COLORADO
Department of Transportation
Freight Mobility & Safety Branch

Colorado Freight Plan

2024

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Planning for the Future and Delivering for Colorado

The Colorado Freight Plan (CFP) builds on the 2019 Statewide Freight Plan, incorporating new federally mandated requirements and Colorado state priorities. The updated CFP guides improvements and investments on the freight systems and supports Colorado's vision of a safe, efficient, coordinated, and reliable system for the movement of goods. The Colorado Department of Transportation (CDOT) is committed to working with partners in the private sector, as well as public agencies, and regional and local planning partners to advance investments, actions, and policies that will achieve this vision. Recognizing current funding constraints and future growth needs, this plan supports the Statewide Transportation Plan and serves as a guiding document for ongoing and coordinated planning efforts at CDOT addressing issues such as aviation, passenger rail, transportation system management and operations, transportation safety, and other freight specific studies and analyses. Ongoing freight planning and implementation efforts will be supported by the Colorado Freight Advisory Council (FAC) and public agency and private industry partners. The CFP positions Colorado to better understand and improve the complex freight systems that Colorado businesses and consumers rely upon.

Colorado's Freight Plan Vision

Colorado's multimodal freight system will support the economic vitality of the state by providing for the safe, efficient, coordinated, and reliable movement of freight.

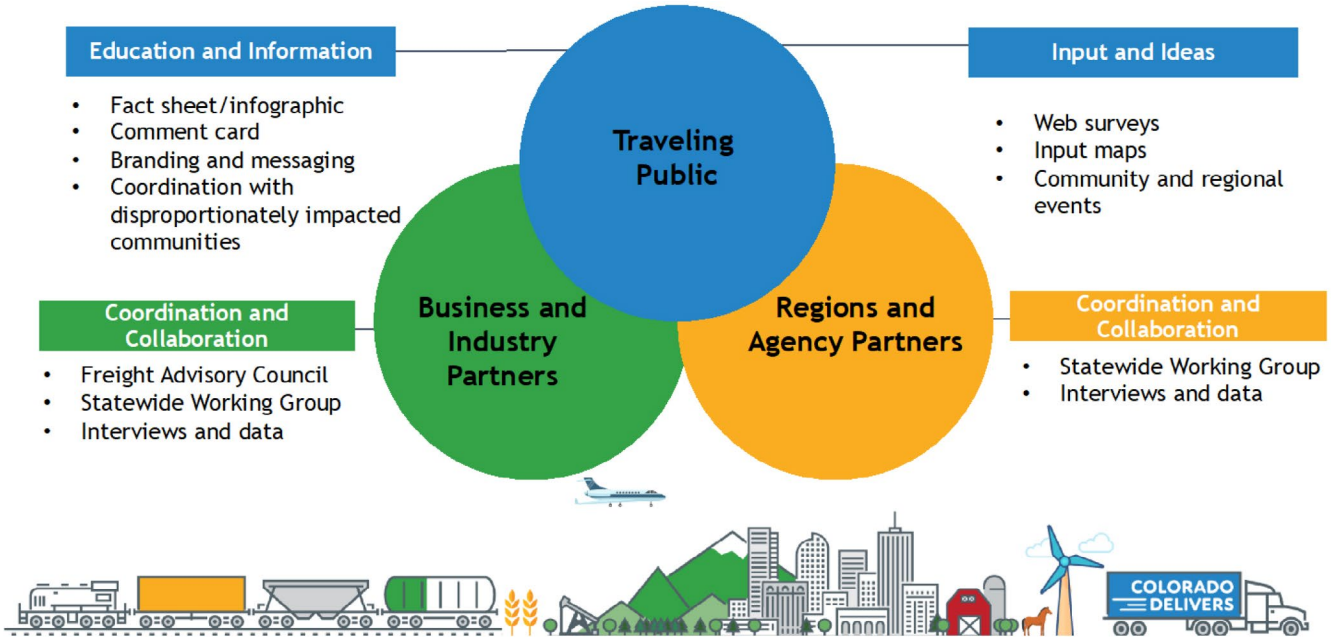
2

Engaging Stakeholders

CDOT is committed to fostering a collaborative freight planning process through partnerships with businesses, agencies and guidance from the FAC. Building upon the 2019 Colorado Freight Plan, the 2024 CFP collects conversations, concepts and feedback from freight planning partners ranging from the traveling public, advisory committees and industry personnel.

Stakeholders participated in the development of the 2024 CFP by attending meetings, writing emails, providing ideas at in-person events, filling out surveys and by responding to social media posts. Figure 1 below illustrates CDOT's approach to outreach and engagement:

Figure 1. Engagement and Outreach Approach



Committee and Working Group Involvement

To guide the CFP development, CDOT engaged businesses, freight transportation providers, industry representatives, local governments, regional planning organizations, state agency partners, a plan-development working group, and elected officials who served as members of advisory committees. Together, these stakeholders supplied information, recommendations, and insights to shape an implementable and actionable plan that can proactively address Colorado's freight issues and priorities.

CDOT appreciates the following partners who contributed to and guided the CFP:

Created by state statute, the **Statewide Transportation Advisory Committee (STAC)** *advises CDOT on transportation needs in Colorado. STAC members include elected officials and regional planning staff from each of Colorado's Transportation Planning Organizations and tribal governments. STAC acted as a forum for the meaningful discussion of regional freight transportation issues, providing feedback and guidance to CDOT on key strategies within this plan.*

The **Colorado FAC** *provides an independent forum where private-sector and public partners work to advocate for commercial transportation, influence transportation policy, and effectively collaborate to implement solutions. This council reviewed state and regional freight-related issues and guided the development of key strategies and recommendations included within this plan. The FAC will continue to work on freight planning efforts, including implementation of the CFP.*

A **Freight Plan Working Group**, *composed of agency personnel, elected officials, and industry stakeholders, met to evaluate key findings and outreach results, identify and prioritize needs and issues, and provide critical oversight to support the strategic direction of the CFP. Members included representatives from geographically diverse regions in Colorado; they included participants from fields such as shipping, trucking carriers, railroads, production and more.*

A **Public Working Group** *allowed additional statewide stakeholders to hear about the CFP and offer feedback. CDOT hosted two virtual meetings for the CFP. The first provided an overview of the process and components, while delineating elements outside of its scope. The second highlighted the finalization of the plan, reviewed feedback gathered from statewide surveys, and focused on policy-driven strategies to meet freight plan goals.*

In-Person Engagement Events

Attending multiple events allowed CDOT to gain specific insight into the freight priorities of many of Colorado's geographically diverse communities. At each, opportunities for engaging directly with residents resulted in meaningful conversations regarding the future of freight and infrastructure.

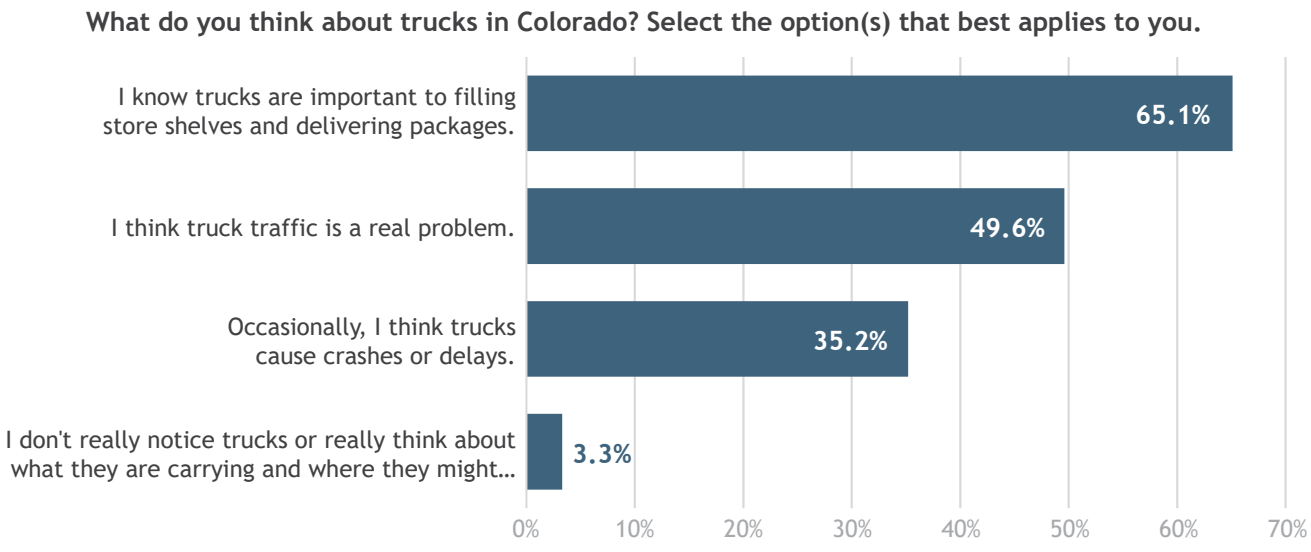
- **Colorado Springs Labor Day Lift Off, Sept. 2-4 (CDOT Region 2) -** As a center for military activity, many conversations revolved around military readiness and its effects on local infrastructure. Other comments focused on the viability of commercial trucking.
- **Grand Junction Downtown Car Show, Sept. 16 (CDOT Region 3) -** The freight concerns of the Western Slope are uniquely different from those on the Front Range. Comments reflected this geographic distinctiveness.
- **Sheridan Celebrates Festival, Sept. 30 (CDOT Region 1) -** At the crossroads of Denver's suburban and DI communities, comments here reflected growing (sub)urban priorities:
- **Lamar Oktoberfest and Car Show, Oct. 7 (CDOT Region 2) -** Lamar sits at the busy intersection of CO 50 and US 287, a major hub in Colorado's eastern plains and a convergence of alternative freight routes to southeastern states (e.g., Kansas, Oklahoma, Texas). The city relies on freight as a source of economic revenue. In addition to service industries, a Port of Entry is on the outskirts of town.

Survey Results

Survey responses highlighted concerns such as roadway safety, infrastructure longevity and multimodal freight solutions. The safety of current transportation methods and the availability of multimodal transportation options also featured prominently.

When ranking how Colorado should prioritize limited transportation dollars for easier freight deliveries, participants ranked infrastructure maintenance as the top priority, followed by improvements to equity, safety, greenhouse gas, mobility and, finally, freight resiliency. Survey comments confirmed this hierarchy; many of them specifically addressed concerns about the state and the functionality of roads.

Figure 2. Respondents Experience with Trucks in Colorado



The general themes of survey comments reflect commonly repeated responses and reinforce CDOT's Wildly Important Goals.

1. **Advancing Transportation Safety:** Safety was a top concern for survey respondents. Participants want a Colorado transportation system that allows all travelers to arrive at their destinations safely.
2. **Accountability and Transparency:** Many respondents greatly value freight priorities that ensure an efficient use of taxpayer funds that focus on construction project delivery.
3. **Clean Transportation:** Survey participants clearly desired freight policies that work to reduce pollution.
4. **Efficiency of Statewide Transit:** Traffic congestion connected to statewide transit systems and rail services was a significant theme among survey respondents.

Critical Concerns: Industry Stakeholders and Freight Plan Working Group

Outreach included regular meetings with the Freight Plan Working Group (FPWG). Concerns reinforced the vision, goals and strategies of the 2024 CFP. The ongoing dialogue suggested areas for investment and criteria to prioritize and assess freight program funding. Most participants answered that the availability of freight and access to multimodal freight infrastructure were top priorities. Workforce readiness and financial constraints were also of concern. The greatest factor survey respondents identified as preventing businesses from improving operational efficiencies was congestion. On the other hand, many are optimistic about adopting new technology within the next 5-10 years..

1. **Economic Partnerships:** A common theme for industry and business partners was to improve internal and external networks for growth.
2. **Capacity & Bottlenecks:** Responses focused on barriers to growth included capacity limits and the presence of bottlenecks.
3. **Modal Diversity:** Participants saw the state prioritizing highway freight often at the expense of other forms.
4. **Safety and Environmental Concerns:** Often addressed simultaneously, participants often connected safety and innovation to environmental priorities.

Conclusion

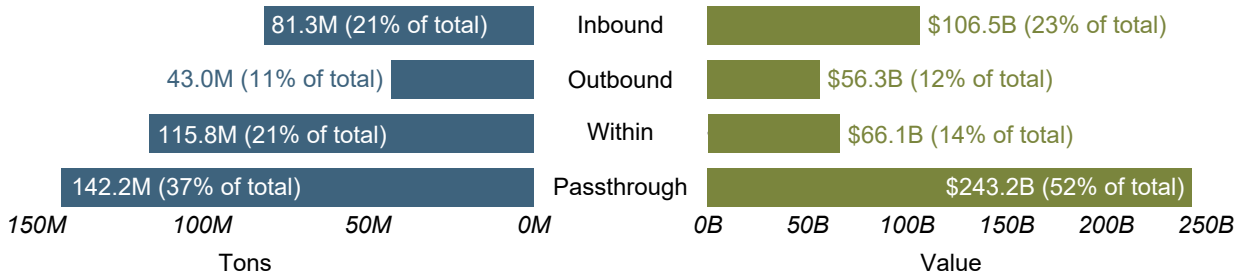
Outreach and engagement efforts for the 2024 CFP surpassed those of previous plans. In addition to a more concerted cultivation of public comment, surveys and other methods reached across Colorado's dynamic and geographically diverse communities to include constituent priorities. Business and industry leaders provided insight into Colorado's freight successes and concerns. Ongoing efforts will ensure that CDOT continues to include a diverse range of voices in the development of Colorado's freight policies and reflect back up on the efforts gained and comments made from a robust outreach and engagement process.

3

Connecting the Economy

Colorado's freight network plays a pivotal role in the state's dynamic economy, serving as a critical backbone for the transportation of goods and commodities. Freight movements on Colorado infrastructure are substantial, with 382 million tons of freight worth nearly $472 billion moved in 2021. About sixty-two percent of cargo originate, terminate, or move within Colorado, while the remaining thirty-seven percent of freight tonnage are passthrough and use the Colorado freight system to move to and from external origins and destinations (Figure 3). Inbound flows are nearly double that of outbound flows by tonnage and value, and thirty percent of freight by tonnage stays within the state, being both generated and consumed within Colorado. These internal freight movements tend to be of lower value commodities than inbound and outbound moves, constituting only fourteen percent of the freight value transported.

Figure 3. Freight Flows by Direction

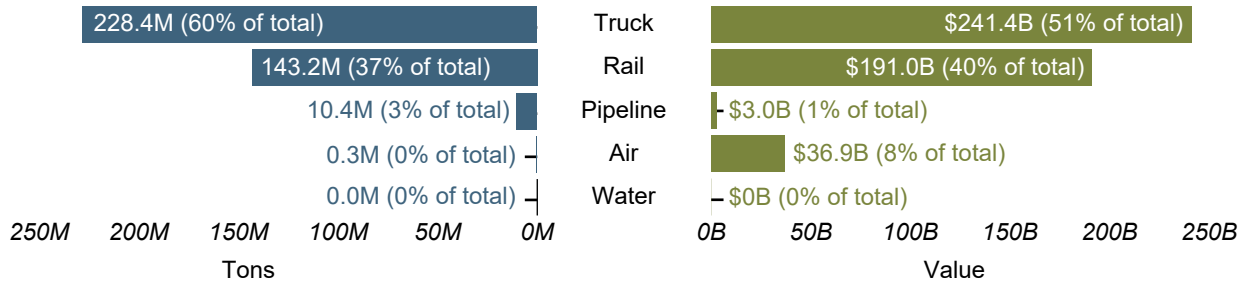


Source: S&P TRANSEARCH with Confidential Waybill

Freight movement in Colorado is expected to grow substantially by 2040. Colorado is projected to move an additional sixty-six million tons by 2040, an approximately seventeen percent increase in freight moved by tonnage. Additionally, the value of freight moved is expected to increase by over fifty percent during the same time period, for an increase of $240 billion. Further attesting to the projected growth in Colorado's economy, the highest increase in freight moves is expected to be in flows internal to Colorado, with freight forecasted to increase twenty-six percent by tonnage and seventy percent by value.

In 2021, truck and rail flows (including passthrough traffic) constituted the majority of freight movements in the state (Figure 4). Truck traffic accounts for the majority of Colorado's freight traffic by tonnage (sixty percent of the total, equaling over 228 million tons) and accounts for just over half of the total freight value moving in the state ($241 billion). Almost all types of commodities are moved by truck in or through Colorado. Construction industry-related flows and food and agriculture shipments constitute a combined sixty percent of truck flows by tonnage. Rail flows comprise a variety of commodity moves (thirty-seven percent of total tonnage and forty percent of total value) and include significant coal shipments that are passing through Colorado from Wyoming to Texas, as well as terminating in Colorado. Rail moves also include large quantities of grain shipments, as well as chemical products and lumber. Air freight, which generally includes priority and time-sensitive items and high-value goods, accounts for 8 percent of freight moved by value (about $37 billion) despite accounting for less than 0.1 percent of freight tonnage.

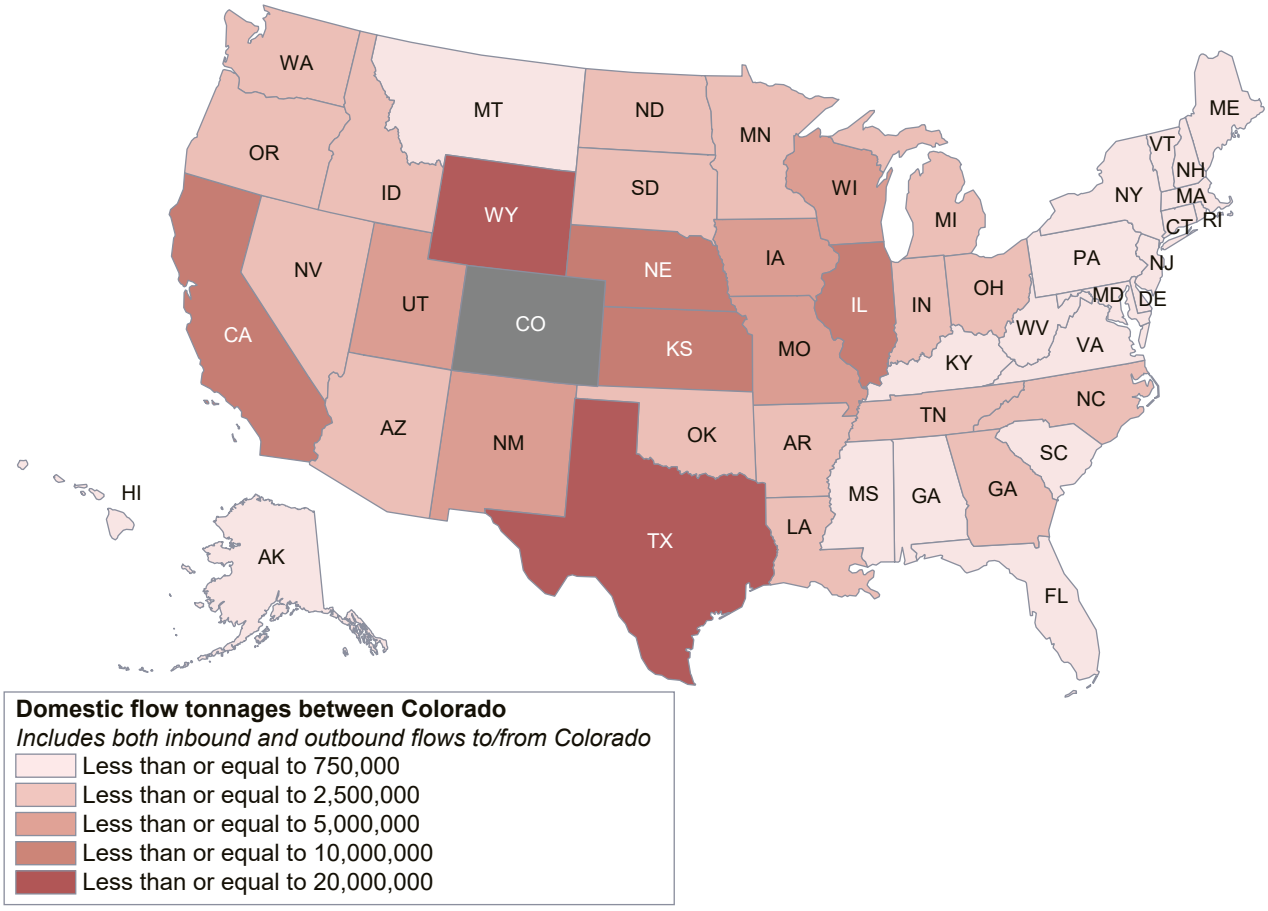
Figure 4. Freight Flows by Mode (Includes Pass-through)



Source: S&P TRANSEARCH with Confidential Waybill

The vast majority of freight flows in Colorado are domestic movements to and from other states in the continental United States. Texas, Wyoming, Illinois, and California are among the top domestic state trading partners to Colorado (Figure 5).

