DUCHESNE COUNTY TRANSPORTATION MASTER PLAN

JULY 2017

PREPARED FOR:

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1. INTRODUCTION

1.1. BACKGROUND

Utah's Duchesne County is located on the south slope and foothills of the longest east-west mountain range in the continental United States, known as the Uintah Mountains. Located between Denver and Salt Lake City; the scenic attractions include: rivers, streams, and lakes that the Uintah Mountains provide; and the Book Cliff Mountains attract thousands of visitors and are located within short driving distances from County locations. Amenities in the area include an 18-hole golf course in Roosevelt City and Starvation Reservoir State Park near the City of Duchesne which contains 3,500 acres of fishing and boating. The Uintah and Ouray Indian Reservation lies within and adjacent to the County boundaries and makes up 19.76 percent of the land area. Important employers include government, agriculture, trucking and oil and natural gas drilling. Duchesne County residents and visitors enjoy a pleasant environment, abundant natural beauty, and numerous recreational opportunities.

1.2. NEED FOR A STUDY

The primary purpose of a transportation system is to move people and goods in a safe and efficient manner. A variety of different travel demands need to be considered in order to fulfill this purpose, including travel within the County, passing through the County, and between rural parts of the County and the County's cities. The movement of people and goods also involves various transportation modes, including vehicular, rail, pedestrian and bicycle, to provide for a high degree of mobility to all segments of the population. The County roadway system is currently the key element of the transportation system in that it accommodates the majority of the travel needs inside the County limits. There is no rail service in the County at this time; however, a study is underway to determine the feasibility of providing rail service.

The County's ability to construct roads is constrained due to lack of funding. A majority of the County's roads and bridges budget is currently used for maintenance and repair of existing roads. These maintenance costs are directly attributable to the high number of road miles serving a large geographic area of somewhat low density and heavy truck traffic. As a result, the main purpose of this transportation plan is to coordinate existing zoning and proposed developments with the future transportation needs of the County.

Duchesne County's population continues to increase with no apparent slowdown in the future. Along with the anticipated growth comes an increase in traffic. Ongoing growth and development in the County is creating an increase in traffic demands on this roadway network that are not easily accommodated. Transportation facilities not designed to accommodate the increase in traffic volumes can create safety problems, congestion, and delay for motorized and non- motorized travel. In order to preserve the unique character in Duchesne County and build a stronger economy, proactive planning of the transportation network is essential. Completing a transportation plan will be paramount to assessing the County's roadway needs and preserving those future corridors and rights–of-way to facilitate the anticipated traffic demand and growth. Transportation concerns identified in Duchesne County include:

- Safety
- Mobility
- Street Classification
- Access Management
- Future Land Use
- Energy Development

The study area for the plan is shown in Figure 1-1.

Figure 1-1. Duchesne County Transportation Master Plan Study Area

1.3. TRANSPORTATION PLANNING PURPOSE

The purpose of this study is to develop a transportation master plan (TMP) for Duchesne County that will be used as a guideline for future planning and development in the County. The primary objective of the study is to establish a reliable transportation network to guide future developments and ensure a functional transportation system. Most transportation plans are used to support an impact fee system to assess developers for roadway improvements necessary to accommodate the proposed development. The TMP includes several major components as outlined below:

- Analysis of existing conditions
- Analysis of future 20 year conditions
- Short range transportation plan
- Long range transportation plan
- Access management guidelines
- Corridor preservation guidelines

Analysis of existing conditions establishes a baseline that can be used as a gauge for future development. Short range improvements focus on specific projects to improve deficiencies in the existing transportation system and account for projects that are currently being planned. The short range plan identifies improvements to accommodate immediate future growth and development. The long range plan will identify those projects which require significant advance planning and funding to implement, and which are needed to accommodate future traffic demand. Access management principles introduced in this plan will balance the need for roadway access with the importance of maintaining mobility on the roadways. The next section describes the planning process for developing the TMP.

1.3.1. COMMUNITY PLANNING

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

1.3.2. ECONOMIC VIABILITY

Traffic congestion is detrimental for economic development. Raw material and product shipping costs increase proportionally with congestion. Customers and travelers will avoid stores and destinations that are difficult or dangerous to reach. The transportation system is the lifeline for economic viability; much like the human body's circulatory system provides blood to organs and muscles. Arterial blood clots can be fatal to the body and roadway traffic congestion can be fatal to a County's economic health. For this

reason, efficient transportation mobility is vital to a County's economic growth and sustainability. A study was recently conducted for the region to identify the economic impacts of energy development and the role of the transportation system in the Uintah Basin. The Uintah Basin Energy and Transportation study was conducted as a joint effort between Uintah and Duchesne Counties and UDOT to understand the relationship between transportation and energy production and to discuss solutions for shortfalls in the existing transportation system. This study is referenced in the TMP and was utilized to provide recommendations consistent with the findings of the study and the TMP.

1.3.3. SAFETY TO CITIZENS

Transportation safety is a major goal of good planning. The integration of trucks, automobiles, agricultural equipment, bicyclists, equestrians, pedestrians, and wheelchairs must occur in a safe and equitable manner. Traffic congestion leads to dangerous driving behavior and increased accident rates for vehicles and pedestrians. Approximately 40,000 people die every year in vehicular accidents in the United States, which makes traffic accidents the third leading cause of death in the country. It is the leading cause of death for people under the age of 30. Utah averages about one fatal car accident per day as reported by the Utah Highway Safety Office. Roadways that are planned and designed correctly can reduce the accident rate by as much as 30%. This plan considers areas of high accident frequency in Duchesne County and recommends projects to improve these areas.

1.3.4. HEALTH OF CITIZENS

Quality of life includes many factors. Some of the factors that are important to the citizens in Duchesne County include: work commute time, the preservation of rural environment and scenic views, air quality, safety, and access to recreational areas. A poorly planned transportation system diminishes all of these elements. There are three reasons why planning improvements to the roadway system should be made:

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

1.3.5. LEGAL BASIS FOR DEVELOPMENT EXACTIONS

Due to the decrease in funding available from Federal and State sources, local governments are forced to ask developers to pay for the infrastructure necessary to support proposed development projects. A long range plan is the legal basis for these exactions and impact fees. Legal challenges will be minimized if the estimated roadway construction costs are based on the County vision and system plans that support the vision. The County does not currently have a roadway impact fee or extraordinary use fee that is assessed to developers at commencement of development, other than a one-time access permit to add an access point along an existing roadway. It is recommended that the County consider an impact fee that will offset the infrastructure costs associated with new development. Such a fee would be utilized to mitigate transportation infrastructure impacts beyond the infrastructure included in the development. Developers are required to construct public transportation facilities to County standards prior to the County taking ownership of the facility. See Section 4.6 Energy/Commercial Development

for recommendations and definitions for extraordinary use and associated implementation of a fee system.

1.3.6. UDOT COORDINATION

The Utah Department of Transportation (UDOT) is responsible for the safe and efficient operation of State roads. Duchesne County lies within the UDOT Region 3 jurisdiction. Coordination with UDOT is essential in obtaining Federal and State monies to construct transportation facilities. This coordination will also help the County put planned projects in the State Transportation Improvement Program (STIP). Lack of overall planning and coordination with UDOT often leads to haphazard results and poor circulation along transportation corridors supported by the State. This coordination will also ensure that improvement projects in the County that affect UDOT will be included in the STIP. The County should continue to coordinate with UDOT on all subdivision and development projects in the County that could possibly impact the State highway system. This is accomplished by continuing to include, in the current development process, a requirement to contact UDOT and discuss the project with them to determine if any mitigation is necessary.

1.4. STUDY PROCESS

The study process for the Duchesne County Transportation Master Plan (TMP) is depicted in Figure 1-2. The goal of this procedure is to identify the needs, opportunities, and constraints for both establishing and implementing the TMP. This process involves the participation of the County and public for guidance, review, evaluation and recommendations in developing the TMP.

The first component of the study process is to evaluate the existing and future traffic conditions, roadway infrastructure, and population and employment conditions. Existing roadway conditions were assessed and core samples taken on paved roadways to provide insight on the existing infrastructure and provide a baseline for future maintenance and replacement. Traffic counts were used to quantify truck and passenger car volumes and patterns. Duchesne County Sherriff, Fire, EMS, and Utah Highway Patrol representatives met to provide insight on problem areas and roadway safety issues in specific locations. A technical review committee was established for each aspect of the evaluation and the public was invited to attend open house meetings to provide input.

The second component of the study process is obtaining public input and making revisions to the plan based on the comments. This component is used to help identify problems being experienced by the general public so the transportation system can be thoroughly evaluated. This input also helps to prioritize the transportation issues. Duchesne County citizens were informed of the plan through public meetings in an “open house” format that were held on two different occasions. Project information was displayed and public comments were recorded for use and incorporation into the plan as necessary. Appendix 7 contains the attendees list and comments received from the public during these meetings. (In addition to these meetings, maps were available at the front counter of the County Offices and on the project website for review and comment by the public. The report was available for several weeks during the Planning commission and County Commission’s review and approval).

The third component of the study process is to present and obtain approval from the Planning Commission and County Commissioners. The County Commissioners and the Planning Commission were heavily involved in providing feedback and steering for the TMP. Comments from these bodies and the public were incorporated into the final document. Transportation projects that were recommended for the short term and long range needs were discussed and finalized. After which, the TMP is adopted and implemented.

The study process solicits input from the public on several different occasions. This public participation element has been included in the study process to ensure that any decisions made regarding this study are acceptable to the County. In addition, the Planning Commission held a public hearing to take input on the plan before it was considered by the County Commission.

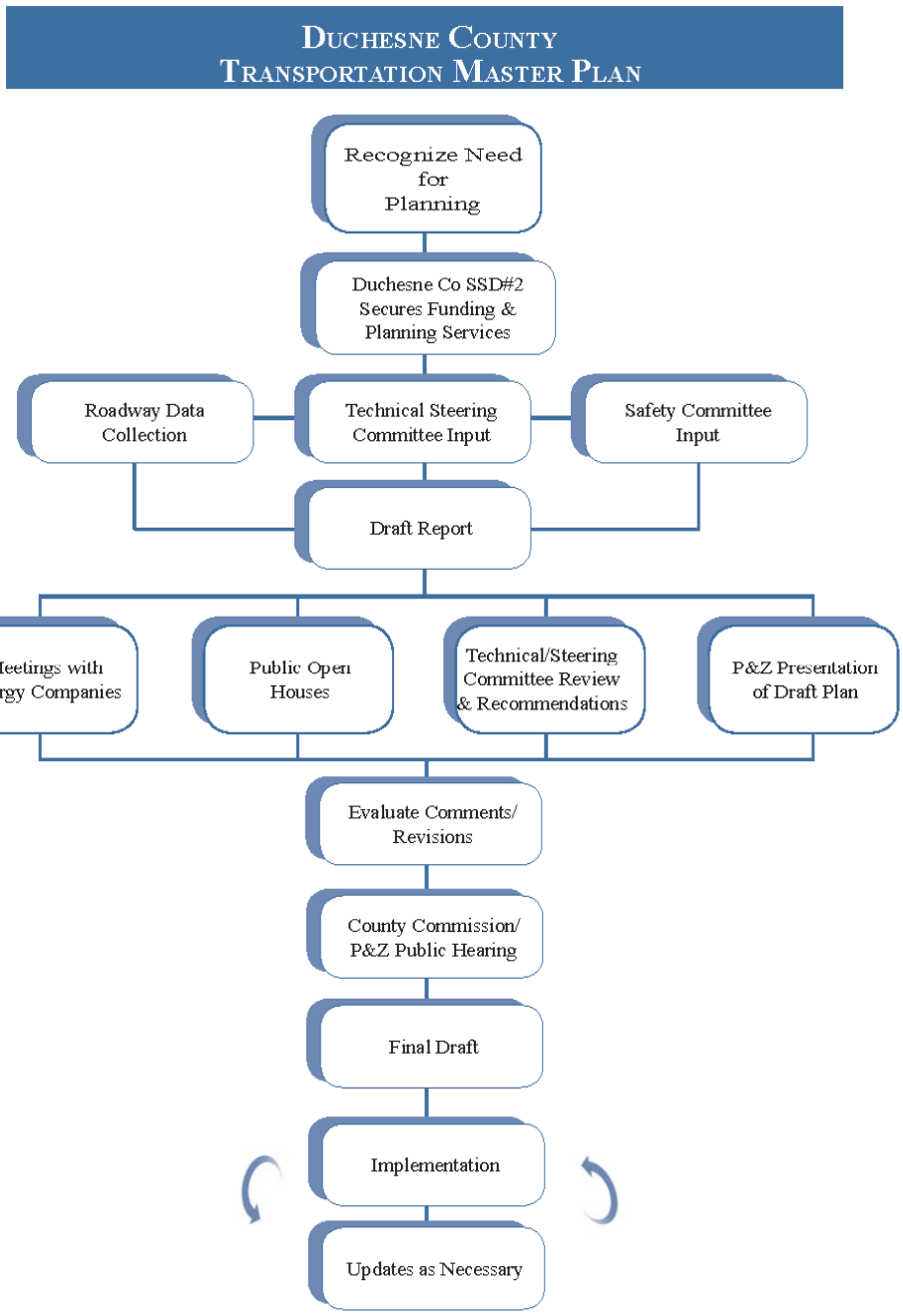

Figure 1-2 Transportation Master Plan Study Process

1.5. STUDY GOALS

Duchesne County's transportation policy recommendations and TMP Study Goals are described below:

- A balanced transportation system which appropriately serves the cultural, economic, mobility, recreational and social interests of County residents and visitors
- A reliable transportation system
- A transportation system that promotes orderly growth, travel and tourism
- Duchesne County shall seek effective access management

- Maintain acceptable levels of roadway efficiencies, protect County and community culture and promote aesthetic and functional design features
- Coordinate provisions of the General plan with County, federal and state transportation managers in assuring that interrelated transportation systems serve residents in the County efficiently and safely
- Ensure that access management principles are implemented and that landscaping and parking provide aesthetic and accessible transportation and mobility features
- Encourage on-going input from citizens and collaboration between affected local and state entities
- Recognize the importance of access to public lands and base access to public lands and road management policy decisions on input from local citizens
- Through regular coordination meetings, maintain appropriate access to and through Tribal properties
- Maintain the historical and continuing use of trail ways, byways, highways, roadways and rights-of-way established by agriculturalists, herders, livestock owners and recreationists in the County
- Achieve flexibility through conditional use permits, variances, and waivers, provided that they are consistent with rural design principles and sound land use planning
- Implement and equitably administer transportation design and access standards through County Road, zoning and subdivision ordinances
- Work cooperatively with community leaders and citizens to encourage optimal design, landscape, and gateway features that identify commercial and residential developments in Duchesne County
- Work cooperatively and proactively with energy development companies and public utilities and incorporate a system for future project planning
- Expand the County's transportation and trails systems
- Emphasize the preservation of air quality, open spaces and freedom of movement that is characteristic of living in or visiting Duchesne County
- Encourage the adoption and enforcement of ordinances that maintain prudent and reasonable noise levels throughout Duchesne County

This Transportation Master Plan has addressed and upheld these goals.

2. EXISTING CONDITIONS

An inventory and evaluation of existing conditions was conducted to identify current transportation infrastructure and land use problems and uses which influence the local and area wide transportation system. This information was then used as a baseline to identify and measure improvements.

2.1. LAND USE

It is essential to analyze and forecast traffic volumes with an understanding of the land uses within the study area. Land along transportation corridors develops and typically follows future land use plans identified by the County.

2.2. DEMOGRAPHIC & SOCIOECONOMIC DATA

Table 2-1 shows the 2010 census population and housing data for Duchesne County.

Table 2-1. Duchesne County Population and Housing Density

Population	Housing Units	Area (sq. mi)	Population Density (pop/sq. mi)	Housing Density (HU/sq. mi)
18,616	**9,745**	**3,238**	**5.75**	**3.01**

Table 2-2: compares the population growth for the State of Utah and Duchesne County. The table shows a slight decline in population in Duchesne County from 1980 to 1990 then an increase in population from 1990 to 2010. Duchesne County has averaged 2.25% growth per year from 1970 to 2000 and a 2.58% growth rate from 2000 to 2010. The annual growth rates from year 2000 to year 2010 are higher than the statewide average growth rate of 2.16% per year.

Table 2-2. Population Growth Trends

Year	State of Utah	Duchesne County
1970	1,059,273	**7,414**
1980	1,461,037	**12,660**
1990	1,722,850	**12,608**
2000	2,233,169	**14,449**
Average Annual Growth (1970 – 2000)	2.52%	**2.25%**
2010	2,763,885	**18,616**
Average Annual Growth (2000-2010)	2.16%	**2.58%**

Duchesne County has similar demographic characteristics when compared with the State of Utah. In the 20 to 24 year old category, the State is at 8.2% and the County is at 6.56%. In the 25 to 44 year old category, the State is at 28.2% and the County is at 25.38%. In the 45 to 64 year old category, the State is at 19.8% and the County is at 20.92%. For the 65+ year old category, the State is at 9.2% and the County is at 10.66%. The median age for the population in the State of Utah and for Duchesne County is 29.2 years and 29.7 years old respectively. The race demographics show a trend that is different from the state. The State has a smaller Non-Hispanic, White population at 80.4%, compared to the County's 89.15%. Duchesne County is more typical of the rural parts of the State, which tend to have a smaller minority population.

The 2010 median income in Duchesne County is $52,895 compared to the State median household income of $55,117. The unemployment rate in the State was 5.1% and in Duchesne County it was 3.9% in 2012. Figure 2-1 shows the 2012 job distribution by industry in Duchesne County.

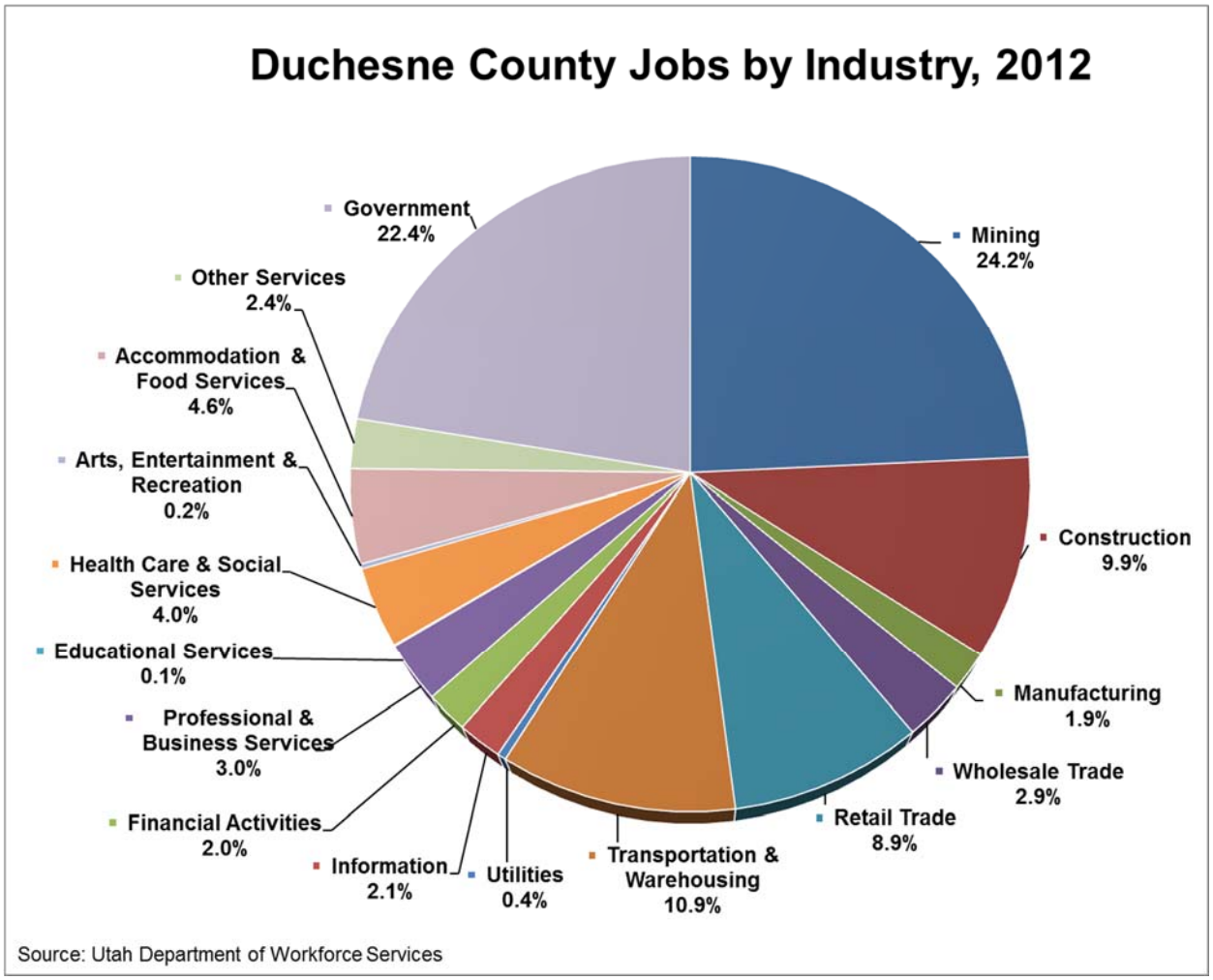

Figure 2-1. 2012 Duchesne County Employment Data

2.3. ROADWAY NETWORK INVENTORY

A wide variety of traffic and roadway data was collected in order to develop the TMP. This data was used to analyze the existing conditions and to help develop the future conditions.

The following information was gathered for the existing roadway network:

- Number of lanes
- Roadway Segment Lengths
- Daily traffic counts, speeds, and classifications on selected roadway segments
- Planned and funded roadway improvement projects
- Vehicle accident information and roadway safety concern areas
- Pavement surveys for a majority of paved roadway segments
- Core samples of a majority of paved roadway segments (asphalt depths, base course, and subgrade materials)
- County and State tracked bridge structure inventories

The County roadway network provides the dominant means of transportation for this area, with the State highway system serving as the backbone for this network.

2.4. COUNTY ROADWAYS THROUGH UINTAH & OURAY INDIAN RESERVATION LANDS

Duchesne County has approximately 213 miles of roadway adjacent to or crossing tribal trust lands. Many of these roadways are important corridors for recreational use and access to Forest Service, BLM, and other public lands. Several of these access corridors have been found deficient in safety and pavement conditions and coordination will be required for repair and maintenance of these roadways. See Appendix A for maps showing roadways and land ownership, including tribal trust lands in the County. A working relationship between these entities is desirable to maintain these corridors and provide adequate safety, functionality, and protection to both roadway users and infrastructure.

It is recommended that agreements and maintenance policies be upheld and sought to benefit both county residents and tribal interests. Possible cost sharing opportunities should be investigated and open communication between Tribal leaders, The Bureau of Indian Affairs, and County leaders can facilitate these opportunities.

2.5. FUNCTIONAL CLASSIFICATION

A roadway network is comprised of a hierarchy of roadways whose functional classifications are defined by their usage. In general, streets serve two functions; they provide access and mobility. The relative degree to which a road serves these functions defines its functional classification. In descending order of their ability to provide mobility, the roadway functional types are more thoroughly described as follows:

2.5.1. STATE AND U.S. HIGHWAY SYSTEM

Much of the primary regional roadway system in Duchesne County consists of roads that are maintained by the Utah Department of Transportation (UDOT):

- US-40 is the primary federal highway within the County. This highway functions as the primary East-West regional corridor through the County.
- US-191 is the second federal highway within the County. This highway functions as the primary North-South regional corridor through the County.
- State Highways in the County include segments of SR-150, SR-35, SR-208, SR-87, SR-311 and SR-121. These roads generally serve collector and minor arterial roadway functions.

2.5.2. ARTERIALS

Arterials carry longer-distance traffic flow for regional, intercommunity and major commuting purposes. Arterials have a limited number of at-grade intersections and, only when other alternatives do not exist, they provide direct property access. Arterials can carry significant traffic volumes at higher speeds for longer distances, and accesses are seldom spaced at closer than 660 foot intervals (See Section 7 for Access Management).

2.5.3. MAJOR COLLECTORS

Major collectors are the next highest classification and are higher speed roadways where mobility still takes precedence over access. This designation is also used for rural primary facilities where the arterial classification is not warranted by lanes or traffic volumes.

2.5.4. MINOR COLLECTORS

Minor collectors serve as main connectors between communities and neighborhoods. They distribute traffic between arterials/major collectors and local roads. Most of the traffic on minor collectors has an origin or a destination within the community. Also known as rural secondary facilities, this classification includes most County roads that are numbered and are not classified as major collectors or arterials.

