table 3-2. WFRC RTP Transit Project Descriptions

WFRC Reference Number	Transit Project	From	To	Description
T-S-1 (2)	Doubletrack FrontRunner (Salt Lake County)	Davis County Line	Utah County Line	Commuter Rail upgrade to doubletrack FrontRunner in Salt Lake County. Planned for Phase 2 (2031-2040)
T-S-2	Electrify FrontRunner	Davis County Line	Utah County Line	Commuter Rail upgrade to electrify FrontRunner. Currently unfunded.
T-S-12	State Street Corridor - BRT	North Temple FrontRunner Station	Draper FrontRunner Station	BRT from North Temple FrontRunner Station to Draper FrontRunner Station via State Street, 12300 South, and Galena Park Blvd. Currently unfunded.
T-S-25 (3)	Draper Line (South) – TRAX Extension	Draper Town Center TRAX Station	Utah County line	TRAX Blue Line Extension from Draper Town Center Trax station south to Utah County line. Planned for Phase 3 (2041-2050).
T-S-26 (3)	TRAX Line West Alignment	Sandy TRAX Station	Utah County Line	TRAX Line West alignment from Utah County Line to Sandy TRAX station branching from Draper Line (South) TRAX extension near 14600 South, north through prison redevelopment and along FrontRunner corridor to 10200 South. Planned for Phase 3 (2041-2050)

Source: WFRC

3.2.2 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.

3.3 Level of Service Evaluation

Regional forecasts and plans assist with the development of Draper City's Master Transportation Plan. The Wasatch Front Regional Council-Mountainland Association of Governments (WFRC-MAG) travel demand model version 8.2 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 performs in the context of future development.

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". 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 2040. 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.

3.3.1 Existing Level of Service

The Travel Demand Model is used to predict future traffic and level of service but can also be used to quantify current conditions. Existing conditions were modeled with a 2014 base year, which is consistent with the base year of the WFRC-MAG model. Figure 3-10 is a map of the 2014 Level of Service for Draper City. 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. Two areas of significant congestion currently exist within the city, on 1300 East from 13200 South to Highland Drive and on Highland Drive between Minuteman Drive and Bangerter Parkway.

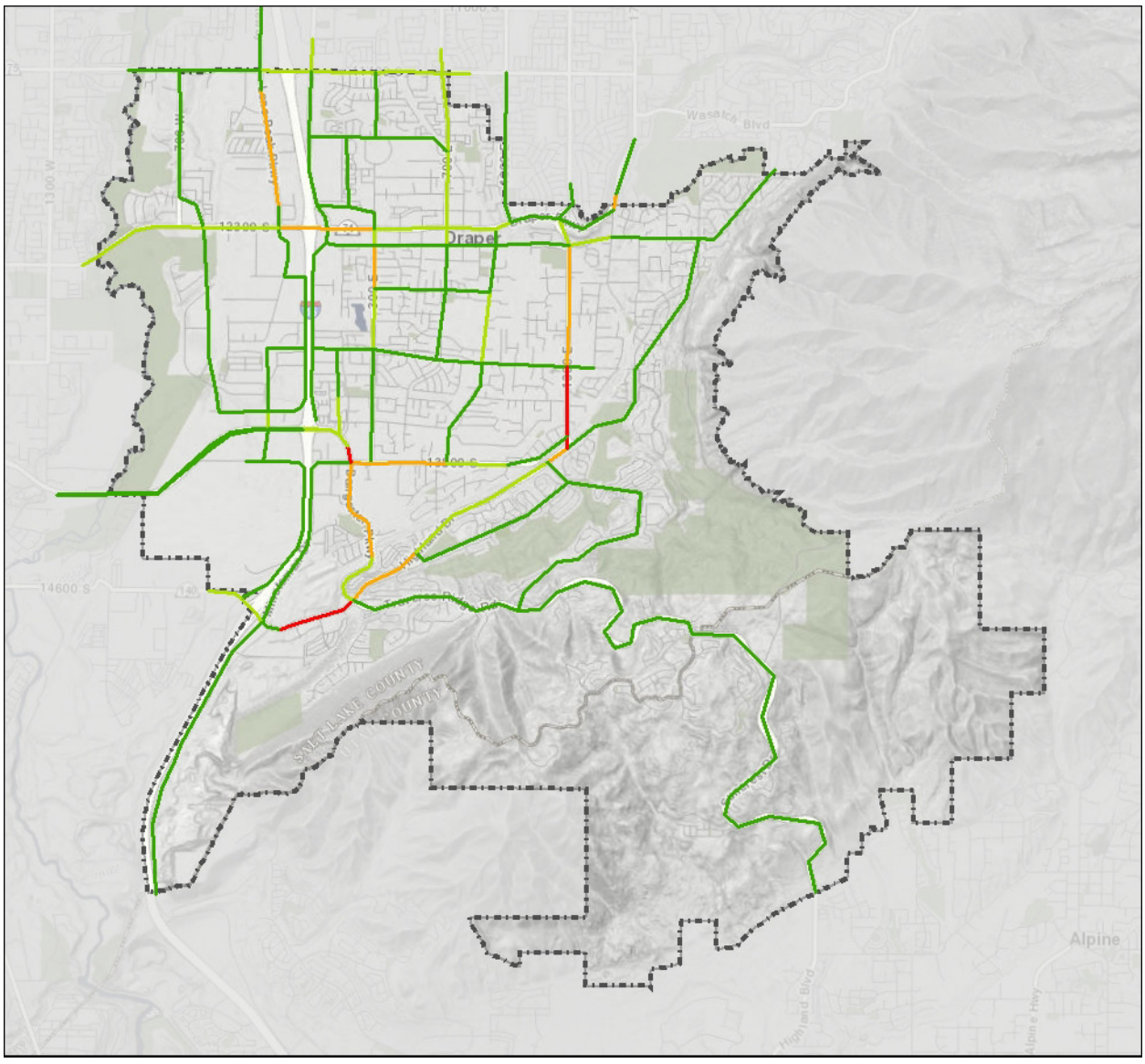


Figure 3-10. 2014 Level of Service

3.3.2 Future Level of Service

Year 2040 roadway traffic volumes were forecasted for all functionally classified roads within Draper City using the WFRC-MAG model and inputs developed with Draper City. In total four sets of 2040 projections were produced from various combinations of land use, roadway network, and transit network assumptions.

Because of the uncertainty regarding development at the prison site, two future land use scenarios were developed to test how the redevelopment of the prison site effects Draper City's transportation system. The intent is to bookend the spectrum of potential development futures, with one lower intensity "typical" and one higher intensity "vision" scenario. This method provides the opportunity to test how the volatility of the prison site redevelopment will impact the greater city street network and understand what infrastructure is necessary to support future development, regardless of how the prison site actually develops over time.

The first scenario assumes redevelopment of the prison site consistent with other existing development patterns along the I-15 corridor in the Wasatch Front. The second scenario is largely based on the recent Point of the Mountain Development Commission's visioning efforts and preferred alternative and has much more dense and aggressive development assumptions. Outside of the immediate prison site, the socioeconomic assumptions of the two scenarios are the same and contain revisions to the WFRC-MAG 2040 data set based upon city input and expected development.

Additionally, two roadway networks and two transit networks were developed. The two roadway networks include a no-build scenario which assumes no change from the existing network within Draper City and a build scenario which includes all projects from the Capitol Facilities Plan. Both the build and no-build networks assume internal prison site roadways are consistent with the Point of the Mountain Commission's preferred alternative.

The first transit network includes no changes from the 2040 network included in the model, which reflects existing plans in the WFRC and MAG long range plans. The second transit network, like the vision land use scenario, is based on the Point of the Mountain Commission's preferred alternative. The major departure from WFRC and MAG long range plans concerns the extension of existing TRAX from its current terminus in Draper City into Utah County along existing UTA-owned rail right-of-way. The vision scenario does not extend the TRAX line in Draper City but instead assumes a new TRAX extension from the Sandy TRAX station west across I-15 to the Sandy Frontrunner station. From there, the new TRAX line runs south parallel to the I-15 corridor and through the prison site before again crossing I-15 and reconnecting with the existing rail right-of-way near 14600 South thus continuing into Utah County.

Combinations of the above inputs were used to model four distinct 2040 scenarios. Table 3-3 summaries the inputs used for each of the four scenarios.

Table 3-3. Scenario Development

	Prison Development	Road Network	Transit Network
Scenario 1	Typical	No-Build	WFRC/MAG RTP
Scenario 2	Vison	No-Build	WFRC/MAG RTP
Scenario 3	Typical	Build	WFRC/MAG RTP
Scenario 4	Vision	Build	TRAX Re-Alignment

Figure 3-11 shows modeling Scenario 1, 2040 No-Build with typical development of the prison site. Without capacity improvements, many roadways within Draper City become severely congested by 2040. Severely congested roads include sections of 12300 South, Lone Peak Parkway, Pioneer Road, 13400 South, Bangerter Parkway, 1300 East, 14600 South, and Highland Drive.

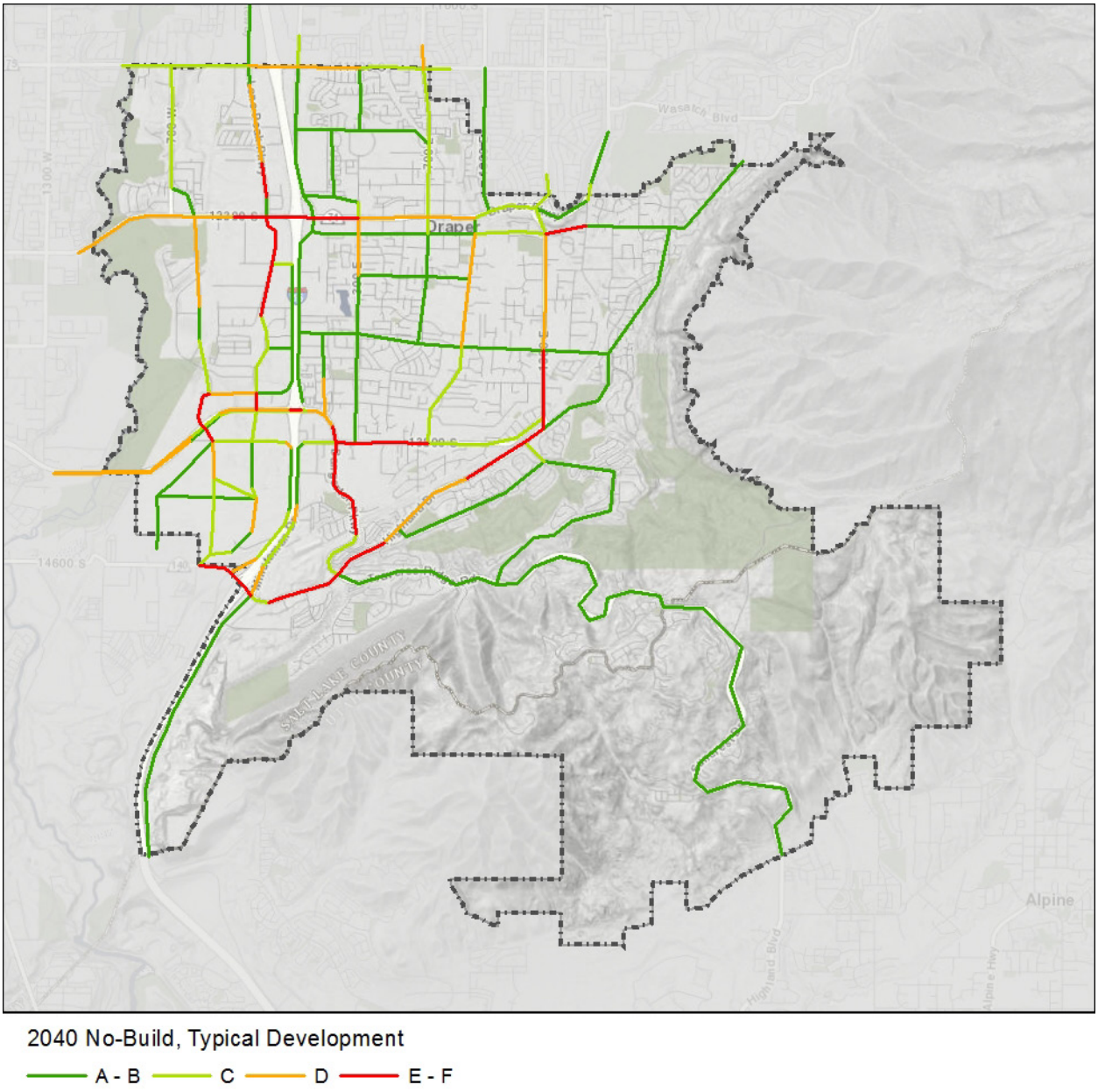


Figure 3-11. Scenario 1 Level of Service – 2040 No Build, Typical Development

Figure 3-12 shows modeling Scenario 2, 2040 No-Build with vison development of the prison site. Here there is a very similar pattern of severely congested roadways outside of the prison site. Internal to the prison site several roads become severely congested, along with Bangerter Highway, west of the interchange.

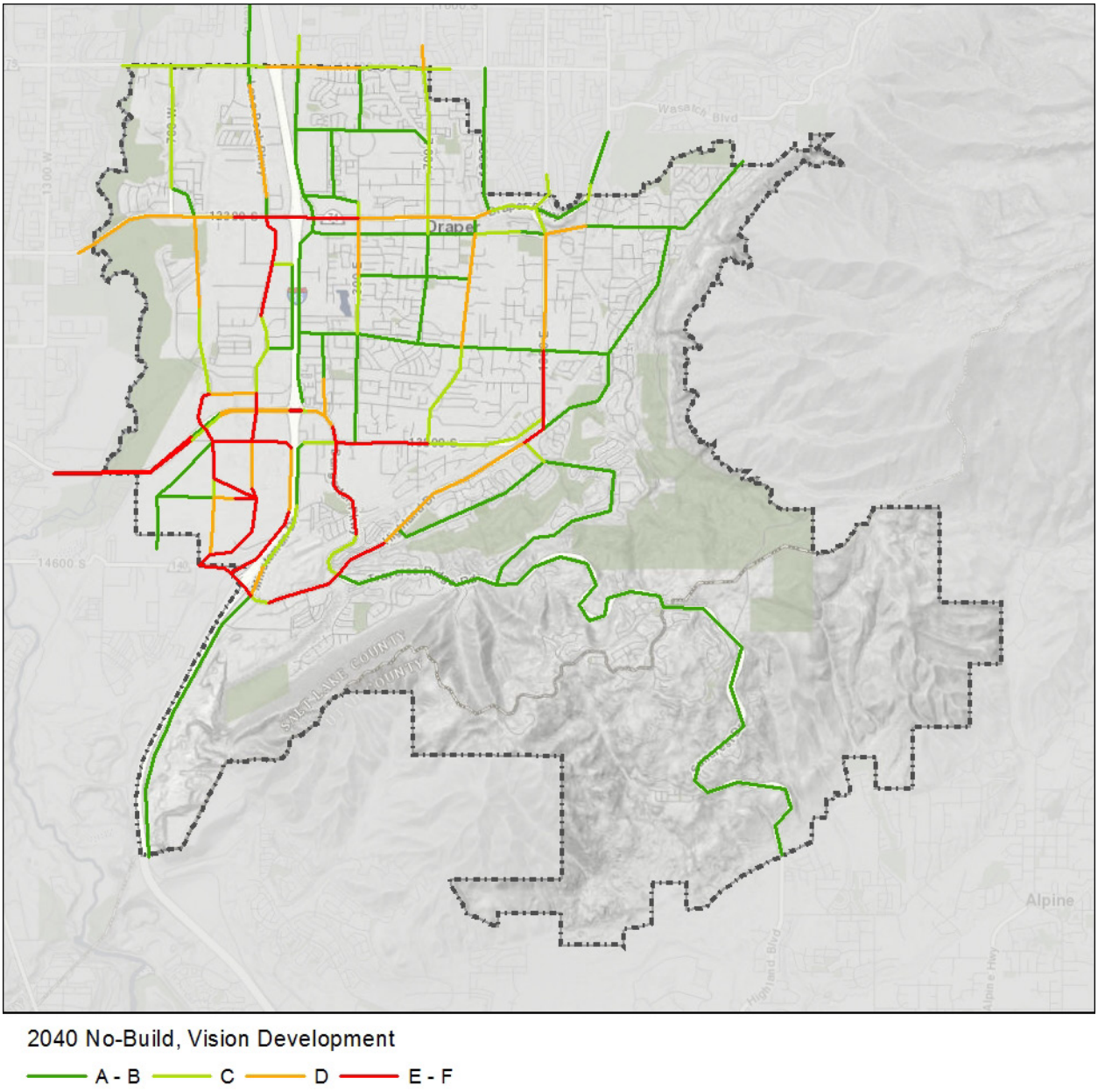


Figure 3-12. Scenario 2 Level of Service – 2040 No Build, Vision Development

Figure 3-13 shows modeling Scenario 3, 2040 Build with typical development of the prison site. This scenario shows that projects within the Capitol Facilities Plan adequately meet the demands placed upon the future network by increased development pressures. Areas of severe congestion are limited to short segments, mostly on state facilitates including, 12300 South, Bangerter Parkway, and 14600 South.

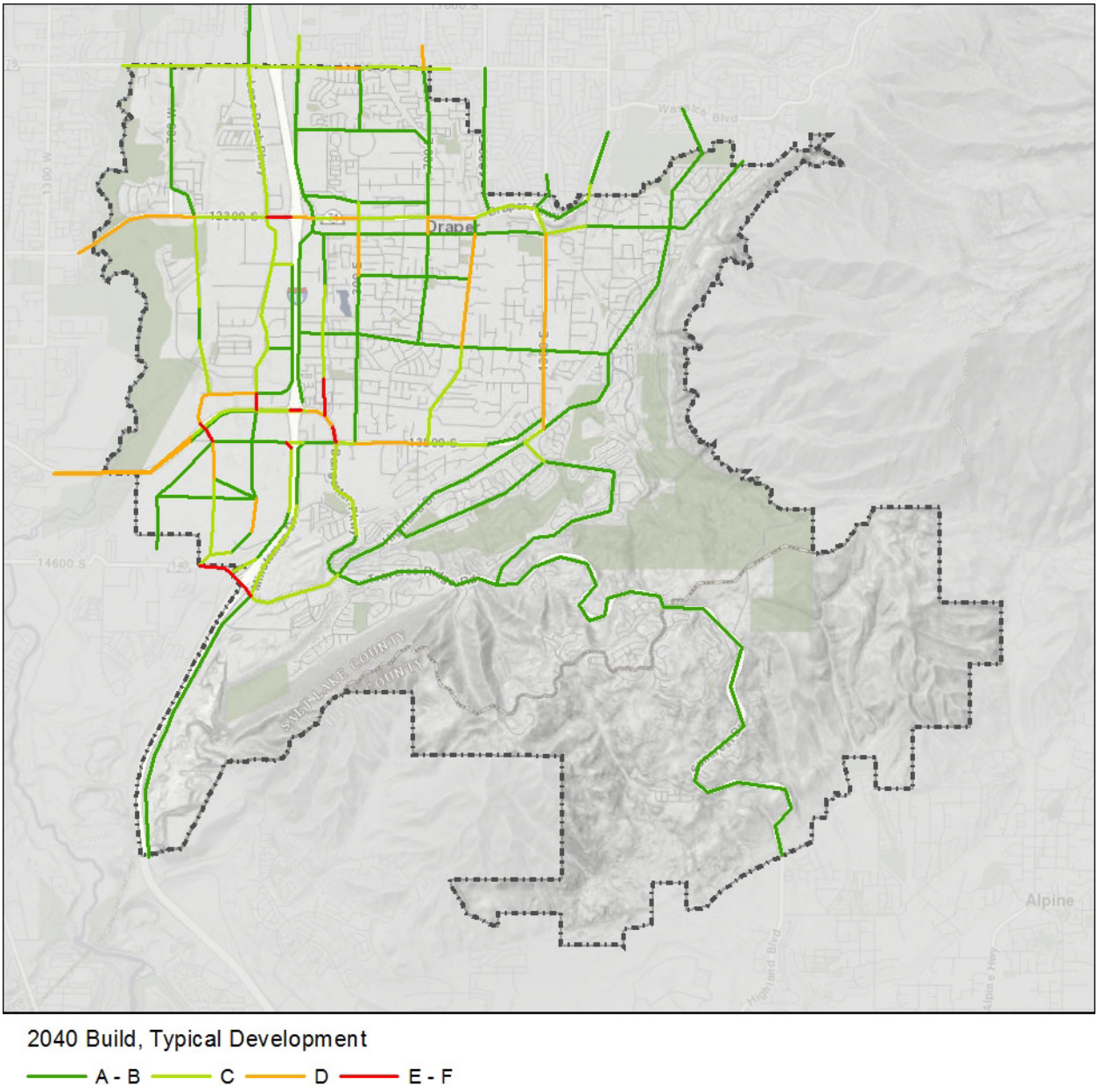


Figure 3-13. Scenario 3 Level of Service – 2040 Build, Typical Development

Figure 3-14 shows modeling Scenario 4, 2040 Build with vision development of the prison site and the re-alignment of TRAX extending into Utah County. Again, the effects of increased development within the prison site remain localized. Congestion patterns are consistent with Scenario 3 outside the prison area with roads internal to the prison site and Bangerter Highway west of the interchange also showing severe congestion.

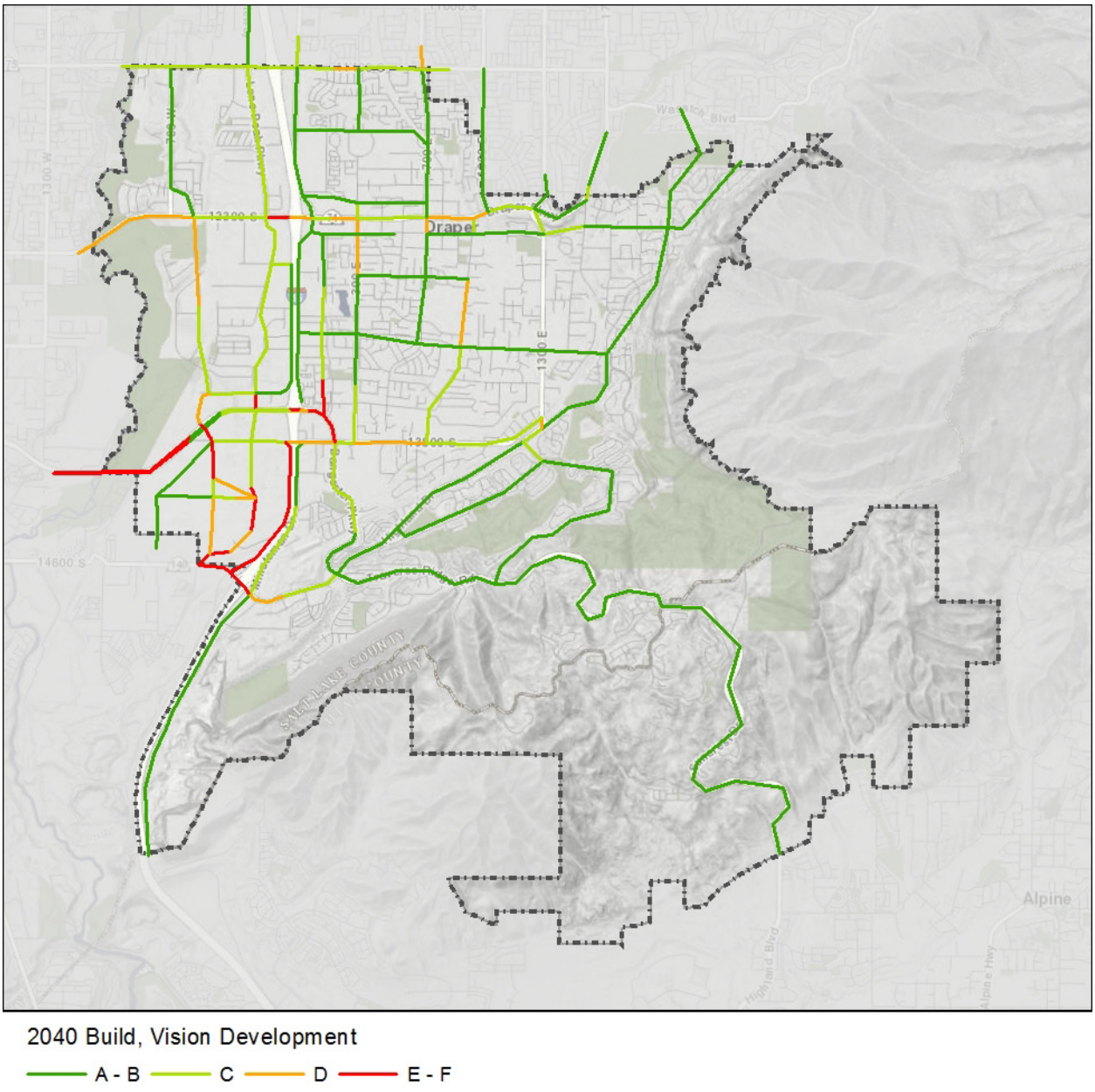


Figure 3-14. Scenario 4 Level of Service– 2040 Build, Vision Development

In summary, widespread congestion occurs in both Scenario 1 and Scenario 2 where no network or capacity improvements are included. Scenario 3 shows that the improvements include in the Capitol Facilities Plan adequately meet the needs of future development, where congestion is limited to small segments and mostly on state facilities. Finally, impacts of increased development densities in the prison site is localized within and around the site itself with little impact to the larger city area, this is evidenced in Scenario 2 and Scenario 4.

