Road Network

4

Network Today

Metropolitan Planning Area Boundary

The Quad Cities is characterized by its excellent existing road network. The planning area boundary encompasses Eldridge, Iowa to the north; LeClaire, Iowa and Port Byron and Colona, Illinois to the east; Buffalo, Iowa and Andalusia, Illinois to the west; and Milan, Oak Grove, and Coal Valley, Illinois to the south. There have been no changes made in this boundary since the 2010 Census and the last plan update. The U.S. Census announced in February 2021 that consideration is being given to changes in the designation of urbanized areas. Comments will be due by May 20, 2021. This may affect the metropolitan planning area (MPA) boundary in the future. Map 4.1 outlines the Quad Cities MPA boundary and existing road network.

The Quad Cities is served by four interstate highways (74, 80, 280, and 88); four U.S. highways (6, 61, 67, and 150); 6 signed state highways, four in Illinois (5, 84, 92, and 94) and two in Iowa (22 and 130); and a variety of local streets. Interstates I-80 and I-280 encompass the majority of the metropolitan area. Interstate 74 runs north/south through the center of the metropolitan area. The Mississippi River flows east to west in the Quad Cities along the Iowa/Illinois border. The existing road network represents every type of classified road from interstates to local streets within the planning area boundary.

Federal Functional Classification

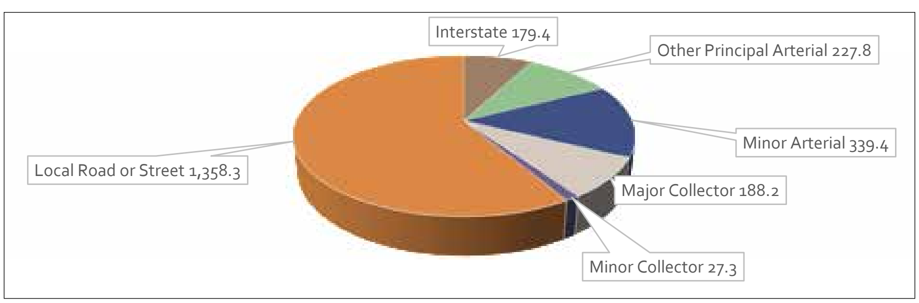
The existing road network is categorized by the Federal Functional Classification (FFC). FFC defines the roadway by the services provided. For example, an interstate is the highest functionally-classified road. An interstate provides the highest level of service at the greatest speed for the longest uninterrupted distance. The lowest FFC level is defined as a local road. A collector road provides less highly-developed service at lesser speeds than an interstate for shorter distances. Roads shown as collectors or greater may be eligible for federal transportation funding. However, roads classified as minor collectors in the rural portions of the metropolitan area are not eligible for federal funds. A roadway providing the lowest service is considered a local road with the shortest distances and the least amount of traffic. A local road provides access to abutting land with little or no through movement. The Illinois and Iowa Departments of Transportation (DOT), in consultation with local governments, have classified all roadways in the Quad Cities MPA boundary. Table 4.1 summarizes the FFC in miles within the MPA, Figures 4.1 and 4.2 display the information in a pie chart by state, and Map 4.1 identifies existing roadways (2018/2019) by this classification system. It should be noted that the large majority of road miles are classified as "Local Road or Street," nearly 60% in total. These roads are not eligible for federal funding; thus, maintenance must be funded entirely by local sources.

Table 4.1 – Quad Cities MPA Federal Functional Classification in Lane Miles

Federal Functional Classification (FFC)	Iowa Quad Cities MPA	Illinois Quad Cities MPA	Total
Interstate	179.4	196.4	375.9
Freeway and Expressway	0.0	18.6	18.6
Other Principal Arterial	227.8	247.2	475.0
Minor Arterial	339.4	249.3	588.7
Major Collector	188.2	214.5	402.8
Minor Collector	27.3	88.6	116.0
Local Road or Street	1,358.3	1,430.8	2,789.1
Total	2,320.5	2,445.5	4,766.0

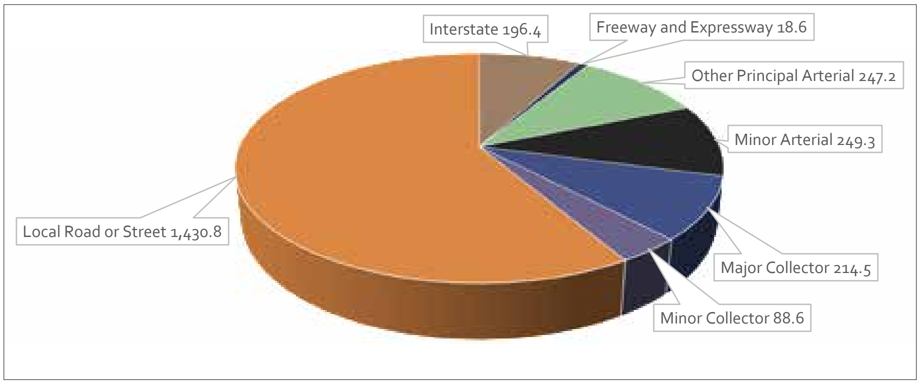
Source: Iowa and Illinois Departments of Transportation

Figure 4.1 – Lane Miles by Federal Functional Classification in the Iowa Quad Cities MPA



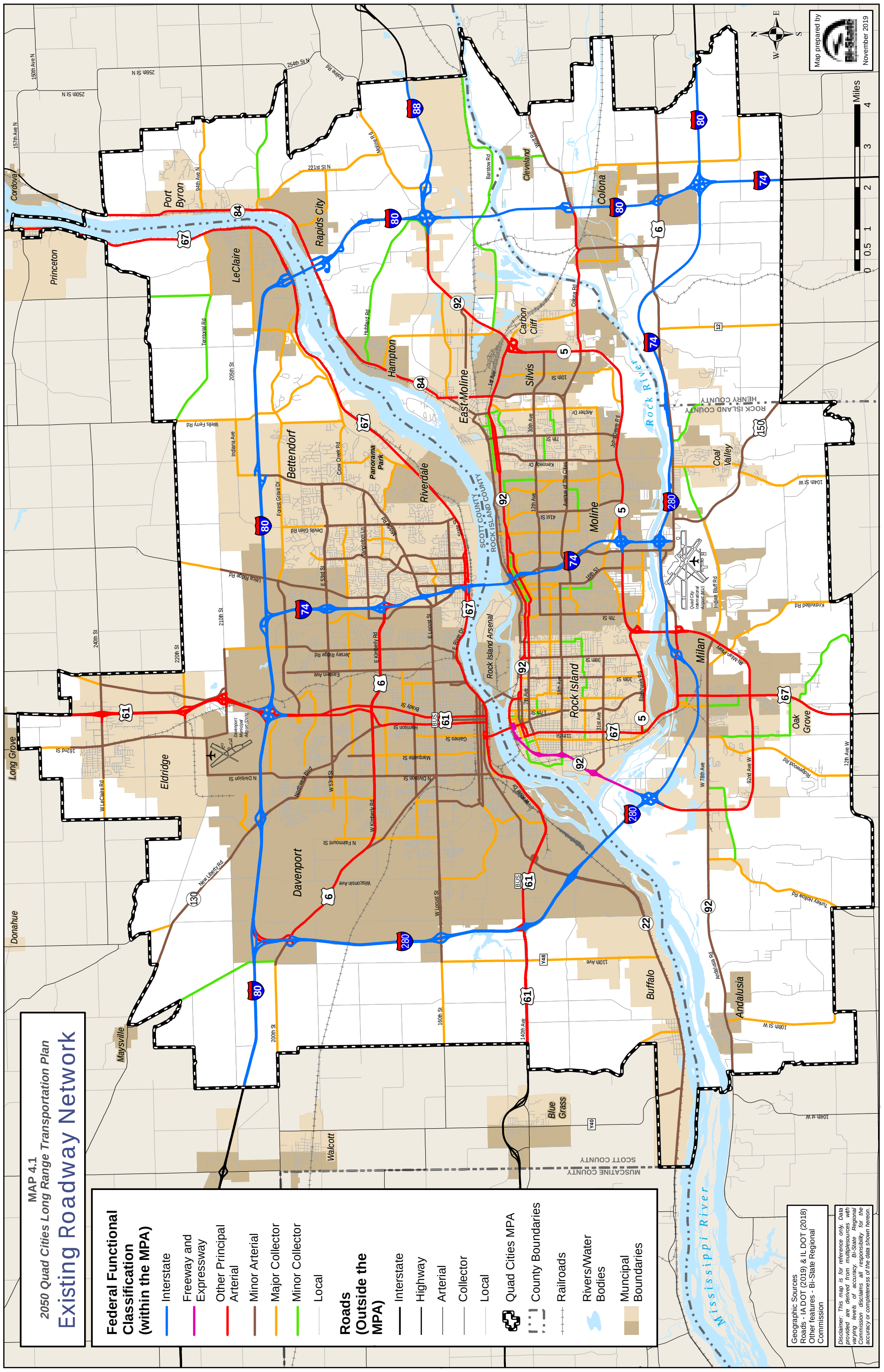
Source: Iowa Department of Transportation

Figure 4.2 – Lane Miles by Federal Functional Classification in the Illinois Quad Cities MPA



Source: Illinois Department of Transportation

Map 4.1 – Existing Roadway Network



Annual Average Daily Traffic

Data on traffic volume, vehicle classification, and truck traffic is foundational to monitoring travel. Each state's department of transportation collects traffic volumes for various functionally classified roads and reports nationally into the federal highway data system. The FHWA Traffic Monitoring Guide (2016) outlines traffic monitoring guidance to provide best practices on the collection of traffic data to inform policies, standards, procedures, and facility/equipment needs. In Iowa, the DOT covers traffic counting needs in areas of the state on a four-year cycle for cities and counties. They also monitor 120 continuous count sites across the state located on the interstate system, and on certain U.S./Iowa Highways, secondary roads, and city streets. Similarly, Illinois DOT collects data at the city and county level on a five-year cycle and manages thousands of 24-hour or 48-hour count locations throughout the state.

The traffic count information provides planners and engineers, as well as city/county officials with information on roads usage. Higher traveled roads carry more people to their destinations. Knowing vehicle weights captured by counters provides information on the type of use. A road like Interstate 80 carries high volumes of traffic, and more than 1/3 of those vehicles are trucks. Using this information, it can be pared with other data like the capacity of the road to determine lane widths and number of lanes, and to decide if congestion may be a problem because the road cannot handle the high volume of traffic.

Map 4.2 provides 2015 annual average daily traffic. The plan's travel demand model used the 2015 base-year data to calibrate the model, or ground check the model's predicted traffic in 2015 with the actual counts. This is discussed in more detail later in the chapter. Map 4.3 illustrates the truck network in the metro area and includes truck volumes where they are collected.

Bridges and Structures

The Quad Cities has two major rivers within its boundaries, the Mississippi River and the Rock River. While they are sources of scenic beauty, recreation, and commercial navigation, they also act as impediments to free movement of vehicular traffic throughout the area. The two-state Quad Cities MPA boundary is joined by five bridges over the Mississippi River – three interstate, one U.S. highway, and one local. Historically, the Quad Cities had the first Mississippi River rail bridge crossing in the United States between Davenport, Iowa and Rock Island, Illinois. The Mississippi River bridges range in age from 48 to 125 years (see Table 4.2). Figure 4.3 provides an aerial view of Lock and Dam 15 and the Government Bridge at the Rock Island Arsenal.

The highest average daily traffic (ADT) count in the entire region, and one of the highest in the State of Iowa, is 69,700 ADT (2019) on the I-74 Bridge over the Mississippi River. Travel is down with the bridge under construction and interstate traffic detoured to I-80 and I-280. With the opening of the new I-74 bridge, traffic is expected to rebound. The three centrally-located bridge crossings at the Mississippi River tend to be the most congested road segments in the Quad Cities, particularly when they are under maintenance and rehabilitation or as a result of an incident on or near the bridges.

In addition to the Mississippi River crossings, there are seven Rock River crossings, with one built and opened in June 2007. This is the first new bridge in the Quad Cities since the I-280 bridge opened in 1973. These Rock River bridges include three federal, three state, and one local crossing. All of these bridges provide important connections throughout the Quad Cities for travel and commerce.

The newest Rock River crossing opened in 2007 as Veterans Memorial Bridge at Carr's Crossing between Moline/Rock Island and Milan. It connects John Deere Road to the Rock Island-Milan Parkway. There is public interest for an east Rock River bridge to connect Route IL 5 to U.S. 6 east of Coal Valley. A feasibility study will be required for this concept.

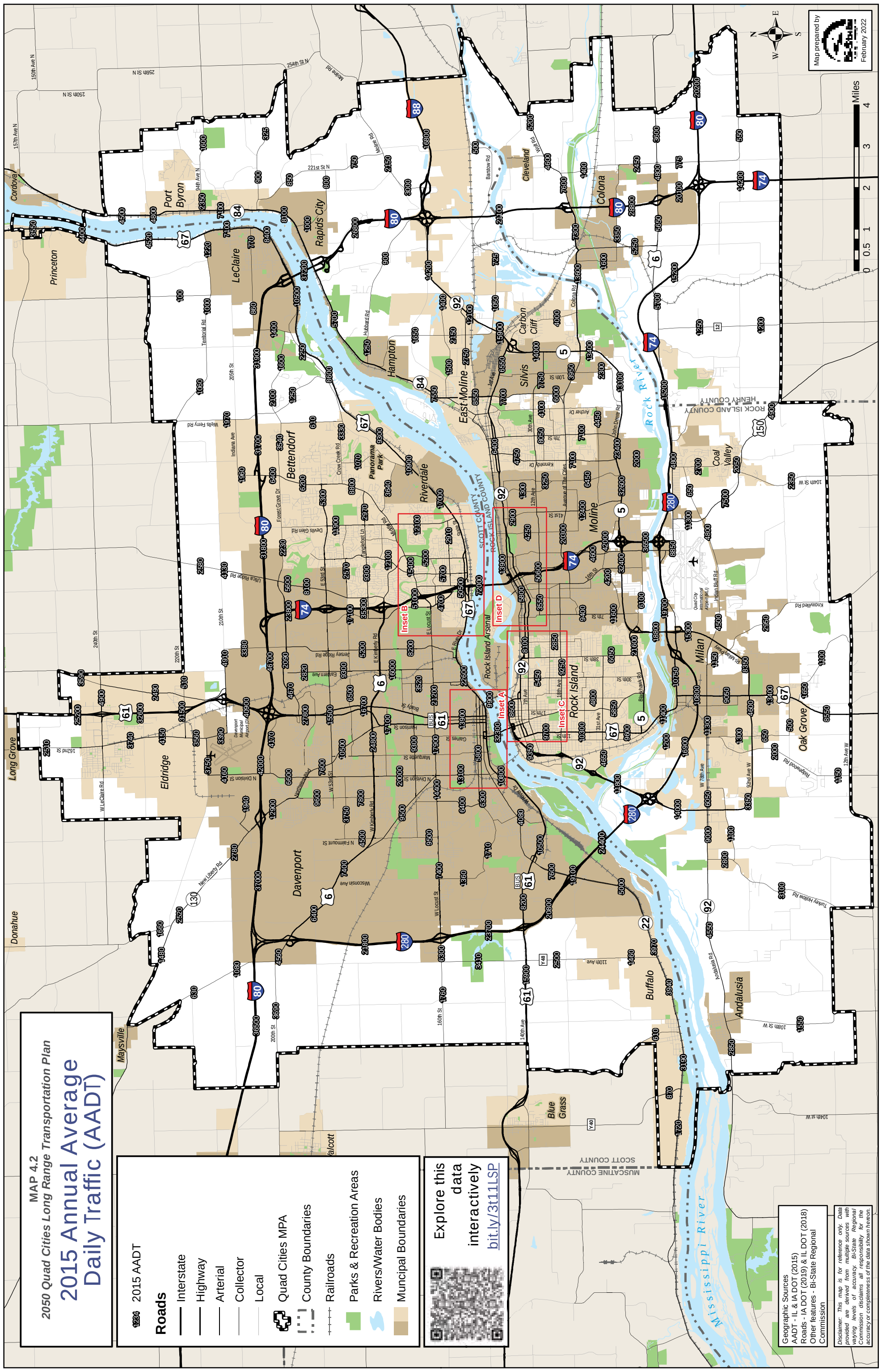
Figure 4.3 – Aerial Photo of the Rock Island Arsenal and Government Bridge

Source: File photo

Table 4.2 – Quad Cities Mississippi River Bridges

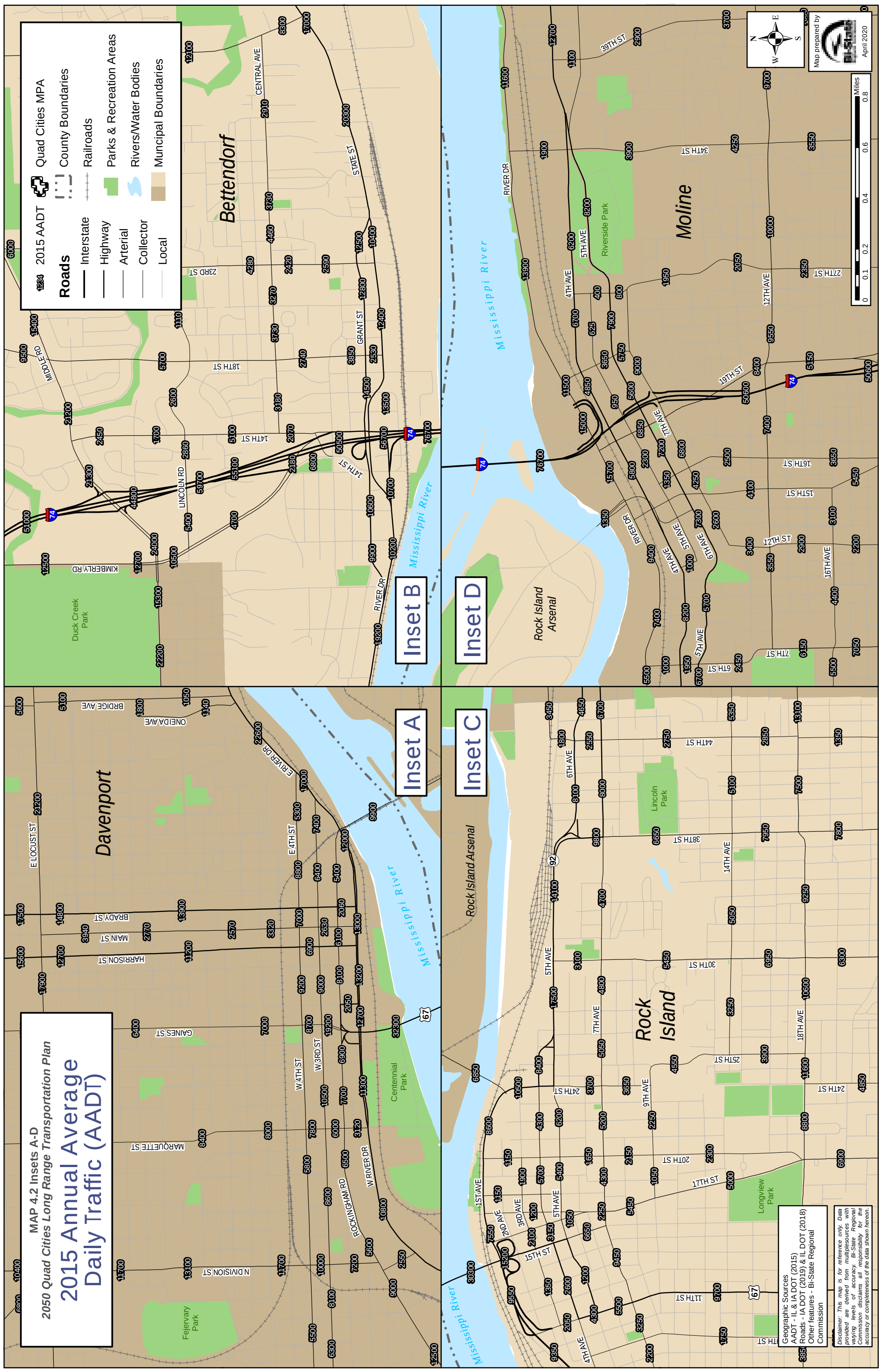
Bridge	Bridge Opened	Design Type	ADT	Count Year
I-280	1973	Steel Thru-Arch, 4 lanes	26,600	2019
Centennial	1940	5 Tied Steel Arches, 4 Lanes	29,950	2019
Government	1896	Swing Span, 2 Lanes	8,275	2018
I-74	NB 1935 SB 1959	Steel Suspension, 4 Lanes	69,700	2019
I-80	1966	Steel Girder, 4 Lanes	36,950	2019
		TOTAL	171,475	

Source: *Latest Average Daily Traffic (ADT) for 24-hour period with counts taken by Illinois Department of Transportation and Iowa Department of Transportation*



Map 4.2 – 2015 Annual Average Daily Traffic (AADT)

