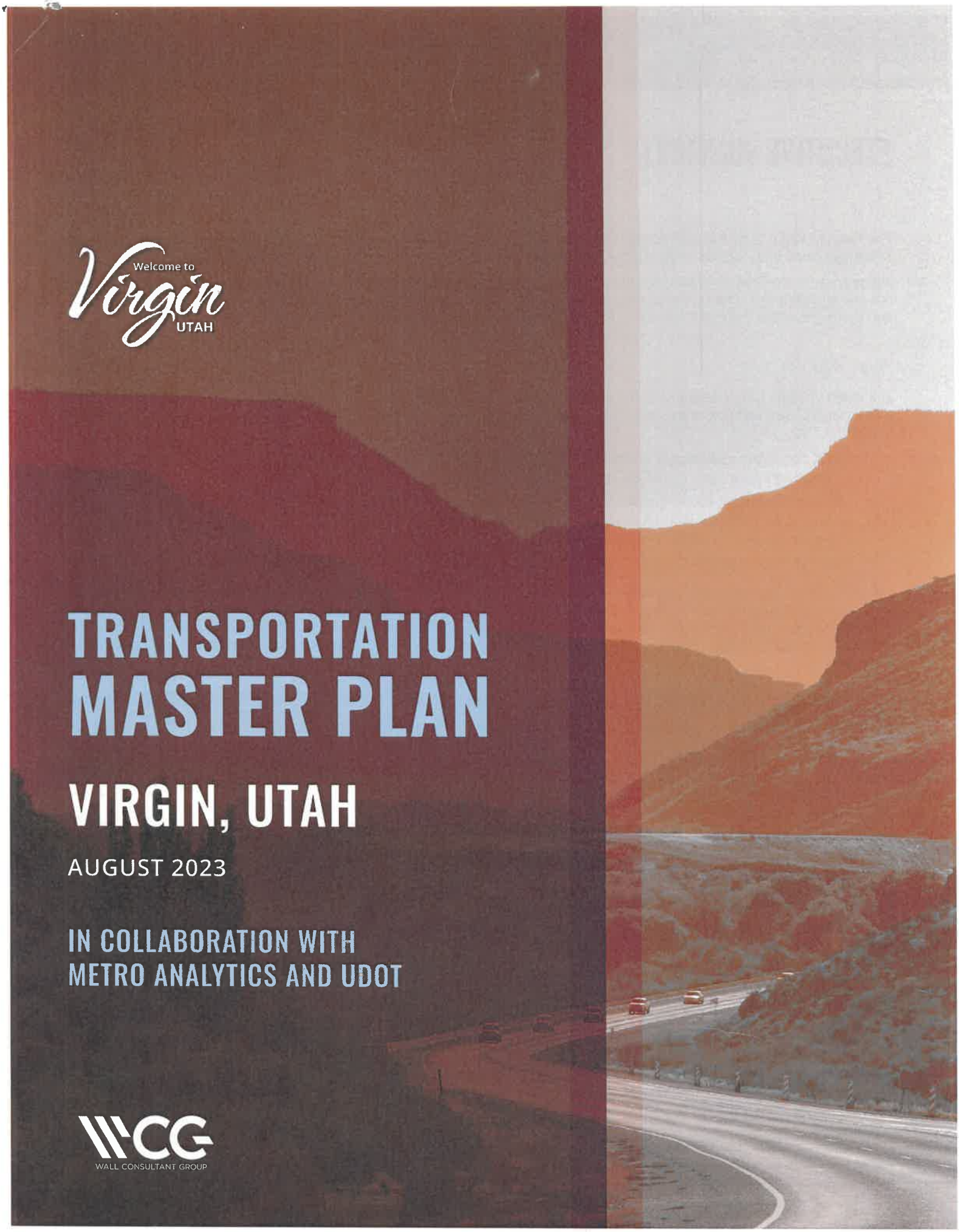


TRANSPORTATION MASTER PLAN

VIRGIN, UTAH

AUGUST 2023

IN COLLABORATION WITH
METRO ANALYTICS AND UDOT

WCG
WALL CONSULTANT GROUP

EXECUTIVE SUMMARY

The Town of Virgin is a rural community located in Washington County, Utah. While it is expected to continue being a primarily residential community, due to SR-9 going through Virgin, there is potential for greater commercial development.

The purpose of this Transportation Master Plan (TMP) is to plan for the future multi-modal transportation needs of Virgin given the current land use plans. This TMP document outlines a comprehensive and strategic approach to address the transportation needs and challenges of the Town of Virgin with a focus on improving mobility, enhancing safety, and promoting sustainability.

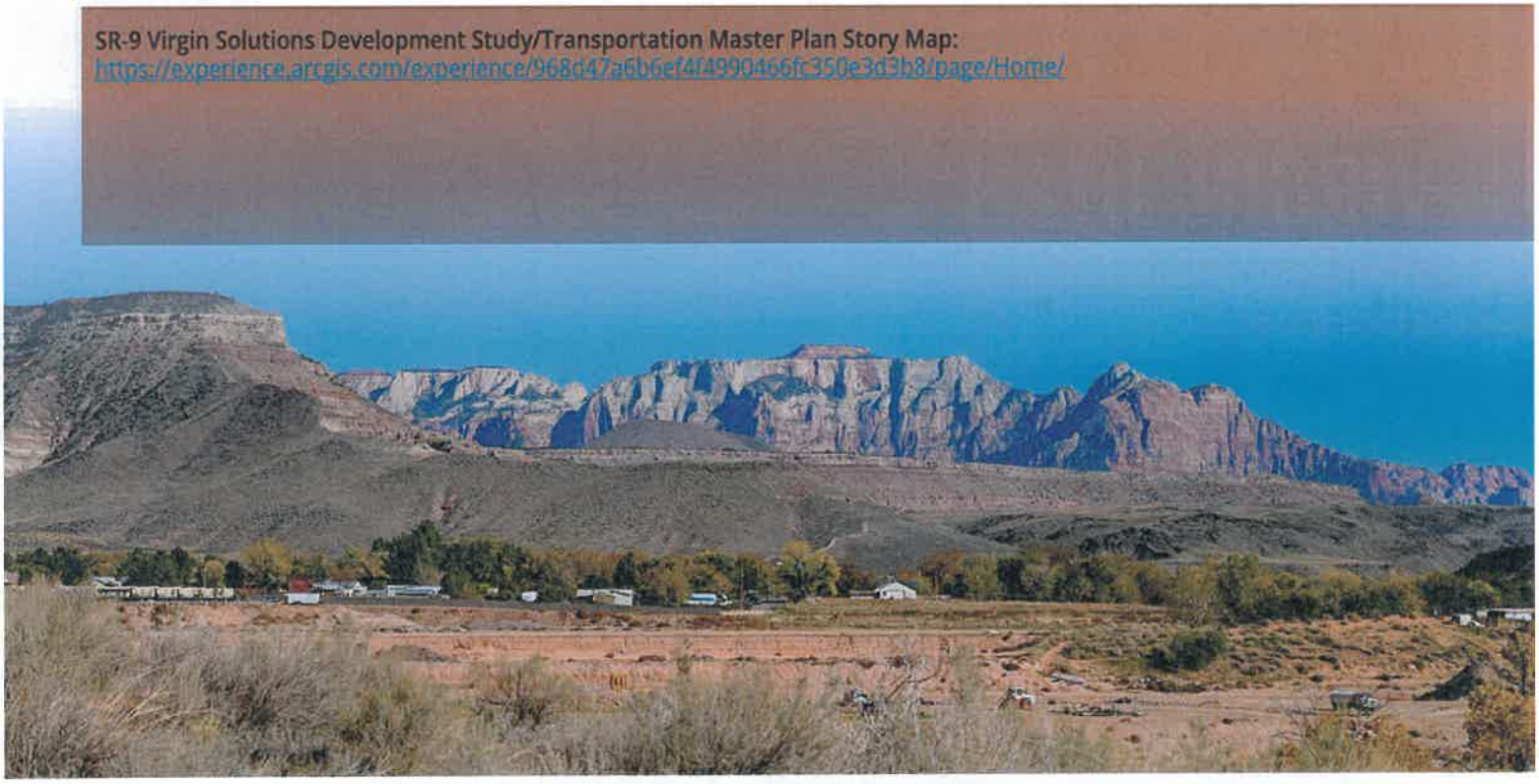
Vision and Goals

The vision of Virgin is to "create a safe and accessible transportation system that promotes a safe, livable, neighborly community and enhances the environment and beauty of the scenic surroundings." To accomplish this vision, the following was completed as part of this TMP:

- Street classifications and cross sections were determined.
- Existing and future traffic volumes through Virgin were identified.
- Potential roadway projects were determined to help Virgin maintain mobility as it continues to develop.
- Existing active transportation infrastructure and potential projects were identified.
- Potential locations for transit hubs were identified.
- Traffic calming measures that can be implemented in Virgin, particularly along SR-9, are discussed.

For additional information pertaining to SR-9 through Virgin, please see the online story map which was created by Metro Analytics under direction by UDOT. The story map provides a summary of this Transportation Master Plan but does not provide all the details in this document. The story map provides additional info on access management, environmental risk assessment, and right-of-way width analysis within Virgin. The maps within the story map are interactive and provide more detail than the maps provided in this document.

SR-9 Virgin Solutions Development Study/Transportation Master Plan Story Map:
https://experience.arcgis.com/experience/968d47a6b6ef4f4990466fc350e3d3b8/page/Home/



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I. INTRODUCTION

A. Overview

The Town of Virgin is a rural community located in Washington County, Utah about 10 minutes east of La Verkin. Virgin is bordered by Virgin River to the south, La Verkin to the west, and Zion National Park about 15 minutes to the east. SR-9 goes through the Town of Virgin.

The most recent 2020 census shows that Virgin has a population of 650 and has experienced a population increase of approximately 50 since the previous 2010 census. Virgin is expected to continue being a primarily residential community; however, due to SR-9 going through Virgin, there is potential for greater commercial development than what exists currently.

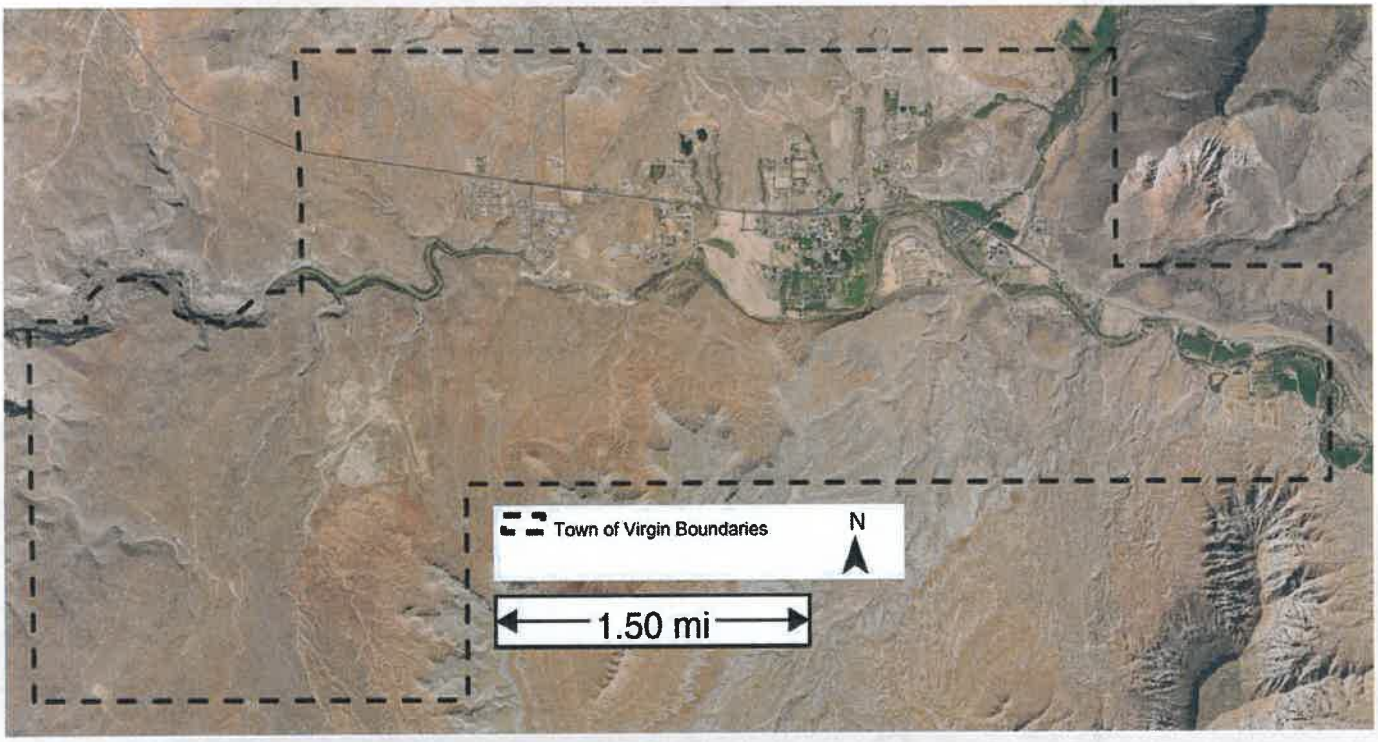
This Transportation Master Plan (TMP) guides transportation infrastructure investments for the future by addressing several goals identified by Virgin Town and the project team, such as:

- Improving safety
- Increasing connectivity
- Minimizing congestion
- Accommodating community and active transportation needs

Key to planning for Virgin's transportation needs is an understanding of the roadway network's existing and future operations. Once existing conditions are established, roadway conditions are forecasted to future years 2032 and 2050 to identify deficiencies in the roadway network that may occur due to land development and the resulting population growth.

This TMP also covers the best transportation management-related practices such as alternative modes of transportation and traffic calming.

Figure 1: Virgin Boundaries

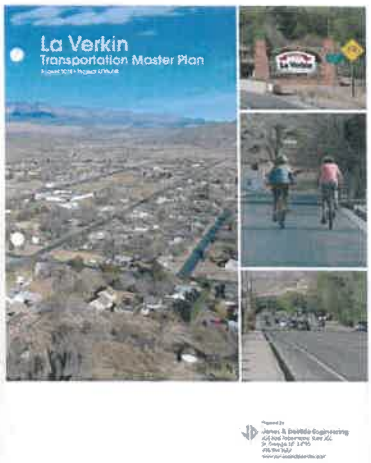


B. Previous Studies

VIRGIN TOWN 2018 GENERAL PLAN

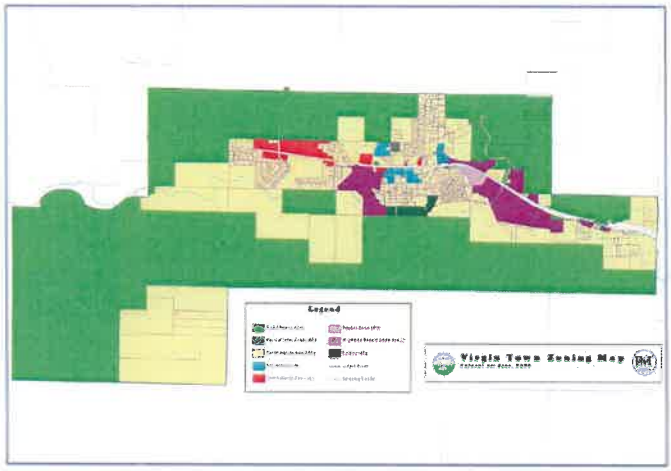
Virgin Town 2018 General Plan

The Virgin Town 2018 General Plan set forth a plan to manage city growth as population increases. The General Plan established the existing land use and environmental hazards in Virgin. It also provided growth management plans and emphasized the importance of infrastructure development and night sky preservation in Virgin.



La Verkin 2018 Transportation Master Plan

The 2018 La Verkin Transportation Master Plan provides a projected population growth of La Verkin. The influence of Zion National Park is discussed regarding travel growth. It also provides a proposed plan for a future roadway network. Roadway functional classification is discussed. The Transportation Master Plan also provides principals for La Verkin regarding access management.