2.5.5. LOCAL ROADS

The primary function of local roads is to provide access to adjacent land uses, whether it is residences, businesses, or community facilities. Local streets generally are internal to or serve an access function for a single neighborhood or development. Traffic using local roads should have a close-by origin or destination. Typically, County numbered roadways with a local classification are limited in length and continuity. This study primarily focuses on arterial and collector roadways and local roads are left to developers to define and construct in their respective developments.

2.5.6. VEHICLE MILES OF TRAVEL (VMT)

The VMT for each roadway was calculated from two different sources. The first source was traffic counts that were conducted on each of the listed roadways as part of this study. The second source was traffic counts that were obtained from UDOT as part of their on-going counting procedures. The VMT was calculated by taking the daily traffic for each specific roadway and multiplying that by the length of that segment of roadway. The VMT was then used in determining the functional classification of each roadway in the study area. Federal Highway Administration guidelines limit the percentage of road miles and VMT on functionally classified highways. The allowable percentages for each classification are shown below in Table 2-3: Allowable Percentage of Road Miles and VMT.

Table 2-3. Allowable Percentage of Road Miles and VMT

Functional Classification	Rural		Urban	
	Mileage	VMT	Mileage	VMT
Principal Arterial	2%-4%	30%-55%	5%-10%	40%-65%
All Arterials	6%-12%	45%-75%	15%-25%	65%-80%
Collectors	10%-25%	20%-35%	5%-10%	5%-10%
Local Roads	65%-75%	5%-20%	65%-80%	10%-30%

2.6. ROADWAY CONDITIONS

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

2.6.1. TRAVEL LANES

The majority of the roads that fall under Duchesne County jurisdiction consist of two travel lanes. Various roadway segments, particularly in the mountainous portion of the County consist of three lanes, with the third lane acting as a climbing or passing lane. Several unpaved roads in the mountainous areas consist of a single travel lane.

2.6.2. SURFACE CONDITIONS

All State Highways in the County are paved. The study roadway segments for the County are paved. Many of the rural and mountainous roads are unpaved. Appendix A includes a map showing the surface condition of all the roadways that were included in the study (Appendix A –Figure A-2: Existing Roadway Assessments).

2.6.3. TRAFFIC VOLUME

Traffic volumes are an indicator of the relative importance of a roadway in an area. When compared to roadway capacity estimates, traffic volumes also reveal generally how a road is functioning (level of service) and if improvements to increase capacity are necessary.

The most commonly used measurement of traffic volume is Average Daily Traffic (ADT). ADT is defined as the total number of vehicles passing a certain point in both directions in a 24-hour period. Figure A-2: Existing Roadway Assessments in Appendix A shows the existing ADT on the major roadways in the County. These ADT's were not adjusted for the average day of the week and month of the year because there is limited data available to use for adjustment.

A complete list of traffic volumes on the study roadway segments is included in Appendix B.

2.7. ROADWAY CAPACITIES

A roadway's capacity can be defined as the maximum traffic volume that can be accommodated at desired levels of service (LOS). LOS is commonly used to define the quality of traffic flow on various roadway types based on a comparison of traffic volumes with roadway characteristics. A LOS scale ranging from A to F is used to define the quality of flow, with LOS A representing an essentially free-flow situation and LOS F representing the highest levels of congestion, with traffic volumes exceeding the intended capacity of the roadway. It is standard engineering practice to assume that a facility with LOS A through LOS D is within an acceptable range for most users. For the purpose of this study, LOS guidelines for the study roadways are LOS C or better. Table 2-4 provides the resulting daily capacities for LOS C based on number of lanes.

Table 2-4. Rural LOS "C" Daily Traffic Capacity Estimates

Travel Lanes	Highway	Arterial	Collector
2	NA	12,000	7,500
3	NA	13,000	8,500
4	50,000	20,500	16,000
5	NA	22,000	18,000
6	72,000	30,500	NA
7	NA	33,000	NA
8	NA	NA	NA

Source: Spanish Valley Transportation Study, July 2005

The 2012-2013 analysis indicates that all of the study roadway segments are operating at LOS A. A Table showing the 2013 LOS for the study roadway segments is found in Appendix B.6.

2.8. VOLUME TO CAPACITY RATIOS

One operational measure that is used to define operational characteristics is volume to capacity ratio (V/C). This is the daily traffic volume on a given roadway divided by the daily capacity of that roadway. LOS analysis was performed on the study roadway segments. The traffic growth projection produces daily traffic volumes (V) for roadway segments and each segment has a maximum capacity (C), which is assumed to be the LOS "C" threshold. The volume to capacity ratio (V/C) is used to measure traffic density on any given road segment. A V/C equal to 1 or more means that the road is carrying as many vehicles as possible so it is very crowded and there isn't much room to maneuver or change speeds. This typically is classified as LOS "F" conditions. A V/C ratio less than 0.6 means that the road is carrying very few vehicles so it is not crowded and there is plenty of room to maneuver or change speeds. This is typically classified as LOS "A" conditions. V/C ratios between 0.6 and 1.0 generally fall within the LOS ratings from "B" to "E".

The LOS analysis is based on roadway segments excluding the intersections. On a typical roadway, the intersections are the limiting factor to the operation of the roadway segment. Hence, the LOS of the intersection is the controlling factor in determining the overall LOS for the roadway. The results produced for the roadway LOS analysis is included in Table 2-5. The table shows that all V/C ratios fall below 0.6, which means that all roads studied currently meet LOS A conditions.

Table 2-5. Existing 2012-2013 ADT & V/C Ratio

Road	Count CV#	Description	2012 ADT Combined	Total % Trucks	Total # Trucks	V/C Ratio 45 mi/h
2000 W	CV1	2000 West North of Neola	725.5	6.50%	47	0.007
3000 W	CV2	3000 West Just North of 4000 North	725.5	6.63%	157	0.007
4000 N	CV3	4000 North	795.3	9.75%	77	0.008
6250 S	CV4	6250 South-NW of Myton	860.5	23.00%	196	0.008
6450 S	CV5	6450 South-NW of Myton	299	29.91%	88	0.003

9000 N	CV6	9000 North-West of Neola	496.3	10.03%	49	0.005
12000 W	CV7	12000 West #1-Bluebell	490.6	7.96%	39	0.005
12000 W	CV8	12000 West #2-Bluebell	277	6.80%	19	0.003
12000 W	CV9	12000 West #1-Bridgeland	753.9	18.14%	136	0.007
16000 W	CV10	16000 West-North of Altamont	364.3	4.28%	16	0.004
21000 W	CV11	21000 West	323.4	6.30%	20	0.003
Antelope Canyon Rd	CV12	Antelope Canyon Road	594.9	23.24%	137	0.006
Bluebell Rd	CV13	Bluebell Road-071712	1210.7	6.44%	77	0.012
Bluebell Rd	CV14	Bluebell Road-061212	1659.3	9.93%	164	0.016
Bluebell Rd	CV15	Bluebell Road-Silver Counter	1190.8	6.35%	75	0.012
Bluebell Rd	CV16	Bluebell Road-Yellow Counter	1242.1	5.96%	74	0.012
CR-33	CV17	CR-33-Pariette Rd South	2122.5	23.66%	501	0.021
East River Rd	CV18	East River Road	602.1	8.61%	51	0.006
Hancock Cove Road	CV19	Hancock Cove Road	940	3.16%	29	0.009
Lake Boreham Rd	CV20	Lake Boreham Road-080712	288.8	22.26%	60	0.003
Moon Lake Rd	CV21	Moon Lake Road #1	33.2	0.00%	1	0.000
Ostler Corner	CV22	Ostler Corner - 200 North	1694.2	4.50%	76	0.016
Ostler Corner	CV23	Ostler Corner - 3000 West	1393.6	13.96%	187	0.014
Strawberry River Road	CV24	Strawberry River Road	330.1	31.19%	101	0.003
Uintah Canyon Road	CV25	Uintah Canyon Road	64	1.43%	1	0.001
CR-33	CV26	CR-33	2621.5	21.92%	570	0.025
CR-33	CV27	CR-33	2251.7	23.89%	531	0.022
Lake Boreham Rd	CV28	Lake Boreham Road-082112	182.4	16.57%	30	0.002
Lake Boreham #1	CV29	Lake Boreham #1 040513	183.3	13.41%	24	0.002
Lake Boreham #2	CV30	Lake Boreham #2 040513	144.4	9.39%	14	0.001
6000 West	CV31	6000 West	202.9	10.38%	21	0.002
Red Creek Road	CV32	Red Creek Road #1	54	3.41%	2	0.001

2.9. TRAFFIC ACCIDENT DATA

Traffic accident data was gathered from the State Department of Transportation for Duchesne County for the four year period from 2006 to 2010.Milepost data and locations were included in the data and a GIS map was created to highlight areas of accidents and crash densities. The system worked well for accidents along State and Federal roadways with milepost data, but it was difficult to pinpoint accident locations on rural roadways. Most of the crashes were random in nature and no major patterns were found that needed to be mitigated. During the four year period of data obtained, there was only a small amount of data with GPS coordinates, however, in the more recent years, law enforcement officers are utilizing GPS technology to record crash sites. It was determined that meetings with the Sherriff's office, Utah Highway Patrol, EMS, and County Emergency Management were more effective in identifying areas of concern and historic crashes on County roadways for this study. It is recommended that

updates to the TMP include utilization of GPS coordinates for County roadway crashes tracked in the GIS map for future identification of problem areas.

Accident Rate is a means in traffic engineering, used by UDOT, to gauge drivers' exposure to accidents. UDOT compares the actual accident rate verses the expected rate, which is the five year average of accident rates for the last five years of available data. Severity rate is a measure of the seriousness of an accident, with #1 being property damage only, going all the way to #5, which is a fatality. Both the accident rate and the severity index are the best indicators of how well or how bad an intersection or segment of roadway is performing with regards to safety.

2.10. REVENUE SOURCES

Funding for the maintenance of the existing transportation facilities comes primarily from revenue sources that include the Duchesne County general fund, federal funds, transportation impact fees, and State Class B and C funds. Funding for local transportation projects consists of a combination of federal, state and local revenues. However, this total is not entirely available for transportation improvement projects since annual operating and maintenance costs must be deducted from the total revenue. In addition, the County is limited in the ability to subsidize the transportation budget from general fund revenues. The County has access to mineral lease monies that are administered through the Special Service District #2 and come from the Community Impact Board. These funds have enabled the County to successfully complete several road projects.

2.10.1. STATE CLASS B AND C PROGRAM

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

Class B and C funds are allocated to each County and City by a formula based on population, road mileage, and land area (see Table 2-6 below). Class B funds are given to counties, and Class C funds are given to cities and towns.

Table 2-6. Apportionment Method of Class B and C Road Funds

Based on	Of
50%	**Roadway Mileage**
50%	**Total Population**

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

reserves for issued bonds. The 2015 Utah Legislature is expected to consider transportation funding enhancement options including increasing the gas tax.

2.10.2. FEDERAL FUNDS

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

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

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

2.10.3. LOCAL FUNDS

Duchesne County, like most counties, has used general fund revenues in its transportation program. Other options available to improve the County's transportation facilities could involve some type of bonding arrangement, either through the creation of a redevelopment district or a special improvement district. These districts are organized for the purpose of funding a single, specific project that benefits an identifiable property or group of properties. Another source is through general obligation bonding arrangements for projects felt to be beneficial to the entire entity issuing the bond. In November 2015 Duchesne County passed a proposition which raised local sales tax $0.01 for every $4 dollars spent. Other counties around the state had the proposition on the ballot. Some counties passed it while others did not. Duchesne County’s allotment of the local option tax is distributed as follows:

- 40% distributed to municipalities in the County
- 20% distributed to the County
- 40% distributed to the local transit authority (BTA)

These funds can be used for transportation projects in the municipalities and throughout Duchesne County.

2.10.4. PRIVATE FUNDING SOURCES

Private interests often provide sources of funding for transportation improvements. Developers construct the local streets within subdivisions and often dedicate right-of-way and participate in the construction of collector or arterial streets adjacent to their developments. Developers can also be

considered as a possible source of funds for projects because of the impacts of the development on the County. Some of these impacts include the addition of traffic signals and/or street widening.

2.10.5. ENERGY DEVELOPMENT SOURCES

Energy development makes up a large portion of the economy and impacts to the transportation system in Duchesne County. In the past, energy development companies have participated in various degrees with improvements to existing roadway infrastructure. No set policy or approach has been taken to quantify impacts or economic benefit for energy development in Duchesne County. Recently, the Uintah Basin Energy and Transportation study was completed to address questions on constraints and limitations to the economy and oil and gas production due to the capacity of the transportation infrastructure. The findings point to material limitations in the capacity of the transportation system with demand exceeding capacity as soon as 2020. The capacity limitations could result in a loss of up to 12% of potential production in the next 30 years. Finding ways for cooperation and funding support will benefit both the transportation system in the County as well as the gas and oil production companies.

2.11. BICYCLE FACILITIES

The Federal Highway Administration uses three general categories of bicycle user types to help determine what type of facility may be appropriate for a specific plan. Advanced riders are typically using a facility for convenience and speed in getting to specific destinations and are comfortable operating their bicycles as they would a motor vehicle. Basic riders also desire convenience and speed but lack the confidence and experience to comfortably ride on busy arterials. They tend to stick to lower volume roadways with wide shoulders. Children may ride with or without an adult, but also need connections to school, friends, convenience stores and parks. They tend to ride on low volume residential roads.

Along with these three types of riders there are three types of bicycle facilities that can be used to accommodate them. These bicycle facilities are sometimes referred to as Type 1, 2, or 3.

A Type 1 bicycle facility is one in which the bicycle rider uses a designated shared use path or trail that is completely separated from the roadway. A shared use path generally serves as a recreational opportunity that is integrated into an area wide system of trails. Common applications are along rivers, canals, utility rights-of-way and former railroad rights-of-way. Type 1 facilities serve all three types of riders, but primarily Basic Riders and Children.

Type 2 bicycle facilities refer to designated bicycle lanes. Bike lanes are delineated by appropriate pavement markings and signs along roads where there is sufficient pavement width to accommodate a safe four to five foot wide lane for bicyclists only. Type 2 facilities typically serve Advanced Riders. Basic Riders and sometimes children will use them if they are on low volume roads.

Type 3 bicycle facilities are also referred to as shared roadway bike routes. These are bike routes that may be designated in an overall bicycle facility plan, but do not provide any physical separation between bicycles and motorized vehicles. In rural areas unsigned Type 3 facilities serve mostly Advanced Riders and are used to connect major destinations. Signed Type 3 facilities indicate to motorists that they

should be aware of bicycles in the roadway and should treat them as they would another motorized vehicle.

There is currently no countywide plan for pedestrian and bicycle facilities. However, the County is actively pursuing funding for an overall trails master plan. Such a plan would work with this Transportation Master Plan to establish bicycle and pedestrian facilities and corridors throughout the County. Some of these facilities are already in place but a majority of them are not. As new corridors are planned and existing corridors upgraded the bicycle and pedestrian facilities described by this plan and the future Trails Master Plan may be accommodated as part of the improvements to the facilities. The type of facility will depend upon the availability of right-of-way to house the facility, amount of funding available to construct the facility, potential users that will use the facility, and roadway characteristics such as speed, shoulder width, availability of additional asphalt width, etc. If high speeds are present with little shoulder separation to adjacent vehicles then a Type 1 facility is recommended. The hierarchy for deciding which type of facility should be constructed for a given roadway should start with a Type 1 facility as being the preferred with a Type 3 being used only if a Type 1 and Type 2 cannot be accomplished.

3. FUTURE GROWTH

3.1. LAND USE AND TRANSPORTATION

Coordination between land use and transportation is critical for the future development of Duchesne County. Street classification and development can guide both desirable and undesirable land uses. The same holds true for land use development. Land use development without transportation planning may result in roadways being classified in opposition to the overall goals of the transportation plan. Therefore, it is imperative that the goals of land use and of transportation are coordinated with each other to support and augment rather than oppose each other.

The Duchesne County future land use plan identifies areas for growth and non-growth. The new developing residential and commercial areas will have the greatest impact on the transportation system because of daily trip traffic. The projected growth for Duchesne County will be a combination of residential, commercial, and energy development related growth. Areas of energy development are not always identified by location or time frame, but efforts to coordinate between the energy companies and the County are necessary for implementation of transportation improvements in those areas.

Traffic data from selected roadway segments on SR-35, US-40, US-191, SR-87, SR-208, and SR-121, gathered by UDOT from the 2010-2012 AADT History published by UDOT, were used to calculate a traffic growth rate for each roadway section. The average of all the growth rates was calculated and a growth rate of 3.75% was used to forecast the future traffic volumes for the study roadways. The data for calculating the traffic growth rates and AADT for State highways is found in Appendix B.

3.2. ROADWAY NETWORK AND TRAFFIC FORECAST

Existing traffic volumes shown in Table B-3 were applied a growth rate of 3.75% for five, ten and twenty years to determine the future traffic volumes on Duchesne County roadways. This factor was determined from UDOT traffic count records and growth between 2010 and 2012 on highways in Duchesne County (Appendix B.4 Traffic Count Data – UDOT Roadways). Table 3-1 below shows the 2033 forecast ADT and future Functional Classification for the study roadways with traffic count data. Spreadsheets showing the VMT, LOS, and Roadway Functional Classification are found in Appendix B. The LOS analysis found that all roadways remained a LOS A for the 20 year period with assumed growth rates. Intersection LOS may be affected by increased traffic and truck activity.

Table 3-1. Duchesne County Roadway Traffic Forecast and Future Classification

County Road #	Location Description	2012-2013 ADT Combined	Total % Trucks	2018 ADT	2023 ADT	2033 ADT	2033 Roadway Functional Classification
CR 331	2000 West North of Neola	725.5	6.5%	872	1048	1515	Minor Collector
CR 152	3000 West North of 4000 North	725.5	6.6%	872	1048	1515	Minor Collector
CR 158	4000 North Cedarview	795.3	9.7%	956	1149	1661	Major Collector
CR 64	6250 South Arcadia	860.5	23.0%	1034	1243	1797	Minor Collector
CR 64	6450 South Arcadia	299	29.9%	359	432	624	Minor Collector
CR 158	9000 North West of Neola	496.3	10.0%	597	717	1036	Major Collector
CR 80	12000 West #1 Bluebell	490.6	8.0%	590	709	1024	Major Collector
CR 80	12000 West #2 Bluebell	277	6.8%	333	400	578	Major Collector
CR 80	12000 West #1 Bridgeland	753.9	18.1%	906	1089	1574	Major Collector
CR 121	16000 West North of Altamont	364.3	4.3%	438	526	761	Minor Collector
CR 113	21000 West	323.4	6.3%	389	467	675	Minor Collector
CR 27	Antelope Canyon Road	594.9	23.2%	715	860	1242	Minor Collector
CR 142	Bluebell Road - Jenkins Draw	1210.7	6.4%	1455	1750	2528	Major Collector
CR 142	Bluebell Road - Cove	1659.3	9.9%	1995	2398	3465	Major Collector
CR 142	Bluebell Road - Altamont	1242.1	6.0%	1493	1795	2594	Major Collector
CR 79	East River Road	602.1	8.6%	724	870	1257	Minor Collector
CR 156	North Hancock Cove Road	940	3.2%	1130	1358	1963	Minor Collector
CR 65	Lake Boreham Road	288.8	22.3%	347	417	603	Minor Collector
CR 113	Moon Lake Road	33.2	0.0%	40	48	69	Minor Collector
CR 154	South Cove Road	1694.2	4.5%	2037	2448	3538	Major Collector
CR 152	3000 West	1393.6	14.0%	1675	2014	2910	Major Collector
CR 14	Strawberry River Road	330.1	31.2%	397	477	689	Minor Collector
CR 331	Uintah Canyon Road	64	1.4%	77	92	134	Minor Collector
CR 33	CR-33 North of Wells Draw Rd	2621.5	21.9%	3151	3788	5474	Major Collector
CR 33	CR-33 South of Wells Draw Rd	2251.7	23.9%	2707	3254	4702	Major Collector
CR 158	6000 West	202.9	10.4%	244	293	424	Minor Collector
CR 15	Red Creek Road	54	3.4%	65	78	113	Minor Collector

3.2.1. OPERATIONAL CHARACTERISTICS

A LOS analysis of the future roadway network was conducted for each of the horizon years in order to evaluate future operational needs. The analyses indicate that all of the study roadways will operate at LOS A for the 2013 through 2033 conditions, based on the assumed growth.

3.3. FUTURE DUCHESNE COUNTY ROADWAY SYSTEM

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

- Arterial
- Collector
- Minor Collector

Appendix A Figure A-3 contains maps that show the proposed future roadway system in the County. The focus of the plan is arterial, major collector and minor collector roadways. Little to no detail is shown for local roadways to allow flexibility as development occurs between the collectors. It is the intention of the plan for collectors to be spaced no closer than one-quarter mile apart. Minimum acceptable traffic signal spacing on a minor arterial is typically one-quarter mile, but varies based on the UDOT classification of the roadway. At some locations, additional right-of-way may be necessary on roadways above and beyond what is shown on the proposed future roadway system maps to accommodate for future auxiliary lanes, such as acceleration, deceleration, and turn lanes.

Frontage roads are an important element of access control in areas with limited access right of way and plenty of open space. Frontage roads provide access from collector roadways coming off arterials. This is the best way to allow commercial development frontage on the arterial roadways while limiting access directly on the arterial.

3.3.1. UDOT'S STATEWIDE TRANSPORTATION IMPROVEMENT PROGRAM

UDOT's Statewide Transportation Improvement Program (STIP) is a five-year plan of highway and transit projects for the State of Utah. The STIP is maintained daily and includes transportation projects on the State, Federal, and County highway systems as well as projects in the national parks, national forests and Indian reservations. These projects use various Federal and State funding programs. UDOT has programmed funds in the Statewide Transportation Improvement Plan (STIP) for roadways in Duchesne County contained in Appendix D.5. Projects identified in the Duchesne TMP meetings with steering committee and safety officials dealing with intersections of County roads and UDOT roads are also listed in Table D-7.

3.3.2. TRAFFIC SIGNAL NEEDS

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

3.3.2.1. 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.

3.3.2.2. IMPROVEMENT ANALYSIS

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

Where the roadway 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 County and/or UDOT.

3.3.3. SCHEDULE OF INTERSECTION SIGNALIZATION

There are currently six signalized intersections in the County, one in Duchesne City on US 40 at SR-87 and five in Roosevelt City on US-40 at 2000 West, State Street, Lagoon Avenue, Highway 121 and 600 East. Based on the development plan, it is anticipated that there will be a few additional intersections that will need to be signalized in the next 20 years. Because the majority of the highest ADT roadways in the County are owned by UDOT, more than likely the potential signalized intersections will be on the state highways. These locations are governed by UDOT and the timing and construction of these improvements will be handled by UDOT, however, recommendations and proposed intersection signalization warrant studies can be brought forward during annual UDOT coordination meetings.

Two ways exist to improve operations at intersections with two-way stop control. First, four-way stop control is used to improve operations at a two-way stop control intersection with equal traffic volumes on all approaches, given the traffic volumes are within the County. Second, signalization is used to improve operations of intersections where two legs have the majority of traffic, but traffic is high on the opposing two legs. Table D-7: UDOT Intersection Proposed Improvements in, Appendix D, contains recommendations from County safety and steering committees for intersections on State and Federal highways.

4. TRANSPORTATION GUIDELINES AND POLICIES

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

A TIS is a specialized study of the impacts that a certain type and size of development will have on the surrounding transportation system. It is specifically concerned with the generation, distribution, and

assignment of traffic to and from the “new development”. The term “new development” also includes properties that are being redeveloped.

4.1. TIS REQUIREMENTS

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

- All new developments or additions to existing developments, which are expected to generate more than 100 new peak hour vehicle trips
- In some cases, a development that generates less than 100 new peak hour trips should require a TIS if it affects local “problem” areas. These would include high accident locations, currently congested areas, or areas of critical local concern
- All applications for rezoning when there is a significant increase in traffic volume
- Any change in the land use or density that will change the site traffic generation by more than 15 percent, where at least 1000 new peak hour trips are involved.
- 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 are more than 2 years old, access decisions are still outstanding, and changes in development have occurred in the site environs.
- When development agreements are necessary to determine “fair share” contributions to major roadway improvements.

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

4.1.1. CATEGORY I

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

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

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

4.1.2. CATEGORY II

A Category II TIS should be required for all developments, which generate from five hundred (500) to one thousand (1,000) peak hour trips during the morning, afternoon or Saturday peak hour. The study horizon should include the opening year of the development, year of completion for each phase of the development, if applicable, and five years after the development’s completion. The minimum study area

should include the site access drives and all signalized intersections and major unsignalized street intersections within one-half mile of the development.

