Central Indiana Regional Freight Plan

Prepared for the Indianapolis Metropolitan Planning Organization

Prepared by:

CPCS Transcom Inc.

In association with:

Rasor Marketing Communications

Acknowledgements

The Indianapolis Metropolitan Planning Organization Regional Freight Plan was prepared in cooperation with the State of Indiana, Indiana Department of Transportation, and the Federal Highway Administration.

The CPCS Team acknowledges and is thankful for the input of those stakeholders consulted for this planning purpose, as well as the guidance and the input of the Indianapolis Metropolitan Planning Organization staff and the representatives from the Freight Strategy Committee.

Cover image source: istockphoto.com

Table of Contents

Table of Figures

Acronyms / Abbreviations

AADT	Annual Average Daily Traffic
AADTT	Annual Average Daily Truck Traffic
AICP	American Institute of Certified Planners
ARA	Accident Reports Act
ARC	Atlanta Regional Commission
ARIES	Automated Reporting Information Exchange System
ASTM	American Society for Testing and Materials
ATRI	American Trucking Research Institute
BIL	Bipartisan Infrastructure Law
BLS	Bureau of Labor Statistics
BTS	Bureau of Transportation Statistics
BUILD	Better Utilizing Investments to Leverage Development
CCP	Crossing Closure Program
CMAQ	Congestion Mitigation and Air Quality Improvement
CO	Carbon Monoxide
CR	County Road
CRFC	Critical Rural Freight Corridor
CUFC	Critical Urban Freight Corridor
DOT	Department Of Transportation
DPM	Delay per Mile
EIA	Energy Information Administration
EJ	Environmental Justice
EPA	Environmental Protection Agency
EV	Electric Vehicle
FAA	Federal Aviation Administration
FAF	Freight Analysis Framework
FAST	Fixing America's Surface Transportation Act
FHWA	Federal Highway Administration
FRA	Federal Railroad Administration
FRSA	Federal Railroad Safety Act
FSC	Freight Strategy Committee
GA	General Aviation
GDP	Gross Domestic Product
GHG	Green-House Gas
GIS	Geographic Information System
GPS	Global Positioning System
HHPA	Hoosier Heritage Port Authority

HPMS	Highway Performance Monitoring System
HSIP	Highway Safety Improvement Program
IA	Implementation Agreement
IDEM	Indiana Department of Environmental Management
IIJA	Infrastructure Investment and Jobs Act
IMPO	Indianapolis Metropolitan Planning Organization
INDOT	Indiana Department of Transportation
INFRA	Infrastructure For Rebuilding America
IRTIP	Indianapolis Regional Transportation Improvement Program
ISRR	Indiana Southern Railroad
IT	Information Technology
LIRC	Louisville and Indiana Railroad Company
LPA	Local Public Agency
LRTP	Long-Range Transportation Plan
MAASTO	Mid America Association of State Transportation Officials
MDL	Manufacturing/Distribution/Logistics centers
MPA	Metropolitan Planning Area
MPO	Metropolitan Planning Organization
MTP	Metropolitan Transportation Plan
NBI	National Bridge Inventory
NCFRP	National Cooperative Freight Research Program
NHFN	National Highway Freight Network
NHFP	National Highway Freight Program
NHS	National Highway System
NHTSA	National Highway Traffic Safety Administration
NOX	Nitrogen Oxides
NPIAS	National Plan of Integrated Airport Systems
NPMRDS	National Performance Management Research Data Set
NS	Norfolk Southern
NTSB	National Transportation Safety Board
ODOT	Ohio Department of Transportation
PASER	Pavement Surface Evaluation and Rating
PCI	Pavement Condition Index
PDO	Property Damage Only
PHED	Peak Hour Excessive Delay
PHFS	Primary Highway Freight System
PM	Particulate Matter
RRGCF	Railroad Grade Crossing Fund
RRIF	Railroad Rehabilitation and Improvement Financing
RSIA	Rail Safety Improvement Act

SAP	State Action Plans
SB	Senate Bill
SFAC	State Freight Advisory Committee
STBG	Surface Transportation Block Grant Program
STIP	Statewide Transportation Improvement Program
SWOT	Strengths, Weaknesses, Threats, And Opportunities
TA	Transportation Alternatives
TAP	Transportation Alternatives Program
TAZ	Traffic Analysis Zone
TDM	Travel Demand Model
TIP	Transportation Improvement Program
TPIMS	Truck Parking Information and Management System
TTTR	Truck Travel Time Reliability
US	United States
VMT	Vehicle Miles Traveled
VOC	Volatile Organic Compounds
WIM	Weigh in Motion

Executive Summary

The Indianapolis Metropolitan Organization's (IMPO's) Central Indiana Regional Freight Plan identifies the regional planning needs, prioritizes multimodal infrastructure improvements, and develops policy recommendations to enhance the freight corridors and areas in the Central Indiana region. The Plan provides a clear understanding of the region's freight system, links the freight operation performance to the local industry activities, and identifies freight needs and issues.

IMPO is the designated planning organization for Central Indiana, responsible for investing federal transportation funds in the highways, transit, non-motorized transportation, and other modes of people and goods movement in an area that covers all of Marion County and portions of Boone, Hamilton, Hancock, Hendricks, Johnson, Morgan, and Shelby Counties.

Why Plan for Freight?

The freight transportation system is integral to the IMPO region's economy connecting producers and consumers of goods. This freight plan helps IMPO identify the freight system's issues and opportunities and anticipates future growth and needs, so that the region's transportation system can best serve and support the freight demands of the growing economy in Central Indiana.

What is Included in the Regional Freight Plan?

Chapter 1

The multimodal freight system in the region consists of multiple highways and rail lines, the Indianapolis International Airport, and a pipeline system connecting the region to major domestic and international markets. In 2020, it was estimated that over 180 million tons of goods moved to, from, and within the region. The freight tonnage is forecast to grow by 42.4% in 2045.

The region is also a thriving and growing business hub. Eight identified freight-reliant industries contributed 39% of the regional GDP and supported 32% of the Central Indiana employment in 2019.

Chapter 1 of this Regional Freight Plan document introduces the plan objectives, identifies the approach and key data sources, and describes the stakeholder engagement strategies.

Chapter 2

In Chapter 2, an assessment of the Central Indiana regional freight system and industries is provided. Key findings presented in this Chapter include:

- **Freight Clusters**: Building upon the 2015 Freight Plan, 2020 IMPO Activity Center Study, and IMPO Travel Demand Model, the plan further refines the list of freight clusters in the region and identifies emerging freight activity centers.
- **Highway System and Condition**: The region is served by about 370 miles of Interstates, 140 miles of US highways, and 190 miles of State highways. Additionally, the region is served by several weigh-in-motion stations, public truck stops, industrial parks, public refrigerated warehouses, and intermodal/transload facilities. The region's corridors that serve relatively high truck volumes include I-65, I-69, I-70, I-74, I-

465, I-865, US-31, US-36, US-40, and IN-37. The region's average truck speeds in 2019 were higher than 46 mph along the interstate system. However, other major highways of the region, including US-421, US-52, US-40, US-36, IN-37, IN-67, and IN-37, experience truck speeds lower than 46 mph, which in most cases, is close to the posted speed limits on these highways. In terms of freight safety impacts, truck-involved collisions that occurred in the region between 2015 and 2019 led to 121 deaths and near 2,649 injuries with various severity levels.

- **Rail System and Condition**: The region is served by 220 miles of Class I railroad and over 100 miles of regional and short line operations. Ten rail-served facilities, including intermodal terminals, transload facilities, and grain elevators are identified in the region. Over 248 freight rail incidents happened in the IMPO region between 2015 and 2019, resulting in 18 deaths and more than 79 person injuries. Between 2015 and 2019, 77 incidents happened at highway-rail grade crossings in the IMPO region, resulting in 9 deaths and 34 person injuries.
- **Air Cargo System and Condition**: The Indianapolis International Airport (IND), located southwest of Downtown Indianapolis in Marion County, handled about 927 million pounds of inbound cargo and 1,019 million pounds outbound freight, ranking the eighth largest cargo airport in the US in 2019.
- **Pipeline System and Condition**: Many major pipelines that transport commodities, including petroleum, natural gas, and refined products, go through the Indianapolis Metropolitan Planning Area. Nine companies operate petroleum, natural gas, and refined products pipelines within IMPO region.

IMPO's transportation system has various freight-related needs and issues, most of which are centered on the road network. These needs and issues are assessed in Chapter 3.

Stakeholder outreach, data analysis and a review of previous plans revealed that the dominant issues in the IMPO region are related to roadway mobility and safety issues, including issues specific to trucks due to their incompatibility with passenger and bicycle traffic. Rail-related issues identified through both data analysis and stakeholder inputs are all related to crossing safety, particularly the impacts of the recent increase in rail traffic frequency and length of trains on communities' safety and quality of life.

By comparison, there were relatively fewer needs and issues related to the topics of community and environmental impacts of freight. In terms of system condition, some stakeholders indicated the location of pavement surface issues, but IMPO's 2021 regional performance analysis update found that only a small portion of the region's roadways are in poor condition (3.62%) and the rest are in fair (50.4%) or good (45.97%) conditions.

A systematic gap analysis approach is used to geocode, evaluate, score, and rank the identified freight needs and issues for the Central Indiana Regional Freight Plan. As a result, a total of 75 freight issue locations are identified through data analysis and review of relevant plans, while 98 freight issue locations are identified by the stakeholders in Central Indiana.

Chapter 3

Chapter 4

Finally, Chapter 4 of this Regional Freight Plan presents the recommended set of strategies that would help IMPO implement the findings of this freight planning effort to improve goods movement across the region, including:

- Support future planning efforts by mapping freight needs and issue locations and providing this information to local stakeholders. Additionally, ongoing engagement through a semi-annual or annual Freight Advisory Council is recommended.
- Improve the safety of the regional road and rail freight operations by including consideration of trucks in future road safety analysis and implementation efforts, along with improving rail safety at crossings in southeast Indianapolis, including consideration of an additional grade separation study along the Louisville and Indiana Railroad line in Greenwood and Franklin.
- Continue to address mobility issues by identifying top regional truck bottleneck locations and working with agency partners to develop appropriate solutions.
- Mitigate infrastructure condition and community impacts by identifying locations of incompatibility between truck activity and local land uses and working with local agencies on developing truck-friendly routes (and truck-prohibited routes) that meet local needs.

Based on the statewide and the previously identified performance measures, this Plan recommends the following list of measures:

- Truck Travel Time Reliability Index
- Truck Crash Rate
- Pavement Condition Ratings
- Percentage of Bridges in Poor Condition
- Railroad Incident Rate

What Stakeholder Engagement Activities Were Implemented?

A combination of Freight Strategy Committee (FSC) meetings, an online survey, and one-on-one stakeholder consultations helped the project team collect inputs on the types and locations of freight issues and needs in the IMPO region. The use of interactive visualization tools during the FSC meetings and the online survey also allowed stakeholders to be actively engaged in developing and finalizing the Strengths, Weaknesses, Opportunities, and Threats (SWOT) analysis.

How Can the Information in This Plan Help IMPO and Its Partners and Stakeholders?

The Central Indiana Regional Freight Plan guides the long-term decisions of IMPO and its partners and stakeholders regarding the potential future freight investments in the Central Indiana region. The information provided in this Plan and accompanying online dashboard inform project ranking based on freight needs and risks, help identify opportunities for public and private stakeholders to take actions to improve goods movement, and support efforts for accessing the state-level freight funding for Central Indiana.

1 Introduction

Key chapter takeaway

The Indianapolis Metropolitan Planning Organization is updating the Regional Freight Plan with the aim of identifying the regional planning needs, prioritizing multimodal infrastructure improvements and developing policy recommendations to enhance the freight corridors and areas in Central Indiana.

Regional Freight Plan Objectives

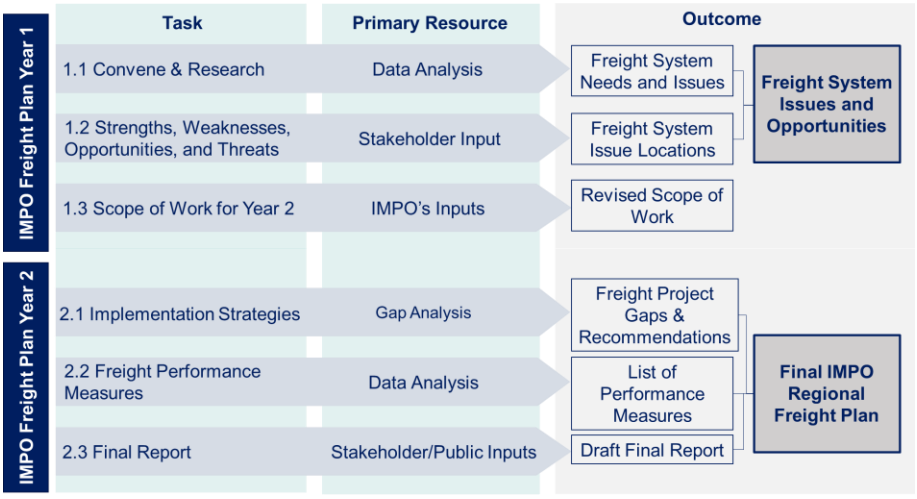
The Indianapolis Metropolitan Organization (IMPO) is the designated planning organization for Central Indiana, responsible for investing federal transportation funds in the highways, transit, non-motorized transportation, and other modes of people and goods movement in an area that covers all of Marion County and portions of Boone, Hamilton, Hancock, Hendricks, Johnson, Morgan, and Shelby Counties.

The Central Indiana Regional Freight Plan identifies the regional planning needs, prioritizes multimodal infrastructure improvements, and develops policy recommendations to enhance the freight corridors and areas in the Central Indiana region.[1] The Plan provides a clear understanding of the region's freight system, links the freight operation performance to the local industry activities, and identifies freight needs and issues.

Approach and Key Data Sources

The consulting team used a phased approach consisting of 6 subtasks, each leading to interim deliverables. Figure 1 shows the general framework and the process used to develop the deliverables for each task, all of which led to the development of this Plan.

Figure 1: Central Indiana Regional Freight Plan Project Approach



Source: CPCS.

[1] Central Indiana region and IMPO region have been used interchangeably in this document.

Various sources of data and information were used to inform the development of this Regional Freight Plan, supported by a comprehensive stakeholder engagement process to ensure that public and key stakeholder input was heard during Plan development. The major sources of data and information included:

1. **Previous Studies, Plans, and Other Relevant Documents** were reviewed to compile qualitative and quantitative information specific or relevant to goods movement in the IMPO region. A synthesis of the freight-related goals and objectives, issues and opportunities, and performance measures identified in previous plans and studies were conducted and presented to the IMPO and key stakeholders. A list of the plans and studies that informed this Regional Freight Plan is provided in **Appendix A**.

2. **Data Analysis and Triangulation** methods were used to evaluate the condition and performance of the freight system and operations in the IMPO region. Examples of data sources include truck activity and speed data provided through IMPO's StreetLight data subscription,[2] historic road crash and rail-related incident data, vehicle counts, vehicle speed data provided by the Federal Highway Administration (FHWA), and information on business establishment locations and sizes.

3. **Stakeholder Engagement** activities supported the data analysis efforts and helped the project team gain a "big picture" understanding of how the communities and businesses in the Central Indiana region are impacted by freight and how the characteristics of the region in terms of transportation assets and business environment impact goods movement.

Stakeholder Engagement

A combination of Freight Strategy Committee (FSC) meetings, an online survey, and one-on-one stakeholder consultations helped the project team collect inputs on the types and locations of freight issues and needs in the IMPO region.

Freight Strategy Committee Meetings

The FSC is comprised of individuals representing key freight stakeholder groups identified by the IMPO, including county and city governments, economic development agencies, industry associations, land developers, community development and social services non-profits, universities, and private sector shippers, receivers, and third-party logistics. A list of participating organizations and entities is provided in **Appendix B**.

The FSC met on a roughly quarterly basis to provide local insight, input, and guidance towards the development of the Regional Freight Plan Update. Information from the FSC is primarily collected through these quarterly meetings and follow-up one-on-one meetings with the committee members, as needed. The FSC has met four times during the development of this plan, in July/November 2021 and March/June 2022.

Using an interactive audience input and visualization tool, the participants confirmed and ranked the identified freight needs and issues and provided inputs on the development of a Strengths, Weaknesses, Opportunities, and Threats (SWOT) analysis.

[2] IMPO's Travel Demand Model provides forecasts of trucking activity throughout the region, however, StreetLight data platform was used for this purpose, due to user-friendly interface and efficiency in running analyses. IMPO members and the consultants associated with them can request access to StreetLight data through IMPO's website: https://www.indympo.org/maps-resources/data-studies/request-streetlight-data

Online Survey

An interactive, online survey using the IMPO's MetroQuest platform was used to capture a broad set of stakeholders' perspectives regarding the strengths and weaknesses of Central Indiana's freight network, threats to the system, and opportunities for improvements.[3] The survey was conducted between October 20th and November 30th, 2021, during which 37 individuals took the survey.

A wide range of public and private freight stakeholders were invited to take the survey, including individuals from the Indiana Department of Transportation (INDOT), Conexus Indiana, Indianapolis International Airport, Indiana Trucking Association, and Indiana Transportation Association, shippers, manufacturers, logistics providers, and industry associations. Time was provided during the November FSC meeting for the committee members to take the survey. The survey was also made available to the public by posting a Take Our Freight Survey link on the Regional Freight Plan Study Update page on IMPO's website and promoted in several issues of the IMPO's teMPO e-newsletter and through the IMPO's social media platforms.

The survey asked the respondents to rank the most important transportation issues in the IMPO region, review and refine the SWOT elements in the 2015 freight plan and point out locations with freight issues and areas that offer opportunities for improvements.

The freight survey and summary results are presented in **Appendix C.**

Stakeholder Consultations

Eleven organizations were consulted regarding the freight-related challenges, needs, and issues in the central Indiana region. They include:

- City of Indianapolis
- City of Franklin
- City of Greenwood
- City of Westfield
- Conexus Indiana
- CSX Railroad
- Indiana Transportation Association
- Indiana Rail Road Company
- Indianapolis Airport Authority
- INDOT Multimodal Office
- INDOT Office of Freight
- INDOT Smart Mobility Initiative

Regional Freight Plan Organization

This Regional Freight Plan consists of three sections:

Existing and Future Freight System Conditions: This section introduces the multimodal freight system in the IMPO region and analyzes the current and future conditions.

Key Freight Issues, Projects Gaps, and Future Trends: This section presents the SWOT analysis conducted on the region's freight system and outlines the key issues and freight project gaps in the region.

Recommended Actions: The final section focuses on providing implementation strategies and freight performance measures to the IMPO and its members to address the needs and opportunities identified in the previous section

[3] MetroQuest survey questions are presented in Appendix A.

2 Existing & Future System Conditions

Key chapter takeaways

This chapter provides an assessment of the Central Indiana freight system and industries. Key takeaways from the review of relevant studies, plans, documents, and data analysis include:

- The region consists of an intertwined network of highways and rail lines, the Indianapolis International Airport, and a system of pipelines connect the region's shippers, distributer, and consumers.
- The region has a thriving and growing business hub based in part on its proximity to other major markets, including Chicago, Cincinnati, and Louisville. Manufacturing, wholesale trade, and retail trade are the top three GDP contributors among the region's freight-related industries.
- Over half of the region's freight-related businesses are in Marion County and about 15% are in Hamilton County. Agricultural businesses are dispersed throughout the region and tend to be in more rural portions of each county.
- The region is served by about 370 miles of Interstates, 140 miles of US highways, and 190 miles of State highways. Additionally, the region is served by several weigh-in-motion stations, public truck stops, industrial parks, public refrigerated warehouses, and intermodal/transload facilities.
- About half of all the truck trips originated from or destined in the IMPO region start and end in four local subareas: 1) The I-465/IN-37 interchange in Fishers; 2) The area northwest of the I-465/I-70 interchange on the east side; 3) The area south of the I-65/IN-267 interchange on the northwest side; and 4) The area northwest of the I-70/I-65 south split in downtown Indianapolis. All these areas are served by the Interstate system; however, their relatively high concentration of trucking activity can exacerbate congestion and other negative freight impacts.
- The region's average truck speeds are generally higher than 46 mph along the interstate system. However, some major highways of the region experience lower than average trucks speeds during peak periods, including US-421, US-52, US-40, US-36, IN-37, IN-67, and IN-37. Peak hour delays are generally not a major problem for trucks on the region's interstates.
- In terms of freight safety impacts, truck-involved collisions that occurred in the region between 2015 and 2019 led to 121 deaths and near 2,649 injuries with various severity levels. Also, over 248 freight rail incidents happened in the IMPO region between 2015 and 2019, resulting in 18 deaths and more than 79 person injuries.

Importance of Freight to Central Indiana Region

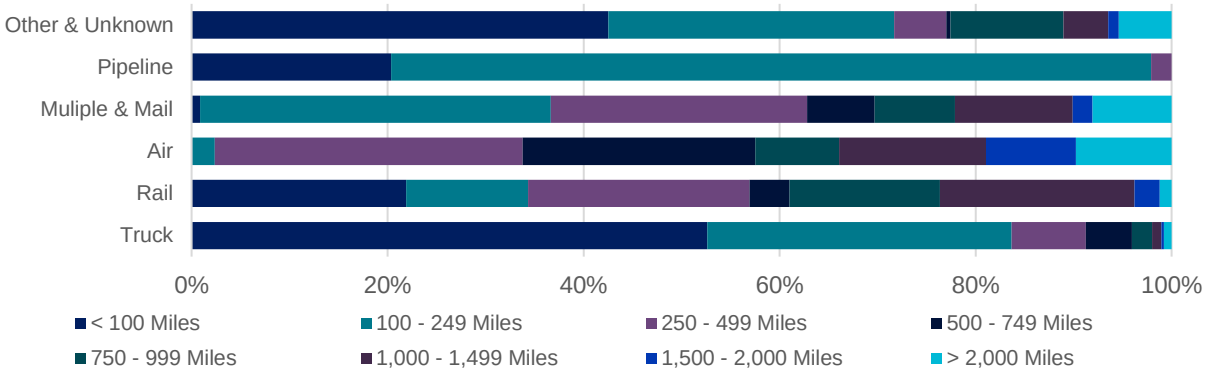
Freight System Modal Shares

According to Freight Analysis Framework (FAF 5.3) 2020 estimates, nearly 71% of the cargo tonnage moved in the Indianapolis-Carmel-Muncie commodity flow survey area[4] is carried by trucks. Meanwhile, pipelines carry 17% of the cargo, and rail lines carry about 7% of the cargo tonnage

[4] The FAF analysis zone is not the same as the Indianapolis MPO boundary. The FAF zone is a larger area with more FAF zones, so non-MPO activities are included in this commodity information.

moved in the area. The rest (less than 1%) is carried by air cargo and a combination of modes (multiple and mail category). As Figure 2 shows, about 80% of the truck trips in the Indianapolis-Carmel-Muncie area travel 250 miles or less. About 62% of rail trips serve origins and destinations that are between 250 and 1,500 miles apart, and 55% of origins and destinations served by air cargo trips are between 250 and 750 miles apart.

Figure 2: Modal Share of Freight Over Various Distances in Indianapolis-Carmel-Muncie Area



Source: CPCS analysis of FAF 5.3 Database. *Other category includes air and truck, mail, multiple, and unknown modes.

Coal and petroleum products, gravel and crushed stones, cereal grains, gasoline, ethanol, and aviation fuels, and nonmetal mineral products are the top commodities moved in the Indianapolis-Carmel-Muncie area using various modes. More than 90% of the gravel and crushed stone originated, destined, or moving through the area is carried by trucks. Businesses carrying cereal grains and prepared foods also heavily rely on trucks for transporting their cargo. These commodities are also carried by rail, while rail is the primary mode of transportation for logs, lumber, and fuel woods. The highest volumes of cargo transported by air are pharmaceuticals, chemical products, and plastics. Coal and petroleum products are primarily carried by pipelines in the area (Figure 3).

Figure 3: Commodity Volumes in Indianapolis-Carmel-Muncie Area

Commodity Category	2020 Annual Volume (1,000 Tons)
Coal-n.e.c.	34,948
Gravel	20,630
Cereal grains	13,773
Gasoline	12,205
Nonmetal min. prods.	9,378
Base metals	7,892
Waste/scrap	7,866
Other foodstuffs	7,543
Motorized vehicles	6,898
Mixed freight	6,685
Other ag prods.	6,245
Natural sands	4,732
Fuel oils	4,021
Plastics/rubber	3,649

Commodity Category	2020 Annual Volume (1,000 Tons)
Wood prods.	3,528

Source: CPCS analysis of FAF 5.3 Database, 2020 forecasts.

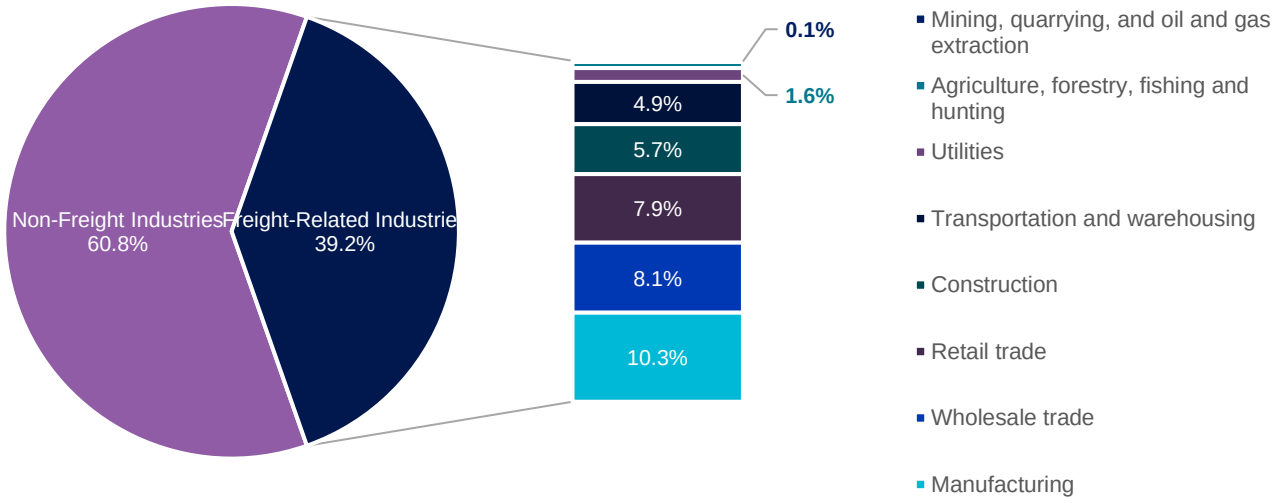
Freight-Related Economy

Freight-related industries are industries that highly rely on the freight transportation system for their operations. These include:

- Agriculture, forestry, fishing, and related activities
- Mining, quarrying, and oil and gas extraction
- Utilities
- Construction
- Manufacturing
- Wholesale Trade
- Retail Trade
- Transportation and Warehousing

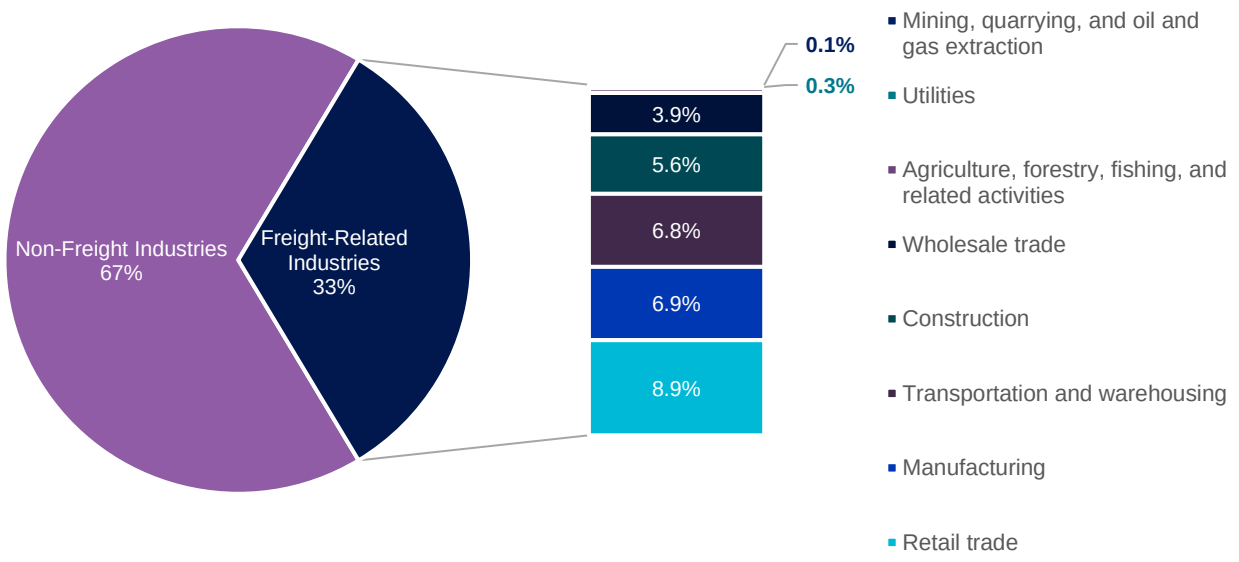
Within the eight counties of the IMPO region, the freight-related industries generate over 39% of the Gross Domestic Product (GDP). As shown in Figure 4, manufacturing (10.3%), wholesale trade (8.1%), and retail trade (7.9%) are the top three GDP contributors among the identified freight-related industries. In comparison to the freight-related industries' shares of GDP, their shares of employment illustrated in the figure below take up a lower percentage (32.8%) of the total employment in the area. The three industries with the highest employees are retail trade (8.9%), manufacturing (6.9%), and transportation and warehousing (6.8%).

Figure 4: Freight Contribution to Economic Output (measured in dollars) – 8-County Region



Source: CPCS analysis of Bureau of Economic Analysis Data (2019), 2021.

Figure 5: Freight-related Employment – 8-County Region



Source: CPCS analysis of Bureau of Economic Analysis Data (2019), 2021.

Freight-Related Business Environment

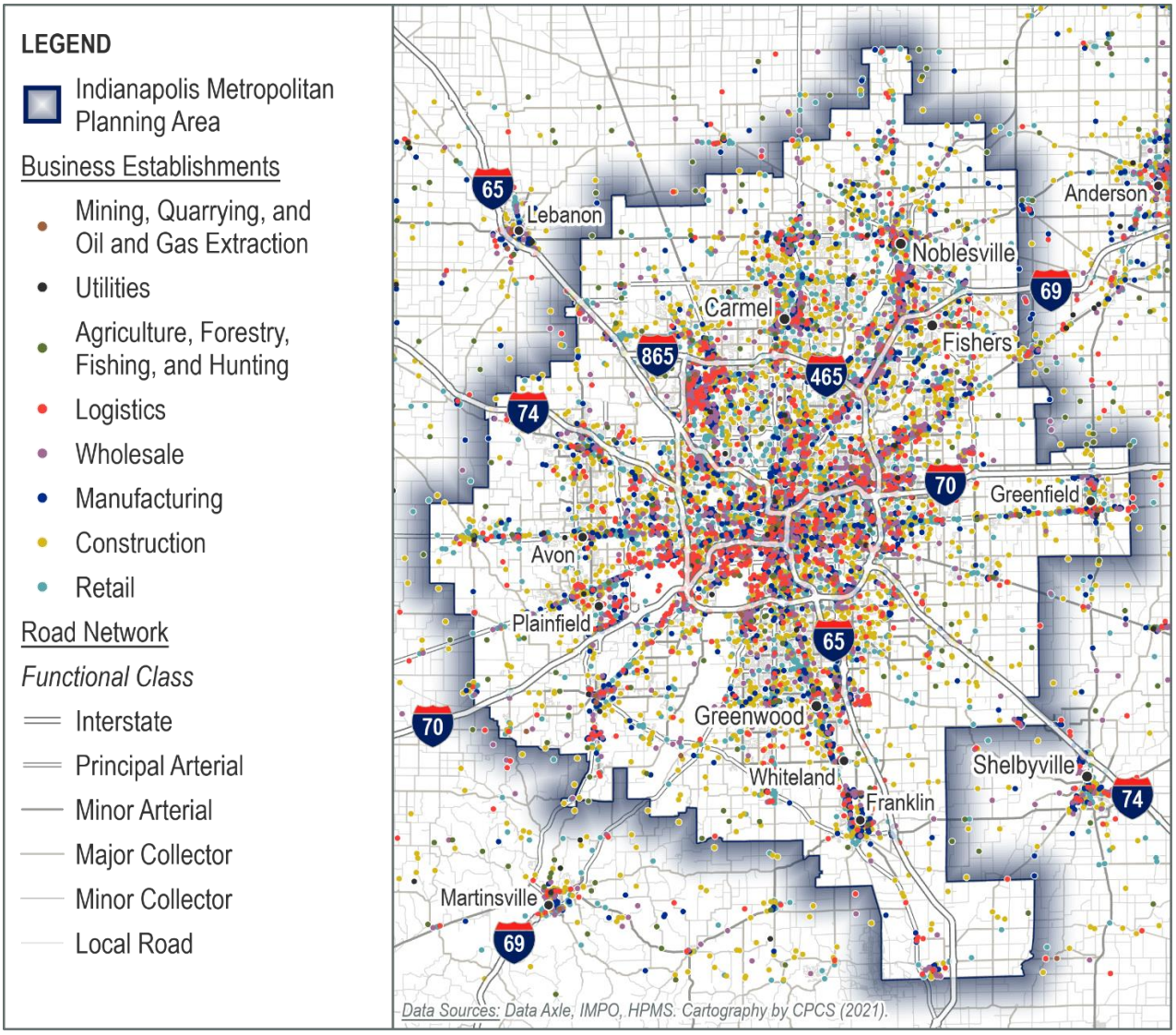
A welcoming business environment attracts new investments and accelerates the growth of existing business establishments. Multiple national polls and statewide studies have recognized Indiana's top-ranked business environment with its government efficiency, fiscal stability, affordability, etc. While the Central Indiana region shares those business advantages, its access to multiple interstates and railroad services (details in the Existing Multimodal Freight System Condition section) and high concentration of logistics facilities (Figure 6) enhance its business friendliness.

Freight-Related Establishments

As shown in Figure 6, freight-related industry business establishments are scattered across the 8-county IMPO region but tend to cluster closer to the city of Indianapolis. Consequently, nearly 51% of the freight-related businesses are located in Marion County, over 15% in Hamilton County.[5] These ratios of freight-related businesses located in the more urban counties of the 8-county region are relevant in nearly every freight-related industry except for agriculture, forestry, fishing, and hunting, and utilities. Agricultural businesses are especially dispersed throughout the region and tend to be in more rural areas in each county.

[5] Data Axle Employment Establishments Data, 2021.

Figure 6: Freight-Related Industry Establishments in Central Indiana Region



The 8-county region's largest freight-related industry, by the number of establishments, is retail trade. The industry has 8,761 businesses, which represents almost 46% of the number of freight-related establishments. Nearly two-thirds of the retail trade businesses in the region lie in Marion and Hamilton Counties. Construction (23%), manufacturing (12%), and wholesale trade (11%) are the other major industries with establishments in the region.[6]

Regional Freight Clusters

Freight clusters are land uses that generate and attract freight traffic, including trucks, trains, air cargo, and pipeline commodities. The IMPO's freight clusters have been identified using various methods in the past and thus, this update of the freight plan takes the results of the following three previous efforts into account and further refines the freight clusters by identifying the most common truck trip origins and destinations using the StreetLight truck GPS data:

[6] CPCS analysis of 2019 Data Axle provided by IMPO, 2021.

- 2015 Freight Plan
- 2020 IMPO activity center study
- IMPO Travel Demand Model

The following sections provide more detail on the freight cluster analysis effort.

2015 Freight Plan

The previous Regional Freight Plan developed in 2015 used a combination of desk research, business establishment data, land use and real estate information, and truck traffic volumes to identify the regional clusters with a significant concentration of freight activity. As a result, the following five freight clusters were identified:

I-65 Lebanon: the area surrounding the I-65/IN-32 interchange is the location of several distribution centers and storage facilities;

I-65 Whitestown: the area along I-65 east of IN-267 is the location of several distribution centers and storage facilities;

Ameriplex/Indianapolis International Airport: the area between US-40 and IN-67 west of I-465 is the location of the Indianapolis International Airport and several logistics facilities;

I-70 Madison/Harding: the area north and south of I-70, south and southwest of downtown Indianapolis is the location of several warehousing and storage facilities and construction material suppliers; and

I-70 Shadeland: the area surrounding the Shadeland Ave/Brookville Rd interchange is the location of several logistics facilities and a rail transload facility.

