Working Paper 2: Freight Vision, Goals, and Performance Measures

Prepared for:

Northwest Indiana Regional Planning Commission

Prepared by:

CPCS Ref: 22039
December 8, 2022
www.cpcstrans.com

Table of Contents

List of Figures

Acronyms / Abbreviations

AADT	Average Annual Daily Traffic
ARIES	Automated Reporting Information Exchange System
BIL	Bipartisan Infrastructure Law
CAV	Connected and Automated Vehicle
CMAQ	Congestion Mitigation and Air Quality
CO	Carbon Monoxide
CURVES	Connected, United, Renewed, Vibrant, Equitable, and Safe
DOT	Department of Transportation
EPA	Environmental Protection Agency
FAF	Freight Analysis Framework
FAST (Act)	Fixing America's Surface Transportation (Act)
FEMA	Federal Emergency Management Agency
FHWA	Federal Highway Administration
FRA	Federal Railroad Administration
HPMS	Highway Performance Monitoring System
INDOT	Indiana Department of Transportation
IRI	International Roughness Index
LRTP	Long-Range Transportation Plan
MTP	Metropolitan Transportation Plan
NAICS	North American Industry Classification System
NHS	National Highway System
NIRPC	Northwestern Indiana Regional Planning Commission
NOx	Nitrogen Oxide
NPMRDS	National Performance Management Research Data Set
NWI	Northwest Indiana
PM10	Particulate Matter, 10 micrometers and smaller
RITIS	Regional Integrated Transportation Information System
TTTR	Truck Travel Time Reliability
USDOT	United States Department of Transportation
VOC	Volatile Organic Compound

Executive Summary

The Northwest Indiana Regional Planning Commission (NIRPC) is the planning organization responsible for investing federal transportation funds in highways, transit, active (non-motorized) transportation, and other modes of people and goods movement in the Northwest Indiana (NWI) region. NIRPC's updated Metropolitan Transportation Plan, the NWI 2050+ Plan, will encompass a freight element to emphasize infrastructure preservation, improve freight safety and accessibility, and enhance the freight system's contribution to the regional economy through equitable allocation of federal, state, and local transportation dollars.

A clear, simple, and broadly accepted vision and associated goals and objectives will help effectively guide freight transportation investments and improvements in NWI. The critical underpinnings of the regional freight vision and its associated goals and objectives are the broad vision and focus areas established in the NWI 2050 Plan and the overarching federal and state transportation policy goals outlined in the Fixing America's Surface Transportation (FAST) Act, Bipartisan Infrastructure Law (BIL) Act, the US Department of Transportation's (DOT's) National Freight Strategic Plan, Indiana's Long-Range Transportation Plan (2045 LRTP), Indiana State Freight Plan, and the Statewide Rail Plan.

Together, these resources inform a simple vision statement to guide freight planning in NWI. This statement facilitates the process of analyzing investments and freight system improvement priorities:

Support and strengthen regional economic growth and competitiveness with an accessible, connected, safe, and efficient freight transportation system while reducing environmental and community impacts.

To achieve this vision, the NIRPC team proposes the following foundational goals:

- Goal 1: Enhance the freight system's contribution to economic competitiveness and growth
- Goal 2: Reduce and mitigate freight safety and security risks
- Goal 3: Reduce and eliminate barriers to efficient mobility
- Goal 4: Maintain, preserve, and extend the service life of existing infrastructure
- Goal 5: Preserve natural and community resources by reducing the negative environmental impacts of freight activities

Each of these goals is complemented by supporting objectives and performance measures, which closely align with the freight-related needs and challenges identified in Phase 1 of this planning effort. An assessment of the measures calculated in the Phase 1 report is also provided to inform NIRPC's freight performance monitoring decisions.

Next Steps

In the next phase of the freight element, the NWI 2050+ Plan freight element team will organize system issues and needs, identify investment gaps appropriate for new project concepts, and prioritize project recommendations.

1 Vision for Improving Freight Transportation in the NWI Region

Key Chapter Takeaways

NWI's freight transportation planning efforts will primarily focus on:

Supporting and strengthening regional economic growth and competitiveness with an accessible, connected, safe, and efficient freight transportation system while reducing environmental and community impacts.

This vision is guided by the following five foundational goals, each of which is complemented by supporting objectives and performance measures closely aligned with statewide and national freight planning principles:

- Goal 1: Enhance the freight system's contribution to economic competitiveness and growth
- Goal 2: Reduce and mitigate freight safety and security risks
- Goal 3: Reduce and mitigate barriers to efficient mobility
- Goal 4: Maintain, preserve, and extend the service life of existing infrastructure
- Goal 5: Preserve natural and community resources by reducing negative environmental impacts

1.1 Background & Approach

The Northwest Indiana Regional Planning Commission (NIRPC) is the designated planning organization for the NWI region. NIRPC is responsible for investing federal transportation funds in highways, transit, active (non-motorized) transportation, and other modes of people and goods movement in NWI. NIRPC is updating its Metropolitan Transportation Plan (MTP) – the NWI 2050+ Plan, which encompasses transportation modal elements, including a freight element.