Figure 5. Top Domestic State Trading Partners for Colorado-based Freight Movements (by Tonnage)

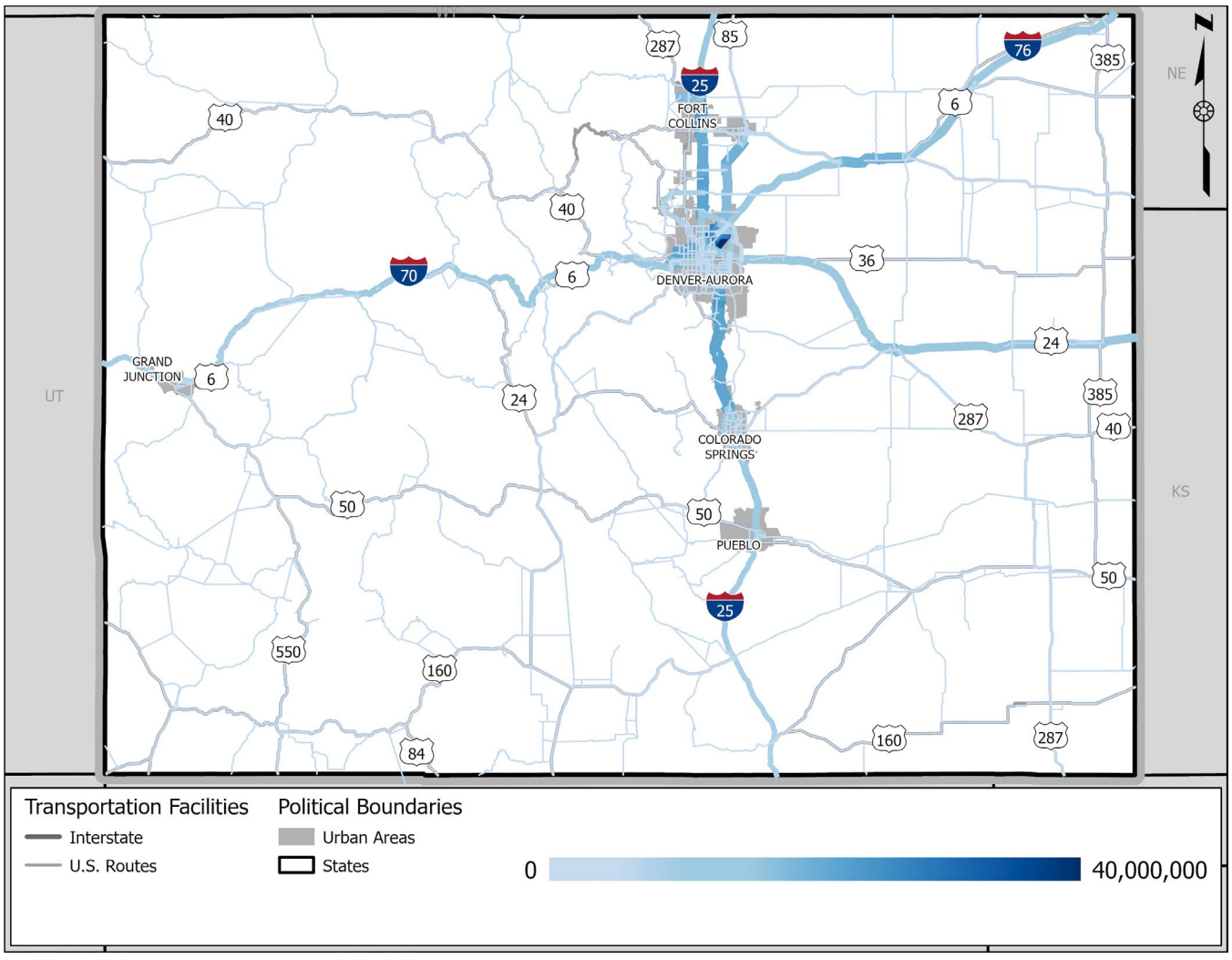


Source: IHS TRANSEARCH, 2021

According to the U.S. Census Bureau, Colorado's international trade is smaller than that of large-population coastal states, with imports of about $16 billion and exports of approximately $9 billion in 2021. The top imported goods were computer and electronic products as well as electrical goods from Asia and Mexico, oil and gas products from Canada, and non-electrical machinery and transportation equipment from various suppliers across the world. The top exported goods from Colorado were meat and meat packaging products, computer and electronic products, non-electrical machinery, and chemical products.

Given that truck transportation is the prevailing mode for domestic freight movements in the state, Colorado roadways are critical to the success of key industry clusters statewide. Interstate and U.S. routes in Colorado (e.g., I-25, I-70, I-76, U.S. 34, U.S. 50, and U.S. 287) are utilized to connect Colorado to national markets. Commodity flow routing illustrates the variation in freight corridors utilized by Colorado-based industries and passthrough traffic (Figure 6 and Figure 7).

Figure 6. Freight Corridors Utilized by Commodity Flow Origin/Destination (By Tonnage) – Non-Passthrough



Source: IHS TRANSEARCH, 2021

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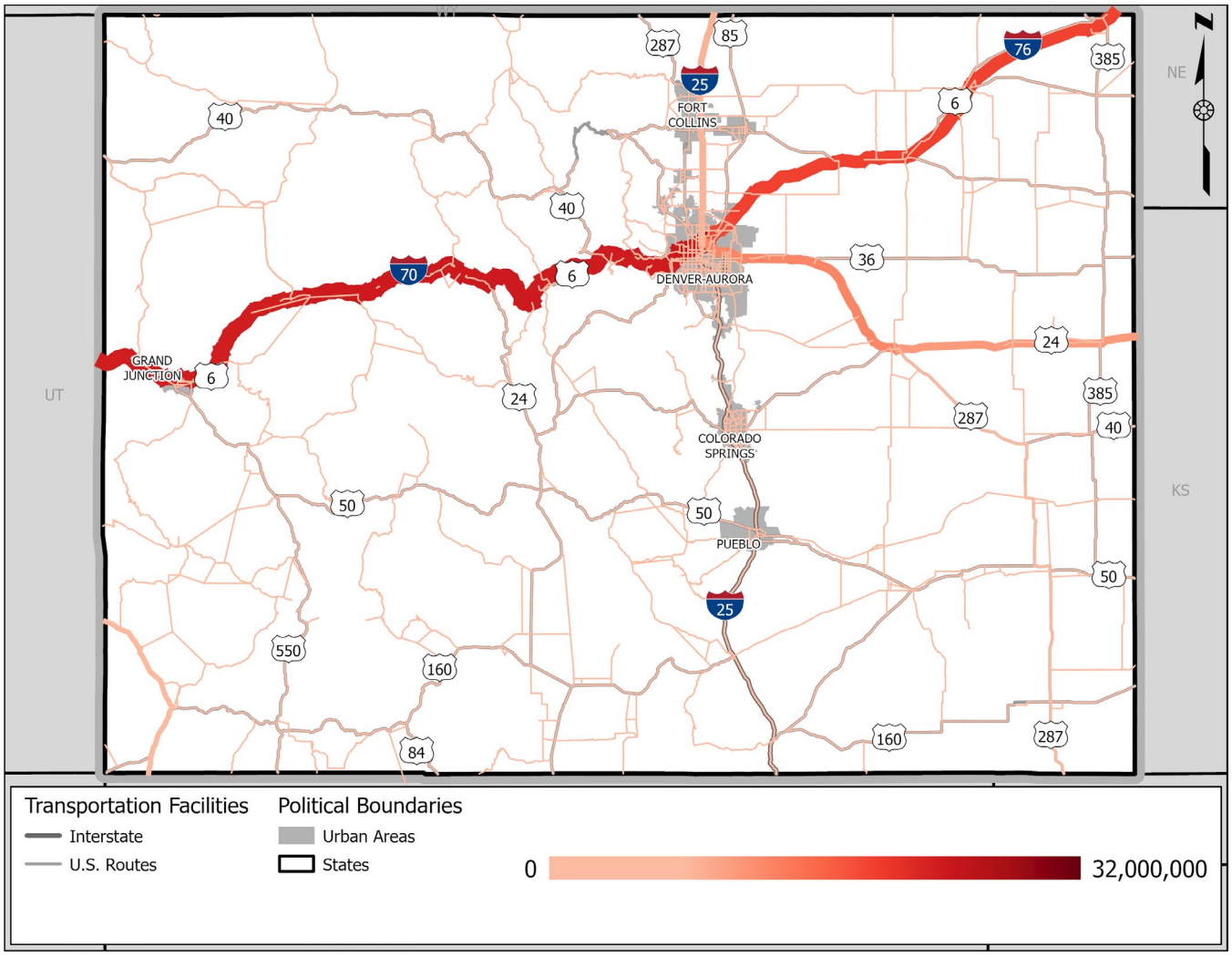
Figure 7. Freight Corridors Utilized by Commodity Flow Origin/Destination (By Tonnage) – Passthrough



Source: IHS TRANSEARCH, 2021

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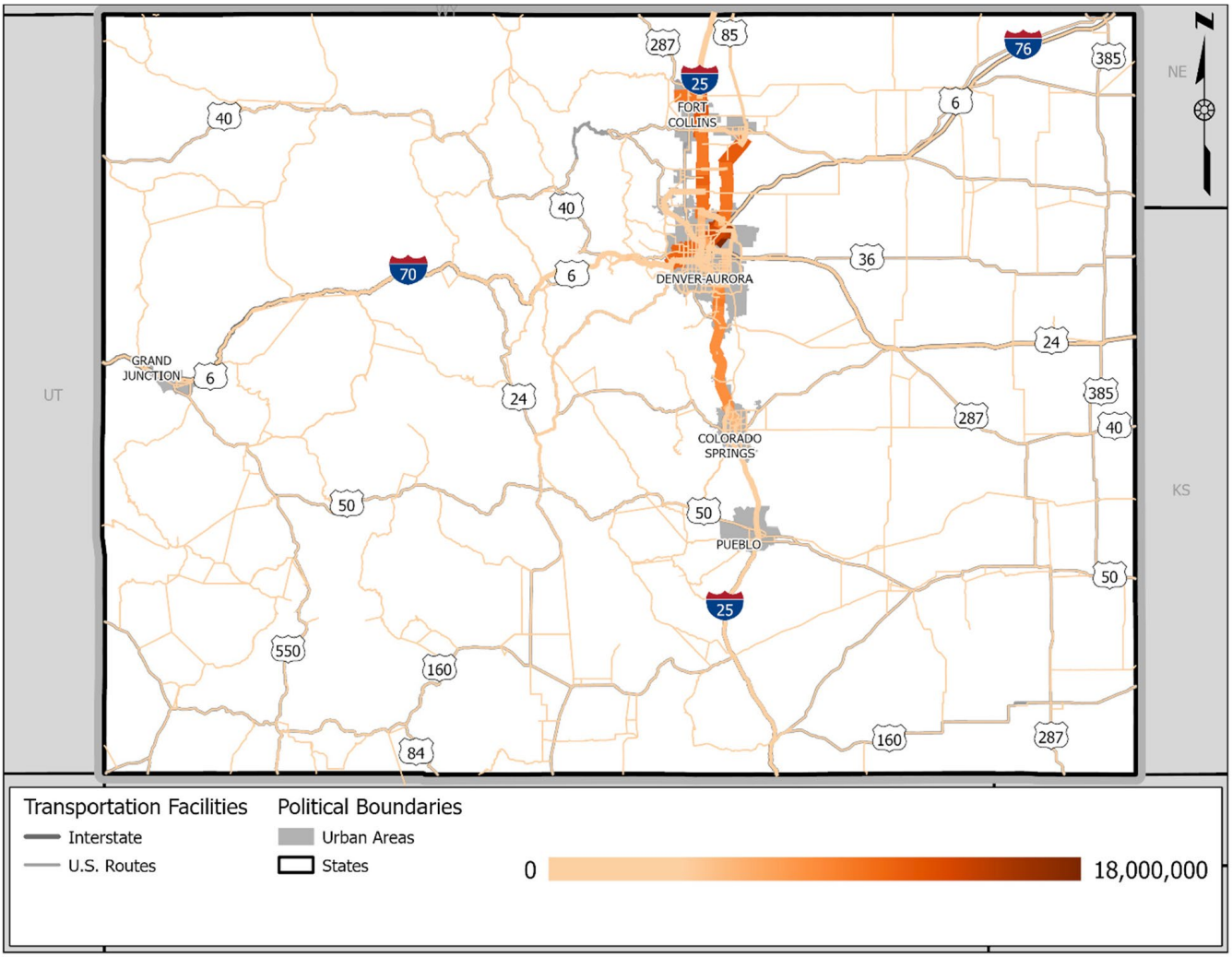
Trucks carrying Colorado-based commodities move along I-25, I-76, I-70, and a variety of other U.S. and state routes connecting Colorado's freight-generating and attracting industries to their origins and destinations. I-25 is the largest freight corridor in Colorado by tonnage flows, connecting factories in the Denver metro area (particularly Weld County and Adams County to the north) to population centers nearby, including Denver and Colorado Springs, supporting the state's construction industry (Figure 8). Construction materials move in large volumes and are expensive to ship so they are often sourced from locations close to where they will be consumed. Therefore, the consumption and production of construction materials tends to congregate around metropolitan areas and construction sites where much of the building occurs.

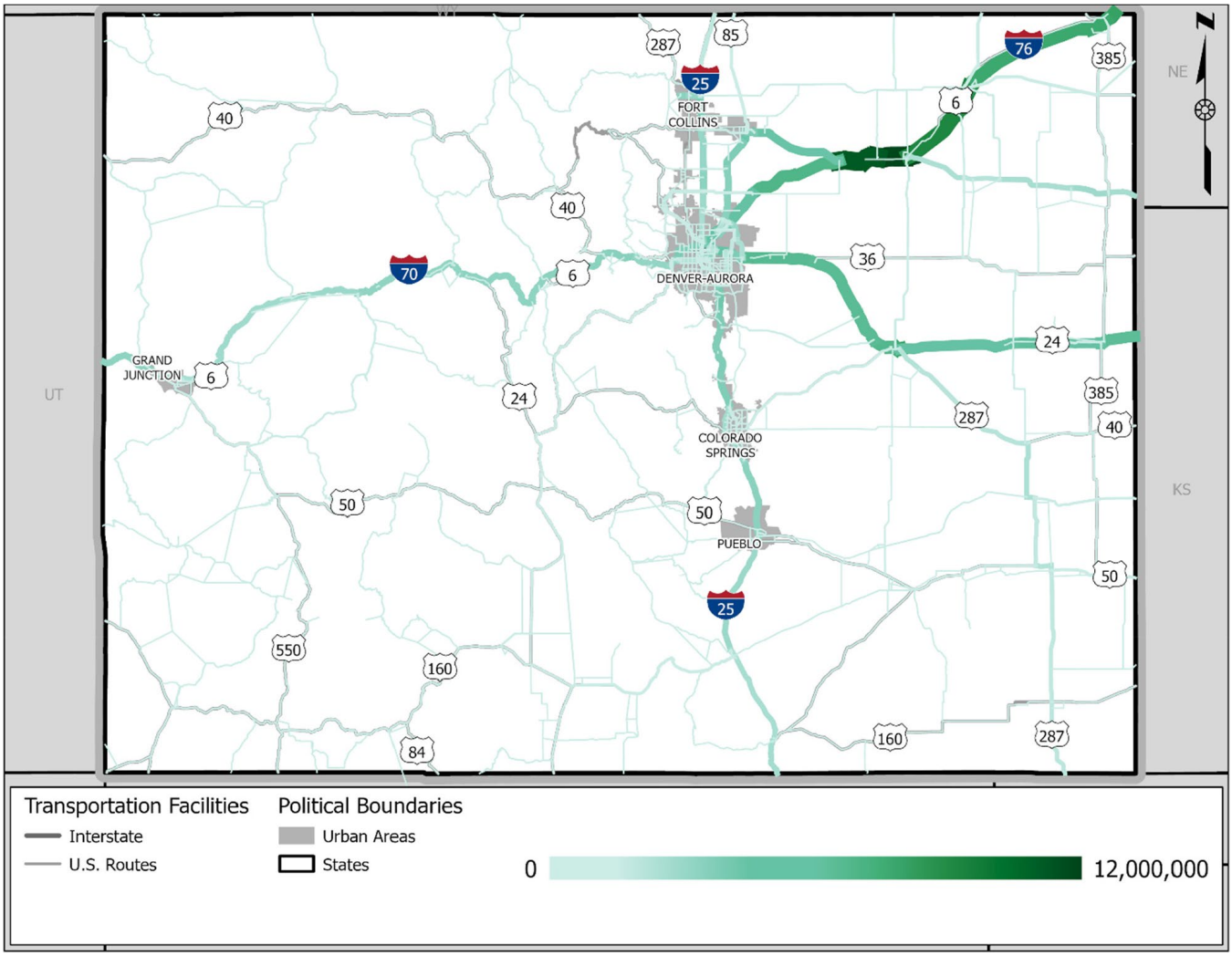
Figure 8. Construction Tonnage Flows on Colorado Roadway Network



Source: IHS TRANSEARCH, 2021

I-76 is the key freight corridor for movements of food and agriculture commodities to and from Colorado, connecting Denver to Nebraska and beyond (Figure 9). Agriculture and food production is unique in its dependence on environmental factors and its large geographic footprint. The northeastern quadrant of the state holds the greatest concentration of agricultural and food production by weight, and I-76 moves these goods produced in this region to Denver and surrounding population centers where they are processed and consumed.

Figure 9. Food & Agriculture Tonnage Flows on Colorado Roadway Network



Source: IHS TRANSEARCH, 2021

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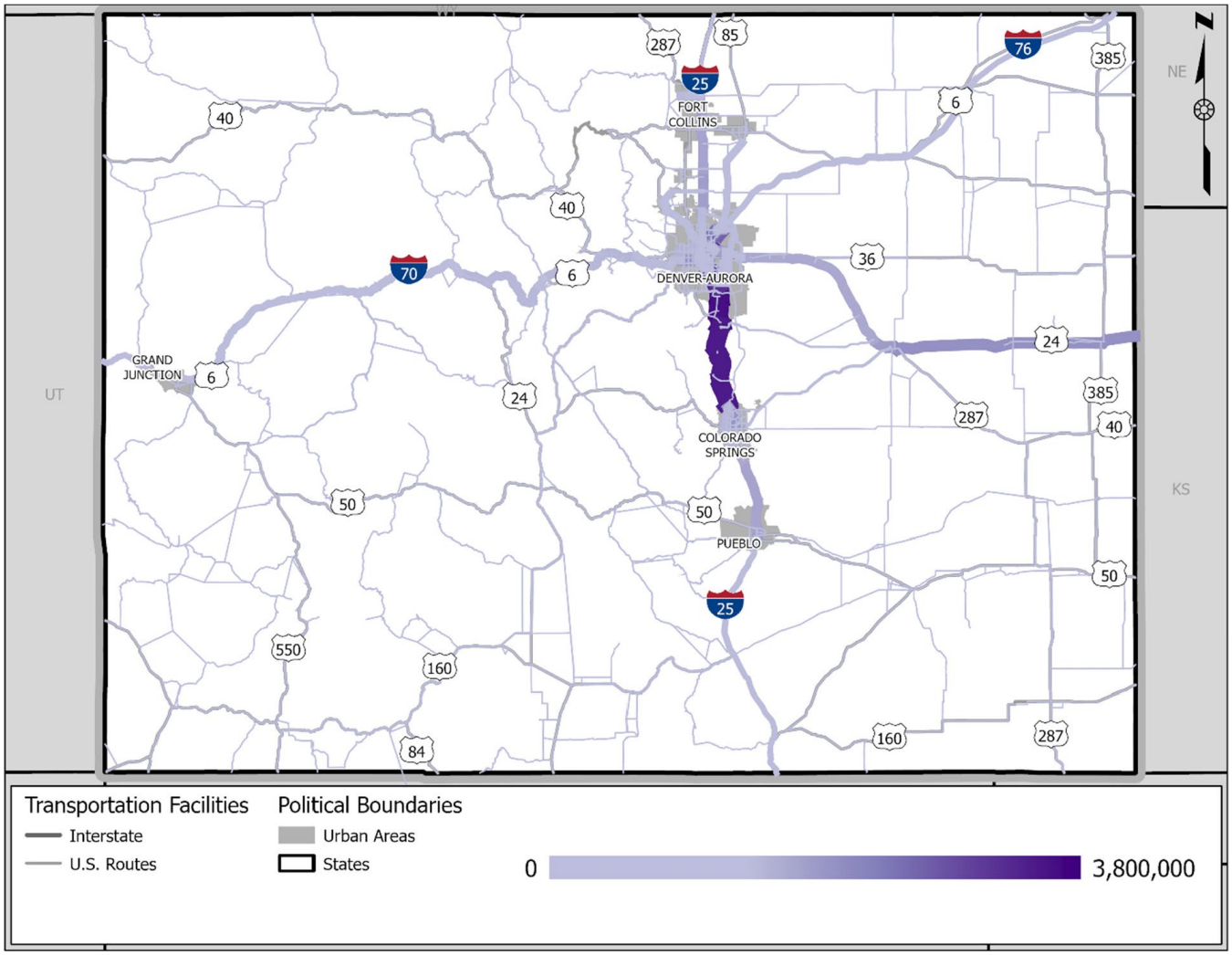
The I-70 corridor from Denver to Limon is part of the national Ports-to-Plains priority freight corridor, connecting the airport in Denver to distribution centers in the metro area, as well as to ports farther away (Figure 10). However, this distribution traffic is also heavily concentrated on the I-25 corridor, particularly on the segment between Denver and Colorado Springs, as over half of this supply chain is composed of movement of grocery and retail-related commodities, which tend to be driven by population density.