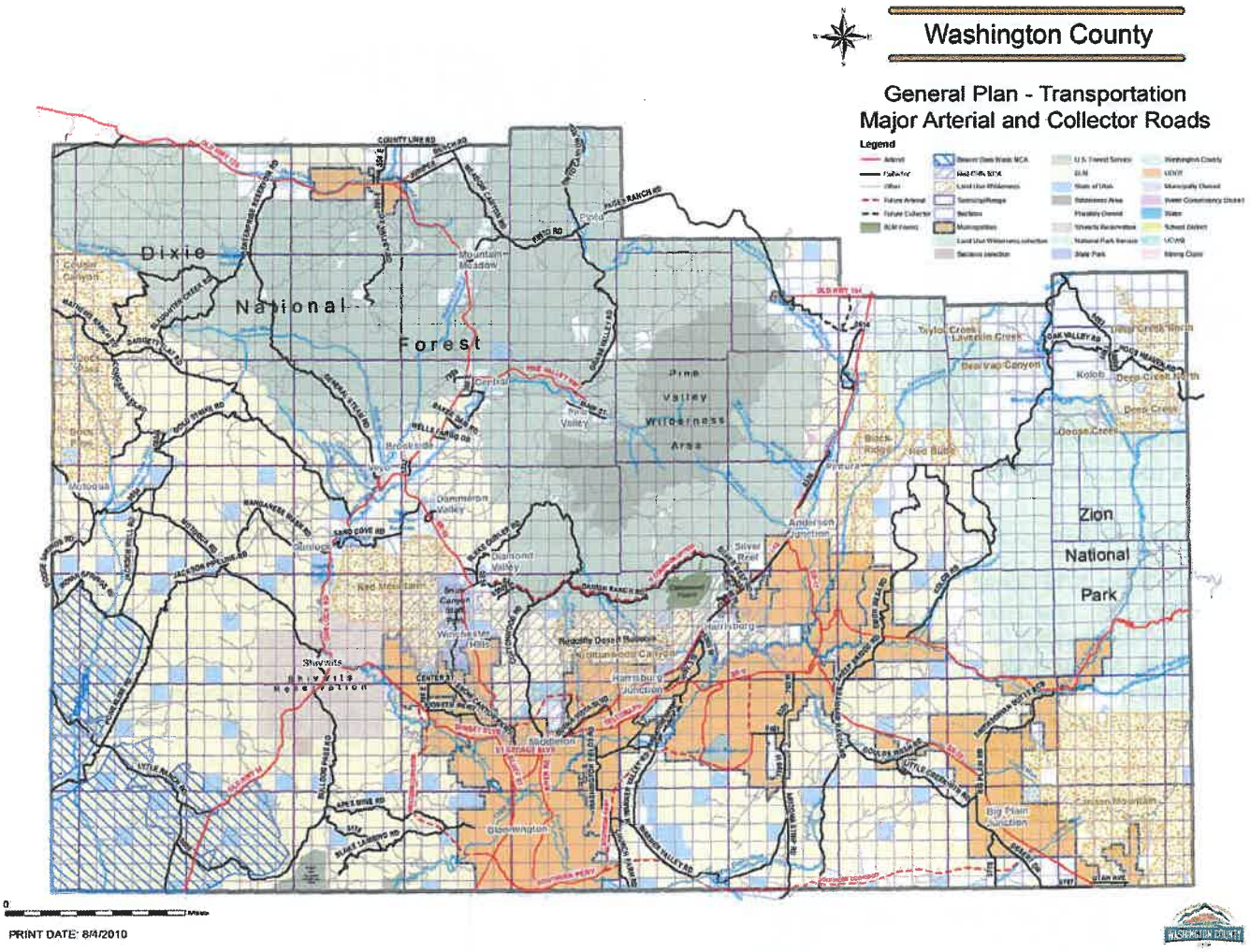


2020 Virgin Town Zoning Map

The 2020 Virgin Town Zoning Map shows the Virgin Town boundaries and which zones within the town are used for which purposes. Open space is the largest land use, followed by rural residential and then highway resort zones (HZA). Virgin also contains residential, commercial, and agricultural zones.

SR-9/SR-17 La Verkin Planning Study

The 2023 SR-9/SR-17 La Verkin Planning Study identifies potential changes that UDOT and La Verkin can implement to improve the transportation system. The goal of increasing mobility and safety for all transportation modes is discussed. Balancing travel demand with community and enhancing economic development is addressed. Transit and active transportation needs are all discussed.



Washington County General Plan Roadway Classification Map

The 2010 Washington County General Plan Roadway Classification Map shows the arterial and collector roadways in Washington County. SR-9 is the only arterial in Virgin. Kolob Road, Sheep Bridge Road, and Smith Mesa Road are the collectors within Virgin.

II. VIRGIN LAND USE CHARACTERISTICS

A. Overview

This section discusses the existing and future land use in the area. Demographic data, including population forecasts, is analyzed and explained.

B. Land Use

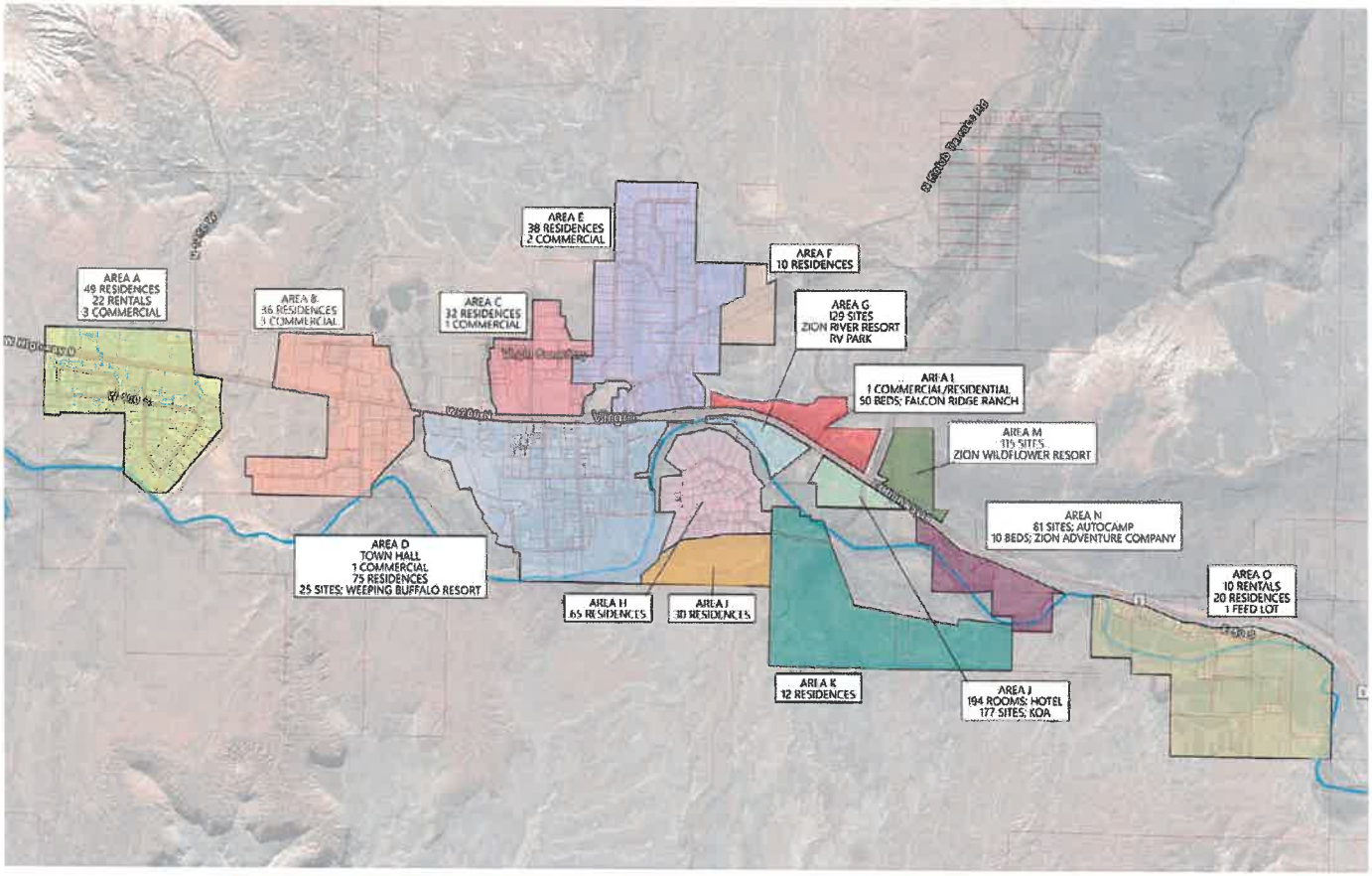
Historically a rural residential area, Virgin has maintained much of its land use as a rural residential community. There are still large amounts of open space within the Town's borders.

There are two highway resort zones in Virgin. One of these is in the middle of the town, while the other is on the east side of the town along SR-9. These highway resort zones provide services to tourists and visitors.

The Town of Virgin also has several institutional uses; a church, a cemetery, a developed neighborhood style park, and an outdoor BMX track comprise the major developed recreational uses.

Future land use is key to understanding the needs of the future transportation systems. The size of future transportation facilities is directly tied to the density and types of future land uses within the Town of Virgin. If Virgin were to stay mostly low-density, single-family residential, there would likely be little demand for future roadway widening projects; however, as commercial/industrial nodes and denser housing developments occur, greater transportation infrastructure will be needed. Figure 2 below shows the proposed future land use in Virgin (source: Virgin Wastewater Study, Sunrise Engineering, 2020).

Figure 2: Future Land Use



C. Demographics

The Town of Virgin has experienced steady population growth over the past 30 years as shown below in Table 1.

TABLE 1: HISTORIC POPULATION GROWTH		
Year	Population	% Change
1990	250	-
2000	398	59%
2010	596	50%
2020	670	12%

Future population projections were based on discussions with Virgin town staff and from analyzing past growth trends. Near-term growth was constrained based on remaining available water connections. It is expected that many of these remaining water connections will be utilized by lodging and commercial operations, thus limited population growth is forecast. For 2050, it was assumed that more water connections would become available, and thus growth was based on available property and historic growth trends. The projected population growth is shown below in Table 2.

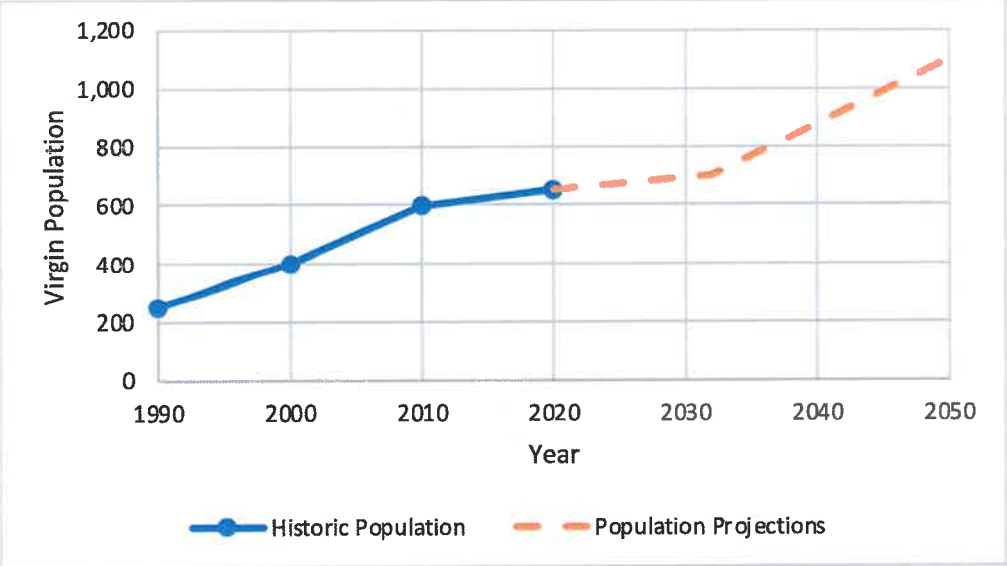
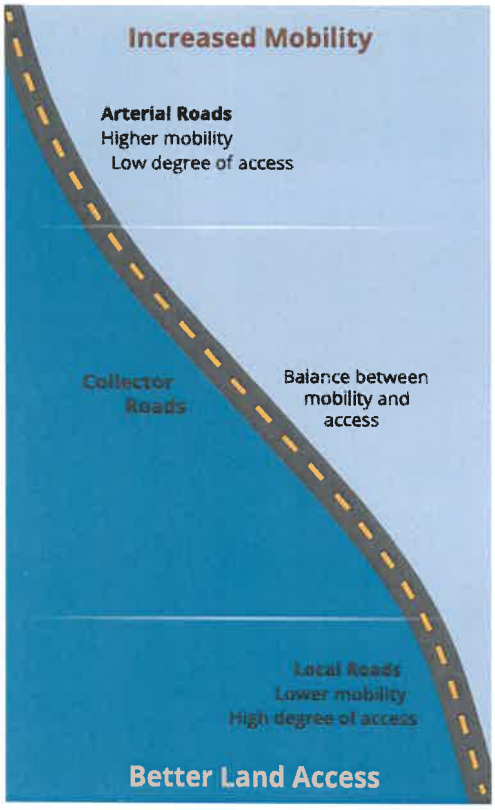


TABLE 2: PROJECTED POPULATION GROWTH		
Year	Population	% Change
2020	670	-
2032	700	4%
2050	1100	57%

III. ROADWAY NETWORK

A. Overview

Key to planning for Virgin's transportation needs is an understanding of the roadway network's current conditions. Once existing conditions are established, roadway conditions are forecasted to future years 2030 and 2050 to identify deficiencies in the roadway network that may occur due to land development and the resulting population growth. A future project plan with a phased list of improvements is provided to address roadway network deficiencies.



B. Functional Classification

The functional classification of a roadway indicates the road's role within the transportation system, which in turn helps determine when increased travel demand or change in the road's use could lead to negative impacts on its intended function in terms of speed, capacity, and relationship to existing and future land use (FHWA, 2013).

The four major classifications of Virgin roadways used in this TMP are arterials, collectors, local streets, and dirt roads:

- **Arterial (State Highway)** — An arterial roadway has high mobility and little access. Arterials have typical ROW widths between 80 and 100 feet and typically have three or more travel lanes. The only arterial roadway in Virgin is SR-9.
- **Collector** — A collector roadway provides both mobility and access. Collectors connect local and arterial roadways. Collectors have typical ROW widths of 66 feet and typically have a two or three-lane cross section.
- **Local** — A local roadway provides full access to adjacent land uses but allows for little mobility. Local roads have typical ROW widths between 60 and 50 feet and have two travel lanes. The local roads classification includes minor local and private roadways.
- **Dirt Roads** — Dirt roads connect to many of the more rural locations in and adjacent to Virgin. These roads carry low volumes and vary significantly in ROW widths and surface condition. Dirt roads were not included in cross section designs or further analysis but were just mapped for identifying key dirt road connections.

The current functional classification map for Virgin is shown below in Figure 3. The cross sections for each functional classification are shown below in Figure 4 through Figure 6 and are summarized in Table 3. Currently most roads in Virgin do not meet these standards. Many roadways in Virgin are missing sidewalks, as shown by the sidewalk map in Figure 15. It is recommended that the sidewalks be implemented on these roads, and that the proposed cross sections be implemented for new roadways as development continues.

