KANE COUNTY

LONG-RANGE TRANSPORTATION PLAN

Spring 2021

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Illinois Department of Transportation
Chicago Metropolitan Agency for Planning
Regional Transportation Authority
Metra
Pace
Ride in Kane & Kane County Paratransit Coordinating Council

PLAN CONSULTANT

Jacobs Engineering Group, Inc.

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V ACRONYMS AND ABBREVIATIONS

ADT	Average Daily Traffic
BNSF	Burlington Northern Santa Fe
BRT	Bus Rapid Transit
CATS	Chicago Area Transportation System
CAV	Connected and Automated Vehicles
CCTV	closed-circuit television
CLAF	County Limited Access Freeway
CMAP	Chicago Metropolitan Agency for Planning
CRIP	Comprehensive Road Improvement Plan
CSD	Context-Sensitive Design
E-E	External-External
E-I	External-Internal
EJ&E	Elgin, Joliet and Eastern Railway
FHWA	Federal Highway Administration
IDOT	Illinois Department of Transportation
I-E	Internal-External
ISTEA	Intermodal Surface Transportation Efficiency Act
ITE	Institute of Transportation Engineers
ITS	Intelligent Transportation Systems
KDOT	Kane County Division of Transportation
LOMFT	Local Option Motor Fuel Tax
LOS	Level of Service
LRTP	Long-Range Transit Plan
MOS	Minimum Operable Segment
mph	miles per hour
NWKC	Northwest Kane County
OCS	Outer Circumferential Commuter Rail Service

RTA	Regional Transportation Authority
RTP	Regional Transportation Plan
SAM	Sugar Grove, Aurora, Montgomery
SRA	Strategic Regional Arterial
STAR	Suburban Transit Access Route
STP-L	Surface Transportation Program – Local
STP-R	Surface Transportation Program - Rural
TAZ	traffic analysis zone
TDM	Travel Demand Management
TEA-21	Transportation Equity Act for the 21st Century
TOD	Transit-Oriented Development
TRB	Transportation Research Board
TSM	Transportation System Management
v/c	volume to capacity
VHD	vehicle hours of delay
VHT	vehicle hours of travel
VMT	vehicle miles of travel
WUF	West Upper Fox

1 SECTION 1. INTRODUCTION

A long range (2020) transportation plan for Kane County was first completed in 1996. Since that time, the county has undergone significant change that warrants an update of the earlier plan. This transportation plan was developed for forecast year 2050 and incorporates the planning efforts completed to date. Also included in the planning process was an extensive community outreach program to incorporate planned improvements defined by the local agencies. This report endeavors to describe the planning process established to bring together the prior long-range plan along with several recent planning initiatives to formulate a transportation framework capable of supporting future development in Kane County and to describe the resulting 2050 transportation plan. The report also highlights the effect of the collaborative transportation plan and provides an implementation plan including a revenue and expenditures forecast completed to assist with the determination of projects to be incorporated in the fiscal program.

Regional Setting

Kane County is one of the seven collar counties surrounding the Chicago metropolitan area. Located in the far west suburbs of Chicago, the county has a land area of 524 square miles. With its unique blend of agricultural lands to the west and the more urbanized areas located adjacent to the Fox River to the east, Kane County exists as a desirable place to live, work, and enjoy the recreational options throughout the County. Figure 1-1 shows the location of Kane County and surrounding areas.

The county measures approximately 30 miles north to south and 18 miles east to west with 16 townships and 30 municipalities. In 2015, the population of Kane County was 548,257, and there were 212,451 persons employed in the county. Kane County is divided into three principal land use areas with a north/south orientation, the urban corridor in the east, critical growth area in the center, and agricultural/village area in the west.

Kane County is within commuting distance of Chicago and other regional employment centers such as Rockford, Schaumburg, and Oak Brook. O’Hare International Airport lies 18 miles to the east.

Purpose of the Study

The primary objective of this study was to develop a balanced transportation plan that responded to both existing deficiencies and projected countywide development trends. The plan is multimodal; that is, it incorporates considerations for public transit, paratransit, bicycle, and pedestrian facilities together with those for motor vehicles. The plan can be implemented, with proposals staged in a logical sequence, and methods of financing identified. Finally, the plan was developed in a manner that facilitates future updating or modification as development continues and conditions change.

Overview of the Planning Process

The principal steps involved in formulating the 2050 transportation plan incorporates:

1. Consolidation of ongoing (or recently completed) studies.
2. Identification of gaps left in recent or ongoing studies to be filled in order to provide a complete picture of the transportation system.
3. Extension of the planning horizon from 2040 to 2050 and forecast socioeconomic data required to establish future travel demand.
4. Evaluation of alternative transportation elements and selection of a set of proposals comprising a recommended plan.
5. Conduct financial analysis by comparing revenues to plan costs.

Plan Development Process

Figure 1-2 is a flow chart showing the sequence of activities involved in arriving at a 2050 transportation plan for Kane County.

The plan development process began with formulation of 2050 socioeconomic assumptions, utilized Chicago Metropolitan Agency for Planning (CMAP) projections, were presented to municipalities throughout Kane County for review, and then were the main driver in predicting future travel volume and patterns. The socioeconomic forecasts were input to the transportation demand model along with other assumptions about the make-up of the transportation system (existing and committed facilities). The resulting 2050 travel forecast was then assigned to the Existing plus Committed highway system to portray deficiencies that would occur without further system improvement.

Concurrent with the travel forecasts, the study team and public participants developed a concise statement of the plan's objectives, and the strategies that allowed fulfillment of the objectives. These provided guidance as alternative transportation strategies were considered to provide for the indicated future travel demand.

Transportation improvement strategies are not a single type of action but embrace a combination of techniques covering the full spectrum of improvement opportunities. A number of prior studies have been completed relating to different forms or types of transportation improvements. These are identified in the boxes on the right-hand side of Figure 1-2. Plans and reports pertaining to each of these alternative strategies were reviewed, summarized, and incorporated into the planning process.

The various potential alternatives and packages of improvements were evaluated for effectiveness in accommodating future demand and fulfilling the transportation goals. Costs were determined for each option and the projects screened and prioritized based on the availability of financial resources. The planning process yielded a transportation plan that is financially attainable and can be implemented.

Public input was solicited at key points throughout the plan development process as shown in Figure 1-2.

Figure 1-1. Location of Kane County and Surrounding Areas

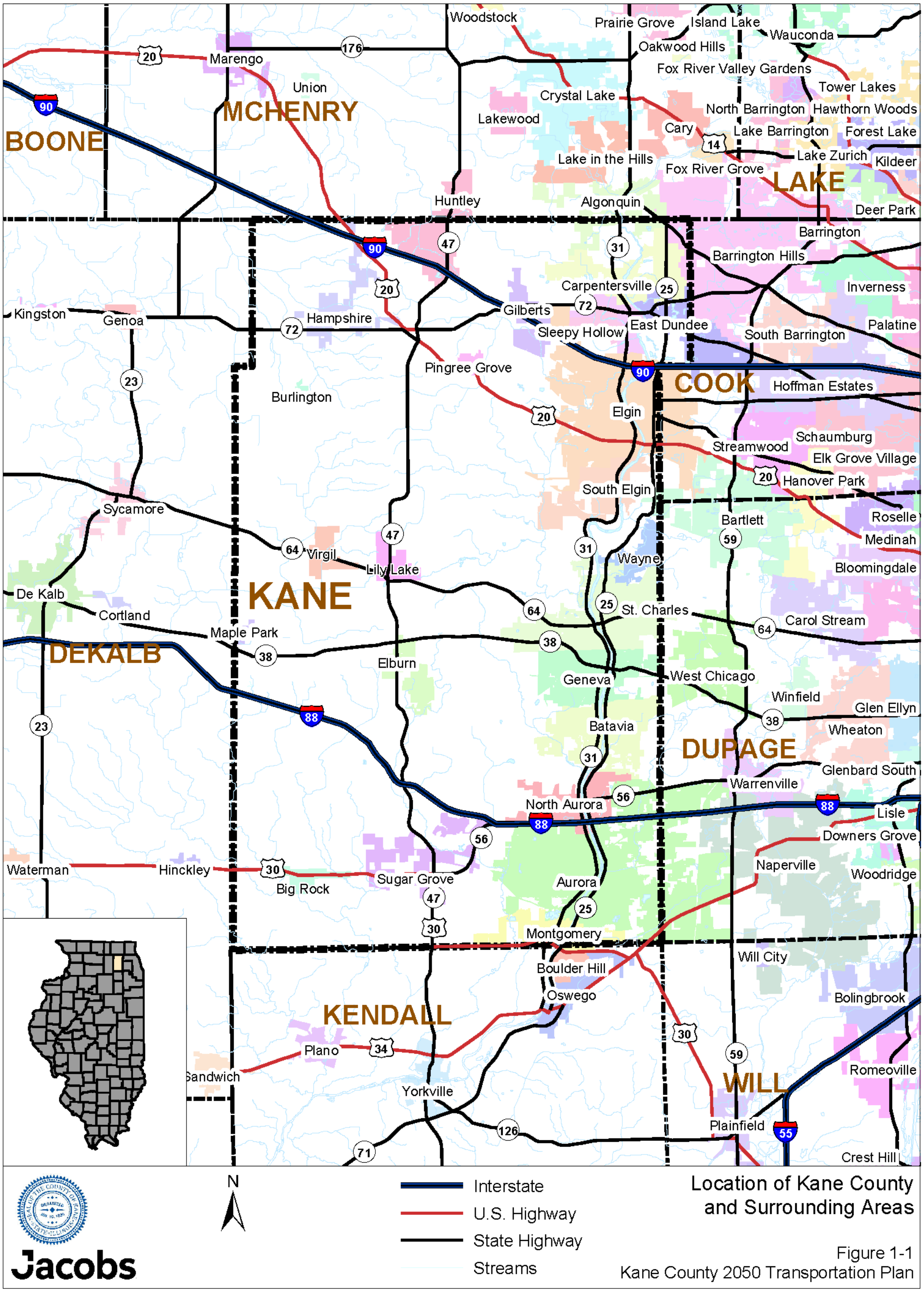

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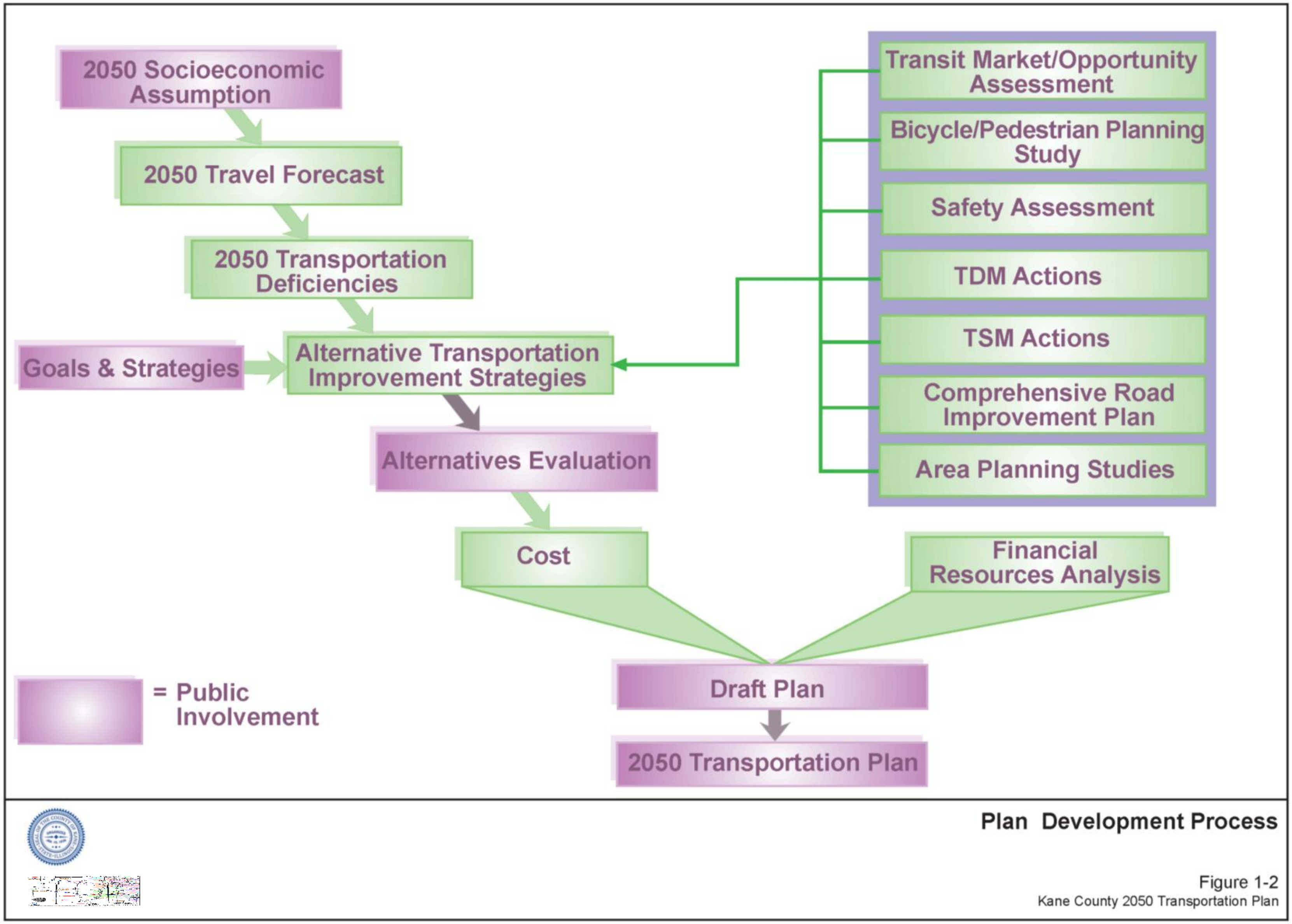
Figure 1-2. Plan Development Process



Stakeholder Engagement

The Kane County transportation system is shared by many users, all whom have varied needs and use the transportation system differently. In developing the 2050 Roadway Plan components, the County engaged stakeholders to seek input on the transportation priorities and habits of people using Kane County's transportation system, as well as gather specific suggestions for improvements and information about locations currently experiencing transportation problems.

Two tools were primarily used to seek input. Members of the Kane County community were asked to provide feedback via an online survey hosted by MetroQuest and PollEverywhere to help identify transportation priorities and develop long-term recommendations to improve the growing travel network in Kane County.

MetroQuest Survey

The Kane County MetroQuest survey was available from September 15 through December 5, 2016. The community was made aware of the MetroQuest survey through local media advertisements, community newsletters, postcards, and social media posts, as well as promoted to public officials at local board and council meetings. The public was able to access the MetroQuest survey on the project's website.[1] To drive participation, Brand Ambassadors were also stationed at several high-volume traffic areas throughout Kane County (such as libraries, transportation centers, community events, and senior centers) where community members could use provided tablets to complete the survey onsite.

The MetroQuest survey, comprised five standardized screens, guided participants through key project information, and requested community members' and stakeholders' input on County priorities and strategies:

Welcome: Participants learned about the Kane County LRTP.

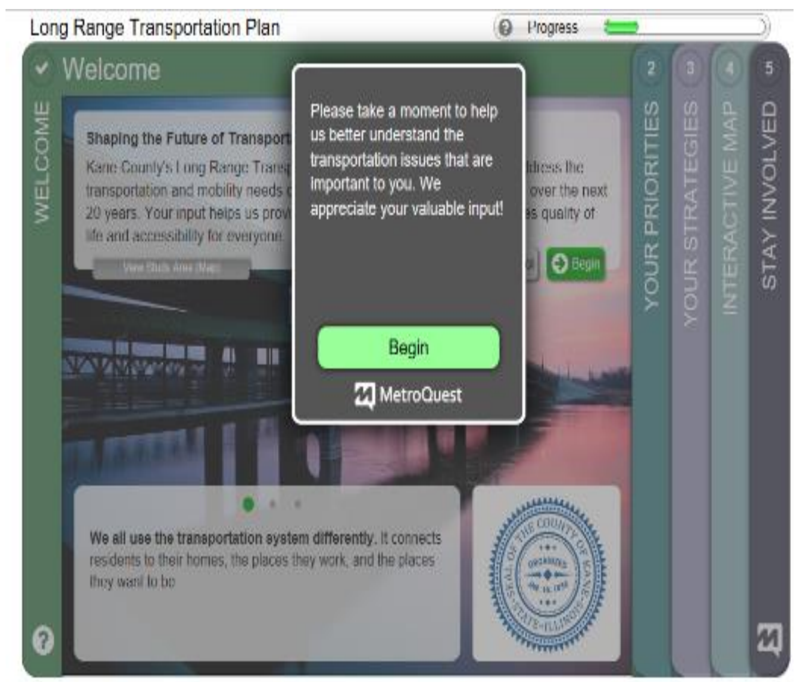
Priorities: Participants ranked their top four transportation priorities for the county.

Strategies: Participants ranked whether they agreed or disagreed, on a scale of 1 to 5, with ideas related to the priorities they had previously identified.

Interactive Map: Participants indicated locations in the County on a map where they had ideas for improvements or concerns.

Stay Involved: Participants provided demographic information about themselves.

Example Survey Page



Participant Information

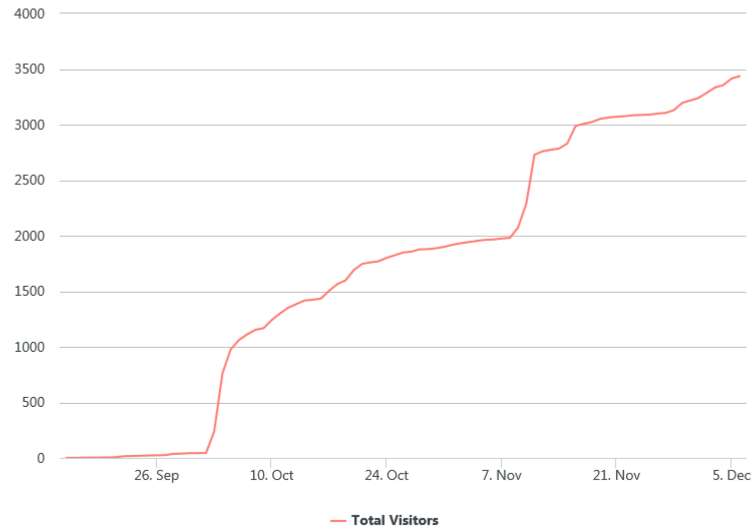
The MetroQuest survey site, which was provided in both English and Spanish, was visited 3,692 times. Respondents provided input or data on 2,154 of the 3,457 visits; however, respondents did not always

[1] http://www.co.kane.il.us/dot/longRange.aspx

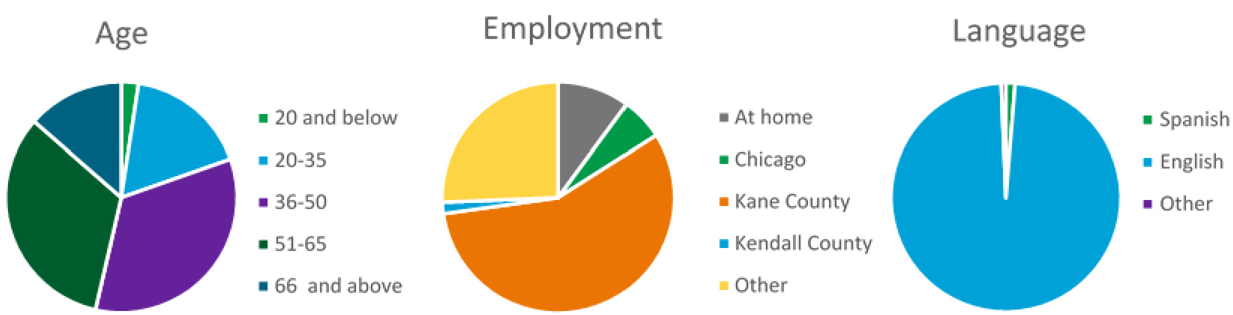
participate in every portion of the survey. Participants were also asked to provide demographic information (e.g., zip code, employment/school location, mode of transportation, age, and ethnicity). The majority of those who participated in the survey were between the ages of 36 to 50, employed in Kane County, and English-speaking.

Accumulated Visits

Figure provided by MetroQuest Survey



Participant Demographics



Survey Results

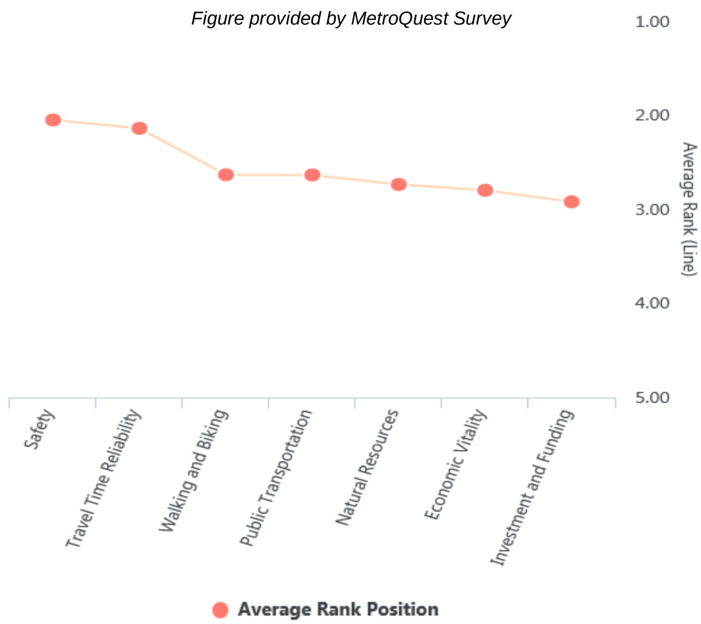
Priorities

To help establish priorities for the LRTP, community members were asked to rank which of the following topics were of the greatest importance to them regarding the transportation system in Kane County. Participants were able to choose from the following priorities:

- Safety
- Travel Time Reliability
- Public Transportation
- Walking and Biking
- Natural Resources
- Economic Vitality
- Investment and Funding

Top-Ranked Priorities

Figure provided by MetroQuest Survey



Based on feedback from respondents, the areas of greatest importance are (see *Top-Ranked Priorities Figure*):

1. Safety
2. Travel Time Reliability
3. Walking and Biking
4. Public Transportation

Strategies

Participants were then asked to evaluate how they currently use the Kane County transportation network by ranking proposed statements on a scale of strongly disagree (1 star) to strongly agree (5 stars). Discovering how members of the community are currently using the transportation system helps to identify specific strategies for the Kane County LRTP.

Based on respondents' comments, the following statements were ranked highest in importance for the Kane County transportation system:

89% of respondents of the **Natural Resources** category agreed (4-5 stars) that "The natural environment should be conserved to the greatest extent possible."

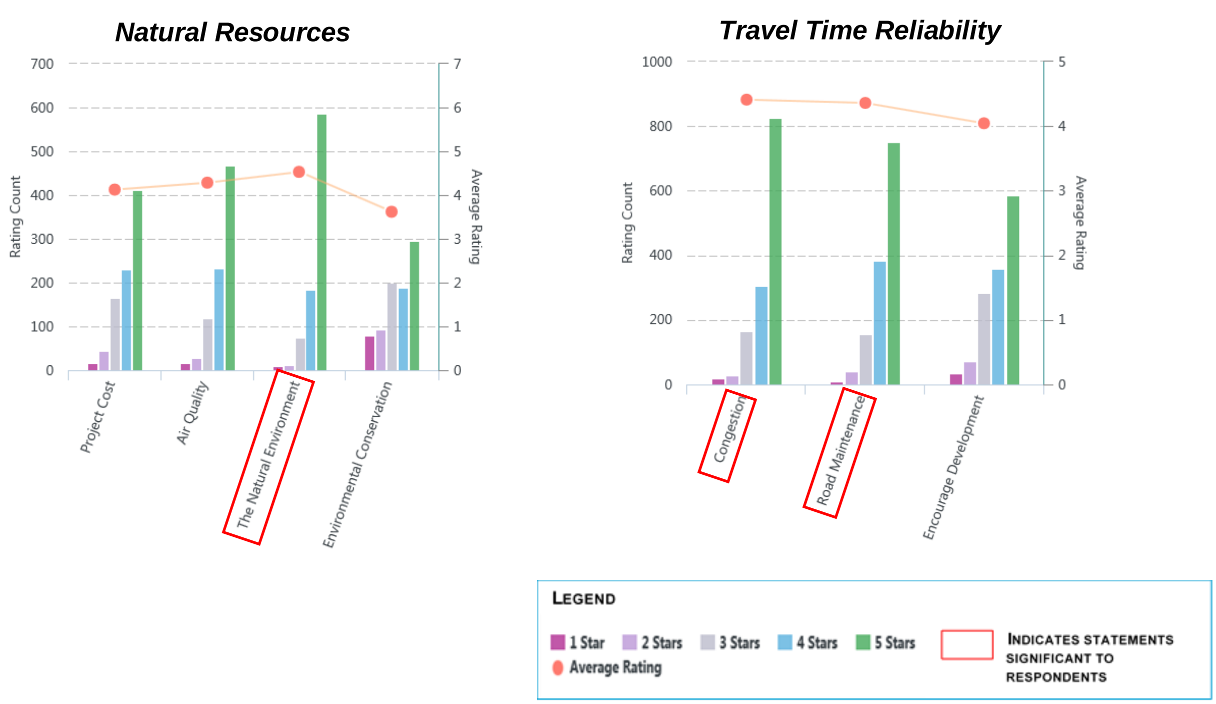
85% of respondents of the **Travel Time Reliability** category agreed (4-5 stars) that "Existing roads should be maintained to improve travel time reliability."

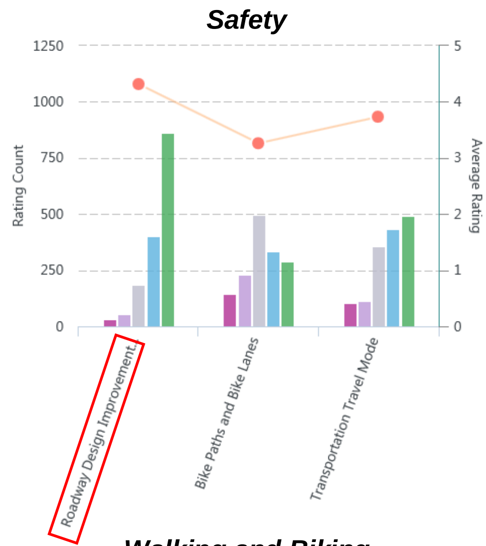
84% of respondents of the **Travel Time Reliability** category agreed (4-5 stars) that "Congestion affects the reliability of the transportation system in Kane County."

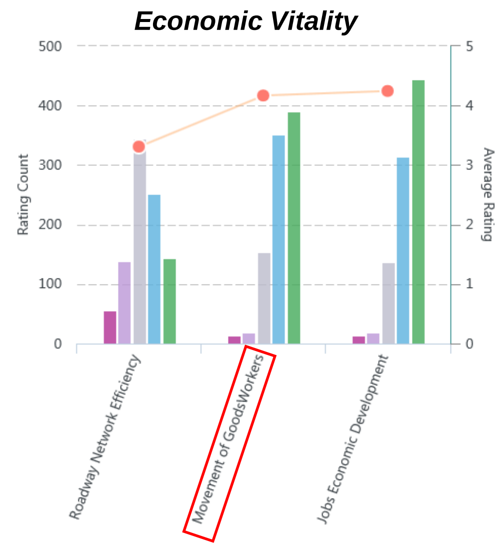
83% of respondents of the **Safety** category agreed (4-5 stars) that "Transportation design improvements (signal timing, turn lanes, congestion reduction) are needed to improve safety in Kane County."

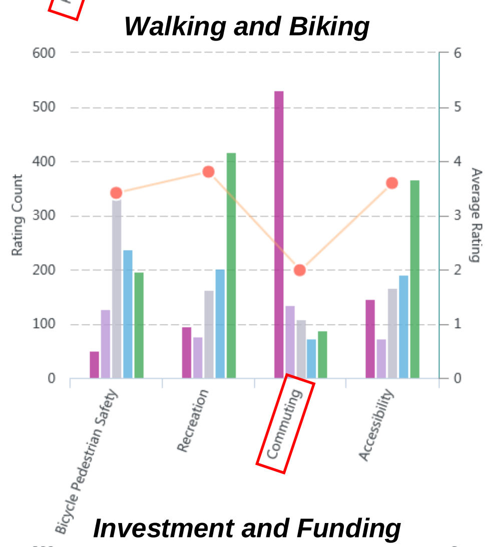
82% of respondents of the **Economic Vitality** category agreed (4-5 stars) that "An effective transportation network will promote the region's job and economic development growth."