The purpose of the Freight Element is to emphasize:

- preserving the existing transportation systems,
- planning for the safety of all transportation system users,
- providing the freight industry with access to the workforce,
- efficiently moving freight to support the economy of the region, and
- ensuring equity in allocating federal, state, and local transportation dollars to benefit all users.

The Freight Element builds upon key findings and relevant content from previous related studies, plans, and formal documents, analysis of relevant data, and information collected through public and stakeholder engagement.

The NWI 2050+ Plan needs to provide a clear, simple, and broadly accepted vision and associated goals and objectives to effectively guide freight transportation investments and improvements in the region. The critical underpinnings of the regional freight vision and its associated goals and objectives are the broad vision and guiding principles established in the NWI 2050 Plan:

"NWI 2050 Plan envisions a connected, renewed, united and vibrant region by 2050."

Connected: Provide accessible, safe, and equal opportunities for working, playing, living, and learning.

United: Celebrate diversity and work together as a community across racial, ethnic, political, and cultural lines for the mutual benefit of the region.

Renewed: Make NWI's urban and rural centers places that people want to come to and live in and ensure our environment is safe and healthy.

Vibrant: Support a thriving economy, a well-educated population, planned growth, and protection of natural and agricultural areas.

As a result of discussions with internal staff and external stakeholders, NIRPC has expanded this vision to include the following additional guiding principles:

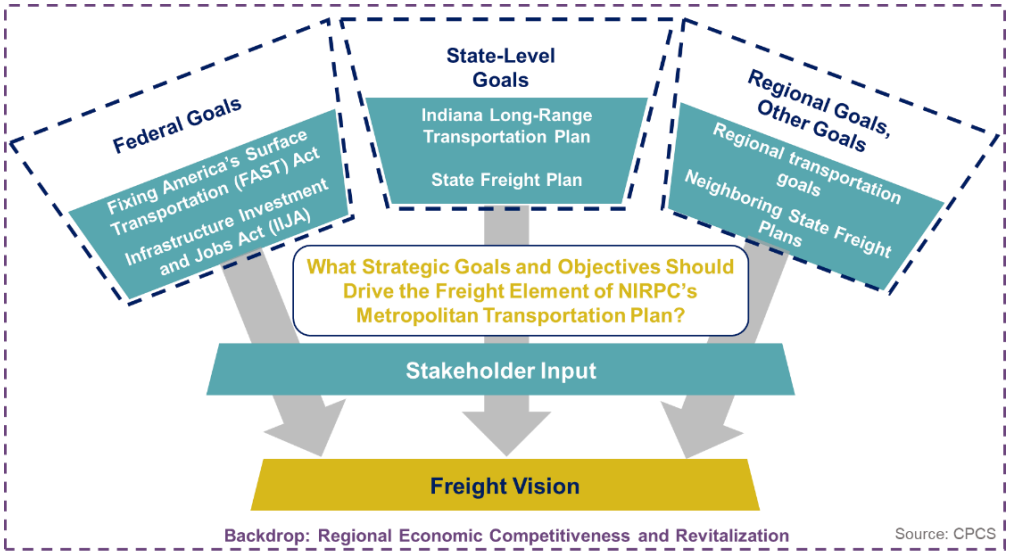
- **Equitable:** Seek fairness in access to resources and opportunities to meet the needs of all community members.
- **Safe:** Reduce and mitigate freight safety and security risks.

The Connected, United, Renewed, Vibrant, Equitable, and Safe (CURVES) guiding principles provide a foundation for setting the goals, objectives, and performance measures for the region's freight system. However, the definitions for each of the principles should be adapted to freight needs based on freight-related themes and overarching transportation policy goals at the national and state levels.

1.2 Establishing Regional Freight Planning Principles

Figure 1 summarizes the sources and the process for establishing the region's freight vision, goals, and objectives. As shown, NWI's freight vision is informed by overarching federal, state, and regional transportation policy goals. Federal freight planning goals are outlined in the Fixing America's Surface Transportation (FAST) Act, Bipartisan Infrastructure Law (BIL) Act, and the US Department of Transportation's (DOT's) National Freight Strategic Plan. The state-level freight goals and objectives are established in Indiana's Long-Range Transportation Plan (2045 LRTP), Indiana State Freight Plan,[1] and the Statewide Rail Plan.

Figure 1: Process for Aligning the Regional Freight Vision and Associated Goals and Objectives



Using this process, the explicit freight-related goals, requirements, and recommendations identified in each of the federal and state-level guiding documents are compared with the vision, guiding principles,

[1] INDOT's Multimodal Freight Plan was published in 2018 as an update to the 2014 Freight Plan to guide the statewide transportation system investments that benefit goods movement. As of November 2022, INDOT is in the process of updating the Statewide Multimodal Freight Plan.

and regional goals provided in the NWI 2050 Plan. Figure 2 provides a summary of the review results. As shown:

- Freight-related goals in the key guiding documents primarily focus on **mobility**. Accordingly, these goals relate to the transportation system's condition, efficiency, and reliability in serving shippers, carriers, consumers, and other stakeholders who directly or indirectly impact, or are impacted by, goods movement.