Map 4.2 Insets A-D – 2015 Annual Average Daily Traffic



Map 4.3– Truck Roadway Network

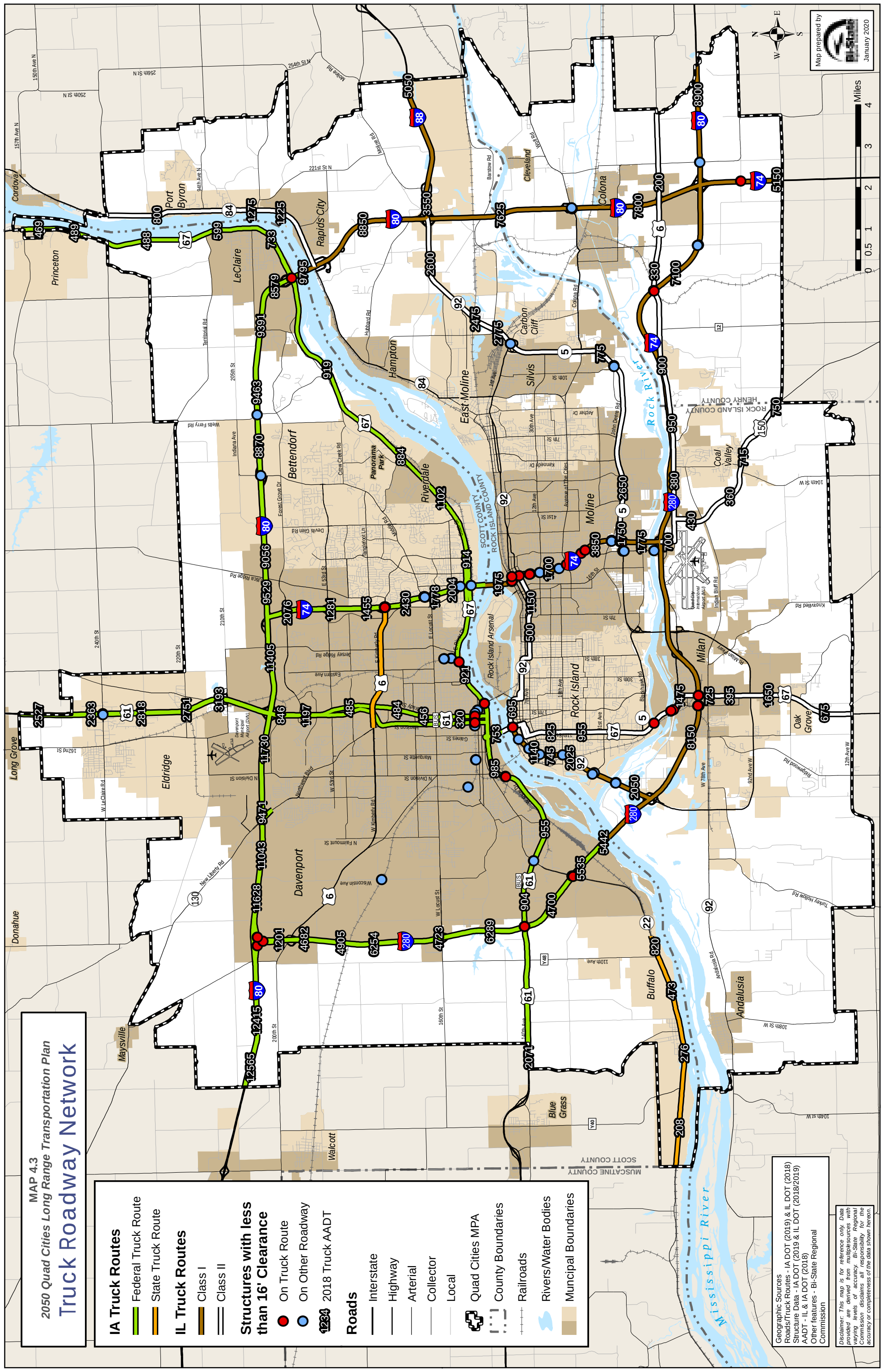


Figure 4.4 – U.S. 67 Centennial Bridge at Mississippi River, Rock Island, Illinois

Source: Bi-State Regional Commission

Bridge Conditions

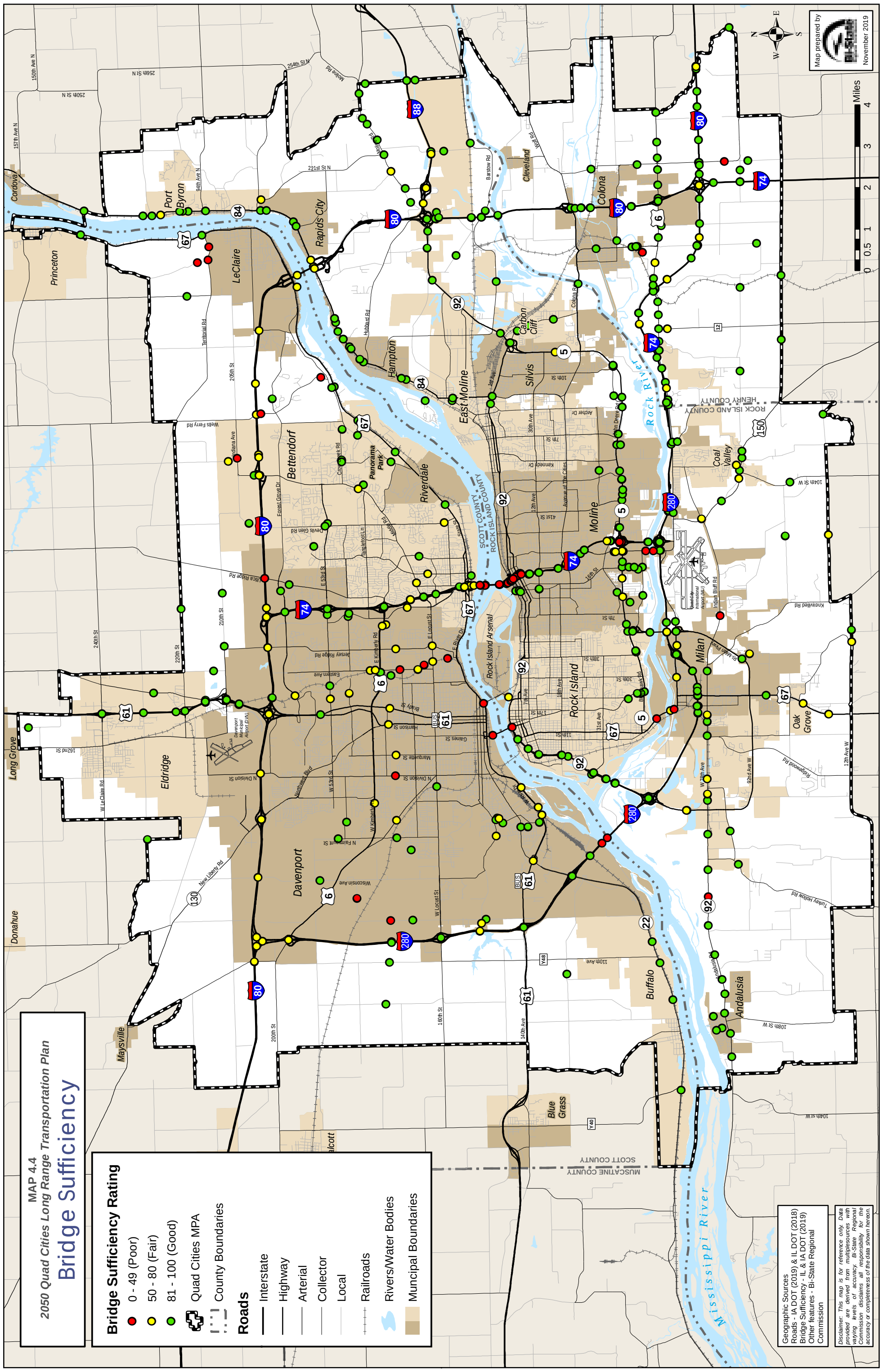
There are 574 bridges and other crossing structures in the Quad Cities MPA. Map 4.4 shows the location of those bridges and their sufficiency rating ranked by good (81-100), fair (50-80), and poor (0-49). The sufficiency rating formula is a method of evaluating factors that indicate a bridge's sufficiency to remain in service. The result of the formula is a percentage in which 100 percent represents an entirely sufficient bridge and zero percent an entirely insufficient or deficient bridge. Many factors are included in the ratings. The sufficiency rating doesn't necessarily indicate a bridge's ability to carry traffic loads. It helps determine which bridges may need repair or replacement. Any bridge found to be unsafe is removed from service until it can be returned to a safe state of operation or replaced.

Of all bridges and crossing structures in the Quad Cities MPA, 71 percent are considered to be in good condition, 20 percent are considered to be in fair condition, and nine percent are considered to be poor. Table 4.3 compares this to the bridge sufficiency from the last long range plan and shows considerable improvement in bridge sufficiency across the area. Figure 4.4 displays the U.S. 67 Centennial Bridge between Rock Island, Illinois and Davenport, Iowa.

Table 4.3 – Quad Cities Bridge Sufficiency

Rating	2015	2020
Poor	106 (20%)	49 (9%)
Fair	137 (26%)	116 (20%)
Good	289 (54%)	409 (71%)

Map 4.4 – Bridge Sufficiency



Crossings Plan History

Extensive reconstructive work was completed in 1997 on the Centennial Bridge. Continued maintenance and recurring congestion precipitated the need to examine the Mississippi River crossings more closely. In FY 1996, the Illinois and Iowa DOTs funded a study regarding Mississippi River crossing needs in the Quad Cities MPO. It was completed with an alternatives/location analysis in Stage II of the study. During the second stage of the study, a Major Investment Study (MIS) was also conducted. The States of Illinois and Iowa each funded 50% of the study, which was finalized in 1998. The Study Management Group that guided the study known as the Mississippi River Crossings Plan, recommended that tolls be removed from the Centennial Bridge, the I-74 Bridge be widened to at least six lanes, and a new bridge be built between East Moline and Bettendorf.

After the Mississippi River Crossings Plan was adopted in November 1998 and approved by the state DOTs in January 1999, a task force was appointed by the Transportation Policy Committee (TPC) to develop and recommend an implementation strategy. The strategy included: (1) a public survey of citizens in Rock Island and Scott Counties to determine the attitude toward a metropolitan transportation authority; and (2) the appointment of project steering groups to promote advancement of the three major projects.

Figure 4.5 – Original Concept of I-74 Mississippi River Bridge Reconstruction Project

Source: Alfred Benesch & Company for Iowa Department of Transportation

Crossing Plan Accomplishments Prior to 2015

In 2000, a draft traffic study showing alternative alignments for access improvements to the Centennial Bridge along U.S. 67 was developed in conjunction with discussions on jurisdictional transfer and toll removal involving the Cities of Davenport and Rock Island and the Illinois and Iowa DOTs. Also, an inspection was done in 1999 to determine improvements that needed to be accomplished in order for the state DOTs to accept jurisdiction of the bridge. Toll removal occurred in May 2003. The improvements required for jurisdictional transfer were completed in 2005, and jurisdictional transfer occurred in July 2005 from the City of Rock Island to the State of Illinois. More recently in 2014, the Centennial Bridge required an extended closure in order to conduct major repairs. Extended lane closures were required in 2015 for additional repairs.

A Project Steering Committee was established for the I-74 capacity improvement study. The purpose was to look at the entire I-74 Mississippi River corridor and the river crossing, and work with a consultant on preliminary engineering, including the development of an environmental impact statement (EIS). In January 2005, a preferred alternative was adopted by the Transportation Policy Committee that included I-74 mainline reconstruction and widening to three travel lanes in each direction plus auxiliary lanes at select locations, a new bridge along "Alignment F," improvements at existing interchanges with local road improvements (Avenue of the Cities, River Drive, Middle Road, U.S. 6/Kimberly Road, and 53rd Street), and a bicycle/pedestrian bridge crossing. A final EIS was approved in 2009, as well as a request for a Record of Decision on the engineering phase. Figure 4.5 represents the final design of the reconstructed I-74 Bridge.

The I-74 Mississippi River Corridor project was part of the original Quad Cities crossing plan. The project has been discussed with the Quad Cities' six-member congressional delegations in Washington, D.C. annually since March 2000. The congressional delegation and subsequent efforts suggest working closely with both Illinois and Iowa DOTs and congressional delegates over the next several years to include the project in state and federal multi-year transportation programs. The I-74 Mississippi River Corridor project initially received funding as part of Safe, Accountable, Flexible, Efficient Transportation Equity Act: A Legacy for Users (SAFETEA-LU) and has continued

Figure 4.6 – I-74 Mississippi River Bridge Initial Reconstruction

Source: Iowa Department of Transportation (2019)

to receive funding under Moving Ahead for Progress in the 21st Century Act (MAP-21) allowing the project to move forward toward the construction phase. Project costs continue to be refined as segments and phases of the project are completed. Expedited corridor improvements have occurred at I-74 and Lincoln Road, Bettendorf with completion of an overpass reconstruction, and a reconstruction of the 53rd Street interchange at I-74 in Davenport. In 2010, the corridor project began the final design engineering phase, which was completed in 2012. Right-of-way acquisition were part of the final stages. Due to the size and complexity of the project, funding in MAP-21, any continuing resolutions, and funding in the next transportation act which was the FAST Act to complete the main section. Subsequent funding will be needed for the North Section to complete the corridor.

Crossing Plan Accomplishments 2015-2021

Since 2015, the I-74 project has continued to move forward. Work began in 2017 and is expected to be completed by the end of 2021. Figure 4.6 shows the new I-74 Mississippi River Bridge under construction. The demolition of the existing structure is expected to be complete by 2022. The total cost of the project is $1.2 billion. The other bridges continue routine inspections and maintenance to address upkeep.

A new bridge between Bettendorf and East Moline has been discussed for long-term crossing needs as part of the original crossing plan. In 1999, the Quad Cities MPO local governments agreed, through the Transportation Policy Committee, on a strategy to consider the feasibility of creating a transportation authority that would utilize a locally-imposed sales tax to construct the bridge and address other roadway needs. Through the efforts of a task force of local leaders and local government funding, a public survey of 1,000 adults in Scott and Rock Island Counties was conducted. Results showed that over 70% of the persons surveyed supported this concept. To further this project, a location study will be required, and both federal and state legislative language will need to be established to form a metropolitan transportation authority. Until implementation of the I-74 project is complete, efforts toward an east Mississippi River crossing will be the lesser priority of the metro area.

There continues to be public interest for another Mississippi River crossing to lessen the 9-mile gap between I-74 and I-80. During a project prioritization roundtable in 2015, there was consensus of the Transportation Policy Committee and Transportation Technical Committee to pursue another major investment study of the Mississippi River Crossings for both highway and rail crossing capacity. This was reaffirmed with this plan update as a project requiring further study. In 2020, a Mississippi River Rail Bridges study was conducted. A new rail bridge was deemed more suitable for the area between the Government Bridge and Crescent Bridge or slightly downstream. Aligning a dual rail and road bridge on the upper pool from I-74 east was not deemed as the preferred alternative. A study of an east Mississippi River bridge remains to be investigated after other bridge improvement needs have been addressed.

Crossing Plan and Beyond

The Crossing Plan of 1998 has resulted in toll removal from the Centennial Bridge and repairs, and the reconstruction of the I-74 bridge. An east Mississippi River bridge remains an interest within the metropolitan area, but will require additional study. Chapter 3 outlines the major projects expected to be over or near $500 million, including the completion of the I-74 bridge reconstruction. Another major project is the replacement of the I-80 bridge. A preliminary engineering study is underway in Illinois, and in Iowa, a location and environmental assessment is being conducted on the I-80 corridor (west of I-280 to approximately 240th Avenue near LeClaire). There is also concern for the aging U.S.67/Centennial Bridge, noted for consideration of a feasibility study to determine if reconstruction or replacement is feasible.

In addition to the major Mississippi River crossings, numerous streams and creeks traverse the landscape of the planning area. On the Rock River, there is public interest in an east Rock River Bridge, noted as needs additional study in Chapter 3.

Duck Creek nearly splits the Cities of Bettendorf and Davenport in half, flowing west to east. This results in several bridge crossings along many major north-south arterials. In the Quad Cities *Extreme Weather and Transportation Resilience Report*, Duck Creek road crossings were noted as potential critical and vulnerable facilities to major

Figure 4.7 – Example of Poor Pavement Conditions, Rock Island, Illinois Due to Freeze/Thaw Conditions

Source: Bi-State Regional Commission, 2019

creek flooding, and sited for consideration of mitigation and adaptation strategies. Many other minor tributaries of the Mississippi and Rock Rivers require the maintenance of bridge crossings.

Pavement Condition

One of the transportation objectives in the Bi-State Region is to preserve the transportation network. This includes repairing and/or replacing existing roads. Roads can be characterized by their surface type and the condition of the surface. Map 4.5 identifies the surface material of the roadways in the MPO, and Map 4.6 identifies the surface condition of roadways in the MPO. Surface condition is used to evaluate maintenance needs and prioritize projects. Roads in the poorest condition and that carry heavy traffic are considered first for improvements. One challenge with this data set is the time between the measure and the current situation. With freeze-thaw cycles, and higher precipitation episodes, fair pavement can shift to poor quickly. (See Figure 4.7) The engineering community is shifting the philosophy from a worst-first approach to one where roads in good-fair condition are evaluated for preservation and rehabilitation. Of course, maintenance needs are greater than the funding available, so addressing both philosophies will eventually bring roads closer to the good-fair asset condition.

The Iowa Pavement Management Program (IPMP) is Iowa DOT's approach for maintaining safe and reliable roads. The program's mission is to support the management, planning, and programming needs of transportation agencies; provide pavement management information, tools, and training for project and network-level activities; and develop and maintain a geographic information system (GIS) pavement management database to support local governmental agencies and the Iowa DOT pavement management efforts. The IPMP data collection is based on a two-year cycle and includes all paved roads. IPMP promotes optimal, cost-effective decisions on highway maintenance, rehabilitation, and reconstruction, using accurate past and projected pavement conditions. IPMP focuses on local transportation agencies and provides these agencies with:

- An objective and consistent planning tool to support development of regional and statewide transportation improvement plans

- Information on pavement condition for individual pavement sections
- Raw pavement distress data from the automated distress collection equipment
- Inventory and history information on roadways
- Training on pavement management software and principles
- Video logging of roadways

The pavement condition data is available to local governments for interstates to collectors. Local engineers utilize this data to determine road maintenance and reconstruction needs. The latest data collection for the Iowa Quad Cities was done in 2013. There is some city data that is more recent between 2017 and 2019 for Davenport and Bettendorf, respectively. Table 4.4 shows the Pavement Condition Index (PCI) value and its respective category.

Table 4.4– Pavement Condition Index (PCI) Value Categorization

PCI Value	Descriptive Category
1-27	Very Poor
28-45	Poor
46-62	Fair
63-78	Good
79-100	Excellent

Source: Iowa Department of Transportation, 2007; and the Institute for Transportation at Iowa State University

The Illinois Department of Transportation (ILDOT) has been using the Condition Rating Survey (CRS) to assess the condition of the state's pavement network since 1974. Initially, this was a very labor-intensive process and became automated in 1994. The results are used extensively at the network level to determine budget share for the pavement improvement program and at the project level to determine priorities of specific pavement improvement proposals. The CRS values range from 1.0 to 9.0 in 0.1 increments. The best CRS value is 9.0, reflecting a newly-constructed pavement surface. The worst CRS value is 1.0, representing total failure of a roadway. Table 4.5 shows the CRS value and its respective category.

Table 4.5 – Condition Rating Survey (CRS) Value Categorization

CRS Value	Descriptive Category
1.0-4.5	Poor
4.6-6.0	Fair
6.1-7.5	Good
7.6-9.0	Excellent

Source: *Illinois Department of Transportation, Condition Rating Survey Manual: State System Condition Rating Survey (CRS), 2004*

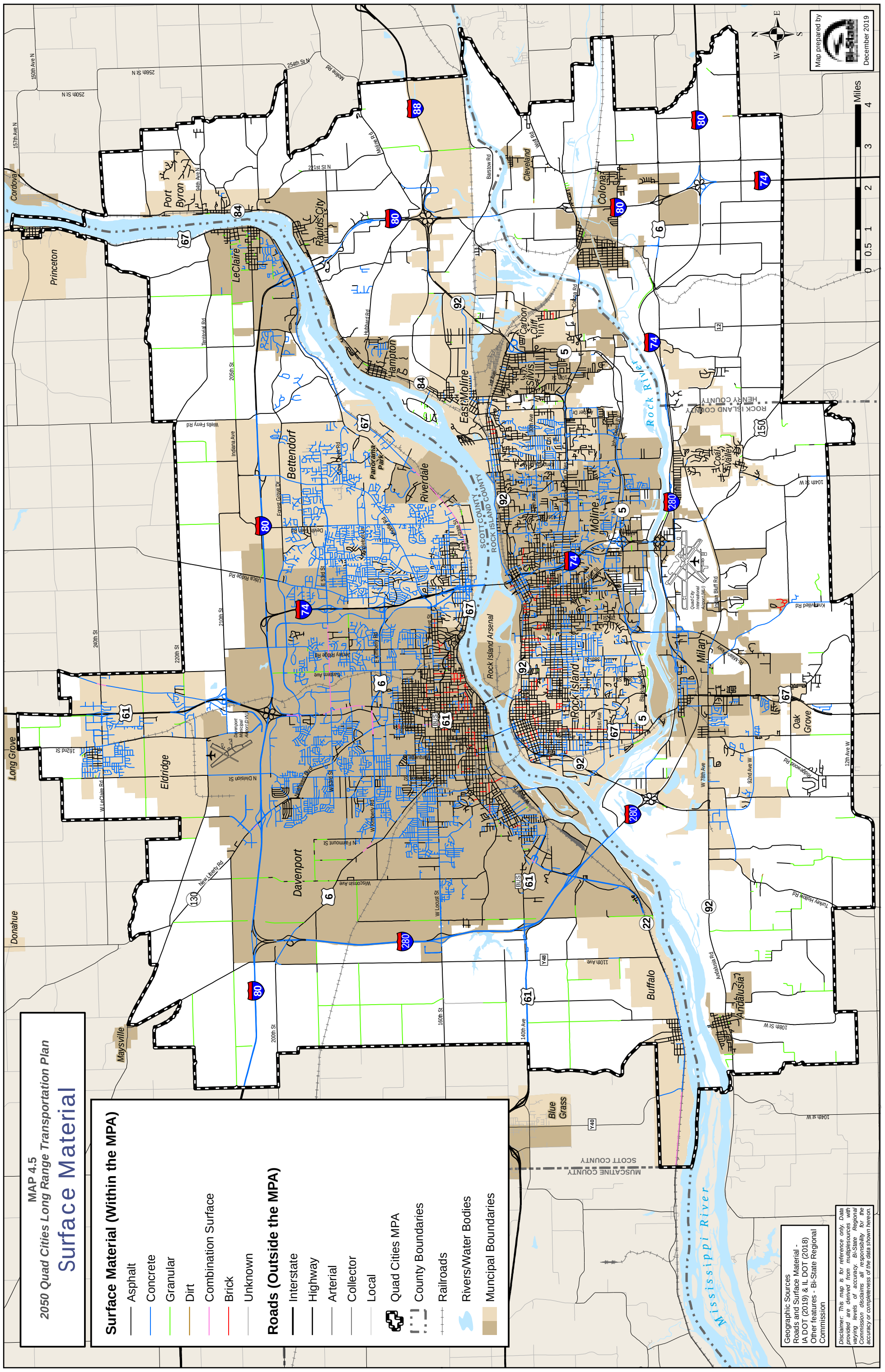
The CRS is an important tool that:

- Provides an opportunity to review the highway network
- Provides overall condition of the state highway system
- Gives input into the legislative/budgeting process
- Allows calculation of pavement needs

