

CHAPTER 7

FREIGHT





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Western Piedmont
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Greater Hickory Metropolitan
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Our nation's freight transportation system is a vast, complex network of almost seven million miles of highways, local roads, railways, navigable waterways, airports, and pipelines. The components of this network are linked to each other through thousands of seaports, airports, and intermodal facilities. This chapter explores recently amended legislation, existing conditions of freight infrastructure, freight resiliency, as well as current and future economic and technological trends affecting the movement of freight in the GHMPO region.

This chapter focuses on the development of recommendations that are designed to manage and improve the safety, efficiency and resiliency of multimodal freight flows through and within the GHMPO region. It also involves integrating freight priorities into the ongoing comprehensive regional planning process, and minimizing the congestion and hazards associated with freight traffic. As in other areas of planning, freight planning is an ongoing and ever-evolving process, but is uniquely critical, as technological advances and socioeconomic trends have pushed this often-overlooked area of transportation into the public eye.

The North Carolina Department of Transportation (NCDOT) amended statewide multimodal freight plan in May of 2022, and anticipates approval of the plan by the Federal Highway Administration in November 2022. North Carolina's freight infrastructure faces continually evolving trend and demands due to new developments in the freight industry.

According to the 2022 North Carolina Statewide Multimodal Freight Plan, these developments include:

- » Significant population growth in the State's urban areas;
- » Adoption of new technologies such as autonomous and connected trucks;
- » Concentration of manufacturing facilities along major trade corridors; and
- » Increasing demand for same-day and next day deliveries (e-commerce), which will continue to stress the capacity and operations of the State's highways, rail, and port facilities

North Carolina's Statewide Multimodal Freight Plan was developed in compliance with The Fixing America's Surface Transportation Act (FAST Act) of 2015 – a five-year, \$305 billion transportation bill providing funding for the nation's transportation planning and infrastructure investments. Similarly, the GHMPO MTP was developed to comply with the FAST Act.

North Carolina's freight shippers try to use each mode to their best advantage in selecting freight transportation services to support their supply chains and distribution networks. One way to visualize these advantages and disadvantages is as a spectrum of freight transportation services.

CHART 7-1. CONTINUUM OF FREIGHT COST AND SERVICE



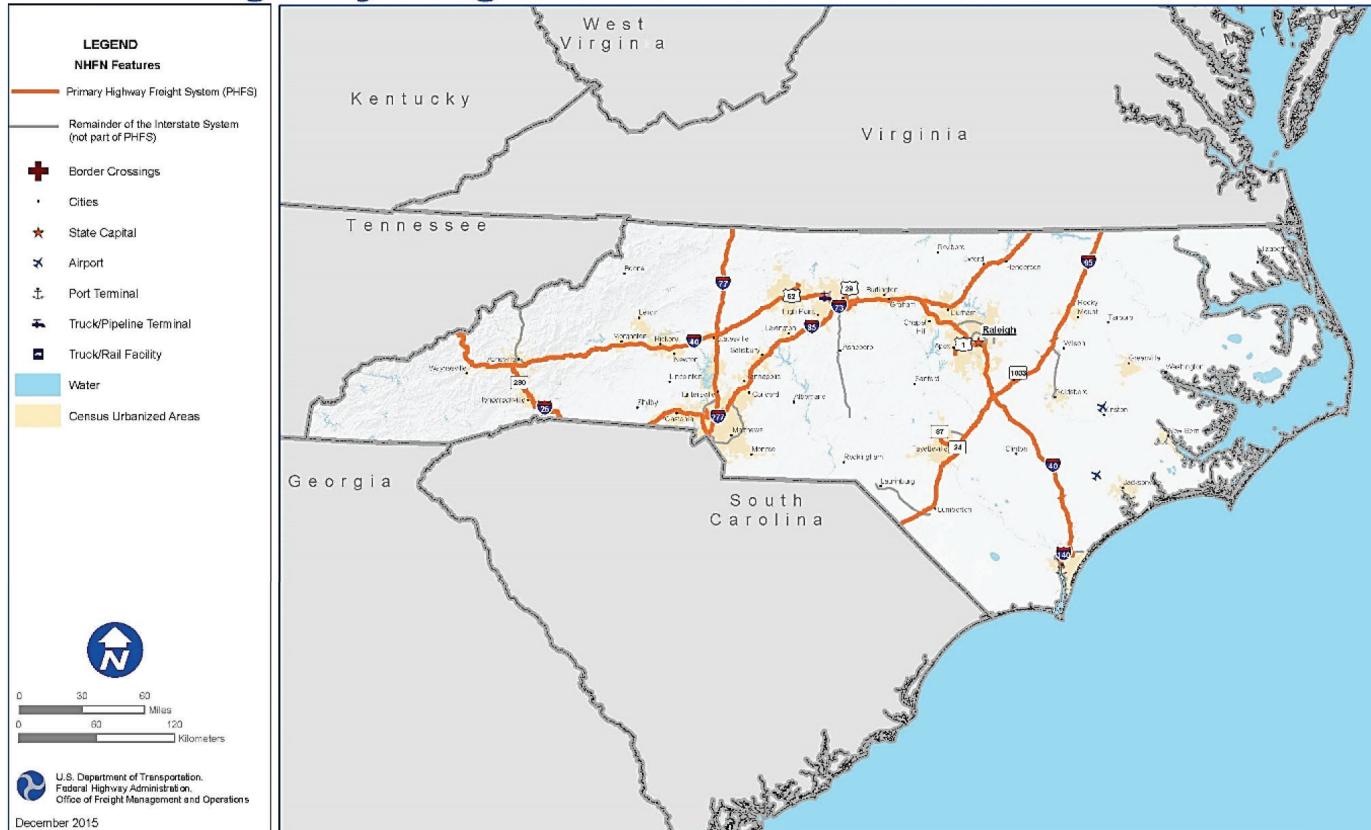
On one end of the spectrum is water transportation, which tends to be the lowest cost carrier, but also provides the slowest service and is not universally available, as is truck service. At the other end of the spectrum is air freight service, which offers fast and reliable shipment, but at much higher prices. Between these extremes are truck, intermodal, and rail services. As a general rule of thumb, higher-value, lower-weight, and more time sensitive freight is shipped by truck and air, while lower value, heavier weight, and less time-sensitive freight moves by rail and water. Many factors are evaluated by freight shippers when considering freight transportation options. Price, capacity, transit speed, and equipment availability are among the most obvious and important considerations for shippers. Reliability, or the degree of certainty and predictability in travel times on a system, is also a critical factor, particularly for just-in-time logistics processes, which rely on timely and predictable shipments to reduce inventory costs. Additionally, the characteristics of the commodities being shipped, as some commodities—due to size, weight, perishability, or other factors—are more cost-effectively transported by one specific mode.

CHART 7-2. THE MULTIMODAL FREIGHT SYSTEM



CHART 7-3. NATIONAL HIGHWAY FREIGHT NETWORK MAP

National Highway Freight Network: North Carolina



GHMPO DRIVERS OF FREIGHT

Freight flows in the region are driven primarily by the region's significant manufacturing base. Other key drivers include retail trade, accommodation and food services, transportation and warehousing and the construction sectors. Approximately 40,000 people in the GHMPO are employed in the manufacturing sector, while approximately 6,700 are employed in the transportation and warehousing sector.

TABLE 7-1. GHMPO TOP 10 EMPLOYMENT SECTORS BY NUMBER OF EMPLOYEES

<u>Industry Sector</u>	<u>2021 Average Employment</u>
Manufacturing	40,026
Health Care and Social Assistance	21,476
Retail Trade	17,203
Accommodation and Food Services	11,346
Educational Services	9,266
Administrative and Support and Waste Management and Remediation	7,916
Public Administration	7,863
Transportation and Warehousing	6,733
Construction	4,943
Professional, Scientific, and Technical Services	3,685
Other Services (except Public Administration)	3,076
Finance and Insurance	2,089
Arts, Entertainment, and Recreation	1,360
Real Estate and Rental and Leasing	888
Information	709

Tables 7-1 through 7-5 provide information about the largest employers in each county of the GHMPO region. Each employer is classified by industry sector (manufacturing, retail trade, accommodation and food services, transportation and warehousing, and construction). It is important to bear in mind that not every large employer necessarily generates significant freight activity. Conversely, some small employers may generate large amounts of freight.

TABLE 7-2. LARGEST EMPLOYERS – ALEXANDER COUNTY

Largest Employers: Alexander County			
Company Name	Industry	Employment Range	Rank
Craftmaster Furniture	Manufacturing	500-999	2
The Mitchell Gold Co	Manufacturing	500-999	3
Hancock & Moore LLC	Manufacturing	250-499	6
Schneider Mills Inc	Manufacturing	250-499	7
Wal-Mart Associates Inc.	Retail Trade	100-249	8
Amteck LLC	Construction	100-249	9
Huntington House Inc	Manufacturing	100-249	10
Shurtape Technologies LLC	Manufacturing	100-249	11
Taylor King Furniture Inc	Manufacturing	100-249	12
Engage Peo	Manufacturing	100-249	13
Industrial Timber LLC	Manufacturing	100-249	17
La-Z-Boy Casegoods Inc	Manufacturing	100-249	18
Royale Comfort Seating Inc	Manufacturing	50-99	19
Paragon Films Inc	Manufacturing	50-99	20
Carpenter Co	Manufacturing	50-99	21
Mays Meats Inc	Wholesale Trade	50-99	22
Precision Materials LLC	Manufacturing	50-99	23
American Roller Bearing Company	Manufacturing	50-99	24

TABLE 7-3**Largest Employers: Burke County**

Company Name	Industry	Employment Range	Rank
Valdese Weavers	Manufacturing	500-999	6
Leviton Manufacturing Co Inc	Manufacturing	500-999	8
Continental Automotive Systems Inc	Manufacturing	500-999	9
Case Farms Processing Inc	Manufacturing	250-499	10
Wal-Mart Associates Inc	Retail Trade	250-499	12
Food Lion	Retail Trade	250-499	15
Molded Fiber Glass North Carolina	Manufacturing	100-249	17
Bimbo Bakeries USA Inc	Manufacturing	100-249	18
Viscotec Automotive Products	Manufacturing	100-249	19
Crothall Healthcare Inc	Accommodation and Food Services	100-249	20
Ingles Markets, Inc	Retail Trade	100-249	21
Gerresheimer Glass Inc	Manufacturing	100-249	22
Hooker Furniture Corporation	Manufacturing	100-249	23
Insperity Services LP	Manufacturing	100-249	24