3.4 Functional Classification

A functional classification of streets groups 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 3-15 summarizes the hierarchy of the functional classification of streets based upon mobility and access.

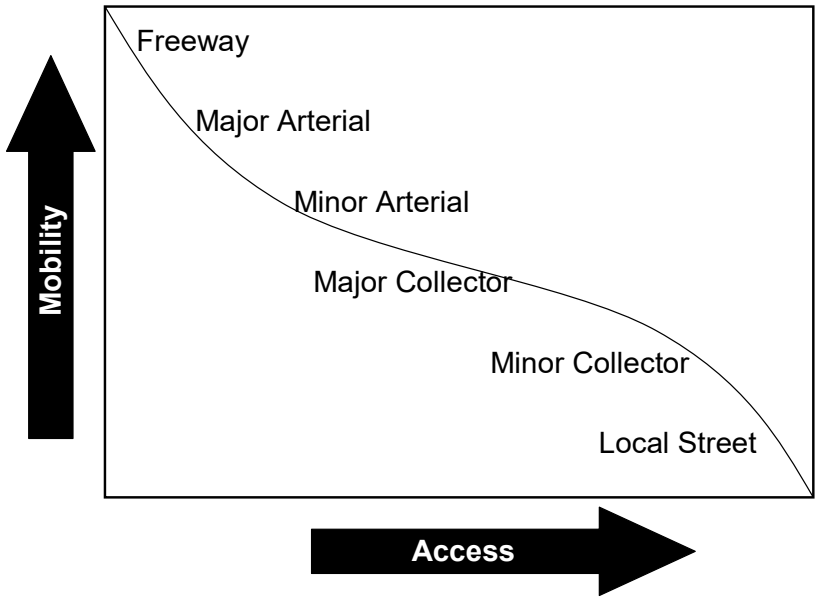


Figure 3-15. Functional Classification of Streets

Table 3-4 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.

Table 3-4. Functional Classification General Characteristics

Functional Group	Speed (mph)	Average Trip Length (miles)	Expected Crash (crashes per million vehicles 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

3.4.1 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 City'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", 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.

3.5 Future Alternative Travel Modes

3.5.1 Transit

Transit lines in Draper currently include TRAX Light Rail and Frontrunner Commuter Rail which both represent major transit investment corridors. Draper is served by the TRAX Blue Line and has light rail stations at Kimball's Lane (700 East) and Draper Town Center. The Frontrunner Commuter Rail station is located at 13000 South in the Vista Station development. Future alternative travel modes in Draper City include core bus service along with enhancements to TRAX Light Rail and Frontrunner Commuter Rail. Future planned transit projects in Draper include extending TRAX Light Rail south into Utah County on one of two yet-to-be-determined alignments. Additionally, there are plans for future core bus service on 12300 South, State Street and a future roadway connection from Bangerter Highway to 14600 South. Finally, there are plans to doubletrack portions of Frontrunner in Salt Lake County. Table 3-2 (shown previously on page 3-11) lists the future transit projects on the WFRC RTP 2019-2050. 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

3.5.2 Walkability

"Bikeable" and "walkable" communities are desirable places to live, work and play, and are therefore a key component of the Draper City 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 City's streets. 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 City’s youth.

3.5.3 Pedestrian and Bicycle

The future planned pedestrian and bicycle network in Draper City 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 3-16. 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

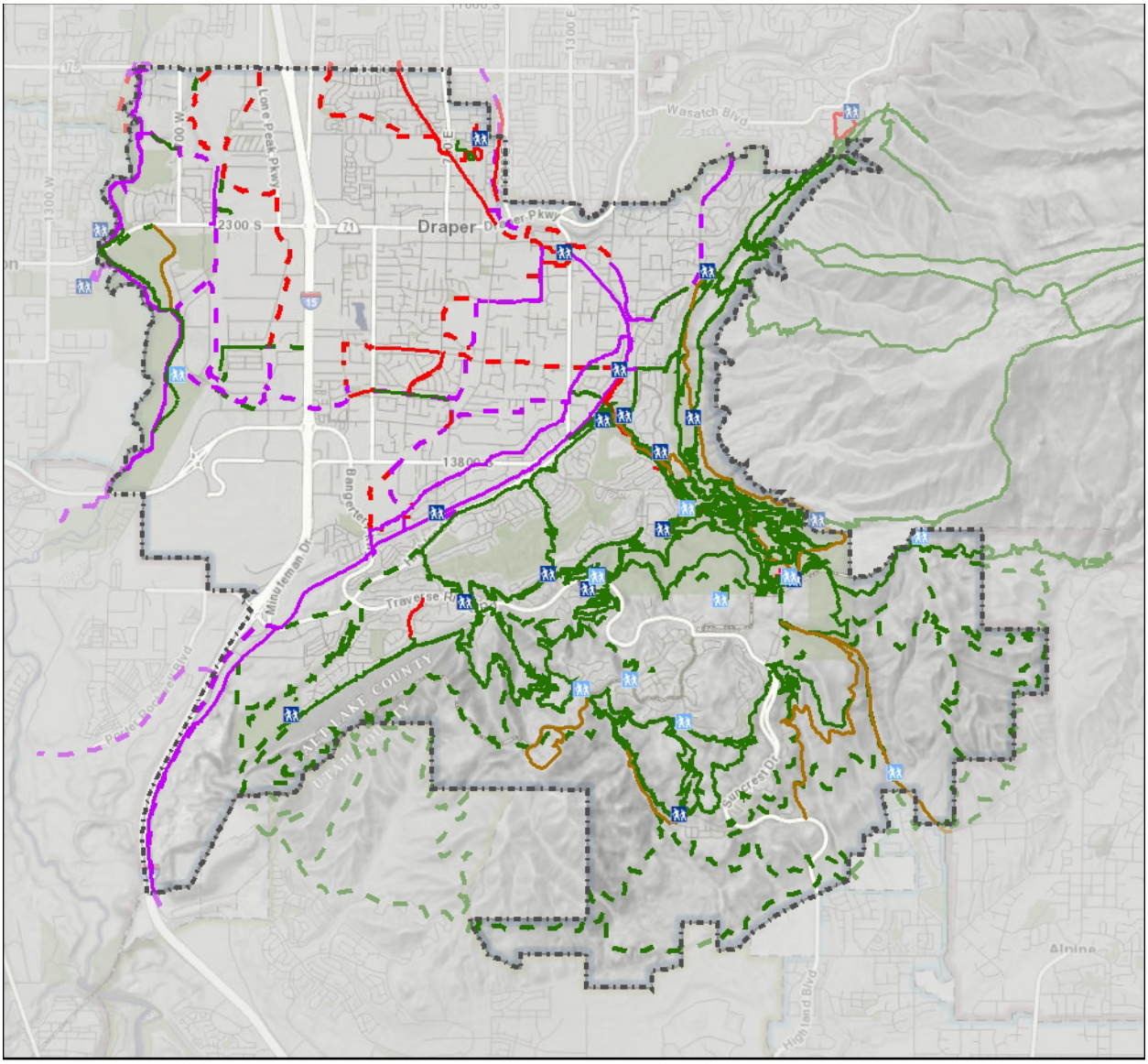


Figure 3-16. Pedestrian Facilities Plan
Source: Draper City Parks and Trails Master Plan

3.5.4 Autonomous Vehicles

While most aspects of vehicle automation fall under the jurisdiction of federal and state governments, Draper City is responsible for maintenance of roadway facilities under its jurisdiction. Today's autonomous vehicle technologies operate best on high-quality infrastructure. Proper road striping, signage, geometries and pavement conditions all help facilitate use of automated vehicle features that are currently in use.

SAE International has identified six levels of vehicle automation to categorize autonomous vehicles, see Figure 3-17. This categorization schedule has become an industry standard and was recognized by The National Highway Traffic Safety Administration (NHTSA) which has also adopted SAE International automation levels.

Most vehicles today operate at Level 0 – no automation. Recent additions of adaptive cruise control or other safety-enhancing technologies such as adaptive cruise control, automatic emergency braking, and lane-departure / blind-spot monitor brought some vehicles to Level 1 – Driver Assistance. Prototypes of autonomous and connected vehicles, with varying levels of automation are currently being tested and some features are becoming more readily available on new vehicles. These prototypes operate at Level 2 and Level 3 and still require a human driver for many maneuvers.

Parking demand is also expected to change with increasing vehicle automation as well as the need for more curbside loading and unloading zones. Although these areas of regulation fall outside the purview of this transportation plan, it will be important monitor changes in these demands as they may impact overall travel behavior.

SAE level	Name	Narrative Definition	Execution of Steering and Acceleration/ Deceleration	*Monitoring* of Driving Environment	Fallback Performance of *Dynamic Driving Task*	System Capability *(Driving Modes)*
***Human driver* monitors the driving environment**						
0	**No Automation**	the full-time performance by the *human driver* of all aspects of the *dynamic driving task*, even when enhanced by warning or intervention systems	Human driver	Human driver	Human driver	n/a
1	**Driver Assistance**	the *driving mode*-specific execution by a driver assistance system of either steering or acceleration/deceleration using information about the driving environment and with the expectation that the *human driver* perform all remaining aspects of the *dynamic driving task*	Human driver and system	Human driver	Human driver	Some driving modes
2	**Partial Automation**	the *driving mode*-specific execution by one or more driver assistance systems of both steering and acceleration/ deceleration using information about the driving environment and with the expectation that the *human driver* perform all remaining aspects of the *dynamic driving task*	**System**	Human driver	Human driver	Some driving modes
***Automated driving system* ("system") monitors the driving environment**						
3	**Conditional Automation**	the *driving mode*-specific performance by an *automated driving system* of all aspects of the dynamic driving task with the expectation that the *human driver* will respond appropriately to a *request to intervene*	System	**System**	Human driver	Some driving modes
4	**High Automation**	the *driving mode*-specific performance by an automated driving system of all aspects of the *dynamic driving task*, even if a *human driver* does not respond appropriately to a *request to intervene*	System	System	**System**	Some driving modes
5	**Full Automation**	the full-time performance by an *automated driving system* of all aspects of the *dynamic driving task* under all roadway and environmental conditions that can be managed by a *human driver*	System	System	System	**All driving modes**

Figure 3-17. SAE International's Level of Driving Automation for On-Road Vehicles
Source: SAE International, SAE J3016™

4. RECOMMENDATIONS

4.1 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 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.

4.1.1 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, traversable area provided beyond the end of the traveled way for the recovery of errant vehicles. The clear zone includes shoulders, bicycle lanes, and auxiliary lanes unless the auxiliary lane functions like a through lane." (pg. 4-15) 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.

4.1.2 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. 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.

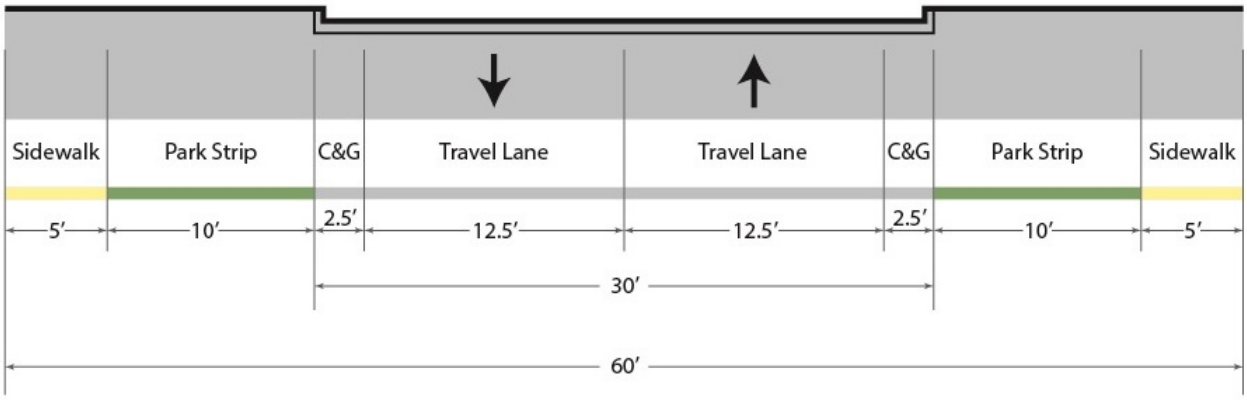


Figure 4-1. Cross Section, Valley Local Street

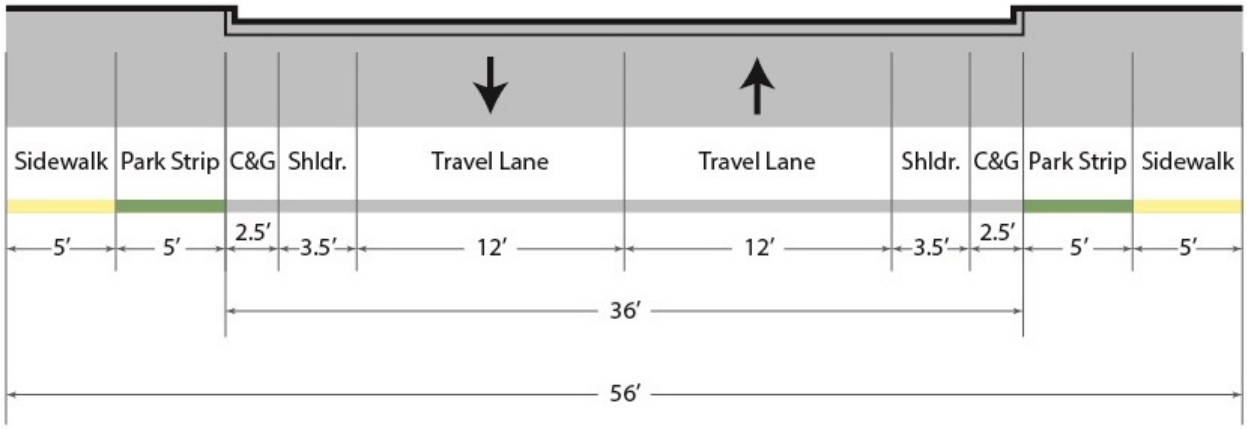


Figure 4-2. Cross Section, Mountain Local Street

4.1.3 Minor Collectors – 66 Feet

Minor Collector streets within Draper City 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, 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.

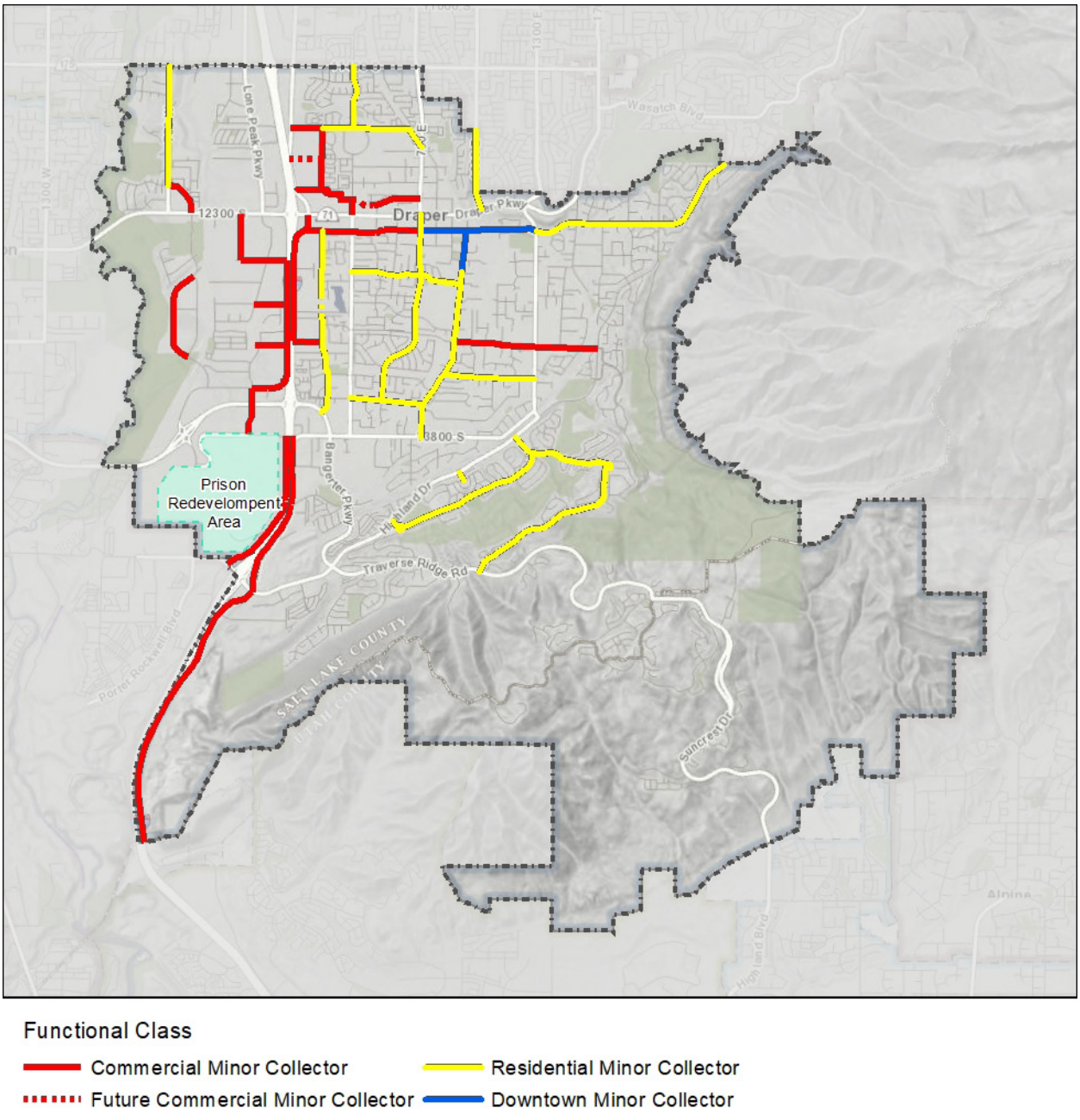


Figure 4-3. Planned Minor Collectors

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.

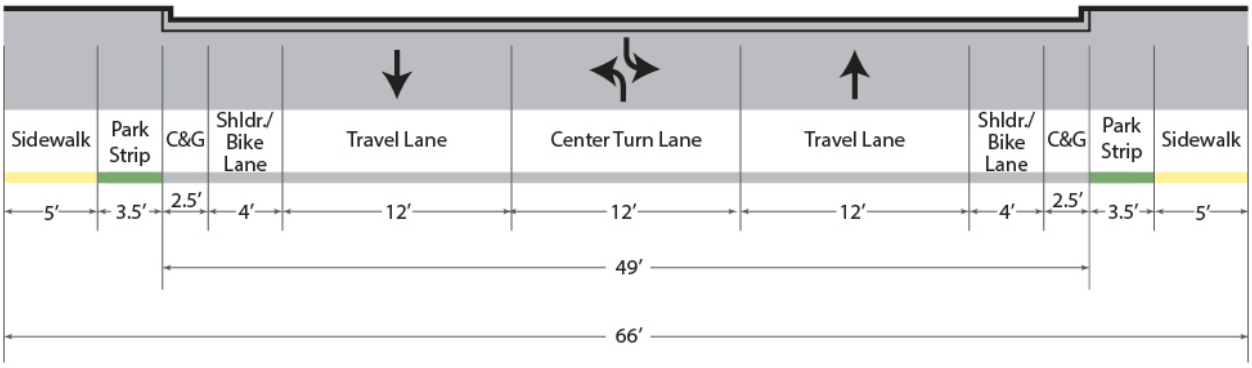


Figure 4-4. Cross Section, Commercial Minor Collector

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. See Figure 4-5.

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

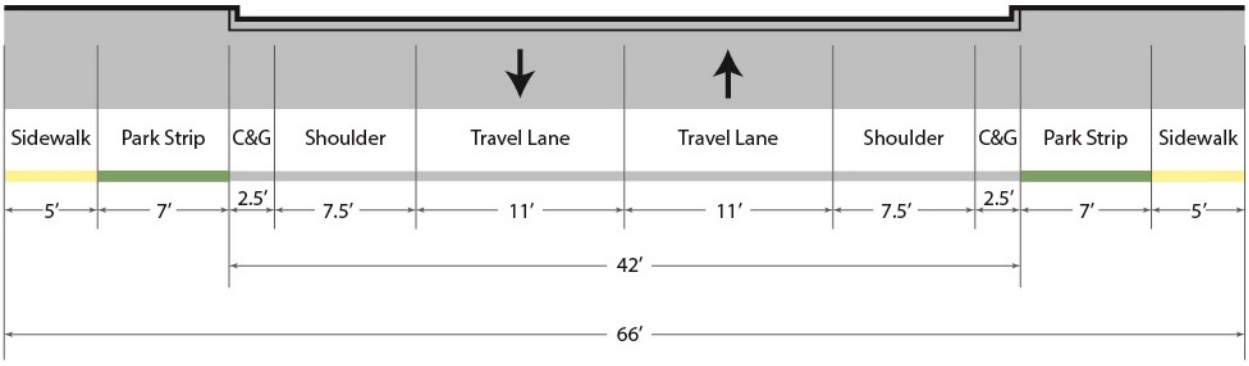


Figure 4-5. Cross Section, Residential Minor Collector

4.1.4 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.

Planned Major Collectors within Draper City are 300 East, 1300 East, 13200 South, 13800 South, and Highline Road. Figure 4-7 shows the Planned Major Collectors.