2020 IMPO Activity Center Study

In 2020, IMPO developed a study of activity centers in the region to help cities, counties, and the region focus limited transportation resources and funds towards areas of high activity and most trips generated. Eight types of activity centers were identified through a collaborative planning process. One of the activity center types, Manufacturing/Distribution/Logistics centers (MDL), is directly linked with freight activities as they have relatively high levels of trucking activity or access to other modes of goods movement. Figure 11

Figure 7 shows the concentration of MDL centers in the IMPO region. Cells with higher MDL activity scores (shown in a darker shade) are primarily clustered in the following areas:

Southeast of the I-465/I-865 interchange: the location of Buckeye Partners' liquid petroleum handling and distribution terminal as well as several shopping centers, auto part dealers, packaging, storage, and warehouse facilities, and parcel shipping facilities (UPS and USPS);

The I-69/I-465/Binford Blvd interchange: the location of several shopping centers and construction material shops;

The I-465/I-70/Massachusetts Ave triangle: the location of several distribution facilities and construction material suppliers;

Between I-70 and Massachusetts Ave east of the I-70/I-65 north split: the location of several distribution facilities and construction material suppliers;

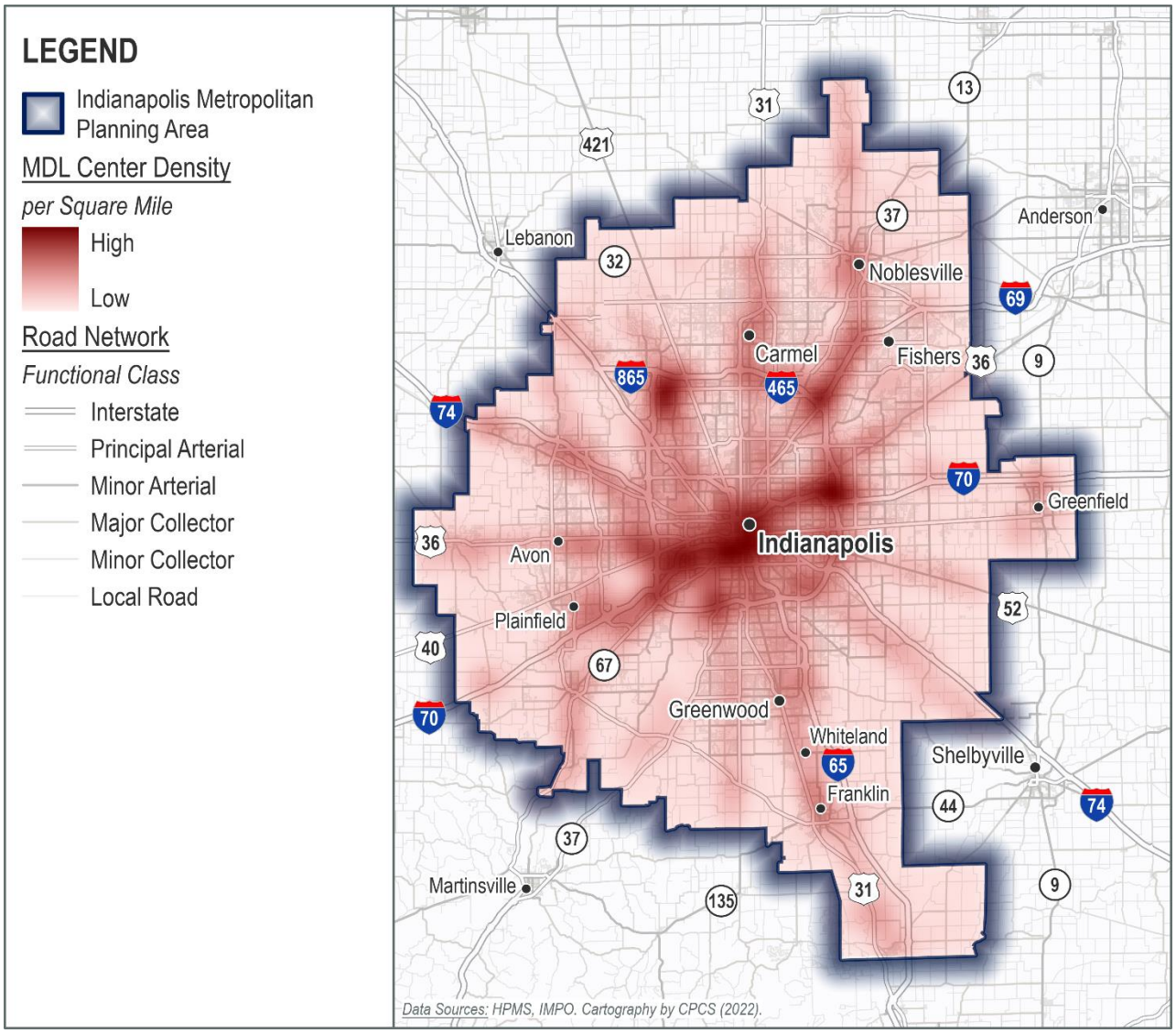
North of I-70/I-65 south split between the interchange and East Washington St.: the location of several warehousing and distribution facilities, cold storage facilities, and construction material suppliers;

South of I-70 and southwest of downtown Indianapolis: the location of the Indianapolis Intermodal Rail Terminal;

West of I-465: the location of the Indianapolis International Airport, Avon intermodal rail terminal, and several freight logistics facilities; and

The I-465/IN-37 interchange south of Indianapolis:[7] the location of the Harding Quarry, two truck stops, truck dealerships, and several logistics facilities.

Figure 7: MDL Centers in the Central Indiana Region



IMPO Travel Demand Model

Freight activity centers are also identified as a result of the IMPO Truck Model, a two-phased update of the IMPO Travel Demand Model, using commercial vehicle probe data provided by the American

[7] Under construction – soon to be I-465/I-69 southwest interchange (as of July 2022).

Trucking Research Institute (ATRI). Major truck origins and destinations identified in this process are listed in Figure 8.

Figure 8: Regional Activity Centers Identified in the IMPO Travel Demand Model Update

Freight Activity Center ID	No. of TAZs	Freight Establishments
Anderson	3	Industrial land use southwest of Anderson, including Nestle USA, IMI Aggregates, Carter Logistics, and FedEx distribution facility
Anson	5	Industrial land use and ruck facilities northwest of Zionsville, including Love's Travel Stop, Coca Cola distribution, Amazon Fulfilment Center, and Cummins Distribution
Circle City Industrial	2	Circle City Industrial Complex near east of downtown Indianapolis and industrial land north of facility
CSX	3	CSX's Avon Intermodal Terminal and industrial facilities along the Ronald Regan Parkway
IIA Warehouse 1 & 2	8	Industrial land use north of Indianapolis International Airport, including Target distribution center, FedEx facility, and Amazon Fulfilment and Return Center
Keystone and 70	2	Industrial land use northwest of I-70/ N Rural St interchange
N Senate	2	Industrial land use northeast of I-65/ N West St interchange
NE IA Airport	10	Industrial land use northeast of the Indianapolis International Airport
North Franklin	4	Industrial land use north of Franklin, including Carter Lumber and Amcor Plastics
NW IA Airport	13	Industrial land use northwest and west of the Indianapolis International Airport
Park 100_96th_Michi	18	Park 100 Industrial area located southeast of Zionsville
Red Cats/Full Beauty	3	Industrial land use north of Southwestern Ave, including Full Beauty Brands and Indianapolis Pallet Wholesale
S Mooresville	1	Industrial land use south of Mooresville
Speedway	5	Industrial land use south of Indianapolis Motor Speedway Museum
SW IA Airport	3	Industrial land use south of the Indianapolis International Airport, including FedEx and United States Postal Service facilities
SW Lebanon	3	Industrial land use west of I-65 in Lebanon

Source: CPCS analysis of IMPO's ITDM Update Report, 2021.

Truck Trip Origins and Destinations

Using the vehicle tracking data collected by StreetLight, an analysis of the truck trip origins and destinations in the IMPO region shows that about 50% of the truck trips originated from or destined to the region start and end in the following five areas:

The area surrounding the I-465/IN-37 interchange south of Indianapolis,[8] where the Harding Quarry, several truck stops, truck dealerships, and logistics facilities are located. Over 20,000 trucks travel along this segment of I-465 daily, which is 19% of the segment's total AADT.

[8] Under construction – soon to be I-465/I-69 southwest interchange (as of July 2022).

The area northwest of the I-465/I-70 interchange east of Indianapolis, where several distribution facilities and construction material suppliers are located. Nearly 40,000 trucks travel along the segments of I-465 and I-70 at this location, which is about 12% of the total AADT.

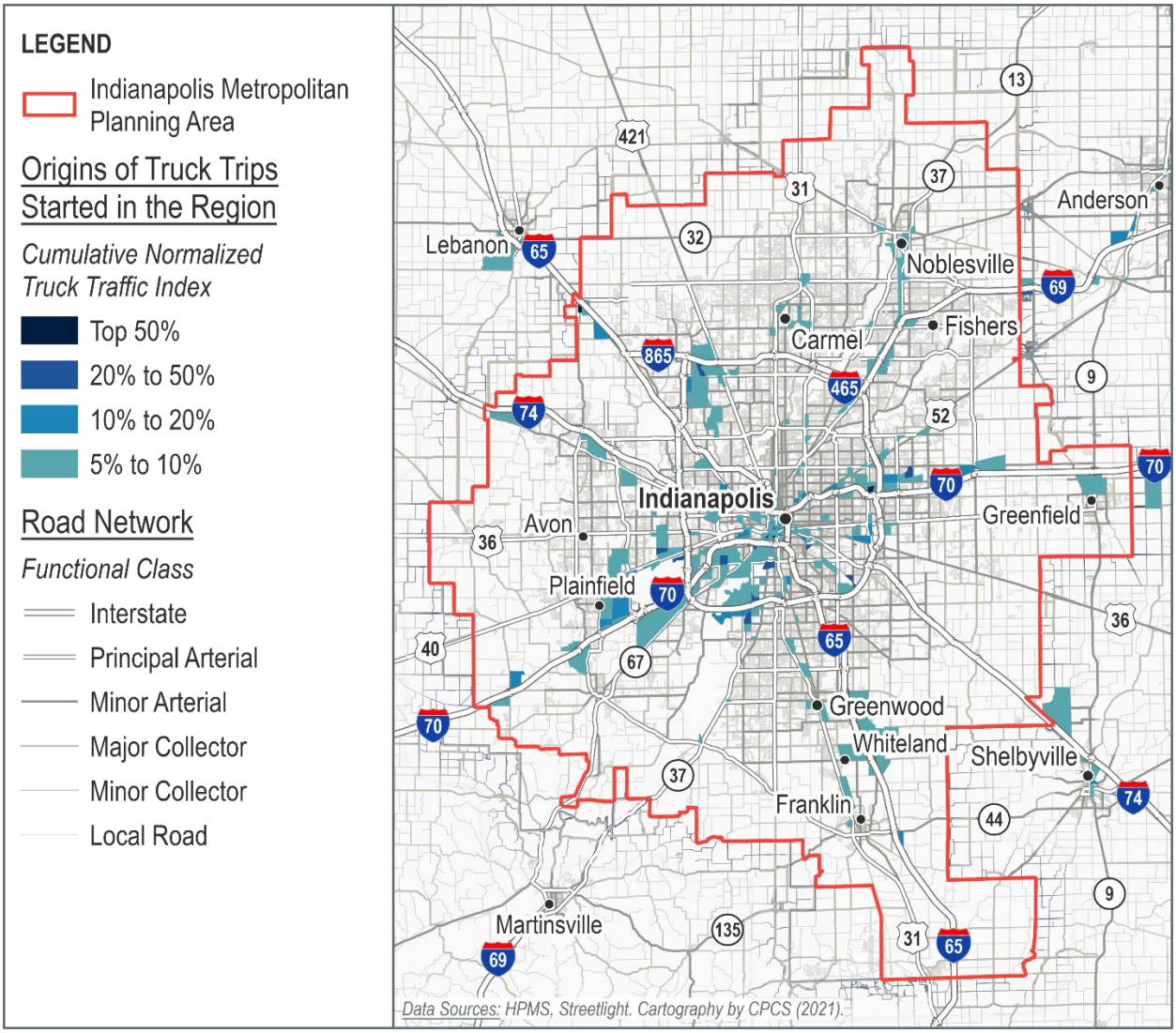
The area south of the I-65/IN-267 interchange in Whitestown, where several logistics and distribution facilities and construction material shops are located. Over 18,000 trucks travel along this segment of I-65 daily, which is about 23% of the total AADT.

The area bordered by Kentucky Ave, Madison Ave, CSX rail tracks, and I-70 south of downtown Indianapolis, where a brewery and several truck shops, distribution facilities, and an intermodal rail yard are located.

Industrial area located southeast of I-465/I-865 interchange in Indianapolis.

The industrial areas near CSX's Avon Terminal and CN/INRD Intermodal Terminal in Indianapolis also had a relatively high number of truck trips. However, these areas are not shown with darker colors in the following maps (Figure 9 and Figure 10) since the truck trip densities (normalized by Traffic Analysis Zones or TAZ areas) for these locations are lower compared to the five areas listed above.

Figure 9: Origins of Truck Trips Started in the Central Indiana Region



Other moderately common truck origins/destinations in the region are:

The industrial areas around **CSX rail spur southwest of Indianapolis**, between I-70 and West Raymond St,

The area **west of the White River, bordered by I-70, Kentucky Ave, and CSX railroad tracks**,

The logistics facilities located north and west of the **Indianapolis International Airport (IND)**,

The areas around **Love's Travel Stop in Mooresville and the Pilot Travel Center in Greenfield**,

The area near the **FedEx facility on Massachusetts Ave** northwest of downtown Indianapolis, and

The area bordered by **East 30th St, Massachusetts Ave, and I-465, east of Indianapolis**.

These areas account for 15% to 40% of the truck trips originated from or destined in the IMPO region.

Figure 10: Destinations of Truck Trips Ended in the Central Indiana Region

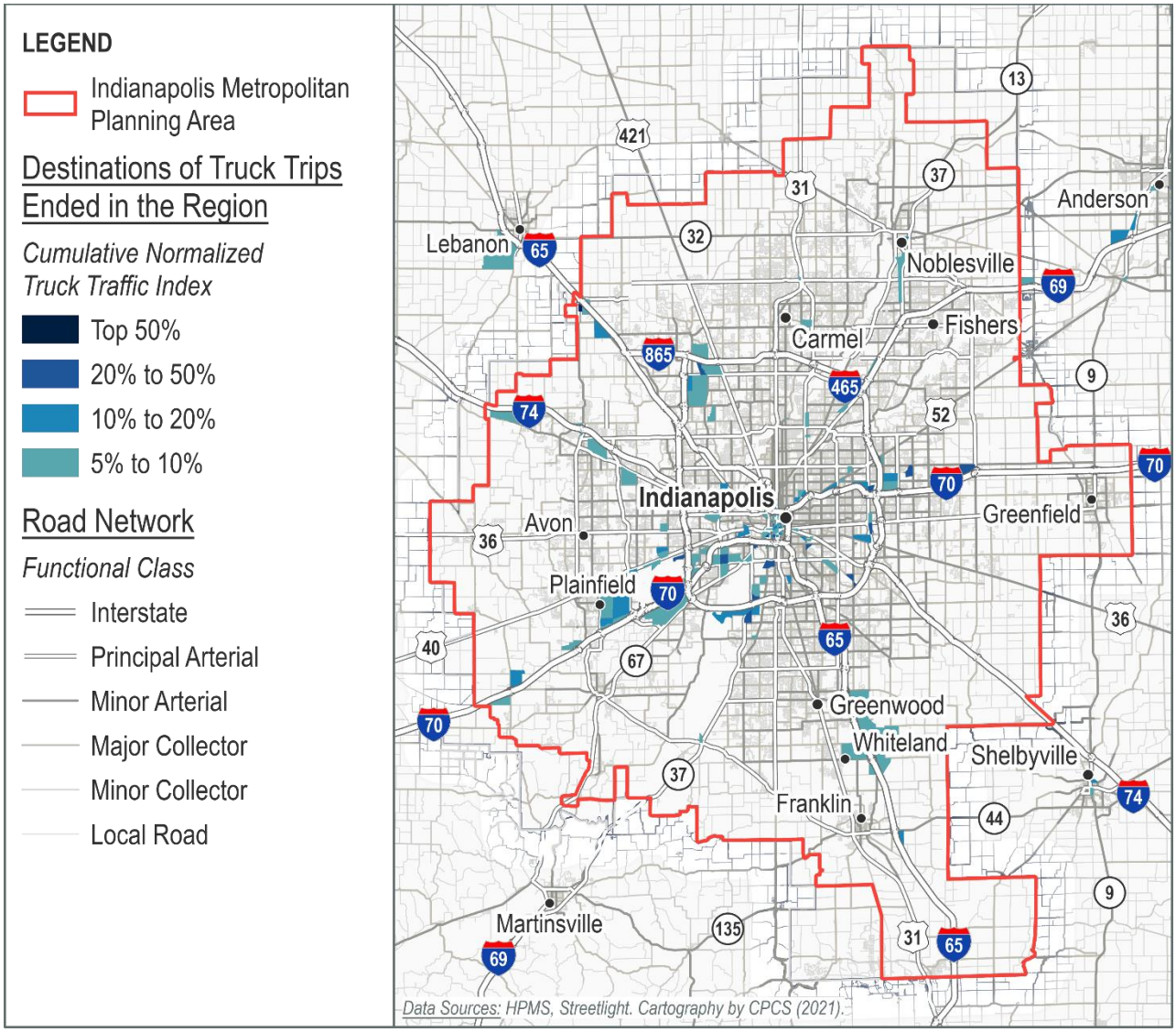


Figure 11 combines the top freight origins and destinations identified through the StreetLight data analysis in conjunction with the MDL regional activity centers and the freight clusters previously

identified in the 2015 Freight Plan/Travel Demand Model. As shown, the following freight activity centers/clusters have grown or continued growing since 2015:

Whitestown (Anson): the area south of the I-65/IN-267 interchange.

IND Airport: the area north and west of the Indianapolis International Airport.

Wholesale District/Old Southside: the area northwest of the I-70/I-65 interchange.

SW Lebanon: industrial land use west of I-65 in Lebanon.

Meanwhile, several freight activity centers have emerged in the region and increased in importance and impact on the transportation system over the past few years. These centers are listed in Figure 12.

Figure 11: Freight Activity Centers and Clusters

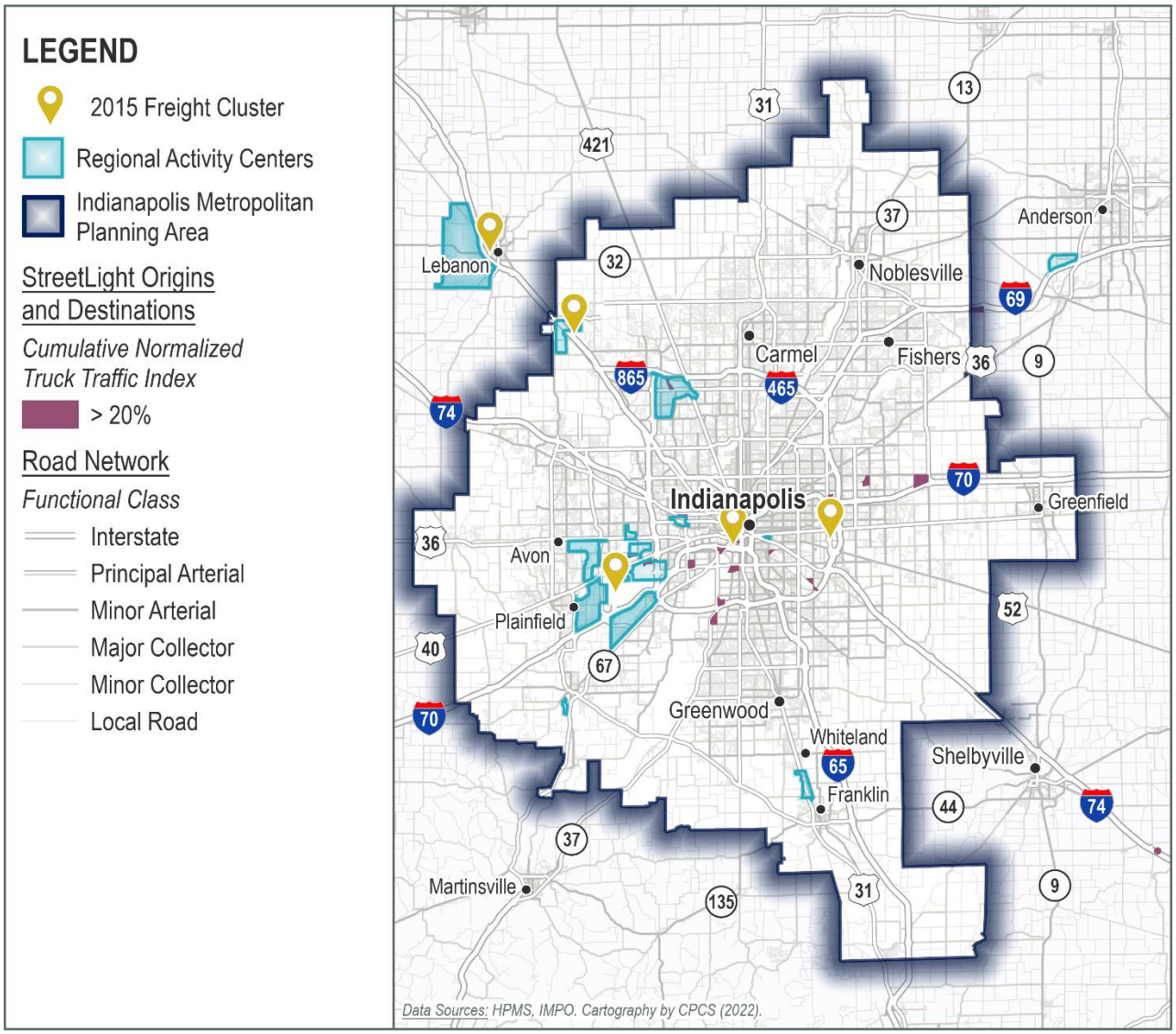


Figure 12: Regional Centers of Freight Activity (Emerging and Growing in Importance)

Freight Activity Center	MDL Centers	TDM Update	StreetLight Analysis
Industrial area southeast of I-465/I-865 interchange in Indianapolis	✹	✹	✹
Area surrounding the I-465/IN-37 interchange south of Indianapolis, (Harding Quarry)	✹		✹
Area northwest of the I-465/I-70 interchange east of Indianapolis	✹		✹
Area southeast of Indianapolis along I-70		✹	✹
Area bordered by East 30th St, Massachusetts Ave, and I-465, east of Indianapolis	✹		✹
CSX Avon Terminal		✹	✹
North Franklin: along US-31		✹	✹
Area near FedEx facility on Massachusetts Ave in Indianapolis		✹	✹
Area bordered by I-70, Kentucky Ave, and CSX railroad tracks		✹	✹
Area surrounding the I-69/I-465/Binford Blvd interchange	✹		
Areas around Love's Travel Stop (Mooresville) and the Pilot Travel Center (Greenfield)			✹
IIA Warehouse 1 & 2		✹	
S Mooresville		✹	
Speedway		✹	

Source: CPCS analysis, 2021.

Existing Multimodal Freight System Condition

Highway

The IMPO region is served by about 370 miles[9] of interstate, 140 miles of US highways, and 190 miles of State highways. The 2015 Regional Freight Plan used a tiered approach to classify major freight corridors for all modes that carry goods within the Central Indiana Regional Freight System.

To identify the highway system tiers the 2015 Regional Freight Plan used various criteria, including National Highway Freight Network (NHFN), National Highway System (NHS), Strategic Highway Network (STRAHNET), Indiana Commerce Corridor designation, daily truck volumes, functional classification, connection to intermodal facilities, and access to major industry clusters. Highway tiers are listed and described below:

Tier 1 – National Highway Freight Network (NHFN): The FHWA defines an NHFN as roadways critical for the movement of goods across the US. The National Highway Freight Program (NHFP) established by the Fixing America's Surface Transportation (FAST) Act is a federal aid program that supports improvement projects along the NHFN, which consists of:[10]

[9] Centerline miles.

[10] USDOT, Fixing America's Surface Transportation Act or "FAST Act", accessed 2022. https://www.fhwa.dot.gov/fastact/factsheets/nhfpfs.cfm

- **Primary Highway Freight System (PHFS):** a network of principal arterials (including interstate highways) that are most critical for freight activity, identified based on the volumes and values of freight moved through them and their Average Annual Daily Truck Traffic (AADTT).[11]
- **Other Interstate portions not on the PHFS:** the remaining portion of the principal arterials not included in the PHFS that are important for continuity and access to freight transportation facilities.
- **Critical Rural Freight Corridors (CRFCs):** public roads in rural areas that connect public transportation facilities or intermodal freight facilities to PHFS.
- **Critical Urban Freight Corridors (CUFCs):** public roads in urban areas that provide connection between the PHFS and public transportation facilities or intermodal freight facilities.

Tier 2 – Remainder of Interstates and Commerce Corridors: defined as the remainder of Interstate highways and commerce corridors identified by State DOT not included in Tier 1.

Tier 3 – Regional Freight Corridors: determined based on two different criteria. The first includes roadways not included in Tiers 1 and 2 and classified as freeway, principal arterial, minor highway, or major collector with an AADT over 1,000. The second criteria in Tier 3 may include roadways with an AADT of less than 1,000 but are critical for regional freight connectivity.

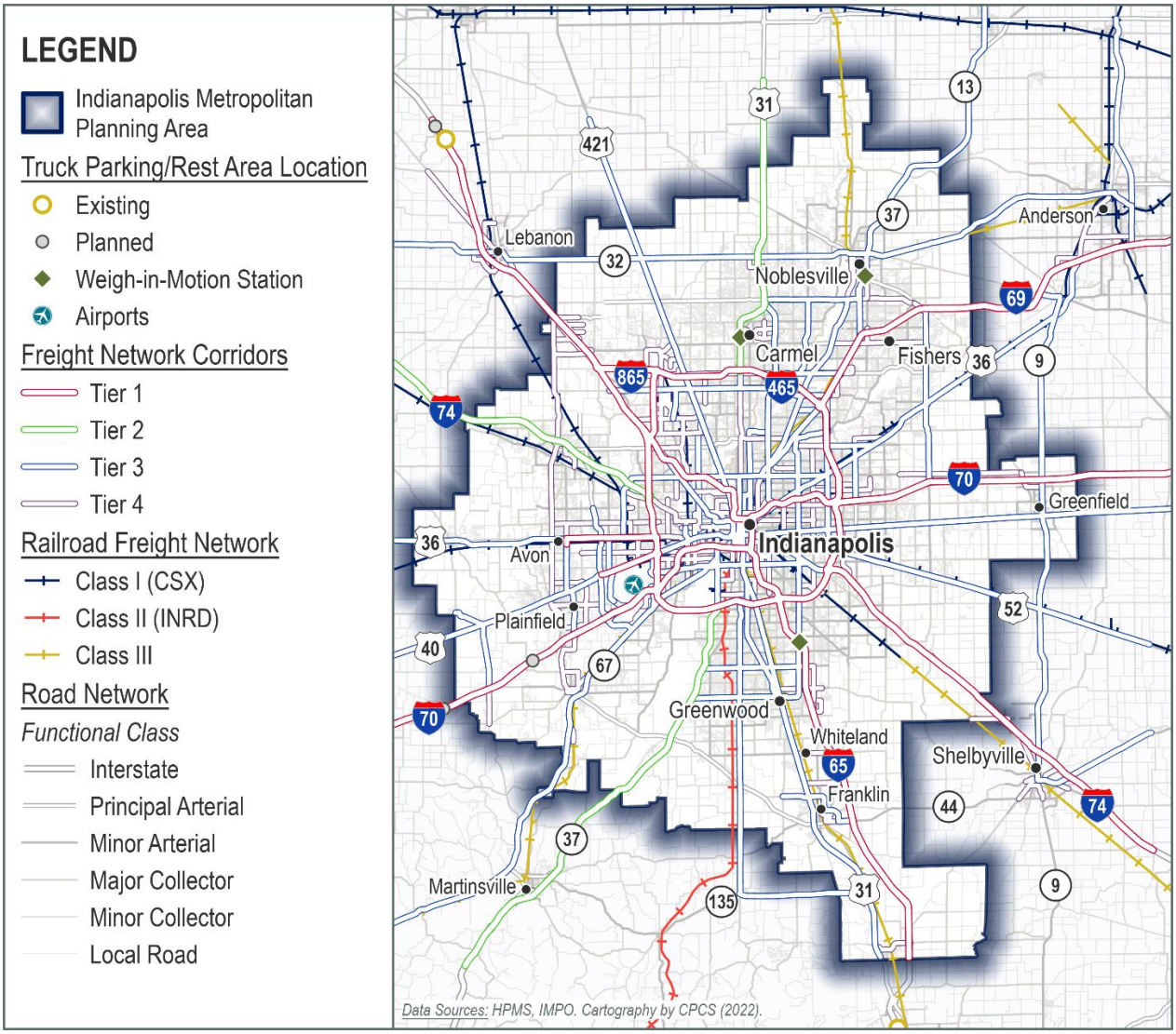
Tier 4 – Freight Connectors: roadways not included in Tiers 1, 2, or 3 that connect to freight generators in the region. Often, freight generators are located in significant manufacturing, industrial, and commercial areas that rely upon freight movements for efficient commerce.

The same criteria above were used to update the regional freight network corridors in this Plan with the addition of one criterion for identifying new Tier 4 segments: roadways not included in Tier 1 through 3 that serves a minimum of 500 trucks on a daily basis. Figure 13 shows the updated regional freight network. As a result of the update, over 50 miles of roadway segments were added to Tier 3 corridors, and 110 miles were added to the Tier 4 corridors. The 2015 Regional Freight Plan also identifies tiered rail and air cargo networks. There has been no update to the rail and air cargo tiered networks.

Figure 13 also shows the locations of weigh-in-motion stations, truck stops, industrial parks, and intermodal/transload facilities that connect the truck modes to other freight modes, including rail, air cargo, and grain elevators. As shown, two truck weigh stations are located within the IMPO region. However, public truck stops are located just outside of the IMPO's boundaries. Several private truck stop operators, including Love's, Flying J, Pilot, and TA have facilities within the IMPO region, primarily along the interstates, namely I-70, I-69, I-65, I-465, and I-74.

[11] Maps and tables showing roads included in the PHFS of the NHFN are available by State here: https://ops.fhwa.dot.gov/freight/infrastructure/ismt/nhfn_states_list.htm.

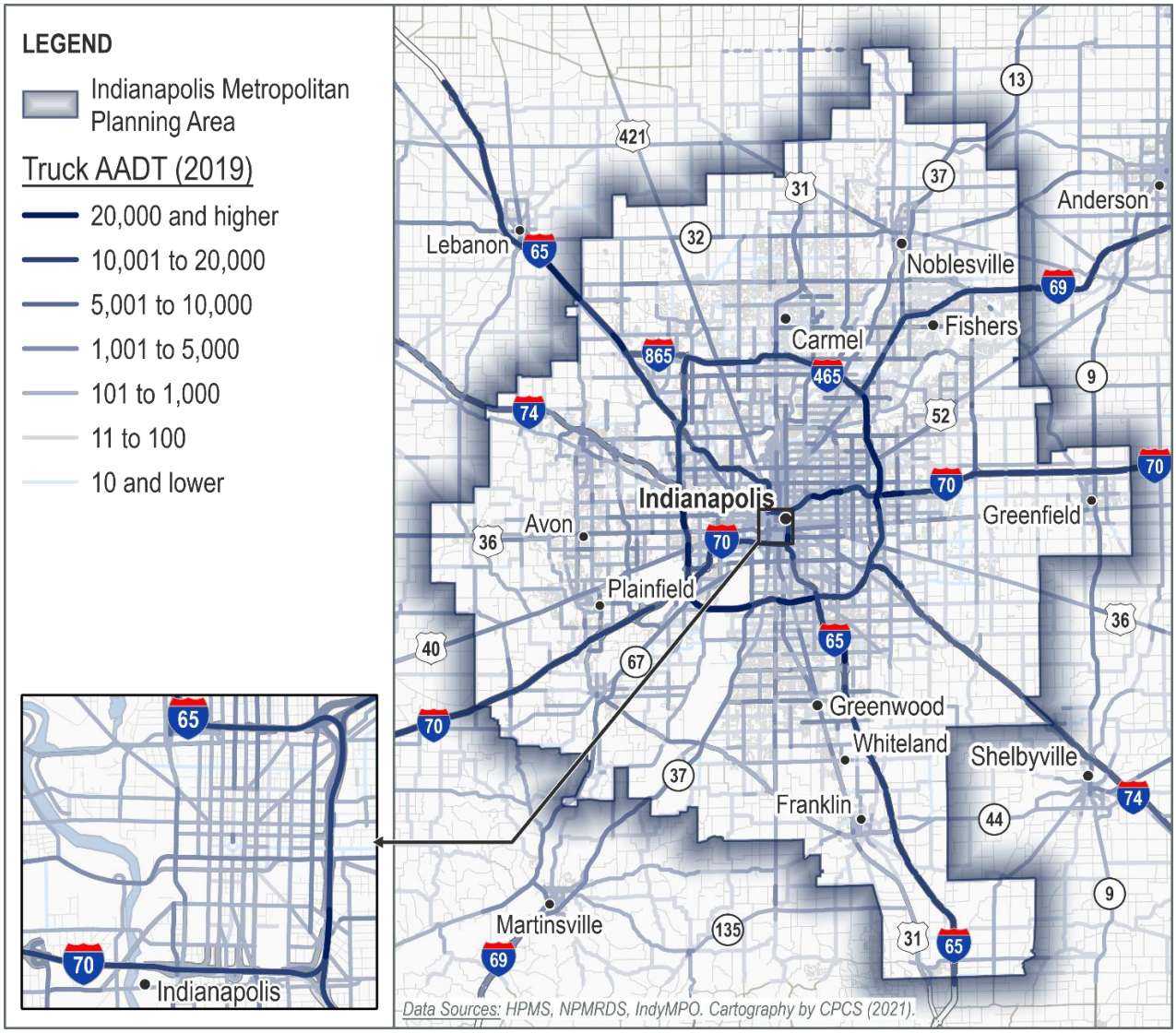
Figure 13: Central Indiana's Road Freight System



Annual Average Daily Truck Traffic

Trucking activities in the IMPO region are served by six interstates as well as a network of US highways and state and county routes. These corridors carry relatively high truck volumes to, from, and through the densely populated Indianapolis metropolitan area. Figure 14 provides an overview of truck-specific traffic volumes in the IMPO region and shows which routes are the most important based on the Annual Average Daily Truck Traffic (AADTT) volume.

Figure 14: AADTT in Central Indiana Region



Key Corridors

The trucks traveling in the IMPO region are served by several major interstates, national and state corridors, as well as a network of county and local routes that provide last-mile connection to the major highways. Figure 15 shows the region's key corridors that serve relatively high truck volumes.

Figure 15: Key Corridor AADT and AADTT (2019)

Key Corridors	AADT (2019)	Truck AADT (2019)
I-65	46,120	6,680
I-69	50,816	5,135
I-70	40,352	6,456
I-74	25,011	4,826
I-465	90,635	11,850
I-865	31,609	7,414

Key Corridors	AADT (2019)	Truck AADT (2019)
US-31	29,146	1,661
US-36	21,702	1,099
US-40	18,424	1,055
IN-37	18,048	1,547

Source: CPCS analysis of HPMS, 2019. AADT is the all-vehicle Annual Average Daily Traffic.

Truck Mobility and Reliability

Analysis of average truck speeds during peak periods provides an in-depth understanding of the highway system performance in serving truck travel demands. Figure 16 shows the average peak period truck speeds along highways and local roads of the IMPO region. As the map shows, average truck speeds in 2019 were generally higher than 46 miles per hour (mph) along the interstate system. However, other major highways of the region, including US-421, US-52, US-40, US-36, IN-37, IN-67, and IN-37, experience truck speeds lower than 46 mph.

Figure 16: Average Truck Speeds – All Roads

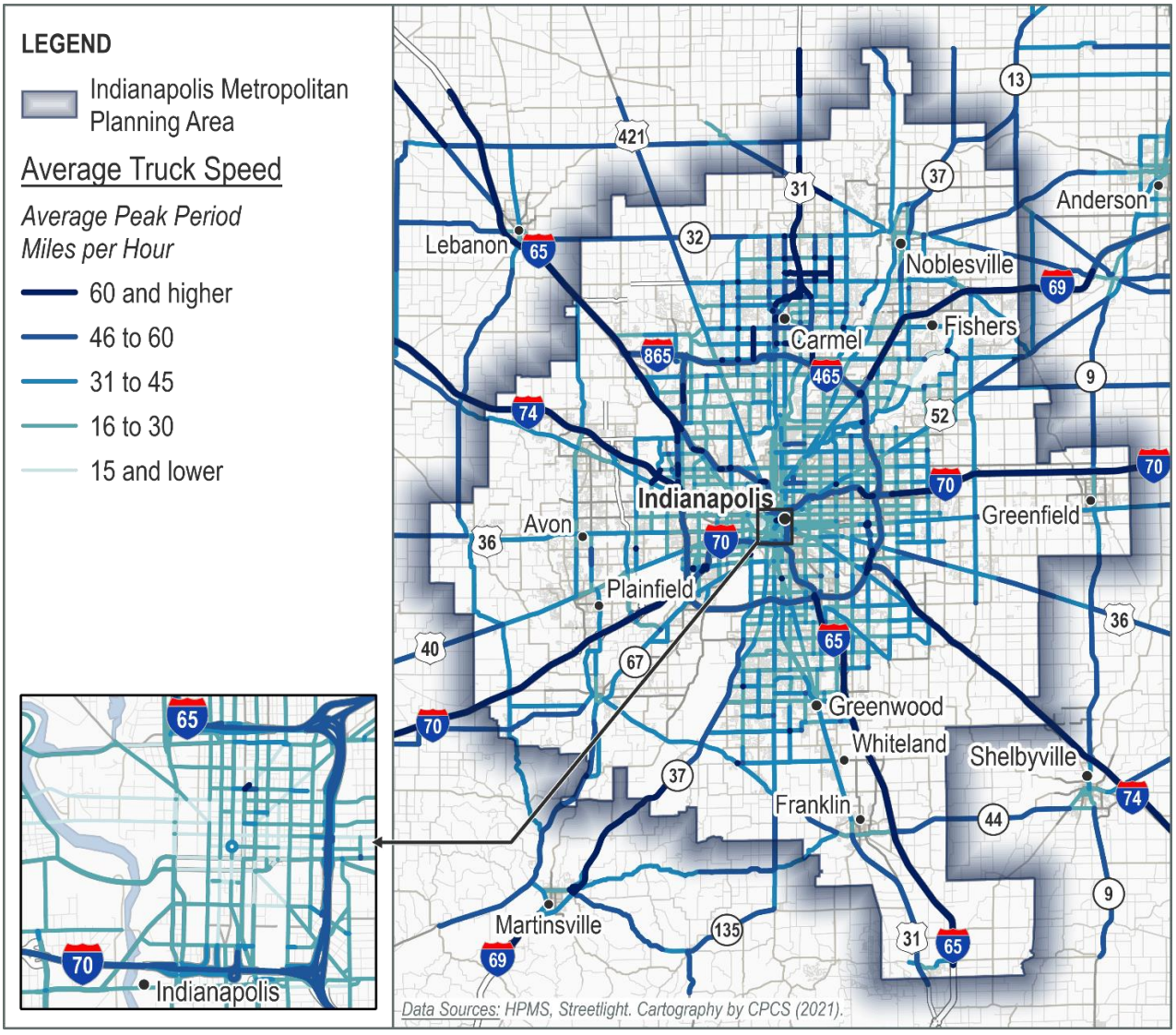


Figure 17 shows the average peak period truck speeds in the IMPO region for the interstate and US highways only. As shown, average speeds along the interstates are generally around 50 mph or higher. However, average speeds are lower than 40 mph for some US highways, including US-36, US-31, US-40, US-52, and US-421. Average truck speeds are significantly low along US-136, between IN-267 and in Ronald Regan Parkway in Brownsburg.

