SHERMAN-DENISON MPO
METROPOLITAN PLANNING ORGANIZATION
INTERMODAL URBAN TRANSPORTATION PLANNING

FREIGHT PLAN

SEPTEMBER 2020

Grayson County Freight Mobility Plan

Sherman-Denison Metropolitan Planning Organization

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1. PLAN OVERVIEW

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PLAN OVERVIEW

The Grayson County Freight Mobility Plan was developed by the Sherman-Denison Metropolitan Planning Organization (SDMPO) from 2018 to 2020. The development of this plan involved analysis of public data, collection of traffic data on US 75, interviews with freight stakeholders, and five meetings of the Grayson County Freight Advisory Committee (FAC). Major outcomes of the plan include the designation of a countywide freight network and a set of infrastructure, policy, and economic development recommendations for Grayson County and the Sherman-Denison MPO.

ORGANIZATION OF THIS PLAN

This chapter summarizes findings from throughout this plan, and the remaining chapters contain additional detail about freight infrastructure, performance, economic impacts, needs, and recommendations.

The remainder of this plan is organized into four chapters:

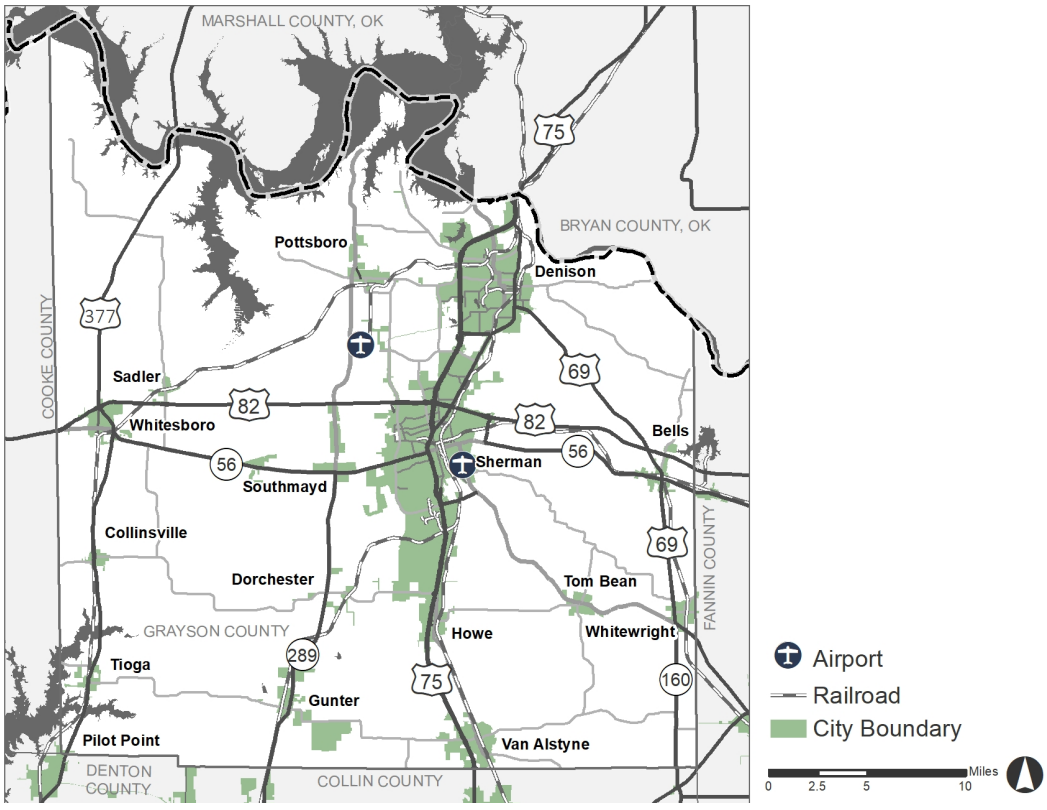
- Chapter 2: Freight Assets and Performance
- Chapter 3: Freight and the Economy
- Chapter 4: Freight Needs and Recommendations

SUMMARY OF FINDINGS

Infrastructure

Grayson County is located on the Texas-Oklahoma border, north of the Dallas-Fort Worth Metroplex. Figure 1 displays the freight infrastructure of Grayson County and its urbanized areas. Transportation users in Grayson County benefit from having several U.S. Highways, state and local roads, two Class I railroads, two short line railroads, and two airports. Additionally, clusters of freight-dependent businesses are located throughout the County and particularly along US 75.

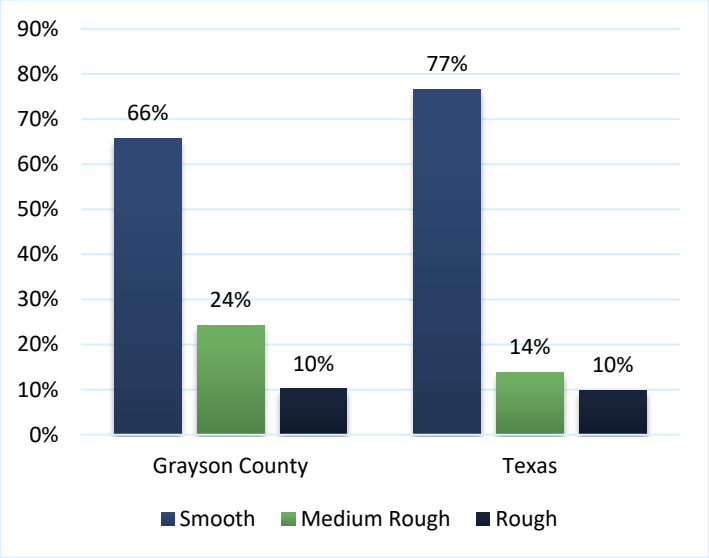
Figure 1. Grayson County Overview



The performance of the Grayson County highway network was assessed in terms of safety, asset condition, congestion, reliability, and connectivity. In summary:

- The pavement condition in the County is generally poorer than Texas as a whole, as shown in Figure 2. The County has fewer commercial motor vehicle (CMV) crashes per truck-mile traveled than the state, and it has a similar rate of CMV-involved fatalities per mile of travel.

Figure 2. Pavement Roughness in Grayson County and Texas



Source: Highway Performance Monitoring System, 2017.

- Most Grayson County roadways are uncongested for freight, though US 75 and SH 289 become congested during peak hours. For comparison, approximately 15 percent of lane-miles on US 75 in Grayson County are congested during the PM peak, while 64 percent of lane-miles on I-35 in Cooke County are congested at this time. Similarly, most of the County has reliable travel times as measured by truck buffer time index, a measure of how much extra time must be allocated in order to arrive on time 95 percent of the time. The lack of congestion in Grayson County makes it an attractive location for freight businesses requiring efficient and reliable transportation.
- Generally, freight can move easily through the County, with most of the freight-related challenges relating to movements of oversized loads. The County has few bridges with sub-standard vertical clearance, and these bridges do not cross roadways which carry the bulk of freight in the County. Similarly, load restricted and poor condition bridges do not restrict most freight movement on U.S. and State Highways carrying the most truck traffic. However, bridges on smaller roadways may still interfere with freight movement if a business generating freight activity is located nearby. Additionally, oversize or overweight cargo may be impeded by infrastructure that only supports standard load. Figure 3 shows an example of an oversized load on FM 902 in Tom Bean.
- US 75 carries more truck traffic than any corridor in the County, and recent data collection indicates that an average of between 7,200-7,800 trucks per day travel the corridor. US 75 carries a similar amount of trucks as I-35 in neighboring Cooke County. There are a number of potential bottlenecks on this corridor, generally related to roadway merging or splitting, or crashes. The corridor has more CMV-involved crashes per mile than other corridors in the County, but similar rates to interstates in the region which have similar traffic flows and speeds. It is relatively uncongested and reliable compared to neighboring corridors.
- Grayson County benefits from two Class I railroads and two rail short lines. These facilities serve a mix of through and local traffic. Union Pacific and BNSF Railway each have a rail yard in the County, and both yards are located in the US 75 corridor. Genesee & Wyoming's two short lines interchange with the Class Is at these locations and connect customers within the County as well as to the east and south.
- Of the County's two airports, North Texas Regional Airport is the largest. Its 9,000 ft. runway can accommodate large commercial aircraft, and industrial sites are available for lease or development. In addition to highway access, an unused rail spur exists to the east of the airport.

Figure 3. Oversized Load in Tom Bean

Economy and Supply Chains

Overall, Grayson County has a strong and diversified economy, which requires a robust freight transportation network to serve existing employers and to attract similar industries. Since, the 2008-2009 Recession, the Grayson County economy has rebounded strongly and has low unemployment coupled with a relatively strong rate of employment growth. However, because Grayson County's unemployment rate and wages are low, its total employment has been growing, and its population growth has lagged the state of Texas overall, skilled labor shortages are being reported by local employers. The County's population is expected to grow—perhaps more than double—over coming decades, which will create challenges for planners, local governments and service providers. At the same time, this growth can feed the region's growing economy, and is an opportunity for reinvestment in infrastructure and manufacturing industries.

The prominent role of the manufacturing sector in the Grayson County economy means that local freight producing/dependent industries are highly reliant on the movement of goods to and from the region. Local stakeholders have reported that relatively few commodities are sourced locally by manufacturers, which has amplified the need to maintain a strong local freight transportation network. Similarly, an analysis of the backward linkages for key freight-producing sectors in the Grayson County input-output model appeared to confirm these anecdotal observations.

Available data from Transearch and the Federal Highway Administration on freight commodity flows into, out of, and within Grayson County estimate that approximately 7.2 million tons valued at $7 billion were moved in the county in 2015. Ten commodity groups were selected by prevalence of local freight business and employment for more detailed analysis. These industries were found to have a mix of regional trading partners such as nearby counties or states as well as linkages to supply chains throughout the county and with Mexico.

Based upon this information, the following economic-based recommendations are offered to local freight transportation planners and economic development officials:

- Ensure that local freight transportation planning efforts address the needs of industry sectors with larger local multipliers and linkages to local freight-generating industries.
- Target economic development strategies to sectors that create the largest regional economic impact. These strategies may include attracting entirely new industry sectors, expanding existing sectors, or attracting industries that support local employers and make the Grayson County economy more vertically integrated.
- Coordinate local economic development strategies and partners across disciplines, such as freight planning and workforce development. While the disciplines may appear disparate, they are part of a "basket" of attributes that site selection specialists consider when choosing new locations.
- Develop greater resiliency in the local transportation network. While US 75 is considered the region's most important corridor for moving freight, other highways like SH 289, US 69, US 82, and US 377 that can and do support local industries. Likewise, creating opportunities for local shippers to make greater use of local rail services would make the local economy more resilient and reduce traffic volumes on the region's primary roadways.

SWOT Analysis and Needs Identification

A freight-based Strengths, Weakness, Opportunities, and Threats (SWOT) analysis was conducted with the Grayson County Freight Advisory Committee (FAC) on May 16, 2018. US 75 was seen as both a strength and a weakness/threat, as it needs significant engineering and infrastructure investments to continue to support regional mobility and connectivity. Growing population was seen as an opportunity to develop a more robust workforce and economy; however without proper support a growing population can be seen as a threat. Rail infrastructure and the regional airport were also seen as opportunities to cultivate economic growth. Finally, policy issues such as better routing for oversize or overweight (OSOW) truck traffic was seen as a concern. Key findings from the SWOT analysis are summarized in Table 1. Full responses from stakeholders are presented in Appendix A.

Plan Findings and Recommendations

The Grayson County Multimodal Freight Network builds off of the Texas Multimodal Freight Network by adding facilities of local and regional significance to the existing set of highways and railroads on the statewide network. The resulting network includes all railroad facilities, the North Texas Regional Airport, the Sherman Municipal airport, and major highway facilities within the region, including: US 75, US 82, US 69, US 377, SH 289, SH 91, SH 160, Spur 503, FM 1417, and FM 120.

The needs on this network were identified and vetted through analysis of highway performance data, stakeholder interviews, and meetings of the Grayson County Freight Advisory Committee. The major highway priorities identified were: Increasing mobility and reliability, particularly on US 75, bridges with low vertical clearance, pavement condition, east/west connectivity, and safety improvements. Planned and potential freight projects were identified to meet these needs on the highway freight network. Rail priorities include investigating options to improve rail efficiency on the regional short line rail network, and increasing utilization of rail yards in the County. No current air cargo infrastructure needs were identified, though stakeholders commented that the county should continue to invest in the North Texas Regional Airport as it expands. The airport would benefit from a customs broker to facilitate international trade and leverage FTZ exemptions by assisting importers and exporters.

Policy and program recommendations for Grayson County fall into two categories: transportation-related solutions and economic development-related solutions. Transportation solutions recommended are to continue to engage freight stakeholders, reduce the impacts of oversize/overweight vehicles, pursue strategic land use and "smart growth," and support infrastructure

Table 1. Grayson County SWOT Analysis Summary Findings

Strengths	Weaknesses	Opportunities	Threats
U.S. 75 connections to major markets	Outdated U.S. 75 infrastructure	Booming population growth	Increasing U.S. 75 traffic
Robust economic environment	OSOW vehicle challenges	Technological change	Changing workforce needs / technology
Available industrial sites	Underutilized Rail and Air facilities	Developing rail sites/yards	Supporting growing population
Workforce availability	Need for East-West highway connections	Airport-related economic development	Infrastructure obsolescence
		Relationships with other agencies (TxDOT, local ED)	

connections to other markets. Economic development solutions include increasing rail access and traffic, leveraging the airport for growth, study manufacturing and logistics-based development opportunities, and prioritizing workforce development.

Finally, Federal, state, and other funding opportunities to meet these needs were identified. In some cases, only certain roadways are eligible for a funding source. Segments of US 75 and US 82 are located on numerous networks, including the National Highway System, the Texas Trunk System, and the National Highway Freight Network (US 75 only). Projects on these roadways may be most flexible in terms of funding eligibility. In addition to grants and distributions of Federal and state money, the Federal Government offers financing options to reduce the cost of advancing projects.

2. FREIGHT ASSETS AND PERFORMANCE

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FREIGHT ASSETS AND PERFORMANCE

Grayson County has highway, railroad, and airport freight assets that enable the movement of freight in, out, and through the County. This chapter inventories these assets and summarize their performance. US 75 is of particular importance to Grayson County, and is discussed separately in addition to being included in the Highway Assets subsection. The final section in this chapter overviews freight-intensive land use and truck parking locations.

Grayson County Highway Assets

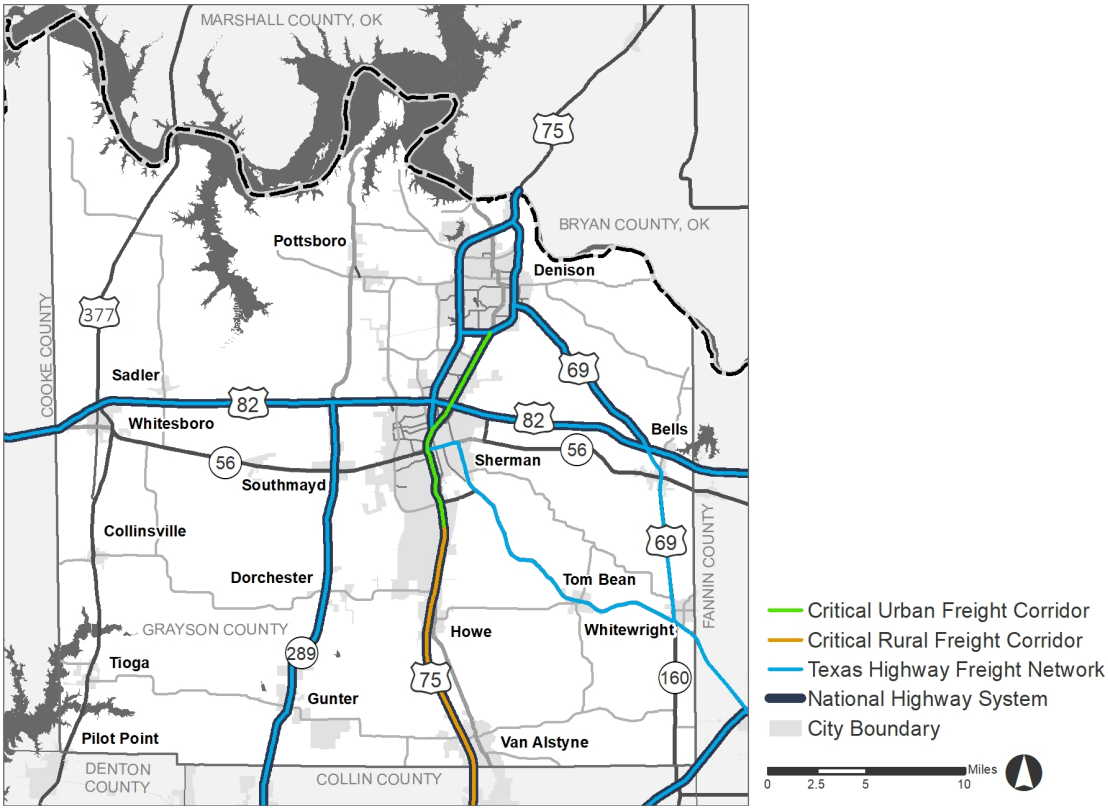
- 90 miles on **National Highway System.**
  - US 75, US 82, US 69, SH 289, SH 91, Spur 503.
- 137 miles on **Texas Highway Freight Network.**
- 10.7 miles of **Critical Urban Freight Corridors.**
- 12.8 miles of **Critical Rural Freight Corridors.**

HIGHWAY ASSETS

Inventory

Grayson County has nearly 2,500 miles of public roadways ranging from U.S. Highways to local roads. These highway assets include segments of the National Highway System (NHS), the Texas Highway Freight Network (THFN), Critical Urban Freight Corridors (CUFC), and Critical Rural Freight Corridors (CRFC). These designations recognize the significance of roadways in Grayson County for the movement of people and goods. Roadways designated as Critical Urban or Rural Freight Corridors are submitted by the Texas Department of Transportation (TxDOT) to the Federal Highway Administration (FHWA) in order to be eligible for National Highway Freight Program funding. These designations are shown in Figure 4.

Figure 4. Grayson County Highway Networks



Source: Texas Freight Mobility Plan, 2018.

The FHWA defines the functional classification of a roadway by the range of mobility and access functions that it serves.[1] Characteristics such as physical barriers, managed access, and regional connectivity determine the functional classification for all roadways except interstates, which are designated by the Secretary of Transportation. Functional classifications for the County and the State are shown in Table 2. Similar to the rest of Texas, most of Grayson County's roadways are local roads, followed by major collectors. Interstate highways, other freeways, and principal arterials have the highest capacity for freight movement but comprise a small portion of the total roadway network.

Table 3 lists the reported ownership by mileage for roadways in Grayson County reported by the TxDOT roadway inventory. TxDOT owns approximately one-third of mileage statewide and in Grayson County. Compared to Texas as a whole, Grayson County owns a larger share of mileage than the average county at 47 percent of miles, and local municipalities own a slightly smaller share in Grayson County than the state average at 21 percent of miles. The Sherman-Denison MPO partners with these organizations to maintain and improve the highway assets in Grayson County.

Table 2. Grayson County Roadways by Functional Classification

Functional Classification	Miles in Grayson County	Percent of Grayson County Network	Miles in Texas	Percent of Texas Network
Interstate	-	0%	34,237	5%
Other Freeway or Expressway	263	5%	15,495	2%
Other Principal Arterial	440	8%	70,927	10%
Minor Arterial	420	8%	50,529	7%
Major Collector	567	10%	106,781	15%
Minor Collector	66	1%	32,103	4%
Local	3,678	68%	419,938	58%
Total	**5,435**	**100%**	**730,010**	**100%**

Source: TxDOT Roadway Inventory, 2020.

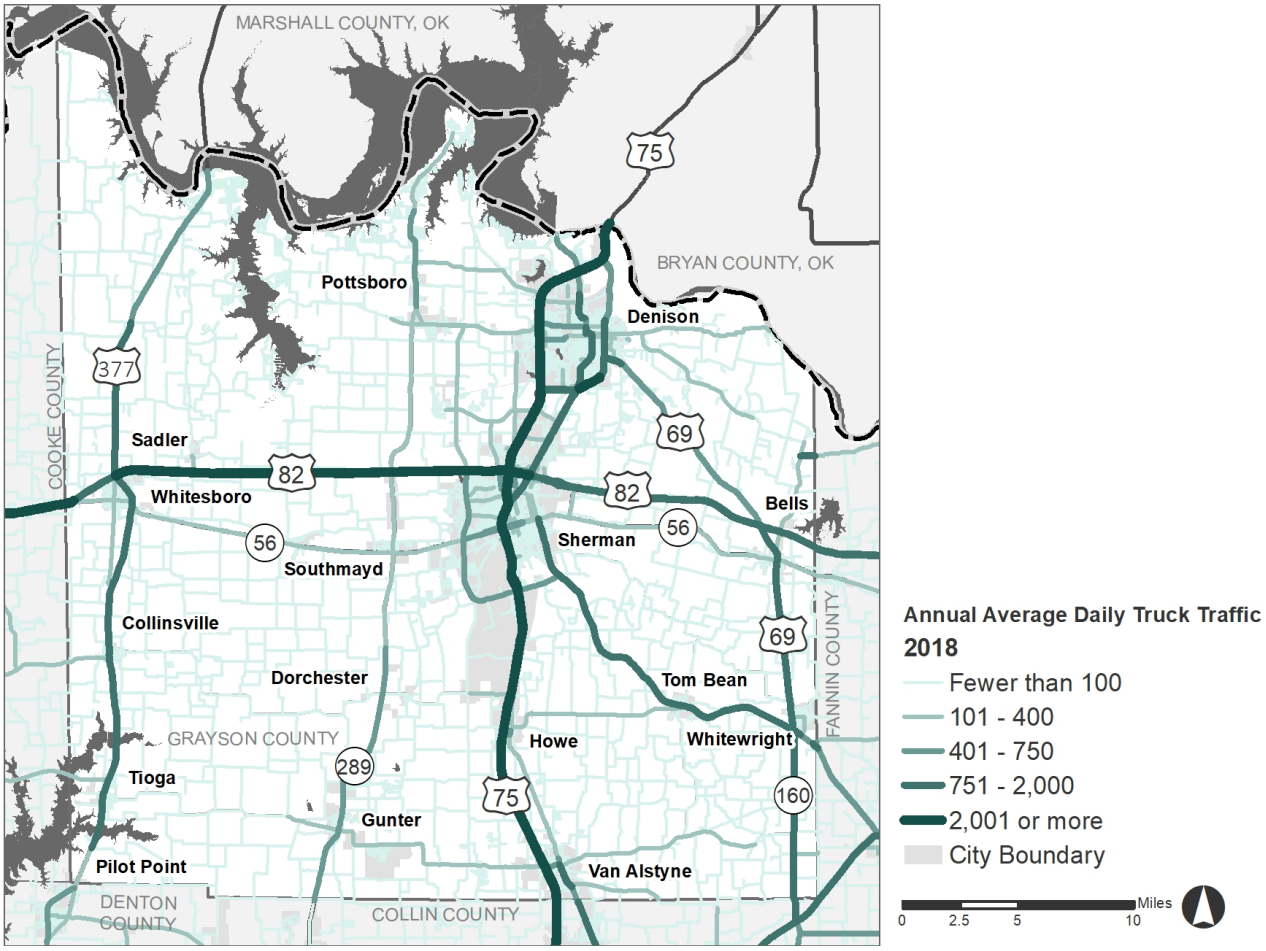
Table 3. Grayson County Roadways by Ownership

Ownership	Miles in Grayson County	Percent of Grayson County Network	Miles in Texas	Percent of Texas Network
State	1,620	30%	242,678	33%
County	2,579	47%	296,995	41%
City	1,147	21%	180,839	25%
Toll Authority	-	0%	3,495	0%
Federal and Other	89	2%	6,004	1%
Total	5,435	100%	730,010	100%

Source: TxDOT Roadway Inventory, 2020.

[1] Federal Highway Administration, Functional Classifications, 2017. https://www.fhwa.dot.gov/planning/processes/statewide/related/highway_functional_classifications/section03.cfm.

Figure 5. Annual Average Daily Truck Traffic



Source: TxDOT Roadway Inventory, 2020.

Truck Traffic Volumes

Based on data from the national HPMS dataset, US 75 has the largest Annual Average Daily Truck Traffic (AADTT) in Grayson County with more than 7,500 trucks per day in 2017. Data collection conducted on US 75 in 2019 revealed possibly even higher levels of truck traffic (7,200-7,800 AADTT). The results of that analysis are discussed later in this chapter. Other roadways with high levels of truck traffic include:

- US 82 throughout Grayson County (2,200 AADTT),
- Spur 503/US 69/Eisenhower Parkway in Denison (1,800 AADTT),
- SH 91/Texoma Parkway in Sherman (1,300 AADTT),
- US 69 between Spur 503 and SH 11 (900 AADTT),
- SH 11 between Sherman and Whitewright (800 AADTT), and
- SH 289 from Dorchester to Collin County (500 AADT).[2]

The roadways with the highest daily truck traffic are predominantly north/south routes and include those serving through traffic as well as local traffic. AADTT in Grayson County is shown in Figure 5.

[2] FHWA, Highway Performance Monitoring System, 2017.

Connectivity to Other Markets

Grayson County has one primary north-south route and one primary east-west route connecting to markets outside of the County. US 75 is the only north-south route which connects to both Dallas and Oklahoma. In Dallas, US 75 becomes I-45 which provides a connection to ports and markets in Houston and Galveston, Texas. To the north, US 75 is the primary connection to Oklahoma in the County and is the nearest route to Tulsa, the second largest city in Oklahoma. Additionally, this route provides a connection from Texas to the oil-producing regions in Osage County, Oklahoma, and natural gas-producing regions in Pittsburg County, Oklahoma.[3] SH 289 is an alternate route to the south, extending into Collin County near the Dallas North Tollway. US 377 is an alternate route to the north, crossing the Red River into Oklahoma approximately 20 miles to the west of US 75. However, neither highway provides an alternate route to both Dallas and Oklahoma. US 82 is the primary east-west route in Grayson County, providing access to producers and markets in Wichita Falls to the west and to Paris and Texarkana to the east. US 82 is also a connection to several interstates, including I-44 in Wichita Falls, I-35 in Gainesville, and I-30 and I-49 near Texarkana.

Additional facilities serve local freight traffic moving within the County. Near the US 75 corridor, FM 1417/Heritage Parkway, Travis Street, and Texoma Parkway all provide alternatives to the primary highway and provide local connectivity to homes and businesses. Multiple east-west State Highways and Farm-to-Market roads traverse the County and create routes between urbanized areas, freight generators, and freight destinations.

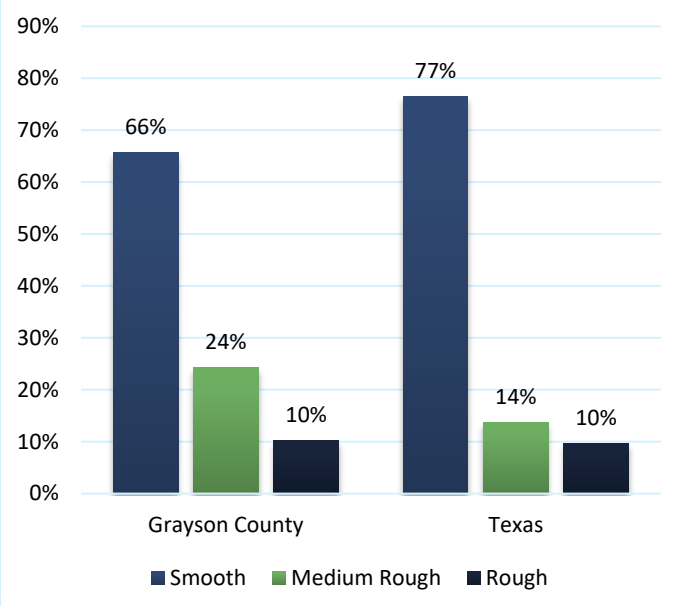
Conditions and Performance

Highway condition and performance is evaluated based on the ability of assets to provide safe, efficient, and reliable movement of goods. Crash rates, pavement quality, bridge conditions, congestion, and variation in travel times are measures for highway condition and performance important to freight. These are examined in each of the following subsections.

Pavement Condition

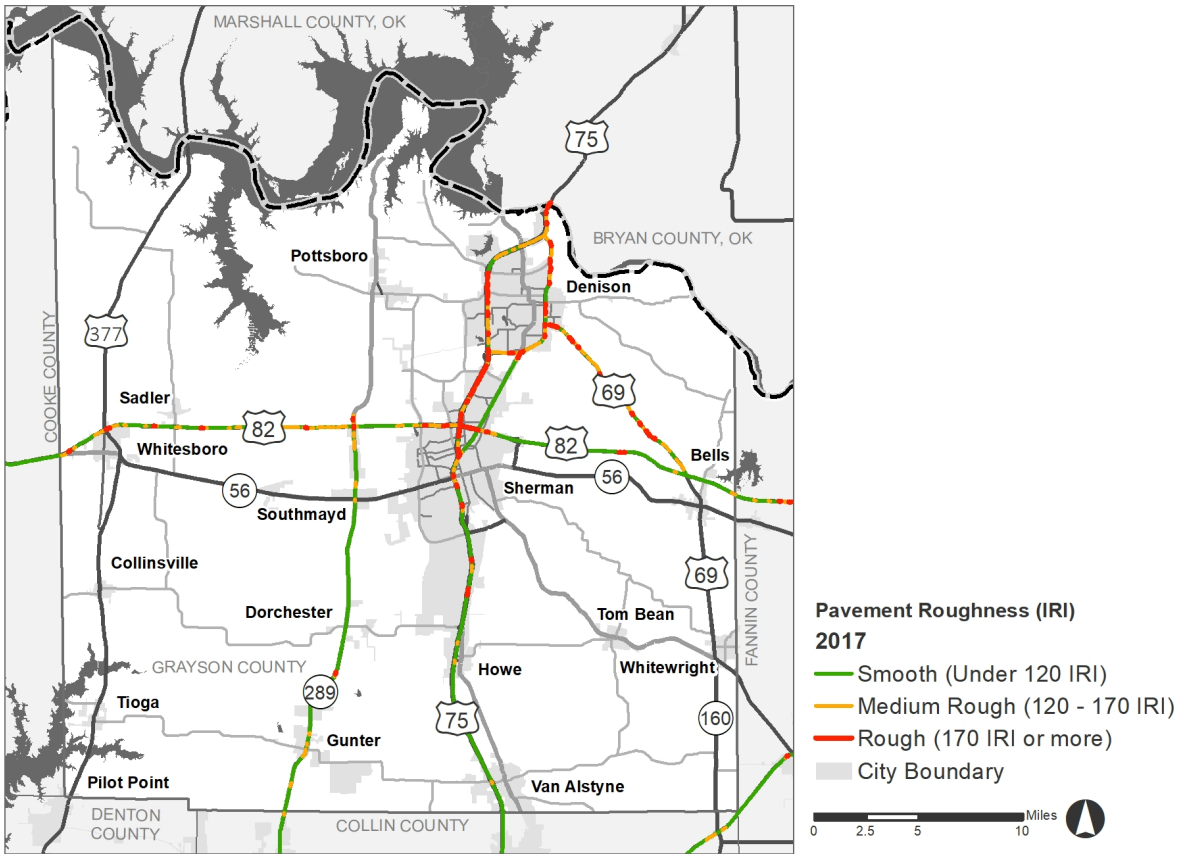
Two measures of highway asset condition are pavement roughness and bridge condition. Nearly 90 percent of roadway mileage in Grayson County is in smooth or medium rough condition. This is a similar proportion as observed for the state. However, statewide a larger percentage of mileage is rated as smooth (77 percent compared to 66 percent in Grayson County) Pavement condition in Grayson County and in Texas is summarized in Figure 6 and shown in Figure 7. The roadways with the roughest pavement in Grayson County as of 2017, the most recent data available, include US 75, US 69, Spur 503, and US 82. Previous analysis of 2015 data indicated that SH 56 and US 377 also have medium rough or worse pavement. However, data for those roadways were not available in the latest dataset. Many of these roadways are also those which carry the most truck traffic in the County.

Figure 6. Pavement Quality in Grayson County and Texas



[3] Oklahoma Corporation Commission data analyzed by NPR StateImpact, 2012.

Figure 7. Pavement Quality on Major Roadways



Source: FHWA, Highway Performance Monitoring System, 2017.

Bridge Conditions

Bridge conditions can also impact the movement of highway freight due to poor condition,[4] load restrictions, or height restrictions. Of 535 bridges in Grayson County, five are in poor condition, twenty-one are load restricted, and two are both. All of the poor condition and load restricted bridges cross and carry local roadways, and as a result may not impact freight movement in the County. Bridges in poor condition or with load restrictions are shown in Figure 8.

Vertical clearance beneath a bridge can be a challenge to freight movement by limiting the maximum vehicle size that can use the facility. Bridges with vertical clearance under the Federal minimum of 13 feet 6 inches can severely limit freight movement, as can clearances less than 16 feet and 6 inches (the previous standard for TxDOT bridges). TxDOT has updated design standards for major roadways to increase the standard clearance to 18 feet and 6 inches to facilitate movement of large freight vehicles beginning in September 2020.

Low clearance bridges over U.S. and State Highways likely have the greatest impact on freight movement due to the volumes carried on these facilities. Nearly 80 percent of bridges in Grayson County cross a non-roadway feature such as a water body. Table 4 lists the types of facilities crossed by the remaining 114 bridges. Bridges crossing a roadway are also shown in Figure 8. Seven bridges in the County are below the Federal minimum of 13 feet 6 inches vertical clearance, though none are crossing a U.S. or State Highway. Six of the seven bridges in Grayson County with vertical clearance less than the Federal minimum are railroad bridges and require coordination with the private sector to improve.

[4] Those bridges that have a score of 4 or less for items 58—62 or 65 (respectively deck, superstructure, substructure, channel and channel protection, culverts, and approach) of the TxDOT and U.S. DOT National Bridge Inventory (NBI) Coding Guides.

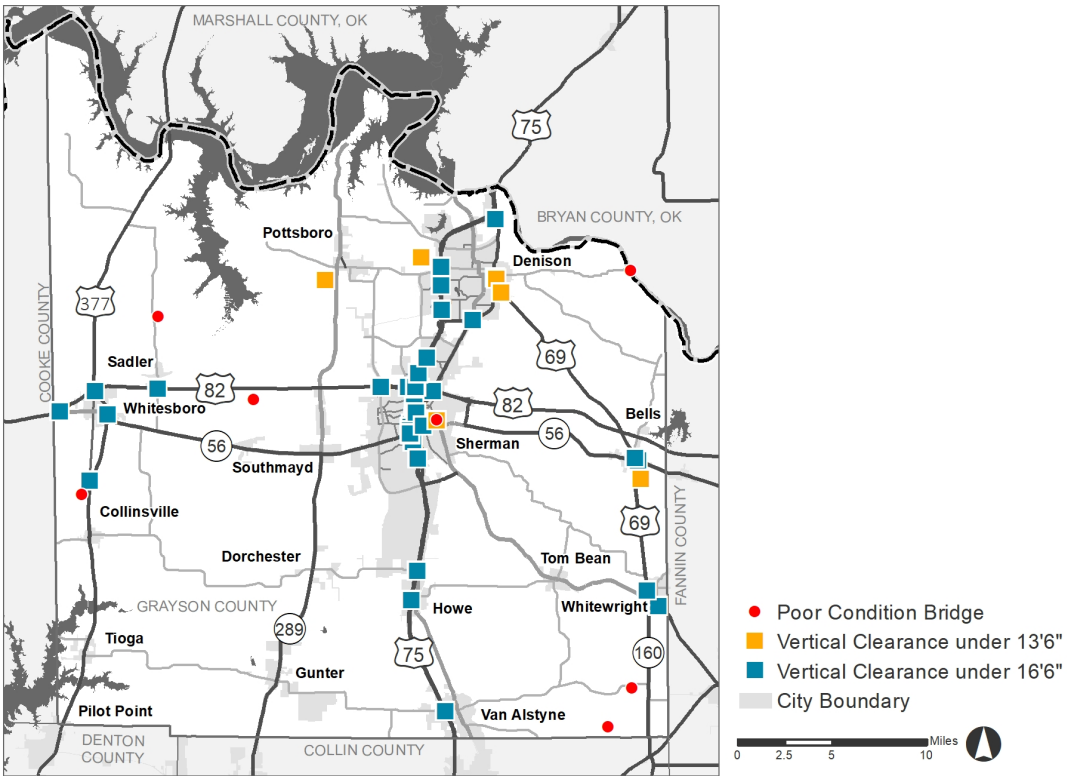
Forty-seven bridges in the county have lower clearance than TxDOT's current standards, and 28 of these cross a U.S. or State Highway. The impact of these bridge heights on freight movement should be evaluated on a corridor basis to determine whether bridge projects need to be developed.

Low bridges over other facility types may have a smaller impact on freight movement and should be evaluated based on adjacent freight origins and destinations. Vertical clearance restrictions are most problematic on routes that carry oversized loads. For example, two bridges below TxDOT standards on US 69 require oversized loads to divert through residential areas of Whitewright via Grand Avenue.

Safety

Highway freight safety can be measured by the frequency and severity of crashes involving commercial motor vehicles (CMV). However, many factors contribute to highway safety, and crash location alone cannot be used to determine causality of crashes. Over the five-year period from 2012-2016, there were 449 crashes involving CMVs in Grayson County[5]. Of these, eleven were fatal crashes (six located on US 75). Figure 9 displays the

Figure 8. Bridge Condition and Vertical Clearance



Source: Texas Department of Transportation Bridge Division, 2017.

Table 4. Vertical Clearance by Facility Type Crossed

Facility Type	Less than 13'6"	13'6" to 16'5"	16'6" to 18'5"	18'6" or Greater	Total
U.S. Highway	0	19	16	2	37
State Highway	0	9	6	1	16
Other	7	19	8	27	61
Total	7	47	30	30	114

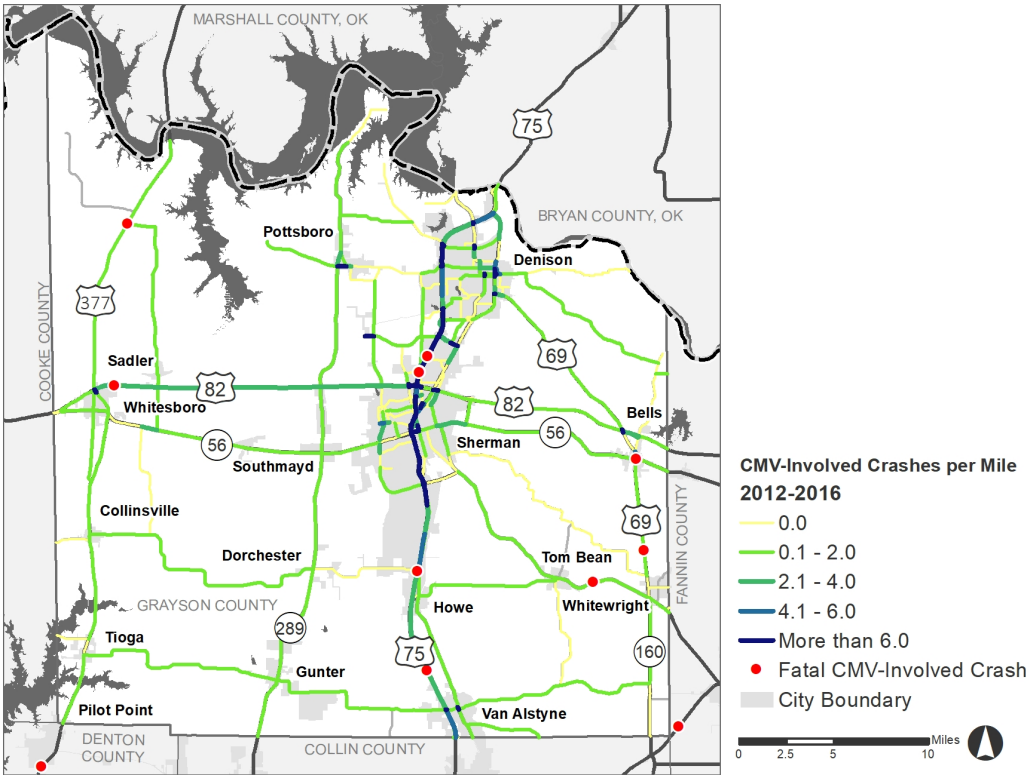
Source: Texas Department of Transportation Bridge Division, 2017.

number of CMV-involved crashes per mile. Roadways with the highest rates of CMV-involved crashes per mile include:

- US 75 throughout Grayson County—US 75 is the corridor with the highest AADTT in the County, and it also has the highest rate of CMV-involved crashes per mile. Six of the eleven fatal CMV-involved crashes during the study period occurred on US 75. The segment from south of FM 1417 to north of Spur 503, spanning most of the Sherman urbanized area, had the highest CMV-involved crash rate of both the corridor and the County. This segment had approximately 25 crashes per year from 2014-2016.
- US 82 between US 377 and US 75—this primary east/west corridor had approximately 10 CMV-involved crashes per year from 2014-2016 and was the location of one CMV-involved fatality.
- Spur 503 between US 69 and US 75—this segment connects two U.S. highways through the eastern edge of the Denison urbanized area. There were between one and three CMV-involved crashes per year on this segment between 2012-2016.

Table 5 compares the number and rate of crashes and fatal crashes involving commercial motor vehicles for Grayson County and Texas for the year 2015. Crashes

Figure 9. CMV-Involved Crashes per Mile



Source: Texas Department of Transportation Bridge Division, 2017.

Table 5. Commercial Motor Vehicle Crashes and Rates

Location	CMV-Involved Crashes	CMV-Involved Crashes per Million Truck Miles Traveled	CMV-Involved Fatal Crashes	CMV-Involved Fatal Crashes per Million Truck Miles Traveled
Grayson County	123	0.79	3	0.019
Texas	39,108	1.42	521	0.019

Source: Texas Department of Transportation, Crash Records Information System, 2018.

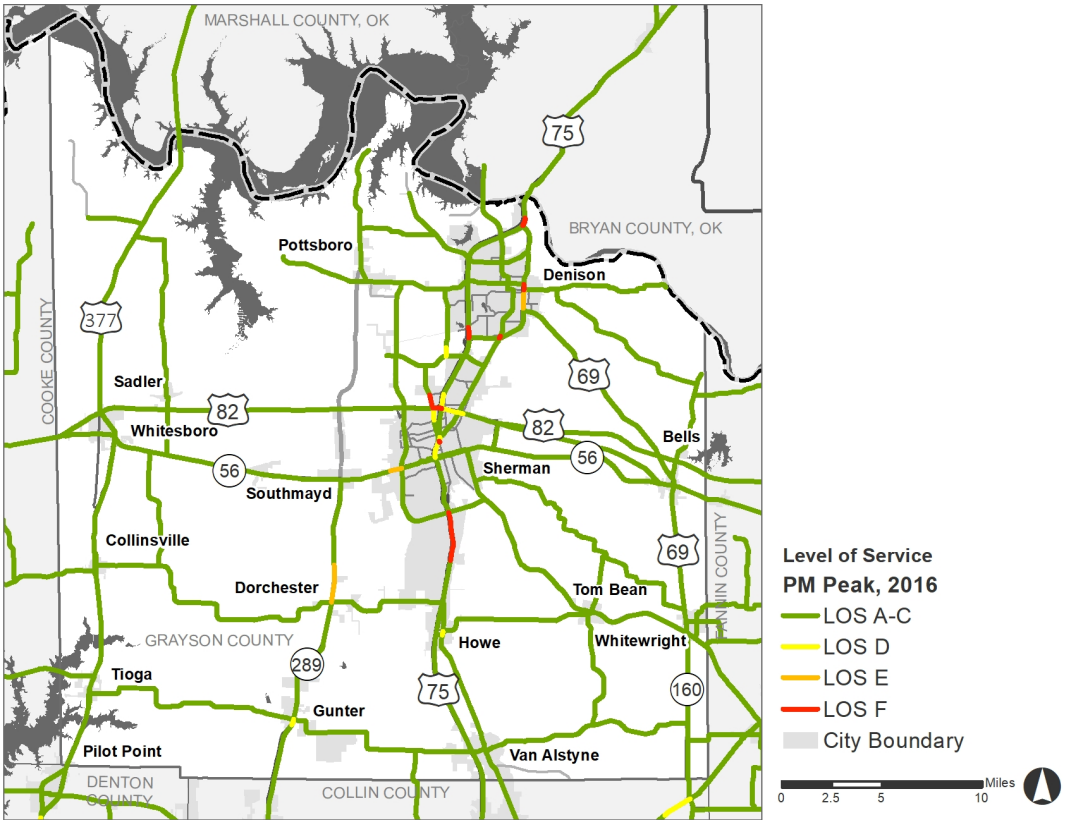
were identified from TxDOT's Crash Records Information System (CRIS). Truck miles traveled were obtained from the Texas Planning and Programming Division 2015 annual inventory. Based on this comparison, Grayson County has a lower rate of CMV-involved crashes than Texas as a whole and the same rate of CMV-involved fatal crashes.

