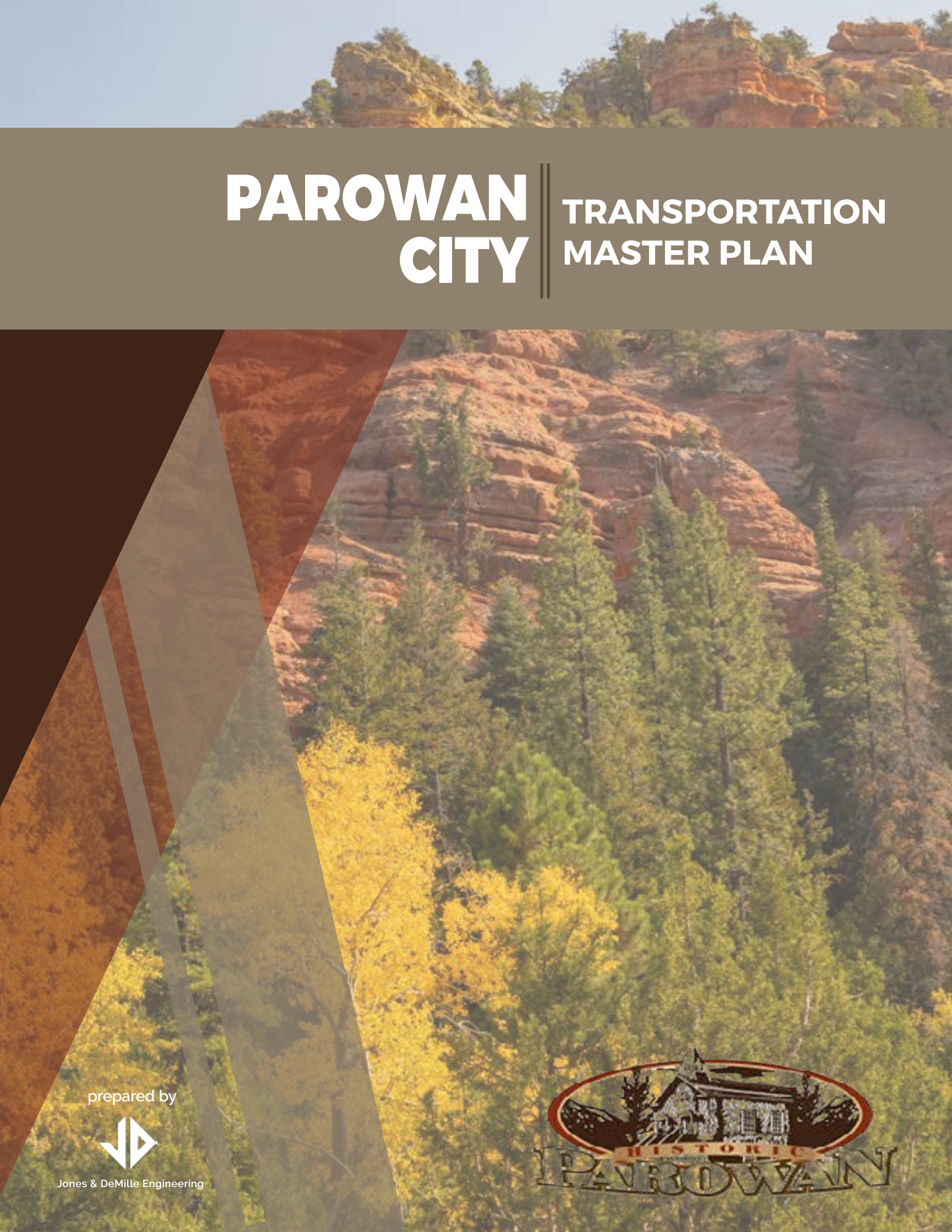

PAROWAN CITY

TRANSPORTATION MASTER PLAN

prepared by

Jones & DeMille Engineering

HISTORIC PAROWAN

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DEFINITIONS

Average Daily Traffic (ADT) – The average number of vehicles passing a specific point on a roadway in either direction over a 24-hour period. Total volumes are collected over a period of time - for this study, approximately ten days were collected for each location - and divided by the number of days collected (see Section 2.5.3).

Class B and C Funds – Funding distributed by the Utah Department of Transportation (UDOT) for Class B and Class C road maintenance and improvements (see Section 2.9.1).[1]

Class B Road – County Roads.

"County roads comprise all public highways, roads, and streets within the state that:

(a) are situated outside of incorporated municipalities and not designated as state highways;
(b) have been designated as county roads; or
(c) are located on property under the control of a federal agency and constructed or maintained by the county under agreement with the appropriate federal agency."[2]

Class C Road – City Streets.

"City streets comprise:

(a) highways, roads, circulator alleys, and streets within the corporate limits of the municipalities that are not designated as class A state roads or as class B roads; and
(b) those highways, roads, and streets located within a national forest and constructed or maintained by the municipality under agreement with the appropriate federal agency."[3]

Class D Road – Any road, way, or other land surface route that has been or is established by use or constructed and has been maintained to provide for usage by the public for vehicles with four or more wheels that is not a class A, class B, or class C road." **Class D roads are not included in any way within this TMP for reference or analysis. Reference to this TMP may not be made for any legal action or analysis involving Class D roads. Any use of analysis, reference, or legal action based upon this TMP regarding Class D roads would require an amendment to the TMP.**

Road Rights-of-Way – means the corridor width for the road itself, all of its appurtenant shoulders, culverts, drains and turnarounds, etc., and any additional corridor width that constitute the City's rights-of-way therefore, plus any and all other rights-of-way acquired by Parowan City in or appurtenant to the corridor width, all of which Parowan City has acquired by any legal means, including but not limited to conveyance, construction with City resources, prescriptive use, or dedication for public use.

Geographic Information Systems (GIS) – GIS is used to create spatial databases for mapping data. Spatial information, such as locations and lengths of roadways, can be uploaded to an online map that can be organized by data feature type and presented visually.

Level of Service (LOS) – A method of determining the quality of traffic flow based on volume and capacity (see Sections 2.6 – 2.7).

Traffic Impact Study (TIS) – A study performed prior to construction of a new development or redevelopment to determine possible impacts to the transportation network and community.

Transportation Corridor – A linear pathway that defines the footprint of an existing or future transportation facility, including road surface and rights-of-way. This can be vehicular, pedestrian, bicycle, rail, etc. (see Section 7).

Vehicle Miles Travelled (VMT) – All miles traveled by vehicles on a given roadway over a period of time. Can be used as a method of comparison between roadways to determine roadway classification (see Section 2.4.7).

[1]Transportation Fund and Highway Finances, Utah Code §72-2-1, Enacted 1998, https://le.utah.gov/xcode/Title72/Chapter2/72-2-S102.html
[2]Highways in General, Utah Code §72-3-103, Enacted 2000, https://le.utah.gov/xcode/Title72/Chapter3/72-3-S103.html
[3]Highways in General, Utah Code §72-3-104, Amended 2020, https://le.utah.gov/xcode/Title72/Chapter3/72-3-S103.html

1 INTRODUCTION

1.1 Background

Parowan City is the county seat of Iron County with a population of around 3,000 residents. Parowan City is located 20 miles Northeast of Cedar City along Interstate 15. The City also rests at the mouth of Parowan Canyon providing year-round access to Brian Head Ski Resort. Other attractions nearby include Cedar Breaks National Monument, Yankee Meadows, and several National Parks.

1.2 Need for a Study

The primary purpose of a transportation system is to keep people and goods moving to their destination in a safe and efficient manner. Without planning for future growth and continually improving its transportation system, Parowan City could experience significant transportation problems. Increasing traffic demands must be met by a living transportation system and transportation planning document. Proper planning for the City ensures that all traffic demands and transportation modes are assessed, including vehicles, bicycles, heavy truck traffic, pedestrians, and rail. The transportation study will ensure that the unique qualities of Parowan City are preserved while providing increased access to all facilities and accommodating all traffic demands.

1.3 Transportation Planning Purpose

The purpose of this study is to develop a Transportation Master Plan (TMP) for Parowan City to be used as a roadmap for future planning and development in the City. The primary objectives of the TMP are as follows:

1. Analyze existing traffic and roadway conditions to determine likely growth patterns and future transportation-related needs,
2. Plan for future transportation-related development and funding acquisition,
3. Guide future development by establishing transportation-related development standards,
4. Provide a framework for the preservation and establishment of transportation corridors and related access management facilities, and
5. Create a Geographic Information System (GIS) Story Map that includes all planning data from the TMP as well as other relevant Parowan City GIS data.

These objectives will allow Parowan City to establish a transportation plan that will ensure a functional transportation system.

1.3.1 Analysis of Existing Traffic and Roadway Conditions

The analysis of existing traffic and roadway conditions is included in Section 2 of this document, which includes the following information:

- Existing land use data and maps,
- Existing demographic and socioeconomic data,
- Future population growth estimates,
- An inventory of the existing roadway network,
  - Functional classification of vehicle roadways,
  - Daily traffic count data at specified locations throughout Parowan City,
  - Vehicle crash data and patterns,
  - Existing funding sources and opportunities.

By analyzing the existing conditions, a baseline can be established for projections of future development.

1.3.2 Plan for Future Development and Funding Acquisition

Future planning addresses the transportation needs of the City as determined by the analysis of existing traffic and roadway conditions. Planning for future growth in Parowan City is analyzed and described in Section 3. These needs include, but are not limited to:

- Traffic signal needs,
- Infrastructure maintenance, including bridges, sidewalks, and roadways,
- Traffic safety concerns,
- Development and land use changes,
- Future projects, and
- Funding opportunities.

Specified future planning projects are separated into short-range and long-range transportation plans. The short-range transportation plan addresses the deficiencies in the existing system and the developments currently planned for the upcoming (approx.) ten years. The long-range transportation plan is a high-level analysis and focuses primarily on general land-use allocation and zoning (ten to twenty years). In addition, any projects which require extensive advance planning and funding or which are deemed necessary but will not be needed for 20+ years will be part of the long-term plan. The short-range transportation improvement plan is included in Section 5.1 and the long-range transportation improvement plan is included in Section 5.2.

