Introduction

DMATS forecasts future transportation needs to support infrastructure investment decisions using its Travel Demand Model (TDM). The model is used to evaluate roadway projects based on anticipated changes in land use, households, and employment, and it supports the development of the Long-Range Transportation Plan (LRTP) as well as other regional planning efforts. The model forecasts conditions from 2025 to 2055 and was updated in 2026 using TransCAD software. It has been reviewed by the Iowa Department of Transportation (Iowa DOT) and the Federal Highway Administration (FHWA)

This chapter describes the development of the TDM and the datasets used to forecast future transportation needs. It also evaluates projected system performance, including future levels of service. The chapter concludes with a list of major corridors where capacity issues are project, which informs project identification and investment priorities in the Projects and Project Prioritization chapter.

DMATS Travel Demand Model (TDM)

A travel demand model (TDM) is a series of mathematical equations that represent how people make travel decisions. Thousands of travel decisions made by individuals add up to create regional travel demand. Many factors including auto ownership rate, income, household size, density, type of development, availability of public transportation, and the quality of the transportation system affect individual travel decisions. The model is based on several assumptions, and its accuracy is limited by the data available.

The level of analysis for the model is the transportation analysis zone (TAZ). TAZs are a series of small areas delineated for the purpose of traffic analysis. For the 2055 model update, DMATS increased the number of TAZs from 1,147 to 1,159. The smaller TAZs allow DMATS to conduct a more detailed analysis of transportation activities in the area. Figure 1 maps the DMATS TAZs.