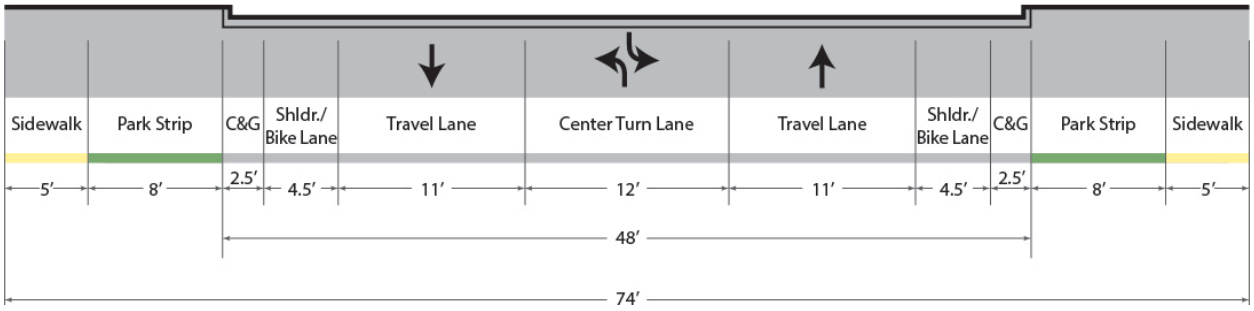


Figure 4-6. Cross Section, Major Collector

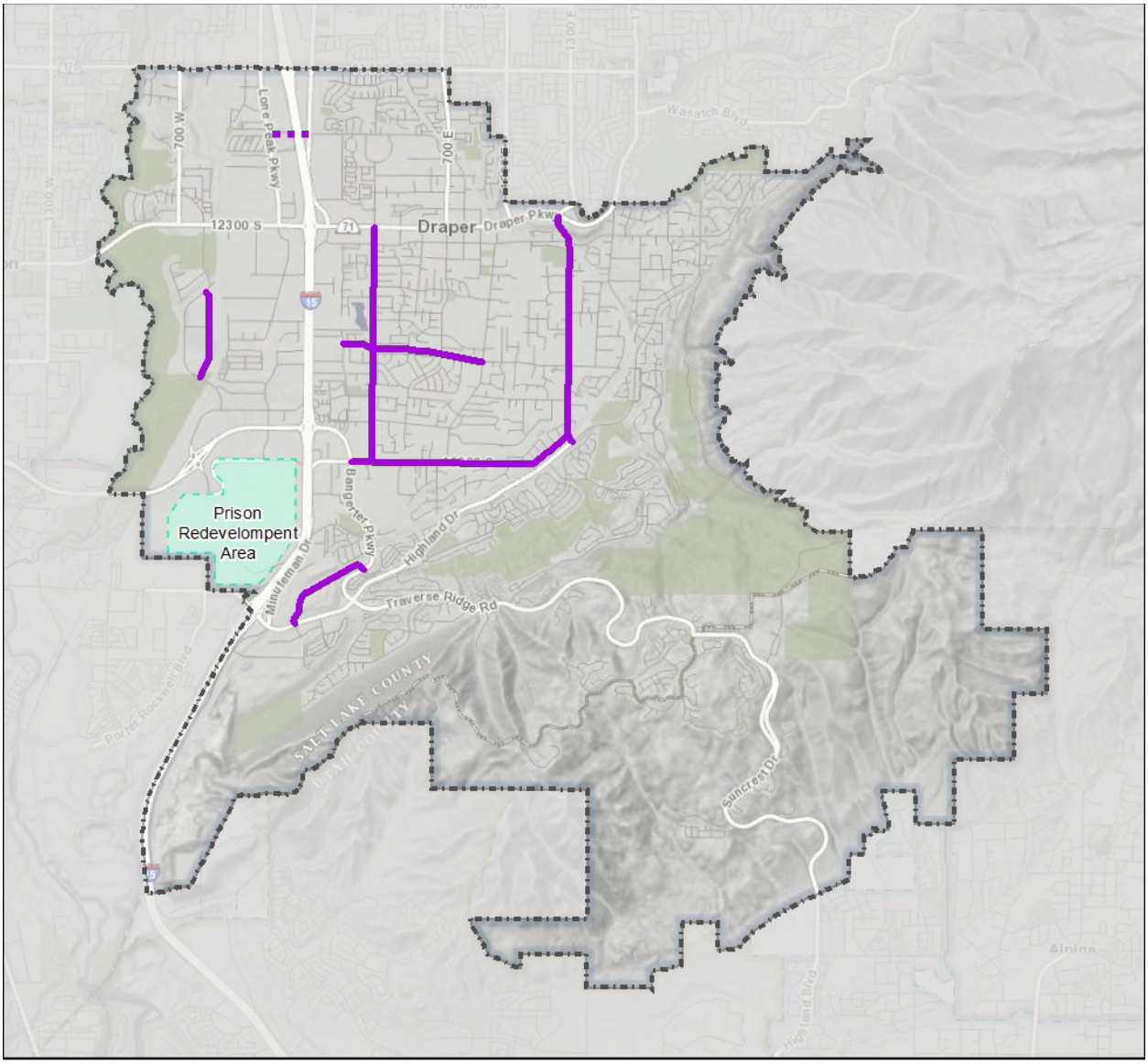


Figure 4-7. Planned Major Collectors

4.1.5 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.

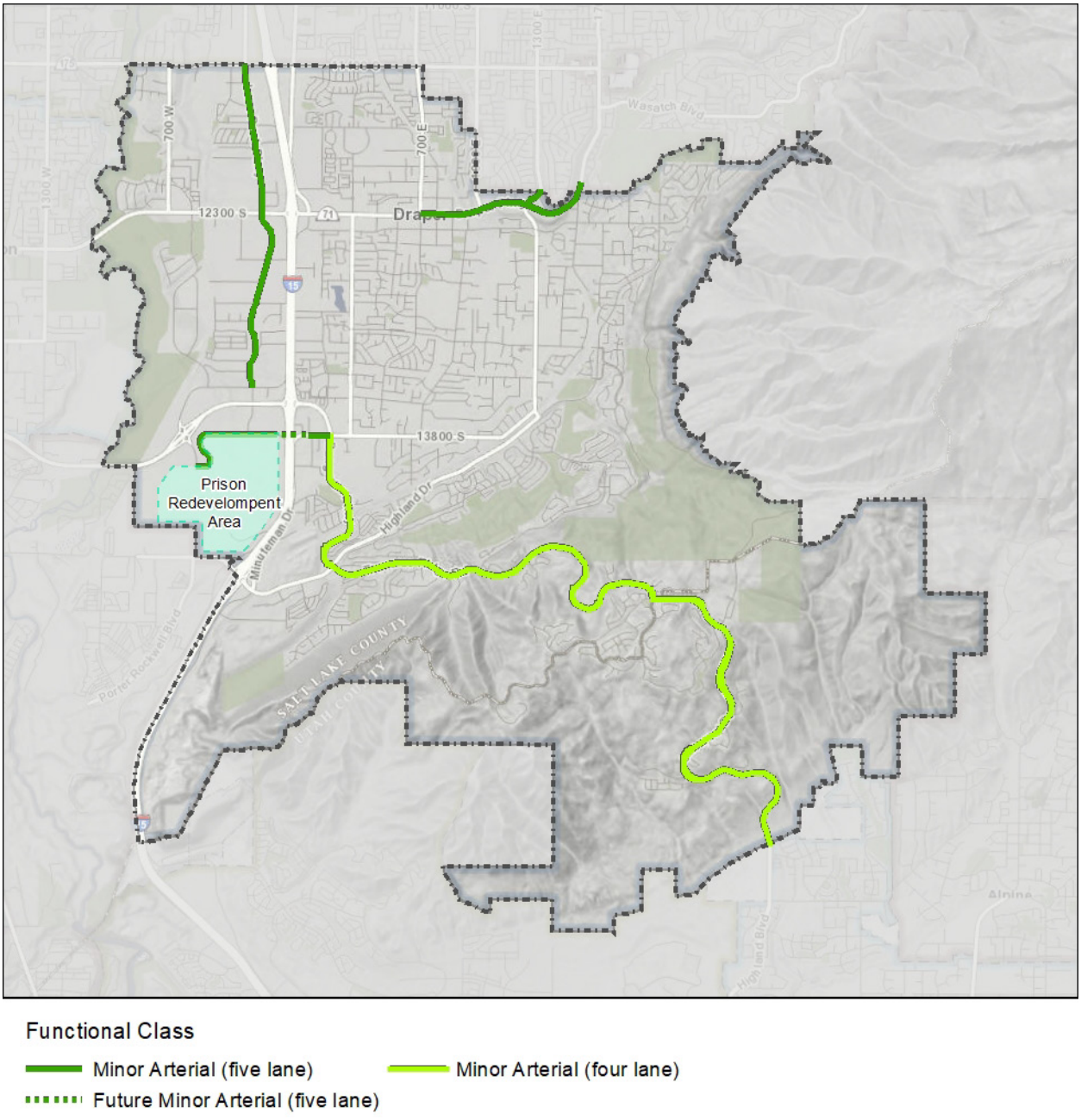


Figure 4-8. Planned Minor Arterials

The four lane Minor Arterial has two 12-foot travel lanes in each direction, and 5.5-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. Figure 4-9 provides the typical four lane Minor Arterial section.

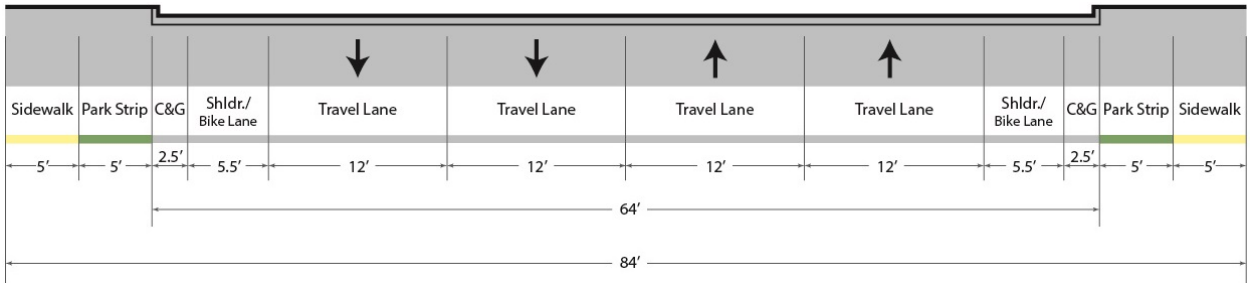


Figure 4-9. Cross Section, Minor Arterial (Four Lane)

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. Figure 4-10 provides the typical five lane Minor Arterial section.

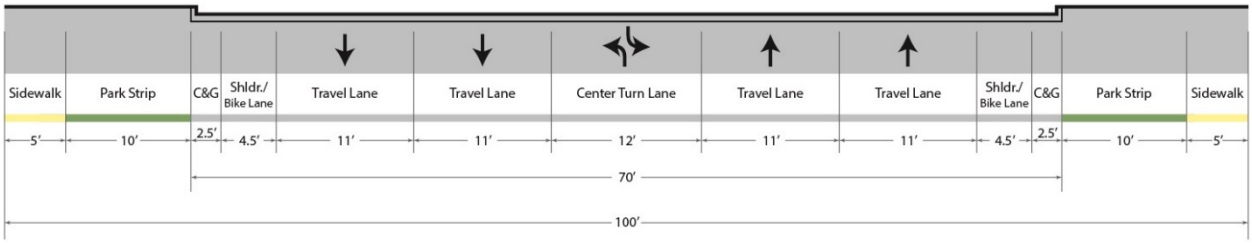


Figure 4-10. Cross Section, Minor Arterial (Five Lane)

4.1.6 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 City roads (600 West, 13490 South, Highland Drive, Vista Station Boulevard, Galena Park Boulevard). Arterial roads within Draper City are shown in Figure 4-11.

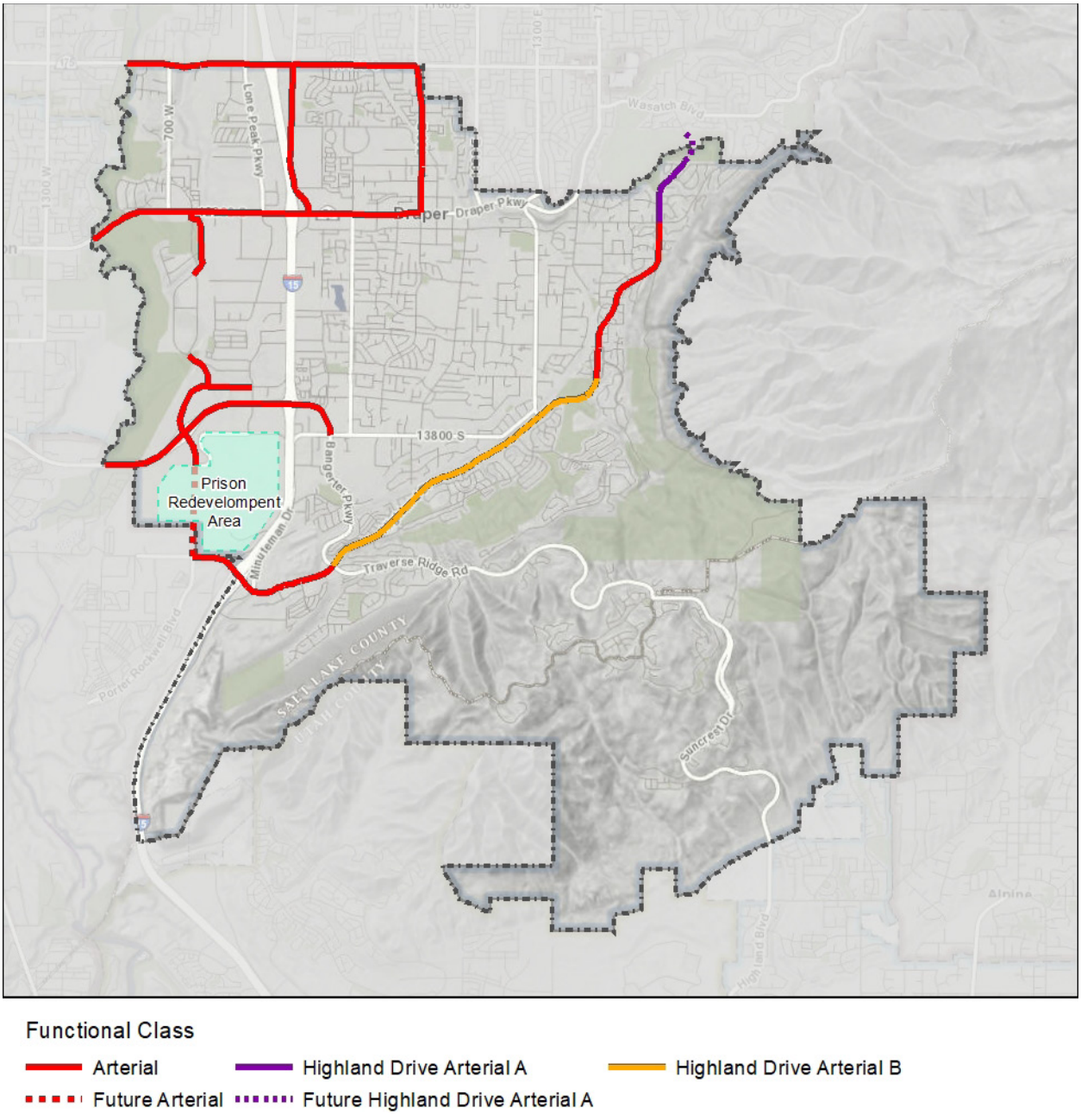


Figure 4-11. Planned Arterials

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 City's Highland Drive Arterial incorporate a non-traversable median in place of a center turn lane. The following figures illustrate the typical arterial cross-sections (Figures 4-12 through 4-15).

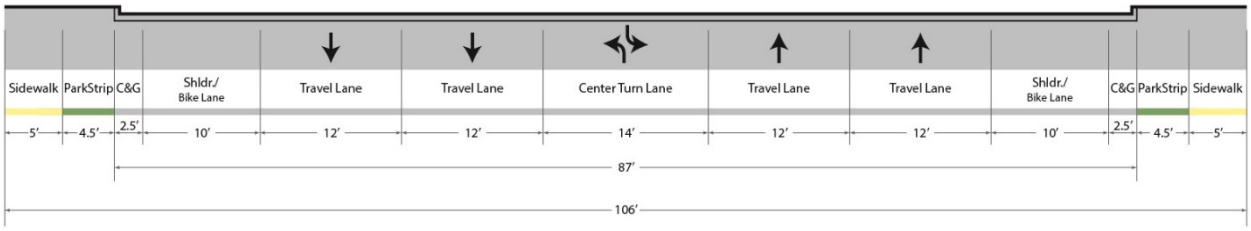


Figure 4-12. Cross Section, Arterial

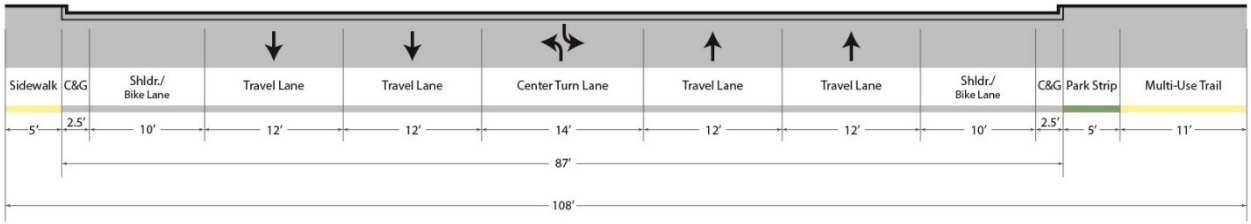


Figure 4-13. Cross Section, Highland Drive Arterial A

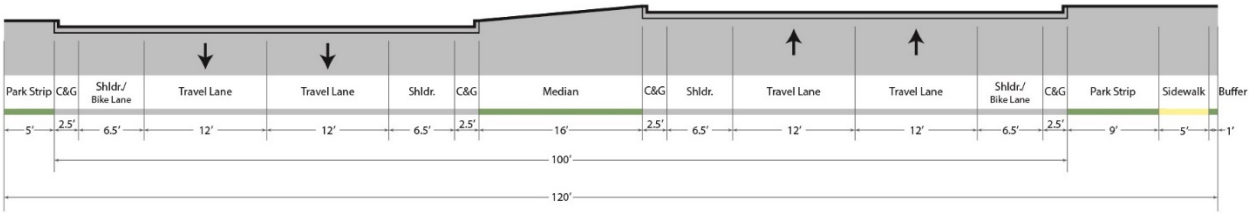


Figure 4-14. Cross Section, Highland Drive Arterial B

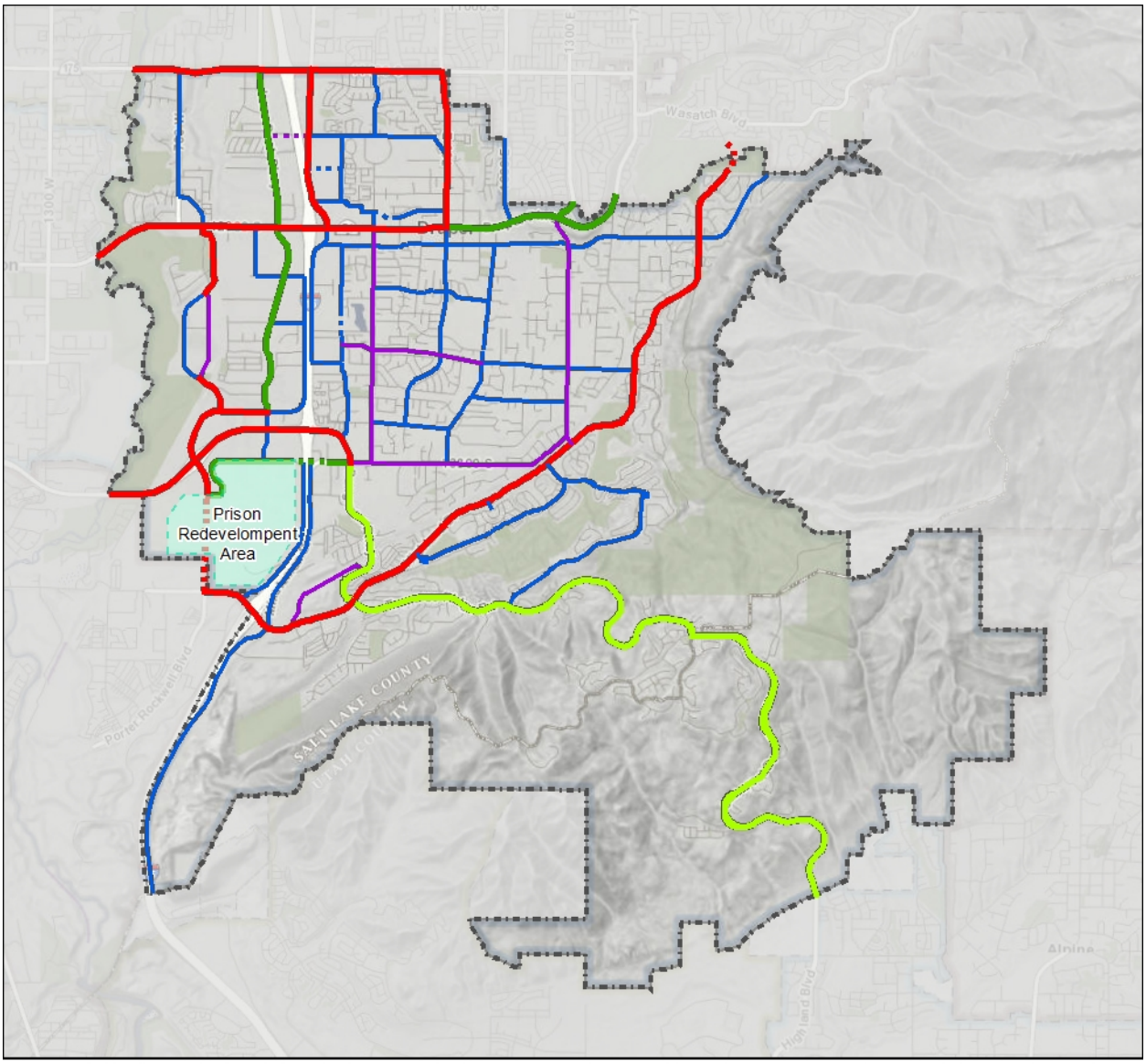


Figure 4-15. Full Functional Classification System

4.2 Access Management

Access management is a concept which has emerged over the past several decades to improve roadway system efficiency. Access management can be defined as the practice of providing restricted access to land developments to preserve traffic flow on surrounding streets, and simultaneously maintain safety, capacity, and speed. Access management can involve the control of a location, design, 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 the implementation of restrictions on higher functioning roadways, such as arterial roads, with little or no restrictions implemented on 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 City engineering standards, which define specific details for the construction of the approach in accordance with the following Draper City Engineering Standards Street Improvement 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 Approach Width

	Approach Width (feet)		
Land Use	Minimum	Maximum	Curb Return Radius (feet)
Industrial and Commercial	25	36	28
Residential – Collector	16	30	5
Residential – Local	12	30	5

Source: Draper City Street Improvement Standard Details

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

Driveway operations are generally approved on a case-by-case basis by the City Engineer. Driveways may restrict certain movements granted upon development approval. For example, circuitous access to individual developments may be provided through operational restrictions of driveways. Driveway restrictions may also be implemented at any time after the driveway is operational as a result of engineering studies or recommendations which may demonstrate improvements in safety, capacity, or speed.

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.

