UDOT
Keeping Utah Moving

Utah Freight Plan

2023 UPDATE

Parametrix

cpcs

Utah Freight Plan

2023 UPDATE

Prepared for

Utah Department of Transportation

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ACRONYMS AND ABBREVIATIONS

AADT	Average Annual Daily Traffic
AADTT	Average Annual Daily Truck Traffic
AAR	Association of American Railroads
AASHTO	American Association of State Highway Transportation Officials
ADAS	Advanced Driver Assistance Systems
ASPIRE	Advancing Sustainability through Powered Infrastructure for Roadway Electrification
ATRI	American Transportation Research Institute
ATTAIN	Advanced Transportation Technologies and Innovative
ATTIMD	Advanced Transportation Technologies & Innovative Mobility Deployment
BEVs	Battery Electric Vehicles
BHI	Bridge Health Index
BMP	Best Management Practice
Cache MPO	Cache Metropolitan Planning Organization
CAV	Connected and Automated Vehicles
CMV	Commercial Motor Vehicle
CO	Carbon Monoxide
CRFC	Critical Rural Freight Corridors
CRISI	Consolidated Rail Infrastructure and Safety Improvements
CUFC	Critical Urban Freight Corridors
DEQ	Department of Environmental Quality
Dixie MPO	Dixie Metropolitan Planning Organization
DoD	Department of Defense
DOT	Department of Transportation
DWQ	State Division of Water Quality
DWR	Utah Division of Wildlife Resources
E-commerce	Electronic Commerce
ERA	Emission Reduction Alberta
FAA	Federal Aviation Administration

ACRONYMS AND ABBREVIATIONS (CONTINUED)

FAC	Freight Advisory Committee
FAF	Freight Analysis Framework
FAST	Fixing America's Surface Transportation Act
FCEV	Fuel Cell Electric Vehicles
FHWA	Federal Highway Administration
FMG	Freight Mobility Group
FTZ	Foreign Trade Zone
GDP	Gross Domestic Product
HAPS	Hazardous Air Pollutants
HB	House Bill
HEV	Hybrid Electric Vehicle
HOS	Hours of Service
I-5	Interstate 5
ICT	Information Communication Technologies
IDDE	Illicit Discharge Detection and Elimination
IIJA	Infrastructure Investment and Jobs Act
INFRA	Nationally Significant Multimodal Freight and Highway Projects
ITS	Intelligent Transportation Systems
LCV	Longer Commercial Vehicles
LPG	Liquified Petroleum Gas
LRTP	Long Range Transportation Plan
MAG	Mountainland Association of Governments
MAP-21	Moving Ahead for Progress 21st Century Act
Mega Projects	National Infrastructure Project Assistance
MPO	Metropolitan Planning Organization
MS4	Municipal Separate Storm Sewer System
NAAQS	National Ambient Air Quality Standards
NEVI	National Electric Vehicle Infrastructure
NGV	Natural Gas Vehicles
NHFN	National Highway Freight Network

ACRONYMS AND ABBREVIATIONS (CONTINUED)

NHFP	National Highway Freight Program
NHS	National Highway System
NMFN	National Multimodal Freight Network
NOx	Nitrogen Oxides
NPMRDS	National Performance Management Research Data Set
OS/OW	Oversized/Overweight (vehicles)
PHEV	Plug-in Hybrid Electric Vehicle
PHFS	Primary Highway Freight System
PIDP	Port Infrastructure Development Program Grants
PROTECT	Promoting Resilient Operations for Transformative, Efficient, and Cost-Saving Transportation
RAISE	Rebuilding American Infrastructure with Sustainability and Equity
RNG	Renewable Natural Gas
RPO	Rural Planning Organization
RURAL	Rural Surface Transportation Grant Program
RV	Recreational Vehicle
SLCIT	Salt Lake City Intermodal Terminal
SMART	Strengthening Mobility and Revolutionizing Transportation
SMR	Steam Methane Reforming
SO2	Sulfur Dioxide
SP	Southern Pacific
STIP	Statewide Transportation Improvement Program
STRACNET	Strategic Rail Corridor Network
STRAHNET	Strategic Highway Network
SWMP	Stormwater Management Program
SWPPP	Stormwater Pollution Prevention Plan
TCO	Total Cost of Ownership
TTTR	Truck Travel Time Reliability
UAV	Unmanned Aerial Vehicle
UDOT	Utah Department of Transportation

ACRONYMS AND ABBREVIATIONS (CONTINUED)

UHFN	Utah’s Highway Freight Network
UMFN	Utah Multimodal Freight Network
UIPA	Utah Inland Port Authority
USD	U.S. Dollar
USTM	Utah Statewide Travel Model
Uvision	Utah's Transportation Vision
V2I	Vehicle-to-Infrastructure
VOC	Volatile Organic Compounds
VTOL	Vertical Take-Off and Landing
WASHTO	Western Association of State Highway and Transportation Officials
WCCTCI	West Coast Clean Transit Corridor Initiative
WFRC	Wasatch Front Regional Council
WSFC	Western States Freight Coalition
ZE	Zero-Emission
ZNZE	Zero and Near Zero Emission

GLOSSARY OF TERMS

Annual Average Daily Traffic (AADT): The total volume of traffic on a highway segment for one year, divided by the number of days in the year.

Annual Average Daily Truck Traffic (AADTT): The total volume of truck traffic on a highway segment for one year, divided by the number of days in the year.

Bulk Cargo/Freight: Cargo that is unbound as loaded; it is without count in a loose unpackaged form. Examples of bulk cargo include coal, grain, and petroleum products.

Capacity: The physical facilities, personnel and process available to meet the product of service needs of the customers. Capacity generally refers to the maximum output or producing ability of a machine, a person, a process, a factory, a product, or a service.

Cargo: Refers in particular to goods being conveyed, generally for commercial gain, by ship, boat, or aircraft, although the term is now often extended to cover all types of freight, including that carried by train, van, truck, or intermodal container.

Carrier: A firm which transports goods or people via land, sea, or air.

Class I Railroads As defined by the Association of American Railroads, have annual revenue exceeding $453 million and account for 69 percent of the industry's mileage, 90 percent of its employees, and 94 percent of its freight revenue. They operate in 44 states and the District of Columbia and concentrate largely on long-haul, high-density intercity traffic. There are seven Class I railroads: BNSF Railway Company, Canadian Pacific Railway, CN, CSX Transportation, Kansas City Southern Railway Company, Norfolk Southern Railway Company, and Union Pacific Railroad. The BNSF and Union Pacific operate in Utah.

Class II Railroad: Often called regional railroads and have operating revenues between $36.6 million and $457.9 million.

Class III Railroad: Often called short line railroads and have operating revenues of $36.6 million or less.

Contract Carrier: A carrier that does not serve the general public, but provides transportation for hire for one or a limited number of shippers under a specific contract.

Commodity: An Item that is traded in commerce. The term usually implies an undifferentiated product competing primarily on price and availability.

Common Carrier: Any carrier engaged in the interstate transportation of persons/property on a regular schedule at published rates, whose services are for hire to the general public.

Container: A "box"' typically ten to forty feet long, which is used primarily for ocean freight shipment. For travel to and from ports, containers are loaded onto truck chassis' or on railroad flatcars.

Containerized Cargo: Cargo that is transported in containers that can be transferred easily from one transportation mode to another.

GLOSSARY OF TERMS (CONTINUED)

Contract Carrier: Carrier engaged in interstate transportation of persons/property by motor vehicle on a for-hire basis, but under continuing contract with one or a limited number of customers to meet specific needs.

Dedicated Short-Range Communication (DSRC): A communications platform used by connected/autonomous vehicles.

Fixing America's Surface Transportation (FAST) Act: An Act to authorize funds for Federal-aid highways, highway safety programs, and transit programs, and for other purposes. The FAST Act is a five-year bill with over $300 billion in funding. It was passed in 2015.

Freight: See cargo.

Hub: A common connection point for devices in a network. Referenced for a transportation network as in "hub and spoke" which is common in the airline and trucking industry.

Integrated Corridor Management (ICM): A multijurisdictional, multimodal systems approach to the management of corridors and accessory roads.

Intermodal: Refers to the movement of freight by more than one mode of transportation. The railroad industry applies the term to container and trailer on flat car transportation only.

Intermodal Terminal: A location where links between different transportation modes and networks connect. Using more than one mode of transportation in moving goods.

Level of Service (LOS): A quantitative assessment of a road's operating conditions. For local government comprehensive planning purposes, level of service means an indicator of the extent or degree of service provided by, or proposed to be provided by, a facility based on and related to the operational characteristics of the facility. Level of service indicates the capacity per unit of demand for each public facility.

Lifts: The process of moving containerized cargo that must be lifted on and off vessels and other vehicles using handling equipment.

Logistics: All activities involved in the management of product movement; delivering the right product from the right origin to the right destination, with the right quality and quantity, at the right schedule and price.

Moving Ahead for Progress in the 21st Century (MAP-21) Act: An Act to authorize funds for Federal-aid highways, highway safety programs, and transit programs and for other purposes. The federal funding and authorization bill was signed into law in 2012.

Mainline: The principal track that connects two points; it usually has sidings, spurs, and yards at a number of locations to serve customers, and to hold freight cars.

Metropolitan Planning Organization (MPO): A federally mandated and federally funded transportation policy-making organization in the United States that is made up of representatives from local government and governmental transportation authorities. The

GLOSSARY OF TERMS (CONTINUED)

United States Congress passed the Federal-Aid Highway Act of 1962, which required the formation of an MPO for any urbanized area with a population greater than 50,000. Federal funding for transportation projects and programs are channeled through this planning process.

Port Authority: State or local government that owns, operates, or otherwise provides wharf, dock, and other terminal investments at ports.

Shipper: Party that tenders goods for transportation.

Short Line and Regional Railroads: As defined by the Association of American Railroads, account for 31 percent of U.S. freight rail mileage and 10 percent of employees. They range in size from small operators handling a few carloads a month to multi-state operators close to Class I size. The more than 560 short line and regional railroads operate in every U.S. state except Hawaii and often feed traffic to Class I railroads and receive traffic from Class I railroads for final delivery.

Switching and Terminal Railroads: As defined by the Association of American Railroads, usually perform pick-up and delivery services within a port or industrial area, or move traffic between other railroads. Many switching and terminal railroads were once branch lines of larger railroads that were sold off, or portions of mainlines that had been abandoned.

Supply Chain: Starting with unprocessed raw materials and ending with final customer using the finished goods.

Third-party Logistics (3PL) Provider: A specialist in logistics who may provide a variety of transportation, warehousing, and logistics-related services to buyers or sellers. These tasks were previously performed in-house by the customer.

Trackage Rights: An agreement between two railroads whereby one buys the right to run its trains on the tracks of the other.

Transload: Transferring bulk shipments from the vehicle/container of one mode to that of another at a terminal interchange point.

Unit Train: A train of a specified number of railcars handling a single commodity type which remain as a unit for a designated destination or until a change in routing is made.

Warehouse: Storage place for products. Principal warehouse activities include receipt of product, storage, shipment and order picking.

Yard: A system of tracks, other than main tracks and sidings, used for making up trains, storing cars or other purposes.

EXECUTIVE SUMMARY

From 2000 to 2020 the population of Utah increased by approximately one million people to approximately 3.4 million in 2022. Strong population growth is forecasted to continue with Utah's population reaching 5 million people by 2050 (Utah Population Committee, Kem C. Gardner Policy Institute). The demand for goods is anticipated to grow in relation to the population. This will put a bigger strain on the freight network as it exists today. Various state and regional plans address transportation network components, such as Utah's Unified Transportation Plan 2019-2050 and the regional transportation plans from the four metropolitan planning organizations (MPOs). The Utah Freight Plan addresses issues and needs specific to the statewide highway and multimodal freight networks.

The Plan was developed and funded by the Utah Department of Transportation (UDOT) and subject to approval of the United States Department of Transportation (USDOT) through the Federal Highway Administration (FHWA). The agency's goal was to develop a freight plan compliant with the requirements found in Infrastructure Investment and Jobs Act (IIJA) also known as the Bipartisan Infrastructure Law.

USDOT provided a list of seventeen required elements for the development of states' freight plans. The requirements also allow flexibility as needed based on the variation of states' needs.

1. An identification of significant freight system trends, needs, and issues with respect to the State;
2. A description of the freight policies, strategies, and performance measures that will guide the freight-related transportation investment decisions of the State;
3. When applicable, a listing of –
    a. multimodal critical rural freight facilities and corridors designated within the State under section 70103 of title 49 (National Multimodal Freight Network);
    b. critical rural and urban freight corridors designated within the State under section 167 of title 23 (National Highway Freight Program);
4. A description of how the plan will improve the ability of the State to meet the national multimodal freight policy goals described in section 70101(b) of title 49, United States Code and the national highway freight program goals described in section 167 of title 23;
5. A description of how innovative technologies and operational strategies, including freight intelligent transportation systems, that improve the safety and efficiency of the freight movement, were considered;
6. In the case of roadways on which travel by heavy vehicles (including mining, agricultural, energy cargo or equipment, and timber vehicles) is projected to substantially deteriorate the condition of the roadways, a description of improvements that may be required to reduce or impede the deterioration;

7. An inventory of facilities with freight mobility issues, such as bottlenecks, within the State, and for those facilities that are State owned or operated, a description of the strategies the State is employing to address those freight mobility issues;
8. Consideration of any significant congestion or delay caused by freight movements and any strategies to mitigate that congestion or delay;
9. A Freight Investment Plan that, subject to 49 U.S.C. 70202(c), includes a list of priority projects and describes how funds made available to carry out 23 U.S.C. 167 would be invested and matched;
10. The most recent commercial motor vehicle parking facilities assessment conducted by the State under 49 U.S.C. 70202(f);
11. The most recent supply chain cargo flows in the State, expressed by mode of transportation;
12. An inventory of commercial ports in the State;
13. If applicable, consideration of the findings or recommendations made by any multi-State freight compact to which the State is a party under 49 U.S.C. 70204;
14. The impacts of e-commerce on freight infrastructure in the State;
15. Considerations of military freight;
16. Strategies and goals to decrease –
    a. The severity of impacts of extreme weather and natural disasters on freight mobility;
    b. The impacts of freight movement on local air pollution;
    c. The impacts of freight movement on flooding and stormwater runoff;
    d. The impacts of freight movement on wildlife habitat loss; and
17. Consultation with the State Freight Advisory Committee, if applicable.

UDOT led the development of the 2023 Utah Freight Plan to ensure that the state's transportation system supports and enhances trade and sustainable economic growth. Utah's freight transportation system plays a critical role in fostering economic vitality and competitiveness in regional and global markets as the "Freight Crossroads of the West" and relies on an efficient and connected transportation network. As a result, Utah businesses have quick access to competitive trucking services to meet any logistics needs across North America. There are two main supply chains to which trucking contributes heavily, resource movement from extraction for energy production and food products transport.

UDOT's approach to the 2023 Utah Freight Plan was built around updating elements found in the 2017 Plan, applying a data-driven approach to new content that is compliant with USDOT and FHWA guidelines, and coordination with expert stakeholders. This alignment of the freight plan will promote efficient freight movement. A choice of transportation modes between locations or activity centers is a benefit to the efficient movement of freight. Through data analysis, UDOT developed an understanding of freight movement to, from, and within Utah as well as transcontinental freight flowing through the state. By improving specific corridors, shippers, receivers, businesses, and industries dependent on those corridors can be strengthened, further supporting the economic competitiveness of Utah and the nation.

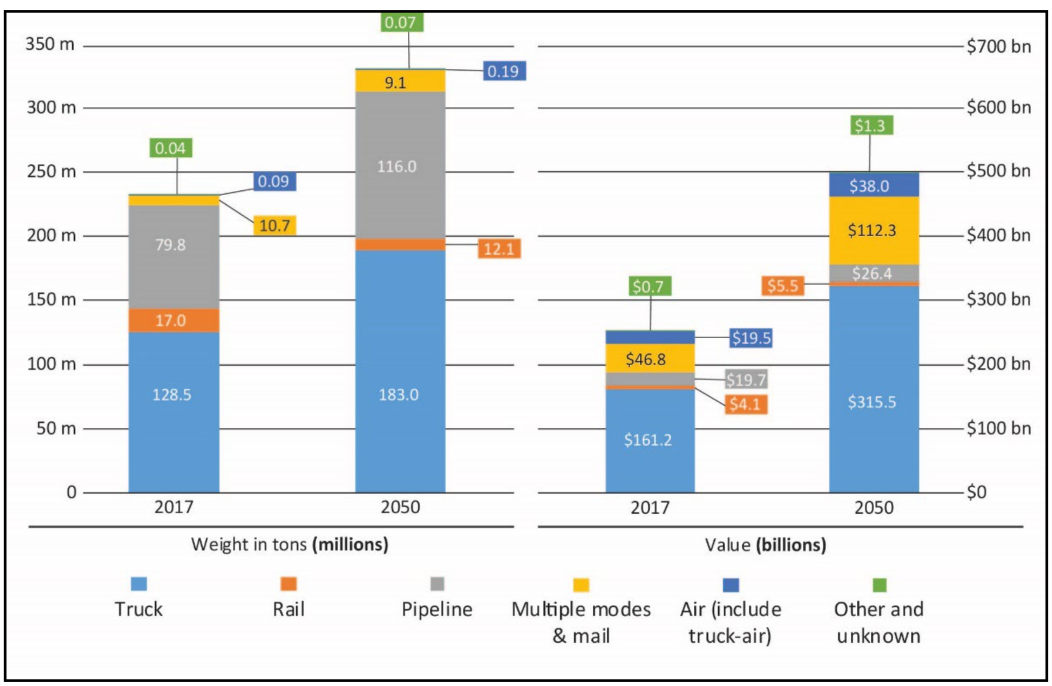
Freight workforce is projected to increase alongside population and freight demand. In 2021, the freight transportation industry provided approximately 41,830 jobs in Utah. When weighted by number of individuals employed by a particular mode or in warehousing, the average income is almost $60,000 per year.

Performance measures specific to freight are required under the FAST Act. FHWA developed a set of measures in 2017 called the Truck Travel Time Reliability (TTTR) Index. State departments of transportation were required to establish two-year and four-year targets for the TTTR Index by early 2018. Metropolitan planning organizations are required to adhere to state targets or establish their own targets within a reasonable timeframe of the state requirements.

Freight Modes in Utah

Freight transportation is an integral part of the state's economy, moving over 235 million tons of cargo worth more than $250 billion in 2017. The freight modes available in Utah include truck, rail, pipeline, and air. Cargo volumes are measured by weight and value. The weight and value of cargo in 2017 and forecasted in 2050 are displayed by mode in Figure ES-1. Trucks and pipelines transport the most cargo by mass. However, trucks and multiple modes & mail transport the highest value. Utah's top trading partners include California, Colorado, Idaho, Nevada, Texas, and Wyoming. A comprehensive breakdown of freight movement, mode, commodities, and trading partners is provided in Elements 1 and 11.

Figure ES-1. Total Mode Share in 2017 and 2050 by Weight and Value



Source: Freight Analysis Framework Version 5.2, Federal Highway Administration, 2021.

Roadways

UDOT was one of the first states in the country to identify its freight corridors. UDOT targets critical infrastructure investments on the UHFN which consists of the Primary Highway Freight System (PHFS), Critical Rural Freight Corridors (CRFC), and Critical Urban Freight Corridors (CUFC), see Figure ES-2. This network is the backbone of highway transportation in the state and serves not only businesses that rely on trucking, but other modes of transportation as well. A complete multimodal freight network map is illustrated in Figure ES-3.

In addition to roadways, UDOT also manages supporting infrastructure throughout the state critical to freight operations safety. This includes bridges, chain-up areas, brake check areas, truck escape ramps, and public truck parking.

Railroads

Freight railroads in Utah are an important component of the multimodal freight network, see Figure ES-3. Of the eight operating railroads in Utah, two are Class I railroads, and seven have access to the national rail system. Union Pacific (UP) is the state's dominant railroad and shares connections with most other general freight rail operators in the state. According to the Association of American Railroads (AAR), Utah has approximately 1,388 miles of freight rail in operation in Utah. Element 3 provides further information regarding Utah's railroads.

Pipelines and Refineries

There are 24 different pipeline operators in Utah that carry a variety of commodities that total more than 21,000 miles in length. Commodities include natural gas and liquid natural gas, petroleum products, carbon dioxide, and anhydrous ammonia. Five oil refineries are located between Salt Lake City and Woods Cross. Each facility provides multimodal freight connections in addition to pipeline service. Additional information and corresponding maps may be found in Element 3.

Aviation

The Salt Lake City International Airport is Utah's principal gateway for air cargo with seven other airports or airfields providing air cargo service in Utah. Although airlines transported a relatively modest 90 thousand tons of cargo in Utah in 2017, that cargo was valued at $20 billion.

Figure ES-2. Utah Highway Freight Network

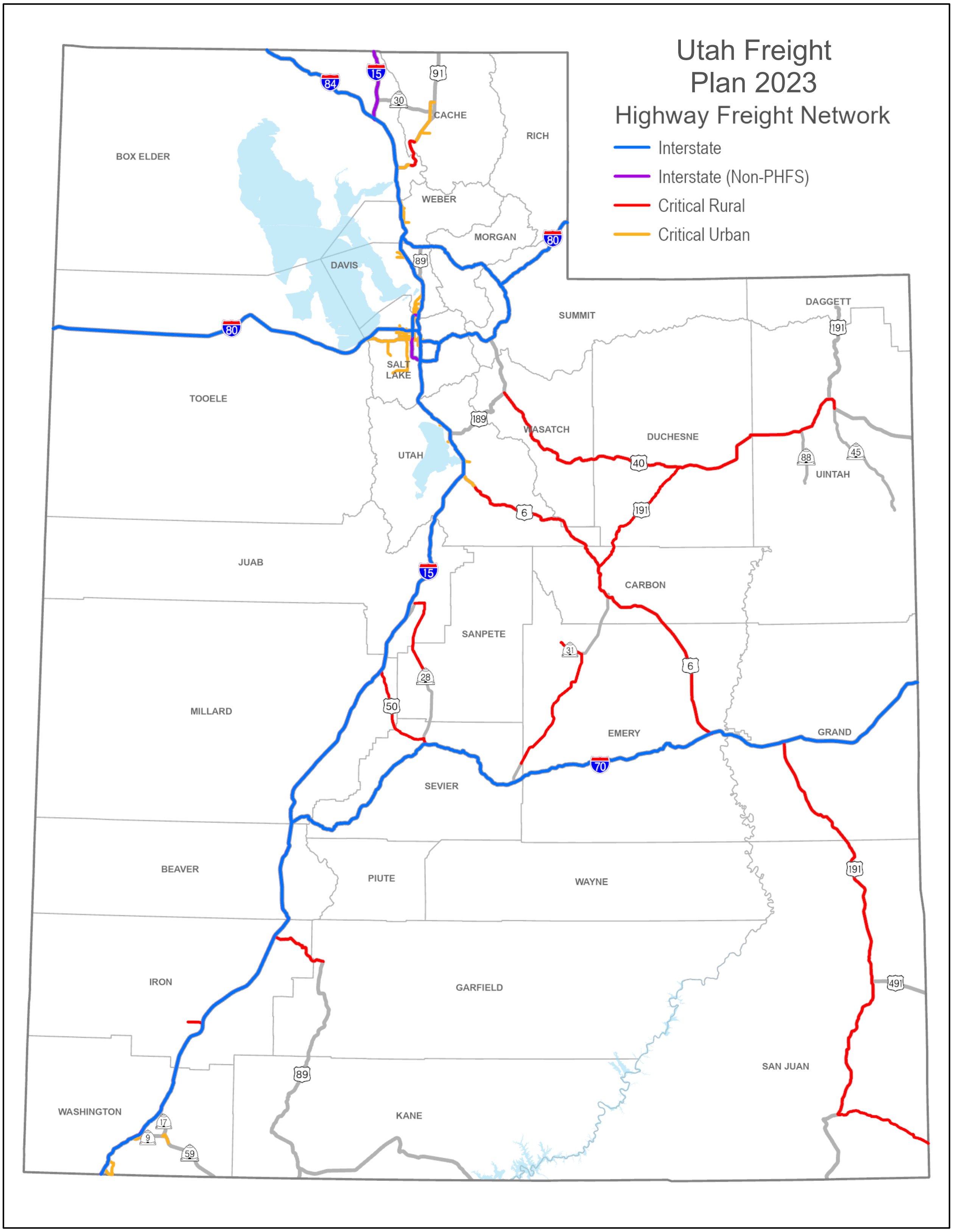
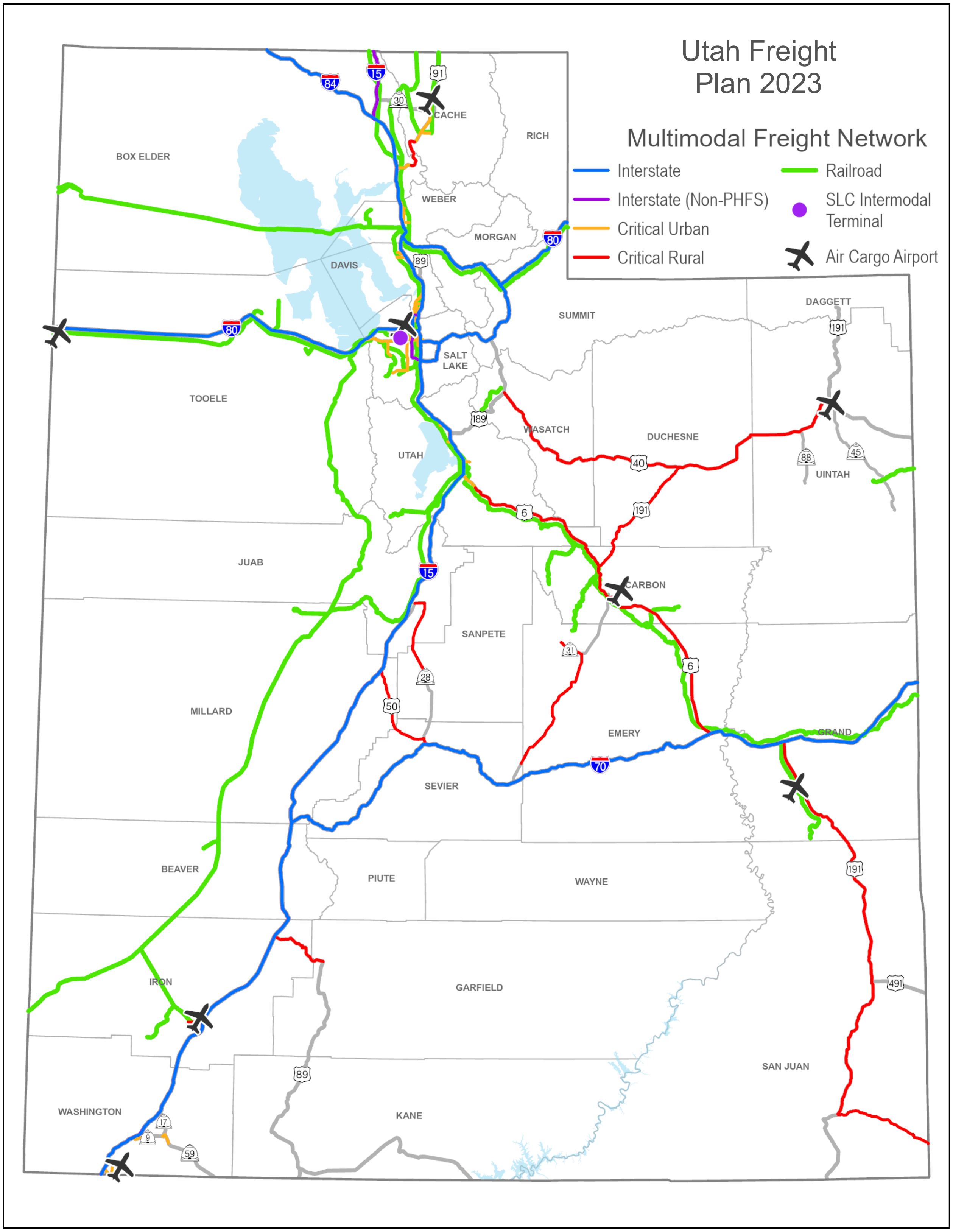


Figure ES-3 Utah's Multimodal Freight Network



Supporting National Freight Goals

The FAST Act established a National Multimodal Freight Network (NMFN) comprised of the NHFN; Class I, Class II, and Class III railroads that are freight rail systems; public ports; inland and intracoastal waterways; the Great Lakes, St. Lawrence Seaway, and coastal/ocean routes used for domestic transport; airports with specific criteria; as well as other strategic intermodal facilities.

The network components of the Utah Multimodal Freight Network (UMFN) include the following:

1. The UHFN, which includes the critical rural and urban freight corridors, and intermodal connectors.
2. The freight rail systems of Class I, II and III railroads in Utah.
3. Eight airports that handle air cargo in Utah.
4. Union Pacific Railroad's Salt Lake City Intermodal Terminal.

A more in-depth discussion of these networks and organizational priorities is in Element 4 and Element 6.

Innovation and Emerging Technology

UDOT maintains a pro-active approach to the incorporation of innovative technological solutions. It is implementing several intelligent transportation systems that will benefit freight mobility and planning for future mobility innovations. Element 5 contains a summary of these efforts and last-mile delivery on freight networks in Utah. Element 14 takes a deep dive into the impacts of electronic commerce on freight movement and logistics in Utah.

Freight Mobility Issues

The UHFN and UMFN routes are generally maintained in a state of good repair. They promote safe and efficient freight movements. However, some routes that link the UHFN and UMFN routes have fallen into disrepair and are in need of improvement.

Freight mobility issues were identified in collaboration with state MPOs and Utah's Freight Advisory Committee (FAC). The various regional transportation plans (RTPs) adopted by these agencies include informed freight issues from each region. Element 7 and Element 8 contain a summary of these freight mobility issues and steps that UDOT is taking to address them.

Truck Parking in Utah

An inadequate supply of truck parking spaces can create a safety hazard caused by fatigued truck drivers often being forced to park in informal or unauthorized locations. Element 10 takes a data-driven approach to identify the supply, demand, and potential areas that would benefit from the construction of additional designated truck parking capacity.

Collaboration

UDOT understands the importance of input from a broad range of individuals and agencies across the transportation industry, local governments, and other interested groups. Element 13 summarizes Utah's collaboration with other states. Element 17 details the consultation that occurred with the Freight Advisory Committee.

Military Freight, Natural Disasters, Environmental Impacts

Element 15 and Element 16 contain new content required by the IIJA. Element 15 contains details about military installations within the state and identifies freight networks that they rely on. Element 16 explores strategies and goals to decrease impacts to freight mobility and freight movement caused by climate change and natural disasters. This element also explores the relationship between freight and air quality, stormwater runoff, and wildlife.

ELEMENT 1. OVERVIEW OF FREIGHT TRENDS, NEEDS, AND FORECASTS

The Federal Highway Administration (FHWA) guidance on state freight plans includes potential topics to consider when identifying the economic trends and forecasts that will affect freight. While not all these items apply to Utah, the following is for consideration:

1. Global, national, regional, and local economic conditions and outlooks, particularly those of the state, neighboring states or countries, and principal trading partners.
2. Population growth and location.
3. Income and employment by industry and service sector, including the expected employment by each sector of the transportation industry.
4. Freight attributes of industry and service sectors (including heavy freight, less than truckload freight, and small package delivery).
5. Type, value, and quantity of imports and exports.
6. Industrial and agricultural production forecasts.
7. Forecasts of freight movements by commodity type and location, including small package deliveries associated with e-commerce, and projected port or rail freight activity.

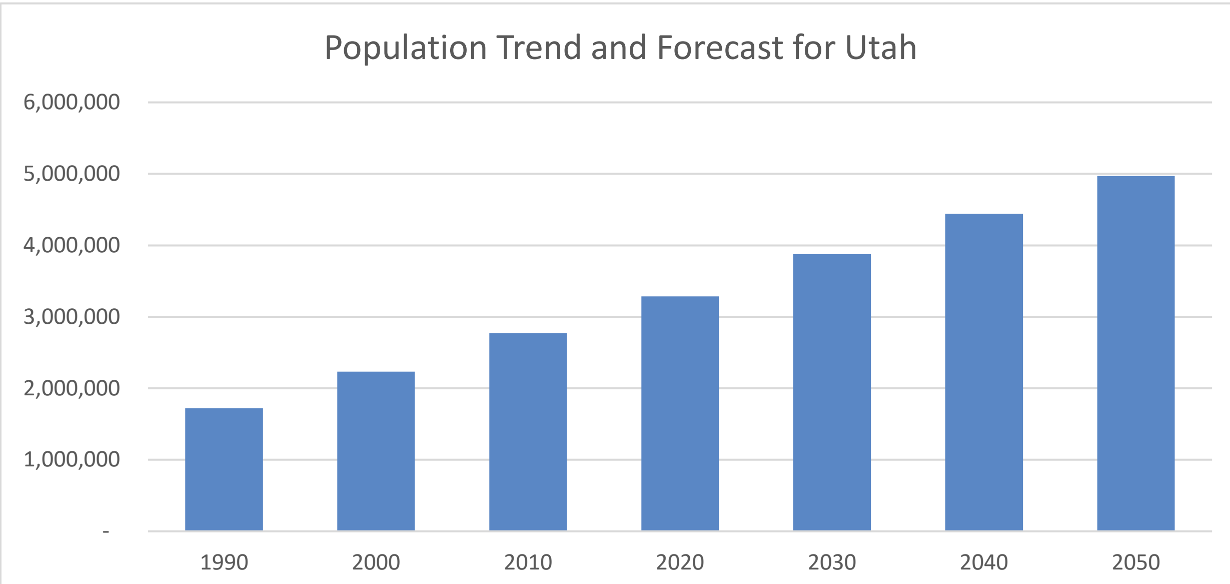
1.1 Economic Conditions and Outlooks

According to the U.S. Bureau of Economic Analysis, in 2022 the national gross domestic product (GDP) grew at an annual rate of 2.1 percent from 2021 levels. Meanwhile Utah fared slightly better with the twelfth highest state-level GDP growing by 2.7 percent. The 2023 Economic Report to the Governor of Utah produced by the Utah Economic Council, projected that the state GDP will increase by a more modest 1.9 percent from 2022 to 2023 and 2.8 percent between 2023 and 2024. During those same periods, these forecasts estimate that the national real GDP will grow by 1.0 percent and 2.0 percent, respectively. This report notes that producing forecasts is confounded by uncertainty if pandemic-caused changes in the economy constitute a new trajectory or will revert to historic norms. The report points out that from January 2020 to November of 2022, employment in the Trade, Transportation, and Utilities sectors increased by 11.3 percent; mining grew by 8.5 percent; and manufacturing by 7.5 percent. The movement of freight is essential to all these industries.

1.2 Population

Between 1990 and 2020, the population of Utah grew by almost 91 percent. From 2000 to 2020 the population of Utah increased by approximately one million people. The existing population (2022) is estimated to be 3.4 million (Utah Population Committee, Kem C. Gardner Policy Institute). The population of Utah is forecasted to grow to approximately 5 million people by 2050 and continue to 5.5 million people by 2060. As population continues to increase, the demand for goods will also increase. This will put a bigger strain on the freight network as it exists today. By looking at how the population will grow, it will allow Utah Department of Transportation (UDOT) to plan for the increase in freight traffic within and through the state of Utah. As with any population growth, urban areas will see the largest increase. This implies that the Wasatch Front will see the largest population growth and therefore the biggest increase in freight traffic.

Figure 1-1. Population Growth 1990-2050



Source: United States Census. Kem C. Gardner Policy Institute, State and County Projections 2020-2060.

1.3 Utah's Freight Transportation Employment by Mode

In 2021, the freight transportation industry provided approximately 41,830 jobs in Utah.

Table 1-1. Freight Employment by Mode

Year*	Trucking	Railroad	Pipeline	Aviation	Warehousing and Storage
2002	16,540	1,800	245	7,090	5,770
2007	19,050	1,900	280	7,040	7,160
2012	20,060	1,590	275	6,350	7,990
2017	22,850	1,460	240	6,710	11,300
2021	20,220	1,020	260	7,280	13,050

*Source: Utah Department of Workforces Services, 2022.

In 2021, the freight transportation industry average annual salary was $75,802 in Utah. It should be noted that there is a significant range in the employment and salary figures. Hence, when weighted by the number employed, the average income is $59,895.

Table 1-2. Average Annual Salary by Mode

Year*	Trucking	Railroad	Pipeline	Aviation	Warehousing and Storage
2002	$32,700	$56,000	$77,400	$53,500	$30,700
2007	$40,300	$62,300	$85,400	$68,200	$35,900
2012	$40,900	$69,200	$105,900	$59,000	$37,400
2017	$45,800	$69,100	$101,800	$83,600	$42,200
2021	$57,610	$77,050	$111,800	$86,120	$46,430

*Source: Utah Department of Workforces Services, 2022.

1.4 Freight Analysis Framework

Freight Analysis Framework (FAF) is the FHWA compiled data set that uses data from multiple sources to outline freight movements for all states. For this plan, FAF Version 5.2, used for analysis. The data provides an estimate for the tonnage, value, and ton-miles for several factors which include origin, destination, mode, and commodities. UDOT has chosen to use value and weight (tonnage) by transportation mode for forecasts. The data used to determine the past trends and forecasts for 2050 appear in increments of five years from 1997 to 2017. The data does not, however, offer insight into the economic impact of freight movements on a national scale and does not account for changes in the cost of transportation or advances in technology.

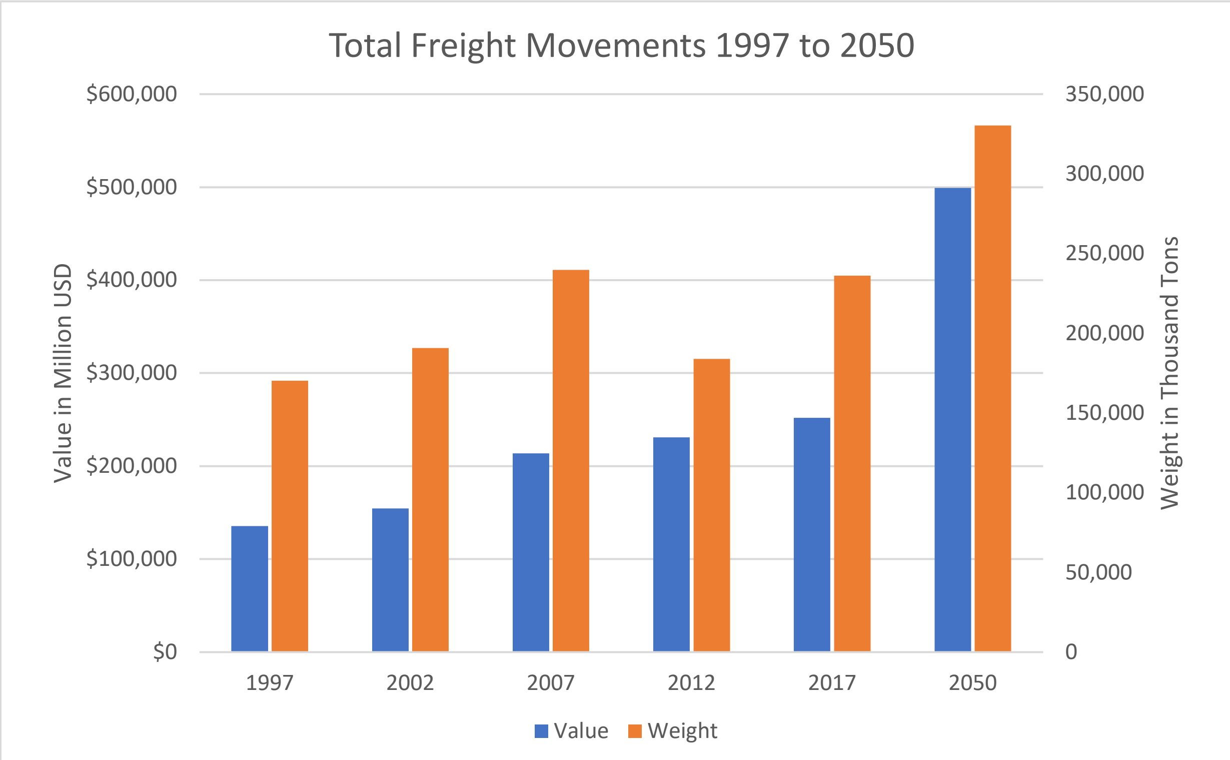
Note: All FAF data in this document referring to the value of freight is based on the 2017 constant of the U.S. Dollar (USD) and is in millions of USD unless otherwise stated. All data referring to the weight of freight is in thousand tons unless otherwise stated.

1.5 Current and Future Freight Movements

The overall trend for freight movements from, to, and within Utah has seen a consistent increase in the value of freight. The 2050 value and weight of freight is projected to significantly increase above 2017 levels. The value of freight is projected in 2050 to increase to almost $500,000 million: 98 percent growth from 2017 levels. Meanwhile the weight of freight is projected to increase to 330,386 thousand tons: a 40 percent increase from 2017 levels.

Element 11 contains additional discussion of historic and more contemporary freight movements in general as well as by mode.

Figure 1-2. Total Freight Movements 1997 to 2050

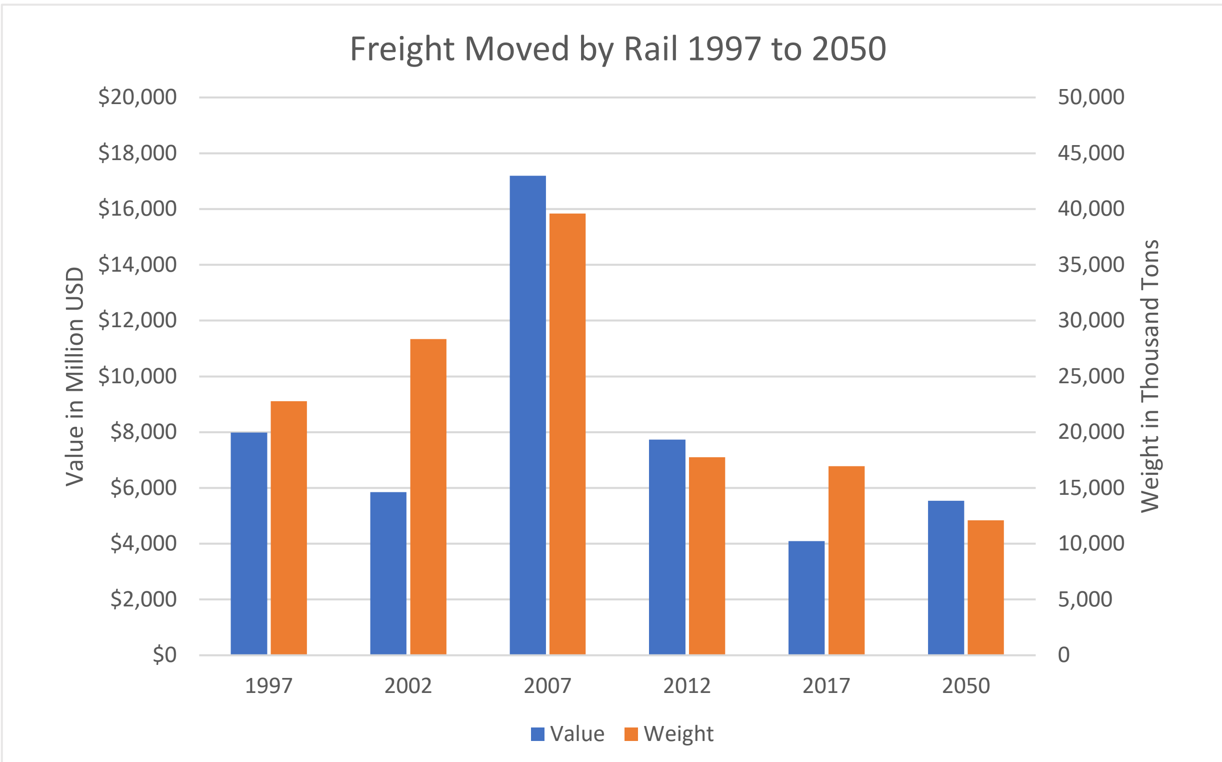


Source: Freight Analysis Framework Version 5.2, Federal Highway Administration, 2021.

1.5.1 Freight Moved by Rail

The value of freight moved by rail experienced significant volatility. Although the value of freight moved by rail is projected to improve in 2050 to $5,540 million, it remains lower than values in 2012 and earlier. The weight of freight moved by rail may continue its downward trend to approximately 12,108 thousand tons in 2050. Element 11 contains additional analysis of freight moved by rail from 1997 through 2017.

Figure 1-3. Freight Moved by Rail 1997 to 2050

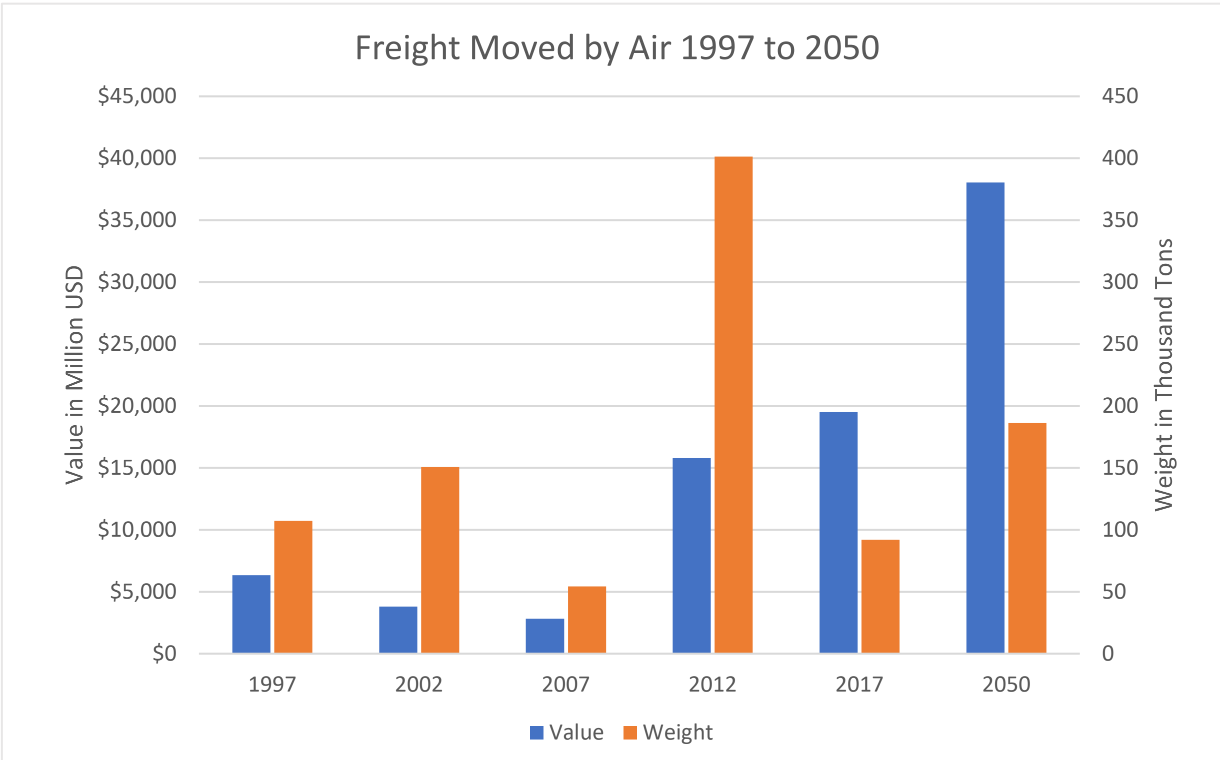


Source: Freight Analysis Framework Version 5.2, Federal Highway Administration, 2021.

1.5.2 Freight Moved by Air

The weight of freight moved by air had substantial variability. In the future, both the value and weight moved by air cargo are projected to increase dramatically above 2017 levels. The value of air cargo is projected to almost double to $38,033 million. While the weight of air cargo increases in 2050, its weight is more like 2002 than 2017 or 2012. Element 11 contains additional analysis of freight moved by air from 1997 through 2017.

Figure 1-4. Freight Moved by Air 1997 to 2050

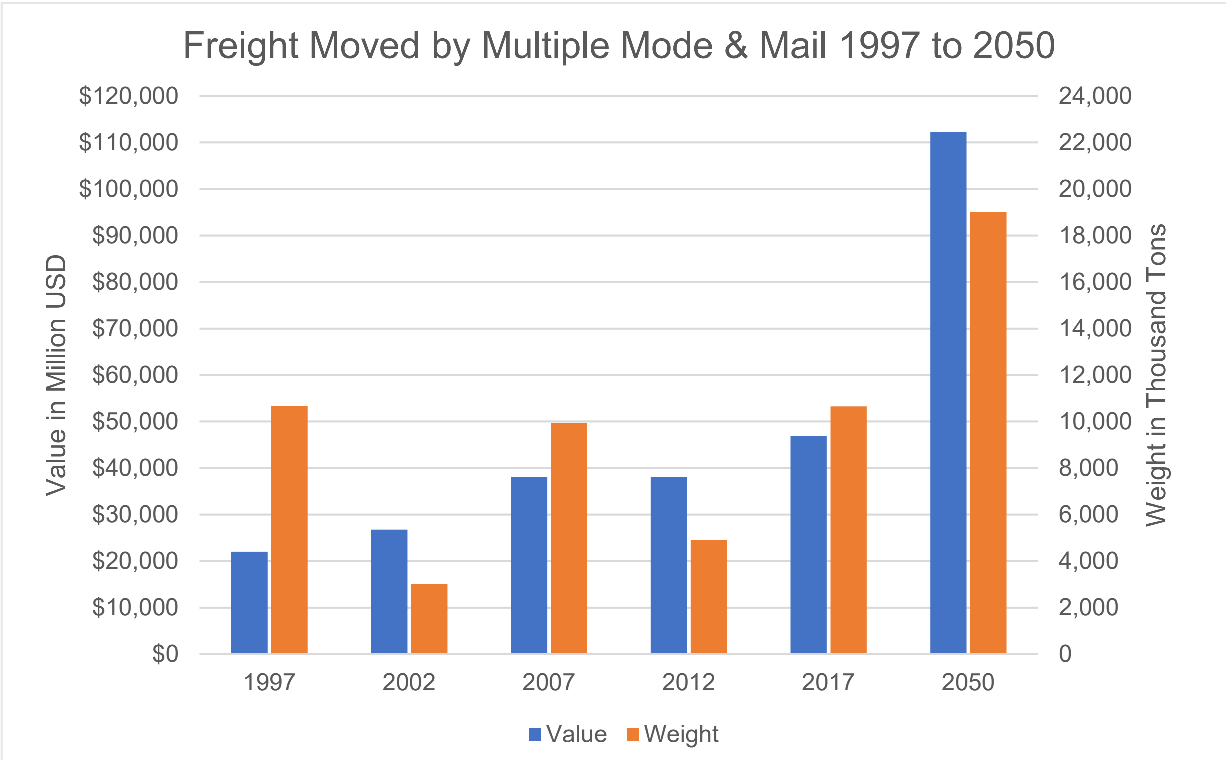


Source: Freight Analysis Framework Version 5.2, Federal Highway Administration, 2021.

1.5.3 Freight Moved by Multiple Modes and Mail

In 2050, both the weight and value of cargo moved by multiple modes, namely rail and truck transfer, and mail is projected to significantly increase beyond 2017 levels. Element 11 contains additional analysis of freight moved by multiple modes and mail from 1997 through 2017.

Figure 1-5. Freight Moved by Multiple Modes and Mail 1997 to 2050

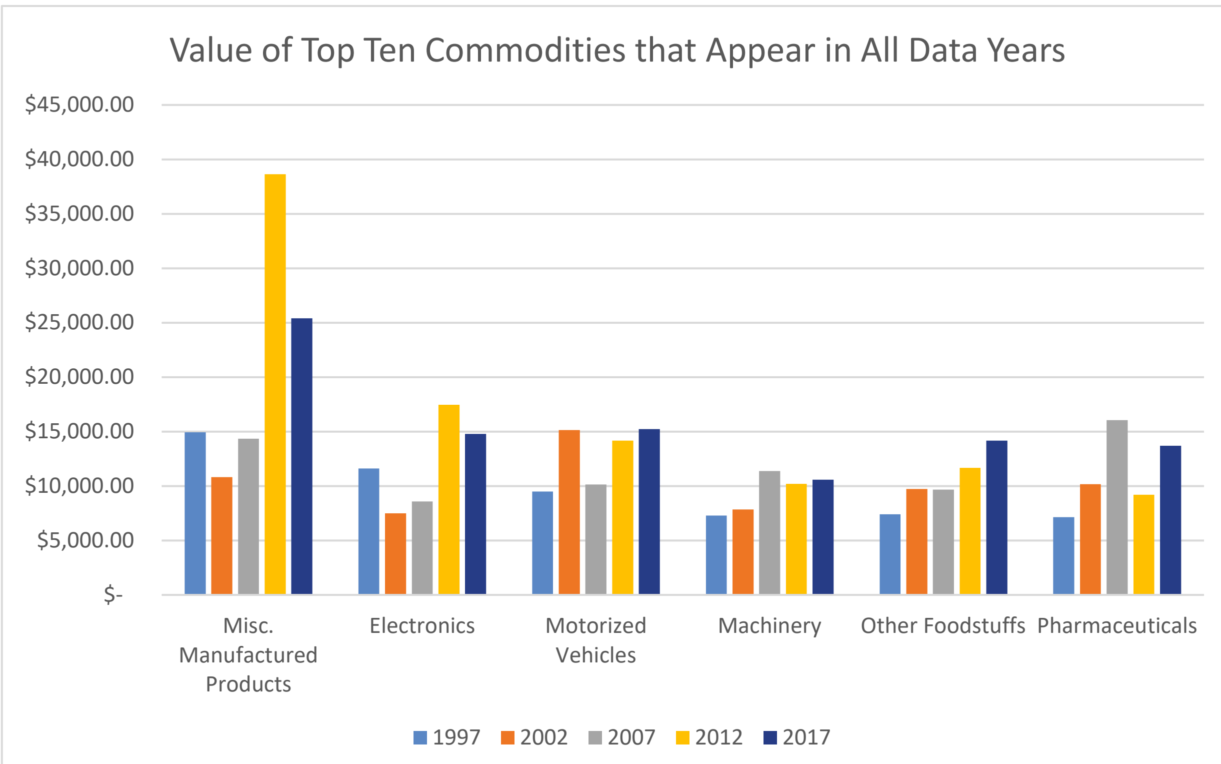


Source: Freight Analysis Framework Version 5.2, Federal Highway Administration, 2021.

1.6 Commodities

Though the top 10 commodities traded from, to, and within Utah change from year to year based on demand, there are several commodities that are consistently in the top 10. The graphs below show the trend for each of these commodities that appeared in all five data years based on their value – 1997, 2002, 2007, 2012, and 2017. These graphs do not show what may occur in the future in terms of which commodities will appear in the top 10 traded commodities. They do, however, show which commodities have the highest value and which commodities have the largest weight in Utah.

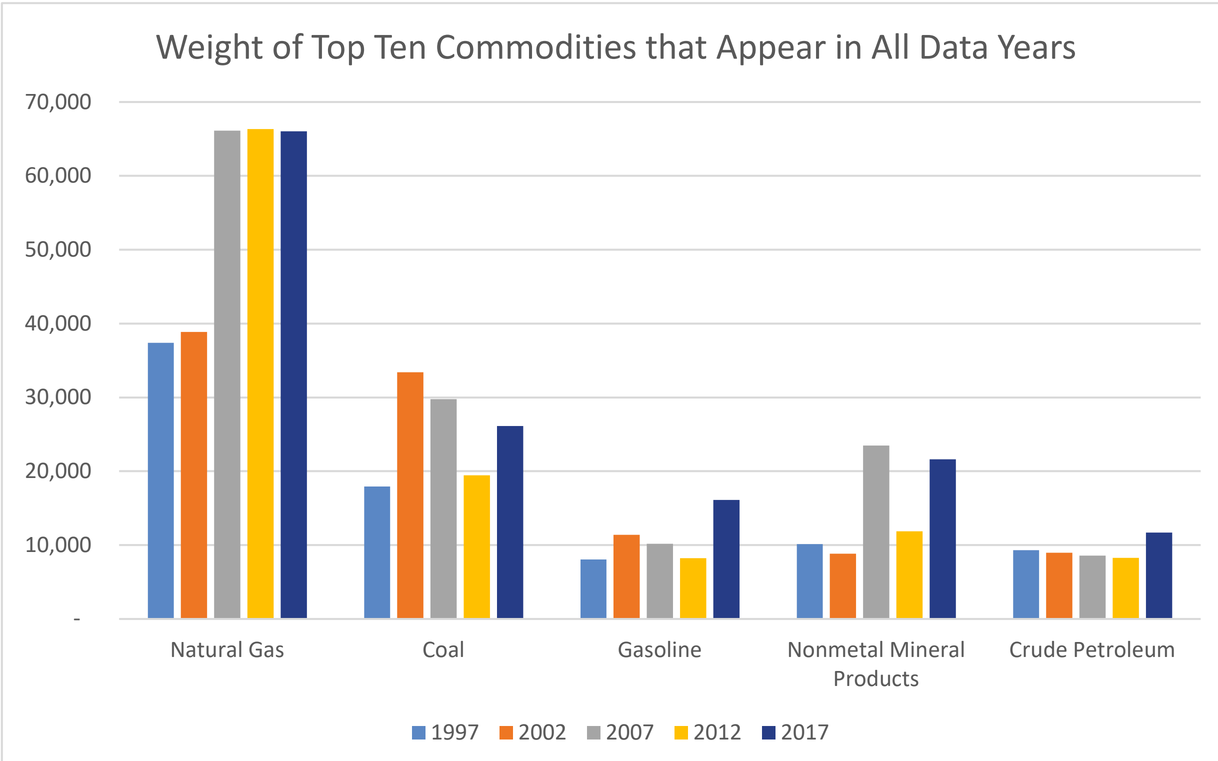
Figure 1-6. Value (million US$) of Top Ten Commodities that Appear in All Data Years



Source: Freight Analysis Framework Version 5.2, Federal Highway Administration, 2021.

Note: FAF reports natural gas as “Coal-not elsewhere classified.”

Figure 1-7. Weight (thousand tons) of Top Ten Commodities that Appear in All Data Years



Source: Freight Analysis Framework Version 5.2, Federal Highway Administration, 2021.

The following tables show the top 10 commodities moved from, to, and within Utah in terms of value and weight as well as the sum of all other commodities for the years 1997, 2002, 2007, 2012, and 2017. They all show that the top 10 commodities traded make up between 50 and 70 percent of all commodities traded by value and weight.

Table 1-3. 1997 Top 10 Commodities by Value (million US$)

Commodity	From Utah	To Utah	Within Utah	Total Value	Percent
Misc. Manufactured Products	$2,829	$10,022	$2,071	$14,922	11%
Electronics	$5,059	$4,619	$1,937	$11,616	9%
Motorized Vehicles	$3,374	$4,481	$1,644	$9,499	7%
Other Foodstuffs	$1,205	$3,798	$2,394	$7,398	5%
Machinery	$1,491	$3,435	$2,352	$7,278	5%
Pharmaceuticals	$2,444	$1,515	$3,189	$7,149	5%
Articles-Base Metal	$1,695	$2,096	$2,245	$6,036	4%
Transport Equipment	$3,351	$2,481	$116	$5,947	4%
Live Animals/Fish	$1	$1,285	$4,032	$5,318	4%
Textiles/Leather	$700	$3,068	$1,114	$4,883	4%
Other	$14,823	$21,502	$19,043	$55,368	41%
Total	**$36,973**	**$58,302**	**$40,137**	**$135,411**	**100%**

Source: Freight Analysis Framework Version 5.2, Federal Highway Administration, 2021.

Table 1-4. 1997 Top 10 Commodities by Weight (thousand tons)

Commodity	From Utah	To Utah	Within Utah	Total Weight	Percent
Natural Gas	12,288	16,411	8,710	37,409	22%
Gravel	464	256	24,879	25,599	15%
Coal	7,400	478	10,065	17,943	11%
Nonmetal Mineral Products	678	1,744	7,706	10,129	6%
Crude Petroleum	1,285	6,402	1,620	9,306	5%
Gasoline	1,060	734	6,266	8,060	5%
Logs	165	173	4,773	5,111	3%
Other Foodstuffs	571	1,892	2,514	4,977	3%
Waste/Scrap	1,959	480	2,371	4,810	3%
Base Metals	1,197	1,965	1,332	4,494	3%
Other	7,308	17,862	17,188	42,358	25%
Total	**34,375**	**48,397**	**87,423**	**170,196**	**100%**

Source: Freight Analysis Framework Version 5.2, Federal Highway Administration, 2021.

Table 1-5. 2002 Top 10 Commodities by Value (million US$)

Commodity	From Utah	To Utah	Within Utah	Total Value	Percent
Motorized Vehicles	$6,726	$3,397	$5,030	$15,153	10%
Mixed Freight	$4,843	$4,769	$3,698	$13,311	9%
Precision Instruments	$2,815	$8,351	$630	$11,796	8%
Misc. Manufactured Products	$3,421	$5,485	$1,923	$10,829	7%
Pharmaceuticals	$3,122	$2,418	$4,619	$10,159	7%
Other Foodstuffs	$1,854	$3,723	$4,146	$9,723	6%
Machinery	$1,726	$3,592	$2,532	$7,850	5%
Electronics	$3,028	$3,111	$1,369	$7,508	5%
Textiles/Leather	$2,371	$3,508	$1,153	$7,033	5%
Articles-Base Metal	$2,394	$1,638	$1,524	$5,556	4%
Other	$16,144	$17,869	$21,734	$55,748	36%
Total	**$48,444**	**$57,864**	**$48,358**	**$154,666**	**100%**

Source: Freight Analysis Framework Version 5.2, Federal Highway Administration, 2021.

Table 1-6. 2002 Top 10 Commodities by Weight (thousand tons)

Commodity	From Utah	To Utah	Within Utah	Total Weight	Percent
Natural Gas	12,465	21,366	5,035	38,866	20%
Coal	9,544	4,024	19,856	33,424	18%
Fuel Oils	7,854	342	14,686	22,881	12%
Gasoline	2,174	789	8,433	11,397	6%
Crude Petroleum	993	6,924	1,059	8,976	5%
Nonmetal Mineral Products	3,351	2,338	3,145	8,833	5%
Basic Chemicals	4,377	1,113	1,243	6,733	4%
Other Foodstuffs	1,004	1,959	3,443	6,406	3%
Nonmetallic Minerals	4,697	313	838	5,848	3%
Base Metals	2,330	932	1,463	4,724	2%
Other	11,877	10,082	20,608	42,568	22%
Total	**60,667**	**50,182**	**79,808**	**190,657**	**100%**

Source: Freight Analysis Framework Version 5.2, Federal Highway Administration, 2021.

Table 1-7. 2007 Top 10 Commodities by Value (million US$)

Commodity	From Utah	To Utah	Within Utah	Total Value	Percent
Base Metals	$15,251	$1,826	$2,549	$19,625	9%
Mixed Freight	$4,639	$5,334	$7,275	$17,248	8%
Pharmaceuticals	$5,726	$6,817	$3,522	$16,065	8%
Misc. Manufactured Products	$4,749	$7,435	$2,148	$14,333	7%
Natural Gas	$4,029	$7,051	$1,485	$12,565	6%
Machinery	$2,242	$4,842	$4,307	$11,391	5%
Motorized Vehicles	$2,663	$5,214	$2,268	$10,145	5%
Other Foodstuffs	$2,928	$4,126	$2,624	$9,678	5%
Articles-Base Metal	$2,804	$2,895	$3,257	$8,956	4%
Electronics	$2,096	$4,391	$2,101	$8,588	4%
Other	$26,064	$33,146	$26,050	$85,259	40%
Total	**$73,191**	**$83,078**	**$57,586**	**$213,854**	**100%**

Source: Freight Analysis Framework Version 5.2, Federal Highway Administration, 2021.

Table 1-8. 2007 Top 10 Commodities by Weight (thousand tons)

Commodity	From Utah	To Utah	Within Utah	Total Weight	Percent
Natural Gas	21,021	36,544	8,544	66,109	28%
Coal	6,673	4,210	18,897	29,781	12%
Nonmetal Mineral Products	2,985	3,450	17,055	23,489	10%
Gravel	225	279	14,816	15,320	6%
Basic Chemicals	11,992	659	500	13,151	5%
Gasoline	1,243	601	8,354	10,198	4%
Crude Petroleum	610	5,395	2,593	8,598	4%
Base Metals	4,486	949	2,358	7,793	3%
Fuel Oils	1,132	1,078	5,145	7,356	3%
Nonmetallic Minerals	4,870	279	1,253	6,403	3%
Other	13,322	16,626	21,708	51,656	22%
Total	**68,559**	**70,070**	**101,223**	**239,852**	**100%**

Source: Freight Analysis Framework Version 5.2, Federal Highway Administration, 2021.

Table 1-9. 2012 Top 10 Commodities by Value (million US$)

Commodity	From Utah	To Utah	Within Utah	Total Value	Percent
Misc. Manufactured Products	$9,283	$17,635	$11,712	$38,630	17%
Mixed Freight	$6,082	$5,974	$6,125	$18,181	8%
Electronics	$7,437	$8,028	$2,003	$17,467	8%
Textiles/Leather	$10,736	$4,344	$2,004	$17,083	7%
Natural Gas	$6,067	$6,648	$2,479	$15,194	7%
Motorized Vehicles	$2,804	$10,006	$1,369	$14,179	6%
Other Foodstuffs	$3,947	$5,279	$2,447	$11,673	5%
Machinery	$2,720	$5,593	$1,894	$10,208	4%
Precision Instruments	$6,387	$2,841	$297	$9,525	4%
Pharmaceuticals	$2,824	$2,246	$4,134	$9,204	4%
Other	$24,745	$24,227	$20,586	$69,558	30%
Total	**$83,032**	**$92,821**	**$55,049**	**$230,902**	**100%**

Source: Freight Analysis Framework Version 5.2, Federal Highway Administration, 2021.

Table 1-10. 2012 Top 10 Commodities by Weight (thousand tons)

Commodity	From Utah	To Utah	Within Utah	Total Weight	Percent
Natural Gas	29,778	26,462	10,116	66,356	36%
Coal	2,924	1,924	14,604	19,452	11%
Nonmetal Mineral Products	3,873	1,224	6,781	11,878	6%
Crude Petroleum	2,943	3,242	2,093	8,278	5%
Gasoline	527	605	7,095	8,227	4%
Other Foodstuffs	2,081	3,611	1,666	7,358	4%
Gravel	363	263	4,882	5,509	3%
Waste/Scrap	410	651	3,740	4,801	3%
Mixed Freight	1,559	933	2,297	4,789	3%
Fuel Oils	166	84	4,477	4,727	3%
Other	17,736	13,055	11,794	42,584	23%
Total	**62,361**	**52,054**	**69,545**	**183,960**	**100%**

Source: Freight Analysis Framework Version 5.2, Federal Highway Administration, 2021.

Table 1-11. 2017 Top 10 Commodities by Value (million US$)

Commodity	From Utah	To Utah	Within Utah	Total Value	Percent
Misc. Manufactured Products	$8,038	$10,738	$6,627	$25,403	10%
Mixed Freight	$10,046	$4,805	$9,330	$24,182	10%
Motorized Vehicles	$3,815	$8,650	$2,771	$15,236	6%
Electronics	$4,655	$6,987	$3,154	$14,797	6%
Natural Gas	$6,956	$4,986	$2,512	$14,454	6%
Other Foodstuffs	$5,589	$5,700	$2,890	$14,179	6%
Pharmaceuticals	$5,140	$4,396	$4,170	$13,706	5%
Textiles/Leather	$6,787	$4,700	$844	$12,330	5%
Machinery	$2,525	$5,625	$2,425	$10,575	4%
Precision Instruments	$5,532	$3,436	$768	$9,736	4%
Other	$32,104	$37,100	$28,229	$97,432	39%
Total	**$91,188**	**$97,121**	**$63,720**	**$252,029**	**100%**

Source: Freight Analysis Framework Version 5.2, Federal Highway Administration, 2021.

Table 1-12. 2017 Top 10 Commodities by Weight (thousand tons)

Commodity	From Utah	To Utah	Within Utah	Total Weight	Percent
Natural Gas	28,598	25,373	12,053	66,024	28%
Coal	9,118	4,089	12,938	26,145	11%
Nonmetal Mineral Products	2,108	1,594	17,917	21,618	9%
Gasoline	34	5,107	10,991	16,132	7%
Gravel	87	157	13,638	13,883	6%
Crude Petroleum	4,808	6,369	526	11,702	5%
Mixed Freight	4,445	1,584	4,038	10,066	4%
Waste/Scrap	449	2,088	5,283	7,819	3%
Fuel Oils	99	72	6,976	7,148	3%
Nonmetallic Minerals	6,323	235	583	7,141	3%
Other	12,997	17,728	17,648	48,373	20%
Total	**69,066**	**64,395**	**102,590**	**236,051**	**100%**

Source: Freight Analysis Framework Version 5.2, Federal Highway Administration, 2021.

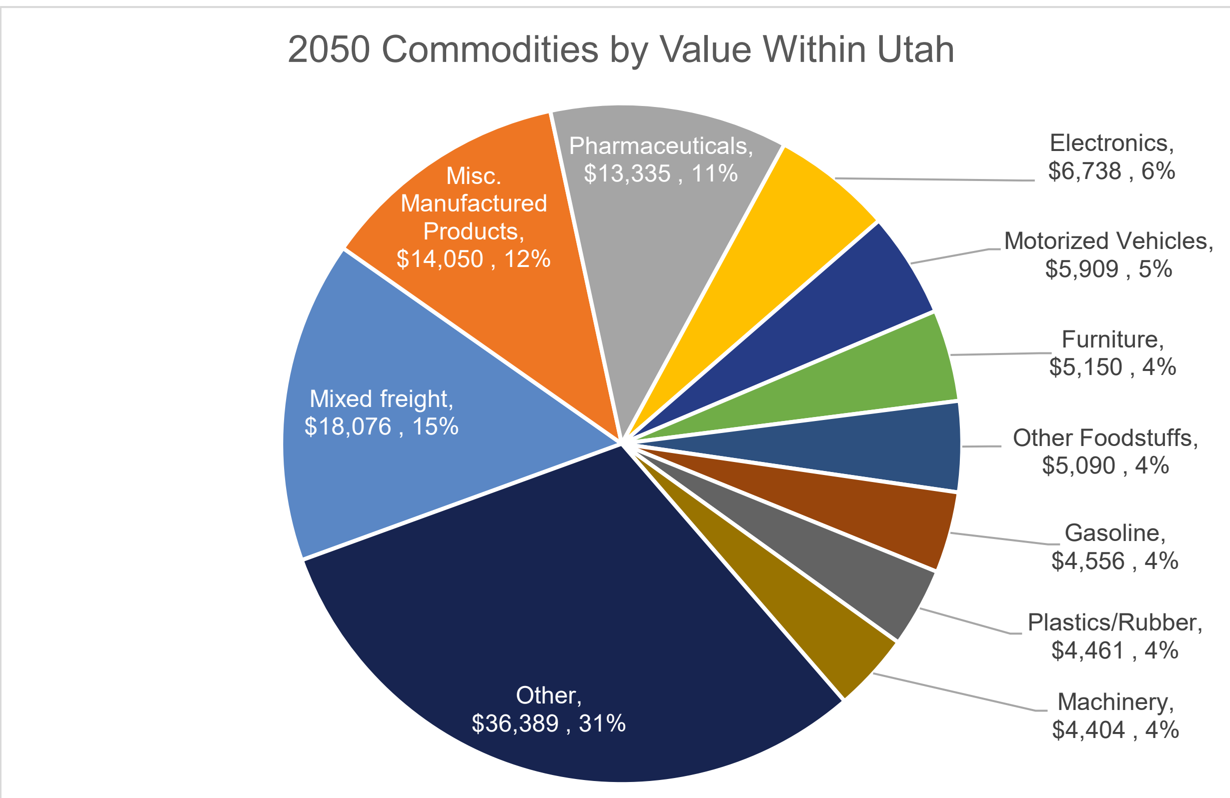
1.6.1 Future Commodities by Value

The charts below show forecasted value of commodities in 2050 for various freight flows. Within Utah, the largest individual categories are Mixed Freight with $18,076 million (15%), Miscellaneous Manufactured Products at $14,050 million (12%), and Pharmaceuticals at $13,335 million (11%). There is a five-percentage point gap between this share and the next largest category.

Among freight that is outbound from Utah, in 2050 Miscellaneous Manufactured Products projected at $21,485 million (11%) is the largest category. The next largest categories are Mixed Freight at $19,767 million (10%) and Textiles/Leather worth $16,972 million (9%).

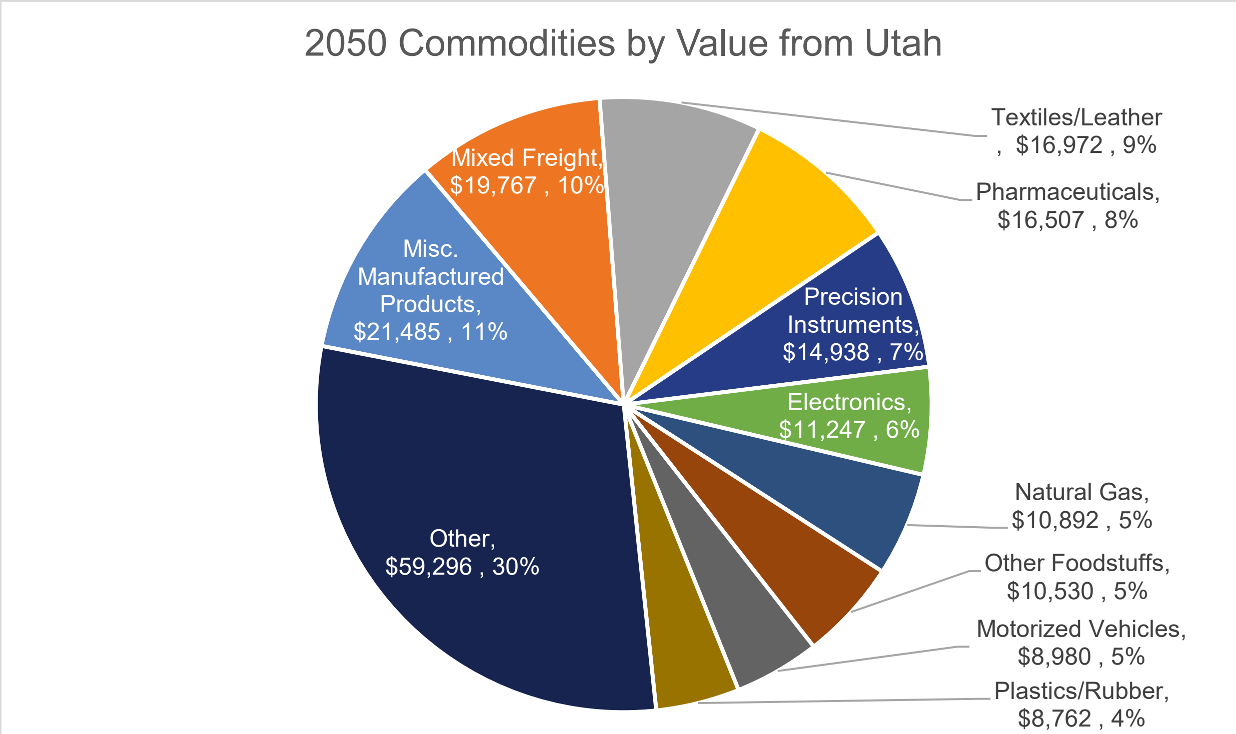
Among commodities with a destination in Utah, in 2050 Miscellaneous Manufactured Products at $25,250 million (14%) is the largest category. The next largest category is Motorized Vehicles worth $15,543 million (9%). In terms of value, Miscellaneous Manufactured Products and Pharmaceuticals are in the top five largest categories for freight within, exported from, and imported to Utah.

Figure 1-8. 2050 Commodities by Value (million US$) Within Utah



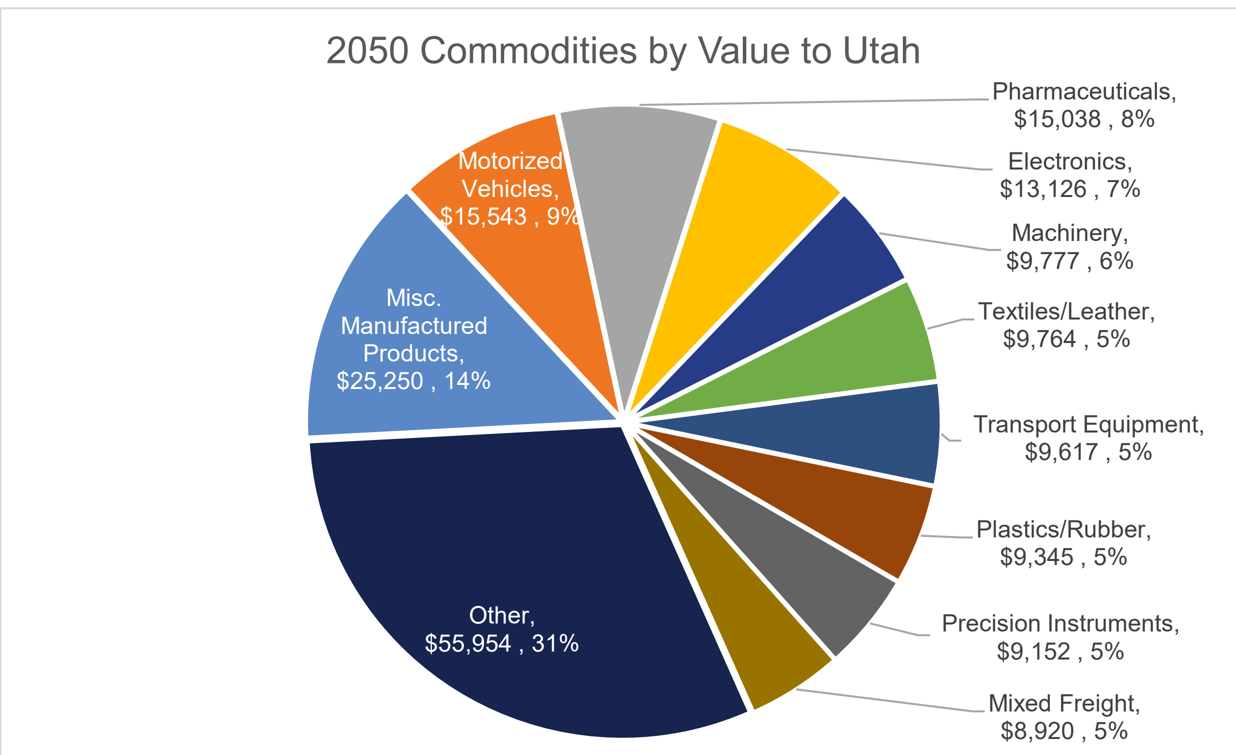
Source: Freight Analysis Framework Version 5.2, Federal Highway Administration, 2021.

Figure 1-9. 2050 Commodities by Value (million US$) from Utah



Source: Freight Analysis Framework Version 5.2, Federal Highway Administration, 2021.

Figure 1-10. 2050 Commodities by Value (million US$) to Utah

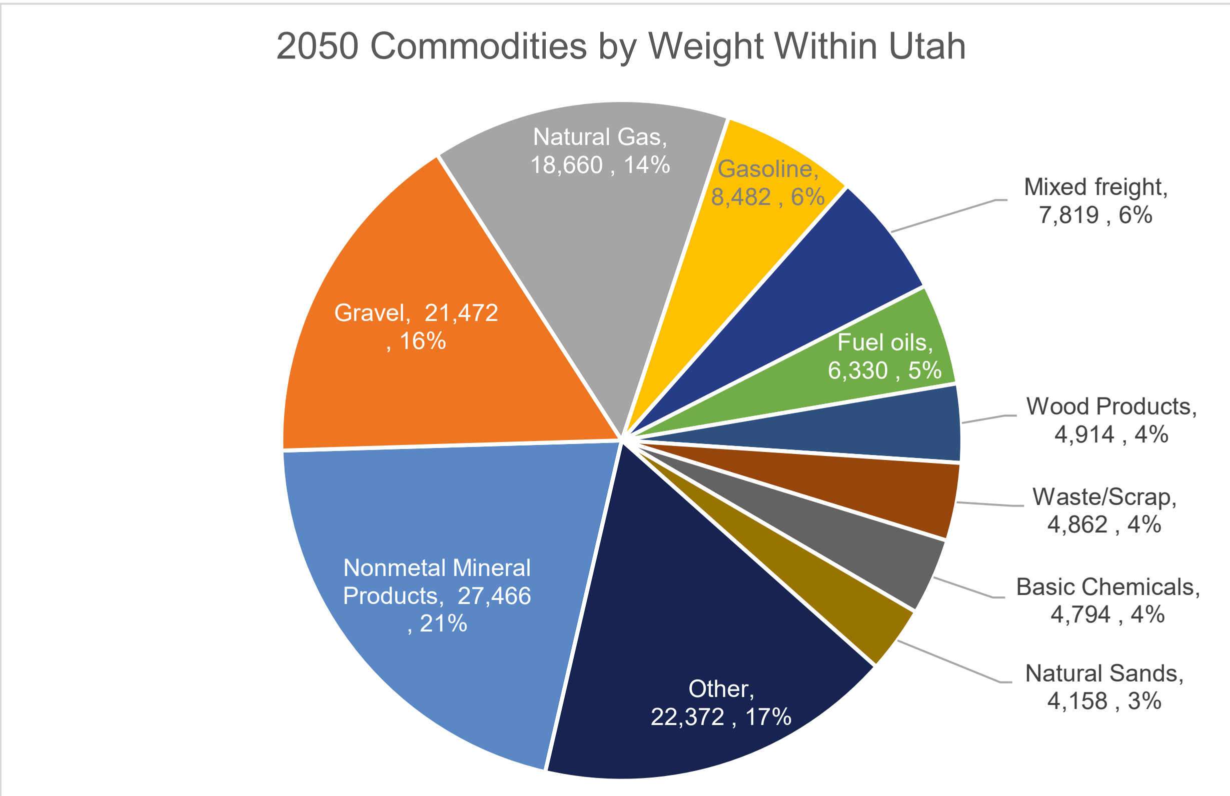


Source: Freight Analysis Framework Version 5.2, Federal Highway Administration, 2021.

1.6.2 Future Commodities by Weight

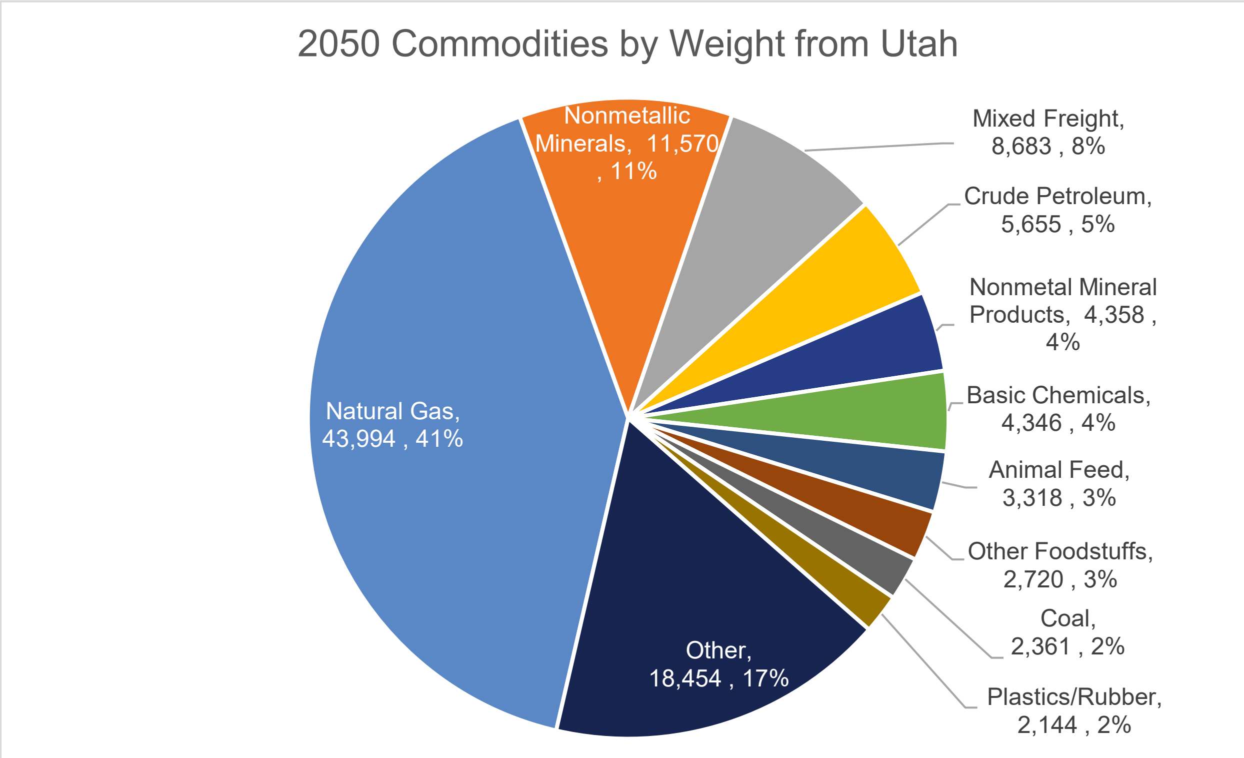
Natural resource commodities—such as Natural Gas, Gravel, Nonmetallic Minerals, and Crude Petroleum—are forecasted in 2050 to comprise most of the weight of all freight related to Utah. In 2050, Natural Gas is projected to comprise approximately 40% of the weight of exports from (43,994 thousand tons) and imports to (39,706 thousand tons) Utah. It also is the third largest category within Utah (18,660 thousand tons / 14%). Among internal freight flows, Nonmetallic Minerals are the largest category, comprising 21% (27,466 thousand tons) of the total weight of freight cargo.