Figure 17: Average Truck Speeds – Interstates and US Highways

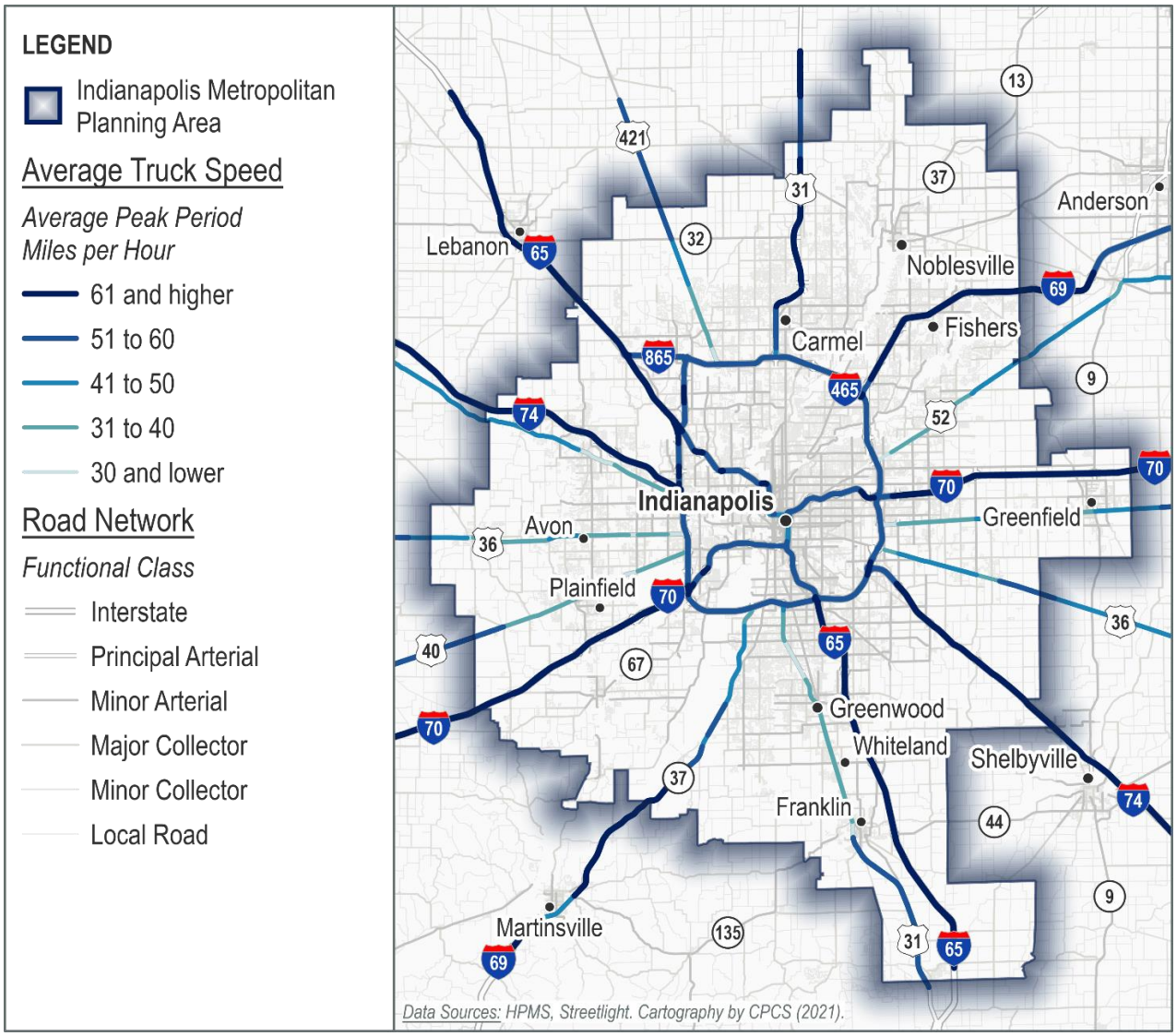
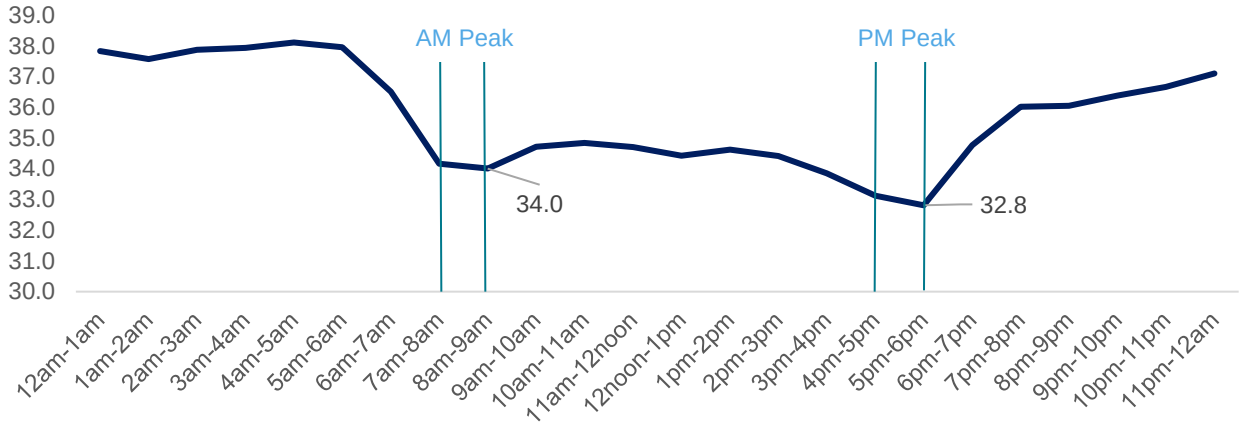


Figure 18 shows the daily[12] profile of average truck travel speeds in the IMPO region. As shown, average truck speeds drop significantly at around 7 AM and generally remain lower than 35 mph until around 6 PM. The sustained period of lower truck travel speeds between AM and PM peak periods indicates that speed reductions are generally due to high volumes of vehicles using the highway system. However, the congestion does not pose a major problem to trucking activities since the average speeds are rarely lower than 30 mph. While the average truck speed for the entire

[12] Weekdays, excluding holidays.

IMPO region may not get significantly low, specific high-volume corridors may still suffer from periodic congestion.

Figure 18: Average Truck Speeds by Time of the Day in the Central Indiana Region



Source: CPCS analysis of NPMRDS Data, 2021.

Figure 19 compares the average peak period truck speeds along highly congested corridors in the IMPO region with corridors in the IMPO's peer regions that experience similar traffic patterns, growth trends, and investment challenges.[13] Every year, the American Transportation Research Institute (ATRI) collects and analyzes truck GPS data in support of numerous Federal Highway Administration (FHWA) assessments of traffic performance across the US. ATRI uses this data to monitor congestion along 300 freight-significant highways identified by the FHWA through collaboration with trucking industry stakeholders.[14] ATRI's congestion value is an index calculated based on the average truck speed deviations from the free flow speeds divided by hourly truck volumes. The congestion values calculated for each of the 300 freight-significant highways are used for identifying and ranking the nation's top 100 truck bottlenecks – a higher congestion value indicates higher levels of truck congestion and a lower rank number.

Figure 19: Average Truck Speeds on Truck Bottlenecks in Central Indiana and Select Peer Regions

Location	Segment	Peak Average Speed (mph)	National Ranking of 100 by Congestion Index
Cincinnati, OH	I-71 at I-75	33.6	2
Nashville, TN	I-24/I-40 at I-440 East	35.0	11
Denver, CO	I-70 at I-25	31.7	22
Nashville, TN	I-40 at I-65 East	38.7	49
Indianapolis, IN	I-65 at I-70 North Split*	40.9	53
Gary, IN	I-65 at I-80	50.5	55
Nashville, TN	I-65 at I-24	44.1	57
Cincinnati, OH	I-75/I-71 at I-275	48.0	71
Kansas City, MO	I-70 at I-670/US-71	44.1	75
Charlotte, NC	I-85 at I-485 West	47.2	80

[13] Peer regions identified by IMPO's staff.

[14] ATRI, Top 100 Truck Bottlenecks, 2021. https://truckingresearch.org/2021/02/23/2021-top-truck-bottlenecks/ - Note: ATRI average the truck volumes and speeds across all days in a year, including weekends and holidays.

Location	Segment	Peak Average Speed (mph)	National Ranking of 100 by Congestion Index
Indianapolis, IN	I-465 at I-69	46.5	85
Milwaukee, WI	I-94/I-794 at I-43	42.5	89
Nashville, TN	I-65 at SR-386	44.0	95
Cincinnati, OH	I-75 at I-74	46.4	96

Source: ATRI, Top 100 Truck Bottlenecks, 2021. *Under improvement project as of July 2022.

As the above table shows, two of the nation's top 100 truck bottlenecks are located within the IMPO region. These corridors are ranked 53rd and 85th in terms of truck congestion compared to other highways across the US. However, compared to congested highways in the peer regions, the Central Indiana truck bottlenecks generally suffer from less congestion and thus have higher average peak hour truck speeds.

Truck travel speeds provided by the StreetLight platform and the National Performance Management Research Data Set (NPMRDS) were used to calculate truck travel times and then the Peak Hour Excessive Delay (PHED) for trucks traveling in the IMPO region. Travel time delay is a performance measure calculated based on the difference between free-flow travel time and observed travel time for particular road segments.

As shown in Figure 20, peak hour truck delays are generally not a major problem along the interstates. However, segments of I-465 between I-70 and US-31 on the northeast side, I-70 and I-65 highways inside the I-465 loop, North College Ave. in downtown Indianapolis, West 86th St. on the north side, and IN-39 between US-40 and I-70 on the west side experience an average of 33 to 85 minutes total daily delays for trucks.

The delay-per-miles are also relatively higher for:

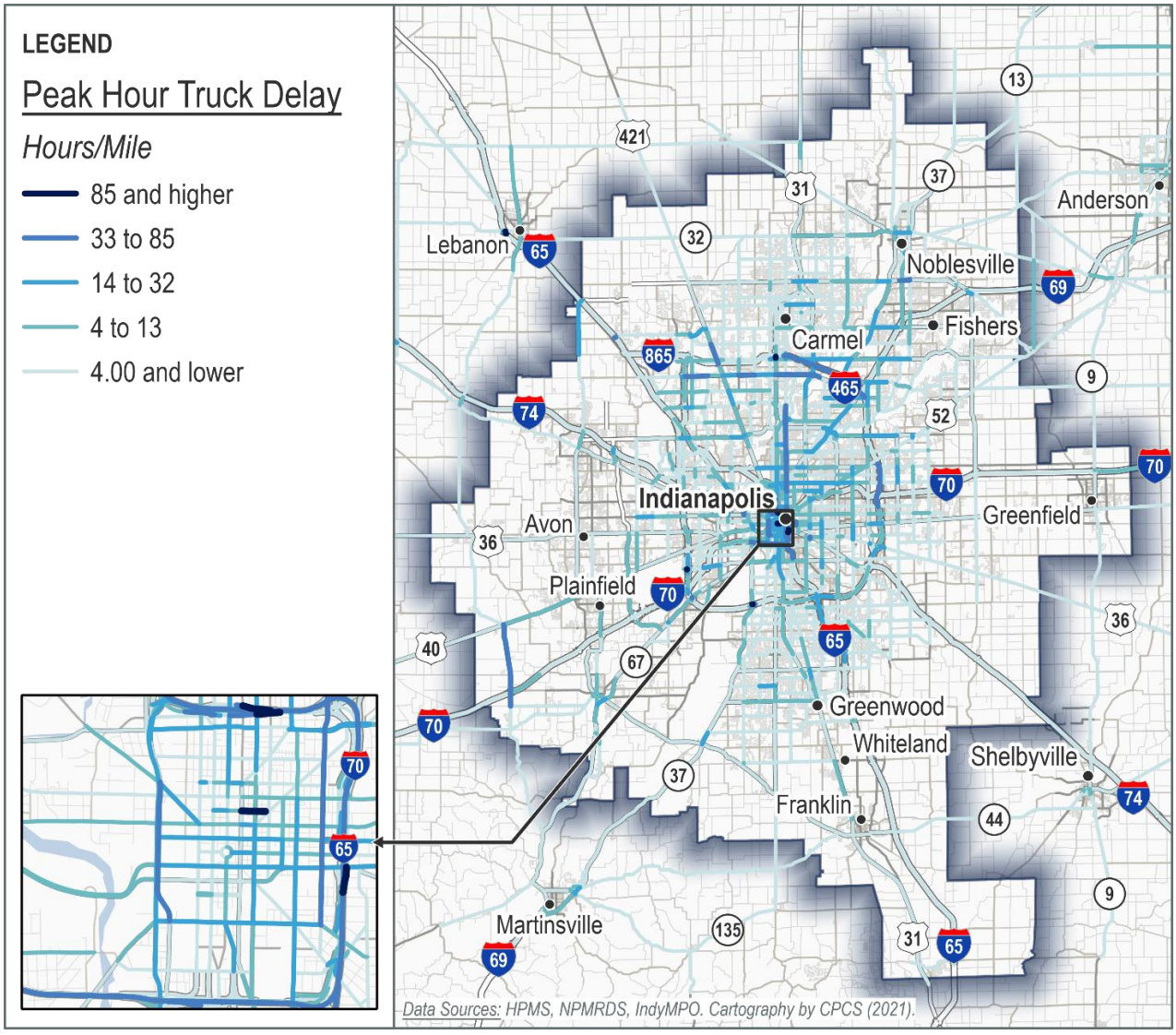
- Segments of I-465 between US-31 and I-69 near Castleton, US-36 and I-70 in Lawrence, US-52 and I-74 on the east side, and I-70 and US-40 near the Indianapolis International Airport;
- I-65 in downtown Indianapolis between the I-65/I-70 interchanges;
- I-70 in downtown Indianapolis between White River and interchange with Madison Ave.

The delay per mile calculated using the above formulas was also used to rank the IMPO region's roadway segments and identify the top 20 regional truck bottlenecks shown in Figure 22. As expected, the corridors with the highest daily truck delays are the ones with the highest daily truck volumes (shown in Figure 20), located generally in Indianapolis and within the I-465 loop.

Since 2019 (which is the analysis base year used in this study), several interchange improvement projects have started in the region that could have contributed to the interchange congestion issues. However, these projects, when completed, would impact the traffic patterns across the region. In addition to the top truck bottlenecks identified through analysis of StreetLight data, the following routes in the IMPO region have been identified by the project stakeholders for carrying relatively high volumes of trucks and suffering from periodic congestion issues:

- E 86th St., between N Keystone Ave. and N Meridian St
- W 86th St., between N Meridian St. and Michigan Rd
- Harding Street between I-70 and Washington St

Figure 20: Peak Hour Truck Delay



Another truck mobility measure is the Truck Travel Time Reliability Index (TTTR), which is the ratio of average truck travel time in peak hours to free-flow truck travel time and indicates the degree to which travel time delays are unexpected to road users. As Figure 21 shows, travel times in the region are higher along corridors that carry traffic from outside of the I-465 corridor to downtown Indianapolis, such as E 16th St., which runs parallel to I-70 between I-465 and I-65, 30th St. running parallel to I-65, and N Capitol Ave. in downtown Indianapolis. Other corridors with high TTTR include:

- Keller Hill Rd. in Mooresville;
- E Edgewood Ave. between US-31 and I-65 on the south side;
- E Stop 11 Rd. in Greenwood;
- IN-234 between US-36 and IN-9; and
- E 96th St. west of Fortville.

Figure 21: Truck Travel Time Reliability Index

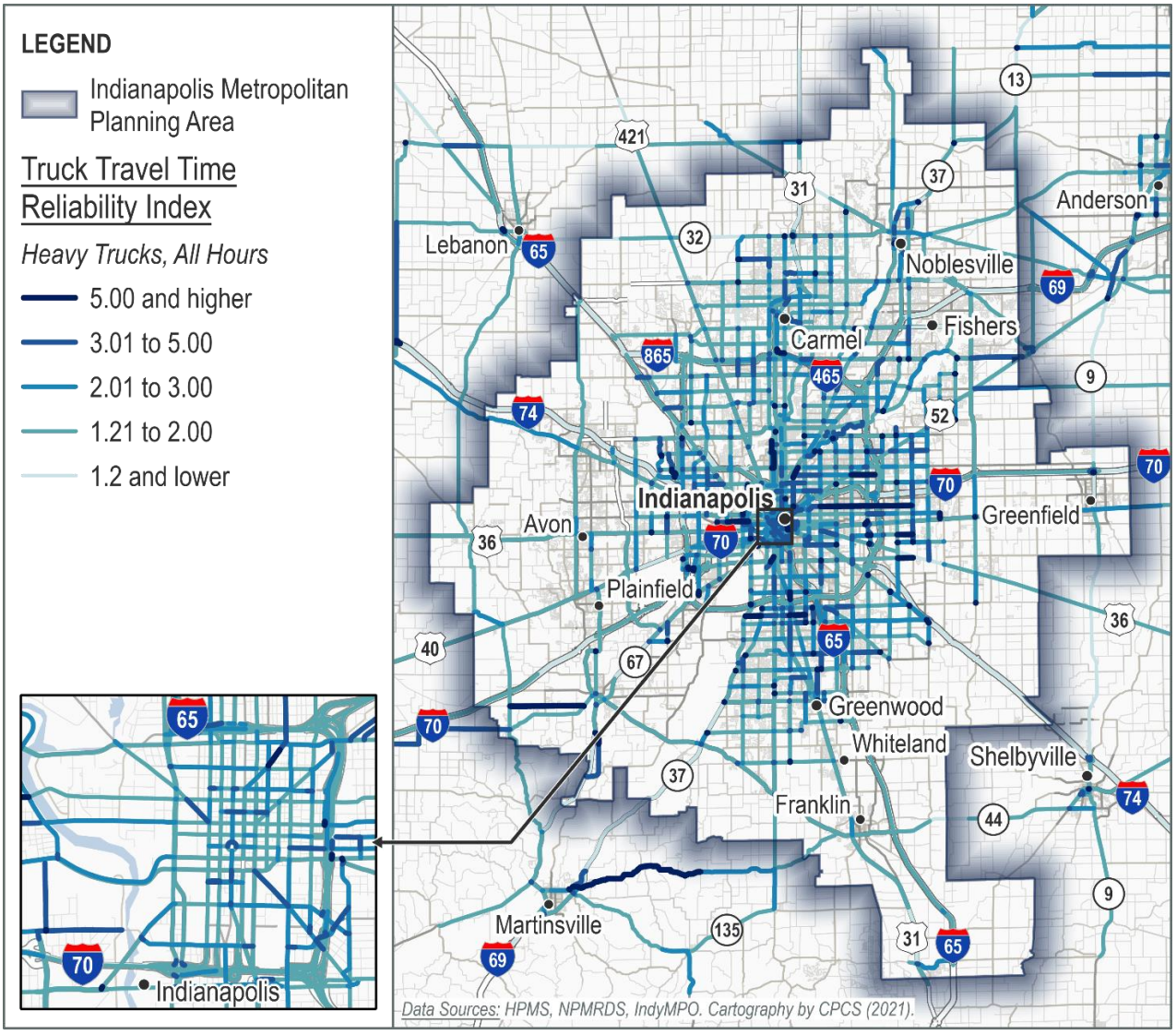


Figure 22 shows the truck bottlenecks in the IMPO region, identified based on the delay per mile and TTTR Index analysis. The challenges affecting truck movements along the region's bottleneck segments can be categorized into the following:

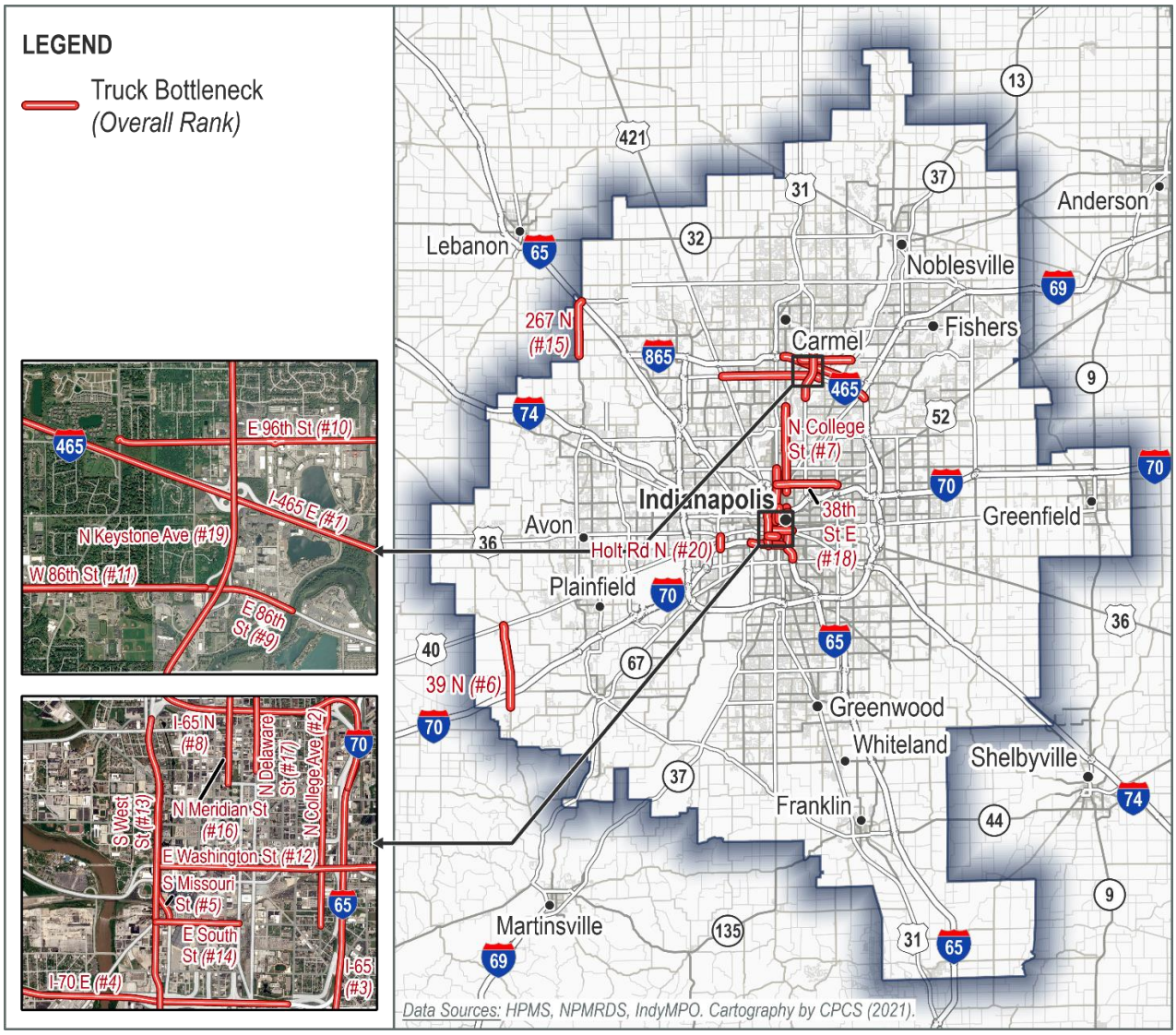
Bottlenecks due to heavy all-vehicle **traffic in downtown** Indianapolis: trucks traveling on section of College St between 16th St. and Fletcher Ave., West St between Indiana Ave. and South St, I-65 between I-70/I-65 north split and Dr. MLK Jr. St, Washington St between I-70 and West St, West St between I-70 and 11th St, South St between Madison Ave. and West St, and Delaware St between 16th St. and Fort Wayne Ave experience relatively higher delays due to having to compete with heavy passenger vehicle traffic volumes traveling in the Indianapolis's downtown area.

Lack of access to interstates and US highways: trucks traveling in the areas north of downtown Indianapolis use local streets such as N Meridian St and N College St to access the I-465 highway and points further north as interstate highway options are not available in this area.

Barriers to traffic flow due to **lack of river bridges and railroad over/under passes**: trucks traveling on routes such as 86th St, 96th St, Keystone Ave, and Holt Rd experience delays due to the limited number of bridge lanes and having to stop at highway-rail grade crossings.

Bottlenecks due to heavy all-vehicle **traffic at highway interchanges**: trucks may experience delays due to high volumes of vehicles and weaving maneuvers at interchanges such as I-465/US-37 on the north side, I-70/I-65 (both splits), I-70/IN-39, and I-65/IN-267.

Figure 22: Truck Bottlenecks

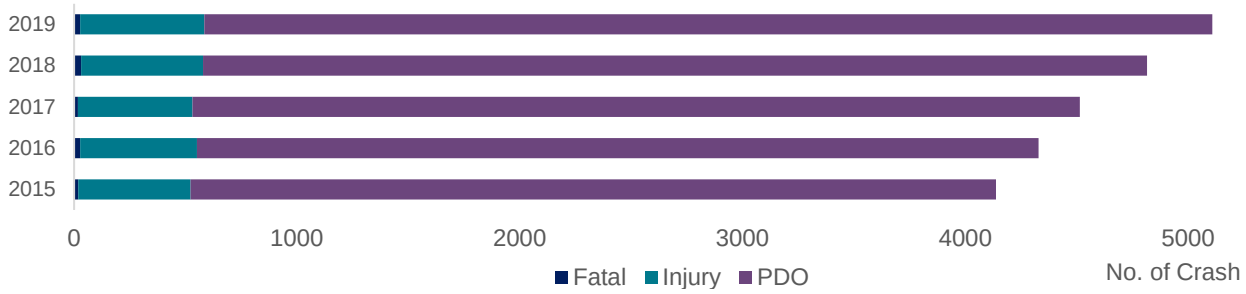


Truck Safety

This section provides an overview of the IMPO region's truck safety performance, focusing on safety trends between 2015 and 2019. Based on the data provided by the IMPO through the Automated Reporting Information Exchange System (ARIES), which is generated by first responder crash reports, more than 16,900 incapacitating or fatal roadway crashes happened in the region over five years, about 16% of which involved trucks.

The 5,110 truck-involved collisions that occurred in the region between 2015 and 2019 led to 121 deaths and near 2,649 injuries with various severity levels (Figure 23). In addition to injury and fatal crashes, over 20,130 Property-Damage-Only (PDO) truck-involved crashes happened in the IMPO region, which did not result in any deaths or injuries. Figure 24 provides the region's truck-involved crashes along the interstate and the US highway systems.

Figure 23: Truck-Involved Crash Trends



Source: CPCS analysis of crash data provided by IMPO, 2021.

Figure 24: Truck Safety Hotspots - Interstate & US Highways

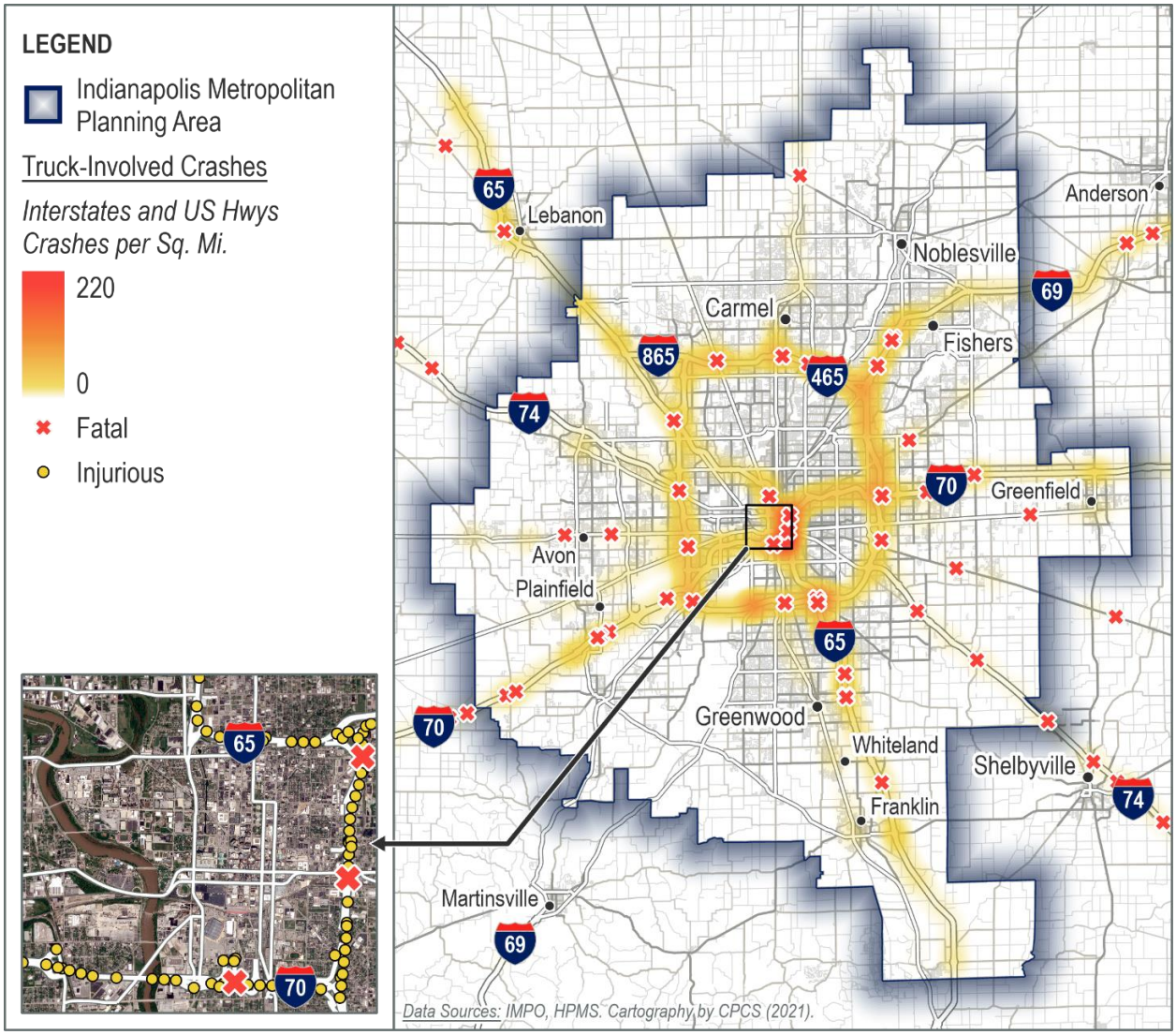
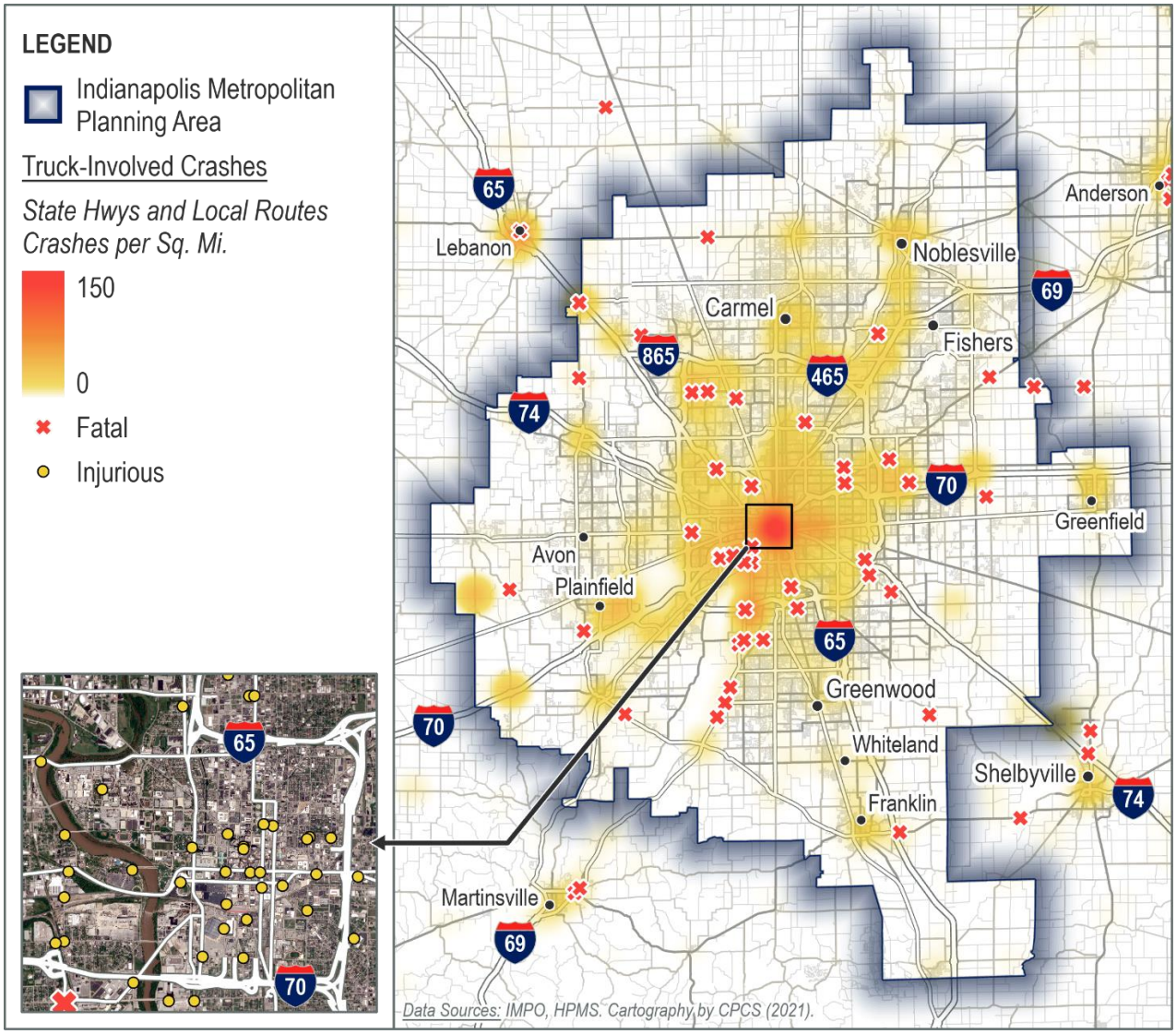


Figure 25 presents the truck-involved crashes along the state and local routes. Comparing the five-year truck collisions with the region's truck AADTs reveals that the majority of truck crashes are clustered along high-volume corridors, including I-465, I-70, I-65, and I-74.

State and local routes that provide access to interstate and US highways also suffer from truck-related safety issues (Figure 25). In particular, injury and fatal truck-involved crashes are clustered near intersections in downtown Indianapolis, along local streets such as Georgetown Rd., Zionsville Rd., Michigan Rd., and East New York St., as well as along state routes including IN-37, IN-67, IN-267, IN-135, and IN-32.

Figure 25: Truck Safety Hotspots - State & Local Routes



Truck crash data analysis shows that sideswipe collisions in the same direction are the leading type of truck crashes in the region (32%). Also, rear-end crashes are responsible for about 33% of injuries and 29% of the truck-involved fatalities in the region. This fatality share is consistent with the overall share of rear-end truck-involved collisions (about 19%). The probability of truck collisions involving a fatality is the highest in head-on (3.9% probability) and right-angle crashes (1.9% probability).

Rail

The IMPO region is served by 220 miles of CSX Class I railroad and over 100 miles of regional and short line operations. Norfolk Southern (NS) is also a Class I railroad with trackage right over CSX's tracks through Indianapolis.[15] The Indiana Rail Road Company (INRD) is the Class II (or regional) railroad operating on a line parallel to IN-135 and connecting to an intermodal facility south of downtown Indianapolis.

The Class III (short line) operations in the IMPO region are Indiana Southern Railroad (ISRR), Louisville & Indiana Railroad Co (LIRC), Central Railroad Co. of Indiana (CIND)[16], and Hoosier Heritage Port Authority (HHPA).

In addition to the intermodal facility south of downtown Indianapolis, CSX has an intermodal facility in Avon. Also, ten rail/truck transload facilities and two grain elevators serve the freight industry in the IMPO region. Figure 26 presents a summary of the freight rail operations in the Central Indiana region, and Figure 27 illustrates these operations as well as facilities that connect rail to other modes.

Railroad Classes

The US Surface Transportation Board (STB) categorizes railroads based on revenue thresholds:

- *Class I*: annual operating revenue of $447.6 M or more;
- *Class II (Regional)*: annual operating revenue between $35.8 and $447.6 M;
- *Class III (Short Lines – include switching and terminal sections)*: annual operating revenue less than $35.8 M.

Source: Surface Transportation Board, 2019.

Figure 26: Freight Railroads Serving the Central Indiana Region

Railroad	Type	Mileage Owned in IMPO Region	Amtrak Mileage
CSX	Class I	220	42.0
NS*	Class I	0	0
INRD	Class II	20	0
ISRR	Short Line	23	0
LIRC	Short Line	31	0
CIND	Short Line	N/A	0
HHPA	Short Line	21**	0

Source: CPCS analysis of rail profile data provided by the IMPO, 2021.
*Through trackage right on CSX's line. **Approximately 17 miles of the HHPA line in Indianapolis is abandoned. HHPA is turning the rest of the line from Noblesville to Indianapolis into a trail. N/A: Not Applicable.