Figure 10. Distribution Tonnage Flows on Colorado Roadway Network



Source: IHS TRANSEARCH, 2021

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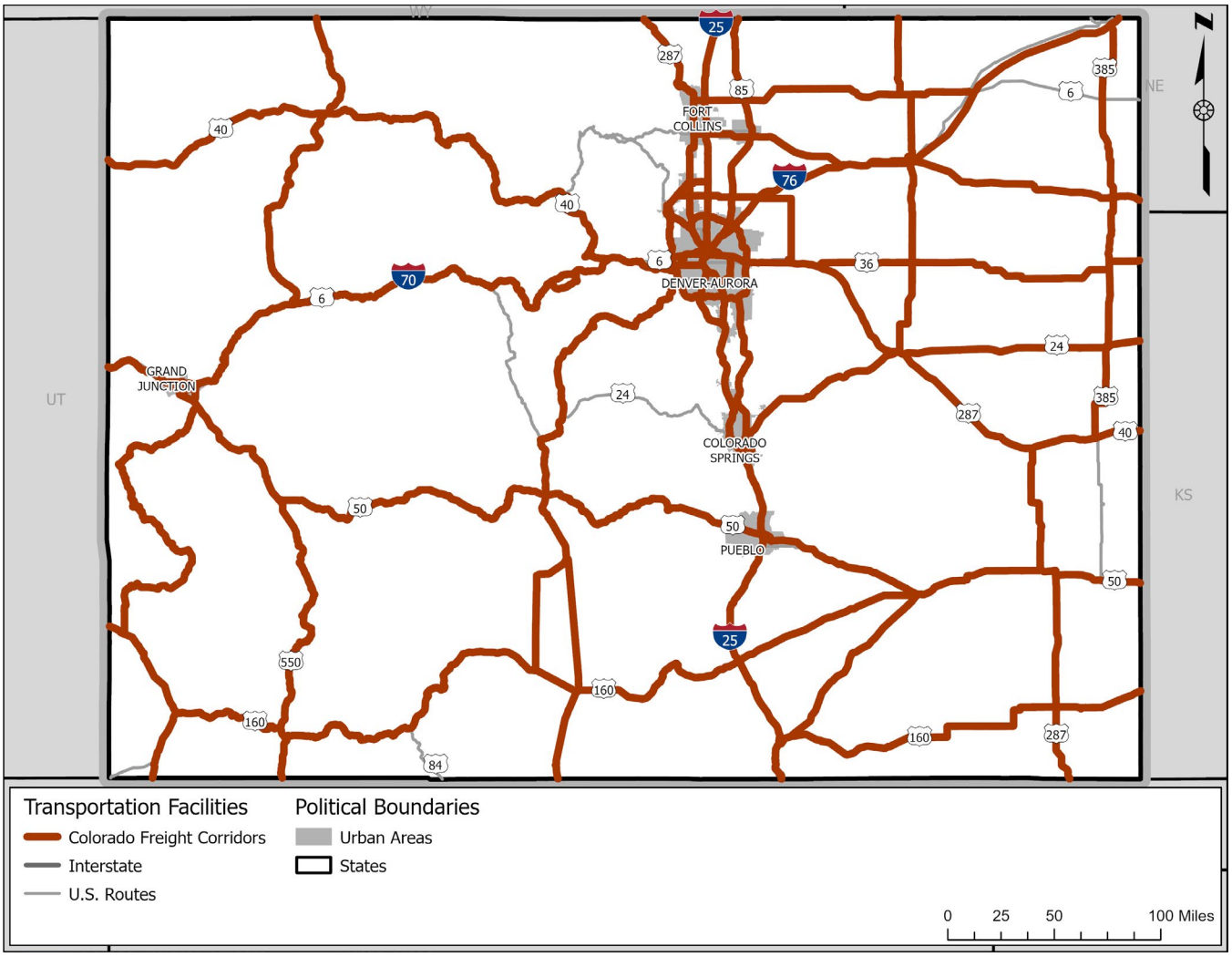
4

Colorado's Highway Freight Network: Safety, Mobility, and Condition Analysis

Colorado's Highway System

As an inland state without any navigable waterways, Colorado relies heavily on its air, rail, and highway infrastructure to support freight industries. Highways, in particular, are integral for to-market goods delivery in the state, as well as the vast majority of middle mile freight transportation. Colorado designates its own distinct freight network, weighing the truck utilization, industries, federal designations, and overall criticality to the movement of freight throughout the state. This network is largely consistent with the higher order corridors of the National Highway System (NHS), but identifies additional corridors primarily in the western and southeastern portion of the state. Routes such as U.S. 160 and SH 141 provide regionally significant connections to main thoroughfares that are notable for statewide freight planning. Figure 11 displays the Colorado freight network.

Figure 11. Colorado's Priority Freight Network

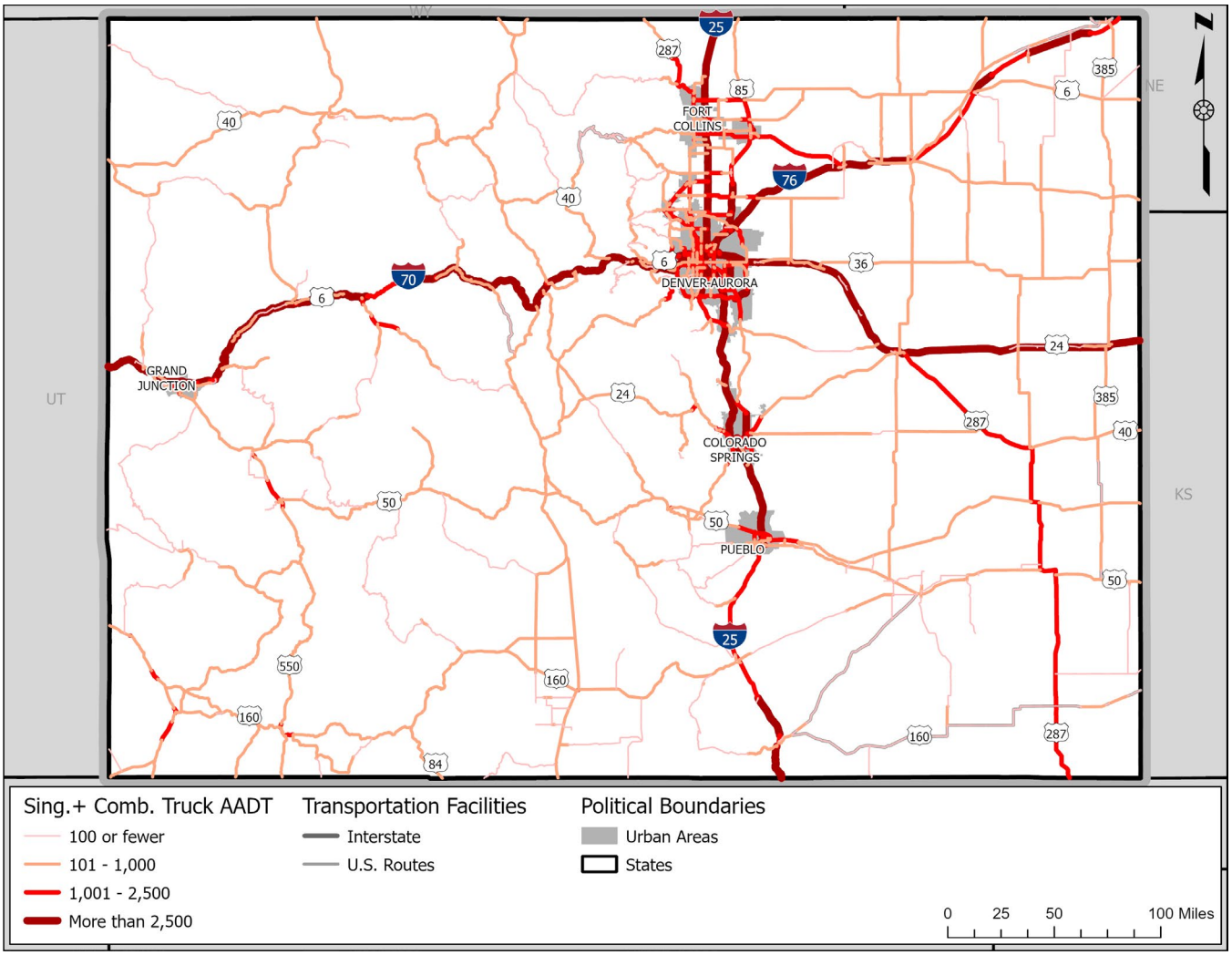


Source: Colorado Department of Transportation, 2022

Truck Volumes

Truck volumes, or the number of trucks traveling on a roadway, indicate where highway freight is most concentrated. This helps CDOT to determine which routes play the most critical role in freight movement and can also be used to estimate which routes may see increased pressure from truck travel throughout the state. The percentage of traffic comprised of freight trucks is used in conjunction with raw volumes to determine which routes are important for freight industries. These two metrics together provide a high-level picture of truck demand in the state and identify the key corridors in the state. Figure 12 shows the Annual Average Daily Truck Traffic (AADTT) in Colorado.

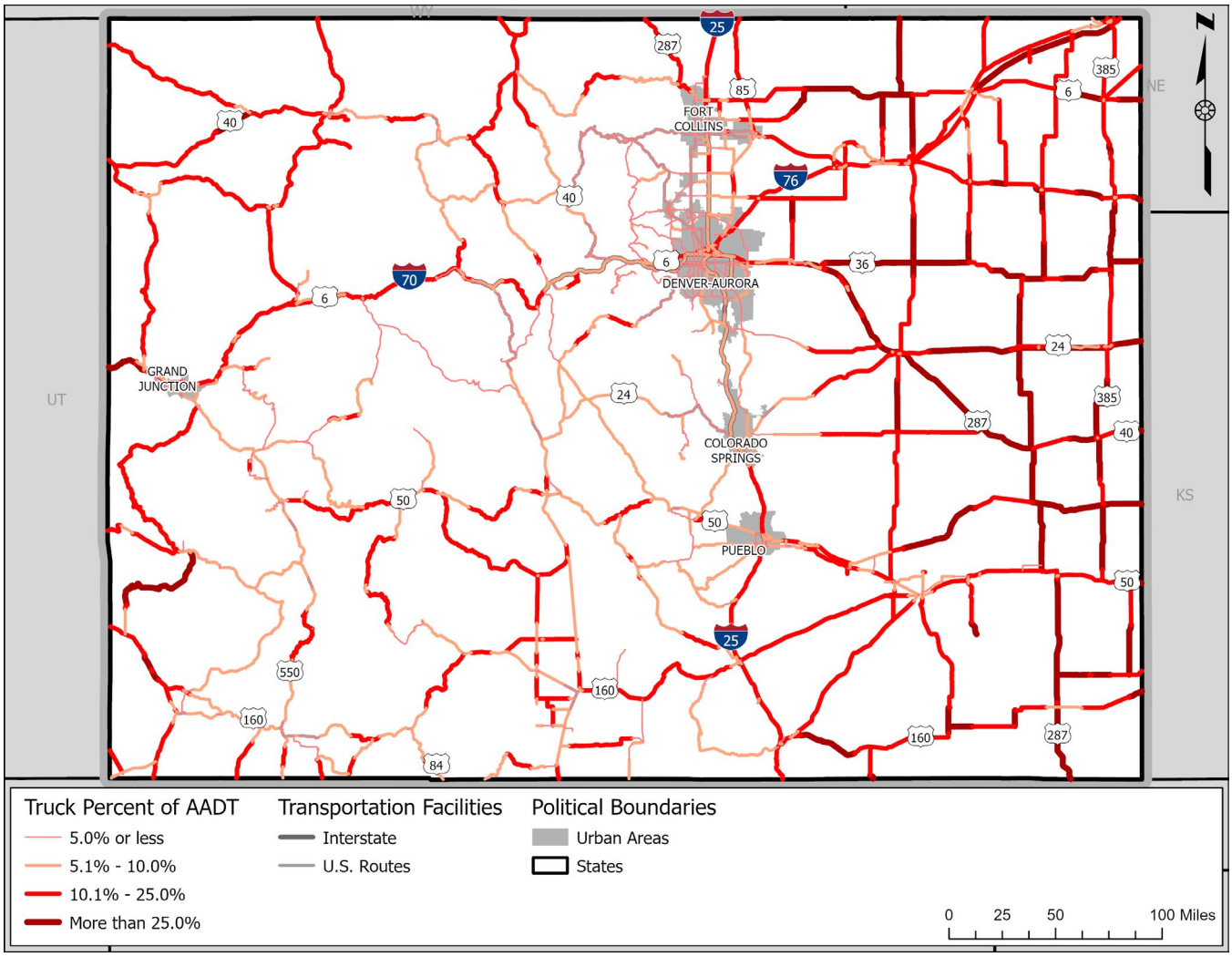
Figure 12. Annual Average Daily Truck Traffic Volumes, 2021



Source: Colorado Department of Transportation, 2022

In Colorado, the majority of roadways with a high percentage of truck traffic are the US and State routes across the Front Range. These correlate to freight industries with a large physical footprint, like agriculture or large warehouses/manufacturing facilities. Figure 13 illustrates two major themes regarding truck travel in Colorado. The percentage of truck traffic along the Western Slope is less than 25 percent, in contrast to higher percentages in similarly rural areas such as the Front Range and Eastern Plains regions. Second, I-76 and I-70 both have substantial segments where the percentage of trucks on the roadway exceeds 25 percent of total traffic. These findings indicate that the west does not have an extensive quantity of freight producing facilities, and that a substantial portion of travel in the eastern portion of the state is dedicated to the movement of goods rather than passenger traffic.

Figure 13. Truck Percent of AADT, 2021



Source: Colorado Department of Transportation, 2022

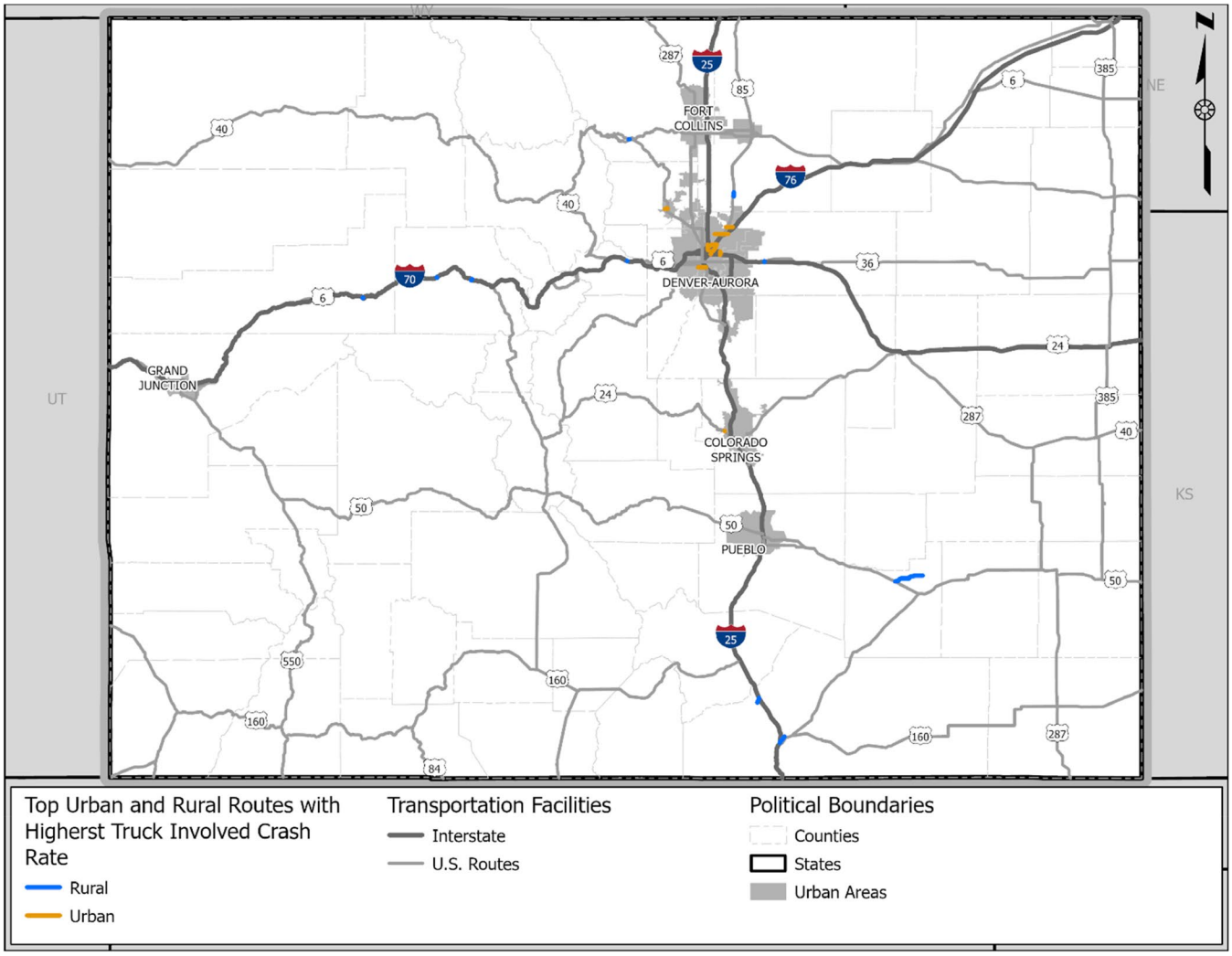
Highway Safety

Safe travel on highways throughout the state ensures both the health and wellbeing of roadway users, as well as the efficient operation of the freight network. Between 2017 to 2021, the number of truck-involved crashes fluctuated, with a significant reduction in 2020 likely due to the pandemic and quarantine measures that reduced the number of cars on the road. As restrictions eased, the number of cars on the road increased as did the number of crashes involving cars and trucks. Crash data indicates that the driver of the car may be at fault in approximately 63 percent of crashes involving cars and trucks in Colorado.[1]

[1] Crash Data, Colorado Department of Transportation, 2017-2021, https://www.codot.gov/safety/traffic-safety/data-analysis/crash-data.
Note: The assumption used in this analysis is that a crash is identified as truck- caused if there is a violation code associated with a truck-type vehicle. In this approach, 66,691 unique crashes were caused by trucks, accounting for approximately 37 percent of all truck-involved crashes.

