FOUNTAIN GREEN CITY

TRANSPORTATION MASTER PLAN

prepared by

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Fountain Green City

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DEFINITIONS

Access Management – The process of establishing restrictions, rules, and guidelines to roadway accesses – including intersections, driveways, and accesses for developments – in an effort to preserve the mobility of traffic flow within a roadway network.

Active Transportation – Any transportation pathways intended for pedestrian and bicycle use. This can include bicycle lanes, bicycle paths, widened roadway shoulders, and sidewalks.

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 – usually 7 to 10 days – and divided by the number of days to determine and average. Weighing factors may be used in determining the average.

Class B and C Funds – Funding distributed by the Utah Department of Transportation (UDOT) for Class B and Class C road maintenance and improvements.[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."[4] 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.

Functional Classification of Roadways – The process of balancing roadway access and mobility needs for roadways within a transportation network. Classifying roadways is beneficial in determining maintenance and expansion needs of existing roadways, the location of necessary future roads, and roadway design parameters such as pavement design, roadway widths, and road right-of-way widths.

Geographic Information Systems (GIS) – GIS is the process of spatial databasing. A GIS database is a computerized database of spatially-related information. A GIS database may include maps and inventories of information related to those maps. For this TMP, data collected on roadway functional classification, traffic volumes, pavement conditions, etc. was gathered into one online story map database to assist in the organization and visualization of project spatial data.

[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-S104.html.
[4] Highways in General, Utah Code §72-3-105, Enacted 2000, https://le.utah.gov/xcode/Title72/Chapter3/72-3-S105.html.

Land Use and Zoning – The process of establishing viable development locations (zones) based on type of development to ensure that all development is consistent with existing infrastructure, transportation networks, and community needs.

Level of Service (LOS) – A method of determining the quality of traffic flow based on volume and capacity. Level of Service is used in determining the need for roadway expansion, additional network redundancies, and/or additional traffic control devices.

Peak Hour Volume – The highest hourly volume of vehicles to drive across a road segment in either direction. For most roadways this peak hour volume occurs during the morning (7:00 A.M. to 9:00 A.M.), evening (4:00 P.M. to 6:00 P.M.), or Saturday peak hours.

Road Right-of-way – The transportation corridor width including pavement and appurtenant shoulders, curb and gutter, sidewalks, culverts, drains and turnarounds, etc., and any additional corridor width. Road right-of-way widths are determined based on roadway functional classification. Right-of-way can be obtained through several means that are described in detail in the Transportation Master Plan report.

Traffic Signal Needs Study – A study performed to determine the need for additional traffic signals. Needs for new signals are determined based on speed, stopping sight distances, and level of service.

Traffic Impact Study (TIS) – A study performed prior to construction of a new development or redevelopment to determine the potential impacts to the transportation network and community. Standards for traffic impact studies are included in the Transportation Master Plan report.

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. Transportation corridor preservation techniques (right-of-way obtainment procedures) are described in the Transportation Master Plan report.

Vehicle Classification – Vehicles are classified based on axle distances and number of axles. Classifying vehicles is useful in determining roadway and pavement design.

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

1 INTRODUCTION

1.1 Background

Fountain Green City is located in beautiful Sanpete County in Central Utah. The City is nestled between beautiful mountains at an approximate elevation of 6,000 ft. It was incorporated as a town on May 22, 1885, and later as a city in 1910. In its early days, sheep ranching was a primary industry and Lamb Days honor this heritage every year. Residents of Fountain Green value their rich pioneer heritage and strive to maintain its rural, family-oriented lifestyle.

1.2 Need for a Study

Fountain Green's transportation network has been established to provide all transportation needs of Fountain Green residents, businesses, and visitors. To ensure that Fountain Green's transportation network continues to provide for all needs of the community a Transportation Master Plan (TMP) is established. This TMP creates a baseline for all future transportation capital projects, future development, and future roadway network inventory. This TMP includes planning guidelines for future vehicular, bicycle, heavy truck traffic, and pedestrian use.

The benefits of establishing a TMP include:

- Compiling and establishing an existing transportation network inventory including roadway classification, average daily traffic (ADT) data, pavement type data, existing vehicular speed and classification data, demographic data, and vehicular crash data;
- Improving development and future growth standards by creating guidelines for corridor preservation, standards for access management, traffic signal needs standards, and standards for Traffic Impact Studies (TIS);
- Improving planning for future roadway capital projects with an emphasis on limiting waste, overspending of funds, and delay of construction;
- Improving potential for funding acquisition.

1.3 Transportation Planning Purpose

The purpose of this study is to develop a TMP for Fountain Green City to use 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, roadway maintenance and construction projects, and funding acquisition,
3. Guide future development by establishing and compiling 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 City GIS data.

These objectives will allow the City to establish a transportation system plan that will ensure a continuingly functional transportation system that adapts with growth and change in the City.

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. It includes the following information:

- Existing land use data and maps (Section 2.1).
- Existing demographic and socioeconomic data and future population growth estimates (Section 2.2).
- An inventory of the existing roadway network (Section 2.3), including:
  - Functional classification of vehicle roadways (Section 2.3.1),
  - Existing ADTs and associated speed and vehicle classification data (Section 2.3.2),
  - Existing Level of Service (LOS) and other traffic characteristics (Section 2.3.3),
  - Roadway pavement assessment (Section 2.3.4),
  - Vehicle crash data and patterns (Section 2.3.5),data (Section 2.3.2),
  - The active transportation network (Section 2.3.6), and
  - Existing bridge inventory (Section 2.3.7).
  - The rail system (Section 2.3.8).
- Funding history and established funding sources (Section 2.4).

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 Fountain Green City is included in Section 3 and Section 4. The following categories are addressed:

- Future land use and annexation (Section 3.1),
  - Future roadway functional classification (Section 3.2.1),
  - Future roadway ADT (Section 3.2.2),
  - Future roadway LOS (Section 3.2.3),
  - Future volume/capacity ratios (Section 3.2.4),
  - Future roadway mileage by functional classification (Section 3.2.5), and
  - Schedule of Intersection Signalization (Section 3.2.6).
- Transportation Improvement Plan (Section 4.1).
- Statewide Transportation Improvement Plan (STIP) (Section 4.2).

1.3.2.1 About Transportation Improvement Plans (TIPs)

The Transportation Improvement Plan (TIP) is a plan that contains all anticipated city capital and planning projects for the upcoming 30 years. TIPs are especially beneficial for allocating and acquiring funding. By planning for all major expenses, the City is better equipped to have sufficient funding allocated by the time that anticipated projects are scheduled for completion. Including these projects into City transportation planning documents also helps the City by opening doors to alternative state and federal funding sources. TIPs are also beneficial in allocating and obtaining vital corridor rights-of-ways and steering development as the City sees necessary. The TIP is included in Section 4.1. The State's TIP is included in Section 4.2.

1.3.3 Establishment of Transportation-related Development Standards

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

- Roadway typical section standards based on roadway purpose and functional classification (Section 5.1),
- Right-of-way (ROW) width standards based on roadway functional classification (Section 5.2),
- Traffic signal warrants and Traffic Signal Needs (TSN) studies (Section 5.3),
- Traffic Impact Study (TIS) requirements (Section 6), and
- Driveway approach and access design standards (Section 7)

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.

1.3.4 Access Management and Preservation of Corridors

Access management principles are used to balance roadway access with mobility. Functional classification, described in Section 2, is integral in determining access management needs and practices. Guidelines, standards, and information on access management are included in Section 7.

This document will also outline the City's ability to establish transportation corridors and the restrictions involved in corridor preservation. Corridor preservation is essential in planning for future transportation network growth. Furthermore, Corridor preservation ensures that desirable developments are constructed in locations most cohesive with and integrated to the transportation network. Corridor preservation techniques and other related information are included in Section 8.

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 aid in visually presenting the study data and future planning. Many of these maps will be included in the TMP document (most are 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. It will be susceptible to updates after adoption. These updates may be caused by disparities between projected and actual growth or funding availability. 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- and development-related plans and standards. A summary of the GIS Story Map is included in Section 9.

1.3.6 Transportation Planning Scope Summary

The transportation planning scope of work has been described in this section. The items discussed may be found in the following sections of the document.

- Analysis of existing conditions (Section 2)
- Plan for future conditions (Section 3)
- Transportation Improvement Plans (Section 4)
- Transportation guidelines and policies (Section 5)
- Standards for Traffic Impact Studies (Section 6)
- Access management standards (Section 7)

- Transportation Corridor Preservation (Section 8)
- GIS Story Map Summary (Section 9)
- Other Future Actions (Section 10)
- Conclusion (Section 11)

1.4 Study Goals

Establishment of a reliable, sustainable, and efficient transportation network provides many 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 Fountain Green City seeks to comply. UDOT's quality of life framework is built on four factors: Better Mobility, Good Health, Connected Communities, and Strong Economy.[5] These factors, when prioritized, can provide the integral benefits a healthy transportation system seeks to supply. This section will explain how Fountain Green City seeks to integrate this quality-of-life framework into its transportation planning.

1.4.1 Better Mobility

Fountain Green 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 according to specific roadway demands. Fountain Green commits to finding the most cost-effective and efficient alternatives to future roadway design. Future planning ensures that roadways which will provide the most effective levels of mobility are the roads that get built. Fountain Green City seeks to address, where possible, mobility deficiencies in the existing roadway network caused by undermaintained roads, unpaved roads, under signalized roads, or network areas with a lack of redundancies.

1.4.2 Good Health

Fountain Green City seeks to improve citizen health by expanding its active transportation network. By coordinating with cities and towns within the City as well as with UDOT, it is desired that a cohesive and interconnected active transportation network can be established. This will provide residents of Fountain Green as well as nonresidents with the ability to enjoy the community, culture, and natural beauty of the City as well as surrounding areas. Fountain Green City also seeks to improve citizen health by seeking safety and sustainability focused alternatives in planning, construction, and maintenance of City transportation facilities. These alternatives will allow the City to lessen its environmental and safety impacts. Fountain Green City desires its residents to live with the benefits of safer roadways, cleaner air, and more expanded active transportation opportunities.

1.4.3 Connected Communities

Fountain Green City seeks to improve both its interconnectedness with other municipalities and with the County. 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 the City. 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 the concerns and needs of every community are voiced.

1.4.4 Strong Economy

Fountain Green 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 will 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. Fountain Green 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. Publishing to the City's website of the TMP planning document and the GIS Story Map.

1.5.1 Coordination with Local, State, and Federal Governments

Fountain Green 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. Coordination with these entities ensures that state or federal

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

owned highways near Fountain Green City are maintained and the City's needs relative to these highways are addressed. This coordination includes maintenance, signalization, access management, and more.

Where possible and necessary, the County seeks to inform and be informed by local, state, and federal entities about transportation-related changes, plans, and standards.

2 EXISTING CONDITIONS & FUTURE PROJECTIONS

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

2.1 Land Use and General Plan

Fountain Green has adopted a city general plan and land use ordinances to promote the organized development of the City. The City's website can be used to access this City General Plan and Land Use Ordinance with the following web address: https://fountaingreencity.com/general-plan-and-land-use-ordinance/. The Land Use Ordinance contains general information, annexation policy, zoning districts, enforcement and description of nonconformance, and design standards for subdivisions, group homes, and private residences.

For all developments affecting the transportation network, reference should be made to the City General Plan. This outlines requirements for roadway widths, street placements, and other design standards. These requirements can be accessed at the above-included link as Section E.2 of the City General Plan. It is the intent of the City to establish a cohesive transportation network that extends existing street rights-of-way widths and establish new street rights-of-way widths in a manner consistent with existing city growth patterns. For more information on roadway right-of-way width standards, see also Section 5.2 of this document.

Land use parameters are established by cities to ensure that growth and development occur in an organized manner that provides the greatest level of functionality and order within the city. Fountain Green City has established guidelines that prioritize a rural atmosphere and maintain a functional and enjoyable environment.

2.2 Demographic & Socioeconomic Data

Table 1 shows the 2021 estimated population and housing data for Fountain Green City. **Table 2** compares the population growth for Fountain Green City, Sanpete County, and the State of Utah from 1990 to 2020. This data was used to calculate an annual growth rate. This annual growth rate was used as a reference point in determining the growth rate for Average Daily Traffic (ADT) growth projections.