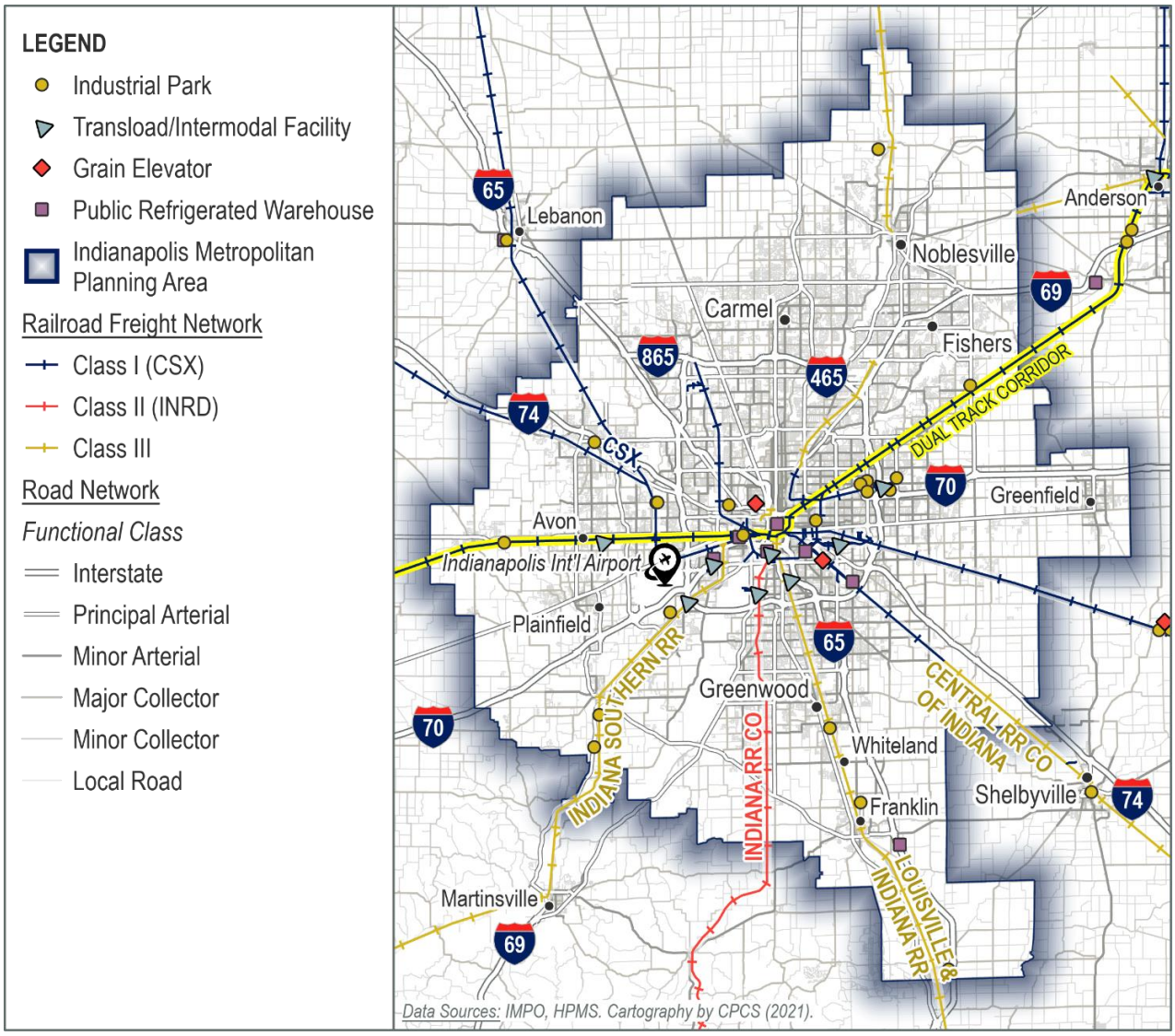
As shown in the table above, the CSX tracks in the IMPO region also serve Amtrak trains on the Cardinal route that travels between Cincinnati, OH and Chicago, IL through Indianapolis, Crawfordsville, and Lafayette. Three Amtrak trains per week travel on the Cardinal route. In 2019, the Cardinal route served an average of 107,700 passengers. Chicago-Indianapolis are the top origin-destination city pairs on the Cardinal route in terms of the number of passengers. Over 10,680 passengers in Indianapolis and 6,500 passengers in Lafayette boarded and un-boarded the

[15] As of 2022, NS is not operating exercising the trackage right. Source: stakeholder input and NS Website: http://www.nscorp.com/content/dam/nscorp/get-to-know-ns/about-ns/state-fact-sheets/in-state-fact-sheet.pdf

[16] CIND only operates on CSX's line up to Shelbyville. Source: stakeholder input and Genesee & Wyoming RR Website: https://www.gwrr.com/cind/

Cardinal trains in 2019.[17] In 2021, Amtrak announced new plans for expanding the rail transit system in Indianapolis, with additional stations and a stop at the IND airport.[18]

Figure 27: Central Indiana Rail System Map

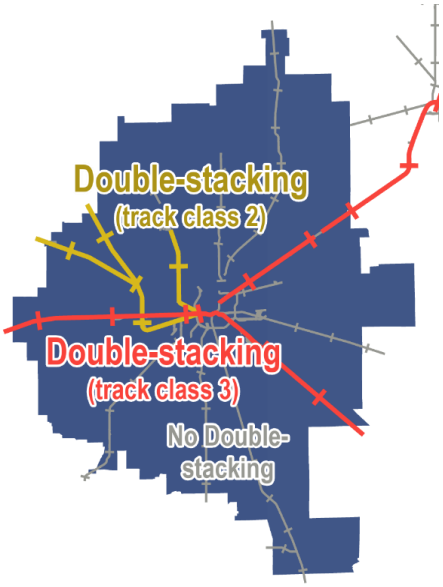


[17] Amtrak Fact Sheet, Cardinal Service & Hoosier State Service, 2019.

[18] Amtrak Website, Connects US, Accessed July 2022.

Region's Tiered Rail Freight Corridors

The previous IMPO Freight Plan (2015) established a tiered approach to classify the freight-specific corridors for road and rail freight modes serving the IMPO region. According to this approach, rail corridors serving Class I rail operations (CSX and NS routes) are categorized as Tier I, while Class II and short line routes are Tier 2 railroads. Figure 28 shows the portion of the tiered rail freight network in the IMPO region that has double-stack clearance.

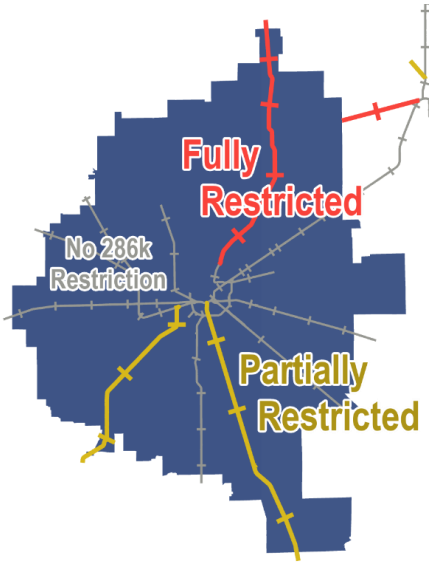


Double-stack rail operations carry two layers of intermodal containers and require a height clearance of 18 feet to 20 feet above the rail tracks.[19] The railroads can increase their operational efficiency and reduce costs, as a freight train can carry roughly twice as many containers in double-stack operations. As shown, about 46% of Class I (Tier 1) system and nearly 8% of Class III (Tier 2) system in the IMPO region can accommodate double-stacked trains.

Figure 28: Double-stack Status in the Central Indiana Region

Railroad Class	Freight Tier	Miles Double-Stack	Percent of Total Miles Double-Stack
Class I	Tier 1	102.3	46%
Class II	Tier 2	0	0%
Short Line	Tier 2	6.5	8%
Total	-	108.8	34%

Source: CPCS analysis of rail profile data provided by the IMPO, 2021.



Upgrading rail corridors to accommodate railcars weighing up to 286K lbs. is a major factor in helping freight railroads improve their total payload and, therefore, productivity. Without the upgrade, the heaviest railcars that can be carried on the rail tracks are about 263K lbs.

Figure 29 shows the portion of the rail freight system in the IMPO region that can accommodate 286K lbs. railcars. As shown, about 77% of the rail freight system in the IMPO region is 286K lbs. capable. Almost the entire length of Class I and Class II railroad tracks in the IMPO region can carry 286K lbs. railcars. However, only about 11% of the short line system in the IMPO region is 286K lbs. capable.

[19] CSX, Double-stack Clearance Map, 2019. https://www.csx.com/index.cfm/library/files/customers/dimensional-clearance/double-stack-map/

Figure 29: Freight Rail Weight Capacity in the Central Indiana Region

Railroad Class	Miles 286K lbs. Capable	Percent of Total Miles 286K lbs. Capable	Miles Restricted	Miles Partially Restricted
Class I	220	99.8%	-	0.2
Class II	19.8	100%	0	0
Short Line	9	11%	21	53.5
Total	249	77%	21	53.7

Source: CPCS analysis of rail profile data provided by the IMPO, 2021.

Rail Served Facilities

The rail-served facilities are mainly located within the jurisdiction of Indianapolis. Figure 30 demonstrates the list of rail-served facilities, including intermodal terminals, transload facilities, and grain elevators in the Central Indiana region. In addition, Central Indiana & Western Railroad serves Industrial Recyclers, a transload facility in Anderson, which is about 30 miles northeast of Indianapolis. As of 2022, INRD has plans for an expansion of its intermodal terminal in the very near future.

Figure 30: Rail Served Facilities

Facility Name	Facility Type	Serving Railroad	Location
CSX Intermodal Terminal	Intermodal Terminal	CSX	Avon, IN
CN/INRD Intermodal Terminal	Intermodal Terminal	INRD	Indianapolis, IN
CSX Transflo Indianapolis	Transload Facility	CSX	Indianapolis.IN
Progressive Logistics LLC	Transload Facility	CSX	Indianapolis.IN
Arrow Reload Systems Inc	Transload Facility	INRD	Indianapolis, IN
Indianapolis Industrial Center	Transload Facility	CSX, INRD	Indianapolis, IN
Venture Logistics	Transload Facility	INRD	Indianapolis, IN
Piper Logistics Warehousing	Transload Facility	CSX	Indianapolis, IN
Venezia Transport Services, Inc.	Transload Facility	INRD	Indianapolis, IN
Kid Glove	Transload Facility	ISRR	Indianapolis, IN

Source: CPCS analysis of information provided in the Indiana State Rail Plan Appendix; Load match website; railroad company websites, 2021.

As listed in Figure 31, the segment of US-36 and Dan Jones Road between exit 13 on I-465/I-74 and the CSX Intermodal Facility in Avon is the only truck/rail intermodal connector identified by USDOT and FHWA in the IMPO region. This intermodal connector is the longest in length among the 20 intermodal connectors in the State of Indiana.

Figure 31: Intermodal Connectors in the Central Indiana Region

Intermodal Connector Route	Segment Length (miles)	Truck AADT (2019)	Facility Served
From I-465/I-74 (exit 13): west on US-36, south on Dan Jones Road to terminal	6.5	490	Avon CSX Intermodal Facility

Source: CPCS analysis of FHWA's Intermodal Connectors List, 2021; IDOT Traffic Count Database System, 2019.

Additional routes may qualify for the FHWA Intermodal Connector designation. These routes are generally selected by the USDOT in consultation with State Departments of Transportation (DOTs) and metropolitan planning organization (MPO) partners. Relevant criteria on routes serving major intermodal rail facilities in the region will be assessed to identify a list of candidate routes for adding to or modifying the NHS Intermodal Connector subsystem.

Rail Crossings

Over 470 active highway-rail grade crossings exist in the IMPO region, over 80% of which are public crossings, and the rest are private crossings. In addition to at-grade crossings, 152 grade-separated railroad crossings exist in the IMPO region that cross over or under the roadway lanes. The majority (98%) of these crossings are public, meaning they cross roadways under the jurisdiction of state or local public transportation authorities. Figure 32 lists the number of rail crossings in the Central Indiana region by position and type.

Figure 32: Central Indiana Railroad Crossings by Position and Type

Crossing Position	Private	Public	Total
At-grade	94	377	471
Railroad over/under the roadway bridge	3	149	152
Total	97	526	623

Source: CPCS analysis of FRA Crossing Inventory Database, 2021.

The Federal Highway Administration (FHWA) provides guidance on equipping at-grade crossings with warning devices in the Manual of Uniform Traffic Control Devices (MUTCD).[20] According to the MUTCD, all public grade crossings should at least be equipped with passive warning devices to mitigate conflict between rail and other modes, which will lead to safety incidents. The traffic control devices such as signs and markings located at or in advance of grade crossings to indicate the presence of a rail crossing are known as passive warning devices. In contrast, active warning devices such as flashing lights, and gates change their aspect at the approach or passing of a train. Typically, both passive and active warning devices are installed at grade crossings to improve safety.

FRA's data shows that 68% of the public grade crossings in the region are equipped with both flashing lights and gates. Meanwhile, private crossings are primarily equipped with passive safety devices such as crossbucks, pavement markings, and stop signs. Five grade crossings in the region are not equipped with any warning devices, all of which cross private roads.

Rail Safety

For the rail safety analysis presented in this section, rail incident reports submitted by railroads to the Federal Railroad Administration (FRA) are used. The Accident Reports Act (ARA), signed into law in 1910, requires the railroads to file monthly reports of "accidents and incidents resulting in injury or death to an individual or damage to equipment or a roadbed arising from the carrier's operations" with the US Secretary of Transportation. ARA's provisions are also fortified through the provisions and amendments introduced in the 1970 Federal Railroad Safety Act (FRSA). Both ARC

[20] FHWA, Manual on Uniform Traffic Control Devices, Online Guide, Accessed July 2021.

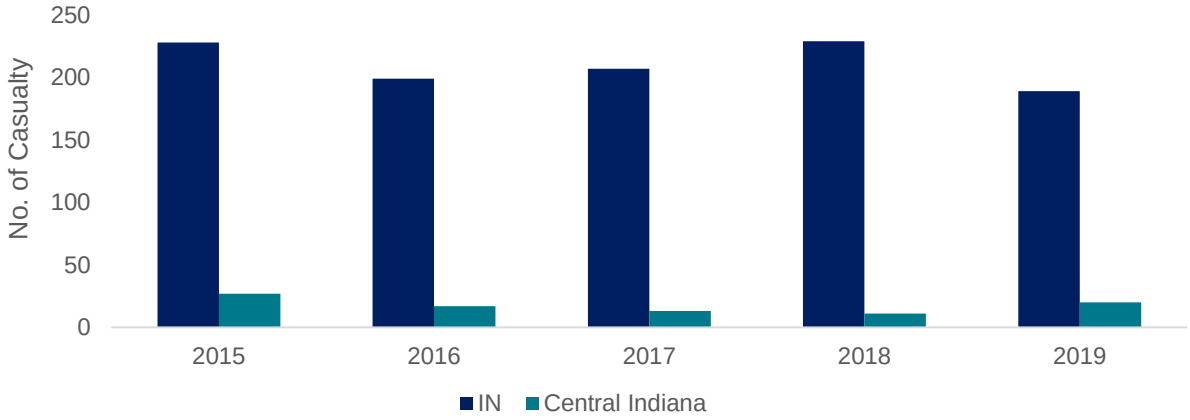
and FRSA delegate the authority for prescription and enforcement of rail safety standards and regulations to the FRA.[21]

The rail safety incident categories based on railroads' reports to FRA include:

- Highway-rail grade crossing incidents;
- Rail equipment incidents, including train collisions, derailments, fires or explosions, and other events that happen during rail operations and meet the FRA's monetary threshold notice for reporting;[22] and
- Rail-related casualties, which are deaths, injuries, and railroad worker occupational illnesses that results in medical treatment, significant diagnosis by a health professional, or loss of consciousness.[23]

Over 248 freight rail incidents happened in the Central Indiana region between 2015 and 2019, resulting in 18 deaths and more than 79 person injuries. In 2019, the region's freight rail system saw 58 incidents in total, which led to 8 deaths and 12 person injuries. Trespassing incidents accounted for the highest share of the 2019 freight rail casualties in Central Indiana (6%). As Figure 33 shows, since 2015, the total number of rail casualties in Central Indiana has more than doubled.

Figure 33: Rail Casualty Trend in Indiana and Central Indiana Region



Source: CPCS analysis of FRA Safety Data, 2021.

Between 2015 and 2019, 77 incidents happened at highway-rail grade crossings in the IMPO region, resulting in 9 deaths and 34 person injuries. In 2019, 21 crossing incidents caused six person injuries and five fatalities in the IMPO region. When comparing 2019 to 2015, IMPO's crossing incidents have increased by about 90%.

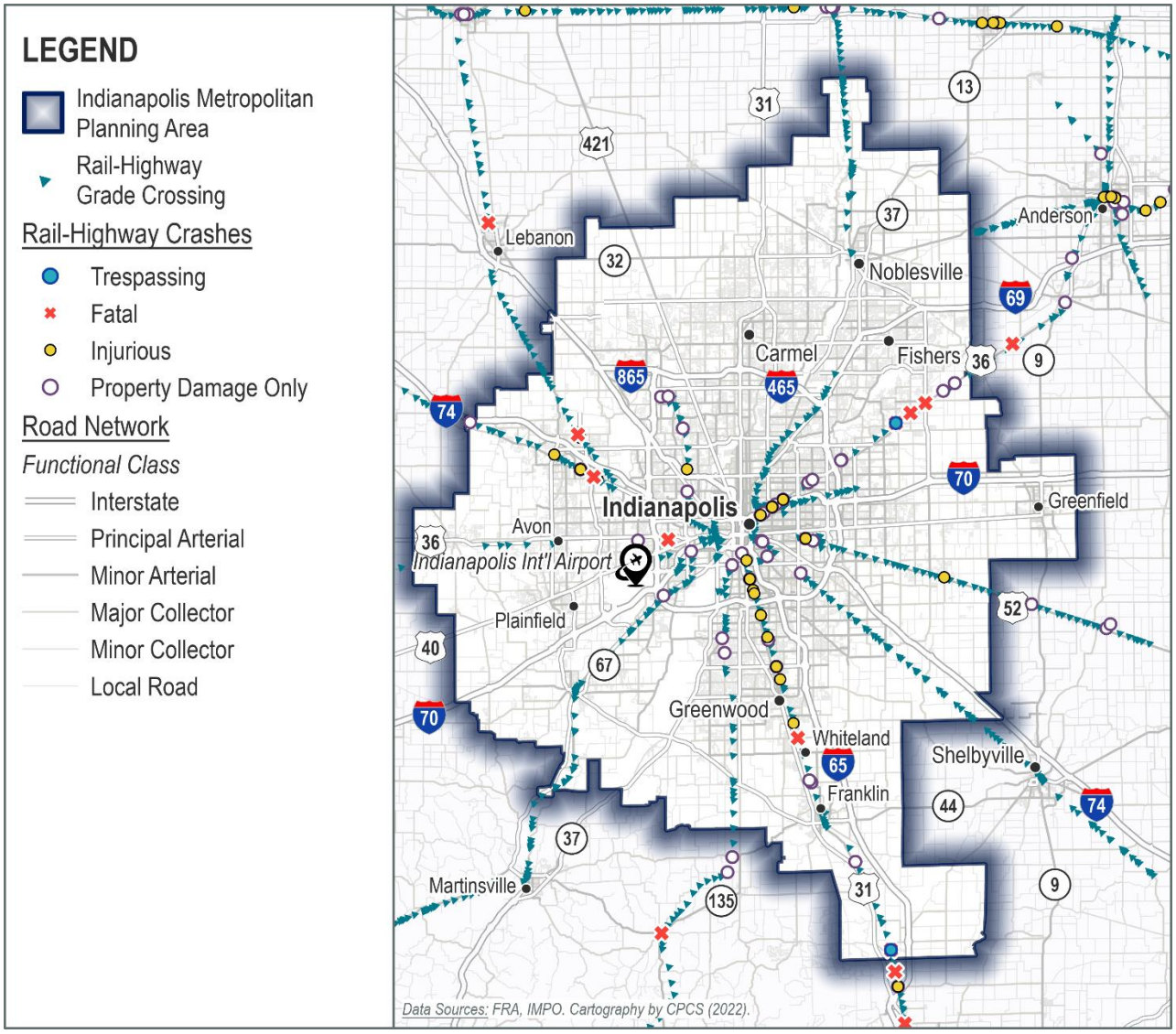
Single-unit trucks and tractor-trailers were involved in 18% of the highway-rail grade crossing incidents that happened over the past five years in the IMPO region. 50% of the time, the trucks involved in highway-rail crossing incidents were moving over the crossings while the trains were approaching, and about 40% of the time, the trucks were stopped on the rail tracks when they were hit by a train (Figure 34).

[21] 49 U.S.C. §§ 20901–20903 and 49 CFR Part 225.

[22] FRA's current monetary threshold is $11,200 (effective January 2021). For more information on FRA's monetary threshold see: https://safetydata.fra.dot.gov/officeofsafety/ProcessFile.aspx?doc=Monetary%20Threshold%20Notice.pdf

[23] FRA Guide for Preparing Accident/Incident Reports, 2011.

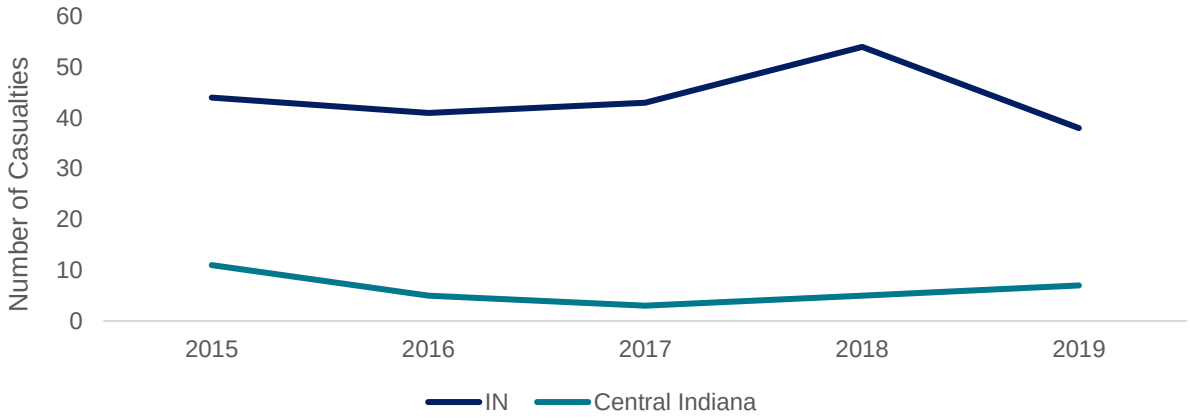
Figure 34: Rail Crossing and Trespassing Incidents in Central Indiana



Between 2015 and 2019, 34 rail trespassing incidents happened in the IMPO region, leading to 11 deaths and 20 person injuries. Over 82% of the region's trespassing incidents were along the CSX railroad's lines in Marion County. In 2019, seven trespassing incidents happened in the IMPO region, five of which were fatal. As Figure 35 shows, rail trespassing incidents have increased by about 40% between 2018 and 2019 in the IMPO region. In contrast, rail trespassing incidents across Indiana have decreased by about 30% between 2018 and 2019, indicating a relatively higher risk of trespassing incidents in the IMPO region compared to the rest of Indiana. This is in line with the national trends, which show that rail trespassing incidents are highly concentrated at densely populated urban areas where pedestrian traffic is relatively higher.[24]

[24] FRA's Trespasser Incidents Dashboard, accessed August 2021. https://railroads.dot.gov/accident-and-incident-reporting/casualty-reporting/trespasser-incidents

Figure 35: Rail Trespassing Incidents (2015-2019)



Source: CPCS analysis of FRA Safety Data, 2021.

Air Cargo

Freight transported by air is usually high-value and time-sensitive. Its role in freight movements and the economy has become more important in recent years due to the increase of e-commerce. The centralized location of Indiana situates the state to be the prime site of domestic and international air cargo activities.

The Federal Aviation Association (FAA) identifies three airports in Indiana, with the landed weight of cargo-only aircraft totaling more than 100 million pounds per year, as the cargo service airports.[25] Figure 36 demonstrates the inbound and outbound cargo volumes of the three airports. In 2019, Indianapolis International Airport (IND), located southwest of Downtown Indianapolis in Marion County, handled about 927 million pounds of inbound cargo and 1,019 million pounds outbound freight, ranking the eighth largest cargo airport in the US.[26]

IND is also home to the world's second-largest FedEx facility. Currently, the FedEx facility in IND is undergoing a seven-year, $1.5 billion expansion that will drastically increase the package-handling capacities and expand its footprint in IND. The 320-acre and 2.5 million-square-foot complex is expected to be fully constructed in 2023 and will be able to handle up to 147,000 packages per hour.[27]

Figure 37 illustrates and compares the cargo volume trends at the three cargo service airports between 2012 and 2020. Looking further into the volume trends of the top ten IND cargo service

[25] Indiana State Freight Plan (2018) https://www.in.gov/indot/files/Indiana%202018%20State%20Freight%20Plan.pdf.
[26] Federal Aviation Administration CY19 All Cargo Landed Weight, Rank Order. https://www.faa.gov/airports/planning_capacity/passenger_allcargo_stats/passenger/media/cy19-cargo-airports.pdf
[27] FedEx's $1.5B investment in Indy will expand capacity, add jobs, strengthen airport finances. Oct. 18, 2018. https://www.ibj.com/articles/70951-fedexs-15b-investment-in-indy-will-expand-capacity-add-jobs-strengthen-airport-finances

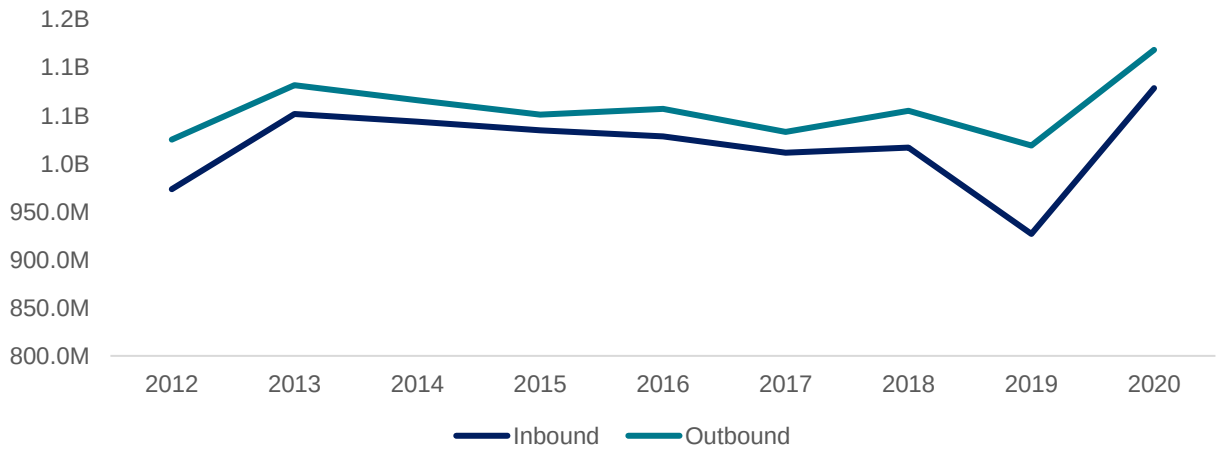
origins and destinations in 2020, the majority of the cargo services demonstrate upward trends between 2012 and 2020, except for Oakland and Memphis for inbound traffic and Newark for outbound traffic. Although the cargo volumes at IND show downward trends between 2012 and 2019, the air cargo activities increased by 12.9% in 2020, possibly due to the growing e-commerce demand.

Figure 36: Cargo Volumes at Indiana Airports (2019 vs. 2020)

Airport	Inbound Cargo (Million Pounds)		Outbound Cargo (Million Pounds)	
	2019	2020	2019	2020
Indianapolis International Airport (IND)	927	1,079	1,019	1,119
Fort Wayne International Airport (FWA)	30	27	25	24
South Bend International Airport (SBN)	14	11	10	9

Note: Cargo includes both freight and mails.
Source: Bureau of Transportation Statistics T-100 Market Data

Figure 37: IND Cargo Volume Trends (2012-2020)



Source: Bureau of Transportation Statistics T-100 Market Data, 2021.

Figure 38 shows the top cargo origins and destinations for IND. Since 2012, the volumes of cargo shipped between these origins/destinations and IND has steadily increased.[28]

Figure 38: The Trends of the Top IND Cargo Origins and Destinations

Top Origin	Top Destination
Los Angeles, CA	Memphis, TN
Newark, NJ	Los Angeles, CA
Oakland, CA	Newark, NJ
Memphis, TN	Oakland, CA
Dallas-Fort Worth, TX	Boston, MA
Atlanta, GA	Atlanta, GA
Ontario, Canada	Dallas-Fort Worth, TX

[28] Bureau of Transportation Statistics T-100 Market Data, 2021.

Top Origin	Top Destination
Boston, MA	Ontario, Canada
San Diego, CA	Phoenix, AZ
Anchorage, AK	San Diego, CA

Source: Bureau of Transportation Statistics T-100 Market Data

In addition, there are five reliever airports within the Central Indiana region, listed in Figure 39.[29] Reliever airports are airports that alleviate the congestion at primary Commercial Service Airports, such as Indianapolis International Airport and provide aviation access to the general public.[30] These airports usually deal with limited amount of cargo service. Yet, they are valuable assets within the Indianapolis aviation network by improving the operational efficiency at IND and supporting IND's freight movements and local economy.

Figure 39: Reliever Airports in Central Indiana

Airport	Category
Eagle Creek Airpark	Reliever
Hendricks County-Gordon Graham Field	Reliever
Indianapolis Executive	Reliever
Indianapolis Metropolitan	Reliever
Indianapolis Regional	Reliever

Source: Federal Aviation Administration, National Plan of Integrated Airport Systems, 2021.

Principal routes that experience daily traffic of at least 100 trucks in each direction or transport at least 100,000 tons annually arriving or departing airports are considered to be intermodal connectors.[31] Two federally identified intermodal connectors serve Indianapolis International Airport (IND). As shown in Figure 40, the two segments both connect IND to I-465/I-74.

Figure 40: Intermodal Connectors in the Central Indiana Region

Source: FHWA, NHS System Website, 2021.

[29] National Plan of Integrated Airport Systems (NPIAS), 2021-2025, Appendix A: List of NPIAS Airports with Activity and Development Estimate. Federal Aviation Administration. https://www.faa.gov/airports/planning_capacity/npias/current/media/NPIAS-2021-2025-Appendix-A.pdf

[30] Airport Categories. March 18, 2021. https://www.faa.gov/airports/planning_capacity/categories/

[31] Freight Intermodal Connectors Study. https://ops.fhwa.dot.gov/publications/fhwahop16057/fhwahop16057.pdf

Aviation Planning and Development

Multiple aviation planning and development efforts have been ongoing in the IMPO region. Those plans can provide knowledge and guidance for IMPO to coordinate stakeholders and improve the region's air cargo operations in the future.

In 2011, the Indianapolis Airport Authority approved a 30-year strategic development plan for IND. The Plan evaluated and selected 50 development sites within seven identified development zones. Those developments, expected to be complete by 2040, will generate between $30 and $63 million in revenues annually.[32] IND is also located in the Airport Tax Increment Financing (TIF) district. A TIF district utilizes the incremental tax from sales and property within the district to fund the initial development and redevelopment. During the period between 2007 and 2017, the Airport TIF district created between $11.8 million and $15.7 million in annual revenue. The 2018 West Side Strategic Revitalization and Airport TIF Implementation Plan identified the needs in the TIF district and provided an investment strategy and a schedule for projects that promote the area's economic development and community wellbeing.[33]

Besides efforts in planning around IND, there are two other plans underway for the Indianapolis Regional Airport (MQJ) and Indianapolis Executive Airport (TYQ). The MQJ Sustainable Airport Master Plan, supported by a grant from FAA in 2020, intends to guide the airport development for the next 20 years and beyond.[34] Similarly, entering into its final phase, the TYQ's land-use study investigates the future airport development options and establishes community-friendly development strategies.[35]

Pipeline

Pipelines are efficient and cost-effective in transporting liquids, gas, and chemicals in large quantities, playing a crucial role in supporting many freight-related industries. Figure 41 summarizes the major commodities transported by pipeline in Indiana.

Figure 41: Major Commodities Carried through Indiana's Pipeline (2020)

Commodity	2020 Indiana Tonnage* (Thousand Tons)	2020 Indianapolis-Carmel-Muncie Area Tonnage (Thousand Tons)
Crude Petroleum	37,951	-
Gasoline	27,899	5,187
Fuel Oils	7,110	1,745
Coal-n.e.c.	119,544	30,906
Basic Chemicals	553	-

Source: CPCS analysis of FAF 5,3, 2022
Note: The 2020 tonnage is a forecast value based on the 2017 tonnage.

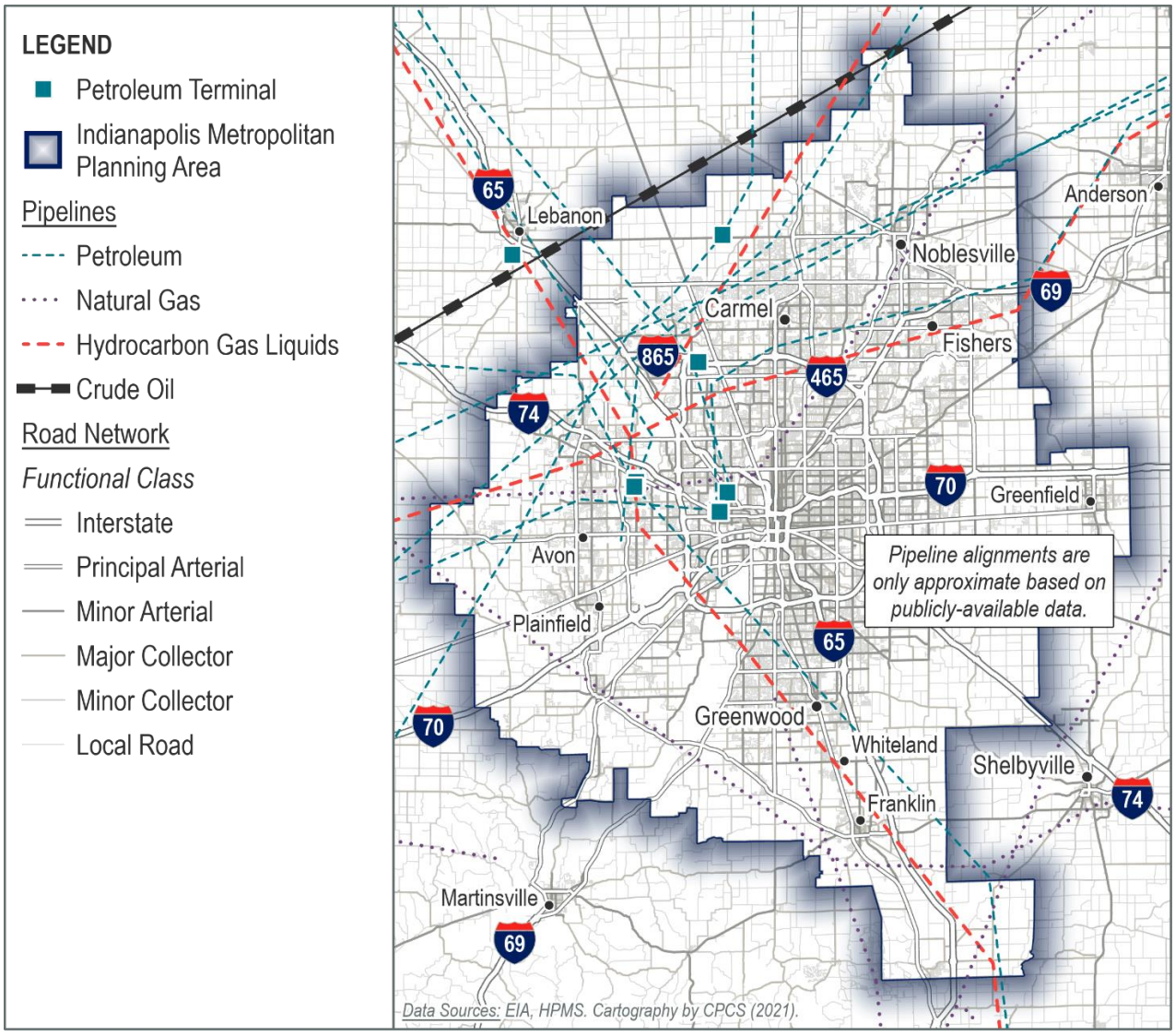
[32] Indianapolis Airport Authority approves 30-year strategic development plan. February 18, 2011. https://www.ind.com/about/media/media-releases/indianapolis-airport-authority-approves-30-year-strategic-development-plan
[33] West Side Strategic Revitalization & Airport TIF Implementation Plan. August 23, 2018. https://www.indygateway.org/wp-content/uploads/2020/07/180912_Final-West-Side-Strategic-Plan-and-Airport-TIF-Implementation-Plan_Combined_WebRes.pdf
[34] MQJ Sustainable Airport Master Plan. https://www.ind.com/mqjmasterplan
[35] Indianapolis Executive Airport Study. https://zionsville-in.gov/566/Indianapolis-Executive-Airport-Study

Many major pipelines that transport commodities, including petroleum, natural gas, and refined products, go through the Indianapolis Metropolitan Planning Area. Marathon Pipeline Co. owns a 5.3-mile crude oil pipeline.

A total 276.8 miles of petroleum products pipelines are owned by BP Pipeline, Buckeye Partners, Countrymark Refining & Logistics, Enterprise Products, and Marathon Pipeline. Three companies, including Buckeye Partners, Enterprise Products, and Marathon Pipeline, own 107.6 miles of hydrocarbon gas liquids pipelines. Natural gas pipelines (about 103.9 miles) are owned by Tallgrass Energy, Panhandle Eastern Pipeline Co., Texas Gas Transmission Corp., and ANR Pipeline Co.