- The national and statewide freight planning principles also focus on the significance of the freight system to **economic vitality and competitiveness**. Since transportation is a derived demand, economic competitiveness goals often relate to strategic investments in economically-critical assets.

Protecting the **environment and serving all communities** are other focus areas in the key guiding documents. These include goals that commit to eliminating barriers to accessibility, implementing transportation systems that serve the needs of diverse users, and mitigating adverse impacts of freight activity on the natural resources and communities' quality of life.

Together, these goals inform a simple statement to guide freight planning in NWI. This statement facilitates the process of analyzing investments and freight system improvement priorities:

Support and strengthen regional economic growth and competitiveness with an accessible, connected, safe, and efficient freight transportation system while reducing environmental and community impacts.

Using this statement, the CURVES guiding principles can be adapted to freight planning needs as follows:

- **Connected:** Provide an integrated freight transportation system to seamlessly connect and provide access to multimodal options for goods movement in NWI.

- **United:** Mitigate the environmental and community impacts of freight activities.

- **Renewed:** Prioritize investments in critical infrastructure improvements to ensure a resilient freight system that is minimally disrupted due to unplanned events and sudden changes.

- **Vibrant:** Support deployment of innovative data and technologies to enhance the efficiency of goods movement and enable a flourishing economy.

- **Equitable:** Seek fairness in providing access to freight transportation options to meet the needs of all community members.

- **Safe:** Reduce and mitigate freight safety and security risks.

Figure 2: Review of Explicit Freight-Related Goals in Key Guiding Documents

Focus Areas	NWI 2050 Plan Goals	FAST Act/BIL	National Multimodal Freight Policy	National Freight Strategic Plan	INDOT State Freight Plan 2018 & Rail Plan 2021	2045 INDOT LRTP
Connected: Provide accessible, safe, and equal opportunities for working, playing, living, and learning.						
Economy & Place	*Update land development policies & strategies to emphasize accessibility between people & opportunities.*		*			*
Environment	*Connect fragmented natural areas and integrated links between people and green spaces to increase resiliency and health outcomes.*	*				
Mobility	*Complete roadway, bicycle, sidewalk, and transit networks across municipal and county lines to enhance safe and efficient access to opportunities for all.*	*	*	*	*	*
People & Leaders	*Commit to removing barriers and obstacles to guarantee equal and accessible opportunities.*	*				*
United: Celebrate diversity and work together as a community across racial, ethnic, political, and cultural lines for the mutual benefit of the region.						
Economy & Place	*Maximize growth in existing centers to enhance civic and economic life and to protect natural areas and farmland.*					*
Environment	*Clean and protect the air, land, water, and natural habitats to sustain and enhance the environment's safety and health for all.*	*	*			*
Mobility	*Improve roadways, bicycle, sidewalk, and transit networks to revitalize existing urban and rural centers and enhance equity.*	*	*		*	*
People & Leaders	*Focus educational and workforce development initiatives on expanding skills that the modern economy requires.*					
Renewed: Make NWI's urban and rural centers places that people want to come to and live in and ensure our environment is safe and healthy.						
Economy & Place	*Collaborate regionally to welcome a diversity of people and talent to achieve mixed and balanced growth.*					
Environment	*Build region-wide coalitions to advance environmental sustainability for the benefit of future generations.*					
Mobility	*Prioritize transformative investments to elevate the position of the region and to attract a diversity of residents and high-quality economic opportunities.*	*	*	*	*	*
People & Leaders	*Foster better communications, cooperation and coordination to bring people together across the lines that divide us.*					*
Vibrant: Support a thriving economy, a well-educated population, planned growth, and protection of natural and agricultural areas.						
Economy & Place	*Promote initiatives and policies to ensure healthy living, sustainability, quality of life, and prosperity.*					*
Environment	*Endorse innovative energy and environmental strategies to achieve a balance that protects diverse and unique ecological treasures while fostering a sustainable economy.*	*				
Mobility	*Adopt technological innovation that enhances the safe and fluid movement of people and goods to enable a flourishing economy.*	*	*	*		*
People & Leaders	*Embrace a dynamic, diversified and sustainable economy that attracts and retains talent, enhances quality of life, and increases personal and household income.*					

Source: CPCS analysis, 2022.

Error! Reference source not found. lists five overarching goals developed based on the freight-specific CURVES principles. These goals are complemented by supporting objectives, which closely align with the freight-related needs and challenges identified in Phase 1: Finding Meaning.

Figure 3: Freight Transportation Goals

Freight Transportation Goals	*Connected*	*United*	*Renewed*	*Vibrant*	*Equitable*	*Safe*
Goal 1: Stimulate economic competitiveness and growth	✓	✓	✓	✓	✓	
Goal 2: Reduce and mitigate freight safety and security risks				✓		✓
Goal 3: Reduce and eliminate barriers to efficient mobility	✓		✓	✓		
Goal 4: Maintain, preserve, and extend the service life of existing infrastructure			✓	✓		
Goal 5: Preserve natural and community resources by reducing the negative environmental impacts of freight activities		✓			✓	

Source: CPCS analysis, 2022.

