

IVINS CITY

IVINS CITY
TRANSPORTATION MASTER PLAN

APRIL 2021

HORROCKS
ENGINEERS

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1 Introduction

1.1 Background

Ivins City is a vibrant community in the southwest corner of Washington County nestled at the base of the majestic cliffs of towering vermilion sandstone known as "The Big Red Mountain" and Snow Canyon State Park. Due to its proximity to the mountains, the city is known as "Our Home Beneath the Big Red Mountain". Ivins, settled in the early 1920's at the base of the towering vermilion sandstone, was a community built on agricultural purposes. Ivins was incorporated in 1935, which at that time was still an agricultural town with minimal growth. Ivins still maintains its small-town characteristics with little agricultural use as it experiences its share of growth. Nowhere in the United States can so many reasons be found to relax and enjoy life as you will find here. A detailed map of the study area including the city limits and annexation areas is shown in Figure 1.

1.2 Study Need

Washington County and Ivins City's population continue to increase at phenomenal rates. Historically, St. George was the recipient of much of the growth and for the most part it remains the destination for Washington County. However, in the past several years much of the growth has occurred in neighboring communities, such as Ivins City. Associated with growth is an increase in commuter and seasonal traffic. Transportation facilities not designed to accommodate high traffic volumes can create safety problems, congestion and delay for both motorized and non-motorized travel. For Ivins to maintain its unique community character and build a stronger economy to serve its residents, importance must be placed on being proactive and influencing traffic patterns sooner than later. Transportation concerns identified in Ivins City include:

- Safety
- Mobility
- Bicycle and Pedestrian Mobility
- Gateway Treatments
- Street Classification
- Access Management
- Asset Management
- Future Land Use
- Aesthetics

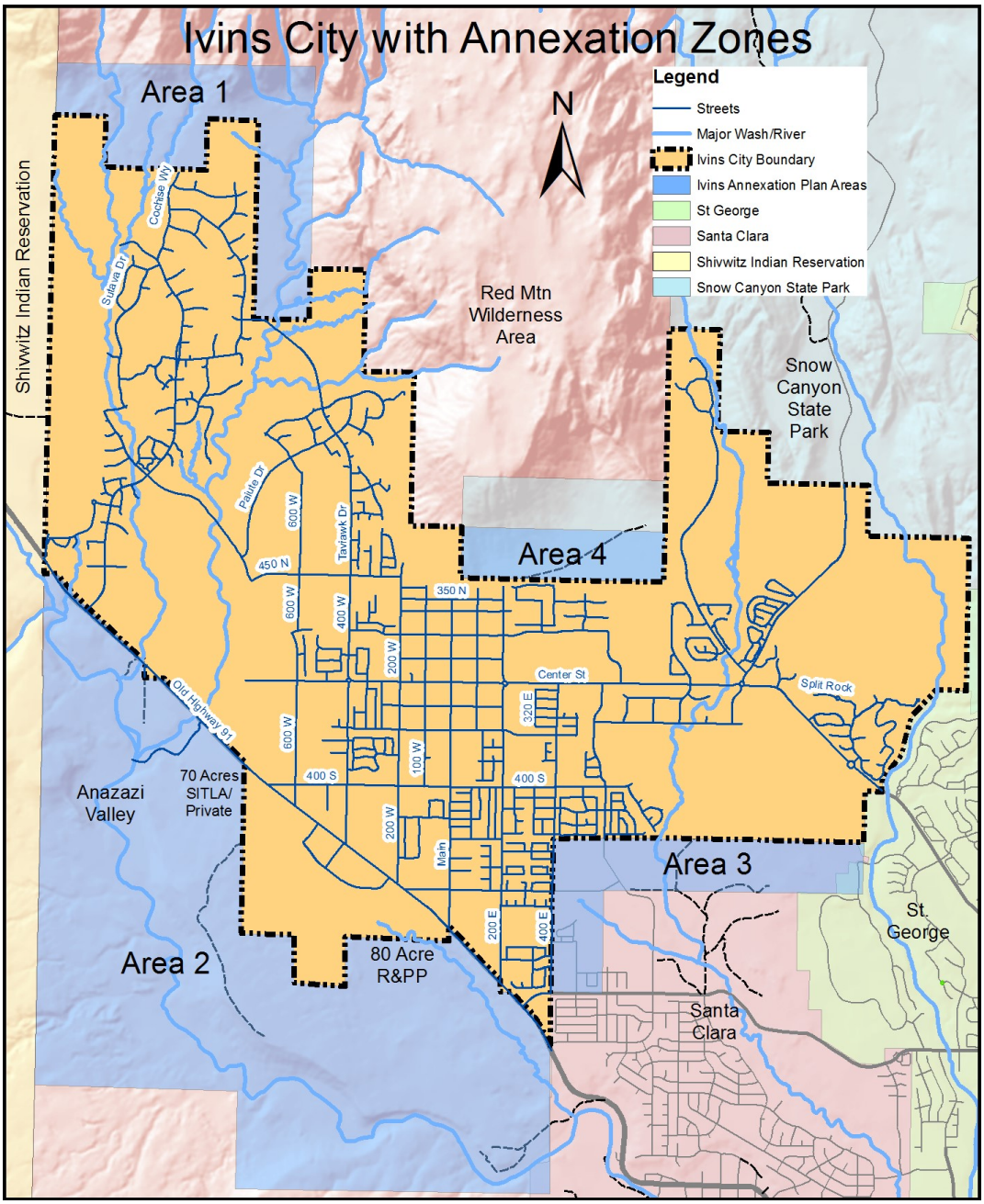


Figure 1 - Study Area

1.1 Transportation Planning Purpose

The purpose of this study is to develop a transportation master plan for Ivins City and evaluate the influence on the plan from the surrounding communities, particularly St. George. The primary objective of the study is to establish a reliable transportation network to guide future developments and roadway expenditures. The master plan includes several major components:

1. Analysis of Existing Conditions
2. Analysis of Future 20-year Conditions

3. Five-year, Short-range Transportation Plan
4. Ten-year, Intermediate-range Transportation Plan
5. Twenty-year, Long-range Transportation Plan
6. Access Management Plan

Five-year improvements focus on projects which are anticipated to address the most critical transportation improvements that need to be constructed to accommodate current growth. The ten-year plan identifies improvements to accommodate immediate future growth and development. The twenty-year plan will identify those projects that require significant advance planning and funding to implement and are needed to accommodate future traffic demand. The initial plan was prepared in 2004 by Carter & Burgess and updates were made in 2008 and 2015 by Horrocks Engineers. Ivins City recognizes the purpose and benefits for development of this plan. The next section describes the planning process that was used to create this plan.

1.1.1 Community Planning

The planning process requires a target or goal. The community vision as outlined in the City's General Plan serves as this target and defines the planning process. This includes a master planning process that helps overall community planning and enhances the understanding of the relationship between individual community elements. The best example of this is the interrelationship between transportation and land use. An expensive cycle of incremental road improvements and land use changes will occur unless these two elements are planned in a coordinated fashion. Proper planning allows early implementation of the ultimate transportation facilities necessary to accommodate the ultimate land use adjacent to the roadway.

1.1.2 Economic Viability

Traffic congestion is bad for business. Raw material and product shipping costs increase proportionally to congestion. Customers will not visit stores that are difficult or dangerous to reach. The transportation system is the lifeline for economic viability; much like the human body's circulatory system provides blood to organs and muscles. Arterial blood clots can be fatal to the body and roadway traffic congestion can be fatal to a community's economic health.

1.1.3 Safety of Citizens

Traffic congestion leads to dangerous driving behavior and increased accident rates for vehicles and pedestrians. More than 38,000 people die every year in vehicle accidents in the United States, which makes traffic accidents the third leading cause of death in the country and the leading cause of death for people under the age of 30. Between 2015 and 2019, Utah averaged 245 fatal car accidents per year. Roadways that are planned and designed correctly can reduce the accident rate by as much as 30%. This plan addresses accident rates in Ivins City and recommends a strategy to decrease these rates.

1.1.4 Health of Citizens

Quality of life includes many factors and some of the factors that are important to the citizens in Ivins include, but are not limited to, work commute time, preservation of rural environment and scenic views, air quality, safety, architectural uniqueness, and development of recreational

facilities. A poorly planned transportation system diminishes all of these elements. There are three reasons for planning improvements to the roadway system:

1. *Mobility* – Alleviate existing or anticipated traffic congestion
2. *Safety* – Improve safety for drivers, pedestrians, and cyclists.
3. *Access* – Provide access routes to newly developed portions of the City

1.1.5 Provides Legal Basis for Development Exaction

Due to the decrease in funding available from federal and state sources, local governments are asking land developers to pay for the infrastructure necessary to support proposed development projects. A long-range plan is the legal basis for these exactions and impact fees. Legal challenges will be minimized if the estimated roadway construction costs are based on the community vision and system plans that support the vision. These costs are estimates and should be used with the idea that this is a planning study.

1.1.6 UDOT Coordination

UDOT is responsible for the safe and efficient operation of state roads, even if they pass through cities. The Western Corridor, through Ivins City, is a major transportation facility and if federal money is used to construct this roadway, UDOT needs to know how this road will look in the future so they can grant driveway access permits on a site-by-site basis. Coordination with UDOT and the DMPO is essential in obtaining federal and state monies to construct transportation facilities. This coordination will also help the city place any of their projects in the State Transportation Improvement Program (STIP). Lack of overall planning and coordination leads to haphazard results and poor circulation along transportation corridors.

1.2 Study Process

The study update process involved close collaboration with City staff and several meetings with an assembled group containing City staff. Meetings included a kick-off meeting, various meetings between Horrocks Engineers and City staff, and a work meeting with the City Council and Planning Commission. This most recent update incorporates into the plan only those amendments that have been added or changed since 2015.

2 Existing Conditions

The transportation data in the updated 2015 Horrocks report was used as a baseline for existing conditions. This baseline condition was then compared to current traffic patterns to identify current transportation issues. This information is used as a baseline to identify improvements that will improve the transportation system.

2.1 Population and Land Use Analysis

This section reviews historical population, existing land use, future land use and estimate of buildout population, and a population projection to determine the approximate year of buildout.

2.2 Historical Population

Ivins City has rapidly grown over the past three decades from a sparsely populated rural city to a significant suburban city, being the fourth largest city in Washington County. Table 1 and Figure 2, below, show the historical growth of Ivins since 1950 based on U.S. Census data.

Table 1 - Historical Population of Utah, Washington County and Ivins City

	1950	1960	1970	1980	1990	2000	2010	2020
State of Utah	688,862	890,627	1,059,273	1,461,037	1,722,850	2,246,553	2,763,885	
% Growth		29.3%	18.9%	37.9%	17.9%	30.4%	23.0%	
Washington County	9,836	10,271	13,669	26,065	48,560	90,354	138,115	
% Growth		4.4%	33.1%	90.7%	86.3%	86.1%	52.9%	
Ivins City	95	77	137	600	1,630	4,450	6,753	8,635*
% Growth		-18.9%	77.9%	338.0%	171.7%	173.0%	51.8%	44.9%

*Estimate based on 2020 Pictometry Aerial and Ivins City Identification of Number of Housing Units

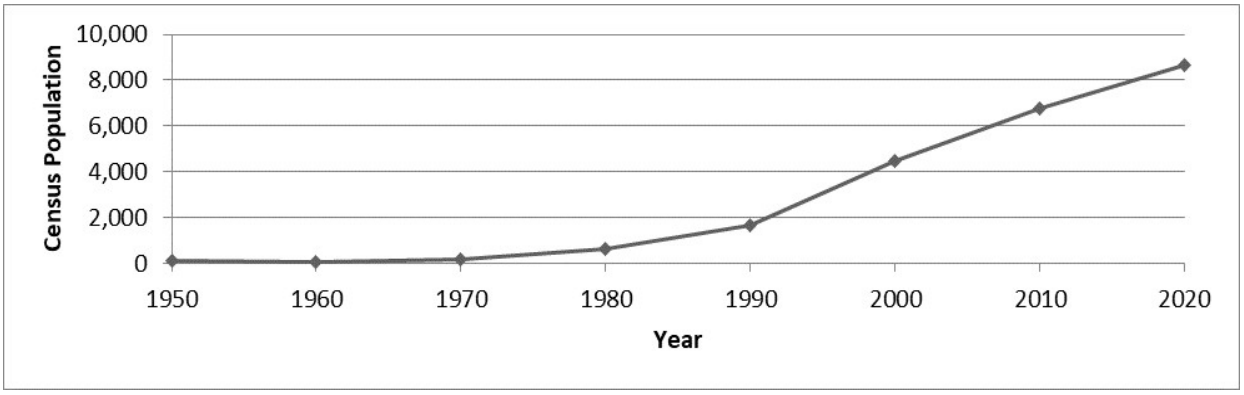


Figure 2 - Graph of Ivins City Historical Population

In previous decades, Ivins had been growing at a rate well above the County rate. In the last two decades, the growth rate has slowed to be nearly the same as the County. In review of US Census data 2000 to 2010, there is a trend where the City is increasing the number of housing units but the population is not proportionately increasing. This is illustrated in Table 2 below:

Table 2 - US Census Population 2000 vs 2010

	Year 2000	Year 2010	2000 to 2010 % Growth
US Census Population	4450	6753	51.8%
US Census Households	1435	2427	69.1%
US Census Housing Units	1598	2880	80.2%
US Census Persons per Household	3.10	2.78	-10.3%

Vacant Housing Units (including second homes)	163 (10.2%)	453 (15.7%)	178%
Second Homes (seasonal, recreational, or occasional use)	91 (5.7%)	289 (10%)	217%

** this table to be updated when 2020 data is available

Even though population has only increased 52 percent over the 10 years between censuses, the housing units have increased 80 percent. The difference between population growth and housing growth can be attributed to the following. First, the quantity of persons per household has significantly decreased to 2.78 in 2010 from 3.10 in 2000. This may be indicative of the attractiveness of Ivins as a retirement community as our population of residents 65 and older has increased from 10.2 percent to 19.8 percent over the same period. Also, there is a statewide and nationwide trend in population demographics towards smaller sized households.

Ivins City has smaller households than the rest of Washington County which in 2010 had an average household size of 2.94 compared to 2.78 in Ivins. The Kem C. Gardner Policy Institute is projecting that the 2020 average household size in Washington County will be 2.65, representing a drastic reduction. We have used this number to derive the 2020 population in Ivins. Until the 2020 Census data is published, this is only an estimate.

Another factor that reduces the City population is the attractiveness of Ivins for second homes. The percentage of second homes in Ivins has increased from 10.2 percent in 2000 to 15.7 percent in 2010. A more recent analysis in March 2020 of GIS data from Washington County shows that 19.6 percent of properties with residential buildings are not primary residences indicating that the trend is continuing.

2.3 Existing Land Use

Land use analysis is basic to City planning. It is necessary to understand the existing land use and compare to the future land use as determined by the adopted Land Use Plan (identified as Figure 3 of the General Plan). The City area was analyzed to determine the number of existing residences, irrigated acres, and the extent of commercial land uses.

Table 3 below shows a summary of the existing land use analyzed by area in acres. Of the more than 6,000 acres within Ivins City's boundary, 2,636 acres or 42.8 percent is developed, 42.3 percent is undeveloped, and another 14.9 percent is considered to be permanent open space.

Table 3 - Summary of Existing Development

	Total (acres)	*%*
Developed Residential	2,421	39.3%
Developed Institutional (Civic, School, Church)	122	2.0%
Developed Commercial	93	1.5%
Undeveloped	2,593	42.3%
Parks and Open Space	919	14.9%
Total	6,148	100%

As shown 42 percent of the city still yet remains to be developed and is currently either naturally vegetated, cultivated, or fallow. A portion of this area may be undevelopable due to slopes, flood plains and other natural geographical features. This does not include the 400 acres of potentially developable land in the Anazazi Valley annexation zone.

The existing land use was further evaluated to determine a more exact number of residences. These results are given in Table 4, below.

Table 4 - Existing Land Use in Ivins City as of May 2020

	All Ivins City
Single Family Houses	3,763
Multi-Family Units	290
Total Housing Units	4,053
Total Households (82.1% of housing units)	3,328
Estimated Population (2.75 x # of households)	9,151
Hotel/Spa Units	258
Single Family Vacant Lots	437

As shown, with a total of 4,053 residential units and estimating that 82.1 percent of these units are permanent households, the current population can be estimated at 9,151.

The following, Figure 3, shows the existing zoning map of Ivins.

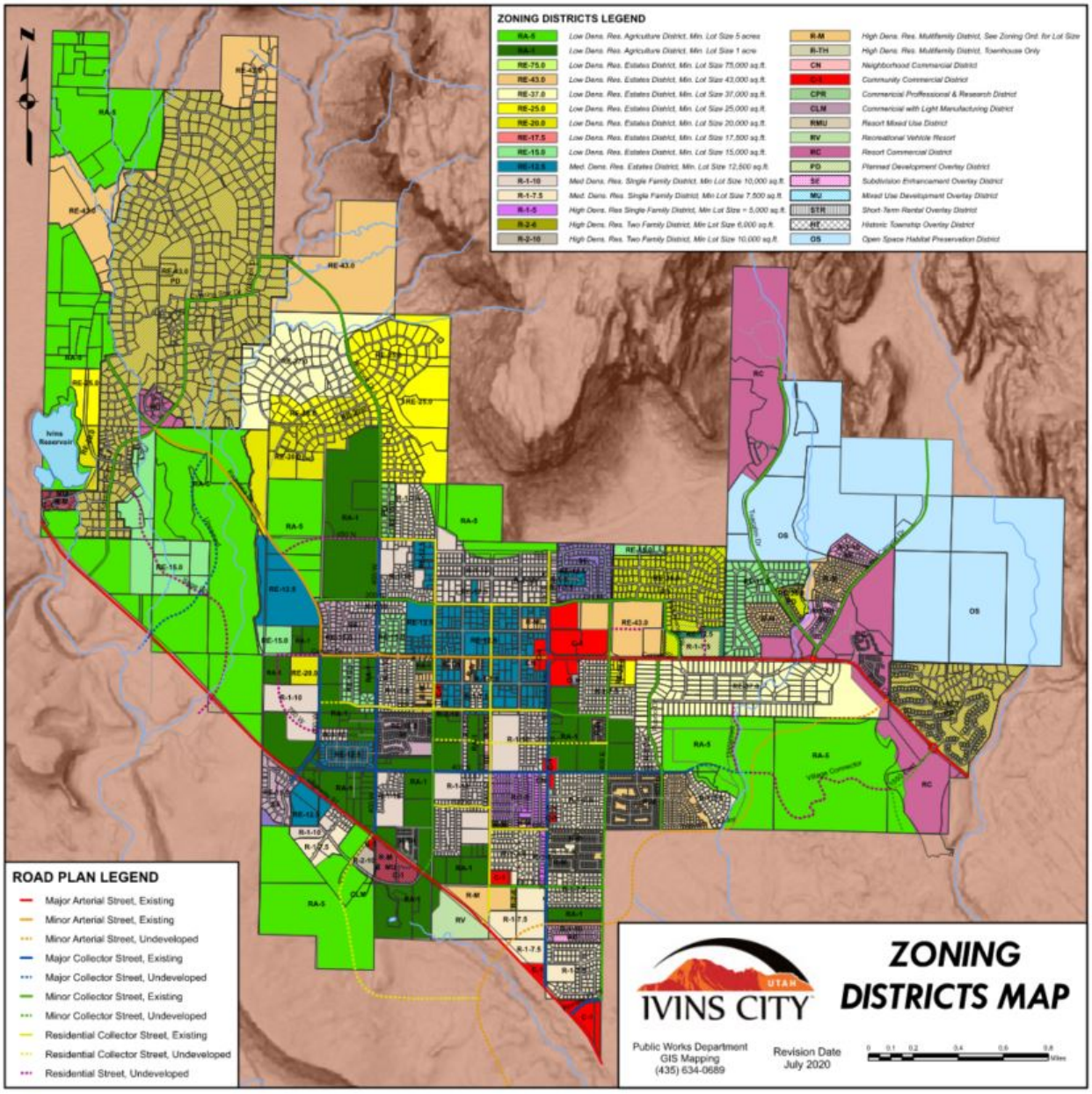


Figure 3 - Existing Zoning Map

2.4 Future Land Use & Projected Buildout

The following, Figure 4, shows the current land use plan as of 2020. The build out population is based on a detailed analysis of the land use plan and existing plans that have been submitted to Ivins City at various stages. This detailed analysis was completed using GIS technology and the resulting work map is provided in Appendix A of the 2013 Ivins City Water Master Plan. The analysis identified areas for infill development as well as the development of the undeveloped areas. Table 5 shows the results of this analysis.

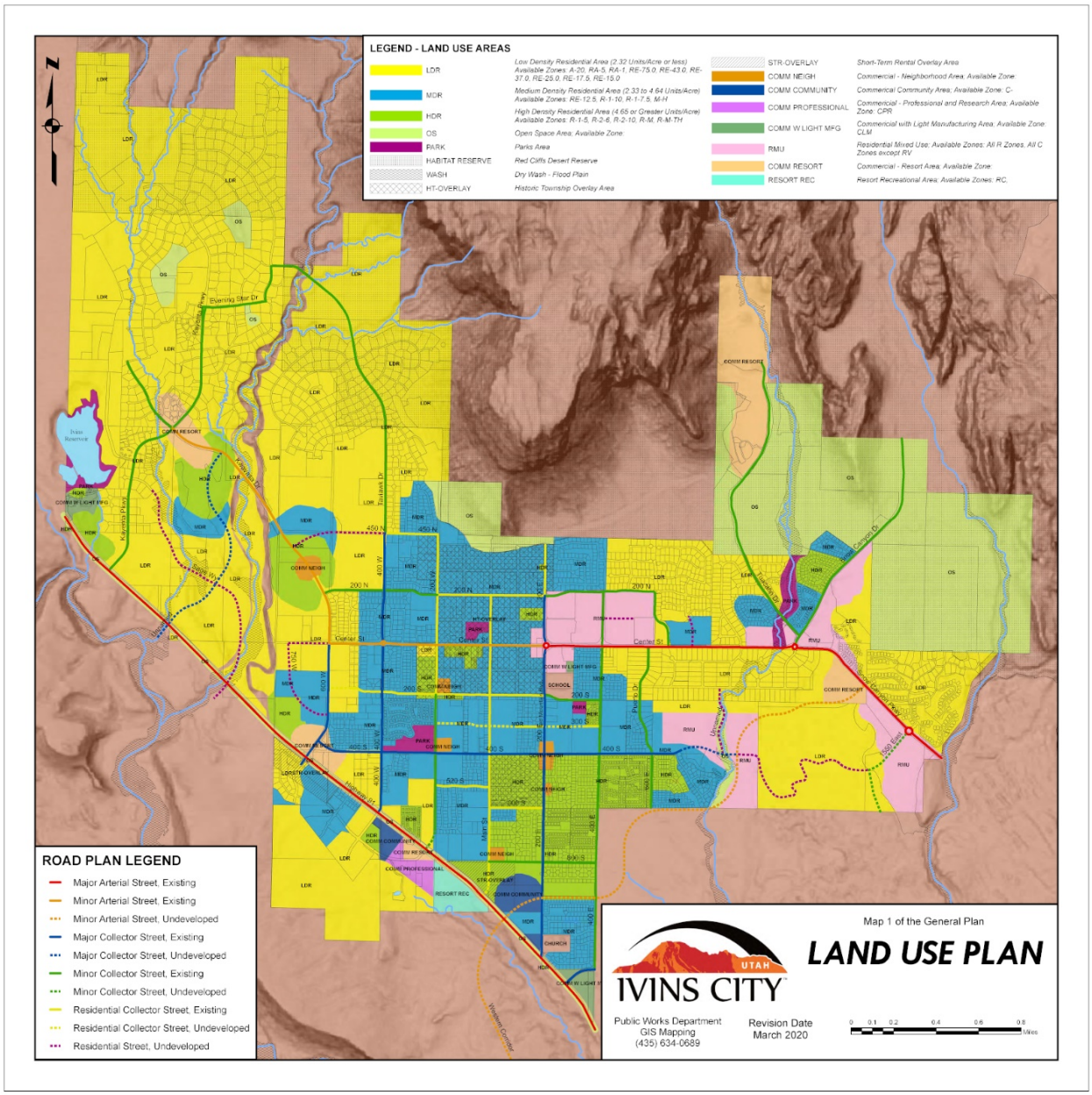


Figure 4 - Ivins City Land Use Plan (March 2020)

Table 5 - Land Use Data for Future Buildout Calculations
Ivins City

	Existing (May 2020)	Buildout
Single Family Housing Units	3,763	7,500
Multi-Family Housing Units	290	1,200
Total Housing Units	4,053	8,700
Vacant Lots for Single Family Housing	437	0
Anazazi Valley SF Residences	0	500
Transient Units	258	2,000
Employees	609	3,000

The buildout number of residences is 8,700 plus 500 residences added for the annexation of Anazazi Valley for a **total of 9,300 residences**. Assuming that 19.6 percent of the residences are second homes or unoccupied in accordance with current conditions as calculated in the discussion on Historical Population, 7,635 units would be considered resident households. A household size of 2.7 (see population projections in Table 6) indicates a **buildout population of 18,400**.

This buildout population estimate will change with any changes to the land use plan. Lately, more dense development is approved with each modification of the land use plan, so there is a possibility that the estimated buildout population will increase in the future. In prior capital facilities plans, an effort was made to estimate this larger population in anticipation of the land use plan being modified, however, this has been deemed unnecessary as these plans are updated every four to six years and should simply be adapted as the land use plan changes over time.

2.5 Population Projections

The population projections identify the timing of community growth and provide information to determine how soon capital facilities need to be placed into service. This growth projection is based on analysis of previous years of growth and an understanding of the local demographics.

The Kem C. Gardner Policy Institute at the University of Utah (KCG) provides the entire State with population growth models that are provided at the County level but not the City level. The latest County estimate is provided in the following figure, Figure 5.

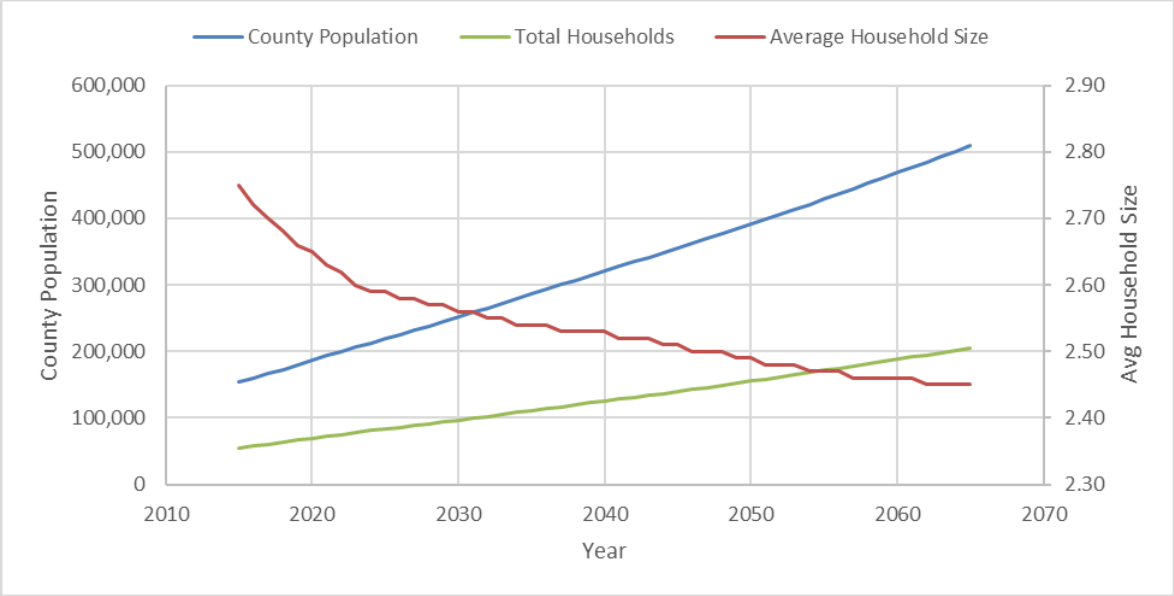


Figure 5 - Washington County Population Project by Kem C. Gardner Policy Institute for 2015 to 2065

Figure 5 illustrates that even though the population is projected to increase at a significant rate, the average household size is trending down at a significant rate from 2.75 in 2015 down to 2.45 in 2065.

In 2018, the Dixie Metropolitan Planning Organization (MPO) took the population projections from KCG and granularized the data down to individual cities. Figure 6, as shown below, depicts the MPO's population projections for Ivins City.

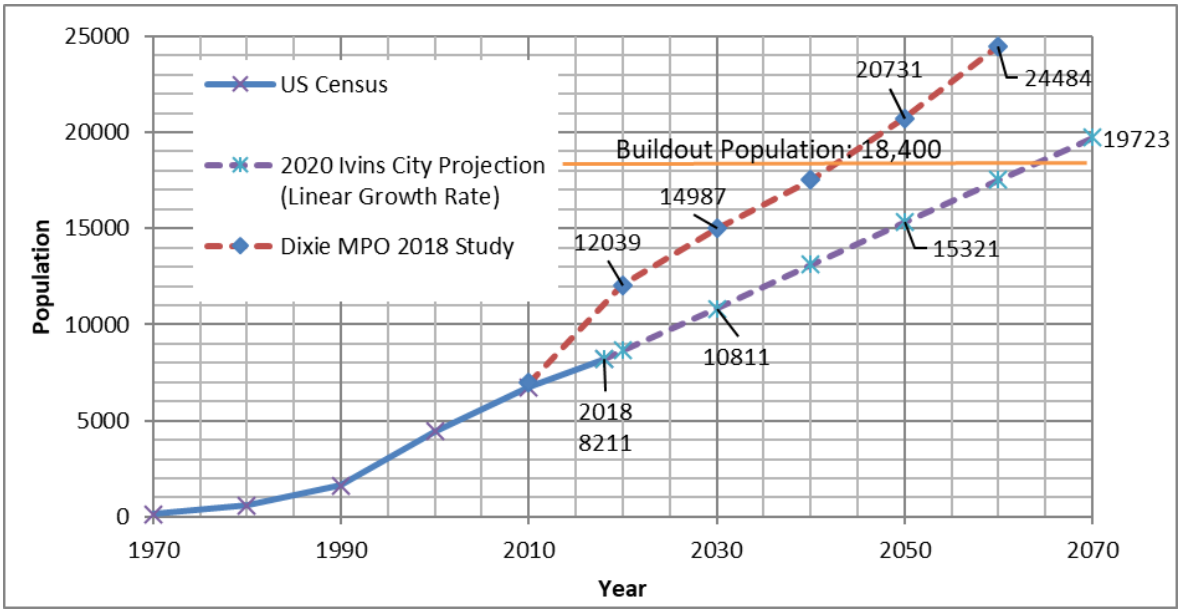


Figure 6 - Ivins City Population Projections

The MPO appears to have overestimated the 2020 population and then used a slight geometric growth pattern to the entire city in mimicry of the KCG County population projection. Figure 6, above, and Table 6 , below, show an alternative growth projection based on linear growth that has been observed by the City for the last 15-20 years. The MPO estimate is a high estimate of growth and the linear model is a low estimate. The resulting population projections show that a **buildout population of 18,400 will be reached somewhere between 2043 (MPO Model) and 2063 (Linear Model)**. For the purposes of developing impact fee revenue projections, the City will use the linear model. The need for projects may be based on the higher MPO population projection.

Table 6 - Ivins Population Projection Data

Year	Population	Population % Growth	Total Housing Units	Total Residences % Growth	Resident Households*	Household Size
1970	137					
1980	600	338%				
1990	1630	172%				
2000	4450	173%	1690		1435	3.10
2010	6753	52%	2880	70%	2427	2.78
2020	8636	28%	4053	41%	3259	2.65
↓ Ivins City (Linear Model) Projected Data ↓						
2030	10800	25%	5253	30%	4223	2.56
2040	13100	21%	6453	23%	5188	2.53
2050	15300	17%	7653	19%	6153	2.49
2060	17500	14%	8853	16%	7118	2.46
2070	19700	13%	10053	14%	8083	2.44

*Resident Households is based on a percentage of total housing units that are considered

2.6 Employment Projections

For the purpose of transportation analysis and computer modeling performed by the Dixie Metropolitan Organization using the CUBE model, it is also necessary to track employment centers and the number of employees. As a residential suburb of St. George, Ivins City does not currently have many employment centers, as most workers travel outside of Ivins for their employment. Therefore, it is easy to list these centers of employment in Table 7.

The table shows the potential for future employment as well as the estimate for current employment. This does not include the employment of home-based workers, which is very common for many residents in Ivins. There is the greatest potential for future employment in the several planned resorts such as Sentierre, Black Desert, and the SITLA 120 developments as they will provide commercial retail centers as well as restaurants and other hospitality offerings.

Table 7 - Ivins City Employment Centers

Employment Centers	Employees 2020 Estimate	Employees Maximum Potential
Ivins City	58	87
Rocky Vista University	50	75
Center Street Commercial Zone	0	300
Family Dollar	5	5
Southern Utah Veterans Home	30	30
Snow Canyon Medical Clinic	15	30
Snow Canyon Roundabout Area	0	300
Red Mountain Resort	30	50
Sagestone Spa and Salon	10	20
Movara Fitness Resort	30	60
Encanto Resort	2	5
200 East Commercial Center	24	35
Mountain Shadows Commercial Center	33	40
Red Mountain Elementary	50	50
Vista School	50	60
Tuacahn High School	40	40
Tuacahn Center for the Arts	150	450
Sentierre Resort	5	350
Miscellaneous Commercial Neighborhood	0	100
Black Desert	3	1000
Old Highway 91 Commercial	0	300
SITLA 120	0	300
Kayenta Art Village	60	300
Crescent Moon Village	7	100
Rider's Mountain View Tire	5	10
Troy's Custom Body & Paint	7	15
Red Mountain Storage	1	2
Amidan Storage	1	2
Construction (scattered throughout)	250	750
Total:	916	4953

Table 8, below, shows the estimates of employment used for the current MPO regional transportation model. The study shows much higher estimates than this study estimated. They started with base numbers gathered from the State of Utah Department of Workforce Services database. It is possible that it includes some home-based businesses, especially construction companies, where the actual worksite of these employees is elsewhere. We have submitted our estimates for consideration in revising the model, however, in some cases it may be necessary for

them to keep their base numbers the same since they need to keep their input data methods consistent across the whole county.

Table 8 - 2018 MPO Study Estimate of Employment for Ivins

Year	*Ivins City Employees*
2010	1861
2020	3537
2030	4322
2040	4840
2050	5582
2060	6288

2.7 Environmental

Southern Utah is rich with cultural, historic, geologic and other natural features. Tourism in southern Utah accounts for a great deal of sustainability for many communities. Much of this tourism is based on features defined by natural and physical environments. Ivins, the city beneath the big red mountain, has some of the most pristine views in all of Utah. These views are attractive to many outsiders but are bounded by many environmental areas. Included among those areas are the desert tortoise habitat, which is protected by the Habitat Conservation Plan, and Snow Canyon State Park. Along with this unique landscape are issues of sensitive species, natural environmental and geologic concerns.

Some of the environmental concerns facing Ivins include threatened and endangered species, wildlife preserves, archaeological sites, geological sites, and water drainage areas (wash). Threatened and endangered species and their habitat are protected by the National Environmental Policy Act (NEPA). Developments in these areas are typically off limits, although in the past, development has been allowed to encroach in these sensitive areas. Development that poses an impact to these areas will require an Environmental Impact Statement (EIS).

Natural drainage areas can be incorporated into many developments, which usually does not create an impact to the feature. The impact is usually felt by the development by the discovery that certain land is undevelopable and usually remains as an open space feature. Environmental concerns should be addressed when looking at an area for any type of improvement to the transportation system. Specific issues for Ivins will not be discussed here, as they are more related to specific projects as they are built.

2.8 Street System Inventory

Traffic and roadway data were collected in the original 2004 Carter & Burgess report in order to develop the Master Plan. The updated data from 2015 was used for analyzing the baseline conditions and to help in developing the current and future conditions.

Roadway and Traffic Data

The following information was gathered:

- Number of lanes

- Speed limits
- Daily traffic counts on selected roadway segments
- Peak Hour traffic counts at selected intersections
- Planned and funded roadway improvement projects
- Crash data

Figure 7 shows the 2020 intersection turning movements at several important intersections in the city. These volumes show Ivins City's peak hour scenario. Ivins City has a unique situation where the highest volume of traffic occurs between 11:00 AM and 1:00 PM. Data was collected for this unique peak hour. Figure 8 shows the existing Average Daily Traffic (ADT) on the major roadways in the City. This number represents the total number of cars traveling that roadway in both directions over an average day. These ADT's were not adjusted for day of week and month of the year due to the fact that those adjustment factors are not available for Ivins. Adjustment factors are available for the St. George area but they are not relevant to the traffic patterns in Ivins.

2.8.1 Analyses of Existing Roadways and Intersections

Figure 8 shows the Level of Service (LOS) for each intersection that was counted. The analysis was based on procedures outlined in the Highway Capacity Manual (HCM) published by the Transportation Research Board (TRB). This type of analysis assigns a letter value based on average delay experienced by vehicles to indicate the level of service (LOS) of the intersection. The assigned letter values range from A to F with A being the best and F being the worst. An uppercase letter designates a signalized intersection LOS and a lowercase letter designates an unsignalized intersection LOS. A summary and definition of each LOS letter designation is provided in Table 9 for signalized and unsignalized intersections.

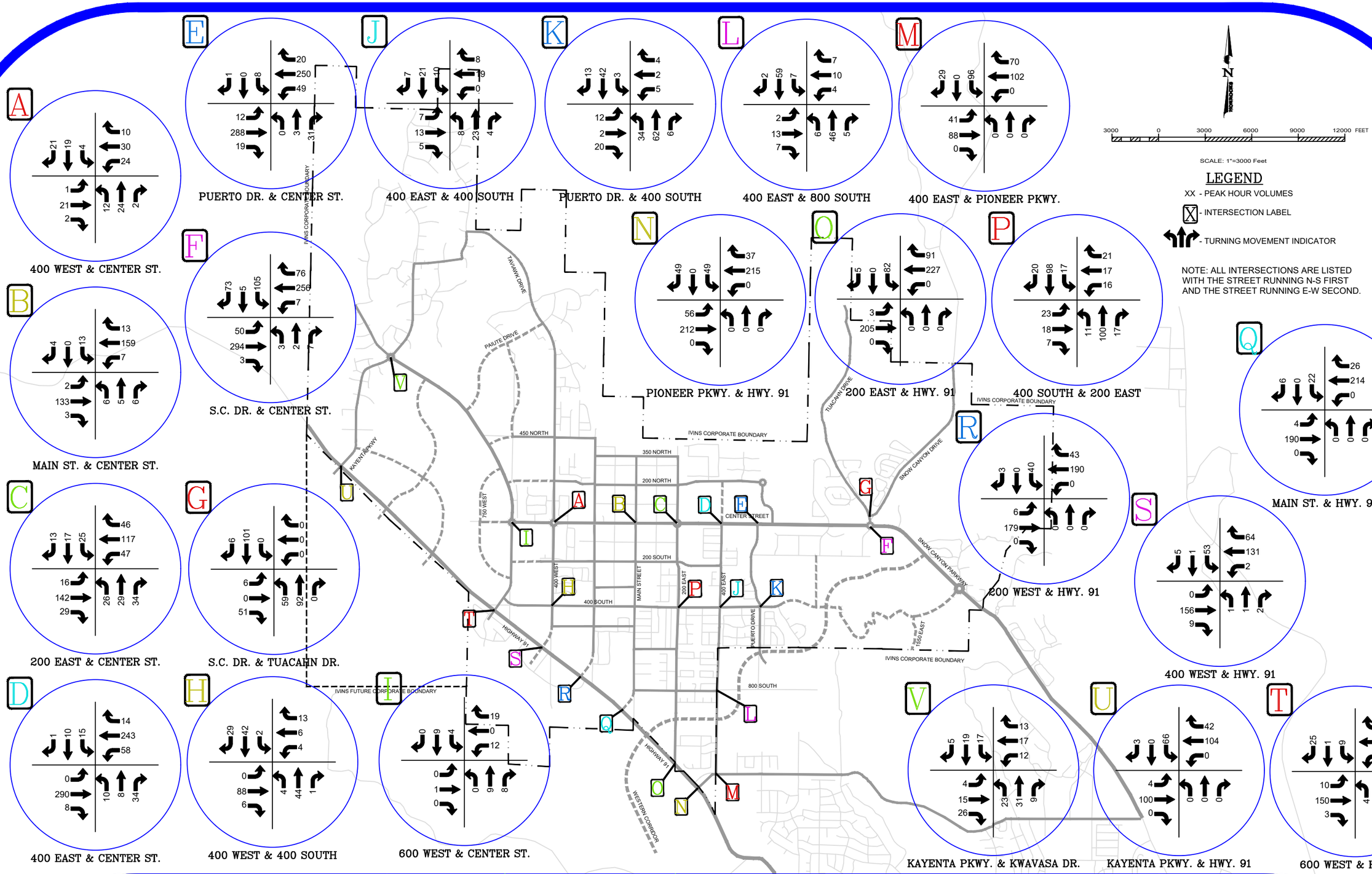
Table 9 - Level of Service Definition-Intersections

Signalized Intersection		Unsignalized Intersection		Definition
LOS	Delay (sec/veh)	LOS	Delay (sec/veh)	
A	≤10.0	A	≤10.0	Free Flow
B	>10.0 and ≤20.0	B	>10.0 and ≤15.0	Stable Flow (slight delays)
C	>20.0 and ≤35.0	C	>15.0 and ≤25.0	Stable Flow (acceptable delays)
D	>35.0 and ≤55.0	D	>25.0 and ≤35.0	Approaching unstable flow (tolerable delay, occasionally waiting through more than one signal cycle before proceeding)
E	>55.0 and ≤80.0	E	>35.0 and ≤50.0	Unstable Flow (intolerable delay)
F	>80	F	>50	Forced Flow (jammed)

Source: *Highway Capacity Manual*, Transportation Research Board, 2016

It is standard engineering practice to assume that a facility with LOS A through LOS D is within an acceptable range for most users. In some instances, LOS E is also determined to be acceptable.

The LOS analyses show that all intersections are operating at acceptable levels of service.



SCALE: 1"=3000'

DATE: October 2020

IVINS CITY UTAH

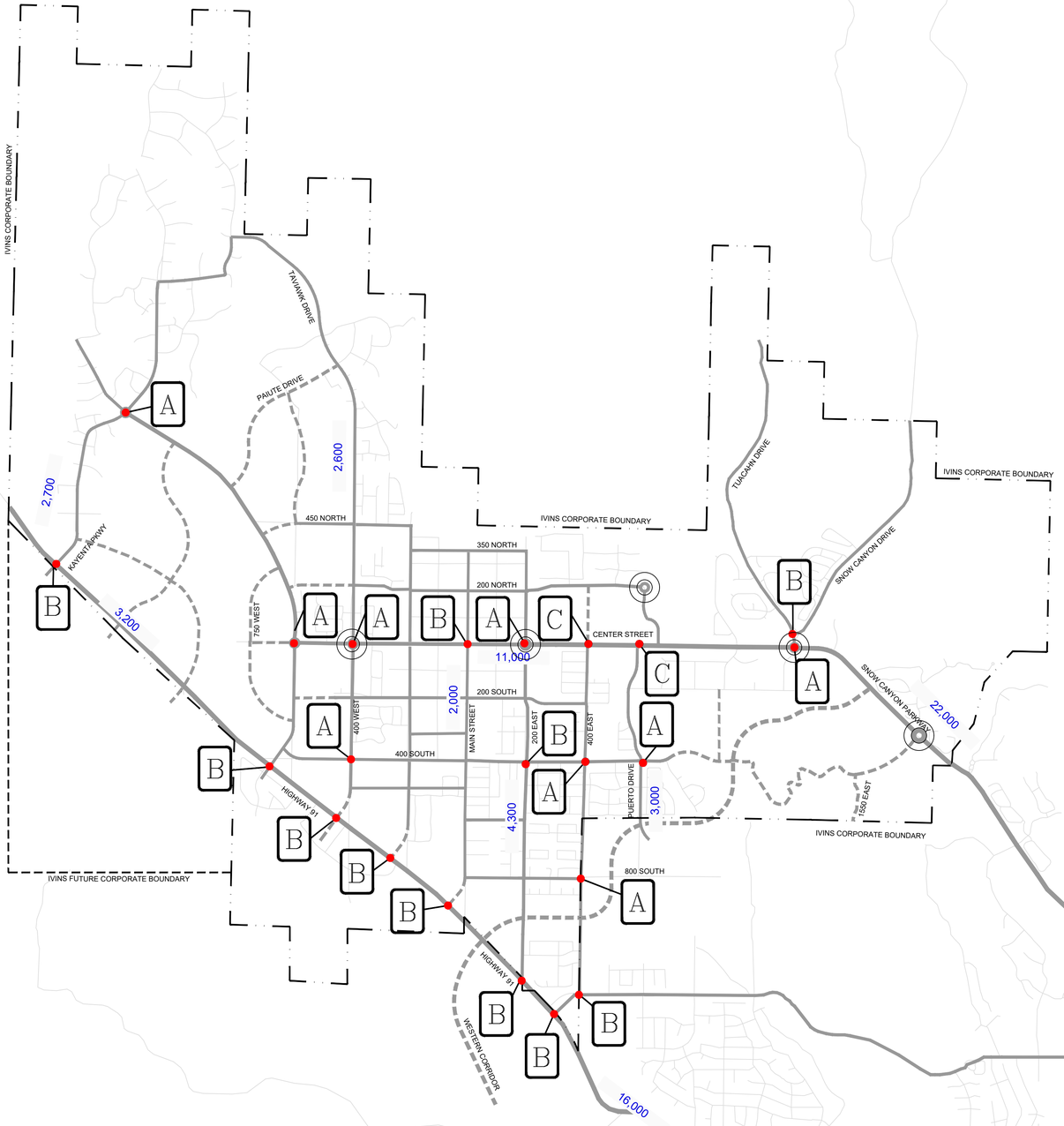
555 SOUTH BLUFF STREET
SUITE 101
ST. GEORGE, UT 84770
(435) 986-7888

Ivins TMP Update

EXISTING VOLUMES

FIGURE NO. 7

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LEGEND

X – EXISTING LOS GRADE NO-BUILD

– STOP CONTROLLED INTERSECTION

– EXISTING ROUNDABOUT

XX – EXISTING DAILY TRAFFIC

NOTES:
-LOS IS LISTED FOR THE WORST APPROACH AND NOT FOR THE OVERALL INTERSECTION.
-ALL INTERSECTIONS WITH A PROPOSED SIGNAL/ROUNDABOUT WILL NOT RETAIN THE SHOWN LOS DESIGNATION, BUT WILL BE IMPROVED WITH THE SIGNAL/ROUNDABOUT.
-EXISTING DAILY TRAFFIC REFLECTS DAILY TRAFFIC SHOWN IN THE TRAVEL DEMAND MODEL AND MAY BE DIFFERENT THAN ACTUAL EXISTING TRAFFIC. MODEL TRAFFIC PROVIDES A COMPARISON BETWEEN 2020 AND 2050.

N

1" = 3000'

SCALE: 1"=3000'

DATE: October 2020

IVINS CITY

555 SOUTH BLUFF STREET
SUITE 101
ST. GEORGE, UT 84770
(435) 986-7888

Ivins TMP Update

2020 LEVEL OF SERVICE (LOS)

FIGURE NO. 8

\\KAYAK\Data\2020\LIT-2236-2001 Ivins Transportation Master Plan Update\Project Data\Figures\Figures Rev12.dwg - 2020 LOS(11X17) - 4/02/2021 05:17pm emily.andrus

2.9 Traffic Accident Data

For this study, reported accident information was obtained from Numetrics Crash Data for the last ten years with more details for the crashes that occurred between January 2016 and December 2020. Total accidents for each of these years, broken down into type of accident and accident location, are displayed in the Appendix.

In the last ten years, the number of crashes in Ivins have fluctuated by year. Between 2010 and 2014, the number of crashes was fairly consistent. A peak of crashes occurred in 2015 and 2018, with a low number of crashes in 2016 and 2017. 2020 showed a decrease in crashes. Figure 9 shows the trend of crashes in Ivins.

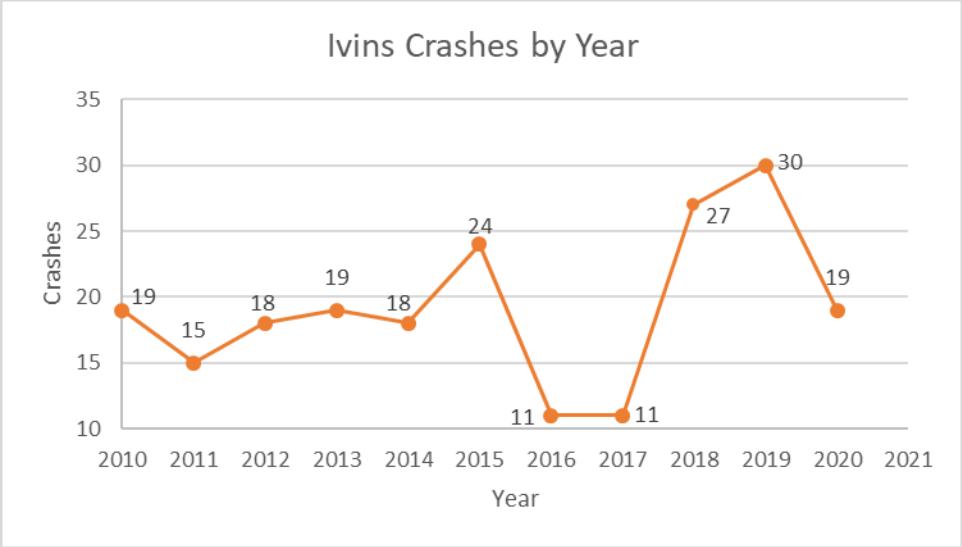


Figure 9 - Ivins Crashes by Year

There were 98 reported crashes in Ivins between the years 2016 and 2020. Forty-four of the 98 crashes occurred on Center Street between the St. George City boundary and 200 East. Of the 98 crashes, 66.3 percent of them involved two or more vehicles. Eight crashes occurred in wet and rainy conditions. There were no fatalities between 2016 and 2020.

Although the sample is rather small, patterns that emerged from this data analysis are as follows:

1) Overall crashes average about 19 per year.
2) On average there are 5.2 injury crashes per year during the period studied. It ranges from two injury crashes in 2016 and eight injury accidents in 2018.
3) The locations with the highest number of reported crashes are:
   a. Center Street, from 400 East to Park Ave Way with 14 crashes between 2016 and 2020
   b. Center Street & Snow Canyon Drive (roundabout installed in 2010), with 15 crashes between 2016 and 2020
   c. Center Street & 200 East (roundabout) with 4 crashes between 2016 and 2020

The prominent crash locations appear to be those locations where drivers have to avoid curbs and medians. Care should be taken to review these locations and be sure that appropriate signage is posted and appropriate lighting for night vision is placed. These features should have high visibility to drivers in various lighting and environmental conditions to help reduce future accidents at these locations.