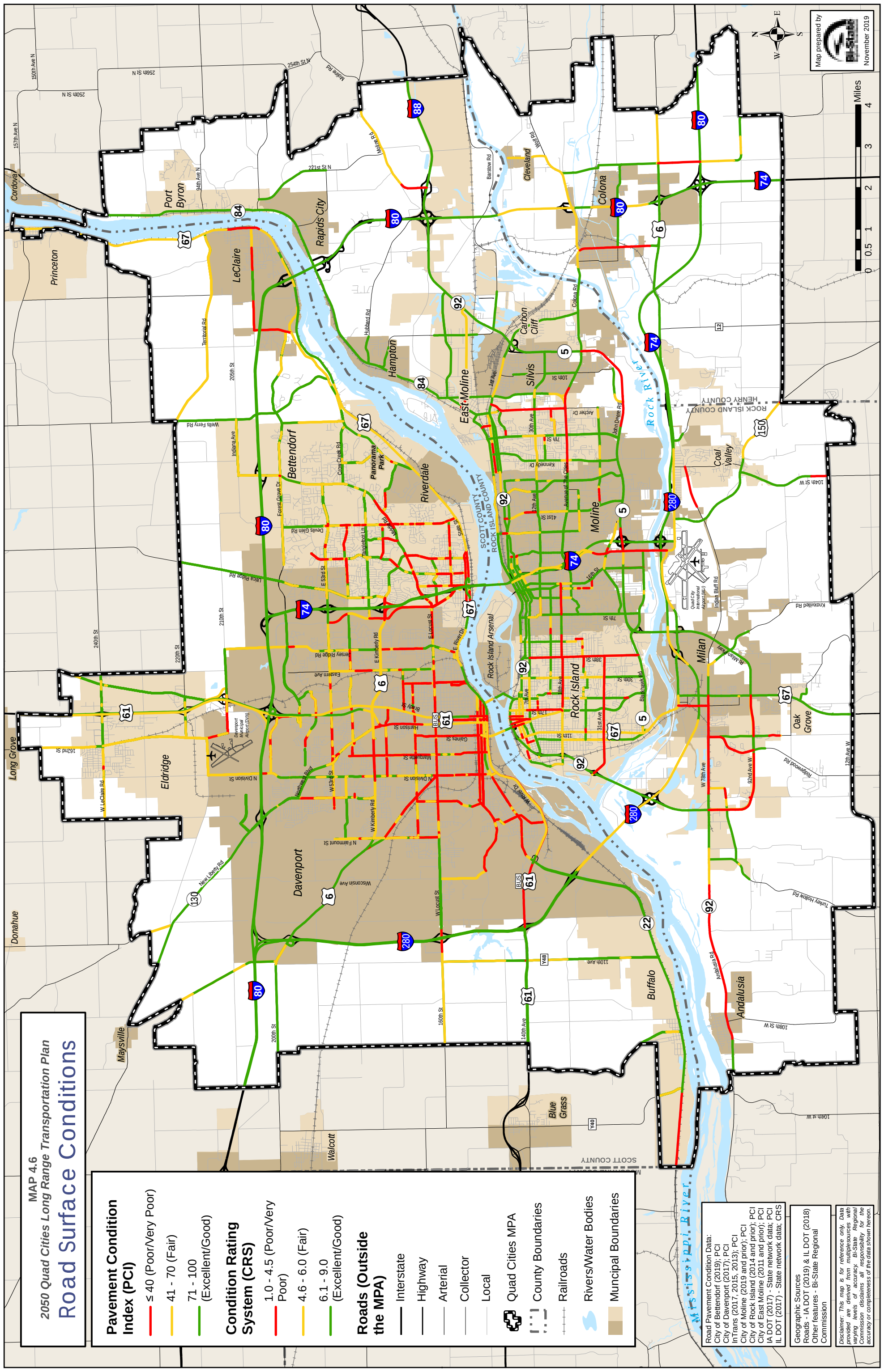
The CRS is conducted annually for alternating halves of the state on the roads under the State of Illinois' jurisdiction, including interstates, U.S. highways, and some local roads. Rock Island and Henry Counties are located in ILDOT District 2, which results in the non-interstate system being rated in odd numbered years. Data on interstates is collected each year. CRS values are applied in even numbered years for interstates in all districts. In odd numbered years, the Pavement Review Team reviews the interstates and estimates the remaining life in the pavement surface.

Map 4.6 collapses the PCI and CRS values into three categories: poor/very poor, fair, and excellent/good. Thus, the scales represented on these two tables are different from those represented on the map. Local Illinois Quad Cities jurisdictions also collect road surface conditions, and their scales are relative to the jurisdiction that submitted the pavement management conditions data. In the next couple of years, the ILDOT will be collecting pavement data for roads classified as collector and above to help further performance management of the greater road system. This will provide more uniform data for these road classifications and allow for more comparable pavement conditions. Currently, federal performance measures only apply to the National Highway System (NHS)-Interstate, and some non-Interstation NHS roads.

Map 4.5 – Surface Material



Map 4.6 – Road Surface Conditions



Maintenance

Maintenance of the existing road network is critical to its efficient, safe operation, and continuing usage. Regular maintenance of roads and associated structures can increase the useful life of a street or bridge. (See Figure 4.8) Roads are constructed with life cycles calculated into their design. Life cycles are developed by taking the average actual life of different surfaces and structures. These can be influenced by climate, construction materials, traffic volumes, and usage based on the weight of vehicles. In general, roads are constructed with a 15- to 20-year life span, while bridges are constructed with a 30- to 50-year life span. Restoration or rehabilitation of such facilities can add 10 to 20 years of life to an existing facility. Therefore, a regular maintenance schedule for all existing roads is important. State and local governments are responsible for the maintenance of the existing road network and repair and rehabilitation of roads through planned maintenance programs.

Federal Highway Administration (FHWA) offers guidance on pavement maintenance that can be classified into three categories: preventative maintenance, minor rehabilitation (non-structural), and routine maintenance. Preventative maintenance is typically used for pavements in good condition to extend a roads service life. Rehabilitation projects restore existing structural capacity through elimination of age-related, environmental cracking of a road surface or by increasing the pavement thickness to strengthen a section of road. Routine maintenance addresses specific conditions and events that restore the road to an adequate level of service.[1]

Technology and Operations

Chapter 2 noted the need for planning considerations of safety, operations, and security. Transportation system management and operations (TSMO) is an integrated approach to managing the performance of the road network to meet travel needs. It is the application of programs, technology, and system processes that support the flow of vehicles, travelers, and goods on the existing roads. These activities support improvements to the day-to-day operations through asset management, application of traffic control devices

1 Source: Federal Highway Administration Pavement Preservation Definitions Memorandum 9-12-05

Figure 4.8 – Sample Road Construction, Rock Island, Illinois

Source: Bi-State Regional Commission, 2020 and real time traveler information, and use of traffic analysis tools to better understand problems and possible solutions. Examples of these include traffic detection and surveillance, arterial management, electronic toll collection, automated enforcement, traffic incident management, road weather management, traveler information services, commercial vehicle operations, traffic control, and freight management.

Intelligent Transportation System (ITS) is a term that applies to any transportation-related project that uses computers, communication, and other advanced technologies to support transportation services. ITS may include telephone systems, such as 511, to disseminate traveler information; weigh-in-motion systems that measure truck weight without stopping; or dynamic message signs (DMS) warning of a crash ahead along a road segment or alerting travelers of construction ahead. ITS has added costs when compared to traditional construction and maintenance projects. However, ITS draws on system engineering methods that provide advantages of integration and use of technology by making the transportation operations better. ITS has been shown to:

- Reduce design costs and development time
- Allow for orderly and efficient expansion
- Improve communications between stakeholders and systems
- Lower project risk
- Promote interoperability
- Allow interchangeability of equipment and devices

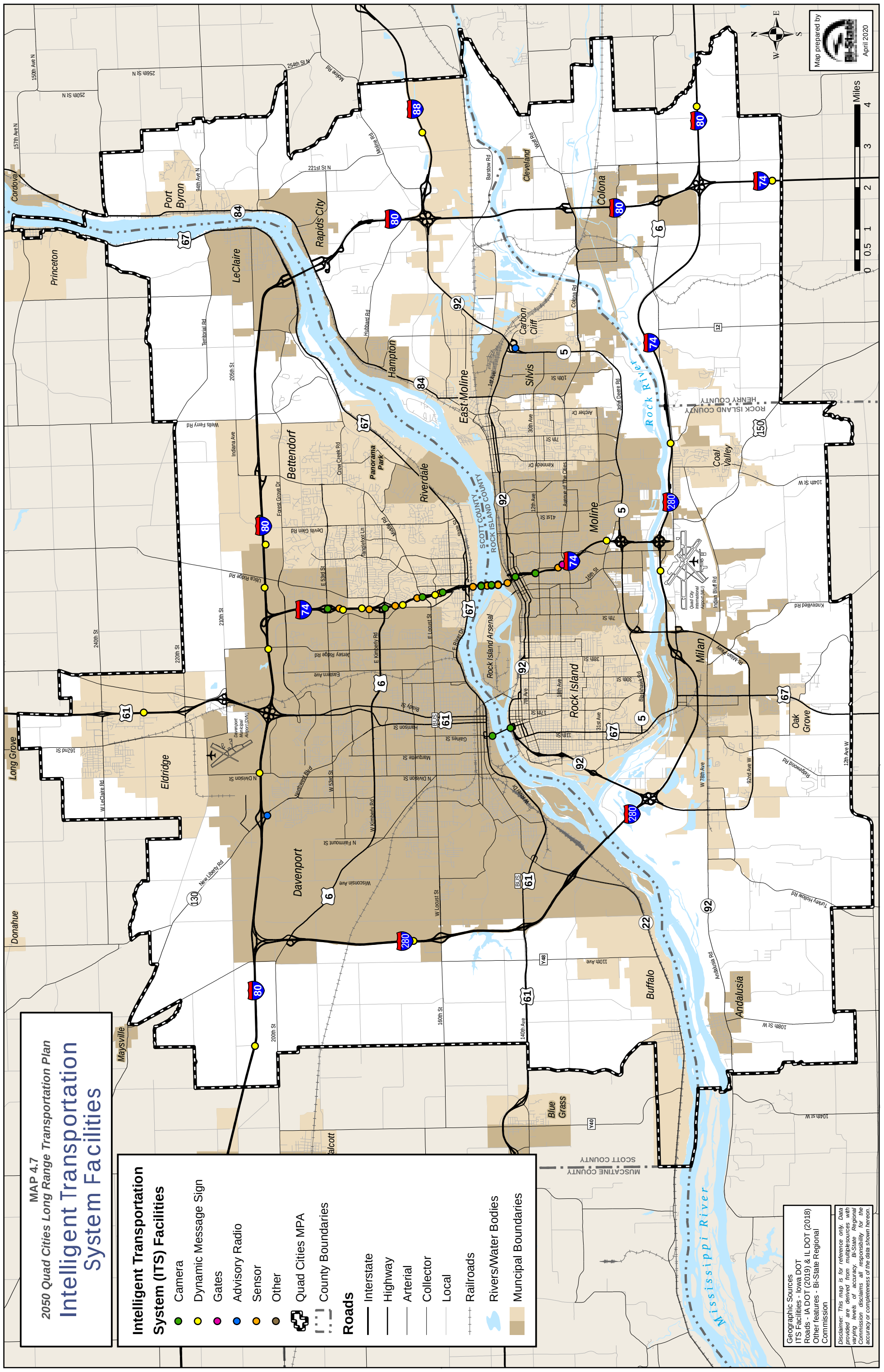
The *Bi-State Regional Intelligent Transportation System (ITS) Architecture Plan* was developed in April 2005 and updated June 2013. A subsequent update will coincide with the completion of the I-74 bridge, which will include deployment of specific detection technologies for maintenance, safety, and travel demand monitoring. The plan is a framework for ensuring institutional agreements and technical integration are in place prior to beginning a project or group of projects that incorporate transportation technologies. With the assistance of the Iowa Department of Transportation, the document was refined in 2006 to incorporate the results of the *I-74 Bridge Incident Management and Response System* and more clearly outline plan maintenance. The most recent plan includes updates for the

I-74 project level architecture as part of the construction engineering phase of the I-74 Mississippi River Corridor project. Map 4.7 identifies ITS technologies currently used in the Quad Cities MPA. Figure 2.6 in Chapter 2 illustrates the interconnective framework of ITS. The ITS needs identified in the regional architecture plan for transportation systems and operations include:

- Incident management at river crossings
- Freeway/Arterial management and coordination on integrated corridors
- Transit management and coordination
- Surveillance and video sharing
- Integrated systems via institutional relationships
- Work zone safety and information availability
- Operation and maintenance technology
- Advance traveler information
- Emergency responsiveness via interagency coordination
- Security and disaster response at critical facilities
- Intelligent corridors

Key ITS elements include the implementation of the following: I-74 Bridge Incident Management and Response System (BIMRS); network surveillance for red light running enforcement; traveler information via dynamic and portable message signs; transit traveler information via kiosks, display boards, and other electronic devices; remotely-controlled traffic signals; traffic signal preemptions for transit; universal transit pass; and automated vehicle locator systems for transit. Deployment of these technologies will improve safety, reduce traffic congestion, and provide greater incentives for auto alternatives via the transit network.

Map 4.7 – Intelligent Transportation System Facilities



Travel Today

Traffic Movement & Congestion

Traffic information provides an opportunity to measure the number of vehicles, speed, vehicle type, and other parameters. Map 4.2 shows the annual average daily traffic (AADT) in the Quad Cities MPA for 2015 (Travel Demand Model base year). The most heavily traveled road within the metropolitan area is located on I-74 with 76,700 vehicles per day, as of 2015. In 2019, I-74 carried 69,700 vehicles per day under construction conditions.

Congestion is an excess of vehicles on a road at a particular time resulting in speeds that are slower than normal. While this is a simple concept, it is not constant. Traffic demands vary significantly by time of day, day of the week, season of the year, special events, and emergencies. Capacity of the roadway also varies because of weather, work zones, traffic incidents, or other non-recurring events.

Two types of congestion are recurring and non-recurring. Recurring congestion generally occurs in short time periods, such as rush hour, and is fairly predictable based on previous days' traffic levels and roadway capacity. Non-recurring congestion is caused from unforeseen incidents, such as accidents, stalled cars, and bad weather. These incidents result in unanticipated delays and driver impatience. It is estimated that almost 60% of traffic delay is caused by non-recurring incidents. In order to reduce recurring congestion and minimize the effects of non-recurring congestion, the FHWA established a Transportation System Management process that has evolved into a Congestion Management System and finally a Congestion Management Process (CMP).

The FHWA defines a CMP as "a systematic approach collaboratively developed and implemented throughout a metropolitan region that provides for the safe and effective management and operation of new and existing transportation facilities through the use of demand reduction and operational management strategies." Bi-State Regional Commission is required to create such a document since it is a Transportation Management Area (TMA) – an urbanized area with a population over 200,000.

Six major sources of congestion:

- *Limited physical capacity (i.e. Bottlenecks)*
- *Poorly functioning traffic signals*
- *Traffic incidents*
- *Work zones*
- *Bad weather*
- *Special events*

The FHWA requires that consideration be given first to strategies that reduce single-occupancy vehicle (SOV) travel and improve the efficiency of the existing system. All other reasonable strategies must be analyzed before a capacity increase is proposed as a congestion management technique. Strategies may include geometric improvements, primarily at intersections including exclusive or multiple turning lanes; traffic signal coordination; reversible or bi-directional lanes; incident detection and management systems; High Occupancy Vehicle (HOV) strategies; transit turnouts; and Intelligent Transportation Systems (ITS) for travel planning/information, travel management, travel payment, commercial vehicle operations, and advanced vehicle technology. These measures address traffic congestion and tend to be lower cost solutions. They require minimal right-of-way and shorter implementation schedules than compared to new construction for additional lanes.

In the Quad Cities, there are some corridors that experience higher Average Daily Traffic (ADT) counts, and as a result, experience more congestion than others. Known corridors with congestion include:

- I-74 from 53^{rd} Street (Davenport) to Airport Road (Moline)
- 53^{rd} Street/Avenue from Pine Street (Davenport) to Devil's Glen Road (Bettendorf)
- Kimberly Road/Spruce Hills Drive from Pine Street (Davenport) to Utica Ridge Road (Bettendorf)
- Locust Street/Middle Road from Fairmount Road (Davenport) to Tanglewood Road (Bettendorf)
- U.S. 61 from 65^{th} Street (Davenport) to 2^{nd} Street (Davenport)
- 18^{th} Street from 53^{rd} Avenue (Bettendorf) to State Street (Bettendorf)
- Avenue of the Cities from Archer Drive (East Moline) to 16th Street (Moline)
- John Deere Road from 7^{th} Street (Moline) to 70^{th} Street (Moline)
- 7^{th} Street from 17^{th} Avenue (Moline) to John Deere Road (Moline)
- Division Street from Northwest Boulevard (Davenport) to 3rd Street (Davenport)
- U.S. 67 from Centennial Bridge (Davenport) to Devil's Glen Road (Bettendorf)

- Northwest Boulevard from I-80 to Kimberly Road (Davenport)
- 41st Street from 12th Ave (Moline) to John Deere Road (Moline)
- 18th/19th Avenue from 11th Street (Rock Island) to 16th Street (Moline)
- Route 6 from Airport Entrance/I-74 (Moline) to Niabi Zoo Road (Coal Valley)
- IL 92 from IL 5 (Carbon Cliff) to 19th Street (Rock Island)

Ongoing maintenance responsibilities continue to restrict the number of available lanes at the river crossings. Bi-State Regional Commission annually convenes meetings to discuss river crossing restrictions and coordinate with the jurisdictions responsible for maintenance and construction. Ongoing local road coordination meetings have been held during the reconstruction of the I-74 Mississippi River bridge. Additionally, both the Illinois and Iowa DOTs meet regularly to coordinate their bridge and road construction and maintenance projects. Where possible, both DOTs utilize traffic controls set by the other DOT on coordinated river crossing projects. These efforts appear seamless to the public, but are examples of significant local interjurisdictional coordination. It is recognized that these efforts help improve traffic flow through construction zones and reduce emissions from idling vehicles.

There has been an issue of trucks colliding with low-clearance structures in the Quad Cities, namely at Brady Street and E. 5th Street, and Harrison Street and W. 5th Street. In November 2000, electronic warning signs alerting truck drivers to the low-clearance railroad bridge were installed on Harrison Street. Low-clearance warning signs can also be found northbound on Highway 61 just west of I-280 (West River Drive) and southbound on Highway 61 in Eldridge. These signs route through-trucks onto I-80 and I-280 and have been in place since the early 1980s.

The Iowa Quad Cities has seen a significant number of crashes involving low-clearance structures. These incidents not only damage the trucks, but recurring collisions could potentially damage the structural integrity of the bridge. A strategy to reduce future collisions at the U.S. 61 sites involved re-designating the corridor as a business route. This redirects primary traffic to I-80 and I-280, particularly the truck traffic. In 2010, the re-designation was approved federally and has since been completed. With all of these efforts in place, crashes have

continued, and discussions with Iowa Interstate Railroad on bridge raising has ensued as another alternative.

Map 4.3 shows the truck routes and low-clearance structures (structures with less than a 16 foot clearance) in the Quad Cities MPA. Looking at the map, there are a number of areas with low-clearance structures that could pose problems to trucks. The data set used was from 2018/2019. With improvements along the I-74 corridor, certain low-clearance structural limitations are expected to be resolved. Crashes at these low-clearance structures can have a negative impact on movement of goods and services in the metro area.

Crashes

Automobile incidents are one of the top reasons for non-recurring congestion. While crashes reduce traffic flow, they also pose a threat to health and safety. A transportation objective of this plan is to reduce fatal crashes and serious injuries. Tables 4.6 and 4.7 show the total crashes, fatalities, and severe crashes sustained each year from 2013 to 2017 by state. Illinois separates injuries into four categories: fatalities, A injuries (incapacitating injury), B injuries (non-incapacitating injury), and C injuries (not evident injury). Iowa also separates injuries into four categories: fatalities, major injuries, minor injuries, and possible/unknown injuries. The average number of fatalities in the Quad City MPA from 2013-2017 is 14.4 fatalities per year. The average number of A injuries/major injuries within the Quad Cities MPO from 2009-2013 is 163 per year.

The Urban Transportation Technical Committee identified not only reducing the total number of injuries as being important, but also reducing their severity. Map 4.8 focuses analysis on intersections with high severity crashes between 2013 and 2017. The locations in red indicate the most severe crash sites, many noted on U.S.6/Kimberly Road, Avenue of the Cities, and Blackhawk Road/John Deere Road corridors. Map 4.9 highlights the concentration of crashes from most to least dense and notes fatalities and serious injuries by location. Many cluster around the same routes just noted and along the I-74 corridor. Improvements along John Deere Road east of I-74 and in the I-74 corridor are expected to change the future crash results post 2017 when these improvements were made.