Table 1 - Fountain Green City Population and Housing Data (2021 Estimate)[6]

Population	Housing Units	Area (sq mi)	Population Density (pop/sq mi)	Housing Denisty (HU/sq mi)
1,128	387	1.25	902	310

[6]American Community Survey, "ACS Demographic and Housing Estimates," United States Census Bureau, https://data.census.gov/table/ACSDP5Y2022.DP05?q=Fountain%20Green,%20Utah. .

[7]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.

[8]United States Census Bureau, "Fountain Green City, Utah," United States Department of Commerce, https://data.census.gov/all?q=Fountain%20Green%20city,%20Utah.

[9]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

[10]American Community Survey, "ACS Demographic and Housing Estimates," United States Census Bureau, https://data.census.gov/table?q=Manti,+Utah&tid=ACSDP5Y2021.DP05.

Table 2 - Population Growth Trends

Year	State of Utah[7]	Sanpete County[8]	Fountain Green City
1990	1,722,850	16,259	606
Average Annual Growth (1990-2000)	2.59%	3.36%	4.23%
2000	2,233,169	22,763	925
Average Annual Growth (2000-2010)	2.13%	2.01%	1.47%
2010	2,763,885	27,822	1,071
Average Annual Growth (2010-2020)	1.69%	0.22%	0.52%
2020	3,271,616	28,437	1,128
Average Annual Growth (1990-2020)	2.14%	1.86%	2.07%

A 2024 water usage report released by the State listed the population of Fountain Green City at 1,275. This accounts for a 3 percent annual increase in four years. Because of this, population growth was estimated at 2 percent annually. It is anticipated that the City's population will more than double in the next 40 years. **Table 3** shows a population growth estimate for the next 40 years based on this average annual growth rate. Based on existing and future estimates, a traffic growth rate of 2.0 percent was used for Level of Service (LOS) analysis (see Section 3.2.3).

Table 3 - Population Growth Estimates[9]

Year	Population
2020	1,128
2030	1,378
2040	1,683
2050	2,055
2060	2,510

The age distribution of residents in the City is illustrated in Figure 1. The median age is 39.4 years old. Approximately 23 percent of the population is under the age of 18 and approximately 14 percent are over the age of 65.[10] In Sanpete County, approximately 25 percent of the population is under the age of 18 and approximately 14 percent are over the age of 65.[11] In the State of Utah, approximately 28 percent of the population is under the age of 18 and approximately 12 percent are over the age of 65.[12]

In Fountain Green City, approximately 91 percent of the population is white with 9 percent of other races.[13] In the State of Utah, approximately 79 percent of the population is white and approximately 1 percent are black, 1 percent are American Indian, and 2.5 percent are Asian[14]

[11]American Community Survey, "ACS Demographic and Housing Estimates," United States Census Bureau, https://data.census.gov/table?q=sanpete+county,+Utah+demographic.

[12]American Community Survey, "ACS Demographic and Housing Estimates," United States Census Bureau, https://data.census.gov/table?q=Utah&tid=ACSDP1Y2021.DP05.

[13]American Community Survey, "ACS Demographic and Housing Estimates," United States Census Bureau, https://data.census.gov/table?q=Fountain+Green,+Utah+&tid=ACSST5Y2021.S0101.

[14]American Community Survey, "ACS Demographic and Housing Estimates," United States Census Bureau, https://data.census.gov/table?q=Utah&tid=ACSDP1Y2021.DP05.

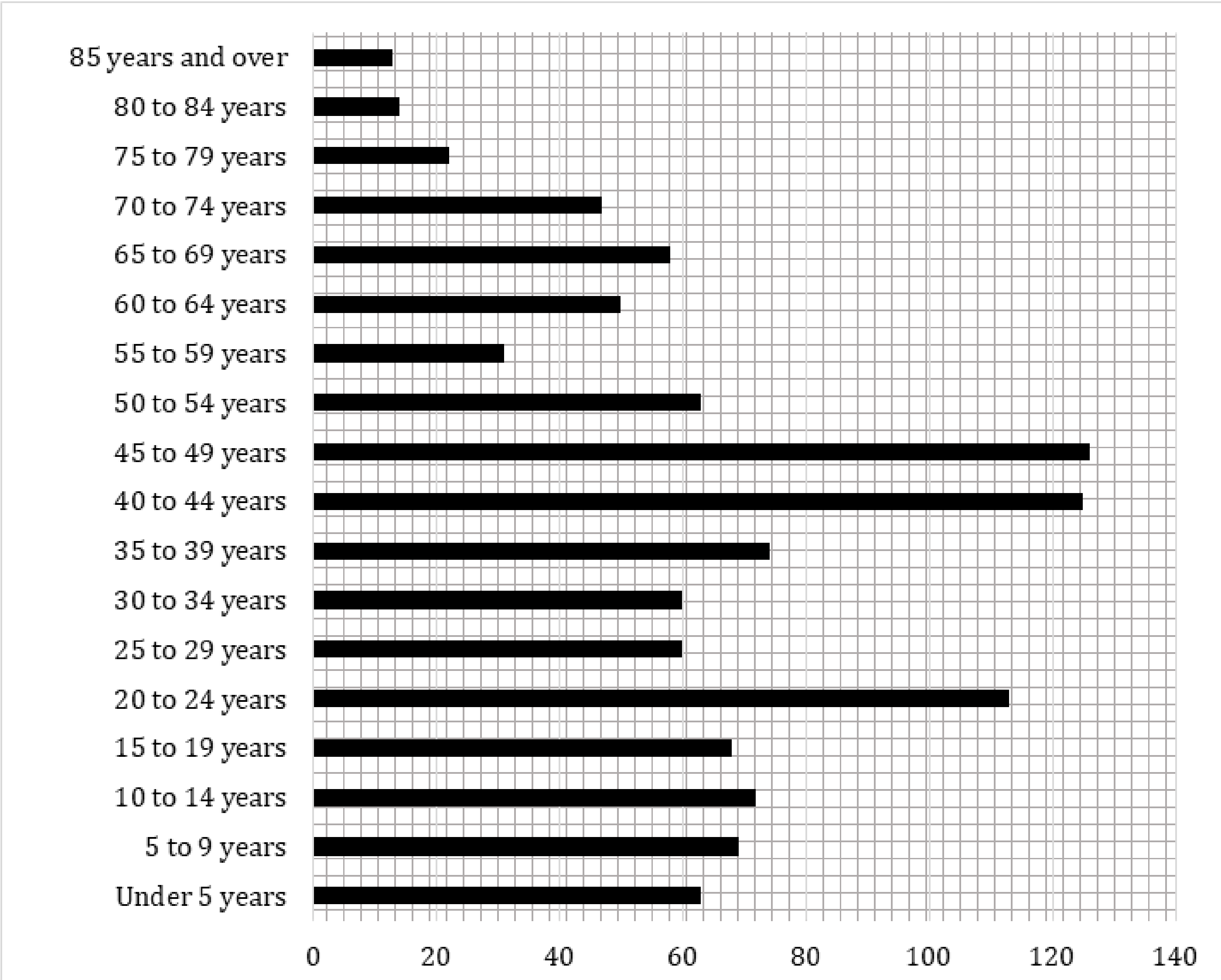

Figure 1 - Age Distribution in Fountain Green, Utah

In Fountain Green City, approximately 88 percent of the population over the age of 18 are high school graduates and approximately 31 have a higher educational degree.[15] In Sanpete County, approximately 90 percent of the population over the age of 18 are high school graduates and approximately 32 percent have a higher educational degree.[16] In the State of Utah, approximately 92 percent of the population over the age of 18 are high school graduates and approximately 43 percent have a higher educational degree.[17] The 2021 median household income (2021 dollars) was $63,125 in Fountain Green City and $79,133 in the State.[18] Key demographic statistics have been included in a report in the GIS Story Map. This has been made easily accessible for use in planning and zoning and city council meetings.

Commuter information and employment data have been included in Figures 2 and 3, respectively.

[15] American Community Survey, "Educational Attainment," United States Census Bureau, https://data.census.gov/table?q=Fountain+Green,+Utah+Educational+attainment.
[16] American Community Survey, "Educational Attainment," United States Census Bureau, https://data.census.gov/table?q=Sanpete+County,+Utah&tid=ACSST5Y2021.S1501.
[17] American Community Survey, "Educational Attainment," United States Census Bureau, https://data.census.gov/table?q=Utah+educational+attainment.
[18] American Community Survey, "Financial Characteristics," United States Census Bureau, https://data.census.gov/table?q=Fountain+Green,+Utah+income&tid=ACSST5Y2021.S2503.

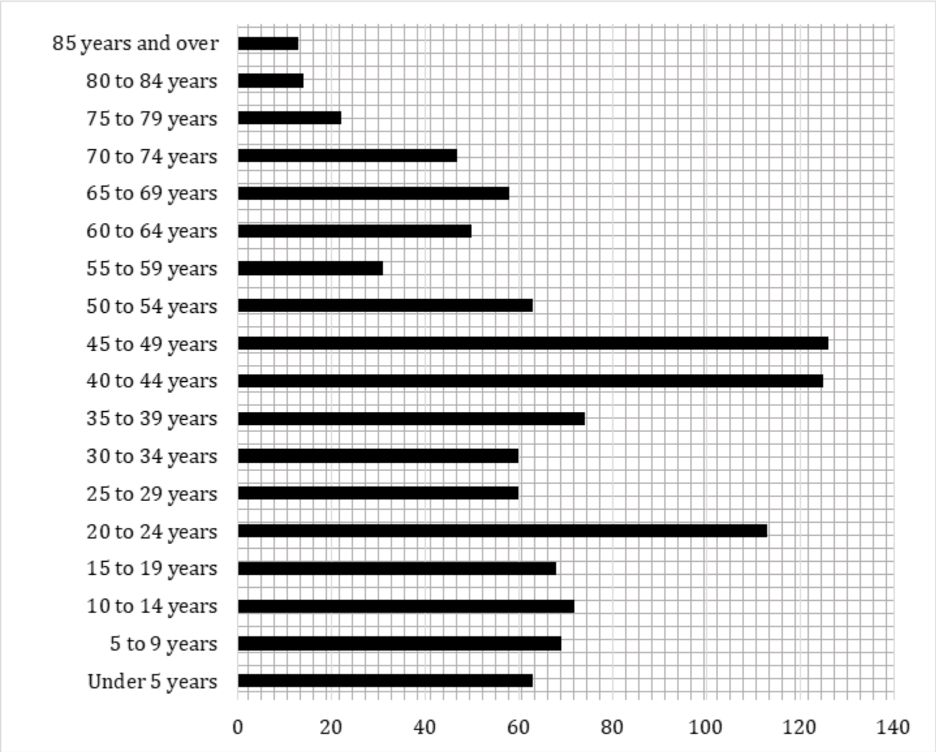

Figure 2 - Commuter Information for Fountain Green City

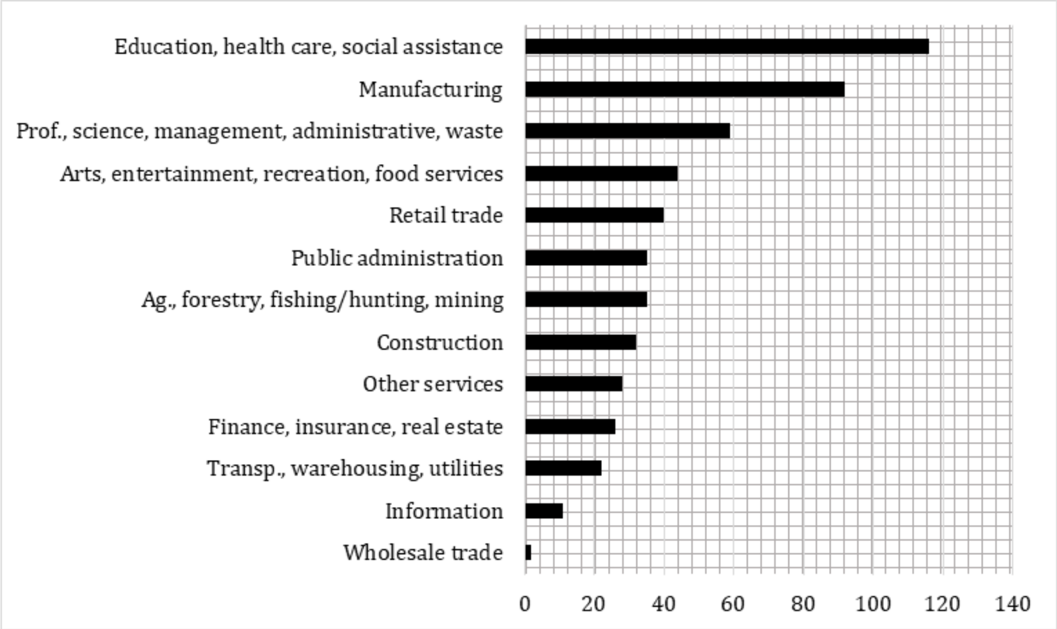

Figure 3 - Employment Data[19]

[19]United States Census Bureau, "Selected Economic Characteristics," United States Department of Commerce, Accessed April 15, 2024, https://data.census.gov/table?q=fountain%20green,%20utah%20employment.