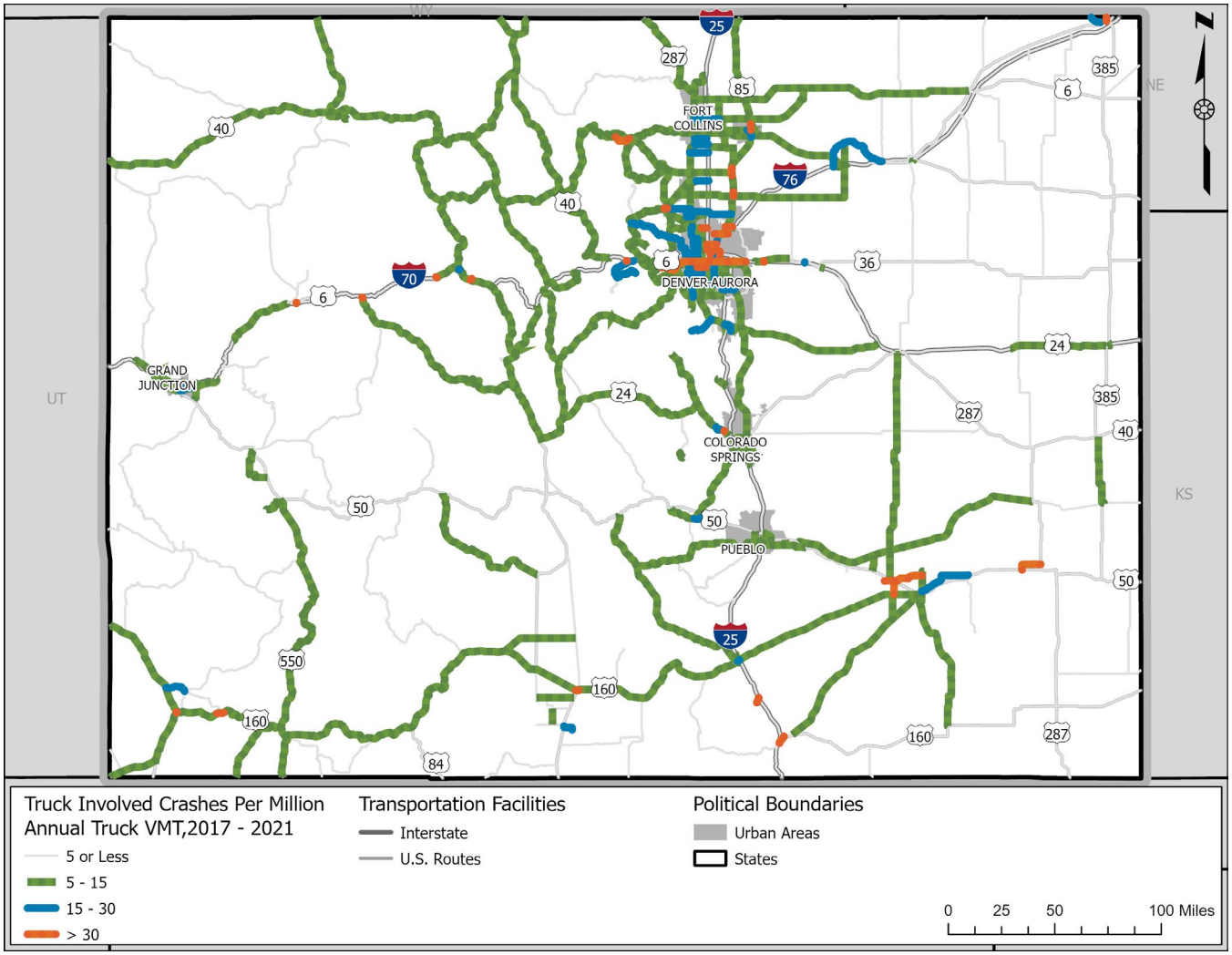
To identify hot spots for truck-involved crashes, a crash density analysis was conducted using the dataset from 2017 to 2021 (Figure 15). Approximately 63 percent of truck-involved crashes took place on interstates and state highways. The highway segments in Denver-Aurora have higher truck-involved crash concentrations. Figure 14 lists the top ten segments with the highest truck-involved crash rates for both urban and rural locations.

Figure 14. Top 10 Urban and Rural Segments by Highest Truck Involved Crash Rate



Source: Crash Data, Colorado Department of Transportation, 2017-2021, https://www.codot.gov/safety/traffic-safety/data-analysis/crash-data

Figure 15. Truck-Involved Crashes Per Million Vehicle Miles Traveled (VMT), 2017-2021



Source: Crash Data, Colorado Department of Transportation, 2017-2021, https://www.codot.gov/safety/traffic-safety/data-analysis/crash-data.

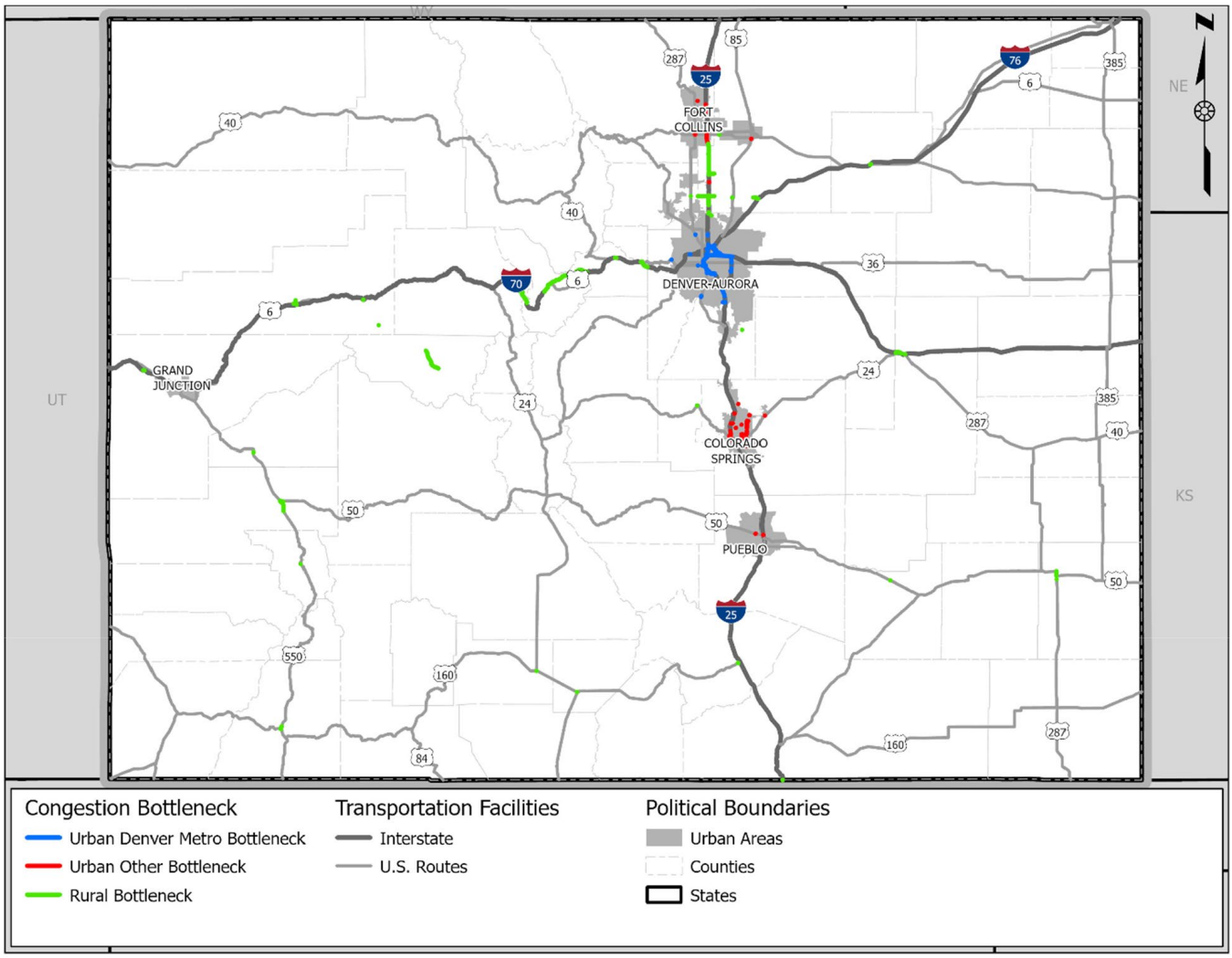
Highway Freight Infrastructure Needs and Issues

Congested Bottlenecks

Bottlenecks are a form of traffic congestion where vehicular flow is constricted within a localized area. Bottlenecks hinder the safe and efficient operation of vehicle and truck traffic. The thresholds used to identify bottlenecks were set at the top five percent of user costs per mile in each bottleneck type (Urban Denver Metro, Urban Other, and Rural). Different thresholds for the user cost metric were used to identify bottlenecks in rural areas versus urban areas. User costs refer to both expected costs of delay during periods of congestion that individuals and businesses account for in their travel planning as well as costs of unreliability (i.e., unexpected increases in travel time due to unforeseen events). There were 155 roadway segments in Urban Denver Metro

with user costs higher than the threshold (in NPMRDS each segment is defined by a unique Traffic Message Channel TMC), totaling 50 centerline miles of roadway. In Urban Other, 69 roadway segments were above the threshold, combining for 21 centerline miles of roadway; in Rural, 91 roadway segments were above the threshold, combining for 99 miles of roadway. In total, urban areas encompassed roughly forty-two percent of the bottleneck mileage compared to fifty-eight percent in rural areas. Figure 16 displays a map of the bottlenecks, depicting complete coverage throughout Colorado, with concentrations in urban regions across the state.

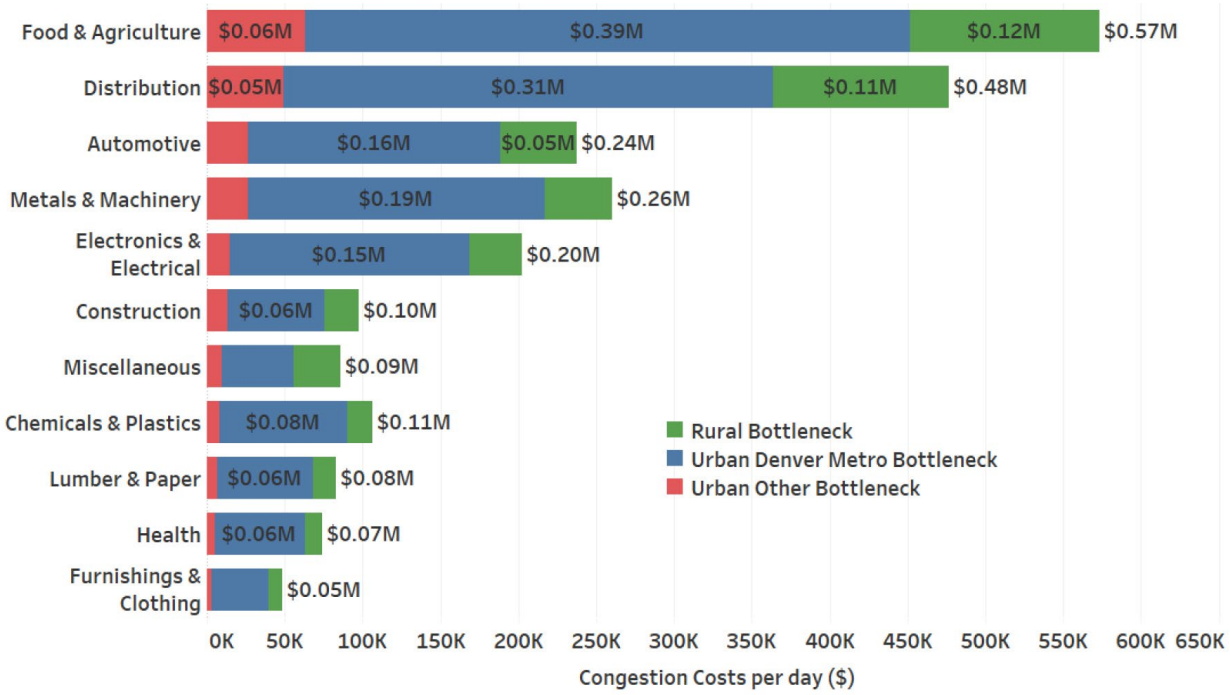
Figure 16. Truck Bottleneck Locations—Statewide



Source: WSP analysis of NPMRDS data

On a typical weekday, congestion is estimated to cause $20.7 million in costs to trucking companies and shippers (throughout the NHS in Colorado). Of this figure, delays valued at approximately $3.7 million occur at specific bottlenecks identified in this analysis. These daily congestion costs were further broken out by supply chain by using commodity flow data from TRANSEARCH. The food and agriculture industry is most impacted by bottleneck hotspots, with congestion costs surpassing $570,000 per day, followed by distribution, automotive, metals and machinery, and electronics and electrical goods (Figure 17). Bottlenecks in the Denver Metro region account for over two-thirds of statewide bottleneck costs accrued by each of the supply chains analyzed.

Figure 17. Bottleneck Congestion Costs per day ($) by Supply Chain Groups

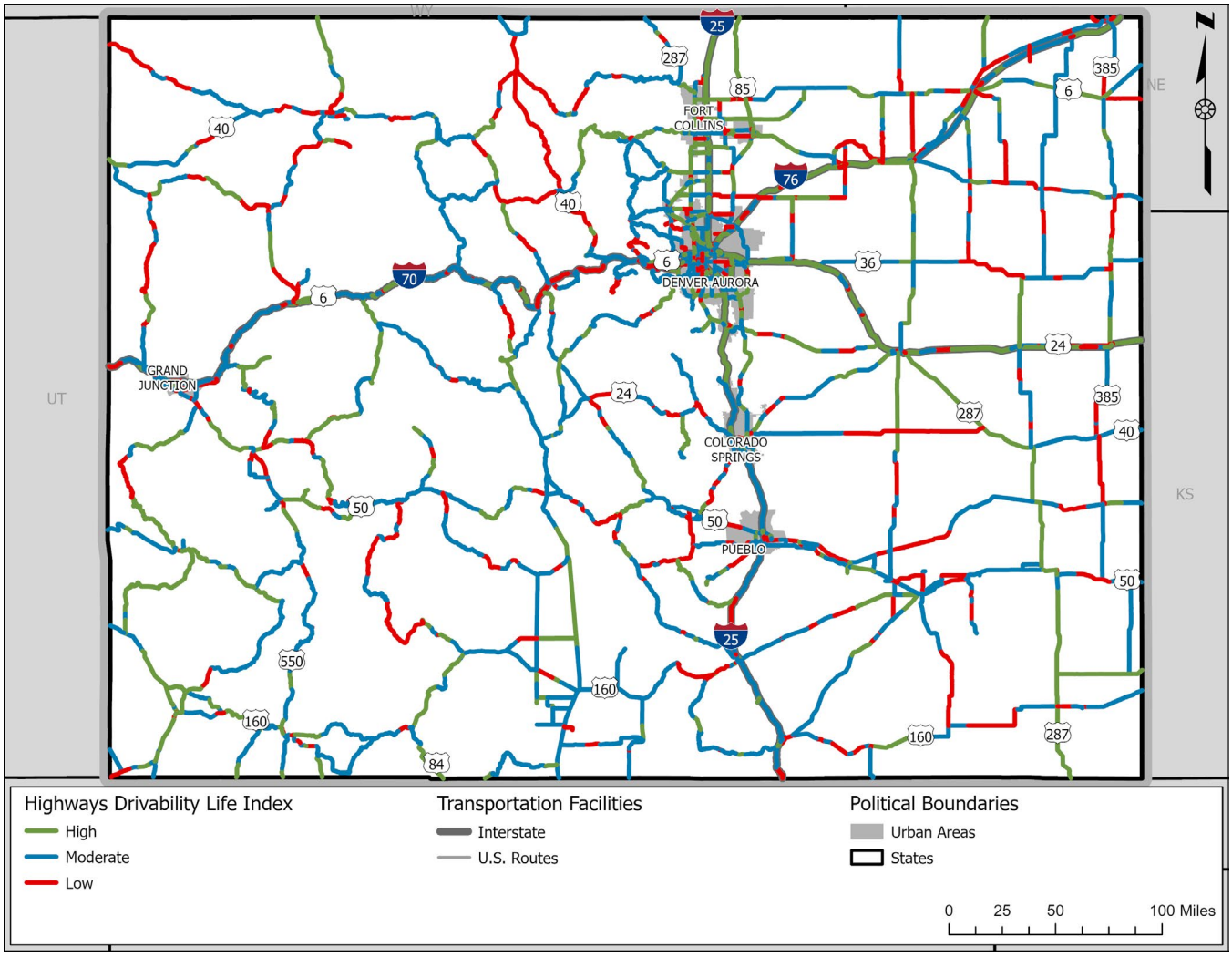


Source: WSP analysis of NPMRDS and TRANSEARCH data

Pavement Condition

The condition of the roadway system has significant implications for the efficiency, safety, and overall cost-effectiveness of freight transportation. In 2013, CDOT developed the Drivability Life Index which assesses pavement's usable lifespan across the state's entire highway system. It classifies highway pavement conditions into three categories: low, moderate, and high, representing remaining lifespans of 0-3 years (19%), 4-10 years (53%), and more than 10 years (28%), respectively, as shown in Figure 18.

Figure 18. Remaining Drivability Life on Colorado Highway



Source: CDOT, Highways: Drivability Life, 2022
https://data-cdot.opendata.arcgis.com/datasets/cf48e81c390945ed8c42afa7e3d6c943_10/explore

Bridge Condition

Bridge conditions and clearance restrictions limit freight mobility. For example, bridges with lower clearance allowance may limit load and route choices for trucks. As of 2022, Colorado has 2,763 bridges situated on and maintained by the NHS. Federal agencies are obligated to periodically assess the condition of these bridges, including the quality of the deck, superstructure, substructure, and culverts. Colorado follows the National Bridge Inventory (NBI) bridge condition rating system of good, fair, and poor.

Bridge quality in Colorado is generally very good with only 3.7 percent of NHS bridges (or 109 bridges) with a poor rating, meeting the target of no more than 4 percent of bridges in poor condition. A total of 36.5 percent of bridges were in good condition, compared to Colorado's good condition target of thirty-six percent by 2025.[2] The state has worked to preserve and maintain structures in fair and good conditions, and the good-condition bridge proportion exceeds the expectation. Treatments to improve bridge conditions generally have relatively lower costs and higher rates of return. To maintain the four percent poor-rated NHS bridge target,[3] continued efforts should focus on the rehabilitation or reconstruction of inadequate structures.

Oversize and Overweight (OSOW) Vehicles

Oversize and overweight (OSOW) loads exceed standard limits for width and weight. However, their transportation is integral to the freight highway system. Every state is responsible for issuing OSOW permits to ensure every loaded vehicle can traverse the roadways safely and efficiently. Colorado, in particular, has a variety of treacherous terrain served by infrastructure where OSOW restrictions are in place.

Bridges and tunnels with insufficient height clearance or weight restrictions for OSOW vehicles, or with hazardous materials restrictions, result in trucks needing to detour onto alternative routes that can sometimes add hundreds of miles onto their trip. As a result, CDOT has prioritized targeting these structures for improvements to allow commercial motor vehicles to fully utilize all routes on Colorado's priority freight network. The CDOT Freight Mobility & Safety Branch has been working with CDOT Staff Bridge for more than three years to identify deliverable solutions to restrictive bridges on freight routes. The number one goal is to eliminate and prevent weight restricted structures on freight routes, and to minimize maintenance and improve safety over the extended life of these structures.

Project P-18-BP Retrofit

Source: CDOT

The Department has committed $6 million ($2 million each fiscal year from 2021-2023) to fixing the liabilities associated with forty-three identified Colorado Freight Network timber structures of which utilize NHFP funds to improve the weight tolerance and safety of the infrastructure. These funds are in addition to the $7.2 million funding for structures not on freight routes. CDOT's program requires regions to manage the process from design to construction, thereby maintaining full cooperation throughout the agency's levels of governance.

[2] https://www.codot.gov/programs/tam/cdot-2022-transportation-asset-management-plan-remediated.pdf

[3] https://www.codot.gov/programs/tam/cdot-2022-transportation-asset-management-plan-remediated.pdf

This hand-in-glove approach ensures that statewide freight infrastructure goals are met with regional support and approval. For example, Project P-18-BP Retrofit's improvements to a mainline I-25 bridge at northbound mile marker 5.596, just north of the New Mexico border, resulted in increased load capacity thereby allowing for continuous route utilization along the interstate and reduced freight pressure on other routes. The project was funded through NHFP funds to the tune of $680,000 and represents one of the most substantive route continuity improvements considering the interstate connection implications.