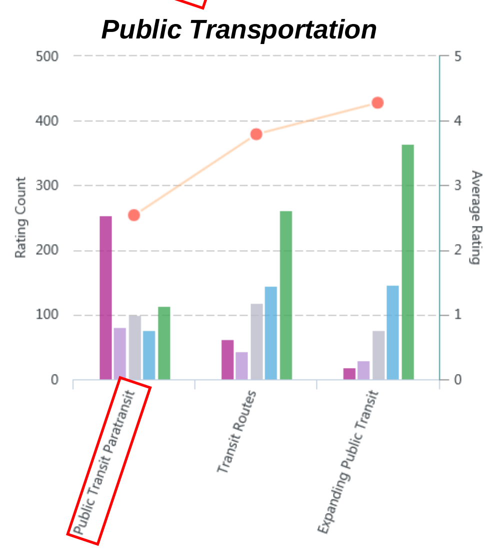
Participants Ranking of Items

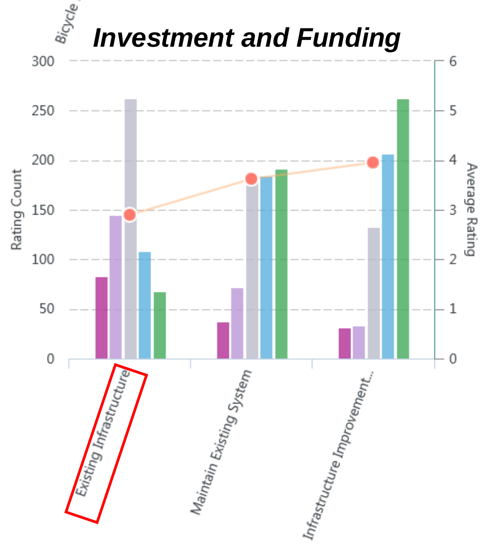








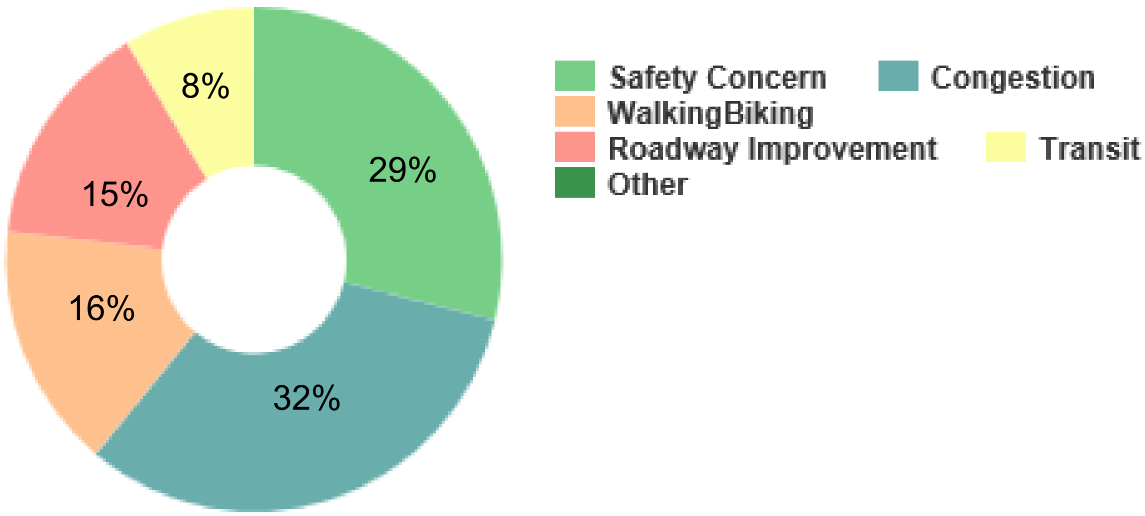




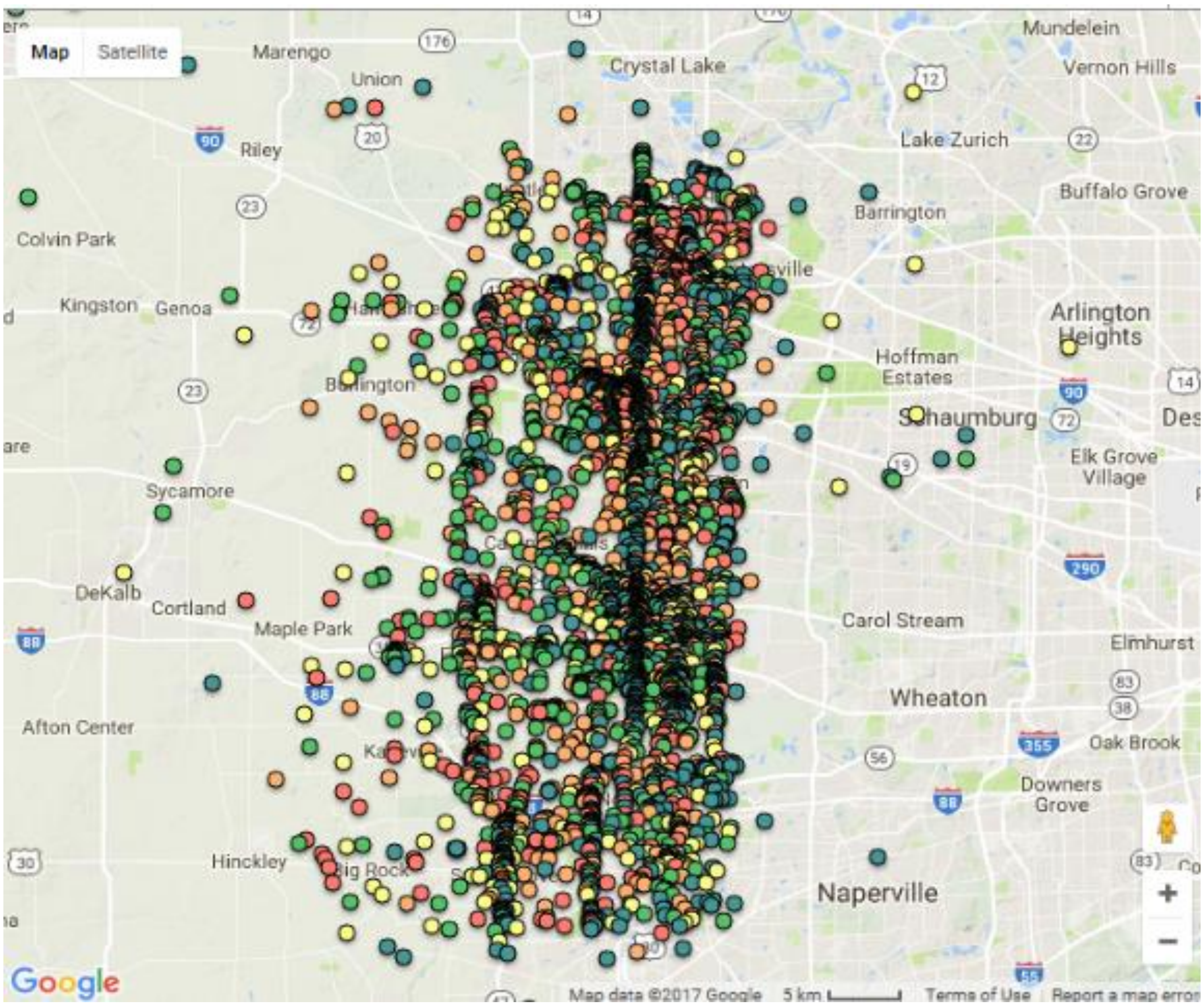
Opportunities for Improvement

Community members were asked to specify locations within Kane County that were in need of change or improvements. The locations most cited for change were those in need of **Safety** improvements and solutions to **Congestion**.

Noted Opportunities for Improvement



Noted Opportunities by Map Location



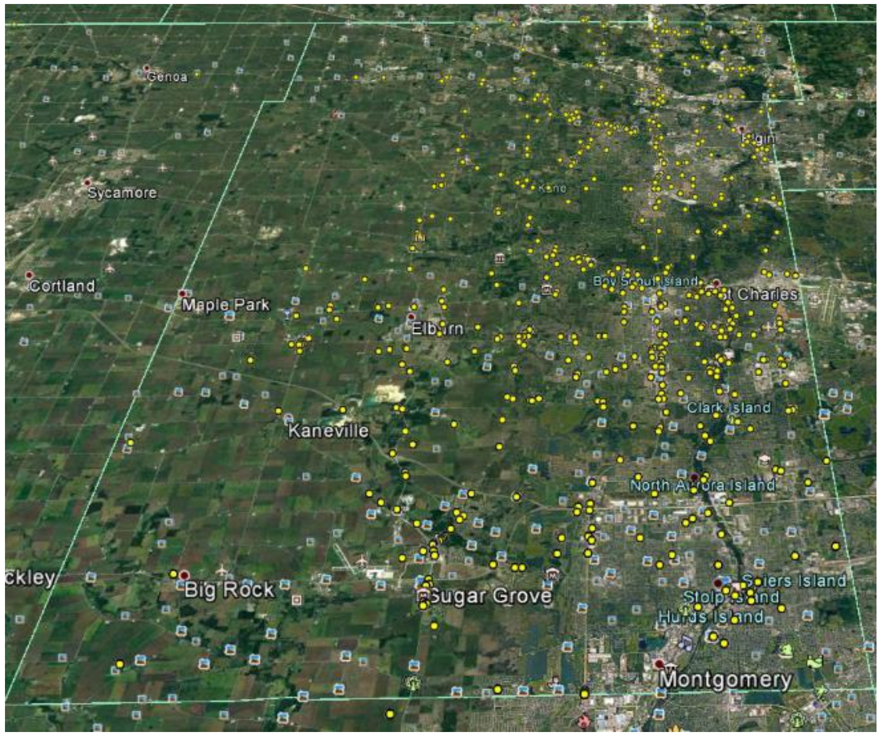
The following are common comments or suggestions provided by respondents using the mapping component of the survey:

- **Safety Concerns**

  Many respondents reported safety concerns throughout the County. Many of these concerns targeted intersections and were related to high usage and/or high speeds. Several felt installation of traffic signals would be a promising solution.

  The following are specific locations where a notable number of survey participants marked safety concerns:

  Pin locations placed by survey respondents for Safety Concerns



  – Feeling unsafe at corner of Fabyan Parkway and IL 31
    - Improve intersection layout
    - Reduce speeds

  – Safety concerns along US 20, particularly at intersections:
    - Route 25
    - Route 31
    - Randall Road
    - Coombs/Plank Road
    - Highland Woods Blvd
    - IL 72 in Pingree Grove
    - Randall Road

  – Safety concerns along Randall Road, particularly at intersections:
    - Huntley
    - Dangerous bike crossing at Illinois Prairie Path – Geneva and Kirk Road

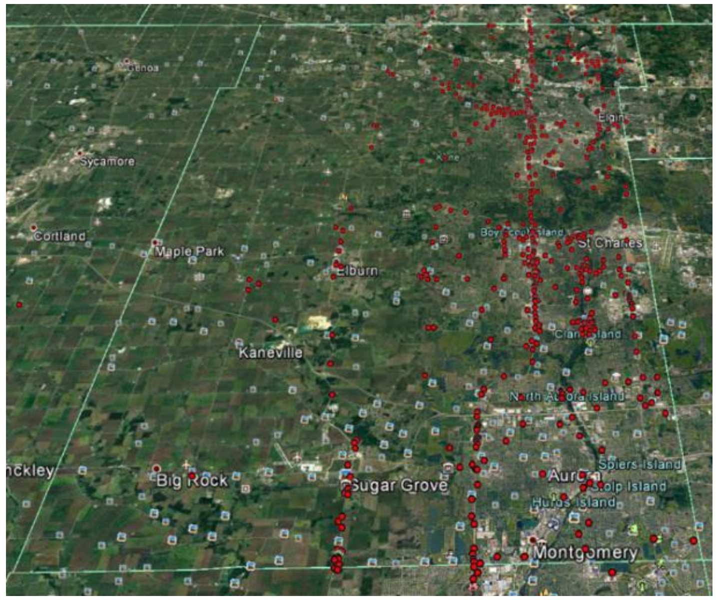
"There seem to be a lot of accidents at the intersection of Route 20 and Coombs/Plank Rd"

"Road improvements are needed at Hopps Road and Randall Road"

- **Congestion Concerns**

  Congestion concerns exist at US 30 and Route 47 and at Orchard Road; along Orchard Road, particularly at intersections; and along Randall Road.

Pin locations placed by survey respondents for Congestion Concerns



"During peak hours, I often have to wait two traffic light cycles on Route 31 in order to cross the intersection with Route 20. Even in off-peak hours, I wait an extended period of time due to the configuration of the traffic lights."

"Congestion on Randall Road is outrageous."

- **Walking/Biking Concerns**

  – Better pedestrian access, connections, and safety were mentioned for the area near Blackberry Creek Bliss Woods in Sugar Grove
    - Additional bike paths or lanes
    - Bridge over IL 47

  – Improved biking lanes along and crossing over Orchard Road

  – Dedicated bike lanes in Geneva

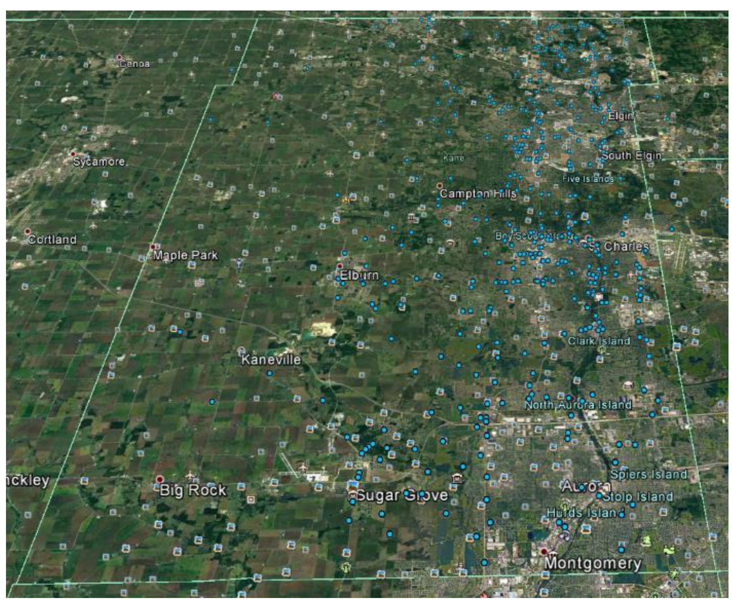
  – Better access to the Fox River Path in Batavia
    - Improved and continuous paths

  – Bicycle path or larger shoulder on Kirk Road
    - Between Fabyan and IL 38
    - Access to Cougars facility

  – Improved bicycle routes/paths in St. Charles

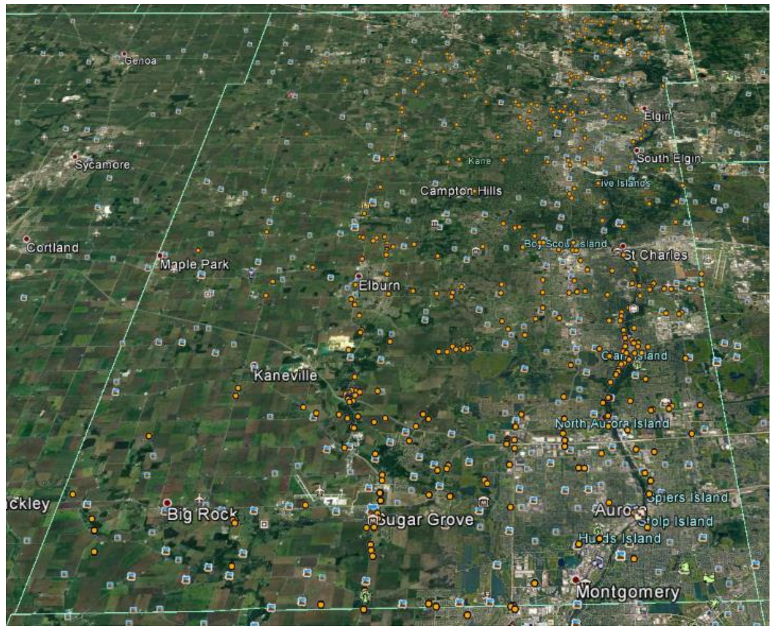
  – Improved pedestrian crossing at Randall Road and IL 38

Pin locations placed by survey respondents for Walking/Biking Concerns



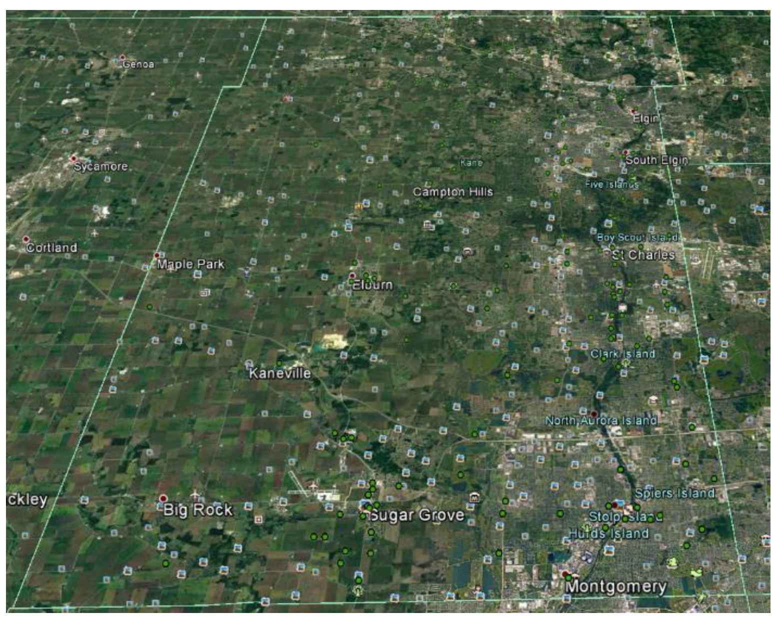
- **Roadway Improvement Concerns**
  - The need for a full interchange at Route 47 and I-88
  - Improvements, including widening and paving of Route 47 in Sugar Grove
  - Request for repaving of IL 38 east of the river
  - Many suggestion for improvements along Fabyan Parkway
    - The alignment of Bliss Road with Fabyan Parkway at Main Street
  - Multiple suggestions for improvements along Randall Road; particularly the need for widening

Pin locations placed by survey respondents for Roadway Improvements Concerns



- **Transit Concerns**
  - Concern was expressed for better transit opportunities for college students in the Sugar Grove area, specifically between Sugar Grove and Waubonsee Community College and Aurora
  - More parking at Metra stations
  - Improved bus service

Pin locations placed by survey respondents for Transit Concerns



Summary

The MetroQuest survey was helpful in collecting information and suggestions from the Kane County community. In short, **Safety** is the number one priority for the respondents. Participants agreed that **Safety**, **Travel Time Reliability**, **Economic Vitality**, and conserving **Natural Resources** were of strategic importance to Kane County, which reflects the priorities of KDOT.

Respondents provided input and comments on specific locations needing improvement within the County via the mapping tool. There were several hotspot locations that were agreed upon by respondents as areas of high safety risk and congestion.

PollEverywhere

In addition to soliciting public input through the MetroQuest Survey, agency input was solicited from various county advisory committees using PollEverywhere.

Results from the MetroQuest Survey were presented to the Transportation Policy Committee on October 19, 2017; Bicycle and Pedestrian Committee on October 25, 2017; and Ride in Kane on December 5, 2017. PollEverywhere was used during the PowerPoint presentation to capture input on transportation concerns and priorities in Kane County and show results on-screen during the live presentation. These committees contained industry leaders, policy makers, elected officials, and others who help shape the transportation network.

Participant Information

Between the three meetings, over 80 people participated in PollEverywhere; however, respondents did not always participate in every question. Demographic information was not collected.

Survey Results

To help establish priorities for the LRTP, meeting participants were asked to rank their top three priorities regarding transportation in Kane County. Participants were able to choose from the following concerns:

- Safety
- Travel Time Reliability
- Public Transportation
- Walking and Biking
- Natural Resources
- Economic Vitality
- Investment and Funding

Although responses varied by committee, safety was identified as a top priority by participants, which is consistent with the results from the MetroQuest Survey (see Figure 2-1). Participants further indicated that signal timing adjustments, addition of turn lanes, and congestion reduction have been most effective in addressing safety within the community. Randall Road in particular has congestion issues that people try to avoid.

Input was requested on public transportation and walking/biking conditions in addition to roadway concerns. Participants strongly agreed that the LRTP should include and prioritize multimodal improvements (bicycle/pedestrian and transit supportive infrastructure) (see Figure 2-2).

Figure 2-1. Top Ranked Priorities from PollEverywhere

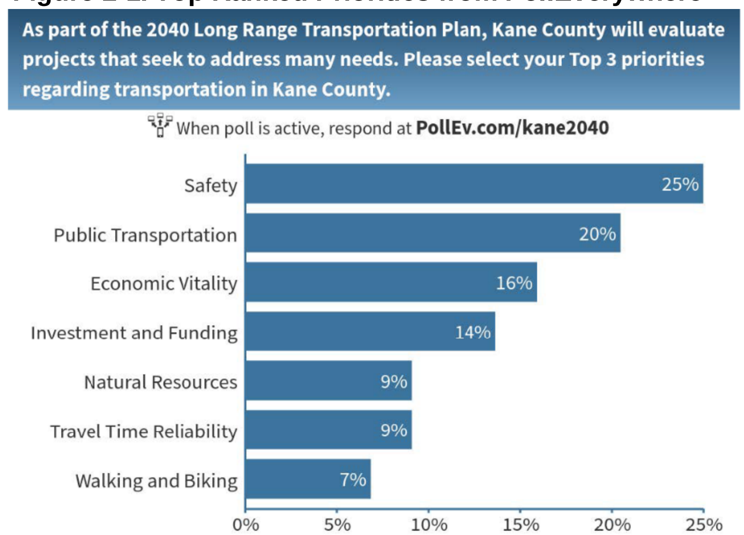
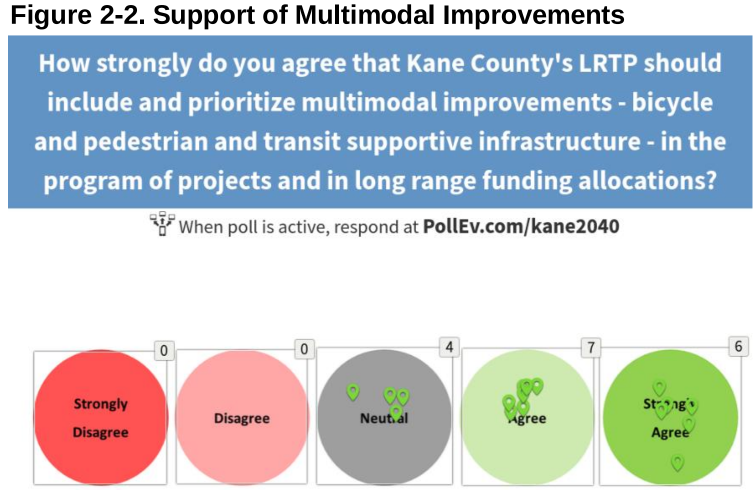


Figure 2-2. Support of Multimodal Improvements



In terms of funding future transportation improvements, participants were most in favor of bonds, Tax Increment Financing, and impact fees as opposed to other sources (e.g., user fees, VMT tax, and higher gas tax).

Summary

PollEverywhere was helpful in further collecting information and suggestions from the Kane County community. KDOT used the information in developing the LRTP to improve travel mobility within the County.

The information provided and collected in the MetroQuest and PollEverywhere surveys were used by KDOT to develop the LRTP to improve travel mobility within the County. The results were compared to the County's mission statement and transportation goals, as well as used for input on specific projects in the plan.

Mission Statement

The mission statement is: To provide and maintain a safe and efficient transportation system while sustaining the County's vision and values.

Goals and Strategies

Safety Goal

Provide a multimodal transportation system that is safe for all users.

Strategies:

- Use the relationship between land use and transportation to direct coordinated development and efficient use of resources.
- Preserve and protect potential and existing rights-of-way for transportation systems.
- Balance the need for additional capacity with the need to preserve and maintain the local area's character while applying Context-Sensitive Designs (CSDs).

Personal Mobility Goal

Develop a balanced intermodal transportation system that adds to the available travel options, increases personal mobility, and offers alternatives to the Single Occupancy Vehicle.

Strategies:

- Promote and consider designs and roadway improvements that result in safe, attractive, and comfortable access and travel for all users.
- Consider transit and multimodal supportive infrastructure and connectivity when designing and improving roadway facilities.
- Develop a comprehensive network of safe, local, and regional bicycle and pedestrian systems through coordinated planning efforts at local and regional levels.
- Promote a safe, convenient, and Americans with Disabilities Act-compliant accessible public transportation system that is both cost and time competitive and serves local and regional trips.

Cooperative Planning Goal

Coordinate local and regional transportation planning to provide a transportation system that accommodates both existing and future travel demands and supports County and regional land use plans and policies.

Strategies:

- Preserve and protect potential and existing rights-of-way for transportation systems.
- Balance the need for additional capacity with the need to preserve and maintain the local area's character while applying CSDs.
- Encourage Transit-Oriented Development (TOD) and Transit Corridor Planning strategies in new developments or redevelopment projects where appropriate.
- Encourage public involvement as part of the transportation planning process, and provide an updated website to keep the public informed.

Quality of the Environment Goal

Maintain and improve the quality of the environment while providing transportation services and facilities.

Strategies:

- Pursue and encourage improvements that reduce congestion and improve air quality.
- Investigate and use relevant Transportation Control Measures to improve and protect the air and environmental quality of Kane County.
- Design and construct transportation improvements in a manner and method that preserves and protects the natural resources of Kane County.

System Efficiency Goal

Reduce the growth in congestion and vehicle miles traveled, while preserving the County's transportation system and its carrying efficiency.

Strategies:

- Prioritize maintenance of facilities in order to preserve the public investment and efficiency of the transportation system.
- Investigate, promote, and institute relevant Transportation Control Measures (Intelligent Transportation Systems [ITS], TDM, TSM, etc.) to improve traffic mobility and to optimize system efficiency.
- Provide continuous routes between activity centers and improved access to Tollway facilities.
- Design major roadways to consolidate access and provide connectivity for motorists, pedestrians, cyclists, and public transportation users.
- Consider capacity improvements that support economic development and address recent and projected growth that is supported by the County's planning efforts and policies.
- Promote and support land use planning, policies, and decisions that minimize vehicle trip generation and vehicle miles traveled.

Planning Assumptions

Using the goals and strategies, the development of the Kane County 2050 Transportation Plan considers certain assumptions. The following assumptions help define the parameters used at the onset of the planning process and put into context the factors that would existing during the planning period:

- The Transportation Plan was based on the year 2050 forecasts for population and employment as prepared by CMAP. The 2050 forecasts serve as the planning horizon for the study. The Kane County traffic demand model with the socioeconomic forecasts will serve as a basis for developing the future forecasted traffic.
- The CMAP 2050 socioeconomic forecasts generally reflect projected land use activity from the municipalities throughout Kane County. In addition, the forecasts also consider regional transportation improvements. These regional improvements are related to the socioeconomic forecasts by connecting mobility and accessibility factors that the improvements represent. No adjustments have been made to the regional forecasts developed by CMAP within Kane County.
- Overall demographics and income levels will not change dramatically relative to the rest of the Chicago metropolitan area. As an example, car ownership trends by household would remain relatively consistent by demographic group and that trip generation rates would not change significantly from rates referenced in year 2015.
- Public transportation in Kane County would continue to operate at current levels of service. Public transportation services from Metra, Pace, and paratransit services would continue to serve Kane County residents at current levels of service. It is anticipated that the public transportation system would capture the same proportional share of travel demand in the future as it does in year 2015.
- Federal, state, and local revenues will remain somewhat constant. This would imply that the ability to finance transportation improvements would be similar to the County’s existing funding levels. If Kane County would support additional revenue sources, then the available funding would increase accordingly.
- LOS D (defined by the Highway Capacity Manual) was the planning LOS performance threshold that is commonly used in urban areas used to determine acceptable performance levels. Drivers on facilities operating at LOS D would experience a slight reduction in travel speed. At intersections, the influence of congestion and resultant delay are noticeable.

Land Use and Access Management

The Federal Highway Administration (FHWA) defines access management as the process that provides access to land development while simultaneously preserving the flow of traffic on the surrounding system in terms of safety, capacity, and speed. Properly implemented access management will improve traffic operations, increase highway safety, and minimize adverse environmental impacts. Unplanned land development and uncontrolled access connections reduce highway safety and capacity and result in early obsolescence of the roadway. Unregulated access increases accidents, delay, and congestion for users of the highway systems within Kane County.

Access management in Kane County is controlled by the KDOT *Permit Regulations and Access Control Regulations* approved by the County Board on January 14, 2004 and implemented by February 2004. These regulations provide updated policies and detailed procedures for permitting access to County highways.

The guiding philosophy of the Access Control Regulations is to provide safe, efficient transportation systems compatible with land use by controlling access on roadways to minimize curb cuts and local street intersections and maintaining existing roadway capacity. The highest degree of access control is applied to the County Limited Access Freeways (CLAFs)[2] and major arterial roads with less access control on minor arterial and collector roads.

The regulations apply different degrees or levels of access control depending on the type and operational characteristics of the highway in question, in combination with the type and intensity of the land use generating the need for access. Therefore, the desirable intersection spacing, and access guidelines vary according to the type of highway and proposed land use. Three levels of access control are described in the regulations:

Level 1—High level of access control based upon conservative parameters of driver behavior, vehicle performance characteristics, and a high margin of safety. This level of access control is applied to major access points on Strategic Regional Arterials (SRAs), CLAFs, and high-speed rural highways.

Level 2—Moderate level of access control based on normal or median parameters for both driver behavior and margin of safety. This level of access control is applied to minor access on all highways and major access on urban/suburban arterials.

Level 3—Minimum guidelines typically representative of physical or geometric constraints or considerations, not based on driver or vehicle performance criteria. This level of access control is applied to all minimum use access on County highways.

The use of a particular access control guideline is based on the type of land use generator and the classification of highway on which the generator is located. The operating speed of the subject highway is built into the individual access guideline. Table 3-1 is a guide to application of the various levels of access control.

[2] Note that the term “freeway” used here does not correspond with this functional classification as described later in the report. County Limited Access Freeways (CLAFs) consist of portions of five major arterial roadways in the county (Fabyan Parkway, Kirk Road, Dunham Road, Orchard Road, and Randall Road).

Table 3-1. Access Guidelines Application Matrix

Traffic Generation Movements Per Day	Highway Classification			
	Urban/Suburban	Rural Highway	CLAF & SRA Commercial	CLAF & SRA Residential
Minimum Use				
<10 movements	Access Level 3	Access Level 3	Access Level 3	Access Level 3
Minor Access				
<150 movements	Access Level 2	Access Level 2	Access Level 2	Access Level 2
Major Access				
>150 movements	Access Level 2	Access Level 1	Access Level 1	Access Level 1

Notes:

1. "Major Access" includes all commercial accesses and public streets classified as collector or above, which includes most subdivisions.
2. The County Engineer may in his/her professional discretion elect to apply a different priority level or deviate above or below the standard for a given priority level based on unique property, site development, highway design, and/or traffic conditions.

Source: KDOT Permit Regulations and Access Control Regulations, Table 1, Page 2-17.

Location of Access Points

Guidelines were also established regarding the location of access points. The first guideline provides that access points be located so that ingress and egress maneuvers will not severely degrade safe and efficient traffic movements and operations on the County highways. The locations should provide adequate sight distance by avoiding placement of access points on a horizontal curve or just below a crest of a vertical curve. If the sight distance is not adequate for specific movements, those movements will not be allowed. Whenever possible, access should be provided via existing cross streets in lieu of additional County highway access points and will be prohibited when a property abutting a county highway has frontage on one or more roadways and reasonable access can be provided from the roadway. New access locations should be aligned with access points for existing development on the opposing side of the highway. Adjacent access points should be spaced to ensure that conflicting movements do not overlap and that safe and efficient traffic movements and operations will be maintained. The distance between adjacent access points should be spaced far enough apart as to provide for full left-turn tapers and storage bays for both access points to the county highway. The County may require joint or shared access facilities. Access points in the vicinity of interchanges, interchange ramp terminals, crossroads, frontage roads, and service drive connections shall be restricted to minimize hazardous and congested conditions. Finally, access points shall be located to provide safety and convenience for pedestrians, bicyclists, and other users of the roadway rights-of-way.