1.3.3 Establishment of Transportation-Related Development Standards

As part of this Transportation Master Plan, the City seeks to establish standards development standards for both private and public development. These development standards include:

- Roadway typical section standards,
- Right-of-way (ROW) width standards by functional classification type,
- Driveway approach and access design standards, and
- Traffic Impact Study (TIS) standards and policies.

Establishment of these standards within the framework of the TMP document helps to ensure that development and future growth occur in a manner consistent with the desires of the City, its residents, and its culture. Section 4 outlines the TIS standards and policies.

1.3.4 Preservation of Corridors and Access Management

This document will outline the City's ability to establish transportation corridors as well as the restrictions involved in corridor preservation. Corridor preservation is essential in planning for future transportation network growth. Furthermore, Corridor preservation ensures that unwanted development does not occur and that desired developments occur in locations most cohesive and integrated to the transportation network. Corridor preservation techniques and other information are included in Section 7.

Access management principles are used to balance roadway access with mobility. Function classification, described in Section 2.4, is integral in determining access management needs and practices. Guidelines, standards, and information on access management are included in Section 6.

1.3.5 GIS Story Map

GIS data is used by the City to accurately locate and inventory transportation-related infrastructure and information. Much of the information included in this study will be added to maps which will visually present the study data and future planning. Many of these maps will be included in the Transportation Master Plan document (primarily in the appendices). They will also be added to the online story map available on the City's website. This online story map is intended to be a living story map, just like the TMP document, and susceptible to maintenance and changes after adoption due to disparities between projected and actual growth. The online story map is interactive in nature and provides the user with the ability to access spatial data in an organized and visual medium. This story map provides an alternative method for private individuals, private organizations, and public entities to access City transportation-related plans and standards.

1.3.6 Transportation Planning Purpose Summary

The transportation planning purpose has been described in this section. In summary, the following list of items will be addressed and included in the Transportation Master Plan.

- Analysis of existing conditions (Section 2)
- Plan for future conditions (Section 3)
- Standards for Traffic Impact Studies (Section 4)
- Short-Term and Long-Term Transportation Improvement Plans (Section 5)
- Access management standards (Section 6)
- Corridor preservation techniques and guidelines (Section 7)
- Other Future Actions (Section 8)

1.4 Study Goals

Establishment of a reliable, sustainable, and efficient transportation network provides many net benefits to the City. Some of these benefits include improved mobility, citizen health, connectivity, and economy. The Utah Department of Transportation (UDOT) has established a quality of life framework with which Parowan City seeks to comply and build upon. UDOT's quality of life framework is built on four factors: Better Mobility, Good Health, Connected Communities, and Strong Economy. [4] These factors, when prioritized, can provide the integral benefits a healthy transportation system seeks to supply. This section will explain how Parowan City seeks to integrate this quality of life framework into its transportation planning.

1.4.1 Better Mobility

Parowan City seeks to improve mobility within the City by prioritizing established corridor preservation techniques, access management principles, roadway ROW and functional classification standards, and other development standards. Mobility improves when roadways are designed by functional classification type. This ensures that mobility and access are balanced and applied respective to specific roadway demands. Parowan City commits to finding the most cost-effective and efficient alternatives to future roadway design. Future planning ensures that the roads which will provide the most effective levels of mobility are the roads that get built. Parowan City seeks to address, where possible, mobility deficiencies in the existing roadway network caused by undermaintained roads, unpaved roads, under signalized roads, or lack of redundancies.

[4]Utah Department of Transportation, "2022 UDOT Strategic Direction," Utah Department of Transportation, 2022. https://www.udot.utah.gov/strategic-direction/index.html#missionSection

1.4.2 Good Health

Parowan City seeks to improve citizen health by expanding its active transportation network. By coordinating with UDOT, Iron County, and surrounding towns, it is desired that a cohesive and interconnected active transportation network can be established. This will allow residents and visitors of Parowan City the ability to enjoy the community, culture, and natural beauty of the City, as well as neighboring municipalities. Parowan City also seeks to improve citizen health by seeking safe and sustainable alternatives in planning, constructing, and maintaining City transportation facilities. These alternatives will allow the City to lessen its environmental and safety impacts. Parowan City desires its residents to live with the benefits of safer roadways, cleaner air, and expanded active transportation opportunities.

1.4.3 Connected Communities

Parowan City seeks to improve both its interconnectedness with other municipalities, counties, and travel destinations as well as its interconnectedness within the City itself. As mentioned in Section 1.4.1, the City seeks to balance mobility and access in future roadway design. The City desires to maintain existing roadways that connect communities and plan new roadways which will expand the connectivity potential of its residents. The City will do this through application of corridor preservation techniques, access management principles, and establishment of transportation improvement plans. The City will seek the input of transportation and roadway professionals, residents, and other City officials and professionals to ensure that every community's concerns and needs are considered and addressed.

1.4.4 Strong Economy

Parowan City recognizes the benefits to the economy of a functional and efficient transportation network. The City desires to address and conceive potential development concepts in its planning which provide the greatest economic benefits while remaining consistent with the culture and desires of the community. Future roadway planning should be consistent with planned development and growth already present within the City. The City also seeks to find transportation alternatives that can improve the transportation experience for local commuters, travelers, tourists, and freight.

1.5 Study Process

Each step of the study process for the Transportation Master Plan is outlined as follows:

1. Coordination between City officials, contractors, and other local and state entities (This coordination continues throughout the entire study process.).
2. Analysis of existing conditions.
3. Analysis of future conditions.
4. Future project planning.
5. Establishment of development standards.
6. Public Input.
7. Final review by UDOT and by City officials.
8. Final changes to document based on public input, and review by UDOT and City officials.
9. Adoption by the City Council.
10. Publish on City's website as Transportation Master Plan document and as GIS Story Map.

1.5.1 Coordination with Local, State, and Federal Governments

Parowan City recognizes the need to coordinate with local, state, and federal governments throughout the planning process to ensure that cohesive and effective transportation networks are established throughout the City. Funding for many transportation projects comes from state and federal sources, and established coordination and cooperation with these entities is beneficial in ensuring future funding opportunities. State and federal highways are also present throughout the City, and coordination with these entities ensures that these highways are maintained and the City's needs relative to these highways are addressed. The City owns roadways and highways that intersect with these state and federal highways, and coordination for maintenance, signalization, and other needs is essential in establishing fluidity between networks.

A public open house allows the public to provide feedback regarding Parowan City's Transportation Plan. Public comments are included in Appendix 4. Where possible and necessary, the City seeks to inform and be informed by local, state, and federal entities about transportation-related changes, plans, and standards.


Welcome To
Parowan
Mother Town of Southern Utah
Est. 1851
PAROWAN

2 EXISTING CONDITIONS AND FUTURE PROJECTIONS

An inventory of existing conditions was created to assist in determining future expansion, development, and maintenance needs.

2.1 Land Use

Parowan City's Land Use Ordinance can be found online at parowan.municipalcodeonline.com. Coordination between roads and land use is essential in determining the most beneficial and efficient development of new roadways. Parowan City has established zoning districts for the entire City. Road development should exist to support the zoning established.

2.2 Demographic & Socioeconomic Data

Demographic and socioeconomic data help Parowan City understand the past, present, and future transportation needs throughout the City. The following subsections outline some of the relevant data from the Unites States Census Bureau and other sources. Additional figures and data can be found in the GIS Story Map and in Appendix 9.

2.2.1 Population Data and Growth

Table 1 shows the 2020 census population and housing data for Parowan City. **Table 2** compares the population growth for Parowan City and the State of Utah from 1950 to 2020. This data was used to calculate an annual growth rate. This annual growth rate was used as a reference point to determine the growth rate for Average Annual Daily Traffic (AADT) growth projections (see Section 3.2).

Table 1 - City Population and Housing Data[3]

Population	Housing Units	Area (sq mi)	Population Density (persons/sq mi)	Housing Denisty (housing units/sq mi)
2996	1407	6.89	435	204

Table 2 - Population Growth Trends

Year	State of Utah[5]	Parowan City[6]
1950	688,862	1,455
1960	890,627	1,486
1970	1,059,273	1,423
1980	1,461,037	1,836
1990	1,722,850	1,837
2000	2,233,169	2,582
2010	2,763,885	2,790
Average Annual Growth (1950-2010)	2.4%	0.94%
2020	3,271,616	2,996
Average Annual Growth (2010-2020)	1.7%	0.69%

Table 3 shows a population growth estimate for the next 40 years by the University of Utah's Kem C. Gardner Policy Institute. It is anticipated that the Iron County's population will nearly double in the next 40 years.

Table 3 - Iron County Population Growth Estimates

Year	Population
2020	57,658
2030	77,312
2040	85,248
2050	91,299
2060	98,098

Population growth is an important consideration when developing and improving a transportation system. Many factors affect the population and traffic growth. For this reason, City populations and traffic volumes do not always increase or decrease proportionately. Parowan City is actively seeking opportunities to develop industrial, commercial, and residential areas throughout the City. Roadways and transportation facilities will need to be improved to meet the traffic demand that this development will create.

Proper transportation planning accelerates the construction of these developments and allows each development to function effectively. Planning with a higher growth rate can help Parowan City's transportation system stay ahead of traffic demands and prepare for unexpected growth. However, planning with too high

[5]United States Census Bureau, "Historical Population Change Data (1910-2020)," United States Department of Commerce, https://www.census.gov/data/tables/time-series/dec/popchange-data-text.html

[6]United States Census Bureau, "QuickFacts: Parowan City, Utah," United States Department of Commerce, https://data.census.gov/all?q=Parowan%20City,%20Utah

[7]Kem G. Gardner Policy Institute, "Utah Long-Term Planning Projections: A Baseline Scenario of Population and Employment Change in Utah and its Counties," The University of Utah, January 2022, https://gardner.utah.edu/wp-content/uploads/LongTermProj-Jan2022.pdf?x71849&x71849

of a growth rate may lead to inefficient use of funds regarding the transportation system. To balance these considerations, a traffic growth rate of 1.5% was used in this report.