Driveway placement will have a profound effect on the function of the roadway on which it is located, regardless of its design or operation. The City Engineer's approval of access point locations is directly related to the findings of traffic impact studies, location of neighboring access points and cross streets, and consideration of the four main principles of access management. The Utah Department of Transportation has adopted an access management 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 management spacing on all streets in Draper City, including State Highways. Because several State Highways are included in Draper City's Arterial Roadway classification, Arterial street access spacing requirements are listed individually, and other functional classification access spacing requirements are listed by functional classification category. Access spacing may be increased upon approval of 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. The City Engineer may or may not require that a traffic impact study be submitted to evaluate the effects of decreasing the access spacing standards. 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/Private Street Spacing (feet)	Private Access Spacing (feet)	State Hwy
12300 South	Jordan River	MP 3.8	2640	N/A	N/A	Yes
12300 South	MP 3.8	MP 4.6	2640	660	500	Yes
12300 South	MP 4.6	Factory Outlet Dr	2640	N/A	N/A	Yes
12300 South	Factory Outlet Dr	700 East	2640	660	350	Yes
11400 South	Jordan River	State Street	2640	N/A	N/A	Yes
State Street	11400 South	12300 South	2640	660	350	Yes
700 East	12300 South	11400 South	2640	660	350	Yes
Bangerter Hwy	Jordan River	Bangerter Pkwy	No Access	No Access	No Access	Yes
Bangerter Pkwy	Bangerter Hwy	13800 S	2640	N/A	N/A	Yes
Bangerter Pkwy	13800 S	Highland Drive	2640	660	500	No
Other Arterial Streets			2640	660	350	No
Major Collector Streets			2640	660	350	No
Minor Collector Streets			1320	350	200	No
Local Streets			1320	300	150	No

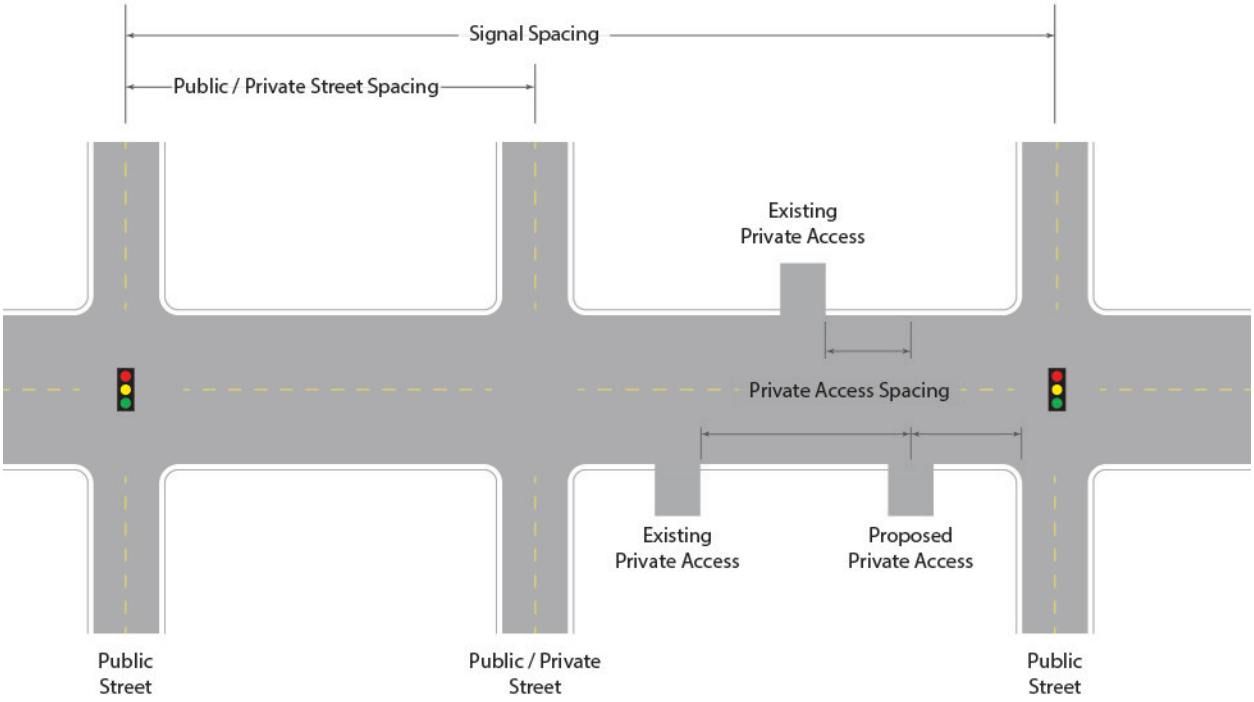


Figure 4-16. Access Management Spacing

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 facilitate drivers processing 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 decreases with each additional driveway (Highway Capacity Manual, 6th Edition) and that accident rates on a road increase by upwards of three percent with each new access point (TRB Access Management Manual, 2014). 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 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 in comparison to private driveways and access points. High volume private driveways with volumes above 5,000 vehicles per day, or 100 vehicles per hour, may be held to public street spacing standards at the discretion of the City Engineer. Issues associated with public street spacing are identical to those associated with access spacing. However, minimum spacing standards for public streets are greater because of higher traffic volumes. Private streets may be restricted to right-in and right-out operation, at the discretion of the City engineer.

Spacing of traffic signals can have profound effects on the safety and efficiency of roadways. Traffic signal placement is limited by warrants outlined in the Manual on Uniform Traffic Control Devices (MUTCD). These warrants serve as minimum standards that must be satisfied before a traffic signal can be considered at a location. Locations which satisfy minimum warrants may be restricted from the installation of a traffic signal because of signal spacing standards previously mentioned.

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. For example, research shows that when direct left turns are diverted into a combined right-turn and U-turn movement, there is a 30 percent reduction in crash rates for arterial streets (TRB Access Management Manual, 2014).

To promote safe and efficient operations of roadway systems within the city, Draper City should consider that new developments install the following conflict reduction methods at the discretion of the City Engineer:

- right turn lane bays,
- raised medians,
- two-way center turn lanes,
- turn pockets,
- driveway illumination,
- and other measures to promote the safety and efficiency at access points.

4.3 Traffic Calming

4.3.1 Traffic Calming Alternatives

Traffic calming methods exist in many forms, from small, easy, inexpensive, non-intrusive actions and projects to 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.

4.3.2 Traffic Calming Tools

There are three classifications of traffic calming tools that can be implemented to increase driver awareness and slow speeding traffic. They are as follows:

1. Informative measures such as signage, signals and pavement markings,
2. Street modifications,
3. And route modifications.

The first alternative of traffic calming implementation consists of the usage of signs, signals and pavement markings which are designed to provide information to drivers. Speed limit signs, yield signs, roadway markings, and traffic signals are all examples of traffic calming measures. Figure 4-17 shows an example of how pavement striping can be used to slow drivers before entering a crosswalk.

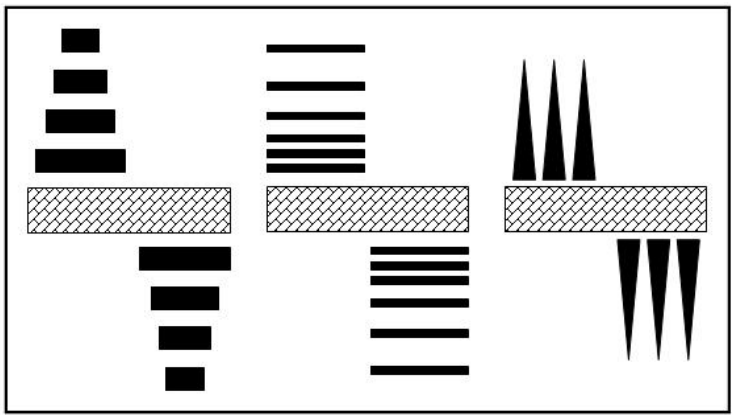


Figure 4-17. Traffic Calming, Crosswalk Striping

The second method of traffic calming involves the application of street modifications. Street modifications are calming tools that change vertical or horizontal physical characteristics of the roadway. Speed bumps, speed tables, islands, and bulb outs are examples of traffic calming street modifications.

Speed tables are prominently used as street modification traffic calming devices. Speed tables come in a variety of forms, from raised asphalt with prominent pavement markings, to alternate materials such as stamped concrete, cobblestone, or brick pavers. Speed table surfaces are 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, raised crosswalk, and overall increased visibility of the treatment causes drivers to reduce speeds. A conceptual drawing of a mid-block raised crosswalk is shown in Figure 4-18.

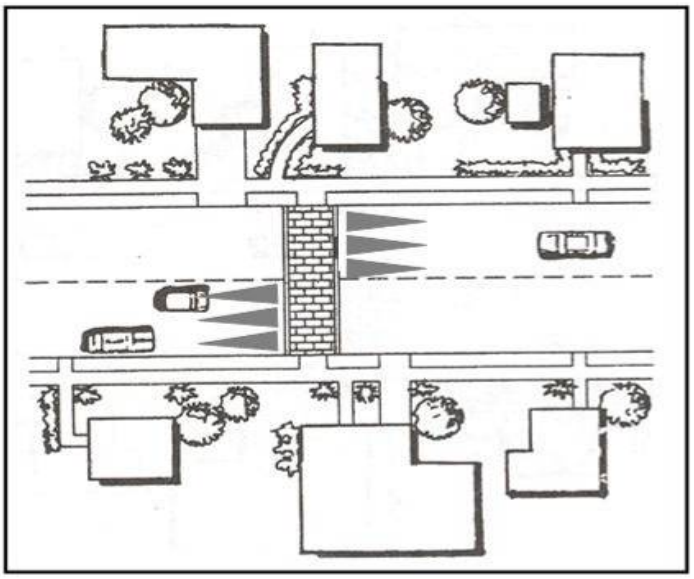


Figure 4-18. Traffic Calming, Raised Crosswalk
Source: Traffic Calming: State of the Practice

Another example of a street modification used for traffic calming is a center island or median below. These islands are typically landscaped, concrete-raised medians in the middle of the roadway. The function of a center island is to narrow an intersection's approach so that drivers are compelled to slow down and exercise caution with their movements. Center islands are typically more effective when they are shorter in length, as opposed to longer medians that separate traffic flow. The following photo shows a an existing center median on 65 East, south of Highland Drive.

Traffic Calming, Center Island, 65 East, south of Highland Drive

Curb extensions, or bulb outs, are another example of a street modification used for traffic calming. Bulb outs narrow a driver's visual field at an intersection so that caution is exercised as the driver proceeds through an intersection. Curb extensions reduce the pavement width at an intersection, thus providing safer crossings for pedestrian and bicyclists by decreasing the length needed to traverse the roadway. Striped crosswalks can be used in conjunction with bulb outs to further increase driver awareness. An example of an intersection with bulb outs is shown in Figure 4-19.

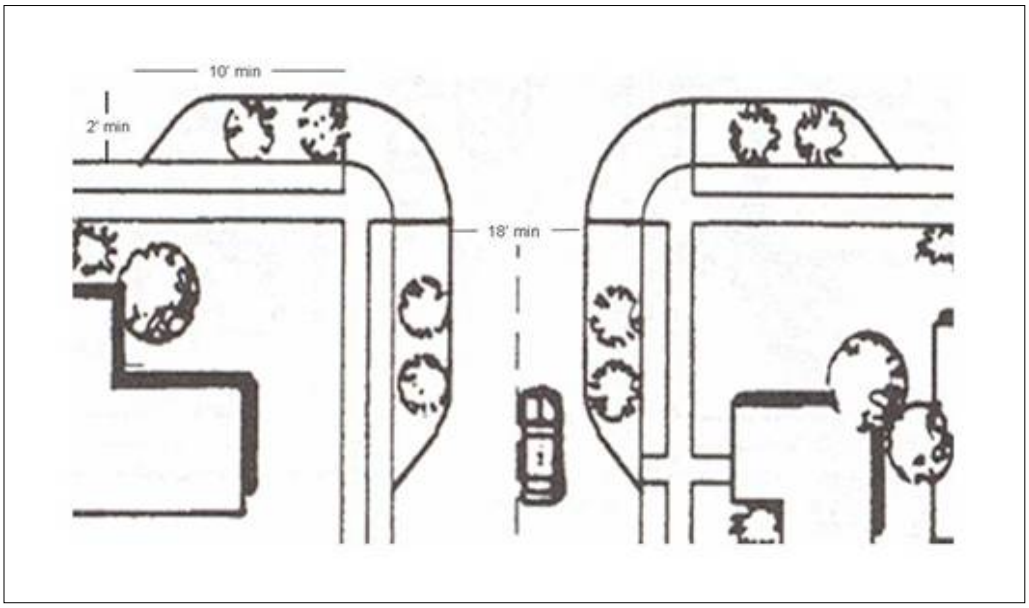


Figure 4-19. Traffic Calming, Bulb Outs
Source: Traffic Calming: State of the Practice

Route modifications are the third alternative of traffic calming methodology. One-way streets, turn prohibitions, closures, and diverters are examples of route modifications. Route modifications can also be used to prevent cut-through traffic within a development or parking lot. Route modifications differ from the first and second traffic calming measures, as they are used to alter traffic routes. In contrast, informational measures and street modifications focus on adjusting driver behavior.

Typical Residential Street in Draper City

4.3.3 Traffic Calming Device Implementation Process

Draper City is currently drafting a traffic calming policy. Future decisions should refer to this policy. Meanwhile, the process for traffic calming device applications is outlined below.

1. Conduct an engineering study to determine if a traffic calming device is necessary. The study should reference and analyze speed data, traffic data, and accident data. Required traffic engineering infrastructure, such as stop signs, yield signs, advanced warning signs, and striping consistent with the MUTCD should be applied prior to any recommendation for traffic calming.
2. Obtain citizen input for the implementation of potential traffic calming devices. Draper City should develop policies for engineering studies which may require the use of traffic calming devices based on speed thresholds, volume thresholds, and related data.
3. Obtain local community and City Council approval. Draper City should develop policies for annual and case-by-case funding applications and related implementation.
4. Implement appropriate traffic calming device.
5. Conduct studies to determine if the traffic calming device is effective. Factors to consider when determining the effectiveness of the device should include speed, traffic and accident data. Such studies should be performed before and after the recommended action. Neighborhood meetings should also be held to gauge the local opinion of the success or failure of the recommended action.

4.3.4 Traffic Calming Considerations

The following items should be considered when implementing a traffic calming device:

- All signage, pavement markings, and traffic control devices should conform to MUTCD 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.
- Consider frequently occurring weather events when determining the appropriate traffic calming device. For example, snow events in Draper City may hinder visibility of traffic calming devices. In contrast, some traffic calming devices may interfere with snow plowing efforts.

- Aesthetically pleasing streetscaping will "soften" the appearance of a traffic calming device, and lessen controversy and opposition associated with its installation.
- Consider minimum and maximum spacing intervals of traffic calming devices that will be used to deter speeding. If speed reduction traffic calming devices are installed at large intervals, speeding is likely to occur between the devices. Traffic calming devices should be spaced at intervals to deter vehicles from accelerating between devices.
- Consider feedback from emergency responders before installing proposed traffic calming devices. For example, a traffic calming device may increase travel time between a life-threatening emergency call and response. Emergency agencies can provide insight for alternative access points, trade-offs, and preferred options.
- Consider traffic calming measures when designing new developments. Several traffic calming devices are part of large retrofit efforts. Long, straight road corridors with limited landscaping may foster higher speeds and are counter to traffic calming goals. Retrofitted traffic calming actions should be designed to eliminate traffic issues, and not relocate problems to a parallel path.
- Know that traffic calming methodology is continually evolving. Consult literature containing up to date procedures and ideals before developing a traffic calming plan. Published manuals and procedures are regularly produced by affiliations such as ITE and the Transportation Research Board.

4.4 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. In recent years, light rail and commuter rail have been added to the travel options available to Draper City citizens.

4.4.1 Commuter Rail

FrontRunner commuter rail service opened between Salt Lake City and Provo in December 2012 and runs through the western part of Draper City. Draper City has one Frontrunner station at approximately 13000 South and Frontrunner Blvd, near the Vista Station development. The WFRC RTP identifies a project to double track portions of Frontrunner in Salt Lake County with funding in Phase 2 (2031-2040).

4.4.2 Light Rail

The TRAX Blue Line extension into Draper City began operation in August 2013 and Draper City is served by three TRAX stations at 11400 South, Kimballs Lane and Draper City Town Center, where the TRAX Blue Line currently ends.

There are multiple potential light rail expansion options for Draper City. There is further planning needed to determine where these transit lines will be located, when they will be built, and where funding sources will be found. Future development, including the prison site redevelopment may influence where these transit lines are located.

As mentioned in Chapter 3, the WFRC RTP details a light rail extension through Draper City with funding planned for phase 3 (2041-2050). The RTP identifies two possible alignments for the extension. The first

alignment is to extend the TRAX Blue Line from its current terminus at Draper Town Center, south into Utah County. The extension would likely feature two additional TRAX stations located near Highland Drive/13800 South and 14600 South just east of I-15.

The second potential alignment would branch off from the TRAX Blue Line near downtown Sandy, cross west of I-15, and parallel I-15 south through Draper and the prison site and then cross I-15 again and continue south around the point of the mountain to Lehi.

Future analysis will determine which option for a TRAX extension is preferred. However, from a high-level, each option maintains certain advantages. Building the TRAX extension from Sandy would provide direct transit access to the prison site. This would also negate noise and railroad crossing concerns associated with the extension alignment from Draper Town Center, but would leave that section of Draper without local transit access. Additionally, the Sandy extension alignment would have impacts to infrastructure west of I-15 whereas the Draper Town Center extension would be constructed within an existing rail corridor.

Sandy TRAX Station

4.4.3 Bus Routes

Bus routes are another key transportation component in the Draper MTP. The core bus routes identified in the WFRC RTP will enhance the ability of Draper residents and workers to connect to key destinations. These routes will upgrade the current intermittent bus service to dedicated, frequent service. Additionally, the core service routes will enhance the ability of stations to connect surrounding land uses to the transit investment corridors of the city.

4.5 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 City. 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 exists beyond Draper City'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 City

The Porter Rockwell, Draper City Canal, and Jordan River Parkway Trail provide paved regional trails in Draper City. These trails connect vital areas of the city and also provide critical connections to neighboring cities. These paved trails are key components to Draper City'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 City 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 Lane on 1300 East at Draper City Park

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	Minuteman Drive (south section)

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 Boulevard

Example of a Bike Route

Figure 4-20 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.

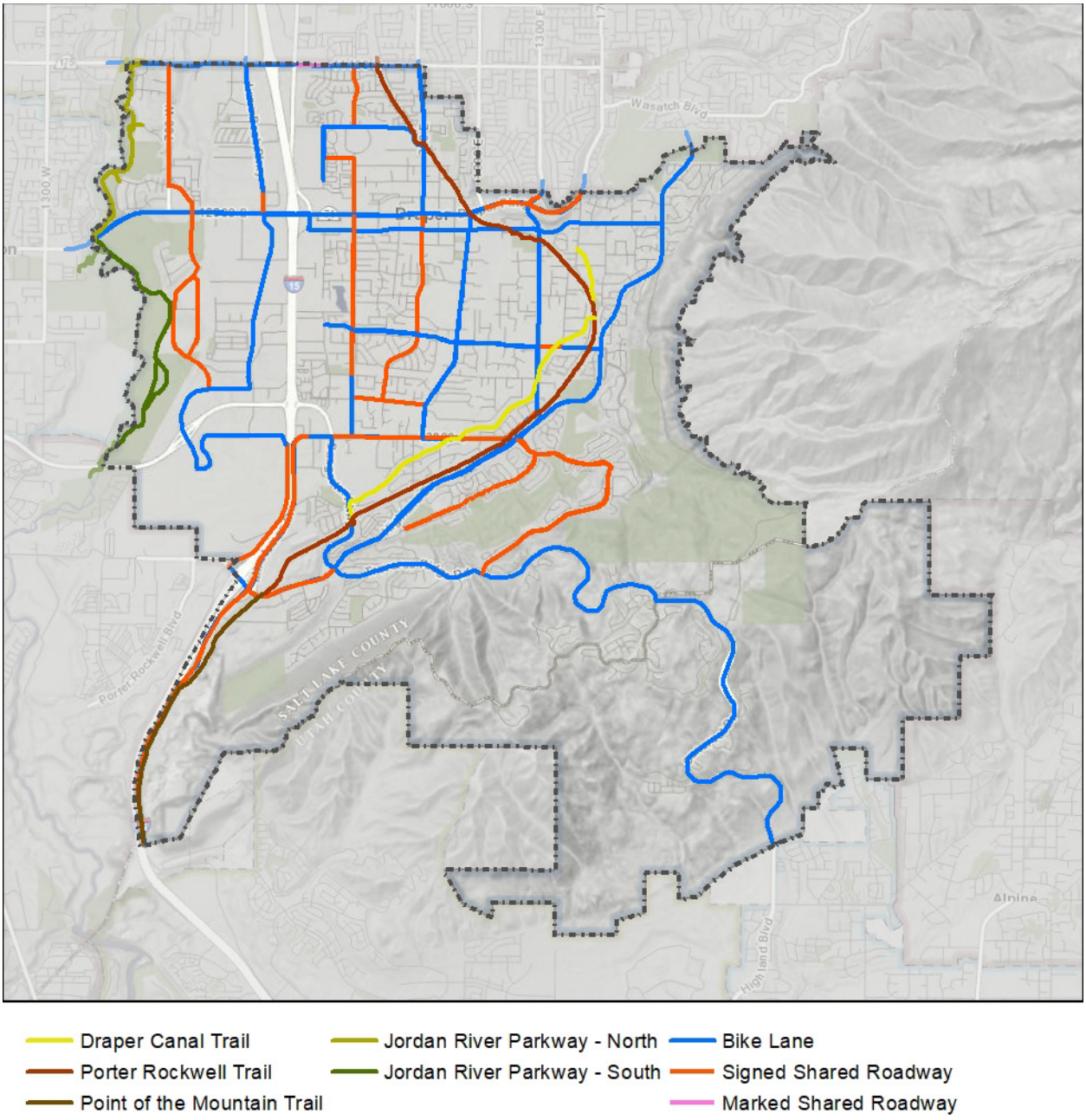


Figure 4-20. Master Transportation Plan, Bike Component

4.6 Crosswalks

Pedestrian crossings are a critical part of the transportation infrastructure since they represent a direct, physical interface between drivers, bicyclists, and pedestrians. The recent national increase in pedestrian fatalities has resulted in more focus on preventing pedestrian deaths on the roadway. Meanwhile, crosswalk amenities continue to evolve providing engineers and planners with more options for crosswalk design.

Crosswalk design for signalized intersections is generally consistent from location to location since the traffic signal infrastructure directs right-of-way for pedestrian and vehicle movement. Roundabouts

typically feature marked and signed crossings on the approaches to the roundabout. Unsignalized intersections may or may not feature marked or signed crosswalks, depending on traffic volume, pedestrian volume and sight distance. Low-volume, residential intersections typically do not feature marked crosswalks. At signalized intersections, unsignalized intersections, or roundabouts where additional pedestrian amenities are desired, advanced warning signs and pavement markings are the typical treatments.

Unlike the more standardized applications for signalized intersections and roundabouts, midblock crossings require a more nuanced and context-sensitive approach. Midblock crossings represent a greater hazard to pedestrian safety than intersection crossings since there are usually fewer, or less obvious, cues to alert drivers and pedestrians to a crossing location. There is also greater flexibility regarding the types of pedestrian treatments that can be used at a midblock crossing. However, it is important to match the appropriate treatments to the characteristics of the crossing. Otherwise, the treatments may be ineffective at reducing safety risks, and in some cases, the treatments may increase safety risks by lowering users' sense of caution.

4.6.1 Crosswalk Treatments

Pedestrian crossing treatments represent many forms and continue to evolve as new concepts develop. Marked crosswalks may need to be supplemented by additional treatments depending on conditions. Table 4-3 provides a summary list of several treatment types. The list is not intended to be comprehensive but contains enough types of treatments to start an investigation of what may be appropriate for a given location. Some treatments overlap with traffic calming alternatives discussed previously. Further guidance on selecting the appropriate treatment types is provide in the next section.