Figure 1-11. 2050 Commodities by Weight (thousand tons) Within Utah



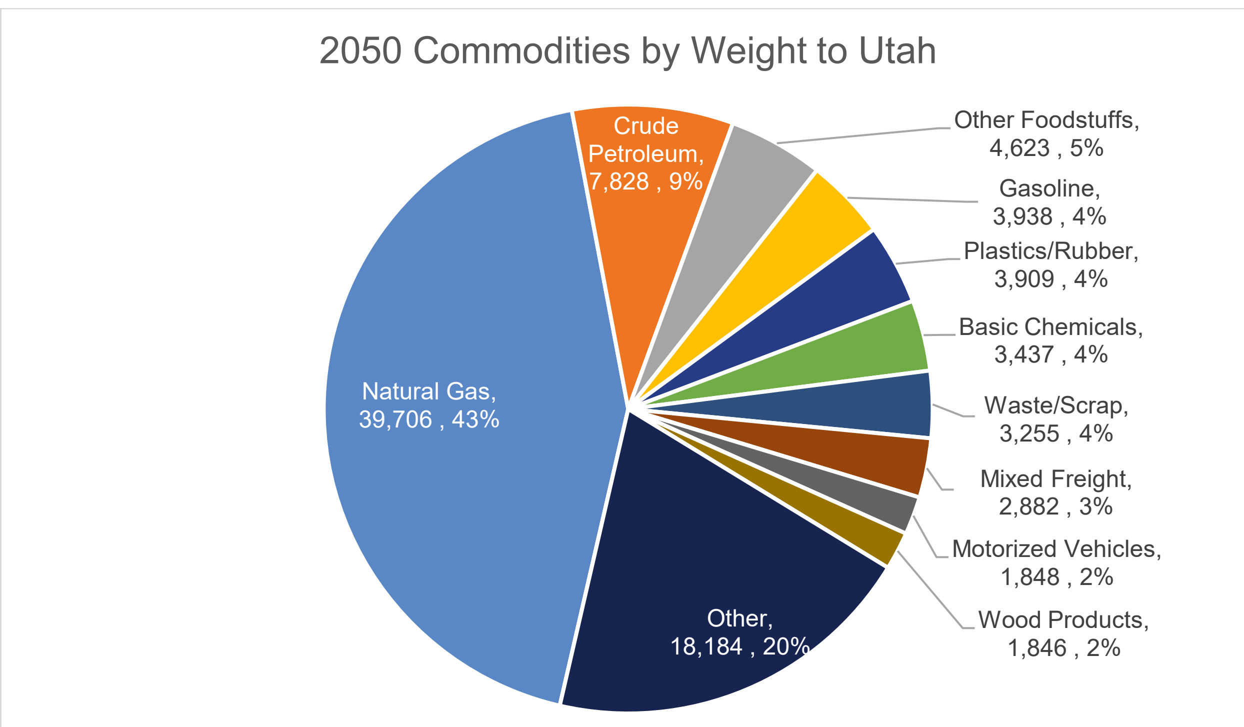
Source: Freight Analysis Framework Version 5.2, Federal Highway Administration, 2021.

Figure 1-12. 2050 Commodities by Weight (thousand tons) from Utah



Source: Freight Analysis Framework Version 5.2, Federal Highway Administration, 2021.

Figure 1-13. 2050 Commodities by Weight (thousand tons) to Utah



Source: Freight Analysis Framework Version 5.2, Federal Highway Administration, 2021.

ELEMENT 2. FREIGHT POLICIES, STRATEGIES, AND PERFORMANCE MEASURES

This chapter of the freight plan describes the state legislative direction as it relates to Utah freight policies and goals, freight in general, the Utah Multimodal Freight Network, and the Utah Highway Freight Network and how they support national goals and policies. It also discusses the involvement that UDOT has with freight planning throughout Utah working with local governments, rural planning organizations (RPOs), metropolitan planning organizations (MPOs), the private sector, and multistate coalitions. A listing of the statutory and constitutional constraints on freight investments will be discussed. Finally, performance measures that will guide the freight-related transportation investment decisions in the state will be provided.

The Utah Freight Plan was developed to support national freight goals and achieve UDOT's three strategic goals. The primary purpose of this plan is to guide cost effective capital and operating investments in the state freight system to ensure maximum benefit and efficient movement of goods.

2.1 Supporting National Freight Policy Goals

On November 15, 2021, President Biden signed the Infrastructure Investment and Jobs Act (IIJA) into law. The IIJA is the largest long-term investment in infrastructure and economy in U.S. history. It provides $550 billion over fiscal years 2022 through 2026 in new federal investment in infrastructure, including in roads, bridges, and mass transit, water infrastructure, resilience, and broadband. It makes a once-in-a-generation investment of $350 billion in highway programs.

The National Freight Strategic Plan defines the U.S. DOT's vision and goals for the national multimodal freight system, assesses the conditions and performance of the freight system and barriers to freight system performance, and defines strategies to achieve its vision and goals. The plan was developed through a multi-agency effort involving extensive consultation with freight stakeholders in both the public and private sectors. The U.S. DOT uses the plan to guide national freight policy, programs, initiatives, and investments; inform state freight plans; identify freight data and research needs; and provide a framework for increased cross-sector, multijurisdictional, and multimodal coordination and partnerships.

2.1.1 National Freight Policy Vision

The freight transportation system of the United States will strengthen our economic competitiveness with safe and reliable supply chains that efficiently and seamlessly connect producers, shippers, and consumers in domestic and foreign markets.

2.1.2 National Freight Policy Strategic Goals

The National Freight Strategic Plan supports the U.S. DOT's strategic goals of Safety, Infrastructure, and Innovation.

1. Safety: Improve the safety, security, and resilience of the national freight system.
2. Infrastructure: Modernize freight infrastructure and operations to grow the economy, increase competitiveness, and improve quality of life.
3. Innovations: Prepare for the future by supporting the development of data, technologies, and workforce capabilities that improve freight system performance.

2.2 State Legislative Direction

The primary state legislative direction for freight movement and facilities in Utah involves UDOT and the Utah Transportation Commission. UDOT is a state agency headed by an Executive Director. The executive director reports to the governor and works with the Utah Transportation Commission. The Utah Transportation Commission works in partnership with UDOT to provide a quality transportation system for all of Utah. Utah's transportation commissioners are appointed by the governor and serve as part of an independent advisory committee. The commission is comprised of seven members – one representing each of the four UDOT Regions and three at-large. The group prioritizes projects and decides how funds are spent. Its roles and responsibilities, as defined in Utah Code 72-1-303, include the following:

1. Determine priorities and funding levels of projects in the state transportation systems and capital development of new public transit facilities for each fiscal year based on project lists compiled by the Department and taking into consideration strategic initiatives.
2. Determine additions and deletions to the state highway system.
3. Hold public hearings and otherwise provide for public input in transportation matters.
4. Make policies and rules in accordance with Title 63G, Chapter 3, Utah Administrative Rulemaking Act, necessary to perform the commission's duties.
5. Review orders issued by the executive director in adjudicative proceedings held in accordance with Title 63G, Chapter 4, Administrative Procedures Act.
6. Advise the Department in state transportation systems policy.
7. Approve settlement agreements of condemnation cases subject.
8. Appoint a commissioner to serve as a nonvoting, ex officio member or a voting member on the board of trustees of a public transit district.
9. Review, at least annually, the short-term and long-range public transit plans.
10. Review administrative rules made, substantively amended, or repealed by the Department.

2.3 UDOT's Mission, Vision, Values, and Strategic Goals

UDOT has a mission, vision, values, and three strategic goals that form the backbone for defining direction and success within the Department. UDOT's strategic goals are supported by the Utah Freight Plan. UDOT's mission, vision, values, and three strategic goals, along with specific objectives for the plan support the goals for the National Freight Strategic Plan, the National Multimodal Freight Network (NMFN), and the National Highway Freight Network (NHFN).

2.3.1 Mission

UDOT's mission is "Enhance Quality of Life Through Transportation." The elements of the Quality of Life Framework are listed below.

1. Good Health: Encompasses the health of individuals and communities, recognizing the role of active transportation in mental and physical health as well as environmental conditions contributing to health such as air quality and water quality.
2. Better Mobility: Addresses traditional transportation objectives to reduce delay. It's thinking that goes beyond just moving cars to moving people. Public transit, walking and biking need to become real options for more Utahns.
3. Strong Economy: Recognizes the vital role of transportation in business and commerce. Not just at the intra-state and inter-state levels, but also how transportation can help inter-city and intra-city economies.
4. Connected Communities: Points to the intersection of transportation and land use as well as the need for intermodal connections between walking, biking, transit and vehicle travel.

2.3.2 Vision

UDOT's vision is "Keeping Utah Moving."

2.3.3 Values

UDOT's values include "Respect, Integrity, and Caring."

2.3.4 Strategic Goals

UDOT's Strategic Direction is built on the foundation of three Strategic Goals that guide everything we do. The Strategic Direction is data- and performance-driven and is constantly updated to reflect what we are doing to meet these goals. They are as follows:

1. Zero Crashes, Injuries, and Fatalities: UDOT is committed to safety, and we won't rest until we achieve zero crashes, zero injuries, and zero fatalities. Zero is the only acceptable goal.

2. Optimize Mobility: UDOT optimizes traffic mobility by adding roadway capacity and incorporating innovative design and traffic management strategies. We are pioneering technology and project delivery methods.
3. Preserve Infrastructure: We believe good roads cost less, and through proactive preservation we maximize the value of our infrastructure investment for today and the future.

2.4 Utah's Multimodal Freight Network

Similar to the National Multimodal Freight Network, UDOT has identified and established the Utah Multimodal Freight Network, which includes highway, railroad and aviation modes. The Utah Multimodal Freight Network does not include navigable waterways because there are none in Utah.

2.4.1 Goals of Utah's Multimodal Freight Network

Utah has also established goals for its multimodal network. In addition to supporting the national goals, Utah's goals include the following:

1. Continue to improve network and intermodal connectivity.
2. Continue to construct projects that improve freight mobility.
3. Continue to work with transportation officials, as well as Utah's business and logistics leaders on freight operations and needs.
4. Continue to monitor freight issues, both nationally and globally, that affect Utah's economy, business community and transportation systems.
5. Continue to educate and support UDOT leaders, RPOs, MPOs, and local government and business decision makers, as well as universities and civic groups on freight issues.

2.5 Utah's Highway Freight Network

Similar to the NHFN, UDOT has identified and established the Utah Highway Freight Network, which includes the Primary Highway Freight System (PHFS), Critical Rural Freight Corridors (CRFCs), Critical Urban Freight Corridors (CUFCs), and Intermodal Connectors. Utah has also established goals for its highway network.

2.5.1 Goals of Utah's Highway Freight Network

Utah has also established goals for its highway network. In addition to supporting the national goals, Utah's goals include the following:

1. Continue to focus infrastructure improvements on Utah's Highway Freight Network such as turning radii, turn lane lengths, signal timing, acceleration/deceleration lanes, full-width paved shoulders, climbing/passing lanes, brake check areas, chain-up area, emergency escape ramps, grade separated highway-rail crossings, and long-term truck parking.

2. Continue to prioritize projects on Utah's Highway Freight Network.
3. Continue to work with local government, RPOs, MPOs, and the private sector to identify needed projects on Utah's Highway Freight Network.
4. Continue to improve access to and from primary freight centers and facilities.

2.6 Coordination with FHWA

The U.S. DOT encourages each state to designate a freight transportation coordinator to facilitate effective communication with the FHWA Division Office in that state regarding the submission of state freight plans and freight investment plans. To this end, UDOT has designated a Freight Planner of the Planning Division from the Program Development Group responsible for the coordination of Utah freight planning activities. This includes assistance in the development of the Utah Freight Plan and ensuring that freight transportation needs are adequately considered during the transportation planning process.

UDOT's Freight Planner coordinates closely with the FHWA Freight Coordinator to ensure compliance with federal legislation such as the designation of critical urban freight corridors, critical rural freight corridors, input to the Primary Highway Freight System, the National Highway Freight Network, the National Multimodal Freight Network and inputs to the National Freight Strategic Plan. The UDOT Freight/Rail Manager also serves to streamline information exchange between UDOT, FHWA and freight stakeholders through correspondence of the Freight Advisory Committee (FAC).

2.7 Additional Coordination/Stakeholder Engagement

Development of the Utah Freight Plan included outreach to public and private sector members of Utah's Freight Advisory Committee (see Element 17 for more information).

2.8 Statutory and Constitutional Constraints on Freight-Related Investments and Policies

The Utah Constitution prohibits the use of taxes generated from use of motor vehicles on non-transportation related issues. Article XIII, Section 5 Use and Amount of Taxes and Expenditures, Subsection 6 lists the following:

> Proceeds from fees, taxes, and other charges related to the operation of motor vehicles on public highways and proceeds from an excise tax on liquid motor fuel used to propel those motor vehicles shall be used for:
>
> a. statutory refunds and adjustments and costs of collection and administration;
>
> b. the construction, maintenance, and repair of state and local roads, including payment for property taken for or damaged by rights-of-way and for associated administrative costs;
>
> c. driver education;

d. enforcement of state motor vehicle and traffic laws; and

e. the payment of the principal of and interest on any obligation of the state or a city or county, issued for any of the purposes set forth in Subsection (6)(b) and to which any of the fees, taxes, or other charges described in this Subsection (6) have been pledged, including any paid to the state or a city or county, as provided by statute.

The Utah Code also specifies the use of transportation funding exclusively for highway purposes. Title 72-2-102, Transportation Fund, declares the following:

1. There is created a fund entitled the "Transportation Fund."
2. Transportation Fund money shall be used exclusively for highway purposes as provided in this title.

2.9 Performance Measures

Performance evaluation is a critical part of freight planning in Utah. The FAST Act and the IIJA both promote a performance-based approach to planning; both require the establishment of a set of performance measures. This plan is required to explain how the state will measure the success of its strategies, policies, and investments in achieving the plan's goals and objectives.

As the FAST Act states, these measurements may be qualitative, but are preferably quantifiable and consistent with the measures (if any) used by the state to describe the conditions and performance of the freight infrastructure (including measures of pavement and bridge condition, traffic congestion and travel time, safety, emissions and water quality, and other factors).

The FAST Act states that, where possible, the state should consider the use of performance measures in the state freight plan that are consistent with those used in other state planning documents and in reports and grant requests submitted to the Federal government – and reflect the state's freight transportation goals. For each goal, there should be at least one measure of condition or performance that indicates how well the freight transportation system is doing in achieving that goal.

Along these lines, the Utah Freight Plan established a set of three performance measures that reflect UDOT's three strategic goals. In the time since the 2015 plan, both the FHWA and the U.S. DOT, as part of the National Freight Strategic Plan, have developed national-level performance measures that Utah can use to build on and enrich its three measures from the 2015 plan.

The following sections summarize the performance measures from these three sources: UDOT strategic goals; FHWA's freight performance measure; and the U.S. DOT recommended performance measures in the Draft National Freight Strategic Plan. Finally, this section proposes a set of performance measures for this plan.

2.10 Performance Measures Derived from UDOT Strategic Goals

UDOT has identified one performance measure for each of the agency's three strategic goals:

1. Zero Crashes, Injuries, and Fatalities
2. Optimize Mobility
3. Preserve Infrastructure

2.10.1 Zero Crashes, Injuries, and Fatalities: Historic Safety Index

To measure the freight network's achievement of this goal, UDOT uses a combination of factors to create a "historic safety index." These factors include crashes of varying types and severities with weights applied to each.

2.10.2 Optimize Mobility: Historic Mobility Index

UDOT utilizes a variety of factors to create a "historic mobility index." This index includes various weighted factors, including delay, reliability, mode split and snow removal.

2.10.3 Preserve Infrastructure: Historic Infrastructure Index

UDOT incorporates multiple factors to create a "historic infrastructure index." This index includes a variety of infrastructure types, including ITS, bridges, pavements, and signals.

2.11 FHWA Truck Travel Time Reliability Index

On May 20, 2017, the FHWA final rulemaking on national performance measures took effect. This final rule set forth measures that state DOTs and MPOs must use to report on several transportation characteristics, including freight movement on the Interstate Highway System.

The freight movement performance measure is travel time reliability on the Interstate Highway System, called the Truck Travel Time Reliability (TTTR) Index. This measure considers factors that are unique to the freight industry, such as the use of the Interstates during all hours of the day and the need to consider more extreme impacts to the system in planning for on-time arrivals.

TTTR Index reporting is divided into five periods: morning peak (6:00 to 10:00 a.m.), midday (10:00 a.m. to 4:00 p.m.) and afternoon peak (4:00 to 8:00 p.m.) Mondays through Fridays; weekends (6:00 a.m.to 8:00 p.m.); and overnights for all days (8:00 p.m. to 6:00 a.m.). The TTTR ratio is generated by dividing the 95^{th} percentile time by the normal time (50th percentile) for each segment. The TTTR Index is generated by multiplying each segment's largest ratio of the five periods by its length, then dividing the sum of all length-weighted segments by the total length of Interstate.

Data for measuring the TTTR Index can be found in the FHWA's National Performance Management Research Data Set (NPMRDS), which includes truck travel times for the full Interstate Highway System. State DOTs and MPOs may use an equivalent data set if they prefer.

ELEMENT 3. MULTIMODAL CRITICAL RURAL FREIGHT FACILITIES AND CRITICAL RURAL AND URBAN FREIGHT CORRIDORS

This element requests a listing of multimodal critical rural freight facilities and corridors designated within the state. The element also requests identification of CRFCs and CUFCs within the state.

UDOT has chosen to not only identify the critical rural freight facilities and corridors, but also the critical urban freight facilities and corridors. The Utah Highway Freight Network with its CRFCs and CRFCs, along with intermodal connectors are discussed and identified.

3.1 Utah's Primary Freight Centers

UDOT has divided the state into four regions as shown in Figure 3-1. Each region oversees administration, construction, and maintenance of all state roads, highways and interstates within their areas.

Since UDOT has divided the state into four regions, this plan also uses the region boundaries to identify Utah's primary freight centers. Primary freight centers are locations that produce high freight movement by highways, railroads, pipelines, intermodal, or aviation. These primary freight centers show a connection from their location to the Utah Multimodal Freight Network and to the Utah Highway Freight Network. Identifying Utah's Primary Freight Centers assists UDOT Regions as they plan for maintenance and capacity projects. The following five figures show primary freight centers and locations within each UDOT Region.

Figure 3-1. UDOT Region Boundaries and Freight Centers

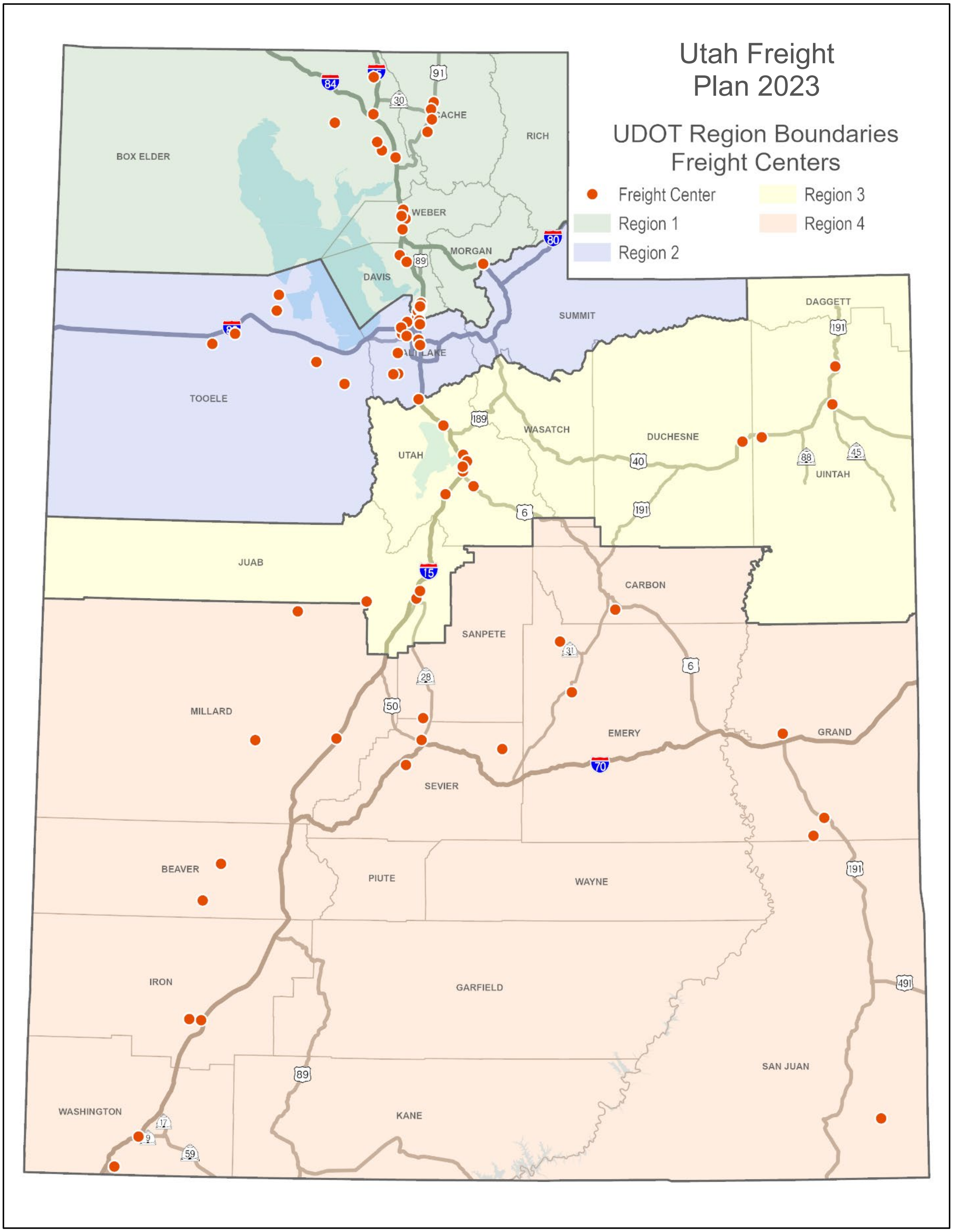


Figure 3-2. UDOT Region 1 Freight Centers

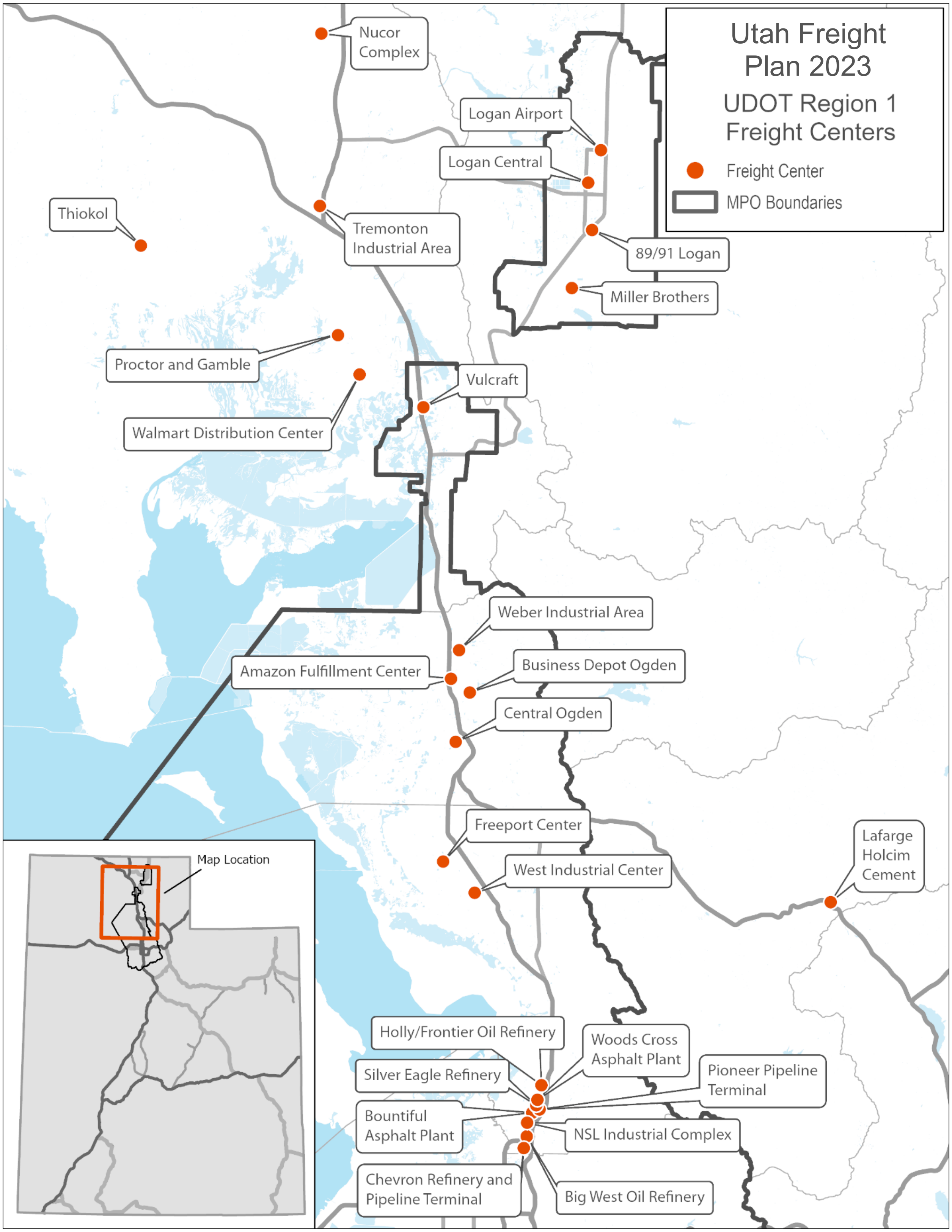


Figure 3-3. UDOT Region 2 Freight Centers

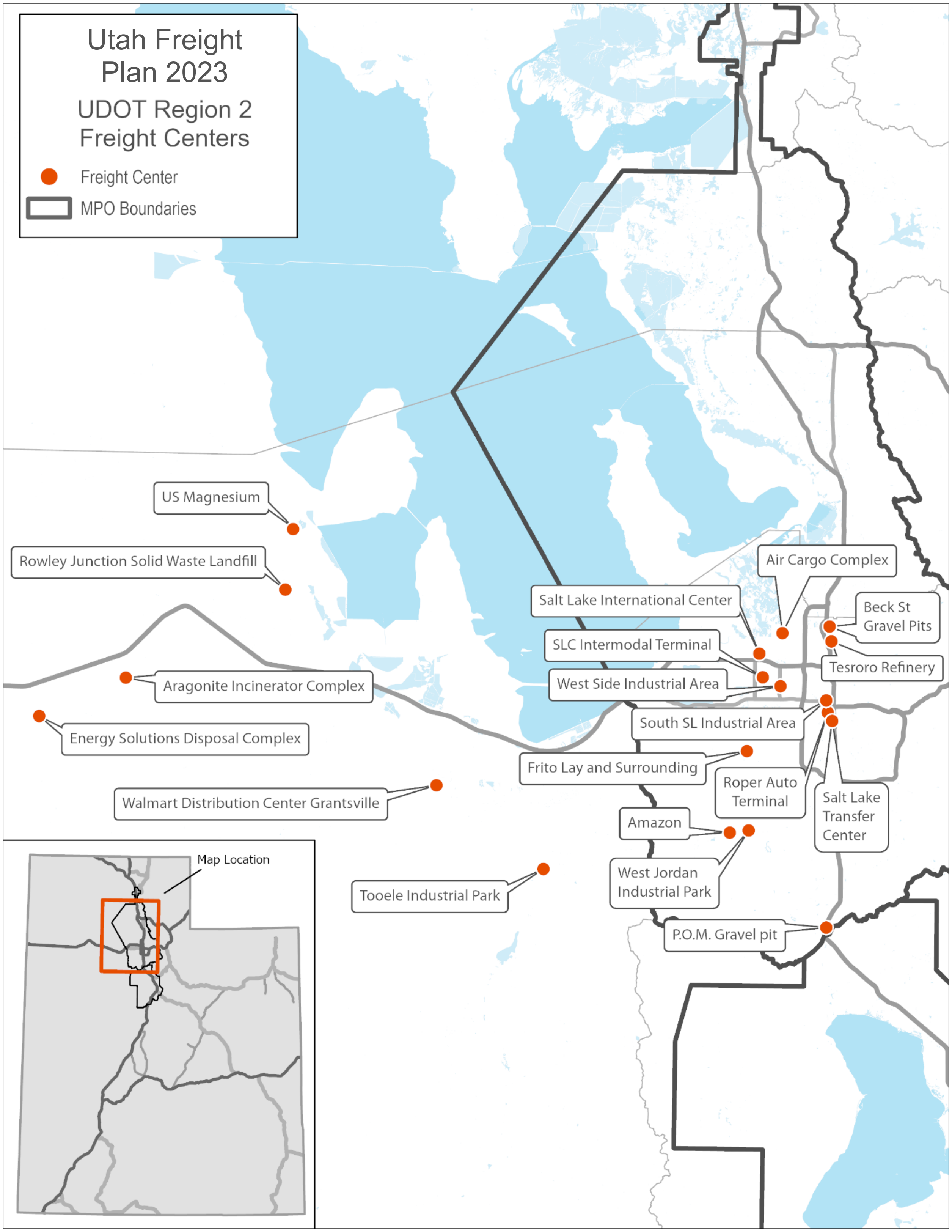


Figure 3-4. UDOT Region 3 Freight Centers

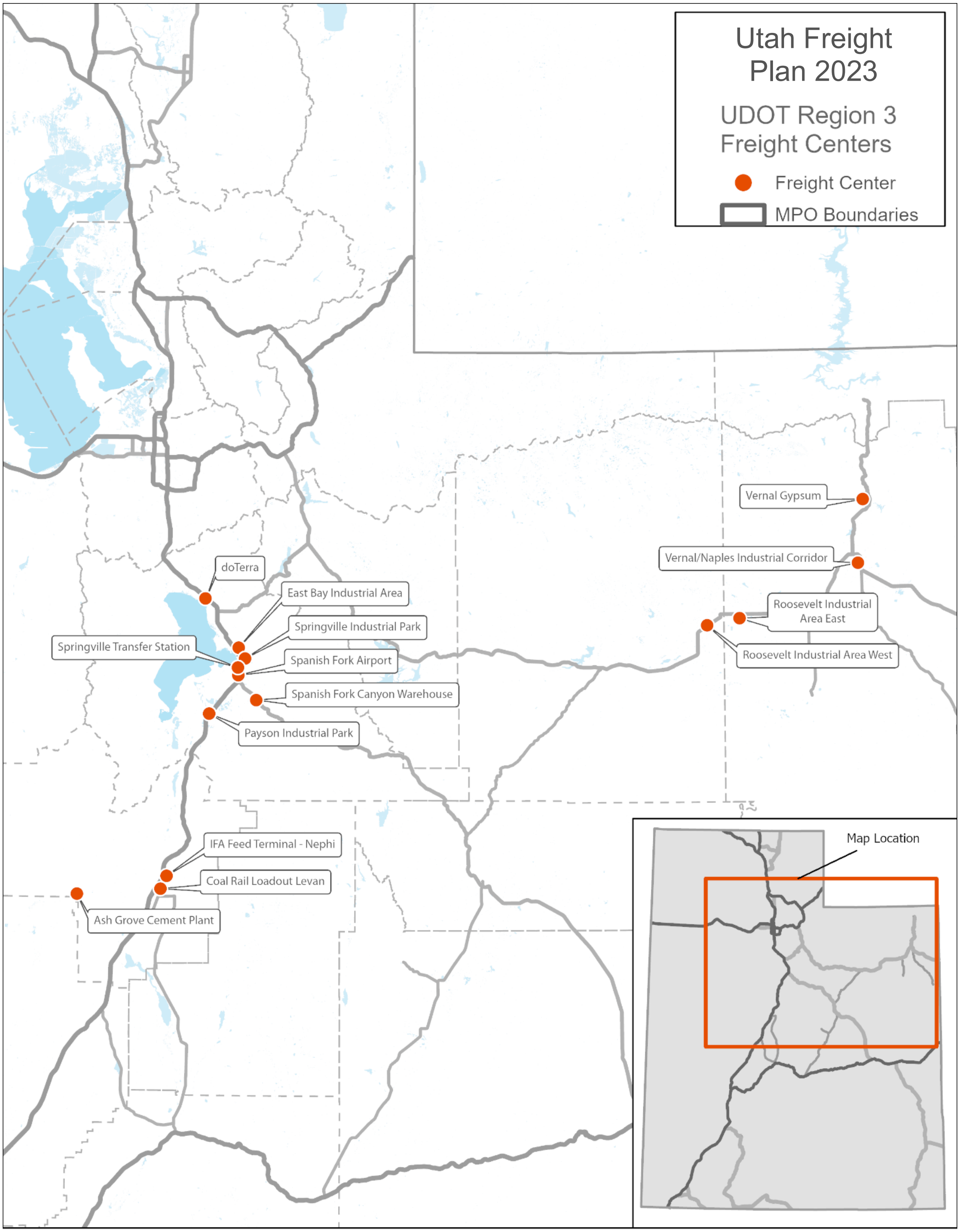
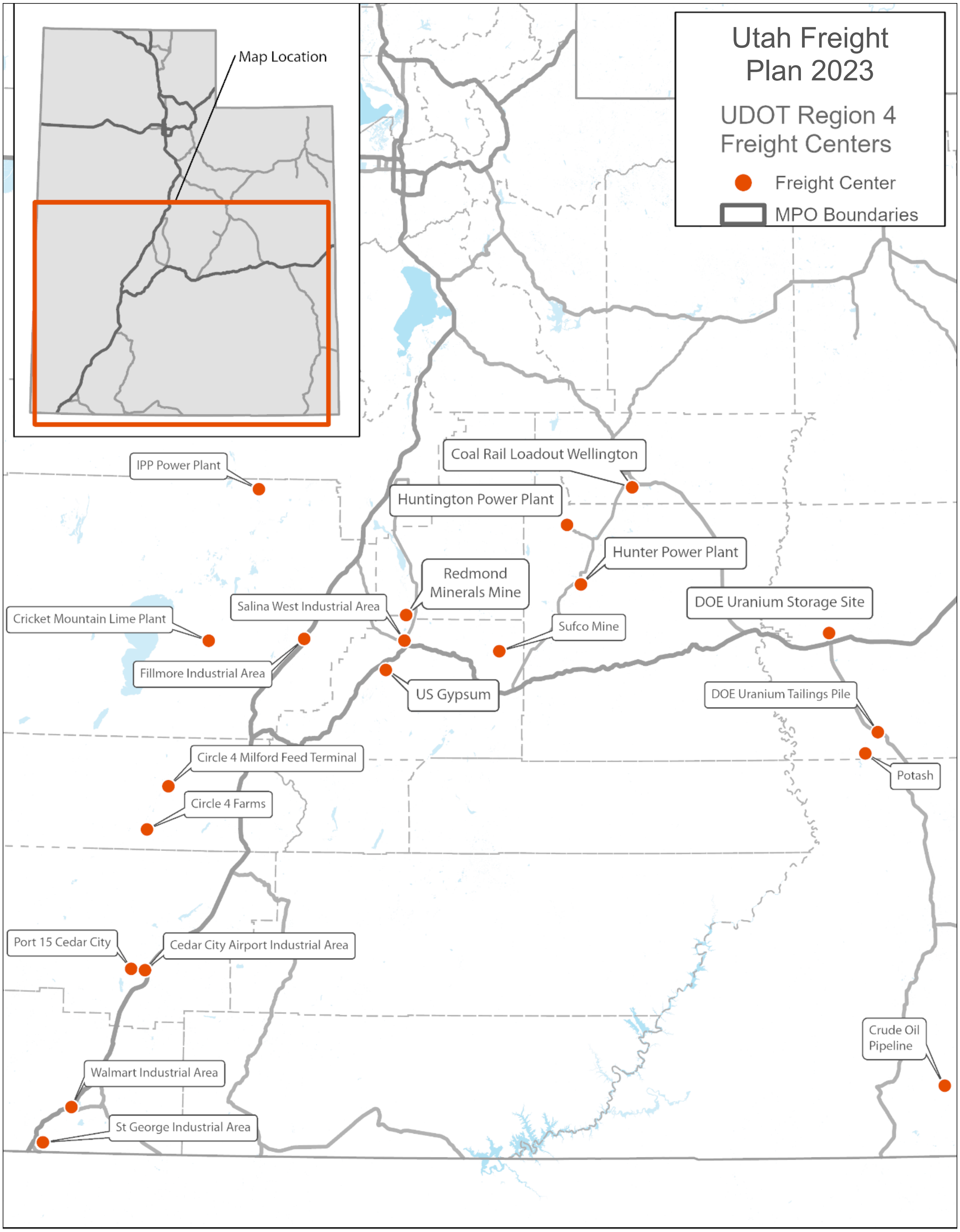


Figure 3-5. UDOT Region 4 Freight Centers



3.2 Utah's Highway Freight Network

Similar to the NHFN, UDOT has identified and established the Utah Highway Freight Network, which includes the Primary Highway Freight System (PHFS), CRFCs, CUFCs, and Intermodal Connectors. Element 4 compares the goals embodied in the National and Utah Highway.

3.2.1 Network Components

Originally defined in 2005 as Primary Freight Corridors, and in 2012 as Primary Freight Network (Highways) as defined by the Moving Ahead for Progress for the 21st Century Act (MAP-21), and in 2015 as the National Highway Freight Network as defined by the FAST Act, the corridors are now amended to be consistent with the requirements of the IIJA as the Utah Highway Freight Network. The Utah Highway Freight Network is an important component of the Utah Freight Plan to prioritize freight projects for available funding sources. The Utah Highway Freight Network includes the following subsystems of roadways:

1. Primary Highway Freight System (PHFS): This is a network of highways identified as the most critical highway portions of the U.S. freight transportation system determined by measurable and objective national data. For Utah, the network consists of 914.67 miles.
2. Interstate Routes not on the PHFS: These highways consist of the remaining portion of the Interstate System not designated as part of the PHFS. These routes provide important continuity and access to freight transportation facilities. In Utah, these routes include I-15 from Tremonton to the Idaho border, the west belt route of I-215 from I-15 (south) on the south to 1700 South, and the west belt route of I-215 from S.R. 67 (Legacy Highway) to I-15 (north). These miles total 30.70.
3. Critical Rural Freight Corridors (CRFCs): These are public roads not in an urbanized area which provide access and connection to the PHFS and the Interstate with other important ports, public transportation facilities, or other intermodal freight facilities. For Utah, CRFCs are limited to 600 miles.
4. Critical Urban Freight Corridors (CUFCs): These are public roads in urbanized areas which provide access and connection to the PHFS and the Interstate with other ports, public transportation facilities, or other intermodal transportation facilities. For Utah, CUFCs are limited to 150 miles.

Figure 3-6 shows the Utah Highway Freight Network.

Figure 3-6. Utah Highway Freight Network

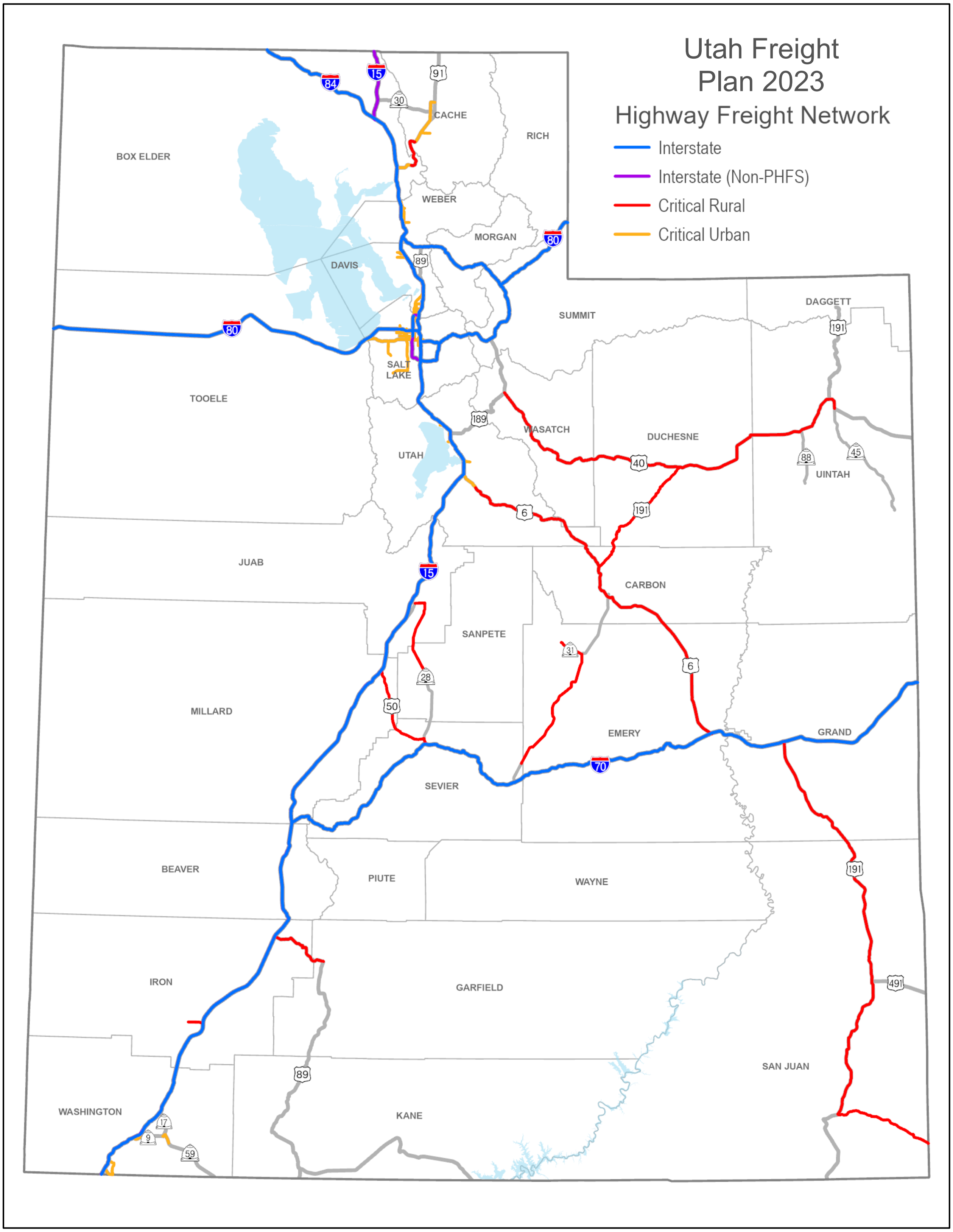


Table 3-1 shows the number of miles by route type in Utah.

Table 3-1. Utah Highway Freight Network Mileage 2023

Route Type	Mileage
Interstate Routes	914.67
Interstates Routes Not on the PHFS	30.70
Critical Rural Freight Routes	600.00
Critical Urban Freight Routes	150.00
Total	**1,695.37**

3.2.2 Network by MPO Jurisdiction

The Utah Highway Freight Network is statewide and include routes within the boundaries of the four MPOs, which include Cache MPO, Dixie MPO, Mountainland Association of Governments (MAG), and the Wasatch Front Regional Council (WFRC). Approximately 22 percent of the Utah Highway Freight Network is located within the MPO areas. The following table shows the route types and number of miles by MPO area.

Table 3-2. Utah Interstate and Critical Urban Freight Corridor Mileage by MPO

Route Type	Cache	Dixie	MAG	WFRC	MPO Total
Interstate Routes	0.00	28.17	44.35	145.22	217.74
Critical Urban Freight Routes	17.85	18.19	10.62	103.34	150.00
Total Route Miles	**17.85**	**46.36**	**54.97**	**248.56**	**367.74**

The following five figures show the Utah Highway Freight Network in each MPO area.

Figure 3-7. Utah Highway Freight Network for the Dixie MPO

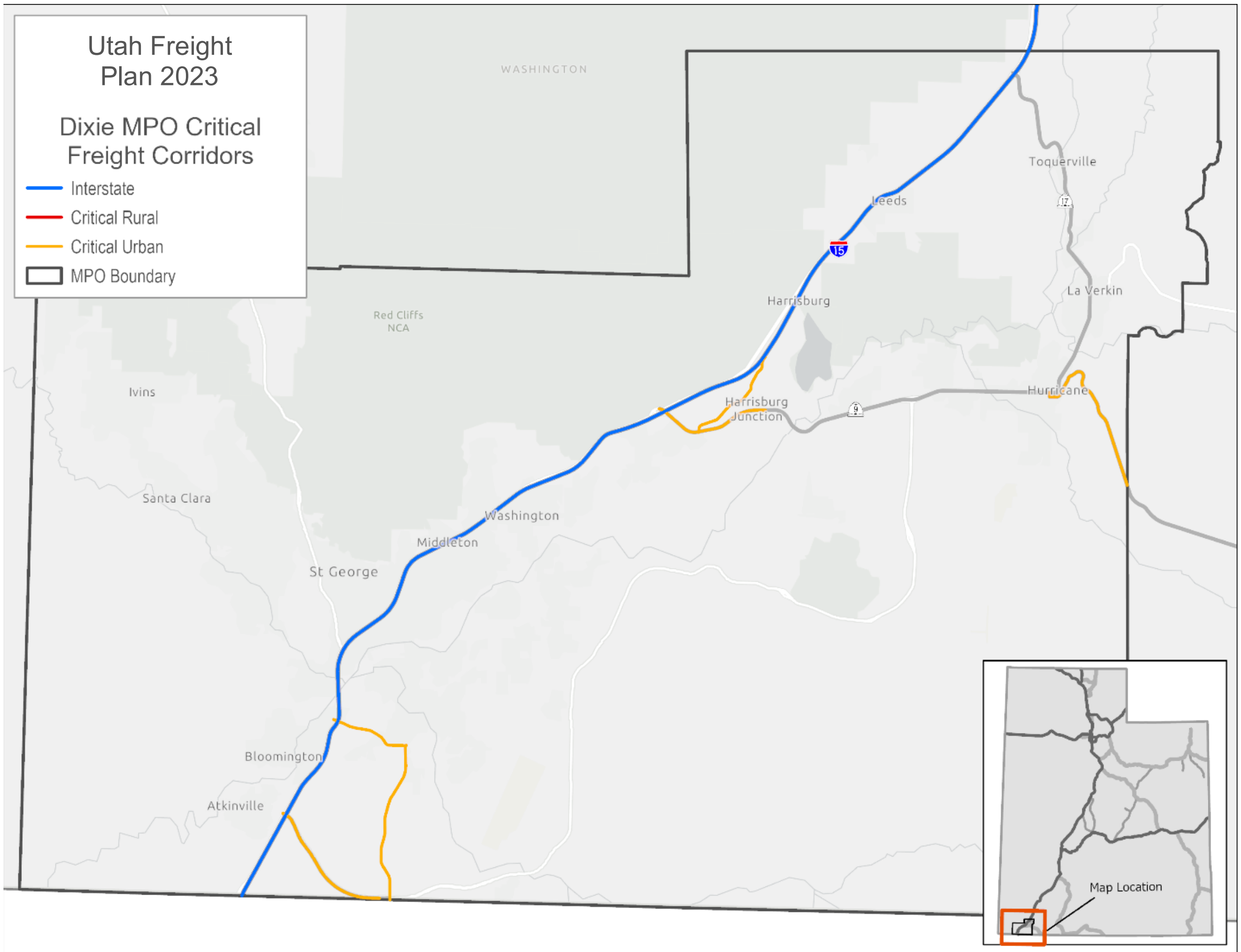


Figure 3-8. Utah Highway Freight Network for Cache MPO

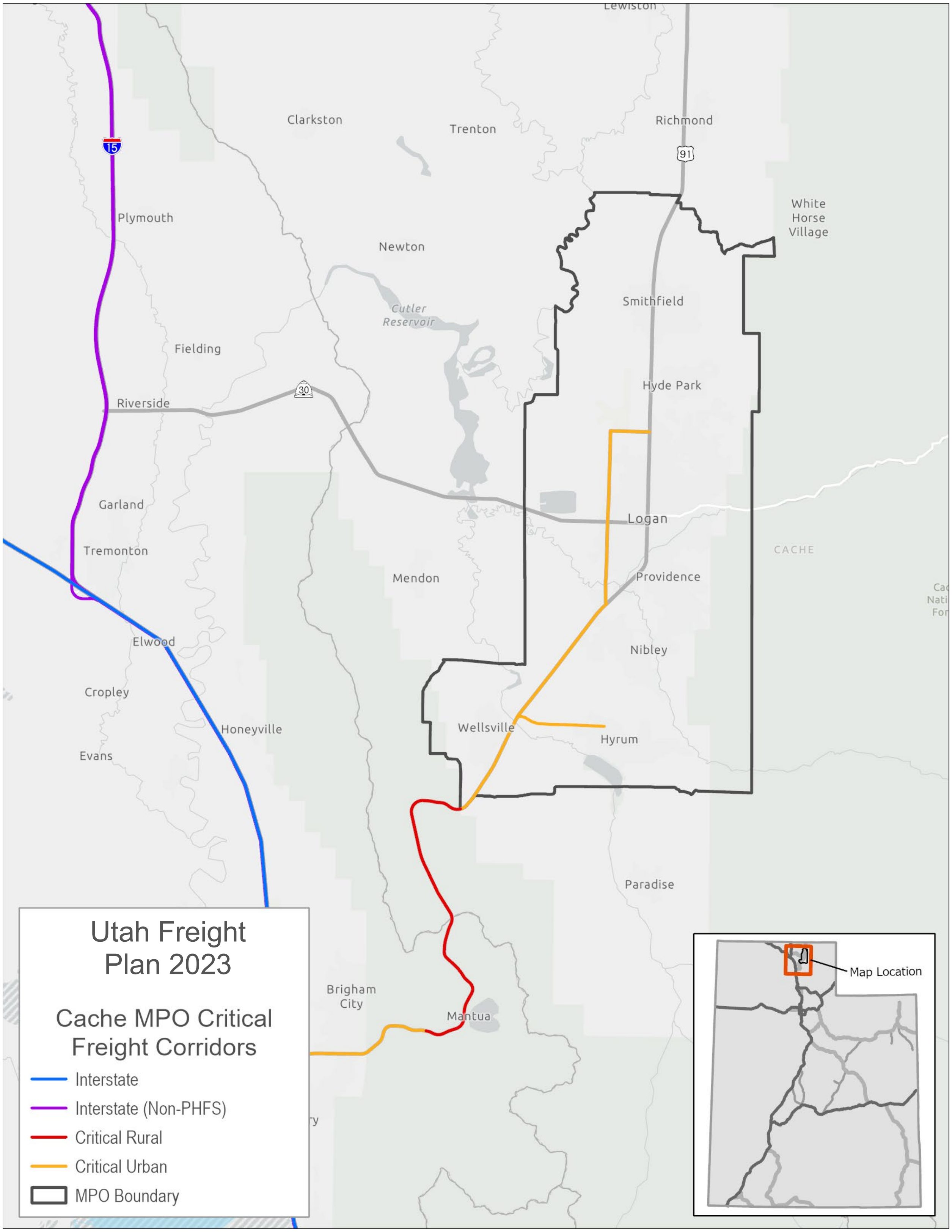


Figure 3-9. Utah Highway Freight Network for MAG MPO

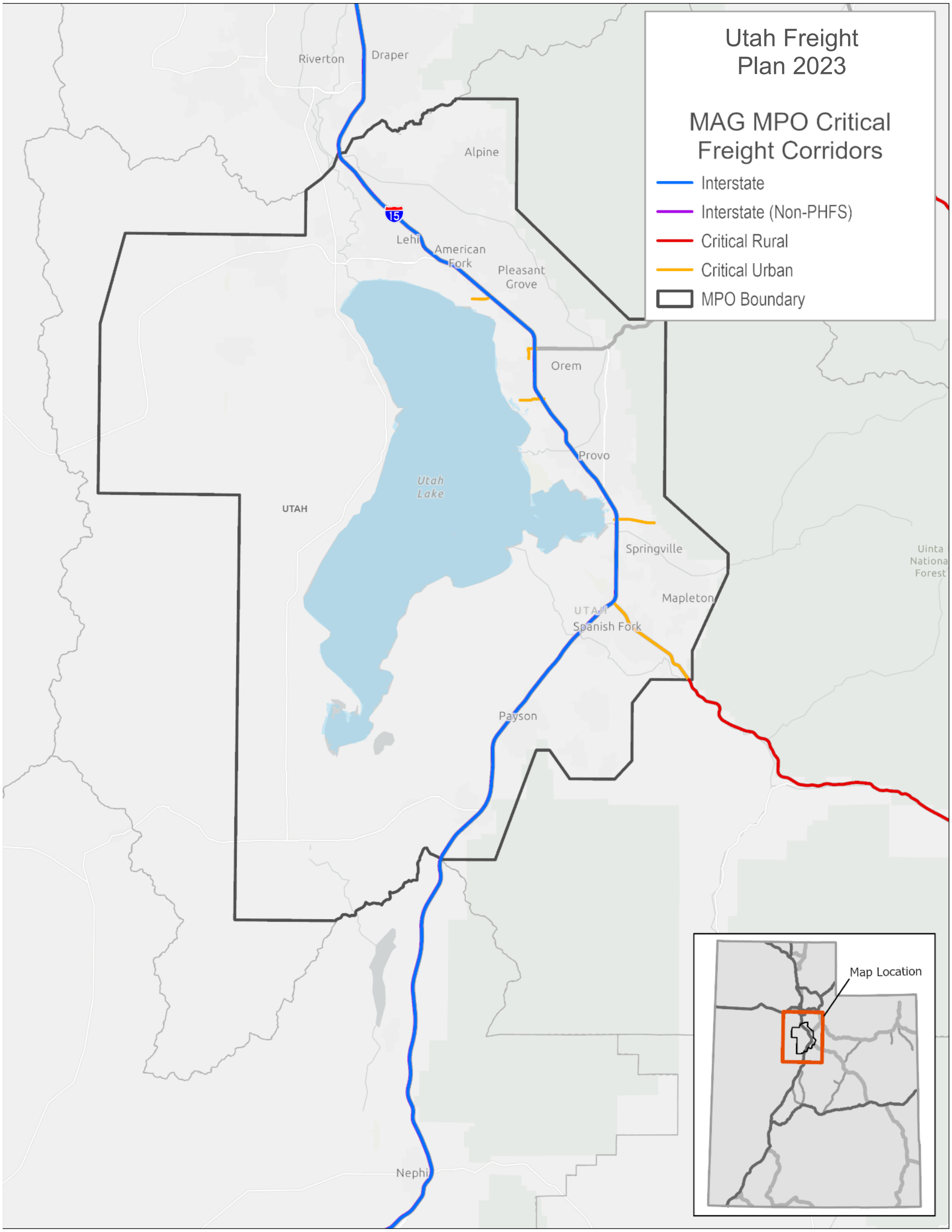
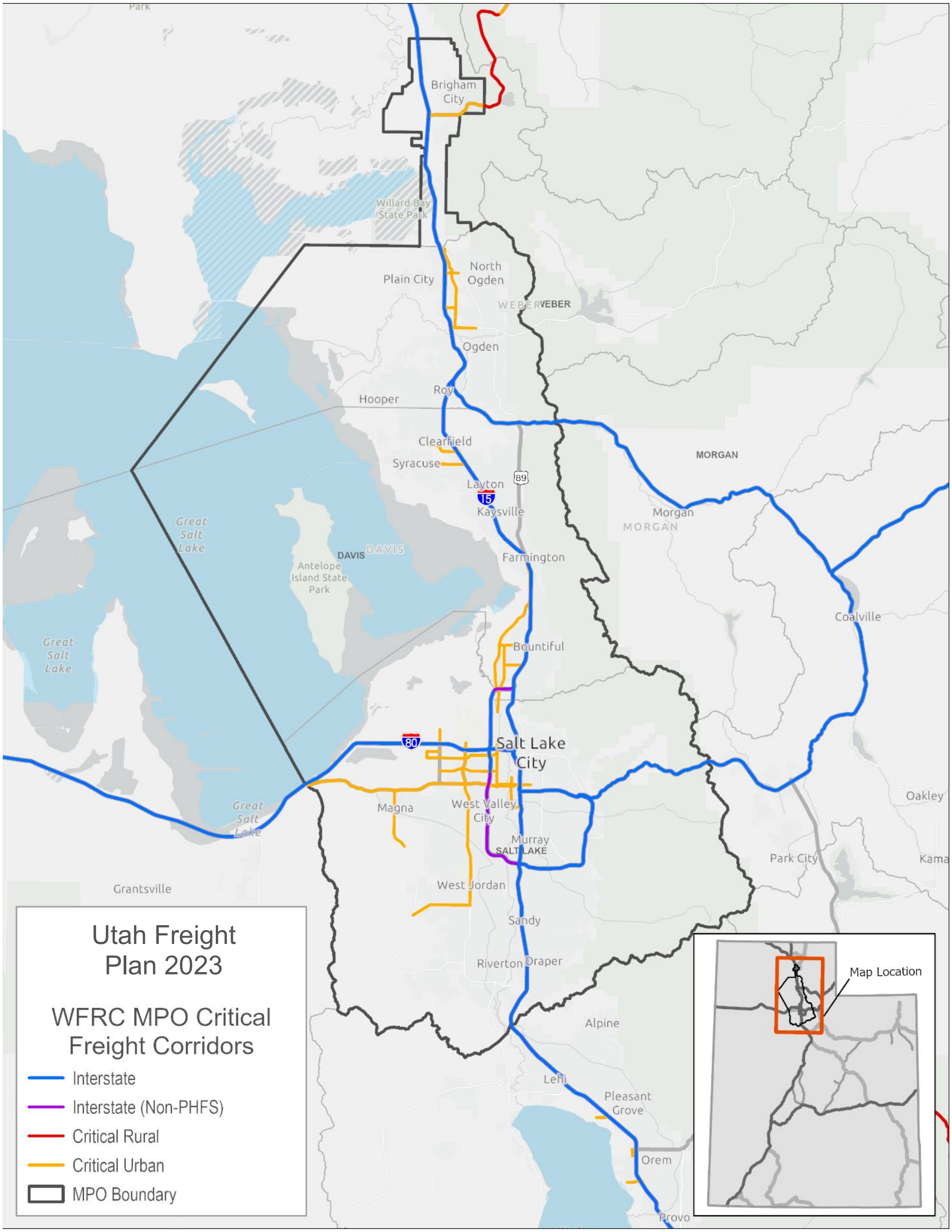


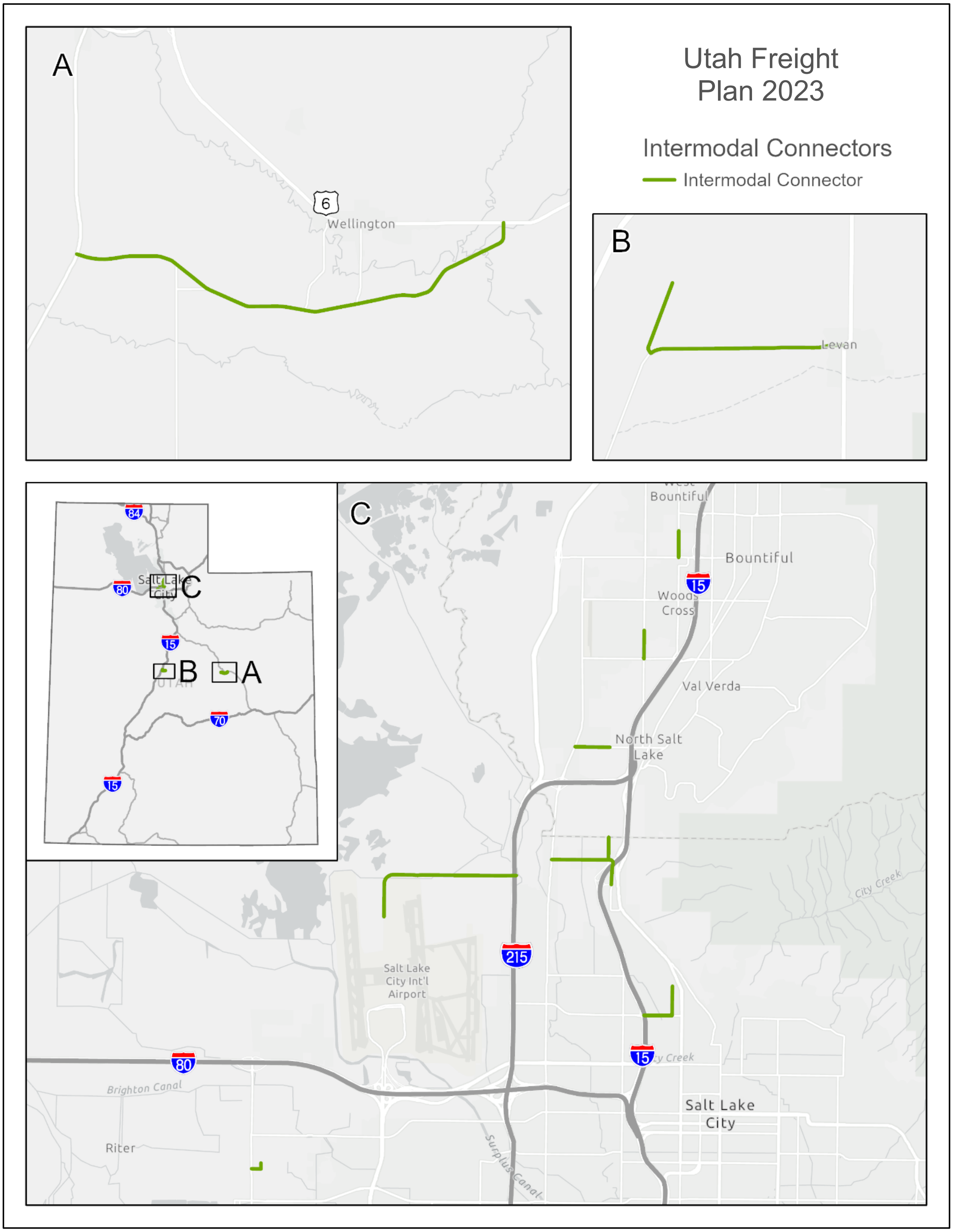
Figure 3-10. Utah Highway Network for WFRC MPO



3.3 Intermodal Connectors

Intermodal connectors are roads that provide the "last-mile" connection between major rail, port, airport, and intermodal freight facilities on the National Highway System (NHS). The officially designated network of NHS intermodal connectors in Utah accounts for less than one percent of total NHS mileage, but these roads are critical for the timely and reliable movement of freight. It is, therefore, important to understand the use, condition, and performance of the Nation's intermodal connectors since they have a direct impact on goods movement efficiency and, therefore, the health of the economy. These are public roads statewide that provide connections to major intermodal facilities. For Utah, UDOT has 10 roads totaling 18.28 miles.

Figure 3-11. Intermodal Connectors



3.4 Public and Private Transportation Assets

Freight transportation assets are part of a state's infrastructure that pertain directly to freight movements, including highways, railroads, pipelines, airports, and intermodal facilities. This section will discuss both public and private infrastructure assets in greater detail.

3.4.1 Highways

Highway freight handled by trucks is the dominate freight mode in Utah. As the literal crossroads of the west for the Interstate Highway System, as well as several non-interstate highways, Utah handles a disproportionate amount of highway freight considering its relatively modest population of just over three million people.

3.4.2 Pavement Management

UDOT manages and preserves approximately 5,896 centerline miles and 48,608 lane miles across the state ranging from multi-lane, urban concrete interstates to two-lane, rural asphalt roads.[1] [2] The Department's pavement management philosophy is that good roads cost less, which means timely, cost-effective treatments minimize cost while achieving the greatest long-term benefit. For more information on pavement management, refer to Element 6: Pavement Management, Improvements Necessary to Reduce/Impede Deterioration.

3.4.3 Bridge Preservation

Bridges represent critical infrastructure for freight movement. Utah boasts some of the best-maintained on-system bridges in the nation.

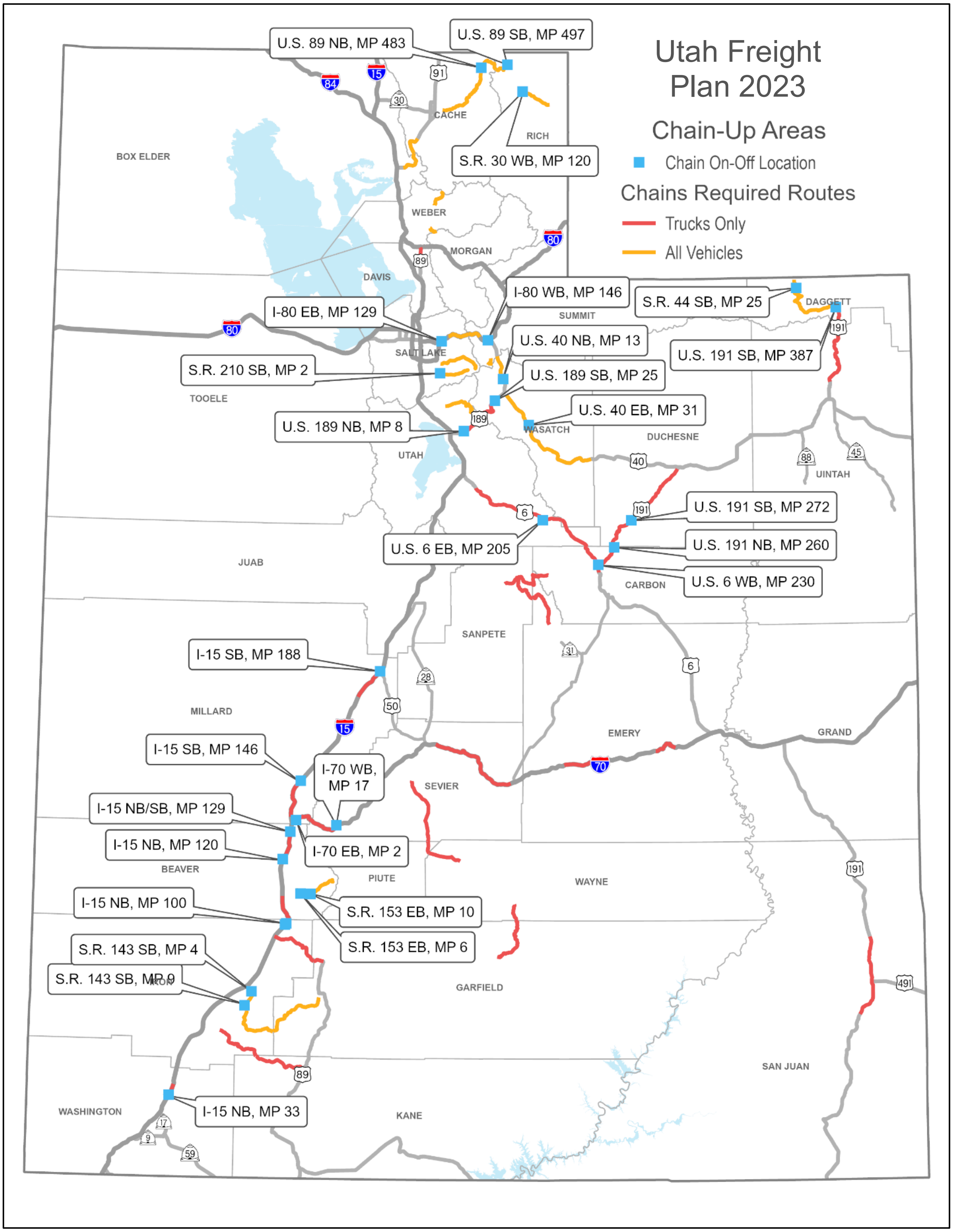
3.4.4 Chain-Up Areas

Commercial motor vehicles with four or more drive wheels are required to have chains for at least four of the drive wheels and recreational vehicles and buses for at least two. Law enforcement may place restrictions on any roads when determined necessary. As shown in Figure 3-12, commercial motor vehicles traveling on highways between October 1 and April 30 are required to have steel link chains. In addition, Figure 3-12 shows chain-up areas located throughout Utah.

[1] https://lookerstudio.google.com/u/0/reporting/9d7c25ad-734f-4f7a-b183-dab4c58cfafc/page/jqBGB

[2] https://maps.udot.utah.gov/wadocuments/Data/strategic_direction/GettingToKnowUdotJul2021.pdf

Figure 3-12. Chain-Up Areas

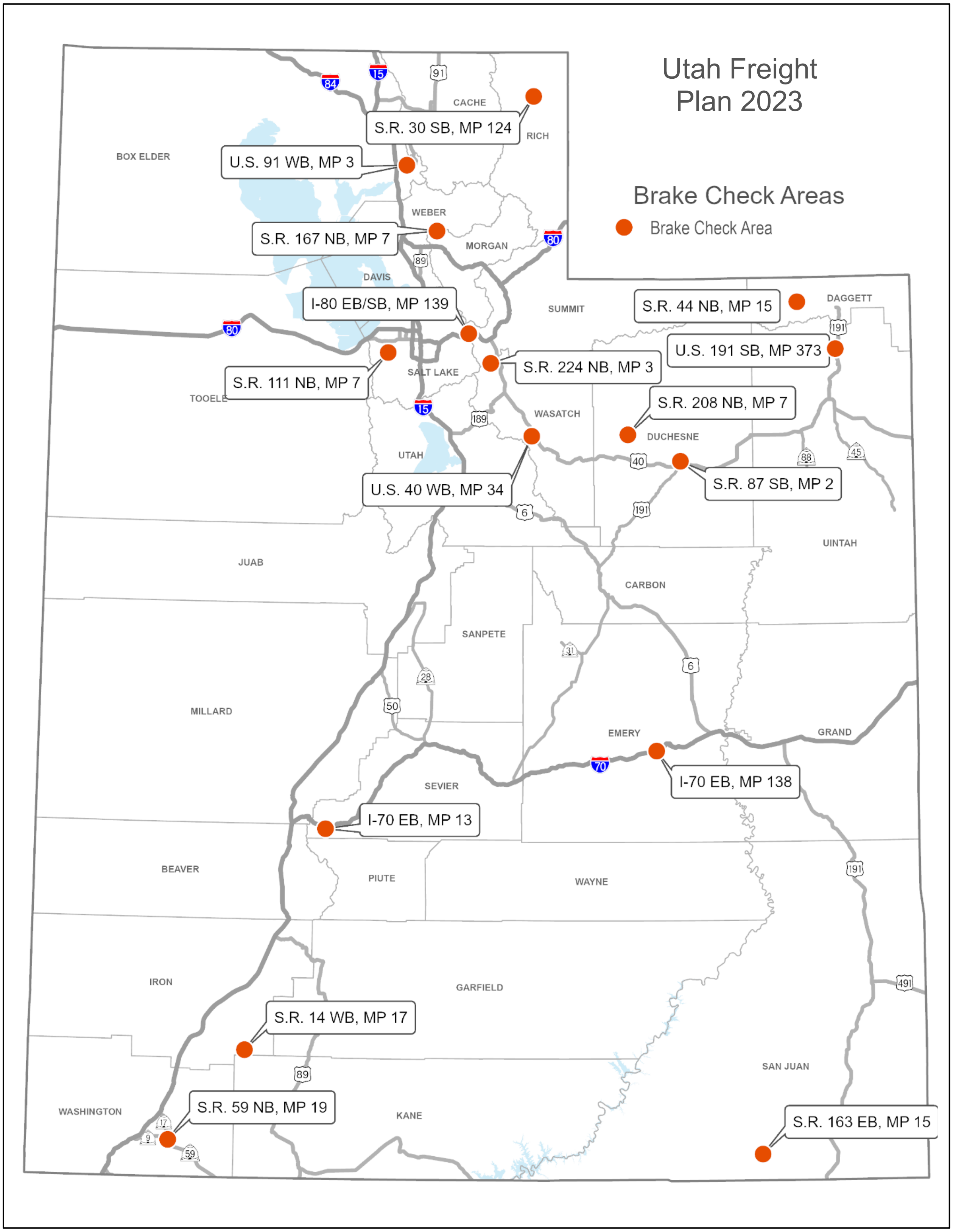


3.4.5 Brake Check Areas

Brake check areas allows truckers, recreational vehicles (RVs) and other motorists to pull safely off the road to check the operation of their brake systems. Some brake check areas are mandatory for trucks and failure to stop in the designated area to check the brakes is a violation of the law. Others are voluntary and stopping to perform a brake check is left to the discretion of the driver.

Typically, brake check areas are located just before a long, steep downgrade in an attempt to prevent the loss of a truck, or other heavy vehicle, braking power during descent. Descending a downhill grade significantly increases brake use because of the design and weight characteristics of these vehicles. Figure 3-13 shows brake check areas located throughout Utah.

Figure 3-13. Brake Check Areas



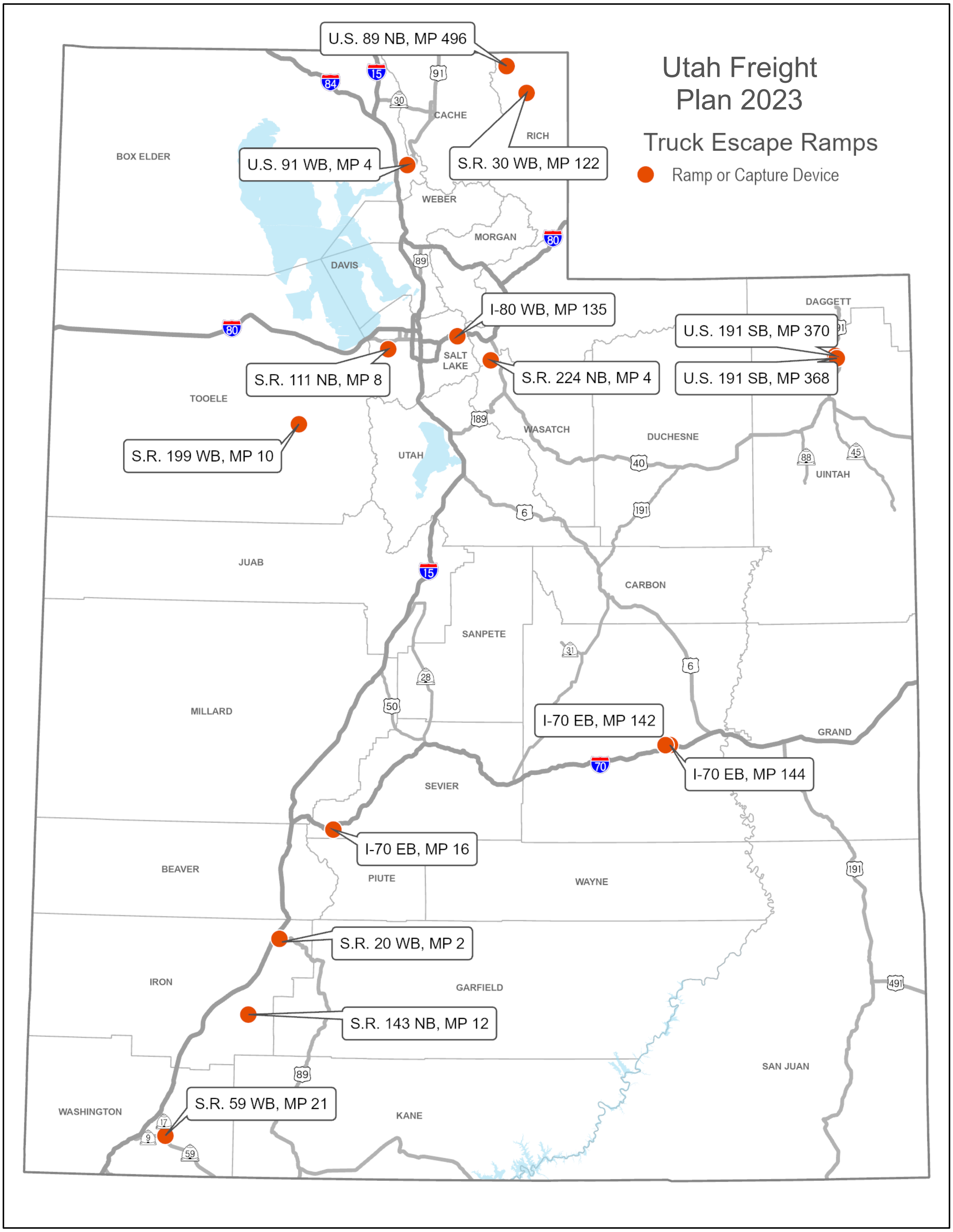
3.4.6 Truck Escape Ramps

A truck escape ramp is an emergency area located adjacent to a downgrade roadway which provides a location for out-of-control vehicles to slow and stop away from other vehicles on the road. They are generally located near the middle or the end of long, steep downgrades. The two most common types of truck escape ramps found in Utah include gravity ramps and aggregate arrestor bed ramps. Gravity ramps are built with an upgrade to use the force of gravity to slow a runaway vehicle. Aggregate arrestor bed ramps use special sized rock in a gravel bed to slow a runaway vehicle. The aggregate arrestor bed ramps may have either an upward or downward grade.

UDOT recently constructed its first runaway truck arresting system on U.S. 89 in Rich County. The system brings runaway vehicles to a stop using a series of nets connected to energy absorbers adjacent to the runaway truck lane. The mechanical arrest system requires less distance to stop a vehicle and can be installed in locations not amenable to a traditional gravel truck escape ramp.

Truck escape ramps are not just for trucks. Truck escape ramps may be used by any vehicle which is experiencing brake problems, or which cannot slow its downhill speed. Figure 3-14 shows the emergency escape ramps located throughout Utah.

Figure 3-14. Truck Escape Ramps



3.4.7 Freight Railroads

There are currently eight freight railroads operating in Utah, including two Class I's and six short lines, all but one of which have access to the national rail system. The Wasatch Front region in northern Utah is the hub of six UP railroad mainline routes. As Utah's dominant railroad common carrier, UP connects with all other general freight rail operators in the state, except for the Deseret Power Railway, which is an industry railroad isolated from the national rail system.

Most non-UP rail freight operates over select UP lines via various trackage rights agreements. The primary connection and interchange points in Utah between UP and these other lines are (from north to south), Ogden (Utah Central Railway), Salt Lake City (Salt Lake, Garfield & Western Railway), Midvale (Savage, Bingham & Garfield Railroad), and (Salt Lake City Southern Railroad), and Provo (Utah Railway). In Utah, BNSF Railway interchanges with Utah Railway at Provo. Utah Railway, as BNSF's agent, interchanges with other common carriers at Midvale (Salt Lake City Southern Railroad), Salt Lake City (Salt Lake, Garfield & Western Railway), and Ogden (Utah Central Railway). The following table lists the freight railroads in Utah.

Table 3-3. Freight Railroads by Type

Railroad	Type
BNSF Railway Company	Class I
Deseret Power Railway (isolated industry railroad)	Short Line
Salt Lake City Southern Railroad	Short Line
Salt Lake, Garfield & Western Railway	Short Line
Savage, Bingham & Garfield Railroad	Short Line
Union Pacific Railroad	Class I
Utah Central Railway	Short Line
Utah Railway	Short Line

Source: Utah State Rail Plan, UDOT.

The railroad industry continues to play a vital role in the transportation of freight in and through Utah. Currently the railroads are the number three freight carrier in Utah behind trucking and pipelines. Utah sits astride both UP's Overland Route and Central Corridor line linking northern California and the Midwest, with other routes radiating out from northern Utah rail terminals to Pocatello, Idaho and the Pacific Northwest as well as Southern California.

The Association of American Railroads (AAR) statistics for 2021 show a total of 1,388 miles of freight railroad is in operation in Utah, the majority of which is owned by the UP.[1] BNSF Railway operates over 448 miles of trackage rights on UP and Utah

[1] Freight Railroad State Data - Association of American Railroads (aar.org)

Railway lines, and there are approximately 61 miles of track served by Utah's local, switching and terminal railroad lines via direct ownership of those lines or trackage rights over other railroads.

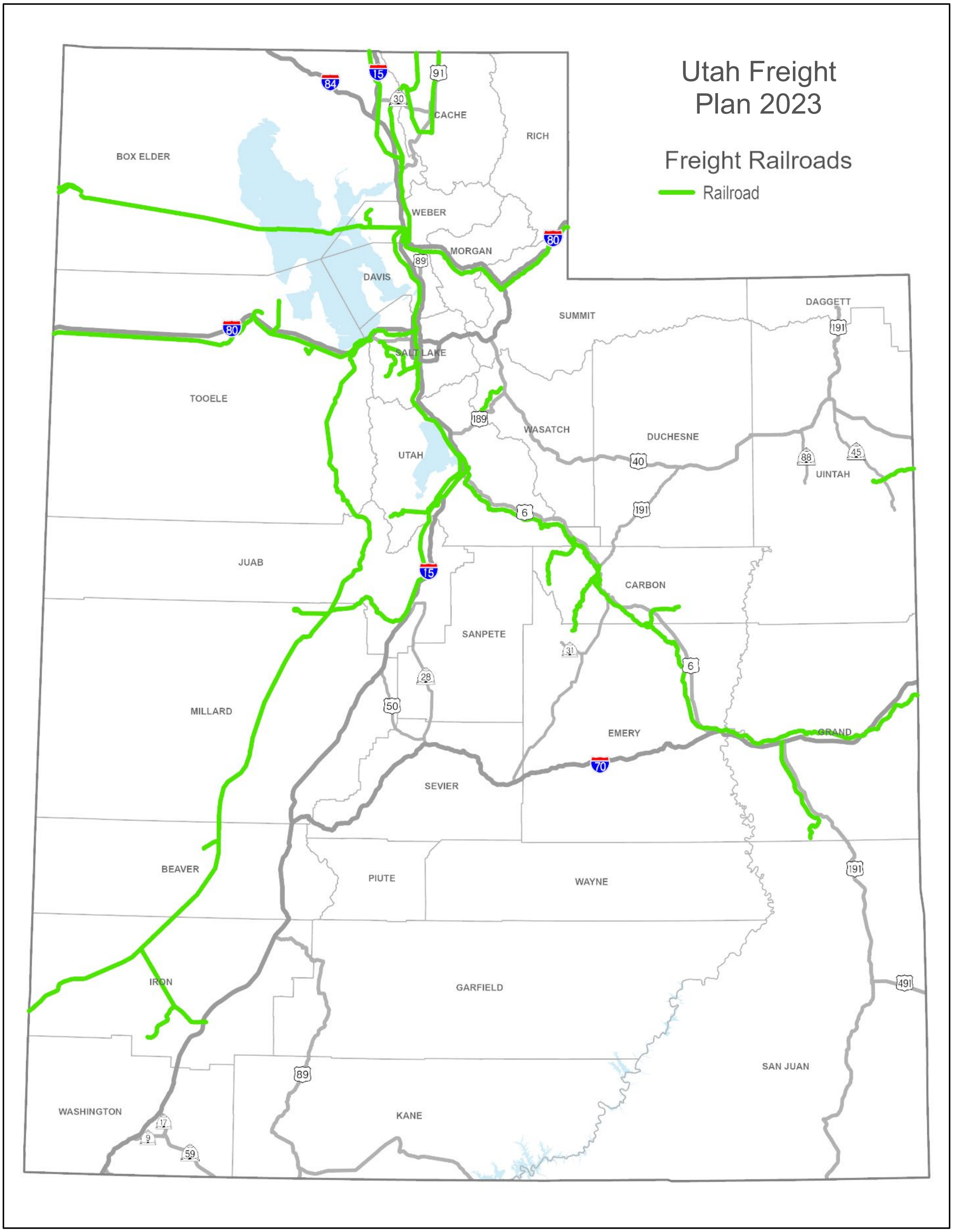
Utah has long been a major hub for the UP, though the 1996 merger with Southern Pacific (SP) diverted much of UP's Midwest to Southern California freight traffic to former SP lines across the southwest via El Paso, Texas. UP operates two routes between Utah and Northern California, a route east to the Midwest via Wyoming and another via Denver, Colorado. There is a line to Southern California via Las Vegas, Nevada, and a route north to Pocatello, Idaho. Three of the six UP routes radiating out from northern Utah railroad yards have been acquired through mergers since 1980.