Eisenhower-Johnson Memorial Tunnels (EJMT)

The EJMT are located approximately 70 miles west of Denver, Colorado on Interstate I-70. Each tunnel consists of two lanes and carries one-way traffic. The tunnels are approximately 9,000 feet long at an elevation of 11,000 feet above sea level. At present, hazardous materials (Hazmat) trucks are not allowed passage through the EJMT and are routed over Loveland Pass via U.S. 6. The latter is a mountain pass with tight switchbacks and steep grades. Hazmat vehicles are currently only allowed through EJMT when U.S. 6 is closed, subject to other restrictions. These restrictions have been evaluated to determine if hazmat should be allowed in the EJMT and under what circumstances. Recommendations include revisions to speed limits, improvements to U.S. 6, installation of a truck runaway ramp, and evaluation of a pilot program. One of the major issues CDOT is facing with respect to the transport of hazardous materials, either over Loveland Pass or through EJMT, is to balance the low probabilities but potentially large consequences of events involving hazardous materials with the daily need for the safe transport of people, energy, and chemicals that facilitate Colorado's economy.

Highway Operations Support Infrastructure

Highway support infrastructures are fundamental elements to maintaining an accommodating and safe freight network. Major support infrastructures include runaway ramps, and chain stations, which are crucial for Colorado.

Runaway Truck Ramps

A runaway truck ramp is a crucial mitigation measure that provides an emergency escape for trucks experiencing brake failure while descending steep grades, allowing them to come to a controlled stop and avoid potential safety issues. Generally, these ramps are strategically placed at points along the roadway where the brake temperature is projected to reach 1,000 degrees Fahrenheit, at which temperature the vehicle may run out of control, indicating the necessity for a safe descent grade.[4] The locations of runaway truck ramps in Colorado are shown in Figure 19.

[4] https://www.dot.state.pa.us/public/Bureaus/design/PUB13M/Chapters/Chap17.pdf.

Truck Chain Stations

In 2011, CDOT initiated the chain law, which requires all commercial vehicles traveling on I-70 between Dotsero exit and Morrison exit to be equipped with sufficient chains from September 1st to May 31st.[5] The establishment of chain stations provides truck drivers a safe area to equip or remove chains from the vehicle, or check the mandatory chains to avoid potential vehicle failure and safety concerns during adverse weather conditions. There are fifty-three designated chain stations along Colorado's roadway network, and twenty-two of them are situated on I-70's mountain corridor as shown in Figure 19. Most of the chain stations are on I-70 because the interstate passes through several mountain ranges and they are more likely to experience severe weather, leading to a greater need to ensure the safety of passing trucks. In addition, I-70 is a major east-west transportation corridor that has a high volume of truck traffic, and chain stations can help truck drivers to safely navigate the route.

Enforcement Infrastructure

There are ten stationary port of entry (POE) facilities located in key positions throughout the state on major highways that a motor carrier operator would use to either enter or exit Colorado. Trucks are weighed and inspected to ensure that they comply with size and weight requirements in place to protect infrastructure, and that the vehicle is in safe operating condition.

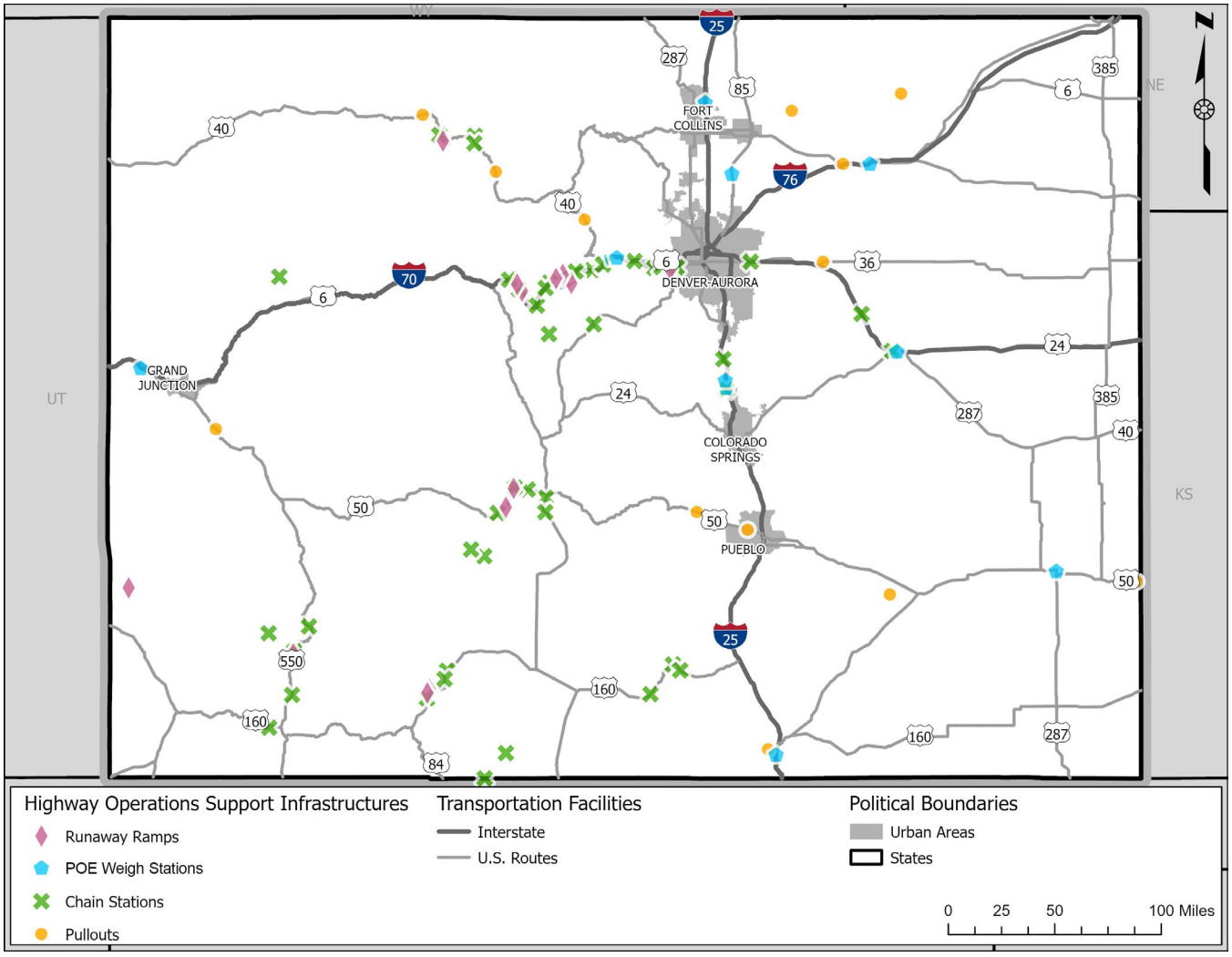
Each POE includes a weigh-in-motion (WIM) system, as shown in Figure 19, that collects each vehicle's axle and gross vehicle weights as they pass over the sensors or scales, and collects traffic data such as volume, vehicle classification, speed, and weight using pavement sensors. The WIM system weighs vehicles traveling at a reduced or average traffic speed without requiring the vehicle to stop. The WIM system for CDOT is operated by the Colorado State Patrol (CSP).

Mobile Enforcement Pullout Sites

CDOT constructed for Colorado State Patrol and Port of Entry 10 Mobile Enforcement Pullout Sites for performing mobile truck enforcement in needed areas around the state. An 11th is under construction, scheduled to open early 2024. These pullouts may have other temporary uses but enforcement safety is the primary focus. Oversize loads may also get inspected or do temporary staging at these locations as well. CDOT owns the ROW for these sites which are typically 500 feet long with 100-foot tapers on each end, for 300 feet of operating area, and that are 14-20 feet wide. The locations were selected by a group from CSP, POE, and CDOT.

[5] https://www.codot.gov/travel/colorado-chain-law.

Figure 19. Runaway Truck Ramps, Chain Stations, POE Weigh Stations, and Enforcement Infrastructure



Source: CDOT OTIS; Freight Mobility and Safety Office Inventory

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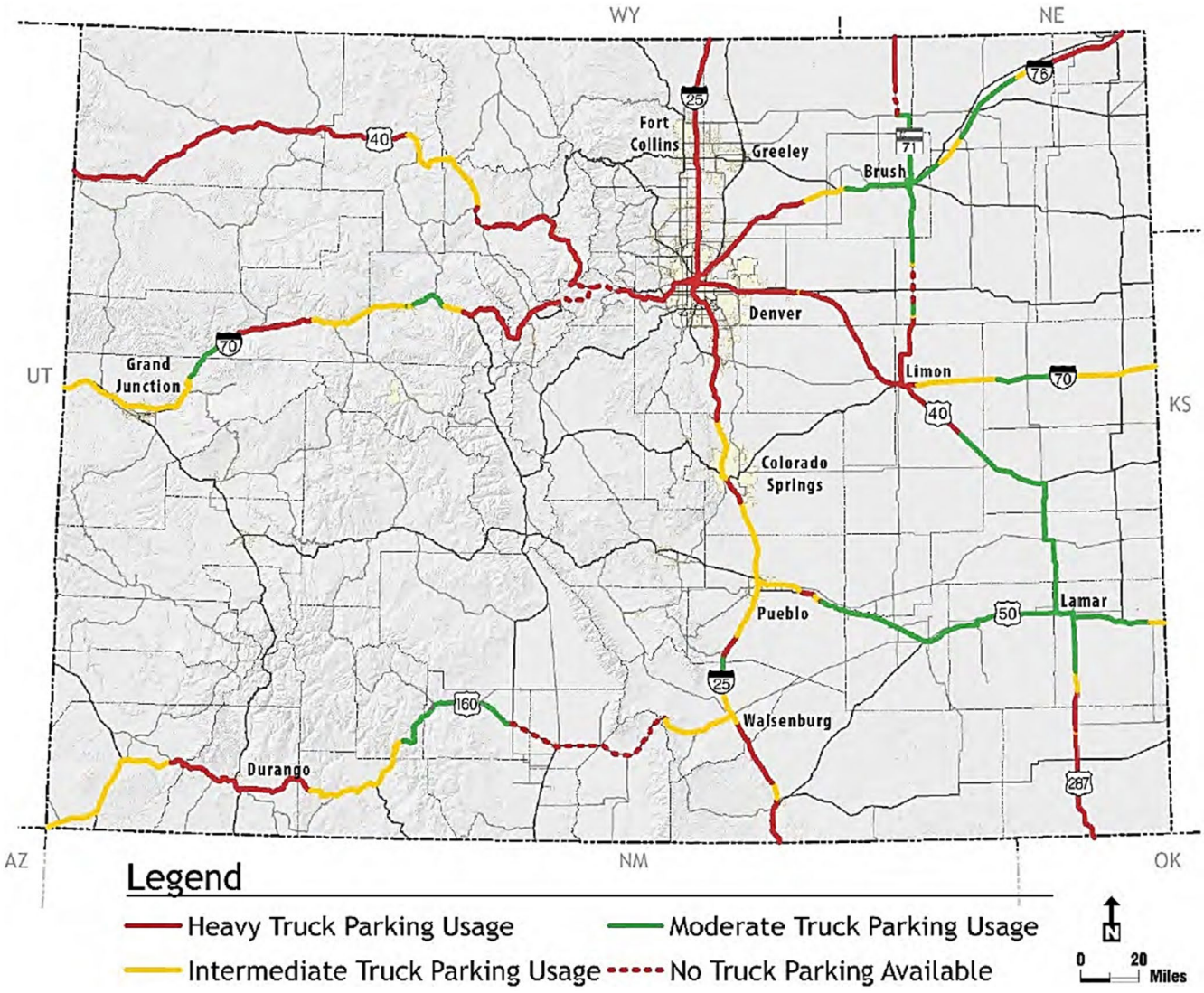
Truck Parking

In 2019, CDOT conducted a Truck Parking Assessment (TPA) to identify statewide truck parking needs and network gaps on major freight corridors. Figure 20 shows the study corridors and provides a summary of current usage ratings along those corridors. Notably, sections of I-70 and U.S. 40 in Clear Creek County, U.S. 160 in Costilla and Alamosa counties, and SH 71 in Washington County were identified as lacking available truck parking. Additionally, most highway segments in the Fort Collins and Denver-Aurora regions exhibited heavy truck parking usage. Most acute shortages are in major freight corridors and large metro areas. Extreme weather conditions, wildfires, and other unplanned events can close roads temporarily, creating a large demand for truck parking until the road re-opens. The Town of Bennet, in a public private partnership with Love's and CDOT, were able to full a major truck parking need as demonstrated in the callout below.

Figure 20. Truck Parking Assessment Corridor Usage Levels, 2017



Source: CDOT, 2019, Colorado Truck Parking Assessment,
https://freight.colorado.gov/sites/freight/files/documents/TPA%202019_Report_FINAL_reduced%20%281%29.pdf

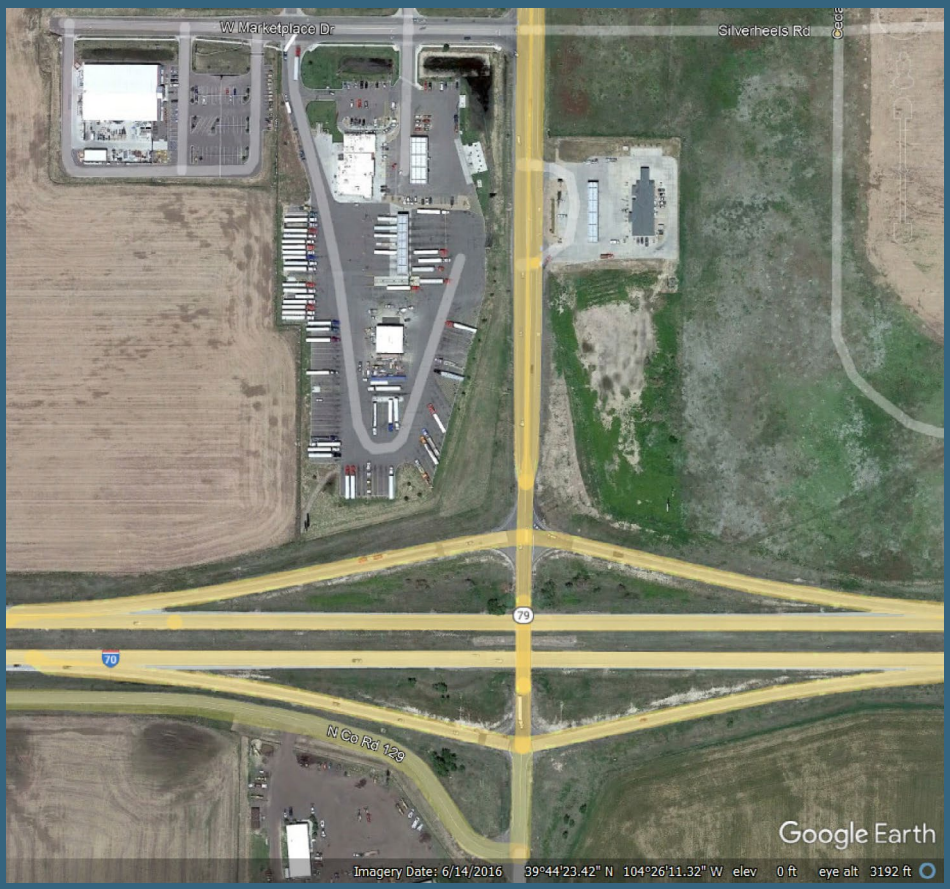
Truck Parking P3 Case Study: Town of Bennett

OPPORTUNITY: A Love's truck stop located in Bennett, a high need truck parking area, was willing to purchase adjacent land to expand their truck parking lot by 70 spaces.

CHALLENGE: In order to accommodate the additional truck traffic forecasted by the expansion, improvements would be needed to a bridge on SH 79 over I-70 that provides access to the Love's. The cost of the bridge improvement, on top of the land purchase and parking lot expansion, rendered the project costs prohibitive for Love's.

SOLUTION: CDOT signed a memorandum with the Town of Bennett, agreeing to pay for the bridge design with National Highway Freight Program dollars. The town made intersection improvements and will seek other funding and federal grant opportunities for construction of the bridge improvements. In 2013 CDOT completed a Planning and Environment Linkages (PEL) study that led to approval of bridge improvements. Love's commitment to build and maintain an additional 70 truck parking spaces, along with the needs identified in 2013 PEL, demonstrated a clear public benefit to move forward with the bridge improvements.

OUTCOMES: CDOT is facilitating the addition of the planned 70, plus an additional 44 spaces, for a total of 114 truck parking spaces in a high need area, at a lower capital investment than had they built it, and with no ongoing maintenance costs. The process will be documented to memorialize lessons learned; roles and responsibilities; and challenges and solutions; and to define a process that can be replicated to achieve additional truck parking successes across the state.



The Mountain Rules Campaign

The Mountain Rules communication program developed by CDOT is a comprehensive, strategic and safety-focused effort to inform and educate in-state and inter-state trucking companies and drivers on the challenges of driving in Colorado's mountains. It includes information on preventing and avoiding hazards, resources to consider, and a consistent reminder to drive slowly and steadily to be safe for the long haul. CDOT's partners in this effort are the Colorado State Patrol, Colorado Motor Carriers Association, and in-cab driver alert providers.

Using a focus group with the help of the Colorado Motor Carriers Association, CDOT was able to identify the best approach for providing alerts, including how to time advance notifications, locations and frequencies for reminders, and the type of alerts (audio and/or visual). Driver alerts are subscription-based and include in-cab driver alerts that notify drivers of steep grades, locations of runaway truck ramps, and areas for brake check and cooling.

The Mountain Rules website also includes instructional videos titled The Mountain Rules, Summer Driving and Avoiding Hot Brakes in Colorado, Truck Safety and Winter Driving in Colorado, and Construction Zone Safety in Colorado.

5

Colorado's Non-Highway Freight Networks: Safety, Mobility, and Condition Analysis

While the highway network serves the majority of freight within the state of Colorado, rail and air transportation systems allow for multimodal options when transporting goods. Rail and air transportation offer shippers different shipping times and rates, potentially minimizing risk to the manufacturers' supply chains. An efficient, accessible multimodal freight network also alleviates roadway traffic, removing additional truck trips from Colorado's highways.

Rail Network

Compared to trucks, freight railroads can ship larger and heavier volumes. Colorado's rail network has the potential for facilitating intermodal travel, transloading between trains and container ships or transferring containers from trucks to trains. Additionally, railroads are at least three times more fuel efficient compared to trucks, reducing greenhouse gas emissions by up to 75 percent on average. Figure 21 depicts Colorado's freight rail system.