2.2.2 Additional Demographic and Socioeconomic Data

In Parowan, 7.0 percent of the population is under the age of 5, 28.2 percent is under the age of 18, and 19.7 percent are over the age of 65. 92.8 percent of the population is white (including Hispanic or Latino), and the other 7.2 percent are other races. 73.3 percent of the population over the age of 16 was in the civilian labor force in 2021.

Parowan City's demographics are comparable to the State's in many categories. However, Parowan City's demographic areas differ from that of the state in a few key areas.

The information used for comparison in this section is per the 2020 U.S. Census, unless otherwise specified. On a per capita basis, sex and race statistics are within a few percentage points for every census-included category between the City and the State. Key differences between the City and the State are present with education, income, and housing. Both the City and the State have greater than 93 percent of high school graduates above the age of 25, but the state has 35.4 percent of persons above the age of 25 with a bachelor's degree or higher, compared to the City's 18.1 percent. The median household income (2021 dollars) was $44,085 in Parowan City and $79,133 in the State. Additionally, the per capita income (2021 dollars) was $21,883 in Parowan City, which is lower than the $33,378 in the State. 66.5 percent of Parowan City's residents are homeowners compared to the State's 69.7 percent.

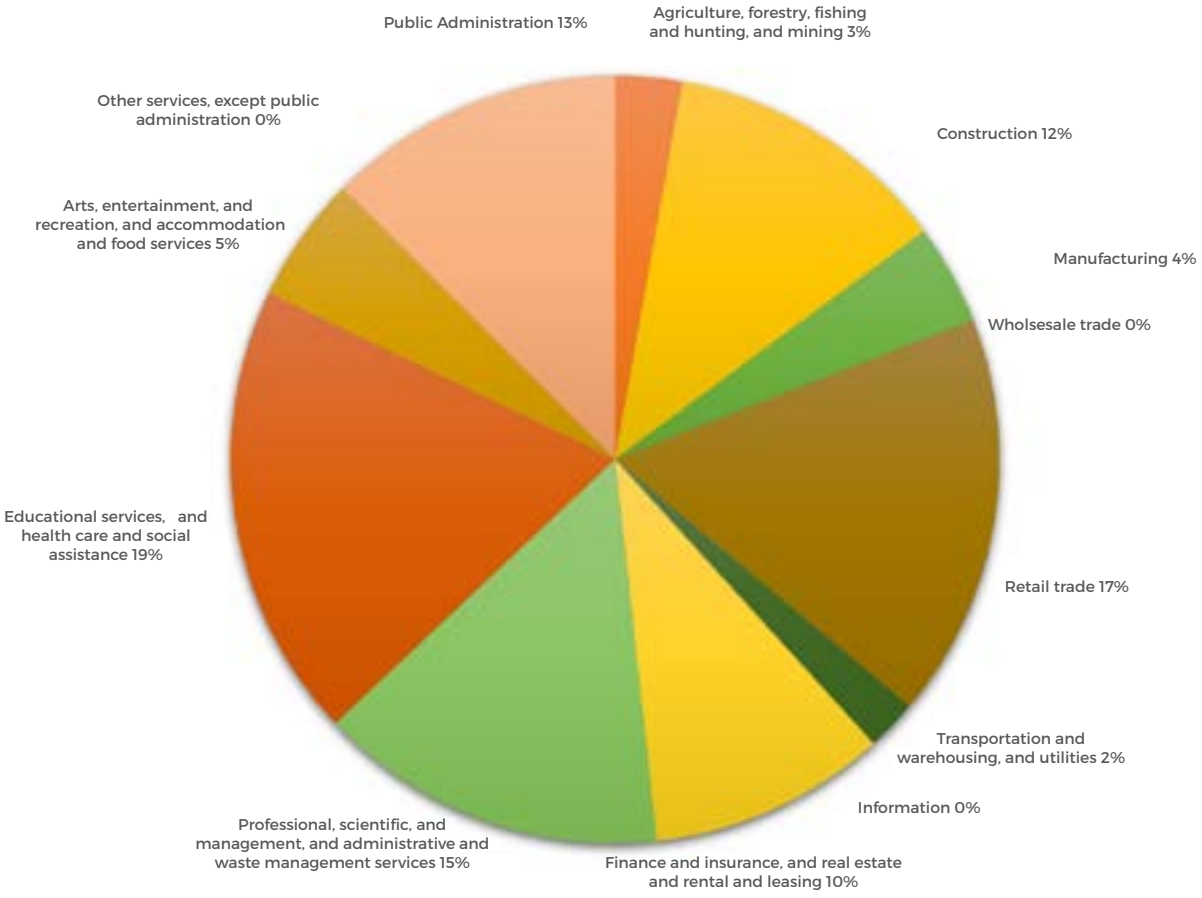


Figure 1 - Employment Data[8]

[8]United States Census Bureau, "Selected Economic Characteristics," United States Department of Commerce, Accessed July 14, 2022, https://data.census.gov/table?q=Parowan%20City%20utah%20employment

2.3 Roadway Network Inventory

A roadway network inventory organizes all City roadways by functional classification. It also provides information on roadways including crash data, vehicular volume, and roadway surface type. A visual representation of the roadway network inventory can be found in the online story map.

The following information was gathered for the existing roadway network:

- Number of lanes
- Roadway segment lengths
- Daily Traffic counts, speeds, and vehicle classifications on selected roadway segments
- Planned and funded roadway improvement projects
- Vehicle crash information

The Parowan City roadway network provides the primary means of transportation to Parowan City, Brian Head, and surrounding areas. The state highway system serves as the backbone for this network. Vehicular travel relies heavily on a well-maintained and complete roadway network.

2.4 Functional Classification

Roadway functional classification is used by the United States Department of Transportation (USDOT) and UDOT to categorize highways and other roadways. This categorization assists planners and designers in creating roadways compatible with intended needs of the roadway network. The American Association of State Highway and Transportation Officials (AASHTO) describes functional classification as the process of "[defining] the role of each roadway in serving motor-vehicle movements within the overall transportation system." It is an organized system with established parameters.

Roadway networks can be categorized into rural and urban. Parowan City's roadway network functions as a rural network. Functional classification is defined in a hierarchical structure based upon factors including roadway design volume, speed, access, and mobility. The functional classification categories used in Parowan City's network will now be described. These functional classification definitions are listed in hierarchical order from highest mobility and lowest accessibility to lowest mobility and highest accessibility.

2.4.1 Freeways

The national interstate highway system is a network of federally controlled toll-free highways. President Dwight D. Eisenhower signed the Federal-Aid Highway Act of 1956 officially establishing the interstate system. These highways are designed with high speeds and limited access to maintain maximum mobility. Freeways utilize grade-separated interchanges to limit congestion and other access-related issues.

Interstate 15 (I-15) is the only federal freeway near Parowan City. I-15 interchanges located at the North and South ends of Parowan provide access to Parowan and nearby areas. I-15 runs North and South carrying large volumes of traffic year round.

2.4.2 State Highways

State highways are designed similar to freeways with emphasis on high mobility and high speed. These highways, however, are not generally grade-separated at intersections and can have traffic-control at intersections, particularly within municipalities. These are toll-free state-controlled highways. These are generally designed as arterials and major collectors throughout counties within the state.

State highways in Parowan City include:

- SR 143 – This highway runs from I-15 Exit 75 into Parowan City and continues up Parowan Canyon. This highway provides access to Brian Head and other recreational areas year-round.
- SR 274 – This state highway extends from I-15 Exit 78 to State Route 143 and serves as Parowan City Main Steet. It also intersects State Route 271.
- SR 271 – This Highway connects Parowan City to the town of Paragonah and continues to I-15 Exit 82.

2.4.3 Arterials

Principle arterials transport longer-distance traffic flow for regional, intercommunity, and commuting purposes. These streets typically have relatively high speeds and can carry sizeable traffic volumes for longer distances. Outside of municipalities, accesses and intersections are ideally spaced no less than one mile apart. Arterials should be designed with the focus on mobility and should be given priority at intersections with other roadways where applicable.

Principal arterials include:

- SR-143
- SR-274
- 200 S from Main Street to SR 143

2.4.4 Major Collectors

Major collectors, like arterials, prioritize mobility and commuting traffic, however, they typically transport lower traffic volumes. These roadways typically connect minor collectors and local roads to arterials or highways. Access to residential developments and rural facilities is more common in major collectors than with arterials. Highway 271 and Old Highway 91 are examples of major collectors in Parowan City.

2.4.5 Minor Collectors

Minor collectors provide access by connecting communities and neighborhoods. These roads funnel traffic from major collectors or arterials to local streets. Many roads that do not have the traffic volumes to be classified major collectors are considered minor collectors. 300 East and 200 West are classified as minor collectors.

2.4.6 Local Roads

Local roads connect adjacent properties, whether residential buildings or commercial facilities. This requires frequent access points and intersections which leads to frequent stops. Therefore, local roads will have lower speed limits and span shorter distances.

2.4.7 Vehicle Miles of Travel (VMT)

The VMT for each roadway was calculated from two different sources. The first source constituted counts that were conducted on each of the listed roadways as part of this study. The second source was comprised of counts that were obtained from UDOT as part of their on-going counting procedures. The VMT was calculated as the product of a roadway and its respective length. The VMT was used in determining the functional classification of each roadway in the study area.

The Federal Highway Administration (FHWA) Guidelines limit the percentage of road miles and VMT on functionally classified highways. The allowable percentages for each classification are shown in **Table 4**.

Table 4 - Allowable Percentage of Road Miles and VMT[9]

Functional Classification	Rural		Urban	
	Mileage	VMT	Mileage	VMT
Major Collectors	8%-19%	10%-23%	10%-17%	12%-24%
Minor Collectors	3%-15%	1%-8%	5%-13%	3%-10%
Local Roads	62%-74%	8%-23%	66%-74%	7%-20%

2.5 Roadway Conditions

The current condition of each roadway is explained in this section. The condition of the roads serves as a basis for how well the transportation system functions.