BNSF Railway provides freight service to Utah over one of the longest trackage rights operations in U.S. railroad history. BNSF freight trains originate in either Stockton, California or Denver and use UP lines through Utah via Grand Junction, Colorado; Provo and Salt Lake City, Utah; Reno, Nevada and Roseville, California. Daily freight train service is operated by BNSF between Denver and Provo. Daily service is operated on an as needed basis from Provo to Stockton depending upon business levels.

The Utah Railway is the largest of Utah's non-Class I railroads with both owned tracks and trackage rights over select UP mainlines. The Utah Railway is one of 115 railroads of various sizes in the United States, Canada, Australia, Europe, and elsewhere that are owned or operated by Genesee & Wyoming.[1] In addition, Utah Railway acts as BNSF's agent in providing competitive service to many Utah shippers. Figure 3-15 shows the locations of the freight railroads in Utah.

[1] About Us – Genesee & Wyoming Inc. (gwrr.com)

Figure 3-15. Freight Railroads



The following tables list the freight railroad yards and terminals in Utah. Only major freight railroad yards and terminals are listed.

Table 3-4. Union Pacific Freight Rail Yards and Terminals

Name	Location	Information
1. Brigham City Yard	Brigham City	Small local yard handling manifest traffic from local shippers as well as trains serving the Malad Branch into Idaho
2. Freeport Center Yard	Clearfield	Manifest traffic to local businesses and warehouses
3. Helper Yard	Helper	Limited manifest freight and through unit coal train traffic
4. Lynndyl Yard	Lynndyl	Limited local manifest freight, unit grain trains, and through unit coal trains
5. Milford Yard	Milford	Limited local manifest traffic from locals to Lynndyl and on the Cedar City Branch, through unit trains of coal and grain, unit iron ore trains, crew change point for all through trains
6. North Yard	Salt Lake City	Limited manifest freight, mainline crew change location
7. Ogden Main Yard	Ogden	Limited manifest freight, mainline crew change point for trains en route to/from northern California and the Midwest
8. Provo Yard	Provo	Manifest freight, through unit coal train traffic
9. Riverdale Yard	Riverdale	Limited manifest freight, intermodal through freight block swaps
10. Roper Yard	South Salt Lake City	Manifest freight and new vehicle shipments, interchange with Utah Railway and Savage, Bingham & Garfield
11. Salt Lake City Intermodal Terminal (SLCIT)	Salt Lake City	Intermodal freight
12. Smelter Yard	Magna	Mainline block swaps, local copper smelter traffic
13. Wendover Yard	Wendover	Limited local manifest freight, unit trains of copper concentrate

Table 3-5. BNSF Railway Freight Rail Yards and Terminals

Name	Location	Information
1. Midvale Yard	Midvale	Manifest freight, some interchange with Utah Railway
2. Ogden Yard	Ogden	Manifest freight, interchanges with Utah Central Railway
3. Provo Yard	Provo	Manifest freight, interchanges with Utah Railway

Table 3-6. Utah Railway Freight Rail Yards and Terminals

Name	Location	Information
1. Helper Yard	Helper (Martin)	BNSF trackage rights manifest trains
2. Provo Yard	Provo	Local manifest trains, BNSF manifest trains

The following three figures show freight rail yards and terminals for UP, BNSF, and the Utah Railway.

Figure 3-16. Union Pacific Railroad Freight Rail Yards and Terminals

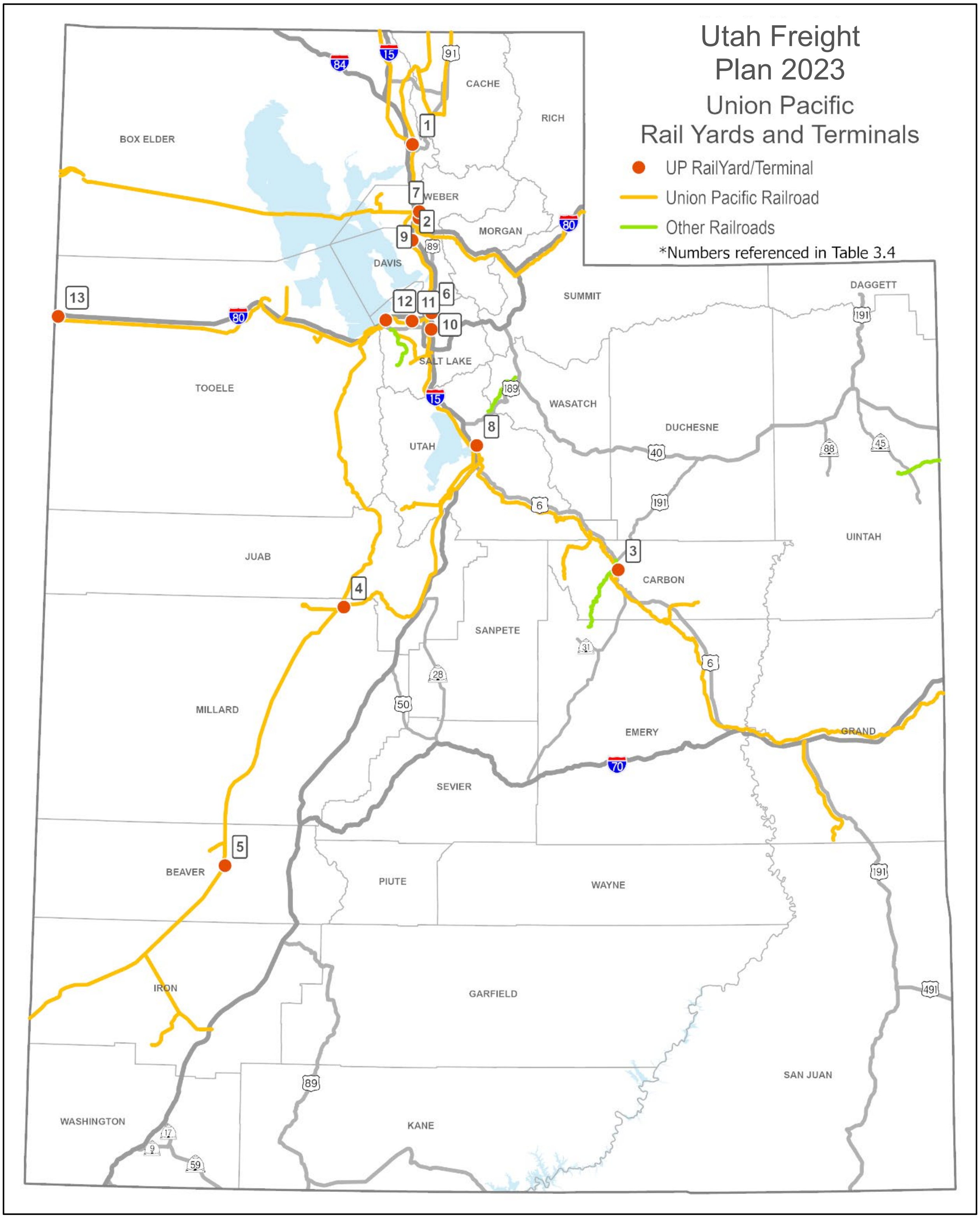


Figure 3-17. BNSF Railway Freight Rail Yards and Terminals

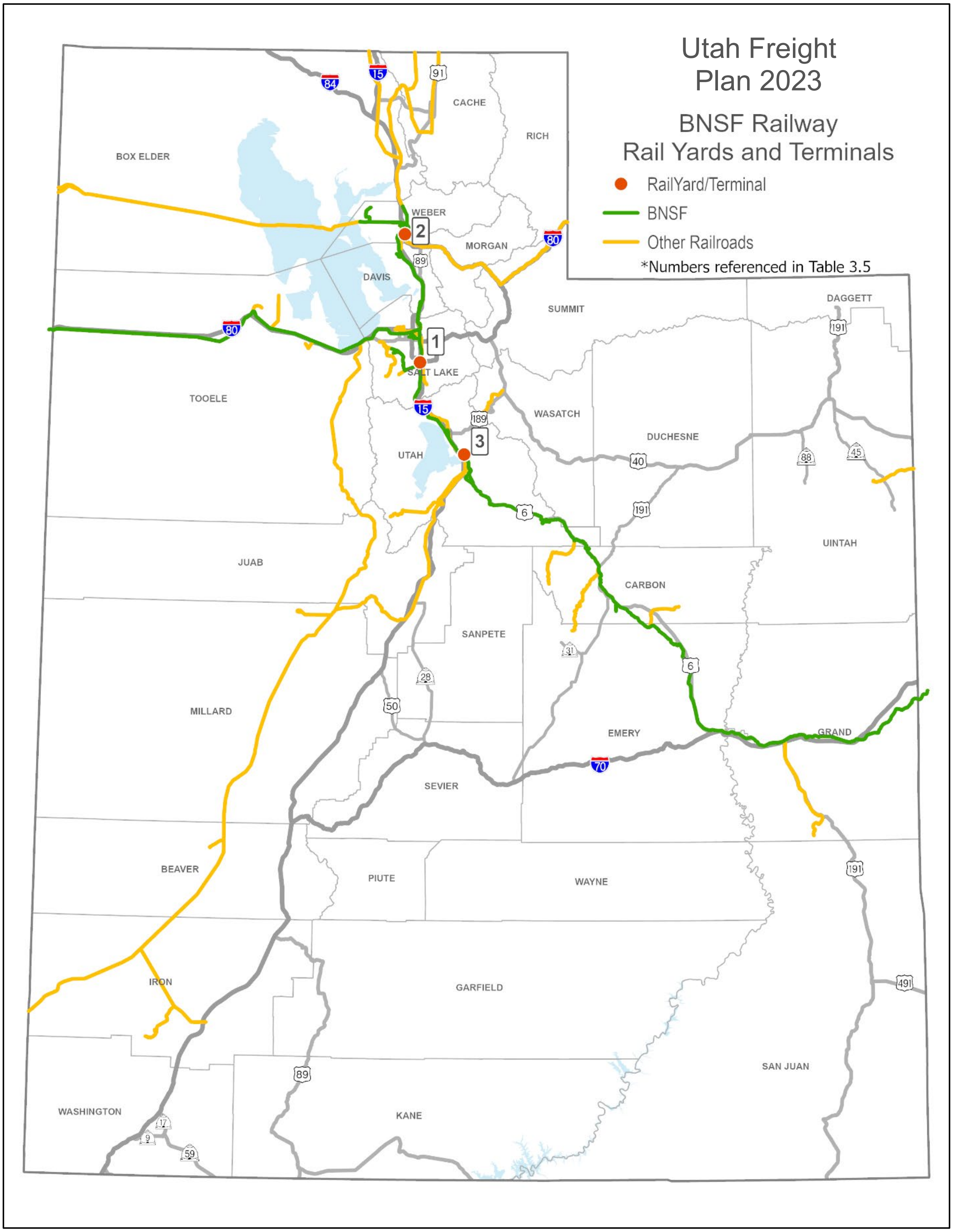
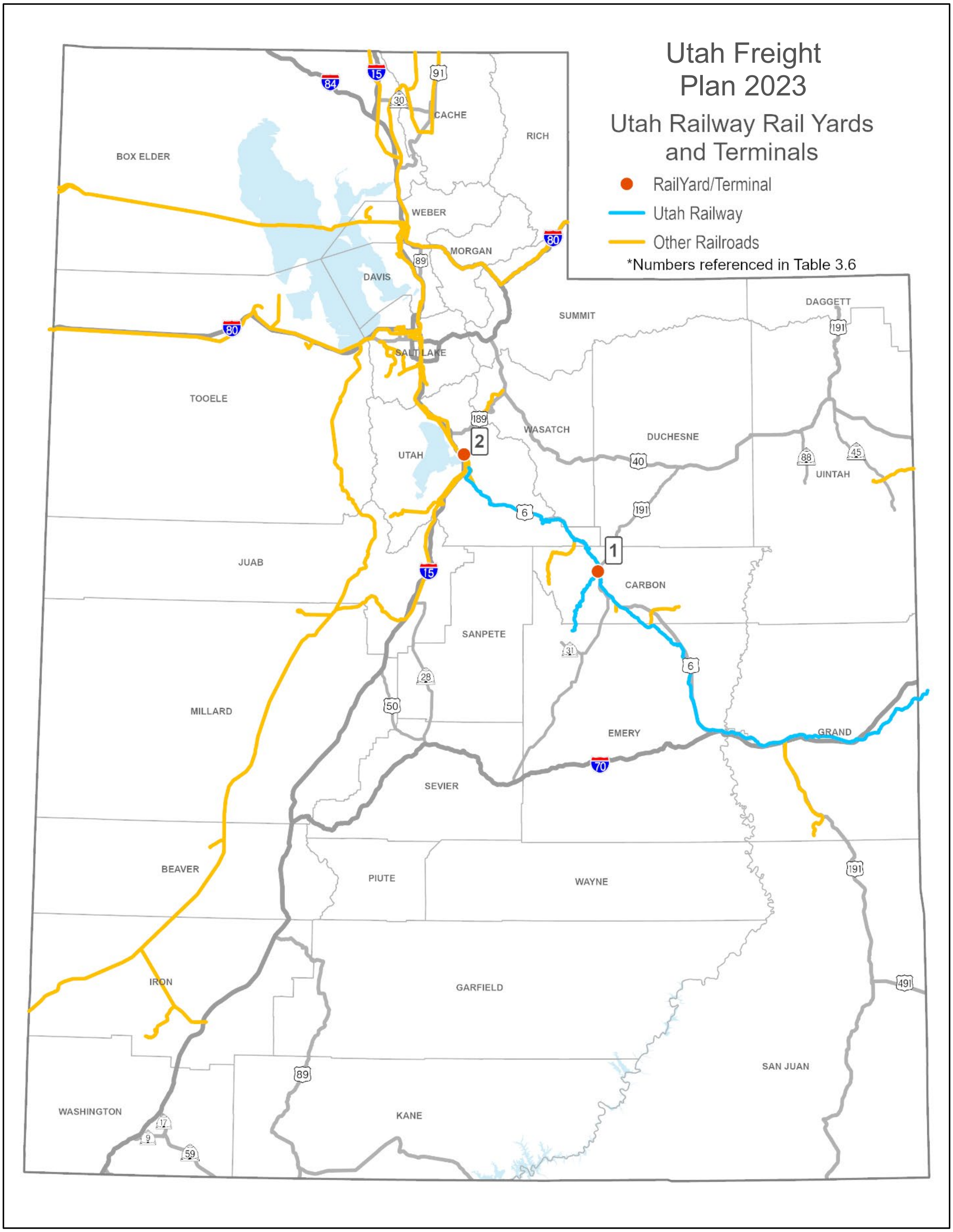


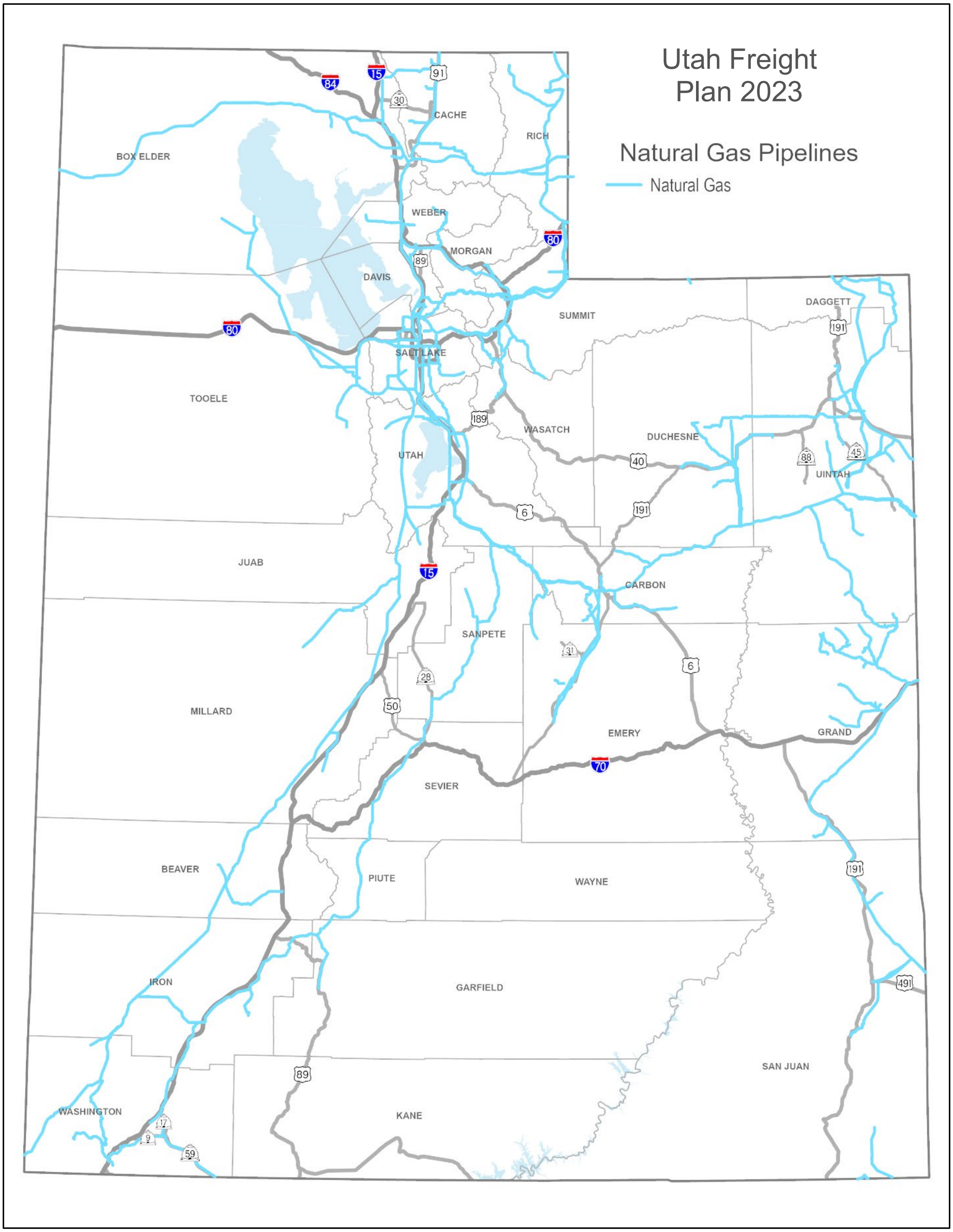
Figure 3-18. Utah Railway Freight Rail Yards and Terminals



3.4.8 Pipelines

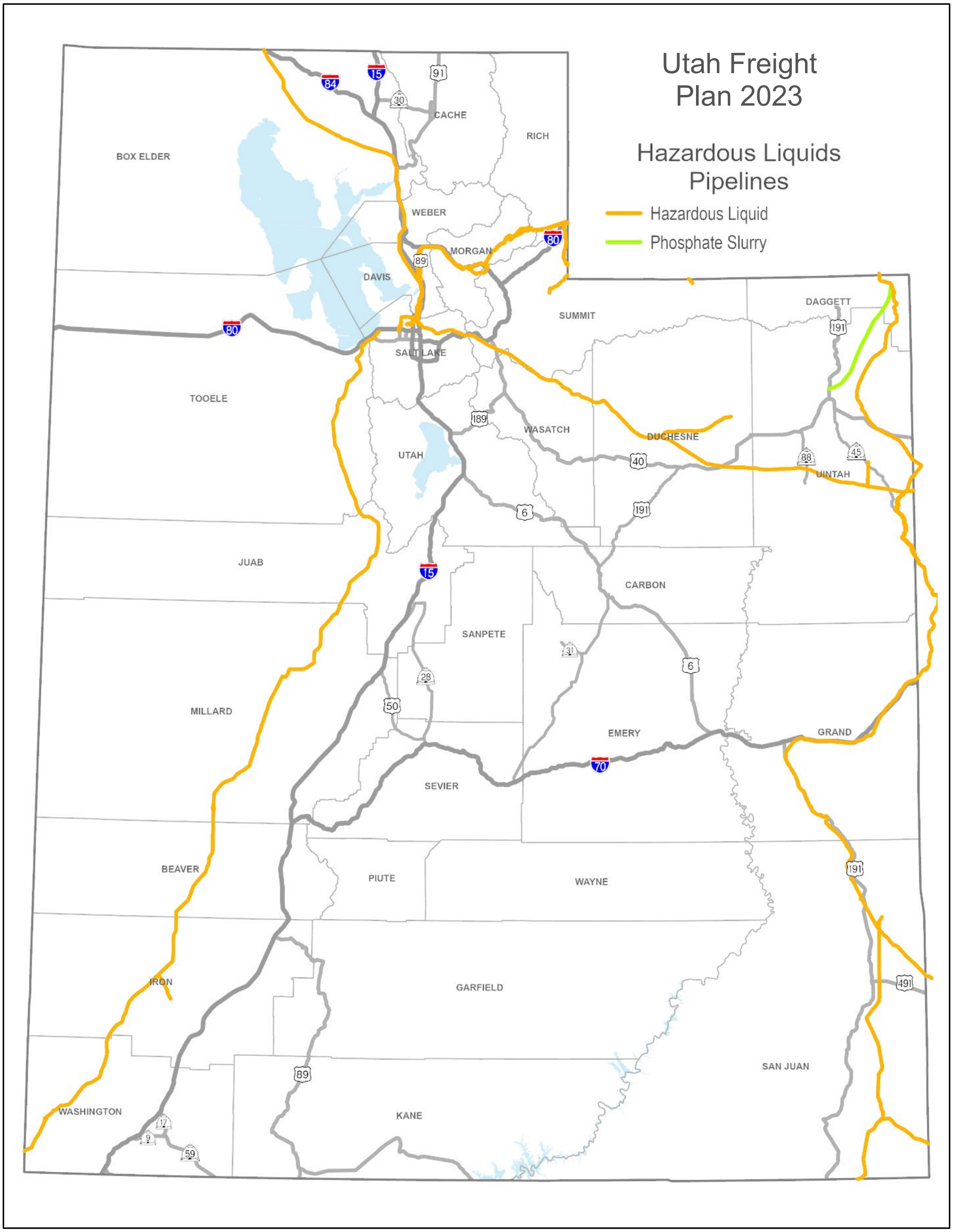
There are 24 different pipeline operators in Utah that carry a variety of commodities through pipelines that total more than 21,000 miles in length, according to the Utah Pipeline Association. Natural gas and natural gas liquids are commodities that are typically transported by pipeline with no other practical alternative. Other commodities, defined as hazardous liquids, that are transported by pipeline in Utah include crude oil, refined petroleum products, highly volatile liquids, carbon dioxide, and anhydrous ammonia. The following two figures show natural gas pipelines and hazardous liquid pipelines in Utah.

Figure 3-19. Natural Gas Pipelines



Source: Utah Geological Survey, 2015.

Figure 3-20. Hazardous Liquids Pipelines



Source: Utah Geological Survey, 2015.

3.4.9 Oil Refineries

There are five oil refineries located between Salt Lake City and suburban Woods Cross, which is located ten miles to the north. All of these facilities provide a form of multimodal freight connection inasmuch as they combine rail freight service with pipelines and trucks.

Demand continues for shipping Utah crude oil out of state for processing in Oklahoma, Texas, Louisiana, and California. Transporting crude oil by truck out of the Uinta Basin to rail transload facilities has an impact on roadway infrastructure. Currently, the crude oil is transported by truck from the Uinta Basin to three transload facilities on the Wasatch Front (Salt Lake, Ogden, Midvale) and three in Carbon County (near Helper and Wellington), where it can be transferred from trucks to rail cars.

When Utah crude oil began to be shipped in large quantities out of state by rail, temporary truck/rail transfer facilities were established along the Wasatch Front. As Carbon County transfer facilities become more established, more crude oil transfer will be shifted there from the more temporary Wasatch Front facilities because of their closer proximity to the Uinta Basin. Each of these Carbon County crude oil terminals currently relies on truck transportation via U.S. 191 through Indian Canyon.

In most oil field developments in the past, a crude oil pipeline would be built to link the extraction area with refineries, water or rail terminals. With the growing environmental concern over pipelines, and given the thick, waxy nature of much of Utah's Uinta Basin crude, pipelines do not provide the bulk transportation solution they have in past energy developments in other parts of the U.S. The following two figures show oil refineries and pipeline terminals, as well as truck/rail crude oil transfer facilities, and their related highway and rail routes.

Figure 3-21. Refineries and Pipeline Terminals

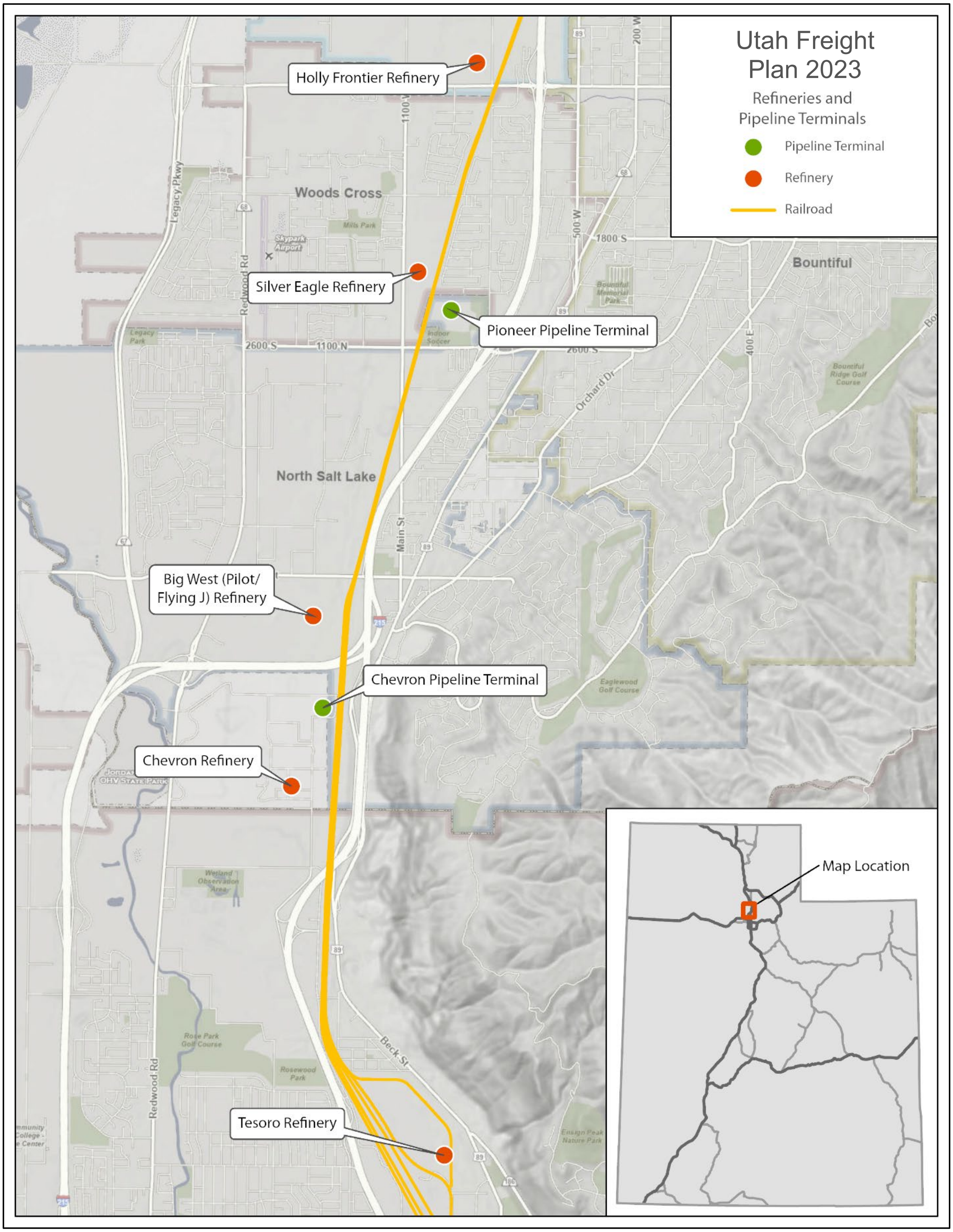
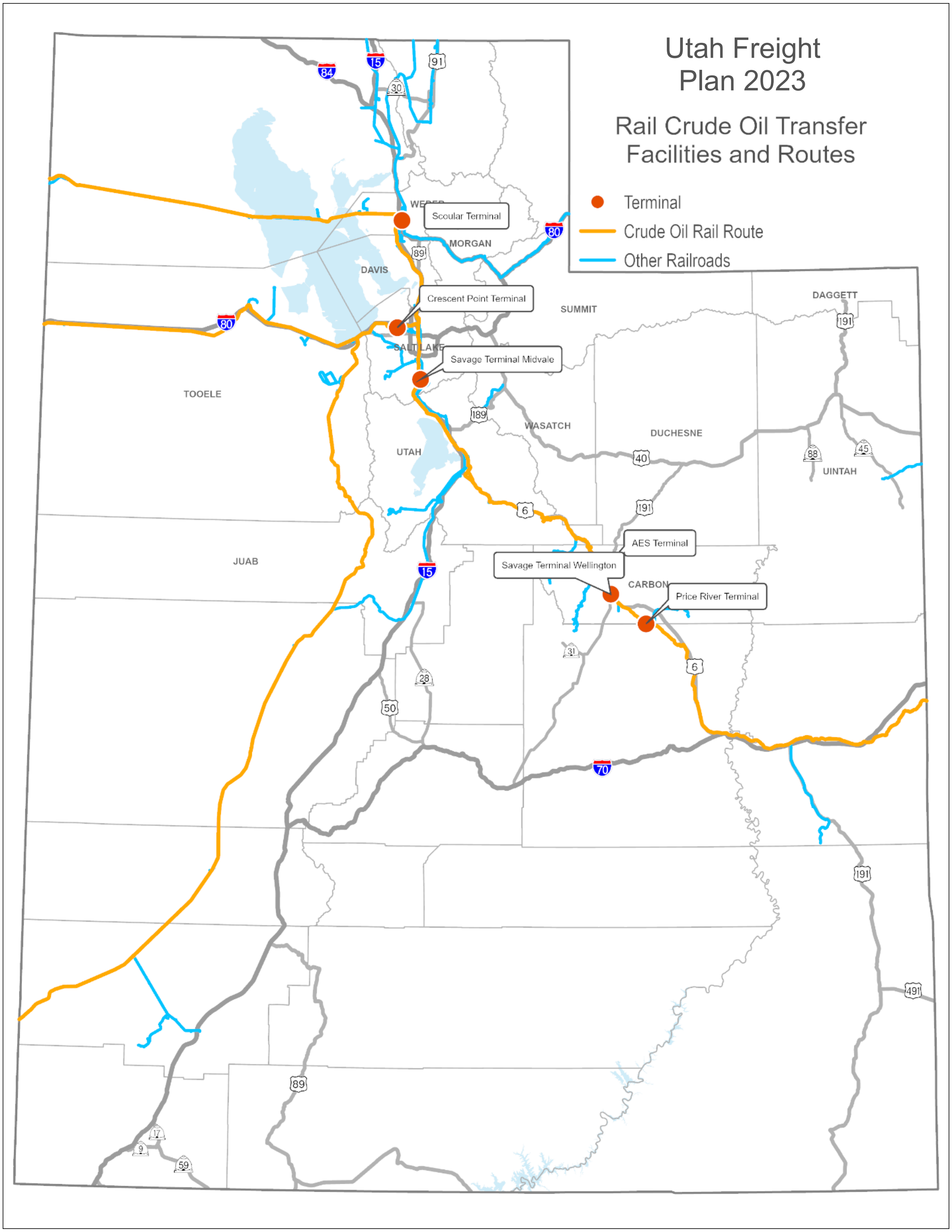


Figure 3-22. Crude Oil Transfer Facilities and Routes



3.4.10 Freight Transfer Facilities

Only one intermodal freight terminal is located in Utah. UP's Salt Lake City Intermodal Terminal (SLCIT) was opened in 2006. SLCIT is located directly adjacent to Salt Lake City's warehousing and distribution center and is in close proximity to three highways identified on the Utah Highway Freight Network as well as the Salt Lake City International Airport. Shipments from as far away as Montana are trucked to and from UP intermodal trains at SLCIT. At the current time, the UP averages approximately 600 container and trailer lifts per day at SLCIT.

Rail intermodal freight service at SLCIT is focused on UP's Midwest to Southern California mainline. The Ports of Los Angeles and Long Beach are Utah's primary global gateways, with the Port of Oakland in northern California sharing in a lesser capacity in Utah's international and Pacific Rim intermodal business. Given the location of UP's main route to the Pacific Northwest, which bypasses Utah through Wyoming and Idaho, the Ports of Portland, Tacoma and Seattle play only a minor role in handling international intermodal shipments to and from Utah by rail.

A facility for new automobiles is maintained by the UP at their Roper Freight Yard, located three miles south of downtown Salt Lake City adjacent to I-15, I-80, and the S.R. 201 freeways. This facility handles all shipments of new automobiles and vehicles by rail for portions of Utah, Idaho, Montana, Nevada, Wyoming, and even northern California, as well as parts of Oregon and Washington. Southwestern Utah, primarily the communities of St. George and Cedar City, receives some of their new vehicles and intermodal freight shipments via a modest UP facility located in North Las Vegas, Nevada. The following two figures show UP's SLCIT and the Roper Yard/Auto Terminal.

Figure 3-23. Union Pacific Railroad's Salt Lake City Intermodal Terminal

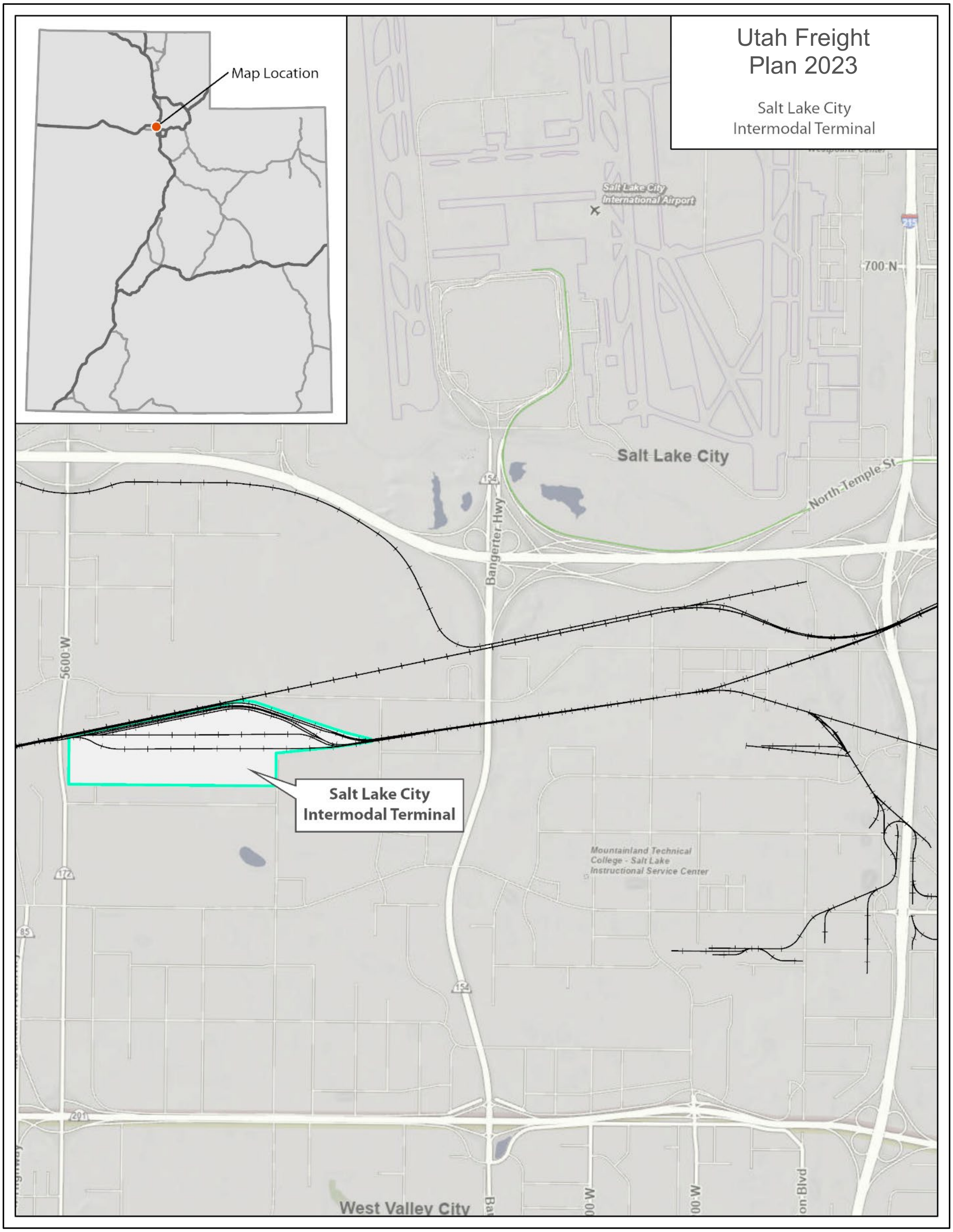
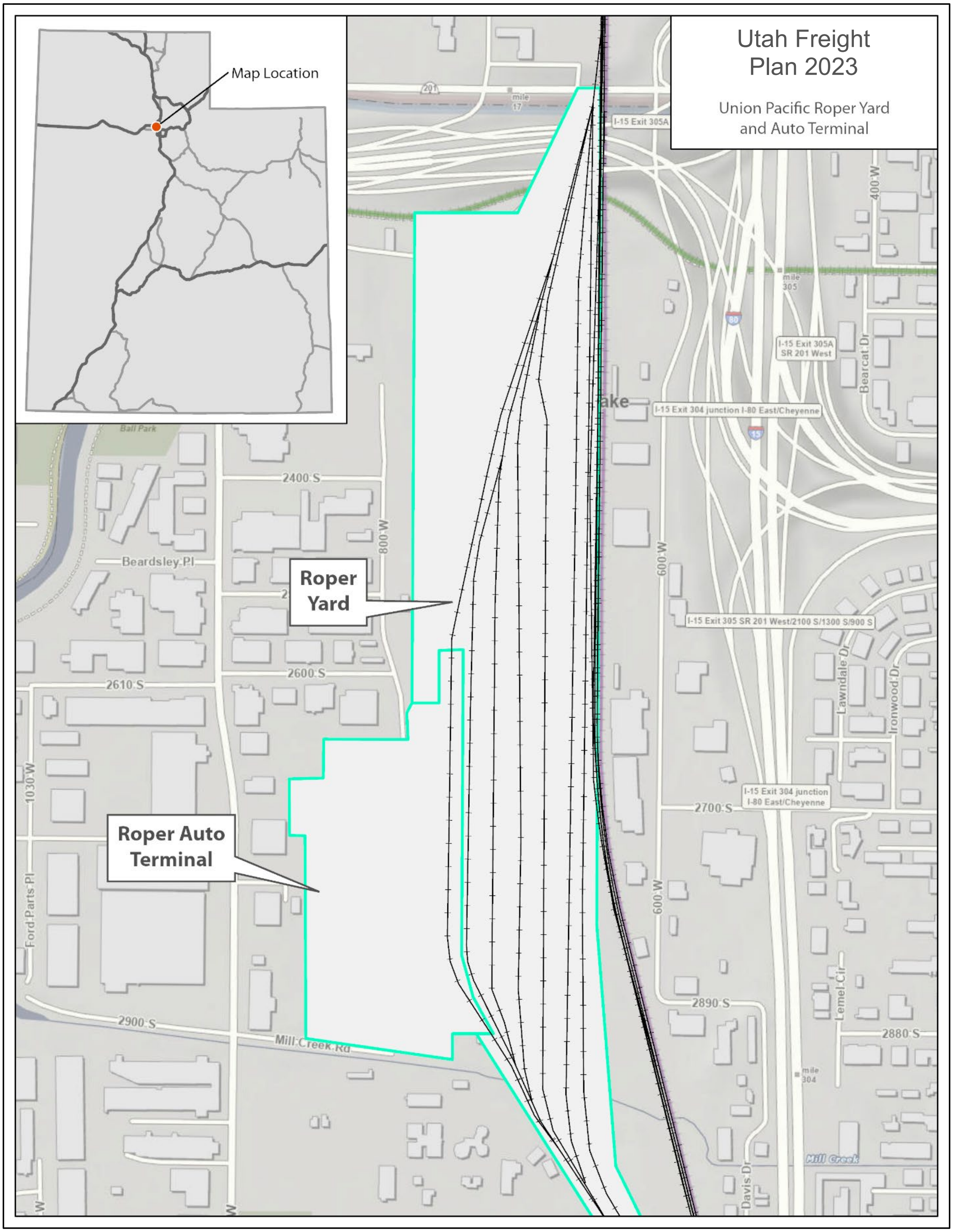


Figure 3-24. Union Pacific Railroad Roper Yard and Auto Terminal



3.4.11 Aviation

Utah's primary gateway for air cargo is the Salt Lake City International Airport. The air cargo facility is located at the northwest end of the Salt Lake City International Airport. There are three air cargo airlines that fly in and out of Salt Lake City International Airport, which include DHL, FedEx, UPS. Although there are 46 public use airports in Utah, only eight have air cargo service including:

1. Buck Davis Field (Price)
2. Canyonlands Field (Moab)
3. Cedar City Regional Airport
4. Logan-Cache Airport
5. Salt Lake City International Airport
6. St. George Municipal Airport
7. Vernal Regional Airport
8. Wendover Airport

According to Salt Lake City International Airport statistics for 2022, in addition to the four air cargo airlines, 14 other airlines handled more than 390 million pounds of air cargo and air mail in 2022. As shown in the table below, the amount of air cargo enplaned was 189,740,223 pounds and the amount of air cargo deplaned was 201,212,667 pounds for a total of 390,952,890 pounds.

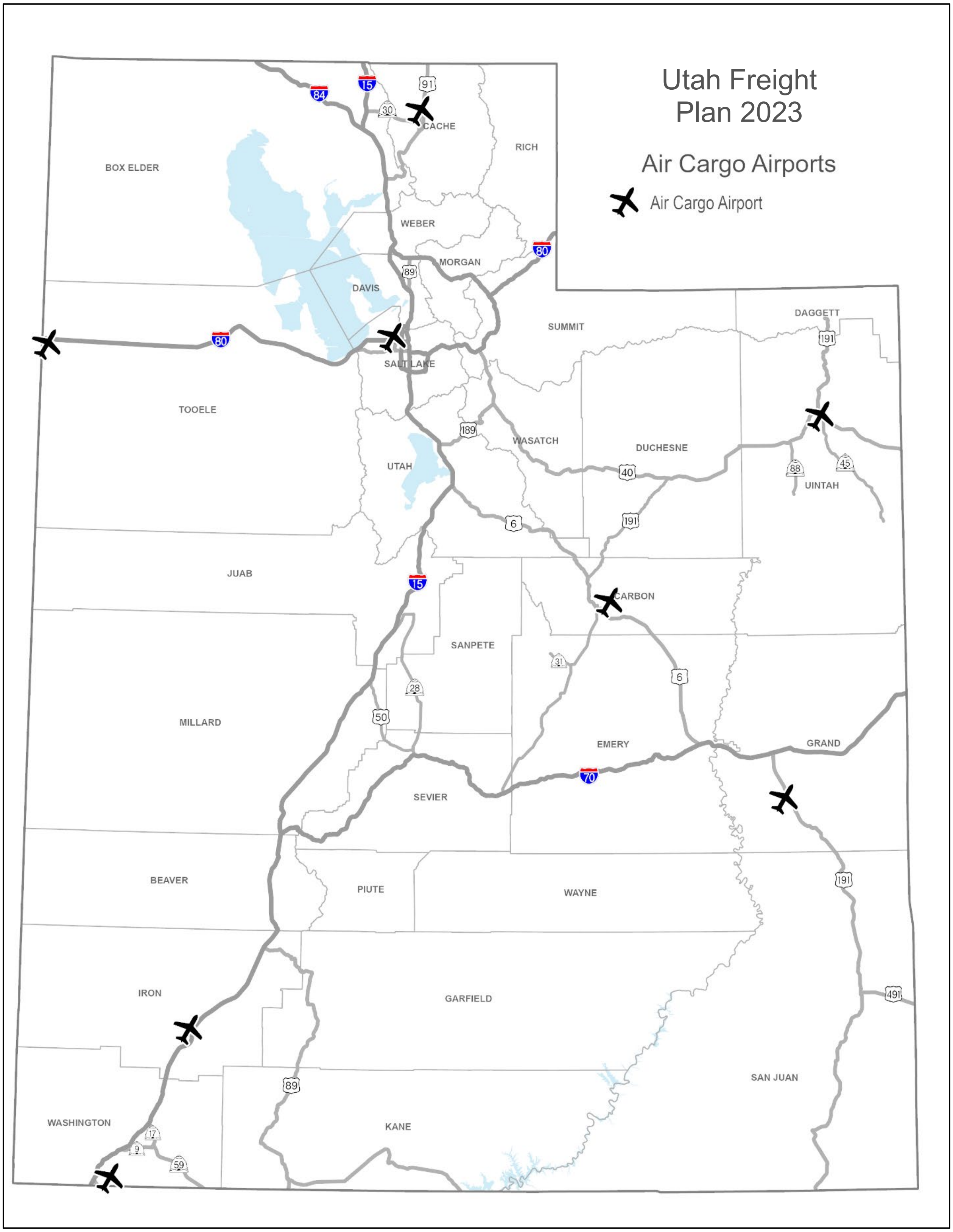
Table 3-7. Top Air Cargo Airlines

Airline	Enplaned Cargo	Deplaned Cargo	Total Cargo
FedEx	100,024,037 (53%)	99,192,463 (49%)	186,826,728 (51%)
UPS	61,991,487 (33%)	69,592,882 (35%)	107,749,530 (34%)
Delta	8,348,137 (4%)	12,868,194 (5%)	23,489,368 (5%)
Southwest	4,427,640 (2%)	4,268,323 (2%)	8,969,857 (32%)
Others (totaled)	14,948,922 (8%)	15,290,890 (8%)	390,952,890 (8%)
Total	**189,740,223**	**201,212,667**	**390,952,890**

Source: Salt Lake City International Airport, Summary Cargo Report for 2022, 2023.

Figure 3-25 shows the location of air cargo airports in Utah.

Figure 3-25. Air Cargo Airports



3.4.12 Warehousing and Distribution

Utah has a relatively high percentage of large truck traffic on its highways. This position has evolved primarily from Utah's geographical position relative to the population centers and consumer markets of the eleven western states, and the fact that Utah is at the crossroads of the nation's highway network here in the west. As a result, many retail, manufacturing, and distribution companies have established their western distribution centers in the Salt Lake City to Ogden portion of the Wasatch Front corridor in northern Utah. Additionally, many large trucking firms are either headquartered in this same area or maintain large truck terminals here.

Utah's economy has greatly benefited from its large concentration of distribution centers. The largest concentration of distribution centers and major truck terminals in the state is located on Salt Lake City's west side adjacent to I-80, I-215, S.R. 201, and S.R. 172 (5600 West).

However, there are challenges associated with the large volumes of truck traffic on our state-maintained highways that support this massive movement of goods. It is well known that higher levels of truck traffic have a definite impact on the quality and longevity of highway infrastructure, ranging from pavement condition to the lifespan of bridges and other structures. High truck volumes also impact traffic flow for other vehicles in both rural and urban areas as well as air quality in critical air sheds, particularly in the populated valley environments in northern Utah. As such, the large numbers of trucks populating many key highways in Utah needs to be carefully addressed through improved highway infrastructure to maximize the economic benefits of such freight movement activity. Improving the Utah Highway Freight Network will also result in minimizing the negative impacts that result from this traffic.

3.4.13 Seaports

Although an inland state, Utah depends on several major West Coast seaports to link it with the rest of the world. Although modest amounts of Utah freight pass through Atlantic and Gulf Coast seaports, as well as those in the Pacific Northwest, Utah's primary global gateways are in California. As already discussed, UP's SLCIT provides direct rail intermodal freight service to the ports of Los Angeles and Long Beach, with indirect rail service to the Port of Oakland.

For bulk commodities such as coal and iron ore, Utah bulk freight has traditionally used the bulk cargo facilities at the Port of Long Beach in Southern California, and the Ports of Richmond and Stockton, located on San Francisco Bay and at the upper end of the Sacramento/San Joaquin River Delta east of San Francisco, respectively.

Utah's primary intermodal and bulk commodity connections to these California seaports is the Union Pacific Railroad, along with Interstates 15 and 80, which are on the Utah Highway Freight Network.

ELEMENT 4. SUPPORTING NATIONAL MULTIMODAL FREIGHT POLICY GOALS

On November 15, 2021, President Biden signed the Infrastructure Investment and Jobs Act (IIJA) into law. Section 11114 of the IIJA amended the National Highway Freight Program (NHFP) in section 167 of title 23, United States Code (23 U.S.C.). The IIJA amendments to 23 U.S.C. 167 took effect on October 1, 2021, and apply to all related funding obligated on or after that date, whether funded from new NHFP authorizations or NHFP funds authorized in previous years. It provides $550 billion over fiscal years 2022 through 2026 in new federal investment in infrastructure, including in roads, bridges, and mass transit, water infrastructure, resilience, and broadband. It makes a once-in-a-generation investment of $350 billion in highway programs.

The Utah Freight Plan supports national freight goals and helps achieve UDOT's three strategic goals. The primary purpose of this plan is to guide cost effective capital and operating investments in the state freight system to ensure maximum benefit and efficient movement of goods.

The plan will help Utah successfully utilize federal freight funds by providing a data-driven analysis supporting highway and multimodal freight projects that meet federal criteria and goals, and by integrating existing state transportation plans into a single state freight plan to address all freight modes in the state system: highway, railroad, pipeline, air, and water.

4.1 National Multimodal Freight Network

The Fixing America's Surface Transportation (FAST) Act established a National Multimodal Freight Network for the following purposes:

1. To assist states in strategically directing resources toward improved system performance for the efficient movement of freight on the network.
2. To inform freight transportation planning.
3. To assist in the prioritization of Federal investment.
4. To assess and support Federal investments to achieve the national multimodal freight policy goals described in section 70101 (b) of this title and the national highway freight program goals described in section 167 of title 23.

4.1.1 Policy Goals

The FAST Act establishes a national policy of maintaining and improving the condition and performance of the National Highway Freight Network to ensure that the network provides a foundation for the U.S. to compete in the global economy. The FAST Act specifies goals associated with this national policy related to the condition, safety, security, efficiency, productivity, resiliency, and reliability of the network, and to reduce the adverse environmental impacts of freight movement on the network. These goals are to be pursued in a manner that is not burdensome to state and local governments

(49 U.S.C. 70101). Table 4-1 shows the NMFP goals along with a checkbox if UDOT is addressing that goal by transportation mode.

Table 4-1. National Multimodal Freight Policy Goals

National Multimodal Freight Policy Goals	Road	Rail	Air
Identify infrastructure improvements, policies, and operational innovations that strengthen the contribution of the National Multimodal Freight Network to the economic competitiveness of the United States, reduce congestion and eliminate bottlenecks on the National Multimodal Freight Network, and increase productivity, particularly for domestic industries and businesses that create high-value jobs.	✓	✓	✓
Improve the safety, security, efficiency, and resiliency of multimodal freight transportation.	✓	✓	✓
Achieve and maintain a state of good repair on the National Multimodal Freight Network.	✓	✓	✓
Use innovation and advanced technology to improve the safety, efficiency, and reliability of the National Multimodal Freight Network.	✓	✓	✓
Improve the economic efficiency and productivity of the National Multimodal Freight Network.	✓	✓	✓
Improve the reliability of freight transportation.	✓	✓	✓
Improve the short- and long-distance movement of goods that travel across rural areas between population centers, travel between rural areas and population centers, and travel from the Nation's ports, airports, and gateways to the National Multimodal Freight Network.	✓	✓	✓
Improve the flexibility of States to support multi-State corridor planning and the creation of multi-State organizations to increase the ability of States to address multimodal freight connectivity.	N/A	N/A	N/A
Reduce the adverse environmental impacts of freight movement on the National Multimodal Freight Network.	✓	✓	✓
Pursue the goals described in this subsection in a manner that is not burdensome to state and local governments.	✓	✓	✓

4.1.2 Network Components

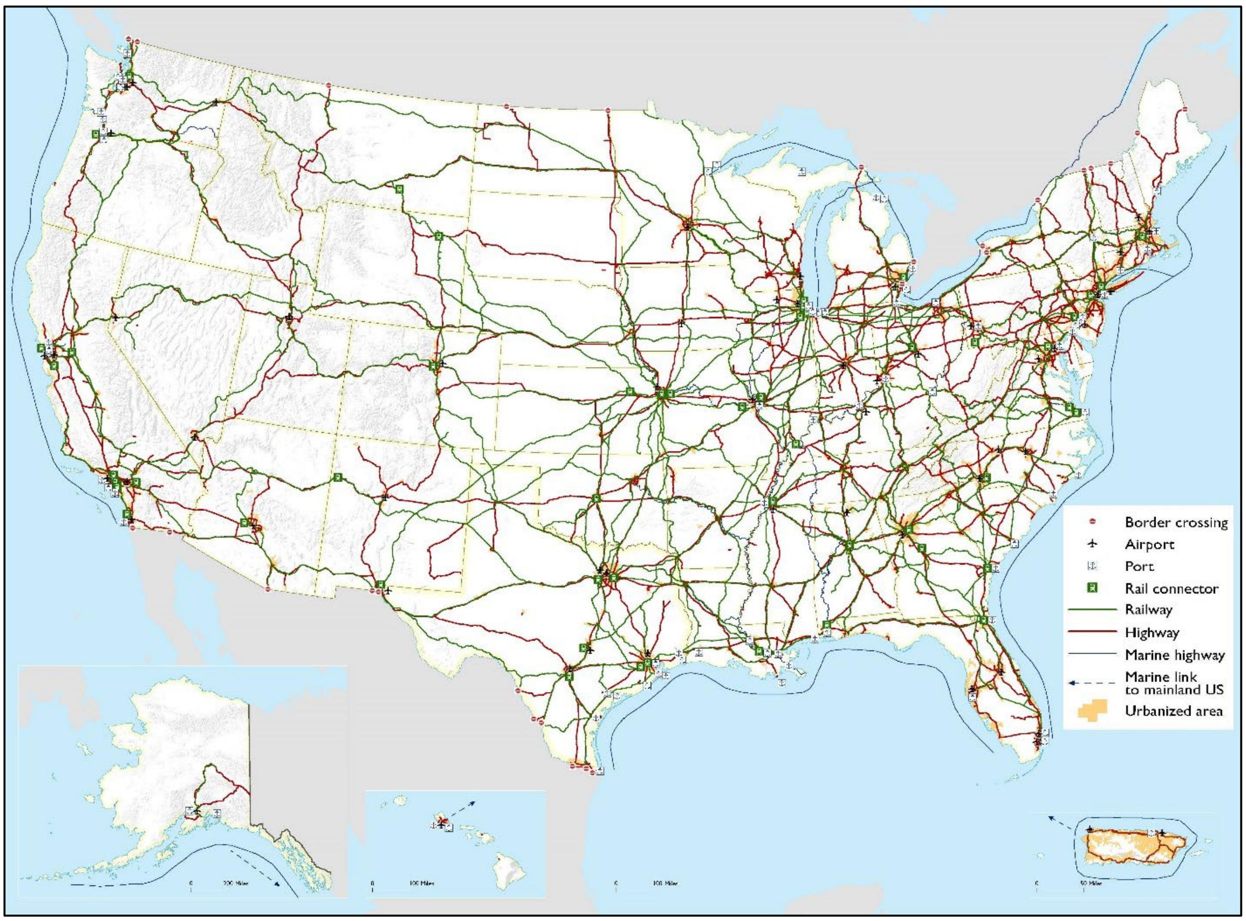
The network components of the National Multimodal Freight Network include the following:

1. The National Highway Freight Network, as established under section 167 of title 23.
2. The freight rail systems of Class I railroads, as designated by the Surface Transportation Board.
3. The public ports of the United States that have total annual foreign and domestic trade of at least 2,000,000 short tons, as identified by the Waterborne Commerce Statistics Center of the Army Corps of Engineers, using the data from the latest year for which such data is available.

4. The inland and intracoastal waterways of the United States, as described in section 206 of the Inland Waterways Revenue Act of 1978 (33 U.S.C. 1804).
5. The Great Lakes, the St. Lawrence Seaway, and coastal and ocean routes along which domestic freight is transported.
6. The 50 airports located in the United States with the highest annual landed weight, as identified by the Federal Aviation Administration.
7. Other strategic freight assets, including strategic intermodal facilities and freight rail lines of Class II and Class III railroads, designated by the Under Secretary as critical to interstate commerce.

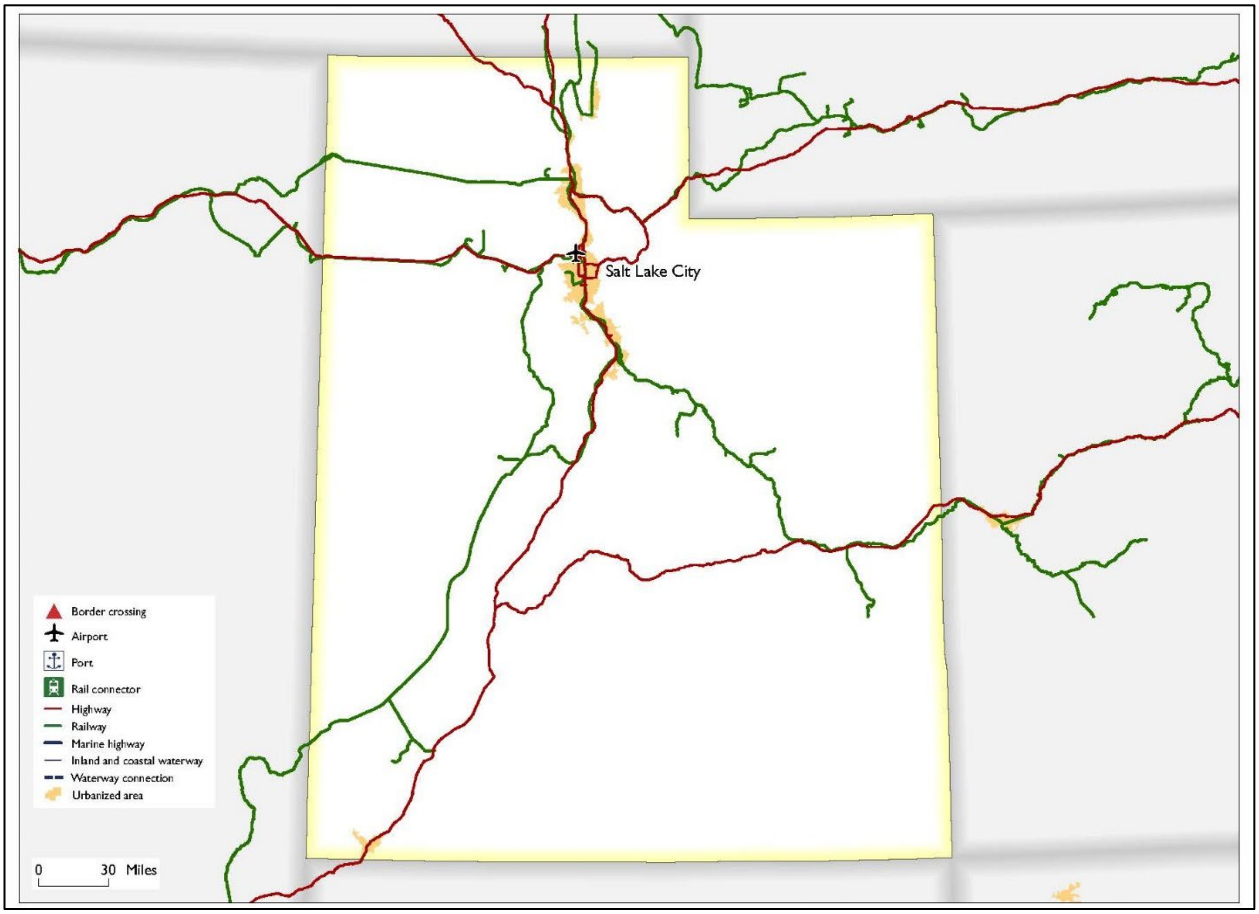
The following two figures show the National Multimodal Freight Network for the United States and Utah.

Figure 4-1. National Multimodal Freight Network (2016)



Source: https://www.transportation.gov/Freight/INMFNmaps/US-Map2016

Figure 4-2. National Multimodal Freight Network in Utah (2016)



Source: https://www.transportation.gov/Freight/INMFNmaps/Utah-State-Map2016

4.2 Utah's Multimodal Freight Network

Like the National Multimodal Freight Network, UDOT has identified and established the Utah Multimodal Freight Network, which includes highway, railroad, and aviation modes. The Utah Multimodal Freight Network does not include navigable waterways because there are none in Utah.

4.2.1 Goals

The FAST Act established a National Multimodal Freight Network with goals and components identified in Federal legislation. Utah has also established goals for its multimodal network. In addition to supporting and including the 10 National goals, Utah's goals include the following:

1. Continue to improve network and intermodal connectivity.
2. Continue to construct projects that improve freight mobility.
3. Continue to work with transportation officials, as well as Utah's business and logistics leaders on freight operations and needs.

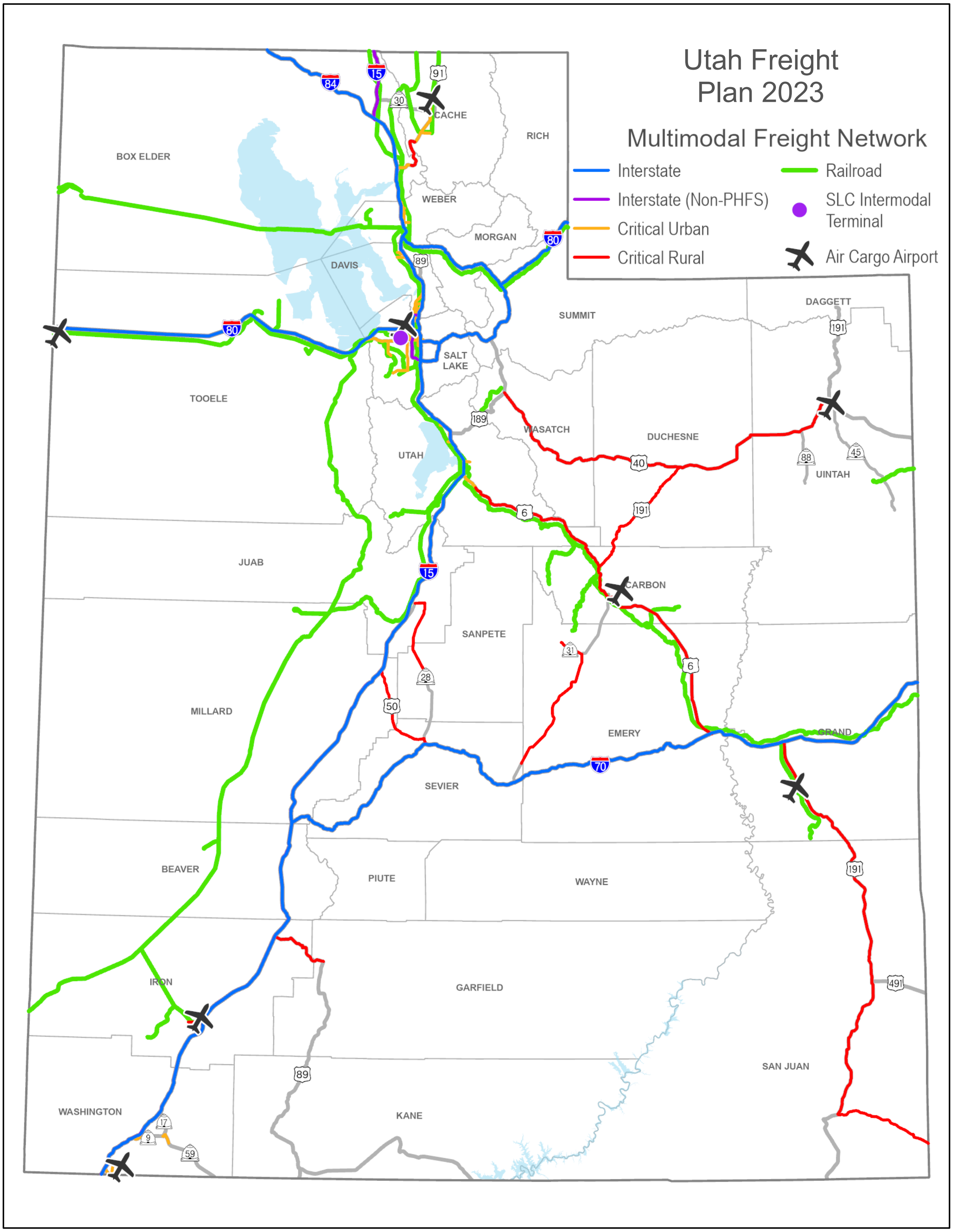
4. Continue to monitor freight issues, both nationally and globally, that affect Utah's economy, business community and transportation systems.
5. Continue to educate and support UDOT leaders, government, and business decision makers, as well as universities and civic groups on freight issues.

4.2.2 Network Components

The network components of the Utah Multimodal Freight Network (Figure 4-3) include the following:

1. The Utah Highway Freight Network, which includes the critical rural and urban freight corridors and intermodal connectors. Details about Utah's intermodal connectors is found in Element 3.
2. The freight rail systems of Class I, II and III railroads in Utah.
3. The eight airports that handle air cargo in Utah.
4. Union Pacific Railroad's Salt Lake City Intermodal Terminal.

Figure 4-3. Utah Multimodal Freight Network



4.3 National Highway Freight Program

The information below provides background and guidance to clarify eligibility requirements for the NHFP under the IIJA.

The NHFP focuses on improving the condition and performance of the National Highway Freight Network (NHFN) and ensuring the network provides the foundation for the United States to compete in the global economy. The goals of the NHFP program are:

4.3.1 Goals

Like the NMFP, Utah supports the goals of the NHFP. Table 4-2 shows the NHFP goals along with a checkbox if UDOT is addressing that goal by transportation mode.

Table 4-2. National Highway Freight Program Goals

National Highway Freight Program Goals	Road
Investing in infrastructure and operational improvements that strengthen economic competitiveness, reduce congestion, reduce the cost of freight transportation, improve reliability, and increase productivity.	✓
Improving the safety, security, efficiency, and resiliency of freight transportation in rural and urban areas.	✓
Improving the state of good repair of the NHFN.	✓
Using innovation and advanced technology to improve NHFN safety, efficiency, and reliability.	✓
Improving the efficiency and productivity of the NHFN.	✓
Improving State flexibility to support multi-State corridor planning and address highway freight connectivity.	N/A
Reducing the environmental impacts of freight movement on the NHFN.	✓

4.3.2 National Highway Freight Network

The NHFN strategically directs Federal resources and policies toward improved performance of highway portions of the U.S. freight transportation system. The NHFN is a set of roadways that supports the movement of goods and consists of the following four separate components:

1. The Primary Highway Freight System (PHFS);
2. Critical Rural Freight Corridors (CRFCs);
3. Critical Urban Freight Corridors (CUFCs); and
4. The remaining portions of the Interstate System not included in the PHFS.

The IIJA increased the total amount of CRFC and CUFC mileage that States and MPOs can designate (23 U.S.C. 167(e)(2) and 167(f)(4)). NHFP funds may only be obligated for eligible projects found under 23 U.S.C. 167(h)(5)(B) and (C) that:

1. Contribute to the efficient movement of freight on the NHFN; and
2. Are identified along with matching funds in a fiscally constrained freight investment plan included in a state freight plan. (See 23 U.S.C. 167(h)(5)(A); 49 U.S.C. 70202(b)(9) and 70202(c)(2)).

Other eligible costs named under a specific eligibility provision, 23 U.S.C. 167(h)(6), are excepted from the general eligibility requirements of section 167(h)(5)(A). Additionally, a State should consider obligating up to 30 percent of the total apportionment under NHFP each fiscal year for freight intermodal or freight rail projects. (See 23 U.S.C. 167(h)(5)(B)).

Network Subsystems

Under 23 U.S.C. 167(c)(l), the FHWA Administrator must establish a NHFN to strategically direct Federal resources and policies toward improved performance of the Network. NHFP funds may be obligated for projects that contribute to the efficient movement of freight on the NHFN. According to 23 U.S.C. 167(c)(2), the NHFN includes the following subsystems of roadways:

1. Primary Highway Freight System (PHFS): This is a network of highways identified as the most critical highway portions of the U.S. freight transportation system determined by measurable and objective national data. For further information on the original designation, see the Federal Register Notice of October 23, 2015 (80 FR 64477).
    a. The FHWA Administrator is required to re-designate the PHFS every 5 years. Each re-designation is limited to a maximum 3 percent increase in the total mileage of the system (23 U.S.C. 167(d)(2)). On August 26, 2021, FHWA published in the Federal Register a notice describing the statutory criteria for re- designation of the PHFS, and inviting comments on potential PHFS changes, see the Federal Register Notice of August 26. 2021 (86 FR 47705). After considering all comments and information received in response to the notice, FHWA plans to publish notice of the re-designated PHFS.
2. Interstate Routes not on the PHFS - These highways consist of the remaining portion of the Interstate System not designated as part of the PHFS. These routes provide important continuity and access to freight transportation facilities.
3. Critical Rural Freight Corridors (CRFC) - These are public roads not in an urbanized area which provide access and connection to the PHFS and the Interstate System with other important ports, public transportation facilities, or other intermodal freight facilities. States are responsible for designating public roads in their State as CRFCs. In accordance with 23 U.S.C. 167(e), a State may designate a public road within the borders of the State as a CRFC if the public road

is not in an urbanized area, and meets one or more of the following seven elements:

   a. The road is a rural principal arterial roadway and has a minimum of 25 percent of the annual average daily traffic of the road measured in passenger vehicle equivalent units from trucks (FHWA vehicle class 8 to 13); the road provides access to energy exploration, development, installation, or production areas;

   b. The road connects the PHFS or the Interstate System to facilities that handle more than:

      1) 50,000 20-foot equivalent units per year; or

      2) 500,000 tons per year of bulk commodities.

   c. The road provides access to:

      1) a grain elevator;

      2) an agricultural facility;

      3) a mining facility;

      4) a forestry facility; or

      5) an intermodal facility;

   d. The road connects to an international port of entry;

   e. The road provides access to significant air, rail, water, or other freight facilities in the State; or

   f. The road is determined by the State to be vital to improving the efficient movement of freight of importance to the economy of the State.

The IIJA increased the CRFC miles available for designation to a maximum of 300 miles or 20 percent of the PHFS mileage in the State, whichever is greater. Rural States, defined under 23 U.S.C. 167(e)(3), are States with a population per square mile of area that is less than the national average, based on the 2010 census, may designate as critical rural freight corridors a maximum of 600 miles of highway or 25 percent of the primary highway freight system mileage in the State, whichever is greater.

4. Critical Urban Freight Corridors (CUFC) - These are public roads in urbanized areas which provide access and connection to the PHFS and the Interstate with other ports, public transportation facilities, or other intermodal transportation facilities. In an urbanized area with a population of 500,000 or more, the metropolitan planning organization (MPO), in consultation with the State, is responsible for designating the CUFCs (23 U.S.C. 167(f)(l)). In an urbanized area with a population of less than 500,000, the State, in consultation with the MPO, is responsible for designating the CUFCs (23 U.S.C. 167(f) (2). Regardless of population, a public road may be designated

as a CUFC if it is in an urbanized area, and meets one or more of the following four elements:

a. The road connects an intermodal facility to.
    1) the PHFS
    2) the Interstate System; or
    3) an intermodal freight facility.
b. The road is located within a corridor of a route on the PHFS and provides an alternative highway option important to goods movement;
c. The road serves a major freight generator, logistic center, or manufacturing and warehouse industrial land; or
d. The road is important to the movement of freight within the region, as determined by the MPO or the State (23 U.S.C. 167(f)(3)).

The IIJA increased the CUFC miles available for designation to a maximum of 150 miles or 10 percent of the PHFS mileage in the State, whichever is greater (23 U.S. C. 167(f)).

States with PHFS mileage greater than or equal to 2 percent, calculated based on the proportion of total designated PHFS mileage in the State to the total mileage of the PHFS in all States, are high mileage States with respect to the PHFS and may obligate funds for projects on the PHFS, the CRFC, and the CUFC. States with PHFS mileage of less than 2 percent are low mileage States with respect to the PHFS and may obligate funds for projects on all portions of the NHFN (the PHFS, the CRFC, the CUFC, and the rest of the Interstate System in their State) (23 U.S.C. 167(i)(3)).

Utah is a high mileage state and therefore can only obligate funds on the PHFS, CRFCs, and the CUFCs. Utah can designate up to 600 miles of CRFCs and up to 150 CURFs mileage. Portions of the Interstate System not included in the PHFS are illegible for NHFP funds in Utah.

As of October 1, 2015, the NHFN consisted of the PHFS and other Interstate portions not on the PHFS, for a total of approximately 51,029 centerline miles. The NHFN mileage continues to increase with the designation of CRFCs and CUFCs and will fluctuate with additions and deletions to the Interstate Highway System. States and MPOs can designate these corridors on a rolling basis and must certify to the FHWA Administrator that the designated corridors meet the requirements of the applicable provision (CRFCs and CUFCs) (23 U.S.C. 167(g)). FHWA anticipates developing additional guidance on the process for identification, designation, and certification of the CRFCs and CUFCs.

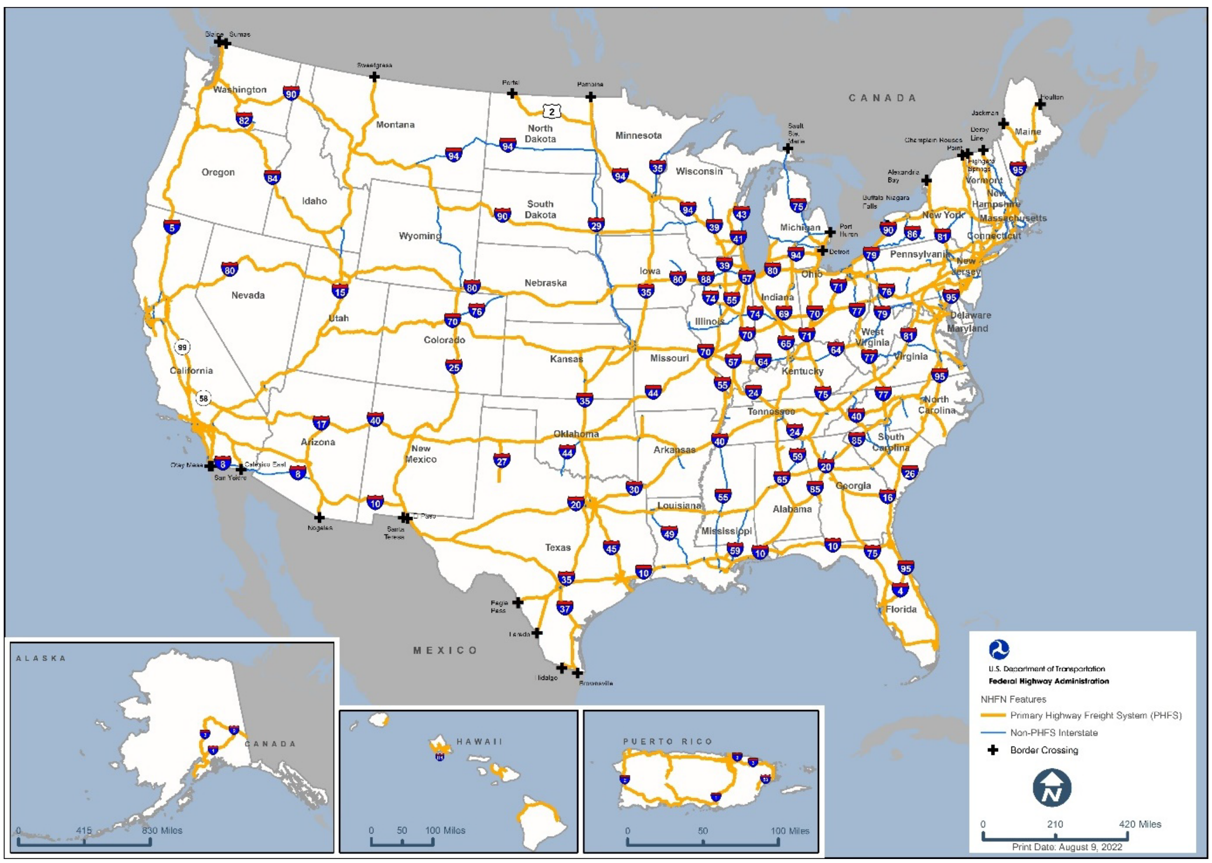
The NHFN is a component of the NMFN. An interim NMFN was established per the FAST Act under 49 U.S.C. 70103(b) and a new NMFN will be designated in accordance with the IIJA.

4.3.3 Alternative Fuel Corridors

The DOT has designated alternative fuel corridors under 23 U.S.C. 151 that identify the near- and long-term need for, and location of, electric vehicle charging infrastructure, hydrogen fueling infrastructure, propane fueling infrastructure, and natural gas fueling infrastructure at strategic locations along major national highways, including portions of the NHFN.

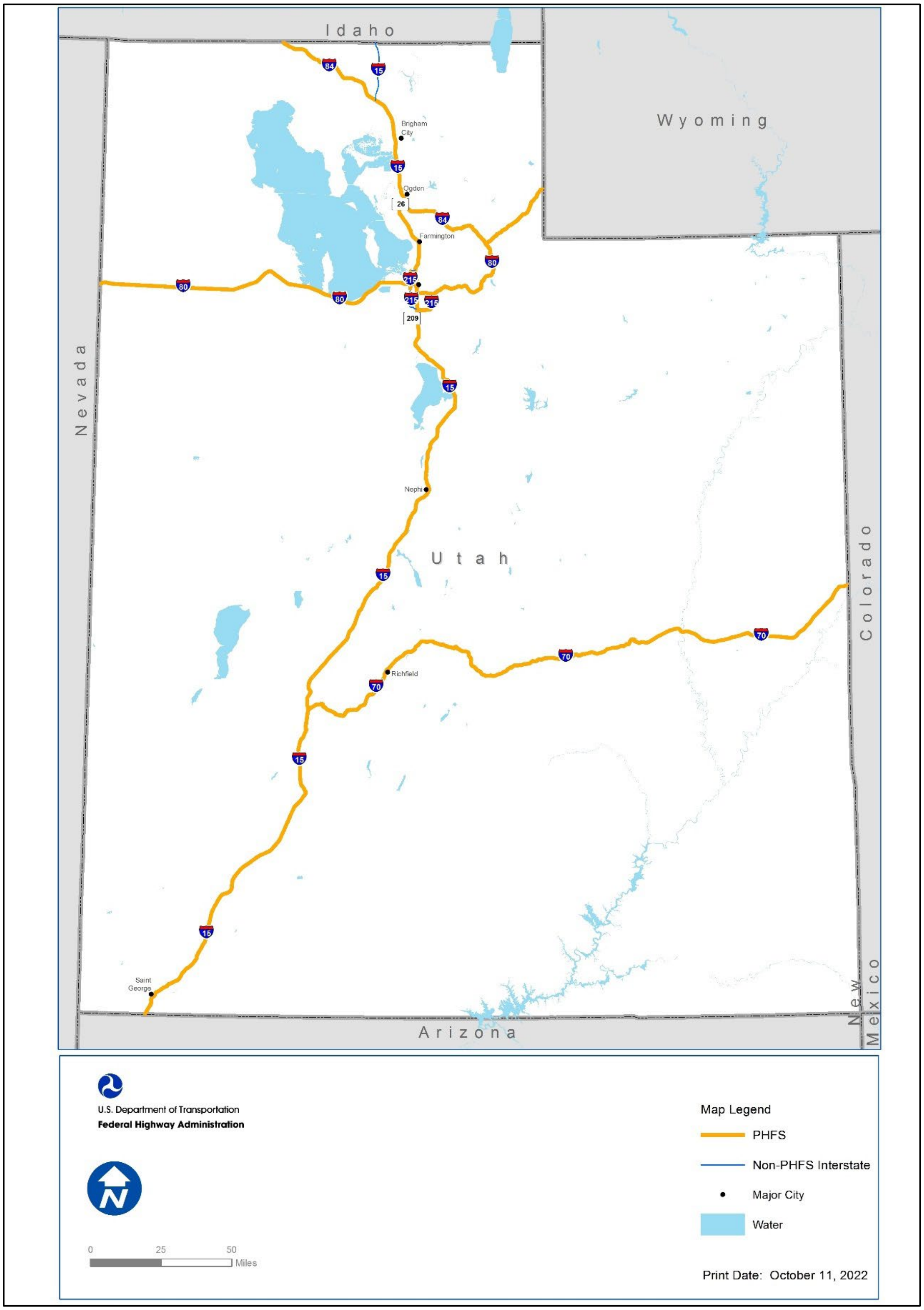
In addition, the IIJA directed USDOT to designate national electric vehicle charging corridors that identify the near- and long-term need for, and the location of, electric vehicle charging infrastructure to support freight and goods movement at strategic locations along major national highways, the NHFN, and goods movement locations including ports, intermodal centers, and warehousing locations. FHWA will provide further information on the national electric vehicle charging corridor designations in the future.

Figure 4-4. National Highway Freight Network (2022)



Source: [National Highway Freight Network Map - FHWA Freight Management and Operations (dot.gov)]

Figure 4-5. National Highway Freight Network in Utah (2022)



Source: [National Highway Freight Network Map and Tables for Utah - FHWA Freight Management and Operations (dot.gov)]

4.4 Utah's Highway Freight Network

Originally defined in 2005 as Utah's Primary Freight Corridors, and in 2012 as Utah's Primary Freight Network (Highways) as defined by the MAP-21, and in 2015 as the Utah's Highway Freight Network (UHFN) as defined by the FAST Act, the corridors are now amended to be consistent with the requirements of the IIJA as the UHFN. Additional details about the UHFN and its components are located in Element 3. UHFN is a critical component of the Utah Freight Plan to prioritize freight projects for available funding sources. The UHFN includes the following subsystems of roadways:

1. Primary Highway Freight System (PHFS)
2. Interstate Routes not on the PHFS
3. Critical Rural Freight Corridors (CRFCs)[1].
4. Critical Urban Freight Corridors (CUFCs)[2]:

Table 4-3 shows the number of miles by route type in Utah.

Table 4-3. Utah Highway Freight Network Mileage 2023

Route Type	Mileage
Interstate Routes	914.67
Interstates Routes Not on the PHFS	30.70
Critical Rural Freight Routes	600.00
Critical Urban Freight Routes	150.00
Total	**1,695.37**

The following two figures show the Utah Highway Freight Network.

[1] For Utah, FHWA limited CRFCs to 600 miles.

[2] For Utah, FHWA limited CUFCs to 150 miles.