TABLE 3: VIRGIN TYPICAL CROSS SECTIONS

Functional Classification	# of Lanes	ROW Width (ft)
Arterial (SR-9)	3	86
Collector	2	68
Local	2	60

Figure 3: Existing (2023) Roadway Functional Classification

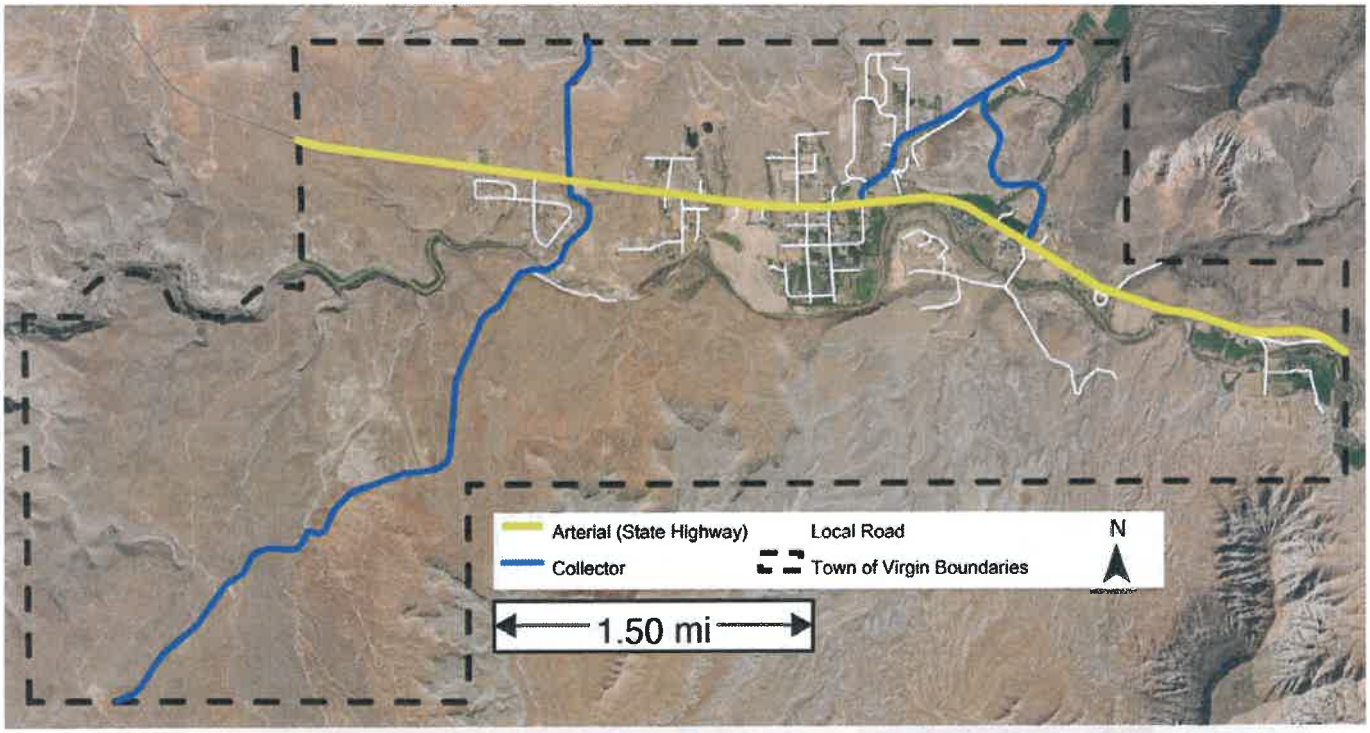


Figure 4: Arterial Roadway Cross Section

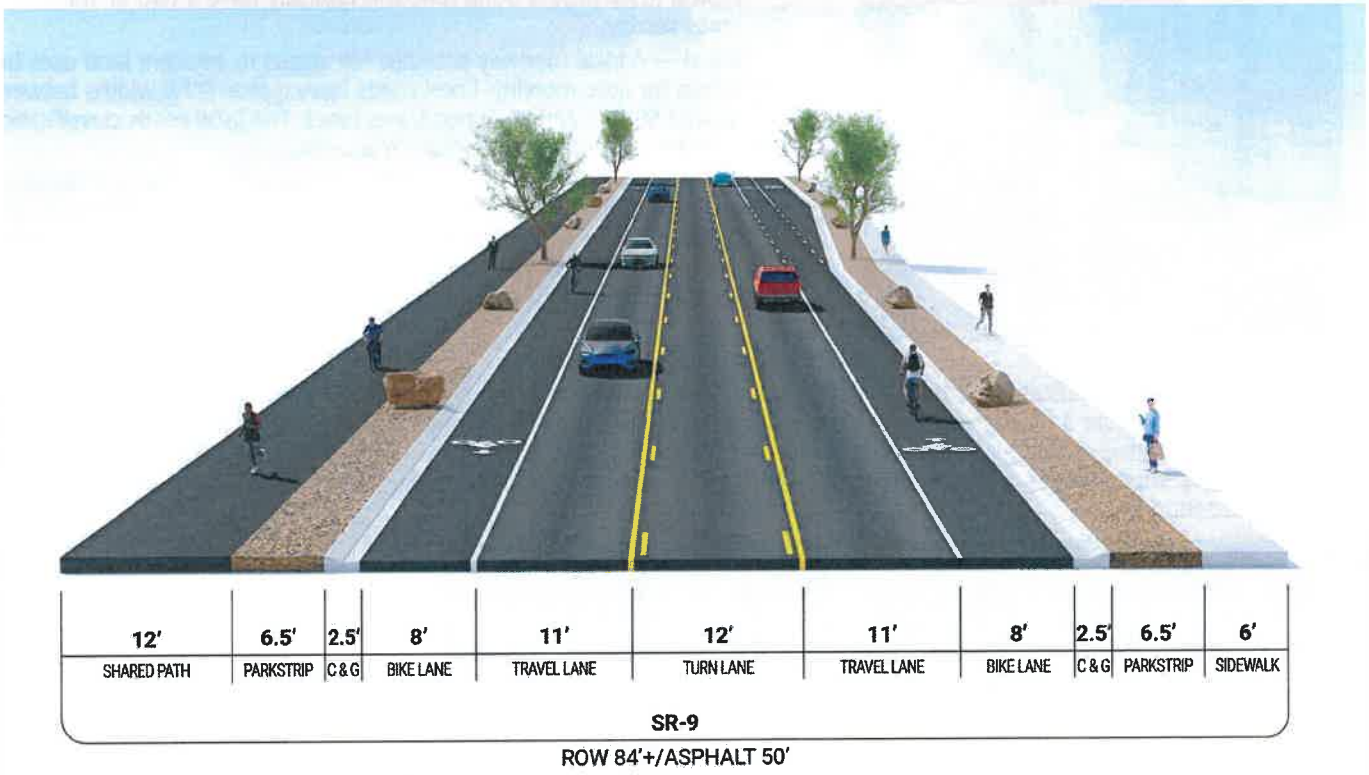


Figure 5: Collector Roadway Cross Section

6'	8'	2.5'	6.5'	11'	11'	6.5'	2.5'	8'	6'
Sidewalk	PARKSTRIP	C & G	BIKE LANE	TRAVEL LANE	TRAVEL LANE	BIKE LANE	C & G	PARKSTRIP	SIDEWALK

COLLECTOR

ROW 68'/ASPHALT 35'

Figure 6: Local Roadway Cross Section

6'	5'	2.5'	16'	16'	2.5'	5'	6'
SIDEWALK	PARKSTRIP	C & G	TRAVEL LANE	TRAVEL LANE	C & G	PARKSTRIP	SIDEWALK

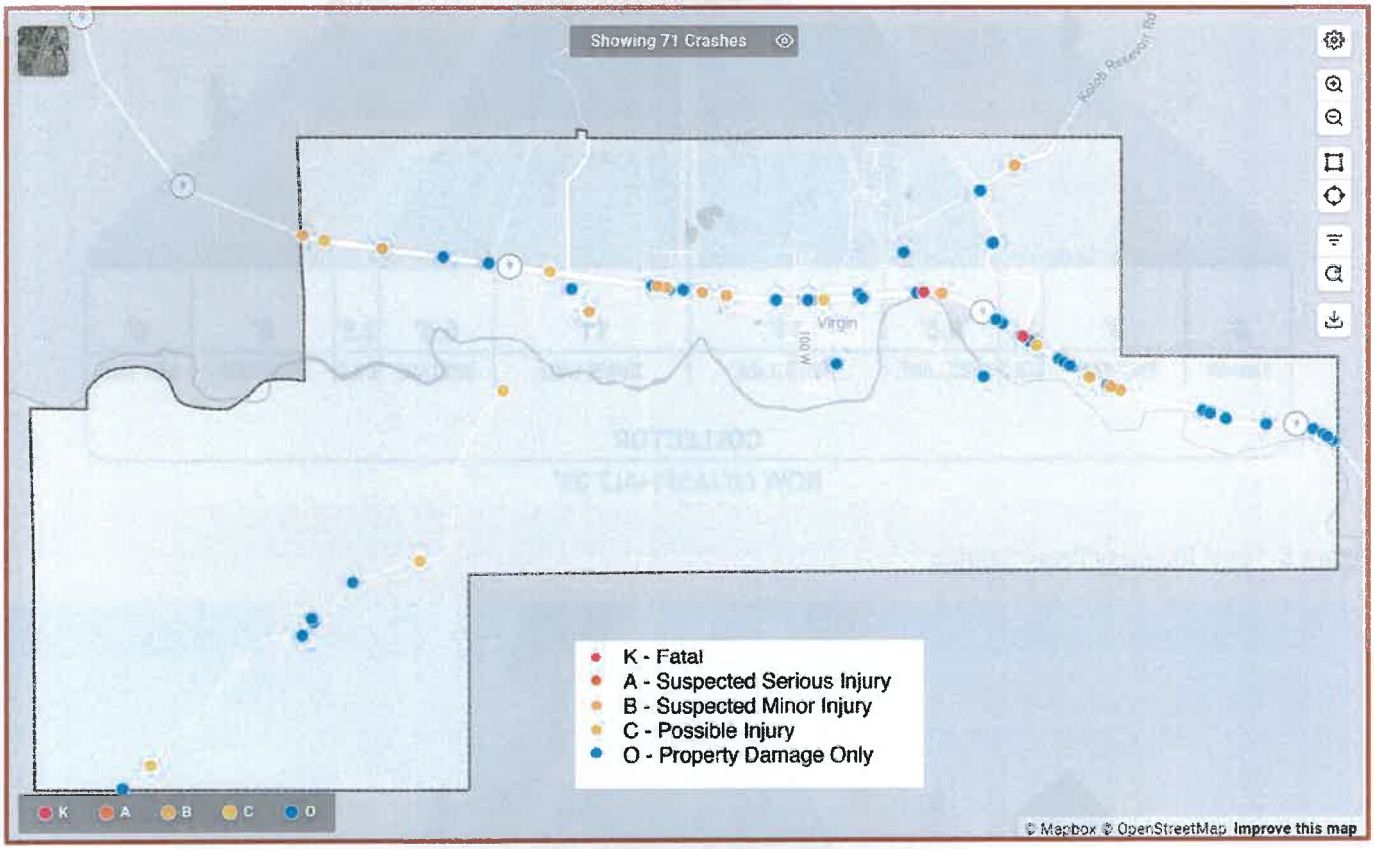
LOCAL

ROW 60'/ASPHALT 32'

C. Safety Analysis

Within the Town of Virgin, 47 crashes have been reported from 2017 to 2022. 20 of these crashes are animal related (43%). There have been two fatal crashes during this time. One fatal crash occurred east of Zion River Resort when a driver made a U-turn and did not see a motorcyclist coming at high speed (2020). The other fatal crash occurred at Kolob Terrace Road where a westbound tour bus hit a southbound vehicle crossing SR-9 (2022). There have been no pedestrian or bicycle crashes during this time. Figure 7 shows a crash map of Virgin Utah, organizing them by intensity.

Figure 7: Virgin Utah Crash Map



A 2022 UDOT Project Safety Analysis (PSA) analyzed that 44% of non-animal related crashes are front-to-rear crashes, and there is a concentration of crashes near cross streets. UDOT suggests that this pattern is an indication that drivers are slowing down to turn onto a cross street and are hit by vehicles that do not expect that movement and cannot stop in time. UDOT suggests extending the two-way-left-turn lane as one possible countermeasure. The full PSA can be found in the Appendix.

D. Level of Service Analysis

Roadway traffic flow is measured based on the Level of Service (LOS). LOS is a planning term that describes the roadways operating performance. LOS is measured quantitatively and reported on a scale from A to F, with A representing free-flow conditions and F representing traffic congestion. Calculating a LOS for a roadway segment is based on volume-to-capacity ratios. The volume is the Average Daily Traffic (ADT) for the given roadway segment and the capacity is based on factors such as lane count, functional classification, and signal spacing. Level of service descriptions for each LOS letter designation and the accompanying range of volume-to-capacity ratios is shown below in Tables 4 and 5.

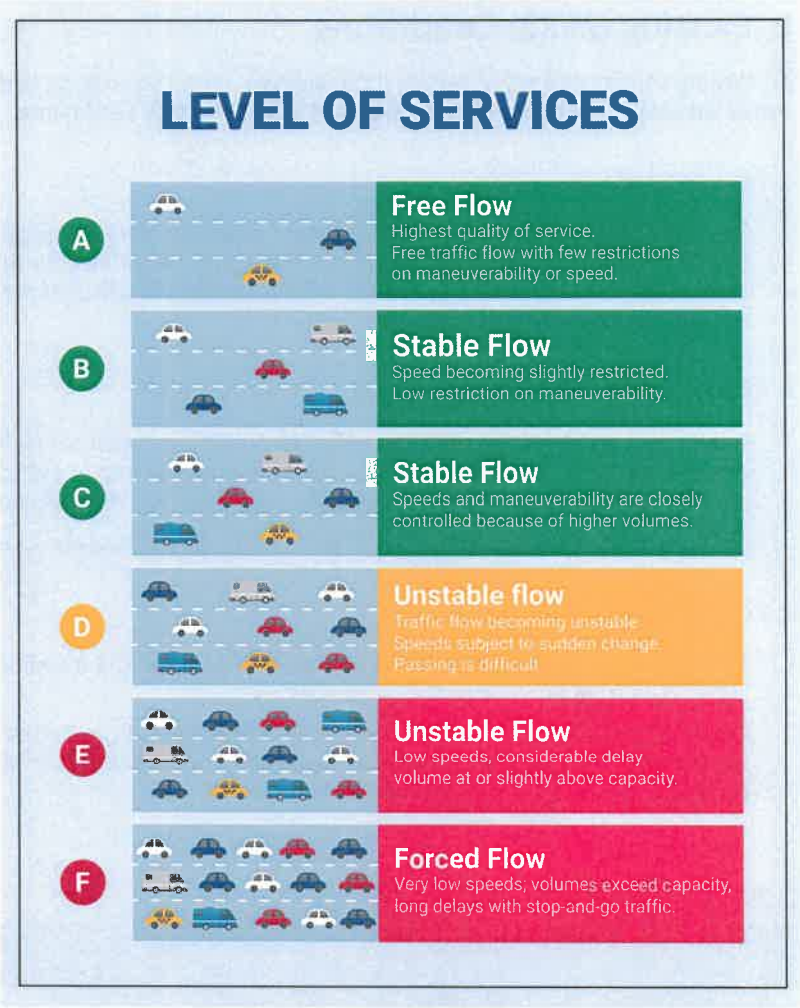


TABLE 4: RURAL TOWN COLLECTOR LOS CAPACITY CRITERIA (VEH PER DAY)			
Lanes	**LOS A - B**	**LOS C**	**LOS D - F**
2	≤ 6,499	6,500 – 7,999	≥ 8,000

TABLE 5: SR-9 LOS CAPACITY CRITERIA (VEH PER DAY)				
Lanes	**LOS C or better**	**LOS D**	**LOS E**	**LOS F**
2	0 – 8,299	8,300 – 10,099	10,100 – 11,799	> 11,800
3	0 – 12,399	12,400 – 15,099	15,100 – 17,699	> 17,700
5	0 – 28,499	28,500 – 32,799	32,800 – 40,299	> 40,300

For the purposes of this study, a minimum overall roadway performance of LOS D is considered acceptable. If LOS E or F for a roadway is calculated, explanations and/or mitigation measures are presented.

E. Existing (2022) Conditions

An existing conditions level of service (LOS) analysis, based on existing land use, has been performed using various data sources explained below to produce existing Average Daily Traffic (ADT) estimates.

a. Existing Land Use

Base year (2022) household and employment estimates were developed by Dixie Metropolitan Planning Organization (DMPO) and Utah Department of Transportation (UDOT) and then refined for this transportation master plan. Estimates were adjusted to match an estimated 2022 population of 650. Household densities are fairly low in most of Virgin. Most employment is on the east side of Virgin near the resorts.

b. Existing (2022) Volumes

Continuous count station data was collected on SR-9 across from Majestic View Lodge in Springdale, Utah to determine the demand along SR-9. WCG previously prepared a memorandum evaluating the demand and capacity of SR-9. Based on this analysis, SR-9 is operating at an acceptable level of service. The full memorandum and analysis can be found in the Appendix.