Number of Access Points

A set of guidelines is specified for the number of access points to be provided. Each development or property regardless of the number of parcels is limited to one access point. When subdividing existing developed parcels to create new lots, no additional access will be permitted. An additional access point may be permitted if it is demonstrated that the LOS at the primary access point would be substantially improved, and the additional access point will not adversely affect traffic safety or operations on the county highway. If the approved access is signalized, no additional full access points are allowed. A right-turn only access point may be permitted, provided that the property owner demonstrated the need and complies with all other policies. The access guidelines for abutting property located at the intersection of two county highways provide that the access point shall be permitted on the county highway with lower volumes. For corner lots at an intersection where only one of the abutting roads is a county highway, access should be provided to the other intersecting road rather than the county highway.

Internal Circulation

Providing adequate internal circulation within a development aids in the operation of major facilities. The County recognizes this need by specifying a guideline that when property abutting a county highway is to be developed, direct access to the county highway shall not be used in lieu of an adequate internal traffic circulation system. Access will not be permitted if internal traffic patterns are not acceptable based on overall traffic circulation, drive-in reservoir and parking space capacities, internal turning movements, and projected trip/parking generation rates. No access shall be permitted if such access would require backing or turning maneuvers onto a county highway or would result in parking on a county highway or within the right-of-way of a county highway.

Transportation Connectivity

The phrase "transportation connectivity" refers to the continuity of the roadway system within each of the functional classifications and the compatibility of design and capacities of the roadways within the county. To ensure continuity, the requirements for main line capacity, functional classification, roadway design, and access must be balanced into a roadway system that will provide continuous travel paths and avoid abrupt transitions between these elements along the length of the roadway.

System continuity along an individual roadway may address the alignment, functional classification, the length of the roadway, and the roadway cross section. The methodology for estimating lane requirements for the 2050 roadway system are initially based on a segment-by-segment assessment of traffic volume and capacity derived from the computerized travel demand model. System continuity requires the selection of a basic number of lanes for a reasonable length of roadway between logical termini.

The connectivity of streets is also a major concern for public transit, and emergency and public service vehicles. Collector streets should be through streets, not winding cul-de-sacs, to provide efficient access for buses, paratransit vehicles, and emergency and public services. The design should afford adequate intersection geometrics to accommodate the turning movements of buses, fire trucks, and public-service vehicles.

Street Standards

Design Requirements

County regulations call for design of access points and accompanying highway improvements complying with the county requirements. The standards and specifications set forth in these regulations are to ensure a safe and efficient highway system for the motoring public. Design features addressed in the regulations are design speed, intersection and driveway sight-distance requirements, access design widths and standards, radius return, angle of intersection, islands, medians, driveway profile, culverts, mailbox turnouts, shoulders, curb and gutter, bike paths, bike lanes, sidewalks, cross-section and materials, traffic control, and onsite design elements.

This section discusses general aspects of road design criteria that should be applied to proposed roads as each project becomes more defined. The recommendation of future roads alone is not enough to ensure adequate transportation infrastructure. These planned improvements must be constructed to design standards to ensure public safety and appropriate investment of public resources. This section provides a general description of preferred practice for road design in Kane County.

Functional Classification

The functional classification of a road describes the character of service the road is intended to provide. The various functional classifications serve two competing functions to different degrees, access to property and travel mobility. Each road will provide varying levels of access and mobility depending on its intended function. When a system is viewed in whole, the objective is to realize an optimal balance between access and mobility functions. The following are definitions for the four general road functional classifications.

- **Freeways and Expressways** are limited-access facilities characterized by their ability to quickly move large volumes of traffic with minimal disturbances. All accesses to freeways is via ramps, and all crossings are grade-separated. Freeways provide for high-speed long-distance trips.
- **Principal and Minor Arterials** are highways that are generally characterized by their ability to quickly move relatively large volumes of traffic with less provision for access to adjacent properties. Arterial highways provide for high-speed travel and longer-distance trips.
- **Collector roads** are characterized by a relatively even distribution of access and mobility functions. Traffic volumes, speeds, and trip lengths are typically lower on collector roads than on arterials routes.
- All public roads and streets not classified as arterials or collectors are classified as **local roads**. Local roads and streets are characterized by numerous points of direct access to adjacent properties. Speeds and volumes are low and trip distances short.

Figure 3-1 shows the schematic relationship between access and mobility functions of streets and highways. The highest classification (freeways) is intended solely for traffic movement and does not provide access to abutting land uses except at interchanges. The lowest category (local street) allows unrestricted access and is not intended to accommodate through traffic. Classifications between these extremes perform a combination of functions with varying emphasis on traffic movement or access. Most of the roads included in this long-range plan are principal and minor arterials.

The proper application of road design criteria depends in part on the functional classification of the road. Not all roadways are created equal. They not only vary in width and design, but also in the function they are intended to perform rather than by their cross section or traffic volume.

Typical Sections

The general design criteria for the design of a road depends in part on its functional classification and its location, either urban/suburban or rural. The typical cross-section describes requirements for width of traveled way, median type and width, curb or shoulder treatment, sidewalks, bicycle lanes, clear zones, and grading.

Urban/Suburban Arterials and Collectors

Figure 3-2 shows typical cross-sections for urban/suburban arterial roads and collector roads. A large number of commercial driveways and possibly pedestrian or bicycle traffic can be expected along these facilities. Center turn lanes are recommended wherever there are frequent entrances into high-volume commercial driveways. Where center turn lanes are not provided, left-turn lanes should be provided at all major intersections. In locations with an expectation of higher speeds and with higher volumes, it is recommended that right-turn lanes also be provided.

Parking should be prohibited along arterials. Signalized intersections should be spaced 0.25 mile apart at a minimum. For SRAs, 0.5-mile spacing of signalized intersections is preferred. Sidewalks to accommodate both pedestrians and bicycles may be provided to separate them from vehicle traffic.

Rural Arterials and Collectors

Figure 3-3 shows typical cross-sections for rural arterials and collector roads. In rural areas with widely dispersed access points, a rural cross-section is recommended. For higher-volume roads through less developed rural areas, a divided cross-section is recommended. Signal spacing on rural arterials should be maximized with a minimum of 0.25-mile spacing.

Intersection Channelization

Channelizing an intersection refers to the provision of lanes dedicated to each movement, through vehicles, left turners, and right turners. Many existing intersections provide for exclusive lanes only for high-volume turning movements. As new projects are designed and constructed, KDOT, as a matter of policy, is providing full channelization at intersections. Doing so provides separate lanes for the through, left, and right movements. This separation enhances vehicle safety, increases intersection capacity, and provides for more flexibility when setting signal timings. Providing for full channelization does require additional right-of-way than a more restricted design and may present challenges for pedestrian movements.

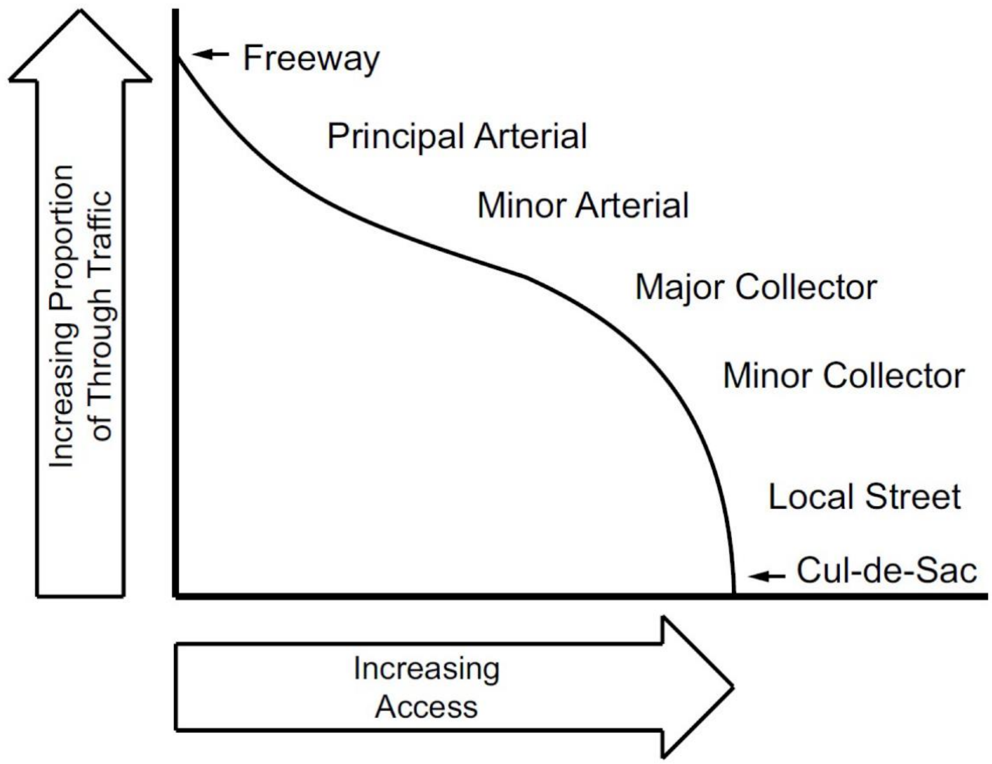
Right-of-Way

Right-of-way guidelines have been defined by functional class to ensure appropriate land acquisition for future widening of roadways. These definitions incorporate land for the road cross-section, including the traveled way, median, parking, shoulders, sidewalks, drainage, and grading. Acquisition of right-of-way could occur before widening is warranted, allowing land to be set aside before development occurs. Often, early acquisition is the most cost-effective way to preserve right-of-way for road widening. Table 3-2 shows right-of-way guidelines for county roads by road functional classification.

Table 3-2. Minimum Right-of-way Guidelines for County Roads by Road Functional Classification

Functional Classification	Right-of-Way
SRAs and County Freeways	170 feet to 200 feet
Principal Arterials	120 feet to 150 feet
Minor Arterials	120 feet
Collectors	80 feet to 120 feet
Local	66 feet to 80 feet

Figure 3-1. Access and Mobility Function of Highways



Source: A Policy on Geometric Design of Highways and Streets 2018

Access and Mobility Function of Highways

Figure 3-1
Kane County 2050 Transportation Plan

Figure 3-2. Urban/Suburban Typical Cross-Sections

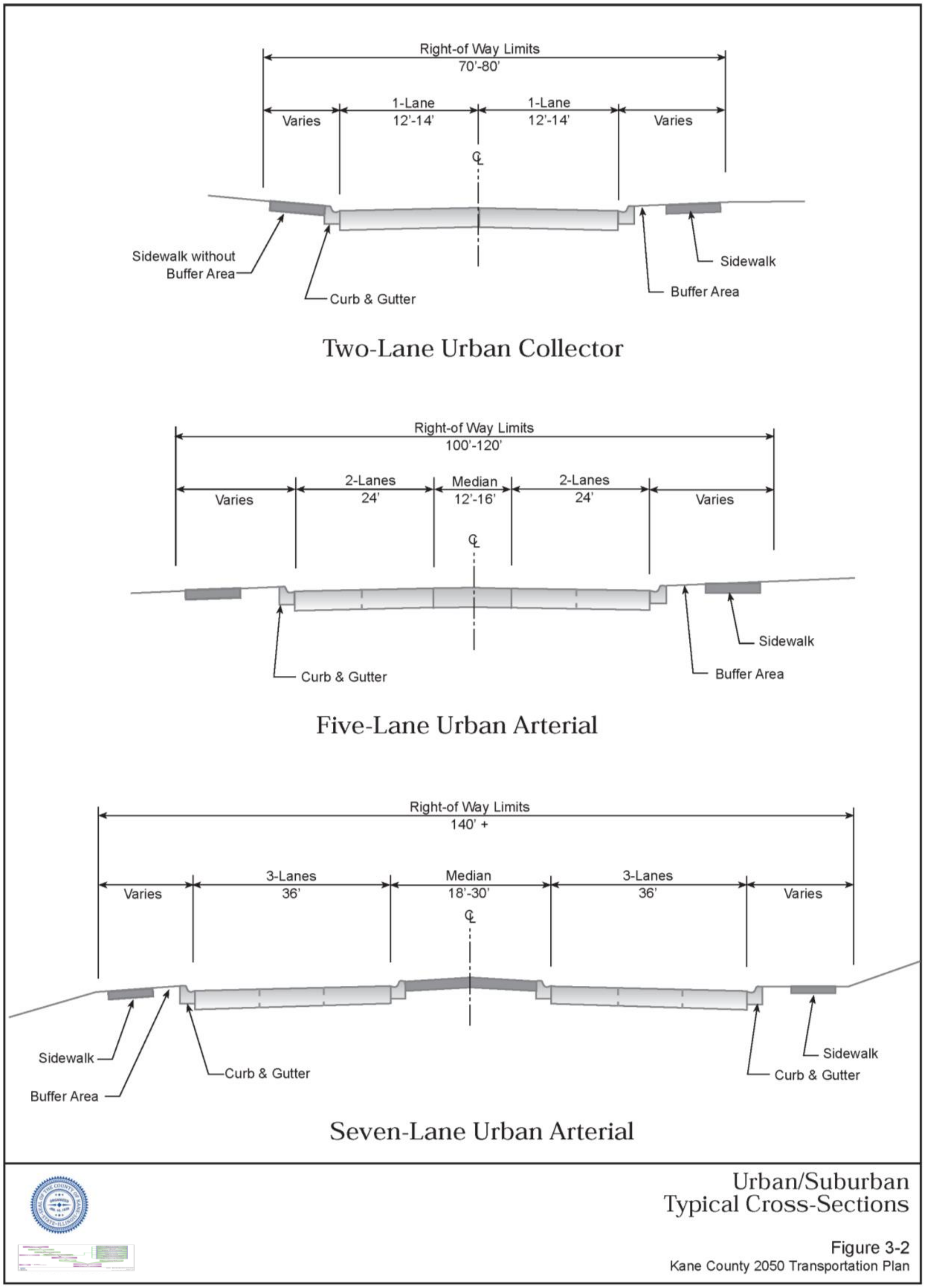
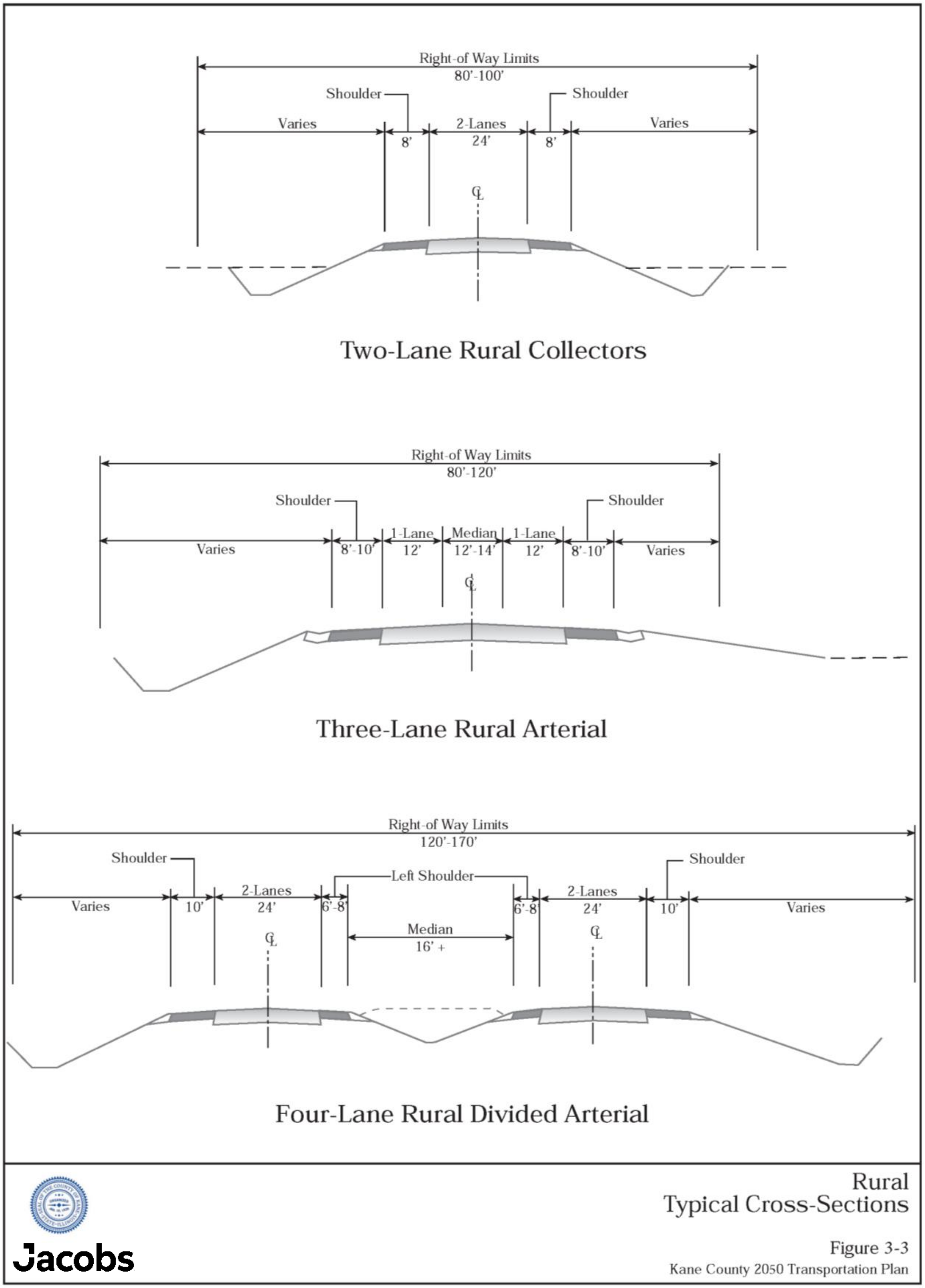


Figure 3-3. Rural Typical Cross-Sections



The Role of Functional Classification

Creation of a system whereby different roadways are engineered to handle varying types of demand is essential in circulation planning. The purpose of having a functionally classified highway system is not only to recognize existing travel patterns, but to reinforce and control the patterns so that there is some established order in the county's traffic flow. If a smoothly functioning system cannot be established, then drivers seeking short cuts on less-congested routes will constantly be diverting on neighborhoods streets that are not designed to handle heavy traffic. Section 3, Land Development and Roadway Access, discussed principles of functional classification in Kane County.

Level of Service

Traffic service is usually measured in terms of LOS. For roadway segments, average delay and speed enter into the LOS determination along with other factors. LOS measures the quality of traffic service and may be determined for each roadway segment on the basis of delay, congested speed, volume to capacity (v/c) ratio, or vehicle density by functional class. The various levels of service for roadway segments are defined as follows:

- **LOS A** describes primarily free-flow operation at average travel speeds, usually about 90 percent of the free-flow speed for the arterial classification.
- **LOS B** represents reasonably unimpeded operations at average travel speeds, usually about 70 percent of the free-flow speed for the arterial classification.
- **LOS C** represents stable operations; however, ability to maneuver and change lanes in mid-block locations may be more restricted than at LOS B, and longer queues, adverse signal coordination, or both, may contribute to lower average travel speeds of about 50 percent of the average free-flow speed for the arterial classification.
- **LOS D** borders on a range in which small increases in flow may cause substantial increases in delay, and hence decreases in arterial speed. Average travel speeds are about 40 percent of free-flow speeds. LOS D is often used as a limiting criterion for design purposes.
- **LOS E** is characterized by significant delays and average travel speeds of one-third of the free-flow speed or less. LOS E is sometimes accepted as limiting for design criterion when restricted conditions make it impractical to consider a higher LOS.
- **LOS F** characterizes arterial flow at extremely low speeds, below one-third to one-fourth of the free-flow speed. Intersection congestion is likely at critical signalized locations with high delays and extensive queuing. LOS F is never used as a design standard. It represents a condition that is intolerable to most motorists.

For segments, the LOS is based on the v/c ratio. Extreme congestion is considered to be LOS F with a v/c greater than 1.0. Severe congestion corresponds with LOS E, which has a v/c greater than 0.79 but less than one. Moderate congestion corresponding with LOS D has a v/c greater than 0.66 but less than or equal to 0.79.

For signalized intersections, both LOS and v/c ratio are indicative of an intersection's operation. LOS is defined in terms of control delay per vehicle. Control delay includes a vehicle's initial deceleration delay at a signal, queue move-up time, stopped delay, and final acceleration delay. Overall intersection LOS ranges from A (less than 10 seconds of control delay per vehicle) to F (greater than 80 seconds of control delay per vehicle), see Table 4-1. LOS C or D for the entire intersection and for individual movements is generally considered desirable for peak-hour operation in urban/suburban areas. The v/c ratio compares the demand flow rate of traffic approaching an intersection to its practical capacity. This is also a measure of the operating characteristic of a signalized intersection. Intersections with critical v/c ratios approaching or slightly exceeding 1.0 represent locations where queues develop, and vehicles wait through more than one cycle to clear the intersection. For planning-level analysis, the target v/c is less than 0.90.

Table 4-1. LOS Criteria for Signalized Intersections

LOS	Control Delay per Vehicle (seconds/vehicle)
A	≤10
B	>10-20
C	>20-35
D	>35-55
E	>55-80
F	>80

Source: *Highway Capacity Manual HCM2000*, Transportation Research Board (TRB), Exhibit 16-2

For unsignalized intersections, LOS is also used to measure intersection operations. However, LOS thresholds for unsignalized intersections are different than those for signalized intersections. Overall intersection LOS for unsignalized intersections range from A (less than 10 seconds of control delay per vehicle) to F (greater than 50 seconds of control delay per vehicle), see Table 4-2. The LOS for a two-way stopped controlled intersection is based on the minor leg or stopped approach. For a planning-level study, intersections with a LOS D or better are considered acceptable.

Table 4-2. LOS Criteria for Unsignalized Intersections

LOS	Control Delay per Vehicle (seconds/vehicle)
A	0 – 10
B	> 10 – 15
C	> 15 – 25
D	> 25 – 35
E	>35 – 50
F	> 50

Source: *Highway Capacity Manual HCM2000*, TRB, Exhibit 17-22

Congestion Management

Traffic congestion and travel delay are among the most visible manifestations of an area's transportation problems. Drivers experience congestion for the most part as a personal annoyance although traffic congestion is a problem that wastes time, consumes energy resources, and contributes to deficient air quality. Businesses are adversely affected by congestion if it discourages potential clients or customers.

Traffic congestion is typically confined to the morning and evening peak hours of travel, but a large proportion of daily travel normally occurs during these peak periods.

Expanding the capacity of roadways is not the sole solution to congestion. Congestion may be alleviated by actions taken to improve both the supply side and demand side of the transportation equation—referred to as TSM and TDM.

New roadways, bridges, and highways built to relieve congestion satisfy deficient supply (capacity) of the roadway system and also provide for latent and diverted travel demand. The use of alternate modes and land use regulations also contribute to an overall program to manage traffic congestion. Other supply-side actions may include expansion/channelization of critical intersections, access control, advanced traffic control/surveillance systems, traffic incident management, and user information distribution.

Congestion is most prevalent during weekday morning and evening peak hours and is most evident at intersections, which are the constricting points in the roadway system.

Intersection modifications such as provision of turn lanes, channelization to separate conflicting traffic movements, or improved signing, marking and modification to existing signalization (i.e., signal heads, re-timing, re-phasing, introduction of adaptive traffic signal control, etc.) are a few of the relatively low-price/impact solutions to intersection congestion problems. Also, in recent years, non-traditional intersection/interchange concepts such as Modern Roundabouts, Continuous Flow Intersections, and Diverging Diamond Interchanges have been promoted by FHWA and are being brought into wider use across the country. Through promoting yield and free-flow operations for left-turning movements, these treatments provide a substantial reduction in delay over more traditional intersection improvements.

However, congestion can also occur at less-frequent times such as during special events (i.e., Kane County Cougars baseball games, large Kane County Fairgrounds events, large church events); unanticipated emergency incidents such as major crashes, road/bridge closures, and major evacuations; as well as traffic impacts related to construction/maintenance activities (i.e., lane/road closures, signal outages, etc.). Certain TSM (advance traffic control and surveillance) improvements and strategies such as notification through computer-aided dispatch, special event signal timing, video monitoring adaptive traffic signal control, deployment and control of dynamic message signs, etc. coordinated through the County's Arterial Operations Center would provide a substantial reduction in delay compared to current traditional traffic management approaches.

Access Management

Management of access to area roadways is yet another method of improving the ability of the system to satisfy mobility requirements. Properly implemented access management will result in improvements to traffic operations, increase highway safety, and minimize adverse environmental impacts.

Each new driveway that is located on an arterial reduces the arterial's traffic-carrying capacity. After several new driveways have been installed, it often becomes clear that turning traffic has a negative impact on traffic speeds on the arterial. Studies indicate that average travel speeds during peak hours are considerably higher on well-managed roads than on roads that are less well-managed, even though the two types of roads carry approximately the same number of vehicles.[3]

Specific techniques applied in access management are addressed in Section 4, Land Development and Roadway Access, of this document.

Transportation System Management

TSM is the concept of more efficiently using existing transportation systems by means other than large-scale construction. Just as TDM strategies are aimed at managing transportation *demand,* TSM strategies are directed at managing the transportation *system*. Some categories of actions that compose TSM are:

- Physical improvements to roadways, intersections, and interchanges such as lane or shoulder widening, channelization, grade separations, and removal of restrictive segments that prevent full utilization of capacity
- Advance traffic control and surveillance systems
- Traffic incident management
- Preferential or exclusive lanes for transit and/or high-occupancy vehicles

[3] Center for Transportation Research and Education (CTRE), Iowa State University. 2000. *Access Management Handbook*. Prepared for the Iowa DOT, the Safety Management System (SMS) Coordination Committee, and the Access Management Task Force. October.

- Provisions for parking and loading
- Pedestrian and bicycle facilities

Transportation Demand Management

TDM is not one action, but rather a set of actions or strategies, the goal of which is to encourage travelers to use alternatives to driving alone, especially at the most congested times of the day. The term TDM encompasses both alternative modes to driving alone and the techniques or strategies that encourage use of these modes.[4] The primary goal of most TDM programs is to reduce commute trips in a particular area and/or at a particular time of day. Program effectiveness varies widely by program type, site, and TDM strategies chosen. In general, the success of a TDM program depends heavily on the extent to which individual employers support the program.

TDM alternatives include familiar travel options such as:

- Carpools and vanpools
- Public and private transit (including buspools and shuttles)
- Bicycling, walking, and other non-motorized travel

TDM alternatives also can include “alternative work hours,” program options that reduce the number of days commuters need to travel to the worksite, or that shift commuting travel to non-peak times of day. Some such programs are flexible work schedules, compressed workweek, and telecommuting.

As indicated above, the success of any of these TDM strategies in reducing peak-period traffic congestion will depend to a great extent on the level of employer participation or encouragement. Experience elsewhere has indicated that rideshare programs, for example, may reasonably be expected to reduce vehicle trips from approximately 2 to 5 percent for a particular traffic generator given a moderate degree of outside support.

Kane County’s Transit Plan[5] and Bicycle/Pedestrian Annual Plan[6] provide additional information about TDM strategies for the County.

Traffic Calming

While *generally* more applicable on lower-volume residential streets, traffic calming is another important element in transportation planning and can be a component of an overall complete street suite of improvements. As defined by the Institute of Transportation Engineers (ITE), traffic calming is:

> *The combination of many physical measures that reduce the negative effects of motor vehicle use, alter driver behavior, and improve conditions for non-motorized street users*.[7]

More broadly defined, traffic calming applies to a number of transportation techniques developed to reduce motorist speed, decrease traffic volumes, increase safety for pedestrians and cyclists, and to educate and increase awareness of the traveling public. The following are some of the “tools” applied in traffic calming:

- Roundabouts
- Turn restrictions and one-way operation

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[4] Comsis Corporation and The Institute of Transportation Engineers in association with Georgia Institute of Technology, K.T. Analytics, Inc. R.H. Pratt, Consultant, Inc. 1993. *A Guidance Manual for Implementing Effective Employer-Based Travel Demand Management Programs*. Prepared for Federal Highway Administration & Federal Transit Administration. November.

[5] http://kdot.countyofkane.org/2040%20Transit%20Plan/KANE%20COUNTY%20LRTP%20Final%20Plan%20(Reduced).pdf

[6] http://kdot.countyofkane.org/Planning%20Documents/Bicycle%20Planning/2019%20Annual%20Bike%20Report%20Draft.pdf

[7] I.M. Lockwood. 1997. “ITE Traffic Calming Definition.” I*TE Journal*, Vol. 67. July.

- Forced-turn channelization
- Median barriers and diverters
- Landscaping/tree-lined streets

As reported by ITE, traffic calming can involve changes in street alignment, installation of barriers, and other physical measures to reduce traffic speeds and cut-through volumes in the interest of street safety, livability, and other purposes. Traffic calming assists in making streets an attractive place to slow down. Reductions in traffic speed and volume, however, are just means to other ends such as traffic safety and active street life.

The County promotes the use of traffic calming techniques where appropriate, and has and continues to pursue the implementation of roundabouts at select intersections across the county.

Effect of Land Use Policies on Transportation

The shape and design of developments play an important role in how much people travel by car. When neighborhoods are compact and many of a person's daily needs can be accommodated by transit, bicycle, or within a few minutes' walk, vehicle trips per household decline rapidly. Supportive land use patterns and site design can result in:

- Reductions in the growth of VMT, pollutant emissions, and energy consumption
- Increased transit use and productivity
- Pedestrianization of activity centers[8]

At higher densities, use of alternative modes of transportation, particularly transit and pedestrian travel, is higher, and per capita passenger vehicle trips and VMT are lower.