Figure 4-6. Utah Highway Freight Network (Statewide)

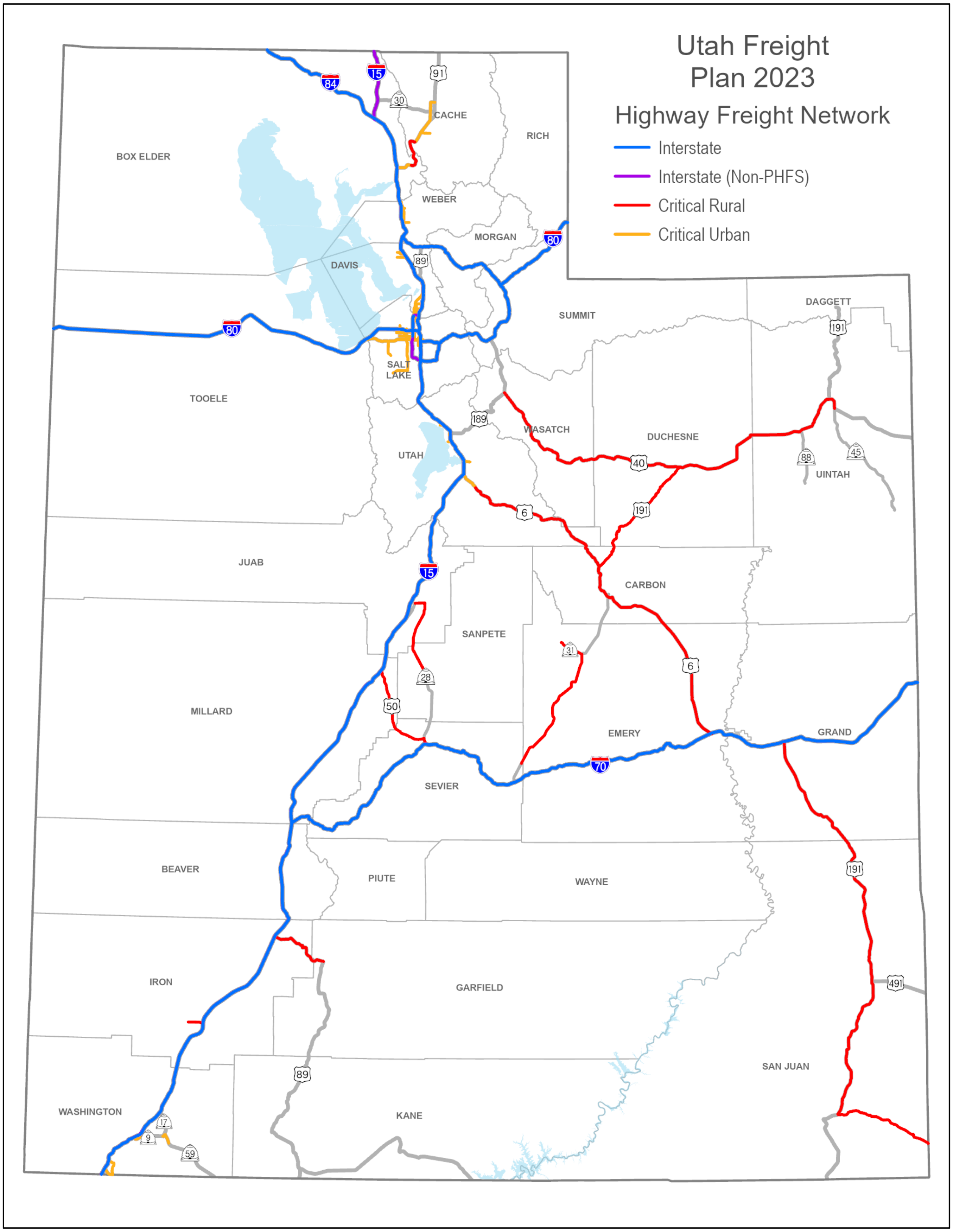
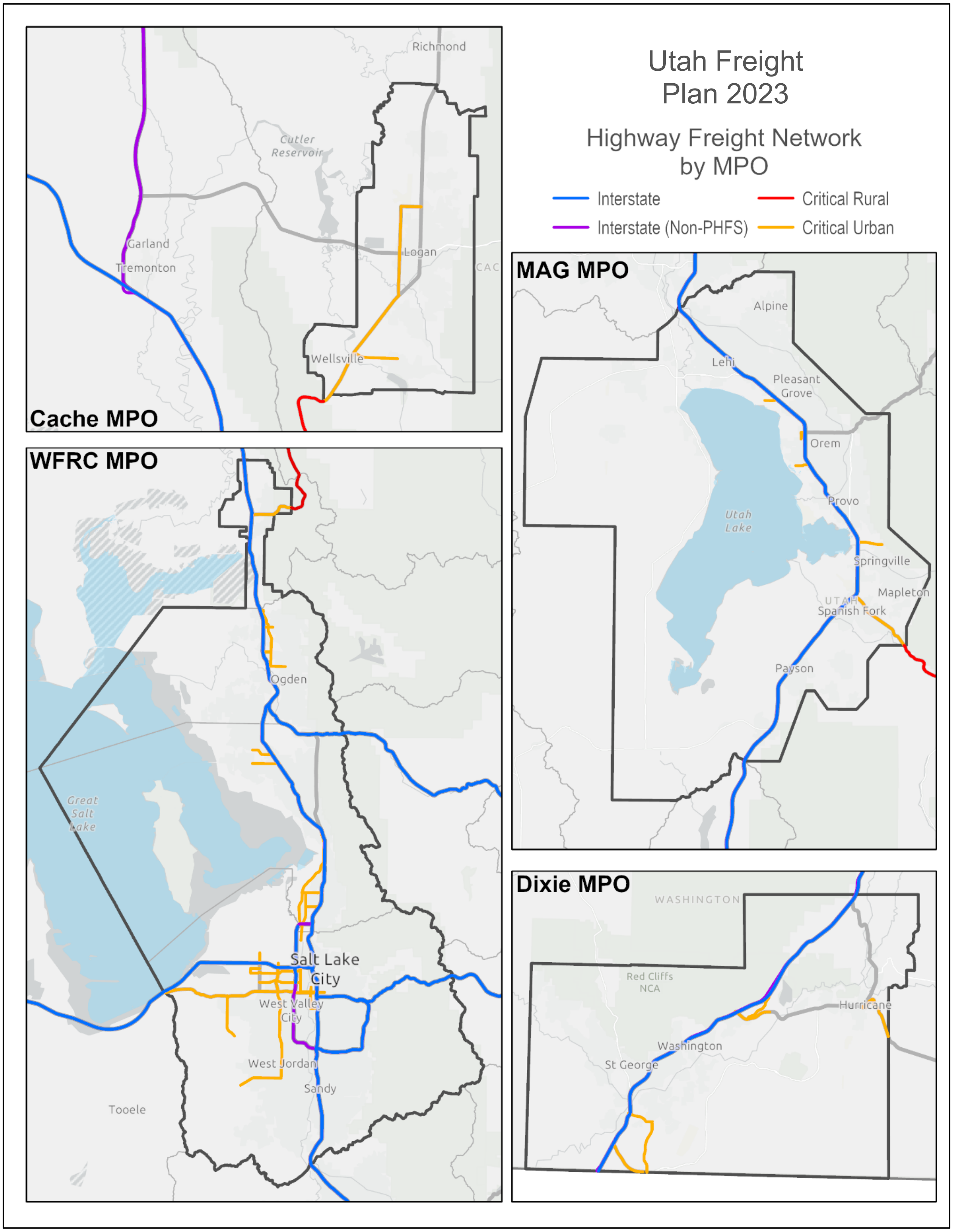


Figure 4-7. Utah Highway Freight Network (by MPO)



4.4.1 Goals

Like the NHFN, UDOT has identified and established the Utah Highway Freight Network, which includes the PHFS, CRFCs, CUFCs, and Intermodal Connectors. Utah has also established goals for its highway network. In addition to supporting and including the seven national goals, Utah's goals include the following:

1. Continue to focus infrastructure improvements on Utah's Highway Freight Network such as turning radii, turn lane lengths, signal timing, acceleration/deceleration lanes, full-width paved shoulders, climbing/passing lanes, brake check areas, chain-up area, emergency escape ramps, grade separated highway-rail crossings, and long-term truck parking.
2. Continue to prioritize projects on Utah's Highway Freight Network.
3. Continue to work with local government, RPOs, MPOs, and the private sector to identify needed projects on Utah's Highway Freight Network.
4. Continue to improve access to and from primary freight centers and facilities.

4.5 UDOT Principles That Support National Goals

The Utah Freight Plan intends to meet national freight goals and support UDOT's three strategic goals. The primary purpose of this plan is to guide cost effective capital and operating investments in the state freight system to ensure maximum benefit and efficient movement of goods. The Utah Freight Plan makes a case for the importance of investing federal and state funds in freight projects and programs.

The plan will help Utah successfully compete for federal freight funds by providing a data-driven benefit analysis supporting truck freight and intermodal freight projects that meet federal criteria and goals, and by integrating existing state transportation plans into a single state freight plan to address all freight modes in the state system: highway, railroad, pipeline, air, and water.

UDOT has a vision, mission, emphasis areas, values, and three strategic goals that form the backbone for defining direction and success within the department. The Utah Freight Plan supports UDOT's strategic goals. UDOT's vision, mission, and three strategic goals, along with specific objectives for the plan that support the goals for the NMFP and the NHFP include the following.

4.5.1 Vision

UDOT's vision is "Keeping Utah Moving."

4.5.2 Mission

UDOT's mission is "Enhance quality of life through transportation." Utah's Transportation Vision also known as UVision is a process for collaborating with partnering agencies to establish a shared vision for transportation statewide. The Quality-of-Life Framework guides the preparation of transportation plans that implement the vision through their component goals and projects. The Framework is composed of four elements:

1. Better Mobility
2. Good Health
3. Connected Communities
4. Strong Economy

4.5.3 Values

These standards represent the core values of UDOT employees when making day-to-day decisions:

1. Respect
2. Integrity
3. Caring

4.5.4 Strategic Goals

UDOT's three strategic goals are as follows:

1. Zero Crashes, Injuries, and Fatalities
2. Preserve Infrastructure
3. Optimize Mobility

4.6 UDOT Initiatives That Support National Goals

In addition to UDOT's strategic goals, UDOT is additionally committed to several other initiatives, programs, policies, and activities which support national freight goals.

4.6.1 Environment and Air Quality

Utah Code Title 72-1-201(d), among other guidance, directs UDOT to plan, develop, construct, and maintain state transportation systems that are environmentally sensitive. Local and state officials are continually considering how projects in urban areas affect air quality. The plans and programs they implement include available options for offsetting or reducing motor vehicle emissions, as required.

The "Good Health" component of the UVision framework—introduced above—acknowledges the role that water, and air quality contribute to the quality of life that UDOT projects seek to promote. Additionally, the Utah Unified Plan as well as the Statewide Rural Long Range Plan include "Air Quality and Environment" as a goal area. The objective of this goal area is to reduce emissions that adversely affect health, quality of life, and the economy. Performance measures for this goal includes reductions in key mobile source emissions.

4.6.2 Connected and Automated Vehicles

These efforts are broad initiatives to install communications infrastructure to support a variety of safety, mobility, and environmental applications. UDOT's Transportation Technology Group, is focusing on establishing a full, situational awareness system that provides awareness of real time roadway conditions. Synthesizing Intelligent Transportation Systems data from a variety of sources in an adaptable way is crucial in moving toward complete situational awareness. The following is a sample of this group's projects that have relevance to freight.

Spot Weather Impact Warnings

Select roadway segments with high rates of weather-related crashes will be equipped with vehicle-to-infrastructure (V2I) systems that report hazardous conditions directly to individual drivers in connected vehicles. This technology will help drivers avoid hazardous conditions. A 2018 UDOT study identified Utah roadway segments that have high rates of weather-related crashes. Based on this information, UDOT has selected a few locations near Salt Lake City for initial deployment of the system. Once the system is deployed and tested successfully, other locations throughout the state will be considered for future deployment.

Curve Speed Warning Systems

UDOT is working to implement a Connected Vehicle Curve Speed Warning system in 20 of the most crash-prone curves in Utah. This system employs V2I communication to warn drivers that they are traveling too fast for an upcoming curve and its recommended speed given current roadway conditions. UDOT has selected eight locations within the Salt Lake metro area that have a high-frequency of curve-related crashes for initial deployment of the Curve Speed Warning systems. The locations include several freeway ramps that provide critical connectivity for freight traffic.

Distributed Acoustic Sensing

UDOT has one of the most robust, DOT-owned fiber optic networks in the nation. Distributed Acoustic Sensing, or "fiber sensing," uses fiber optic cable buried alongside the road to monitor roadways in real time by detecting acoustic events in the vicinity of the fiber, like crashes. This UDOT fiber sensing project will be one of the first in the nation. The technology allows UDOT to keep Utah travelers in connected and conventional vehicles informed thereby increasing mobility and safety.

Automated Vehicle Readiness Study

To prepare for connected and automated vehicles (CAV), in August 2021 UDOT and a private sector partner analyzed selected Utah roads. This study evaluated the compatibility of over 1,000 miles of Utah roads with CAV technologies, specifically technologies that rely on camera evaluations of lane markings. The study demonstrated that most surveyed routes are very suitable for automated vehicle driving functions.

Connected vehicle technology will enable considerable progress toward UDOT's goal of zero fatalities and crashes while also providing travel time reliability benefits.

4.6.3 Interstate Collaboration

UDOT understands that freight knows no boundaries. Freight needs to keep moving 24 hours a day seven days a week regardless of jurisdictional boundaries. UDOT collaborated with other states on the I-80 Winter Operations Coalition and the I-15 Mobility Alliance.

When a freight project needs to be considered with neighboring or even other states, UDOT will contact the department of transportation for that state, and both jurisdictions will collaborate to ensure completion of the project.

4.6.4 Discrimination

Title VI of the 1964 Civil Rights Act was passed to prevent discrimination against individuals because of race, color, or national origin. Since its passing, other acts and executive orders have expanded prohibition of discrimination based on sex, age, disabilities, income, minority status, and English language proficiency. Not only does Title VI apply to specific projects funded by the federal government, but it also applies to state agencies who receive federal funding. Therefore, UDOT is bound by Title VI in all aspects of its operations. This means that UDOT transportation projects completed with federal funds should not disproportionately affect (positively or negatively) any person. It also requires equal opportunity to participate in all UDOT planning activities, including long-range transportation planning. UDOT is committed to fulfilling federal mandates for Title VI and environmental justice throughout the planning process and project development phases of its work.

4.6.5 Economic Vitality

UDOT is actively supporting the state's freight industry through policies and planning efforts such as the State Freight Plan. The freight industry in the state supports many jobs at various income levels. Table 4-4 shows employment by industry with average salary by freight industry.

Table 4-4. Utah's Freight Employment by Mode 2021

Industry	Employed	Average Annual Salary
Aviation	7,280	$86,120
Pipeline	260	$111,800
Railroad	1,020	$77,050
Trucking	20,220	$57,610
Warehousing and Storage	13,050	$46,430
Total	**41,830**	**$75,802**

Source: Utah Department of Workforce Services, 2022.

ELEMENT 5. INNOVATIVE TECHNOLOGIES AND OPERATIONAL STRATEGIES

The continued advancements in technology will impact the future of freight in Utah and affect UDOT's need to retrofit or otherwise modify and/or expand existing infrastructure. These implications are important to consider as they impact safety and efficiency of freight movement.

In addition, some applications of new technology are already being implemented while others undergo prototype testing by manufacturers and departments of transportation. The following are some of the important areas to consider for the future of freight in Utah. Developments in intelligent transportation systems (ITS) and zero and near-zero emission fleet technologies are leading areas that are expected to have wide-reaching impacts. Additional technologies spanning a variety of emerging fields in innovation should also be considered.

5.1 Intelligent Transportation Systems

Intelligent transportation systems (ITS) integrate advanced information communication technologies (ICT) into transportation infrastructure and vehicles.[1] These types of technologies and systems provide new and expanding opportunities to help address some of Utah's most pressing freight needs and issues, potentially including a direct influence on truck crashes, truck mobility, truck parking, and commercial vehicle safety inspections. Utah has seen advancements in the following ITS areas.

5.1.1 Smart Road Technologies

UDOT has been a pioneer in utilizing new smart road technology. This technology uses cell chip data in vehicles to anonymously and securely transmit data about a vehicle's whereabouts. UDOT built the first connected vehicle corridor in the US along Redwood Road in Salt Lake and has since expanded the network to include University Parkway and University Avenue in Utah County. Announced in 2020, UDOT began a 5-year $50 million partnership with Panasonic to help Utah install sensors along Utah's highways, including the I-80 corridor and Big Cottonwood Canyon.[2] The sensors will communicate with state-owned connected vehicles and the CIRRUS system, helping to send alerts to drivers in the event of congestion or other issues. This helps UDOT manage traffic and also provides useful data for infrastructure planning.

5.1.2 Connected and Automated Vehicle Technologies

Connected and Automated Vehicle (CAV) technology encompasses emerging technologies which allow vehicles to connect with each other, connect with traffic signals,

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[1] FHWA, Intelligent Transportation Systems Joint Program Office, 2020, https://www.its.dot.gov/stratplan2020/ITSJPO_StrategicPlan_2020-2025.pdf

[2] KSL.com, Smart Roads Coming to Utah could, eventually, decrease traffic, 2020, https://www.ksl.com/article/46701377/smart-roads-coming-to-utah-could-eventually-decrease-traffic

signs, and other road items, or obtain data from the cloud. UDOT has been actively engaged in CAV research and implementation over the past several years. In 2021 UDOT completed the Automated Vehicle Readiness Study. The study found that a majority of routes in Utah are very suitable for CAV relevant technologies, such as Lane-Keep Assist feature which is common in many Advanced Driver Assistance Systems (ADAS) and rely on camera evaluations of lane markings.[1] UDOT and UTA also partnered in 2019 to launch an Autonomous Vehicle Shuttle Pilot which found strong public support for autonomous vehicles, particularly as a complement to public transport.[2]

5.1.3 Thermal Cameras

UDOT has installed thermal cameras near major interchanges to identify wrong-way driving. When vehicles moving against traffic are identified, vehicles upstream travelling in the correct direction are alerted with electronic signs. The Department has also invested in additional low-tech solutions to reduce wrong-way collisions, including wrong-way signs and road paint.[3]

5.1.4 Wireless Device to Improve Signal Timing

The dilemma zone is a region near an intersection where a vehicle can “neither stop safely nor clear an intersection at its present speed” if the traffic light turns yellow. In order to reduce the frequency of such a situation, wireless communication devices invented by Purdue University and Indiana DOT placed in vehicles and at intersections allow traffic lights to be timed more intelligently. The technology extends green or switches early to yellow in order to avoid presenting drivers with a yellow light in the dilemma zone. While not yet deployed in Utah, this may be a technology for consideration in the future.

5.1.5 Collective Perception

Collective perception refers to ITS technologies that aggregate information provided by nearby vehicles or sensors to produce a better picture of a vehicle’s surroundings. This allows vehicle software, including autonomous systems, to effectively “see” objects hidden from a driver’s immediate view, including around corners, or behind buildings.[4] This is an emerging area in ITS that affects the capabilities of vehicles on Utah’s roadways. As these technologies expand, they can improve driver safety.

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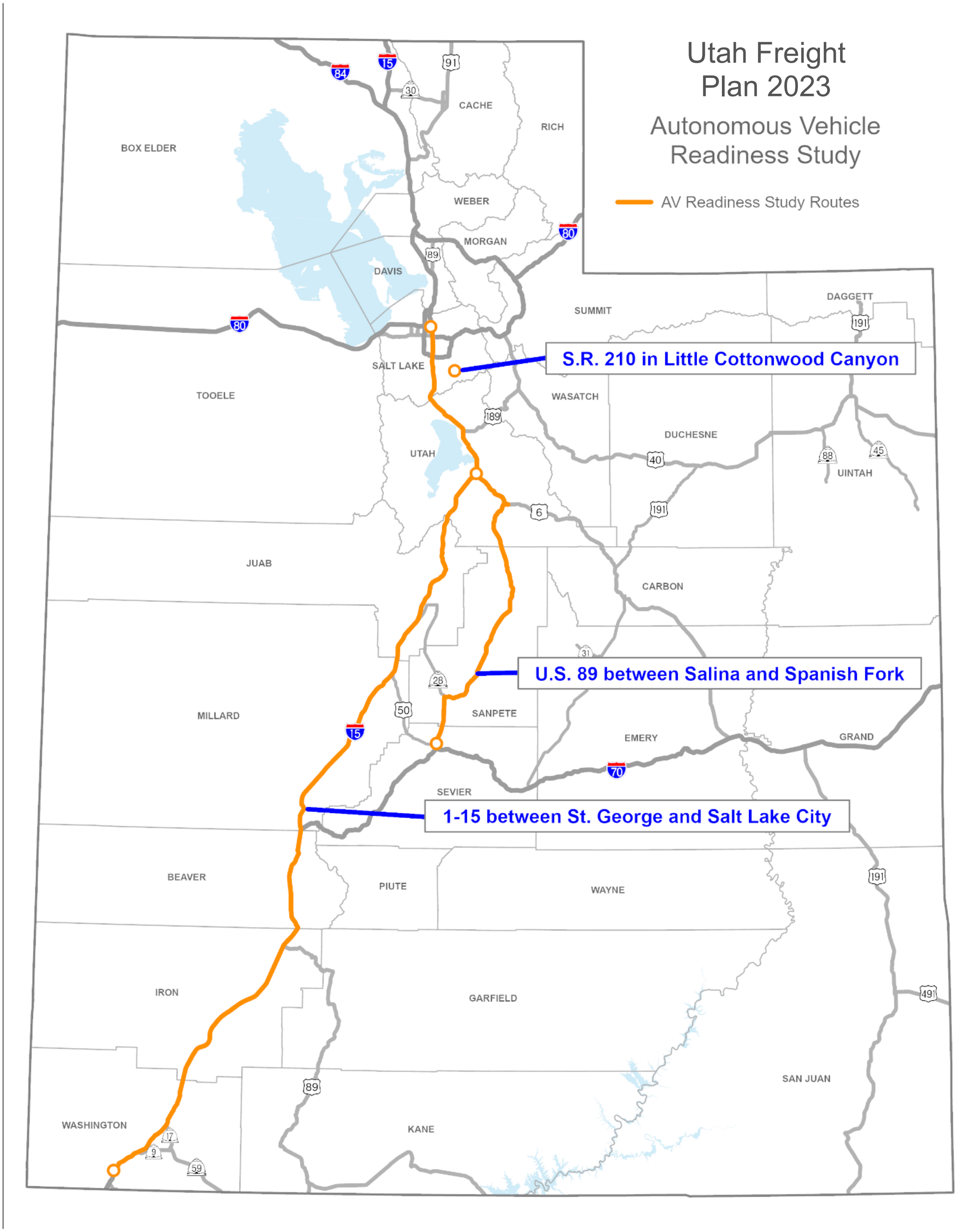
[1] UDOT, Automated Vehicle Readiness Project, Accessed September 2022 https://transportationtechnology.utah.gov/automated-vehicle-readiness-project/

[2] UDOT, Autonomous Shuttle Pilot, Accessed September 2022 http://www.avshuttleutah.com/

[3] KUTV, State installs thermal imaging cameras to help identify wrong-way drivers before collision, March 17, 2022, https://kutv.com/news/local/udot-to-test-high-tech-devices-to-prevent-wrong-way-drivers

[4] iTWire, New technology allows smart cars to detect hidden pedestrians and cyclists, November 2, 2021, https://itwire.com/science-news/automotive/new-technology-allows-smart-cars-to-detect-hidden-pedestrians-and-cyclists.html

Figure 5-1. Roadways Evaluated in 2021 Autonomous Vehicle Readiness Study



Source: UDOT, Automated Vehicle Readiness Project, Accessed September 2022, https://transportationtechnology.utah.gov/automated-vehicle-readiness-project/

5.2 Zero and Near-Zero Emission Fleets

Alternative fuel-powered vehicles run on zero and near-zero-emission (ZNZE) engines that emit relatively low amounts or no greenhouse gases or pollutants directly in powering vehicle movements. With the support of enabling federal and state policies and electricity generated from more renewable sources, ZNZEs have taken an instrumental role in decarbonizing transportation.

In 2020, Utah legislators passed House Bill (HB) 259, which directed UDOT to plan a statewide electric vehicle charging network that would be funded under the National Electric Vehicle Infrastructure (NEVI) federal program. NEVI funding requires charging stations at least every 50 miles, although there is a mechanism for exceptions.

Also, the Utah Department of Environmental Quality (DEQ) offers reimbursements for up to half of the installation costs of fast-charging stations for electric vehicles. Government buildings are eligible to receive even more financial support for providing charging infrastructure through DEQ's Workplace Electric Vehicle Charging Funding Assistance Program. Several utilities across Utah also provide rebates and grants to residential and commercial customers interested in installing charging stations.[1]

These policies and programs suggest electricity as the zero-emission (ZE) option of choice in Utah, as in the rest of the country. This leaves room for others, which are not ZE, but certainly are lower-emission (near-zero) compared to traditional diesel, including renewable diesel, biofuels, natural gas, and hybrid technologies. As the enabling policies at the federal and state levels are gradually implemented, battery electric vehicles and natural-gas-powered vehicles are already on Utah's roads, while other varieties of ZNZE vehicles will be available in short to intermediate term. Items below discuss the various ZNZE fuel fleet options.

5.2.1 Battery Electric Vehicles

Battery Electric Vehicles (BEVs) are widely available for passenger vehicles and are being designed for other vehicle weight categories. Light-duty electric vehicles have been gaining market share in the past decade, particularly as more affordable models are offered in the market. While only about 0.02 percent of the heavy-duty fleet in the US is currently battery-electric, electrification of medium and heavy-duty trucks is rapidly advancing through pilots and projects that attest to the increasing maturity of lithium-ion battery technology and decreasing Total Cost of Ownership (TCO).[2] Medium and heavy-duty BEVs also present unique technological barriers to the electricity grids due to their significant power requirements. Utilities are beginning to work with governmental agencies and private industry to understand and plan for the impending demand that will come as more fleets begin to electrify. For instance, PacifiCorp, one of Utah's energy

[1] US Department of Energy, Alternative Fuels Data Center, Accessed September 2022, https://afdc.energy.gov/laws/all?state=UT

[2] Muncrief, R., A Comparison of Nitrogen Oxide (NOx) Emissions from Heavy-Duty Diesel, Natural Gas, and Electric Vehicles, 2021, https://theicct.org/sites/default/files/publications/low-nox-hdvs-compared-sept21.pdf

holding companies, is planning to increase grid capacity and invest $50 million in fast electric vehicle charging infrastructure across the state.[1] Also, UDOT adopted the Statewide Electric Vehicle Charging Plan in 2021 to analyze and implement EV infrastructure capacity and accessibility improvements in line with HB259 directions. Such required infrastructure upgrades will be critical to reliably supply electricity to the medium and heavy-duty vehicle segment.

I-5 Electric Truck Corridor

The West Coast Clean Transit Corridor Initiative (WCCTCI) is a consortium of west coast electric utilities and agencies representing utilities. In 2020, WCCTCI released **a planning study for enabling an electric medium- and long-distance truck corridor along the full length of Interstate 5 (I-5)**. The Initiative's vision is to establish charging stations every 50 miles for medium-duty and 100 miles for heavy-duty trucks along the freeway from Canada to Mexico. Findings from the study suggest that while much has been done to bring medium and heavy-duty BEVs to market, much more needs to be done to reach a point where there is a fully developed system. To date, programs aimed at enabling fleets to move to BEV have focused on building out the infrastructure at a fleet's home base. To encourage electrification in longer-distance operations, the study identified a need to start developing the electric infrastructure so that there is a ready supply of publicly available charging locations and units to facilitate the transition for many fleets; the total cost of ownership is much less if the fleet owner does not have to build out the infrastructure on-site.

Source: West Coast Clean Transit Corridor Initiative, HDR, Calstart, S Curve Strategies, and Ross Strategic, Interstate 5 Corridor California, Oregon, Washington Final Report, June 2020, https://www.westcoastcleantransit.com/

In addition to trucking operations, battery electric technologies will be a strong contender for freight rail in the future. Several pilot studies and demonstration projects are underway across the US to help these technologies mature and break into the market. However, similar to road transportation, battery electric locomotives are expected to serve short-range applications in the near term as they are still in the early stages of development. The Wabtec FLXDrive battery-electric freight train was first demonstrated in Pittsburgh in 2021 with a maximum weight of 430,000 lbs., a maximum speed of 75 mph, and a battery range of up to 350 miles. Wabtec also offers a hybrid freight train that runs on one electric locomotive positioned between two diesel locomotives for improved efficiency. In 2021, Wabtec tested the battery electric locomotive and charging station in collaboration with BNSF Railway in Stockton, California.[2]

[1] Rocky Mountain Power, Electric Vehicle Infrastructure Plan, 2022, https://www.rockymountainpower.net/about/newsroom/news-releases/rmp-launches-utah-electric-vehicle-initiatives.html

[2] Wabtec Corporation, FLXdrive, Accessed September 2022, https://www.wabteccorp.com/locomotive/alternative-fuel-locomotives/flxdrive

5.2.2 Fuel Cell Electric Vehicles

Fuel Cell Electric Vehicles (FCEVs) use hydrogen to generate electricity. Hybrid FCEV models can also be equipped with a plug-in battery for improved fuel efficiency by recapturing the braking energy and turning off the fuel cell during low power needs. Similar to BEVs, FCEVs have zero tailpipe emissions. Hydrogen is primarily produced using natural gas as a feedstock and through steam methane reforming (SMR) or electrolysis processes. SMR combines high-temperature steam with natural gas to extract hydrogen, while in the electrolysis method, hydrogen is the output of running an electrical current through water to separate its molecules into hydrogen and oxygen. Like producing electricity via renewable energy generation sources, electrolysis offers an opportunity to produce hydrogen with zero emissions if the electrical current is generated using renewable sources. Also, the biogas captured from animal manure or through landfill remediation processes can be used to make hydrogen production through SMR more sustainable.[1] Utah is pioneering new technology implementation to produce hydrogen from renewable sources. In June 2022, the US Department of Energy issued a $504.4 million loan guarantee to finance the development of the Advanced Clean Energy Storage facility in Delta, Utah. The facility will use a 220-megawatt electrolyser bank and storage opportunities offered by Utah's salt caverns to provide large-scale hydrogen production and long-term storage.[2] The hydrogen technology has reached maturity and is generally poised to serve relatively long routes and heavier, more complex fleet duty cycles. However, the FCEV refueling infrastructure in the US is currently at its very early stages of implementation.[3]

Similar to roadway operations, hydrogen fuel cells can power electric locomotives. The technology is in its early stages at the moment and is being tested in the US and around the world. For instance, Canadian Pacific Railroad tested a hydrogen fuel cell locomotive in Alberta, Canada in 2021. After receiving a $15 million (in CAD) support from Emission Reduction Alberta (ERA), Canadian Pacific is also planning to invest in two linehaul hydrogen fuel cell locomotives, one switcher, and two hydrogen production facilities in Alberta.[4]

5.2.3 Renewable Diesel and Biodiesel

Renewable diesel and biodiesel fuels offer alternatives to conventional petroleum diesel with more environmental benefits (near zero-emission options). Both biofuels are created from similar feedstocks but using different processes, and each interacts with vehicle engines and fueling and storage infrastructure differently. Both fuels are regulated as

[1] NREL, Renewable Hydrogen Potential from Biogas in the United States, 2014, https://www.nrel.gov/docs/fy14osti/60283.pdf

[2] Energy.Gov Load Program Office, Advanced Clean Energy Storage, accessed September 2022, https://www.energy.gov/lpo/advanced-clean-energy-storage

[3] US Department of Energy, Alternative Fuels Data Center, Accessed September 2022, https://afdc.energy.gov/vehicles/fuel_cell.html

[4] Railway Age, CP Hydrogen Locomotive Program, May 2022, https://www.railwayage.com/mechanical/locomotives/cp-hydrogen-locomotive-program-advances/

motor vehicle fuels or fuel additives. However, biofuel is not compatible with cold Utah temperatures due to fuel gelling and vehicle stalling problems, while renewable diesel is chemically identical to petroleum-based diesel and meets the same engine specification as conventional diesel. These NZE options provide a short-term solution while ZE technologies mature, and infrastructure is developed.

5.2.4 Natural Gas and Renewable Natural Gas Vehicles

Natural Gas Vehicles (NGV) and Renewable Natural Gas (RNG) vehicles also offer lower emission options compared to conventional diesel and have been in use in Utah for over 20 years. While NGV deployment has steadily increased since then, new heavy-duty NGVs only represented about 1.5% of the market sales.[1] Both fuels are made of hydrocarbons, primarily methane, but while natural gas is a fossil fuel extracted from formations below the Earth's surface and then refined, RNG is a product of various biomass feedstocks, such as gas from landfills, livestock manure, wastewater treatment processes, and other types of organic wastes. Similar to renewable diesel and biodiesel, NGVs offer a low emission solution in the short and medium term.

5.2.5 Other Non-Zero Emission Alternative Fuel Options

Other non-zero emission alternative fuel options are available for specific transportation operations such as port and terminal drayage vehicles and material handling equipment. An example is Liquefied Petroleum Gas (LPG, or propane) which emits less NOx pollution compared to conventional diesel and is suitable for use in light, medium, and heavy-duty propane vehicles that serve over short distances. Also, hybrid electric vehicles, which use both electricity and gasoline, or diesel are available for trucks, cargo vans, passenger vans, and shuttle buses. Hybrid electric (HEV) and plug-in hybrid electric vehicles (PHEV) both offer tailpipe emissions benefits compared to conventional fossil fuel-powered vehicles. However, lifecycle emissions of HEVs and PHEVs vary depending on how the required electricity is generated. In areas that depend heavily on coal, natural gas, or other fossil fuels for electricity generation, the lifecycle emissions benefits of these hybrid vehicles will be less than the same vehicles operating in areas that use lower-polluting energy sources for electricity generation.

Overall, as pilot projects, planning studies, and other developments underway suggest, ZNZE vehicle technologies are expected to succeed first in operations on predictable routes and over relatively short distances where overnight charging at a depot is possible. From there, ZNZE vehicles are expected to progress over time and serve increasingly longer, heavier, and more complex routes and operations.

[1] US Department of Energy, Alternative Fueling Station Locator, Accessed September 2022, https://afdc.energy.gov/stations/#/analyze?region=US-UT&fuel=BD&show_map=true

Advancing Sustainability through Powered Infrastructure for Roadway Electrification (ASPIRE)

This consortium of universities and industry partners focuses on solutions that eliminate barriers to vehicle electrification, including charging requirements and operating range challenges. One member of the ASPIRE consortium, Purdue University, announced in 2021 that it was partnering with the Indiana Department of Transportation to research and test a wireless in-road charging technology developed by Magment. The technology involves placing magnetized cement in the roadway, which is then electrified via embedded coils. Electric vehicles outfitted with an electromagnetic receiver on their undersides are then powered wirelessly as they drive along the road. The technology is similar to the wireless charging technology now commonly found in smartphones. While in-road charging promises to one day reduce or eliminate the need for electric charging stations, decrease the size of vehicle batteries, and reduce distance range concerns, regulatory, capital costs, and technical challenges remain. In February 2022, Michigan followed Indiana's lead and announced that it intends to be the first state to build a public road with the technology. Through a collaboration between the Michigan Department of Transportation and Electreon, $1.9 M will be invested in the country's first public in-road wireless charging, with expected completion in 2023. More recently, Electreon announced that it is partnering with another ASPIRE member, Utah State University, to install and test an electrified road in Utah.

Source: Purdue University, Advancing Sustainability through Powered Infrastructure for Roadway Electrification (ASPIRE), accessed September 2022, https://engineering.purdue.edu/ASPIRE; Michigan.Gov, Whitmer Announces First-in-the-U.S. Wireless Electric Vehicle Charging Road System Contract Awarded by MDOT, 2022, https://www.michigan.gov/whitmer/news/press-releases/2022/02/01/announces-first-in-the-u-s--wireless-electric-vehicle-charging-road-system-contract-aw; Globes, Electreon Wireless to install electric road in Utah, March 2022, https://en.globes.co.il/en/article-electreon-wireless-to-install-electric-road-in-utah-1001405011.

5.3 E-Commerce

E-commerce refers to buying and selling products electronically. Online shopping continues to grow in Utah due to the growth in the number and diversity of online shopping approaches as well as the pandemic lockdown. The rise in e-commerce has real-world transportation impacts that will affect Utah in years to come. Two of those potential impacts include land use needs and last mile delivery activity.

5.4 Land Use Needs

Demands for new fulfilment centers, warehouses, and distribution centers are increasing, especially in urban centers.

5.5 Last-Mile Delivery Activity

Businesses and residents are relying more and more on last-mile delivery options. This overall trend impacts traffic mobility, safety, and air quality as delivery trucks look for parking and in congested areas, sometimes double park to unload deliveries.

5.6 Complete Streets

Utah municipalities are experiencing an increased demand for active transportation facilities. Freight movement may be impacted when new facilities are built, or existing facilities are expanded without intentional integration. Complete streets policies and active transportation plans present opportunities to facilitate collaborative street design between stakeholders in order to enhance safety for all users. Coincidentally, design considerations for freight may also apply to transit vehicles (e.g., buses), thereby offering broader design impacts. Complete streets plans that effectively engage freight operators as stakeholders will be more likely to produce context-sensitive design that supports freight movement and accommodates all users of the road.

5.7 Other Technology Systems

Six other technology systems are discussed below.

5.7.1 Ports of Entry Traffic Sensors

As a result of data needs spurred by the COVID-19 outbreak, UDOT worked across divisions to update port of entry sensors and bring them up to current UDOT standards. These updates provide important data on the number of vehicles entering and exiting Utah. This project will have long-term benefits, allowing better analysis of roadway data on state routes and providing additional information to decision-makers on population dynamics and interstate traffic.[1]

5.7.2 Traffic Application with Growing Users

In 2011 UDOT released one of the first traffic apps developed by a state DOT. The app had been downloaded over 1 million times as of January 2021. The information provided by the app, including construction projects, crashes, and other incidents, real-time congestion and delays, traffic cameras, road weather data, and seasonal road closures, will continue to benefit drivers using Utah's road networks. The app is also continuing to evolve and recently added a snowplow tracker that allows drivers to see where plows have been and where they are going.[2]

5.7.3 Unmanned Aerial Vehicles or Drones

Unmanned aerial vehicles (UAVs), or drones, have a wide variety of potential uses, including last-mile freight delivery and the movement of goods to areas that are dangerous to reach by land. They have also started being used to assess infrastructure

[1] UDOT, Annual Innovation and Efficiencies Report, 2021, https://udot.utah.gov/connect/about-us/technology-innovation/

[2] UDOT, Traffic App Reaches 1 Million Downloads, 2021, https://www.udot.utah.gov/connect/2021/01/29/udot-traffic-app-reaches-1-million-downloads/

condition, including in Utah.[1] The drones capture photos and videos of assets that are dangerous or difficult to reach with human labor. In Connecticut, drones are being deployed to quickly develop a digital reconstruction of a vehicle crash to deliver a more appropriate response.[2] These uses not only save costs but improve safety and reduce the traffic congestion that would be induced were these activities performed on the ground.

5.7.4 Recycled Pavement

A variety of different methods are being developed to make asphalt production more sustainable. Caltrans has started testing and installing an entirely recycled pavement recipe made from existing asphalt and plastic bottles.[3] A single mile of roadway re-paved using this method reuses about 150,000 plastic bottles. A number of states, including Georgia and Arizona, have started using the rubber from recycled tires in their asphalt mixtures. A layer of this asphalt added to 11 miles of I-17 in the Phoenix area in 2017 recycled roughly 75,000 tires.[4] [5]

Recycled pavement doesn't just have the benefit of redirecting materials from the landfill, though. California's recycled asphalt and plastic pavement is highly cost-effective and was found to last up to three times longer than traditional asphalt mixtures during testing. Arizona has also found that its rubberized asphalt experiences greater durability, offers a smoother traveling experience, and reduces traffic noise. This is an area of innovation that could impact the future of road and highway construction in Utah.

5.7.5 Autonomous Aircrafts

Autonomous aircraft are taking off. Natilus reported in February 2022 that it had sales commitments worth about $6 billion for its autonomous cargo aircraft. The largest of its freighters will be able to carry almost 315,000 pounds of goods, which is equivalent to over 78 2-ton cars.[6] Elroy Air unveiled its hybrid-electric vertical take-off and landing

[1] INTERDRONE, How the Utah DOT Integrated Drones Into Their Inspection Workflow, October 25, 2017, https://interdrone.com/inspection/how-the-utah-dot-integrated-drones-into-their-inspection-workflow/

[2] CT Insider, How CT is using drones to moderate traffic, April 21, 2022, https://www.ctinsider.com/news/article/How-CT-is-using-drones-to-mitigate-traffic-17116093.php

[3] Caltrans, Caltrans Repaves Roadway with Recycled Plastic Bottles, July 2020, https://dot.ca.gov/news-releases/news-release-2020-024

[4] Tire Review, Georgia Moving Forward With Recycled Rubber Asphalt Use, 2012, https://www.tirereview.com/georgia-moving-forward-with-recycled-rubber-asphalt-use/

[5] ADOT, ADOT's use of rubberized asphalt gives new life to recycled tires, 2017, https://azdot.gov/adot-news/adot%E2%80%99s-use-rubberized-asphalt-gives-new-life-recycled-tires

[6] Future Flight, Natilus Claims Bended Wing Autonomous Freighters Will Transform Air Freight Business, February 24, 2022, https://www.futureflight.aero/news-article/2022-02-24/natilus-claims-blended-wing-autonomous-freighters-will-transform-air

(VTOL) Chaparral aircraft in January 2022.[1] While the vehicle is currently in pre-production, Elroy envisions the Chaparral carrying up to 500 pounds of goods. Because it is an autonomous VTOL aircraft, the Chaparral will be able to fly goods to remote locations with rough terrain quickly and without risks to human life. Eviation Aircraft's Alice e-Cargo plane will be the first all-electric cargo plane, and DHL has already committed to purchasing 12 by 2024.[2]

Xwing is taking a different approach to autonomous aircraft, instead opting to retrofit existing vehicles with technology that renders them capable of autonomous flight.[3] The company successfully completed the first autonomous gate-to-gate cargo flight in April 2021. A Cessna Grand Caravan 208B retrofitted with Xwing's software left the gate, taxied, took off, landed, and returned to the gate without human assistance.

As these technologies expand, more and more companies may elect to transport freight by air.

5.7.6 Autonomous Warehouse Operations

Autonomous warehouse operations are also expanding. Boston Dynamics announced Stretch in March 2021, a commercial robot capable of moving boxes in a warehouse setting.[4] DHL announced a $15 million deal in January 2022 to purchase Stretch robots for its North American facilities. DHL says the robots will start out unloading trucks but may be moved to other tasks later on. The robots will hopefully improve warehouse safety and reduce the need for humans to perform highly repetitive tasks. The expansion of these technologies is expected to improve and streamline operations, allowing for increased outputs for distributors.

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[1] The Verge, Elroy Air unveils its autonomous vertical take off and landing cargo plane, the Chaparral, January 26, 2022, https://www.theverge.com/2022/1/26/22902351/elroy-air-chaparral-autonomous-vtol-electric-hybrid-cargo-plane

[2] DHL, Electricity is in the air as e-cargo planes take flight, Accessed September 2022, https://www.dhl.com/global-en/delivered/sustainability/electric-aircraft-sustainable-logistics.html

[3] Engadget, Xwing completes first autonomous gate-to-gate commercial cargo flight, April 15, 2021, https://www.engadget.com/xwing-first-autonomous-commercial-cargo-flight-160057111.html

[4] TechCrunch, Boston Dynamics' warehouse robot gets at $15M gig working for DHL, January 26, 2022, https://techcrunch.com/2022/01/26/boston-dynamics-warehouse-robot-gets-a-15m-gig-working-for-dhl/

ELEMENT 6. PAVEMENT MANAGEMENT, IMPROVEMENTS NECESSARY TO REDUCE/IMPEDE DETERIORATION

Asset preservation is critical to the life cycle of Utah's roads and bridges. Pavement and bridge conditions, traffic volume, and load sizes can all affect a road's serviceability and safety. A cracked, corrugated, or uneven road can cause damage to vehicles, slow traffic, and worsen fuel efficiency. Additionally, oversized/overweight (OS/OW) vehicles may place greater wear and tear on Utah's roadway infrastructure.

6.1 Good Roads Cost Less

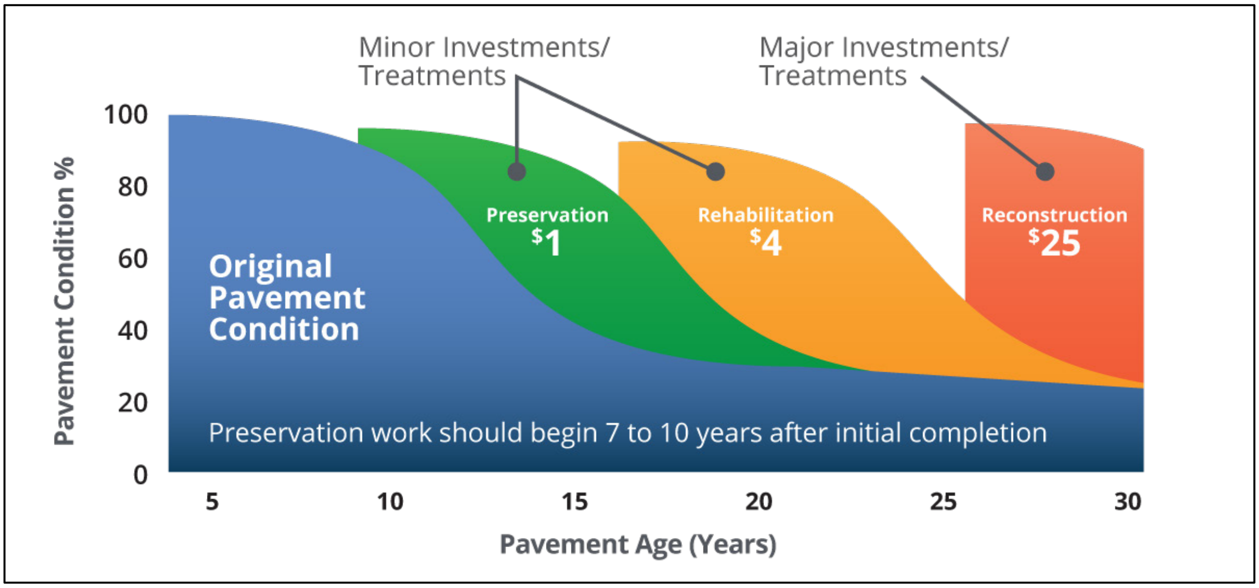
UDOT manages and preserves approximately 5,896 centerline miles and 48,608 lane miles across the state ranging from multi-lane, urban concrete interstates to two-lane, rural gravel roads.[1, 2] UDOT has long understood the benefits of maintaining roads to acceptable standards rather than allowing them to deteriorate before fixing, typically at greater expense and disruption. In fact, one of UDOT's strategic goals is preserve infrastructure.

UDOT's pavement management philosophy is that good roads cost less, which means timely, cost-effective treatments minimize cost while achieving the greatest long-term benefit. Pavement and bridge maintenance can become costly when the opportunities for minor preservation treatments are not captured. Utah's Unified Transportation Plan explains that $1 invested in roadway infrastructure preservation can save up to $25 in future repairs and replacements. To ensure that it makes more cost-effective investments in infrastructure maintenance, UDOT has proactively prioritized roads and bridges in need of rehabilitation rather than waiting for infrastructure to deteriorate to a condition that require major repairs or reconstructions.

[1] https://lookerstudio.google.com/u/0/reporting/9d7c25ad-734f-4f7a-b183-dab4c58cfafc/page/jqBGB

[2] https://maps.udot.utah.gov/wadocuments/Data/strategic_direction/GettingToKnowUdotJul2021.pdf

Figure 6-1. Maintenance Investments Comparison



Source: Utah's Unified Transportation Plan, 2019-2050.

Funding varies from year to year based upon the fund type and the amount of funding from Federal sources and the Utah Legislature. Funding is allocated to transportation assets. Transportation assets are defined as the physical roadway infrastructure items that have value to UDOT and the traveling public. Examples of assets are pavement, bridges, intersection signal systems, or pavement striping. UDOT uses a diversified approach to managing its physical assets by using a tiered system of asset management as shown in the graphic below.

Figure 6-2. UDOT's Infrastructure Asset Tiers

Source: [UDOT Strategic Direction (utah.gov)]

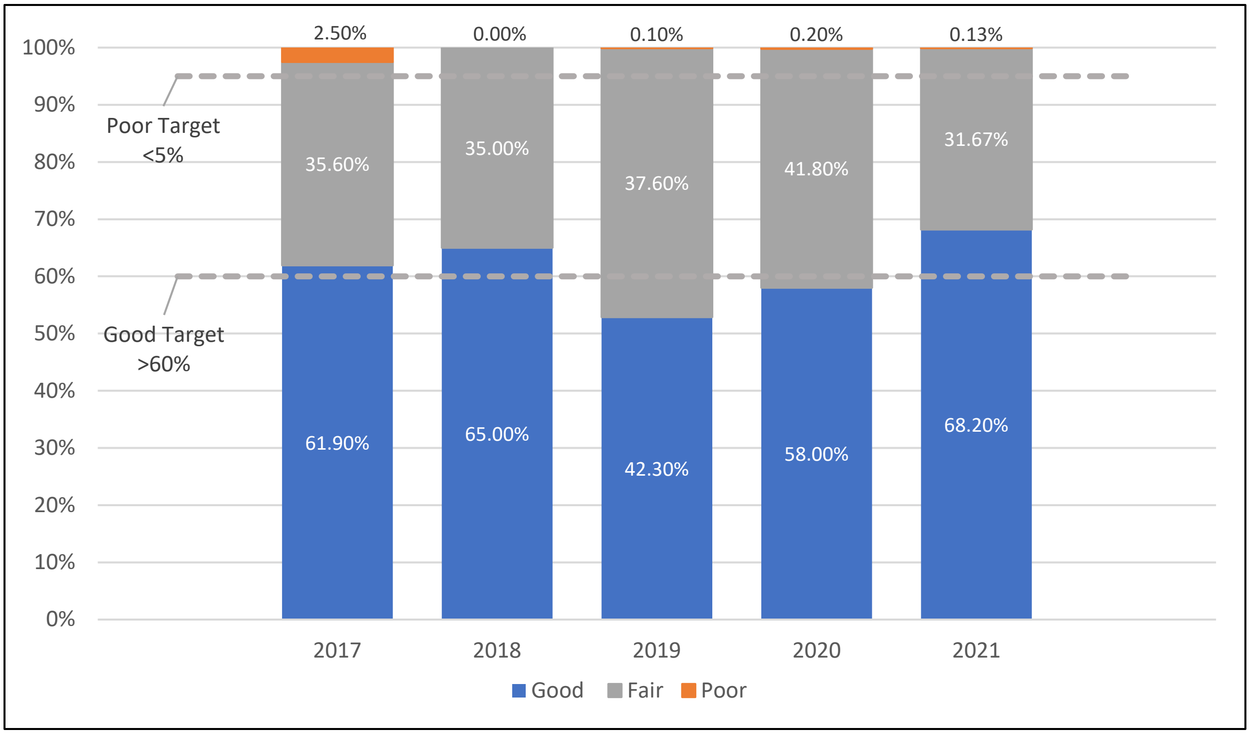
6.2 Pavement Condition

The FHWA requires states to report pavement conditions using metrics determined by roughness, rutting, and percent cracking for both asphalt and concrete pavement. Based on index ranges for both pavement types, the NHS roadways are given an assessment of good, fair, or poor condition each year. The FHWA has allotted 10 percent of funds apportioned to the state DOT under the Surface Transportation Block Grant to account for pavement in poor condition if condition goals are not met that year.

6.2.1 Utah Pavement Conditions on the NHS

The pavement condition on NHS's Interstates met targets in 2021. Figure 6-3 shows that 68.2 percent of the pavement on NHS Interstates was in good condition, and 0.13 percent of the pavement was in poor condition in 2021. The percentage of Interstate pavement in good condition exceeded the 60 percent target except for 2019 and 2020, when it fell to 42.3 and 58.0 percent, respectively. In 2017, 2.5 percent of roadways were in poor condition, improving and falling to nearly zero percent from 2018 onward.

Figure 6-3. Utah's Interstate Highway System Pavement Condition (2017-2021)



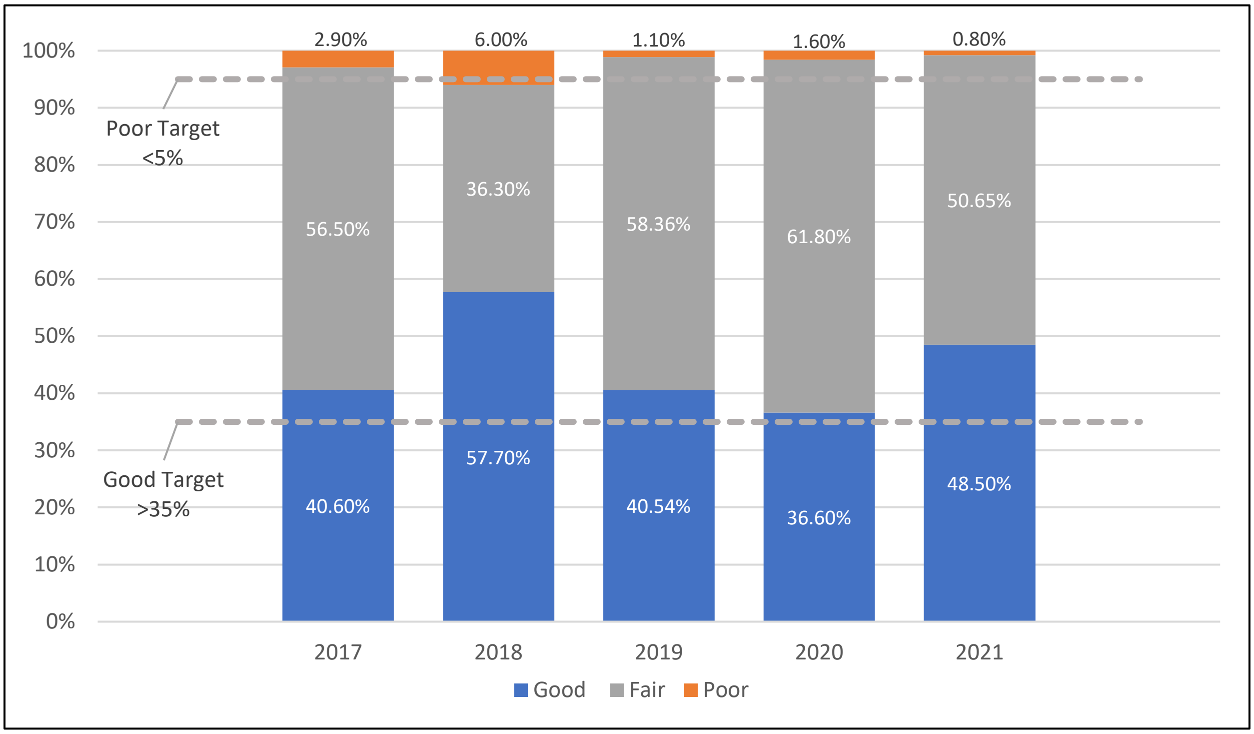
Source: Utah Highway Infrastructure Condition – Pavement, UDOT

UDOT set the target for non-Interstate NHS pavement in good condition to be at least 35 percent. The state DOT is required to develop a plan to identify how pavement condition targets will be met in the future for non-Interstate NHS pavement in poor condition or not meeting FHWA targets.[1]

Figure 6-4 shows that non-Interstate NHS pavement met the good condition target each year, with 48.5 percent of segments in good condition in 2021. The portion of pavement in good condition varies significantly from year to year, with the lowest in 2020 at 36 percent and the highest in 2018 at 57 percent. The percentage in poor condition dropped to 0.8 percent in 2021 after peaking at 6 percent in 2018.

[1] FHWA, *Highway Infrastructure Condition, Pavement,* (2021). [Microsoft Power BI (powerbigov.us)]

Figure 6-4. Utah's National Highway System Pavement Condition (2017-2021)



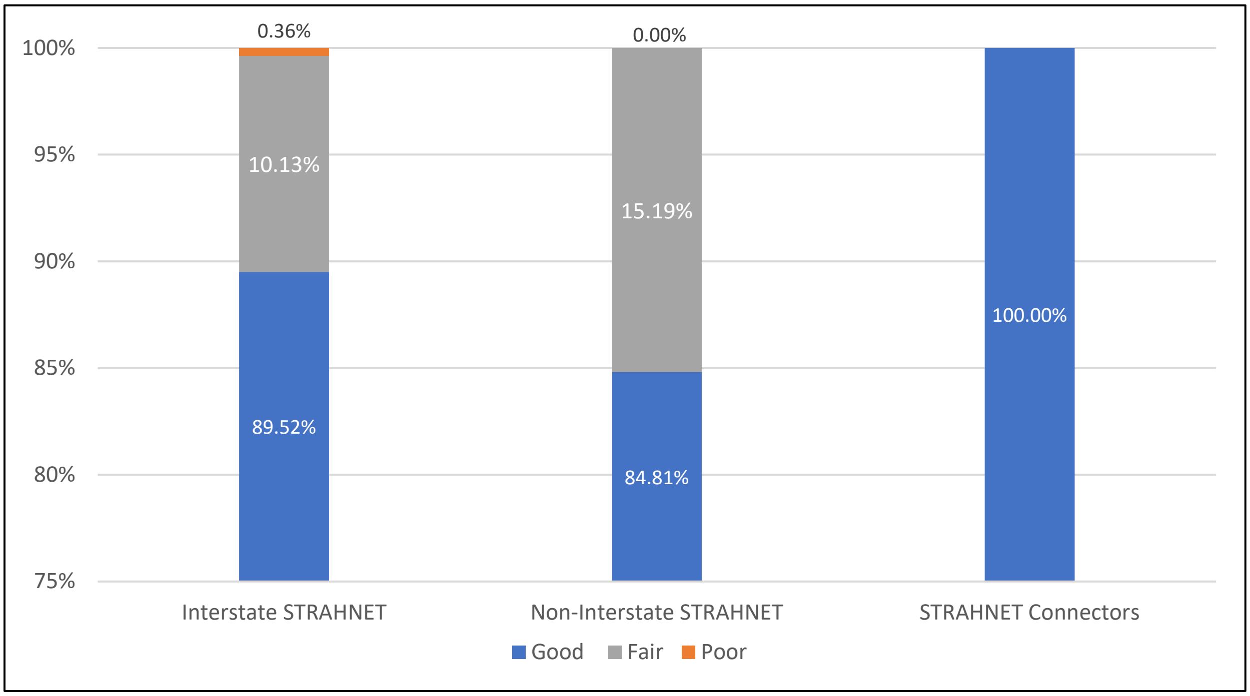
Source: Utah Highway Infrastructure Condition – Pavement, UDOT

The Strategic Highway Network (STRAHNET) refers to the system of public roadways used by the U.S. military for defense and emergency purposes. STRAHNET highways and connected bridges are essential to the rapid mobilization of military equipment and personnel when necessary.[1] As a result, STRAHNET roadways are often used by convoys and OS/OW vehicles and may face greater stress on pavement. The condition of these roadways is, therefore, essential to the safe, efficient, and continuous transport of military freight. Utah's STRAHNET includes the entire route of I-15, I-70, I-80, I-84, U.S. 6, and U.S. 191.

Figure 6-5 demonstrates 2022 pavement conditions on Utah's STRAHNET connectors and STRAHNET highways. Interstates, non-interstates, and connectors are all majority in good condition with 100 percent of connectors in good condition. Very little pavement is in poor condition on STRAHNET roadways; 0.3 percent of interstate pavement is considered poor with zero percent on all other STRAHNET roadways.

[1] USDOE, *US Strategic Highway Network (STRAHNET)*, (2020). Strategic Highway Network (STRAHNET) — DOE Directives, Guidance, and Delegations

Figure 6-5. Pavement Condition on Utah's STRAHNET System (2022)



Source: UDOT.

6.2.2 Statewide Pavement Condition

In addition to the Federally required pavement condition measure, UDOT also monitors the International Roughness Index[1] to inform its funding allocation and decision making. This measure takes a "high-volume and low-volume" approach: the high-volume system includes Interstates and roadways with over 1,000 AADT, and the low-volume system consists of roadways with less than 1,000 AADT. The pavement preservation of the former focuses on maintaining the current pavement condition, while the latter is focused on improving pavement condition.[2]

Figures 6-6 and 6-7 demonstrate the pavement conditions on the high-volume and low-volume systems, respectively. The high-volume pavement conditions are somewhat consistent from 2017 to 2021, ranging between 61 and 66 percent in good condition and three to five percent in poor condition. In 2021, targets for high-volume pavement conditions were met, as less than 5 percent of pavement was in poor condition, and more than 65 percent was in good condition.

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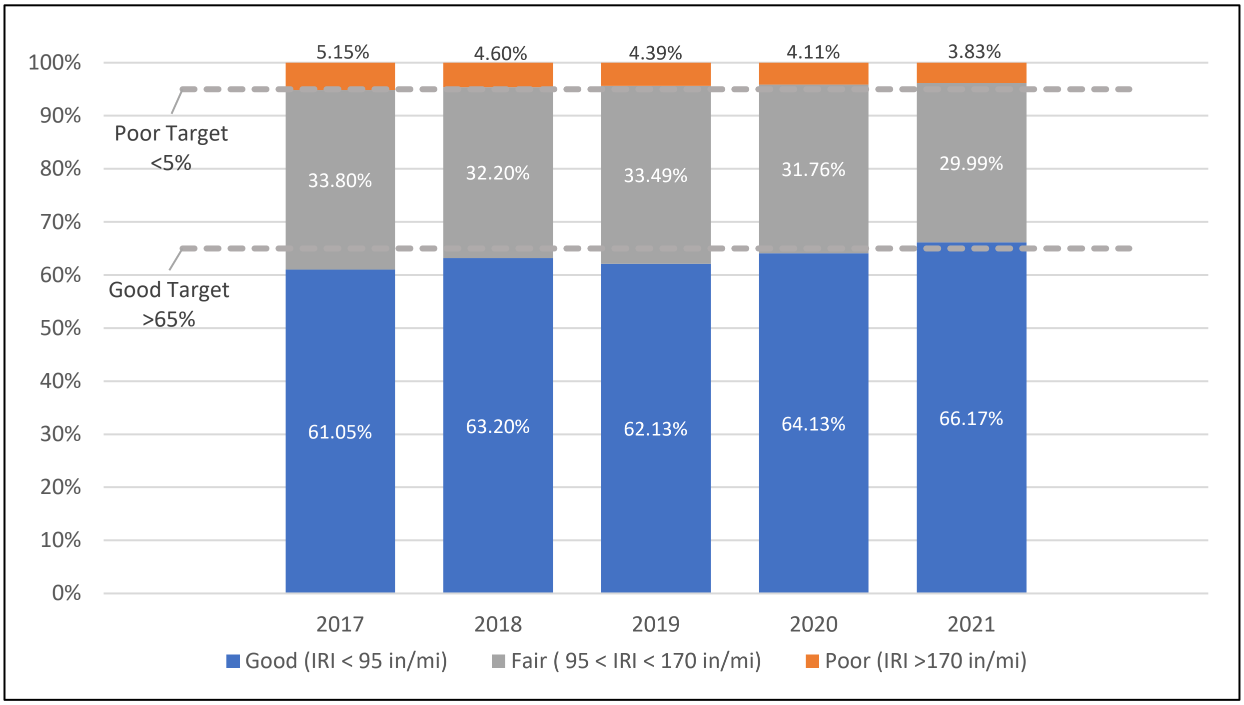
[1] International Roughness Index (IRI) is a common measure that describes the total vertical movements occurring to a standard passenger vehicle over a mile of driving distance at 50 mph. Higher IRIs indicate rougher roadways.

[2] UDOT, *Strategy,* (UDOT Pavement Information, 2019). [UDOT Pavement Information - Strategy (google.com)]

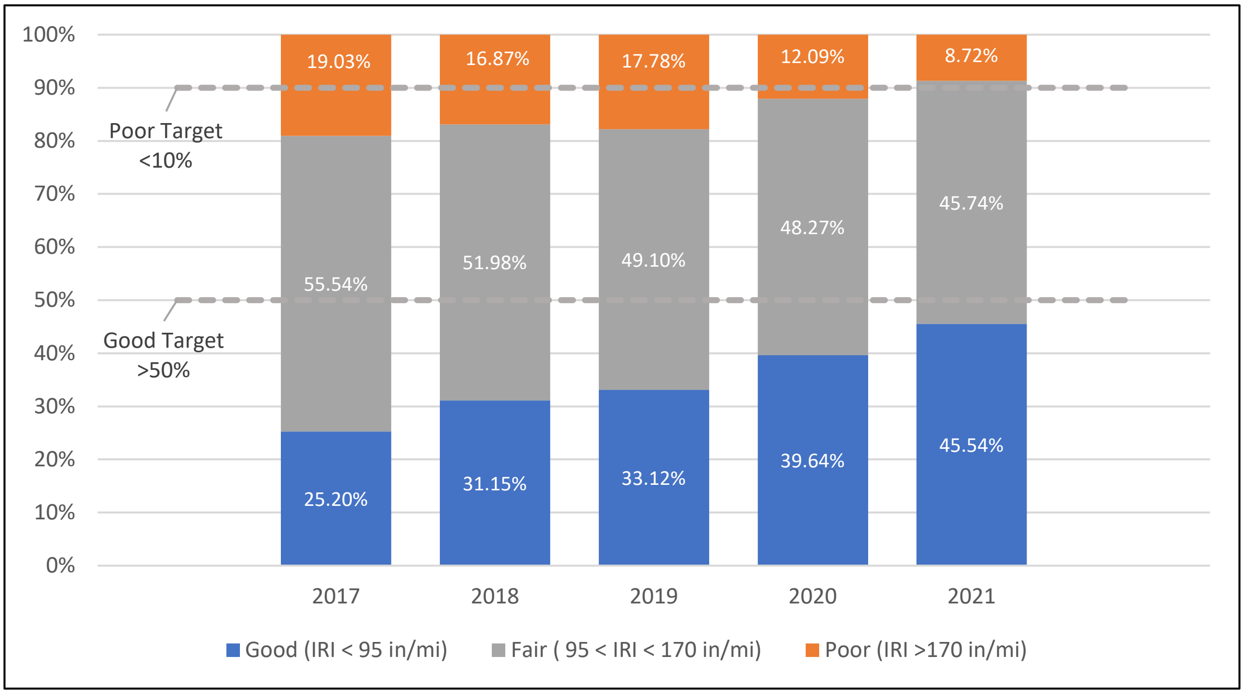
Figure 6-6. High Volume Pavement Condition (2017-2021)



Source: 2022 UDOT Strategic Direction, UDOT

Figure 6-7 shows an upward trend in the percentage of low-volume pavement in good condition, from 25 percent in 2017 to 45 percent in 2021. Similarly, low-volume pavement in poor condition has decreased from 19.0 percent to 8.7 percent within the five years shown. In 2021, the low-volume system met the poor condition target but failed to reach the good condition target. With good condition pavement at 45.5 percent, the low-volume system pavement was 5 percent short of the good target.

Figure 6-7. Low Volume Pavement Condition (2017-2021)



Source: 2022 UDOT Strategic Direction, UDOT

6.3 Bridge Condition

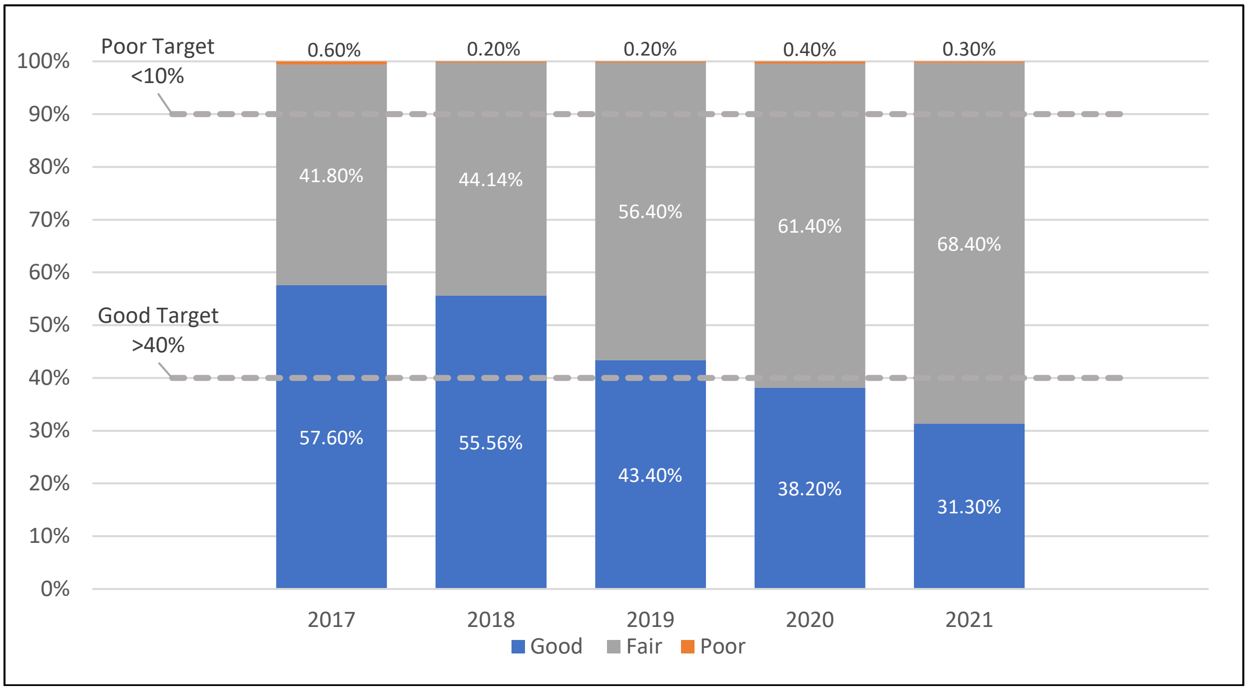
As part of measuring the condition of pavement and roadways, FHWA requires states to report the NHS and non-NHS bridge conditions based on a series of metrics. Bridges are inspected biennially and assigned a condition based on their lowest metric rating in the categories of deck, superstructure, substructure, and culvert.[1] The score of that metric is then weighted based on the overall roadway area of the bridge such that a larger deck area has a greater influence on the condition rating. If 10 percent or more of the state's NHS bridges are in poor condition for a 3-year period, the state DOT must designate 50 percent of the federal bridge program apportionment to improving bridge conditions. In 2022, Utah had the lowest percentage of NHS bridges in poor condition in the nation.[2]

Figure 6-8 and Figure 6-9 show the FHWA assessment of Utah's NHS and non-NHS bridges, respectively. The condition of Utah's NHS bridges has shown a steady decline from 57 percent in good condition in 2017 to 31 percent in 2021. Less than one percent of bridges has been in poor condition any year, while bridges in fair condition have increased by 27 percent in the five years shown.

[1] FHWA, *Highway Infrastructure Condition, Bridges,* (2021). Microsoft Power BI (powerbigov.us)

[2] FHWA, National Highway Performance Program (NHPP) – Condition of National Highway System (NHS) Bridge, (2022). https://www.dropbox.com/s/o50onvyj42cgdog/FY23%20NHPP%20Bridge%20Penalty%20Notifications%20-%20Multiple%20States1.pdf?dl=0

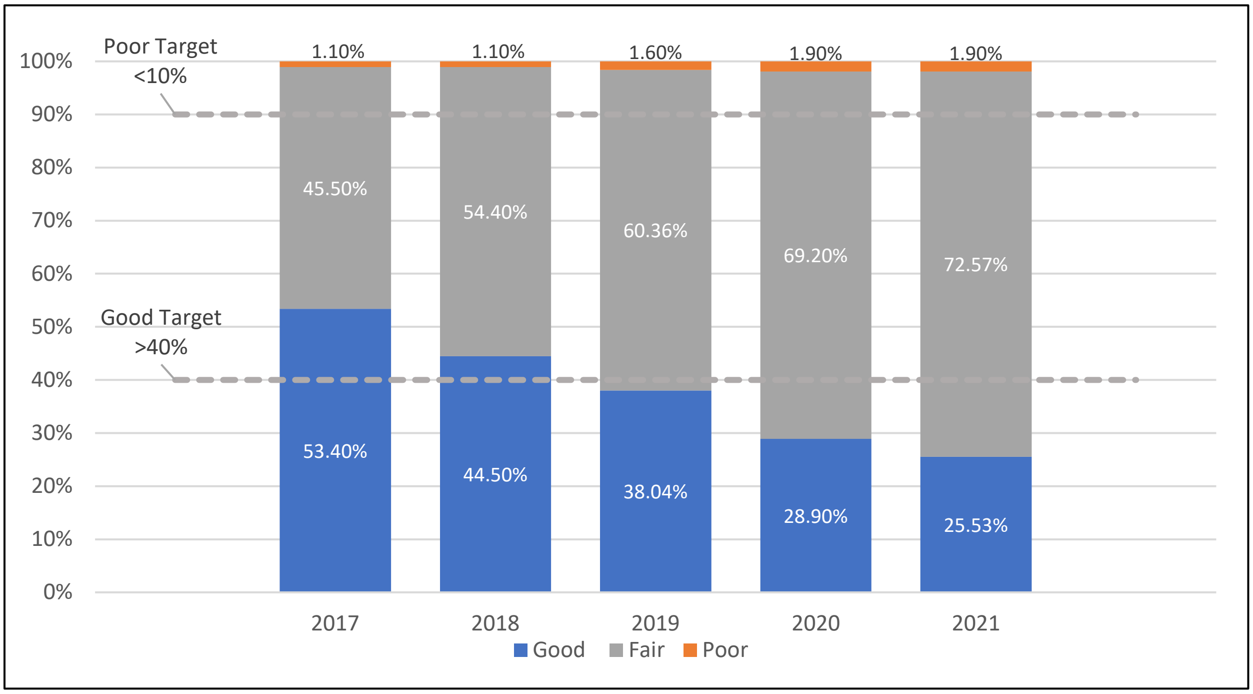
Figure 6-8. Bridge Condition on Utah's National Highway System (2017-2021)



Source: Utah Highway Infrastructure Condition – Bridges, UDOT

Utah's non-NHS bridge conditions are shown in Figure 6-9. Like Utah's NHS roadways, the percentage of bridges in good condition has decreased by 28 percent in five years, while bridges in fair condition have increased by 27 percent. Meanwhile, bridges in poor condition have been slightly increasing from 1.1 percent to 1.9 percent, remaining well below the target of 10 percent or fewer bridges in poor condition.

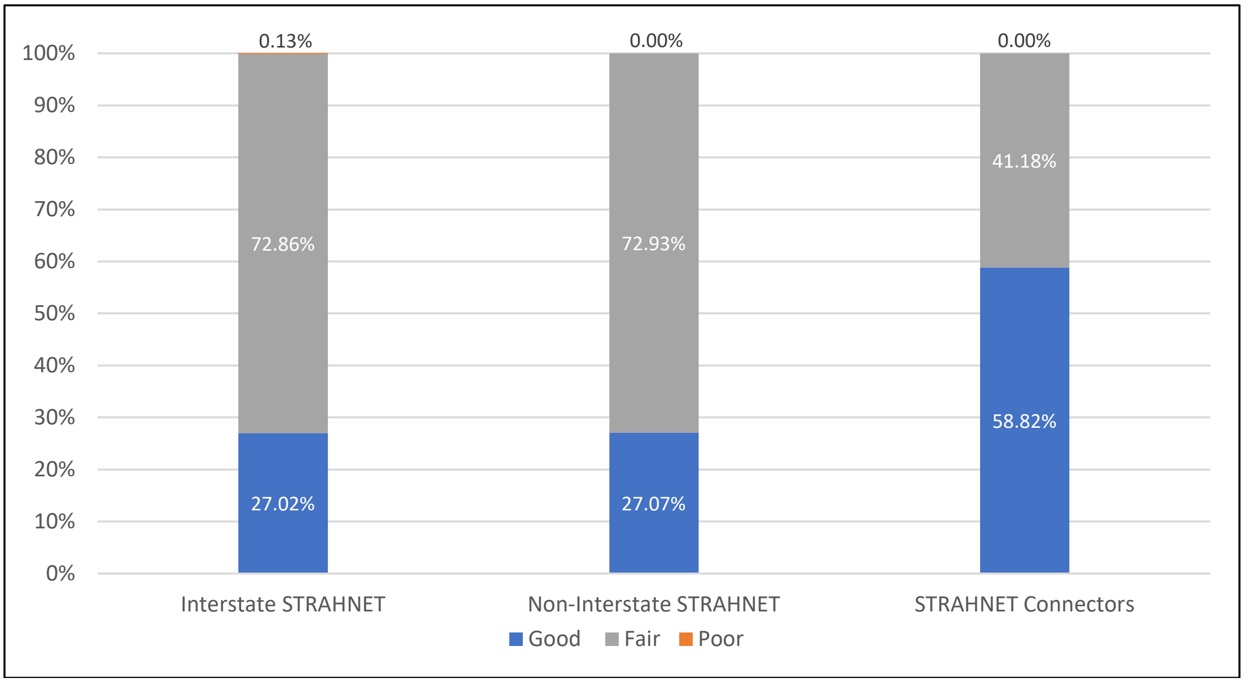
Figure 6-9. Bridge Condition on Utah's Non-National Highway System (2017-2021)



Source: Utah Highway Infrastructure Condition – Bridges, UDOT

Figure 6-10 shows STRAHNET bridges with 27 percent in good condition, 72 percent in fair condition, and nearly zero percent in poor. Non-interstate STRAHNET has nearly identical conditions with a fraction of percentages as a difference. By contrast, STRAHNET connectors have zero percent of their roadways in poor condition, 41 percent in fair condition, and the remaining majority designated as good.

Figure 6-10. Bridge Condition on Utah's STRAHNET System (2022)



Source: National Bridge Inventory, 2022

6.3.1 Statewide Bridge Condition

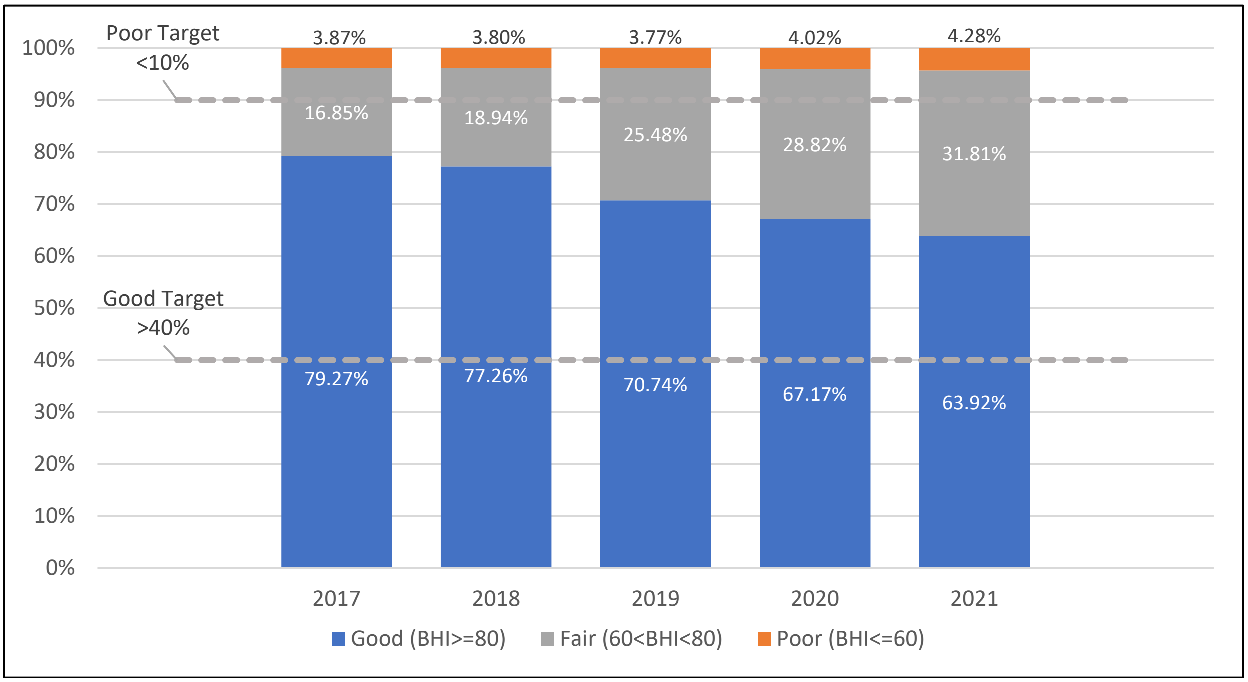
Figures 6.11 through 6.13 show the condition of Utah's highway network through UDOT's Bridge Health Index (BHI) measurement system. The BHI is used to track bridge conditions and prioritize future repairs. While FHWA's bridge ratings use the lowest ratings for deck, superstructure, substructure,[1] and culvert to determine bridge condition, the BHI is a result of scoring and weighting four elements of a bridge structure (i.e., deck, superstructure, substructure, and culvert) and factoring in the FHWA ratings. Each element's score is the ratio of the current condition to the best possible condition. Deck health is weighted highest as it has the most bearing on the safety of the rest of the bridge.[2]

Figure 6-11 shows BHI conditions on Utah's NHS roadways from 2017 to 2021. The BHIs have met UDOT's targets for bridges in good (more than 40 percent) and poor (less than 10 percent) condition each year. There has been a steady decline from 79 percent in 2017 to 64 percent in 2021 in bridges in good condition. Meanwhile, NHS bridges in fair condition increased to 31 percent in 2021.

[1] Tables of Frequently Requested NBI Information. Federal Highway Administration. https://www.fhwa.dot.gov/bridge/britab.cfm

[2] Bridge Management Manual. UDOT. October 2022. https://drive.google.com/file/d/1oEO6GCKep4IH0w6CP3jpndw9NTHtqCk6/view

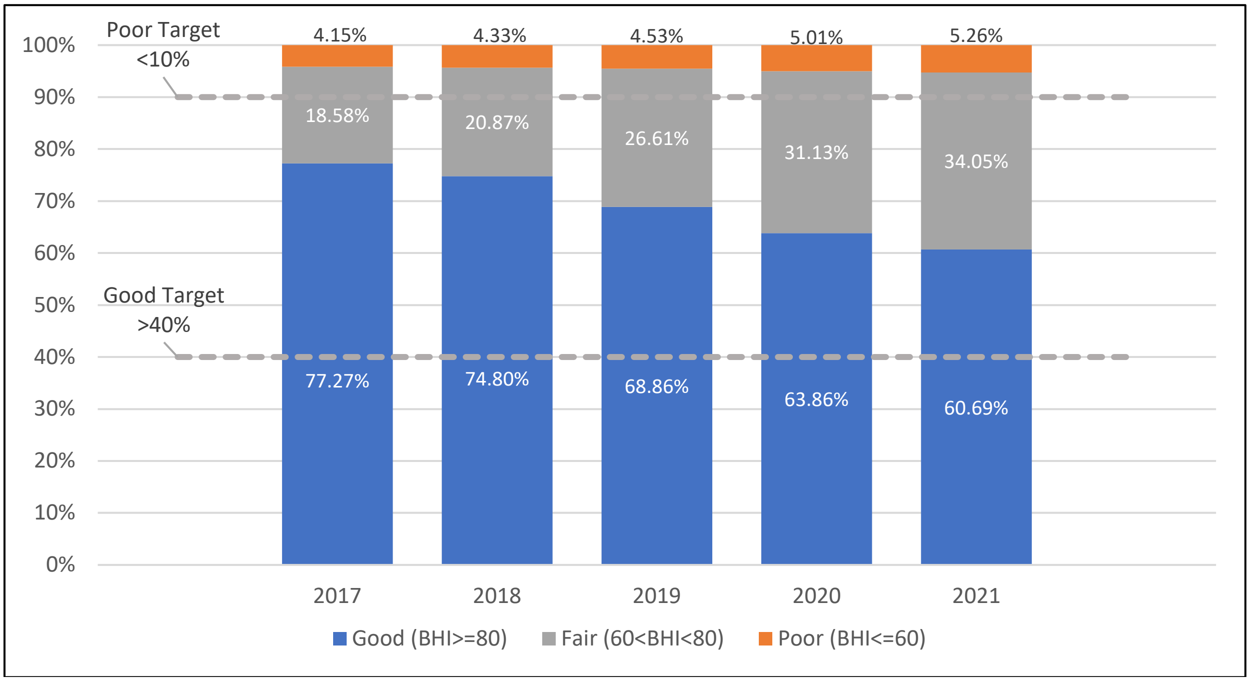
Figure 6-11. Bridge Health Index on Utah's National Highway System (2017-2021)



Source: 2022 UDOT Strategic Direction, UDOT.

Figure 6-12 shows BHI scores of Utah's state-owned non-NHS highway bridges from 2017 to 2021. Like the previous figure, targets for good and poor non-NHS bridges have been met each year though bridges in good condition have declined from 77 percent in 2017 to 60 percent in 2021. Highway bridges in fair condition have increased by 16 percent in the four-year period, while poor condition bridges have remained between 4 and 5.3 percent.

