Developing a Homegrown Multidisciplinary Rail Workforce through Engagement with the Corridor Systems Planning Process

TENNESSEE

Task 2.1 Rail Workforce Needs Assessment

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Disclaimer Statement

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TABLE OF CONTENTS

Disclaimer Statement ii
Alternative Format Statement ii
List of Tables iv
List of Figures v
Acronym List vi
1. Executive Summary 8
2. Overview of Rail Operations 9
3. Current Rail Workforce in Tennessee 13
4. Projected Trends 20
5. Emerging Industry Workforce Needs 22
6. Education and Training Sources 24
7. Local Career Pathways 37
8. Challenges and Opportunities 43
9. Conclusions and Key Takeaways 44

List of Tables

Table 1. Rail Employment Details in Tennessee as of 2023. 17
Table 2. University of Tennessee System Institutions 26
Table 3. Locally Governed Universities in Tennessee. 26
Table 4. Tennessee Board of Regents – Community Colleges 26
Table 5. Tennessee Colleges of Applied Technology (TCAT System) 27
Table 6. Engineering Education Programs in Tennessee. 28
Table 7. Mechanical, Diesel, and Industrial Maintenance Programs 29
Table 8. Universities that offer Civil Engineering and Construction related programs 30
Table 9. Community Colleges and TCATs offering Construction and Infrastructure Training Programs in Tennessee. 30
Table 10. Welding and Fabrication Programs in Tennessee. 31
Table 11. Heavy Equipment Training in Tennessee 31
Table 12. Universities offering Logistics, Transportation and Supply Chain Programs in Tennessee. 32
Table 13. Community Colleges offering Logistics, Transportation and Supply Chain Programs in Tennessee. 32
Table 14. TCAT institutions offering Logistics, Supply Chain and Transportation related programs. 32
Table 15. Universities in Tennessee with Information Technology and Cyber Security programs... 33
Table 16. Community Colleges with Information and Cyber Security Programs in Tennessee. 33
Table 17. TCATs offering Information Technology and Cyber Security Programs. 34
Table 18. Universities offering Mechatronics and Advanced Manufacturing programs. 34
Table 19. Community Colleges offering Manufacturing, CAD and Mechatronics 35
Table 20. TCATs offering Technical Manufacturing, Machining & Mechatronics Training 35
Table 21. Institutions providing Rail-related Education and Training in Tennessee 36
Table 22. Dual Enrollment and Early College Pathways in Tennessee 38
Table 23. Work-Based Learning and Internship Opportunities in Tennessee. 39
Table 24. Technical and On-the-job skills Development programs in Tennessee. 39
Table 25. Apprenticeships and Earn-and-Learn Pathways in Tennessee. 40

List of Figures

Figure 1: Tennessee Freight Rail State Map (Source: AAR) 11
Figure 2. Labor Market Conditions in Tennessee compared to National Averages. (Source: Bureau of Labor Statistics (2024) as summarized by NASWA, 2025). 13
Figure 3. Population Density Map of Tennessee (Census Tract Level, 2020). (Source: U.S. Census Bureau, 2020 Decennial Census.) 15
Figure 4. Educational Attainment for Tennessee. (Source: U.S Census Bureau) 16
Figure 5. Rail-Specific Employment by Occupation in Tennessee. (Source: Produced with data from Bureau of Labor Statistics,2023) 18
Figure 6. Mean annual wages of Rail-Specific Occupations in Tennessee. (Source: Produced with data from Bureau of Labor Statistics, 2023) 19
Figure 7. Spatial Distribution of Colleges and Universities in Tennessee. (Source: https://tnscore.org/resources/higher-ed-data) 25

Acronym List

AAR	American Association of Railroads
ABC	Associated Builders and Contractors
AI	Artificial Intelligence
ASE	Automotive Service Excellence
AWS	American Welding Society
BLS	Bureau of Labor Statistics
BNSF	Burlington Northern Santa Fe
BS	Bachelor of Science Degree
CAD	Computer-Aided Design
CDL	Commercial Driver's License
CIT	Computer Information Technology
CN	Canadian National Railway
CNC	Computer Numerical Control
CPKC	Canadian Pacific Kansas City
CRISI	Consolidated Rail Infrastructure and Safety Improvements
CSULB	California State University, Long Beach
CTE	Career and Technical Education
CTR	Center for Transportation Research
CTSO	Career and Technical Student Organization
FRA	Federal Railroad Administration
FY	Fiscal Year
GDP	Gross Domestic Product
HBCU	Historically Black Colleges and Universities
HVAC	Heating, Ventilation, and Air Conditioning
IT	Information Technology
JATC	Joint Apprenticeship & Training Center/Committee Programs
K-12	Kindergarten through 12th grade
LGI	Locally Governed Institution
MBA	Master of Business Administration
MIG	Metal Inert Gas
MS	Master of Science Degree
MSU	Montana State University
NASWA	National Association of State Workforce Agencies
NATEF	National Automotive Technicians Education Foundation
NEJATC	Nashville Electrical Joint Apprenticeship and Training Committee
OEWS	Occupational Employment and Wage Statistics
OJT	On-The-Job Training
OSHA	Occupational Safety and Health Administration

PDH	Professional Development Hours
PhD	Doctor of Philosophy
PLC	Programmable Logic Controller
PTC	Positive Train Control
RHA	Rural Health Association of Tennessee
SMAW	Shielded Metal Arc Welding
STEM	Science Technology Engineering Mathematics
TBR	Tennessee Board of Regents
TCAT	Tennessee Colleges of Applied Technology
TIG	Tungsten Inert Gas
TVA	Tennessee Valley Authority
UofM	University of Memphis
UP	Union Pacific
UT	University of Tennessee
UTK	University of Tennessee, Knoxville
WBL	Work-based Learning

1. Executive Summary

The federal government recently made historic investments to upgrade the nation's rail infrastructure and to support rail planning and implementation projects. To realize the full economic, operational, and job creation benefits deriving from these investments, efforts to strengthen the industry's talent pipeline need to occur in tandem with rail systems planning processes and capital improvement projects. Montana State University (MSU) is leading an initiative, in partnership with the University of Memphis (UofM) and California State University, Long Beach (CSULB), to align education, training, and outreach efforts with the real-world needs of regional rail operators and rail suppliers and service providers. The project is funded by the Federal Railroad Administration's (FRA) Consolidated Rail Infrastructure and Safety Improvements (CRISI) program.

The state-level needs assessment documents rail workforce challenges and gaps in Tennessee and identifies the available training, education, and job placement resources and programs that can be leveraged regionally to address industry needs. The research will be utilized to inform the development of a project implementation plan—based on local conditions and needs—and to engage industry, academic, and other multisector stakeholders to guide project implementation in the region. This document describes Tennessee's current and projected rail operations and local labor market conditions. It also outlines local education and training resources that can be leveraged for the purposes of the project. The conclusions and key takeaways encompass national rail workforce trends and findings for context.

2. Overview of Rail Operations

Tennessee's geographic and demographic characteristics play an important role in shaping its rail system and workforce. The state covers about 42,000 square miles and has a population of over 7 million, making it more densely populated than many rural states. This matters because rail activity in Tennessee is not spread evenly across the state. It is strongly connected to major population, industrial, and logistics centers such as Memphis, Nashville, Chattanooga, and Knoxville.[1]

Rail transportation plays a central role in Tennessee's freight system and remains important to the state's industrial and logistics activities. The rail industry contributes 2% of Tennessee's GDP and over $750 million in tax revenue.[2] Across the state, rail lines connect major logistics centers, manufacturing facilities, and agricultural producers to the broader national freight network, enabling goods to move efficiently across regions. While recent industry data provides a snapshot of freight rail activities and employment in the state,[3] a more detailed understanding of the rail system (both freight and passenger) can be obtained from state-level planning documents. According to the *2019 Tennessee Statewide Rail Plan*, rail operations in the state are built around a 2,940-mile backbone of Class I railroads that support long-distance freight movement. In addition to this, short-line (Class III) railroads operate about 763 miles of track, providing critical short-haul connections that link local industries and communities to the broader national network.[4] These systems create an integrated network that supports both in-state freight movement and access to major rail markets across the country.

This is important because the Class I railroads mainly support the long-distance movement of goods, while short-line railroads help complete the local connections that larger railroads may not directly serve. In that sense, Tennessee's rail system depends on both types of service. The major railroads provide statewide and national connections, while the short lines help connect rural communities, industries, and smaller freight generators to the broader rail network.[5]

Freight Rail Operations

The six Class I railroads operating in the state are CSX Transportation, Norfolk Southern Railway, Canadian National Railway (CN), Burlington Northern Santa Fe (BNSF), Union Pacific (UP), and Canadian Pacific Kansas City (CPKC)[6]. These provide long-distance freight transportation and operate major corridors linking the state to markets in the Midwest, the Gulf Coast, and the East Coast.[7] Tennessee's geographic location plays a major role in how important rail transportation is

[1] U.S. Census Bureau, *QuickFacts: Tennessee*, accessed 2026. Available: https://www.census.gov/quickfacts/TN
[2] Tennessee Department of Transportation, *Tennessee State Rail Plan Update, 10/30/2025* *https://www.tn.gov/content/dam/tn/tdot/freight-and-logistics/FAC%20Rail%20Plan%20K.%20Bucklew.pdf*
[3] Association of American Railroads, *Railroads in Tennessee*, accessed March 2026, https://www.aar.org/tennessee/.
[4] Tennessee Department of Transportation, *Tennessee Statewide Rail Plan* (Nashville, TN: Tennessee Department of Transportation, 2019), https://www.tn.gov/content/dam/tn/tdot/freight-and-logistics/TDOT_RailPlan_updated_2019.pdf.
[5] Tennessee Department of Transportation, *Tennessee Statewide Rail Plan*
[6] Tennessee Department of Transportation, *Tennessee Statewide Rail Plan*
[7] Tennessee Department of Transportation, *Tennessee State Rail Plan Update, 10/30/2025* *https://www.tn.gov/content/dam/tn/tdot/freight-and-logistics/FAC%20Rail%20Plan%20K.%20Bucklew.pdf*

to the state, as several key freight corridors pass through the state, making it easier for goods to move between major economic regions across the country. Unlike states where one railroad may dominate most of the system, Tennessee's rail operations are spread across several Class I carriers. This gives the state a more connected and competitive rail environment. It also means that the workforce supporting rail activity is not tied to only one dominant railroad, but to a broader mix of freight operators, terminals, short lines, and supporting industries.[8]

The Memphis metropolitan area stands out as a major freight hub where multiple Class I railroads meet and connect with other modes of transportation, including trucking, air cargo, and inland waterways.[9] Because of this level of connectivity, Memphis plays an important role in linking freight movement across different parts of the United States, and its rail network supports a large share of the state's logistics and distribution activities.