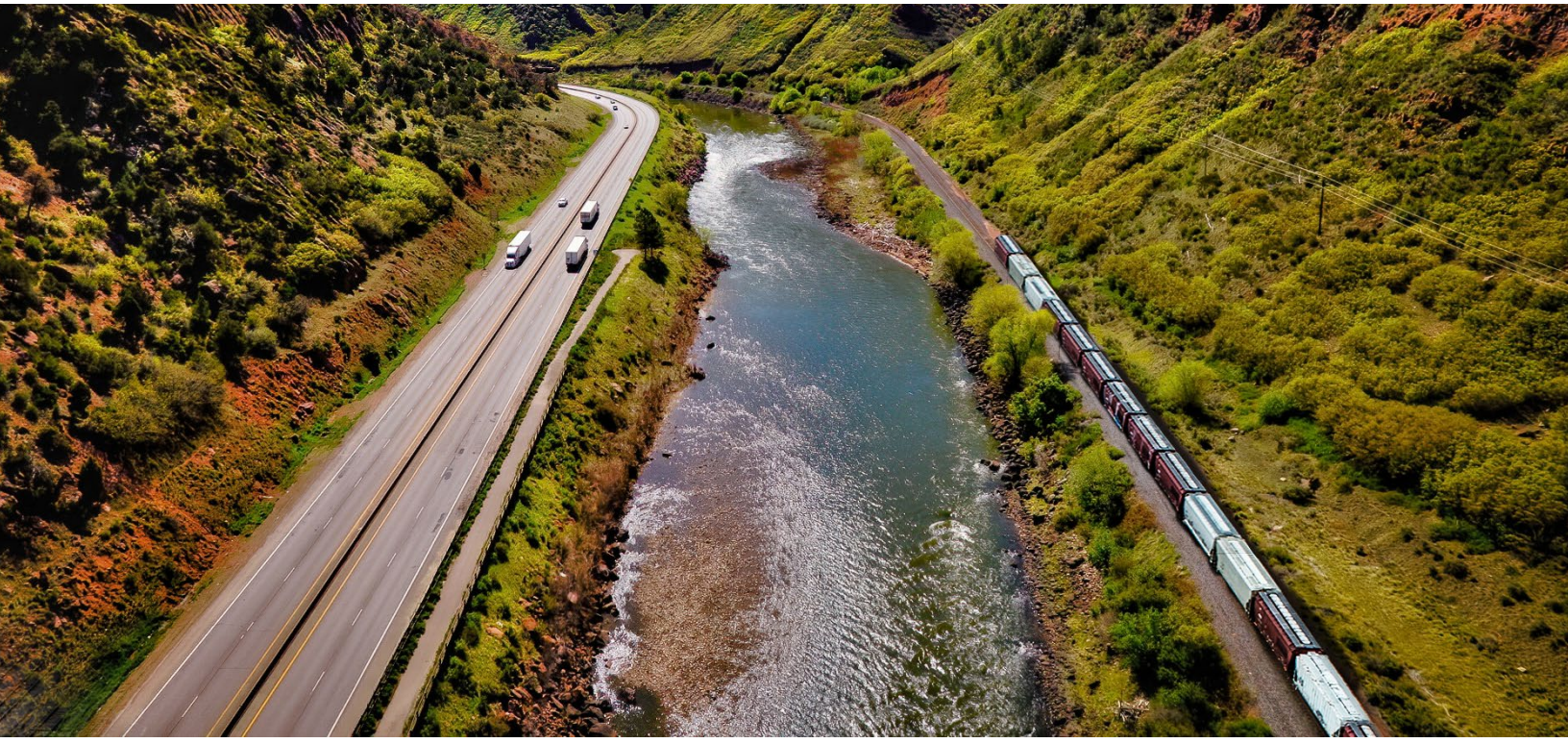
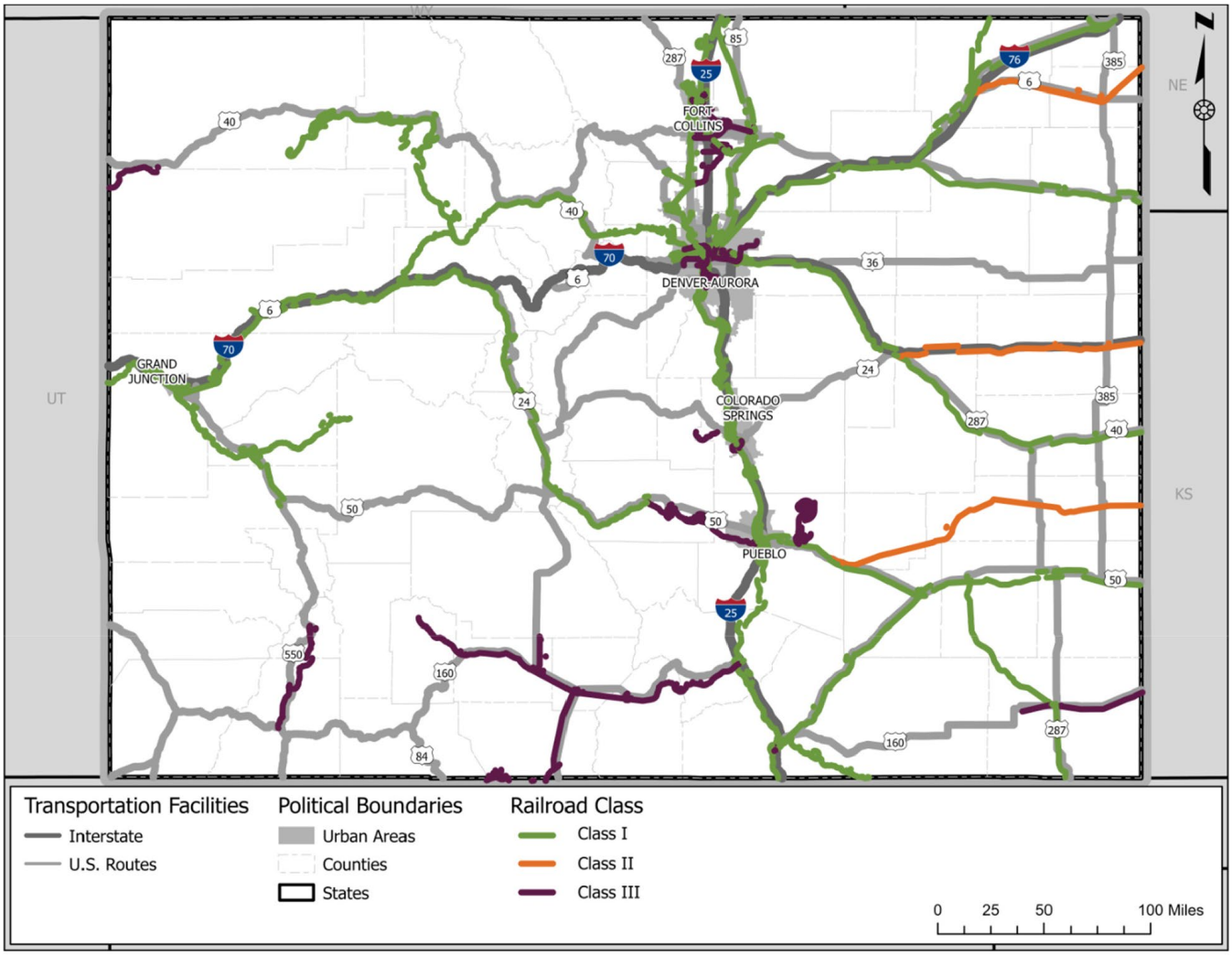


Figure 21. Colorado's Freight Rail System



Source: Federal Railroad Administration

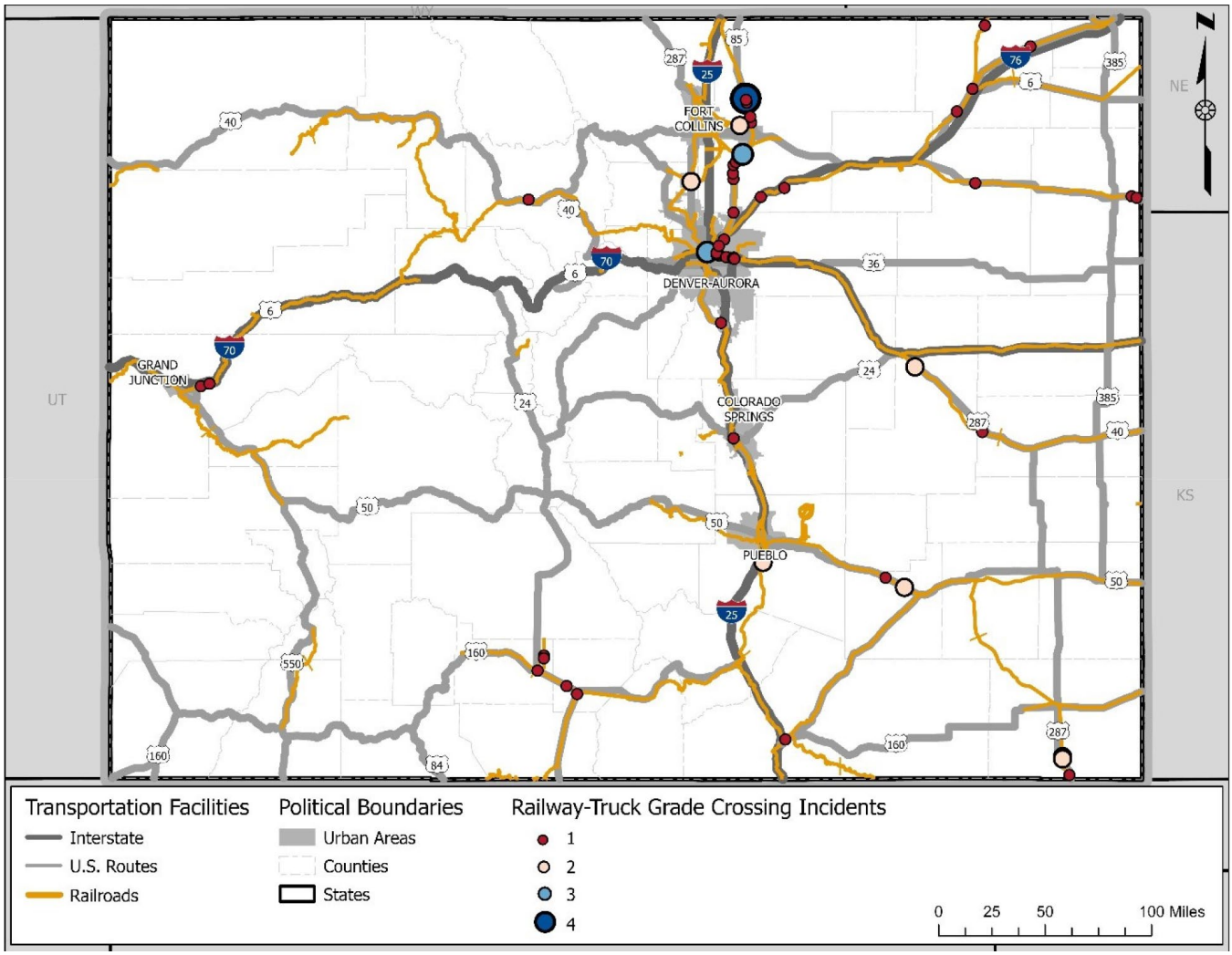
Freight Rail Needs and Capacity Constraints

In order to serve Colorado's rail customers more efficiently and retain the competitiveness of the state's rail system, capacity constraints on existing systems must be identified. Capacity constraints on Colorado's freight rail system include vertical clearance restrictions preventing the movement of double-stacked cars, weight limits that restrict the ability of short lines to interface with Class I rail networks, limited terminal and yard capacity, and rail safety and security issues. With these existing constraints, improvements are needed, such as rail-served industrial developments. These initiatives may be funded by private railroads or through partnerships with CDOT, local or regional agencies, and private railroads. Issues regarding capacity constraints will be monitored by CDOT staff, addressed through coordination with rail partners, acted on in implementation efforts, and integrated into future state and regional planning efforts.

At-Grade Rail Crossings

At-grade rail crossings are places where a rail line intersects with the roadway at the same level, without the usage of bridges or tunnels. These locations can be dangerous for potential conflicts between rail cars and motor vehicles. Between 2012 and 2022, there were fifty-eight railway-truck crossing safety incidents involving trucks and truck-trailers. Figure 22 maps out the railway-truck incidents across Colorado and indicates at-grade crossings where multiple incidents have occurred. Most incidents are concentrated in grade crossings near U.S. 85 and I-70 in Denver and north along U.S. 85 towards Fort Collins. Grade crossings in Ault, Gilcrest, and Denver had the highest number of reported collisions. These incidents generally involve accidental crashes when trucks attempt to circumvent safety devices, when trucks stall on tracks, or when truck drivers fail to yield at grade crossings.

Figure 22. Railway-Truck At-grade Crossing Incidents, 2012 to 2022



Source: Federal Railroad Administration—Highway-Rail Grade Crossing Accident/Incident Report. https://data.transportation.gov/Railroads/Highway-Rail-Grade-Crossing-Accident-Data-Form-57-/7wn6-i5b9

Inland Commercial Ports

Over the last three decades, inland ports have evolved as multimodal logistics parks at interior sites with good connections to global trade gateways. The availability of developable land with strong air, rail, and highway access by itself is a stimulus, enabling many inland ports to arise organically from private development with successive government support.

The 2022 CDOT Inland Port Study defines inland ports as a cluster of facilities serving the multimodal exchange of containers, air cargo operations, and large concentrations of distribution centers and/warehouses near major transportation hubs (airports, highways, railroads) where a range of activities from cross-docking to storage and sortation currently take place or will take place once completed.[6] All of these may have but are not required to have direct rail intermodal service to seaports that handle containerized international trade, and may be privately owned, publicly owned or governed by public-private partnerships.

As a landlocked state, Colorado does not have a designated government division to oversee port administration, commercial port, or inland port development. However, Colorado has established assets built by public and private enterprises that effectively services the state in the same form and function as an inland port or commercial port. In place of master-planned, commercial port/inland port development led by the state, Colorado benefits from organic development driven by both private sector entities such as railroads and industrial real estate developers and public sector jurisdictions such as airports, counties, and cities. However, without official designation under an agency with authority and resources, infrastructure and regulatory challenges are more difficult to overcome, and development is more limited and takes longer to implement.

Colorado Commercial Ports

Figure 23 exhibits the location of assets that are taking on one or more inland port/commercial port functions within the state of Colorado. Collectively, these assets, mostly located within Adams, Denver, Arapahoe and Weld counties, are fulfilling the mission of an officially designated commercial port/inland port. Some of these assets are privately owned, predominantly railroad intermodal terminals, while others are controlled by state authorities with private sector collaboration, such as the Denver International Airport. Proximity to ground transportation including major highways and rail networks in Colorado is important as these are essential conduits to facilities functioning as inland ports. Each of the sites represents a focus area for real estate and industrial development growth, where transportation access from multiple modes should be planned for in the future.

Airports, in particular, play a key role in Colorado's economy, generating $4.4 billion in business revenues to the state. Colorado is home to fourteen commercial service airports with twenty-eight runways. Air cargo is handled by dedicated private freight carriers and carried on passenger flights as belly cargo. Denver International Airport (DEN) handled 25.000 tons of air mail and 337,000 tons of air freight in calendar year 2022, ranking DEN 23rd among 791 U.S. airports for total volume in the air freight category.[7] Freight through DEN accounts for approximately 95 percent of all air freight moved in and out of Colorado. The remaining top-five airports—Colorado Springs Municipal (COS), Grand Junction Regional (GJT), Durango-La Plata County (DRO), and Yampa Valley Regional (HDN) close to Hayden—account for nearly all other air cargo moved.

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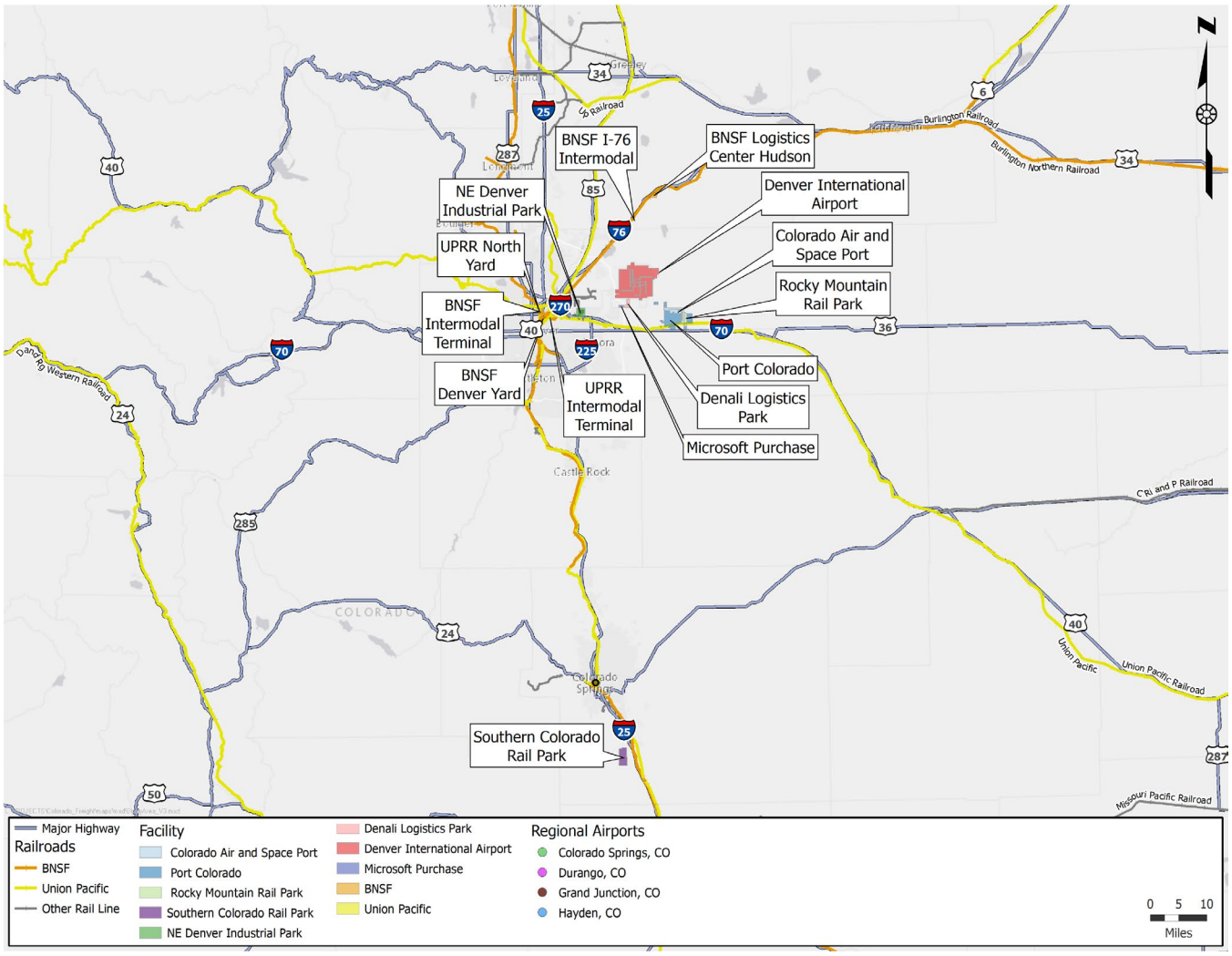
[6] CDOT Inland Port Study 2022 | Colorado Department of Transportation—Freight and Permitting, https://freight.colorado.gov/media/611

[7] Bureau of Transportation Statistics (RITA | BTS | Transtats); www.flydenver.com, Passenger and Revenue Reports

Many of the public and privately owned commercial ports in Colorado, including DEN, fall within the Limon Foreign Trade Zone (FTZ-293), which covers all of Adams and Arapahoe counties as well as significant portions of Lincoln, Elbert and Morgan counties. FTZ's provide a mechanism for manufacturers to employ special customs procedures that defer or avoid customs duty payments on goods being traded.

Figure 23. Colorado Assets Functioning as Commercial Ports



Source: CDOT Open Data Portal

Colorado's Military Facilities

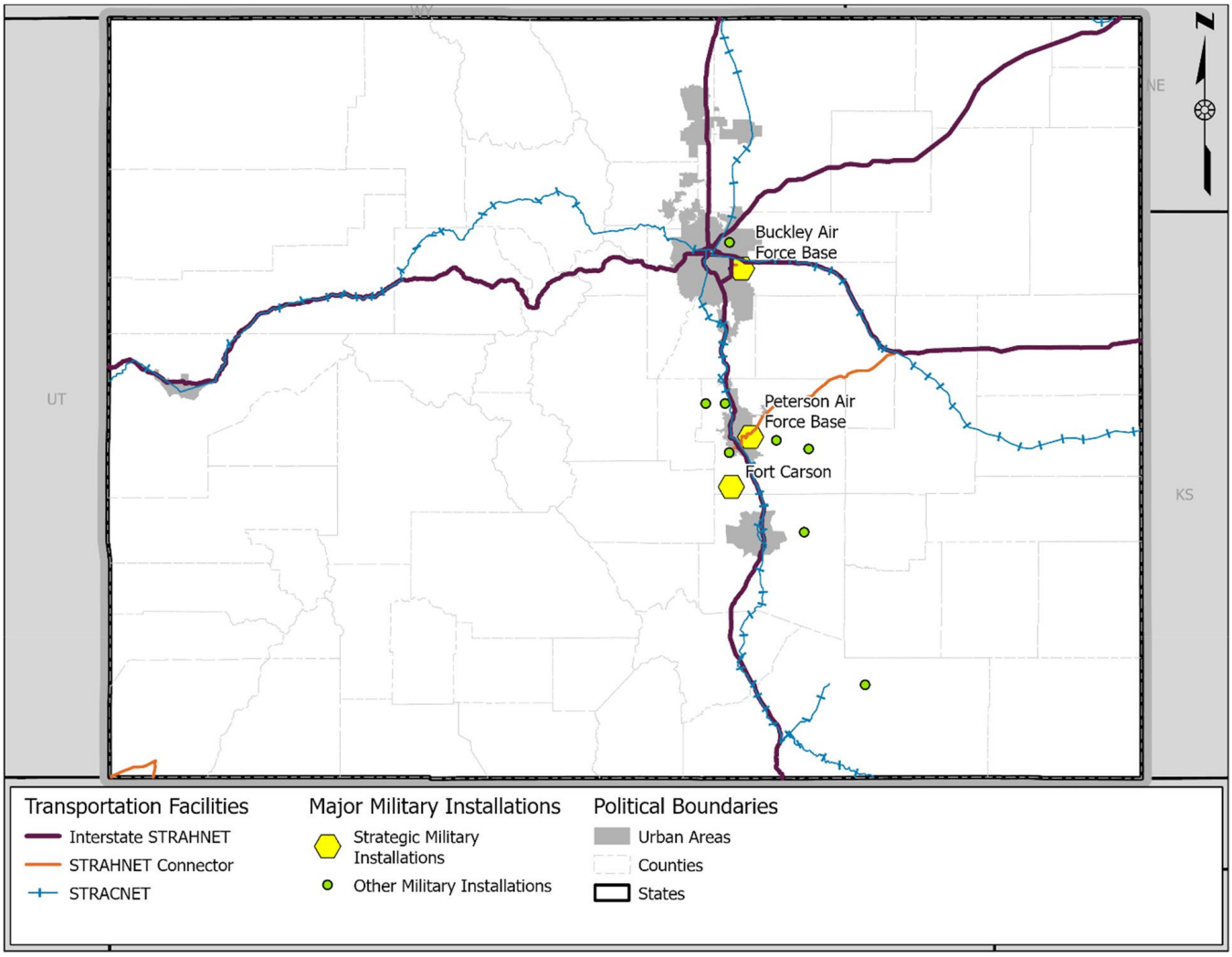
National military assets are critical components of threat recognition, personnel and equipment staging, and strategic response. Colorado is home to some of the Nation's most important military assets. The three main military assets in Colorado are military installations, the Strategic Highway Network (STRAHNET), and the Strategic Rail Corridor Network (STRACNET). Military installations are those facilities, storage, training, housing, and general building, equipment, or personnel related footprints from which military operations are staged. Fort Carson, The Airforce Academy, Peterson Air Force Base (AFB), and Buckley AFB are among the 11 installations in the state. Military installations are the primary

infrastructure for readiness, providing the facilities to support all military operations. Fort Carson also serves as one of 18 national Power Projection Platforms (PPPs).