There is general consensus regarding the positive relationship between land use density and transportation, and a number of studies have shown a relationship between population density and per-capita auto travel, with less per-capita vehicle travel at higher densities. Higher densities are associated with lower proportions of travel by single-occupancy vehicle, lower vehicle miles travelled, and most strongly linked with higher use of transit and walking modes. However, the success of density in reducing vehicle trips is *also* dependent on the following factors:

1. **Distance to transit**—The location of a development relative to transit can result in a mode shift and therefore reduce VMT. Typically, TODs include residential and commercial centers designed around a rail or bus station and should consider the following design features to optimize vehicle trip reduction:

   a. A transit station/stop located within a 5- to 10-minute walk (approximately 0.25 mile)

   b. A rail station located within a 20-minute walk (approximately 0.5 mile)

   Effects of TOD on Housing, Parking, and Travel[9] reports that TODs have 47 percent lower vehicle trip rates and have 2 to 5 times higher transit mode share.

2. **Location**—The location of a development relative to urban/suburban contexts influences the amount of VMT. Density has a negligible impact on VMT reduction in a rural environment (or Greenfield site, unless it is a master planned community) because jobs and amenities may not be accessible **without** the use of a vehicle. *Growing Cooler*[10] reviewed 10 studies that consider the effect of location on VMT

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[8] *Transit Cooperative Research Program Report 95, 2003*

[9] Transit Cooperative Research Program. 2008. *TCRP REPORT 128 Effects of TOD on Housing, Parking, and Travel*.

[10] Ewing, Reid, Keith Bartholomew, Steve Winkelman, Jerry Walters, and Don Chen with Barbara McCann and David Goldberg. 2007. *Growing Cooler: The Evidence on Urban Development and Climate Change*. October.

and found that infill locations generate substantially lower VMT per capita than do Greenfield locations, ranging from 13 to 72 percent lower VMT.

3. **Mix of uses**—Typically residential and commercial development and the degree to which they are balanced in an area (jobs-housing balance). A mixture of land uses reduces the number of vehicle trips by reducing travel distances and allowing more trips by alternative modes (i.e., cycling, walking, and transit). Trip reduction is further reduced when affordable housing is located in job-rich areas (Modarres 1993; Kuzmyak and Pratt 2003; Ewing, et al. 2010; Spears, Boarnet and Handy 2010).
4. **Design and Walkability**—Neighborhood layout and street characteristics, particularly connectivity, block size, presence of sidewalks and other design features (e.g., shade, scenery, presence of attractive homes, and stores) that enhance the pedestrian and bicycle friendliness of an area.

The 2040 Conceptual Land Use Strategy adopted by the Kane County Board is the framework for the 2040 Land Resource Management Plan. The land use strategies are given for three areas within the county—the Sustainable Urban Corridor Area located in the easternmost portion of the county along the Fox River; the Critical Growth Area located west of the Urban Corridor generally in the center of the county; and the Agricultural/Food, Farm, and Small Town Area in the westernmost portion of the county. Two of the *Smart Growth Principles* from the 2040 Conceptual Land Use Strategy are to create walkable neighborhoods and provide a variety of transportation choices. It is acknowledged that communities are beginning to implement new approaches to transportation planning, such as better coordinating land use and transportation; increasing the availability of high-quality transit service; creating connectivity within the transportation networks and between pedestrian, bike, transit, and road facilities.

The County's 2040 Land Resource Management Plan recognizes the role of all of the 10 smart growth principles, as well as the new Livability Principles recommended by the Partnership for Sustainable Communities, in providing more transportation choices, and creating active and convenient communities that link people to jobs as well as to commercial, retail, and entertainment centers. The County encourages communities to embrace the Smart Growth and Livability Principles to support and create more livable communities, and to reduce the growth in congestion through smart land use decisions.

Introduction

An important prerequisite to transportation planning is an understanding of the components and performance of the existing transportation system. This section describes the existing transportation system in Kane County and summarizes 2015 travel demand, travel desire patterns, and system performance.

Existing Highway System

Major expressways serving Kane County include the Northwest Tollway (I-90) and the East-West Tollway (I-88), both radiating from Chicago. Three U.S. highways and 11 state highways also serve the county.

There are roughly 540 miles of highway (excluding local roads) in Kane County. Figure 5-1 is a map of the existing highway system by jurisdictional classification—Interstate (including Illinois State Tollways), U.S. Highway, Illinois State Highway, and Kane County Highway. Table 5-1 summarizes the mileage of existing highway in each jurisdictional classification. County highways make up 312 route-miles, or 56 percent of the existing highway system.

Table 5-1. Mileage of all Highways in Kane County by Jurisdiction Classification—2015

Jurisdiction	Route-Miles	Lane-Miles
Interstates	46	196
U.S. Highways	34	77
State Highways	160	418
County Highways	302	706
Total	**542**	**1,397**

Functional classifications of highways in Kane County were discussed earlier in Sections 1 and 2. Functional classifications extend from freeways, expressways, and principal arterials (primarily traffic service) to minor arterials, collectors, and local streets (primarily service to abutting land uses). Figure 5-2 depicts the functional classification of highways in Kane County, and Table 5-2 shows the existing mileage of highways by functional classification. Functional class of just the Kane County highways is shown in Table 5-3.

Table 5-2. Mileage of Highways in Kane County by Functional Class—2015

Functional Class	Route-Miles	Lane-Miles
Freeways	59	247
Principal Arterials	275	808
Minor Arterials	266	577
Collectors	554	1,117
Total	**1,151**	**2,749**

Note: Excludes local streets.

Table 5-3. Mileage of Kane County Highways by Functional Class—2015

Functional Class	Route-Miles	Lane-Miles
Principal Arterials	53	207
Minor Arterials	185	370
Collectors	74	148
Total	**312**	**725**

The SRA system has been developed to serve as a second tier to the freeway system with a focus on throughput capacity. The system is planned to be a comprehensive transportation network that can handle long distance regional traffic. CMAP's latest SRA data (2012) notes that there are more than 1,340 designated miles of SRA routes in the Chicago metropolitan area, of which 91 miles are located in Kane County. Parts of the County highway system that are also designated as an SRA are as follows:

- Orchard Road/Randall Road (SRA 104)
- Fabyan Parkway (SRA 506)
- Kirk/Dunham Road (SRA 407)
- Stearns Road east of Randall Road (SRA 507)

Travel Demand Model

Background

CATS, now CMAP, developed a transportation model of the Kane County transportation system in 1996. After the model was tested and calibrated by CMAP it was applied in the development of the *2020 Transportation Plan* and further used in 2003, 2005, and 2009 to develop the *Kane County 2030 Transportation Plan*, *Kane County Impact Fee Plan,* and *2040 Transportation Plan*, respectively.

The model was updated again in 2019 for use in development of the *2050 Transportation Plan.* Forecasts of 2015 and 2050 households, population, and employment in Kane County were obtained from data developed by CMAP for their *ON TO 2050* Plan. The forecasts, furnished by CMAP for each quarter-section were aggregated into traffic analysis zones (TAZs), and slightly adjusted to reflect local existing conditions and future forecasts for the 2050 Transportation Plan. The forecasts developed for the 2050 Transportation Plan used the most current information available at the time. Many variables go into predicting future population, households, and employment, and forecasts are only the best guess at the time of the assumptions. The assumptions do not provide exact locations, rather general areas of the land uses that will produce the vehicular trips that feed into the travel demand modeling efforts. The travel modeling efforts are performed to develop overall travel demand assessments for the 2050 planning horizon. Results from the modeling efforts are further examined, post-processed, and adjusted to better reflect projected system performance based on local knowledge. As the County moves forward with future planning efforts, development patterns and plans change and the forecasts will be adjusted using the most recent development information and controlled data sources (such as updated CMAP 2050 Regional Transportation Plan (RTP) information and U.S. Census information).

Methodology

The travel demand forecasting process used in Kane County relies on a series of mathematical models incorporating three primary components: (1) trip generation, (2) trip distribution, and (3) trip assignment.

CMAP developed a TAZ system as part of the *Kane County Sub-Area Study, July 1996*. The zone system consisted of 1,379 TAZs representing the Chicago metropolitan area. Of these, 780 TAZs were located within Kane County (Figure 5-3). This is a finer breakdown than the CMAP regional zone structure. Figure 5-

4 depicts the zone system used for the entire metropolitan area, showing the larger external zones outside of Kane County and the external stations on the periphery of the area.

The trip-generation model translates land use and demographic information into the number of trips created by an area. Four trip-purpose categories were used to predict the number of daily vehicle trips: home-based work, home-based other, non-home based, and truck. Estimated trips were calculated based upon TAZ land use information, including population and employment, by type.

The trip-distribution model estimates where trips will be made within the study area. The primary objective is to distribute the total number of trips produced in each TAZ among all possible destination zones. The distribution model used for this study is commonly known as the gravity model. The gravity model assumes that trips between a zone of production and all other TAZs is proportional to the number of attractions in all possible destination TAZs and inversely proportional to some function of the impedance (expressed as travel time) between the TAZs. The number of attractions in a TAZ is correlated with the number and type of employees in the TAZ.

Trip-assignment models assign the distributed volumes of vehicle trips to individual network links representing roadway segments. An equilibrium trip assignment model was used in this study. This process is an optimization procedure that searches for the best combination of the current and previous assignment iterations. Equilibrium is said to be achieved when no trip can reduce travel time by changing paths.

The basic outputs of the travel demand modeling process are travel forecasts expressed as estimated traffic volumes on each segment of the road network. These volume estimates are used to indicate whether the transportation system can adequately serve future developments.

Existing Traffic Demand

The existing traffic model used in Kane County was originally developed and calibrated by the KDOT in 2000 using the TRANPLAN suite of programs. The model development and calibration process is described in detail in *Development and Calibration of Kane County Transportation Systems Planning Model* prepared for the Division of Transportation in 2000. The work closely followed earlier CMAP model development reported in *Kane County Sub-Area Study, July 1996*. Further calibration of the updated model was undertaken in 2003 as part of the 2030 Transportation Plan, in 2005 as part of the Impact Fee Plan, in 2009 as part of the 2040 Transportation Plan, and in 2019 as part of the development of the 2050 Transportation Plan. The travel demand model developed for this project was determined to meet or exceed the accepted criteria for validation/calibration of a tool of this type.

Figure 5-5 shows ranges of existing (modeled 2015) Average Daily Traffic (ADT) on highways in Kane County. The 2015 ADT values were based on volumes produced by the traffic assignment model and generally correspond with the actual counts on maps published by the Illinois Department of Transportation (IDOT) Office of Programming and Planning. Higher-volume highways are located predominantly in the easternmost portion of the county. The heaviest traveled routes include the I-90 and I-88, Randall Road, the Carpentersville/Dundee/North Elgin area, and Tri-Cities area.

Commercial vehicle (truck) traffic is also an important consideration in the analysis of current transportation facilities and in developing future plans. IDOT provided data regarding the daily volume of heavy commercial vehicle traffic on state and federal routes in Kane County. As would be expected, the tollways carry a large percentage of commercial traffic, but truck traffic was also heavy on portions of IL 47 and IL 64.

Existing Travel Desires

Examination of travel desires is especially useful in planning transportation facilities. This analysis technique considers the travel desires of motorists regardless of the underlying traffic network. By assigning traffic to a network resembling a spiderweb that is unconstrained in terms of roadway availability and capacity, the trips follow a direct path from origin to destination. The travel desires are shown as bands, with the width of the band proportional to the traffic volume on that link.

In order to portray travel desires, the 780 CMAP TAZs within Kane County were aggregated into 15 larger zones. The trip table also was compressed to conform to the modified zone structure. Connecting the centroids of adjacent zones created a “spiderweb” network. A graphic portrayal of travel desires was produced by assigning the base year (2015) daily vehicular trips to the spiderweb network (Figure 5-6).

The prominent travel desire is oriented in a north-south direction in the eastern part of the county through urbanized areas along the Fox River, which coincides with the largest concentration of development in the County. The north-south travel desires appear to be a combination of trips originating in and destined to locations in the urban corridor, as well as regional trips traveling through the county. In general, travel demand drops off considerably toward the western parts of the county. Another trend is the travel-desire pattern between Kane and surrounding counties. The following list highlights some of these travel patterns:

- Northwest-southeast direction in the northern portion of the county between Kane County and McHenry and Cook counties.
- East-west direction in the central portion of Kane County along the eastern border between Kane and DuPage counties, particularly in the vicinity of Illinois Tollway facilities.
- Northeast and southwest direction in the southern portion of the county between Kane County and Kendall and DuPage Counties.

This set of travel desires indicates the importance of examining travel demand in relationship to the surrounding Counties. The roadway system that is in place accommodates these travel desires as follows:

- The Jane Addams Tollway and US 20 support northwest-southeast directional movement in the northern portion of the county.
- IL 64, IL 38, and Fabyan Parkway support the east-west directional movement in the central portion of the county.
- I-88/IL 56/US 30 and IL 59/US 34 support the northeast-southwest directional movement in the southern portions of the county.

Performance Measures

Performance measures were established to assess the ability of the transportation system and its components in meeting set performance goals. This type of technical evaluation was used to evaluate system conditions in the study base year and for the year 2050. Three categories of performance were used to analyze performance:

- Traffic service measures
- Congestion measures
- Traffic safety measures

The basic tool used in calculating the performance measurements for both the existing and future transportation networks was the travel demand model.

Traffic Service Measures

Traffic service measures match a calculated performance value such as speed or travel time to a corresponding level of congestion. VMT is a facility-based measure indicating system usage. It is the product of traffic volume over a specified length of highway. Vehicle hours of travel (VHT) is a user-based measure indicating the travel time spent from origin to destination. Summing the travel times of vehicles using a segment of highway produces VHT. Another traffic service measure is vehicle hours of delay (VHD). The delay function (VHD) can be calculated for each link by comparing the travel time produced at desirable speed for a particular roadway as defined by its functional classification to the congested time that results from the traffic assignment. VHD is a product of traffic volume multiplied by the change in travel time. The system-wide delay can be calculated by summing delays for all links. Separate summaries may be produced by functional class or by individual route.

Another measure used to evaluate traffic performance is travel speed. Travel speed is a measure that evaluates the operating characteristics of a facility. The travel speed measure can be determined by comparing the VMT and VHT by roadway segment.

Congestion Measures

Congestion is generally measured in terms of LOS and the v/c ratio. Definitions of LOS for both roadway segments and intersections were presented in Section 1. As explained, LOS on roadway segments is described by operating speed and delay experienced by motorists. For purposes of long-range planning, the ratio of v/c is often used as a surrogate measure to estimate the level of congestion on each facility segment in the travel model output. This measure of congestion is reflective of driver comfort and the degree of maneuverability within the traffic stream. Table 5-4 describes the v/c ratios used for the level of congestion categories.

Table 5-4. Level of Congestion Measures

Level of Congestion	Max v/c
Little or none	>0.66
Moderate	0.79
Severe	1.00
Extreme	>1.00

Source: *Highway Capacity Manual, TRB Special Report 209*, Table 7-1. Levels of congestion correspond generally with LOS C or better through LOS E

Traffic Safety Measures

Among transportation performance criteria, traffic safety is most universally accepted. Therefore, a quantitative index or measure of safety performance is appropriate as one of the basic performance measures for the Kane County transportation system.

Safety has often been discussed only in general or qualitative terms. To include safety as a more useful performance measure, it is desirable to quantify safety in readily understandable terms. Of course, any effort to quantify safety must be fully supportable. With the recent release of the first edition of FHWA's *Highway Safety Manual*, there are now widely accepted tools for engineers to use to quantify the potential for reductions in crash frequency and severity when making transportation facility design and operations decisions. Highway safety can best be characterized by the number of highway crashes and the resulting injuries and fatalities that might occur or be expected to occur over a given time. Developing a highway safety performance measure thus becomes an exercise in relating basic transportation system features and attributes to an expected number of highway crashes. There are a number of basic, well-established principles relating highway safety to elements of the highway. These include (1) the relationship of vehicular traffic volume to crash frequency and (2) differences in the safety performance of different highway types.

The following are recommended safety strategies that Kane County is in the process of pursuing:

1. Adopt AASHTO *Highway Safety Manual* methodology for crash prediction for determining necessary safety elements/countermeasure for all maintenance and construction projects.
2. Apply new standards for design of all new and modernized traffic signal installations for increased conspicuity and target value of traffic signal faces—"one signal head per lane/center of lane" and backplates on all signal heads at high speed (45 miles per hour [mph] or greater) locations.

3. Increased pavement marking-line widths and continued evaluation of wet/night pavement marking products.
4. Use of rumble strips and safety edges on highways (pavement resurfacing projects).
5. Use of protected and\or flashing yellow arrow left-turn signalization at high speed (45 mph or greater) locations.
6. Use of zero and/or positive offset left-turn lanes for permitted left turns.
7. Improved pedestrian accommodations, including countdown pedestrian timers, refuge medians, and Americans with Disabilities Act-compliant accessible features.

Existing Traffic Performance Analysis

The traffic performance analysis of the existing Kane County highway system relied on data related to travel demand and existing facilities, as well as measures of effectiveness derived from the County's travel demand model.

Existing Traffic Service Measures

Table 5-5 summarizes the traffic service measures of VMT, VHT, and VHD on all modeled roadways stratified by functional classification, as well as county roads only. In examining the traffic performance of all modeled roadways, principal arterials, which account for 31 percent of the lane-miles within the model, were found to carry the bulk of traffic (approximately 43 percent of VMT) and experience approximately 62 percent of VHD. The same trend is further amplified when looking exclusively at the county roadway network. For county highways alone, principal arterials account for 47 percent of the system lane-miles, but carried approximately 69 percent of traffic and experienced 85 percent of the VHD.

Table 5-5. Modeled Traffic Performance – 2015

	VMT		VHT		VHD	
Functional Class	Miles	%	Hours	%	Hours	%
2015 All Modeled Roadways						
Freeways	2,389,634	17	47,463	9	6,739	5
Principal Arterials	5,957,135	43	240,219	47	91,516	62
Minor Arterials	1,787,438	13	65,276	13	14,714	10
Collectors	3,865,943	28	162,519	32	35,077	24
Totals	**14,000,151**	**100**	**515,478**	**100**	**148,046**	**100**
2015 Modeled County Highways						
Principal Arterials	2,395,884	69	95,479	72	42,032	85
Minor Arterials	1,026,895	30	35,042	27	7,283	15
Collectors	35,645	1	1,527	1	341	1
Totals	**3,458,424**	**100**	**132,047**	**100**	**49,656**	**100**

Existing Congestion Measures

Figure 5-7 illustrates congestion on all highways for 2015, based on daily traffic. Only roadway segments that were found to be operating at LOS D, E, or F are shown. The congestion level has been designated in three categories related to levels of service as follows:

- Moderate Congestion (LOS D)
- Severe Congestion (LOS E)
- Extreme Congestion (LOS F)

When considering all highways in Kane County, 41 percent of route-miles and 45 percent of lane-miles were classified as congested. For just county roads, 39 percent of route-miles and 45 percent of lane-miles were deemed to be congested. The concentration of these roadways was in the eastern part of the county in the vicinity of Carpentersville/Dundee/Elgin, St. Charles/Geneva, and Aurora.

Table 5-6 shows the length and percentage of route-miles and lane-miles at each LOS for all highways and for county highways only.

Table 5-6. Congestion – 2015

	Route-Miles		Lane-Miles	
Level of Service	**Miles**	**%**	**Miles**	**%**
2015 All Modeled Highways				
A	399	33	801	29
B	173	14	389	14
C	137	11	340	12
D	143	12	364	13
E	171	14	424	15
F	189	16	449	16
Total	**1,214**	**100**	**2,767**	**100**
Total Congested*	**504**	**41**	**1,237**	**45**
2015 Modeled County Highways				
A	124	42	248	35
B	38	13	82	12
C	21	7	57	8
D	16	5	40	6
E	26	9	83	12
F	74	25	189	27
Total	**298**	**100**	**699**	**100**
Total Congested*	**115**	**39**	**311**	**45**

*LOS D, E, and F

Figure 5-1. Jurisdictional Classification of Existing Highways - 2015

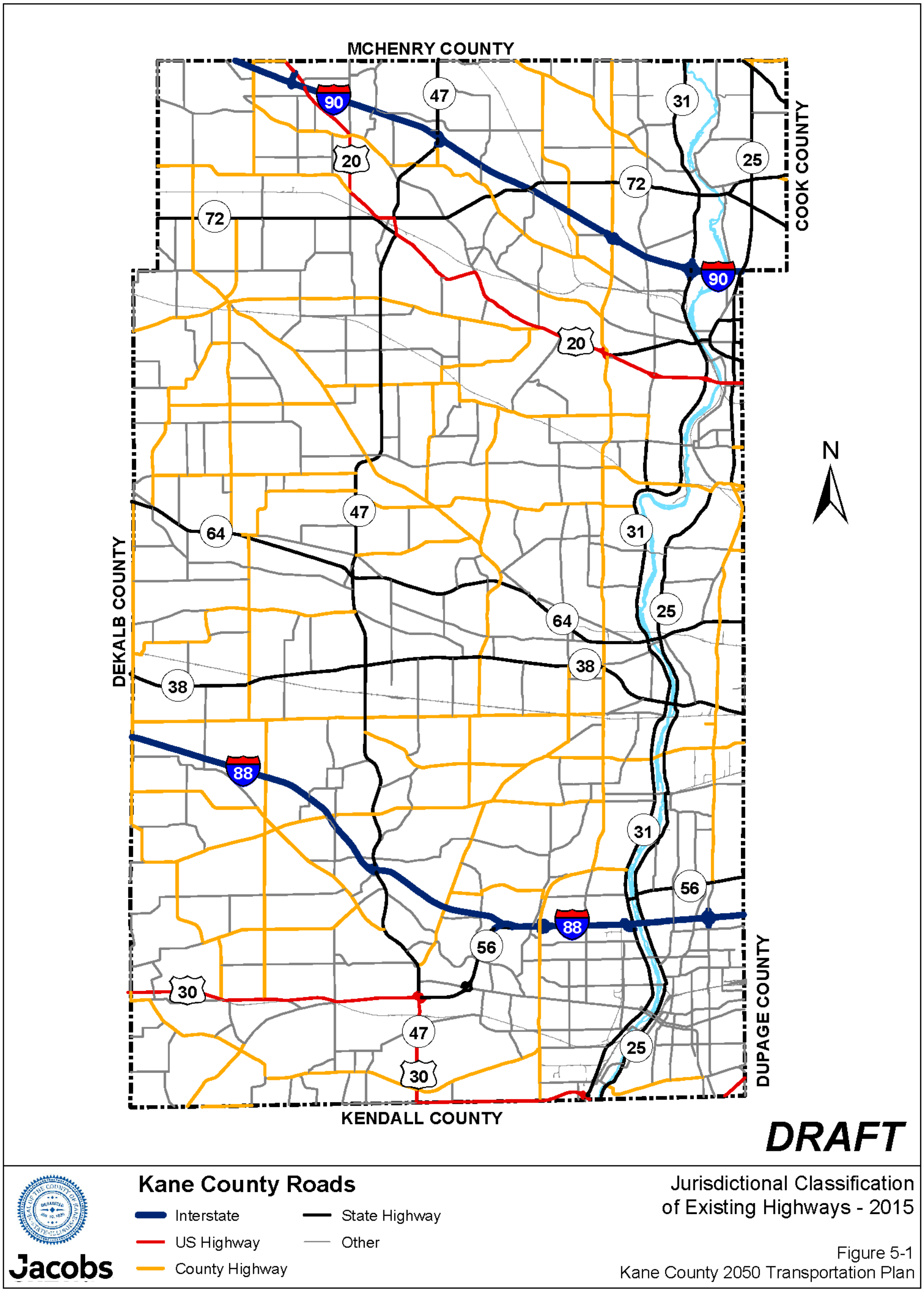

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Figure 5-2. Roadway Functional Classification

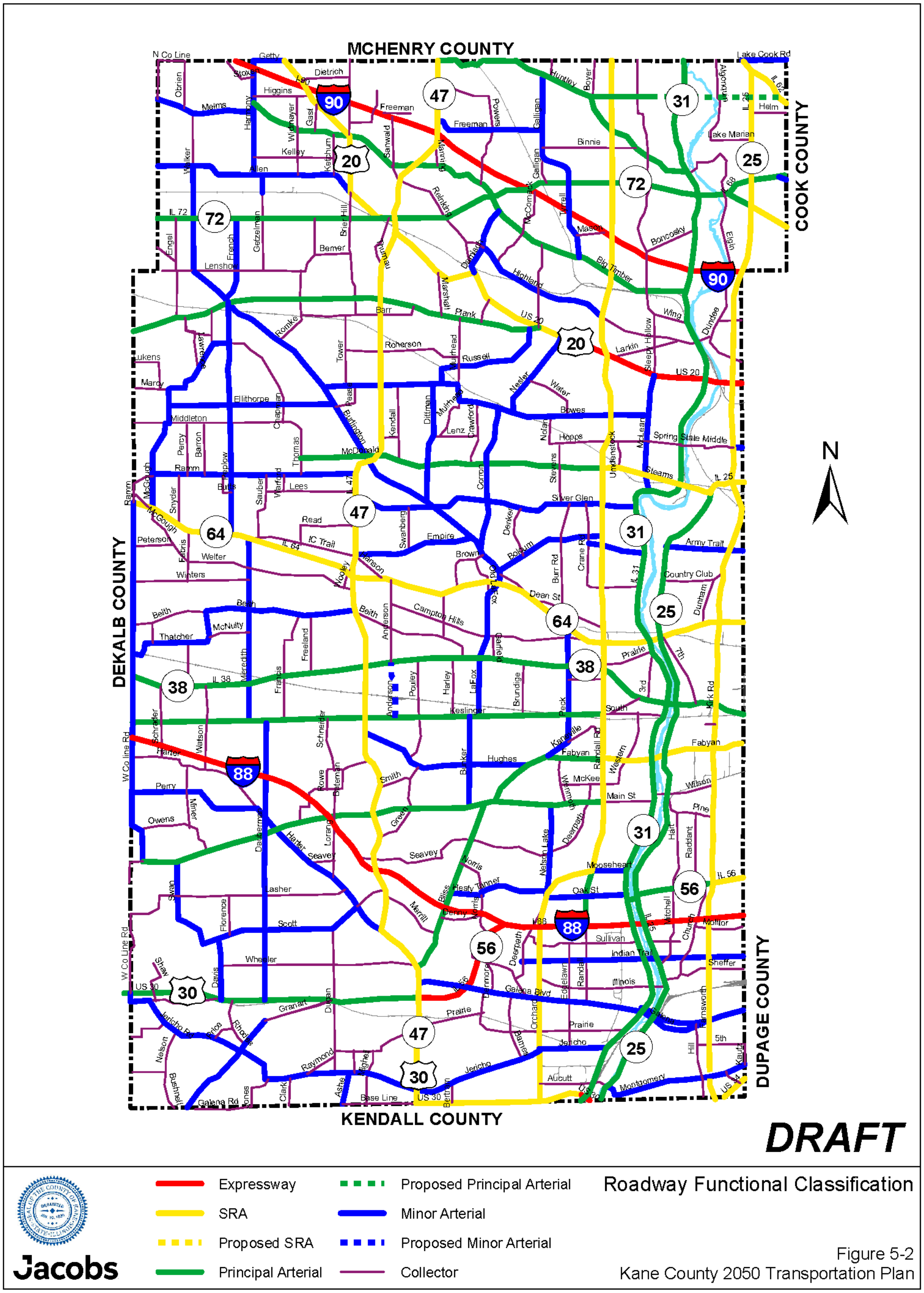

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Figure 5-3. Kane County Traffic Analysis Zones

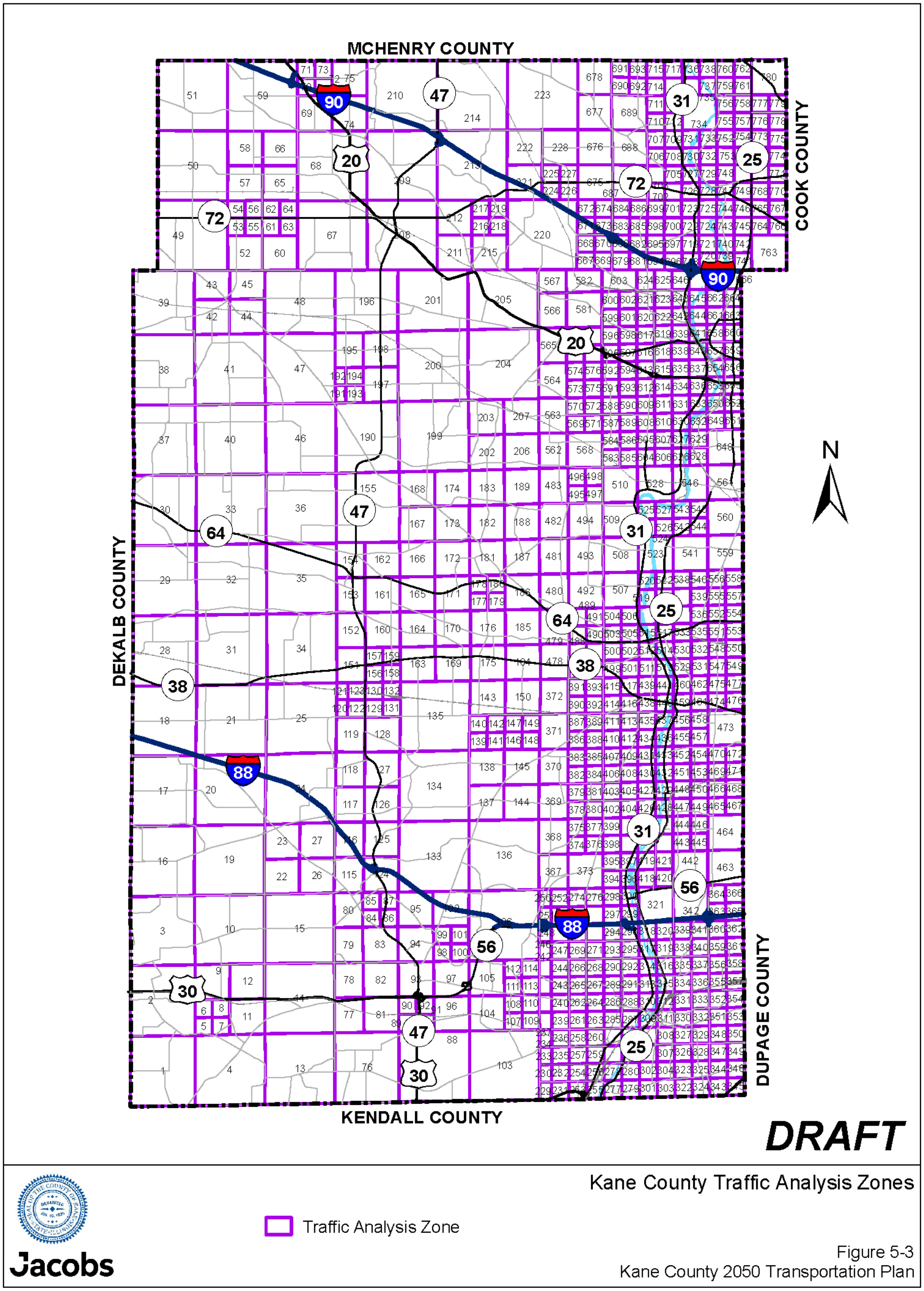

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Figure 5-4. Kane County Travel Demand Model Full Metropolitan Area Traffic Analysis Zones