The number and type of accidents in Ivins is not higher than usual. Between 2016 and 2020, 73 percent of the accidents involved only property damage to vehicles, and the remaining 27 percent were injury accidents. There was one severe crash that involved a bicyclist on Center Street in 2019. In the study period, there was one vehicle/pedestrian crash, two bicycle crashes, and three motorcycle crashes. The implementation of an active transportation plan as discussed in the following section could provide safer routes for pedestrians and bicyclists in the future. It is unfortunate that even one accident has to be endured by drivers and their passengers as they can sometimes be life-changing events.

Figure 10 is a map of the accidents that occurred in Ivins City between 2010 and 2020.

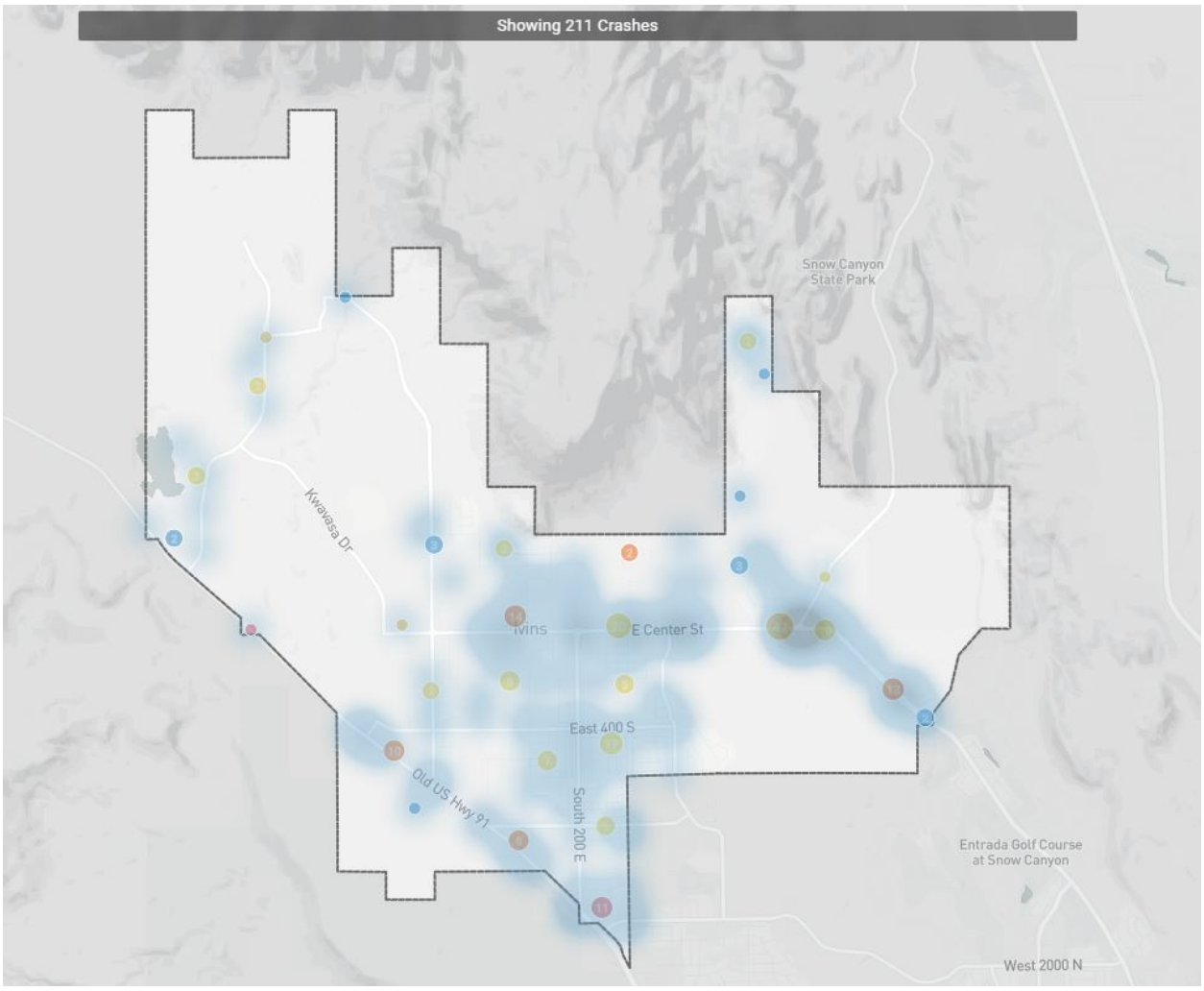


Figure 10 - Accident Locations in Ivins City from 2010-2020

2.9.1 Active Transportation Plan

One of the goals of Ivins City is to provide a healthy environment for the citizens in the community by providing mobility, safety, and access throughout the city. All of these can be partially achieved through active transportation. The City already has 10 miles of multi-use paved trails in place that alleviate traffic, provide safe routes for bicyclists and pedestrians, and provide access within the City. Shared use paths create a lower stress environment for bicyclists and pedestrians than when they drive on or walk near busy roads.

SunTran also provides connectivity within the city. Connectivity between the transit system and the bike and pedestrian facilities creates even more access from place to place. The SunTran route through Ivins also provides access to bus routes through Santa Clara and St George, furthering the access for riders.

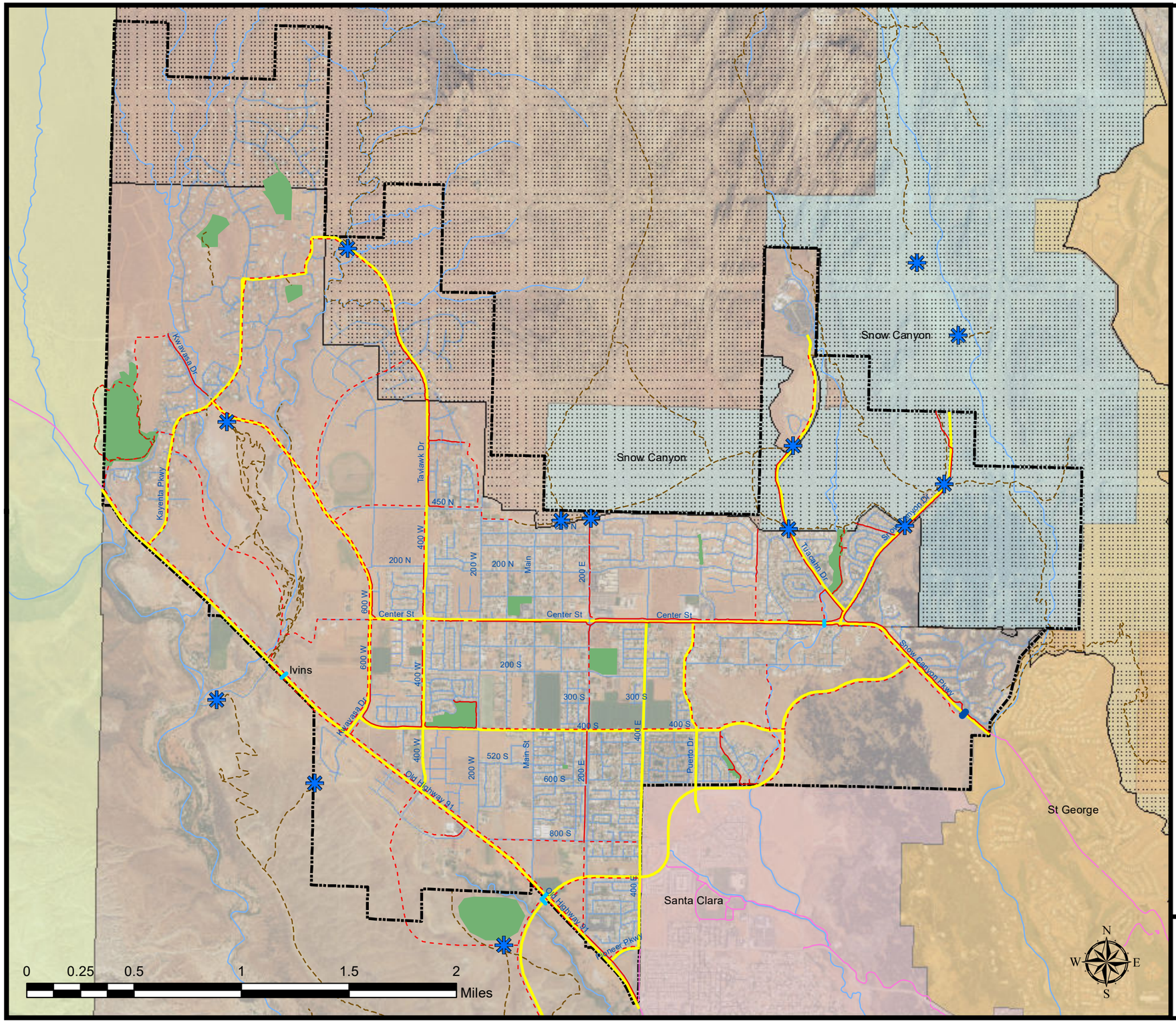
Future plans for bike lanes are to fill in the gaps between multi-use trails, transit, and other routes such as sidewalks and bike lanes. Figure 11 shows the existing Active Transportation Map.

This network has been produced with the premise that with rising fuel costs and an increased emphasis on recreation and fitness, more people will use these on-road and off-road facilities than ever before. There has been a large increase in bicycle riders, both recreational riders and commuters. During the COVID pandemic, there has been an even greater demand for outdoor recreation and safe multi-use paths. For those cyclists who want to enjoy a ride without interfering with motorized vehicles, there are off-road and shared use trails. For those cyclists who would like to stay on the road system, there are designated bike lanes that quickly and safely transport riders from point A to point B. A great deal of effort has been made to plan for future trail routes that promote connectivity between neighborhoods and attractions such as schools, parks and commercial centers.

In Ivins City, there are few barriers to creating a connected active transportation network. Barriers in other networks might include high-speed roads, topographical barriers (washes, rivers, etc.), fences, retaining walls, etc. In Ivins, most areas are accessible by bicycle or on foot without having to confront any of these barriers. Most of the roads have speed limits of 25 miles per hour, which provides for low stress crossings. Center Street is a wider road with higher speeds, however, there are crossings at Snow Canyon Drive, Puerto Drive, 200 East, and 400 West. On Old Highway 91, however, there are no crossing locations for bicycles and pedestrians. There are shared-use paths on either side of the highway, but the high speeds and wider cross-section make it stressful to cross. If development continues on the south side of Old Highway 91, a crossing, or multiple crossings, should be considered.

This trail network has been coordinated with the adjacent community of Santa Clara and Washington County and provides an adequate connectivity of trails throughout the community. Sidewalks are also provided throughout the community to accommodate pedestrian traffic. Some areas lack sidewalk, which requires pedestrians to walk on the shoulder of the road. These areas that lack sidewalk have been identified and included as part of the improvement plan for future implementation. All new development is required to provide sidewalks except as noted in

the roadway cross sections. These cross-sections will also denote where bicycle lanes will be planned in new roadway construction.



IVINS CITY Active Transportation Plan

Updated: 2021

Legend

- Trailheads
- Existing Trail Underpass
- Future Trail Underpass
- Existing Shared Use Trails
- Proposed Shared Use Trails
- Proposed Bike Lanes
- Adjacent City Trails
- City Boundary
- Trails, Unimproved
- Municipal Parks
- Major Wash/River
- RedCliffsDesertReserve
- City of St George
- City of Santa Clara
- Snow Canyon State Park
- Shivwits Reservation
- Streets

Proposed Bike Lanes & Trails

Figure No. 11

2.10 Revenue Sources

Maintenance of the existing transportation facilities and construction of new facilities come primarily from revenue sources that include the Ivins City general fund, federal funds, transportation impact fees and State Class C funds. Financing for local transportation projects consists of a combination of federal, state, and local revenues. However, this total is not entirely available for transportation improvement projects since annual operating and maintenance costs must be deducted from the total revenue. In addition, the City is limited in their ability to subsidize the transportation budget from general fund revenues. The following is a list of funding programs available to Ivins City:

- Highway Sales Tax (.3%) for Local Transportation Projects
- Ivins City Sales Tax (.25%) $122,000 Annually for Transportation, $66,000 Annually for Transit
- Washington County Corridor Preservation Fund ($10 per vehicle registrations)
  - To be used for the purchase of future ROWs
- State Class B and C
- State Park Access Funds
- Transportation Alternative Programs (TAP) through UDOT and DMPO
- Safe Routes to School through UDOT
- Community Impact Board (CIB) Loans and Grants
- Community Development Block Grant (CDBG) Funds

2.10.1 State Funds

2.10.1.1 State Class B and C Program

The distribution of Class B and C Program monies is established by state legislation and is administered by the State Department of Transportation. Revenues for the program are derived from state fuel taxes, registration fees, driver license fees, inspection fees, and transportation permits. Seventy-five percent of the funds derived from the taxes and fees are kept by the Utah Department of Transportation for their construction and maintenance programs. The remaining twenty-five percent is made available to counties and cities.

Class B and C funds are allocated to each city and county by a formula based on population, road mileage, and land area. Class B funds are given to counties, and Class C funds are given to cities and towns. Table 10 below identifies the method used to allocate B and C funds.

Table 10 - Apportionment Method of Class B and C Funds

Based on	Of
50%	Roadway Mileage
50%	Total Population

Class B and C funds can be used for maintenance and construction of highways; however, thirty percent of the funds must be used for construction or maintenance projects that exceed $40,000. Class B and C funds can also be used for matching federal funds or to pay the principal, interest, premiums, and reserves for issued bonds.

2.10.1.2 State Park Access Funds

State Park Access Funds provide matching funds for projects on local roads that provide access to state parks. Local jurisdictions are expected to provide half of the funding. Snow Canyon Drive provides access through Ivins to Snow Canyon State Park and would qualify for this funding.

2.10.1.3 Transportation Alternative Programs

The Transportation Alternatives Program supports projects that enhance safety and expand options for non-drivers, mitigate environmental impacts and convert former interstate facilities to new uses. Funds are divided between UDOT and MPOs. To qualify for funding, a project must fit into one of nine federally designated categories:

- Construction, planning, and design of facilities for pedestrians and bicyclists in compliance with ADA requirement
- Safe routes for non-drivers to access daily needs
- Conversion and use of abandoned railroad corridors for trails
- Any environmental mitigation activity
- Reduced vehicle-caused wildlife mortality
- Safe Routes to School projects

2.10.1.4 Safe Routes to School Program

The Safe Routes to School Program funds programs, tools and infrastructure projects that support a safe walking or riding environment for children traveling to and from neighborhood schools. Improvements such as sidewalks, paved trails, and installed bike racks are eligible for funding.

2.10.1.5 CIB Loans and Grants

The Community Impact Fund Board provides loans and grants to counties, cities and towns that are impacted by mineral resource development on federal lands. Local communities cannot collect taxes from federal lands so a portion of the federal lease fees are returned to the Community Impact Board to distribute to the impacted communities.

2.10.1.6 CDBG Funds

The State of Utah Community Development Block Grant program provides grants to cities of fewer than 50,000 people and counties of fewer than 200,000. The purpose of the small cities program is "to assist in developing viable communities by providing decent housing and a suitable living environment and expanding economic opportunities, principally for persons of low and moderate incomes."

2.10.2 Federal Funds

There are federal monies that are available to cities and counties through the federal-aid program. The funds are administered by the Utah Department of Transportation. In order to be eligible, a project must be listed on the five-year Statewide Transportation Improvement Program (STIP).

The Surface Transportation Program (STP) provides funding for any road that is functionally classified as a collector street or higher. STP funds can be used for a range of projects including rehabilitation and new construction. Fifty percent of the STP funds are allocated to urban and rural areas of the state based on population. Thirty percent can be used in any area of the State, at the discretion of the State Transportation Commission. The remaining twenty percent must be spent on highway safety projects and transportation enhancements. Transportation enhancements include 10 categories ranging from historic preservation, bicycle and pedestrian facilities, and water runoff mitigation.

The amount of money available for projects specifically in the study area varies each year depending on the planned projects in UDOT's Region Four. As a result, federal aid program monies are not listed as part of the study area's transportation revenue.

2.10.3 Local Funds

Ivins City, like most cities, has utilized general fund revenues in its transportation program. Other options available to improve the City's transportation facilities could involve some type of bonding arrangement, either through the creation of a redevelopment district or a special improvement district. These districts are organized for the purpose of funding a single, specific project that benefits an identifiable group of properties. Another source is through general obligation bonding arrangements for projects felt to be beneficial to the entire entity issuing the bonds.

2.10.4 Private Sources

Private interests often provide sources of funding for transportation improvements. Developers construct the local streets within the subdivisions and often dedicate right-of-way and participate in the construction of collector or arterial streets adjacent to their developments. Developers can also be considered as a possible source of funds for projects because of the impacts of the development, such as the need for traffic signals or street widening.

3 Future Growth

3.1 Land Use and Transportation

Coordination between land use and transportation is critical for the future development of Ivins City. Street classification and development of streets can guide both desirable and undesirable land uses. The same holds true for land use development. It forces the street classification in advance that could be in opposition to the goals of the transportation plan. Therefore, it is imperative that the goals of land use and transportation are coordinated with each other to support and augment each other and not oppose each other.

Ivins future land use plan identifies areas for growth and non-growth. The new developing residential areas will impact the transportation system the greatest because of daily trip traffic. It is projected that Ivins will potentially reach buildout sometime between the years 2043 and 2063. This is based on current population trends that Ivins has experienced in the past and the availability of developable land at the current identified densities. Reclassification of street type has been recommended for these areas and is identified in the Roadway Functional Classification. Residential land use areas should be maintained as identified in the land use plan.

3.1.1 Functional Street Classification

Functional street classification is a subjective means to identify how a roadway functions and operates when a combination of the roadway's characteristics is evaluated. These characteristics include; roadway configuration, right-of-way, traffic volume, carrying capacity, property access, speed limit, roadway spacing, and length of trips using the roadway. Eight primary classifications were used in classifying selected roadways in Ivins. These classifications are: Major Arterial, Minor Arterial, Major Collector, Minor Collector, Residential Collector, Residential Standard, Residential Alternative, and Residential Private. Arterials provide a higher degree of traffic mobility with limited property access and often connect to the freeway system. Collectors provide a balance between mobility and property access trips. Residential streets and roads serve property access-based trips and these trips are generally shorter in length. Traffic from residential roads is gathered on to the collector system and channeled to the arterials.

The major roads in Ivins City are classified as follows:

Major Arterial

- East end of Center Street
- Snow Canyon Parkway
- Old Highway 91

Minor Arterial

- Western Corridor
- Kwavasa Drive
- West end of Center Street

Major Collector

- 400 West
- 400 South
- 600 West from Center Street to Old Highway 91
- A future unnamed road connecting Kwavasa Drive to Old Highway 91
- 200 East

Minor Collector

- 200 West
- 400 East
- 200 South

- 600 East
- Snow Canyon Drive
- Tuacahn Drive
- 1550 East
- Kayenta Parkway
- West end of Kwavasa Drive
- Taviawk Drive
- Puerto Drive
- Park Avenue Way
- 800 South
- Evening Star Drive
- 200 North

The remaining roads are functionally classified as Residential Collector or various Residential type roads. A map of the roads and their classifications is shown in Figure 12. Included on this map are right-of-way widths and future proposed roadways. These features are discussed on the next several pages. The roadway cross-sections for new development have changed slightly from what they were in the past. This does not mean that every existing roadway in town will have to be reconstructed to meet these standards. This effort is to develop a standard section that will meet the city's needs and be used for future development plans. All new roadways will be required to meet this new standard. The new road cross sections are shown on the pages for Cross Sections 1.1 through 12.

Ivins City Transportation Master Plan

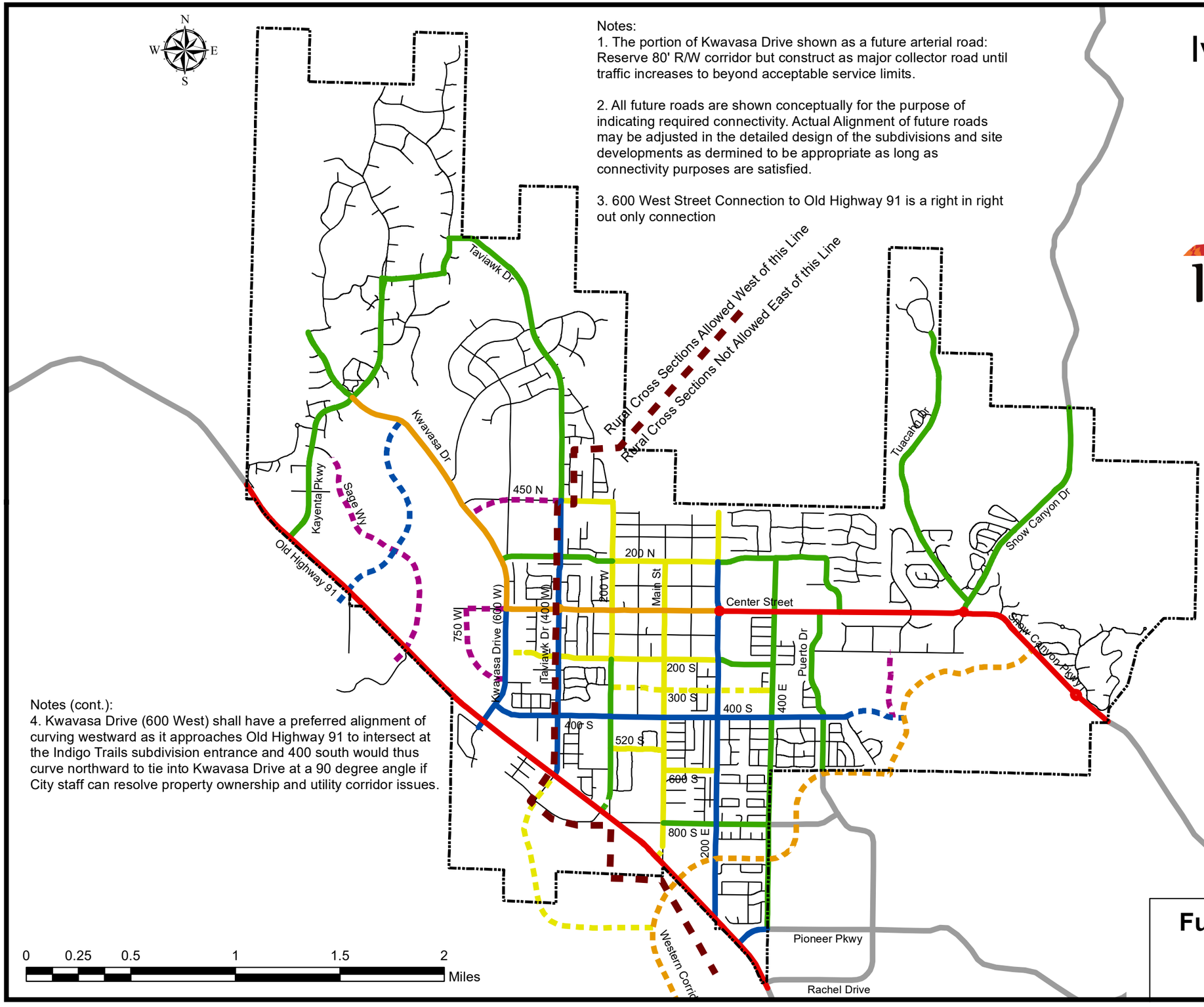
Updated: 2021

Notes:
1. The portion of Kwavasa Drive shown as a future arterial road: Reserve 80' R/W corridor but construct as major collector road until traffic increases to beyond acceptable service limits.

2. All future roads are shown conceptually for the purpose of indicating required connectivity. Actual Alignment of future roads may be adjusted in the detailed design of the subdivisions and site developments as dermined to be appropriate as long as connectivity purposes are satisfied.

3. 600 West Street Connection to Old Highway 91 is a right in right out only connection

Notes (cont.):
4. Kwavasa Drive (600 West) shall have a preferred alignment of curving westward as it approaches Old Highway 91 to intersect at the Indigo Trails subdivision entrance and 400 south would thus curve northward to tie into Kwavasa Drive at a 90 degree angle if City staff can resolve property ownership and utility corridor issues.



IVINS CITY UTAH

Legend

- City Boundary

Functional Class

- Major Arterial, Existing (100' ROW)
- Minor Arterial, Existing (85'/90' ROW)
- Minor Arterial, Undeveloped (85'/90' ROW)
- Major Collector, Existing (66' ROW)
- Major Collector, Undeveloped (66' ROW)
- Minor Collector, Existing (60' ROW)
- Minor Collector, Undeveloped (60' ROW)
- Residential Collector, Existing (55' ROW)
- Residential Collector, Undeveloped (55' ROW)
- Residential, Undeveloped (see Xsec for ROW)
- Adjacent Cities Main Roads
- Existing Local (Residential) Streets

Functional Classification & Cross-sections

Figure No. 12

3.1.2 Roadway Cross Sections

Cross sections are the combination of the individual design elements that constitute the design of the roadway. Cross section elements include the pavement surface for driving and parking lanes, curb and gutter, sidewalks and additional buffer/landscape areas. Right-of-way is the total land area needed to provide for the cross-section elements.

The design of the individual roadway elements depends on the intended use of the facility. Roads with higher design volumes and speeds need more travel lanes and wider right-of-way than low volume, low speed roads. The high use roadway type should include wider shoulders and medians, separate turn lanes, dedicated bicycle lanes, elimination of on street parking, and control of driveway access. On most of the cross sections an additional buffer area is provided beyond the curb line. This buffer area accommodates the sidewalk area, landscaping, and recreational facilities. Locating the utilities outside the traveled way minimizes traffic disruption with utility repairs and when changes in service are needed.

The hierarchy of cross-sections provided for are residential (2 lanes), minor collector (2 lanes), major collector (2 lanes and a median/parking), and minor and major arterial roadways (4 lanes and a median). There are few dimensions used in street design that have been determined exact by research. The cross-section generally represents a consensus of opinions based on operating experience. The roadway cross-sections for Ivins are shown in Cross Sections 1-12. Typical elements of these roadway cross sections are identified in the following paragraphs.

3.1.2.1 Residential Streets

Residential streets provide access to abutting land uses and service local traffic movement. Due to low traffic speeds and relatively small traffic volumes on the street, parking is usually allowed on the street and bicycles are allowed without a separate travel lane. The Residential Standard cross-section includes 50-feet of right-of-way, and 55-feet of right-of-way for the Residential Collector. This allows two travel lanes, parking on one side or both sides, and a park strip on each side to separate the pedestrians from the vehicular traffic.

There is a 43-foot wide Residential Alternative cross section that does not have a planter strip between the curb and the sidewalk that is intended to be used where traffic volumes will be low and depends on the type of development, the location of the development, connectivity with neighborhoods, as well as other criteria. Staff, in conjunction with the TRC, will determine when this cross section can appropriately be used.

There is also a 38-foot wide Residential Alternative cross section. This cross section only requires sidewalk to be installed on one side of the street. The approval and use of this cross section are similar to the 43-foot Alternative cross section.

The Private Residential Rural street cross-section is also provided only for use in the designated rural zone. Rural street cross-sections are described further on the following page.

3.1.2.2 *Minor Collectors*

Collector streets provide for traffic movement between local streets and arterial streets and provide access to abutting land uses. The Minor Collector is a two-lane section with 60-feet of right-of-way. The 60-feet allows for two 11-foot lanes, parking on one side or two-five-foot shoulders, and park strips and sidewalks on both sides of the road. The increased width of this type of roadway versus that of the local streets allows for the development of on-street bus stops or a separate right turn lane by eliminating the on-street parking near the intersection. Due to higher speeds and increased traffic volumes, recreational bicyclists are served by using the sidewalks with the potential to increase their width and location in the landscape buffer area. More serious cyclists that are commuting or touring will use the shoulder that may be striped as a bike lane if parking is prohibited or the travel lane if parking is permitted.

3.1.2.3 *Major Collectors*

The major collector includes a 42-foot roadway cross-section. This design allows for two 12-foot lanes, a possible 12-foot two-way left-turn lane or shoulders for parking on both sides of the road, and park strips and sidewalks on both sides of the road. One of the sections also provides a bike path on one side of the road. Commuting or touring cyclists will use the travel lanes if the shoulder is not designated for bikes.

3.1.2.4 *Arterials*

Arterial streets provide major through traffic movement between geographic areas. These roadways typically have some form of access control that limits the location of driveways. The Minor Arterial roadway includes either an 85 or 90-foot roadway cross-section. The 85-foot cross-section allows for a 10-foot center lane for left turns, four 10.5-foot travel lanes, 4-foot bike lanes, curb, gutter, sidewalk or trail, and a park strip on each side of the road. The 90-foot cross-section increases the width of the lanes to 11-feet and the median to 12 feet.

Old Highway 91, a 100-foot wide Major Arterial, is planned to be improved to a 3-lane road with wide, paved, wide shoulders and paved trail on the north side. The portion of the Highway between 200 East and Ivins reservoir has been improved since the last update of the Master Plan. The remainder of the Highway between 200 East and the Shivwits reservation is planned to be improved within the next year (2021). In the future beyond 10 years, the volume of the road will be such that the shoulders will need to be used as travel lanes for an ultimate 5-lane section. The City will build the 2-lane section to meet their 10-year plan, and widening to 5-lanes will occur for the 20-year plan.

3.1.2.5 *Rural Streets*

A new street can be designed as a rural street if it is located west of 400 West as delineated in Figure 12. In these rural areas, asphalt widths for all road designations should match those of urban cross sections except for residential streets which shall be allowed to follow Cross-Section 2 - Residential Private Rural which allows a 26-foot pavement width. This reduced width road allowed with the condition that “No Parking” signage be installed per the adopted Fire Code. Pedestrian facilities (sidewalks or trails) are not required when traffic studies show that a road has a volume of less than 200 vehicles per day (approximately 20 dwelling units). All other rural streets shall provide either an 8-foot wide asphalt shared-use trail on at least one side of the

street, per the Trail Network Plan shown in Figure 11, or a minimum 5-foot wide sidewalk on both sides of the street.

3.1.2.6 *Roadside Drainage*

For urban streets, curb and gutter is required to be installed on both sides of the street. For rural streets, there are three options along with installing the minimum width required for asphalt:

Option A: Curb and gutter on both sides of the street.

Option B: Rock-lined ditch on both sides of the street.

The ditch shall be a minimum 3-inch in depth, with a minimum 3-inch diameter rock. A drainage study needs to show that the ditch can handle a 10-year flood event where the ditch collects 600 feet or more of half-width residential street.

Option C: Unarmored ditch both sides

This option is only allowed in low erosion situations where velocities in the ditch during a 10-year event must not exceed 2 feet per second. Storm water must flow into an underground drainage system or wash prior to velocities achieving 2 feet per second. Any place where velocities are expected to exceed 2 feet per second, the ditch or channel must be armored.

The City may require curb and gutter in the rural zone on a case-by-case basis in areas of commercial, industrial or medium/high-density residential.

3.1.2.7 *Street Transitions*

Many streets in Ivins City have been built according to a previous cross-sectional standard. New street sections should be built to the cross-section standards as they are approved. In instances where new streets are placed to continue older, existing streets, a transition from old to new sections may need to occur. However, there may be important design, right-of-way, drainage, maintenance, or other consistency reasons that may require that the previous cross-sectional standard be continued for the new street. If this is the case, the City Engineer will determine where to allow the design and construction of the previous cross section to more smoothly transition into new road section areas. The end result is to provide a smooth transition that meets quality and design standards that Ivins City requires.

3.1.2.8 *Private Streets*

Where residential private streets are approved to be built for single family home subdivisions, they shall be designed and built according to residential public street standards to maintain system integrity, consistency, and driver expectation in all single-family home areas of the City. Also, private streets have been a source of complaints by some residents that are left with the cost to maintain the streets while paying the same amount of taxes as all other residents. If a developer chooses to use private streets for single family home developments, it should be provided on some basis other than to lower development costs.

For multi-family and commercial developments, street and parking access widths may be reduced if it meets the fire code requirements and still adequately provides for stabilized drainage and pedestrian access.

One exception to the single family home private street requirement is a cross-section for a private residential shared access drive that meets the following parameters:

1. The access is not required for adequate emergency or fire response
2. Using public Street standards does not allow for reasonable development per property zoning

The private shared access drive requirements are:

1. 24-foot wide asphalt, concrete, masonry or equivalent improved drivable surface
2. Signed no parking on one side
3. Concreted curb and gutter are required on both sides when drive is longer than 200 feet except in rural zone. In all cases, it may be necessary to consider drainage improvements such as curb and gutter
4. The gutter is considered part of the drivable surface. A mountable curb is also considered part of the drivable surface
5. To reduce parking problems, vehicle garages shall be setback from alley at least 20 feet, unless an off-street parking area is provided within the project

A cross section of this 24-foot shared access drive is shown in Figure 13.

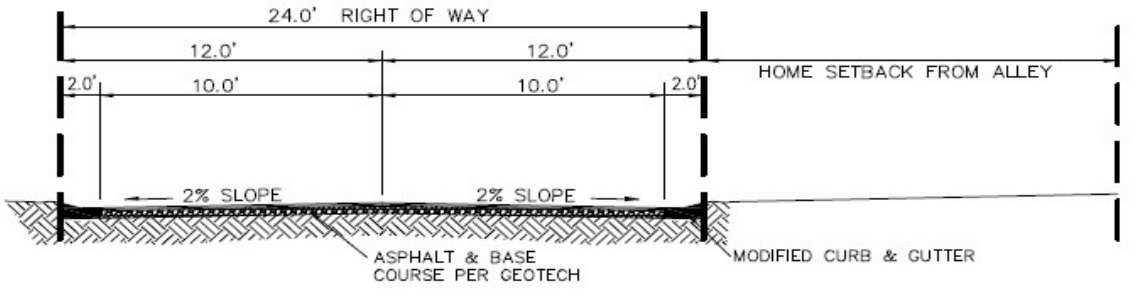


Figure 13 - Shared Access Drive Detail

Another exception is in the designated rural area on the west side of Ivins where residential streets without curb and gutter are allowed due to the Kayenta-style aesthetic treatment of rural desert lands. Cross-Section 2 has been developed to allow this private road concept. No residential street will be accepted as a public road without curb and gutter and the minimum 28-feet of asphalt per Cross-Sections 1.1, 1.2 and 1.3. Collector streets, however, shall be public in all circumstances even in rural areas where the developer is approved to use the rural side drainage.

3.1.2.9 *Landscaped Medians*

Landscaped medians shall be considered on major collectors and arterials. The landscaped median adds a pleasant aesthetic treatment to the streetscape, but it has many increased safety benefits, as well, by controlling location of left-hand turns, calming traffic, and reducing collisions. This Transportation Master Plan identifies installing landscaped medians on Center Street and on portions of Highway 91 and the Western Corridor. Additionally, it is expected that developers will install landscaped medians on Kwavasa Drive.

Generally, landscaped medians should be installed such that at least 2 feet of clearance is provided from the face of a curb, and, per the adopted fire code, at least 20 feet of unobstructed drivable surface (including gutter pans or gravel shoulders) shall be provided on both sides of the median. A landscaped median will be maintained by the City on major collector and arterial streets. A landscaped median shall not be allowed on minor collector or lesser public streets unless a home owners association agrees to maintain it.

3.1.2.10 *Landscape Buffer Areas*

Landscape buffer areas are intended to provide an area of landscaped open space along all public streets where front yards of homes do not front the street. The intent is to provide the general public using the public streets with a more open view of scenic vistas prominent in the Ivins community and consistently beautify the public streets with softening landscaping. Landscape buffers shall be owned and maintained by the City on arterials and major collectors except where a home or commercial site fronts the street. Otherwise the adjacent property owners shall maintain the buffer including the park strip or other landscape areas within the public right-of-way.

3.1.2.11 Wall Design

All fencing/walls adjacent to a landscape buffer on a minor collector, major collector and any arterial shall have a consistent design as follows:

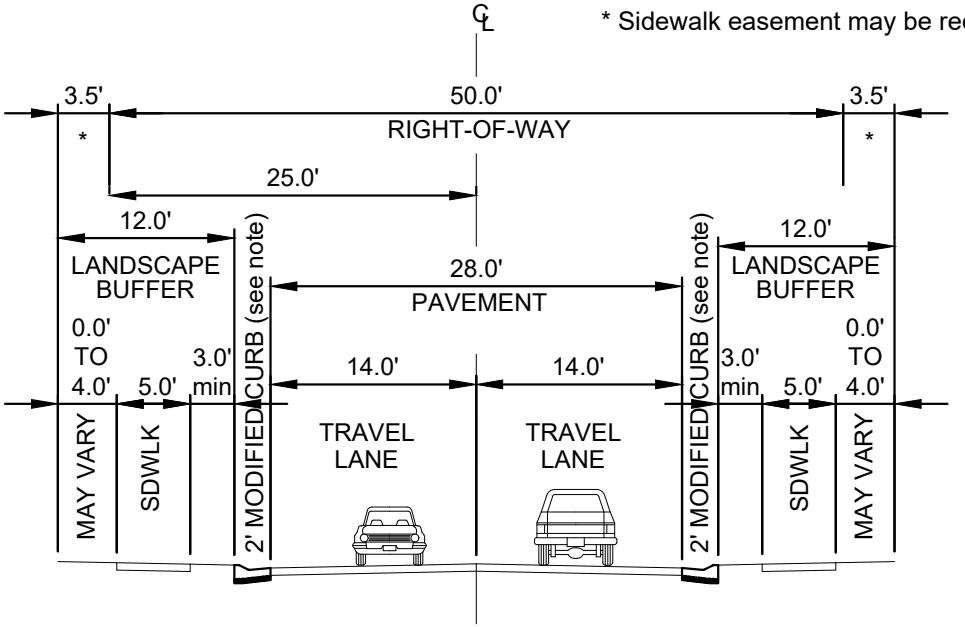
- Sandstone colored CMU block
- Snow Canyon Parkway and Center Street - from 200 East eastward: all fence block facing the streetscape shall be textured split faced. All other locations shall have one split faced textured row of block set on the second row beneath the capstone block.
- Capstones shall always be 4-inches thick and overhang the wall front by 1-inch
- CMU Pilasters with smooth faced block shall be set at each change in wall direction.
- Fencing/walls shall be segmented horizontally with the appearance of randomness in variable lengths with no straight unbroken wall segments longer than 40' and no intermediary pilasters in any one segment.
- Short horizontal offset distances between the longer wall segments should have an appearance of randomness in variable lengths between 24-inches up to 72-inches. In some limited cases where the available space is constricted due to issues that are not in the control of the developer, the offset maybe reduced to as low as 10-inches.

- Each adjacent wall segment shall be at least one block higher or lower than an adjacent segment, preferably segments that are closer to the street are lower than segments that are further away.
- If due to excessive grade change, the wall needs to increase in height at a faster rate than one block per long segment than a height change may be allowed in the middle of the long segment.
- Gates to rear yards are not encouraged, but are allowed when requested. They must be at least 50-percent screened and placed in a perpendicular orientation to the street in offset space between the longer segment walls.
- Fencing/walls, generally, when possible, should be centered on property lines. Maintenance of the wall is shared between both property owners. Responsibility of repair of walls depends on which side the wall damage or blemish occurred. Gates are maintained by the individual private property owner that has the sole use of the gate.

NOTE

1. Meandering sidewalk recommended where possible. Meander sidewalk through landscape buffer area.
2. Sidewalk may undulate but must meet clear zone requirements.
3. The City may require that the 2' modified curb be substituted by a 2.5' high back curb when
   - road is curvilinear and grade has portions steeper than 2 percent,
   - road is recieving water from an intersecting road or other drainage feature that has an apparent risk of storm water jumping the curb due to high velocities, or
   - a substantive drainage benefit is determined per approved drainage studies.

* Sidewalk easement may be required for meandering sidewalks.

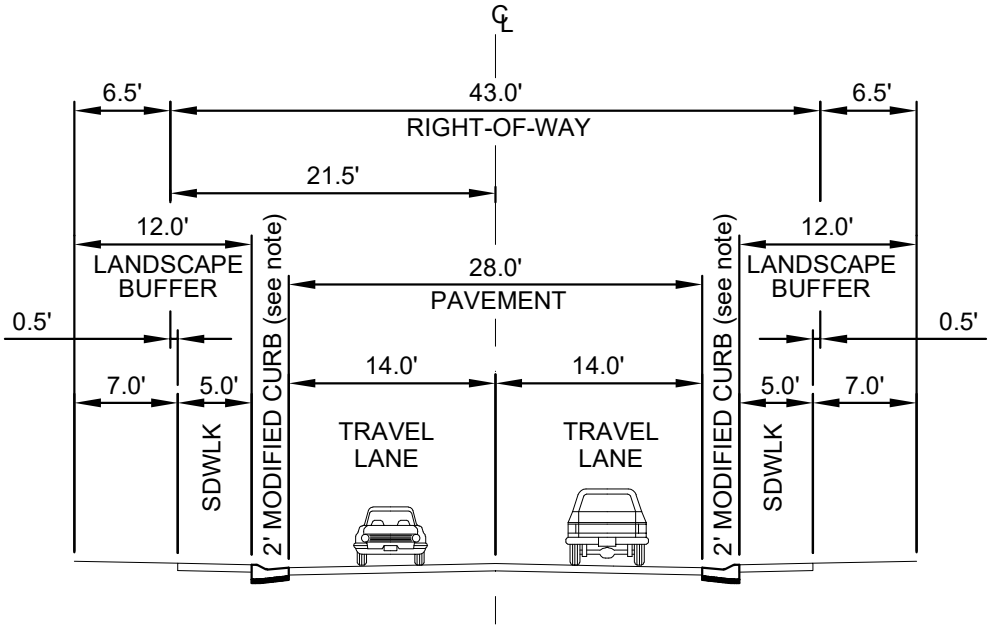


RESIDENTIAL STANDARD 50'

SCALE			CROSS SECTION NO.
NONE	555 S. BLUFF STREET SUITE 101 ST. GEORGE, UT 84770 (425) 986-7888	Ivins City	1.1
DATE		RESIDENTIAL STANDARD 50'	
Sept. 2020			

NOTE

1. The City may require that the 2' modified curb be substituted by a 2.5' high back curb when
   - road is curvilinear and grade has portions steeper than 2 percent,
   - road is recieving water from an intersecting road or other drainage feature that has an apparent risk of storm water jumping the curb due to high velocities, or
   - a substantive drainage benefit is determined per approved drainage studies.

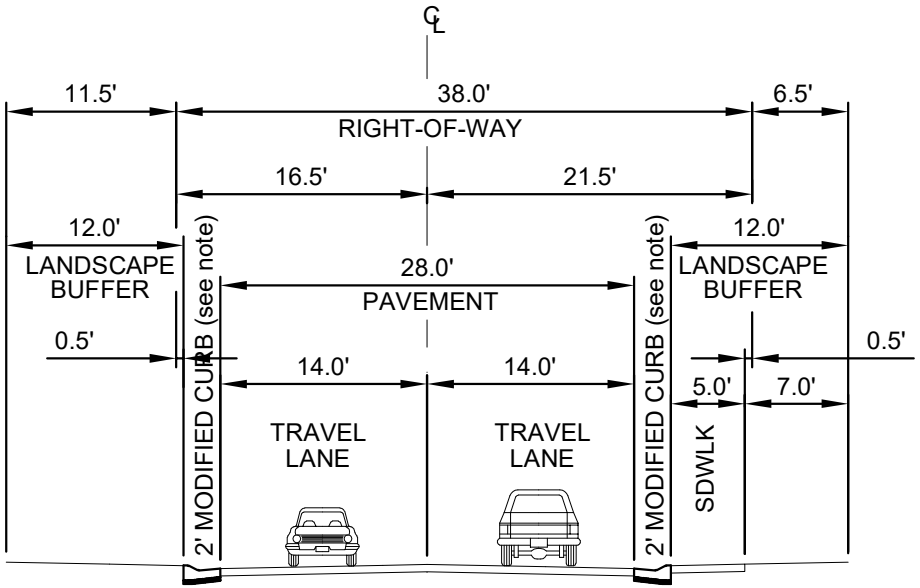


RESIDENTIAL ALTERNATIVE 43'

SCALE: NONE DATE: Sept. 2020	IVINS CITY UTAH	555 S. BLUFF STREET SUITE 101 ST. GEORGE, UT 84770 (425) 986-7888	Ivins City RESIDENTIAL ALTERNATIVE 43'	CROSS SECTION NO. 1.2

NOTE

1. The City may require that the 2' modified curb be substituted by a 2.5' high back curb when
   - road is curvilinear and grade has portions steeper than 2 percent,
   - road is recieving water from an intersecting road or other drainage feature that has an apparent risk of storm water jumping the curb due to high velocities, or
   - a substantive drainage benefit is determined per approved drainage studies.

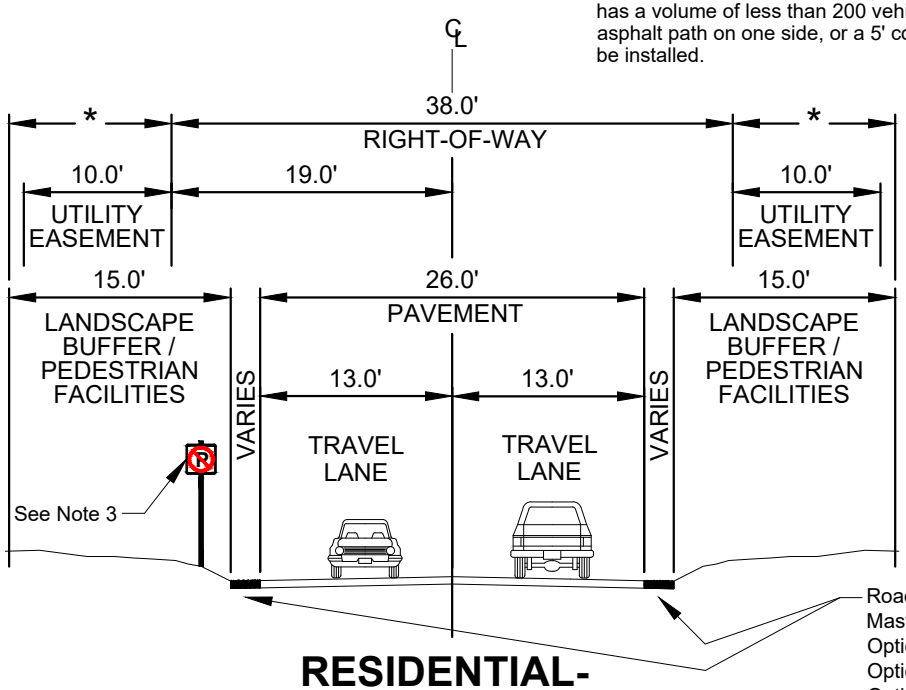


RESIDENTIAL ALTERNATIVE 38'

SCALE: NONE DATE: Sept. 2020	IVINS CITY UTAH	555 S. BLUFF STREET SUITE 101 ST. GEORGE, UT 84770 (425) 986-7888	Ivins City RESIDENTIAL ALTERNATIVE 38'	CROSS SECTION NO. 1.3

NOTE

1. Pedestrian facilities required on rural streets per the Transportation Master Plan Chapter 3. Sidewalk/trail shall be located within landscape buffer area, meandering where possible.
2. Residential driveways shall be constructed to keep drainage within the roadway or natural drainage to prevent flooding of private property.
3. When driveable surface width (asphalt + shoulders) is 32 feet or less, "No Parking" signs shall be installed on one side of the road per adopted fire code. Driveable surface shall not be less than 29 feet.
4. Pedestrian facilities are not required when traffic studies show a road has a volume of less than 200 vehicles per day. Otherwise, an 8' wide asphalt path on one side, or a 5' concrete sidewalk on both sides shall be installed.



* Sidewalk / Trail easement, if required. Width varies per Road Side Drainage

Road Side Drainage (see Transportation Master Plan Chapter 3)
Option A: 2' Curb & Gutter
Option B: Rock lined ditch
Option C: Unarmored ditch 3' road base shoulder required minimum.

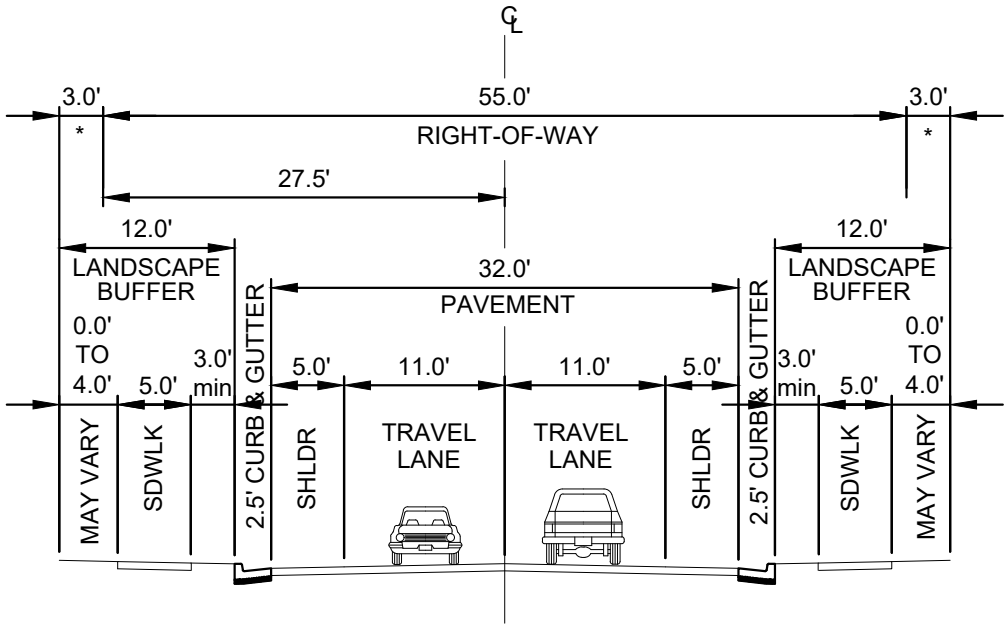
RESIDENTIAL-PRIVATE RURAL

SCALE: NONE DATE: Sept. 2020	IVINS CITY UTAH	555 S. BLUFF STREET SUITE 101 ST. GEORGE, UT 84770 (425) 986-7888	Ivins City RESIDENTIAL PRIVATE RURAL	CROSS SECTION NO. 2

NOTE

1. Meandering sidewalk recommended where possible. Meander sidewalk through landscape buffer area.
2. Sidewalk may undulate but must meet clear zone requirements.

* Sidewalk easement may be required for meandering sidewalks.