The STRAHNET is the series of interstate and connector roadways that make up the military critical highway routes. In Colorado, there are 1,056 miles of STRAHNET, of which 953 miles are interstate and 103 miles are highway connectors. The connectors are the access routes between military installations and the interstate routes. Connectors also represent the military's critical freight corridors as they are necessarily required to accommodate military freight.

The STRACNET are the rail corridors across the state that are critical to military freight and deployment. Colorado contains 1,067 rail miles, providing access across both the mountain and front range corridors. These railways are particularly important for the movement of large, heavy equipment between installations and seaports. Figure 24 shows the STRACNET, STRAHNET, and the strategic military installations in the state.

Figure 24. Colorado Military Installation, STRAHNET, and STRACNET

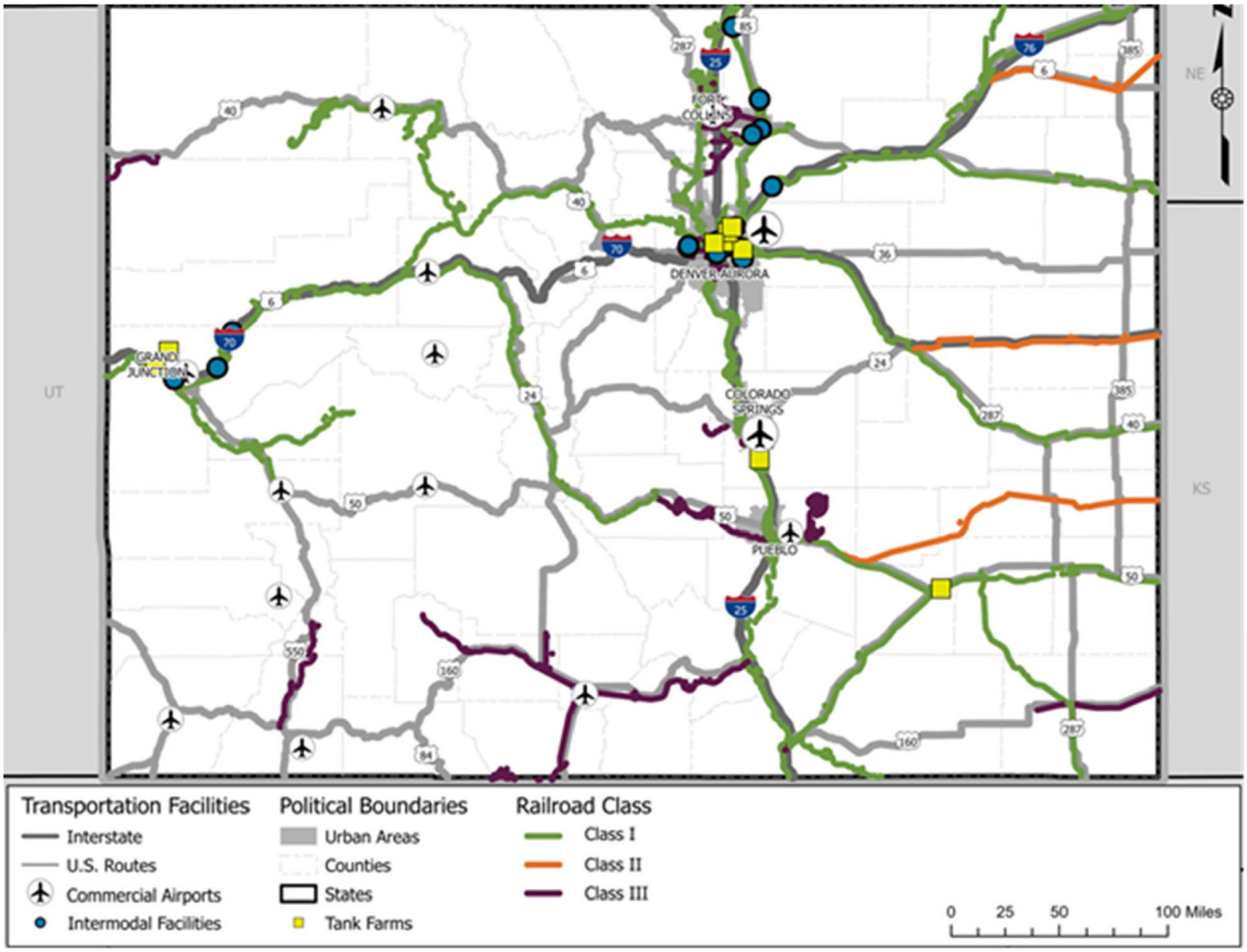


Source: Army Surface Deployment and Distribution Command (SDDC), U.S. Department of Defense (DOD), 2023

Colorado's Intermodal Network

An intermodal network refers to a transportation system that integrates different modes of transportation, such as rail, truck, ship, and air, to efficiently move goods from origin to destination. The goal of an intermodal network is to leverage the strengths of each mode, creating a seamless and integrated supply chain for the movement of freight or cargo. The combined locations of Colorado's intermodal facilities, including rail lines, airports, gasoline tank farms, and intermodal logistics parks are shown in Figure 25. While many of these facilities are concentrated in Denver, each type of facility can be found throughout the state. This allows for freight and logistics partners to have non-highway options when shipping goods in, out, and through Colorado.

Figure 25. Colorado's Intermodal Network



Source: Cambridge Systematics

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6

Technological and Environmental Tie Ins to Colorado's Freight Network

Innovative Highway Technology Strategies

In recent years, there have been many technological developments that have the potential to improve freight safety and operations on the highway system. Roadway infrastructure investments alone will not be able to fully meet freight system needs related to safety, economic competitiveness, mobility, and reliability. New technology applications can improve freight system efficiency, increase logistics reliability, reduce freight industry costs, and enhance safety. Moreover, emerging freight transportation technology developments in the private sector—such as truck automation, real-time logistics tracking, and big data—represent opportunities for CDOT to support, partner on, and develop new freight network technology applications to assist in meeting these needs.

Table 1 lists a set of roadway technology innovations for freight, along with a brief description of their technology readiness, roadside infrastructure needs, and regulatory considerations. The table also indicates which of these innovations has been adopted (or tested) in Colorado.

Table 1. Summary of Freight Technology Innovations

INNOVATION/ APPLICATION	TECHNOLOGY READINESS	INFRASTRUCTURE NEEDS	REGULATORY CONSIDERATIONS	ADOPTED IN COLORADO?
Telematics and Freight Traveler Information	Adopted	» N/A	» N/A	Yes
Electronic data loggers (for hours of service)	Adopted	» N/A	» Must adhere to FMCSA requirements	Yes
T5xAutomation at Ports/ Intermodal Terminals	Adopted	» Private infrastructure[1]	» N/A	Yes
Automation at warehouses	Adopted	» Private infrastructure[2]	» N/A	Yes
In-motion size and weight inspection and electronic screening	Adopted	» Requires roadside technology and communications	» Must adhere to FMCSA requirements	Yes
Advanced Driver Assistance Systems (ADAS)	Emerging	» N/A	» NHTSA has authority to mandate ADAS features	Yes
Drayage Optimization	Emerging	» N/A	» N/A	No
Smart trailers	Emerging	» N/A	» Must adhere to FMCSA requirements	No
Connected and Automated Vehicles (CAV) for freight	Testing	» May require digital CAV infrastructure, including roadside communications and processing » May require dedicated CAV lanes or enhanced striping and signage	» NHTSA has authority to mandate CAV technology and standards » States might have other regulations related to CAV	No
Freight platooning and V2V technology	Testing	» May require changes to roadway and pavement design standards if widely adopted	» NHTSA has authority to mandate V2V technology and standards » States might have other rules and regulations related to platooning	No
Data Analytics/Artificial Intelligence (AI)	Testing	» N/A	» N/A	No
Freight signal priority (FSP)	Testing	» Requires FSP technology and communications at traffic signals	» N/A	No

Key: *FMCSA = Federal Motor Carrier Safety Administration; NHTSA = National Highway Traffic Safety Administration; V2V = vehicle-to-vehicle*

Notes: [1] *E.g., BNSF Intermodal Terminal Denver uses RailPass to facilitate efficient gate entry;*
[2] *E.g., Amazon uses proprietary gate technology to facilitate entry and exist of vehicles from facilities*

Air Quality and Emissions

Transportation is the largest source of greenhouse gas (GHG) emissions in Colorado.[8] Within the sector, medium- and heavy-duty vehicles (M/HDV) are the second-largest source of GHG emissions, accounting for twenty-two percent of on-road GHG emissions, despite making up less than ten percent of vehicles in Colorado. In 2019, there were around 480,000 heavy duty vehicles registered in the state, emitting over 5.3 million tons of GHG.[9] In addition to GHG emissions, within the sector, M/HDV are among the largest contributors to mobile source emissions of NOx, which reacts with the atmosphere to form ozone and particulate matter (PM). The Front Range region, which includes Denver, is in nonattainment for the 2015 eight-hour ozone standard. All counties in Colorado are in attainment for all other National Ambient Air Quality Standards.[10]

Reducing emissions across all vehicle types will be crucial for Colorado to achieve its target of a fifty percent reduction in statewide emissions by 2030 and ninety percent by 2050. Pursuing strategies that accelerate the transition to zero emissions vehicles (ZEV) has the potential to reduce GHG emissions by forty-five percent, NOx emissions by fifty-four percent and PM emissions by fifty-three percent by 2050 from a 100 percent baseline scenario.[11]

Reducing emissions across all vehicle types will be crucial for Colorado to achieve economy-wide emissions cuts of at least 65 percent by 2035, 75 percent by 2040, 90 percent by 2045, and net-zero by 2050 (as set in SB 23-016). The Colorado Medium- and Heavy-Duty Vehicle Study (2021) considered how particular strategies could support statewide GHG reduction goals and found that aggressive strategies could reduce the state's GHGs by nearly half. The 2022 Clean Trucks Strategy built on previous studies to consolidate strategies for government vehicles and formalize specific strategies for the M/HDV market. One of the strategies identified is the Advanced Clean Trucks (ACT) rule, which was adopted in April 2023. The ACT rule requires manufacturers of M/HDVs to sell an increasing percentage of zero-emissions models. The rule takes effect for trucks with model year 2027, with the sales standard percentage incrementally increasing through 2035. The Low-NOx rule, also adopted in April 2023, establishes new standards for gas and diesel-powered truck engines, improves testing requirements for engines, and extends warranties. In addition to these rules, Colorado has established new grant programs to incentivize operators and manufacturers and help them meet the targets set by the ACT rule. The Clean Fleet Vehicle and Technology Grant Program, launched in March 2023, reimburses up to sixty percent of the cost of new electric trucks.

Freight emissions have been a focus of study and policy development since 2021. The focus on analysis is ongoing and continues with initiatives like the 2023 study on *Medium- and Heavy-Duty Charging Infrastructure in the State of Colorado*, which identifies locations and corridors for the near- and longer-term rollout of infrastructure suitable for zero-emission freight vehicles (shown in Figure 26).

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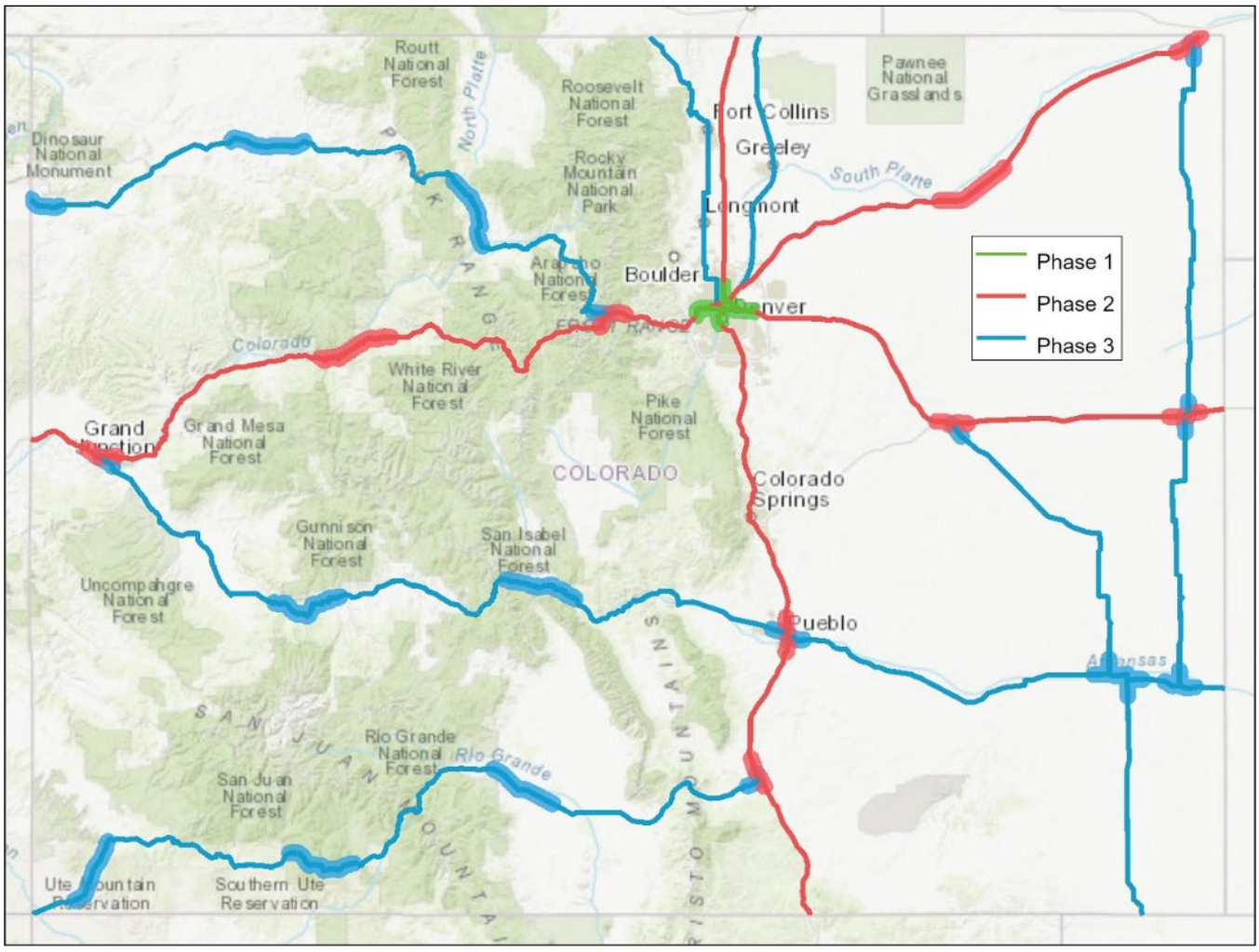
[8] Colorado Greenhouse Gas Reduction Roadmap https://energyoffice.colorado.gov/climate-energy/ghg-pollution-reduction-roadmap-20

[9] CDPHE (2023). 2021 Greenhouse Gas Inventory Update

[10] United States Environmental Protection Agency (2023). Colorado Nonattainment/Maintenance Status for Each County by Year for All Criteria Pollutants. Retrieved from: https://www3.epa.gov/airquality/greenbook/anayo_co.html

[11] Colorado Legislature Senate Bill 23-016. Retrieved from: https://leg.colorado.gov/sites/default/files/2023a_016_signed.pdf

Figure 26. Medium- and Heavy-Duty Priority Areas

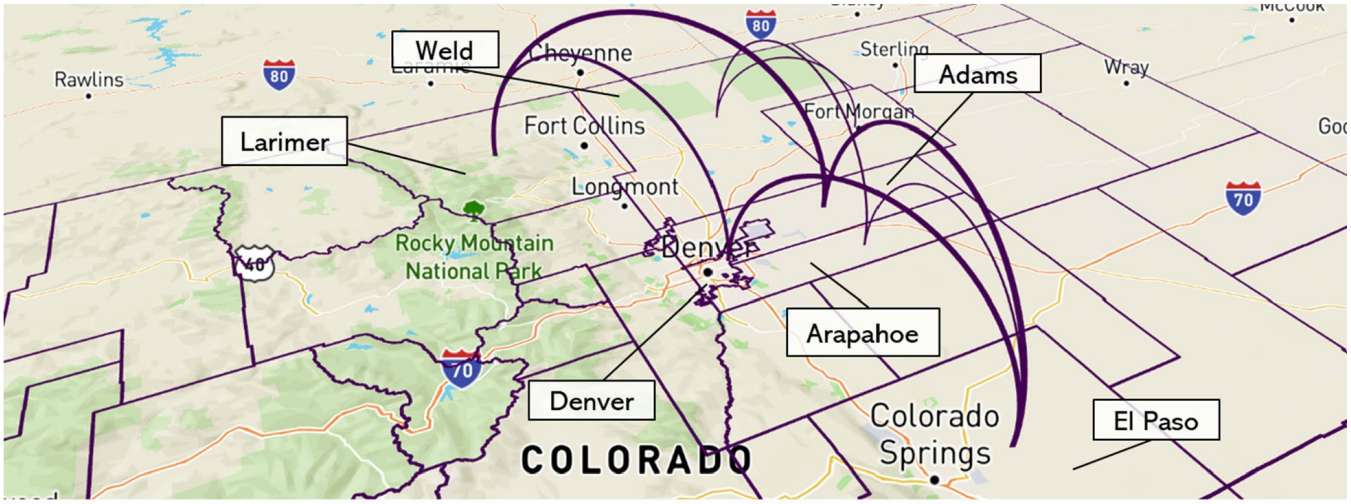


Source: Colorado Medium and Heavy-Duty (M/HD) Charging Corridors Map (2023).
https://experience.arcgis.com/experience/9f2da35d8f0a4d0aaec8db151f668696

M/HD zero-emission vehicles may initially take advantage of the relatively mature technology available to support battery electric propulsion and a growing network of charging infrastructure. As of October 2023, there are 314 medium-duty vehicles available for purchase (including trucks, cargo vans, and step vans) compared to 116 heavy duty trucks.[12] The North American Council for Freight Efficiency (NACFE) believes that up to fifty percent of regional trips are 'electrifiable', particularly short and medium hauls (less than 100-mile trips from a depot). Telematics data on medium- and heavy-duty trips were used to identify which counties generate/receive a high number of trips between 75 and 125 miles (average) before a stop of at least eight hours. These trips are concentrated in the Front Range area between El Paso County (including Colorado Springs) and Larimer County (including Fort Collins). Figure 27 shows that there are large a number of trips between El Paso and northern counties (including Denver, Adams, and Arapahoe). There are also a high number of trips between Adams and Larimer Counties.