4.1.3. CATEGORY III

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

4.1.4. INITIAL WORK ACTIVITY

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

The Public Works Director or designated representative (or UDOT if a state highway is affected) 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 Public Works Director and/or UDOT, the developer shall prepare for submittal to the Public Works Director, and/or UDOT for review and approval, a draft table of contents for the TIS. The table of contents will be sufficiently detailed to explain the proposed area of influence for the study, intersections and roadways to be analyzed, and level of detail for gathering of traffic volume information and preparation of level of service analyses. There should also be included in the draft a proposed trip distribution for site traffic. After approval of the draft table of contents and trip distribution by the County and/or UDOT, the actual TIS work activities may begin.

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

4.1.5. QUALIFICATIONS FOR PREPARING TIS DOCUMENTS

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

4.2. ANALYSIS APPROACH AND METHODS

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

4.2.1. STUDY AREA, HORIZON AND TIME PERIOD

The minimum study area should be determined by project type and size in accordance with the criteria previously outlined. The extent of the study area may be either enlarged or decreased, depending on special conditions as determined by the County and/or UDOT. The study horizon years should be determined by project type and size, in accordance with the criteria outlined in Sections 4.1.1 – 4.1.3.

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

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

4.2.2. SEASONAL ADJUSTMENTS

When directed by the County and/or UDOT, traffic volumes for the analysis hours should be adjusted for the peak season, in cases where seasonal traffic data is available.

4.2.3. DATA COLLECTION REQUIREMENTS

All data should be collected in accordance with the latest edition of the ITE Manual of Traffic Engineering Studies, or as directed by the County and/or UDOT.

4.2.3.1. 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 County and/or UDOT. Turning movement counts may be extrapolated from existing turning movement counts, no more than two years old, with the concurrence of the County and/or UDOT.

4.2.3.2. 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 County and/or UDOT. Where daily count data is not available, mechanical counts will be required at locations agreed upon by the County and/or UDOT.

4.2.3.3. ROADWAY AND INTERSECTION GEOMETRICS

Roadway geometric information should be obtained. This includes, but is not limited to, roadway width, number of lanes, turning lanes, vertical grade, location of nearby driveways, and lane configuration at intersections.

4.2.3.4. TRAFFIC CONTROL DEVICES

The location and type of traffic controls should be identified at all locations to be analyzed.

4.2.4. TRIP GENERATION

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

4.2.5. TRIP DISTRIBUTION AND ASSIGNMENT

Projected trips should be distributed and added to the projected non-site traffic on the roadways and 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 County and/or UDOT. 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 County and/or UDOT must give prior approval to the growth rate used. In addition, any nearby proposed development projects currently under review by the County (“on-line”) should be taken into consideration when forecasting future traffic volumes. The increase in traffic from proposed "on-line" projects should be compared to the increase in traffic by applying an annual growth rate.

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

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

added to the street network. This “figure” should be prepared showing the base-line volumes with site-generated traffic added to the street network. This "figure" will represent site specific traffic impacts to existing conditions.

4.2.6. CAPACITY ANALYSIS

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

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

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

4.3. TIS REPORT FORMAT

This section provides the format requirements for the general text arrangement of a TIS. Deviations from this format must receive prior approval of the County and /or UDOT.

I. INTRODUCTION AND SUMMARY
   1. Purpose of Report and Study Objectives
      a. Executive Summary
      b. Site Location and Study Area
      c. Development Description
      d. Principal Findings
      e. Conclusions
      f. Recommendations

II. PROPOSED DEVELOPMENT
   1. Off-Site Development
   2. Description of On-Site Development
      a. Land Use and Intensity
      b. Location
      c. Site Plan
      d. Zoning

e. Development Phasing and Timing

III. STUDY AREA CONDITIONS

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

IV. ANALYSIS OF EXISTING CONDITIONS

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

V. PROJECTED TRAFFIC

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

VI. TRAFFIC AND IMPROVEMENT ANALYSIS

1. Site Access
2. Capacity and Level of Service Analysis
   a. Without Project (for each horizon year including any programmed improvements)
   b. With Project (for each horizon year, including any programmed improvements)
3. Roadway Improvements
   a. Improvements Programmed to Accommodate Non-site (Background) Traffic
   b. Additional Alternative Improvements to Accommodate Site Traffic
4. Traffic Safety

a. Sight Distance
b. Acceleration/Deceleration Lanes, Left-Turn Lanes
c. 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
   a. On-Site
   b. Off-Site
   c. 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
5. Accident Data and Summaries

X. FIGURES AND TABLES

1. The following items shall be documented in the text or Appendices
   a. Site Location
   b. Site Plan
   c. Existing Transportation System
   d. Existing Peak Hour Turning Volumes
   e. Estimated Site Traffic Generation
   f. Directional Distribution of Site Traffic
   g. Site Traffic
   h. Non-Site Traffic
   i. Total Future Traffic
   j. Projected Levels of Service
   k. Recommended Improvements

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

XI. DESIGN STANDARD REFERENCE

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

4.4. ROADWAY STANDARDS

All roadways shall be designed to conform to the Engineering standards and technical design requirements adopted by Duchesne County or UDOT if under their jurisdiction. These standards can be supplemented by this master plan, and include current edition of the AASHTO (American Association of State Highways Transportation Officials), A Policy on Geometric Design of Highways and Streets, and the current Utah edition of the MUTCD (Manual on Uniform Traffic Control Devices). In cases of conflict, a determination shall be made by the County and/or UDOT, whose determinations shall be final.

Duchesne County has adopted these design standards for roadways to ensure that the facilities provide the necessary safety and capacity elements. The requirements for the roadway cross-section configurations are shown in Table 4-1. These requirements are based on traffic capacity design speed, projected traffic, system continuity and overall safety. All new developments shall use roadway cross-sections with fifty-foot (50') or more of right-of-way. Access to multi-family or commercial development shall use roadway cross-sections with sixty six feet (66') or more of right-of-way. Appendix A contains an existing conditions map that shows the surface type for all roadways in the County. Appendix E includes the standard typical sections by functional classification for roadways in the County. The local roads are left to developers and the arterial roadways are under UDOT jurisdiction.

Table 4-1. Roadway Cross-Section Configurations

Classification	Minimum ADT or [D.U.'s]	Traffic Index	Right-of- Way (ft.)	Pavement Width (ft.)	
Minor Collector	1,260 to2,000 [126 to200]	5.5	60	30	
Major Collector[2]	2,010 to6,000 [201 to600]	6	66	30	
Arterial[2]	6,000 to20,000 [600 to 2000]	7	80	40	

NOTES:
1. Pavement width measured from lip of curb to lip of curb.
2. Configuration of major collector and higher classifications may be adjusted with proper justification and approval of County.
3. The minimum right-of-way and pavement width is shown. Each may be increased when required by a traffic impact study.

4.5. SAFE TRANSPORTATION SYSTEM

A goal of Duchesne County is to maintain a safe transportation system. This is a high priority and the County will work diligently to meet applicable safety standards. This can be best accomplished by the following recommendations:

- Require all major developments to provide adequate access for emergency vehicles.
- Provide safe pedestrian street crossings, particularly near schools and recreation areas.

- Encourage development of school routing and recreation plans that minimize vehicle/pedestrian conflicts.
- Establish speed limits based on traffic engineering analysis. Enforce speed limits, especially near schools, in residential areas and commercial areas.
- Provide guidance for vehicles on roadways through striping, raised medians and islands, reduction of roadside obstructions, and other traffic engineering solutions.
- Require all roadway features to meet minimum design standards established by the American Association of State Highway and Transportation Officials (AASHTO). All signs, pavement markings and traffic signals must meet standards established by the current Utah edition of the Manual of Uniform Traffic Control Devices (MUTCD). Exceptions can be granted by the County on a case-by-case basis for those designs that demonstrate innovative superiority over the existing standards.

- Maintain optimal walkway conditions for walking, wheelchairs and strollers by:
    a. Repairing cracks and bumps
    b. Minimizing slopes
    c. Maintaining visibility at corners
    d. Avoiding abruptly ending walkways
    e. Reducing speed and traffic
    f. Keeping walkways clear of poles and other objects
    g. Avoiding poor drainage and standing water on or adjacent to roadway
    h. Providing curb cuts and ramps that comply with the Americans with Disabilities Act (ADA)
    i. Provide adequate emergency access and/or turnarounds on all dead-end streets or cul-de-sacs

4.5.1. ROADWAY NETWORK DESIGN

New roadway networks shall be designed in accordance with the general planning concepts, guidelines, and objectives provided in this section. The “Quality of Life” for residents should be a primary concern when designing a residential roadway network with safety as the overriding factor in design. An emphasis on proper street hierarchy should be adhered to, namely, local streets should access collectors; collectors should access arterials; etc. An emphasis on access management should provide careful control of the location, design, and operation of all driveways, median openings, and street connections to a roadway. For more information on access management, refer to the Access Management section of this document (Section 7).

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

A reduction in the use of cul-de-sacs should be emphasized in order to provide greater traffic circulation. Cul-de-sacs should only be allowed where topography and/or natural barriers prohibit the design of

through streets. Circulation is of the utmost importance; long blocks and excessive dead-end streets should be avoided.

Stopping sight distance must be considered at all intersections and curves to ensure the safety of the public, in accordance with AASHTO standards. Pedestrian and bicycle traffic should be considered in the planning and design of all developed streets.

Roadways should be planned to accommodate the traffic demand associated with adjoining developments and commercial areas. The capacity of these roadways can be established by following LOS criteria that has been established by various governmental agencies across the country. Table 2-4 shows the LOS thresholds for various roadway types.

4.5.2. IMPROVEMENT REQUIREMENTS

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

- Required curb, gutter and sidewalk shall be constructed in certain zones as specified in the County Subdivision Ordinance (except in areas where gravel road are allowed by the ordinance)
- Driveways shall be constructed in locations approved by the Public Works Director or UDOT
- Except in areas where gravel roads are allowed, all roadways, public or private, shall be surfaced to grade, with double chip seal or asphalt concrete pavement to the required minimum width and thickness as required by the County Subdivision Ordinance
- When new construction occurs in areas where curb and sidewalk are required, handicap ramps shall be constructed at all roadway intersections, unless otherwise approved, in accordance with the standard drawings. In addition, when a project occurs where existing improvements are in place, handicap ramps shall be upgraded to meet current standards
- Raised medians on public roadways shall be approved by the County and/or UDOT. Design and construction shall be in accordance with applicable standards
- Developers shall construct the minimum number of accesses needed to adequately address the needs of the development and only at approved locations, and
- Adequate drainage facilities shall be installed to properly control runoff from the roadway. Sub-drains and surface drainage facilities shall be designed in accordance with the approved drainage study

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 County and/or UDOT.

4.6. ENERGY/COMMERCIAL DEVELOPMENT IMPACT AND MITIGATION

Developments within Duchesne County and their associated impact fees and/or impact mitigation measures shall be addressed as per the recommendations in this section.

Several models can be adopted to mitigate impacts to infrastructure from development traffic loadings. They are:

1. Proactive, performance based (Prepare infrastructure for projected impact prior to development. “Armor up” the pavement structure.)

2. Reactive, performance based (impact fees for damage to infrastructure)
3. Reactive, not performance based (impact fee not associated with infrastructure impacts from a development)

Research by the Texas Department of Transportation suggests that a 7-to-1 cost benefit can be realized if roads are "armored up" prior to exposure to operator traffic (Assessing the Impacts of Energy Developments on Rural Texas Highway Infrastructure, Miller & Sassin, 2012). In other words, working proactively with industry and expending funds to improve infrastructure up front before major developments occur will realize significant savings compared to situations where infrastructure is rebuilt after it has been damaged. This is a proactive, performance-based approach that strengthens pavements prior to development activities and assesses fees for facility damage resulting from higher traffic volumes and heavy trucks. This approach requires coordination early and often between industry, specifically major energy companies, and Duchesne County.

With the understanding that significant cost savings can be realized by improving pavement structures prior to developments the following proactive process to mitigate infrastructure impacts should be followed for major developments in Duchesne County.

- Make a determination as to the traffic impact of the development.
    - For example, The Uintah Basin Energy and Transportation Study found that an average of 1,000 trucks per well location is a good estimate of the required truck traffic for an oil or gas development in the Uintah Basin.
- If the development will increase traffic by more than 25% of normal operating volume then it will be deemed "Extraordinary Use" and measures should be taken to improve insufficient pavement structures prior to the development.
- The mitigation measures pursued and fees assessed to the developer should be site specific. The following criteria should be considered when making this determination. It is not implied that this list is "all inclusive" and contains all elements to be considered when determining appropriate mitigation measures and impact fees.
    - The length, width, etc. of county infrastructure impacted by the development.
    - The current condition of the pavement.
    - The current depth of pavement and underlying base material.
    - The classification and associated estimated strength of the native soil. An estimated California Bearing Ratio (CBR) based on the native soil classification would likely be sufficient unless further analysis is deemed necessary.
    - Any existing geometric deficiencies or other concerns which could have a detrimental impact on the safety of the traveling public with the increased traffic from the development.
    - The projected equivalent single axle loads (ESALs) created by the development.
    - The required pavement structure to handle the increased traffic loading from the development.
    - Any deficiencies in drainage infrastructure that could be impacted by the development.
- Once the site specific impacts to the existing infrastructure are determined and associated probable costs of required improvements are calculated, it is optimal for all parties for Duchesne County to partner with the developer to make the improvements prior to the development impact occurring. In this scenario the developer would be required to fund, by way

of an impact fee, the improvements required due to the increased traffic load of their development. Duchesne County would fund any additional improvements beyond what is deemed necessary for the development.

- Impact fees may be imposed only after Duchesne County complies with the requirements of Title 11, chapter 36a of the Utah Code (see section 8.2.9 below)

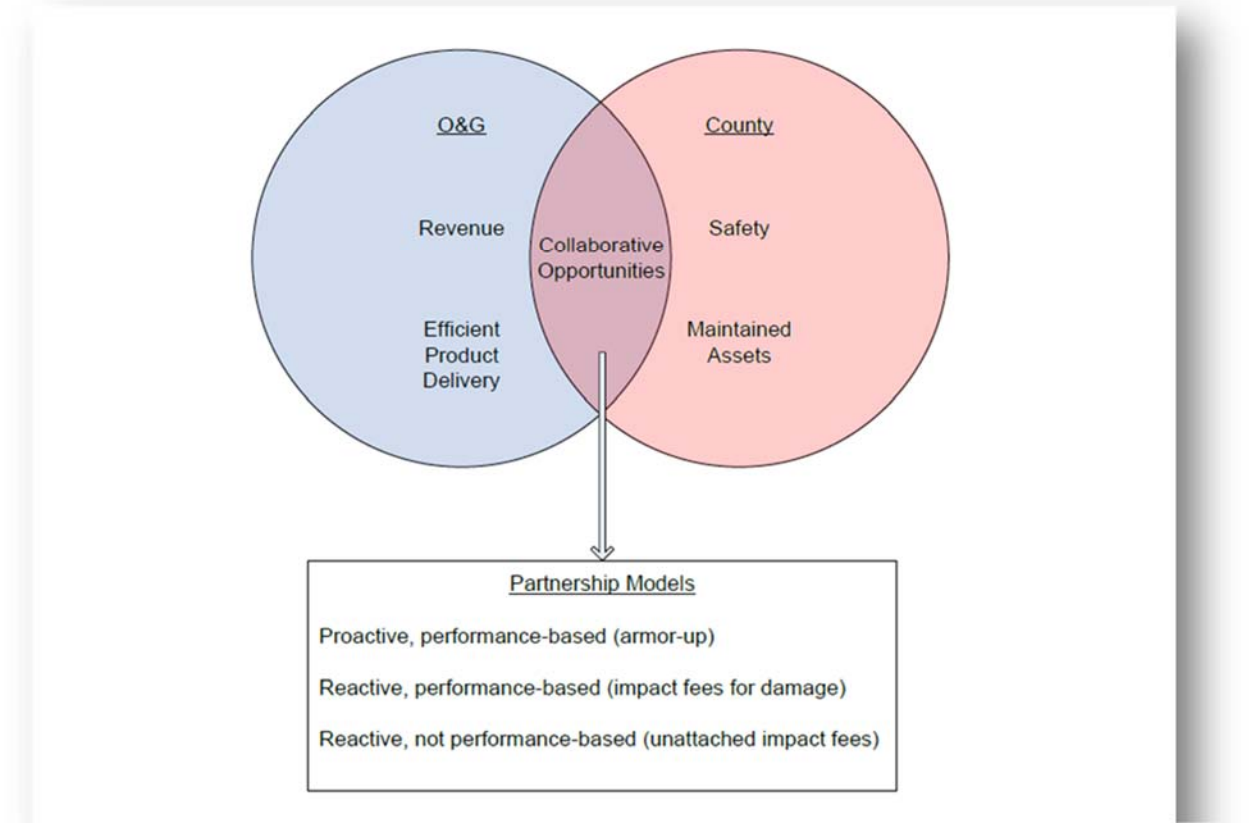

Figure 4-1. Partnership Models for Maintenance of Rural Road Networks.

Collaborative opportunities exist between the O&G industries and Duchesne County.

5. SHORT RANGE TRANSPORTATION IMPROVEMENT PLAN (1 - 5 AND 5 - 10 YEAR TIP)

The proposed short range TIP combines projects already identified by the County Public Works Department with findings and recommendations from the TMP study. The following general recommendations include:

- Develop an impact fees system for roadways to assess necessary roadway improvements on future development, in accordance with the Title 11, Chapter 36a of the Utah Code
- Track accidents in the County on a GIS database to help identify problem areas
- Update the TMP every 5 years

- Continue a routine chip seal maintenance program for asphalted roads to keep them in good working condition, with overlays as necessary
- Continue the existing process to include UDOT in subdivision and other development approvals that affect state highways
- Work with each of the cities in the County to monitor their transportation plans and update this plan as a working document
- Construct as many roadway improvements as possible as shown on the attached study area maps in Appendix A and tables in Appendix D

6. LONG RANGE TRANSPORTATION IMPROVEMENT PLAN (10 - 20 YEAR TIP)

- Most of the new proposed corridors and realigned roadways on the study area maps will fall in this category. Specific projects that are more relevant to quickly developing areas need to be addressed first after which the remainder can be done
- Target specific projects at longer range horizons that the County can focus its resources on as shown on Appendix A maps

7. ACCESS MANAGEMENT

This section will define and describe some of the aspects of Access Management for roadways and why it is so important. Uncoordinated growth along some of the region's major travel corridors has resulted in strip development and a proliferation of access points. A good example is Highway 40 west of Roosevelt. In most instances, each individual development along the corridor has its own access driveway. Numerous access points along the corridor create conflicts between turning and through traffic which causes delays and accidents.

A good access management program will accomplish the following:

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

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

Access management shall be used on all roadways within Duchesne County. Roadway access management strategies extend the useful life and capacity of roads at little or no cost to taxpayers. Access management can be used as an inexpensive way to improve performance on a major roadway that is increasing in volume. Access management should be used on new roadways and roadways that are to be improved so as to prolong the usefulness of the roadway.

7.1. DEFINITION

Access management involves providing (or managing) access to land development while simultaneously preserving the flow of traffic on the surrounding road system in terms of safety, capacity, and speed. (Source: Policy on the geometric Design of highways and Streets, AASHTO, 2001).

7.2. ACCESS MANAGEMENT TECHNIQUES

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

7.2.1. ACCESS MANAGEMENT

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 roadway connections. In addition, auxiliary lanes (turn lanes or by- pass lanes) are also used to divert traffic out of the through traffic stream to improve the traffic flow and improve safety.

Roadways are classified for access control based upon their importance to local and regional mobility. No facility can move traffic well and provide unlimited access at the same time. Table 7-1 below shows the relationship between mobility, access and the functional classification of streets. For example, the strictest access control is applied to roadways that serve through traffic or regional trips. The least access control is given to local streets that serve local traffic and short trips. In many cases, accidents and congestion are the result of streets trying to serve both mobility and access needs at the same time.

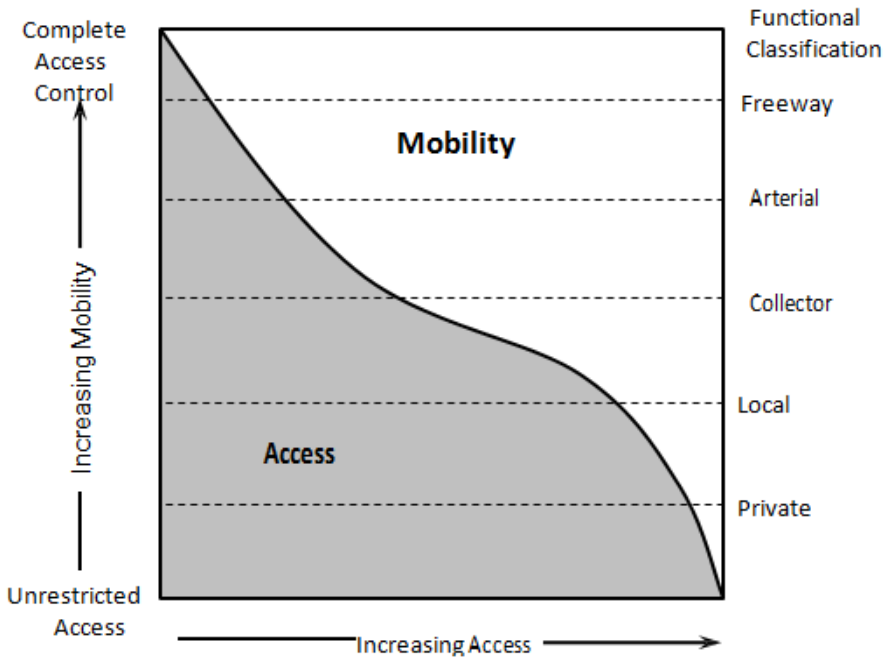

Figure 7-1. Access vs. Mobility

7.2.2. BENEFITS OF ACCESS MANAGEMENT

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

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

7.2.3. GENERAL ACCESS MANAGEMENT PRINCIPLES

The following access management guidelines and policies shall be adhered to within Duchesne County:

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

7.2.4. NUMBER OF ACCESS POINTS

Controlling the number of access points or driveways from a site to a roadway reduces potential conflicts between vehicles, pedestrian, and bicycles. Each parcel should normally be allowed one access point, and shared accesses are preferred where possible.

7.2.5. SIGNALIZED INTERSECTIONS

Uniform or near uniform spacing of signals is essential for efficient traffic flow. As a minimum, signals should be spaced no closer than one-quarter mile (1,320 feet) (see Table 7-1).

7.2.6. UNSIGNALIZED INTERSECTIONS

Unsignalized intersections are much more common than signalized intersections. Minimum separation standards are included in Table 7-1.

7.2.7. RIGHT-IN/RIGHT-OUT ACCESSES

Restricted access movement can provide for additional access to promote economic development with minimal impact to the facility. This type of access should be spaced to allow for a minimum of traffic conflicts and provide distance for deceleration and acceleration of traffic in and out of the access (See Table 7-1 for intersections and Table 7-2 for driveways).

7.2.8. RESIDENTIAL LOTS

The number of accesses on residential lots shall be based on the following:

- Number of Driveways: residential lots shall not have more than one driveway, unless approved by the Public Work Director.
- Distance, width: No driveway shall be planned right next to another driveway nor be more than 32 feet in width, unless approved by the Public Works Director. In no event shall the combined width of such driveways exceed 46 feet or 50% of the entire lot frontage, whichever is less.
- Corner Lots: In no event shall a driveway be placed on any corner lot within the distance of twenty 25 feet from the point of the intersection of property lines nearest the intersection or the point of intersection of the two rights-of-way, whichever is further from the intersection.

7.2.9. COMMERCIAL LOTS

Commercial lots or developments are not limited to a certain number of accesses per lot and should be addressed on a case-by-case basis. Additional accesses must be approved by the Public Works Director upon completion of a circulation plan or Traffic Impact Study provided to the Public Works Director indicating that more than one access is required to adequately handle the developments traffic volumes and further indicating that the additional access will not be detrimental to traffic flow on the adjacent street network.

Table 7-1 shows the spacing requirements, based on functional class, for roadway intersection spacing. Table 7-2 shows the requirements based on the functional class of the roadway facility for driveway access spacing.