Table 4.6 – Number of Crashes by Severity for Iowa Quad Cities

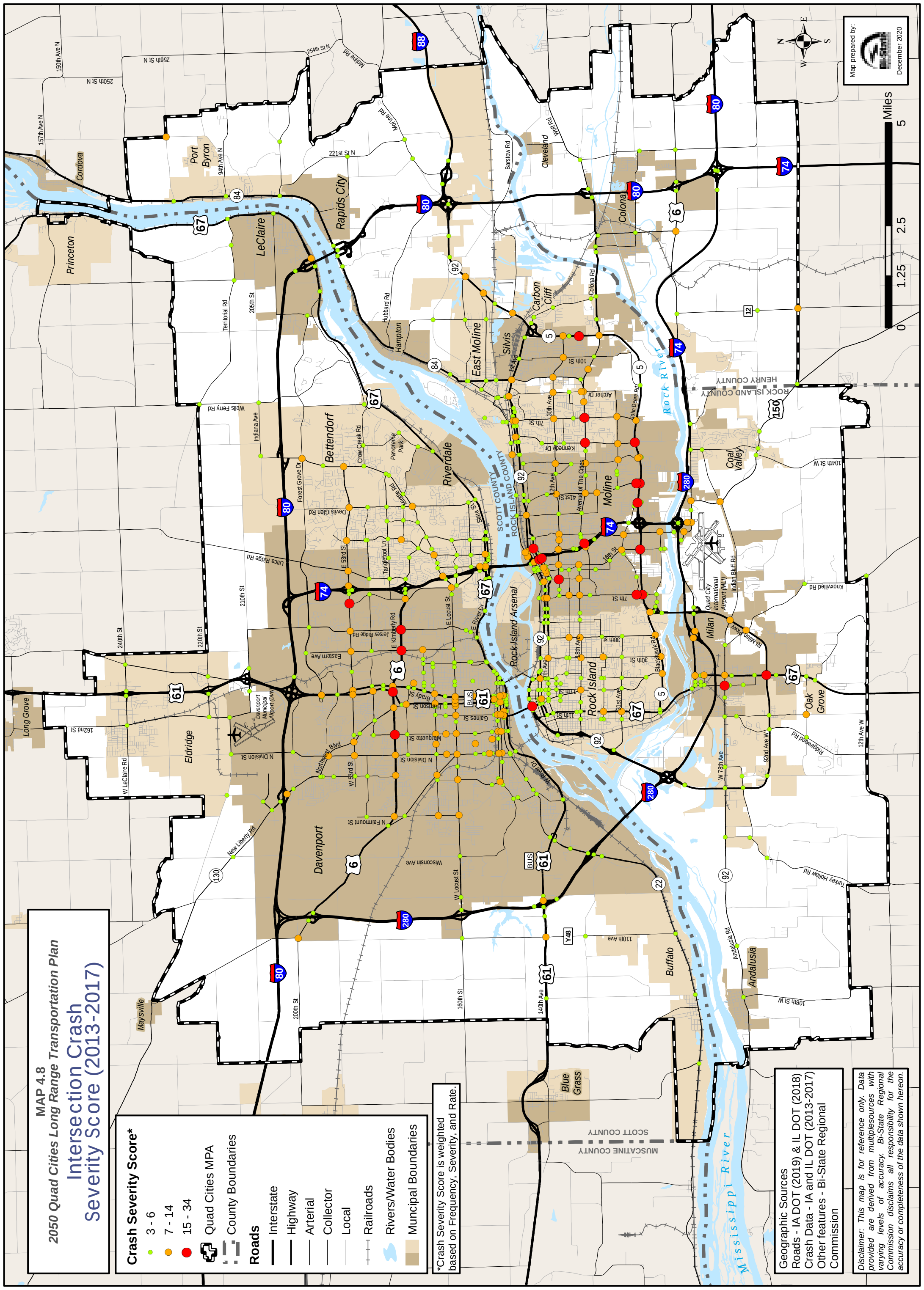
	Year					
Record Type (Severity)	**2013**	**2014**	**2015**	**2016**	**2017**	**5-Year Avg.**
Fatal	7	11	16	15	7	11.2
Major Injury	44	46	47	44	48	45.8
Minor Injury	264	268	271	323	330	291.2
Total Crashes	3,327	3,456	3,798	3,878	3,824	3,656.6

Source: Illinois DOT 2009-2013 Crash Data

Table 4.7 – Number of Crashes by Severity for Illinois Quad Cities

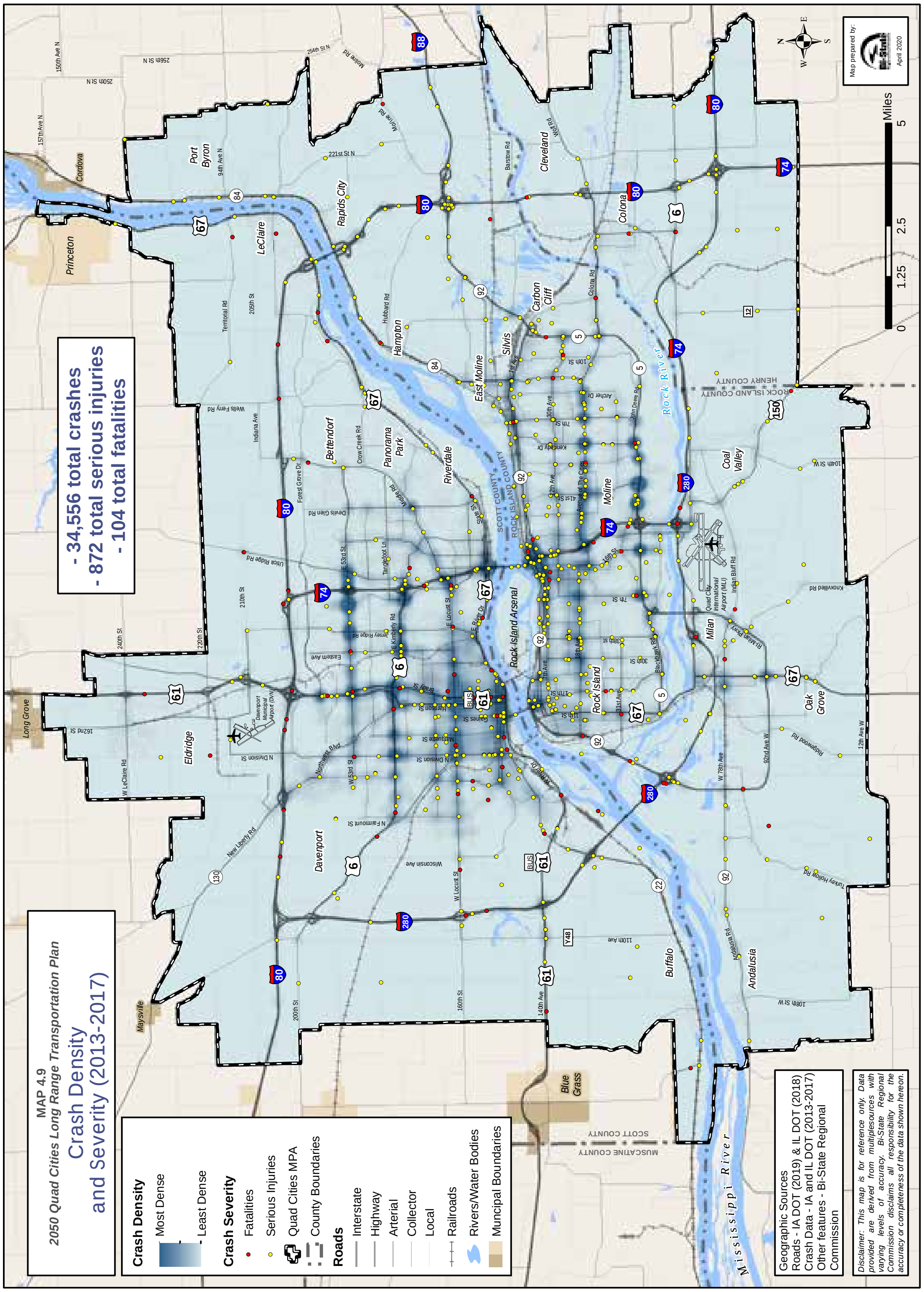
	Year					
Injury Status	**2013**	**2014**	**2015**	**2016**	**2017**	**5-Year Avg.**
Fatalities	6	7	7	11	6	**7.4**
Major Injuries A injuries (incapacitating injury)	117	77	106	89	91	**96**
Minor Injuries B injuries (non-incapacitating injury)	350	277	375	336	285	**324.6**
Total Crashes	3,063	3,195	3,321	3,341	3,353	**3,254.6**

Source: Iowa DOT 2009-2013 Crash Data



Map 4.8 – Intersection Crash Severity Score (2013-2017)

Map 4.9 – Crash Density and Severity (2013-2017)



Tables 4.6 and 4.7 also show a calculated 5-year average. It has been determined as part of the Moving Ahead for Progress in the 21st Century (MAP-21) rulemaking that the safety performance measures will consider a 5-year rolling average for Fatal and Class A or Incapacitating Injuries. As targets have been established at the state level, MPOs determine whether to support the states crash reduction efforts or development MPO-level targets.

In the case of the Quad Cities, supporting the states' respective targets has been the position. Supporting the targets locally means looking at the state emphasis areas and aligning efforts locally to reduce fatal and serious injury crashes in those areas, as well as those specific to the MPO. The *Quad Cities Traffic Safety Plan, 2020* was prepared for location officials to utilize for decision-making on improving these areas of concern.

In order to continue improving traffic safety in the Quad Cities, it is important to consider the causes of harmful accidents. The following tables outline the most harmful crash types in Illinois and Iowa respectively. Tables 4.8 (Illinois) and 4.9 (Iowa) highlight crash emphasis areas where the crash characteristics allow an understanding and application of education and enforcement strategies to reduce crashes.

Table 4.8 – Illinois Quad Cities Crashes 2013-2017 by Emphasis Area

Emphasis Areas	Fatal Crashes	Serious Crashes	Severe Crashes	Fatalities	Serious Injuries	Severe Injuries	Severe Injury Rank	Percent of Severe Injuries	Total Crashes	% of Crashes Resulting in Severe Injury
Intersection	9	220	229	10	290	300	1	47%	7,358	3%
Younger Driver	8	207	215	9	284	293	2	46%	6,491	3%
Speed	11	185	196	12	241	253	3	39%	6,048	3%
Lane Departure	19	149	168	21	173	194	4	30%	2,606	6%
Unprotected Person	19	115	134	21	151	172	5	27%	789	17%
Older Driver	7	118	125	9	158	167	6	26%	2,987	4%
Impaired Driving	19	77	96	20	97	117	7	18%	808	12%
Motorcycle	10	73	83	11	80	91	8	14%	275	30%
Distracted Driving	1	44	45	1	53	54	9	8%	924	5%
Pedestrian	5	33	38	5	36	41	10	6%	137	28%
Heavy Truck	5	30	35	5	33	38	11	6%	896	4%
Winter Roads	2	27	29	2	31	33	12	5%	1,739	2%
Bicycle	2	18	20	2	18	20	13	3%	122	16%
Work Zone	1	6	7	1	11	12	14	2%	354	2%
Local Roads	16	284	300	18	340	358		56%	9,571	3%
Non-Local Roads	21	196	217	22	263	285		44%	6,702	3%
All Crashes	37	480	517	40	603	643			16,273	3%

Source: Illinois DOT 2013-2017 Crash Data

Table 4.9– Iowa Quad Cities Crashes 2013-2017 by Emphasis Area

Emphasis Area	Fatal Crashes	Serious Crashes	Severe Crashes	Fatalities	Serious Injuries	Severe Injuries	Severe Injury Rank	Percent of Severe Injuries	Total Crashes	% of Crashes Resulting in Severe Injury
Speed	33	110	143	39	134	173	1	52%	7,952	2%
Intersection	18	97	115	21	110	131	2	39%	7,223	2%
Lane Departure	26	76	102	30	100	130	3	39%	2,112	5%
Unprotected Person	25	66	91	31	84	115	4	35%	331	27%
Impaired Driving	19	56	75	25	69	94	5	28%	891	8%
Motorcycle	11	54	65	15	60	75	6	23%	322	20%
Younger Driver	13	33	46	14	40	54	7	16%	4,213	1%
Older Driver	9	34	43	9	42	51	8	15%	3,099	1%
Distracted Driving	5	26	31	6	37	43	9	13%	1,641	2%
Pedestrian	10	29	39	10	32	42	10	13%	174	22%
Bicycle	0	15	15	0	17	17	11	5%	129	12%
Heavy Truck	6	6	12	6	8	14	12	4%	488	2%
Work Zone	3	5	8	4	7	11	13	3%	370	2%
Winter Roads	2	5	7	2	6	8	14	2%	1,687	0%
Local Roads	19	111	130	20	125	145		44%	9,834	1%
Non-Local Roads	37	118	155	44	144	188		56%	8,449	2%
All Crashes	56	229	285	64	269	333			18,283	2%

Data Source: Iowa DOT 2013-2017 Crash Data

Map 4.9 shows the high density crash and severity locations in the MPA from 2013-2017. It is important to note that Iowa and Illinois gather and report their data differently. Instead of comparing Iowa to Illinois, it is only accurate to compare different locations within each state.

Tables 4.10 and 4.11 show the top crash locations by average annual crashes, crash frequency, and crash severity in Illinois and Iowa respectively.

Table 4.10 – Top Crash Locations in Illinois Quad Cities 20013-2017

Rank	Intersection	Average Annual Crashes	Crash Rate	Average Annual Severity	Score
1	6th Ave. & 23rd St. - Moline	22.6	6.03	26	34
2	Avenue of the Cities & Kennedy Dr. - Moline	22.8	1.29	37	28
3	John Deere Rd. & 38th St. - Moline	29.2	0.88	31	27
4	John Deere Rd. & 41st St. - Moline	25.2	0.81	34	26
5	6th Ave. & 19th St. - Moline	14.4	2.81	22	25
6	92nd Ave./Milan Beltway & 1st St. - Milan	14.8	1.70	35	24
7	John Deere Rd. & 16th St. - Moline	20.2	0.99	28	21
7	John Deere Rd. & 60th St. - Moline	16.2	1.51	21	21
9	Avenue of the Cities & 19th St. NB - Moline	14.6	1.59	20	20
10	Avenue of the Cities & 7th St. - East Moline	14	0.96	28	18
10	38th Ave. & 41st St. - Moline	11.2	2.00	14	18

Source: Illinois DOT Crash Data 2013-2017, Quad Cities Strategic Traffic Safety Plan

In Table 4.10, the five Illinois Quad Cities intersections appear multiple times in the 5-year period. The intersection of 38th Street and John Deere Road in Moline is in the top 3 crash location list all five years. Avenue of the Cities and Kennedy Drive in East Moline is in the list in 2009 and 2013. The intersection of 38th Street and 41st Street in Moline is in the list in 2009 and 2010. Avenue of the Cities and 7th Street in East Moline is in the list in 2009 and 2011. Avenue of the Cities and 19th Street in Moline is in the list in 2012 and 2013.

Traffic Safety "E's" and Entities Involved in Traffic Safety Management

- **Engineering**
  - *IA/ILDOT*
  - *IA/ILDOT districts*
  - *Municipal engineers*
- **Education**
  - *State Department of Education*
  - *Universities*
  - *IA/ILDOT districts*
- **Enforcement**
  - *Highway Patrol*
  - *Local police departments*
  - *Judiciary*
  - *Department of Public Safety*
  - *Attorney General's Office*
- **Emergency Services**
  - *State Department of Health*
  - *First responders*

Table 4.11 – Top Crash Locations in Iowa Quad Cities 2013-2017

Rank	Intersection	Average Annual Crashes	Crash Rate	Average Annual Severity	Score
1	E. Kimberly Rd. & Jersey Ridge Rd. - Davenport	11	3.11	13	23
2	E. Kimberly Rd. & Welcome Way - Davenport	14.8	1.06	18	18
3	W. Kimberly Rd. & N Marquette St. - Davenport	11	1.45	16	16
3	E 53rd St. and Elmore Ave. - Davenport	14.4	0.94	17	16
5	E Kimberly Rd. & Eastern Ave. - Davenport	12.2	1.05	15	15
6	W Central Park Ave. & Marquette St. - Davenport	9.4	1.28	11	14
6	E Locust St. & Brady St. - Davenport	11.4	0.90	15	14
8	W Locust St., Hickory Grove Rd. & N Division St. - Davenport	10.6	0.87	11	13
8	W 2nd St. & N Gaines St. - Davenport	9.2	0.93	15	13
8	W Locust St. & Main St.	8.6	1.09	9	13

Source: Iowa DOT Crash Data 2013-2017, Quad Cities Strategic Traffic Safety Plan

Table 4.11 has three Iowa Quad Cities roads that appear multiple times in the 5-year period. The intersection of 53rd Street and Elmore Avenue in Davenport is in the top three crash location list in all 5 years. Kimberly Road and Eastern Avenue is in the list in 2009 and 2011. Kimberly Road and Elmore Avenue is in the list in 2009 and 2013. All of these roads are high-volume, so it is not surprising to see they have a high number of crashes.

It is important to look at the crash rate. It is usually expressed in terms of crashes per million entering vehicles. For instance, even though these roads have the highest number of crashes, their crash rate may be low compared to the number of vehicles traveling on the road. A low-volume road may have a high crash rate showing a disproportionate number of crashes compared to the volume the roadway handles. This would indicate the road should be looked at to reduce the number of crashes. The crash rate is a factor analyzed in the crash report that Bi-State Regional Commission conducts every few years.

In 2020, Bi-State Regional Commission published the *Quad Cities Traffic Safety Plan* for the Davenport-Rock Island-Moline urbanized area. The report provided an analysis for the top 10 intersections in the Iowa and Illinois Quad Cities, as well as noting the crash emphasis areas above. The report gives a detailed analysis of the number and types of crashes at each of the top ranked intersections to allow stakeholders to pinpoint problem areas and develop engineering strategies to mitigate hazards, focus on traffic enforcement, and/or develop public education strategies to reduce crashes. Intersections were ranked using crash frequency, crash severity, and crash rate. This crash study supports the *2050 Quad Cities Long Range Transportation Plan* in an effort to increase the safety of the Quad Cities Area's transportation system through identifying problem locations.

MAP-21 required states to create a State Highway Safety Plan. These requirements were carried forward in the FAST Act. It is important for MPO activities to be consistent with State Highway Safety Plans in order to facilitate safer roads. In the State of Iowa, the Comprehensive Highway Safety Plan outlines five safety policy areas and eight safety program areas. The overall vision is "One Death is Too Many," and the policy areas focus attention on young drivers, occupant protection, motorcycle safety, traffic safety enforcement, and traffic safety improvements. These statewide policies will be supported by the eight program areas targeting lane departure, safety corridors, intersections, local roads, crash data records, senior mobility, safety training and education, and unpaved rural roads.

In the State of Illinois, the *Comprehensive Highway Safety Plan* outlines ten data-driven emphasis areas that were identified for immediate action. The overall vision is "Highway users arrive safely at their destination" with a "Zero Fatalities" goal. The emphasis areas seek to focus attention on alcohol and other impaired driving, driver behavior and awareness, highway-railroad grade crossing, information systems, intersections, large trucks, road departure, safety belts/occupant protection, vulnerable users (pedestrian, motorcyclists, pedalcyclists), and work zones.

Quad Cities Wafinding Logo

In the traffic safety field, there are 4 E's of safety – Engineering, Education, Enforcement, and Emergency Medical Services. These key safety objectives should be considered first, every time and at every stage of a project. Listed in the sidebar are the four E's, accompanied by agencies that are recommended to work cooperatively and fulfill the safety objectives. A 5th E was added to represent "Everyone." With **everyone** working together, the traffic culture can change so that **everyone** arrives alive.

Wayfinding

The appropriate use of signs to guide traffic is also a congestion management strategy. Signage is needed to direct travelers to local attractions and throughout the MPA. Consistent signage along major corridors aides efficient flow of traffic.

With a variety of opportunities offered by the 17 contiguous communities in the region, the challenge is to navigate along a consistently named corridor through multiple communities. In many cases, a single roadway corridor may have as many as five different names depending on the community and jurisdiction responsible for its maintenance. Visitors to the Quad Cities may be especially confused by different street names along the east-west corridors. Fortunately, many of these corridors are marked state or federal routes, providing some consistency. However, there are corridors in the area made up of only local roads that could be improved with uniform signage and naming conventions. Two examples of strides in uniform street naming occurred in 2002 when 23rd Avenue, Moline/42nd Avenue, East Moline/23rd Avenue, Silvis changed to "Avenue of the Cities," and in 2009 when 65th/67th Street corridor east of Brady Street in Davenport was renamed Veterans Memorial Parkway.

In the past 25 years, efforts have been made to improve signage to attractions while providing guidance to the interstate system. Results include additional riverfront and attraction signs and interstate trail blazers. Groups, such as the Visit Quad Cities and the Quad Cities Chamber of Commerce, continue to build upon these endeavors. In 2008, a uniform area-wide wayfinding signage system was implemented. This system uses color-coded quadrants to help travelers know when they are entering or leaving a community. Davenport is the green quadrant, Bettendorf the yellow quadrant, Rock Island the red quadrant, and Moline/East Moline the blue quadrant. The signs will not only alert the driver to what city they're in, but also where to find attractions, venues, public parking, and adjacent cities. There are 217 wayfinding signs directing visitors to 85 destinations throughout the Quad Cities.

Connectivity

The existing road network currently integrates other modes into the overall transportation system. Continuing to improve these connections is important. The road network provides motor vehicle and bicycle access to multi-purpose trails, transit facilities, airports, railroad stations and terminals, and intermodal freight facilities. In many areas, sidewalks accompanying these facilities also provide access and connections for pedestrians. Figure 4.9 illustrates pedestrian connectivity to MetroLink's District Station. Roads intersect these various modes and connect land, air, or water transportation.

From a regional perspective, the interstates (I-74, I-80, I-88, and I-280) provide important corridors for thru-traffic and external-internal traffic either for the purpose of travel or freight movement. For example, arterial roads from the rural areas carry agricultural products. These roads allow freight to be transported to barge terminals located at the Mississippi River. This freight can then be carried to other ports not only regionally, but nationally and internationally. Other examples include roads that provide the corridors with transit routes, as well as crossings of the Mississippi River bridges. There are a host of connections that can be illustrated using existing roads as the linkage. An integrated road network is important to supporting economic vitality; increasing accessibility and mobility; enhancing connectivity, safety, and security; promoting system efficiency; and enhancing the environment.

Figure 4.9 – MetroLINK District Station, Rock Island

Source: Bi-State Regional Commission

Travel Tomorrow

Future road improvement needs were determined through input from the various jurisdictions and public in the MPA, as well as examining existing road network conditions and evaluating projects by level of service with a travel demand model. Planners and engineers from the jurisdictions used existing comprehensive land use plans and/or city street plans, where available; and the crash, condition, traffic volume to capacity, and resilience criticality data on the existing road network when developing suggested road improvements.

While road preservation projects may take less time for planning and engineering, an expansion project for a road or highway typically includes the following major phases over several years' time:

- Feasibility Study (Pre-Engineering Process)
- Engineering Phase I (with Environmental Impact Statement–EIS)
- Engineering Phase II (with Plan Preparation)
- Land Acquisitions
- Utility Relocations
- Environmental Mitigation
- Bridge Work (if applicable)
- Construction (Grading, Paving, and Other)
- Lighting and Signing

Each of these phases also includes bidding and contract negotiations between the jurisdiction developing a new road and the people completing that particular phase of the project. An important purpose of the long range transportation plan is to develop a list of expansion projects on the FFC system s and systematically determine projects for the short- and long-term horizon years when construction is expected.