Table 4-3. Sample of Pedestrian Crossing Treatments

Category	Treatment Type
Static Signs	Signs adjacent to crosswalk
	Advance warning signs
	Overhead warning signs
	In-street, movable signs
Active Signs	Signs with constant warning flashers
Pavement Markings	Yield lines
	Graduated transverse lines
Traffic Control Signals	HAWK signal
	TOUCAN signal
	Pedestrian traffic signal
Geometric Changes	Curb extensions
	Refuge islands
	Raised crosswalk
	Roadway narrowing
Miscellaneous	Crossing flags

4.6.2 Considerations for Crosswalks at Uncontrolled Locations

The following considerations should be taken into account when implementing a midblock crosswalk, a crosswalk at an uncontrolled intersection, or investigating additional treatments to existing midblock and uncontrolled intersection crosswalks:

- Crosswalk treatments should be consistent with pedestrian treatments at nearby, similar locations to enhance driver and pedestrian expectations.
- Crosswalk treatments should correlate with the key characteristics of a crossing: pedestrian demand, pedestrian user types, vehicle demand, vehicle speeds, crossing width, sight distance, other roadway geometric features.
- An inappropriately designed crossing can lead to an increased risk of pedestrian crashes.
  - Higher vehicle travel speeds narrow the driver's cone of vision leading to reduce ability to detect and react to pedestrians.
  - Wider roads limit a driver's awareness of activity on the edges of the crosswalk.
  - Momentum and expectation have a direct correlation with driver and pedestrian compliance of a crossing.
  - Auto-dominated environments require substantial treatments to achieve good driver compliance.
  - Roadways with more than three lanes or vehicle operating speeds greater than 35 miles per hour are generally a very poor location for a simple, painted midblock crosswalk.
- Adding a crosswalk is not guaranteed to have a positive effect and, in some cases, no crosswalk is the appropriate action.
  - When crosswalks are underutilized, drivers become conditioned to ignoring the crosswalk and the ability of the crosswalk treatments to alert drivers to a potential hazard diminishes.
  - Meanwhile, the lack of a crosswalk can be a cue to pedestrians to take appropriate caution in areas where they are not likely to be expected or perceived by drivers even if there was a crosswalk.
  - Generally, when crossings do not support a minimum of 20 crossings during the peak hour, adding a crosswalk is not a recommended treatment.

4.6.3 Additional Resources

Additional resources to aid crosswalk design and treatment selection are available from National Association of City Transportation Officials (NACTO) design guides and the MUTCD. National Cooperative Highway Research Program (NCHRP) Report 562: *Improving Pedestrian Safety at Unsignalized Intersections* provides a data-driven approach to determining whether a crossing is appropriate for a location and what kind of treatments best support safety of the crossing. Requirements and warrants for school crossings are found in Part 7 of the Utah MUTCD.

4.7 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 (Figure 4-21) 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.

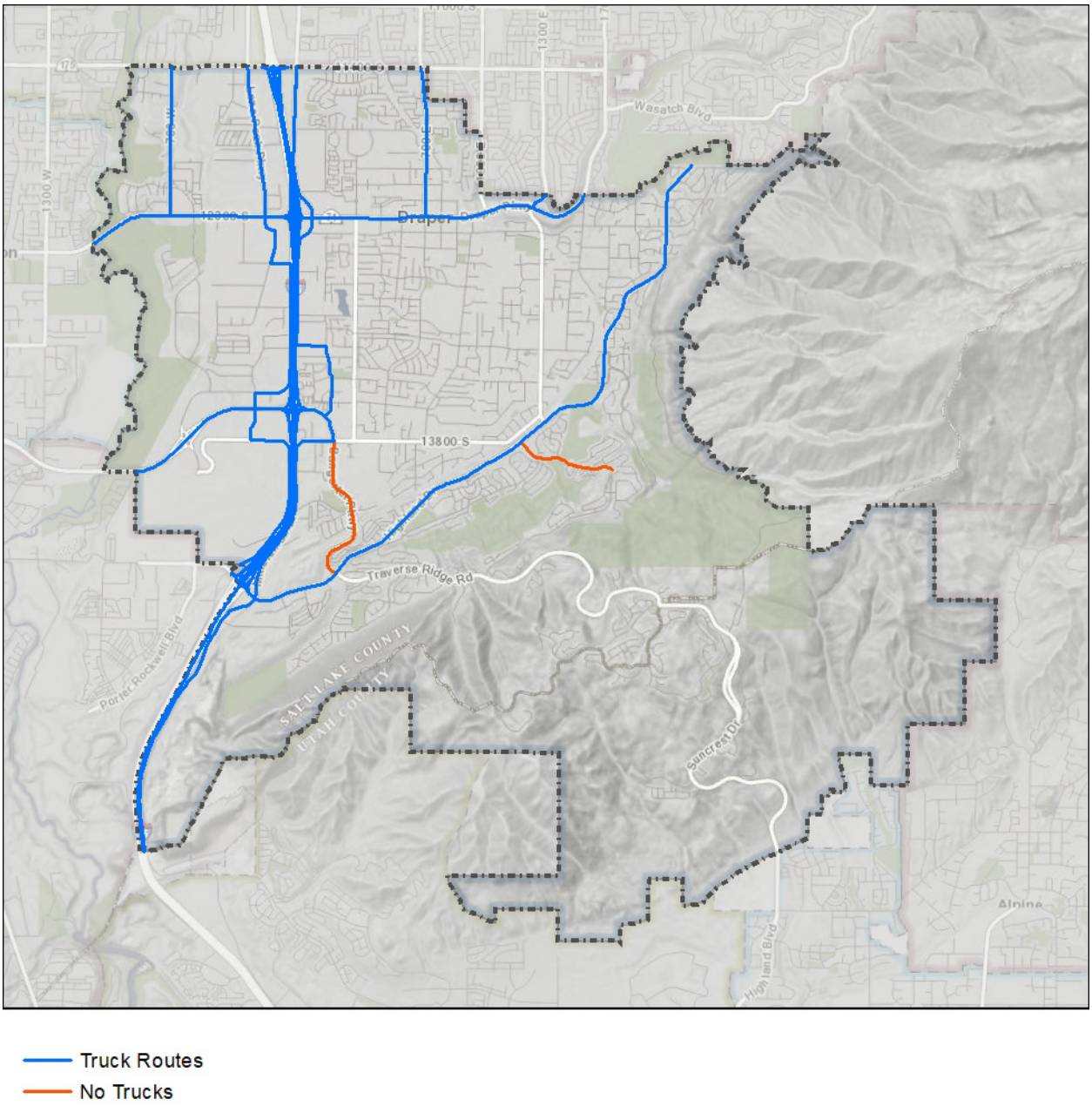


Figure 4-21. Truck Routes

4.8 Connectivity

Though many of the connectivity barriers affecting Draper City are due to physical terrain features, there are areas of opportunity to improve connectivity at both the regional and community scales. Some of these opportunities require coordination with other agencies, such as neighboring cities, UDOT, UP, or UTA. Draper City should continue to foster working relationship with these entities and proactively seek opportunities to eliminate connectivity barriers.

One of the opportunities to improve regional-scale connectivity is completing Highland Drive from the Draper City boundary to 9800 South in Sandy City. Constructing the Highland Drive gap would complete a regional route in eastern Salt Lake County stretching from 2100 South Salt Lake City to I-15 at 14600 South in Draper City. The Highland Drive connection from Draper City to 9800 South has traditionally been a high priority for Draper City and could help alleviate traffic pressures on parallel routes like Wasatch Boulevard and 1300 East.

At a community scale, Draper City should stay involved with the redevelopment of the prison site to ensure the constructed roadway network supports good internal circulation and access to major highways. The future I-15 crossing at 13800 South identified in this plan, will facilitate traffic flowing between the prison redevelopment site and other parts of Draper City to bypass the already busy I-15 interchange at Bangerter Highway.

The lack of east-west connectivity from Fort Street to 1300 East between Pioneer Road and 13800 South will be aided by three roadway projects in Phase 1 of this plan. These connections will bring east-west connectivity on par with neighboring area between 300 East and Fort Street. The frequency of east-west connections between 300 East and Fort Street do not appear to cause any undue harm to the transportation system. In contrast, the connectivity allows traffic to disperse onto several streets rather than concentrate on any single road. It is expected that the area between Fort Street to 1300 East would see similar benefits with improved connectivity.

Draper City should coordinate with Sandy City regarding the removal of the roadway barrier on Pineridge Road. Removing the barrier would improve local north-south connectivity and allow residences to access nearby businesses without putting additional traffic pressure on the Draper City Parkway/1300 East intersection.

At Draper City TRAX stations, nearby paved trails augment local walk connectivity between the stations and local land uses. The Frontrunner station offers good walk access to several major office buildings. However, the neighborhoods east of the station are underserved. Adding a pedestrian bridge over the Frontrunner lines and the UP lines would eliminate the circuitous walking path to access the station for these neighborhoods.

5. CAPITAL FACILITIES PLAN

5.1 Capital Facilities Plan

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 (2018 - 2024 years), Phase II (2025 - 2034) and Phase III (2034 - 2040). 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.

Priorities identified in this Master Transportation Plan reflect those of CTC 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.

I-15 and Pony Express Road

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 2018 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 is the map of the planned improvements by phase. Table 5-1 lists the projects by phase. In addition to phase 1-3 projects, the figure and table include an undetermined phase with one project encompassing the prison site. This project will represent a need for improved road infrastructure here, with the understanding that the prison site will develop under State direction outside of the City's direct influence. Phasing and exact road alignments are yet unknown and will be the responsibility of the development authority.

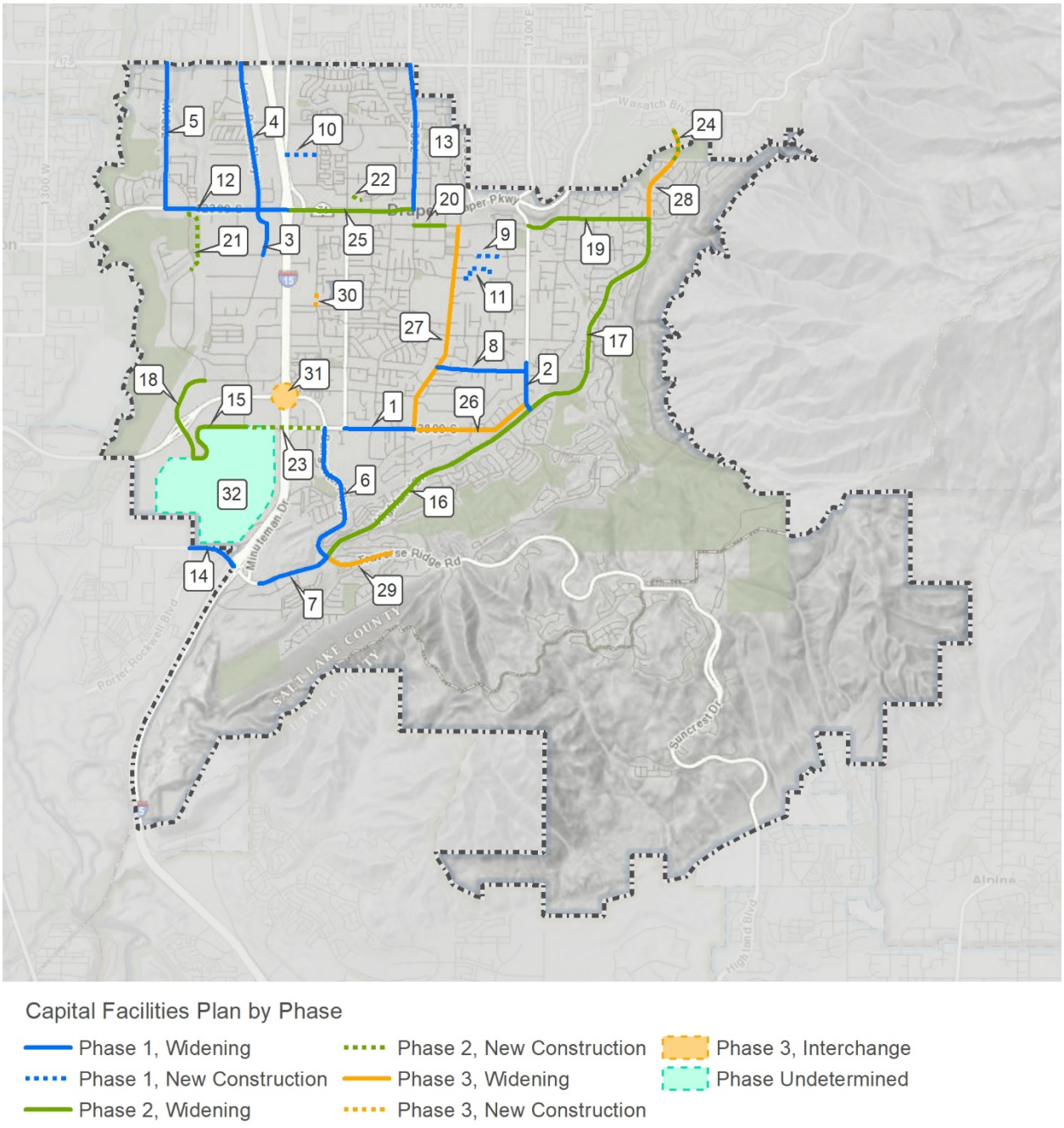


Figure 5-1. Improvements by Phase

Table 5-1. Improvements by Phase

2018 CFP Project List						
Phase 1 (2018-2024)						
#	**Roadway**	**From**	**To**	**Proposed Improvements**	**Cost ($M)**	**Type**
1	13800 South	300 East	Fort Street	Widen to three lane major collector	$ 5.4	Capacity
2	1300 East	Nashi Ln	Highland Dr	Widen to three lane major collector	$ 3.0	Capacity
3	Lone Peak Parkway	12650 South	12300 South	Widen to five lane minor arterial	$ 5.3	Capacity
4	Lone Peak Parkway	11400 South	12300 South	Widen to five lane minor arterial	$ 4.9	Capacity
5	700 West	11400 South	12300 South	Residental Collector	$ 6.9	Capacity
6	Bangerter Parkway	13800 South	Highland Dr	Re-stripe to four lane arterial	$ 1.8	Capacity
7	Highland Drive	I-15	Bangerter Parkway	Widen to five lane arterial	$ 7.8	Capacity
8	13400 South	Fort St	1300 East	Minor Collector	$ 5.2	Gap
9	12650 South	Approx. 1010 East	Willow Creek	Build local street connection	$ 3.6	Local Connection
10	11950 South	State Street	150 East	Minor Collector	$ 1.6	Local Connection
11	Walden Lane	Northrup Cv	Cindy Ln	Build local street connection	$ 2.9	Local Connection
12	12300 South	700 West	I-15	Widen to seven lanes	--	UDOT
13	700 East	11400 South	12300 South	Widen to five lane arterial	--	UDOT
14	14600 South	PRB	I-15	Widen to six lanes	--	UDOT
				Total Cost	**$ 48.4**	
Phase 2 (2025 - 2034)						
#	**Roadway**	**From**	**To**	**Proposed Improvements**	**Cost ($M)**	**Type**
15	13800 South (13775 South)	200 West	600 West	Widen to five lane minor arterial	$ 7.8	Capacity
16	Highland Drive	Bangerter Parkway	1300 East	Widen to five lane arterial	$ 18.7	Capacity
17	Highland Drive	1300 East	Pioneer Road	Widen to five lane arterial	$ 26.4	Capacity
18	600 West	Vista Station Blvd	14000 South	Widen to seven lane arterial	$ 7.8	Capacity
19	Pioneer Road (12400 South)	1300 East	Highland Dr	Widen to minor collector and add curb, gutter, and sidewalk where needed	$ 6.6	Capacity
20	Pioneer Road (12400 South)	700 East	900 East	Widen to minor collector and add curb, gutter, and sidewalk where needed	$ 1.4	Capacity
21	Vista Station Blvd	Frontrunner Blvd	12300 South	Realign and build new file lane arterial	$ 6.2	Capacity
22	12200 South	300 East	700 East	Build/widen to minor collector and add curb, gutter, and sidewalk where needed	$ 3.1	Gap
23	13800 South Overpass	Bangerter Parkway	200 West	Build/widen five lane minor arterial (including I-15 overpass)	$ 24.0	Gap
24	Highland Drive	12000 South	Sandy City	Build major collector standard through Hidden Valley Country Club	$ 2.2	Gap
25	12300 South	I-15	700 East	Widen to seven lanes		UDOT
				Total Cost	**$ 104.1**	
Phase 3 Projects (2035-2040)						
#	**Roadway**	**From**	**To**	**Proposed Improvements**	**Cost ($M)**	**Type**
26	13800 South	Fort Street	1300 East	Widen to three lane major collector	$ 8.7	Capacity
27	Fort Street	12400 South	13800 South	Build/widen to minor collector	$ 10.8	Capacity
28	Highland Drive	Pioneer Road	Sandy City	Widen to arterial	$ 9.5	Capacity
29	Traverse Ridge Road	Highland Drive	Steep Mountain Dr	Widen to four lane minor arterial	$ 6.0	Capacity
30	150 East	12800 South	13000 South	Complete minor collector and add curb, gutter, and sidewalk where needed	$ 4.5	Gap
31	I-15 / Bangerter Highway Interchange			Upgrade to freeway to freeway interchange		UDOT
				Total Cost	**$ 39.4**	
Phase Undetermined						
#	**Roadway**	**From**	**To**	**Proposed Improvements**		**Type**
32	Prison Area Road Network			Network to serve prison area, phasing dependant upon timing of development		State

6. AREAS OF CONCERN

6.1 Incorporate Existing Area Plans into the Master Transportation Plan

6.1.1 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 City. By outlining various local and collector street standards, this plan helps to preserve the City's unique identity and heritage.

6.1.2 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 City'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 City. 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.

6.2 Signals, Roundabouts and Special Intersections

The need for roundabouts and traffic signals will increase as traffic volume throughout Draper City continues to grow. The installation of traffic signals is guided by 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. Figure 6-1 displays the locations of possible future intersection controls based on signal warrants. Signal locations were identified using recommendations from the 2011 Master Plan update, city plans, and discussions with city staff. 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.

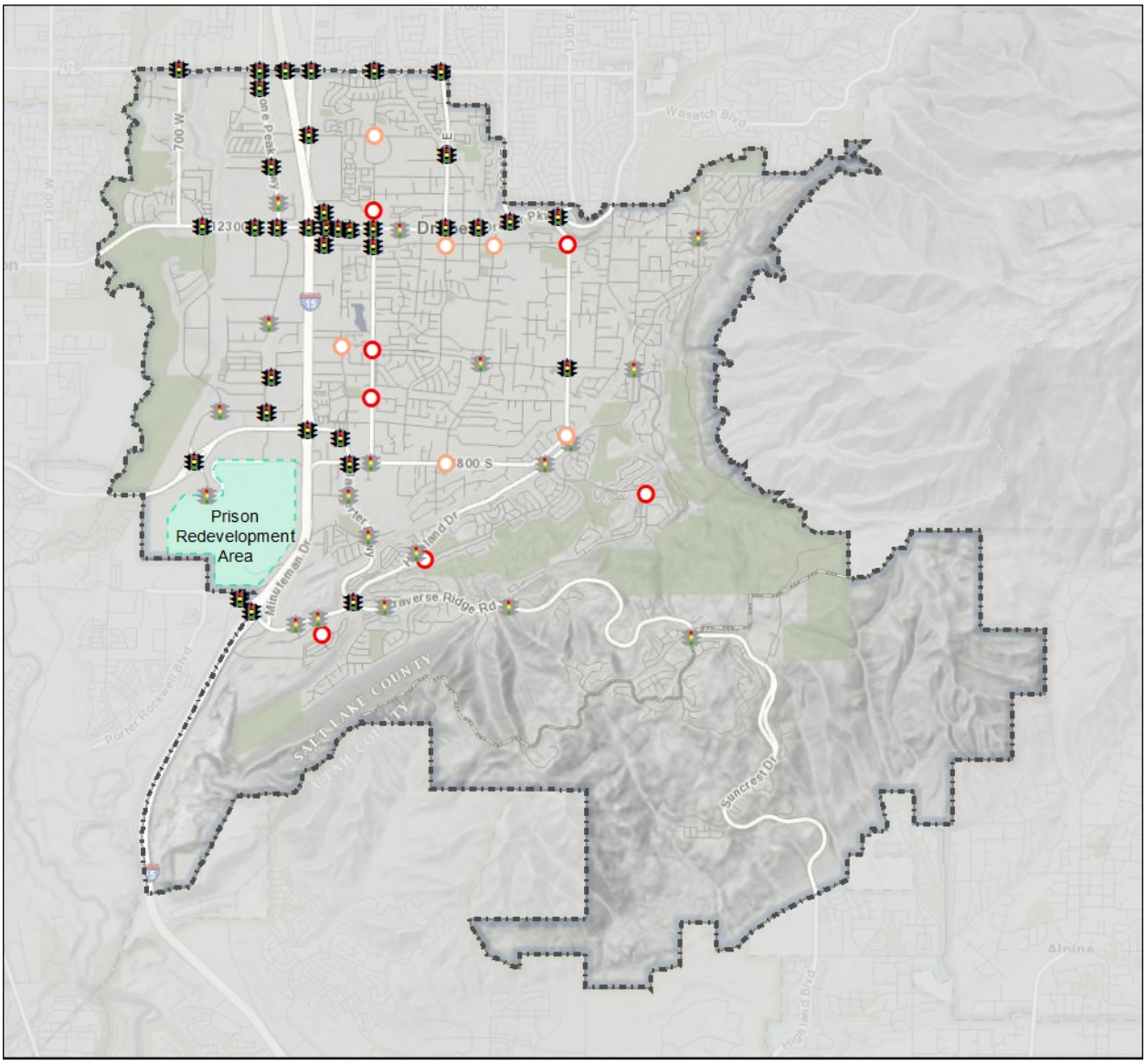


Figure 6-1. Current and Future Controlled Intersections

6.2.1 Roundabouts

In recent years, Draper City 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.

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. 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. 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.

6.2.2 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 intersections may require continued monitoring or evaluation to determine whether additional turn lanes or other modifications are needed to accommodate growth.

6.2.2.1 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 has been a historic concern for Draper City. The close proximity of the intersections forces drivers to make multiple decisions and lane shifts in a confined area. The presence of a major trail crossing adds to the complexity and safety concerns.

However, the roadway geometry was recently revised to add extra turn lanes. Modifications were also made to crosswalk locations and crosswalk marking schemes. Additionally, since the last MTP, Draper City extended 13200 South to Highland Drive creating another railroad crossing between 1300 East and Boulter Street. The new 13200 South railroad crossing has the potential to alleviate the traffic demand at the 1300 East crossing. Draper City should continue to monitor conditions in this area to determine whether the recent changes have improved conditions or if additional modifications are valuable.

6.2.2.2 1300 East & Pioneer Drive

Historically, the 1300 East & Pioneer Drive roundabout has been predicted to require a future conversion to a traffic signal. In recent years, traffic volumes have remained relatively stable. Additionally, the potential extension of Highland Drive could significantly shift traffic volumes away from 1300 East. A decision to remove the roundabout should not be made until congestion shows a sustained increase and the future of the Highland Drive extension becomes more clear.

6.2.2.3 Bangerter Parkway & 13800 South

As one of the few accesses to both I-15 and Bangerter Parkway, the Bangerter Parkway & 13800 South intersection is a key point in the Draper City transportation network. Additional turn lanes and through lanes will be required with the planned minor arterial cross-sections for the west leg and the south leg. In particular, the planned 13800 South crossing of I-15 will provide direct access to the prison redevelopment area which may directly add traffic volumes to the intersection.