Figure 42 illustrates the locations of the five petroleum terminals and the pipelines within the IMPO region. A crude oil pipeline is located just north of the Indianapolis Metropolitan Planning Area boundary.

Figure 42: Central Indiana's Pipeline System



Indian is home to the Nation's largest inland oil refinery, Whiting refinery, which has the capacity of about 430,000 barrels of crude oil per calendar year.[36] The Whiting refinery is located in northwest Indiana, just outside of Chicago and approximately 150 miles northwest of Indianapolis. The refinery processes crude coming from Canada, southwest US, and domestic and foreign offshore, passing through the IMPO region by a petroleum products pipeline and a hydrocarbon gas liquids pipeline.[37]

Within the IMPO region, there is no presence of refineries or underground natural gas storage. However, a couple of the petroleum product terminals are located in the Indianapolis Metropolitan Planning Area, including U.S. Venture Inc. (Indianapolis), Buckeye Terminals LLC (Zionsville, Raceway Terminal, and Indianapolis), Countrymark Coop. LLP (Jolietville), Kinder Morgan Liquid Terminals (Indianapolis), Marathon Petroleum Co. LLC (Indianapolis), and MPLX Terminals LLC (Indianapolis and Speedway).

Future Freight Conditions

Future Freight Traffic Flows

According to Freight Analysis Framework (FAF 5.3), 2045 commodity flow forecasts provided by the FHWA through a partnership with the BTS, the total commodity volumes carried to, from, and through the Indianapolis-Carmel-Muncie area will increase by 43% in 2045.

As Figure 43 shows, truck tonnages are expected to increase by 48%. Meanwhile, commodity volumes carried by rail are expected to increase by 67%, and air cargo and pipeline modes are expected to carry 96% and 22% more commodity volumes, respectively. The high growth rate for air cargo is due to the high expected growth for the commodities that are typically transported by air. The growth rates for the other modes are roughly consistent with underlying economic growth for the Central Indiana region.

Figure 43: 2045 Cargo Tonnage by Mode in the Indianapolis-Carmel-Muncie Area

Mode	2020 Indianapolis-Carmel-Muncie Area Tonnage (1,000 Tons)	2045 Indianapolis-Carmel-Muncie Area Tonnage (1,000 Tons)	Percent of Volume Change
Truck	129,093	190,744	48%
Rail	6,951	11,631	67%
Air (include truck-air)	27	53	96%
Pipeline	37,839	46,322	22%

Source: CPCS analysis of FAF 5.3, 2045 Forecast, 2022. Note that 2020 values were derived as forecasts from the 2017 base. More recent FAF forecasts are not yet available.

Future Commodity Flows

Figure 44 shows the expected change in the volumes of the commodities carried in the Indianapolis-Carmel-Muncie area, forecasted by FAF 5.3. Coal and petroleum products volumes are expected to grow by 2045. These commodities are generally carried through the pipeline and rail systems. However, the volume increase (36.5%) by 2045 is expected to primarily be carried by the rail freight system and, therefore, increase train traffic volumes in the IMPO region, which can lead to safety and environmental impact (due to hazmat spillage) concerns.

[36] EIA Indiana State Profile and Energy Estimates, June 18, 2020. https://www.eia.gov/state/?sid=IN#tabs-2

[37] BP Whiting Refinery Modernisation, Indiana. https://www.hydrocarbons-technology.com/projects/bt_whiting/

Gravel and crushed stone volumes are expected to increase by 30%. Several quarries and construction material storage, handling, and distribution establishments are located within the IMPO region, many of which are adjacent to mixed-use areas, densely populated neighborhoods, and high-volume road corridors. The expected growth in the gravel and crushed stone volumes would primarily be reflected in the highway operations in the region, increasing truck volumes along corridors that carry the traffic in and out of the downtown Indianapolis area.

Commodities related to agricultural and food manufacturing industries such as fertilizer production, wood production, cereal grains, and prepared foodstuff are also expected to significantly grow in terms of volumes carried in the region.

Figure 44: Changes in the Top 15 Commodities in the Indianapolis-Carmel-Muncie Area

Commodity Category	2045 Estimated Annual Volume (1,000 Tons)	Percent of Volume Change Since 2020
Coal-n.e.c.	47,697	36.5%
Gravel	26,815	30.0%
Cereal grains	17,763	29.0%
Gasoline	9,867	-19.2%
Nonmetal min. prods.	13,461	43.5%
Base metals	10,611	34.5%
Waste/scrap	9,751	24.0%
Other foodstuffs	10,299	36.5%
Motorized vehicles	12,326	78.7%
Mixed freight	12,553	87.8%
Other ag prods.	8,707	39.4%
Natural sands	5,963	26.0%
Fuel oils	3,889	-3.3%
Plastics/rubber	8,195	124.6%
Wood prods.	5,374	52.3%

Source: CPCS analysis of FAF 5.3, 2045 Forecast, 2022.

3 Key Freight Issues, Project Gaps, and Future Trends

Key chapter takeaways

Central Indiana's transportation system has various freight-related needs and issues, most of which are related to the road network. Both stakeholder feedback and data analysis revealed that the dominant issues in the IMPO region are related to roadway mobility and safety issues, including truck operations that are sometimes incompatible with passenger and cyclist traffic. Rail-related issues were also identified through both data analysis and stakeholder feedback. These issues include crossing safety, particularly the impacts of the recent increase in rail traffic frequency and length of trains on communities' safety and quality of life.

By comparison, there were relatively fewer needs and issues that were identified related to the topics of community and environmental impacts of freight. Some stakeholders indicated the location of local pavement surface issues and the IMPO's 2021 regional performance analysis update found that a small portion of the region's roadways are in poor condition (4%) and the rest are in fair (50%) or good (46%) conditions.

A systematic gap analysis approach was used to geocode, evaluate, score, and rank the identified freight needs and issues for the Central Indiana Regional Freight Plan. This approach was developed based on lessons learned from other regions and customizing these lessons based on Central Indiana's unique freight characteristics and a revised tiered Freight Network designation. A total of 75 freight issue locations were identified through data analysis and review of relevant plans, while 98 freight issue locations were identified by the stakeholders in Central Indiana.

Analysis of Strength, Weaknesses, Opportunities, and Threats

Regional Freight System Needs and Issues

A key purpose of the Central Indiana Regional Freight Plan was the assessment and documentation of freight transportation needs to inform the future project selection and investment priorities of IMPO and its partners and stakeholders. Since many freight needs may have shared causes, they often can be addressed through shared solutions – for instance, improving traffic control signal design at an intersection can address both mobility and safety of goods movement operations.

To consider this overlap in causes and benefits, a modal approach was taken[38] to assess the freight system needs and issues, classified for simplicity into mobility, safety, infrastructure condition, and environmental/community impacts categories. These analysis categories are in alignment with the regional freight-related recommendations in IMPO's 2050 Metropolitan Transportation Plan (MTP):

[38] The air cargo and pipeline operations in Central Indiana are assessed in Chapter 2, however, these modes are not considered in the assessment of the regional freight needs and issues. IMPO's roles with respect to addressing needs and issues related to these modes is mainly focused on where they intersect with truck and rail modes.

Mobility: related to the performance of the system and the speed and ease with which freight can move in the region. This includes topics like congestion, weight limits, and bridge clearances.

Safety: primarily related to truck-involved crash hotspots for roads and grade crossing incidents for the railroad system.

Condition: relates to the maintenance of road and bridge structures.

Community and Environmental Impacts: related to pollution and noise emissions from freight activities and impacts on communities located near freight clusters.

Many project types can provide benefits to both freight users and the traveling public.

A combination of literature review, data analysis, and stakeholder feedback (as described in Chapter 1) was used to identify the needs and issues of the regional freight system. A detailed list of freight needs and issue locations is provided in **Appendix D**.

Road Freight System

Mobility

An analysis conducted by ATRI identified that two of the top 100 truck bottlenecks in the US occur in Central Indiana, as shown in Figure 45. At these locations, truck speeds during the peak commute period average between 47.0 and 50.3 mph, which indicates that these bottlenecks have only a modest overall impact on truck travel times along their journeys.

Figure 45: Top Truck Bottlenecks In Central Indiana Region

Location	Segment	Average Speed during Peak Period (mph)	Posted Speed Limit (mph)	National Ranking by Congestion Index
Indianapolis, IN	I-65 at I-70 North	47.0	55	53
Indianapolis, IN	I-465 at I-69	50.3	55	85

Source: ATRI, Top 100 Truck Bottlenecks, 2022.

Also, an assessment of truck travel time delays using StreetLight truck GPS data analysis showed that peak hour delays are generally not a major problem for trucks traveling along the region's interstates. However, some segments were found to experience relatively longer hours of delay, including:

- I-465 at US-31 north of Indianapolis;
- I-70 and I-65 highway overlap through downtown Indianapolis;
- North College Ave. and West 86th St.; and
- IN-39 between US-40 and I-70 west of Plainfield.

Truck delays are generally not a problem in the Central Indiana region.

The freight stakeholders confirmed that truck congestion and travel time delays are generally not a major problem in the Central Indiana region. However, they cited relatively lower truck speeds during peak hours along high-volume corridors such the interstate highways. They also identified the ongoing road and intersection construction projects as an impediment to mobility. While these projects create mobility and safety concerns at the moment, the stakeholders also noted that they would eventually improve the overall transportation operations across the region.

Safety

Over these five years, the following key crash facts were identified:

- 25,240 truck-involved crashes occurred 80% of which involved property damage only.
- 2,560 injuries occurred as a result of truck-involved crashes.
- 121 deaths resulted from truck-involved crashes.

Sideswipe collisions were the leading type of truck crash in the region, accounting for 32% of all crashes. Rear-end crashes were the second highest type of truck crash, accounting for 29% of the truck-involved fatalities in the region.

Stakeholders' input emphasized the need for providing additional safe parking spots for trucks, whether to accommodate for their mandated Hours of Service (HOS) break or for staging trucks while they wait for loading/unloading. Undesignated truck parking was cited as a safety issue along I-74 in Brownsburg, I-65 in Franklin, US-31 west of Edinburgh, and along local streets close to warehouses and transload facilities in downtown Indianapolis.

The use of non-freight funding sources such as the Highway Safety Improvement Program (HSIP) for freight safety issues and the deployment of autonomous technologies were also identified by the stakeholders as potential solutions for safety issues.

Pavement and Bridge Condition

Counties in Indiana regularly inspect road bridge conditions and record their ratings in the National Bridge Inventory (NBI). The NBI database is administered by the Federal Highway Administration (FHWA) and compiles bridge inventory and condition ratings according to evaluations of structural elements such as deck, superstructure, substructure, and culvert on a scale between zero and nine.[39]

The City of Indianapolis uses the Pavement Condition Index (PCI) to record the road surface pavement conditions for the non-NHS roads, excluding the local routes.[40] PCI is a measure standardized by the American Society for Testing and Materials (ASTM) in ASTM D5340, which assigns point scales between 0 and 100 to road surfaces based on visual surveys of distressed segments.[41] Other local public agencies (LPAs) use the Pavement Surface Evaluation and Rating (PASER) measure, which rates the pavement surface using a scale between 0 and 10 according to visual inspections of surface defects, deformations, cracks, and potholes.[42]

[39] FHWA, National Bridge Inventory (NBI), accessed September 2021. https://www.fhwa.dot.gov/bridge/nbi.cfm

[40] Highway functional class 7. Information provided by IMPO, 2022.

[41] USDOT, Practical Guide for Quality Management of Pavement Condition Data Collection, 2013.

[42] University of Wisconsin Transportation Information Center, Pavement Surface Evaluation and Rating: PASER Manual for Asphalt Roads, 2002.

Over one-third of the pavement surfaces in the Central Indiana region are in poor condition, while a small portion of the bridges in the region has a poor structural condition.

As Figure 46 shows, the IMPO's 2021 Regional Performance Measure Update (based on 2020 data) estimated that over 36% of the roads are in poor condition using the PCI measuring technique, while 18% are identified to have poor condition using the PASER method. Meanwhile, about 4% of the bridges in the eight-county region are in poor condition.[43]

Figure 46: Region's Pavement and Bridge Conditions

Method/Condition	Percentage
PASER (PCI) Condition Percent Good	29.36% (27.19%)
PASER (PCI) Condition Percent Poor	18.04% (36.49%)
Bridges in the IMPO Region in Good condition	45.97%
Bridges in the IMPO Region in Poor condition	3.62%

Source: IMPO Regional Performance Measure Update, 2021.

According to the Central Indiana stakeholders, lack of funding for addressing infrastructure condition needs, lack of revenue streams for local transportation authorities, and funding distribution are major concerns. Also, bridge capacity is limited for trucks traveling to and from the downtown Indianapolis area, and there is a need for either constructing new bridges or improving the existing infrastructure to accommodate heavy-duty trucks.

Community and Environmental Impacts

Trucks are significant contributors to regional VOC and NOx emissions. As part of the development of the 2050 MTP, the IMPO prepared an Air Quality Conformity report that includes forecasts of volatile organic compounds (VOC) and nitrous oxides (NOx). Figure 47 shows the annual limitations and forecasted VOC and NOx emissions in the 9-County region. As shown, it is expected that with the implementation of 2050 MTP projects and strategies, the 8-hour Ozone levels will remain below the regulated levels and, therefore, conform to federal air quality requirements.[44] Therefore, there are no significant environmental impacts from truck activity in the region.

Figure 47: Mobile Source Emission Forecasts for the 9-County Region

Year	VOC (Tons/Day)		NOx (Tons/Day)	
	Annual Limit	Forecast	Annual Limit	Forecast
2020 (Attainment Year)	24.7	25.07	69.00	57.29
2030	24.7	14.96	69.00	31.91
2040	24.7	10.53	69.00	31.54
2050	24.7	8.72	69.00	25.31

Source: IMPO Travel Demand Model, 2021.

Stakeholders did not cite many examples of community and environmental impacts in the IMPO region, likely because such issues are not isolated and can impact the entire region. Some stakeholders raised concerns regarding trucks traveling through residential and mixed-use areas,

[43] IMPO, Regional Performance Measure Update, 2020.

[44] Some stakeholder input suggests that more consideration will be needed regarding the possible future impacts of climate change. Warmer weather and increased precipitation levels over time could exacerbate current emission projections.

posing safety issues due to modal incompatibility (i.e., pedestrians and cyclists sharing the roads with trucks) as well as air quality issues due to particulate matter and NOx emitted by trucks.

Rail Freight System

Mobility

Rail mobility issues are primarily caused by track class and structural design characteristics, at-grade intersections with the roadway system, and terminal and yard operational inefficiencies. Currently, 377 public and 94 private highway-rail grade crossings are operating in the IMPO region. Trains passing or blocking at-grade crossings can cause delays for both passenger vehicles and trucks. These delays can be exacerbated if the roadways are used heavily during the morning and evening peak hours.

The Federal Railroad Administration (FRA) maintains a database for the public to report occurrences of blocked crossings. Since 2019, 381 blocked crossing cases have been reported by the public in Indiana into this system. The durations of blocking range from less than 15 minutes to about two hours. Figure 48 lists the blocked crossings reported in the Central Indiana region. These reported crossings caused a total of between 7 and 17 hours of delay for the road users and represented a small fraction of the total delay caused at crossings.[45]

Figure 48: Blocked Crossings Reported in the Central Indiana Region

City	Railroad	Street	Duration of Blocking
Indianapolis	CSX	Lynhurst Dr	2-6 hours
Indianapolis	CSX	Schusters Blk	1-2 hours
Indianapolis	CSX	Girls School Rd	1-2 hours
Lawrence	CSX	59th St	31-60 minutes
Indianapolis	CSX	New York St	31-60 minutes
Greenwood	CSX	700 W Co Line Rd	31-60 minutes
McCordsville	CSX	CR 600 W	16-30 minutes
Brownsburg	CSX	West Northfield Dr	16-30 minutes
Pittsboro	CSX	CR 475E	16-30 minutes
Indianapolis	INRD	West Street	16-30 minutes
Indianapolis	CSX	Belmont Ave	16-30 minutes
Indianapolis	CSX	W 10th St	0-15 minutes

Source: FRA Blocked Crossing Website, 2019-2020.

A concern raised by the stakeholders was a lack of access to high-volume container facilities in the region; however, there are locations within the IMPO region that can expand to serve as intermodal facilities, including the CSX and Indiana Rail Road yards in downtown Indianapolis. Another issue cited by the stakeholders is where rail transit and freight routes overlap in the region, creating significant delays for both users of the roads that cross such rail tracks and the passengers traveling in the trains.[46]

[45] Based on ongoing investigations by the Surface Transportation Board, Precision-schedule railroading (PSR) is a contributor to these delays as it comprises longer trains with fewer tracks and fewer crew members. Source: Central Indiana Stakeholder Inputs, July 2022.
[46] IndyGo is currently investigate delay reduction solutions at some locations in Indianapolis. Source: IndyGo, July 2022.

Safety

FRA incident data were used to analyze rail safety issues in the IMPO region. The rail segments and at-grade crossings with the highest concentration of rail incidents between 2014 and 2019 were:

- The segment of CSX railroad running parallel to Massachusetts Avenue in Indianapolis, between N Sherman Drive and Commerce Avenue: 13 crossing incidents and five trespassing incidents occurred along this segment over five years.
- The segment of CSX railroad between McCordsville BMW Branch and Oaklandon Road in Lawrence: three crossing and three trespassing incidents occurred along this segment, two of which were fatal.
- CSX railroad's grade crossing with N Rural Street in Indianapolis: five crossing incidents occurred at this location between 2014 and 2019.
- Louisville & Indiana Railroad's crossing with E Troy Avenue south of Garfield Park in Indianapolis: five crossing incidents occurred at this location between 2014 and 2019.

Blocked crossings can also have safety impacts. Studies have shown that drivers will attempt to clear the crossings in front of arriving trains at locations where crossings are routinely blocked for extended periods. Pedestrians may also attempt to cross the blocked crossings by crawling between stopped railcars.[47] Potential solutions to this problem are grade separation projects and restrictions on the frequency and duration of trains blocking the grade crossings. Other rail safety issues are highlighted in the next section.

Stakeholders also cited blocked crossings and higher train volumes as a major safety (and also mobility) concern at grade crossings.

Infrastructure Condition

As Figure 49 shows, about 46% of the Class I rail network and nearly 8% of the short line rail network in the region can accommodate double-stacked trains. Also, almost the entire length of Class I and Class II railroad tracks in the IMPO region can carry 286K lbs. railcars. However, only about 11% of the short line system in the Central Indiana region is 286K lbs. capable.

Figure 49: Summary of Central Indiana Rail System Characteristics

Railroad Class	Freight Tier	Total Miles	Miles Double-Stack	Percent of Total Double-Stack	Miles 286K lbs. Capable	Percent of Total 286K lbs. Capable
Class I	Tier 1	220.4	102.3	46%	220	99.8%
Class II	Tier 2	20	0	0%	20	100%
Short Line	Tier 2	81.3	6.5	8%	9	11%
Total	-	321.7	108.8	34%	249	77%

Source: CPCS analysis of rail profile data provided by the IMPO, 2021.

Most of the rail tracks in the Central Indiana region are capable of handling 286K railcars, and about half of the region's rail system can serve double-stack trains.

[47] FRA Newsroom, Federal Railroad Administration Launches Web Portal for Public to Report Blocked Railroad Crossings, December 20, 2019.

Community and Environmental Impacts

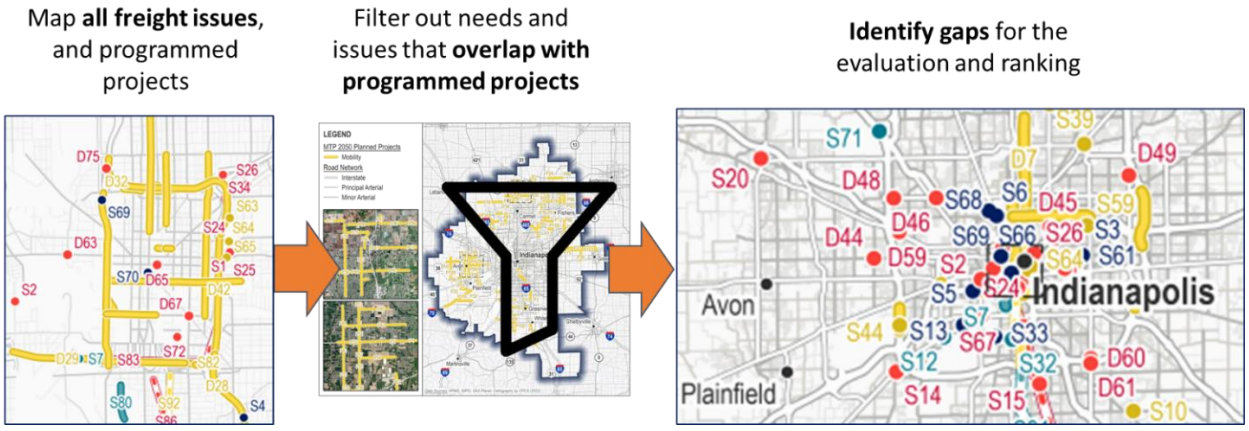
There are no significant community or environmental impacts from freight rail activities. Railroads are four times more fuel-efficient than trucks for moving a ton-mile of freight.[48] Additionally, emission regulations have set standards for the model year 2015 and newer locomotives that reduce PM emissions by nearly 90% and NOx emissions by about 80% compared to older models.[49] Therefore, the environmental impacts of freight rail are relatively small. The community impacts of rail freight activities are more focused on safety issues which are discussed as part of the safety section.

Freight Project Gap Analysis

A systematic gap analysis approach was used to geocode,[50] evaluate, score, and rank the freight needs and issues for the Central Indiana Regional Freight Plan. This approach was developed based on lessons learned from other regions as well as Central Indiana's unique characteristics in terms of freight volumes and tiered Freight Network designation.

Figure 50 summarizes the steps in the gap analysis approach. As shown, all the freight needs and issues identified for the IMPO region were geocoded as either links or nodes. Next, all the programmed projects in the region were mapped to indicate the overlaps between the needs and issues and projects already identified and prioritized for the region. In the last step, those issues and needs that did not overlap with any of the programmed projects are indicated as gaps. The following sections describe these steps in more detail.

Figure 50: Process for Identifying Project Gaps



Source: CPCS, 2022.

Step 1: Map Freight Needs and Issues

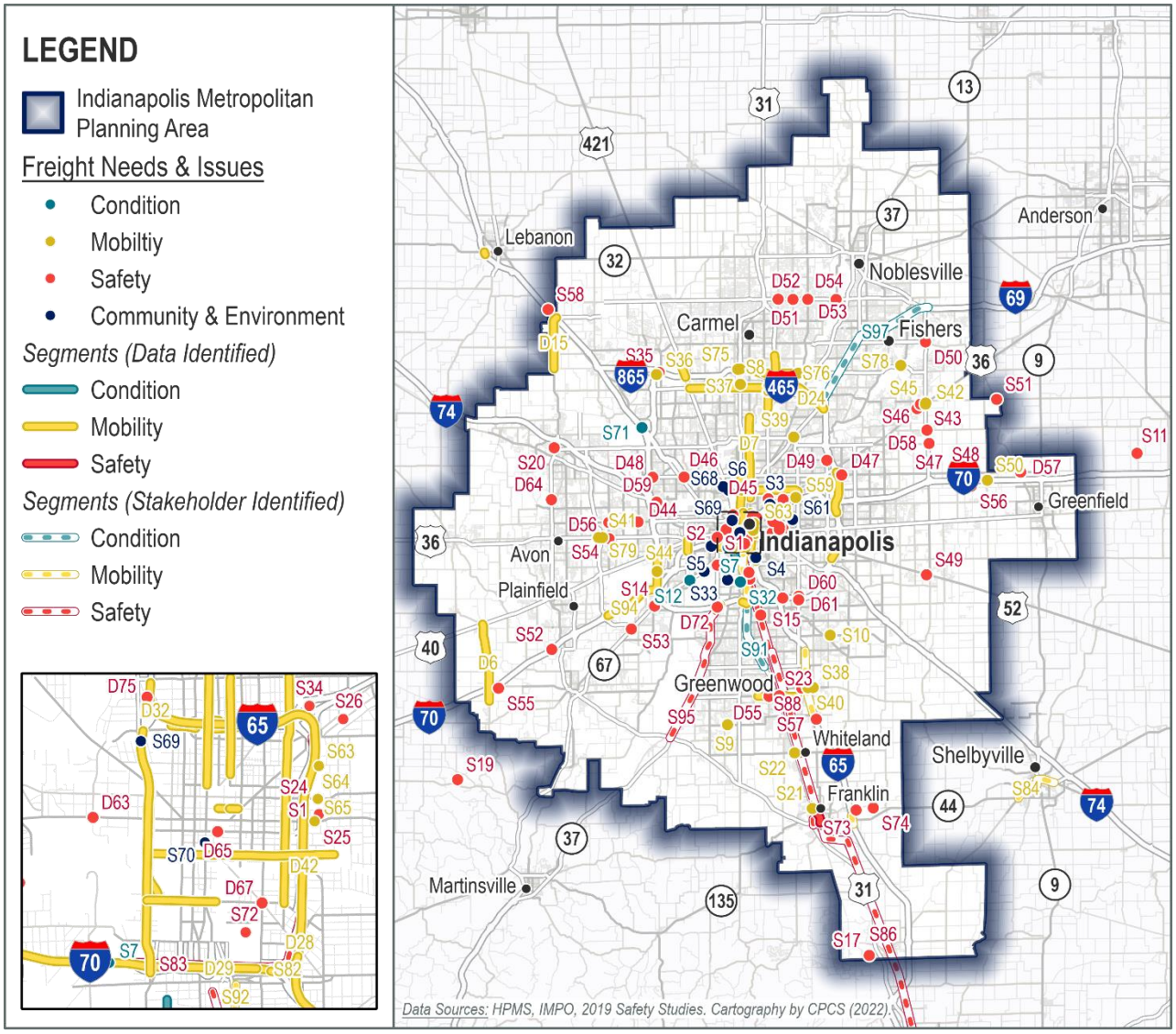
Figure 51 shows the freight issues identified in the IMPO region. A total of 75 freight issue locations were identified through data analysis and review of relevant plans, while 98 freight issue locations were identified by the stakeholders in Central Indiana. **Appendix D** provides a list of all the identified freight needs and issues in the region.

[48] FRA, A Modal Comparison of Domestic Freight Transportation Effects on the General Public, 2011-2099 (published 2012).

[49] EPA, Regulations for Emissions from Locomotives, accessed September 2021. https://www.epa.gov/regulations-emissions-vehicles-and-engines/regulations-emissions-locomotives

[50] Identify the geographical coordinates corresponding to an issue location.

Figure 51: Freight Issue Locations in the Central Indiana Region



Step 2: Map Region's Planned Projects

Many project types can provide benefits to both freight users and the traveling public. Where freight issues and programmed projects overlap, there may be the opportunity to improve the region's freight network with non-freight dollars. Information on overlaps of planned projects with identified freight needs and issues will help IMPO and its local partners understand how their currently programmed investments could affect freight transportation. Furthermore, this examination of overlaps will aid in the prioritization and selection of projects for advancement to a pre-engineering feasibility assessment. Information on IMPO's programmed projects came from the following sources:

The **Indianapolis Regional Transportation Improvement Program** (IRTIP) identifies a schedule and funding amount for transportation projects over the next four years. The detailed project

list[51] in the TIP includes all projects with federal highway or transit funding, as well as state-funded highway projects. The TIP also contains freight and rail investments for reference.

The IMPO's **Metropolitan Transportation Plan** (MTP) lists 30 years of highway investments for the region. These longer-term plans for projects are not guaranteed to be constructed but are listed in the MTP to aid in coordination and planning.

Both the IRTIP and MTP projects are listed and presented as interactive maps on IMPO's website.[52]

Step 3: Identify and Prioritize the Freight Project Gaps

A total of 120 project or project concept gaps are identified using the above process. Notable gaps between programmed projects and needs and issues include:

Freight-related safety gaps were the most common, making up about 46% of the identified gaps. These were distributed across almost all areas of the IMPO region but were particularly focused on higher-traffic roadways and the rail segment running between intermodal yards in Indianapolis and the southern boundaries of IMPO's planning area (CSX railroad corridor used by both CSX and Louisville & Indiana railroad (LIRC).

Freight mobility gaps made up about 40% of the total identified gaps. These gaps constitute some of the most pressing needs for the IMPO region, including mobility/maneuverability impediments at high-traffic intersections and interchanges in Indianapolis and areas where additional passing lanes, turn lanes, or lane expansion may be required.

Infrastructure condition and community and environmental gaps made up the remaining 14% of identified gaps and included six gaps identified related to poor pavement surface conditions and one gap identified related to the need for additional roadway signage to direct through truck traffic. Eight gaps were found related to emission impacts on trucking activities.

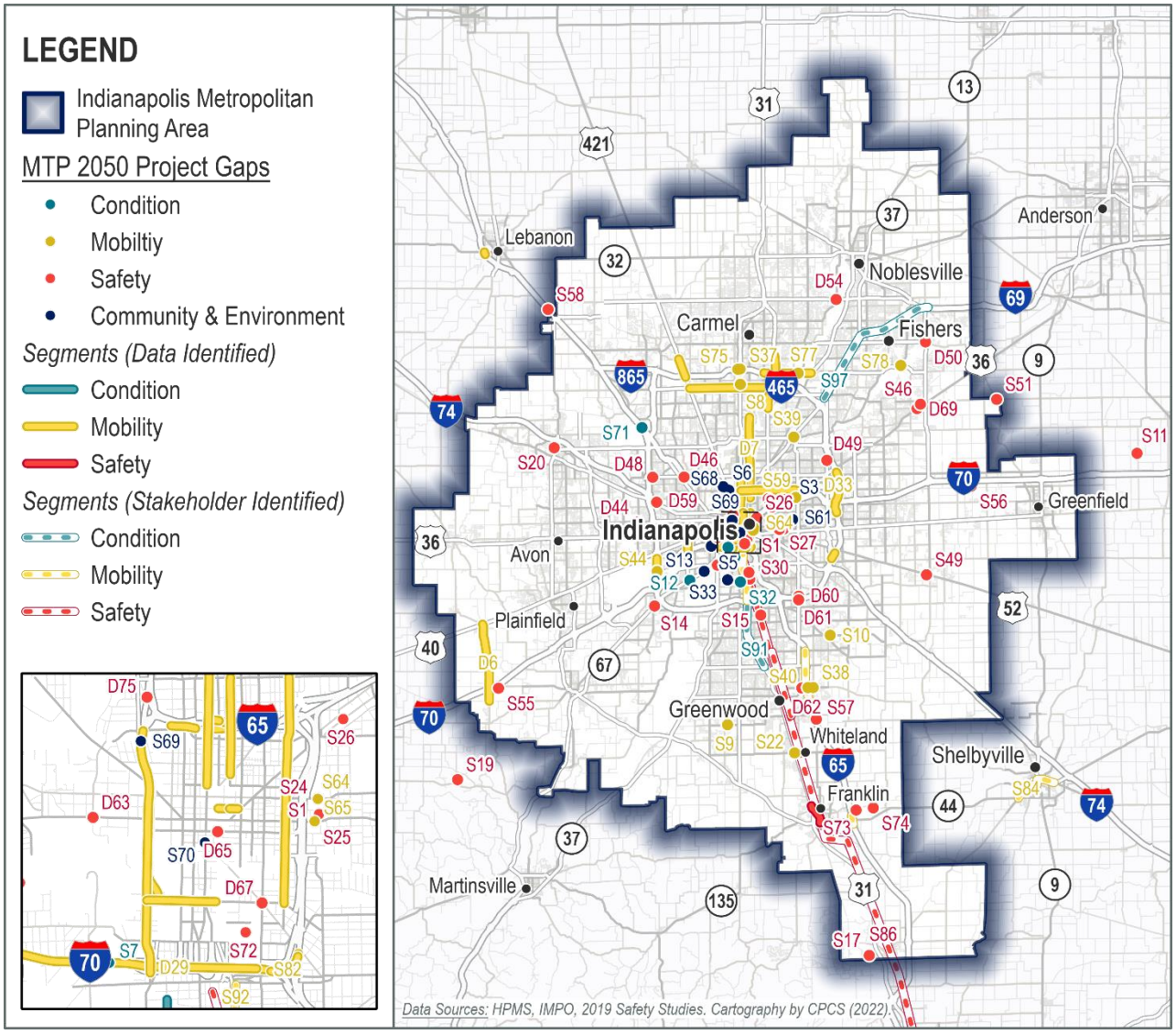
The identified gaps are presented in Figure 52. Gaps shown in this map are coded based on whether the freight issues were identified through data analysis (coded as D-number) or flagged by the stakeholders (coded as S-number). A list of identified gaps is provided in Appendix D to help IMPO and its partners and stakeholders determine:

- The type of benefits that could be provided if project gaps are addressed (i.e., if projects are advanced at these locations), and
- The projects could provide more freight benefits than others.

[51] For a detailed list of IRTIP projects and IRTIP amendments, see: https://mitip.indympo.org/

[52] MTP project Map: https://www.indympo.org/whats-underway/mtp; IRTIP project lust and map: https://www.indympo.org/whats-underway/irtip

Figure 52: Project Gaps Identified for the Central Indiana Region



Based on the review of IMPO's existing process for evaluating and ranking MTP projects and the process established for evaluating freight needs and issues in other states and regions, investment gaps identified in the previous step are evaluated using the attributes presented in Figure 53.

Figure 53: Freight Project Gap Evaluation Attributes

Category	Attribute Used for Evaluation	Description
Mobility	Truck Peak Hour Delay per Mile	The difference between free-flow travel times and observed travel times for trucks divided by segment length.
	Truck Travel Time Reliability Index	The ratio of average truck trip time to free-flowing truck trip time.
Safety	Number of Truck-Involved Injury/Fatality Crashes	Attributes are calculated through analysis of road safety data between 2015 and

	Truck-Involved Crash Rate	2019, provided by the IMPO through ARIES data.
	Number of Grade Crossing/Trespassing Incidents	Attributes are calculated through analysis of rail incident reports submitted by railroads to the Federal Railroad Administration.
Condition	Pavement and bridge infrastructure conditions that may impact freight operations	These attributes are considered in the process of identifying the freight need and issues in the IMPO region and will be used for gap evaluation (but will not be scored).
Community & Environmental Impacts	The impacts of freight activities on the environment and communities' quality of life	

Source: CPCS, 2022.

This approach was developed to evaluate the gaps (potential project concepts) and not concrete, defined projects. The gaps evaluation process focused on the regional freight issues known to be important to IMPO (vs. those that may be more important to the state) and used as much data as available and stakeholder inputs.

The following provides an overview of the scoring results that comprised each component:

Truck Peak Hour Delay per Mile (DPM) Score. Truck delays were not a major issue in the IMPO region, and this is reflected in the distribution of scores, with only about 37% of the gaps receiving half or over half of the maximum available score.

Truck Travel Time Reliability (TTR) Index Score. Reliability was generally not considered to be a problem in the IMPO region, and this was reflected in the distribution of scores, with most potential projects receiving no points (24%). Additionally, a large number of potential projects lacked truck speed data due to limited NPMRDS data coverage in the area.

Truck-Involved Injury/Fatality Crash Score. Casualty truck crash scores were assigned based on the overlap between truck-involved crashes and identified project gaps.

Truck Crash Rate Score. Crash rate scores were assigned to all identified gaps based on the overlap between truck-involved crash rates and identified project gaps.

Rail Safety Score. At-grade crossing and trespassing incidents were only assigned to the rail-related gaps within the region as well as road segment gaps that crossed a rail line. In general, these incidents were rare in the IMPO region, and the majority of the gaps (92%) did not receive any scores.

Since many gaps had equal total scores, truck volumes, truck share of all vehicle traffic on segments, and freight network designation status were used to break the ties. Figure 54 presents the top ten project gaps based on the percent scores. The resulting scores and rankings for all project gaps are provided in **Appendix D**, and an interactive map is available on IMPO's website.

Figure 54: Top 10 Project Gaps

Rank	Description	Location	AADTT	Mobility Score	Safety Score	Total Score	Maximum Score	% Score
1	High Crash Intersection	Commercial Dr at 38th St	39,866	0	10	10	10	100%
2	Delay Hotspot	I-65 NB off-ramp to W South St	1,114	8.75	10	18.75	20	94%
3	Top Bottleneck	E 96th St	3,096	6.25	10	16.25	20	81%
4	High Crash Intersection	Olio Rd at E 116th St	40,329	5	10	15	20	75%
5	High Crash Intersection	10th St at Girls School Road	39,496	5	10	15	20	75%
6	High Crash Intersection	Crawfordsville Rd at Cunningham Rd	38,492	5	10	15	20	75%
7	High Crash Intersection	River Road at E 146th St	34,935	5	10	15	20	75%
8	High Crash Intersection	Shadeland Ave at E 46th St	31,965	5	10	15	20	75%
9	Delay Hotspot	N Sherman Dr and CSX RR at-grade crossing	711	7.5	0	7.5	10	75%
10	Delay Hotspot	Sam Jones Expwy off-ramp to I-465 SB Est of IND Airport	262	10	5	15	20	75%

Source: CPCS, 2022.

As shown in the table above, gaps ranked 4 to 10 had the same percent score and therefore were ranked based on truck volumes (AADTT), truck percentage, and Freight Network tiers. AADTTs are provided in the table for reference. The above map also shows that some gaps may have relatively high scores for safety or mobility categories while being lower down the list due to their total score and percent score. **Appendix D** can be used to better assess the project gaps based on their expected benefits.

4 Recommended Actions

Key chapter takeaways

This chapter presents the recommended set of strategies that help the IMPO improve goods movement across the region. These strategies were developed based on brainstorming within the project team along with discussions with the IMPO and the Freight Strategy Committee members. These projects were determined to will be the ones that best address the regional goods movement need and provide benefits to the freight community and all transportation system users.