RESIDENTIAL COLLECTOR

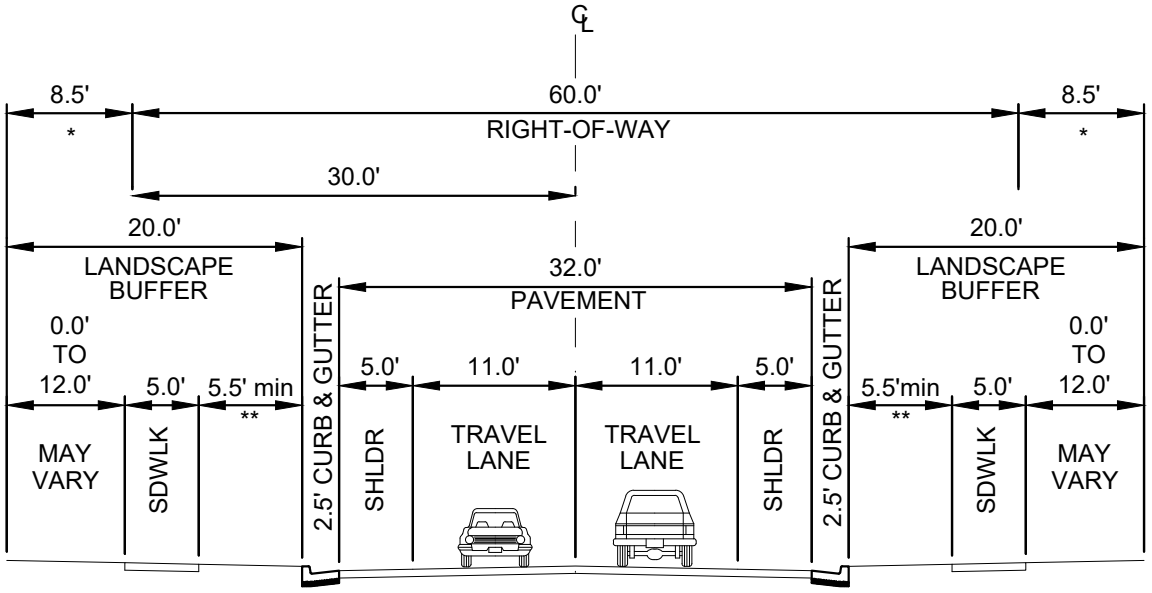
SCALE			CROSS SECTION NO.
NONE	555 S. BLUFF STREET SUITE 101 ST. GEORGE, UT 84770 (425) 986-7888	Ivins City	3
DATE		RESIDENTIAL COLLECTOR	
Sept. 2020			

NOTE

1. Meandering sidewalk recommended where possible. Meander sidewalk through landscape buffer area.
2. Sidewalk may undulate but must meet clear zone requirements.
3. 5' Shoulder may be striped for a bicycle lane where indicated.

* Sidewalk easement may be required for meandering sidewalks.

** For meandering sidewalks, parkstrip width will vary with a required minimum width at closest point to be 3.0'.

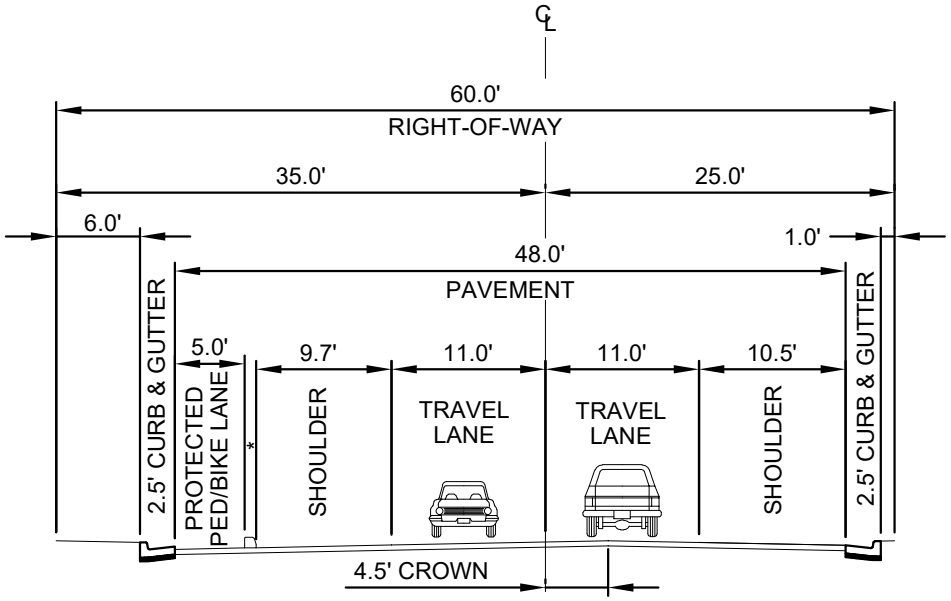


MINOR COLLECTOR

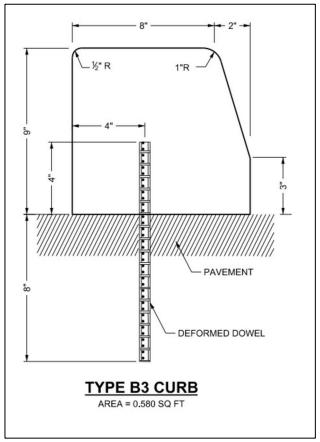
SCALE			CROSS SECTION NO.
NONE	555 S. BLUFF STREET SUITE 101 ST. GEORGE, UT 84770 (425) 986-7888	**Ivins City**	**4**
DATE		**MINOR COLLECTOR**	
Sept. 2020			

NOTES-UDOT STANDARD DETAIL FOR B3 CURB

1. Type B3 curb shall not be continuous through residential driveways.
2. Type B3 curb detail shown below.



*SEE NOTES



USE CURB TYPE B3 WITH DESIGN SPEED UP TO 40 MPH EXCEPT IN PREDOMINATELY URBAN OR RAPIDLY DEVELOPING RURAL AREAS WHERE CURBS MAY BE USED WITH DESIGN SPEEDS UP TO 50 MPH.

USE $\frac{3}{4}$ INCH DEFORMED DOWELS ON 5 FT MAXIMUM CENTERS.

PRECAST CURBS:

A. MINIMUM OF 10 FT IN LENGTH.
B. DOWELS AT A MINIMUM OF 3 PER 10 FT LENGTH.
C. INCLUDE ADEQUATE REINFORCING STEEL TO WITHSTAND HANDLING STRESSES.

MEASURE CURB HEIGHT VERTICALLY FROM THE FLOW LINE OF THE GUTTER TO TOP BACK OF CURB.

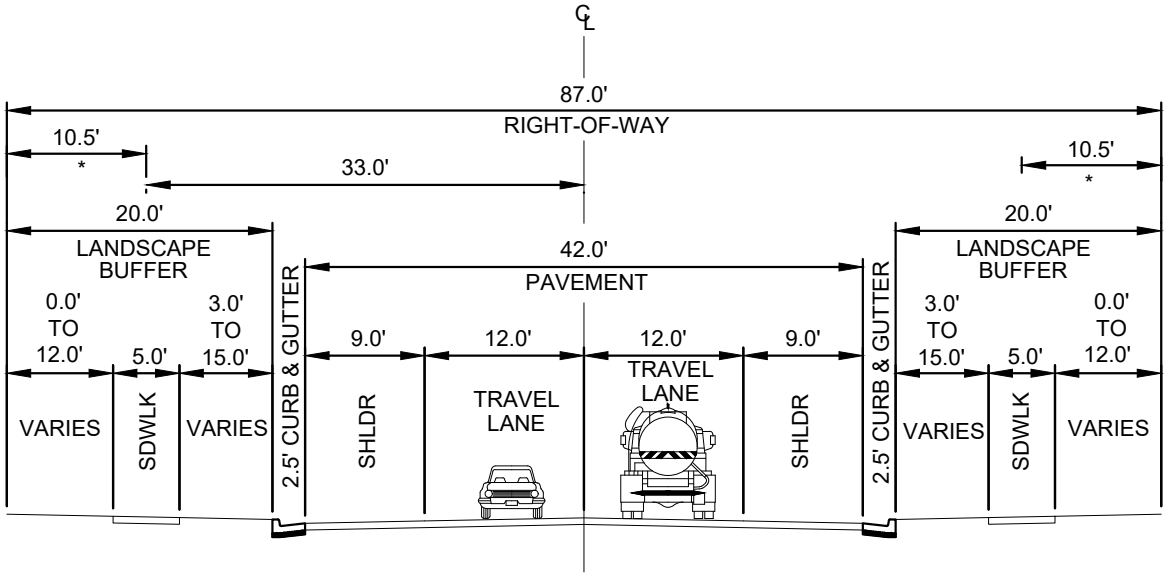
MINOR COLLECTOR - PUERTO DRIVE, CURB-SEPARATED PED/BIKE FACILITIES

SCALE: NONE DATE: Nov. 2020	IVINS CITY UTAH	555 S. Bluff Street St. George, UT 84770 (435) 986-7888	Ivins City MINOR COLLECTOR - PUERTO DRIVE	CROSS SECTION NO. 5

NOTE

1. Meandering sidewalk/trail required. Meander sidewalk through landscape buffer area.
2. Sidewalk may undulate but must meet clear zone requirements.
3. 9' shoulder with 2' of gutter pan may be separated into a 4' bike lane and 7' parking where indicated on the Ivins City Bike Lane Plan.

* Where homes or commercial sites do not front street, landscape buffer must be dedicated to City.



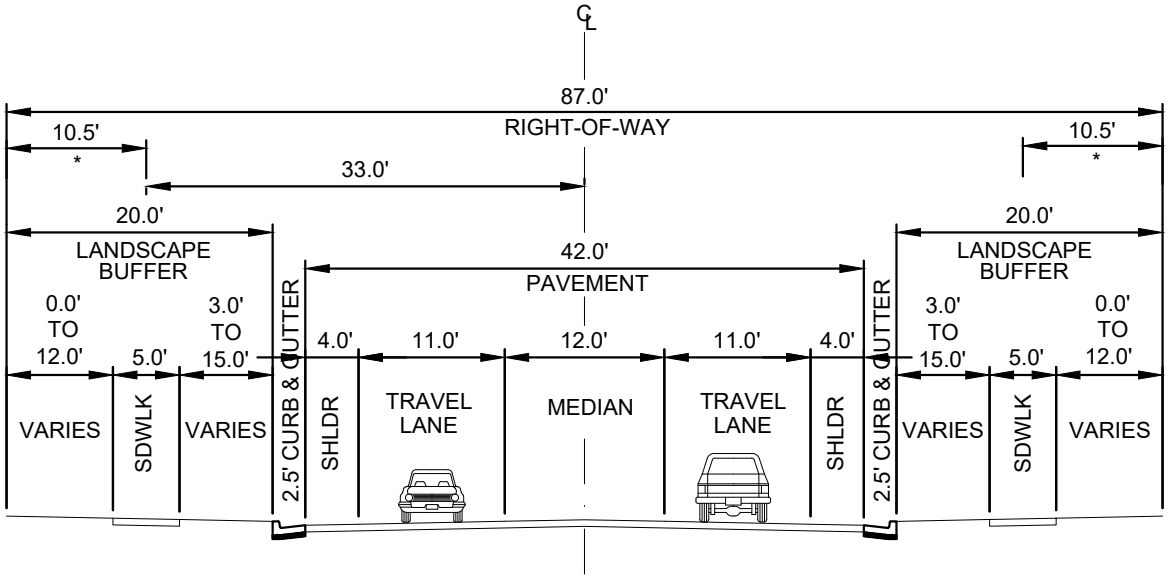
MAJOR COLLECTOR (STREET PARKING)

SCALE: NONE DATE: Sept. 2020	IVINS CITY UTAH	555 S. BLUFF STREET SUITE 101 ST. GEORGE, UT 84770 (425) 986-7888	Ivins City MAJOR COLLECTOR (STREET PARKING)	CROSS SECTION NO. 6

NOTE

1. Meandering sidewalk required. Meander sidewalk through landscape buffer area.
2. Sidewalk may undulate but must meet clear zone requirements.
3. 4' Shoulder may be striped for a bicycle lane where indicated.

* Where homes or commericial sites do not front street, landscape buffer must be dedicated to City.



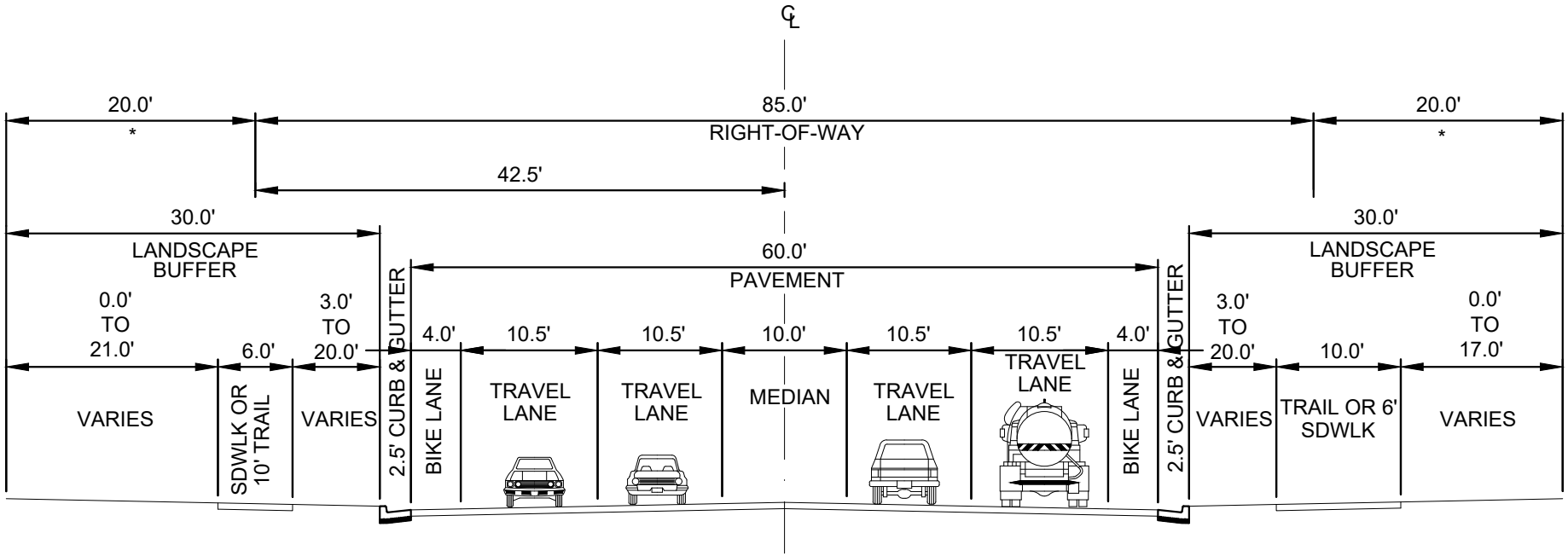
MAJOR COLLECTOR (CENTER LANE STRIPING)

SCALE: NONE DATE: Sept. 2020	IVINS CITY, UTAH	555 S. BLUFF STREET SUITE 101 ST. GEORGE, UT 84770 (425) 986-7888	Ivins City MAJOR COLLECTOR (CENTER LANE STRIPING)	CROSS SECTION NO. 7

NOTE

1. Meandering sidewalk required. Meander sidewalk through landscape buffer area.
2. Sidewalk may undulate but must meet clear zone requirements.
3. See city Trail Map for trail locations.
4. Additional width will be required at intersections for a 12-foot right turn lane as approved by the City Engineer.
5. To be used on Center Street, east of 200 West.

* Where homes or commercial sites do not front street, landscape buffer must be dedicated to City.



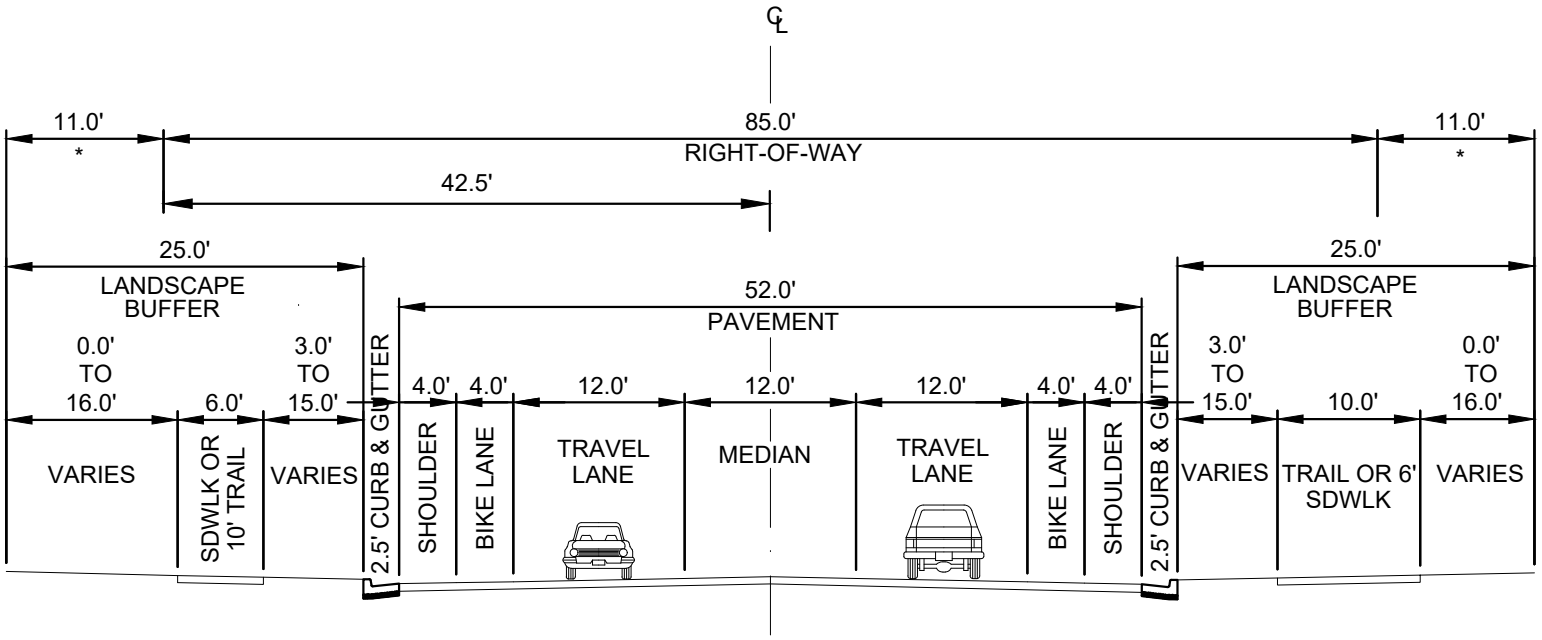
MINOR ARTERIAL - CENTER STREET

SCALE: NONE DATE: Sept. 2020	IVINS CITY UTAH	555 S. BLUFF STREET SUITE 101 ST. GEORGE, UT 84770 (425) 986-7888	Ivins City MINOR ARTERIAL - CENTER STREET	CROSS SECTION NO. 8A

NOTE

1. Meandering sidewalk required. Meander sidewalk through landscape buffer area.
2. Sidewalk may undulate but must meet clear zone requirements.
3. See city Trail Map for trail locations.
4. Additional width will be required at intersections for a 12-foot right turn lane as approved by the City Engineer.
5. To be used on Center Street between 200 West and 600 West.

* Where homes or commercial sites do not front street, landscape buffer must be dedicated to City.



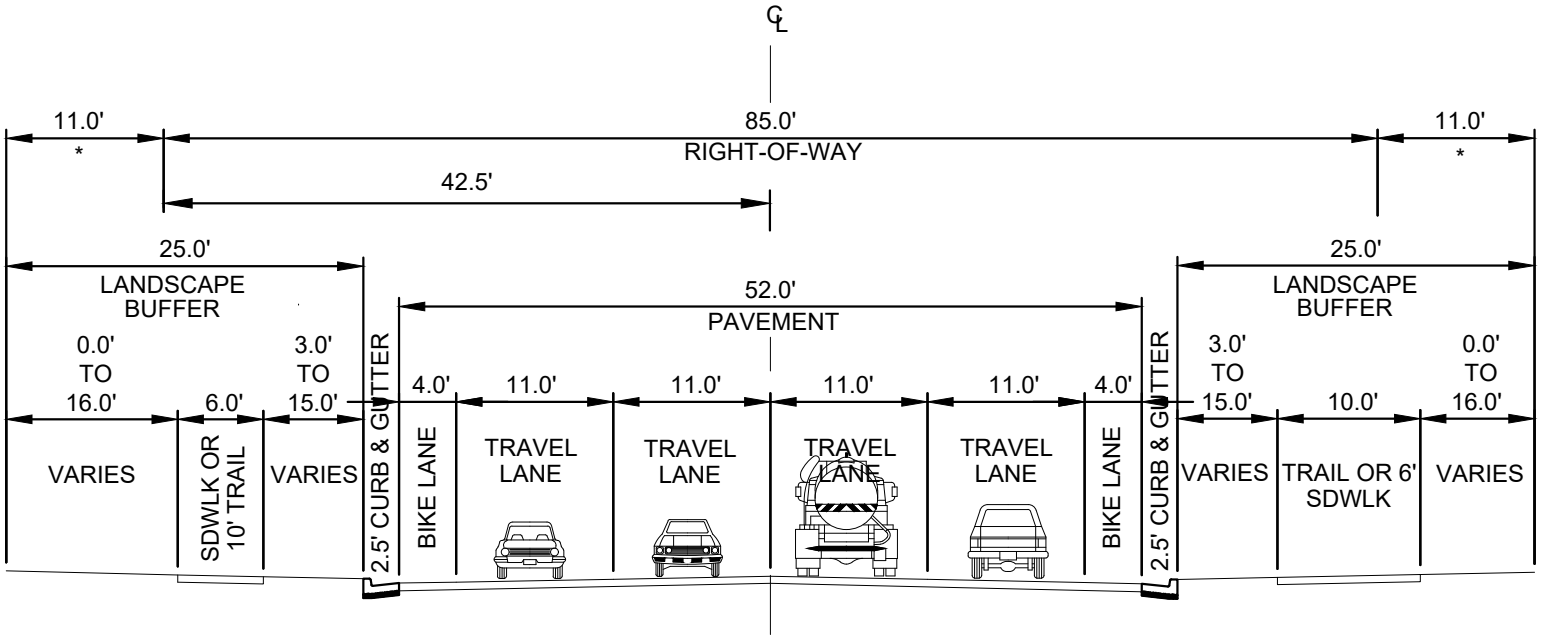
MINOR ARTERIAL - WEST CENTER STREET 3-LANE

SCALE			
NONE	IVINS CITY UTAH	555 S. BLUFF STREET SUITE 101 ST. GEORGE, UT 84770 (425) 986-7888	Ivins City MINOR ARTERIAL - CENTER STREET
DATE Sept. 2020			CROSS SECTION NO. 8B

NOTE

1. Meandering sidewalk required. Meander sidewalk through landscape buffer area.
2. Sidewalk may undulate but must meet clear zone requirements.
3. See city Trail Map for trail locations.
4. Additional width will be required at intersections for a 12-foot right turn lane as approved by the City Engineer.
5. To be used to widen Center Street between 200 West and 600 West.

* Where homes or commercial sites do not front street, landscape buffer must be dedicated to City.



MINOR ARTERIAL - WEST CENTER STREET 4-LANE

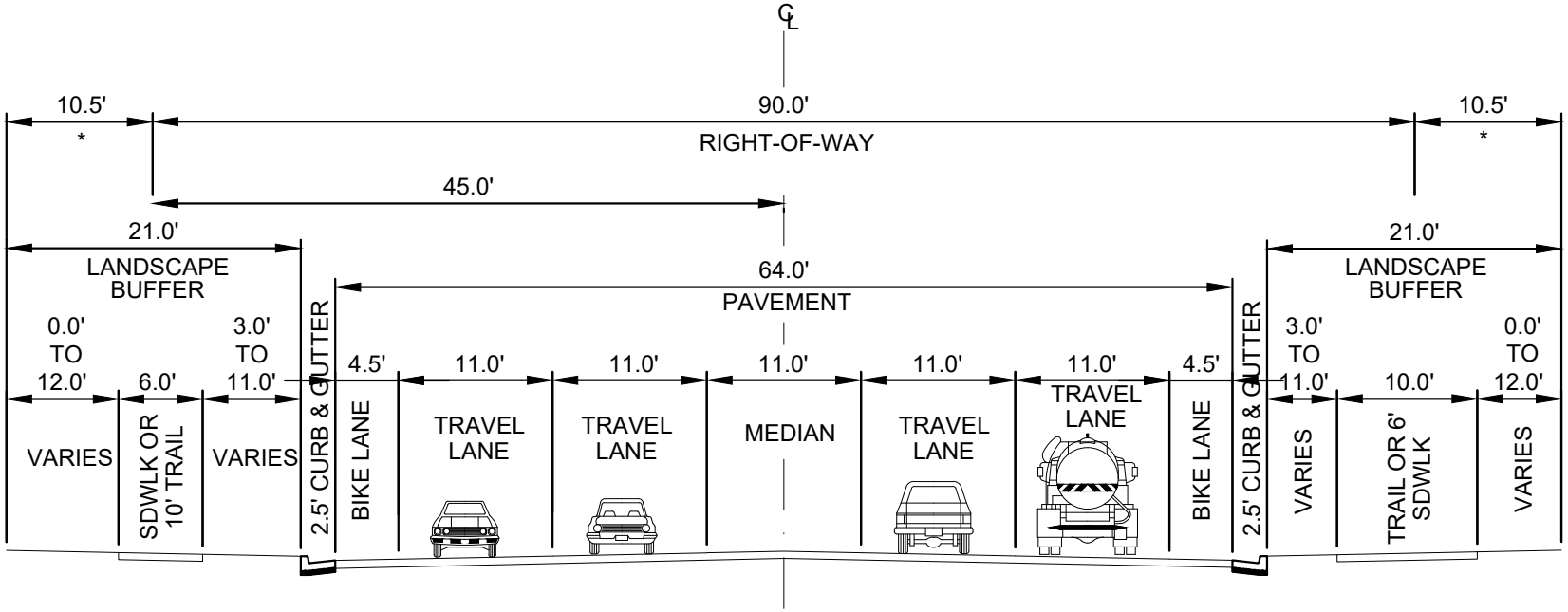
SCALE: NONE DATE: Sept. 2020	IVINS CITY UTAH	555 S. BLUFF STREET SUITE 101 ST. GEORGE, UT 84770 (425) 986-7888	Ivins City MINOR ARTERIAL - CENTER STREET	CROSS SECTION NO. 8C

NOTE

1. Meandering sidewalk required. Meander sidewalk through landscape buffer area.
2. Sidewalk may undulate but must meet clear zone requirements.
3. See city Trail Map for trail locations.

* Where homes or commericial sites do not front street, landscape buffer must be dedicated to City.

** Parkstrip minimum width may be 3.0' for a meandering sidewalk.



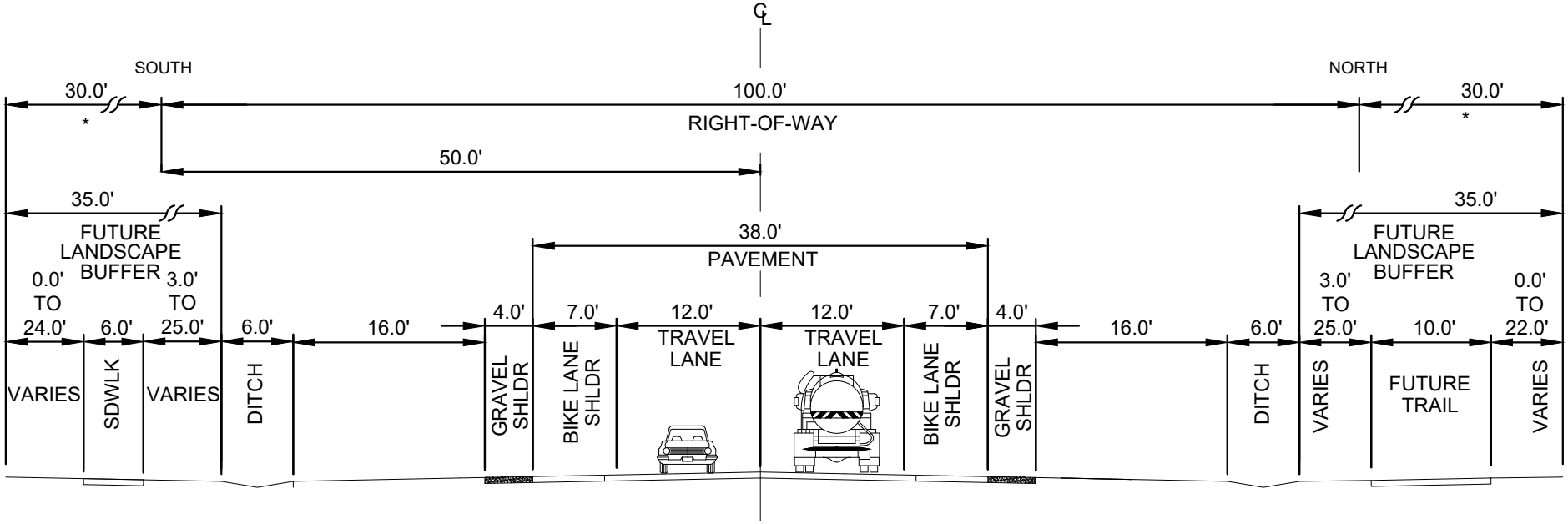
MINOR ARTERIAL - WESTERN CORRIDOR

SCALE			CROSS SECTION NO.
NONE	IVINS CITY UTAH	Ivins City	9
DATE	555 S. BLUFF STREET SUITE 101 ST. GEORGE, UT 84770 (425) 986-7888	MINOR ARTERIAL - WESTERN CORRIDOR	
Sept. 2020			

NOTE

1. Meandering sidewalk/trail required. Meander sidewalk through landscape buffer area.
2. Sidewalk may undulate but must meet clear zone requirements.
3. See city Trail Map for trail locations.

* Where homes or commericial sites do not front street, landscape buffer must be dedicated to City.



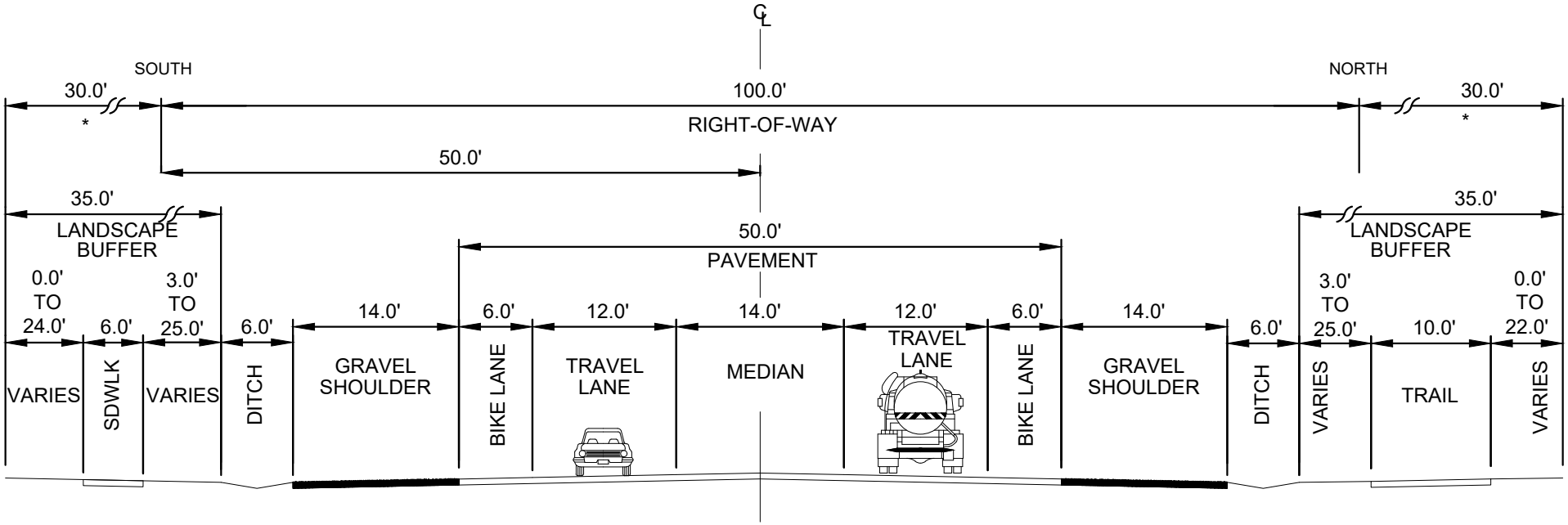
MAJOR ARTERIAL - OLD HIGHWAY 91 (2-LANE)

SCALE			CROSS SECTION NO.
NONE	555 S. BLUFF STREET SUITE 101 ST. GEORGE, UT 84770 (425) 986-7888	Ivins City	10A
DATE		MAJOR ARTERIAL - OLD HIGHWAY 91 (2-LANE)	
Sept. 2020			

NOTE

1. Meandering sidewalk/trail required. Meander sidewalk through landscape buffer area.
2. Sidewalk may undulate but must meet clear zone requirements.
3. See city Trail Map for trail locations.

* Where homes or commericial sites do not front street, landscape buffer must be dedicated to City.



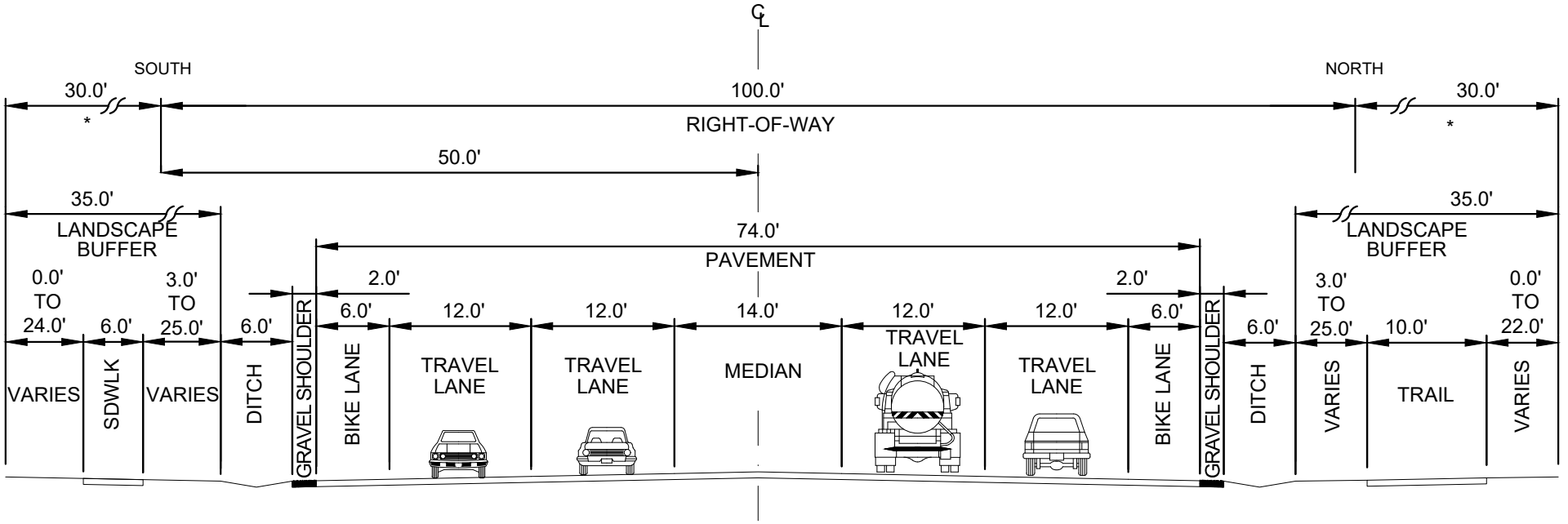
MAJOR ARTERIAL - OLD HIGHWAY 91 (3-LANE)

SCALE: NONE DATE: Sept. 2020	IVINS CITY UTAH	555 S. BLUFF STREET SUITE 101 ST. GEORGE, UT 84770 (425) 986-7888	Ivins City MAJOR ARTERIAL - OLD HIGHWAY 91 (3 LANE)	CROSS SECTION NO. 10B

NOTE

1. Meandering sidewalk required. Meander sidewalk through landscape buffer area.
2. Sidewalk may undulate but must meet clear zone requirements.
3. See city Trail Map for trail locations.

* Where homes or commericial sites do not front street, landscape buffer must be dedicated to City.



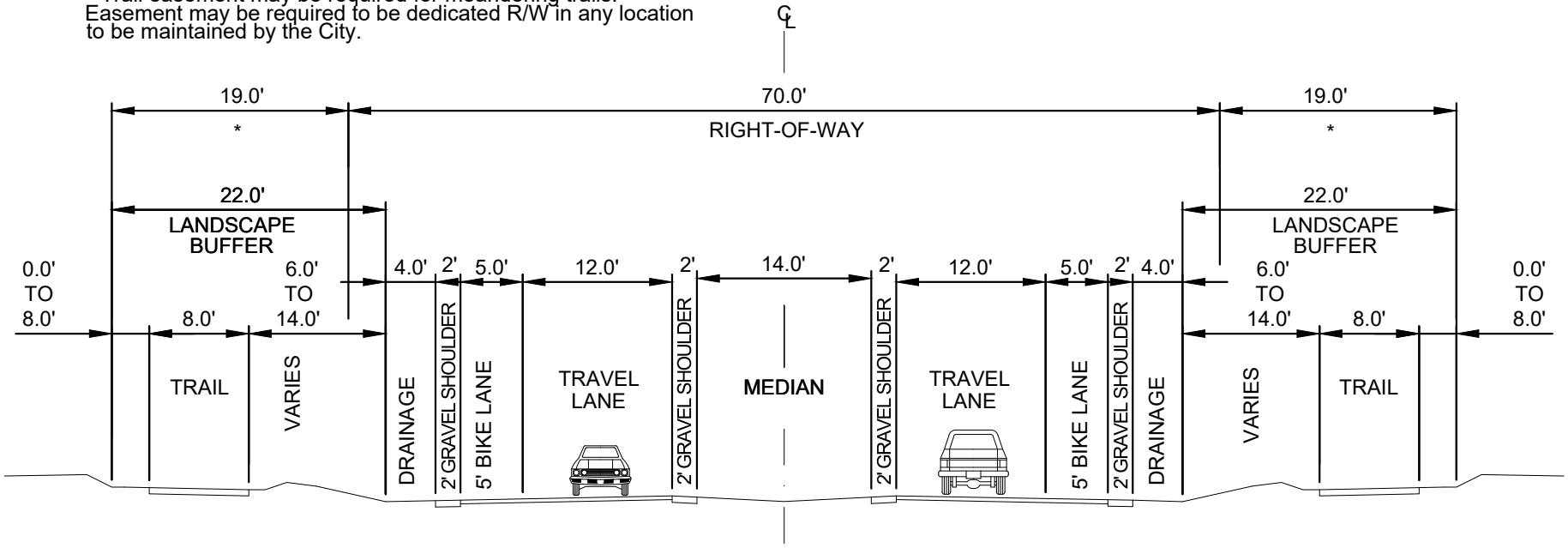
MAJOR ARTERIAL - OLD HIGHWAY 91 (5-LANE)

SCALE NONE DATE Sept. 2020	IVINS CITY UTAH	555 S. BLUFF STREET SUITE 101 ST. GEORGE, UT 84770 (425) 986-7888	Ivins City MAJOR ARTERIAL - OLD HIGHWAY 91 (5-LANE)	CROSS SECTION NO. 10C

NOTE

1. Trails and sidewalks may undulate but must meet clear zone requirements.
2. See city Trail Map for trail locations.
3. Where possible meander trail through landscape buffer area.
4. A concrete curb and gutter may be substituted at the outside edge of pavement for roadside drainage and may be required if specified by a drainage study.
5. The City may also require curb and gutter in the rural zone on a case by case basis in areas of commercial, industrial or medium- and high-density residential or as necessary to provide a reasonable and consistent transition from areas with curb and gutter to areas without.

* Trail easement may be required for meandering trails.
Easement may be required to be dedicated R/W in any location to be maintained by the City.



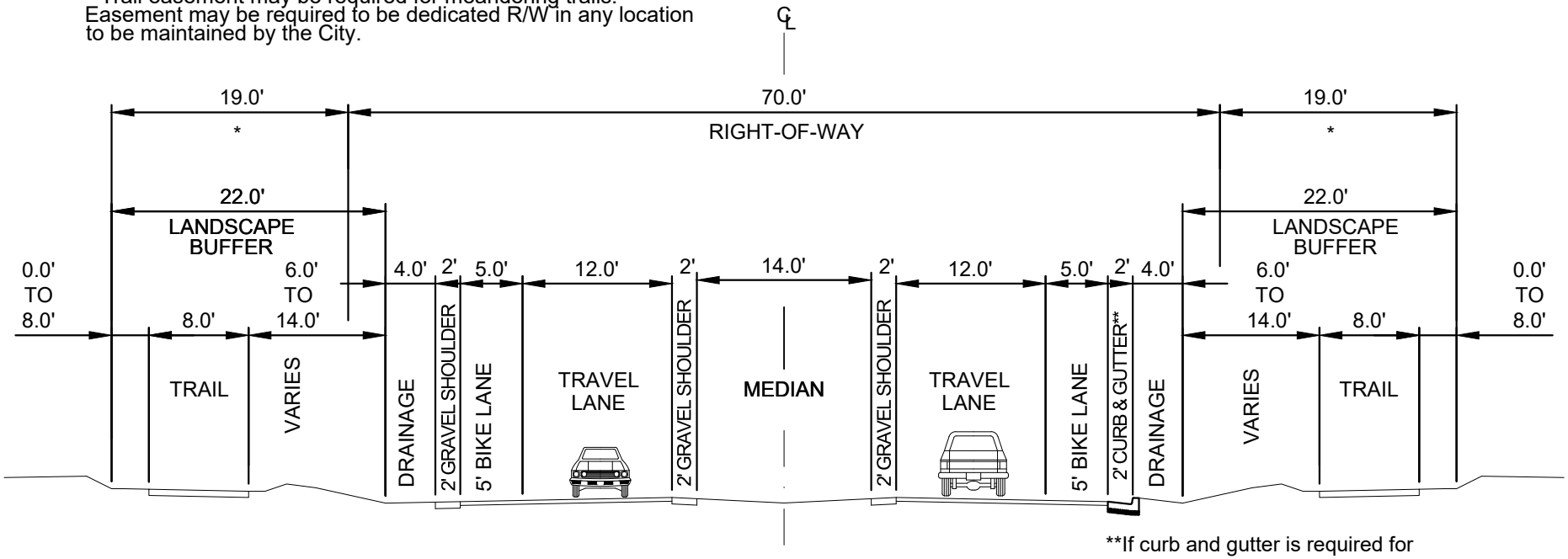
MAJOR COLLECTOR - LANDSCAPED MEDIAN IN RURAL ZONE

SCALE			CROSS SECTION NO.
NONE	555 S. BLUFF STREET SUITE 101 ST. GEORGE, UT 84770 (425) 986-7888	Ivins City	11A
DATE		MAJOR COLLECTOR - RURAL	
Sept. 2020			

NOTE

1. Trails and sidewalks may undulate but must meet clear zone requirements.
2. See city Trail Map for trail locations.
3. Where possible meander trail through landscape buffer area.
4. A concrete curb and gutter may be substituted at the outside edge of pavement for roadside drainage and may be required if specified by a drainage study.
5. The City may also require curb and gutter in the rural zone on a case by case basis in areas of commercial, industrial or medium- and high-density residential or as necessary to provide a reasonable and consistent transition from areas with curb and gutter to areas without.

* Trail easement may be required for meandering trails.
Easement may be required to be dedicated R/W in any location to be maintained by the City.



**If curb and gutter is required for drainage, locate here, replace 2' gravel shoulder

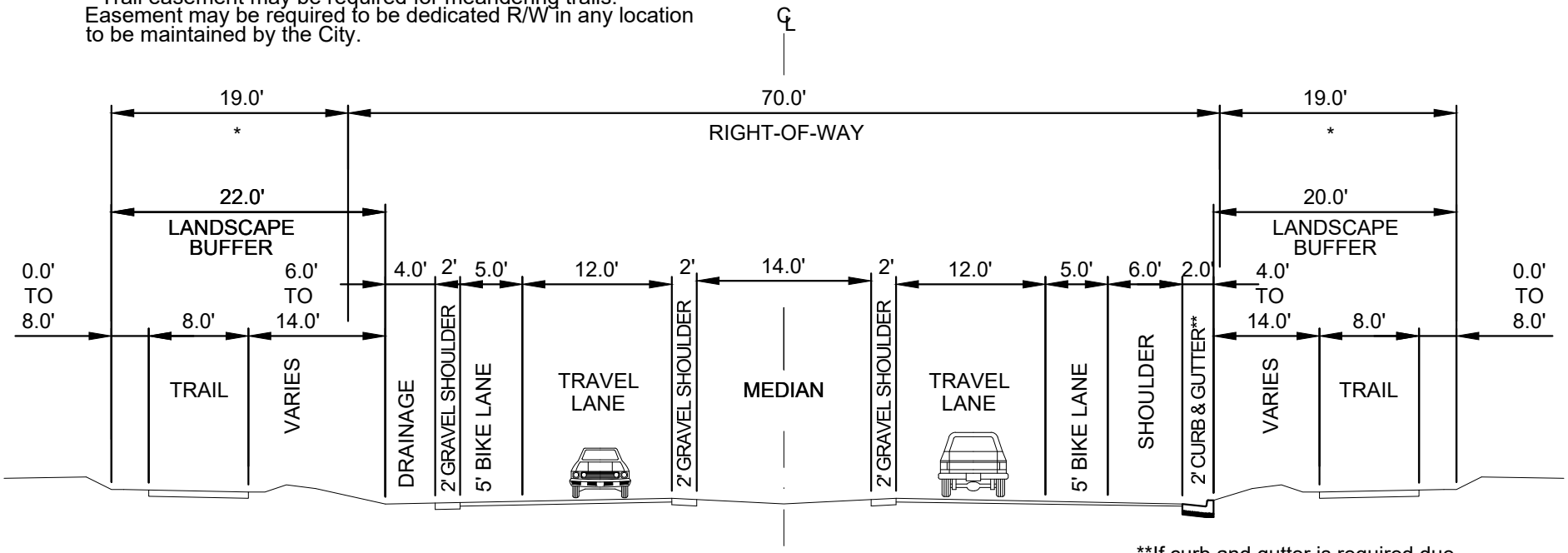
MAJOR COLLECTOR - LANDSCAPED MEDIAN IN RURAL ZONE KWAVASA DRIVE (SOUTH OF CENTER ST.)

SCALE: NONE DATE: Sept. 2020	IVINS CITY, UTAH	555 S. BLUFF STREET SUITE 101 ST. GEORGE, UT 84770 (425) 986-7888	Ivins City MAJOR COLLECTOR - KWAVASA DRIVE	CROSS SECTION NO. 11B

NOTE

1. Trails and sidewalks may undulate but must meet clear zone requirements.
2. See city Trail Map for trail locations.
3. Where possible meander trail through landscape buffer area.
4. A concrete curb and gutter may be substituted at the outside edge of pavement for roadside drainage and may be required if specified by a drainage study.
5. The City may also require curb and gutter in the rural zone on a case by case basis in areas of commercial, industrial or medium- and high-density residential or as necessary to provide a reasonable and consistent transition from areas with curb and gutter to areas without.

* Trail easement may be required for meandering trails. Easement may be required to be dedicated R/W in any location to be maintained by the City.



**If curb and gutter is required due to drainage, locate here and extend asphalt to lip of gutter

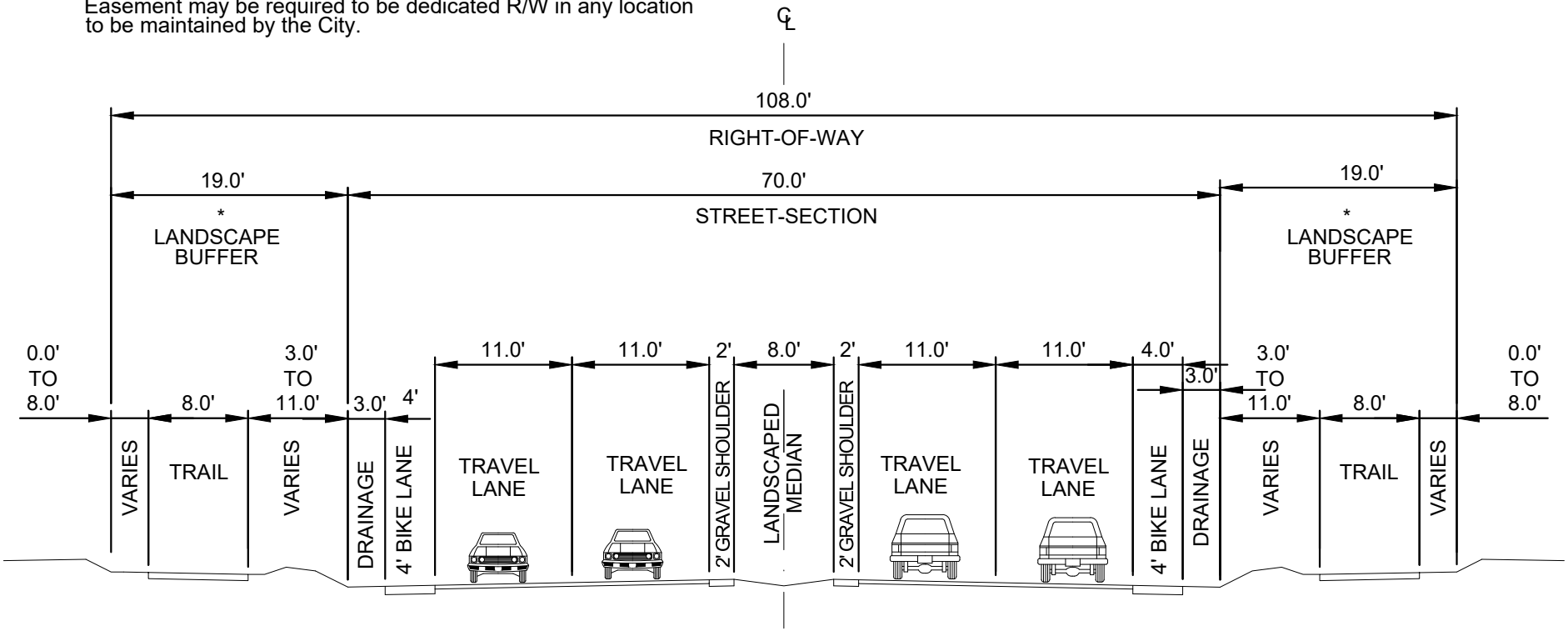
MAJOR COLLECTOR - LANDSCAPED MEDIAN IN RURAL ZONE KWAVASA DRIVE (NORTH OF CENTER ST.)

SCALE			
NONE	IVINS CITY UTAH	Ivins City	CROSS SECTION NO.
DATE	555 S. BLUFF STREET SUITE 101 ST. GEORGE, UT 84770 (425) 986-7888	MAJOR COLLECTOR-KWAVASA DRIVE	11C
Jan. 2021			

NOTE

1. Trails and sidewalks may undulate but must meet clear zone requirements.
2. See city Trail Map for trail locations.
3. Where possible meander trail through landscape buffer area.
4. A concrete curb and gutter may be substituted at the outside edge of pavement for roadside drainage and may be required if specified by a drainage study.
5. The City may also require curb and gutter in the rural zone on a case by case basis in areas of commercial, industrial or medium- and high-density residential or as necessary to provide a reasonable and consistent transition from areas with curb and gutter to areas without.

* Trail easement may be required for meandering trails. Easement may be required to be dedicated R/W in any location to be maintained by the City.