Appendices

CFP Phase 1 Cost Estimates

CFP Phase 2 Cost Estimates

CFP Phase 3 cost Estimates

Safety Analysis

13800 South					
300 East to Fort Street				Length of Project (Ft)	3100
Widen to three lane major collector				(Mi)	0.59
Item	Description	Unit	Quantity	Unit Cost	Estimated Cost
ROADWAY					
	SURVEY	LUMP	1	3.0%	$74,700
	MOBILIZATION	LUMP	1	5.0%	$124,500
	SWPPP	LUMP	1	1.0%	$24,900
	UTILITY RELOCATIONS	LUMP	1	8.0%	$199,200
	PUBLIC INFORMATION SERVICES	LUMP	1	0.5%	$12,500
	TRAFFIC CONTROL	LUMP	1	5.0%	$124,500
	REMOVALS AND RELOCATIONS	LUMP	1	5.0%	$124,500
	MAJOR COLLECTOR RDWAY	LF	3100	$377	$1,168,700
	ROADWAY ASPHALT REMOVAL	CU YD	4400	$27	$118,800
	STORM DRAIN SYSTEM	MI	0.6	$450,000	$264,205
	BOX CULVERT EXTENSION	LF	50	$8,200	$410,000
	LANDSCAPING & FINISH ITEMS	LF	3100	$100.00	$310,000
	PERMANENT SIGNING	LF	3100	$4.00	$12,400
	NEW STREET LIGHTING	MI	0.6	$350,000	$205,492
				ROADWAY SUBTOTAL	$3,174,397
RIGHT-OF-WAY					
	UNDEVELOPED	AC			
	DEVELOPED	AC	0.4	$705,000	$282,000
	RESIDENTIAL RELOCATIONS (GARAGE)	EACH	1	$25,000	$25,000
	BUSINESS RELOCATIONS	EACH			
	ROW ACQUISTION (MAPS, APPRAISALS, ETC)	LUMP		15%	$46,050
				RIGHT-OF-WAY SUBTOTAL	$353,050
				SUBTOTAL	$3,527,447
				CONTINGENCY (30%)	$1,058,234
				PROJECT SUBTOTAL	$4,585,681
OTHER					
	ENGINEERING			10%	$458,568.11
	CONSTRUCTION ENGINEERING			8%	$366,854.48
				PROJECT TOTAL	$5,411,104

1300 East					
Nashi Lane to Highland Drive				Length of Project (Ft)	2100
Widen to three lane major collector				(Mi)	0.40
Item	Description	Unit	Quantity	Unit Cost	Estimated Cost
ROADWAY					
	SURVEY	LUMP	1	3.0%	$38,500
	MOBILIZATION	LUMP	1	5.0%	$64,100
	SWPPP	LUMP	1	1.0%	$12,900
	UTILITY RELOCATIONS	LUMP	1	8.0%	$102,500
	PUBLIC INFORMATION SERVICES	LUMP	1	0.5%	$6,500
	TRAFFIC CONTROL	LUMP	1	5.0%	$64,100
	REMOVALS AND RELOCATIONS	LUMP	1	5.0%	$64,100
	MAJOR COLLECTOR RDWAY	LF	2100	$377	$791,700
	ROADWAY ASPHALT REMOVAL	CU YD	3400	$27	$91,800
	STORM DRAIN SYSTEM	MI	0.4	$450,000	$178,977
	LANDSCAPING & FINISH ITEMS	LF	2100	$100.00	$210,000
	PERMANENT SIGNING	LF	2100	$4.00	$8,400
				ROADWAY SUBTOTAL	$1,633,577
RIGHT-OF-WAY					
	UNDEVELOPED	AC			
	DEVELOPED	AC	0.6	$500,000	$300,000
	RESIDENTIAL RELOCATIONS	EACH			
	BUSINESS RELOCATIONS	EACH			
	ROW ACQUISTION (MAPS, APPRAISALS, ETC)	LUMP		15%	$45,000
				RIGHT-OF-WAY SUBTOTAL	$345,000
				SUBTOTAL	$1,978,577
				CONTINGENCY (30%)	$593,573
				PROJECT SUBTOTAL	$2,572,150
OTHER					
	ENGINEERING			10%	$257,215.05
	CONSTRUCTION ENGINEERING			8%	$205,772.04
				PROJECT TOTAL	$3,035,138

Lone Peak Parkway					
12650 South to 12300 South				Length of Project (Ft)	2200
Widen to five lane minor arterial				(Mi)	0.42
Item	Description	Unit	Quantity	Unit Cost	Estimated Cost
ROADWAY					
	SURVEY	LUMP	1	3.0%	$56,000
	MOBILIZATION	LUMP	1	5.0%	$93,400
	SWPPP	LUMP	1	1.0%	$18,700
	UTILITY RELOCATIONS	LUMP	1	8.0%	$149,300
	PUBLIC INFORMATION SERVICES	LUMP	1	0.5%	$9,400
	TRAFFIC CONTROL	LUMP	1	5.0%	$93,400
	REMOVALS AND RELOCATIONS	LUMP	1	5.0%	$93,400
	MINOR ARTERIAL (FIVE LANE) RDWAY	LF	2200	$519	$1,141,800
	NEW 10' WIDE ASPHALT TRAIL	LF	2200	$20	$44,000
	ROADWAY ASPHALT REMOVAL	CU YD	3300	$27	$89,100
	STORM DRAIN SYSTEM	MI	0.4	$450,000	$187,500
	SIGNAL MODIFICATIONS	EACH	1	$175,000	$175,000
	LANDSCAPING & FINISH ITEMS	LF	2200	$100.00	$220,000
	PERMANENT SIGNING	LF	2200	$4.00	$8,800
				ROADWAY SUBTOTAL	$2,379,800
RIGHT-OF-WAY					
	UNDEVELOPED	AC			
	DEVELOPED	AC	1.2	$800,000	$960,000
	RESIDENTIAL RELOCATIONS	EACH			
	BUSINESS RELOCATIONS	EACH			
	ROW ACQUISTION (MAPS, APPRAISALS, ETC)	LUMP		15%	$144,000
				RIGHT-OF-WAY SUBTOTAL	$1,104,000
				SUBTOTAL	$3,483,800
				CONTINGENCY (30%)	$1,045,140
				PROJECT SUBTOTAL	$4,528,940
OTHER					
	ENGINEERING			10%	$452,894
	CONSTRUCTION ENGINEERING			8%	$362,315
				PROJECT TOTAL	$5,344,149

Lone Peak Parkway					
11400 South to 12200 South				Length of Project (Ft)	4800
Widen to five lane minor arterial				(Mi)	0.91
Item	Description	Unit	Quantity	Unit Cost	Estimated Cost
ROADWAY					
	SURVEY	LUMP	1	3.0%	$42,800
	MOBILIZATION	LUMP	1	5.0%	$71,200
	SWPPP	LUMP	1	1.0%	$14,300
	UTILITY RELOCATIONS	LUMP	1	8.0%	$113,900
	PUBLIC INFORMATION SERVICES	LUMP	1	0.5%	$7,200
	TRAFFIC CONTROL	LUMP	1	5.0%	$71,200
	REMOVALS AND RELOCATIONS	LUMP	1	5.0%	$71,200
	PAVEMENT WIDENING	LF	4800	$73	$352,543
	NEW 10' WIDE ASPHALT TRAIL	LF	2500	$20	$50,000
	CONCRETE CURB & GUTTER	LF	7500	$17	$127,500
	CONCRETE SIDEWALK	SF	45000	$5.00	$225,000
	STORM DRAIN SYSTEM	MI	0.9	$450,000	$409,091
	SIGNAL MODIFICATIONS	EACH		$175,000	$0
	LANDSCAPING & FINISH ITEMS	LF	2400	$100	$240,000
	PERMANENT SIGNING	LF	4800	$4	$19,200
				ROADWAY SUBTOTAL	$1,815,134
RIGHT-OF-WAY					
	UNDEVELOPED	AC			
	DEVELOPED	AC	0.911	$1,306,800	$1,191,000
	RESIDENTIAL RELOCATIONS	EACH			
	BUSINESS RELOCATIONS	EACH			
	ROW ACQUISTION (MAPS, APPRAISALS, ETC)	LUMP		15%	$178,650
				RIGHT-OF-WAY SUBTOTAL	$1,369,650
				SUBTOTAL	$3,184,784
				CONTINGENCY (30%)	$955,435
				PROJECT SUBTOTAL	$4,140,219
OTHER					
	ENGINEERING			10%	$414,022
	CONSTRUCTION ENGINEERING			8%	$331,218
				PROJECT TOTAL	$4,885,459

700 West					
11400 South to 12300 South				Length of Project (Ft)	6400
Residential Collector				(Mi)	1.21
Item	Description	Unit	Quantity	Unit Cost	Estimated Cost
ROADWAY					
	SURVEY	LUMP	1	3.0%	$102,500
	MOBILIZATION	LUMP	1	5.0%	$170,800
	SWPPP	LUMP	1	1.0%	$34,200
	UTILITY RELOCATIONS	LUMP	1	8.0%	$273,200
	PUBLIC INFORMATION SERVICES	LUMP	1	0.5%	$17,100
	TRAFFIC CONTROL	LUMP	1	5.0%	$170,800
	REMOVALS AND RELOCATIONS	LUMP	1	5.0%	$170,800
	RESIDENTIAL MINOR COLLECTOR RDWAY	LF	6400	$308	$1,971,200
	ROADWAY ASPHALT REMOVAL	CU YD	8600	$27	$232,200
	STORM DRAIN SYSTEM	MI	1.2	$450,000	$545,455
	LANDSCAPING & FINISH ITEMS	LF	6400	$100.00	$640,000
	PERMANENT SIGNING	LF	6400	$4.00	$25,600
				ROADWAY SUBTOTAL	$4,353,855
RIGHT-OF-WAY					
	UNDEVELOPED	AC			
	DEVELOPED	AC	0.32	$375,000	$120,000
	RESIDENTIAL RELOCATIONS	EACH			
	BUSINESS RELOCATIONS	EACH			
	ROW ACQUISTION (MAPS, APPRAISALS, ETC)	LUMP		15%	$18,000
				RIGHT-OF-WAY SUBTOTAL	$138,000
				SUBTOTAL	$4,491,855
				CONTINGENCY (30%)	$1,347,556
				PROJECT SUBTOTAL	$5,839,411
OTHER					
	ENGINEERING			10%	$583,941.09
	CONSTRUCTION ENGINEERING			8%	$467,152.87
				PROJECT TOTAL	$6,890,505

Bangerter Parkway					
13800 South to Highland Drive				Length of Project (Ft)	6700
Re-stripe to four lane arterial, new right-turn lanes				(Mi)	1.27
Item	Description	Unit	Quantity	Unit Cost	Estimated Cost
ROADWAY					
	SURVEY	LUMP	1	2.0%	$16,900
	MOBILIZATION	LUMP	1	5.0%	$42,200
	SWPPP	LUMP	1	1.0%	$8,500
	UTILITY RELOCATIONS	LUMP	1	8.0%	$67,400
	PUBLIC INFORMATION SERVICES	LUMP	1	0.5%	$4,300
	TRAFFIC CONTROL	LUMP	1	4.0%	$33,700
	REMOVALS AND RELOCATIONS	LUMP	1	5.0%	$42,200
	STORM DRAIN SYSTEM MODIFICATIONS	LUMP	1	10%	$84,300
	MILL AND OVERLAY (1.5")	LF	6700	$66.00	$442,200
	NEW 12' TURN LANE, INCL SIDEWALK, C&G	LF	1040	$165.00	$171,600
	REMOVE CONCRETE (SIDEWALK)	SQ YD	700	$9.00	$6,300
	REMOVE CURB	LF	1100	$4.00	$4,400
	4-INCH SOLID WHITE STRIPE	LF	13400	$2.50	$33,500
	4-INCH SKIP WHITE STRIPE	LF	13400	$2.00	$26,800
	4-INCH SOLID AND BROKEN YELLOW LINE	LF	13400	$2.00	$26,800
	PERMANENT SIGNING	LF	6700	$4	$26,800
	LANDSCAPING & FINISH ITEMS	LF	1040	$100	$104,000
				ROADWAY SUBTOTAL	$1,141,900
RIGHT-OF-WAY					
	UNDEVELOPED	AC			
	DEVELOPED	AC	0.06	$800,000	$50,000
	RESIDENTIAL RELOCATIONS	EACH			
	BUSINESS RELOCATIONS	EACH			
	ROW ACQUISTION (MAPS, APPRAISALS, ETC)	LUMP		15%	$7,500
				RIGHT-OF-WAY SUBTOTAL	$57,500
				SUBTOTAL	$1,199,400
				CONTINGENCY (30%)	$359,820
				PROJECT SUBTOTAL	$1,559,220
OTHER					
	ENGINEERING			10%	$155,922.00
	CONSTRUCTION ENGINEERING			8%	$124,737.60
				PROJECT TOTAL	$1,839,880

Highland Drive					
I-15 to Bangerter Parkway				Length of Project (Ft)	3500
Widen to five lane arterial				(Mi)	0.66
Item	Description	Unit	Quantity	Unit Cost	Estimated Cost
ROADWAY					
	SURVEY	LUMP	1	3.0%	$24,100
	MOBILIZATION	LUMP	1	5.0%	$40,200
	SWPPP	LUMP	1	1.0%	$8,100
	UTILITY RELOCATIONS	LUMP	1	8.0%	$64,300
	PUBLIC INFORMATION SERVICES	LUMP	1	0.5%	$4,100
	TRAFFIC CONTROL	LUMP	1	5.0%	$40,200
	REMOVALS AND RELOCATIONS	LUMP	1	5.0%	$40,200
	ARTERIAL	LF	3500	$572	$2,002,000
	ROADWAY ASPHALT REMOVAL	CU YD	5200	$27	$140,400
	STORM DRAIN SYSTEM	MI	0.7	$450,000	$298,295
	LANDSCAPING & FINISH ITEMS	LF	3500	$100.00	$350,000
	PERMANENT SIGNING	LF	3500	$4.00	$14,000
				ROADWAY SUBTOTAL	$3,025,895
RIGHT-OF-WAY					
	UNDEVELOPED	AC			
	DEVELOPED	AC	2.3	$775,000	$1,782,500
	RESIDENTIAL RELOCATIONS	EACH			
	BUSINESS RELOCATIONS	EACH			
	ROW ACQUISTION (MAPS, APPRAISALS, ETC)	LUMP		15%	$267,375
				RIGHT-OF-WAY SUBTOTAL	$2,049,875
				SUBTOTAL	$5,075,770
				CONTINGENCY (30%)	$1,522,731
				PROJECT SUBTOTAL	$6,598,502
OTHER					
	ENGINEERING			10%	$659,850.16
	CONSTRUCTION ENGINEERING			8%	$527,880.13
				PROJECT TOTAL	$7,786,232

13400 South					
Fort Street to 1300 East				Length of Project (Ft)	3900
Minor Collector				(Mi)	0.74
Item	Description	Unit	Quantity	Unit Cost	Estimated Cost
ROADWAY					
	SURVEY	LUMP	1	3.0%	$63,200
	MOBILIZATION	LUMP	1	5.0%	$105,300
	SWPPP	LUMP	1	1.0%	$21,100
	UTILITY RELOCATIONS	LUMP	1	8.0%	$168,400
	PUBLIC INFORMATION SERVICES	LUMP	1	0.5%	$10,600
	TRAFFIC CONTROL	LUMP	1	5.0%	$105,300
	REMOVALS AND RELOCATIONS	LUMP	1	5.0%	$105,300
	RESIDENTIAL MINOR COLLECTOR RDWAY	LF	3900	$308	$1,201,200
	NEW 10' WIDE ASPHALT TRAIL	LF	1800	$20	$36,000
	ROADWAY ASPHALT REMOVAL	CU YD	4800	$27	$129,600
	STORM DRAIN SYSTEM	MI	0.7	$450,000	$332,386
	LANDSCAPING & FINISH ITEMS	LF	3900	$100.00	$390,000
	PERMANENT SIGNING	LF	3900	$4.00	$15,600
				ROADWAY SUBTOTAL	$2,683,986
RIGHT-OF-WAY					
	UNDEVELOPED	AC			
	DEVELOPED	AC	0.75	$800,000	$600,000
	RESIDENTIAL RELOCATIONS	EACH			
	BUSINESS RELOCATIONS	EACH			
	ROW ACQUISTION (MAPS, APPRAISALS, ETC)	LUMP		15%	$90,000
				RIGHT-OF-WAY SUBTOTAL	$690,000
				SUBTOTAL	$3,373,986
				CONTINGENCY (30%)	$1,012,196
				PROJECT SUBTOTAL	$4,386,182
OTHER					
	ENGINEERING			10%	$438,618.23
	CONSTRUCTION ENGINEERING			8%	$350,894.58
				PROJECT TOTAL	$5,175,695

12650 South					
Approximately 1010 East to Willow Creek				Length of Project (Ft)	1300
Build local street connection (Valley Local Collector)				(Mi)	0.25
Item	Description	Unit	Quantity	Unit Cost	Estimated Cost
ROADWAY					
	SURVEY	LUMP	1	3.0%	$30,900
	MOBILIZATION	LUMP	1	5.0%	$51,500
	SWPPP	LUMP	1	1.0%	$10,300
	UTILITY RELOCATIONS	LUMP	1	8.0%	$82,400
	PUBLIC INFORMATION SERVICES	LUMP	1	0.5%	$5,200
	TRAFFIC CONTROL	LUMP	1	5.0%	$51,500
	CLEARING AND GRUBBING	LUMP	0.25	5.0%	$51,500
	VALLEY LOCAL STREET	LF	1300	$271	$352,300
	NEW 10' WIDE ASPHALT TRAIL	LF	1300	$20	$26,000
	NEW BRIDGE/BRIDGE WIDENING	SQ FT	2700	$150	$405,000
	STORM DRAIN SYSTEM	MI	0.25	$450,000	$110,795
	LANDSCAPING & FINISH ITEMS	LF	1300	$100.00	$130,000
	PERMANENT SIGNING	LF	1300	$4.00	$5,200
				ROADWAY SUBTOTAL	$1,312,595
RIGHT-OF-WAY					
	UNDEVELOPED	AC	0.1	$17,000	$1,700
	DEVELOPED	AC	1	$900,000	$900,000
	RESIDENTIAL RELOCATIONS	EACH			
	BUSINESS RELOCATIONS	EACH			
	ROW ACQUISTION (MAPS, APPRAISALS, ETC)	LUMP		15%	$135,255
				RIGHT-OF-WAY SUBTOTAL	$1,036,955
				SUBTOTAL	$2,349,550
				CONTINGENCY (30%)	$704,865
				PROJECT SUBTOTAL	$3,054,416
OTHER					
	ENGINEERING			10%	$305,441.56
	CONSTRUCTION ENGINEERING			8%	$244,353.25
				PROJECT TOTAL	$3,604,210

11950 South					
State Street to 150 East				Length of Project (Ft)	1400
New Local Collector				(Mi)	0.27
Item	Description	Unit	Quantity	Unit Cost	Estimated Cost
ROADWAY					
	SURVEY	LUMP	1	3.0%	$21,300
	MOBILIZATION	LUMP	1	5.0%	$35,400
	SWPPP	LUMP	1	1.0%	$7,100
	UTILITY RELOCATIONS	LUMP	1	8.0%	$56,600
	PUBLIC INFORMATION SERVICES	LUMP	1	0.5%	$3,600
	TRAFFIC CONTROL	LUMP	1	5.0%	$35,400
	CLEARING AND GRUBBING	LUMP	0.27	5.0%	$35,400
	COMMERCIAL MINOR COLLECTOR RDWAY	LF	1400	$316	$442,400
	STORM DRAIN SYSTEM	MI	0.3	$450,000	$119,318
	LANDSCAPING & FINISH ITEMS	LF	1400	$100.00	$140,000
	PERMANENT SIGNING	LF	1400	$4.00	$5,600
				ROADWAY SUBTOTAL	$902,118
RIGHT-OF-WAY					
	UNDEVELOPED	AC	0.08	$1,200,000	$96,000
	DEVELOPED	AC			
	RESIDENTIAL RELOCATIONS	EACH			
	BUSINESS RELOCATIONS	EACH			
	ROW ACQUISTION (MAPS, APPRAISALS, ETC)	LUMP		15%	$14,400
				RIGHT-OF-WAY SUBTOTAL	$110,400
				SUBTOTAL	$1,012,518
				CONTINGENCY (30%)	$303,755
				PROJECT SUBTOTAL	$1,316,274
OTHER					
	ENGINEERING			10%	$131,627.36
	CONSTRUCTION ENGINEERING			8%	$105,301.89
				PROJECT TOTAL	$1,553,203

Walden Lane					
Northrup Cove to Cindy Lane				Length of Project (Ft)	1200
Build local street connection (Valley Local Collector)				(Mi)	0.23
Item	Description	Unit	Quantity	Unit Cost	Estimated Cost
ROADWAY					
	SURVEY	LUMP	1	3.0%	$24,700
	MOBILIZATION	LUMP	1	5.0%	$41,200
	SWPPP	LUMP	1	1.0%	$8,300
	UTILITY RELOCATIONS	LUMP	1	8.0%	$65,800
	PUBLIC INFORMATION SERVICES	LUMP	1	0.5%	$4,200
	TRAFFIC CONTROL	LUMP	1	5.0%	$41,200
	CLEARING AND GRUBBING	LUMP	0.23	5.0%	$41,200
	VALLEY LOCAL STREET	LF	1200	$271	$325,200
	NEW BRIDGE/BRIDGE WIDENING	SQ FT	1800	$150	$270,000
	STORM DRAIN SYSTEM	MI	0.2	$450,000	$102,273
	LANDSCAPING & FINISH ITEMS	LF	1200	$100.00	$120,000
	PERMANENT SIGNING	LF	1200	$4.00	$4,800
				ROADWAY SUBTOTAL	$1,048,873
RIGHT-OF-WAY					
	UNDEVELOPED	AC	2	$375,000	$750,000
	DEVELOPED	AC			
	RESIDENTIAL RELOCATIONS	EACH			
	BUSINESS RELOCATIONS	EACH			
	ROW ACQUISTION (MAPS, APPRAISALS, ETC)	LUMP		15%	$112,500
				RIGHT-OF-WAY SUBTOTAL	$862,500
				SUBTOTAL	$1,911,373
				CONTINGENCY (30%)	$573,412
				PROJECT SUBTOTAL	$2,484,785
OTHER					
	ENGINEERING			10%	$248,478.45
	CONSTRUCTION ENGINEERING			8%	$198,782.76
				PROJECT TOTAL	$2,932,046

13800 South (13775 South)					
200 West to 600 West				Length of Project (Ft)	3900
Widen to five lane minor arterial				(Mi)	0.74
Item	Description	Unit	Quantity	Unit Cost	Estimated Cost
ROADWAY					
	SURVEY	LUMP	1	3.0%	$92,800
	MOBILIZATION	LUMP	1	5.0%	$154,700
	SWPPP	LUMP	1	1.0%	$31,000
	UTILITY RELOCATIONS	LUMP	1	8.0%	$247,400
	PUBLIC INFORMATION SERVICES	LUMP	1	0.5%	$15,500
	TRAFFIC CONTROL	LUMP	1	5.0%	$154,700
	REMOVALS AND RELOCATIONS	LUMP	1	5.0%	$154,700
	MINOR ARTERIAL (FIVE LANE) RDWAY	LF	3900	$519	$2,024,100
	ROADWAY ASPHALT REMOVAL	CU YD	5200	$27	$140,400
	STORM DRAIN SYSTEM	MI	0.7	$450,000	$332,386
	BOX CULVERT EXTENSION	LF	20	$9,500	$190,000
	LANDSCAPING & FINISH ITEMS	LF	3900	$100.00	$390,000
	PERMANENT SIGNING	LF	3900	$4.00	$15,600
				ROADWAY SUBTOTAL	$3,943,286
RIGHT-OF-WAY					
	UNDEVELOPED	AC			
	DEVELOPED	AC	6.1	$160,000	$976,000
	RESIDENTIAL RELOCATIONS	EACH			
	BUSINESS RELOCATIONS	EACH			
	ROW ACQUISTION (MAPS, APPRAISALS, ETC)	LUMP		15%	$146,400
				RIGHT-OF-WAY SUBTOTAL	$1,122,400
				SUBTOTAL	$5,065,686
				CONTINGENCY (30%)	$1,519,706
				PROJECT SUBTOTAL	$6,585,392
OTHER					
	ENGINEERING			10%	$658,539
	CONSTRUCTION ENGINEERING			8%	$526,831
				PROJECT TOTAL	$7,770,763