Congestion and Reliability

Level-of-service (LOS) is one measure of the congestion level on a roadway based on the amount of traffic carried on a facility relative to its design capacity, with an LOS of A indicating free-flowing conditions down to an LOS of F indicating severe congestion.[6] Peak level-of-service in Grayson County as modeled by the TxDOT Statewide Analysis Model (SAM) is shown on Figure 10. In Grayson County, US 75 is the most congested roadway with segments near the urbanized areas of Sherman and Denison operating at LOS F during peak traffic. FM 131 (Travis Street/Preston Road) and US 69 in Denison also have segments operating at LOS F. SH 289 north of Dorchester and US 82 near US 75 show lower levels of congestion with segments operating at LOS D or E. Data collection for observed traffic conditions and causes of congestion on specific segments is necessary to determine whether geometric or operational improvements are appropriate to address the causes of congestion.

In addition to congestion, reliability is an important measure for freight transportation as businesses must plan for non-recurring congestion due to lane closures, crashes, or other periodic interruptions in addition to

Figure 10. Level-of-Service



Source: Texas Department of Transportation, Statewide Analysis Model, 2016.

[6] LOS analysis should be used to understand relative congestion and ultimately be combined with other measures to determine the need for roadway investment. It is not feasible or desirable for all roadways to operate at LOS A; some roadways in urban areas, for example, are designed to operate at LOS C or D.

recurring daily congestion. The truck buffer time index represents the extra time (buffer) commercial vehicles need to add to their average travel time to ensure 95 percent on-time arrival. For instance, a buffer time index of 20 percent (0.2) means that a truck should budget an additional 20-minutes for a trip that typically takes 100-minutes to ensure that they arrive on time 95 percent of the time. The higher the buffer index, the more extra time must be planned for in order for trucks to reliability make it to their destination on time.

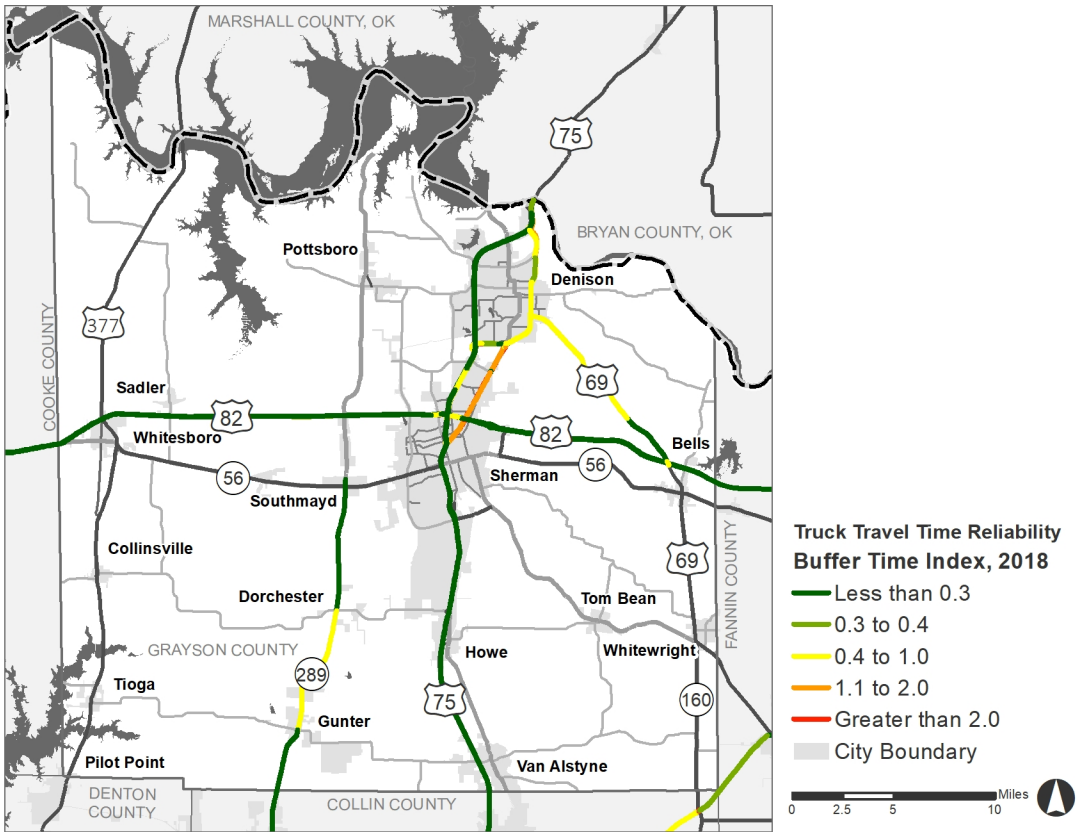
In Grayson County, the major thoroughfares such as US 75, US 82, and SH 289 generally operate reliably with low buffer time indices.[7] This is advantageous for businesses as they can reliably predict the amount of time it will take to traverse Grayson County. In Grayson County, about 20 percent of roadways are considered unreliable for trucks when using this measure. As with observed congestion, investigation into the causes of unreliability on a particular segment is necessary to determine the potential benefit of either geometric or operational improvements. The buffer time indices on Grayson County roadways are shown on Figure 11.

US 75 CORRIDOR

Overview

The US 75 corridor is the center of freight activity in Grayson County. This highway carries more truck traffic than any other roadway in the County and connects the County to markets in Dallas and Houston to the south and in Oklahoma to the north. The corridor is also a center for freight-dependent businesses, with 53 percent of freight businesses in the County located within two miles of the corridor and 32 percent within one mile.

Figure 11. Reliability: Buffer Time Index



Source: National Performance Management Research Dataset processed for Texas Freight Mobility Plan, 2018.

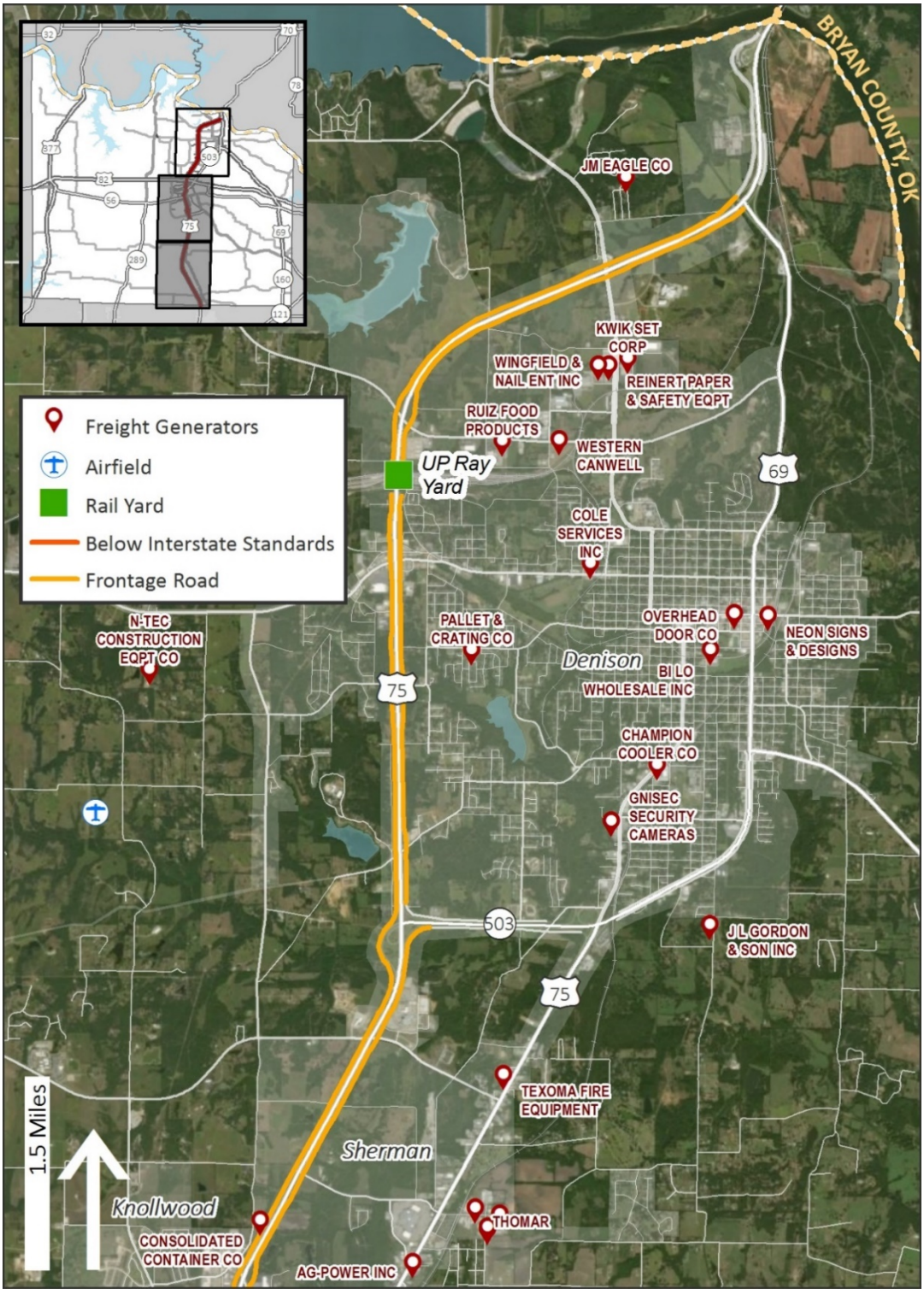
[7] A buffer time index of 0.5 or higher as observed across five time periods is considered unreliable.

While most of US 75 is designed to interstate standards, a 4-mile gap exists between FM 1417 and SH 91. South of Grayson County, US 75 is as many as 10 lanes wide. The roadway narrows to four lanes in Collin County and is four lanes wide throughout Grayson County. Frontage roads exist on both sides of the highway; however they are not continuous throughout the County, with gaps in the following locations:

- Northbound at Ponderosa.
- Northbound at Travis.
- Northbound at Spur 503.
- In both directions at the UP tracks in Denison.
- North of US 69.

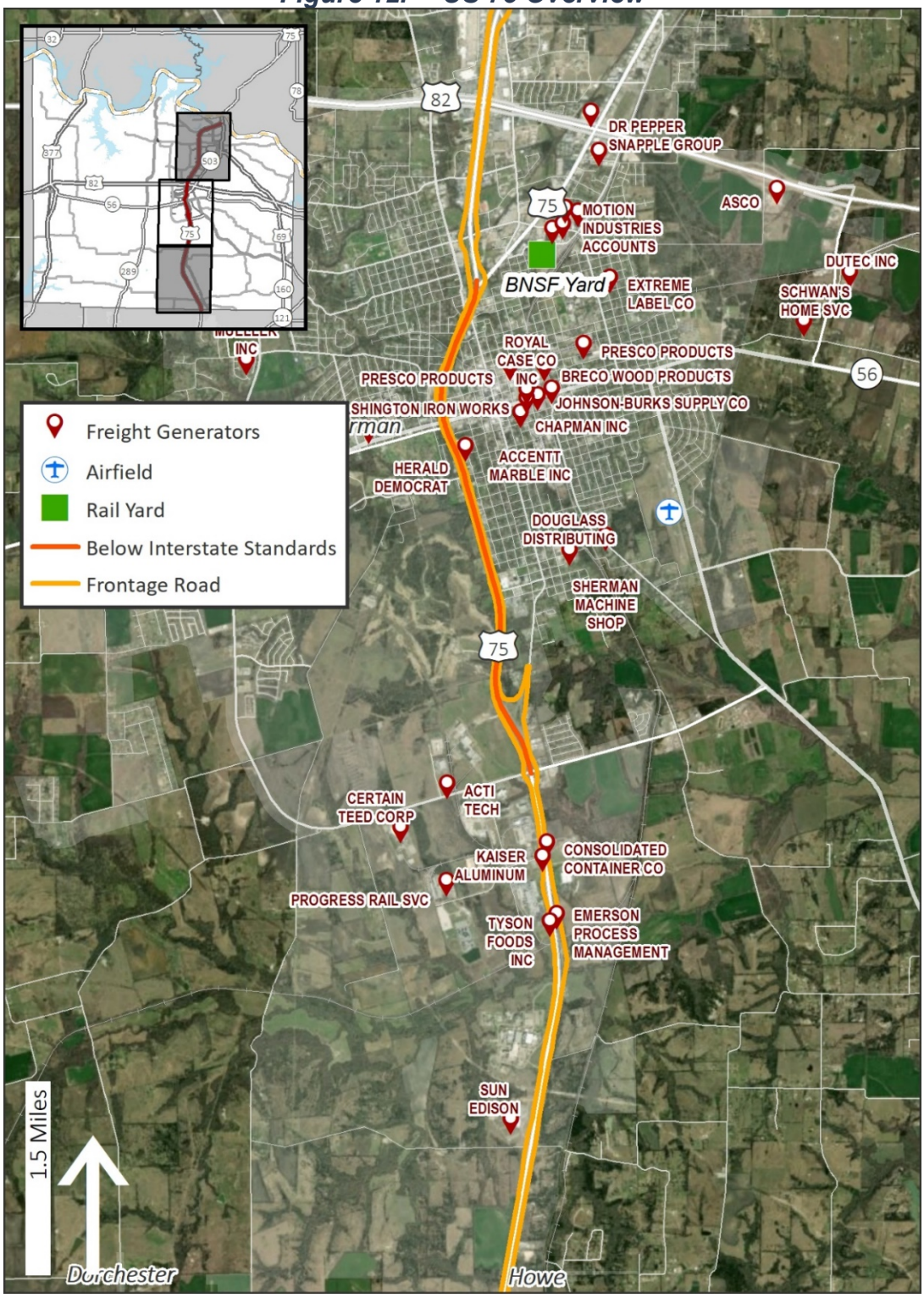
Breaks in frontage roads limit their ability to serve as an alternate route in the event of a traffic incident on the highway main lanes, and may make local businesses and roads more difficult to access. Frontage roads and freight businesses are shown in Figure 12.

Figure 12. US 75 Overview



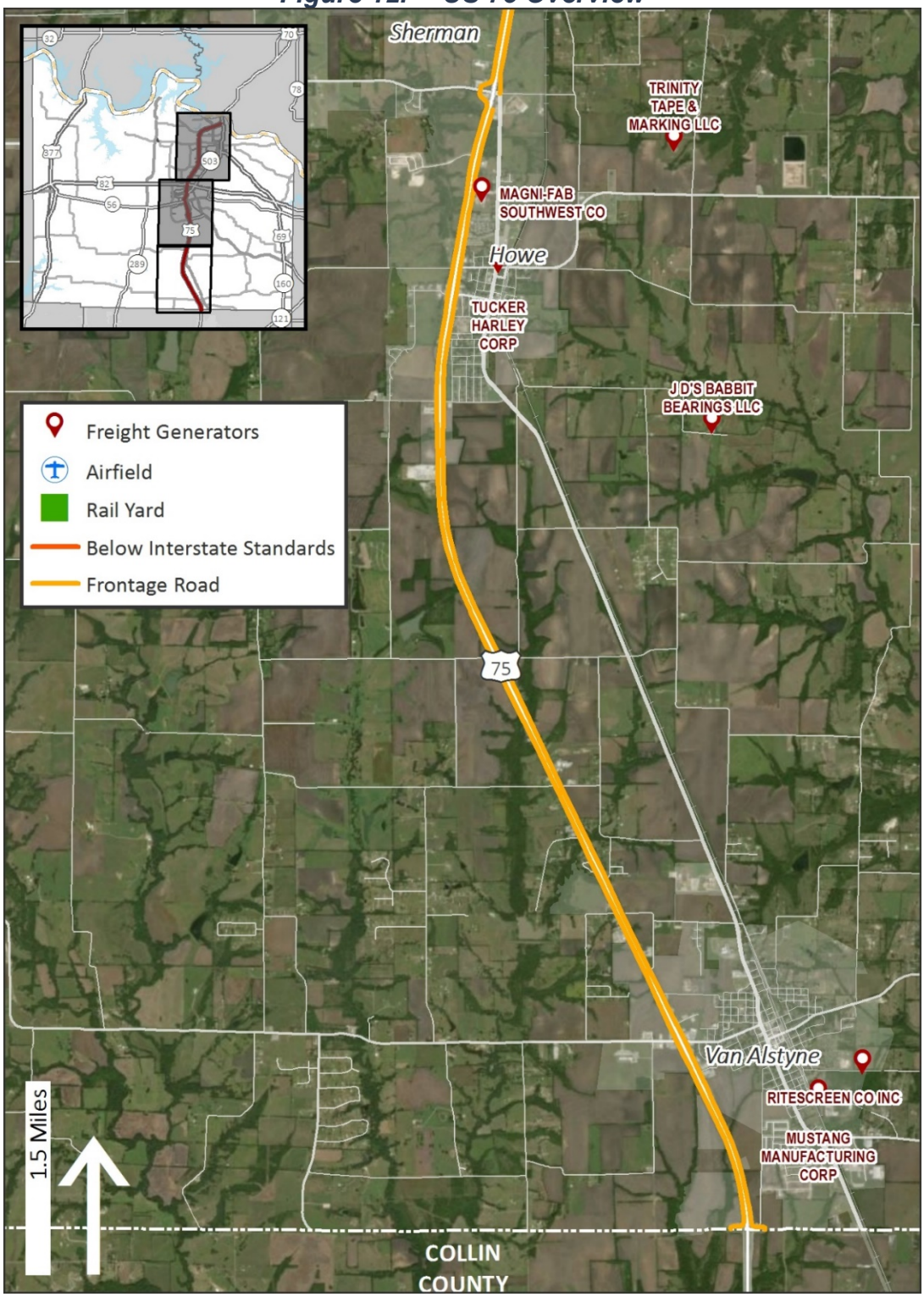
Source: TxDOT Transportation Planning and Programming, 2016.
IHS Global Insight, Freight Finder, 2018.
Note: Oklahoma businesses are not included in this dataset.

Figure 12. US 75 Overview



Source: TxDOT Transportation Planning and Programming, 2016.
IHS Global Insight, Freight Finder, 2018.
Note: Oklahoma businesses are not included in this dataset.

Figure 12. US 75 Overview



Source: TxDOT Transportation Planning and Programming, 2016.
IHS Global Insight, Freight Finder, 2018.
Note: Oklahoma businesses are not included in this dataset.

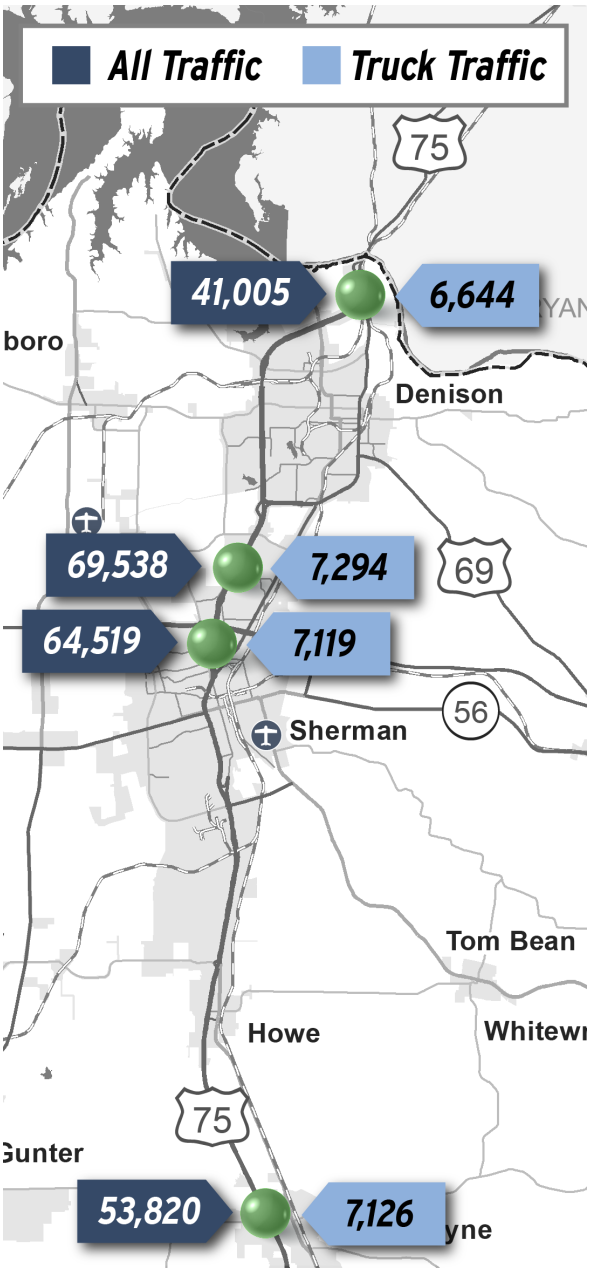
Performance

The performance of a roadway can be measured in terms of asset condition, safety, congestion, and reliability. This corridor analysis considered bottlenecks on US 75 based on congestion and safety factors, and compares US 75 to similar corridors in the region based on additional performance considerations.

Traffic Levels and Congestion

Traffic counts with video classification were conducted in spring 2019 to verify the total and truck traffic on US 75 and compare to existing data sources, such as the HPMS data discussed earlier in this chapter. This data collection was completed at four locations, shown in Figure 13, selected to capture traffic levels in the busiest parts of the county as well as its north and south boundaries. Total annual average daily traffic (AADT) is highest north of US 82 (66,500 AADT), followed by south of US 82 (61,400 AADT). These locations are near the intersection of two major highways and in the middle of the largest urbanized area in the county. The locations at the edge of the county have lower traffic levels. These patterns reflect density of residential and industrial development in the urban areas. Truck traffic is more consistent throughout the corridor, ranging between 7,200 and 7,800 trucks per day.

Figure 13. Traffic Counts on US 75



Bottleneck Analysis

Bottleneck locations with recurring congestion and poor reliability were examined to identify potential causes for poor performance relative to the rest of the corridor, such as interchanges, lane merges, or recurring crashes. More detailed study of causes of recurring and intermittent congestion is required to develop targeted solutions for each location.

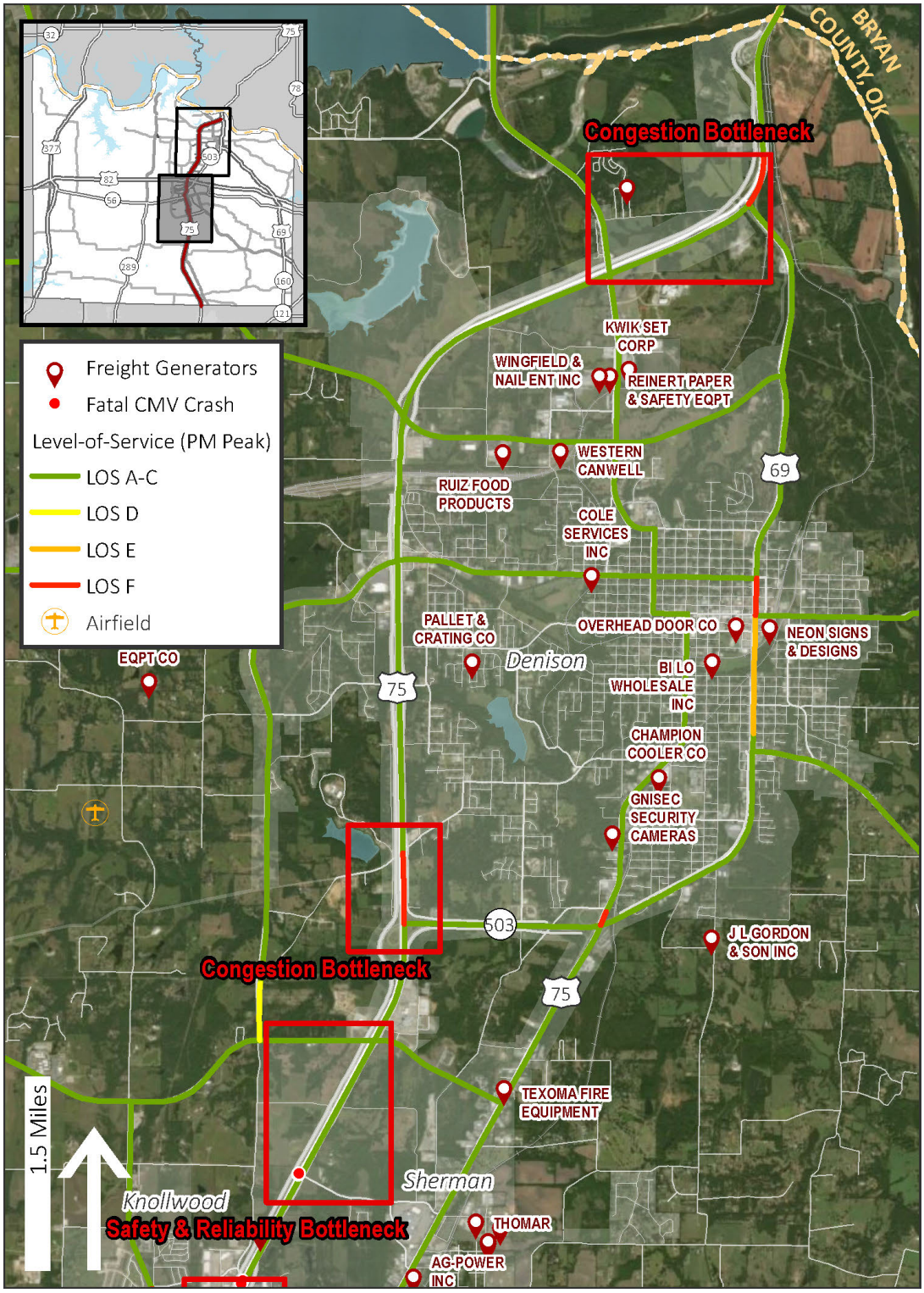
Bottlenecks were identified by locating segments with LOS D or worse or unreliable travel times. Then, potential causes of the bottleneck were identified using crash data and aerial imagery as bottlenecks often occur where lanes drop or at an interchange. Non-safety congestion bottlenecks along US 75 include:

- US 75/US 69 interchange in Denison, predominantly on the north side. Both northbound and southbound directions on US 75 interchange with US 69 north of the intersection, while the roadway south of the intersection is typical of the rest of the corridor.
- US 75/Spur 503 interchange in Denison, predominantly on the north side in the northbound direction.
- US 75/US 82 interchange in Sherman, predominantly on the north side in the southbound direction. Additionally, approaches on US 82 become congested.
- US 75/SH 91 split in Sherman, predominantly on the south side in the northbound direction.

Congestion bottleneck improvements can increase performance on the entire corridor. Bottleneck projects may include operational improvements to enhance vehicle movement and merging, the addition of auxiliary lanes, ramp reversals, or similar, strategic actions which address a localized design deficiency. These geometric and traffic management solutions can reduce the impact of bottlenecks and facilitate smoother traffic flow throughout the corridor. For example, northbound between US 82 and Grayson Drive (near Fallon Drive), there are 2.5 miles between exit ramps. The addition of a ramp to the frontage road could improve reliability and travel times in the event of a crash or other disruption to the highway at a much lower cost than a widening project.

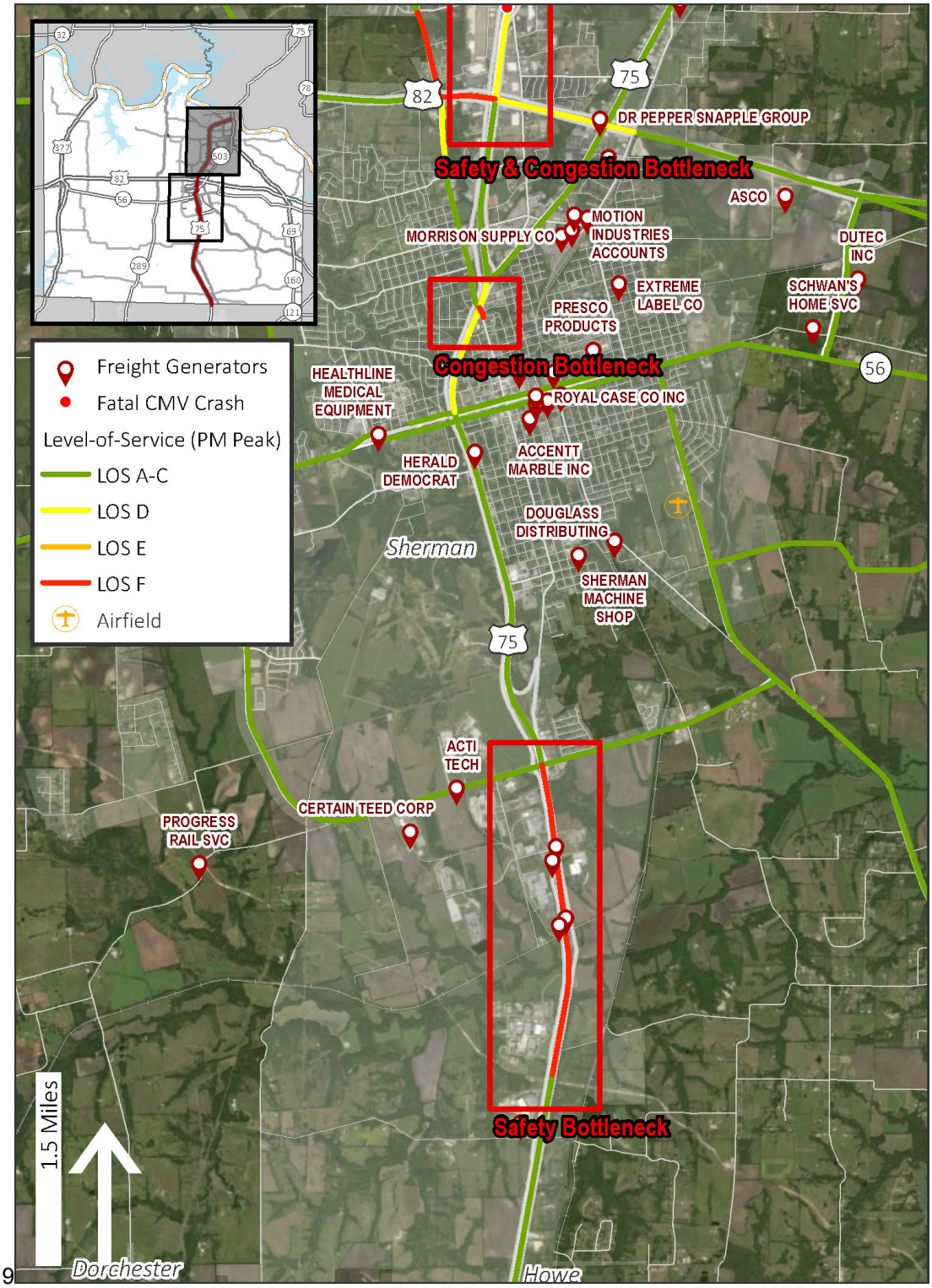
Crashes cause non-recurring congestion when lanes must be closed to clear an incident, and fatal crashes result in longer closures. Locations with poorer safety performance may result in recurring congestion issues if crashes occur frequently. Two safety-related bottlenecks on US 75 are located between US 82 and FM 691, shown on Figure 14. A third safety-related bottleneck is located south of FM 1417.

Figure 14. US 75 Bottlenecks



Source: TxDOT Transportation Planning and Programming, 2016.
IHS Global Insight, Freight Finder, 2018.
Note: Oklahoma businesses are not included in this dataset.

. US 75 Bottlenecks



Source: TxDOT Transportation Planning and Programming, 2016.
IHS Global Insight, Freight Finder, 2018.
Note: Oklahoma businesses are not included in this dataset.

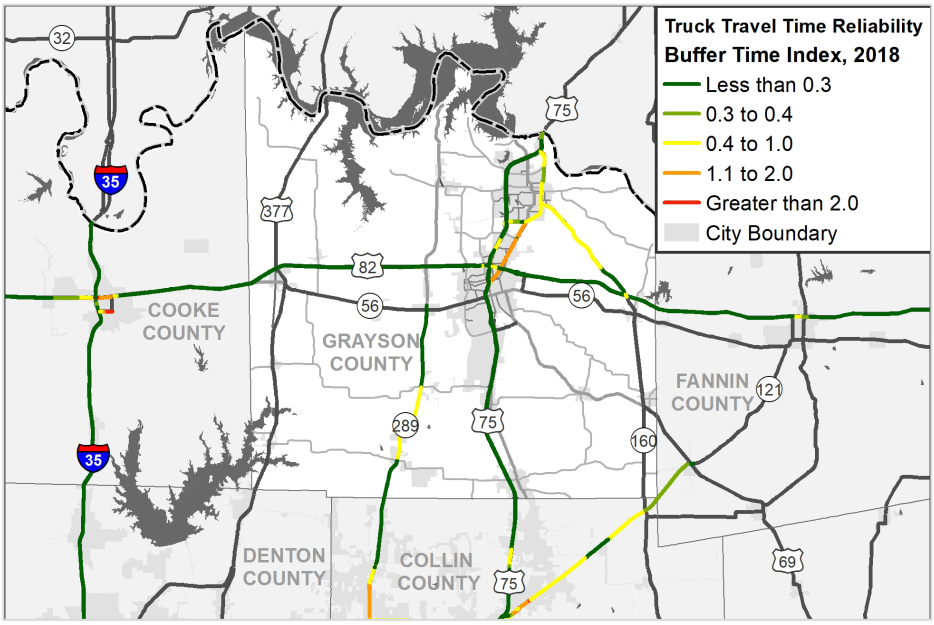
US 75 Corridor Benchmarking

US 75 was compared to nearby interstates to better understand its relative performance within the County and within the region. I-35 and I-30 were selected for comparison because of their roles as alternate and complementary routes, respectively. I-35 is parallel to US 75 to the west, and I-35E, I-30, and US 75 all converge in downtown Dallas. The segments of the corridors in Cooke and Hunt counties were selected due to their similar position relative to the Dallas-Fort Worth metroplex. The most recent traffic data available across all data points was used, resulting in a comparison year of 2017.

Table 6 compares 2017 AADT reported by TxDOT. US 75 and I-35 are compared at similar latitudes and positions relative to US 82. I-30 is compared near Greenville which, like Sherman, is the county seat and largest urbanized area in the county. Total and truck volumes on US 75 were slightly higher than on I-35. Total volume on US 75 exceeds volume on I-30 by more than 10,000 vehicles per day, though more truck traffic was reported on I-30 than either of the other corridors.

Reliability and congestion patterns are similar between US 75 and I-35. Both corridors are generally reliable, and have moderate congestion throughout. US 75 has sections south of Spur 503 with lower reliability and more congestion than the rest of the two corridors (Figure 15 and Figure 16). TxDOT estimates that congestion will increase on nearly the entire US 75 and I-35 corridors (Figure 16).

Figure 15. Reliability on US 75 and I-35



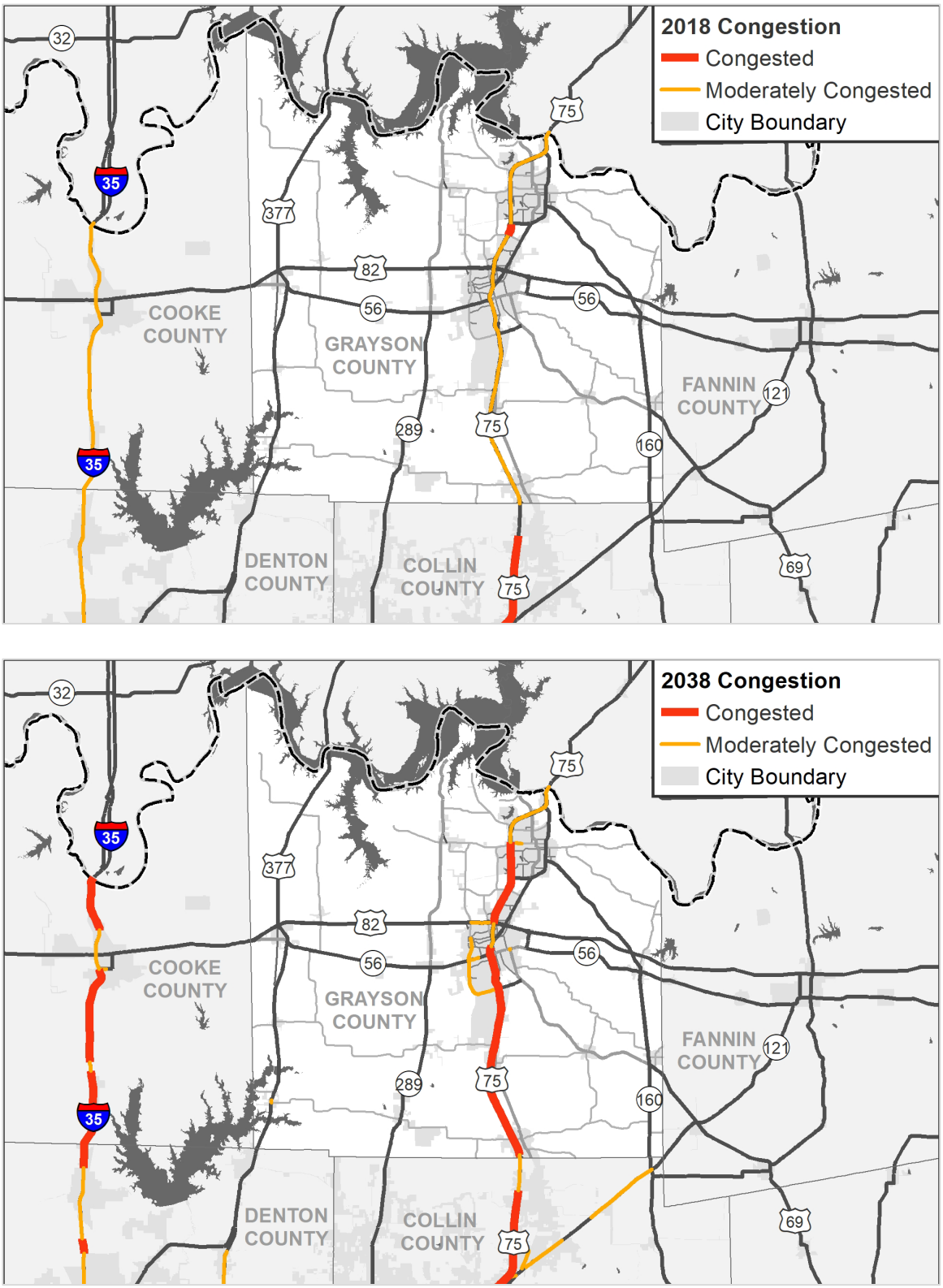
Source: National Performance Management Research Dataset processed for Texas Freight Mobility Plan, 2018.

Table 6. Comparison to I-35 and I-30 Traffic Counts (2017)

Location	Year	Total Traffic	Truck Traffic	Truck Percent
U.S. 75 south of U.S. 82	2017	49,190	7,926	16%
I-35 south of U.S. 82 (near Gainsville)	2017	48,838	7,383	15%
I-30 east of Greenville	2017	37,037	13,140	35%

Source: TxDOT STARS II, 2017.

Figure 16. Current and Future Congestion on US 75 and I-35



Source: TxDOT Open Data Portal, 2018.

Table 7 compares US 75 in Collin County and displays several factors related to congestion, reliability, pavement quality, and safety on US 75, I-35, and I-30. Key findings include:

- US 75 in Grayson County and I-35 in Cooke County have similar levels of total and truck traffic, with slightly higher traffic in Grayson County for the most recent data available. US 75 in Collin County has the most traffic of any of the segment analyzed, and I-30 has the most truck traffic of any segment.
- US 75 in Collin County is the only corridor of the four locations compared with significant congestion today. US 75 in Grayson County and I-30 in Hunt County are expected be congested on 75 percent of the corridor by 2038, and I-35 in Cooke County is expected to be congested on more than 80 percent of the corridor.
- US 75 is currently more reliable in Grayson County than in Collin County to the south. Investment in mobility and accessibility are needed to maintain this advantage as the county continues to grow and develop.
- Pavement condition on US 75 in Grayson County is worse than any of the other comparison corridors with 16 percent of lane-miles in poor condition. US 75 in Collin County reported only 9 percent in poor condition during the same year, and I-35 and I-30 did not report significant pavement issues.
- US 75 in Grayson County ranked in the middle of these corridor in terms of commercial vehicle-involved crashes. While this segment had fewer crashes per mile than the others, the crash rate fell in the middle when normalized by truck-miles traveled.
- Additionally, while there was a lower truck crash rate on US 75 in Grayson County than in Collin County, there was a higher rate of fatal crashes in Grayson County compared to Collin County. I-35 in Cooke County reported the highest rate of fatal crashes of any of the corridors.

Table 7. US 75 Corridor Benchmarking

Corridor	U.S. 75 in Grayson County	U.S. 75 in Collin County	I-35 in Cooke County	I-30 in Hunt County
Mobility: 2017 AADT (Location)	49,190 (south of US 82)	117,866 (south of US 380)	48,838 (south of US 82)	37,037 (east of Greenville)
Mobility: 2017 AADTT (Location)	7,926 (south of US 82)	11,660 (south of US 380)	7,383 (south of US 82)	13,140 (east of Greenville)
Current Congestion: Percent of lane-miles congested	3%	93%	0%	0%
Future Congestion: Percent of lane-miles congested	73%	93%	82%	75%
Reliability: Percent of lane-miles unreliable (Buffer Index >= 0.5)	4%	44%	0%	0%
Asset Condition: Percent of lane-miles in poor pavement condition	16%	9%	4%	0%
Safety: CMV-Involved crashes per mile (2012-2016)	7.16	23.66	9.27	10.61
Safety: CMV-Involved fatalities per mile (2012-2016)	0.20	0.07	0.37	0.30
Safety: CMV-Involved crashes per million TVMT (2012-2016)	0.69	2.06	0.63	0.65
Safety: CMV-Involved fatalities per million TVMT (2012-2016)	0.019	0.006	0.025	0.018

Source: TxDOT Transportation Planning and Programming, 2016, 2017.
National Performance Management Research Dataset processed for Texas Freight Mobility Plan, 2016

RAILROAD ASSETS

Inventory

The rail network within Grayson County consists of two Class I railroads and two Class III, or short line, railroads. In the United States, the freight railroad classification system, originally developed by the Interstate Commerce Commission in 1911, refers to the size of the freight railroad by means of operating revenue. As of 2017, the revenue thresholds by class are:

- Class I – Operating revenue of at least $447,621,226,
- Class II – Operating revenue of at least $35,809,698 and less than $447,621,226, and
- Class III – Operating revenue of less than $35,809,698.