2.3 Roadway Network Inventory

A roadway network inventory organizes all City roadways by functional classification and includes relevant data for selected roadways. A visual representation of various data for the roadway network inventory can be found in maps included in the online GIS story map.

The following information was gathered for the existing roadway network:

- Functional classification data;
- Daily traffic counts, speeds, and vehicle classifications on selected roadway segment;
- Planned and funded roadway improvement project;
- Historical funding allocation;
- Pavement type of roadways;
- Bridge data; and
- Vehicle crash information.

The data gathered for the City's roadway network is included in the following sections.

2.3.1 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."[20] It is an organized system with established parameters.

Roadway networks can be categorized into rural and urban. Fountain Green'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. Functional classification categories will now be described for Fountain Green's network. These functional classification definitions are listed in hierarchical order from highest mobility and lowest accessibility to lowest mobility and highest accessibility.

Both existing and future functional classification maps are included in Appendix 1. The existing functional classification map matches the existing functional classification map standardized by UDOT. The future functional classification seeks to build upon the existing map to reflect the growth and development of Fountain Green City. Creating and updating these maps allows the City to apply for additional funding sources to improve or construct classified roads.

2.3.1.1 Freeways

Freeways (Federal Highways) are highways included in the national Interstate Highway System. Freeways are maintained by state transportation departments and receive funding (at least in part) for the maintenance of these highways. Freeways are designed with high speed limits and are created to serve high mobility needs with limited access. Access on these highways is limited to ensure that the greatest level of mobility possible can be achieved. These highways have grade-separated interchanges. There are no freeways within Sanpete County.

2.3.1.2 State Highways

State highways are designed similar to freeways with emphasis given to 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. They are generally designed as arterials and major collectors throughout counties within the state.

The only state highway in Fountain Green City is SR-132. This highway functions as the principal arterial and Main Street for Fountain Green. This roadway serves as the main access into the city from the north and south.

2.3.1.3 Arterials

Arterials are classified and designed to function as the "spine" of transportation networks. All other roadways of the transportation network should function to provide access to arterials. Arterials are roadways that function as the main access road for municipalities. In Fountain Green, the principal arterial (as mentioned above) is Main Street (SR-132). This roadway contains most government buildings and commercial buildings, and provides the main access through the city, connecting Fountain Green to Nephi in the north and Moroni in the south. Mobility is the primary function of arterials. Within cities, some mobility may be sacrificed for accessibility, but priority should be given to arterials at all intersections. Arterials can be classified as both principal and minor. There are currently no minor arterials classified in Fountain Green.

2.3.1.4 Major Collectors

Major collectors, like arterials, prioritize mobility. However, they typically transport lower traffic volumes than arterials. These roadways connect local roads and minor collectors to arterials or highways. Access to residential developments and rural facilities is more common in major collectors than with arterials. Intersection between major collectors and lower-classified roadways should give priority to the major collector. This is done to ensure that major collectors provide increased mobility. The only major collector in Fountain Green is West Side Road / 400 South. This roadway connects Main Street (SR-132) to the west side of the city before turning south and continuing to Wales.

[20] American Association of State Highway and Transportation Officials, A policy on Geometric Design of Highway and Streets, 7th Edition, 2018.

2.3.1.5 Minor Collectors

Minor collectors provide access by connecting communities and neighborhoods. These roads funnel traffic from major collectors or arterials to local roads. Minor collectors are intended to balance mobility and access. They are often stop controlled and have lower speed limits. They provide increased mobility over local roads yet still have residential access. The only minor collector currently classified in Fountain Green is Big Hollow Road which connects Fountain Green's east side over the mountain to US 89.

2.3.1.6 Local Roads

Local roads connect residential areas and sacrifice mobility to provide the highest level of accessibility. It is preferable that accesses be placed on local roads where possible, rather than arterials and collectors. Placing accesses on arterials and collectors requires frequent access points and intersections which leads to frequent stops and delays. Placing accesses on local roads can help to prevent these potential delays and stops. Local roads are designed to have lower speed limits and span shorter distances. They tend to have higher pedestrian traffic and are often built in a manner to discourage high amounts of through traffic. All unclassified roadways within Fountain Green are local roads.

2.3.2 Traffic Count Data

Traffic counts were collected on select city roads. These roads were determined based on historical concerns, future project planning, and known high traffic volumes. Detailed traffic count reports for every roadway studied are included in Appendix 7. Traffic count data provides traffic volumes, traffic speeds, and classification delineations of vehicles. Available traffic count data provided by UDOT for state highways in Fountain Green is also included.

2.3.2.1 Traffic Volumes

Traffic volumes indicate the travel demand of existing roadways and the importance of the roadway to the transportation network. 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 is calculated as the number of vehicles passing a certain point on a roadway on an average day. Traffic data is generally collected for 7 to 10 days and averaged to create an ADT. This includes both directions of traffic. **Table 4** lists the ADTs for all of the roadways studied as part of the TMP analysis. For future ADT estimates and level of service (LOS) analysis on these roadways, see Section 3.2.2 and Section 3.2.3, respectively.

Table 4 - 2023 ADT for Selected Fountain Green Roadways

Roadway	2023 ADT (Average Daily Traffic)	2023 PHV (Peak Vehicles per Hour)
100 South	231	47
300 West (@ 400 South)	84	33
400 North (@ 600 West)	261	34
400 North (@ State Street)	227	34
400 South	42	98
400 West (@ 400 North)	42	9
500 West (@ 400 North)	94	18
500 West (@ 400 South)	155	24
600 West (@ 400 North)	149	25
600 West (@ 400 South)	118	27
Big Hollow Road	63	19
Big Springs Road	227	29
Center Street	353	74
West Side Road	567	65

2.3.2.1.1 UDOT Highway Traffic Volumes

UDOT track ADTs on all state highways. Based on their traffic counts, an annual average daily traffic (AADT) is determined. Included in **Table 5** are traffic counts for UDOT highways in Fountain Green.

Table 5 - Historical ADT for State Highways in Fountain Green[21]

Roadway	2022 ADT	2018 ADT	2013 ADT	2008 ADT
SR 132 (north of Fountain Green)	3,800	3,500	2,900	2,800
SR 132 (within Fountain Green)	3,500	3,200	2,700	2,800
SR 132 (south of Fountain Green)	4,400	4,100	3,000	3,900

2.3.2.2 Speed Analysis

Speed data was collected from traffic counts performed in conjunction with this study. Included in **Table 6** is average speed data, 85th percentile speed data, and speed limit data. Generally, in transportation planning and design the 85th percentile speed is used as a key factor in determining roadway speed limit. Other important factors in roadway speed limit determination include traffic patterns, ADT data, vehicle crash history, access management and spacing, intersection controls, and existing safety concerns such as clear zone obstructions, limited sight triangle distances, and bridge and culvert crossings. It is recommended that the City assess the speed data to assist in determining any potential speed limits alterations. All required geometric design, safety, and other standards by both the City and AASHTO must be followed when adjusting roadway speed limits. In **Table 6**, all 85th percentile speeds 5 miles per

hour greater than the existing speed limit have been italicized. Roadways with an 85th percentile speed 10 miles per hour greater than the existing speed limit have also been bolded.

Table 6 - Roadyway Speed Analysis for Selected Roadways in Fountain Green

Roadway	Speed Avg	85th Percentile Speed	Speed Limit
100 South	20	24	25
300 West (@ 400 South)	21	25	25
400 North (@ 600 West)	17	21	25
400 North (@ State Street)	18	23	25
400 South	11	14	25
400 West (@ 400 North)	11	14	25
500 West (@ 400 North)	19	25	25
500 West (@ 400 South)	18	24	25
600 West (@ 400 North)	17	24	25
600 West (@ 400 South)	20	26	25
Big Hollow Road	21	27	25
Big Springs Road	21	26	25
Center Street	24	28	25
West Side Road	39	50	50

2.3.2.3 Vehicle Classification Analysis

Vehicle classification is a categorization method used to describe types of vehicles. These classifications are based on vehicle weight, number of axles, and axle spacing. Vehicle classification is important in determining vehicle impact on roadways. This number can be used with ADT to determine the total impact of traffic. Heavy trucks have an immensely greater impact on roadways than passenger vehicles. The impact of a vehicle on a roadway pavement is determined in units of Equivalent Single Axle Loads (ESALs). One ESAL is equivalent to 18,000 lbs per axle. Heavy truck loads generally range from 1.5 to 4.0 ESALs. Passenger vehicles generally only provide about .02 ESALs per vehicle. Because of this, heavy trucks destroy pavements exponentially quicker than passenger vehicles. The Federal Highway Administration (FHWA) classifies 13 vehicle classes; these can be seen in Figure 4. ADTs and heavy truck traffic percentages can be used to determine anticipated effective life of a pavement. Vehicle classification data for selected City roadways is included in **Table 7.** Vehicle classification data for state highways in Fountain Green is included in **Table 8**.

Table 7 - Vehicle Classification Analysis for Selected Fountain Green Roadways

Roadway	2023 Average Daily Traffic	Passenger Vehicle Percentage*	Two or Three Axel Trucks and Buses Percentage**	Four or More Axel and Multi-Unit Trucks Percentage***
100 South	231	84.1%	14.0%	1.0%
300 West (@ 400 South)	84	85.7%	10.8%	2.3%
400 North (@ 600 West)	261	80.0%	15.9%	1.5%
400 North (@ State Street)	227	77.4%	16.4%	2.0%
400 South	42	84.3%	6.5%	2.2%
400 West (@ 400 North)	42	84.3%	6.5%	2.2%
500 West (@ 400 North)	94	80.5%	12.5%	1.8%
500 West (@ 400 South)	155	70.5%	18.8%	2.5%
600 West (@ 400 North)	149	83.0%	10.7%	0.6%
600 West (@ 400 South)	118	78.9%	14.6%	1.5%
Big Hollow Road	63	73.7%	16.9%	8.1%
Big Springs Road	227	84.9%	11.4%	1.4%
Center Street	353	84.1%	13.5%	1.8%
West Side Road	567	75.8%	19.7%	4.1%

*Includes all vehicles in Class 1, 2, and 3.
**Includes all vehicles in Class 4, 5, and 6.
***Includes all vehicles in Class 7, 8, 9, 10, 11, 12, and 13.