2.5.1 Travel Lanes

The dimensions and amount of travel lanes on a roadway impact the amount of traffic a road can accommodate. Parowan City's transportation system is primarily constituted of roadways with two travel lanes eleven or twelve feet wide. However, there are segments of roadway with high traffic volumes that have additional turn lanes.

2.5.2 Surface Conditions

The surface type of the roadway affects the durability, comfort, and capacity of a roadway. All state highways and arterials in Parowan City are paved. The study roadway segments for the City are paved. Some low traffic connecting roads in Parowan City remain unpaved. Included in the TMP Story Map is a layer showing the surface type of all roadways in the study.

Roadway surfaces in a state of disrepair also affect the usability of a road. The condition of the roadway surface is one of the determining factors when deciding which road projects to prioritize.

2.5.3 Traffic Volumes

Traffic volumes indicate the travel demand of existing roadways and the importance of the roadway for an area. Roadways with the greatest impact generally have the highest traffic volumes. Traffic volumes and road capacity are used to determine how well a road is functioning. The average daily traffic (ADT) is one of the most common metrics to analyze the amount of traffic a road experiences. ADT refers the amount of traffic passing a certain point on an average day. This includes both directions of traffic.

Traffic Counts were obtained for select roadway segments as part of this report. Traffic Counts remained in place for 7-10 days to get an average daily traffic volume. A 1.5% traffic growth rate was used to obtain all projected values. For more information on the traffic growth rate see Section 2.2.1. The current and projected average daily traffic values are shown in **Table 5**. More information obtained in these traffic counts can be found in Appendix 8 and in the GIS Story Map.

Table 5 - Average Daily Traffic on Selected Parowan City Roads

Roadway Segment	Current ADT (2023)	Projected ADT (2033)	Projected ADT (2043)
100 N	896	1042	1212
100 S	399	465	542
100 W (near 200 S)	497	578	673
100 W (near North Interchange Travel Center)	417	486	565
200 N	270	315	367
200 S	1244	1446	1681
200 W	226	264	308
300 E (near Pool)	205	239	279
300 E (near Fairgrounds)	614	714	830
400 N	822	957	1113
600 W (near Gap Road)	307	357	415
600 W (North of 200 S)	1170	1361	1583
600 W (South of 200 S)	571	664	772
Airport Road	160	187	218
Center Street	2129	2474	2875
Highway 271	1182	1375	1599
Old Highway 91	979	1139	1324
Pine Canyon Drive (Frontage Road)	382	445	518

[9]Federal Highway Administration, "Planning Processes: Statewide Transportation Planning," United States Department of Transportation, September 27, 2017, https://www.fhwa.dot.gov/planning/processes/statewide/related/highway_functional_classifications/section03.cfm

2.6 Level of Service

Traffic volumes and traffic flow of each roadway are used to determine a level of service (LOS) rating. The LOS is a measurement of the ability of a road to meet the traffic demand. LOS classifications are categorized with a letter rating A, B, C, D, E, and F. Free-flowing traffic is considered LOS A, and maximum levels of vehicle congestion would be considered LOS F. A lower LOS rating (such as LOS E and LOS F) indicates that the roadway is not functioning effectively and can cause mobility and safety concerns. **Table 6** shows the existing and projected future levels of service for select roadway segments based on traffic volumes shown in **Table 6**.

Table 6 - Level of Service of Selected Parowan City Roads

Roadway Segment	Current LOS (2023)	Projected LOS (2033)	Projected LOS (2043)
100 N	B	B	B
100 S	A	A	A
100 W (near 200 S)	A	A	A
100 W (near North Interchange Travel Center)	A	A	A
200 N	A	A	A
200 S	B	B	C
200 W	A	A	A
300 E (near Pool)	A	A	A
300 E (near Fairgrounds)	A	B	B
400 N	A	A	A
600 W (near Gap Road)	A	A	A
600 W (North of 200 S)	A	A	A
600 W (South of 200 S)	A	A	A
Airport Road	A	A	A
Center Street	C	D	D
Highway 271	A	A	B
Old Highway 91	A	A	A
Pine Canyon Drive (Frontage Road)	A	A	A

2.7 Volume to Capacity Ratios

The volume to capacity ratio (V/C) measures the traffic density of a road segment by comparing a road's traffic volume to the road's capacity. A V/C value of 1 signifies that the road is at its maximum capacity of traffic volume which leads to serious congestion and typically operates at a LOS F. A V/C value of 0.6 indicated that the road carries very small amounts of traffic and typically qualifies as LOS A. Therefore, a V/C value between 0.6 and 1.0 will result in LOS B to LOS E.

2.8 Traffic Crash Data

A record of all vehicular crashes throughout the state is maintained by the Utah Department of Public Safety (UDPS). This data can be accessed on the UDPS's Numetric website. Information from the website has been organized into **Table 7** and Figure 2. Both **Table 7** and Figure 2 represent the same dataset, just in alternative visual formats.

A heat map of traffic crash locations and intensity is included in Appendix 5.

Table 7 - Traffic Crash Data[10]

Year	Traffic Crashes	Total Injuries	Total Fatalities
2011	11	2	1
2012	8	2	0
2013	31	6	0
2014	24	4	0
2015	25	5	0
2016	28	6	0
2017	34	10	0
2018	34	8	0
2019	50	17	0
2020	34	5	1
2021	47	15	2
2022	50	13	0
2023	44	12	1
Average	**32**	**8**	**0**

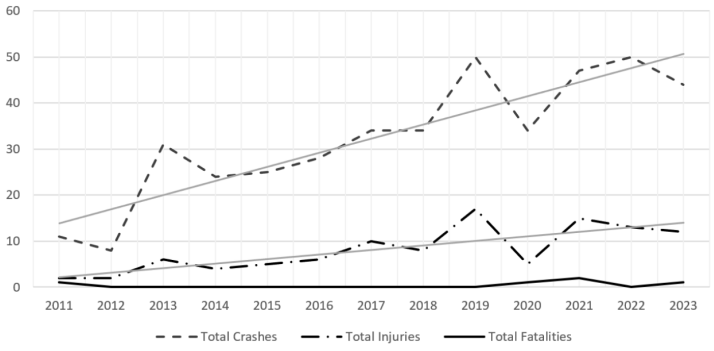


Figure 2 - Traffic Crash Data[10]

2.9 Revenue Sources

Funding for the maintenance and construction of the existing transportation facilities comes primarily from revenue sources which include the Parowan City general fund, federal funds, and State Class B and C funds. Funding 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 because annual operating and maintenance costs must be deducted from the total revenue. In addition, the City is limited in its ability to subsidize the transportation budget from general fund revenues.

[10] Utah Department of Public Safety's Highway Safety Office, Utah Crash Summary, Utah Department of Public Safety, Accessed January 10, 2024, https://udps.numetric.net/utah-crash-summary#/

2.9.1 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 Utah 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 funds derived from the taxes and fees are kept by the Utah Department of Transportation for 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 county and city 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 8** identifies the method used to allocate class B and C road funds.

Table 8 - 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 roadways; however, thirty percent must be used for construction or maintenance projects that exceed $40,000. Class B and C funds may also be used to match federal funds or to pay the principal, interest, premiums, and reserves for issued bonds. **Table 9** identifies funds allocated to Parowan City for the fiscal years 2018 to 2022.

Table 9 - Class B & C Roadway Funds Allocated by Fiscal Year[11]

Year	1st Payment	2nd Payment	3rd Payment	4th Payment	5th Payment	6th Payment	TOTAL
2019	$28,225.01	$35,916.39	$34,648.54	$28,596.41	$32,188.01	$41,830.17	$201,404.53
2020	$24,877.82	$40,077.69	$33,663.37	$29,507.30	$36,196.05	$34,070.84	$198,393.06
2021	$29,383.08	$35,836.70	$32,457.89	$33,506.77	$37,544.16	$47,051.28	$215,779.89
2022	$27,232.39	$35,404.51	$36,491.86	$34,390.21	$35,476.70	$49,427.99	$218,423.67
2023	$27,302.93	$40,771.86	$36,875.93	$32,244.05	$41,579.97	$54,982.53	$233,757.27
2024	$33,490.95	$35,995.41	$42,153.39	----	----	----	----

2.9.2 Federal Funds

Federal funds are available to cities and counties through the federal aid program. These 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 functionally classified as a collector street or higher. STP funds may 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 and enhancement projects. Transportation enhancements include ten categories, some of which are historic preservation, bicycle and pedestrian facilities, and water runoff mitigation.

Money for specific projects in the study area varies depending on what is planned for UDOT's Region Four each year. As a result, federal aid program money is not listed as part of the study area's transportation revenue.

2.9.3 Local Funds

Parowan City may use general fund revenues in its transportation program. It is also possible to improve the City transportation facilities through some type of bonding arrangement, either through a redevelopment district or special improvement district. These districts are organized for the purpose of funding a single, specific project that benefits an identifiable group of properties. Bonding arrangements under general obligation are another source of financing for projects that are deemed to benefit the whole entity issuing the bond.

2.9.4 Private Sources

Private interests often provide sources of funding for transportation improvements. Developers often dedicate right-of-way as they construct local streets within a subdivision and participate in the construction of collector or arterial streets adjacent to their developments. Due to the impacts of the development on the City, developers can also be considered as potential sources of funding for projects. Among these impacts are the addition of traffic signals and the widening of streets.

2.9.5 Bicycle Facilities

The Parowan City Active Transportation Plan (see Appendix 3) outlines the existing pedestrian and bicycle facilities as well as plans for future facilities. The GIS Story map also shows the active transportation plan.

2.10 Rail System

There are currently no rail lines or proposed rail lines in Parowan City.