Freight rail in Tennessee also supports key supply chains such as automotive, advanced manufacturing, agricultural products, chemicals and plastics, and other manufactured goods. These commodities reflect the structure of Tennessee's economy, where manufacturing, logistics and distribution are major parts of freight activity.[10]

In addition to the Class I railroads, the state's short-line and regional railroads provide important local services by connecting industries, distribution facilities, and rural communities to the national rail network. Short-line railroads are particularly important in supporting industrial development, especially in areas that are not directly served by the larger carriers. There are 16 Class III railroads operating in Tennessee as of 2025.[11] This also has workforce implications. Short-line railroads may not employ the same number of workers as the larger railroads, but they still require skilled employees for track maintenance, equipment handling, inspections, operations, and customer service. In rural areas, attracting workers into these roles can be more difficult because the available labor pool may be smaller and the work may require specialized training.[12]

[8] Tennessee Department of Transportation, *Tennessee Statewide Rail Plan*
[9] Tennessee Department of Transportation, *Tennessee Statewide Rail Plan*
[10] Tennessee Department of Transportation, *Tennessee Statewide Multimodal Freight Plan* (Nashville, TN: Tennessee Department of Transportation, 2023), https://www.tn.gov/content/dam/tn/tdot/freight-and-logistics/TDOT_2023_StatewideMultimodalFreightPlan_FullReport_Final,%202023%2005%2030.pdf.
[11] Tennessee Department of Transportation, *Tennessee State Rail Plan Update, 10/30/2025 https://www.tn.gov/content/dam/tn/tdot/freight-and-logistics/FAC%20Rail%20Plan%20K.%20Bucklew.pdf*
[12] Tennessee Department of Transportation, *Tennessee Statewide Rail Plan*

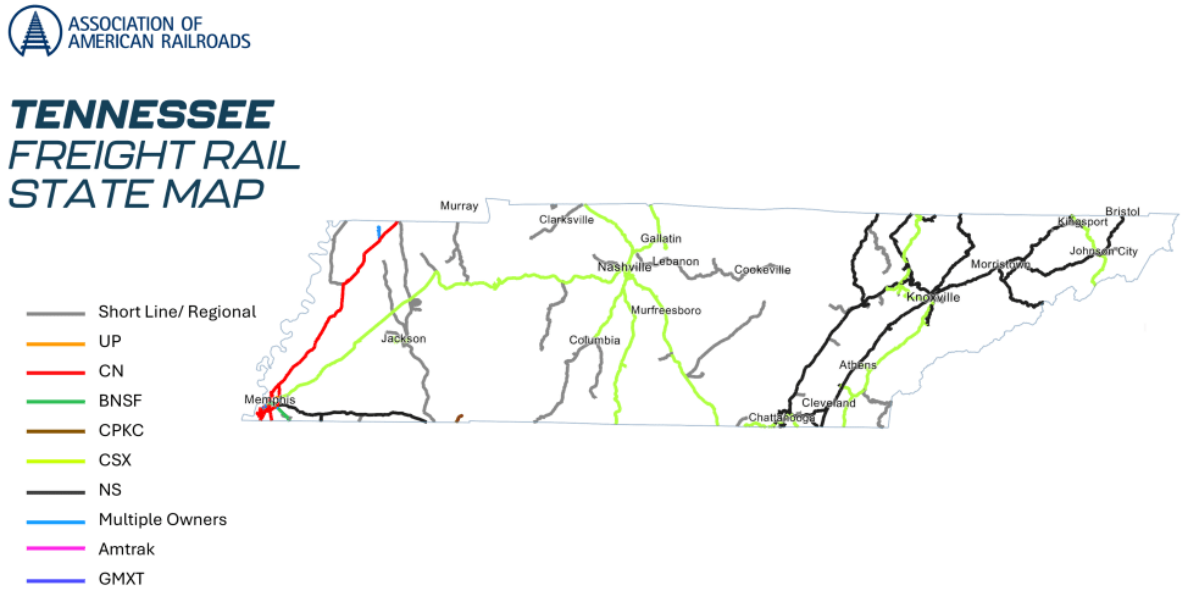


Figure 1: Tennessee Freight Rail State Map (Source: AAR)

Passenger Rail Operations

Passenger rail activity in Tennessee is more limited but still contributes to the state's rail operations. Amtrak operates the *City of New Orleans* passenger rail service, which connects Memphis with Chicago and New Orleans and provides passenger rail access at Memphis Central Station and Newbern-Dyersburg.[13] In addition, the Nashville metropolitan area operates the WeGo Star commuter rail line, which provides weekday passenger service between Lebanon and downtown Nashville.[14]

The *City of New Orleans* is one of Amtrak's long-distance routes and operates on tracks primarily owned by freight railroads, which means that passenger service in Tennessee depends on shared-use infrastructure. By federal statute, Amtrak trains are given operational preference over freight trains, although in practice delays can still occur due to freight traffic volumes and network congestion.[15] The service typically operates once daily in each direction and serves a limited number of stations within Tennessee, with Memphis acting as the primary passenger rail hub in the state. Ridership on this route has shown recovery in recent years following declines during the 2020 pandemic, reflecting continued demand for intercity passenger rail service, particularly for long-distance travel connecting major metropolitan regions.[16]

The WeGo Star commuter rail line operates along a 32-mile corridor between Lebanon and downtown Nashville and primarily serves weekday commuters. The service runs during morning

[13] Amtrak, "City of New Orleans," accessed March 27, 2026, https://www.amtrak.com/city-of-new-orleans-train.
[14] WeGo Public Transit, "Train – Transit Services," accessed March 27, 2026, https://www.wegotransit.com/ride/transit-services/train/.
[15] Amtrak, "City of New Orleans," accessed March 27, 2026, https://www.amtrak.com/city-of-new-orleans-train
[16] Amtrak, "City of New Orleans," accessed March 27, 2026, https://www.amtrak.com/city-of-new-orleans-train

and afternoon peak periods and is designed to support daily travel to and from employment centers in Nashville. Compared to freight rail, the scale of commuter rail operations is much smaller, but it still requires coordination with freight rail operators because it also uses shared rail infrastructure.[17]

Although freight rail dominates the rail system in Tennessee, these passenger services represent additional components of the state's rail transportation network. They are also important because they show that Tennessee's rail system is not only a freight system, even though freight is clearly the larger part. Passenger rail is limited in coverage, but it still creates a workforce needed for station operations, scheduling, safety, maintenance coordination, and customer service.[18] [19]

[17] WeGo Public Transit, "Train – Transit Services," accessed March 27, 2026, https://www.wegotransit.com/ride/transit-services/train/.
[18] Amtrak, "City of New Orleans," accessed March 27, 2026, https://www.amtrak.com/city-of-new-orleans-train
[19] WeGo Public Transit, "Train – Transit Services," accessed March 27, 2026, https://www.wegotransit.com/ride/transit-services/train/.

3. Current Rail Workforce in Tennessee

Labor Market Information on Tennessee

Tennessee's rail workforce should be understood within the broader labor market conditions of the state. Recent labor market data show that Tennessee operates under relatively tight labor conditions. The state recorded an annual average unemployment rate of 3.4% in 2024, compared with 4.0% nationally, and had approximately 0.6 unemployed persons per job opening, indicating that available jobs outnumber job seekers in many sectors.[20] This has direct implications for rail workforce development because rail employers are not recruiting in isolation. They compete with other industries that require similar skill sets, particularly transportation, warehousing, construction, logistics, and manufacturing. These sectors often demand workers with mechanical ability, equipment operation skills, safety awareness, and the ability to work in field-based or shift-based environments. As a result, even when rail jobs are available, attracting workers can be difficult if comparable opportunities exist in competing industries.[21] Figure 2 shows further details on labor market conditions in Tennessee as compared to national averages.

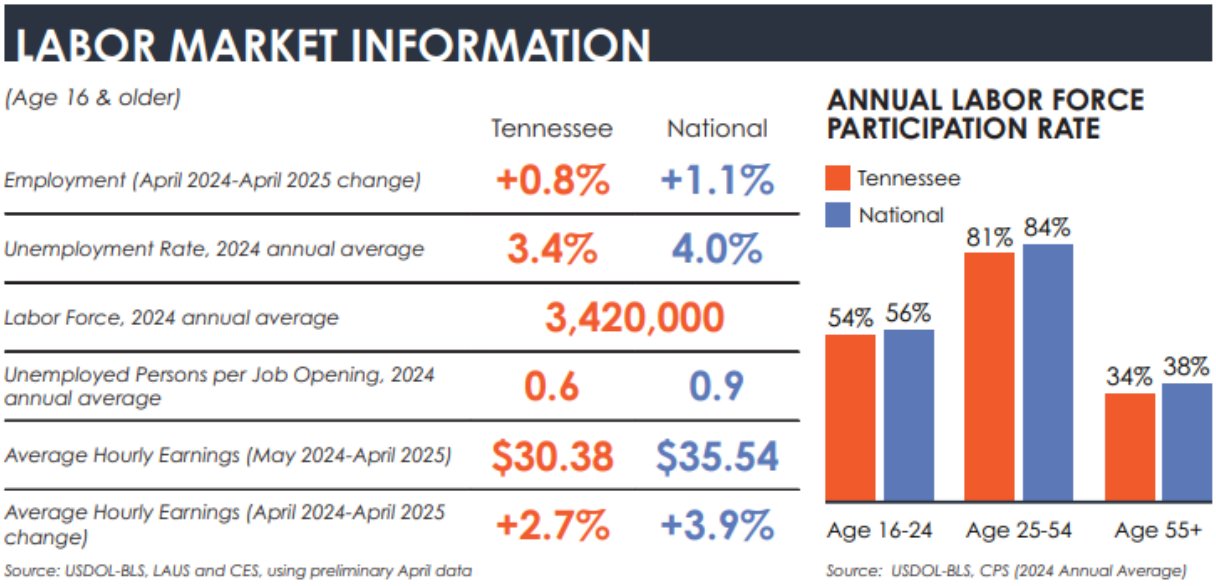


Figure 2. Labor Market Conditions in Tennessee compared to National Averages. (Source: Bureau of Labor Statistics (2024) as summarized by NASWA, 2025).

Labor force participation is another important factor affecting workforce availability. Tennessee's labor force participation rate was approximately 59.4% in 2024, compared to the national average of 62.6%, placing the state among those with lower participation rates.[22] A lower participation rate

[20] National Association of State Workforce Agencies (NASWA), *State of the Workforce: Tennessee*, 2025. Available: 2025stateoftheworkforce-2025-09tn.pdf

[21] Bureau of Labor Statistics (BLS), *Employment in Transportation and Warehousing Industries*, U.S. Department of Labor, 2024. Available: Keeping America Moving: Employment in Transportation and Warehousing Industries : Spotlight on Statistics : U.S. Bureau of Labor Statistics

[22] Boyd Center for Business and Economic Research, University of Tennessee, *An Economic Report to the Governor of the State of Tennessee*, 2025.Available: 2025ERG.pdf

suggests that a smaller share of the working-age population is actively engaged in the labor market, which reduces the pool of potential workers available for industries such as rail.

Population and Demographic Structure in Tennessee

The state has a population of approximately 7.2 million, providing a relatively large labor base. The median age is about 39 years, with a relatively balanced mix of younger and older workers within the workforce.[23] A significant share of the population falls within the working-age group (25–64 years), which forms the core labor pool for industries such as rail transportation. At the same time, about 17% of the population is aged 65 and older, pointing to an aging segment of the workforce that may need to be replaced over time.[24]

Population density provides important insight into the spatial distribution of the workforce across Tennessee. The state has an average population density of approximately 168 persons per square mile, placing it near the middle among U.S. states[25] and indicating a moderately populated environment.[26] This suggests that, compared to low-density states, Tennessee has a relatively accessible labor base, although it is less concentrated than highly urbanized regions.

As illustrated in Figure 3, however, this average conceals significant spatial variation within the state. The population is heavily concentrated in major urban centers such as Memphis, Nashville, and Chattanooga, while large portions of the state remain sparsely populated.[27] This uneven distribution creates a mixed workforce environment. In densely populated urban areas, rail employers benefit from access to larger labor pools but face increased competition from industries such as logistics and warehousing.[28] In contrast, rural areas experience fewer competing industries but have smaller labor pools, which can make recruitment and retention more challenging, particularly for technical and maintenance roles.[29]

[23] U.S. Census Bureau, *American Community Survey 1-Year Estimates: Tennessee Profile*, 2024. Available: https://censusreporter.org/profiles/04000US47-tennessee/
[24]U.S. Census Bureau, *Population 65 Years and Over in Tennessee*, American Community Survey. Available: https://www.census.gov/quickfacts/TN
[25] https://state.1keydata.com/state-population-density.php
[26] U.S. Census Bureau, *2020 Decennial Census: Population and Housing Data*, Washington, DC, 2021. [Online]. Available: https://www.census.gov/programs-surveys/decennial-census/decade/2020.html
[27] U.S. Census Bureau, *2020 Decennial Census: Population and Housing Data*, Washington, DC, 2021. [Online]. Available: https://www.census.gov/programs-surveys/decennial-census/decade/2020.html
[28] U.S. Department of Transportation, *Freight and Logistics in the U.S. Economy: Understanding Workforce and Industry Competition*, Washington, DC, 2020; Tennessee Department of Transportation, *Tennessee Multimodal Freight Plan*, Nashville, TN, 2023. [Online]. Available: https://www.tn.gov/tdot/freight-and-logistics-home.html
[29] U.S. Department of Transportation, *Freight and Logistics in the U.S. Economy: Understanding Workforce and Industry Competition*, Washington, DC, 2020; Tennessee Department of Transportation, *Tennessee Multimodal Freight Plan*, Nashville, TN, 2023. [Online]. Available: https://www.tn.gov/tdot/freight-and-logistics-home.html