Table 8 - Vehicle Classification Analysis for State Highways in Fountain Green

Roadway	2023 ADT	Passenger Vehicle Percentage	Single Unit Trucks Percentage	Multi-Unit Trucks Percentage
SR 132 (north of Fountain Green)	3,800	71.69%	17.95%	10.36%
SR 132 (within Fountain Green)	3,500	69.41%	18.99%	11.61%
SR 132 (south of Fountain Green)	4,400	69.41%	18.99%	11.61%

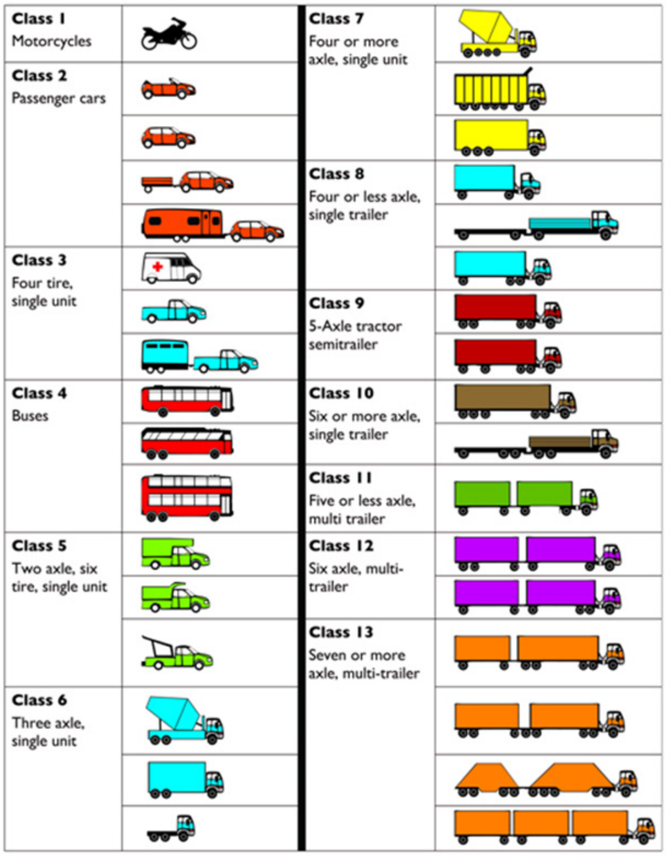

Figure 4 - Vehicle Classifications[22]

2.3.3 Roadway Traffic Characteristics

2.3.3.1 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 are considered LOS "F". A lower LOS rating (such as LOS "E" and LOS "F") indicates that the roadway is not functioning effectively and may cause mobility and safety concerns. A LOS "D" is considered acceptable for most applications. LOS "F" and LOS "E" roadways should be given highest priority for improvement. Some common roadway LOS improvement methods include:

- Adding turn lanes at congested intersections;
- Adding signalization at congested intersections;
- Adding extra travel lanes;
- Adjusting existing roadway geometrics such as lane width, striping, and shouldering;
- Adjusting speed limits;
- Establishing alternative roadways to function as redundancies; and
- Improving mobility at accesses by either removing accesses or adding slip or merge lanes.

A visual representation of the LOS categories is included as Figure 5.

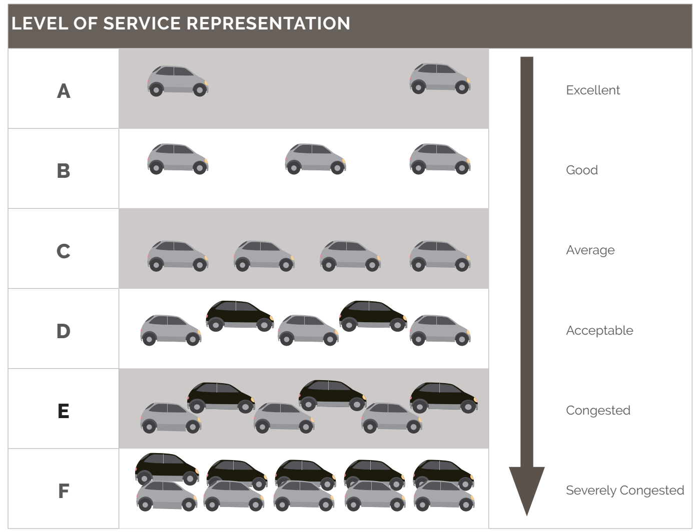

Figure 5 - Roadway Level of Service Representation

LOS is determined differently for highways and for intersections. Often on a rural road or freeway, the LOS will be determined based on highway travel. On local roads, which generally have more intersections and access points, intersection LOS will be the controlling LOS factor. For this study, no intersections were studied, only highways and roadways. The LOS analysis was performed using equations provided in the Institute of Transportation Engineers' Highway Capacity Manual. Highway LOS is measured in terms of volume to capacity (V/C) ratios, and intersection LOS is measured in terms of vehicle delay (in seconds/vehicle).

2.3.3.1.1 Existing LOS Analysis

The existing LOS for the studied roadways is included in **Table 9**.

Table 9 - 2023 LOS for Selected Fountain Green City Roadways

Roadway	2023 LOS	2028 LOS	2033 LOS	2038 LOS	2043 LOS
100 South	A	A	A	A	A
300 West (@ 400 South)	A	A	A	A	A
400 North (@ 600 West)	A	A	A	A	A
400 North (@ State Street)	A	A	A	A	A
400 South	A	A	A	A	A
400 West (@ 400 North)	A	A	A	A	A
500 West (@ 400 North)	A	A	A	A	A
500 West (@ 400 South)	A	A	A	A	A
600 West (@ 400 North)	A	A	A	A	A
600 West (@ 400 South)	A	A	A	A	A
Big Hollow Road	A	A	A	A	A
Big Springs Road	A	A	A	A	A
Center Street	A	A	A	A	A
West Side Road	A	A	A	A	A

[21]Federal Highway Administration, "Traffic Monitoring Guide", Office of Highway Policy Information, https://www.fhwa.dot.gov/policyinformation/tmguide/tmg_2013/vehicle-types.cfm. Edited November 7, 2014.

2.3.3.1.2 Level of Service Recommendations

All studied roadways currently function at a LOS "A". Where LOS "A" to LOS "D" are considered acceptable for municipalities and counties, there are no present concerns with roadway congestions functionality. All roadways have sufficient capacity for anticipated traffic growth within the next twenty years. See Section 3.2.3 for additional information on future LOS analysis.

2.3.3.2 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 ratio of 1.0 signifies that the road is at its maximum capacity of traffic volume which leads to serious congestion and typically operates at a LOS "F". The closer a roadway V/C is to 1.0, the more congested the roadway will be. **Table 10** includes the existing 2023 V/C ratios for selected Fountain Green roadways. This table also includes anticipated V/C ratios for the upcoming 20 years.

Table 10 - Volume Capacity Ratio for Selected Fountain Green City Roadways

Roadway	2023 V/C	2028 V/C	2033 V/C	2038 V/C	2043 V/C
100 South	0.02	0.02	0.03	0.03	0.03
300 West (@ 400 South)	0.01	0.02	0.02	0.02	0.02
400 North (@ 600 West)	0.01	0.02	0.02	0.02	0.02
400 North (@ State Street)	0.02	0.02	0.02	0.02	0.02
400 South	0.04	0.04	0.05	0.06	0.06
400 West (@ 400 North)	0.00	0.00	0.01	0.01	0.01
500 West (@ 400 North)	0.01	0.01	0.01	0.01	0.01
500 West (@ 400 South)	0.01	0.01	0.01	0.02	0.02
600 West (@ 400 North)	0.01	0.01	0.01	0.01	0.02
600 West (@ 400 South)	0.01	0.01	0.01	0.02	0.02
Big Hollow Road	0.01	0.01	0.01	0.01	0.01
Big Springs Road	0.01	0.01	0.02	0.02	0.02
Center Street	0.04	0.04	0.04	0.05	0.05

2.3.3.2.1 Recommendations

All studied roadways are anticipated to remain under 10 percent of capacity for the upcoming 20 years. There are no recommendations for alterations to roadway capacity demands at this time.

2.3.3.3 Vehicle Miles of Travel (VMT)

Vehicle Miles of Travel (VMT) is a method established federally to determine the amount of vehicular usage for a specified roadway. VMT is calculated as the total miles of vehicular travel for a specified roadway over a specified period. This characteristic and roadway mileage are useful in determining roadway functional classification. The Federal Highway Administration (FHWA) specifies the allowable percentages of roadway mileage and VMT per functional classification type. These limitations are specified to provide balance within the roadway network and ensure an appropriate number of arterials, collectors, and local roads throughout the system.

Federally established guidelines should be referenced in determining changes to classification of the roadway network.

The allowable percentages for each classification are shown in **Table 11**. The existing percentages for each classification are shown in **Table 12**.

Table 11 - Allowable Percentage of Road Miles and VMT[23]

Roadway 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%

Table 12 - Fountain Green City Roadway Mileage by Functional Class*

Roadway Type	Mileage	Percentage	Allowable Mileage Percentage
Interstate & Other Freeways	0.00	0.0%	1%-5%
Principal Arterials	1.22	7.7%	2%-6%
Minor Arterials	0.00	0.0%	2%-6%
Major Collectors	0.73	4.6%	8%-19%
Minor Collectors	0.13	0.8%	3%-15%
Local Roads	13.79	86.9%	62%-74%

* Roadway mileages and percentages are approximations.

2.3.3.3.1 Classification Recommendations

Based on existing roadway mileage percentages and demands on the existing transportation network, it is recommended that Fountain Green City adopt the following changes to its existing functional classification map as soon as feasible:

- Establish 500 West as a major collector.
- Establish Big Spring Road as a minor collector.
- Establish 400 North from SR-132 to Big Spring Road as a minor collector.Establish Union Street as a minor collector from 500 West to 600 East.

[23]Federal Highway Administration, "Planning Processes: Statewide Transportation Planning," United States Department of Transportation, September 27, 2017, https://www.fhwa.dot.gov/planning%20/processes/statewide/related/highway_functional_classifications/section03.cfm

- Establish 100 North west of SR-132 as a minor collector.

See **Table 13** for recommended Fountain Green City classification type mileages and percentages. For more detailed information on roadway classifications and an expanded list of future recommendations see Section 3.2.1. For an analysis of future functional classification see Section 3.2.1. For existing and future functional classification maps see Appendix 1.on roadway classifications and an expanded list of future recommendations see Section 2.3.1. For an analysis of future functional classification see Section 3.2. For existing and future functional classification maps see Appendix 1.

Table 13 - Recommended Fountain Green City Roadway Mileage by Functional Class*

Roadway Type	Mileage	Percentage	Allowable Mileage Percentage
Interstate & Other Freeways	0.00	0.0%	1%-5%
Principal Arterials	1.22	7.7%	2%-6%
Minor Arterials	0.00	0.0%	2%-6%
Major Collectors	1.51	9.5%	8%-19%
Minor Collectors	1.93	12.2%	3%-15%
Local Roads	11.21	70.6%	62%-74%

* Roadway mileages and percentages are approximations.

2.3.4 Roadway Pavement Assessment

The current condition of each roadway is explained in this section. The condition of roadways serves as a basis for how well the transportation system functions and provides guidance for future roadway capital project planning and changes to future functional classification.

2.3.4.1 Travel Lanes

All roadways in Fountain Green consist of two travel lanes (one in each direction) except for Main Street (SR-132) which has four travel lanes (two in each direction). The City wants SR-132 to become a two-lane highway through the City, however, due to high speeds of travelers and low ADT (Average Daily Traffic). The City believes that restriping the roadway as a two-lane road with a median lane will prevent speeding without hindering traffic flow. The City recommends that UDOT study this alternative and implement any necessary changes. Almost all other roadways in City limits are unstriped and are maintained by Fountain Green.

2.3.4.2 Surface Conditions

SR-132 (Main Street) is paved and striped. Almost all roadways within the City and maintained by the City are also paved. Notable exceptions include certain roadways on the outlying edges of the City, particularly mountainous roads in the east side of the City. The online GIS Story Map includes a map of roadway surface conditions illustrating paved and unpaved roadways. This map can also be found in Appendix 2.

2.3.5 Traffic Crash Data

The Utah Department of Public Safety (UDPS) records all reported vehicular crashes throughout the state. Online records include all crash data since 2010. There has been one fatality in Fountain Green from vehicular crashes since 2010. Crash data has been organized into **Table 14** and Figure 6. This data includes all crash data from 2010 to 2023. A heat map of traffic crashes is included in Appendix 5, as well as a UDPS report including key crash statistics and data.