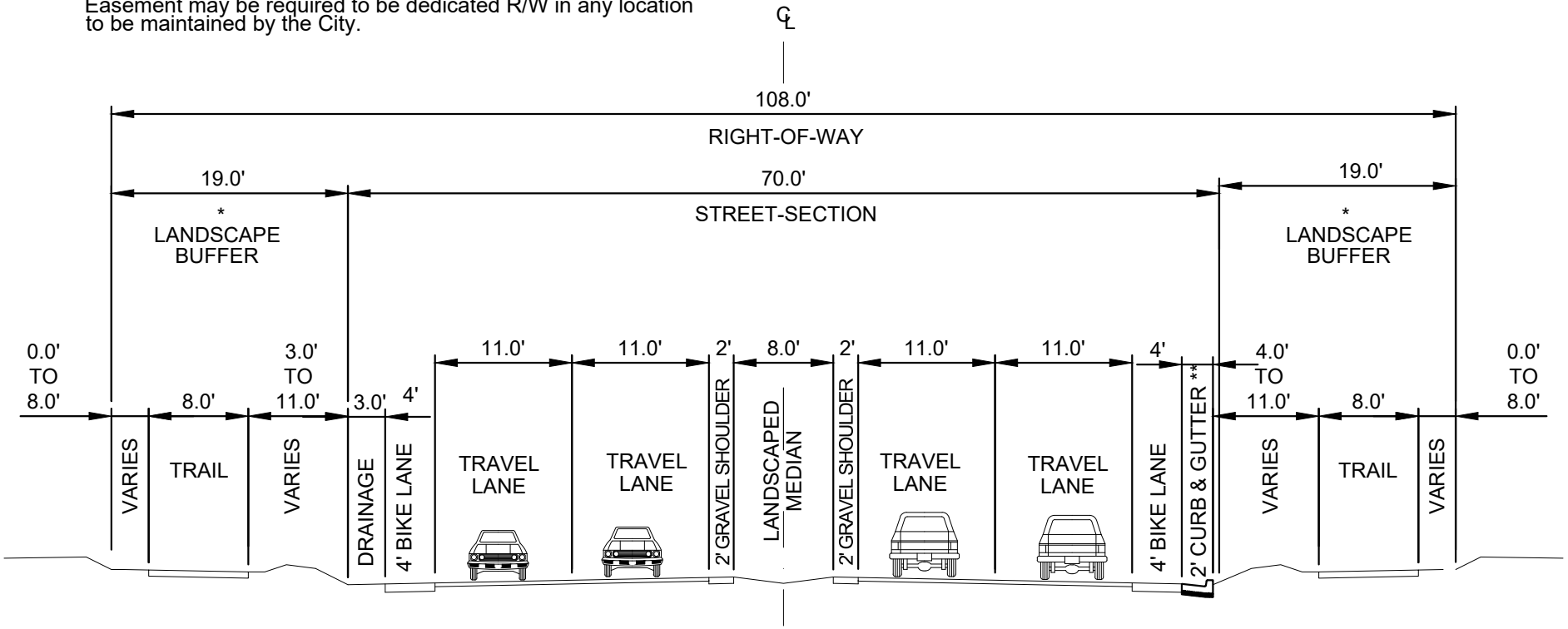
MINOR ARTERIAL - LANDSCAPED MEDIAN IN RURAL ZONE

SCALE			
NONE	IVINS CITY UTAH	555 S. BLUFF STREET SUITE 101 ST. GEORGE, UT 84770 (425) 986-7888	Ivins City MINOR ARTERIAL-RURAL
DATE Jan. 2021			CROSS SECTION NO. 12A

NOTE

1. Trails and sidewalks may undulate but must meet clear zone requirements.
2. See city Trail Map for trail locations.
3. Where possible meander trail through landscape buffer area.
4. A concrete curb and gutter may be substituted at the outside edge of pavement for roadside drainage and may be required if specified by a drainage study.
5. The City may also require curb and gutter in the rural zone on a case by case basis in areas of commercial, industrial or medium- and high-density residential or as necessary to provide a reasonable and consistent transition from areas with curb and gutter to areas without.

* Trail easement may be required for meandering trails. Easement may be required to be dedicated R/W in any location to be maintained by the City.



**If curb and gutter is required due to drainage, locate here

MINOR ARTERIAL - LANDSCAPED MEDIAN IN RURAL ZONE KWAVASA DRIVE (NORTH OF CENTER ST.)

SCALE: NONE DATE: Jan. 2021	IVINS CITY UTAH	555 S. BLUFF STREET SUITE 101 ST. GEORGE, UT 84770 (425) 986-7888	Ivins City MINOR ARTERIAL-KWAVASA DRIVE (FUTURE)	CROSS SECTION NO. 12B

3.1.3 The Central Core of Ivins

Ivins should consider keeping their City Hall in the core of the downtown and work towards developing a city core over the long term. The philosophy behind this is that you allow civic uses to develop the downtown core and have ancillary uses evolve naturally to support the civic uses. These support services would be banking institutions and professional offices with service retail to support these uses. Because Ivins did not evolve with a traditional downtown core similar to many communities, it is not likely that one will naturally evolve without the City planning and guiding it. A common development pattern with growing cities similar to Ivins is the development of public/private/retail enterprises occurring along transportation corridors. This develops the multi-nucleus zone, which does not have a central core of civic and professional uses but possesses many uses. This does not create a "sense of place" which many communities are now struggling to create.

3.1.4 Importance of a City Core

The downtown core is important for a couple of reasons. It identifies a place or an identity for a community. Many civic activities that promote and celebrate historic and cultural community activities are concentrated in one area, typically the civic block or core area. Concentration of government services in a central area provides efficient service and better communication for residents. Disjointed or separated government activities tend to create frustration and confusion for residents and employees. With population build-out projections estimated around 18,400 by year 2043, this area could easily support a city core.

Ivins is in a very unique situation in that it has a great opportunity to guide its future development pattern to create a very livable community based upon the classification of its transportation network. Additionally, the land use and transportation network have been coordinated to work in support with each other.

3.2 Transportation Model

Computer traffic models aid community planners to help forecast what growth can do to the current public transportation system. These models help to define what traffic pressures can be expected in the future and help to justify projects that enhance capacity. A transportation planning model was developed for the study area to facilitate the forecasting of future traffic volumes. The model is a mathematical representation of travel behavior and utilizes land use data, observed travel behavior, and roadway network information to forecast future traffic volumes along selected roadways.

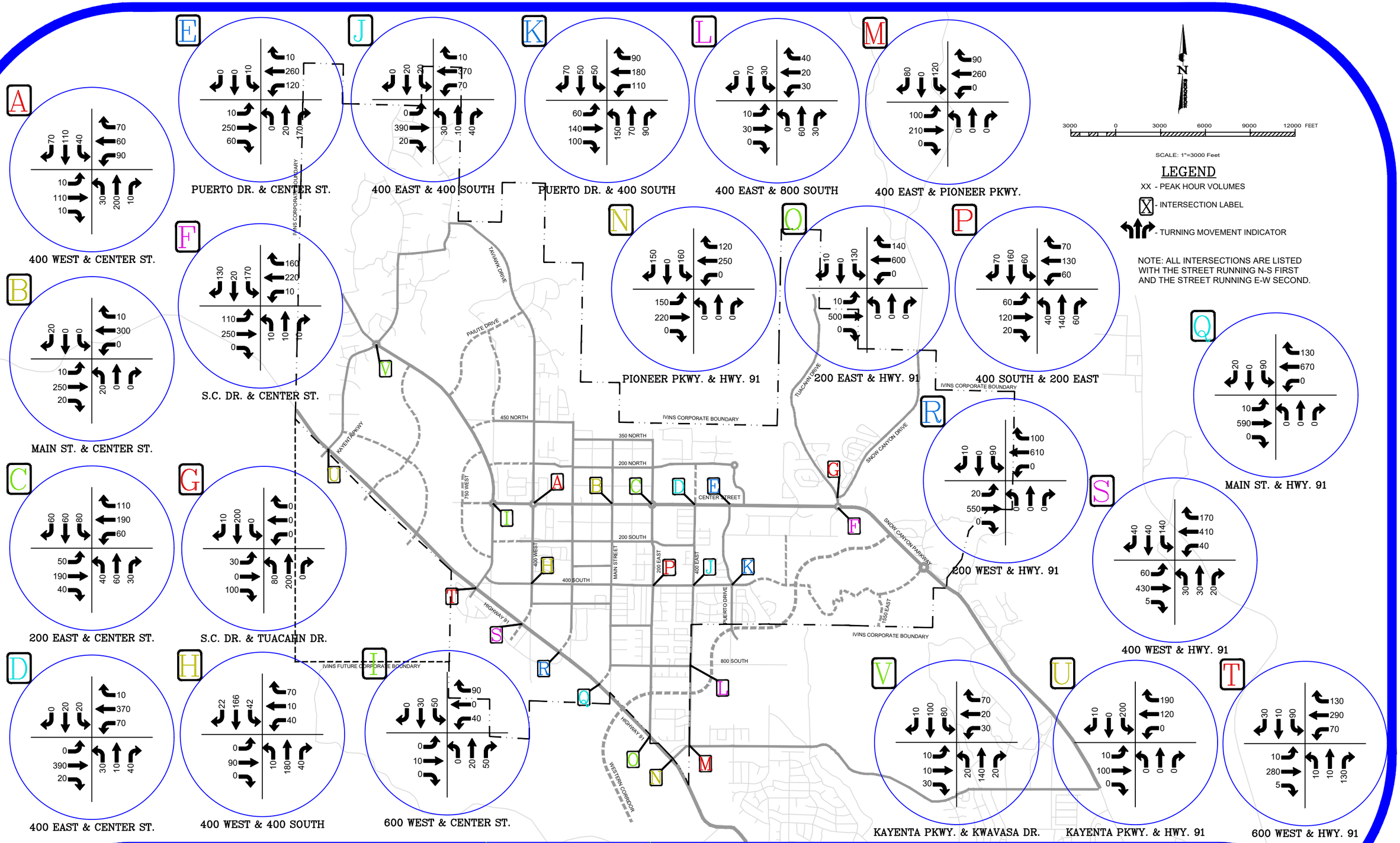
The Dixie Metropolitan Planning Organization (DMPO) has prepared a calibrated traffic model that covers the urbanized area of Washington County. Horrocks Engineers utilized the DMPO's model and prepared a 2020 traffic model and a future 2050 traffic model. Other years were not modeled because the traffic in Ivins does not begin to cause intersection failures until 2050.

3.3 Roadway Network and Traffic Forecast

Forecasted 2050 intersection volumes are shown in Figure 15. Forecasted 2050 ADT volumes for each major roadway in the City as well as intersection LOS are shown in Figure 16.

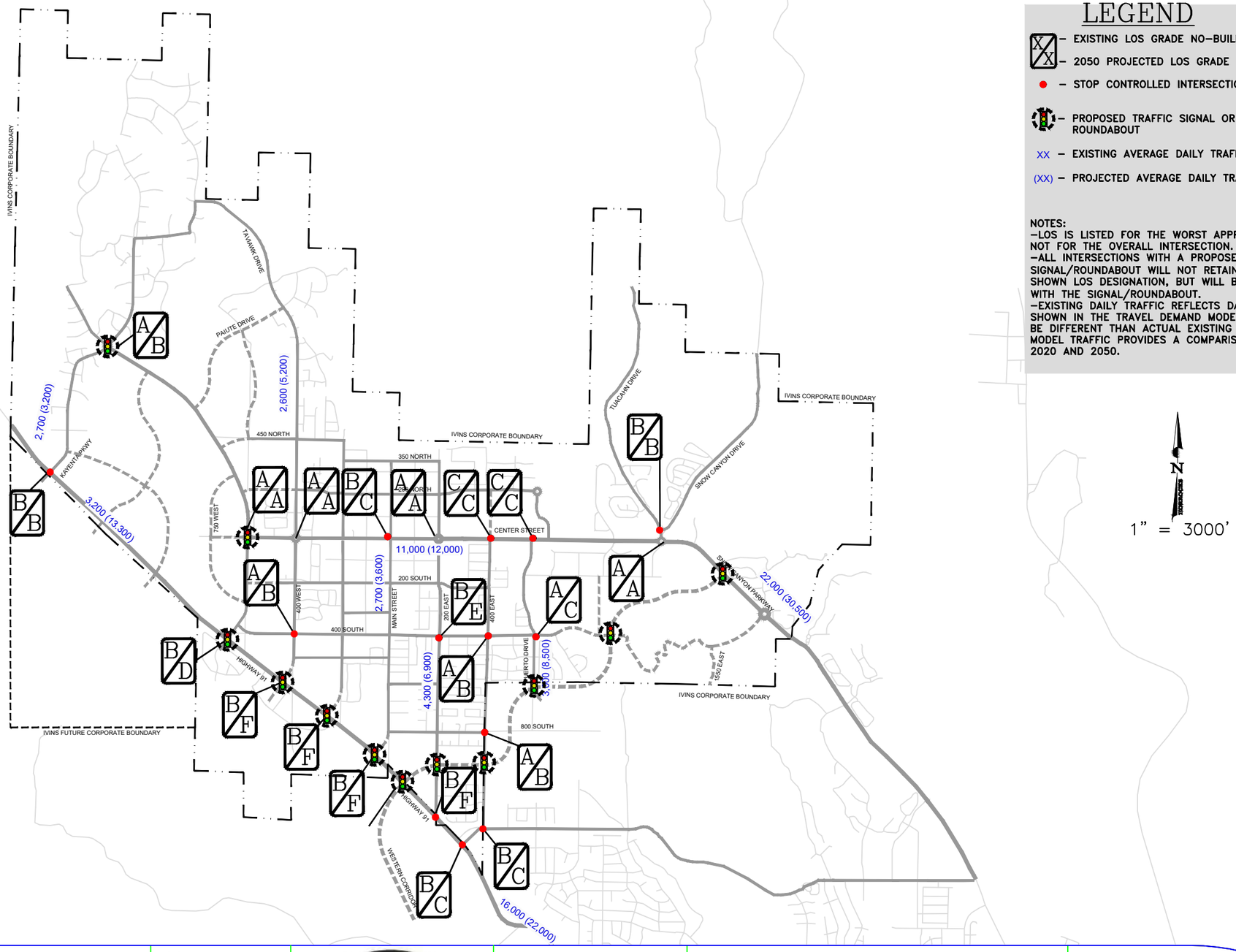
3.4 Operational characteristics

Very few of the intersections in Figure 16 show an unacceptable LOS with the projected future volumes. These intersections include 400 South and 200 East, and each intersection with Old Highway 91 at 200 East, Main Street, 200 West, 400 West, and 600 West. The LOS is shown for the worst approach and not for the overall intersection. Adding signals or roundabouts to these locations greatly improves the LOS and, in most cases, elevates it to LOS A or B. Signals should only be installed at these locations when signal warrants are met as outlined in the Manual on Uniform Traffic Control Devices (MUTCD). The intersection of Old Highway 91 & 200 East will need to be adjusted in the future with the connection of the Western Corridor. 200 East has a skewed alignment at Old Highway 91 and with the new connection at the Western Corridor, 200 East would not be the right intersection for a signal or roundabout. The signal or roundabout should be placed at the Old Highway 91 & Western Corridor intersection and the 200 East traffic should use this intersection. This would allow 200 East to be discontinued at Old Highway 91 or realigned at Old Highway 91.



H:\2020\UT-2236-2001 Ivins Transportation Master Plan Update\Project Data\Figures\Figures Rev12.dwg - 2050 Peak Volumes - 2/03/2021 02:37pm emily.andrus

SCALE: 1"=3000'	IVINS CITY UTAH	555 SOUTH BLUFF STREET SUITE 101 ST. GEORGE, UT 84770 (435) 986-7888	Ivins TMP Update **2050 PEAK VOLUMES**
DATE: October 2020			FIGURE NO. **15**



LEGEND

- XX/XX – EXISTING LOS GRADE NO-BUILD
- XX/XX – 2050 PROJECTED LOS GRADE
- – STOP CONTROLLED INTERSECTION
- – PROPOSED TRAFFIC SIGNAL OR ROUNDABOUT
- XX – EXISTING AVERAGE DAILY TRAFFIC (ADT)
- (XX) – PROJECTED AVERAGE DAILY TRAFFIC (ADT)

NOTES:
-LOS IS LISTED FOR THE WORST APPROACH AND NOT FOR THE OVERALL INTERSECTION.
-ALL INTERSECTIONS WITH A PROPOSED SIGNAL/ROUNDABOUT WILL NOT RETAIN THE SHOWN LOS DESIGNATION, BUT WILL BE IMPROVED WITH THE SIGNAL/ROUNDABOUT.
-EXISTING DAILY TRAFFIC REFLECTS DAILY TRAFFIC SHOWN IN THE TRAVEL DEMAND MODEL AND MAY BE DIFFERENT THAN ACTUAL EXISTING TRAFFIC. MODEL TRAFFIC PROVIDES A COMPARISON BETWEEN 2020 AND 2050.

N

1" = 3000'

H:\2020\IUT-2236-2001 Ivins Transportation Master Plan Update\Project Data\Figures\Figures Rev12.dwg - 2050 LOS(11X17) - 2/03/2021 02:38pm, emily.andrus

SCALE: 1"=3000'

DATE: October 2020

IVINS CITY UTAH

555 SOUTH BLUFF STREET
SUITE 101
ST. GEORGE, UT 84770
(435) 986-7888

Ivins TMP Update

2050 LEVEL OF SERVICE (LOS)

FIGURE NO. 16

3.5 Proposed Gateways

Ivins currently has three leading gateways into the City: Snow Canyon Parkway at the border of St. George and on Old Highway 91 at the border with Santa Clara and at the border near the Shivwits reservation. Other circuitous routes through Santa Clara also exist but do not possess the high visibility that Snow Canyon Parkway and Old Highway 91 hold. Gateways are ideal for special road treatments or enhancements into the community and ideal for concentrations of commercial land uses. Typical land uses at gateways are more conducive to regional or community centers supporting uses such as grocery, apparel, restaurant, and service oriented. These land uses rely on high visibility traffic corridors and high internal activity as well. Some uses that typically would not stimulate these commercial nodes are office and professional services because they are appointment driven and do not rely on high visibility or high traffic corridors. However, some mixed-use developments could support office and professional services on a second-floor development pattern.

The proposed Western Corridor intersection at Snow Canyon Parkway is an ideal location for a regional or a community center because of the high traffic volumes and high visibility. Additionally, Snow Canyon Parkway serves as the gateway to the core of Ivins. The Western Corridor will eventually bring the high traffic volumes with its future route to I-15. The intersection of Old Highway 91 and 200 East is also a high visibility high traffic corridor that is ideal for community gateway development. As identified in Section 3.1 of this document, 200 East has been identified as a major collector and Snow Canyon Parkway as a major arterial, which support the community gateway treatment for these roads.

Specific land use recommendations for these gateways:

- Maximum 50,000 square feet for a single retailer
- Sit down restaurants

Specific Design Criteria:

- Corner buildings should front the street. Parking should be oriented to the rear or the interior of the development.
- Maximum building height of 25 feet
- Provide a mix of building materials
- Major retailers should have a prominent front façade
- A pedestrian network plan is required

3.6 Proposed Commercial Areas

Commercial zones not only stimulate economic activity in a community, it also generates traffic, depending on what kind of commercial uses are in operation. The City has revised the Land Use Plan shown in Figure 3 where commercial zones are indicated.

3.7 Roundabouts

Many communities in the United States such as Ivins are beginning to embrace the concept of "roundabouts." A roundabout is composed of a circular, raised, center island with deflecting islands on the intersecting streets to direct traffic movement around the circle. Traffic circulates in a counter-clockwise direction making right turns onto the intersecting streets. There are no traffic signals; rather, entering traffic yields to vehicles already in the roundabout (see Figure 17).

Ivins City has taken progressive steps in designing and constructing roundabouts, and they have proven to be a superior traffic control device in many cases. Advantages of roundabouts include reduced traffic delays, increased safety and reduced right of way requirements. They can reduce delays because the stop signal phase (when vehicles entering the intersection are unable to move) is eliminated. At the same time, roundabouts can improve safety because the number of potential conflict points are substantially reduced over a conventional four-way intersection. Properly designed roundabouts can also accommodate emergency vehicles and trucks.

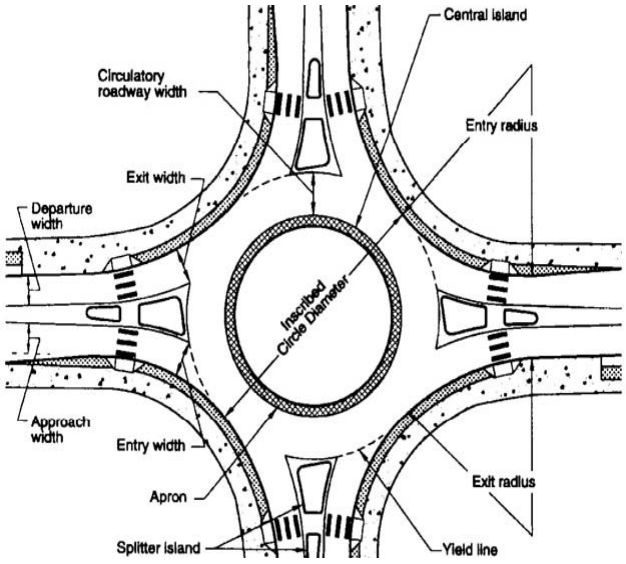


Figure 17 - Typical Roundabout

Design standards for roundabouts are very specific and the Federal Highway Administration (FHWA) has prepared a design guide for modern roundabouts in the United States. Development of a roundabout should only occur as a result of an intersection study by a qualified Traffic Engineer and when the minimum capacity and design criteria can be met. The FHWA has determined that the maximum flow rate that can be accommodated at a roundabout depends on the geometric elements (circle diameter, number of lanes), the circulating flow (vehicles going around the circle), and entry flow (vehicles entering the circle). A single lane roundabout can accommodate up to 1,800 vehicles per hour and a double lane roundabout can accommodate up to 3,400 vehicles per hour. The capacity of a roundabout will be lower, however, as the entry flow increases (i.e. more vehicles trying to get in the roundabout conflicting with those already

going around the circle). The FHWA's Safety website adds, "Most significantly, roundabouts REDUCE the types of crashes where people are seriously hurt or killed by 78-82% when compared to conventional stop-controlled and signalized intersections, per the AASHTO Highway Safety Manual."

The National Transportation Research Board examined traffic delays before and after roundabouts were installed at eight intersections in the United States. The study determined that delays (the time spent stopped and moving up to the intersection) decreased on average by 78% and 76% during the AM Peak Hour and PM Peak Hour, respectively. The results indicate that roundabouts can reduce congestion in certain circumstances. In addition, the FHWA studied safety characteristics of a sample of eleven roundabouts in the United States. The agency determined that the number of personal injury accidents and property damage-only accidents decreased 51% and 29%, respectively, after roundabouts replaced conventional intersections. A report from the NCHRP adds, "In general, roundabouts have improved both overall crash rates and, particularly, injury crash rates in a wide range of settings (urban, suburban, and rural) for all previous forms of traffic control except for all-way stop control…" (NCHRP Report 572, Roundabouts in the United States, January 2007). Roundabouts may be an appropriate solution for certain problem intersections in Ivins City.

Ivins City has determined locations where signals and/or roundabouts will be considered to improve future intersection capacity. These intersections are identified in Figure 18.

It shall be assumed that a roundabout will be the future form of traffic control and that in the case of future development adjacent to any of these intersections, right-of-way will be set aside for the future roundabout based on a conceptual design of the roundabout to be completed at the time of the said development. A roundabout shall be the only considered future traffic control at these intersections, unless, it is shown that a roundabout is impractical due to the cost of removing existing structures or to obtain necessary City right-of-way, or if an Intersection Control Study performed by a qualified traffic engineer shows that a roundabout could not provide a minimum level of service.

Traffic models have forecasted that 2025, 2035, or 2040 traffic volumes at the indicated intersections will be such that a higher-type of traffic control device will be needed such as a signal or roundabout. The dashed, circular symbols indicate locations of future roundabouts. These routes are more centrally located in Ivins where roundabouts would complement the objective of encouraging lower speed traffic and enhancing the appearance of neighborhoods. The symbols of signals with a circle around them on Old Highway 91 and the Western Corridor indicate either a signal or roundabout. Since these two routes are regional facilities and cross jurisdictional boundaries with other cities, further consideration needs to be taken to determine which traffic control device would be appropriate. Funding of regional facilities often come through the Dixie MPO who encourage traffic efficiency. Traffic signals can be advantageous due to their lower cost and if higher speeds are needed to maintain a progressive flow of traffic. Roundabouts, although more expensive than traffic signals, encourage slower speeds, fewer accidents, and less delay per vehicle, on average. Roundabouts are also more aesthetically pleasing and encourage a more peaceful driving experience.

Roundabouts can be considered for intersection locations other than a location that is identified in Figure 18. Generally, if developers desire to have a roundabout located adjacent to a residential project, Ivins City will consider its placement as an appropriate site based on expected volume, geometry, right-of-way needs, and costs. Developers should expect to pay for these requested intersection improvements.

Ivins City Transportation Master Plan

Updated: 2021

IVINS CITY UTAH

Legend

- City Boundary
- Existing Roundabout
- Future Roundabout or Signal

* The traffic model indicates that the intersections of Old Highway 91 with 200 W and Main St may require a roundabout or signal in the future. R/W should be reserved for this potential.

** The model indicates that the intersection of Pioneer Parkway and Old Highway 91 may not require a roundabout or signal, however, R/W should still be reserved.

N
W E
S

Taviawk Dr
Kwavasa Dr
Kayenta Pkwy
Sage Wy
Old Highway 91
450 N
200 N
200 W
Main St
750 W
Kwavasa Drive (600 W)
Taviawk Dr (400 W)
Snow Canyon Parkway (Center St)
200 S
300 S
400 S
400 E
Puerto Dr
520 S
600 S
800 S
200 E
Tuacahn Dr
Snow Canyon Dr
Snow Canyon Pkwy
Pioneer Pkwy
Rachel Drive
Western Corridor

0 0.25 0.5 1 1.5 2 Miles

Traffic Control Locations

Figure No. 18

3.7.1 Mini-Roundabouts

Mini-roundabouts are another option for traffic control in Ivins City. As their name suggests, mini-roundabouts are small scale roundabouts. Mini-roundabouts are a useful measure that can be used in intersections where space is a constraint. They can act as a traffic calming device or to improve delay at minor intersections.

Mini-roundabouts are best implemented in low-speed, residential areas. The center island can be painted or mounted, but should traversable. Like a typical roundabout, mini-roundabouts require yield control at each entry. Figure 19 shows a general layout for a mini-roundabout. More information on the design of mini-roundabouts can be found in the *Mini-Roundabouts Technical Summary* by the FHWA.

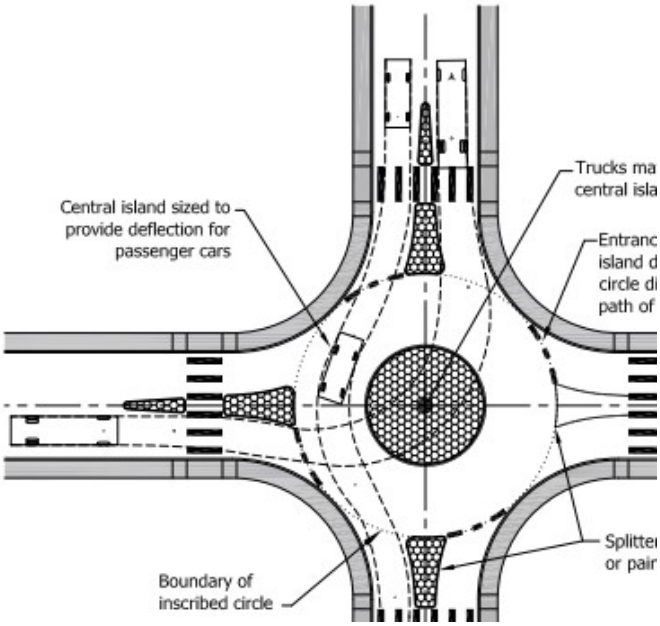


Figure 19 - Typical Features of a Mini-Roundabout, FHWA Mini-Roundabouts Technical Summary

There are currently no mini-roundabouts in Ivins City, however there may be opportunities in the future to implement them. Two intersections that may be improved by the use of mini-roundabouts are Mesa Vista Drive and Puerto Drive, and at 400 South and Puerto Drive.

Mini-roundabouts may be a useful addition to Ivins City and provide another option for traffic control at small intersections that cannot house a full roundabout.

3.8 Future Bicycle and Pedestrian Traffic

For continued implementation and expansion of the trails network, all future development within the identified trail network should provide connectivity with existing trails, as shown on Figure 11. With the implementation of a bike lane plan, also shown on Figure 11, it is the City's hope

that the bike lane network will gradually evolve into a legitimate alternative mode of travel that is both safe and efficient. These facilities are expected to be signed and striped for the safety of the traveling public.

3.9 Traffic Impact Study Guidelines

Ivins City may require a Traffic Impact Study (TIS) for any new development when the following guidelines indicate that a TIS is needed. The following sections are to be used to establish uniform guidelines for when a TIS is required and how the study is to be conducted, based on suggested guidelines established by the Institute of Transportation Engineers (ITE) and the American Public Works Association (APWA).

A TIS is a specialized study of the impacts that a certain type and size of development will have on the surrounding transportation system. It is specifically concerned with the generation, distribution, and assignment of traffic to and from the "new development". The term "new development" also includes properties that are being redeveloped.

3.9.1 TIS Requirements

A TIS shall be required for all new developments or additions to existing developments which generate 100 or more trips during the morning, afternoon or Saturday peak hours or which will have a significant impact on the City's transportation system as determined by the City. The TIS will help the city determine the required functional classification for each roadway in the development. Traffic Impact Studies are divided into three categories. The scale of development will determine which category of study will be required. Each category differs by specific analysis requirements for the study and the study's level of detail. Below is a description of each category.

3.9.1.1 Category I

A Category I TIS should be required for all developments which generate one hundred (100) or more new peak hour trips, but less than five hundred (500) trips, during the morning, afternoon or Saturday peak hour. Peak hour trips will be determined by the latest edition ITE *Trip Generation* Manual. In addition to the above threshold requirements, a Category I TIS may also be required by the City for any specific traffic problems or concerns such as:

- Proposed or existing offset intersections
- Situation with a high number of traffic accidents
- Driveway conflicts with adjacent developments
- Nearby intersections that have reached their capacity
- Proposed property rezones when there is a significant potential increase in traffic volumes, and
- When the original TIS is more than two years old, or where the proposed traffic volumes in the original TIS increase by more than twenty percent

For a Category I TIS, the study horizon should include the opening year of the development, and build-out of the entire development, if applicable. The minimum study area should include site access drives, affected signalized intersections and major unsignalized street intersections.

3.9.1.2 Category II

A Category II TIS should be required for all developments, which generate from five hundred (500) to one thousand (1,000) peak hour trips during the morning, afternoon or Saturday peak hour. The study horizon should include the opening year of the development, year of completion for each phase of the development, if applicable, and five years after the development's completion. The minimum study area should include the site access drives and all signalized intersections and major unsignalized street intersections within one-half mile of the development.

3.9.1.3 Category III

A Category III TIS should be required for all developments, which generate above one thousand (1,000) peak hour trips during the morning, afternoon or Saturday peak hour. The study horizon shall be for the year of completion for each phase of the development, the year of its completion, five years after the development's completion and ten years after the development's completion. The minimum study area shall include the site access drives and all signalized intersections and major unsignalized street intersections within one-half mile of the development.

3.9.2 Initial Work Activity

A developer, or their agent, should first estimate the number of vehicular trips to be generated by the proposed development to determine if a TIS may be required and if so, to determine the applicable category. The City must give concurrence on the number of trips to be generated by the proposed development. The developer may, if desired, request that the City assist in estimating the number of trips for the purpose of determining whether a TIS is required for the proposed development.

The City or designated representative shall make the final decision on requiring a TIS and determining whether the study falls within a Category I, II or III.

If a study is determined to be required by the City, the developer should prepare for submittal to the City, for review and approval, a draft table of contents for the TIS. The table of contents will be sufficiently detailed to explain the proposed area of influence for the study, intersections and roadways to be analyzed, and level of detail for gathering of traffic volume information and preparation of level of service analyses. There should also be included in the draft a proposed trip distribution for site traffic. After approval of the draft table of contents and trip distribution by the City, the actual TIS work activities may begin.

The Traffic Impact Study Scope of Work agreement between the developer and his/her traffic engineer should conform to the pre-approved draft table of contents. The findings, conclusions and recommendations contained within the TIS document should be prepared in accordance with appropriate professional Civil Engineering Canons.

3.9.3 Qualifications for Preparing TIS Documents

The TIS should be conducted and prepared under the direction of a Professional Engineer (Civil) licensed to practice in the State of Utah. The subject engineer should have special training and experience in traffic engineering and be a member of the Institute of Transportation Engineers (ITE). The final report shall be sealed, signed and dated.

3.9.4 Analysis Approach and Methods

The traffic study approach and methods should be guided by the following criteria:

3.9.4.1 Study Area, Horizon, and Time Period

The minimum study area should be determined by project type and size in accordance with the criteria previously outlined. The extent of the study area may be either enlarged or decreased, depending on special conditions as determined by the City. The study horizon years should be determined by project type and size, in accordance with the criteria outlined in Section 3.7.1 TIS Requirements.

Both the morning and afternoon weekday peak hours should be analyzed, unless the proposed project is expected to generate no trips, or a very low number of trips, during either the morning or evening peak periods. If this is the case, the requirement to analyze one or both of these periods may be waived by the City.

Where the peak traffic hour in the study area occurs during a different time period than the normal morning or afternoon peak travel periods (for example mid-day), or occurs on a weekend, or if the proposed project has unusual peaking characteristics, these additional peak hours should also be analyzed.

3.9.4.2 Seasonal Adjustments

When directed by the City, traffic volumes for the analysis hours should be adjusted for the peak season, in cases where seasonal traffic data is available.

3.9.4.3 Data Collection Requirements

All data should be collected in accordance with the latest edition of the ITE *Manual of Traffic Engineering Studies*, or as directed by the City.

- **Turning Movement Counts:** Manual turning movement counts should be obtained for all existing cross-street intersections to be analyzed during the morning, afternoon and Saturday peak periods (as applicable). Turning movement counts may be required during other periods as directed by the City. Turning movement counts may be extrapolated from existing turning movement counts, no more than two years old, with the concurrence of the City.
- **Daily Traffic Volumes:** The current and projected daily traffic volumes should be presented in the report. If available, daily count data from the local agencies may be extrapolated to a maximum of two years with the concurrence of the City. Where daily count data is not available, mechanical counts will be required at locations agreed upon by the City.
- **Roadway and Intersection Geometrics:** Roadway geometric information should be obtained. This includes, but is not limited to, roadway width, number of lanes, turning lanes, vertical grade, location of nearby driveways, and lane configuration at intersections.
- **Traffic Control Devices:** The location and type of traffic controls should be identified at all locations to be analyzed.
- **Crash Data:** As part of the safety section, vehicle crash data from the past 3 years at the study intersection locations should be provided. Crash patterns and possible mitigations should be considered to reduce crashes in the future.

3.9.5 Trip Generation

The latest edition of ITE's *Trip Generation* Manual should be used for selecting trip generation rates. Other rates may be used with the approval of the City in cases where *Trip Generation* does not include trip rates for a specific land use category, or includes only limited data, or where local trip rates have been shown to differ from the ITE rates. Site traffic should be generated for daily, AM, PM and Saturday peak hour periods (as applicable). Adjustments made for "pass-by", "diverted-link" or "mixed-use" traffic volumes shall follow the methodology outlined in the latest edition of the ITE *Trip Generation* Manual or the ITE *Trip Generation Handbook*. A "pass-by" traffic volume discount for commercial centers should not exceed twenty-five percent unless approved by the City. A trip generation table should be prepared by phase showing proposed land use, trip rates, and vehicle trips for daily and peak hour periods and appropriate traffic volume adjustments, if applicable.

3.9.6 Trip Distribution and Assignment

Projected trips should be distributed and added to the projected non-site traffic on the roadways and intersection under study. The specific assumptions and data sources used in deriving trip distribution and assignment should be documented in the report and reviewed with the City. Future traffic volumes should be estimated using information from transportation models, or applying an annual growth rate to the base-line traffic volumes. The future traffic volumes should be representative of the horizon year for project development. If the annual growth rate method is used, the City must give prior approval to the growth rate used. In addition, any nearby proposed development projects currently under review by the City ("on-line") should be taken into consideration when forecasting future traffic volumes. The increase in traffic from proposed "on-line" projects should be compared to the increase in traffic by applying an annual growth rate.

If modeling information is unavailable, the greatest traffic increase from either the "on-line" developments, the application of an annual growth rate or a combination of an annual growth rate and "on-line" developments, should be used to forecast the future traffic volumes.

The site-generated traffic should be assigned to the street network in the study area based on the approved trip distribution percentages. The site traffic should be combined with the forecasted traffic volumes to show the total traffic conditions estimated at development completion. A "figure" should be prepared showing daily and peak period turning movement volumes for each traffic study intersection. In addition, a "figure" should be prepared showing the base-line volumes with site-generated traffic added to the street network. This "figure" should be prepared showing the base-line volumes with site-generated traffic added to the street network. This "figure" will represent site specific traffic impacts to existing conditions.

As a part of the safety considerations, a circulation plan should be provided, indicating how ingress and egress traffic is anticipated to be served due to new development. Diverted links caused by new development should be identified and those trips mitigated.

3.9.7 Capacity Analysis

Level of service (LOS) shall be computed for signalized and unsignalized intersections in accordance with the latest edition of the *Highway Capacity Manual*. The intersection LOS should be calculated for each of the following conditions (if applicable):

- Existing peak hour traffic volumes ("figure" required)
- Existing peak hour traffic volumes including site-generated traffic ("figure" required)
- Future traffic volumes not including site traffic ("figure" required)
- Future traffic volumes including site traffic ("figure" required)
- LOS results for each traffic volume scenario ("table" required)

The LOS table should include LOS results for AM, PM and Saturday peak periods, if applicable. The table shall show LOS conditions with corresponding vehicle delays for signalized intersections, and LOS conditions for the critical movements at unsignalized intersections. For signalized intersections, the LOS conditions and average vehicle delay shall be provided for each approach and the intersection as a whole. If the new development is scheduled to be completed in phases, the TIS will, if directed by the City, include a LOS analysis for each separate development phase in addition to the TIS for each horizon year. The incremental increases in site traffic from each phase should be included in the LOS analysis for each preceding year of development completion. A "figure" will be required for each horizon year of phased development.

3.9.8 Traffic Signal and Roundabout Studies

An intersection needs study should be conducted for all new proposed roundabouts and/or traffic signals for the base year. If the warrants are not met for the base year, they should be evaluated for each year in the five-year horizon. Traffic signal and roundabout needs studies should be conducted by a method pre-approved by the City.

Speed Considerations

Vehicle speed is used to estimate safe stopping and cross corner sight distances. In general, the posted speed limit represents the 85th percentile speed. The design speed of the roadway should be used to calculate safe stopping and cross corner sight distances.

Improvement Analysis

The roadways and intersections within the study area should be analyzed, with and without the proposed development to identify any projected impacts in regard to LOS and safety.

Where the highway will operate at LOS C or better without the development, the traffic impact of the development on the roadways and intersections within the study area should be mitigated to LOS D for arterial and collector streets and LOS C on all other streets during peak hours of travel. Mitigation to LOS D on other streets may be acceptable with the concurrence of the City.

3.9.9 TIS Report Format

This section provides the format requirements for the general text arrangement of a TIS. Deviations from this format must receive prior approval of the City.

I. INTRODUCTION AND SUMMARY

1. Purpose of Report and Study Objectives
2. Executive Summary
   - Site Location and Study Area
   - Development Description
   - Principal Findings
   - Conclusions
   - Recommendations

II. PROPOSED DEVELOPMENT

1. Off-Site Development
2. Description of On-Site Development
   - Land Use and Intensity
   - Location
   - Site Plan
   - Zoning
   - Development Phasing and Timing

III. STUDY AREA CONDITIONS

1. Study Area
   - Area of Significant Traffic Impact
   - Influence Area
2. Land Use
   - Existing Land Use and Zoning
   - Anticipated Future Development
3. Site Accessibility
   - Existing and Future Area Roadway System
   - Traffic Volumes and Conditions
   - Access Geometrics
   - Other as applicable

IV. ANALYSIS OF EXISTING CONDITIONS

1. Physical Characteristics
   - Roadway Characteristics
   - Traffic Control Devices
   - Pedestrian/Bicycle Facilities
2. Traffic Volumes
   - Daily, Morning, Afternoon and Saturday Peak Periods (as applicable)
3. Level of Service
   - Morning, Afternoon and Saturday Peak Hour (as applicable)
4. Safety

- Crash Data from Past 3 Years

V. PROJECTED TRAFFIC

1. Site Traffic Forecasts (each horizon year)
   - Trip Generation
   - Mode Split
   - Pass-by Traffic (if applicable)
   - Trip Distribution
   - Trip Assignment
2. Non-Site Traffic Forecasting (each horizon year)
   - Projections of Non-site (Background) Traffic (methodology for the projections shall receive prior approval of City)
3. Total Traffic (each horizon year)

VI. TRAFFIC AND IMPROVEMENT ANALYSIS

1. Site Access
2. Capacity and Level of Service Analysis
   - Without Project (for each horizon year including any programmed improvements)
   - With Project (for each horizon year, including any programmed improvements)
3. Roadway Improvements
   - Improvements Programmed to Accommodate Non-site (Background) Traffic
   - Additional Alternative Improvements to Accommodate Site Traffic
4. Traffic Safety
   - Sight Distance
   - Acceleration/Deceleration Lanes, Left-Turn Lanes
   - Adequacy of Location and Design of Driveway Access
5. Pedestrian Considerations
6. Speed Considerations
7. Traffic Control Needs
8. Traffic Signal Needs (base plus each year, in five-year horizon)
9. Site Circulation and Parking
   - Circulation Route Plan

VII. FINDINGS

1. Site Accessibility
2. Traffic Impacts
3. Need for Improvements
4. Compliance with Applicable Local Codes

VIII. RECOMMENDATIONS/CONCLUSIONS

1. Site Access/Circulation Plan
2. Roadway Improvements
   - On-Site
   - Off-Site
   - Phasing (as applicable)

3. Transportation System Management Actions (as applicable)
4. Other

IX. APPENDICES

1. Existing Traffic Volume Summary
2. Trip Generation/Trip Distribution Analysis
3. Capacity Analyses Worksheets
4. Traffic Signal Needs Studies

X. FIGURES AND TABLES

1. The following items shall be documented in the text or Appendices
   - Site Location
   - Site Plan
   - Existing Transportation System
   - Existing Peak Hour Turning Volumes
   - Estimated Site Traffic Generation
   - Directional Distribution of Site Traffic
   - Site Traffic
   - Non-Site Traffic
   - Total Future Traffic
   - Projected Levels of Service
   - Recommended Improvements

(For Category 1, many of the items may be documented within the text. For other categories the items shall be included in figures and/or tables that are legible).

XI. DESIGN STANDARD REFERENCE

1. Design in accordance with current *Ivins City Standards*.
2. Conduct capacity analysis in accordance with the latest edition of the *Highway Capacity Manual.*

3.10 Public Transportation

Ivins City entered into an agreement with the City of St. George to expand the SunTran bus service to Ivins City. The agreement provides for a fixed bus route between St. George and Ivins and is compatible with St. George's public transit services as well as acknowledgement that such a route is subject to the requirements of the Federal Transit Administration (FTA). The SunTran route through Ivins City is shown in Figure 20.

Currently the Ivins route runs approximately every hour and twenty minutes. Expansion in the future would like be in the form of increased frequency of the buses.

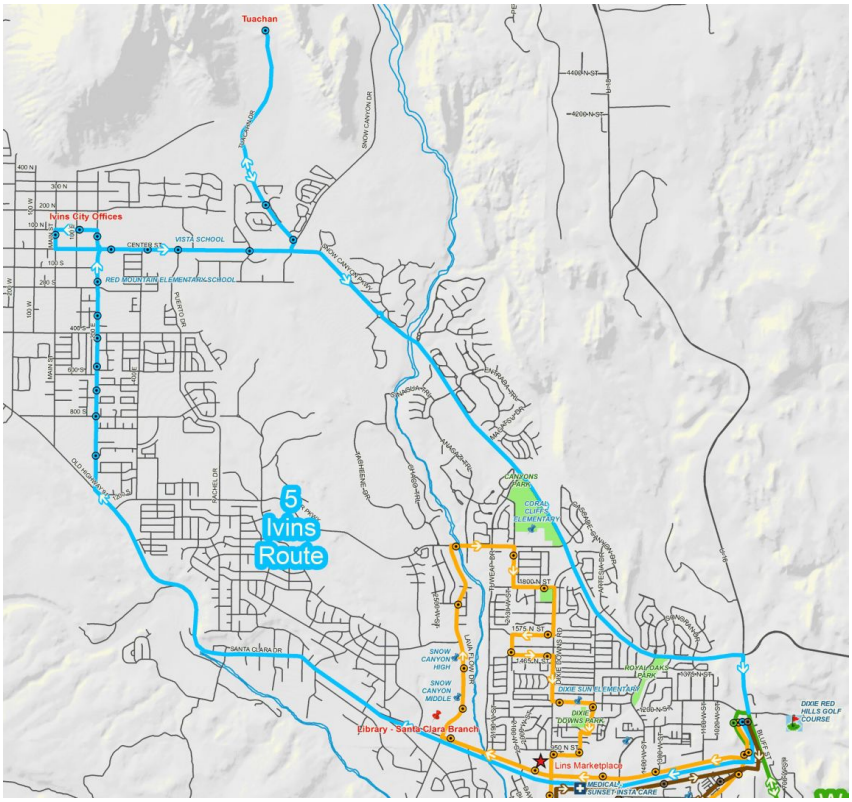


Figure 20 - SunTran Route through Ivins City

The current SunTran route through Ivins does not serve some of the major apartment complexes around 200 and 400 West. In the future, there may be an opportunity to benefit more people by including those areas in the route.

3.11 Roadway Standards

All streets shall be designed to conform to the Engineering standards and technical design requirements contained within *Ivins City Standards*. The standards outlined in that document can be supplemented by this master plan, AASHTO (American Association of State Highways Transportation Officials), *A Policy on Geometric Design of Highways and Streets,* and the MUTCD (Manual on Uniform Traffic Control Devices). In cases of conflict, a determination shall be made by the City, whose determinations shall be final.

3.11.1 Safe Transportation System

A goal of Ivins City is to establish and maintain a safe transportation system. This should be a high priority and the City should work diligently to meet applicable safety standards. This can be best accomplished by the following:

- Require all major developments to provide adequate access for emergency vehicles
- Provide safe pedestrian street crossings, particularly near schools and recreation areas
- Encourage development of school routing and recreation plans that minimize vehicle/pedestrian conflicts

- Establish speed limits based on traffic engineering analysis. Enforce speed limits, especially near schools, in residential areas and downtown commercial areas.
- Provide guidance for vehicles on streets through striping, raised medians and islands, reduction of roadside obstructions, and other traffic engineering solutions
- Require all roadway features to meet minimum design standards established by the *American Association of State Highway and Transportation Officials* (AASHTO). All signs, pavement markings and traffic signals must meet standards established by the *Manual of Uniform Traffic Control Devices* (MUTCD). Exceptions can be granted by the City on a case-by-case basis for those designs that demonstrate innovative superiority over the existing standards.
- Maintain optimal walkway conditions for walking, wheelchairs and strollers by:
    - Repairing cracks and bumps
    - Minimizing slopes
    - Maintaining visibility at corners
    - Avoiding abruptly ending walkways
    - Reducing speed and traffic
    - Keeping walkways clear of poles and other objects
    - Avoiding poor drainage and standing water on sidewalks, and
    - Providing curb cuts and ramps that comply with the Americans with Disabilities Act (ADA)
- Provide adequate emergency access and/or turnarounds on all dead-end streets or cul-de-sacs

Respecting clear zones are an important aspect of maintaining a safe transportation system. From AASHTO, the clear zone is "…used to designate the unobstructed, relatively flat area provided beyond the edge of the traveled way for the recovery of errant vehicles." Although the width of a clear zone is influenced by criteria such as traffic volume, speed, and embankment slopes, generally the clear zone is at least 10 feet (measured from the white edge line or edge or asphalt if no white line is present) in low-speed rural collector and rural local roads, and as far as is practical in urban settings where space for clear zones is generally restricted. Again, from AASHTO regarding urban streets, "A minimum offset distance of 18 inches should be provided beyond the face of the curb, with wider offsets provided where practical…. However, since most curbs do not have a significant capability to redirect vehicles, a minimum clear-zone distance commensurate with prevailing traffic volumes and vehicle speeds should be provided where practical." It is of paramount importance that a conscious effort be made to look for opportunities to comply with this policy.

3.11.2 Street Design

All streets shall be designed to conform to the standards and technical design requirements contained within the *Ivins City Standard Specifications for Design and Construction*. The standards outlined in this document can be supplemented by AASHTO, *A Policy on Geometric Design of Highways and Streets*. In cases of conflict, a determination shall be made by the City, whose determinations shall be final.

Some of the basic elements of street design are outlined in this section. For the full text on Street Design issues, please refer to the *Ivins City Standard Specifications for Design and Construction*.

3.11.2.1 Street Cross-Section Standards

The requirements for the street cross-section configurations are shown in Table 11. These requirements are based on traffic capacity, design speed, projected traffic, system continuity and overall safety. All new developments shall use street cross-sections as determined by the ADT in Table 11. Access to multi-family or commercial developments shall use street cross-sections with fifty-five feet (55') or more of right-of-way.

Table 11 - Street Cross-Section Standards

Street Cross-Section Configurations							
Road Classification	**Minimum ADT or [D/U's]**	**Traffic Index**	**R-O-W Width (ft)**	**Pavement Width (ft)**	**Planter Width (ft)**	**Sidewalk Width (ft)**	**Landscape Buffer (ft)**
Residential Standard 50'	510 to 1,250 (51-125)	5	50	28	3 min	5	12
Residential Alternative 43'	210 to 500 (21 -50)	5	43	28	N/A	5	12
Residential Alternative 38'	0 to 200 (0-200)	5	38	28	N/A	5 (One side)	12
Residential Private-Rural	0 to 200 (0-200)	5	38	26	3' – 15' (Varies)	5' min	15
Residential *Kwavasa Drive*	0 to 200 (0-200)	5	38	26	3' – 15' (Varies)	5' min	15
Residential Collector	1,260 to 2,000 (126-200)	5	55	32	3 min	5	12
Minor Collector	1,260 to 2,000 (126-200)	5.5	60	32	5.5 min	5	20
Minor Collector *Puerto Drive*	1,260 to 2,000 (126-200)	5.5	60	43	N/A	5 (One side)	6 (One side)
Major Collector (with street parking)	2,010 to 6,000 (201-600)	6	87	42	3' – 15' (Varies)	5	20
Major Collector (with center lane striping)	2,010 to 6,000 (201-600)	6	87	42	3' – 15' (Varies)	5	20
Major Collector (with landscaped median in Rural Zone)	2,010 to 6,000 (201-600)	6	70	34	N/A	8' trail	22
Minor Arterial *Center Street*	6,000 to 20,000	7	85	60	3' – 20' (Varies)	6 (or 10' trail)	30
Minor Arterial *West Center Street*	6,000 to 20,000	7	85	52	3' – 15' (Varies)	6 (or 10' trail)	25
Minor Arterial *Western Corridor*	6,000 to 20,000	8	90	64	3' – 10' (Varies)	6 (or 10' trail)	20
Major Arterial *Old Highway 91 (2-lane)*	20,000 to 40,000	8	100	38	3' -25' (Varies)	6' one side 10' trail on other side	35
Major Arterial *Old Highway 91 (3-lane)*	20,000 to 40,000	8	100	50	3' -25' (Varies)	6' one side 10' trail on other side	35
Major Arterial *Old Highway 91 (5-lane)*	>40,000	8	100	74	3' -25' (Varies)	6' one side 10' trail on other side	35

NOTES:
1. See Ivins City Zoning Ordinances for applicable grades.
2. Pavement width measured from lip of gutter to lip of gutter.