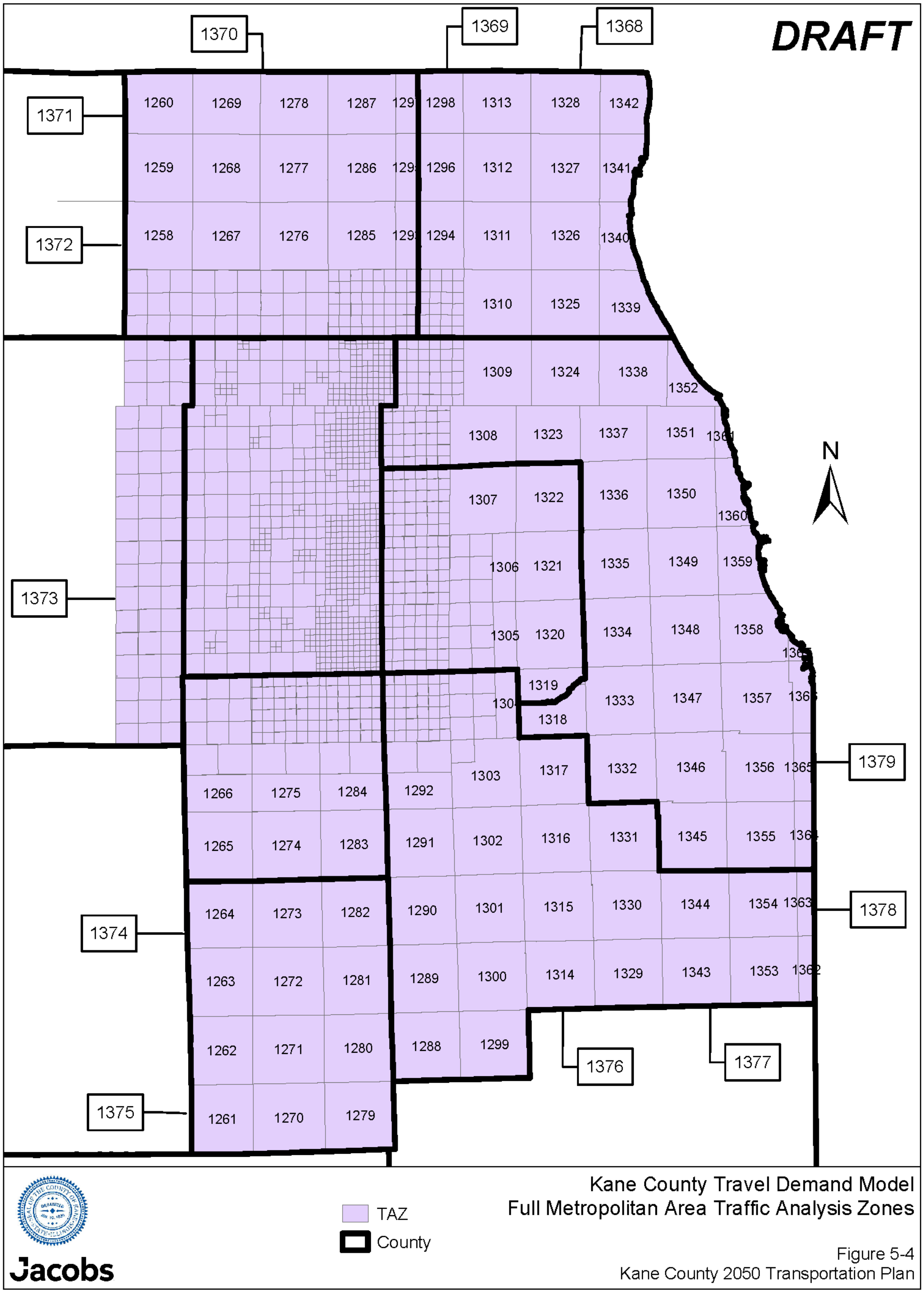

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Figure 5-5. Modeled Average Daily Traffic Year 2015

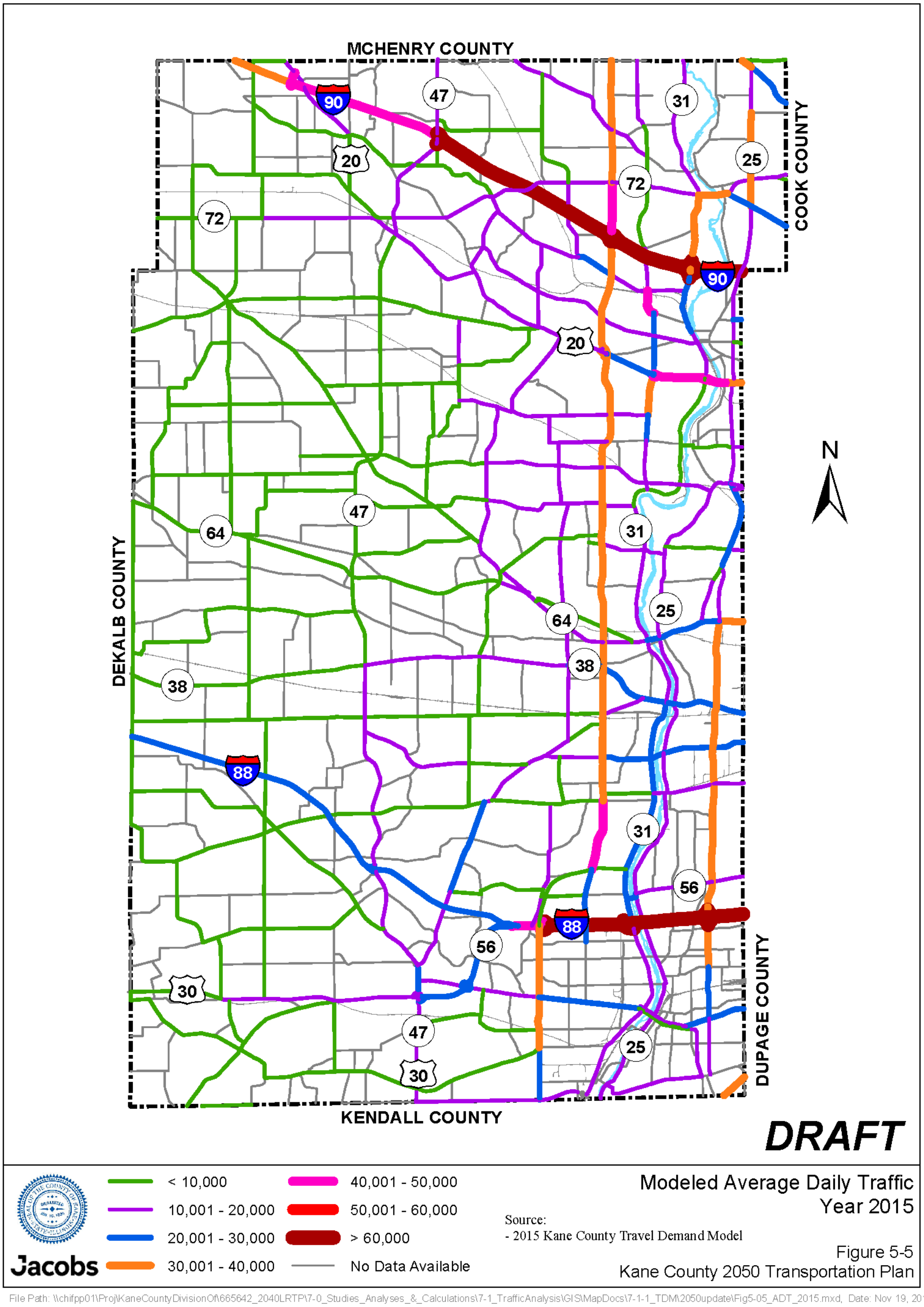
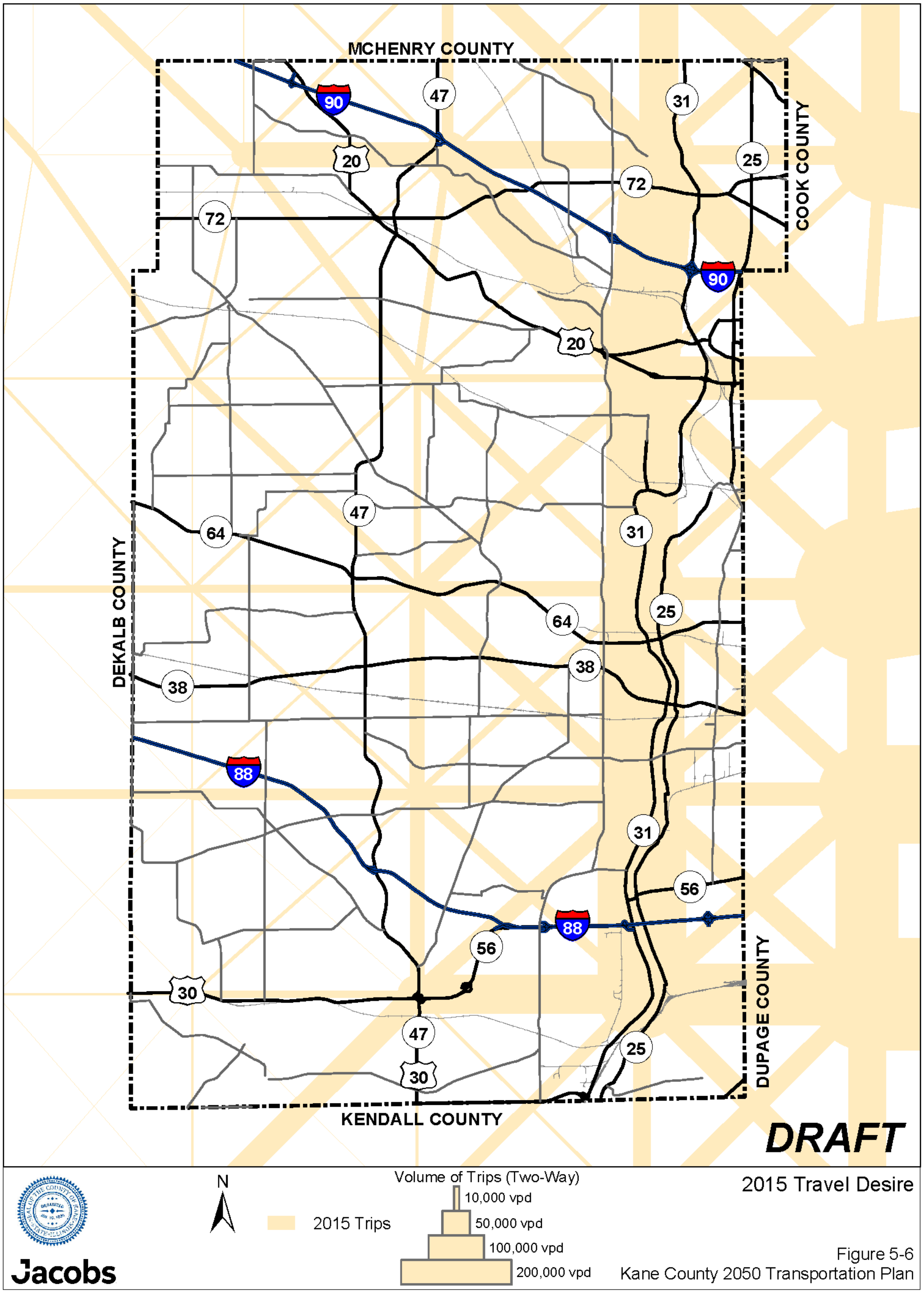
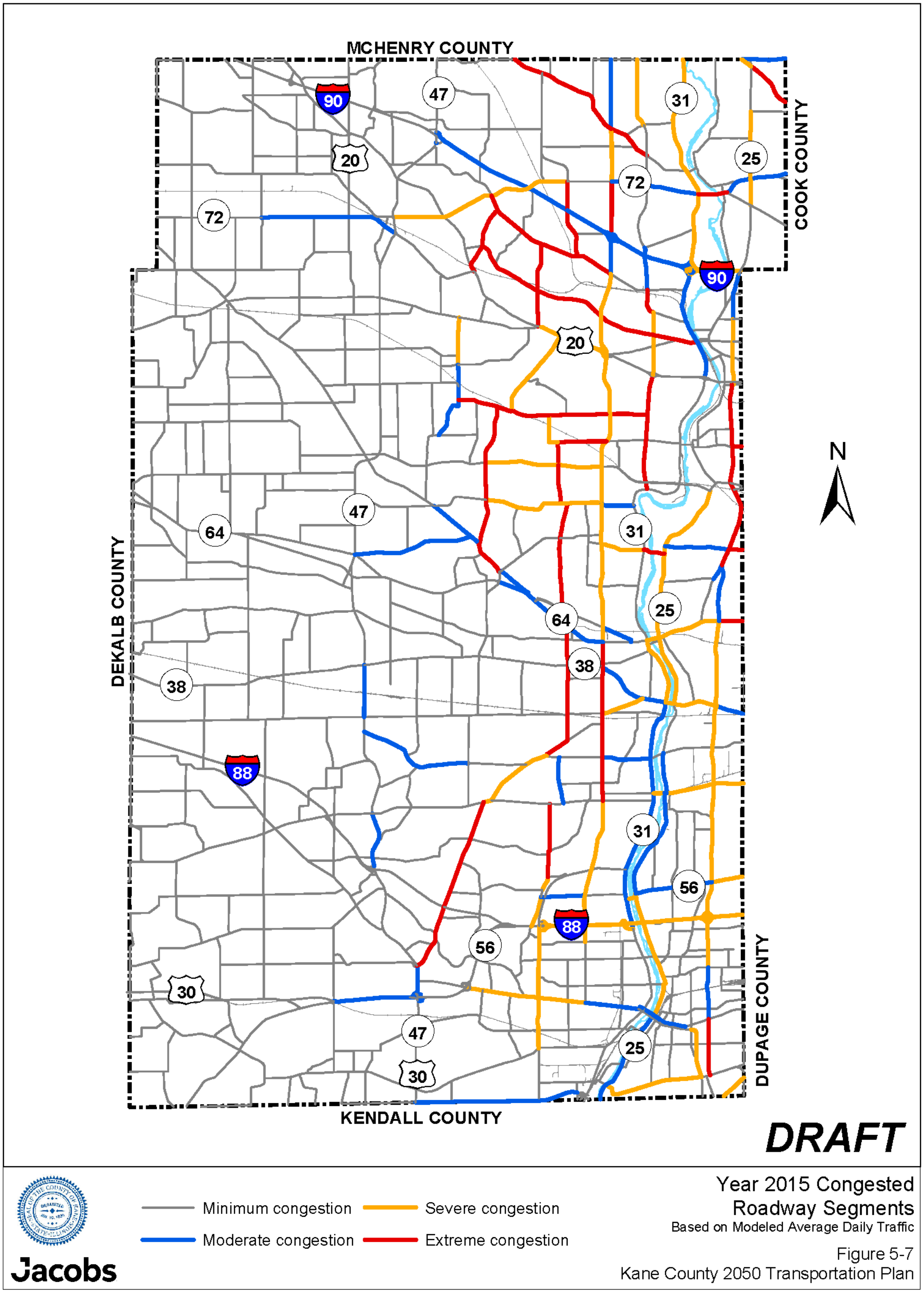


Figure 5-6. 2015 Travel Desire



File Path: \\athena\proj\KaneCountyDivisionOf\393375\6-0_Analysis\6-1_TrafficAnalysis\GIS\MapDocs\Section3\Fig3-06_DesireLines09.mxd, Date: May 3, 2011

Figure 5-7. Year 2015 Congested Roadway Segments



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Introduction

To examine the adequacy of Kane County's transportation system over the planning horizon, it is necessary to assemble a forecast for the rate of growth, type of growth, the location of growth, and household travel characteristics. In the preparation of this transportation plan, information on land use and population and employment was obtained from CMAP. The 2050 forecasts were furnished by quarter-section for the entire Chicago metropolitan area.

The methodology used in the development of the Kane County travel demand model was described in Section 3. This section of the report describes the application of the model to forecast 2050 travel demand and the operational performance of the future system.

Population and Employment Forecasts

Forecasts of 2015 and 2050 households, population, and employment in Kane County were obtained from data developed by CMAP for the ON TO 2050 Plan, which generally reflect development projections in reference to overall growth in the region. The forecasts, furnished by CMAP for each quarter-section, were aggregated into TAZs and slightly adjusted to reflect local existing conditions and future forecasts for the 2050 Transportation Plan. The forecasts developed for the 2050 Transportation Plan used the most current information available at the time. Many variables go into predicting future population, households, and employment, and forecasts are only the best guess at the time of the assumptions. The assumptions do not provide exact locations, rather general areas of the land uses that will produce the vehicular trips that feed into the travel demand modeling efforts. The travel modeling efforts are performed to develop overall travel demand assessments for the 2050 planning horizon. Results from the modeling efforts are further examined, post-processed, and adjusted to better reflect projected system performance based on local knowledge. As the County moves forward with future planning efforts, development patterns and plans change, and the forecasts will be adjusted using the most recent development information and controlled data sources (such as updated CMAP 2050 RTP information and U.S. Census information).

Table 6-1 summarizes projected growth of population, households, and employment from 2015 until 2050 used for this study.

Table 6-1. Projected Growth of Population, Households and Employment — 2015-2050

	2015	2050	Percent Increase
Population	548,257	781,538	42.5%
Households	186,440	298,205	59.9%
Employment	212,451	301,019	41.7%

Source: CMAP *ON TO 2050* Conformity Analysis, October 2018.

Figures 6-1 and 6-2 depict the distribution of projected growth in housing and population between 2015 and 2050. To an extent, TAZs with the greatest population in 2050 are also those that would exhibit the largest numerical population growth over the 35-year planning period. Forecasted population growth appears to be concentrated most heavily along the IL 47 corridor, particularly near the northern border with McHenry County.

Figure 6-3 shows the estimated growth of employment in Kane County from 2015 to 2050. Both existing and forecasted employment is heaviest along the eastern, northern, and southern boundaries of the county.

The projections of population, households, and employment by TAZ are the basic tools used in developing forecasts of future travel. The estimated values were applied directly into trip-generation relationships determined earlier in the transportation-planning process.

Existing plus Committed Highway System

An Existing plus Committed traffic-assignment network was developed for travel forecasting. The network consists of the existing highway system augmented by other roads or roadway improvements that are programmed or otherwise firmly committed for improvement in the near term. Committed roadway improvements used to develop the Existing plus Committed network included the completion of Longmeadow Parkway over the Fox River. Zone-to-zone travel impedance used in the initial 2050 travel forecast was obtained from Existing plus Committed network travel times. Later in the transportation planning process, travel times were adjusted to reflect other roadway modifications incorporated into the future networks.

External-Internal and Through-Travel Growth

External trip making consists of three distinct types of trips: Internal-External (I-E) trips that originate in a Kane County TAZ and have a destination outside of the county; External-Internal (E-I) trips with an origin outside of the county and a destination within the county; and External-External (E-E) through-trips that have neither an origin nor destination in Kane County.

The 2015 and 2050 forecasts of E-I/I-E and E-E/I-I trips were derived by interpolating between the assignments developed for 2003, 2030, and 2040 as part of the Kane County 2040 Transportation Plan.

2050 Vehicle Traffic Volume and Pattern

The traffic demand model was applied to forecast 2050 zone-to-zone vehicular travel based on population and employment growth described earlier and assuming implementation of the Existing plus Committed roadway network. It is projected that total daily vehicle trips in Kane County would increase by 59 percent. The increase would not be uniform throughout the county. Areas that experience the most population and employment growth would also realize the greatest travel increase. Figure 6-4 shows the resulting forecast year 2050 estimated ADT, and Figure 6-5 shows the projected change in ADT on Kane County highways from 2015 to 2050.

The largest increase in traffic volumes would occur on the north-south arterials, primarily Randall Road. Between I-90 and IL 64, the roadway would experience traffic growth of more than 15,000 vehicles per day. Other high-growth areas would be the roadways in the south-central and north-central portions of the county, adjacent to Illinois Tollway facilities. The south-central area would be expected to experience high growth on US 30, IL 56, and Orchard Road. The northern sections of the county would be expected to experience high growth along US 20 and IL 72. In addition, high growth in traffic would be expected in the Tri-Cities areas on IL 64.

Desire bands can also be used to provide a depiction of the pattern of travel growth. Figure 6-6 shows a combination of 2015 and 2050 vehicular travel desire bands. Travel growth is represented by the difference in bandwidth from the base year (2015) until the forecast year (2050). The heavy existing north-south travel desires that presently exist in eastern Kane County would be further magnified. There would also be significant travel increases in the vicinity of Sugar Grove, as well as in the Upper Fox and Greater Elgin areas.

2050 System Performance

The traffic performance analysis of the future Kane County highway system relied on data described in previous sections of the report related to future travel demand and Existing plus Committed facilities, as well as, measures of effectiveness derived from the travel demand model. Performance is described by measures of traffic service, congestion, and traffic safety.

Traffic Service Measures

The traffic service measures applied in this analysis, described in Section 5, consist of VMT, VHT, and VHD. Table 6-2 summarizes 2050 traffic service measures separately for all highways and for county roads alone, stratified by functional classification. Similar to existing traffic conditions, principal arterials would carry a large share of the traffic burden (approximately 39 percent of the VMT) and would experience 52 percent of VHD. This trend also carries through for county roadways. County roads that are classified as principal arterials would carry about 60 percent of the vehicle miles traveled and would experience 74 percent of the VHD, but would represent only 49 percent of the county road lane-miles.

Table 6-2. 2050 Modeled Traffic Service

	VMT		VHT		VHD	
Functional Class	Miles	%	Hours	%	Hours	%
2050 All Modeled Roadways						
Expressways	3,025,967	13	79,386	5	28,129	3
Principal Arterials	8,884,440	39	698,392	45	473,028	52
Minor Arterials	3,315,084	14	212,588	14	110,154	12
Collectors	7,645,249	33	565,284	36	299,296	33
Totals	**22,870,741**	**100**	**1,555,650**	**100**	**910,607**	**100**
2050 Modeled County Highways						
Principal Arterials	3,722,605	60	275,745	66	188,938	74
Minor Arterials	2,382,737	39	136,825	33	63,507	25
Collectors	75,435	1	5,512	1	3,039	1
Totals	**6,180,777**	**100**	**418,083**	**100**	**255,484**	**100**

Congestion Measures

Figure 6-7 shows forecast 2050 levels of congestion on existing and committed highways based on ADT. For the entire system, 73 percent of route-miles and 75 percent of lane-miles would be congested (Table 6-3). For county roads alone, 69 percent of route-miles and 74 percent of lane-miles would be congested. The areas found to be congested in 2015 would remain so in 2050, and in some locations would worsen as a result of the increase in travel demand. In year 2015, about half of the county would be congested. In 2050, the congestion would spread west into the northern area of the county, Sugar Grove, and west of Tri-Cities to Elburn, encompassing about three-quarters of the county.

Table 6-3. Modeled Future Roadway Congestion

	Route-Miles		Lane-Miles	
Level of Service	Miles	%	Miles	%
2050 All Modeled Roadways				
A	128	11	257	9
B	81	7	176	6
C	123	10	258	9
D	80	7	181	6
E	186	15	463	17
F	618	51	1,453	52

Table 6-3. Modeled Future Roadway Congestion

Level of Service	Route-Miles		Lane-Miles	
	Miles	%	Miles	%
Total	1,215	100	2,788	100
Total Congested	884	73	2,098	75
2050 County Highways				
A	50	16	100	14
B	17	6	35	5
C	26	9	54	7
D	21	7	47	6
E	61	20	152	21
F	131	43	343	47
Total	307	100	730	100
Total Congested	**213**	**69**	**541**	**74**

Conclusions and Comparisons

Existing and Committed Highway System

Table 6-4 shows the change in VMT, VHT, and VHD between 2015 and 2050 stratified by functional classification. For all roads, the VMT would increase by 63 percent, and the VHT would increase nearly 2 times between 2015 and 2050. In addition, the VHD would increase by approximately 5 times as a result of increased congestion. For county highways, the VMT would increase by 79 percent, the VHT would more than double, and the VHD would increase by more than four times. This dramatic deterioration of traffic performance indicates that the existing and committed facilities alone would not adequately handle future travel demand.

The number of route-miles and lane-miles at each range of LOS would shift. In 2015, most roadways were found to operate at LOS C or better. By 2050, most roadways would operate at LOS D or worse. Table 6-5 illustrates the projected change in route-miles and lane-miles for the different classifications of LOS. For the entire highway system, congested lane-miles would increase by 70 percent. While 41 percent of Kane County experienced congestion in 2009, congestion would expand to cover 73 percent of the county in 2050.

Table 6-4. Comparison of Modeled Traffic Performance

Functional Class	VMT		VHT		VHD	
	Δ Miles	Δ %	Δ Hours		Δ Hours	Δ %
2015-2050 All Modeled Highways						
Expressways	636,333	+27	31,923	+67	21,390	+317
Principal Arterials	2,927,305	+49	458,173	+191	381,512	+417
Minor Arterials	1,527,646	+85	147,312	+226	95,440	+649
Collectors	3,779,306	+98	402,765	+248	264,219	+753
Totals	**8,870,590**	**+63**	**1,040,172**	**+202**	**762,561**	**+515**

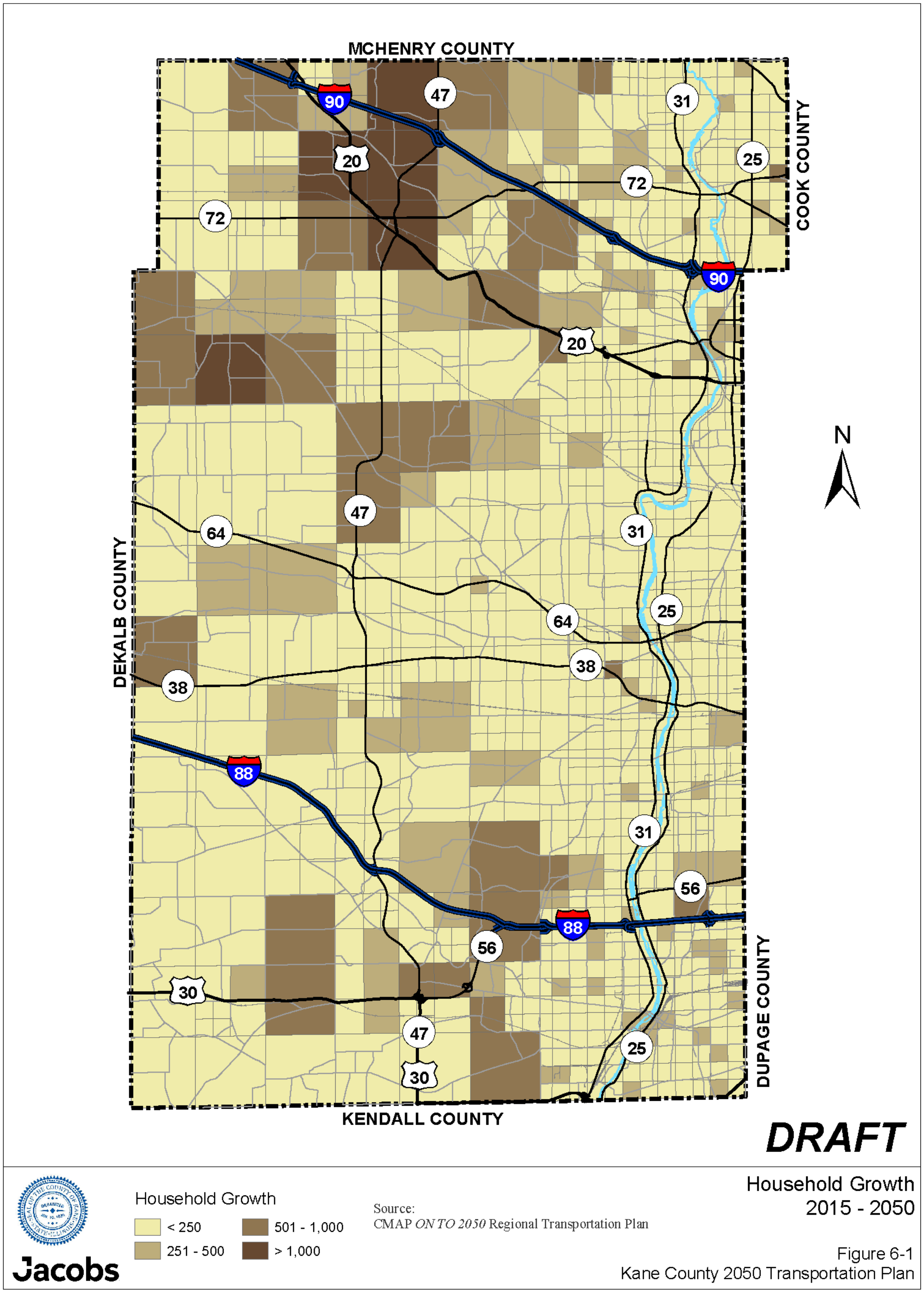
Table 6-4. Comparison of Modeled Traffic Performance

Functional Class	VMT		VHT		VHD	
	Δ Miles	Δ %	Δ Hours		Δ Hours	Δ %
2015-2050 Modeled County Highways						
Principal Arterials	1,326,721	+55	180,266	+189	146,906	+350
Minor Arterials	1,355,842	+132	101,783	+290	56,224	+772
Collectors	39,790	+112	3,985	+261	2,698	+791
Totals	**2,722,353**	**+79**	**286,036**	**+217**	**205,828**	**+415**