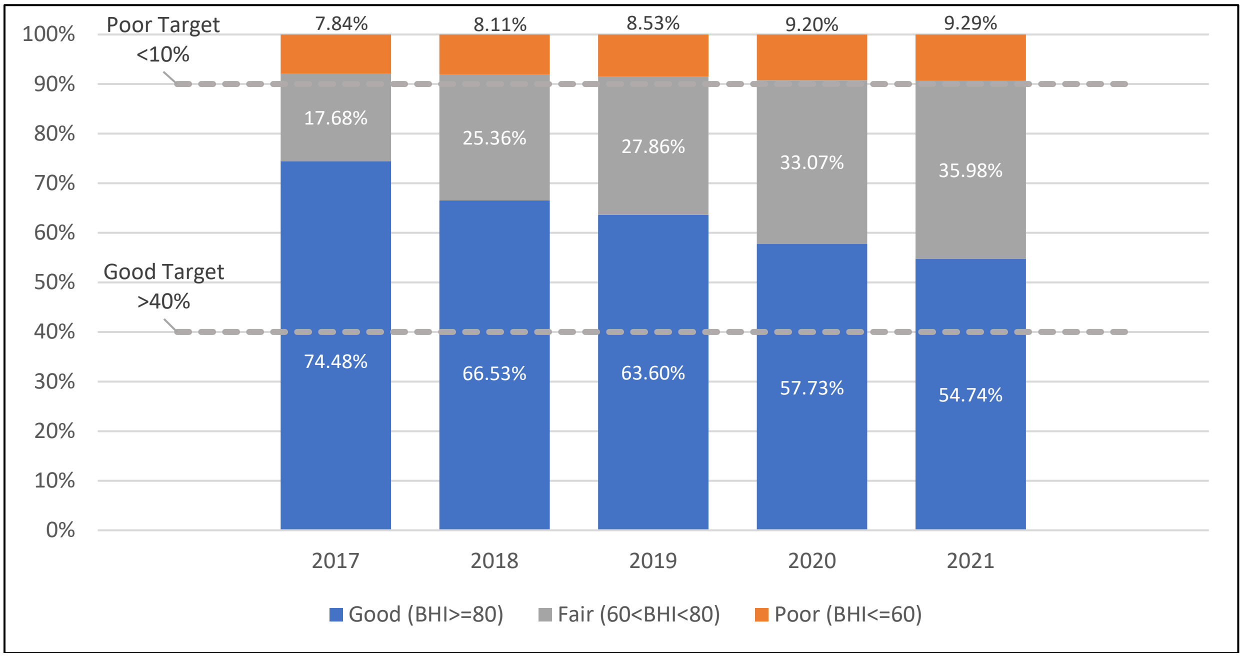
Figure 6-12. Bridge Health Index on Utah's State-Owned Non-National Highway System (2017-2021)



Source: 2022 UDOT Strategic Direction, UDOT.

Figure 6-13 shows BHI conditions on Utah's local-owned non-NHS bridges from 2017 to 2021. This figure shows similar results to the NHS and state-owned non-NHS evaluations. Each year, the target has been met for maintaining less than 10 percent of bridges in poor condition and more than 40 percent in good condition. Though bridges in good condition have declined by 20 percent, bridges in fair condition have increased by 18 percent to 35 percent in 2021. While remaining within target, bridges in poor condition sit at 9.3 percent in 2021, up from under 8 percent in 2017.

Figure 6-13. Bridge Health Index on Utah's Local-Owned Non-National Highway System (2017-2021)



Source: 2022 UDOT Strategic Direction, UDOT.

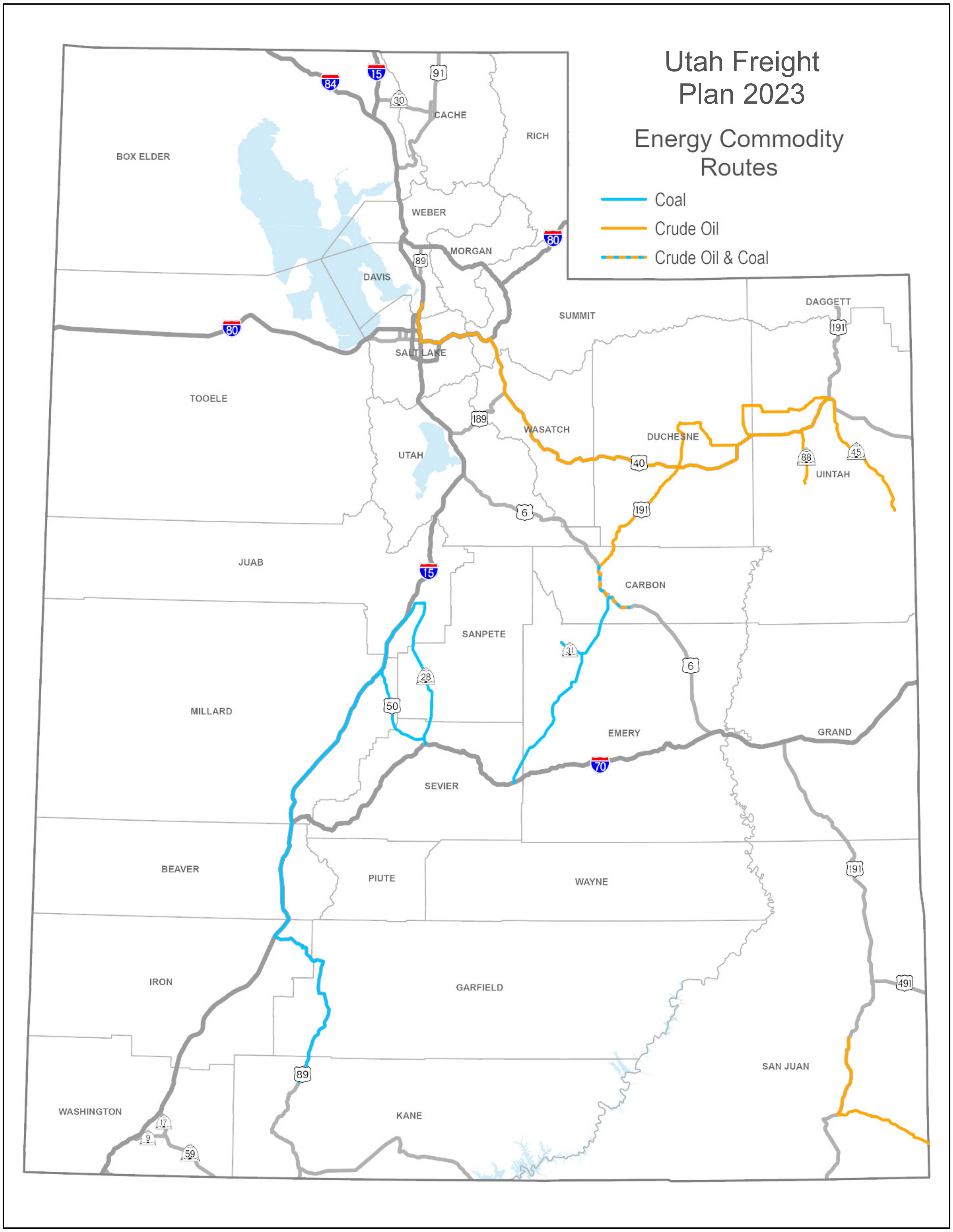
6.4 Utah's Energy Routes

The mining and energy industries each have a major impact on supply chain movement in Utah. Therefore, Utah has identified major energy routes throughout the state. The goal is to have the routes identified for a higher maintenance standard and a better level of service for the corridor. This systematic approach to freight corridor improvements helps alleviate the impacts of the boom/bust cycle of energy production and ensures a transportation network that is in good repair for all users.

Utah has the fourth-highest number of producers of crude oil and natural gas on federal land in the country.[1] As a result, the mining and energy industry produces significant amounts of freight traffic through the state, including OS/OW loads, varying based on demand cycles. The efficient and safe transport of these commodities depends on the health of the identified energy routes. The following map in Figure 6-14 shows the energy routes.

[1] US Energy Information Administration, "Utah State Profile," April 2022. U.S. Energy Information Administration - EIA - Independent Statistics and Analysis

Figure 6-14. Energy Commodity Routes



6.4.1 Pavement Condition on Energy Routes

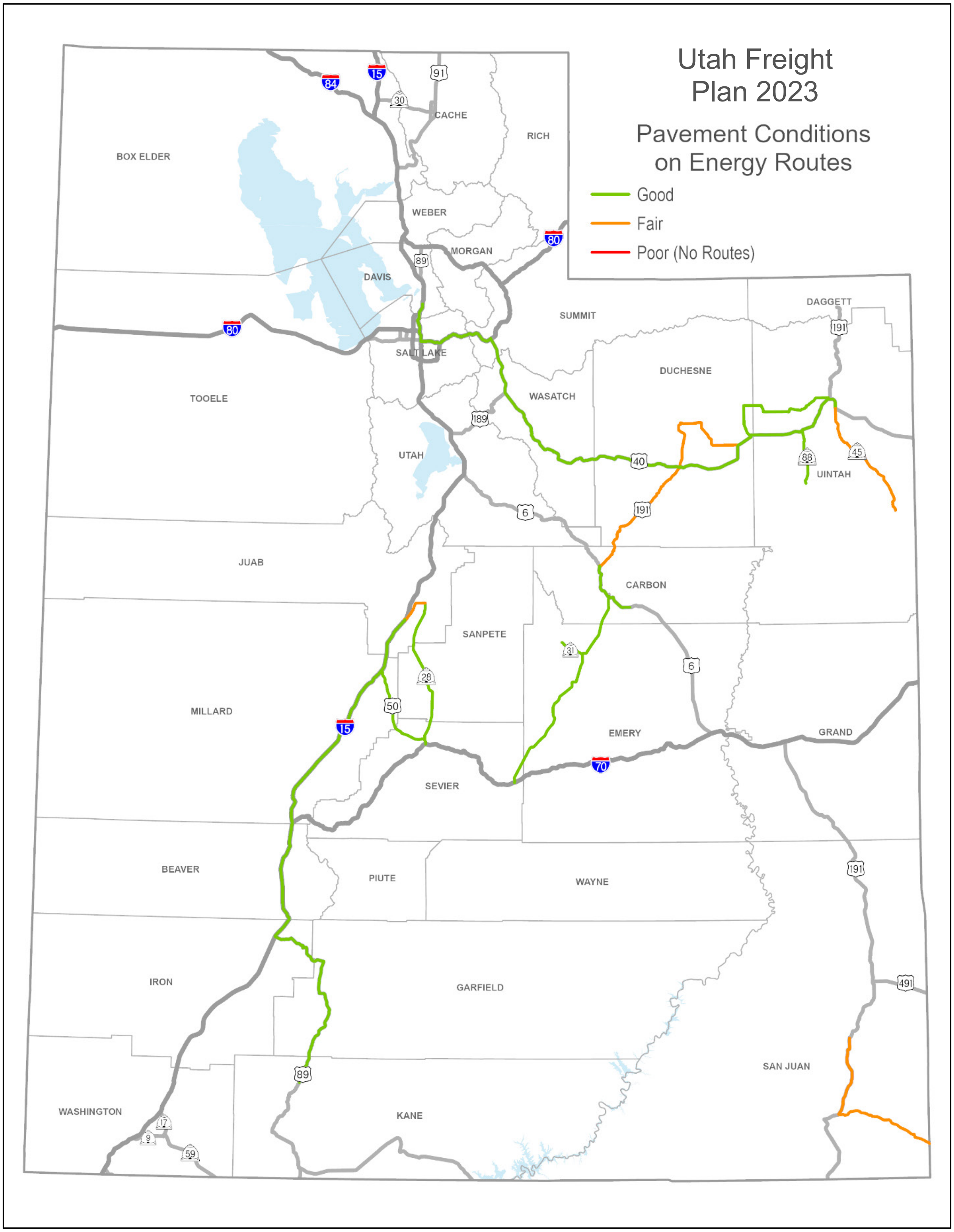
Table 6.1 and Figure 6-15 show the pavement condition along Utah's energy commodity routes based on UDOT's pavement rating system. Though the majority of energy routes remain in good condition (96.52 percent) as of 2022, small segments along U.S. 45, U.S. 191, and near U.S. 28 are in fair condition (3.48 percent), suggesting they may require repairs in coming years. No routes on energy freight corridors are in poor condition.

Table 6-1. Pavement Condition on Energy Routes

Pavement Condition	Percentage
Good	96.52
Fair	3.48
Poor	0.00

Source: CPCS Analysis of Highway Performance Monitoring System, 2022.

Figure 6-15. Pavement Conditions on Energy Routes



6.4.2 Roads Not Built for Energy Demands

Several of Utah's major energy routes have evolved into their current function, having originally been constructed as intrastate or interstate connections. U.S. 40 connects Utah and Colorado and was constructed before the energy boom in the Uinta Basin, which U.S. 40 crosses.

Additionally, U.S. 191 between U.S. 40 and U.S. 6 connects the Uinta Basin and a rail loadout facility in Carbon County for crude oil transport. However, this road was also constructed prior to the Uinta Basin energy boom and was not constructed to the necessary standards required for today's freight vehicles.

Finally, S.R. 162 in southeastern Utah connects the San Juan County towns of Bluff and Montezuma Creek and continues into Colorado where it becomes Colorado Route 41. It is a narrow, two-lane highway with minimal shoulders and is not conducive to the crude oil transport route that it has become. However, there are plans to improve this corridor.

6.4.3 Bridge Condition on Energy Routes

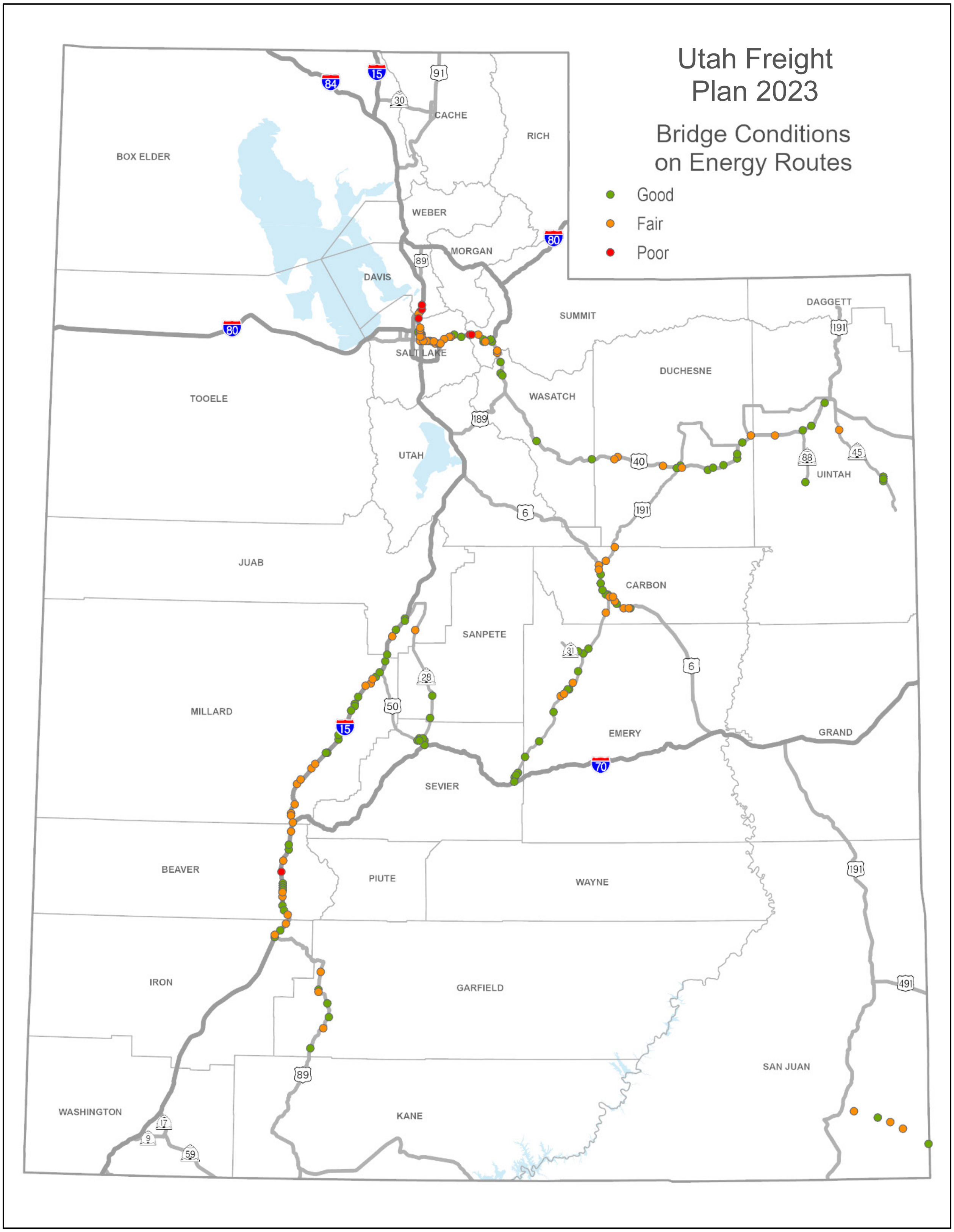
Table 6-2 and Figure 6-16 show bridge conditions on Utah's energy routes based on FHWA's National Bridge Inventory ratings. Only 1.21 percent of the bridges on the energy routes were in poor condition in 2021 and are primarily in and around Salt Lake County. The distribution of the nearly 99 percent of good and fair bridges is dispersed.

Table 6-2. Bridge Condition on Energy Routes

Bridge Condition	Percentage
Good	68.24
Fair	30.55
Poor	1.21

Source: CPCS Analysis of the National Bridge Inventory.

Figure 6-16. Bridge Conditions on Energy Routes Map



6.5 Other Freight-Dependent Industries in Utah

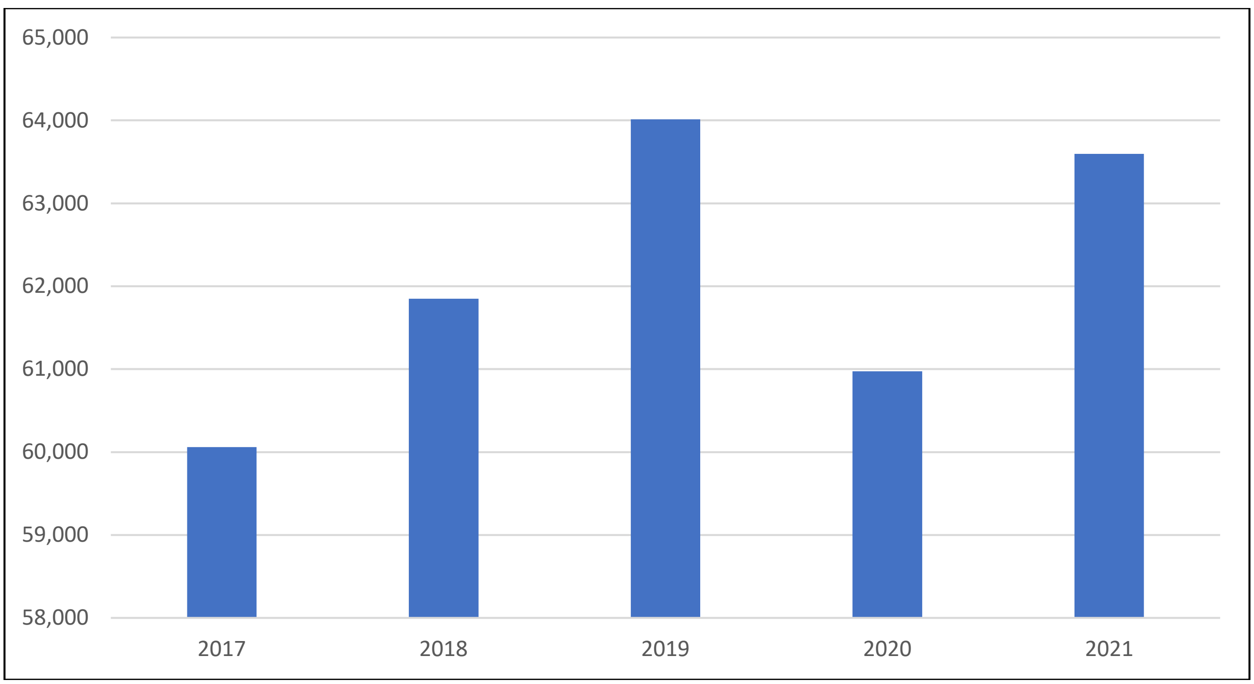
In addition to energy, other important sectors of Utah's economy are also reliant on freight movement. Agriculture and mining are two key components of the state's economy. Agricultural commodities in Utah include crops such as corn, hay, and barley as well as many kinds of fruit. However, livestock is the largest agricultural commodity including beef and dairy cattle, sheep, and a growing poultry industry.

Mining has historically played an important role in Utah's economy and continues till today. The Bingham Canyon Mine, owned and operated by Rio Tinto, is the world's largest open pit copper mine and continues functioning at full capacity. Other minerals mined include gold, silver, zinc, and other minerals. These are primarily transported by rail and have less impact on the highway network.

6.6 Oversize/Overweight Vehicles

Utah has been issuing increasing numbers of permits to OS/OW vehicles to roughly 3,500 more permits in 2021 than in 2017 (Figure 6-17). 2021 permit volumes had not yet reached pre-COVID (2019) levels. Overweight vehicles place more stress on pavement than a typical vehicle, though accounting for a smaller amount of overall traffic. Major corridors where OS/OW vehicles may travel include U.S. 40, U.S. 89, U.S. 6, and S.R. 201,[1] making a system that consistently monitors the condition of these roadways essential.

Figure 6-17. Oversize/Overweight Vehicle Permit Counts in Utah (2017-2021)



Source: UDOT

[1] Consultation notes with UDOT.

6.6.1 Pavement Management Challenges of Heavy Freight Vehicles

There are several factors that make it difficult to manage and maintain Utah's freight infrastructure and vehicles. One reason is that Utah allows for 129,000-pound gross vehicle weight trucks on the roads, whereas most states' maximums are 80,000-90,000 pounds. The increased weight of these vehicles causes more wear and tear on the roads and quicker deterioration.

In addition to weight, the state permits longer commercial vehicles (LCVs) on selected routes as well. Utah allows "Rocky Mountain Doubles" which is an LCV with a regular tractor-trailer (40 plus feet) and an additional trailer on the back, usually about 28 feet. Further, the state allows triple trailers, each trailer 28 feet, on selected roadways. Like weight, LCVs with more axels and more tires will lead to deterioration more quickly.

Utah's topography also contributes to the difficulty in managing heavy freight vehicles. The state's mountainous terrain makes roads more difficult to build and so vehicle traffic is concentrated on fewer roads. The terrain also contributes to the lack of rail infrastructure to serve coal mining areas resulting in much of Utah's coal transport being on roadways, rather than rail.

6.6.2 Strategies to Manage Heavy Freight Vehicles on Roadways

Utah has developed and implemented many ways to better accommodate heavy freight vehicles on its roadways. UDOT has identified and built many miles of passing lanes on rural freight corridors around the state and has developed a process to prioritize future passing lane locations, including the importance of the route to freight. UDOT has implemented a "2 plus 1" plan for sections of U.S. 40 so that there are alternating passing lanes in each direction for a total of three lanes (one each direction and a passing lane) on any given segment of the highway. UDOT's Region Four is also exploring this concept on segments of U.S. 89 and U.S. 191.

Also, UDOT has added climbing lanes on Interstates such as eastbound on I-80 in Parley's Canyon in the Wasatch Front Mountains near Salt Lake City and on I-15 in southern Utah in the Black Ridge Wilderness Area. In addition, UDOT has also planned for downhill passing lanes on U.S. 40 west of Strawberry Reservoir. Finally, traffic engineering and design considerations for freight routes that UDOT has implemented include providing wider shoulders on freight corridors, using signal timing plans that allow for vehicles that need extra time when starting, longer turning lanes to allow for vehicle length, and turning radii that accommodate LCVs.

6.7 Viability of Shifting Freight to Other Modes

In Utah, shifting freight from highway to other modes presents a specific set of challenges primarily related to accessibility. Because of Utah's mountainous terrain, most coal mines are not directly served by rail, leaving coal hauled by truck as the most viable option. Most of Utah's crude oil comes out of the Uinta Basin, an area which is not currently served by rail infrastructure. Utah's crude oil is also a waxy consistency, making it difficult to be pumped through conventional pipelines.

6.7.1 Waterways, Ports, and Railroads to Accommodate Heavy Freight

With no navigable waters in Utah, waterways do not factor into Utah's freight infrastructure. However, Union Pacific Railroad's SLCIT is Utah's global gateway for truck/rail intermodal freight and is Union Pacific's hub for the Mountain West, serving the logistics needs of a six-state region. The Ports of Los Angeles and Long Beach are Utah's primary ocean global gateways, with the Port of Oakland in northern California sharing in a lesser capacity in Utah's international and Pacific Rim intermodal business.

ELEMENT 7. INVENTORY OF FREIGHT MOBILITY ISSUES

Although the UHFN and the Utah Multimodal Freight Network (UMFN) routes are in very good shape with regards to safe and efficient freight movement, many routes that link freight centers with these networks need improvement. While some of these routes are state highways, many are roads and streets that are locally maintained, requiring greater multi-jurisdictional collaboration. The majority of facilities with freight mobility issues are found in Utah's primary urbanized area, called the "Wasatch Front," which extends from Ogden south to Salt Lake City and beyond to Orem and Provo.

7.1 Identification Methodology for Freight Mobility Issues

In order to identify freight mobility issues in Utah, several existing plans as well as transportation planners were consulted. The freight mobility impediments featured in UDOT's Utah Freight Plan 2017 was a significant source for this document. The Regional Transportation Plans adopted by the Wasatch Front Regional Council (WFRC), Mountainland Association of Governments (MAG), Cache Metropolitan Planning Organization (Cache MPO) and Dixie Metropolitan Planning Organization (Dixie MPO) were also consulted for region-specific challenges. Many of these plans involve the feedback from representatives of the trucking and railroad industries. Utah's FAC and UDOT Planning also highlighted examples of significant impediments to the movement of freight traffic in the state.

The process of identifying freight issues is rooted in the individual plans as well as the insight of stakeholders described above. A freight issue is a situation where external forces interfere with the operational ability, roadway capacity, safety, or mobility of freight. Often, a project aimed at addressing one of these metrics will yield benefits for another. For example, by constructing needed truck chain-up areas, safety, mobility, and operational metrics all improve.

7.2 Inventory of Freight Mobility Issues

The majority of the freight mobility issues are related to Utah's number one freight mode – trucks. Addressing these highway issues will benefit truck freight, truck to rail freight, truck to air freight, and truck to pipeline intermodal operations.

It is worth noting that no Utah roadways appear on the American Transportation Research Institute's (ATRI) 2023 list of the Top 100 Truck Bottlenecks in the United States. This is a testament to UDOT's continued dedication and ongoing efforts to address freight mobility issues.

This element explores types of freight mobility issues within the state. Element 9 provides a specific list of freight improvement projects to address the issues introduced in this element.

7.3 Highway

There are many highway freight challenges and needs that will benefit trucking and the efficient movement of highway freight. The design elements will not only benefit trucks, but it will work well for RVs and automobiles. When designing highways, it is important to keep in mind that if the highway is designed for automobiles, it may not work for trucks. However, if you design it for trucks, it will easily accommodate RVs and automobiles.

7.3.1 Interchange and Intersection Design

Routes that feature a high percentage of truck traffic are often not designed with trucks in mind. Many intersections along these roadways feature narrow turning radii that require trucks to cross into other lanes of traffic to complete a turn. Traffic signal timing along these routes is often not calibrated to account for the slower acceleration speed of trucks, resulting in congestion. Similarly, turn lanes are often not long enough to permit the queuing of multiple trucks from the travel lane. Potential solutions include the following.

1. Increase turning radii at intersections along the UHFN.
2. Calibrate traffic signal timing to better enable truck movement.
3. Increase the length of turn lanes at key locations near warehouses, oil refineries, and other truck facilities.

7.3.2 Acceleration and Deceleration Lanes

The UHFN is largely comprised of roadways with higher speed limits. Heavier vehicles such as trucks are slower when accelerating or decelerating. A traffic safety hazard is created when two streams of vehicles traveling at different speeds are forced to merge. In some locations, there is not adequate space for a truck to sufficiently decelerate in order to safely execute a turn without interfering with through-traffic. At other locations, merging trucks impede the flow of traffic because they are forced to merge into higher speed traffic without being able to accelerate to match the posted speed limit. Potential solutions include the following.

1. Construct acceleration/deceleration lanes at locations featuring high turning volumes for trucks.
2. Fully pave the shoulders of routes along the UHFN and intermodal connectors.

7.3.3 Insufficient Capacity at Freight Centers

Along and at key junctions within the UHFN there are concentrations of warehousing and distribution centers. Naturally these roads have a high percentage of truck traffic that is only expected to increase as a result of Utah's projected economic development trends. Many of these routes experience regular traffic congestion when demand exceeds the roadway's capacity. Congestion also occurs along intermodal connector routes and impacts the mobility of freight traveling by non-highway modes. Potential solutions include the following.

1. Add additional travel lanes to alleviate congestion hot spots near concentrations of industrial parks and warehouses.
2. Improve interchange and roadway geometry to better accommodate truck traffic.

7.3.4 Climbing and Passing Lanes

Utah is a state comprised of rugged mountainous terrain that impacts all of the UHFN routes. This reality combined with the majority of freight being moved by trucks results in congestion due to slower truck operating speeds when ascending or descending grades. Similarly, when one truck is attempting to pass a slower truck, it may obstruct the movement of other vehicles. UDOT has made it a focus to identify these locations and construct climbing lanes on interstate highways and passing lanes on non-interstate highways on the UHFN. Potential solutions include the following.

1. Continue to identify locations on interstates to construct climbing lanes.
2. Continue to identify locations on rural, two-lane highways to construct passing lanes.

7.3.5 Long-term Truck Parking

Utah's proximity to major freight origins in the western U.S. causes many long-haul truck drivers to frequently hit their DOT-mandated rest times within the state boundaries. As a result, drivers are faced with a dilemma: park in unsafe locations when there is not available truck parking or illegally drive to find such parking. In 2010 UDOT commissioned a truck parking study to research this issue and identify ways that the organization could work to alleviate these issues. An updated statewide truck parking study is currently underway and is scheduled to be completed late 2023. UDOT will use the findings of the study to evaluate needs and opportunities to expand public and/or private truck parking. Potential solutions include the following.

1. Continue to update the long-term truck parking inventory annually.
2. Continue to coordinate with the private sector truck stop owners and operators about the need and location for additional long-term truck parking.
3. Pursue public-private partnerships to construct additional long-term truck parking.
4. Work with warehousing operators at larger freight centers to expand truck parking opportunities near or at their facilities.

7.3.6 Chain-Up Areas

The UHFN traverses mountainous terrain in several locations and truckers must contend with winter precipitation for a large portion of the year. Thus, segments of these routes require truckers to apply tire chains before proceeding. Unfortunately, many of the required chain-up highway segments either do not provide chain-up areas or are insufficient in scale to accommodate the application of tire chains by truckers. Thus, drivers are often faced with a challenging dilemma: risk causing congestion and a fine when they become stuck after not applying tire chains or create congestion when unable to adequately park outside of the travel lane while applying chains. Potential solutions include the following.

1. Continue to identify locations where truck chain-up areas are needed.
2. Construct new chain-up areas featuring lighting and pavement.
3. Expand chain-up capacity at particularly busy locations.

7.3.7 Truck Routes

Interstates and state highways comprise the UHFN. However, truck mobility can be hindered by an absence of truck routes connecting major freight routes to freight origins or destinations. Potential solutions include the following.

1. Collaborate with communities to establish designated truck routes on non-state-maintained facilities.

7.4 Railroads

Railroads form another significant portion of Utah's freight mobility portfolio. Many of the mobility issues related to railroads center on highway-rail grade crossings and the traffic congestion caused by long freight trains or by freight trains switching operations.

7.4.1 Grade Separated Highway-Rail Grade Crossings

The movement of rail freight at select locations in Utah where roadways cross railroads can interfere with the mobility of trucking and other non-freight modes of transportation including cars, transit, bicyclists and pedestrians. One means of avoiding this conflict is separating the roadway and railroad by constructing a bridge for either the roadway or railroad. Doing so also improves the mobility of train traffic since grade separation may eliminate the need to reduce speed when approaching a highway-rail grade crossing. Further, roadway traffic is not stopped for long periods of time waiting for the train to pass. Potential solutions include the following.

1. Identify locations where grade separated railroad crossings are needed.
2. Construct grade separated crossings as identified.

7.4.2 Rail Intermodal Terminal Operations

At Union Pacific Railroad's SLCIT, the length of the rail intermodal terminal siding limits terminal and intermodal train operational efficiency. UDOT recently constructed a grade separated crossing at S.R. 172, which will allow for construction of increased siding lengths and track for SLCIT.

1. Construct additional siding length to enable greater efficiency at intermodal rail terminals away from the mainline.

7.5 Pipelines

There are five oil refineries located between Salt Lake City and suburban Woods Cross, which is located ten miles to the north. All these facilities provide a form of multi-modal freight connection inasmuch as they combine rail freight service with pipelines and trucks. Many of the refineries' accesses are intermodal connectors that have highway needs associated with interchange and intersection design, turning radii, signal timing, turn lane lengths, and acceleration and deceleration lanes. Pipelines are private infrastructure and are not constructed or maintained by UDOT, yet coordination with the pipeline industry is necessary for them to obtain permits for boring under roadway infrastructure. Potential solutions include the following.

1. Identify highway needs on intermodal connectors accessing the refineries.
2. Continue to coordinate with the pipeline industry on safety and highway improvement needs.

7.6 Aviation

The Salt Lake City International Airport is the primary air cargo hub in Utah and is a model of success in addressing freight mobility issues. Previously, truck traffic to the air freight terminal was combined with passenger traffic at the general passenger terminals. Realizing this freight mobility challenge, the air freight terminal was relocated from the southern end of the airport to the northwest side. This relocation, with the associated update to the intermodal connector route, enabled the air freight terminal to expand. Additionally, truck traffic now utilizes a different route, interchange, and interstate removed from other airport traffic. Potential solutions include the following.

1. Identify highway needs on intermodal connectors accessing the air cargo terminal.
2. Coordinate with the UDOT Aeronautics Division, Salt Lake City International Airport, and the Federal Aviation Administration (FAA) on future air cargo needs.

7.7 Seaports

Although an inland state, Utah depends on several major West Coast seaports to link it with the rest of the world. A modest amount of Utah freight passes through Atlantic and Gulf Coast seaports, as well as those in the Pacific Northwest. However, Utah's primary global gateways are in California. As already discussed, UP's SLCIT provides direct rail intermodal freight service to the ports of Los Angeles and Long Beach, with indirect rail service to the Port of Oakland.

Labor relations, environmental standards and freight mobility issues affecting intermodal freight through these ports can affect businesses in Utah. Potential solutions include the following.

1. Continue to monitor issues impacting Utah freight movement through West Coast seaports.

ELEMENT 8. CONGESTION CAUSED BY FREIGHT AND STRATEGIES TO MITIGATE CONGESTION

This element identifies congested corridors caused by freight and provides performance strategies to mitigate congestion due to freight movement. Capacity utilization is identified for existing and future conditions. Truck bottlenecks in Utah are identified using a data-driven approach. This element concludes with strategies to address these level of service and truck bottleneck issues.

8.1 Optimize Mobility

As discussed previously in this plan, UDOT has three strategic goals. One of those goals is Optimize Mobility. UDOT optimizes traffic mobility by incorporating innovative design and traffic management strategies in addition to increasing roadway capacity. The performance measure for this strategic goal is level of service.

Level of service, a metric of traffic flow, is partly a function of roadway demand at a given time to the capacity of that facility. Both sides of that ratio are derived from the Utah Statewide Travel Model (USTM). This model focuses on rural areas but incorporates the detail of the models maintained by the state’s MPOs. The model estimates traffic conditions during a typical weekday evening peak period in 2019. Demand in the future is grown based on projected development patterns. By adjusting the future capacity of roadways within the model, it is possible to simulate the construction of projects within the Long Range Plan, as well as their absence.

New capacity needs are those anticipated deficiencies between 2019 and 2040 that are necessary to maintain level of service standards identified by AASHTO. Level of service standards for urban areas are typically “D” or better while level of service standards for rural areas are typically “C” or better. Both UDOT and the MPOs follow AASHTO guidelines but also apply engineering judgment where necessary.

Figures 8-1 through 8-3 show level of service for the 2019 base year as well as two 2040 scenarios. The no-build map represents level of service if no projects from the transportation plans are built by 2040. The 2040 build map shows level of service assuming the projects from the transportation plans are constructed.

There are segments in both the 2040 no-build and the 2040 build scenarios with levels of service that fall below AASHTO standards. These locations need more analysis (e.g., through corridor studies) to determine what types of projects may be necessary to improve corridor performance.

Figure 8-1. Highway Freight Network Base Year 2019 Level of Service

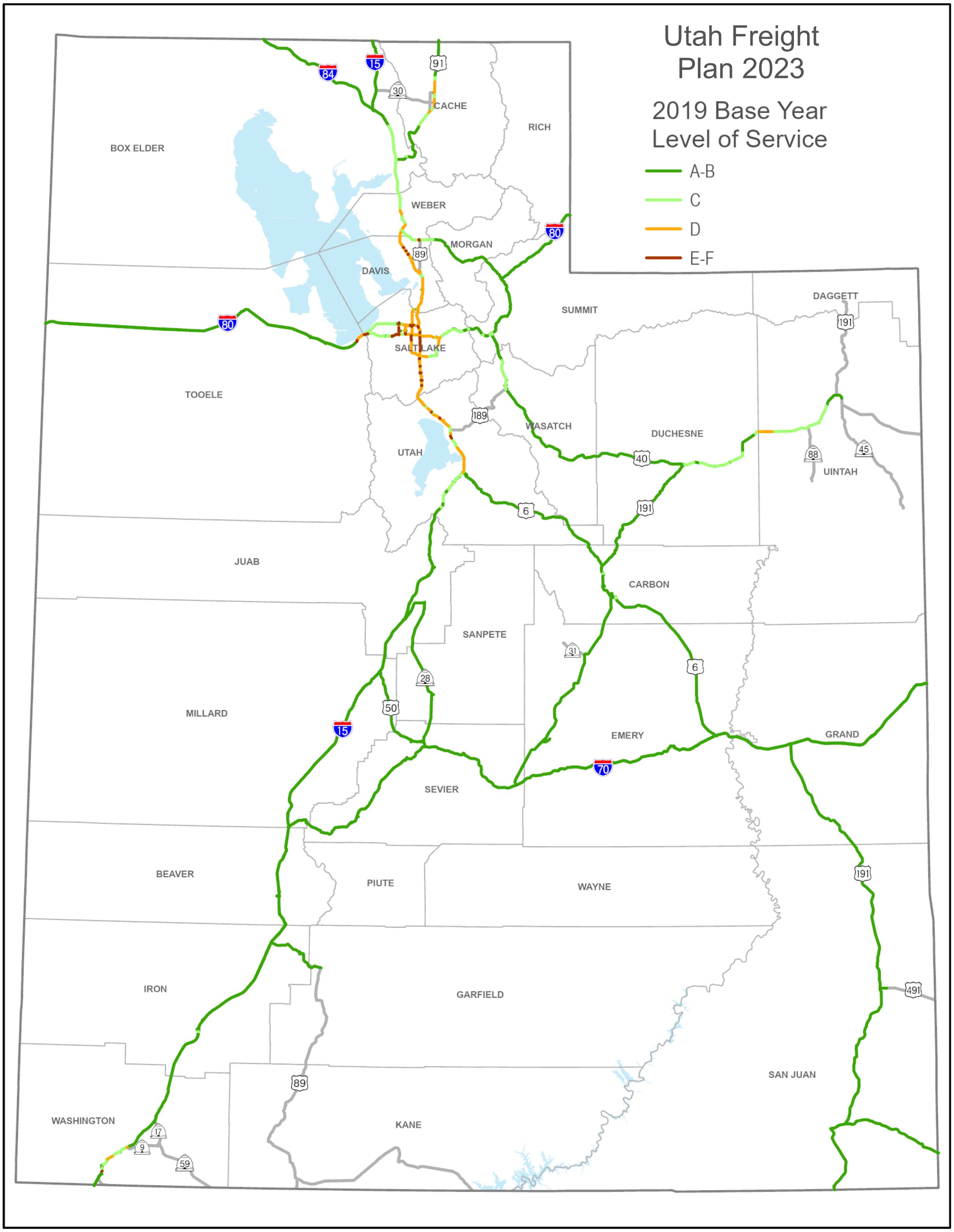


Figure 8-2. Highway Freight Network 2040 No Build Level of Service

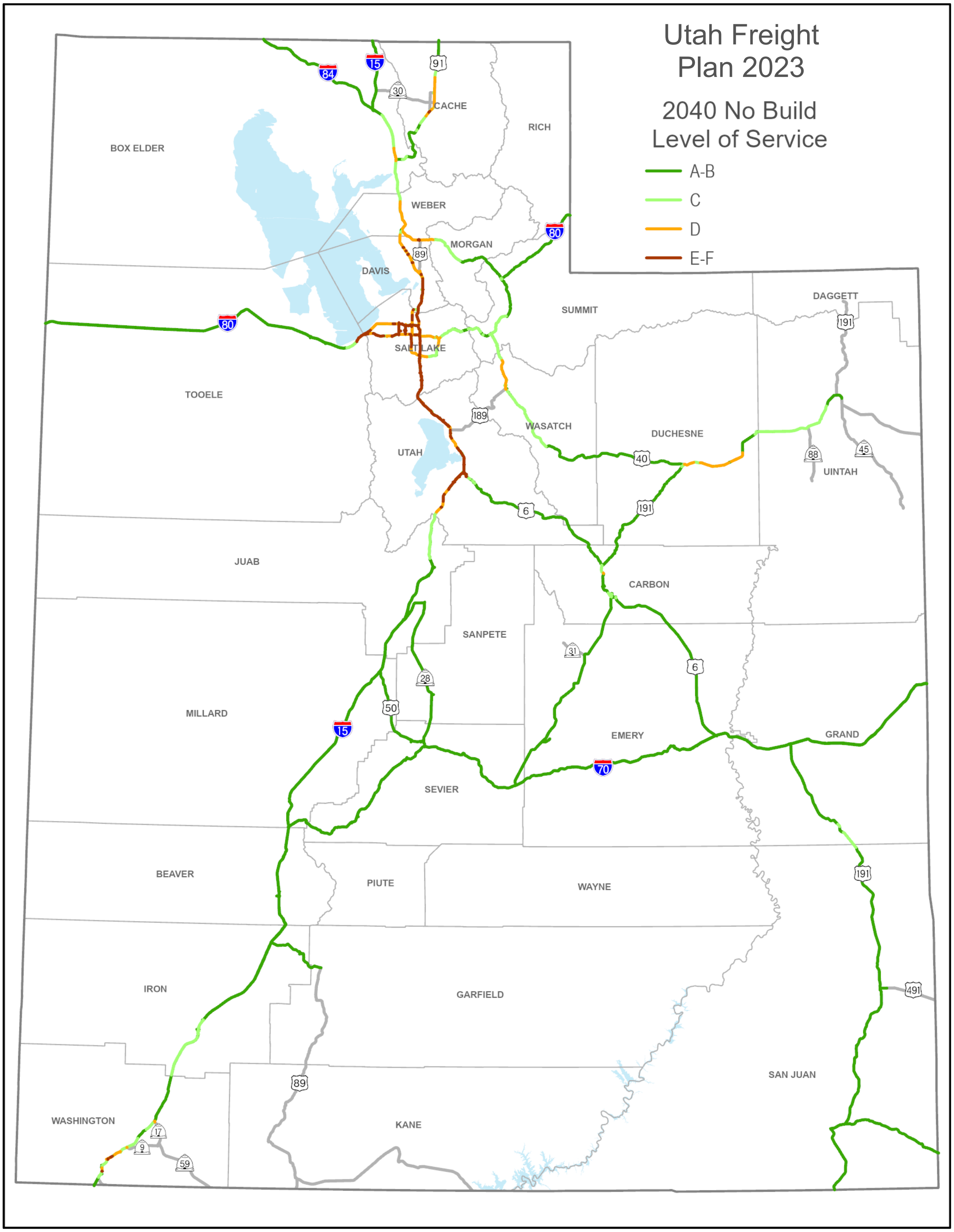
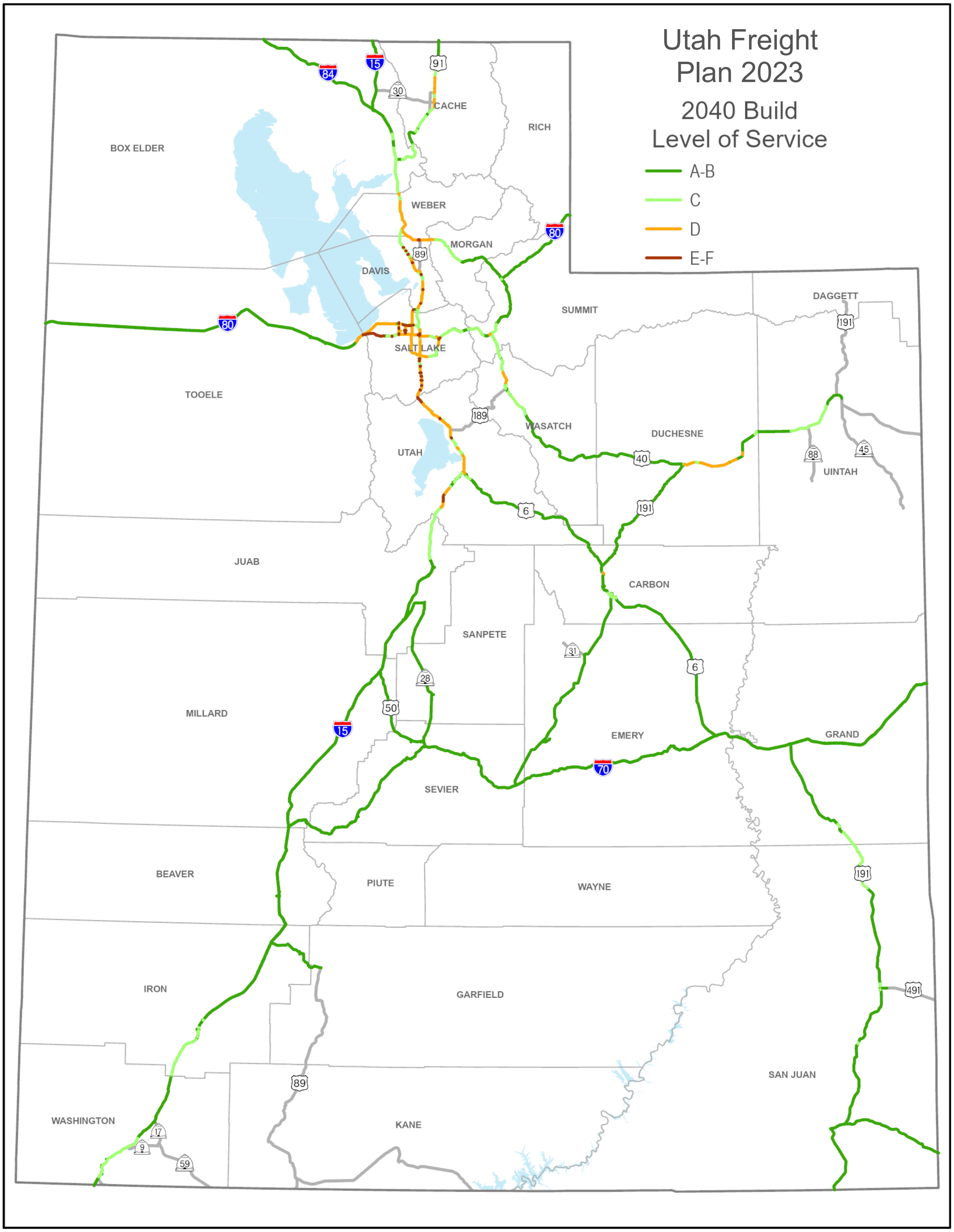


Figure 8-3. Highway Freight Network 2040 Build Level of Service



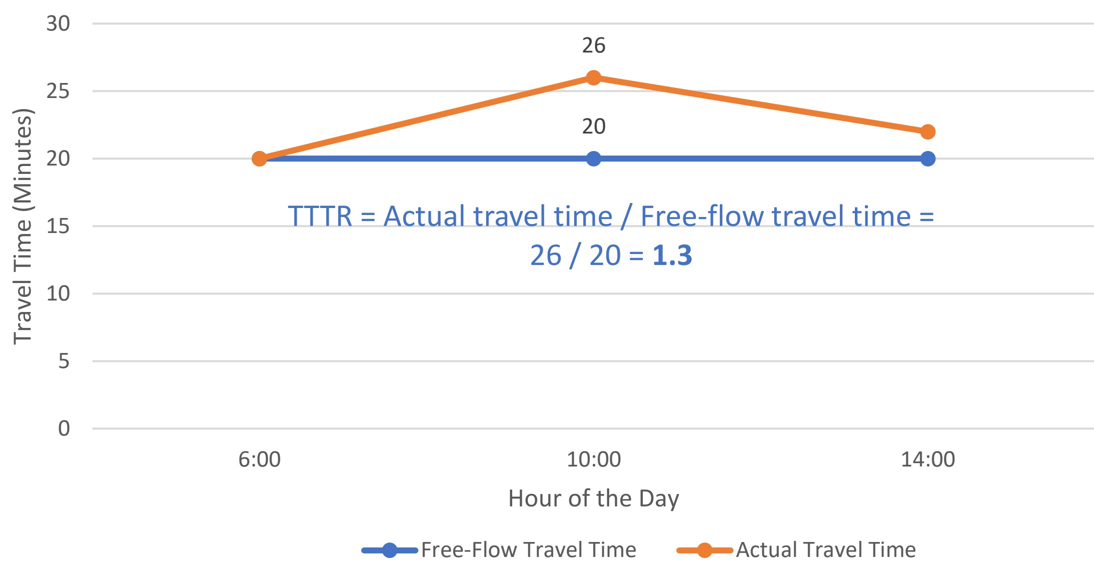
8.2 Truck Travel Time Reliability Index Performance Measure

The TTTR Index is the key freight performance measure required by FHWA to assess freight system performance. TTTR indicates the consistency of vehicle travel times, or the degree to which unexpected delays happen, and provides an avenue for DOTs to understand the impacts of congestion and unplanned delays on freight stakeholders.

FHWA requires state DOTs to establish two- and four-year TTTR targets (for 2019 and 2021 respectively). UDOT's TTTR targets are shown in Table 8-1. Those targets were reported to FHWA in the state's baseline performance period report in 2018. State DOTs had the option to adjust the 2021 four-year targets in their mid-performance period progress reports to FHWA in 2020.

The TTTR Index is the ratio of the travel time during the peak period to the time required to make the same trip at free-flow speeds. A value of 1.3, for example, indicates a 20-minute free-flow trip requires 26 minutes during the peak period (demonstrated in Figure 8-4). A TTTR Index higher than one indicates lower travel reliability and a longer travel time than traveling at free-flow speeds.

Figure 8-4. TTTR Calculation Example



8.2.1 Methodology

Data used to measure the TTTR Index is from the FHWA's NPMRDS, which includes truck travel speeds collected from truck GPS devices. The truck travel speed data is then transformed into travel times for the entire Interstate Highway System for the TTTR calculation.

TTTR Index reporting is divided into five periods:

- Morning peak (6:00 a.m. to 10:00 a.m., Monday-Friday)
- Midday (10:00 a.m. to 4:00 p.m., Monday-Friday)
- Afternoon peak (4:00 p.m. to 8:00 p.m., Monday-Friday)
- Weekends (6:00 a.m. to 8:00 p.m., Saturday-Sunday)
- Overnight (8:00 p.m. to 6:00 a.m., all days).

The TTTR ratio was generated by dividing each segment's 95th percentile truck travel time by the normal truck travel time (50th percentile). Each segment's largest ratio of the five periods was then weighted by length.

8.2.2 TTTR in Utah

This section examines the TTTR Index at statewide and corridor levels. Table 8-1 presents Utah's statewide TTTR Index ratings between 2018 and September 2022 and the state targets (available for 2019 and 2021). Utah's TTTR Index has fluctuated but has overall hovered around 1.2 except for 2020, in which the TTTR Index dropped to 1.13. The drop is likely due to an overall decrease in traffic during part of the COVID-19 pandemic. The TTTR Index in 2019 (1.23) failed to meet the state target of 1.2, but the index decreased to 1.18 and reached the raised target of 1.3 in 2021.

Table 8-1. Utah's Statewide TTTR Index and Targets

Measure	2018	2019	2020	2021	2022 (through Sept.)
UDOT TTTR Targets	-	1.2	-	1.3	-
TTTR Index on Interstates	1.2	1.23	1.13	1.18	1.19

Source: CPCS analysis of NPMRDS data, 2022; FHWA State Biennial Reports, 2018 & 2020; UDOT.

Eleven bottlenecks were identified using the TTTR Index and UDOT's 2021 TTTR target (displayed in Figure 8-5 and listed in Table 8-2).[1] All bottlenecks contain multiple segments with a TTTR Index higher than UDOT's target of 1.3 and are located in the Salt Lake City metropolitan area on I-15 and I-215. These bottleneck are in urban areas that experience high volumes of passenger and truck traffic. Element 9 outlines proposed projects that could help improve the freight movements in the identified bottleneck locations.

[1] It is worth noting that the TTTR Index revealed a few other potential truck bottlenecks, such as the I-80 segment east of Wendover and I-15 north of the Arizona-Utah border. The low travel reliability at these two locations is likely due to trucks traveling through the UDOT Motor Carrier Division Ports of Entry at various speeds. After discussion with UDOT, the project team decided to remove them from the bottleneck list.

Figure 8-5. Utah's Truck Bottlenecks on the Interstate Highway System

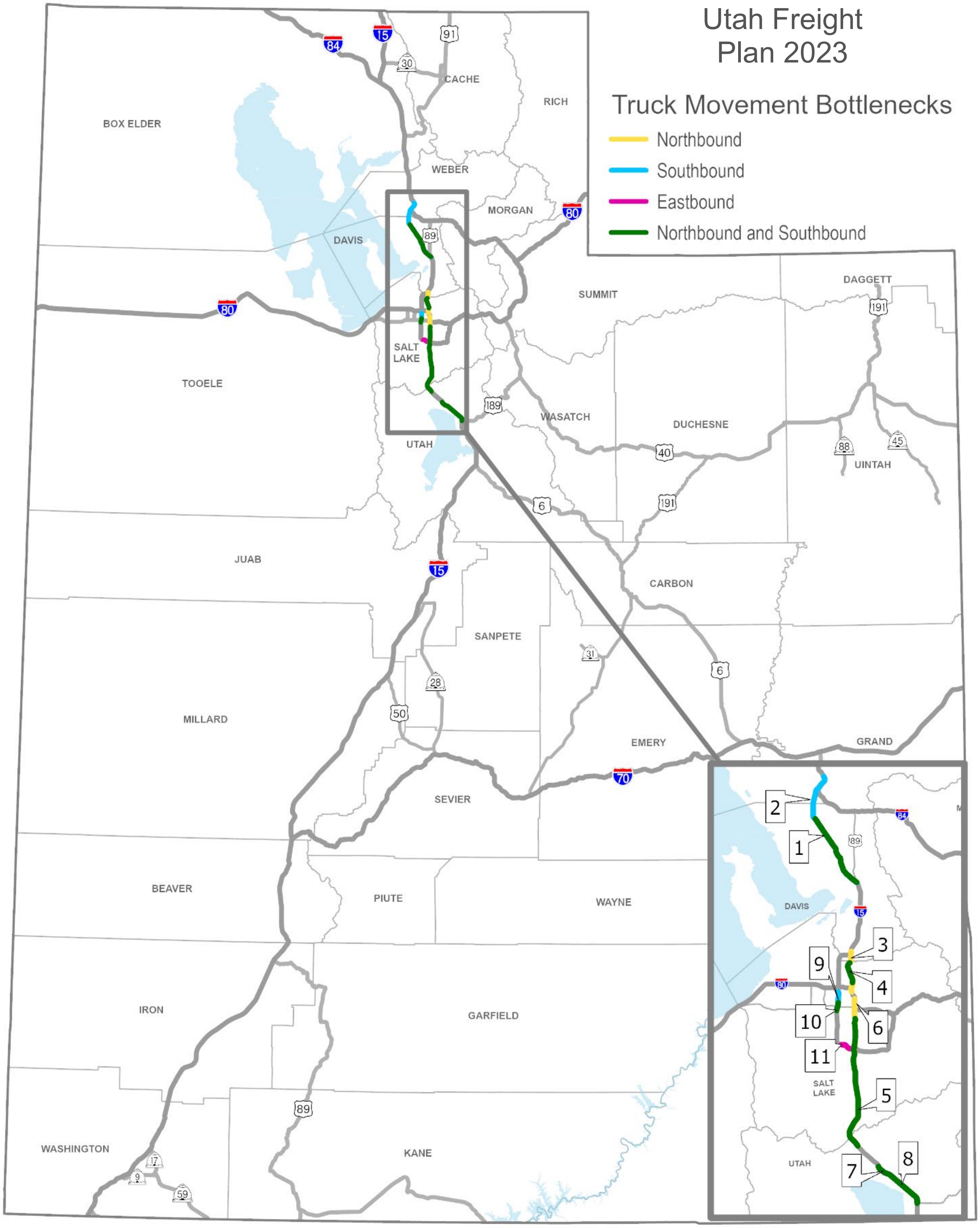


Table 8-2. Utah's Truck Bottlenecks List

	UDOT Road Segment	Begin Milepost	End Milepost	Length	TTTR	Description
1	0015P	324.4	342.2	17.9	2.28	Northbound I-15, Farmington to Clearfield
2	0015N	271.9	279.8	7.9	1.75	Southbound I-15, Ogden to Farmington
3	0015P	272.2	280.0	7.7	1.68	Northbound I-15, 600 South to I-215
4	0015N	284.1	303.5	19.5	1.24*	Southbound I-15, Beck Street to 300 North
5	0015N	284.0	306.4	22.4	2.16	Southbound I-15, 3300 South to SR 92
6	0015P	12.2	13.5	1.3	1.55	Northbound I-15, SR 92 to 1300 South
7	0015N	19.0	21.6	2.6	1.53	Southbound I-15, Lehi Main Street to 800 North
8	0015P	18.9	20.1	1.2	1.29*	Northbound I-15, 800 North to Lehi Main Street
9	0215N	307.8	313.7	5.8	1.33	Southbound I-215, 1100 S to 2500 S
10	0215P	307.9	312.0	4.2	1.34	Northbound I-215, 2500 S to 1700 S
11	0215N	324.5	334.9	10.4	1.41	Eastbound I-215, Redwood Road to 700 West

Source: National Performance Management Research Data Set, 2021; HPMS; UDOT.

* These two bottlenecks contain multiple discrete segments with a TTTR Index higher than 1.3. The aggregated TTTR values become lower than 1.3 when factoring in segments with lower TTTR on the bottlenecks.

8.3 Strategies to Mitigate Congestion

Although not an exhaustive list, what follows is a summary of the current, planned or potential strategies to optimize mobility in Utah. Many of these strategies are also highlighted in Element 7.

8.3.1 Managed Motorways

Managed Motorways prevent congestion to improve travel time reliability and safety. Managed Motorways, or smart freeways, continuously monitor traffic flows and control access to the freeway with state-of-the-art ramp metering signal technologies. By applying contemporary and proven algorithms (i.e., ramp signal control formulas) that consider the system's larger operations, traffic becomes more consistent, which helps prevent congestion.

8.3.2 Interchange and Intersection Design

Routes that feature a high percentage of truck traffic are often not designed with trucks in mind. Many intersections along these roadways feature narrow turning radii that require trucks to cross into other lanes of traffic to complete a turn. Traffic signal timing along these routes is often not calibrated to account for the slower acceleration speed of trucks, resulting in congestion. Similarly, turn lanes are often not long enough to permit the queuing of multiple trucks from the travel lane. Applying the following strategies along major truck routes can optimize mobility, improve travel time reliability and safety.

1. Increase turning radii at intersections where freight truck traffic is high.
2. Calibrate traffic signal timing to better enable truck movement.
3. Increase the length of turn lanes at key locations near warehouses, oil refineries, and other truck facilities.

8.3.3 Acceleration and Deceleration Lanes

Freight trucks often move along routes with higher speed limits. Heavier vehicles, such as trucks, are slower when accelerating or decelerating. A traffic safety hazard is created when two streams of vehicles traveling at different speeds are forced to merge. At some locations, merging trucks impede the flow of traffic, because they are forced to merge into higher speed traffic without being able to accelerate to match the posted speed limit. In other locations, there is not adequate space for a truck to sufficiently decelerate in order to safely execute a turn without interfering with through-traffic. Potential strategies to address these issues include the following.

1. Construct acceleration/deceleration lanes at locations featuring high turning volumes for trucks.
2. Fully pave the shoulders of routes along the UHFN and intermodal connectors.

8.3.4 Climbing and Passing Lanes

Utah is a state comprised of rugged mountainous terrain that impacts many routes. Many bottleneck locations exist due to steep grades through Utah’s terrain. This reality combined with most freight being moved by trucks results in congestion due to slower truck operating speeds when ascending or descending grades. Similarly, when one truck is attempting to pass a slower truck, it may obstruct the movement of other vehicles. UDOT has made it a focus to identify these locations and construct climbing lanes on interstate and non-interstate highways. Potential strategies to address these grades include the following.

1. Continue to identify locations on interstates to construct climbing lanes.
2. Continue to identify locations on rural, two-lane highways to construct passing lanes.

8.3.5 Chain-Up Areas

As mentioned, trucks must traverse mountainous terrain in several locations, and truckers must contend with winter precipitation for a large portion of the year. Thus, segments of these routes require truckers to apply tire chains before proceeding. Unfortunately, many of the highway segments requiring chain-ups either do not provide chain-up areas or are insufficient in scale to accommodate the application of tire chains by truckers. Thus, drivers are often faced with a challenging dilemma: risk causing congestion and a fine when they become stuck after not applying tire chains or create congestion when unable to adequately park outside of the travel lane while applying chains. Potential strategies include the following.

1. Continue to identify locations where truck chain-up areas are needed.
2. Construct new chain-up areas featuring lighting and pavement.
3. Expand chain-up capacity at particularly busy locations.

ELEMENT 9. FREIGHT SYSTEM INVESTMENT PLAN

9.1 National Highway Freight Program Opportunities

9.1.1 Overview

As an extension of the Moving Ahead for Progress in the 21st Century Act (MAP-21) and the Fixing America's Surface Transportation (FAST) Act, the IIJA continued the National Highway Freight Program (NHFP)'s efforts to fund projects that improve the efficient movement of goods along the National Highway Freight Network. To be eligible for NHFP funds, states must complete an FHWA-approved State Freight Plan every four years, including a Freight System Investment Plan that lists priority projects for NHFP funding and details when the funds will be used and matched.

Table 9-1 shows the NHFP funding apportioned to Utah between FY 2021 and FY 2026.

Table 9-1. NHFP Funding Apportioned to Utah

Fiscal year	2021	2022	2023	2024	2025	2026
Estimated Utah Apportionment	$13.0 Million (M)	$12.0 M	$12.3 M	$12.5 M	$12.8 M	$13.0 M

Source: FHWA

9.1.2 NHFP-Funded Projects

Utah's Statewide Transportation Improvement Program (STIP) is a six-year highway and transit project work plan that outlines how UDOT will spend their transportation funds on planning, design, construction, and other projects. Utah's STIP is maintained daily and documents the state's compliance with the FAST Act and IIJA as well as plans for any upcoming transportation projects on state, county, and city highway systems. Projects are selected for NHFP funding from Utah's 2023-2028 STIP.

Performance Measures and Project Selection

UDOT has developed a series of performance measures to assess the condition of Utah roadway systems from three angles aligning with UDOT's strategic goals: safety, preservation, and mobility. UDOT intends to utilize those measures – truck AADT, CMV accident counts and severity, bridge and pavement conditions, and TTTR – to inform future freight funding allocation and project selection, providing the agency with another planning tool guiding its decision-making.

UDOT has traditionally rolled over unused funding from prior FYs' NHFP funding. Table 9-2 on the next page details the project UDOT has identified for the NHFP funding. The remaining NHFP funding (including funds from the prior years) will be allocated to project opportunities derived from the STIP and other planning activities in a future amendment.

Table 9-2. **National Highway Freight Program (NHFP) Funded Projects**

Project Name	Project Description	FY21	FY22	FY23	FY24	FY25	FY26	FY27	FY28	Matching Funds	Project Total
Statewide Weigh-in-Motion Installations	Install multiple weigh-in-motion (WIM) stations throughout the state.	0.00	0.00	0.00	$4,661,500	0.00	0.00	0.00	0.00	$338,500	$5,000,000
SR-162 & SR-262 Safety and Energy Corridor Project*	Improve safety and maintain a state of good repair.	0.00	0.00	0.00	0.00	$23,307,500	0.00	0.00	0.00	$1,692,500	$25,000,000
TOTAL		**$0.00**	**$0.00**	**$0.00**	**$4,661,500**	**$23,307,500**	**$0.00**	**$0.00**	**$0.00**	**$2,031,000**	**$30,000,000**

*Project only includes the NHFP portion for SR-162. There is a total of $72,920,779 in other funds on the project.

The $5-million Statewide Weigh-in-Motion Installation project will be funded by $4.66 million NHFP funding and a $338,000 state matching fund in FY 2024. WIM systems are designed to measure the weights of trucks and detect overweight vehicles while keeping goods moving. This project will install a series of WIM devices across Utah to help support safe and efficient goods movements and mitigate pavement deterioration caused by heavy vehicles.

SR-162 and SR-262 Safety and Energy Corridor project will be funded by $23.3 million NHFP funding and a $1,692,500 state matching fund in FY 2025. This project will improve corridor safety and maintain in a good state of repair access to the Running Horse Pipeline petroleum terminal, located within the Navajo Nation. The project will also provide improved roadway conditions for residents and visitors to the reservation.

9.2 Other Freight System Funding Opportunities

In addition to the NHFP, states can take advantage of a variety of other funding opportunities under IIJA. $2.2 billion has been apportioned to Utah in 2023 for over 168 projects.[1] Besides NHFP, IIJA also provides funding for non-NHFN highways and other modal projects. Utah can leverage the select IIJA grant program funding listed in Table 9-3 to invest in other STIP projects to address critical goods movement needs and issues outside of the NHFN.

Table 9-3. Select IIJA Grant Programs

Program	Category	Description
National Infrastructure Project Assistance (Mega Projects)	Roads, Bridges, and Major Projects	Supports large, complex projects that are difficult to fund by other means and likely to generate national or regional economic, mobility, or safety benefits.
Local and Regional Project Assistance (Rebuilding American Infrastructure with Sustainability and Equity [RAISE])	Roads, Bridges, and Major Projects	Supports projects that will have significant local or regional impact and improve transportation infrastructure.
Nationally Significant Multimodal Freight and Highway Projects (INFRA)	Roads, Bridges, and Major Projects	Supports multimodal freight and highway projects of national or regional significance.
Rural Surface Transportation Grant Program (RURAL)	Roads, Bridges, and Major Projects	Supports projects to improve and expand surface transportation infrastructure in rural areas.
Bridge Investment Program	Roads, Bridges, and Major Projects	Supports projects to improve bridge and culvert condition, safety, efficiency, and reliability.
Consolidated Rail Infrastructure and Safety Improvements (CRISI)	Freight and Passenger Rail	Supports projects that improve the safety, efficiency, and reliability of intercity passenger and freight rail.

[1] Investing in America: President Biden's Bipartisan Infrastructure Law is Delivering in Utah, FHWA. May 2023. Link. Accessed in June 2023.

Program	Category	Description
Railroad Crossing Elimination Program	Safety	Supports highway-rail or pathway-rail grade crossing improvement projects that focus on improving the safety and mobility of people and goods.
Port Infrastructure Development Program (PIDP) Grants	Ports and Waterways	Supports projects that improve the resiliency of ports, as well as projects that reduce or eliminate port-related criteria pollutant or greenhouse gas emissions.
Reduction of Truck Emissions at Port Facilities	Ports and Waterways	Supports projects that reduce truck idling and emissions at ports, including through the advancement of port electrification.
Advanced Transportation Technologies & Innovative Mobility Deployment (ATTIMD)	Roads, Bridges, and Major Projects	Supports projects to deploy, install, and operate advanced transportation systems.
Strengthening Mobility and Revolutionizing Transportation (SMART)	Technology	Supports demonstration projects focused on advanced smart community technologies and systems in order to improve transportation efficiency and safety.
Promoting Resilient Operations for Transformative, Efficient, and Cost-Saving Transportation (PROTECT)	Resilience	Supports planning, resilience improvements, community resilience, evacuation routes, and at-risk coastal infrastructure.
Airport Infrastructure Grants	Airports and FAA Facilities	Supports projects that address the aging infrastructure of the nation's airports, influencing airport runways, taxiways, and safety and sustainability projects. Includes the Airport Terminals Program and Contract Tower Competitive Grant Program.

Source: White House, Build.gov, https://www.whitehouse.gov/build/?utm_source=build.gov; USDOT, SMART Grants Program, https://www.transportation.gov/grants/SMART.

Table 9-4 lists previous grants awarded to freight-related projects in Utah. Utah has advanced a series of projects related to freight infrastructure and advanced transportation technology in rural and urban areas across the state. Utah can continue to apply to IIJA grant programs to fund crucial transportation projects identified in the STIP projects at the state, county, and city levels.

Table 9-4. Previous Grants Awarded to Freight-Related Projects in Utah

Project	Project Description	Program	Funding Awarded
Planning and Optimizing a Multi-Modal Logistics Center in Southern Utah	RAISE funded a market assessment and business case analysis for an intermodal logistics center and related infrastructure needs to reduce truck transport and expand freight rail movement	RAISE	$445,000
Brush Wellman Road	Millard County used project funds to reconstruct 14 miles of rural roadway from Jones Road to the Juab/Millard County line.	BUILD	$7,994,000
Baker Canyon and Dog Valley Climbing Lanes Project	TIGER funded a climbing lane construction project on I-15 northbound and southbound in Millard County, Utah.	TIGER	$15,000,000
Northwest Quadrant Freight Mobility Project	UDOT was awarded funds to add roadway capacity, a new roadway/rail grade separation, and new unit-train capacity.	INFRA	$25,000,000
Vineyard Rail Consolidation Project	The CRISI grant awarded a project that abandoned 2 miles of track running along Geneva Road in Vineyard and constructed new leads from the Provo Subdivision track.	CRISI	$6,839,272
Connected Communities Program	Utah DOT will use the funding for its Connected Communities program to expand connected vehicle technology and capabilities statewide with a focus on disadvantaged and rural communities.	ATTAIN	$5,000,000
Enabling Trust and Deployment Through Verified Connected Intersections	Similar to the state’s Connected Communities Program, Utah used SMART grant funds to prototype a Connected Intersection Corridor and develop a plan for nationwide V2X systems deployment	SMART	$1,855,000
Feasibility and Needs Study for I-84 Bridges	Utah DOT was awarded $800,000 to conduct a feasibility study to inspect and identify maintenance needs for 40 bridges along I-84 in rural Utah.	Bridge Investment Grant Program	$800,000
Salt Lake City International Airport Expansion	The FAA awarded Salt Lake City International Airport funds to replace aging infrastructure in its concourses, including 16 contact gates and 5 permanent hardstand positions to improve the overall passenger experience.	Airport Infrastructure Grants	$29,000,000

Source: Investing in America: President Biden’s Bipartisan Infrastructure Law is Delivering in Utah, May 2023.

ELEMENT 10. COMMERCIAL MOTOR VEHICLE PARKING FACILITIES

Truck parking shortages are a national safety concern. Commercial truck drivers need access to safe, secure, and accessible truck parking. With the projected growth of truck traffic, the demand for truck parking will continue to outpace the supply of public and private parking facilities and will only exacerbate the truck parking problems experienced in many regions.

An inadequate supply of truck parking spaces can result in negative consequences. Tired truck drivers may continue to drive because they have difficulty finding a place to park for rest. Truck drivers may choose to park at unsafe locations, such as on the shoulder of the road, entrance and exit ramps, or vacant lots, if they are unable to locate official, available parking.

UDOT recognizes that the private sector provides much of the truck parking in Utah at commercial truck stops. Currently, UDOT is developing the Utah Truck Parking Study. Completion for this study is anticipated in late 2023.

10.1 Utah Truck Parking Study History

As the “Crossroads of the West” for highway freight traffic, truck parking is an important issue that UDOT has studied. In August 2010, UDOT received a grant for the Utah I-15 Truck Parking Study, which was funded by the Truck Parking Initiative from FHWA through Section 1305, Truck Parking Facilities. The purpose of the grant was to complete a truck parking study along the approximately 400-mile I-15 corridor in Utah and its Interstate connections. The study included the formation of a project management committee that guided the study, which included the following work:

1. Reviewed previous truck parking studies including the National Commercial Motor Vehicle (CMV) Drivers Survey.
2. Reviewed Utah safety data focused on large truck crashes.
3. Conducted Utah’s own survey of more than 400 CMV drivers along the I-15 corridor.
4. Performed an inventory of truck parking on the Interstates in Utah.
5. Identified current and future truck parking demand using Freight Analysis Framework Version 3.
6. Conducted focus groups with commercial truck stop facility managers and CMV drivers for reaction to the survey results, their perception of truck parking along the I-15 corridor, as well as to explore possible truck parking solutions.
7. Conducted a limited warehouse survey for truck parking.
8. Worked with private property owners for potential public/private partnerships for additional truck parking locations.

9. Developed and distributed 22,000 copies of the UDOT Truck Parking map.
10. Created a website that provided and housed the study information along with interactive maps, study presentations, final written report, and other study information.

Since the Utah I-15 Truck Parking Study, five major truck stops have been constructed at strategic locations on I-15 and I-70, providing much needed truck parking spaces. For additional information about truck parking in Utah, go to www.udot.utah.gov/truckparking.

Because of UDOT's preliminary analysis for the grant application for the Utah I-15 Truck Parking Study, UDOT received a $1.1 million grant in 2011 to construct 24 additional truck parking spaces at the Lunt Park Rest Areas in southern Utah. UDOT Region 4 constructed 12 new truck parking spaces on the northbound and southbound rest areas including parking spaces for oversized trucks.

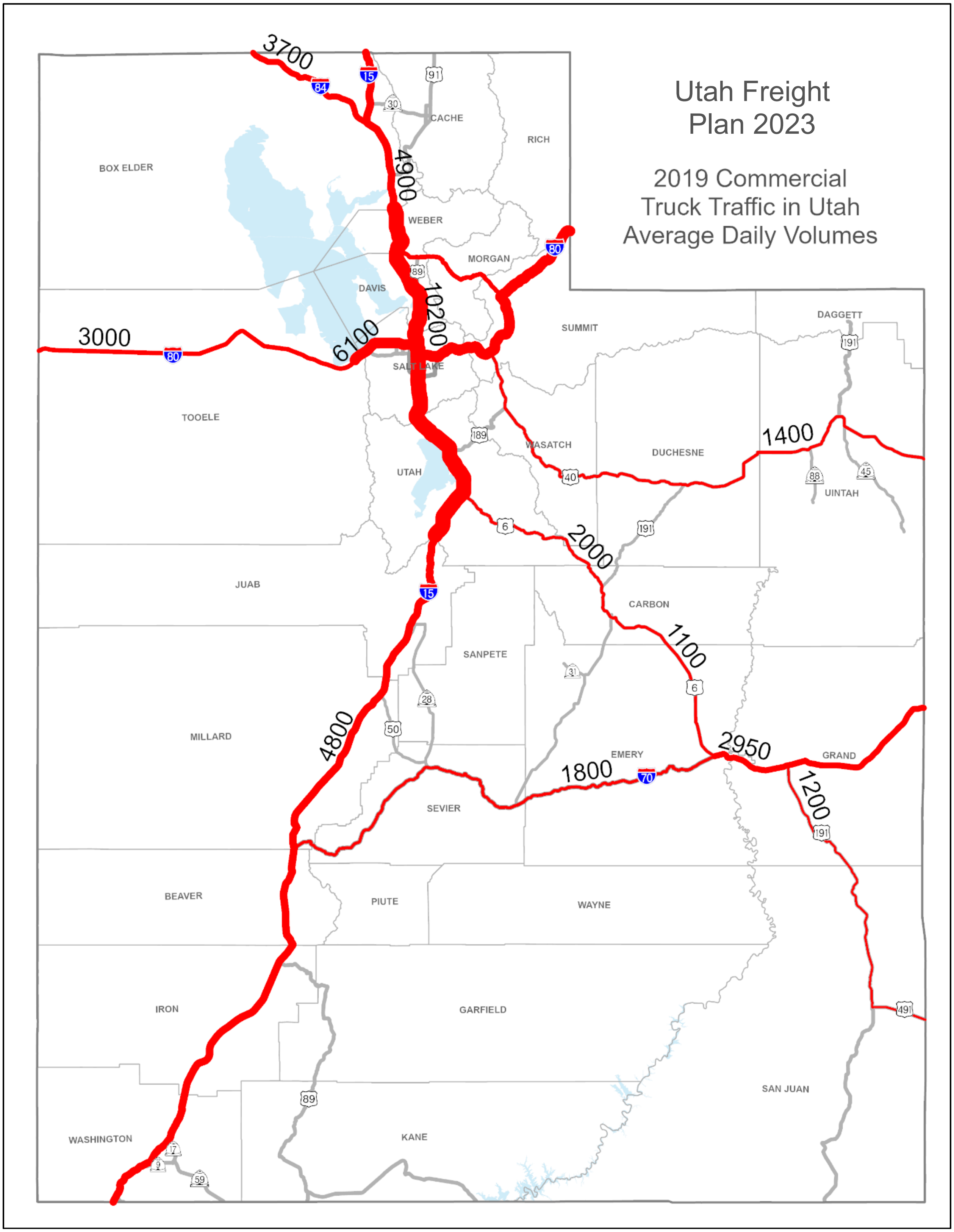
10.2 Commercial Truck Traffic Volumes in Utah

Truck Traffic volumes in Utah were calculated from UDOT's *Traffic on Utah Highways, 2019*, which provides AADT and truck percentages for state highways. Figure 10-1 shows the average daily truck traffic on the Interstate highways in Utah, as well as the U.S. 40 corridor from I-80 to the Colorado border and the U.S. 6 / U.S. 191 / U.S. 491 corridor from I-15 to the Colorado border. Truck volumes from 2019 were utilized because they were the most recent available as of writing that did not reflect the abnormal effects of the pandemic on freight traffic.

As shown in Figure 10-1, the highest average daily truck volumes peak at around 10,000 trucks per day on I-15 along the Wasatch Front. There are around 5,000 trucks per day on I-15 from Ogden to the Idaho border and 5,000 trucks per day on I-15 from the Wasatch Front south to Arizona. Truck volumes on I-80 range from 3,000 trucks per day west of Salt Lake County, around 6,000 trucks per day through Salt Lake County and around 6,500 trucks per day east of Salt Lake County to the Wyoming border.

Average truck traffic volumes on I-84 average around 3,000 per day from I-80 to I-15, and around 4,000 trucks per day from I-15 to the Idaho border. Truck volumes on I-70 are around 3,000 per day east of U.S. 6 and drop off to around 1,800 per day west of U.S. 6 to I-15. Truck volumes on the U.S. 6 / U.S. 191 / U.S. 491 corridor range from 2,000 per day on U.S. 6 near I-15 to around 1,000 trucks per day near Monticello. Truck volumes on the U.S. 40 corridor range from 1,400 trucks per day in Uintah County to 4,000 trucks per day near I-80.

Figure 10-1. 2019 Truck Volumes



Source: Traffic on Utah Highways, 2019, UDOT.

10.3 Utah Truck Parking Locations

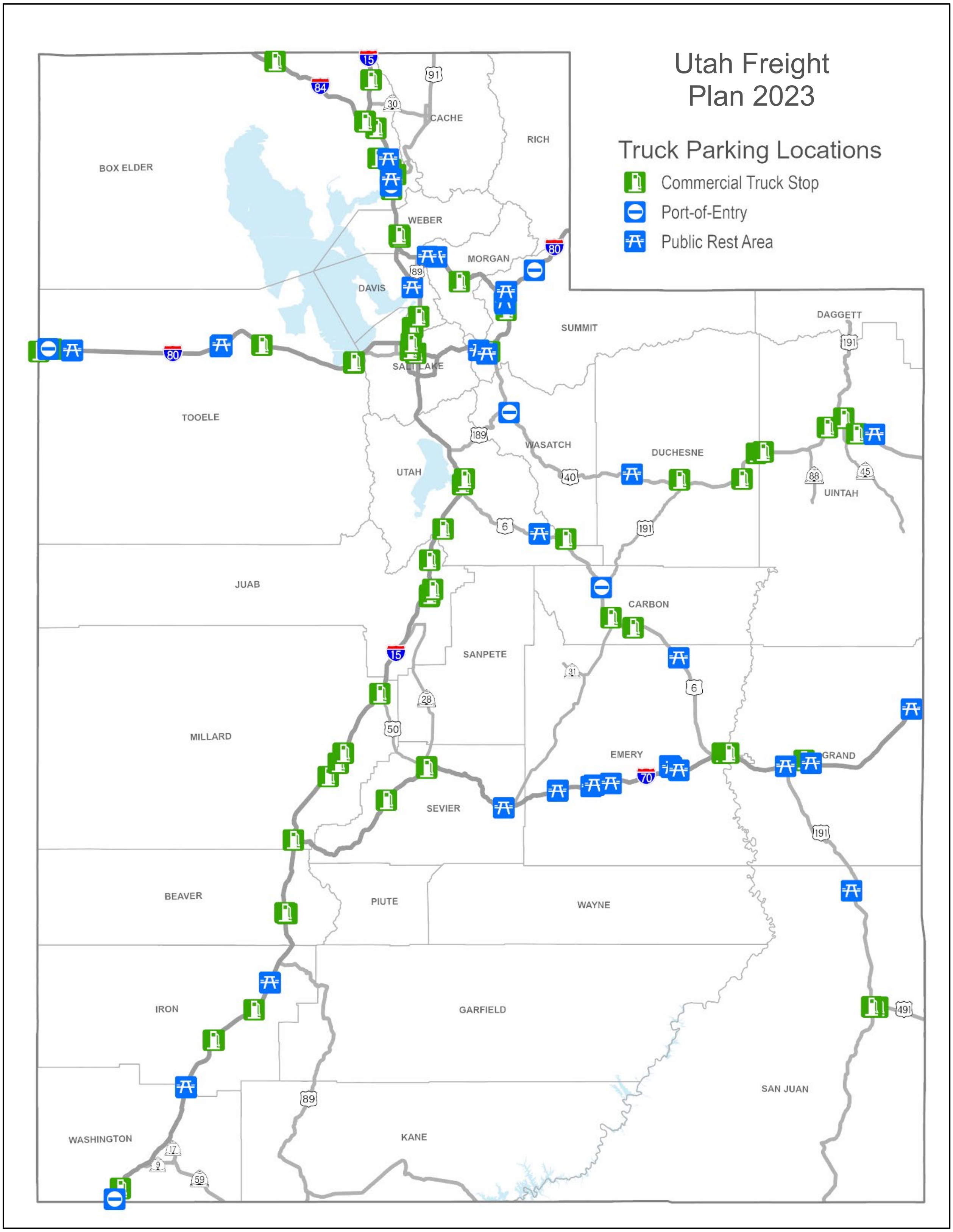
The most recent commercial truck parking facilities assessment was conducted in 2022. Truck parking facilities were evaluated for both public facilities such as rest areas and private facilities such as commercial truck stops. An inventory of truck parking facilities was conducted statewide and included truck parking locations on Interstates, the U.S. 6 / U.S. 191 / U.S. 491 corridor between I-15 and the Colorado border and the U.S. 40 corridor from I-80 to the Colorado border. Table 10-1 shows the number truck parking locations at rest areas, ports of entry, and commercial truck stops by Interstate and on the U.S. 6 / U.S. 191 / U.S. 491 corridor and the U.S. 40 corridor.