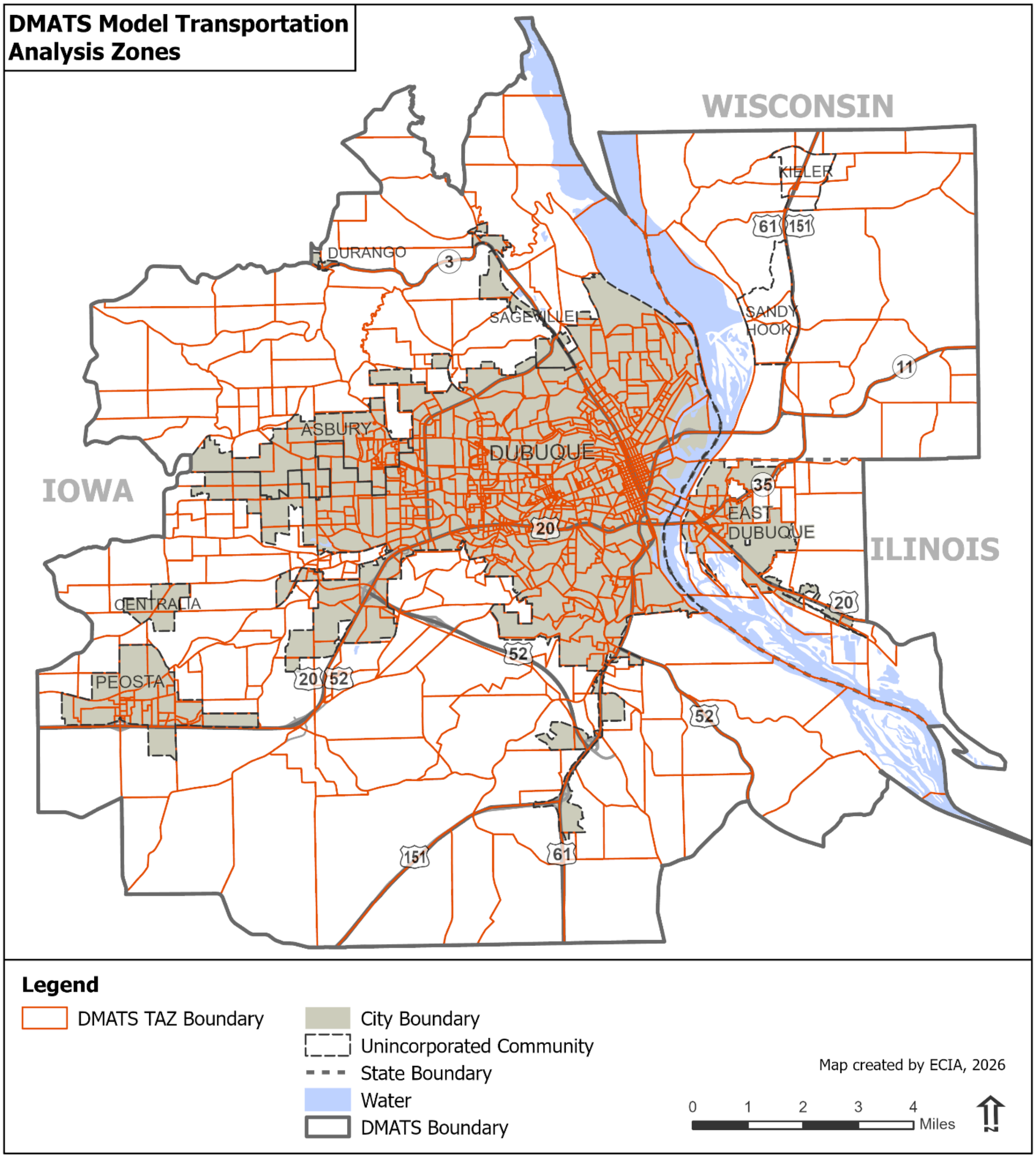


Figure 1. DMATS Transportation Analysis Zones

Travel Demand Modeling Process

Travel demand forecasting involves four steps: trip generation, trip distribution, mode choice, and trip assignment.

Trip Generation estimates the number of trip productions (starting points) and trip attractions (ending points) for each traffic analysis zone. The result is the total number of vehicle trips to and from activities in the study area. Information from land use, population, and economic forecasts is used to estimate how many trips will be made to and from the 1,159 TAZs. Methods for producing these forecasts are documented in Chapter 2.

Trip Distribution links trip productions to trip attractions for each pair of TAZs. The most commonly used method for trip distribution is the gravity model. The gravity model distributes trips produced by one zone to other zones based on trip attractions and the size of the zone.

In Mode Choice, the model splits the number of trips among all TAZ pairs between all possible modes of transportation. The DMATS model omits this step because personal vehicle trips make up more than 95% of trips in the area.