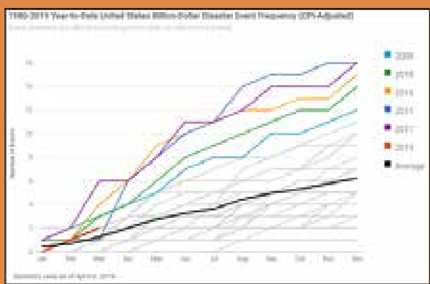
Technology, Automation, and Intelligent Traffic Systems

Technology continues to play a growing role in our lives and our transportation system. Discussions of autonomous vehicle readiness are occurring at the state and federal levels. In Iowa, an Iowa Advisory Council has been formed on the subject. The state published a vision document in 2017 with goals on mobility, roadway safety, and freight movement. Many of the elements of autonomous vehicles will coincide with ITS, requiring some system integration. Illinois addresses the issue within their *2019 Long Range Transportation Plan* on mobility and the economy. The MPO will monitor state and federal activities in this area for impacts on the local metropolitan system.

As referenced in Chapter 2 and above in existing conditions, the ITS Architecture document will need to be updated to address changes implemented in the I-74 corridor reconstruction. There are opportunities for ITS in traffic operations such as signal synchronization and traveler information that is widely available through apps and traveler information websites. The MPO will work with state and federal partners to monitor advances in technology, automation, and ITS to allow discussions on infrastructure and/or systems changes that would affect the transportation network within the Quad Cities.

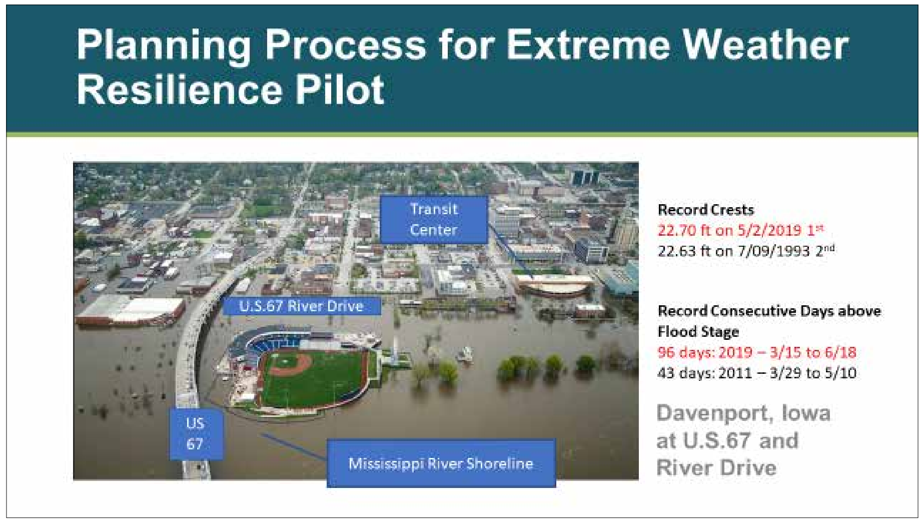
Unexpected Travel Disruptors

Chapter 2 notes a variety of planning considerations from hazard mitigation to resilience. Natural hazards and man-made events can be disruptors to the transportation system via a hazardous materials spill, an extreme weather event, or a global pandemic. Counties and cities within the MPA participate in hazard mitigation planning. These events can be short in duration or much longer. The Novel Corona Virus (COVID-19) pandemic began in March 2020, and a "return-to-normal" as of March 2021 remains uncertain. In the case of extreme weather, the Mississippi River experienced the greatest flood height on record and the longest duration flood of over 40 days in 2019 from March to June. Flooding required a long-term detour on U.S. 67/River Drive in Davenport and detours in downtown Davenport for many days.



Source: National Weather Service

Figure 4.10 Extreme Weather Resilience Pilot – Flooding Example



Source: Bi-State Regional Commission 2020

Global Pandemics

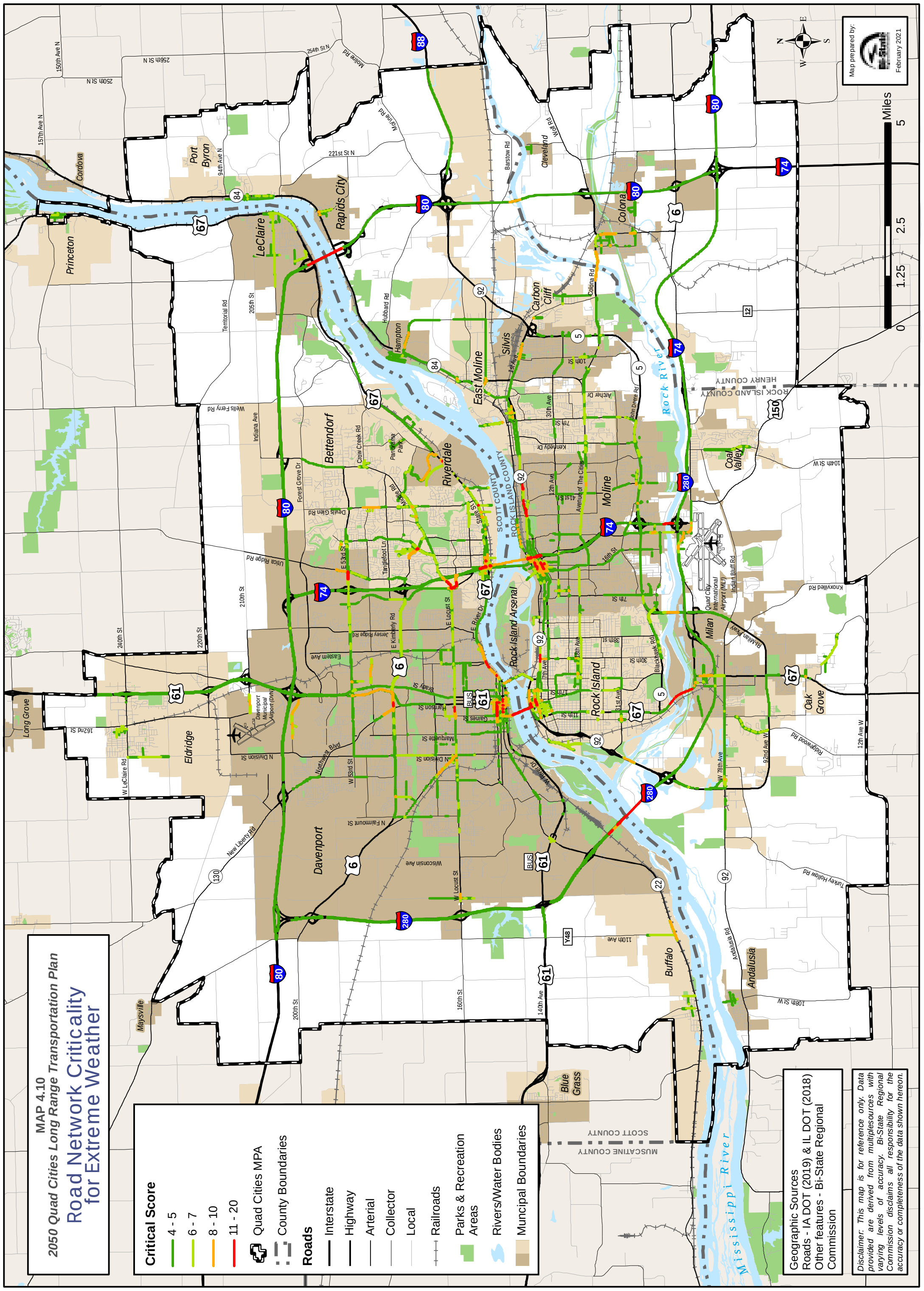
In March 2020, states across the nation took varying steps to limit the spread of COVID-19. In Iowa and Illinois, stay-at-home guidance or directives halted significant travel except for essential activities. At the writing of this plan, the metro area is within one year of the disruption and continues to see limitations on economic activities and general lifestyle activities. As noted in Chapter 5, transit and air travel have seen significant impacts from 40-60% reductions in ridership and enplanements. COVID-19 has impacted passenger vehicle travel nationally and observed statewide in Iowa and Illinois. Interstate travel with goods movement has seen the least impact. However, the full extent of the pandemic on travel is still under review. It is anticipated that once social distancing is no longer needed for prevention, the demand for travel will resume. It is uncertain with the shift to remote work whether employees will be returning to workplaces as regularly as they had before.

Extreme Weather

The FAST Act included resilience as an emphasis area. The nation has experienced 6 annual billion-dollar weather related disasters since 2008, as reported by the National Weather Service (NWS) in the side-bar. NWS promotes a weather-ready nation, and hazard mitigation planning within the MPO will compliment efforts to be prepared for transportation disruptors. Bi-State Regional Commission was one of eleven FHWA-sponsored pilot projects to examine extreme weather vulnerability as it relates to transportation.

The 2020 *Quad Cities Extreme Weather Resilience Report* identified critical facilities and road assets that were vulnerable to specific weather occurrences, derived from state and local stakeholders input, including precipitation resulting in flooding, extreme temperature, ice and snow, wind, and other weather, such as fog. Map 4.10 illustrates the areas of the transportation network that represent critical locations where extreme weather events could pose disruptions. Map 4.10 is based on weighted multi-variate criterion that includes high traffic corridors, transit routes, proximity to critical facilities (such as public works and emergency/medical facilities), and major employers. The 2020 report details how extreme weather events at vulnerable transportation locations intersect with the critical facilities in Map 4.10. The resilience report has been drafted, and final publication is expected in the 2nd quarter of 2021, where it will be posted to the Bi-State Regional Commission website.

Map 4.10 – Road Network Criticality for Extreme Weather



Maintenance and Operations Tomorrow

As noted in this chapter, maintenance and operations are important considerations in the future road network. Investing in roads that are classified in fair pavement condition will help reduce maintenance costs and sustain a better level of service on the road network. Pavement preservation techniques help prolong the roads. According to the For Pavement Preservation (FP^2) trade association, for every $1 spent on pavement preservation, $6-10 in costs are eliminated or delayed on future rehabilitation and reconstruction. Fixing the worst first can often cause preventative maintenance work to be neglected and can lead to deterioration of the road network. According to FHWA, pavement preservation is the culmination of all activities implemented to provide and maintain serviceable roads.

While specific maintenance projects are not spelled out in this plan, it will be up to the state and local jurisdictions to develop their respective priorities in the short- and long-terms. Map 4.6 highlights road surface conditions at a point in time. The on-going need to collect pavement condition information will help support better decision-making. In the Iowa Quad Cities, pavement data is collected with assistance at the state level for local roads. However, pavement data in the Illinois Quad Cities is collected by the local jurisdictions. As part of the future planning process, there is interest in more uniform pavement data for the entire metro area. As noted, giving priority to pavement in fair condition through a preventative maintenance program will allow more dollars to be used to serve a greater number of roads. Of course, failing roads or those in poor condition will require attention. Proactive preservation initiatives will lead to improved pavement performance, safer roads, higher user satisfaction, and reduced overall life-cycle costs. *(FHWA Resource Center, Pavement Preservation Concepts and Techniques.)*

Best practices to enhance the area's existing road system through improved traffic operations noted by FHWA include access management, traveler information technologies, work zone management, signal and speed management, and incident management. Traffic demands management improves system reliability and safety, and allows for choices. The Congestion Management Process report is an addendum to this plan. Crashes and work zones are the greatest cause of congestion in the Quad Cities. Working to reduce incidents and manage work zones will result in better, more reliable travel in the metro area. FHWA has extensive resources on planning for operations, and the effort is consistent with the transportation objectives of this plan.

Additionally, the Quad Cities MPO maintains the *Bi-State Regional Intelligent Transportation System (ITS) Architecture Plan* that emphasizes providing information technologies and data collection within key corridors, such as the interstate systems and specifically the I-74 corridor, to aid traffic operations. The area is served by a fiber optic loop that provides an opportunity for enhanced communications for both safety and security. As on-board vehicle technologies see greater deployment, the ITS network will need to adapt to manage information, relay information, and provide traveler information to enhance system reliability and mobility in the metro area.

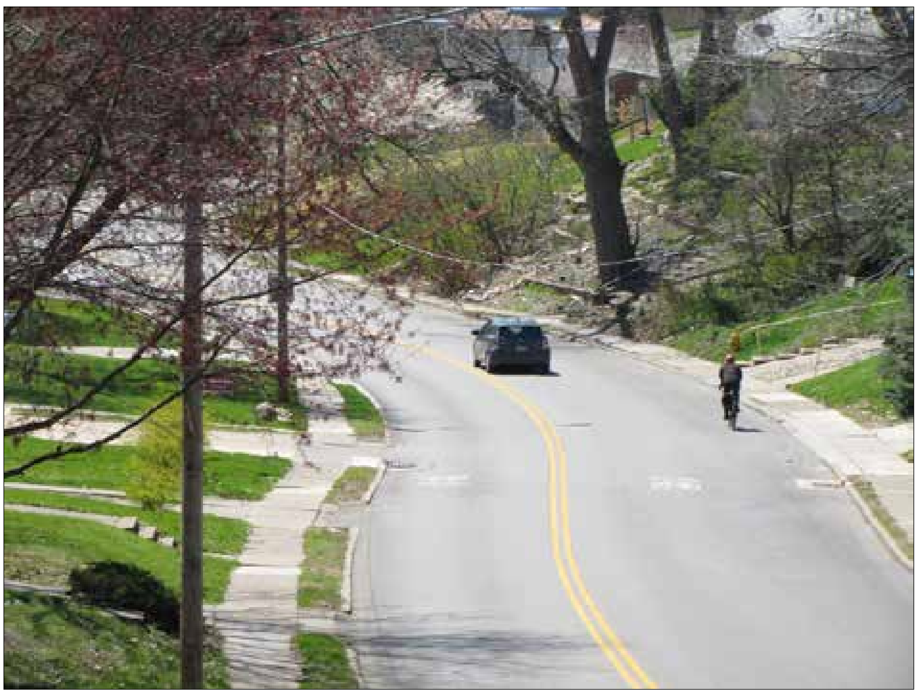
Complete Streets

The Quad Cities Urbanized Area Transportation Policy Committee adopted the Quad Cities MPO Complete Streets Policy on October 28, 2008 as follows:

> "Complete Streets" refers to public right-of-way that is designed for the safety and accessibility of multiple users, regardless of ability. As a standard practice in the Quad Cities MPO, a balanced approach in design and operation of the transportation system within public right-of-way will be taken as feasible, giving consideration to:
>
> - Types of users of the transportation system, including pedestrians, bicyclists, transit users, motor vehicles, and freight interests in design and operation
> - Project surroundings in context with how and who will use the facility to determine what accommodations users will be provided
> - Service levels for all users anticipated by adopted comprehensive or system-wide plans

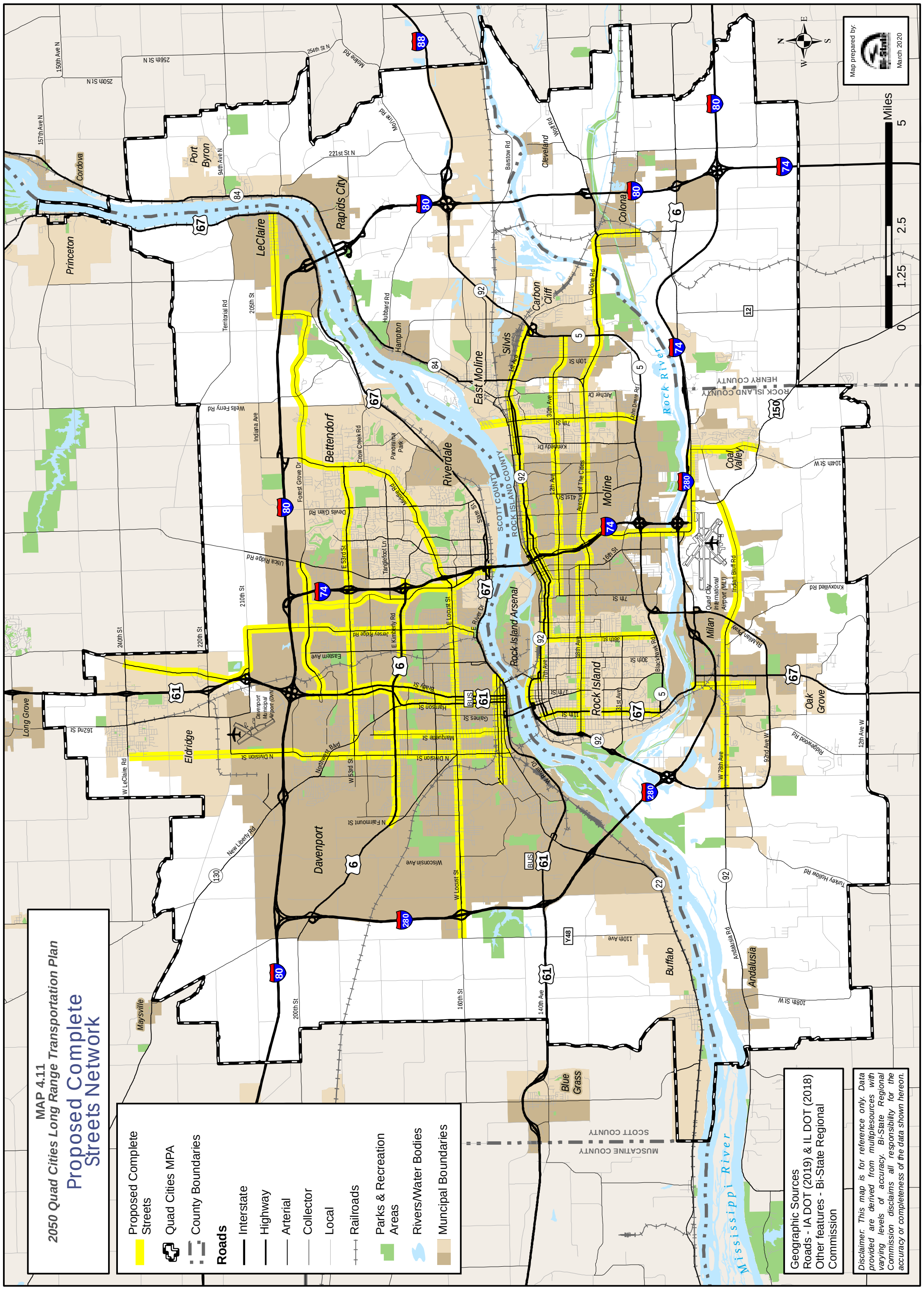
In 2007, the State of Illinois passed Complete Streets legislation; and on June 1, 2010, the Illinois Department of Transportation published its revised bicycles and pedestrian policies to incorporate Complete Streets. The new policies are contained in the Illinois Department of Transportation Bureau of Design and Environment's Manual. Refer to Map 4.11 for the Quad Cities Complete Streets Network. These corridors have been identified to focus Complete Streets features such as sidewalks, bike lanes, transit access, etc.

Figure 4.11 – Complete Streets Example, Jersey Ridge Road, Davenport



Source: Bi-State Regional Commission

Map 4.11 – Proposed Complete Streets Network



Travel Demand Modeling for Transportation Planning

Travel Demand Modeling (TDM) is a tool used to quantify the amount of traffic on the future road network. In the TDM, a road network of streets and highways was created to represent the connection between urban activities and land uses within the planning area. This network, developed from Geographic Information System (GIS) files maintained by Iowa and Illinois DOTs, includes all freeways, freeway ramps, arterials, collectors, and some local roads needed for system connectivity. Zone connector links were also added to conceptually represent traffic loadings from traffic analysis zones.

Traffic Analysis Zones for Urban Activity

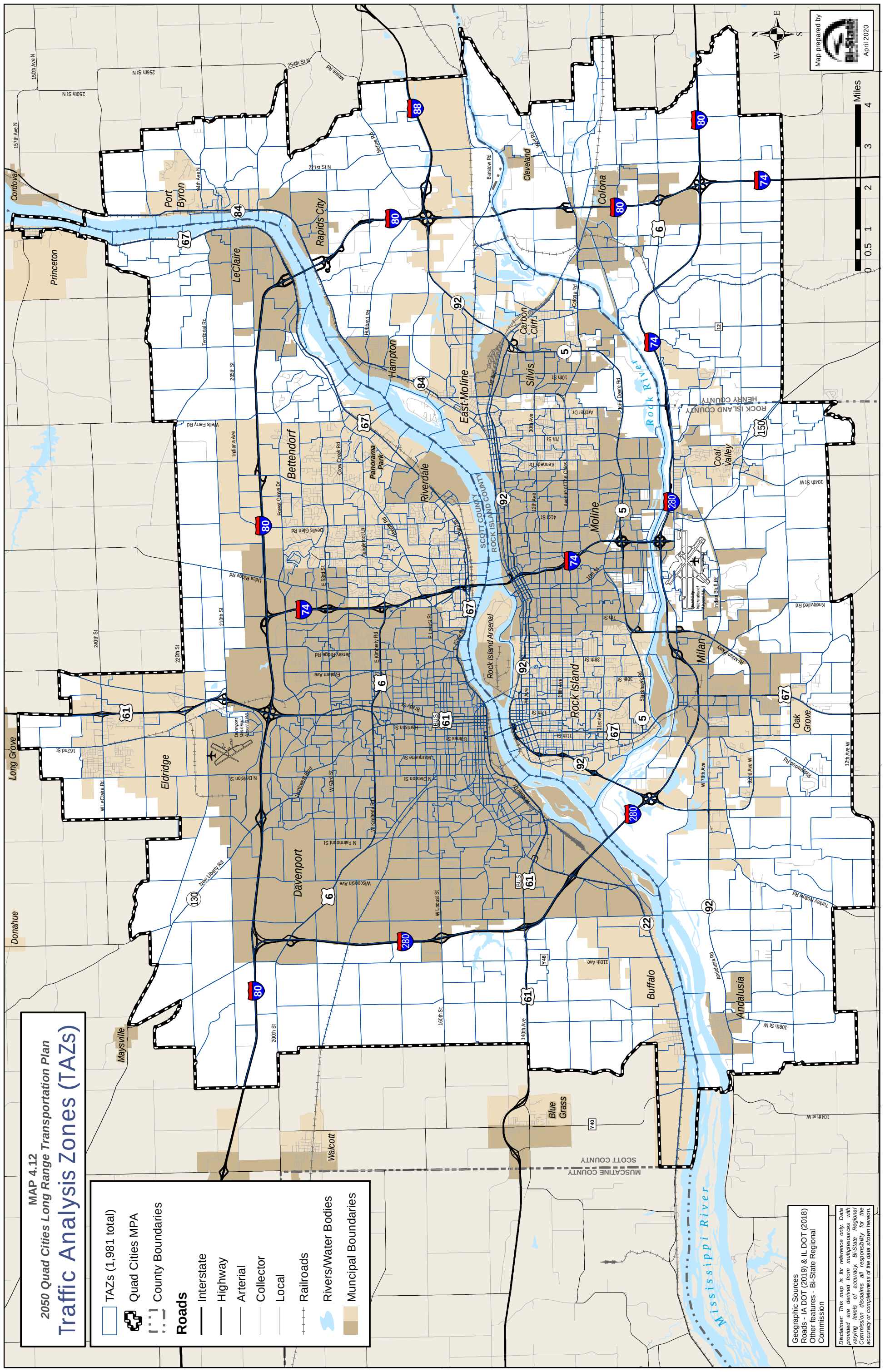
Urban activities are located in traffic analysis zones (TAZs). A TAZ, in an ideal setting, is a portion of the planning area delineating similar or homogeneous land use and travel purposes. The original TAZs for the planning area were developed in cooperation with the Iowa DOT who utilized a mainframe computer software package, PLANPAC, to conduct the planning area's travel demand forecasting prior to 1992. The Census 2000 Traffic Analysis Zones program was initiated in 1998, completed in 2000, and provided the basic geography for the travel demand model. TAZs had been refined since then to reflect a change in urban activity and land use and align with the 2010 Census geographies. As part of that process, the number of TAZs was increased to 881 for refinement of the model output.