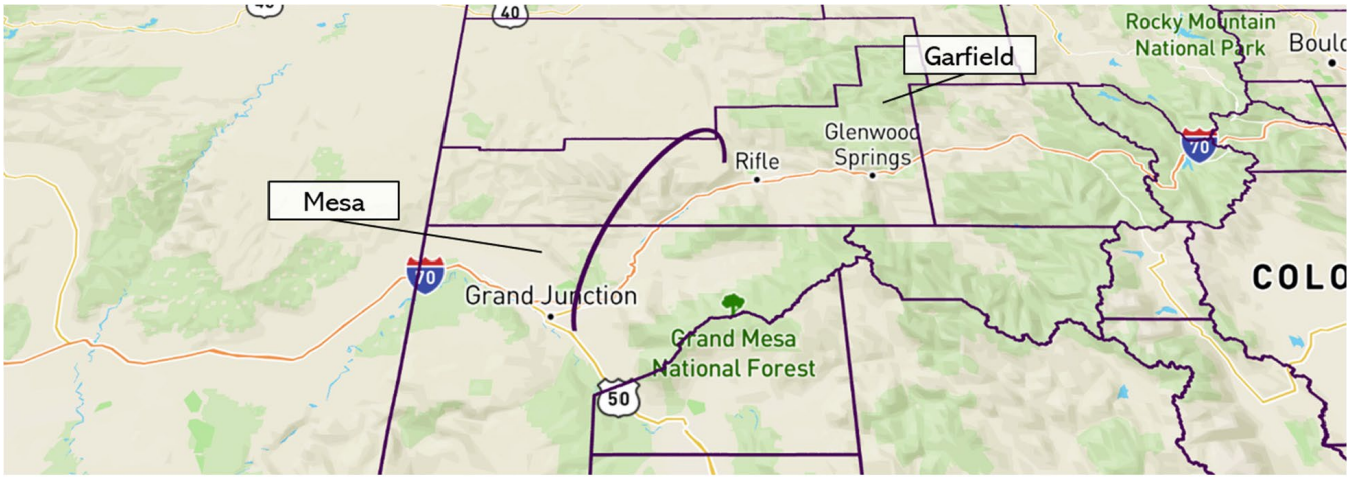
[12] https://globaldrivetozero.org/tools/zeti-data-explorer/

Figure 27. Front Range Medium-Duty Vehicle Trips (Emphasis on Number of Trips)



On the Western Slope, Figure 28 shows that there are also a high number of medium-duty truck trips between Mesa and Garfield Counties that average between 75 and 125 miles. More than 3,000 truck trips originated in either Mesa or Garfield and ended in the neighboring county.

Figure 28. Western Slope Medium-Duty Trips (Emphasis on Number of Trips)



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7

Moving Forward

Linking Goals, Strategies, Performance, and Investments

CDOT's Accountability and Transparency Wildly Important Goals (WIG) aims to ensure the efficient use of taxpayer funds and efficient construction project delivery. In line with this goal, CDOT is committed to maximizing the impact of limited funds to improve its freight system. This performance-based investment approach directly links statewide freight goals and performance measures to help inform investment decisions and to prioritize projects for funding. Performance measures enable CDOT to evaluate current conditions, set future targets, and assess progress toward those targets.

Investment emphasis areas identified in the CFP support Colorado's multimodal freight goals as well as CDOT's WIGs and national freight program goals. Within each statewide goal area, potential freight projects are evaluated with freight performance measures and data-driven criteria. Projects are further prioritized through stakeholder-driven processes, including the active involvement of the FAC and Colorado Transportation Commission. This project prioritization and selection process helps evaluate the expected performance impacts of projects and determine how that project may achieve goals and performance targets. CDOT is continually developing additional data sources and analysis methods to generate improved performance data available at the project level.

At the goal level, potential investment actions are identified to best utilize available funding sources. Dedicated freight funding sources, such as the NHFP, as well as other funds sources, such as Statewide Planning Funds or Freight Operations Funds, may be utilized to make progress on identified strategies. With competing investment priorities, this approach enables CDOT to focus on projects and priorities that most directly impact goods movement and have the most significant potential to improve mobility, system performance, and safety.

Aligning National and State Goals

Each fiscal year, CDOT produces a Performance Plan, as required under Colorado Revised Statute C.R.S. § 2-7-204, also known as the State Measurement for Accountable, Responsive and Transparent (SMART) Act. The Performance Plan is CDOT's strategic roadmap that informs partners about the upcoming fiscal year's WIGs. The WIGs are ambitious, short-term goals that align the Governor's Key Priorities with CDOT's strategic priorities. For fiscal year 2023-2024, the WIGS are:

- **Advancing Transportation Safety** - Advance the safety of Colorado's transportation system so all travelers arrive at their destination safely.
- **Accountability & Transparency** - Ensure efficient use of taxpayer funds and efficient construction project delivery.
- **Clean Transportation** - Reduce pollution from the transportation sector.
- **Statewide Transit** - Relieve traffic congestion with connected statewide transit and rail services.[13]

[13] *Performance Plan and Reports*. Colorado Department of Transportation. https://www.codot.gov/performance/performance-plan

Colorado's multimodal freight goals support national multimodal freight goals established by the FAST Act and revised by the 2021 Bipartisan Infrastructure Law (BIL). These national goals focus on investments in infrastructure and operational improvements that strengthen economic competitiveness, reduce the cost of transportation, improve reliability, and increase productivity. Safety, security, and resiliency are also emphasized, along with improving the state of good repair of the highway system. National goals also align with CDOT's recent efforts to innovate and leverage advanced technology and support state flexibility to address freight connectivity.

As revised by the BIL, the goals of the National Highway Freight Program are:

- to invest in infrastructure improvements and operational improvements that strengthen economic competitiveness, reduce congestion, reduce the cost of freight transportation, improve reliability, and increase productivity;
- to improve the safety, security, efficiency, and resiliency of freight transportation in rural and urban areas;
- to improve the state of good repair of the National Highway Freight Network;
- to use innovation and advanced technology to improve the safety, efficiency, and reliability of the National Highway Freight Network;
- to improve the efficiency and productivity of the National Highway Freight Network;
- to improve the flexibility of States to support multi-State corridor planning and the creation of multi-State organizations to increase the ability of States to address highway freight connectivity; and
- to reduce the environmental impacts of freight movement on the National Highway Freight Network.[14]

Table 2 shows how the Colorado Freight Plan Goals are aligned with the National Freight Goals and Colorado's Wildly Important Goals.

Table 2. Linking Shared National and State Goals

COLORADO FREIGHT PLAN GOALS	Safety & Security	Mobility	Maintenance	Economic Vitality	Sustainability & Resiliency
NATIONAL FREIGHT GOALS	» Safety and security	» Congestion » Reliability » Goods Movement » Innovation and Technology	» State of Good Repair	» Economic Efficiency and Productivity » Multi-State Planning	» Resiliency » Environmental
COLORADO WILDLY IMPORTANT GOALS	Advancing Transportation Safety	Accountability and Transparency		Statewide Transit	Clean Transportation
PD-14	Safety	Mobility	Asset Management		

[14] *Implementation Guidance for the National Highway Freight Program as Revised by the Bipartisan Infrastructure Law*. USDOT. https://ops.fhwa.dot.gov/freight/documents/NHFP_Implementation_Guidance.pdf

Colorado Freight Plan Implementation Framework

Strategies

Strategies for accomplishing the State Freight Plan goals that were included in the prior Colorado Highway Freight Plan were updated to address needs and issues raised through the plan development process, recommendations from stakeholders, and best practices from other state freight planning efforts. The below Tables 3 – 7 list the actions for each goal area, further defined by:

- **Timeline -** Actions are assumed to meet conservative estimates for development and roll-out. Actions are assessed on whether progress is reasonably feasible within a given lead time. Some actions may face significant barriers to implementation (e.g. funding, legislation, policy, resources, staff capacity, etc.) that could extend the timeline.
- **Lead -** Priority is given to actions where CDOT is the likely lead implementer and responsible agency. Other actions may require CDOT in the lead role with internal or external partnerships needed for action. Actions that do not address traditional CDOT roles or where CDOT is not the lead implementer are considered to need significant partner leadership and support.

Table 3. Safety Strategies

ACTION	TIMELINE	LEAD
Commercial Vehicle Safety – Prioritize identified commercial vehicle safety hotspots and other locations with specific safety challenges for funding within NHFP project selection.	Short-term	CDOT
Prioritize Truck Parking Investments - Utilize statewide truck parking assessment to prioritize network gaps and solutions for funding and implementation of public parking projects.	Ongoing	CDOT
Emergency Truck Parking – Establish partnerships with facilities that have large, underutilized parking lots, that could serve as overflow parking during emergency road closures.	Short-term	CDOT
Truck Parking Information - Design and deploy a Colorado Truck Parking Information Management System	Ongoing	CDOT
Truck Parking Partnerships - Support private sector and public agency partners in exploring innovative pilot programs or public-private initiatives to expand the availability of privately-owned truck parking facilities.	Ongoing	CDOT
Operational Safety Enhancements – Evaluate where and what enhancements are needed, and establish a secure funding source, for improvements and maintenance of chain stations, runaway truck ramps, safety pull-outs, and other highway freight network operational and safety features.	Ongoing	CDOT
Rail Safety - Streamline delivery of the Railway-Highway Crossings (Section 130) Program, including project prioritization and risk assessments for future projects.	Ongoing	CDOT
Safety Data - Enhance internal data and analytical capabilities to identify and assess commercial vehicle safety hotspots and integrate needs into regional and state project selection processes.	Short-term	CDOT
Communications - Continue to build on the Mountain Rules information campaign, in partnership with the Colorado State Patrol, Colorado Motor Carriers Association, and in-cab driver alert providers, to enhance safety for truckers traveling through the state's mountainous areas.	Ongoing	CDOT

Table 4. Mobility Strategies

ACTION	TIMELINE	LEAD
Mobility Data - Enhance internal data and analytical methods to identify highway bottlenecks and congestion points that contribute to travel time or reliability issues and link to funding opportunities.	Short-term	CDOT
Incident Management - Continue to support and expand CDOT capabilities for commercial vehicle incident management, including the Colorado State Patrol's (CSP) Heavy Tow program for commercial vehicles on Colorado Freight Corridors.	Ongoing	CDOT
Management and Operations - Continue coordination with CDOT Division of Maintenance & Operations and local and regional planning partners to identify potential ITS applications for commercial vehicles (e.g., ramp meter bypass, lane management, express lanes) and identify opportunities for funding and implementation of projects.	Short-term	CDOT
Freight Coordination - Coordinate with local and regional planning partners to address identified local freight issues, including truck parking needs, restrictive freight policies, curb management practices, roadway design, and other mobility constraints.	Mid-term	CDOT
Freight Information - Continue to enhance CDOT's freight webpage (https://freight.colorado.gov/), a platform to disseminate information on freight trip planning, truck routes, real-time travel information, truck parking, safety and capacity constraints, and other information.	Ongoing	CDOT
Freight Technology - Support private-sector partner efforts to deploy innovative technologies or pilot test freight technologies including in-cab communications, truck platooning, connected commercial vehicles, and other safety and mobility technologies.	Mid-term	FAC
At-grade Railroad Crossings - Work with local communities and industry to reduce truck delays at at-grade RR crossings through improved communications and routing.	Ongoing	CDOT
Military Freight - Continue coordination with the US Department of Defense to identify and improve routes critical to national defense, including STRAHNET, STRACNET, and PPP.	Ongoing	CDOT

Table 5. Maintain Strategies

ACTION	TIMELINE	LEAD
Bridge Constraints - Identify and prioritize bridges on freight corridors or freight support corridors that are currently restricting freight corridors due to load, height, or width restrictions.	Ongoing	CDOT
Freight Rail Condition - Develop and implement an assistance program (loan fund, grant program, or hybrid) to fund critical capacity needs and track upgrades for short-line railroads.	Long-term	CDOT
System Condition - Identify and implement maintenance and improvement projects on the Colorado Freight Corridors by integrating freight specific projects into current CDOT project development, selection, and funding processes.	Short-term	CDOT
Mitigate Pavement Deterioration - Evaluate improvements that may be required to reduce or impede the deterioration of roadways traveled by heavy vehicles.	Mid-term	CDOT
Sustainable Funding - Identify sustainable funding sources for maintenance and operation of freight highway infrastructure.	Short-term	CDOT

Table 6. Economic Strategies

ACTION	TIMELINE	LEAD
Education and Communications - Continue working with industry partners in support of the Colorado Delivers communications initiative.	Ongoing	CDOT
Economic Development - Develop a process with Engineering Regions and TPRs to identify potential projects that improve rural and urban economic competitiveness and advance projects into regional planning and project selection processes.	Short-term	CDOT
Economic Coordination - Develop ongoing coordination processes with state, regional, and local economic development agencies to identify and advance multimodal freight improvement needs – including highway, rail, or air cargo connectivity to existing and future industrial, free trade, or economic redevelopment areas such as a consolidated intermodal freight port (sometimes referred to as inland port).	Mid-term	CDOT
Freight Workforce - Support public agency partners in evaluating freight and logistics workforce needs and developing programs to address specific needs—such as fixed route transit, car and van pooling, and other shared mobility options to improve reliable access to logistics jobs.	Mid-term	FAC
Trade and Logistics - Support public agency or civic partner organizations in developing a statewide export, manufacturing, and trade and logistics strategy to support an increase in outbound freight shipments.	Long-term	FAC
Economic Benefits - Develop data and methods to support identification, evaluation, and prioritization of freight projects with economic development benefits or impacts.	Mid-term	CDOT

Table 7. Sustainability Strategies

ACTION	TIMELINE	LEAD
Supply Chain Efficiency - Coordinate with industry partners on opportunities to improve supply chain efficiencies, including load-matching resulting in reduced emissions and environmental impacts.	Mid-term	FAC
Consolidated Intermodal Freight Port - Coordinate with state, regional, and local land use agencies to identify and advance a consolidated intermodal freight port (sometimes referred to as inland port) to facilitate private investment in zero emission fueling infrastructure and more efficient freight operations, rail access, intermodal transfers, and workforce transit.	Long-term	FAC
Highway Mobility and Operational Improvements - Improve mobility (and reduce associated emissions) by removing barriers associated with truck operations (e.g., deficient bridges) and by leveraging ITS to better operate highways.	Short-term	CDOT
Encourage Fleet Turnover - Support the Colorado Clean Truck Strategy through continued partnerships focused on retiring the oldest vehicles on the road.	Long-term	CEO, CDPHE, CDOT
Pursue Partnerships for Charging Infrastructure. Expand partnerships both within and across states to support medium- and heavy-duty zero emission charging and fueling infrastructure.	Ongoing	CEO, CDPHE, CDOT
Mitigate Wildlife Habitat Loss - Continue collaboration with Colorado Parks & Wildlife to identify appropriate locations to construct wildlife crossings. Continue collaboration with Colorado Parks and Wildlife to mitigate wildlife collision and identify potential wildlife crossings to ensure safety for all and alleviate wildlife conservation threats.	Ongoing	CDOT
System Risk and Redundancy - Coordinate with CDOT's Resilience Program to evaluate potential natural hazard risks (e.g., extreme weather, natural disasters, flooding) identified in the interactive map titled Resilience in Colorado, to key freight corridors and identify redundant routes and necessary improvements to ensure redundancy of the system.	Ongoing	CDOT

National Highway Freight Program

The NHFP is a formula-based funding program that supports investments in the NHFN. To be funded through the NHFP, potential projects must be incorporated within a state Freight Investment Plan (FIP) and contribute to efficient goods movement on the NHFN. Funding eligibility covers all planning, feasibility, preconstruction, mitigation, and construction activities for highway, bridge, and multimodal capacity, safety, and operational projects. Investments in technology, safety, operations, parking, security, and alternative fuels to improve system performance are also eligible. Strategic planning, analysis, and data collections efforts are also eligible through this program. Each fiscal year, up to thirty percent of NHFP funds may be used for intermodal or freight rail projects, including improvements located within private facilities. Colorado's FIP provides a framework to leverage and direct NHFP funding toward targeted programmatic investment areas.

Colorado Freight Investment Plan

Colorado's multimodal freight system investment needs significantly exceed dedicated freight funding available through the NHFP. To balance needs against available funding, while improving Colorado's multimodal freight network, CDOT employs a performance-based process to guide allocation of NHFP funding.

To be considered for funding under Colorado's multimodal FIP, projects should clearly:

- Support NHFP and CFP multimodal freight goals and performance targets;
- Emphasize safety, mobility, or condition improvements on Colorado Freight Corridors that benefit trade and transport on a broader regional or interstate level;
- Demonstrate a clear freight nexus that directly impact freight-reliant industries or where goods movement is the primary rationale and direct beneficiary of the improvement;
- Indicate how funds will address immediate freight issues and advance projects toward construction and implementation; and,
- Address high-priority focus areas of truck safety, freight operations and clean transportation.

The FIP directs future freight-related investments towards initiatives that directly support national and state performance goals. CDOT works with local agencies and regional planning partners to identify key needs and potential investments that align with the CFP system-wide goals of safety, mobility, economic vitality, maintenance, and sustainability. Performance measures, project evaluation criteria, and project prioritization principles are also developed with partners to guide project selection. Projects are evaluated in cooperation with the FAC and Engineering Regions and prioritization results are used as input into final programming decisions. By prioritizing freight projects and considering state, system, and stakeholder investment priorities, CDOT's process maximizes investments and delivers a more effective freight program. This strategic investment and decision-making approach is visualized in Figure 29.

Figure 29. Investment and Decision Approach

SHARED NATIONAL AND STATE GOALS					
COLORADO FREIGHT PLAN GOALS	Safety & Security	Mobility	Maintenance	Economic Vitality	Sustainability & Resiliency
NATIONAL FREIGHT GOALS	» Safety and security	» Congestion » Reliability » Goods Movement » Innovation and Technology	» State of Good Repair	» Economic Efficiency and Productivity » Multi-State Planning	» Resiliency » Environmental
COLORADO WILDLY IMPORTANT GOALS	Advancing Trans-portation Safety	Accountability and Transparency		Statewide Transit	Clean Transportation
PD-14	Safety	Mobility	Asset Management		

PERFORMANCE MEASURES AND STAKEHOLDER CONSIDERATIONS

FREIGHT INVESTMENT PLAN EMPHASIS AREAS

TRUCK SAFETY	FREIGHT OPERATIONS	CLEAN TRANSPORTATION

FREIGHT PROGRAM AREA PERFORMANCE AND PROJECT EVALUATION MEASURES

PRIORITIZED FREIGHT INVESTMENT PLAN PROJECTS

Colorado Freight Plan Investment Emphasis Areas

To meet present needs, priority investment emphasis areas are identified to guide NHFP project selection, enabling CDOT to direct freight funding to target present system needs. Investment emphasis areas are identified through the CFP planning process and in consultation with FAC members, industry stakeholders, and planning partners. These priorities link directly to national goal areas, state goals and performance targets, and identified system needs.

To allocate NHFP funding, CDOT will focus on freight investments that address the following emphasis areas.

Truck Safety

Improving safety for all travelers is the number one priority for CDOT. Safety improvements that reduce conflicts between trucks and passenger vehicles or obstacles, add shoulders or passing lanes, implement weather-related improvements, or provide safety information to travelers can help Colorado reach its safety goals.

CDOT is currently assessing statewide crash data to identify patterns and specific commercial vehicle hotspot locations. This data driven analysis results in the identification of specific project opportunities to make commercial vehicle travel safer. Potential NHFP projects are assessed based on safety-related performance measures, including overall truck volume, crash severity, crash hotspot recurrence, and other project level measures.

Freight Operations

The COVID-19 global pandemic revealed deficiencies in global supply chains that slowed delivery of critical goods to businesses and consumers.

Colorado is actively pursuing operational improvements within the highway freight network to reduce the friction in the supply chain. These include:

- Safe parking options for overnight rest, during inclement weather, and while waiting for appointment times;
- ITS to better operate highways, chain stations, and safety pullouts;
- In-cab communication systems to alert drivers to hazards;
- Runaway truck ramps that are well maintained; and
- Weigh in Motion stations that dramatically reduce enforcement delays without compromising safety and compliance.

Clean Transportation

Reducing emissions across all vehicle types will be crucial for Colorado to achieve its target of a fifty percent reduction in statewide emissions by 2030 and one hundred percent by 2050. This can be accomplished through coordinated efforts of many stakeholders. Actions such as such as eliminating bottlenecks to reduce emissions from congestion, reducing truck vehicle miles traveled (VMT) by removing barriers (e.g., deficient bridges) to more direct routes, accelerating the transition to zero emission trucks by providing charging stations on key freight corridors, and facilitating emerging technologies and last-mile delivery trends such as e-cargo bikes can all reduce emissions associated with freight.