BNSF Railway (BNSF) and Union Pacific (UP) are the two Class I railroads operating in Grayson County. Kansas City Southern (KCS) is the only other Class I railroad that operates in Texas, and it serves the nearby Dallas-Fort Worth Metroplex. Genesee & Wyoming owns both short line railroads in Grayson County: Dallas, Garland & Northeastern Railroad (DGNO) and Texas Northeastern Railroad (TNER). A summary of these four freight railroads is shown in Table 8.

UP, BNSF, and G&W each own between 29 and 36 percent of rail mileage in the County, with UP owning the largest share of track in the County. Class I railroads comprise a smaller share of the Grayson County rail network than the state as a whole, at 65 percent of mileage in Grayson County and 78 percent of mileage in Texas.

Grayson County Railroad Assets

- 158 miles of track
- Two Class I railroads: BNSF Railway and Union Pacific
- Two Genesee & Wyoming short lines: DGNO and TNER

In addition to the segments owned by a company, trackage rights allow railroads to operate on track owned by another railroad. The two G&W short lines have trackage rights on segments of the UP and BNSF lines enabling access to markets beyond Grayson County.

Within Grayson County, there are four primary rail corridors:

- A BNSF corridor, known as the Madill Subdivision, operating between the Texas-Oklahoma state line to the north of Denison and south along the US 75 corridor. South of Sherman, the BNSF corridor services Dorchester and Gunter along the SH 289 corridor.
- A UP corridor operating between the Texas-Oklahoma state line to the north of Denison and points west and south. In addition to Denison, the corridor services Pottsboro and Sadler, as well as Whitesboro, Collinsville, and Tioga along the US 377 corridor.
- A DGNO corridor operating between BNSF trackage in south Sherman and points south along the US 75 corridor, including Howe and Van Alstyne.
- A TNER corridor operating between BNSF trackage in Sherman and points east and south. In addition to Sherman, the corridor services Bells and Whitewright along the US Highway 69 corridor. To the east, the TNER is inactive in various states.

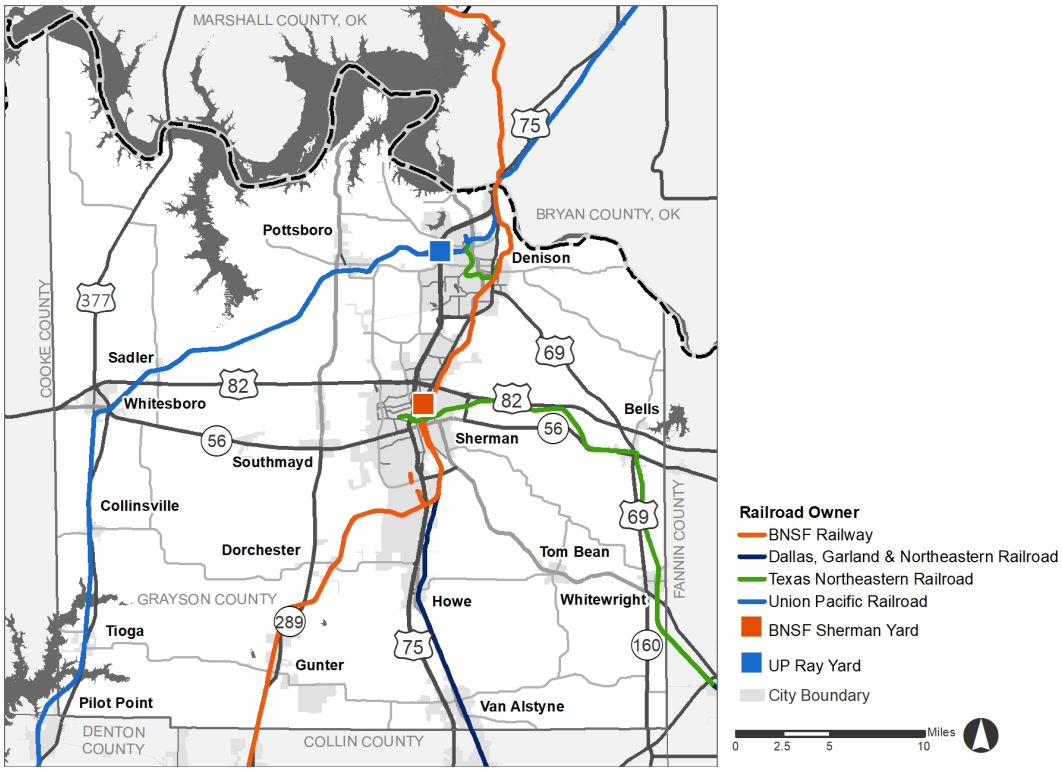
The Grayson County rail network is shown in Figure 17.

Table 8. Railroad Ownership in Grayson County and Texas

Railroad	Miles Owned in Texas	Split of Miles Owned in Texas	Miles Owned in Grayson County	Split of Miles Owned in Grayson County
Class I	11,138	78%	103	65%
Other	3,154	22%	55	35%
Total	14,292	100%	158	100%

Source: Texas Department of Transportation, Railroads, 2020.

Figure 17. Grayson County Rail Network



Source: Texas Department of Transportation, Railroads, 2020.

BNSF Railway

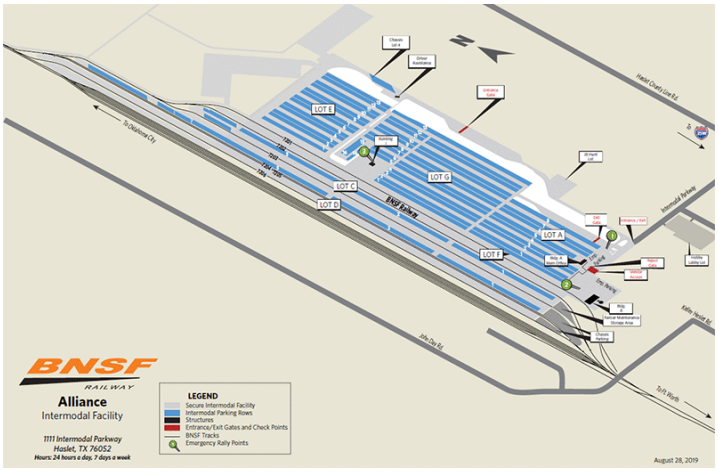
In terms of operating revenue, BNSF is the largest Class I railroad in the United States. Operating across the western US, BNSF generated operating revenues of over $23 billion in 2019.[8] Within Texas, BNSF's network is second only to UP in network mileage. Across the state, BNSF trackage services a large region from Houston and Galveston to Amarillo and points northwest. Additionally, BNSF's El Paso Branch operates between Belen, New Mexico, to the south of Albuquerque. BNSF also has trackage rights between Houston and Brownsville, between a San Antonio and Eagle Pass, and lastly, from El Paso to Sierra Blanca.

BNSF's North Texas intermodal operations are centered around the railroad's Alliance Intermodal Facility in Fort Worth, shown in Figure 18. From Fort Worth, BNSF operates two corridors to Amarillo and Denver as well as north to Oklahoma City and Kansas City. South of Fort Worth, service is operated to Galveston. From Dallas, an additional north-south corridor is operated between Houston and Tulsa. North of Dallas, a portion of this branch, known as the Madill Branch, passes through Grayson County.

Based on interviews conducted with BNSF staff, the railroad operates approximately 24 daily trains along the Madill Branch through Grayson County, all of which is capable of handling 286,000lb car loads. Progress Park, home to Tyson Foods, J.P. Hart Lumber, Progress Rail, and other key freight-producing firms in Grayson County, is serviced between two and three times per week. Service to Progress Park is currently the primary opportunity for local service from a Class I railroad. Key commodities transported along the branch include aggregates and grain. BSNF staff indicated an interest in developing an additional industrial park in Grayson County and would support local economic development efforts if the location and customer were appropriate.

[8] https://www.bnsf.com/about-bnsf/financial-information/pdf/10k-llc-2019.pdf

Figure 18. BNSF Alliance Facility



Source: BNSF Railways, 2019.

Union Pacific

Operating in many of the same markets as BNSF in the western US, UP is the second largest railroad in the United States in terms of operating revenue, behind BNSF. In 2019, UP generated operating revenues of just under $22 billion.[9] Within Texas, UP has the most expansive network of any Class I railroad, and provides access to the state's largest markets, most regional and smaller cities in eastern Texas, the Interstate 20 and Rio Grande corridors in western Texas, and portions of the Texas Panhandle.

For UP, the Metroplex provides an important junction within its rail network. East-west service through Dallas and Fort Worth is part of its Sunset Corridor between Shreveport and points west including El Paso, Tucson, and Los Angeles. Although UP used to provide intermodal service between Dallas and Houston's Barbours Cut Container Terminal, service between the two cities has been cut as of April 2019. In efforts to implement precision railroading efforts, UP cited low yields along this once-weekly service.[10] Service is still operated between Fort Worth and San Antonio, as well as into Mexico. UP additionally has trackage rights on BNSF tracks between Fort Worth and points south of Denver in Colorado, and between Fort Worth and Oklahoma City. North of the Metroplex, UP operates two corridors. The first is between Fort Worth and Wichita through Wise and Montague Counties. The second passes through Grayson County and connects Fort Worth with Kansas City. South of the Metroplex, UP's Dallas Intermodal Terminal at the International Inland Port of Dallas serves as its primary intermodal facility in North Texas. It opened in 2005 to support growing demand for intermodal container operations in Dallas-Fort Worth.[11] UP has an additional facility in Mesquite (east of Dallas) which includes both container and automobile facilities. While located outside of Grayson County, major intermodal terminals are not typically located close to each other, and facilities in the Metroplex contribute to the overall transportation capabilities in North Texas. Features of the South Dallas terminal are shown in Figure 19.

Based on interviews conducted with UP staff, the railroad operates approximately 18 daily trains along the Fort Worth – Kansas City corridor, through Grayson County. The majority of this traffic is through tonnage consisting of intermodal traffic between the Port of Los Angeles, Fort Worth, and points north, as well as aggregates, lumber, and steel. There are no current plans to rehabilitate the spur near North Texas Regional Airport; however, UP noted potential for future service depending on demand.

Dallas, Garland & Northeastern Railroad

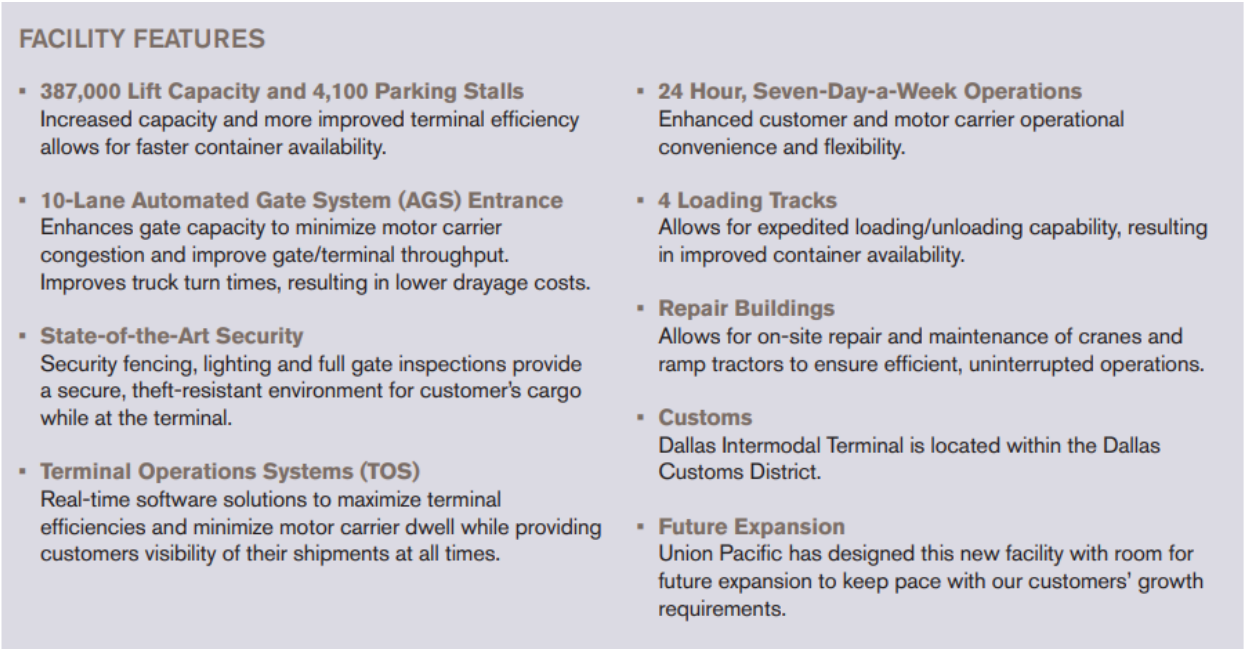
The DGNO is a 187-mile short line railroad serving Dallas and points north within Texas to the Red River border with Oklahoma. The trackage comprising the DGNO was originally part of the Missouri-Kansas-Texas (MKT) Class I system (also commonly referred to as the Katy). In 1988, the MKT merged with UP, which began abandoning or selling off redundant parts of its newly expanded system. In 1992, the DGNO was created to continue service on the Garland – Greenville – Trenton corridor. Additionally,

[9] https://www.up.com/media/releases/200123-4q-2019-earnings.htm#:~:text=2019%20Full%20Year%20Summary,to%20%2422.8%20billion%20in%202018.

[10] https://www.joc.com/port-news/us-ports/port-houston/dallas-importers-losing-houston-rail-link_20190312.html

[11] https://www.uprr.com/newsinfo/releases/service/2005/0919_dallas_intermodal.shtml

Figure 19. UP Dallas Intermodal Terminal Features



Source: Union Pacific, 2015.

the DGNO was given exclusive rights to operate freight service on Dallas Area Rapid Transit (DART) tracks between Dallas, Lake Dallas, and Plano. In 2000, the DGNO was purchased by RailAmerica Inc. Today, the DGNO is owned by Genesee & Wyoming Inc., which acquired RailAmerica Inc. in 2012.

In its entirety, the DGNO consists of multiple segments, shown in Figure 20:

- **Greater Dallas Region:** Two branches operating between Dallas and Lake Dallas, and between Dallas and West Dallas. Service between Dallas, Lake Dallas, and Plano is operated along DART-owned tracks. Between Dallas and Irving the DGNO has trackage rights along BNSF tracks. Portions of those services in the Greater Dallas area also operate on UP-owned tracks.
- **Carrolton – Plano:** A branch operating between Carrolton and Plano in Denton and Collin Counties. Between Carrolton and Irving, the DGNO has trackage rights along BNSF tracks.
- **Garland – Greenville – Trenton:** A branch operating between Garland, Greenville, and Trenton, across Collin, Rockwall, Hunt, and Fanning Counties. Between Garland and Dallas, the DGNO has trackage rights along Kansas City Southern (KSU) tracks.
- **McKinney – Sherman:** A branch operating between McKinney and Sherman in Collin and Grayson Counties. Between Sherman and Denison in Grayson County, the DGNO has trackage rights along BNSF tracks.

Within Grayson County itself, the DGNO services South Sherman where it connects to the BNSF network, and points south along the US-75 corridor, including Howe and Van Alstyne. For the DGNO, Foxworth Galbraith in Van Alstyne is a key customer, generating over 100 annual carloads.[12] At its Van Alstyne facility, Foxworth Galbraith manufactures roof trusses.

The DGNO has physical interchanges with BNSF lines in Sherman and Irving, KSU in Garland, and UP in Denison and Dallas. However, DGNO only offers interchange with

[12] Texas FTP Portal (https://ftp.dot.state.tx.us/pub/txdot-info/rail/tiger3/sun_belt/project_maps.pdf)

UP in Grayson County due to the sale agreement that was negotiated when UP spun off the line in 1992. Key commodities transported along the railroad include aggregates, chemicals, corn syrup, frozen foods, lumber, military equipment, paper, plastic resins, scrap metals, and wheat. During an interview, staff reported six rock trains per week of 75 carloads each. The entire railroad is capable of handling 286,000lb car loads.

Figure 20. DGNO System Map

Source: Genesee & Wyoming, 2020.

During a 2018 interview with G&W staff, the Denison Industrial Lead was identified as a constraint on the number of cars per train as well as the amount of time required to run trains through Grayson County. The current track configuration requires trains transferring to the southbound BNSF line to back completely into a siding (northbound) before traveling southbound. The length of this track limits the number of cars to 75, which greatly complicates the process of handling trains in excess of 75 cars, including unit trains. Additionally, the time required to slowly back into the track, come to a complete stop, and proceed southbound was estimated at approximately two hours. During a 2020 interview, this constraint was confirmed, but staff did not feel it was as pressing as in the past. Staff commented on additional future needs, noting that as customers are added, the need for additional sidings or track capacity would increase.

Texas Northeastern Railroad

The TNER is a 87-mile railroad serving portions of northeastern Texas. The trackage comprising the TNER was also originally part of the MKT and consisted of a continuous east-west route between Whitesboro in western Grayson County and Texarkana. After acquisition by UP and subsequent spin-off as an independent railroad, operations ceased on the portion of the railroad between Bells, Paris, and New Boston, in multiple increments. As of 2020, there are no plans to reinstate service through this section of the corridor. The TNER was purchased by RailAmerica Inc. in 2000 and is currently owned by Genesee & Wyoming Inc.

The TNER currently consists of the following segments, shown in Figure 21:

- **Sherman – Trenton:** A branch operating between Sherman and Trenton in Grayson and Fannin Counties. Between Sherman and Denison in Grayson County, the TNER has trackage rights over BNSF tracks.
- **Texarkana – New Boston (Red River Army Depot):** A branch operating between Texarkana and New Boston and the Red River Army Depot in Bowie County.

Within Grayson County itself, the TNER services East Sherman where it connects to the BNSF network, and points east along the US-82 corridor to Bells. After Bells, the TNER turns south and services Whitewright. In addition, the TNER has trackage rights between Sherman and Denison on BNSF tracks, and directly services Denison on its own tracks within the city. The following are key customers for the TNER, each generating over 100 annual carloads:[13]

[13] Texas FTP Portal (https://ftp.dot.state.tx.us/pub/txdot-info/rail/tiger3/sun_belt/project_maps.pdf)

- ConAgra – Ardent Mills flour producer in Sherman,
- Florestone bath & shower manufacturer in Denison,
- Helena Chemical Company agricultural chemical producer in Whitewright, and
- El Dorado Chemical agricultural chemical producer in Whitewright.

The TNER interchanges with BNSF in Sherman, KSU in Texarkana, UP in both Denison and Texarkana, and DGNO in Trenton. Like the DGNO, the TNER can only exchange with UP in Grayson County. Key commodities transported along the railroad include coal, military equipment, polyethylene, and wheat. The entire railroad is capable of handling 286,000lb car loads.

Inactive Lines

Two locations with inactive lines present an opportunity for rail rehabilitation in Grayson County. The UP spur near North Texas Regional Airport (NTRA), shown in dashed pink in Figure 22, presents an opportunity to serve local industrial development west of Denison. However, development of this line should be done in close coordination with UP to ensure the design meets the requirements for interchange with the line. Ray Yard is located 6 miles northeast of NTRA, so opportunities at this location will likely be interdependent with operations at Ray Yard.

The second location is on the TNER east of Bells. Only a short segment of this line is located in Grayson County. However, access to markets in Northeast Texas, particularly the Red River Army Depot near Texarkana, could present an opportunity. The segment from Bells to Bonham is still controlled by the TNER, and the railroad expressed needing an anchor customer to justify the rehabilitation cost. This segment, shown in dashed green in Figure 22, represents the most immediate opportunity for rehabilitation. In addition to the main TNER line, an inactive spur in Savoy (just outside of Grayson County) accesses a large site formerly used for the Luminant Valley Power Plant. While this site might be a desirable

Figure 21. TNER System Map

Source: Genesee & Wyoming, 2020.

location for a new customer that would require rehabilitation of relatively little track, the site was marketed as a luxury ranch property in 2018 priced at $24.5 million.[14]

The segment from Bonham to Paris, shown in dashed red in Figure 22, is the TxDOT Bonham Subdivision. In 2006, TxDOT entered into a lease agreement with the Fannin County RRTD to operate on the state-owned rail line. However, the track has not been rehabilitated due to funding and lack of a large customer to justify the investment. The segment between Paris and New Boston (not shown) has largely been converted to the Northeast Texas Trail, a recreational trail in the rail right-of-way. While trail systems and railbanking can be used to preserve right-of-way until it is needed, reinstituting rail service on this segment of the corridor would likely present a significant barrier.

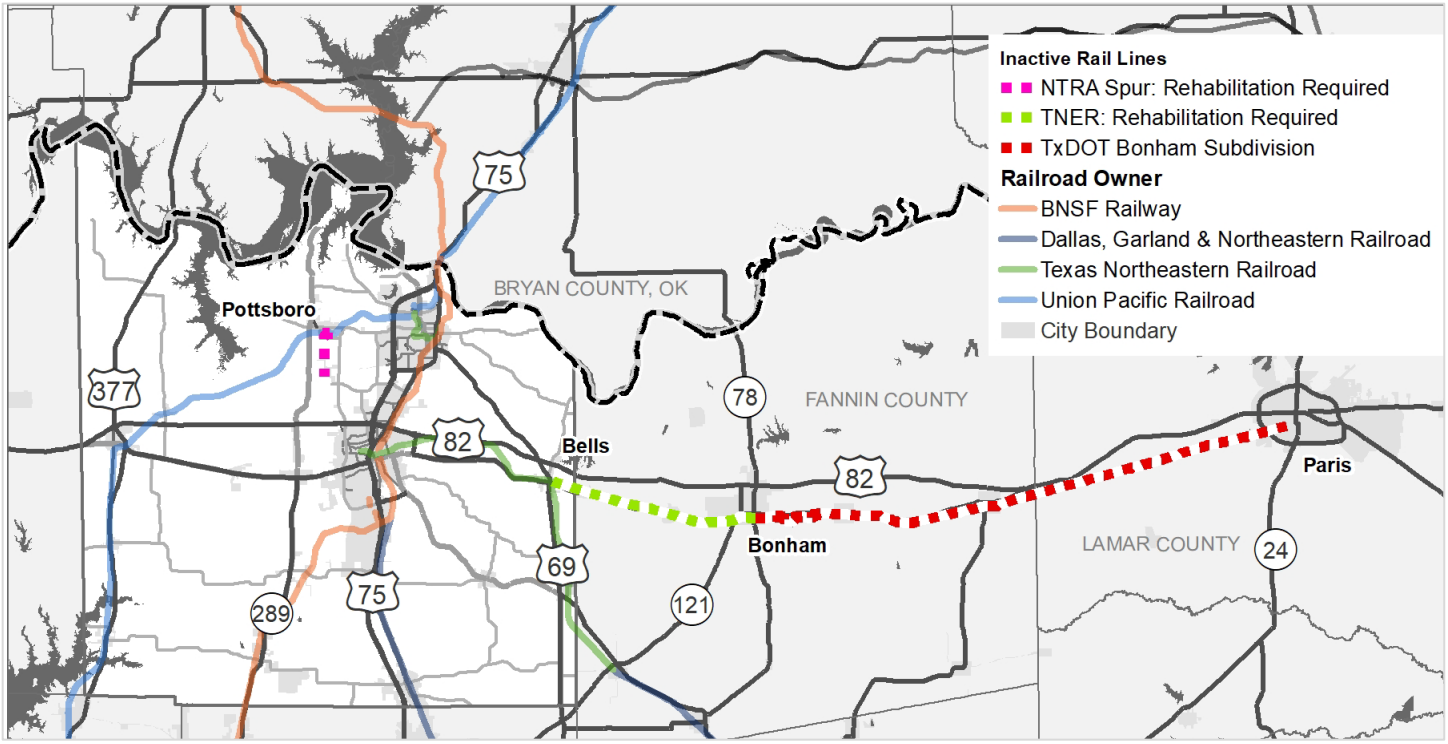
Conditions and Performance

All railroads in Grayson County are privately owned, and detailed information about the condition and performance of these systems is not publicly available. However, some information on system performance was identified through interviews and analysis of highway-rail interactions.

Rail Constraints

Two capacity constraints that can influence performance are 286,000-lb. compatibility and chokepoints caused by single-tracked segments or interchanges. TxDOT's 2016 Rail Plan cited accommodating 286,000-lb. maximum gross weight as one of the largest constraints on short line railroads in the U.S. These heavier cars are now the industry standard, though some short lines with antiquated infrastructure are unable to accommodate

Figure 22. Inactive Rail Lines in and near Grayson County



Source: Texas Department of Transportation, Railroads, modified based on interviews, 2020.

[14] https://www.bizjournals.com/dallas/news/2018/09/13/for-24-5m-you-can-own-a-north-texas-lake.html

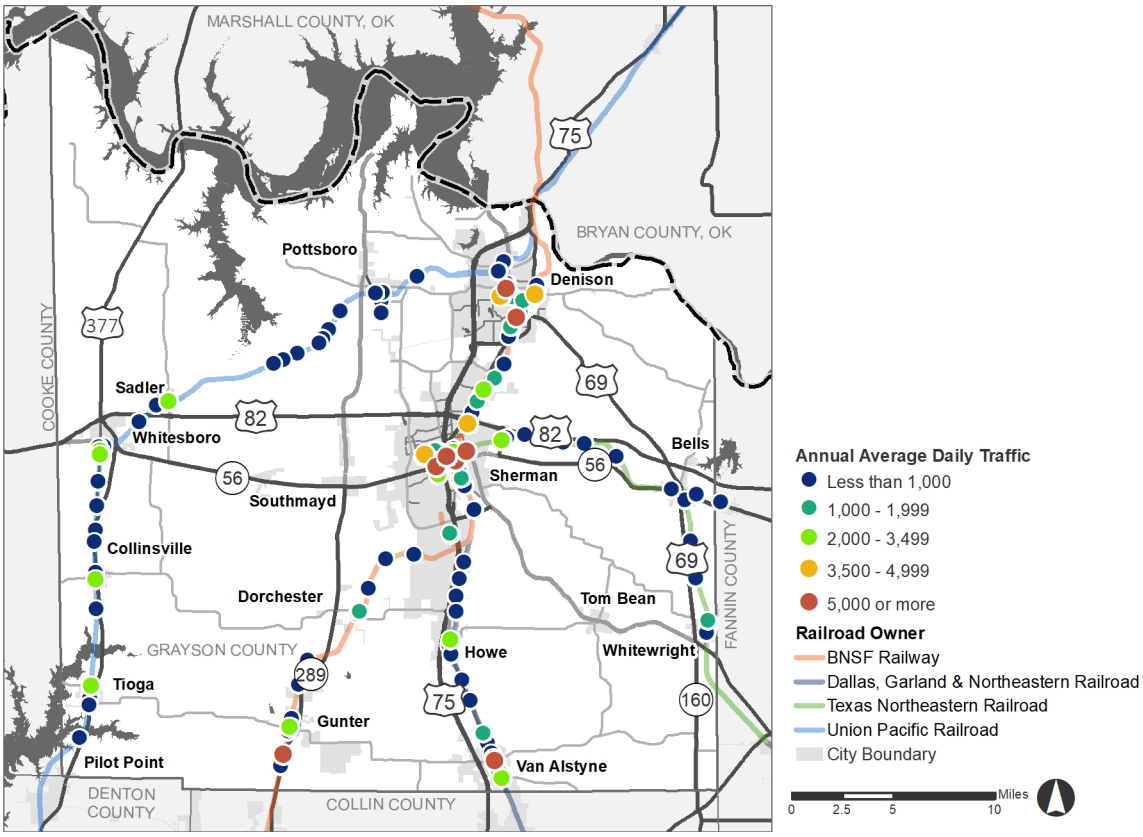
them. The two short line railroads in Grayson County, DGNO and TNER, both have capacity for 286,000-lb. cars.

Capacity is limited on the Denison Industrial Lead for unit trains transferring onto BNSF's track in Denison. Currently, a maximum unit train length of 75 cars can be turned around to travel south, and the turnaround requires approximately two hours. The G&W Railroad proposed the addition of a wye at this location to increase capacity to 110 cars and eliminate the turnaround time in 2018. The railroad anticipates that this improvement would lower costs for customers and allow additional trains to run each week.

At-grade Highway-Rail Crossings

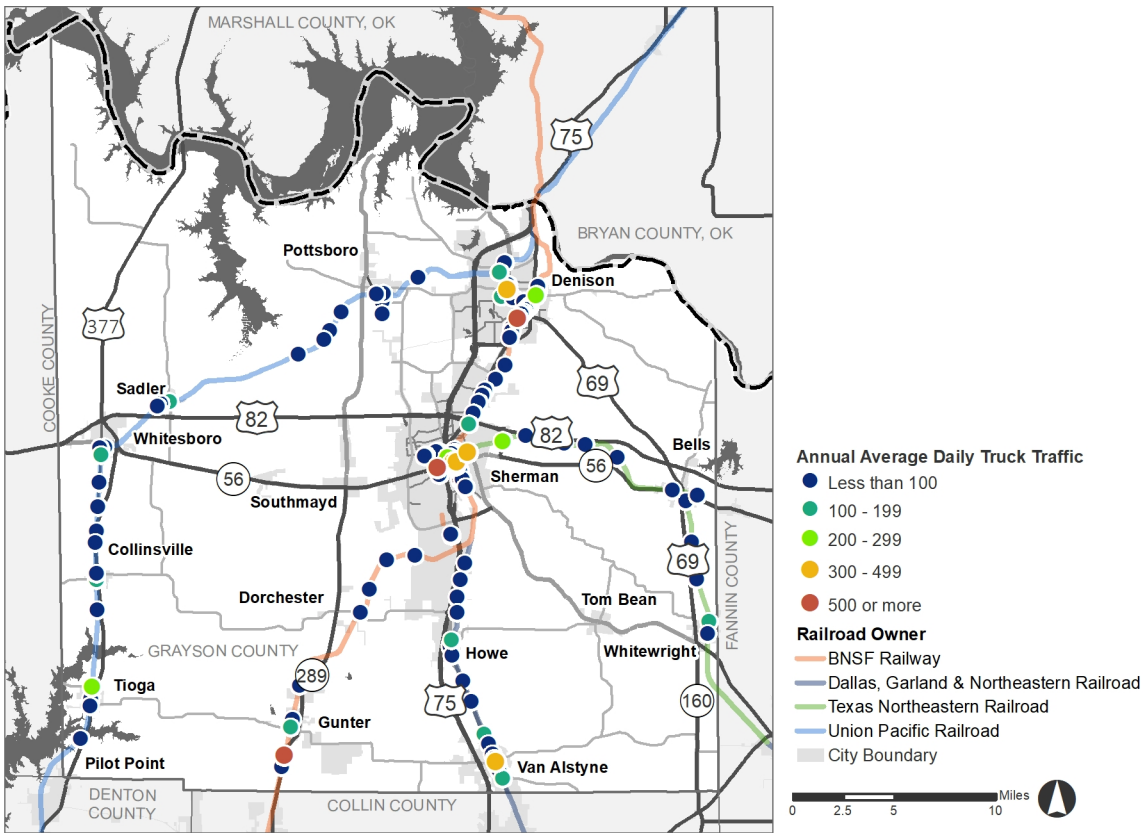
The majority of highway-rail crossings within Grayson County are at-grade, which means that the road and rail networks directly intersect. These types of crossings require special consideration and can pose infrastructure, mobility, and safety concerns. This includes both rural crossings outside of Sherman and Denison as well as crossings within the two largest cities. As previously indicated, many of the rail corridors in Grayson County parallel key highways, including US 69, US 75, and US 377, as well as SH 91 and SH 289. As such, many of the rural grade crossings occur within close proximity to these highways, along roads of varying level-of-service (LOS) capacities that eventually intersect the highways. Within the two cities, grade crossings occur with a mix of residential and light-to-moderate industrial streets, as well as certain commercial streets within the traditional center business districts. Given this variety, a wide range of measures will likely be necessary to ensure safety and mobility.

Figure 23. Annual Average Daily Traffic and At-grade Crossings



Source: Federal Rail Administration, TxDOT Roadway Inventory, 2020.

Figure 24. Annual Average Daily Truck Traffic and At-grade Crossings



Source: Federal Rail Administration, TxDOT Roadway Inventory, 2020.

Between 2014 and 2018, there were three grade crossing incidents at the following locations:

- Belden Road in Dorchester along BNSF tracks,
- Farm-to-Market 121 in Gunter along BNSF tracks, and
- King Street in Ardent Mill in Sherman along BNSF tracks.

The Dorchester incident occurred in a rural location, the Gunter incident occurred near a small town center, and the Sherman incident occurred in an urban location. These grade crossing incidents are shown in Figure 25.

Based on the identification of three grade crossing incidents over the five-year period, there does not appear any significant trend or increases associated with such incidents. On average, less than one grade crossing incident occurs annually. Additionally, these figures are well below statewide figures when normalized on to a per-mile basis. As such, no specific grade crossing safety-related recommendations are proposed at this time. However, as Grayson County continues to develop and experience increased passenger, truck, and rail traffic, these statistics should be monitored.

Rail Yards and Progress Park

There are two active rail yards in Grayson County: BNSF's Sherman Yard and UP's Ray Yard in Denison. Additionally, Progress Park is an industrial park in Sherman that is served by BNSF.

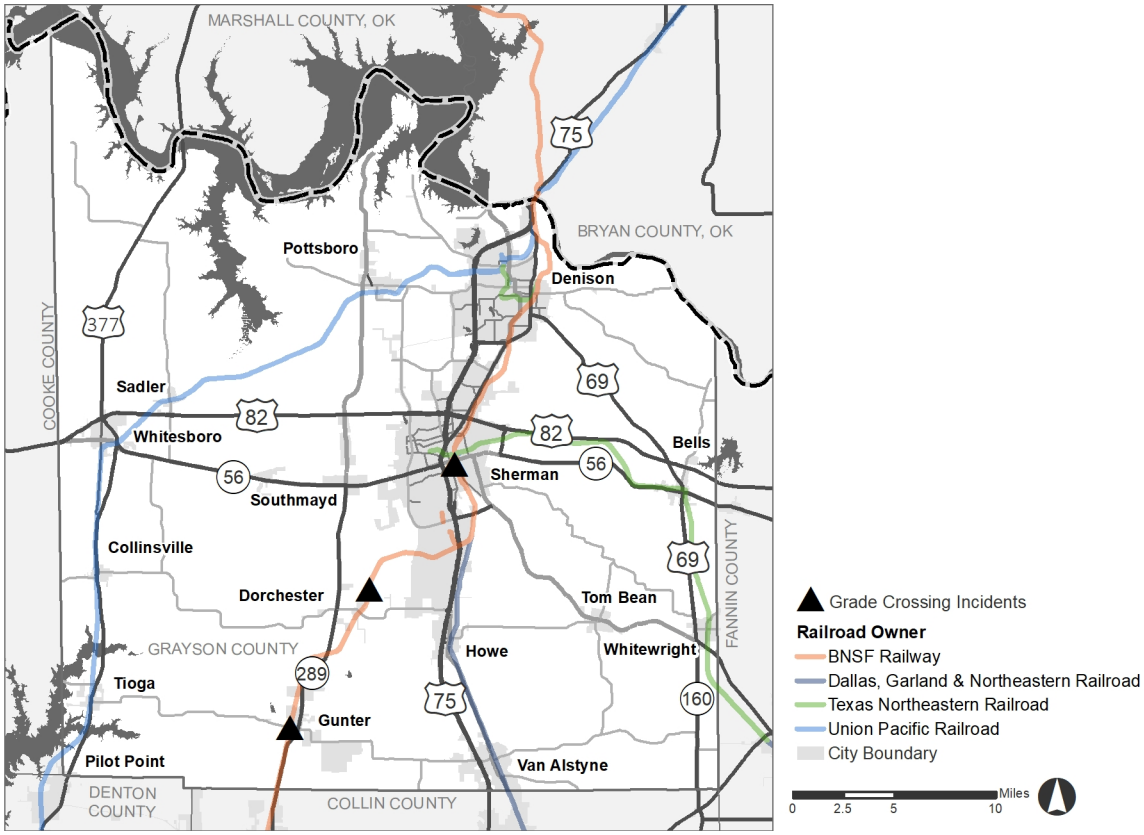
BNSF Sherman Yard

BNSF's Sherman Yard consists of approximately 36 acres and is located entirely within the city limits of Sherman, to the northeast of the central business district. Sherman Yard is a relatively minor yard in BNSF's intermodal network. There are no significant operations currently occurring at the yard, and its primary function is for switching, positioning of trains and cars, and other operational needs. There are no intermodal operations occurring at the yard, and local service on the BNSF line is concentrated at the nearby Progress Park.

UP Ray Yard

UP's Ray Yard, consisting of approximately 120 acres, is located just over two miles northwest of the Denison central business district. Ray Yard is also considered a minor yard within UP's carload network. As of 2020, UP does not heavily utilize the Ray Yard. The majority of freight activity instead takes place at the Davidson Yard in Fort Worth, and Ray Yard can serve as a relief location if needed. Current operations at the Ray Yard consist of some switching and crew changes. Switching is primarily done for local customers, specifically as an interchange point with the DGNO. Several spurs, or right-of-way from former spurs, access property north of Ray Yard on the east side of US 75. These properties are currently occupied by Sign Warehouse, Ruiz Foods, Champion Cooler, and ACS Manufacturing.

Figure 25. Grade Crossing Incidents, 2014-2018



Source: Federal Rail Administration, 2020.

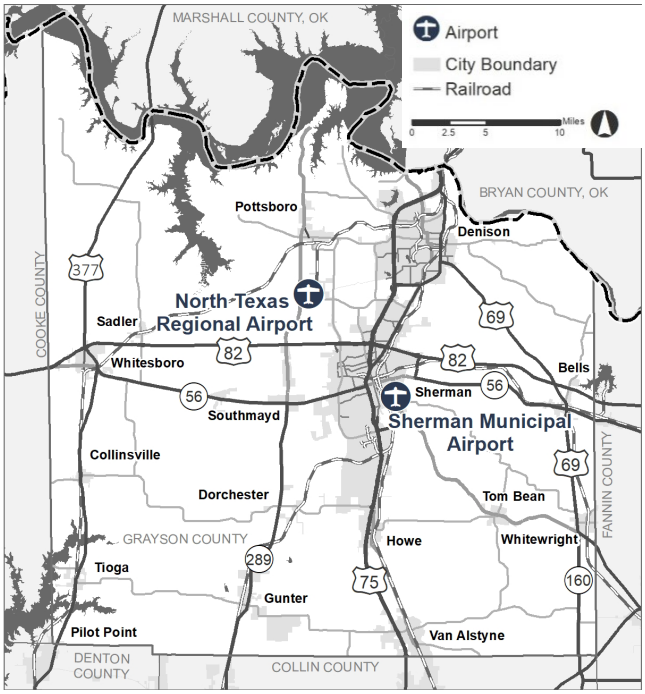
Progress Park

Progress Park is an industrial development area southwest of US 75 and FM 1417. This site has several rail spurs connected to the BNSF Railway track that runs through the Sherman-Denison urbanized area. Nearly 20 businesses are located in this development, though not all have rail access. Progress Rail is located here, and it uses the rail spur to ship rail equipment and materials. There are five sites with rail access, and additional site and building space without rail access.

Dallas-Fort Worth Intermodal Facilities

In addition to the assets present in Grayson County, businesses and railroads in the county benefit from the wider rail network of the larger Dallas-Fort Worth Metroplex: the three Class I railroads operating in Texas operate four major intermodal facilities within 100 miles of Grayson County. All four offer container on flatcar service, while three also handle trailers. Preserving and creating uncongested connections between Grayson County and the region's intermodal facilities (by rail and highway) will improve market access and economic competitiveness in Grayson County.

Figure 26. Airport Locations



Source: Texas Department of Transportation, 2020.

AIRPORT ASSETS

The primary airport in Grayson County is the North Texas Regional Airport (NTRA). NTRA is located off of SH 289 near the largest urbanized areas in the County, Sherman and Denison. This airport has a 9,000-foot runway and can accommodate large commercial aircraft. Foreign-trade zone (FTZ) exemptions are available at the airport, which provide advantages to industrial uses with international supply chains. For example, it may be cost-advantageous for a company to receive materials in a FTZ, add value through manufacturing or assembling, and import the final product rather than importing each of the intermediate materials. The airport would benefit from a customs broker to facilitate international trade and leverage FTZ exemptions. Customs brokers assist importers and exporters by submitting necessary paperwork and payments to U.S. Customs and Border Patrol (CBP) on their behalf.

The airport has hangars, a full service fixed-base operator, and sites available for lease and development. While small airports may not move a large amount of freight, they create connections which enable just-in-time deliveries for distribution and logistics companies as well as manufacturers of high value products such as electrical components.

Air cargo originating in or destined for Grayson County may also pass through a large hub such as Dallas-Fort Worth International Airport (DFW). DFW is located approximately 70 miles south of the heart of the County with drive times between 1-1.5 hours. Fort Worth Alliance Airport is another freight hub approximately 85 miles away. These two major air cargo facilities with domestic and international connections within a reliable two-hour drive of the County's industrial hubs are an advantage for companies that rely on air cargo.

Grayson County Airport Assets

- North Texas Regional Airport with 9,000 ft. and 4,000 ft. runways.
- Sherman Municipal Airport.
- Two additional major freight airports within 90 miles.

FREIGHT AND LAND USE

In general, freight-dependent businesses in Grayson County are located near a major roadway, a rail line, or an airport where materials and goods can be shipped in and out effectively. Freight-dependent businesses are also concentrated along the US 75 corridor in Sherman and Denison, including clusters on nearby corridors such as SH 91. Outside of the central corridor, freight-intensive land use is located west of US 75 on US 82 and SH 56, near the North Texas Regional Airport, and in smaller urbanized areas throughout the County. These locations are often selected due to the presence of freight infrastructure, and they also generate additional demand for investment in these assets to preserve the competitiveness of the location. Freight generating businesses in Grayson County are shown in Figure 27.

A business inventory conducted along US 75 in 2019 cataloged 246 businesses, including those not directly related to freight transportation, directly adjacent to the corridor. These businesses totaled an estimated 7.2 million square feet with 2.2 million square feet of manufacturing. Table 9 summarizes the findings of this business inventory, and the following section discusses an economic analysis of Grayson County including the impact of freight-generating businesses.