In Trip Assignment, the model assigns trips to specific travel paths on a digital model of the area's roadway network. The network model categorizes all primary roads in the region based on capacity, speed of travel, number of lanes, presence of turn lanes, and surrounding land uses. The model then uses the road network to simulate trips between the production and attraction pairs of traffic analysis zones. The model chooses routes based on the shortest total travel time. Figure 2 illustrates the DMATS modeling process.

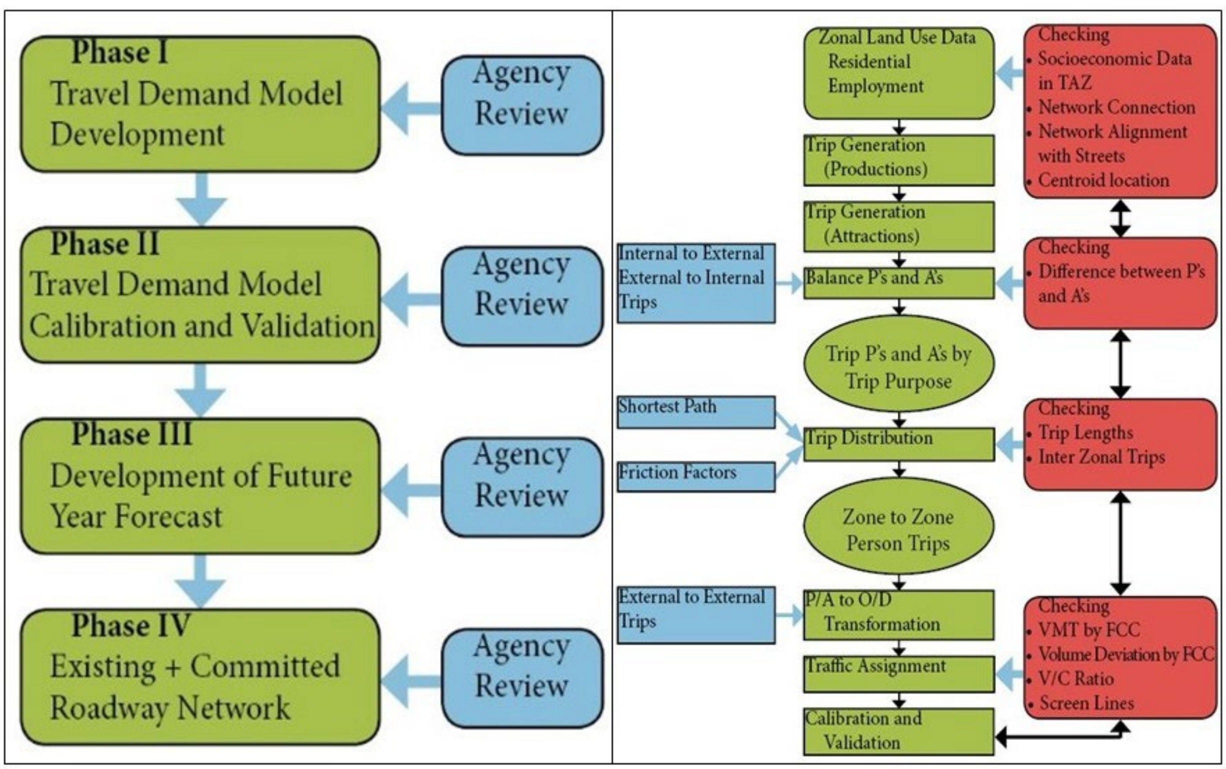


Figure 2. DMATS Modeling Process

ISMS

For the 2055 model update, DMATS developed its travel demand model to meet the standards of the Iowa Standardized Model Structure (ISMS). ISMS provides standardized travel demand modeling architecture for all MPOs across Iowa. ISMS was the result of a multi-year effort led by the Iowa DOT in coordination with the Midwest Travel Model Users Group (MTMUG), a group that provides a forum where transportation professionals meet to discuss travel demand modeling forecasting issues.