Table 10-1. Utah Truck Parking Locations by Freight Corridor

Freight Corridor	Number of Truck Parking Locations			
	Rest Areas	Ports of Entry	Commercial Truck Stops	Total
I-15 Corridor	8	4	36	**48**
I-70 Corridor	13	0	9	**22**
I-80 Corridor	10	3	8	**21**
I-84 Corridor	2	0	5	**7**
Interstates Total	**33**	**7**	**58**	**98**
U.S. 6 / U.S. 191 / U.S. 491 Corridor	4	3	6	**13**
U.S. 40 Corridor	2	1	8	**11**
TOTAL	**39**	**11**	**72**	**122**

Figure 10-2 shows the locations of the public and private truck parking facilities on Interstates, the U.S. 6 / U.S. 191 / U.S. 491 corridor, and the U.S. 40 corridor within the state. Note that truck parking locations on I-215 and SR-201 within Salt Lake County are included in the I-15 corridor.

Figure 10-2. Existing Truck Parking Locations on Freight Corridors



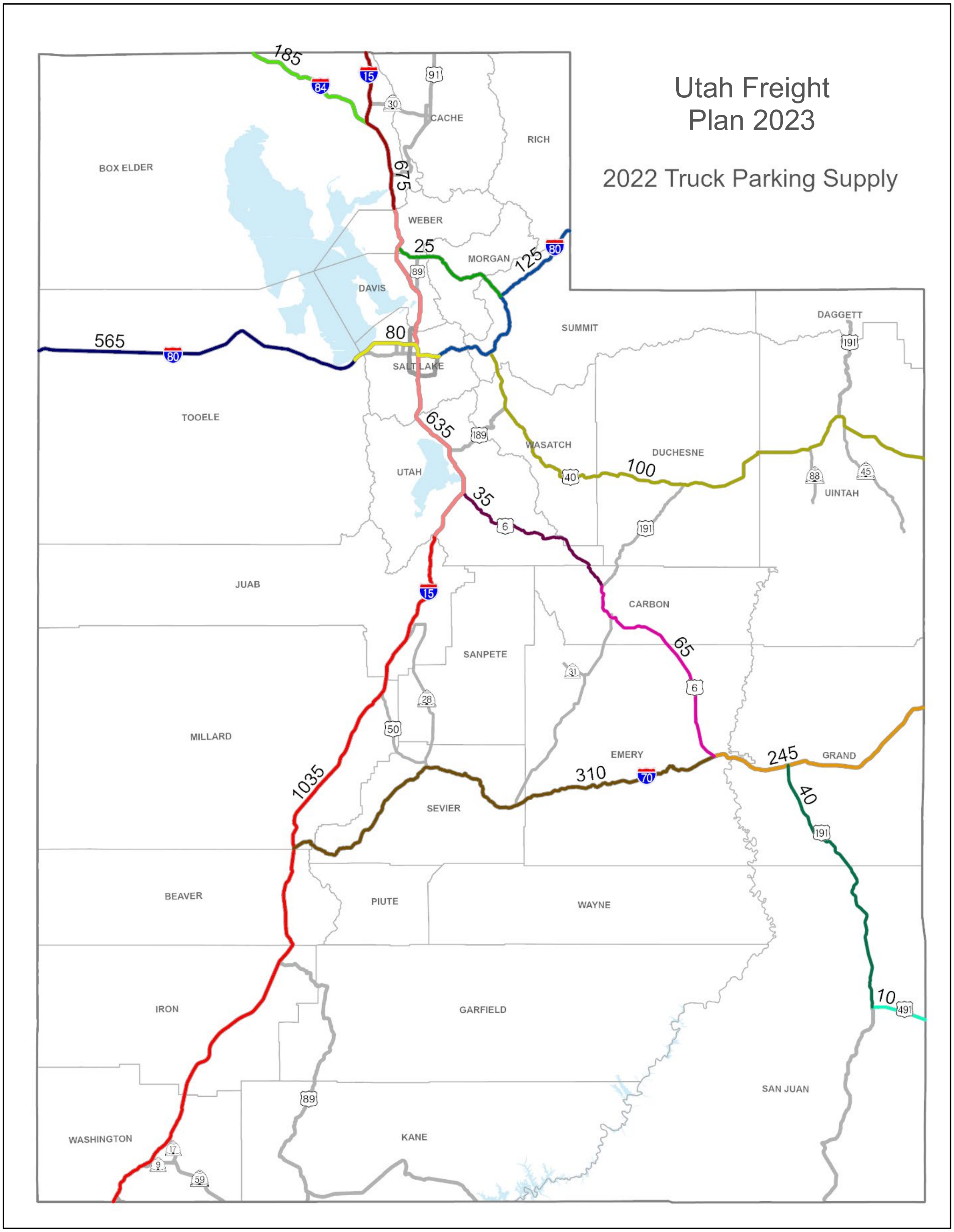
10.4 Utah Truck Parking Supply

An inventory of the existing truck parking supply on the Interstates and the U.S. 6 / U.S. 191 / U.S. 491 corridor in Utah was conducted to determine the number of existing truck parking spaces that are currently available. Table 10-2 details the number of truck parking spaces currently found on the critical freight corridors within the state of Utah including the total number of public spaces (rest areas, ports of entry) and private spaces (commercial truck stops) for each analysis segment. Figure 10-3 shows the existing truck parking supply for each analysis segment. Across the Interstates, U.S. 6 / U.S. 191 / U.S. 491 corridor, and the U.S. 40 corridor, there is a total of 4,130 truck parking spaces, with 560 spaces at public facilities and 3,570 spaces at private facilities.

Table 10-2. Utah Existing Truck Parking Supply

Critical Freight Corridor Segment	Existing Truck Parking Spaces		
	Public	Private	Total
I-15 from St. George to Santaquin	145	890	1,035
I-15 from Santaquin to Willard	20	615	635
I-15 from Willard to Idaho border	45	630	675
I-15 Corridor Total	**210**	**2,135**	**2,345**
I-70 from I-15 to US-6	75	235	310
I-70 from US-6 to Colorado border	35	210	245
I-70 Corridor Total	**110**	**445**	**555**
I-80 from Nevada border to Salt Lake County	65	500	565
I-80 in Salt Lake County	0	80	80
I-80 from Salt Lake County to Wyoming border	85	40	125
I-80 Corridor Total	**150**	**620**	**770**
I-84 from Idaho border to I-15	0	185	185
I-84 from I-15 to I-80	17	8	25
I-84 Corridor Total	**17**	**193**	**210**
U.S. 6 from I-15 to U.S. 191	28	7	35
U.S. 6 from U.S. 191 to I-70	20	45	65
U.S. 191 from I-70 to Monticello	10	30	40
U.S. 491 from Monticello to Colorado border	0	10	10
U.S. 6 / U.S. 191 / U.S. 491 Corridor Total	**58**	**92**	**150**
U.S. 40 from I-80 to Colorado border	15	85	100
U.S. 40 Corridor Total	**15**	**85**	**100**
TOTAL	**560**	**3,570**	**4,130**

Figure 10-3. Existing Truck Parking Spaces by Segment



10.5 Utah Truck Parking Demand

Truck parking demand is a key component to determining where truck parking needs exist on the Interstate and U.S. highway corridors in Utah. Once truck parking demand is determined, it can be compared against the existing truck parking supply to focus in on areas where there are shortages of truck parking.

10.5.1 Demand Formula

Truck parking demand for the analysis segments within the state of Utah was calculated using a parking demand model formula developed by the FHWA. A simplified version of the formula is:

$$D = THT \times P_{avg}$$

Where:

D = truck parking demand,

THT = Truck Hours of Travel per day on the analysis segment

P_{avg} = the average parking time per truck hour of travel.

The formula predicts peak hour truck parking demand based on the number of truck hours traveled per segment of highway, adjusting for seasonal variance, percent of long-haul versus short-haul trucks, and park-to-drive time per week.

10.5.2 Shortages and Surpluses

Using the parking demand formula, predicted peak hour truck parking demand was calculated for the each of the analysis segments on the Interstates, U.S. 6, U.S. 40, U.S. 191 and U.S. 491 within the state of Utah. Using the existing truck parking supply for the state of Utah, the truck parking shortage/surplus can be determined for each analysis segment. Table 10-3 below summarizes truck parking supply, peak hour truck parking demand, and the truck parking shortage/surplus for each of the analysis segments on the selected Interstates and U.S. highways in the state. Figure 10-4 details the truck parking shortage or surplus for each segment.

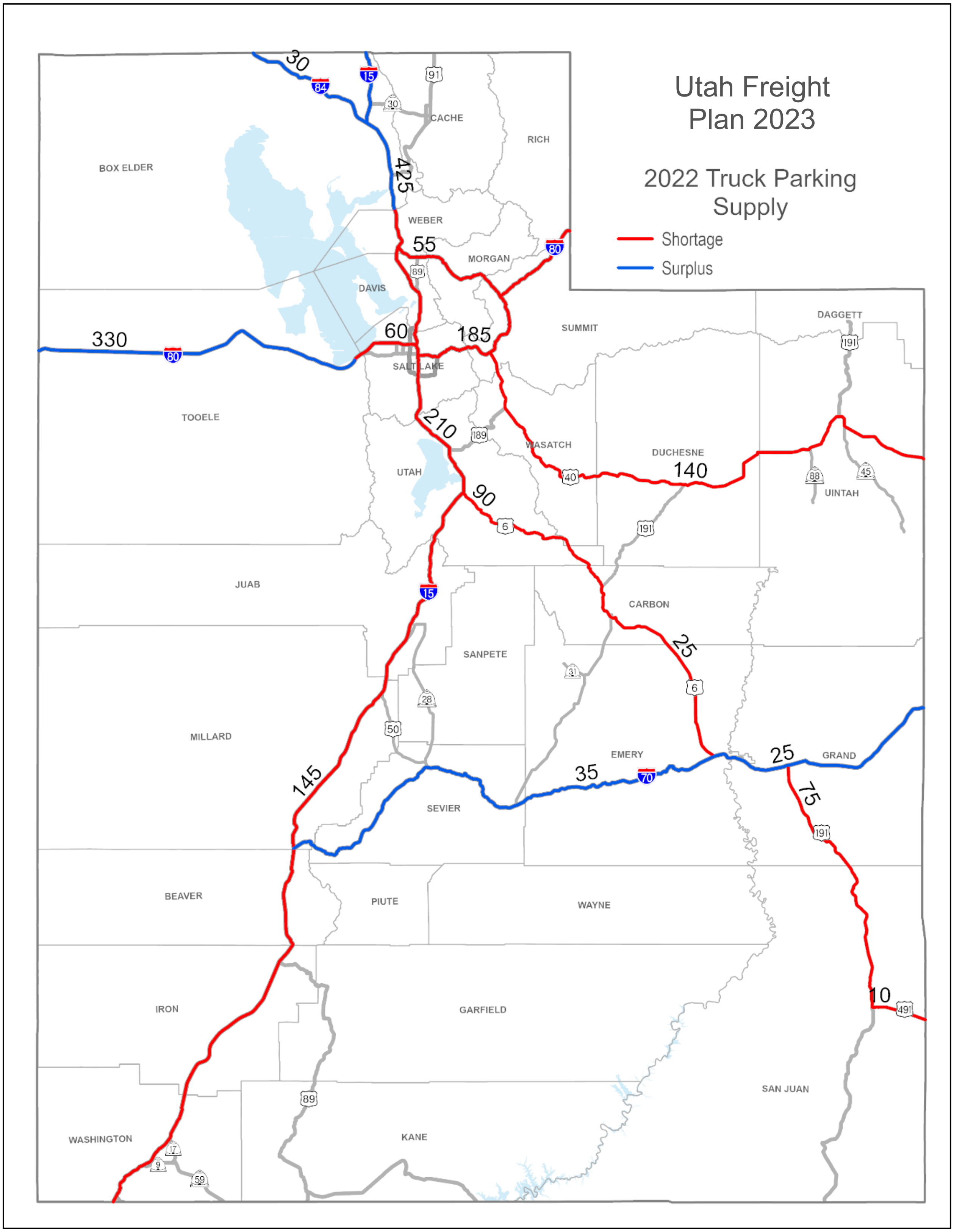
The underlying causes of Utah's truck parking shortages likely include:

1. Utah's rapid population growth. Utah was the fastest-growing state in the nation between 2010 and 2020. Other nearby Western states—including Idaho, Nevada, and Arizona—were in the top ten fastest-growing states in that same time period. With that population growth comes an increased demand for goods, resulting in additional trucks traveling to and through Utah.
2. A rapid increase in warehousing and distribution center space (especially in Salt Lake City's Northwest Quadrant).
3. Insufficient new truck parking capacity being constructed to keep up with demand.

Table 10-3. Truck Parking Shortages/Surpluses

Segment	Existing Truck Parking Spaces	Peak Hour Truck Parking Demand	Truck Parking Surplus/ Shortage
I-15 from St. George to Santaquin	1,035	1,180	-145
I-15 from Santaquin to Willard	635	845	-210
I-15 from Willard to Idaho border	675	250	425
I-70 from I-15 to U.S. 6	310	275	35
I-70 from U.S. 6 to Colorado border	245	220	25
I-80 from Nevada border to Salt Lake County	565	235	330
I-80 in Salt Lake County	80	140	-60
I-80 from Salt Lake County to Wyoming border	125	310	-185
I-84 from Idaho border to I-15	185	155	30
I-84 from I-15 to I-80	25	80	-55
U.S. 6 from I-15 to U.S. 191	35	125	-90
U.S. 6 from U.S. 191 to I-70	65	90	-25
U.S. 191 from I-70 to Monticello	40	115	-75
U.S. 491 from Monticello to Colorado border	10	20	-10
U.S. 40 from I-80 to Colorado border	100	240	-140

Figure 10-4. Existing Truck Parking Shortages/Surpluses



As shown in Figure 10-4, there is a shortage of 145 truck parking spaces on I-15 from St. George to Santaquin, a shortage of 210 truck parking spaces on I-15 along the Wasatch Front, and a shortage of 185 spaces on I-80 from Salt Lake County to the Wyoming border. U.S. 6 from I-15 to I-70 has a shortage of 115 spaces, and U.S. 191 and U.S. 491 have a shortage of 95 truck parking spaces from I-70 to the Colorado border. U.S 40 from I-80 to the Colorado border has a shortage of 140 truck parking spaces. The greatest need for new truck parking spaces exists on I-15 from St. George to Ogden and on I-80 from Salt Lake County to Wyoming.

Conversely, there is a surplus of truck parking spaces on I-80 from Wendover to Salt Lake County, on I-15 from Willard to the Idaho border, on the entirety of I-70 and on I-84 from Tremonton to the Idaho border. For the entirety of the state, combining the truck parking surplus and shortages on the critical freight routes results in a total net shortage of only 10 truck parking spaces.

10.6 Utah Commercial Truck Safety and Crash Analysis

When long haul truck drivers reach their federally mandated hours of service (HOS) limits in a location without available, legal parking, crashes involving drowsy truck drivers may occur as a result. This analysis seeks to examine these types of crashes as a means of identifying unmet truck parking needs. Five years of crash data (2017-2021) were used. When a crash occurs, the responding law enforcement officer completes a form describing the dynamics, involved parties, and context of the collision. These data are then verified and made available for query and download from the Numetric online portal. This analysis and all crash data are protected under 23 U.S.C. 407.

In addition to single and multiple unit trucks, commercial motor vehicles as defined in the crash data include a wide range of vehicle types such as tour buses or work vans. For the purposes of this analysis, the following vehicle types are defined as a “truck” that was included in this analysis:

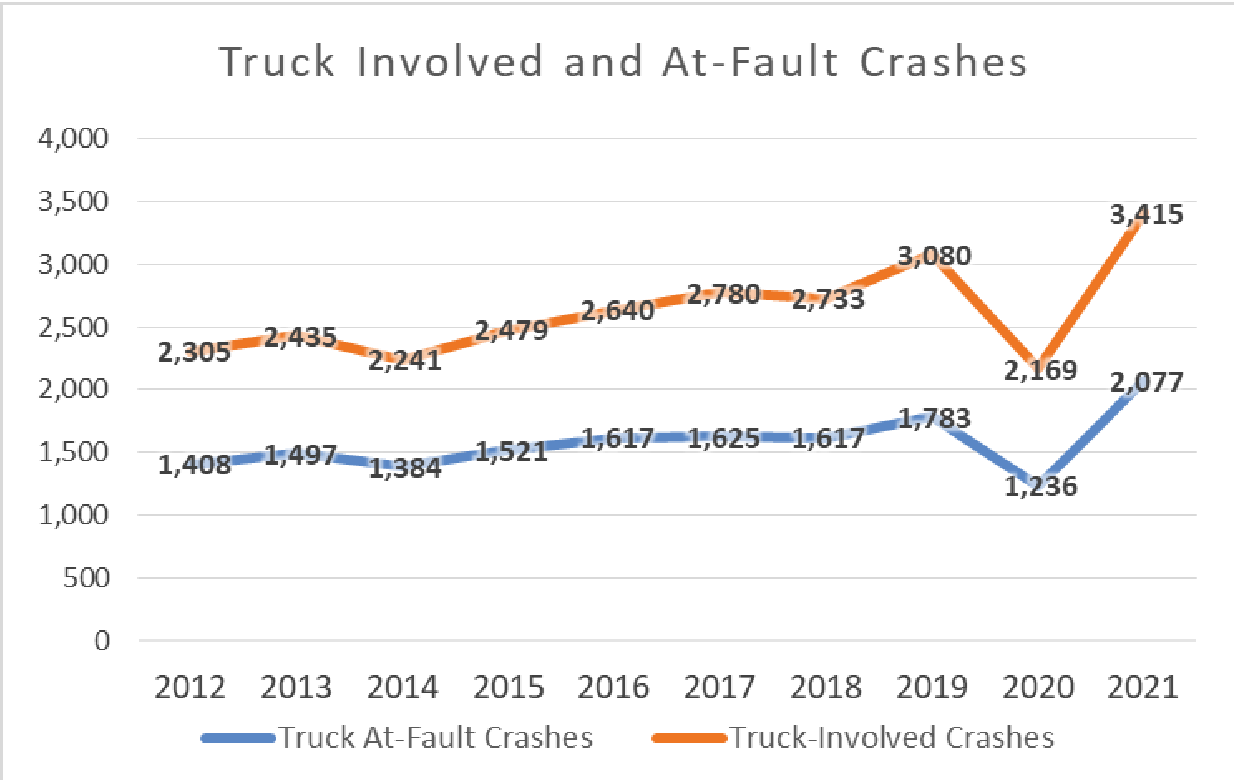
1. Single Unit Truck (3 or more axles)
2. Truck Tractor
3. Truck/Trailer
4. Heavy Truck Other

10.6.1 All Truck Crashes

From 2017 to 2021, there were 14,177 crashes that involved a truck as defined above. To better understand longer-term trends, Figure 10-5 shows the annual number of truck-involved crashes over the last decade. Except for 2014, 2018, and 2020, truck-involved crashes have increased each year between 2012 and 2021. Excluding the pandemic-related precipitous drop in 2020, the largest increase in numbers of crashes occurred between 2019 and 2021.

For added context, the number of these crashes where the truck driver was at-fault are also included. This shows that truck drivers are responsible for causing roughly 60 percent of these crashes. Further discussion regarding this sub-category of crash is included in Section 10.6.2.

Figure 10-5. Truck Involved and At-Fault Crashes (2012-2021)



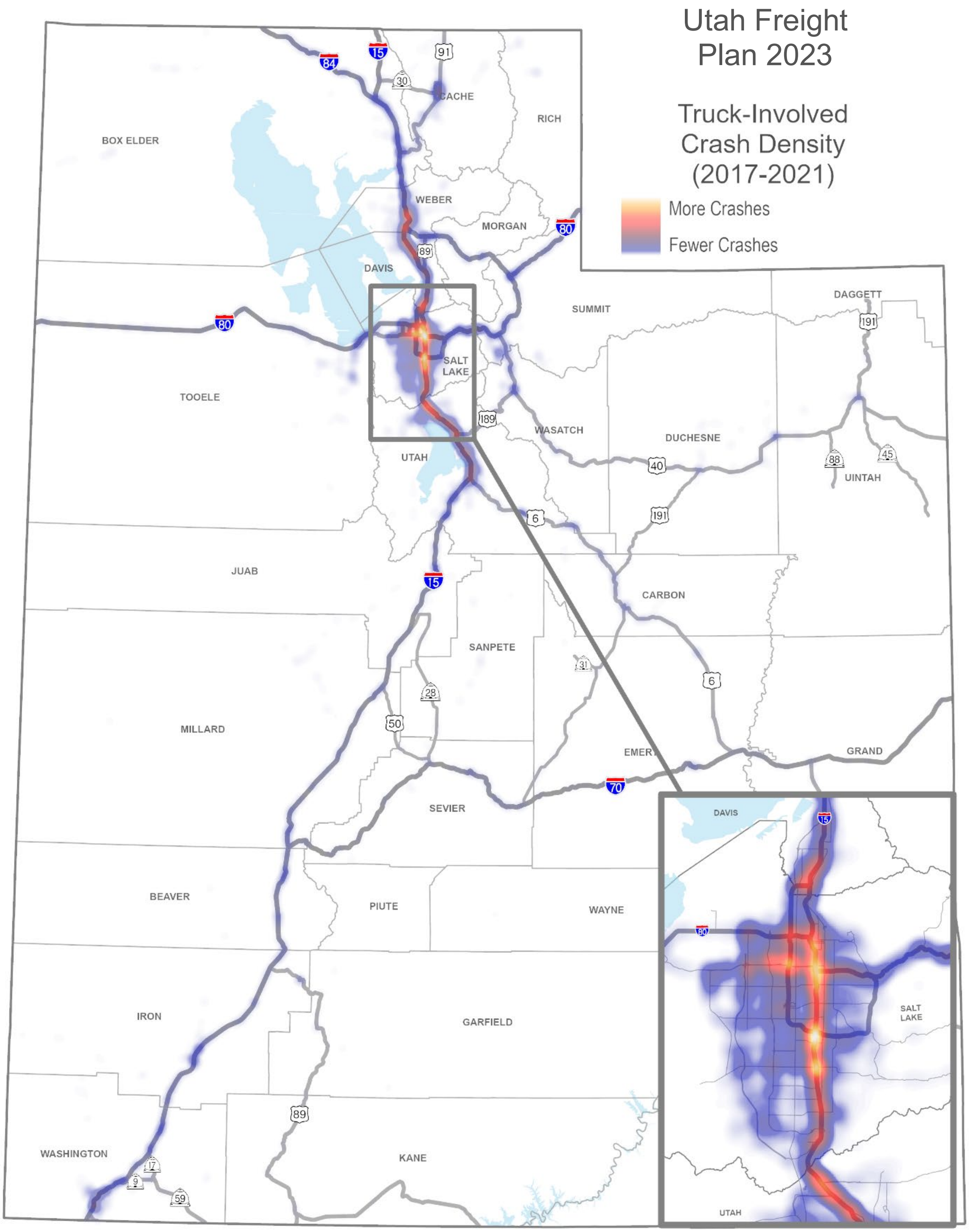
Crash data are protected under 23 U.S.C. 407.

Figure 10-6 shows concentrations of truck-involved crashes. There appears to be concentrations of these crashes in the following locations:

1. I-15 between I-80 and I-215 North
2. I-15 from I-215 South to approximately 9000 South
3. I-15 from the Utah County border to approximately American Fork

These locations are not particularly unexpected, given that they all feature large truck and vehicle volumes. State Route 201 is a limited access highway that accesses areas with large numbers of freight centers. This highway connects to I-15 between the northern and southern junctions of I-80. This corridor also experiences a high concentration of truck-involved crashes.

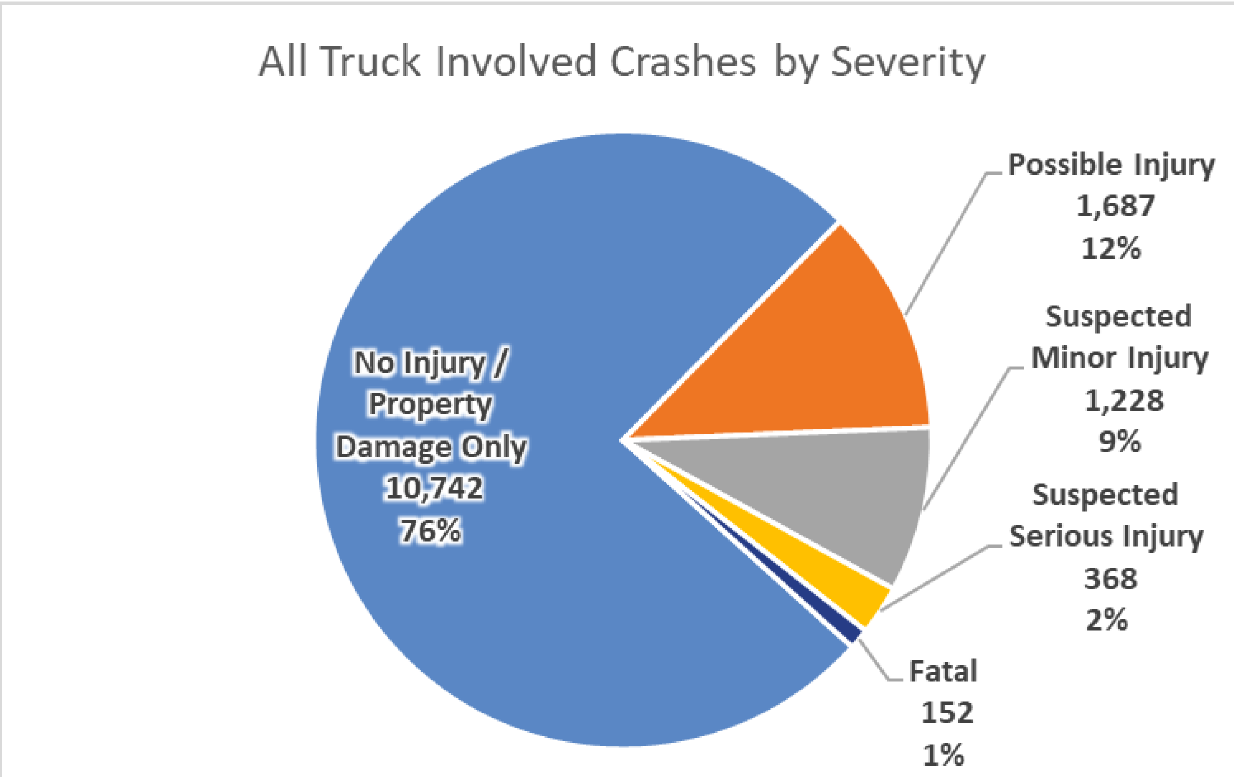
Figure 10-6. Truck-Involved Crash Density (2017-2021)



Crash data are protected under 23 U.S.C. 407.

Figure 10-7 shows the severity of crashes involving trucks. Slightly over three quarters of crashes resulted in only property damage without any injuries. Severe crashes refer to crashes that result in a suspected serious injury—typically extensive enough to require medical treatment—or a fatality. Four percent of crashes were severe with 152 involving fatalities.

Figure 10-7. All Truck Involved Crashes by Severity



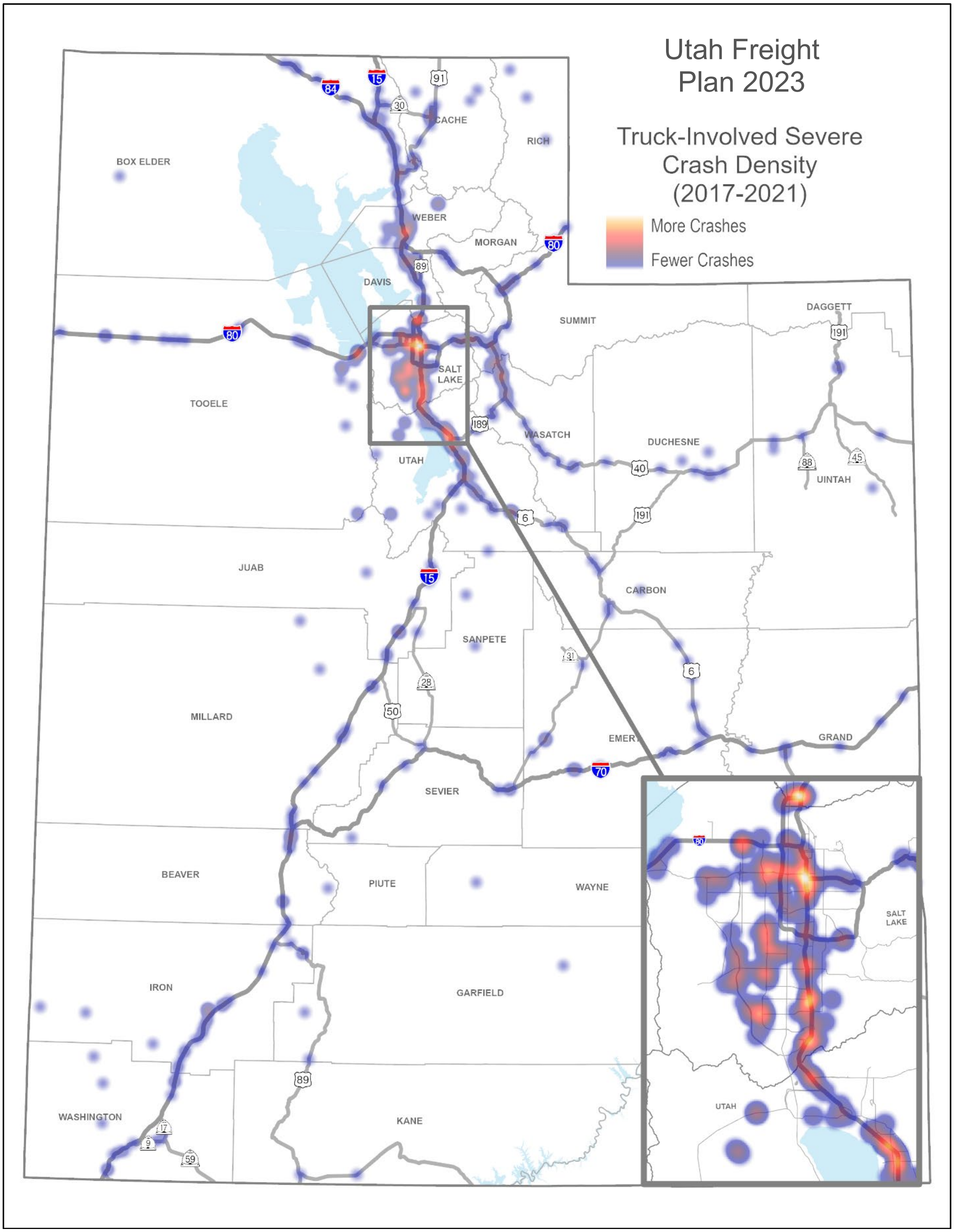
Crash data are protected under 23 U.S.C. 407.

Figure 10-8 below shows the concentrations of severe crashes involving a truck. There appear to be concentrations of severe crashes in the following locations:

1. North interchange of I-215 and I-15
2. I-80 and I-15 interchange
3. I-80 and S.R. 36 interchange
4. 11400 South (S.R. 175) and I-15 interchange
5. I-15 in Lindon/Orem

Again, these severe crash hot spots tend to coincide with locations with large numbers of trucks. It is also worth noting that these locations tend to feature traffic congestion. Interchanges are another location where vehicles traveling different speeds intermingle and can produce crashes.

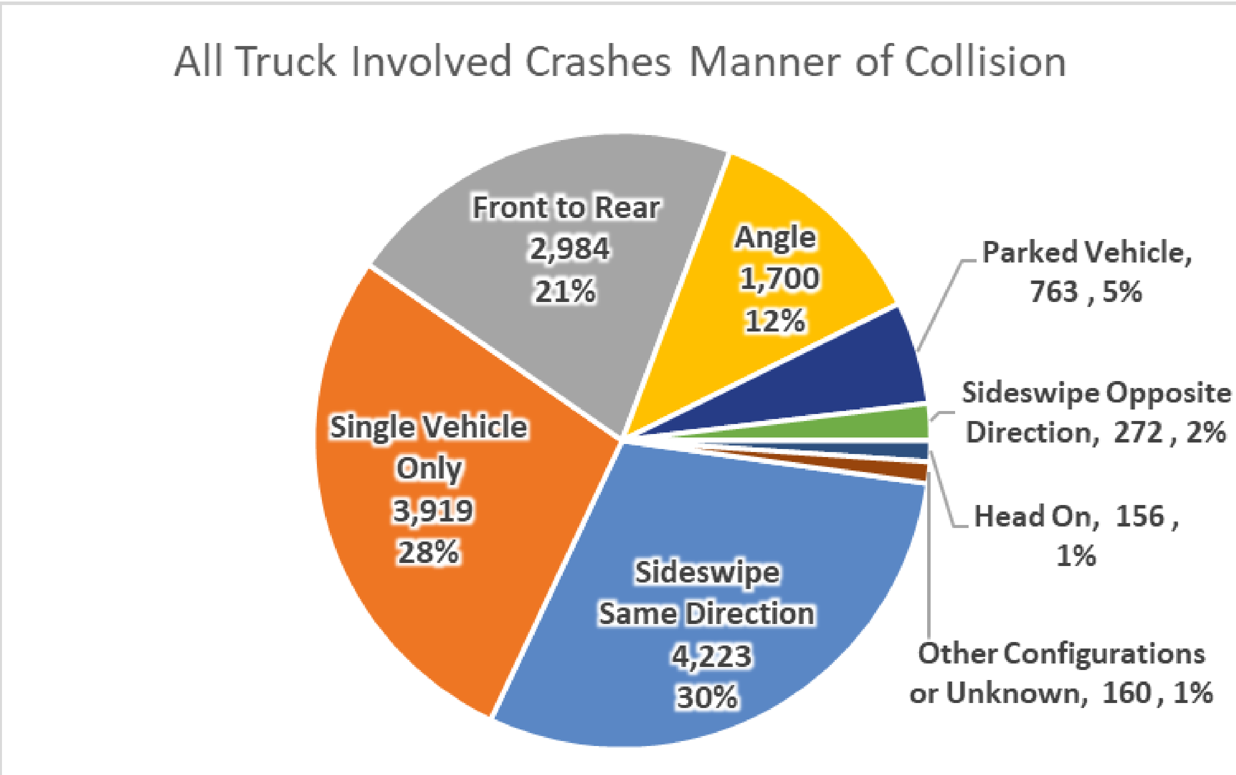
Figure 10-8. Truck-Involved Severe Crash Density



Crash data are protected under 23 U.S.C. 407.

Figure 10-9 shows the manner of collision of all truck-involved crashes. Sideswipe same direction—where the side of one vehicle impacts the side of a second vehicle—and single vehicle only account for over half of crashes involving a truck. Front to rear crashes is the next largest category with 21 percent. This manner of collision tends to be more common near intersections and in locations with stop and go traffic congestion.

Figure 10-9. All Truck Crashes Manner of Collision

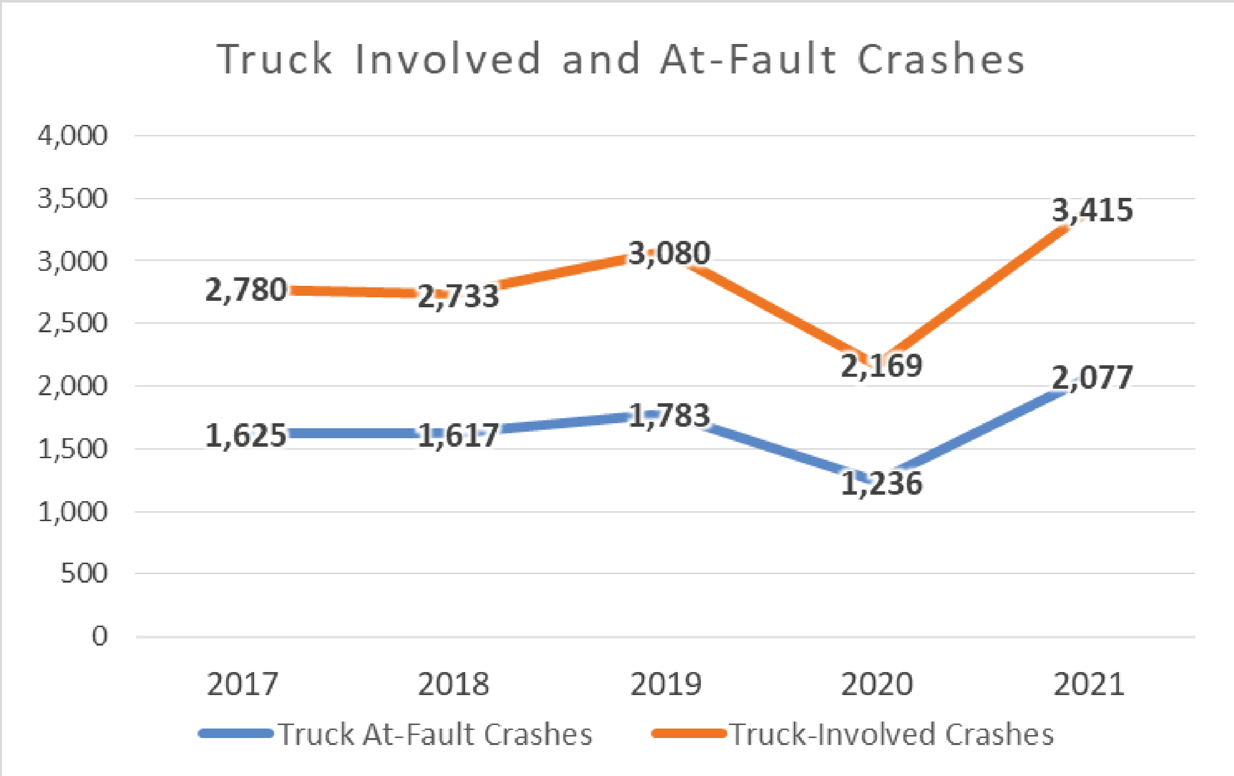


Crash data are protected under 23 U.S.C. 407.

10.6.2 Truck At-Fault Crashes

When a crash occurs, the at fault vehicle is recorded as “vehicle 1” in the crash data. Hence, it is possible to identify the crashes that were the fault of the truck driver. During the five-year analysis timeframe there were 8,338 crashes where the truck was determined to be at fault. Figure 10-10 shows these numbers in the context of the total number of truck-involved crashes. Roughly 40 percent of crashes involving a truck are not the fault of the truck driver. The truck at-fault crashes mirror the trend seen in all truck-involved crashes: trending upward except for 2020.

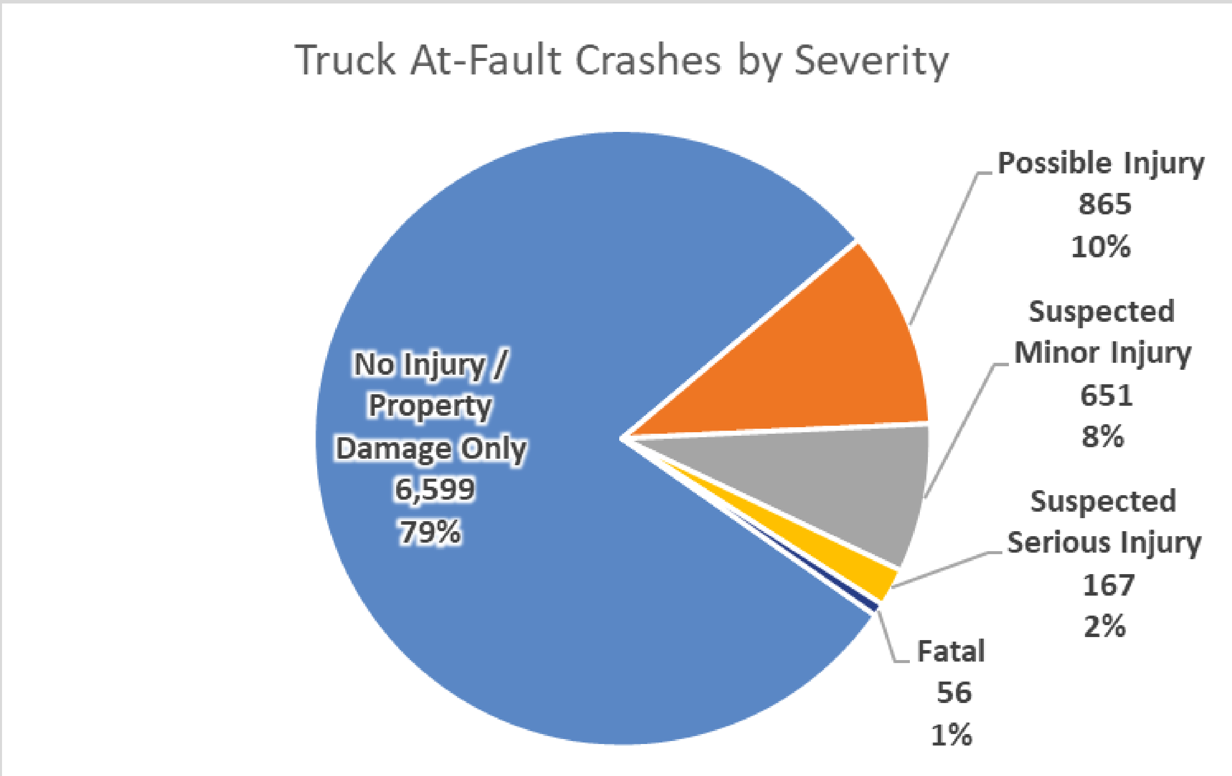
Figure 10-10. Truck Involved and At-Fault Crashes (2017-2021)



Crash data are protected under 23 U.S.C. 407.

Figure 10-11 shows the severity of crashes when the truck driver is at-fault. In these circumstances, the severity of the crash is not significantly different from the severity of all truck-involved crashes displayed in Figure 10-7. By comparison, there are slightly more no injury/property damage only and fewer crashes that resulted in a possible injury.

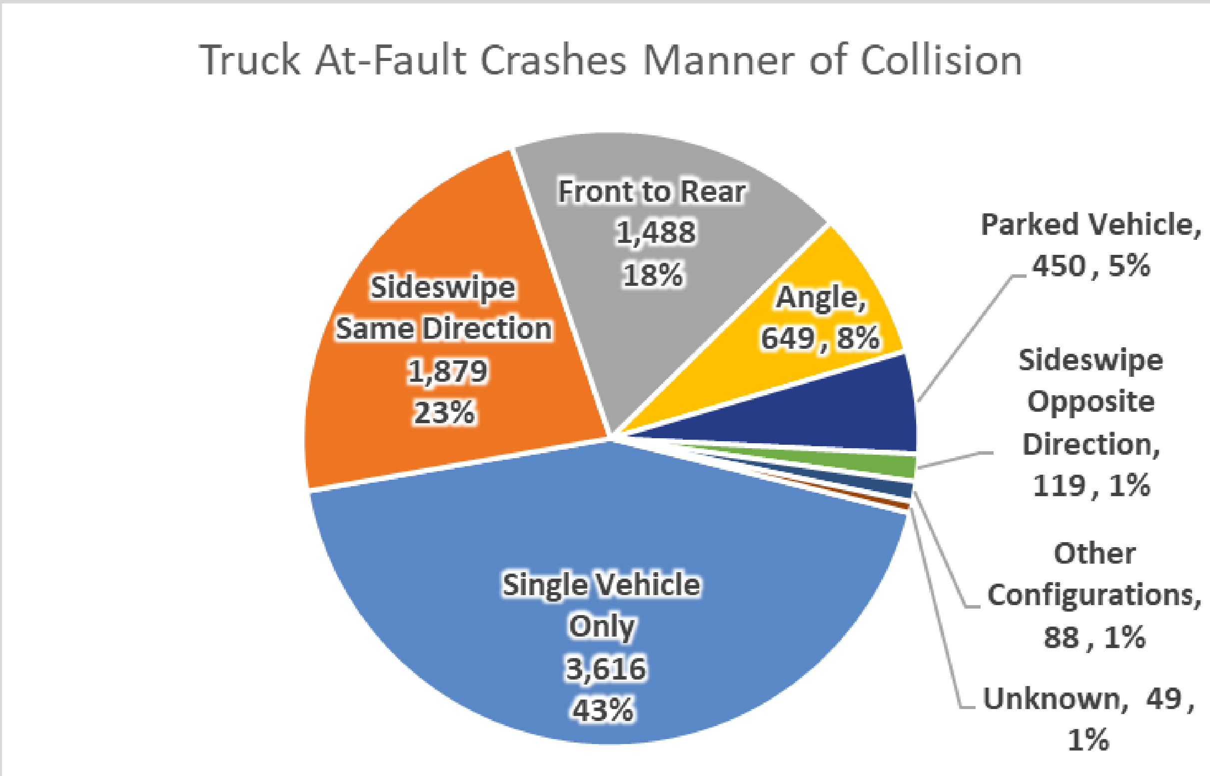
Figure 10-11. Truck At-Fault Crashes by Severity



Crash data are protected under 23 U.S.C. 407.

The manner of collision of truck at-fault crashes—displayed in Figure 10-12—does however diverge from the larger dataset. All crashes involving a truck had roughly similar numbers of sideswipe same direction and single vehicle only crashes. However, when the truck driver is at fault there are significantly more single vehicle crashes by comparison. Other crash configurations occur at roughly the similar proportions.

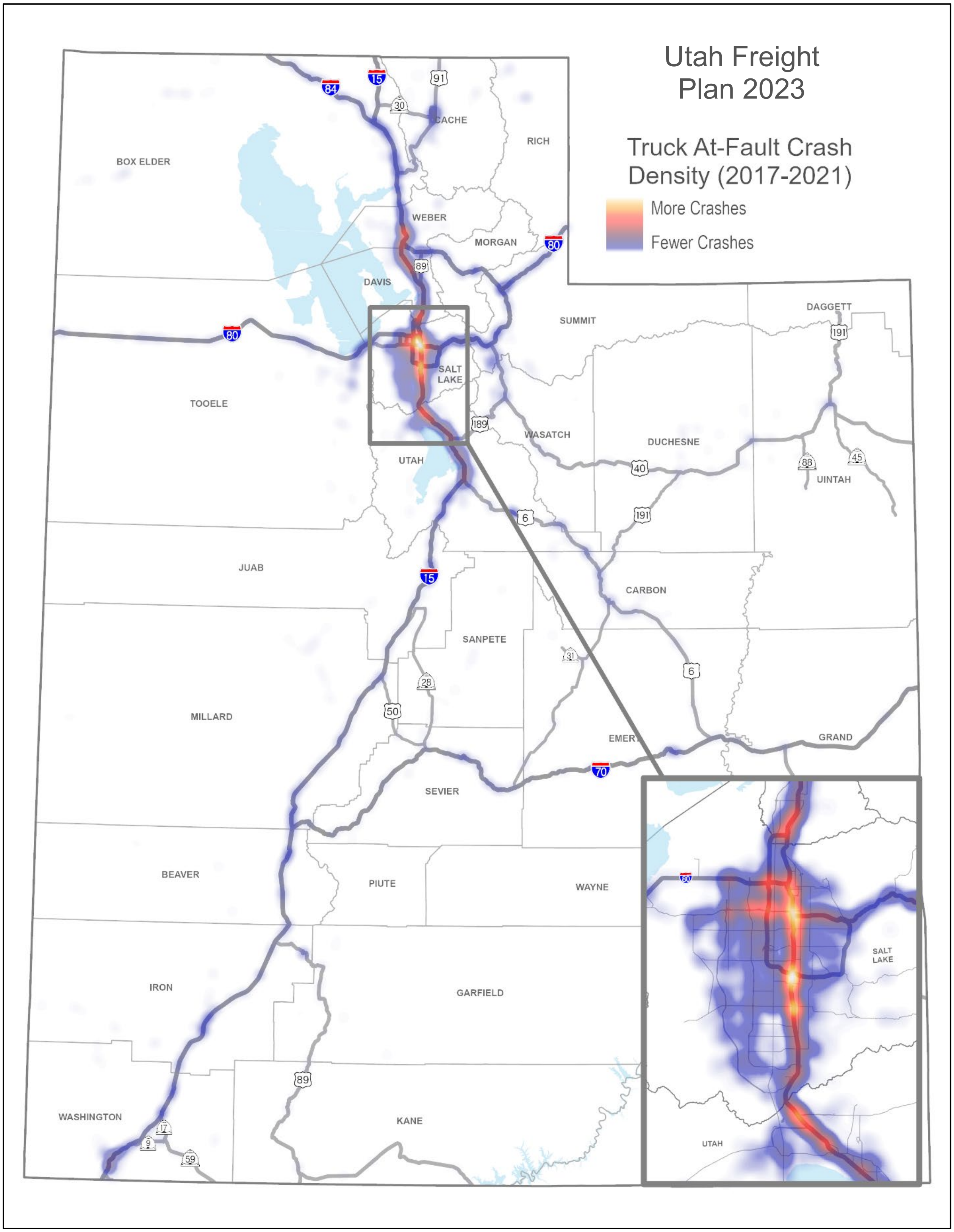
Figure 10-12. Truck At-Fault Crashes Manner of Collision



Crash data are protected under 23 U.S.C. 407.

Figure 10-13 shows the concentrations of crashes where the truck driver was at-fault. The concentrations of truck at-fault crashes are not significantly different from the concentrations observed in the all truck-involved heat map.

Figure 10-13. Truck At-Fault Crash Density



Crash data are protected under 23 U.S.C. 407.

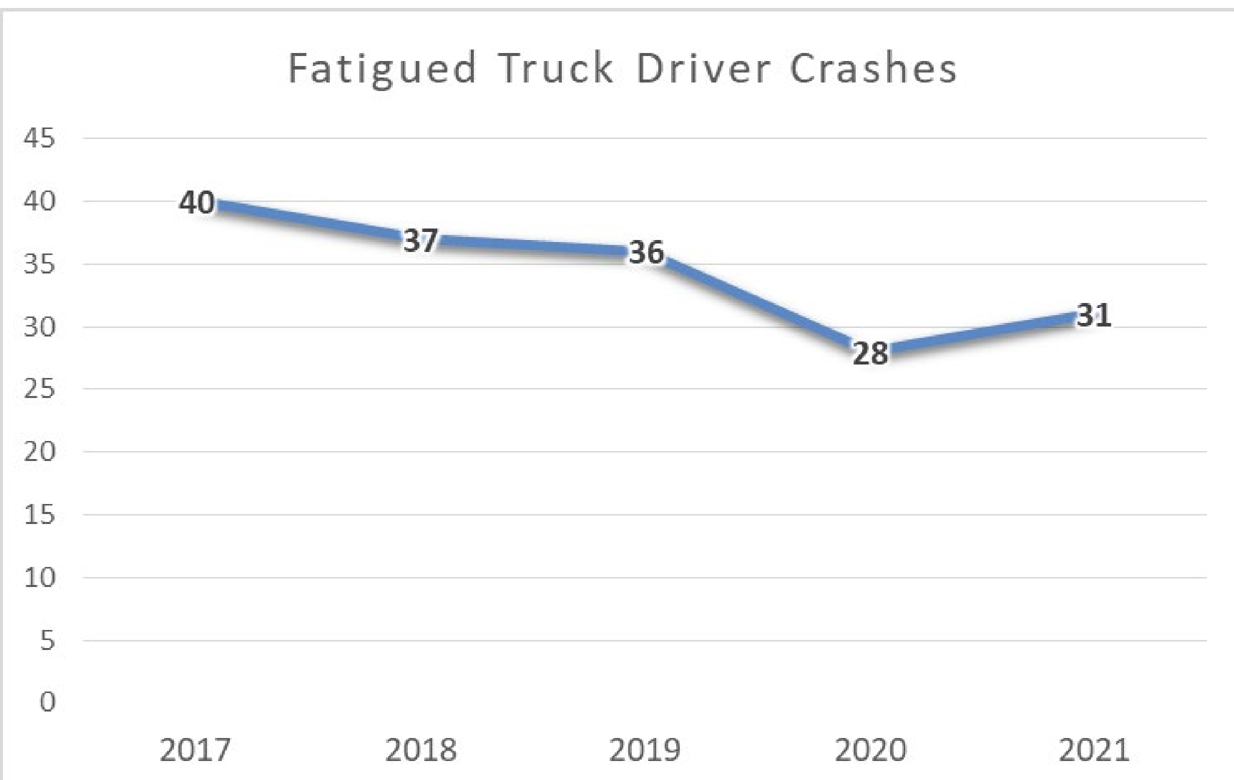
10.6.3 Fatigue-Related Crashes

Addressing the issue of fatigue-related crashes caused by a truck requires a dual policy and infrastructure approach. Federally-mandated HOS limits—a policy solution—place a legal cap on the number of hours a driver can drive before being required to stop for rest or a sleep period. Factors impacting the fatigue of individual drivers in spite of this policy are beyond the purview of this analysis. However, the presence of crashes caused by fatigued truck drivers can also indicate a gap in access to designated truck parking. Ongoing projects that seek to construct and promote more truck parking opportunities are one approach to addressing this issue.

Fatigue-involved truck crashes were identified using the “Driver Condition” attribute in the crash data. Crashes where a truck was listed as “vehicle 1”—specifically the vehicle at fault in the crash—were included. Thus, only crashes where the truck was at fault and the driver condition was “fatigue/asleep” were included in this analysis.

During the analysis period, this included 172 crashes. Figure 10-14 below shows the number of these crashes by year. Over the five years analyzed, crashes with this characteristic have trended downward. The significant drop from 2019 to 2020 could be related to pandemic-induced reductions in truck traffic. In 2021, the number of these crashes grew compared to 2020 but remains below the number of crashes in 2019. One possible interpretation of this downward trend could be that ongoing efforts to construct more truck parking opportunities have resulted in fewer of these crashes. However, additional study would be required to definitively establish a causal link between the two.

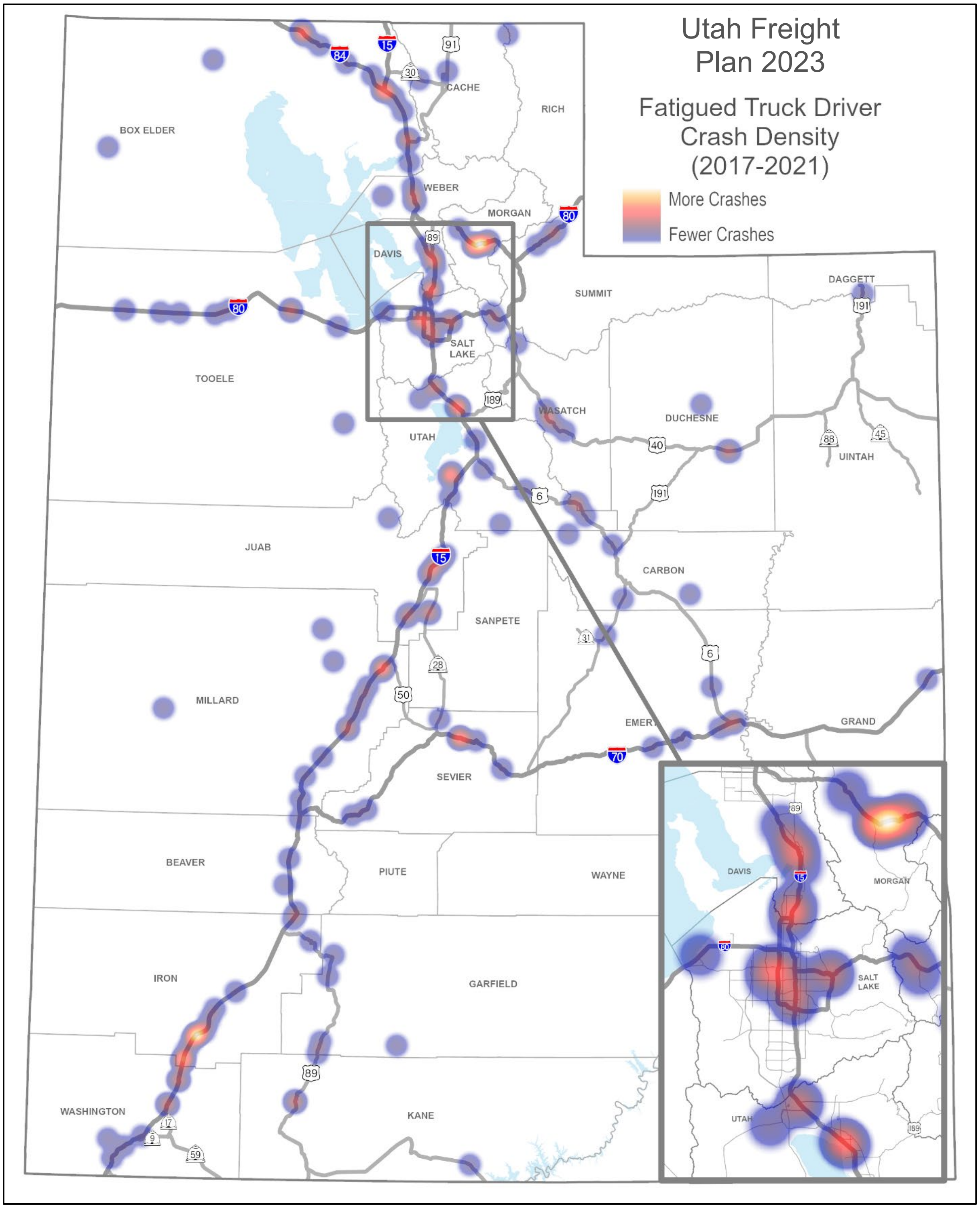
Figure 10-14. Fatigued Truck Driver Crashes



Crash data are protected under 23 U.S.C. 407.

Figure 10-15 shows the concentrations of these crashes caused by a fatigued truck driver. There appear to be concentrations on I-84 in Morgan County and on I-15 between Cedar City and Saint George, both locations in rural areas with limited truck parking options.

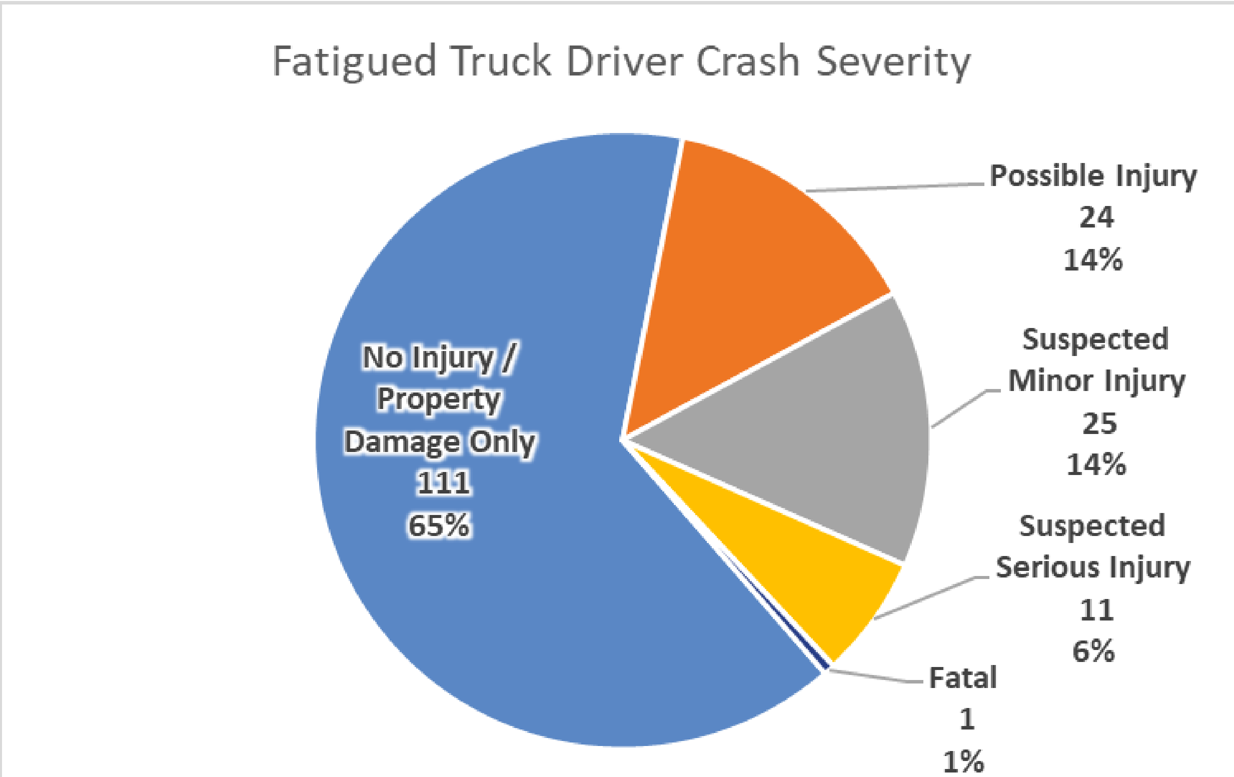
Figure 10-15. Fatigued Truck Driver Crash Density



Crash data are protected under 23 U.S.C. 407.

The severity of crashes involving a fatigued truck driver are displayed in Figure 10-16. Almost two thirds of these crashes resulted in no injuries and property damage only. Seven percent of crashes were classified as “severe.” However, when compared to all truck-involved crashes, a larger share involved a suspected serious or minor injury.

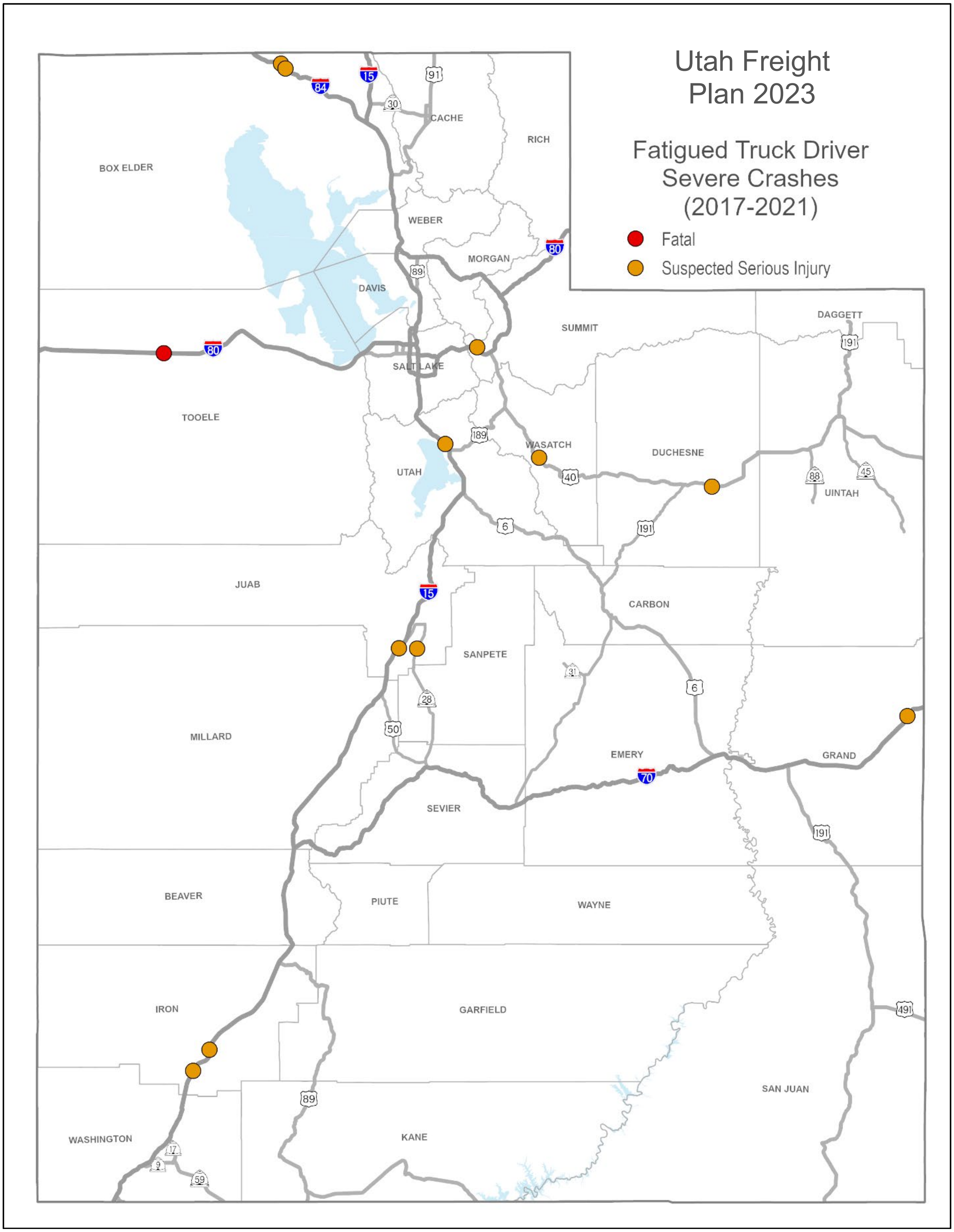
Figure 10-16. Fatigued Truck Driver Crash Severity



Crash data are protected under 23 U.S.C. 407.

The map in Figure 10-17 shows the locations of the 12 severe crashes resulting from a fatigued truck driver. The single fatal crash occurred along a remote stretch of I-80 in the West Desert. Two suspected serious injury crashes are closely spaced along I-84 near the Idaho border as well as near Cedar City on I-15. It is worth noting that many of these crashes occurred in rural locations and away from development. Approximately 92 percent (11) of the severe crashes occurred within 20 miles of a location included in the truck parking inventory. Half of the severe crashes occurred within six miles of a location in the inventory. However, it is uncertain if available truck parking spaces at those locations could have prevented these crashes.

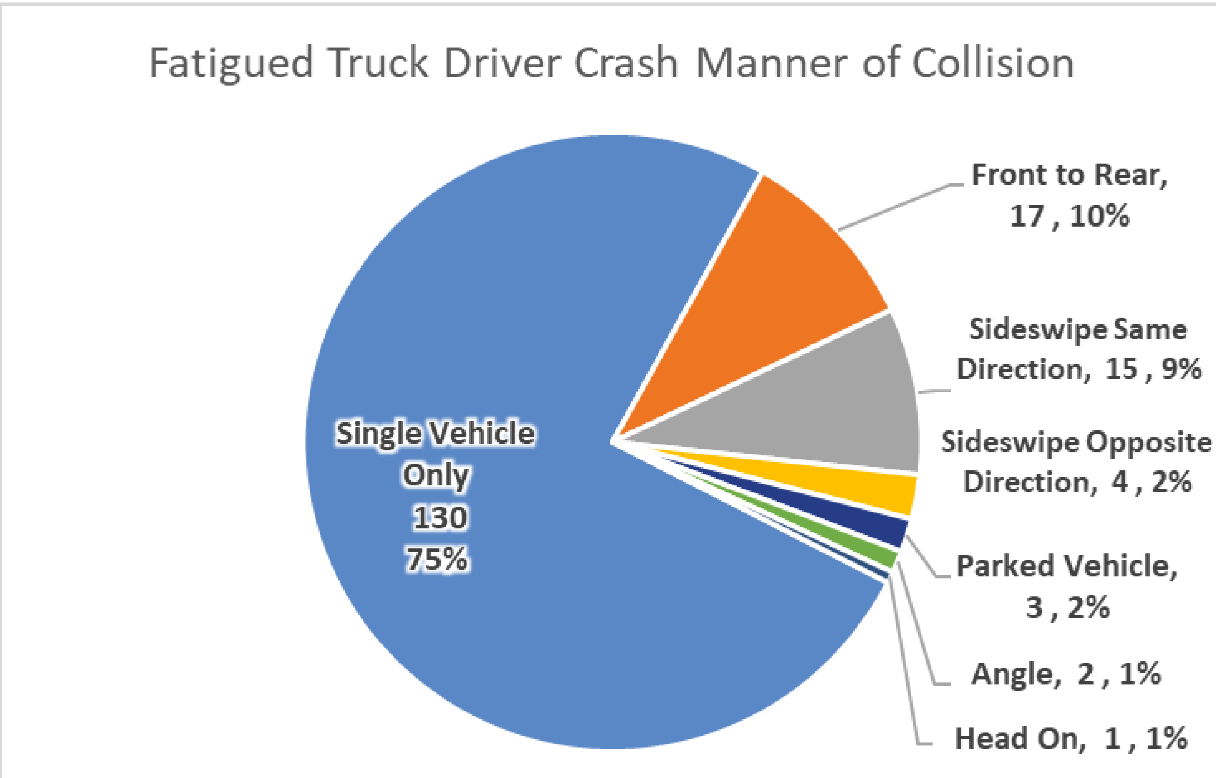
Figure 10-17. Fatigued Truck Driver Severe Crashes



Crash data are protected under 23 U.S.C. 407.

Figure 10-18 displays the manner of collision that results when a fatigued truck driver crashes. When examining the manner of collision resulting from crashes caused by a fatigued truck driver, the overwhelmingly largest category involved a single vehicle. A single-vehicle crash is any crash that causes damages to only one vehicle and its driver and passengers, such as collisions with roadside objects or running-off-the-road crashes. Crashes that resulted in front to rear or a sideswipe—where the sides of two vehicles collide—occurred with almost equal frequency and were the next largest categories. About 76 percent of fatigue-related truck crashes involved a single vehicle, this is much higher than the 28 percent share seen in all truck-involved crashes.

Figure 10-18. Fatigued Truck Driver Crash by Manner of Collision



Crash data are protected under 23 U.S.C. 407.

ELEMENT 11. SUPPLY CHAIN CARGO FLOWS AND MODES

The FHWA guidance on state freight plans includes some items to consider when identifying Utah's supply chain cargo flows and their respective modes. While not all these items apply to Utah, the following is for consideration:

1. Total cargo flows by mode, regardless of commodity type and geography.
2. Estimated freight flow data by mode of transportation.
3. Identification of major industries, their related cargo flows, and trading partners.
4. State-level GDP information.

11.1 Freight Analysis Framework

Freight Analysis Framework (FAF) is the FHWA compiled data set that uses data from multiple sources to outline freight movements for all states. For this plan, FAF Version 5.2, the newest version of data, was used for analysis. The data provides an estimate for the tonnage, value, and ton-miles for several factors which include origin, destination, mode, and commodities. UDOT has chosen to use value and weight (tonnage) by transportation mode for forecasts. The data used to determine the past trends and forecasts for 2050 are given in increments of five years from 1997 to 2017. The data does not, however, offer insight into the economic impact of freight movements on a national scale and does not account for changes in the cost of transportation or advances in technology.

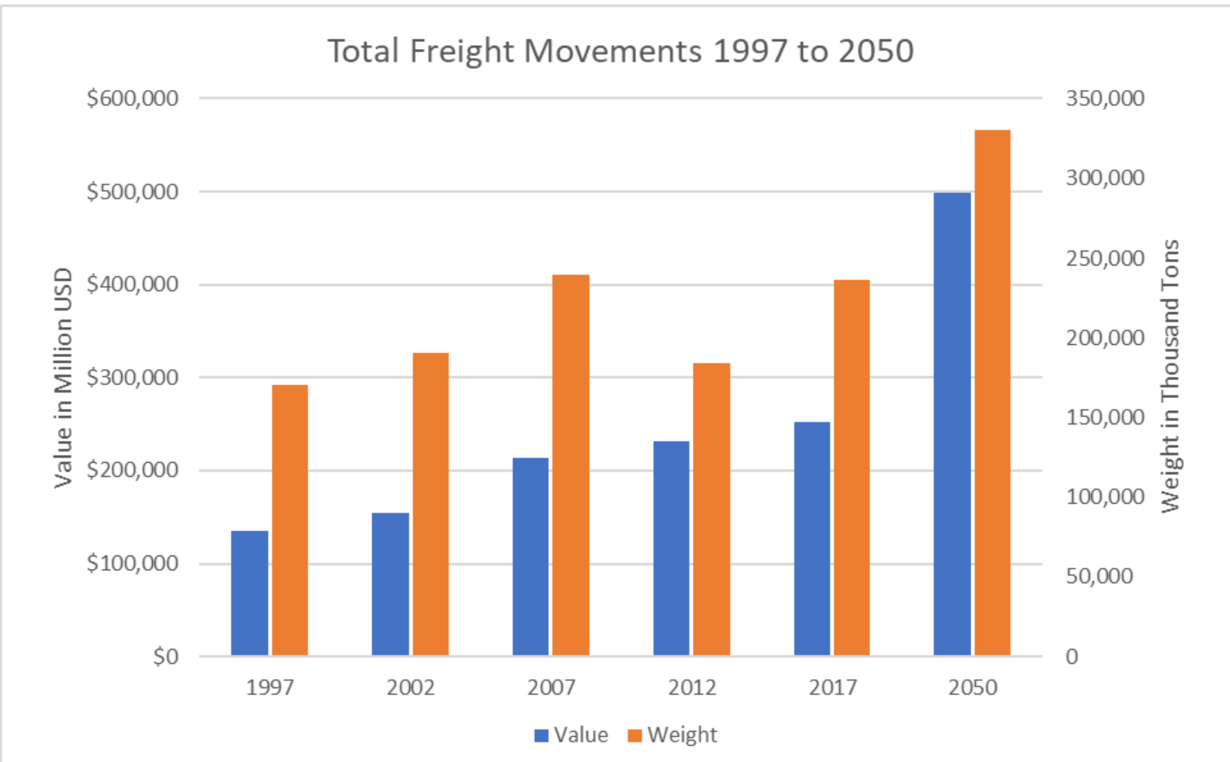
Note: All FAF data in this document referring to the value of freight is based on the 2017 constant of the USD and is in millions of USD unless otherwise stated. All data referring to the weight of freight is in thousand tons unless otherwise stated.

11.2 Supply Chain Cargo Modes

The overall trend for freight movements from, to, and within Utah has seen a consistent increase in the value of freight. From 1997 to 2017, the value of all freight moved within the borders of Utah increased by 86 percent ($116,548 million) in 20 years. The weight of freight increased by a more modest 39 percent (65,855 thousand tons) during that same period. But the weight of freight has not grown steadily, with a spike to 239,852 in 2007 and a subsequent drop in the following years to 183,960 in 2012.

Element 1 contains additional discussion of projected freight movements in general as well as by mode.

Figure 11-1. Total Freight Movements 1997 to 2050

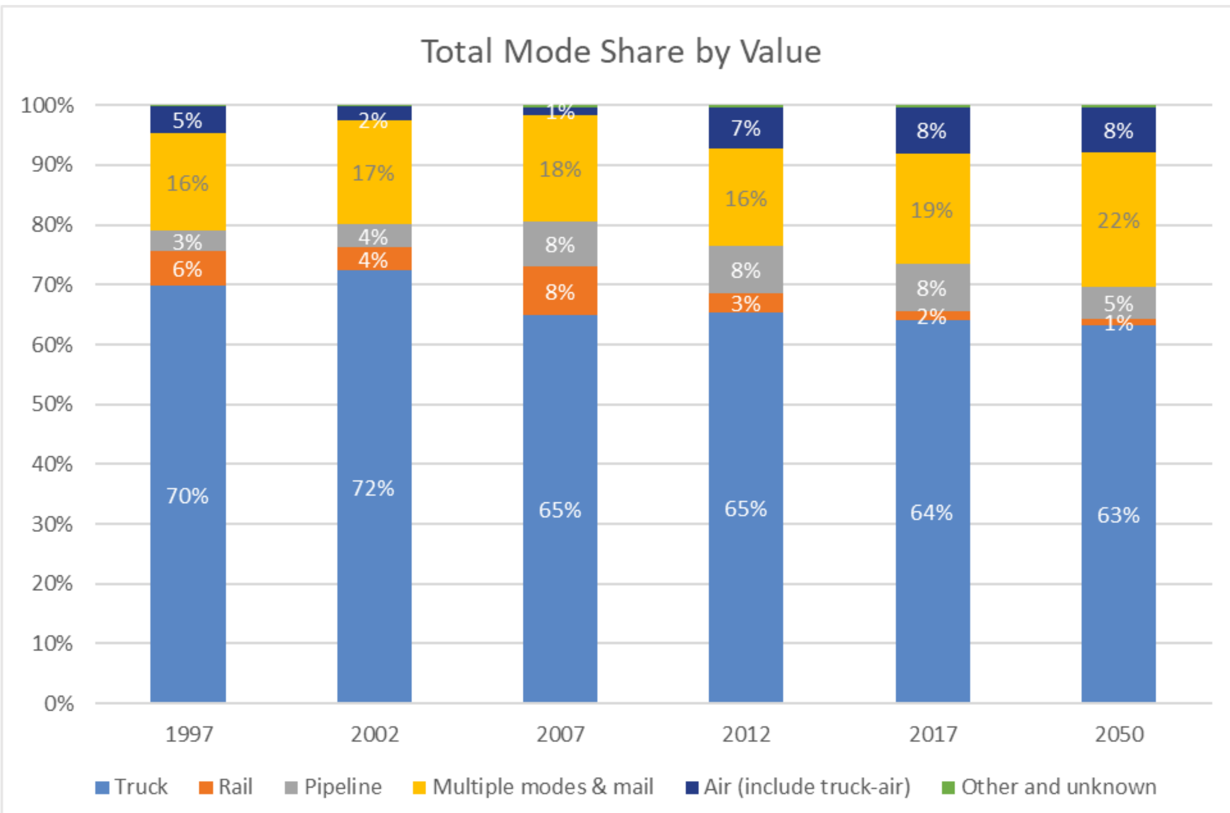


Source: Freight Analysis Framework Version 5.2, Federal Highway Administration, 2021.

11.2.1 Cargo Modes by Value

The following graph is based on the FAF 5.2 data and shows how freight has been split by mode in the past and forecasted in 2050. Trucks have been the largest mode of transportation for freight, comprising from about 70 percent to two thirds of the value moved. Trucks in 2050 are projected to continue to slowly decline in share of value moved. Multiple modes and mail as well as pipeline have increased in the value of freight carried from 1997 to 2017 and is forecasted to continue in 2050. Pipeline was the only mode with sustained increases in the past but is forecasted to fall three percent in 2050. Air cargo grows significantly in 2012 and remains stable. Air and rail show some variations from year to year. Following a spike in value in 2007, rail declines significantly starting in 2012 and this trend is forecasted to continue in 2050. Multiple modes and mail are forecasted to comprise the second largest share of freight moved by value after truck in 2050.

Figure 11-2. Total Mode Share by Value

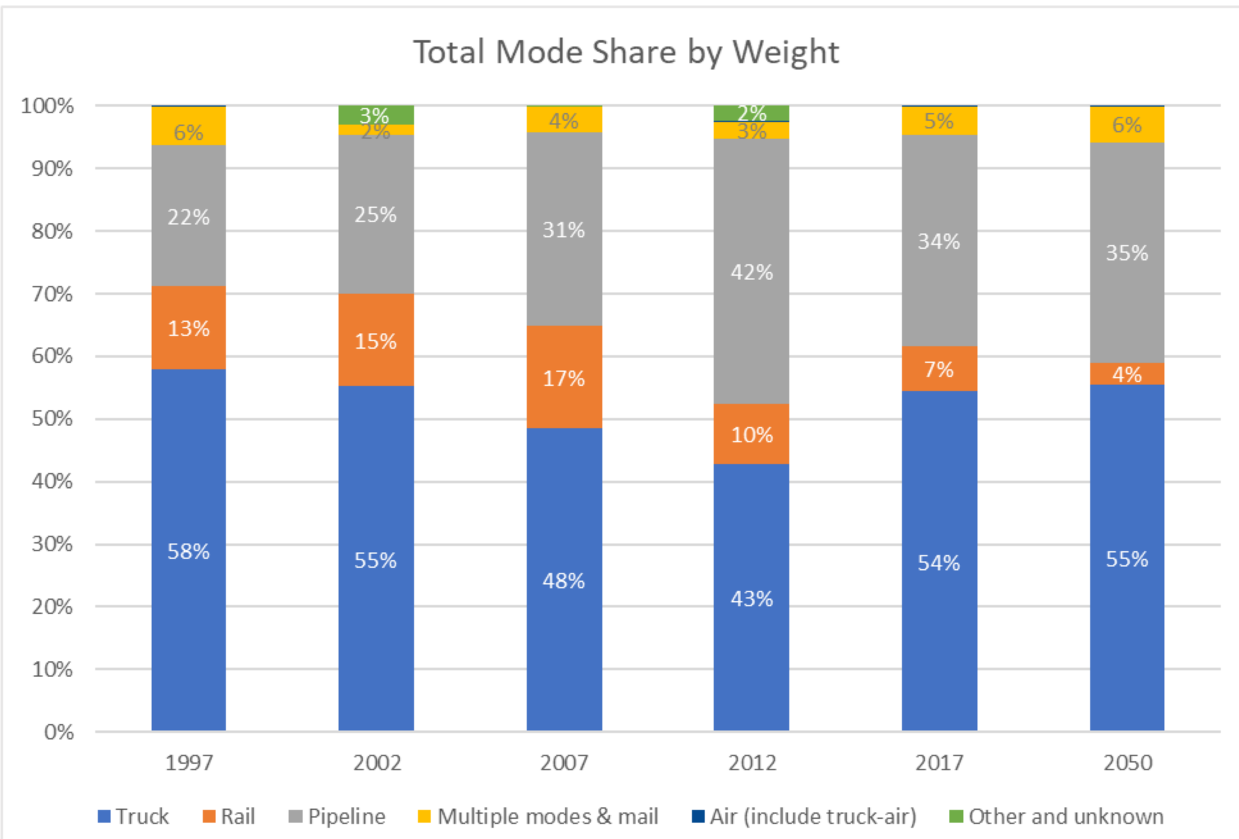


Source: Freight Analysis Framework Version 5.2, Federal Highway Administration, 2021.

11.2.2 Cargo Modes by Weight

The three most significant mode shares by weight are truck, pipeline, and rail. However, in 2050, it is forecasted that multiple modes and mail will replace rail in the top three. Truck historically had the largest mode share by weight with over 50 percent in 1997 and 2002, but by 2012 it was about even with pipeline. It appears in 2017 and 2050 that this shift in pipeline and truck reverted to ratios predating 2012. Pipeline held less than a quarter of the mode share by weight in 1997, but by 2017 it had become approximately one third with this trend forecasted to continue in the future. Rail is showing a decline overall—despite some variation—from a high of 17 percent in 2007 down to seven percent in 2017. This downward trend in weight transported by rail is forecasted to continue in 2050. Multiple modes and mail, air, and other or unknown modes of freight transportation have a minimal mode share when it comes to the weight of freight moved within, from, and to Utah. Freight moved by air has such a small mode share—less than one percent of the weight—because of the prohibitive cost of air freight. In 2050 mode shares are projected to be like 2017 with rail further declining while other modes slightly increasing.

Figure 11-3. Total Mode Share by Weight



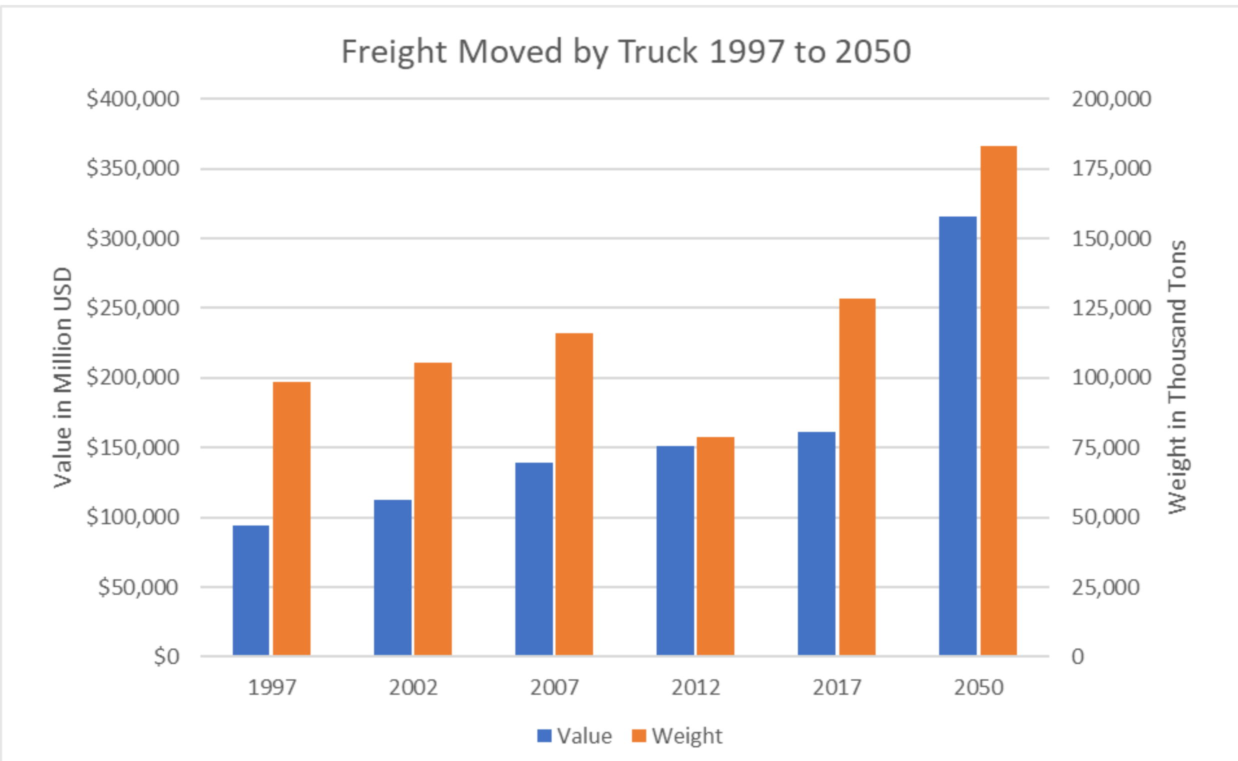
Source: Freight Analysis Framework Version 5.2, Federal Highway Administration, 2021.