With the adoption of Iowa Standardized Model Structure (ISMS) in 2020, Bi-State Regional Commission has switched to a parcel-based TAZ system and land use data categories. In this process, refined TAZ boundaries following parcel land areas resulted in additional TAZs. There are 1,982 internal and 88 external, for a total of 2,070 TAZs for the 2050 travel demand model (TDM). Map 4.12 illustrates the MPA boundary and TAZ geography for the Quad Cities.

The travel demand on the Quad Cities road network is defined by the urban activity, such as housing and business. The travel supply is represented by the service provided by this road network. The travel demand forecasting process is a four-step process, including trip generation, trip distribution, modal split, and trip assignment.

The Quad Cities model applies mode shares by trip type rather than a full-blown mode split model. This approach accounts for trips by modes of trip-making, such as transit, bicycling, or walking, that are removed to generate motorized person trips. Further explanation of each component follows in the "Development and Calibration of Travel Demand Model" section of this chapter. Forecasting transit trips in this plan employed a different methodology from travel demand modeling due to the type of travel model being utilized. Transit ridership forecasting information is in Chapter 5, Figure 5.4.

Map 4.12 – Traffic Analysis Zones (TAZs)



Travel Demand Modeling Process

TransCAD is a travel demand model software package utilized to conduct the current travel demand forecasting process. In 2020, Bi-State Regional Commission adopted TransCAD under the Iowa Standard Model Structure (ISMS), and technical assistance from Iowa DOT. This new modeling methodology allows for quantitative analyses of land use and road network scenarios in regard to level of traffic in the region. With the ISMS enhanced model interface, in-house modeling allows more opportunities to refine the road network and conduct alternatives analyses. It is one tool that can help evaluate and plan for future traffic and metropolitan road network improvement needs.

In 2018, Bi-State Regional Commission transitioned to the ISMS for its Travel Demand Model framework. ISMS was created in 2015 by Iowa DOT and its consultants, with inputs from all MPOs involved. ISMS is a modeling platform built on TransCAD with a customized interface. It continues the 4-step modeling processes (Trip Generation, Trip Distribution, Mode Choice/Split, and Traffic Assignment), which use existing and forecasted socio-economic data to quantify the travel activity for the planning area.

The model generates trips by TAZ, distributes these trips between TAZs, splits the trips into different modes, and assigns the vehicular trips to the road network with an equilibrium algorithm. The equilibrium assignment, using trip tables and traffic volumes, is constrained by the capacity of the streets or the maximum number of vehicles that can pass over a given section of road. Traffic is loaded onto the streets by the model in an iterative manner, until an equilibrium is reached with optimized travel time for all trips in the network. Details on the model can be found in the *Travel Demand Model Documentation Report*, and addendum of this plan.

Model Input Data

A major makeover with this latest ISMS model upgrade is the land use data format. ISMS requires the input of land use data to be parcel-based. That is a departure from prior Census geographical delineation of TAZs. The benefit of parcel-based data is much finer categories of land use information from local municipalities, both for base year and future years. As a result of this change, Bi-State staff has increased total number of TAZs from 881 to 2,070 and improved the representation of the MPA land uses and transportation network. The planning horizon year is 2050, with 2030 as an intermediate year for analysis purposes.

The model is a useful tool to predict traffic and help determine the effects of future project choices. Travel demand forecasting predicts the amount of future travel on the road network based on existing and anticipated social economic features of the planning area. Data on the existing and projected planning area was collected at the parcel level and aggregated to TAZs to predict travel in the planning area. Map 4.12 illustrates the 2,070 TAZs in the MPA.

A fundamental component of the travel demand forecasting process is determining where people live and where they work, both in the present and future. A base year of 2015 was used to calibrate the travel demand model for base year conditions, while future years 2030 and 2050 data were used to predict future traffic patterns. Calibration is the process of applying and adjusting the model parameters, so the model can closely approximate the traffic in the base year.

Table 4.12 summarizes the MPA Travel Demand Model Data used to predict trips. The reference to high and low projections for population and employment are generally described in Figures 1.19 and 1.20 in Chapter 1. These projections (raw numbers) in Table 4.12 frame the TAZ or zonal level projections derived from local officials that were to fall in between these figures and provide a "reasonable" forecast for population and employment.

Table 4.12 Parcel-Derived Population and Employment Projections and Limits

Planning Area Demographic Data	Projection	Base Year 2015 Total	Horizon Year 2030 Total	Horizon Year 2050 Total
Population	High	310,196	333,330	372,718
	Model	**310,196**	**330,000**	**350,000**
	Low	306,546	305,169	303,344
Employment	High	191,814	210,448	238,139
	Model	**192,784**	**206,481**	**218,995**
	Low	191,814	187,262	181,360

Source: U.S. Census Bureau, decennial censuses 1970-2015, and Bi-State Regional Commission 2020 for population, and InfoGroup, 2020 local sources, Woods & Poole Economics, Inc. and Bi-State Regional Commission 2020 for employment.

Using the parcel-based data from 2015 for the Quad Cities MPA, allocations were made to individual Traffic Analysis Zones (TAZs) for land use then converted to population and employment based on residential housing units and land use development codes. TAZs vary in size by the density or nature of the urban land use that they encompass. As noted above, the TAZs in this report were created to analyze traffic flow on the major streets in the MPA. A model documentation report will follow the adoption of the plan to document the detail used in the modeling process.

Land Use Data

ISMS model input is entirely different than the prior model input directly from Census and employment information. ISMS land use data starts from the land use parcel data that local governments use for zoning and tax purposes. Because of the nature of parcel data, it is more detailed and accurate to be used as input to the travel demand model. Number of existing and future housing units for residential parcels, and square footage of non-residential existing and future structures within the parcels are identified.

Furthermore, parcel data is coded into more than 70 land use codes (following) and grouped into nine categories for the purpose of trip generation step of the travel demand model. The nine categories that represent the characteristics of land use are shown in the side-bar.

Other Model Data Input

In addition to housing units and non-residential structure utilization, additional socio-economic data and other transportation data is needed to run the model. Other zonal level socio-economic data include the following: number of households by household size, number of auto availability, school enrollment, time-of-day/weekday-weekend trip split, and activity by special generators. The households by household size and auto availability are derived from the Census Transportation Planning Package (CTPP), which was applied to the prior 2045 Quad Cities travel demand model. School enrollment is determined from each school district. A special generator is defined by the FHWA Model Validation and Reasonableness Checking Manual as a major land use where standard trip generation and distribution models are not expected to provide reliable estimate of travel patterns. The employment for special generators is derived from Infogroup and applied to such locations as the Quad City International Airport and area casinos, as examples. The 2013-14 Quad Cities Household Travel Survey was used to develop trip attraction rates and verify average trip lengths, district-to-district trips, intra-zonal trips, time-of-day factors, directional factors, and vehicle trip percentages. External travel was derived from the Iowa DOT statewide travel model and 88 external stations where roads cross the Bi-State planning area boundary, and average daily traffic was available through the Illinois and Iowa DOTs.

The prior Bi-State model road network is updated with latest completed projects, as well as future planned projects marked for planned year of completion. The road network is represented as "links' in the model and coded with attributes such as number of lanes; direction; area type, such as Central Business District (CBD); base year traffic counts, capacity; posted speeds; turn penalty codes; and functional classification. Traffic counts were obtained from the Iowa and Illinois DOTs.

Land Use Code Categories

- 10-12, Single family residential
- 20 -28, Multifamily and special residential
- 30-39, Industrial
- 40-45, Transportation
- 50-59, Commercial
- 60-69, Office, service
- 70-79, Institutional
- 80-89, Educational
- 90-99, Low intensity

Land Use Code Categories

- 10-12, Single family residential
- 20 -28, Multifamily and special residential
- 30-39, Industrial
- 40-45, Transportation
- 50-59, Commercial
- 60-69, Office, service
- 70-79, Institutional
- 80-89, Educational
- 90-99, Low intensity

Future Years Data

Future year land use data was collected by working with local governments for potential parcel level land use changes and growth. Specifically, horizon year 2030 or 2050 was indicated for each parcel land use.

For new housing units within the parcels, a downward adjustment of 64% of full build-out was applied during the process of projecting future year 2030 and 2050 population growth in the planning area. as shown in Table 4.12. The socio-economic data variables described in Table 4.12 were used in forecasting the travel demand for 2030 and 2050. These years were selected as the mid-term and long-term horizon periods for review and evaluation. The parcel land use data was once again aggregated to TAZs that provided the building blocks or variables necessary to forecast future traffic. Model forecasts were developed based on past, observed trends, and demographic projections as a framework, and with input for future growth/decline from community planners, engineers, and public officials in the planning area.

To frame community travel model data input for reasonableness, the 2030 and 2050 forecasts were prepared for population and employment (by place of work) within the MPA boundary. Scenarios for slow growth and fast growth were used to limit community-derived zonal forecasts. The community-derived forecasts fell between the low and high forecasts and represent what is foreseen today to be a reasonable expectation of future population and employment. Housing was used to predict future population as persons per housing unit. Housing units were not forecasted on its own as a framing variable. Conversations were held with city and county officials to discuss comprehensive land use plans, near-term, and future developments for both residential and commercial/industrial land uses. Map 1.7 in Chapter 1 illustrates future land use discussed with planners, engineers, and other officials and added or deleted development by TAZ. The summation of the TAZs by population and employment derived from future land is shown in Table 4.12. For a full summary on population and employment projections, refer to the travel model documentation report as an addendum to this plan.

Implementation and Calibration of Travel Demand Model

For the Quad Cities' ISMS model, the travel demand forecasting process includes three primary steps, one of which is trip generation. Trip generation quantifies the number of trips to be made at each TAZ in the planning area based on land use types and its intensity. Trip generation is composed of two parts – trip productions and trip attractions that refer to residential and non-residential trip ends, respectively. The production points and the attraction points are called trip ends. One trip is made up of two trip ends, a production, and an attraction.

To use a mathematical model for future regional travel demand forecasting, trip generation, trip distribution, and trip assignment procedures must closely represent the planning area trip characteristics in the base year. As noted, Year 2015 was the base year for model calibration purposes. Base year traffic counts from 2015, or those available closest to 2015, were used as the basis for calibration.

Trip Generation

Trip generation rates were tabulated from the Quad Cities Household Travel Survey. Table 4.13 lists the production (residential) trip rates by trip purpose, household size, and vehicle ownership. Table 4.14 lists the trip attraction (non-residential) rates by trip purposes used in the model.

Table 4.13– Quad Cities MPA Production Trip Rates

	Household Size	Number of Vehicles			
Residential Trip Purpose		0	1	2	3+
Work	1	0.28	0.83	1.03	1.49
Work	2	0.28	1.02	2.01	2.75
Work	3+	0.28	1.10	3.18	5.10
School	1	0.00	0.00	0.00	0.00
School	2	0.00	0.01	0.01	0.01
School	3+	2.58	2.60	2.60	2.60
Shopping	1	0.55	1.08	1.04	1.10
Shopping	2	0.53	1.98	1.79	1.87
Shopping	3+	1.33	2.37	2.07	2.22
Social-Recreation	1	0.39	0.87	0.96	0.92

Table 4.13 (Continued)

	Household Size	Number of Vehicles			
Social-Recreation	2	0.39	1.70	1.78	1.68
Social-Recreation	3+	1.05	2.22	2.34	2.18
Other	1	0.13	0.36	0.47	0.48
Other	2	0.14	0.74	0.90	0.91
Other	3+	1.11	2.45	2.70	2.71
Non-Home Based	1	1.40	1.40	1.54	1.86
Non-Home Based	2	0.96	2.95	3.35	3.49
Non-Home Based	3+	5.03	5.03	5.42	5.42

Source: *Quad Cities Household Travel Survey 2013-2014 and trip rates developed by HNTB 2015*

Table 4.14 – Quad Cities MPA Attraction Trip Rates

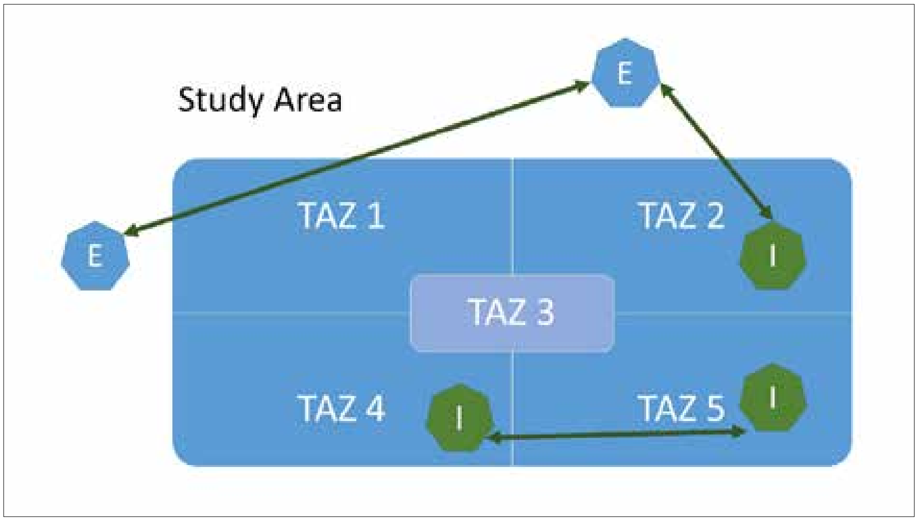
Purpose	Industrial	Other	Retail	Casino	K-12	College	Households
Work	1.07	1.14	0.76	1.10	0.41	0.85	0.06
School	0.00	0.00	0.00	0.00	1.87	0.00	0.00
Shop	0.14	0.76	4.17	0.00	0.07	0.00	0.07
Social-Rec-reation	0.05	1.12	0.20	7.70	0.21	0.15	0.30
Other	0.09	0.34	0.20	0.00	1.23	1.08	0.13
Non-Home	0.43	1.20	3.28	2.60	0.78	0.28	0.31
Commercial	0.34	0.08	0.32	0.30	0.01	0.01	0.07

Source: *Quad Cities Household Travel Survey 2013-2014 and trip rates developed by HNTB 2015*

The trip generation rates were the starting points as the model was converted into the ISMS platform. Further breakdowns of these trip rates were made to reflect low, medium, and high income levels, as well as additional attraction points such as hospitals, hotels, and airports. Lastly, trip rates were differentiated by weekday trips and weekend trips, based also on the findings from the aforementioned household travel survey.

Trips having at least one end outside the planning area boundary are either called external-internal (E-I) trips (one end is outside the area) or external-external (E-E) trips (both ends are outside the area) (see Figure 4.12). The traffic counts at the 88 external zones (TAZs that cross the planning area boundary) were used as the control totals. The Iowa DOT's statewide model was used to split E-I trips by trip purpose and determine E-E trip flows between external zones.

Figure 4.12 – Trip Types in Relation to the Study Area



Legend:

E – I: External Internal Traffic

I – I: Internal Traffic

E – E: External - External (through) Traffic

Trip Distribution

Following the trip generation process, which estimated the total trips beginning and ending at each TAZ, a distribution model was developed to link the productions with the attractions. The distribution of trips can be reflected in a mathematical equation that compares the relative intensities of each land use to the distance separating them. Figure 4.13 illustrates this relationship, which is called the gravity model.

The friction factor (F_{ij}) is an empirically-derived travel time factor that measures the average area wide effect of spatial separation on trip interchange between zones "i" and "j." It expresses the probability of trip making at each one-minute increment of travel time. The trip distribution calculation was carried out in an iterative manner to bring the model-estimated trip tables into agreement with the observed data. The output is a zone-to-zone origin-destination (O-D) matrix, which was then used for traffic assignment. The average trip length from the household travel survey was 3.9 miles, and the model average trip length was 3.8 miles. Intra-zonal trips represent 4.3% of the trips in the model compared to 4.4% in the survey.

Figure 4.13 – The Gravity Model

$$T_{ij} = P_i \times \left(\frac{A_j \times F_{ij} \times K_{ij}}{\sum_{j=1}^{n} A_j \times F_{ij} \times K_{ij}} \right)$$

Where, i – Origin zone (production)

j – Destination zone (attraction)

Tij – Trip produced in zone i and attracted to zone j

Pi – Trip productions at i

Aj – Trip attractions at j

Fij – Friction Factor, reflecting travel time separation between zones i and j

(Kij) – An optional trip distribution adjustment factor for interchanges between Zone i and Zone j

n – The highest numbered zone in the planning area

Traffic Assignment and Model Validation

The ISMS model used a two class assignment algorithm to carry out the traffic assignment step of the modeling process. Auto and truck trips were loaded onto the road network using the minimum (time/distance) path available through an iterative process. An "equilibrium" assignment uses the capacity constraints on links and calculates the updated minimum (time/distance) path for each iteration until an optimized results was attained. That means for each and every O/D trip, no better route could be found within the set criteria.

A highway network for base year 2015 was loaded with trips. When compared to the base year traffic count data, the model's ability to replicate the actual travel characteristics on the streets can be determined. This step is called model validation. The total model estimated volume is within 5% of traffic counts for all classifications of roads, other than the small number of freeway-to-freeway connectors. Table 4.15 illustrates the level of accuracy by road classification.

Table 4.15 – Quad Cities MPA Travel Model Results by Road Classification

	Number of Counts	VMT		Error		Distribution		FHWA Goal
Facility Type		Estimated	Observed	Difference	Percent	Estimated	Observed	
Freeways	82	1,246,403	1,263,492	-17,089	-1.4%	42%	42%	+/-7%
Principal Arterial	192	637,134	602,885	34,249	5.7%	21%	20%	+/-10%
Minor Arterial	464	618,106	694,036	-75,930	-10.9%	21%	23%	+/-15%
Collector	432	319,959	326,521	-6,563	-2.0%	11%	11%	+/-20%
Ramps	120	177,186	156,419	20,767	13.3%	6%	5%	N/A
All Classes	**1,290**	**2,998,787**	**3,043,353**	**-44,565**	**-1.5%**	**100%**	**100%**	

Source: Bi-State Regional Commission, February 2021

Table 4.16 summarizes model accuracy by each side of the Mississippi River, as well as for all bridge crossings. It shows model estimates and counts across the planning area well within the range expected.

Table 4.16 – Quad Cities Travel Model Results by Area Type

	Number of Counts	VMT		Error		Distribution	
Area Type		Estimated	Observed	Difference	Percent	Estimated	Observed
Iowa	629	1,793,264	1,837,581	-44,317	-2.4%	60%	60%
Illinois	654	1,057,859	1,063,482	-5,623	-0.5%	35%	35%
Bridge	7	147,665	142,290	5,375	3.8%	5%	5%
Total	**1,290**	**2,998,787**	**3,043,353**	**-44,565**	**-1.5%**	**100%**	**100%**

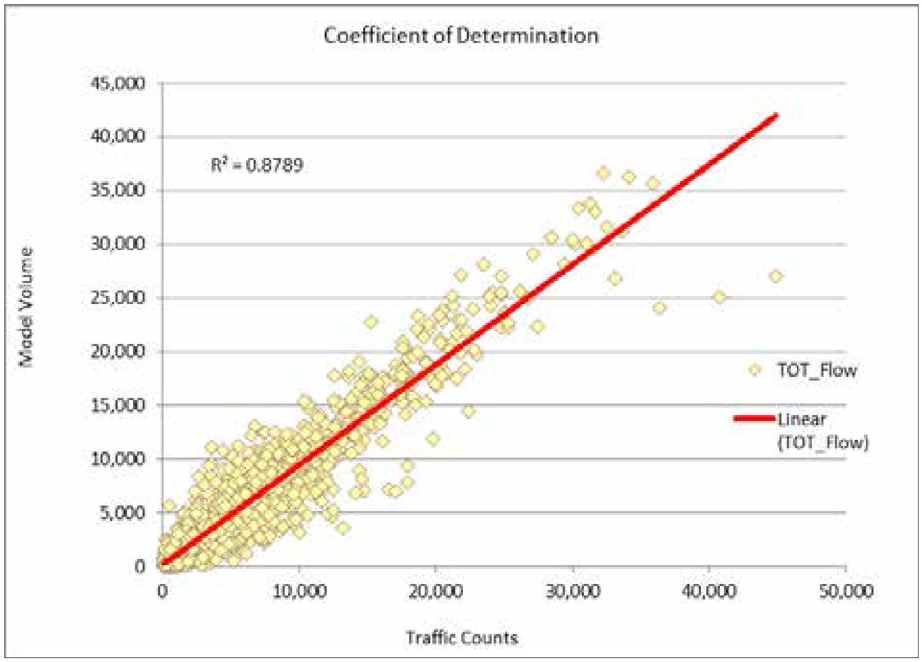
No travel demand model can replicate actual traffic counts with one hundred percent accuracy. The volume difference errors reported in Table 4.16 are well within Federal Highway Administration guidelines (1990), which suggests the following acceptable range of error for each functional classification:

- Interstate Freeway ± 7%
- Major arterial ± 10%
- Minor arterial ± 15%
- Collector ± 20%

It should be noted that during the calibration process, special attention was devoted to Mississippi River screenline. It divides the region approximately in half, with five bridges as the sole linkage of the two parts.

One overall check of the model is via a scatterplot in Figure 4.14. It looks at model estimated traffic at all points where base year 2015 traffic counts are present.