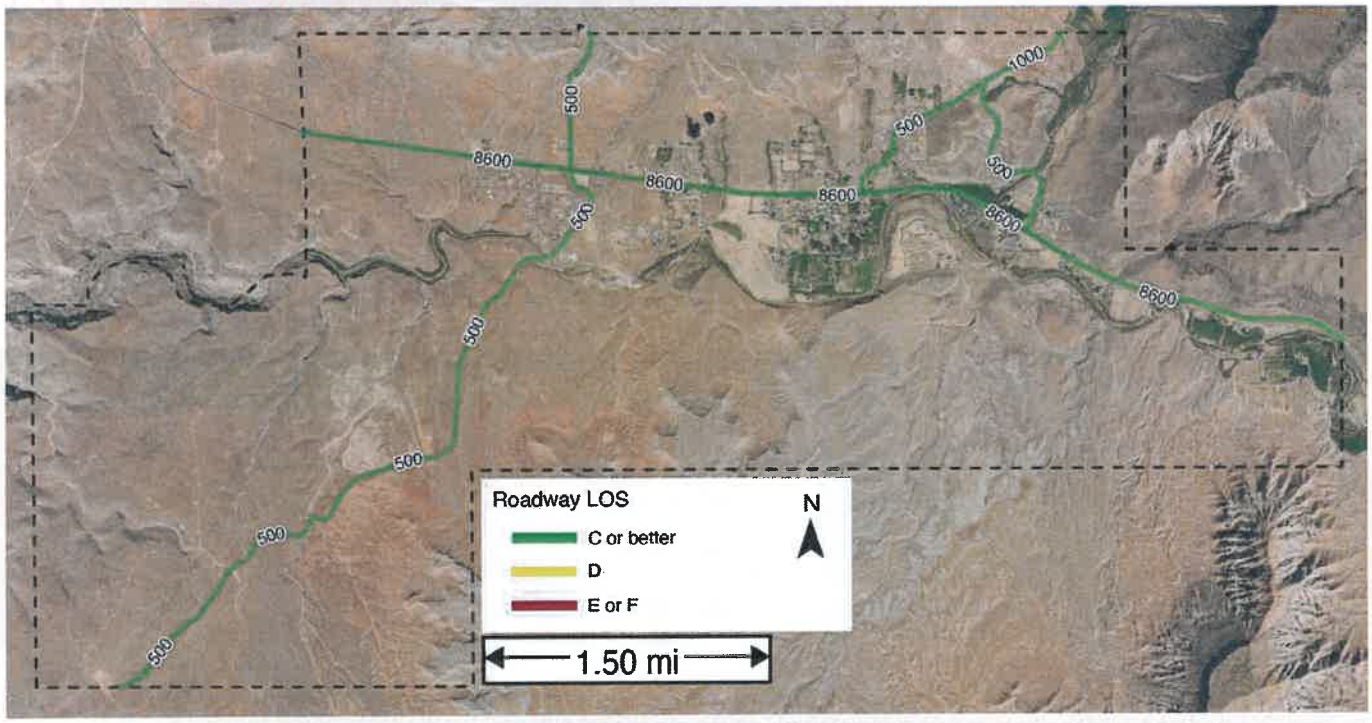
For collector and local roadways, the Dixie travel demand model and local growth patterns were used to determine the volumes.

c. Existing (2022) LOS

Existing (2022) Average Daily Traffic (ADT) is derived from the travel demand model. ADT values have been adjusted to best reflect data from the continuous count stations.

The existing (2022) LOS has been calculated using criteria from Tables 4 and 5, and results are shown below in Figure 8. The numbers on the roads indicate the average daily traffic volumes on those roadways. As shown in Figure 8, SR-9 in Virgin is currently operating at an acceptable LOS C or better.

Figure 8: Existing (2022) ADT and LOS



F. Travel Demand Model

Travel demand modeling was performed using the latest version (v3.0) of the Dixie Travel Demand Model. Edits were made to the roadway network, vehicle loading locations, and socio-economic data to best represent current and projected future conditions within Virgin. Travel demand modeling was performed in Bentley Cube version 6.5.0.

Details regarding modeling specifics such as roadway network, demographics, and scenario testing are described in later sections of the report.

G. Future (2032) Conditions

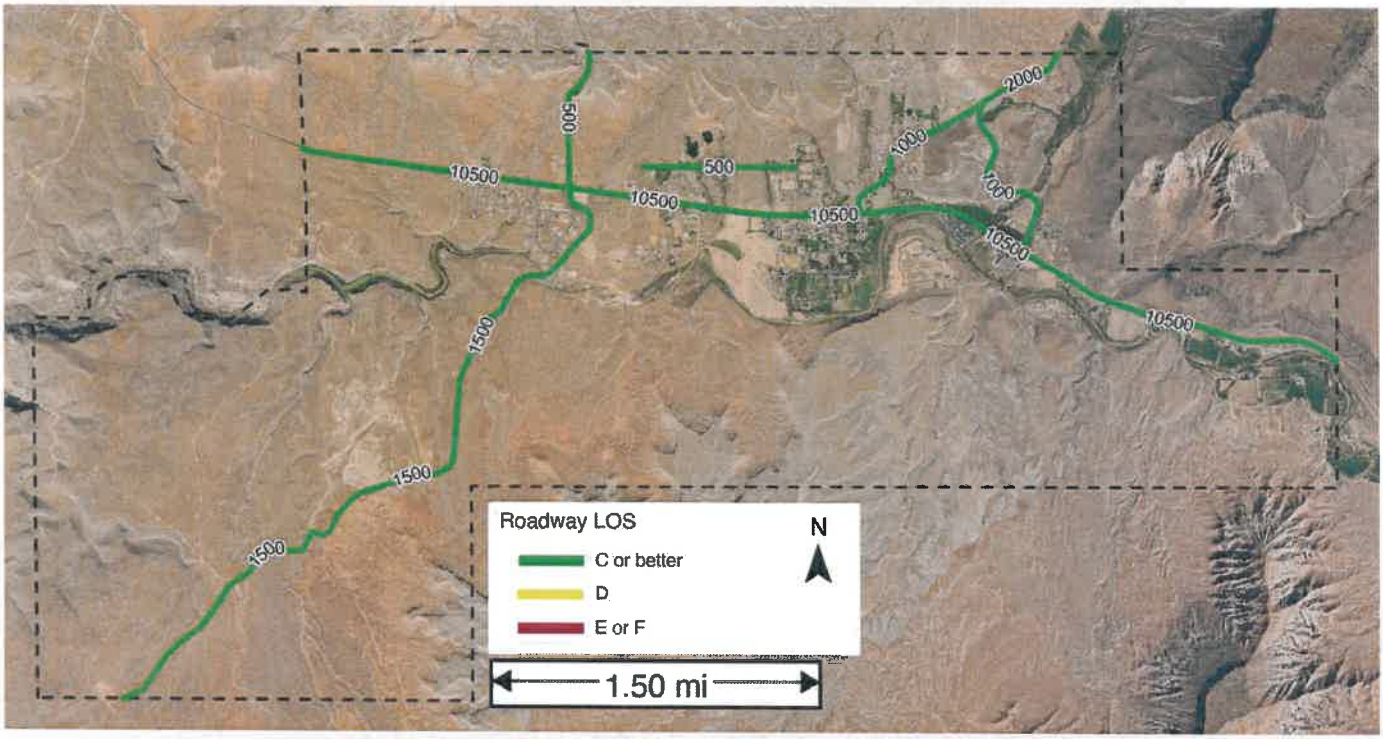
a. Future (2032) Land Use

Virgin population is projected to be 700 by 2032. Household projections were adjusted to match this population. Household distribution across TAZs were projected based on developable land and projected residential densities provided in the future land use plan. Commercial areas were projected to be partially developed by 2032.

b. Future (2032) Volumes LOS

Traffic volumes from the 2032 travel demand model have been compared to the LOS thresholds in Tables 4 and 5. LOS results from the analysis are shown below in Figure 9. As shown, all roadway segments are expected to operate at an acceptable level of service (LOS C or better). The Town of Virgin may restrict traffic from going through Pocketville road. If Pocketville road is restricted, traffic will reroute to Kolob Terrace road. It is anticipated operations on Kolob Terrace Road will still be an acceptable LOS with the additional traffic.

Figure 9: Future (2032) ADT and LOS



H. Future (2050) Conditions

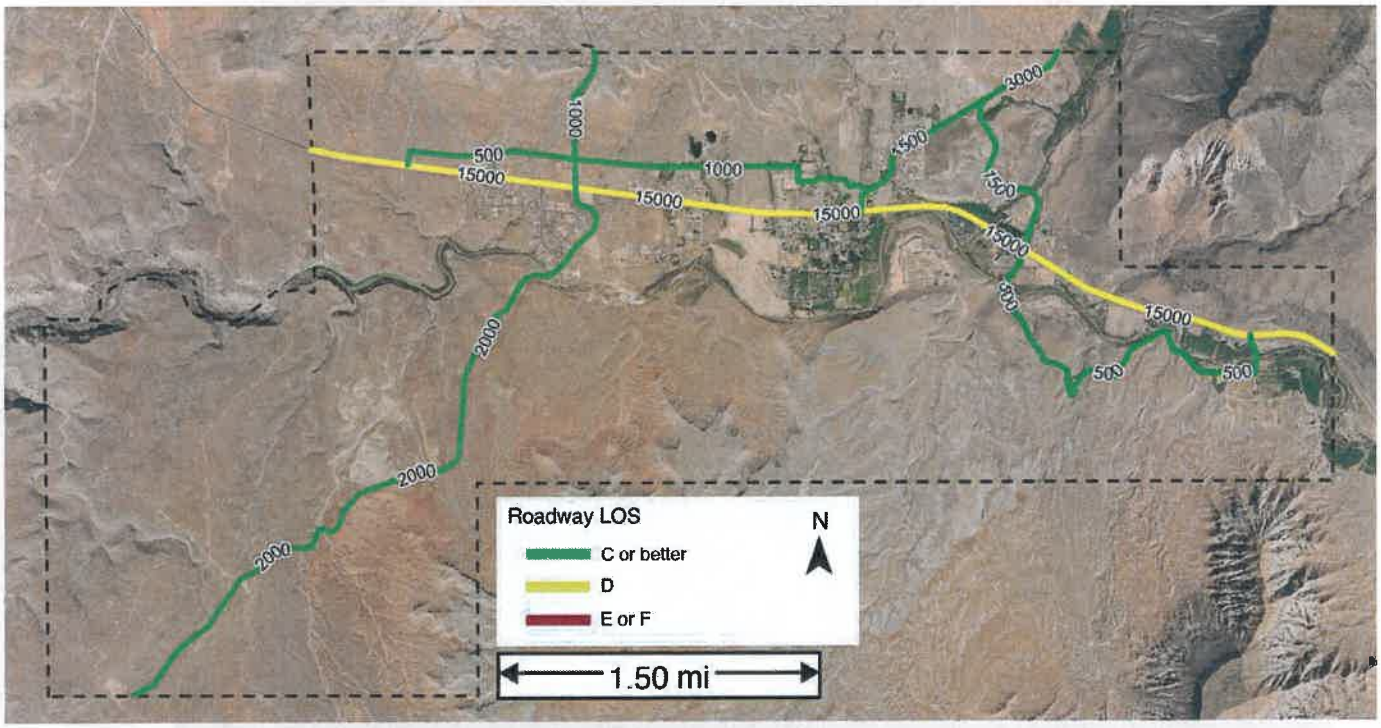
a. Future (2050) land use

The Virgin population is projected to be 1,100 by 2050. Household projections were adjusted to match this population. Household distribution across TAZs were projected based on developable land and projected residential densities provided in the future land use plan. Commercial area densities were determined based on the likely number of jobs that could be served by Virgin and surrounding city populations and input from Town of Virgin staff.

b. Future (2050) Volumes and LOS

Traffic volumes from the 2050 travel demand model have been compared to the LOS thresholds in Tables 4 and 5. LOS results from the analysis are shown below in Figure 10. As shown in the figure, it is anticipated that all roadways will operate at LOS C or better except for SR-9 which will operate at LOS D.

Figure 10: Future (2050) ADT and LOS



I. Recommendations for Future Projects

Dixie Metropolitan Planning Organization Roadway Projects

The Dixie Metropolitan Planning Organization Regional Transportation Plan lists the following roadway project in their long-range plan near Virgin:

- Sheep Bridge Road – A roadway improvement project paving the roadway, expected to occur between 2022 to 2030.

UDOT Projects

The UDOT projects list includes the following roadway project in their plan near Virgin.

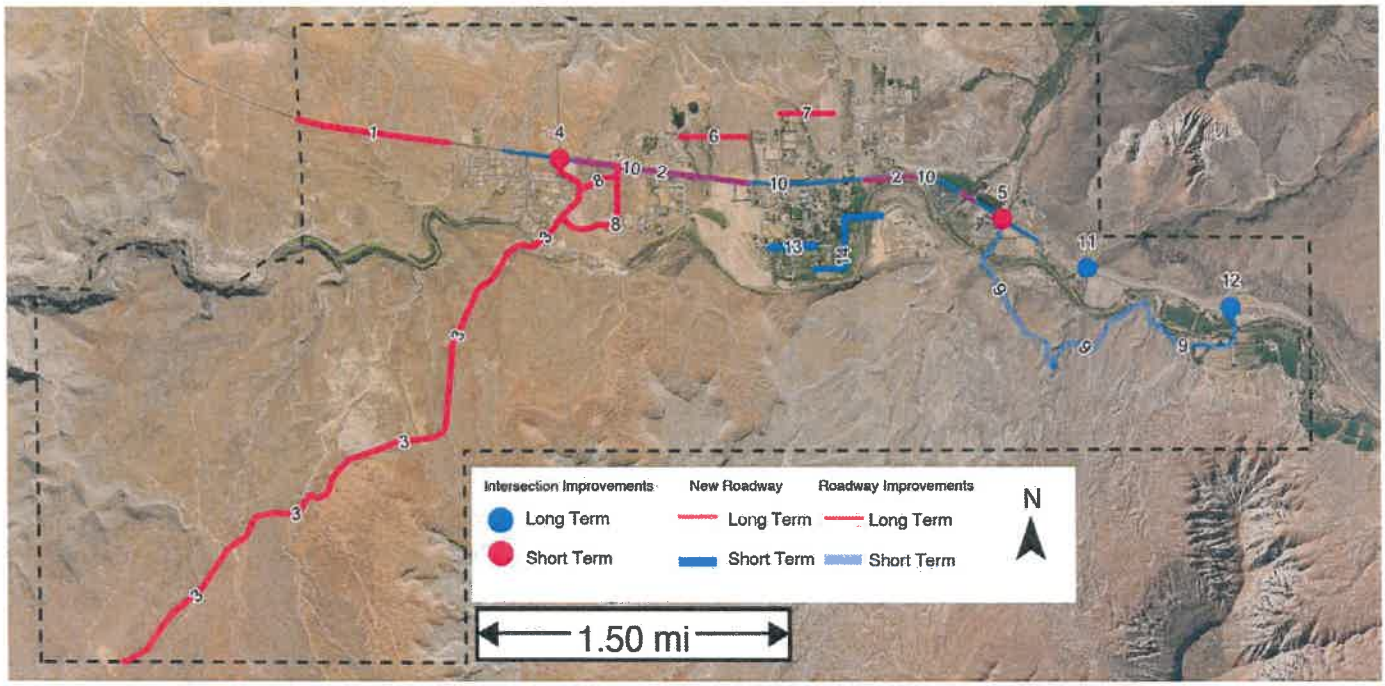
- SR-9 – A roadway improvement project to extend the passing lane on the west side of Virgin. A project schedule has not yet been determined.

Virgin TMP Roadway Projects

Based on projected growth within and around Virgin, the following roadway projects are recommended between 2022 and 2050 and were developed as part of the Virgin transportation master planning process. The recommended future projects are focused on increasing connectivity within Virgin rather than increasing roadway capacity. This will allow for improved mobility for all users, increased resiliency, and reduced emergency access time. The project number listed in the table is for identification only and is no indication of project prioritization. Short-term refers to projects that should be implemented within the next ten years. Long-term refers to projects that can be implemented after a ten year period. It is recommended the Town of Virgin begin planning for the proposed roadway improvements shown below in Table 6. Figure 11 below depicts the locations of the proposed roadway improvements.