Table 14 - Traffic Crash Data[24]

Year	Total Crashes	Total Injuries	Total Fatalities
2010	2	0	1
2011	4	1	0
2012	3	1	0
2013	2	1	0
2014	2	0	0
2015	5	0	0
2016	8	1	0
2017	4	1	0
2018	10	3	0
2019	3	0	0
2020	5	0	0
2021	15	4	0
2022	6	0	0
2023	12	0	0
Total	**81**	**12**	**1**
Average	**5**	**1**	**0**

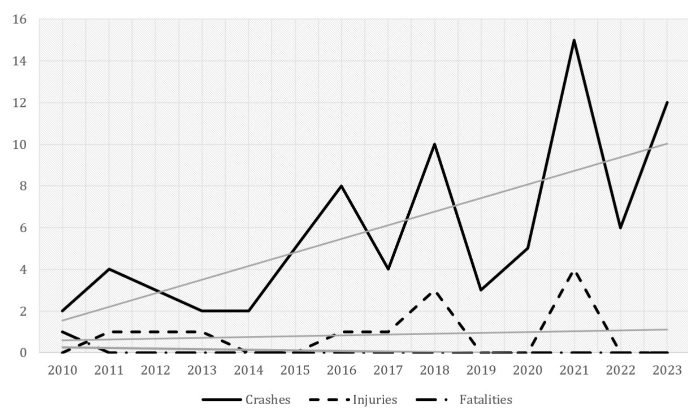

Figure 6 - Traffic Crash Data[24]

2.3.6 Active Transportation

2.3.6.1 Bicycle Facilities

The Federal Highway Administration identifies several bikeway types that can be designed for construction. Several of these

[24]Utah Department of Public Safety's Highway Safety Office, Utah Crash Summary, Utah Department of Public Safety, Accessed July 14, 2022, https://udps.numetric.net/utah-crash-summary#/.

bikeway types such as advisory bike lanes or shared lanes are only viable in urban environments. Only bikeway types viable for Fountain Green City have been included in this section. All images in this section are from the FHWA's Bikeway Selection Guide (Figure 6 to Figure 10). Fountain Green City seeks to align with UDOT's objectives to expand the state's active transportation network and connect the entire state with active transportation pathways. Fountain Green City does not currently have any bike paths constructed within the City. Fountain Green City will continue to expand the active transportation network until the entirety of the circumference of the city has active transportation access. The planned future active transportation map can be found in Appendix 3.[25]

Widened Shoulders

In this design approach widened roadway shoulders are paved with the intention of allowing sufficient roadway width for bike travel without requiring a designated bike lane or bike path. This option is most viable for highways with limited constructable widths or funding. This option is acceptable but holds greater risk for bicyclists than some of the other options.

Figure 7 - Widened Shoulders

Bike Lanes

In this design approach bicyclists are afforded a lane adjacent to travel lanes. This design differs from widened shoulders in that the bike lane is specifically delineated as a separate lane. This has increased safety compared to widened shoulders but is slightly more expensive and may require more pavement width.

Figure 8 - Bike Lanes

Separated Bike Lanes

In this design approach the bike lane is separated from the roadway by a buffer, curb, parking, or some other separator. This is the safer but more expensive design compared to bike lanes as it requires wider pavement, increased paint striping, and delineators.

Figure 9 - Separated BIke Lanes

Shared Use Path (Bike Route)

In this design approach the bike path is separated from the roadway by a buffer, curb, parking, or some other separator. This is similar to the separated bike lanes approach, but it places both directions of the bike path on one side of the roadway. Greater separation between bicycle and vehicle travel lanes is required due to bicyclists riding in an opposing direction to adjacent traffic. This option is ideal when there are high bicycle and pedestrian volumes. It is the safest option, but it also the most expensive.

Figure 10 - Shared Use Path

The FHWA's Bikeway Selection Guide references the Netherlands' bicycle network as one of the safest and most integrated transportation networks in the world. By following these principles, the Netherlands has reduced its traffic fatalities by more than 80 percent since 1970. The Netherlands' transportation network is guided by five key design principles:[26]

[25] Federal Highway Administration, "Bikeway Selection Guide", United States Department of Transportation, February 2019, https://safety.fhwa.dot.gov/ped_bike/tools_solve/docs/fhwasa18077.pdf.

[26] Federal Highway Administration, "Bikeway Selection Guide", United States Department of Transportation, February 2019, https://safety.fhwa.dot.gov/ped_bike/tools_solve/docs/fhwasa18077.pdf.

1. **Functionality -** Defining roadways by functional classification ensures that design balances accessibility, speed, and safety (see Section 2.3.1).
2. **Homogeneity -** Roadways with higher pedestrian access should be designed with slower speed limits and/or increased and clearly defined separation.
3. **Predictability -** Roadway design should encourage drivers to follow speed limits and other posted guidelines.
4. **Forgiveness -** Roadway design should account for and plan on human error. Design should be intended to mitigate severe crashes.
5. **State Awareness -** Individual driver, cyclists, and pedestrians should be educated and aware to improve safety.

UDOT has placed increased emphasis in recent years on expanding the state's active transportation network. The department is looking to establish a statewide interconnected active transportation network. These goals align with UDOT's quality of life vision to improve mobility, health, and safety for Utah citizens and visitors. Fountain Green City seeks to find opportunities to embrace UDOT's vision in implementing active transportation-related infrastructure and pathways.

2.3.6.1.1 Proposed Bike Facilities

Proposed locations for future bike routes include:

- SR 132
- Big Springs Road
- West Side Road

2.3.6.2 Pedestrian Facilities

Constructing pedestrian sidewalks and walkways can also improve and expand the active transportation network for Fountain Green City. The locations of existing sidewalks in Fountain Green City are mapped out in the existing sidewalk map included in Appendix 3 and in the active transportation map in the GIS story map. Fountain Green City recognizes the importance of constructing sidewalks to promote safety for pedestrians and separate pedestrians from roadways. Most existing city sidewalks are located along the spine of the City (SR-132 and surrounding blocks). These are the busiest roads in the city and sidewalks are most critical along these corridors to ensure pedestrian/vehicle separation.

2.3.7 Bridges

Waterway Bridges – There are no natural waterways in Fountain Green City. Fountain Green does not maintain any waterway bridges or culverts larger than 24".

Roadway Bridges – Fountain Green does not maintain any roadway or railroad crossing bridges. There are no bridges present within City limits.

2.3.8 Rail System

There are no existing rail lines in Fountain Green City. This plan does not include any proposed rail.

2.4 Revenue Sources

Funding for the maintenance and construction of the existing transportation facilities comes primarily from revenue sources which include the Fountain Green 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 funding 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.

2.4.1 State Class B and C Program

The distribution of Class B and C Program monies is established by state legislation and is administered by UDOT. 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. Fifty percent of funds are apportioned based on maintained roadway mileage, and the other fifty percent are apportioned based on municipal 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 15 identifies funds allocated for the fiscal years 2018 to 2022.

[24] "Federal Highway Administration, "Bikeway Selection Guide", United States Department of Transportation, February 2019, https://safety.fhwa.dot.gov/ped_bike/tools_solve/docs/fhwasa18077.pdf.

Table 15 - Class B & C Roadway Funds Allocated by Fiscal Year[27]

Year	1st Payment	2nd Payment	3rd Payment	4th Payment	5th Payment	6th Payment	TOTAL
2019	$11,656.80	$14,846.82	$14,316.48	$11,817.04	$13,313.51	$17,283.07	$83,233.72
2020	$10,278.31	$16,557.08	$13,905.69	$12,188.24	$14,950.20	$14,032.93	$81,912.46
2021	$12,103.03	$14,760.86	$13,367.63	$13,796.83	$15,458.26	$20,067.89	$89,554.50
2022	$11,607.98	$15,091.37	$15,554.23	$14,657.97	$15,120.29	$20,993.99	$93,025.84
2023	$11,596.82	$17,317.46	$15,662.42	$13,693.59	$17,656.10	$23,357.20	$99,283.59
2024	$14,228.09	$15,291.52	$17,907.39	$18,192.78	----*	----*	----*

* Not yet allocated by time of adoption.

2.4.2 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. To be eligible, a project must be listed on the five-year Statewide Transportation Improvement Program (STIP). For more information on the STIP, see Section 4.2.

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.

Fountain Green is in UDOT's Region Four. 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.

2.4.3 Local Funds

Fountain Green City may use general fund revenues in its transportation program. It is also possible to improve the City's 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.

2.4.4 Private Sources

Private interests often provide sources of funding for transportation improvements. Developers construct local streets within new subdivisions and commercial buildings. They often dedicate right-of-way and participate in the construction of collector or arterial streets adjacent to their developments as well. For example, this may include paying partial or complete costs for a traffic signal, turn lane, or median. Due to the impacts of the development on the city, developers can also be considered as potential sources of funding for projects.

Fountain Green City requires that all new commercial developments perform a Traffic Impact Study (TIS) to determine the necessity of additional roadway improvements and the impact of the development on the roadway network. Other new developments may be required to perform a TIS as well. TIS standards are included in this document in Section 6. These standards outline which developments will necessitate a TIS and the scope of the TIS, if required.

[27] 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 together to create a desirable and well-functioning community. Zoning, street classification, and new development will guide how Fountain Green expands. Transportation planning must align with the goals of the City to provide improved access and mobility. The Fountain Green General Plan includes a land use element and a transportation element. This document is beneficial in improving coordination between departments and should be referenced for future planning and zoning decisions, where necessary. Additional coordination between zoning, transportation, and other planning departments should occur frequently. A lack of coordination when planning can easily lead to ineffective use of land and an ineffective transportation network.

3.2 Future Fountain Green City Roadway System

Roadway projects are selected in part based on the analysis provided in this document. The recommended project list includes projects that were determined based on the following key factors:

- Improving roadways with geometric issues,
- Improving roadways with safety concerns,
- Improving roadways with additional capacity needs,
- Constructing new roadways needed to add redundancies and provide alternatives to the transportation network,
- Incorporating new and existing roadways into other local, state, and federal networks, and
- Expanding the City's active transportation network.

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. For more information on access management and spacing considerations, see Section 7. 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 travel and 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.

UDOT was involved in the planning process to ensure that roadways and highways impacting its transportation network constructed throughout the City are congruous with UDOT's network. The establishment of new highways requires in-depth studies and long-term planning. UDOT's assistance in planning and funding is necessary for the construction of new highways.

3.2.1 Future Functional Classification

The future functional classification map is included in Appendix 1. This map outlines the anticipated future roadway network for Fountain Green City. This map includes future local roads, minor collectors, and major collectors. It is important for Fountain Green City to ensure that roadway mileage by classification remains within the FHWA's outlined mileage percentages. These percentages are established to ensure that road networks maintain a balanced distribution of roadway types. See Section 2.3.3.3 for functional classification recommendations for the existing network.

The future functional classification network established for Fountain Green City anticipates some of the following changes:

- Local road extension of the grid system to the north of the existing grid. This growth is anticipated to occur within existing municipal limits.
- Local road extension of the grid system to the west of the existing grid. This growth is anticipated to occur within existing municipal limits.
- Additional local road development to the south of the city. This growth is anticipated to occur within existing municipal limits.

3.2.1.1 Future Functional Classification Mapping Benefits

Some of the benefits of future functional classification mapping include:

- Ensuring that the roadway network is established with proportionally distributed roadway types; i.e. the roadway network contains sufficient collector and arterially designed roadways.
- Ensuring that future roadways are not constructed in locations that force dead end local roads where through collector roads would be preferable; i.e. houses being constructed at the end of an existing road or at a planned road corridor location.
- Ensuring that development (residential, industrial, or commercial) does not inhibit the establishment of roadway corridors critical to the network's functionality.

- Ensuring that the local network maintains accessibility to the regional transportation network.
- Ensuring that mobility and accessibility remain balanced by preventing an overage of accesses on collector and arterial roadways.
- Ensuring that roadways are spaced sufficiently far apart to allow for cohesive development and safe intersections.
- Ensuring that future land use districts are established complementary to the future roadway network.

3.2.2 Future Estimated Average Daily Traffic (ADT)

ADT values collected from traffic counts performed in the summer of 2023 were used as a basis for future ADT estimates (see Section 2.3.2). ADT estimates were based off anticipated city growth patterns described in Section 2.2. The anticipated population growth rate for Fountain Green City is 2.0 percent per annum, and this rate was applied to ADT increase. **Table 16** includes existing and estimated ADTs for the upcoming 20 years for selected roadways in Fountain Green.