While the overall four-step modeling process remained the same, implementation of the ISMS architecture required DMATS to implement a number of changes within the basic model development structure depicted in Figure 2.

The most significant ISMS-related change was the shift away from traditional sources of input data to a parcel-based concept. Travel demand models rely on data about economic activity and housing units to predict transportation decisions and trip generations. Prior to the adoption of ISMS, most travel demand models, including the DMATS model, relied on national datasets such as the U.S. Census Bureau and the Bureau of Labor Statistics for input data. ISMS introduced a new parcel-based approach to modeling that relies on the parcel data that is produced and maintained by local tax agencies. After evaluating the options for input data, the ISMS model development team chose to recommend parcel data because of its accuracy and availability.

For the 2055 model, DMATS developed an area-wide parcel file based on GIS parcel data provided by the Dubuque City Assessor, the Dubuque County Assessor, the Grant County Assessor, and the Jo Daviess County Assessor. The parcel file serves as the source of basic input data like land use, number of housing units, acres of agricultural and park space, and square feet of commercial and industrial buildings for the model's base year and future forecast years.

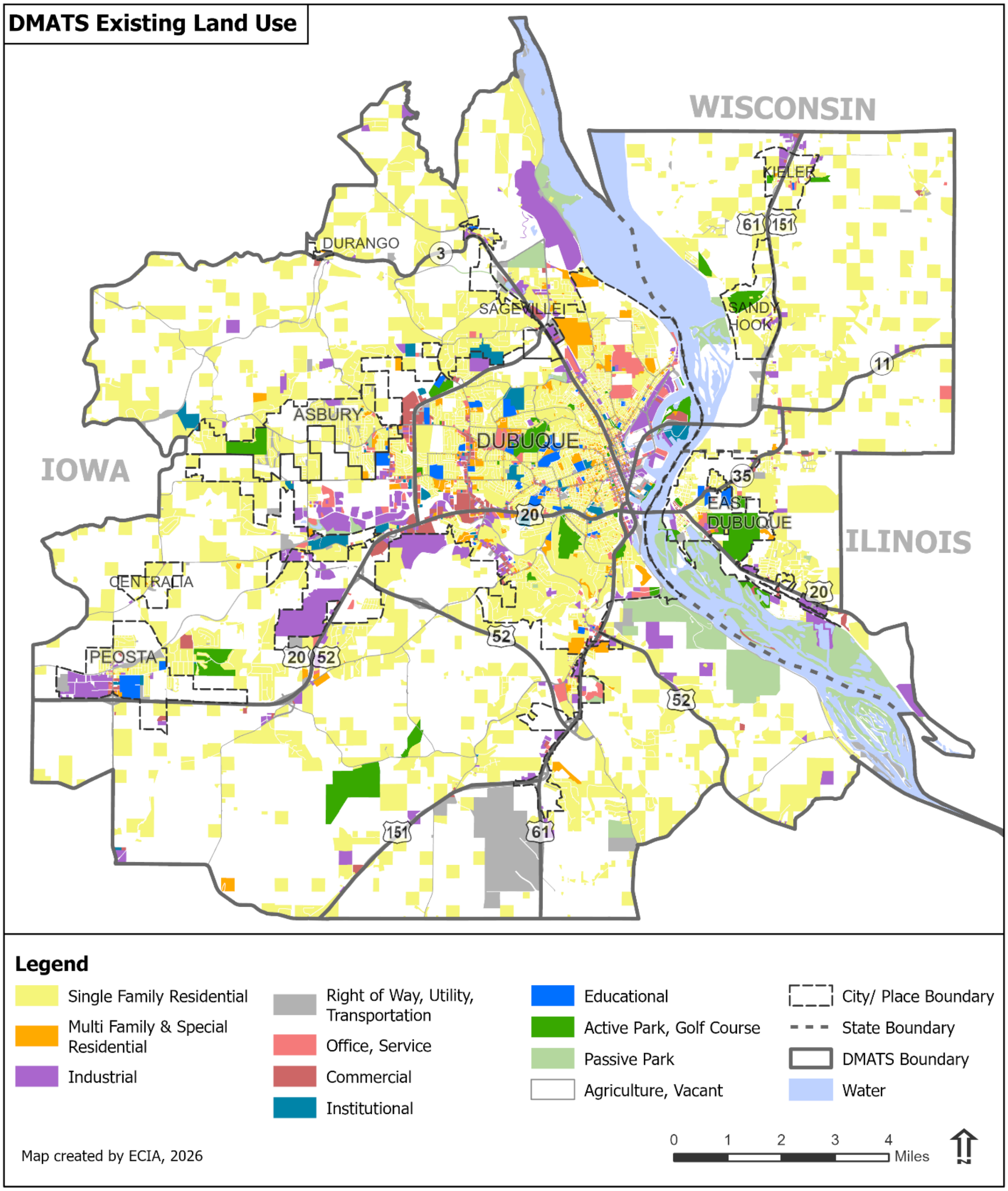
Land Use

Land use is a critical component of the DMATS travel demand model. Over time, new development and changes in land use will result in changes in travel patterns. The model uses land use data to determine where future population and employment activity will occur. Figure 3 displays the DMATS existing land use map. DMATS created a standardized land use map for the region by combining tax assessor's land use classifications into the DMATS parcel file.

DMATS Future Land Use Forecasts

After mapping the region's existing land use, the next step in the modeling process is creating a forecast of the area's future land use. DMATS created its future land use forecasts based on (1) the future population and employment projections described in Chapter 2 and (2) on input from local officials and local planning documents including city and county comprehensive plans. The population and employment forecasts provide an estimate of region-wide growth, while the input from local officials and plans provides an estimate of the locations within the area where growth is expected to occur.

To align with model inputs, DMATS converted its population and employment forecasts into estimates of housing units and commercial and industrial square footage. The forecast population growth of approximately 22,000 equates to about 9,600 additional housing units and the estimated 11,500 additional employees will require an additional 7.75 million square feet of commercial and industrial space.


DMATS Existing Land Use
WISCONSIN
IOWA
ILINOIS
KIELER
DURANGO
SAGEVILLE
SANDY HOOK
ASBURY
DUBUQUE
EAST DUBUQUE
CENTRALIA
PEOSTA
3
61
151
11
35
20
52
Legend
Single Family Residential
Multi Family & Special Residential
Industrial
Right of Way, Utility, Transportation
Office, Service
Commercial
Institutional
Educational
Active Park, Golf Course
Passive Park
Agriculture, Vacant
City/ Place Boundary
State Boundary
DMATS Boundary
Water
0 1 2 3 4 Miles
Map created by ECIA, 2026

2055 Housing Projection Methodology

The projected housing numbers were determined using DMATS 2055 Population Projection, dividing by average household size in Dubuque County from the 2020 Decennial Census. The future housing units were then distributed to parcels in the 2055 parcel file using locations determined from a combination of meetings with member agencies, locations of approved future housing development, as well as future land use maps.

Real developments, either built or approved to be built in the future were assigned unit counts based on the real number of units. Speculated units were determined through size of the parcel as well as the type of housing projected in the location. Single-family parcels were assigned one (1) housing unit per acre, two-family parcels were assigned two (2) units per acre, and multi-family parcels were assigned 10 units per acre. Figure 4 maps the forecasted increase in housing units between 2021 and 2055. The size of the circle represents the number of new housing units.