Goal 1: Enhance the freight system's contribution to economic competitiveness and growth

NWI's robust freight system is a critical source of economic vitality in the region. A variety of freight-dependent industries rely on this system for their operations, including manufacturing, which is among the most prominent industries in the region. Notably, the warehousing and distribution industry is growing faster than the national average. Nevertheless, freight-dependent industries in NWI face challenges including a shrinking working-age population, driving workforce shortages for many industries.

A number of freight-related objectives can help NWI stimulate continued economic competitiveness and growth, including:

- **Coordinate with economic development agencies, NWI Forum, and Conexus Indiana to provide freight-related industries with relevant resources, including freight data, planning resources, and funding opportunities.** To support the economic competitiveness and growth of freight-related industries, NIRPC should ensure that they have access to the resources required to make informed planning and investment decisions. This means making requisite data available, sharing funding opportunities, and partnering with other organizations to achieve ongoing engagement with relevant freight stakeholders.
- **Collaborate with economic development agencies and educational institutions to advance training programs with a focus on freight industry workforce development.** NIRPC can collaborate with partners to foster proactive labor development programs with an eye toward the future. This demands conscientious data tracking and collaboration with partners ranging from economic development agencies to educational institutions.
- **Identify and promote the development of land that is appropriate for freight-related industries.** This entails not only assisting interested developers or private stakeholders find and assemble parcels appropriate for their needs, but to gatekeep development away from incompatible land uses like wildlife habitats or residential and mixed-use areas.

Goal 2: Reduce and mitigate freight safety and security risks

NIRPC and its partners are responsible for ensuring the safety not just of freight system users, including truck drivers and railroad engineers, but all users of the infrastructure from bicyclists to pedestrians to drivers. Some of the largest and heaviest equipment is transported by freight operators, using the region's road, rail, air, and water networks. And, as a major infrastructure crossroads for the country, NWI is particularly at-risk for safety issues. A number of freight-related objectives can help to reduce and mitigate freight safety and security risks, including:

- **Reduce the incidence and severity of truck-involved crashes.** This might involve reducing modal conflicts, improving sight lines, reducing travel speeds in dangerous areas, improving emergency response, or improving infrastructure design.
- **Reduce highway-rail grade crossing safety and trespass risks.** The most obvious solution is to grade separate crossings to eliminate the problem. When this isn't feasible, safety warning devices should be implemented, some crossings closed, and safety awareness campaigns introduced.
- **Reduce conflict between freight and active transportation modes.** Ensuring that the proper protections are in place to reduce risks to bicycles and pedestrians that share the road with trucks and other vehicles is paramount. Certain roads can be closed to trucks, protected bike lanes introduced, and infrastructure design improved for better visibility and to reduce travel speeds in high-density crash locations.
- **Ensure that safety concerns are not disproportionately clustered in disadvantaged communities.** Infrastructure improvements should focus on improving safety in these historically underinvested communities. Often, the poorest and most marginalized communities are disproportionately affected by adverse impacts of freight and industrial activity, including safety impacts.

Goal 3: Reduce and mitigate barriers to efficient mobility

Moving goods from point A to point B is an essential role of the freight system. Barriers to mobility, including congestion, delay, and bottlenecks impact the freight system's ability to do its job. While mobility is a goal in itself, it is intimately related to Goal 2: Safety and Goal 5: Environmental Impacts. Safety issues can generate mobility problems, as incidents force temporary closures of lanes or tracks, and travel slowdowns increase travel times, leading vehicles to emit additional emissions. A number of freight-related objectives can help to reduce and eliminate barriers to efficient mobility, including:

- **Reduce the number and duration of blocked crossings.** When trains travel across at-grade crossings, vehicles traveling to the other side of the tracks must wait, introducing travel delays. This is a particular issue with trains of excessive length, or when trains are impacted by rail congestion and are either traveling slowly or stopped completely.
- **Eliminate truck bottlenecks.** Certain sections of roadways are particularly prone to travel slowdowns and congestion. These bottlenecks introduce disproportionate mobility issues and are important targets of mobility improvement strategies. Infrastructure design, ramp queues, demand management, dynamic lanes, and sometimes capacity expansion are all strategies that can improve bottlenecks.
- **Eliminate bridge clearance issues.** Low bridges that prevent vehicles from passing below them force route detours and can slow down travel.
- **Support dredging and ice-breaking activities at maritime facilities**. The waterway depths near NWI ports must be maintained through dredging. Moreover, in winter, the Great Lakes can freeze, which, unless ice-breaking ships create navigable waterways, prevents other ships

from traveling. Thus, both investments in dredging and ice-breaking are crucial for maritime mobility.

- **Support the development of intermodal, transload, and other multimodal facilities to handle goods.** Investments in the freight system should help to improve multimodal connectivity throughout the freight system, including facilities that transfer goods between road and rail, maritime and rail, or long-distance truck trailers to local delivery vehicles. These facilities move freight to the mode most suitable for each leg of its journey to ensure efficiency and reliability.

Goal 4: Maintain, preserve, and extend the service life of existing infrastructure

It is critical that infrastructure be maintained and preserved. Sometimes, bare minimum maintenance is all that can be performed, but usually, it is best to pair maintenance projects with improvements to the asset's service life, safety, environmental impacts, and overall design.