TABLE 6: FUTURE ROADWAY PROJECTS							
Project Number	Location	Responsibility	Phase	Cause for Improvement	Improvement Scope	# of Lanes	
						2022	Proposed
1	SR-9	UDOT	Short Term	Capacity	Widening	2	3
2	SR-9 through Virgin	UDOT	Short Term	Capacity	Widening	2	3
3	Sheep Bridge Road	County	Short Term	Safety	Paving	2	2
4	Sheep Bridge Rd / SR-9	UDOT	Short Term	Safety	Roundabout	-	-
5	Kolob Terrace Rd / SR-9	Short Term	Safety	Roundabout	-	-	2
6	225 North	Developer / Virgin	Short Term	Connectivity	New Roadway / Roadway Extension	-	2
7	350 North	Virgin	Short Term	Connectivity	New Roadway / Roadway Extension	-	2
8	150 South Extension & SR-9 Connection	Developer / Virgin	Short Term	Connectivity	New Roadway / Roadway Extension	-	2
9	Willard Dr	Virgin	Long Term	Safety	Paving	2	2
10	SR-9	UDOT	Long Term	Safety / Beautification	Beautification / Traffic Calming / Bike Lanes	2	3
11	Dalton Wash Rd / SR-9	UDOT	Long Term	Safety	Intersection Improvements	-	-
12	2020 East / SR-9	Virgin / UDOT	Long Term	Safety	Relocated Intersection	-	-
13	130 South	Developer / Virgin	Long Term	Connectivity	New Roadway / Roadway Extension	-	2
14	170 East	Developer / Virgin	Long Term	Connectivity	New Roadway / Roadway Extension	-	2
15	100 South	Developer / Virgin	Long Term	Connectivity	New Roadway / Roadway Extension	-	2

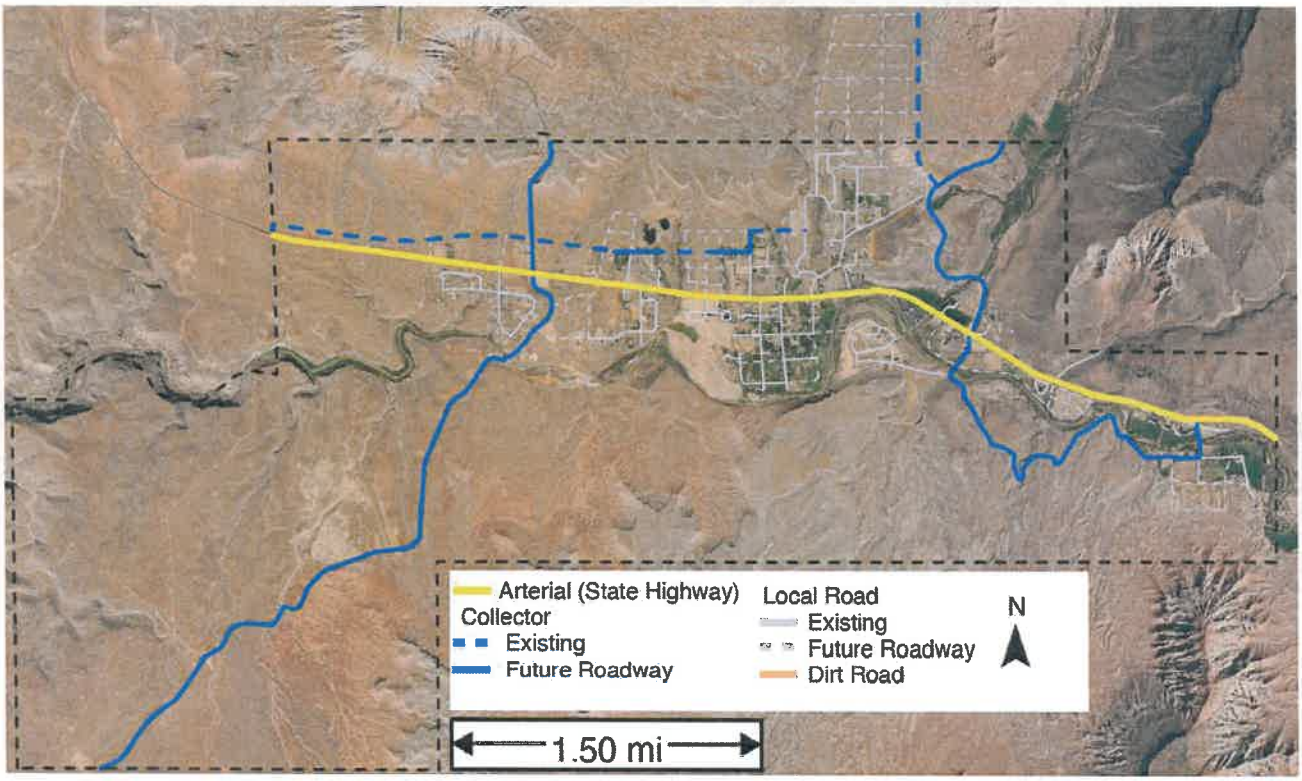
Figure 11: Recommended Future Roadway Projects in Virgin



J. Future Roadway Network

It is likely that the Town of Virgin will continue to grow beyond the planning horizon of 2050. Figure 12 shows a map of future roadways that can further improve connectivity within Virgin as it develops. Not all the roadways shown are included in the project list since it is anticipated they will not be needed until after the planning horizon.

Figure 12: Future Roadway Map of Virgin



IV. ALTERNATIVE MODES OF TRANSPORTATION

A. Public Transit

Public transit typically includes buses, light rail, and shuttle routes. The analysis on public transportation was completed by Metro Analytics.

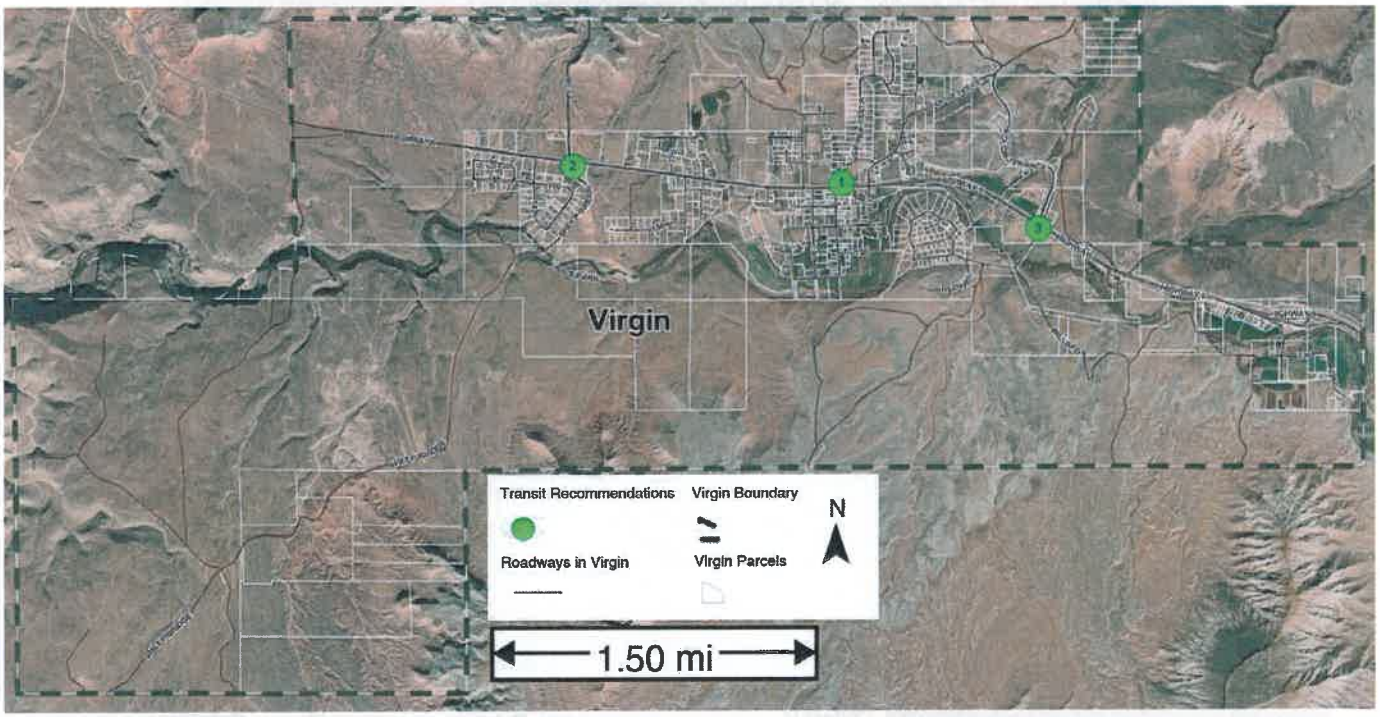
Future Transit Service

Virgin should be actively involved in working with UTA and UDOT to support transit as a viable and efficient transportation mode. Planning and lobbying efforts will help procure funds to support the development and maintenance of a sustainable transit system.

St. George's Public Transit System is anticipating the implementation of a regional transit service from St. George to Springdale in 2023 with a proposed stop in Virgin. This will provide transit opportunities to the citizens of Virgin. The proposed transit route will follow SR-9 through Virgin. It is recommended that Virgin identify a dedicated location for a mobility hub. A mobility hub located in Virgin would provide opportunities for not only transit but also active transportation, rideshare, and recreational activities related to Zion's National Park. Below are three potential locations in Virgin for a dedicated mobility hub and transit stop. These locations are also shown in Figure 13.

- 10 East / SR-9
- Sheep Bridge Road / SR-9
- Kolob Terrace Road / SR-9

Figure 13: Potential Locations for a Mobility Hub and Transit Stop in Virgin

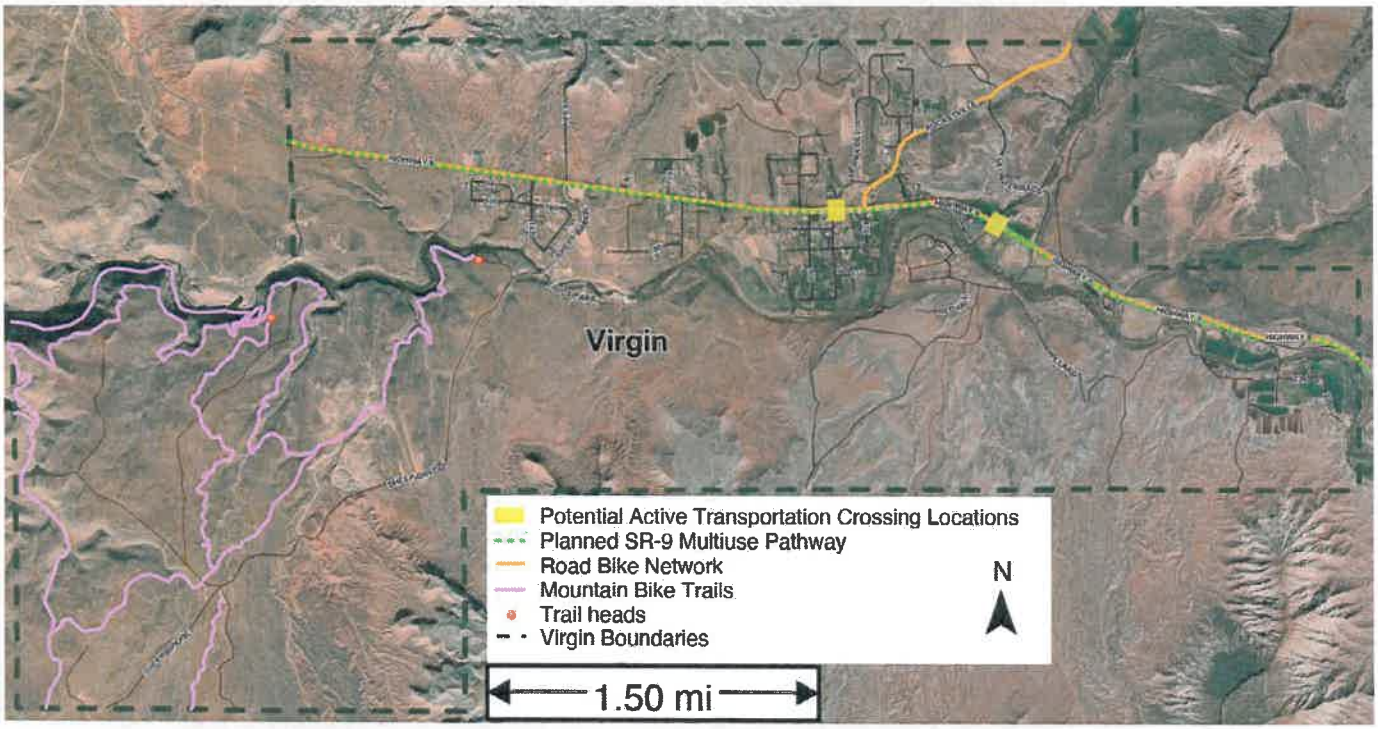


B. Active Transportation

The analysis on active transportation was completed by Metro Analytics as part of the SR-9 Virgin Solutions Development Study. Active transportation includes human-powered mobility such as biking and walking. Providing safe and convenient alternative transportation facilities is essential in providing active and equitable multimodal transportation. The Collector cross section may allow for the addition of bicycle lanes. Bicycle facilities are an essential part of a connected transportation network and should be implemented when feasible.

Existing Active Transportation facilities in Virgin are comprised of mountain biking trails in the southwest part of the town, a road bike network along SR-9 and Pocketville/Kolob Terrace Road, and its existing sidewalks. In addition to the facilities mentioned above, a multiuse-trail is currently being planned to run along the south side of SR-9, ultimately crossing under North Creek to the north side of SR-9 and connecting to Kolob Terrace Road. The planned trail is shown in green on the map to the right. Currently there is no estimated construction date for the trail. A map of the existing active transportation infrastructure is shown in Figure 14.

Figure 14: Existing Active Transportation Infrastructure in Virgin



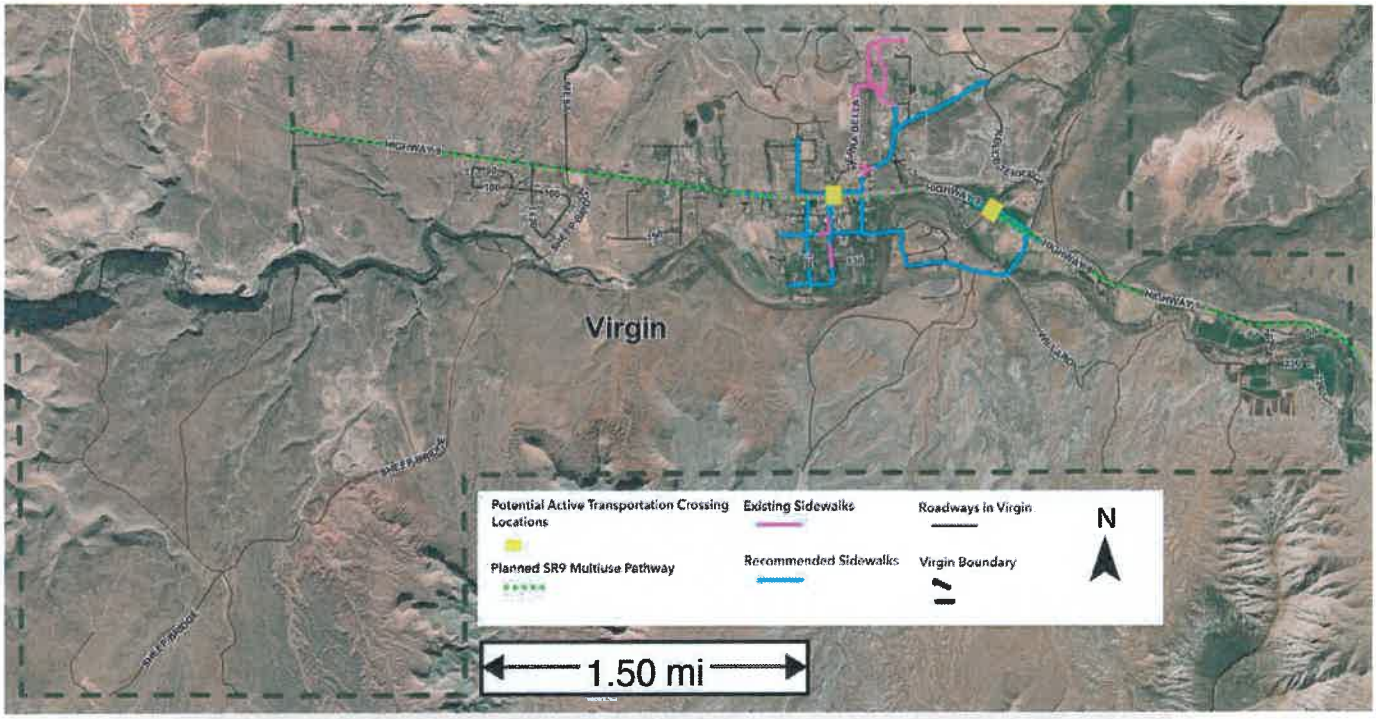
Incomplete roadway segments (i.e. missing shoulders) pose a serious hazard to bicyclists, therefore roadways should be complete along the entire length of the bicycle lane.

The following active transportation improvement projects are recommended in Virgin:

- SR-9 multi-use trail - Encourage the continued planning and development of the multi-use trail along SR-9 to serve as the backbone for other active transportation elements.
- Provide safe active transportation crossing locations:
    - 10 East (Mill Street) / SR-9 - This intersection could be at-grade with appropriate safety equipment and markings or grade-separated if warranted in the future.
    - Encourage an active transportation crossing at North Creek - During the development of the multi-use trail create a connection under the bridge at North Creek and connect to Kolob Terrace Road.

It is recommended that Virgin continue to work to fill in gaps in their existing sidewalk network. Constructing sidewalks in areas where network gaps currently exist is essential in providing a complete system of sidewalks that aid in pedestrian mobility and safety.

Figure 15: Sidewalk Map of Virgin



V. TRAFFIC CALMING

The Institute of Transportation Engineers (ITE) defines traffic calming as "the combination of mainly physical measures that reduce the negative effects of motor vehicle use, alter driver behavior and improve conditions for non-motorized street users."

Traffic calming measures are designed to reduce vehicle speeds in residential and other areas where pedestrians and cyclists interact. Traffic calming is an important aspect of many cities' public works initiatives. The purpose of traffic calming measures is to improve safety, reduce traffic-related noise and air pollution, and enhance the livability and walkability of communities.