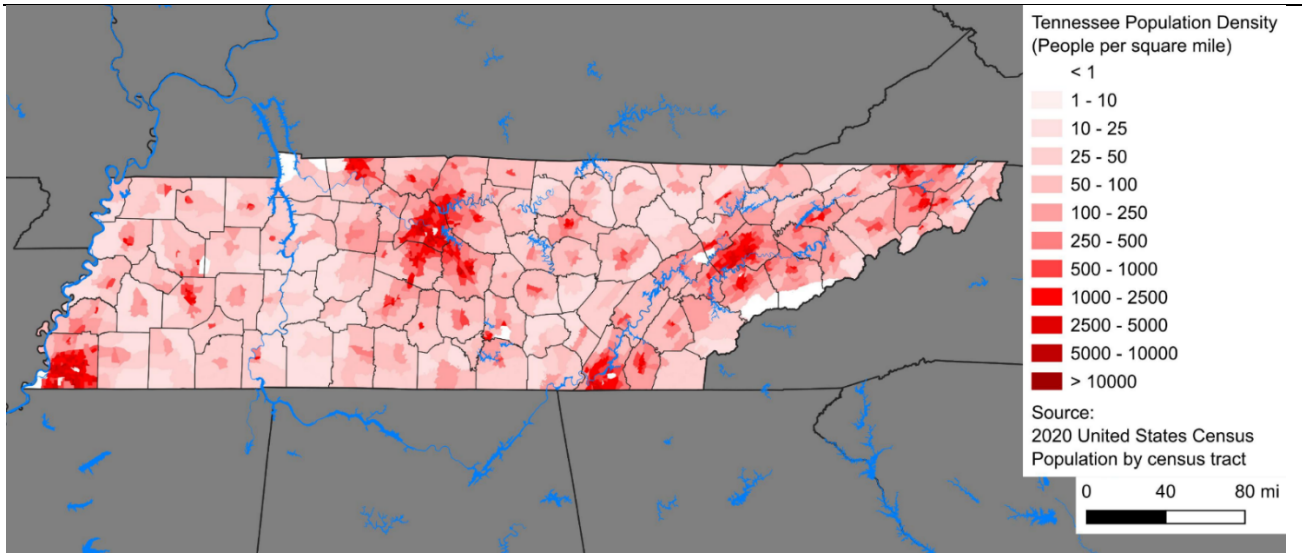


Figure 3. Population Density Map of Tennessee (Census Tract Level, 2020). (Source: U.S. Census Bureau, 2020 Decennial Census.)

Educational Attainment in Tennessee

Educational attainment is another important factor influencing workforce readiness in Tennessee. Data from the American Community Survey, displayed in Figure 4, shows that approximately 32% of adults aged 25 and over hold a bachelor's degree or higher, which is below the national average of 36.8%.[30] At the same time, a larger share of the population has a high school diploma or some college education, but not necessarily a completed degree. This distribution has direct implications for the rail workforce. While many rail occupations do not require a four-year degree, they do require technical skills, certifications, and practical training. A workforce with moderate levels of formal education but strong participation in technical and vocational pathways can support rail operations effectively, particularly in roles related to maintenance, equipment operation, and infrastructure inspection.

Educational attainment also varies across the state. Urban counties such as Davidson and Shelby tend to have higher levels of educational attainment, while many rural counties have lower shares of residents with postsecondary degrees.[31] This uneven distribution affects workforce availability, especially for rail operations that extend into less densely populated areas where access to skilled labor may be more limited.

[30] U.S. Census Bureau, *American Community Survey 1-Year Estimates: Educational Attainment in Tennessee*, 2024. Available: https://data.census.gov
[31] U.S. Census Bureau, *American Community Survey 1-Year Estimates: Educational Attainment in Tennessee*, 2024. Available: https://data.census.gov

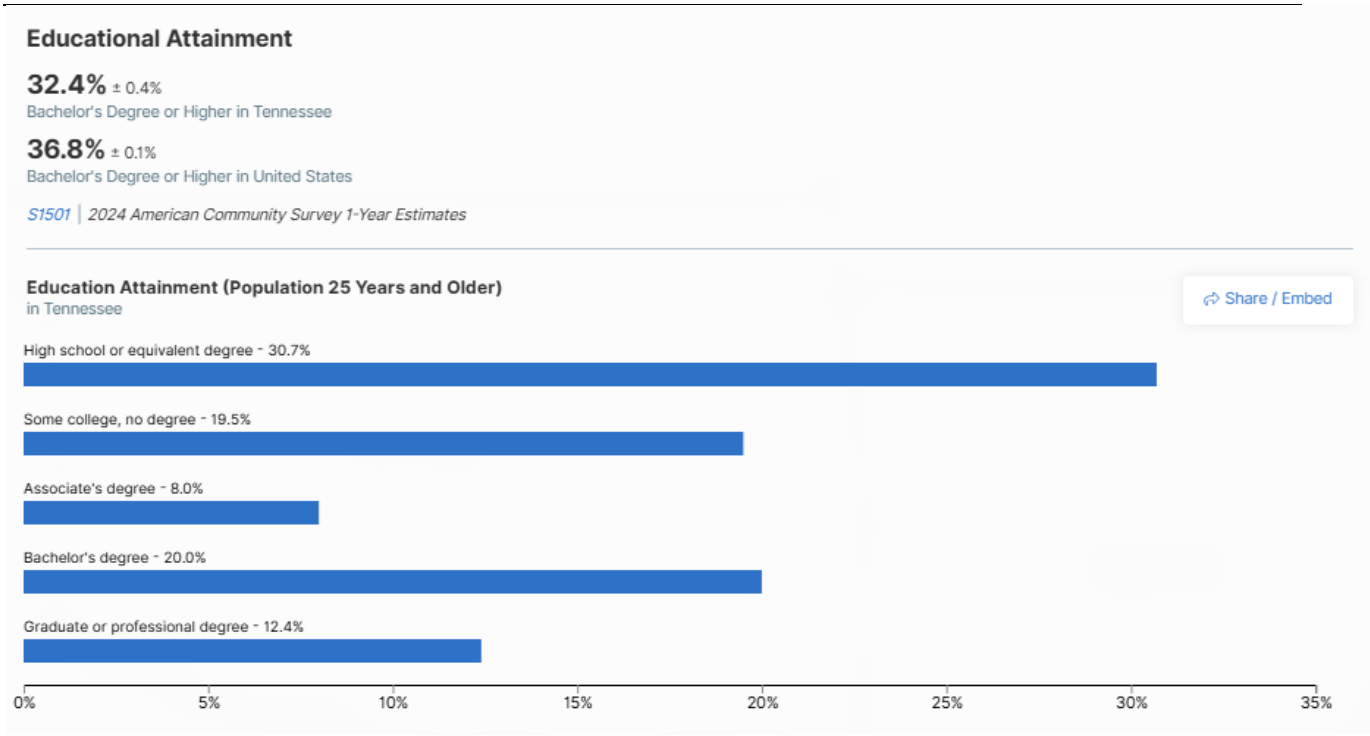


Figure 4. Educational Attainment for Tennessee. (Source: U.S Census Bureau)

Rail Employment in Tennessee

Understanding the rail workforce in Tennessee requires looking beyond individual job titles to how employment is structured across different types of roles. Workforce data grouped under the Bureau of Labor Statistics classification system helps capture both operational positions and the supporting roles in maintenance, construction, administration, and technical services. This approach provides a clearer picture of how rail activities are supported across the state and the range of skills required to sustain them.[32]

Tennessee's rail workforce supports rail operations through a range of occupations. The workforce includes employees directly responsible for train operations, such as locomotive engineers, conductors, dispatchers, and yardmasters, who coordinate train movements and manage rail traffic along the network.[33] These operational employees are responsible for ensuring that trains move safely across rail corridors and that rail yards operate efficiently.

Other significant portions of the rail workforce focus on maintaining rail infrastructure and equipment. These workers include track maintenance crews, signal technicians, bridge inspectors, and mechanical technicians who maintain rail lines, signaling systems, and locomotives.[34] Their roles are essential because reliable infrastructure and equipment directly affect safety, service

[32] Bureau of Labor Statistics, "Tennessee – May 2023 OEWS State Occupational Employment and Wage Estimates," accessed March 27, 2026, https://www.bls.gov/oes/2023/may/oes_tn.htm.
[33] Bureau of Labor Statistics, "Tennessee – May 2023 OEWS State Occupational Employment and Wage Estimates," accessed March 27, 2026, https://www.bls.gov/oes/2023/may/oes_tn.htm.
[34] U.S. Bureau of Labor Statistics (BLS). *Occupational Outlook Handbook: Railroad Occupation. Available:* Railroad Workers : Occupational Outlook Handbook: : U.S. Bureau of Labor Statistics

continuity, and operational efficiency.[35] Additionally, professional and technical occupations play an important role in supporting the rail system. These positions include civil engineers, transportation planners, logistics specialists, and safety inspectors who analyze freight flows, design rail infrastructure improvements, and ensure compliance with safety regulations. Many of these roles are not always classified strictly under rail employment but still contribute significantly to rail-related activities.[36]

Occupational Distributions and Key Roles

Employment statistics provide additional insights into the structure of the rail workforce in Tennessee. Occupational employment estimates from the U.S Bureau of Labor Statistics (BLS) indicate several key rail occupations that are present in the state as of 2023.[37] Table 1 summarizes the most recent employment estimates for these occupations in Tennessee.

Table 1. Rail Employment Details in Tennessee as of 2023.

Occupation	Estimated Employment in Tennessee (Last Updated-2023)	Description
Railyard conductors and Yardmasters	790	Coordinate train operations, supervise train crews, and manage switching operations within rail yards.
Locomotive Engineers	700	Operate locomotives and control train speed and braking systems during rail operations.
Rail Transportation Workers (All Other)	190	Includes specialized operational workers who support train movement and rail yard activities.
Rail Yard Engineers / Hostlers	30	Move locomotives within rail yards and prepare trains for service.
Rail-Track Laying and Maintenance Equipment Operators	360	Operate rail-track laying and maintenance equipment.
Railcar repairers	210	Inspect, fix, and maintain railcars (freight and passenger) to keep them safe and operational.

The distribution across these occupations, depicted in Figure 5, shows that operational roles such as

[35] Federal Railroad Administration, *Railroad Industry Workforce Development Report*, 2020. https://railroads.dot.gov
[36] Federal Railroad Administration, *Railroad Industry Workforce Development Report*, 2020. https://railroads.dot.gov
[37] Bureau of Labor Statistics.

locomotive engineers, conductors, and yardmasters account for a large share of employment. This reflects the fact that Tennessee's rail system is heavily oriented toward freight movement, where efficient train operations are critical. Maintenance-related roles, including track equipment operators and railcar repairers, also form a significant portion of the workforce, highlighting the continuous need for infrastructure upkeep and equipment reliability.[38]

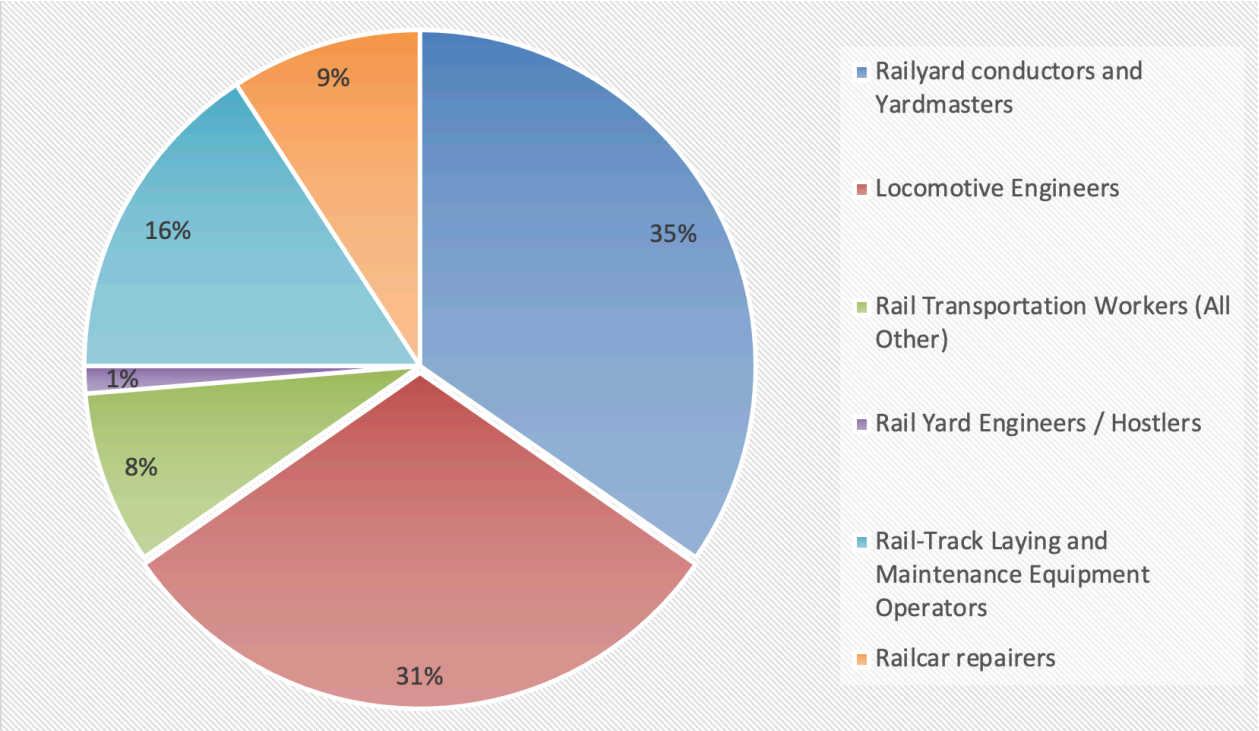


Figure 5. Rail-Specific Employment by Occupation in Tennessee. (Source: Produced with data from Bureau of Labor Statistics,2023)

Rail occupations in Tennessee generally offer competitive wages compared to many other industries in the state. Many operational and technical roles provide stable employment with structured career progression, often without requiring a four-year degree. This makes the rail industry an important pathway for accessing relatively high-paying jobs through technical training and on-the-job experience rather than traditional academic routes, as shown in Figure 6.[39]

These classes of occupations represent the core operational workforce responsible for train movement, but they do not capture the full size of the rail workforce in the state. Industry employment records provide a broader estimate of the total rail workforce. Data from the U.S. Railroad Retirement Board show that approximately 3,679 railroad employees were working in Tennessee in 2023 across rail employers participating in federal railroad employment programs.[40] These employees include workers employed by freight railroads, rail terminals, rail service contractors, and engineering firms that support rail infrastructure projects.