Table 7-1. Roadway Intersection Separation Distances Based on Functional Class

Functional Class	Minimum Signal Spacing (ft.)	Minimum Unsignalized Full Movement (ft.)	Minimum Right- In/ Right-Out (ft.)
Private	1320	150	-
Residential Local	1320	150	-
Minor Collector	1320	250	150
Major Collector	1320	250	250
Arterial	1320	500	250
Commercial Local	1320	400	200
Industrial Local	2640	500	250

Table 7-2. Driveway Access Separation Distances Based on Functional Class

Functional Class	Minimum Full Movement (ft.)	Minimum Right-In/Right-Out (ft.)
Private	75	-
Residential Local	75	-
Minor Collector	125	-
Major Collector	250	**125**
Arterial	660	**330**
Commercial Local	400	**200**
Industrial Local	**500**	**250**

Note: Access spacing shall be measured from center of access to center of access.

Note: If the roadway is a state highway, access is regulated by UDOT.

Collector and Arterial roadways will have limited access. Where multiple parcels are consolidated, accesses shall also be consolidated according to County design and spacing standards. Temporary access may be granted to undeveloped property prior to completion of a final development plan if access is needed for construction or preliminary site access. Temporary accesses are subject to removal, relocation, or redesign after final development plan approval.

7.2.10. 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 7-3 Minimum Offset Distance between Driveways on Opposite Sides of Road below (See also Table 7-2).

Table 7-3. Minimum Offset Distance between Driveways on Opposite Sides of Road

Functional Class	Minimum Offset* (feet)Minimum Offset* (feet)
Private	Per County Ordinance/Zoning
Residential Local	Per County Ordinance/Zoning
Minor Collector	150
Major Collector	200
Arterial	600 ft. for speed of 45 or greater, 300 ft. for speeds under 45
Commercial Local	100 (25 mph); 300’ (26-40 mph); 500’ (40 mph)
Industrial Local	100 (25 mph); 300’ (26-40 mph); 500’ (40 mph)

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

7.2.11. CORNER SPACING

Providing adequate corner spacing improves traffic flow and roadway safety by ensuring that the traffic turning into a driveway does not interfere with the function of an intersection. Access to corner lots

should be from the lesser-classified road at the greatest distance possible from the intersection, and should not be less than the distances shown in Table 7-4. This distance is measured from the PC (point of curve) of the corner curve (See Figure 7-2 below). A 25-foot radius is considered the minimum where the existing radius is less than 25 feet.

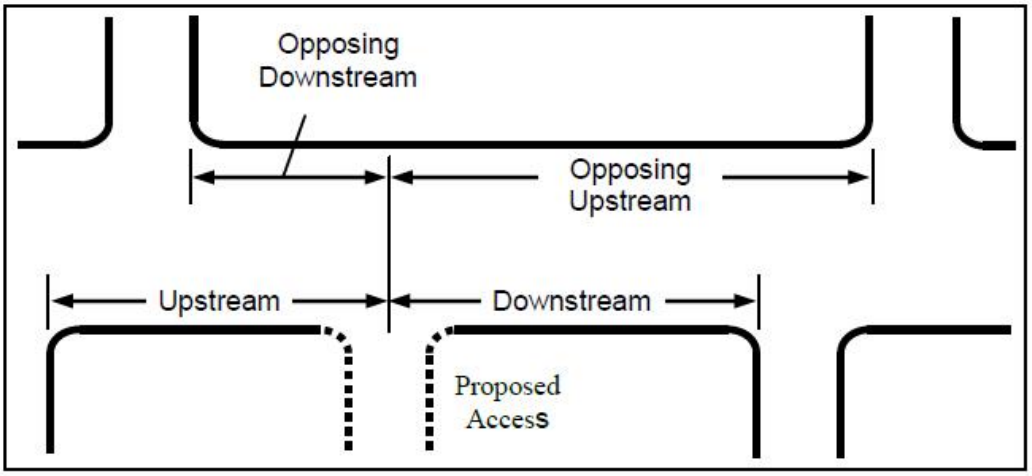

Figure 7-2. Access Distance from Corner

Table 7-4. Access Distance from Corner According to Facility Type

Facility Type	Upstream Distance on Major Roadway (feet)	Downstream Distance on Major Roadway (feet)
Residential Private	50	50
Residential Local	50	50
Minor Collector	100	75
Major Collector	175	150
Arterial	200	185
Commercial Local	100	-
Industrial Local	100	-

NOTES: a. All access points shall be approved by the County and/or UDOT. Distances shown may be adjusted by the County and/or UDOT on a case- by-case basis. Exceptions can only be approved by the County and/or UDOT upon submittal of proper traffic justification.

b. Distances shown are the minimum.

7.2.12. MEDIANS

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

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

Medians can also add to the overall aesthetics 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. Only ground cover plantings should be planted within 350 feet of an intersection/access opening. Care should be taken to select landscape material that will not intrude into the roadway and to locate materials such that they will not cause a safety problem. Trees should be selected that will not be larger than 4 inches in diameter when mature. Availability of irrigation water and access for maintenance must be considered.

Two way left turn lanes should only be used to retrofit areas of existing development and should be limited to roadways with less than 18,000 ADT. In areas with greater than 18,000 ADT, consideration should be given to a raised median with appropriately spaced median openings. Table 7-5 shows typical guidelines for spacing of unsignalized restricted median openings.

Table 7-5. 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

7.2.13. WIDTH OF ACCESS POINTS

In addition to limiting the number of access points, the width of the access point should be restricted based on the use of the site. Residential lot driveways should be limited to a maximum throat width of 32 feet at the back of the drive approach. The maximum width for a commercial or industrial site entrance with two-way traffic should be limited to 44 feet unless wider entrances are deemed necessary by the Public Works Director or UDOT to serve large vehicles. The width includes 12 feet for right out, 12 feet for left out, 16 feet for an ingress lane, and two-2 foot shoulders. The width of the entrance should be determined based on the type of use for the site, the type of traffic (cars vs. 18 wheel trucks), and the projected volume of traffic.

7.2.14. TURNING RADIUS

The turning radius of a driveway or access road affects both the flow and safety of through traffic as well as vehicles entering and exiting the roadway. The size of the turning radius affects the speed at which vehicles can exit the flow of traffic and enter a driveway. The larger the turning radius, the greater the speed at which a vehicle can turn into a site. The speed of the roadway, the anticipated type and volume of the traffic, pedestrian safety, and the type of use proposed for the site should be considered when evaluating the turning radius.

Table 7-6 below shows the turning radii for accesses based on vehicle type.

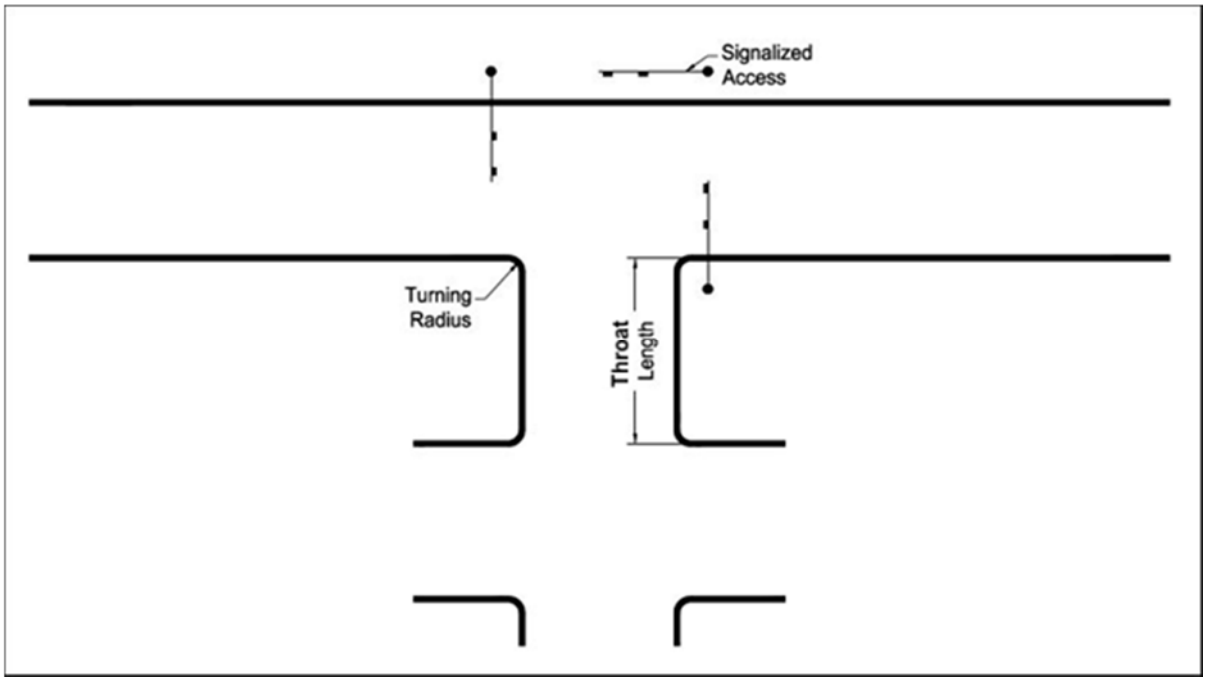

Figure 7-3. Turning Radius and Access Throat Length

Table 7-6. Turning Radius at Access Locations

Vehicle Type	Turning Radius
Passenger Cars	15 to 30 feet
18 Wheel Trucks	30 to 50 feet

7.2.15. THROAT LENGTH

Throat length is the length of the driveway that is controlled internally from turning traffic, measured from the intersection with the road. Driveways should be designed with adequate throat length to accommodate queuing of the maximum number of vehicles as defined by the peak period of operation in the traffic study. This will prevent potential conflicts between traffic entering the site and internal traffic flow. Table 7-7 shows the minimum driveway throat length at signalized accesses.

Table 7-7. Minimum Driveway Throat Length at signalized Accesses

Number of Egress Lanes	Minimum Throat Length
2	75 feet
3	200 feet
4	300 feet

7.2.16. SHARED ACCESS

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

7.2.17. ALIGNMENT OF ACCESS POINTS

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

7.2.18. SIGHT DISTANCE

Sight distance is the length of the road that is visible to the driver. A minimum safe sight distance should be required for access points based on the roadway classification. It is essential to provide sufficient intersection sight distance at the driveway point for vehicles using a driveway to see oncoming traffic and judge the gap to safely make their movement. Intersection sight distance varies depending on the design speed of the roadway to be entered and assumes a passenger car can turn right or left into a two-lane highway and attain 85 percent of the design speed without being overtaken by an approaching vehicle that reduces speed to 85 percent of the design speed. Table 7-8 gives intersection sight distance requirements for passenger cars.

Table 7-8. Intersection/ Driveway Sight Distance

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

*Driver eye is 15 feet measured from the traveled way

7.2.19. TURNING LANES

Turning lanes remove the turning traffic from the through travel lanes. Left turning lanes are used to separate the left turning traffic from the through traffic. Right turn lanes reduce traffic delays caused by

the slowing of turning vehicles. These lanes are generally used in high traffic areas on arterial and collector roadways. A traffic impact study will determine the need for turning lanes or tapers. Table 7-9 shows the minimum guidelines for storage length of turning lanes based on speed.

Table 7-9. Turning Lanes Storage Length (100 Feet Minimum)

Intersection	Length
Unsignalized Intersection	2 times the number of cars likely to arrive in a 2 minute period during peak hour*
Signalized Intersection	10% of the peak hour design year volume expressed in feet*

* Assumes 25 feet per vehicle

* 2004 AASHTO Geometric Design of Highways and Streets

Turning lanes shall normally be a minimum of 12 feet in width. Any exception will require approval from the County and/or UDOT. Right turn lanes require an additional 12 feet of pavement to accommodate the lane.

The provision for left turn lanes is important from both the capacity and safety perspectives, where left turns would otherwise share the use of a through lane. Shared use of a through lane will dramatically reduce capacity, especially when opposing traffic is heavy. Left turn lanes shall be provided at signalized intersections.

Right turn lanes remove the speed differences in the main travel lanes. This helps to reduce 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. Table 7-10 provides typical warrants, based on posted speed and traffic volumes for when auxiliary lanes are to be installed.

A separate turning lane consists of a taper plus a full width auxiliary lane. Taper length will vary based on speed: a length of 90 feet for speeds below 45 mph, 140 feet for speeds of 45 and 50 mph, and 180 feet for speeds over 50 mph. If a two lane turn lane is to be provided, it is recommended that a 10:1 taper be used to develop the dual lanes. The taper will allow for additional storage during short duration surges in traffic volumes.

Table 7-10. Guidelines for Left turn and Right Turn Lanes on Two Lane Highways

Minimum levels for installation auxiliary lanes on rural two lane roads (farm access excluded)				
Speed	Left Turn Lane	Right Turn Lane	Right Turn Acceleration Lane	Left Turn Acceleration Lane
40 mph and less	25 vph	50 vph	-	-
45 mph and greater	10 vph	25 vph	50 vph	*

* Optional for 50 mph and less; required for 55 mph or greater

vph = vehicles per hour in any one hour period in passenger car equivalents

7.2.20. PEDESTRIAN AND BICYCLE ACCESS

All new development and redevelopment of existing sites should address pedestrian and bicycle access to and within the site.

7.2.21. ROUNDABOUTS

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

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

Development of a roundabout should occur as a result of an intersection study by a qualified Traffic Engineer and when the minimum capacity and design criteria can be met. The Federal Highway Administration (FHWA) has prepared a design guide for modern roundabouts in the United States. A single-lane roundabout can accommodate up to 1,800 vehicles per hour.

8. TRANSPORTATION CORRIDOR PRESERVATION

This chapter 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 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 Duchesne County. A bibliography of the relevant publications is included in Section 10.

8.1.1. DEFINITIONS

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

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

8.2. CORRIDOR PRESERVATION TECHNIQUES

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

8.2.1. ACQUISITION

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

8.2.2. ADVANCE PURCHASE AND EMINENT DOMAIN

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

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

Before property may be taken for a corridor the acquiring agency must identify the corridor location, general route and termini. If the acquiring agency, without reasonable justification, does not commence or 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).

8.2.3. HARDSHIP ACQUISITION

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

8.2.4. PURCHASE OPTIONS

A conditional contract or option is executed that gives the public agency the right but not the obligation to buy the property at a future date. The contract would specify the terms and conditions of the future purchase (Utah Code Annotated §27-12-96). A related concept involves the use of rights of first refusal under which the government entity obtains the first right to purchase the property when a landowner determines to sell the property.

8.2.5. DEVELOPMENT EASEMENTS

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

8.2.6. PUBLIC LAND EXCHANGES

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

8.2.7. PRIVATE LAND TRUSTS

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

8.2.8. EXERCISE OF POLICE POWERS

Regulatory controls under the police power can be used to control the development of private property in order to preserve the transportation corridor. These measures impose requirements with no

compensation to the landowner. Land use and development controls are typically administered by local governments (36 A.L.R.3d 751).

8.2.9. IMPACT FEES AND EXACTIONS

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

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

Monetary payments in lieu of contributions – Developers pay money in lieu of or in addition to in- kind contributions. This method may be used where the pooled contributions of numerous small developments is more effective than individual dedications of small parcels of land. The money is then used to acquire right-of way or make other improvements.

Impact fees – This method applies to a broader range of improvements whose need is generated by a new development. The effected jurisdiction charges developers for a pro rata share of capital funding for the improvements based on relative contributions to the impacts of the development by newly developed property and existing developments.

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

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

- The cost of existing facilities;
- The manner of financing existing capital facilities (such as user charges, special assignments, bonded indebtedness, general taxes, or federal grants);
- The relative extent to which the newly developed properties and other properties in the jurisdiction have already contributed to the cost of existing capital facilities (by such means as user charges, special assignments, or payment from the proceeds of general taxes);
- The relative extent to which the newly developed properties in the jurisdiction will contribute to the cost of existing capital facilities in the future;
- The extent to which the newly developed properties are entitled to a credit because the jurisdiction is requiring their developers or owners (by contractual arrangement or otherwise) to provide common facilities (inside or outside the proposed development) that have been

provided by the jurisdiction and financed through general taxation or other means (apart from user fees) in other parts of the jurisdiction;
- Extraordinary costs, if any, in servicing the newly developed properties; and
- The time-price differential inherent in fair comparisons of amounts paid at different times.

In addition to constitutional limitations, 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.

8.2.10. SETBACK ORDINANCES

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

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

8.2.11. OFFICIAL MAPS OR MAPS OF RESERVATION

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

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

Some courts have held that statutes permitting government to impose a development moratorium on property, located in a proposed transportation corridor during a period of reacquisition planning, unconstitutionally permits the taking of property without just compensation. Other courts have held that where the purpose of the government action is the prevention of development of land, that would increase the cost of planned future acquisition of such land by government, is unconstitutional. Some courts have found official maps unconstitutional if they also include compensation for the property owner for the period of temporary deprivation of the right to develop. Other statutory schemes have been validated when they allow development to proceed to avoid substantial damage to a property owner (Utah Code Annotated §§17-27-307, 10-9-306).

8.2.12. ADEQUATE PUBLIC FACILITIES AND CONCURRENCY REQUIREMENTS

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

9. OTHER FUTURE ACTIONS

In addition to the long and short-term action items, the following actions should also be considered.

9.1. 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 County by providing a framework for future access permit applications related to private development. It also helps UDOT by providing enough overall County information so that individual access points can be reviewed with an understanding of future adjacent needs.

It is important that the County understand UDOT's requirements for traffic signals and the access points within the operational sphere of a signalized intersection. An understanding of UDOT's access permitting requirements is important also and should be a part of the County's subdivision and development process. It is recommended that the County continue to coordinate with UDOT on every new

development that could impact the state highway system. This will ensure that the new development will share its burden of impact on that system.

9.2. LAND USE PLANNING INTEGRATION

The County's current Zoning Plan calls for growth adjacent to existing corridors. This is similar to the development pattern in other rural communities, like the communities in Duchesne County. Traffic studies in such rural communities indicate that this centralized commercial development land use pattern has negative traffic impacts as the County grows. Residents from the outskirts of town must travel downtown or to the central corridor to go shopping, which creates a lot of traffic from the outlying areas into the communities. These communities have considered placing small commercial clusters around the outside of town to create convenient locations for people to purchase goods and services, while minimizing travel distances. This could be accomplished in Duchesne County with simple rezoning, conditional use permits, or through planned unit developments. It is recommended that the County consult with cities within the County to discuss this concept in more detail.

10. REFERENCES

- American Association of State Highway and Transportation Officials, "Report of the AASHTO Task Force on Corridor Preservation," Washington DC, July 1990.
- Corridor Preservation – Case Studies and Analysis Factors in Decision Making, USDOT, FHWA.
- Federal Highway Administration, U.S. Department of Transportation, "Corridor Preservation Techniques and Applications," Participant Workbook, National Highway Institute Course No. 15130, FHWA, May 1993.
- Utah Department of Transportation, "Local Government Corridor Preservation Toolkit."
- Secretary of Transportation, "Appendix – B Report of the Secretary of Transportation to the United State Congress on Preservation of Transportation Corridors," November 3, 1994.

APPENDIX A. DUCHESNE TRANSPORTATION MASTER PLAN MAPS

A.1. MAP A-1: FUNCTIONAL CLASSIFICATION AND FUTURE ROUTES

Duchesne County Transportation Master Plan

Functional Classification and Future Routes

SUMMIT COUNTY

DAGGETT COUNTY

WASATCH COUNTY

UINTAH COUNTY

CARBON COUNTY

Label #	Route Name	Functional Class	Mileage
1	47000 W to 5000 S	Local	0.5
2	Extension 46000 W to Hidden Meadow Subdivision	Minor Collector	1.3
3	CR 253 Connection Alt	Local	2.9
4	Blue Bench Chevron Pipeline Road	Major Collector	10.6
5	Blue Bench N-S	Minor Collector	2.0
6	6000 South Mail Route from Arcadia	Minor Collector	9.6
7	Arcadia Mail Route 6000 South Alternative	Minor Collector	3.7
8	Arcadia-Blue Bench North Access Corridor	Minor Collector	8.8
9	Alt Hansen Route	Minor Collector	3.8
10	12000 West Clay Basin Extension	Local	0.8
11	Boulder Boulevard to Bluebell	Major Collector	9.6
12	6000 West	Major Collector	4.6
13	6000 North	Minor Collector	2.1
14	Possible Truck Route - SR 87 to Bluebell Road	Major Collector	4.6
15	3000 West Bluebell Connector to US-40	Major Collector	2.9
16	Bluebell to Neola Hwy	Local	0.6
17	3000 N North Crescent Minor Collector	Minor Collector	1.7
18	Future North Crescent E-W corridor	Local	1.1
19	Antelope Canyon Road	Major Collector	3.6
20	BLM Fence Road	Major Collector	10.2
21	Pariette Road	Major Collector	6.6

UDOT Functional Class

- Other Principal Arterial
- Minor Arterial
- Major Collector
- Minor Collector
- Local

Future Route Functional Class

- Major Collector
- Minor Collector
- Local

- County Roads
- Municipal Boundary

Land Ownership

- Bureau of Land Management
- National Forest
- National Wilderness Area
- State Trust Lands
- State Parks and Recreation
- State Wildlife Management Area
- Tribal Lands
- Private Land

N

0 2.5 5 Miles

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A.2. MAP A-2: EXISTING ROADWAY ASSESSMENTS

Duchesne County Transportation Master Plan

Current Road and Traffic Conditions

SUMMIT COUNTY

DAGGETT COUNTY

WASATCH COUNTY

UINTAH COUNTY

CARBON COUNTY

Stockmore
Hanna
Tabiona
Fruitland
Talmage
Boneta
Mountain Home
Altonah
Altamont
Mt Emmons
Bluebell
Monarch
Neola
Cedarview
Roosevelt
Upalco
Ioka
Arcadia
Myton
Bridgeland
DUCHESNE

Traffic Count Details

Map #	Road Name	County Road	Combined ADT	# of Trucks	% Trucks	VC Ratio
1	2000 West	331	726	47	6.5%	0.0070
2	3000 West	152	726	157	6.6%	0.0070
3	4000 North	158	795	77	9.7%	0.0077
4	6250 South	64	861	196	23.0%	0.0083
5	6450 South	64	299	88	29.9%	0.0029
6	9000 North	158	496	49	10.0%	0.0048
7	12000 West	80	491	39	8.0%	0.0048
8	12000 West	80	277	19	6.8%	0.0027
9	12000 West	80	754	136	18.1%	0.0073
10	16000 West	121	364	16	4.3%	0.0035
11	21000 West	113	323	20	6.3%	0.0031
12	Antelope Canyon Road	27	595	137	23.2%	0.0058
13	Bluebell Road	142	1211	77	6.4%	0.0117
14	Bluebell Road	142	1659	164	9.9%	0.0161
15	Bluebell Road	142	1242	74	6.0%	0.0120
16	East River Road	79	602	51	8.6%	0.0058
17	Hancock Cove Road	156	940	29	3.2%	0.0091
18	Lake Boreham Road	65	289	60	22.3%	0.0028
19	Moon Lake Road	113	33	1	0.0%	0.0003
20	Ostler Corner	154	1694	76	4.5%	0.0164
21	Ostler Corner	152	1394	187	14.0%	0.0135
22	Strawberry River Road	14	330	101	31.2%	0.0032
23	Uintah Canyon Road	331	64	1	1.4%	0.0006
24	CR-33	33	2622	570	21.9%	0.0254
25	CR-33	33	2252	531	23.9%	0.0218
26	Lake Boreham Road	65	182	30	16.6%	0.0018
27	Lake Boreham Road	65	183	24	13.4%	0.0018
28	Lake Boreham Road	65	144	14	9.4%	0.0014
29	6000 West	158	203	21	10.4%	0.0020
30	Red Creek Road	15	54	2	3.4%	0.0005
31	North Crescent Road	176	794	52	6.5%	0.0077

Paved County Roads - Surveyed Condition

- Poor
- Fair
- Good

Test Bore Holes - Total BSC Depth

- Less than 4"
- 4" - 6"
- 6" - 8"
- 8" - 10"
- More than 10"

- Traffic Count Locations
- County Roads
- Municipal Boundary

Land Ownership

- Bureau of Land Management
- National Forest
- National Wilderness Area
- State Trust Lands
- State Parks and Recreation
- State Wildlife Management Area
- Tribal Lands
- Private Land

N

0 2.5 5 Miles

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A.3. MAP A-3: PROPOSED TIP PROJECTS

Duchesne County Transportation Master Plan

Transportation Improvement Plan (TIP)