Table 16 - ADT Estimates for Selected Roadways

Roadway	2023 Peak Hour Volume	2023 ADT	2028 ADT	2033 ADT	2038 ADT	2043 ADT
100 South	47	231	256	283	313	346
300 West (@ 400 South)	33	84	93	103	114	126
400 North (@ 600 West)	34	261	289	320	354	392
400 North (@ State Street)	34	227	251	278	308	341
400 South	98	42	47	52	58	65
400 West (@ 400 North)	9	42	47	52	58	65
500 West (@400 North)	18	94	104	115	128	142
500 West (@ 400 South)	24	155	172	191	212	235
600 West (@ 400 North)	25	149	165	183	203	225
600 West (@ 400 South)	27	118	131	145	161	178
Big Hollow Road	19	63	70	78	87	97
Big Springs Road	29	227	251	278	308	341
Center Street	74	353	391	433	479	530
West Side Road	65	567	627	693	766	847

An existing ADT map is included in Appendix 7 and in the GIS Story Map.

3.2.2.1 UDOT Future Estimated Average Daily Traffic

ADT estimates for state highways in Fountain Green City are included in **Table 16**. Historical growth rates for state highway usage in Fountain Green are comparable to local growth rates. Growth rates within 1 percentage point of 2.0 percent were used for estimating future ADTs. These rates were determined from historical growth patterns. **Table 17** includes existing and estimated ADTs for the upcoming 20 years for state highways in Fountain Green.

Table 17 - ADT Estimates for Selected Roadways

Roadway	2022 ADT	2028 ADT	2033 ADT	2038 ADT	2043 ADT
SR 132 (north of Fountain Green)	3,800	4,200	4,700	5,300	5,900
SR 132 (within Fountain Green)	3,500	3,800	4,100	4,400	4,800
SR 132 (south of Fountain Green)	4,400	4,800	5,200	5,700	6,200

3.2.3 Future Level of Service (LOS) Analysis

Existing and future Level of Service (LOS) analyses were determined for all roadways that received a traffic count. The LOS of each roadway for every five years within the twenty-year scope is included in **Table 18**. Traffic growth rates were based on a 2.0 percent annual growth rate.

Table 18 - Roadway Level of Service for Selected Roadways

Roadway	2023 ADT	2023 LOS	2028 LOS	2033 LOS	2038 LOS	2043 LOS
100 South	231	A	A	A	A	A
300 West (@ 400 South)	84	A	A	A	A	A
400 North (@ 600 West)	261	A	A	A	A	A
400 North (@ 500 State Street)	227	A	A	A	A	A
400 South	42	A	A	A	A	A
400 West (@ 400 North)	42	A	A	A	A	A
500 West (@400 North)	94	A	A	A	A	A
500 West (@ 400 South)	155	A	A	A	A	A
600 West (@ 400 North)	149	A	A	A	A	A
600 West (@ 400 South)	118	A	A	A	A	A
Big Hollow Road	63	A	A	A	A	A
Big Springs Road	227	A	A	A	A	A
Center Street	353	A	A	A	A	A
West Side Road	567	A	A	A	A	A

3.2.3.1 Recommendations

It is recommended, where possible, that roadways receive an additional in-depth study within five years of becoming LOS "D" to determine necessary alterations. LOS "E" is considered unacceptable and should be avoided where possible. Based on the 2.0 percent growth rate, there are no roads within the city anticipated to be below LOS "A" for the 20-year horizon. If additional in-depth LOS analysis of roadways determines that other alterations are necessary, steps should be taken to ensure that the roadway does not fall into an unacceptable LOS category.

Existing and future road network LOS maps are included in Appendix 7 and the GIS Story Map.

3.2.4 Future Volume to Capacity Ratios

For future volume to capacity (V/C) ratios, see Section 2.3.3.2.

3.2.5 Future Roadway Mileage by Functional Classification

Future roadway mileage percentages delineated by functional classification should be considered as city growth develops. As Fountain Green's roadway grid network expands (see the GIS Story Map or Appendix 1 for anticipated growth areas) it is critical that collector roads be established within the framework of expanding local roads. This network planning ensures that the road network continuously functions in an effective and safe manner. Access management, corridor preservation, traffic impact, and roadway typical section standards should all be followed and used as precedence for continuing development. See Section 2.3.3.3 for more details on roadway mileage delineation and proposed mileage percentages.

3.2.6 Schedule of Intersection Signalization

There are currently no signalized intersections in the City. Based on the anticipated growth, it is estimated that there will not be a need for any intersection signalization in the upcoming 20 years. There are other warrants for intersection, however. See Section 5.3 for more information on intersection signalization.

4 TRANSPORTATION IMPROVEMENT PLANS

4.1 Fountain Green Transportation Improvement Plan

A Transportation Improvement Plan (TIP) encompasses improvements to be completed within the next 20 years. City personnel will work with UDOT and other relevant agencies to ensure compatibility between transportation networks. The TIP should be updated periodically to reflect the City's transportation goals. To utilize the TIP effectively, the City should:

- Update master plan every 5 years.
- Continue a routine crack seal and chip seal or microsurfacing maintenance program for asphalt roads to ensure that roads remain in good condition.
- Work with Sanpete County and other cities in the County as necessary to monitor their transportation plans and update this plan as needed in accordance with the attached maps.
- Construct as many suggested roadway improvements as possible.

Projected costs and completion dates are provided for some projects. Appendix 10 contains complete cost estimates analyzed in association with this TMP. **Table 19** includes the TIP list of projects.

Table 19 - Transportation Improvement Plan

Project	Cost (2023)	Cost (@ Construction)	Completion Year	Scope of Work
Cemetery Road Paving	$322,000	$426,000	2029	Asphalt paving of Fountain Green City Cemetery roadways.
400 South/West Side Road Bike Path	$500,000	$871,000	2034	Construction of bike path along 400 South and West Side Road from SR 132 to the city limit.

4.2 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 in or adjacent to Fountain Green (**Table 20**):

Table 20 - UDOT Statewide Transportation Improvement Plan

Project	Project Value	Work Start Date	Work Comletion Date	Scope of Work
SR 132; Canyon EB Passing Lane Connection	$8,236,908	November 2023	November 2024	Construction of passing lane on SR 132 from milepost 37.05 to 38.5

5 TRANSPORTATION GUIDELINES AND POLICIES

This section includes transportation-related standards and guidelines for Fountain Green City. These standards and standards included in Section 6 and Section 7 are intended to assist the City in steering development in a manner consistent with the needs of the city and its residents. Fountain Green City seeks to establish effective, safe, and efficient growth within the city to ensure the highest quality of life for residents and visitors.

5.1 Roadway Typical Sections

Roadway typical sections establish pavement design standards for Fountain Green City. The typical roadway sections for the City are included in Appendix 4. These typical sections outline the depths of pavement features including asphalt, base course, and borrow. Roadway (pavement) widths are also specified with surface level drainage infrastructure, curb and gutter, and/or sidewalks features included.

Roadway typical sections are designed to guide development to be consistent with the future functional classification network. Roadway widths need to be sufficient to account for existing and future growth and it is important that right-of-way widths are designed to account for any anticipated future growth. This prevents unnecessary future expenses. Roadway typical sections establish a minimum pavement width and depth for most roads and should address vehicular loading and traffic volumes. Roadways which are anticipated to have high traffic volumes, particularly high heavy truck traffic volumes, should be designed with increased pavement strength.

5.2 Right-of-Way Width Standards

Right-of-way widths are established for roadway functional classification types in the Fountain Green City standard typical sections (see Appendix 4 and Section 5.1). Older roads in Fountain Green generally have right-of-way widths of 99 feet. However, the majority of new roadways have 66-foot, 60-foot, or 50-foot right-of-way widths. Moving forward, Fountain Green City seeks to establish a 99-foot right-of-way width standard. Roadways with right-of-way widths less than 99 feet can present challenges to future development, utility work, additional roadway improvements, and road widening. Fountain Green seeks to avoid any future roadways with right-of-way widths less than 99 feet.

Fountain Green City seeks to maintain a minimum 2-foot right-of-way behind sidewalks or edge of pavement shoulder to allow for utility work to be performed on City property.

5.3 Traffic Signal Needs Studies

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:

5.3.1 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.

5.3.2 Improvement Analysis

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

Traffic signal warrants should be studied to assist in determining traffic signal needs. Traffic signal warrants are described in the next section.

5.3.3 Traffic Signal Warrants

The *Manual on Uniform Traffic Control Devices* (MUTCD) specifies the warrants for placing a traffic signal at an intersection. At least one of these warrants must be satisfied in order for a traffic signal to be placed. Warranting alone does not necessarily indicate that a traffic signal will or should be placed. All safety and design guidelines and requirements specified in the MUTCD should be followed. The eight warrants are: [28]

1. Eight-Hour Vehicular Volume
   a. An eight-hour vehicular volume higher than the values specified in Section 4C.02 of the MUTCD may indicate a need for signalization.
2. Four-Hour Vehicular Volume
   a. A four-hour vehicular volume higher than the values specified in Section 4C.03 of the MUTCD may indicate a need for signalization.
3. Peak Hour Volume
   a. A peak hour vehicular volume higher than the values specified in Section 4C.04 of the MUTCD may indicate a need for signalization
4. Pedestrian Volume
   a. A pedestrian volume higher than the values specified in Section 4C.05 of the

[28] Federal Highway Administration, Manual on Uniform Traffic Control Devices, https://mutcd.fhwa.dot.gov/htm/2003r1r2/part4/part4c.htm, Last Modified November 20, 2023.

MUTCD may indicate a need for signalization.

5. School Crossing
    a. A school crossing may require signalization if the warrants as specified in Section 4C.06 of the MUTCD are satisfied.
6. Coordinated Signal System
    a. An intersection may require signalization to maintain the fluidity of a transportation network as specified in Section 4C.07 of the MUTCD even if the intersection does not meet other warrants for signalization.
7. Crash Experience
    a. Crash history, severity, and frequency may necessitate signalization as specified in Section 4C.08 of the MUTCD.
8. Roadway Network
    a. Signalization may be required at an intersection to encourage certain traffic patterns, organization, and flow as specified in Section 4C.09 of the MUTCD.

6 TRAFFIC IMPACT STUDIES

A Traffic Impact Study (TIS) is a specialized study of the impacts that a certain type and size of development will have on the surrounding transportation system. It is specifically concerned with the generation, distribution, and assignment of traffic to and from the "new development". For reference throughout these guidelines, the term "new development" also includes properties that are being redeveloped.

Fountain Green City or UDOT may require a TIS for any new development adjacent to or near local roads or UDOT roads, respectively, when the following guidelines (Section 6.1) indicate that a TIS is needed. The following sections are to be used to establish uniform guidelines determining when a TIS is required and how the study is to be conducted, based on suggested guidelines established by the Institute of Transportation Engineers (ITE).

The following TIS requirements will apply for Fountain Green City along local roads. For UDOT roads, refer to Utah Administrative Code R930-6.

6.1 TIS Requirements

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

- The new development is commercial or industrial.
- All new developments or additions to existing developments which are expected to generate at least 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 City or designated representative requires a study to be conducted.

The specific analysis requirements and level of detail are set forth in the following sections. Different categories of a TIS are determined by the number of peak hour trips a development will produce. **Table 21** may be helpful in determining which category of TIS would be required by a new development.

Table 21 - Fountain Green City Requirements for Traffic Impact Studies*

TIS Category	Land Use Intensity Thresholds (ITE Trip Generation)
Category 1	Single Family: 25 to 100 Dwelling Units Apartment: 50 to 200 Dwelling Units Lodging: 40 to 170 Rooms General Office: 10,000 to 55,000 Sq. Ft. Retail: 2,000 to 15,000 Restaurant: 2,000 to 6,000 Sq. Ft.
Category 2	Single Family: 100 to 525 Dwelling Units Apartment: 200 to 1,000 Dwelling Units Lodging: 170 to 720 Rooms General Office: 55,000 to 350,000 Sq. Ft. Retail: 15,000 to 50,000 Restaurant: 6,000 to 30,000 Sq. Ft.
Category 3	Single Family: > 525 Dwelling Units Apartment: > 1,000 Dwelling Units Lodging: > 720 Rooms General Office: > 350,000 Sq. Ft. Retail: > 50,000 Sq. Ft. Restaurant: > 30,000 Sq. Ft.

* All commercial and industrial developments require a traffic impact study. Trip generation values based on square footage are to be used as a guideline in determining which category of TIS is required.