[38] U.S. Bureau of Labor Statistics, *Occupational Outlook Handbook: Railroad Occupations*, 2023, https://www.bls.gov/ooh/transportation-and-material-moving/railroad-occupations.htm.
[39] U.S. Bureau of Labor Statistics, *Occupational Outlook Handbook: Railroad Occupations*, 2023,
[40] U.S. Railroad Retirement Board, *Railroad Employment by State and County* (Chicago, IL: U.S. Railroad Retirement Board, 2023), https://www.rrb.gov/sites/default/files/2025-07/StateCounty2023.pdf.

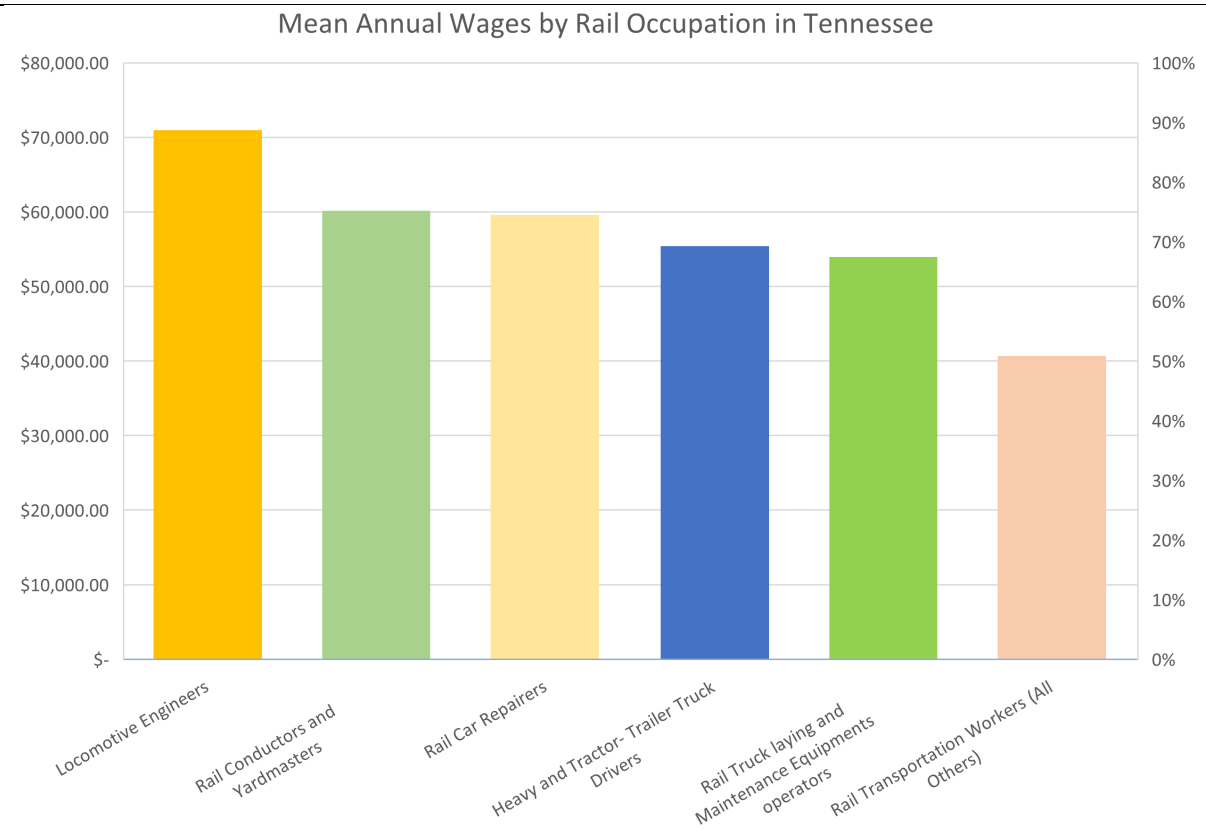


Figure 6. Mean annual wages of Rail-Specific Occupations in Tennessee. (Source: Produced with data from Bureau of Labor Statistics, 2023)

Additionally, many rail-related jobs fall under other occupational classes, such as mechanical technicians, construction workers, engineers, administrative, legal, and logistics professionals who support rail infrastructure and freight operations.[41] [42] Further, the number of direct jobs related to the rail industry in the state is estimated to be nearly 35,000, with this number increasing to nearly 80,000 when indirect/induced jobs are included.[43]

Job posting patterns in Tennessee suggest that opportunities in the rail sector are not limited to traditional operations roles but extend to engineering, technical, and support functions, reflecting the multidisciplinary nature of the workforce. There is also significant overlap between the rail workforce and other industries, particularly trucking, logistics, warehousing, and construction. Workers in these sectors often possess transferable skills, which can create both opportunities for recruitment and competition for labor. This overlap is especially important in Tennessee, where freight and logistics activity plays a major role in the state's economy.[44]

[41] U.S. Bureau of Labor Statistics, *Occupational Outlook Handbook: Railroad Occupations*, 2023, https://www.bls.gov/ooh/transportation-and-material-moving/railroad-occupations.htm.
[42] Federal Railroad Administration, *Railroad Industry Workforce Development Survey*, U.S. Department of Transportation, Washington, DC, 2020, https://railroads.dot.gov/sites/fra.dot.gov/files/2020-11/Workforce%20Development%20Survey-A.pdf.
[43] Tennessee Department of Transportation, *Tennessee State Rail Plan Update, 10/30/2025 https://www.tn.gov/content/dam/tn/tdot/freight-and-logistics/FAC%20Rail%20Plan%20K.%20Bucklew.pdf*
[44] Tennessee Department of Transportation, *Tennessee Statewide Multimodal Freight Plan* (Nashville, TN: Tennessee Department of Transportation, 2023), https://www.tn.gov/content/dam/tn/tdot/freight-and-logistics/TDOT_2023_StatewideMultimodalFreightPlan_FullReport_Final,%202023%2005%2030.pdf.

4. Projected Trends

Rail transportation in Tennessee is expected to experience continued changes driven by shifts in freight activity, economic growth, and evolving transportation patterns. The Tennessee Statewide Rail Plan (2019) and the Tennessee Multimodal Freight Plan (2023) both point to a system that is becoming more active and increasingly interconnected. These changes are shaping how rail operations function across the state and are gradually influencing the structure of activities carried out within the rail sector.[45] [46]

A key trend identified in both documents is the steady increase in freight demand. Tennessee's location within major national freight corridors means that rail continues to play a significant role in moving goods across long distances. As economic activity grows, the volume of freight moving through the state is also expected to increase. This trend is particularly evident in areas such as Memphis, where multiple transportation modes intersect and support large-scale freight movement.[47] The continued rise in freight volumes suggests a system that will operate at higher levels of activity over time. The growing importance of intermodal transportation further reflects this shift. The freight plan emphasizes the need for efficient connections between rail, trucking, and other transportation modes, highlighting the role of integrated supply chains in modern freight movement.[48] This aligns with national trends where rail is increasingly used as part of intermodal logistics systems rather than operating independently.[49]

Key supply chains driving increased rail activity in the state are automotive, advanced manufacturing, agriculture, and chemicals and plastics. Additionally, there is a projected 43% growth in total rail freight in Tennessee over 2022 baseline by 2050.[50]

Pressure on rail capacity and system performance is also becoming more noticeable.[51] [52] The 2019 rail plan notes that, although there have been efforts to expand track mileage and improve corridors, these additions may not keep pace with projected freight demand. As a result, congestion is expected to become more evident along key corridors and at major terminals.[53] Increased traffic volumes also

[45] Tennessee Department of Transportation, *Tennessee Statewide Rail Plan* (Nashville, TN: Tennessee Department of Transportation, 2019), https://www.tn.gov/content/dam/tn/tdot/freight-and-logistics/TDOT_RailPlan_updated_2019.pdf.
[46] Tennessee Department of Transportation, *Tennessee Statewide Multimodal Freight Plan* (Nashville, TN: Tennessee Department of Transportation, 2023), https://www.tn.gov/content/dam/tn/tdot/freight-and-logistics/TDOT_2023_StatewideMultimodalFreightPlan_FullReport_Final,%202023%2005%2030.pdf.
[47] Tennessee Department of Transportation, *Tennessee Statewide Rail Plan*.
[48] Tennessee Department of Transportation, *Tennessee Statewide Multimodal Freight Plan* (Nashville, TN: Tennessee Department of Transportation, 2023), https://www.tn.gov/content/dam/tn/tdot/freight-and-logistics/TDOT_2023_StatewideMultimodalFreightPlan_FullReport_Final,%202023%2005%2030.pdf.
[49] Federal Railroad Administration, "Annual Modal Research Plan FY 2022–2023," U.S. Department of Transportation, Washington, DC, USA, Jul. 2021. [Online]. Available: https://www.transportation.gov/sites/dot.gov/files/2022-02/AMRP%20FY2022-2023%20FRA%20FINAL.pdf
[50] Tennessee Department of Transportation, *Tennessee State Rail Plan Update, 10/30/2025 https://www.tn.gov/content/dam/tn/tdot/freight-and-logistics/FAC%20Rail%20Plan%20K.%20Bucklew.pdf*
[51] Tennessee Department of Transportation, *Tennessee Statewide Rail Plan* (Nashville, TN: Tennessee Department of Transportation, 2019), https://www.tn.gov/content/dam/tn/tdot/freight-and-logistics/TDOT_RailPlan_updated_2019.pdf.
[52] Federal Railroad Administration, "Annual Modal Research Plan, 35
[53] Tennessee Department of Transportation, *Tennessee Statewide Rail Plan,* 35

contribute to faster infrastructure deterioration and greater strain on existing rail assets, potentially affecting overall system reliability. In some cases, this also has implications for how efficient trains can move through busy corridors, especially in areas where activity is already high.

While freight continues to dominate rail activity in Tennessee, there is also a gradual shift in attention toward passenger rail development. The rail plan identifies population growth and changing travel patterns as factors that could increase interest in passenger rail, particularly in urban and intercity corridors.[54] Ongoing corridor studies suggest that, although currently limited, passenger rail may become more relevant in future transportation planning within the state with several new corridor opportunities being examined.[55] [56] This is still developing, but it shows that the system is not entirely static and may evolve depending on future demand and policy direction, as reflected in ongoing federal efforts to develop and advance new intercity passenger rail corridors across the United States.[57] [58]

Beyond these system-specific changes, broader demographic and economic growth trends continue to influence rail activity. Tennessee's growing population and expanding economy contribute to increased demand for both freight movement and transportation services. The rail plan links these factors to rising pressure on the transportation system and the need for continued system expansion and improvement.[59] These underlying conditions provide the context within which all other rail-related trends are occurring.