TIP	Label #	County Road	Location/Name	Mileage	Reconstruction Action
1 - 5 Year	1	CR 152	3000 West Bluebell Connector to US 40	2.9	Reconstruct Major Collector
	2	CR 142	Bluebell Connector Phase III (Store to Jenkins Draw)	5.0	Reconstruct Major Collector
	3	CR 142	Bluebell Connector Phase IV (Jenkins Draw to Hancock Cove)	5.0	2" & 3" Rotomill and Overlay, Shoulder Work, Geometric Improvements
	4	CR 32	Gate Canyon Road	6.5	Reconstruct Major Collector
	5	CR 154	Hancock Cove Rd (3000 W Bluebell Phase II)	3.5	Overlay/Widening
	6	CR 65	Lake Boreham Road Realignment	1.3	Reconstruct Minor Collector
	7	CR 113	Moon Lake Road	14.0	Reconstruct Minor Collector
	8	CR 33	Pariette Road Sandwash Road to Uintah County Line	2.4	Reconstruct Major Collector
	9	CR 33	Pariette Road to Sandwash Road	6.0	Geometric Improvements
	10	CR 95	Towanta Flat Road	7.0	Reconstruct Minor Collector
	11	CR 337	Uintah Canyon Road	8.0	Reconstruct Minor Collector
5 - 10 Year	12	CR 64	6250 South Arcadia Road	3.5	Reconstruct Minor Collector
	13	CR 27	Antelope Canyon	5.2	Reconstruct Minor Collector
	14	CR 65	Lake Boreham Road - Lake Boreham to CR-64	2.5	3" Rotomill and Overlay, Geometric Improvements, Shoulder Work
	15	CR 15	Lower Red Creek	5.0	Reconstruct Minor Collector
	16	CR 7	North Fork Road	5.0	Reconstruct Local
10 - 20 Year	17	CR 64	Arcadia Road 12000 West to Lake Boreham Road	5.5	Spot Improvements, Geometric Improvements
	18	CR 30 & 31	BLM Fence Road	10.2	Future Major Collector
	19	CR 95	Rock Creek Road	12.0	2" Cold-in-place Recycle with Chip Seal, Shoulder Work

Duchesne County Transportation Improvement Plan

- 1 - 5 Year Projects
- 5 - 10 Year Projects
- 10 - 20 Year Projects
- UDOT STIP 2013 - 2018
- County Roads
- Municipal Boundary

Land Ownership

- Bureau of Land Management
- National Forest
- National Wilderness Area
- State Trust Lands
- State Parks and Recreation
- State Wildlife Management Area
- Tribal Lands
- Private Land

N

0 2.5 5 Miles

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A.4. MAP A-4: TEST BORE HOLE LOCATIONS

Duchesne County Transportation Master Plan

Test Bore Hole Results

SUMMIT COUNTY

DAGGETT COUNTY

WASATCH COUNTY

UINTAH COUNTY

Test Bore Hole Results

Test Hole ID	County Road #	Road Name	BSC Depth	Tar Sands Depth	Total BSC Depth	UBC Depth	Subbase Type	Subbase AASHTO Class	Subbase USCS Class	Subbase PI	Subbase CBR	Subbase CBR 2	Comments
100	14	Strawberry Road	3		3	7.5	Silty sand with Gravel	A-2-4(0)	SM	3	25	27	
101	14	Strawberry Road	4		4	8	Sandy Silty Clay	A-4(1)	CL-ML	7	5	15	
102	14	Strawberry Road	4		4	8.5	Silty Sand	A-2-4(0)	SM	NP	25	27	BSC (old)
103	1	45000 West	6		6	3	Sandy Lean Clay	A-4(2)	CL	9	5	15	
104	15	Lower Red Creek Road	3		3	8	Poorly Graded Gravel With Clay and Sand	A-2-4(0)	GP-GC	9	25	65	
105	15	Lower Red Creek Road		3.5	3.5		Silty Sand With Gravel	A-2-4(0)	SM	NP	25	27	
106	7	North Fork Road		3	3	2.5	Silty Clayey Gravel with Sand	A-2-4(0)	GC-GM	4	27	40	Fine UBC
107	7	North Bend Road		3	3	2.5	Silty Clayey Gravel with Sand	A-1-b	GC-GM	5	20	65	
108	1	Tabby Swale Road		4.5	4.5	5	Silty sand with Gravel	A-2-6(0)	SC	11	10	20	
109	11	7000 North	4	2	6	7.5	Silty sand	A-4(0)	SM	NP	10	25	
110	337	Uintah Canyon Road	6		6	3	Silty Gravel with Sand	A-1-b	GM	NP	20	65	
111	337	Uintah Canyon Road		3	3	4.5	Silty sand with Gravel	A-2-4(0)	SM	NP	25	27	
112	337	Uintah Canyon Road	3.5		3.5	5	Poorly Graded Gravel With Silt and Sand	A-1-a	GP- GM	NP3	37	85	
113	158	9000 North	3	3.5	6.5	6.5	Clayey Sand With Gravel	A-2-6(1)	SC	20	10	20	Old BSC or Cold Mix, Very Brittle
114	158	4000 West	5		5	7	Clayey Sand	A-2-6(0)	SC	11	10	20	
115	158	8500 North	4.5		4.5	8	Sandy Fat Clay	A-7-6(19)	CH	29	3	5	Old BSC or Cold Mix, Very Brittle
116	146	8000 North		2.5	2.5	5	Silty sand with Gravel	A-2-4(0)	SM	NP	25	27	
117	158	6000 West	5		5	4	Silty, Clayey Sand with Gravel	A-4(0)	SC-SM	5	10	20	
118	158	6000 North	4		4	7.5	Silty Sand	A-2-4(0)	SM	NP	25	27	
119	158	5000 West	6.5		6.5	8.5	Silty Sand	A-2-4(0)	SM	NP	25	27	Brittle Cold Mix
120	103	2750 North	9		9	5	Silty Sand With Gravel	A-1-b	SM	NP	20	25	
121	96	23000 West	3	3	6	8	Silty sand with Gravel	A-2-4(0)	SM	NP	25	27	
122	107	6250 North	8		8		Clayey Sand	A-2-4(0)	SC	8	20	27	No UBC Under BSC
123	107	20000 West	4.5		4.5	3.5	Silty Gavel With Sand	A-1-b	GM	NP	0		
124	107	5750 North	4		4	4.5	Poorly Graded Gavel With Silty clay and Sand	A-1-b	GP- GC	6	20	65	
125	107	5500 North	5		5	3.5	Silty Gravel with Sand	A-1-b	GM	6	20	65	
126	107	19250 West	5		5	8	Silty sand with Gravel	A-1-b	SM	NP	20	25	
127	107	5000 North	4.5		4.5	3.5	Silty Sand With Gravel	A-1-b	SM	2	20	25	
128	108	18750 West		3	3	7.5	Silty, Clayey Sand	A-4(0)	SC-SM	4	10	25	
129	123	6000 North	3	2.5	5.5	3	Silty Sand With Gravel	A-2-4(0)	SM	NP	25	27	
130	115	13250 West	2.5	2.5	5	4.5	Silty Sand	A-2-4(0)	SM	NP	25	27	
131	145	7000 North	3.5		3.5	2.5	Clayey Sand	A-7-6(11)	SC	40	10	13	
132	115	7000 North	7		7	7	Clayey Sand With Gravel	A-2-4(0)	SC	10	20	27	
133	120	15000 West	3		3	6	Silty Sand With Gravel	A-1-b	SM	NP	20	25	
134	120	8000 North	4		4	8	Silty Sand With Gravel	A-2-4(0)	SM	NP	25	27	
135	121	16000 West	3	2.5	5.5	4.5	Clayey Sand With Gravel	A-6(0)	SC	13	10	13	
136	119	17000 West		4	4	7	Silty Sand	A-2-4(0)	SM	NP	25	27	
137	114	9000 North	3		3	4	Silty Sand With Gravel	A-2-4(0)	SM	NP	25	27	
138	121	16000 West	8		8	4.5	Poorly Graded Gravel with silty clay and sand	A-1-b	GP-GC	6	20	40	
139	137	12000 West	2.5	3	5.5	5	Sandy Silty Clay	A-4(0)	CL-ML	6	5	15	
140	163	3000 West		2.5	2.5	8	Silty Sand With Gravel	A-2-4	SM	NP	25	27	
141	163	3250 West	5		5	8.5	Silty Sand With Gravel	A-2-4	SM	NP	25	27	
142	176	1000 West	4		4	8.5	Silty Sand With Gravel	A-2-4	SM	NP	25	27	
143	176	1000 West	2.5	3	5.5	5.5	Clayey Sand With Gravel	A-6(1)	SC	12	10	13	

Test Hole ID	County Road #	Road Name	BSC Depth	Tar Sands Depth	Total BSC Depth	UBC Depth	Subbase Type	Subbase AASHTO Class	Subbase USCS Class	Subbase PI	Subbase CBR	Subbase CBR 2	Comments
144	177	5000 North	3	4	7	5	Silty Sand	A-2-4(0)	SM	NP	25	27	
145	177	1000 West	4		4	5.5	Sandy Silty Clay	A-4(1)	CL-ML	7	5	15	
146	177	North Crescent Road	3	4.5	7.5	5	Silty Sand With Gravel	A-2-4	SM		25	27	
147	176	North Crescent Road	5.5		5.5	5.5	Sandy Lean Clay	A-4(3)	CL	10	5	15	
148	154	South Cove Road	6.5		6.5	5.5	Silty Sand	A-2-4	SM	NP	25	27	
149	154	Hancock Cove Road	9		9	3.5	Sandy Silt	A-4(0)	ML	NP	5	15	Cold Mix Aspahlt (old)
150	142	Bluebell Road	7		7	5	Sandy Lean clay	A-6(9)	CL	17	5	13	Uncompacted, Heavy voided BSC
151	142	Bluebell Road	5		5	5	Silty Sand	A-2-4	SM	NP	25	27	
152	137	12000 West	8.5		8.5	1	Silty Sand	A-2-4	SM		25	27	
153	80	12000 West	5		5	3	Clayey Sand	A-2-6(2)	SC	19	10	20	
154	49	6250 South	2.5		2.5	5.5	Sandy Lean Clay	A-7-6(9)	CL	23	5	15	
155	49	2000 West	3		3	2	Clayey Sand	A-6(1)	SC	13	10	15	
156	49	5000 South	2.5	3	5.5	4.5	Sandy Lean Clay	A-7-6(10)	CL	24	3	5	
157	54	State Street	7		7	8.5	Sandy Lean Clay	A-6(6)	CL	16	5	13	
158	54	State Street	9		9		Clayey Sand	A-6(2)	SC	16	10	13	Loose Gravel, OIL coated, but Loose
159	190	3000 South	2.5		2.5	5.5	Clayey Sand	A-6(3)	SC	14	3	13	
160	52	Mortensen Lane		2.5	2.5	2	Clayey Sand	A-6(5)	SC	18	10	13	
161	46	7500 South	3		3	2.5	Silt with Sand	A-4(5)	ML	8	5	15	
162	46	8000 South	5		5	2	Poorly Graded Sand with Silty Clay	A-2-4(0)	SP-SC	7	20	40	Cold MIX Very Brittle
163	65	Lake Boreham Road	3		3	6	Silty , Clayey Sand With Gravel	A-2-4(0)	SC-SM	7	10	25	
164	79	East River Road	7		7	5	Clayey Sand	A-4(1)	SC	LL 26/ PI 9	10	25	Cold Mix (falling Apart)
165	80	12000 West	4.5		4.5	7.5	Clayey Sand with Gravel	A-2-6(0)	SC	LL 28 / PI 12	10	20	
166	64	6500 South	6		6	6.5	Sandy Lean Clay	A-6(5)	CL	LL 33 / PI 14	5	15	
167	81	13000 West	4.5	1.5	6	5	Silty, Clayey Sand	A-2-4(0)	SC-SM	LL 21 / PI 4	10	25	
168	113	Moon Lake Road		3	3	2.5	Silty Sand	A-2-4(0)	SM	NP	20	27	
169	113	Moon Lake Road		2	2	4	Silty Gravel With Sand	A-1-b	GM	NP	20	70	
170	113	Moon Lake Road	8		8	4	Silty, Clayey Sand With Gravel	A-2-4(0)	SC-SM	5	20	27	
171	95	Rock Creek Road	6		6	5	Silty Gravel With Sand	A-1-b	GM	NP	20	70	
172	95	Rock Creek Road	5		5	6.5	Clayey Sand with Gravel	A-2-4(0)	SC	9	10	20	
173	95	Towanta Flat	5		5	5.5	Poorly Graded Sand With Silt and Gravel	A-1-b	Sp-SM	NP	10	40	
174	95	6750 North	5.5		5.5	5.5	Silty Clayey Gravel With Sand	A-1-b	GC-GM	LL 23 / PI 6	20	45	
RR#1	92	River Road	3	2.5	5.5	7	Silty Sand	A-2-4(0)	SM	NP			
RR#2	92	River Road	3	4.5	7.5	6.5	Silty Clay with Sand	A-4-(2)	CL-ML	5			
RR#3	92	River Road	3	2	5	10	Sandy Lean Clay	A-7-6(12)	CL	25			Cold Mix Asphalt
RR#4	92	River Road	3		3	10.5	Sandy Lean Clay	A-6(7)	CL	17			
RR#5	92	River Road	3		3	6	Poorly Graded Gravel with Sand with Boulders to 12"	A-2-6(0)	GP	14			
RR#6	92	River Road	3		3	27	Silty Clayey Gravel with Sand	A-1-b	GC-GM	6			
RR#7	92	River Road	3		3	6	Clayey Sand	A-6-(1)	SC	11			
RR#8	92	River Road	22		22		Lean Clay with Sand	A-6(13)	CL	18			
RR#9	92	River Road	3		3	9	Sandy Silt	A-4(0)	ML	NP			
RR#10	92	River Road	4		4	8	Silty Sand	A-2-4(0)	SM	NP			
RR#11	92	River Road	5.5		5.5	13.5	Sandy Silt	A-4(0)	ML	3			
RR#12	92	River Road	4.5		4.5	15.5	Silty Sand	A-2-4(0)	SM	NP			
RR#13	92	River Road	3		3	25	Clayey Sand	A-6(2)	SC	11			

Test Bore Holes - Total BSC Depth

- Less than 4"
- 4" - 6"
- 6" - 8"
- 8" - 10"
- More than 10"

- County Roads
- Municipal Boundary

Land Ownership

- Bureau of Land Management
- National Forest
- National Wilderness Area
- State Trust Lands
- State Parks and Recreation
- State Wildlife Management Area
- Tribal Lands
- Private Land

N

0 2.5 5 Miles

Jones & DeMille Engineering

RICHFIELD - MANTI - PRICE - ROOSEVELT

- infrastructure professionals -

MAP NAME: H:\JD\Proj\1112-021\Design\GIS\Maps\Report_Maps\Test_Bore_Hole_Results_LandOwnership.mxd

PROJECT NUMBER: 1112-021 | DRAWN BY: ALP 06-13 | LAST EDIT: 02/01/2016

APPENDIX B. EXISTING ROADWAY CONDITIONS DATA & ANALYSIS

B.1. PAVEMENT SURVEY METHODOLOGY & DATA

In the 1980s, the Federal Highway Administration (FHWA) conducted the Long Term Pavement Performance (LTPP) Program. From this study, the LTPP Pavement Distress Identification Manual was published and widely accepted as the national standard for visual pavement distress evaluation. In this study, the LTPP manual was used as the backbone of the evaluation criteria. Pavement distress surveys were conducted for the majority of the County paved roadways in half mile segments. Field crews evaluated evidence of fatigue, transverse cracking, longitudinal cracking, and other distress (potholes, edge raveling, rutting, etc.). Table B - 1 provides definitions of these terms and descriptions with causes for the pavement damage.

Table B - 1. Pavement Distress Terms and Definitions

Term	Description and Cause
Longitudinal Cracks	Cracks parallel to the pavement's centerline or lay down direction. They may be caused by poorly constructed paving joints, shrinkage of the asphalt surface due to low temperature, or a reflective crack caused by joints and cracks beneath the surface course.
Transverse Cracks	Cracks perpendicular to the pavement's centerline or lay down direction. They are caused by fatigue failure of the pavement under repeated traffic loading, settlement of an underground utility or trench, or as a result of thermal movement and shrinkage due to low temperatures and/or asphalt binder hardening.
Alligator Cracking	Series of interconnecting transverse cracks caused by fatigue of the asphalt concrete surface under repeated traffic loading. It is considered a major structural distress and is often accompanied by rutting.
Block Cracking	Series of interconnected cracks that divide the pavement into rectangular pieces. Block cracking usually indicates that the asphalt has hardened significantly.
Bleeding	Film of asphalt binder appearing on roadway surface. Caused by insufficient air voids in pavement for expansion during hot temperatures or by too much asphalt binder in mix.
Distortions	Irregularities in surface caused by corrugations, bumps, sags, and shoving. They are localized, abrupt, upward or downward displacements in the pavement surface, series of closely spaced ridges and valleys, or localized longitudinal displacements of the pavement surface.
Patch	An area of pavement, which has been replaced with new pavement material to repair the existing pavement. A patch is considered a defect no matter how well it is performing.
Rut	A depression in the wheel path. Rutting stems from a permanent deformation in any of the pavement layers or sub grade. It is usually caused by consolidated or lateral movement of the materials due to traffic loads.
Raveling	The wearing away of the pavement surface. This distress often indicates that either the asphalt binder has hardened appreciably or that a poor quality mixture is present.
Potholes	Cracks and holes in pavement caused by freeze/thaw cycles through cracks in pavement and moisture in sub-base.
Edge Cracking	Failure of the asphalt surface at the edge of the pavement surface. It is often caused by a lack of lateral support such as curb and gutter. It is evidenced by asphalt cracking and crumbling at the edge of the asphalt surface.

B.2. BORING LOG DATA

Test holes were taken to determine the existing thickness, layers, and classification of pavements, tar sands, base course, and subgrade material on selected roadways. This information was useful to identify roadways with thin asphalt that likely will not stand up to heavy truck traffic should energy development increase in the respective area. The AASHTO Soil Classification and the Unified Soil Classification was determined, as well as the California Bearing Ratio (CBR) of the sub-base. Appendix A contains a map of existing conditions with symbology displaying the bituminous surface course (asphalt or tar sand) depths of roadways cored. Table B-2 below contains the bore log/test hole summary, with test hole #, Bituminous Surface Course (BSC) depths, which includes hot mix asphalt, chip seal, tar sands and other asphalt layer thicknesses. Also the depth of the untreated base course (UBC) depth, sub-base soil classifications in both AASHTO and USCS systems is given. The plasticity index (PI) and California Bearing Ratio (CBR) data is given.

Table B - 2. Boring Log Summary

Test Hole ID	BSC Depth1	TarSands Depth2	Total BSC Depth	UBC Depth1	SubBase_Type	SubBase AASHTO Class	SubBase USCS Class	SubBase PI	SubBase CBR	SubBase CBR2	Comments
100	3		3	7.5	Silty sand with Gravel	A-2-4(0)	SM	3	25	27	
101	4		4	8	Sandy Silty Clay	A-4(1)	CL-ML	7	5	15	
102	4		4	8.5	Silty Sand	A-2-4(0)	SM	NP	25	27	BSC (old)
103	6		6	3	Sandy Lean Clay	A-4(2)	CL	9	5	15	
104	3		3	8	Poorly Graded Gravel With Clay and Sand	A-2-4(0)	GP-GC	9	25	65	
105		3.5	3.5		Silty Sand With Gravel	A-2-4(0)	SM	NP	25	27	
106		3	3	2.5	Silty Clayey Gravel with Sand	A-2-4(0)	GC-GM	4	27	40	Fine UBC
107		3	3	2.5	Silty Clayey Gravel with Sand	A-1-b	GC-GM	5	20	65	
108		4.5	4.5	5	Silty sand with Gravel	A-2-6(0)	SC	11	10	20	
109	4	2	6	7.5	Silty sand	A-4(0)	SM	NP	10	25	
110	6		6	3	Silty Gravel with Sand	A-1-b	GM	NP	20	65	
111		3	3	4.5	Silty sand with Gravel	A-2-4(0)	SM	NP	25	27	
112	3.5		3.5	5	Poorly Graded Gravel With Silt and Sand	A-1-a	GP- GM	NP3	37	85	
113	3	3.5	6.5	6.5	Clayey Sand With Gravel	A-2-6(1)	SC	20	10	20	Old BSC or Cold Mix, Very Brittle
114	5		5	7	Clayey Sand	A-2-6(0)	SC	11	10	20	
115	4.5		4.5	8	Sandy Fat Clay	A-7-6(19)	CH	29	3	5	Old BSC or Cold Mix, Very Brittle
116		2.5	2.5	5	Silty sand with Gravel	A-2-4(0)	SM	NP	25	27	
117	5		5	4	Silty, Clayey Sand with Gravel	A-4(0)	SC-SM	5	10	20	
118	4		4	7.5	Silty Sand	A-2-4(0)	SM	NP	25	27	
119	6.5		6.5	8.5	Silty Sand	A-2-4(0)	SM	NP	25	27	Brittle Cold Mix
120	9		9	5	Silty Sand With Gravel	A-1-b	SM	NP	20	25	
121	3	3	6	8	Silty sand with Gravel	A-2-4(0)	SM	NP	25	27	
122	8		8		Clayey Sand	A-2-4(0)	SC	8	20	27	No UBC Under BSC
123	4.5		4.5	3.5	Silty Gavel With Sand						
124	4		4	4.5	Poorly Graded Gavel With Silty clay and Sand	A-1-b	GP- GC	6	20	65	
125	5		5	3.5	Silty Gravel with Sand	A-1-b	GM	6	20	65	
126	5		5	8	Silty sand with Gravel	A-1-b	SM	NP	20	25	
127	4.5		4.5	3.5	Silty Sand With Gravel	A-1-b	SM	2	20	25	
128		3	3	7.5	Silty, Clayey Sand	A-4(0)	SC-SM	4	10	25	
129	3	2.5	5.5	3	Silty Sand With Gravel	A-2-4(0)	SM	NP	25	27	
130	2.5	2.5	5	4.5	Silty Sand	A-2-4(0)	SM	NP	25	27	
131	3.5		3.5	2.5	Clayey Sand	A-7-6(11)	SC	40	10	13	
132	7		7	7	Clayey Sand With Gravel	A-2-4(0)	SC	10	20	27	
133	3		3	6	Silty Sand With Gravel	A-1-b	SM	NP	20	25	
134	4		4	8	Silty Sand With Gravel	A-2-4(0)	SM	NP	25	27	
135	3	2.5	5.5	4.5	Clayey Sand With Gravel	A-6(0)	SC	13	10	13	
136		4	4	7	Silty Sand	A-2-4(0)	SM	NP	25	27	
137	3		3	4	Silty Sand With Gravel	A-2-4(0)	SM	NP	25	27	
138	8		8	4.5	Poorly Graded Gravel with silty clay and sand	A-1-b	GP-GC	6	20	40	
139	2.5	3	5.5	5	Sandy Silty Clay	A-4(0)	CL-ML	6	5	15	
140		2.5	2.5	8	Silty Sand With Gravel	A-2-4	SM	NP	25	27	
141	5		5	8.5	Silty Sand With Gravel	A-2-4	SM	NP	25	27	
142	4		4	8.5	Silty Sand With Gravel	A-2-4	SM	NP	25	27	
143	2.5	3	5.5	5.5	Clayey Sand With Gravel	A-6(1)	SC	12	10	13	
144	3	4	7	5	Silty Sand	A-2-4(0)	SM	NP	25	27	
145	4		4	5.5	Sandy Silty Clay	A-4(1)	CL-ML	7	5	15	
146	3	4.5	7.5	5	Silty Sand With Gravel	A-2-4	SM		25	27	
147	5.5		5.5	5.5	Sandy Lean Clay	A-4(3)	CL	10	5	15	
148	6.5		6.5	5.5	Silty Sand	A-2-4	SM	NP	25	27	
149	9		9	3.5	Sandy Silt	A-4(0)	ML	NP	5	15	Cold Mix Aspahlt (old)
150	7		7	5	Sandy Lean clay	A-6(9)	CL	17	5	13	Uncompacted, Heavy voided BSC
151	5		5	5	Silty Sand	A-2-4	SM	NP	25	27	
152	8.5		8.5	1	Silty Sand	A-2-4	SM		25	27	
153	5		5	3	Clayey Sand	A-2-6(2)	SC	19	10	20	
154	2.5		2.5	5.5	Sandy Lean Clay	A-7-6(9)	CL	23	5	15	
155	3		3	2	Clayey Sand	A-6(1)	SC	13	10	15	
156	2.5	3	5.5	4.5	Sandy Lean Clay	A-7-6(10)	CL	24	3	5	
157	7		7	8.5	Sandy Lean Clay	A-6(6)	CL	16	5	13	
158	9		9		Clayey Sand	A-6(2)	SC	16	10	13	Loose Gravel, OIL coated, but Loose
159	2.5		2.5	5.5	Clayey Sand	A-6(3)	SC	14	3	13	
160		2.5	2.5	2	Clayey Sand	A-6(5)	SC	18	10	13	
161	3		3	2.5	Silt with Sand	A-4(5)	ML	8	5	15	
162	5		5	2	Poorly Graded Sand with Silty Clay	A-2-4(0)	SP-SC	7	20	40	Cold MIX Very Brittle
163	3		3	6	Silty , Clayey Sand With Gravel	A-2-4(0)	SC-SM	7	10	25	
164	7		7	5	Clayey Sand	A-4(1)	SC	LL 26/ PI 9	10	25	Cold Mix (falling Apart)
165	4.5		4.5	7.5	Clayey Sand with Gravel	A-2-6(0)	SC	LL 28 / PI 12	10	20	
166	6		6	6.5	Sandy Lean Clay	A-6(5)	CL	LL 33 / PI 14	5	15	
167	4.5	1.5	6	5	Silty, Clayey Sand	A-2-4(0)	SC-SM	LL 21 / PI 4	10	25	
168		3	3	2.5	Silty Sand	A-2-4(0)	SM	NP	20	27	
169		2	2	4	Silty Gravel With Sand	A-1-b	GM	NP	20	70	
170	8		8	4	Silty, Clayey Sand With Gravel	A-2-4(0)	SC-SM	5	20	27	
171	6		6	5	Silty Gravel With Sand	A-1-b	GM	NP	20	70	
172	5		5	6.5	Clayey Sand with Gravel	A-2-4(0)	SC	9	10	20	
173	5		5	5.5	Poorly Graded Sand With Silt and Gravel	A-1-b	SP-SM	NP	10	40	
174	5.5		5.5	5.5	Silty Clayey Gravel With Sand	A-1-b	GC-GM	LL 23 / PI 6	20	45	
RR#1	3	2.5	5.5	7	GB 16, Silty Sand	A-2-4(0)	SM	NP			
RR#2	3	4.5	7.5	6.5	GB 12, Silty Clay with Sand	A-4-(2)	CL-ML	5			
RR#3	3	2	5	10	GB 10, Sandy Lean Clay	A-7-6(12)	CL	25			Cold Mix Asphalt
RR#4	3		3	10.5	GB 14.5, Sandy Lean Clay	A-6(7)	CL	17			
RR#5	3		3	6	GB 21, Poorly Graded Gravel with Sand with Boulders to 12"	A-2-6(0)	GP	14			
RR#6	3		3	27	GB was combined with UBC, Silty Clayey Gravel with Sand	A-1-b	GC-GM	6			
RR#7	3		3	6	GB 21, Clayey Sand	A-6-(1)	SC	11			
RR#8	22		22		Lean Clay with Sand	A-6(13)	CL	18			
RR#9	3		3	9	GB 18, Sandy Silt	A-4(0)	ML	NP			
RR#10	4		4	8	GB 17, Silty Sand	A-2-4(0)	SM	NP			
RR#11	5.5		5.5	13.5	GB 14, Sandy Silt	A-4(0)	ML	3			
RR#12	4.5		4.5	15.5	GB 12, Silty Sand	A-2-4(0)	SM	NP			
RR#13	3		3	25	UBC/ Granular Fill , 25 Clayey Sand	A-6(2)	SC	11			

B.3. TRAFFIC COUNT DATA – COUNTY ROADWAYS

Traffic counts were taken on selected roadways to identify traffic patterns, existing roadway use, classification of vehicles using roadway, and calculating average daily traffic (ADT) values. Table B - 3: Traffic Count Data for County Roadways (2012-2013) below contains a summary of the counts completed during the study period.