TABLE 7-4**Largest Employers: Caldwell County**

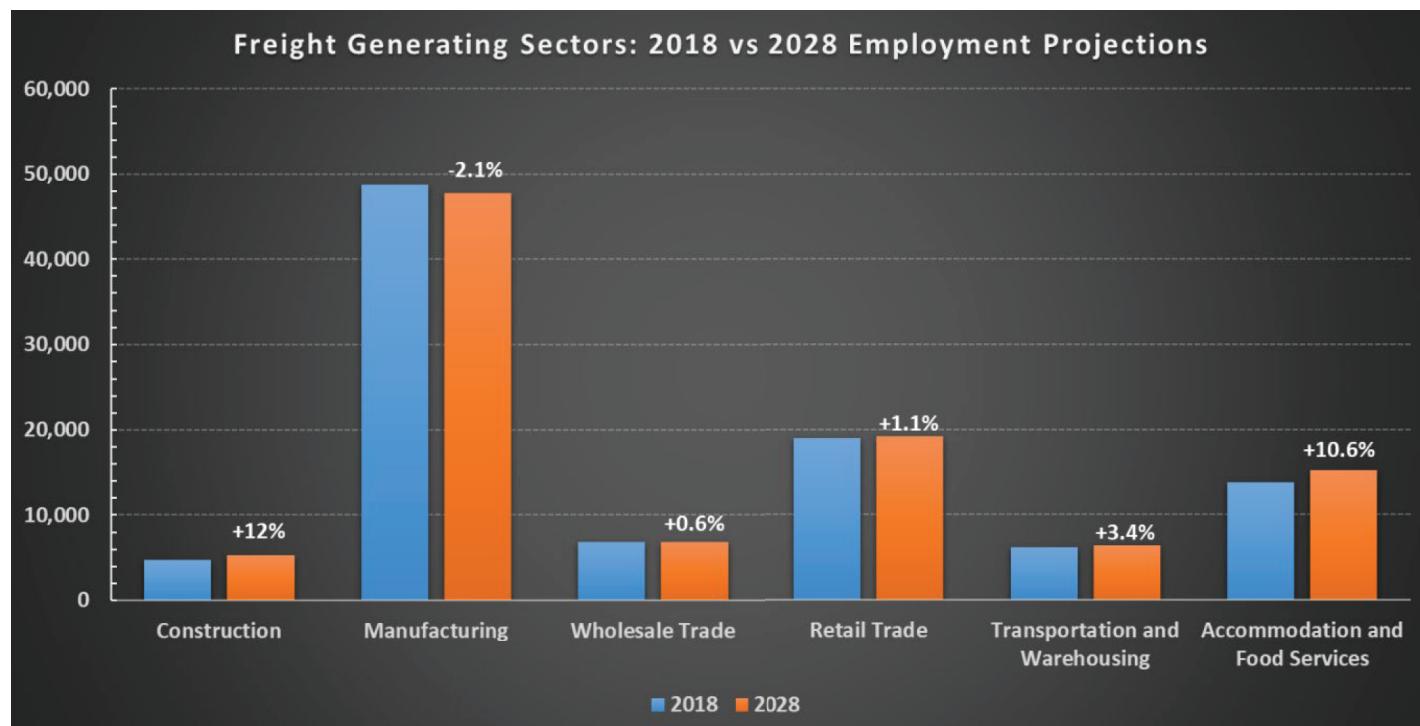
Merchants Distributors LLC	Wholesale Trade	1000+	2
Bernhardt Furniture Company	Manufacturing	1000+	3
Wal-Mart Associates Inc	Retail Trade	500-999	5
Exela Pharma Sciences LLC	Manufacturing	250-499	8
Sealed Air	Manufacturing	250-499	9
Fairfield Chair Co	Manufacturing	250-499	10
Rpm Wood Finishes Group Inc	Manufacturing	250-499	12
Stallergenes Career	Manufacturing	250-499	13
Sealed Air Corporation	Manufacturing	250-499	16
Food Lion	Retail Trade	100-249	21
Bemis Manufacturing Co	Manufacturing	100-249	22
McCREARY MODERN INC	Manufacturing	100-249	23
United Parcel Service Inc	Transportation and Warehousing	100-249	24
Continental Structural Plastics	Manufacturing	100-249	25

TABLE 7-5**Largest Employers: Catawba County**

Commscope	Manufacturing	1000+	3
Target Stores Div	Transportation and Warehousing	1000+	4
Corning Optical Communications LLC	Manufacturing	1000+	5
Wal-Mart Associates Inc	Retail Trade	1000+	7
Gkn Driveline Newton LLC	Manufacturing	500-999	9
Sutter Street Manufacturing Inc	Manufacturing	500-999	10
Century Furniture LLC	Manufacturing	500-999	12
Pierre Foods Inc	Manufacturing	500-999	13
Performance Food Group Inc	Wholesale Trade	500-999	15
McCREARY MODERN INC	Manufacturing	500-999	16
Bassett Furniture Industries Of NC	Manufacturing	500-999	17
Shurtape Technologies LLC	Manufacturing	500-999	18
Prysmian Communications Cables And	Manufacturing	500-999	19
Sherrill Furniture Company	Manufacturing	500-999	20
Westrock Services LLC	Manufacturing	500-999	22
Cargo Transporters Inc	Transportation and Warehousing	500-999	23
Lee Industries Inc	Manufacturing	500-999	24
Apple Computer Inc	Retail Trade	500-999	25

Employment in the manufacturing sector is forecasted to decline by 2.1% by 2028, while construction employment is forecasted to increase by 12%; accommodation and food service employment by nearly 11%; and transportation and warehousing by 3.4%. Growth in the wholesale and retail trade sectors is forecasted to flat over the period.

CHART 7-4. EMPLOYMENT PROJECTIONS – GHMPO FREIGHT GENERATING SECTORS



FOREIGN TRADE ZONE

In 2000, local officials applied for the expansion of Foreign Trade Zone #57, which is headquartered in Charlotte (the FTZ is managed by the Charlotte Regional Business Alliance), into the Western Piedmont region. Having regional foreign trade zones allows local businesses to reduce tariffs on international imports or exports.

By using a FTZ, companies can defer, reduce or eliminate customs duties/tariffs on products admitted to the zone. Goods stored in a FTZ (ex. a warehouse) are considered to be legally outside of U.S Customs territory. Freight activity, rail and truck traffic in the GHMPO may be impacted due to the region's inclusion (with the exception of Burke County) in the FTZ, as companies take advantage of its benefits.



FREIGHT'S IMPORTANCE TO RURAL COMMUNITIES

Freight transport is critical to support rural industry as it transports the raw goods and products needed to support and promote growth in rural economies. Well-planned, multimodal freight systems provide opportunities for companies to locate and grow in rural regions due to efficient and reliable connections with major markets and ports. Intermodal facilities and logistics centers located in rural areas can benefit from lower costs than urban areas and may be strategically located at a key transfer point in a freight corridor.

Rural freight transportation also poses challenges to policymakers. For example, the restructuring of the rail industry has led to the abandonment of many branch lines, cutting off service to many rural areas, leading to grain elevator consolidation along mainline and increased truck travel on rural roads to get wheat from farms to grain elevators. Heavy truck traffic passing through rural areas can also raise road maintenance costs without bringing direct economic benefits to the area. Such issues present challenges for rural regions, which have fewer resources and less flexibility to address such issues.

GHMPO FREIGHT NETWORK: OVERVIEW AND EXISTING CONDITIONS

Highway freight is the anchor of goods movement in the GHMPO region, and accounts for the vast majority of freight movement. Interstate 40, which runs east/west through the Hickory GHMPO for approximately 47 miles through Burke and Catawba counties, is the only major thoroughfare in the planning area currently designated as part of the National Highway Freight Network (NHFN). Because of the corridor's close proximity to several major principal connectors, this section of I-40 frequently experiences congestion during peak hours, most noticeably in Catawba County. Although not part of the NHFN, US-321 carries large amounts of north-south traffic through the region, including significant truck traffic.

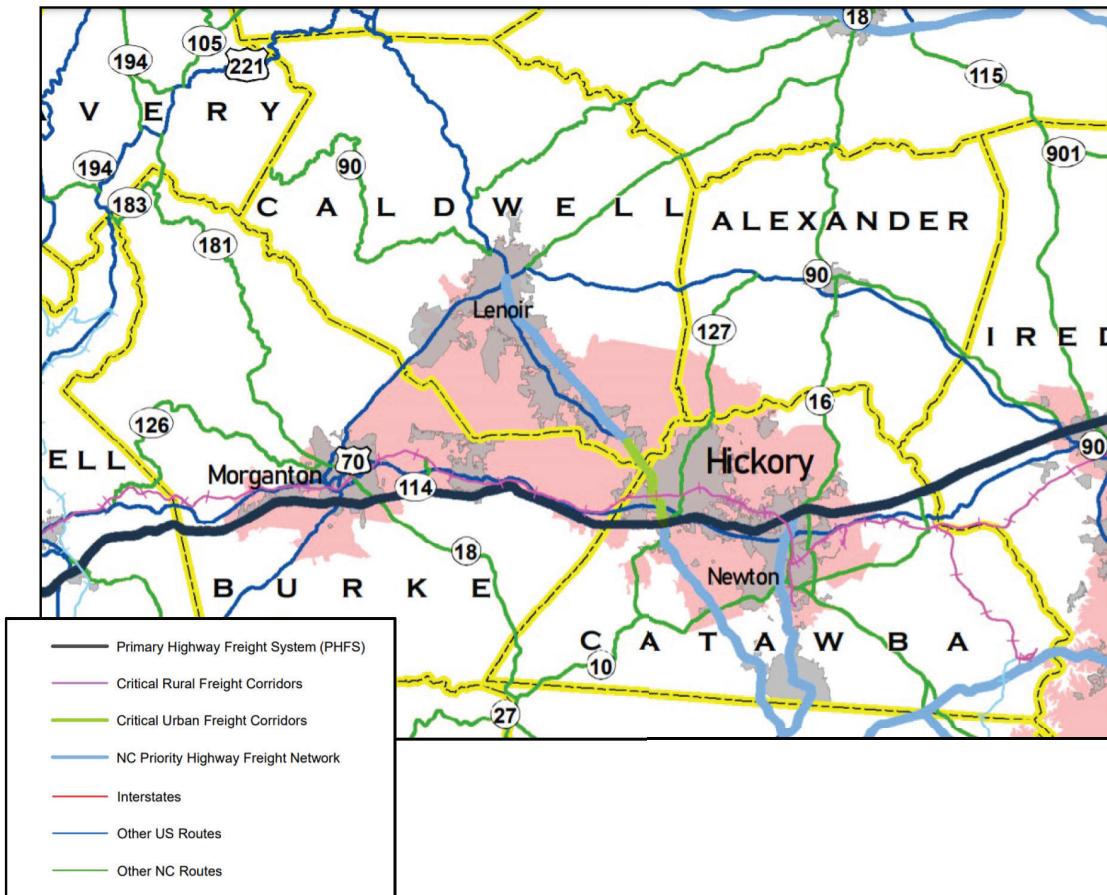
The roadways in the Greater Hickory MPO area are currently able to support truck freight transportation. This is the mode used by most commercial facilities to move goods into and out of our region. Interstate 40 is a major truck route passing through Catawba and Burke Counties and the main east-west transportation corridor used by trucks and passenger vehicles. US Highway 321 is the region's major north-south corridor and is the primary truck route into Caldwell County. Interstate 40 and US 321 intersect in southwest Hickory.