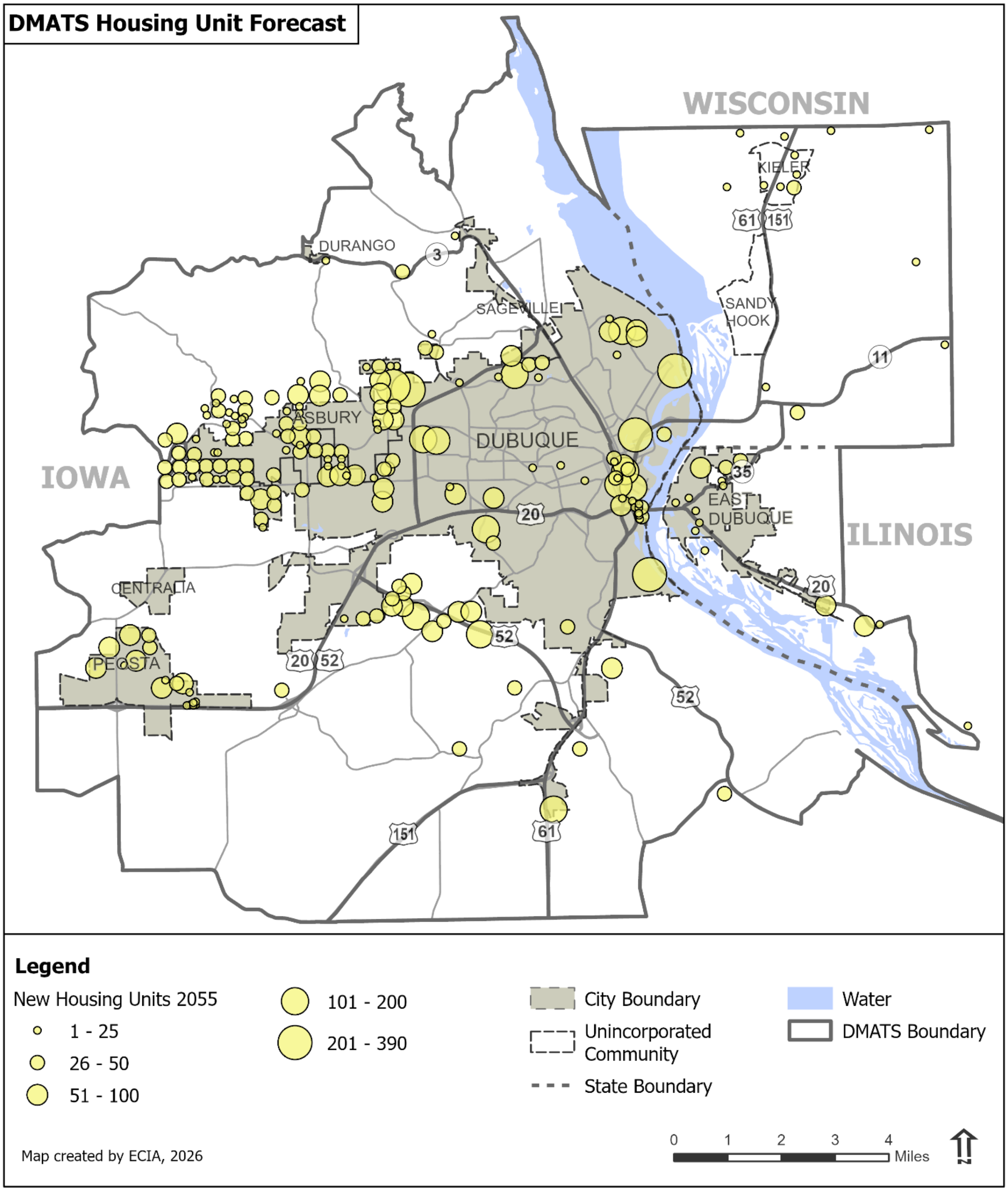


Figure 4. DMATS Housing Unit Forecast

2055 Employment Projection Methodology

Commercial and industrial square footage inputs for the DMATS Travel Demand Forecast Model are developed using a combination of parcel data and employment projections. Base-year square footage is derived directly from assessor parcel data, while future-year square footage is forecast based on adopted regional employment control totals. Employment projections are developed by DMATS staff using historical trends and multiple data sources, including Iowa Workforce Development, U.S. Census Bureau OnTheMap, and ESRI Business Analyst. Once reviewed and adopted by the DMATS Technical and Policy Committees, these employment control totals are converted to thousands of square feet (KSF) using observed base-year employment density rates (jobs per KSF) calculated from parcel-level employment and building area relationships. Employment data are spatially joined to parcels, cleaned for location accuracy and employee count consistency, particularly for large regional employer and analyzed by land use type to determine commercial and industrial employment shares, employment densities, and floor area ratios (FAR).

Future employment growth is allocated spatially using two growth concepts: intensification areas and new growth areas. Based on historical employment trends, 30 percent of future growth is assumed to occur through intensification of existing commercial and industrial areas, while 70 percent is allocated to designated future growth areas identified through local planning efforts. In intensification areas, employment growth is distributed proportionally across parcels with existing development, preserving observed clustering patterns and relative development intensity.

In new growth areas, forecast square footage is distributed according to parcel development potential, calculated using parcel area and land-use-specific FAR assumptions. Parcel weights derived from potential building floor area are used to allocate growth, ensuring consistency with employment projections while reflecting both land availability and planned development patterns. This approach provides a transparent, data-driven, and replicable method for forecasting and distributing future commercial and industrial square footage across the DMATS region.

Figure 5 maps the spatial distribution of the forecasted increase in employment between 2021 and 2055. The size of the circles represents the number of jobs. More detailed information is available in Appendix XX *Future Employment Forecasting and Spatial Distribution Methods*.