Another related trend is the gradual shift in workforce composition across the rail industry, particularly as experienced workers approach retirement and new entrants begin to take their place. Federal Railroad Administration (FRA) studies identify the aging workforce and the need for recruitment as key workforce challenges across the industry.[60] [61]

These trends show that rail transportation in Tennessee is becoming more active, more interconnected, and increasingly shaped by both economic growth and technological change. Together, they give a clearer picture of a system that is evolving in scale and complexity, which sets the stage for understanding the workforce implications associated with these changes.

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[54] Tennessee Department of Transportation, *Tennessee Statewide Rail Plan*,
[55] Tennessee Department of Transportation, *Tennessee Statewide Rail Plan*,
[56] Tennessee Department of Transportation, *Tennessee State Rail Plan Update, 10/30/2025* *https://www.tn.gov/content/dam/tn/tdot/freight-and-logistics/FAC%20Rail%20Plan%20K.%20Bucklew.pdf*
[57] Federal Railroad Administration, *Corridor Identification and Development Program*, U.S. Department of Transportation, January 23, 2023, https://www.transportation.gov/rural/grant-toolkit/corridor-identification-and-development-program.
[58] Federal Railroad Administration, *FY2024 Corridor Identification and Development Program: Project Pipeline Report*, U.S. Department of Transportation, 2024, https://railroads.dot.gov/sites/fra.dot.gov/files/2024-04/FY2024%20Corridor%20Identification%20%26%20Development%20Project%20Pipeline%20Report.pdf.
[59] Tennessee Department of Transportation, *Tennessee Statewide Rail Plan*
[60] Federal Railroad Administration, *Railroad Industry Workforce Development Survey Report* (Washington, DC: U.S. Department of Transportation, 2020), https://railroads.dot.gov/sites/fra.dot.gov/files/2020-11/Workforce%20Development%20Survey-A.pdf.
[61] Federal Railroad Administration, *Railroad Industry Modal Profile* (Washington, DC: U.S. Department of Transportation, 2016), https://railroads.dot.gov/sites/fra.dot.gov/files/fra_net/15714/Railroad%20Industry%20Modal%20Profile_final2.pdf.

5. Emerging Industry Workforce Needs

The emerging trends in the rail system show that it is becoming more active, more interconnected, and more complex over time. As freight demand increases, intermodal operations expand, and system pressures grow, the workforce supporting rail transportation in Tennessee will need to adapt accordingly. These changes are not only regarding the number of workers required but also the types of skills, training, and roles needed to support the evolving system.[62] [63]

One of the most immediate needs is related to supporting increased freight activity across the rail network. As rail volumes continue to grow, there will be greater demand for workers involved in train operations, yard management, dispatching, and equipment handling. The expansion of freight movement also places additional pressure on infrastructure, which increases the need for workers involved in track inspection, maintenance, and repair. Maintaining reliable operations under higher levels of use requires a workforce that can respond quickly to both operational and infrastructure-related challenges. The continued growth of intermodal transportation and logistics systems also introduces new workforce requirements. As rail becomes more integrated with trucking, warehousing, and distribution systems, there is an increasing need for workers who understand how these systems connect. This includes roles in terminal operations, freight coordination, and logistics planning. The ability to manage the movement of goods across multiple transportation modes is increasingly an important part of rail-related work, particularly in major hubs such as Memphis.[64]

The pressure on rail capacity and system performance also adds another layer to this. As congestion becomes more common along key corridors, there is a growing need for workers in areas such as engineering, planning, and infrastructure development.[65] [66] These roles are important for identifying system constraints, improving capacity, and keeping rail operations reliable even as demand continues to increase.[67]

Passenger rail is still limited in Tennessee, but there is some indication that it may become more relevant over time. The Tennessee Statewide Rail Plan points out that current passenger services are minimal, while also noting corridor-level interest driven by population growth and changing travel patterns.[68] If any level of expansion happens, it would introduce a different side of rail operations

[62] Tennessee Department of Transportation, *Tennessee Statewide Rail Plan* (Nashville, TN: Tennessee Department of Transportation, 2019), https://www.tn.gov/content/dam/tn/tdot/freight-and-logistics/TDOT_RailPlan_updated_2019.pdf.
[63] Tennessee Department of Transportation, *Tennessee Statewide Multimodal Freight Plan* (Nashville, TN: Tennessee Department of Transportation, 2023), https://www.tn.gov/content/dam/tn/tdot/freight-and-logistics/TDOT_2023_StatewideMultimodalFreightPlan_FullReport_Final,%202023%2005%2030.pdf.
[64] Tennessee Department of Transportation, *Tennessee Statewide Multimodal Freight Plan* (Nashville, TN: Tennessee Department of Transportation, 2023), https://www.tn.gov/content/dam/tn/tdot/freight-and-logistics/TDOT_2023_StatewideMultimodalFreightPlan_FullReport_Final,%202023%2005%2030.pdf.
[65] Tennessee Department of Transportation, *Tennessee Statewide Rail Plan* (Nashville, TN: Tennessee Department of Transportation, 2019), https://www.tn.gov/content/dam/tn/tdot/freight-and-logistics/TDOT_RailPlan_updated_2019.pdf.
[66] Federal Railroad Administration, *Annual Modal Research Plan FY2022–2023* (Washington, DC: U.S. Department of Transportation, 2022), https://www.transportation.gov/sites/dot.gov/files/2022-02/AMRP%20FY2022-2023%20FRA%20FINAL.pdf.
[67] Tennessee Department of Transportation, *Tennessee Statewide Rail Plan*,
[68] Tennessee Department of Transportation, *Tennessee Statewide Rail Plan*,

beyond freight. Passenger services typically require more coordination, scheduling, and safety oversight, especially where they operate on shared infrastructure. So even though the system is still freight-dominated, this gradual shift suggests that the workforce may need to extend into areas that are not as prominent today.

At the same time, technology is becoming harder to ignore. Rail operations are increasingly tied to advanced signaling systems, communication networks, and data-driven processes, and this is already changing how work is done. The FRA points to workforce challenges linked to these changes, particularly around training and skill development, as new technologies continue to be introduced.[69] In simple terms, the work is not the same as it used to be. There is more reliance on technical systems, and that means workers are expected to be more comfortable with them. Alongside this, there is also the issue of workforce replacement. As experienced workers retire, industry must find ways to bring in new people, and that has not always been straightforward. Recruitment and retention are being discussed as ongoing concerns within the state, mirroring that of the national level.[70]

These trends point to a broader need to strengthen how the Tennessee rail workforce is developed. There is growing emphasis on training programs, education, and partnerships with universities and training institutions to prepare workers for these changing roles.[71] Without that kind of structure, it becomes difficult to keep up with what the system is demanding. When taken in sum, freight growth, intermodal expansion, infrastructure pressure, and increasing technology capabilities, it is clear the workforce requirements are shifting. It is not just about having more workers but having people who can handle a system that is gradually becoming more complex.

[69] Federal Railroad Administration, *Annual Modal Research Plan FY2022–2023* (Washington, DC: U.S. Department of Transportation, 2022), https://www.transportation.gov/sites/dot.gov/files/2022-02/AMRP%20FY2022-2023%20FRA%20FINAL.pdf.
[70] Federal Railroad Administration, *Annual Modal Research Plan FY2022–2023* (Washington, DC: U.S. Department of Transportation, 2022), https://www.transportation.gov/sites/dot.gov/files/2022-02/AMRP%20FY2022-2023%20FRA%20FINAL.pdf.
[71] Federal Railroad Administration, *Annual Modal Research Plan FY2022–2023* (Washington, DC: U.S. Department of Transportation, 2022), https://www.transportation.gov/sites/dot.gov/files/2022-02/AMRP%20FY2022-2023%20FRA%20FINAL.pdf.

6. Education and Training Sources

Overview of Tennessee's Education System

Education in Tennessee is organized across multiple levels, beginning with K–12 schools and extending through community colleges, technical colleges, and universities. The system is designed to serve both academic and applied learning needs, with institutions offering a range of programs from foundational education to advanced degrees. These institutions provide broad access to education and training opportunities, with programs delivered across both urban and rural areas of Tennessee.[72] [73]

Pre-Secondary Education

Public K–12 education in Tennessee is delivered through a statewide network of school districts serving students across both urban and rural communities. As of the 2023–2024 academic year, the state enrolls over 1 million students in more than 1,800 public schools across approximately 147 school districts.[74] Larger school systems are concentrated in metropolitan areas such as Memphis (Shelby County Schools), Nashville (Metro Nashville Public Schools), Knox County, and Hamilton County, while smaller districts serve less densely populated rural areas.

School districts operate with local governance, but within a framework set by the Tennessee Department of Education. The department establishes academic standards, oversees statewide assessments (TNReady), manages teacher licensure, and administers federal and state funding programs. It also maintains statewide data systems used to track student achievement and school performance.[75] This structure allows for local flexibility while ensuring consistency in educational standards across the state.

Post-Secondary Education

At the postsecondary level, Tennessee's public education system includes universities, community colleges, and technical colleges that together serve a large and diverse student population. The state's higher education system is organized under a statewide coordinating body, the Tennessee Higher Education Commission. The system is governed under several other entities, including the Tennessee Board of Regents (TBR), the University of Tennessee Board of Trustees, and six Locally Governed Institution (LGI) boards. The TBR manages 13 community colleges and 24 Tennessee Colleges of Applied Technology (TCAT) campuses, which provide associate degrees, technical diplomas, and workforce-focused training programs across multiple locations statewide.[76] The UT and LGI boards oversee the public universities across the state.

[72] Tennessee Board of Regents, *The College System of Tennessee*, accessed 2026. Available: https://www.tbr.edu
[73] Tennessee Department of Education, *Overview of Public Education in Tennessee*, accessed 2026. Available: https://www.tn.gov/education
[74] Tennessee Department of Education, *Tennessee Education Data and School Directory*, 2024. Available: https://www.tn.gov/education
[75] Tennessee Department of Education, *About the Tennessee Department of Education*, 2024. Available: https://www.tn.gov/education/about-tdoe.html
[76] Tennessee Board of Regents, *The College System of Tennessee*, accessed 2026. Available: https://www.tbr.edu

This structure allows Tennessee to offer a wide range of educational opportunities, from short-term technical training to advanced graduate education, with institutions distributed across different regions of the state. For this reason, students have access to multiple entry and exit points within the system, whether they pursue direct workforce training, transfer pathways into four-year programs, or a combination of both.[77]

Structure of Tennessee's Postsecondary System

Tennessee's universities, community colleges, and technical colleges are distributed across the state, providing a broad range of academic and workforce-oriented programs. There are 44 public institutions in total, serving more than 200,000 undergraduate students.[78] The University of Tennessee (UT) system includes multiple campuses, with the UT, Knoxville serving as its R1 flagship and land-grant campus. The system also includes the Chattanooga, Martin, and Southern (Pulaski) campuses, as well as the UT Health Science Center with its primary medical campus in Memphis.[79] Universities with LGI boards include the University of Memphis, Middle Tennessee State University, Tennessee Technological University, East Tennessee State University, Tennessee State University, and Austin Peay State University. These institutions offer a wide range of undergraduate and graduate programs across the state, with the University of Memphis also serving as an R1 research institution. The universities in the Tennessee system offer undergraduate and graduate programs in fields such as engineering, agriculture, business, and logistics, along with a variety of liberal arts disciplines.

The TBR oversees a separate system that includes 36 public community and technical colleges. Community colleges primarily provide associate degrees and transfer pathways into four-year institutions. TCAT campuses focus on technical diplomas and certificates that emphasize practical, workforce-ready skills.[80] Table 2 through Table 5 list the Tennessee public institutes of higher education and Figure 7 shows their spatial distribution across the state.