6.1.1 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,
- Location(s) with a high amount 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.

6.1.2 Category II

A Category II TIS should be required for all developments, which generate between five 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, the 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.

6.1.3 Category III

A Category III TIS should be required for all developments, which generate above one thousand (500) peak hour trips during the morning, afternoon, or Saturday peak hour. The study horizon should include the opening year of the development, 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 mile of the development.

6.1.4 Initial Work Activity

Any development of land, be it commercial, residential, or industrial, requires an estimate of vehicle trips generated by the proposed new development. 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. If the estimate determines that a TIS is required the developer or their agent should 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. This does not require the City to assist in the estimation.

Based on the developer's estimation, 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 submit a draft table of contents for the TIS to the City for review and approval. The table of contents should 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.

6.1.5 Qualifications for Preparing TIS Documents

The TIS must 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.

6.2 Analysis Approach and Methods

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

6.2.1 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 and size should be determined by project type and size, in accordance with the criteria outlined in Sections 6.1.1 – 6.1.3.

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 of these periods may be waived by the City.

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

6.2.2 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.

6.2.3 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 and cross slope, 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.

6.2.4 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, daily 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.

6.2.5 Trip Distribution and Assignment

Projected trips should be distributed and added to the projected non-site traffic on the roadways and intersections 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. Future traffic volumes should include, where applicable, the existing volumes projected as well as volumes created by nearby proposed development projects currently under review or approved by the City.

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.

6.2.6 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 must include LOS results for AM, PM and Saturday peak periods, if applicable. The table must 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 must be provided for each approach and the intersection as a whole. If the new development is scheduled to be completed in phases, the TIS must, 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.

6.3 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

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

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

X. DESIGN STANDARD REFERENCE

1. Design in accordance with current Fountain Green 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*.

6.4 Roadway Standards

All streets shall be designed to conform to the engineering standards and technical design requirements adopted by Fountain Green City. These standards can be supplemented by this master plan and AASHTO's (American Association of State Highways Transportation Officials), A Policy on Geometric Design of Highways and Streets, and the USDOT's MUTCD (Manual on Uniform Traffic Control Devices). In cases of conflict, a determination shall be made by the City, whose determinations shall be final.

Fountain Green City has adopted these design standards for roadways to ensure that the facilities provide the necessary safety and capacity elements. The requirements for the street typical cross-section configurations are shown in Appendix 4. 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. Developers retain ownership of local roads that are not subject to City standards, but it is imperative to note all private roads will not be maintained by the City.

6.5 Safe Transportation System

Maintaining a safe transportation system is one of Fountain Green City's primary transportation objectives. Fountain Green City follows UDOT's "Zero Fatalities" framework in roadway design and encourages developer to do the same. To meet applicable safety standards, safe roadway design should be given highest priority by developers. The City has the following safety requirements in roadway design for new developers:

- All major developments are to provide adequate access for emergency vehicles. This includes but is not limited to Fire, Paramedic, Law enforcement, and other entities.
- All signs, pavement markings and traffic signals must meet standards established by the *Manual of Uniform Traffic Control Devices* (MUTCD).
- All roadway features must meet minimum design standards established by the *American Association of State Highway and Transportation Officials* (AASHTO).
- Speed limits must satisfy all clear zone, stopping sight distance, and other requirements as established by the City.

The following recommendations of the City, while not requirements, can help developers in achieving safe roadway design and satisfying safety goals:

- Provide innovative and 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, reducing roadside obstructions, and traffic signage to guide vehicles on streets.
- 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, and
  - Providing curb cuts and ramps that comply with the Americans with Disabilities Act (ADA) where applicable.

6.5.1 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 the Access Management section of this document (Section 7).

Residential streets should be designed, where possible, in a curvilinear method to reduce or eliminate long straight stretches of residential roadways, which encourage speeding and cut-through traffic. Development which creates substantial increases in average daily traffic on adjacent 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 and must be 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.

6.5.2 Improvement Requirements

All improvements, including but not limited to the following, shall be constructed as specified below.

- Required curb, gutter and sidewalk shall be constructed according to City standards.
- Driveways shall be constructed in approved locations only in accordance with City access management standards.
- All streets, public or private, shall be surfaced to grade with current asphalt concrete pavement standards to the required minimum width and thickness.
- Cross gutters may be used for drainage purposes, as approved by City.
- When new construction occurs, ADA compliant ramps shall be constructed at all street intersections, unless otherwise approved by the City in a manner consistent with City standard drawings. In addition, when a project occurs where existing improvements are in place, ramps shall be upgraded to meet current standards.
- Raised medians on public roadways require the approval of the City. Design and construction shall be in accordance with applicable standards.
- Developments shall construct the minimum number of accesses needed to adequately address the needs of the development and only at approved locations.
- Adequate drainage facilities shall be installed to properly control runoff from the roadway. Sub-drains and surface drainage facilities shall be designed in accordance with the approved drainage study. Drainage study for developments shall be submitted to City for review. All developments must prove that drainage infrastructure is in compliance with City standards prior to approval for construction.

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.

7 ACCESS MANAGEMENT

The balance of access and mobility is integral to the operability of a transportation network. Managing the level of access across a transportation network helps to ensure improved functionality of the system. Access management for roadways will be described in this section and guidelines will be included. Reference to City access management standards is included where relevant.

Previous growth along some of the region's major travel corridors has resulted in strip development and a proliferation of access points. Individual developments along a corridor typically have their own access driveways. Numerous closely situated access points along corridors create conflicts between turning and through traffic which can cause 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,
- Reduce offset distances at intersections,
- Provide sufficient spacing for at-grade, signalized intersections, and
- Provide adequate onsite circulation and storage.

Although access management has the greatest impact on roads with greater volumes covering larger areas, it is also applicable to roads that are considered residential or rural.

7.1 Definition

Access management is the process of establishing restrictions, rules, and guidelines to intersections accesses for developments in an effort to preserve the mobility of traffic flow within a roadway network. The American Association of State Highway and Transportation Officials (AASHTO) defines and provides guidance on access management in A Policy on Geometric Design of Highways and Streets 7th Edition.[29]

7.2 Access Management Techniques

Access management can be accomplished using many different techniques. Signal spacing, street spacing, access spacing, and interchange to crossroad access spacing are the most common techniques. Depending on the type of roadway being accessed, the distances for each spacing vary. The Utah Department of Transportation has developed an access management program, and more information can be gathered from the UDOT website and from the Access Management Program Coordinator.

Common access management techniques include:

- Increasing spacing between traffic signals and interchanges,
- Increasing spacing of driveways,
- Improving design and location of driveways,
- Adding exclusive turning lanes,
- Adding raised medians,
- Adding two-way-left-turn lanes (TWLTL),
- Correcting sight distance limitations and speed issues,
- Implementing greater use of frontage and service roads, and
- Creating land use policies that limit access to highways.

7.3 Benefits of Access Management

Some benefits of access management include, but are not limited to:

- Reducing traffic conflicts and crashes,
- Reducing traffic congestion,
- Preserving traffic capacity and level of service,
- Improving economic benefits for businesses and service agencies,
- Improving economic benefits for the City by reducing the need for expensive roadway and intersection improvements,
- Discouraging poor site design,
- Improving roadway appearance and aesthetic,
- Reducing air pollution emissions from vehicle exhausts, and
- Improving overall cohesiveness of the transportation network.

7.4 Access Management Principles

Any location where a road, driveway, or other form of access intersects with another road, driveway, or form of access is considered an access point. All access points in a transportation network should be designed and maintained to adhere to the principles listed below.

- Conflicts at intersections and driveways should be separated and the number of conflicts should be reduced as much as possible.
- Optimum traffic speeds should be maintained, particularly on arterials and highways where mobility is given preference to access.
- A "time-space" perspective – meaning the balance between vehicular speed and roadway distance – should guide (a) the location, timing, and coordination of traffic signals; (b) the placement of access; and (c) the design and operation of intersections.

[29] American Association of State Highway and Transportation Officials, *A Policy on Geometric Design of Highways and Streets 7th Edition*, 2018.

- 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 shall 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 traffic flows.
- Interference between through traffic and site traffic should be addressed by incorporating additional traffic lanes and turn lanes to accommodate turning vehicles and through vehicles.
- Adequate on-site storage and driveway dimensions should be designed to accommodate the traffic demand entering and exiting the site. Fewer, properly placed, and adequately designed driveways are preferable to a larger number of inadequately designed driveways, especially when spaced at least 500 feet apart. In all cases, the integrity of mainline traffic operations must not be compromised.
- All driveways and accesses must adhere to sight distance and clear zone requirements as specified by A Policy on Geometric Design of Highways and Streets 7th Edition and the City.

7.4.1 Application of Access Management Principles

Safety, capacity, and speed are determining factors on how land development is accessed by a roadway. Managing access is achieved by controlling the location, design, and operation of driveways, median openings, and street connections. In addition, auxiliary lanes (turn lanes or bypass lanes) are also used to divert traffic out of the through stream to improve the flow and improve safety.

Roadways are classified for access control based upon importance to local and regional mobility. No facility can move traffic well and provide unlimited access at the same time. For example, the strictest access control is applied to roadways that serve through traffic or regional trips such as freeways and state highways. The least access control is given to local streets and residential areas that serve local traffic and short trips. In many cases, crashes and congestion are the result of streets trying to serve both mobility and access at the same time.

Access Management principles can be implemented and adhered to in the following ways:

- Ensure roadways are managed properly by having a comprehensive plan to address key issues; include goals, objective, and policies related to access management,
- Ensure that roads are classified per the functional classification plan of the City and provide for a wide variety of street types with varying design standards,
- Establish a basic requirement limiting one driveway per parcel, excepting necessary exemptions where a second driveway is necessary for the handling of traffic flow and can increase safety,
- Locate driveways away from intersections following standards for access spacing,
- Connect parking lots and consolidate driveways,
- Provide residential access through neighborhood streets,
- Increase minimum lot frontage on major roads,
- Promote a connected street system,
- Encourage internal access to parcels,
- Regulate the location, spacing, and design of driveways, and
- Coordinate with other municipalities and state agencies.

Access Management shall be used on all roadways with the City. Corridor access management strategies extend the useful life of roads at little or no cost to taxpayers. Access management is an inexpensive way to improve performance and maintain integrity of roadways with increasing traffic volume. Access management principles should be applied wherever possible to extend roadway life and performance.

7.5 Controlling Access

The City may control access through several methods.

Regulation – The City may exercise its statutory authority to pass ordinances that instigate and improve access management. Regulation cannot remove access rights but can deny direct access if alternative and reasonable access is provided.

Land-use Ordinances – The City may create zoning ordinances and requirements for subdivision design that ensure uniformity in site design, setback distances, access types, and parking restrictions.

Geometric Design – City policies and standards ensure that geometric design of roadways are constructed to allow for reasonable, safe, and effective access.

7.5.1 Spacing Guidelines

Substantial spacing between access points reduces the number of potential conflicts and improves the mobility of roadways. Signalized intersections and driveways should remain no closer than one-quarter mile to ensure efficiency of traffic flow. Unsignalized intersections should be at minimum 500 feet apart for full movement intersections. Access points should not compromise mainline traffic. All accesses to be placed on state highways should be in accordance with UDOT standards as specified in Transportation Preconstruction Tools R930-6. **Table 22** shows UDOT's state highway access management spacing standards.

Table 22 - State Highway Access Management Spacing Standards[30]

Functional Class	Minimum Signal Spacing (feet)	Minimum Street Spacing (feet)
Interstate	N/A	N/A
Arterial Rural	5280	1000
Arterial Urban	2640	N/A
Major Collector Rural	2640	660
Major Collector Urban	2640	660
Minor Collector Rural	1320	300
Minor Collector Urban	1320	300
Other	1320	300
One-way Frontage Road	1320	660

Collector and arterial roadways should have limited access. Where possible, all accesses should access local roads; collectors and arterials may be accessed if no other alternative is possible and it is approved by the City. Where multiple parcels are consolidated, accesses should also be consolidated according to City design and spacing standards. Temporary access may be granted to undeveloped property prior to completion of a final development plan if access is needed for construction or preliminary site access. Temporary accesses are subject to removal, relocation, or redesign after final development plan approval.