Table B - 3. Traffic Count Data for County Roadways (2012-2013)

Road	Count CV#	Description	Start Date	ADT South	ADT North	ADT West	ADT East	ADT Combined	Total % Trucks	Total # Trucks
2000 W	CV1	2000 West North of Neola	Wednesday, 9/26/2012, 1:13:43 PM -	364.6	360.8			725.5	6.5%	47
3000 W	CV2	3000 West Just North of 4000 North	Tuesday, 10/9/2012, 8:04:27 AM -	364.6	360.8			725.5	6.6%	157
4000 N	CV3	4000 North	Tuesday, 11/27/2012, 2:05:24 PM -			385.1	410.2	795.3	9.7%	77
6250 S	CV4	6250 South-NW of Myton	Monday, 10/22/2012, 4:20:43 PM -			428.3	432.2	860.5	23.0%	196
6450 S	CV5	6450 South-NW of Myton	Monday, 10/22/2012, 4:49:49 PM -			149.7	149.3	299	29.9%	88
9000 N	CV6	9000 North-West of Neola	Wednesday, 9/26/2012, 7:42:32 AM -			247.2	249.1	496.3	10.0%	49
12000 W	CV7	12000 West #1-Bluebell	Tuesday, 11/27/2012, 2:38:33 PM -	240.9	249.7			490.6	8.0%	39
12000 W	CV8	12000 West #2-Bluebell	Monday, 12/3/2012, 12:41:54 PM -	143.5	133.5			277	6.8%	19
12000 W	CV9	12000 West #1-Bridgeland	Monday, 10/29/2012, 6:38:15 PM -			384.8	369	753.9	18.1%	136
16000 W	CV10	16000 West-North of Altamont	Monday, 12/3/2012, 1:25:05 PM -	180.5	183.8			364.3	4.3%	16
21000 W	CV11	21000 West	Tuesday, 11/20/2012, 4:08:02 PM -	163.6	159.8			323.4	6.3%	20
Antelope Canyon Rd	CV12	Antelope Canyon Road	Tuesday, 11/13/2012, 6:12:13 PM -	322.8	272			594.9	23.2%	137
Bluebell Rd	CV13	Bluebell Road-071712	Tuesday, 7/17/2012, 10:57:16 AM -			563	647.7	1210.7	6.4%	77
Bluebell Rd	CV14	Bluebell Road-061212	Tuesday, 6/12/2012, 11:29:49 AM -			797.7	861.6	1659.3	9.9%	164
Bluebell Rd	CV15	Bluebell Road-Silver Counter	Wednesday, 3/7/2012, 3:22:14 PM -			604.6	586.2	1190.8	6.4%	75
Bluebell Rd	CV16	Bluebell Road-Yellow Counter	Wednesday, 3/7/2012, 3:05:56 PM -			627.6	614.5	1242.1	6.0%	74
CR-33	CV17	CR-33-Pariette Rd South	Thursday, 4/5/2012, 11:22:58 AM	1085.1	1037.5			2122.5	23.7%	501
East River Rd	CV18	East River Road	Tuesday, 11/6/2012, 9:42:01 AM -			316.3	285.8	602.1	8.6%	51
Hancock Cove Road	CV19	Hancock Cove Road	Thursday, 12/13/2012, 5:14:51 PM -			503.6	436.4	940	3.2%	29
Lake Boreham Rd	CV20	Lake Boreham Road-080712	Tuesday, 8/7/2012, 2:44:41 PM -			133.1	155.7	288.8	22.3%	60
Moon Lake Rd	CV21	Moon Lake Road #1	Tuesday, 11/13/2012, 7:09:23 PM -	15.9	17.3			33.2	0.0%	1
Ostler Corner	CV22	Ostler Corner - 200 North	Tuesday, 12/11/2012, 3:06:42 PM -			800.5	893.7	1694.2	4.5%	76
Ostler Corner	CV23	Ostler Corner - 3000 West	Tuesday, 12/11/2012, 3:24:07 PM -	672.2	721.4			1393.6	14.0%	187
Strawberry River Road	CV24	Strawberry River Road	Tuesday, 11/6/2012, 8:57:33 AM	166	164.2			330.1	31.2%	101
Uintah Canyon Road	CV25	Uintah Canyon Road	Tuesday, 11/20/2012, 5:46:10 PM	41.8	22.2			64	1.4%	1
CR-33	CV26	CR-33	Tuesday, 10/16/2012, 2:22:42 PM -	1295.6	1325.9			2621.5	21.9%	570
CR-33	CV27	CR-33	Tuesday, 10/16/2012, 2:40:57 PM -	1097.6	1154.1			2251.7	23.9%	531
Lake Boreham Rd	CV28	Lake Boreham Road 082112	Tuesday, 8/21/2012, 12:46:36 PM -			89.9	92.6	182.4	16.6%	30
Lake Boreham #1	CV29	Lake Boreham #1 040513	Friday, 4/5/2013, 1:48:12 PM -			88.3	95	183.3	13.4%	24
Lake Boreham #2	CV30	Lake Boreham #2 040513	Friday, 4/5/2013, 2:02:20 PM -			68.2	76.2	144.4	9.4%	14
6000 West	CV31	6000 West	Tuesday, 3/12/2013, 2:31:20 PM -	105.1	97.8			202.9	10.4%	21
Red Creek Road	CV32	Red Creek Road #1	Thursday, 2/28/2013, 1:59:58 PM -			26.4	27.6	54	3.4%	2

B.4. TRAFFIC COUNT DATA – UDOT ROADWAYS

Data from UDOT for State and Federal Highway segments within Duchesne County were found at http://www.udot.utah.gov/main/f?p=100:pg:0::::V,T:,4227. Average Annual Daily Traffic (AADT) for 2010 through 2012 was used to calculate an average growth rate for each year, with a total average of 3.75%. Percentages above or below 25% or 0%were not used in the average calculation, as data accuracy and collection methods were unknown (shaded cells).

Table B - 4. Traffic Count Data and AADT Growth Rate - UDOT Roadways

ROUTE NAME	BEG. MILEPOST	END MILEPOST	LOCATION DESCRIPTION	2012 AADT	2011 AADT	2010 AADT	2011-12 Growth	2010-11 Growth
SR-35	028.651	035.671	Road Right To West Fork Duchesne	385	365	335	5.5%	9.0%
SR-35	035.671	042.143	Tabby Lane (41824 West)	475	450	600	5.6%	-25.0%
SR-35	042.143	044.939	3750 North Tabiona	715	535	1,075	33.6%	-50.2%
SR-35	044.939	062.012	SR 208 - SR 87	515	490	445	5.1%	10.1%
US-40	057.959	062.007	Currant Creek Rd (Rt 3100)	3,745	3,780	3,615	-0.9%	4.6%
US-40	062.007	068.247	45000 West Fruitland	4,755	4,395	4,205	8.2%	4.5%
US-40	068.247	085.931	SR 208 39225 West	5,155	5,200	4,975	-0.9%	4.5%
US-40	085.931	086.524	SR 311 22220 West Duchesne	5,845	5,900	5,615	-0.9%	5.1%
US-40	086.524	086.894	SR 87 Center Street Duchesne	8,965	7,770	7,340	15.4%	5.9%
US-40	086.894	096.579	East River Road Duchesne	7,780	5,435	5,140	43.1%	5.7%
US-40	096.579	104.909	12000 West Road to Bridgeland	6,765	5,865	5,785	15.3%	1.4%
US-40	104.909	105.204	Main Street Myton	10,135	7,545	6,760	34.3%	11.6%
US-40	105.204	109.538	B Street (300 North) Myton	9,600	8,320	7,865	15.4%	5.8%
US-40	109.538	111.355	SR 87 (3000 South) Roosevelt	11,410	8,340	9,315	36.8%	-10.5%
US-40	111.355	114.576	2000 South Roosevelt	12,930	11,210	10,590	15.3%	5.9%
US-40	114.576	115.216	SR 121 SR 40 turns Right onto 200 North Roosevelt	18,565	16,090	15,205	15.4%	5.8%
US-40	115.216	117.415	Union Street Roosevelt	14,140	12,250	10,225	15.4%	19.8%
SR-87	000.000	000.660	SR 40 Duchesne	4,110	4,190	4,205	-1.9%	-0.4%
SR-87	000.660	005.947	8750 South	2,835	2,890	2,900	-1.9%	-0.3%
SR-87	005.947	015.618	SR 35	1,530	710	715	115.5%	-0.7%
SR-87	015.618	018.635	3940 North Left to Mountain Home Route 1566	985	1,005	1,010	-2.0%	-0.5%
SR-87	018.635	020.946	18000 West Left to Boneta	1,345	1,370	1,405	-1.8%	-2.5%
SR-87	020.946	021.372	16000 West Left to Altonah	2,410	1,720	1,725	40.1%	-0.3%
SR-87	021.372	028.529	Center Street Altamont	1,245	1,270	1,275	-2.0%	-0.4%
SR-87	028.529	038.159	Upalco Center Street- SR 40 Southwest of Roosevelt	1,160	1,185	955	-2.1%	24.1%
SR-121	000.000	000.557	SR 40 200 North 200 East Roosevelt	7,320	7,460	7,485	-1.9%	-0.3%
SR-121	000.557	004.970	200 North RT turns North Roosevelt	4,590	4,550	2,760	0.9%	64.9%
SR-121	004.970	010.016	Road left to Cedarview (4000 North)	1,455	1,530	1,535	-4.9%	-0.3%
SR-121	010.016	013.013	Neola SR 121 turns East	1,315	1,340	1,345	-1.9%	-0.4%
US-191	259.076	294.537	Emma Park Road	530	540	545	-1.9%	-0.9%
US-191	294.537	294.847	400 South Duchesne - SR 40	2,710	900	900	201.1%	0.0%
SR-208	000.000	010.205	SR 40 - SR 35 Tabiona	335	345	345	-2.9%	0.0%
			AVERAGE AADT GROWTH RATE:				**3.6%**	**3.9%**

B.5. BRIDGE DATA & RATINGS

The TMP study did not include bridge evaluations; however, data was incorporated into the mapping, GIS, and project TIP list considerations. For reference, the data available for State tracked bridges as well as County bridges is included.

Table B - 5. National-State Tracked Bridge Inventory

National Bridge Inventory ID	County Structure ID	Feature Intersected	Bridge Location	Year Built	Age in 2013	Cost [$]	Rating	Traffic Lanes	ADT	Year of ADT	Latitude	Longitude
013001F	1F	Duchesne River	.05 Miles SE of Hanna	1965	48	-	57	1	13	2010	40.424	-110.800
013002F	2F	Duchesne River	1.5 Miles SE of Hanna	1965	48	-	64	1	69	2010	40.415	-110.783
013003F	3F	Farm Creek	3 Miles NW of Tabiona	1978	35	-	99	2	69	2010	40.393	-110.745
013004C	4C	Duchesne River	2 Miles NW of Tabiona	1945	68	-	13	1	13	2010	40.382	-110.742
013005C	5C	Duchesne River	1 Mile NW of Tabiona	1945	68	-	41	2	76	2010	40.371	-110.728
013006F	6F	Duchesne River	West of Tabiona	1968	45	-	68	2	139	2010	40.353	-110.714
013007C	7C	Duchesne River	1 Mile SE of Tabiona	1942	71	-	35	2	63	2010	40.345	-110.701
013008C	8C	Rock Creek	4 Miles S of Stillwater Dam	1970	43	-	89	2	252	2010	40.533	-110.624
013012A	12A	Duchesne River	7 Miles SW of Talmage	1952	61	-	21	1	45	2010	40.297	-110.515
013014D	14D	Lake Fork Overflow Channel	3 Miles W of Altonah	1999	14	-	96	2	189	2010	40.402	-110.349
013015C	15C	Lake Fork Creek	4.5 Miles N of Mountain Home	1955	58	-	65	1	195	2010	40.467	-110.382
013016F	16F	Yellowstone Creek	3.5 Miles NE of Mountain Home	1985	28	-	37	2	202	2010	40.444	-110.364
013017E	17E	Duchesne Feeder Canal	1 Mile N of Bridgeland	1993	20	-	100	2	529	2010	40.168	-110.217
013018C	18C	Lake Fork Overflow Channel	3 Miles SW of Altonah	1999	14	-	91	2	63	2010	40.398	-110.346
013019F	19F	Lake Fork Creek	2.5 Miles W of Altonah	1992	21	-	69	2	189	2010	40.403	-110.344
013020C	20C	Lake Fork Canal	1.5 Miles NW of Altonah	1989	24	-	84	2	66	2010	40.414	-110.313
013021C	21C	Class "C" Canal	2 Miles NW of Altamont	1995	18	-	50	2	32	2010	40.375	-110.313
013022C	22C	Class "C" Canal	2050 N 15000 W, Upalco	2002	11	-	91	2	189	2010	40.335	-110.275
013023C	23C	Class "C" Canal	3.5 Miles NW of Upalco	1999	14	-	88	2	189	2010	40.318	-110.256
013030C	30C	BIA Canal	2 Miles NW of Neola	1945	68	-	41	2	66	2010	40.462	-110.048
013031C	31C	Currant Creek	3 Miles SW of Fruitland	1999	14	-	87	2	63	2010	40.196	-110.871
013034C	34C	Strawberry River	22 Miles W of Duchesne	1940	73	-	88	2	13	2010	40.115	-110.813

National Bridge Inventory ID	County Structure ID	Feature Intersected	Bridge Location	Year Built	Age in 2013	Cost [$]	Rating	Traffic Lanes	ADT	Year of ADT	Latitude	Longitude
013035V	35V	Red Creek	24 Miles W of Duchesne	1981	32	-	0	2	69	2010	40.150	-110.754
013036F	36F	Red Creek	24.6 Miles W of Duchesne	1981	32	-	100	2	63	2010	40.143	-110.753
013037C	37C	Strawberry River	18.5 Miles W of Duchesne	1993	20	-	48	1	25	2010	40.127	-110.742
013038C	38C	Red Creek	18 Miles W of Duchesne	1983	30	-	76	2	32	2010	40.128	-110.740
013040F	40F	Strawberry River	16 Miles W of Duchesne	2002	11	-	100	2	63	2010	40.133	-110.693
013041F	41F	Strawberry River	15 Miles W of Duchesne	2002	11	-	100	2	126	2010	40.132	-110.686
013042F	42F	Strawberry River	14 Miles W of Duchesne	2002	11	-	100	2	126	2010	40.133	-110.651
013043F	43F	Strawberry River	13 Miles W of Duchesne	2002	11	-	100	2	126	2010	40.141	-110.611
013044F	44F	Strawberry River	10.5 Miles W of Duchesne	1998	15	-	100	2	63	2010	40.155	-110.583
013045F	45F	Strawberry River	9.5 Miles W of Duchesne	1998	15	-	100	2	63	2010	40.155	-110.563
013046F	46F	Strawberry River	9 Miles W of Duchesne	1998	15	-	100	2	63	2010	40.155	-110.555
013047F	47F	Strawberry River	8 Miles W of Duchesne	1972	41	-	88	2	63	2010	40.156	-110.547
013053F	53F	Duchesne River	5 Miles N of Duchesne	1966	47	-	68	2	132	2010	40.239	-110.408
013054F	54C	Lake Fork Creek	7 Miles N of Bridgeland	2007	6	-	100	2	330	2010	40.258	-110.222
013055F	55C	Lake Fork Creek	4 Miles NW of Myton	2005	8	-	95	2	70	2010	40.209	-110.117
013057C	57C	Canal	2 Miles N of Bridgeland	1950	63	-	51	2	132	2010	40.171	-110.212
013058F	58C	Duchesne River	In Bridgeland	2007	6	-	100	2	420	2010	40.162	-110.233
013059C	59C	Gray Mountain Canal	1.5 Miles SE of Bridgeland	1985	28	-	69	2	101	2010	40.149	-110.219
013061C	61C	Gray Mountain Canal	2 Miles SE of Bridgeland	1965	48	-	52	1	6	2010	40.146	-110.200
013063C	63C	Sand Creek	Red Creek Cyn 1 Miles S SR 40	1977	36	-	97	2	63	2010	40.189	-110.771
013064C	64C	Duchesne River	1 Miles NW of Tabiona	1965	48	-	41	2	50	2010	40.359	-110.720
013065C	65C	Class "C" Canal	1 Mile NW of Altamont	1986	27	-	81	2	38	2010	40.366	-110.305
013067A	67A	Duchesne River	In Hanna	1952	61	-	42	1	25	2010	40.403	-110.766
013068F	39A	Strawberry River	12 Miles W of Duchesne	2008	5	365,375	100	2	30	2010	40.141	-110.600
013069C	62C	Class "C" Canal	2 Miles SE of Mt Emmons/300 N 14300 W	2009	4	58,000	100	1	63	2010	40.323	-110.264
013070C	33C	Strawberry River	23 Miles W of Duchesne	2008	5	52,000	100	1	10	2010	40.116	-110.823
013071C	32C	Strawberry River	24 Miles W of Duchesne	2008	5	52,000	100	1	10	2010	40.119	-110.832

Table B - 6. County Tracked Bridge Inventory

County Road #	Location	L x W [ft]	Year Built	Footers	Beams	Deck	Cost	Notes	Latitude	Longitude
12	38730 W 5580 N, Tabiona	19 x 16		Concrete	Wood	Wood	$ 14,250		40.382482	-110.729160
115	.2 Miles W of 18000 W 7000 N, Altonah	13 x 32			Precast		$ 30,000		40.401994	-110.335552
118	S of 18000 W 7000 N, Altonah	19 x 19		Concrete	Steel	Steel	$ 19,000		40.401632	-110.331889
129	.2 Miles S of 17000 W 7000 N, Altonah	19 x 17		Concrete	Wood	Wood	$ 14,250		40.39904	-110.312984
310	.1 Miles S of 16500 W 8000 N, Altonah	18 x 17		Wood	Wood	Wood	$ 13,500		40.41464	-110.303395
184	2 Miles N of 16000 W 8000 N, Altonah	20 x 16		Concrete	Steel	Steel	$ 15,000	Replaced deck in 2011	40.442384	-110.304364
121	S of 16000 W 8000 N, Altonah	18 x 21		Concrete	Steel	Steel	$ 18,000		40.415944	-110.29389
120	.1 Miles E of 16000 W 8000 N, Altonah			Concrete Arch Culvert			$ 16,000	Replaced bridge	40.417102	-110.29102
123	15000 W 6000 N, Altonah	17 x 24		Concrete	Steel	Steel	$ 17,000		40.388439	-110.2751
131	S of 15480 W 3000 N, Upalco	26 x 17		Steel	Steel	Steel	$ 26,000		40.344134	-110.284572
132	W of 15480 W 3000 N, Mt Emmons	19 x 14		Concrete	Wood	Wood	$ 14,250	Decking replaced Fall 07	40.344818	-110.285285
311	.4 Miles S of 10000 W 1740 S, Upalco	18 x 22	2004	Concrete	Steel	Steel	$ 18,000		40.276732	-110.180795
33	1 Mile S of 5400 W 11350 S, Pleasant Valley	18 x 34			Precast		$ 35,000		40.125437	-110.080386
72	.2 Miles S of 5000 W 7000 S, Myton	18 x 18		Concrete	Steel	Steel	$ 18,000		40.197847	-110.085921
92	S of Guy Taylor residence, Utahn 4785 S River Road	18 x 32	2004		Precast		$ 34,712		40.230182	-110.408218
44	Hunky Dugway, 3000 W 9000 S	17 x 24	2005	Concrete	Steel	Steel	$ 18,000		40.171855	-110.048023
68	Arcadia, Stan Keller, 9000 W 6230 S	18 x 20	2005	Concrete	Steel	Steel	$ 18,000		40.210845	-110.161644

B.6. LEVEL OF SERVICE ANALYSIS

The Level of Service (LOS) for Duchesne County roadways was found by comparing the traffic count data for each roadway counted and comparing the volume with the capacity based on the "Principles of Highway Engineering and Traffic Analysis" manual for passenger cars per hour per lane. The table below shows the relationship between free flow speed and capacity.

Table B - 7. Free-Flow Speed Capacity for Roadways

Free Flow Speed	Capacity/hr	Capacity/day
45 mi/h	2150	51,600
50 mi/h	2200	52,800
55 mi/h	2250	54,000

Using the capacity ratios above and a growth rate of 4% to year 2033, all of the Volume/Capacity (V/C) ratios were in the "A" LOS rating. While local congestion and lower levels of service may be experienced at local and State highway intersections, the volumes on Duchesne County roads are under capacity in regards to LOS.