Table 6-5. Comparison of Modeled Congestion

Level of Service	Route-Miles		Lane-Miles	
	Δ Miles	Δ %	Δ Miles	Δ %
2015-2050 All Modeled Highways				
A	-271	-68	-544	-68
B	-92	-53	-213	-55
C	-14	-10	-82	-24
D	-63	-44	-183	-50
E	15	+9	39	+9
F	429	+227	1,004	+224
Total Congested	**380**	**+75**	**861**	**+70**
2015-2050 Modeled County Highways				
A	-74	-60	-148	-60
B	-21	-55	-47	-57
C	5	+24	-3	-5
D	5	+31	7	+18
E	35	+135	69	+83
F	57	+77	154	+81
Total Congested	**98**	**+85**	**230**	**+74**

Figure 6-1. Household Growth 2015 -2050



File Path: \\athena\proj\KaneCountyDivisionOf\393375\6-0_Analysis\6-1_TrafficAnalysis\GIS\MapDocs\Section4\Fig4-01hh_growth.mxd, Date: March 17. 2010

Figure 6-2. Population Growth 2015 - 2050

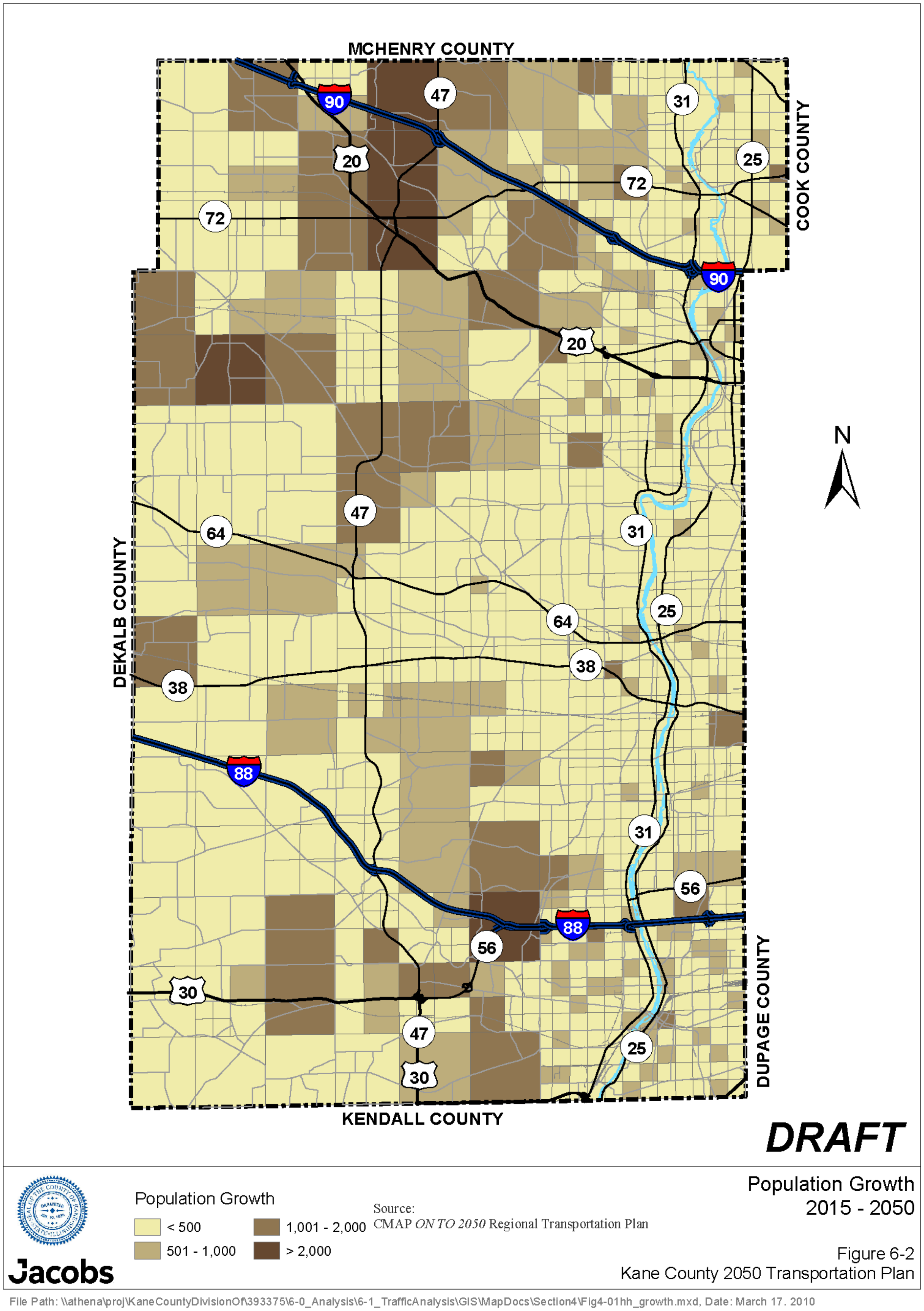
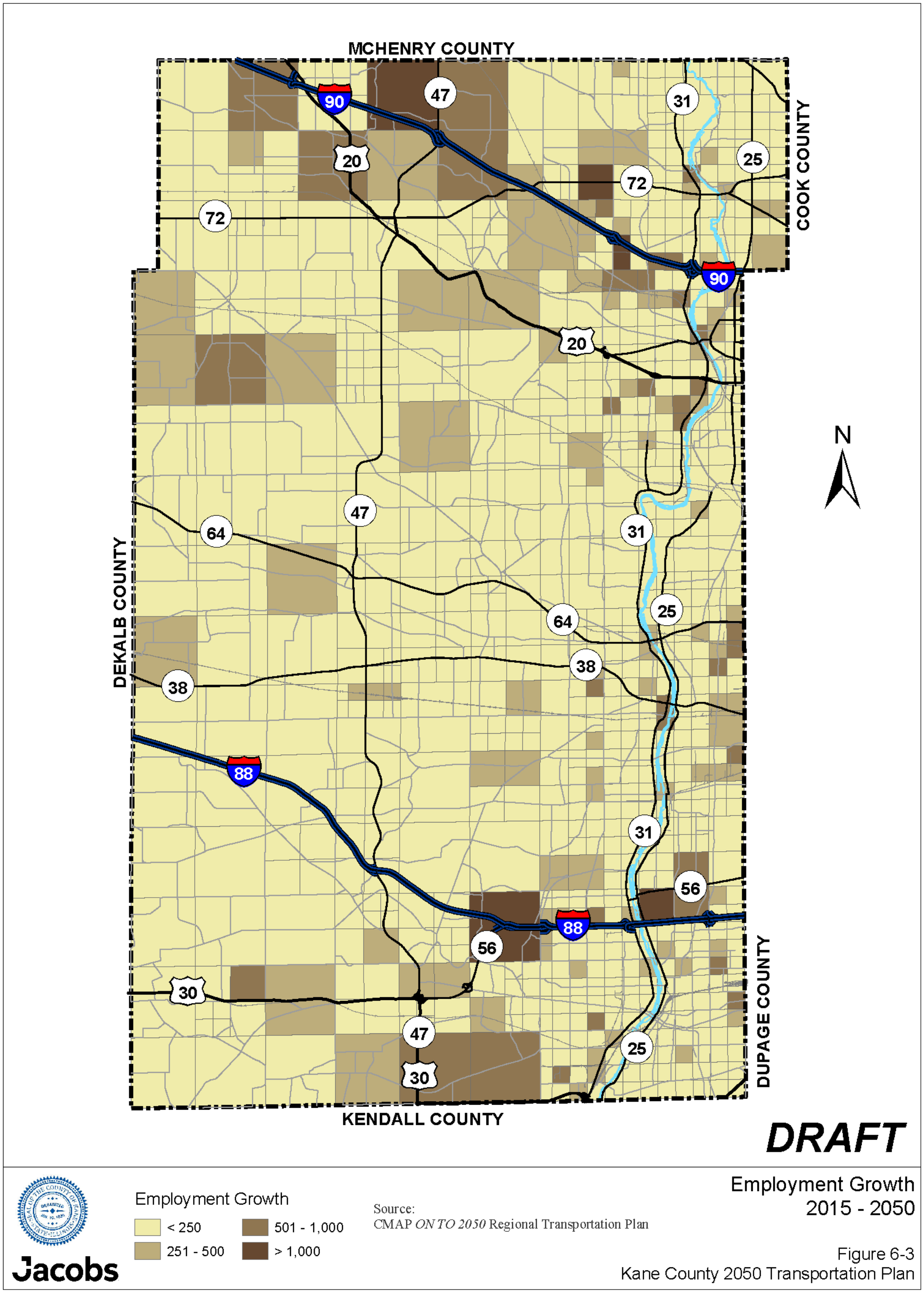


Figure 6-3. Employment Growth 2015 - 2050



File Path: \\athena\proj\KaneCountyDivisionOf\393375\6-0_Analysis\6-1_TrafficAnalysis\GIS\MapDocs\Section4\Fig4-01hh_growth.mxd, Date: March 17. 2010

Figure 6-4. Modeled Average Daily Traffic Forecast Year 2050

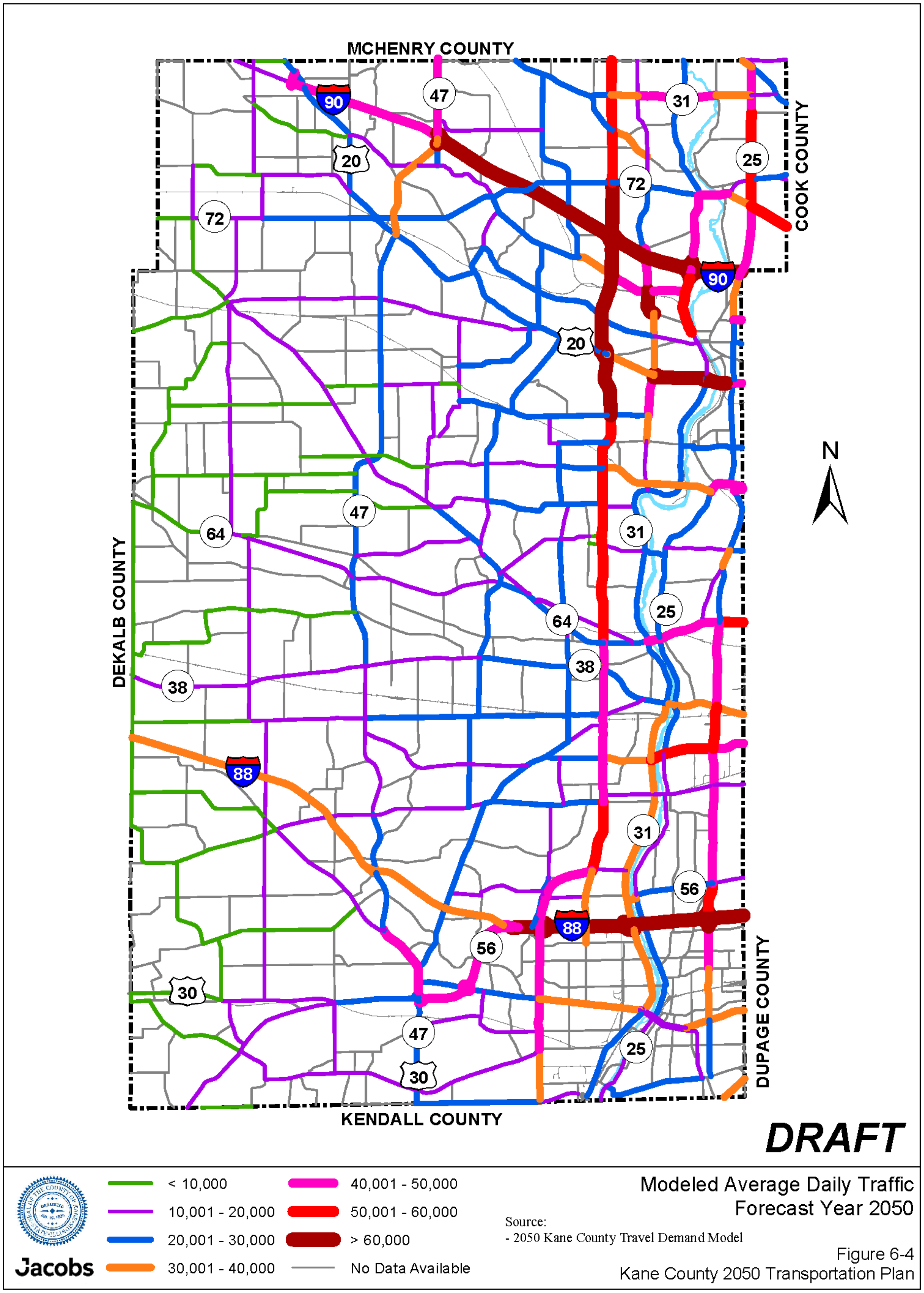


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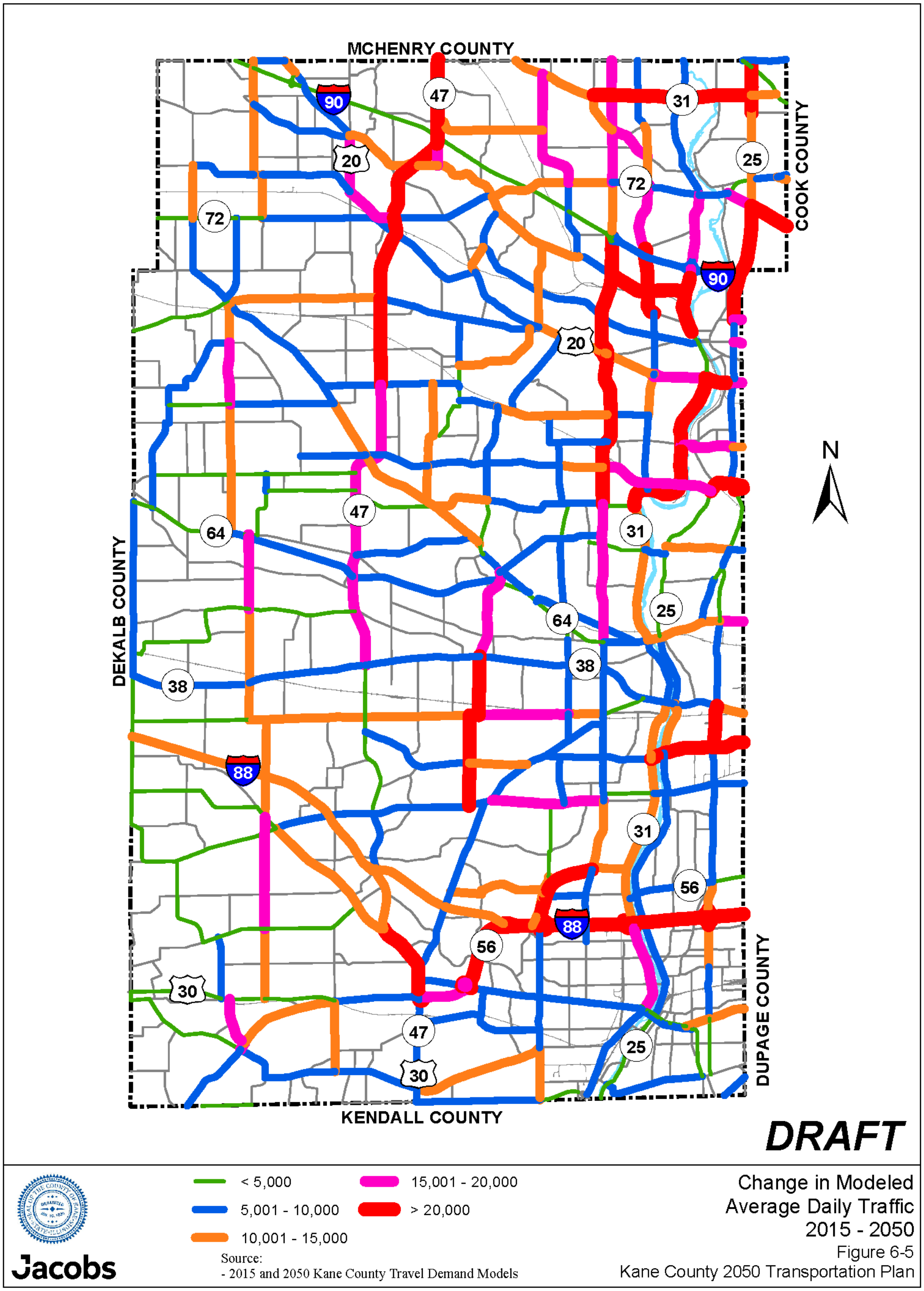
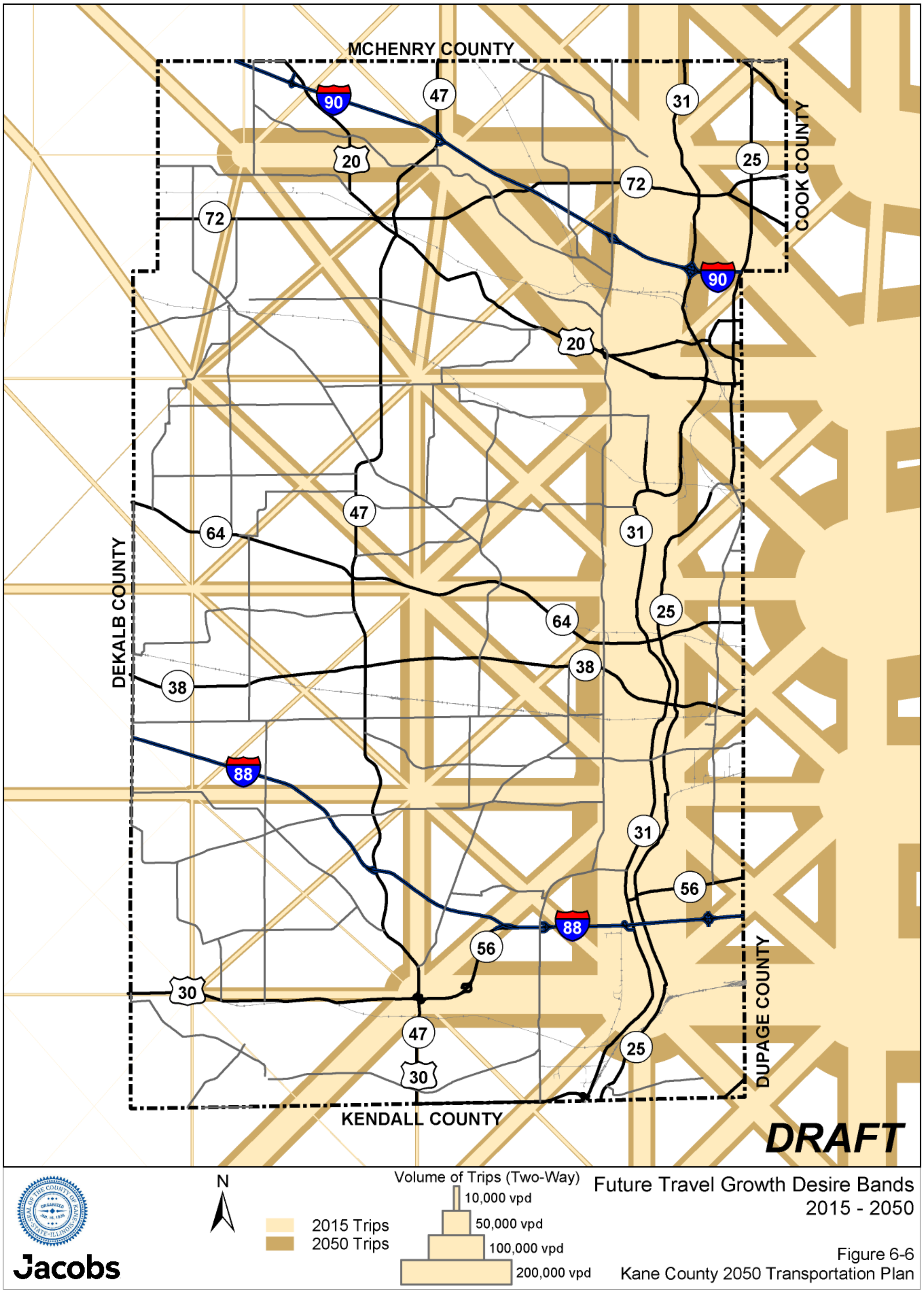
Figure 6-5. Change in Modeled Average Daily Traffic 2015 - 2050



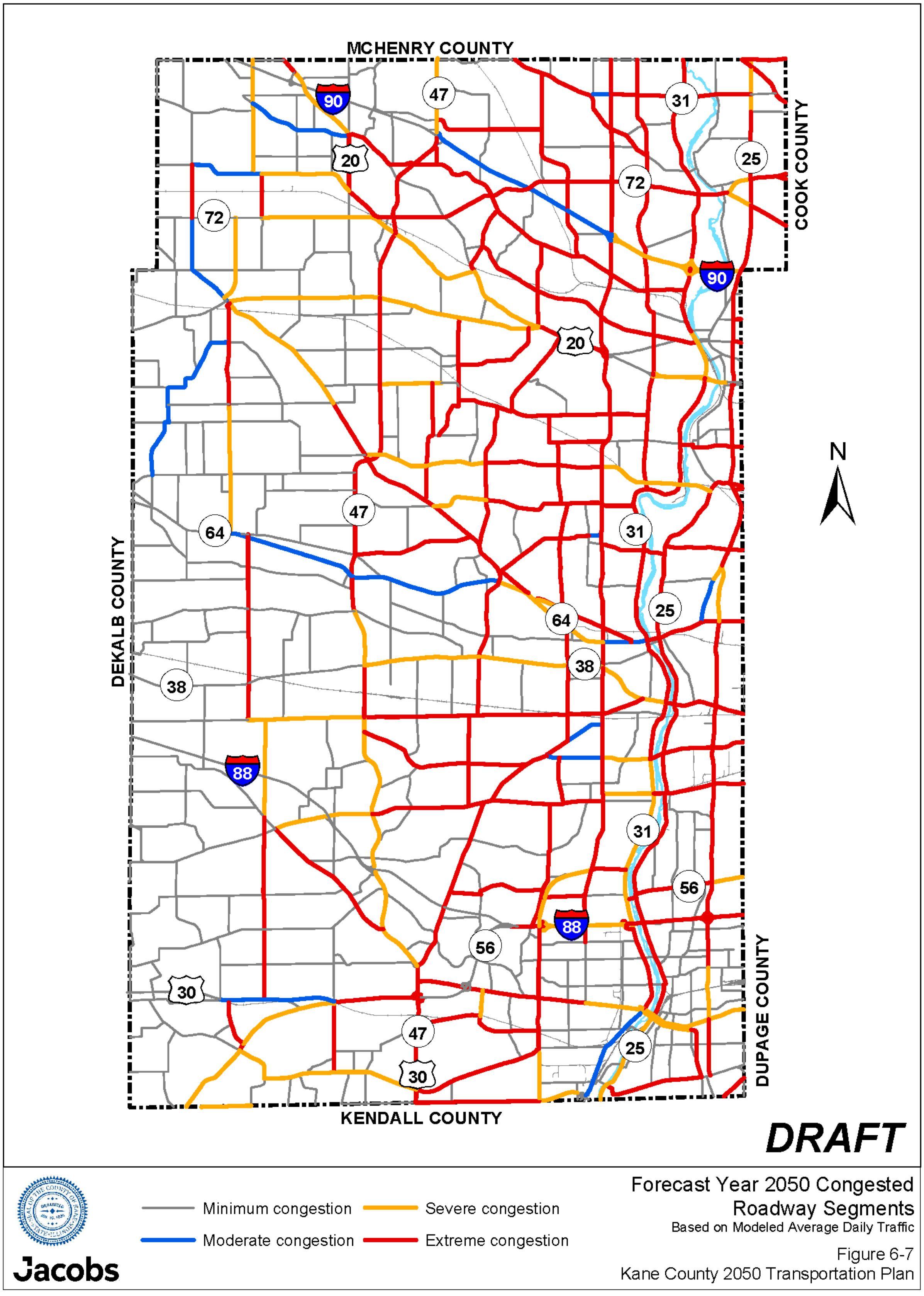
File Path: \\chifpp01\Proj\KaneCountyDivisionOf\665642_2040LRTP\7-0_Studies_Analyses_&_Calculations\7-1_TrafficAnalysis\GIS\MapDocs\7-1-1_TDM\2050update\Fig6-05_ADTchange_2015_2050.mxd, Dat

Figure 6-6. Future Travel Growth Desire Bands 2015 - 2050



File Path: \\athena\proj\KaneCountyDivisionOf\393375\6-0_Analysis\6-1_TrafficAnalysis\GIS\MapDocs\Section3\Fig3-06_DesireLines09.mxd, Date: May 3, 2011

Figure 6-7. Forecast Year 2050 Congested Roadway Segments



Streets and Highways

A list of roadway projects was identified as part of the development of the transportation plan. Many of the projects were from previous planning efforts, and some of the projects were identified from multiple sources. LOS E is characterized by significant delays where traffic is at or near the capacity of the roadway; however, it is sometimes accepted as a limiting design criterion when restricted conditions make it impractical to consider a higher level of service. In light of the limited financial forecast, and the likelihood that major roadway expansions will be difficult to fund in the future, the 2050 Recommended Roadway Plan recommends new improvements only for roadways that modeled at a LOS F (greater than 50 seconds of control delay per vehicle at a signalized intersection) under assumed 2050 conditions. Typically, at LOS F motorists experience stop-and-go traffic and significant delays at traffic lights. The resulting roadway improvement list incorporates the 2017 Impact Fee CRIP and most of the previous recommendations from the 2040 Transportation Plan.

The initial set of improvements in the 2050 Recommended Roadway Improvement Plan includes committed projects Improvement Plan. Although the Impact Fee CRIP is underfunded, many of the projects are intersection type projects, and are also considered to be near-term needs (since the CRIP is a 10-year plan). Other recommended improvements are for roadways, limited-access freeways, SRAs, expressways, and tollways with a regional significance. Improvement types include add-lane projects, new alignments, realignments, Fox River Bridge crossing, grade separations, interchange improvements, and isolated intersection projects. The projects were evaluated to determine their effectiveness at reducing congestion.

Connectivity—Collector Roadway Network

Aside from the *arterial-based* roadway improvements identified in the recommended roadway plan, the County is a strong proponent of *collector-based* improvement strategies, which rely primarily on a collector roadway network to distribute local trips in any given area. Collector roads serve a dual function of providing mobility and access, while the major arterial improvements primarily enhance mobility. An efficient and continuous collector road system improves mobility on arterials by providing better access to abutting land uses and connectivity using the local road network. In addition, the collector roads can provide an alternative route whenever an incident occurs or during a special event. Planned collector roadways can also connect future developments that may be partially or fully constructed by developers.

Between 2002 and 2005, the County, in coordination with local agencies, assisted in the development and evaluation of local transportation improvement plans for high-growth areas in the county that focused on collector-based plans for the West Upper Fox planning area, the Elgin Far West planning area, the Sugar Grove, Aurora, Montgomery planning area and the Northwest Kane County planning area. The plans, which also incorporated arterial-based improvements and access management, have helped to guide transportation development in those portions of the County.

The following five objectives were set up to guide the development of the plans:

1. Enhance connectivity.
2. Reduce delay.
3. Reduce congestion.
4. Be proactive towards development related to infrastructure improvements.
5. Distribute trips to appropriate facility types.

In addition to the joint effort Planning Area Studies, the County supports local municipal transportation-planning efforts that provide collector improvements or in-fill network to link land uses throughout municipalities. These local improvements should be considered as development occurs. These improvements represent a joint effort to improve transportation performance, are crucial to create a complete roadway network, and reduce congestion on the arterial highways.

Access Management

Management of access to area roadways is yet another method of improving the ability of the system to satisfy mobility requirements. Properly implemented access management will result in improvements to traffic operations, increase highway safety, and minimize adverse environmental impacts.

Each new access located on an arterial reduces the arterial's traffic-carrying capacity. After several new access locations have been installed, it often becomes clear that turning traffic has a negative impact on traffic speeds on the arterial. Studies indicate that average travel speeds during peak hours are considerably higher on well-managed roads than on roads that are less well managed, even though the two types of roads carry approximately the same number of vehicles.[11]

A recommendation of the transportation plan is to include more county roads where access-control management would be applied along with the coordination of access issues with various transportation agencies, as discussed in Section 2, *Land Development and Roadway Access*, and the County's *Permit Regulations and Access Control Regulations*.

Complete Streets

As the County moves forward with roadway improvements, all projects are considered for improvements that will make the roadway safe and accessible for all users. Commonly known as *Complete Streets,* this movement results in roadways designed and operated to enable safe, attractive, and comfortable access and travel for all users, including motorists, pedestrians, bicyclists, public transportation users, and people of all ages and abilities. Complete streets include one or more of the following elements: sidewalks, bike lanes (or wide paved shoulders), special bus lanes, comfortable and accessible public transportation stops, frequent and safe crossing opportunities, median islands, accessible pedestrian signals, curb extensions, narrower travel lanes, roundabouts, traffic-calming measures, and more. The elements in a complete street depend on the context of the roadway. For instance, a complete street in a rural area will look quite different from a complete street in a highly urban area, but both are designed to balance safety and convenience for everyone using the road.

Complete streets are intended to provide safe access to land uses and a variety of transportation options. Safe and attractive roadways for all users can reduce reliance on single-occupancy vehicles and reduce congestion and therefore harmful vehicle emissions. This type of roadway design improves the efficiency and capacity of existing roads that could reduce the need for capacity improvements in the form of expensive additional traffic lanes.

Complete streets also promote a healthy population by encouraging walking, bicycling, and easy access to transit (transit users are typically pedestrians or cyclists for a portion of their trip). They also contribute to strong walkable and livable communities; provide opportunities for increased social interactions, and lower transportation costs for users who do not travel by automobile.

Kane County has had a Complete Streets policy for years and was included as a strategy in the Kane County 2040 Plan adopted in 2012. Kane County also released a Bike and Pedestrian Report in 2018 that includes Compete Streets elements as best practices when considering roadway projects whether they are new construction or simple resurfacing projects. The use of curb bump outs, pedestrian countdown timers, and clearly marked crosswalks make the streetscape safer for all users. As part of all new project starts, KDOT staff completes a Complete Streets assessment which includes examining access for all modes of travel.

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[11] Center for Transportation Research and Education (CTRE), Iowa State University. 2000. *Access Management Handbook*. Prepared for the Iowa DOT, the Safety Management System (SMS) Coordination Committee, and the Access Management Task Force. October.