[11]Utah Department of Transportation, "Local Government Program Assistance," Utah Department of Transportation, 2022. https://udot.utah.gov/connect/business/public-entities/local-government-program-assistance/

3 FUTURE GROWTH

3.1 Land Use and Transportation

Land use and transportation work hand in hand to create a desirable and well-functioning community. Zoning, street classification, and street development will guide how Parowan City grows. Transportation planning must align with the goals of the City to improve access and mobility. A lack of coordination when planning can easily lead to ineffective use of land and ineffective transportation.

3.2 Future Parowan City Roadway System

Roadway projects are selected based on the analysis provided in the previous sections. The recommended system includes projects that were determined to have geometric issues, safety issues, or need additional capacity. The recommendations are shown in terms of functional classifications.

- Arterial
- Major Collector
- Minor Collector
- Residential Street

Included in Appendix 1 is the roadway classification map. This map shows the proposed future roadway system in the City. The proposed system can also be viewed using the map viewer in the GIS story map. These figures are schematic in nature and do not represent actual road alignments or curves. The primary focus of the plan is on improving arterial, major collector and minor collector roadways. No detail is shown for residential standard and residential private roadways to allow flexibility as development occurs between the collectors. It is the intention of the plan for side road collectors to be spaced no closer than one-quarter mile. The minimum acceptable traffic signal spacing on a minor arterial is typically one-quarter mile but varies based on the UDOT classification of the roadway. At some locations, additional right-of-way may be necessary on roadways above and beyond what is shown on the proposed future roadway system maps to accommodate for future auxiliary lanes, such as acceleration, deceleration, and turn lanes.

Frontage roads (or access roads) are an important element of access control in areas with limited access right of way and plenty of open space. The frontage roads provide access from collector roadways coming off arterials. Providing commercial development frontage along an arterial while limiting direct access is the best approach.

In developing the proposed future roadway maps, discussions and meetings were held with UDOT to obtain approval. The maps have been revised to include UDOT's comments.

3.2.1 UDOT's Statewide Transportation Improvement Program

UDOT's Statewide Transportation Improvement Program (STIP) is a five-year plan of highway and transit projects for the State of Utah. The STIP is maintained daily and includes transportation projects on the state, city, and county highway systems as well as projects in the national parks, national forests, and tribal lands. These projects use various federal and state funding programs.

UDOT has programmed funds in the Statewide Transportation Improvement Plan (STIP) for the following roadways near Parowan City:

- Parowan Bridge Rehabilitation – Off-System Bridge Rehabilitation
  (Old Hwy 91, MP 7.00-7.01)
  Estimated Cost: $5,044,000
- Old Highway 91 – Non-Urban Road Improvements
  (MP 0.64-2.64)
  Estimated Cost: $2,137,000

3.2.2 Traffic Signal Needs

A traffic signal needs study should be conducted for all new proposed signals for the base year. If warrants are not met for the base year, they should be evaluated for each year in the five-year horizon. Studying traffic signal needs should be conducted by a method pre-approved by the City and address the following:

- 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.

3.2.3 Schedule of Intersection Signalization

There are currently no signalized intersections in Parowan City. State highways have the highest traffic volumes within Parowan City limits, therefore, most of the potential signalized intersections will be state owned. These locations are governed by UDOT, and timing and construction of these improvements are handled by UDOT.

There are currently no plans to signalize an intersection in Parowan City. This plan does not include any specific recommendations in this area.

3.2.4 Bridges

Parowan City has six bridges on the national bridge inventory system.[12] There are also plans to construct additional bridges over Parowan Creek. The locations of the existing and proposed bridges can be found on the story map. By maintaining a state of good repair on Parowan City bridges, the safety, mobility, and efficiency of the transportation network can be improved. All bridges on the national bridge inventory are reported as in fair or good condition.

Federal and state funding is crucial to the maintenance of these bridges. Federal grants, such as the BID grant, will allow the City to perform the necessary construction and maintenance of these bridges. UDOT's joint highway committee and the community impact board are also sources of funding for maintenance and replacement of bridges.

[12] "Bridge Selection and Data Presentation" Federal Highway Administration https://infobridge.fhwa.dot.gov/Data

4 TRANSORTATION GUIDELINES AND POLICIES

Parowan City may require a Traffic Impact Study (TIS) for any new development when the following guidelines indicate a TIS is needed. Following are guidelines for how to conduct a TIS, based on suggested guidelines developed by the Institute of Transportation Engineers (ITE). In a TIS, the impacts of a particular type and size of development are examined on the surrounding transportation system. It specifically addresses the generation, distribution, and assignment of traffic to and from the "new development". Redevelopment of properties is also considered a new development.

4.1 TIS Requirements

A complete TIS shall be performed if any of the following situations are proposed:

- All new developments or additions to existing developments which are expected to generate more than 25 new peak hour vehicle trips. (Peak hours from 7 AM to 9 AM and 4 PM to 6 PM on weekdays)
- In some cases, a development that generates less than 25 new peak hour trips should require a TIS if it affects an area of concern such as high crash locations or highly congested roadways.
- All applications for rezoning when there is a significant increase in traffic volume.
- Any change in land use density that results in an increase of more than 15 percent in site traffic, with at least 1000 new peak-hour trips.
- Any change in the land use that will cause the directional distribution of site traffic to change by more than 20 percent.
- When the original TIS is more than two years old, access decisions are still outstanding, and changes in development have occurred in the site environs.
- When a development directly affects a UDOT roadway in any way, a TIS is required. If this situation is proposed, the TIS required must meet UDOT standards and be completed by a consultant that is approved by UDOT.

The specific analysis requirements and level of detail are set forth in the following sections.

4.1.1 Category I

A Category I TIS should be required for all developments which generate twenty-five (25) or more new peak hour trips, but less than one hundred (100) 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 crashes,
- 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.

4.1.2 Category II

A Category II TIS should be required for all developments, which generate from one hundred (100) to five hundred (500) 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.

4.1.3 Category III

A Category III TIS should be required for all developments, which generate above five hundred (500) 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.

4.1.4 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 method of estimation must be approved by the City. 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 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.

4.1.5 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.

4.2 Analysis Approach and Methods

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

4.2.1 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 Sections 4.1.1 – 4.1.3.

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 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.

4.2.2 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.

4.2.3 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.

4.2.4 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.

4.2.5 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.

4.2.6 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 an 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.

4.3 TIS Report Format

The purpose of this section is to provide information on the general formatting requirements for a TIS. Any deviation from this format must be approved by the City in advance.

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
   - Morning, Afternoon and Saturday Peak Hour Periods (as applicable)
3. Level of Service
   - Morning, Afternoon and Saturday Peak Hour Periods (as applicable)
4. Safety

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

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

FIGURES AND TABLES - should this be X?

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

XI. DESIGN STANDARD REFERENCE

1. Design in accordance with current Parwoan City engineering standards.
2. Design in accordance with AASHTO standards.
3. Conduct capacity analysis in accordance with the latest edition of the *Highway Capacity Manual.*

4.4 Roadway Standards

All streets shall be designed to conform to the Engineering standards and technical design requirements adopted by Parowan City. These standards can be supplemented by this master plan and include 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.

Parowan City has adopted design standards for roadways to ensure that the facilities provide the necessary safety, capacity, and quality of life. The requirements for the street typical cross-section configurations are shown in Appendix 6. These requirements are based on traffic capacity, design speed, projected traffic, system continuity and overall safety. All new developments shall use typical sections in accordance with those found in the appendix. Right-of-way width shall be determined by City personnel based on City standards. All depths of materials shown on typical sections are subject to change based on engineered pavement design. Pavement designs within the City shall be submitted to the City Road Department for review by City staff. Appendix 2 includes a map showing the surface type for all City roads. Listed in Appendix 6 are the typical sections that the City uses for its collector roadways. Developers retain ownership of local roads that are not subject to City standards, but it is imperative to note that all private roads will not be maintained by the City. All arterial highways are under UDOT jurisdiction.

Using the GIS Story Map web service, the standards associated with this transportation master plan can be accessed. Story maps use Geographic Information System (GIS) tools to combine geospatial data with photos, video, and text to visualize a theme or sequential events. Story maps are designed for nontechnical audiences with access to the internet; users do not need experience with GIS software to read or use story maps. This story map can be accessed through the City GIS website.

4.5 Safe Transportation System

Maintaining a safe transportation system is one of goals and top priorities of Parowan City. In order to meet applicable safety standards, this should be a top priority for the City. The following recommendations can help achieve this goal.

- Require all major developments to provide adequate access for emergency vehicles. This includes but is not limited to Fire, Paramedic, Law enforcement, and other entities.
- Provide safe pedestrian street crossings, particularly near schools and recreation areas.
- Encourage development of school routing and recreation plans that minimize vehicle/pedestrian conflicts.
- Analyze traffic engineering data to determine speed limits. Speed limits should be enforced in residential and commercial areas, especially near schools.
- Implement traffic engineering solutions such as striping, raised medians, traffic islands, traffic signage, and reducing roadside obstructions, to guide vehicles on streets.
- 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 may be granted by the City on a case-by-case basis for designs that demonstrate innovative superiority over existing standards.
- Maintain optimal 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,
  - Providing curb cuts and ramps that comply with the Americans with Disabilities Act (ADA) where applicable, and
  - Providing adequate emergency access and/or turnarounds on all dead-end streets or cul-de-sacs.

4.5.1 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 Section 6 of this document.

Residential streets should be designed in a curvilinear method 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 to provide greater traffic circulation. Cul-de-sacs should only be allowed where topography and/or natural barriers prohibit the design of through streets. 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.

Roadways should be planned to accommodate the traffic demand associated with adjoining developments and commercial areas. The capacity of these roadways can be established by following LOS criteria that has been established by various governmental agencies across the country. Parowan City Engineering Standards outline the LOS thresholds for various roadway types.

A road surface treatment program should be continued by the City to maintain the integrity of existing roadways. It is recommended the City continually build on this system and keep it up to date.