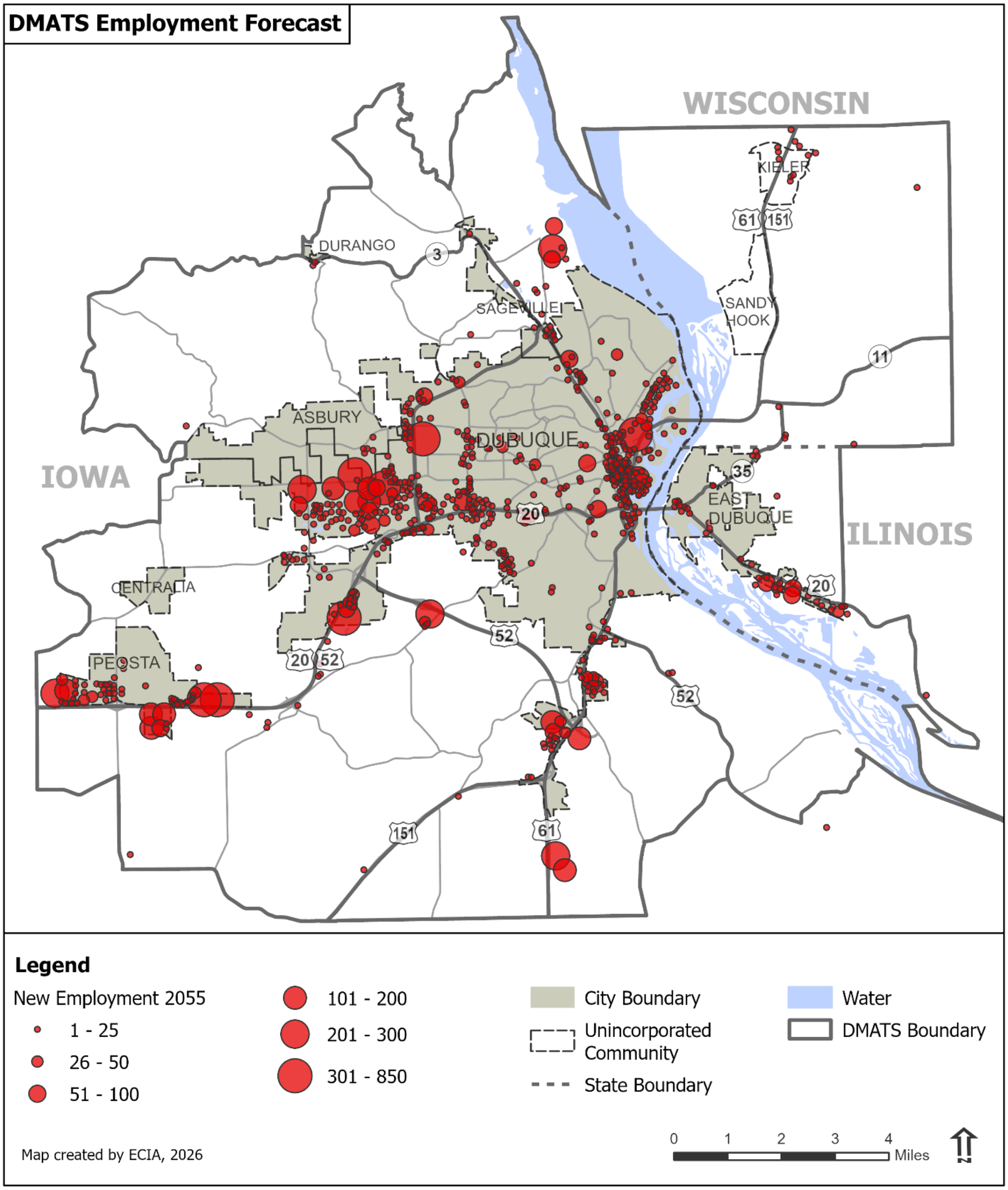


Figure 5. DMATS Commercial and Industrial Forecast

Travel Demand Model Application

After DMATS staff complete the TDM development process, including validation and calibration procedures that verify its accuracy, the model is reviewed and adopted by the DMATS Policy Board. Once adopted, DMATS can then use the TDM to develop the LRTP and for other planning applications.

TDM is a critical component of the LRTP development process. DMATS uses the TDM to help understand the impact of future development on transportation, and to gauge the system-wide impact of a proposed project. Overall, TDM allows DMATS to make informed decisions by providing the best possible information about the region's future transportation needs.

The following sections provide examples of outputs from the 2055 DMATS travel demand model. Figure 6 and Figure 7 map 2055 traffic volume and level of service produced by DMATS TDM. DMATS uses these forecasts as a key part of its process to select and prioritize the projects listed in the LRTP.

2055 Traffic Volume

The final output of the travel demand model is the traffic volume for each road segment. Annual Average Daily Traffic (AADT) is the unit of measurement for traffic volume. Following the initial run, the model is calibrated by comparing base year forecasts to observed traffic counts. Calibration allows the model developer to test the accuracy of the model's forecasts. The National Cooperative Highway Research Program and the Transportation Research Board set standards for calibration. If the predicted traffic volume differs greatly from the observed counts, the assumptions in the model will need to be adjusted. Figure 6 displays 2055 traffic volume forecast for the DMATS area.