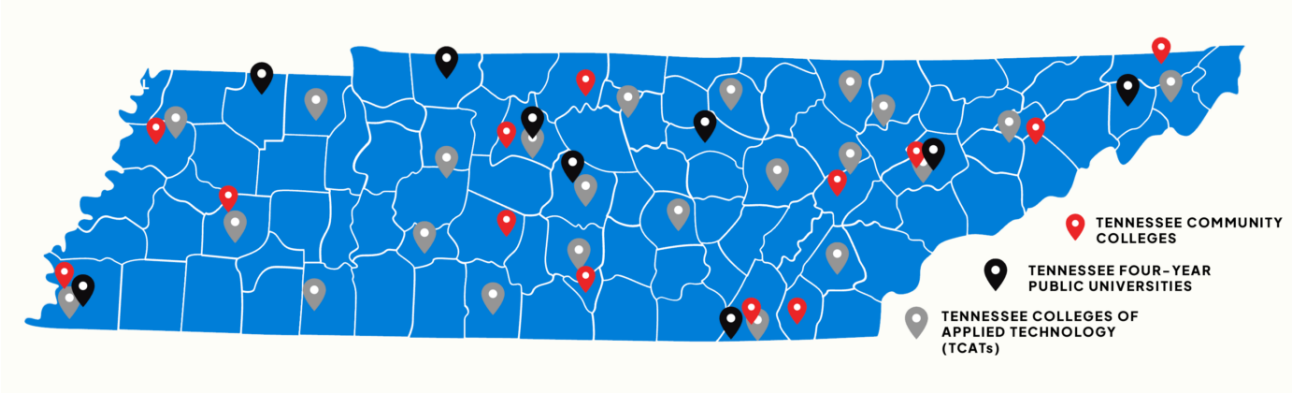


Figure 7. Spatial Distribution of Colleges and Universities in Tennessee. (Source: https:// tnscore.org/resources/higher-ed-data)

[77] Tennessee Higher Education Commission, *Overview of Higher Education in Tennessee*, 2024. Available: https://www.tn.gov/thec
[78] State Collaborative on Reforming Education, *2024 Higher Ed By the Numbers*, 2024. Available: https://tnscore.org/assets/documents/2024-HigherED-BY-THE-NUMBERS-2.pdf
[79] University of Tennessee System, *Campuses and Structure*, 2024. Available: https://www.tennessee.edu
[80] Tennessee Higher Education Commission, *Overview of Higher Education in Tennessee*, 2024. Available: https://www.tn.gov/thec

Table 2. University of Tennessee System Institutions

Institution	Type	Location
University of Tennessee, Knoxville	Public, 4-Year (Flagship, Land-Grant)	Knoxville
University of Tennessee at Chattanooga	Public, 4-Year	Chattanooga
University of Tennessee at Martin	Public, 4-Year	Martin
University of Tennessee Southern	Public, 4-Year	Pulaski

Table 3. Locally Governed Universities in Tennessee.

Institution	Type	Location
University of Memphis	Public, 4-Year (Research University)	Memphis
East Tennessee State University	Public, 4-Year	Johnson City
Middle Tennessee State University	Public, 4-Year	Murfreesboro
Tennessee State University	Public, 4-Year (HBCU, Land-Grant)	Nashville
Tennessee Technological University	Public, 4-Year	Cookeville
Austin Peay State University	Public, 4-Year	Clarksville

Table 4. Tennessee Board of Regents – Community Colleges

Institution	Type	Location
Chattanooga State Community College	Public, 2-Year	Chattanooga
Cleveland State Community College	Public, 2-Year	Cleveland
Columbia State Community College	Public, 2-Year	Columbia
Dyersburg State Community College	Public, 2-Year	Dyersburg
Jackson State Community College	Public, 2-Year	Jackson
Motlow State Community College	Public, 2-Year	Tullahoma
Nashville State Community College	Public, 2-Year	Nashville
Northeast State Community College	Public, 2-Year	Blountville
Pellissippi State Community College	Public, 2-Year	Knoxville
Roane State Community College	Public, 2-Year	Harriman

Southwest Tennessee Community College	Public, 2-Year	Memphis
Volunteer State Community College	Public, 2-Year	Gallatin
Walters State Community College	Public, 2-Year	Morristown

Table 5. Tennessee Colleges of Applied Technology (TCAT System)

Institution	Type	Location
TCAT Nashville	Public, Technical College	Nashville
TCAT Memphis	Public, Technical College	Memphis
TCAT Knoxville	Public, Technical College	Knoxville
TCAT Chattanooga	Public, Technical College	Chattanooga
TCAT Murfreesboro	Public, Technical College	Murfreesboro
TCAT Jackson	Public, Technical College	Jackson
TCAT Dickson	Public, Technical College	Dickson
TCAT Pulaski	Public, Technical College	Pulaski
TCAT Elizabethton	Public, Technical College	Elizabethton
TCAT Livingston	Public, Technical College	Livingston
TCAT McMinnville	Public, Technical College	McMinnville
TCAT Covington	Public, Technical College	Covington
TCAT Hartsville	Public, Technical College	Hartsville
TCAT Crump	Public, Technical College	Crump
TCAT Shelbyville	Public, Technical College	Shelbyville
TCAT Ripley	Public, Technical College	Ripley
TCAT Oneida/Huntsville	Public, Technical College	Huntsville

Career and Technical Education in Tennessee

In Tennessee, Career and Technical Education (CTE) programs are organized around major industry areas such as transportation, construction, advanced manufacturing, and STEM. These programs are designed to connect classroom instruction with practical applications, helping students develop relevant skills while also gaining an understanding of potential career paths.[81] The Tennessee Council for Career and Technical Education oversees postsecondary programs while the Tennessee Department of Education's Division of Postsecondary, Workforce, CTE and Military Readiness focuses on K-12 programs across the state.

Enrollment in CTE programs in Tennessee is substantial, with nearly 11% of postsecondary students attending TCAT programs and a large share of secondary students participating in at least one CTE course each year. Many of these programs include opportunities for industry-recognized certifications,

[81] University of Tennessee System, *Campuses and Structure*, 2024. Available: https://www.tennessee.edu

work-based learning experiences, and participation in Career and Technical Student Organizations (CTSOs), which provide additional avenues for practical skill development and career exploration.[82] For K-12, CTE programs are delivered at the local school district level, which means availability can vary across the state. Larger school systems, particularly in urban areas, are typically able to offer a wider range of programs, while smaller or rural districts may focus on a limited number of pathways or combine related areas to align with local workforce needs and available resources.

Post-Secondary Engineering and Technical Training Pathways

Postsecondary training and education in Tennessee include a wide range of programs offered through universities, community colleges, and technical institutions that support infrastructure, transportation, and related industries. These programs range from bachelor's and advanced degrees to associate-level and certificate programs that combine classroom instruction with practical training. In engineering and technical fields, universities offer degrees in areas such as civil engineering, mechanical engineering, and related disciplines that support infrastructure design and system operations.

Community colleges provide pathways such as the Associate of Science (A.S.) degree, which is more academically oriented and often used for transfer into four-year programs, and the Associate of Applied Science (A.A.S.) degree, which focuses on practical, career-oriented training in fields such as engineering technology and construction. Technical institutions, particularly the TCAT, offer shorter-term certificates and diplomas that emphasize applied skills and direct workforce entry. While most of these programs are not labeled specifically as rail-focused, they provide the foundational technical and analytical skills needed to support rail operations and related sectors.[83] [84] Specific engineering programs relevant for the rail industry are listed in Table 6.

Table 6. Engineering Education Programs in Tennessee.

Program Category	Degree / Credential	Typical Institutions
Civil Engineering	B.S., M.S., PhD	University of Tennessee (Knoxville, Chattanooga), University of Memphis, Tennessee Technological University, Tennessee State University (BS only)
Engineering Technology	B.S., A.A.S., Certificates	Tennessee Technological University, University of Memphis, Community Colleges, TCAT
Pre-Engineering Pathways	A.A.S.	Community Colleges (TBR system)
General Engineering	B.S., M.S.	University of Tennessee Martin (BS), Tennessee State University (MS)

[82] University of Tennessee System, *Campuses and Structure*, 2024. Available: https://www.tennessee.edu
[83] Tennessee Board of Regents, *The College System of Tennessee*, accessed 2026. Available: https://www.tbr.edu
[84] Tennessee Department of Education, *Overview of Public Education in Tennessee*, accessed 2026. Available: https://www.tn.gov/education

Mechanical / Industrial Engineering or Technology	B.S., A.A.S., Certificates	Universities, TCAT
Construction Engineering / Management	B.S., A.A.S., Certificates	Universities, Community Colleges, TCAT
Electrical / Computer Engineering	B.S.	University of Tennessee (Knoxville, Chattanooga), University of Memphis, Tennessee Technological University, Tennessee State University (BS only)

Mechanical and Equipment-Based Training

Mechanical and equipment-based training is available through several TCAT. These programs are mostly hands-on and are designed for students who want to move directly into technical work. For example, TCAT Nashville offers Diesel Powered Equipment Technology, with credentials ranging from certificates to a diploma, and the program covers troubleshooting, engine analysis, disassembly, and repair of diesel-powered equipment. TCAT Memphis and TCAT Dickson also list diesel-related programs, with TCAT-Dickson noting National Institute for Automotive Service Excellence/ National Automotive Technicians Education Foundation (ASE/NATEF) accreditation areas such as diesel engines, brakes, electrical/electronics, suspension and steering, drive trains, preventive maintenance, hydraulics, and HVAC (Heating, Ventilation, and Air Conditioning).[85] Table 7 gives a summary of the programs and the institutions that have them in the state.

Table 7. Mechanical, Diesel, and Industrial Maintenance Programs

Topic / Program	Institutions	Credentials / Degree Type	Focus
Diesel Powered Equipment Technology	TCAT Nashville	Certificate, Diploma	Diesel equipment repair, troubleshooting, and engine analysis
Diesel Powered Equipment Technology	TCAT Memphis	Certificate, Diploma	Diesel service technician and mechanic preparation
Diesel Powered Equipment Technology	TCAT Dickson	Certificate, Diploma	Commercial vehicle diesel systems; ASE/NATEF-accredited areas
Industrial Maintenance	TCAT Jackson	Certificate, Diploma	Maintenance technician training using classroom and shop equipment

[85] Tennessee College of Applied Technology Nashville, "Diesel Powered Equipment Technology," accessed 2026. Available: https://tcatnashville.edu/programs/diesel-powered-equipment-technology

Industrial Maintenance / Mechatronics	TCAT Nashville	Certificate, Diploma	Electronics, pneumatics, hydraulics, motor controls, PLCs, robotics

Construction and Infrastructure Training

Construction and civil-related training are available at both technical and university levels. TCAT Nashville offers Building Construction Technology, which covers basic construction skills and supports certification in trades such as carpentry, electrical, plumbing, and masonry. At the university level, multiple institutions across the state offer civil engineering programs as shown in Table 8. Additionally, there are multiple construction programs across a range of institution types, as shown in Table 9.[86] [87]

Table 8. Universities that offer Civil Engineering and Construction related programs

Program	Degree / Credential Type	No. of Institutions
Civil Engineering	B.S., M.S., PhD	5
Construction Engineering / Management / Leadership	Certificate, B.S., M.S., PhD	5
Construction Management	B.S., M.S., PhD	1

Table 9. Community Colleges and TCATs offering Construction and Infrastructure Training Programs in Tennessee.

Program	Degree / Credential Type	No. of Institutions
Civil and Construction Engineering Technology	A.A.S.	1
Construction Engineering Technology (option within Engineering Technology)	A.A.S.	1
Concrete Technology / Concrete Management (transfer pathway)	A.A.S., A.S.	1
Building Construction Technology	Diploma, Certificate	5

Welding, Fabrication, and Industrial Skills

Welding training is also well represented across TCAT campuses. TCAT Jackson's Welding Technology program covers shielded metal arc welding (SMAW), Metal Inert Gas (MIG) welding, Tungsten Inert Gas (TIG) welding, flux-core welding, flame cutting, and plasma arc cutting. TCAT Nashville also provides welding training aimed at certification, covering common welding and cutting processes. TCAT Memphis lists a 12-month welding program that includes classroom instruction,

[86] Tennessee College of Applied Technology Nashville, "Building Construction Technology," accessed 2026. Available: https://tcatnashville.edu/programs/building-construction-technology

[87] University of Memphis, "Civil, Construction, and Environmental Engineering," accessed 2026. Available: https://www.memphis.edu/ce/future-students/

shop experience, blueprint reading, cutting, and fabrication, and identifies the program as American Welding Society certified.[88] Table 10 below shows the various institutions and the Welding and Fabrication programs in the state.

Table 10. Welding and Fabrication Programs in Tennessee.