North of this interchange, US 321 is a four-lane highway with numerous traffic lights, intersections and driveways. South of the interchange, US 321 is a limited-access freeway to Gastonia and Interstate 85. US Highway 70 parallels Interstate 40 through most of the GHMPO. During road construction or traffic accidents on Interstate 40, US 70 serves as an alternate route. This is also "Main Street" for several of the region's local municipalities.

NC Highway 127 runs north/south through the City of Hickory, connecting US 64/NC 90 and NC 10 and providing access to Interstate 40 and US 321. NC 16 travels north-south through central Catawba County, including the cities of Conover and Newton with an interchange at I-40. An 8-mile section of NC 16 south of Newton is being widened to 4 lanes, which will complete the multilane project linking Charlotte and I-85 with I-40 in Catawba County. This is also a major route into Alexander County and Taylorsville.

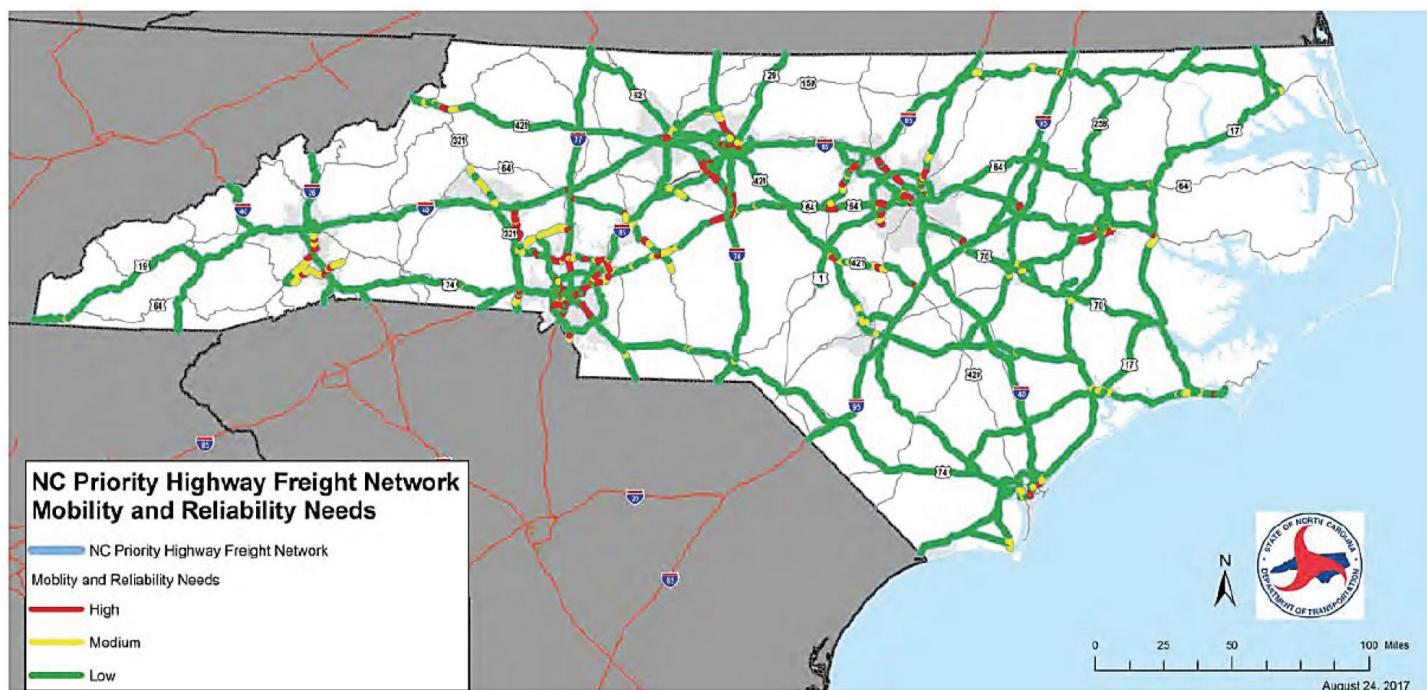
Another route used by trucks, US 64/NC 18, travels southwest from the City of Lenoir to the City of Morganton. This thoroughfare provides access to Interstate 40. Other thoroughfares, such as Connelly Springs Road in Caldwell and Burke counties and McDonald Parkway in Catawba County, are often used by trucks to avoid high traffic volumes, but the major truck routes are I-40, US 321 and the NC Highways listed above.

MAP 7-5. NORTH CAROLINA PRIORITY HIGHWAY FREIGHT NETWORK



Map 7-5, shows the sections of roadways included in the North Carolina Priority Highway Freight Network (US 321 Caldwell and Catawba counties, Business 321 in Catawba County, and NC 150 in Catawba County). US 321 is designated as a Critical Urban Freight Corridor (from Interstate 40 to Alex Lee Boulevard in Caldwell County). Interstate 40 in Burke and Catawba counties is part of the Primary Highway Freight System.

MAP 7-6. GHMPO FREIGHT HIGHWAY NETWORK MOBILITY AND RELIABILITY NEEDS



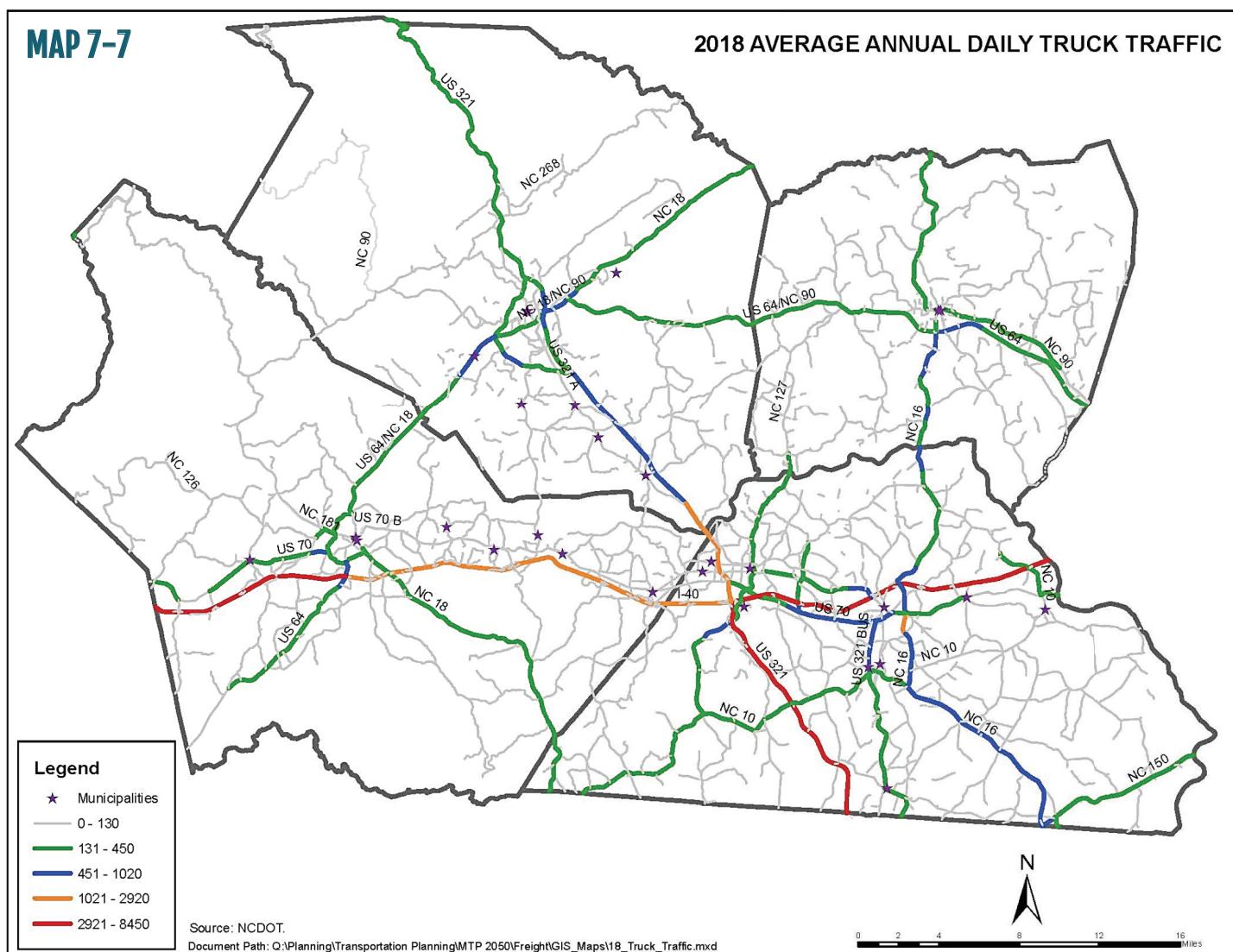
Efficient highway freight movements require reliable and predictable travel times. NCDOT's Statewide Multimodal Freight Plan used the following measures to identify areas in the GHMPO freight network that need improvements.