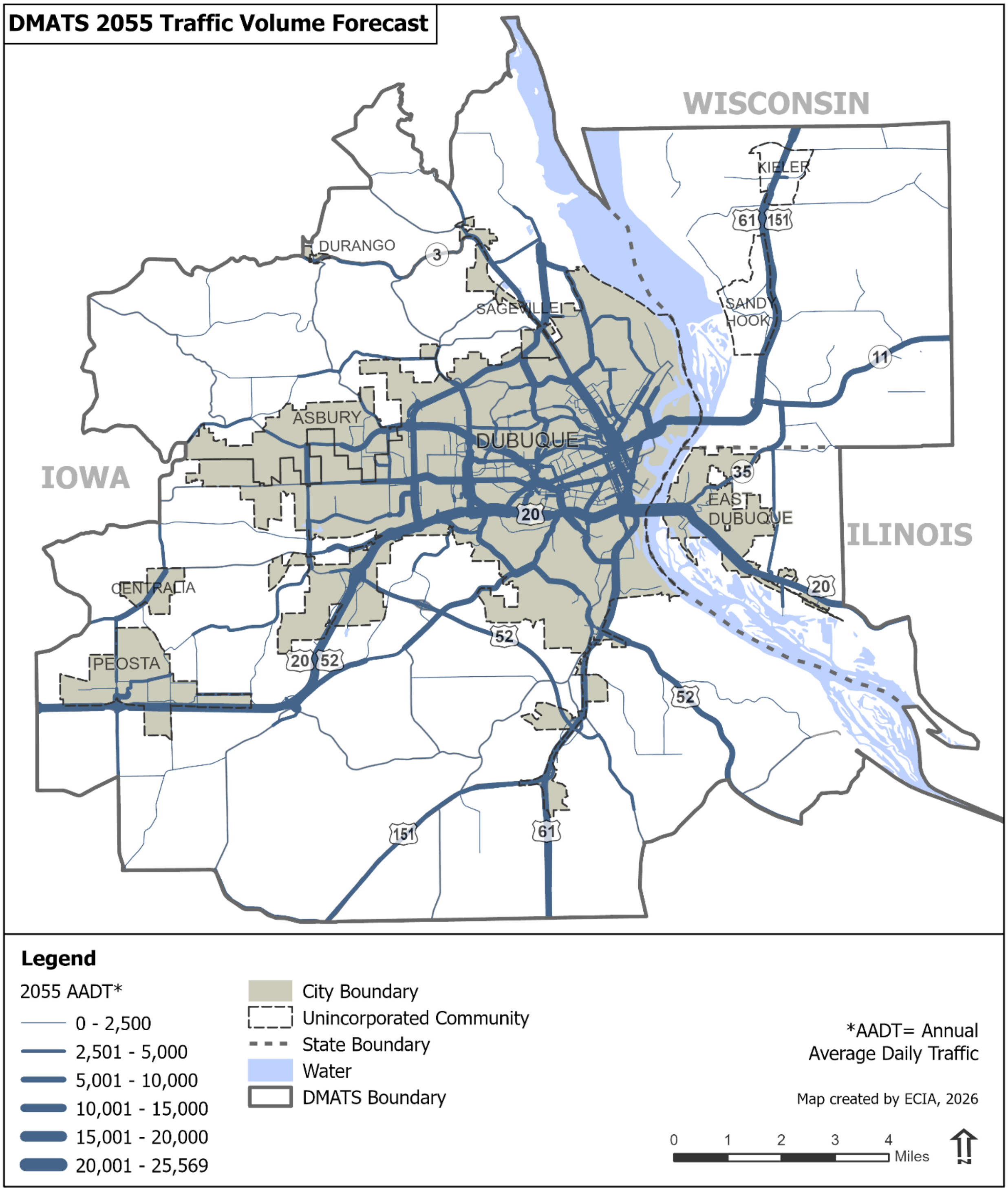


Figure 6. DMATS 2055 Traffic Volume Forecast

2055 Level of Service

Level of Service (LOS) is a qualitative measure used to describe conditions within a traffic stream, based on factors such as speed and travel time, freedom to maneuver, traffic interruptions, comfort, and convenience. LOS values are based on the Volume to Capacity ratio (V/C) ratio, where the traffic volume (observed or forecasted) is divided by the estimated capacity of the roadway.

LOS A represents complete free flow of traffic allowing traffic to maneuver unimpeded. LOS F represents a complete breakdown in traffic flow, resulting in stop and go travel. DMATS has defined the following V/C ratio thresholds each LOS category.

- LOS A: ≤ 0.13
- LOS B: > 0.13 and ≤ 0.25
- LOS C: > 0.25 and ≤ 0.35
- LOS D: > 0.35 and ≤ 0.50
- LOS E: > 0.50 and ≤ 0.70
- LOS F: > 0.7

Figure 7 shows the projected level of service in the Dubuque Metropolitan Area for the year 2055 based on the DMATS Travel Demand Forecast Model. Table 1 lists the major corridors projected to operate at level of service E or F in 2055. The table includes segments with a 2055 traffic volume forecast of 10,000 AADT or greater and a V/C ratio value of 0.5 or greater.