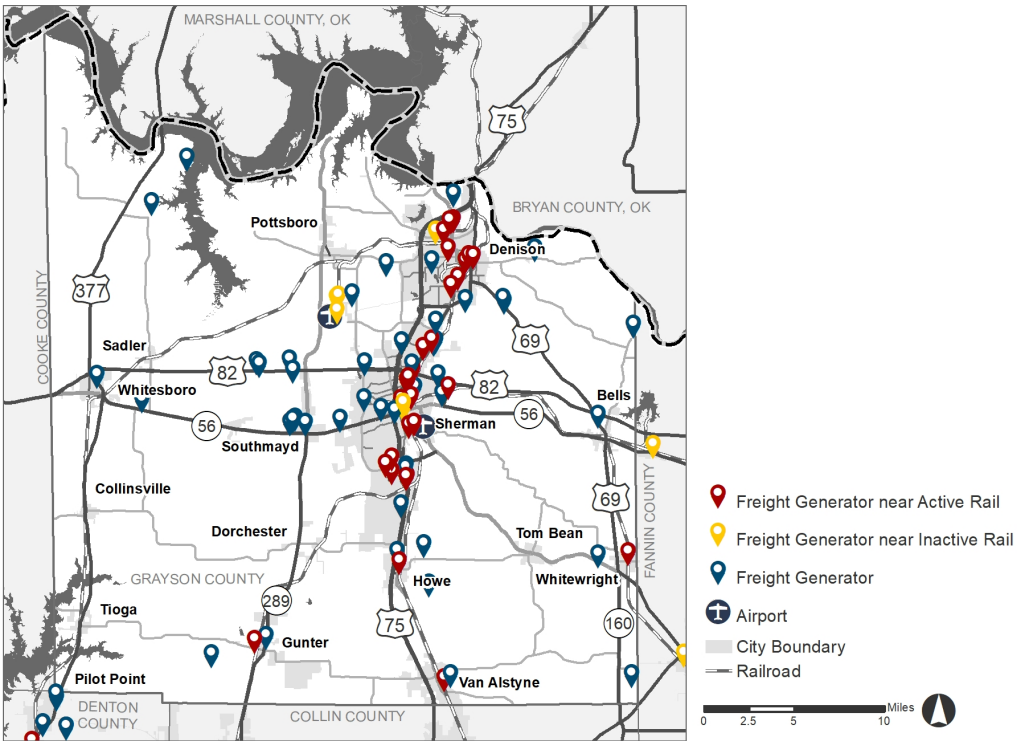
Economic development corporations in Grayson County and the Freight Advisory Committee expect to see continued growth in freight-oriented businesses along US 75, and Figure 28 displays the locations identified by these stakeholders.

Table 9. Businesses Directly Adjacent to US 75 in Grayson County

Industry	Number of Businesses	Total Square Footage
Manufacturing	10	2,172,750
Services	56	1,697,404
Retail Trade	80	1,480,454
Accommodation and Food Services	57	655,052
Health Care and Social Assistance	28	608,725
Transportation and Warehousing	4	528,650
Construction	7	46,400
Wholesale Trade	3	30,800
Agriculture, Forestry, Fishing and Hunting	1	6,000
Total	**246**	**7,226,235**

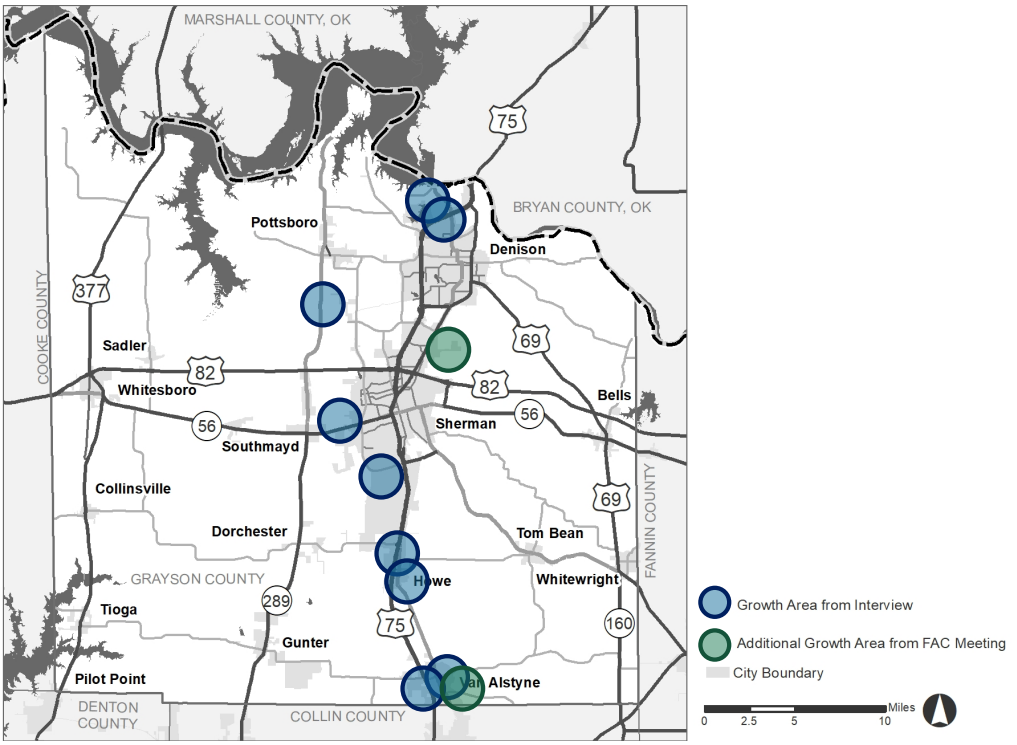
Source: Collected by GRAM NTX, 2019. Analyzed by Cambridge Systematics.

Figure 27. Freight Businesses in Grayson County



Source: IHS Markit, Freight Finder, 2016.

Figure 28. Anticipated Freight Growth Areas along US 75

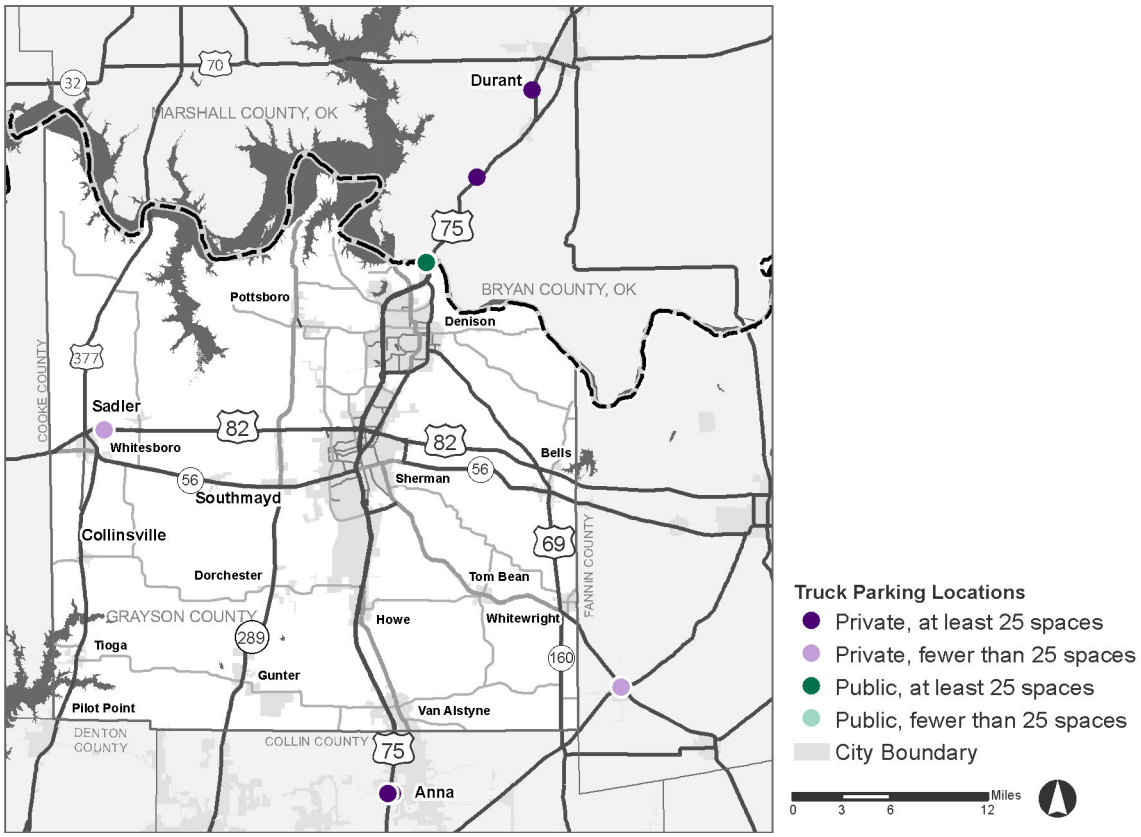


Source: Interviews and FAC Input, 2019.

Truck Parking

Truck parking facilities serve both through traffic and regional traffic, and a lack of truck parking is an issue in Grayson County as it is nationally. Drivers need safe locations to stop for federally-mandated hours-of-service breaks. They also need locations to stage to wait for a pick up/delivery or to avoid curfew hours, congestion, or traffic interruptions. Grayson County does not have any full-service truck stops despite having interstate-level traffic and its proximity to activity and congestion in Dallas-Fort Worth. Figure 29 displays available truck parking in Grayson County and its surrounding area. There is a 40-space rest area on the southbound US 75 frontage road just south of the Oklahoma border. TxDOT's ongoing truck parking study has found that this location is at or over capacity for much of the day. There are no other truck parking locations on US 75 in the county, and drivers must use the Love's or Choctaw truck stops in Oklahoma or the Love's or Flying J truck stops in Collin County. A small, 10-space truck stop exists on US 82 near US 377 in Whitesboro. This location was also found to be regularly over capacity.

Figure 29. Truck Parking Inventory in Grayson County



Source: Texas Department of Transportation, 2020.

3. FREIGHT AND THE ECONOMY

SHERMAN-DENISON MPO
METROPOLITAN PLANNING ORGANIZATION
INTERMODAL URBAN TRANSPORTATION PLANNING

FREIGHT AND THE ECONOMY

Businesses and residents depend on freight movement to transport inputs and outputs of manufacturing processes, to stock grocery stores, to supply hospitals and other critical infrastructure, and to deliver goods directly to residents. All of these functions support the regional economy and promote quality of life. This chapter identifies regional employers and supply chains, benchmarks the economy against other Texas urbanized areas, and identifies potential target industries for economic development related to freight. Additional statistics on socioeconomic trends in Grayson County are included in Appendix B.

REGIONAL SUPPLY CHAINS

Grayson County is heavily concentrated in the manufacturing sector and efficient regional supply chains are essential for the local economy to retain its employment base and maintain its regional competitiveness. This section will discuss the contributors to Grayson County's freight intensive industry sectors. Namely, Grayson County's major freight-related employers and the larger firms in its freight logistics industry. It will also discuss commodity movements within Grayson County, based upon Transearch data, and the intraregional supply chains for its key freight industries.

Major Employers

Despite being a medium-sized community, Grayson County is well represented by the manufacturing sector and other sectors of the economy that are freight generators or receivers. The county's largest two employers are in the food manufacturing industry, Tyson Fresh Meats (1,745 jobs) and Ruiz Foods (1,198 jobs). Walmart is a major freight receiver and Grayson County's third largest employer with 450 workers among its multiple stores. As shown in Table 10, the region has a number of traditional manufacturers that produce goods ranging from earth-moving equipment to door locks to plastic wrap

Table 10. Major Employers and Freight Generators in Grayson County

Company	Industry	Employees
Tyson Fresh Meats	Beef & Pork Products	1,745
Ruiz Foods	Frozen Foods	1,191
Wal-Mart/Sam's	Retail	450
Caterpillar, Inc.	Machinery	400
Emerson Process/Fisher Controls	Industrial Equipment	360
ACS Manufacturing	Acoustical Equipment Enclosures	340
Eaton B-Line	Metal Fabricated Products	335
Douglass Distributing	Fuel and convenience stores	300
Royal Case	Carrying Cases	280
Spectrum Brands-Kwikset	Door Locks	250
Champion Cooler Corporation	Evaporative Coolers	220
GlobiTech	Silicon-epitax Coating Services	213
Presco Products	Flexible PVC Film	190
Progress Rail Services	Rail Equipment	190
Kaiser Aluminum	Aluminum Extrusions	170

Source: Sherman Economic Development Corporation and Denison Development Alliance, 2018.

and aluminum cans. Progress Rail Services not only receives and generates freight, it also supports it by maintaining track.

Table 11 shows major employers in Grayson County that generate or receive freight that is often high-value and/or time-sensitive, nonetheless, the volumes may not necessarily be significant when compared to other freight industries. Employers within these sectors are dependent upon a reliable freight transportation and often rely upon air freight to send or received time-sensitive goods. Two important sectors in the Grayson County economy with these characteristics are hospitals and electronics and computer manufacturing. Grayson County has four hospitals among its major employers, which collectively employ approximately 4,200 workers. The Texoma Regional Medical Center is the largest hospital with approximately 3,000 workers. The largest technology employer in Grayson County is Texas Instruments, which has 900 workers. Finisar has opened a new facility in Grayson County and is expected to employ 500 workers when fully staffed.

Freight Carriers and Logistics

Grayson County's freight customers are served by a number of locally-based freight carriers. Some carriers represent regional or national trucking firms, while others are smaller local firms that may have only a few or even one driver. Freight carriers with a larger presence in Grayson County, which includes a cross-docking facility are:

- ABF Freight Systems (Sherman).
- Central Freight Lines (Sherman).
- Con-Way Southern Express (Sherman).
- Fed-Ex Freight.
- Stanford Trucking.
- SAIA Motor Freight Lines (Sherman).
- Southeastern Freight Lines (Sherman).
- YRC Freight (Sherman).

Grayson County is also served by Class I and short line railroads, as discussed in Chapter 2.

Warehousing and Distribution

Despite Grayson County's proximity to the Dallas-Fort Worth region and that region's importance for warehousing and distribution—locally, regionally, and nationally—Grayson County has not yet developed into a major warehousing and distribution center, even though it has abundant land and low wages. The only major distributor is Douglass Distributing (300 workers), which delivers fuel and goods for convenience stores. One challenge may be that Grayson County is still too far from the Metroplex to serve efficiently. However, as Collin County continues to grow northward, it is anticipated that

Table 11. Freight Sensitive Major Employers in Grayson County

Company	Industry	Employees
Texoma Regional Medical Center	Hospital	3,000
Texas Instruments	Semiconductors	900
Wilson N. Jones Regional Medical Center	Hospital	792
Finisar	Electronics	500[1]
Carrus Hospital	Hospital	205
Baylor Scott & White Surgical Hospital	Hospital	200
Texoma Regional Medical Center	Hospital	3,000
Wilson N. Jones Regional Medical Center	Hospital	792

Source: Sherman Economic Development Corporation and Denison Development Alliance, 2018.

[1] Anticipated employment at full operation.

Grayson County will be considered a more attractive location for distribution activities.

Commodity Movements

The movement of commodities to and from Grayson County is generated through consumption by local residents and economic activity. This activity was quantified using two sources: Transearch and the FHWA's Freight Analysis Framework (FAF). Transearch is reported at the county level for truck and "other" modes; however it is aggregated to larger regions for rail flows. To account for this shortcoming, FAF supplied rail estimates. The FAF is reported in multi-county regions, and was disaggregated to isolate the rail flows for Grayson County. Transearch and FAF flows are developed using different methods and cannot be directly compared; however, both data sources were used in this analysis to better understand the level of freight activity, top commodities and supply chains, and trading partners for Grayson County.

In total, an estimated 7.2 million tons valued at $7 billion moved into, out of, or within Grayson County in 2015. Outbound tonnage accounted more than half of tonnage and value, reflecting the strong manufacturing sector in Grayson County. Inbound freight comprises 47 percent of tonnage and 41 percent of value, and only 3 percent of freight is estimated to move within the county. Freight flows by direction are shown in Table 12.

The top commodities by weight in the county are shown Table 13. These commodities are typically heavy, relatively low value commodities such as minerals, waste, or stone. Grayson County also has a large percentage of tonnage in the food and farm products commodity groups reflecting local industries and facilities. By comparison, the statewide top commodities include similar low value commodities with the addition of petroleum, chemicals, and secondary traffic.[15]

Table 12. Total Freight Flows in Grayson County by Direction, 2015

Direction	Tonnage	Percent of Tonnage	Value	Percent of Value
Inbound	3,341,925	46.6%	$2,878,719,336	41.1%
Outbound	3,614,719	50.4%	$3,952,392,722	56.4%
Within	215,597	3.0%	$176,322,980	2.5%
Total	7,172,241	100.0%	$7,007,435,039	100.0%

Source: IHS Global Insight, TRANSEARCH, 2015. Federal Highway Administration, Freight Analysis Framework, 2016.

Table 13. Total Freight Flows in Grayson County by Commodity, 2015

Grayson County		Texas	
Commodity	Percent of Tonnage	Commodity	Percent of Tonnage
Nonmetallic Minerals	37%	Petroleum or Coal Products	21%
Waste or Scrap Materials	14%	Nonmetallic Minerals	14%
Food or Kindred Products	10%	Chemicals or Allied Products	13%
Farm Products	8%	Secondary Traffic	8%
Clay, Concrete, Glass or Stone	7%	Clay, Concrete, Glass or Stone	7%
All Others	24%	All Others	37%
Total	100%	Total	100%

Source: IHS Global Insight, TRANSEARCH, 2015. Federal Highway Administration, Freight Analysis Framework, 2016.

The commodities shown in Table 13 affect the transportation network due to truck volume and accelerated roadway deterioration. However, these commodities do not necessarily result in the largest economic impact in the county. Grayson County's large manufacturing sector means there is a variety of sectors that are contributing to regional freight flows. Table 14 shows Transearch estimates of the inbound, outbound, and intra-county movement of select commodities in Grayson County during 2015. These commodity groupings were chosen to align with many of the major freight generating employers in Grayson County, and the top five by value are displayed.

Table 14. Movements of Major Freight Commodities in Grayson County

Commodity Group	Tonnage	Share of County Tonnage	Value	Share of County Value
Food or Kindred Products				
Inbound	260,493	3.6%	$589,228,042	8.4%
Outbound	404,983	5.6%	$1,423,047,560	20.3%
Within	34,207	0.5%	$117,556,201	1.7%
Total	699,683	9.8%	$2,129,831,804	30.4%
Rubber or Miscellaneous Plastics				
Inbound	48,011	0.7%	$217,860,019	3.1%
Outbound	254,357	3.5%	$1,205,366,231	17.2%
Within	596	0.0%	$2,619,882	0.0%
Total	302,965	4.2%	$1,425,846,132	20.3%
Farm Products				
Inbound	436,187	6.1%	$678,604,782	9.7%
Outbound	146,115	2.0%	$47,382,723	0.7%
Within	3,927	0.1%	$4,351,213	0.1%
Total	586,228	8.2%	$730,338,718	10.4%
Machinery				
Inbound	8,982	0.1%	$98,854,783	1.4%
Outbound	23,785	0.3%	$271,179,676	3.9%
Within	995	0.0%	$11,095,849	0.2%
Total	33,761	0.5%	$381,130,308	5.4%
Fabricated Metal Products				
Inbound	24,605	0.3%	$94,775,602	1.4%
Outbound	64,248	0.9%	$268,593,439	3.8%
Within	3,351	0.0%	$11,821,857	0.2%
Total	92,203	1.3%	$375,190,898	5.4%

Source: IHS Global Insight, TRANSEARCH, 2015. Federal Highway Administration, Freight Analysis Framework, 2016.

Food and farm products collectively accounted for more than 40 percent of freight by value in Grayson County in 2015 (18 percent of weight) at $2.8 billion. The high value of this industry aligns with the almost 3,000 workers in Grayson County employed by food manufacturers. Inbound flows of farm products comprised nearly 10 percent of value (6 percent of tonnage), and outbound flows of food products comprised more than 20 percent of value (6 percent of tonnage). The second largest sector was rubber and miscellaneous products, which accounted for 20 percent of the value and 4 percent of the tonnage of commodities moved in the region. Rubber and plastics are incorporated into the manufacturing process of many products, as well as by firms like Presco Products, which produce plastics-based goods. The remainder of the table shows the other selected commodities.

Table 15 shows the top trading partner for each commodity. Within Texas, origins and destinations are disaggregated to the county, but outside of Texas they are reported at the state or country level. Most top trading partners are urban counties within Texas (Dallas, Harris, and Tarrant counties) or nearby states (Oklahoma, Louisiana, and Arkansas). Mexico was the largest trading partner for primary metal products, inbound machinery, and inbound transportation equipment. This trade flow reflects the closely linked advanced manufacturing supply chain between Texas and Mexico.

The Transearch and FAF data also provide estimates of how much tonnage of each selected commodity is moved by transportation mode. A summary of these data is provided in Table 16. It is estimated that the vast majority of freight movements in Grayson County occur by truck, with a relatively small percentage moving by rail. Commodity groupings with largest share of movements by rail are chemical and allied products (90 percent), fabricated metal products (38 percent), and primary metal products (20 percent). Notably, relatively small portions of food and farm products move by rail. The truck and rail estimates presented below are not directly comparable due to the use of two different data sources for these estimates. However, they are presented together here to illustrate which industries and movements are most truck-dependent, and which use rail more heavily than others.

Table 15. Primary Trading Partners with Grayson County by Select Industry Sector

Commodity Group	Top Partner by Tonnage	Top Partner by Value
Food or Kindred Products		
Inbound	Dallas County	Kansas
Outbound	Dallas County	Kansas
Rubber or Miscellaneous Plastics		
Inbound	Louisiana	Louisiana
Outbound	Harris County	Harris County
Farm Products		
Inbound	Oklahoma	Oklahoma
Outbound	Dallas County	Tarrant County
Machinery		
Inbound	Mexico	Mexico
Outbound	West Virginia	West Virginia
Fabricated Metal Products		
Inbound	Harris County	Canada
Outbound	Dallas County	Canada

Source: IHS Global Insight, TRANSEARCH, 2015. Federal Highway Administration, Freight Analysis Framework, 2016.

Table 16. Commodity Movements in Grayson County by Transportation Mode

Commodity Group	Percent Tonnage Truck	Percent Tonnage Rail[1]	Percent Tonnage Other
Food or Kindred Products			
Inbound	88%	12%	0%
Outbound	100%	0%	0%
Within	100%	0%	0%
Total	95%	5%	0%
Rubber or Miscellaneous Plastics			
Inbound	96%	4%	0%
Outbound	95%	5%	0%
Within	97%	3%	0%
Total	96%	4%	0%
Farm Products			
Inbound	88%	12%	0%
Outbound	94%	6%	1%
Within	100%	0%	0%
Total	92%	7%	1%
Machinery			
Inbound	82%	18%	0%
Outbound	96%	4%	0%
Within	100%	0%	0%
Total	93%	7%	0%
Fabricated Metal Products			
Inbound	55%	45%	0%
Outbound	68%	26%	5%
Within	100%	0%	0%
Total	60%	38%	2%

Source: IHS Global Insight, TRANSEARCH, 2015. Federal Highway Administration, Freight Analysis Framework, 2016.

Intraregional Supply Chains

Freight-oriented production activities (such as manufacturing, mining, or agriculture) require the use of multiple inputs and, typically, some or many of them must be imported into the regional economy. Understanding where these inputs come from is useful for economic development purposes, since sourcing locally produced inputs can generate more local economic activity. It is also relevant and important for understanding regional freight flows. However, most firms consider their sourcing data to be proprietary information and they are unwilling to share it. As a result, there is typically little data about intraregional supply chains for freight planners to incorporate into their analysis. To address this deficiency, the project team explored two data sources. The first source was simply to ask firms and other knowledgeable

parties if they would report it. These questions were relayed during the stakeholder interviews and during the first Freight Advisory Committee Meeting. A few of the participants described instances of intraregional supply chains, although some of the examples they reported are no longer active. The second source of information came from the industry linkages information incorporated into IMPLAN's regional model for Grayson County.

To calculate the output of economic activity, Input-output models contain tables showing the inputs necessary for production. Based on information incorporated into the model from Federal and state sources, assumptions are made about the amount of each input that is sourced from the local economy and the amount that must be sourced from outside of the region. To understand a local industries' linkages to other local sectors, employment growth (i.e., Adding 100 new employees) was assumed for key freight-related sectors and the IMPLAN model estimated the impacts of this stimulus on the other sectors of the Grayson County economy.

The results of the analysis for the semiconductor manufacturing industry are shown below in Table 17 and for the remaining sectors in Appendix B. The indirect employment impacts, which show the backward linkages from production in the semiconductor manufacturing sector to the other sectors of the Grayson County economy, are ranked to show the top ten affected sectors. Most the local labor inputs come from service sectors and are not necessarily freight-related, with the exceptions of wholesale trade and truck transportation. This pattern was a common finding in the analysis of the manufacturing sectors. This finding also appears to confirm the information provided during the stakeholder interviews and during the first Freight Advisory Committee meeting that most local industries received their inputs from outside of Grayson County and sold most of their output outside of it, as well. The construction sectors had more impacts on the retail sectors, which would generate freight, and the agricultural and food manufacturing sectors and the oil and gas sectors had a greater influence on other freight related sectors in the local economy.

Table 17. Industry Linkages for the Semiconductors Sector Employment Change per 100 added workers

Rank	Industry Sector	Direct	Indirect	Induced	Total
1	Business support services	0.00	8.20	0.52	8.73
2	Services to buildings	0.00	7.45	2.09	9.53
3	Wholesale trade	0.00	6.65	1.34	8.00
4	Employment services	0.00	5.27	1.22	6.49
5	Maintenance and repair construction of nonresidential structures	0.00	4.83	0.55	5.38
6	Management of companies and enterprises	0.00	4.54	0.29	4.84
7	Investigation and security services	0.00	3.68	0.38	4.06
8	Other support services	0.00	3.21	0.16	3.37
9	Landscape and horticultural services	0.00	2.11	0.72	2.83
10	Truck transportation	0.00	1.81	0.61	2.42
	TOTAL EMPLOYMENT IMPACTS ALL SECTORS	100.0	76.0	98.4	274.4

Source: Derived from IMPLAN, 2018.

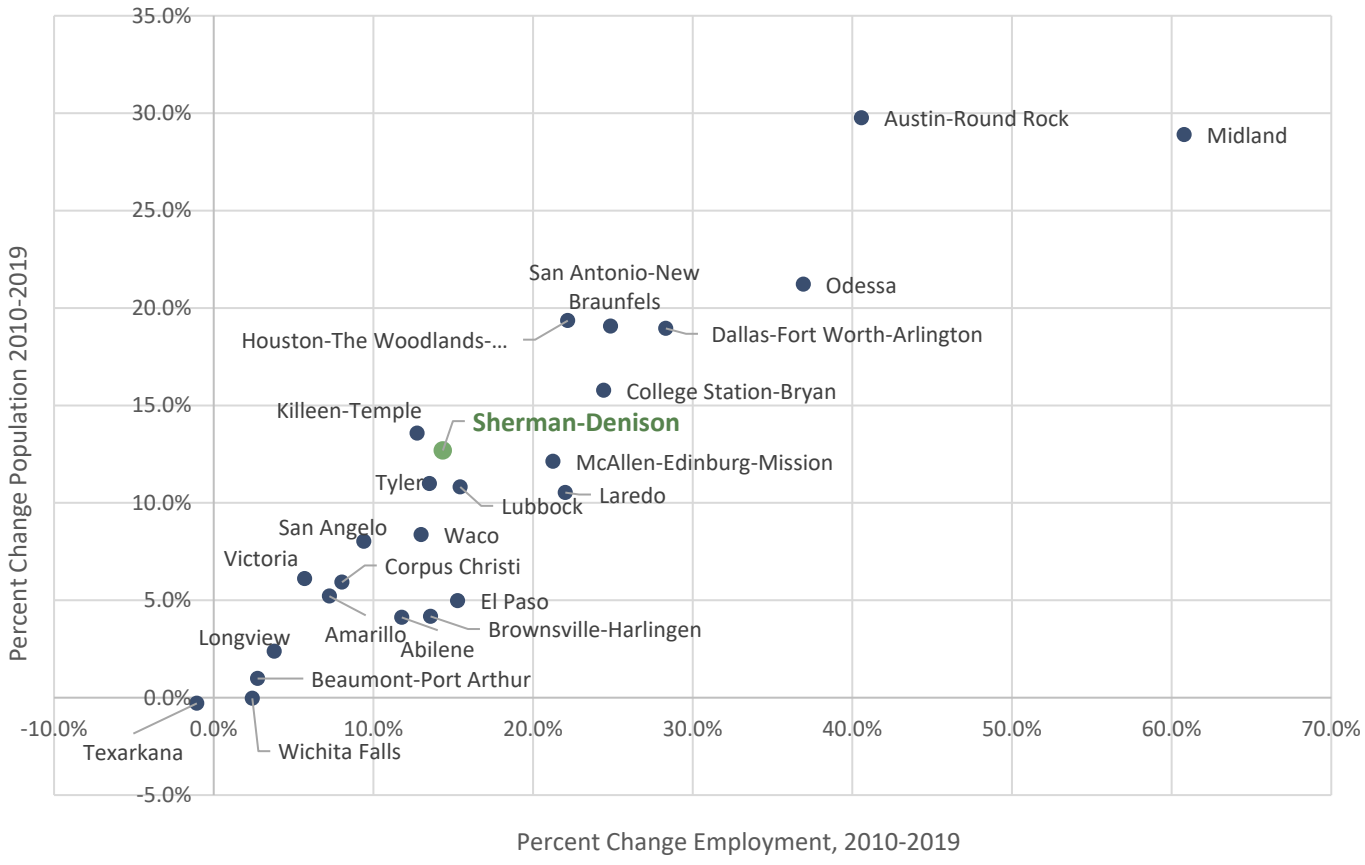
BENCHMARKING THE GRAYSON COUNTY ECONOMY

Descriptive statistics, while helpful for conveying the basic characteristics of the Grayson County economy, they do not necessarily provide a more nuanced understanding of the region's competitiveness within the overall state economy. What follows in this chapter is a series of scatterplots that compare conditions in the Sherman-Denison Metropolitan Statistical Area (MSA) to the other Texas MSAs. The benchmarking graphs show that the region generally performed well compared to other regions in the state, but there remain areas for improvement. It is also worth noting that the comparison period for this analysis covers a unique span of time (starting in 2010) when the state's economy had begun its recovery from the 2008-2009 Recession, the rapid expansion of the state's petroleum industry from hydraulic fracturing, and the subsequent decline of the petroleum industry as prices collapsed. The data do not include any of the impacts of the COVID-19 pandemic on the state's or region's economies. All these recent events should be taken into consideration when assessing the scatterplots.

Socioeconomic Trends

Figure 30 shows each MSA's population growth rate between 2010 and 2019 plotted against its employment growth rate over the same period. As would be expected, the plots generally align from the intersection of the axes to the upper right quadrant. In other words, as population grows, it would be expected that employment grows at a similar rate or vice-versa. Population in the Sherman-Denison MSA has grown by 12.7 percent during this nine-year period and its employment grew by 14.4 percent. These growth rates place it above average among all MSAs in Texas. The region's growth rates are catching it up to Texas's largest MSAs, which have some of the fastest growth rates in the state, even though it might be expected that (given their size) their rates of growth might be slower.

Figure 30. Rate of Population Growth versus Employment Growth in Texas



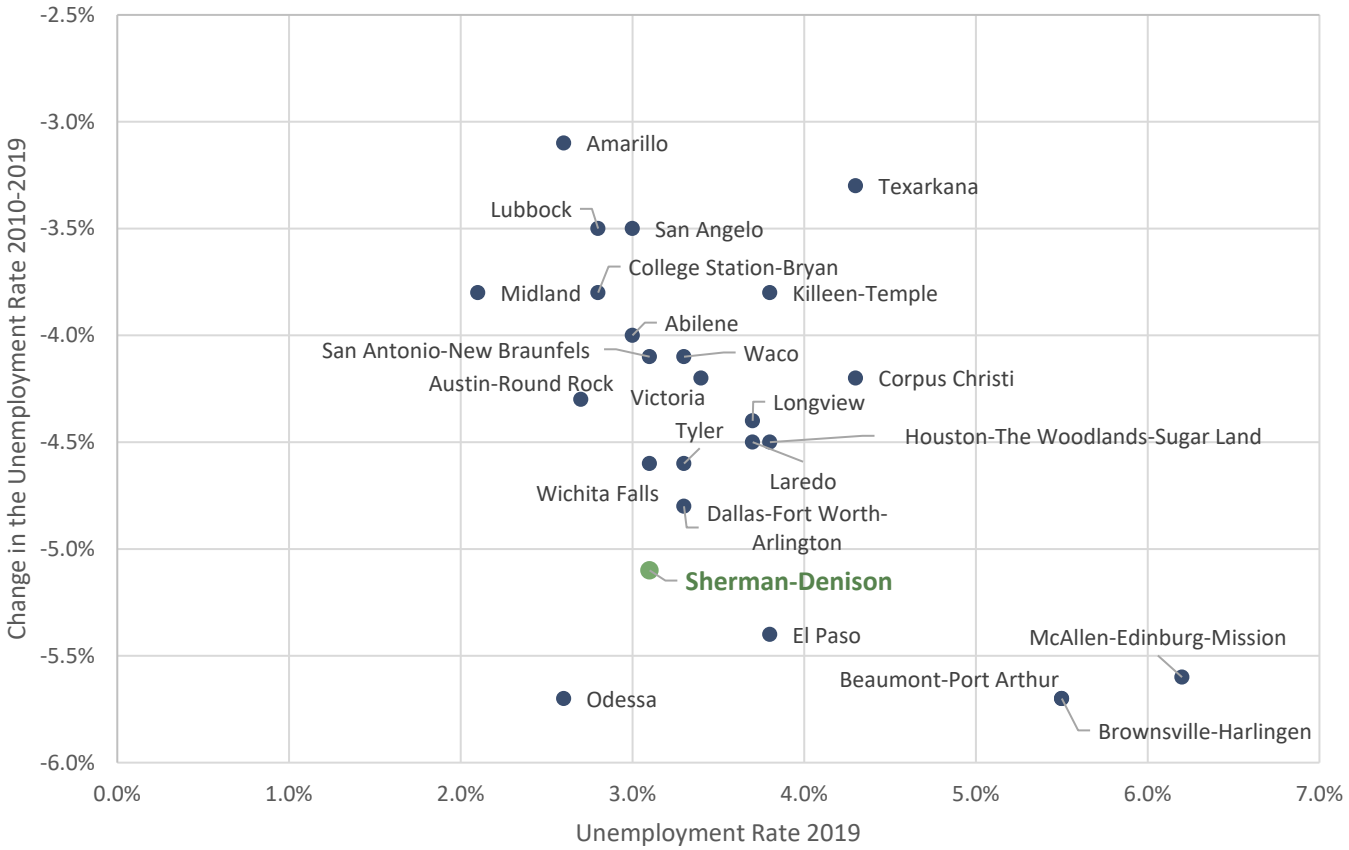
Sources: U.S. Census Bureau and the Texas Workforce Commission, 2020.

Figure 31 shows the overall unemployment rate in each MSA against the change in the region's unemployment rate between 2010 and 2019. The Sherman-Denison MSA occupies an enviable position on this chart. Notably, among the all the MSAs in Texas, Sherman-Denison not only had a low 2019 unemployment rate, at 3.1 percent, it also had a significant reduction in unemployment, falling 5.1 percent between 2010 and 2019.

Median household income was compared to the change in median household income, and these data show that the Sherman-Denison MSA's median household income lies within a reasonable norm, compared to other MSAs in the state. However, income growth has lagged many other MSAs in Texas.

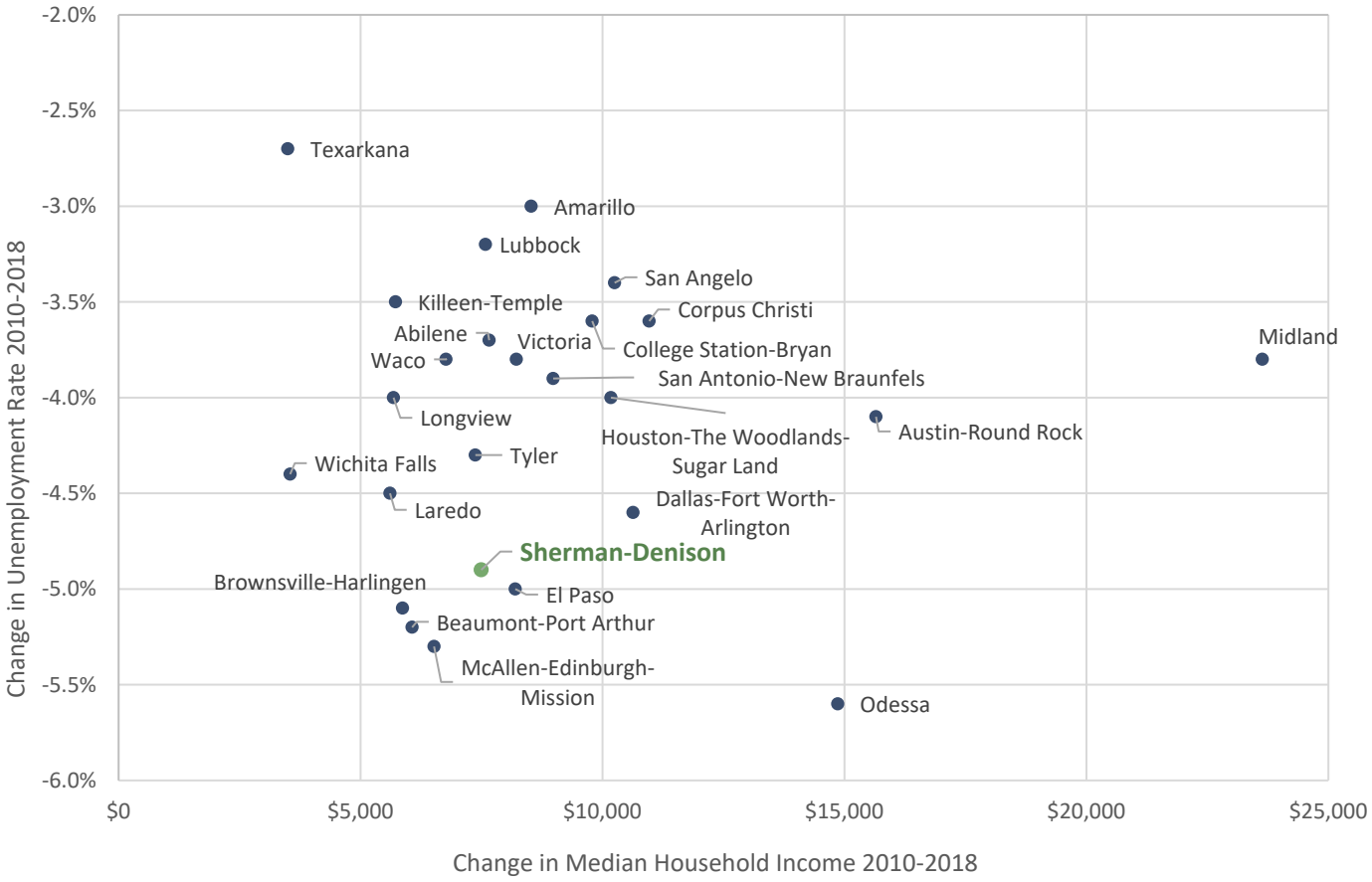
Figure 32 provides a comparison of the change in the unemployment rate and the median household income for Texas MSAs. Given the historical context of this figure (i.e. starting from the recovery of the 2008-2009 Recession until just before the COVID-19 pandemic), the least desirable location in the chart would be the upper left quadrant, where regions have not substantially reduced unemployment rates and incomes are not growing, while the lower right quadrant would be the most desirable. Interesting, Odessa is the only Texas MSA that trended toward the lower right quadrant and only two MSAs (Midland and Austin-Round Rock) trended toward the upper right quadrant. The Sherman-Denison region has performed well in lowering its unemployment rate but has somewhat lagged in wage growth compared to the rest of the state. The region's low wages (compared to the Metroplex, for example), coupled with its slow pace of wage growth, could discourage workers from migrating to the region and contribute to a skilled labor shortage that was discussed during the first Freight Advisory Committee meeting.

Figure 31. Unemployment Rate versus Change in Unemployment Rate in Texas MSAs



Sources: Texas Workforce Commission, 2020.

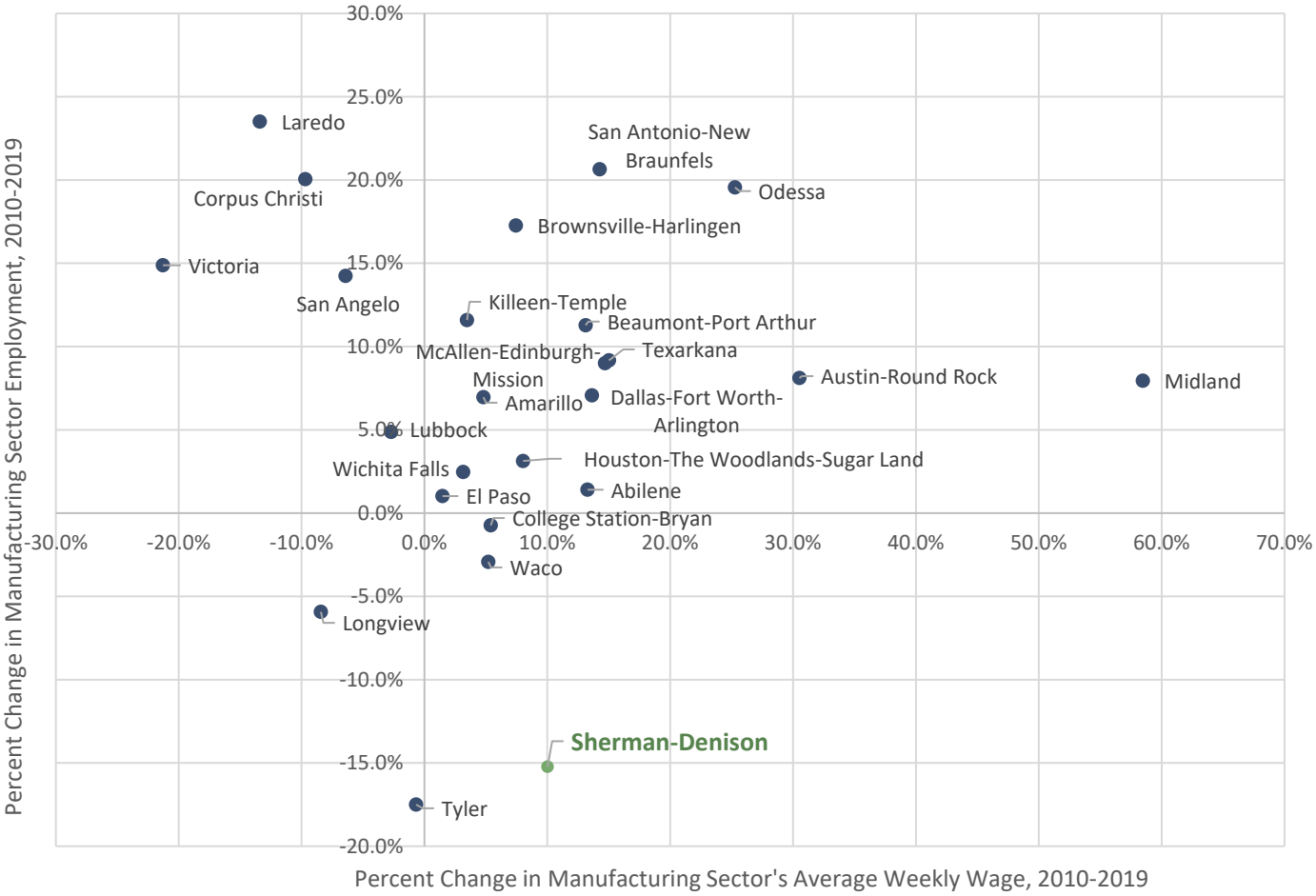
Figure 32. Change in Median Household Income versus Change in Unemployment Rate in Texas MSAs



Source: U.S. Census Bureau and Texas Workforce Commission, 2020

Figure 33 compares employment change in the manufacturing sector between 2010 and 2019 with the change in wages over the same period. The data show that the Sherman-Denison MSA's employment in the manufacturing sector grew by approximately 10 percent during this period. However, where the Sherman-Denison MPO does perform poorly is in wage growth. Nominal wages (not shown on Figure 33) were essentially stagnant, compared to many other areas of the state where they have grown significantly, even while the manufacturing sector overall was shrinking in some regions. When the change in wages is adjusted by the change in the consumer price index (CPI), the average real wage for Grayson County workers in the manufacturing sector declined by approximately 15 percent over nine years. This change has made the Sherman-Denison region an outlier in the state and, again, may explain some of the difficulty finding skilled workers.