- » Volume-to-Capacity (V/C) Ratio
 - » Truck Travel Time Reliability
 - » Connectivity to Strategic Supply Chain Industries
 - » Connectivity to Intermodal Terminals and Gateways
 - » At-Grade Railroad Crossings

Map 7-6, page 7, shows NCDOT's evaluation of mobility and reliability needs for highways in the GHMPO region that are a part of the NC Priority Freight Network. Sections of US 321 in Caldwell and Catawba counties have medium needs, as does NC 150 in Catawba County. US 321 Business in Catawba County is classified as having high needs.

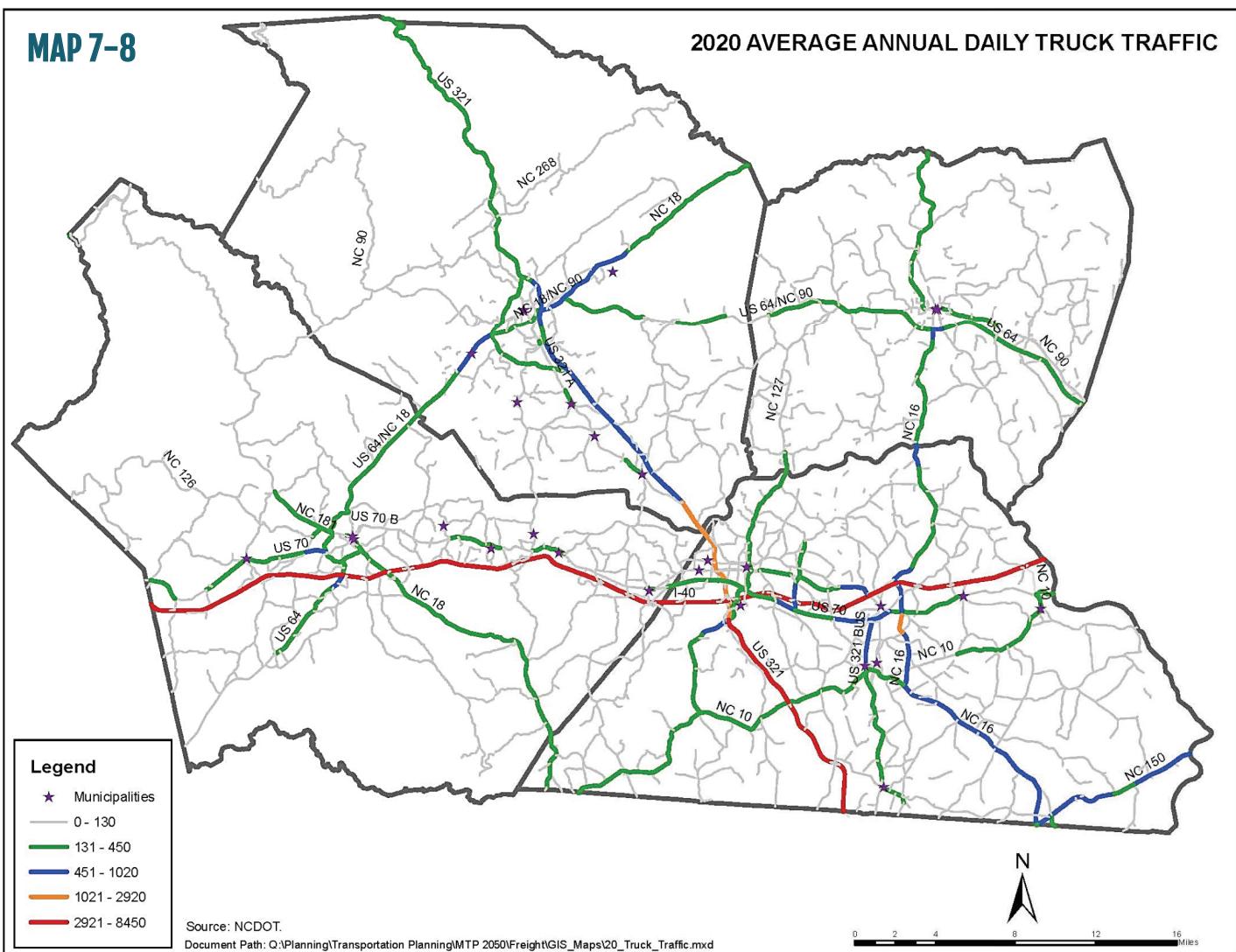
Projects designed to improve freight mobility and reliability are either underway (in the case of US 321 in Caldwell and Catawba counties) or included in the most recent draft STIP (NC 150). Potential freight mobility and reliability improvements to US 321 Business should be evaluated during the future project prioritization processes.

Map 7-7 below shows Average Annual Daily Truck Traffic (AADTT) on the GHMPO's major truck routes in 2018. The highest truck traffic occurred on I-40 in Catawba and Burke counties, US 321 in Catawba and Caldwell counties, portions of NC 16 and US 64 in Alexander County, portions of US 64/NC 18 in Caldwell County, US 321 Business in Catawba County, and portions of US 64 and US 70 in Burke County. Map 7-8, page 8, also shows AADTT, but for 2020. Truck traffic continues to be heaviest in central Catawba County on I-40 and US 321. Truck traffic increased on NC 150 in Catawba County, and decreased in Alexander County on routes 64 and 16.



MAP 7-8

2020 AVERAGE ANNUAL DAILY TRUCK TRAFFIC



Across the GHMPO region, the following route segments experienced increases in truck traffic from 2018-2020:

- » NC 18 in Caldwell County
- » I-40 in Caldwell and Burke counties
- » NC 150 in Catawba County
- » NC 10 in Catawba County
- » Segments of US 70 in Burke County

Across the GHMPO region, the following route segments experienced decreases in truck traffic from 2018-2020:

- » US 64 in Alexander County
- » NC 16 in Alexander County

Note: Caution should be exercised in interpreting these results due to the impacts of the COVID-19 pandemic.

GHMPO TRUCK PARKING

According to the North Carolina Department of Transportation (NCDOT), truck parking has become an increasingly serious concern for truck drivers, motor carriers, truck facility operators and public officials throughout the United States. A recent report, "Critical Issues in the Trucking Industry" (ATRI, 2021), stated that the lack of truck parking is the fifth highest-ranked concern among truck drivers.

Adequate truck parking located in the right areas will help to make conditions safer for truck drivers and other travelers, reduce unnecessary fuel consumption, and improve the efficiency of commercial vehicle operations. The recently completed truck stop facility on US 321 has added a significant number of truck parking spaces, along with other amenities. Results of a recent truck parking inventory are included in Table 7-6, page 10.

TABLE 7-6. GHMPO TRUCK PARKING INVENTORY

GHMPO Truck Parking Inventory			
Name	Spaces	Corridor	County
Country Market Truck Stop	80	US 321	Catawba
Love's Travel Stop	104	US 321	Catawba
Pilot Travel Center	62	I-40	Catawba

GHMPO BOTTLENECKS

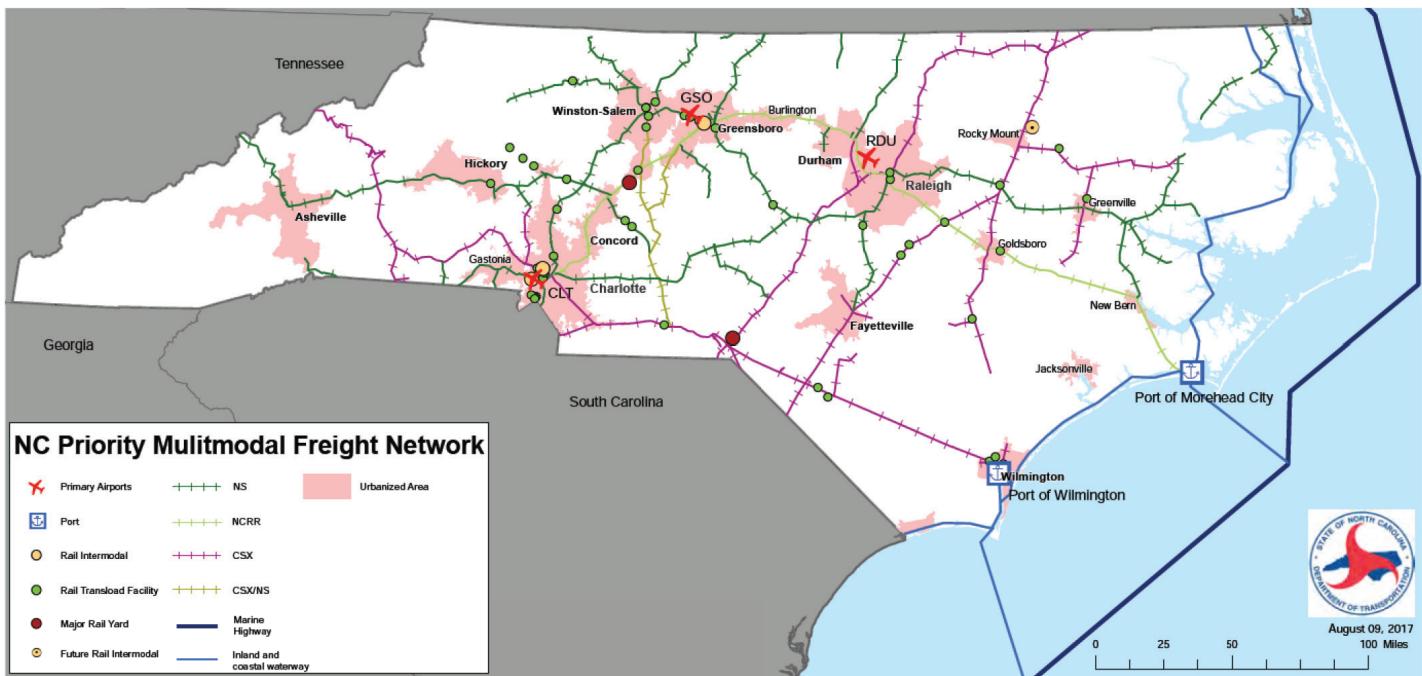
Improvements in data analytics has helped identify traffic bottlenecks in the GHMPO. Using data from cell phones and mobile apps, it is possible to identify and rank bottlenecks based on their location, average maximum length in miles, average daily duration, total duration for a specified time period (hour, day, month, and year), and estimated volume. Table X-X shows the region's top 20 bottlenecks in 2021. Identifying these locations is important for understanding freight traffic and resiliency in the GHMPO region, given that most of these bottlenecks are also heavily used by trucks.