Emerging Freight Transportation Trends

Understanding the freight transportation trends at the state and national levels is critical for IMPO and its partners to address the existing issues and plan for the future needs on the freight system. At the state level, INDOT has collaborated with Purdue University and many other agencies to investigate innovative solutions to improve the safety, preservation, and efficiency of the roadway system. Nationally, the Bipartisan Infrastructure Law (BIL, 2021) put an emphasis on increasing the resiliency of the transportation infrastructure. The following four technologies demonstrate how IMPO can leverage the existing initiatives and programs to enhance the freight system within its region.

I-70 Truck Automation Corridor: While trucks continue to be the freight mode that moves the most freight across the country, driver shortages and safety and efficiency issues are impacting the trucking industry. A team of partners, including the INDOT, ODOT, DriveOhio, and the Transportation Research Center, applied for and was later awarded a $4.4 million grant through FHWA's Advanced Transportation and Congestion Management Technologies Deployment program. The grant has been used for a four-year-long project that pilots truck automation technologies on the segment of I-70 between Indianapolis and Columbus (Figure 55).

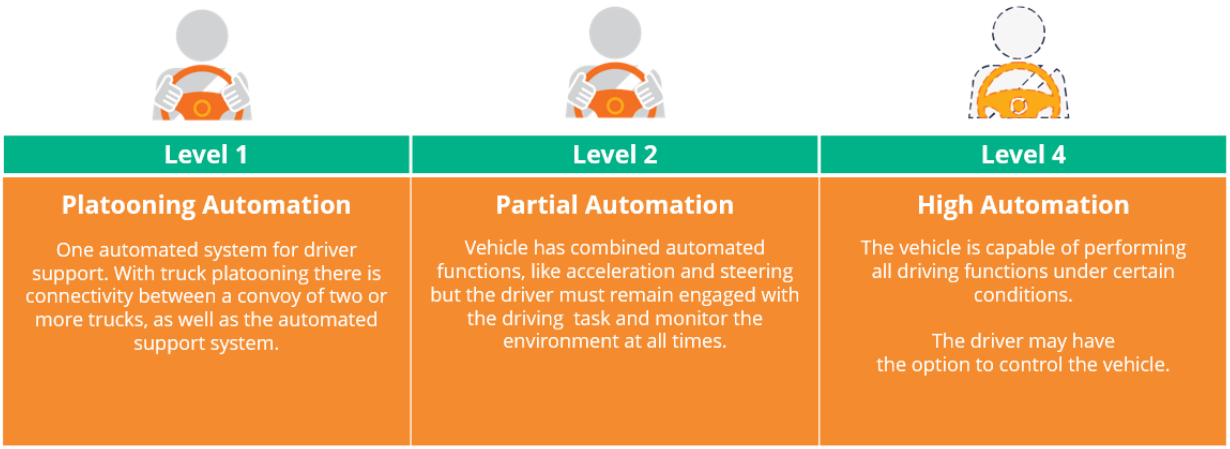
Figure 55: I-70 Truck Automation Corridor

Source: Purdue.edu, 2022.

The project will test three levels of truck automation technologies, as depicted in Figure 56. Following the testing, the team will conduct a road audit that identifies deficiencies and recommend changes and create tools to assess roads' automated vehicle readiness. The project also plans to produce an Automated Vehicle Readiness Guidebook. At the end of the project, the team hopes the automated truck technology pilot will improve roadway safety for truckers, increase labor productivity, and reduce trucks' environmental impacts.[53]

[53] ODOT and INDOT I-70 Truck Automation Corridor Project. https://docs.lib.purdue.edu/cgi/viewcontent.cgi?article=4586&context=roadschool

Figure 56: Levels of Truck Automation Technologies



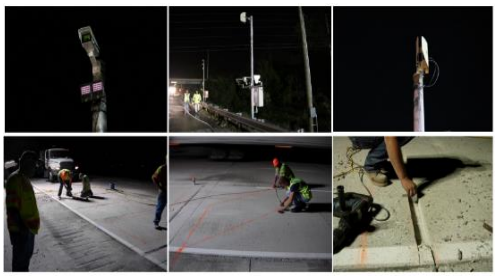
Source: Purdue.edu; NHTSA, Society of Automotive Engineering.

Intersection Safety Technology: Drivers often decide to stop or continue driving through intersections when traffic signals turn yellow. Nevertheless, the insufficient length of the yellow lights puts drivers in a "dilemma zone" where they neither can stop nor pass through the intersections. Purdue University and INDOT invented an intersection safety technology that utilizes wireless communication devices placed at traffic signals and in vehicles. Those sensors detect the position of each vehicle and predict their moving trajectories. After communicating the vehicle information to the sensors installed at the traffic lights, the traffic signals can extend the green time or advance the yellow time depending on the vehicle volumes at the intersections to reduce crashes happening at the "dilemmas zones." This technology has already gone through weeklong testing at County Road 500 S. at U.S. Highway 231 in Tippecanoe County.[54]

Such an innovative safety technology also shares similarities to a transportation systems management and operation approach that specifically helps increase truck safety, called the Truck Signal Priority (TSP). Trucks not only face the same dilemma as other vehicles when going through intersections, but also require longer passing time and have harder time to stop due to their weights and sizes. TSP is a technology that uses detection devices to identify trucks and extends green lights' timing to allow trucks to pass through the intersection safely.

Direct Weigh-in-Motion (WIM): Overweight trucks not only pose a safety threat on highways but also accelerate the deterioration of pavements. Traditional weighing scales require trucks to slow down and can impact the traffic flows on highways. The WIM technology is an array of sensors embedded in the pavement, which allows trucks to be weighed at normal or slightly reduced speed, minimizing the impact of the weighing activities on highway traffic movements. In addition, WIM also serves as direct enforcement by using cameras to capture the credentials of overweight trucks and issuing tickets virtually.

Figure 57: WIM Installation on I-94



Source: INDOT, 2022.

In 2016, INDOT, in collaboration with the Indiana Department of Revenue, Indiana State Police, Purdue University, and Kapsch TrafficCom, launched the Direct Weigh in Motion and Credential Enforcement Program.

[54] Purdue invents technology to make traffic at intersections safer. https://www.jconline.com/story/news/2022/02/19/wireless-traffic-cameras-purdue-engineering-tech-indot-safety-laws/6829740001/

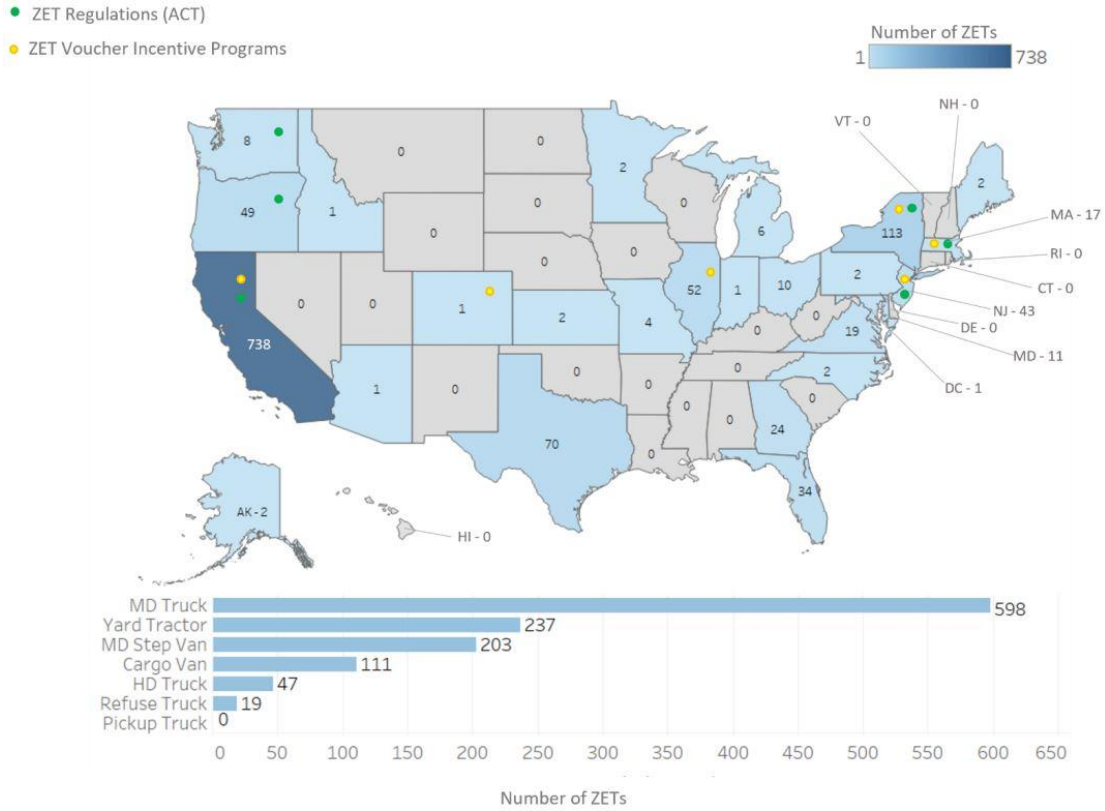
The program installed a WIM equipment on I-94 EB Lane 3 milepost 28.0. The pilot program helps INDOT to consider the expansion of virtual WIM systems in Indiana.[55]

Electric Vehicle (EV) Charging Network: According to the Environmental Protection Agency, the transportation sector generated the most U.S. greenhouse gas (GHG) in 2020, contributing 27% of the total GHG emissions.[56] Therefore, zero- and near-zero emission (ZNZE) vehicle fuel options are becoming more accessible and affordable in the medium- and heavy-duty vehicle market to enable expansion in goods movement operations while mitigating the emission impacts.

Figure 58 shows the number of zero-emission truck deployments by state as of December 2021. As shown, the number of trucks operating with zero-emission engines is still limited across the country. However, INDOT and IMPO can consider opportunities for expanding the required charging and fueling infrastructure to ensure future demands can be addressed.

BIL provides $2.5 billion to increase EV charging access across the nation, incentivizing states to support the transition from fossil fuel to electric-powered vehicles. To respond to the trend, INDOT is investing more than $100 million to build the EV charging network along Indiana's federally designated alternative fuel corridors.[57]

Figure 58: Zero-Emission Truck Deployments by State



Source: Al-Alawi, B., MacDonnell, O., McLane, R., & Walkowicz, K. (2022, January). CALSTART. Zeroing In On Zero-Emission Trucks. Retrieved from https://calstart.org/wp-content/uploads/2022/02/ZIO-ZETs-Report_Updated-Final-II.pdf

[55] KAPSCH/INDOT Direct Enforcement Pilot Project. https://docs.lib.purdue.edu/cgi/viewcontent.cgi?article=4118&context=roadschool

[56] Carbon Pollution from Transportation. EPA. https://www.epa.gov/transportation-air-pollution-and-climate-change/carbon-pollution-transportation

[57] Electric Vehicle Charging Infrastructure Network. INDOT. https://www.in.gov/indot/current-programs/innovative-programs/electric-vehicle-charging-infrastructure-network/

Implementation Strategies

This section presents a set of strategies that can help IMPO improve the operation, maintenance, and governance of the regional freight system.

Support Future Planning Efforts

This regional planning effort has identified and ranked several gaps or freight needs. Ultimately, many of these needs will be addressed through the implementation of projects and policies developed at the municipal level with consideration of the impacts on all system users. A key outcome of this freight planning effort is to make the freight issues list, project gap list, and related GIS maps available to local jurisdictions. It is also recommended that the communication with the stakeholders established and used for this regional freight planning effort is utilized for ongoing conversations with the freight stakeholders and the Freight Strategy Committee (FSC). The FSC is comprised of IMPO and INDOT planners, stakeholders from public agencies that have freight-related activities such as Ports of Indiana, Indianapolis International Airport, representatives from cities and counties, and economic development agencies. Stakeholders from non-profit organizations and private partners such as railroads have also been involved in the outreach efforts for the Regional Freight Plan.

Ongoing conversations with FSC would help IMPO and INDOT better understand freight stakeholders' perspectives, enhancing the consideration of freight in regional transportation planning. ***Regular meetings*** with FSC members would also provide a platform for knowledge sharing and data collaboration among public and private stakeholders and support freight-related public outreach. These meetings can be scheduled regularly and cover a range of topics, such as:

- Milestone updates by IMPO, INDOT, representatives from cities and counties, and the private sector on freight-related projects,
- Current freight issues for consideration into the regional transportation planning process (Transportation Improvement Program and the Metropolitan Transportation Plan),
- Case study presentations on emerging transportation technologies and data sources, and
- Announcements of upcoming projects, pilots, and planning activities.

Meetings with the freight community and especially the FSC members can be on a semi-annual or annual basis. Regional freight meetings are common practice at MPOs across the US.

Atlanta Regional Commission (ARC) Freight Advisory Task Force

ARC is the planning agency serving Atlanta Metro Area. The ARC Freight Advisory Task Force was established as part of the regional planning in 2003 to provide inputs to ARC on the importance of goods movement to the regional economy and policies and improvements that can enhance the overall freight operations. The Task Force consists of members from the local public agencies and the private sector, including railroads, trucking companies, airports, chambers of commerce, and community improvement districts. These members meet periodically throughout the year (bi-monthly and quarterly as needed), providing a platform for ongoing dialogue among the freight community and public agencies on freight trends, issues, and opportunities.

A major topic of discussion in the meetings is ongoing/upcoming Freight Cluster Plans to provide locally-focused freight analysis and recommendations. The Task Force also announces interest topics for upcoming meetings to attract presenters from the private logistics industry.

Source: Atlanta Regional Commission Website, Accessed June 2022.

Improve Safety of the Regional Road and Rail Freight Operations

In 2019, IMPO sponsored a regional safety study with the aim of identifying high-crash intersections in the region and developing a completed site study and project recommendations for the Local Public Agencies (LPAs) to consider in their call for project applications for the use of Highway Safety Improvement Program (HSIP) funds. Of the 24 site-specific studies and project recommendations that resulted from the 2019 study, five intersection improvement projects have so far been slated for implementation as part of the IRTIP and moved to the engineering phase.[58]

The ***truck-involved crash*** assessment conducted as part of this freight planning effort identified safety hotspots that included some of the intersections analyzed in the 2019 Safety Study. It is recommended for the IMPO and stakeholders to ***incorporate truck volumes and truck-involved crash characteristics*** into future safety analyses. Additionally, ***IMPO should consider the importance of safety improvements at critical freight-related locations from the 2019 Safety Study***, specifically:

- Emerson Ave at Victory Dr,
- Commercial Dr at 38th St,
- 10th St at Girls School Road,
- Crawfordsville Rd at Cunningham Rd,
- E 24th St at N Keystone Ave,
- Elmwood Ave at Emerson Ave,
- Shadeland Ave at E 46th St, and
- Main Street at Sheek Road.

These locations are important for truck movements based on either being part of the regional freight network, relatively high truck percentages, or the number of truck-involved crashes.

Truck parking concerns were also identified by stakeholders. As part of the INDOT State Freight Plan, truck parking issues are being analyzed at the statewide level, and recommendations will be developed that impact truck parking in Central Indiana. Also, Indiana is a Mid America Association of State Transportation Officials (MAASTO) member state, partnering with seven other states to improve truck parking availability information through the Truck Parking Information and Management System (TPIMS) program. When completed, TPIMS will cover 19 truck parking facilities in Indiana, helping truck drivers to better plan for their overnight and staging parking. The truck parking facility on I-65 northbound at the Lebanon rest area is also planned for expansion and TPIMS update by 2024.

To address truck staging issues in the downtown Indianapolis area, ***IMPO can integrate truck parking into local plans and studies***. As an example, the Atlanta Regional Commission (ARC), the regional planning agency in the 10-county Atlanta region, works with the cities to ensure that local land use policies are informed about regional freight needs, including truck parking needs.[59] Similarly, the City of Los Angeles conducted a study to identify truck routes and loading/unloading and staging needs and issues. As a result, the City identified available land that could provide temporary legal parking or staging area near warehouses and storage facilities while investing in

[58] IMPO, Safety Study, 2019: https://d16db69sqbolil.cloudfront.net/mpo-website/downloads/Data/Exec.-Summary_2019-IMPO-Safety-Studies-11-17-19-2.pdf; Inputs provided by IMPO Planning Division, 2022.
[59] FHWA, Strategies for Managing Freight Traffic through Urban Areas: Technical Report, 2020. Report 0-6851-R1.

creating designated truck staging areas.[60] IMPO can collaborate with the City of Indianapolis to identify excess land close to or within freight activity centers that could be used for truck staging.

Freight rail safety analysis identified high crash locations at the at-grade crossings along the rail segment running between intermodal yards in Indianapolis and the southern boundaries of IMPO's planning area (CSX railroad corridor used by both CSX and Louisville & Indiana Railroad) through Franklin, Whiteland, Greenwood, and other towns.

In the City of Franklin, the rail line has at-grade crossings at State Street, E Monroe Street, E Jefferson Street, E King Street, E Adams Street, Cincinnati Street, Graham Road, Bryant Drive, Commerce Drive, and E 300 N. In Greenwood, the LIRC line has at-grade crossings at E 750 N, E Stop 18 Road, Smith Valley Road, E Main Steet, and N Meridian Street at grade. In Whiteland, LIRC crosses Paul Hand Blvd, Pearl St, Walnut St, and County Rd 600 N.

Between 2015 and 2019, two trespassing incidents and four rail crossing incidents happened along the LIRC line in Franklin, Whiteland, and Greenwood, leading to two severe injuries and one fatality. With the recent increase in train volumes and lengths due to precision schedule railroading practices, the local communities in these cities have expressed concerns regarding the potential for increased rail safety issues. An additional grade separation along this line would provide additional opportunities for pedestrians, bicycles, and cars to cross the rail track safely.

Additionally, this can be coupled with closed at-grade crossings at other locations to provide additional safety benefits to the community. To identify the optimal location for a grade separation project, an analysis must be done that considers current and future volumes of traffic across all modes and takes into consideration input from the local community. ***It is recommended that the IMPO works with LPAs to identify the most effective grade separation project(s) along the LIRC rail line in Greenwood and Franklin and determine the need for additional rail crossing safety equipment.***

The Indiana Department of Transportation (INDOT) provides funding for local rail safety improvement projects through federal programs such as Section 130. INDOT uses FHWA's hazard index formula to select and prioritize projects. Various factors, including road and rail traffic volumes and speed limits, number of roadway lanes and railroad tracks, angle of the rail line(s) crossing the road, and the number of crashes occurring over the previous five years, are considered in the hazard index formula.[61] Using this method, INDOT has identified a list of short-range investments in the recently published State Rail Plan. These short-range projects are programmed to be completed by 2025 using federal and other public funding sources. Within the IMPO region, the Smith Valley Rd bridge over the LIRC line in Greenwood is planned to be replaced with a cost of about $2.2 million.[62]

In addition to the hazard index formula, INDOT considers feedback from local jurisdictions in the decisions regarding crossing safety improvement projects. The following are grade crossing safety improvement projects that have been identified in the State Rail Plan by the IMPO:

- **Installing grade crossing signal preemption at Kentucky Ave and Ameriplex Pkwy crossing** with Indiana Southern Railroad (ISRR) in Indianapolis. The project is expected to cost around $355k.

[60] FHWA, Urban Freight Case Studies - Los Angeles, accessed June 2022. https://ops.fhwa.dot.gov/publications/fhwahop10020/index.htm#toc

[61] Federal Highway Administration, Highway-Rail Crossing Handbook – Third Edition. Retrieved from: https://safety.fhwa.dot.gov/hsip/xings/com_roaduser/fhwasa18040/

[62] Indiana State Rial Plan 2021. https://www.in.gov/indot/files/INDOT_SRP_Combined_FINAL_Nov-2021-INDOT-website.pdf

- **Grade separating the crossing of County Rd 900 E and E US Hwy 136 (Crawfordsville Rd)** from the CSX rail line in Brownsburg. The project is expected to cost about $8.8 M.
- **Constructing a southeast bypass in Whiteland**, including an overpass of the LIRC line. This project is expected to cost over $100 M and, if implemented, can significantly improve rail-related safety issues along the LIRC line in the southern portion of the IMPO region.

It is recommended that the IMPO works with INDOT to include these priority projects in the Indiana State Freight Plan 2023 and secure funding for them. The new Rail Crossing Elimination Program authorized under BIL has greatly expanded the existing rail crossing funding programs. INDOT and IMPO can explore the opportunities for using this new program in order to address rail crossing safety issues in the Central Indiana region. A summary of funding opportunities is provided in **Appendix F**.

Class I railroads also heavily invest in improvement projects and programs. According to the State Rail Plan, CSX railroad has 17 safety and capacity improvement and maintenance projects in Indiana. As Figure 59 shows, two of these projects are located in Avon, and three are located in Indianapolis.

Figure 59: CSX Rail Planned Investments in Central Indiana Region

Location Type	City	Project Description
Grade Separation	Avon	Close, fill-in and redirect traffic from Bridgeport Rd undergrade crossing
Grade Separation	Avon	Replace current South Raceway Rd undergrade double track bridge
Grade Separation	Indianapolis	Improve roadway clearances for Pleasant Run Blvd undergrade bridge
Grade Separation	Indianapolis	Improve roadway clearances for Sherman Dr undergrade bridge
Grade Separation	Indianapolis	Improve roadway clearances for New York St undergrade bridge

Source: INDOT State Rail Plan, 2021.

Address Mobility/Congestion Issues

Freight mobility and congestion are less of a concern in the IMPO region relative to other major metropolitan areas. Analysis of truck travel times and speeds in the region showed that truck congestion happens during peak traffic hours, especially along the interstate interchanges and on roads that connect downtown Indianapolis with the rest of the region. Also, based on an analysis conducted by the American Transportation Research Institute (ATRI), two of the top 100 truck bottlenecks in the US in 2021 are in the IMPO region (I-65 at I-70 North and I-465 at I-69). The ATRI analysis estimated that average peak hour truck speeds along these bottlenecks are about 46 mph, compared to 30 mph for trucks traveling along top bottlenecks in the Atlanta Metropolitan Area and 24 mph for trucks traveling along Houston's top bottlenecks. INDOT currently has planned and ongoing projects at the I-65/I-70 and I-465/I-69 interstate interchanges, which are expected to improve truck and passenger vehicle mobility and safety. ***IMPO can work with INDOT to address truck congestion issues at other locations along the National Highway System.*** The list of top truck bottlenecks in Central Indiana will be made available to INDOT's Freight Manager for further analysis and inclusion in statewide congestion mitigation efforts.

On the other hand, the ***transportation technology pilots*** and studies led by INDOT and other agencies and entities in Indiana (such as Conexus) and across the nation can inform project

selection and investment decisions of IMPO and its partners and stakeholders to make regional goods movement more efficient. It is also recommended that the IMPO partners with private sector technology providers and public freight stakeholders to explore the potential benefits and impacts of autonomous and connected vehicle technologies and emerging Intelligent Transportation System (ITS) design methods on goods movement operations in the Central Indiana region.

Freight Signal Priority (FSP) Concept

FSP is an extension of Adaptive Signal Control (ASC) applications that use communication technologies and signal control approaches to dynamically alter the traffic signal cycles for specific operations – in the case of FSP, trucking operations.

Researches show that FSP applications can improve freight fluidity while reducing emissions. For instance, retiming 215 signals in the Washington, D.C. suburbs in 2004 resulted in a nearly 94% reduction in average arterial delays. Inter-jurisdictional collaborations are key to implementing such concepts since the majority of traffic signals are operated and maintained by local transportation agencies.

Source, Transportation Research Board, NCFRP 49: Understanding and Using New Data Sources to Address Urban and Metropolitan Freight Challenges, 2018. Image source: iMove.

Mitigate Infrastructure Condition & Community Impacts

Central Indiana has experienced a growth in freight activity in recent years; much of this has occurred in the most urbanized areas due to a rise in online shopping and demand for home deliveries, which is in alignment with the national e-commerce growth trends. This growth is expected to continue as more companies build major fulfillment centers and distribution hubs in and around Indianapolis to leverage the region's business-friendly environment and efficient transportation network.

With the increase in freight traffic, the challenges and issues associated with goods movement through various modes and ***freight land use developments*** will continue to impact the communities in the region. Stakeholders in the IMPO region cited both safety and air quality as their major concerns regarding trucks traveling on local streets.

Also, trucks traveling on local streets contribute to a relatively higher rate of pavement deterioration, requiring higher investments by local transportation authorities in maintenance and rehabilitation projects. While maintenance projects are often prioritized when states and regions allocate their available sources, there are limited resources for funding new or expanded infrastructure investments.[63] ***It is recommended that IMPO reviews the new funding sources authorized under BIL*** to identify programs that may be relevant to the freight needs and issues in the region. Appendix F is a starting point for this review.

[63] An overview of funding programs that may be relevant to the freight needs and issues in the IMPO region is presented in Appendix F.

Community-related truck issues tend to be particularly noticeable in disadvantaged residential areas that are often located close to freight activity clusters. Some local communities have tried to address these concerns by incorporating traffic-calming measures in local street designs, such as tight turns, narrow lanes, and frequent speed bumps. These measures may create mobility impediments for first/last mile truck movements. ***Therefore, it is important to consider land use incompatibility issues in future planning efforts and project development activities.***

IMPO can also collaborate with the local transportation authorities ***to develop a regional truck route network*** and invest in the communication methods that can direct truck drivers to the most appropriate routes (i.e., dynamic messaging signs, live maps, media announcements, email blasts, etc.).

Other actions that can help IMPO mitigate the impacts of freight activity on communities' safety and quality of life include:

- ***Exploring the potential for investments in alternative fuel vehicle charging infrastructure to promote zero-emission goods movement technologies.***
- ***Collaborating with INDOT to designate the following road segments*** as official Federal Highway Administration (FHWA) NHS intermodal connectors to allow for use of NHS funding for:
  - S Senate Avenue, Wisconsin St, and S West Street segment connecting the Indiana Rail-Road facility to I-70,
  - Sam Jones Expressway off-ramp to I-465 SB.

Freight Performance Measures

This section presents a summary of the existing regional and statewide freight-related performance measures and evaluates the measures recommended in the 2016 IMPO Freight Plan according to the data availability and ease of calculation for regular performance benchmarking and target setting. A list of recommended freight performance measures is also provided for consideration by the IMPO and its partners and stakeholders.

Regional Performance Measures

The regional transportation performance measures benchmarked as part of the IMPO's 2050 Metropolitan Transportation Plan (2050 MTP) are classified under four major themes: Move, Prosper, Make Safe, and Sustain. Each of these themes has several objectives that can be tracked using specific performance measures. Figure 60 summarizes the performance measures under each of these themes that are relevant to freight activities.

Figure 60: Regional Freight-Related Performance Measures

Theme	Objective	Freight-Relevant Performance Measure	2020 Update	Targets & Projections
Move	Enhancing transportation options and choices for all users	Regional vehicle connectivity: average minutes of travel time during peak morning travel between economic clusters	25 Average Minutes of Travel Time During Peak Morning Travel Between Regional Activity Centers	N/A*
	Implementing strategies that	Annual hours of peak hour excessive delay per capita;	4.07 (last updated for 2019)	N/A

Theme	Objective	Freight-Relevant Performance Measure	2020 Update	Targets & Projections
	address congested transportation segments	Percent of reliable miles traveled on NHS and non-NHS systems in the region		
Prosper	Ensuring the efficient movement of goods and freight	Truck Travel Reliability Index (TTTR): the reliability of truck travel on the National Highway System	1.24	1.3 (4-year target)
Make Safe	Improving safety for travelers system-wide through project investment	Number of serious injuries and fatalities (5-year rolling average)	Fatalities: 907.7 Serious Injuries: 3,327	Fatalities (2021): 817.3 Serious Injuries (2021): 3,311.4
		Serious injury and fatality per 100 million vehicle miles (5-year rolling average)	Fatality Rate: 1 Serious Injury Rate: 4.45	Fatality Rate (2021): 1.01 Serious Injury Rate (2021): 4.45
	Preserving or enhancing the existing transportation system	Percentage of the bridge on NHS in good condition	48%	47.2% (4-year target)
		Percentage of pavement on NHS and non-NHS in good condition	NHS: 56.5% Non-NHS: 44.8%	NHS: 50% (4-year target) Non-NHS: 40% (4-year target)
Sustain	Minimizing negative impacts on the natural environment	Land consumption: acres of developed land in the IMPO's metropolitan planning area	203.5K Acres**	N/A

Source: IMPO, 2019 and 2020 Performance Measure Update. *N/A: Not Applicable. **Agricultural acreage is considered vacant.

Additionally, the 2015 Regional Freight Plan provided a list of recommended performance measures that targeted freight issues such as congestion, safety, infrastructure condition, and multimodal connection and were categorized under four major freight planning goals (Figure 61).

Figure 61: Regional Freight Planning Measures

Freight Planning Goal	Performance Measure
Reduce Congestion and Improve Reliability of the Regional Freight System	**Level of Service:** corridor-level commercial vehicle hours of delay
	Reliability Index: additional time needed to travel due to system variations
Improve the Safety and Resiliency of the Regional Freight System	**Commercial Vehicle Crash Rate:** crashes per commercial vehicle miles traveled
	Pavement Rating: safety ratings based on INDOT's database
	Weight Restricted Bridges: no. of weight-restricted bridges on the network
	Incident Clearance Rate: the rate at which incidents are cleared on the network
	Railroad Incident Rate: incidents at rail crossings

Freight Planning Goal	Performance Measure
Capitalize on the Existing Infrastructure of the Regional Freight System	**Annual investment** in existing vs. new facilities
Provide an Interconnected, Multimodal Regional Transportation System that Supports Access to Jobs	**LOS** on intermodal connectors and other key linkages
	Transit availability to freight clusters: number of overlapping transit routes over freight clusters
	Transit access to freight clusters by IMPO EJ areas
	Transit ridership in freight clusters: level of transit ridership within 1/2 mile of a freight cluster
	Intermodal Container Lifts: no. of intermodal container lifts at intermodal sites
	Air Cargo Activity: volume of air cargo in tonnages
	Freight-related jobs within a standard deviation of the median regional per capita income

Source: IMPO, Regional Freight Plan, 2015.

Statewide Performance Measures

Under the FAST Act (2015) guidelines, INDOT is also required to track the Truck Travel Time Reliability performance measure. INDOT also maintains detailed highway safety records that include truck crashes. However, no specific freight safety performance is currently benchmarked by INDOT. The following is a summary of the freight performance measures recommended by INDOT in the 2018 State Freight Plan:[64]

- **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.
- **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.
- **Multimodal Integration and Synergy:** performance measures include the percent of intermodal connectors with "fair" or better pavement conditions and the number of intermodal or multimodal projects completed.
- **Capacity to Meet Demands:** recommended performance measures are the percent 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.
- **Economic Impact:** includes tracking of percent growth in jobs in freight-intensive industries and percent growth in export value (domestic or foreign).

Recommended Freight Performance Measures

The following process was used to evaluate the freight performance measures recommended in the 2015 Regional Freight Plan and develop a new list of measures for IMPO to consider:

[64] As of June 2022, INDOT is in the process of updating the Indiana State Freight Plan.

- Organized the measures according to their relevance to IMPO's freight planning goals as well as INDOT's and National Freight planning objectives;
- Indicated the data required to benchmark each measure as well as the frequency of data updates; and
- Categorized the measures based on data accessibility and level of analysis effort as follows:

    1. Data access and analysis requires assistance from outside of the agency;
    2. Data can be obtained from outside of the agency but analyzed using in-house resources; and
    3. Data is available internally and can be analyzed using in-house resources.

Figure 62 presents the resulting list of freight performance measures for IMPO to consider. Detailed performance measure evaluation tables are presented in **Appendix E.**

Figure 62: Recommended Freight Performance Measures

Performance Measure	Notes
Truck Travel Time Reliability (TTTR) Index	Requires truck speed data that is available to IMPO through FHWA's National Performance Management Research Data (NPMRDS). State DOTs are required to report the TTTR Index on Interstates annually. Data can be obtained from outside of the agency but analyzed using in-house resources.
Truck Crash Rate	ARIES crash data and truck vehicle miles traveled (VMT) information by highway functional class. IMPO can request ARIES data free of charge; truck VMT data can be extracted from the Highway Performance Monitoring System (HPMS) data updated and provided by FHWA on an annual basis. IMPO can obtain the data and analyze them internally.
Pavement Condition Ratings*	Pavement condition data is collected by the cities and submitted to IMPO annually. FHWA is in charge of collecting and publishing pavement condition data along the NHS routes. INDOT establishes statewide 2- and 4-year targets for non-Interstate NHS and 4-year targets for the Interstate system. IMPO has access to the data and can analyze them using in-house resources.
Percentage of Bridges in Poor Condition*	Bridge condition data is collected by the cities and submitted to IMPO annually. FHWA is in charge of collecting and publishing bridge condition data for infrastructure located on the NHS routes. IMPO has access to the data and can analyze them using in-house resources.
Railroad Incident Rate	Rail crossing safety data is provided by the Federal Railroad Administration (FRA) on a monthly basis. Railroad mileage data can be obtained from INDOT. IMPO can obtain the data free of charge and can analyze them using in-house resources.

Source: CPCS analysis, 2022. *Measure is already being tracked by IMPO as part of the MTP update process (PM-2).

Additional freight-related measures that can be informative for IMPO's various planning efforts (but are not necessary to regularly update) include:

- Level of service (LOS)/ LOS on intermodal connectors;
- Incident clearance rate;
- Annual investment in existing vs. new facilities;
- Intermodal container lifts;
- Air cargo activity;
- Freight-related jobs;
- Freight investments to address environmental/equity concerns; and
- Percentage of Weight Restricted Bridges.

Transit-related measures such as access to transit within freight clusters and transit ridership in freight clusters are also measures that can be calculated as needed to inform IMPO's decisions regarding investments in locations with a higher concentration of freight activities, especially as it relates to mitigating the Environmental Justice (EJ) impacts of freight on underserved communities.

5 Appendices

Appendix A Reviewed Plans, Studies, and Documents

Figure 63: Plans and Studies Reviewed

Plan Name	Publishing Agency	Year Published
State Level Studies		
INDOT's Customer Satisfaction Survey	INDOT	2020
Long-Range Transportation Plan	INDOT	2019
State Transportation Improvement Program (STIP)	INDOT	2019
Indiana Multimodal Freight Plan Update	INDOT	2018
Statewide Interstate Tolling Strategic Plan	INDOT	2018
Indiana State Rail Plan Appendix	INDOT	2017
Indiana State Rail Plan	INDOT	2017
Indiana 2014 Multimodal Freight and Mobility Plan	INDOT	2014
Blue Ribbon Panel on Transportation Infrastructure	Governor's Blue Ribbon Panel on Transportation Infrastructure	2014
Central Indiana Suburban Transportation and Mobility Study	INDOT	2004
Market Research Project	INDOT	2004
Indiana Transportation Funding	INDOT	2003
MPO Level Studies		
Transportation Conformity Determination Report	IMPO	2021
Indianapolis Metropolitan Planning Organization 2045 Long Range Transportation Plan Amendment #6	IMPO	2021
Performance Measure Update	IMPO	2020
Performance Measure Update	IMPO	2019
Appendix S Target Support	IMPO	2018
Air Quality Conformity Determination Report	IMPO	2018
2045 Long Range Transportation Plan	IMPO	2017
2045 Long Range Transportation Plan Appendices	IMPO	2017
Appendix R: Red Flag Report	IMPO	2017
Central Indiana Transit Plan	Indy Connect	2016
Regional Freight Plan	IMPO	2016
Freight Transportation Study WP1	IMPO	2010
Freight Transportation Study WP2	IMPO	2010
Freight Transportation Study WP3	IMPO	2010
Mount Comfort Road Corridor Study	IMPO	2008
Other Regional/Local Level Studies		
Hendricks County Thoroughfare Plan	Hendricks Co.	2019

Plan Name	Publishing Agency	Year Published
Morgan County Comprehensive Plan Appendix A	Morgan Co.	2019
Morgan County Thoroughfare Plan	Morgan Co.	2019
Morgan County Comprehensive Plan	Morgan Co.	2019
Thoroughfare Plan Indianapolis + Marion County	Metropolitan Development Commission	2019
Indianapolis Transportation Plan: Indy Moves	Indianapolis & Marion Co.	2018
Alternative – Indianapolis North Split Vision Statement	Urban Indy	2018
Boone County Thoroughfare Plan	Boone Co.	2017
Marion County Comprehensive Plan	Marion Co.	2018-19
Marion County Land Use Plan Pattern Book	Marion Co.	2017
Central Indiana Transit Plan	Indy Connect	2016
Comprehensive Plan, Hancock County, Indiana	Hancock Co.	2012
Johnson County Comprehensive Plan	Johnson Co.	2011
Boone County Area Comprehensive Plan	Boone Co.	2009
Hamilton County Thoroughfare Plan Update	Hamilton Co.	2007
Hamilton Indiana Comprehensive Plan Update	Hamilton Co. Planning Commission	2006
Hendricks County Quality Growth Study	Hendricks Co.	2006
Shelby County Comprehensive Plan	Shelby Co.	2006
Hancock County Comprehensive Plan	Hancock Co.	2005*
Corridor Studies		
City of Noblesville EW Corridor	City of Noblesville	2020
Mount Comfort Corridor Study	ULI	2019
SR 37 Executive Summary	Hamilton Co.	2012
SR 32 Corridor Study	City of Westfield	2011
City of Greenwood: EAST/WEST Corridor Study	City of Greenwood	-

Source: CPCS, 2021.*Hancock County's updated Comprehensive Plan will be completed in 2022.