Figure 33. Change in Manufacturing Employment versus Manufacturing Average Weekly Wage (Real) in Texas MSAs

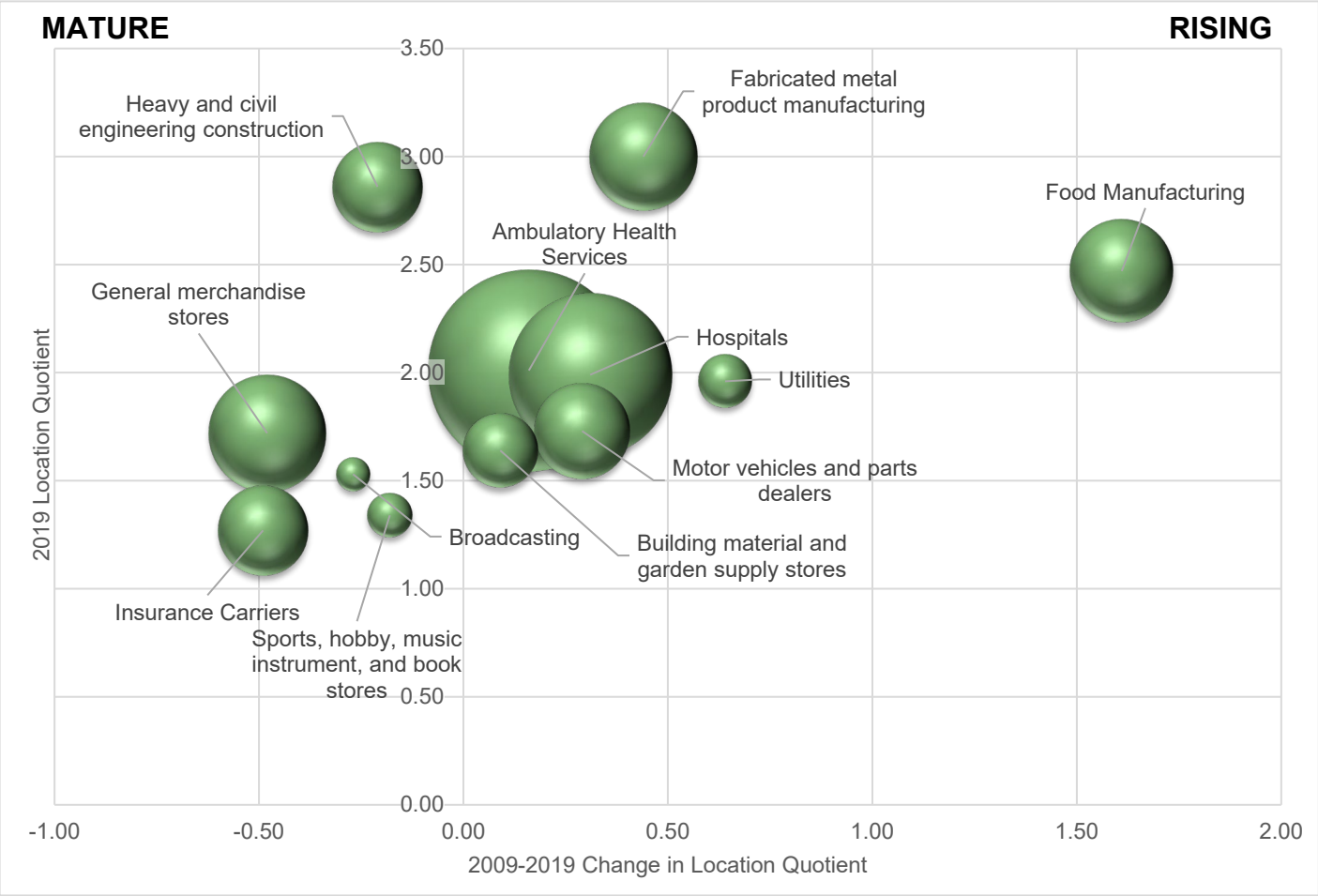


Source: Texas Workforce Commission, 2020

Industry Specialization

Regional economies undergo constant change, reflecting patterns in the larger state and national economies, as well as the influences of local conditions. Over the past decade, Grayson County economy has experienced changes in its industry specialization. One method for measuring industrial specialization is to calculate a region's "location quotient", which shows the ratio of its share of employment in an industry to the that same industry's share of employment in the U.S. economy. If the value of the location quotient is greater than 1.0, then there is specialization in that industry. Typically, economists look for industries with a location quotient value of 1.25 or higher to signify a meaningful specialization. Among the freight generating industries in Grayson County, the fabricated metal product manufacturing and the food manufacturing sectors had the highest location quotients (see Figure 34). Both industries increased their location quotient values between 2009 and 2019, with food manufacturing showing the most change. Some of the expected industries, like semiconductors, are missing from this figure due to federal agencies withholding employment data that might violate confidentiality obligations.

Figure 34. Industrial Specialization in Grayson County Based Upon Location Quotients



Source: Texas Workforce Commission, 2020

IDENTIFICATION OF TARGET INDUSTRIES

While the U.S. economy is always in a state of change and reorganization, 2020 has been extraordinary by any measure. The COVID-19 pandemic has shocked the global population and economy, and a transition towards more protectionist trade policies over the last several years has disrupted trade patterns and relationships. It is within this complicated backdrop at the global and national levels that Grayson County's leaders attempt to create new employment opportunities and economic growth.

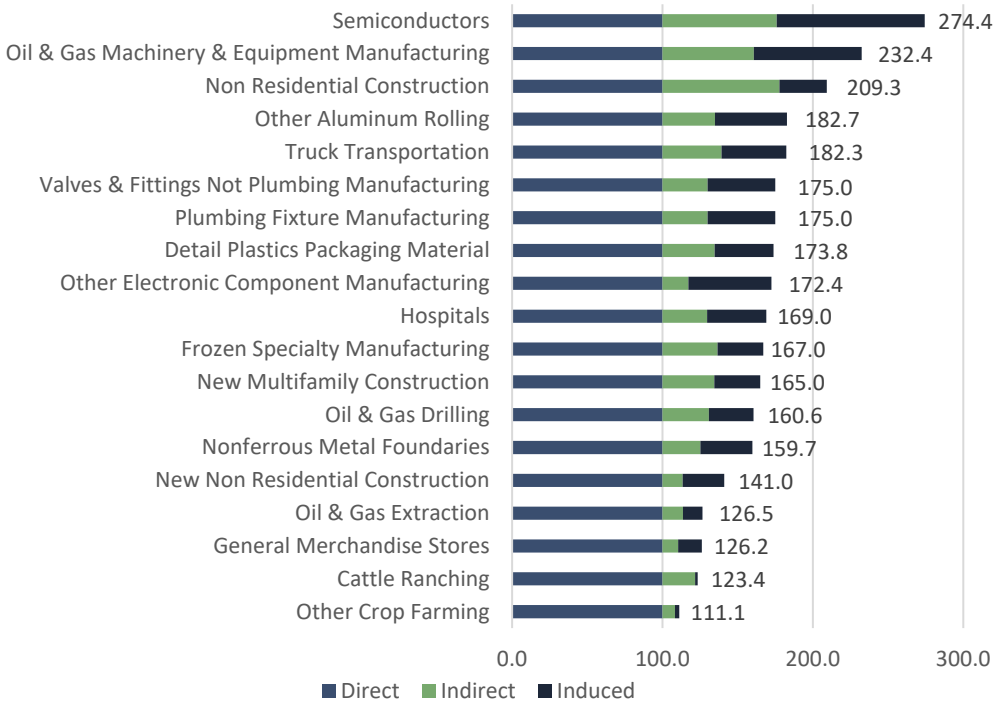
Economic development strategies in Grayson County are largely led by the Sherman Economic Development Corporation (SEDCO) and the Denison Development Alliance (DDA), who work closely with the municipal and county governments. The region's economic development strategy is primarily based upon the granting of incentives, which include providing industrial land for development, tax abatements, tax exemptions, cash grants, and workforce training. Neither EDC relies heavily on industry cluster analysis or other economic development paradigms since these paradigms are likely not well-suited to the region's economy. Rather, their focus is on fielding expressions of interest from inquiring parties, responding to information requests, and working to convince firms to relocate or expand in Grayson County. Below is a synthesis of the overarching economic development goals of SEDCO, DDA, and the region at-large, particularly as they relate to freight-oriented industries:

- Continue Grayson County's economic growth through employer retainment, expansion, and attraction of target industries and their allies,
- Leverage existing resources to attract new employers in new industries,
- Recruit more sophisticated freight-oriented industries that pay higher wages,
- Attract more college-educated and other high-skill workers to support higher wage industries,
- Support workforce development at all skill levels,
- Cultivate and support entrepreneurship for new and existing firms,
- Use EDC real estate holdings and other assets to attract industrial users and investment, and
- Encourage minority-owned and women-owned businesses.

Employment Impacts of Expanding Freight Intensive Industries

One approach to identifying desired employment industries is to consider the rippling impact of adding jobs in a given industry. Businesses buy from suppliers, sell to customers, and employ staff that spend money in the community, and different industries generate different impacts per added employee. Figure 35 shows the total employment impact of adding 100 jobs to select industry sectors representing many of the most important freight generators in the Grayson County economy. The total employment generated includes the direct jobs added (i.e., 100), as well as the indirect and induced employment that results from those additional 100 jobs. Indirect employment represents the jobs created by the purchase of inputs from within the region to support the new activity. The indirect employment reflects the backwards linkages to the local economy (i.e., the local supply chain). Induced jobs are the result of expenditures in the region by the workers of the direct and indirect employment, who consume goods and services with the wages they earn.

Figure 35. Total Employment Impact on Grayson County from Adding 100 Workers by Industry Sector



Source: Derived from IMPLAN, 2018.

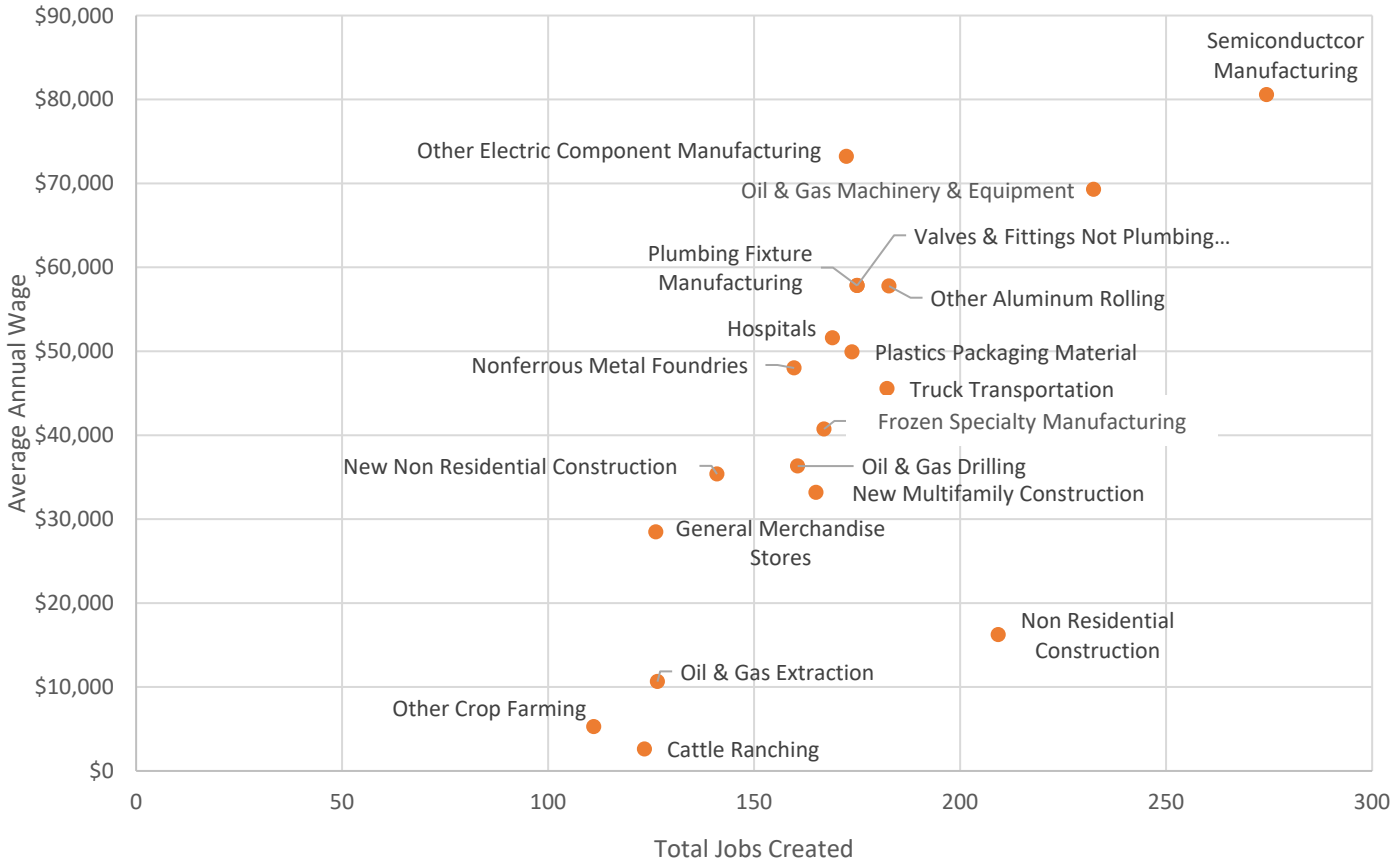
A number of the sectors analyzed in the IMPLAN model represent Grayson County's manufacturing sector, which produce strong multipliers. The multiplier of an industry is its total employment impact in the model divided by 100. Expansion of the semiconductor manufacturing sector has the greatest potential impact on the Grayson County economy, adding approximately 175 indirect and induced jobs, in addition to the 100 direct jobs. The semiconductor manufacturing sector's multiplier is 2.74, meaning each job added creates a total of 2.74 jobs (a shorthand for direct, indirect, and induced employment). The oil and gas machinery manufacturing sector also create strong economic impacts, with a multiplier of 2.35. Most manufacturing sectors have multipliers between 1.67 and 1.82. The construction sector also contributes strongly to the local economy with multipliers between 1.67 and 2.09. Other freight generating industries like general merchandise stores have very small impacts on the Grayson County economy, with a multiplier of 1.26, while the agricultural sector creates multipliers of 1.11 to 1.23.

The sectors with the highest indirect impacts are nonresidential construction, semiconductor manufacturing, and oil & gas machinery & equipment manufacturing. Most of the analyzed sectors in the Grayson County create between 20 and 40 indirect jobs for every 100 direct jobs added. The induced employment impacts show a similar pattern to the indirect impacts. The semiconductor manufacturing sector has the highest induced employment impact on the Grayson County economy, adding nearly 100 induced jobs for every 100 direct jobs. Oil & gas machinery & equipment manufacturing and electronic component manufacturing are other sectors with high induced impacts. Most freight-oriented sectors produce between 25 and 50 induced jobs for every 100 direct jobs added. The two agricultural sectors included in the analysis produced very little induced employment.

Adding employment to the semiconductor industry generates the greatest overall increase to income in the Grayson County economy, primarily due to the high wages for workers in that sector. Other skilled manufacturing sectors, such as oil & gas machinery manufacturing, electronic component manufacturing, aluminum rolling, and plumbing-related manufacturing are also strong contributors. On the other hand, although general merchandise stores are large freight generators, they contribute little to local income outside of direct income, which itself is lower than most other sectors in the analysis. Agriculture, which is frequently a part-time endeavor, generates the most modest incomes.

Lastly, Figure 36 is a scatterplot showing the average wage for each industry sector from the IMPLAN model against the total employment impact per 100 direct jobs added. The upper right quadrant would be considered the most desirable location, which would be an industry sector that creates many high wage jobs. Semiconductor manufacturing, electronic components manufacturing, and oil and gas machinery and equipment manufacturing are examples of industries that fit into this quadrant. The least desirable location would the lower left quadrant, where wages are lower and there are fewer indirect and induced jobs created. The expected industry sectors are found there, namely agriculture and retail. Given Grayson County's very low unemployment and below average wage conditions, industry sectors that fit in the upper left corner are possibly the most desirable, since they pay good wages and create less pressure on the local labor market.

Figure 36. Total Jobs Created versus Average Annual Wage (Assuming 100 Direct Jobs Added) in Grayson County



Source: Derived from IMPLAN, 2018.

Leveraging Local Resources

One of the reasons behind Grayson County's success in attracting manufacturers is its abundance of resources that are important to many types of manufacturing. These resources include its transportation network, affordable land, and capable workforce. They also include Grayson County's plentiful water, cheap electricity, and available and inexpensive natural gas. The availability of water is an especially important asset, with water supplies becoming more constrained as the state's climate becomes drier in many regions. Table 18 shows estimates of industry water usage from a research study (Hendrickson et al., 2010) that relied upon Canadian data to estimate water usage in the United States, as part of an input-output analysis. Their estimates of water usage are presented as gallons of water input per million dollars of economic output and included more than 400 sectors of the U.S. economy. The usage by industry ranged from 1.24 billion gallons of water to produce one million dollars of economic output to 900 gallons of water to generate a million dollars of economic output.

Manufacturing and processing sectors, although still heavy water users, require substantially less water to produce one million dollars of economic output. Some examples of these industrial sectors are shown below in Table 19. More recently, researchers at Lawrence Berkeley Laboratory working with Canadian water use data scaled to U.S. water use, based on employment (Rao, et al. 2017), estimated water usage by three-digit NAICS sector for states and counties. They also estimated the ratio of energy use to water use for the three-digit NAICS subsectors. The top three industries are shown below in Table 20.

Table 18. Industry Sectors with the Highest Water Withdrawals Per Dollar of Economic Output

Rank	Sector of the Economy	Gallons per Million Dollars of Production
1	Cotton farming	1.24 billion
2	Grain farming	1.19 billion
3	Sugarcane and sugar beet farming	0.76 billion
4	Tree nut farming	0.46 billion
5	Fruit farming	0.45 billion
6	Electric power generation, transmission, and distribution	0.25 billion
7	Vegetable and melon farming	0.24 billion
8	Paint and coating manufacturing	0.12 billion
9	Sand, gravel, clay, and ceramic and refractory minerals mining and quarrying	0.06 billion
10	Greenhouse, nursery, and floral production	0.05 billion

Source: Hendrickson, et al., 2010

Table 19. Economic Output of Industry Sectors with High Water Usage

Industry Sector	Gallons per Million Dollars of Production
Paperboard Mills	36 million
Wineries	34 million
Pesticide and other agricultural, chemical manufacturing	30 million
Adhesive manufacturing	21 million
Distilleries	14 million
Artificial and synthetic fibers and filaments manufacturing	11 million
Breweries	6 million

Source: Blackhurst, et al., 2010

Table 20. Top Three Manufacturing Subsectors with the Highest Water to Energy Ratio

NAICS Code	Industry	Million gallons per day/TeraBTUs
331	Primary Metal	3.3
322	Paper	2.5
312	Beverage and Tobacco Products	2.0

Source: Rao, et al. 2017

The upshot of this discussion is that the region's abundant supply of water, electricity, and natural gas could make it an attractive location for industries that require heavy use of one or more of these resources. It is likely that the access to water and energy resources contributed to the location decisions by many of Grayson County's existing manufacturers, as it could for future ones. Other local resources that Grayson County can leverage, as appropriate, are the region's access to rail service, connectivity through US 75 and other highways, and proximity to the Metroplex. If the Texas Instruments facility remains intact after shutting down, its clean room could potentially be repurposed for use by a pharmaceutical or medical instrument manufacturer, a manufacturer of precision instrumentation, or other activities that require an ultraclean room or a sterile environment.

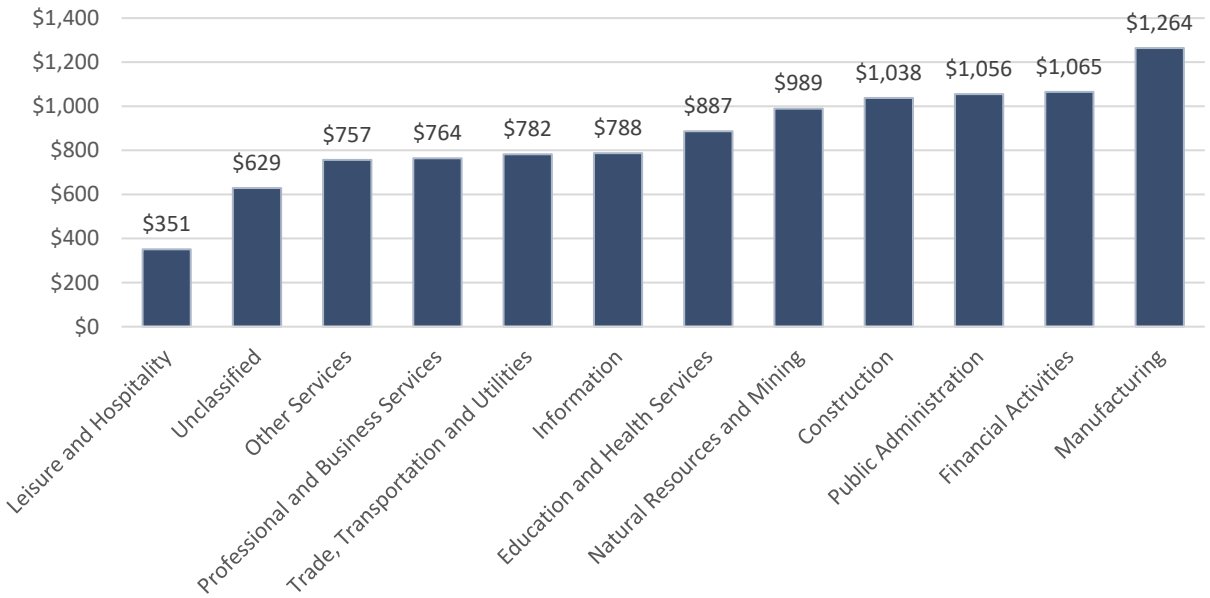
Pursuit of Higher Wages

Grayson County's most important asset is its workforce, including the many skilled workers in its manufacturing sector and other freight-oriented industries. As Figure 37 shows, Grayson County's manufacturing sector was the highest paying industry in the local economy during 2019. However, wage growth in Grayson County's manufacturing sector has significantly lagged other regions of the state, despite the region's tight labor market. Improving wages in Grayson County's manufacturing sector is an important goal in the region because it generates proportionately more economic activity that lead to more jobs of all types. Several factors have likely contributed to falling real wages in the manufacturing sector, which include:

- Employment losses in manufacturing sectors with higher average wages, like semiconductor manufacturing
- Increased employment in manufacturing sectors with lower average wages.
- Closing of facilities with unionized labor forces who earned higher wages

The lower wages paid in Grayson County create competitive advantages and disadvantages for attracting new employers and workers. All things equal, employers are most interested in locations where workers receive lower wages and are still highly productive. However, the low levels of unemployment achieved prior to COVID-19 suggest that Grayson County's pool of inexpensive labor

Figure 37. Average Weekly Wage in Grayson County by Industry Sector



Source: Derived from IMPLAN, 2018.

has largely been absorbed and, looking forward, strategies for attracting new freight-oriented jobs to Grayson County should include targeting higher wage employers, as well as attracting college-educated and higher-skilled workers.

To better understand which freight-oriented industries might offer these higher wages, it is useful to have more detailed information than simply the average wage of an industry. These data are needed because there can be significant disparities between the higher wage earners and the lower wage earners in the same sector and large subgroups of an industry's workforce can be heavily skewed toward lower wage earners. This information can also be helpful for understanding labor market shortages by occupation and workforce training needs. Fortunately, the U.S. Bureau of Labor Statistic's 2017 Occupational Employment Statistics provides wage detail by occupation (at the national level) for various manufacturing and warehousing and distribution sectors. Using these data, it is possible to estimate the relative share of workers in each industry who earned at or above Grayson County's median household income. A full table is included in Appendix B.

Comparing these data to Grayson County's major employers, many are in freight-oriented industries that pay most of their employees less than the median household income in Grayson County of $54,370. The county's two largest manufacturing employers are in industries with only 7.2 and 18.3 percent of workers making more than Grayson County's median household income. Moving down the list, the region has many traditional manufacturers that produce goods ranging from earth-moving equipment to door locks to plastic wrap and aluminum cans. Generally, within these industries, fewer than 40 percent of workers are paid wages higher than the median household income. There are, however, some Grayson County industries in the higher wage groups. The semiconductor, electronics, and instrumentation manufacturing industries are sectors that pay 50 percent or more of their workers at or above Grayson County's median household income. Unfortunately, the announced closing of Texas Instrument's semiconductor plant in 2023 could result in disproportionately negative economic impacts, due to the loss of these higher paying jobs.

Lastly, it should be clarified that the wage distribution data reflects estimated compensation within firms at the national level. The salaries are reflective of the workforce at an entire company, and individual facilities may not necessarily include all the higher paying roles. For example, headquarters staff (CEO, CFO, COO, attorneys, etc.) at a large corporation would not be based at an individual factory site. Nonetheless, the data do provide useful additional detail about the distribution of income of workers within each industry.

Recommended Target Industries

After consideration of all the information and trends discussed in the sections above, suggested target industries for Grayson County were identified. Listed below are SEDCO's current target industries, which also generally align with the industry targets of DDA:

- Manufacturing
  - Technology products
  - Equipment
  - Metal fabrication
  - Plastics
  - Recycling
  - Food and beverage processing
- Warehouse/distribution centers

DDA has qualified that its recruitment targets will focus on higher wage employers. Most of the industries on this list already exist in Grayson County, although recycling is a new and timely addition. Until recently, most recycled materials in the United States were sent to China for processing and remanufacture. However, in 2018, the Chinese government refused to accept most recyclables, which has led to massive stockpiles in the United States since most municipalities have continued collecting them. Firms are starting to build domestic facilities to handle these recyclables in a safe and cost-effective manner. A recycled paper mill might be especially well suited for Grayson County, given its access to low-cost water and energy, as well as its proximity to municipal recycling

facilities (MRFs) in the Dallas-Fort Worth region, which would insure a large supply of raw material. A paper mill might also pay about a quarter or more of their workers more than Grayson County's median household income. At present, there is one known recycled paper mill in North Texas, Smurfit Kappa, located in Dallas. Major industry player, Pratt Recycling, has built five recycled paper mills around the country, but has yet to build one in Texas. It or other firms could be candidates for Grayson County. Glass and plastic recycling are also options for consideration, but the markets and processes can be more complicated.

Warehousing and distribution are another target that could offer additional opportunities for Grayson County. Despite North Texas's importance for warehousing and distribution - locally, regionally, and nationally - Grayson County has not yet developed into a major warehousing and distribution center, despite its abundant land and low wages. Low electricity costs could make it attractive for cold or frozen storage at some point in the future. The only major distributor in Grayson County is Douglass Distributing (300 workers), which delivers fuel and goods for convenience stores. Outside of Grayson County and the Metroplex, in surrounding cities that are not located along I-35, only two large distribution centers were identified. Big Lots! has a distribution center in Durant, Oklahoma and Dollar Tree has a distribution center in Marietta, Oklahoma. Most distribution centers and large warehouses in the North Texas region are located in the Dallas-Fort Worth or its environs, which gives them access to two intermodal yards, multiple interstates, a trained workforce, and immediate access to a market of seven million people. One challenge Grayson County may face for some time, at least until the urban sprawl of the Metroplex inches much closer, is that it may still be viewed as too far from the Dallas-Fort Worth region to serve it efficiently and cost-effectively. However, over time, as Collin County continues to grow northward, it is anticipated that Grayson County will be considered a more attractive location for local and regional distribution activities.

Hosting future warehouses and distribution centers may require some investment in workforce training to ensure that workers have the appropriate skills. The reputation of warehousing and distribution is that it consists of primarily manual labor and repetitive tasks. While this can be true, newer warehousing and distribution centers are investing in advanced technologies to increase their productivity and the accuracy of fulfillment. These technologies include sophisticated tracking and fulfillment software, augmented reality to assist with picking, and robotics. Augmented reality allows workers to wear a pair of glasses that can point them to the precise location of an item, showing them a picture before they pick it. This technology helps speed up picking time since the worker is shown the exact location by aisle, section, and shelf (or bin). The glasses' projected image of the item helps to reduce confusion about the desired item. Many warehouses are starting to incorporate different types of robotics into their operations. In some instances, collaborative robots (sometimes called cobots) are used, which help workers lift heavy items or perform repetitive actions. The worker and the robot work together in a shared space. In other instances, robots operate in a cordoned area performing tasks that make the job of picking and sorting more efficient. Amazon, for example, uses robots to move entire shelving units of items to the picker, rather than making the picker walk to the item. This setup also allows the warehouse to use chaotic storage, which is a system of disorganized storage that is more efficient than sorting items for storage. In some of its facilities, Amazon uses robots in place of conveyor belts to sort items to be placed on delivery trucks. Workers handling goods in an advanced warehouse must know how to work with these technologies. These technologies also create opportunities for robotics technicians and engineers, computer programmers, and supply chain and logistics specialists.

Pharmaceuticals and medical equipment are another suggested target industry for Grayson County. As discussed earlier, if the clean room from the Texas Instruments semiconductor plant becomes available for a new tenant after its closure, it could potentially be used for manufacturing items that need to be produced in a sterile environment. Federal initiatives to encourage reshoring and resilience in the nation's medical supply chain could lead manufacturers to relocate from places like China to the United States, especially if there were to be federal subsidies. Pharmaceutical firms also pay higher wages than many other manufacturers. Alternately, a repurposed Texas Instruments clean room could be used to manufacture precision instruments.

Lastly, the earlier discussion on local resources suggests that employers who relocate to Grayson County could find a cost advantage using it inexpensive water and energy as inputs in a production line. Industries that are heavy users of water and/or energy and could be appropriate targets for Grayson County include:

- Paint and coating manufacturing
- Wineries/Breweries/Distilleries
- Pesticide and other agricultural, chemical manufacturing
- Adhesive manufacturing
- Artificial and synthetic fibers and filaments manufacturing
- Greenhouse crop and ornamental plant production, as well as hydroponic farms

4. FREIGHT NEEDS AND RECOMMENDATIONS

SHERMAN-DENISON MPO
METROPOLITAN PLANNING ORGANIZATION
INTERMODAL URBAN TRANSPORTATION PLANNING

FREIGHT NEEDS AND RECOMMENDATIONS

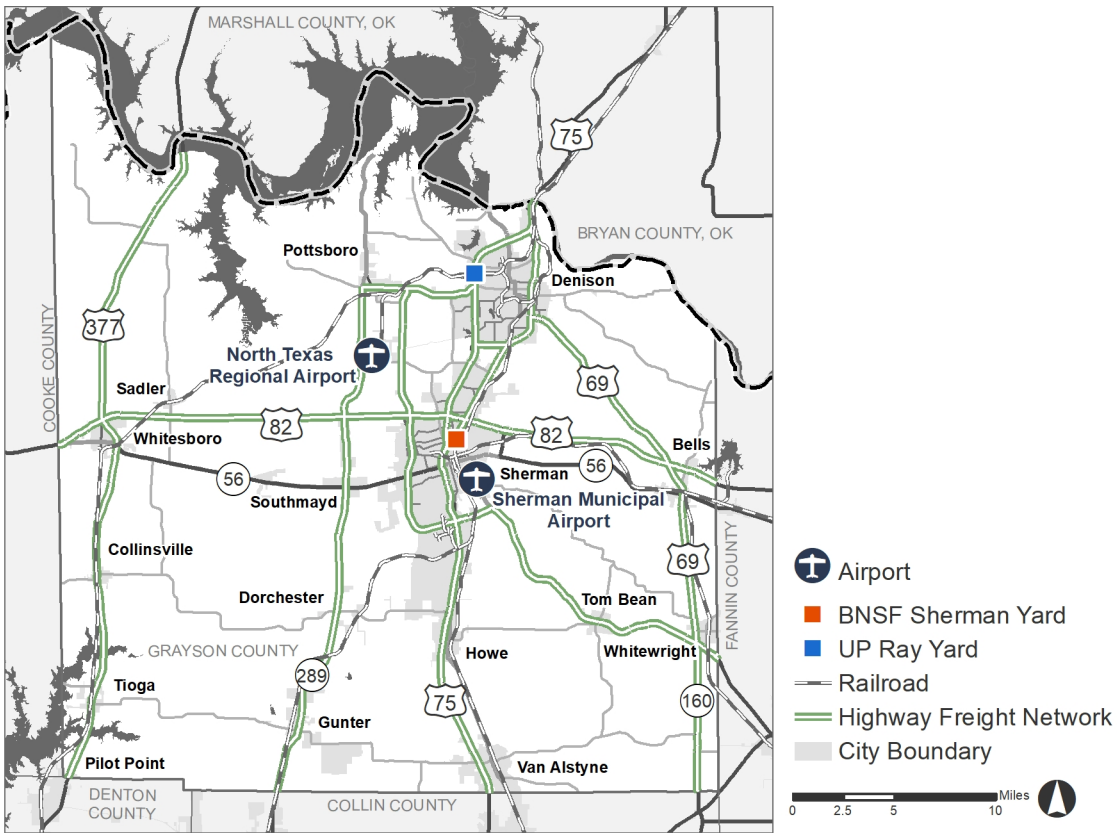
The Grayson County Freight Mobility Plan culminates in a countywide freight network and a set of infrastructure recommendations for that network, as well as policy and programming recommendations for Grayson County and the Sherman-Denison MPO. This chapter details these findings and recommendations.

GRAYSON COUNTY MULTIMODAL FREIGHT NETWORK

The Grayson County Multimodal Freight Network builds off of the Texas Multimodal Freight Network by adding facilities of local and regional significance to the existing set of highways and railroads on the statewide network. The resulting network includes all railroad facilities, the North Texas Regional Airport, the Sherman Municipal airport, and major highway facilities within the region, including: US 75, US 82, US 69, US 377, SH 289, SH 91, SH 11, SH 160, and Spur 503.

These facilities were selected from the infrastructure evaluated this plan based on their role in freight transportation and stakeholder input. The network builds upon the Texas Multimodal Freight Network developed by the Texas Department of Transportation (TxDOT) to include additional roadways serving local and regional freight generators and traffic as well as two additional airports. Each of the transportation assets shown in Figure 38 serves freight transportation in Grayson County by moving a significant amount of freight, providing a connection to businesses or intermodal opportunities, or providing an alternate route for freight.

Figure 38. Grayson County Multimodal Freight Network



INFRASTRUCTURE NEEDS AND OPPORTUNITIES

Highway Needs and Opportunities

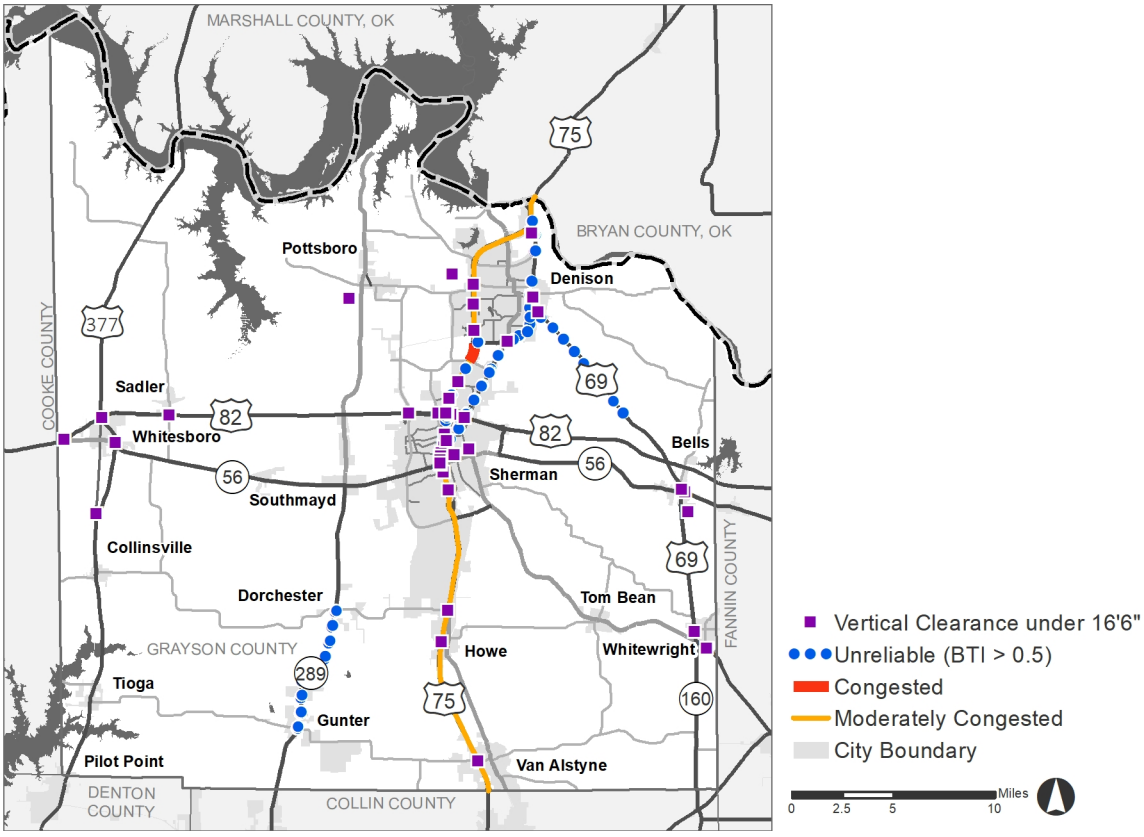
The following subsections identify specific highway needs (mobility and reliability, bridge vertical clearance and condition, east-west connectivity, and safety), as well as potential opportunities for improvement. Priority recommendations are discussed in further detail later in this chapter. The resulting highway needs are shown in Figure 39.

Mobility and Reliability

The most congested segments of US 75 are located near interchanges at Spur 503 and SH 91; however, the entire corridor is at least moderately congested. Segments of US 75, SH 289, SH 91, and Spur 503 have a buffer time index greater than 0.5, indicating that during at least one time of day, shippers must plan 1.5 times the normal drive time to ensure on-time delivery. Additionally, the turning radii at US 75 and US 82 was identified as a challenge for trucks, causing traffic to back up behind them.

Several recent projects in Grayson County address freight mobility and reliability, including completion of the "gap" project. This project addresses a 4.5-mile stretch of US 75, the only section of US 75 in Texas that does not meet interstate standards, and is currently under construction. Interchange improvements at US 75 and US 82 to address congestion and turning radii are also under construction. Construction of ramp reconfigurations on US 75 at Spur 503 is complete, and another ramp project funded by the City of Sherman was also completed. Ten miles north of Grayson County, a project in Calera, Oklahoma is grade-separating US 75 where a signalized intersection currently exists. Additionally, US 75 from the

Figure 39. Combined Highway Needs



Source: Texas Department of Transportation and Cambridge Systematics analysis, 2020.

Grayson/Collin County Line to FM 902 is expected to begin construction in 2024, and US 75 from US 82 to North Loy Lake Road in Denison is expected to begin construction in 2027.

In addition to projects on US 75, FM 1417 (Heritage Parkway) is under construction to be widened to four lanes between US 82 and SH 56. A new spur is planned in the southwest corner of the County. The spur is aligned with existing and planned segments of the Dallas North Tollway and is designed to integrate into a future extension of the tollway into Grayson County.

Bridge Vertical Clearance and Conditions

Bridges over US 75 and US 69 were identified by stakeholders as an obstacle to moving oversized trucks in Grayson County. Three bridges over US 69 cause truck traffic to divert off of the highway and through cities on local streets in Bells and Whitewright. Two of these bridges are owned by the G & W Railroad and will require coordination to improve. Additionally, there are eight bridges on US 75 that are below 16'6" in at least one direction with a cluster between US 82 and SH 56. Seven vertical clearance issues on US 75 between FM 1417 and SH 91 are being addressed during the gap project (construction began September 2019). Two bridges on US 377 are also below this threshold. However, upgrading these bridges is a lower priority due to lack of stakeholder input and less truck traffic in the western portion of the County. Additionally, the US 377 bridge over Lake Texoma provides limited connectivity between Texas and Oklahoma in the western part of the County due to its narrow and outdated design. The Oklahoma Department of Transportation has begun bridge and approach replacements on US 377 over Lake Texoma.

Pavement Roughness

The FAC identified asset condition and design for freight as a key issue for US 75 and the county. When comparing US 75 in Grayson County to similar corridors in the region, committee members noted that US 75 has similar truck traffic levels but markedly worse pavement quality. The corridor benchmarking discussed in Section 2 confirms this observation from local stakeholders. Additionally, segments of the frontage road have washed out and cannot carry permitted loads, including between SH 91 and FM 84. These segments are expected to reopen within a year; however, this issue highlights the need to modernize US 75 to better handle extreme rain and weather events. Pavement challenges result in significant maintenance cost for the TxDOT Paris District, including $3 million annually to maintain US 75 between SH 91 and Spur 503. Despite this investment, traffic and truck volumes cause continued challenges on this segment.

East/West Connectivity

While there are multiple north/south routes in the County, only one major east/west route exists: US 82. Additional east/west connections between major roadways and in the southern portion of the County will improve freight mobility by providing reasonable route alternatives and connecting markets within the County. FM 902 and FM 121, particularly between the Grayson Parkway spur (under development) and US 75, are both east/west priorities identified as principal arterials in the Grayson County Thoroughfare Plan. In some cases, discontinuous roadways through a city or town complicate freight movement and are a barrier to east/west connectivity. For example, FM 902 intersects with US 377 in Collinsville. The segment of FM 902 to the west of US 377 is a quarter-mile south of the segment to the east, requiring traffic to zig-zag through town. FM 902 is also discontinuous at US 75, and trucks must travel across a narrow bridge to access the opposite segment. Another location near Fallon Drive was also identified as a difficult transition onto US 75 due to lack of ramps, and the FedEx facility at this location is relocating to FM 1417. Interchanges and jug handles designed for heavy freight vehicles were also mentioned by the FAC as a connection need along US 75.

A segment of a bypass around Gunter is planned for fiscal year 2022 to address east/west mobility on FM 121 east of SH 289, and once complete will eliminate two sharp turns in the through route. The continuation of the project west of SH 289 is unfunded. This project will remove through-traffic from the town's Main Street. Similar projects are planned for FM 902 in Howe and Tom Bean and for FM 121 in Van Alstyne beginning in fiscal year 2022.

Safety

Safety issues are often caused on roadways where infrastructure is not designed for current traffic volumes or mixes. Most traffic, as well as crashes involving commercial vehicles (CMV) in Grayson County are located on or near US 75. US 75 was initially designed as

a 45-mph roadway and its design does not reflect the level and speed of traffic today. The gap project FM 1417 to SH 91 and ramp relocations at Spur 503 and FM 1417 will address these issues. US 82 west of US 75 is also a top location for CMV crashes. This is a four-lane divided highway with a grass median with a speed limit of 70 mph. Driveways for businesses and residences are directly connected to the highway, requiring passenger vehicles and trucks to accelerate and decelerate in the main lanes of the highway.

Additionally, stakeholders identified grade changes and hills as challenges for trucks entering and exiting facilities due to visibility, increasing or decreasing speed of traffic on inclines, and low truck clearance preventing vehicles from overcoming sudden grade changes. Ramp spacing can also present a challenge to trucks if sightlines are poor or ramps are close to the facility they are accessing. Abrupt movements from lane changes, roadway curves, or traffic interactions are more dangerous for trucks carrying liquid loads as the shifting weight of the load can cause rollovers. Two of the problem areas identified were the US 75/FM 84 interchange and SH 56 at Friendship Road.