While traffic calming measures can bring many positive benefits to communities, they can also have some negative impacts. One of the main negative impacts of traffic calming measures is that they can cause inconvenience for emergency vehicles. For example, increased delay and added time to emergency vehicle operations can increase response time. Faster response times are crucial for saving lives and minimizing property damage during emergencies.

A. Acceptable Measures

Implementing appropriate traffic calming measures is crucial as it can significantly impact the safety and livability of a community. Incorrect traffic calming measures can lead to unintended consequences and may even exacerbate the situation. Provided below are potential traffic calming measures that could be implemented in Virgin. This list is not exhaustive and emphasizes measures that are better suited to integrate harmoniously with the local community. A more comprehensive list of speed reduction mechanisms can be found on the National Association of City Transportation Officials (NACTO) website. Traffic calming measures shall only be implemented when recommended by an engineering study.

- **Raised Crosswalks**

Raised crosswalks are traffic calming devices that span across the entire width of the roadway and are typically located at midblock crossing locations. They consist of ramped speed tables and are demarcated with either paint or special paving materials. The purpose of raised crosswalks is to allow pedestrians to cross at the same level as the sidewalk, while also slowing down vehicle traffic.

- **Bulb Outs**

Bulb-outs, also known as curb extensions, are traffic calming measures designed to improve safety and slow down traffic in urban areas. They involve extending the sidewalk or curb into the roadway, narrowing the width of the road, and creating a more prominent and defined space for pedestrians.

- **Mini Roundabout / Neighborhood Traffic Circle**

A mini roundabout is a type of traffic calming measure that is used to manage intersections and control traffic flow. It is a smaller version of a traditional roundabout and is typically implemented in areas with lower traffic volumes or where space constraints prevent the construction of larger roundabouts. Mini roundabouts typically feature yield or give-way signs at the entry points, requiring drivers to yield to vehicles already within the roundabout. This simplified intersection control improves traffic flow and reduces the likelihood of severe collisions.

- **Driver Feedback Sign**

A driver feedback sign, also known as a radar speed sign or dynamic speed display, is a traffic calming device used to inform drivers about their current speed and encourage them to comply with speed limits. These signs typically display the speed of an approaching vehicle and provide real-time feedback to drivers, promoting self-regulation and reducing speeding behaviors.

- **In-Street Pedestrian Sign**

An in-street pedestrian sign is a traffic calming device designed to improve pedestrian safety and raise driver awareness at crosswalks. These signs are typically placed within or directly adjacent to the roadway, providing a highly visible and eye-catching indication for drivers to yield to pedestrians.

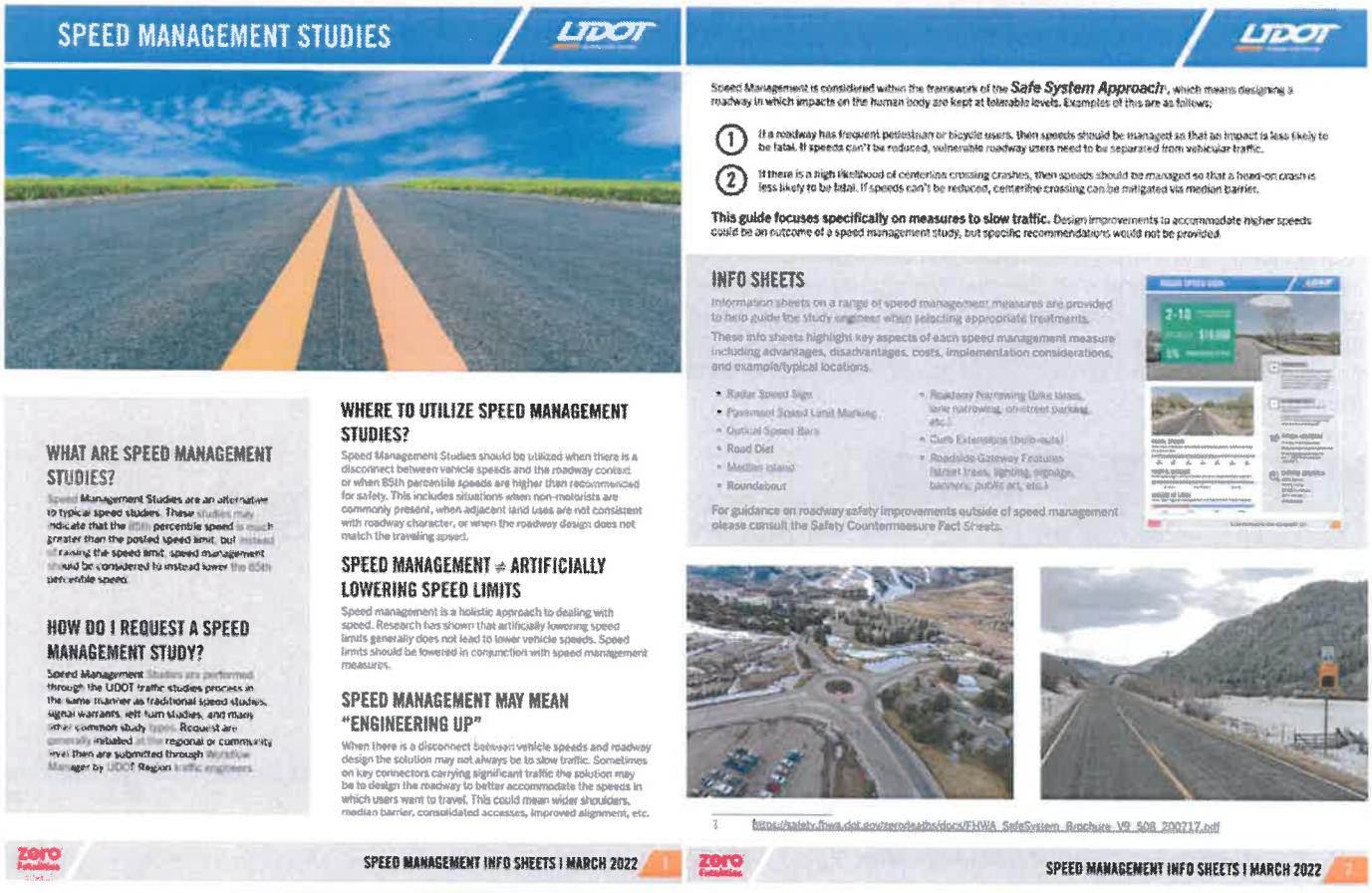
- Rectangular Rapid-Flashing Beacon (RRFB)

A Rectangular Rapid Flashing Beacon (RRFB) is a type of traffic control device used to enhance pedestrian safety at crosswalks. It consists of a rectangular sign with rapidly flashing LED lights that are activated when a pedestrian intends to cross the road. RRFBs are designed to increase driver awareness and encourage them to yield to pedestrians.

B. SR-9 Recommendations

SR-9 is the sole arterial road passing through Virgin. Given the characteristics of SR-9, including higher speeds and traffic volumes compared to other local roads, it is crucial to employ measures that are specifically suitable for accommodating these factors along SR-9 in Virgin. All other roadways with Virgin have lower speeds and volumes. Therefore, the traffic calming measures implemented on the local roadways can be different from the traffic calming implemented on SR-9 as they are accommodating different traffic types. For more information regarding traffic calming measures, view the UDOT Speed Management Information Sheets which explain traffic calming treatments, advantages and disadvantages, typical costs, example locations, and other potentially useful information.

UDOT Speed Management Sheets:
https://maps.udot.utah.gov/wadocuments/Data/Region4/SR_258_and_SR_118_Corridor_Study/Speed%20Management%20Info%20Sheets_2021_06_24.pdf



Additional traffic calming resources include:

- **FHWA** https://safety.fhwa.dot.gov/speedmgt
- **ITE** https://www.ite.org/technical-resources/traffic-calming/
- **NACTO** https://nacto.org/publication/urban-street-design-guide/design-controls/design-speed/speed-reduction-mechanisms/

When implementing traffic calming measures, it is important to note that often one single measure will not result in reduced speeds. Combining multiple traffic calming measures creates a cumulative effect on speed reduction. Individual traffic calming measures may have limitations or be less effective on their own. By using multiple measures, any potential weaknesses or limitations of one measure can be compensated for by the strengths of others. This comprehensive approach increases the chances of achieving the desired speed reduction goals.

TRAFFIC CALMING RECOMMENDATIONS FOR SR-9 THROUGH VIRGIN INCLUDE THE FOLLOWING:

- **Landscaping**
  - Planting trees, bushes, and flower boxes
- **Visual cues to encourage slower speeds**
  - Street furniture installation such as benches, bike racks, etc.
  - Public art
  - City banners on streetlights
- **Narrow travel lanes**
  - Bike lanes
  - Curb and gutter with a sidewalk
- **Monument and wayfinding signs**
- **Roundabouts at the Mesa Road and Kolob Terrace Road intersections with SR-9.**

Roundabouts at these intersections will act as gateways to vehicles entering and exiting Virgin. These roundabouts, combined with other measures and visual cues listed above will help to reduce vehicle speeds and increase safety in Virgin.

C. Other Roadways in Virgin

As mentioned, the traffic speeds and volumes on SR-9 through Virgin is different from the traffic on other roadways. Traffic calming involving physical changes to the roadway are more acceptable on lower volume roadways. Virgin has already installed speed bumps on Pocketville Road. Similar traffic calming measures could be implemented on other local roads such as 100 West and Mill Street. Temporary speed tables can provide physical change to the roadway and can be relocated if speeding becomes a concern on other low volume roadways. These physical changes, in combination with driver feedback signs, can result in lower speeds on these local roadways.

TRAFFIC CALMING RECOMMENDATIONS FOR LOWER VOLUME ROADWAYS SUCH AS 100 WEST AND MILL STREET INCLUDE THE FOLLOWING:

- **Landscaping**
  - Planting trees, bushes, and flower boxes
- **Temporary speed tables**
- **Driver feedback signs**
- **Completing the recommended sidewalks as shown in the sidewalk map**
- **Traffic Circles at intersections**

VI. CONCLUSION

A. Overview

The purpose of the Virgin TMP is to plan the future transportation needs of the Town of Virgin. The following tasks were completed as part of this TMP:

- Traffic data was collected, including daily traffic volumes to help establish existing conditions in the Town.
- Future traffic volumes were developed to future planning years 2032 and 2050.
- A travel demand analysis based on existing and future land use was performed.
- A list of future roadway and intersection projects was created.
- Town street functional classifications and cross sections were updated.
- Access management standards were developed.
- Recommendations for future active transportation and transit facilities were provided.

B. Next Steps

In summary, this TMP provides several opportunities for the Town of Virgin staff to implement recommendations based on the findings of this TMP now and in the years to come.

VII. APPENDIX

Appendix A. UDOT Project Safety Analysis (PSA)

Appendix B. SR-9 Traffic Volumes Estimates Memo

APPENDIX A

UDOT Project Safety Analysis (PSA)

SAFETY ANALYSIS

20486_PSA_Virgin Access Management Study_Region 4_2022

Created on December 23, 2022
Created by Ivana Vladisavljevic
Requested by Chris Hall
For crashes from January 1, 2017 to December 31, 2021

Total Crashes	47	Fatal Crashes	1

Project Notes

For the purposes of filling out the Project Design Certification (PDC), no specific countermeasures are recommended.

ANALYST COMMENTS:
Animal related (including both domestic and wild animal) crashes comprise 43% of total crashes in the project area; all of which are lower severities. They occurred between LM 17.9 and LM 21, but were mostly concentrated between LM 19.5 and LM 21. The project team should make sure that the area is appropriately signed.

Front-to-rear crashes were 44% of all non-animal related crashes. There were a few concentrations of these front-to-rear crashes leading up to the crossing street: LMs 16.1, LM 17.25; and some that are spread out, but all next to one of the side streets. This pattern is a possible indication that people are slowing to take an exit to a side street and being hit by vehicles that either don't expect that movement or cannot stop in time. One possible mitigation for this type of crash would be adding two way left turn lane. None of these front-to-rear crashes were severe, thus, calculated safety benefits would not show a high benefit-to-cost ratio. However, if the project team wants to consider adding two way left turn lane, that would increase safety in the area, and possibly have benefits to the operation. In addition, these two way left turn lanes would provide additional separation between two opposing directions of travel. If adding a two way left turn lane is not an option, the project team should consider adding only left and/or right turn lanes in the areas where the conflicts may arise, and should base them on possible conflict areas, and not crash history.

There were three severe crashes in the project area in the studied time period. One fatal crash was caused by a driver making a u-turn and not seeing a motorcyclist that was coming at the high speed. Two suspected serious injury crashes, one was due to medical condition and the other was off-road vehicle riding on the shoulder. No pattern was associated with these crashes, so no mitigation was recommended.

While specific recommendations are not included, potential countermeasures and comments in notes are provided to inform and guide the project team to ensure safe design. Relevant issues should be addressed as possible, and the data and potential countermeasures in this report should be reviewed to determine if any safety improvements would be appropriate to include in the project.

If the project team would like to review this PSA and data in Numetric, please email crashstudies@utah.gov.

UDOT Crash Summary		Crashes
Total Crashes	47	100.00%
Animal Related	20	42.55%
Intersection Related	9	19.15%
Roadway Departure	7	14.89%
Speed Related	4	8.51%
DUI	3	6.38%
Distracted Driving	2	4.26%
CMV Involved	1	2.13%
+ 5 more	3	6.39%

Crash Severity		Crashes
No injury/PDO	31	65.96%
Suspected Minor Injury	8	17.02%
Possible Injury	5	10.64%
Suspected Serious Injury	2	4.26%
Fatal	1	2.13%

Crash Date Time (Year)		Crashes
2021	11	23.40%
2020	10	21.28%
2019	5	10.64%
2018	11	23.40%
2017	10	21.28%
+ 8 more	0	0%

Manner of Collision		Crashes
Not Applicable/Single Vehicle	28	59.57%
Front to Rear	12	25.53%
Angle	3	6.38%
Sideswipe Opposite Direction	2	4.26%
Head On (front-to-front)	1	2.13%
Other*	1	2.13%
+ 5 more	0	0%

Roadway Surface Condition		Crashes
Dry	42	89.36%
Wet	3	6.38%
Dirt	1	2.13%
Unknown	1	2.13%
+ 11 more	0	0%

First Harmful Event of Crash		Crashes
Collision With Other Motor Vehicle in Transport	19	40.43%

Animal - Wild	15	31.91%
Animal - Domestic	4	8.51%
Ditch	2	4.26%
Collision Between Motor Vehicle in Transport and Vehicle Cargo/Part or Object Set in Motion by Motor Vehicle	1	2.13%
Concrete Barrier	1	2.13%
Fence	1	2.13%
Guardrail	1	2.13%
+ 48 more	3	6.39%

Light Condition		Crashes
Daylight	26	55.32%
Dark - Not Lighted	15	31.91%
Dark - Lighted	2	4.26%
Dawn	2	4.26%
Dark - Unknown Lighting	1	2.13%
Dusk	1	2.13%
+ 2 more	0	0%

Roadway Surface Condition		Crashes
Dry	42	89.36%
Wet	3	6.38%
Dirt	1	2.13%
Unknown	1	2.13%
+ 11 more	0	0%

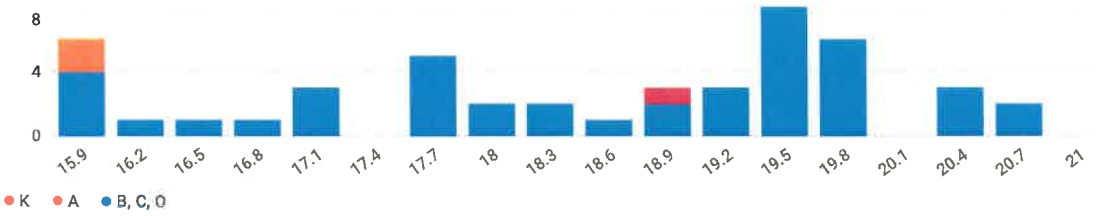
Route 0009P, MP 16 - 21

Route Overview

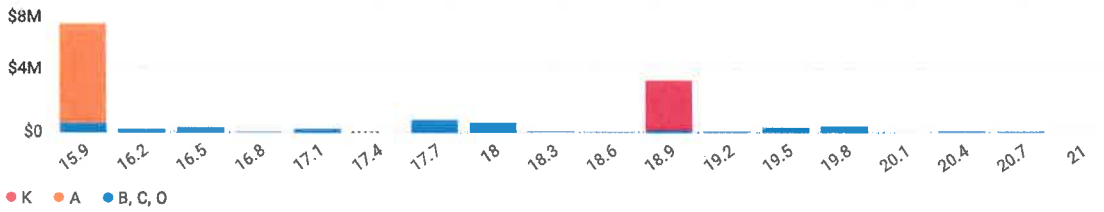
47 Total Crashes

1 (K) Fatal Injury • 2 (A) Suspected Serious Injury • 8 (B) Suspected Minor Injury • 5 (C) Possible Injury • 31 (O) Property Damage-Only