A number of freight-related objectives can help to maintain, preserve, and extend the service life of existing infrastructure, including:

- **Maintain pavement and bridge condition in a state of good repair.** Currently, over 98 percent of NWI's Interstates, over 97 percent of non-Interstates, and roughly 95 percent of the bridges are in good or fair condition. Regular and strategic investment in transportation system maintenance is the key to preserving this quality and ensuring cost efficiency in the long run.
- **Increase capacity and accessibility of truck parking.** Sufficient truck parking is critical to improve trucking safety and efficiency and reduce overall traffic congestion. Parking capacity must be expanded and systems introduced to help drivers find parking.
- **Identify and address infrastructure condition issues disproportionately clustered in disadvantaged communities.** As discussed earlier, poorer or marginalized populations are more likely to live in communities where infrastructure has experienced chronic underinvestment. Infrastructure maintenance must focus on improving conditions in these communities and ensuring that this equity is retained.

Goal 5: Preserve natural and community resources by reducing negative environmental impacts

NIRPC and its partners have a responsibility to address and reduce the impacts of the freight system on the environment while at the same time mitigating the impacts of climate change and natural disasters on the infrastructure. A number of freight-related objectives can help to preserve natural and community resources by reducing negative environmental impacts, including:

- **Support demonstration and deployment of technologies and strategies to reduce environmental impacts associated with freight activity.** According to the US Environmental Protection Agency (EPA), the transportation sector contributed 27 percent of the greenhouse gas emissions in the US in 2020. Freight system operations also emit noise. These air and noise pollutions can have profound impacts on the quality of life, health, wildlife, and climate. It is crucial to reduce these impacts through tactics including electrification, the use of alternative fuels, anti-idling technology, congestion reduction, or noise barriers.
- **Conduct a hazardous materials commodity flow study to identify and mitigate the risks of spills on supply chain flows, communities, and the environment.** The freight system moves all kinds of goods, including hazardous materials. Sometimes these toxic materials spill or leak into the environment, which can have disastrous consequences for wildlife habitat, community health, and safety. Hazardous commodity flow studies can help identify and reduce the risks and mitigate the impacts of these kinds of accidents.

- **Conduct a regional infrastructure vulnerability study to identify and mitigate threats to system resiliency.** Resiliency refers to the ability to recover from or adjust easily to disruptions. In the case of the freight system, disruptions may be caused by a variety of factors, including environmental risks like floods, extreme heat, winter storms, and human-made disasters such as cyberattacks and sudden shifts in demand. Any such threat has the potential to damage infrastructure, threaten community safety, and disrupt supply chains. It is crucial to conduct a study to identify vulnerabilities to system resiliency and identify strategies to mitigate these risks, either through emergency response systems, hardened infrastructure, or system redundancies.

2 Performance-Based Freight Planning

Key Chapter Takeaways

This section presents a summary of the existing regional and statewide freight-related performance measures and evaluates the measures calculated in Phase 1: Finding Meaning, according to the data availability and ease of calculation for regular performance reporting and monitoring. A list of recommended freight performance measures is also provided for consideration by NIRPC and its partners and stakeholders.

2.1 Background and Analysis Framework

The regional transportation performance measures identified in the NIRPC 2050 Plan are organized according to the Plan's four vision components: connected, renewed, united, and vibrant. Figure 4 summarizes the freight-related performance measures under each of these vision terms, along with a proposed analysis.

Generally, NIRPC proposed that the "Connected" term be measured using trip times and transportation safety, the "Renewed" term be measured using reported emissions and infrastructure conditions, and the "Vibrant" term be measured using the number of vehicles with advanced technologies (alternative fuels and CAVs) and travel time reliability.[2] There are no freight-related performance measures under the "United" term proposed in NIRPC's 2050 Plan.

Figure 4: NIRPC Vision Terms and Associated Performance Measures

Vision Term	Performance Measure	Analysis Proposed
Connected	Average Trip Time	Trip times from the Household Travel Survey
	Number of fatalities Rate of fatalities per 100 million VMT Number of serious injuries Rate of serious injuries per 100 million VMT	Crashes from ARIES crash database
Renewed	Number of annual ozone emission critical value exceedances	8-hour Ozone Air Quality Action and Exceedance Days Summary from Indiana Department of Environmental Management
	Carbon Monoxide (CO) reduction from Congestion Mitigation Air Quality (CMAQ)-funded projects (kg/day) Particulate Matter less than 10 microns in diameter (PM10) reduction from Congestion Mitigation Air Quality (CMAQ)-funded projects (kg/day)	Emissions are claimed in the CMAQ project applications for CMAQ-funded projects.
	Percent of Interstate pavements in good and poor condition Percent of non-Interstate National Highway System (NHS) pavements in good and poor condition	For asphalt pavements: International Roughness Index (IRI), percent cracking, and percent rutting; for jointed concrete pavements: IRI, percent cracking, percent faulting; for continually reinforced concrete pavements: IRI, percent cracking

[2] NIRPC, NWI 2050 Plan. https://nirpc.org/2050-plan/.