Transportation System Management

TSM is the concept of more efficiently using existing transportation systems by means other than large-scale construction. Just as TDM strategies are aimed at managing transportation *demand,* TSM strategies are directed at managing the transportation *system*. The deployment of advanced traffic management systems continue to have a substantial benefit in terms of cost and effectiveness in terms of improving mobility, safety and the general quality of life. TSM strategies are low-cost but effective in nature, and studies have shown as much as a 40:1 cost benefit for these types of improvements at a significantly less capital cost as compared to more traditional capacity improvements such as the adding of additional through-lanes.

The County is pursuing the following TSM strategies from the *2007 Kane County Intelligent Transportation Systems Strategic Plan* and *2011 Concept of Operations for the Kane County Arterial Operations Center*:

- Advanced traffic control and surveillance systems that provide information to the transportation agency in real time and allows traffic management responses and/or usable information to be provided to the motoring and non-motoring public (user information distribution) to improve mobility and reduce delay.

  These can include ITS, for which current efforts/projects include:

  - Operation of a centralized traffic signal/ITS control fiber optic network
  - Operation of an Arterial Operations Center
  - Roadway Weather Information Systems (two bridge locations)
  - Closed-circuit television (CCTV) traffic-monitoring cameras (various intersection and bridge locations)
  - Driver feedback (speed control) signing
  - Uninterruptible Power Supply (battery backup) systems for many traffic signals
  - Adaptive Traffic Signal Control
  - Dynamic Message Signs (permanent and portable)
- Future efforts/projects include:
  - Continuing expansion of the centralized traffic signal/ITS control fiber optic network
  - Roadway Weather Information Systems at additional locations
  - CCTV traffic monitoring cameras at additional intersection and bridge locations
  - Driver feedback (speed control) signing at additional locations
  - Traffic signal modernization (phase modification) to increase signal efficiency and reduce delay
  - Improved/additional pedestrian and bicycle accommodations to existing traffic signal infrastructure and operations
  - Improved management of special event traffic
  - Real-time traffic information (webpage, mobile phone applications, e-mail subscription, in-vehicle navigation systems, third-party providers, etc.)

- Traffic incident management strategies for the allocation of resources in response to unplanned incidents (i.e., severe crash(s), road closures, evacuations, etc.) that result in major disruption and delay of traffic on highways.

Implementation of ongoing and future TSM programs within Kane County includes expansion of the existing Advanced Traffic Management System/Traffic Signal System network, centralized traffic signal control, Arterial Operations Center, and demonstration of adaptive Traffic Signal Control. Roadway advisory information will be provided to various other agencies and roadway users not only within the county but also throughout the Chicagoland region through various outlets, including Kane County webpages, cell phone applications, e-mail subscription services, Travelmidwest.com, and third-party commercial traffic information providers. Greater detection and mitigation of incidents and unplanned/planned special events will be possible by using the above technologies together with previously planned strategies and increased coordination/interaction with other parties (emergency responders, etc.) to reduce the time and degree of adverse impact to traffic.

TSM strategies also include roadway infrastructure improvements such the addition of turn lanes at intersection, intersection modifications to roundabout, continuous-flow intersections, and divergent diamond interchanges, which decrease delay and congestion through innovation.

Future Trends in Transportation Technology

Emerging technologies and mobility trends have the potential to reduce congestion in the future and to shift how people in the Chicago metropolitan area get around. This section discusses various emerging technologies and mobility trends and how they may be considered within the context of Kane County's future transportation system.

Transportation System Management Technologies

Improved highway management and operations techniques address the recurring and non-recurring sources of congestion to move toward a system that operates more efficiently, reliably, and safely. Highway management and operations strategies include active traffic management, managed lanes (controlled by pricing, occupancy, or other means), ramp metering, incident management (detection and response), traveler information, access management, integrated corridor management, and more broadly the emergence of Smart Cities—that is, a system of interconnected systems, including employment, health care, retail/entertainment, public services, residences, energy distribution, and transportation, tied together by information and communication technologies that transmit and process data about a variety of activities.

Current and emerging transportation system management technologies alone do not have the ability to address future capacity needs. However, they offer the ability to optimize operations across a transportation network.

Connected and Automated Vehicle Technologies

In recent years, few emerging transportation technologies have captured as much public and policymaker attention as "driverless" vehicles, also known as fully automated or autonomous vehicles. The term Connected and Automated Vehicles (CAVs) refers to vehicles that can partially or completely drive on their own, providing for safety, convenience, accessibility, and quality of life benefits. Recent studies predict broad CAV market penetration within 10 to 20 years, though this timeframe ranges and is dependent on a number of factors, including the price of remote sensing technology, the adoption of connected vehicle technologies, and customer preferences.

Implementation of CAVs will bring disruptive changes—both positive and negative. CAVs have the potential to dramatically change the transportation network system performance. Smart communications technology would enable vehicles to send and receive real-time information about road conditions and enable transportation agencies to quickly reroute vehicles, respond to accidents, and adjust signal timing, speed limits, and tolls to reduce congestion and improve the speed and reliability of transportation. In addition, CAVs could provide critical mobility to the elderly and disabled, enhance effective road capacity, and reduce fatal crashes, injuries, traffic congestion, and fuel consumption. Automated vehicles might be able to travel with more compact spacing, increasing the capacity of roadways while maintaining safety.

At the same time, CAVs are likely to result in an increase in travel demand. As mobility improves, so does the VMT. VMT increases will be related to the demand for more trips, for trips serving populations that currently do not drive (children, disabled, elderly), and empty vehicles. There may also be shifts from transit usage (with high occupancies) to lower-occupancy CAV use. Also, the transition period between human driving and fully automated driving is likely to be marked by focused decreases in capacity, safety conflicts, and policy issues.

While broad market penetration of CAV offers the potential to enhance transportation network system performance, it is likely to result in increased roadway travel demand. Transportation agencies should consider the impact of CAVs in planning studies.

For example, driverless vehicles will increase the need for drop-off and pick-up points and compete for curb space, as people will want to be picked up and dropped off as close to their destinations as possible. The rapid growth of ride-sharing services like Uber and Lyft has already created a need for such points, and this need will only increase with shared automated vehicles. The same will be true with privately owned driverless cars, as they will drop off their passengers and then park themselves. These drop-off and pick-up points will appear in areas beyond airports and train stations, such as by office buildings, commercial areas, cultural and sport venues, and apartment buildings.

In addition, automated vehicles will impact roadway design. For example, lane width could be closer to actual vehicle width because of lane-centering technologies and minimal side-to-side movement. This also means that every vehicle will essentially be driving in two wheel tracks, and roads may have to be built from concrete or thicker asphalt.

Shared Mobility Technologies for Passenger Vehicles

Transportation network companies connect passengers with drivers who provide transportation on the driver’s non-commercial vehicle (e.g., their personal vehicle) via websites and mobile apps. These services allow riders to arrange rides in real time with drivers who provide a ride in exchange for payment. Uber and Lyft are examples of well-known (and growing) transportation network companies. These services have sometimes been called “ride sourcing” services, rather than “ridesharing,” since they are not designed to reduce vehicle trips, as is the goal for ridesharing approaches (e.g., carpooling and high-occupancy vehicle Lanes). However, these companies are increasingly pursuing ridesharing functions, which involve the sharing of one vehicle by multiple riders. Some services have gone further, creating smartphone-enabled transit services. The service optimizes pick-ups, drop-offs, and routing based on demand, at a cost typically higher than a public transit fare but lower than a taxi. These services can provide a level of flexibility less available in more traditional public transit systems.

Supporters view ride sourcing as part of a suite of transport options that serve a previously unmet demand for fast, flexible, and convenient mobility in urban areas. By providing an appealing alternative to driving, it can potentially reduce auto use when effectively coupled with transit. However, it has been argued that these privatized transit companies have the potential to undermine local transit routes and fare revenues, as well as to increase VMT while vehicles drive awaiting a call for a ride.

Pavement Technologies

Asphalt and concrete pavements have continued to evolve since their origins in the 1800s. They have become stronger, more economical, and more sustainable, as well as safer, quieter, and smoother for drivers. Some research efforts to improve asphalt and concrete pavements have focused on specialty mixes for specific applications, while others have focused more broadly on best practices, enhanced durability, and increased use of recycled materials. Today, innovative pavement technologies are emerging, largely due to the present and expected impacts of climate change. Warmer temperatures, wet conditions, and extreme weather events can damage roads, bridges, and other transportation facilities and are costly to repair. In addition, the process to create asphalt and concrete pavements releases high concentrations of greenhouse gases. Further, pavements need to be designed to endure increasing volumes of passenger vehicles, freight traffic, and bus transit.

The following pavement innovations are being developed and tested:

- ***Inductive Charging Pavements:*** This "inductive power transfer" technology integrates electrical supply cables in a prefabricated concrete slab implemented in the roadway. These cables create an electromagnetic induction field, used for charging an electric vehicle while driving. Highways England is currently conducting off-road trials to test Dynamic Wireless Power Transfer technology. The trials involve fitting vehicles with wireless technology and testing the equipment, installed underneath the road, to duplicate highway conditions. The off-road trials are expected to last for approximately 18 months and could be following by road trials.
- ***Intelligent Networked Highways:*** Fiber optics and sensors embedded in roadway pavement, in addition to roadside "listening stations," will link up with global positioning system receivers in cars to monitor traffic patterns and accidents. Information is then passed back to the navigation system in vehicles to help drivers avoid congested areas and accidents. A more functional fiber backbone and Advanced Traffic Management System will enable the County to feed connected vehicle movement. In addition, positioning and communications technologies enable the collection of probe data, which can help KDOT better understand vehicle behavior.
- ***Solar Power Signs:*** Solar energy is becoming a popular option to power everything from traffic lights to stop signs, providing better overall visibility, saving money, and consuming less electricity in the process. Compared to typical street signs, solar powered LED signs increase the range of visibility day and night, as well as in extreme weather conditions. Whether they are used at crosswalks or intersections, these signs help promote greater safety for both pedestrians and motor vehicle operators.
- ***Dynamic Paint:*** Symbols that appear on the road surface that can indicate whether the temperature is hot enough or cold enough to affect driving conditions. It provides early warning when roads start to become dangerous because of freezing weather conditions.

Figure 7-1. Dynamic Pavement Paint

- ***Glass Material in Highways:*** Recycled broken glass, a renewable material (also referred to as cullet or pulverized glass aggregate), can be used as roadway aggregate material. Cullet has been found to be a suitable supplement for gravel in many construction applications; it does not have harmful environmental side effects and can be cost-competitive with other aggregate materials.
- ***Green Cement:*** This is an alternative process to create cement in a way that releases less greenhouse gases than the typical process. The Illinois Tollway has conducted research on recycled concrete aggregates and additives to traditional pavement, which reduce asphalt plant emissions, fuel, and energy use.
- ***Hydrogen Highways:*** For hydrogen-powered vehicles to become a viable option, investment in the underlying infrastructure is required (i.e., hydrogen stations). A hydrogen highway would be a chain of hydrogen fuel stations and infrastructure along a common highway or route to enable hydrogen-powered cars to travel. California has developed a blueprint for Hydrogen Highway infrastructure and has opened hydrogen stations. An East Coast Hydrogen Highway from Maine to Florida is also being planned.
- ***Pavement Heat Exchangers:*** There is research underway on evaluating the thermal energy potential of "asphalt collector" systems to take advantage of the heating or cooling effects that

pavements can provide. This technology could potentially provide heating, cooling, or energy to associated/surrounding structures or facilities, reduce the heat island effect, and provide additional safety in the form of deicing.

- ***Photocatalytic Concrete:*** Photocatalytic concrete contains a type of cement mix coated with highly reactive titanium dioxide particles that react to break down harmful air pollutants. This process cleans the concrete by deflecting and degrading dirty air particles. In addition to cleaning the air, titanium dioxide helps keep the concrete cool by reflecting sunlight. This technology has been tested and proven successful in several European locations. In addition, the I-35W replacement bridge in Minneapolis includes two 30-foot sculptures made of photocatalytic concrete.
- ***Resin-Based Pavement:*** Resin-based pavements use clear tree resin and pitch from pine trees in place of petroleum-based elements to bind aggregate. Because the resin is transparent, the pavement takes on the lighter color of aggregate, which gives the pavement a higher surface reflectivity and lower surface temperature than blacktop asphalt. Because the mixture does not need to be heated like conventional asphalt, less energy and fossil fuels are expended in the construction process. Resin pavements are more commonly used on lower-volume public roads, highway and airport shoulders, private access roads, parking lots, sidewalks and walkways, and trails.
- ***Solar Highway Energy Generation:*** The concept of "Solar Highways" involves the installation of photovoltaic panels along undeveloped highway right-of-way. The energy created by the solar panels can be used to power different elements of the highway, such as night time illumination, road signs, emergency telephones, and even ventilation systems for tunnels. The first "Solar Highway" project in the U.S. was completed at the I-5/I-205 Interchange near Tualatin, Oregon, in December 2008. The project consists of 504 ground-mounted solar panels that produce 128,000 kilowatt hours annually, or about one-third of all electricity needed to run the illumination at the interchange. Another successful project is Nevada's State Highway 447, referred to as "America's Solar Highway." It includes 10 solar arrays that produce 451 kilowatts of energy along 75 miles, equating to 6 kilowatts per mile, believed to be the largest amount of distributed solar power per mile of any highway in the U.S.
- ***Glow-in-the-Dark Road Markings:*** Road markings with "glow-in-the-dark" paint so that they can be seen without the need for lights.
- ***Anti-Icing Roads:*** Road surfaces creating naturally reactive de-icer (such as the patented, epoxy-aggregate pavement surface, SafeLane surface overlay) that prevent ice from forming on the roadway.
- ***Interactive Wind-Powered Lights:*** Road lights that only turn on when a car is present and are powered by the wind.
- ***Piezoelectric Energy Roads:*** Piezoelectric crystals generating energy from the vibrations that vehicles generate as they drive along the roadway.

Bridge and Roadway Designs to Mitigate Increased Flood Risks

Bridges and roads that parallel or intersect rivers and floodplains are subject to flooding, and as a result of climate change, increased flood risks pose a concern. In the past 30 years, flooding has caused billions of dollars in damages, including damages to bridges and roads.

As storm events become more intense as a result of climate change, strategies that promote resilient infrastructure and stormwater infiltration should be a priority. Strategies include:

- Increasing the carrying capacity of culverts, detention basins, and other drainage systems
- Ensuring adequate maintenance of roadway infrastructure
- Raising road embankments and increasing slopes
- Raising or relocating roadways out of flood zones
- Monitoring scour action at inland bridges
- Conducting vulnerability assessments to better understand the potential for flooding in certain locations

- Implementing stormwater best management practices (e.g., bioswales and detention ponds) and green infrastructure

Summary

To address current and future transportation needs, the County has considered a range of roadway strategies that range from proper planning at the community level through coordination with planning area studies, to traditional approaches for addressing capacity and operations. Overall, the proposed improvements included widening of arterials and the tollways, creation of new corridors, realignments, and the promoting of a local collector road system. However, the County also recognizes that transportation technologies are continuing to evolve and is committed to monitoring and implementing some of these changes, where appropriate. These include improvements in the materials used for construction, the evolving manner in how vehicles are powered and communicate with one another, and the changing way people approach vehicle ownership and increasing use of ridesharing. The County also recognizes the need for future improvement to be resilient and responsive to increasing flood risks.

Introduction—Financing Improvements

The development of the Kane County 2050 Transportation Plan addresses the anticipated infrastructure needs based on the projected growth in development. Along with identifying the needs, it is imperative to balance those needs with available financial resources. A strategic planning process requires that priorities be established to allocate the limited resources to the competing needs. The Kane County 2050 Transportation Plan considers a broad spectrum of needs based on, at first, a financially unconstrained basis, and then subjects the roadway improvements to a prioritization process that forms the basis for a financially constrained plan.

Funding for Transportation Projects

Funding for streets and highways within Kane County comes from a variety of sources, including federal, state, and local resources. A majority of state programs are financed from federal funds with additional revenues from the State Motor Fuel Tax. Local programs rely on state subsidy of motor fuel tax revenue, property and sales taxes, local fees, and federal assistance through metropolitan planning organizations.

A majority of capital projects are financed with federal funds, with the federal share for eligible projects at 80 percent and a "local" match of 20 percent by the requesting agency. The resources for the "local match" typically are provided via local motor-fuel tax revenue, sales taxes, property taxes, impact fees, area legislators, Kane County, and other units of governments or private industry.

The guidelines set forth beginning in 1991 with the Intermodal Surface Transportation Efficiency Act (ISTEA) specified that LRTPs provide a financial analysis that demonstrates an implementation schedule for long-range projects. Under ISTEA, most federal funding was divided into specific program categories that restricted the use of the funds. As stipulated in the Transportation Equity Act for the 21st Century (TEA-21), which was signed into law in 1998, there were fewer restrictions placed on federal funding so that funds dedicated for highways may be used for non-motorized facilities, historic preservation, and aesthetic improvements. The most recent transportation bill, the Fixing America's Surface Transportation Act (FAST Act, 2015), generally continues the direction of previous bills, while further emphasizing stakeholder engagement and multi-modal considerations.

Financial Resources

A Comparison of Revenues and Costs

The seven primary funding sources from which Kane County receives a majority of the revenue are listed below. In addition, the County may apply for additional revenues through a variety of programs depending on the proposed project. These other funding resources are included as reference. All fund source amounts are quoted for an average of 8 years, from 2018 through the year 2025. The forecasts in this Plan were prepared in August 2020 when forecasts of revenue sources were unpredictable due to the ongoing COVID-19 pandemic. This report is using the most recent information available at the time it was finalized.

- **Motor Fuel Tax**—The State of Illinois collects $0.387 per gallon of gasoline and $0.462 for diesel sold in the state. A distribution formula is used to allocate these funds to counties based upon the number of registered vehicles within the County. The revenue from motor fuel tax is approximately $9.2 million annually for Kane County.
- **Local Option Motor Fuel Tax (LOMFT)**—The State of Illinois legislation provides an option for specified counties to add up to four cents of additional tax per gallon of motor fuel to be used for transportation. Kane County has enacted a four-cent LOMFT, which generates $8.8 million annually.
- **Local Revenues for Property Taxes**— An additional source of local revenues is from property tax levies. Property taxes generate $5.3 million annually.
- **Surface Transportation Program-Local (STP-L) and Rural funds**—The STP program is one of the main efforts of the Kane Kendall Council of Mayors and provides the most direct avenue for local

governments to receive federal funding for Local Surface Transportation Projects. Approximately $8.6 million are available for the Kane Kendall Council of Mayors annually. All municipalities within the boundaries of the Kane Kendall Council of Mayors are eligible and encouraged to apply for the STP dollars on a specific project basis. KDOT typically receives $1.3 million annually from this source.

- **Impact Fee Program**—Kane County imposes an impact fee on new residential and non-residential developments in the county. Kane County's impact fee program generates approximately $1.5 million annually.
- **Sales Tax Revenues**—Kane County receives approximately $13.8 million annually from sales tax revenues.

Kane County has several other revenue sources that can generate additional funds annually. In addition, there are other funding programs that KDOT has access to either through shared funding agreements or through direct allocation. These sources of funding are as follows.

- **Congestion Mitigation and Air Quality Improvement Program**—The program funds transportation projects that help non-attainment areas meet the requirements of the Clean Air Act Amendment. The program funds projects that will reduce congestion and/or provide an air quality benefit. The program is financed with federal dollars through CMAP.
- **Illinois State Toll Highway Authority**—Finances projects on its toll highway system.
- **IDOT**—Finances projects on the state highway system.
- **Highway Bridge Program—**The program provides assistance for the rehabilitation of bridges. The program is financed with federal dollars through IDOT.
- **National Highway System—**Funds from the program may be used for all types of transportation improvements, including construction, reconstruction, operational improvements, and planning. The roadways designated in the National Highway System are major routes of national significance, including interstates, expressways, and those surface arterial roads which are a critical link in the regional transportation system. The program is financed through the FHWA.
- **Illinois Transportation Enhancements Program—**The program was designed to broaden the transportation focus from Interstate and highway project to making our communities more livable. The program is financed through IDOT with federal money from the Fixing America's Surface Transportation Act (FAST Act).
- **Grade Crossing Commuter Rail**—The program helps finance improvements to safety at railroad crossings and to improve rail operations for transit operators and surface conditions for street traffic. The program is financed through IDOT with a matching share from Federal Transit Administration.
- **Operational Green Light Capital Improvement Program**—The program supports public transportation projects by providing safe and convenient stations, parking, and access. The program is financed through IDOT.
- **Access to Transit Capital Improvement Program**—The program provides funding for multimodal access to mass transit as a component of the Operation Green Light program. The program is financed through IDOT.
- **Rail Safety Program**—The program supports improvements at railroad crossings. The program is financed through the Federal Railroad Administration.
- **Truck Access Route Program**—The program provides financial assistance with the incremental cost of improving local highways to meet the additional weight and geometric modifications for truck accessibility. The program is financed through IDOT.
- **Bike Path Grant Program**—The program provides support for acquiring, constructing, and rehabilitating public non-motorized bicycle paths and directly related support facilities. The program is financed through the Illinois Department of Natural Resources.

- **Federal Recreational Trails Program**—The program provides funding for acquisition, development, rehabilitation, and maintenance of both motorized and non-motorized recreational trails. The program is financed through Illinois Department of Natural Resources.
- **Grade Crossing Safety Protection Program**—The program assists with the cost of installing necessary improvements with the objective of reducing accidents at railroad/highway crossings. The program is financed through the Illinois Commerce Commission.
- **Community Planning Grant**—The program provides technical assistance for transit planning to local governments. Projects with an explicit transit focus are financed through the RTA. Projects focused on the integration of land use and transportation, or on transportation modes other than transit (such as bicycle and pedestrian planning) are funded by CMAP.
- **Transportation, Community, and System Preservation Program—**A comprehensive initiative of research and grants to investigate the relationships between transportation and community and system preservation and private sector-based initiatives.
- **Safe Routes to School**—This program supports projects and programs that enable and encourage walking and bicycling to and from school. The program applies to schools serving grades Kindergarten through 8th grade.
- **Highway Safety Improvement Program—**This program's goal is a significant reduction in traffic fatalities and serious injuries on all public roads. Highway safety improvement projects correct or improve a hazardous road location or feature or address a highway safety problem.
- **High Risk Rural Roads Program**—This program supports construction and operational safety improvements on roadways functionally classified as a rural major or minor collector or rural local road that have fatal and incapacitating injury crash rates higher than the statewide average for those functional classes of roads.
- **Job Access and Reverse Commute (JARC) Program [Section 5316]/New Freedom Program [Section 5310]—**This program is available to local governments, transportation agencies, and the Chicago Transit Authority, Metra, and Pace for operating and capital projects derived from the RTA's Coordinated Public Transportation Human Services Transportation Plan that enhance mobility for seniors, people with disabilities, and low-income populations, address reverse commute markets, and/or provide access to jobs.

Additionally, the County pursues funding alternatives such as project staging, cooperative planning, intergovernmental agreements, etc. Enabling legislation in the Illinois Highway Code authorizes counties to construct and operate a toll bridge over and across any navigable or non-navigable waters. The County will operate the bridge portion of the Longmeadow Parkway Bridge Corridor as a toll bridge over the Fox River. This provides an opportunity for a unique funding approach, wherein funding and local match would be provided by users via tolling, along with municipal participation with dedication of right-of-way, counties (Kane and McHenry), state, and private developers with land donations and road construction.

Projected Revenue Summary

In evaluating the potential revenues available to KDOT as aggregated to the 2050 planning horizon, a scenario including $2 million in federal funding, as a general annual estimate, was evaluated. (The County has prior funding commitments from the federal government and may also receive additional federal funds in future, and actual federal funding is subject to change.) This scenario considers the extrapolation of the current sources of revenues, including the impact fee program, and would yield $1.73 billion over the 30-year planning period.

Transportation Expenditures

KDOT expenditures can be categorized in the following categories: maintenance, operations and administration, bond repayment, and capital for capacity improvement projects and rehabilitation.

- **Facility Maintenance**—The County is responsible for maintaining about 312 miles of roadways. The annual cost of resurfacing and general road maintenance is $14.8 million. Maintenance of the facilities includes resurfacing, restriping, de-icing materials, and bridge repairs.
- **Operation and Administration**—The County has a budget of $9.9 million annually for operations, fuel, personnel, and other support costs.
- **Bond Repayment**—The County issued motor fuel tax bonds to fund capital improvements, including the Longmeadow Parkway. The annual debt payment on the bonds is $2.2 million.
- **Capacity Improvements Projects**—The County is responsible for the expansion of its system to support the travel demand. Capacity improvement projects include the widening of existing facilities, development of new facilities, and improvements on control and channelization at intersections.

Total annual expenditures excluding recent capacity enhancement projects for an 8-year average from 2018 through 2025 are approximately $43.5 million, for a total need of $1.5 billion over the 30-year planning period. This cost excludes any additional capacity projects developed as part of transportation plan.

As highlighted in Section 5, an unconstrained set of roadway improvements was established to respond to the recent and forecasted residential and commercial growth in the County by 2050. In response to this growth, KDOT will have infrastructure needs that will exceed the financial resources the County anticipates in the future. The ability to fund the operation and maintenance of existing facilities and provide for funding of capital improvements in the future will be a major challenge. The Transportation Plan takes into consideration the projected needs and limited resources to develop an implementable plan that meets goals and objectives set forth by the planning process.

Capital Improvement Needs

Cost Model

Cost estimates were either developed or referenced from other studies for roadways, transit improvements, and pedestrian and bicycle facilities. For roadways, the project cost estimates were developed from a combination of three sources: project cost taken directly from Impact Fee CRIP, construction and right-of-way cost estimations using the SRA cost methodology or using a freeway methodology. Note that since the projects being considered in Kane County are pre-Phase 1 types of improvements, the cost-estimating methodology need not be as detailed as for preliminary engineering. Costs have been updated to 2018 dollars.

Below, the cost items that are to be used are described, and then the methodology, documentation, and quality control procedures are explained.

CRIP Projects

The cost for projections identified from the Impact Fee Program were the same costs as were published in the CRIP dated 2017. If a CRIP project was considered a part of a larger project, the cost from the smaller project was rolled into the overall cost.

Roadway Cost Methodology

Construction Costs

The cost methodology described in the following subsections was used for the proposed arterial improvements. The construction cost methodology uses the following items: roadway reconstruction, new structures, structure widening, intersections, interchanges, engineering, and contingencies. All cost estimates are for the year 2019.

Roadway

The roadway cost item is measured in miles. It is meant to include the costs of upgrading the existing roadway to the proposed cross section, and constructing segments on new alignment. The roadway costs include reconstruction of the existing roadway due to the limited service life of the existing pavement, as well as the costs for earthwork, drainage, landscaping, etc. As a general guideline, a unit cost of $750,000 per lane-mile was assumed for widening projects, and $685,000 per lane-mile was assumed for reconstruction projects.

The length of roadway to be measured is the centerline length, including through intersections and interchanges, but excluding segments on long bridges (longer than 500 feet).

New construction had a cost estimate of $2.5 million per mile for a two-lane cross-section and $5.2 million per mile for a four-lane cross section.

Structures

Costs of each new or widened structure should be estimated separately, except when part of an interchange. Estimated costs for interchanges will include all associated structures.

There may be situations where it appears that an existing structure can remain in use, perhaps with some widening. An example is the situation where one of the roadways can use an existing structure, while a new structure is constructed for the other roadway. However, due to the limited service life of structures, it should be assumed that some of these structures would be replaced. The smaller, more inexpensive structures should nearly always be replaced.

New Structures

Table 8-1 shows the estimated costs of new structures in millions of dollars, based on the number of lanes on the structure and the number of lanes spanned by the structure. If a median is carried by the structure, its width should be converted to an equivalent number of lanes. Similarly, medians that are spanned should be included. However, shoulder and sidewalk widths should not be added since they are already assumed to be included in the structure costs.

Railroads that are spanned can be treated as having two equivalent lanes per rail line. The widths of medium-sized rivers can also be converted to equivalent numbers of lanes for cost-estimation purposes.

Table 8-1 also supplies costs for short structures used for spanning minor watercourses. For new structures longer than 200 to 250 feet, the estimated construction cost should be based on the bridge deck area, in square feet, as noted in the table.

Table 8-1. Cost Estimate for New Roadway Construction/Reconstruction

	Cost ($ Millions per mile) Equivalent Number of Lanes Over		
Equivalent Number of Lanes Under	2–3 Lanes	4–5 Lanes	6–7 Lanes
2 to 5	1.95	3.9	5.85
6 to 7	3.9	5.85	7.8
Structures Over Minor Waterways	0.75	1.15	1.725

Note:
Structures that are part of interchanges are not costed separately. Equivalent lanes refer to travel lanes and medians only. For extra-long bridges (over 200 feet), use $173 per square foot of assumed deck.

Widened Structures

The cost for widening existing structures is $173 per square feet of deck area being added to the bridge. The widths of any medians, shoulders, and sidewalks should be included when determining the area of widening.

Intersections

Some at-grade intersections are to have costs attributed to them that are over and above the per-mile roadway costs. The intersection costs are meant to allow for the costs of signalization and additional turn lanes and/or through lanes.

Only the following four types of intersections are to have additional costs attributed to them:

- Intersections with another arterial
- Existing unsignalized intersections at which new signalization is proposed
- Intersections where additional turn lanes will be needed
- Newly proposed intersections at which signalization is also proposed, including turning roadway/cross-street intersections

A full upgrade for an intersection includes upgrading the control at the intersection and adding all possible turn lanes. A partial upgrade is for intersections with some existing turn lanes. The cost is broken down further by four leg and three leg intersections. The intersection cost does not include reconstructing the through lanes and center of the intersection; this cost is included in the segment costs described above. No costs should be added for interchange ramp intersections, since those costs are included in the interchange cost estimate.

Costs of intersection improvements that are not listed above are not provided because they are determined not to be attributes to the highway improvement project, but rather to other improvements.

Table 8-2 lists the additional construction costs to be attributed to some at-grade intersections based on intersection type.

Table 8-2. Cost Estimate for At-Grade Intersections

Intersection Type	Additional Cost ($ each)
4-leg full upgrade	1,200,000
4-leg partial upgrade	750,000
3-leg full upgrade	975,000
3-leg partial upgrade	630,000
At an interchange ramp	-0-
Other intersections	-0-

Grade-separated intersections have no applicable additional costs. This is because the costs for the structure, the turning roadway(s), and the cost for any signalization at the turning roadway intersection(s) should be treated as discussed previously.