3. The minimum right-of-way and pavement width is shown. Each may be increased when required by a traffic impact study.
4. Landscape Buffer is measured from the back of the curb.
5. Commercial Local roads share the same cross-section with Minor Collectors, but with a Traffic Index of 10.
6. Industrial Local roads share the same cross-section with Major Collectors, but with a Traffic Index of 10.
7. See Cross-Section drawings for additional specific notes.

3.11.2.2 Roadway Network Design

New roadway networks shall be designed in accordance with the general planning concepts, guidelines, and objectives provided in this section. The "Quality of Life" for residents should be a primary concern when designing a residential roadway network with safety as the overriding factor in design. An emphasis on proper street hierarchy should be adhered to, namely, local streets should access collectors; collectors should access arterials; etc. An emphasis on access management should provide careful control of the location, design, and operation of all driveways, median openings, and street connections to a roadway. For more information on access management, refer to the Access Management section of this document.

Residential streets should be designed in a curvilinear method in order to reduce or eliminate long straight stretches of residential roadways, which encourage speeding and cut-through traffic. Substantial increases in average daily traffic, due to development on adjacent property on established streets not originally designed to accommodate such increases should be avoided. Drainage methods should concentrate on meeting the drainage needs while not impeding the movement of traffic. Roads should be designed to lie within existing topographic features without causing unnecessary cuts and fills.

A reduction in the use of cul-de-sacs should be emphasized in order to provide greater traffic circulation. Circulation is of the utmost importance; long blocks and excessive dead-end streets should be avoided. Stopping sight distance must be considered at all intersections and curves to ensure the safety of the public, in accordance with AASHTO standards. Pedestrian and bicycle traffic should be considered in the planning and design of all developed streets. All street grades shall have a maximum grade as specified in the Ivins City Zoning Ordinance.

3.11.2.3 Improvement Requirements

All improvements, including but not limited to the following, shall be constructed in accordance with the standard specifications and drawings unless otherwise approved. The developer shall dedicate right of way and install improvements for proposed streets which are planned to adjoin or traverse the project or which are necessary for the development. The entire proposed right of way shall be dedicated to the city according to the design width specified by the Ivins transportation master plan. The city may participate in a percentage of the cost of improvements for arterial and major collector streets as proposed in the Ivins City capital facilities plan.

Required curb, gutter and sidewalk shall be constructed. Driveways shall be constructed in approved locations only. All streets, public or private, shall be surfaced to grade, with asphalt concrete pavement to the required minimum width and thickness in accordance with the *Ivins City Standard Specifications for Design and Construction*. No cross gutters shall be allowed across major collector or major and minor arterial streets. On commercial and industrial streets, cross gutters are generally not allowed and require approval by the City for use. When new construction occurs, handicap ramps shall be constructed at all street intersections, unless

otherwise approved, in accordance with the standard drawings. In addition, when a project occurs where existing improvements are in place, handicap ramps shall be upgraded to meet current standards. Raised medians on public roadways shall be approved by the City. Design and construction shall be in accordance with applicable standards.

Developments shall construct the minimum number of accesses needed to adequately address the needs of the development and only at approved locations. Adequate drainage facilities shall be installed to properly conduct runoff from the roadway. Sub-drains and surface drainage facilities shall be designed in accordance with the approved drainage study.

Sidewalks shall be required on both sides of public and private streets, with exceptions for low volume roads as identified in this transportation master plan. The sidewalk may be placed in the landscaped buffer area. If sidewalks serving public streets are not placed within a dedicated right of way, an easement for access and maintenance will be required. The minimum sidewalk width requirements shall be in accordance with the cross sections depicted in the transportation master plan and the standard specifications. Required sidewalk and bike paths shall serpentine on streets with a landscape buffer greater than fifteen feet (15') wide. (Ord. 2016-02, 2016). A ten-foot (10') asphalt trail may substitute for sidewalks on both sides of the street in the identified rural zone. Landscaped areas, in compliance with the design guidelines, between the street curb and gutter and the sidewalk, and between the sidewalk and outside right of way boundary, are encouraged.

The above required improvements are not all inclusive. Other improvements needed to complete the development in accordance with current engineering and planning standard practice may be required by the City.

3.11.2.4 Connected Street System or Grid System

When designing residential standard roadways, block lengths without an intervening collector roadway shall not exceed eight hundred feet (800') in length unless approval has been granted by the City (cul-de-sacs are not considered an intervening connecting street). Cul-de-sac streets shall not exceed seven hundred fifty feet (750') in length as measured from center of cross street to center of cul-de-sac unless approval has been granted by the City. Cul-de-sacs shall have a minimum pavement turnaround diameter of ninety-six feet (96'). The gutter pan can be included in the 96-foot diameter. The entire curb can be included if the curb is mountable. Streets in subdivisions, excluding collector streets, exceeding eighty feet (80') in length are encouraged to be curvilinear or provide sufficient alignment variation to calm traffic and enhance aesthetic appeal in the subdivision. Subdivision streets shall be designed to approach an arterial or collector street in accordance with the standard specifications. (Ord. 2016-02, 2016).

Major collectors and higher functional classification roadways shall not be permanently dead-ended or end in a cul-de-sac unless approval has been granted by the City. Stub streets are required to serve adjacent undeveloped properties as directed by the City. Where a stub street is provided which accesses more than two lots on each side, a temporary turnaround and public use easement at least eighty feet (80') in diameter, or equivalent hammerhead turnaround, shall be provided as approved by the fire marshal. Bicycle/pedestrian easements or access ways may be

required at the end of cul-de-sacs or between residential areas and parks, schools, churches, or other activity centers as directed by the City.

4 Five Year Transportation Improvement Plan (TIP)

4.1 Basis for Improvements

With the growth that is happening in Ivins and the topographic challenges of being land locked, it is imperative that a plan for future roadway and intersection improvements be created to address these issues.

4.2 Five-year Transportation Projects

The proposed intersection and roadway improvements developed for the five-year TIP vary from small improvements to existing roadways to larger projects such as the Western Corridor and roadway widening.

Following are the recommended projects for the five-year TIP. The individual projects are discussed in general terms and are not in any priority. Each project is identified individually, including discussion of the project's needs, benefits, and costs.

5A) Old Highway 91- 200 East to Kwavasa Drive
Description: This project will be the first phase of the Old Highway 91 project which will entail widening of the current roadway to accommodate bike travel. Therefore, the asphalt will be widened and the shoulders will be improved to enhance safety for all traffic on the road. This project is currently underway. Old Highway 91 should reflect the cross-sections shown in Cross Sections 10A, 10B, and 10C.

Estimated Cost: Ivins participation is $1,710,000 for design and construction, 75% of which will be paid by impact fees.

Total cost: $6,500,000

5B) Public Works Yard Relocation
Description: This project will relocate the Ivins City Public Works Yard.

Estimated Cost: $3,120,000 with 25 percent to be charged to street impact fees

5C) Old Highway 91- Kwavasa Drive to the Shivwits Reservation
Description: This project will be the second phase of the Old Highway 91 project which will entail widening of the current roadway to accommodate bike travel. Therefore, the asphalt will be widened and the shoulders will be improved to enhance safety for all traffic on the road. Old Highway 91 should reflect the cross-sections shown in Cross Sections 10A, 10B, and 10C.

Estimated Cost: Ivins participation is $500,000 for design and construction, 50% of which will be paid by impact fees.

Total cost: $2,000,000

5D) Chip Seal Access Road to 100 Acre BLM Property
Description: This project will chip seal the road to the 100-acre BLM property, south of Old Highway 91 as it loops from approximately 400 West to 200 West.

Estimated Cost: $200,000, 75% of which will be paid by impact fees.

5E) Roundabout at Kayenta Parkway and Kwavasa Drive
Description: A roundabout at the intersection of Kwavasa Drive and Kayenta Parkway has been discussed with the developer of Kayenta Parkway. The Kayenta Development has agreed to partially fund the roundabout.

Estimated Cost: Total cost of $170,000 to be partially funded and built by developers, $100,000 to be paid by impact fees.

5F) 400 West Gap Fill
Description: A portion of 400 West between 200 South and 350 South is not built to full width with curb and gutter. This project would finish the roadway where there is a gap in asphalt, curb, gutter, and sidewalk.

Estimated Cost: $100,000 for design and construction, paid by impact fees.

5G) Center Street Streetscape Improvements- 750 East to 950 East
Description: This project will install landscaped medians, including lighting, in the center of the roadway from 750 East to 950 East. Center Street should be designed according to the cross-sections shown previously in this report (see Cross Section 8A).

Estimated Cost: $100,000 for design and construction

5H) Puerto Drive - Safe Routes to School
Description: This project will include re-striping Puerto Drive. The lanes will be changed from 12-feet wide to 11-feet wide and will be moved to the west. There will be a five-foot sidewalk on the west side, and 10.5-foot shoulders to accommodate parking and bicyclists. The road will reflect the Puerto Drive cross section (see Cross Section 5). UDOT's Safe Routes to School program may help fund this project.

Estimated Cost: Ivins participation is $100,000 for design and construction.
Total cost: $280,000

5I) Puerto Drive Mini Roundabouts
Description: Puerto Drive has grown into an important north-south connection in Ivins city for both active transportation and vehicles. The installation of mini roundabouts at select intersections along Puerto Drive would provide traffic control without signals or stop signs.

Estimated Cost: Total cost is $50,000 for design and construction, 50% of which will be paid by impact fees.

5K) Miscellaneous Projects for Safety, Road Gap Filling, or Streetscape
Description: As development occurs, there will be a need to contribute to capital improvement costs that should be borne by the City.

Estimated Cost: $200,000, 50% of which will be paid by impact fees.

Street Light Replacement
Description: The City has a program to replace outdated street lights with newer, more efficient hardware.

Estimated Cost: $300,000

Pavement Maintenance
Description: The City has a program to maintain pavement on streets throughout the city to prevent pavement deterioration.

Estimated Cost: $2,100,000

4.3 Project Ranking

The most critical projects are the intersection projects because they resolve safety issues. The Old Highway 91 corridor is the next most critical because it is being planned to carry the majority of the traffic into Ivins from the south. The other projects are development driven and will most likely occur when land is developed adjacent to that roadway.

5 Ten Year Transportation Plan

The following are the recommended projects for the ten-year TIP. The individual projects are discussed in general terms and are not in any priority. Each project is identified individually, including discussion of the project's needs, benefits, and costs.

5.1 Recommended system improvements

10A) Western Corridor- Connection to Gap Canyon Parkway, St. George.
Description: This project will construct a new roadway from Ivins City to Gap Canyon Parkway in St. George City. The concept is to purchase the right-of-way using COG funds and the City will construct the entire roadway. This new roadway will be the western component of the Dixie Beltway, which is the beltway that travels around the combined metropolitan area of St. George, Washington, Ivins, and Santa Clara. The Western Corridor should reflect the cross-section shown in Cross Section 9.

Estimated Cost: Ivins participation is $1,000,000 for design and construction.

Total cost: $30,000,000

10B) Western Corridor- 200 East to 400 East
Description: This project will construct a new roadway in Ivins City between 200 East and 400 East. The concept is to purchase the right-of-way using COG funds and the City will construct the entire roadway. This new roadway will be the western component of the Dixie Beltway, which is the beltway that travels around the combined metropolitan area of St. George, Washington, Ivins, and Santa Clara. The Western Corridor should reflect the cross-section shown in Cross Section 9.

Estimated Cost: Ivins participation is $200,000 for design and construction.

Total cost: $1,200,000

10C) Western Corridor- 200 East to Old Highway 91
Description: This project will construct a new roadway in Ivins City between 200 East and Old Highway 91. This project would also include a roundabout at the intersection of Old Highway 91 and the Western Corridor. The concept is to purchase the right-of-way using COG funds and the City will construct the entire roadway. This new roadway will be the western component of the Dixie Beltway, which is the beltway that travels around the combined metropolitan area of St. George, Washington, Ivins, and Santa Clara. The Western Corridor should reflect the cross-section shown in Cross Section 9.

Estimated Cost: Ivins participation is $300,000 for design and construction.

Total cost: $1,700,000

10D) Pedestrian Underpass (or Bridge) at Old Highway 91 and the Western Corridor
Description: This project will be the construction of two crossings, a pedestrian underpass or bridge under Old Highway 91 and the Western Corridor at the planned roundabout intersection. The pedestrian facilities would allow bicyclists and pedestrians to safely cross the anticipated busy intersection of the Western Corridor and Old Highway 91.

Estimated Cost: Ivins participation is $500,000 for design and construction.

Total cost: $1,500,000

10E) Pedestrian Bridge (or Underpass) at Snow Canyon Drive and Center Street
Description: This project will be the construction of a pedestrian bridge over Center Street at the roundabout intersection with Snow Canyon Drive. The approximate span of the proposed bridge is 220 feet. The bridge would become part of the regional trail system and provide a connection to the existing trail on the north side of Center Street.

Estimated Cost: Ivins participation is $300,000 for design and construction.

Total cost: $900,000

10F) Old Highway 91 Streetscape
Description: This project will install landscaped medians, including lighting, in the center of the roadway. Old Highway 91 should be designed according to the cross-sections shown previously in this report (see Cross Sections 10A, 10B, and 10C).

Estimated Cost: $1,000,000 for design and construction

10G) Roundabout at Center Street and 400 East
Description: This project is for design and construction of a roundabout at the intersection of Center Street and 400 East.

Estimated Cost: $650,000 for design and construction

10H) Miscellaneous Projects for Safety, Road Gap Filling, or Streetscape
Description: As development occurs, there will be a need to contribute to capital improvement costs that should be borne by the City.

Estimated Cost: $500,000

Street Light Replacement
Description: The City has a program to replace outdated street lights with newer, more efficient hardware.

Estimated Cost: $250,000

Pavement Maintenance
Description: The City has a program to maintain pavement on streets throughout the city to prevent pavement deterioration.

Estimated Cost: $1,750,000

5.2 Project Ranking

The Western Corridor will become a need as the area develops. The timeline of this project will be driven by development.

6 Twenty Year Transportation Plan

The following are the recommended projects for the twenty-year TIP. The individual projects are discussed in general terms and are not in any priority. Each project is identified individually, including discussion of the project's needs, benefits, and costs.

6.1 Recommended system improvements

20A) Old Highway 91- Kwavasa Drive to Pioneer Parkway, 5 lanes

Description: This project will include the addition of two through lanes to make Old Highway 91 a five-lane facility from Kayenta Parkway to Pioneer Parkway. The project will include the installation of sidewalk, trail, bike lanes, and storm drain as well as installation of high-type traffic control (roundabouts or traffic signals) at major intersections when warranted. Old Highway 91 should reflect the cross-sections shown in Cross Sections 10A, 10B, and 10C.

Estimated Cost: Ivins participation is $500,000 for design and construction.
Total cost: $1,500,000

20B) Western Corridor, from Gap Canyon Parkway to I-15 (Local Match)

Description: In 2006, the Dixie MPO conducted a study to ascertain the future alignment of the 2-lane Western Corridor from Old Highway 91 to the south to I-15. The approximate cost of the project will be about $105 million. This project is anticipated to be paid with Federal Funds, which will require a local match. It is estimated that the approximate cost attributable to Ivins City is about one-third of this local match. The Western Corridor should reflect the cross-section shown in Cross Section 9.

20C) Western Corridor Widening to 5 Lanes, Old Highway 91 to Snow Canyon Parkway

Description: This segment of the Western Corridor begins at Old Highway 91, proceeds northeast, and connects with the segment at 400 East that was done in the Ten-Year plan, and picks up again at 200 East to the east to Santa Clara. The remaining portion is from the north side of Santa Clara to Snow Canyon Parkway. Right-of-way will be purchased from willing sellers using COG funding. If development is moving forward before right-of-way can be acquired, right-of-way will need to be dedicated. Development will be required to place 45-feet of asphalt (3, 12-foot lanes plus 7-foot shoulders), landscaped median, pedestrian facilities, drainage, and landscaped ditches and earth shoulders. In the future, the City will widen the road to full width and install curb and gutter. The Western Corridor may need five-lane sections of roadway where the volume exceeds 11,000 vehicles per day. The Western Corridor should reflect the cross-section shown in Cross Section 9.

Estimated Cost: Ivins participation is $500,000 for design and construction.
Total cost: $1,515,255

20D) Kwavasa Drive, Widen to 5 Lanes
Description: Kwavasa Drive will be built jointly by Ivins City and the Kayenta Development. Ivins City will pay for a chip sealed road and Kayenta will pay for road base preparation and property dedication. When developed further, Kwavasa Drive will be installed in accordance with Cross Section 12, paid for by the developer.

Estimated Cost: Ivins participation is $300,000 for design and construction.
Total cost: $1,041,936

20E) Other Signals and Roundabouts
Description: As traffic congestion patterns emerge in the twenty-year outlook, it is necessary to look closely at individual intersection control that requires more than just the installation of signs. A traffic signal will require about $250,000 to $350,000; a roundabout will require about $200,000 to $400,000.

Possible intersections that may need to be addressed in the twenty-year horizon:

- 200 East & Old Highway 91 intersection (see Section 3.4 for an explanation of this intersection)
- Main Street & Old Highway 91 intersection
- 200 West & Old Highway 91 intersection
- 400 West & Old Highway 91 intersection
- Kwavasa Drive & Old Highway 91 intersection
- 200 East & 400 South intersection

Estimated Cost: $1,000,000

20F) Miscellaneous Roundabouts and Projects for Safety, Road Gap Filling, or Streetscape
Description: As development occurs, there will be a need to contribute to capital improvement costs that should be borne by the City.

Estimated Cost: $1,000,000

6.2 Project ranking

The need for additional roadways in Kayenta will be based on the growth in that development. As the area grows, Old Highway 91 will need to be improved with traffic control to accommodate the future traffic volumes at congested intersections. Because Santa Clara Drive will not be an option to handle this amount of traffic, the need for the southern half of the Western Corridor will be crucial.

7 Access Management

This section will define and describe some of the aspects of Access Management for roadways and why it is so important. Access Management can make many of the roads in a system work better and operate more safely if properly implemented. There are many benefits to properly implemented access management. Some of the benefits are as follows:

- Reduction in traffic conflicts and accidents
- Reduced traffic congestion
- Preservation of traffic capacity and level of service
- Improved economic benefits businesses and service agencies
- Potential reductions in air pollution from vehicle exhausts

Though Access Management is generally used on roads that are larger and have more volume, it can have impacts on those roads that are defined as residential as well.

7.1 Definition

Access management is the process of comprehensive application of traffic engineering techniques in a manner that seeks to optimize highway system performance in terms of safety, capacity, and speed. Access Management is one tool of many that makes a traffic system work better with what is available.

7.1.1 Access Management Techniques

There are many techniques that can be used in access management. The most common techniques are signal spacing, street spacing, access spacing, and interchange to crossroad access spacing. There are various distances for each spacing dependent upon the roadway type being accessed and the accessing roadway. The Utah Department of Transportation has developed an access management program. More information can be gathered from the UDOT website and from the Access Management Program Coordinator.

7.1.2 Access Management

Access management is the process in which access is provided from the street network to adjacent land development while preserving traffic flow on the roadway system. Safety, capacity, and speed are determining factors on how land development is accessed by a roadway. Managing access is achieved by controlling the location, design, and operation of driveways, median openings, and street connections. In addition, auxiliary lanes (turn lanes or by-pass lanes) are also used to divert traffic out of the through traffic stream to improve the traffic flow and improve safety.

Roadways are classified for access control based upon their importance to local and regional mobility. For example, the strictest access control is applied to roadways that serve through traffic or regional trips. The least access control is given to local streets and residential areas that serve local traffic and short trips. Figure 21 shows the relationship between access and vehicular movement.

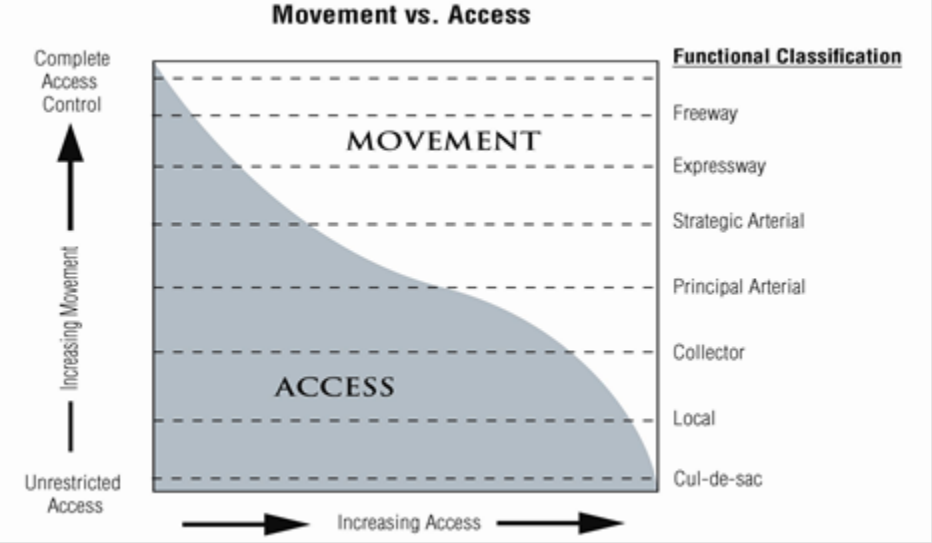


Figure 21 - Access vs. Mobility

7.1.3 Benefits of Access Management

Benefits of access management include:

- Decreased travel time
- Improved safety
- Preservation of roadway level of service
- Reduces the need for expensive roadway and intersection improvements
- Discourages poor site design
- Improves roadway appearance

7.1.4 Ten Ways to Manage Roadway Access

There are ten ways to manage roadway access to get the most out of a transportation system, they are:

1. Assure roadways are managed properly, by having a comprehensive plan to address key issues. Include goals, objectives, and policies related to access management. Make sure roads are classified per the functional classification plan. Provide for a wide variety of street types with varying design standards
2. Establishing a basic requirement that driveways are limited to one per parcel, with special conditions for additional driveways
3. Locating driveways away from intersections
4. Connecting parking lots and consolidate driveways
5. Providing residential access through neighborhood streets
6. Increasing minimum lot frontage on major roads
7. Promoting a connected street system

8. Encouraging internal access to outparcels
9. Regulating the location, spacing, and design of driveways
10. Coordinate with other municipalities and state agencies

7.2 General Access Management Principles

The following access management guidelines and policies shall be adhered to within Ivins City.

- Conflicts at intersections and driveways should be separated and the number reduced as much as possible.
- A "time-space" perspective should guide (a) the location, timing, and coordination of traffic signals; (b) the placement of access; and (c) the design and operation of intersections. Optimum progressive travel speeds along arterial roadways should be determined and maintained.
- Signal cycles should be as short as possible but consistent with capacity, pedestrian clearance, and coordination requirements. A cycle length range of 60 to 120 seconds is appropriate. Cycle lengths should not exceed 150 seconds.
- Unsignalized access should be located so as not to interfere with queues or maneuvering areas of signalized intersections and positioned to take advantage of gaps in, or less dense, traffic flows.
- Interference between through traffic and site traffic should be addressed by incorporating additional traffic lanes to accommodate turning vehicles and through vehicles. Adequate on-site storage and driveway dimensions should be designed to accommodate the traffic demand entering and exiting the site. Fewer, properly placed, and adequately designed driveways are preferable to a larger number of inadequately designed driveways, especially when spaced at least 500 feet apart. In all cases, the integrity of mainline traffic operations must not be compromised.

7.2.1 Number of Accesses per Parcel

Accesses are to be limited to one per lot or development for residential uses. Commercial lots or developments are not limited to one per lot and should be addressed on a case-by-case basis but not to exceed the access frontage requirements listed in the next sections. Additional accesses must be approved by the City upon completion of a circulation plan or Traffic Impact Study provided to the City indicating that more than one access is required to adequately handle the developments traffic volumes and further indicating that the additional access will not be detrimental to traffic flow on the adjacent street network. Circular driveways are considered one access. If a lot has a circular driveway then only a maximum of one more additional access may be granted.

All additional accesses in addition to the one stated above shall not exceed one access for frontage of 300 feet or less, two accesses for 300 to 600 feet of frontage and a maximum of two accesses for frontage greater than 500 feet, as approved by the City. Collector and Arterial roadways will have limited access. Where multiple parcels are consolidated, accesses shall also be consolidated according to City design and spacing standards. Temporary access may be granted to undeveloped property prior to completion of a final development plan if access is

needed for construction or preliminary site access. Temporary accesses are subject to removal, relocation, or redesign after final development plan approval.

7.2.2 Corner Spacing

Access to corner lots should be from the lesser-classified road at the greatest distance possible from the intersection, and should not be less than the distances shown in Table 12. This distance is measured from the centerline of the proposed access to the curb face or pavement edge of the adjacent intersecting street. Accesses shall not be located within the functional boundaries of intersections as outlined in Table 12 .

Table 12 - Access Distance from Corner According to Facility Type

FACILITY TYPE	PUBLIC STREET SPACING	REQUIRED SIGHT DISTANCE	MINIMUM DRIVEWAY SPACING	
			Same Side Upstream, Downstream, & Opposing Upstream	*Opposing Downstream*
Major Arterial	1320’	500’	250’	150’
Minor Arterial	660’	500’	200’	150’
Major Collector	660’	400’	175’	150’
Minor Collector	250’	400’	150’	125’
Residential Collector	250’	300’	100’	75’
Residential Standard	150’	300’	50’	50’

Notes:

1. **All access is determined by City and distances shown may be adjusted on a case-by-case basis if warranted by specific traffic conditions.**
2. **Measurement of public streets spacing shall be from centerline of right-of-way to centerline of right-of-way.**
3. **Measurement of driveway spacing shall be from centerline of proposed access to corner/edge of nearest driveway or road.**
4. **When two or more accesses serve the same multi-family/commercial development, distance between shall be at least 300 feet on Arterials and Major Collectors and 200 feet for all other roads.**
5. **When non-residential driveways cannot be separated with the spacing shown above they should be combined into a shared access with necessary access easements and agreements.**

7.2.3 Residential Access

New residential developments and subdivisions shall not have driveway access on arterials and major collectors. Minor subdivisions or “flag lots” are discouraged along arterials and major collectors. Accesses for these minor subdivisions are under the same criteria for design and spacing listed in Table 12. When two or more accesses serve adjacent single-family residential property, the minimum distance between the nearest points of the two accesses shall be at least 12 feet. For corner residential lots, one access on each frontage may be permitted if it is determined by the City that two driveways are needed to provide safe access for traffic entering and leaving the lot because of site distance and geometric design considerations. Double frontage residential lots will only have one access onto the lesser classified roadway unless approved by the City. Circular driveways are considered one access. If a lot has a circular

driveway then only a maximum of one more additional access may be granted. Single-family residential access driveways shall be a minimum of 12 feet in width and a maximum of 16 feet for a single garage, 20 feet for a double garage, and 27 feet for a triple garage. See Table 13 for all access widths.

Table 13 - Access Driveway Widths

	Single Family Residential	*Commercial/Multi Family Residential*	*Industrial*
Max. Driveway Width	40’	40’	40’
Min. Driveway Width	12’	25’	35’
Curb Radius	2.5’ - 10’	15’ - 30’	20’ - 30’

Notes:

1. All access widths are determined by City and widths may be adjusted on a case-by-case basis if warranted.
2. Driveways for accesses to large developments may be wider if necessary to accommodate turning lanes that are shown to be necessary by the traffic study.

In 2010, Ivins City developed a Special Assessment Area (SAA) project in the Historic Township Area for the installation of curbs, gutters, and sidewalks along with new asphalt paved streets. Property owners have historically accessed their property from any location adjacent to the public streets in a manner that would now be difficult to make consistent with the current access management policies. Therefore, an addendum was approved to establish the allowance of exceptions and variances from the adopted Transportation Master Plan standards for properties within the SAA that have existing residential structures prior to the formation of the SAA.

The Ivins City Technical Review Committee has been given the authority to consider and approve these variances such as:

- Allowing a mountable (modified) curb on minor and residential collector streets
- Eliminating the required landscape strip between curb and sidewalk
- Allowing properties to continue accessing at historical locations on collector streets where there would be no concerns of affecting street capacity
- Other minor modifications to cross-sections and street network functional classes in a manner to meet the purposes established above

7.2.4 Medians

Based upon safety and operational studies, median treatments such as two-way-left-turn lanes (TWLTL) and raised non-transferable medians may be required on major collector and arterial streets, as determined by the City.

7.2.5 Location, Spacing and Design of Intersections and Accesses

Design of accesses shall be in conformance to all City standards, where applicable, and should meet the design criteria as specified in Table 12 and Table 13. Accesses should be aligned directly with existing access on opposite side of parcel. Where it is not feasible to align driveways, major driveways on opposite side of the street should not be offset less than 150 feet. Where commercial lots are not large enough to allow access on opposite sides of the street to be aligned, the center of driveways not in alignment should be offset a minimum of 250 feet on all collector streets, and 300 feet on all major and arterial streets. Greater distances may be required if needed for left-turn storage lanes.

Where two or more accesses serve the same or adjacent non-single-family residential development, the minimum distance between the centerlines of accesses should be at least 200 feet on streets with design speeds below 30 mph and 300 feet on streets with design speeds above 30 mph. If adjacent driveways cannot be separated by the distances outlined, they should be combined into a single joint access. At least 300 feet of clear sight distance shall be provided for drivers entering or leaving all accesses onto local streets; 400 feet for collector streets; and 500 feet for arterial streets.

7.2.6 Auxiliary Lanes

Auxiliary lanes provide a buffer between through traffic and turning vehicles. Especially on roads with high volumes and/or high speeds, auxiliary lanes provide safe areas for cars to turn onto adjacent roadways.

7.2.6.1 Turning Lanes

Turning lanes remove the turning traffic from the through travel lanes. Left-turning lanes are used to separate the left-turning traffic from the through traffic. Right-turn lanes reduce traffic delays caused by the slowing of right-turning vehicles. Designated right- or left-turn lanes are generally used in high traffic situations on arterial and collector roadways. A traffic impact study will identify the need for and make recommendations on the design of turning lanes or tapers based on the existing traffic volumes, speed, and the projected impacts of the proposed use and make recommendations on the design of the turning lane.

Table 14 shows the minimum right turn volume-per-hour where a right-turn lane is recommended.

Table 14 - Right Turn Deceleration Lane Minimum Volumes

Right Turn deceleration lane

Functional Class	Peak Hr Right Turn Volume VPH
Residential Collector	25
Major Collector	25
Minor Arterial	10
Arterial Major	10

Right-turn deceleration, and taper are required when the project peak hour right-turn ingress turning volume is greater than or equal to the values shown in the table below.

Right-of-way shall be provided to accommodate a dual left-turn when two arterials are intersecting, and when it is anticipated that future left-turn traffic volumes during the peak hour will exceed 200 vehicles per hour. An additional 12 feet for a dual left-turn, and an additional 12 feet for a right-turn deceleration lane is required.

7.2.6.2 Storage Length

The length of the turning lane shall be a minimum of 100 feet. At an unsignalized intersection it shall be a minimum length to accommodate two 25-foot vehicles based on the number of vehicles likely to arrive in a 2-minute period at peak hour. For signalized intersections, the storage length shall be 10% of the peak hour design year volume expressed in feet. Table 15 shows the recommended turning lane length for unsignalized and signalized intersections.

Table 15 - Turning Lane Recommended Lane Length

Storage Length

	Turning Lane storage length (100 feet minimum)
Unsignalized intersection	2 times the number of cars likely to arrive in a 2 minute period during peak hour*
Signalized intersection	10% of the peak hour design year volume expressed in feet*

** assume 25 feet per vehicle*

** 2004 AASHTO Geometric Design of Highways and Streets*

7.2.6.3 Lane Width

Turning lanes shall normally be a minimum of 12 feet in width. Any exception will require approval from the City Engineer. For right-turn lanes, provide an additional 12 feet of pavement to accommodate the lane. The table below, Table 16, provides warrants when auxiliary lanes are to be installed.

7.2.6.4 Left-Turn Lanes

The provision of left-turn lanes is essential from both capacity and safety standpoints, where left turns would otherwise share the use of a through lane. Shared use of a through lane will dramatically reduce capacity, especially when opposing traffic is heavy. Left-turn lanes shall be provided at a signalized intersection. The table below provides warrants when auxiliary lanes are to be installed.

Table 16 - Minimum Volumes for Left Turn Lanes on Rural Two-Lane Roads

Guide for Left-Turn and Right-Turn Lanes on Two Lane Highways

Minimum levels for installation of turn lane and acceleration lane on rural two lane roads				
Speed	Left Turn Lane	Right Turn Lane	Right Turn Acceleration Lane	Left Turn Acceleration Lane
40 MPH and less	25 VPH	50 VPH	N/A	N/A
45 and up	10 VPH	25 VPH	50 VPH	**

** Farm Access Excluded*

*** Optional for 50 MPH and less; for 55 MPH as required by the City Engineer*

**** As required by the City Engineer*

VPH = vehicles per hour in any on hour period in passenger car equivalents

Source UDOT Standard drawing

7.2.6.5 Right-Turn Lanes

Right-turn lanes remove the speed differences in the main travel lanes, thereby reducing the frequency and severity of rear-end collisions. They also increase capacity of signalized intersections and may allow more efficient traffic signal phasing. Table 16 illustrates typical warrants for left- and right-turn lanes, based on posted speed and traffic volumes.

7.2.6.6 Length of Auxiliary Lanes

A separate turning lane consists of a taper plus a full width auxiliary lane. The design of turn lanes is based primarily on the speed at which drivers will turn into the lane, the speed to which drivers must reduce in order to turn into the driveway after traversing the deceleration lane, and the amount of vehicular storage that will be required. These three components are shown in Figure 22. Other special considerations include the volume of trucks that will use the turning lane and the steepness of an ascending or descending grade.

The total length of an auxiliary lane is made up of the storage length plus the distance necessary to come to a stop from the prevailing speed of the road and the taper distance (which both vary based on speed). The length needed for a vehicle to come to a stop from either the design speed or an average running speed of a roadway is shown in Table 17. These deceleration lengths assume the roadway is on a 2 percent or less vertical grade. It is a common practice to include the taper length and deceleration distance as shown in the figure below. This plus the storage distance will result in the total distance needed including the taper.

7.2.6.7 Deceleration Length

Table 17 - Deceleration Lengths based on Speed

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

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

Figure 22 shows the relationship between storage, deceleration length, and taper length.

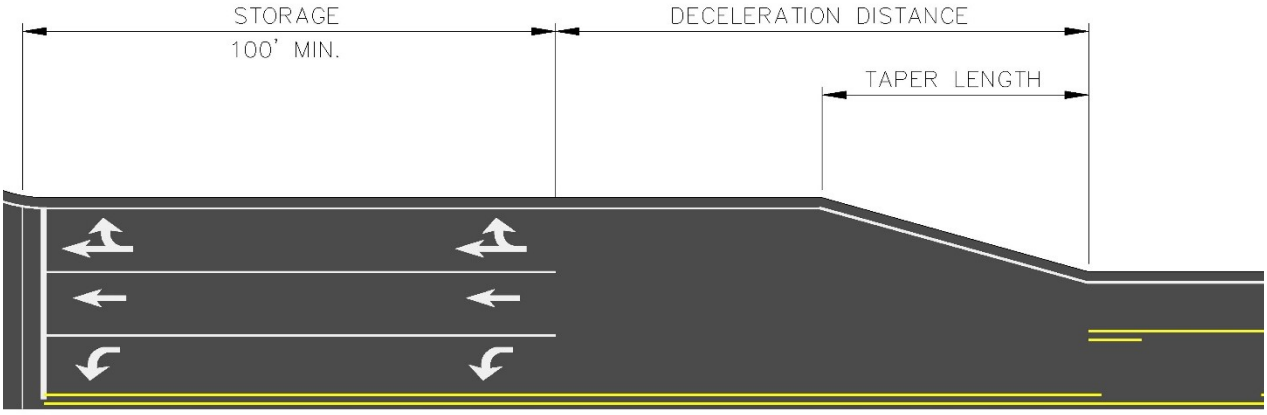


Figure 22 - Diagram of Storage, Deceleration, and Taper Lengths

7.2.6.8 Taper Length

A taper length of 90 feet for speeds below 45 mph, 140 feet for speeds of 45 to 50 mph, and 180 feet for speeds over 50 mph is typical. If a dual turn lane is to be provided, it is recommended that a 10:1 taper be used to develop the dual lanes. The taper will allow for additional storage during short duration surges in traffic volumes.

7.2.7 Where to Use Access Management

Access Management shall be used on all roadways within Ivins City. Roads, like other resources, also need to be carefully managed. Corridor access management strategies extend the useful life of roads at little or no cost to taxpayers. Access management can be used as an inexpensive way to improve performance on a major roadway that is increasing in volume. Access management should be used on new roadways and roadways that are to be improved so as to prolong the usefulness of the roadway.

8 Street Lighting

It will be important to maintain and upgrade street lighting as the years progress. Street lights will be replaced in a systematic fashion so all lights will be addressed. For more information about how lights should be installed, refer to Ivins City Standard Specifications and the Lighting Ordinance.

9 Intelligent Transportation Systems Solutions

A part of the future of transportation is Intelligent Transportation Systems (ITS). ITS plans provide for the use of connected and autonomous vehicles (CAV) by planning communication infrastructure.

Figure 23 depicts the current fiber optic utilities that exist within the boundary of Ivins. This knowledge base opens possibilities for collaboration with telecommunication companies in the future. As an example, if an ITS device such as a traffic camera was needed in the near term and this camera was proposed to be on Center Street, TDS could be contacted to see if this connection could exist as there is a fiber optic line that is located at Center Street. There is also a CenturyLink fiber optic line in Ivins City, but the location is currently unknown to the City.

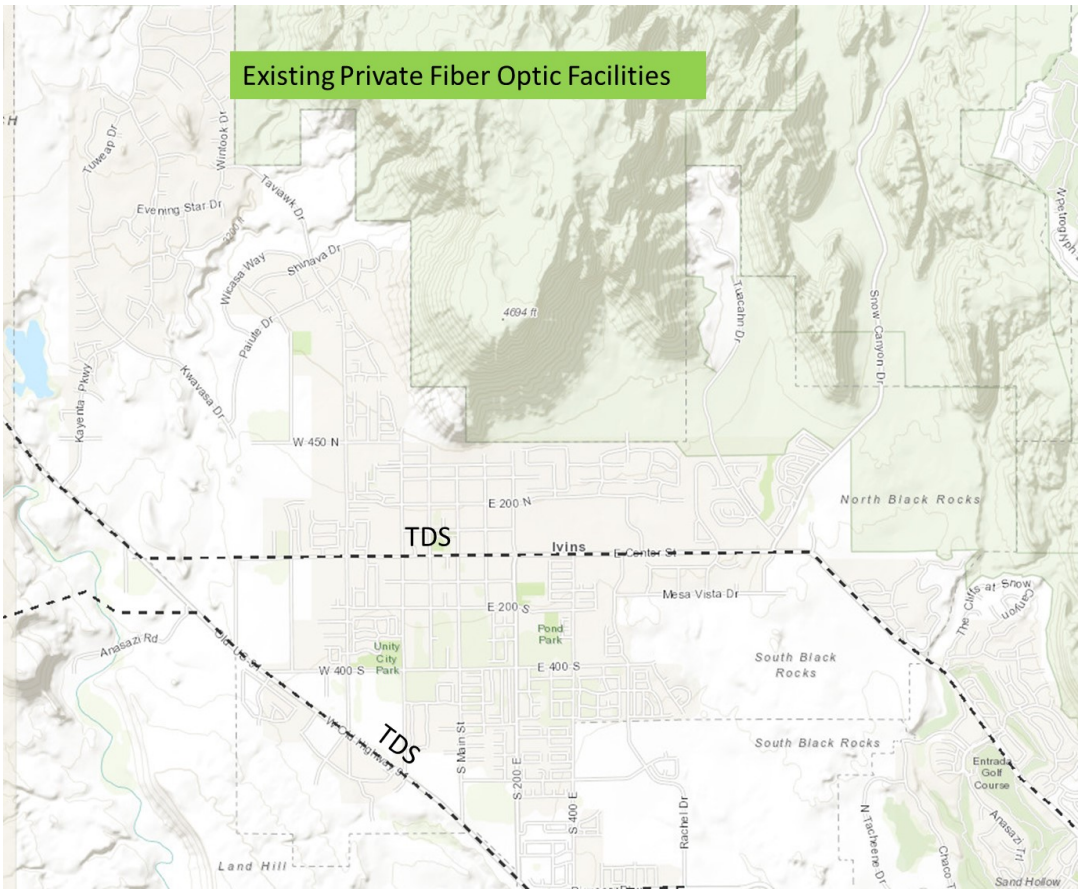


Figure 23 - Existing Private Fiber Optic Facilities in Ivins, UT

The Dixie MPO (DMPO) has an adopted ITS Communications Plan that shows where future Regional ITS conduit could be placed and a recommended timeframe for installation of these projects. Figure 24 is taken from the Dixie MPO Plan that shows possible projects in the coming years. The highest priority projects in red consist of 1D conduit (a cluster of 4 individual 1.25-inch diameter conduit) to be placed in Center Street and 200 East. This cluster of conduits is planned to accommodate 144 strands of fiber optic cable. The next priority, or Priority 2, would be within the Western Corridor, place an MD7 conduit (an individual 3" diameter conduit with 7 distinct chambers inside the pipeline to separate fiber optic strands) that will convey 72 strands of fiber optic cable. The Western Corridor south of Old Highway 91 would have a pair of MD7 conduit to carry 288 strands of fiber optic cable. A segment of Old Highway 91 also shares Priority 2 from Rachel Drive to 200 East with an MD7 conduit. A later priority, Priority 3, suggests an MD7 conduit be placed in Old Highway 91 from 200 East to 6210 West, with 144 strands of cable.

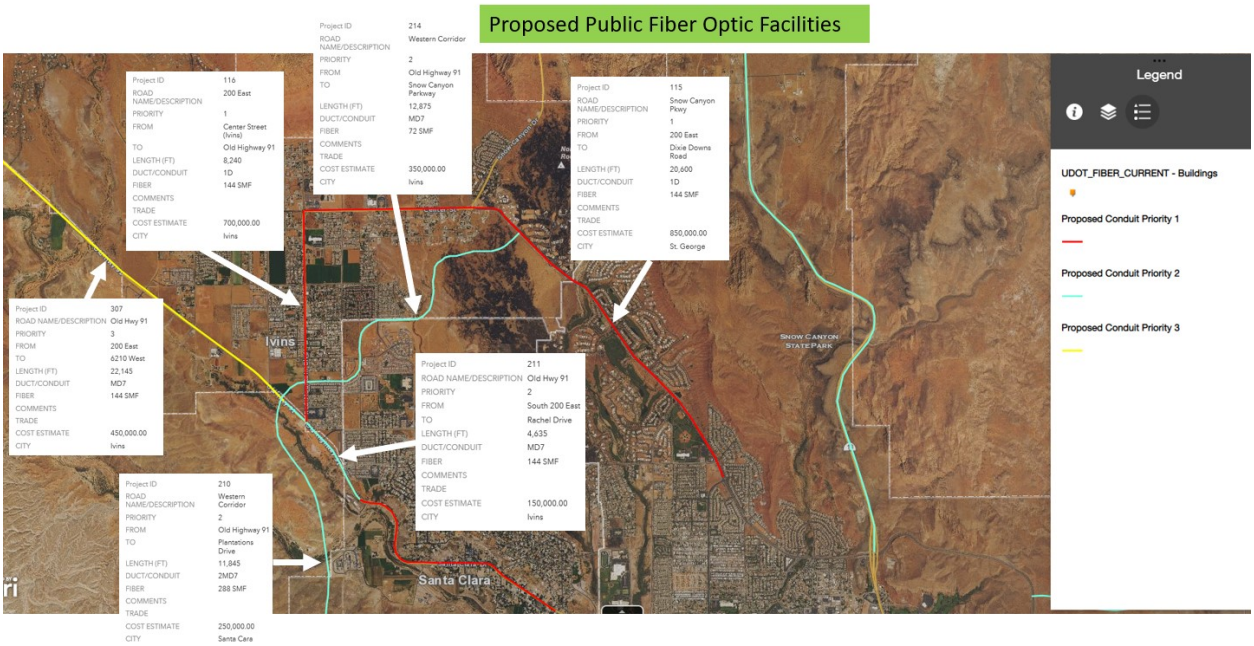


Figure 24 - DMPO ITS Plan for Ivins City

The DMPO recommends the following projects be completed in the highest priority areas:

- Dedicated short-range communication (DSRC) roadside units as needed
- Backhaul fiber optic infrastructure with adequate bandwidth that is scalable for future expansion
- Retroreflective signage
- Road markings
- Rumble strips as needed in conjunction with shoulder and centerline striping
- Connected traffic signals that interface with DSRC units
- Road repair and an effective maintenance plan
- Designated safe harbor areas
- Identification of roadways that support connected and autonomous vehicles (CAV) through signage or signal transmission

- Develop an effective data management and security plan for supported ITS infrastructure

The second priority projects are meant to be built in addition to the first priority projects. The second priority projects include:

- 5G cellular infrastructure, if available
- Barcoded signage if available, otherwise continue using retroreflective signage
- Connected traffic signals with 5G cellular interface if available
- Pedestrian signalized crosswalks
- Upgradable data management and security for the entire ITS system as required
- Add smart parking as needed

In addition to the infrastructure listed in the first and second priorities, the following projects are recommended as a part of the third priority:

- Continue using DSRC roadside unites unless infrastructure is available for 5G or greater cellular connectivity
- Add digital wireless signage if available
- Add advanced road markings if available
- Add designated CAV lanes
- Upgrade the data management and security systems for the entire ITS

The recommendations given by the DMPO are helpful for prioritizing what Ivins City needs for ITS infrastructure. Some of the projects are already completed, such as the retroreflective signing, which is already in use in Ivins City. Based on these recommendations, the following are the priorities for ITS infrastructure in Ivins City:

- Installing roadside communication units along major corridors, including having conduit available along key roadways
- Ensuring all major corridors are striped for ITS, with the potential to upgrade to a more reflective striping in the future
- Connecting traffic signals
- Providing pedestrian signalized crosswalks where required, especially on the major roundabouts in Ivins City
- Identifying potential safe harbor areas for CAVs
- Fully funding road maintenance programs

After Priority 1 fiber optic is placed in Center Street and 200 East, traffic cameras can then be located along this path, denoted by red dots on Figure 25.

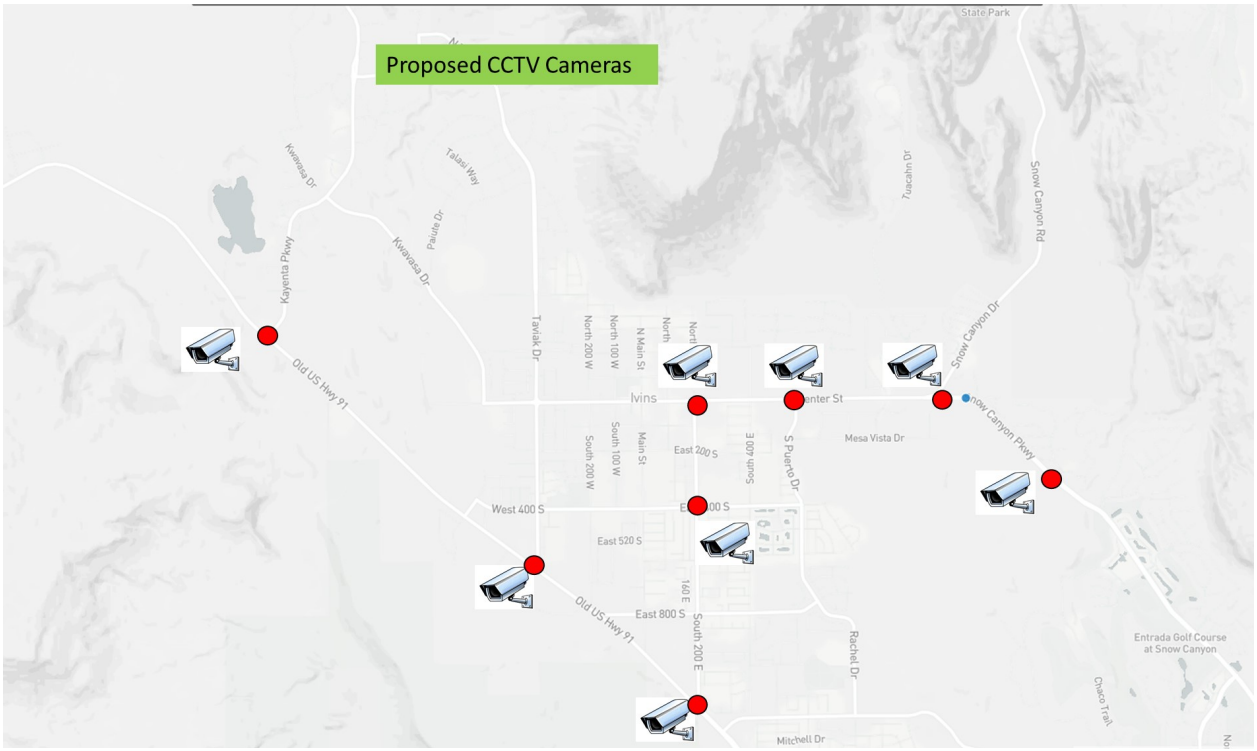


Figure 25 - Proposed CCTV Camera Locations

CCTV traffic cameras provide another resource to cities and other agencies to view traffic issues in real time. At locations with live cameras, it is possible to access images of traffic queues, congestion, traffic incidents or crashes, or weather conditions. In real time, decisions can be made about lane closures, clearance time for traffic incidents can be estimated, or complaints can be addressed.

There is a possibility of placing devices in other locations using Bluetooth wireless technology so a fiber optic line does not need to be hardwired to those locations. As this streaming technology continues to evolve, communication possibilities are improved and wireless video quality will be enhanced.

9.1 ITS Funding

Every year, ITS funding is made available through the Dixie MPO. These funds are set aside for ITS planning projects. City jurisdictions can apply for these funds and use them as needed. In addition to the MPO funding, ITS projects can be funded by including ITS plans into budgets of bigger projects. For example. If a road is being widened, it may provide an opportunity to install ITS infrastructure. The budget for the road widening can account for the ITS installation with careful and conscientious planning.

10 Transportation Corridor Preservation

This chapter identifies and evaluates techniques that can be used to preserve defined corridors for future transportation facilities.

10.1 Introduction

Several recent research efforts have addressed the issue of corridor preservation. The 1990 Report of the American Association of State Highway and Transportation Officials (AASHTO) Task Force on Corridor Preservation provided an identification and evaluation of various techniques. Subsequent efforts of the Federal Highway Administration (FHWA) and Transportation Research Board (TRB) have added to the literature. Drawing from these documents and a brief review of relevant Utah law, this chapter provides a discussion of potential techniques that may have applicability to Ivins City. A bibliography of the relevant publications is included.