Topic / Program	Institutions	Credentials / Degree Type	Focus
Welding Technology	TCAT Jackson	Certificate, Diploma	SMAW, MIG, TIG, flux-core welding, and cutting processes
Welding Technology	TCAT Nashville	Certificate, Diploma	Welding theory, equipment, techniques, and certification preparation
Welding Technology	TCAT Memphis	Certificate, Diploma	Welding, blueprint reading, cutting, fabrication; AWS-certified program

Heavy Equipment Training

Heavy equipment training is available at TCAT Memphis through the Heavy Equipment Technology program. The program covers engines, fuel systems, electrical systems, transmissions, hydraulics, drivelines, suspension, steering, brake systems, and HVAC. TCAT Memphis lists the program as a 20-month, 2,160-hour program with certificate and diploma options as captured in Table 11 below.[89]

Table 11. Heavy Equipment Training in Tennessee

Topic / Program	Institution	Credentials / Degree Type	Focus
Heavy Equipment Technology	TCAT Memphis	Certificate, Diploma	Heavy equipment repair, hydraulics, power train, brakes, HVAC

Logistics, Transportation and Supply Chain Programs

Tennessee also has verified university programs in freight and supply chain fields. The University of Memphis offers a Graduate Certificate in Freight Transportation, described as a 15-credit-hour program for students with science or engineering backgrounds, with coursework connected to supply chain and logistics, maritime transportation, and rail transportation. Middle Tennessee State University offers a B.B.A. in Supply Chain Management, focused on the movement and coordination of goods, and an online M.S. in Supply Chain Management, with career preparation in planning,

[88] Tennessee College of Applied Technology Jackson, "Industrial Maintenance," accessed 2026. Available: https://tcatjackson.edu/programs/industrial-maintenance

[89] Tennessee College of Applied Technology Memphis, "Heavy Equipment Technology," accessed 2026. Available: https://tcatmemphis.edu/programs/heavy-equipment-technology

sourcing/logistics, manufacturing, continuous improvement, and inventory planning.[90] [91]. Table 12 through Table 14 show the number of universities, community colleges and TCAT institutions that offer the programs in Tennessee.

Table 12. Universities offering Logistics, Transportation and Supply Chain Programs in Tennessee.

Standardized Program Area	Credential or Degree Type	No. of Institutions
Supply Chain Management / Logistics / Logistics, Materials, and Supply Chain Management	B.B.A. / B.S.	8
Graduate Supply Chain Management	M.S. / MBA	3
Freight Transportation / Intermodal Freight	Graduate Certificate	1

Table 13. Community Colleges offering Logistics, Transportation and Supply Chain Programs in Tennessee.

Standardized Program Area	Credential or Degree type	No. of Institutions
Supply Chain Management Transfer Pathway	A.S.	11
Logistics / Supply Chain Technical Certificate or Applied Program	Certificate	4
Operations / Logistics Support Programs	Certificate	2

Table 14. TCAT institutions offering Logistics, Supply Chain and Transportation related programs.

Standardized Program Area	Program focus	No. of TCAT institutions
Transportation, Distribution, Warehousing, and Logistics	Transportation, Distribution, Warehouse/Warehousing, and Logistics	1
Transportation, Distribution, and	Transportation, Distribution, and Logistics	1

[90] University of Memphis, "Graduate Certificate in Freight Transportation," accessed 2026. Available: https://www.memphis.edu/ce/future-students/cert-freight.php
[91] Middle Tennessee State University, "Supply Chain Management, B.B.A.," accessed 2026. Available: https://www.mtsu.edu/program/supply-chain-management-b-b-a/

Logistics		
Freight Forwarding and Supply Chain Logistics	Essentials of Freight Forwarding and Supply Chain Logistics	2
Distribution and Logistics Management	Distribution and Logistics Management	1
Truck Driving / CDL Training	Truck Driving; CDL preparation	14

Information Technology, Cybersecurity and System Training

Information technology and cybersecurity training are also available through technical institutions. TCAT Nashville offers Computer Operating Systems, Networking and Cybersecurity, with training in computer/network servicing and cybersecurity fundamentals, and credentials including certificates and a diploma. TCAT Memphis offers Computer Information Technology, covering computer hardware, networks, firewalls, cybersecurity, workstations, servers, and network infrastructure, with credentials ranging from certificates to diplomas.[92] [93] Table 15, Table 16, and Table 17 capture the number of institutions offering information technology and cyber security programs in Tennessee.

Table 15. Universities in Tennessee with Information Technology and Cyber Security programs.

Standardized Program Name	Degree / Credential Type	No. of Institutions
Cybersecurity / Cyber Defense	B.S., M.S., MBA (concentration), Certificate	15
Information Systems / Information Technology	B.S., B.B.A.	11
Computer Science (with cybersecurity/networking/systems components)	B.S.	19
IT / Cybersecurity Graduate Programs	M.S., MBA concentration	3

Table 16. Community Colleges with Information and Cyber Security Programs in Tennessee.

Standardized Program Name	Degree / Credential Type	No. of Institutions
Cybersecurity / Cyber Defense	A.A.S., Certificate	13
Information Systems (Transfer Pathway)	A.S.	13
Computer Science (Transfer Pathway)	A.S.	9
Computer Information Technology (CIT) / Networking / Systems Administration	A.A.S., Certificate	13

[92] Tennessee College of Applied Technology Nashville, "Computer Operating Systems, Networking and Cybersecurity," accessed 2026. Available: https://tcatnashville.edu/programs/computer-information-technology
[93] Tennessee College of Applied Technology Memphis, "Computer Information Technology," accessed 2026. Available: https://tcatmemphis.edu/programs/computer-information-technology-0

Table 17. TCATs offering Information Technology and Cyber Security Programs.

Standardized Program Name	Degree / Credential Type	No. of Institutions
Computer Information Technology / Computer Information Systems	Diploma, Certificate	14
Network Security / Cyber Defense Support	Diploma, Certificate	12
IT Support / Systems Support	Diploma, Certificate	13
Network Infrastructure / Cloud / Enterprise Systems	Diploma, Certificate	11
Cybersecurity Certification / Bootcamp Training	Short-term Certificate	1

Manufacturing, Machining, CAD and Mechatronics Training

Manufacturing, machining, and computer-aided design (CAD) programs form a key part of Tennessee's technical training system. Within the TCAT system, institutions such as Tennessee Colleges of Applied Technology Memphis offer Machine Tool Technology programs covering blueprint reading, precision measurement, and Computer Numerical Control (CNC) operations, while TCAT Nashville provides both machining and CAD-related training.[94]

In parallel, Tennessee offers training in mechatronics and advanced manufacturing systems, which focus on automation, robotics, and integrated mechanical and electrical systems. Universities such as Middle Tennessee State University and East Tennessee State University provide engineering-level education, while community colleges and TCAT institutions offer applied programs in mechatronics, industrial maintenance, and automation.[95] [96] These program areas support workforce development across both traditional manufacturing processes and modern automated production systems, as summarized in Table 18 through Table 20.

Table 18. Universities offering Mechatronics and Advanced Manufacturing programs.

Program	Degree / Credential Type	No. of Institutions
Mechatronics Engineering	B.S, M.S.	3
Mechatronics / Engineering Technology (Mechatronics-related)	B.S.	2
Mechanical Engineering (Mechatronics / Robotics concentration)	B.S, M.S, PhD	1

[94] Tennessee Colleges of Applied Technology Memphis, *Machine Tool Technology Program*; Tennessee Colleges of Applied Technology Nashville, *Programs of Study*. Available: https://tcatnashville.edu/
[95] Middle Tennessee State University, *Mechatronics Engineering, B.S.*; East Tennessee State University, *Mechatronics Engineering Program*. Available: https://www.mtsu.edu/program/mechatronics-engineering-b-s/; https://www.etsu.edu
[96] Southwest Tennessee Community College, *Mechatronics Technology Program*; Tennessee Colleges of Applied Technology Nashville, *Industrial Maintenance/Mechatronics Program*. Available: https:// tcatnashville.edu/

Advanced Manufacturing / Industrial Technology (Automation-focused)	B.S.	1

Table 19. Community Colleges offering Manufacturing, CAD and Mechatronics

Program	Degree / Credential Type	No. of Institutions
Mechatronics Technology / Mechatronics	A.A.S., Certificate	4
Industrial Automation and Robotics	A.A.S., Certificate	1
Engineering Systems Technology (Mechatronics specialization)	A.A.S.	1
CAD / Drafting Technology	A.A.S., Certificate	4

Table 20. TCATs offering Technical Manufacturing, Machining & Mechatronics Training

Program	Degree / Credential Type	No. of Institutions
Machine Tool Technology (Machining / CNC)	Diploma, Certificate	3
CAD Technology	Diploma, Certificate	2
Industrial Maintenance / Mechatronics	Diploma, Certificate	5
Mechatronics (Standalone Program)	Diploma, Certificate	1
Industrial Maintenance Automation	Diploma, Certificate	1
Industrial Electrical / Control Systems	Diploma, Certificate	4

For Table 20 above, counts reflect only programs with directly verifiable listings from institutional program pages. Additional campuses may offer similar programs under different titles but are not included.

Rail-Specific Education and Training

Rail-specific education and training opportunities in Tennessee are primarily concentrated at the University of Tennessee, Knoxville, which offers specialized railroad training programs through its Center for Transportation Research (CTR).[97] These programs provide direct, industry-focused training in areas such as track inspection, track design, and railroad safety. The other institutions in the state incorporate rail-related content within broader Civil and Transportation Engineering programs. The Table 21 below highlights the various institutions in Tennessee and the programs available.

[97] University of Tennessee, Knoxville, *Railroad Education and Training*, Center for Transportation Research, accessed March 2026, https://ctr.utk.edu/training/railroad-education-training/

Table 21. Institutions providing Rail-related Education and Training in Tennessee

Institution	Program Type	Degree / Certificate	Link
University of Tennessee Knoxville (UTK)	Center for Transportation Research (CTR) – Railroad Training (Track Inspection, Design, Bridge Inspection, Maintenance)	Professional Certificate / Continuing Education	CTR Railroad Training - Tennessee Transportation Assistance Program
University of Tennessee Knoxville (UTK)	Railroad Education & Training (FRA-aligned programs, industry training courses)	Professional Development (PDHs / Non-degree)	Railroad Education & Training - Center for Transportation Research
University of Memphis	Graduate Certificate in Freight Transportation	Graduate Certificate	https://www.memphis.edu/ce/future-students/cert-freight.php
Tennessee Colleges of Applied Technology Knoxville	Essentials of Freight Forwarding and Supply Chain Logistics	Professional Certificate / Workforce Training	https://onlinetraining.tcatknoxville.edu/training-programs/essentials-of-freight-forwarding-and-supply-chain-logistics/
Tennessee Colleges of Applied Technology Northwest	Certified Supply Chain Professional – Freight Broker / Agent Training	Professional Certificate / Workforce Training	https://onlinetraining.tcatnorthwest.edu/training-programs/certified-supply-chain-professional-freight-broker-agent-training/

7. Local Career Pathways

Local career pathways in Tennessee are supported through a combination of CTE, dual enrollment, work-based learning, technical training institutions, and registered apprenticeship systems. These pathways provide multiple entry points into the workforce, allowing individuals to move from secondary education into postsecondary training and employment through a mix of classroom instruction and practical experience.

At the secondary level, CTE serves as the primary entry point into career pathways. Across Tennessee, more than 100,000 students participate in CTE programs annually, with many completing advanced coursework in specific career areas.[98] High schools across the state offer students an opportunity for career-connected learning through CTE programs. The Tennessee Department of Education's Division of Postsecondary, Workforce, CTE, and Military Division sets goals for the state's high school graduates pertaining to academic and career pathway readiness that include providing opportunities for students to earn industry-recognized credentials, experience hands-on and work-based learning for credit, and choose programs of study within a wide range of industry focus areas.

While there are no rail-specific career clusters, there are several with rail-relevant programs of study, including:[99]

- Construction (architecture and engineering design, mechanical and electrical systems, structural systems)
- Supply Chain and Transportation (logistics, automotive maintenance)
- Digital Technology (cyber security, networking)
- Civic, Public Service and Safety (law enforcement, emergency management, legal services)
- Advanced Manufacturing (Advanced STEM, engineering, robotics technology, welding)

Dual Enrollment and Early College Pathways

Tennessee supports early-career entry through dual-enrollment programs that allow high school students to earn postsecondary credits. These programs allow students to begin technical or academic pathways early, often while still in high school, through structured dual enrollment opportunities. By earning postsecondary credits in advance, students can reduce the time required to enter the workforce while gaining exposure to college-level coursework. In addition, these pathways create a smoother transition into postsecondary education by aligning high school programs with community college, technical training, and university systems, making it easier for students to continue their education without gaps or duplication of coursework.[100] [101] In addition to the programs listed in Table 22, all of

[98] Advance CTE, *Tennessee State Profile*, 2024. Available: https://carrertech.org/state-profile/tennessee/
[99] Tennessee Department of Education, *Future Ready Tennessee*, accessed March 2026, https://futureready.tnedu.gov/home.
[100] Tennessee Department of Education, *Career and Technical Education Programs*, 2024. Available: https://www.tn.gov/education
[101] Tennessee Student Assistance Corporation, *Dual Enrollment*, 2024. Available: https://www.tn.gov/tsac

the 4-year public institutions in the state offer dual enrollment opportunities in a range of programs as well.