4.5.2 Improvement Requirements

All improvements, including but not limited to the following, shall be constructed in accordance with standard specifications and drawings unless otherwise approved:

- Required curb, gutter and sidewalk shall be constructed.
- Driveways shall only be constructed in approved locations in accordance with City standards.
- All streets, public or private, shall be surfaced to grade. and shall be the required minimum width and thickness according to current asphalt and concrete pavement standards.
- Cross gutters may be used for drainage purposes, as approved by the Parowan City Manager.
- 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, and
- Adequate drainage facilities shall be installed to properly control runoff from the roadway. Surface and subsurface drainage facilities shall be designed in accordance with the approved drainage study. Drainage study for developments shall be submitted to County for review.

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.

5 TRANSORTATION IMPROVEMENT PLANS

5.1 Short-Range Transportation Improvement Plan

A short-range transportation plan encompasses improvements to be completed within the next 10 years. Parowan City personnel will work with UDOT and other relevant agencies to ensure compatibility between transportation networks. The Short-Range Transportation Improvement Plan (TIP) is to be updated periodically to reflect the City's transportation goals. To utilize the short-term TIP effectively, the City should:

- Consider developing an impact fees system for roadways to assess necessary roadway improvements on future development.
- Update master plan every 5 years.
- Continue a routine chip seal maintenance program for old, asphalted roads to ensure roads remain in good working condition.
- Update active transportation plan as needed to create a connected active transportation network.
- Coordinate with surrounding cities and counties to ensure that Parowan City's transportation system connects to other transportation networks while maintaining smooth traffic flow for all users.
- Construct as many suggested roadway improvements as possible.

Projected costs and completion dates are provided for some projects. The projects listed in **Table 10** are included in the short-range TIP. See GIS Story Map for more information on the projects mentioned.

Table 10 - Short-Range Transportation Improvement Plan Projects

Project Name	Estimated 2023 Cost	Estimated Date	Estimated Future Cost	Project Type
850 N & Airport Rd Realignment	$459,000	2026	$555,000	New Construction
Airport Business Loop	$2,622,000	2028	$3,544,000	New Construction
200 N Improvements	$3,774,000	2030	$5,702,000	Road Widening
200 S Improvements	$2,070,000	2032	$3,497,000	Road Widening
Hwy 271 Realignment	$316,000	2034	$596,000	New Construction

As part of the 200 S improvements and Highway 271 Realignment projects, Parowan intends to complete a jurisdictional transfer of 200 S and 700 N to UDOT. Once the roads are improved, they will serve as state highways. It is also the intention to have Center Street jurisdictionally transferred from UDOT to Parowan once 200 S becomes part of the state highway system. See GIS Story Map for more information.

5.2 Long-Range Transportation Improvement Plan

A Long-Range TIP consists of transportation projects that are to be completed within 10 to 20 years. Projects included in the Long-Range TIP are shown in **Table 11**.

Table 11 - Long-Range Transportation Improvement Plan Projects

Project Name	Estimated 2023 Cost	Estimated Date	Estimated Future Cost	Project Type
200 N & 600 W Intersection Improvements	$120,000	2036	$248,000	Intersection Reconstruction
I-15 Pedestrian Crossing	*N/A	2038	*N/A	Bridge Widening
300 E & Center St Intersection Improvements	$1,148,000	2040	$3,022,000	Intersection Reconstruction
Center St Widening	$2,362,000	2042	$6,985,000	Road Widening
100 N Widening	$1,493,000	2044	$4,940,000	Road Widening
100 W Widening	$1,020,000	2046	$3,777,000	Road Widening
200 W Widening	$2,382,000	2048	$9,877,000	Road Widening
300 S Improvements	$367,000	2050	$1,668,000	New Construction

* Cost and scope of project to be determined upon further coordination with UDOT

6 ACCESS MANAGEMENT

Access management for roadways and its importance will be defined and described in this section. Individual developments along the major travel corridors typically have their own access driveways. Numerous access points along the corridor create conflicts between turning and through traffic which causes delays and crashes. An effective access management program will achieve the following objectives:

- Limit the number of conflict points at driveway locations,
- Separate conflict areas,
- Reduce the interference of through traffic,
- Provide sufficient spacing for at-grade, signalized intersections, and
- Provide adequate onsite circulation and storage.

Although access management is generally used on roads with greater volumes and larger areas, it is also applicable to local residential roads.

6.1 Access Management Principles

Access management involves providing and controlling access to land development while preserving the flow of traffic on the surrounding road system's safety, capacity, and speed.[13]

6.1.1 Mobility vs Accessibility

Safety, capacity, and speed determine 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. Auxiliary lanes (turn lanes or bypass lanes) are also used to divert traffic out of the through traffic stream to improve the traffic flow and safety.

Access control varies based upon the effect each road will have on local and regional mobility. No transportation system can provide complete accessibility and mobility. Figure 3 shows the relationship between mobility, access, and the functional classification of streets. For example, the strictest access control is applied to roadways that serve through traffic or regional trips. Local streets, residential areas, and shorter roads require the least amount of access control. In many cases, crashes and congestion are the result of streets trying to serve both mobility and access at the same time.

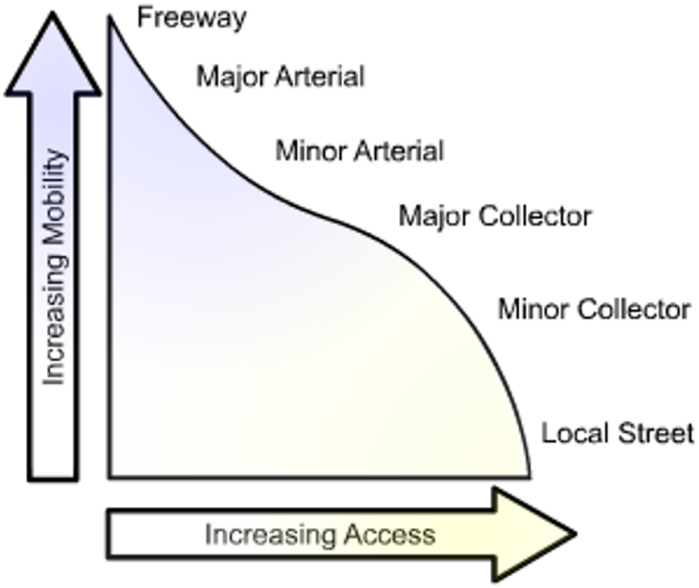


Figure 3 - Conceptual Roadway Functional Hierarchy[14]

6.1.2 Benefits of Access Management

The American Association of State Highway and Transportation Officials (AASHTO) states "the number of crashes is disproportionately higher at driveways than at other intersections... thus their design and location merits special consideration." Fewer direct accesses, greater separation of driveways, and improved driveway design are the basic elements of access management. With good access management, the following are some of the recognizable benefits:

- Improving overall roadway safety
- Reducing total number of vehicle trips
- Decreasing interruptions in traffic flow
- Minimizing traffic delays and congestion
- Maintaining roadway capacity
- Extending the useful life of roads
- Avoiding costly highway projects
- Improving air quality
- Encouraging compact development patterns
- Improving access to adjacent land uses
- Enhancing pedestrian and bicycle facilities

[13]American Association of State Highway and Transportation Officials, A Policy on Geometric Design of Highways and Streets 7th Edition, 2018.
[14]Federal Highway Administration, "What is Access Management," United States Department of Transportation, June 3, 2021. https://ops.fhwa.dot.gov/access_mgmt/what_is_accsmgmt.htm

6.1.3 General Access Management Guidelines

The following access management principles and policies shall be adhered to within Parowan City.

- Intersections and driveways should be separated to reduce conflicts. "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 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. **In all cases, the integrity of mainline traffic operations must not be compromised**.

6.1.4 Where to Use Access Management

Access management shall be used on all roadways within Parowan City. Roadway 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 to prolong the usefulness of the roadway.

6.2 Access Management Techniques

Access management can be accomplished using a variety of techniques such as signal spacing, street spacing, access spacing, and interchange to crossroad access spacing. Depending on the type of roadway, the spacing between accesses will vary. The Utah Department of Transportation has developed an access management program. More information about this program can be found on the UDOT website and from the Access Management Program Coordinator.

The following guidelines are recommended for use by Parowan City. All values in this section are subject to change based on engineering analysis.

6.2.1 Access Point Spacing

Controlling the number of access points along a roadway reduces potential conflicts between vehicles, pedestrians, and bicycles. These access points include intersecting roadways, residential driveways, and commercial accesses.

Access spacing guidelines in the following sections are based on the Utah Department of Transportation's Access Management standards.

6.2.1.1 Unsignalized Intersection Spacing

Table 12 shows the minimum street spacing by functional class.

Table 12 - Unsignalized Intersection Spacing Standards[15]

Functional Class	Minimum Street Spacing (feet)
Interstate	N/A
Arterial Rural	1000
Arterial Urban	N/A
Major Collector Rural	660
Major Collector Urban	660
Minor Collector Rural	300
Minor Collector Urban	300
Other	300
One-way Frontage Road	660

6.2.1.2 Signalized Intersection Spacing

Uniform or near uniform spacing of signals is essential for efficient traffic flow. As a minimum, signals should be spaced no closer than one-quarter mile (1,320 feet).

It is recommended that signalized intersection spacing follows standards outlined by the Utah Department of Transportation. Signal spacing requirements are shown in **Table 13**.

Table 13 - Signalized Intersection Spacing Standards[15]

Functional Class	Minimum Signal Spacing (feet)
Interstate	N/A
Arterial Rural	5280
Arterial Urban	2640
Major Collector Rural	2640
Major Collector Urban	2640
Minor Collector Rural	1320
Minor Collector Urban	1320
Other	1320
One-way Frontage Road	1320

[15]UDOT, Transportation Preconstruction Rules R930, R930-6 Access Management

6.2.1.3 Driveway Spacing

Each parcel should typically be allowed one access point, and shared accesses are preferred where possible. The City should consider adopting a policy to allow for no more than one access per residence unless otherwise approved by City personnel.