Vision Term	Performance Measure	Analysis Proposed
	Percent of National Highway System (NHS) bridge area in good and poor condition	Deck condition, superstructure condition, sub-structure condition, approach roadway width, structure length, and deck width from National Bridge Inventor
United	None	N/A
Vibrant	Number of alternatively fueled/powered vehicles registered	Number of alternatively fueled/powered vehicles registered from South Shore Clean Cities and/or the Indiana Bureau of Motor Vehicles
	Number of Connected or Automated Vehicles (CAVs) registered plus the fleet size of CAVs licensed to operate in NW Indiana	Vehicle registrations from the Indiana Bureau of Motor Vehicles when data becomes available
	Percent of person miles traveled on the Interstate and non-Interstate NHS that is reliable	Travel time from the National Performance Measure Research Data Set (NPMRDS), Annual Average Daily Traffic (AADT) from Highway Per-formance Monitoring System (HPMS), vehicle occupancy factors from the US Department of Transportation
	Truck Travel Time Reliability (TTTR) In-dex	Travel time from the National Performance Measure Research Data Set (NPMRDS)
	Peak Hours of Excessive Delay per capita in the Chicago, IL-IN Urbanized Area	Travel time from the National Performance Measure Research Data Set (NPMRDS), Annual Average Daily Traffic (AADT) and speed limits from Highway Performance Monitoring System (HPMS), vehicle occupancy factors from the USDOT

Source: CPCS analysis of NIRPC NWI 2050 Plan.

Under the FAST Act guidelines, INDOT is required to track the Truck Travel Time Reliability (TTTR) Index to measure freight system performance. Additionally, INDOT maintains detailed highway safety records that include truck crashes. However, no specific freight safety performance measure is currently benchmarked by the DOT. The following is a summary of the freight performance measures recommended by INDOT in the 2018 Freight Plan:

- **Capacity to Meet Demands:** recommended performance measures are the percentage of lane miles at the level of service C or better, reduction in the hours of truck delay, and improvement in Truck Travel Time Reliability Index.
- **Multimodal Integration and Synergy:** performance measures include the percentage of intermodal connectors with “fair” or better pavement conditions and the number of intermodal or multimodal projects completed.
- **Access to National and International Markets:** the performance measure recommended under this goal is the hours of delay on roadways within 5 miles of ports and cargo airports.
- **Quality of Life:** performance measures to benchmark under this goal focus on freight safety and specifically reducing truck-involved crashes and fatalities and the removal of rail-highway grade crossings.
- **Economic Impact:** includes tracking of percent growth in jobs in freight-intensive industries and percent growth in export value (domestic or foreign).

These freight planning measures are used to inform this plan’s performance measure development.

2.2 Evaluation of Freight Performance Measures

This plan recommends aligning regional and statewide freight performance measures with freight planning vision and goals. Each freight-related goal works to attain various vision terms while also informing performance measure classifications. For example, "*Goal 5: Preserve natural and community resources by reducing negative environmental impacts"* comprises both the United and Equitable vision terms, and the region's performance in attaining this goal can be measured by examining environmental-related data points.

As shown in Figure 5, many performance measures are either carried over from or inspired by those in the NIRPC 2050 plan. The selected measures generally align with those discussed in Phase 1 of this planning effort. Moreover, each performance measure is paired with information that will assist with ongoing performance reporting and monitoring, including data required, data update frequency, data accessibility, and other additional considerations. Recommended performance measures are intended to be simple to track and update while still providing an accurate account of the region's freight system.

The following ranking system is used to categorize measures based on data accessibility and the level of in-house or outsourced effort required for analysis. The highest rank is assigned to measures that use readily available data and minimal in-house analysis, while the lowest rank is given to measures that require outsourcing for both data access and analysis.

1. Data is readily available and can easily be analyzed using in-house resources.
2. Data can be obtained with some effort and may require substantial in-house resources to analyze.
3. Data access and analysis is complicated and may require assistance from outside resources.

Figure 5: Performance Measures Analyzed in Phase 1

NIRPC Freight Planning Goal	Measure	Data Required	Data Update Frequency	Data Accessibility & Level of Analysis	Notes
Goal 1: Enhance the freight system's contribution to economic competitiveness and growth	Freight-dependent industry employment and GDP (total and share)	Total Full-Time and Part-Time employment by NAICS Industry, US Bureau of Economic Analysis	Yearly	1 Data is readily available and can easily be analyzed using in-house resources	Freight-dependent industries include Farm employment, Forestry, fishing, and related activities, Mining, quarrying, oil and gas extraction, Utilities, Construction, Manufacturing, Wholesale Trade, Retail trade, and Transportation and warehousing. Pulled for Lake, Porter, and LaPorte Counties. Can be compared to total employment among all industries.
		Gross Domestic Product (GDP) by County and Metropolitan Area	Yearly	1 Data is readily available and can easily be analyzed using in-house resources	Same as above. The best BEA data is housed under "Employment County, Metro, and Other Areas." Interactive data under this umbrella includes GDP by county. GDP should be chained to a certain year to address inflation.
	Shift-Share Industry Competitiveness	Comparison of regional and US employment growth among different industries, using US Bureau of Economic Analysis data	Yearly	2 Data can be obtained with some effort and may require substantial in-house resources to analyze	The analysis should follow the following process for each industry: 2010 Employment in NWI * (2019 Employment in NWI / 2010 Employment in NWI – 2019 US Employment / 2010 US Employment). Data gaps can make comparisons complicated.