Table 22. Dual Enrollment and Early College Pathways in Tennessee

Program	Institution / Provider	Opportunity Type	Link
Dual Enrollment Grant Program	Tennessee Student Assistance Corporation	Free/low-cost college credits for HS students	https://www.tn.gov/tsac
TCAT Dual Enrollment	Tennessee Colleges of Applied Technology	Early technical training and diploma pathways	https://www.tcat.edu
Community College Dual Enrollment	TBR Community Colleges	Transferable academic credits	https://www.tbr.edu

Work-Based Learning and Internship Opportunities

Work-based learning (WBL) and internship opportunities in Tennessee are supported through structured partnerships between schools, state agencies, and industry partners, ensuring that students gain direct exposure to real work environments. The Tennessee Department of Education coordinates these efforts through its statewide WBL framework, which requires schools to partner with local employers to provide supervised, credit-bearing work experiences aligned with students' programs of study. For example, community colleges such as Volunteer State Community College offer formal WBL programs that connect students with regional employers for internships and applied projects tied to coursework.[102] [103]

At the K–12 level, school districts collaborate directly with local businesses to place students in internships, cooperative (co-op) positions, and career practicum experiences, often through CTE capstone courses. In addition, regional workforce organizations such as the Greater Memphis Chamber support employer engagement by connecting schools with industry partners through workforce development initiatives and educator externships.[104] These efforts help align classroom instruction with current industry needs and ensure that work-based learning remains an integrated part of the education system, linking students more directly to employment opportunities.[105]

Community Colleges and universities also offer students an opportunity to earn credit for work experiences. These programs are structured in a variety of ways, such as through formal internship courses or co-op opportunities. Many institutions also offer credit for experience that is documented

[102] Tennessee Department of Education, *Work-Based Learning Framework and Programs*, 2024. Available: https://wbl.tnedu.gov
[103] Volunteer State Community College, *Work-Based Learning Program*, accessed 2026. Available: https://www.volstate.edu/workforce/work-based-learning
[104] Greater Memphis Chamber, *Teacher Externship Program*, accessed 2026. Available: https://memphischamber.com/workforce-development/teacher-externship-program
[105] Tennessee Department of Education, *Work-Based Learning Framework and Programs*, 2024. Available: https://wbl.tnedu.gov

through portfolios of student work and review by relevant experts. Table 23 captures the WBL and internship opportunities in the state.

Table 23. Work-Based Learning and Internship Opportunities in Tennessee.

Program	Institution / Organization	Type of Opportunity	Link
Work-Based Learning (WBL) Program	Tennessee Department of Education	Internships, co-ops, and job shadowing	https://wbl.tnedu.gov
Career Practicum (CTE Capstone)	Tennessee High Schools	Credit-based internships	https://www.tn.gov/education
Work-Based Learning Program	Community colleges and universities	Internships and employer projects	See specific institution websites

Technical Training and On-The-Job Skills Development

Technical training and on-the-job skills development in Tennessee are supported primarily through the TCAT system, which provides practical, hands-on training aligned with workforce needs. TCAT programs offer training in areas such as welding, electrical systems, mechanical technology, diesel equipment, and industrial maintenance, and are delivered as short-term diplomas and certificates designed for direct workforce entry as summarized in Table 24. Training is largely applied, using lab-based instruction and industry-standard equipment, and is often aligned with employer needs through partnerships that support job placement and skill development. This structure allows students to transition more efficiently from training into employment while meeting the technical demands of local industries.[106] [107]

Table 24. Technical and On-the-job skills Development programs in Tennessee.

Program Area	Institution	Type of Training	Link
Welding, Electrical, Mechanical	TCAT (Statewide)	Diploma / Certificate	https://www.tcat.edu
Diesel Technology	TCAT Nashville / Memphis	Hands-on technical training	https://tcatnashville.edu
Industrial Maintenance	TCAT Jackson	Workforce training	https://tcatjackson.edu

Apprenticeships and Earn-and-Learn Pathways

Apprenticeships and earn-and-learn pathways in Tennessee are delivered through Apprenticeship Tennessee, a statewide initiative led by the Tennessee Department of Labor and Workforce

[106] Tennessee Board of Regents, *Colleges of Applied Technology Overview*, 2024.
Available: https://https://www.tbr.edu/institutions/colleges-applied-technology
[107] Tennessee College of Applied Technology, *Programs and Workforce Training Mission*, 2024.
Available: https://tcatjackson.edu/student-handbook/?page-id=4956

Development that works directly with employers to design and implement registered apprenticeship programs. These programs are federally recognized and combine structured on-the-job training (OJT) with classroom instruction, allowing participants to earn wages while progressing toward industry-recognized credentials. As of 2024–2025, Tennessee supports nearly 500 active apprenticeship programs and over 9,000 apprentices statewide, reflecting the scale of employer participation across multiple sectors.[108] [109]

Unlike traditional education pathways, apprenticeship programs in Tennessee are employer-driven. Organizations such as the Associated Builders and Contractors (ABC) Greater Tennessee Construction Trades Academy provide apprenticeship training in trades like electrical, carpentry, and construction through a combination of classroom instruction and supervised field experience.[110] Similarly, electrical apprenticeship programs such as those offered through joint training committees (e.g., NEJATC in Nashville) require thousands of hours of OJT alongside formal coursework, ensuring that apprentices develop both theoretical knowledge and practical skills needed for industry work.[111] This structure makes apprenticeships one of the most direct and effective pathways into skilled technical occupations in Tennessee and is captured in Table 25 below.

Table 25. Apprenticeships and Earn-and-Learn Pathways in Tennessee.

Trade / Program Area	Program / Organization	Type of Apprenticeship	Link
Electrical (Inside Wireman, Lineman)	Nashville Electrical JATC (NEJATC)	Registered Apprenticeship (8,000+ hrs OJT + classroom)	https://www.nejatc.org
Electrical Trades	ABC Greater Tennessee Construction Trades Academy	Construction apprenticeship (electrical track)	https://abctn.org/education/apprenticeship-application/

[108] Tennessee Department of Labor and Workforce Development, *Apprenticeship Tennessee Overview*, 2025. Available: https://www.tn.gov/apprenticeshiptn
[109] Tennessee Department of Labor and Workforce Development, *Registered Apprenticeship Programs*, 2025. Available: https://www.tn.gov/workforce
[110] Associated Builders and Contractors Greater Tennessee, *Construction Trades Apprenticeship Program*, 2025. Available: https://abctn.org
[111] Nashville Electrical Joint Apprenticeship and Training Committee (NEJATC), *Electrical Apprenticeship Program*, 2025. Available: https://www.nejatc.org/

Trade / Program Area	Program / Organization	Type of Apprenticeship	Link
Electrical (Utility / Power Systems)	Tennessee Valley Authority (TVA) Electrician Apprentice Program	Paid apprenticeship with wage progression	https://www.tva.com/careers/electrician-apprentice-program
Construction Trades (Carpentry, Electrical, Craft Trades)	ABC Greater Tennessee	Multi-trade apprenticeship programs	https://abctn.org
Industrial / Mechanical / Manufacturing	Apprenticeship Tennessee (Statewide Employer Programs)	Employer-sponsored registered apprenticeship	https://www.tn.gov/apprenticeshiptn/find-a-program.html
Advanced Manufacturing / CNC / Maintenance	Employer-based Apprenticeship TN Programs	Industry-driven apprenticeship training	https://www.tn.gov/apprenticeshiptn
Healthcare (example of sector expansion)	Rural Health Association of Tennessee (RHA)	Registered apprenticeship (2,000 hrs OJT + mentoring)	https://www.tnruralhealth.org
Multi-Industry Apprenticeships	Apprenticeship Tennessee	Statewide programs across construction, IT, manufacturing, and transportation	https://www.tn.gov/apprenticeshiptn

Local and Specialized Career Pathway Initiatives

Additionally, Tennessee has one of the only transportation-focused STEM schools in the country, the Transportation-STEM Academy at East High School.[112] This school offers students programs of study in varied transportation-related areas, including diesel mechanics, computer science, and

[112] University of Memphis, Southeast Transportation Workforce Center, *T-STEM Academy Playbook*, accessed March 2026, https://www.memphis.edu/setwc/tstemplaybook.pdf

engineering. The school has multiple industry and academic partnerships that provide students with an opportunity to learn about Rail-River-Runway-Road career pathways through guest speakers, field trips, conference participation, and other unique experiences. The students also earn numerous industry credentials (including OSHA-10) and dual enrollment credits (general education, diesel mechanics, engineering, and other STEM areas) before graduation.

8. Challenges and Opportunities

Tennessee's rail system is positioned as a critical component of the state's economy and national freight network, but it faces several interrelated challenges tied to growth, workforce dynamics, and system complexity. With rail freight projected to grow significantly by 2050, this places pressure on existing rail capacity, infrastructure, and operations. Congestion along key corridors and at major hubs such as Memphis may affect system reliability and efficiency if not addressed through coordinated planning and investment. At the same time, the aging workforce and ongoing recruitment and retention challenges create uncertainty in maintaining a skilled labor force to support expanding operations.

Additional challenges stem from the evolving nature of rail work. The growing integration of intermodal logistics and the adoption of advanced technologies (e.g., signaling systems, data-driven operations) require workers with increasingly specialized and multidisciplinary skill sets. However, current education and training pathways are somewhat fragmented, with limited rail-specific programming at the secondary and post-secondary levels and relatively few dedicated programs statewide. This can make it difficult to build a scalable pipeline into rail careers.

These challenges also present significant opportunities. Tennessee's strategic location, strong freight activity, and established multimodal connectivity, especially in Memphis, create a favorable environment for expanding rail-related workforce initiatives. Strengthening partnerships among K-12 systems, technical and community colleges, universities, and industry can help align training with industry needs and create more visible and accessible career pathways. Additionally, emerging trends such as intermodal growth, potential passenger rail expansion, and increased reliance on technology offer opportunities to attract a new generation of workers into high-skill, high-demand roles. Coordinated workforce development strategies can position Tennessee and other states across the country to meet future demand while enhancing economic competitiveness related to the rail industry.

9. Conclusions and Key Takeaways

This needs assessment underscores the critical importance of aligning rail workforce development with ongoing and future investments in rail infrastructure, operations, and technology through a strategic and collaborative approach. As the industry evolves, proactive, coordinated strategies are essential to ensure that workforce capacity keeps pace with demand and enables communities to fully realize the economic and mobility benefits of rail expansion. Key findings from this research include:

- *Workforce capacity is a limiting factor*. Historic federal investments and planned rail expansions are outpacing the current availability of a skilled workforce, increasing the need for pipeline development.
- *An aging workforce and anticipated large-scale retirements are driving workforce challenges*. Significant retirements are expected across the industry, intensifying the need for recruitment, training, and knowledge transfer strategies.
- *Persistent recruitment and retention issues further complicate a sustainable workforce strategy*. Workforce shortages are exacerbated by competition with other industries, quality-of-life concerns, and limited awareness of rail career pathways.
- *Evolving technology capabilities in the industry mean evolving skill requirements*. Advances in automation, data analytics, sustainability, and advanced technologies (e.g., PTC, AI, alternative fuels) are shifting demand toward more technical, interdisciplinary skillsets.
- *Education and training gaps exacerbate pipeline challenges*. While programs exist, stronger alignment between industry needs and education/training pathways is needed, along with expanded introductions to rail careers through diverse programs of study, work-based learning, and career-connected opportunities.
- *Coordination between academic and industry stakeholders is crucial to addressing workforce challenges*. Effective workforce development requires sustained collaboration among industry, academia, government, and community partners to build scalable and adaptable talent pipelines.
- *Regional variability matters.* Workforce needs and opportunities differ across contexts (e.g., major hubs like California, logistics centers like Tennessee, and rural/frontier systems like Montana), requiring tailored, place-based solutions.

Overall, this assessment provides a foundation for targeted implementation strategies to be undertaken through this CRISI-funded project that connects workforce development efforts with real-world rail system needs, supporting long-term industry resilience and community benefit.