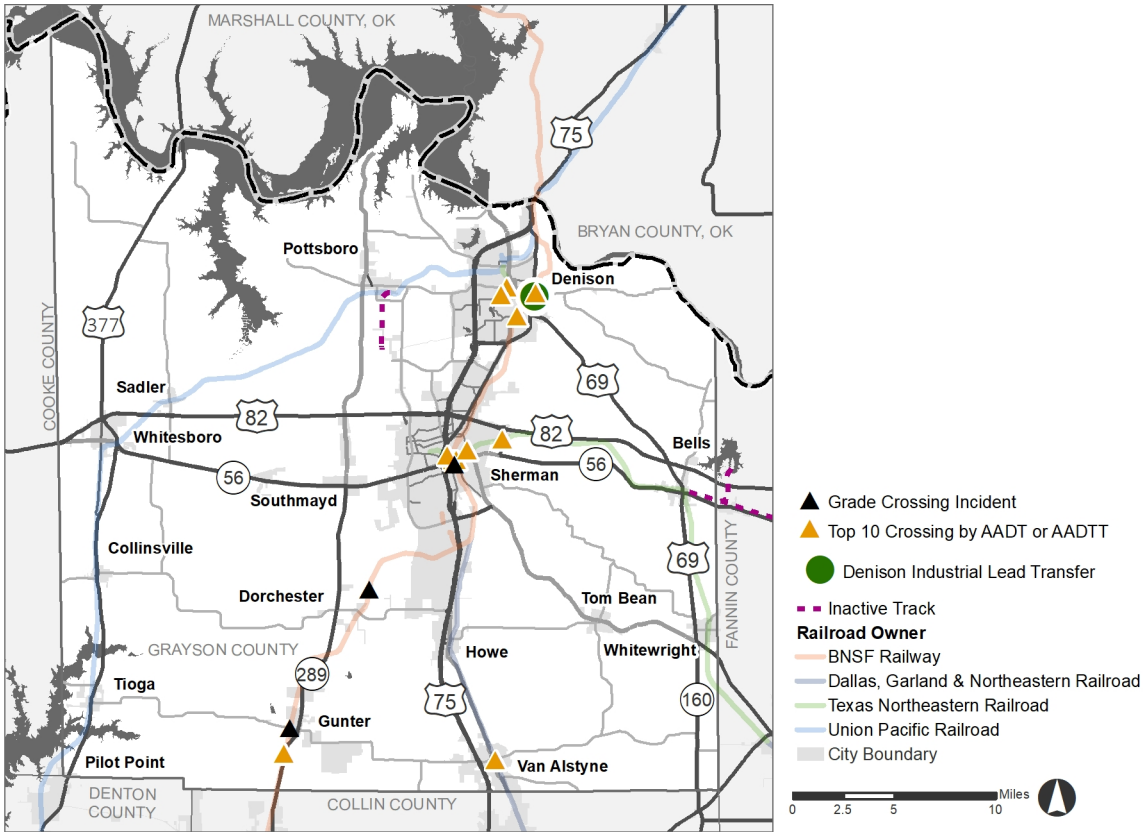
Rail Needs and Opportunities

Rail needs were identified through analysis of available data, interviews with railroads, and meetings of the FAC. Priority locations or strategies are discussed further in the following section on freight recommendations, and combined needs are shown in Figure 40.

New Rail Development

During interviews with railroads operating in Grayson County, all expressed some level of interest in increasing their service or footprint in the county. The G&W staff suggested small improvements as customers are added, while the BNSF staff discussed their interest in a new industrial park in North Texas. A site centrally located in Grayson County was recently considered by a Class I

Figure 40. Combined Rail Needs and Opportunities



Source: Texas Department of Transportation and Cambridge Systematics analysis, 2020.

railroad for a new rail park, though it has not proceeded. Development of additional rail-served industrial space in the county could increase economic competitiveness of the county, particularly as congestion in the region worsens. Appendix C includes four case studies of exemplary freight rail developments to highlight attributes of successful projects. Notably, projects are most likely to be successful if there is strong coordination between the public and private sectors. Sites will be more attractive to tenants if they are confident they will receive rail service that meets their requirements. Access to more than one Class I railroad is particularly attractive, as the opportunity for competitive service is highly desired by rail shippers.

Grade Crossings

Very few highway-rail incidents have occurred in recent years, and no clear safety priorities emerged. SDMPO, Grayson County, and localities should continue to encourage this positive trend by:

- Supporting the grade crossing rationalization on the BNSF line identified in the statewide rail plan,
- Implementing appropriate warning devices for the level of highway and rail traffic,
- Continuing communication with the FAC about local priorities for freight mobility,
- Advocate for funding to eliminate at-grade crossings from Federal Section 130 funds or grants, and
- Discouraging development of incompatible land uses near freight corridors, particularly those with critical transportation needs such as hospitals.

Inactive Track

Currently inactive track in Grayson County presents an opportunity to restore rail service to locations at a lower cost than acquiring right-of-way and constructing a new facility. However, these projects will likely only be successful if there are clear users of the system and agreements from railroad operators to serve the sites. Economic development corporations (EDCs) in Grayson County report that industrial building space has been largely filled, and the EDCs may have to consider a new approach to attracting firms. The potential for a rail spur by NTRA or additional connections to the east via rail may be attractive negotiating points. Class I railroads have requirements for interchange to ensure efficient operations, so proposals should be thoroughly vetted with railroad development staff.

Denison Industrial Lead

The Denison Industrial Lead constraint at the TNER/BNSF transfer point currently causes travel delay for the short line and limits the number of cars per train. A wye between the eastbound and southbound directions through a currently undeveloped portion of land would alleviate these concerns. Pursuing this opportunity requires significant collaboration with BNSF and G&W. However, current operating conditions require trains to transfer onto the BNSF line from a complete stop, and both railroads may benefit from increasing the operating speeds near this location. In addition to considering a more direct connection between the two rail lines, an extension of the north-south track that limits train length would increase the length of trains that G&W can run from 75 cars to the desired 110 cars. This strategy would require less, or possibly no, support from BNSF

Shared Use Freight Corridor

DART operates the nation's longest light rail system, and its service in the US 75 corridor currently runs from Downtown Dallas to Plano (Parker Road Station). DART owns additional track north of Plano in the same corridor that DGNO operates from McKinney to Sherman. DART does not have a service agreement with any municipalities in northern Collin County or in Grayson County. As the population of Grayson County and the Greater Dallas-Fort Worth areas grow, passenger rail service to Grayson County may become more attractive. SDMPO should consider the potential for shared-use freight and passenger operations in this corridor, including the need for passing lanes and land for future passenger stations. These strategies would be effective in accommodating freight and passenger operations on the line regardless of whether DART or another transit operator were to serve it. However, DART is a likely partner given its proactive investment in right-of-way, connection to major economic and employment centers in North Texas, and existing capital and staff capacity.

Air Needs and Opportunities

The Grayson County-owned North Texas Regional Airport (formerly Perrin Air Force Base, then Grayson County Airport; ICAO identifier KGYI) has several potential economic development opportunities. The airport has multiple runways, a control tower, relatively unobstructed airspace, available land and facilities previously used by the military, and is located close to U.S. 75 and both Sherman and Denison. These factors position the airport well for a variety of "on-airport" opportunities, including military and/or civilian aviation training or maintenance programs. The airport has joined the Federal Aviation Administration's Contract Tower Program, and support from the FAA reduces county operating obligations to the airport. [16]

At the same time, the MPO should explore opportunities to support logistics and freight-related business development around the airport. The region's proximity to the Metroplex, strengths in existing industry, and latent airport capacity could provide a welcome base to a number of industries, including those whose supply chains include air cargo. The MPO should further study the opportunity to develop an air-served multimodal industrial hub and/or industrial district near the airport. Future studies could examine the market proposition and requirements of potential industries, role of the MPO and County in economic development efforts, and coordination opportunities with local and state economic development agencies to develop a realistic development plan for both on- and off-airport sites.

Water Transportation Opportunities

In 2019, the Texas Legislature passed House Bill 4166 compelling the Red River Authority of Texas to study the feasibility of increasing navigation on the Red River between Texarkana and Denison. The North Central Texas Council of Governments (NCTCOG) is partially funding this study. If the study finds that increasing navigability of the river is feasible, Grayson County should support and prepare for improvements. The county and the MPO have the ability to advocate for enabling policy through their State and U.S. Representatives, funding from the state or federal government, and support from key local stakeholders. Additionally, preparation and preservation of land for a river port as well as landside access by highway and rail should be proactively pursued as the project moves forward.

INFRASTRUCTURE RECOMMENDATIONS

Highway Freight Priorities

The following sections summarize highway freight project priorities in Grayson County. There are thirteen projects that are planned and funded, and 38 projects that are unfunded. Appendix D contains a full list of freight projects identified by the MPO and stakeholders.

Complete Improvements on US 75

TxDOT's 2021 Unified Transportation Program includes funding to widen three segments of US 75: the Grayson/Collin County Line to FM 902, SH 91/Texoma Parkway to US 82 (unfunded), and US 82 to North Loy Lake Road. The TxDOT Paris District has included the segment from SH 91 to FM 120 in its stakeholder outreach conducted as part of Federal environmental regulations in anticipation of a phased implementation. Additionally, the segment from US 69 to the state line to the north is under development. In the long-term, increased traffic may warrant development of projects to widen the remaining segments beyond those currently under development. The top priority segments are:

- SH 91 to FM 120: Complete current study area.
- FM 902 to FM 1417: Align roadway with improvements to the south.
- North Loy Lake Road to US 69: Align roadway with improvements to the south.
- US 69 to Oklahoma state line: Align roadway with improvements to the north.

Continuous frontage roads and ramp improvements will enhance performance of the roadway in locations where widening is not yet warranted by improving reliability and increasing access to local businesses. These features will

[16] http://www.heralddemocrat.com/news/20180628/grayson-approves-new-contract-with-texas-aviation-partners-for-ntra.

be addressed during planned widening projects. However, they may be advanced as individual projects in locations without a funded project as a near-term mobility solution.

Improve Mobility on Other Highways

Freight mobility projects have been identified for several other corridors in the County for both east/west and north/south corridors. In general, north/south thoroughfare projects are aimed at increasing capacity, and east/west thoroughfare projects are bypasses to create a continuous corridor. Mobility projects are located on the following freight corridors:

- US 82.
- Spur 503.
- FM 1417.
- FM 121.
- FM 902.
- Grayson Parkway Spur (future tollway alignment).

Additionally, three bridges over US 69 identified by stakeholders are the top priority vertical clearance issues in the County. While additional bridges in the County may create a barrier to movement of large freight in the future, funding replacement of these bridges is a lower priority than meeting existing needs.

Rail Freight Priorities

Grayson County is currently served by UP, BNSF, and regional railroads through the short line conglomerate G&W. As both UP and BNSF have major facilities in the Dallas region, the infrastructure for Grayson County is typically considered “through” traffic. Most customers or future customers in the county receive rail service via the short-line, which transfers railcars from smaller operators either directly to the destination, or to the cross-county Class I railroads. In Grayson County, the primary constraint for G & W Railroad, which operates two short line railroads, is a complex interchange with the BNSF line for their southbound traffic. Trains currently are limited to 75 cars due to available track length, though 110-car train capacity is desired. In addition to limiting the capacity of a single train, turning the train around requires approximately two additional hours of travel time in the County, limiting the weekly capacity of the line.

The railroad also expressed interest in rehabilitating the railroad from Bells to Bonham. While this section is predominantly outside of Grayson County, it could benefit freight businesses in the County by increasing connectivity to regional markets. Finally, the railroad expressed interest in operations out of Ray Yard, currently owned by UP. Currently, Ray Yard is operating under capacity and there is the opportunity to expand operations by UP or another operator. There is no current project or funding sources identified for these needs.

Finally, Grayson County can address safety and mobility by assessing opportunities to improve the busiest highway/rail crossings. Table 21 includes the top ten locations by vehicle AADT and AADTT. Seven locations are in both lists, resulting in a list of thirteen priority locations.

Air Freight Priorities

NTRA recently completed a series of projects to increase capacity through a second runway and to join the Federal Aviation Administration’s (FAA) Tower Program. Participation in this program introduces new funding mechanisms and elevates the status of the airport on the national level. No additional air cargo-related infrastructure investment needs were identified as part of this study; however, economic development investment in the area surrounding the airport was identified as an opportunity. The ability to bring in international goods to the airport was also identified as a need; coordination with U.S. Customs and Border Protection and the addition of a Customs Agent at the airport will be needed.

Water Freight Priorities

The U.S. Army Corps of Engineers is undertaking an economic feasibility study of navigation on the Red River between Denison and Arkansas in partnership with the North Central Texas Council of Governments. While this study is in its early stages, it could present a new opportunity for Grayson County if a water port in Grayson County is determined to be feasible.

Table 21. Highest Priority Grade Crossings by AADT and AADTT

Crossing	Railroad	Roadway Name	AADT	AADTT	AADT Rank	AADTT Rank
415027H	TNER	SH 56/E Houston St./E. Lamar St.	12,446	448	1	2
795221X	TNER	N. Travis St.	11,493	264	2	5
410968L	DGNO	FM 120	10,251	493	3	1
795214M	TNER	Grand Ave.	7,760	311	4	4
765365V	DGNO	FM 121	5,318	362	5	3
672948X	BNSF	FM 121	4,714	231	6	7
410970M	TNER	Crawford St.	4,310	138	7	12
765374U	BNSF	Baker St.	3,847	123	8	13
795416K	TNER	FM 1417	3,367	239	9	6
795270U	UP	FM 902	3,322	163	10	11
795275D	UP	FM 922	2,799	224	11	8
765403C	DGNO	FM 902	2,496	182	12	9
765308G	DGNO	FM 3133	2,327	169	13	10

Federal Rail Administration, TxDOT Roadway Inventory, 2020.

TRANSPORTATION POLICY AND PARTNERSHIP RECOMMENDATIONS

The following sections describe four broad policy and partnership recommendations to improve freight movement in Grayson County. Specific implementation steps and partners for implementation are shown in Table 22.

Continue to Engage Stakeholders

Since inception of this freight plan in 2018, the Sherman-Denison MPO has played a role as a regional strategic leader on issues related to transportation and economic growth. As part of this plan, the MPO has convened a Freight Advisory Committee (FAC) comprised of local and regional experts from the private sector, transportation agencies, and economic development companies. This group has given critical feedback throughout the project, helped identify needs and issues, and vetted recommendations and projects.

Many of the recommendations laid out in this section will require the MPO to continue its role as a strategic leader, and to work with local agencies, municipalities, and businesses to further the economic growth and transportation future of Grayson County. Continued engagement of the FAC is an important avenue to both engage local leaders in ongoing conversations about freight, economic development, and transportation related issues as well as strengthen the partnerships necessary to implement the recommendations of this plan.

The MPO should continue to engage the FAC on a periodic basis on a variety of topics related to freight in Grayson County and advance implementation of this freight plan. Future meeting topics may include:

- Discussion of the upcoming Federal Transportation Reauthorization (TxDOT, FHWA lead)
- Updates on major transportation projects or planning (TxDOT, SDMPO lead)
- Freight industry trends (local businesses and/or industry associations)
- TxDOT Freight Program update (periodic updates by TxDOT)
- Various working sessions around other transportation or county related issues (SDMPO, FAC to determine priorities and leads)

Support Infrastructure Connections to Major Markets

An effective freight network enables the movement of goods through mobility, reliability, and connectivity. There are a number of projects being undertaken by TxDOT, nearby regions, and by neighboring states that have significant impacts to Grayson County businesses and customers. It will be important for the County to monitor (and participate, as needed) in these efforts to ensure that connections to these markets are maintained and enhanced. The most proximate of these are major improvements to U.S. 75, as detailed in the TxDOT workplan. In addition, TxDOT, the North Texas Tollway Authority, and the Grayson County Regional Mobility Authority are conducting studies on extending the Dallas North Tollway through the county.[17] The Grayson County Thoroughfare Plan identifies additional corridors which will serve as the future transportation network.

Beyond these projects and proposed studies relevant to the Grayson County multi-modal network, there is likely significant potential in further leveraging the connectivity of the county's rail system. While being home to two small cities (Sherman and Denison), Grayson County is unique in that two Class I railroads pass through it, both of which with sizable traffic (BNSF – 24 daily trains, Union Pacific – 18 daily trains). Two additional short line railroads provide strengthened access to Northeast Texas, making the County's density of rail tracks notably high compared to others in Texas. As noted from Figure 27, the number of commercial and industrial sites served by rail is low as a proportion of all sites within close proximity to the railroads. The SDMPO should consider taking steps to develop, and where applicable, rehabilitate access spurs. In doing so, Grayson County's proximity and strong rail connections to the Dallas-Fort Worth Metroplex, Oklahoma City, and additional markets such as other major Texas cities, Memphis, and Kansas City should be considered and marketed. This recommendation would be carried out most efficiently as part of a coordinated effort with the Sherman Economic Development Corporation (SEDCO) and Denison Development Alliance (DDA). Coordination with these EDCs is further elaborated on in the economic development recommendations identified below.

Along with supporting direct infrastructure connections between commercial and industrial sites and the county's rail network, SDMPO should continue to identify additional rail infrastructure needs within Grayson County. This includes maintaining a strong understanding of track quality, choke points, weight limits, and height clearances. Ideally any of these infrastructure components should be vetted to determine if they affect the county's ability to attract rail-based economic development. This will involve maintaining strong and consistent communication with the county's four railroads. Beyond rail infrastructure, such recommendations are relevant to road and utility infrastructure needs as well.

In addition, it will be important to monitor and/or coordinate with Oklahoma DOT activities. Grayson County is connected to the major markets of Tulsa (and the Port of Catoosa) and Oklahoma City. U.S. 69/U.S. 75 is highlighted as key freight corridors in ODOT's Freight Plan. These roadways are also a major safety concern, as they are (1) used extensively by the U.S. Military for transport of hazardous materials, including munitions and (2) has an unusually high rate of crashes per mile traveled.[18] ODOT has about $121 million in work planned for U.S. 69/U.S. 75 between Calera and the U.S. 70 interchange as part of its 2018-2025 construction work plan. This section has many at-grade intersections, and is considered a bottleneck (and is one of the few non-urban bottlenecks in the Freight Plan).[19]

Prepare for Oversize and Overweight Vehicles

Oversize or overweight (OSOW) loads are permitted to operate on public highways based on requirements set by the Texas Department of Motor Vehicles, which will change as the shipping requirements of our economy

[17] While tolling agreements can potentially be effective public-private partnerships and project finance mechanisms, the Texas Transportation Commission is not currently permitting inclusion of any tolled projects in the state's Unified Transportation Program, the 10-year funding document for major transportation projects in the state.

[18] https://ok.gov/odot/documents/OKFreightPlan2018_2022.pdf.

[19] http://www.odot.org/cwp-8-year-plan/cwp_ffy2018-ffy2025/8_year_cwp_division2_map.pdf.

change. During the 85th Texas Legislature, OSOW regulations were generally broadened to permit greater movement of OSOW vehicles, including increasing certain weight limits near the Arkansas state line (HB 2319), increasing the authorized areas for OSOW permits near ports (HB 4156, SB 1291), and preventing municipalities from restricting certain OSOW movements near ports (SB 1524).[20] While these changes do not affect Grayson County directly, the trend toward expansion of OSOW permits is expected to continue in future legislative sessions, particularly near intermodal port and rail facilities. To prepare for these potential changes, Grayson County should evaluate bridge conditions on its highway network, particularly in proximity to current OSOW shippers and rail facilities.

In Grayson County, there have been numerous hindrances or close calls due to undesirable OSOW routing through communities like Tom Bean, where a 150-foot methane extractor was routed on FM 902. Grayson County should collaborate with TxDMV to ensure that the department's preferred OSOW routes align with available infrastructure and that the department has the best-available data about the highway network. Additionally, as Grayson County is at and near the border of other states, the MPO should support efforts for OSOW harmonization with Oklahoma and Arkansas.

Support Growth through Strategic Land Use Around Rail and Industrial Facilities

Grayson County is expected to experience continued increasing population growth over the next decades. State demographers estimate the County's population will grow from over 130,000 in 2017 to more than 180,000 in 2050.[21] Estimates by the MPO forecast the population to grow as high as 335,000 by 2050[22]. This projected population growth associated with similar growth trends in and around the Metroplex and North Texas collar counties.

Increased competition for land, particularly in prime locations near transportation and commercial infrastructure is a natural result of population growth. Often, population growth leads to residential and commercial developments supplanting previously industrial land in desirable locations. However, this can lead to industrial and freight generating facilities, which are critical job-creators and economic drivers, being pushed onto less desirable parcels at the fringes of a community—or beyond. This creates challenges for businesses such as reduced access to multimodal facilities, services, and workforce. It also creates challenges for the public sector and residents, as industry moving to the periphery of a community can lead to increased congestion and reduced access to jobs.

Growth can also lead to residential or other non-compatible uses being located near rail lines. Residential properties are particularly sensitive to noise, light and vibration issues that occur from trains. Emergency services such as medical transport or fire departments may be negatively impacted by nearby at-grade crossings. Finally, location near rail lines increases the opportunities for trespass and potential safety incidents.[23]

Preserving industrial zoned land and/or promoting mixed use development can help alleviate some growth challenges that may soon face Grayson County. A study undertaken by the Center for Transportation Research in 2007 compiled information relevant to Texas counties and municipalities in terms of opportunities and costs of rail corridor preservation, including industrial land near rail lines and facilities. The authors identify powers available to various entities and acknowledge that Texas counties do not have access to many of the tools central to controlling land use, such as broad use of eminent domain or zoning controls. Additionally, land acquisition priorities could be coordinated with TxDOT as the state agency is explicitly permitted to acquire land for rail right-of-way. While the costs associated with acquiring land (rail right-of-way or adjacent property) may be high, rail

[20] TxDOT, 85th Legislature 2017, Summary of Enacted Legislation. https://ftp.dot.state.tx.us/pub/txdot-info/sla/85th-legislative-summary.pdf.

[21] Source: Texas State Data Center and U.S. Census Bureau, 2018.

[22] https://www.heralddemocrat.com/news/20180210/grayson-population-to-surpass-330k-by-2050.

[23] Protecting and Preserving Rail Corridors Against Encroachment of Incompatible Uses, Center for Transportation Research, 2007.

line relocation to remedy conflicts is extremely costly. For example, the ReTRAC project in Reno was completed in 2005 at a cost of $265 million, while estimates to implement the Colorado Front Range Relocation came in at $1.1 billion after a $2.2 million feasibility study. In the case of freight rail, relocation can be further complicated by the need to continue service to customers on existing lines.[24]

The Sherman-Denison MPO can play a role in ensuring that the County is both prepared for and supporting future growth by strategic land use around rail and industrial facilities. Roles for the MPO can include:

- Setting a regional vision for land use around industrial and rail facilities.
- Preserving opportunities for rail and industrial use in high priority locations.
- Preserving right-of-way along active and inactive rail corridors.
- Supporting municipalities and EDCs in creating mixed use developments to reduce transportation impacts and preserve access to jobs.
- Communicating with state and federal agencies and landowners on utilization and/or disposal of public lands.
- Coordinate with municipalities and railroads to reduce conflicts at rail lines and at-grade crossings through enacting barriers, access roads, or other safety measures.

[24] Ibid.

Table 22. Roles for Implementing Transportation Policy Recommendations

Recommendation	Implementation Step	Lead and Support Organizations
Continue to Engage Stakeholders	Formalize ongoing Freight Advisory Committee Structure	SDMPO; FAC
	Identify new FAC participants as industries grow and change	SDMPO; FAC
	Connect freight stakeholders to information and development opportunities	SDMPO; FAC
Support Infrastructure Connections to Major Markets	Improve US 75 to interstate standards	SDMPO; TxDOT
	Assess potential for partnerships with nearby MPOs on US 69 and US 82	SDMPO; Nearby MPOs; TxDOT
	Improve N/S and E/W routes within the county to promote reliability	SDMPO; TxDOT
	Improve rail market access by removing bottleneck at DIL and supporting rehabilitation	SDMPO; Railroads
	Support Red River Navigation feasibility study and plan for landside needs	SDMPO; Red River Authority
	Support air cargo capabilities through investment in airport and landside connections	SDMPO; NTRA; EDCs
Prepare for Oversize/Overweight Traffic	Ensure permit issuer(s) such as TxDMV have accurate data about roadway and bridge network as system is improved	SDMPO; TxDMV; TxDOT
	Address low clearance bridges on the Highway Freight Network	SDMPO; TxDOT
	Continue communication with OSOW carriers to understand evolving needs	SDMPO; FAC; TxDOT
Support Strategic Land Use and Smart Growth	Set regional vision for high priority locations to preserve for industrial activity	Grayson County; SDMPO; Municipalities
	Preserve right-of-way along active and inactive rail corridors	Municipalities; Grayson County
	Support mixed use developments to reduce transportation impacts	Municipalities; EDCs; SDMPO
	Communicate vision with state and federal landowners to best utilize public lands (especially at disposal)	Grayson County; TxDOT; USACE
	Identify or support opportunities to develop publicly- or privately-owned truck parking along U.S. 75 and U.S. 82	Grayson County; Municipalities; TxDOT

ECONOMIC DEVELOPMENT RECOMMENDATIONS

The following sections describe four broad freight-related economic development recommendations to improve economic competitiveness and quality of life in Grayson County. Specific implementation steps and partners for implementation are shown in Table 24.

Refine Economic Development Strategy for New Goals

The first economic development-focused strategy focuses on further refining the economic development goals utilized by SEDCO and DDA. While both have successfully attracted new employers, modest adjustments to their economic development strategies could position Grayson County in a more competitive environment. Initiatives for consideration include:

- **Shift Strategy from Incentives to Workforce Development:** In addition to workforce and entrepreneurial development/training (elaborated on in the following recommendations), workforce housing and quality of life should directly be considered as part of a comprehensive strategy.

- **Prepare and Maintain Inventory of Local Resources:** Includes technical information that could assist with preliminary assessments or decision making for relocations or new facility siting. This would include ownership/contact information, tax details, utilities, specification of services, transportation capabilities and connectivity, property details, presence of hazardous materials, natural hazards, and utilities.

- **Optimize Recruitment Targeting:** Actively recruit companies within industries that best fit with identified local resources.

- **Identify and Communicate Future Infrastructure/Investment Needs:** While such needs, primarily in the context of rail, are largely identified throughout this report, they also need to be communicated properly to elected officials who can streamline incentives and funding sources.

- **Develop a Strategy to Attract Reshoring Industries:** Identification of any state and federal funds that provide incentives or subsidies for reshoring could be used to attract firms, primarily in the pharmaceutical, medical equipment, and automotive industries.

- **Present Grayson County as an Attractive, Resilient Location:** With an emphasis on manufacturing, warehousing and distribution, and back office services. The strategy should emphasize available resources, proximity to the Metroplex, rail access, and a supportive local government.

Target Industries

Taking into account existing and modified economic development strategies, analysis was undertaken to identify key target industries for growth in Grayson County. In addition to local EDC support, Grayson County benefits from the following factors:

- Strong multi-modal transportation network
- Affordable and abundant land
- Capable workforce
- Cheap electricity
- Available and inexpensive natural gas
- Abundant water, especially valuable as the statewide climate continues to become drier

In addition, manufacturing wages in Grayson County have significantly lagged compared to across other cities in Texas despite a relatively tight labor market. This may stem from multiple factors including employment losses in manufacturing sectors with higher average wages (such as semiconductors), increased employment in manufacturing sectors with lower average wages, and/or the closing of facilities with higher wage unionized labor forces. Together, these two trends (lower wage growth combined with lower unemployment) may suggest that Grayson County's pool of inexpensive labor has largely been absorbed. As a result, looking forward, strategies for attracting new freight-oriented jobs to Grayson County should include targeting higher wage employers, as well as attracting college-educated and higher-skilled workers.

Based on these trends, the following target industries are recommended for Grayson County:

- **Paper Recycling:** Until 2018, most recycled materials in the United States were sent to China for processing and remanufacture. The result of international tensions has led to increased stockpiles of such materials since most municipalities continue collection. As a result, firms are starting to build domestic facilities to handle these recyclables in a safe and cost-effective manner. A recycled paper mill, such as those operated by Pratt Recycling, might be especially well suited for Grayson County, given its access to low-cost water and energy, as well as its proximity to municipal recycling facilities (MRFs) in the Dallas-Fort Worth region, which would insure a large supply of raw material. Glass and plastic recycling are also options for consideration, but the markets and processes can be more complicated.

- **Warehousing and Distribution:** Despite the importance and prominence of North Texas for warehousing and distribution at the local, regional, and national scales, Grayson County has not yet developed into a major warehousing and distribution center. Despite abundant land, low wages, and low electricity costs (useful for cold/frozen storage), Douglass Distributing is the only major distributor in Grayson County. This may stem from Grayson County being on the fringe of the Metroplex, making it less cost-efficient than other areas around Dallas and Fort Worth, to directly serve the major population centers and attract skilled workers. Strategies to make Grayson County more attractive to warehouse and distribution center development are further highlighted in the next recommendation.

- **Pharmaceuticals:** The soon-to-close Texas Instruments manufacturing facility in Sherman could potentially be used for manufacturing items that need to be produced in a sterile environment, such as pharmaceuticals and medical equipment. Compared to other industries and manufacturers, pharmaceutical firms pay higher wages.

- **Resource-Intensive Industries:** Industries that consume large quantities of water and energy during production could be attracted to Grayson County. This includes Paint/Coating Manufacturing, Wineries/Breweries/Distilleries, Pesticides/Chemical Manufacturing, Adhesive Manufacturing, Artificial/Synthetic Fibers and Filaments Manufacturing, and Greenhouses/Hydroponic Farms.

Create Opportunities for Manufacturing Entrepreneurs and Employers

This strategy involves direct investment in the workforce of Grayson County through multiple approaches. In reality, some of the target industries identified above tend to have specific and unique workforce needs. For example, while the warehousing industry has long had a reputation of requiring primarily manual/repetitive labor, efficiency needs (similar to the rise of precision railroading) are driving the incorporation of advanced technologies, especially in newer facilities. Such technologies include sophisticated tracking and fulfillment software, robotics, and augmented reality. As a result, any new warehouse will require a skilled workforce capable of working with, or even managing these components. The following strategies focus on addressing needed skills through partnerships, trainings, and providing access to needed tools.

University Partnerships

As a somewhat exurban county on the fringe of the Dallas-Fort Worth Metroplex, Grayson County undoubtedly faces challenges in maintaining and attracting young skilled talent. This relative remoteness also makes it difficult for those who may already have full-time jobs and families to attend universities in and around the major urbanized centers. As such, developing a branch campus of a public university in Grayson County (working in conjunction with Grayson College to supply lower-division undergraduate instruction) would offer residents an opportunity to earn affordable undergraduate and graduate degrees while meeting local workforce needs. Potential relevant fields of study could include industrial, mechanical, and electrical engineering; management; accounting; finance; human resource; and supply chain management. This approach has already been successfully undertaken in a number of suburban and exurban cities across Texas including the following:

- University of North Texas – Frisco Campus (2018)

- Texas Tech University – McKinney/Collin Higher Education Learning Center Partnership (2015)
- Texas State University – Round Rock Campus (2004)
- University of Houston – Sugar Land Campus (1994)

While developing a branch campus would produce significant benefits, a public university willing to establish a facility in Grayson County will likely expect a significant local contribution to offset initial investments, given the higher capital and operating costs of remote campuses. This should be taken into consideration and vetted against additional recommendations for workforce development.

Support Entrepreneur/Employer Training

Most local training programs focus on workers who do not have specialized skills to do a job, need to upgrade their skills, or need to retool their skills for a new career. Many entrepreneurs and owners of small business find themselves in similar situations, but may not be able to leave work for an extended period of time to acquire needed skills. Such entrepreneurs could benefit from low- or no-cost flexible, targeted courses or bootcamps to acquire necessary skills such as accounting, human resources, taxation, management, sales etc. This could also include trainings and certifications such as Lean Six Sigma, Professional Management Professional (PMP), or others. Increasing such workforce capabilities through direct trainings could be one of the quickest and most cost-effective methods to retain firms, support expansions, and tout the benefits of Grayson County to prospective employers.

It is noted that DDA staff reported a previous effort by Grayson College, approximately 15 years ago, to offer Six Sigma training to local business owners. However, the program was cancelled due to limited interest. While there is no guarantee that offering these programs again would yield a better response, the identified certifications have more visibility and significance today. Additionally, marketing is now much easier through social media, and the increased role of technology in business ensures that such skills are especially viable.

Provide Access to Incubation Technology & Tools for Manufacturing Entrepreneurs

In addition to possessing necessary skills, entrepreneurs, especially in the manufacturing sector, require access to key tools and technologies. This stems from the high barriers of entry associated with manufacturing. As such, the concept of an incubator 'makerspace' could be suitable to Grayson County, as a means of strengthening the entrepreneurial workforce. Makerspaces are facilities that offer key equipment for use, including 3-D printers, laser cutters, and computerized machine tools. Additional equipment could include soldering irons and hand tools. These facilities typically have one or more experts on hand for supervising and offering tutorials. Most makerspaces are affiliated with universities, although approximately 10% operate for-profit through memberships.

Development of a successful makerspace carries a number of costs. Adequately equipping a space can push costs up to $1 million, in addition to any necessary construction. In addition, ongoing operational costs need to be considered, and weighed against what may be limited initial interest across Grayson County. Long-term commitments from sponsors are also crucial. As such, a makerspace may provide a slower, potentially more uncertain, return-on-investment than other methods of workforce development. Still, multiple successful makerspaces exist in Texas including:

- Spark Makerspace at University of North Texas,
- Texas Inventionworks at University of Texas at Austin,
- Library Makerspace at Texas Tech University, and
- MakerSpace at Texas State University.

Ensure Adequate Space for Growth

In recent years, SEDCO and the Denison Development Alliance (DDA) have reported a lack of available large industrial spaces to be a hindrance to attracting new employers. In terms of potential recruitment leads received from the State of Texas or nearby economic development corporations, industrial spaces of at least 50,000 to 100,000 square feet of space are a

requirement. At present, Grayson County does not have any of such spaces available. Development of such spaces, assuming the permission of local zoning ordinances, could be met in two ways: (1) Through private investors independently building speculative space; and (2) Through public-private partnerships (PPP) between developers and one or more government entities.

Taking into account current economic factors and near-term market uncertainties, it may become necessary or opportunistic for Grayson County to engage in a PPP that involves a public-sector investment of land and cash incentive (either through an EDC or local government), along with a match from a private source. This approach has already been used in Grayson County. In 2016, SEDCO entered into a PPP agreement with Midway Warehouses, LLC to construct a 60,000 square foot facility. In exchange for Midway Warehouses, LLC constructing the building, SEDCO agreed to pay rent for up to five years, with reimbursement as the space was rented. Table 23 provides additional examples from across the United States in which PPPs were used to develop industrial spaces.

As the table shows, a wide variety of strategies can be undertaken through a PPP. Although the details are not clear in every case, in some instances, the parties simply split the costs and the profits when the building was sold or leased. In one instance, the City of Sioux Falls, Iowa provided the land for free and paid the interest on the developer's loan. The developer was responsible for acquiring the loan and constructing the building. The diversity of methods in this small sample suggests that local governments and EDCs can be creative and find solutions that work for all parties, once they can find a private sector partner. As such, while the success of such partnership can be somewhat difficult to fully vet from the point of view of the public sector, the risk-reward may prove highly favorable within the context of Grayson County.

Table 23. Industrial Development Public-Private Partnership Examples

Location	Cost/Sales Price	Size (sq. ft.)	Date Constructed	Arrangement
Union, SC[1]	Sales Price $3.9 M	100,000	2018	Partnership between Union County and Lockhart Power. Building to be sold to industrial tenant. Equal sharing of construction costs.
Newberry, SC[1]	N/A	100,440	2019	Partnership between Newberry County and Newberry Electric Coop
Crawfordsville, IN[1]	N/A	50,000	2015	Partnership between Garmong Development Company, LLC and the City of Crawfordsville
Sherman, TX[1]	N/A	60,000	2016	Partnership between SEDCO and Midway Warehouses, LLC. SEDCO agreed to pay a rent for five years and to be reimbursed at $2.20 per sq. ft. as space is leased.
Rock Hill, NC	Sales Price $34 M	126,000 and 432,000	2016	Partnership between the City of Rock Hill, NC and Scannell Properties. Price also included industrial park
Sioux City, IA[1]	N/A	40,000-50,000	2014	Proposed partnership between the City of Sioux City, IA and yet to be identified developers. Developers would construct building and obtain financing. The City of Sioux City would donate the land and pay the interest on the loan

Source: University of North Texas analysis, 2020.

Table 24. Roles for Implementing Economic Development Recommendations

Recommendation	Implementation Step	Lead and Support Organizations
Refine Economic Development Strategy for New Goals	Develop a coordinated marketing strategy for properties near rail and airport	EDCs; Grayson County
	Develop and publish an online inventory of assets, such as utilities and water availability	Grayson County; EDCs
	Consider partnership with public university to develop more advanced training opportunities	Grayson County; Municipalities; EDCs
	Continue coordination with Grayson College on workforce needs (e.g., advanced warehousing)	EDCs; Grayson County
Create Opportunities for Manufacturing Entrepreneurs and Employers	Support manufacturing entrepreneur and management training, such as Lean Six Sigma or PMP training	Grayson College; Grayson College; EDCs
	Create a manufacturing incubator or "makerspace" to lower barriers to entry (space, 3D printing, expert staff)	Grayson College; Grayson College; EDCs
	Advertise existing training programs to manufacturing sector and community	Grayson College; Grayson College; EDCs
Ensure Adequate Space for Growth	Consider speculative industrial site development to increase competitiveness, especially as a PPP	EDCs; Grayson County
	Preserve large parcels, especially those with transportation access, for industrial uses (zoning, subdivision policies)	Municipalities; Grayson County
	Support growing workforce by monitoring housing, wage, and quality of life trends	Grayson County; Municipalities; EDCs

FUNDING OPPORTUNITIES

This section provides an overview of potential funding opportunities available to Grayson County for capital infrastructure and transportation planning projects. While not an exhaustive list, the sources detailed here include major programs at the state and Federal level typically available to infrastructure investments and projects such as those identified as part of this plan.

TxDOT Funding

TxDOT funnels its available funding through 12 categories, shown in Figure 41. These categories direct Federal, state, and local funds into buckets organized by the types of projects funded by each category. Each category is described below with information on potential corridors and projects that could be funded in Grayson County.

- **Category 1: Preventative Maintenance and Rehabilitation—**Preventive maintenance and rehabilitation on the existing state highway system, including minor roadway modifications to improve operations and safety; and the installation, rehabilitation, replacement, and maintenance of pavement, bridges, traffic control devices, traffic management systems, and ancillary traffic devices. Projects are selected by districts. The Texas Transportation Commission allocates funds through a formula allocation program. Projects selected for energy-sector distribution/initiatives are managed by the Maintenance Division (MNT). This funding

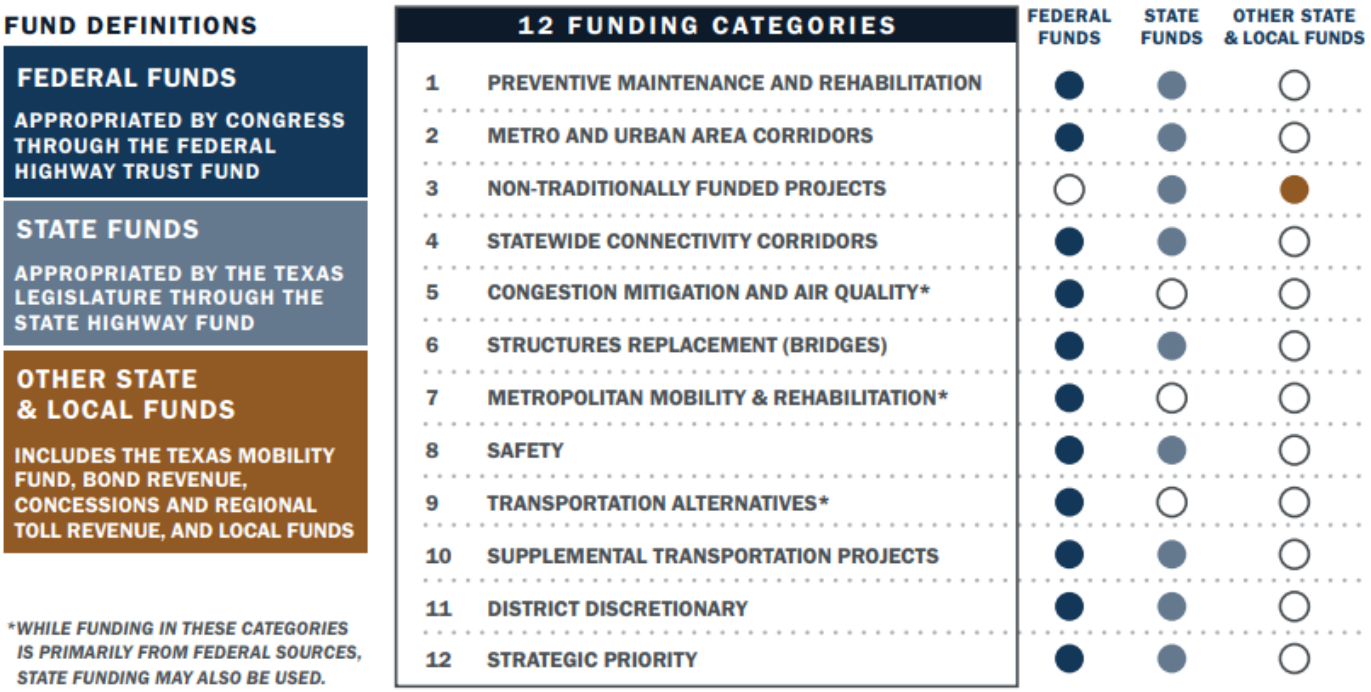
category applies to all state roadways in Grayson County.

- **Category 2: Metropolitan and Urban Area Corridor Projects—**Mobility and added capacity projects along a corridor that improve transportation facilities in order to decrease travel time and the level or duration of traffic congestion, and safety, maintenance, or rehabilitation projects that increase the safe and efficient movement of people and freight in metropolitan and urbanized areas. Projects are selected by MPOs in consultation with TxDOT. The Texas Transportation Commission allocates funds through a formula allocation program. This funding category applies to all state roadways in Grayson County.

- **Category 3: Non-traditionally Funded Transportation Projects—**Transportation-related projects that qualify for funding from sources not traditionally part of the state highway fund including state bond financing under programs such as Proposition 12 (General Obligation Bonds), Texas Mobility Fund, pass-through toll financing, unique Federal funding, regional toll revenue, and local participation funding. Projects are determined by legislation, Texas Transportation Commission approved Minute Order, and local Government commitments.

The Texas Mobility Fund (TMF) could present a funding opportunity for roadways in Grayson County if bonding capacity becomes available. Local governments can coordinate directly with TxDOT districts to request TMF funding. TxDOT evaluates TMF requests on a case-by case basis and funds projects that provide the highest public transportation benefits. Once funding is approved, the local Government will then coordinate with the MPO to ensure the project is listed in regional planning documents.