TABLE 7-7. TOP 20 GHMPO BOTTLENECK LOCATIONS: CALENDAR YEAR 2021

GHMPO Top 20 Bottleneck Locations: 2021		
<u>Rank</u>	<u>County</u>	<u>Location</u>
1	Caldwell	US-321 S @ US-64/NC-18/NC-90/WILKESBORO BLVD/H
2	Caldwell	US-321 N @ US-321-ALT/N MAIN ST
3	Caldwell/Catawba	US-321 S @ 2ND AVE NW
4	Catawba	I-40 W @ US-321/EXIT 123
5	Caldwell	US-321 N @ US-64/NC-18/NC-90/WILKESBORO BLVD/H
6	Caldwell	US-64 E @ US-321/BLOWING ROCK BLVD
7	Caldwell	US-64 W @ US-321/BLOWING ROCK BLVD
8	Caldwell	US-64 W @ NC-18-BR/NC-90/HARPER AVE
9	Caldwell/Catawba	US-321 N @ MAIZEL RD/NEW FARM RD
10	Caldwell	US-64 E @ HIBRITEN DR
11	Burke	I-40 E @ CAROLINA ST/EXIT 111
12	Catawba	US-321 N @ 2ND AVE NW
13	Catawba	I-40 E @ HIGHLAND AVE NE/EXIT 125
14	Burke	I-40 E @ MINERAL SPRINGS MTN RD/EXIT 112
15	Catawba	I-40 W @ HIGHLAND AVE NE/EXIT 125
16	Catawba	NC-16 N @ N NC-16-BR
17	Alexander	NC-16 S @ US-64/NC-90/W MAIN AVE
18	Alexander	NC-90 E @ NC-16/3RD ST SW
19	Catawba	US-70 W @ US-321-BR/WESTSIDE BLVD
20	Burke	I-40 W @ JAMESTOWN RD/EXIT 100

Source: RITIS, Probe Data Analytics Suite, 2022.

MAP 7-9. RAIL SERVICE IN THE GHMPO REGION



Both Norfolk Southern and CSX railroads operate in the GHMPO region. A Norfolk Southern truck - rail transload facility is located in Conover. This facility, which allows for the direct transfer of rail freight to trucks (and vice versa) consists of 65 truck parking spots and a 150,000 sq. ft. warehouse.

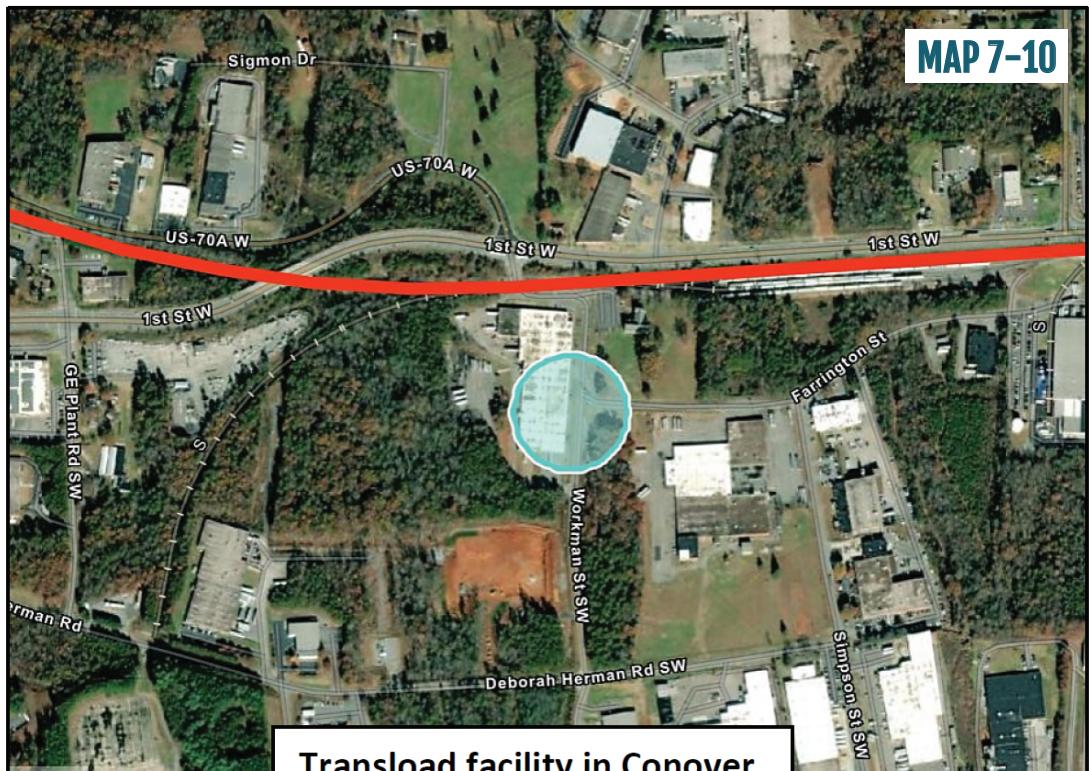
In addition, two short line railroads operate in the region. The Caldwell Railroad Commission owns an 18-mile rail line that connects the Norfolk Southern line in Hickory to the City of Lenoir. This short line, managed by the Caldwell County Railroad Company, helps to support the freight operations of several industries in the county. Some of the current railroad users include:

- » Boone Lumber
- » New River Building Supply
- » ShurTape
- » Pregis
- » Sealed Air

In 2007, Caldwell County and the City of Lenoir constructed a trans-load facility on the rail line south of the current Google property. The trans-load facility contains three sets of tracks with lifts and room to transfer freight to/from trucks.

The Alexander Railroad connects Taylorsville to the Norfolk-Southern rail line in Statesville and is important to the economic development of Alexander County.

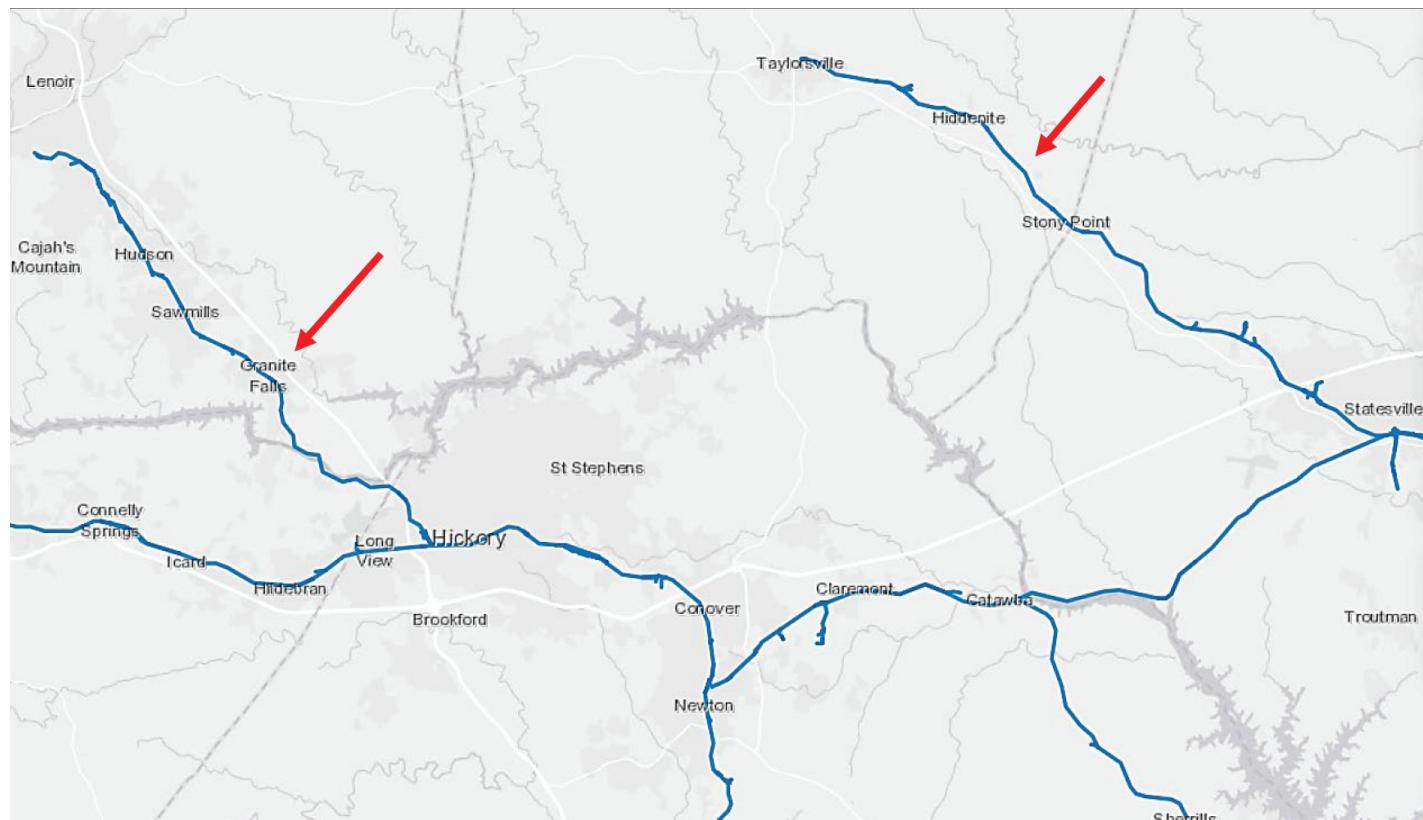
Paragon Films in Taylorsville is the Alexander railroad's largest customer.



The Alexander Railroad and Alexander County Economic Development Commission recently completed the construction of a new 50,000 square foot shell building, which has been occupied by Borealis Compounds Inc., a provider of plastic pellets used in the automotive industry.

Both short line railroads provide vital connections to the national and global economies, and make the region more attractive from an economic development standpoint.

MAP 7-11. SHORT LINE RAIL SERVICE IN THE GHMPO REGION



Source: NCDOT.

Rail service is also provided to the Claremont International Business Park by Norfolk Southern. The presence of rail service there has increased the freight shipping options available to tenants and greatly enhances the Parks' development potential.