Table B - 8. Level of Service Analysis of Duchesne County Roadways

Road Segment	Count CV#	Total ADT	V/C Ratio [45 mi/h]	2033 ADT	2033 V/C Ratio	LOS
2000 W	CV1	726	0.70%	1590	1.54%	A
3000 W	CV2	726	0.70%	1590	1.54%	A
4000 N	CV3	795	0.77%	1743	1.69%	A
6250 S	CV4	861	0.83%	1885	1.83%	A
6450 S	CV5	299	0.29%	655	0.63%	A
9000 N	CV6	496	0.48%	1087	1.05%	A
12000 W #1	CV7	491	0.48%	1075	1.04%	A
12000 W #2	CV8	277	0.27%	607	0.59%	A
12000 W #3	CV9	754	0.73%	1652	1.60%	A
16000 W	CV10	364	0.35%	798	0.77%	A
21000 W	CV11	323	0.31%	709	0.69%	A
Antelope Canyon Rd	CV12	595	0.58%	1303	1.26%	A
Bluebell Rd - 1	CV13	1,211	1.17%	2653	2.57%	A
Bluebell Rd - 2	CV14	1,659	1.61%	3636	3.52%	A
Bluebell Rd - 3	CV15	1,191	1.15%	2609	2.53%	A
Bluebell Rd - 4	CV16	1,242	1.20%	2722	2.64%	A
East River Rd	CV18	602	0.58%	1319	1.28%	A
Hancock Cove Road	CV19	940	0.91%	2060	2.00%	A
Lake Boreham Rd	CV20	289	0.28%	633	0.61%	A
Moon Lake Rd	CV21	33	0.03%	73	0.07%	A
South Cove Road	CV22	1,694	1.64%	3712	3.60%	A
3000 West	CV23	1,394	1.35%	3054	2.96%	A
Strawberry River Road	CV24	330	0.32%	723	0.70%	A
Uintah Canyon Road	CV25	64	0.06%	140	0.14%	A
CR-33 - 2	CV26	2,622	2.54%	5744	5.57%	A
Lake Boreham #1	CV29	183	0.18%	402	0.39%	A
6000 West	CV31	203	0.20%	445	0.43%	A
Red Creek Road	CV32	54	0.05%	118	0.11%	A

APPENDIX C. ACCIDENT REPORTS, SAFETY CONCERNS, & FEEDBACK

C.1. ROADWAY SAFETY CONCERNS

The following areas were pinpointed with safety concerns during meetings with safety committee members, with minutes included below Table C - 1: Roadway Safety Concern Areas.

Table C - 1. Roadway Safety Concern Areas

County Road #	Safety Concern Area	Safety Concern	Proposed Action	Associated County Project
CR 27	Antelope Canyon Road	Canal crossing area and bends have problems	Realignment, geometry	Antelope Canyon Road
CR 64; CR 49	Arcadia Dump Road	Trucks on narrow road and junction	Intersection, widen	6250 South Arcadia Road; 6250 South US 40 to 2000 West
CR 64	Arcadia Road	Drivers leaving road	Realignment, geometry	Arcadia Road 12000 West to Lake Boreham Road
CR 104	Big Hollow	Trees and poor sight on curve by intersection	Realignment, tree removal	N/A
CR 142	Bluebell Road - Bluebell and Roosevelt	Potholes, flat turn, crashes west of houses	Reconstruction, repair	Bluebell Connector Phase III (Jenkins Draw to Hancock Cove)
CR 176	Dye Dugway - North Crescent Road	Alternate emergency route	Completed 2013	Old Dye Dugway Road
CR 32	Gate Canyon	Geometry issues and roadway condition	Reconstruction	Wells Draw Road
CR 142	Jenkins Draw - Bluebell Road	Weather issues, close guardrail	Widen and increase radius bend	Bluebell Connector Phase II (Store to Jenkins Draw)
CR 156	North Cove Road	Hard to enforce speed, steep shoulder	Shoulder, speed	N/A
CR 95	Rock Creek Road/Tommy Hollow	Potholes, poor condition, losing camp trailers	Reconstruction	Towanta Flat Road
CR 14	Strawberry River Road	Curves need realignment	Completed 2013	Strawberry River Road

C.1.1. ROADWAY SAFETY INVENTORY MEETING MINUTES

February 7, 2013 at Duchesne County Administration Building – Conference Room

In Attendance:

- Mike Lefler – Duchesne County Emergency Management
- Sherriff Travis Mitchell - Duchesne County Sheriff's Dept.
- Von Johnson – EMS Coordinator – Uintah Basin Medical Center
- Lt. Jeff Chugg - Utah Highway Patrol
- Michael Hawley & Eric Major - Jones & DeMille Engineering

Meeting Goals:

- Identify locations and roadways with historical accidents
- Highlight areas on maps of concern
- Incorporate discussion and findings in Master Plan

Summary of Findings:

Discussion began on areas of accidents and access problems with comments noted on maps and minutes.

Dye Dugway to Neola from North Crescent Road discussed as a route for emergency vehicles to homes in that area. Alternate route if Highway 121 was blocked would likely be to the west of SR 121 and not Dye Dugway unless improvement project occurs. **(Alternate Route Constructed 2013)**

Bluebell Road – Jenkins Draw area a problem area, with bend and wintertime conditions, close guardrail and shaded areas.

Bluebell Road – Flat turn has caused crashes and problems, geometry issues and cross slope/super elevation

Bluebell Road – Pothole areas going downhill and turn at bottom of grade also a problem area

North Cove Road – Roadway is narrow, very steep shoulder in some areas, and very hard to patrol, speed enforcement is a problem

Pariette Road (CR33) – Turning lanes from Highway 40 and onto Highway 40, will be addressed with UDOT and SSD#2 project **(completed Summer 2013)**

Antelope Canyon Road Intersection with HWY 40 – needs turn lanes and/or widening onto highway as trucks need to swing wide and go into travel lane

Antelope Canyon Road – canal area crossings and bends there have had some problems

Pariette Road (CR33) – Blind hill by canal, **(addressed in CR33 Reconstruction Project in 2013)**

Arcadia dump road – 4 way junction, trucks coming onto very narrow road

Arcadia road sharp bends, drunk driver catcher and many accidents there

Gate canyon – conditions, to be addressed in future project

Strawberry River Road – old concave guardrail along S curve area, bends and turns near Highway have historic problems, straighten **(completed 2013)**

Roads near Lower Red Creek – Berry Petroleum looking at increased development of the area and road conditions are poor, turnouts are narrow. Concern with gravel roads coming onto the highway, Mike Lefler to meet with Berry Petroleum and discuss areas of development and routes

Indian Canyon – Sowers Canyon Road – No turn lane on SR-191, increased traffic will hold up highway traffic

Big hollow – intersection of 3750 North onto SR87, need for improved sight distance, either re-alignment of intersection, cutting slope and removing trees to see oncoming traffic

SR35 – Wolf Creek curves coming down and majority of crashes in this area are a concern

SR35-SR208 intersection – Cannot see to the east from SR208 looking onto SR35

Rock Creek Road – Tommy Hollow area on Tribal Ground, hill is starting to sink and camp trailers have been lost there, will continue to increase in accidents without geometry and surfacing improvements. Cattle guard on this road on tribal boundary needs attention

Fruitland Area – Oil growth there and blind corners on road going South (Sundowner Ridge)

Mike Lefler expressed need for HAS MAT purposes to identify areas of waterways near to travelled areas with industrial hauling. Increased chances of spills may warrant onsite deployment booms for cleanup, as utilized in Duchesne River and Strawberry River.

C.1.2. DEPUTY HARRISON FEEDBACK ON COUNTY ROADWAYS

County Road Truck Route Information

For the month of February, I was given the task of checking for county roads that commercial vehicles should not have access to or should not use or travel on. In the month I was able to locate several county roads especially on the East side of the county that commercial vehicles should not have access without special permission or a reason to use the road. There are so many roads in the county that I tried to limit the time I spent on these roads and which ones I should look at and see if there currently is any commercial traffic on these roads. I started with the most common roads. There are a lot of roads not covered in this report. I tried to limit which roads I checked; roads that I knew need assessing and

roads that can be limited or closed. Some of the roads will have to have complete access and can't be limited to one direction or another. These roads were not listed on this report. I am also sure that I have some roads I have missed. I will continue to track roads as I work and try to build upon this report. But for purposes of this report I listed the main roads or roads I have received complaints on or information.

1. North Cove Road or 1000 North in Hancock Cove
    a. From SR 121 to 3000 West there is only one oil location that I see that was in use. It is my proposal that no commercial vehicles be allowed on this road except to access this site. Further suggestion that all commercial traffic that needs to access this location should access it from 3000 West only and leave the same way it was accessed. The reason for this suggestion is that there are numerous commercial vehicles using 3000 west and South Cove Road going to Bluebell highway and the Cedar View area. There is no reason for traffic to access this location from two separate directions. I also have not observed many vehicles going in and out of the oil well location on this road. Most of the traffic I observed was traveling through to 3000 West from 121. It is my suggestion that 1000 North in the cove be limited access only. This road is too small and unsafe to allow commercial vehicles on it.
2. North Crescent Road
    a. There is a water disposal facility on the Hwy-121 side of North Crescent Road and two oil well locations on the 0 East sides of North Crescent Road. This is a much harder road to determine what way it should be accessed. Due to the fact that there are two locations, on the main side of the road. I believe that the use of this road is going to be hard to contain to one way in and one way out. I believe that it would be good if no commercial vehicles travel on 3000 North to access North Crescent. They should either access from State Street or SR-121. Try to limit how they access may contain some damages to at least a smaller area.
3. 2750 North or Sharmel Acres
    a. I have received several complaints about this road and commercial vehicle use. There is one location located on this road and it is just off of 3000 West. This road is small and being damaged severely by the commercial traffic on the road. The corner at the end could be dangerous for a vehicle and a commercial vehicle at the same time.
    b. This road is a smaller two lane with not enough room for both a commercial vehicle and a private vehicle to pass on it. It is suggested that this road be closed completely from 121 to approximately 2800 West. The access should be from 3000 West to limit the damage to one side of the road. If at all possible this road should be closed completely to commercial vehicles without permit.
4. Cobble Hollow Drive or North Myton Bench Road
    a. I checked this road and could not see a reason that all truck traffic could not access it from Highway 40. I was able to locate at least one oil location on this road in operation. This location is located a mile from Highway 40. Access at a minimum should be limited to from Highway 40 only.
5. Mortensen Lane onto South State Street or 0 East
    a. From Highway 40 to South State Street this area is mainly housing and it is a small narrow road. Trucks should not be allowed on this road from Highway 40 sides to State Street. The trucks should access anything from 6250 South or the old dump road. This road is small but the private traffic is a lot lighter than on

Mortensen Lane. There are fewer homes on this section of the road. All locations in this area can be accessed from the old dump road. It also is unsafe for trucks to be turning off of Highway 40 onto this road there is no turning lane and it may cause an accident.

6. 4000 West from SR 87 to 2000 South
    a. This road has no reason for trucks to be on it. I have found on this road that trucks are using it to avoid the main roads.
7. 4000 South west of Highway 40 (Lemon Bench Road)
    a. Trucks will need to access this road. But they should only do so from Highway 40 and not from SR 87. This includes three roads that should not have trucks on them and they are, 5000 West, 6000 West, and 7000 West. The main access should be from Highway 40.
8. Lake Boreham Road
    a. Trucks will need access to this road there are several locations on this road from Highway 40 to the Dam of the lake. But from 6500 South and 7000 West approximately, the trucks should be limited to access. The road is too small for large vehicles and has many small turns that could present a problem to the public and commercial vehicle alike. I did find a location that was in use in the 7000 West to 12000 West areas. It is proposed that the trucks access this location from 12000 West. This area may be difficult to manage due to the fact that there are so many locations in it. But it will help in keeping damages down when vehicles access the locations from one direction.
9. South Myton Road
    a. This road is basically Center Street in Myton, it goes south to the Pleasant Valley road. I drove the road and found that I could not find an oil location on this road from Myton to the Pleasant Valley road or 10000 South. The problem with this road is it again is small and narrow, also there is a dug way on this road that could present a problem in the winter and for two commercial vehicles passing at the same time. I believe that this road should be shut down completely to commercial vehicles. If any access is needed they can access from 10000 South to the north.

10. Hunky Dugway
    a. Myton City has already put a no “commercial vehicles allowed” sign on this road. I agree with this idea. This road is too small for the access of commercial vehicles and there is no reason that they should not access the gravel pit from 10000 South. There are no locations on this road as far as I could find. All the commercial traffic on this road is trying to access the gravel pit located at 10000 South and this road. All vehicles should access this gravel pit from 10000 South. This road also has a dug way and it is too narrow for two vehicles to pass if one is a commercial vehicle. The corners on it are blind and it is too unsafe to allow traffic on it. This road I have had several complaints on as well.

11. Old River Road Duchesne City to SR 35
    a. There are no oil locations on this road. Due to that fact this road should be closed to commercial traffic.

12. East River Road
    a. This road is a larger road and can accommodate commercial traffic. I know of only one oil location. It is a populated road and I believe that this road should be closed in most part, to commercial traffic. Most traffic using this road can use Highway 40, a road more capable of handling the traffic that will be using the road. A lot of the traffic on this road, use it to avoid the major traffic but, with Highway 40 so close to this road and taking the same route, it should be closed to through commercial traffic. The traffic on this road can access the shop for certain companies that are based on this road, but they can access this road from the Duchesne City side of the road and limit their access to that side only.
13. Strawberry River Road
    a. This road is a road that needs access to it for Oilfield traffic. The only drawback to this road is the dugway leading to the road. The dugway is narrow and unsafe.

This report includes most of the roads that can be high traffic commercial roads. There are a few that are not listed and still need to be looked at. This will be an ongoing investigation and report. For this point in time this report covers the major roads that are complained about and used.

Deputy J. Harrison

C.2. SCHOOL BUS DRIVER FEEDBACK

Glen Simkins, the Transportation Coordinator for the Duchesne County School District had the following concerns during a meeting in February 2013:

- Major problem of access by Kings Peak Elementary in Roosevelt
- Expressed need for more bus turnouts, with room for parents to park as routes consolidate and more students required to come to the main road that the bus will take
- Hwy 40 and Poleline Road/Airport road dangerous and difficult intersections to pull in and out.
- Hwy 40 near Myton at bottom of hill has an area with no left turn lane, and students are getting dropped off on the side of the Highway, with bus stopping Hwy 40 traffic.

Glen distributed surveys to get locations of problems for bus routes and bus drivers. The following table summarizes their comments:

Roadway/Address	**Proposed Action/Comment**
Sandhill road	None - General Maintenance
Fruitland Bus Garage Road	Needs pavement, or at least gravel by doorways
45000 West 5000 South Fruitland	Pave Road
Old Hwy 40 Through Pinon Ridge	Potholes
Access to and roads inside Vonsville Sub	Road graded, Potholes filled, Repaved
6000 West Hwy 40	Potholes
7500 South	Potholes
6500 West hwy 40	Extreme Heavy Truck damage
7000 West Hwy 40	Potholes
6250 S Hwy 40 to 6250 S 6400 W	Road is falling apart due to heavy oilfield traffic
3000 W 1500 N	Intersection-remove cement barriers/fix bottle neck
3000 W 2500 N	Straighten 2500 N to move intersection away from blind hill
Bluebell Hwy	Fix rough road from wash-out by (Denver's-Skip's House)
Pole Line Road @ 5000 W	Fix Large dip caused by new water line (dip is getting larger)
2750 W (Sharmel Acres) Neola Hwy-3000 W	Narrow, rough road, Huge potholes - needs widened to pass
10000 W off 3000 S -North/Vonsville Sub	Grading due to washboard, needs paved. Subdivision Road failing
10000 W off 3000 S -North/Vonsville Sub	Signs block view coming out of subdivision looking west
10000 W off 3000 S -North/Vonsville Sub	Large hole turning east onto HWY 40 from Vonsville
Mortensen Lane Road	Road needs to be done
3200 W between 8000 N & 9000 N	Fix potholes
Hwy 35 about Mile marker 45	A new sign to replace older one so it is noticeable
1000 N 3/4 Miles east	Tree needs to be cut down
Oilfield road	Turn around after Bart Miller's house-on oilfield road

APPENDIX D. TRANSPORTATION IMPROVEMENT PLANS & COST ESTIMATES

D.1. 1 TO 5 YEAR TIP

The following projects are recommended within the next five years, as funding allows. The proposed actions and estimated costs will determine the order or grouping of projects. See associated maps of proposed projects in Appendix A. Note that County Road Department maintenance type projects are not included in the TIP, however, a separate list maintained by the County contains projects smaller in scale and it is recommended that a maintenance plan is continued and implemented based on findings in the TMP study.

Table D - 1. 1 to 5 Year TIP

County Road #	Location/Name	Reconstruction Action	Mileage	Estimated Reconstruction Cost
CR 142	Bluebell Connector Phase III (Store to Jenkins Draw)	Reconstruct Major Collector	5.00	$6,000,000
CR 142	Bluebell Connector Phase IV (Jenkins Draw to Hancock Cove)	3" Rotomill and Overlay, 2" Rotomill and Overlay, Shoulder Work, Geometric Improvements	5.00	$4,215,000
CR 65	Lake Boreham Road Phase II (Lake Boreham to Felter Intersection)	Reconstruct Major Collector	2.5	$4,300,000
	Minor Collector Roadway – Ledge Lane	Minor Improvements	3.00	$2,500,000
	Minor Collector Roadway – Tabby Lane	Spot Improvements & Overlay	1.40	$1,000,000
	Minor Collector Roadway – Mutton Road	Minor Improvements	3.00	$2,500,000
CR 32	Gate Canyon Road	Reconstruct Major Collector	6.50	$14,000,000
CR 113	Moon Lake Road (Big Hollow to Mountain Home)	Reconstruct Major Collector	2.80	$4,800,000
CR 95	Towanta Flat Road*	Reconstruct Minor Collector	7.00	$6,482,000
CR 337	Uintah Canyon Road*	Reconstruct Minor Collector	8.00	$7,408,000
	*Project lies within Tribal lands		61.75	$60,266,500

D.2. 5 TO 10 YEAR TIP

Table D - 2. 5 to 10 Year TIP

County Road #	Location/Name	Reconstruction Action	Mileage	Estimated Reconstruction Cost
CR 33	Pariette Road Sandwash Road to Uinta County Line	Reconstruct Major Collector	2.40	$4,000,000
CR-33	Pariette Road to Sandwash Road	Geometric Improvements	6.00	$1,008,000
CR 27	Antelope Canyon	Reconstruct Minor Collector	5.20	$4,815,200
CR 113	Moon Lake Road – Tribal	Reconstruct Minor Collector	9.00	$8,334,000
176	North Crescent; Roosevelt to North Crescent Road	Reconstruct Major Collector	4.60	$7,886,000
CR 15	Lower Red Creek	Reconstruct Minor Collector	5.00	$4,630,000
CR 7	North Fork Road	Reconstruct Local	5.00	$3,765,000
			21.20	$18,121,200

D.3. 10 TO 20 YEAR TIP

Table D - 3. 10 to 20 Year TIP

County Road #	Location/Name	Reconstruction Action	Mileage	Estimated Reconstruction Cost
CR 64	Arcadia Road 12000 West to Lake Boreham Road	Spot Improvements, Geometric Improvements	5.50	$1,133,000
CR 95	Rock Creek Road	2" Cold-in-place Recycle with Chip Seal, Shoulder Work	12.00	$3,924,000
CR 30 & 31	BLM Fence Road	Future Major Collector	10.20	$12,240,000
			27.70	$17,297,000

D.4. UDOT STIP

These projects use various Federal and State funding programs. UDOT has programmed funds in the Statewide Transportation Improvement Plan (STIP) for several projects within Duchesne County over the next several years. See the link below for a complete listing of all currently planned projects on the UDOT STIP.

http://maps.udot.utah.gov/uplan_data/documents/apps/UDOTProjectsApp/

Projects identified in the Duchesne TMP meetings with steering committee and safety officials dealing with intersections of County roads and UDOT roads are listed below in Table D - 4.

Table D - 4. UDOT Intersection Proposed Improvements

Location	Improvement	Comment
Pariette Road (US-40)	Turn lanes and widen	Completed 2013
Antelope Canyon (US-40)	Turn lanes and widen	Trucks swing wide and leave travel lane
Sowers Canyon Rd (US-191)	Turn lanes	Trucks stopping traffic to turn, blind
SR-208 onto SR-35	Intersection Sight Improvements	Can't see East from SR-208
Poleline Road/Airport Road (US-40)	Intersection Geometry/Traffic Signal	Trucks/School Buses difficult to get on US-40
Bluebell Connector (2000 West at US-40)	Intersection Geometry/Traffic Signal	Difficult turning onto US-40

D.5. FUTURE CORRIDOR PLAN

The following projects have been identified for future corridors or alternative routes for connectivity, development, and corridor preservation. Cost estimates based on functional classification are included. See Map A-1: Functional Classification and Future Routes in Appendix A for locations and extents. These projects are at various levels of need and feasibility. Further design and alignment analysis are required for future projects.

County Road #	Name	Location/Description	Proposed Functional Classification	Mileage	Project Cost
CR 4	47000 W to 5000 S	47000 W, from 5500 S to 5000 S	Local	0.5	$385,000
TBD	Future North Crescent E-W corridor	3500 N, from CR 177 (1000 W) to CR 176 (North Crescent Road)	Local	1.0	$770,000
CR 87	Blue Bench Chevron Pipeline Road	CR 87, from SR 87 to CR 80 (12000 W)	Major Collector	11.0	$13,046,000
CR 87 ; CR 82	6000 South Mail Route from Arcadia	CR 87 (6000 S) and CR 82 (5000 S), from SR 87 to CR 80 (12000 W)	Minor Collector	10.0	$9,240,000
CR 81	Arcadia Mail Route 6000 South Alternative	6000 S, from proposed 6000 South Mail Route from Arcadia to CR 80 (12000 W)	Minor Collector	4.0	$3,696,000
CR 84	Alt Hansen Route	Approximately 4000 S, from proposed Arcadia-Blue Bench North Access Corridor to CR 80 (12000 W)	Minor Collector	4.0	$3,696,000
CR 84	Arcadia-Blue Bench North Access Corridor	Approximately 4000 S - 4500 S, from proposed Blue Bench Chevron Pipeline Road to CR 80 (12000 W)	Minor Collector	9.0	$8,316,000
TBD	12000 West Clay Basin Extension	Approximately 12000 W - 12300 W, from CR 258 (6250 N) to CR 145 (7000 N)	Local	1.0	$770,000
TBD	Blue Bench N-S	17500 W, from proposed Blue Bench Chevron Pipeline Road to proposed Arcadia-Blue Bench North Access Corridor	Minor Collector	2.0	$1,848,000
TBD	Bluebell to Neola Hwy	Approximately 1500 N, from 1350 W to SR 121	Local	0.5	$385,000
CR 280	Extension 46000 W to Hidden Meadow Subdivision	46000 W and CR 280 (6800 S), from US 40 to Hidden Meadow Subdivision	Minor Collector	1.5	$1,386,000
CR 57 ; CR 151	Possible Truck Route - SR 87 to Bluebell Road	4000 W, from SR 87 to CR 142 (Bluebell Road/1500 N)	Major Collector	4.5	$5,337,000
CR 160	6000 West	6000 W, from CR 142 (Bluebell Road/1500 N) to CR 158 (6000 N)	Major Collector	4.5	$5,337,000
CR 178	3000 N North Crescent Minor Collector	3000 N, from CR 177 (3250 N) to CR 176 (North Crescent Road)	Minor Collector	2.0	$1,848,000
CR 165	6000 North	CR 165 (6000 N), from CR 158 (5000 W) to CR 163 (3000 W)	Minor Collector	2.0	$1,848,000
CR 253	CR 253 Connection Alt	CR 253 (750 N), from SR 87 to CR 96 (23000 W)	Local	3.0	$2,310,000
CR 145 ; CR 146	Boulder Boulevard to Bluebell	CR 145 (11000 W) and CR 146 (8000 N), from CR 142 (4000 N) to CR 158 (6000 W)	Major Collector	10.0	$11,860,000
CR 152	Bluebell Connector to US-40	Approximately 2000 W - 3000 W, from US 40 to CR 154 (South Cove Road)	Major Collector	2.5	$2,965,000
CR 176	North Crescent Road	CR 176 (North Crescent Road), from approximately 4900 N to 6700 N	Minor Collector	2.5	$2,310,000

D.6. COST ESTIMATES

D.6.1. COST ESTIMATES PER MILE OF ROADWAY

Table D - 5. Cost Estimates Per Mile of Roadway Reconstruction, Overlay, & Chipseal

Proposed Action	Pavement Width [ft]	Pavement Depth [in]	Base Depth [in]	Sub-base Depth [in]	Cost Per Mile*
Major Collector Reconstruction	30	6	6	6	$1,200,000
Minor Collector Reconstruction	30	4.5	6	-	$926,000
Local/Residential Reconstruction	30	3	6	-	$753,000
3" Overlay	30	3	-	-	$235,000
6" Overlay	30	6	-	-	$464,000
Chipseal	30	-	-	-	$46,000