NIRPC Freight Planning Goal	Measure	Data Required	Data Update Frequency	Data Accessibility & Level of Analysis	Notes
	Volume and Value of Goods Moved by Each Mode	All modes: Freight Analysis Framework (FAF) data.	Every 5 years	1 Data is readily available and can easily be analyzed using in-house resources	A FAF5 network analysis tool is available to analyze disaggregated freight flows. A visualization tool is also in development and should be released in 2023. FAF Zone 181: Chicago IL-IN-WI (IN Part) should be used. This includes Jasper and Newton Counties but is a good approximation for the NIRPC region.
		Maritime: United States Army Corps of Engineers (USACE) Waterborne Commerce Statistics Center (WCSC) Commerce Data.	Yearly	1 Data is readily available and can easily be analyzed using in-house resources	WCSC data should be analyzed for Indiana Harbor, Burns Harbor, Gary, and Buffington.
		Air: Federal Aviation Administration (FAA) All-Cargo Airports by Landed Weight	Yearly	1 Data is readily available and can easily be analyzed using in-house resources	FAA data should be analyzed for Gary/Chicago International
Goal 2: Reduce and mitigate freight safety and security risks	Truck-Involved Crashes	ARIES (Automated Reporting Information Exchange System)	Unclear	2 Data can be obtained with some effort and may require substantial in-house resources to analyze	NIRPC can request ARIES data free of charge. Should measure number and severity of truck-involved crashes by filtering the crash data by types of vehicles involved. There is also an option to separate out serious injury crashes and fatal crashes.
	Rail Crossing Incidents	FRA rail safety data	Monthly	1 Data is readily available and can easily be analyzed using in-house resources	NIRPC can obtain the data free of charge. Should measure number and severity. FRA's rail crossing safety data can be downloaded at the county level and individual incident reports are available at crossing level.
Goal 3: Reduce and mitigate barriers to efficient mobility	Interstate TTTR Index	National Performance Management Research Data Set (NPMRDS)	Yearly	2 Data can be obtained with some effort and may require substantial in-house resources to analyze	Requires truck speed data that is available to NIRPC free of charge through FHWA's National Performance Management Research Data (NPMRDS). The Regional Integrated Transportation Information System (RITIS) tool provides summary mobility reports. NIRPC has existing access to this data through INDOT and regularly monitors the TTTR index for the region on the Interstate.
	Interstate Delay per Mile – TTTR Combined Index	HPMS; NPMRDS	Yearly	3 Data access and analysis is complicated and may re-	FHWA' HPMS manual provide details and steps to analyze delay per mile and TTTR measures separately. These measures then can be combined for each link.

NIRPC Freight Planning Goal	Measure	Data Required	Data Update Frequency	Data Accessibility & Level of Analysis	Notes
				quire assistance from outside resources	
	Number of Bridge Clearances Under 16' on Interstates and 14' on Other Public Roads	INDOT Bridge Clearance data	Ongoing updates	2 Data can be obtained with some effort and may require substantial in-house resources to analyze	Data must be cleaned to include only bridges over roadways.
	Blocked Crossing Duration and Frequency	FRA Blocked Crossing Crowdsourced Database	Ongoing	1 Data is readily available and can easily be analyzed using in-house resources	NIRPC can access the data free of charge. Alternatively, NIRPC can collaborate with the NWI Rail Crossings Task Force to regularly collect detailed data of crossing blockage across the region, similar to the efforts in 2019. The information is provided at the crossing level and can be filtered by date, location, and duration of blocking. This blocked crossing data could also be used to identify the share of blocked crossings by duration bucket (i.e., 0-15 min, 15+ min).
Goal 4: Maintain, preserve, and extend the service life of existing infrastructure	Percent of Pavement in Good, Fair, and Poor Condition	HPMS	Yearly	2 Data can be obtained with some effort and may require substantial in-house resources to analyze	FHWA is in charge of collecting and publishing pavement condition data along the NHS routes. The information is reported in the HPMS database. This database provides detailed measures such as IRI, rutting, and cracking by road segment. FHWA's method[3] can be used to translate these measures into overall condition ratings (poor, good, and fair). INDOT establishes statewide 2- and 4-year targets for non-Interstate NHS and 4-year targets for the Interstate system.
	Number of Road Bridges in Poor Condition	USDOT National Bridge Inventory	Ongoing	1 Data is readily available and can easily be analyzed using in-house resources	INDOT may have additional bridge performance data
Goal 5: Preserve natural and community resources by reducing	Ozone, NOx, and VOC Emissions	US EPA Air Quality Statistics Report; Outdoor Air Quality Data	Yearly	2 Data can be obtained with some effort and may require substantial in-	The transportation sector is a major contributor to ground-level Ozone production and portions of NWI remain in nonattainment.