GHMPO AIR FREIGHT

Two airports in the GHMPO region are publicly owned, and can support air freight service: Foothills Regional Airport and Hickory Regional Airport. Hickory Regional Airport is the larger of the 2 airports, with a control tower and 2 runways (6,400 feet and 4,400 feet long).

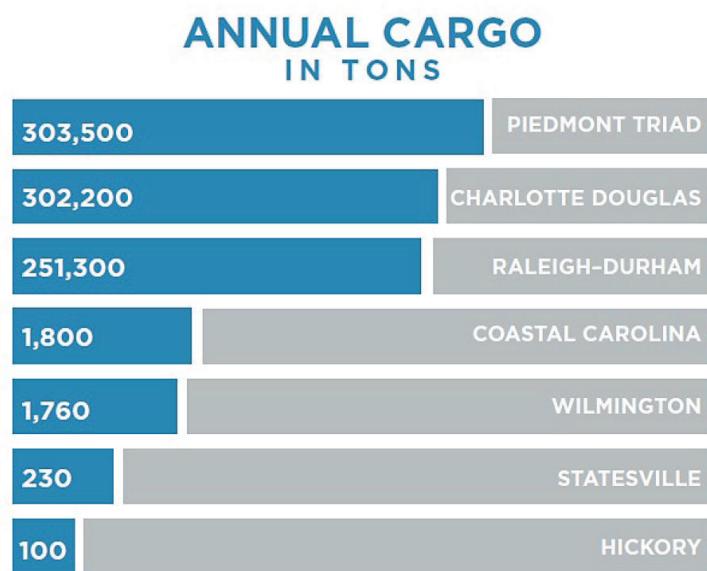
Just off of US 321 and less than four miles from the interchange of US 321 and Interstate 40, the Hickory Regional Airport is owned and operated by the City of Hickory.

While Hickory can accommodate aircraft such as Boeing 737s, military C-130s, large private jets and other aircraft of similar size, prior landing permission is required for these aircraft types. At 6,400 feet in length, the airport's main runway is long enough to land these aircraft (depending on the weight of each aircraft, its cargo and time of year). However, regularly scheduled operations of these heavier aircraft would damage the runway and taxiway system. Foothills Regional Airport's close proximity to both Lenoir and Morganton give it unique advantages for the provision of passenger and freight service. Foothills Regional Airport's 5,500 foot runway can accommodate some larger aircraft (private/corporate jets, etc.).

The airport is governed by the Foothills Regional Airport Authority, which is comprised of elected officials from the

cities of Morganton and Lenoir, and the counties of Burke and Caldwell. The cities of Morganton and Lenoir and the counties of Burke and Caldwell help fund the airport.

CHART 7-5. NC AIRPORT ANNUAL CARGO TONNAGE



Several North Carolina airports provide freight air services. Air freight helps meet the global demand for the rapid movement of goods such as overnight packages and time-sensitive medical items.

North Carolina ranks 16th among states in total tons of air freight cargo moved each year—more than 1.1 million tons worth more than \$23 billion. North Carolina ranks eighth in the country for employment in air freight services.

According to North Carolina, The State of Aviation (2021), the Hickory Regional Airport is ranked 7th in North Carolina for total air cargo tonnage. Hickory Regional Airport's 100 tons of air cargo was listed just after Statesville Regional Airport (230 tons).

The following 3 charts summarize freight carrier activity at Hickory Regional Airport in 2019.

All information contained in these charts is for on-demand charter freight flights, as there are no scheduled freight flights at the airport.

Chart 7-6 summarizes the top 10 origin cities and number of flights from each city, Chart XX summarizes the total pounds of freight from those top 10 cities, and Chart XX summarizes the top 10 air freight carriers by trip frequency (NCDOT, 2019).

CHART 7-6. TOP 10 ORIGIN CITIES BY TRIP FREQUENCY (2019)

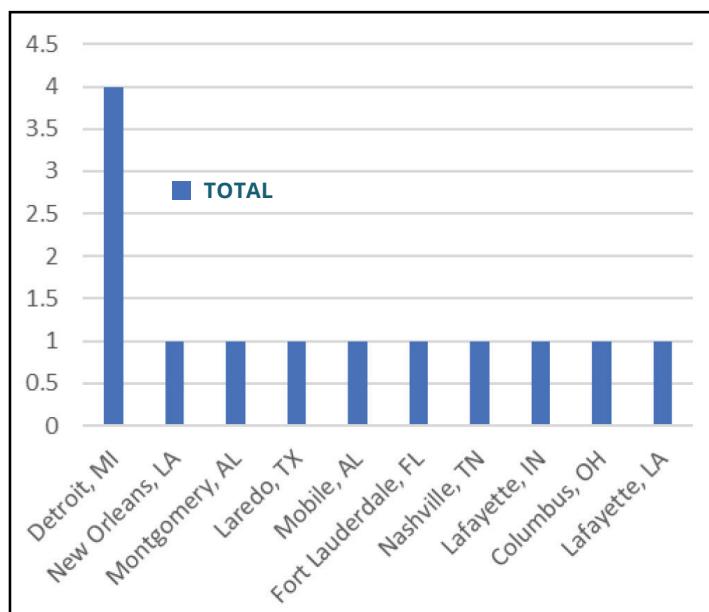


CHART 7-7. SUM OF FREIGHT (POUNDS 2019)

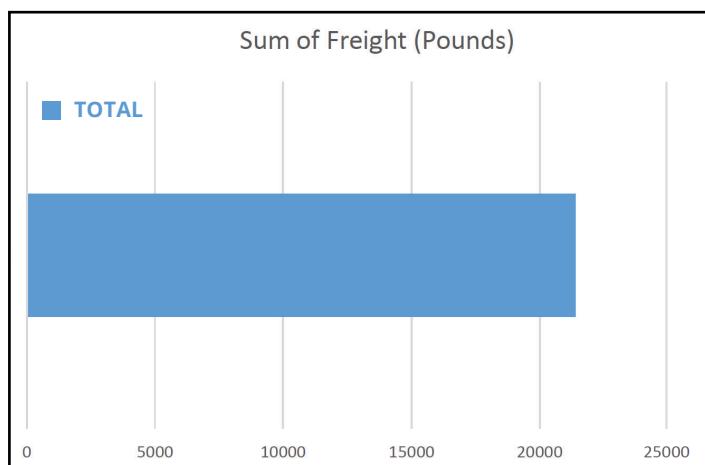
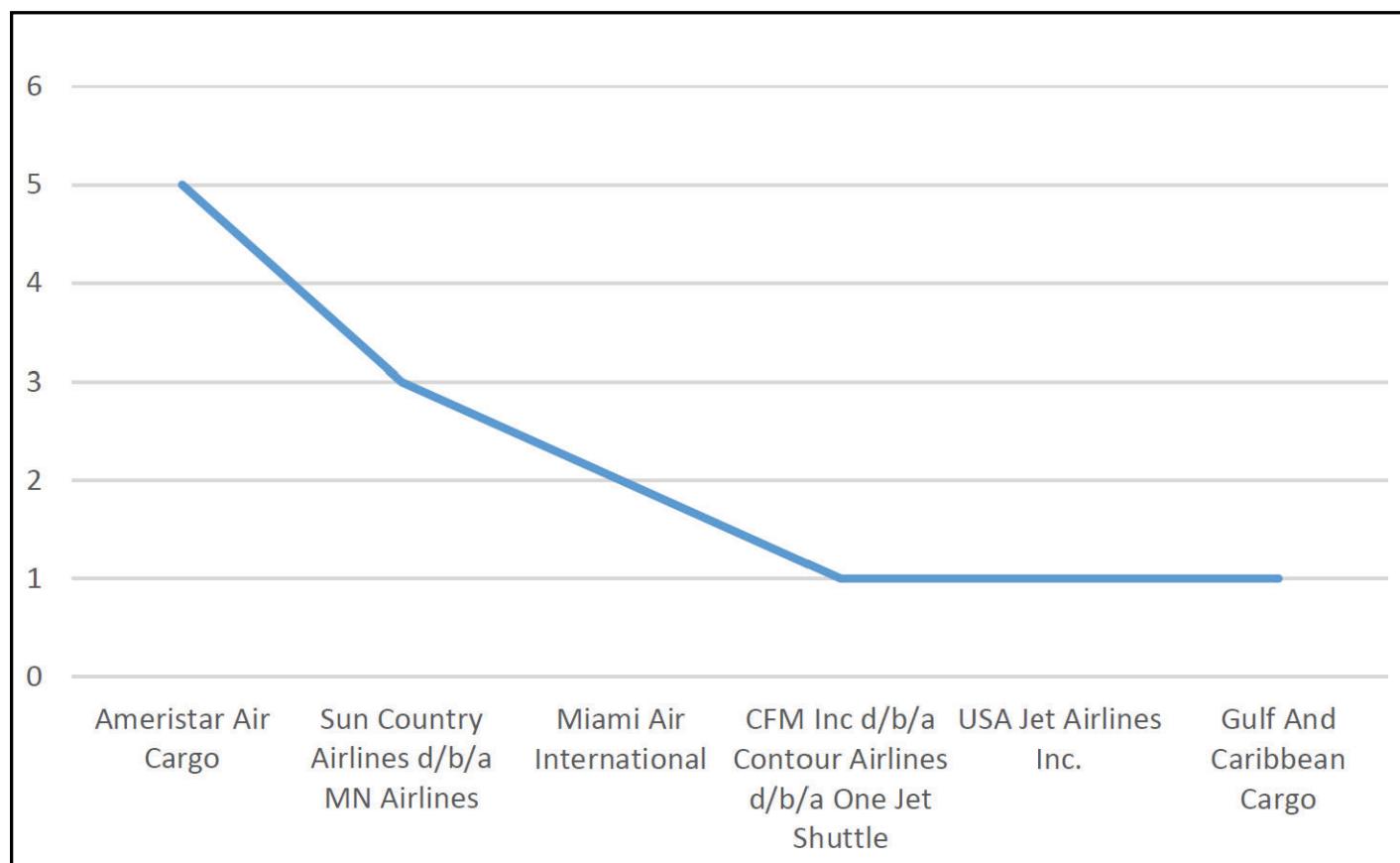


CHART 7-8. TOP 10 CARRIERS BY FLIGHT FREQUENCY (2019) Source: NCDOT, 2019.