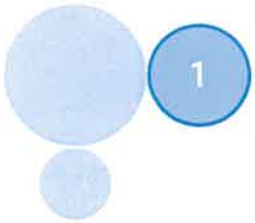
Crashes By MilePoint



Cost By MilePoint



Potential Countermeasures (Route 0009P, MP 16 - 21)



Top Countermeasures	Max Benefit	Unique
1 Roundabout or Signal	$10.8M	100.0%
2 Clear Zone Improvements	$4.17M	100.0%
3 Left Turn Lane	$224k	100.0%

1. Countermeasure: Roundabout or Signal

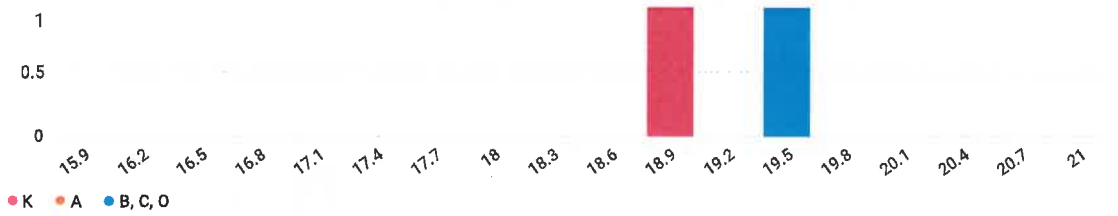
Treatments: Change Intersection from Stop Control to Signal Control, Convert Signalized Intersection to Roundabout, Convert High-Speed (40-65 mph) Minor-Leg Stop Intersection to Roundabout, Convert Two-Way Stop Intersection to Single Lane Roundabout

Benefit Estimates	
Service Life (years)	20 - 30
Benefit	$4,085,485 - $10,753,873
Annual Cost Savings	$268,661 - $538,598
Annual Crash Reduction	0.18 - 0.32
Annual Severe Crash Reduction	0.09 - 0.18
Unique To Project	100.0% - 100.0%

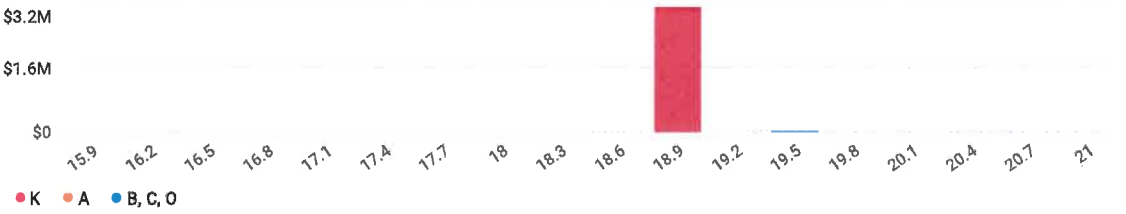
2 Addressable Crashes

1 (K) Fatal Injury • 0 (A) Suspected Serious Injury • 0 (B) Suspected Minor Injury • 0 (C) Possible Injury • 1 (O) Property Damage-Only

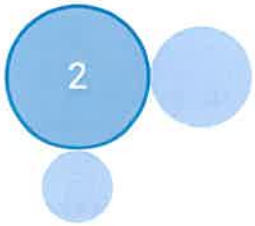
Crashes By MilePoint For Countermeasure: Roundabout or Signal



Cost By MilePoint For Countermeasure: Roundabout or Signal



Potential Countermeasures (Route 0009P, MP 16 - 21)



Top Countermeasures	Max Benefit	Unique
1 Roundabout or Signal	$10.8M	100.0%
2 Clear Zone Improvements	$4.17M	100.0%
3 Left Turn Lane	$224k	100.0%

2. Countermeasure: Clear Zone Improvements

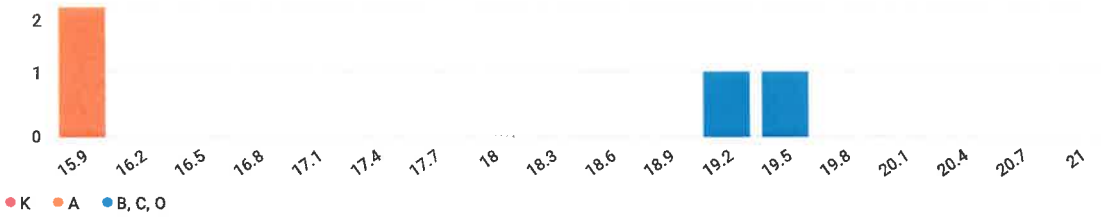
Treatments: Improve Clear Zone and/or Sideslopes

Benefit Estimates	
Service Life (years)	20
Benefit	$4,172,511
Annual Cost Savings	$274,384
Annual Crash Reduction	0.18
Annual Severe Crash Reduction	0.09
Unique To Project	100.0%

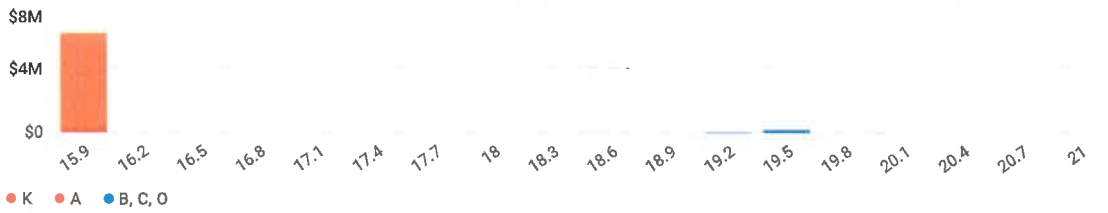
4 Addressable Crashes

0 (K) Fatal Injury • 2 (A) Suspected Serious Injury • 0 (B) Suspected Minor Injury • 1 (C) Possible Injury • 1 (O) Property Damage-Only

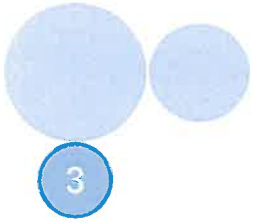
Crashes By MilePoint For Countermeasure: Clear Zone Improvements



Cost By MilePoint For Countermeasure: Clear Zone Improvements



Potential Countermeasures (Route 0009P, MP 16 - 21)



Top Countermeasures	Max Benefit	Unique
1 Roundabout or Signal	$10.8M	100.0%
2 Clear Zone Improvements	$4.17M	100.0%
3 Left Turn Lane	$224k	100.0%

3. Countermeasure: Left Turn Lane

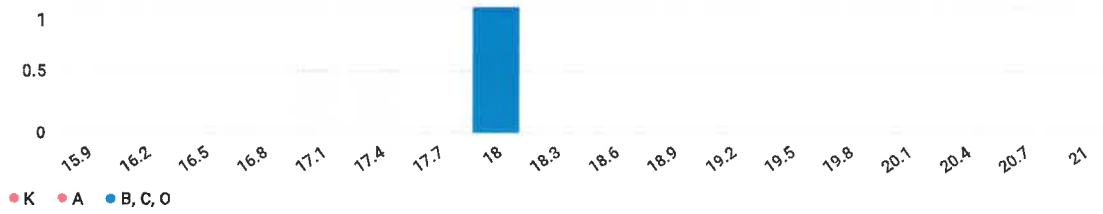
Treatments: Install Left Turn Lane at Stop Control Major Approach, Install Left Turn Lane at Signalized Major Approach

Benefit Estimates	
Service Life (years)	20 - 20
Benefit	$184,151 - $224,184
Annual Cost Savings	$12,110 - $14,742
Annual Crash Reduction	0.05 - 0.06
Annual Severe Crash Reduction	0.00 - 0.00
Unique To Project	100.0% - 100.0%

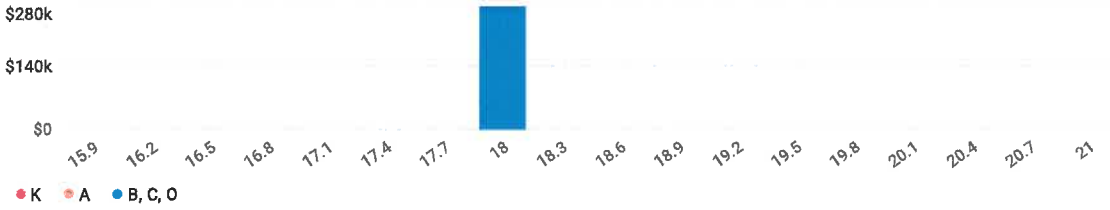
1 Addressable Crash

0 (K) Fatal Injury • 0 (A) Suspected Serious Injury • 1 (B) Suspected Minor Injury • 0 (C) Possible Injury • 0 (O) Property Damage-Only

Crashes By MilePoint For Countermeasure: Left Turn Lane



Cost By MilePoint For Countermeasure: Left Turn Lane



Crash Details (Route 0009P, MP 16 - 21)

UDOT Crash Summary		Crashes
Total Crashes	47	100.00%
Animal Related	20	42.55%
Intersection Related	9	19.15%
Roadway Departure	7	14.89%
Speed Related	4	8.51%
DUI	3	6.38%
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2020	10	21.28%
2019	5	10.64%
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Other*	1	2.13%
+ 5 more	0	0%

Roadway Surface Condition		Crashes
Dry	42	89.36%
Wet	3	6.38%
Dirt	1	2.13%
Unknown	1	2.13%
+ 11 more	0	0%

First Harmful Event of Crash		Crashes
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Animal - Wild	15	31.91%
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Fence	1	2.13%
Guardrail	1	2.13%
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Light Condition		Crashes
Daylight	26	55.32%
Dark - Not Lighted	15	31.91%
Dark - Lighted	2	4.26%
Dawn	2	4.26%
Dark - Unknown Lighting	1	2.13%
Dusk	1	2.13%
+ 2 more	0	0%

Roadway Surface Condition		Crashes
Dry	42	89.36%
Wet	3	6.38%
Dirt	1	2.13%
Unknown	1	2.13%
+ 11 more	0	0%

APPENDIX B

SR-9 Traffic Volumes Estimates Memo

WALL CONSULTANT GROUP

2139 S. 1260 W.
Salt Lake City, UT 84119

801-456-3847
wcg.us

Date: August 22, 2023

To: UDOT; Chris Hall

From: Jeremy Searle, PE, PTOE, Austin Feula, PE, PTOE, Ian MacGregor, EIT

Subject: SR-9 Traffic Volume Estimates

Traffic volume projections were developed for both the current year (2022) and a future condition (2050) for the SR-9 corridor study area. The methodology for developing these volumes is described in the memo below.

Data Sources

The following data sources were utilized in estimating *traffic volumes*:

- **CCS 9000 & 9060:** January 2022 – December 2022 daily, hourly, and directional volume data

The following data sources were utilized in estimating future *traffic growth rates*:

- **UDOT CCS data:** Station 9000, 9060 – 2022 AADT
- **Dixie Travel Demand Model:** 2022, 2032, and 2050 daily volume outputs
- **University of Utah – An Economic Analysis of Zion National Park Scenarios**
- **Zion National Park Visitations:** 2010 – 2019 visitations

CCS Data Collection

A continuous count station is a device used to monitor and record the number of vehicles that pass a particular location on a road or highway. The UDOT counters provides continuous data on traffic volume, which can be used to analyze traffic patterns, and make informed decisions about traffic management. This can provide more information on patterns than a single day observation.

CCS stations 9000 and 9060 were used in this study. Both stations are located at the south end of Springdale along SR-9. Figure 1 shows the location of these stations. Station 9000 counts eastbound traffic while station 9060 counts westbound traffic. The continuous count stations are situated a few miles to the east of Virgin. There are some attractions present between Virgin and the stations. There is potential for vehicles to travel through Virgin and turn off SR-9 instead of continuing towards Zion National Park.

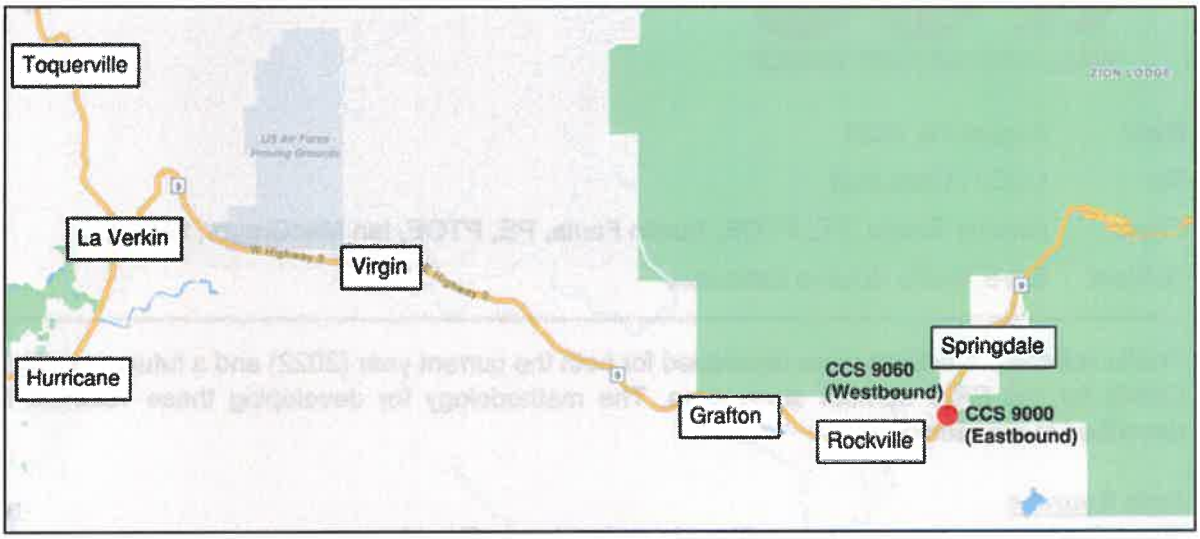

Figure 1: CCS Locations

UDOT collected 12-hour traffic volume on Thursday, May 25, 2023, near Kolob Terrace Road in Virgin. Comparing these volumes with the CCS data from the same day, volumes are 7% higher in Virgin than they are east of Rockville. A comparison of the volumes between Kolob Terrace Road and East of Rockville can be shown in Figure 2. As shown, the hourly trends are similar at both locations. Additionally, a 7% difference in traffic volumes is not a large enough difference to consider the CCS data as unreliable. Therefore, the volumes reported by continuous count stations are considered as a dependable indication of the volumes along SR-9 through Virgin.

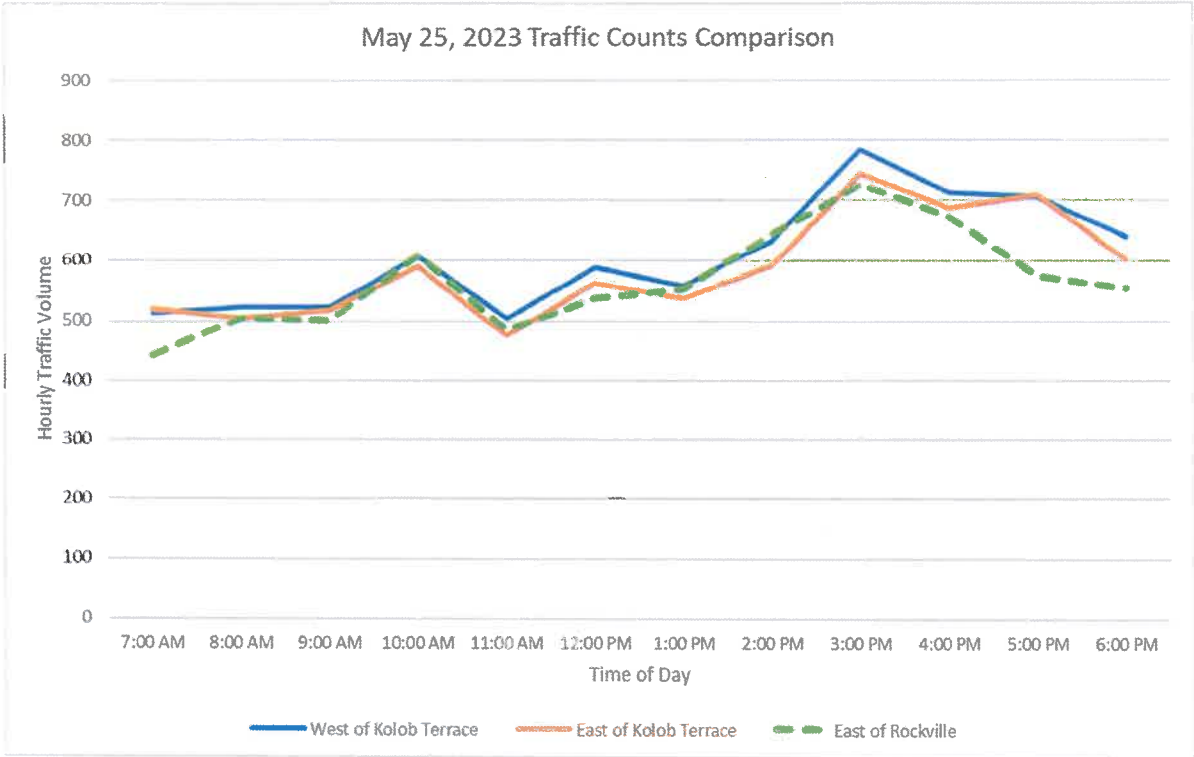

Figure 2: Traffic Volume Comparisons near Kolob Terrace and Rockville

Travel Demand Model Updates

The travel demand modeling was performed using the latest version (v3.0, dated May 1, 2023) of the Dixie Travel Demand Model. Edits were made to the socio-economic data to best represent current and projected future land uses within Virgin. Travel demand modeling was performed in Bentley Cube version 6.5.0.