Figure 4.14 – Model vs. Traffic Counts (Scatterplot)



In conclusion, the comparison of model estimated trips and traffic with the field traffic counts for the planning area confirms that the Quad Cities MPO Travel Demand Model closely replicated the 2015 Base Year condition. Therefore, the travel demand model structure along with its parameters can be applied to estimate future traffic in the planning area.

Network Improvements Model Analysis

In addition to maintaining the existing network, this plan considers what is needed to expand roadway capacity through 2050. The future road system is presented in general terms related to corridor improvements. Chapter 3 of this plan outlines future road improvements based on the area's ability to afford projects, specifically those that increase capacity of the road network. Costs and projected revenues are also described in that chapter.

The travel demand model was used to look at projects that affect the network capacity. Local jurisdictions provided a list of all capacity enhancing or expansion projects that they wished to see completed by 2050. The travel demand model analysis looked at the scenarios in the following table.

2050 Road Network

Alternatives analyses for the road network were conducted. This analysis is one tool used by local and state jurisdictions to determine a future road network. In addition, road capacity, pavement condition, crash history, and extreme weather criticality are other elements, as well as funding availability. Alternatives analysis identifies existing and future congested road segments. Projects are proposed and refined, based on these findings, to address the congested and critical corridors within the road network. The calibrated model can demonstrate 24-hour traffic volumes, traffic volume over capacity (V/C) ratios, and/or vehicle miles over hours traveled (VMT/VHT) ratios for this analysis. The regional model uses time-of-day and directional factors to represent peak hour and off-peak congestion; V/C ratio summaries illustrate the highest congestion levels during the day.

The analysis is outlined in Table 4.17 for the 2015 base year, no build scenario, full build scenario if all desired projects were constructed, and fiscally constrained scenario of projects that can reasonably be expected to be funded in the future. Map 4.13 illustrates the base year 2015 network as an existing, no-build condition with morning peak hour traffic. Maps 4.14 and 4.15 show the area no-build scenario for 2030 and 2050 during morning peak hour traffic. This means if nothing is done to increase the capacity or expand any roads, the roads shown in red would experience congestion. The red symbols demonstrate areas where the volume to capacity (V/C) ratio is equal to or greater than 1.01 or considered poor Level of Service (LOS). This means that the roadway segment has virtually reached the level of traffic that it can safely handle (capacity) and is failing to handle traffic in the manner it was designed. The orange symbols indicate areas where the V/C ratio is equal to or greater than 0.81 or greater or less than 1.01. This means the traffic on the segment is at its capacity, and congestion is becoming a problem. The yellow symbols indicate areas where the V/C ratio is between 0.71-0.90 and nearing capacity. The green symbols illustrate segments with V/C ratios less that 0.71; thus, these segments did not demonstrate a capacity problem on average over a 24-hour period. Without any new projects, the travel demand model identifies capacity problems beginning to occur in some areas of the MPA at the bridges and along I-74 (pre-final construction of the improvements) and I-80.

Table 4.17 – Travel Demand Model Scenarios Analysis

Projects Network	TAZ SE Data			Notes
	2015	2030	2050	
2015 Network	X		X	No Build with 2050 Socio-Economic Data
2015/TIP Committed		X	X	Only Projects in TIP
2030 Constrained		X	X	Projects in Fiscal Constraint Table 3.3 (2021-2030)
2050 Constrained			X	Projects in Fiscal Constraint Table 3.3 (2031-2050)
2030 Unconstrained		X		Projects in Fiscal Constraint (2021-2030) - All projects
2050 Unconstrained			X	Projects in Fiscal Constraint (2031-2050)- All projects
State Only 2030 & 2050			X	Projects in Table 3.4 - All years - All State Projects

Maps 4.16 and 4.17 demonstrate 2030 and 2050 morning peak hour traffic, respectively, by V/C on both the 2030 and 2050 unconstrained road network or full build scenario. The unconstrained scenarios represent all capacity enhancing or expansion projects desired by the local jurisdictions, as well as the state capacity enhancing or expansion projects. Capacity enhancing or expansion projects were defined as those projects that would require right-of-way, add travel lanes or change the direction of the traffic flow in some way for the purpose of travel demand modeling. From these maps, the model indicates very few locations with V/C 0.91 or greater. Map 4.18 show projects

in the unconstrained (full-build) by horizon year 2030 and 2050 by local and state projects.

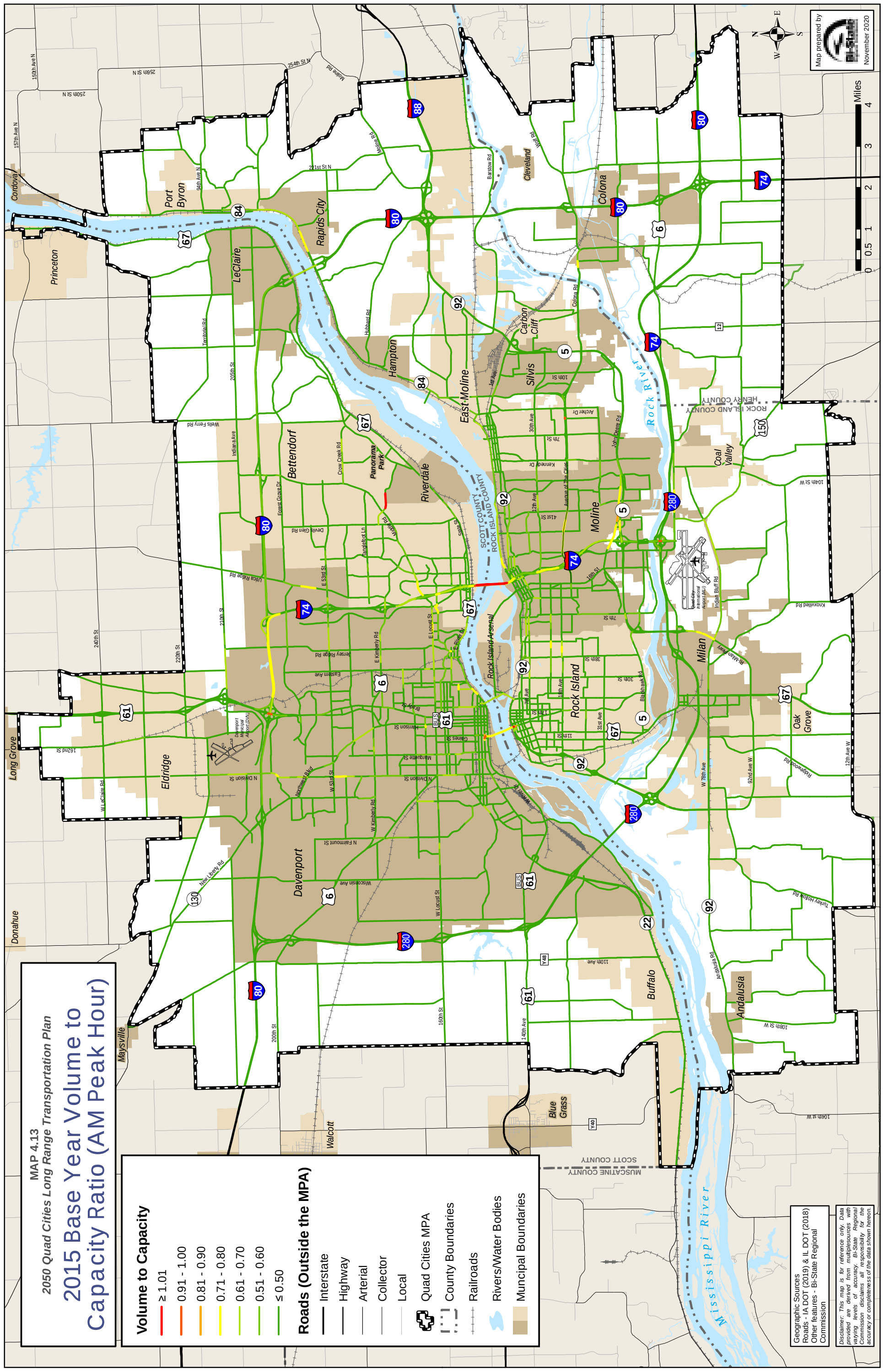
Projects from the unconstrained scenario analysis were evaluated, refined, and/or proposed to address the congested areas, as well as other existing conditions such as capacity, pavement condition, crashes and extreme weather criticality. The results of evaluating short-term (2021-2030) and long-term (2031-2050) projects on the network and their impact on the capacity of the road system are shown in Maps 4.19 and 4.20, respectively. These maps represent the fiscally-constrained network of projects with a reasonable expectation of funding being available to accomplish them. In some locations, such as I-80 at I-74 interchange, there may be a need to examine the travel demand further. Map 4.21 shows the fiscally constrained projects resulting from this process noted above for 2030 and 2050, differentiating between state and local projects.

In reviewing the respective maps, some of the improvements appear to reduce congested areas, while others provide alternative routing via new roads. In addition, not all congestion concerns could be addressed for various reasons through road capacity expansion, but may be addressed using alternatives as part of the metro area's Congestion Management Process.

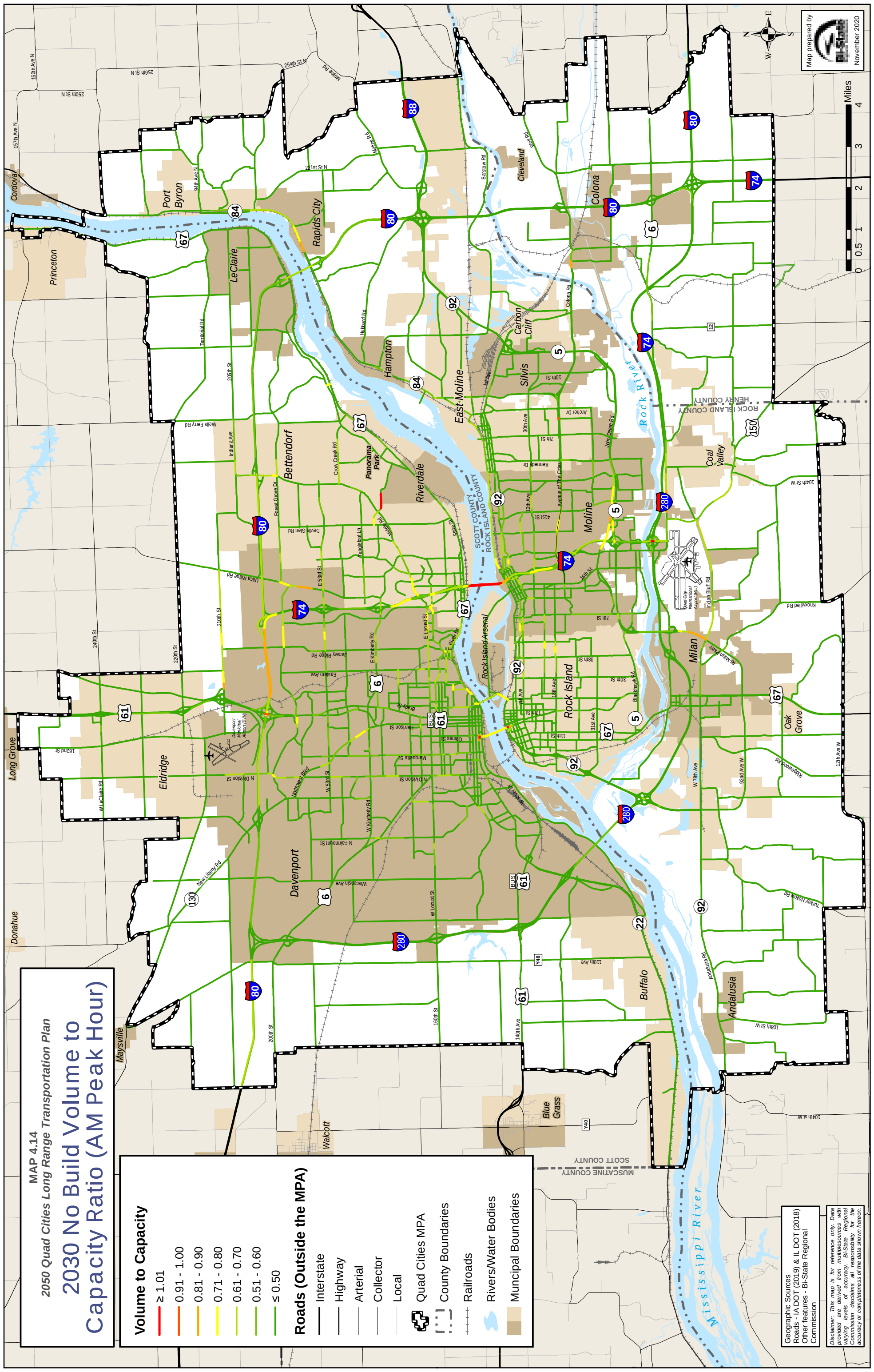
As a result of changing demographics, a few new congested locations were created that may need further study in the future. In addition, there may be a few locations where the Federal Functional Classification (FFC) should be reconsidered to reflect improvements in the connectivity of the road network. This type of change would affect the results of the V/C analysis.

Maps 4.22 and 4.23 and their respective insets illustrate the projected daily traffic volumes for the 2030 and 2050 fiscally constrained network, showing where the higher volume traffic will be on the future road network. They are also viewable on an interactive mapping portal using a QR code on each map. As the plan is reevaluated, amended, and/or updated in the future, these issues of capacity and traffic can be further studied as part of the project development process, moving from long-range planning to implementation.

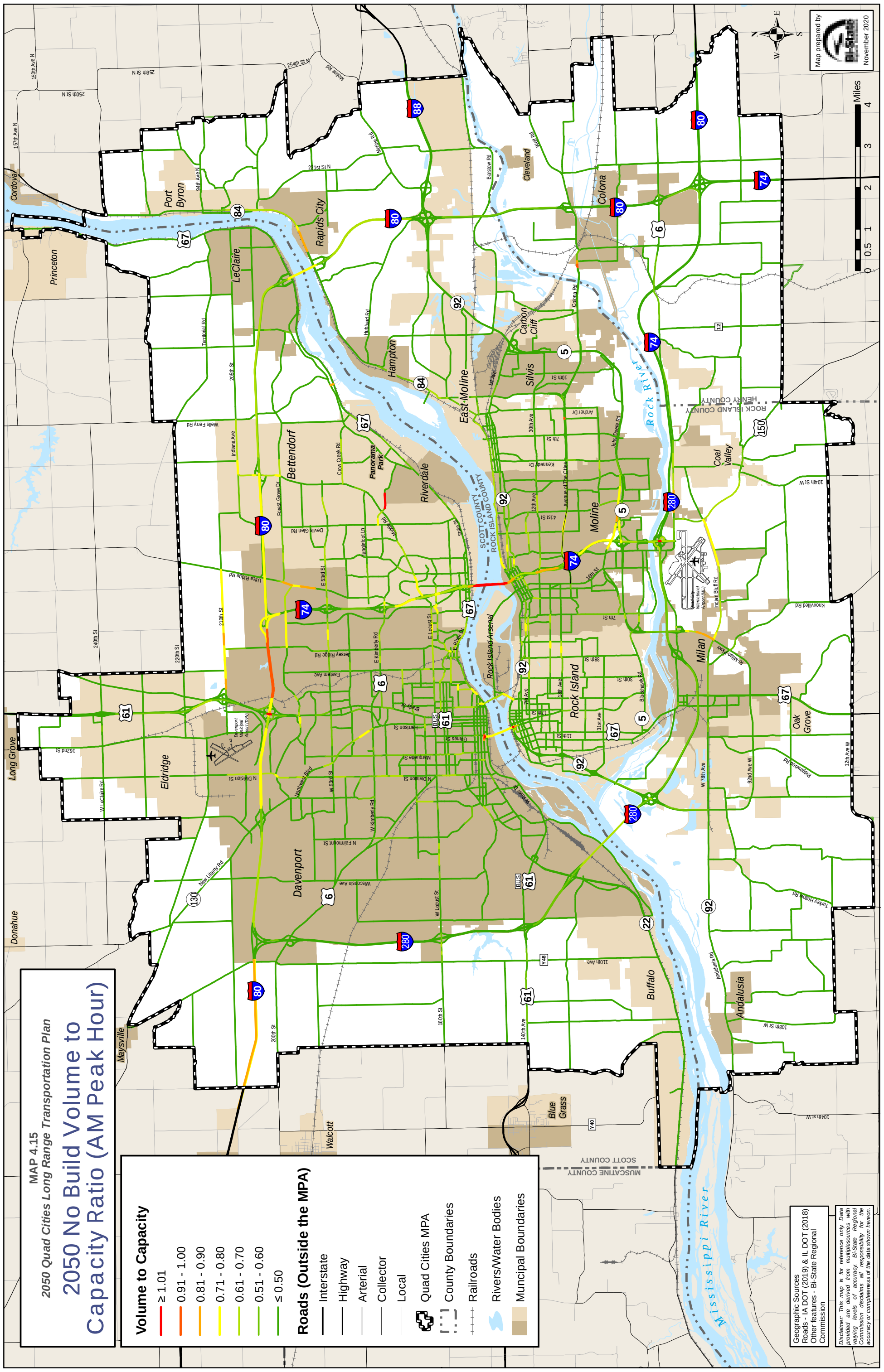
Map 4.13 – 2015 Base Year Volume to Capacity Ratio (AM Peak Hour)



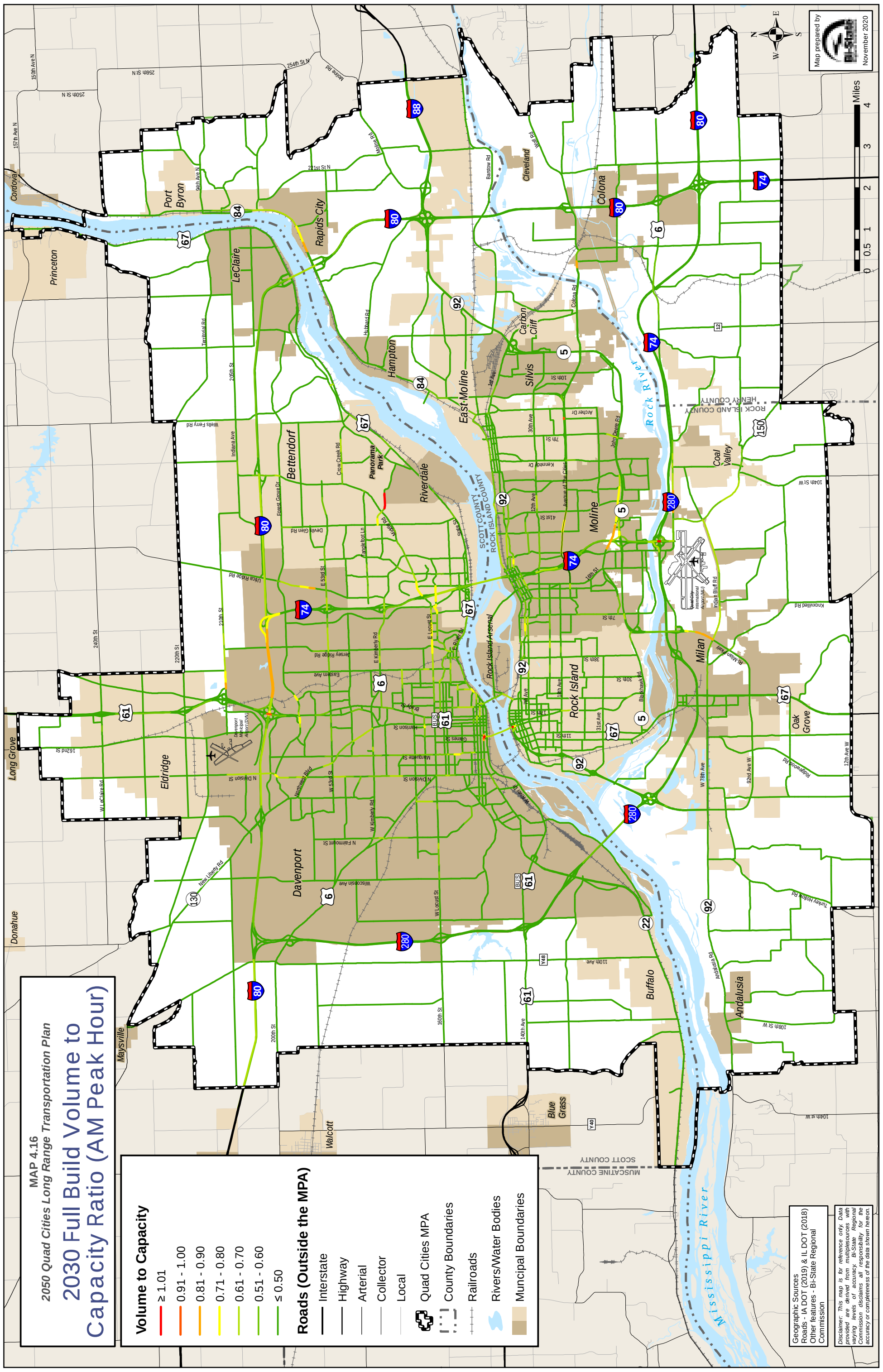
Map 4.14 – 2030 No Build Volume to Capacity Ratio (AM Peak Hour)