[3] FHWA, Overview of Performance Measures: Pavement Condition to Assess the National Highway Performance Program, 2017: https://www.fhwa.dot.gov/policyinformation/presentations/hisconf/thu01_hpms_and_tpm-part_1_overview_of_performance_measures-pavement_condition_max_grogg.pdf

NIRPC Freight Planning Goal	Measure	Data Required	Data Update Frequency	Data Accessibility & Level of Analysis	Notes
negative environmental impacts				house resources to analyze	
	Number and Volume of Reported Hazardous Spills	Indiana Department of Environmental Management Spills Data	Ongoing	2 Data can be obtained with some effort and may require substantial in-house resources to analyze	Data can be split by year and according to mode.
	National Risk Index	FEMA National Risk Index	Yearly	1 Data is readily available and can easily be analyzed using in-house resources	The annual indices are updated on an ongoing basis as new data becomes available.

Source: CPCS analysis, 2022.

2.3 Recommended Freight Performance Measures

Based on the evaluation presented in the previous section, Figure 6 presents the recommended list of freight performance measures for NIRPC to consider. The rationale for inclusion is included and generally considers the accessibility of the data and the importance of the measure to have a comprehensive understanding of freight system performance.

Figure 6: Recommended Freight Performance Measures

Goal	Performance Measure	Rationale
Goal 1	Freight-dependent industry employment	Data is highly accessibly and helps to assess the size and condition of the freight workforce.
	Volume and Value of Goods Moved by Each Mode	Data is highly accessible and is necessary to understand the relationship between the freight system and the economy
Goal 2	Truck-Involved Crashes	Data is less accessible, but is crucial to understand road safety
	Rail Crossing Incidents	Data is highly accessible and is crucial to understand rail and road safety
Goal 3	Interstate TTTR Index	Data is less accessible but offers the federal standard of understanding on freight mobility. State DOTs are required to report the TTTR Index on Interstates annually.
	Blocked Crossing Duration and Frequency	Data is highly accessible and provides a crucial understanding of rail and road mobility.
Goal 4	Percent of Pavement in Good, Fair, and Poor Condition	Data is less accessible but is the best method to understand road condition
	Number of Road Bridges in Poor Condition	Data is highly accessible and provides an understanding of bridge condition which is distinct from pavement condition.
Goal 5	National Risk Index	Data is highly accessible and provides a general understanding of resiliency risks that is useful in planning.

Source: CPCS analysis, 2022.

Additional freight-related measures that can provide context and inform NIRPC's various planning efforts (but are not necessary to regularly update) include:

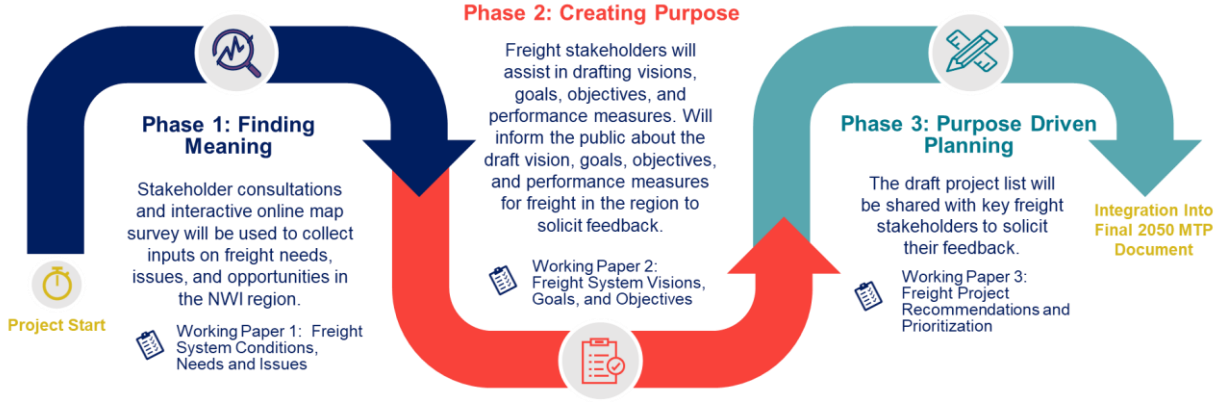
- Freight-dependent industry employment,
- Volume and value of goods moved across the region, and
- Ozone, NOx, and VOC emissions from freight-related activities.

Also, since workforce shortage is a major issue highlighted by both data analysis insights and stakeholder inputs, NIRPC can collaborate with economic development agencies in NWI to track job openings and labor turnovers in freight-dependent industries. This measure is currently provided by the US Bureau of Labor Statistics but at the national and state levels.

3 Next Steps

This working paper marks the conclusion of Phase 2 of the Freight Element of NIRPC's NWI 2050+ Plan. The freight system vision, goals, objectives, and associated performance measures identified in this working paper will guide NIRPC's freight planning and investments into the future. The framework offered in this report will be used to help organize system issues and needs, identify investment gaps appropriate for new project concepts, and prioritize project recommendations in Phase 3.

Figure 7: Work Plan Summary



Source: CPCS, 2022.