Highland Drive					
Bangerter Parkway to 1300 East				Length of Project (Ft)	11200
Widen to five lane arterial				(Mi)	2.12
Item	Description	Unit	Quantity	Unit Cost	Estimated Cost
ROADWAY					
	SURVEY	LUMP	1	3.0%	$286,400
	MOBILIZATION	LUMP	1	5.0%	$477,200
	SWPPP	LUMP	1	1.0%	$95,500
	UTILITY RELOCATIONS	LUMP	1	8.0%	$763,600
	PUBLIC INFORMATION SERVICES	LUMP	1	0.5%	$47,800
	TRAFFIC CONTROL	LUMP	1	5.0%	$477,200
	REMOVALS AND RELOCATIONS	LUMP	1	5.0%	$477,200
	HIGHLAND DRIVE ARTERIAL B RDWAY	LF	11200	$617	$6,910,400
	NEW 10' WIDE ASPHALT TRAIL	LF	3300	$20	$66,000
	ROADWAY ASPHALT REMOVAL	CU YD	16600	$27	$448,200
	STORM DRAIN SYSTEM	MI	2.1	$450,000	$954,545
	LANDSCAPING & FINISH ITEMS	LF	11200	$100.00	$1,120,000
	PERMANENT SIGNING	LF	11200	$4.00	$44,800
				ROADWAY SUBTOTAL	$12,168,845
RIGHT-OF-WAY					
	UNDEVELOPED	AC			
	DEVELOPED	AC			
	RESIDENTIAL RELOCATIONS	EACH			
	BUSINESS RELOCATIONS	EACH			
	ROW ACQUISTION (MAPS, APPRAISALS, ETC)	LUMP		15%	$0
				RIGHT-OF-WAY SUBTOTAL	$0
				SUBTOTAL	$12,168,845
				CONTINGENCY (30%)	$3,650,654
				PROJECT SUBTOTAL	$15,819,499
OTHER					
	ENGINEERING			10%	$1,581,949.91
	CONSTRUCTION ENGINEERING			8%	$1,265,559.93
				PROJECT TOTAL	$18,667,009

Highland Drive					
1300 East to Pioneer Road				Length of Project (Ft)	10900
Widen to five lane arterial				(Mi)	2.06
Item	Description	Unit	Quantity	Unit Cost	Estimated Cost
ROADWAY					
	SURVEY	LUMP	1	3.0%	$74,400
	MOBILIZATION	LUMP	1	5.0%	$124,000
	SWPPP	LUMP	1	1.0%	$24,800
	UTILITY RELOCATIONS	LUMP	1	8.0%	$198,300
	PUBLIC INFORMATION SERVICES	LUMP	1	0.5%	$12,400
	TRAFFIC CONTROL	LUMP	1	5.0%	$124,000
	REMOVALS AND RELOCATIONS	LUMP	1	5.0%	$124,000
	ARTERIAL	LF	10900	$572	$6,234,800
	NEW 10' WIDE ASPHALT TRAIL	LF	4200	$20	$84,000
	ROADWAY ASPHALT REMOVAL	CU YD	15400	$27	$415,800
	STORM DRAIN SYSTEM	MI	2.1	$450,000	$928,977
	LANDSCAPING & FINISH ITEMS	LF	10900	$100.00	$1,090,000
	PERMANENT SIGNING	LF	10900	$4.00	$43,600
				ROADWAY SUBTOTAL	$9,479,077
RIGHT-OF-WAY					
	UNDEVELOPED	AC			
	DEVELOPED	AC	5.6	$1,200,000	$6,720,000
	RESIDENTIAL RELOCATIONS	EACH			
	BUSINESS RELOCATIONS	EACH			
	ROW ACQUISTION (MAPS, APPRAISALS, ETC)	LUMP		15%	$1,008,000
				RIGHT-OF-WAY SUBTOTAL	$7,728,000
				SUBTOTAL	$17,207,077
				CONTINGENCY (30%)	$5,162,123
				PROJECT SUBTOTAL	$22,369,200
OTHER					
	ENGINEERING			10%	$2,236,920.05
	CONSTRUCTION ENGINEERING			8%	$1,789,536.04
				PROJECT TOTAL	$26,395,657

600 West					
Vista Station Blvd to 14000 South				Length of Project (Ft)	4300
Widen to seven lane arterial				(Mi)	0.81
Item	Description	Unit	Quantity	Unit Cost	Estimated Cost
ROADWAY					
	SURVEY	LUMP	1	3.0%	$120,000
	MOBILIZATION	LUMP	1	5.0%	$200,000
	SWPPP	LUMP	1	1.0%	$40,000
	UTILITY RELOCATIONS	LUMP	1	8.0%	$319,900
	PUBLIC INFORMATION SERVICES	LUMP	1	0.5%	$20,000
	TRAFFIC CONTROL	LUMP	1	5.0%	$200,000
	REMOVALS AND RELOCATIONS	LUMP	1	5.0%	$200,000
	ARTERIAL (7 LANE)	LF	3030	$700	$2,121,000
	CONCRETE PAVEMENT (9", INCL BC)	SY	3400	$93	$316,200
	ROADWAY ASPHALT REMOVAL	CU YD	9300	$27	$251,100
	STORM DRAIN SYSTEM	MI	0.8	$450,000	$366,477
	BOX CULVERT EXTENSION	LF	25	$9,500	$237,500
	STREET LIGHTING	MI	0.24	$350,000.00	$84,186
	SIGNAL MODIFICATIONS	EACH	1	$175,000.00	$175,000
	LANDSCAPING & FINISH ITEMS	LF	4300	$100.00	$430,000
	PERMANENT SIGNING	LF	4300	$4.00	$17,200
				ROADWAY SUBTOTAL	$5,098,563
RIGHT-OF-WAY					
	UNDEVELOPED	AC			
	DEVELOPED	AC			
	RESIDENTIAL RELOCATIONS	EACH			
	BUSINESS RELOCATIONS	EACH			
	ROW ACQUISTION (MAPS, APPRAISALS, ETC)	LUMP		15%	$0
				RIGHT-OF-WAY SUBTOTAL	$0
				SUBTOTAL	$5,098,563
				CONTINGENCY (30%)	$1,529,569
				PROJECT SUBTOTAL	$6,628,132
OTHER					
	ENGINEERING			10%	$662,813.17
	CONSTRUCTION ENGINEERING			8%	$530,250.54
				PROJECT TOTAL	$7,821,195

Pioneer Road (12400 South)					
1300 East to Highland Drive				Length of Project (Ft)	5400
Widen to minor collector and add C&G and sidewalk where needed				(Mi)	1.02
Item	Description	Unit	Quantity	Unit Cost	Estimated Cost
ROADWAY					
	SURVEY	LUMP	1	3.0%	$85,900
	MOBILIZATION	LUMP	1	5.0%	$143,200
	SWPPP	LUMP	1	1.0%	$28,700
	UTILITY RELOCATIONS	LUMP	1	8.0%	$229,100
	PUBLIC INFORMATION SERVICES	LUMP	1	0.5%	$14,400
	TRAFFIC CONTROL	LUMP	1	5.0%	$143,200
	REMOVALS AND RELOCATIONS	LUMP	1	5.0%	$143,200
	RESIDENTIAL MINOR COLLECTOR RDWAY	LF	5400	$308	$1,663,200
	ROADWAY ASPHALT REMOVAL	CU YD	6000	$27	$162,000
	NEW 10' WIDE ASPHALT TRAIL	LF	800	$20	$16,000
	STORM DRAIN SYSTEM	MI	1.0	$450,000	$460,227
	LANDSCAPING & FINISH ITEMS	LF	5400	$100.00	$540,000
	PERMANENT SIGNING	LF	5400	$4.00	$21,600
				ROADWAY SUBTOTAL	$3,650,727
RIGHT-OF-WAY					
	UNDEVELOPED	AC			
	DEVELOPED	AC	0.5	$1,100,000	$550,000
	RESIDENTIAL RELOCATIONS	EACH			
	BUSINESS RELOCATIONS	EACH			
	ROW ACQUISTION (MAPS, APPRAISALS, ETC)	LUMP		15%	$82,500
				RIGHT-OF-WAY SUBTOTAL	$632,500
				SUBTOTAL	$4,283,227
				CONTINGENCY (30%)	$1,284,968
				PROJECT SUBTOTAL	$5,568,195
OTHER					
	ENGINEERING			10%	$556,819.55
	CONSTRUCTION ENGINEERING			8%	$445,455.64
				PROJECT TOTAL	$6,570,471

Pioneer Road (12400 South)					
700 East to 900 East				Length of Project (Ft)	1350
Widen to minor collector and add C&G and sidewalk where needed				(Mi)	0.26
Item	Description	Unit	Quantity	Unit Cost	Estimated Cost
ROADWAY					
	SURVEY	LUMP	1	3.0%	$21,600
	MOBILIZATION	LUMP	1	5.0%	$36,000
	SWPPP	LUMP	1	1.0%	$7,200
	UTILITY RELOCATIONS	LUMP	1	8.0%	$57,600
	PUBLIC INFORMATION SERVICES	LUMP	1	0.5%	$3,600
	TRAFFIC CONTROL	LUMP	1	5.0%	$36,000
	REMOVALS AND RELOCATIONS	LUMP	1	5.0%	$36,000
	RESIDENTIAL MINOR COLLECTOR RDWAY	LF	1350	$308	$415,800
	ROADWAY ASPHALT REMOVAL	CU YD	1800	$27	$48,600
	STORM DRAIN SYSTEM	MI	0.3	$450,000	$115,057
	LANDSCAPING & FINISH ITEMS	LF	1350	$100.00	$135,000
	PERMANENT SIGNING	LF	1350	$4.00	$5,400
				ROADWAY SUBTOTAL	$917,857
RIGHT-OF-WAY					
	UNDEVELOPED	AC			
	DEVELOPED	AC			
	RESIDENTIAL RELOCATIONS	EACH			
	BUSINESS RELOCATIONS	EACH			
	ROW ACQUISTION (MAPS, APPRAISALS, ETC)	LUMP		15%	$0
				RIGHT-OF-WAY SUBTOTAL	$0
				SUBTOTAL	$917,857
				CONTINGENCY (30%)	$275,357
				PROJECT SUBTOTAL	$1,193,214
OTHER					
	ENGINEERING			10%	$119,321.39
	CONSTRUCTION ENGINEERING			8%	$95,457.11
				PROJECT TOTAL	$1,407,992

Vista Station Boulevard					
Frontrunner Boulevard to W 12300 South				Length of Project (Ft)	3100
Build new five lane minor arterial				(Mi)	0.59
Item	Description	Unit	Quantity	Unit Cost	Estimated Cost
ROADWAY					
	SURVEY	LUMP	1	3.0%	$65,900
	MOBILIZATION	LUMP	1	5.0%	$109,800
	SWPPP	LUMP	1	1.0%	$22,000
	UTILITY RELOCATIONS	LUMP	1	8.0%	$175,700
	PUBLIC INFORMATION SERVICES	LUMP	1	0.5%	$11,000
	TRAFFIC CONTROL	LUMP	1	2.0%	$44,000
	REMOVALS AND RELOCATIONS	LUMP	1	5.0%	$109,800
	MINOR ARTERIAL (FIVE LANE) RDWAY	LF	3100	$519	$1,608,900
	STORM DRAIN SYSTEM	MI	0.6	$450,000	$264,205
	LANDSCAPING & FINISH ITEMS	LF	3100	$100.00	$310,000
	PERMANENT SIGNING	LF	3100	$4.00	$12,400
				ROADWAY SUBTOTAL	$2,733,705
RIGHT-OF-WAY					
	UNDEVELOPED	AC			
	DEVELOPED	AC	7.12	$160,000	$1,138,659
	RESIDENTIAL RELOCATIONS	EACH			
	BUSINESS RELOCATIONS	EACH			
	ROW ACQUISTION (MAPS, APPRAISALS, ETC)	LUMP		15%	$170,799
				RIGHT-OF-WAY SUBTOTAL	$1,309,458
				SUBTOTAL	$4,043,163
				CONTINGENCY (30%)	$1,212,949
				PROJECT SUBTOTAL	$5,256,112
OTHER					
	ENGINEERING			10%	$525,611
	CONSTRUCTION ENGINEERING			8%	$420,489
				PROJECT TOTAL	$6,202,212

12200 South					
300 East to 700 East				Length of Project (Ft)	3000
Build/widen to minor collector; add C&G and sidewalk where needed				(Mi)	0.57
Item	Description	Unit	Quantity	Unit Cost	Estimated Cost
ROADWAY					
	SURVEY	LUMP	1	3.0%	$33,200
	MOBILIZATION	LUMP	1	5.0%	$55,300
	SWPPP	LUMP	1	1.0%	$11,100
	UTILITY RELOCATIONS	LUMP	1	8.0%	$88,400
	PUBLIC INFORMATION SERVICES	LUMP	1	0.5%	$5,600
	TRAFFIC CONTROL	LUMP	1	5.0%	$55,300
	CLEARING AND GRUBBING	LUMP	1	5.0%	$55,300
	COMMERCIAL MINOR COLLECTOR RDWAY	LF	1900	$316	$600,400
	ROADWAY ASPHALT REMOVAL	CU YD	1100	$27	$29,700
	STORM DRAIN SYSTEM	MI	0.4	$450,000	$161,932
	LANDSCAPING & FINISH ITEMS	LF	3000	$100.00	$300,000
	PERMANENT SIGNING	LF	3000	$4.00	$12,000
				ROADWAY SUBTOTAL	$1,408,232
RIGHT-OF-WAY					
	UNDEVELOPED	AC	1	$530,000	$530,000
	DEVELOPED	AC			
	RESIDENTIAL RELOCATIONS	EACH			
	BUSINESS RELOCATIONS	EACH			
	ROW ACQUISTION (MAPS, APPRAISALS, ETC)	LUMP		15%	$79,500
				RIGHT-OF-WAY SUBTOTAL	$609,500
				SUBTOTAL	$2,017,732
				CONTINGENCY (30%)	$605,320
				PROJECT SUBTOTAL	$2,623,051
OTHER					
	ENGINEERING			10%	$262,305.14
	CONSTRUCTION ENGINEERING			8%	$209,844.11
				PROJECT TOTAL	$3,095,201

13800 South Overpass					
Bangerter Parkway to 200 West				Length of Project (Ft)	3600
Build/widen to five lane minor arterial (including I-15 overpass)				(Mi)	0.68
Item	Description	Unit	Quantity	Unit Cost	Estimated Cost
ROADWAY					
	SURVEY	LUMP	1	3.0%	$295,100
	MOBILIZATION	LUMP	1	8.0%	$786,900
	SWPPP	LUMP	1	1.0%	$98,400
	UTILITY RELOCATIONS	LUMP	1	8.0%	$786,900
	PUBLIC INFORMATION SERVICES	LUMP	1	1.0%	$98,400
	TRAFFIC CONTROL	LUMP	1	6.0%	$590,200
	REMOVALS AND RELOCATIONS	LUMP	1	5.0%	$491,900
	MINOR ARTERIAL (FIVE LANE) RDWAY	LF	3250	$519	$1,686,750
	COMMERCIAL MINOR COLLECTOR RDWAY	LF	1500	$316	$474,000
	BORROW	CU YD	20000	$30	$600,000
	NEW BRIDGE/BRIDGE WIDENING	SQ FT	31500	$150	$4,725,000
	BRIDGE WIDENING OVER CANAL	SQ FT	1300	$150	$195,000
	MODULAR BLOCK WALL	SQ FT	18400	$50	$920,000
	ROADWAY ASPHALT REMOVAL	CU YD	5200	$27	$140,400
	STORM DRAIN SYSTEM	MI	0.7	$450,000	$306,818
	STREET LIGHTING	MI	0.7	$350,000	$238,636
	SIGNAL MODIFICATIONS	EACH	1	$175,000	$175,000
	LANDSCAPING & FINISH ITEMS	LF	3600	$100.00	$360,000
	PERMANENT SIGNING	LF	3600	$4.00	$14,400
				ROADWAY SUBTOTAL	$12,983,805
RIGHT-OF-WAY					
	UNDEVELOPED	AC			
	DEVELOPED	AC	2.3	$1,000,000	$2,300,000
	RESIDENTIAL RELOCATIONS	EACH			
	ROW ACQUISTION (MAPS, APPRAISALS, ETC)	LUMP		15%	$345,000
				RIGHT-OF-WAY SUBTOTAL	$2,645,000
				SUBTOTAL	$15,628,805
				CONTINGENCY (30%)	$4,688,641
				PROJECT SUBTOTAL	$20,317,446
OTHER					
	ENGINEERING			10%	$2,031,744.59
	CONSTRUCTION ENGINEERING			8%	$1,625,395.67
				PROJECT TOTAL	$23,974,586

Highland Drive					
12000 South to Sandy City				Length of Project (Ft)	1500
New Major Collector				(Mi)	0.28
Item	Description	Unit	Quantity	Unit Cost	Estimated Cost
ROADWAY					
	SURVEY	LUMP	1	3.0%	$26,400
	MOBILIZATION	LUMP	1	5.0%	$44,000
	SWPPP	LUMP	1	1.0%	$8,800
	UTILITY RELOCATIONS	LUMP	1	8.0%	$70,400
	PUBLIC INFORMATION SERVICES	LUMP	1	0.5%	$4,400
	TRAFFIC CONTROL	LUMP	1	1.0%	$8,800
	REMOVALS AND RELOCATIONS	LUMP	1	2.0%	$17,600
	MAJOR COLLECTOR RDWAY	LF	1500	$377	$565,500
	NEW 10' WIDE ASPHALT TRAIL	LF	1500	$20	$30,000
	STORM DRAIN SYSTEM	MI	0.3	$450,000	$127,841
	LANDSCAPING & FINISH ITEMS	LF	1500	$100.00	$150,000
	PERMANENT SIGNING	LF	1500	$4.00	$6,000
				ROADWAY SUBTOTAL	$1,059,741
RIGHT-OF-WAY					
	UNDEVELOPED	AC			
	DEVELOPED	AC	2.55	$120,000	$305,785
	RESIDENTIAL RELOCATIONS	EACH			
	BUSINESS RELOCATIONS	EACH			
	ROW ACQUISTION (MAPS, APPRAISALS, ETC)	LUMP		15%	$45,868
				RIGHT-OF-WAY SUBTOTAL	$351,653
				SUBTOTAL	$1,411,394
				CONTINGENCY (30%)	$423,418
				PROJECT SUBTOTAL	$1,834,812
OTHER					
	ENGINEERING			10%	$183,481.19
	CONSTRUCTION ENGINEERING			8%	$146,784.96
				PROJECT TOTAL	$2,165,078

13800 South (13775 South)					
Fort Street to 1300 East				Length of Project (Ft)	5300
Major Collector				(Mi)	1
Item	Description	Unit	Quantity	Unit Cost	Estimated Cost
ROADWAY					
	SURVEY	LUMP	1	3.0%	$95,900
	MOBILIZATION	LUMP	1	5.0%	$159,800
	SWPPP	LUMP	1	1.0%	$32,000
	UTILITY RELOCATIONS	LUMP	1	8.0%	$255,700
	PUBLIC INFORMATION SERVICES	LUMP	1	0.5%	$16,000
	TRAFFIC CONTROL	LUMP	1	5.0%	$159,800
	REMOVALS AND RELOCATIONS	LUMP	1	5.0%	$159,800
	MAJOR COLLECTOR RDWAY	LF	5300	$377	$1,998,100
	ROADWAY ASPHALT REMOVAL	CU YD	7200	$27	$194,400
	STORM DRAIN SYSTEM	MI	1	$450,000	$451,705
	LANDSCAPING & FINISH ITEMS	LF	5300	$100.00	$530,000
	PERMANENT SIGNING	LF	5300	$4.00	$21,200
				ROADWAY SUBTOTAL	$4,074,405
RIGHT-OF-WAY					
	UNDEVELOPED	AC			
	DEVELOPED	AC	1.4	$1,000,000	$1,400,000
	RESIDENTIAL RELOCATIONS	EACH			
	BUSINESS RELOCATIONS	EACH			
	ROW ACQUISTION (MAPS, APPRAISALS, ETC)	LUMP		15%	$210,000
				RIGHT-OF-WAY SUBTOTAL	$1,610,000
				SUBTOTAL	$5,684,405
				CONTINGENCY (30%)	$1,705,321
				PROJECT SUBTOTAL	$7,389,726
OTHER					
	ENGINEERING			10%	$738,973
	CONSTRUCTION ENGINEERING			8%	$591,178
				PROJECT TOTAL	$8,719,877

Fort Street					
12400 South to 13800 South				Length of Project (Ft)	9300
Build/widen to minor collector				(Mi)	1.76
Item	Description	Unit	Quantity	Unit Cost	Estimated Cost
ROADWAY					
	SURVEY	LUMP	1	3.0%	$150,600
	MOBILIZATION	LUMP	1	5.0%	$250,900
	SWPPP	LUMP	1	1.0%	$50,200
	UTILITY RELOCATIONS	LUMP	1	8.0%	$401,400
	PUBLIC INFORMATION SERVICES	LUMP	1	0.5%	$25,100
	TRAFFIC CONTROL	LUMP	1	5.0%	$250,900
	REMOVALS AND RELOCATIONS	LUMP	1	5.0%	$250,900
	RESIDENTIAL MINOR COLLECTOR RDWAY	LF	9300	$308	$2,864,400
	ROADWAY ASPHALT REMOVAL	CU YD	13800	$27	$372,600
	NEW 10' WIDE ASPHALT TRAIL	LF	1000	$20	$20,000
	STORM DRAIN SYSTEM	MI	1.8	$450,000	$792,614
	LANDSCAPING & FINISH ITEMS	LF	9300	$100.00	$930,000
	PERMANENT SIGNING	LF	9300	$4.00	$37,200
				ROADWAY SUBTOTAL	$6,396,814
RIGHT-OF-WAY					
	UNDEVELOPED	AC			
	DEVELOPED	AC	0.7	$775,000	$542,500
	RESIDENTIAL RELOCATIONS	EACH			
	BUSINESS RELOCATIONS	EACH			
	ROW ACQUISTION (MAPS, APPRAISALS, ETC)	LUMP		15%	$81,375
				RIGHT-OF-WAY SUBTOTAL	$623,875
				SUBTOTAL	$7,020,689
				CONTINGENCY (30%)	$2,106,207
				PROJECT SUBTOTAL	$9,126,895
OTHER					
	ENGINEERING			10%	$912,689.52
	CONSTRUCTION ENGINEERING			8%	$730,151.62
				PROJECT TOTAL	$10,769,736

Highland Drive					
Pioneer Road to Sandy City				Length of Project (Ft)	3000
Widen to arterial				(Mi)	0.57
Item	Description	Unit	Quantity	Unit Cost	Estimated Cost
ROADWAY					
	SURVEY	LUMP	1	3.0%	$69,800
	MOBILIZATION	LUMP	1	5.0%	$116,300
	SWPPP	LUMP	1	1.0%	$23,300
	UTILITY RELOCATIONS	LUMP	1	8.0%	$186,100
	PUBLIC INFORMATION SERVICES	LUMP	1	0.5%	$11,700
	TRAFFIC CONTROL	LUMP	1	5.0%	$116,300
	REMOVALS AND RELOCATIONS	LUMP	1	5.0%	$116,300
	HIGHLAND DRIVE ARTERIAL A RDWAY	LF	3000	$548	$1,644,000
	ROADWAY ASPHALT REMOVAL	CU YD	4200	$27	$113,400
	STORM DRAIN SYSTEM	MI	0.6	$450,000	$255,682
	LANDSCAPING & FINISH ITEMS	LF	3000	$100.00	$300,000
	PERMANENT SIGNING	LF	3000	$4.00	$12,000
				ROADWAY SUBTOTAL	$2,964,882
RIGHT-OF-WAY					
	UNDEVELOPED	AC			
	DEVELOPED	AC	5.6	$500,000	$2,800,000
	RESIDENTIAL RELOCATIONS	EACH			
	BUSINESS RELOCATIONS	EACH			
	ROW ACQUISTION (MAPS, APPRAISALS, ETC)	LUMP		15%	$420,000
				RIGHT-OF-WAY SUBTOTAL	$3,220,000
				SUBTOTAL	$6,184,882
				CONTINGENCY (30%)	$1,855,465
				PROJECT SUBTOTAL	$8,040,346
OTHER					
	ENGINEERING			10%	$804,034.64
	CONSTRUCTION ENGINEERING			8%	$643,227.71
				PROJECT TOTAL	$9,487,609