Table 14 - Driveway Spacing Standards[15]

Functional Class	Minimum Driveway Spacing (feet)
Interstate	N/A
Arterial Rural	1000
Arterial Urban	N/A
Major Collector Rural	500
Major Collector Urban	350
Minor Collector Rural	150
Minor Collector Urban	150
Other	150
One-way Frontage Road	N/A

6.2.1.4 Corner Lot Access Spacing

Providing adequate corner spacing improves traffic flow and roadway safety by ensuring the traffic turning into the driveway does not interfere with the function of the intersection. Access to corner lots should be from the lesser-classified road at the greatest distance possible from the intersection.

6.2.1.5 Offset Distance

Offset distance is the distance from the center of an access to the center of the next access on the opposite side of the road. On undivided roadways, access on opposite sides of the road should be aligned. Where alignment is not possible, driveways should be offset based on the values set in **Table 15**.

Table 15 - Minimum Offset Distance Between Driveways on Opposite Sides of Road

Functional Class	Minimum Offset* (feet)
Private	-
Residential Local	-
Minor Collector	150
Major Collector	200
Arterial	600 for speed of 45 mph or greater, 300 for all other speeds
Commercial Local	200
Industrial Local	220

*Distance in table is measured from center to center of driveway

6.2.2 Reduction of Turning Movements

Reducing the amount of turning movements can improve the safety at access points. Left turns cause the most delay and safety concerns. Removing or reducing the left turn movements at certain accesses may improve the functionality and safety of the roadways.

6.2.2.1 Right-In/Right-Out Accesses

Right-In/Right-Out accesses eliminate left turns making them particularly effective on high traffic volume roads. Restricted access movement can provide additional access while promoting economic development, reducing crashes, and improving traffic flow with minimal impact to the facility. This type of access should be spaced in a manner that minimizes traffic conflicts and provides adequate distance for deceleration and acceleration of traffic in and out of the access.

6.2.2.2 Medians

Medians are used to control and manage left turns and crossing movements as well as separating traffic moving in opposite directions. Restricting left turning movements reduces the conflicts between through and turning traffic, resulting in improved safety. Studies have shown the installation of a non-traversable median will reduce crashes by 30% over that of a two way left turn lane (TWLTL). A 14-foot median is desirable to provide for an adequate left turn lane at intersections.

The need for a median can be identified through an engineering review (a traffic study assessing the impact of a proposed project) and should be considered on any roadway that has a speed limit greater than 40 mph. Medians can improve pedestrian safety by providing a refuge area for the pedestrian.

Medians can also add to the overall aesthetic of a roadway corridor or a development by incorporating landscaping or other items of visual interest. However, care should be taken to maintain sight distance around the intersection/access locations. Ground cover plantings should be planted within 350 feet of an intersection/access opening. It is important to select landscape material that will not intrude onto the roadway and to locate it in such a way that it will not create a safety issue. Trees should be selected that will not be larger than 4 inches in diameter when mature.

Two way left turn lanes should only be used to retrofit areas of existing development and should be limited to roadways with less than 18,000 ADT. In areas with greater than 18,000 ADT, consideration should be given to a raised median with appropriately spaced median openings. **Table 16** shows typical guidelines for spacing of unsignalized restricted median openings.

Table 16 - Guidelines for Spacing of Unsignalized Restricted Median Openings

Functional Classification	Spacing of Median Openings (ft)*		
	Urban	Suburban	Rural
Collector	330	500	660
Arterial	500	660	800

*Values are for estimating, exact values shall be based on an engineering study
*Values based on UDOT State Highway Access Management Standards. Table 7.4-1

A 14-foot median is desirable to provide for an adequate left turn lane at intersections.

6.2.2.3 Roundabouts

Several communities in the United States are beginning to embrace the concept of "roundabouts". A roundabout is an intersection control measure used extensively in Europe for many years. A roundabout is composed of a circular, raised, center island with deflecting islands on the intersecting streets to direct traffic movement around the circle. Traffic circulates in a counterclockwise direction making right turns onto the intersecting streets. There are no traffic signals; rather, entering traffic yields to vehicles already in the roundabout.

Roundabouts can reduce delays because the stop signal phase (when vehicles entering the intersection are unable to move) is eliminated. Roundabouts can also improve safety because the number of potential impact points and the number of conflict points is less than a four-way intersection.

Development of a roundabout should 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 Federal Highway Administration (FHWA) has prepared a design guide for modern roundabouts in the United States. A single-lane roundabout can accommodate up to 1,800 vehicles per hour.

6.2.3 Other Considerations

6.2.3.1 Shared Access

Access points can be shared between adjacent parcels to minimize the potential for conflict between turning and through traffic. Interconnections between sites can eliminate the need for additional curb cuts, thereby preserving the capacity of the roadway. This is particularly important for commercial/industrial sites and should be used to encourage the development of interconnectivity between parcels. Future roadway rights-of-way should also be preserved to promote interconnected access to vacant parcels.

6.2.3.2 Alignment of Access Points

Accesses represent points of conflict for vehicles, bicycles, and pedestrians. To minimize the potential conflicts and improve safety, intersections and driveways shall be aligned opposite each other wherever possible and intersect at a 90-degree angle.

6.2.3.3 Throat Length

Throat length is the length of the access measured from the edge of the intersecting roadway to the nearest access or roadway. Figure 4 shows the throat length for two common accesses. Driveways should be designed with adequate throat length to accommodate queuing of the maximum number of vehicles as defined by the peak period of operation in the traffic study. This will prevent potential conflicts between traffic entering the site and internal traffic flow.

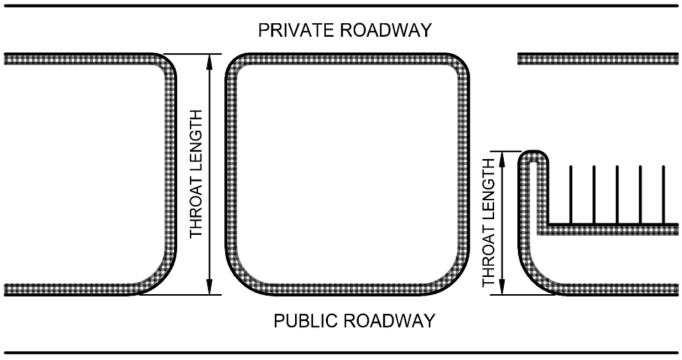


Figure 4 - Throat Length of an Access

Throat length is especially critical when the access serves as the leg of a signalized intersection. Traffic queuing and traffic volumes are typically much higher at these intersections. **Table 17** shows the minimum driveway throat length at a signalized access.

Table 17 - Minimum Driveway Throat Length at Signalized Accesses

Number of Egress Lanes	Minimum Throat Length
2	75 Feet

*Throat Length may be increased from minimum based on engineer analysis.

6.2.3.4 Sight Distance

Sight distance is the length of the road visible to the driver. A minimum safe sight distance should be required for access points based on the roadway classification. It is essential to provide sufficient intersection sight distance at the driveway point for vehicles using a driveway to see oncoming traffic and safely make their movement. Intersection sight distance varies depending on design speed of the roadway to be entered and assumes a passenger car can turn right or left into a two-lane highway and attain 85 percent of the design speed without being overtaken by an approaching vehicle that reduces speed to 85 percent of the design speed. **Table 18** gives intersection sight distance requirements for passenger cars.

Table 18 - Intersection/Driveway Sight Distance

Posted Speed Limit	Sight Distance Required* (feet)					
	Left Turn			Through and Right Turn		
MPH	2 Lanes	3 Lanes	5 Lanes	2 Lanes	3 Lanes	5 Lanes
30	335	355	375	290	310	335
35	390	415	440	335	365	390
40	445	475	500	385	415	445
45	500	530	565	430	465	500
50	555	590	625	480	515	555
55	610	650	690	530	570	610
60	665	710	750	575	620	665
65	720	765	815	625	670	720

*Driver eye is 15 feet measured from the traveled way

6.2.3.5 Turning Radius

The turning radius of a driveway or access road affects both the flow and safety of through traffic as well as vehicles entering and exiting the roadway. The size of the turning radius affects the speed at which vehicles can exit the flow of traffic and enter a driveway. The larger the turning radius, the greater the speed at which a vehicle can turn into a site.

The speed of the roadway, the anticipated type and volume of the traffic, pedestrian safety, and the type of use proposed for the site should be considered when evaluating the turning radius. **Table 19** shows the turning radii for different access types. This is based on the size of vehicles anticipated to use each access type. Verification on a site-by-site basis may be needed to ensure the design vehicle can traverse the turn radius.

Table 19 - Turning Radius at Access Locations

Access Type	Turning Radius
Residential	10' Minimum
Commercial	30' Minimum
Street Approaches	30'-50'

*All radii are minimums and may be increasedbased on engineer analysis.

6.2.3.6 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 turning vehicles. These lanes are generally used in high traffic areas on arterial and collector roadways. A traffic impact study will determine the need for turning lanes or tapers. **Table 20** shows the minimum guidelines for storage length of turning lanes based on speed.

Table 20 - Turning Lanes Storage Length (100 feet minimum)

Intersection	Length
Unsignalized Intersection	Two 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*

*Assumes 25 feet per vehicle
*2004 AASHTO Geometric Design of Highways and Streets

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

The provision for left turn lanes is important from both capacity and safety perspectives, 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 signalized intersections.

Right turn lanes remove the speed differences in the main travel lanes. This reduces the number and severity of rear-end collisions. Right turn lanes also increase capacity of signalized intersections and may allow more efficient traffic signal phasing.

A separate turning lane consists of a taper plus a full width auxiliary lane. Taper length will vary based on speed. A length of 90 feet for speeds below 45 mph, 140 feet for speeds of 45 and 50 mph, and 180 feet for speeds over 50 mph. If a two-turn lane is to be provided, it is recommended 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 TRANSPORTATION CORRIDOR PRESERVATION

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

7.1 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 been 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 Parowan City. A bibliography of the relevant publications is included.