10.2 Definitions

For purposes of this discussion, a "corridor" is defined as "the path of a transportation facility that already exists or may be built in the future". The AASHTO report defines corridor preservation as "a concept utilizing the coordinated application of various measures to obtain control of or otherwise protect the right-of-way for a planned transportation facility". The AASHTO report further defines the objectives of corridor preservation as follows:

- Prevent inconsistent development
- Minimize or avoid environmental, social, and economic impacts
- Reduce displacement
- Prevent the foreclosure of desirable location options
- Allow for the orderly assessment of impacts
- Permit orderly project development
- Reduce costs

10.3 Targeted Corridors

Ivins City has plans for multiple corridors within the city where right-of-way will need to be acquired or preserved. The following is a list of locations where right-of-way will be needed:

- Western Corridor
- Additional width on Old Highway 91
- Additional width on Kayenta Parkway
- Additional width on Kwavasa Drive
- Roundabout at Kayenta Parkway and Kwavasa
- Roundabout at Old Highway 91 and Main Street
- Roundabout at Old Highway 91 and 200 West
- All Future Roundabouts

10.4 Corridor Preservation Techniques

Techniques for corridor preservation fall into the following three major categories: (1) acquisition, (2) exercise of police powers, and (3) voluntary agreements and governmental inducements. The various issues associated with each corridor are unique. Therefore, one preservation technique cannot be recommended as the best for all situations. The purpose of this chapter is to provide a "toolbox" of techniques available, a brief summary of each is provided below.

10.4.1 Acquisition

This technique involves the purchase of fee simple or lesser interests in property to bank or preserve it for the corridor location. This could be accomplished using federal funds or by using state funds where a project would be implemented without federal participation. The use of state funds could generally be accomplished with more flexibility and fewer requirements. If federal funds are used, or expected to be used for future elements of the project, certain federally required procedures must be followed. Acquisition can be accomplished in the following ways.

10.4.2 Advance Purchase and Eminent Domain

Undeveloped property is acquired, either by direct purchase or eminent domain, and "banked" until needed for construction. Such a method may systematically acquire the entire right-of-way or it may strategically acquire only selected parcels.

Under Utah statutes, acquisition of property by eminent domain is authorized if (a) the use is authorized by law, (b) the taking is necessary for such use, (c) the construction and use of property will commence within a reasonable time, and (d) fair compensation is paid. Fair value must be paid for interests taken and damages which accrue to the remainder of adjacent property not taken (Utah Code Annotated §78-34-1).

Before property may be taken for a corridor the acquiring agency must identify the corridor location, general route and termini. If the acquiring agency, without reasonable justification, does not commence or compete construction and use of a roadway within the corridor within the time specified, additional damages might be payable to a property owner (Utah Code Annotated §27-12-96).

10.4.3 Hardship Acquisition

Property is acquired to alleviate a particular hardship to a property owner. The hardship must occur as a result of an inability to sell the property due to public awareness of the pending project. Applies only to limited parcel-by-parcel actions in extraordinary or emergency situations (Utah Code Annotated §27-12-96).

10.4.4 Purchase Options

A conditional contract or option is executed that gives the public agency the right but not the obligation to buy the property at a future date. The contract would specify the terms and conditions of the future purchase (Utah Code Annotated §27-12-96). A related concept involves

the use of rights of first refusal under which the government entity obtains the first right to purchase the property when a landowner determines to sell its property.

10.4.5 Development Easements

The government agency purchases development rights or a development easement. The agreement would specify the uses that would be allowed on the land. The public agency would purchase the property owner's right to develop the land, leaving the owner with all other rights of ownership. Thus, intensification of and use or development would be precluded.

Existing Utah law provides for conservation easements to maintain land or water areas predominantly in a natural scenic, or open condition, or for recreational, agricultural, cultural, wildlife habitat or other use or condition consistent with the protection of open land. Such easements must be granted to a tax-exempt organization or government agency and cannot be obtained by eminent domain. The easement may be terminated pursuant to conditions set forth in the easement document (Utah Code Annotated §47-18-1).

10.4.6 Public Land Exchanges

Surplus government land is exchanged as compensation for private property needed for right-of-way.

10.4.7 Private Land Trusts

Private land trusts play an increasingly important role in land conservation where public objectives are aligned with private trust objectives. Where government budgets are insufficient to acquire critical tracts in a given time frame, private land trusts may acquire the tracts and hold them for future acquisition by the government.

10.4.8 Exercise of Police Powers

Regulatory controls under the police power can be used to control the development of private property in order to preserve the transportation corridor. These measures impose requirements with no compensation to the landowner. Land use and development controls are typically administered by local governments (36 A.L.R.3d 751).

10.4.9 Impact Fees and Exactions

This method involves a mandatory property or monetary contribution by a developer to the local jurisdiction as a condition of a land use approval or permit. These approvals or permits could be associated with a contract zoning, site plan approval, proposed subdivision, special use permit, or other development permission. In most cases, impact fees and exactions can be assessed only after a jurisdiction makes an individualized determination that the required dedication is "roughly proportional" in both nature and extent to the impact of the proposed development. Impact fees and exactions include the following variations (Utah Code Annotated §11-36-201).

- In-kind contributions – Land owners and developers construct improvements or dedicate land for public facilities or right-of-way within or abutting the development site.

- Monetary payments in lieu of contributions – Developers pay money in lieu of or in addition to in-kind contributions. This method may be used where the pooled contributions of numerous small developments is more effective than individual dedications of small parcels of land. The money is then used to acquire right-of way or make other improvements.
- Impact fees – This method applies to a broader range of improvements whose need is generated by a new development. The effected jurisdiction charges developers for a pro rata share of capital funding for the improvements based on relative contributions to the impacts of the development by newly developed property and existing developments.

Constitutional standards of reasonableness govern the validity and amount of impact fees and exactions. To be constitutional, an impact fee or exaction must be a fair contribution in relation to contributions by others. Thus, an impact fee or exaction must not require newly developed properties to bear more than their equitable share of the capital costs in relation to the benefits conferred.

Eight factors must be considered in analyzing the fairness of an impact fee or exaction (Utah Code Annotated §11-36a-304.2):

1) The cost of each existing public facility that has excess capacity to serve the anticipated development resulting from the new development activity;
2) The cost of system improvements for each public facility;
3) Other than impact fees, the manner of financing for each public facility, such as user charges, special assessments, bonded indebtedness, general taxes, or federal grants;
4) The relative extent to which development activity will contribute to financing the excess capacity of and system improvements for each existing public facility, by such means as user charges, special assessments, or payment from the proceeds of general taxes;
5) The relative extent to which development activity will contribute to the cost of existing public facilities and system improvements in the future;
6) The extent to which the development activity is entitled to a credit against impact fees because the development activity will dedicate system improvements or public facilities that will offset the demand for system improvements, inside or outside the proposed development;
7) Extraordinary costs, if any, in servicing the newly developed properties; and
8) The time-price differential inherent in fair comparisons of amounts paid at different times.

In addition to constitutional limitations, in 1995 the Utah legislature in special session adopted stringent controls on the ability of local government to adopt impact fees to finance development growth. The new act requires that prior to the imposition of an impact fee, a government entity must do the following (Branberry Development Corporation v South Jordan City):

- Prepare a capital facilities plan that establishes that impact fees are necessary to achieve an equitable allocation to the costs borne in the past and to be borne in the future in comparison to the benefits already received and yet to be received.

- Prepare a written analysis of the impact fee identifying the impact on the system caused by the development activity, demonstrate how those impacts are reasonably related to the development activity, estimate the proportionate share of the impact cost that are reasonably related to the new development activity, and identify how the impact fee was calculated.
- Find that an impact fee is reasonably related to the new development based on analyses of specific factors.
- Calculate the impact fee based on a list of defined criteria.
- Hold public hearings on the adoption of the impact fee ordinance.
- Establish a service area within which the jurisdiction calculates and imposes impact fees for various land use categories and either adopts a schedule of such fees by use category or establishes the formula for calculating such fees by use category.

The act contains other requirements relating to environmental mitigation fees, definitions of public facilities and in some cases detailed standards governing the adoption and administration of impact fees.

10.4.10 Setback Ordinances

A local ordinance establishes a certain distance from a curb, right-of-way, property line, or structure within which construction is prohibited. These requirements may be contained within subdivision ordinances, zoning ordinances or building codes.

Setback requirements do not constitute a compensable taking (Hargraves v Young). But if setbacks or minimum lot sizes have the effect of prohibiting all economic use of property for otherwise permitted uses, a taking may occur.

10.4.11 Official Maps or Maps of Reservation

Development is prohibited within proposed right-of-way in areas covered by an official master street plan adopted by the jurisdiction. The official map may be used to plat future as well as existing streets. Generally, prohibition of development must not exceed a reasonable period after the implementing agency is advised of proposed development.

Prior to 1992, Utah law permitted the adoption of an official street map by municipalities and counties. Under prior law, the official street map had the legal effect of prohibiting development within the boundaries of the proposed street unless approved by the legislative body. Beginning in July of 1992, counties and municipalities were specifically prohibited from adopting an official map. Moreover, current law provides that an official map adopted under prior law does not require the municipality or county to acquire the property designated for eventual use as a public street. Utah law also expressly provides that an official map may not be used to unconstitutionally prohibit development of property (Utah Code Annotated §§17-27-7, 10-9-23).

Some courts have held that statutes permitting government to impose a development moratorium on property, located in a proposed transportation corridor during a period of reacquisition planning, unconstitutionally permits the taking of property without just compensation. Other courts have held that where the purpose of the government action is the prevention of

development of land, that would increase the cost of planned future acquisition of such land by government, is unconstitutional. Some courts have found official maps unconstitutional if they also include compensation for the property owner for the period of temporary deprivation of the right to develop. Other statutory schemes have been validated when they allow development to proceed to avoid substantial damage to a property owner (Utah Code Annotated §§17-27-307, 10-9-306).

10.4.12 Adequate Public Facilities and Concurrency Requirements

Some communities address infrastructure needs by adopting ordinances that require a concurrency program intended to ensure that public facilities such as transportation systems are either in place, planned for, or provided as impacts occur from new development. Tools for implementation include carrying capacity limits, development caps, phasing systems, growth rate control, and other similar tools. This concept does not necessarily require developers pay for improvement, but does require that such improvements be made when development occurs.

APPENDICES

APPENDIX A
Ivins City 2010-2020 Accident Data

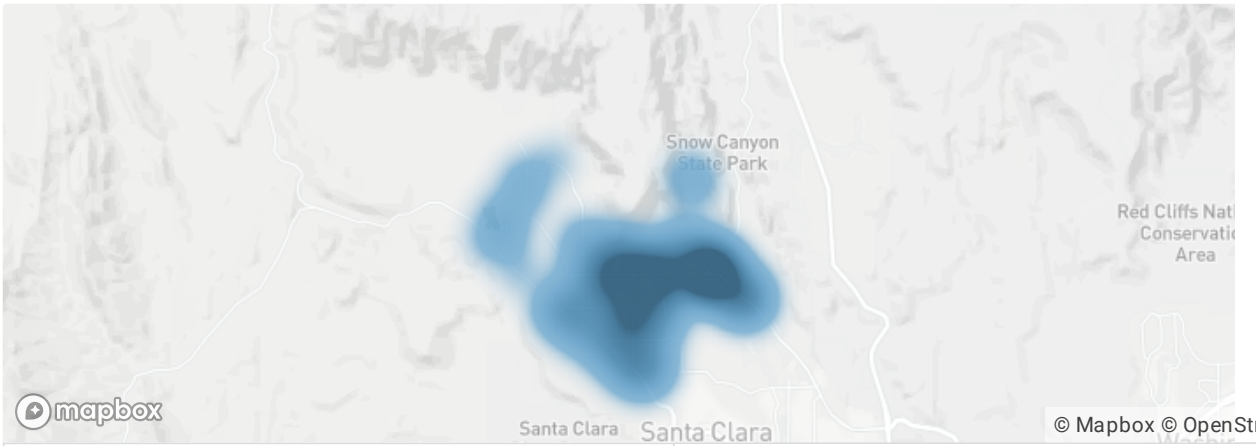
CRASH SUMMARY REPORT

Ivins Crashes 2010-2020

Created on April 2, 2021
Created by Emily Andrus
Data extents: January 11, 2010 to December 10, 2020

Applied Filters

City (Geo) = Ivins | Crash Date Time (Year) ≤≥ 2010 - 2020



Total Crashes	211	Fatal Crashes	2

UDOT Crash Summary		Crashes
Total Crashes	211	100.00%
Intersection Related	127	60.19%
Roadway Departure	63	29.86%
Speed Related	23	10.90%
Distracted Driving	19	9.00%
Motorcycle Involved	15	7.11%
DUI	14	6.64%
CMV Involved	10	4.74%
+ 5 more	29	13.74%

Crash Severity		Crashes
No injury/PDO	133	63.03%
Possible injury	48	22.75%
Suspected Minor Injury	20	9.48%
Suspected Serious Injury	8	3.79%
Fatal	2	0.95%
Unknown	0	0.00%

Injury Level		People
No injury	396	77.19%
Possible injury	85	16.57%
Suspected Minor Injury	21	4.09%
Suspected Serious Injury	8	1.56%
Fatal	2	0.39%
Unknown	1	0.19%

Manner of Collision		Crashes
Not Applicable/Single Vehicle	85	40.28%
Angle	43	20.38%
Sideswipe Same Direction	25	11.85%
Front to Rear	22	10.43%
Parked Vehicle	17	8.06%
Head On (front-to-front)	7	3.32%
Sideswipe Opposite Direction	6	2.84%
Other*	3	1.42%
+ 3 more	3	1.42%

Crash Date Time (Year)		Crashes
2020	19	9.00%
2019	30	14.22%
2018	27	12.80%
2017	11	5.21%
2016	11	5.21%
2015	24	11.37%
2014	18	8.53%
2013	19	9.00%
+ 4 more	52	24.64%

Roadway Surface Condition		Crashes
Dry	187	88.63%
Wet	17	8.06%
Unknown	3	1.42%
(retired) Sand, Dirt, Gravel	2	0.95%
Ice/Frost	1	0.47%
Oil	1	0.47%
+ 9 more	0	0%

Weather Condition		Crashes
Clear	177	83.89%
Cloudy	17	8.06%
Rain	14	6.64%
Unknown	2	0.95%
Other	1	0.47%
+ 6 more	0	0%

Most Harmful Event		Vehicle
Collision With Other Motor Vehicle in Transport	215	63.61%
Collision With Parked Motor Vehicle	24	7.10%
Other Fixed Object*	15	4.44%
Pedestrian	9	2.66%
Tree/Shrubbery	9	2.66%
Concrete Barrier	8	2.37%
Overturn/Rollover	7	2.07%
Unknown	6	1.78%
+ 47 more	45	13.33%

Light Condition		Crashes
Daylight	151	71.56%
Dark - Not Lighted	27	12.80%
Dark - Lighted	24	11.37%
Dark - Unknown Lighting	3	1.42%
Dusk	2	0.95%
Unknown	2	0.95%
Dawn	1	0.47%
Other	1	0.47%

Bicycle Involved		Crashes
N	203	96.21%
Y	8	3.79%

Motorcycle Involved		Crashes
N	196	92.89%
Y	15	7.11%

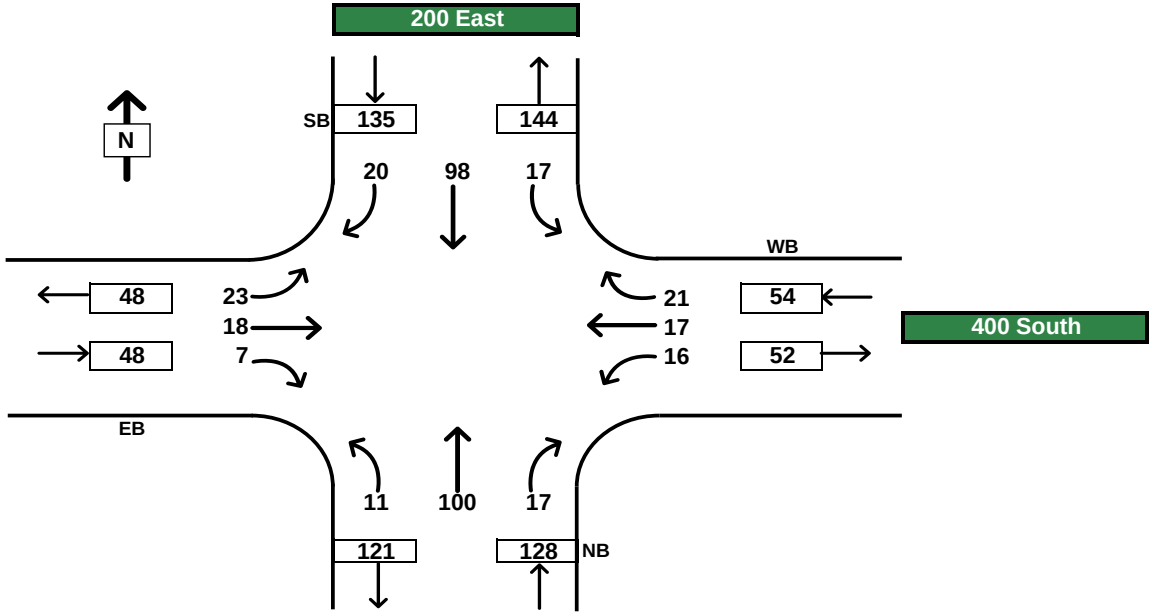
APPENDIX B
2020 Ivins City Intersection Counts

TRAFFIC COUNT SUMMARY

City: **Ivins, UT**
N-S Street: **200 East**
E-W Street: **400 South**
Date: **Friday, February 28, 2020**
Begin Time: **01:15 PM**
Interval Length: **15 min**

HORROCKS ENGINEERS

Time Interval		SB				WB				NB				EB				Total	Hourly
		Left	Thru	Right	PED	Left	Thru	Right	PED	Left	Thru	Right	PED	Left	Thru	Right	PED	All Moves	Totals
		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16		
01:15 PM	01:30 PM	4	22	9	0	7	2	0	0	6	22	5	0	6	7	2	0	92	
01:30 PM	01:45 PM	3	30	2	0	2	1	5	0	2	19	2	0	5	5	0	0	76	
01:45 PM	02:00 PM	7	26	7	0	2	7	6	0	1	29	3	0	4	3	3	0	98	
02:00 PM	02:15 PM	3	20	2	0	5	7	10	0	2	30	7	0	8	3	2	0	99	365



ADJUSTED PEAK HOUR TRAFFIC VOLUMES												
Southbound			Westbound			Northbound			Eastbound			
Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	
17	98	20	16	17	21	11	100	17	23	18	7	
135			54			128			48			
Trucks:		0%	Trucks:		0%	Trucks:		0%	Trucks:		0%	
Peak Hour:		1:15:00 PM		2:15 PM		Peak Vol:		365	PHF:		0.92	

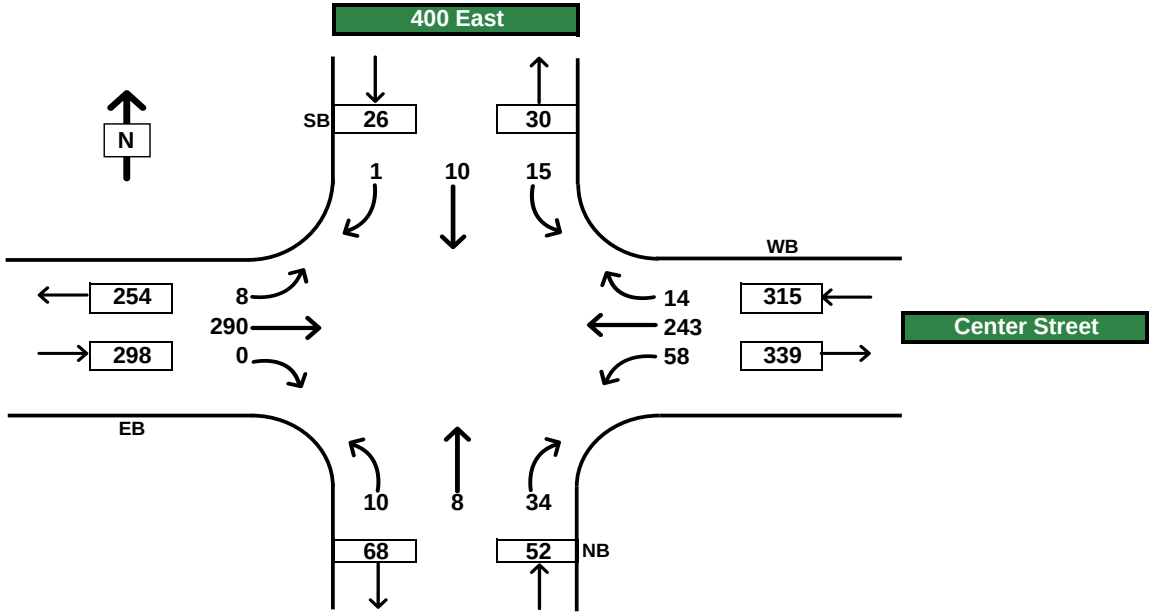
OPTIONAL	
Adjustment Factor	
Monthly:	1.00
Daily:	1.00
Interval:	1.00
Count:	1.00
Total:	1

TRAFFIC COUNT SUMMARY

City: **Ivins, UT**
N-S Street: **400 East**
E-W Street: **Center Street**
Date: **Friday, March 6, 2020**
Begin Time: **01:15 PM**
Interval Length: **15 min**

HORROCKS ENGINEERS

Time Interval		SB				WB				NB				EB				Total	Hourly
		Left	Thru	Right	PED	Left	Thru	Right	PED	Left	Thru	Right	PED	Left	Thru	Right	PED	All Moves	Totals
		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16		
01:15 PM	01:30 PM	5	2	1	0	9	56	0	0	2	0	10	0	0	64	0	0	149	
01:30 PM	01:45 PM	3	4	0	0	9	54	0	0	2	2	11	0	0	78	0	0	163	
01:45 PM	02:00 PM	6	3	0	0	19	61	5	0	3	3	9	0	3	82	0	0	194	
02:00 PM	02:15 PM	1	1	0	0	21	72	9	0	3	3	4	0	5	66	0	0	185	691



ADJUSTED PEAK HOUR TRAFFIC VOLUMES												
Southbound			Westbound			Northbound			Eastbound			
Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	
15	10	1	58	243	14	10	8	34	8	290	0	
26			315			52			298			
Trucks:		0%	Trucks:		0%	Trucks:		0%	Trucks:		0%	
Peak Hour:		1:15:00 PM			2:15 PM	Peak Vol:		691	PHF:		0.89	

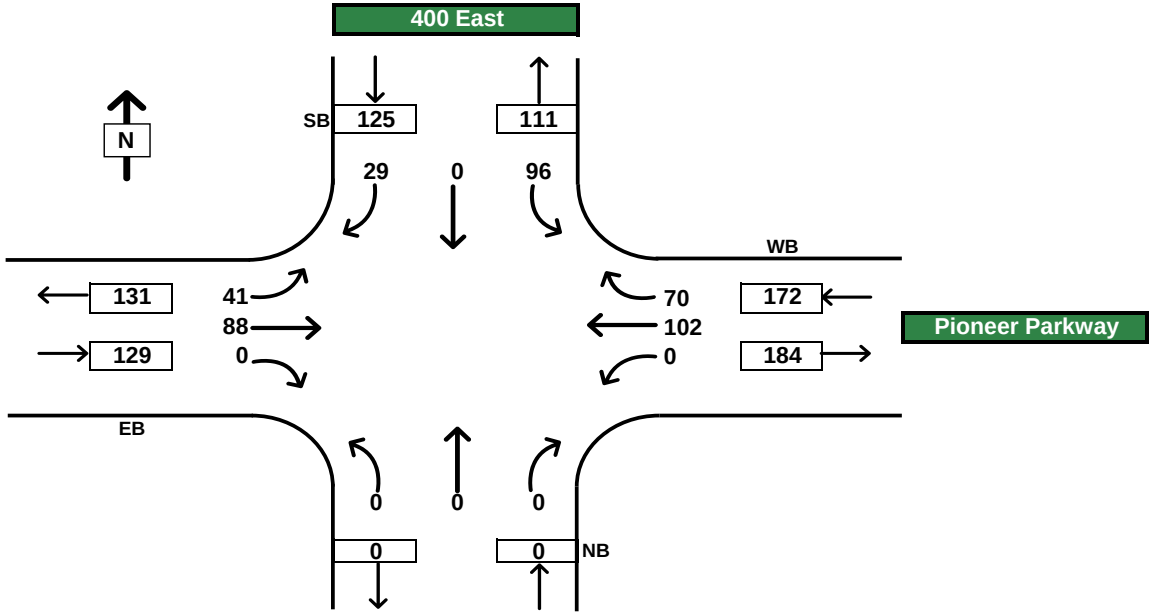
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Adjustment Factor	
Monthly:	1.00
Daily:	1.00
Interval:	1.00
Count:	1.00
Total:	1

TRAFFIC COUNT SUMMARY

City: **Ivins, UT**
N-S Street: **400 East**
E-W Street: **Pioneer Parkway**
Date: **Friday, February 21, 2020**
Begin Time: **12:15 PM**
Interval Length: **15 min**

HORROCKS ENGINEERS

Time Interval		SB				WB				NB				EB				Total	Hourly
		Left	Thru	Right	PED	Left	Thru	Right	PED	Left	Thru	Right	PED	Left	Thru	Right	PED	All Moves	Totals
		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16		
12:15 PM	12:30 PM	19	0	7	0	0	21	14	0	0	0	0	0	10	30	0	0	101	
12:30 PM	12:45 PM	16	0	8	0	0	27	14	0	0	0	0	0	5	14	0	0	84	
12:45 PM	01:00 PM	27	0	9	0	0	29	20	0	0	0	0	0	11	25	0	0	121	
01:00 PM	01:15 PM	34	0	5	0	0	25	22	0	0	0	0	0	15	19	0	0	120	426



ADJUSTED PEAK HOUR TRAFFIC VOLUMES												
Southbound			Westbound			Northbound			Eastbound			
Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	
96	0	29	0	102	70	0	0	0	41	88	0	
125			172			0			129			
Trucks:		0%	Trucks:		0%	Trucks:		0%	Trucks:		0%	
Peak Hour:		12:15:00 PM		1:15 PM		Peak Vol:		426	PHF:		0.88	

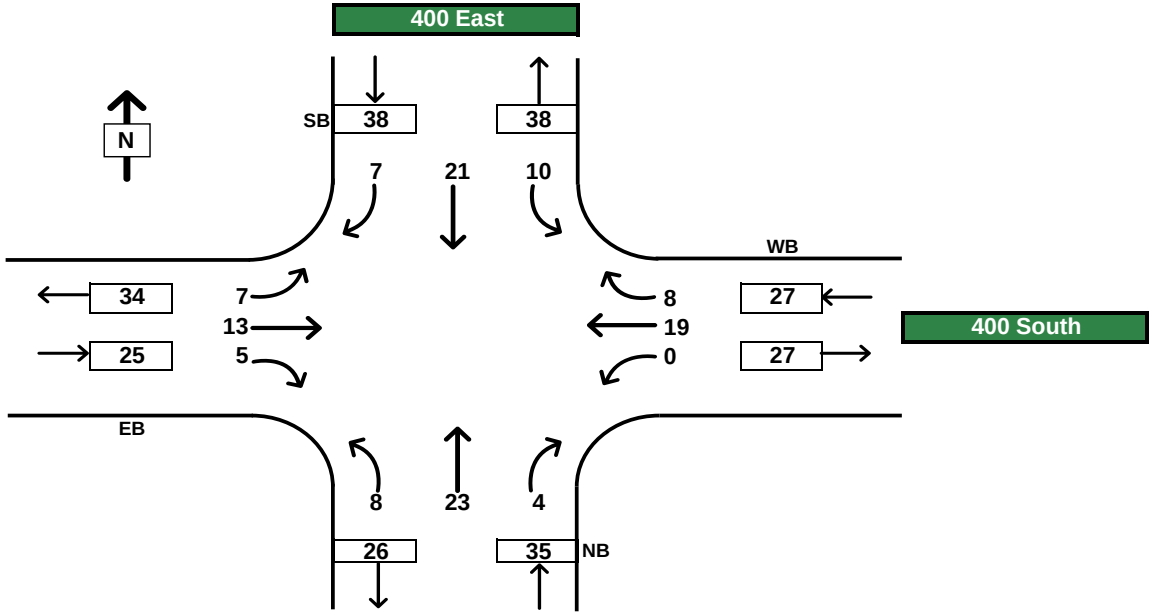
OPTIONAL	
Adjustment Factor	
Monthly:	1.00
Daily:	1.00
Interval:	1.00
Count:	1.00
Total:	1

TRAFFIC COUNT SUMMARY

City: **Ivins, UT**
N-S Street: **400 East**
E-W Street: **400 South**
Date: **Tuesday, February 25, 2020**
Begin Time: **01:15 PM**
Interval Length: **15 min**

HORROCKS ENGINEERS

Time Interval		SB				WB				NB				EB				Total	Hourly
		Left	Thru	Right	PED	Left	Thru	Right	PED	Left	Thru	Right	PED	Left	Thru	Right	PED	All Moves	Totals
		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16		
01:15 PM	01:30 PM	1	3	1	0	0	1	1	0	0	3	1	0	1	4	0	0	16	
01:30 PM	01:45 PM	2	6	2	0	0	4	3	0	2	4	1	0	2	1	1	0	28	
01:45 PM	02:00 PM	2	9	1	0	0	5	2	0	3	10	0	0	2	4	3	0	41	
02:00 PM	02:15 PM	5	3	3	0	0	9	2	0	3	6	2	0	2	4	1	0	40	125



ADJUSTED PEAK HOUR TRAFFIC VOLUMES												
Southbound			Westbound			Northbound			Eastbound			
Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	
10	21	7	0	19	8	8	23	4	7	13	5	
38			27			35			25			
Trucks:		0%	**Trucks:**		0%	**Trucks:**		0%	**Trucks:**		0%	
Peak Hour:		1:15:00 PM			2:15 PM	**Peak Vol:**		125	**PHF:**		0.76	

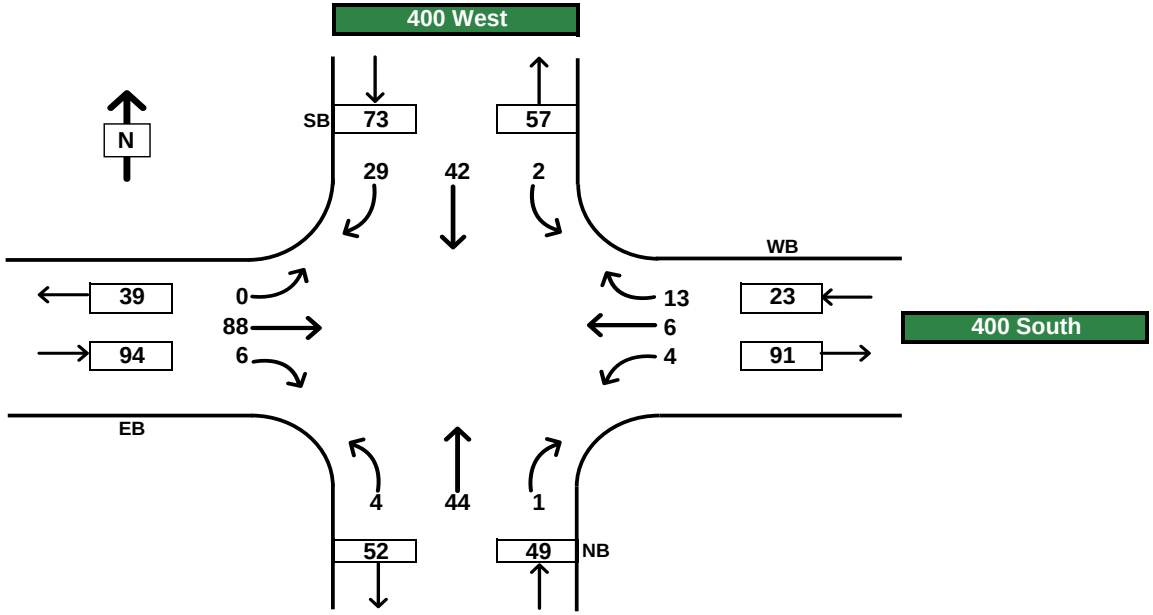
OPTIONAL Adjustment Factor	
Monthly:	1.00
Daily:	1.00
Interval:	1.00
Count:	1.00
Total:	1

TRAFFIC COUNT SUMMARY

City: **Ivins, UT**
N-S Street: **400 West**
E-W Street: **400 South**
Date: **Thursday, February 27, 2020**
Begin Time: **01:15 PM**
Interval Length: **15 min**

HORROCKS ENGINEERS

Time Interval		SB				WB				NB				EB				Total	Hourly
		Left	Thru	Right	PED	Left	Thru	Right	PED	Left	Thru	Right	PED	Left	Thru	Right	PED	All Moves	Totals
		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16		
01:15 PM	01:30 PM	1	11	7	0	1	0	4	0	1	10	0	0	0	30	1	0	66	
01:30 PM	01:45 PM	1	12	8	0	0	3	2	0	1	14	0	0	0	14	1	0	56	
01:45 PM	02:00 PM	0	11	9	0	2	2	4	0	2	11	0	0	0	25	4	0	70	
02:00 PM	02:15 PM	0	8	5	0	1	1	3	0	0	9	1	0	0	19	0	0	47	239



ADJUSTED PEAK HOUR TRAFFIC VOLUMES												
Southbound			Westbound			Northbound			Eastbound			
Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	
2	42	29	4	6	13	4	44	1	0	88	6	
73			23			49			94			
Trucks:		0%	Trucks:		0%	Trucks:		0%	Trucks:		0%	
Peak Hour:		1:15:00 PM			2:15 PM	Peak Vol:		239	PHF:		0.85	

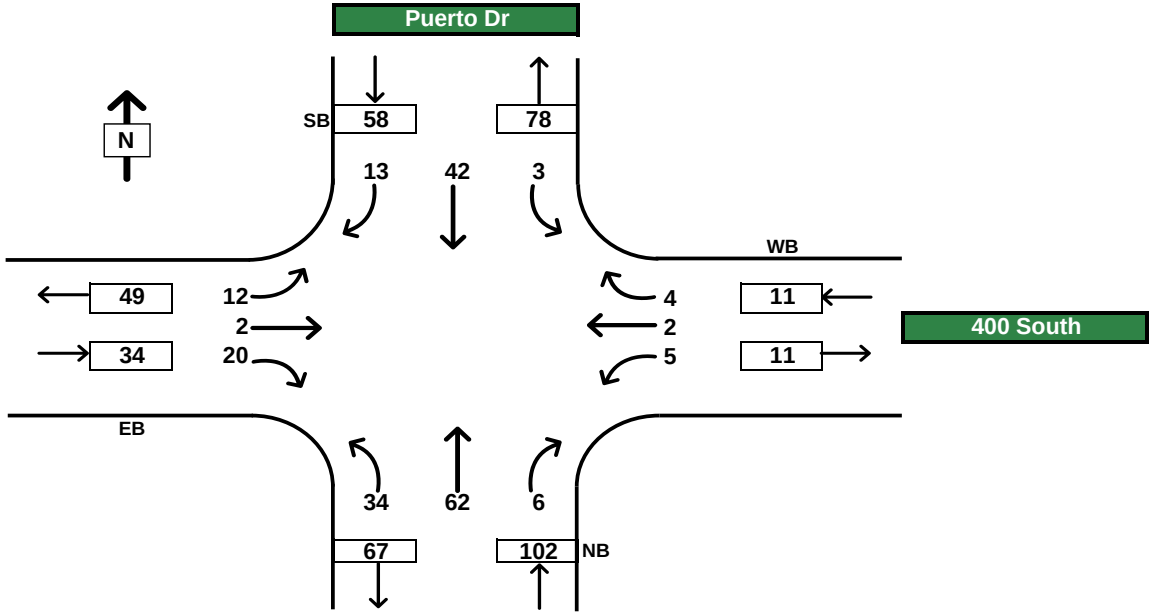
OPTIONAL	
Adjustment Factor	
Monthly:	1.00
Daily:	1.00
Interval:	1.00
Count:	1.00
Total:	1

TRAFFIC COUNT SUMMARY

City: **Ivins, UT**
N-S Street: **Puerto Dr**
E-W Street: **400 South**
Date: **Thursday, February 27, 2020**
Begin Time: **12:15 PM**
Interval Length: **15 min**

HORROCKS ENGINEERS

Time Interval		SB				WB				NB				EB				Total	Hourly
		Left	Thru	Right	PED	Left	Thru	Right	PED	Left	Thru	Right	PED	Left	Thru	Right	PED	All Moves	Totals
		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16		
12:15 PM	12:30 PM	0	10	5	0	2	1	1	0	10	10	1	0	2	0	3	0	45	
12:30 PM	12:45 PM	3	11	1	0	2	0	1	0	8	22	1	0	4	1	6	0	60	
12:45 PM	01:00 PM	0	9	5	0	0	0	1	0	13	14	1	0	3	0	5	0	51	
01:00 PM	01:15 PM	0	12	2	0	1	1	1	0	3	16	3	0	3	1	6	0	49	205



ADJUSTED PEAK HOUR TRAFFIC VOLUMES												
Southbound			Westbound			Northbound			Eastbound			
Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	
3	42	13	5	2	4	34	62	6	12	2	20	
58			11			102			34			
Trucks:		0%	**Trucks:**		0%	**Trucks:**		0%	**Trucks:**		0%	
Peak Hour:		12:15:00 PM			1:15 PM	**Peak Vol:**		205	**PHF:**		0.85	

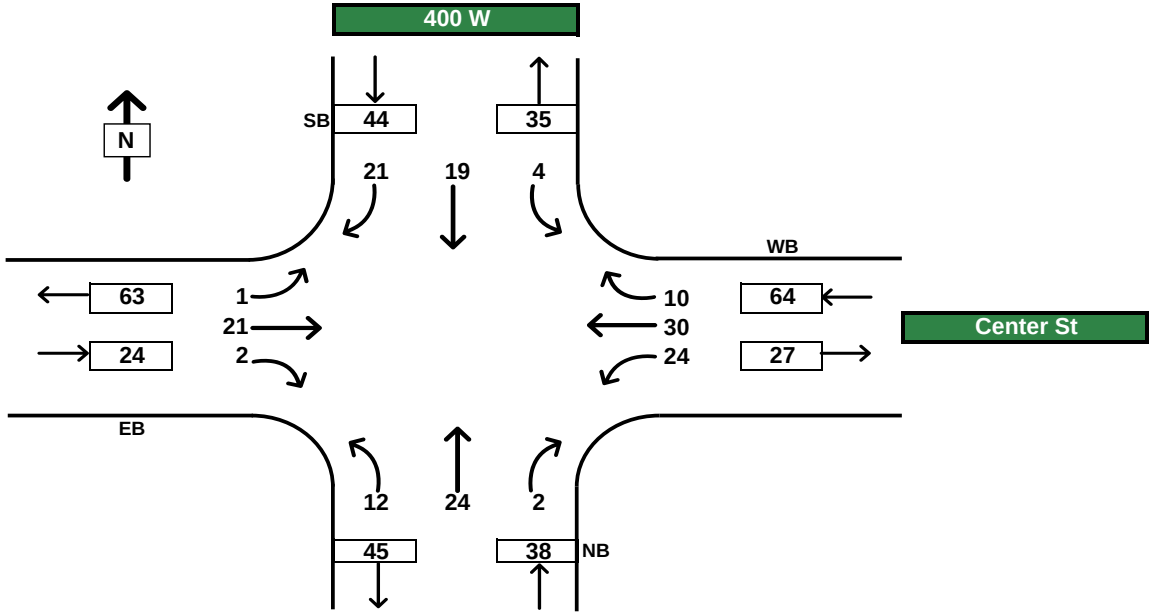
OPTIONAL Adjustment Factor	
Monthly:	1.00
Daily:	1.00
Interval:	1.00
Count:	1.00
Total:	1

TRAFFIC COUNT SUMMARY

City: **Ivins, UT**
N-S Street: **400 W**
E-W Street: **Center St**
Date: **Tuesday, September 1, 2020**
Begin Time: **12:15 PM**
Interval Length: **15 min**

HORROCKS ENGINEERS

Time Interval		SB				WB				NB				EB				Total	Hourly
		Left	Thru	Right	PED	Left	Thru	Right	PED	Left	Thru	Right	PED	Left	Thru	Right	PED	All Moves	Totals
		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16		
12:15 PM	12:30 PM	1	2	7	0	6	7	3	0	4	10	0	0	0	4	0	0	44	
12:30 PM	12:45 PM	0	5	1	0	8	10	2	0	1	6	1	0	0	4	0	0	38	
12:45 PM	01:00 PM	3	5	6	0	2	9	3	0	3	5	1	0	1	11	1	0	50	
01:00 PM	01:15 PM	0	7	7	0	8	4	2	0	4	3	0	0	0	2	1	0	38	170



ADJUSTED PEAK HOUR TRAFFIC VOLUMES												
Southbound			Westbound			Northbound			Eastbound			
Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	
4	19	21	24	30	10	12	24	2	1	21	2	
44			64			38			24			
Trucks:		0%	Trucks:		0%	Trucks:		0%	Trucks:		0%	
Peak Hour:		12:15:00 PM		1:15 PM		Peak Vol:		170	PHF:		0.85	

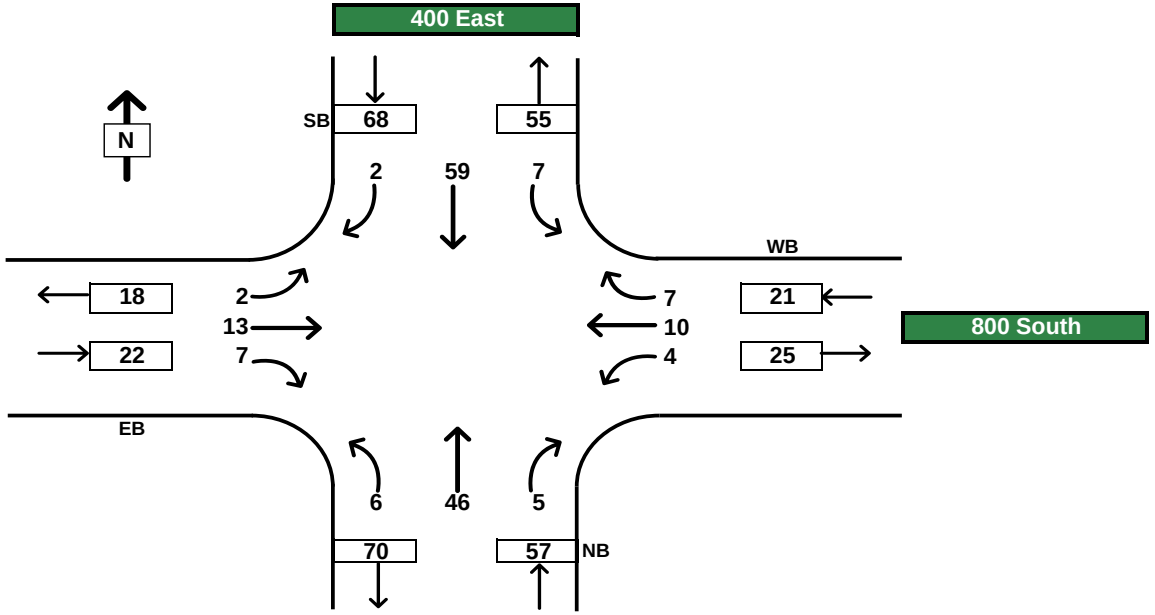
OPTIONAL Adjustment Factor	
Monthly:	1.00
Daily:	1.00
Interval:	1.00
Count:	1.00
Total:	1

TRAFFIC COUNT SUMMARY

City: **Ivins, UT**
N-S Street: **400 East**
E-W Street: **800 South**
Date: **Wednesday, March 4, 2020**
Begin Time: **01:49 PM**
Interval Length: **15 min**

HORROCKS ENGINEERS

Time Interval		SB				WB				NB				EB				Total	Hourly
		Left	Thru	Right	PED	Left	Thru	Right	PED	Left	Thru	Right	PED	Left	Thru	Right	PED	All Moves	Totals
		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16		
01:49 PM	02:04 PM	2	11	1	0	0	4	2	0	1	11	0	0	0	3	2	0	37	
02:04 PM	02:19 PM	2	14	0	0	1	2	1	0	0	5	1	0	0	1	0	0	27	
02:19 PM	02:34 PM	2	14	0	0	2	1	2	0	1	13	2	0	1	1	5	0	44	
02:34 PM	02:49 PM	1	20	1	0	1	3	2	0	4	17	2	0	1	8	0	0	60	168



ADJUSTED PEAK HOUR TRAFFIC VOLUMES												
Southbound			Westbound			Northbound			Eastbound			
Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	
7	59	2	4	10	7	6	46	5	2	13	7	
68			21			57			22			
Trucks:		0%	Trucks:		0%	Trucks:		0%	Trucks:		0%	
Peak Hour:		1:49:00 PM		2:49 PM		Peak Vol:		168	PHF:		0.70	

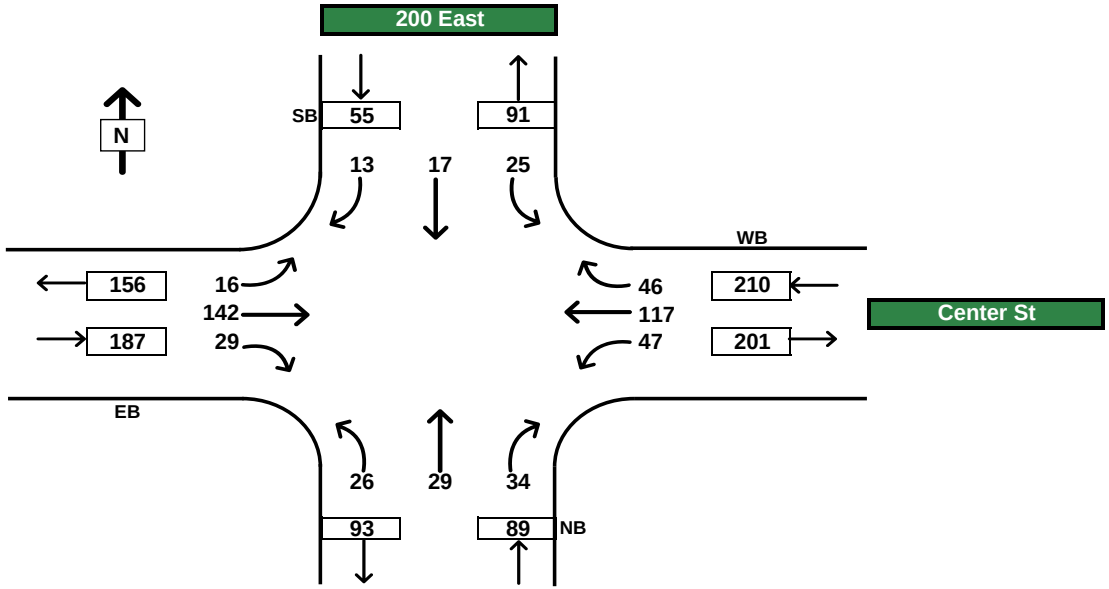
OPTIONAL Adjustment Factor	
Monthly:	1.00
Daily:	1.00
Interval:	1.00
Count:	1.00
Total:	1

TRAFFIC COUNT SUMMARY

City: **St George**
N-S Street: **200 East**
E-W Street: **Center St**
Date: **Wednesday, October 21, 2020**
Begin Time: **11:00 AM**
Interval Length: **15 min**

HORROCKS ENGINEERS

Time Interval		SB				WB				NB				EB				Total	Hourly
		Left	Thru	Right	PED	Left	Thru	Right	PED	Left	Thru	Right	PED	Left	Thru	Right	PED	All Moves	Totals
		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16		
11:00 AM	11:15 AM	0	0	0	1	0	0	0	0	0	0	0	0	0	2	0	1	2	
11:15 AM	11:30 AM	0	0	0	0	0	0	0	0	0	0	0	5	0	2	0	0	2	
11:30 AM	11:45 AM	0	0	0	2	0	0	0	0	0	0	0	0	0	0	0	1	0	
11:45 AM	12:00 PM	0	0	0	0	0	1	0	0	0	0	0	1	0	1	0	0	2	6
12:00 PM	12:15 PM	10	7	1	0	10	41	12	0	7	6	9	0	4	38	7	0	152	156
12:15 PM	12:30 PM	1	0	6	0	14	30	10	0	5	5	11	0	3	45	11	0	141	295
12:30 PM	12:45 PM	6	5	5	0	11	26	11	0	8	10	4	0	5	29	9	0	129	424
12:45 PM	01:00 PM	8	5	1	0	12	20	13	0	6	8	10	0	4	30	2	0	119	541



ADJUSTED PEAK HOUR TRAFFIC VOLUMES											
Southbound			Westbound			Northbound			Eastbound		
Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right
25	17	13	47	117	46	26	29	34	16	142	29
55			210			89			187		
Trucks:		0%	Trucks:		0%	Trucks:		0%	Trucks:		0%
Peak Hour:		12:00:00 PM			1:00 PM	Peak Vol:		541	PHF:		0.89

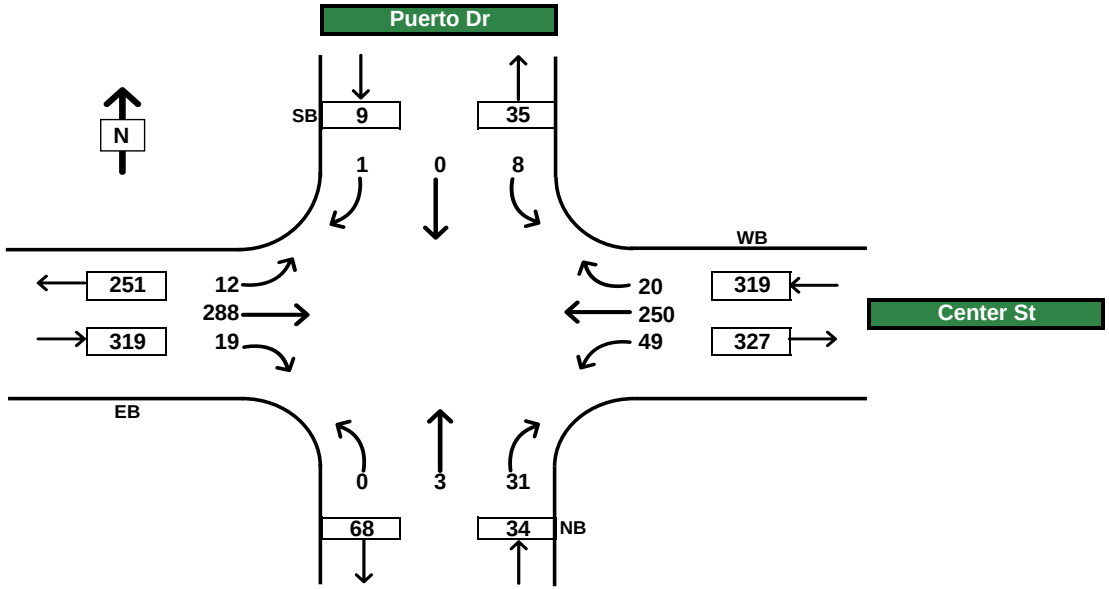
OPTIONAL Adjustment Factor	
Monthly:	1.00
Daily:	1.00
Interval:	1.00
Count:	1.00
Total:	1