11.2.3 Freight Moved by Truck

Since 1997 the value in US dollars has steadily increased for freight moved by truck from, to, and within the state of Utah. The value went from $94,533 million in 1997 to $161,201 million in 2017: a 71 percent increase. The average annual growth rate for these 20 years is 15 percent for the value of freight moved by truck, dropping from an average of 21.3 percent increase from 1997 to 2007. In 2050, the value of freight moved by truck is projected to increase by 96 percent from 2017 levels to $315,472 million.

The weight of freight moved by truck grew by 30 percent from 1997 (98,605 thousand tons) to 2017 (128,530 thousand tons). However, this has not been a steady increase. Between 2007 and 2012 there was a precipitous 32 percent drop followed by a 63 percent surge between 2012 and 2017. In 2050 the weight moved by truck is projected to increase by 42 percent to 182,999 thousand tons.

Figure 11-4. Freight Moved by Truck 1997 to 2050

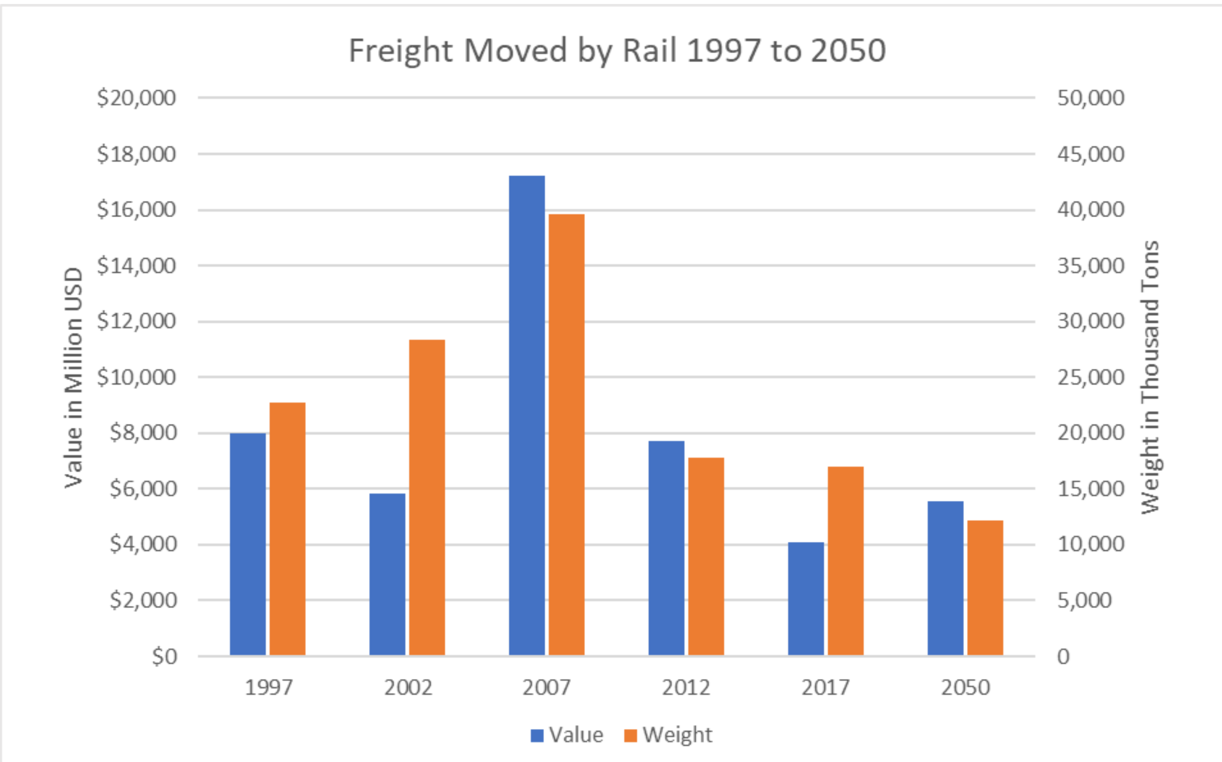


Source: Freight Analysis Framework Version 5.2, Federal Highway Administration, 2021.

11.2.4 Freight Moved by Rail

The value of freight moved by rail experienced significant volatility—falling 27 percent in 2002 before surging 194 percent in 2007. Meanwhile the weight of freight moved during that same period steadily increased by 74 percent. This suggests that the value of the goods being moved by rail, which in Utah is namely coal, decreased over those five years. The value increased significantly from 2002 to 2007 followed by another significant drop between 2007 and 2012. The weight of freight moved by rail increased steadily between 1997 and 2007 followed by a significant drop by over half between 2007 and 2012. Additional analysis of forecasted freight moved by rail is in Element 1.

Figure 11-5. Freight Moved by Rail 1997 to 2050

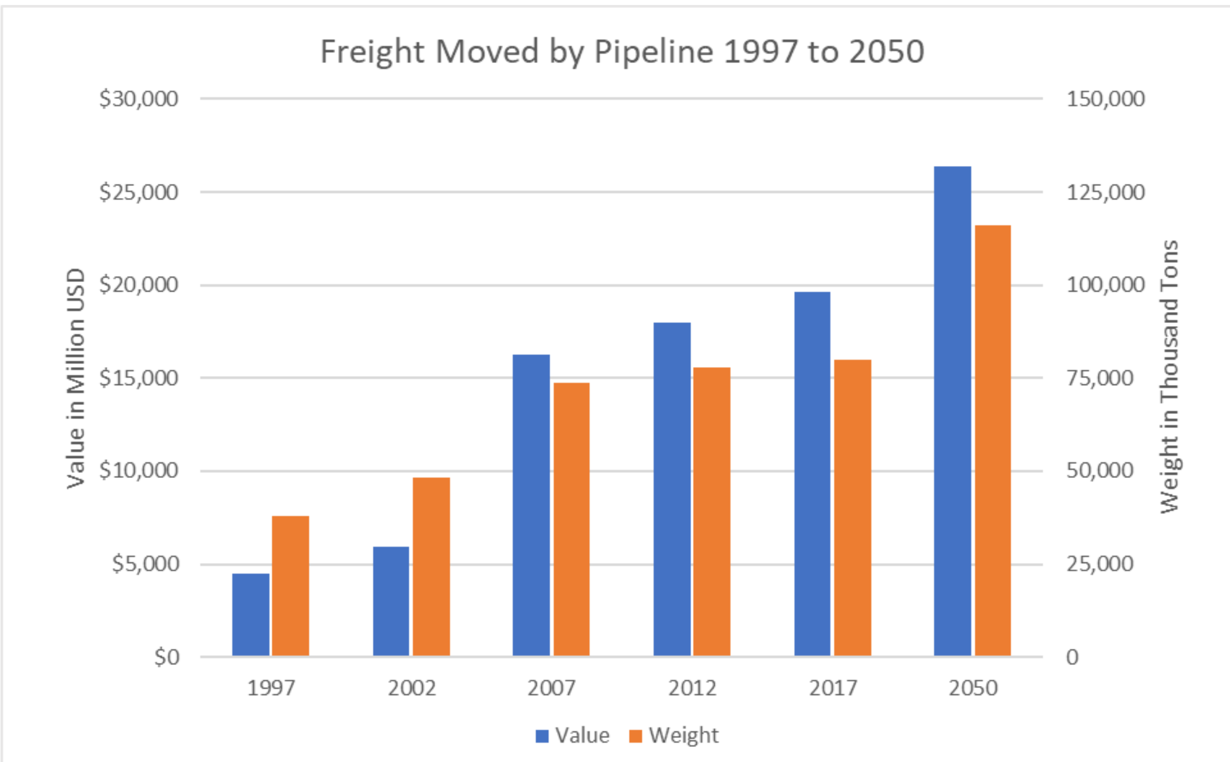


Source: Freight Analysis Framework Version 5.2, Federal Highway Administration, 2021.

11.2.5 Freight Moved by Pipeline

The value of freight moved by pipeline has increased significantly in the 18 years between 1997 and 2017. With a value of $4,472 million in 1997, it more than tripled by 2017 to $19,653. The largest increase was between 2002 and 2007 where the value of freight increased by 174 percent over the five years. The weight also had sustained growth from 1997 and 2012, with a growth of 110 percent (41,747 thousand tons) in the 20 years to 79,781 thousand tons. Both the value and weight of freight moved by pipeline are projected to continue their upward trend in 2050.

Figure 11-6. Freight Moved by Pipeline 1997 to 2050

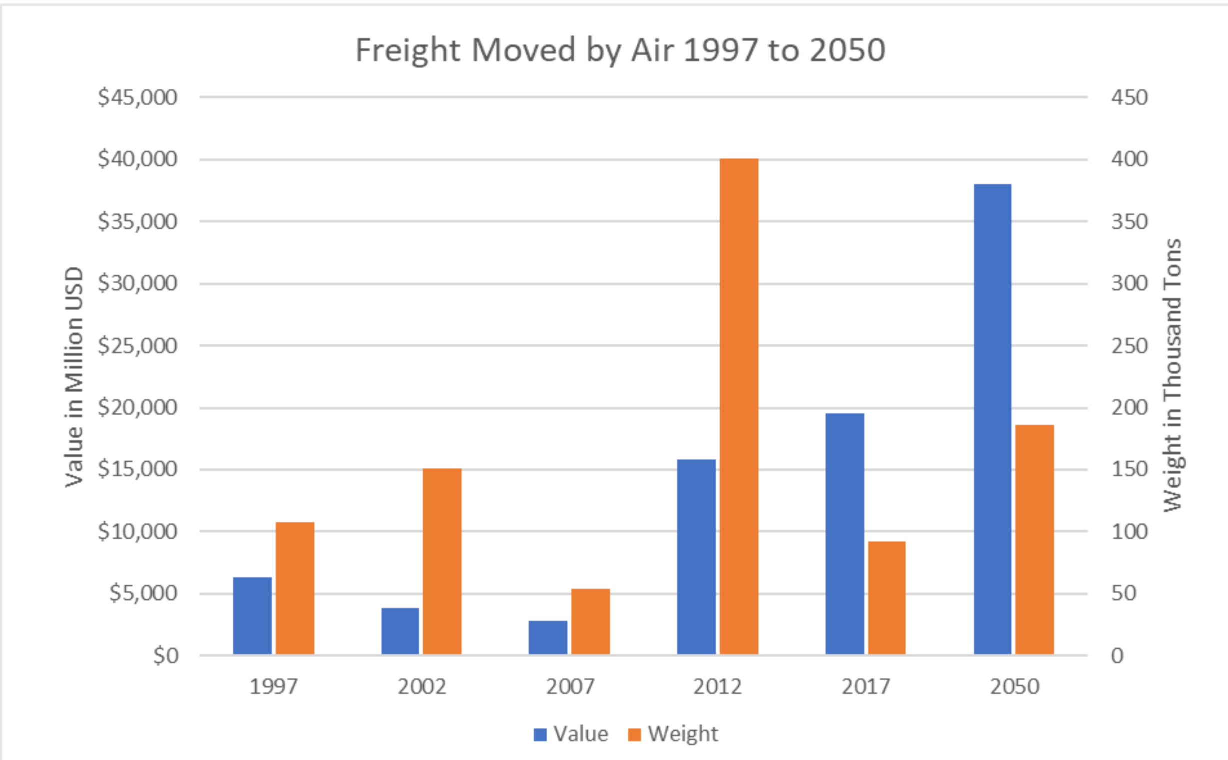


Source: Freight Analysis Framework Version 5.2, Federal Highway Administration, 2021.

11.2.6 Freight Moved by Air

The weight of freight moved by air had substantial variability: declining from 1997 through 2007 before spiking by 643 percent in 2012 and finally falling 77 percent to 92 thousand tons in 2017. The value of freight moved by air cargo also experienced a sporadic history. From 1997 through 2007 it declined then grew by over fourfold: from $2,822 million in 2007 to $12,957 million in 2012. Since 2012, the value of freight continued to increase at a more modest rate to $19,492 million in 2017. Element 1 contains additional analysis of forecasted freight moved by air.

Figure 11-7. Freight Moved by Air 1997 to 2050

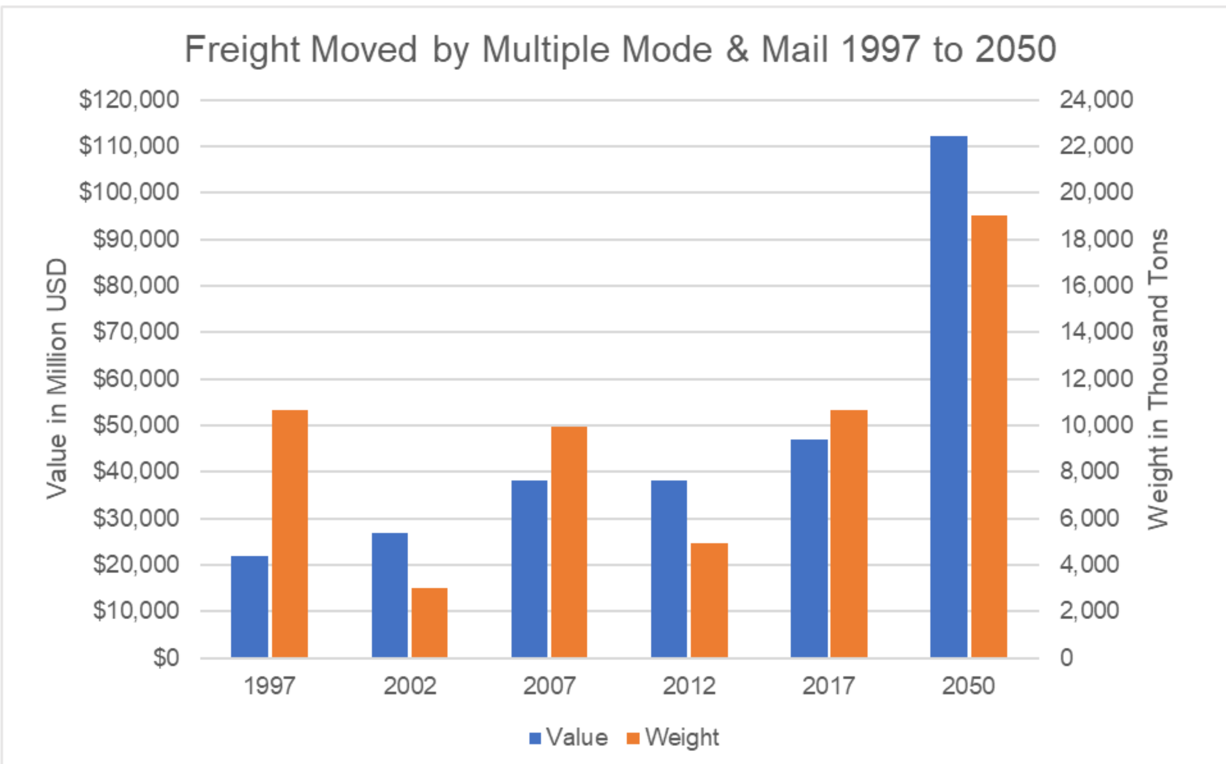


Source: Freight Analysis Framework Version 5.2, Federal Highway Administration, 2021.

11.2.7 Freight Moved by Multiple Modes and Mail

The trend of the value of freight moved by multiple modes, namely rail and truck transfer, and mail increased from 1997 to 2007 before remaining unchanged from 2007 through 2012. In 2017, it is estimated that this value started increasing again. Over the 20-year period, the value of freight moved by these modes increased by $24,838 million, an increase of 112 percent. The weight of freight moved by multiple modes and mail decreased drastically from 1997 at 10,670 thousand tons to 3,007 thousand tons in 2002. The weight then increased back to about 1997 levels in 2007 before dropping again in 2012, and in 2017 reverting to approximately 2007 amounts. In 2050, both the weight and value of cargo moved by these modes is projected to significantly increase beyond 2017 levels.

Figure 11-8. Freight Moved by Multiple Modes and Mail 1997 to 2050



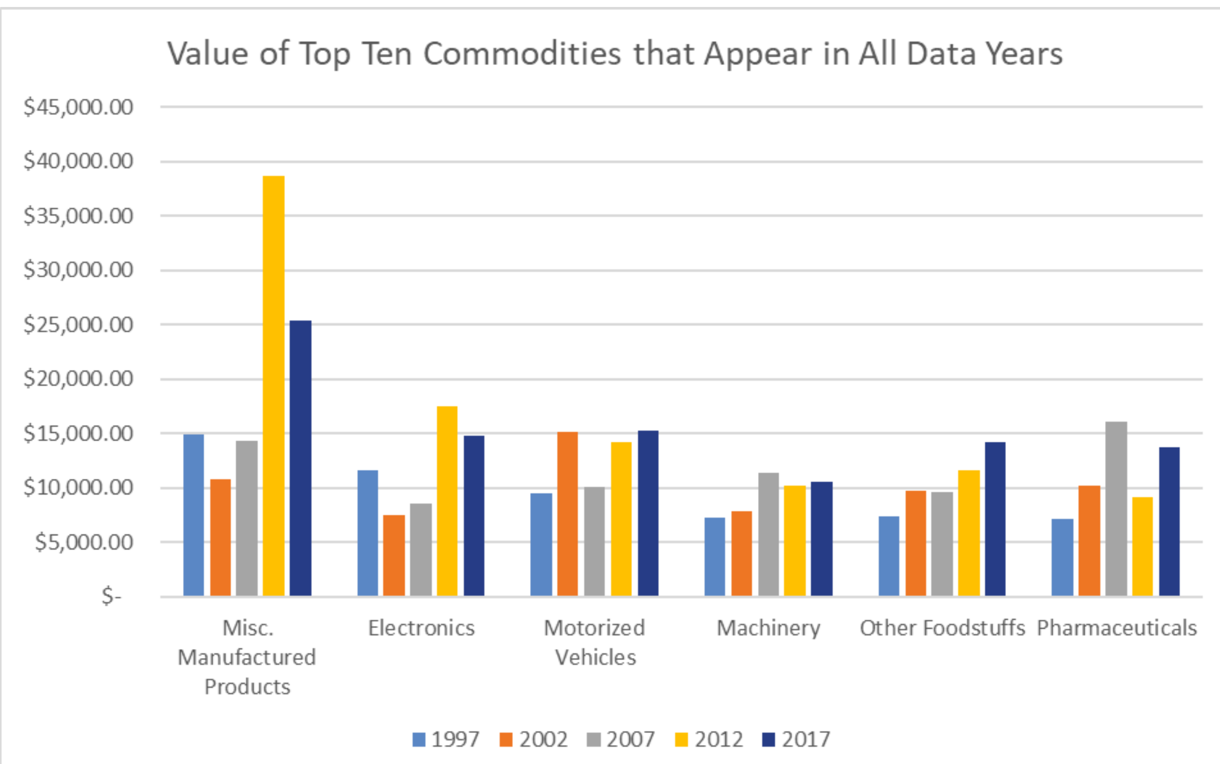
Source: Freight Analysis Framework Version 5.2, Federal Highway Administration, 2021.

11.3 Supply Chain Cargo Commodities

Though the top 10 commodities traded from, to, and within Utah change from year to year based on demand, there are several commodities that are consistently in the top 10. The graphs below show the trend for each of these commodities that appeared in all five data years based on their value – 1997, 2002, 2007, 2012, and 2017. These graphs do not show what may occur in the future in terms of which commodities will appear in the top 10 traded commodities. They do, however, show which commodities have the highest value and which commodities have the largest weight in Utah.

It should be noted that among the top ten commodities by value, all of them involve combining various elements to produce finished products. As a result, Utah's most valuable commodities are susceptible to supply chain disruptions. Meanwhile commodities produced by the mining and energy extraction industries are routinely in the top ten in terms of weight. In this regard, future shifts in demand for these products—for example due to growing utilization of renewable energy sources or the adoption of electric vehicles—introduce added uncertainty for these industries.

Figure 11-9. Value of Top Ten Commodities that Appear in All Data Years



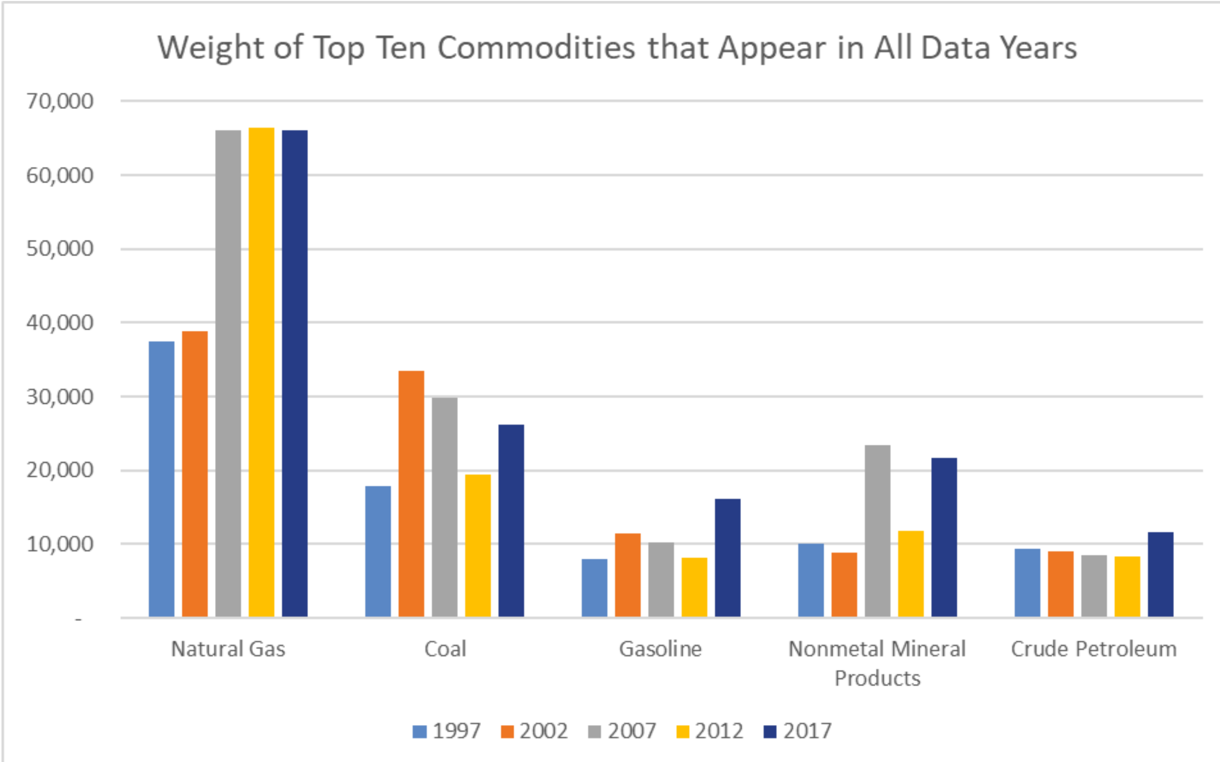
Notes:

Natural gas in FAF 5.2 is classified as "Coal-not elsewhere classified."

Value is millions of US dollars.

Source: Freight Analysis Framework Version 5.2, Federal Highway Administration, 2021.

Figure 11-10. Weight of Top Ten Commodities that Appear in All Data Years



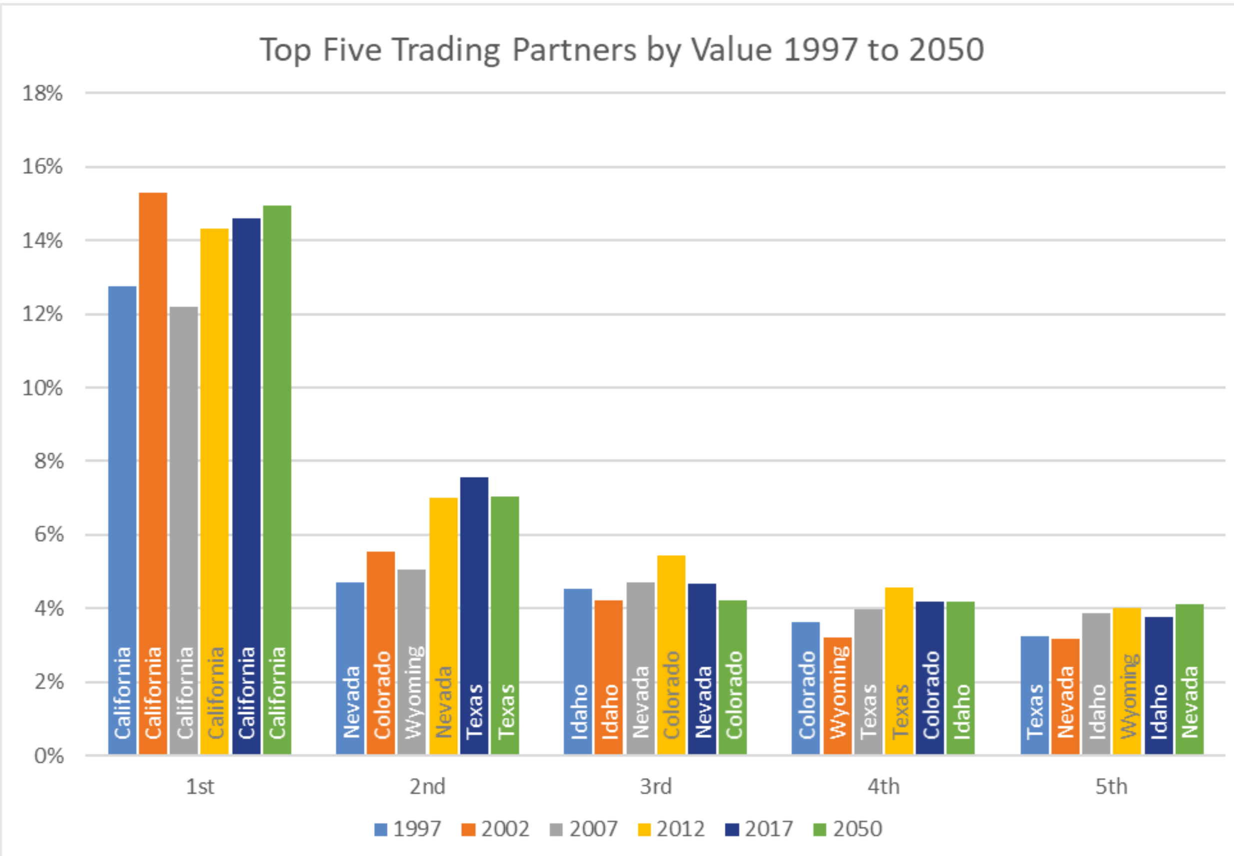
Source: Freight Analysis Framework Version 5.2, Federal Highway Administration, 2021.

Note: Weight is thousand tons.

11.4 Trading Partners by Value

In the past, the top five trading partners with states other than Utah in terms of value have varied slightly, except for California consistently being the top trading partner. For all data years, Utah is its own biggest trading partner in terms of value. In the future, California is projected to remain the top trading partner by value and Texas second. Colorado and Idaho are forecasted to become more dominant while Nevada falls from third in 2017 to fifth in 2050.

Figure 11-11. Top Five Trading Partners by Value 1997 to 2050

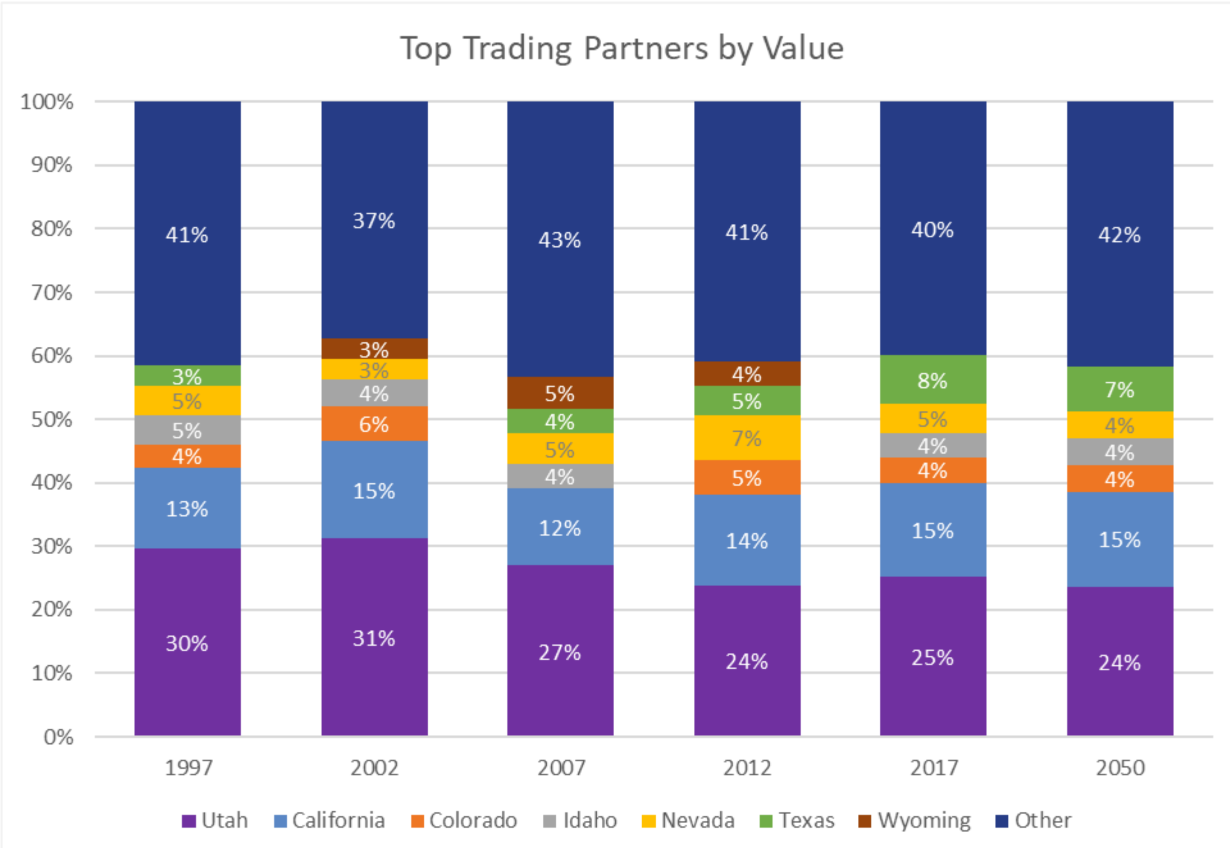


Source: Freight Analysis Framework Version 5.2, Federal Highway Administration, 2021.

When looking at trading partners, it is important to consider the state itself as a trading partner. When freight is moved solely within the state, Utah becomes a trading partner with itself. In 1997, Utah traded 30 percent of all freight value with itself, while the top five states Utah traded with made up 29 percent. Starting in 2007, Utah's share of freight value became smaller than the top five trading partners. The term "Other" refers to any states not in the top five trading partners or Utah. This category is the largest overall in every year.

In 2050, the forecasted share of value slightly falls among Utah, Nevada, and Texas while "other" and the remaining trading partners remains unchanged from 2017.

Figure 11-12. Top Trading Partners by Value



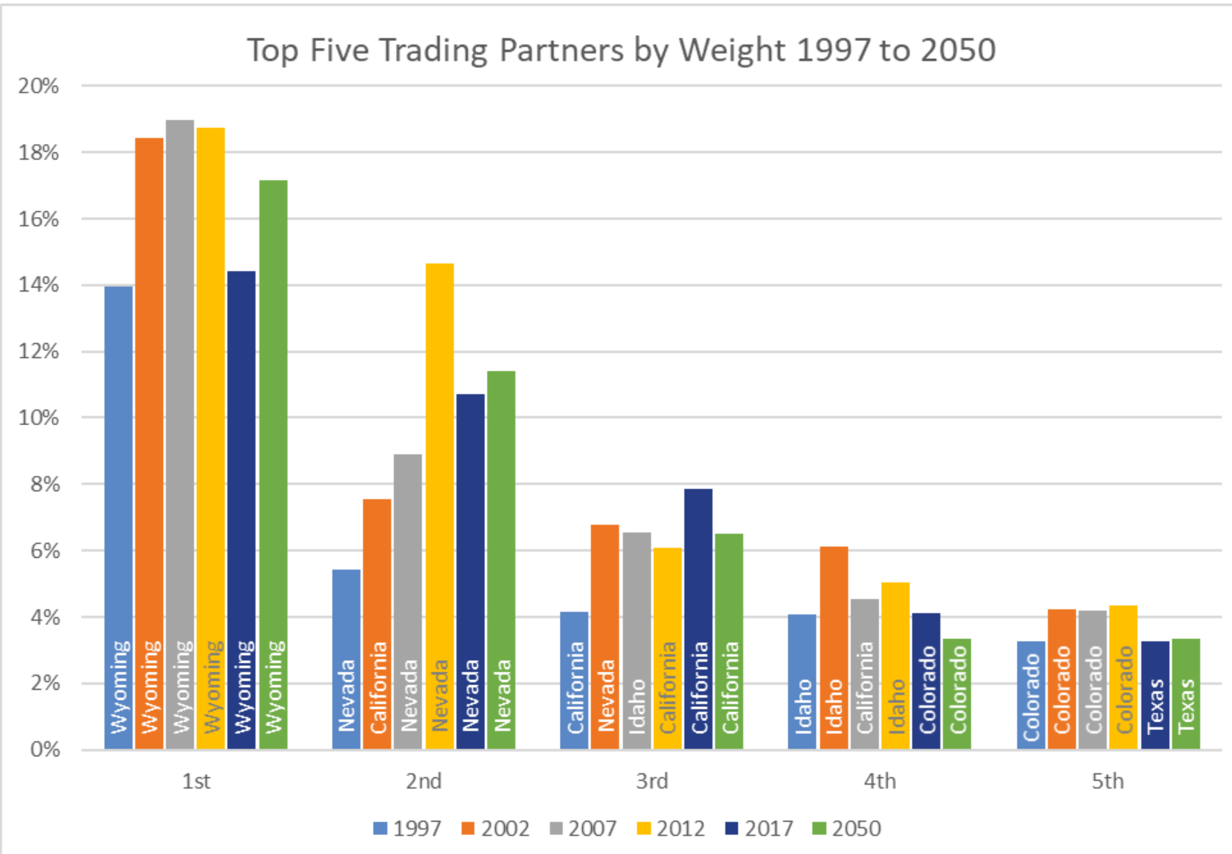
Source: Freight Analysis Framework Version 5.2, Federal Highway Administration, 2021.

11.5 Trading Partners by Weight

California, Colorado, Idaho, Nevada and Wyoming are consistently in the top five trading partners by weight, with Texas being the single outlier, showing up in 2017 at number five. It is worth noting that Texas is projected to remain in the top five in 2050. Wyoming is consistently number one and Colorado is almost consistently number five with the exception of moving up to fourth in 2017.

In 2050, the top five trading partners are not forecasted to significantly shift from historic trends. It appears that between 2017 and 2050, Wyoming, Nevada, and Texas to a lesser extent comprise a growing share while California and Colorado slightly decline.

Figure 11-13. Top Five Trading Partners by Weight 1997 to 2050

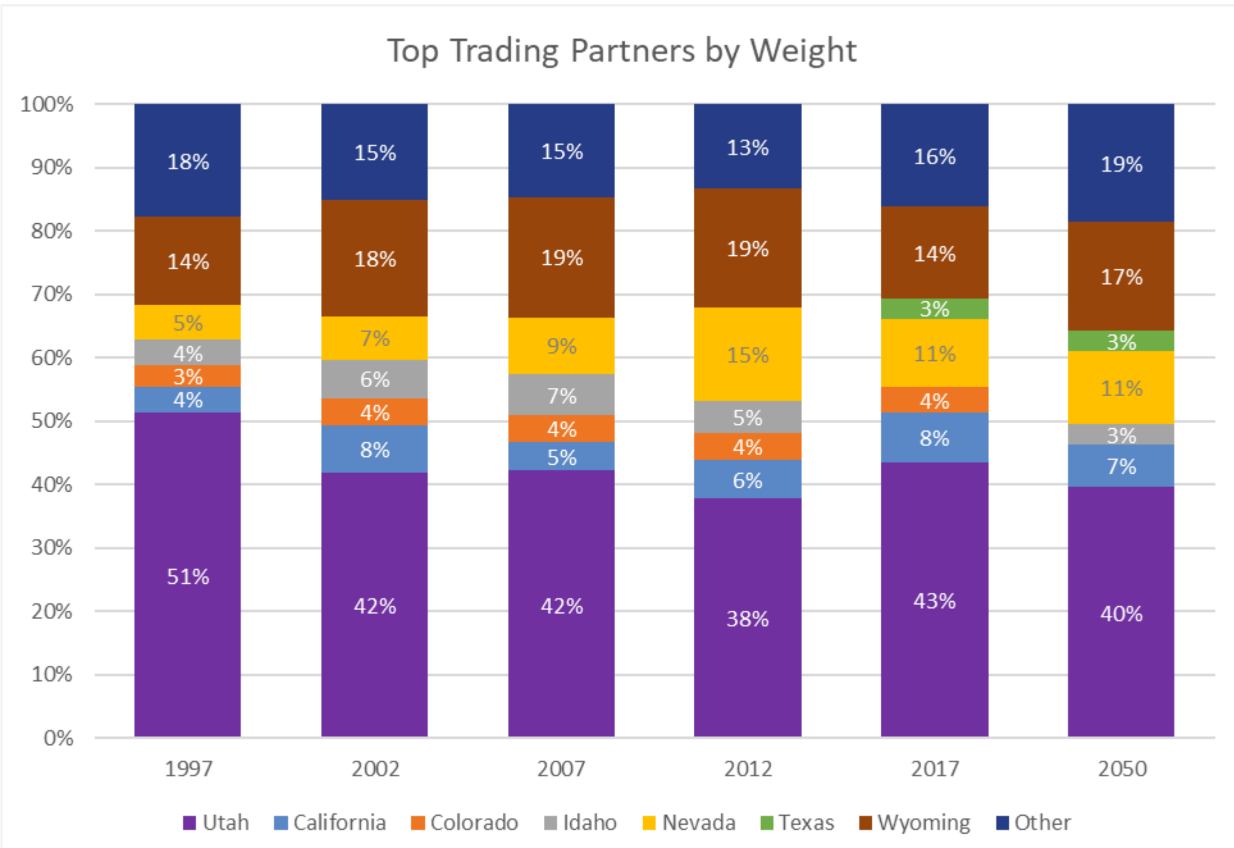


Source: Freight Analysis Framework Version 5.2, Federal Highway Administration, 2021.

The data is in thousand tons and shows how much weight was traded in 1997 with other states as well as within Utah. In terms of weight, Utah ceased being the majority trading partner in 1997. From 2007 through 2012, the top five trading partners by weight were a larger share than Utah with this pattern reversing in 2017. Wyoming is the largest trading partner by weight for all past and forecasted years, comprising a larger share than the remaining 45 trading partners in the "Other" category from 2002 through 2012.

In 2050, Utah's, Colorado's, and California's share of trade by weight is forecasted to decline from 2017 levels. Meanwhile, Idaho, Wyoming, and the "Other" category become more significant.

Figure 11-14. Top Trading Partners by Weight

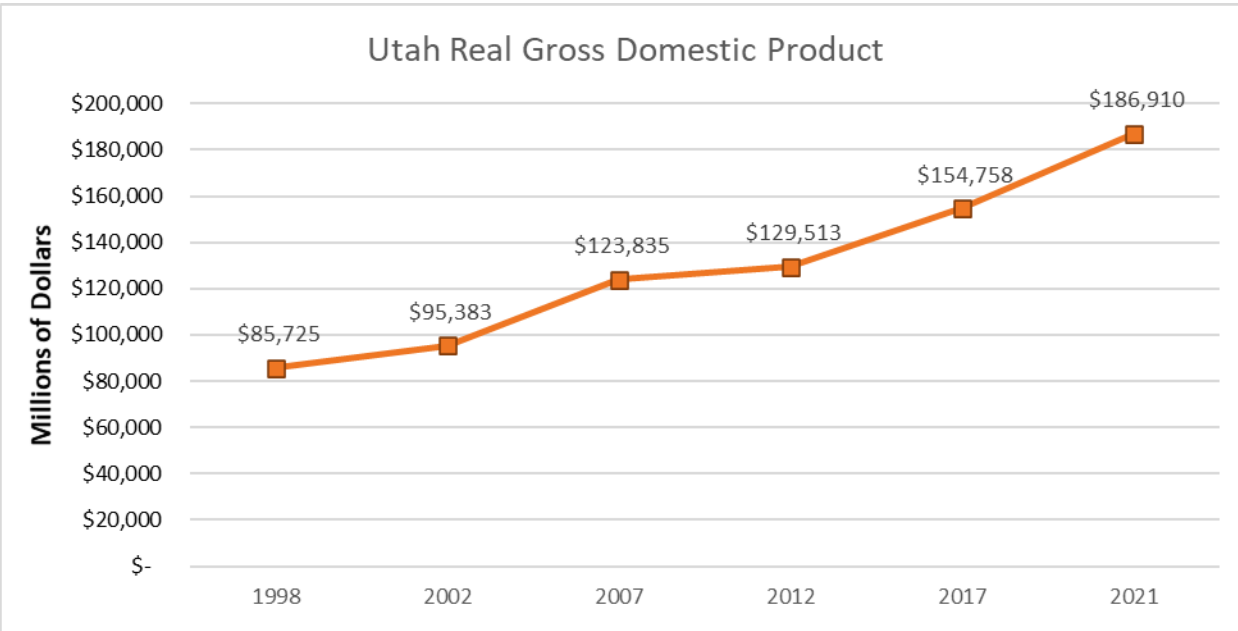


Source: Freight Analysis Framework Version 5.2, Federal Highway Administration, 2021.

11.6 Utah's Gross Domestic Product

An aspect of understanding these cargo flows includes the larger economic context within which they are occurring. The Real Gross Domestic Product is an inflation-adjusted measure of each state's gross product that is based on national prices for the goods and services produced within the state. It is worth noting that these figures are expressed in millions of chained dollars with a 2012 base year. Data prior to 1998 was not available, it was included due to being the closest to 1997. Additionally, the year 2021 is the latest that the data are available and is included for additional context.

Figure 11-15. Utah Real Gross Domestic Product



Source: U.S. Bureau of Economic Analysis, [SASUMMARY State annual summary statistics: personal income, GDP, consumer spending, price indexes, and employment]

ELEMENT 12. INVENTORY OF COMMERCIAL PORTS IN UTAH

This element of the freight plan contains a listing of commercial ports in Utah and a few coastal seaports outside of Utah that impact intermodal container traffic in the state.

12.1 Utah Inland Port Authority

The Utah Inland Port Authroity (UIPA) was established in 2018 by the Utah State Legislature and is a statewide organization that oversees project areas, activities, and logistics projects within its purview. The purpose of the authority is to fulfill the statewide public purpose of working in concert with applicable state and local government entities, property owners and other private parties, and other stakeholders to encourage and facilitate development of the authority jurisdictional land and land in other authority project areas to maximize the long-term economic and other benefit for the state, consistent with the strategies, policies, and objectives.[1]

UIPA is located in Northwest Salt Lake County and covers more than 16 thousand acres of majority undeveloped land zoned for manufacturing and industrial use. The port area has direct access to I-215, I-80, S.R. 201, S.R. 172, and S.R. 154, and I-15. The area is just west of downtown Salt Lake City and adjacent to both the Union Pacific Railroad Salt Lake City Intermodal Terminal and Salt Lake City International Airport. The port is also part of an existing Foreign Trade Zone (FTZ #30). The port area is mostly privately-held and the UIPA is directed to facilitate its sustainable development.

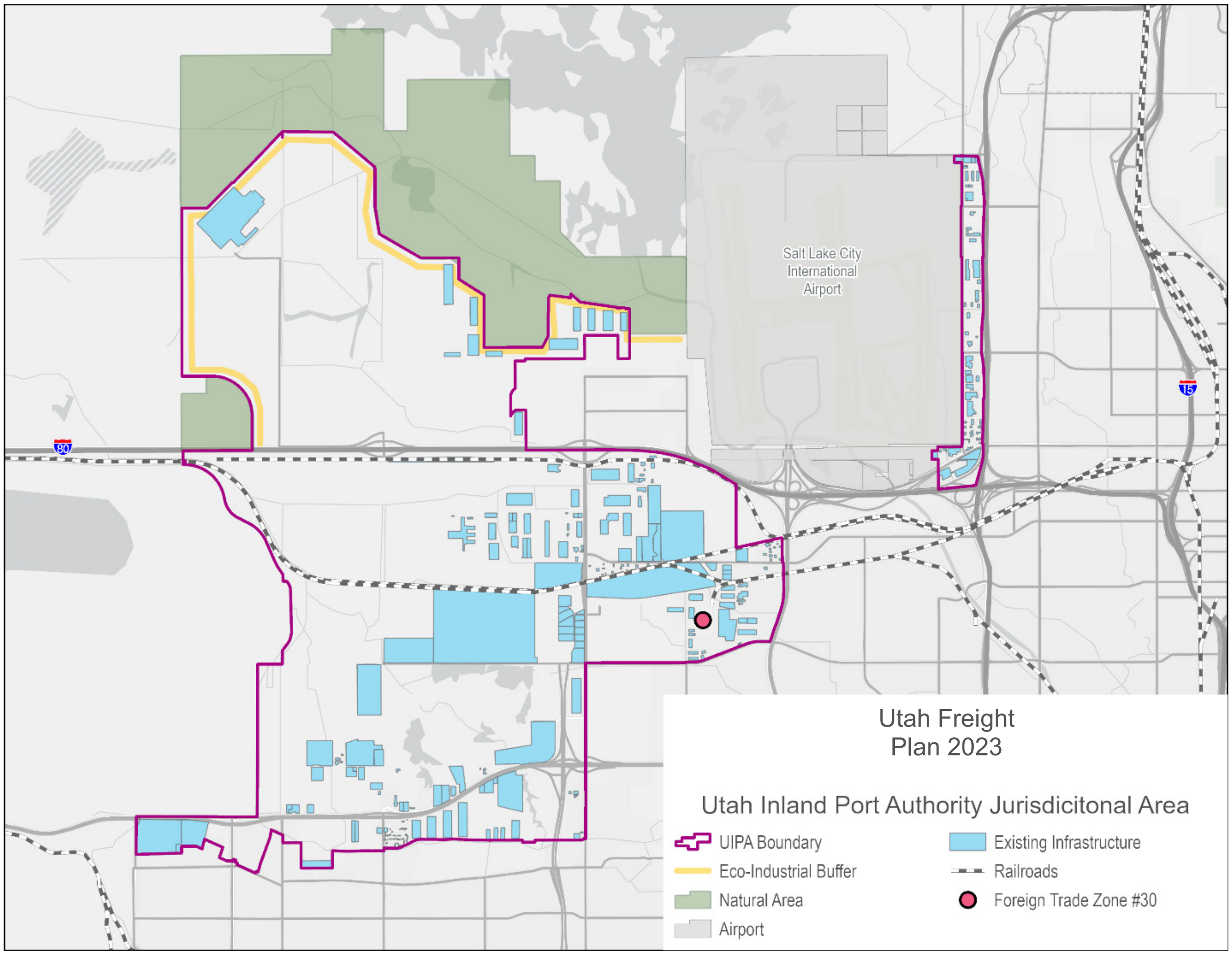
Additional "project areas" designated by the UIPA include those in Iron County and Spanish Fork.

12.2 Union Pacific Railroad's Salt Lake City Intermodal

Union Pacific Railroad's SLCIT opened in 2006. SLCIT is located directly adjacent to Salt Lake City's warehousing and distribution center and has direct access to three highways identified on the Utah Highway Freight Network as well as the Salt Lake City International Airport. Shipments from as far away as Montana are trucked to and from Union Pacific's intermodal trains at SLCIT. At the current time, the UP averages approximately 600 container and trailer lifts per day at SLCIT. See Figure 12-1 for a location map of the SLCIT.

[1] Utah Code Section 11-58-201

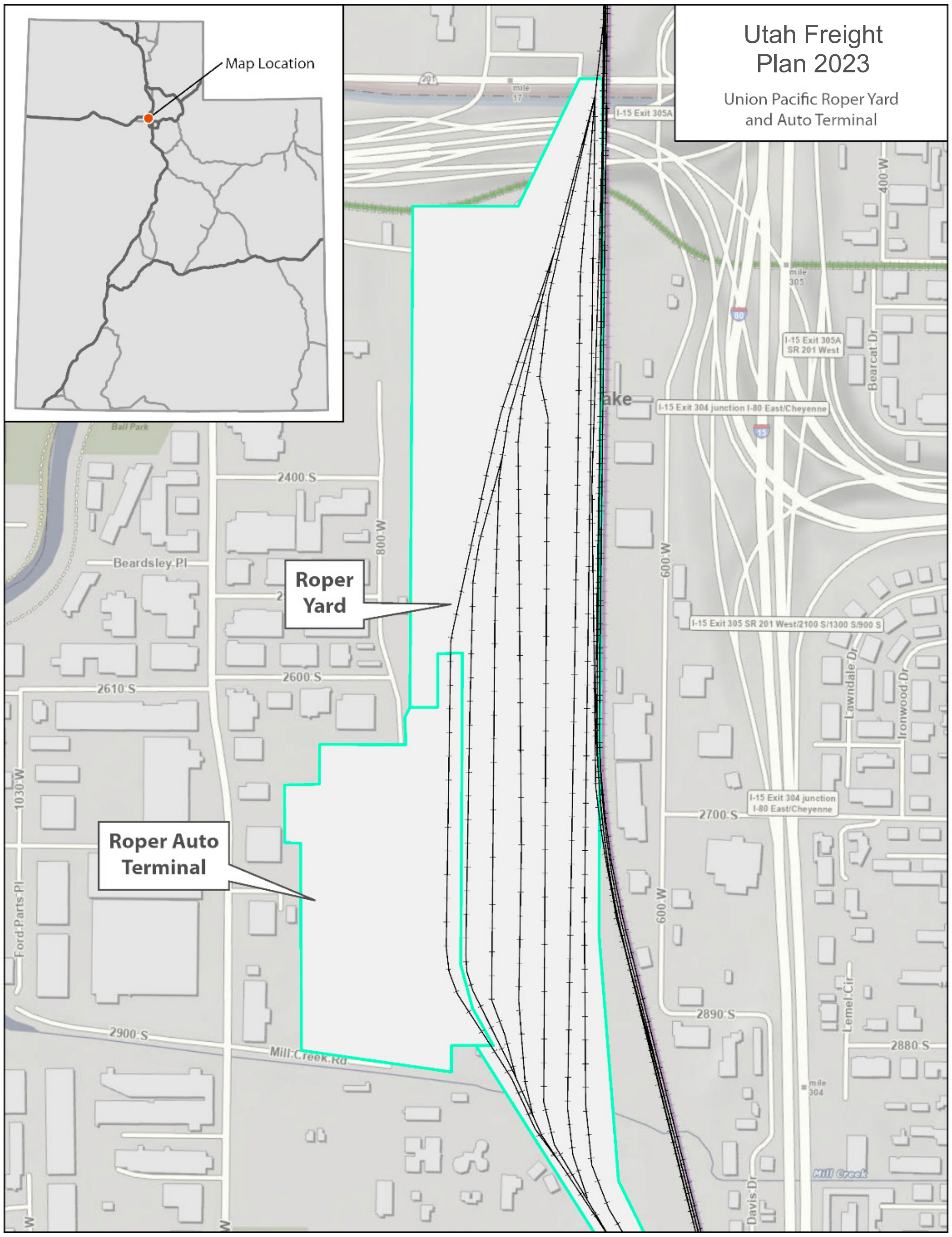
Figure 12-1. Utah Inland Port Authority Jurisdiction Area



12.3 Union Pacific Railroad's Roper Auto Terminal

A facility for new automobiles is maintained by the Union Pacific at their Roper Freight Yard, located three miles south of downtown Salt Lake City adjacent to I-15, I-80, and the S.R. 201 freeways. This facility handles shipments of new automobiles and vehicles by rail for portions of Utah, Idaho, Montana, Nevada, Wyoming, and even northern California, as well as parts of Oregon and Washington. See Figure 12-2 for a location map of the Roper Yard and Auto Terminal.

Figure 12-2. Union Pacific Roper Yard and Auto Terminal



12.4 Salt Lake City International Airport

Utah's primary gateway for air cargo is the Salt Lake City International Airport. The air cargo facility is located at the northwest end of the Salt Lake City International Airport. There are three air cargo airlines that fly in and out of Salt Lake City International Airport, which include DHL, FedEx, and UPS.

According to Salt Lake City International Airport statistics for 2022, in addition to the three air cargo airlines, fourteen other airlines handled more than 390 million pounds of air cargo and air mail in 2022. As shown in Table 12-1, the amount of air cargo enplaned was 189,740,223 pounds and the amount of air cargo deplaned was 201,212,667 pounds for a total of 390,952,890 pounds.

Table 12-1. Top Air Cargo Airlines

Airline	Enplaned Cargo	Deplaned Cargo	Total Cargo
FedEx	100,024,037 (53%)	99,192,463 (49%)	186,826,728 (51%)
UPS	61,991,487 (33%)	69,592,882 (35%)	107,749,530 (34%)
Delta	8,348,137 (4%)	12,868,194 (5%)	23,489,368 (5%)
Southwest	4,427,640 (2%)	4,268,323 (2%)	8,969,857 (32%)
Others (totaled)	14,948,922 (8%)	15,290,890 (8%)	390,952,890 (8%)
Total	**189,740,223**	**201,212,667**	**390,952,890**

Source: Salt Lake City International Airport, Summary Cargo Report for 2022, 2023.

12.5 Coastal Seaports

Although an inland state, Utah depends on three major West Coast seaports to link it with the rest of the world. Although modest amounts of Utah freight pass through Atlantic and Gulf Coast seaports, as well as those in the Pacific Northwest, Utah's primary global gateways are in California. Union Pacific's SLCIT provides direct rail intermodal freight service to the ports of Los Angeles and Long Beach, with indirect rail service to the Port of Oakland.

For bulk commodities such as coal and iron ore, Utah bulk freight has traditionally used the bulk cargo facilities at the Port of Long Beach in Southern California, and the Ports of Richmond and Stockton, located on San Francisco Bay and at the upper end of the Sacramento/San Joaquin River Delta east of San Francisco, respectively.

Utah's primary intermodal and bulk commodity connections to these California seaports is the Union Pacific Railroad, along with I-15 and I-80, which are on the Utah Highway Freight Network.

ELEMENT 13. MULTI-STATE FREIGHT COMPACTS

Utah does not currently belong to any multi-state freight compacts. UDOT used to be a member of and participate in the Western States Freight Coalition (WSFC) before it was dissolved in early 2022. Since most states were members of the Western Association of State Highway and Transportation Officials (WASHTO), the WSFC members decided to participate in the Special Committee on Highway Transport. However, UDOT Planning is participating in regional activities and studies that include the following organizations, which represent corridors on the National Highway Freight Network:

1. Interstate 80 Winter Operations Coalition
2. Interstate 15 Mobility Alliance

13.1 Interstate 80 Winter Operations Coalition

Interstate 80 is a major east-west interstate corridor through the western states of California, Nevada, Utah, Wyoming, and Nebraska, and is a major economic freight and traveler corridor which can better service the public through improved and coordinated maintenance and traveler information services. During winter, poor travel reliability and increased delay seriously affect commerce and goods movement along this major route, especially in the west with multiple mountain passes. During severe winter weather (including snow and ice), portions of I-80 are often closed due to safety hazards of trucks and other vehicles trying to navigate extreme elevations. Integration and continuity of winter maintenance operations across the United States is needed to provide consistent traveler information and similar levels of service to achieve a higher degree of boundary transparency and improved mobility, as seen by the traveling public. These five states have initiated a single strategic planning effort to reach consensus on how best to link operational processes and data to maximize winter mobility in their I-80 corridor.

The purpose of the coalition is to provide better and more comprehensive I-80 corridor condition information to both transportation agencies and to travelers. To make good decisions, the road users must have accurate, consistent, and near-real time information. Road descriptions such as slippery spots on the road, blowing snow, areas where chains are required, road closures, weather conditions, and reliability information must be available and accurate across the entire Western Region. This is accomplished by linking traffic management centers that share a common goal of focusing on all weather mobility and developing a coordinated strategy for how information is shared with agencies and road users.

Additionally, this effort will build on existing multi-state coordination efforts on I-80 and expand to include general road conditions information, consistent corridor-wide traveler information, proactive traffic management strategies, coordinated maintenance operations and potentially shared use of infrastructure near state boundaries. Other items include proactive and coordinate snow and ice control training among the DOTs in the four states. The coalition leverages state resources and tools to implement innovative solutions for winter operations as well as day-to-day corridor management. Coalition objectives include the following:

1. Establish institutional structure for coordinating operations on I-80 in the western states.
2. Aggregate weather conditions information from multiple sources.
3. Identify traffic data collection capabilities and share information with other agencies.
4. Establish existing capabilities and near-term enhancements to identify specific continuity issues.
5. Research innovative practices from other areas of the country facing similar challenges.

13.2 Interstate 15 Mobility Alliance

The DOTs in California, Nevada, Arizona, and Utah have formed a cooperative alliance to develop a long-range multimodal transportation system master plan that will address current and future mobility needs along the I-15 corridor from Southern California to Northern Utah. The I-15 Mobility Alliance is led by senior leadership of the Arizona, California, Nevada, and Utah departments of transportation. The Alliance partners come from state and local transportation agencies, local and interstate commerce, port authorities, departments of aviation, freight and passenger rail authorities, freight transportation services, providers of public transportation services, environmental and natural resource agencies, and others. The Alliance partners provide invaluable data, resources, and assistance in capturing, analyzing, and summarizing data needed to update and maintain the Corridor System Master Plan as a functional and living document.

The I-15 corridor is a vital linkage in the economy not only of the western U.S., but of the entire nation. Projected increases in commodity flows from the western U.S. and Mexican ports, and population growth will result in the impacted segments of I-15 experiencing severe congestion thus impeding commerce, hindering mobility, and degrading the quality of life of the people served by the corridor.

The mission of the Alliance and its members includes:

1. Developing, in partnership with public and private sectors, a comprehensive, multimodal master plan for the I-15 corridor.
2. Prioritize projects and policies of interregional significance.
3. Seek financial and other resources necessary for the implementation of the master plan.
4. Devise appropriate governance mechanisms for the ongoing efficient and effective construction, operations, and maintenance of the corridor on a more sustainable basis.

The goals of the I-15 Mobility Alliance are to:

1. Reduce or eliminate congestion impacting the interregional movement of people or goods.
2. Improve interregional travel time reliability of people or goods movement.
3. Improve the safety of the interregional movement of people or goods.
4. Construct projects in a manner that respects and honors the unique goals/objectives/standards of each sponsoring community/entity.

The I-15 Mobility Alliance developed the first I-15 Corridor System Master Plan in 2012, which was updated in 2017. More than just a traditional transportation study, the I-15 Corridor System Master Plan is an alliance of public and private agencies and users of the I-15 corridor working together to enhance the movement of people, freight, and other commodities for decades to come. The plan included multimodal solutions being studied to improve mobility within the corridor include moving more people and goods via rail, air, and transit in addition to potential highway and local/regional road network improvements. The master plan also considered solutions and infrastructure improvements for the "transportation" of energy, data, and communications within the corridor.

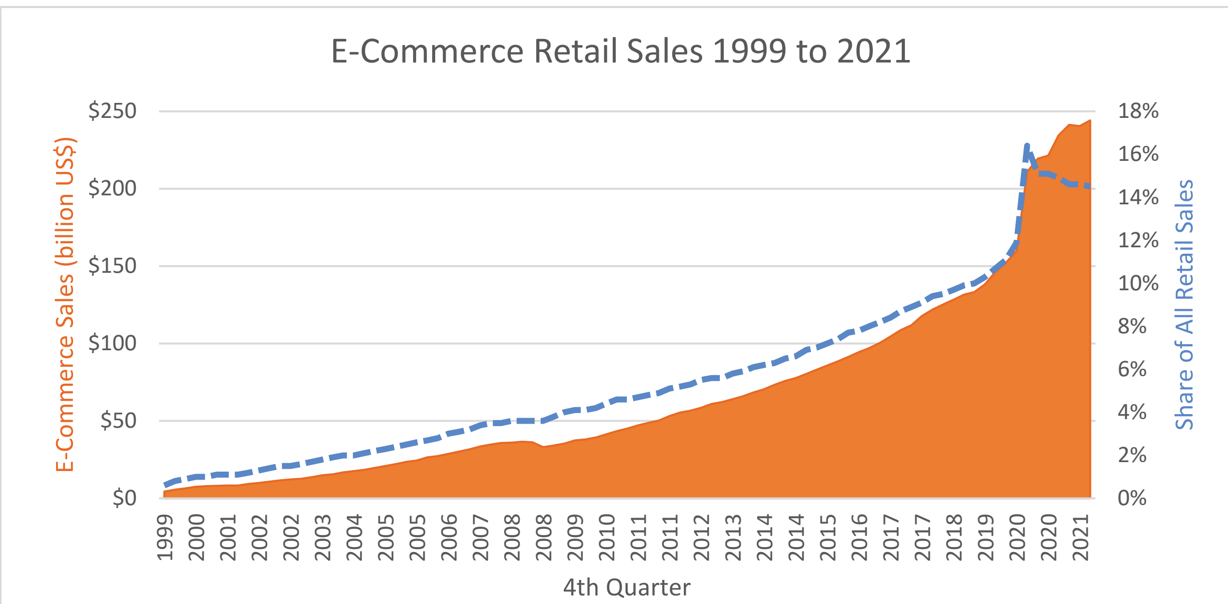
ELEMENT 14. IMPACTS OF ELECTRONIC COMMERCE ON FREIGHT INFRASTRUCTURE

Electronic commerce (E-commerce) is defined as the process of buying and selling products and services electronically. In Utah, approximately half of residents surveyed responded they were shopping more online than before the COVID-19 pandemic, according to the U.S. Census Bureau Household Pulse Survey in September 2020. Families with higher incomes also tend to make more purchases online.[1]

14.1 E-commerce Growth

E-commerce in the U.S. grew from only 0.6% in 1999 to a high of 16% of all retail sales at the start of the COVID-19 lockdown in the second quarter of 2020. Although in-person shopping has rebounded, e-commerce held steady around 13% of total retail sales at the end of 2021. E-commerce retail sales have grown exponentially over the last twenty years across the U.S.

Figure 14-1. E-Commerce Retail Sales

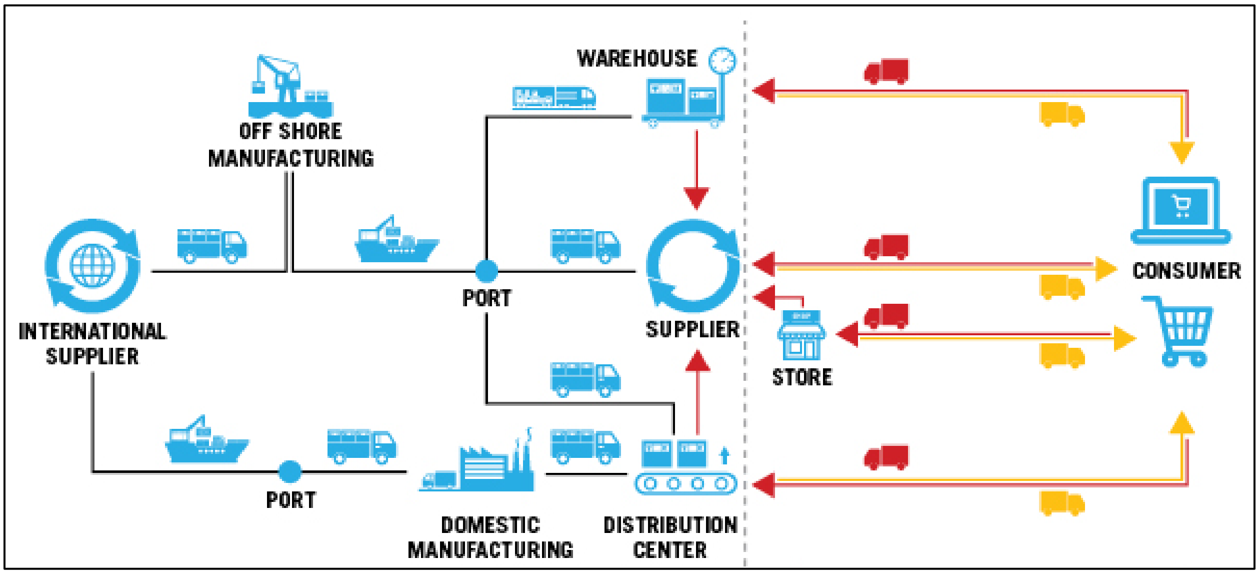


Source: CPCS Analysis of U.S. Federal Reserve St. Louis E-Commerce Sales, 1999-2021.

[1]U.S. Census Bureau, "Household Pulse Survey, Week 15: Household Spending Table 2. Changes to Household Spending or Shopping Behavior in the Last 7 Days, by Select Characteristics," September 2020. Retrieved April 18, 2022, from https://www.census.gov/programs-survey/shousehold-pulse-survey/data.html.

Figure 14-2 shows the flow of goods for a typical e-commerce distribution channel within a broader retail supply chain. The addition of e-commerce generates truck trips directly between the consumer and the supplier (typically a retailer). It also generates trips between the consumer and a warehouse location. E-commerce activity can also generate truck trips between the warehouse and the supplier to balance out inventory levels. The addition of all these movements can impact further upstream movements such as trips between the port, warehouse, distribution center, and domestic manufacturers. E-commerce increases supply chain complexity and the reliance of freight on an efficient freight transportation system to deliver goods.

Figure 14-2. E-Commerce Logistics and Supply Chain Schematic



Source: Omni-Channel Retail: Roadmap to Profit, Inbound Logistics, January 17, 2017.

14.2 E-commerce Impacts

Unlike traditional truck freight, the freight flows generated by e-commerce usually consists of the following characteristics:

1. High percentage of light commercial vehicles traveling on local roads to carry out last-/first-mile deliveries, adding freight traffic to residential neighborhoods, and
2. E-commerce requires a denser network of warehousing and storage space near population centers.

E-commerce impacts Utah's multimodal freight system in the following ways.

14.2.1 Increased Demand for Warehouse and Distribution Center Space

Consumers increasingly want and demand expedited shipping times for their online purchases. This increases the complexity of the supply chain as retailers increasingly demand more warehousing and distribution space to ensure they stock sufficient inventory close to consumption markets. New fulfillment centers, warehouses, and distribution centers are increasingly needed in urban and metropolitan regions, as well as last-mile carrier workers, hours of operations, and fleets to meet demand. Warehouses serve as storage space for longer-term inventory and usually have not been purchased by consumers yet. In contrast, fulfillment centers consolidate, package, assemble, label, and fulfill orders within a shorter period of time and usually are made up of inventory that has already been sold.

In response to the increased demand, the Salt Lake City region's industrial real estate has been burgeoning in recent years. In 2022, the largest volume of warehouses was completed in Salt Lake City, with a total of 13 million square feet of warehouses delivered.[1] As demonstrated in Table 14-1, the Northwest Quadrant market is particularly robust with a low vacancy rate (2.8 percent) and over eight million square feet in construction as of the end of 2022. The overall absorption rate came down from its highest point in 2021 but remained at a healthy point of 5.6 percent, which indicates that the demand for warehouses continues after the surge during the COVID pandemic. Recently, major e-commerce businesses, such as Amazon and Walmart, opened mega last-mile fulfillment centers in Salt Lake City and plan to open more across Utah.[2, 3]

Table 14-1. Industrial Real Estate Market Report, 2022

Submarket	Inventory (square feet)	Overall Vacancy Rate	Overall Net Absorption (square feet)*	Under Construction (square feet)*
Salt Lake County				
Northeast	5,947,749	1.2%	-20,131	0
Northwest	108,804,997	2.8%	7,703,061	8,189,314
Central East	5,126,563	1.4%	-7,384	0
Central West	16,676,317	1.4%	23,216	190,146
Southeast	3,007,403	3.3%	50,491	148,056
Southwest	12,910,001	3.7%	863,030	1,186,569
Total	**152,473,030**	**2.6%**	**8,612,283**	**9,714,085**
Utah County				
Central	13,709,367	1.5%	-146,015	NA
North	14,508,127	1.3%	617,782	NA
South	13,623,296	0.9%	949,373	NA
West	1,238,630	1.2%	388,000	NA
Total	**43,079,420**	**1.2%**	**1,809,140**	**NA**

Source: Salt Lake City MarketBeat Industrial Q4, 2022, Cushman & Wakefield; Utah County Industrial Q2, 2022, Colliers.

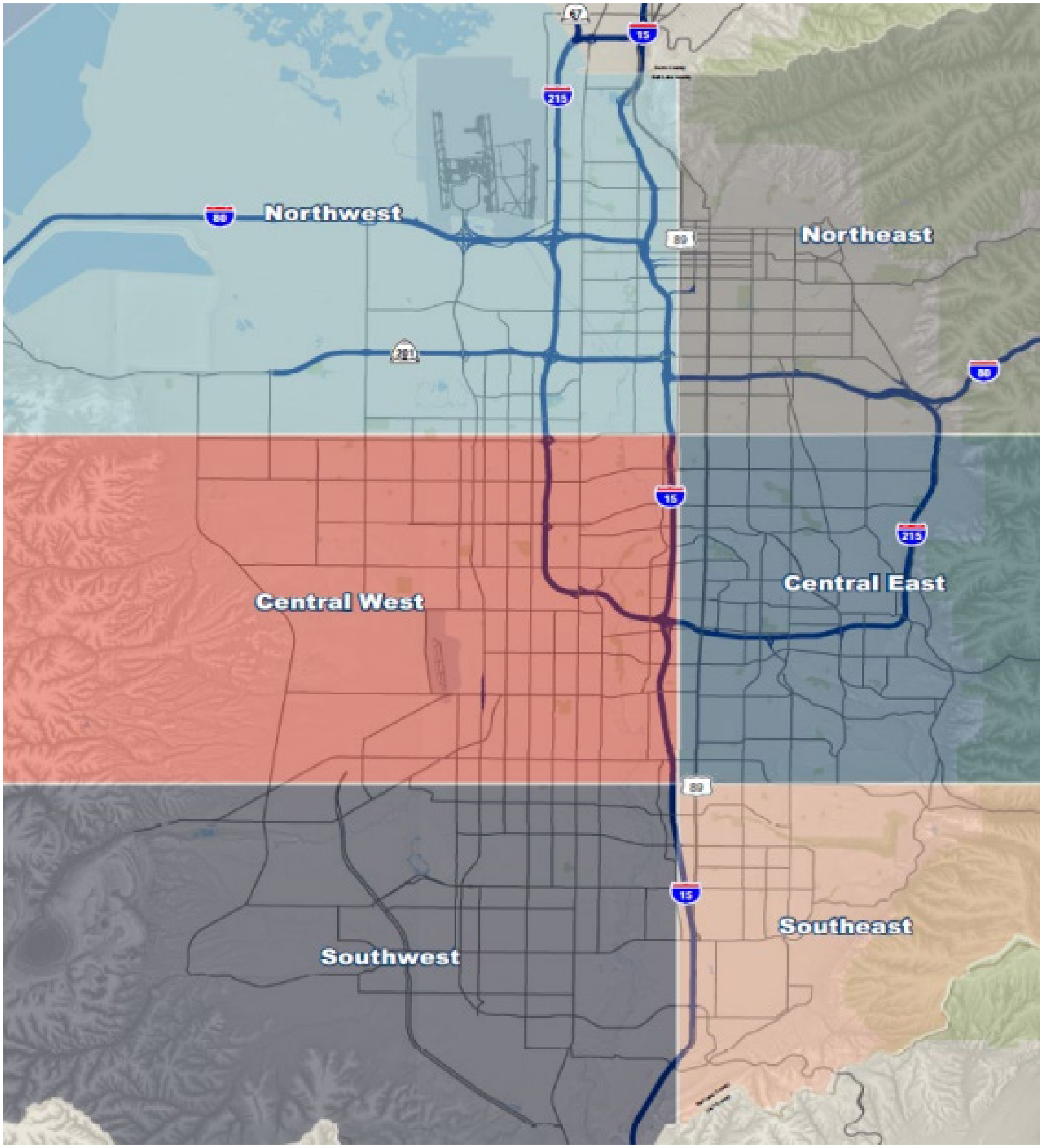
* The data for Utah County only includes the first two quarters of 2022.

[1] Salt Lake City Industrial Insight Q4 2022. JLL. https://www.us.jll.com/content/dam/jll-com/documents/pdf/research/americas/us/q4-2022-industrial-insights/jll-us-industrial-insight-q4-2022-salt-lake-city.pdf

[2] Walmart Selects Salt Lake City, Utah for New Fulfillment Center, Opening Summer 2022. Walmart.com. https://corporate.walmart.com/newsroom/2021/12/15/walmart-selects-salt-lake-city-utah-for-new-fulfillment-center-opening-summer-2022.

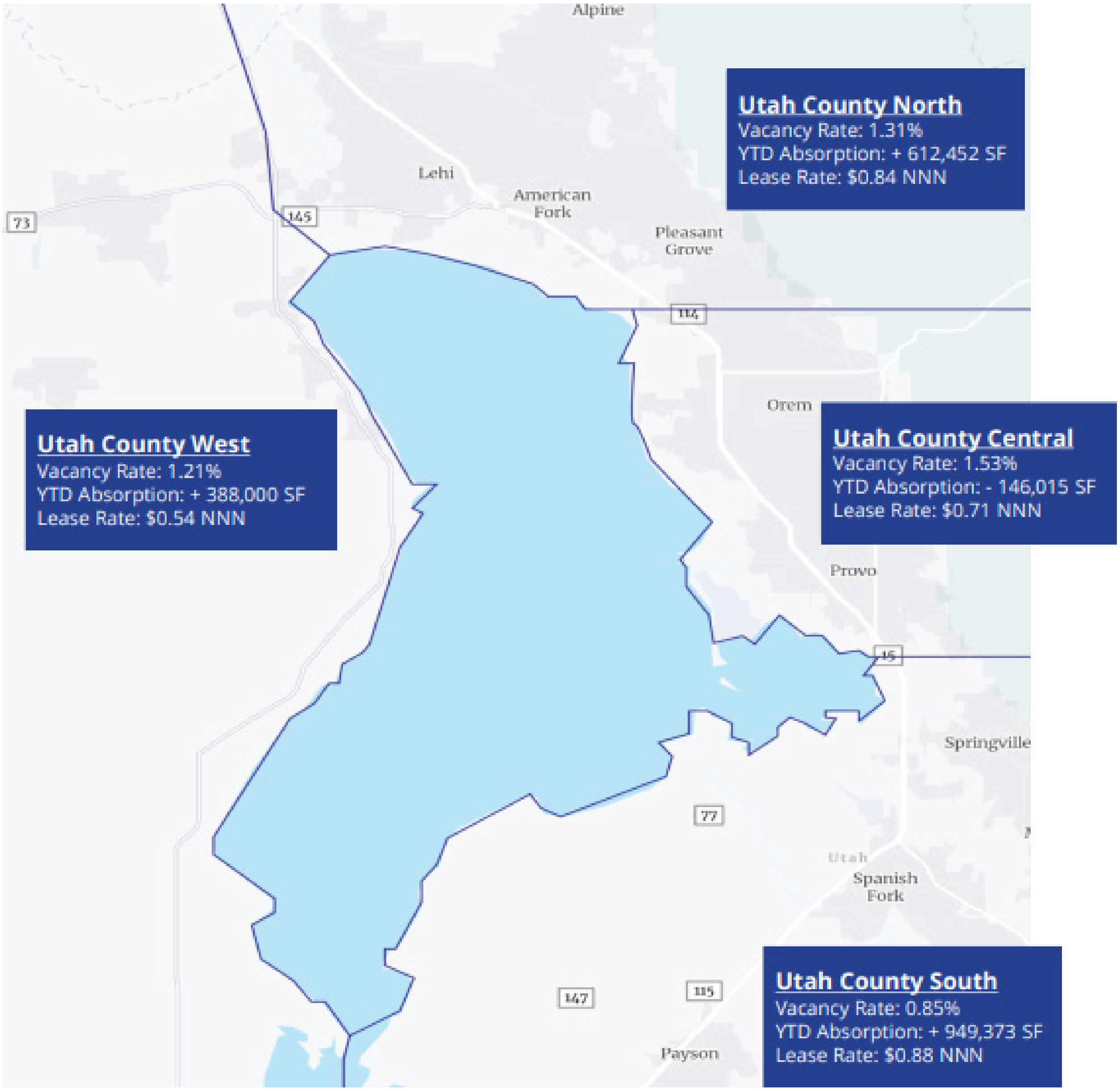
[3] Amazon launches first same-day fulfillment center in Salt Lake City. KSL.com. https://www.ksl.com/article/50308706/amazon-launches-first-same-day-fulfillment-center-in-salt-lake-city

Figure 14-3. Salt Lake City Submarkets



Source: Salt Lake City MarketBeat Industrial Q4, 2022, Cushman & Wakefield; Utah County Industrial Q2, 2022, Colliers.

Figure 14-4. Utah County Submarkets



Source: Salt Lake City MarketBeat Industrial Q4, 2022, Cushman & Wakefield; Utah County Industrial Q2, 2022, Colliers.

Amazon's Same-Day Fulfillment Center

Amazon opened the 150,000-square-foot center at 6338 W. 700 North Street to support its same-day delivery service in 2021.[1] The rapid delivery service allows consumers to purchase three million daily consumption items, such as baby, beauty and health, kitchen, electronics, and pet supplies, and receive them in as fast as five hours.

Walmart Fulfillment Center

Walmart opened its first fulfillment center in Salt Lake City, Utah, in 2022. The over-a-million-square-foot facility is located at 990 N 6550 W and is intended to store, sort, and ship directly to consumers as soon as the next day.[2] The new fulfillment center strengthens Walmart's retail supply chain network and helps it become more nimble in e-commerce.

14.2.2 Increased Truck Traffic on Last-mile Connectors

The development of new warehouses and distribution centers generates more truck traffic on last-mile connectors. These connectors may require facility access management or corridor management. Access problems may include poorly designed entrances/exits, poor street design and navigation, spillage of long truck queues onto local streets, and roadway users with opposing mobility needs (such as bicyclists and trucks). Corridor management needs may include long waiting times at traffic signals, tight turns at on-and off-ramps that connect last-mile connectors with highways, and potential conflicts for truck-train collisions at highway-rail grade crossings. Although there is no clear evidence indicating that last-mile delivery vehicles contribute to or exacerbate existing congestion in Utah, proactive examination of current roadway networks and investigation into the potential corridor and facility access needs as a result of increasing e-commerce activities could be beneficial.

14.2.3 Changes in Last-mile Freight Delivery

As direct-to-consumer deliveries become more commonplace, logistics firms are shifting deliveries to more rapid deliveries and from fewer, more concentrated locations such as commercial buildings and retail stores to an increased number of dispersed residential homes. In urban locations, increased residential delivery means a higher number of trucks that may generate additional air pollution and conflict with passenger vehicles, bicyclists, and pedestrians. Urban roadway configurations may also not be designed for trucks. Companies are increasingly experimenting with "micro-freight" modes such as light-duty vans, passenger vehicles, and bicycles for home deliveries. This may require curbside management strategies in urban regions to accommodate multimodal use.

14.2.4 Shortage of Freight and Logistics Workforce

The industry continues to suffer from a short supply of truck drivers and warehouse workers. The American Trucking Association estimates that there is a nationwide

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[1] Ibid.

[2] Ibid.

shortage of 80,000 drivers that will double by 2030.[1] Moreover, there is also a short supply of warehouse workers especially in urban regions as demand for warehousing space continues to grow.

Amazon's New Electric Delivery Vans

In November 2022, Amazon deployed a fleet of electric delivery vehicles to Salt Lake City and Provo. These vehicles are powered by electricity and contain features, such as automatic emergency braking and 360-degree cameras, to mitigate potential roadway safety hazards. Additionally, each vehicle is equipped with a built-in GPS to ensure the timely delivery of packages.[2]

Amazon Electric Delivery Van

Interior of the Delivery Van

[1] ATA Chief Economist Pegs Driver Shortage at Historic High | American Trucking Associations (2021, October). Retrieved November 1, 2021, from https://www.trucking.org/news-insights/ata-chief-economist-pegs-driver-shortage-historic-high.

[2] Fleet of Amazon's new electric delivery vehicles arrives in Utah. Abc4.com. https://www.abc4.com /news/wasatch-front/fleet-of-amazons-new-electric-delivery-vehicles-arrives-in-utah/

ELEMENT 15. CONSIDERATIONS OF MILITARY FREIGHT

The expeditious movement of military freight, equipment, and personnel in support of the U.S. Armed Forces is critical to national defense whether the deployment is local, national, or global. Military freight travels on the same infrastructure that commercial freight moves on, and it is vital that this infrastructure is maintained to be always in a state of readiness. Cooperation between the military and federal, state, and local government agencies is essential for safe and successful military convoy deployments.

15.1 Military Installations

Utah is home to five main military installations – Hill Air Force Base, Tooele Army Depot, Dugway Proving Grounds, Camp Williams, and the Roland R. Wright Air National Guard Base.

15.1.1 Hill Air Force Base

Hill Air Force Base is an Air Force Materiel Command base located in Davis County, Utah. It is the Air Force's second largest base by population and geographical size and is home to many operational and support missions. The base is also the largest single-site employer in the state of Utah, with an economic impact of more than $3 billion annually.[1]

The base also has support responsibility for the operation of the Utah Test and Training Range. Located in Utah's west desert, the airspace is situated over 2.3 million acres of land and contains the largest block of overland contiguous special-use airspace in the continental United States.[2]

15.1.2 Tooele Army Depot

Tooele Army Depot is a premier active joint ammunition storage site for the United States Army. The site is located in Tooele County and Tooele City, Utah and covers roughly 24,000 acres.[3] The Tooele Army Depot is responsible for shipping, storing, receiving, inspecting, demilitarization, and maintaining training and war reserve conventional ammunition.

15.1.3 Dugway Proving Grounds

Dugway Proving Grounds is the United States Army's premier science and test facility and is located in Tooele County, Utah. It is responsible for testing and evaluating nearly all Department of Defense (DoD) chemical and biological defense equipment and

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[1] About Us (af.mil)

[2] About Us (af.mil)

[3] History Fact Sheet FY2016.pdf (army.mil)

capabilities. Within its nearly 800,000 acres, there are numerous state-of-the-art laboratories, unique test chambers and extensive field test grids.[1]

In addition to chem/bio defense testing and evaluation, Dugway supports training for military and first responders, testing and evaluation of obscurants, and the development, testing, and integration of unmanned aircraft systems.

15.1.4 Camp W. G. Williams

The Utah National Guard is located at Camp Williams in Bluffdale, Utah. Camp Williams is home to the Utah Training Center and is a National Guard training site. It consists of 24,000 acres of combat-training areas and facilities that include small-arms-weapons firing ranges, artillery-firing points, demolition, grenade, and crew-served-weapon ranges.[2]

15.1.5 Roland R. Wright Air National Guard Base

The Utah Air National Guard Base is located in Salt Lake City, Utah and is the home to the 151st Air Refueling Wing (the 151st ARW).[3] The 151st ARW supports air refueling operations, aeromedical evacuation, and cargo missions. The base access is via I-215 and 700 North.

15.2 Strategic Highway and Rail Corridors

Under its Railroads and Highways for National Defense program, the DoD, with the support of the Department of Transportation (DOT), ensures the nation's highway and rail infrastructure can support defense emergencies. Efficient freight movement is very important to military installations, who rely upon the highway and rail corridors to move equipment and personnel in both peace and war.

15.2.1 Strategic Highway Network

The Strategic Highway Network (STRAHNET) system of public highways provides access, continuity, and emergency transportation of personnel and equipment in times of peace and war. The 62,791-mile system, designated by the Federal Highway Administration in partnership with DoD, comprises about 46,749 miles of Interstate and 16,042 miles of defense highways.[4] STRAHNET highway routes link more than 200 military installations and ports to the network. Even though DoD primarily deploys heavy equipment by rail, highways play a critical role.