Traverse Ridge Road					
Highland Drive to Steep Mountain Drive				Length of Project (Ft)	4300
Widen to four lane minor arterial				(Mi)	0.81
Item	Description	Unit	Quantity	Unit Cost	Estimated Cost
ROADWAY					
	SURVEY	LUMP	1	3.0%	$91,600
	MOBILIZATION	LUMP	1	5.0%	$152,600
	SWPPP	LUMP	1	1.0%	$30,600
	UTILITY RELOCATIONS	LUMP	1	8.0%	$244,200
	PUBLIC INFORMATION SERVICES	LUMP	1	0.5%	$15,300
	TRAFFIC CONTROL	LUMP	1	5.0%	$152,600
	REMOVALS AND RELOCATIONS	LUMP	1	5.0%	$152,600
	MINOR ARTERIAL (FOUR LANE) RDWAY	LF	4300	$460	$1,978,000
	NEW 10' WIDE ASPHALT TRAIL	LF	450	$20	$9,000
	ROADWAY ASPHALT REMOVAL	CU YD	9300	$27	$251,100
	STORM DRAIN SYSTEM	MI	0.8	$450,000	$366,477
	LANDSCAPING & FINISH ITEMS	LF	4300	$100.00	$430,000
	PERMANENT SIGNING	LF	4300	$4.00	$17,200
				ROADWAY SUBTOTAL	$3,891,277
RIGHT-OF-WAY					
	UNDEVELOPED	AC			
	DEVELOPED	AC			
	RESIDENTIAL RELOCATIONS	EACH			
	BUSINESS RELOCATIONS	EACH			
	ROW ACQUISTION (MAPS, APPRAISALS, ETC)	LUMP		15%	$0
				RIGHT-OF-WAY SUBTOTAL	$0
				SUBTOTAL	$3,891,277
				CONTINGENCY (30%)	$1,167,383
				PROJECT SUBTOTAL	$5,058,660
OTHER					
	ENGINEERING			10%	$505,866
	CONSTRUCTION ENGINEERING			8%	$404,693
				PROJECT TOTAL	$5,969,219

150 East					
12800 South to 13000 South				Length of Project (Ft)	3000
Complete minor collector and add C&G and sidewalk where needed				(Mi)	0.57
Item	Description	Unit	Quantity	Unit Cost	Estimated Cost
ROADWAY					
	SURVEY	LUMP	1	3.0%	$48,000
	MOBILIZATION	LUMP	1	5.0%	$79,900
	SWPPP	LUMP	1	1.0%	$16,000
	UTILITY RELOCATIONS	LUMP	1	8.0%	$127,800
	PUBLIC INFORMATION SERVICES	LUMP	1	0.5%	$8,000
	TRAFFIC CONTROL	LUMP	1	5.0%	$79,900
	REMOVALS AND RELOCATIONS	LUMP	1	5.0%	$79,900
	RESIDENTIAL MINOR COLLECTOR RDWAY	LF	3000	$308	$924,000
	ROADWAY ASPHALT REMOVAL	CU YD	3900	$27	$105,300
	STORM DRAIN SYSTEM	MI	0.6	$450,000	$255,682
	LANDSCAPING & FINISH ITEMS	LF	3000	$100.00	$300,000
	PERMANENT SIGNING	LF	3000	$4.00	$12,000
				ROADWAY SUBTOTAL	$2,036,482
RIGHT-OF-WAY					
	UNDEVELOPED	AC			
	DEVELOPED	AC	1	$750,000	$750,000
	RESIDENTIAL RELOCATIONS	EACH			
	BUSINESS RELOCATIONS	EACH			
	ROW ACQUISTION (MAPS, APPRAISALS, ETC)	LUMP		15%	$112,500
				RIGHT-OF-WAY SUBTOTAL	$862,500
				SUBTOTAL	$2,898,982
				CONTINGENCY (30%)	$869,695
				PROJECT SUBTOTAL	$3,768,676
OTHER					
	ENGINEERING			10%	$376,867.64
	CONSTRUCTION ENGINEERING			8%	$301,494.11
				PROJECT TOTAL	$4,447,038

Draper City
Safety Hot Spot Summary

12300 SOUTH & 900 EAST

This intersection experienced a high number of front to rear crashes, see Figure 1. According to police reports, more than half of these crashes were a rear-end collision while stopped at the signal or for traffic (eastbound/westbound). Upon further examination at the site, the signals have much lower degree of prominence than other signals on the corridor. The signal heads are cable strung rather than mounted on mast arms and appear somewhat obscured by surroundings and low signal height, see Figure 2. On approach, drivers may be missing visual cues that this is a signalized intersection and not expecting to have stopped or slowed vehicles. **This intersection may be a good candidate for reflective, high-visibility signal head backplates and/or upgraded to feature full signal poles and mast arms.**

35 motor vehicle crashes:

- 5 Angle
- 22 Front to Rear
- 2 Sideswipe Opposite Direction
- 1 Parked Vehicle
- 5 Single Vehicle

Figure 1 – Manner of Collision at 12300 South & 900 East Intersection

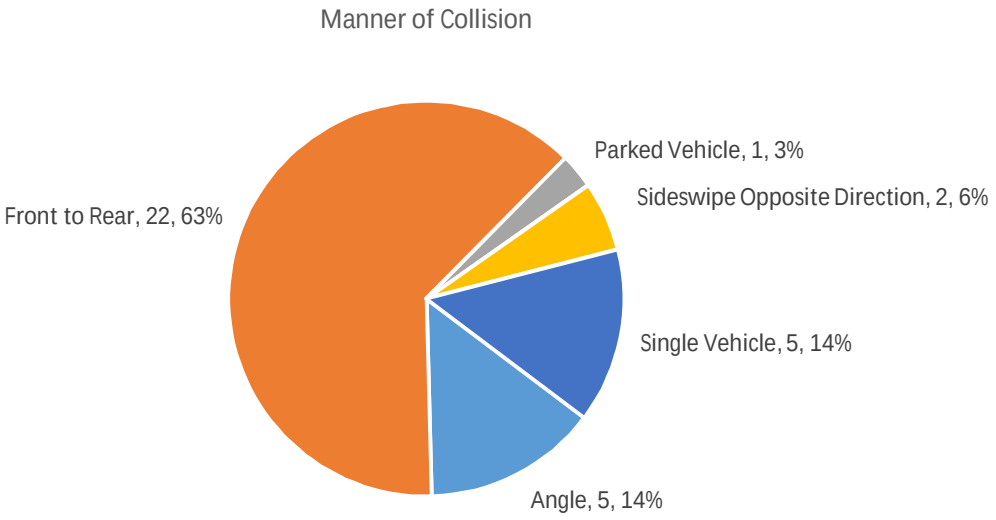


Figure 2 – Looking East at 12300 South & 900 East Intersection

DRAPER PARKWAY & 1300 EAST

While this intersection experiences a relatively high percentage of front to rear crashes, angle crashes were also high for the years studied. Many rear-end crashes occurred when traffic was stopped at the signal during the red phase. Like the previous intersection, **this intersection may be a good candidate for reflective, high-visibility signal head backplates.**

Further examination of angle crashes reveals two trends. First, parking lot access management appears problematic. Several crashes occurred when drivers were entering or exiting the Wendy's/Einstein's & Walgreens parking lots from 1300 East. See Figure 4. This may be due to obscured sight lines from the bend in 1300 East. Second, police report information indicates a high number of drivers that were performing left turn movements are entering the intersection during the red phase. **Access management at the driveways on the north 1300 East leg may be an appropriate step to reduce crashes. Also, left-turn yellow and red times may also need to be evaluated.**

51 total crashes:

- 17 angle crashes
- 22 Front to Rear
- 8 Sideswipe Same Direction
- 4 Single Vehicle

Figure 3- Manner of Collision at Draper Parkway and 1300 East Intersection

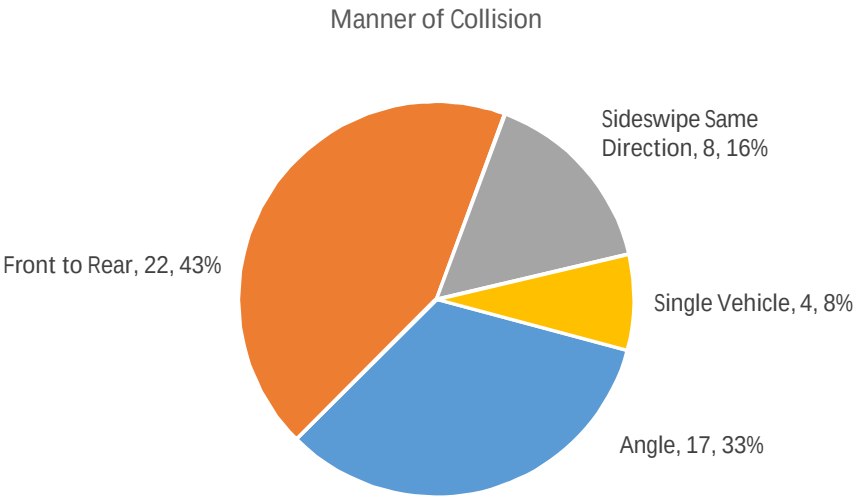
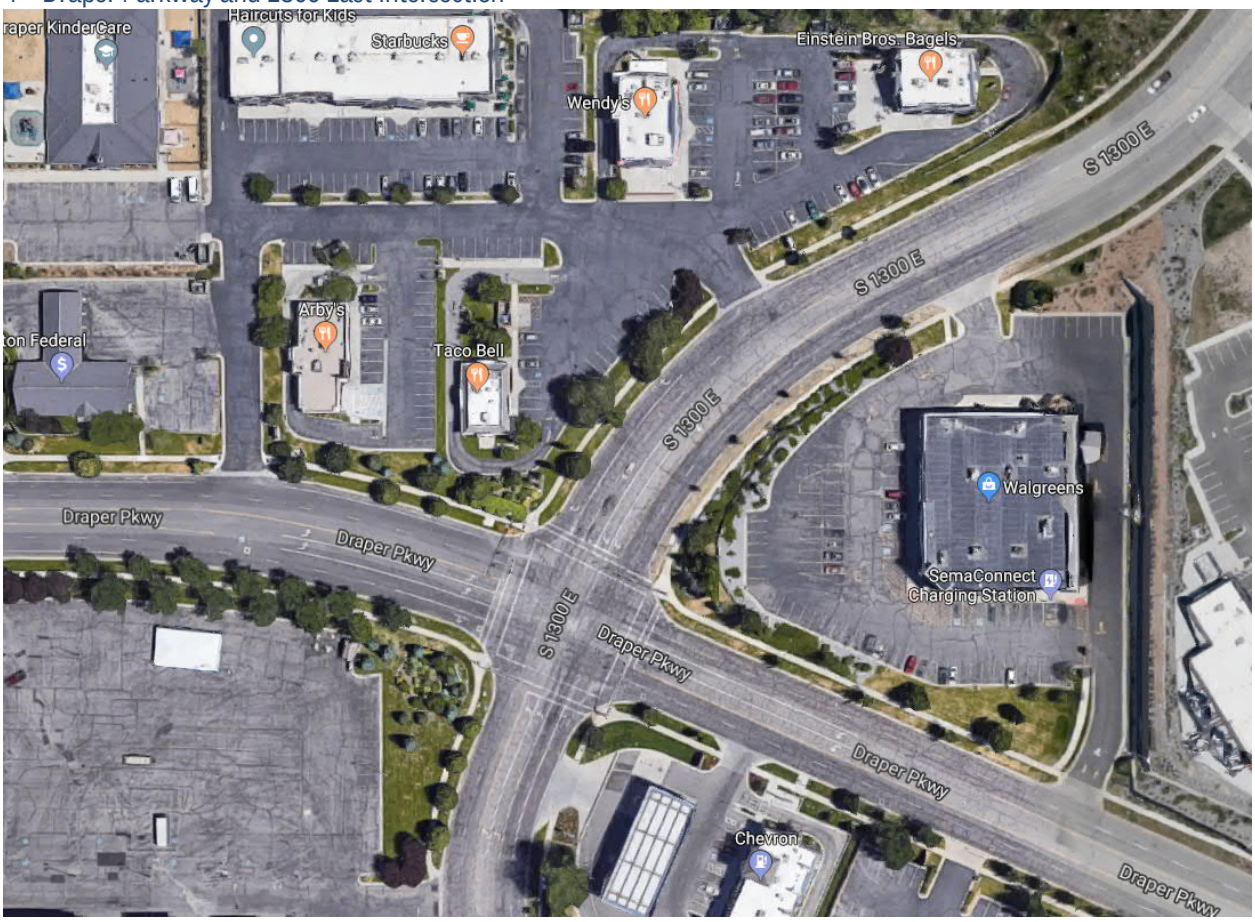


Figure 4 – Draper Parkway and 1300 East Intersection



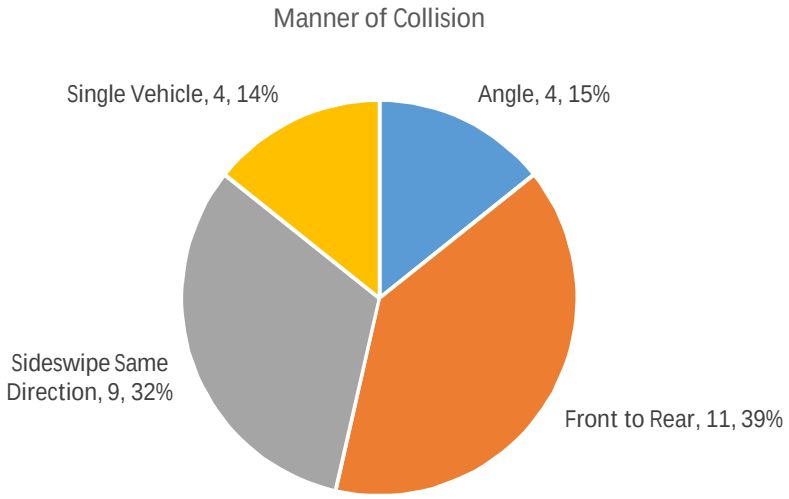
PIONEER ROAD & 1300 EAST ROUNDABOUT

Primary crash causes at this intersection are attributed to sideswipes of vehicles traveling in the same direction and front to rear crashes. Many of the sideswipe crashes involve vehicles not properly yielding while merging or entering the roundabout. Rear-end crashes generally occurred when traffic was stopped prior to entering the roundabout. Crash severity is generally low at this intersection and resulted in relatively in minor or no bodily injury, except for other crash causes attributed to reckless driving or driving under the influence. **This intersection may benefit from an increased attention to maintaining lane striping at roundabout entries and exits since off-tracking vehicles tend to wear the striping quickly.**

28 total crashes:

- 4 Angle
- 11 Front to Rear
- 9 Sideswipe Same Direction
- 4 Single Vehicle

Figure 5 – Manner of Collision at Pioneer Road and 1300 East (Roundabout)



HIGHLAND DRIVE & 1300 EAST & 13800 SOUTH

This intersection is an unusual configuration as it is comprised of two adjacent smaller-intersections (see Figure 7). Angle crashes comprised 17 of the 33 total crashes at this intersection. These are primarily attributed to a driver's failure to yield to oncoming traffic. Front to rear crashes, or rear-end crashes, were also common at this intersection. Crashes frequently occurred when vehicles were stopped due to the presence of vehicle traffic that has the right-of-way, without a traffic control device. The 1300 East southbound lane does not have a traffic control device at 13800 South although the other two intersection legs are controlled with a stop sign.

This intersection has been the subject of much study in the past. There were some recent lane striping modifications on the north/south road segments between 13800 South and Highland Drive and relocations of crosswalks. Because of this change and recent opening of the 13200 South railroad crossing, **this intersection should be continued to be monitored to see if the changes have an effect on crashes.**

33 total crashes:

- 17 Angle
- 12 Front to Rear
- 1 Head On (front-to-front)
- 1 Sideswipe Opposite Direction
- 2 Single Vehicle

Figure 6 – Manner of Collision at Highland Drive & 1300 East Intersection (Includes 13800 South Intersection)

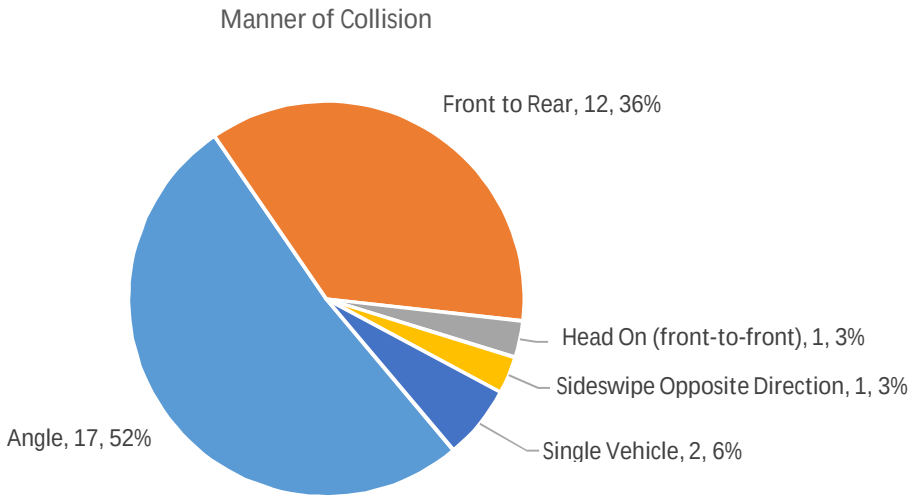


Figure 7 – Intersection at Highland Drive & 1300 East (includes 13800 South Intersection)

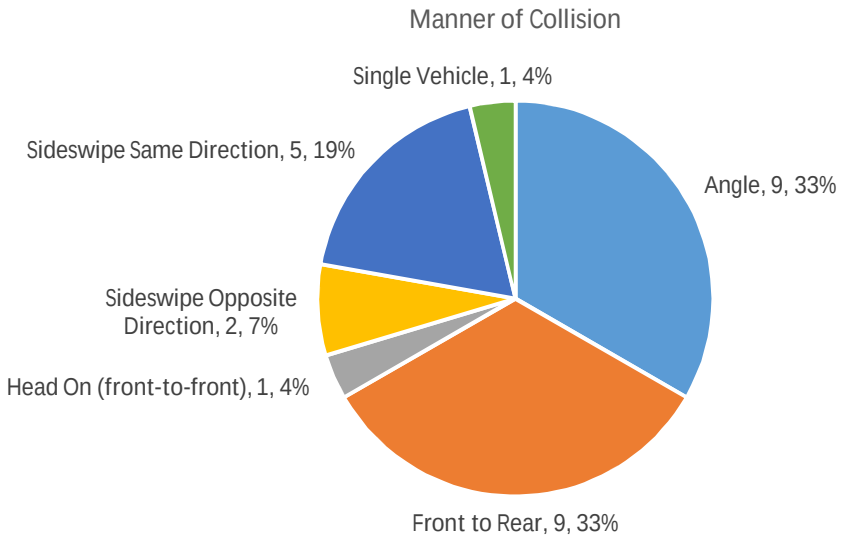
HIGHLAND DRIVE & BANGERTER PARKWAY / TRAVERSE RIDGE ROAD

Angle and front to rear crashes were each attributable to 33 percent of crashes at this intersection, totaling 66 percent. There are a multitude of intersection conditions contributing to a variety of crash types at the intersection. There is limited sight distance due to horizontal and vertical curvature on every approach. The proximity of the Chevron gas station driveways is a factor in several crashes. The large intersection footprint makes driver decisions and turning movements more difficult. Many of the angle crashes involve vehicles turning left from Highland Drive. The Highland Drive approaches do not have any protected left-turn phasing in contrast to the Bangerter Parkway/Traverse Ridge Road approaches which have protected-only left-turn phasing. **The intersection may benefit from left-turn phasing for Highland Drive due to the frequent angle crashes.**

27 total crashes:

- 9 Angle
- 9 Front to Rear
- 1 Head On (front-to-front)
- 2 Sideswipe Opposite Direction
- 5 Sideswipe Same Direction
- 1 Single Vehicle

Figure 8 – Manner of Collision at Highland Drive & Bangerter Parkway / Traverse Ridge Road

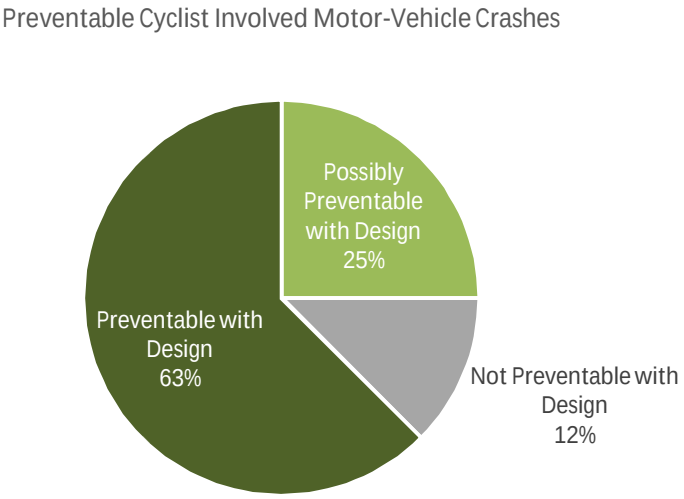


BICYCLE SAFETY

There were 32 crashes involving drivers and cyclists in years 2015-2017. The bicycle crash locations are scattered through the city such that the data does not point to any obvious problem areas. Instead, examining the attributes of each crash can lend insight as to policy or systemic treatments that my help lower bicycle crashes overall. While some crashes appear to be primarily behavior-related, several of these crashes may have an engineering-related mitigation. For example, many of the crashes involved a driver striking a cyclist when they are riding on a narrow shoulder or in a conventional motor-vehicle travel lane. Dedicated bicycle facilities can prevent these types of incidents. Other types of incidents that may be preventable include:

- Incidents where a cyclist is struck by a driver entering or exiting a driveway while traveling on a sidewalk because a bicycle facility is not available
- Incidents where a cyclist is struck by a driver performing an intersection turn movement and the cyclist is not positioned in a manner that enhances visibility to driver
- Incidents where a cyclist is crossing the street in a crosswalk instead of a marked bicycle facility because intersection positioning is ambiguous.

Figure 9 – Cyclist/Motor-Vehicle Crashes and Prevention Possibility with Design



The addition of bicycle facilities could possibly held prevent many of these incidents. A bicycle and pedestrian master plan would help the city identify locations to add bicycle facilities along key roadways and corridors. A bicycle and pedestrian master plan could also contain design guidelines for:

- **Conventional bike lanes**
- **Buffered or protected bike lanes**
- **Intersection design**

PEDESTRIAN SAFETY

There were 31 crashes involving pedestrians and drivers in years 2015-2017. As with bicycle crashes the data does not point to any obvious problem areas. Instead, examining the attributes of each crash can lend insight as to policy or systemic treatments that my help lower bicycle crashes overall.

Seven of the crashes, approximately 23 percent, are classified as a hit-and-run. Many of these incidents are possibly preventable. Such examples include:

- Incidents where a pedestrian is crossing the road at a location outside of a crosswalk. Frequent jaywalking may be a symptom of a lack of crosswalks
- Incidents where a pedestrian is struck walking on a shoulder without a sidewalk
- Incidents where a pedestrian is crossing the road with two or more lanes in each direction in an unsignalized mid-block crosswalk and is struck by a vehicle in the second lane.

Treatments that enhance pedestrian visibility such as intersection lighting, HAWK signals, and dedicated pedestrian signal phases, increase pedestrian safety at crosswalks. These may also potentially help decrease incidents that are related to vehicle turn movements at intersections which were common during the years studied.

Figure 10 – Pedestrian/Motor-Vehicle Crashes and Prevention Possibility with Design