7.1.1 Definitions

For purposes of this discussion, a "corridor" is defined as "the existing or planned path of a transportation facility that already exists or may be built, expanded and/or upgraded and improved in the future," and a "transportation facility" is defined as "a county, city, or state highway, to which, and along which, the public has a perpetual right of access and use for purposes of motorized travel subject to prevailing traffic laws and regulations." 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.

7.2 Corridor Preservation Techniques

Techniques for corridor preservation fall into the following four major categories:

For existing corridors:

1. Documentation and recordation to prove record fee ownership or vested right-of-way interest as a public road right-of-way.

For future corridors:

2. Acquisition,
3. Exercise of planning and zoning authority, and
4. Voluntary agreements and governmental inducements

The various issues associated with each of the foregoing techniques 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.

7.2.1 Documentation and Recordation

The objective is to gather and preserve enough evidence to clearly and convincingly show that the City has either fee ownership of, or a vested right-of-way interest through, the existing corridor. Evidence of ownership should be recorded in the City Recorder's office. Evidence of a vested right-of-way interest through continuous public use or public construction, such as affidavits, witness statements, depositions, and other documentation including maps and photographs, do not necessarily have to be recorded in the City Recorder's Office, as such is often not feasible or practical. Such information should be kept and preserved by the City Road Department in case the right-of-way interest is ever challenged. Efforts should be pursued in right-of-way cases to obtain from the servient owner(s) any necessary deeds quitclaiming the right-of-way interest in favor of the City as an added measure of security, and such quitclaim deeds should be recorded in the City Recorder's office. Existing corridors should be professionally surveyed when feasible.

Moreover, any subdivision development that may occur adjacent to or connecting with an existing corridor, should require obtaining a quitclaim deed in favor of the City pertaining to any part of the Corridor that developers, or the landowners whom they represent, are able to sign over to the City, as a condition for obtaining a subdivision permit and/or encroachment permit. Such a conveyance should be noted on all relevant plats that are to be recorded in the City Recorder's Office.

7.2.2 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.

7.2.2.1 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 complete 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).

7.2.2.2 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).

7.2.2.3 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.

7.2.2.4 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).

7.2.2.5 Public Land Exchanges

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

7.2.2.6 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.

7.2.3 Exercise of Planning and Zoning Authority

Regulatory controls under law enforcement 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).

7.2.4 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 – Landowners 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.

Seven factors must be considered in analyzing the fairness of an impact fee or exaction (Utah Code Annotated §11-36-201):

- The cost of existing facilities.
- The manner of financing existing capital facilities (such as user charges, special assignments, bonded indebtedness, general taxes, or federal grants).
- The relative extent to which the newly developed properties and other properties in the jurisdiction have already contributed to the cost of existing capital facilities (by such means as user charges, special assignments, or payment from the proceeds of general taxes).
- The relative extent to which the newly developed properties in the jurisdiction will contribute to the cost of existing capital facilities in the future.
- The extent to which the newly developed properties are entitled to a credit because the jurisdiction is requiring their developers or owners (by contractual arrangement or otherwise) to provide common facilities (inside or outside the proposed development) that have been provided by the jurisdiction and financed through general taxation or other means (apart from user fees) in other parts of the jurisdiction.
- Extraordinary costs, if any, in servicing the newly developed properties; and
- The time-price differential inherent in fair comparisons of amounts paid at different times.

In addition to constitutional limitations, the Utah legislature, in a special session in 1995, 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 County).

- 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 new 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.

8 OTHER FUTURE ACTIONS

Along with the long- and short-term action items, the following actions should also be considered.

8.1 Interagency Agreement with UDOT

After adoption, it will be necessary to complete an agreement with UDOT regarding access to the state highways. This will help the City by providing a framework for future access permit applications related to private development. It also helps UDOT by providing enough overall City information so individual access points can be reviewed with an understanding of future adjacent needs.

It is important that the City understands UDOT's requirements for traffic signals and the access points within the operational sphere of a signalized intersection. It is also important to understand UDOT's access permit requirements, which should be included in the City's subdivision and development process. It is recommended that the City coordinate with UDOT on every new development that may impact the state highway system. This will ensure the new development will share the burden of impact on that system. See section 4 for TIS requirements for developments along a state highway system.

8.2 Land Use Planning Integration

As Parowan City grows, planning and zoning should remain a high priority. In rural communities like Parowan City, traffic studies indicate that centralized commercial development land use has negative transportation impacts. When all commercial facilities are grouped in one area, residents from the less populated areas of the City must travel downtown or to the central corridor to access these facilities. This creates increased traffic from the outlying areas into the most populated areas of the City. In these communities, small commercial clusters have been considered to minimize travel distances for people to buy goods and services and create convenient locations for people to shop. This could be accomplished in Parowan City through rezoning or through planned unit developments. It is recommended that the City consult with an urban planner to discuss this concept in more detail.

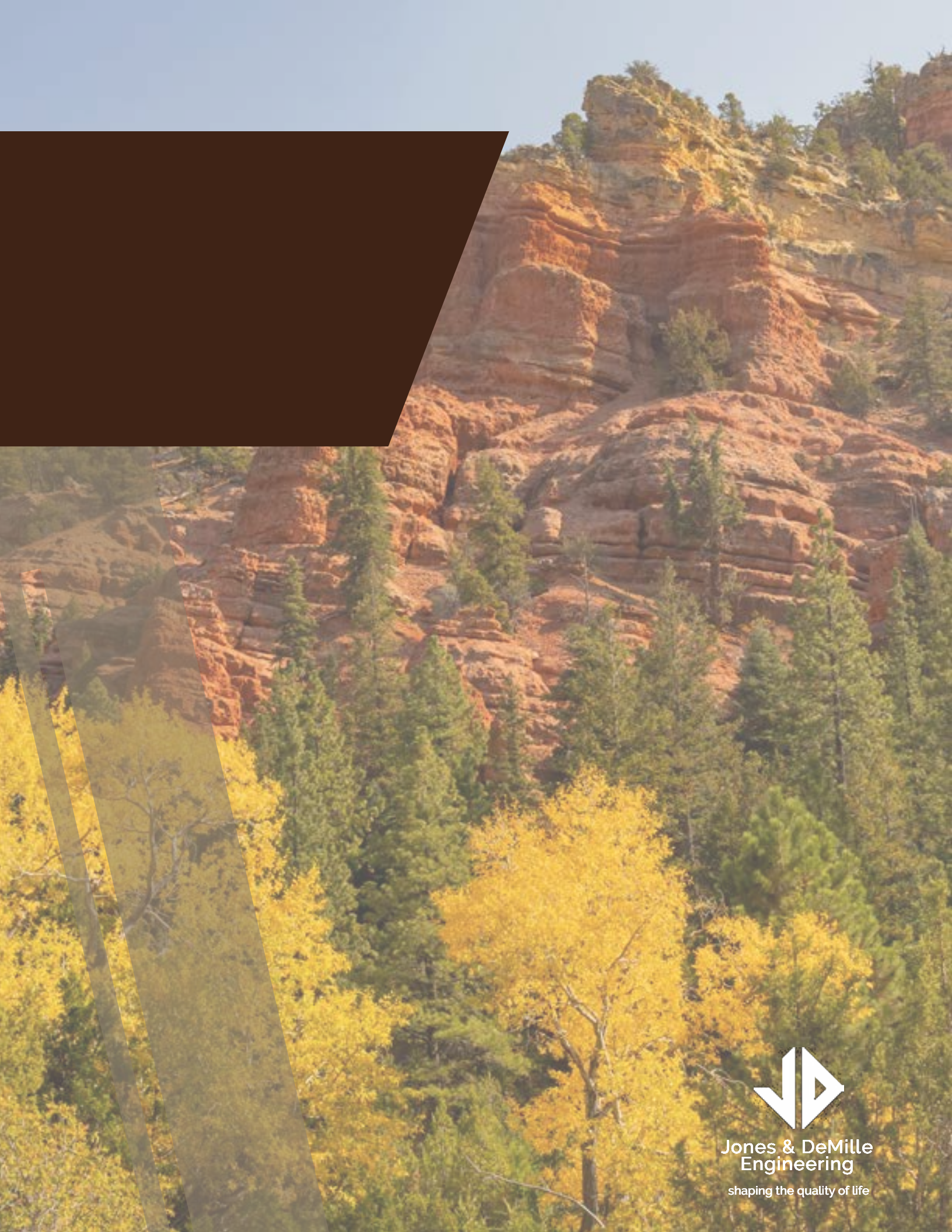
9 CLOSURE

The purpose of the Transportation Master Planning effort is to create a general guideline for growth and development to increase mobility in and through Parowan City. The transportation master plan is to act as a guide for future decisions in all City departments. As part of the planning effort, a GIS map database has been created and can be accessed via the City GIS webpage. This enables City officials to access the plan in an interactive environment and allows actual use of the plan in meetings, such as planning & zoning or commission meetings.

The plan addresses the key components of a master plan by outlining projects that meet the goals of the City to be economically viable, provide safer mobility for its citizens, provide recommendations for standards within the City transportation network, and providing a general outline of needed projects for the next 20+ years. Coordination with Iron County was crucial in determining the needs of Parowan City, and public input provided general information of the needs of the City's citizens.

In closing, the plan has outlined the existing conditions of the transportation system within the City. A data-driven decision-making process has been used to make projections based on historical data. The data from previous years was used to predict future growth, although growth patterns have fluctuated drastically in the past 10 years. Based on future growth projections and current City needs, transportation guidelines and policies were developed. Working with City officials, a short- and long-range project plan was developed beginning in 2024. This list will be updated to the transportation master plan every five years. To ensure safe mobility for users of the transportation network, access management was also addressed. Lastly, the most substantial component of the transportation master planning effort was to determine areas of concern where right-of-way preservation for future corridors would be required. An updated map has been provided for the future transportation network in the appendix, along with the interactive GIS map provided to the City.

For more information regarding the transportation network or the transportation requirements, City officials are available to answer questions as needed.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