TRAFFIC COUNT SUMMARY

City: **St George**
N-S Street: **Puerto Dr**
E-W Street: **Center St**
Date: **Wednesday, October 21, 2020**
Begin Time: **11:00 AM**
Interval Length: **15 min**

HORROCKS ENGINEERS

Time Interval		SB				WB				NB				EB				Total	Hourly
		Left	Thru	Right	PED	Left	Thru	Right	PED	Left	Thru	Right	PED	Left	Thru	Right	PED	All Moves	Totals
		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16		
11:00 AM	11:15 AM	0	0	0	1	7	61	7	0	0	0	3	0	7	57	5	0	147	
11:15 AM	11:30 AM	2	0	0	0	20	48	12	0	1	0	11	0	4	70	2	0	170	
11:30 AM	11:45 AM	2	0	0	0	9	41	14	0	0	1	6	0	3	69	5	0	150	
11:45 AM	12:00 PM	0	1	0	0	9	56	11	0	1	1	5	0	8	55	5	0	152	619
12:00 PM	12:15 PM	2	0	0	0	8	48	7	0	0	1	3	0	5	69	7	0	150	622
12:15 PM	12:30 PM	1	0	0	0	11	56	5	0	0	1	9	1	6	72	5	3	166	618
12:30 PM	12:45 PM	2	0	0	0	15	60	5	0	0	1	13	0	1	81	3	0	181	649
12:45 PM	01:00 PM	3	0	1	0	15	86	3	0	0	0	6	0	0	66	4	0	184	681



ADJUSTED PEAK HOUR TRAFFIC VOLUMES											
Southbound			Westbound			Northbound			Eastbound		
Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right
8	0	1	49	250	20	0	3	31	12	288	19
9			319			34			319		
Trucks:		0%	Trucks:		0%	Trucks:		3%	Trucks:		1%
Peak Hour:		12:00:00 PM			1:00 PM	Peak Vol:		681	PHF:		0.93

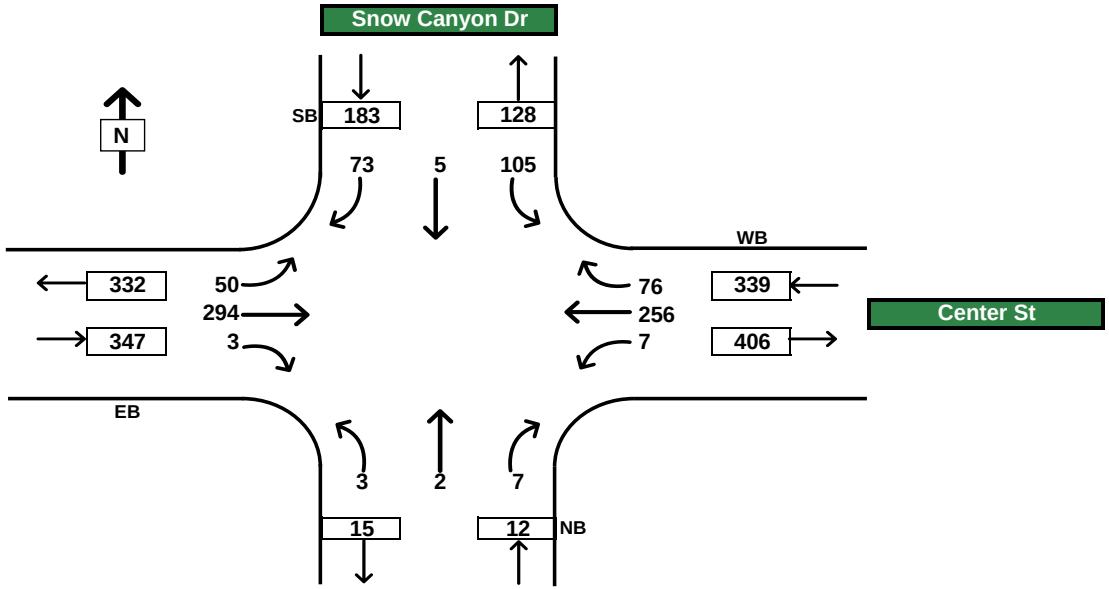
OPTIONAL Adjustment Factor	
Monthly:	1.00
Daily:	1.00
Interval:	1.00
Count:	1.00
Total:	1

TRAFFIC COUNT SUMMARY

City: **St George**
N-S Street: **Snow Canyon Dr**
E-W Street: **Center St**
Date: **Wednesday, October 21, 2020**
Begin Time: **11:00 AM**
Interval Length: **15 min**

HORROCKS ENGINEERS

Time Interval		SB				WB				NB				EB				Total	Hourly
		Left	Thru	Right	PED	Left	Thru	Right	PED	Left	Thru	Right	PED	Left	Thru	Right	PED	All Moves	Totals
		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16		
11:00 AM	11:15 AM	0	0	0	1	0	0	0	0	0	0	0	0	0	2	0	1	2	
11:15 AM	11:30 AM	0	0	0	0	0	0	0	0	0	0	0	5	0	2	0	0	2	
11:30 AM	11:45 AM	0	0	0	2	0	0	0	0	0	0	0	0	0	0	0	1	0	
11:45 AM	12:00 PM	0	0	0	0	0	1	0	0	0	0	0	1	0	1	0	0	2	6
12:00 PM	12:15 PM	31	1	25	0	2	59	16	0	0	0	1	0	13	81	0	0	229	233
12:15 PM	12:30 PM	25	2	16	0	2	70	22	0	2	1	1	0	14	61	3	0	219	450
12:30 PM	12:45 PM	32	1	20	0	2	71	19	0	1	1	2	0	11	80	0	0	240	690
12:45 PM	01:00 PM	17	1	12	0	1	56	19	0	0	0	3	0	12	72	0	0	193	881



ADJUSTED PEAK HOUR TRAFFIC VOLUMES											
Southbound			Westbound			Northbound			Eastbound		
Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right
105	5	73	7	256	76	3	2	7	50	294	3
183			339			12			347		
Trucks:		0%	Trucks:		0%	Trucks:		0%	Trucks:		0%
Peak Hour:		12:00:00 PM			1:00 PM	Peak Vol:		881	PHF:		0.92

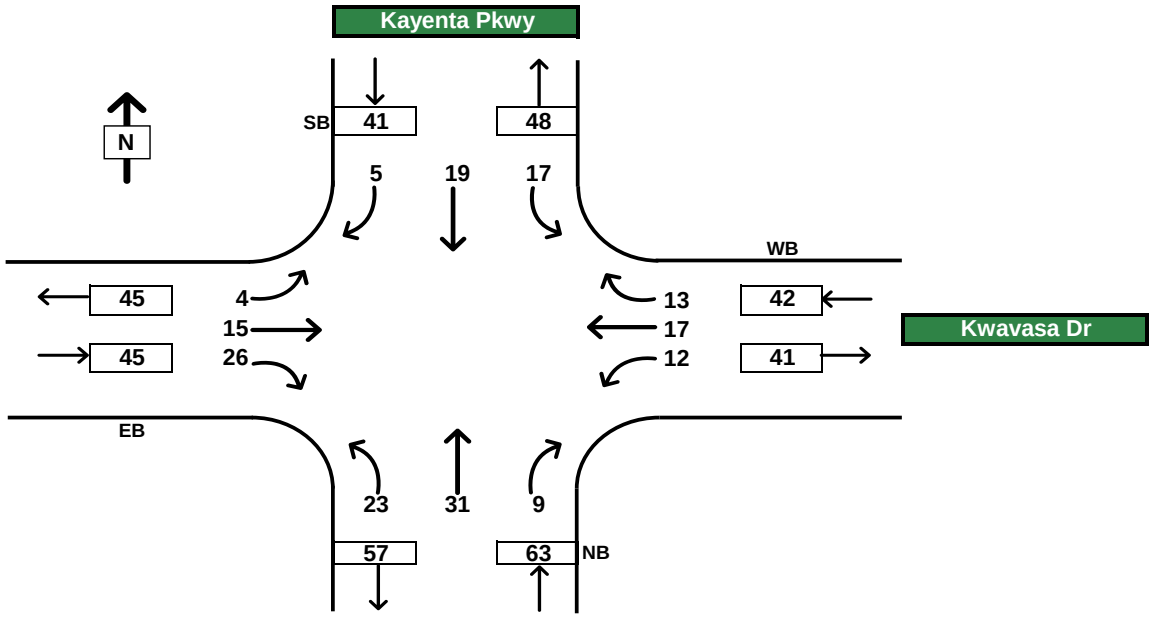
OPTIONAL Adjustment Factor	
Monthly:	1.00
Daily:	1.00
Interval:	1.00
Count:	1.00
Total:	1

TRAFFIC COUNT SUMMARY

City: **Ivins, UT**
N-S Street: **Kayenta Pkwy**
E-W Street: **Kwavasa Dr**
Date: **Friday, March 6, 2020**
Begin Time: **11:30 AM**
Interval Length: **15 min**

HORROCKS ENGINEERS

Time Interval		SB				WB				NB				EB				Total	Hourly
		Left	Thru	Right	PED	Left	Thru	Right	PED	Left	Thru	Right	PED	Left	Thru	Right	PED	All Moves	Totals
		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16		
11:30 AM	11:45 AM	5	5	1	0	3	6	5	0	5	6	1	0	1	5	10	0	53	
11:45 AM	12:00 PM	3	7	0	0	2	0	1	0	8	6	1	0	2	5	3	0	38	
12:00 PM	12:15 PM	3	2	1	0	4	3	3	0	4	11	2	0	1	2	7	0	43	
12:15 PM	12:30 PM	6	5	3	0	3	8	4	0	6	8	5	0	0	3	6	0	57	191



ADJUSTED PEAK HOUR TRAFFIC VOLUMES												
Southbound			Westbound			Northbound			Eastbound			
Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	
17	19	5	12	17	13	23	31	9	4	15	26	
41			42			63			45			
Trucks:		0%	Trucks:		0%	Trucks:		0%	Trucks:			0%
Peak Hour:		11:30:00 AM			12:30 PM	Peak Vol:		191	PHF:			0.84

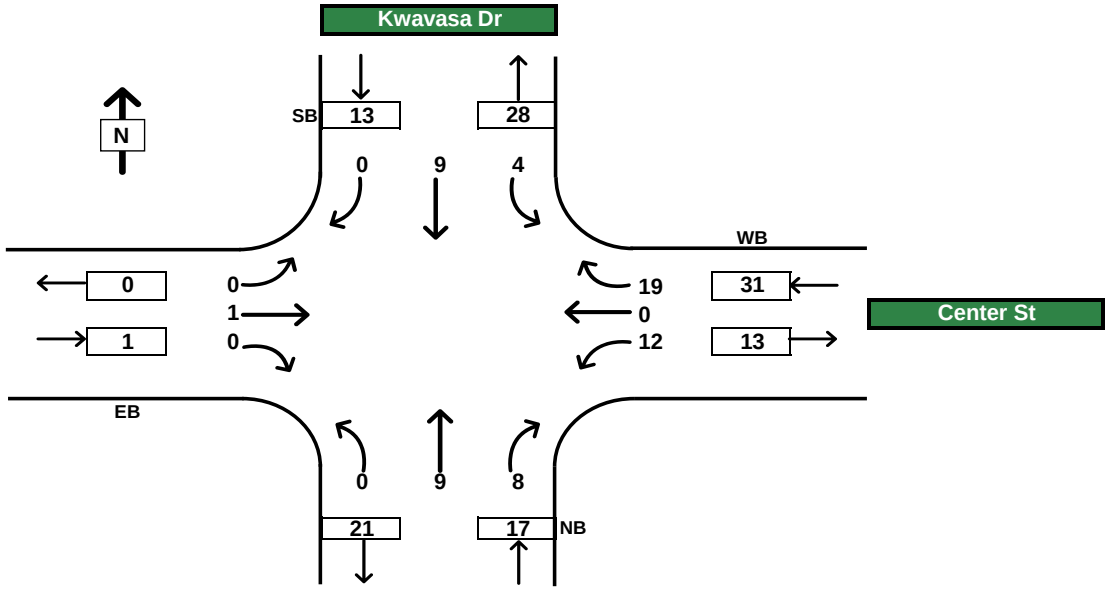
OPTIONAL Adjustment Factor	
Monthly:	1.00
Daily:	1.00
Interval:	1.00
Count:	1.00
Total:	1

TRAFFIC COUNT SUMMARY

City: **Irvin**
N-S Street: **Kwavasa Dr**
E-W Street: **Center St**
Date: **Thursday, March 12, 2020**
Begin Time: **11:00 AM**
Interval Length: **15 min**

HORROCKS ENGINEERS

Time Interval		SB				WB				NB				EB				Total	Hourly
		Left	Thru	Right	PED	Left	Thru	Right	PED	Left	Thru	Right	PED	Left	Thru	Right	PED	All Moves	Totals
		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16		
11:00 AM	11:15 AM	0	1	0	0	2	0	6	0	0	2	2	0	0	0	0	0	13	
11:15 AM	11:30 AM	1	2	0	0	1	0	5	0	0	0	0	0	0	0	0	0	9	
11:30 AM	11:45 AM	1	0	0	0	6	0	2	0	0	0	3	0	0	0	0	0	12	
11:45 AM	12:00 PM	0	2	0	0	4	0	3	0	0	2	3	0	0	0	0	0	14	48
12:00 PM	12:15 PM	3	2	0	0	6	0	3	0	0	2	3	0	0	0	0	0	19	54
12:15 PM	12:30 PM	0	1	0	0	0	0	6	0	0	3	1	0	0	0	0	0	11	56
12:30 PM	12:45 PM	1	4	0	0	2	0	7	0	0	2	1	0	0	1	0	0	18	62
12:45 PM	01:00 PM	0	0	0	0	2	1	2	0	0	2	2	0	0	0	0	0	9	57



ADJUSTED PEAK HOUR TRAFFIC VOLUMES											
Southbound			Westbound			Northbound			Eastbound		
Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right
4	9	0	12	0	19	0	9	8	0	1	0
13			31			17			1		
Trucks:		0%	Trucks:		0%	Trucks:		0%	Trucks:		0%
Peak Hour:		11:45:00 AM			12:45 PM	Peak Vol:		62	PHF:		0.82

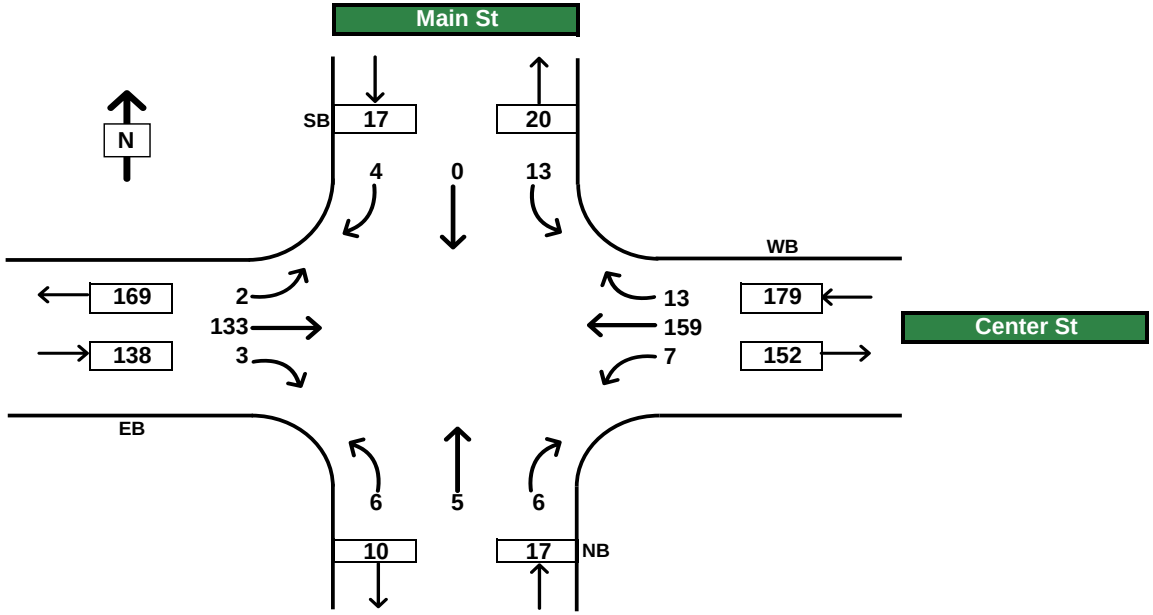
OPTIONAL Adjustment Factor	
Monthly:	1.00
Daily:	1.00
Interval:	1.00
Count:	1.00
Total:	1

TRAFFIC COUNT SUMMARY

City: **Ivins, UT**
N-S Street: **Main St**
E-W Street: **Center St**
Date: **Thursday, March 5, 2020**
Begin Time: **12:15 PM**
Interval Length: **15 min**

HORROCKS ENGINEERS

Time Interval		SB				WB				NB				EB				Total	Hourly
		Left	Thru	Right	PED	Left	Thru	Right	PED	Left	Thru	Right	PED	Left	Thru	Right	PED	All Moves	Totals
		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16		
12:15 PM	12:30 PM	6	0	1	0	0	39	2	0	3	1	1	0	1	33	1	0	88	
12:30 PM	12:45 PM	3	0	2	0	6	43	3	0	3	3	1	0	1	37	1	0	103	
12:45 PM	01:00 PM	2	0	0	0	0	43	3	0	0	1	2	0	0	31	0	0	82	
01:00 PM	01:15 PM	2	0	1	0	1	34	5	0	0	0	2	0	0	32	1	0	78	351



ADJUSTED PEAK HOUR TRAFFIC VOLUMES												
Southbound			Westbound			Northbound			Eastbound			
Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	
13	0	4	7	159	13	6	5	6	2	133	3	
17			179			17			138			
Trucks:		0%	**Trucks:**		0%	**Trucks:**		0%	**Trucks:**		0%	
Peak Hour:		12:15:00 PM			1:15 PM	**Peak Vol:**		351	**PHF:**		0.85	

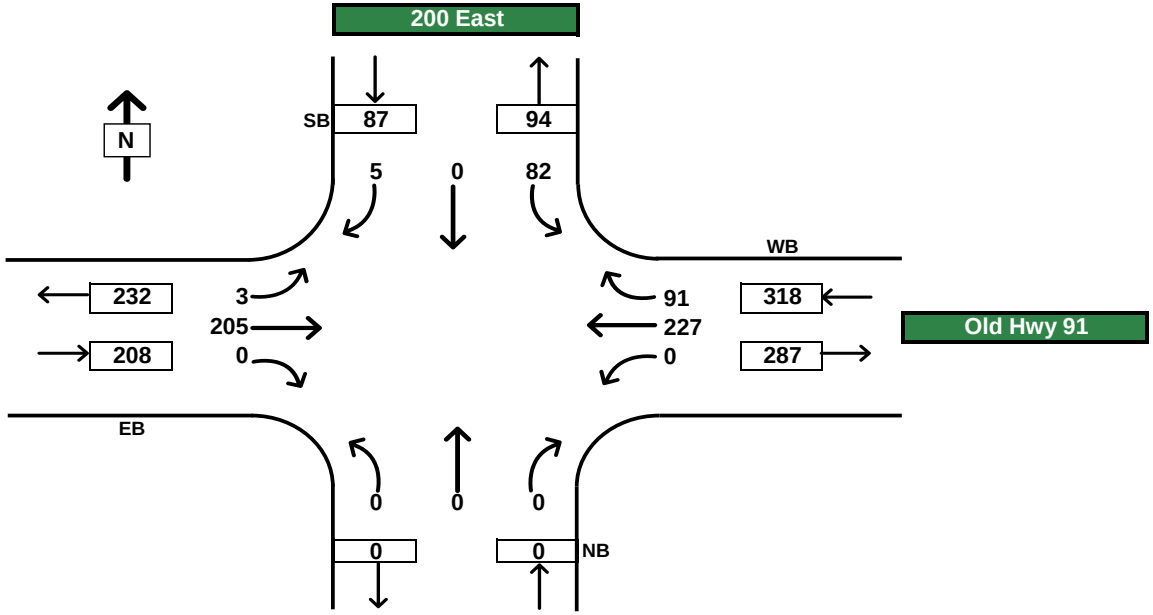
OPTIONAL Adjustment Factor	
Monthly:	1.00
Daily:	1.00
Interval:	1.00
Count:	1.00
Total:	1

TRAFFIC COUNT SUMMARY

City: **Ivins, UT**
N-S Street: **200 East**
E-W Street: **Old Hwy 91**
Date: **Friday, February 28, 2020**
Begin Time: **11:45 AM**
Interval Length: **15 min**

HORROCKS ENGINEERS

Time Interval		SB				WB				NB				EB				Total	Hourly
		Left	Thru	Right	PED	Left	Thru	Right	PED	Left	Thru	Right	PED	Left	Thru	Right	PED	All Moves	Totals
		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16		
11:45 AM	12:00 PM	23	0	0	0	0	62	21	0	0	0	0	0	0	48	0	0	154	
12:00 PM	12:15 PM	15	0	3	0	0	61	25	0	0	0	0	0	1	59	0	0	164	
12:15 PM	12:30 PM	19	0	1	0	0	50	19	0	0	0	0	0	1	57	0	0	147	
12:30 PM	12:45 PM	25	0	1	0	0	54	26	0	0	0	0	0	1	41	0	0	148	613



ADJUSTED PEAK HOUR TRAFFIC VOLUMES											
Southbound			Westbound			Northbound			Eastbound		
Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right
82	0	5	0	227	91	0	0	0	3	205	0
87			318			0			208		
Trucks:		0%	**Trucks:**		0%	**Trucks:**		0%	**Trucks:**		0%
Peak Hour:		11:45:00 AM			12:45 PM	**Peak Vol:**		613	**PHF:**		0.93

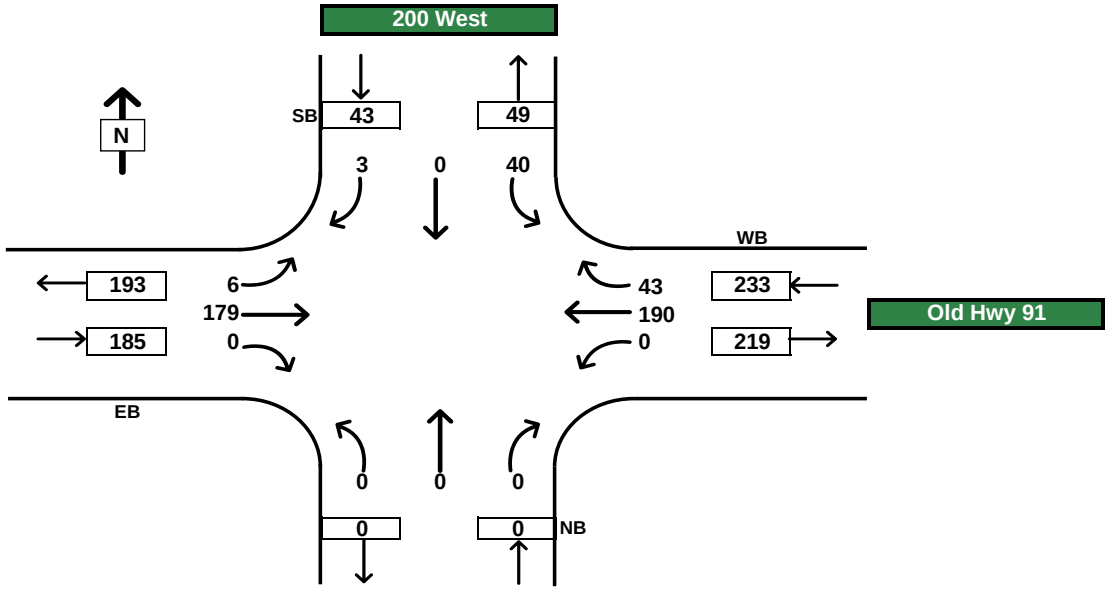
OPTIONAL Adjustment Factor	
Monthly:	1.00
Daily:	1.00
Interval:	1.00
Count:	1.00
Total:	1

TRAFFIC COUNT SUMMARY

City: **Irvin**
N-S Street: **200 West**
E-W Street: **Old Hwy 91**
Date: **Thursday, March 12, 2020**
Begin Time: **11:00 AM**
Interval Length: **15 min**

HORROCKS ENGINEERS

Time Interval		SB				WB				NB				EB				Total	Hourly
		Left	Thru	Right	PED	Left	Thru	Right	PED	Left	Thru	Right	PED	Left	Thru	Right	PED	All Moves	Totals
		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16		
11:00 AM	11:15 AM	2	0	3	0	0	34	7	0	0	0	0	0	1	45	0	0	92	
11:15 AM	11:30 AM	8	0	0	0	0	36	7	0	0	0	0	0	2	47	0	0	100	
11:30 AM	11:45 AM	7	0	0	0	0	44	12	0	0	0	0	0	3	48	0	0	114	
11:45 AM	12:00 PM	15	0	3	0	0	61	14	0	0	0	0	0	0	41	0	0	134	440
12:00 PM	12:15 PM	10	0	0	0	0	49	10	0	0	0	0	0	1	43	0	0	113	461
12:15 PM	12:30 PM	6	0	1	0	0	39	6	0	0	0	0	0	1	37	0	0	90	451
12:30 PM	12:45 PM	8	0	4	0	0	42	7	0	0	0	0	0	1	42	0	0	104	441
12:45 PM	01:00 PM	5	0	0	0	0	40	17	0	0	0	0	0	2	37	0	0	101	408



ADJUSTED PEAK HOUR TRAFFIC VOLUMES											
Southbound			Westbound			Northbound			Eastbound		
Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right
40	0	3	0	190	43	0	0	0	6	179	0
43			233			0			185		
Trucks:		0%	Trucks:		0%	Trucks:		0%	Trucks:		0%
Peak Hour:		11:15:00 AM			12:15 PM	Peak Vol:		461	PHF:		0.86

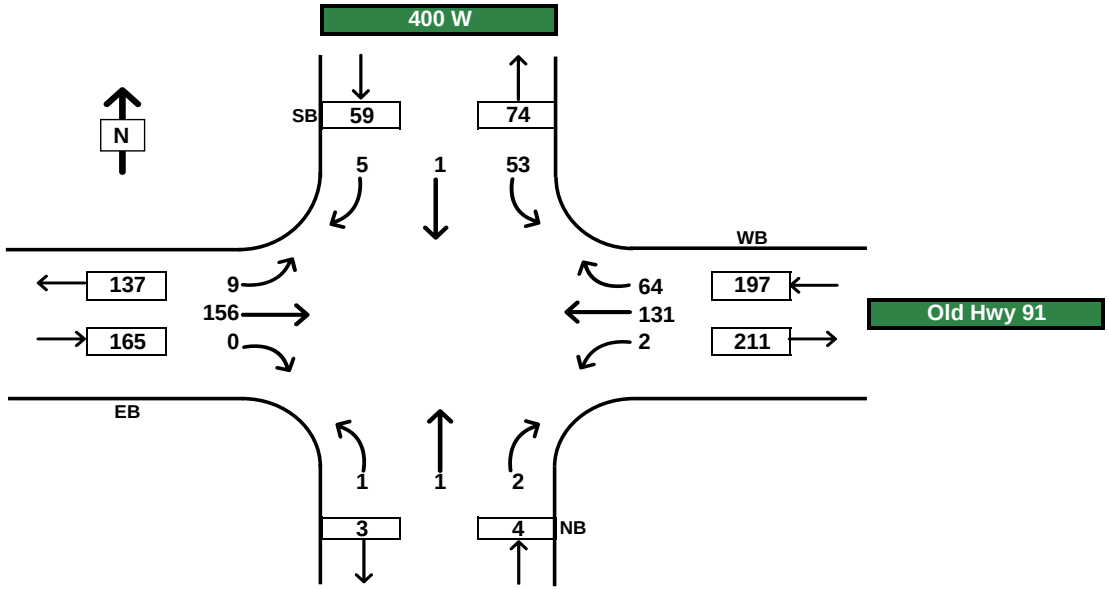
OPTIONAL Adjustment Factor	
Monthly:	1.00
Daily:	1.00
Interval:	1.00
Count:	1.00
Total:	1

TRAFFIC COUNT SUMMARY

City: **Ivin**
N-S Street: **400 W**
E-W Street: **Old Hwy 91**
Date: **Thursday, March 12, 2020**
Begin Time: **11:00 AM**
Interval Length: **15 min**

HORROCKS ENGINEERS

Time Interval		SB				WB				NB				EB				Total	Hourly
		Left	Thru	Right	PED	Left	Thru	Right	PED	Left	Thru	Right	PED	Left	Thru	Right	PED	All Moves	Totals
		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16		
11:00 AM	11:15 AM	5	1	1	0	2	36	12	0	0	1	2	0	2	35	0	0	97	
11:15 AM	11:30 AM	15	2	2	0	0	39	15	0	0	1	1	0	2	34	0	0	111	
11:30 AM	11:45 AM	9	0	2	0	0	32	12	0	0	0	2	0	1	44	0	0	102	
11:45 AM	12:00 PM	9	0	1	0	1	25	17	0	0	0	0	0	4	50	0	0	107	417
12:00 PM	12:15 PM	15	0	1	0	1	34	14	0	1	1	1	0	1	30	0	0	99	419
12:15 PM	12:30 PM	17	1	1	0	0	38	15	0	0	0	0	0	3	35	0	0	110	418
12:30 PM	12:45 PM	12	0	2	0	0	34	18	0	0	0	1	0	1	41	0	0	109	425
12:45 PM	01:00 PM	7	0	0	0	0	17	10	0	0	0	1	0	1	14	0	0	50	368



ADJUSTED PEAK HOUR TRAFFIC VOLUMES												
Southbound			Westbound			Northbound			Eastbound			
Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	
53	1	5	2	131	64	1	1	2	9	156	0	
59			197			4			165			
Trucks:		0%	Trucks:		0%	Trucks:		0%	Trucks:		0%	
Peak Hour:		11:45:00 AM		12:45 PM		Peak Vol:		425	PHF:		0.97	

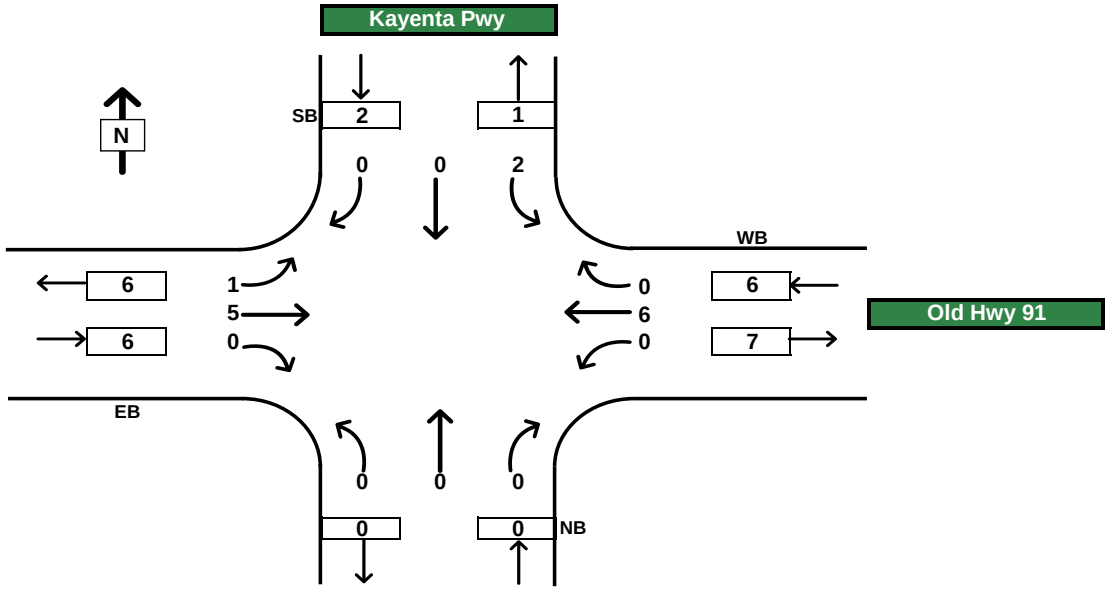
OPTIONAL Adjustment Factor	
Monthly:	1.00
Daily:	1.00
Interval:	1.00
Count:	1.00
Total:	1

TRAFFIC COUNT SUMMARY

City: **Ivin**
N-S Street: **Kayenta Pwy**
E-W Street: **Old Hwy 91**
Date: **Thursday, March 12, 2020**
Begin Time: **11:00 AM**
Interval Length: **15 min**

HORROCKS ENGINEERS

Time Interval		SB				WB				NB				EB				Total	Hourly
		Left	Thru	Right	PED	Left	Thru	Right	PED	Left	Thru	Right	PED	Left	Thru	Right	PED	All Moves	Totals
		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16		
11:00 AM	11:15 AM	0	0	0	0	0	3	0	0	0	0	0	0	0	1	0	0	4	
11:15 AM	11:30 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
11:30 AM	11:45 AM	0	0	0	0	0	1	0	0	0	0	0	0	0	3	0	0	4	
11:45 AM	12:00 PM	0	0	0	0	0	2	0	0	0	0	0	0	0	0	0	0	2	10
12:00 PM	12:15 PM	0	0	0	0	0	3	0	0	0	0	0	0	0	0	0	0	3	9
12:15 PM	12:30 PM	0	0	0	0	0	2	0	0	0	0	0	0	0	0	0	0	2	11
12:30 PM	12:45 PM	0	0	0	0	0	1	0	0	0	0	0	0	0	2	0	0	3	10
12:45 PM	01:00 PM	2	0	0	0	0	0	0	0	0	0	0	0	1	3	0	0	6	14



ADJUSTED PEAK HOUR TRAFFIC VOLUMES											
Southbound			Westbound			Northbound			Eastbound		
Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right
2	0	0	0	6	0	0	0	0	1	5	0
2			6			0			6		
Trucks:		0%	Trucks:		0%	Trucks:		0%	Trucks:		0%
Peak Hour:		12:00:00 PM			1:00 PM	Peak Vol:		14	PHF:		0.58

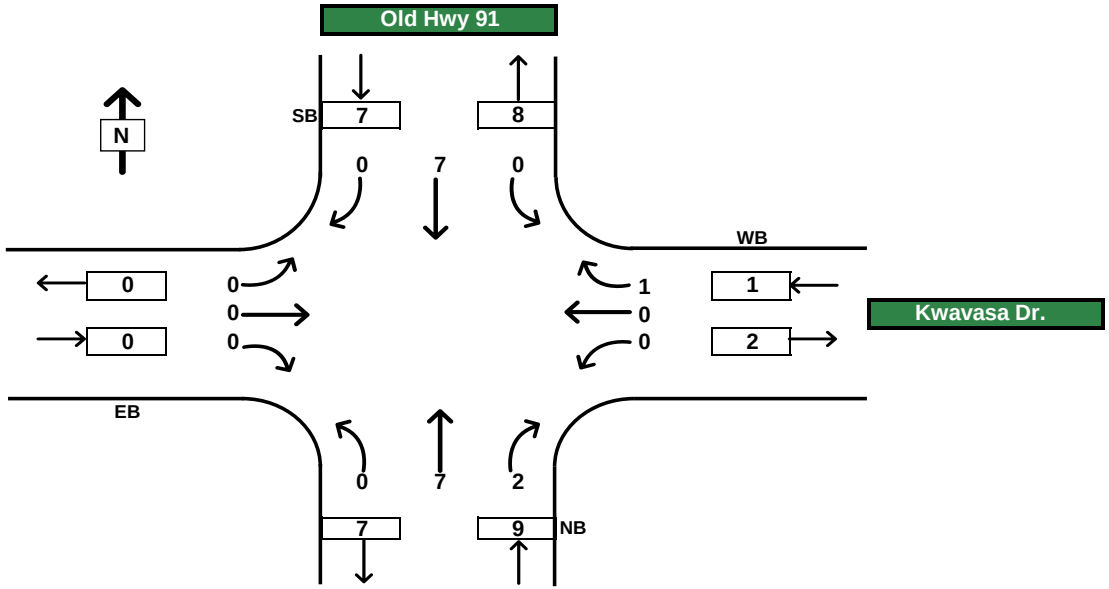
OPTIONAL Adjustment Factor	
Monthly:	1.00
Daily:	1.00
Interval:	1.00
Count:	1.00
Total:	1

TRAFFIC COUNT SUMMARY

City: **Irvin**
N-S Street: **Old Hwy 91**
E-W Street: **Kwavasa Dr.**
Date: **Thursday, March 12, 2020**
Begin Time: **11:00 AM**
Interval Length: **15 min**

HORROCKS ENGINEERS

Time Interval		SB				WB				NB				EB				Total	Hourly
		Left	Thru	Right	PED	Left	Thru	Right	PED	Left	Thru	Right	PED	Left	Thru	Right	PED	All Moves	Totals
		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16		
11:00 AM	11:15 AM	0	4	0	0	0	0	0	0	0	3	2	0	0	0	0	0	9	
11:15 AM	11:30 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
11:30 AM	11:45 AM	0	2	0	0	0	0	1	0	0	2	0	0	0	0	0	0	5	
11:45 AM	12:00 PM	0	1	0	0	0	0	0	0	0	2	0	0	0	0	0	0	3	17
12:00 PM	12:15 PM	0	0	0	0	0	0	0	0	0	2	0	0	0	0	0	0	2	10
12:15 PM	12:30 PM	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	1	11
12:30 PM	12:45 PM	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	7
12:45 PM	01:00 PM	0	3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	3	7



ADJUSTED PEAK HOUR TRAFFIC VOLUMES											
Southbound			Westbound			Northbound			Eastbound		
Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right
0	7	0	0	0	1	0	7	2	0	0	0
	7			1			9			0	
Trucks:		0%	Trucks:		0%	Trucks:		0%	Trucks:		0%
Peak Hour:		11:00:00 AM		12:00 PM		Peak Vol:		17	PHF:		0.47

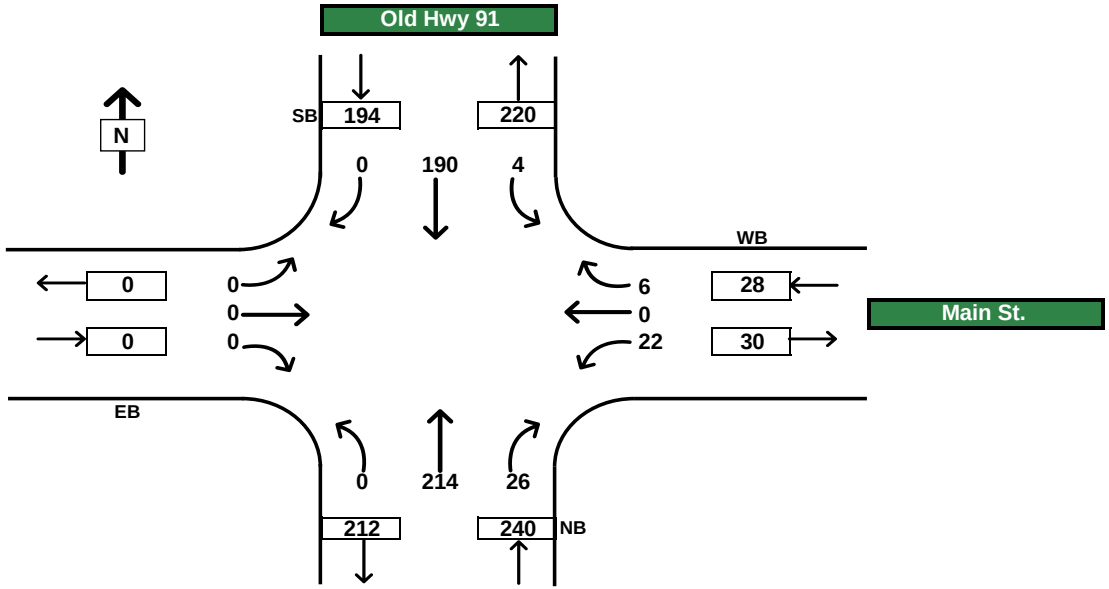
OPTIONAL Adjustment Factor	
Monthly:	1.00
Daily:	1.00
Interval:	1.00
Count:	1.00
Total:	1

TRAFFIC COUNT SUMMARY

City: **Irvin**
N-S Street: **Old Hwy 91**
E-W Street: **Main St.**
Date: **Thursday, March 12, 2020**
Begin Time: **11:00 AM**
Interval Length: **15 min**

HORROCKS ENGINEERS

Time Interval		SB				WB				NB				EB				Total	Hourly
		Left	Thru	Right	PED	Left	Thru	Right	PED	Left	Thru	Right	PED	Left	Thru	Right	PED	All Moves	Totals
		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16		
11:00 AM	11:15 AM	0	53	0	0	4	0	2	0	0	58	5	0	0	0	0	0	122	
11:15 AM	11:30 AM	0	46	0	0	6	0	2	0	0	49	6	0	0	0	0	0	109	
11:30 AM	11:45 AM	2	49	0	0	5	0	0	0	0	52	7	0	0	0	0	0	115	
11:45 AM	12:00 PM	2	42	0	0	7	0	2	0	0	55	8	0	0	0	0	0	116	462
12:00 PM	12:15 PM	1	42	0	0	4	0	0	0	0	42	4	0	0	0	0	0	93	433
12:15 PM	12:30 PM	0	50	0	0	6	0	0	0	0	43	10	0	0	0	0	0	109	433
12:30 PM	12:45 PM	0	57	0	0	6	0	1	0	0	34	10	0	0	0	0	0	108	426
12:45 PM	01:00 PM	3	46	0	0	5	0	0	0	0	53	7	0	0	0	0	0	114	424



ADJUSTED PEAK HOUR TRAFFIC VOLUMES											
Southbound			Westbound			Northbound			Eastbound		
Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right
4	190	0	22	0	6	0	214	26	0	0	0
194			28			240			0		
Trucks:		0%	Trucks:		0%	Trucks:		0%	Trucks:		0%
Peak Hour:		11:00:00 AM		12:00 PM		Peak Vol:		462	PHF:		0.95

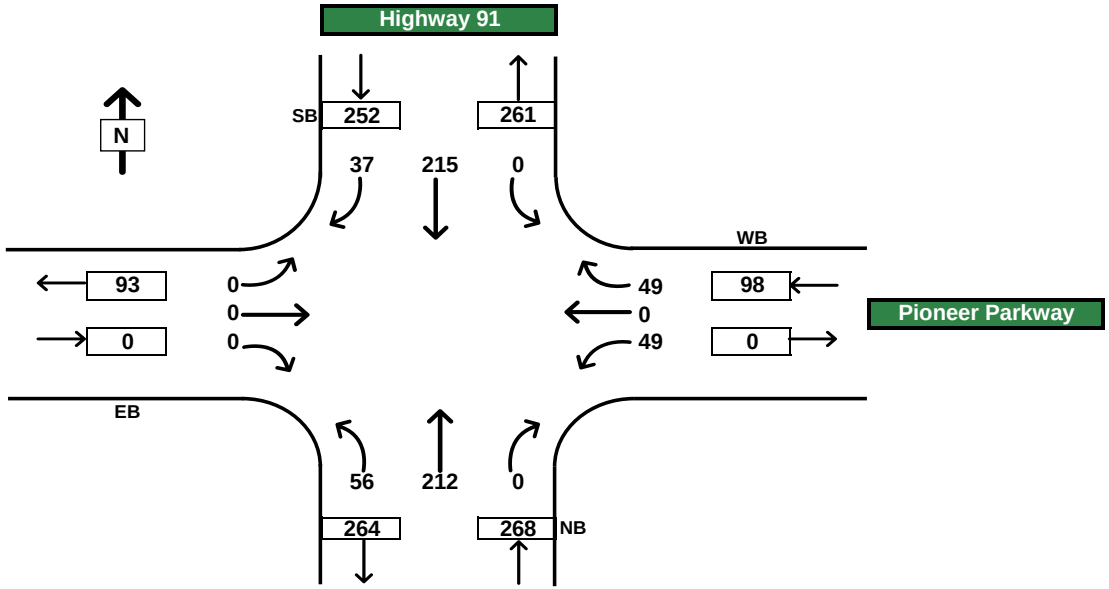
OPTIONAL Adjustment Factor	
Monthly:	1.00
Daily:	1.00
Interval:	1.00
Count:	1.00
Total:	1

TRAFFIC COUNT SUMMARY

City: **Ivin**
N-S Street: **Highway 91**
E-W Street: **Pioneer Parkway**
Date: **Thursday, September 3, 2020**
Begin Time: **12:15 PM**
Interval Length: **15 min**

HORROCKS ENGINEERS

Time Interval		SB				WB				NB				EB				Total	Hourly
		Left	Thru	Right	PED	Left	Thru	Right	PED	Left	Thru	Right	PED	Left	Thru	Right	PED	All Moves	Totals
		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16		
12:15 PM	12:30 PM	0	64	8	0	12	0	13	0	11	58	0	0	0	0	0	0	166	
12:30 PM	12:45 PM	0	45	12	0	13	0	14	0	23	49	0	0	0	0	0	0	156	
12:45 PM	01:00 PM	0	42	8	0	8	0	14	0	11	49	0	0	0	0	0	0	132	
01:00 PM	01:15 PM	0	64	9	0	16	0	8	0	11	56	0	0	0	0	0	0	164	618
01:15 PM	01:30 PM																		
01:30 PM	01:45 PM																		
01:45 PM	02:00 PM																		
02:00 PM	02:15 PM																		



ADJUSTED PEAK HOUR TRAFFIC VOLUMES											
Southbound			Westbound			Northbound			Eastbound		
Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right
0	215	37	49	0	49	56	212	0	0	0	0
252			98			268			0		
Trucks:		0%	Trucks:		0%	Trucks:		0%	Trucks:		0%
Peak Hour:		12:15:00 PM			1:15 PM	Peak Vol:		618	PHF:		0.93

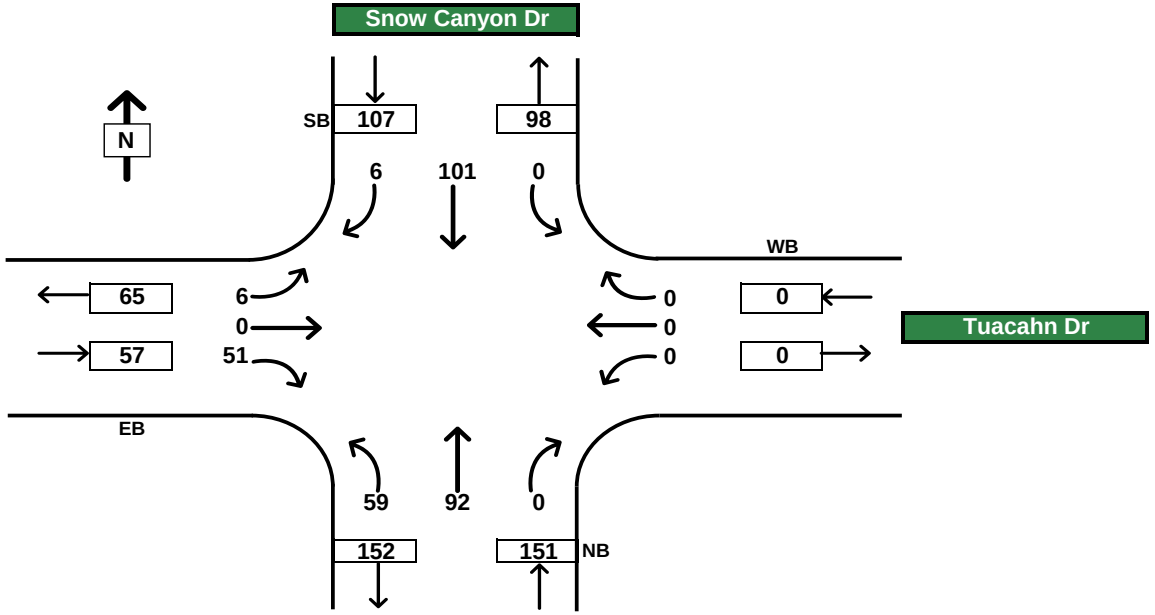
OPTIONAL Adjustment Factor	
Monthly:	1.00
Daily:	1.00
Interval:	1.00
Count:	1.00
Total:	1

TRAFFIC COUNT SUMMARY

City: **Ivins, UT**
N-S Street: **Snow Canyon Dr**
E-W Street: **Tuacahn Dr**
Date: **Wednesday, March 4, 2020**
Begin Time: **12:00 PM**
Interval Length: **15 min**

HORROCKS ENGINEERS

Time Interval		SB				WB				NB				EB				Total	Hourly
		Left	Thru	Right	PED	Left	Thru	Right	PED	Left	Thru	Right	PED	Left	Thru	Right	PED	All Moves	Totals
		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16		
12:00 PM	12:15 PM	0	18	0	0	0	0	0	0	19	30	0	0	2	0	7	0	76	
12:15 PM	12:30 PM	0	23	3	0	0	0	0	0	15	16	0	0	1	0	17	0	75	
12:30 PM	12:45 PM	0	27	0	0	0	0	0	0	12	30	0	0	1	0	19	0	89	
12:45 PM	01:00 PM	0	33	3	0	0	0	0	0	13	16	0	0	2	0	8	0	75	315

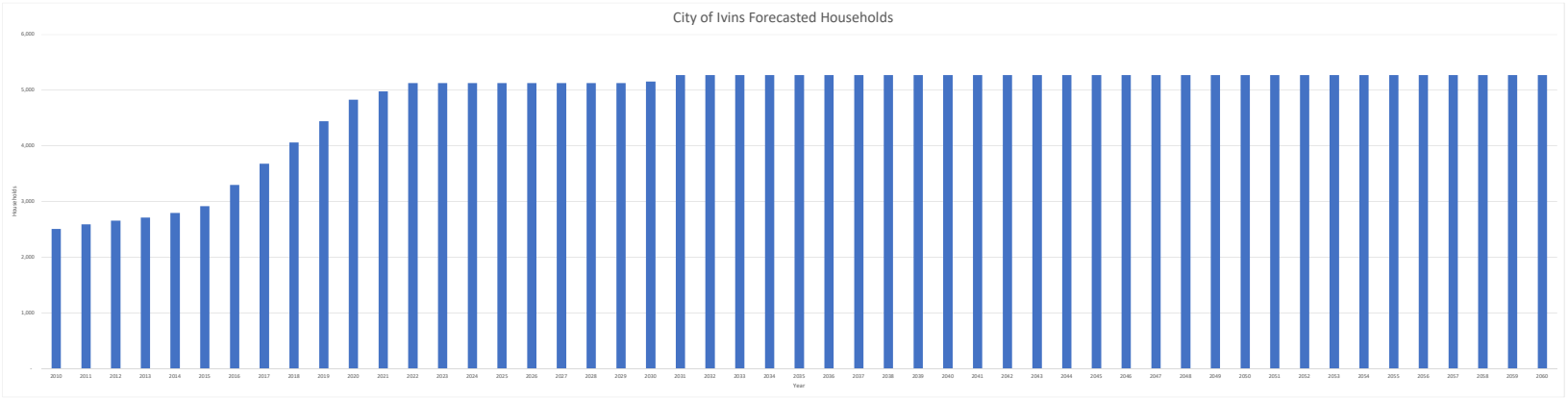


ADJUSTED PEAK HOUR TRAFFIC VOLUMES											
Southbound			Westbound			Northbound			Eastbound		
Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right
0	101	6	0	0	0	59	92	0	6	0	51
	107			0			151			57	
Trucks:		0%	Trucks:		0%	Trucks:		0%	Trucks:		0%
Peak Hour:		12:00:00 PM		1:00 PM		Peak Vol:		315	PHF:		0.88