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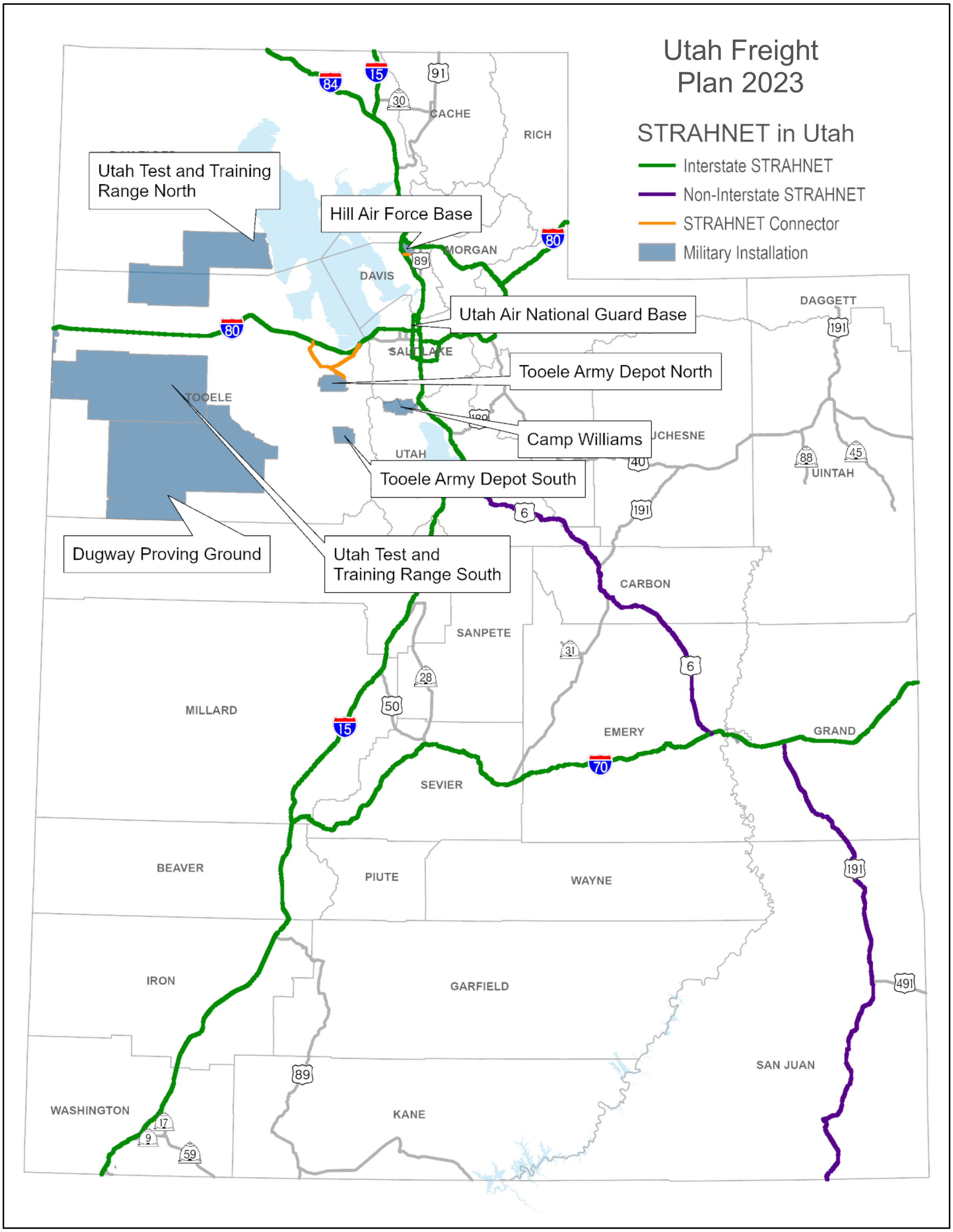
1 U.S. Army Dugway Proving Ground | DPG

2 Utah Training Center, Camp Williams

3 Home of the 151st Air Refueling Wing (af.mil)

4 2004 Conditions and Performance - Policy | Federal Highway Administration (dot.gov)

Figure 15-1. STRAHNET System



Source: ut_utah.pdf (dot.gov)

Only Hill Air Force Base and the Tooele Army Depot are listed as bases that have defined access to the STRAHNET. Most of the freight shipments to Hill Air Force Base are received by trucks through the Roy gate on Hill Force Base at I-15 and S.R. 97 on the north end of the base. However, both I-15 and I-84 are listed on the STRAHNET Interstates. S.R. 193 on the south end of the base is listed as a STRAHNET Connector to Layton gate. The Tooele Army Depot has access to the STRAHNET Interstate via I-80 and the STRAHNET Connectors via S.R. 138 and S.R. 112.

15.2.2 Strategic Rail Corridor Network

The Strategic Rail Corridor Network (STRACNET) consists of civil rail lines most important to national defense. The military places heavy and direct reliance on railroads to integrate bases and connect installations to predominantly maritime ports of embarkation. Mainlines, connectors, and clearance lines must all combine to support movement of heavy and/or oversized equipment. STRACNET consists of 38,800 miles of rail lines important to national defense and provides service to 193 defense installations whose mission requires rail service.[1]

Hill Air Force Base and the Tooele Army Depot are listed as the only bases in Utah that have rail access to the STRACNET. Hill Air Force Base has rail access via the Hill Field Industrial Lead of the Union Pacific Railroad. The Tooele Army Depot has rail access to the STRACNET also via the Union Pacific Railroad.

The Military Surface Deployment and Distribution Command Transportation Engineering Agency and the Federal Railroad Administration reviewed and updated the designation of the civil rail lines important to national defense. Virtually all the lines designated for STRACNET and connectors to military installations and activities requiring rail service meet defense readiness requirements for maintenance condition, clearance, and gross weight capability. Department of Defense installations and activities requiring rail service to accomplish their assigned mission in Utah are listed below.[2]

1. ATK Thiokol
2. Hill Air Force Base
3. Tooele Army Depot

15.3 Understanding of Military Freight Mobility

UDOT understands the importance of military freight mobility, including freight that solely passes through Utah, as well as oversize/overweight vehicles. The majority of STRAHNET roadways are on the Utah Highway Freight Network. Further, the two STRAHNET connectors are state highways and therefore are maintained by UDOT as well.

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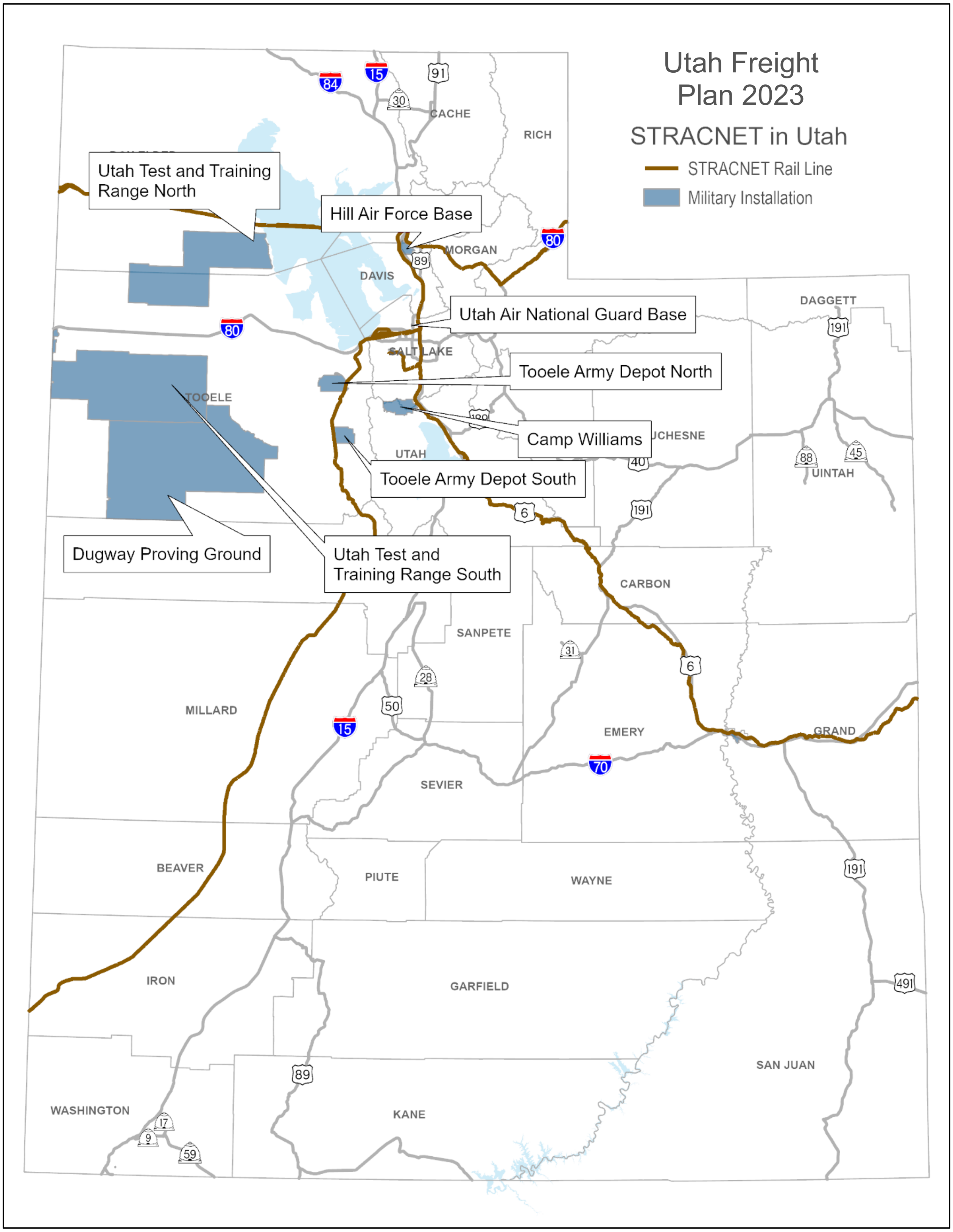
[1] Strategic Rail Corridor Network (STRACNET) (globalsecurity.org)

[2] Strategic Rail Corridor Network (STRACNET) and Defense Connector Lines, October 2018.

Figure 15-2. STRACNET System



Source: GlobalSecurity.org - Reliable Security Information

While railroads are private companies, UDOT understands the importance of the freight railroads and their ability to transport military equipment. Utah is not only the crossroads of the west for the highway network, but also for the rail network. Four of the six Union Pacific Railroad mainline routes in Utah are designated on the STRACNET. UDOT allocates all its Railway-Highway Crossing Program (Section 130) funds for the elimination of hazards at highway-rail grade crossings. Many of these highway-rail grade crossings are located on the four rail lines designated on the STRACNET.

ELEMENT 16. STRATEGIES AND GOALS TO DECREASE IMPACTS TO FREIGHT MOBILITY AND FREIGHT MOVEMENT ON THE ENVIRONMENT

Recent trends have prompted the review of certain vulnerabilities to the UDOT freight system and to develop strategies to mitigate risk. These trends include, but are not limited to, climate change and severe weather events that can result in rapid road closures as well as public health emergencies – like the COVID-19 pandemic, which have disrupted production and created shortages.

UDOT's mission is to "enhance quality of life through transportation." The UVision Quality of Life Framework—introduced in Element 4—implements this vision through four areas: good health, strong economy, better mobility, and connected communities. UDOT is incorporating the framework into key decision-making processes as a useful tool for quality of life considerations prior to making policies, plans and other transportation-related decisions. Each area within the UVision Framework incorporates metrics that jointly account for environmental impacts on freight movement as well as freight impacts on local air pollution, flooding and stormwater runoff, and wildlife habitat loss.

16.1 Impacts of Extreme Weather and Natural Disasters on Freight Mobility

To mitigate many of these risks, UDOT will continue a close examination of alternative routing systems. These alternate routes should be considered at the system level to understand the cost incurred by re-routed trucks, the impacts of traffic on the alternate routes, and the potential for various disasters to impact both the main route and the alternate route based on the ongoing increase in frequency and size of disasters that is occurring in Utah and the western U.S.

16.1.1 Extreme Short-Term Weather Events

Extreme weather events such as rainstorms, windstorms, and snowstorms are the main causes of roadway closures in Utah. I-15, serving a critical north-south trading corridor that connects six western states, may face temporary closures due to inclement weather. Although weather forecasts and transportation management systems help UDOT anticipate potential impacts on roads and update truckers with road conditions, the severity of the impacts of heavy rain, snow, and high wind impacts freight movement, deliveries, and truckers' hours of service.

16.1.2 Climate Change

Besides increasing average temperature, climate change manifests itself by causing extreme droughts, major wildfires, decreasing soil quality, rising sea level, and many other natural disasters that are detrimental to the economy and the environment. Changes to hydrological basins due to reduced rainfall are a key risk and can result in reduced agricultural production in the state. Projections for the Southwest region, including Utah, anticipate that loss of snowpack due to warming temperatures, as well as severe and sustained drought, will continue to stress water resources.

16.1.3 Avalanches

Between January and April, heavy snow accumulation and unstable snowpack cause hazardous conditions in Utah's mountain areas and result in several road closures. UDOT has taken efforts in recent years to use explosives and artillery to trigger avalanches that threaten public roads, such as projects around Little Cottonwood Canyon to keep S.R. 210 safe and open to the public.

16.1.4 Earthquakes

While not related to climate change, seismic activity can disrupt a spectrum of freight modes. While Utah does not sit directly on the seam of a tectonic plate, it is on the extending western portion of the North American plate and has numerous quaternary fault lines throughout the state. Thus, seismic activity occurs throughout the state, with areas around the Wasatch Front prone to higher activity. For example, the 2020 magnitude 5.7 earthquake in Magna caused damages to Magna's main street and temporarily shut down Salt Lake City International Airport and rail lines until inspections were completed.

16.1.5 Wildfires

Utah's climate is primarily arid, which means a higher risk for wildfires. It is one of the most wildfire prone states in the United States. Every summer, there are an estimated 800 to 1,000 wildfires. With an increased length of fire seasons, due to long periods of drought, dangerous conditions are created in Utah that allow fire to spread rapidly. While most wildfires occur on undeveloped land, wildfires can occur in developed areas and near critical freight corridors.

16.1.6 Landslides

Various types of landslides including debris flows, slides, and rockfalls are common across Utah. They can be naturally occurring or human-caused and often take place without warning and can result in destructive and costly outcomes. Landslides are also common after wildfires. For example, the 2011 landslide near Cedar City shut down S.R. 14 by displacing and removing a near half-mile stretch of the road.

16.1.7 Strategies and Goals to Decrease Impacts of Extreme Weather and Natural Disasters on Freight Mobility

Goal: Reduce the number of roadway closures resulting from extreme weather and natural disasters.

Extreme short-term weather events, especially during the winter are one of if not the largest environmental concern on freight mobility in Utah. UDOT keeps close watch on weather patterns and storms and uses message signs and other warning technology to warn of incliment weather. Truck parking, which is outlined in Element 10 is extremely important to ensure safe freight travel, especially when routes close due to extreme short-term weather events such as blizzards and high winds. Additionally, as stated above, UDOT takes effort to use explosives and artillery to trigger avalanches that threaten public roads. These roads include S.R. 190, S.R. 210, S.R. 92, S.R. 144, and U.S. 189 along with many other canyon roads. To increase resiliency, UDOT is also planning to incorporate avalanche sheds into future improvements as a means of physically shielding a road from avalanche and landslide paths.

Utah Department of Public Safety has an Emergency Management division with an Emergency Mangement plan to handle any natural disasters in the state. The Utah Department of Public Safety works closely with UDOT on emergency management and safety.

UDOT will continue to utilize its Asset Risk Management Process to integrate and incorporate risk and resilience assessment into decision-making processes. The process identifies, values, and prioritizes environmental threats to the UDOT transportation system. By incorporating this Risk Process into existing decision-making processes, UDOT will be equipped to either understand and accept certain risks or to take proactive steps to reduce these environmental risks to the transportation system. The process enables planning, design, maintenance, and project delivery to account for environmental hazards and proactively respond to them. The model computes risk as a function of owner costs, user cost, and environmental probabilities. Risks are then prioritized based on criticality and network redundancy. Thus, high priority risks are subjected to a mitigation analysis where means of improving resiliency to extreme weather and natural disasters are evaluated based on return on investment. UDOT will continue to work towards ensuring that freight modes are sufficiently accounted for in this process.

16.2 Impacts of Freight Movement on Local Air Pollution

The freight transportation industry contriubutes to air pollution through the mobile-source emissions of light-duty and heavy-duty trucks, internal combustion engines, diesel locomotives, cargo aircraft, and supporting equipment. Strategies to reduce emissions are located in the Element 5: Innovative Technologies and Operational Strategies. Areas within the state of Utah currently do not meet the Federal Clean Air Act's National Ambient Air Quality Standards (NAAQS) for Particulate Matter, Ozone, and Carbon Monoxide as shown in Table 16-1 and described in the sections below.

Table 16-1. NAAQS Nonattainment and Maintenance Areas (as of April 30, 2022)

Criteria Pollutant	Region	Current Status	Current Classification or at Redesignation
PM-2.5	Salt Lake City Region	Nonattainment	Serious
	Logan	Maintenance	Moderate
PM-10	Ogden	Maintenance	Moderate
	Salt Lake County	Maintenance	Moderate
	Utah County	Maintenance	Moderate

Criteria Pollutant	Region	Current Status	Current Classification or at Redesignation
Sulfur Dioxide	Tooele County	Nonattainment	Not Classified
Ozone	Northern Wasatch Front	Nonattainment	Marginal
	Southern Wasatch Front	Nonattainment	Marginal
	Uinta Basin	Nonattainment	Marginal
Carbon Monoxide	Ogden	Maintenance	Moderate
	Provo	Maintenance	Moderate
	Salt Lake City	Maintenance	Not Classified

Source: EPA Green Book, Last Updated April 30, 2022.

16.2.1 Particulate Matter

Both PM-2.5 and PM-10's major sources include vehicles, wood-burning, wildfires or open burns, industry, and fugitive dust from construction, landfills, gravel pits, agriculture, and open lands. Elevated levels of particulate matter tends to occur during wintertime inversions but can also occur during the summertime during high wind activity or wildfire smoke. The Salt Lake City, Provo, and Logan areas are currently in nonattainment for PM-2.5 as shown in Figure 16-1. Salt Lake County, Utah County, and Ogden City are currently in maintenance for PM-10 emissions as shown in Figure 16-2.

16.2.2 Ozone

Ozone is produced when nitrogen oxides (NOx), volatile organic compounds (VOCs), and other compounds react in the presence of sunlight. Utah is currently in marginal nonattainment for Northern and Southern Wasatch Front, as well as the Uinta Basin as shown in Figure 16-3. The Uinta Basin tends to exceed standards of ozone levels during winter months while the Wasatch Front nonattainment areas tend to exceed the standard during summer months.

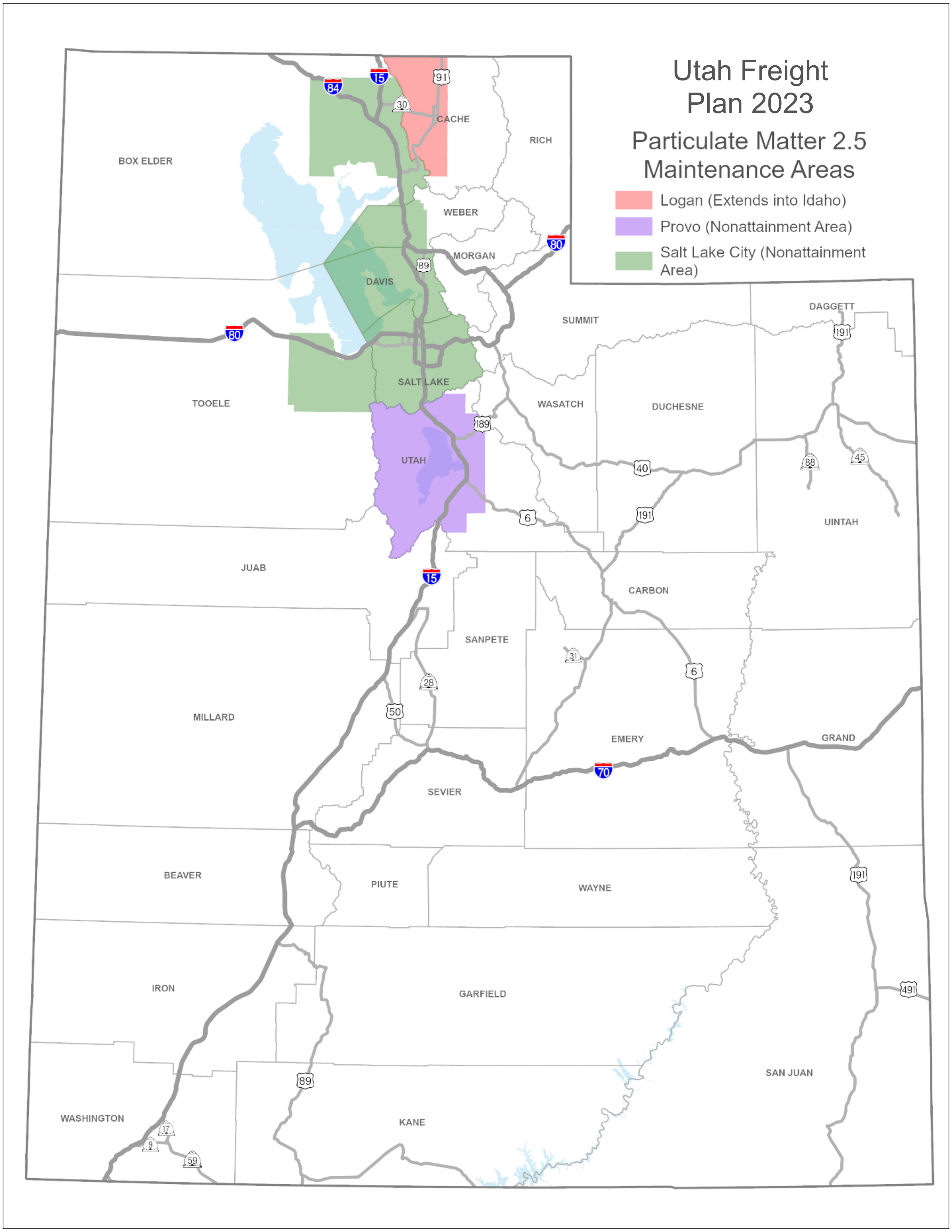
16.2.3 Carbon Monoxide

On-road mobile emissions is the primary source of carbon monoxide (CO), mainly through the combustion of fuels such as gasoline, followed by wood burning and other miscellaneous sources. There have been no violations of carbon monoxide standards since 1993, despite an increase of wintertime inversions which tends to increase CO pollution levels. Three Utah regions have been redesignated as maintenance areas, which include Ogden (2001), Provo (2005), and Salt Lake City (1999) as shown in Figure 16-4.

16.2.4 Sulfur Dioxide

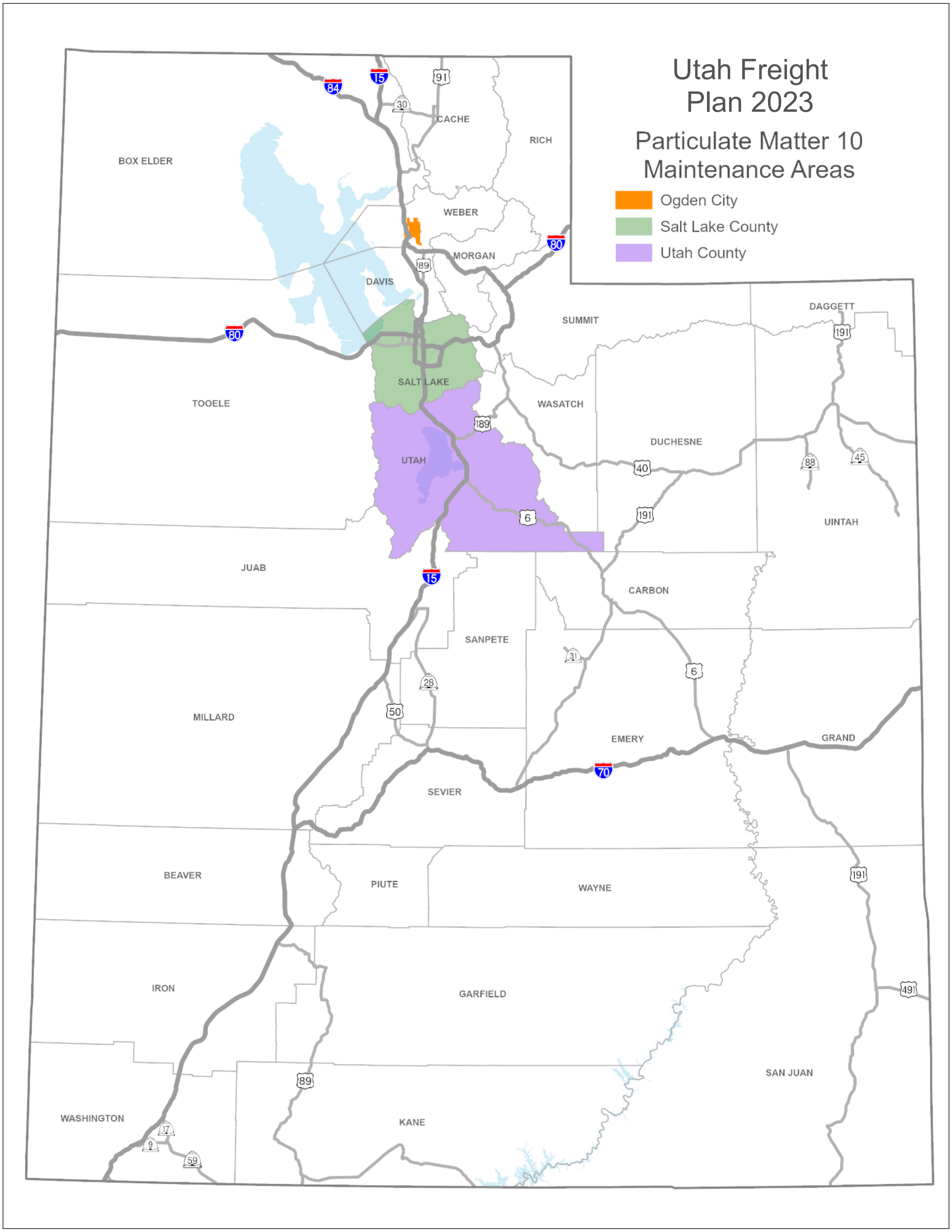
Sulfur dioxide (SO2) is emitted primarily from stationary, "point" sources that burn fossil fuels (such as power plants, refineries, copper smelting) diesel fuel, and gasoline that contains sulfur. Salt Lake County and the eastern portion of Tooele County are currently in nonattainment for sulfur dioxide as shown in Figure 16-5.

Figure 16-1. Particulate Matter 2.5 Maintenance Areas



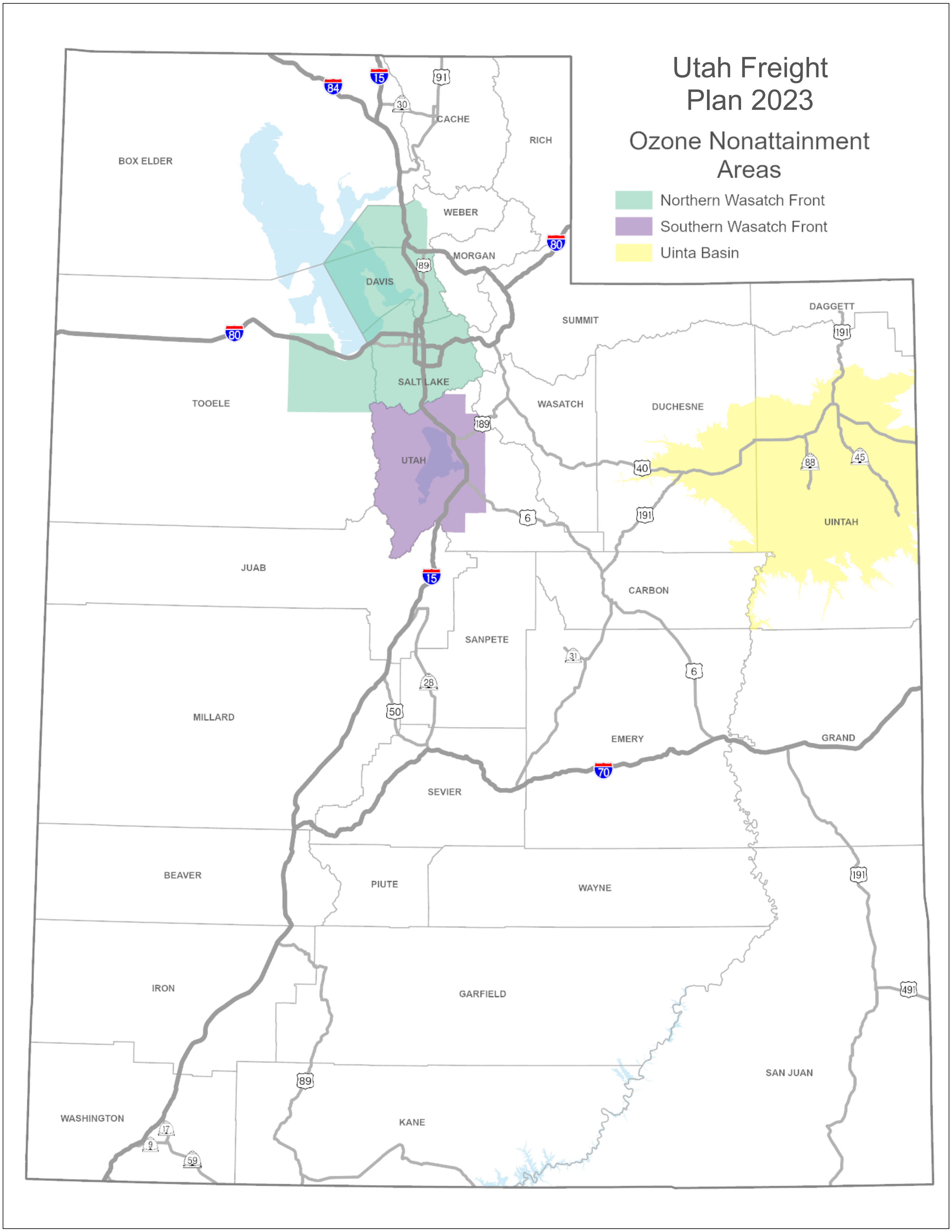
Source: Utah Department of Air Quality 2021 Annual Report.

Figure 16-2. Particulate Matter 10 Maintenance Areas



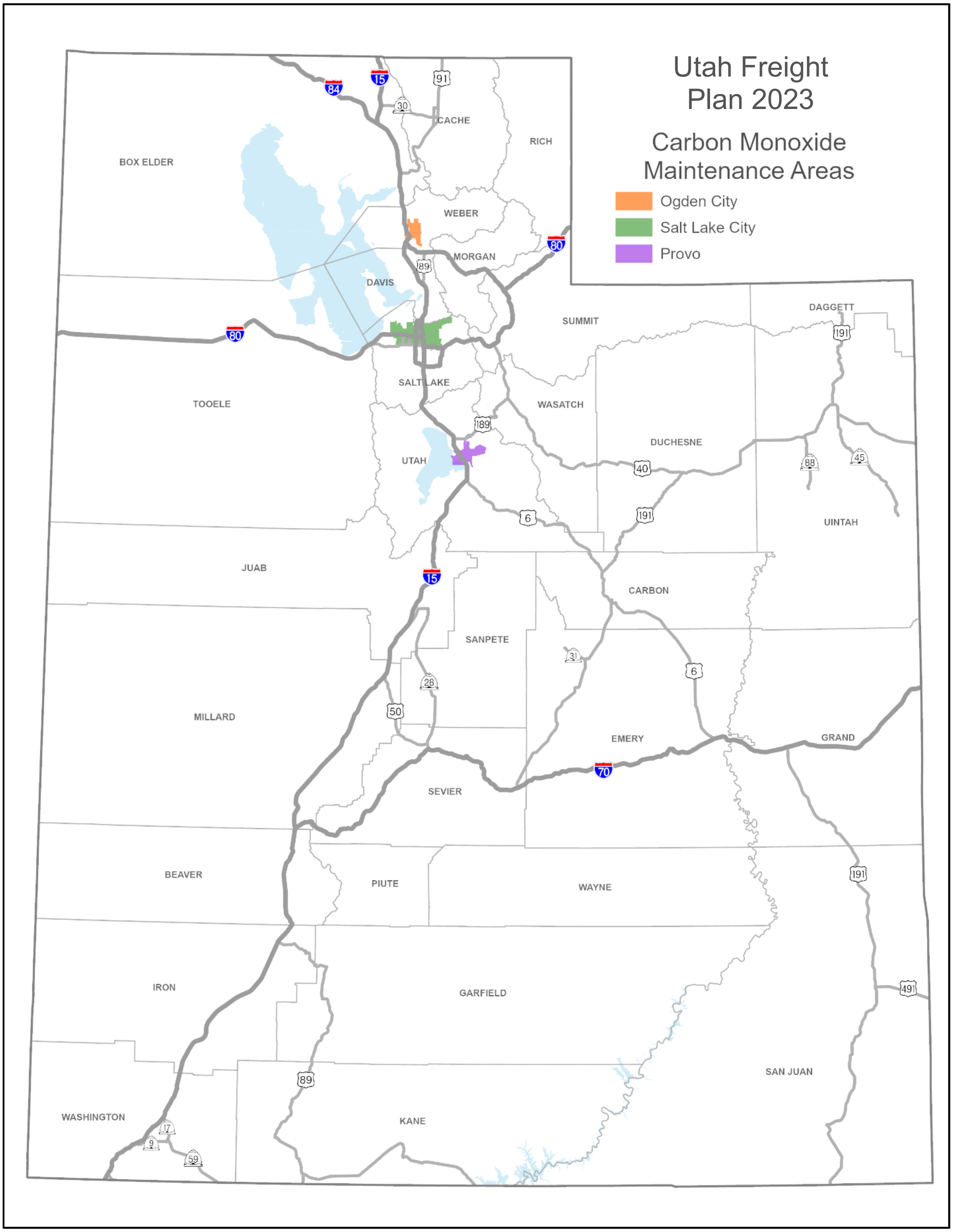
Source: Utah Department of Air Quality 2021 Annual Report.

Figure 16-3. Ozone Nonattainment Areas



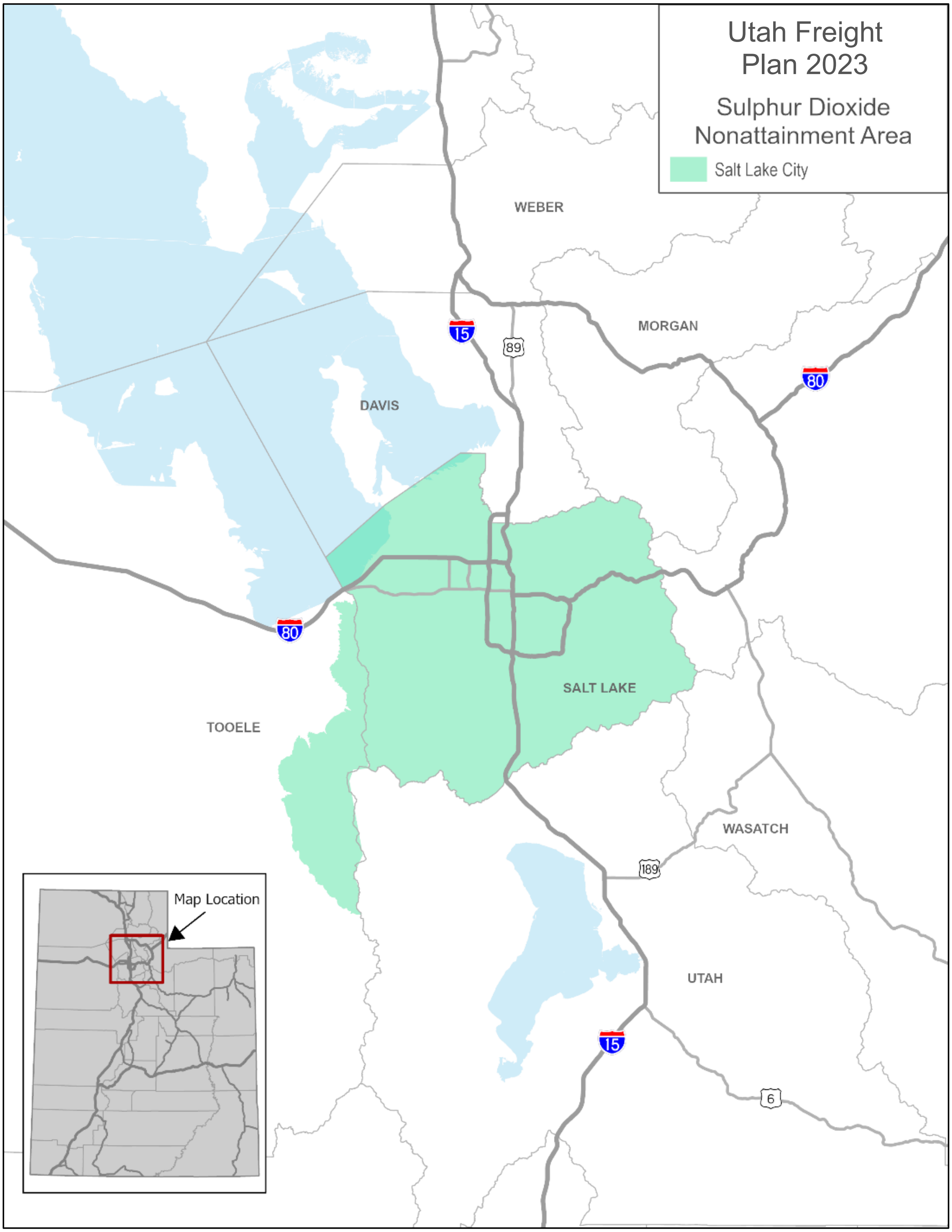
Source: Utah Department of Air Quality 2021 Annual Report.

Figure 16-4. Carbon Monoxide Maintenance Areas



Source: Utah Department of Air Quality 2021 Annual Report.

Figure 16-5. Sulphur Dioxide Nonattainment Area



Source: Utah Department of Air Quality 2021 Annual Report.

16.2.5 Utah Department of Environmental Quality

The Utah DEQ is responsible for updating a comprehensive emissions inventory for point, area, and mobile sources every three years, and annually for large point sources. These statewide inventories include ammonia, carbon monoxide, lead and lead compounds, nitrogen oxides, particulate matter, sulfur oxides, and volatile organic compounds. DEQ also reports hazardous air pollutants (HAPS) that are not part of the NAAQS for point sources.

16.2.6 Strategies and Goals to Decrease Impact of Freight Movement on Local Air Pollution

Goal: Reduce local criteria air pollutants caused by freight movement to levels below those identified in Utah's Air Quality: 2022 Annual Report, published by the Utah Department of Environmental Quality.

The Good Health area of the UVision Framework encompasses the health of individuals and communities. This area recognizes the role of mental and physical health and environmental conditions that contribute to health such as air and water quality. The UVision goals ensure that a project's environmental impact is considered in conjunction with its share of truck traffic, and traditional objectives to reduce delay and adding greater redundancy to the system. UDOT will continue to utilize this framework that prioritizes projects that serve freight traffic and have more limited environmental imapcts.

Freight movement has impact on local air pollution, especially when trucks are ideling or unneccessiarly running their engine. Electric hookups should be provided at truck parking locations so that drivers do not need to run their engines. Another strategy to reduce truck emissions resulting from idling at ports of entry is a broader implementation such as weigh-in-motion technologies which UDOT is deploying in the state. UDOT will continue to support initiatives that reduce mobile source emissions due to idling trucks or locomotives among other sources.

16.3 Impacts of Freight Movement on Flooding and Stormwater Runoff

Flooding can strain transportation networks in both the short and long-term with transportation delays, infrastructure damage, and can affect economies. Additionally, stormwater can be polluted by freight activity. Discharge of pollutants to storm drain systems can happen especially during construction, at facilities, and with illicit discharges.

16.3.1 Strategies and Goals to Decrease Impact of Freight Movement on Flooding and Stormwater Runoff

Goal: Reduce stormwater pollution levels caused by freight movement.

UDOT complies with a statewide Municipal Separate Storm Sewer System (MS4)[1] discharge Permit required by EPA and regulated by the State Division of Water Quality

[1] https://drive.google.com/file/d/1PFAYUrrHXbFfFVhnsukzS4XGFPya4INA/view

(DWQ). This Permit allows UDOT to discharge stormwater from roadways and UDOT-owned and operated facilities, such as maintenance facilities, ports of entrt, rest areas, park and rides and vistor's centers. UDOT has prepared a Stormwater Management Program (SWMP)[1] plan that describes the minimum control measures and other activities to lessen discharge of pollutants from UDOT roadways and facilities, to waters in the state. The SWMP contains best management practices for six minimum control measures established by the EPA through the State of Utah Division of Water Quality including public education and outreach, public invovment/partcipation, illicit discharge detection and elimination (IDDE), construction site stormwater runoff control, post-construction stormwater management in new development and redevelopment, pollution prevetion/good housekeeping for municipal operations along with additional measures outlining best management practices for industrial and high risk runoff and wet weather monitoring. UDOT is required to submit an annual report to DWQ that documents activites including the current SWMP document, a summary of data, including monitioring data, accumulated through the reporting year for wet weather monitoring, a summary describing the number of enforcement actions, inspections, and public education programs, and annual expenditures for UPDES Permit compliace and project budget for the upcoming fiscal year.

UDOT has developed a site specific Stormwater Pollution Prevention Plan (SWPP) for each UDOT-owned or operated facility. Along with EPA permits, best practices can be put into place at facilitites to reduce stormwater runoff. The Utah Division of Water Quality has provided the top ten Best Management Practices (BMPs)[2] for pollution preventiation at industrial and municipal sites. Freight facitlities should follow these practices and many are outlined in UDOT's SWMP. These BMPS include outlines for vehicle equipment maintanence, cleaned paved surfaces, minimizing storm water discharge, waste management, and good housekeeping practices.

UDOT also partners with the Salt Lake County Stormwater Coalition, the Utah Stormwater Advisory Council, and the Utah Floodplain and Stormwater Management Associations, as well as a number of local and regional stormwater coalitions across the state to help provide education and outreach on stormwater pollutants and measures to minimize pollutant discharges.

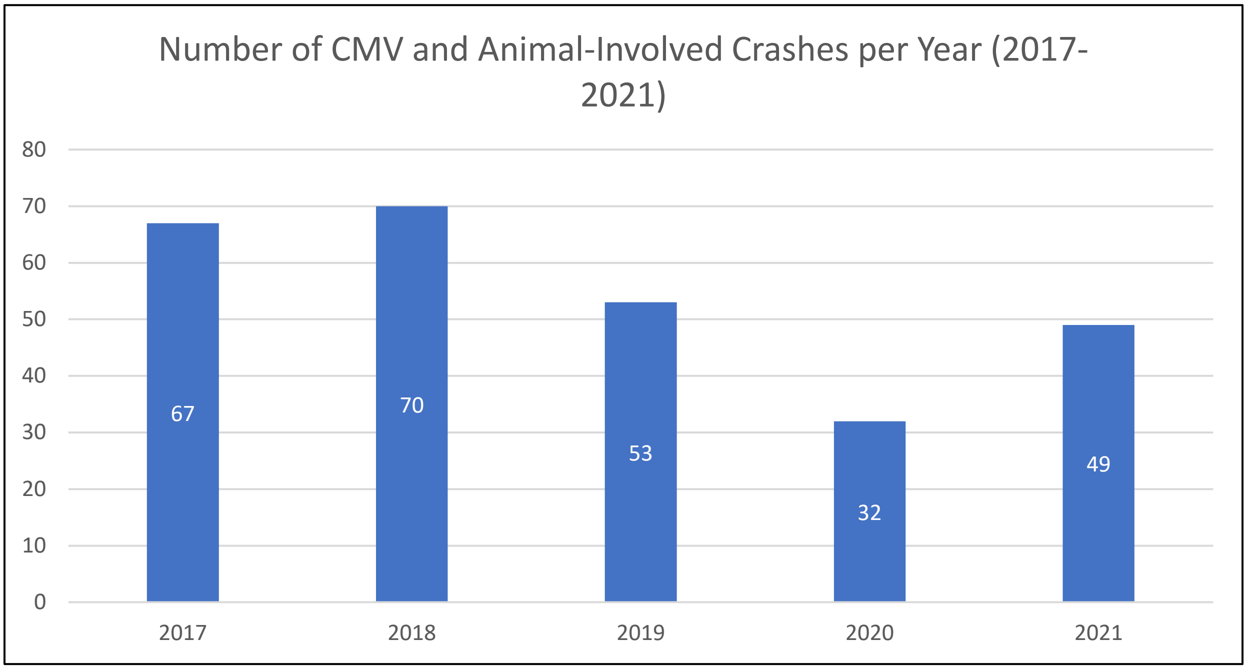
16.4 Impacts of Freight Movement on Wildlife Habitat Loss

The wide range of habitats including sandy red rock and tall mountain ranges are an asset to Utah. Home to thousands of different kinds of wildlife, long transport corridors and the large vehicles that use them are a risk to Utah's wildlife and habitats. Over the past 5 years (2017-2021), there have been 271 Commercial Motor Vehicle Involved Animal-Related Crashes. Figure 16-6 breaks down the number of crashes per year. Animal-Related CMV crashes decreased in 2020 but have since increased again in 2021.

[1] https://drive.google.com/file/d/1gW0iRHqDLBZtrm0dtTUxZuRy2T2C4CLL/view

[2] https://documents.deq.utah.gov/communication-office/bizhelp/top-10-bmps-industrial-municipal.pdf

Figure 16-6. Number of CMV and Animal-Involved Crashes in Last 5 Years (2017-2021)



Crash data are protected under 23 U.S.C. 407.

The Utah Wildlife Action Plan[1] written by the Utah Division of Wildlife Resources outlines these threats with goals and actions to reduce these threats. Roads can often destruct or fragment wildlife habitat. An additional threat exists as Utah's population is projected to grow substantially by 2050. This could lead in changes to existing roads and many new roads being planned and built. It will be important to collaborate with major stakeholders as these roads are altered or built to minimize habitat fragmentation while benefiting wildlife and people.

16.4.1 Strategies and Goals to Decrease Impact of Freight Movement on Wildlife Loss

Goal: Reduce the number of commercial motor vehicle crashes involving wildlife.

In 2017, the Utah Wildlife Migration Initiative was founded to better track and study the migration patterns of different wildlife and fish species in the state and help them make those journeys. Most of the data comes from animals wearing GPS tracking device or from fish tagged with implanted transmitters. These fish and wildlife structures vary but include:

1. Overpasses, which allow wildlife to cross over a roadway.
2. Bridges, which allow vehicles to cross over a river or ravine while wildlife safely travel underneath the bridge.

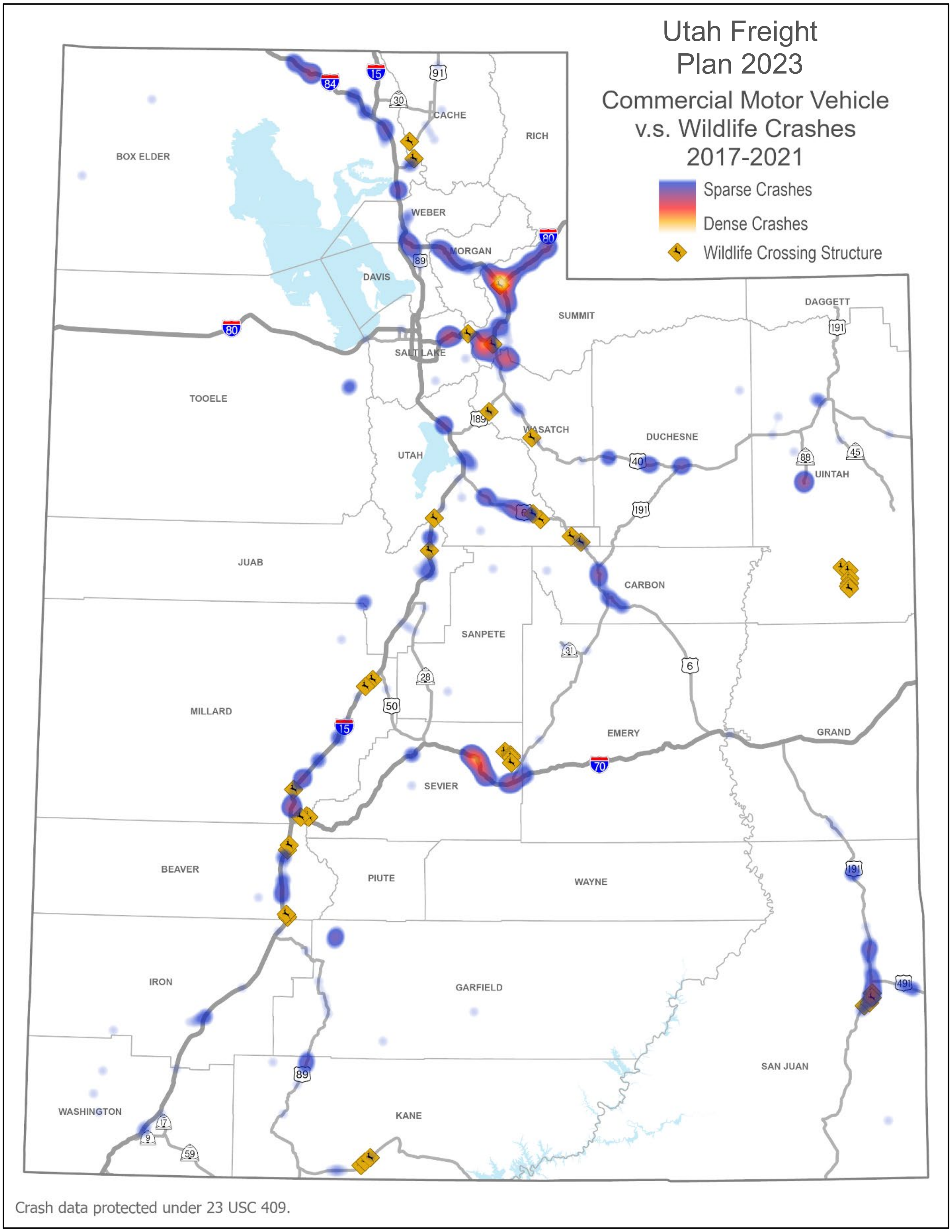
[1] https://wildlife.utah.gov/pdf/WAP/Utah_WAP.pdf

3. Culverts, which allow wildlife to cross under a roadway (the majority of Utah’s wildlife crossings).
4. Fences, which eliminate roadway crossings in certain areas and funnel the animals to an overpass or culvert where they can safety cross.
5. Various “fish ladders” and other structures in rivers and streams that help fish migrate to different spawning areas.

The Utah Division of Wildlife Resources (DWR) is working alongside UDOT to identify critical hotspots throughout the state where wildlife mitigation features are needed. These crossings are imperative to reduce wildlife-vehicle collisions and in allowing wildlife safe movement over and under Utah’s expanding transportation network. Wildlife crossings can not be placed everywhere so UDOT and DWR work together to determine the best locations for wildlife crossings. Both agencies fund projects and UDOT oversees the building and maintenance of structures. Utah currently has about 60 wildlife structures. Studies have shown there is a 90 percent reduction in wildlife/vehicle collisions when there is a crossing structure or fence in the area. Figure 16-7 shows where these wildlife crossing structures have been constructed along with where major wildlife crashes occur with commerical motor vehicles. This map can be used for future planning and protection of wildlife in the state of Utah.

UDOT will continue to partner with DWR to help wildlife safely migrate across the state by finding locations for new or improve wildlife strucutres. Additionally, exisiting projects are monitored. As of 2022, UDOT is required to include wildlife and livestock mitigation anaylses in its annual report to state legislators. This report includes other topics such as operation, maintenance, conditon, mobility, and safety of Utah roads.

Figure 16-7. Commercial Motor Vehicle and Wildlife Crashes



ELEMENT 17. CONSULTATION WITH FREIGHT ADVISORY COMMITTEE

Title 49 U.S.C. 70201 encourages states to establish a freight advisory committee consisting of a representative cross-section of public and private sector freight stakeholders, including representatives of ports, freight railroads, shippers, carriers, freight-related associations, third-party logistics providers, the freight industry workforce, the transportation department of the state, State environmental protection departments, State air resource board, State economic development agencies and local governments. As described in 49 U.S.C. 70202 (b) (10), one of the roles of the committee is to take part in the development of the state freight plan.

The purpose of this Chapter is to summarize consultation with the Utah FAC, coordination with FHWA, and other engagement with freight stakeholders.

17.1 UDOT's Freight Advisory Committee

UDOT understands the importance of input from a broad range of individuals and agencies across the transportation industry, local governments, and other affected groups. To offer the most comprehensive and continuous coordination with a wide range of interests, UDOT established a Freight Mobility Group (FMG) in 2013. This group included representatives from public and private sectors including MPOs, UDOT, FHWA, and other interested groups such as the Utah Trucking Association. The FMG served as an informal advisory, educational, and informational committee that contributed to the development of earlier Freight Plans. In 2018 the FMG developed a mission statement, selected goals, and objectives, and became the Utah FAC.

The mission of the FAC is to support freight projects within the State of Utah that foster economic vitality and competitiveness, promote efficient and safe freight movement across all modes, and are in alignment with federal standards and UDOT strategic goals. To achieve the mission, the FAC:

1. Provides input and guidance on the Utah Freight Plan.
2. Provides a venue for information exchange with a broad range of freight stakeholders.
3. Provides educational opportunities to FAC members and promote freight education and awareness to the broader community.
4. Develops recommended projects for inclusion in the Utah Freight Plan, which then are integrated into the Long Range Transportation Plan (LRTP).
5. Recommends policy guidance at the state level.

Current entities represented on the FAC appear in Table 17-1 and all have the qualifications named in 49 U.S.C. 70201(b).

Table 17-1. Freight Advisory Committee Membership

Freight Advisory Committee Membership
BNSF Railway
Cache Metropolitan Planning Organization
Dixie Metropolitan Planning Organization and Iron County Rural Planning Organization
Federal Highway Administration
Mountainland Association of Governments and the Wasatch Rural Planning Organization
UDOT Aeronautics
UDOT Motor Carrier Division
UDOT Planning
UDOT Region 1
UDOT Region 2
UDOT Region 3
UDOT Region 3
Union Pacific Railroad
Utah Inland Port Authority
Utah Manufactures Association
Utah Railway/Salt Lake City Southern Railroad
Utah Trucking Association
Wasatch Front Regional Council and the Tooele Rural Planning Organization
Utah Operation Lifesaver
City of Provo

The FAC held online meetings during the freight planning process. The FAC supplied input, guidance, and reviewed projects for inclusion in the Freight Investment Plan. A list of meetings held, and topics related to the Freight Plan update appear in Table 17-2. Individual meetings were also held with Utah RPOs, MPOs, and UDOT Regions to designate critical freight corridor mileage.

Table 17-2. Freight Advisory Committee Meetings

Date	Freight Plan Topics Discussed
June 21, 2021	• Introduced the Freight Plan update process. • Discussed the role of the freight plan. • Discussed critical freight corridor mileage designation process.
October 7, 2021	• Supplied an update on the Freight Plan development. • Discussed significant issues for consideration in the plan or expanded into detailed studies. • Discussed how the Freight Plan can support FAC members in their job duties. • Brainstormed potential critical freight corridors.
June 29, 2023	• Review selected critical freight corridors. • Review and comment on Freight Investment Plan projects. • Review new topics included in the 2023 update.

17.2 Coordination with FHWA

The USDOT encourages each state to choose a freight transportation coordinator to help effective communication with the FHWA Division Office in that state about the submission of state freight plans and freight investment plans. To this end, UDOT has chosen the Freight Planner of the Planning Division from the Program Development Group to be responsible for the coordination of Utah freight planning activities. This includes support in the development of the Utah Freight Plan and ensuring that freight transportation needs are considered during the transportation planning process.

APPENDIX: CRITICAL FREIGHT CORRIDOR DESIGNATION LETTERS

State of Utah

SPENCER J. COX
Governor

DEIDRE M. HENDERSON
Lieutenant Governor

DEPARTMENT OF TRANSPORTATION

CARLOS M. BRACERAS, P.E.
Executive Director

LISA J. WILSON, P.E.
Deputy Director of Engineering and Operations

BENJAMIN G. HUOT, P.E.
Deputy Director of Planning and Investment

August 4, 2023

U.S. Department of Transportation
Federal Highway Administration, Utah Division
Attn. Ivan Marrero, Division Administrator
2520 West 4700 South, Suite 9A
Salt Lake City, UT 84129

Dear Mr. Marrero:

SUBJECT: Utah's Critical Rural and Urban Freight Corridor Designation Request

STATEMENT: As required by 23 U.S.C. 167(g), and other pertinent federal regulations, the following tables identify critical freight corridors in accordance with the current Federal Highway Administration (FHWA) guidance covering the designation and certification requirements.

CRITICAL RURAL FREIGHT CORRIDOR CERTIFICATE

I hereby certify that the public roads listed in the table below meet the requirements of 23 U.S.C. 167(e) as designated Critical Rural Freight Corridor (CRFC) routes and connectors.

I further certify that the length in centerline mileage is accurate and does not exceed the maximum mileage limit, that the designated freight corridors have been coordinated with the appropriate stakeholder groups, and that the freight corridors have been, or will be incorporated into the State Freight Plan prior to FHWA authorizing the use of federal funds.

Table 1: Utah Designated CRFCs

Map ID #	County/ Counties	Corridor	From	To	Length (miles)	CRFC ID
1	Cache, Box Elder	US-91/89	Cache MPO Boundary	WFRC Boundary	10.67	G
2	Wasatch, Duchesne, Uintah	US-40	SR-45	US-189	130.61	B
3	Duchesne, Carbon	US-191	US-40	US-6	43.55	G
4	Utah, Carbon, Emery	US-6	MAG Boundary	I-70	121.6	G
5	Juab	SR-78	SR-28	Elevator Road	2.97	D
6	Juab, Sanpete	SR-28	SR-78	MP 7	22.98	A
7	Millard, Sevier	US-50	I-15	US-89	28.74	B
8	Emery	SR-31	SR-10	Deer Creek Road	7.65	B
9	Sevier	US-89	US-50	I-70	1.77	B
10	Emery, Sevier	SR-10	SR-31	MP 6.5	41.15	G
11	Grand, San Juan	US-191	I-70	SR-162	131.22	G
12	San Juan	SR-162	Colorado Border	US-191	31.91	B
13	Iron, Garfield	SR-20	US-89	I-15	20.56	G
14	Iron	SR-56	I-15	Iron Springs Road	4.61	F
Utah's Total CRFC Mileage					**600 Miles**	

Table 2 contains the CRFC ID letters and corresponding route/facility descriptors that appear in Table 1.

Table 2: CRFC IDs and Route/Facility Descriptor

CRFC ID	Route/Facility Descriptor (Rural)
A	Rural principal arterial roadway with a minimum of 25 percent of the annual average daily traffic of the road measured in passenger vehicle equivalent units from trucks
B	Provides access to energy exploration, development, installation, or production areas
C	Connects the Primary Highway Freight System (PHFS) or the interstate system to facilities that handle more than: • 50,000 20-foot equivalent units per year; or • 500,000 tons per year of bulk commodities
D	Provides access to a grain elevator, an agricultural facility, a mining facility, a forestry facility, or an intermodal facility
E	Connects to an international port of entry
F	Provides access to significant air, rail, water, or other freight facilities
G	Corridor that is vital to improving the efficient movement of freight of importance to the economy of the State

CRITICAL URBAN FREIGHT CORRIDOR CERTIFICATE

I hereby certify that the public roads listed in the table below meet the requirements of 23 U.S.C. 167(f) as designated Critical Urban Freight Corridor (CUFC) routes and connectors.

I further certify that the length in centerline mileage is accurate and does not exceed the maximum mileage limit, that the designated freight corridors have been coordinated with the appropriate stakeholder groups, and that the freight corridors have been, or will be incorporated into the State Freight Plan prior to FHWA authorizing the use of federal funds.

Table 3: Utah Designated CUFCs

Map ID #	County/ Counties	MPO[1]	Corridor	From	To	Length (miles)	CUFC ID
1	Cache	CMPO	SR-252	US-91/89	US-91/89	6.84	J
2	Cache	CMPO	US-91/89	SR-252	Cache MPO Boundary	8.16	J
3	Cache	CMPO	SR-101	400 West	US-91/89	2.55	J
4	Cache	CMPO	300 North	200 West	SR-101	0.29	J
5	Box Elder	WFRC	US-91/89	WFRC Boundary	I-15	4.93	K
6	Weber	WFRC	Parkland Boulevard	US-89	SR-134	2.2	J
7	Weber	WFRC	SR-134	US-89	I-15	1.11	I
8	Weber	WFRC	Rulon White Boulevard	SR-134	SR-39	4.4	J
9	Weber	WFRC	400 North	1200 West	I-15	0.98	K
10	Weber	WFRC	SR-39	SR-204	I-15	2.04	K
11	Davis	WFRC	SR-193	I-15	1000 West	2.53	H
12	Davis	WFRC	SR-108	I-15	1000 West	2.99	H
13	Davis,	WFRC	SR-67	State St	I-215	11.61	I

[1] CMPO = Cache Metropolitan Planning Organization
WFRC = Wasatch Front Regional Council
MAG = Mountainland Association of Governments
DMPO = Dixie Metropolitan Planning Organization

Map ID #	County/ Counties	MPO[1]	Corridor	From	To	Length (miles)	CUFC ID
	Salt Lake						
14	Davis	WFRC	500 South	SR-68	SR-67	0.43	K
15	Davis, Salt Lake	WFRC	SR-68	I-15	Jordan River Bridge	7.14	J
16	Davis	WFRC	1100 North	800 West	SR-68	1.41	J
17	Salt Lake	WFRC	5600 West	John Cannon Drive	I-80	1.27	J
18	Salt Lake	WFRC	300 South	5600 West	6400 West	1.03	J
19	Salt Lake	WFRC	6400 West	300 South	700 South	0.51	J
20	Salt Lake	WFRC	SR-154	Terminal Drive	9000 South	12.92	I
21	Salt Lake	WFRC	700 South/ 500 South	SR-68	6400 West	5.69	J
22	Salt Lake	WFRC	SR-68	North Temple	SR-201	3.39	J
23	Salt Lake	WFRC	California Avenue	SR-68	5600 West	4.64	J
24	Salt Lake	WFRC	2100 South	SR-68	900 West	1.17	K
25	Salt Lake, Tooele	WFRC	SR-201	US-89	MPO Boundary	18.25	I
26	Salt Lake	WFRC	900 West	1700 South	SR-171	2.38	J
27	Salt Lake	WFRC	SR-171	I-15	900 West	0.85	H
28	Salt Lake	WFRC	SR-111	SR-201	5400 South	4.8	J
29	Salt Lake	WFRC	SR-48	SR-154	SR-111	4.72	J
30	Utah	MAG	1500 South	SR-135	500 East	0.59	J
31	Utah	MAG	SR-135	I-15	2800 West	0.4	J
32	Utah	MAG	SR-52	I-15	1500 West	0.39	J
33	Utah	MAG	1500 West	SR-52	400 North	0.53	J
34	Utah	MAG	Business Park Drive	SR-114	1840 West	0.65	J

Map ID #	County/ Counties	MPO[1]	Corridor	From	To	Length (miles)	CUFC ID
35	Utah	MAG	SR-265	I-15	SR-114	0.58	J
36	Utah	MAG	SR-75	US-89	I-15	2.03	J
37	Utah	MAG	US-6	I-15 Ramps	MAG Boundary	5.45	H
38	Washington	DMPO	SR-59	SR-9	Dixie MPO Boundary	4.07	K
39	Washington	DMPO	Old Highway 91	Development Fringe	SR-9	2.46	J
40	Washington	DMPO	SR-9	5300 West	I-15	2.78	J
41	Washington	DMPO	Brigham Road	River Road Ramp	I-15	1.86	K
42	Washington	DMPO	River Road	Brigham Rd.	SR-7	3.77	J
43	Washington	DMPO	SR-7	River Road	I-15	3.21	K
Utah's Total CRFC Mileage						**150 Miles**	

Table 4 contains the CUFC ID letters and corresponding route/facility descriptors that appear in Table 3.

Table 4: CUFC IDs and Route/Facility Descriptor

CUFC ID	Route/Facility Descriptor (Urban)
H	Connects an intermodal facility to the PHFS, the interstate system, or an intermodal freight facility.
I	Located within a corridor of a route in the PHFS and provides an alternative highway option important to goods movement
J	Serves a major freight generator, logistic center, or manufacturing and warehouse industrial land
K	Corridor that is important to the movement of freight within the region, as determined by the MPO or the State

Figures 1 through 5 depict the NHFN in Utah and include CRFC and CUFC designations.

Figure 1: CRFCs

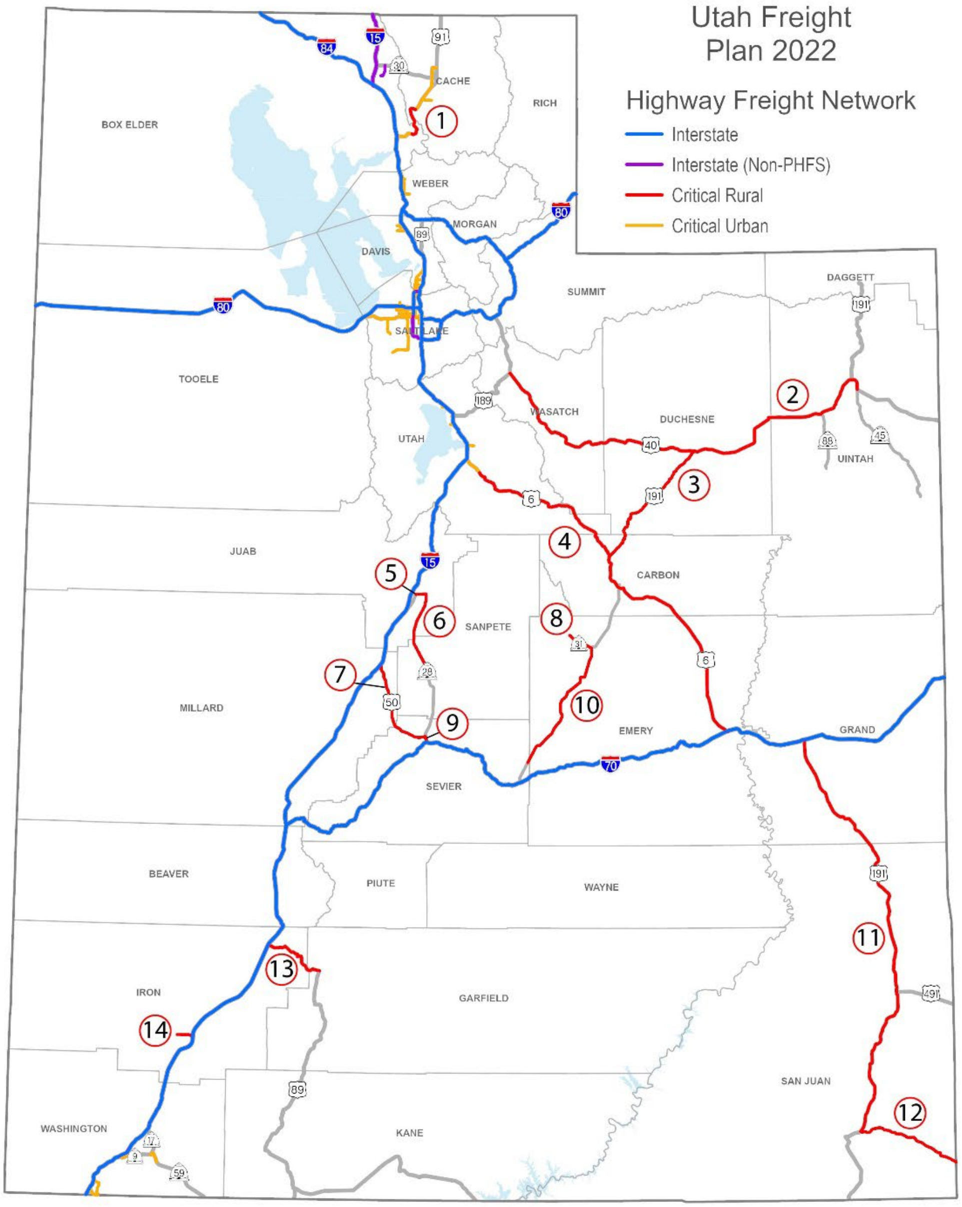


Figure 2: CUFCs (Cache MPO)

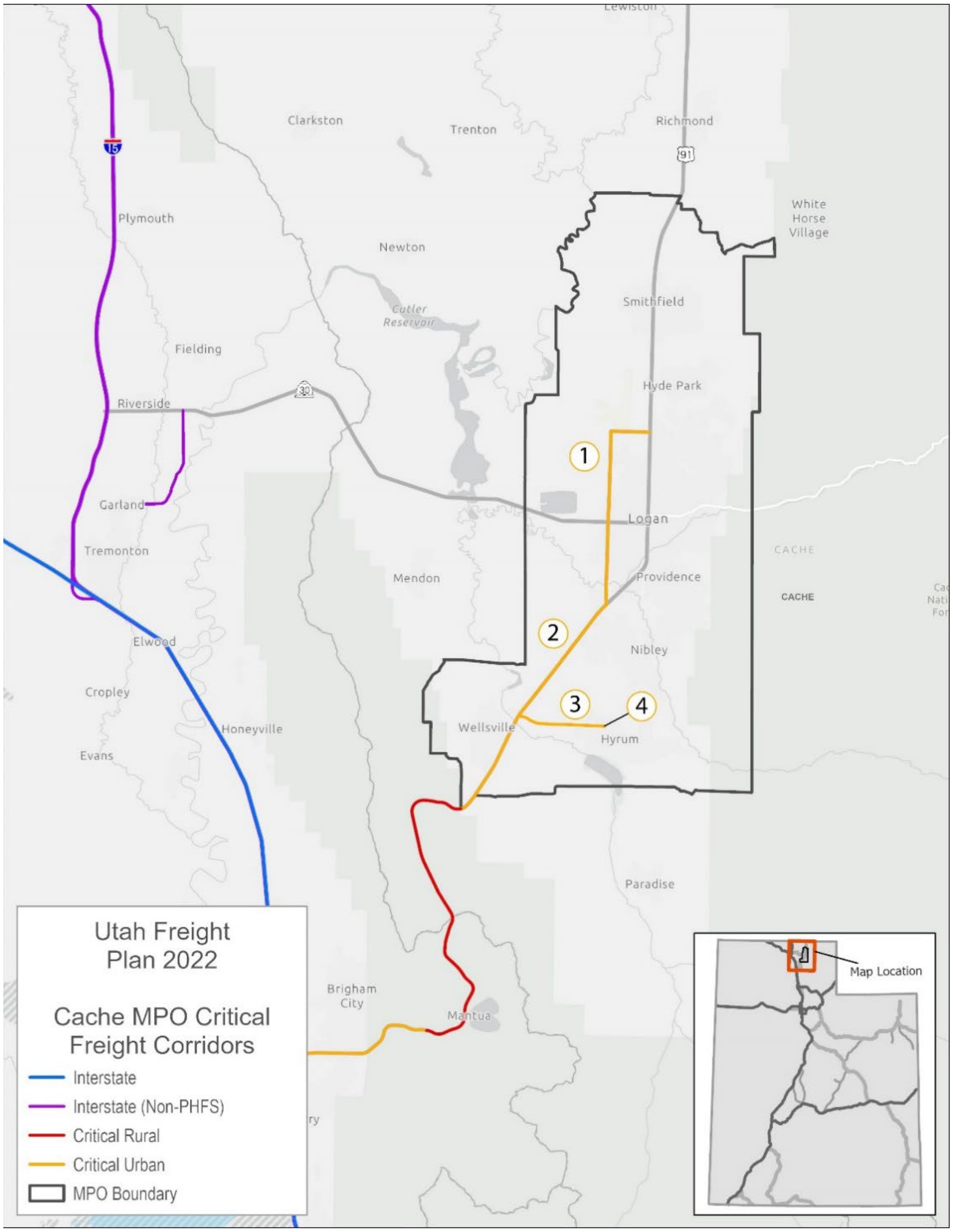


Figure 3: CUFCs (WFRC)

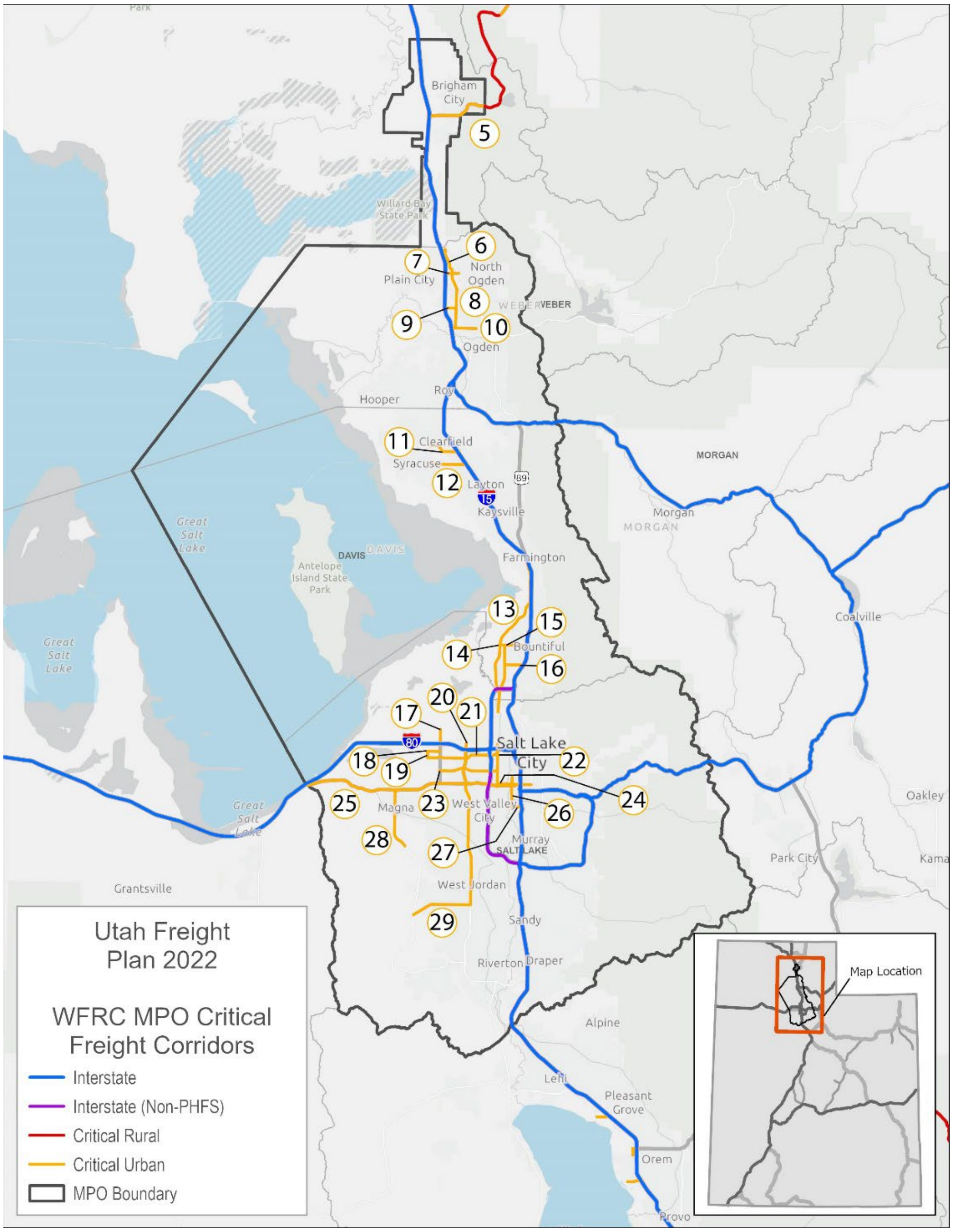


Figure 4: CUFCs (MAG)

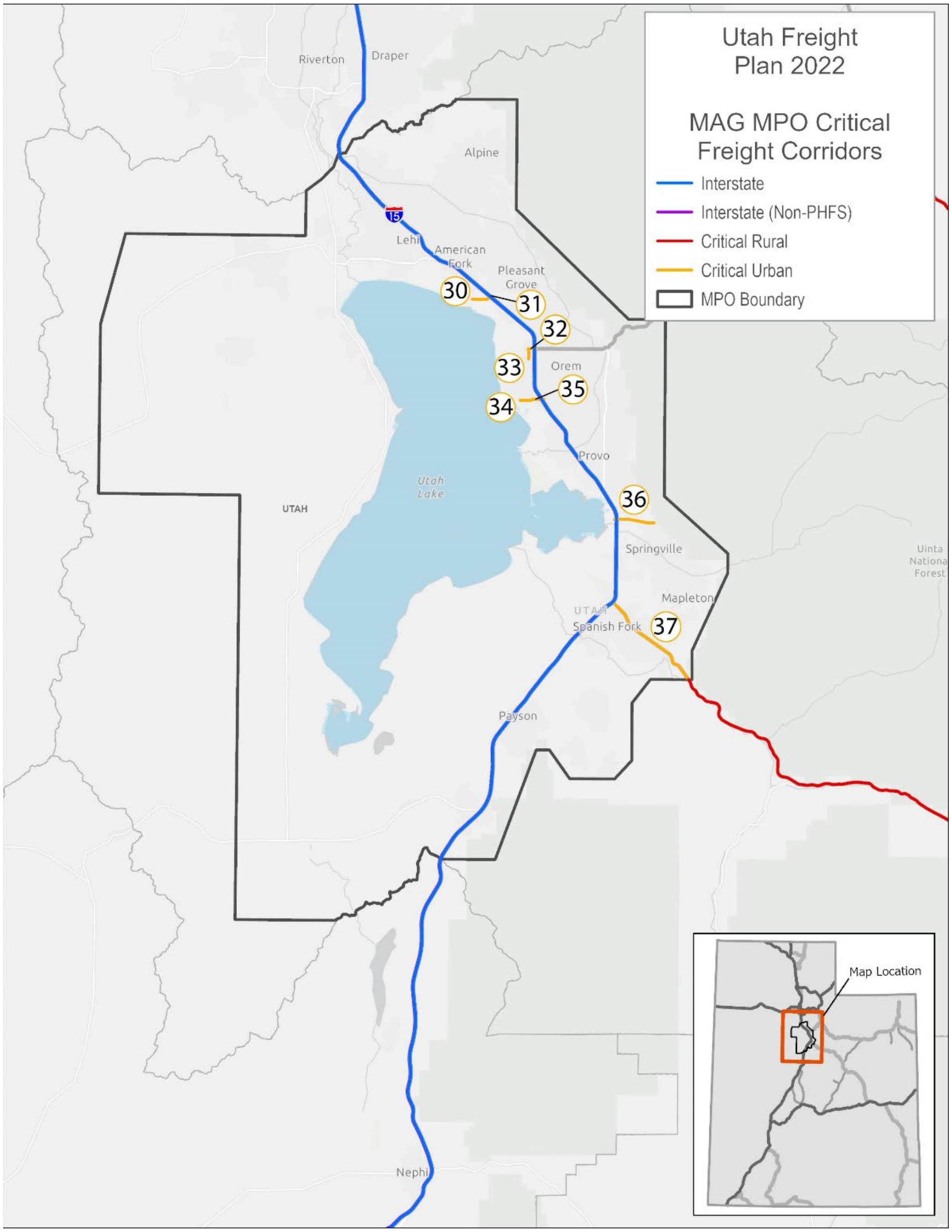
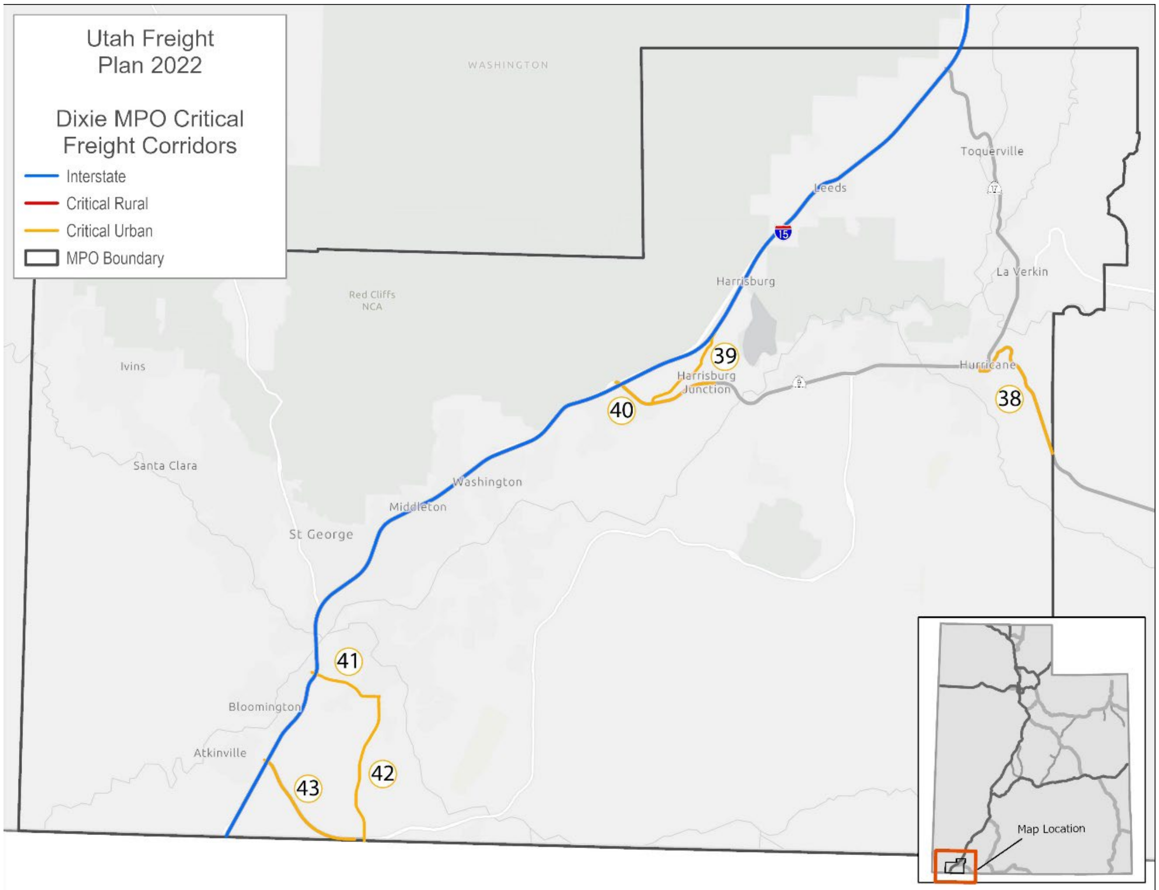


Figure 5: CUFCs (Dixie MPO)



If you require any additional information, please contact Jordan Backman, Urban Planning Manager, at jbackman@utah.gov.

Sincerely,

Ben Huot, P.E.
Deputy Director of Planning and Investment
Utah Department of Transportation

U.S. Department
of Transportation
Federal Highway
Administration

Utah Division

2520 West 4700 South, Suite 9-A
Salt Lake City, UT 84129-1874
801-955-3520
FAX 801-955-3539

August 11, 2023

In Reply Refer To:
HDA-UT

Mr. Ben Huot, P.E.
Deputy Director of Planning and Investment
Utah Department of Transportation
4501 South 2700 West
Salt Lake City, UT 84129

SUBJECT: Utah's Critical Rural and Urban Freight Corridor Designation Request

Dear Mr. Huot:

The Federal Highway Administration, Utah Division Office has reviewed the request documentation to update Utah's critical rural and urban freight corridors as required by 23 U.S.C 167(g). The documentation was received at our Office on August 4, 2023.

Based on the review of the documentation, we approve UDOT's request for the updated Critical Rural and Urban Freight Corridor designations.

Should you have any questions, please contact Mr. Kelly Lund at (801) 955-3522 or kelly.lund@dot.gov.

Sincerely,

Ivan Marrero, P.E.
Division Administrator

cc: Andrea Olsen, UDOT
Jordan Backman, UDOT
Brigitte Mandel, HDA-UT
Jennifer Elsken, HDA-UT

UDOT
Keeping Utah Moving