*See Section D.7.2 for details and unit cost estimates

D.6.2. COST ESTIMATE BREAKDOWN AND ASSUMPTIONS BY PROJECT TYPE

Table D - 6. Cost Estimate Breakdown and Assumptions for 1 Mile of Major Collector Roadway Reconstruction

MAJOR COLLECTOR ASSUMPTIONS	WIDTH [ft]	DEPTH [in]
GEOGRID - SUBGRADE AND BASE REINFORCEMENT	30	1
GRANULAR BORROW (PLAN QUANTITY)	45	6
UNTREATED BASE COURSE (PLAN QUANTITY)	39	6
HOT MIX ASPHALT, 3/4" MAX.	33	6

Item No.	Description	Unit	Estimated Quantity/Mile	Estimated Unit Price	Estimated Total Price
1-1	MOBILIZATION	MILE	1	$30,000	$30,000
1-2	TRAFFIC CONTROL	MILE	1	$30,000	$30,000
1-3	DUST CONTROL AND WATERING	MILE	1	$30,000	$30,000
1-4	RELOCATIONS & REMOVALS	MILE	1	$5,000	$5,000
1-5	SIGNAGE & STRIPING	MILE	1	$5,600	$5,600
1-6	RIGHT-OF-WAY FENCING	MILE	1	$26,400	$26,400
1-7	GUARDRAIL	L.F.	528	$35	$18,480
1-8	ROADWAY EXCAVATION (PLAN QUANTITY)	CU. YD.	11,440	$5	$57,200
1-9	GEOGRID - SUBGRADE AND BASE REINFORCEMENT	SQ. YD.	17,600	$2	$35,200
1-10	PAVEMENT PULVERIZATION - 12" (PLAN QUANTITY)	SQ. YD.	17,600	$1	$17,600
1-11	GRANULAR BORROW (PLAN QUANTITY)	CU. YD.	4,400	$14	$61,600
1-12	UNTREATED BASE COURSE (PLAN QUANTITY)	CU. YD.	3,813	$21	$80,080
1-13	HOT MIX ASPHALT, 3/4" MAX.	TON	6,752	$70	$472,626
1-14	ASPHALT CONCRETE DRIVEWAY	EACH	12	$770	$9,240
1-15	DRAINAGE CULVERTS	L.F.	300	$400	$120,000
				CONSTRUCTION COST PER MILE	$1,000,000
				ENGINEERING, CM, & CONTINGENCY (20%)	$200,000
				TOTAL COST PER MILE OF ROADWAY RECONSTRUCTION	**$1,200,000**

Table D - 7. Cost Estimate Breakdown and Assumptions for 1 Mile of Minor Collector Roadway Reconstruction

MINOR COLLECTOR ASSUMPTIONS	WIDTH [ft]	DEPTH [in]
ROADWAY EXCAVATION (PLAN QUANTITY)		
GEOGRID - SUBGRADE AND BASE REINFORCEMENT	30	1
UNTREATED BASE COURSE (PLAN QUANTITY)	37.5	6
HOT MIX ASPHALT, 3/4" MAX.	32.25	4.5

Item No.	Description	Unit	Estimated Quantity/Mile	Estimated Unit Price	Estimated Total Price
2-1	MOBILIZATION	MILE	1	$31,000	$31,000
2-2	TRAFFIC CONTROL	MILE	1	$24,000	$24,000
2-3	DUST CONTROL AND WATERING	MILE	1	$24,000	$24,000
2-4	RELOCATIONS & REMOVALS	MILE	1	$5,000	$5,000
2-5	SIGNAGE & STRIPING	MILE	1	$5,600	$5,600
2-6	RIGHT-OF-WAY FENCING	MILE	1	$26,400	$26,400
2-7	GUARDRAIL	L.F.	528	$35	$18,480
2-8	ROADWAY EXCAVATION (PLAN QUANTITY)	CU. YD.	6,032	$5	$30,158
2-9	GEOGRID - SUBGRADE AND BASE REINFORCEMENT	SQ. YD.	17,600	$2	$35,200
2-10	PAVEMENT PULVERIZATION - 12" (PLAN QUANTITY)	SQ. YD.	17,600	$1	$17,600
2-11	UNTREATED BASE COURSE (PLAN QUANTITY)	CU. YD.	3,667	$21	$77,000
2-12	HOT MIX ASPHALT, 3/4" MAX.	TON	4,949	$70	$346,413
2-13	ASPHALT CONCRETE DRIVEWAY	EACH	12	$770	$9,240
2-14	DRAINAGE CULVERTS	L.F.	300	$400	$120,000
				CONSTRUCTION COST PER MILE	$771,000
				ENGINEERING, CM, & CONTINGENCY (20%)	$155,000
				TOTAL COST PER MILE OF ROADWAY RECONSTRUCTION	**$926,000**

Table D - 8. Cost Estimate Breakdown and Assumptions for 1 Mile of Local/Residential Roadway Reconstruction

RESIDENTIAL ROADWAY ASSUMPTIONS	WIDTH [ft]	DEPTH [in]
ROADWAY EXCAVATION (PLAN QUANTITY)		
GEOGRID - SUBGRADE AND BASE REINFORCEMENT	30	1
UNTREATED BASE COURSE (PLAN QUANTITY)	36	6
HOT MIX ASPHALT, 3/4" MAX.	31.5	3

Item No.	Description	Unit	Estimated Quantity/Mile	Estimated Unit Price	Estimated Total Price
3-1	MOBILIZATION	MILE	1	$26,000	$26,000
3-2	TRAFFIC CONTROL	MILE	1	$19,000	$19,000
3-3	DUST CONTROL AND WATERING	MILE	1	$19,000	$19,000
3-4	RELOCATIONS & REMOVALS	MILE	1	$5,000	$5,000
3-5	SIGNAGE & STRIPING	MILE	1	$5,600	$5,600
3-6	RIGHT-OF-WAY FENCING	MILE	1	$26,400	$26,400
3-7	GUARDRAIL	L.F.	528	$35	$18,480
3-8	ROADWAY EXCAVATION (PLAN QUANTITY)	CU. YD.	5,060	$5	$25,300
3-9	GEOGRID - SUBGRADE AND BASE REINFORCEMENT	SQ. YD.	17,600	$2	$35,200
3-10	PAVEMENT PULVERIZATION - 12" (PLAN QUANTITY)	SQ. YD.	17,600	$1	$17,600
3-11	UNTREATED BASE COURSE (PLAN QUANTITY)	CU. YD.	3,520	$21	$73,920
3-12	HOT MIX ASPHALT, 3/4" MAX.	TON	3,222	$70	$225,572
3-13	ASPHALT CONCRETE DRIVEWAY	EACH	12	$770	$9,240
3-14	DRAINAGE CULVERTS	L.F.	300	$400	$120,000
				CONSTRUCTION COST PER MILE	$627,000
				ENGINEERING, CM, & CONTINGENCY (20%)	$126,000
				TOTAL COST PER MILE OF ROADWAY RECONSTRUCTION	**$753,000**

Table D - 9. Cost Estimate Breakdown and Assumptions for 1 Mile of 3" Overlay Project

3" OVERLAY ASSUMPTIONS	WIDTH [ft]	DEPTH [in]
HOT MIX ASPHALT, 3/4" MAX. [UNIT WEIGHT 155 LB/FT^3]	30	3
POTHOLE REPAIR, SAWCUTTING, LEVELING 0.25% OF TOTAL ASPHALT		
MOBILIZATION	4%	
TRAFFIC CONTROL	2%	

Item No.	Description	Unit	Estimated Quantity/Mile	Estimated Unit Price	Estimated Total Price
4-1	MOBILIZATION	%	4%	$10,000	$10,000
4-2	TRAFFIC CONTROL	%	2%	$4,660	$5,000
4-3	POTHOLE REPAIR, SAWCUTTING, LEVELING	TON	8	$150	$1,200
4-4	STRIPING	MILE	1	$3,000	$3,000

4-5	HOT MIX ASPHALT, 3/4" MAX.	TON	3,069	$70	$214,830
				TOTAL COST PER MILE OF ROADWAY OVERLAY (3")	**$235,000**

Table D - 10. Cost Estimate Breakdown and Assumptions for 1 Mile of 6" Overlay Project

6" OVERLAY ASSUMPTIONS	**WIDTH [ft]**	**DEPTH [in]**
HOT MIX ASPHALT, 3/4" MAX. [UNIT WEIGHT 155 LB/CUBIC FOOT]	30	6
POTHOLE REPAIR, SAWCUTTING, LEVELING 0.25% OF TOTAL ASPHALT		
MOBILIZATION	4%	
TRAFFIC CONTROL	2%	

Item No.	Description	Unit	Estimated Quantity/Mile	Estimated Unit Price	Estimated Total Price
5-1	MOBILIZATION	%	4%	$19,000	$19,000
5-2	TRAFFIC CONTROL	%	2%	$10,000	$10,000
5-3	POTHOLE REPAIR, SAWCUTTING, LEVELING	TON	15	$150	$2,2500
5-4	STRIPING	MILE	1	$3,000	$3,000
5-5	HOT MIX ASPHALT, 3/4" MAX.	TON	6,138	$70	$429,660
				TOTAL COST PER MILE OF ROADWAY OVERLAY (6")	**$464,000**

Table D - 11. Cost Estimate Breakdown and Assumptions for 1 Mile of Chip Seal Project

CHIP SEAL ASSUMPTIONS		
TYPE II CHIP WITH FLUSH COAT	30	FT IN WIDTH
EMULSIFIED ASPHALT	$750	TON
APPLICATION RATE WITH 240 GALLONS/TON	0.45	GALLONS/SY
POTHOLE REPAIR, PATCHING, LEVELING 0.25% OF TOTAL ASPHALT		
MOBILIZATION	4%	
TRAFFIC CONTROL	2%	

Item No.	Description	Unit	Estimated Quantity/Mile	Estimated Unit Price	Estimated Total Price
6-1	MOBILIZATION	%	4%	$2,000	$2,000
6-2	TRAFFIC CONTROL	%	2%	$1,000	$1,000
6-3	POTHOLE REPAIR AND LEVELING	TON	6	$200	$1,200
6-4	STRIPING	MILE	1	$3,000	$3,000
6-5	TYPE II CHIP	SY	17,600	$0.75	$13,200
6-6	EMULSIFIED ASPHALT	TON	33	$750	$24,750
				TOTAL COST PER MILE OF ROADWAY CHIP SEAL	**$46,000**

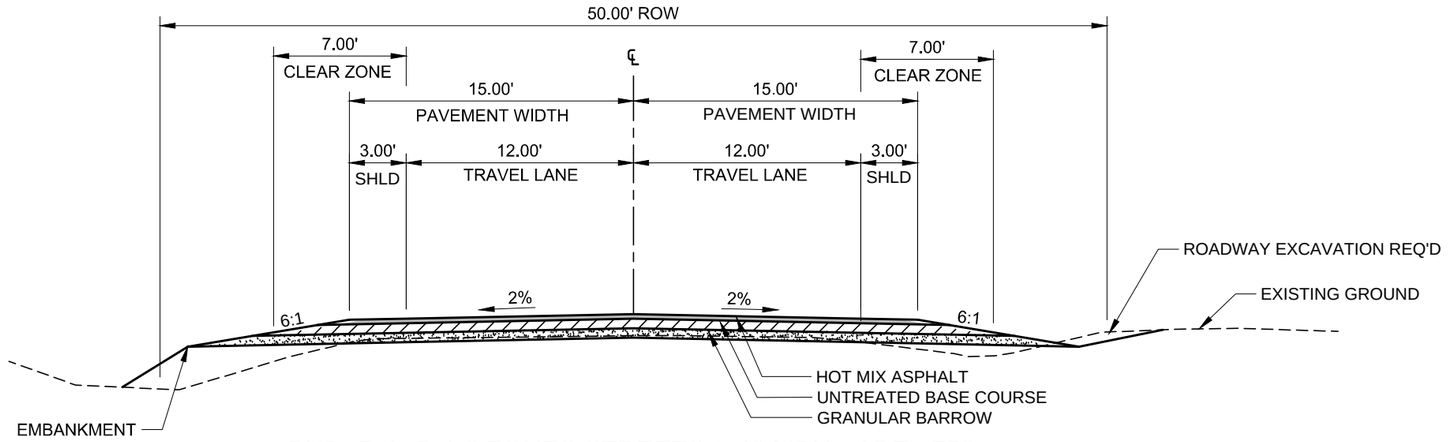
APPENDIX E. DUCHESNE COUNTY STANDARD ROADWAY SECTIONS BY FUNCTIONAL CLASSIFICATION

TYPICAL SECTION - 01

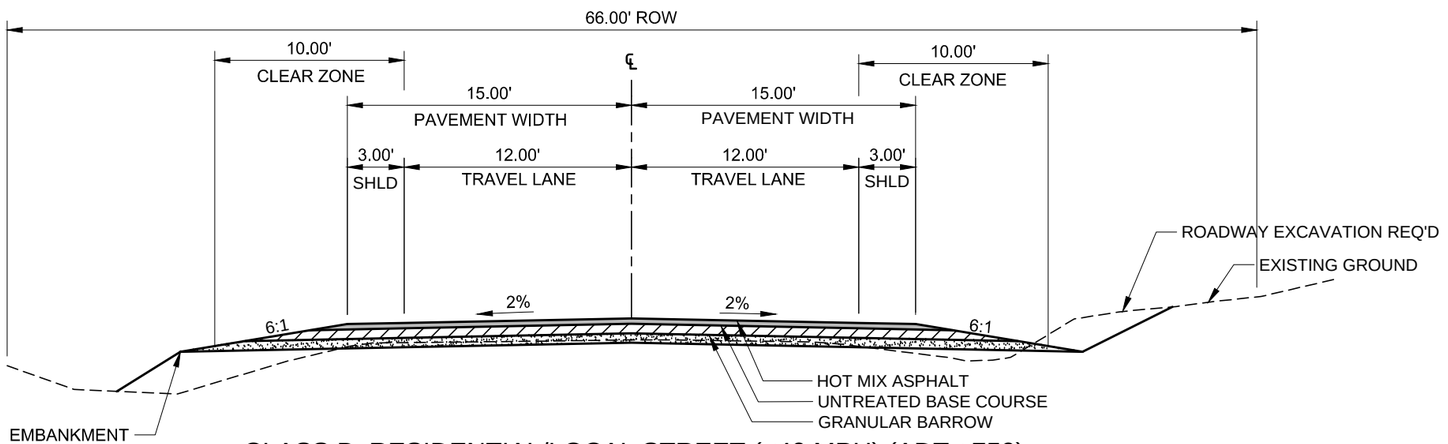
PUD, R-1, R-1/2 ZONES STREETS (<40 MPH) (ADT<750)

CLASS B: RESIDENTIAL/LOCAL STREET (<40 MPH) (ADT<750)

DUCHESNE COUNTY TYPICAL STREET CROSS SECTION STANDARDS



PUD, R-1, R-1/2 ZONES STREETS (<40 MPH) (ADT< 750)



CLASS B: RESIDENTIAL/LOCAL STREET (<40 MPH) (ADT< 750)

NOTES:
1. ASPHALT, BASE, AND SUB-BASE DEPTHS TO BE DETERMINED BY PAVEMENT DESIGN, NATIVE SUBGRADE BEARING CAPACITY, AND EXPECTED TRAFFIC.
2. SEE DUCHESNE COUNTY CODE TITLE 9.6 FOR DESIGN STANDARDS.
3. ROADWAY DESIGN TO CONFORM W/AASHTO AND MUTCD STANDARDS.

NO. | DATE | DESIGN REV. BY: | MAPS CORR. BY: | PARCELS AFFECTED | REQUEST BY: | REMARKS
ORIGINAL SUBMISSION FOR AUTHORIZATION

SCALE: NTS
DWG NAME: TS-01
SHT SET: 1112-021
DWG CREATED: CR_DATE
PEN TBL: 1stndrd-v2800.ctb
LAST UPDATE: 6/20/2013

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REVIEW | DATE: | BY:
DESIGN: . | CHECK: .
DRAWN: LWG 6/13 | CHECK: .
QUANT: . | CHECK: .

APPROVAL RECOMM: DATE
PROJECT DESIGN ENGINEER
APPROVED: DATE

DUCHESNE COUNTY SSD#2
TRANSPOTATION MASTER PLAN
TYPICAL SECTION
PROJECT NUMBER: 1112-021

DUCHESNE COUNTY

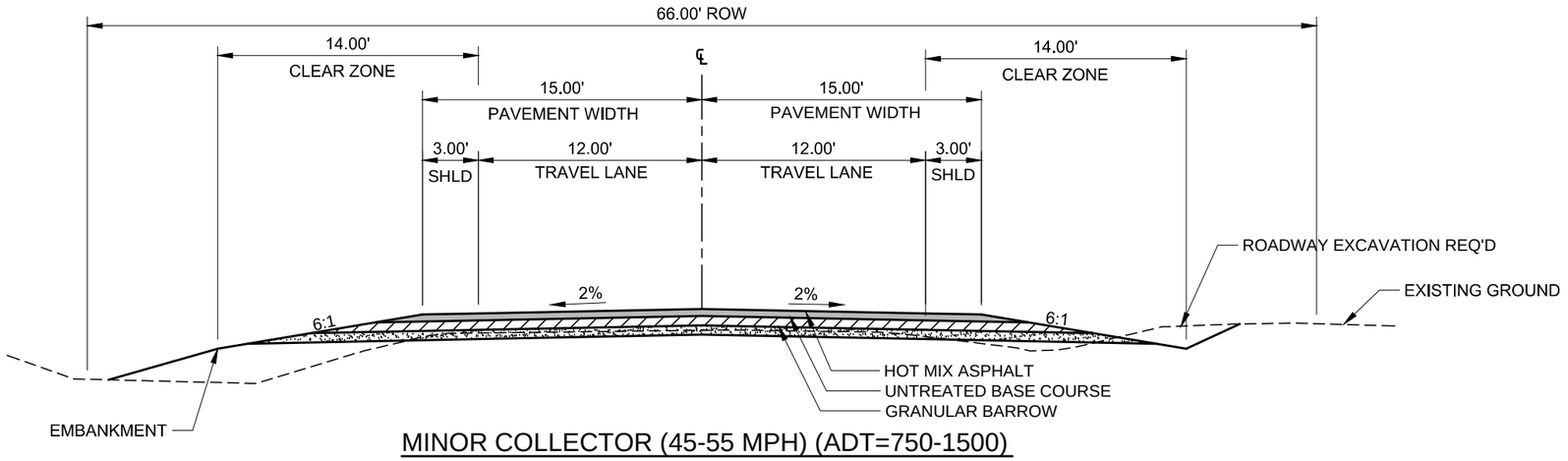
SHEET NO. TS-01

TYPICAL SECTION - 02

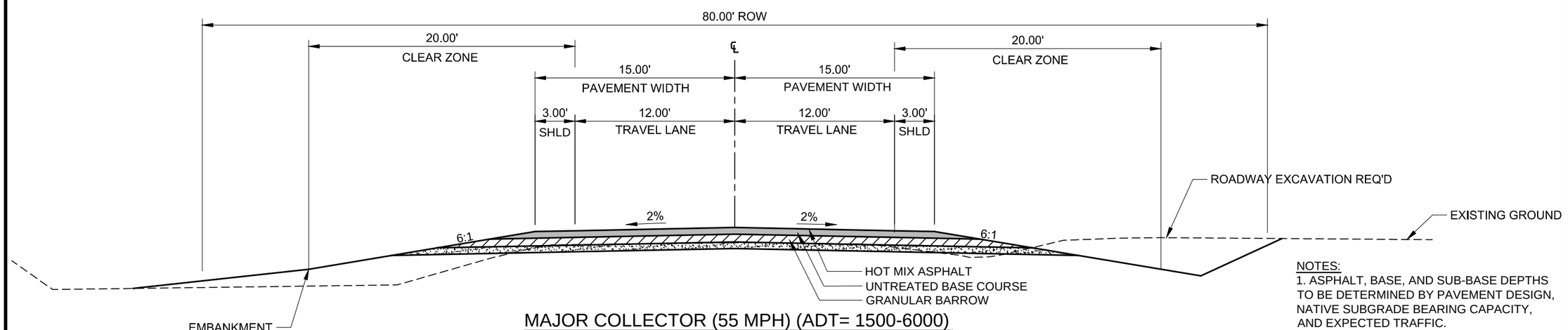
MINOR COLLECTOR (45-55 MPH) (ADT = 750-1500)

MAJOR COLLECTOR (55 MPH) (ADT = 1500-6000)

DUCHESNE COUNTY TYPICAL STREET CROSS SECTION STANDARDS



MINOR COLLECTOR (45-55 MPH) (ADT=750-1500)



MAJOR COLLECTOR (55 MPH) (ADT= 1500-6000)

NOTES:
1. ASPHALT, BASE, AND SUB-BASE DEPTHS TO BE DETERMINED BY PAVEMENT DESIGN, NATIVE SUBGRADE BEARING CAPACITY, AND EXPECTED TRAFFIC.
2. SEE DUCHESNE COUNTY CODE TITLE 9.6 FOR DESIGN STANDARDS.
3. ROADWAY DESIGN TO CONFORM W/AASHTO AND MUTCD STANDARDS.

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REVISIONS

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PROJECT DESIGN ENGINEER
APPROVED: DATE

DUCHESNE COUNTY SSD#2
TRANSPOTATION MASTER PLAN
TYPICAL SECTION
PROJECT NUMBER: 1112-021

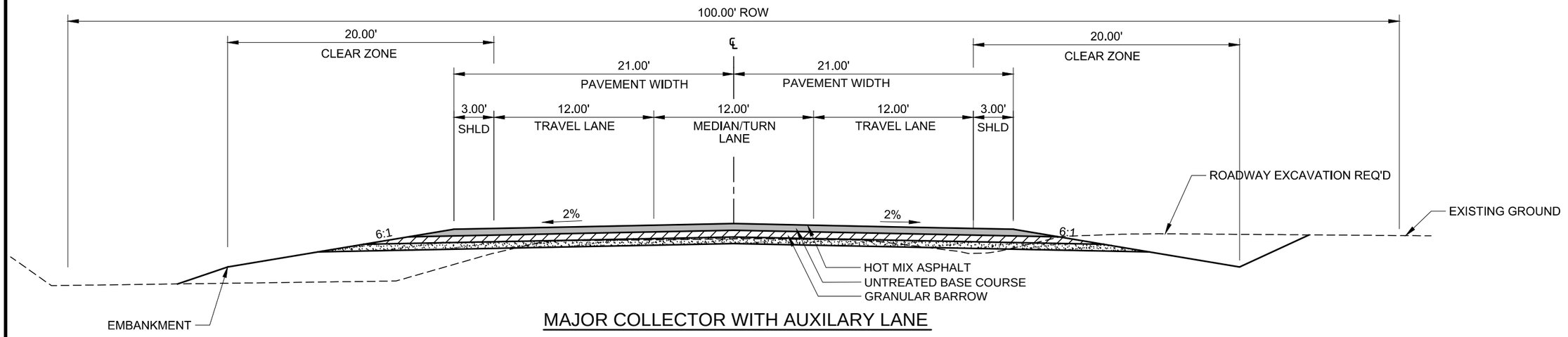
DUCHESNE COUNTY

SHEET NO. TS-02

TYPICAL SECTION - 03

MAJOR COLLECTOR WITH AUXILIARY LANE (55 MPH) (ADT = 1500-6000)

DUCHESNE COUNTY TYPICAL STREET CROSS SECTION STANDARDS



MAJOR COLLECTOR WITH AUXILARY LANE

NOTES:
1. ASPHALT, BASE, AND SUB-BASE DEPTHS TO BE DETERMINED BY PAVEMENT DESIGN, NATIVE SUBGRADE BEARING CAPACITY, AND EXPECTED TRAFFIC.
2. SEE DUCHESNE COUNTY CODE TITLE 9.6 FOR DESIGN STANDARDS.
3. ROADWAY DESIGN TO CONFORM W/AASHTO AND MUTCD STANDARDS.

NO. | DATE | DESIGN REV. BY: | MAPS CORR. BY: | PARCELS AFFECTED | REQUEST BY: | REMARKS
ORIGINAL SUBMISSION FOR AUTHORIZATION

REVISIONS

SCALE: NTS
DWG NAME: TS-01
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REVIEW
DATE: . BY: .
DESIGN: . CHECK: .
DRAWN: LWG 6/13 CHECK: .
QUANT: . CHECK: .

APPROVAL RECOMM: DATE
PROJECT DESIGN ENGINEER
APPROVED: DATE

DUCHESNE COUNTY SSD#2
TRANSPOTATION MASTER PLAN
TYPICAL SECTION
PROJECT NUMBER: 1112-021

DUCHESNE COUNTY

SHEET NO. TS-03