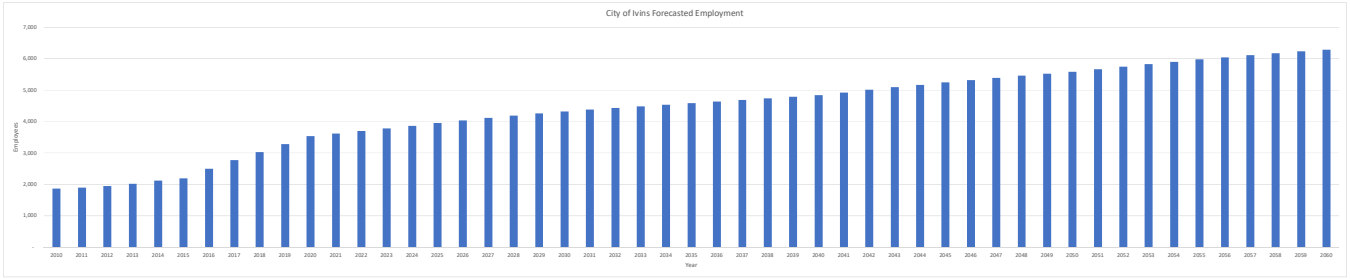
OPTIONAL Adjustment Factor	
Monthly:	1.00
Daily:	1.00
Interval:	1.00
Count:	1.00
Total:	1

APPENDIX C
2020 Ivins City Traffic Model Input Data

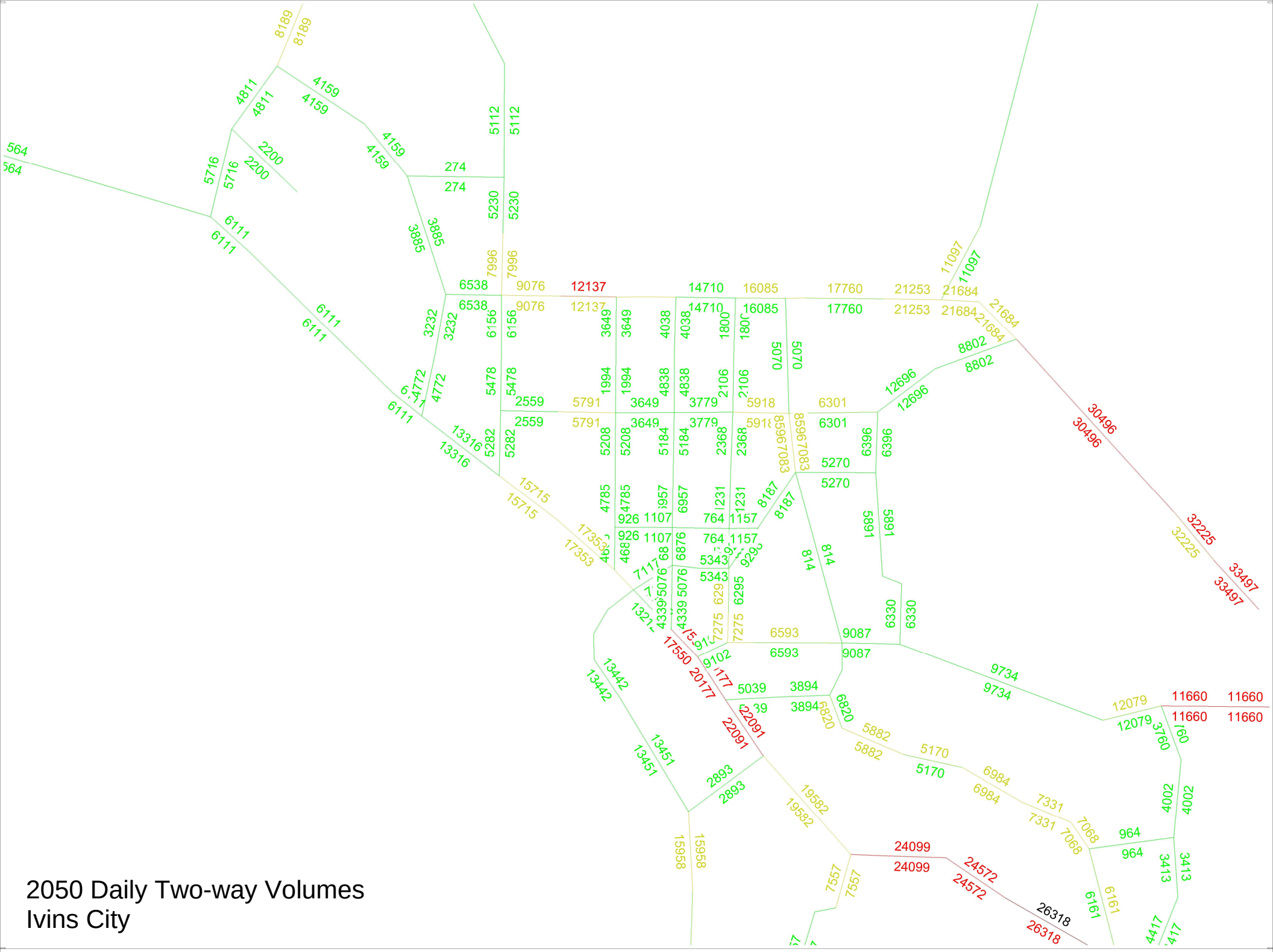
CO_TAZID	CITY_NAME	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034	2035	2036	2037	2038	2039	2040	2041	2042	2043	2044	2045	2046	2047	2048	2049	2050	2051	2052	2053	2054	2055	2056	2057	2058	2059	2060
530020	Ivins	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
530031	Ivins	92	98	104	110	116	124	124	124	124	124	124	124	124	124	124	124	124	124	124	124	124	124	124	124	124	124	124	124	124	124	124	124	124	124	124	124	124	124	124	124	124	124	124	124	124	124	124	124	124	124	124
530032	Ivins	73	74	74	75	76	78	126	168	200	231	265	279	290	290	290	290	290	290	290	290	290	290	290	290	290	290	290	290	290	290	290	290	290	290	290	290	290	290	290	290	290	290	290	290	290	290	290	290	290	290	290
530034	Ivins	17	17	17	17	18	18	18	18	18	18	18	18	18	18	18	18	18	18	18	18	18	18	18	18	18	18	18	18	18	18	18	18	18	18	18	18	18	18	18	18	18	18	18	18	18	18	18	18	18	18	18
530037	Ivins	56	60	63	67	70	75	75	75	75	75	75	75	75	75	75	75	75	75	75	75	75	75	75	75	75	75	75	75	75	75	75	75	75	75	75	75	75	75	75	75	75	75	75	75	75	75	75	75	75	75	75
530038	Ivins	9	9	9	9	9	10	16	21	25	28	33	35	36	36	36	36	36	36	36	36	36	36	36	36	36	36	36	36	36	36	36	36	36	36	36	36	36	36	36	36	36	36	36	36	36	36	36	36	36	36	36
530044	Ivins	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	5	120	120	120	120	120	120	120	120	120	120	120	120	120	120	120	120	120	120	120	120	120	120	120	120	120	120	120	120	120	120	120
530046	Ivins	20	26	31	36	42	48	117	196	265	324	384	413	444	444	444	444	444	444	444	444	444	449	449	449	449	449	449	449	449	449	449	449	449	449	449	449	449	449	449	449	449	449	449	449	449	449	449	449	449	449	449
530047	Ivins	26	31	37	42	47	54	114	176	224	268	313	336	349	349	349	349	349	349	349	349	349	354	354	354	354	354	354	354	354	354	354	354	354	354	354	354	354	354	354	354	354	354	354	354	354	354	354	354	354	354	354
530048	Ivins	18	23	28	33	39	45	45	45	45	45	45	45	45	45	45	45	45	45	45	45	45	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50
530050	Ivins	3	3	3	3	3	3	12	38	101	174	227	248	277	277	277	277	277	277	277	277	277	282	282	282	282	282	282	282	282	282	282	282	282	282	282	282	282	282	282	282	282	282	282	282	282	282	282	282	282	282	282
530051	Ivins	122	124	125	126	127	131	175	207	235	263	298	309	320	320	320	320	320	320	320	320	320	325	325	325	325	325	325	325	325	325	325	325	325	325	325	325	325	325	325	325	325	325	325	325	325	325	325	325	325	325	325
530054	Ivins	186	194	200	207	214	225	301	356	404	453	512	531	551	551	551	551	551	551	551	551	551	551	551	551	551	551	551	551	551	551	551	551	551	551	551	551	551	551	551	551	551	551	551	551	551	551	551	551	551	551	551
530056	Ivins	53	54	54	55	60	67	67	67	67	67	67	67	67	67	67	67	67	67	67	67	67	67	67	67	67	67	67	67	67	67	67	67	67	67	67	67	67	67	67	67	67	67	67	67	67	67	67	67	67	67	67
530057	Ivins	142	149	155	161	168	178	178	178	178	178	178	178	178	178	178	178	178	178	178	178	178	178	178	178	178	178	178	178	178	178	178	178	178	178	178	178	178	178	178	178	178	178	178	178	178	178	178	178	178	178	178
530059	Ivins	263	267	269	271	274	281	281	281	281	281	281	281	281	281	281	281	281	281	281	281	281	281	281	281	281	281	281	281	281	281	281	281	281	281	281	281	281	281	281	281	281	281	281	281	281	281	281	281	281	281	281
530060	Ivins	102	103	104	105	106	109	127	141	154	169	187	190	197	197	197	197	197	197	197	197	197	197	197	197	197	197	197	197	197	197	197	197	197	197	197	197	197	197	197	197	197	197	197	197	197	197	197	197	197	197	197
530061	Ivins	1	1	1	1	1	1	4	12	32	55	70	76	85	85	85	85	85	85	85	85	85	85	85	85	85	85	85	85	85	85	85	85	85	85	85	85	85	85	85	85	85	85	85	85	85	85	85	85	85	85	85
530063	Ivins	116	118	119	119	121	124	124	124	124	124	124	124	124	124	124	124	124	124	124	124	124	124	124	124	124	124	124	124	124	124	124	124	124	124	124	124	124	124	124	124	124	124	124	124	124	124	124	124	124	124	124
530066	Ivins	75	76	76	77	78	80	80	80	80	80	80	80	80	80	80	80	80	80	80	80	80	80	80	80	80	80	80	80	80	80	80	80	80	80	80	80	80	80	80	80	80	80	80	80	80	80	80	80	80	80	80
530067	Ivins	278	282	285	286	290	297	297	297	297	297	297	297	297	297	297	297	297	297	297	297	297	297	297	297	297	297	297	297	297	297	297	297	297	297	297	297	297	297	297	297	297	297	297	297	297	297	297	297	297	297	297
530068	Ivins	105	106	107	108	109	112	128	143	156	171	189	192	199	199	199	199	199	199	199	199	199	199	199	199	199	199	199	199	199	199	199	199	199	199	199	199	199	199	199	199	199	199	199	199	199	199	199	199	199	199	199
530069	Ivins	55	56	57	57	58	59	59	59	59	59	59	59	59	59	59	59	59	59	59	59	59	59	59	59	59	59	59	59	59	59	59	59	59	59	59	59	59	59	59	59	59	59	59	59	59	59	59	59	59	59	59
530076	Ivins	12	18	23	28	33	39	39	39	39	39	39	39	39	39	39	39	39	39	39	39	39	39	39	39	39	39	39	39	39	39	39	39	39	39	39	39	39	39	39	39	39	39	39	39	39	39	39	39	39	39	39
530077	Ivins	305	310	313	315	318	327	327	327	327	327	327	327	327	327	327	327	327	327	327	327	327	327	327	327	327	327	327	327	327	327	327	327	327	327	327	327	327	327	327	327	327	327	327	327	327	327	327	327	327	327	327
530080	Ivins	157	160	161	162	164	168	186	200	215	233	254	259	259	259	259	259	259	259	259	259	259	259	259	259	259	259	259	259	259	259	259	259	259	259	259	259	259	259	259	259	259	259	259	259	259	259	259	259	259	259	259
530087	Ivins	196	199	200	201	204	209	209	209	209	209	209	209	209	209	209	209	209	209	209	209	209	209	209	209	209	209	209	209	209	209	209	209	209	209	209	209	209	209	209	209	209	209	209	209	209	209	209	209	209	209	209
530091	Ivins	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
530092	Ivins	6	6	6	6	6	6	19	47	77	104	126	136	147	147	147	147	147	147	147	147	147	147	147	147	147	147	147	147	147	147	147	147	147	147	147	147	147	147	147	147	147	147	147	147	147	147	147	147	147	147	147
530096	Ivins	9	9	9	9	9	9	9	9	9	9	9	9	9	9	9	9	9	9	9	9	9	9	9	9	9	9	9	9	9	9	9	9	9	9	9	9	9	9	9	9	9	9	9	9	9	9	9	9	9	9	9
530099	Ivins	9	14	19	25	30	36	36	36	36	36	36	36	36	36	36	36	36	36	36	36	36	36	36	36	36	36	36	36	36	36	36	36	36	36	36	36	36	36	36	36	36	36	36	36	36	36	36	36	36	36	36
530109	Ivins	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4
	TOTAL	2,508	2,591	2,657	2,715	2,795	2,918	3,299	3,678	4,061	4,445	4,829	4,978	5,127	5,127	5,127	5,127	5,127	5,127	5,127	5,127	5,157	5,271	5,271	5,271	5,271	5,271	5,271	5,271	5,271	5,271	5,271	5,271	5,271	5,271	5,271	5,271	5,271	5,271	5,271	5,271	5,271	5,271	5,271	5,271	5,271	5,271	5,271	5,271	5,271	5,271	5,271



CO_TAZID	CITY_NAME	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034	2035	2036	2037	2038	2039	2040	2041	2042	2043	2044	2045	2046	2047	2048	2049	2050	2051	2052	2053	2054	2055	2056	2057	2058	2059	2060
530020	Ivins	12	12	12	13	13	14	23	34	46	60	75	80	86	91	97	103	109	114	120	125	129	133	137	140	144	148	151	155	158	162	165	171	177	182	188	193	198	202	207	211	215	220	225	230	234	239	243	247	250	254	257
530031	Ivins	102	104	107	111	116	120	170	205	236	264	290	297	303	311	318	325	332	338	344	350	355	359	363	367	371	375	378	382	386	390	394	400	406	412	417	422	428	433	437	441	445	451	457	462	467	471	476	480	484	487	491
530032	Ivins	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
530034	Ivins	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
530037	Ivins	35	36	37	38	40	42	61	79	95	109	122	126	130	134	138	142	146	149	153	156	159	161	163	166	168	170	172	174	176	178	180	184	187	190	194	197	199	202	205	207	209	212	215	218	221	224	226	228	230	232	234
530038	Ivins	8	8	8	9	9	9	17	24	33	43	54	58	62	66	70	75	79	83	87	91	94	97	100	103	105	108	111	114	116	119	122	126	130	135	139	143	147	150	154	157	160	164	168	172	175	178	181	184	187	190	192
530044	Ivins	-	-	-	-	-	-	-	-	-	-	1	1	1	1	2	2	2	2	3	3	3	4	4	4	5	5	5	6	6	7	7	9	10	11	13	15	17	19	21	24	26	30	34	39	44	49	54	60	66	72	77
530046	Ivins	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	1	1	1	2	2	2	2	2	2	3	3	3	3	3	4	4	5	5	6	6	7	8	8	9	10	11	12	13	13	14	15	16	17	18	18
530047	Ivins	2	2	2	3	3	3	5	7	11	15	20	22	25	27	29	30	33	36	38	41	43	45	47	49	51	53	56	58	60	62	64	68	72	75	79	82	86	89	92	94	97	101	104	108	110	113	116	119	121	124	126
530048	Ivins	-	-	-	-	-	-	-	-	-	-	1	1	1	1	2	2	2	2	3	3	3	4	4	4	5	5	5	6	6	7	7	9	10	11	13	15	17	19	21	23	26	29	34	38	42	47	52	58	63	68	73
530050	Ivins	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
530051	Ivins	6	6	6	6	7	7	7	7	7	7	7	7	7	7	7	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8
530054	Ivins	46	47	48	50	52	54	68	78	85	92	98	100	101	103	105	107	108	110	111	112	114	115	116	117	118	118	119	120	121	122	123	125	126	127	129	130	131	133	134	135	136	137	139	140	141	142	143	144	145	146	147
530056	Ivins	24	25	25	26	28	29	44	58	71	83	95	98	101	105	109	113	116	119	122	125	127	129	132	134	135	137	139	141	143	145	147	150	153	156	159	161	164	166	169	171	173	176	178	181	183	186	188	190	191	193	195
530057	Ivins	362	369	379	393	412	426	426	426	426	426	426	426	426	426	426	426	426	426	426	426	426	426	426	426	426	426	426	426	426	426	426	426	426	426	426	426	426	426	426	426	426	426	426	426	426	426	426	426	426	426	426
530059	Ivins	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
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530061	Ivins	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
530063	Ivins	10	10	10	11	11	11	20	30	42	56	74	81	88	95	103	111	119	127	134	141	148	154	159	165	170	176	182	187	193	198	204	213	223	231	240	249	257	265	272	279	286	294	303	311	318	326	332	338	345	350	355
530066	Ivins	3	3	3	3	3	3	6	9	12	17	23	25	27	29	32	35	37	40	43	45	47	50	52	54	56	58	60	62	64	66	68	72	75	79	82	85	88	91	94	97	99	103	106	109	112	115	117	120	122	124	126
530067	Ivins	25	25	26	27	28	29	29	29	29	29	29	29	29	29	29	29	29	29	29	29	29	29	29	29	29	29	29	29	29	29	29	29	29	29	29	29	29	29	29	29	29	29	29	29	29	29	29	29	29	29	29
530068	Ivins	82	84	86	89	94	97	155	212	266	321	373	388	405	421	438	457	473	489	503	515	528	539	548	558	568	577	586	596	605	614	623	638	654	667	681	694	706	718	730	740	750	764	776	788	800	810	820	830	839	847	855
530069	Ivins	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
530076	Ivins	96	98	101	104	109	113	174	223	268	312	351	363	375	387	399	411	422	434	443	452	461	468	475	481	488	495	501	508	514	521	527	537	548	558	567	576	585	593	601	608	615	624	633	642	651	658	665	672	679	685	690
530077	Ivins	2	2	2	2	2	2	3	3	4	4	5	5	5	5	5	5	5	5	5	5	6	6	6	6	6	6	6	6	6	6	6	6	6	6	7	7	7	7	7	7	7	7	7	7	7	7	7	8	8	8	8
530080	Ivins	74	75	77	80	84	87	133	176	216	251	287	298	308	319	331	341	352	361	370	379	386	393	399	405	411	417	423	429	434	440	445	455	464	473	481	489	497	504	512	518	524	533	541	549	556	563	570	576	581	587	592
530087	Ivins	4	4	4	5	5	5	9	14	19	26	34	37	40	44	47	51	54	58	62	65	68	71	73	76	79	81	84	87	89	92	94	99	103	108	112	116	120	123	126	130	133	137	141	145	148	152	155	158	161	163	166
530091	Ivins	726	740	762	790	826	855	855	855	855	855	855	855	855	855	855	855	855	855	855	855	855	855	855	855	855	855	855	855	855	855	855	855	855	855	855	855	855	855	855	855	855	855	855	855	855	855	855	855	855	855	855
530092	Ivins	3	3	3	4	4	4	7	9	12	15	18	19	19	20	21	22	23	24	25	26	26	27	28	28	29	29	30	30	31	32	32	33	34	35	36	36	37	38	38	39	40	40	41	42	43	43	44	44	45	46	46
530096	Ivins	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
530099	Ivins	206	210	216	224	234	242	247	251	253	256	258	259	260	260	261	262	263	263	264	265	265	266	266	266	267	267	268	268	269	269	269	270	271	272	272	273	274	274	275	275	276	277	277	278	279	279	280	280	281	281	282
530109	Ivins	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	TOTAL	1.861	1.896	1.952	2.024	2.118	2.191	2.499	2.768	3.025	3.278	3.537	3.614	3.695	3.779	3.865	3.953	4.036	4.116	4.189	4.258	4.322	4.379	4.432	4.483	4.534	4.586	4.638	4.689	4.740	4.791	4.840	4.927	5.011	5.092	5.170	5.247	5.320	5.391	5.458	5.522	5.582	5.668	5.750	5.828	5.904	5.976	6.045	6.110	6.172	6.232	6.288

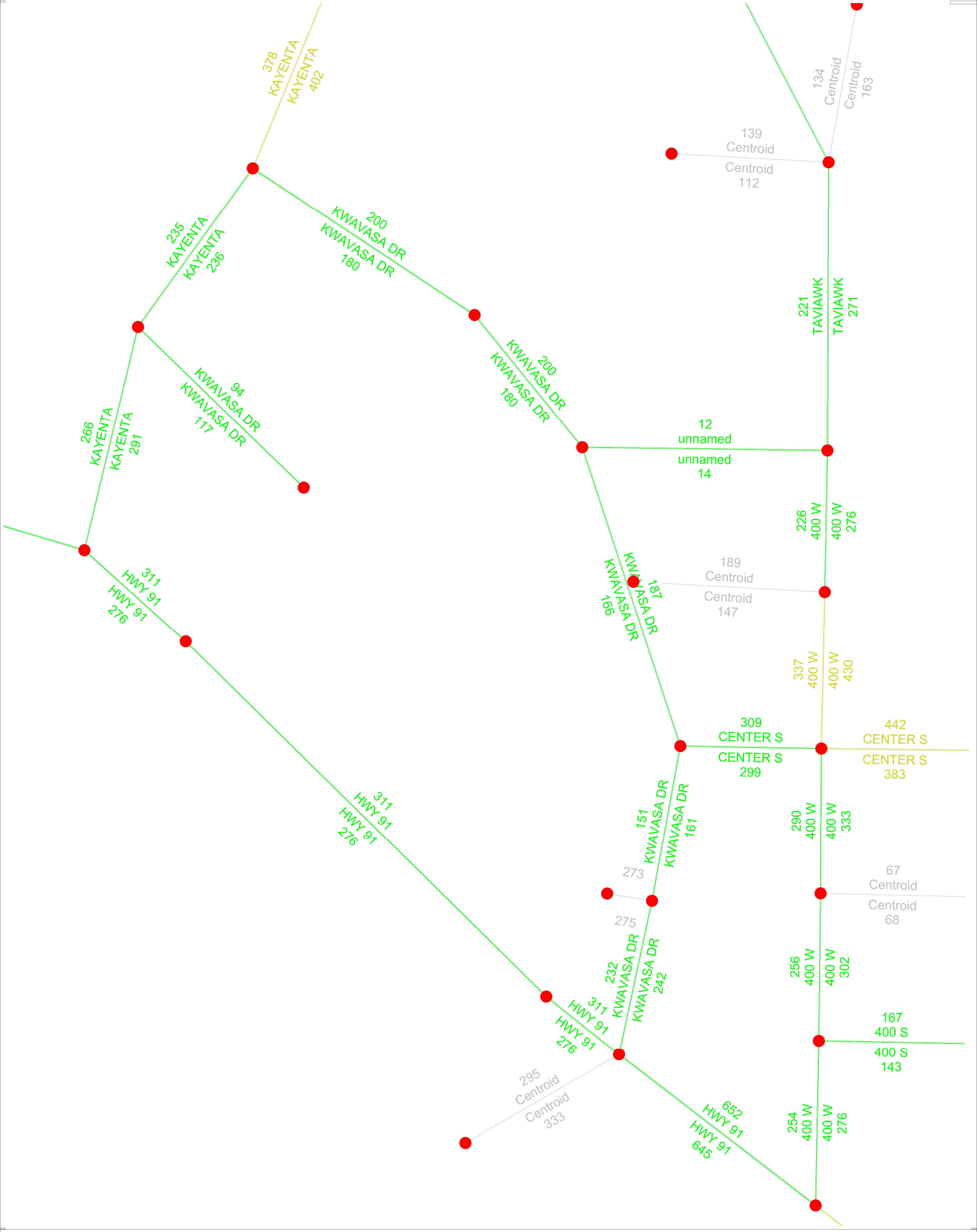


APPENDIX D
2050 Ivins City Traffic Model Output Data

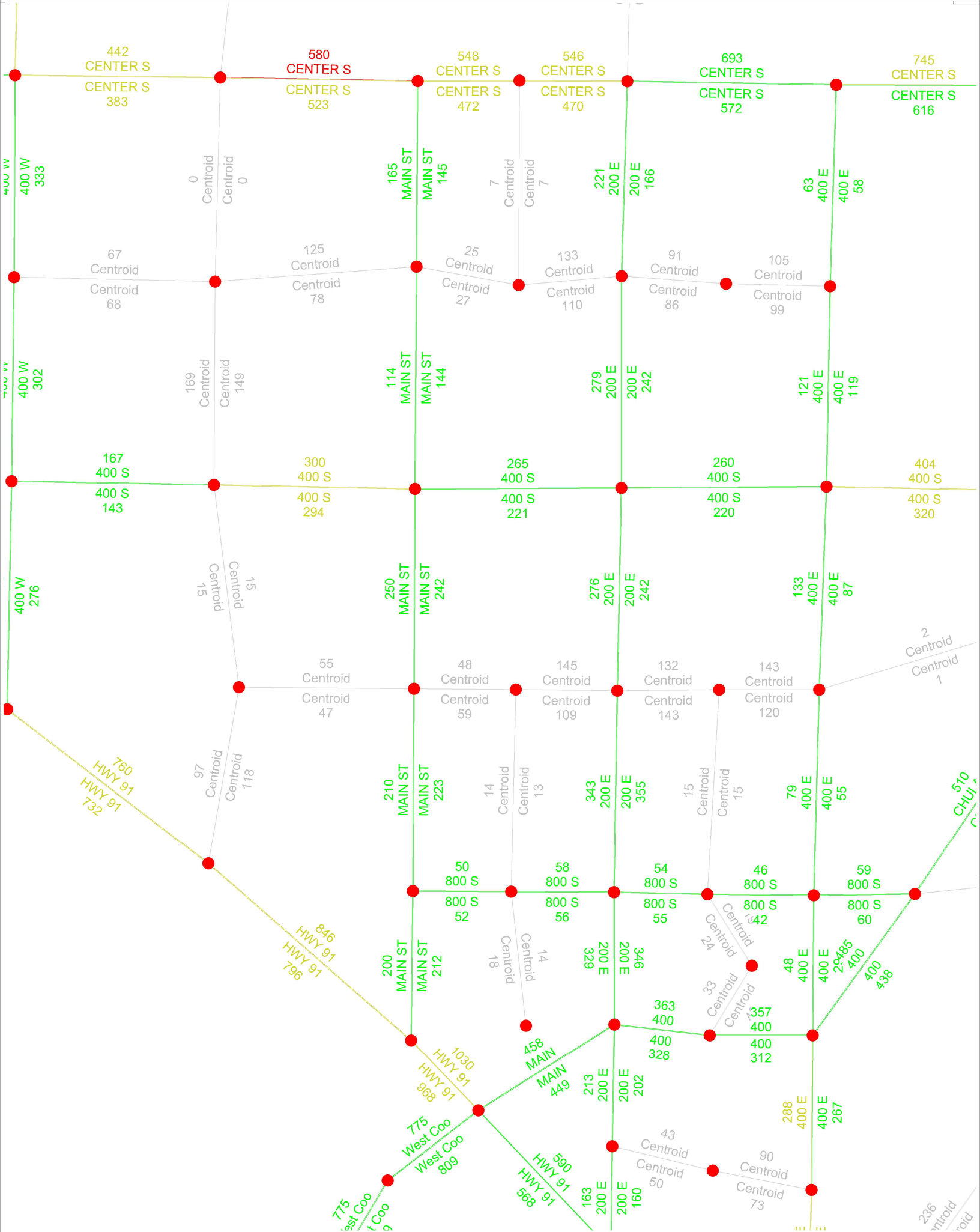


cube
(Licensed to Horrocks Engineers)

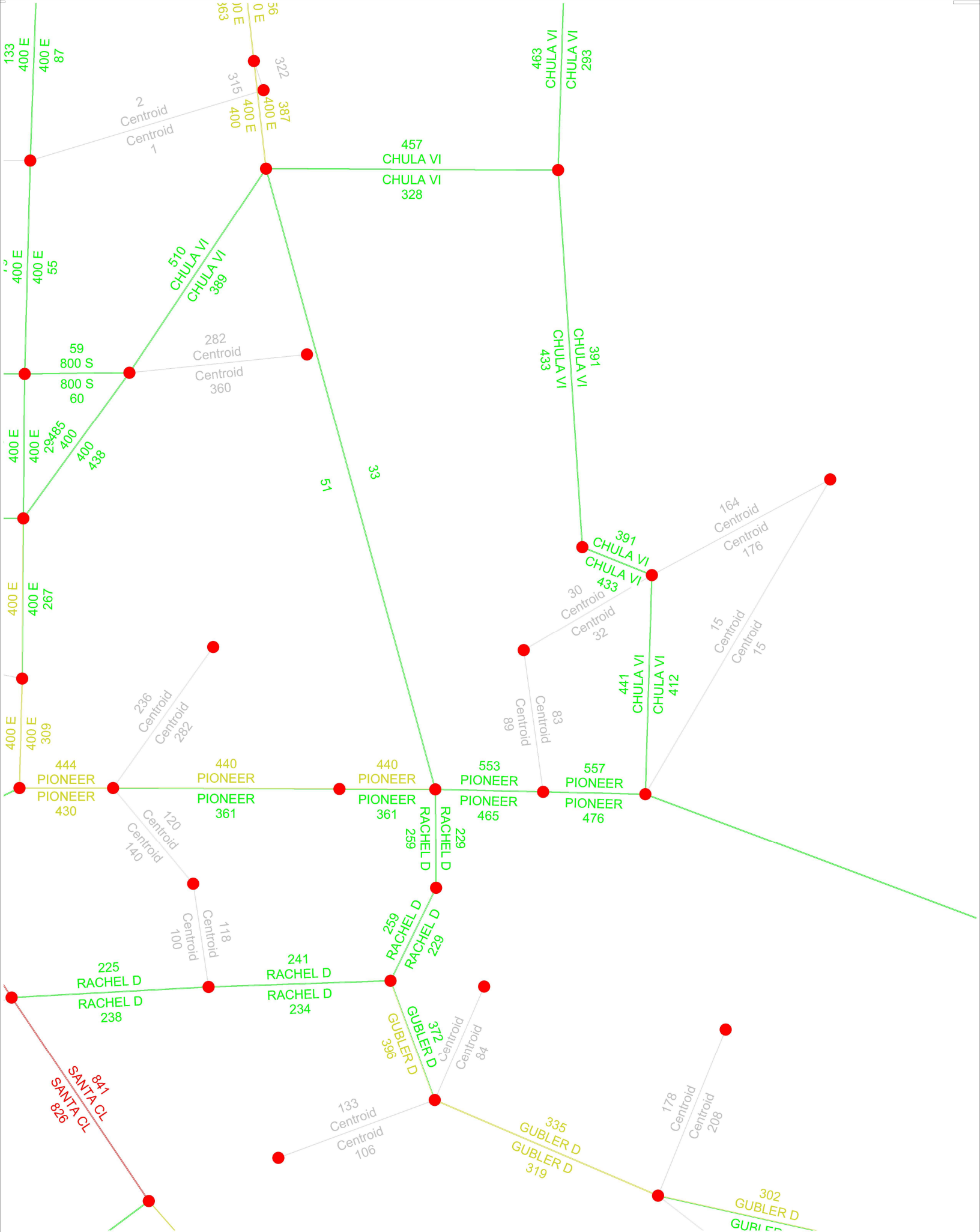
APPENDIX E
2020 Ivins City Traffic Model Trip Ends



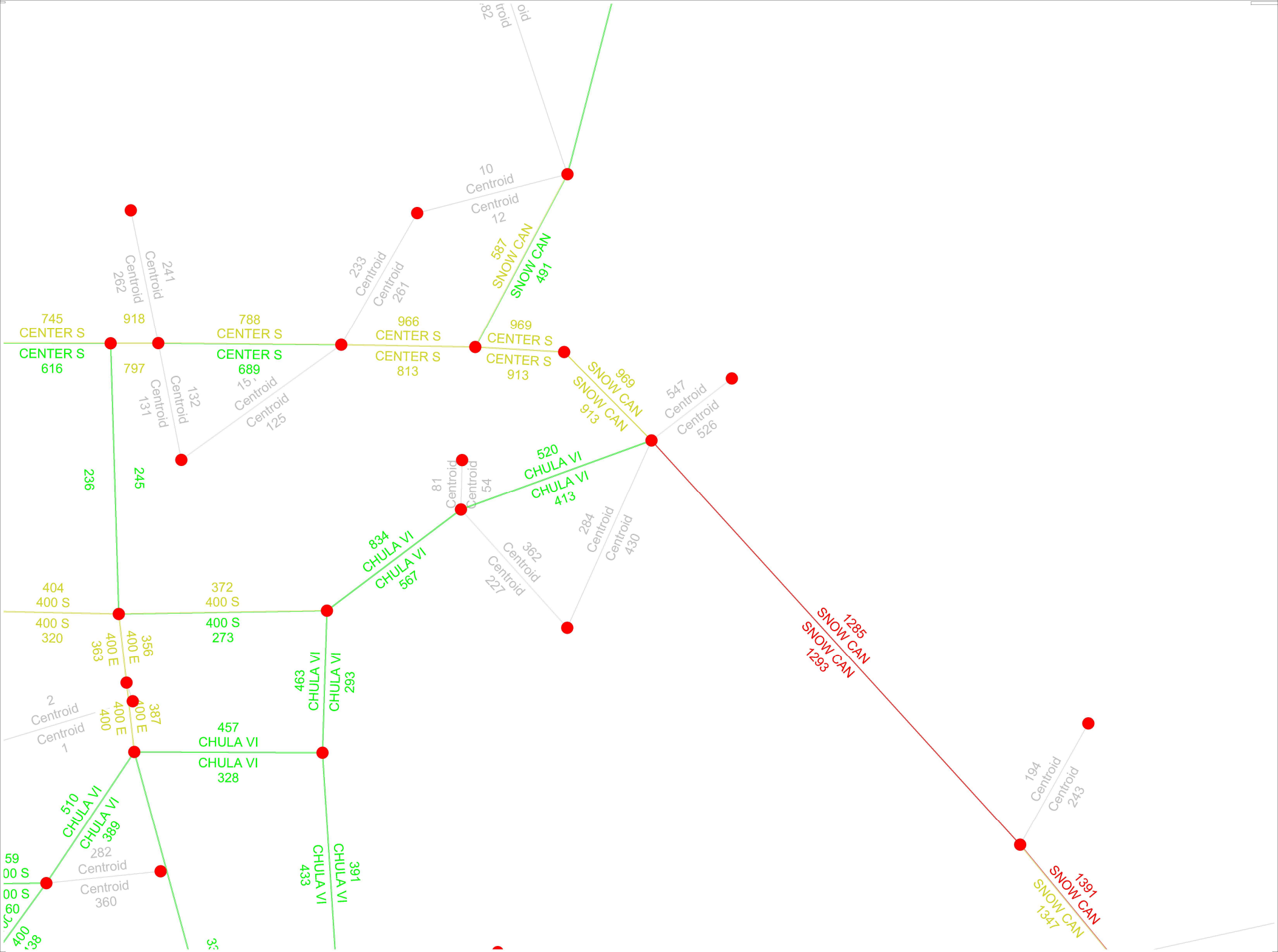
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APPENDIX F
2020 Ivins City Capital Facilities Plan & Estimates

2015 Transportation Master Plan - CRG Notes on Capital Facilities Plan

Project ID	Description	Total Estimate	Ivins City Cost
5-Year Transporation Plan (2021-2025)			
5A	Old Highway 91 - Widen Shoulder - 200 E to Kwavasa	$ 6,500,000	$1,710,000
5C	Old Highway 91 - Widen Shoulder - Kwavasa to Shivwits	$ 2,000,000	$ 500,000
5B	Public Works Yard Relocation	$ 3,120,000	$ 3,120,000
5D	Chip Seal Access Road to 100 Acre BLM Property	$ 200,000	$ 200,000
5E	Roundabout - Kayenta Parkway/Kwavasa	$ 170,000	$ 100,000
5F	400 West Gap Fill	$ 100,000	$ 100,000
5G	Center Street Streetscape Improvement, 750 E to 950 E	$ 100,000	$ 100,000
5H	Puerto Drive - Safe Route to School	$ 280,000	$ 100,000
5I	Puerto Drive - Mini Roundabouts	$ 50,000	$ 50,000
5K	Miscellaneous Projects for Safety, Road Gap Filling or Streetscape	$ 200,000	$ 200,000
	5 Year Plan Totals:	$ 12,720,000	$6,180,000
10-Year Transportation Plan (2026-2030)			
10A	Western Corridor - Connection to Gap Canyon Pkwy	$ 30,000,000	$ 1,000,000
10B	Western Corridor - 200 East to 400 East	$ 1,200,000	$ 200,000
10C	Western Corridor - 200 East to Old Highway 91 (roundabout)	$ 1,700,000	$ 300,000
10D	Trail Underpass (or overpass) on Old Highway 91 @ Western Corridor (need 2)	$ 1,500,000	$ 500,000
10E	Trail Underpass (or overpass) on Center St near Snow Canyon Dr	$ 900,000	$ 300,000
10F	Highway 91 Streetscape	$ 1,000,000	$ 1,000,000
10G	Roundabout - 400 East Center Street	$ 650,000	$ 650,000
10H	Miscellaneous Roundabouts and Projects for Safety, Road Gap Filling, or Streetscape	$ 500,000	$ 500,000
	10 Year Plan Totals:	$ 37,450,000	$ 4,450,000
30-Year Transportation Plan (2031-2050)			
20A	Old Highway 91 - Kwavasa to Pioneer Parkway - 5 lanes	$ 1,500,000	$ 500,000
20B	Western Corridor - Gap Canyon Parkway to I-15	$ 30,000,000	$ -
20C	Western Corridor, Old Highway 91 to Snow Canyon Parkway (widen)	$ 1,515,255	$ 500,000
20D	Kwavasa Drive widen to 5 lanes	$ 1,041,936	$ 300,000
20E	Other Signals and Roundabouts	$ 1,000,000	$ 1,000,000
20F	Miscellaneous Roundabouts and Projects for Safety, Road Gap Filling, or Streetscape	$ 1,000,000	$ 1,000,000
	30 Year Plan Totals:	$ 36,057,191	$ 3,300,000

APPENDIX G
Ivins City Traffic Volume Comparison, 2015 vs. 2020

EXISTING VOLUMES				
Intersection Label	**Intersection Name**	**2015 (PM)**	**2020 Peak Hour**	**Growth %**
A	400 W & Center St.	159	170	6.92%
B	Main St. & Center St.	343	351	2.33%
C	200 E & Center St.	488	541	10.86%
D	400 E & Center St.	475	691	45.47%
E	Puerto Dr. & Center St.	582	681	17.01%
F	S.C. Dr. & Center St.	773	881	13.97%
G	S.C. Dr. & Tuacahn Dr.	185	315	70.27%
H	400 W & 400 S	92	239	159.78%
I	600 W & Center St.	0	62	N/A
J	400 E & 400 S	146	325	122.60%
K	Puerto Dr. & 400 S	149	205	37.58%
L	400 E & 800 S	162	168	3.70%
M	400 E & Pioneer Pkwy.	280	426	52.14%
N	Hwy. 91 & Pioneer Pkwy.	569	618	8.61%
O	200 E & Hwy. 91	528	613	16.10%
P	400 S & 200 E	271	365	34.69%
Q	Main St. & Hwy 91	0	12	N/A
R	200 W & Hwy 91	0	461	N/A
S	400 W & Hwy 91	0	425	N/A
T	600 W & Hwy 91	0	17	N/A
U	Kayenta Pkwy & Hwy 91	0	14	N/A
V	Kayenta Pkwy & Kwavasa Dr	0	613	N/A
	TOTALS	5202	8193	57.50%

APPENDIX H
Roundabouts vs. Traffic Signals, Estimates and Capacities

ROUNDABOUTS VS. SIGNALS AND STOP SIGNS

An excerpt taken from RoundaboutsUSA.com by Bill Baranowski

Three general questions must be answered to justify a roundabout as the most appropriate form of control at any intersection:

- Will a roundabout be expected to perform better than other alternative control modes? In other words, will it reduce delay, improve safety or solve some other operational problem?
- Are there factors present to suggest that a roundabout would be a more appropriate control, even if delays with a roundabout are slightly higher?
- If any contradicting factors exist, can they be resolved satisfactorily?

If these questions may be answered favorably, then a roundabout should be considered as a logical intersection choice.

Roundabout controlled intersections can efficiently service traffic with decreased delay and greater efficiency than traffic signals. This is particularly true where traffic volumes entering the roundabout are nearly balanced on all legs and where there are a high number of left turning vehicles.

Traffic Signals

Traffic signals cause unnecessary delay for many reasons:

- The need to provide a minimum green time to each movement in every cycle creates time intervals in which no vehicles are entering the intersection.
- The need to provide for the most critical of two or more movements that proceed simultaneously results in an ineffective use of green time by non-critical movements.
- The "lost time" associated with startup and termination of a green phase detracts further from the amount of time that is available for moving traffic.
- Left turns that take place from shared lanes impede the other movements in the shared lanes unnecessarily. This results in a very inefficient utilization of the available roadway space.
- Heavy left turns, even from exclusive lanes, require dedicated phases that rob time from the major movements and increase the total time lost due to startup and termination of traffic movements.
- Signals are mechanical devices that not only require maintenance but also periodically malfunction. They are also dependent upon electrical power and do not, therefore, provide any control during power failures.
- Many signal violations occur at higher speeds so that the severity of accidents is often high.
- Permitted left turns and right turns on red introduce additional conflicts.

Two-Way Stop Control (TWSC)

TWSC can accommodate low traffic volumes with much less delay than traffic signals, but this control mode favors the major street (unstopped) movements at the expense of the

minor street (stopped) movement. When the major street traffic volumes are heavy (typically 1400 vph or more) there is little or no opportunity for cross street access. This places a definite limit on the application of TWSC. Even when TWSC capacity is not exceeded, there is often public pressure to install signals at TWSC intersections.

All-Way Stop Control (AWSC)
AWSC treats the cross street movements more favorably, without the wasted time associated with traffic signals. However, the rate at which vehicles may enter an intersection (i.e. headway) under AWSC is relatively low and, therefore, the total intersection capacity is somewhat limited.

Roundabouts
A roundabout overcomes all of these disadvantages. There is no sequential assignment of right-of-way and therefore no wasted time. Left turns are not subordinated to through traffic. Vehicles enter under yield control instead of stop control and therefore have lower headways and higher capacities. There are no electrical components to malfunction. Roundabouts, on the other hand, have their own limitations:

- Steady-state entry headways are shorter at traffic signals because of the positive assignment of right-of-way. By using long cycle times to minimize the effects of startup lost time, it is possible under most conditions to achieve higher approach capacities.
- For very low-volume applications, TWSC and AWSC are easier and less expensive to implement.
- Since roundabout operation is not periodic, it is not possible to coordinate the operation of roundabouts on an arterial route to provide smooth progression for arterial flows.
- Roundabouts offer the least positive form of control. Each vehicle entering the intersection must yield to all traffic that has already entered, but they still experience less accidents than a comparable signal or stop control.
- Roundabouts impose a new form of traffic control that is not familiar to motorists in the USA, but experience has found that drivers learn quickly how to drive in a roundabout.

Therefore, roundabouts are not the solution to all traffic problems at all locations. Careful study is required to identify the most appropriate control method at any given location. The studies required to justify the installation of traffic signal control and all-way stop control are based on the warrants and requirements set forth in the Manual of Uniform Traffic Control Devices (MUTCD). A Modern Roundabout should be considered as an alternative traffic control to traffic signals and stop sign control.

Roundabout "Warrants"
Before deciding on a traffic signal, other types of traffic control devices should be considered. Many of these will have benefits in terms of operations as they offer less restrictive movement of the vehicles through the intersection. At the same time, each of them will also offer some safety benefits over a signalized intersection. The 1998 Texas DOT document "Traffic Signal Warrants" states that the objective of an intersection review

is to "utilize the least restrictive form of traffic control that produces safe and efficient vehicle and pedestrian operation. These other forms of right-of-way control should be considered even if the intersection meets one or more of the traffic signal warrants. Authorities in Western Australia consider a traffic signal as their 'last alternative' when considering improvements to an intersection. Among the different types of 'less restrictive' traffic control devices, traffic roundabouts have been proposed by a growing number of municipal and state authorities. Traffic roundabouts offer many significant safety benefits over signalized intersections and have the same capacity to handle a significant volume of traffic (up to 7000 entering vehicles per hour - 60,000 vehicles/day). Traffic roundabouts have fewer conflict points than a signalized intersection and tend to have accidents of a less severe nature because there are no opposing movements. In particular, traffic roundabouts can be considered as an alternative to a signalized intersection when there are a high number of right angle, head on, left turn/through or U-turn accidents or intersections with an unusually high accident severity ratio (Florida DOT 1996).
The following jurisdictions have formally recommended traffic roundabouts as an alternative traffic control device to a signalized intersection, given that the same careful operational and safety investigations are carried out:

- New York State Department of Transportation
- Virginia Department of Transportation
- Maryland Department of Transportation
- Oregon Department of Transportation
- Florida Department of Transportation
- California Department of Transportation
- Federal Highway Administration (FHWA)

FHWA has recently published a comprehensive report on roundabouts entitled "Roundabouts: An Informational Guide" (FHWA 2000). This report contains a section on warrants for roundabouts.

Costs of Roundabouts Versus Traffic Signals

The cost of a typical 4-way traffic signal ranges from $160,000 to $200,000 depending on what right-of-way is required, the compliance of handicap access ramps, and any re-work of approaches and driveways. Roundabouts cost between $200,000 and $800,000, which is a wide-range of costs due to the necessary intersection re-design. The lower end of the costs will be realized when an existing intersection is retrofitted with curb treatments, gore islands, and a center median. The costs escalate when drainage needs to be addressed at a higher level, right-of-way needs to be acquired, if the intersection is geometrically atypical (i.e., five-approach intersection, approach angles are not 90 degrees, side slopes are significantly steeper than 2%, etc.), and elaborate landscaping is proposed.

Capacity of Roundabouts and Traffic Signals

The following chart is from FHWA's "Roundabouts: An Informational Guide" (FHWA 2000). It shows the capacities of various roundabout configurations.

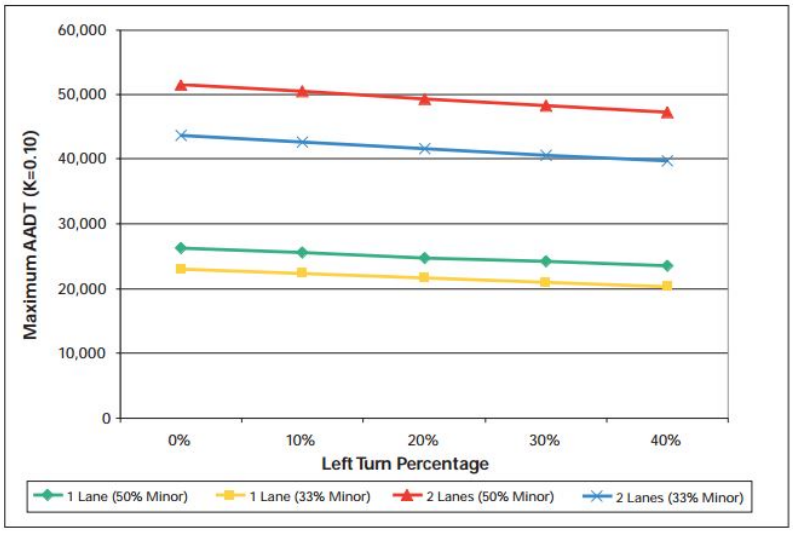


Exhibit 3-1. Maximum daily service volumes for a four-leg roundabout.

For three-leg roundabouts, use 75 percent of the maximum AADT volumes shown.

From this chart, the capacity of a roundabout is impacted by three main criteria; number of lanes, percentage of left turns, and percentage of side-street volume. For instance, assuming a one-lane roundabout with a high percentage of left turns (40%) and 33% of total approach volume coming from the side streets, a four-leg roundabout could accommodate a maximum daily approach volume of 20,000 vpd. If there are high right turns, an exclusive right turn lane could be implemented that separates these vehicles from the 20,000 vpd, so the 20,000 vpd ultimately include through movements and left turns. This equates to approximately a 2,000-vph peak hour.

The table below is from FHWA's "Signalized Intersections: An Informational Guide" (FHWA August 2004). It shares rules of thumb for sizing a signalized intersection and is based on collective experience of past practice, so it should be looked at as an early stage of design. Based on this criteria, it is ideal to have no more than 450 vph per approach lane. If there are 100 or more vph turning left, an exclusive left-turn lane is recommended. Similarly, when there are 300 or more right-turns anticipated, an exclusive right-turn lane should be planned.

For discussion purposes, for a one-lane approach for each leg and an exclusive left-turn lane, and excluding the right turn lanes as with roundabouts, a signal can comfortably accept an hourly volume of 2,200 vehicles, which exceeds the roundabout capacity. Thus, signals generally have a higher volume ceiling than roundabouts, but it should be noted that there are many aspects of a signalized intersection that impact the capacity such as cycle length, split timing, signal synchronization, percentage of left turns, etc.

Table 18 - Planning-level guidelines for sizing an intersection. From FHWA "Signalized Intersection: An Informational Guide"

Table 36. Planning-level guidelines for sizing an intersection.

Geometric Property	Comment
Number of lanes[2]	As a general suggestion, enough roadway lanes should be provided to prevent a lane from exceeding 450 vehicles per hour. Mainline facilities that are allocated the majority of green time may accommodate higher volumes. Other elements that should be considered in the sizing of a facility include the number of upstream/downstream lanes, lane balance, signal design elements, pedestrian/bicycle effects, right-of-way constraints, and safety implications.
Exclusive left-turn lanes[2]	The decision to provide an exclusive left-turn lane should generally be based on the volume of left-turning and opposing traffic, intersection design, and safety implications. Exclusive left-turn lanes should be investigated when a left-turn volume exceeds 100 vehicles per hour. Dual left-turn lanes could be considered when the left-turn volume exceeds 300 vehicles per hour. On some facilities, left-turn lanes may be desirable at all locations regardless of volume.
Exclusive right-turn lanes[2]	The provision of right-turn lanes reduces impedances between lower speed right-turning vehicles and higher speed left-turning vehicles. Separating right turns also reduces the green time required for a through lane. Safety implications associated with pedestrians and bicyclists should be considered. In general, a right-turn lane at a signalized intersection should be considered when the right-turn volume and adjacent through lane volume each exceeds 300 vehicles per hour.
Left-turn storage bay length[41]	Storage bays should accommodate twice the average number of left-turn arrivals during a cycle.

APPENDIX I
2021 Ivins Traffic Impact Fee Facilities Plan

APPENDIX J
2021 Ivins Traffic Impact Fee Analysis