7.5.2 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 19**.

7.5.3 Corner Spacing

Access to corner lots should be from the lesser-classified road at the greatest distance possible from the intersection. **Table 23** is included for reference in determining desirable access distances from intersection corners. These values do not represent standards, and placement of all access points must be approved by the City. This distance is measured from the point of curvature (PC) of the corner radius. A 25' radius is considered the minimum where the existing radius is less than 25'. Accesses should not be located within the functional boundaries of intersections as outlined in **Table 23**. Driveways should follow offset distance standards where possible. Figure 11 illustrates major road access spacing.

Table 23 - Acces Distance from Corner According to Facility Type[1]

Facility Type	Upstream Distance (feet)	Downstream Distance (feet)
Residential Access	-	-
Local Residential	-	-
Residential Standard	-	-
Residential Collector	100	75
Major Collector	175	150
Minor Arterial[1]	200	185
Major Arterial[1]	250	230

Notes:

1. All access points shall be approved by the City. Distances shown may be adjusted by the City on a case-by-case basis. Exceptions can only be approved by the City upon submittal of proper traffic justification.

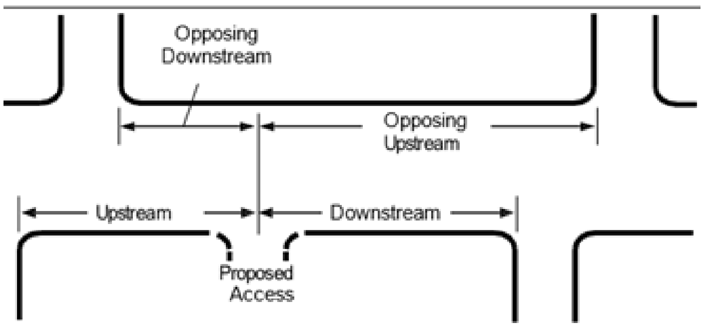

Figure 11 - Major Road Access Spacing

7.5.4 Geometric Design

Several methods of roadway geometric design may be used to improve accessibility while maintaining roadway mobility. Some of these methods are now described.

Right-in/Right-out Accesses – This access type guides traffic entering a driveway or parking lot to only enter and exit using right-turn movements. This access type is often accompanied by a median on the main road to further ensure that traffic is required to adhere to the desired access design. Figure 12 illustrates differing right-in/right-out access designs.

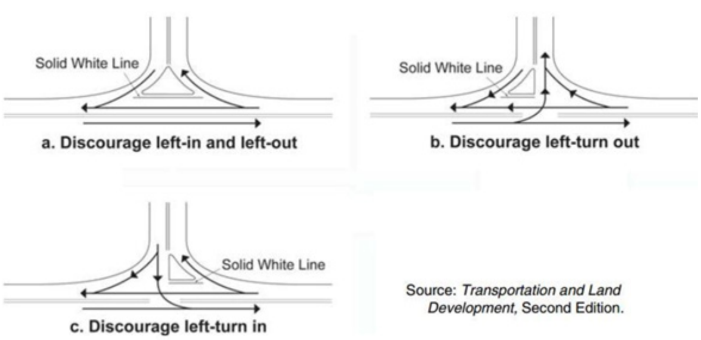

Figure 12 - Right-in/Right-out Accesses[31]

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

[31] Stover, Vergil G.; Koepke, Frank J., *Transportation and Land Development: second Edition*, January 1, 1988

Medians – Medians are placed to control left-turn movements between intersections. Reducing potential left-turn movements is beneficial in improving traffic mobility and increasing traffic safety. Medians are especially important on high use roads with speed limits greater than 40 mph.

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 according to City standards. 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 raised medians with appropriately spaced median openings. **Table 24** shows UDOT guidelines for spacing of unsignalized restricted median openings.

Table 24 - 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.

Shared Accesses – Where possible, access can be shared to mitigate potential conflict points between oncoming and left-turning traffic. Shared accesses are especially beneficial on roadways with many commercial/industrial developments where connected parking lots are possible and reasonable.

Access Alignment – Accesses should be aligned directly opposite each other and intersect roadways at a 90-degree angle. This decreases the number of potential conflict points and driver confusion.

Sight Distance – Providing minimum stopping sight distances and intersection sight distances ensures that all vehicles following the speed limit have sufficient visibility to avoid potential conflicts that may arise. Design varies based on roadway speed. **Table 25** illustrates the minimum sight distances based on speed limit as found in AASHTO's A Policy on Geometric Design of Highways and Streets.

Table 25 - Intersection/Driveway Sight Distance[32]

Speed Limit (mph)	Stopping Sight Distance (ft)	Design Intersection Sight Distance for Left Turn (ft)	Design Intersection Sight Distance for Through and Right Turn (ft)
25	155	280	240
30	200	335	290
35	250	390	335
40	305	445	385
45	360	500	430
50	425	555	480
55	495	610	530
60	570	665	575
65	645	720	625

*Driver eye is 15 feet measured from the travel way.

Turning Lanes – Turning lanes improve mobility of travel lanes and decrease congestion by separating turning vehicles from through vehicles. These lanes are beneficial on highways and roadways with high speed limits and roadways with greater emphasis on mobility such as arterials and major collectors. They can also be beneficial on side roads intersecting with arterials and collectors where accessing the major roadway can be difficult due to higher traffic volumes on the major road. Adding turning lanes at such intersections can improve the level of service with or without the addition of signalization. Turning lanes should generally be designed with a minimum width of 12 feet. Left-turn lanes, and two-way left-turn lanes (TWLTLs) should be designed with a width of 14 feet where possible.

AASHTO's *A Policy on Geometric Design of Highways and Streets* recommends the following guidelines for storage length of left-turn lanes (**Table 26**):

Table 26 - Left-Turn Lanes Storage Length (100 feet minimum)[33]

Intersection	Length
High-speed Roads	100 feet
Rural Roads	100 feet
Left-turn Lanes Approaching Arterial Roads	250 feet
Left-turn Lanes Approaching Collector Roads	150 feet

The provision for left turn lanes is important from both a capacity and a safety perspective, 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.

32 *A Policy on Geometric Design of Highway and Streets*, 7th Edition, American Association of State Highway and Transportation Officials (AASHTO), 2018.

33 *A Policy on Geometric Design of Highway and Streets, 5th Edition, American Association of State Highway and Transportation Officials (AASHTO), 2004.*

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 should be considered adequate. 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.

Table 27 includes recommendations for when a left- or right-turn lane should be considered on two-lane highways. The City may require a developer to construct the turn lane if a TIS determines that it is necessary. For more information about TIS requirements, see Section 6.

Table 27 - Guidelines for Requiring Left Turn and Right Turn Lanes on Two Lane Highways

Speed Limit	Left-Turn Lane	Right-Turn Lane	Right-Turn Acceleration Lane	Left-turn Acceleration Lane
40 mph or less	25 veh/hr	50 veh/hr	-	-
45 mph or more	10 veh/hr	25 veh/hr	50 veh/hr	-

Pedestrian and Bicycle Access – When designing roadway accesses, all transportation types should be considered. For design of pedestrian and bicycle facilities, see Section 2.3.6.

Roundabouts – Roundabouts function as an alternative to the traditional four-way intersection. They function as a four-way yield intersection which allows traffic movement to maintain mobility in all four directions by removing the stop signal phase of a four-way stop or signalized intersection. Roundabouts are also beneficial in that they remove potential conflict points, particularly left-turning conflict points. This means that roundabouts can be much safer than four-way intersections if built properly. Traffic studies should be performed to determine the effectiveness and relevance of a roundabout. Development of a roundabout must be guided by an intersection study from a qualified Traffic Engineer to determine 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.

Signalized Intersection and Street Spacing – Uniform or near uniform spacing of signals is helpful in providing for efficient and predictable traffic flow. UDOT requires that signals should be spaced no closer than one-quarter mile (1,320 feet), depending on functional class of road. **Table 22** shows the spacing requirements used by UDOT. These requirements are based on the functional class of the roadway facility for street spacing and signalized intersection spacing.

7.6 Number of Accesses Per Parcel

Accesses to parcels should be consistent with the overall functionality of the transportation network. Collector and Arterial roadways should have limited access points with accesses being given preference to local roads and minor collectors where possible. Where multiple parcels are consolidated, accesses shall also be consolidated according to City design and spacing standards. Where possible, it is recommended to avoid allowing multiple accesses to residential parcels, especially if those accesses are onto multiple roadways or arterial or collector roads. Traffic impact studies are beneficial in determining the necessary number of accesses required for a parcel.

Design of accesses and intersection shall be in conformance to City standards where applicable.

8 TRANSPORTATION CORRIDOR PRESERVATION

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

8.1 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 Fountain Green City. A bibliography of the relevant publications is included.

8.1.1 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.

8.2 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.

8.2.1 Documentation and Recordation

(a) 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. But 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.

(b) 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.

8.2.2 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.

8.2.2.1 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).

8.2.2.2 Hardship Acquistion

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).

8.2.2.3 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.

8.2.2.4 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).

8.2.2.5 Public Land Exchanges

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

8.2.2.6 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.

8.2.3 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).

8.2.4 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.

[22] Utah Department of Public Safety's Highway Safety Office, Utah Crash Summary, Utah Department of Public Safety, Accessed July 14, 2022, https://udps.numetric.net/utah-crash-summary#/.

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

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

The 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.

9 GIS STORY MAP

An integral part of the Fountain Green City Transportation Master Plan is the online GIS Story Map. A GIS story map is a publicly accessible interactive mapping tool. The GIS story map for Fountain Green City includes various interactive maps that allow public officials and private individuals to be informed of city transportation planning and the existing transportation inventory. Maps in the GIS Story map include:

- Existing Roadway Classification Network
- Future Roadway Classification Network
- Roadway Surface Type
- Average Daily Traffic (2023)
- Existing Roadway Level of Service (2023)
- Future Roadway Level of Service (2043)
- Roadway Safety and Crash Data
- Active Transportation Plan
- Short-range Transportation Improvement Plan
- Long-range Transportation Improvement Plan

The story map also includes a project overview and a socioeconomic overview. Links to transportation-related documents (including this report and its appendices) are also included for ease of accessibility.

The GIS Story Map may be accessed from the City's website.

10 OTHER FUTURE ACTIONS

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

10.1 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 the City understand 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 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 6 for TIS requirements for developments along a state highway system.

10.2 Lane Use Planning Integration

The City's current Zoning Plan calls for growth adjacent to existing corridors. In rural communities like Fountain Green City, traffic studies indicate that centralized commercial development land use has negative transportation impacts as the city grows. Residents from the less populated areas of the city must travel downtown or to the central corridor to go shopping, which 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 Fountain Green City through rezoning or through planned unit developments. It is recommended the City consult with an urban planner to discuss this concept in more detail.

11 CLOSURE

The primary purpose of the Transportation Master Planning effort is establishing a foundation for city growth and development. The transportation master plan is to act as a guide and an assistance 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 that allows greater ease of use for the plan in meetings, such as planning & zoning and City Council meetings.

The plan addresses the key components of a master plan by outlining needs of existing infrastructure and specifying future maintenance projects, capital infrastructure projects, and corridor acquisitions. Projects have been planned based on City objectives, specifically to increase economic viability and provide safer mobility for residents and visitors. Also included in this project are transportation guidelines aimed at directing development and growth in the city in a manner consistent with long-term network efficacy. Coordination with UDOT, the County, and residents was critical in determining most needed and effective projects, guidelines, and plans.

In closing, this plan has established an existing transportation inventory for the City (see Section 2). A data-driven decision-making process has been used to make future network growth projections based on this data (see Section 3). Based on future growth projections and current City needs, transportation guidelines and policies were developed (see Section 5 to Section 7). A short- and long-range project plan was developed for years 2023-2043 (see Section 4). It is intended that this list be updated in the transportation master plan every five years. To ensure safe mobility for users of the transportation network and a functional and interconnected roadway network, access management and corridor preservation guidelines were addressed (see Section 7 and Section 8). Updated maps have been provided for the future transportation network in the appendix and in the GIS interactive map (see Section 9). These maps include data from the existing network inventory, planned projects, projected growth patterns, and roadway functional classification mapping.

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