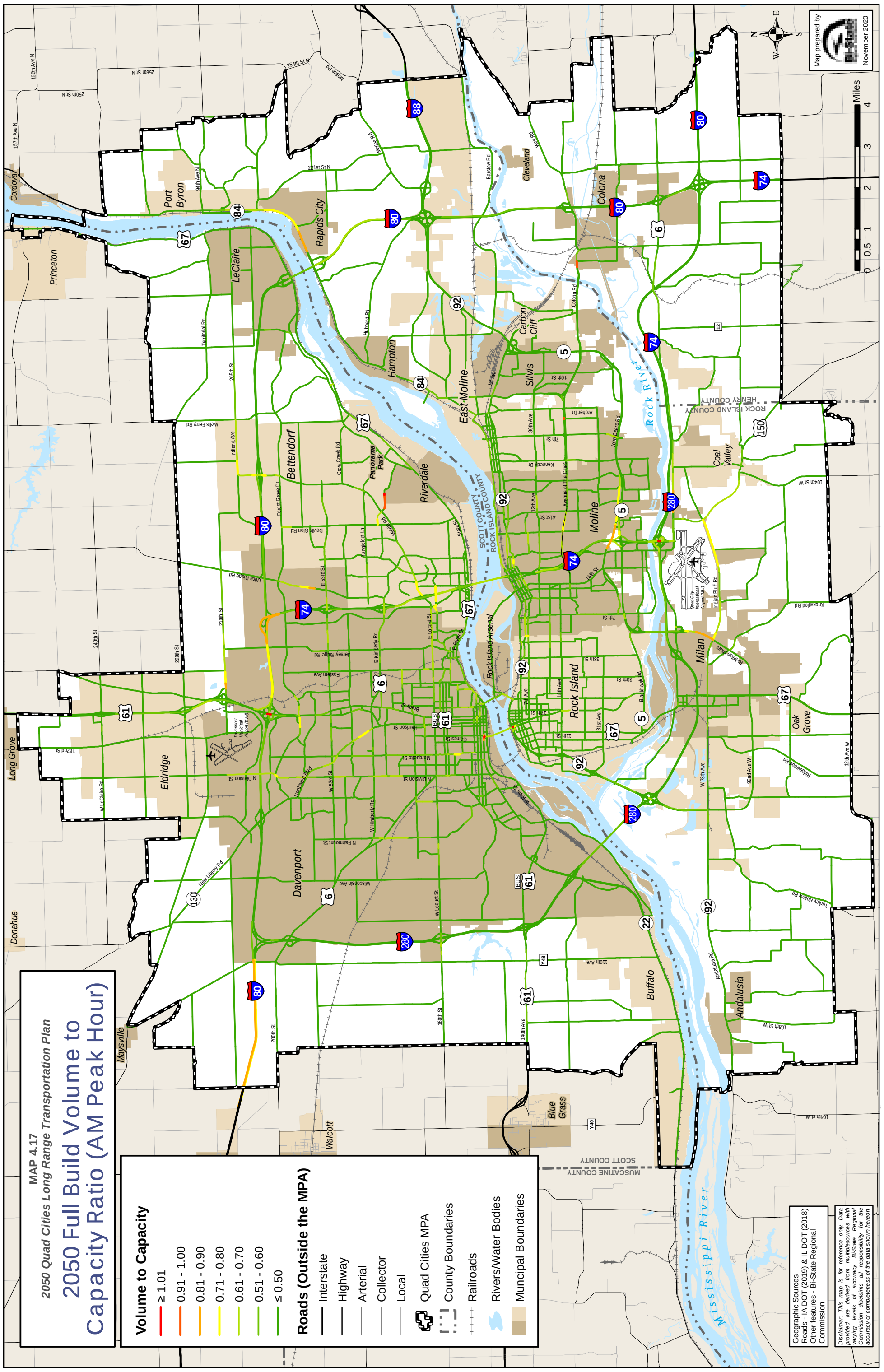
Map 4.15 – 2050 No Build Volume to Capacity Ratio (AM Peak Hour)



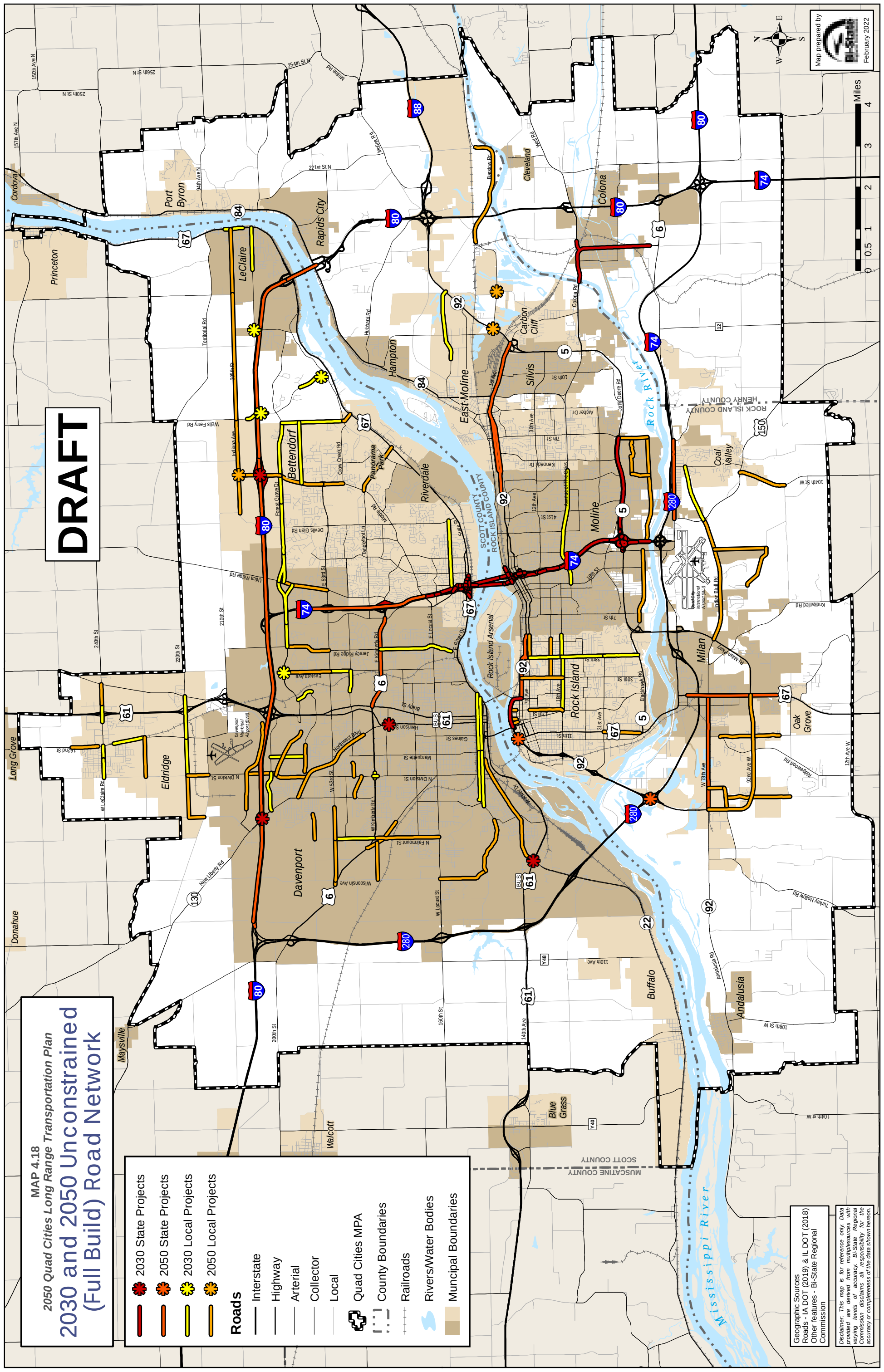
Map 4.16 – 2030 Full Build Volume to Capacity Ratio (AM Peak Hour)



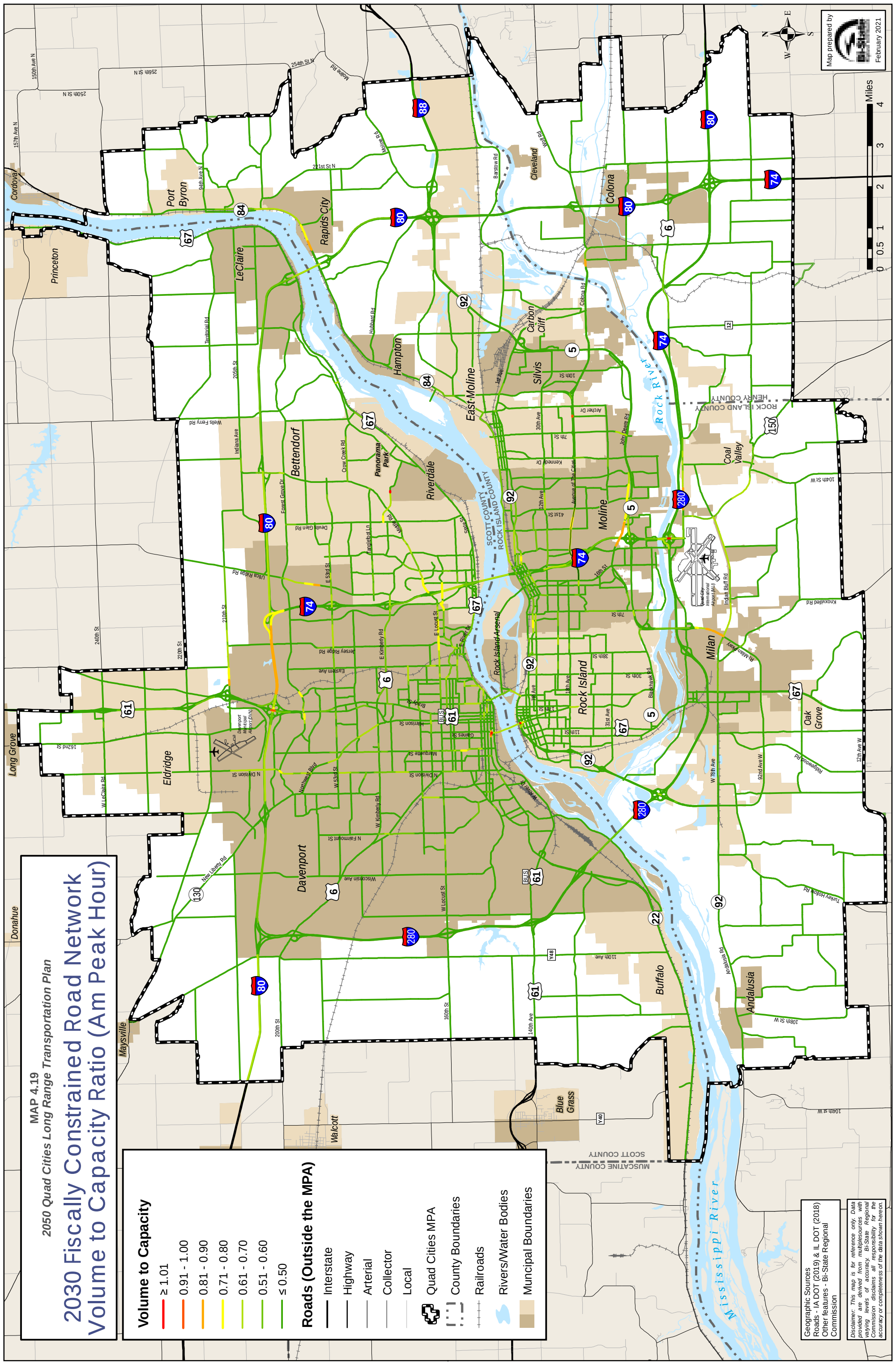
Map 4.17 – 2050 Full Build Volume to Capacity Ratio (AM Peak Hour)



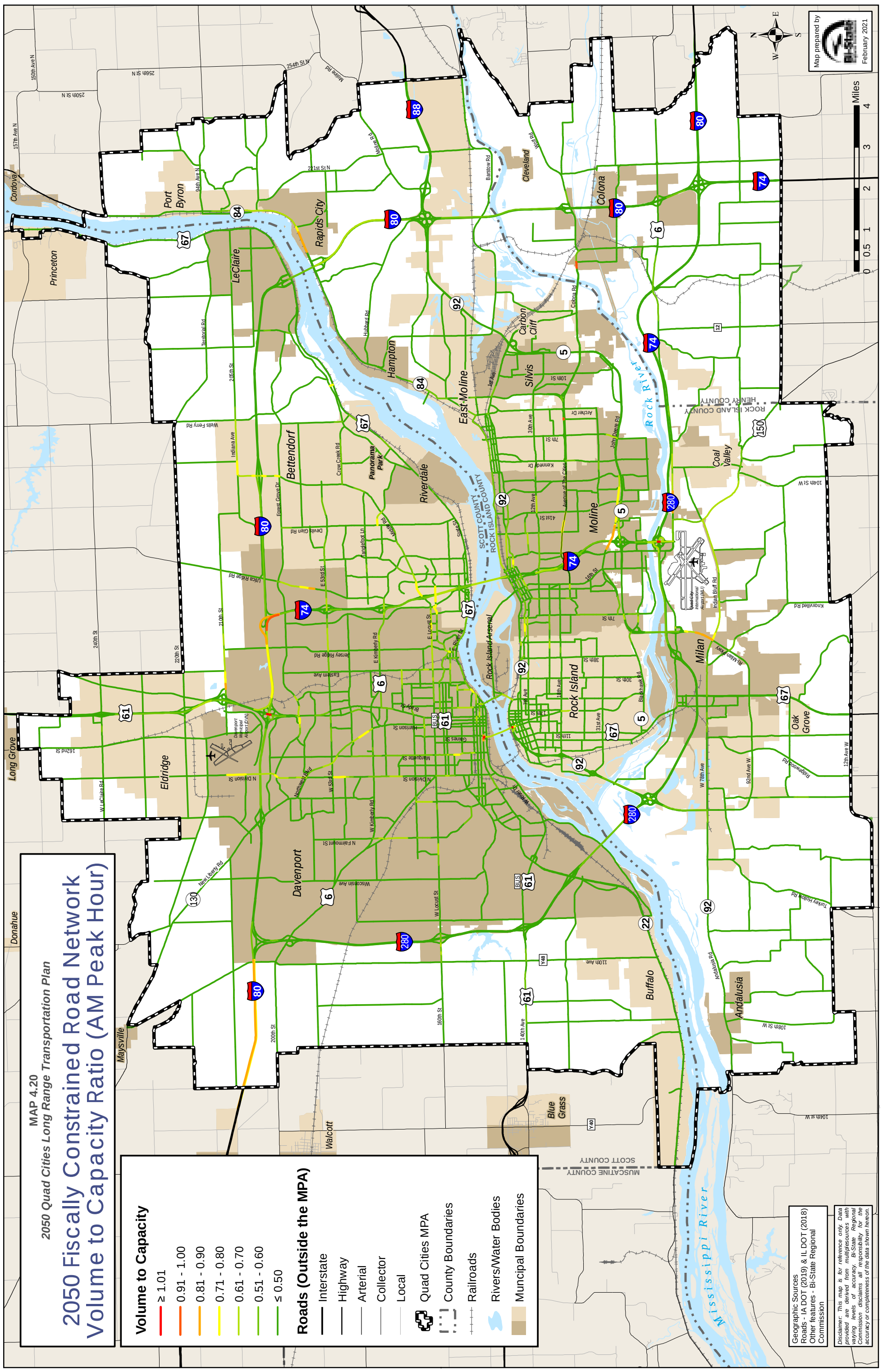
Map 4.18 – 2030 and 2050 Unconstrained (Full Build) Road Network



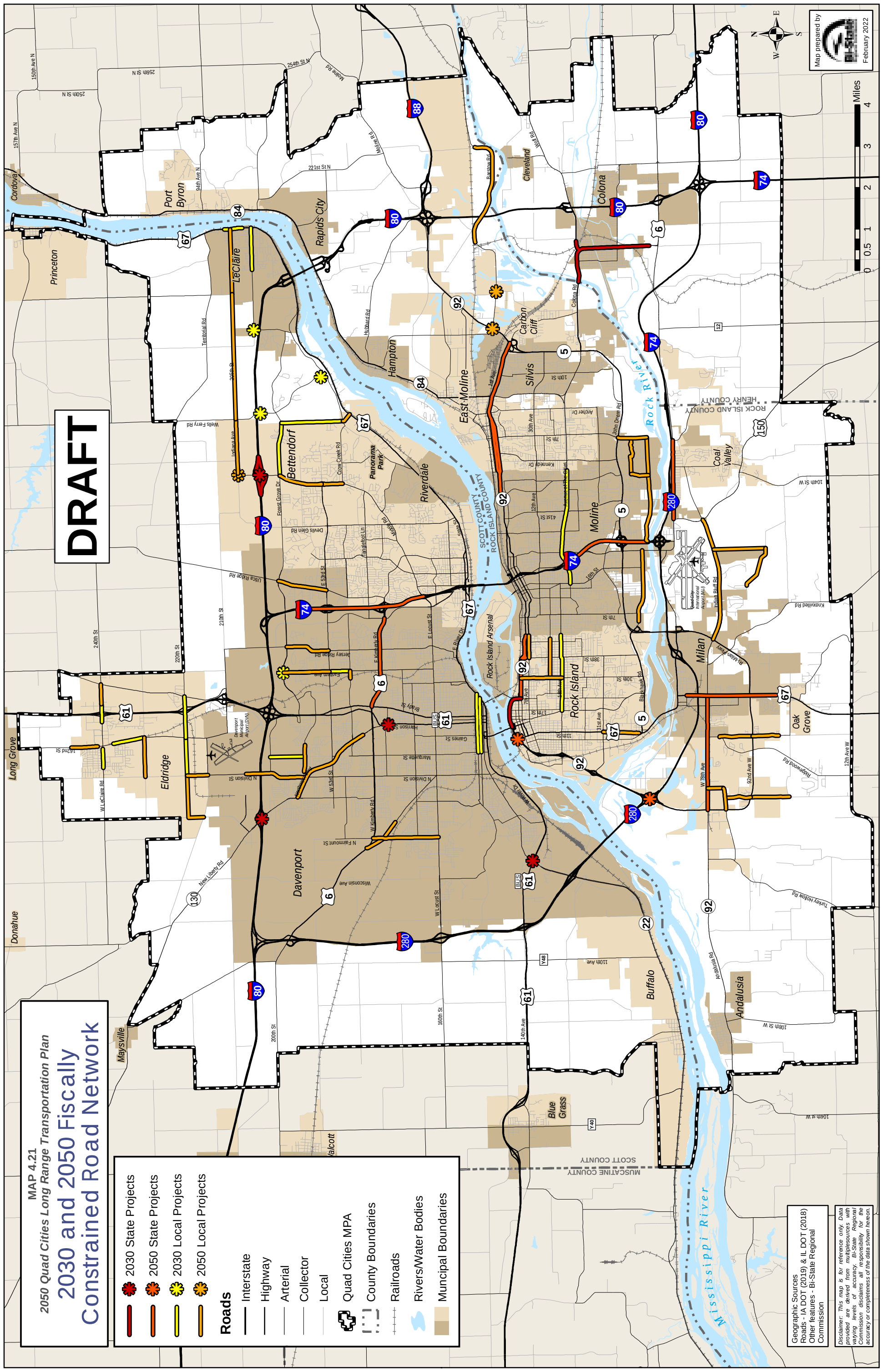
Map 4.19 – 2030 Fiscally Constrained Road Network Volume to Capacity Ratio (AM Peak Hour)



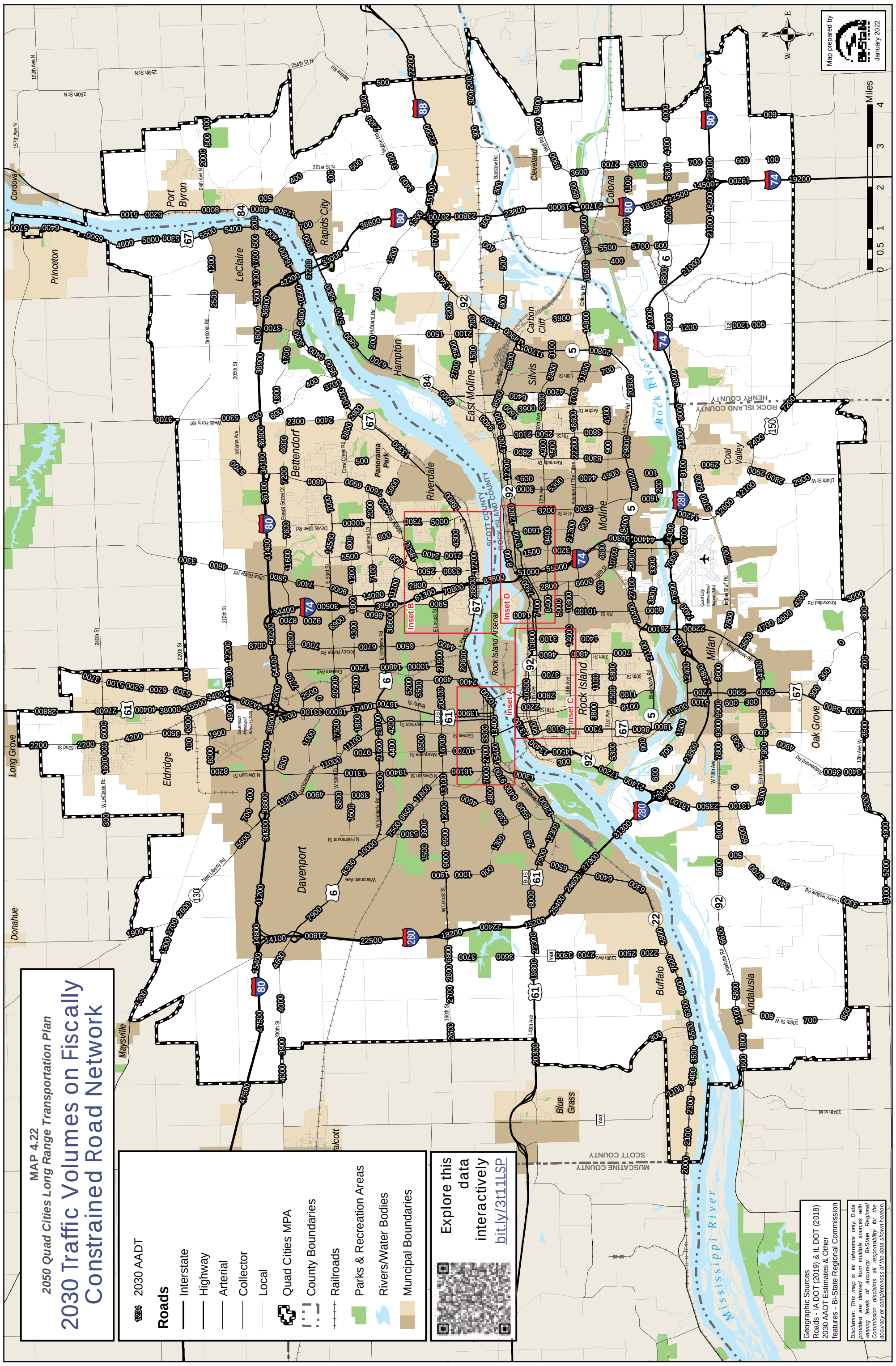
Map 4.20 – 2050 Fiscally Constrained Road Network Volume to Capacity Ratio (AM Peak Hour)



Map 4.21 – 2030 and 2050 Fiscally Constrained Road Network



Map 4.22 – 2030 Traffic Volumes on Fiscally Constrained Road Network



Map 4.23 – 2050 Traffic Volumes on Fiscally Constrained Road Network