Figure 41. TxDOT Funding Categories



- **Category 4: Statewide Connectivity Corridor Projects—**Mobility and added capacity projects on major state highway system corridors which provide statewide connectivity between urban areas and corridors, to create a highway connectivity network composed of the Texas Highway Trunk System, National Highway System, and connections from those two systems to major ports of entry. In Grayson County, the following highways are on these networks:
  - Texas Highway Trunk System: US 75 and US 82.
  - National Highway System: US 75 and US 82.
- **Category 6: Structures Replacement and Rehabilitation—**Replacement and rehabilitation of deficient existing bridges located on public highways, roads, and streets in the state; construction of grade separations at existing highway and railroad grade crossings; and rehabilitation of deficient railroad underpasses on the state highway system. Projects are selected by the Bridge Division (BRG) based on a listing of eligible bridges prioritized first by deficiency categorization (structurally deficient followed by functionally obsolete) and then by sufficiency ratings. Railroad grade separation projects are selected based on a cost-benefit index rating. Projects in the Bridge Maintenance and Improvement Program are selected statewide based on identified bridge maintenance/improvement needs to aid in ensuring the management and safety of the state's bridge assets. The Texas Transportation Commission allocates funds through the Statewide Allocation Program.
- **Category 8: Safety—**Safety-related projects both on and off the state highway system including the Federal Highway Safety Improvement Program, Railway-Highway Crossing Program, Safety Bond Program and High Risk Rural Roads Program. Projects are selected statewide by federally mandated safety indices and prioritized listing. Projects selected in the Systemic Widening Program are evaluated by roadway safety features for preventable severe crash types using total risk factor weights. The Texas Transportation Commission allocates funds through the Statewide Allocation Program.
- **Category 11: District Discretionary—**Projects eligible for Federal or state funding selected at the district engineer's discretion. The Texas Transportation Commission allocates funds through a formula allocation program. A minimum $2.5 million allocation goes to each district per legislative mandate. The commission may supplement the funds allocated to individual districts on a case-by-case basis to cover project cost overruns.
- **Category 12: Strategic Priority—**Projects with specific importance to the state including those that generally promote economic opportunity, increase efficiency on military deployment routes or retain military assets in response to the Federal military base realignment and closure reports, and maintain the ability to respond to both manmade and natural emergencies. The Texas Transportation Commission selects these projects.

Federal Transportation Grant Opportunities

Since the implementation of the Transportation Investment Generating Economic Recovery (TIGER) discretionary grant program as part of the American Recovery and Reinvestment Act (ARRA) of 2009, discretionary funding has played a larger role in large scale transportation infrastructure projects. This trend has increased with programs under the Moving Ahead for Progress in the 21st Century (MAP-21) and the Fixing America's Surface Transportation (FAST) Act, which provided the first Federal funding specifically targeted towards freight investments. While the FAST Act has been reauthorized, a new transportation bill may change the available funding programs or their requirements. Currently, the two major Federal transportation grant programs are the Better Utilizing Investments to Leverage Development (BUILD) and the Infrastructure for Rebuilding America (INFRA) discretionary grant programs. Additionally, the Consolidated Rail Infrastructure and Advanced Transportation and Congestion Management Technologies Deployment programs provide funding specific to rail and technology infrastructure, respectively. Each of these is summarized below.

Better Utilizing Investments to Leverage Development (BUILD) Grant Program

The Better Utilizing Investments to Leverage Development (BUILD) grant program is a U.S. Department of Transportation (U.S. DOT) discretionary grant program previously known as TIGER[25]. BUILD grants can be used for surface transportation projects, including multimodal or intermodal projects. The U.S. DOT plans to award a greater share of funding to rural transportation projects than urban projects, which may benefit some parts of Grayson County. The fiscal year 2018 appropriation for the BUILD program was $1.5 billion. Up to $15 million can be awarded to planning or design of projects, and up to $300 million can be combined with the Transportation Infrastructure Finance and Innovation Act (TIFIA) program for loan assistance. Statutory requirements related to minimum project size and grant amounts are depicted in Table 25.

Eligible projects under the BUILD grant program include:

- Highway, bridge or other road projects.
- Freight rail transportation projects.
- Intermodal freight projects.

The selection criteria for BUILD grants include:

- Safety.
- State of Good Repair.
- Economic Competitiveness.
- Environmental Protection.
- Quality of Life.
- Innovation.
- Partnership.
- Non-Federal Revenue for Transportation Infrastructure Investment.

Infrastructure for Rebuilding America (INFRA) Grant Program

Revisions to the FAST Act created the Infrastructure for Rebuilding America (INFRA) grants program (previously known as Fostering Advancements In Shipping And Transportation For The Long-Term Achievement Of National Efficiencies, or FASTLANE)[26]. INFRA allows eligible applicants to apply for funding to complete projects that improve safety and hold the greatest promise to eliminate freight bottlenecks and improve critical freight movements. Approximately $1.5 billion were available for infrastructure grants for fiscal years 2017 and 2018. States can leverage their own dedicated transportation funding with these Federal sources, as well as with other local, regional, and private-sector funding.

Eligible projects under the INFRA grant program include:

- Highway freight projects on the NHFN, which includes the segments of US 75 designated as Critical Urban and Rural Freight Corridors.
- Highway or bridge projects on the National Highway System (NHS), which includes US 75 and US 82.
- Grade crossing or grade separation projects.
- Other freight projects that are:
  - An intermodal/rail freight project, or
  - Within the boundaries of a public or private freight rail, maritime (including ports) or intermodal facility.

Eligible project costs include development phase activities and construction activities. Development phase activities involve planning, feasibility analysis, revenue forecasting, environmental review, preliminary engineering, design work, and other pre-construction activities. Construction activities involve new construction, reconstruction, rehabilitation, property or

[25] https://www.transportation.gov/BUILDgrants.

[26] https://www.transportation.gov/buildamerica/infragrants

equipment acquisition, environmental mitigation, construction contingencies, and operational improvements. Additional statutory requirements related to minimum project size and grant amounts are depicted in Table 25.

The selection criteria for the INFRA grants include:

- Support for national or regional economic vitality.
- Leveraging of Federal funding.
- Potential for innovation.
- Performance and accountability.

Consolidated Rail Infrastructure and Safety Improvements (CRISI) Program

The Consolidated Rail Infrastructure and Safety Improvements (CRISI) Program is a U.S. Department of Transportation (U.S. DOT) Federal Railroad Administration (FRA) discretionary grant program that funds projects that improve the safety, efficiency and reliability of intercity passenger and freight rail. About $300 million has been appropriated for this program annually since 2018. Statutory requirements related to minimum project size and grant amounts are depicted in Table 25.

Eligible projects under the CRISI grant program include:

- Railroad safety technology
- Rail capital projects that address congestion, facilitate ridership, or improve short-line or regional railroad infrastructure
- Highway-rail grade crossing improvements
- Rail line relocation
- Regional rail and corridor service development
- Enhancement of multimodal connections and service integration between rail and other modes
- Implementation of safety programs
- Workforce development
- Research

The selection criteria for CRISI grants include:

- Effects on system and service performance
- Effects on safety, competitiveness, reliability, trip or transit time, and resilience
- Efficiencies from improved integration with other modes
- Ability to meet existing or anticipated demand

Advanced Transportation and Congestion Management Technologies Deployment (ATCMTD)

The Advanced Transportation and Congestion Management Technologies Deployment (ATCMTD) Program was established as part of the FAST Act as a grant funding source for model deployment sites and advanced technologies. A number of programs and technologies are eligible to receive this funding including advanced traveler information, public transportation, and safety systems; autonomous vehicle, transportation management, collision avoidance, infrastructure and advanced mobility and access technologies; maintenance, monitoring, and condition assessment; and systems for data collection, among others. Grants are distributed based on applicant's ability to prove that the program or technology improves safety, efficiency, system performance, and infrastructure return on investment. The program was authorized for $60 million annually from 2016-2020.

Other Funding Mechanisms

Transportation Infrastructure Finance and Innovation Act (TIFIA)

The Transportation Infrastructure Finance and Innovation Act (TIFIA) program provides Federal credit assistance in the form of direct loans, loan guarantees, and standby lines of credit to finance surface transportation projects of national and regional significance. TIFIA credit assistance provides improved access to capital markets, flexible repayment terms, and potentially more favorable interest rates than can be found in private capital markets for similar instruments. TIFIA can help advance qualified large-scale projects that otherwise might be delayed or deferred because of size, complexity or uncertainty over the timing of revenues, and could be considered as a source of funding for infrastructure projects in Grayson County. TxDOT and local governments are both eligible applicants for the TIFIA program, though local governments may wish to apply in collaboration with TxDOT if creditworthiness is a concern.

Projects eligible for Federal assistance through existing transportation programs are eligible for the TIFIA credit program. These projects include:

- Highway projects; including intelligent transportation systems (ITS).
- International bridges and tunnels.
- Publicly-owned freight rail facilities.
- Private facilities providing public benefit for highway users.
- Intermodal freight transfer facilities, projects that provide access to such facilities.
- Service improvements on the National Highway System.

Projects located within the boundary of an intermodal terminal are also eligible to receive TIFIA credit assistance under certain conditions. The project must address surface transportation to facilitate direct intermodal interchange, transfer, and access into and out of the facility. Construction and non-construction costs are eligible to be financed, including but not limited to planning, feasibility analysis, environmental review, permitting, and preliminary engineering and design work. Eligible projects must be included in the State

Table 25. Funding Requirements for Federal Grants

Grant	Match Requirement	Minimum Funding	Maximum Funding
Better Utilizing Investments to Leverage Development (BUILD) Transportation Grants Program	20% - Urban Projects < 20% - Rural Projects	$5,000,000 - General $1,000,000 - Rural Projects $0 - Planning Projects	$25,000,000
Infrastructure for Rebuilding America (INFRA) Program	40%, of which no more than half can come from another federal source.	$5,000,000 - Small Project $25,000,000 - Large Project	N/A. Note that from FY2016-2020, $500 million was available for non-highway freight rail, port, and intermodal projects
Advanced Transportation and Congestion Management (ATCMTD) Grant	50%	N/A	$12,000,000
Consolidated Rail Infrastructure and Safety Improvements (CRISI) Program	20%	N/A	N/A

Note: Due to the pending reauthorization of the FAST Act, available discretionary grant programs may change, and they may or may not be reauthorized.

Transportation Improvement Program (STIP) with a capital cost of at least $50 million. ITS projects have a $15 million eligibility requirement. TIFIA financing should attract public and private investment, result in a project proceeding earlier and/or more efficiently, and reduce use of Federal grant assistance to the project.

Railroad Rehabilitation and Improvement Financing (RRIF)

The Railroad Rehabilitation and Improvement Financing (RRIF) Program is a potential source of funding for rail-related projects in Grayson County. The program was established in the 1998 Transportation Equity Act for the 21st Century and amended most recently by the FAST Act in 2016. The RRIF program authorizes the Federal Railroad Administration (FRA) Administrator to provide direct loans and loan guarantees for projects which:

- Acquire, improve, or rehabilitate intermodal or rail equipment or facilities, including track, components of track, bridges, yards, buildings and shops.
- Refinance outstanding debt incurred for the purposes listed above.
- Develop or establish new intermodal or railroad facilities.

The FAST Act amended the program to clarify that pre-construction activities such as planning or design can be financed.

Up to $35 billion of financing is available, with at least $7 billion reserved for projects not on Class I railroads. Since 2002, 35 loan agreements totaling $5 billion have been executed (an average of $147 million per agreement). Financing can be provided for up to 100% of project costs with repayment periods of up to 35 years. Recipients benefit from interest rates that equal to the cost of borrowing to the Government. The FAST Act also authorized the U.S. DOT to enter into Master Credit Agreements. These agreements include one or more loans to be made in the future on a program of related projects.

Railroads, state and local governments, Government-sponsored authorities and corporations, joint ventures that include at least one railroad, and limited option freight shippers who intend to construct a new rail connection are all eligible to borrow under RRIF. The FAST Act increased access to this program by extending eligibility to allow joint ventures with any type of eligible applicant.

Applications will be selected based on the following criteria:

- The statutory eligibility of the applicant and the project.
- The creditworthiness of the project, including the present and probable demand for rail services and a reasonable likelihood that the loan will be repaid on a timely basis.
- The extent to which the project will enhance safety.
- The significance of the project on a local, regional, or national level in terms of generating economic benefits and improving the railroad transportation system.
- The improvement to the environment that is expected to result directly or indirectly by the implementation of the project.
- The improvement in service or capacity in the railroad transportation system or the reduction in service-or capacity-related problems that is expected to result directly or indirectly from the implementation of the project.

Priority will be given to projects that:

- Enhance public safety, including positive train control;
- Enhance the environment through energy efficiency and environmental quality improvements;
- Promote economic development and increase U.S. competitiveness in international markets;
- Are endorsed by applicable statewide planning documents;
- Preserve or enhance rail or intermodal service to small communities or rural areas;

- Enhance service and capacity in the national rail system; or,

- Materially alleviate rail capacity problems.

Public-Private Partnerships

A Public-Private Partnership (P3) is a contractual agreement between a public agency (Federal, state or local) and a private entity for a long-term performance based approach to procure public infrastructure. The private entity assumes the major share of the risk in terms of financing, constructing and the performance of the project in return for the right to collect revenue from the project over a set period of time. In Texas, this model was used effectively to expand transportation infrastructure such as the Dallas LBJ Expressway and the North Tarrant Express, both sponsored by TxDOT in cooperation with local entities. The Texas Transportation Commission has elected to remove toll projects from the TxDOT UTP for the time being. However, plans for the Dallas North Tollway's extension to the Grayson/Collin County line continue to be developed, and Grayson County is preparing for a future extension of that alignment into the County by developing the Grayson Parkway Spur. Additionally, rail and intermodal projects are an opportunity for public-private partnerships with private railroad companies when these projects can provide enough public benefit to justify spending County funding.

APPENDIX A: SWOT ANALYSIS INPUT

This appendix details the responses of the Grayson County Freight Advisory Committee members for the Strengths, Weaknesses, Opportunities, and Threats (SWOT) analysis conducted in May, 2018. Participants were given prompts from the consultant team and the opportunity to provide free responses in each of the SWOT categories. The responses were summarized and organized by the consultant team into the categories shown below.

Category	Response	Strength	Weakness	Opportunity	Threat
Air Cargo	691-289 connection would help NTRA			O	
Air Cargo	NTRA has long runway, outside of DFW airspace			O	
Air Quality	Air quality in attainment	S			
Air Quality	Air quality is near non-attainment; proactive planning needed with DFW				T
Bridges	FY21 bridge heights going up to 18.5 ft for TxDOT standards			O	
Collaboration	MPO and RMA able to move forward on ideas	S			
Collaboration	MPO/FAC policy group			O	
Collaboration	Siloed discussions occurring				T
Collaboration	Engaged community/good planning	S			
Collaboration	Active EDCs, TxDOT, communities	S			
Economic Environment	Diversified markets can weather economic shifts	S			
Economic Environment	Niche markets are specialized (semiconductor, food)	S			
Economic Environment	Business friendly	S			
Economic Environment	Low cost of living	S			
Economic Environment	Low cost of permitting, doing business	S			
Economic Environment	Proximity to Metroplex	S			
Economic Environment	DFW labor and land cost going up—Grayson more attractive			O	
Funding	Roadway funding—funding diversions and declining revenue				T
Funding	Using innovative funding mechanisms	S			

Category	Response	Strength	Weakness	Opportunity	Threat
Funding	Vehicle registration fee/highway funding			O	
Intermodal	Intermodal facilities (ex: ACS)			O	
Maintenance	If max weight goes up, maintenance cost goes up				T
Maintenance	Poor maintenance could lead to lower weight limits				T
Maintenance	69/75—road conditions		W		
Mobility/Access	Access to western markets (have to go to Dallas or 82)		W		
Mobility/Access	U.S. 82—if not invested in before development comes (don't want to be like 380)				T
Mobility/Access	Alternate routes available (120, 289)	S			
Mobility/Access	U.S. 82 could be major E/W route with investment			O	
Mobility/Access	Truck weight increase to 100k would reduce number of trucks			O	
OS/OW	OS probably not affected by CAV in the near future			O	
OS/OW	U.S. 75/U.S. 82 (SB 75 -EB 82)—OS trucks (12-14 ft wide)		W		
OS/OW	Dallas has OW truck curfew, OW routes down 69 to avoid		W		
OS/OW	Policy- if U.S. 75 becomes IH, could change OS/OW permitting				T
Rail	UP not serving local businesses; generally, some customers don't have access		W		
Rail	At-grade crossings need separation, especially if growth continues		W		
Rail	2 Class I railroads (UP and BNSF)	S			
Rail	Rail access and development			O	
Rail	Customers could use rail if available			O	
Site Development	Gas distribution infrastructure not developed at some sites		W		
Site Development	Rail-served industrial park	S			
Site Development	Water supply, air quality, power plant, land availability	S			
Site Development	Many sites with good road access	S			
Site Development	Air quality, water/land availability			O	
Technology	CAV could open funding for SDMPO			O	
Technology	Increased demand for parking due to HOS, ELD			O	
Technology	U.S. 75 as technology-ready corridor			O	
Technology	Smarter traffic mgmt—including partnering with neighbors			O	

Category	Response	Strength	Weakness	Opportunity	Threat
Trade	Lack of customs broker (at the airport)		W		
U.S. 75 Mobility	U.S. 75 has 4.5 mile gap not up to IH standard (safety and mobility issue)		W		
U.S. 75 Mobility	U.S. 75 outdated geometry		W		
U.S. 75 Mobility	On/off ramps need to be updated (some in design now)		W		
U.S. 75 Mobility	U.S. 75 constraints with growth (10 lanes in Collin County down to 4 in Grayson)				T
U.S. 75 Mobility	Major employers look for interstates, none in Grayson Co				T
U.S. 75 Mobility	Investment in on/off ramps in some areas	S			
U.S. 75 Mobility	U.S. 75 serves major N/E corridor	S			
U.S. 75 Mobility	Oklahoma investing in bringing U.S. 75 to IH standards			O	
U.S. 75 Mobility	Bond for U.S. 75 gap, could make I-45 designation possible			O	
Workforce	Partner with teachers to shift perception of mfg. careers			O	
Workforce	Low wages		W		
Workforce	Labor shortage (relatively recent issue)		W		
Workforce	If workforce comes from outside county, traffic and cost are worse				T
Workforce	Labor shortage for some industries (pulling from DFW)				T
Workforce	Perceptions of mfg. careers for potential employees (pressure to go to 4-year college)				T
Workforce	Increased employment	S			
Workforce	Partnership with Grayson College and Companies	S			
Workforce	Workforce development with Grayson College	S			
Workforce	Grants with Grayson College for training			O	
Workforce	High school advanced manufacturing program			O	

APPENDIX B: ADDITIONAL ECONOMIC BENCHMARKING DATA

REGIONAL SOCIOECONOMIC TRENDS

This appendix provides updated population, employment, income, and economic output statistics that informed the economic development assessment and recommendations in Chapters 3 and 4.

Population

During the 2010 U.S. Census, Grayson County had a population of 120,877 residents, which was an increase of 65 percent since 1960. Between 1960 and 2010, Grayson County's population growth varied from decade to decade, but its rate of growth consistently lagged the state overall. Between 2000 and 2010, Grayson County's population grew by a compounded annual growth rate (CAGR) of 0.9 percent, compared to the state of Texas's population, which grew by 1.89 percent during the same period (See Table B.1). In terms of total population, the Sherman-Denison metropolitan statistical area (MSA) ranked #23 out 25 MSAs in Texas and #313 out 383 MSAs in the United States.

Table B.1: Historic Population Growth in Grayson County and Texas, 1960-2010

Year	Grayson County	CAGR	State of Texas	CAGR
1960	73,043	--	9,579,677	--
1970	83,225	1.3%	11,196,730	1.57%
1980	89,796	0.8%	14,229,191	2.43%
1990	95,021	0.6%	16,986,510	1.79%
2000	110,595	1.5%	20,851,820	2.07%
2010	120,877	0.9%	25,145,561	1.89%

Source: U.S. Census Bureau, 2020.

Between 2010 and 2017, Grayson County's population grew by more than 10,000 persons to an estimated 131,140 residents. Despite this increase, Grayson's County's population growth rate continued to lag the state's rate during most years, until 2016 (see Table B.2).

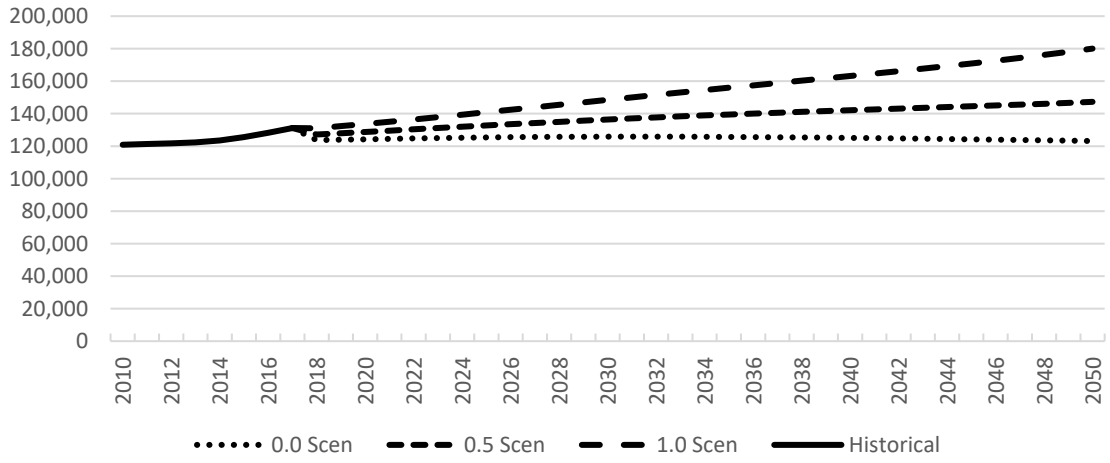
Table B.2: Recent Population Change Grayson County, 2010-2019

Year	Grayson County	Annual Growth	Percent Growth	State of Texas	Percent Growth
2010	120,877	--	--	25,145,561	--
2011	121,430	442	0.5%	25,645,629	2.0%
2012	121,854	424	0.3%	26,084,481	1.7%
2013	122,362	508	0.4%	26,480,266	1.5%
2014	123,599	1,237	1.0%	26,964,333	1.8%
2015	125,628	2,029	1.6%	27,470,056	1.9%
2016	128,291	2,663	2.1%	27,914,410	1.6%
2017	131,152	2,861	2.2%	28,295,273	1.4%
2018	133,787	2,635	2.0%	28,628,666	1.2%
2019	136,212	2,425	1.8%	28,995,881	1.3%

Note: 2010 Census counts assume April 1, 2010, while the estimate years assume the counts are on July 1st.
Source: U.S. Census Bureau, 2020.

Every few years the Texas State Data Center prepares population projections for the state and each county in Texas. Three sets of projections are prepared, based upon three growth scenarios. The first scenario, called the zero-migration scenario assumes a region has no net migration. The region's future population growth is determined entirely by births and deaths. The 0.5 migration scenario assumes that the future county migration rate will be one-half the historic 2000 to 2010 migration rate, as estimated by the U.S. Census Bureau. The 1.0 migration scenario assumes that future migration rate will equal to the region's 2000-2010 migration rate. Figure B.1 suggests that the 1.0 migration scenario for Grayson County most closely aligns with recent population growth trends.

Figure B.1: Population Projections for Grayson County, 2018 to 2050

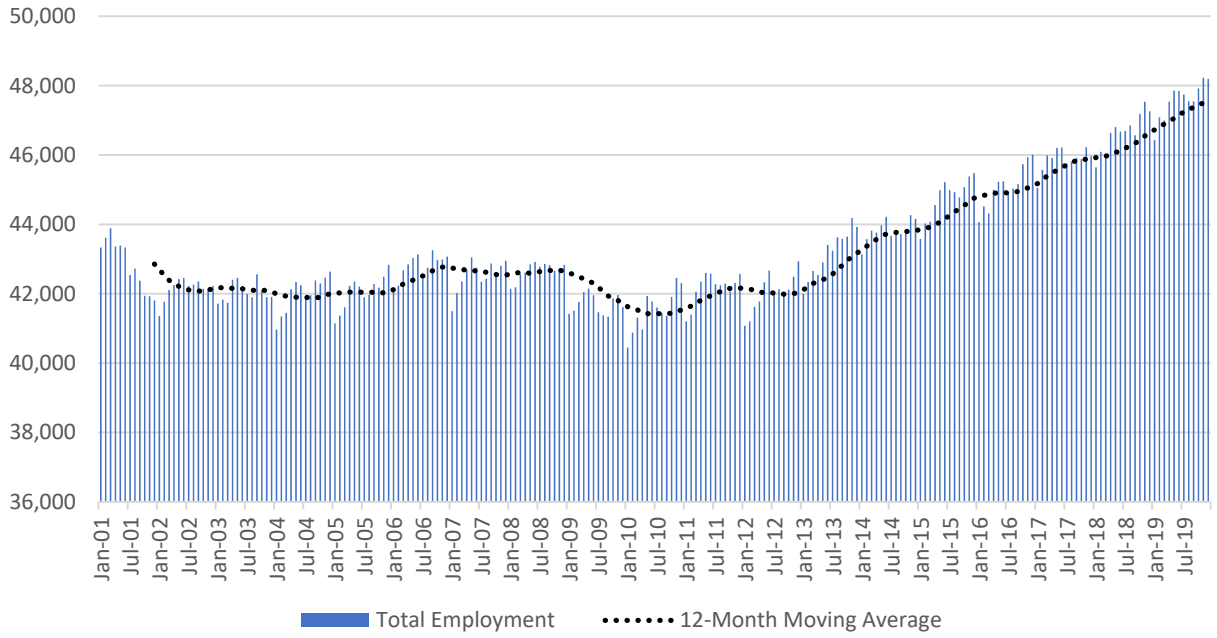


Source: Texas State Data Center and U.S. Census Bureau, 2018.

Employment

At the end of 2019, the Grayson County economy had roughly 48,000 jobs. Figure B.2 shows the total employment in Grayson County between 2001 and 2019. These data show that employment growth in the region was essentially stagnant from 2001 to 2012. During the economic expansion that followed the 2001 Recession, job growth was modest, as were the job losses during the 2008-2009 Recession. However, starting in 2012, the region began to experience substantial job growth that continued through 2019. The 12-month moving average line shows the smoothed growth trend over this period.

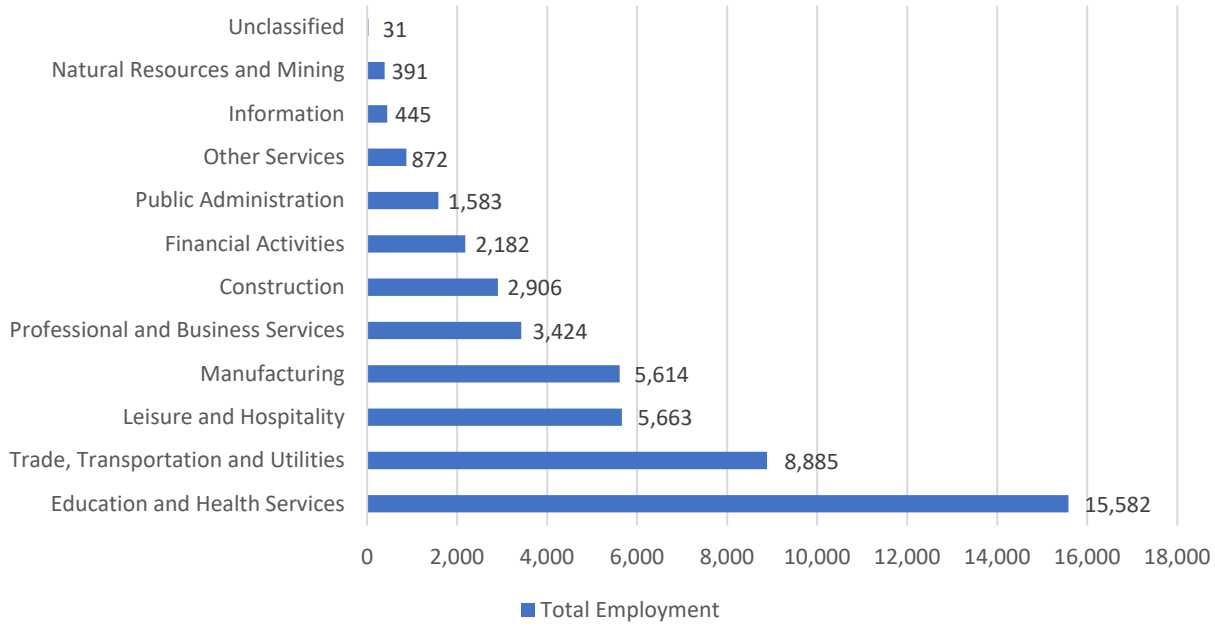
Figure B.2: Total Employment in Grayson County, 2001-2019



Source: U.S. Bureau of Labor Statistics, 2020.

Total employment by industry sector is shown in Figure B.3. The region's largest employment sector is education and health care services, which is generally a function of population. The next largest share of total employment is in the trade, transportation, and utilities sector. This sector includes retail establishments. Notably, Grayson County's fourth largest employment sector, with more 5,600 workers, is manufacturing. Other freight-intensive sectors are construction (2,906 jobs) and natural resources and mining (391 jobs).

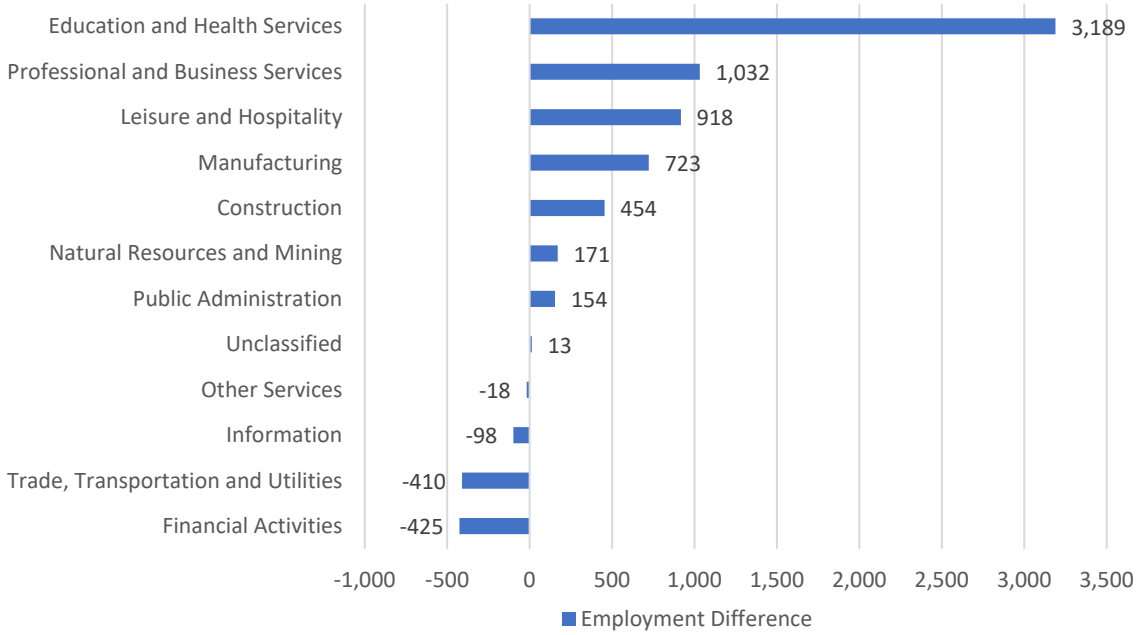
Figure B.3: Grayson County Employment by Industry Sector, 2019



Source: Texas Workforce Commission, 2020.

Between 2007 and 2019, the manufacturing sector gained approximately 723 trade, while the transportation, and utilities sector, which includes retailers and trucking, lost 410 jobs (See Figure B.4). The construction sector added 454 jobs and the natural resources and mining sector added 171 jobs. Most of the employment growth in the region has been in the service sector, with education and health services accounting for more than half of the county's employment growth with 3,189 new jobs. The professional and business services sector was the second fastest growing sector with 1,032 additional jobs and the leisure and hospitality sector was the third fastest growing sector with 918 new jobs (pre-COVID-19).

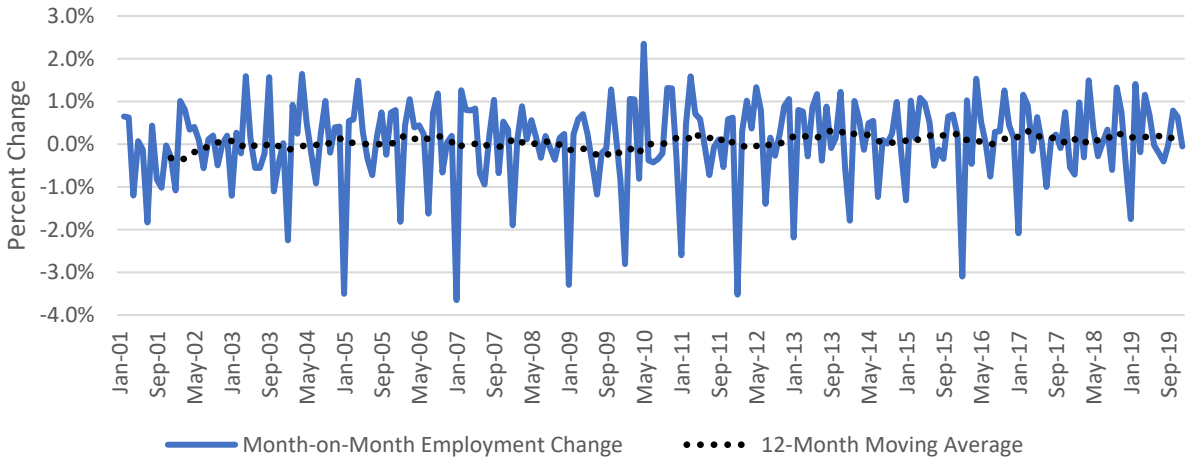
Figure B.4: Grayson County Employment Change by Sector, 2009-2019



Source: Texas Workforce Commission, 2020.

Figure B.5 shows unadjusted month-on-month employment change in Grayson County between 2001 and 2019. As is obvious from the graph, the percent employment change can fluctuate significantly from month to month. Many of the largest swings are the result of seasonal hiring, but other abrupt changes can reflect academic calendars, new employers, layoffs, furloughs, or shutdowns. The 12-month moving average smooths this "noise" to show the overall employment trend. The figure shows that employment change has been positive since 2012, as noted earlier, with relatively modest average monthly growth.

Figure B.5: Month-on-Month Employment Change in Grayson County, 2001-2019

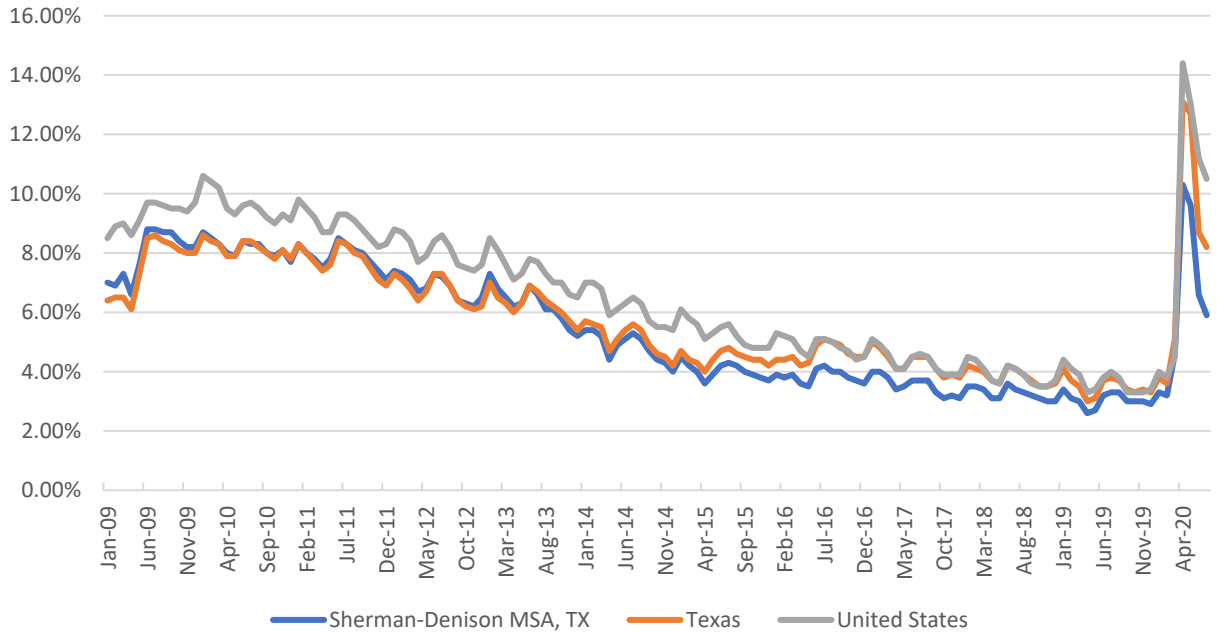


Source: U.S. Bureau of Labor Statistics, 2020. Note: Unadjusted unemployment data.

Unemployment

Grayson County's unemployment rate was usually at or below the national unemployment rate between 2009 and 2019. During the 2008-2009 Recession, Grayson County's unemployment rate peaked at 8.8 percent in June 2009 (See Figure B.6). Since 2011, the county's unemployment rate consistently fell and generally followed the statewide rate, diverging in early 2015 as the state began to lose jobs in the oil and gas sector. Grayson County's unemployment stood at its lowest level in April 2019 at 2.6 percent, before rising sharply during the economic lockdown at the start of the COVID-19 pandemic. In February 2020, the region's unemployment rate was 3.2 percent, rising to 14.4 percent by April 2020. Since the "reopening" of the state's economy, unemployment levels have dropped substantially. Grayson County's unemployment rate in July 2020 stood at 5.9 percent, considerably lower than the state's unemployment rate at 8.2 percent and the nation's at 10.5 percent.

Figure B.6: Monthly Unemployment Rate in the United States, Texas, and Grayson County, 2009-2019 (Not adjusted)

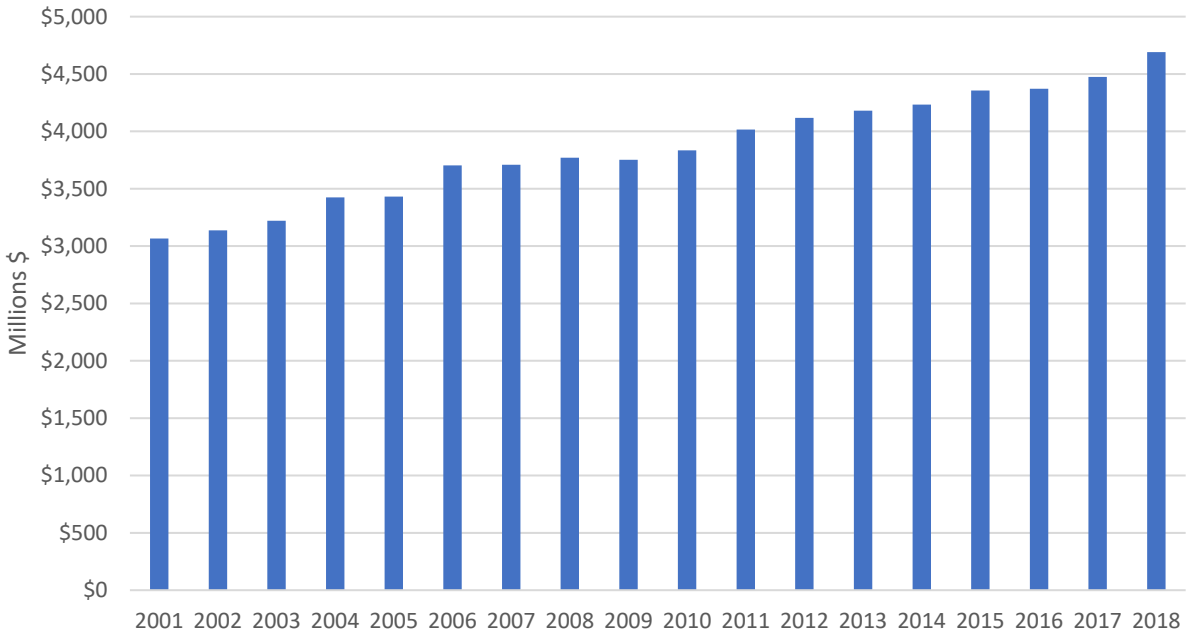


Source: Texas Workforce Commission, 2018.

Regional Gross Domestic Product (GDP)

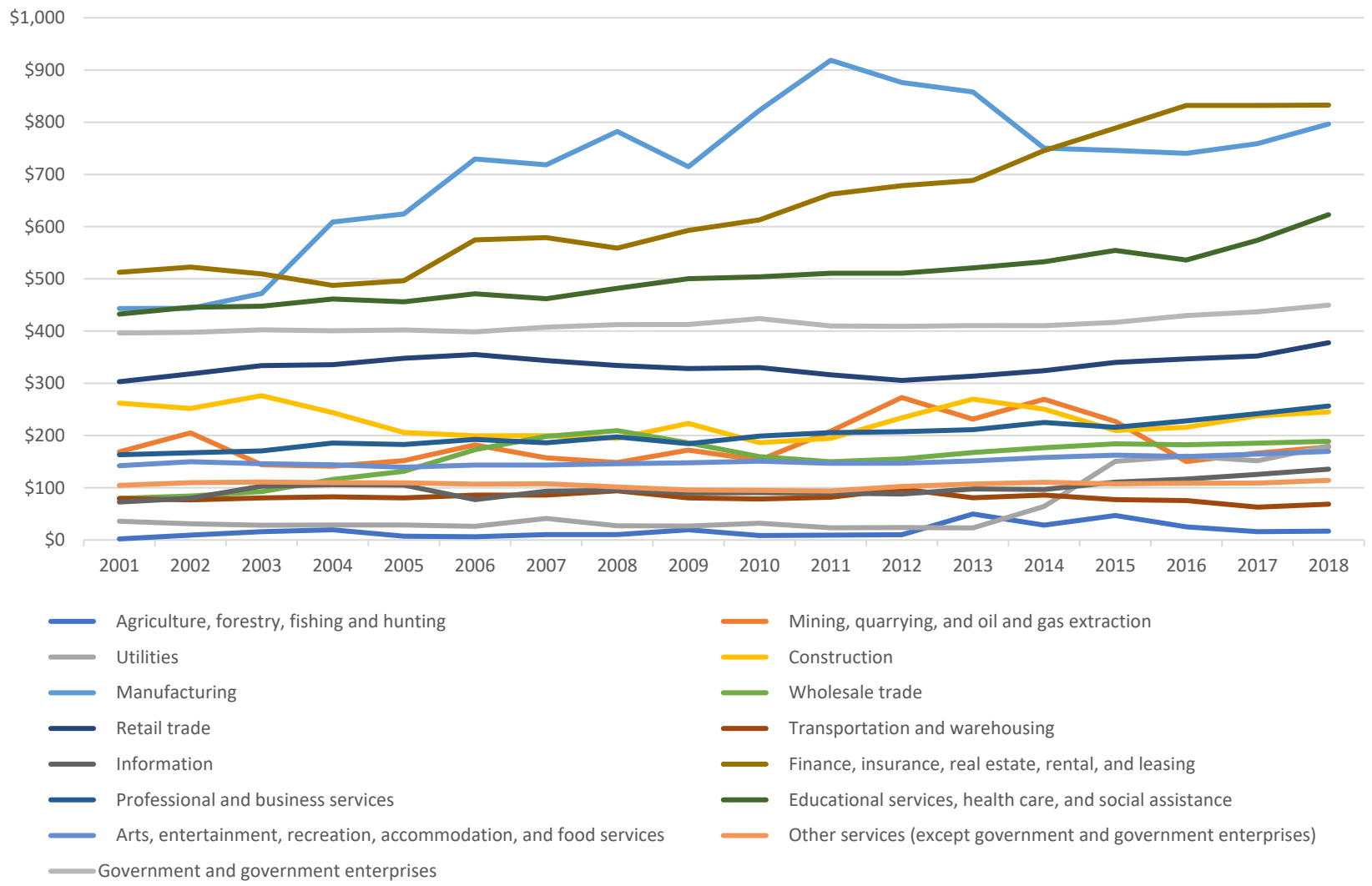
Regional gross domestic product (GDP) is a measure of the total goods and services produced within the region. The U.S. Bureau of Economic Analysis (BEA) prepares estimates of GDP for each MSA in the United States on a quarterly basis. Figure B.7 shows the Sherman-Denison MSA's GDP for the period between 2001 and 2018. During this period, the region's real GDP (i.e. adjusted for inflation) grew from $3.0 billion to almost $4.7 billion or an increase of 56.7 percent. The strongest growth period occurred between 2001 and 2006, followed by another, more modest growth period following the 2008-2009 Recession, between 2011 and 2018.