Appendix B Freight Strategy Committee Membership

The Freight Strategy Committee was comprised of individuals representing key freight stakeholder groups identified by the IMPO, including:

- Central Indiana Regional Development Authority (CIRDA)
- City of Fishers
- City of Greenwood
- City of Indianapolis
- City of Westfield
- Drive Clean Indiana
- Fifth Third Bank
- Hamilton County
- Hendricks County
- Hendricks County Economic Development Partnership
- Indiana Farm Bureau
- Indianapolis Airport Authority
- Indianapolis Public Transportation Corporation (IndyGo)
- Indiana State Department of Transportation
- Indy Partnership
- Johnson County
- Madison County Council of Governments (MCCOG)
- Madison County Corporation for Economic Development (CED)
- Ports of Indiana
- Purdue School of Engineering & Technology
- Town of Avon
- Whitestown Municipal Utilities

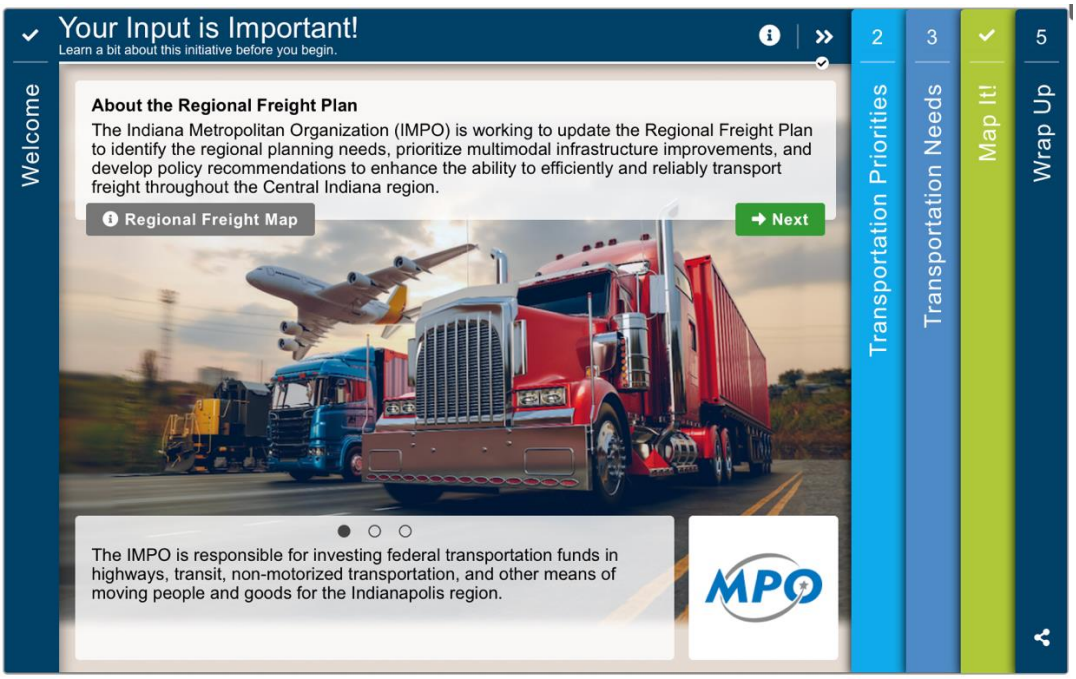
Appendix C Freight Survey and Summary Results

Freight Survey

The freight survey was conducted using the MetroQuest public input platform, which uses a highly engaging structure to share information with participants while also collecting feedback from them. The survey consisted of five steps (or screens), each with a different focus:

Step 1: Welcome – Your Input is Important
This screen introduced the Central Indiana Regional Freight Plan and the effort to update it. It also provided information about the IMPO and how the updated Freight Plan will be used.

Figure 64: MetroQuest Survey for Central Indiana Regional Freight Plan – Welcome Screen



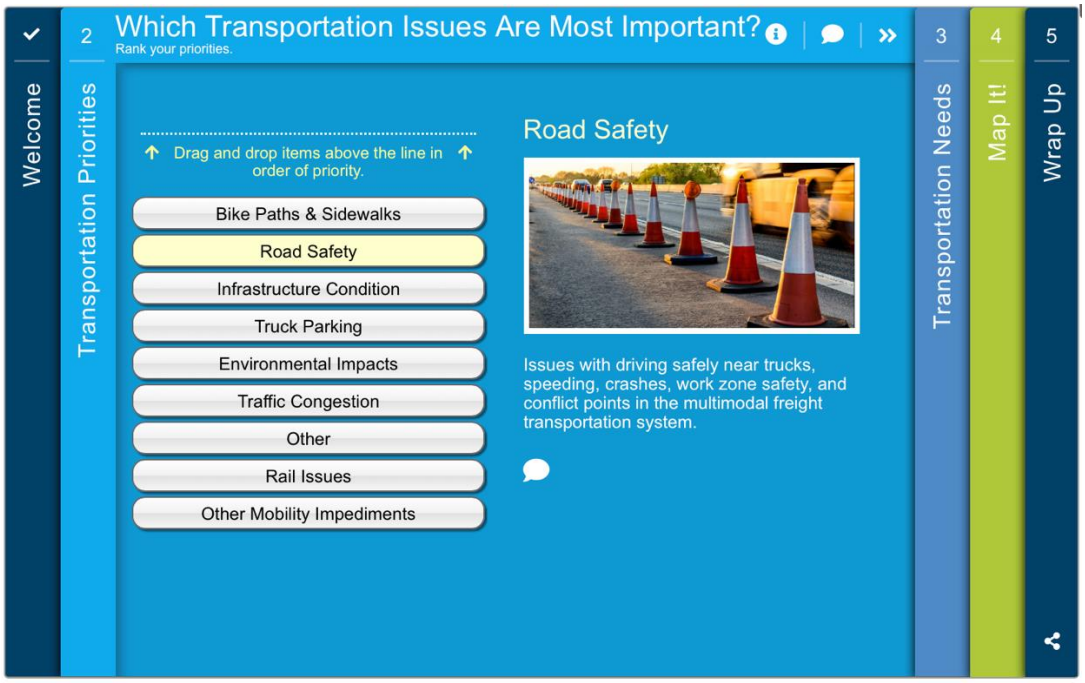
Source: Rasor, 2021.

Step 2: Transportation Priorities – Which Transportation Issues Are More Important?
This screen presented eight transportation issues and asked participants to rank the issues in order of importance to them. Participants could also select "Other" and write in their own issue. The issues were presented in a random order to each participant. Each issue, listed below, included a comment bubble that participants could use to share comments.

- **Road Safety** - Issues with driving safely near trucks, speeding, crashes, work zone safety, and conflict points in the multimodal freight transportation system.
- **Rail Issues** - Issues with rail safety at at-grade crossings, conditions of tracks, trespassing concerns, etc.
- **Traffic Congestion** - Issues with congestion that restrict the movement of freight.

- **Other Mobility Impediments** - Other issues that restrict movement of freight, including intersection delays, low bridges, narrow lanes, sharp or tight turning movements, wet pavement, snow, and ice.
- **Truck Parking** - Issues related to the need for safer and more convenient truck parking options.
- **Bike Paths & Sidewalks** - Issues related to sidewalks, dedicated bike lanes, and/or shared-use paths, improved sidewalks or paths, ramps needed for accessibility, etc.
- **Environmental Impacts** - Issues concerning the environmental impacts of freight activities, such as air, water, and noise pollution.
- **Infrastructure Condition** - Issues with the condition of existing infrastructure (roads, bridges, sidewalks, etc.) such as age, structural integrity, weight limits, shoulder width and availability.
- **Other**

Figure 65: MetroQuest Survey for Central Indiana Regional Freight Plan – Transportation Priorities Screen

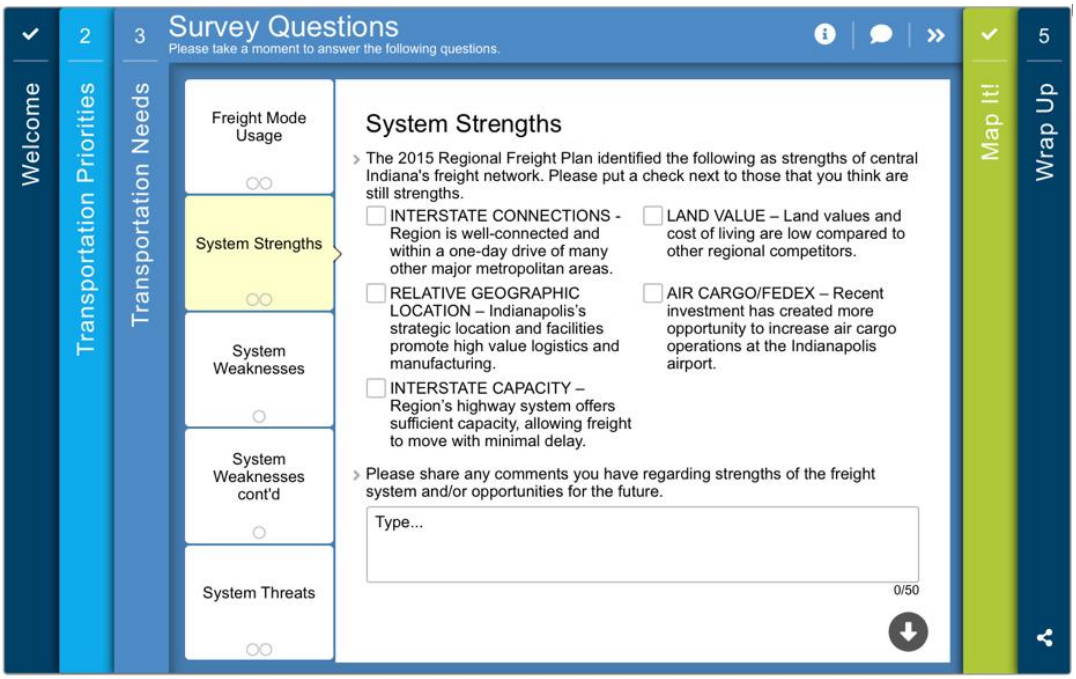


Source: Rasor, 2021.

Step 3: Transportation Needs – Survey Questions

The Transportation Needs screen asked a series of survey questions. The first asked which freight modes participants use most. The remaining questions highlighted the strengths, weaknesses and threats to the central Indiana freight system identified in the 2015 Regional Freight Plan and asked participants to identify which they think are still valid. Participants also had the opportunity to share comments and/or suggestions for improvements.

Figure 66: MetroQuest Survey for Central Indiana Regional Freight Plan – Transportation Needs Screen



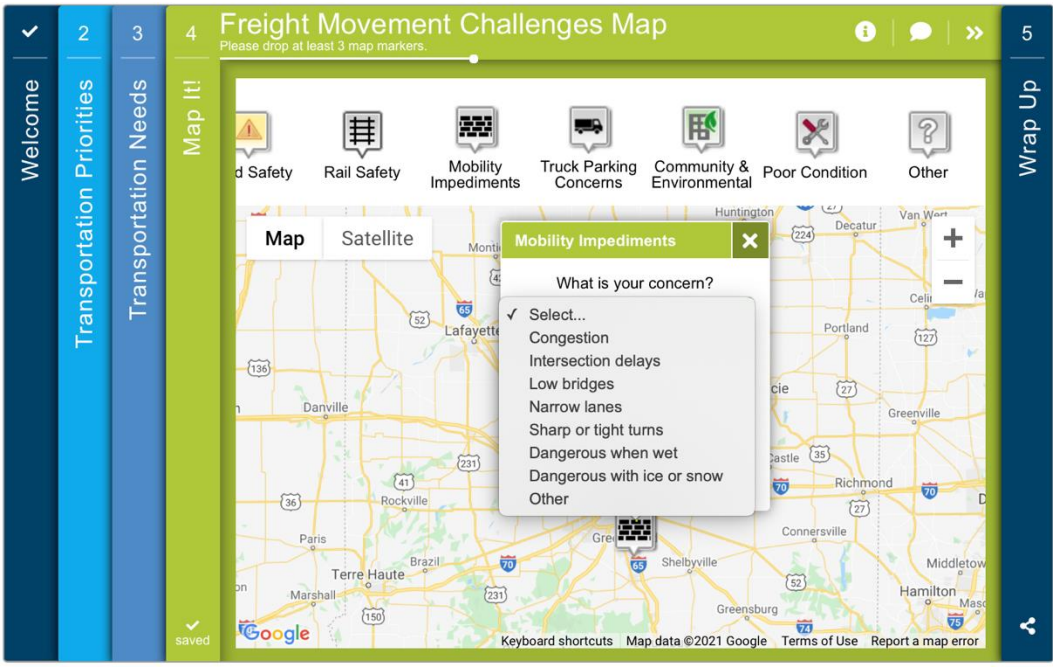
Source: Rasor, 2021.

Step 4: Map It! – Freight Movement Challenges Map

This screen invited participants to place markers on a Google-based map to highlight the locations of concerns related to the issues listed below. Once a marker was placed on the map, a pop-up box invited respondents to provide additional information by selecting a descriptor from a drop-down menu (also listed below) and/or providing a written comment.

- **Road safety** – Proximity to other vehicles, speeding, crashes, work zone safety, conflict points, other.
- **Rail safety** – Safety at at-grade crossings, trespassing, track condition, facility condition, other.
- **Mobility impediments** – Congestion, intersection delays, low bridges, narrow lanes, sharp or tight turns, dangerous when wet, dangerous with ice or snow, other.
- **Truck parking concerns** – Need more parking, trucks park at undesignated locations, other.
- **Community and environmental issues** – Community issues, impacts to underserved communities, air and noise pollution, other.
- **Poor condition** – Open response.
- **Other** – Open response.

Figure 67: MetroQuest Survey for Central Indiana Regional Freight Plan – Map IT! Screen



Source: Rasor, 2021.

Step 5: Wrap Up – Thank You for Your Input

This final screen gathered information about the participants – their occupation, where they work, how they heard about the survey and if they would like to receive updates. It also provided links to the project page on the IMPO website.

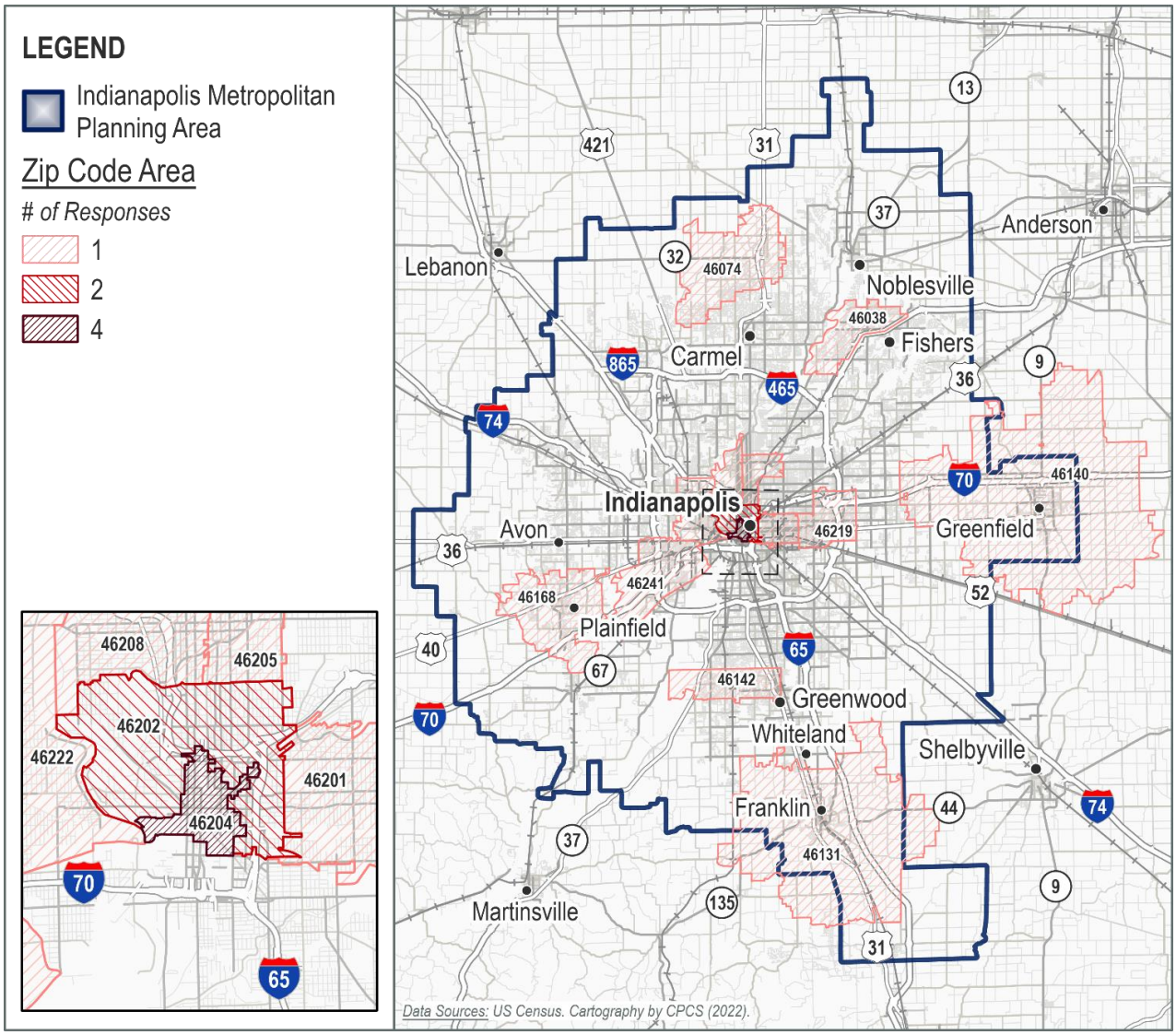
Figure 68: MetroQuest Survey for Central Indiana Regional Freight Plan – Closing Screen

Source: Rasor, 2021.

Summary Results

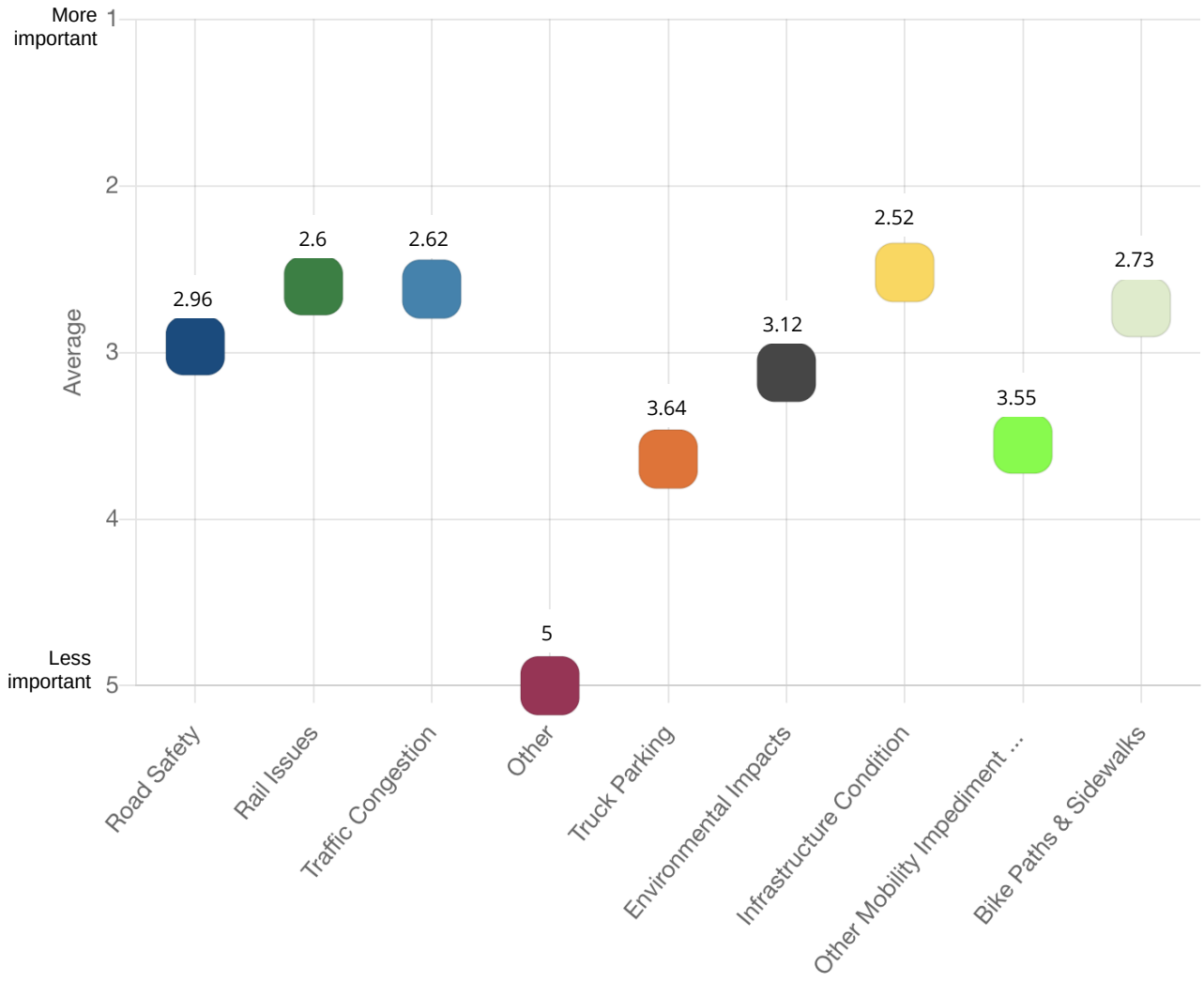
It was also requested from the respondents to provide information about occupation, where they work, how they heard about the survey, and if they would like to receive updates. 19 of the respondents opted to provide these inputs. As Figure 69 shows, most of the respondents lived/worked in the downtown Indianapolis area.

Figure 69: Distribution of Respondents in the IMPO Region



The survey respondents were asked to rank the most important transportation issues in the IMPO region from 1-5. Infrastructure condition issues received the highest-ranking score, followed closely by rail safety concerns and traffic congestion issues. Figure 70 shows the issues ranked by the stakeholders. Note that due to the configuration of the MetroQuest ranking exercise, the lower the ranking score (closer to 1.0), the more important the issue.

Figure 70: Transportation Issues Ranked by IMPO's Stakeholders



Source: MetroQuest Report, 2021.

2015 Freight Plan SWOT Elements to Transfer to The Current Study

As part of the online survey, IMPO's freight stakeholders reviewed the SWOT elements included in the 2015 freight plan and indicated areas of strength, weakness, and threat that still apply for the region's freight activities. The following presents a summary of the SWOT analysis results provided in the 2015 Plan:

Strength: The IMPO **region is well-connected** to other metro areas, states, and US-Canada border crossing through a network of interstates and national and state highways. Overall, these highways do not suffer from severe congestion issues and enable reliable goods movement between various origins and destinations. The region is also strong in terms of **overall land values and cost of living** compared to other Midwestern competitors, as well as its **strategic location** in the Midwest region as a freight hub. Multimodal services are provided by facilities such as the FedEx hub in the Indianapolis Airport.

Weaknesses: Although the region's highways rarely suffer from severe congestion issues, **vehicle delays** at intersections and interchanges negatively impact freight mobility and increase shipping costs. **Highway and bridge maintenance,** limited **rail connection to sea and river ports**, and lack of access to **high-volume container facilities** are other major weaknesses for

the region. A significant portion of the freight moving in the IMPO region is passthrough or inbound, leading to an **imbalance in the trade** that can affect economic opportunities. The **movement of people** in the region also impacts the freight industry, as the newer logistics facilities in Central Indiana are typically developed in green-field suburban areas where access to transit and affordable housing is limited.

Opportunities: Since the majority of the truck movements in the IMPO region are passthrough, providing **truck stop services** as well as **warehousing and distribution hubs** can help intercept this flow and create jobs and other benefits for the region. Deployment of **autonomous and connected** trucking technologies, establishing **joint line services with railroads, sister city trade initiatives,** and expansion of **transload and cold chain facilities** are other opportunities identified in the IMPO region.

Threats: Many bridges throughout the region pose **weight or geometric restrictions** to truck movements. Also, outside of the IMPO boundaries, **congestion** exists along major interstates that cross the region. In the absence of congestion management programs and investment in improving freight multimodality, these congested segments can expand and severely impact the movement of goods with the IMPO region.

Figure 71 shows the freight system strength and weaknesses and threats that have been confirmed by the stakeholders as still relevant and impactful on the regional freight operations. We will consider all of these elements in the development of project recommendations. As shown, Central Indiana stakeholders believe that the relative geographic location of the region has the most significance for its current and future freight activities. Meanwhile, interstate congestion and access to work for workers are the most important threats and weaknesses affecting the regional goods movement performance.

Figure 71: SWOT Elements to Transfer to the Current Planning Effort

Factor	Type
Relative Geographic Location- Indianapolis's strategic location and facilities promote high-value logistics and manufacturing.	Strength
Air Cargo/FedEx-Recent investment has created more opportunities to increase air cargo operations at the Indianapolis airport.	Strength
Interstate Connections- Region is well- connected and within a one-day drive of many other major metropolitan areas.	Strength
Land Value - Land values and cost of living are low compared to other regional competitors	Strength
Interstate Capacity- Region's highway system offers sufficient capacity, allowing freight to move with minimal delay	Strength
Worker Mobility - location of warehouses/distribution centers lack affordable housing for workers, and public transit is limited.	Weakness
Interchange Congestion - Bottlenecks at key interchanges impact travel and productivity.	Weakness
Proximity to Rail Gateway Cities - Our near proximity to gateway cities makes it challenging to attract eastern rail carriers.	Weakness
Limited Access to Ports - Our location is not accessible to boats and barges	Weakness
Roadway Maintenance - Attention is needed on roadway maintenance issues.	Weakness
Trade Imbalance - We receive more inbound freight than outbound.	Weakness
Passthrough Freight - A significant portion of the region's freight doesn't stop here.	Weakness

Factor	Type
Few High-Volume Container Facilities - The region's two intermodal container facilities are not large enough to support sustained export growth.	Weakness
Multimodal Connectivity – Fewer airport departures than competitor cities; fewer rail and marine connections.	Weakness
Railroad Rates- Limited rail competition leads freight customers to look at other markets.	Threat
Interstate Congestion- Many interstate routes to other metropolitan areas are congested.	Threat
Workforce Availability- Local workforce shortages are a major challenge to growth.	Threat
Bridges - Local bridges can be challenging due to weight limits and design issues.	Threat
Transportation Technologies - Deployment of autonomous and connected trucking technologies.	Opportunity
Rail Improvements - Establishing joint line services with railroads and expansion of transload and cold chain facilities.	Opportunity

Source: CPCS analysis of Stakeholder responses to IMPO freight survey, 2021.

Mapping Goods Movement Challenges

MetroQuest's Map It! tool was used to solicit stakeholder inputs on the locations of freight issues and areas that offer opportunities for improvements on a Google-based map. Thirty-seven respondents identified 79 issue locations across the region. As Figure 72 shows, the majority of issues identified by the stakeholders were related to freight mobility and road and rail safety.

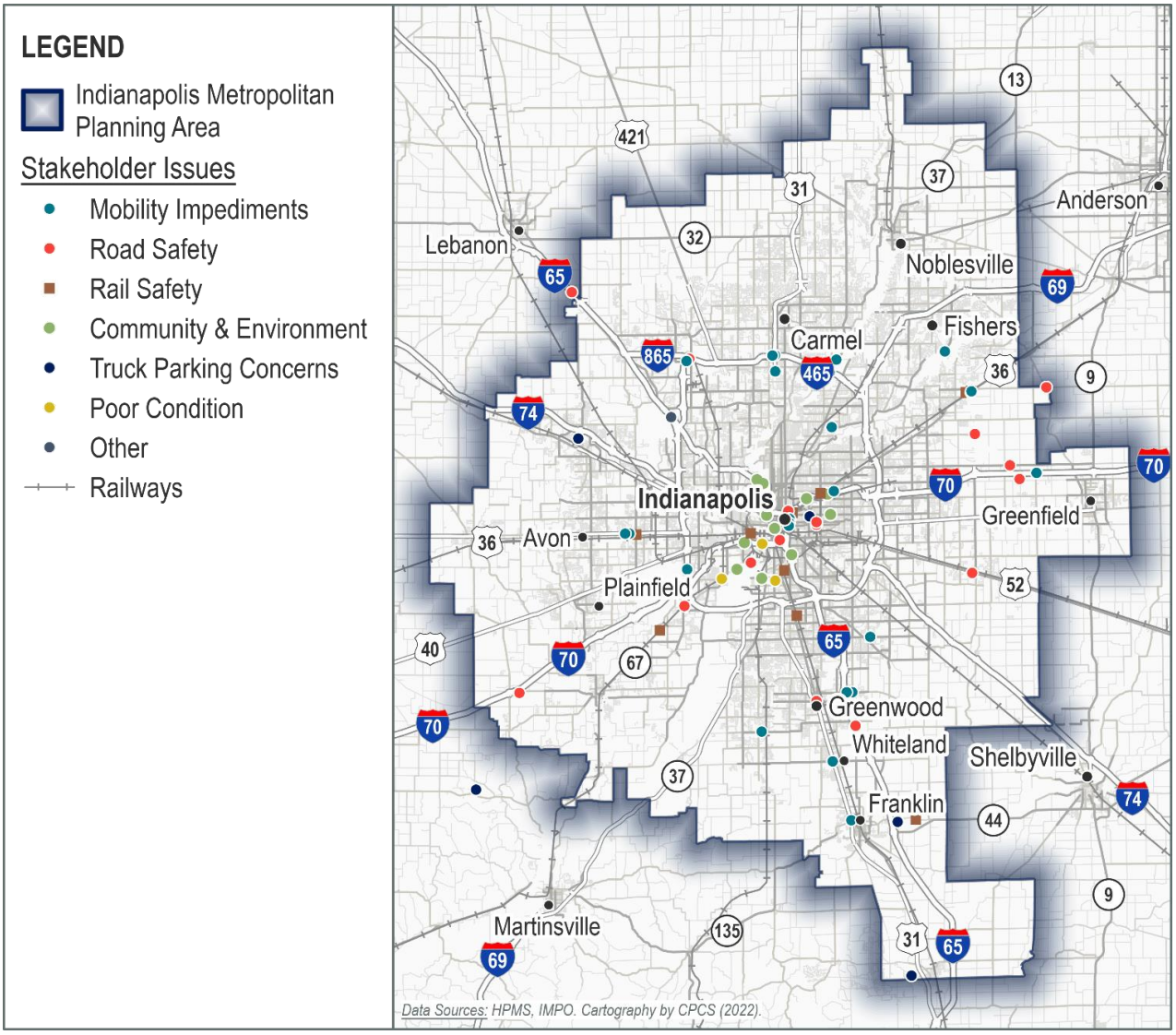
Figure 72: Number of Freight-Related Issues Reported Through Online Survey

Type of Issue	Count of Issues Identified	% Of Total
Mobility Impediments	24	30%
Road Safety	17	22%
Rail Safety	14	18%
Community & Environmental	11	14%
Truck Parking Concerns	9	11%
Poor Condition	3	4%
Other	1	1%
Total	**79**	**100%**

Source: CPCS, based on MetroQuest online survey results, 2021.

Figure 73 shows the locations for the freight-related issues identified by the stakeholders. These issues and comments provided by the respondents are integrated into the SWOT summary tables presented in the next chapter.

Figure 73: Stakeholder-Identified Freight Issues and Needs in Central Indiana



Source: CPCS, based on MetroQuest online survey results, 2021.

Appendix D Lists of Freight Project Issues and Gaps

Figure 74: List of Identified Freight Issues

Source	ID	Need Type	Condition	Description
Data	D1	Mobility	Top Bottleneck	I-465 E
Data	D22	Mobility	Delay Hotspot	I-65 off-ramp to E 12th St
Data	D3	Mobility	Top Bottleneck	I-65 N
Data	D25	Mobility	Delay Hotspot	I-70 EB to I-65 NB ramp
Data	D27	Mobility	Delay Hotspot	I-65 off-ramp to 11th St
Data	D29	Mobility	Delay Hotspot	I-70 E
Data	D30	Mobility	Delay Hotspot	11th St between N Meridian St and N Delaware St
Data	D8	Mobility	Top Bottleneck	I-65 N
Data	D33	Mobility	Delay Hotspot	I-465 interchange with I-70 (East)
Data	D34	Mobility	Delay Hotspot	US 421 in Zionsville
Data	D35	Mobility	Delay Hotspot	I-465 SB east of IND Airport
Data	D12	Mobility	Top Bottleneck	E Washington St
Data	D37	Mobility	Delay Hotspot	I-465 SB south of Brookville Rd
Data	D38	Mobility	Delay Hotspot	Sam Jones Expy off-ramp to I-465 SB Est of IND Airport
Data	D15	Mobility	Top Bottleneck	267 N
Data	D39	Mobility	Delay Hotspot	N Meridian St south of interchange with I-465
Data	D40	Mobility	Delay Hotspot	I-65 NB off-ramp to W South St
Data	D41	Mobility	Delay Hotspot	E Vermont St between N Pennsylvania St and Alabama S
Stakeholder	S80	Condition	Poor pavement condition along access roads to Indiana Rail-Road facility	S Senate Ave and Wisconsin St
Data	D44	Safety	High Crash Intersection	10th St at Girls School Road
Data	D21	Mobility	Delay Hotspot	
Data	D45	Safety	High Crash Intersection	E 24th St at N Keystone Ave
Data	D23	Mobility	Delay Hotspot	
Data	D24	Mobility	Delay Hotspot	I-465 E
Data	D46	Safety	High Crash Intersection	Commercial Dr at 38th St
Data	D26	Mobility	Delay Hotspot	
Data	D48	Safety	High Crash Intersection	N High School Rd at 38th St

Source	ID	Need Type	Condition	Description
Data	D28	Mobility	Delay Hotspot	I-65 N
Data	D49	Safety	High Crash Intersection	Shadeland Ave at E 46th St
Data	D50	Safety	High Crash Intersection	Olio Rd at E 116th St
Data	D31	Mobility	Delay Hotspot	
Data	D32	Mobility	Delay Hotspot	I-65 N
Data	D54	Safety	High Crash Intersection	River Road at E 146th St
Data	D59	Safety	High Crash Intersection	Crawfordsville Rd at Cunningham Rd
Data	D60	Safety	High Crash Intersection	Elmwood Ave at Emerson Ave
Data	D36	Mobility	Delay Hotspot	
Data	D61	Safety	High Crash Intersection	Emerson Ave at Victory Drive
Data	D62	Safety	High Crash Intersection	Main Street at Sheek Road
Data	D63	Safety	High Crash Intersection	New York St at University Boulevard
Data	D65	Safety	High Crash Intersection	Ohio St at Pennsylvania St
Data	D67	Safety	High Crash Intersection	South St at Virginia Ave & East St
Data	D42	Mobility	Delay Hotspot	
Data	D43	Mobility	Delay Hotspot	
Data	D74	Safety	High Density Crash	East New York Ave
Data	D75	Safety	High Density Crash	I65 Interchange
Stakeholder	S82	Mobility	Congestion due to weaving patterns at I-65/I-70 split	39.783287, -86.143699 and 39.752998, -86.145342
Data	D47	Safety	High Crash Intersection	N Franklin at 38th St
Stakeholder	S84	Mobility	SR44 in Shelbyville	
Stakeholder	S85	Mobility	I-65 can have some congestion and that traffic can be routed along IN-31 when there is a backup	I65 in Shelbyville(?) near IN-31(?)
Stakeholder	S1	Safety	Rail Safety	Safety at at-grade crossings
Data	D51	Safety	High Crash Intersection	Carey Rd at E 146th St
Data	D52	Safety	High Crash Intersection	Gray Rd at E 146th St
Data	D53	Safety	High Crash Intersection	Hazel Dell Parkway at E 146th St
Stakeholder	S10	Mobility	Mobility Impediments	
Data	D55	Safety	High Crash Intersection	W Smith Valley Rd at Averitt Rd
Data	D56	Safety	High Crash Intersection	N Raceway Rd at W 10th St
Data	D57	Safety	High Crash Intersection	CR300N at Fortville Pike
Data	D58	Safety	High Crash Intersection	Mount Comfort Rd at CR 600N
Stakeholder	S11	Safety	Road Safety	
Stakeholder	S12	Condition	Poor Condition	never know what trash and debris

Source	ID	Need Type	Condition	Description
Stakeholder	S13	Community & Environmental	Community & Environmental	Pollution - Emission
Stakeholder	S14	Safety	Road Safety	Conflict points
Stakeholder	S15	Safety	Rail Safety	Other
Data	D64	Safety	High Crash Intersection	Northfield Dr at S Green St
Stakeholder	S16	Safety	Truck Parking Concerns	Need more parking
Data	D66	Safety	High Crash Intersection	Rural St at Washington St
Stakeholder	S17	Safety	Truck Parking Concerns	Trucks park at undesignated location
Stakeholder	S18	Safety	Truck Parking Concerns	Trucks park at undesignated location
Stakeholder	S19	Safety	Truck Parking Concerns	Need more parking
Stakeholder	S2	Safety	Rail Safety	
Stakeholder	S20	Safety	Truck Parking Concerns	Need more parking
Data	D72	Safety	High Density Crash	I465/IN37 Interchange
Data	D73	Safety	High Density Crash	South Sherman Drive
Stakeholder	S22	Mobility	Mobility Impediments	Other
Stakeholder	S24	Safety	Rail Safety	Safety at at-grade crossings
Stakeholder	S86	Safety	Louisville and Indiana railroad from Indy to Louisville has crossing safety concerns	
Stakeholder	S25	Safety	Rail Safety	Safety at at-grade crossings
Stakeholder	S26	Safety	Rail Safety	Safety at at-grade crossings
Stakeholder	S4	Community & Environmental	Community & Environmental	Pollution - Emission
Stakeholder	S27	Safety	Rail Safety	
Stakeholder	S28	Safety	Road Safety	Other
Stakeholder	S29	Safety	Road Safety	Conflict points
Stakeholder	S3	Community & Environmental	Community & Environmental	Pollution - Emission
Stakeholder	S30	Safety	Rail Safety	Facility condition
Stakeholder	S31	Safety	Truck Parking Concerns	Need more parking
Stakeholder	S32	Condition	Poor Condition	Downtown streets are in terrible shape. Downtown is the first and sometimes only impression visitors/potential businesses see if the region.
Stakeholder	S33	Community & Environmental	Community & Environmental	Pollution - Emission
Stakeholder	S37	Mobility	Mobility Impediments	Congestion
Stakeholder	S38	Mobility	Mobility Impediments	Intersection delays
Stakeholder	S39	Mobility	Mobility Impediments	Intersection delays