Design Condition

Due to large tourism demands along SR-9, traffic patterns do not follow typical month of year or day of week traffic distributions. With this in mind, an analysis condition needed to be determined. The average daily volumes by month for 2022 were calculated. As shown in Figure 3, May was the highest volume month in 2022.

Month	Average Daily Volumes
January	3,716
February	4,637
March	7,185
April	8,434
May	8,741
June	8,344
July	7,632
August	6,821
September	7,645
October	8,066
November	5,634
December	3,926

Figure 3: 2022 Average Daily Volumes by Month

The average volume for each day of the week was then determined and can be shown in Figure 4. As shown in the figure, it is observed that Saturdays have the higher average volumes.

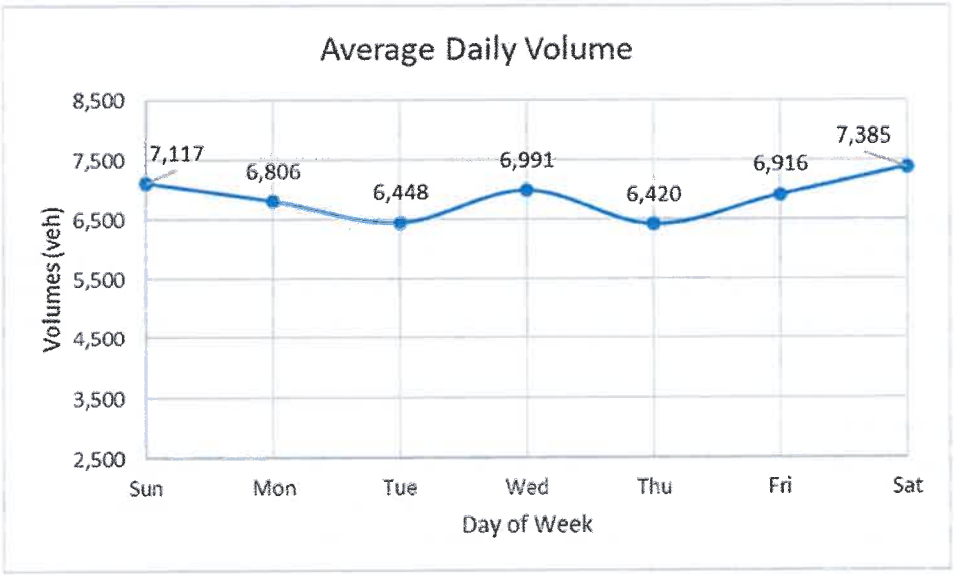

Figure 4: Average Daily Volume Along SR-9

It was decided that a typical peak day (Saturday) during the spring, summer, and fall (March – October) would be utilized. This average of approximately 32 Saturdays ensures the corridor is planned for busy summer conditions, but also that the roadway is not overbuilt to accommodate a condition that only occurs a few days out of the year. Figure 5 shows the average volume from these Saturdays, as well as the peak Saturday in the year and the Saturday with the closest volume to the average.

Day	Volume (veh)
Average Spring-Fall Saturday	8,632
Peak Saturday (Memorial Day weekend, 5/28/2022)	11,576
Saturday closest to average volumes (6/11/2022)	8,638

Figure 5: Study Volumes along SR-9

Daily volumes may be higher during special events and on holidays. Additionally, local observations indicate a high proportion of drivers who are unfamiliar with the corridor, which can result in periodic increases in congestion.

The 2021 volumes were also analyzed. The highest daily volume for 2021 was determined to be 13,928 vehicles on the Saturday prior to Memorial Day (5/29/2021). However, visitation to Zion in 2021 was likely increased by COVID-19 closures and a greater desire to do activities in outdoor environments.

2050 Growth Rate Estimates

Growth estimates were developed based on the three data sources described below:

- Dixie Travel Demand Model
  - Estimated an average of 2.1% annual growth rate between 2019 and 2050 along the study corridor (Between 2022 and 2050 this results in 80% total growth)
- University of Utah – An Economic Analysis of Zion National Park Scenarios
  - Approximate average annual growth rate of 0.5% between 2020 and 2030
- Zion National Park Historic Visitation
  - Zion Park Visitation from 2010 – 2019 was used to determine a growth rate. 2020 was not included due to the offset in visitations from the COVID pandemic. Using these values, an approximate linear annual growth rate of 2.3% was calculated.

Figure 6: Zion Park Visitation from 2010-2019

It is worth noting that visitation through March of 2023 has been lower than visitation through March in previous years. The visitation for 2023 is closer to 2018 than any later year.

Given the range of estimates, we consider a 2% annual growth rate as reasonable. This results in an 74% increase in traffic volumes between 2022 and 2050.[1]

Volume Estimates

By applying the annual growth rate to the counts on a 2022 typical peak day (Saturday) during the spring-fall (March – October), volumes were projected for 2050.

Using a 2% annual growth rate between 2022 and 2050, the daily traffic volumes along SR-9 in 2050 is estimated to be 15,000 through Virgin.

Hourly Traffic Volume Trends

In addition to determining the daily volume along SR-9, the hourly traffic volume was determined from observed data. Knowing the hourly traffic volume in addition to the average daily traffic is important because it provides a more detailed understanding of traffic patterns and helps to identify peak traffic periods.

The Highway Capacity Manual (HCM) provides values for determining the capacity of roadways in undeveloped areas. However, some roadways have a more complex geometry. Therefore, we determined that these values should consider local conditions. To do this, we observed the hourly volume for Big Cottonwood Canyon (SR-190) and compared it to the hourly volume to Zion (SR-9). The SR-190 volumes were obtained from CCS 5750 (westbound) and CCS 5710 (eastbound).

Figure 7 shows the total hourly volume comparison between SR-9 leading to Zion on an average Saturday (6/11/22), the busiest Saturday of the year (5/28/22), and an average Saturday in February for Big Cottonwood Canyon (2/4/22). As shown, volumes for Big Cottonwood Canyon are heavy in the AM peak hour as drivers enter to ski as early as possible. The hourly volumes for SR-9 are more evenly distributed. Additionally, the hourly volumes for SR-9 show a similar trend for both an average Saturday and the peak Saturday.

[1] Due to compounding growth.

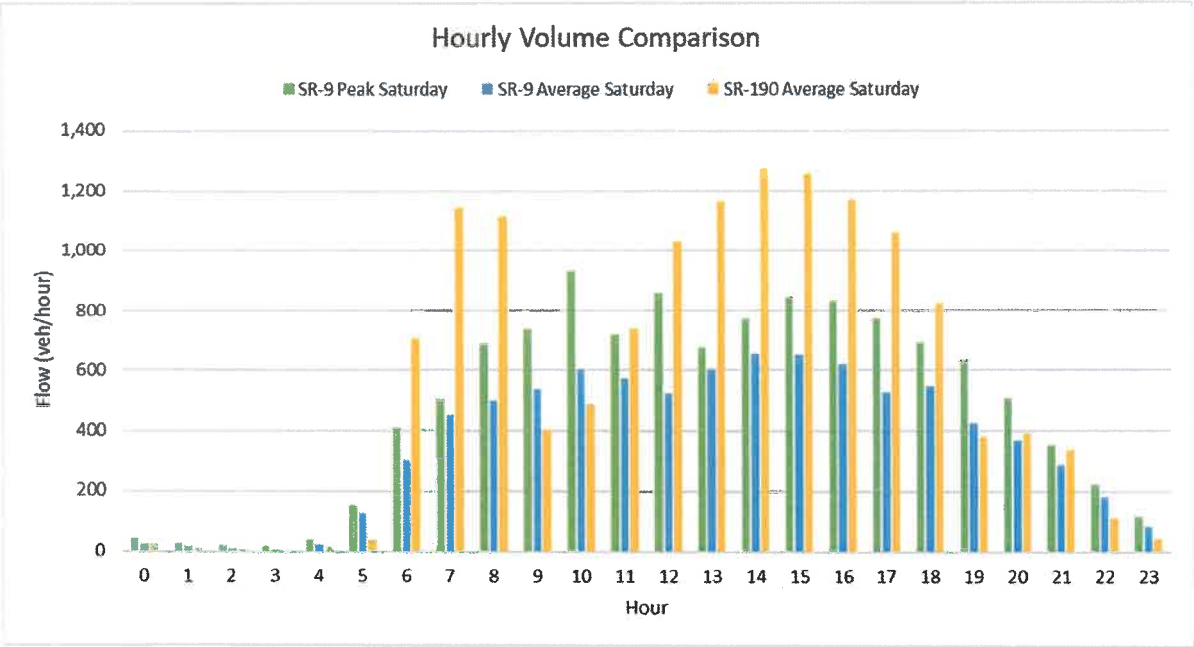

Figure 7: Hourly Volume Comparison between Zion and BCC

In addition to the hourly volume, the directional volume is also important. A roadway may be able to handle a certain demand, but if it is all in one direction, that can lead to congestion issues. To help identify how SR-9 directional hourly volumes compare to other roadways, we compared directional hourly volumes from Big Cottonwood Canyon (SR-190) to understand the capacity of a two lane highway in an undeveloped area that leads to a recreational area. The Saturday close to average volumes (6/11/22) for SR-9 was used, and an average winter Saturday for SR-190.

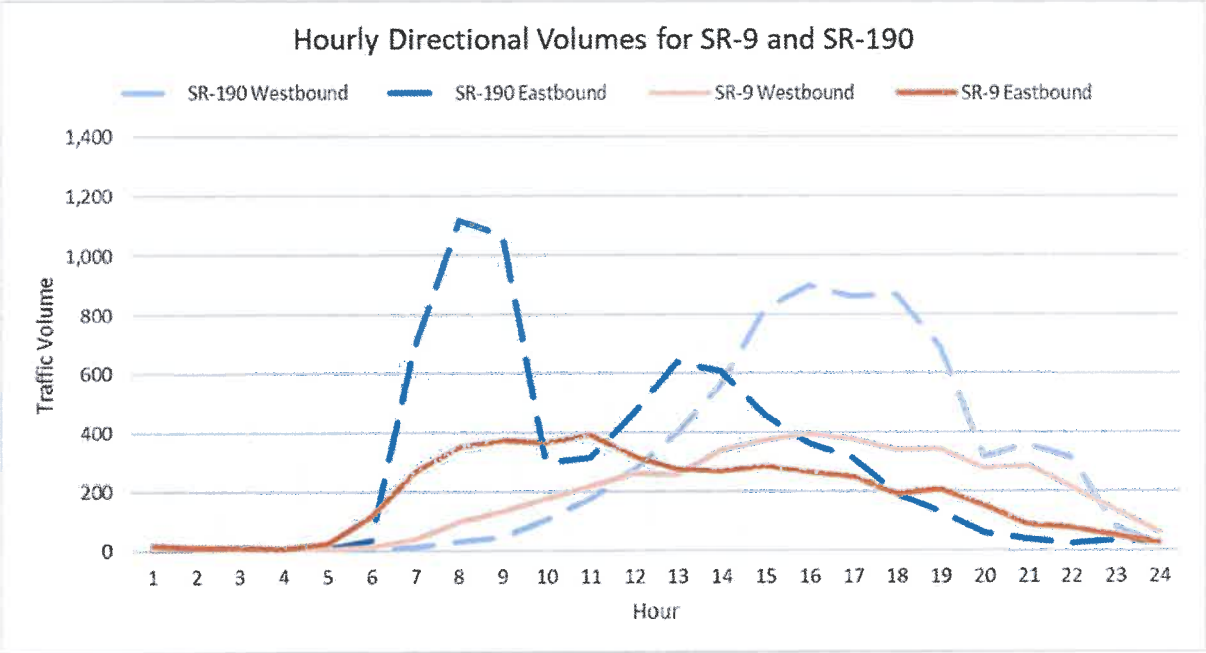

Figure 8: Hourly Directional Volumes for SR-9 and SR-190

As shown in Figure 8, the SR-190 has a large demand in the eastbound direction during the AM peak hour. This is due to drivers entering the canyon to ski. The hourly directional demand for SR-9 is more evenly distributed. Therefore, SR-9 does not have as many congestion problems as SR-190.

Projected daily volume profiles along SR-9 are shown below in Figure 9. It was assumed that future traffic volumes will follow a similar pattern to existing volumes. As travel demand increases it is likely that the peak hours will spread out throughout the day. Currently, hourly volumes are estimated to peak at 800 vehicles in 2032. By 2050 this is projected to grow to approximately 1,140 vehicles per hour.

Additionally, 2032 and 2050 projections were examined by direction which is shown in Figure 9. The peak directional volume in 2050 is projected to be 680 vehicles per hour from 4 PM to 5 PM in the westbound direction.

Year	2022	2032	2050
Average Daily Volume	8,600	10,500	15,000
Peak Hourly Volume	650	800	1,140
Peak Directional Hourly Volume	390	480	680

Figure 9: SR-9 Volumes for 2022, 2032, and 2050

Travel Speeds

In addition to AADT and directional hourly traffic volumes, free flow speed (FFS) is an indication of how a roadway is performing. If drivers are slowing down significantly, that is an indication of congestion and the roadway nearing capacity.

To determine how free flow speeds were being impacted along SR-9, Iteris ClearGuide[2] was used. This software shows what percent of freeflow speed drivers are traveling at. If they are travelling at a lower percent of the FFS, that indicates that there is some congestion. Figure 10 shows a screenshot of this software of SR-9 through Virgin leading to Zion Park. The moment shown is the peak summer day (5/28/22) at noon. As shown, there is no drop in FFS along SR-9 until entering Springdale.

Figure 10: Iteris ClearGuide Screenshot of SR-9 through Virgin leading to Zion Park

Roadway Capacity

Roadway capacity is often determined using Level of Service (LOS). Level of Service is a term that compares the demand with the capacity. UDOT standard for acceptable LOS is D or better.

SR-9 Capacity (segments with frequent accesses)				
Lanes	**C or better**	**D**	**E**	**F**
2	0 – 8,299	8,300 – 10,099	10,100 – 11,799	> 11,800
3	0 – 12,399	12,400 – 15,099	15,100 – 17,699	> 17,700
5	0 – 28,499	28,500 – 32,799	32,800 – 40, 299	> 40,300

As shown in Figure 5, the average Spring-Fall Saturday has a volume of 8,632 vehicles. This indicates that SR-9 is operating at LOS D or better for most of the year in two lane sections and LOS C in three lane sections.

With the estimated average Spring-Fall Saturday daily volume of 15,000 in 2050, it is anticipated that SR-9 will operate at LOS F in two lane sections and LOS D in three lane sections. Thus, it is recommended that SR-9 is widened to a three lane section throughout the entire developed area

[2] https://ut.iteris-clearguide.com/

of Virgin. Widening to a five lane section is not recommended as a three lane section acceptably accommodates the traffic demand.

Other Considerations

It has been well reported trend that the Springdale entrance to Zion National Park has been at, or near, capacity since the start of the COVID-19 pandemic. There are many reasons to believe that the high growth that has occurred recently in this area won't continue at the same rate. A few potential reasons are listed below:

- With Spring-Fall Saturdays being near capacity it is likely that Zion National Park visitation will grow more during off-peak/off-season periods than during peak periods.
- With the new development adjacent to the east entrance to Zion National Park it is likely that some visitors will shift to that entrance.
- So far in 2023 Zion National Park visitation is lower than either 2022 or 2021, thus indicating that visitation might revert to pre-pandemic levels.

These factors likely indicate that the assumed 2% yearly growth rate is conservate and traffic growth (especially during peak periods) could be much lower.

Conclusion

Based on conservative growth estimates, which don't include capacity limitations of the Springdale entrance to Zion National Park, the analysis still shows that a three lane cross section is sufficient, and a five lane cross section will not be necessary to meet UDOT LOS standards.