FREIGHT RESILIENCE

The FAST Act states that:

State and metropolitan transportation planning should now include resilience as a planning factor (23 USC 134, 23 CFR 450).

and that:

Metropolitan transportation plans shall include an assessment of capital investment and other strategies to... reduce the vulnerability of the existing transportation infrastructure to natural disasters (23 CFR 450.324(f)(7))
In addition to the federal requirement to include resilience as a section in the MTP, North Carolina Executive Order 80 states that "Cabinet agencies shall integrate climate adaptation and resiliency planning into their policies, programs, and operations (i) to support communities and sectors of the economy that are vulnerable to the effects of climate change and (ii) to enhance the agencies' ability to protect human life and health, property, natural and built infrastructure, cultural resources, and other public and private assets of value to North Carolinians."

WHAT IS RESILIENCE?

FHWA's definition of resilience:

"The ability to anticipate, prepare for, and adapt to changing conditions and withstand, respond to, and recover rapidly from disruptions."

In terms of project development and prioritization in the context of freight, this MTP will focus on planning for investments that will help mitigate the effects of extreme weather events and natural disasters, while also considering how freight will flow through the region during a natural disaster.

Goal: Integrate consideration of resilience in transportation decision making

- In support of 23 U.S.C. § 503(b)(3)(B)(viii), which directs the U.S. Department of Transportation “to carry out research and development activities ... to study vulnerabilities of the transportation system to ... extreme events and methods to reduce those vulnerabilities.”

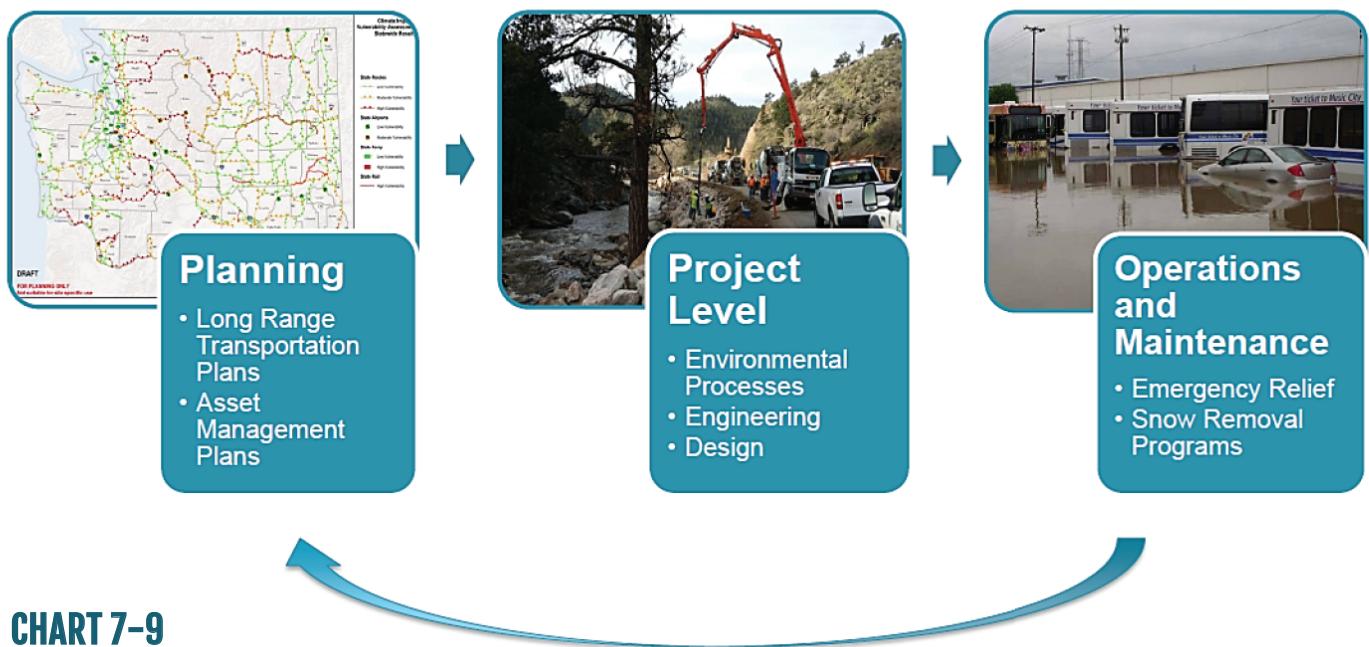


TABLE 7-8. POTENTIAL DISRUPTIONS TO GHMPO REGION FREIGHT OPERATIONS

Facility	Extreme Rainfall	Extreme Heat	Wildfires	Tornados
Highways/Roads	Inundation, Washout, Rockslides/Landslides/Mudslides	Buckled pavement	Damaged pavement	Damaged pavement
Railroads	Inundation, Washout	Buckled rails	Damaged rails	
Bridges	Inundation, Washout, Damaged/destroyed pavement/supports	Buckled pavement	Damaged supports	Damaged pavement/supports
Airports	Inundation, Washout	Buckled pavement	Damaged pavement	Damaged pavement
Intermodal Connectors	Inundation, Washout	Buckled pavement	Damaged pavement	Damaged pavement

Several recent extreme events have caused disruptions to GHMPO freight operations:

- » 2003 landslide in the Black Bear area of US 321 in Caldwell County – closed in both directions for 3 weeks, cutting off access to/from the High Country
- » 2017 tornado destroyed 2 aircraft hangars and several aircraft at Hickory Regional Airport
- » 2020 flooding from extreme rainfall in the Hiddenite area of Alexander County – loss of life and bridge washouts

- » 2020 flooding from extreme rainfall in Catawba and Hickory – state of emergency declaration; road and bridge damage
- » 2019 flooding from extreme rainfall in Caldwell County – state of emergency declaration; road and bridge damage
- » 2020 flooding from extreme rainfall in Burke County – state of emergency declaration; road and bridge damage

Our region's economic health depends on the ability of our freight network to function properly. Disruptions from extreme events – even for short periods of time will likely result in economic losses to businesses and other hardships for residents.

Knowing that extreme events may increase in the future, what can be done from a freight planning perspective? As the GHMPO develops future projects, it will be important to conduct the initial project development and prioritization phases with freight resiliency in mind.

FREIGHT RESILIENCE PLANNING PRINCIPLES

The following list summarizes some of the key freight resilience planning principles to consider during the initial project development and prioritization phases:

- » Identify facilities that have been/will be impacted by extreme events (floods, heat, wildfires, tornados, etc.)
- » Identify floodplains and future floodplain in proposed project areas; determine potential on and off-site impacts of flood events
- » Avoid projects in areas that are subject to impacts from extreme events
- » Assess availability of alternative routes during initial project development phase
- » Account for potential future environmental conditions when evaluating proposed projects or conducting corridor planning studies
- » Identify bottlenecks that hinder truck traffic and assess impacts
- » Determine appropriate solutions to mitigate project impacts (nature-based solutions, hardening, raising bridges, etc.)

FEDERAL HIGHWAY ADMINISTRATION NATURE BASED SOLUTIONS

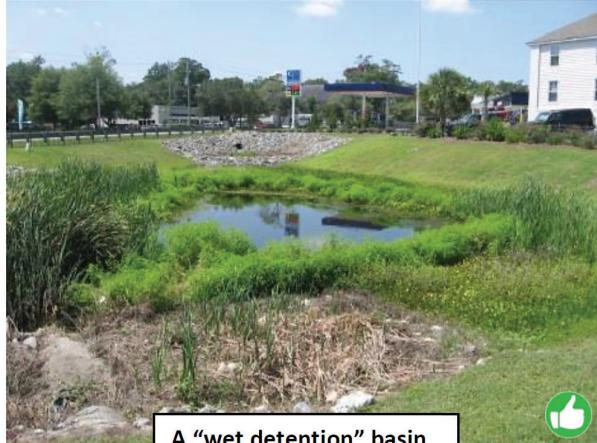
The Federal Highway Administration (FHWA) has recommended that "Nature Based Solutions" be used to mitigate project impacts. While there are many varieties of nature based solutions, they all have one aspect in common – instead of conveying water to nearby streams (which often worsens the effects of extreme rainfall events), nature based solutions typically hold (and in some cases treat) water nearby. Water can then filter slowly into the ground and/or be absorbed by plants, reducing the impacts on local streams and lessening overall flood impacts.



Nature based solution under construction next to highway on-ramp.



A "swale" next to a road.



A "wet detention" basin.

FREIGHT AND TECHNOLOGICAL ADVANCES IN TRANSPORTATION

In recent years, stakeholders have identified four technology driven, mutually reinforcing trends that are poised to transform the transportation sector: sharing, automation, connectivity, electrification and e-commerce/last mile delivery.

Sharing – “Mobility as a Service” (Zipcar, Car2Go, Uber, Lyft, bike shares, e-scooters).

Automation – moving toward driverless vehicles.

In North Carolina, the NC-540 Triangle Expressway has served as a pilot site for the testing of automated vehicle technologies since 2017.

Chart 7-10, shows the U.S. Department of Transportation's scale of vehicle automation.

“Transportation is in the midst of its greatest technological revolution since the rise of the automobile a century ago.

Although no one knows exactly what the future of transportation will look like, new innovations are already reshaping how we move from place to place.”

--NC First Commission, 2020.

CHART 7-10. US DEPARTMENT OF TRANSPORTATION VEHICLE AUTOMATION SCALE

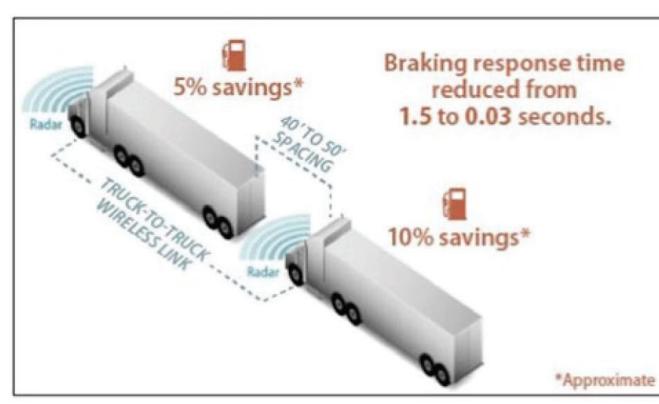
Source: NC First Commission, 2020.