Source	ID	Need Type	Condition	Description
Stakeholder	S40	Mobility	Mobility Impediments	Intersection delays
Stakeholder	S44	Mobility	Mobility Impediments	Other
Stakeholder	S46	Safety	Rail Safety	Other
Stakeholder	S49	Safety	Road Safety	Crashes
Data	D68	Safety	Rail Safety Hotspot	Massachusetts Ave, between N Sherman Dr and Commerce Ave
Stakeholder	S21	Mobility	Mobility Impediments	Sharp or tight turns
Data	D69	Safety	Rail Safety Hotspot	McChordsville BMW Branch, Oaklandon Rd
Stakeholder	S23	Safety	Road Safety	Proximity to other vehicles
Data	D70	Safety	Rail Safety Hotspot	CSX railroad grade crossing with N Rural St in Indianapolis
Data	D71	Safety	Rail Safety Hotspot	Louisville & Indiana Railroads crossing with E Troy Ave south of Garfield park in Indianapolis
Stakeholder	S5	Community & Environmental	Community & Environmental	Pollution - Emission
Stakeholder	S51	Safety	Road Safety	Crashes
Stakeholder	S55	Safety	Road Safety	Conflict points
Stakeholder	S56	Safety	Road Safety	Other
Stakeholder	S57	Safety	Road Safety	Conflict points
Stakeholder	S58	Safety	Road Safety	Conflict points
Stakeholder	S59	Mobility	Mobility Impediments	
Stakeholder	S6	Community & Environmental	Community & Environmental	Pollution - Emission
Stakeholder	S34	Safety	Road Safety	
Stakeholder	S35	Safety	Road Safety	
Stakeholder	S36	Mobility	Mobility Impediments	Congestion
Stakeholder	S60	Safety	Truck Parking Concerns	
Stakeholder	S61	Community & Environmental	Community & Environmental	
Stakeholder	S62	Safety	Rail Safety	Safety at at-grade crossings
Stakeholder	S64	Mobility	Mobility Impediments	Congestion
Stakeholder	S41	Mobility	Mobility Impediments	Congestion
Stakeholder	S42	Mobility	Mobility Impediments	Congestion
Stakeholder	S43	Safety	Rail Safety	Safety at at-grade crossings
Stakeholder	S65	Mobility	Mobility Impediments	Congestion
Stakeholder	S45	Mobility	Mobility Impediments	Intersection delays

Source	ID	Need Type	Condition	Description
Stakeholder	S66	Community & Environmental	Community & Environmental	Impacts underserved communities
Stakeholder	S47	Safety	Road Safety	Crashes
Stakeholder	S48	Safety	Road Safety	Conflict points
Stakeholder	S88	Safety	Rail crossing safety at grade crossings in Greenwood	
Stakeholder	S50	Mobility	Mobility Impediments	Intersection delays
Data	D2	Mobility	Top Bottleneck	N College Ave
Stakeholder	S52	Safety	Truck Parking Concerns	Need more parking
Stakeholder	S53	Safety	Rail Safety	Safety at at-grade crossings
Stakeholder	S54	Safety	Rail Safety	Other
Data	D4	Mobility	Top Bottleneck	I-70 E
Data	D5	Mobility	Top Bottleneck	S Missouri St
Data	D6	Mobility	Top Bottleneck	39 N
Data	D7	Mobility	Top Bottleneck	N College St
Data	D9	Mobility	Top Bottleneck	E 86th St
Data	D10	Mobility	Top Bottleneck	E 96th St
Stakeholder	S67	Safety	Road Safety	Crashes
Data	D11	Mobility	Top Bottleneck	W 86th St
Stakeholder	S63	Mobility	Mobility Impediments	Congestion
Data	D13	Mobility	Top Bottleneck	S West St
Data	D14	Mobility	Top Bottleneck	E South St
Stakeholder	S68	Community & Environmental	Community & Environmental	Impacts underserved communities
Data	D16	Mobility	Top Bottleneck	N Meridian St
Stakeholder	S69	Community & Environmental	Community & Environmental	Community Issue
Stakeholder	S7	Condition	Poor Condition	I-70 over White River appears to be reaching theend of its useful lifespan.
Stakeholder	S70	Community & Environmental	Community & Environmental	Community Issue
Stakeholder	S71	Condition	Other	There’s an overhead sign on southbound I-65 thatdirects drivers to Downtown (65S) or the airport (465S). It would be great if the City could work with INDOT on adjusting this sign to discourage freight thru traffic and to direct freight to 465 as opposed
Data	D17	Mobility	Top Bottleneck	N Delaware St

Source	ID	Need Type	Condition	Description
Data	D18	Mobility	Top Bottleneck	38th St E
Data	D19	Mobility	Top Bottleneck	N Keystone Ave
Data	D20	Mobility	Top Bottleneck	Holt Rd N
Stakeholder	S76	Mobility	Mobility Impediments	Congestion
Stakeholder	S72	Safety	Road Safety	Conflict points
Stakeholder	S73	Safety	Truck Parking Concerns	Trucks park at undesignated location
Stakeholder	S79	Mobility	Mobility Impediments	Congestion
Stakeholder	S89	Mobility	High truck volumes along I65 in Greenwood	
Stakeholder	S81	Mobility	Congestion due to weaving patterns at I-69/465 split	39.894796, -86.054435
Stakeholder	S74	Safety	Rail Safety	Safety at at-grade crossings
Stakeholder	S83	Safety	Lack of Truck parking on I65 and I70 corridors	corridor length
Stakeholder	S75	Mobility	Mobility Impediments	Congestion
Stakeholder	S77	Mobility	Mobility Impediments	Intersection delays
Stakeholder	S78	Mobility	Mobility Impediments	Intersection delays
Stakeholder	S87	Safety	Need for Public Parking in Franklin	
Stakeholder	S8	Mobility	Mobility Impediments	
Stakeholder	S9	Mobility	Mobility Impediments	
Stakeholder	S90	Mobility	Concerns about increasing truck volume along Smith Valley Road	Smith Valley Road
Stakeholder	S91	Condition	US-31 has pavement surface issue once you get closer to Indianapolis	US31 just south of I465 in Indianapolis
Stakeholder	S92	Mobility	When there is an accident on I-65 so all the traffic is rerouted towards US-31 which creates congestion and community impacts	US-31 south of Indianapolis in the IMPO region
Stakeholder	S93	Safety	US-31/N Main St in Franklin have truck mobility issues due to a sudden reduction in the number of lanes	US31/N Main St in Franklin
Stakeholder	S94	Mobility	I-70/I-465 congestion during afternoon peak hours	I70/I465 near the IND airport
Stakeholder	S95	Safety	Amazon facility on I69 south has created overnight parking issues	Amazon facility on I69 S (?)

Source	ID	Need Type	Condition	Description
Stakeholder	S96	Safety	Undesignated parking is an issue along !80	Corridor
Stakeholder	S97	Condition	I69 NB in Hamilton County has many pavement issues	I69 NB in Hamilton County
Stakeholder	S98	Mobility	Where US31 connects with I465 has major congestion issues	US31/I465

Figure 75: Project Gap List

Source	ID	Need Type	Condition	Description	Score
Data	D46	Safety	High Crash Intersection	Commercial Dr at 38th St	100.00%
Data	D40	Mobility	Delay Hotspot	I-65 NB off-ramp to W South St	93.75%
Data	D10	Mobility	Top Bottleneck	E 96th St	81.25%
Data	D50	Safety	High Crash Intersection	Olio Rd at E 116th St	75.00%
Data	D44	Safety	High Crash Intersection	10th St at Girls School Road	75.00%
Data	D59	Safety	High Crash Intersection	Crawfordsville Rd at Cunningham Rd	75.00%
Data	D54	Safety	High Crash Intersection	River Road at E 146th St	75.00%
Data	D49	Safety	High Crash Intersection	Shadeland Ave at E 46th St	75.00%
Stakeholder	S62	Safety	Rail Safety	Safety at at-grade crossings	75.00%
Data	D38	Mobility	Delay Hotspot	Sam Jones Expwy off-ramp to I-465 SB Est of IND Airport	75.00%
Data	D41	Mobility	Delay Hotspot	E Vermont St between N Pennsylvania St and Alabama S	75.00%
Data	D25	Mobility	Delay Hotspot	I-70 EB to I-65 NB ramp	68.75%
Data	D37	Mobility	Delay Hotspot	I-465 SB south of Brookville Rd	62.50%
Data	D4	Mobility	Top Bottleneck	I-70 E	62.50%
Data	D35	Mobility	Delay Hotspot	I-465 SB east of IND Airport	62.50%
Data	D34	Mobility	Delay Hotspot	US 421 in Zionsville	62.50%
Data	D60	Safety	High Crash Intersection	Elmwood Ave at Emerson Ave	56.25%
Data	D20	Mobility	Top Bottleneck	Holt Rd N	56.25%
Data	D16	Mobility	Top Bottleneck	N Meridian St	56.25%
Data	D22	Mobility	Delay Hotspot	I-65 off-ramp to E 12th St	55.00%
Data	D7	Mobility	Top Bottleneck	N College St	53.75%
Data	D19	Mobility	Top Bottleneck	N Keystone Ave	51.25%
Data	D27	Mobility	Delay Hotspot	I-65 off-ramp to 11th St	51.25%

Source	ID	Need Type	Condition	Description	Score
Stakeholder	S7	Community & Environmental	Poor Condition	I-70 over White River appears to be reaching the end of its useful lifespan.	50.00%
Data	D61	Safety	High Crash Intersection	Emerson Ave at Victory Drive	50.00%
Data	D45	Safety	High Crash Intersection	E 24th St at N Keystone Ave	50.00%
Data	D39	Mobility	Delay Hotspot	N Meridian St south of interchange with I-465	50.00%
Stakeholder	S77	Mobility	Mobility Impediments	Intersection delays	50.00%
Stakeholder	S69	Community & Environmental	Community & Environmental	Community Issue	50.00%
Stakeholder	S26	Safety	Rail Safety	Safety at at-grade crossings	50.00%
Data	D62	Safety	High Crash Intersection	Main Street at Sheek Road	50.00%
Stakeholder	S2	Safety	Rail Safety		50.00%
Stakeholder	S65	Mobility	Mobility Impediments	Congestion	50.00%
Stakeholder	S25	Safety	Rail Safety	Safety at at-grade crossings	50.00%
Stakeholder	S15	Safety	Rail Safety	Other	50.00%
Data	D18	Mobility	Top Bottleneck	38th St E	45.83%
Data	D33	Mobility	Delay Hotspot	I-465 interchange with I-70 (East)	45.00%
Data	D29	Mobility	Delay Hotspot	I-70 E	45.00%
Data	D11	Mobility	Top Bottleneck	W 86th St	45.00%
Data	D14	Mobility	Top Bottleneck	E South St	45.00%
Data	D17	Mobility	Top Bottleneck	N Delaware St	43.75%
Data	D30	Mobility	Delay Hotspot	11th St between N Meridian St and N Delaware St	43.75%
Data	D67	Safety	High Crash Intersection	South St at Virginia Ave & East St	41.25%
Data	D71	Safety	Rail Safety Hotspot	Louisville & Indiana Railroads crossing with E Troy Ave south of Garfield park in Indianapolis	40.00%
Stakeholder	S82	Mobility	Delay Hotspot	Congestion due to weaving patterns at I-65/I-70 split	37.50%
Data	D5	Mobility	Top Bottleneck	S Missouri St	37.50%
Stakeholder	S78	Mobility	Mobility Impediments	Intersection delays	37.50%
Stakeholder	S29	Safety	Road Safety	Conflict points	37.50%
Data	D48	Safety	High Crash Intersection	N High School Rd at 38th St	35.00%
Data	D63	Safety	High Crash Intersection	New York St at University Boulevard	35.00%
Data	D13	Mobility	Top Bottleneck	S West St	35.00%
Data	D70	Safety	Rail Safety Hotspot	CSX railroad grade crossing with N Rural St in Indianapolis	33.75%
Data	D9	Mobility	Top Bottleneck	E 86th St	31.67%

Source	ID	Need Type	Condition	Description	Score
Stakeholder	S89	Mobility	Delay Hotspot	High truck volumes along I-65 in Greenwood	31.25%
Data	D68	Safety	Rail Safety Hotspot	Massachusetts Ave, between N Sherman Dr and Commerce Ave	31.25%
Data	D65	Safety	High Crash Intersection	Ohio St at Pennsylvania St	27.50%
Stakeholder	S44	Mobility	Mobility Impediments	Other	25.00%
Stakeholder	S97	Condition	I69 NB in Hamilton County has many pavement issues	I69 NB in Hamilton County	25.00%
Stakeholder	S61	Community & Environmental	Community & Environmental	Trucks traveling on local roads	25.00%
Data	D74	Safety	High Density Crash	East New York Ave	25.00%
Stakeholder	S28	Safety	Road Safety	Road safety issue location identified by residents	25.00%
Stakeholder	S27	Safety	Rail Safety	Rail safety issue location identified by residents	25.00%
Stakeholder	S10	Mobility	Mobility Impediments	Road congestion issue location identified by residents	25.00%
Data	D2	Mobility	Top Bottleneck	N College Ave	23.75%
Stakeholder	S60	Safety	Truck Parking	Concerns raised by the residents regarding undesignated truck parking	25.00%
Data	D69	Safety	Rail Safety Hotspot	McCordsville BMW Branch, Oaklandon Rd	15.00%
Stakeholder	S14	Safety	Road Safety	Conflict points	12.50%
Stakeholder	S39	Mobility	Mobility Impediments	Intersection delays	12.50%
Stakeholder	S13	Community & Environmental	Community & Environmental	Pollution emission due to heavy truck traffic	12.50%
Stakeholder	S12	Community & Environmental	Poor Pavement Condition	Trash and debris left on the road	12.50%
Stakeholder	S91	Condition	Poor Pavement Condition	US-31 has pavement surface issue once you get closer to Indianapolis	12.50%
Stakeholder	S92	Mobility	Delay Hotspot	Crashes on I-65 reroute traffic towards US-31 which creates congestion and community impacts	12.50%
Stakeholder	S84	Mobility	Delay Hotspot	SR44 in Shelbyville	12.50%
Data	D6	Mobility	Top Bottleneck	39 N experiences delays	12.50%
Stakeholder	S40	Mobility	Mobility Impediments	Intersection delays	12.50%
Stakeholder	S75	Mobility	Mobility Impediments	Truck congestion	12.50%
Stakeholder	S64	Mobility	Mobility Impediments	Truck congestion	12.50%
Stakeholder	S24	Safety	Rail Safety	Safety at at-grade crossings	12.50%

Source	ID	Need Type	Condition	Description	Score
Stakeholder	S51	Safety	Road Safety	Truck crashes	12.50%
Stakeholder	S86	Safety	Rail Safety	Rail crossing safety concerns	10.00%
Stakeholder	S67	Safety	Road Safety	Truck crashes	5.00%

Source: CPCS, 2022.*There are additional project gaps for which no data was available to informing scoring and ranking. These gaps are provided in the dashboard on IMPO's website.

Appendix E Freight Performance Measure Evaluation Tables

IMPO Freight Planning Goal 1: Reduce Congestion and Improve Reliability of the Regional Freight System

Associated INDOT planning goal: Capacity to Meet Demand – Reduce bottlenecks to improve the reliability and efficiency of freight movement, leading to less congestion, fewer infrastructure repairs, and lower emissions.

National Freight Planning Goals:

- Identify infrastructure improvements to reduce congestion and eliminate bottlenecks
- Achieve and maintain a state of good repair
- Improve the reliability of freight transportation

Figure 76: Performance Measures Related to Congestion Reduction and Reliability Improvement Goal

Performance Measure	Corresponding NCFRP PMs	Data Required	Data Update Frequency	Data Accessibility	Notes
Level of Service (LOS): corridor-level vehicle hours of delay	NA	Vehicle per lane per mile; speed	Inquire of INDOT	Inquire of INDOT	INDOT uses a Work Management System software for their operations. Starting from 2012, INDOT used the LOS feature embedded in the software to collect LOS.
Reliability Index: additional time needed to travel due to system variations	Freight Efficiency – Interstate Highway Reliability	Speed; VMT	State DOTs are required to report the TTTR on interstates annually	Interstates – 3 Other roadways – 2 or 1	NA

Source: CPCS, 2022.

IMPO Freight Planning Goal 2: Improve the Safety and Resiliency of the Regional Freight System

Associated INDOT planning goal: Quality of Life – Identify opportunities to improve and maintain Indiana's transportation infrastructure, supporting the safe movement of freight through the State

National Freight Planning Goals:

- Reduce the adverse environmental impacts of freight movement
- Pursue the goals described without burdening state and local governments

Figure 77: Performance Measures Related to Safety and Resiliency

Performance Measure	Corresponding NCFRP PMs	Data Required	Data Update Frequency	Data Accessibility	Notes
Commercial Vehicle Crash Rate: crashes per commercial vehicles traveled	Freight Safety – Truck Injury and Fatal Crash	ARIES data	NA	2	NA
Pavement Rating: safety ratings based on INDOT's database	Freight System Condition – NHS Pavement Condition	Highway Performance Management System	Annual	2	https://www.fhwa.dot.gov/policyinformation/hpms.cfm
Weight Restricted Bridges: no. of weight-restricted bridges on the network	NA	National Bridge Inventory	Annual	2	Suggest using percentage; https://www.fhwa.dot.gov/bridge/nbi/ascii.cfm
Incident Clearance Rate: the rate at which incidents are cleared on the network	NA	NA	NA	NA	NA
Railroad Incident Rate: incidents at rail crossings	Freight Safety – Highway-rail At-Grade Incidents	FRA accident data	Monthly	2	https://safetydata.fra.dot.gov/OfficeofSafety/publicsite/DownloadCrossingInventoryData.aspx

Source: CPCS, 2022.

IMPO Freight Planning Goal 3: Capitalize on the Existing Infrastructure of the Regional Freight System
Associated INDOT planning goal: Multimodal Integration and Synergy – Develop and implement transportation networks that support direct multimodal freight expansion, leading to improvement and establishment of multimodal/intermodal facilities
National Freight Planning Goals: · Improve safety, security, efficiency, and reliability of the National Multimodal Freight Network · Use innovation and technology to improve safety, efficiency, and reliability

Figure 78: Performance Measures Related to Infrastructure Preservation

Performance Measure	Corresponding NCFRP PMs	Data Required	Data Update Frequency	Data Accessibility	Notes
Annual investment in existing vs. new facilities	Freight Investment – Estimated Capital to Sustain NHS and rail market share	IRTIP, STIP, Airport Master Plan	IRTIP is updated at least every two years	2	https://www.indympo.org/whats-underway/irtip

Source: CPCS, 2022.

IMPO Freight Planning Goal 4: Provide an Interconnected, Multimodal Regional Transportation System that Supports Access to Jobs

Associated INDOT planning goal:

. Access to National and International Markets – Support better connectivity between all modes of freight transportation, including between Indiana's water ports and highway and rail modes

. Economic Impact – Cultivate a strong and diverse economy by growing Indiana as a magnet for jobs

National Freight Planning Goals:

· Improve short- and long-distance movement of goods through and rural areas and gateways
· Improve flexibility of states to support multi-state corridor planning
. Improve economic efficiency and productivity of the National Multimodal Freight Network

Figure 79: Performance Measures Related to Infrastructure Preservation

Performance Measure	Corresponding NCFRP PMs	Data Required	Data Update Frequency	Data Accessibility	Notes
LOS on intermodal connectors and other key linkages	NA	Vehicle per lane per mile; speed	Inquire of INDOT	Inquire of INDOT	INDOT uses a Work Management System software for their operations. Starting from 2012, INDOT used the LOS feature embedded in the software to collect LOS.
Intermodal Container Lifts: no. of intermodal container lifts at intermodal sites	NA	Private data	Private sectors usually have month-to-month container volume data	Depending on the data	NA
Air Cargo Activity: volume of air cargo in tonnages	NA	T-100 data or data provided by private entities	Monthly – Seasonally	2	https://www.transtats.bts.gov/Fields.asp?gnoyr_VQ=GDL
Transit availability to freight clusters: number of overlapping transit routes	NA	Existing public transit routes	Depending on changes made by county and transit agencies.	2	Boone Area Transit System (BATS) http://www.booneseniors.org/services/transportation/
		Freight clusters			Hamilton County Express www.janus-inc.org

Performance Measure	Corresponding NCFRP PMs	Data Required	Data Update Frequency	Data Accessibility	Notes
over freight clusters					Hancock Area Rural Transit (HART)
					www.hcssi.org/services
					Hendricks County Transit/Sycamore Services (LINK)
					https://www.hcseniors.org/transportation
					IndyGo http://www.indygo.net/
Transit access to freight clusters by IMPO EJ areas	NA	Existing public transit routes	Depending on changes made by county and transit agencies.		EJ areas are not defined. Recommend to take a look at the EPA's EJ index as reference: https://www.epa.gov/ejscreen/environmental-justice-indexes-ejscreen
Transit ridership in freight clusters: level of transit ridership within 1/2 mile of a freight cluster	NA	From public transit operators	Depending on changes made by county and transit agencies.		See above
Freight related jobs within a standard deviation of the median regional per capita income	NA	BLS	Monthly	2	https://www.bls.gov/oes/current/oessrcma.htm

Source: CPCS, 2022.

Appendix F Funding Sources

This appendix provides an overview of funding programs that may be relevant to the freight needs and issues in the IMPO region.

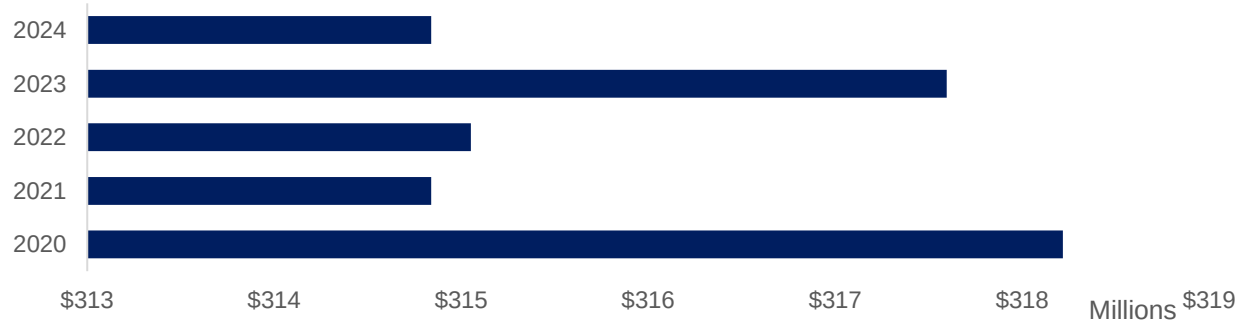
Statewide Transportation Improvement Program (STIP)

Indiana's five-year STIP Plan is prepared in collaboration with the local governments across the state, including the IMPO. The STIP indicates the funding for and schedule of transportation projects by fiscal year, starting on July 1 and ending on June 30. The state's 2020-2024 STIP resources are available through:

- The state and local Federal Highway Administration's (FHWA) Federal Aid Fund consists of federal formula apportionments plus carry-over.
- FHWA's Federal-aid highway[65] earmarks are specifically apportioned to the local governments.
- The Federal Grant Fund is the US Department of Transportation's (USDOT) Better Utilizing Investments to Leverage Development (BUILD) grant program.
- Federal Transit Administration's (FTA) Federal-aid funds provide grants to public transit systems within the jurisdiction of local governments.
- State Highway funds from motor fuel taxes and registration fees.
- State Highway Road Construction Improvement fund established by INDOT to support highway construction, expansion, and reconstruction projects.[66]
- Crossroads fund supporting state highway construction, expansion, and reconstruction projects.[67]

Figure 80 shows the share of local government (MPO and non-MPO) projects from the annual uses of STIP funds.

Figure 80: STIP Uses for Local projects (MPO and non-MPO)



Source: INDOT, STIP Plan 2020-2024.

[65] Including the Interstate Highway System, primary highways and secondary local roads. For more information see: https://www.fhwa.dot.gov/legsregs/directives/fapg/cfr0470a.htm

[66] Indiana Code, Title 8. Utilities and Transportation Article 14. Highway Finances Chapter 10. State Highway Road Construction and Improvement Fund, 2015. https://law.justia.com/codes/indiana/2015/title-8/article-14/chapter-10/

[67] Ibid.

IMPO's share of annual STIP allocation is roughly $50 million, broken down into the following four programs under the Fixing America's Surface Transportation Act or the FAST Act:[68]

- **Surface Transportation Block Grant Program (STBG):** IMPO receives $31.9 million through the STBG program, which can be used to support a wide variety of projects, such as infrastructure preservation and maintenance and safety improvement, as long as the project is located along the federal-aid highway, bridge and tunnel system or on any public road, pedestrian and bicycle infrastructure.[69]
- **Congestion Mitigation and Air Quality Improvement (CMAQ) Program:** CMAQ provides $8.7 million of IMPO's STIP allocation, supporting projects that are included in the MPO's Metropolitan Transportation Plans to reduce or mitigate air pollution.[70] In recent years, the CMAQ program's focus has been on diesel engine retrofitting for non-road or on-road equipment and alternative fuel infrastructure projects along the federally designated alternative fuel corridors.[71]
- **Highway Safety Improvement Program (HSIP):** About $7.4 million of the IMPO's STIP allocation is through the HSIP program, which focuses on reducing road-related fatalities and serious injuries on all public roads.[72]
- **Transportation Alternatives Program (TAP):** About $2.6 million of the STIP allocation comes from TAP, a program focused on supporting small-scale transportation projects (i.e., pedestrian and bicycle facilities, recreational trails, etc.). TAP was eliminated at the end of 2020 and is currently replaced by a set-aside of STBG, known as the transportation alternatives (TA) fund.[73]

Next Level Trust Fund

The Indiana General Assembly announced the Next Level Indiana Fund in 2017, with the aim to invest in communities across the state. The Fund's portfolio was constructed to provide funds to about 20-30 individual recipients diversified by sector, geography, amount, and other factors.[74] The Next Level Roads program was also established to invest over $60 billion in 20 years on local road and bridge condition improvement projects across the state.[75]

Rail Safety Programs

Railroads in Indiana are responsible for maintaining the crossing surfaces and warning devices. As part of a survey of the railroads for the 2017 Indiana State Rail Plan, the railroad representatives stated their preference for sharing the costs of maintaining crossings with the roadway owners or users.[76]

---

[68] Information provided by IMPO, October 2021.

[69] FHWA, Surface Transportation Block Grant Program (STBG), accessed November 2021. https://www.fhwa.dot.gov/specialfunding/stp/

[70] FHWA, Fixing America's Surface Transportation Act or "FAST Act", accessed November 2021. https://www.fhwa.dot.gov/fastact/factsheets/cmaqfs.cfm

[71] FHWA, Congestion Mitigation and Air Quality Improvement (CMAQ) Program, September 2021. https://www.fhwa.dot.gov/environment/air_quality/cmaq/

[72] FHWA, Highway Safety Improvement Program (HSIP), accessed November 2021. https://safety.fhwa.dot.gov/hsip/

[73] FHWA, Transportation Alternatives, accessed November 2021. https://www.fhwa.dot.gov/fastact/factsheets/transportationalternativesfs.cfm

[74] Next Level Indiana, Next Level Indiana Trust Fund Investment Policy, 2017.

[75] INDOT, Next Level Roads, accessed November 2021. https://www.in.gov/gov/about-the-governor/about-governor-eric-j-holcomb/infrastructure/next-level-roads/

[76] INDOT, State Rail Plan, 2017. https://www.in.gov/indot/files/2017-Indiana-State-Rail-Plan.pdf

The Rail Safety Improvement Act (RSIA) of 2008 required ten states[77] with the highest number of grade crossing incidents to develop highway-rail grade crossing State Action Plans (SAP).[78] In 2013, the National Transportation Safety Board (NTSB) recommended all the US states develop SAPs in order to identify and address highway-railway grade crossing safety issues. In 2020 FRA announced a new rule requiring all the states and the District of Columbia to submit SAP reports describing grade crossing safety issues and the actions they have taken or are planning to take to address them. The SAPs are due by February 2022.[79]

INDOT's Rail Office administers the FHWA's Section 130 Highway-Rail Crossing Safety Program funds for Indiana, which provides an annual fund to cover 90% of grade crossing safety improvement projects.[80] The project selection is based on data-driven analysis of safety hotspots (hazard index formula) and identification of unsafe rail corridors in need of safety improvements (stakeholder inputs).

According to INDOT's SAP submitted to FRA in 2012, at-grade crossing incidents will be "immediately directed to the Rail Office Section 130 program manager for quick review" to expedite the process for determining possible improvements.[81] The grade crossing safety improvement projects identified by the MPOs should be amended into the appropriate MPO Transportation Improvement Plan (TIP) and then integrated into the Indiana State Transportation Improvement Plan (STIP). INDOT then assigns the Section 130 funding to the qualified projects. While railroads are responsible for creating the design drawings of the improvements, the projects are initiated and implemented by "force account" through agreements established between INDOT and railroads.[82]

INDOT's Railroad Office is also responsible for managing the Railroad Grade Crossing Fund (RRGCF) program established by the Indiana State Legislature. RRGCF's objective is to support grade crossing safety improvement projects along regional and short line railroad lines[83] as a cost-reimbursement grant. Between $20,000 and $50,000 can be reimbursed per crossing to help Local Public agencies (LPAs) with no match in contribution requirement.[84]

Use of RRGCF for permanently closing qualified (based on the FRA predicted accident rate) highway-rail grade crossings is encouraged by INDOT. The Crossing Closure Program (CCP) is a part of the RRGCF, providing up to $45,000 as reimbursement for crossing closure projects.[85]

INDOT also established the Local Trax Rail Overpass Program in 2018 (as part of the state's 2017 long-term transportation funding legislation) to provide a total of $125 funding in the form of grants to cities, towns, and counties for grade crossing safety improvement projects, including grade separations, crossing closures, and other safety enhancements. The projects should be located at rail crossings with local public roads. As of 2021, INDOT has provided about $101 million in Trax funding to support 12 projects across the state.[86]

---

[77] Alabama, California, Florida, Georgia, Illinois, Indiana, Iowa, Louisiana, Ohio, and Texas.

[78] FRA, State Highway-Rail Grade Crossing Action Plans, 2021. https://railroads.dot.gov/sap

[79] Federal Register, State Highway-Rail Grade Crossing Action Plans, December 2020. https://www.federalregister.gov/documents/2020/12/14/2020-26064/state-highway-rail-grade-crossing-action-plans

[80] The remaining 10% is paid by the highway authority or the railroad [23 U.S.C. 130(f)(3)]

[81] INDOT, Highway-Rail Grade Crossing Safety Action Plan, 2012. https://www.in.gov/indot/files/TrafficSafety_HRGCSAP_062712.pdf

[82] INDOT, Rail-Highway Crossing Program (Section 130), accessed November 2021. https://www.in.gov/indot/safety/traffic-safety/rail-highway-crossing-program-section-130/

[83] Class I railroads are not eligible to apply for the program.

[84] INDOT, Railroad Crossing Closure Guidelines FY22 Railroad Grade Crossing Fund, 2021.

[85] Ibid.

[86] INDOT, Trax Program Flier, 2021. https://www.in.gov/indot/doing-business-with-indot/files/Local-Trax-Flier-April2020.pdf

The Bipartisan Infrastructure Law

In November of 2021, the Bipartisan Infrastructure Law (BIL – also known as the Infrastructure Investment and Jobs Act)[87] was signed into law, representing the largest investment in freight transportation in modern history. This section provides a review of the BIL implications for IMPO. Additional details may be provided as more guidance/rulemaking is provided by the USDOT. Overall, BIL provides an increase in freight funding for the state of Indiana and to MPOs, which may provide additional opportunities for improving the freight system in the IMPO region.

What does the BIL mean for the IMPO?

The BIL positively impacts the IMPO by providing additional funding to MPOs and providing an opportunity for MPOs to be included in State Freight Advisory Committees (SFACs).[88] The following provides a high-level analysis of BIL:

BIL increases funding for the National Highway Freight Program (NHFP) compared to the Fixing America's Surface Transportation Act (FAST Act)[89] in 2015 from $6.2 billion to $7.2 billion. Of the $7.2 billion, MPOs will receive $1.6 billion in NHFP dollars to improve the efficient movement of freight transportation in metropolitan areas. When the NFHP was created in the FAST Act, its funding for MPOs was determined based on previous set-aside requirements outlined in 23 U.S.C. 134 – Metropolitan transportation planning. However, the BIL provides dedicated NHFP to MPOs.

Historically, MPOs have not been required to serve on SFACs organized by state departments of transportation (state DOTs). However, BIL recommends expanded participation in SFACs by encouraging that MPOs be included on the committees. This expansion may provide IMPO with an opportunity to represent the Central Indiana region's interests in the Indiana SFAC.

BIL includes a provision that requires MPOs to consider the "equitable and proportional representation of the population of the metropolitan planning area" when designating county and local officials on the MPO. This policy change is intended to enhance coordination amongst an entire MPO region and ensure all populations are represented.

What does the BIL mean for Indiana?

BIL provides $8.8 billion in transportation funding to Indiana from 2022 to 2026, based on projected federal funding formulas.[90] Of note, Indiana is likely to receive:

$6.6 billion for highway improvements, including infrastructure and mobility enhancements

$401 million for bridge replacement and repair

$170 million for airport infrastructure enhancement and development

The state can also apply and compete for the $12.5 billion Bridge Investment Program (BIP) for economically significant bridges and nearly $16 billion for major projects with substantial economic benefits to communities.[91]

---

[87] H.R.3684 - Infrastructure Investment and Jobs Act, accessed November 2021. https://www.congress.gov/bill/117th-congress/house-bill/3684/text

[88] This is not required but encourage and is at the state DOT's discretion.

[89] Gov Info, Fixing America's Surface Transportation Act, accessed November 2021. https://www.govinfo.gov/content/pkg/PLAW-114publ94/html/PLAW-114publ94.htm

[90] White House State Facts Sheets, IIJA, November 2021.

[91] Whitehouse, The Infrastructure Investment and Jobs Act will Deliver for Indiana, 2021. https://www.whitehouse.gov/wp-content/uploads/2021/08/INDIANA_Infrastructure-Investment-and-Jobs-Act-State-Fact-Sheet.pdf

What does the BIL mean for Indiana freight?

Notably, BIL creates several new freight-related funding programs allocating dedicated funding for critical safety and operational improvements, including grade crossing projects. The addition of these funding programs provides state DOTs and MPOs with the option to compete for new funding outlets to address their most pressing freight needs. The new funding opportunities are outlined below:

National Infrastructure Project Assistants Grant Program, which provides $2 billion annually over five years to large-scale multimodal and multi-jurisdictional highway, bridge, at-grade crossings, passenger rail, and public transit projects.

Local and Regional Infrastructure Assistance Grant Program, which is established to support multimodal projects with local and regional impacts. The program is authorized at $1.5 billion annually over five years.

Railroad Crossing Elimination Program, which provides $500 million annually over five years to projects eliminating dangerous railroad crossings.

Also, the BIL expands the eligibility of multimodal projects under some existing programs by raising the cap for eligible multimodal projects for the Infrastructure for Rebuilding America (INFRA) funding program from 10% to 3%. The INFRA program is slated to receive $4.8 billion over five years – a $0.3 billion increase from the FAST Act. The INFRA program will receive $1 billion each year between 2022 and 2024 and $900 million annually in both 2025 and 2026. Additionally, the Railroad Rehabilitation and Improvement Financing (RRIF) program is reformed to include landside port infrastructure projects. Additionally, the RRIF program will receive $50 million annually over five years to provide credit risk premium subsidies, and the program can now provide up to $20 million per loan or loan guarantee.

Appendix G Public Engagement

Early project engagement included the following:

- The project team met four times with the Freight Strategy Committee (FSC) for guidance on plan development in July and November 2021 and in March and June 2022.
- Eleven stakeholder consultations with businesses, organizations, and communities were held in late 2021/early 2022 during the development of the SWOT analysis.
- An online public survey was open for response in November 2021. See Appendix C for more information.

In addition, this appendix provides a summary of outreach and engagement efforts undertaken to communicate the Central Indiana Regional Freight Plan with the public stakeholders. The public comment period on the Plan started on July 13 and ended on July 26, 2022. During this time, a link to the Draft Plan document was provided on IMPO's website, followed by announcements through various platforms, as shown in Figure 81.

The public engagement efforts led to the solicitation of 19 comments from the key stakeholders and the public. The present version of the Central Indiana Regional Freight Plan has incorporated all of those comments.

Figure 81: Public Engagement Activities to Communicate the Central Indiana Regional Freight Plan

Activity	Description
Social Media Posts	Announcements were released on IMPO's Facebook, Instagram, LinkedIn, and Twitter accounts on July 13, with promotions released on July 18 and July 22, 2022.
teMPO Newsletter	Eblast summarizing the purpose of the Plan, describing the Plan's development process, and announcing its availability for public review and comment released on June 17 and July 1, 13, and 29, 2022.
Minority Publication Advertising	Paid advertisements in La Voz and the Indianapolis Recorder newspapers published between July 13 and July 29, 2022.
Flyers	Flyers were distributed to 46 public library branches across Central Indiana to disseminate information on the Plan and links to the IMPO's website.
Public Webinars	Webinars were held on July 19 and 20, 2022, presenting Plan's summary and recommendations.
Presentation to Indiana Motor Truck Association	Presentation of Plan's summary and recommendations on June 29, 2022.
Document Sharing with Key Stakeholders	Draft Plan document shared directly via email with: • All IMPO membership • Freight Strategy Committee members • IMPO partner agencies • INDOT Central & District offices (Greenfield, Crawfordsville, Seymour)

Indianapolis Metropolitan Planning Organization
Info@IndyMPO.org | 317.327.8601

200 East Washington Street, Suite 2322
Indianapolis, IN 46204