Figure B.7: Sherman-Denison MSA Real Gross Domestic Product (GDP), 2001-2018



Note: Chained to 2012 dollars.
Source: U.S. Bureau of Economic Analysis, 2020.

In addition to the aggregate, regional measure of GDP, the BEA also produces estimates of GDP by industry sector. Figure B.8 shows the annual output of GDP for each sector in the Grayson County economy. The key takeaway from the data is that the manufacturing sector, through most of this period, was the dominant contributor of the economic output of Grayson County. Its role grew significantly between 2003 and 2011, before declining from 2012 and 2014, mostly stabilizing through 2018. Other freight-oriented industry sectors, such as construction, wholesale trade, and transportation and warehousing were not large contributors to overall GDP growth in the Sherman-Denison MSA.



Source: U.S. Bureau of Economic Analysis, 2020.

Figure B.8: Sherman-Denison GDP by Industry Sector (Chained 2012 dollars), 2001-2018

Income and Wages

In 2018, the median household income in Grayson County was $54,370, which had increased 16.0 percent from the 2010 median household income of $46,875 (See Table B.3). Household incomes in Grayson County lag the state overall, which had a median household income of $59,570 in 2018. Household income also grew faster at the state level at 20.0 percent between 2010 and 2018.

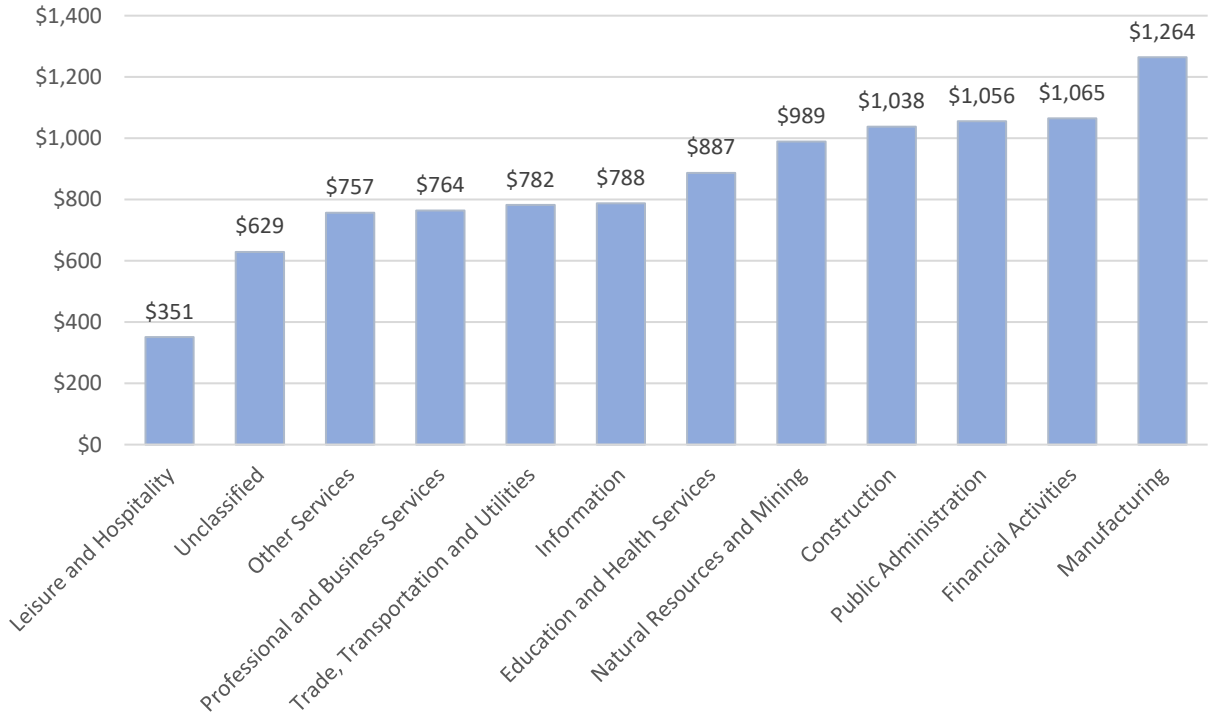
Table B.3: Nominal Median Household Income in Texas and Grayson County, 2010 and 2018

Geography	2010	2018	Change
State of Texas	$49,646	$59,570	20.0%
Grayson County	$46,875	$54,370	16.0%

Note: The 2010 and the 2018 values represent a sample of American Community Survey responses for the reported year and four prior years, adjusted to the reported year's value in dollars.
Source: U.S. Census Bureau, 2020.

Figure B.9 shows the average weekly wage by industry in Grayson County during 2019. The region's manufacturing sector provided the highest average wages at $1,264 per week. Other freight-oriented sectors with higher weekly wages were construction ($1,038), natural resources and mining ($989), and trade, transportation, and utilities ($782).

Figure B.9: Average Weekly Wage by Industry in Grayson County, 2019



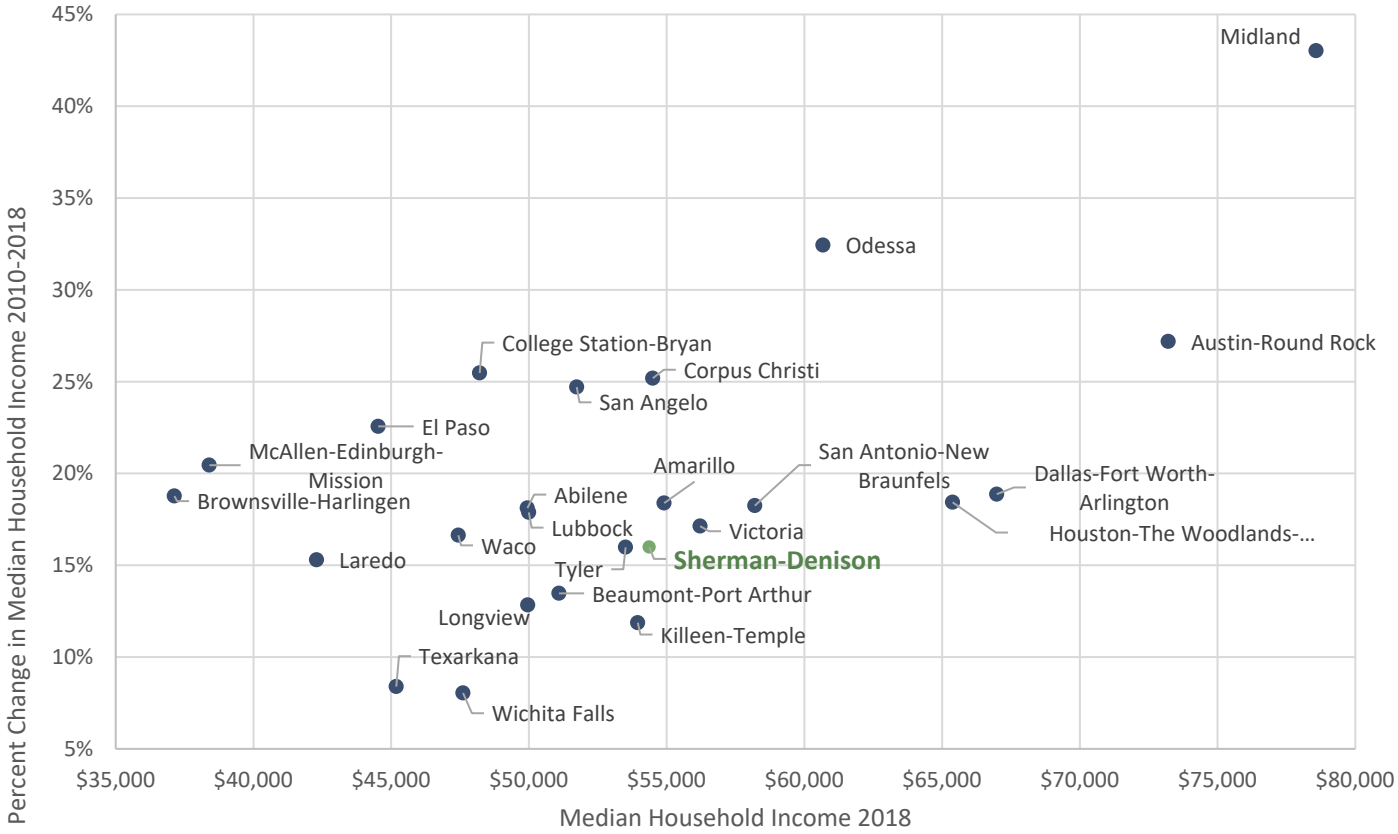
Source: Texas Workforce Commission, 2020.

Summary

Overall, the data in the preceding figures show that Grayson County has moved in a positive direction over the past few years, increasing its rate of population growth and experiencing strong employment growth. The impacts of COVID-19 only appear on Grayson's County unemployment rate, since more detailed data are not yet available (as of August 2020). However, the initial indications are that Grayson County experienced less adverse impacts than the state or nation overall. Additional discussion on this topic is included in Chapter 3.

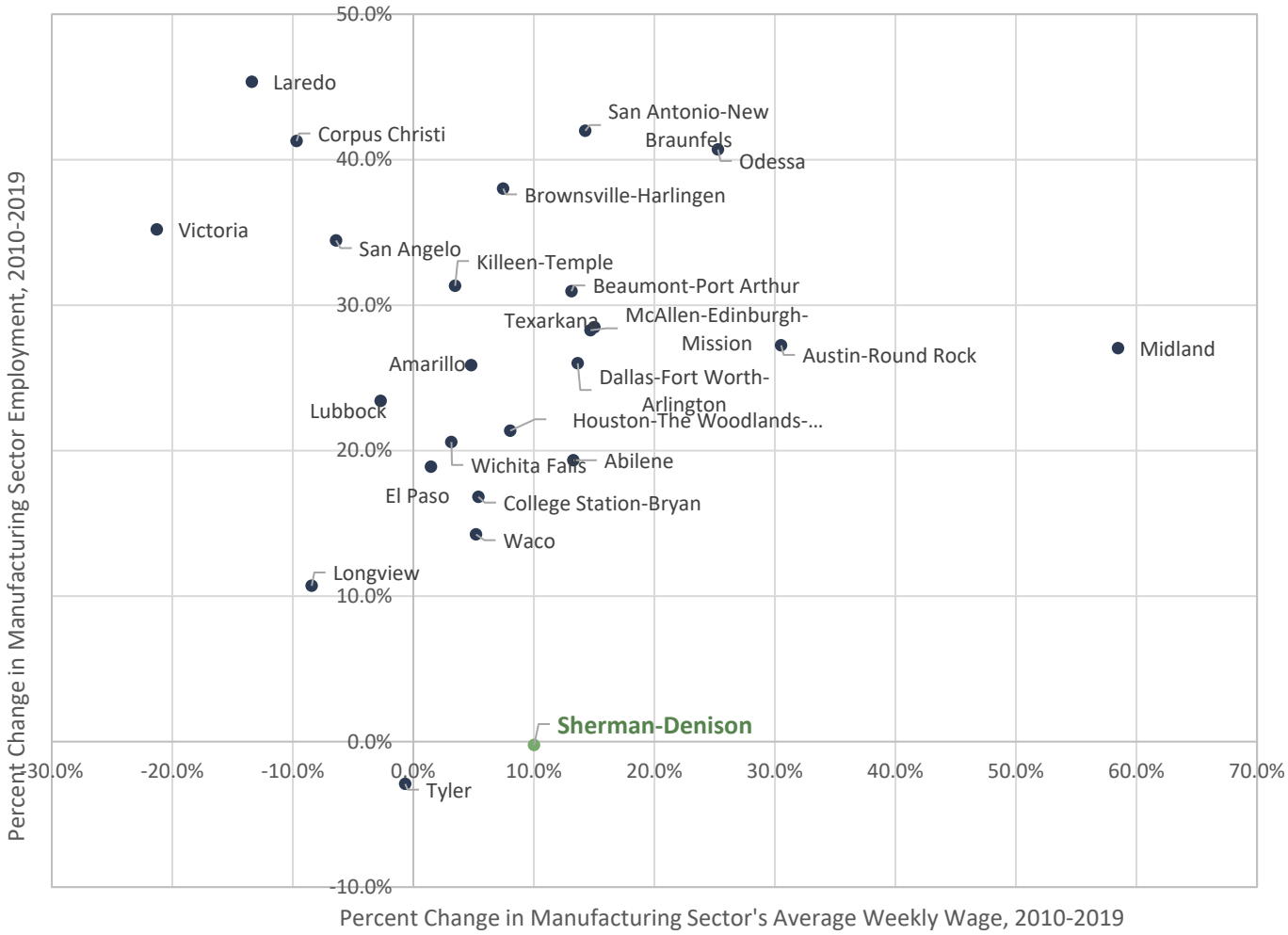
ADDITIONAL BENCHMARKING CHARTS

Figure B.10: 2016 Median Household Income versus Change in Median Household Income in Texas MSAs, 2010-2018



Source: U.S. Census Bureau, 2020.

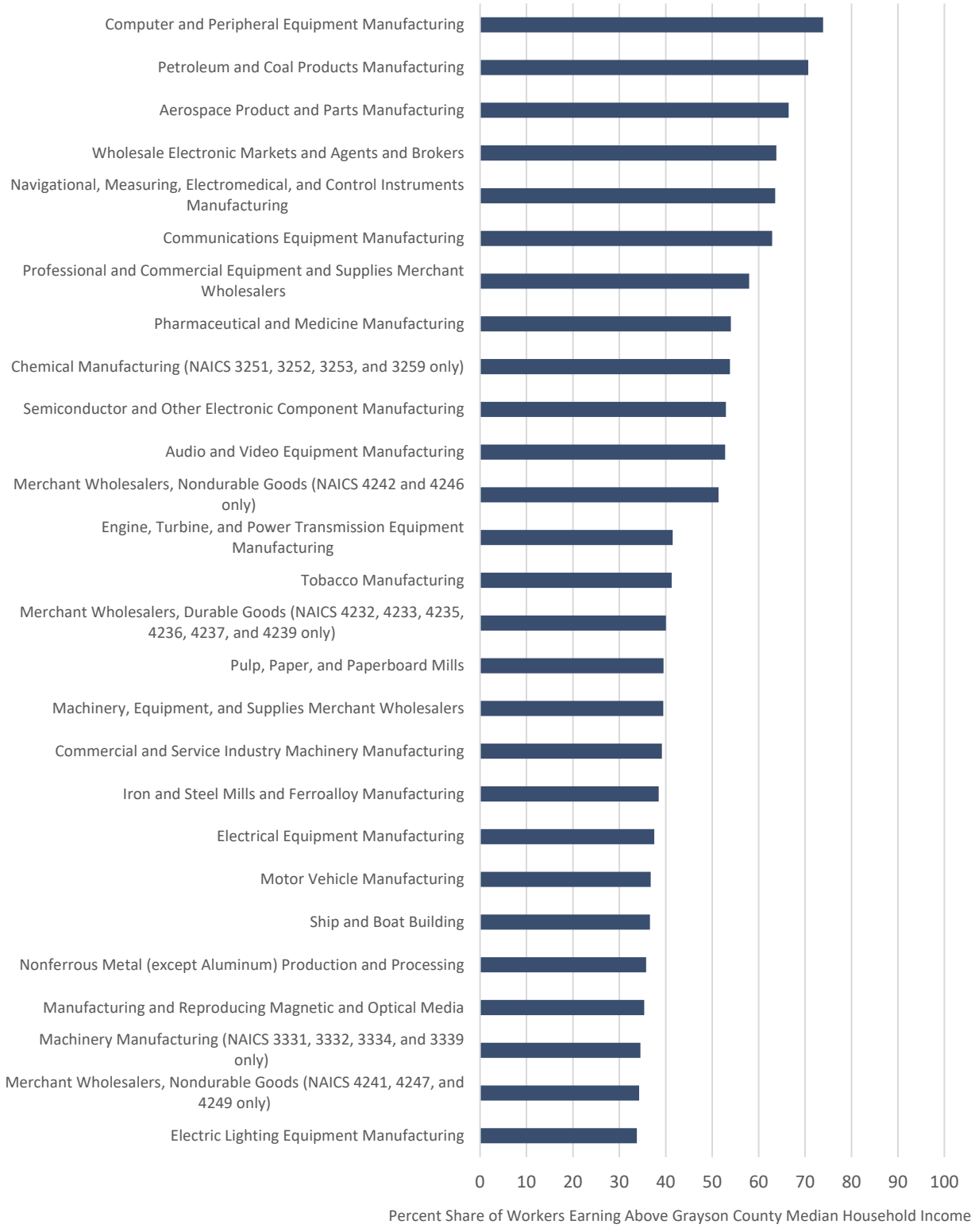
Figure B.11: Change in Manufacturing Employment versus Average Weekly Wage (Nominal) in Texas MSAs, 2010-2019

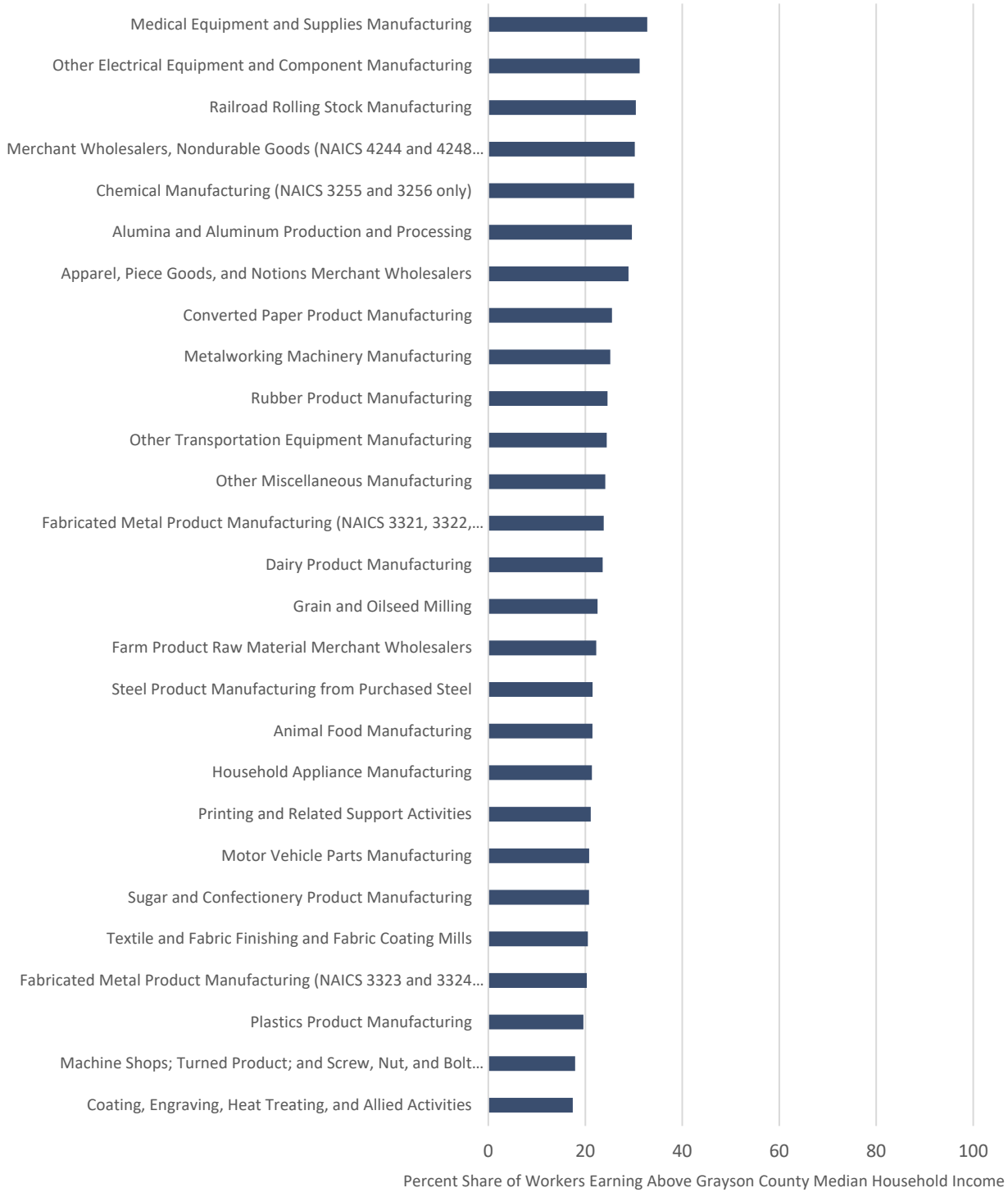


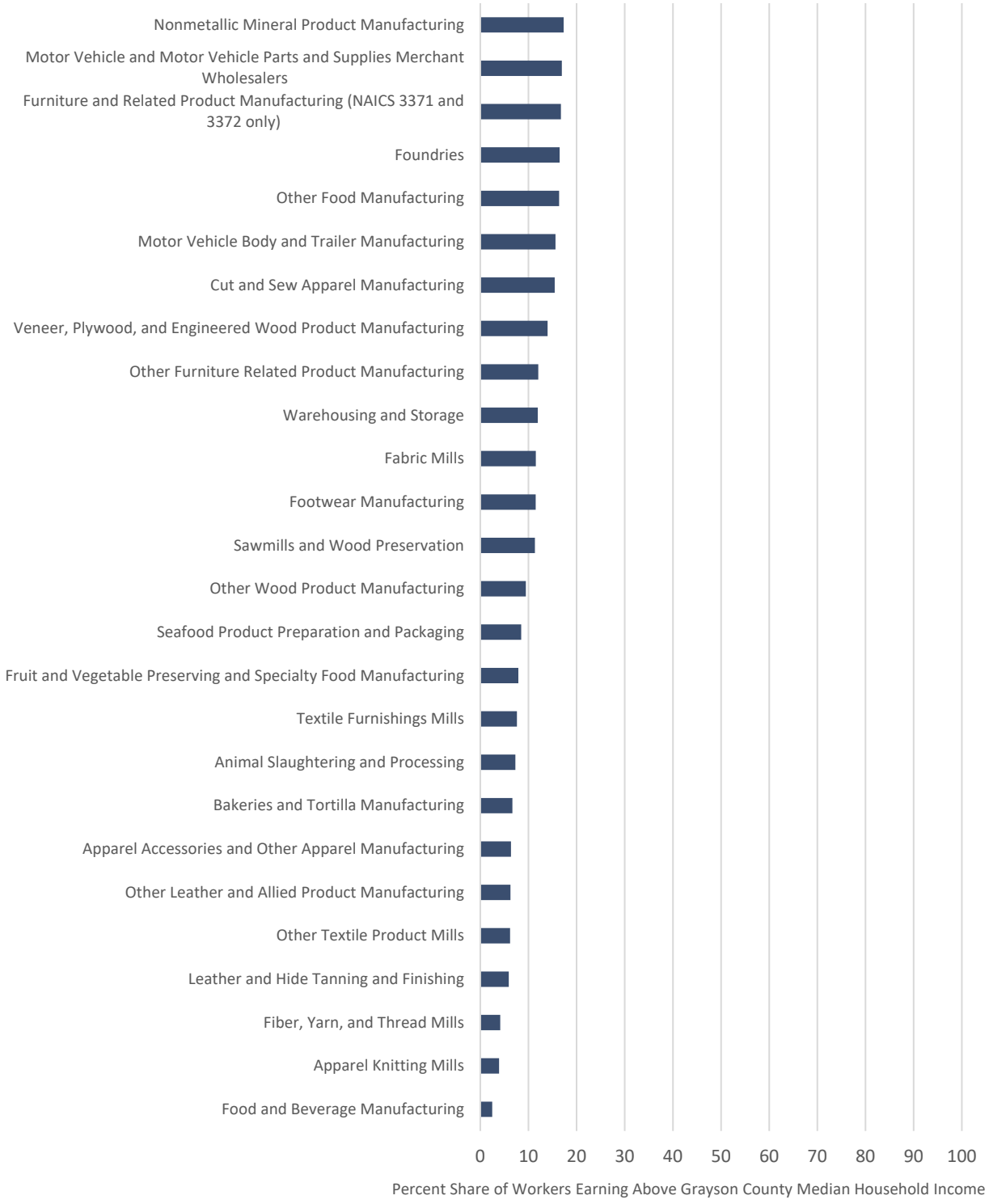
Source: Texas Workforce Commission, 2020.

ADDITIONAL TARGET INDUSTRY INFORMATION

Figure B.12: Percentage of U.S. Workers by Industry Earning More than the Grayson County Median Household Income




Medical Equipment and Supplies Manufacturing
Other Electrical Equipment and Component Manufacturing
Railroad Rolling Stock Manufacturing
Merchant Wholesalers, Nondurable Goods (NAICS 4244 and 4248…
Chemical Manufacturing (NAICS 3255 and 3256 only)
Alumina and Aluminum Production and Processing
Apparel, Piece Goods, and Notions Merchant Wholesalers
Converted Paper Product Manufacturing
Metalworking Machinery Manufacturing
Rubber Product Manufacturing
Other Transportation Equipment Manufacturing
Other Miscellaneous Manufacturing
Fabricated Metal Product Manufacturing (NAICS 3321, 3322,…
Dairy Product Manufacturing
Grain and Oilseed Milling
Farm Product Raw Material Merchant Wholesalers
Steel Product Manufacturing from Purchased Steel
Animal Food Manufacturing
Household Appliance Manufacturing
Printing and Related Support Activities
Motor Vehicle Parts Manufacturing
Sugar and Confectionery Product Manufacturing
Textile and Fabric Finishing and Fabric Coating Mills
Fabricated Metal Product Manufacturing (NAICS 3323 and 3324…
Plastics Product Manufacturing
Machine Shops; Turned Product; and Screw, Nut, and Bolt…
Coating, Engraving, Heat Treating, and Allied Activities
0
20
40
60
80
100
Percent Share of Workers Earning Above Grayson County Median Household Income


Nonmetallic Mineral Product Manufacturing
Motor Vehicle and Motor Vehicle Parts and Supplies Merchant Wholesalers
Furniture and Related Product Manufacturing (NAICS 3371 and 3372 only)
Foundries
Other Food Manufacturing
Motor Vehicle Body and Trailer Manufacturing
Cut and Sew Apparel Manufacturing
Veneer, Plywood, and Engineered Wood Product Manufacturing
Other Furniture Related Product Manufacturing
Warehousing and Storage
Fabric Mills
Footwear Manufacturing
Sawmills and Wood Preservation
Other Wood Product Manufacturing
Seafood Product Preparation and Packaging
Fruit and Vegetable Preserving and Specialty Food Manufacturing
Textile Furnishings Mills
Animal Slaughtering and Processing
Bakeries and Tortilla Manufacturing
Apparel Accessories and Other Apparel Manufacturing
Other Leather and Allied Product Manufacturing
Other Textile Product Mills
Leather and Hide Tanning and Finishing
Fiber, Yarn, and Thread Mills
Apparel Knitting Mills
Food and Beverage Manufacturing
0
10
20
30
40
50
60
70
80
90
100
Percent Share of Workers Earning Above Grayson County Median Household Income

APPENDIX C: RAIL DEVELOPMENT CASE STUDIES

Virginia Inland Port – Front Royal, VA

Considered to be the first true 'dry port' in the United States, the 161-acre Virginia Inland Port (VIP), a United States Customs-designated port of entry, was constructed in 1989 at a cost of approximately $10 million. As an official US port of entry, the VIP provides an expedited process of moving customs-cleared goods to and from the Port of Norfolk, which in turn, provides benefits of reduced congestion and bottlenecks in and around the maritime seaport. However, the main reason for the construction of the VIP, over 200 miles inland from Norfolk, was for reasons of economic competitiveness. In particular, the Virginia Port Authority saw the VIP as a means of attracting business in the Ohio Valley Region that would otherwise utilize the Port of Baltimore due to factors of time and cost.[27]

According to early articles, activity at the VIP was low at the onset of operations.[28] This activity did however increase through the 1990s and 2000s. In 2018, the 78,000 TEU-capacity VIP handled approximately 70,000 TEUs. Although this was only a small fraction of the total cargo handled by the Virginia Port Authority as a whole, it is estimated that approximately 95% of this traffic would have otherwise flowed through a different port authority. Also, while regional economic development wasn't the original goal of the project, over 30 distribution centers and industrial parks have opened up within proximity to the VIP. Such tenants now include Home Depot, Kohls, Rite Aid, Newell Rubbermaid, Lenox, Mercury Power, Red Bull, and others, with additional customers continuously expressing interest.[29]

Source: Virginiaplaces.org

[27] The Dry Port Concept: Moving Seaport Activities Inland? https://www.unescap.org/sites/default/files/bulletin78_Article-5.pdf

[28] https://www.washingtonpost.com/archive/business/1989/05/15/port-of-call-front-royal-va-inland-facility-tries-to-steer-cargo-shippers-toward-norfolk/530d27aa-5177-462f-9890-20bb190f5c84/

[29] http://www.virginiaplaces.org/transportation/inlandport.html#five

Key Takeaways

- Regardless of regional economic impacts, economic competitiveness on the part of the Port Authority was the key driver of this project.
- The actual physical location of the VIP wasn't nearly as important as the enabled access to key markets.
- The Virginia Port Authority is a large stakeholder which likely contributed to the realization of the project.

Southern Virginia Multimodal Park - Hurt, VA

Recently coming to fruition, the Southern Virginia Multimodal Park is an 800-acre industrial park located in the southern Virginia. The development is the culmination of the Staunton River Regional Industrial Facility Authority (SRRIFA), a formed partnership between four municipalities, with the assistance of Pittsylvania County. To assess feasibility, the partnership undertook a study looking at the viability of the multimodal park to lower shipping costs for potential customers. The study concluded the feasibility, but also expressed the importance of having a set of anchor tenants. Although Norfolk Southern, the Class I railroad serving the site was not interested in management of rail operations at the multimodal park, a local short line expressed interest in serving the park, and coordinating with Norfolk Southern.[30]

Given the recent timeline of the project, it's difficult to measure its success. However, in May 2020, the SRRIFA announced its first tenant at the site, Staunton River Plastics LLC. A subsidiary of a larger regional plastics producer, Rage Corporation, Staunton River Plastics is expected to occupy a 250,000 square foot facility starting in mid-2021, while bringing approximately 200 jobs to the region.[31]

Source: townofhurtva.gov

[30] https://godanriver.com/news/pittsylvania_county/southern-virginia-multimodal-park-could-be-the-door-to-the-outside-world/article_23e8e31c-d374-11e6-bc24-d31add9d44c6.html

[31] SRRIFA https://townofhurtva.gov/srrifa/

Key Takeaways

- The ability and confidence to attract anchors is key to success in a rail development project.
- Strong coordination with rail operators is crucial to attracting tenants to a rail development site.

151st Street Reconstruction - Phoenix, IL

Cook County, home to Chicago and a number of surrounding suburbs supported a project to reconstruct 151st Street in Phoenix. The project was undertaken to support the retention and expansion of Sterling Lumber, a construction lumber seller, also taking advantage of on-site rail access. The resulting efforts helped Sterling Lumber expand from 112 to 240 on-site employees.[32]

Source: Google Maps

Key Takeaways

- Knowledge of tenant and customer needs, of all sizes, is crucial in appropriating funding for transportation projects.

[32] Connecting Cook County: 2018 Freight Plan
https://www.connectingcookcounty.org/implementation/CC_FreightPlan_DEC4_FINALv5lr.pdf

BNSF Logistics Park – Edgerton, KS

In terms of size and scale, BNSF's Logistics Park just outside of Kansas City is the largest identified rail development case study at approximately 1,700 acres, including a new 400-acre intermodal terminal for BNSF. The entire development, including the new intermodal terminal (opened in 2013), was first conceived in 2004, in response to growing demand for containerized transportation and capacity limitations at the nearby Argentine Yard in Kansas City. In all, a number of stakeholders were involved in this project from conception. This included:

- **State of Kansas:** KDOT undertook improvements to the adjacent Interstate 35 interchange to improve access to Logistics Park. In addition, the state's economic development authority provided a number of financial incentives, as well as a $35 million grant from Kansas' Rail Assistance Program. The grant was issued on condition that BNSF would commence construction before 2011.

- **Johnson County:** The local county agreed to upgrade local roadways used to access Logistics Park.

- **City of Edgerton:** In 2009, the City of Edgerton annexed the land that would eventually be home to Logistics Park, and agreed to integrate the future facility into the city through utility and infrastructure development and upgrades. The City of Edgerton also agreed to designate and fund the road used to access Logistics Park as a heavy-haul corridor. This would allow heavyweight trucks to enter and exit the facility without worry of overweight penalties. Lastly, 10-year property tax abatements were granted for the facility.

In addition, private stakeholders besides BNSF were important to the success of the project. As the intermodal terminal was being constructed, NorthPoint Development began speculative construction of a 500,000 square foot facility on-site, given the attractiveness of the new facility to large customers (including due to Kansas City's position as a key national intermodal hub).[33] In recent years, NorthPoint Development has undertaken additional projects at Logistics Park. As of 2018, there was approximately 7 million square feet of industrial space at the park, with room for additional growth.[34]

[33] BNSF LPKC – Concept to Construction https://www.arema.org/files/library/2013_Conference_Proceedings/BNSF_LPKC-Concept_to_Construction.pdf

[34] https://www.kansascity.com/news/local/article234309742.html

Source: BNSF

Key Takeaways

- Strong knowledge of market conditions, as well as strategic economic incentives, are important to attract development.
- Coordination between state, county, and municipal stakeholders is important in order to recognize private sector needs.
- The concept of the new intermodal terminal and industrial park first came about due to capacity constraints at a nearby BNSF intermodal terminal.

APPENDIX D: FREIGHT PROJECT LIST

The following lists of funded and unfunded projects were identified by the Sherman-Denison MPO through transportation planning documents, stakeholder input, and needs analysis. These projects were selected for their impact on the safety and mobility of freight transportation in Grayson County.

Table D.1 Funded Freight Projects in Grayson County

Location	Highway	From	To	Description	Estimated Construction Cost	Estimated Construction Start Date
Grayson County	U.S. 75	FM 902	Collin County Line	Widen From 4 Lane To 6 Lane	$49,590,000	FY2021-2024
Sherman/Denison	U.S. 75	North Loy Lake Road	U.S. 82	Widen From 4 Lane To 6 Lane	$79,000,000	FY2025-2030
Whitesboro	U.S. 82	Shawnee Trail	U.S. 377	Construct Frontage Road from Shawnee Trail to U.S. 377 and reverse ramps	$2,200,000	FY2024
Howe	FM 902 Bypass	U.S. 75	FM 902	Construct 2 lane segment of FM 902 Bypass	$4,440,000	FY2024
Tom Bean	FM 902 Bypass	Joe Bob Lane	SH 11	Construct 2 lane segment of FM 902 Bypass	$1,800,000	FY2024
Grayson County	Grayson Parkway	Collin County Line	FM 121	Extension Of Dallas North Tollway Service Roads into Grayson County	$8,000,000	FY2021-2024

Table D.2 Unfunded Freight Projects in Grayson County

Location	Highway	From	To	Description	Estimated Construction Cost	Type	Priority Project?
Denison	U.S. 75	U.S. 69	FM 120	Widen From 4 Lane To 6 Lane	TBD	North/South Mobility	Y
Denison	U.S. 75	State Line	U.S. 69	Widen From 4 Lane To 6 Lane	TBD	North/South Mobility	Y
Denison	U.S. 75	FM 120		Increase Bridge Clearance (current minimum is 15'10")	TBD	Bridge	
Grayson County	U.S. 75	FM 1417	FM 902	Widen From 4 Lane To 6 Lane	$42,400,000	North/South Mobility	Y
Howe	U.S. 75	SH 5 / FM 902		Increase Bridge Clearance (current minimum is 15'9")	TBD	Bridge	
Howe	U.S. 75	at Hall Cemetery/LB Kirby		Construct new interchange	$11,900,000	North/South Mobility	
Howe	U.S. 75	at Spur 381		Ramp Reversal	$3,200,000	North/South Mobility	
Howe	U.S. 75	at Farmington		Ramp Reversal	$3,200,000	North/South Mobility	
Sherman	U.S. 75	Loy Lake Road		Increase Bridge Clearance (current minimum is 16'4")	TBD	Bridge	
Sherman	U.S. 75	Fallon Drive		Increase Bridge Clearance (current minimum is 16'2")	TBD	Bridge	
Sherman	U.S. 75	U.S. 82	SH 91/ Texoma Parkway	Widen From 4 Lane To 6 Lane	$68,000,000	North/South Mobility	Y
Van Alstyne	U.S. 75	at Farmington Road		Construct 4 lane interchange	$14,000,000	North/South Mobility	
Van Alstyne	U.S. 75	at Hodgin Road		Construct 6 lane interchange	$14,000,000	North/South Mobility	

Location	Highway	From	To	Description	Estimated Construction Cost	Type	Priority Project?
Van Alstyne	U.S. 75	Spence Road		Construct 6 lane interchange	$10,000,000	North/South Mobility	
Bells	U.S. 69	G&W Railroad		Increase Bridge Clearance (current minimum is 13'11")	TBD	Bridge	
Denison	U.S. 69	UP RR		Increase Bridge Clearance (current minimum is 15'4")	TBD	Bridge	
Whitewright	U.S. 69	G&W Railroad		Increase Bridge Clearance (current minimum is 14'4")	TBD	Bridge	
Whitewright	U.S. 69	Spruce Street		Increase Bridge Clearance (current minimum is 14'10")	TBD	Bridge	
Grayson County	U.S. 82	Throughout		Continuous Frontage Roads	TBD	East/West Mobility	Y
Sherman	U.S. 82	At Skaggs Road		Construct Overpass	$6,000,000	East/West Mobility	
Sherman	U.S. 82	FM 131		Increase Bridge Clearance (current minimum is 16'1")	TBD	Bridge	
Sherman	U.S. 82	Loy Lake Road		Increase Bridge Clearance (current minimum is 16'0")	TBD	Bridge	
Whitesboro	U.S. 377	U.S. 82		Increase Bridge Clearance (current minimum is 14'11")	TBD	Bridge	
Gunter	FM 121 Bypass	SH 289	FM 121	Construct 2 lane segment of FM 121 Bypass	$6,200,000	East/West Mobility	Y
Gunter	FM 121 Bypass	Block Road	SH 289	Construct 2 lane segment of FM 121 Bypass	$4,800,000	East/West Mobility	Y
Tioga	FM 121 Bypass	Kardum Lane	FM 922	Construct 2 lane segment of FM 121 Bypass Along Airport Road around Tioga	$8,780,000	East/West Mobility	Y
Van Alstyne	FM 121 Bypass	U.S. 75	Hinton Ln	Construct 2 lane segment of FM 121 Bypass	$4,400,000	East/West Mobility	Y

Location	Highway	From	To	Description	Estimated Construction Cost	Type	Priority Project?
Van Alstyne	FM 121 Bypass	Lincoln Park Road	U.S. 75	Construct 2 lane segment of FM 121 Bypass along Spence Road	$4,400,000	East/West Mobility	Y
Sherman	FM 1417	SH 11	SH 56	Complete FM 1417 Loop	$25,000,000	North/South Mobility	
Sherman	FM 1417	SH 56	Ob Groner Road	Widen From 2 lane to 4 lane	$25,000,000	North/South Mobility	
Sherman	FM 1417	Ob Groner Road	U.S. 75	Widen From 2 lane to 4 lane	$24,000,000	East/West Mobility	
Sherman	FM 1417	U.S. 82		Increase Bridge Clearance (current minimum is 14'9")	TBD	Bridge	
Sherman	FM 1417	Luella	SH 11	Widen Existing Roadway	$9,051,500	East/West Mobility	
Tom Bean	FM 2729 Bypass	SH 11	Meadows Estate St	Construct 2 lane segment of FM 2729 Bypass around Tom Bean	$2,200,000	North/South Mobility	Y
Van Alstyne	FM 3133 Bypass	Chapman Road	U.S. 75	Construct 2 lane segment of FM 3133 Bypass along County Line Road	$8,100,000	East/West Mobility	Y
Sherman/Denison	FM 691	SH 91	Theresa Road	Reconstruct and add 2 lanes	$4,550,000	East/West Mobility	
Dorchester	FM 902	at Railroad		Construct bridge over railroad crossing	$2,500,000	Safety	
Collinsville	FM 902 Bypass	Batey Road	Jordan Creek	Construct 2 lane segment of FM 902 Bypass around Collinsville	$7,320,000	East/West Mobility	Y
Denison	G & W Railroad	BNSF Interchange		Support construction of wye to facilitate short line movements	TBD	Railroad	Y

Location	Highway	From	To	Description	Estimated Construction Cost	Type	Priority Project?
Grayson County	Grayson Parkway	FM 121	FM 902	Construct 2 lane segment of service road for Grayson Parkway (Extension of DNT)	$14,000,000	Tollway Extension	
Grayson County	Grayson Parkway	FM 902	U.S. 82	Construct 2 lane segment of service road for Grayson Parkway (Extension of DNT)	$33,500,000	Tollway Extension	
Grayson County	Grayson Parkway	U.S. 82	SH 289	Construct 2 lane segment of service road for Grayson Parkway (Extension of DNT)	$24,100,000	Tollway Extension	
Grayson County	Grayson Parkway	SH 289	Preston Road	Construct 2 lane segment of service road for Grayson Parkway (Extension of DNT)	$8,800,000	Tollway Extension	
Grayson County	Grayson Parkway	Preston Road	U.S. 75	Construct 2 lane segment of service road for Grayson Parkway (Extension of DNT)	$11,550,000	Tollway Extension	
Dorchester	SH 289	at FM 902		Construct turning lanes	$250,000	Safety	
Pottsboro	SH 289	FM 996	Elks Blvd.	Construct Four Lanes With Raised Median	$28,500,000	North/South Mobility	
Van Alstyne	SH 5 Bypass	County Line Road	Judd Road	Construct 2 lane segment of SH 5 Bypass along Lincoln Park Road	$12,200,000	North/South Mobility	Y
Sherman	SH 56	Friendship Rd	Case Rd.	Reconstruct and widen from 2 lane to 4 lane	$1,550,000	Safety	
Sherman	SH 91	U.S. 82		Increase Bridge Clearance (current minimum is 15'1")	TBD	Bridge	
Denison	Spur 503	U.S. 75	SH 91	Reconstruct and widen from 4 lane to 6 lane; remove service roads	$13,600,000	North/South Mobility	

Location	Highway	From	To	Description	Estimated Construction Cost	Type	Priority Project?
Denison	Spur 503	SH 91	Acheson St	Reconstruct and widen from 4 lane to 6 lane; remove service roads	$18,100,000	North/South Mobility	
Denison	Spur 503	BNSF Railroad		Increase Bridge Clearance (current minimum is 14'1")	TBD	Bridge	