Table 1. Roadways with 2055 LOS E or F

Level of Service E	Level of Service F
US Highway 20	US Highway 20
US Highway 61/151	
US Highway 52/ SW Arterial	
Asbury Rd	
E 32nd Street	
Fremont Ave	
John Deere Rd S	
Pennsylvania Ave	
Peosta St/ Sundown Rd	
Sinsinawa Ave	

Source: DMATS Travel Demand Forecast Model

By identifying where future capacity constraints are most likely to occur, the DMATS Travel Demand Forecast Model helps inform transportation investments that enhance system performance, support regional growth, and maintain travel reliability. Model-projected traffic volumes and level of service values play a key role in the project prioritization process that is used to determine which projects are included in the fiscally constrained LRTP.

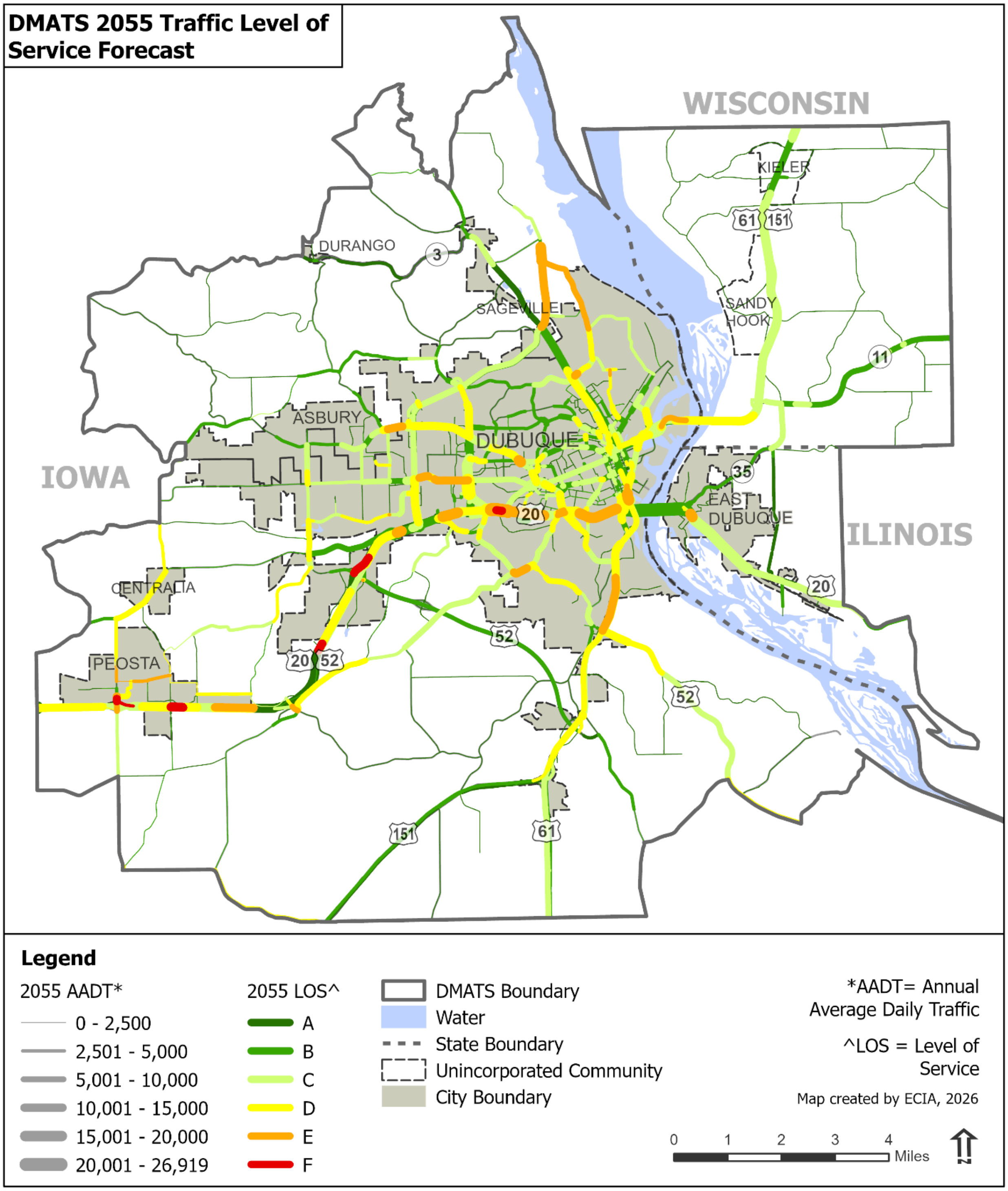


Figure 7. 2055 Level of Service