Level	Name	Automated System Role	Human Role
0	No automation	None	All driving functions of the vehicle
1	Driver assistance	Can sometimes assist the human driver conduct some parts of the driving task	All core driving functions
2	Partial automation	Can actually conduct some parts of the driving task such as steering, acceleration, and deceleration	Continues to monitor the external driving environment and performs all remaining aspects of the driving task
3	Conditional automation	Can actually conduct some parts of the driving task and monitor the driving environment in some instances, but may request human intervention for specific driving tasks	Must be ready to take back control and respond appropriately when the system requests intervention
4	High automation	Can conduct the driving task and monitor the driving environment, but only in certain environments and under certain conditions	Human driver is present but does not need to take back control
5	Full automation	Can perform all driving tasks under all conditions that a human driver could perform them	None, except providing destination or navigation input

Connectivity – wireless vehicle to vehicle or vehicle to infrastructure connectivity.

“On trucks, these include sensor systems that combine adaptive speed control, automatic braking, lane-departure warning systems, and vehicle-to-vehicle communications.” (NC First Commission, 2020)

“By allowing sensors on one truck to communicate with sensors on another truck, partially automated trucks could soon travel more closely together to improve fuel efficiency, in a practice known as truck platooning or truck trains” (NC First Commission, 2020).



Electrification – Walmart and Amazon have both invested heavily in electric trucks and delivery vans, and industry analysts are predicting that electric trucks and other electric vehicles will quickly grow in popularity. According to Atlas Public Policy, 23,500 electric vehicles were sold in North Carolina through December 2020, with 5,400 of those sales occurring in 2020.

E-Commerce and Last-Mile Delivery – truck traffic is increasing as more people order goods online, and those goods need to be delivered to customer's homes. "Last mile" refers to the trips that are made in order to deliver products to their final destinations. Drone are increasingly being used to make deliveries of goods to residential areas and to deliver pharmaceutical and medical supplies to hospitals. According to the NC First Commission, "33 companies including Amazon, Alphabet, UPS, Walmart, and DHL are all exploring drone delivery. In North Carolina, authorized pilot projects have delivered take-out food in Holly Springs, groceries in Fayetteville, prescription drugs in Cary, and medical supplies to WakeMed, Novant Health, and Wake Forest Baptist hospitals."

Table 7-9, shows some of the potential impacts of these freight transportation trends in the Greater Hickory Metropolitan Planning Region.

TABLE X-X. POTENTIAL IMPACTS OF FUTURE FREIGHT TRENDS IN THE GHMPO

Innovation	Impacts	
	Positive	Negative
Same Day Delivery/E-commerce	Increased employment Fast delivery	Increased traffic in residential areas Increased emissions (unless EV)
Truck Platooning	Increased efficiency Lower emissions (if EV)	Loss of state fuel revenues (if EV) Loss of state fuel revenues (if EV)
Electric Trucks	Lower emissions	Loss of state fuel revenues
Drones	Increased employment Lower emissions	Loss of state fuel revenues



Source: Walmart.

FREIGHT SURVEY

100 freight operators in the GHMPO region were mailed 1 page freight surveys in April 2022. Each survey contained a pre-paid, pre-addressed envelope for the freight operators to return completed surveys. The surveys were anonymous, and responses will be forwarded to NCDOT.

Freight companies contacted included:

ABF Freight
Advance Pierre Foods Inc
Alexander Trucking Co
Ally Enterprises LLC
Associated Hardwoods Inc
Associated Hardwoods Trucking LLC
Automated Solutions LLC
B Watson Trucking LLC
Bakers Waste Equipment
Bassett Furniture Industries Of NC
Bemis Manufacturing Co
Bernhardt Furniture Company
Best of Beers
Bimbo Bakery
Blue Ridge Transport LLC
BRS Enterprises
Cargo Transporters
Cargo Transporters Inc
Carolina Cargo And Freight LLC
Carolina Classic Carriers
Carolina Container
Carrigan & Sons Trucking
Case Farms Processing Inc
Century Furniture
Century Furniture LLC
Comfort Royale Seating Inc.
Commscope
Continental Automotive Systems Inc
Continental Automotive Systems Inc Corning
Optical Communications LLC
Craftmaster
Daniels Woodcarving Co. Inc.
Estes Express Lines

Exela Pharma Sciences LLC
Fairfield Chair Co
FedEx Freight
G & S Trucking
Gerresheimer Glass Inc
GKN Driveline Newton LLC
Granite Hardwoods
Hancock & Moore LLC
Heico Fasteners
HSM Solutions
Huntington House Inc
Ideal Transport Inc
In & Out Moving & Delivery, LLC
Industrial Timber LLC
Ink Tec
La-Z-Boy Casegoods, Inc
Lee Industries Inc
Leviton Manufacturing Co Inc
Liberty Reload Services
Maple Springs Laundry
Mccreary Modern Inc
Mccreary Modern Inc
Merchants Distributors LLC
Mitchell Gold + Bob Williams Molded Fiber
Glass North Carolina
Morrisette Paper Co.
O.K. Transport Inc.
Old Dominion Freight Line
On Time Express Inc.
Ozark Motor Lines
Paragon Films
Performance Food Group IncPregis
Prysmian Cables & Systems USA

Queen Transportation LLC
R & S Farms/Trucking
Randall Miller Co
Rpm Wood Finishes Group Inc Ryder
Transportation
Saia LTL Freight
Schneider Mills
Sealed Air
Sealed Air Corporation
Sherrill Furniture Company
Shurtape Technologies LLC
Shurtape Technologies LLC
Southeastern Freight Lines Southern
Furniture Company
Southwest Logistics
Stallergenes
STAT, Inc.
Stephen Craig Transport
SunBelt Furniture Xpress
Sutter Street Manufacturing Inc
Target Stores Distribution Center
Tarheel Paper
Taylor King Furniture Inc
Taylorsville Freight Service LLC
United Beverage UPS Freight
Valdese Weavers
Viscotec Automotive Products
WCD Trucking
Westrock Services LLC
Wiseway
Wolf Trucking Co
Zenith Freight Lines LLC

FREIGHT SURVEY RESULTS

4 completed surveys were returned. Results of the survey, while not qualifying as a representative sample of the GHMPO freight sector, are shown below.

1. What is your role in the freight industry?

Driver
Transportation Manager - 2
Logistics
Dispatch
Shipper - 1
Other: "Truck company owner with 500 trucks."

2. What best describes your operational coverage? (Check all that apply)

Hickory-Lenoir-Morganton region (Alexander, Burke, Caldwell, Catawba counties) - 3
Western North Carolina - 2
Charlotte/Greensboro/Raleigh - 2
Statewide North Carolina - 2
Southeastern United States - 2
Nationwide - 2
International - 1

3. Please list specific roadways or intersections in the Hickory-Lenoir-Morganton region that are especially challenging for trucks:

"Hwy 321 south - Castle Bridge"
"Intersection of 321 + 18 in Lenoir"
"I-40, 85, SC 85"
"Rock Barn Rd. + I-40 @ Pilot, McDonald Pkwy +22nd St SE turning left from 22nd."

4. What types of improvements would most benefit truck travel at these locations? (Please list)

"Commute from Caldwell to Catawba County."
"A truck turning lane." (321 + 18 in Lenoir)
"More parking."
"Rock Barn in front of Pilot – turn lane for trucks."
McDonald and 22nd – Stop light."

5. Are the truck parking facilities in the Hickory-Lenoir-Morganton region sufficient?

More than sufficient
Sufficient- 1
Insufficient - 3
Does not apply

6. If truck parking is insufficient, which truck parking areas need to be improved and how?

"Need an additional truck stop."
"Not enough truck parking at truck stops due to ELD's."
"Additional parking needed along I40 near US 321, rest areas, remove ramp, no parking signs where safe to do so."

**7. What is the greatest safety concern faced while driving in the Hickory-Lenoir-Morganton region?
(Choose one)**

Traffic congestion/volume - 2
Sight distance
Construction zones - 1
Poor turn radii at intersections - 1
Pedestrians/bicyclists
Rail crossing safety

8. What are the biggest challenges you face in delivering freight to and within the Hickory-Lenoir-Morganton region? (Check all that apply)

Congestion - 3
Signal timing - 2
Road conditions (pavement, bridge conditions)
Intersection turning configurations - 1
Poor access to the network (narrow lanes, restrictive roads, etc.) - 2
Other

9. Where are the most problematic locations to pick up or deliver freight in the Hickory-Lenoir-Morganton region?

"Hickory City limits."
"Hwy 127 in Hickory, 181 in Morganton, Hwy 18 + 64 in Lenoir."
"Congestion on Hwy 321 from Hudson to Hickory."

10. With regard to the global pandemic, how would you say your operations have changed since March 2020?

Decreased significantly
Decreased slightly - 1
No significant change
Increased slightly - 1
Increased significantly - 2

11. What else would you like to tell us about moving freight in the Hickory-Lenoir-Morganton region?

"321 Boone to Lenoir needs flashing truck speed lights."
"Our region is home to some large DC's and manufacturing. Truck traffic and its accommodation are paramount."
"Traffic congestion 7-8am + 3-5pm on Hwy 321 from Hickory Airport to Lenoir Crossing."

FREIGHT RECOMMENDATIONS

- » Incorporate resiliency planning principles into the initial project planning and prioritization phases.
- » Consider street design elements for freight trucks when new streets are created/existing streets are improved, especially in industrial parks and manufacturing areas. At a minimum, these elements should include:
 - Ample lane width – 12 feet minimum;
 - Turning radii – 25 feet minimum;
 - Separation from pedestrian facilities and bicycle lanes, for example with 5 foot planting strips.
- » Work with NCDOT to prioritize improvements to insufficient Interstate 40 interchanges (exits, on-ramps and bridges).
- » Work with NCDOT to address bottlenecks in the region.
- » Work with NCDOT to synchronize traffic light timing on major freight routes at high volume times to increase efficiency, and reduce noise and air pollution, especially within city limits.
- » Ensure that new industrial and manufacturing areas have sufficient access to arterials.
- » Encourage municipalities to incorporate the above design criteria into their street design requirements in industrial areas and on truck routes.
- » Support the City of Hickory as it works to expand air freight service and regain commercial air service.
- » Support the Foothills Regional Airport's freight transportation needs.
- » Support the on-going improvement and development of the Alexander and Caldwell county short-line railroads.
- » Ensure that the needs of trans-load facilities are evaluated when projects are being developed within close proximity to facilities.