Interchanges

Costs of new or modified interchanges should be estimated based on interchange type. These costs are in addition to the per-mile costs of the roadway through the interchange area, discussed previously. The interchange costs include all associated structures, retaining walls, and any signalization of ramp intersections. Table 8-3 shows estimated interchange costs by interchange type. A partial interchange improvement is estimated at half the cost.

Table 8-3. Cost Estimate for Interchanges

Interchange Type	Cost ($ Millions, each)
Single Point Diamond	20.7
Typical Diamond or Parclo	13.8

Right-of-Way Costs

As part of the cost estimate, a general cost per square foot was assumed for right-of-way acquisition. The right-of-way cost was taken from the Impact Fee Program at a value of $3.05 dollars per square foot. Right-of-way guidelines have been set to ensure that a minimum right-of-way is provided for each type of facility.

Cost Methodology

The freeway cost methodology was used for the proposed improvements on the freeway and tollway system included in cost estimates for US 20 and IL 56.

Construction Costs

The construction cost methodology utilizes the following items: pavement removal, new pavement, earthwork, drainage, erosion control, traffic control, lighting, signing/markings, typical utilities, structure widening, incidentals, engineering, and contingencies.

Pavement

The pavement cost is measured in square yards and includes pavement removal and new pavements for mainline and ramps. The unit price is $7.50 per square yard for pavement removal, and $69.00 per square yard for new pavement. The improvements on the freeways assume widening and not full reconstruction of all lanes.

Additional Roadway Cost

Additional costs are identified for freeway projects. These costs are based on a percentage of the pavement cost. Table 8-4 shows the percentages for each category.

Table 8-4. Percent of Pavement Cost for Additional Freeway Items

Type	Percent
Earthwork	10
Drainage	8
Erosion Control	2.5
Traffic Control	10
Lighting	2
Signing/Markings	3
Typical Utilities	5
Incidentals	20

Structures

For the purposes of this cost estimate, it was assumed that the bridges would be widened. The cost for widening the bridge is the same as the roadway cost-estimate methodology of $173 per square foot. In addition to the direct cost, a structure incidental cost of 20 percent was added to cover miscellaneous items.

Right-of-Way

It is assumed for the purposes of this study that sufficient right-of-way exists to widen the roadways.

Engineering and Contingencies

For both the roadway and freeway cost, a percentage of the total cost is added for engineering and contingencies. The engineering cost is 25 percent of the total construction cost. The contingency cost is 20 percent of the construction, engineering, and right-of-way costs combined.

Comparison of Revenues and Needs

With a goal of meeting the basic expenditures of operations and administration, facility maintenance, and bond repayment, the revenue scenario was compared to the projected needs. Table 8-5 lists the revenue and needs projections.

The scenario examines a comparison of revenues to expenditures with the assumption of an additional $2 million in federal funds annually. As required by Kane County ordinance, 95 percent of the revenue generated by impact fees must be spent for capacity improvements by representative traffic districts. Historically, portions of revenue from state and local motor fuel tax have been used for capital improvements, but because of maintenance and operational needs, portions of these funds have been diverted to cover these costs. There would be sufficient funds to meet the operation and maintenance needs in comparison to the projected revenues, with an additional $217.6 million available for capital improvements. However, as mentioned earlier, the County has prior funding commitments from the federal government and may also receive additional federal funds in future. The actual funding available for capital improvements could be more than $217.6 million.

Table 8-5. Kane County General Revenues and Needs Forecast Estimates – FY 2021–FY 2050

Projected Revenue	Annual Revenue	30 year Cumulative Revenue
County Bridge Levy	307,626	9,654,678
County Highway Levy	5,008,514	155,344,370
County Highway Matching Levy	64,070	2,010,958
Impact Fees	1,456,828	43,188,681
Interest	1,745,349	48,558,457
Miscellaneous	20,819	666,545
Motor Fuel Tax - Local	8,755,586	227,677,278
Motor Fuel Tax - State	9,194,921	715,225,499
Permits and Fees	459,312	26,316,560
CMAP UWP Reimbursements	192,729	9,651,920
Reimbursements - Federal	1,425,329	44,339,104

Table 8-5. Kane County General Revenues and Needs Forecast Estimates – FY 2021–FY 2050

Projected Revenue	Annual Revenue	30 year Cumulative Revenue
Reimbursements - Other	789,559	23,672,915
Sales Tax	13,823,096	407,824,640
Toll Bridge Revenue	250,000	14,500,000
Total Projected Revenue	**$ 43,493,738**	**$ 1,728,631,605**
Projected Needs	**Annual Need**	**30-Year Cumulative Needs**
Bicycle / Pedestrian Projects	943,009	30,968,087
Bridge / Structure - Repair & Replacement Projects	5,805,452	177,836,057
Bridge Maintenance	732,300	22,436,168
Building Improvements	392,969	12,533,269
Contractual Services	1,637,614	118,006,496
Debt	2,204,468	53,876,433
Information Technology Services	454,468	22,222,900
Intersection Safety/Operational Projects	4,483,764	138,996,670
Maintenance and Supplies	435,220	8,301,738
Operations and Maintenance	133,467	10,154,185
Pavement Maintenance	8,708,063	272,205,839
Personnel	7,576,083	321,120,253
Rock Salt/Ice Control	1,140,619	138,434,597
Traffic - Signals/Lighting/Signs	1,755,584	74,395,154
Traffic Safety/Interconnect	1,935,705	62,700,783
Vehicles & Equipment	1,463,500	46,863,234
Total Projected Needs	**$ 39,802,284**	**$ 1,511,051,865**

* Inflation factors determined based on KDOT revenue and needs forecast. Percentage factors represent percent increase per year.

** This is a *general*, annual estimate. The County has prior funding commitments from the federal government and may also receive additional federal funds in future, and actual federal funding is subject to change.

The forecasts in this Plan were prepared in August 2020 when forecasts of revenue sources were very unpredictable due to the ongoing COVID-19 pandemic. This report is using the most recent information available at the time it was finalized.

Annual need based on 30 year average

Introduction

The 2050 Recommended Roadway Plan is composed of roadway improvements to the Kane County Transportation System. Projects include improvements to the tollways, SRAs, other arterials, new bridge and road corridors, and realignments. All of the roadway projects identified in the CMAP 2050 Transportation Plan and Impact Fee CRIP are included in the Recommended Roadway Plan. The plan is focused on expanding the highway system and will be supported with locally funded collector road networks, transit and non-motorized improvements, and through the use of additional transportation strategies such as TDM and TSM. Figure 9-1 shows the roadway element of the recommended transportation plan, which includes roads that are functionally classified as arterials or above. Additional recommendations include local bridge projects and locally planned capacity improvements to the collector roadway system, and are described in this section.

Committed Projects

Committed projects are projects with known construction funding sources and are anticipated to be built in the near term. The following are committed projects:

- Extension of Dauberman Road from US 30 to Granart Road
- Realignment of Bliss Road and Fabyan Parkway with Main Street
- Completion of Longmeadow Parkway over the Fox River

Interstate Projects

The interstate projects identified for Kane County are all on the Illinois Tollway system and include I-90 and I-88. I-88 would be widened to an eight-lane cross section from Orchard Road to the east county. A half-interchange improvement is proposed at Brier Hill Road with I-90. Currently, there is no access to I-90 from Brier Hill Road.

Additional Highway/Expressway Projects

US 20 through Elgin is currently a four-lane highway. IDOT is planning major improvements from west of Randall Road to Shales Parkway. In accordance with the IDOT 2020-2025 Improvement Plan, the project will include bridge replacements, ramp modifications, bridge repairs, new bridge decks, bridge widening, noise walls, channelization, and safety improvements. This includes the interchange at US 20 and Randall Road.

Strategic Regional Arterials

The SRAs form a system of major roadways developed to serve as a second tier to the highway system with a focus on throughput capacity and regional connectivity. Improvements are planned for many of the SRAs in Kane County, in coordination with the previous IDOT SRA studies.

- Randall Road/Orchard Road, Fabyan Parkway, and Dunham/Kirk Road are SRAs under county jurisdiction where widening is planned. Randall Road is a major north-south arterial in the developed and expanding portions of the county and includes many commercial/retail centers.
    - On Orchard Road, there is a planned widening to a six-lane cross section from Randall Road to US 30 around the interchange with I-88.
    - There are plans to widen the four-lane sections of Randall Road to six-lanes from Silver Glen Road to the proposed Longmeadow Parkway and then from Oak Street in St. Charles to Orchard Road.
    - The SRA portion of Fabyan Parkway, from Randall Road to the east county line, is planned to be widened to a six-lane cross-section.

- Farnsworth, Kirk, Dunham, and the IL 25 corridor in the eastern portion of Kane County form another north-south SRA route.
    - This corridor is planned to be widened to four lanes from the south county line to New York Street, to six lanes from I-88 to south of IL 56, to six lanes from Wilson Street in Batavia to IL 64, and to four lanes from IL 64 to the Kirk/Dunham junction.
    - Development in portions of this corridor is dense, with limited room for expansion.
- All other SRA projects are state or federal designated routes.
    - Much of the IL 47 corridor from the south county line to the north county line is a state SRA route planned for expansion.
        - The expansion of IL 47 through Elburn would be limited by existing development.
        - The entire length of IL 47 is planned to be four lanes wide with six-lane sections between IL 56 and College Drive, and between Big Timber Road and Del Webb Boulevard.
    - US 20 is an SRA west of the existing highway section through Elgin.
        - US 20 and IL 72 in Hampshire are to be realigned and grade-separated from the railroad track, similar to the intersection of Peck and Keslinger roads.
        - In Pingree Grove, the curve in the alignment of US 20 would be slightly rounded to improve the safety of this higher-speed facility.
        - As mentioned earlier, the ultimate roadway plan calls for the section of US 20 from Coombs Road to Randall Road to be widened to six lanes (in accordance with the *Elgin Far West Plan* and Elgin's *U.S. Route 20 Corridor Study Primer)* and to four lanes from the north county line to Coombs Road.
    - US 30 along the southern border of Kane County is planned to be widened to four lanes from IL 47 to the current four-lane section over the Fox River.
    - IL 64 is planned to be widened to six lanes from west of Kirk Road to the east county line.
    - IL 62 in the northeast corner of the county through Barrington Hills is planned to be widened to four lanes east of IL 25.
    - IL 56 is an SRA from Kirk Road to the east county line and is planned to be widened to four lanes.
    - IL 72 from IL 25 to the east county line is designated as an SRA and is planned to be widened to six lanes.
    - US 34 along the southeastern border of Kane County is planned to be widened to six lanes.

It should be noted that the final scope of work for all improvement projects on the state highway system will be subject to preliminary engineering and the public involvement process through Context Sensitive Solutions.

Fox River Bridge Corridors

The Longmeadow Parkway Bridge Corridor project is underway, with all roadway sections under construction or completed. This project is funded with federal, state, and local support. The Corridor is a minor arterial that extends from Huntley Road to IL 62 in the northern portion of the county in the Algonquin and Carpentersville Area. The entire corridor is scheduled to open in late 2021.

Locally planned bridges[12] include the Carpentersville Bridge Corridor, which would extend from IL 31 to Washington Street in the East Dundee area (in accordance with the Village of Carpentersville Fox River Local

[12] http://kdot.countyofkane.org/Planning%20Documents/bridgecorridor.pdf

Bridge Study), and a local bridge in Batavia which is being evaluated as part of their future plans. These bridges are planned to be two-lane facilities that carry local traffic.

Widening of Existing Arterials

Arterials other than SRAs have also been identified for widening. Table 9-1 shows the additional arterial widening projects. All of the roadways listed would be widened to four lanes, with the exception of Jericho Road, which is a three-lane project. It should be noted that Kreutzer Road is shown as an arterial in that there are plans to reroute traffic from Huntley Road to Kreutzer Road providing a bypass of the downtown Huntley area.

Table 9-1. Non-SRA Arterial Widening Improvements

Roadway	Segment Limits	Jurisdiction
IL 31	North County Line to Huntley Road	IDOT
IL 38	IL 47 Randall Road	IDOT
IL 68	IL 72 to East County Line	IDOT
IL 72	IL 47 to Tyrell Road	IDOT
IL 72	Tyrell Road to Locust Drive	IDOT
U.S. 30	Dauberman Road to IL 47	IDOT
Big Timber Road	Ketchum to Randall Road	County
Bliss Road	IL 47 to Main Street	County
Bowes Road	South Water Road to McLean Road	County
Burlington Road	Bolcum Road to IL 64	County
Fabyan Parkway	Main Street to Randall Road	County
Galena Boulevard	IL 47 to Orchard Road	IDOT
Galligan Road	Binnie Road to Freeman Road	County
Huntley Road	North County Line to Sleepy Hollow Road	County
Jericho Road	IL 47 to Orchard Road	County
Keslinger Road	East of Peck Road to Randall Road	County
Keslinger Road	Bunker Road to Peck Road	County
Keslinger Road	IL 47 to Anderson Road	County
Kreutzer Road	IL 47 to Huntley Road	Local
Main Street	Bunker Road to Randall Road	County
McLean Road	IL 31 to Hopps Road	IDOT
Montgomery Road	Briarcliff Road to Hill Road	County
Plank Road	IL 47 to Russell Road	County
Plank Road	Russell Road to US 20	County
West Bartlett Road	Il 25 to East County Line	County

New Alignments

Within the Planning Area Studies, there are multiple major new alignments planned by Kane County and local municipalities to support the arterial system. The new alignments would add connectivity to the transportation system and access to newly developed areas. Healy Road is planned to be extended from Bliss Road to Seavy Road.

In addition, the County supports the efforts to improve connectivity and system efficiency with locally planned new alignments. The Corron Road extension from Bowes Road to Plank Road and possibly US 20 is planned to provide additional north-south access between IL 47 and Randall Road (in accordance with the Northwest Kane County Planning Area Study). The Corron Road extension connects to a local collector road at US 20, providing further connectivity to Coombs Road.

Gordon Road in south-central Kane County is planned to extend from south of Jericho to Galena Boulevard (in accordance with the Sugar Grove, Aurora, Montgomery Planning Area Study). This would be a locally funded and maintained four-lane alignment with a boulevard cross-section and a grade separation at the railroad crossing. The southern and northern sections of Gordon Road have already been built.

The County supports additional local planning efforts to increase connectivity within the collector roadway system.

Realignments

Realignments are planned to provide additional connectivity between existing roadways. All proposed realignments would be County-funded and maintained. Bliss Road would be realigned with Fabyan Parkway at Main Street as part of the proposed Bliss Road widening project. Bunker Road would be extended and then aligned with La Fox to provide a better north-south connection in the central portion of the county. The railroad crossing on this alignment north of Keslinger Road was previously grade-separated.

In the southeast portion of the county, Deerpath Road would be realigned at Orchard Gateway Boulevard to connect the north and south segments of the roadway. Healy Road would be realigned at Norris Road to connect with Tanner Road, and Tanner would be realigned at Deerpath to connect with Oak Street. These realignments, in conjunction with the Healy Road extension, would provide greater continuity and connectivity for traffic in the area. In addition to this location, a realignment of Farnsworth Avenue at Montgomery Road is planned to provide continuity for the SRA running along the county’s eastern border.

The northern portion of Galligan Road would be realigned west of the existing roadway and would extend the road north past Huntley Road to intersect with Lakewood Road in McHenry County.

Six realignments in the western third of the county are planned. Together, these six alignments provide for a continuous north-south corridor and improve connectivity. The five alignments are:

- Bliss Road and Fabyan Parkway at Main Street
- Granart Road and Dauberman Road (at US 30)
- Dauberman Road and Meredith Road (at Keslinger Road)
- Meredith Road with Peplow Road (at IL 64)
- Peplow Road and French Road (Burlington Bypass)
- French Road and Harmony Road (new alignment between West Oak Knoll Drive and Allen Road)

The Granart/Dauberman Road alignment will assist in relieving the traffic congestion at Dugan Road and US 30 and would help provide north-south connectivity in the western third of the county. The Burlington Bypass and the French/Harmony alignment would both have a grade separation with the Chicago Central & Pacific Railroad and the Canadian National Railroad, respectively.

In addition, the Brier Hill realignment and widening to a four-lane cross section is a locally planned initiative improvement to support the proposed half interchange at Brier Hill, and I-90 and would provide improved access to US 20 and Big Timber Road from the north.

Isolated Intersection Projects

Additional isolated intersection projects (mainly from the Impact Fee CRIP) that are not incorporated in the projects described above are also included in the transportation plan. These projects are primarily intersection improvements incorporating additional turn lanes and improvements to intersection control. All the CRIP projects are on County facilities. The CRIP is a 10-year plan and may be used in the determination of priorities. The County anticipates that additional intersection improvements will be identified as warranted.

Collectors/Local Projects

The County and municipalities have completed many local plans that include the addition of collector roads. Collector roads are also components of four sub-regional planning area studies conducted in the WUF, Elgin Far West, Sugar Grove-Aurora-Montgomery, and North West Kane County areas. The collector roads identified in these plans and other municipal plans serve a dual function of providing mobility and access to abutting land uses.

Although the 2050 Recommended Roadway Plan does not detail local collector improvements, an efficient and continuous collector road network would benefit the county.

The collectors would be effective in removing local traffic from the arterial roads, thereby providing for enhanced mobility on the arterials. Collector roads would provide safe access to abutting residential areas and would help control access onto the arterials. Also, the collector roads would provide an alternative route should an incident occur.

For detailed plans of the sub-regional areas, refer to the Kane County Transportation Planning Area Study Plans.

Table 9-2 is a list the roadway projects contained in the 2050 Transportation Plan.

Table 9-2. Recommended Roadway Projects

Map ID	Name	From	To	Functional Class	Improvement	Length (Miles)	Cost (Millions)
Committed Projects (Cost estimates for each project may include multiple jurisdictions.)							
N/A	Longmeadow Parkway	Boyer Road	IL-62	Minor Arterial	New Bridge Corridor, 4-lanes	N/A	$114.26
	Subtotal						**$114.26**
	*Project cost estimates include construction and construction engineering only.						
County (Cost estimates for each project may include multiple jurisdictions.)							
1	West Bartlett Road	IL-25	East County Line	Minor Arterial	Widen to 4-lanes	0.26	$3.42
3	Big Timber Road	Ketchum Road	Randall Road	Minor Arterial	Widen to 4-lanes	9.62	$112.51
4	Bliss Road	IL-47	Fabyan/Main Street	Principal Arterial	Widen/Realign 4-lanes	5.11	$32.23
5	Bowes Road	South Water Road	McLean Boulevard	Minor Arterial	Widen to 4-lanes	4.36	$20.10
7	Bunker Road	Realignment with LaFox Road		Minor Arterial	Realignment	N/A	$5.38
10	Burlington Road	Bolcum Road	IL 64	Minor Arterial	Widen to 4-lanes	0.29	$3.98
14	Dauberman Road	Keslinger Road	Meredith Road	Minor Arterial	Extension, 2-lanes	0.85	$10.94
16	Dunham Road	Kirk Road	Stearns Road	SRA	Segment intersection improvements	2.53	$4.20
18	Fabyan Parkway	Main Street	West of Randall Road at Walmart Entrance	Principal Arterial	Widen/Realign 4-lanes	3.69	$42.42
19	Fabyan Parkway	Randall Road	East County Line	SRA	Widen to 6-lanes, Intersection Improvement, Bridge Rehabilitation	3.08	$48.81
23	French Road	Realignment with Harmony		Minor Arterial	Realignment, New Road	N/A	$16.06
25	Galligan Road	Binnie Road	Freeman Road	Minor Arterial	Widen to 4-lanes	0.50	$3.42

Table 9-2. Recommended Roadway Projects

Map ID	Name	From	To	Functional Class	Improvement	Length (Miles)	Cost (Millions)
26	Galligan Road	Realignment South of Huntley Road	Lakewood Road	Minor Arterial	Realignment	N/A	$2.78
27	Granart Road	Jericho Road	US-30	Minor Arterial	Realignment, 2-lanes	0.25	$19.12
31	Healy Road	Seavey Road	Existing Healy Road	Minor Arterial	Extension 2-lanes	1.54	$13.07
32	Healy Road	Existing Healey Road	Tanner Road	Minor Arterial	Realignment, 2-lanes	0.29	$5.42
34	Huntley Road	North County Line	Sleepy Hollow Road	Minor Arterial	Widen to 4-lanes	4.97	$45.47
36	Jericho Road	IL-47	Orchard Road	Minor Arterial	Widen to 3-lanes	3.79	$27.01
38	Keslinger Road	IL-47	Anderson Road	Principal Arterial	Widen to 4-lanes	0.86	$8.76
39	Keslinger Road	Bunker Road	Peck Road	Minor Arterial	Widen to 4-lanes	2.83	$32.39
40	Keslinger Road	East of Peck Road	Randall Road	Principal Arterial	Widen to 4-lanes	1.30	$3.34
43	Kirk Road	Dunham Road	Foxfield	SRA	Widen to 4-lanes	1.36	6.75
44	Kirk Road	IL-64	Fabyan Parkway	SRA	Widen to 6-lanes	7.15	$79.31
50	Main Street	Bunker Road	Randall Road	Minor Arterial	Widen to 4-lanes, Intersection Improvement	3.90	$44.75
52	Meredith Road	Realignment with Peplow Road		Minor Arterial	Realignment, New Road	N/A	$5.43
53	Montgomery Road	Briarcliff Road	Hill Road	Minor Arterial	Widen/Realign 4-lanes	2.21	$24.49
54	Orchard Road	Randall Road	US-30	SRA	Widen to 6-lanes	7.88	$82.69
56	Peplow Road	Realignment with French Road		Minor Arterial	Realignment	N/A	$15.93
57	Plank Road	Russell Road	US-20	Minor Arterial	Widen to 4-lanes, Intersection Improvement	0.37	$3.65

Table 9-2. Recommended Roadway Projects

Map ID	Name	From	To	Functional Class	Improvement	Length (Miles)	Cost (Millions)
58	Plank Road	IL-47	Russell Road	Minor Arterial	Widen to 4-lanes	4.37	$44.63
59	Randall Road	Longmeadow Pkwy	Silver Glen Road	SRA	Widen to 6-lanes	11.01	$187.63
60	Randall Road	N of Oak Street (St. Charles)	Orchard Road	SRA	Widen to 6-lanes	0.44	$63.16
62	Tanner Road	at Healy Road/Oak Street		Minor Arterial	Realignment, 2-lanes	0.37	$4.46
	Subtotal						**$1,023.71**
State/U.S. System (Cost estimates for each project may include multiple jurisdictions.)							
24	Galena Boulevard	IL-47	Orchard Road	Minor Arterial	Widen to 4-lanes	3.48	$42.20
51	McLean Boulevard	Hopps Road	IL-31	Minor Arterial	Widen to 4-lanes	1.42	$14.62
64	IL-25	North of Kenyon Road	Dunham Road	SRA	Widen to 4-lanes	1.75	$10.80
65	IL-31	North County Line	Huntley Road	Principal Arterial	Widen to 4-lanes	3.33	$32.27
66	IL-38	IL-47	Randall Road	Principal Arterial	Widen to 4-lanes	6.89	$70.10
67	IL-47	Bliss Road	IL-47/IL-56/US-30	SRA	Widen to 6-lanes	1.28	$15.49
68	IL-47	Big Timber Road	College Drive	SRA	Widen to 4-lanes	22.48	$180.00
69	IL-47	Del Webb Boulevard	Big Timber Road	SRA	Widen to 6-lanes	2.13	$29.57
70	IL-47	College Drive	Bliss Road	SRA	Widen to 6-lanes	1.96	$18.19
71	IL-47/US-30	Base Line Road	IL-47/US-30 Existing 4 Lane Segment	SRA	Widen to 4-lanes	3.03	$44.39
72	IL-56 (at Oak Street)	IL-25	East County Line	SRA	New Bridge Corridor, 4-lanes	3.09	$36.95
73	IL-62	IL-25	East County Line	SRA	Widen to 4-lanes	1.47	$12.67

Table 9-2. Recommended Roadway Projects

Map ID	Name	From	To	Functional Class	Improvement	Length (Miles)	Cost (Millions)
74	IL-64	West of Kirk Road	East County Line	SRA	Widen to 6-lanes	0.85	$12.03
75	IL-68	IL-72	East County Line	Principal Arterial	Widen to 4-lanes	1.84	$16.77
76	IL-72	IL-47	Tyrell Road	Principal Arterial	Widen to 4-lanes	5.27	$53.96
77	IL-72	Tyrell Road	Locust Drive	Principal Arterial	Widen to 4-lanes	1.27	$12.63
78	IL-72	IL-25	East County Line	SRA	Widen to 6-lanes	1.17	$15.05
79	US-20	North County Line	Coombs Road	SRA	Widen to 4-lanes	10.88	$94.95
80	US-20	Coombs Road	Randall Road	SRA	Widen to 6-lanes	2.50	$17.50
83	US-30	Dauberman Road	IL-47	Principal Arterial	Widen to 4-lanes	4.20	$65.11
84	US-30	IL-47/US-30	IL-31	SRA	Widen to 4-lanes	5.08	$45.10
85	US-34	South County Line	East County Line	SRA	Widen to 6-lanes	0.78	$9.36
	Subtotal						**$849.71**
Expressways (Cost estimates for each project may include multiple jurisdictions.)							
63	I-88	Orchard Road	East County Line	Tollway	Widen to 8-lanes	5.80	$83.08
81	US-20	Randall Road	East County Line	Freeway	Widen to 6-lanes	4.30	$36.03
82	US-20	at Randall Road		I/C	Interchange Improvement	N/A	$40.67
	Subtotal						**$159.78**
Isolated Intersection Improvements (Cost estimates for each project may include multiple jurisdictions.)							
2	Beith Road	at IL-47	N/A	N/A	Intersection Improvement	N/A	$2.10
8	Burlington Road	at Bolcum Road	N/A	N/A	Intersection Improvement	N/A	$1.81

Table 9-2. Recommended Roadway Projects

Map ID	Name	From	To	Functional Class	Improvement	Length (Miles)	Cost (Millions)
9	Burlington Road	at Old LaFox Road	N/A	N/A	Intersection Improvement	N/A	$1.60
11	Corron Road	at Bowes Road	N/A	N/A	Intersection Improvement	N/A	$1.47
12	Corron Road	at Silver Glen Road	N/A	N/A	Intersection Improvement	N/A	$1.81
13	Corron Road	at McDonald Road	N/A	N/A	Intersection Improvement	N/A	$1.63
17	Empire Road	at IL-47	N/A	N/A	Intersection Improvement	N/A	$4.20
28	Harter Road	at IL-47	N/A	N/A	Intersection Improvement	N/A	$2.36
29	Harter Road	at Scott Road	N/A	N/A	Intersection Improvement	N/A	$1.80
30	Harter Road	at Main Street	N/A	N/A	Intersection Improvement	N/A	$2.36
33	Hughes Road	at IL-47	N/A	N/A	Intersection Improvement	N/A	$1.80
35	Jericho Road	at IL-47	N/A	N/A	Intersection Improvement	N/A	$1.81
37	Kaneville Road	at Peck Road	N/A	N/A	Intersection Improvement	N/A	$1.60
46	LaFox Road	at Campton Hills Road	N/A	N/A	Intersection Improvement	N/A	$4.60
47	Lake Cook Road	at IL-62	N/A	N/A	Intersection Improvement	N/A	$2.10
55	Peck Road	at Bricher Road	N/A	N/A	Intersection Improvement	N/A	$0.95
	Subtotal ***Additional intersection projects will be identified as warranted***						**$34.00**
Local Improvements (Cost estimates for each project may include multiple jurisdictions.)							
6	Brier Hill Road	at I-90		Minor Arterial	Interchange Improvement	N/A	$27.03
15	Deerpath Road	Mooseheart Road	I-88	Minor Arterial	Realignment, 2-lanes	1.49	$16.67

Table 9-2. Recommended Roadway Projects

Map ID	Name	From	To	Functional Class	Improvement	Length (Miles)	Cost (Millions)
20	Farnsworth Avenue	South County Line	Montgomery Road	SRA	Widen/Realign, 4-lanes	0.62	$11.90
21	Farnsworth Avenue	Montgomery Road	New York Street	SRA extension	Realignment, 3-lanes	0.32	$7.27
22	Farnsworth Avenue	I-88	South of IL-56	SRA	Widen to 6-lanes	0.80	$11.57
45	Kreutzer Road	IL-47	Huntley Road	Principal Arterial	Widen to 3-lanes	2.27	$24.90
	Subtotal ***The County supports additional projects that are more local in nature.***						**$99.34**

The total cost of the plan as shown in Figure 9-1 is $2.28 billion. The estimated cost of improvements on the county highway system, not including committed projects, is approximately $1.023 billion.

Fiscally Constrained Plan

Compared to its needs, Kane County has limited revenues. As a result the County would not be able to fund all the capacity expansion projects within the planning horizon of the transportation plan. Those projects that are not contained within the financially constrained priorities will be pursued through right-of-way protection and through agreements with other local, state, and federal agencies. The fiscally constrained priorities only pertain to facilities within the County's jurisdiction and serve as a priority list of projects for the County to develop over the long-term.

Estimated Cost of Kane County's Roadway Improvements

Although additional federal funds are possible, and unique funding opportunities such as toll financing are being explored, Kane County could expect that approximately $24 million would be available to spend on capacity improvements during the planning horizon. Since the planning process considers financial constraints, the expenditures should be comparable to the available revenues for capacity improvements. Given limited revenues projected for capital improvements, the following priorities have been established:

- Improvements that address public safety
- Capacity enhancements on Randall Road and Orchard Road
- Various Intersection and Capacity Improvements Countywide

A main priority for the County is to address safety concerns as they arise. Capacity enhancements along Randall Road and Orchard Road include improving critical segments along the corridor to six lanes or by improving intersection capacity by adding through lanes and/or channelization. The Randall/Orchard Road enhancements will improve north-south travel through the eastern portion of the county. Finally, intersection improvements throughout the county are a priority and can include such items as turn lanes and the addition of traffic signals. Priority intersections have been identified as part of the CRIP, and additional intersection improvements will be identified as warranted.

Operational Performance of Plan

Implementation of roadway projects included in the Kane County 2050 Recommended Transportation Plan would result in improved operational performance. All operational improvements are based on the completion of the arterial and roadway projects as shown in Figure 9-1. The arterial and roadway projects would add approximately 360 new lane-miles to the transportation system. Under existing conditions, the VMT increases 49 percent from 2015 to 2050 on roadways in Kane County. With the recommend projects in place the VMT increased a further 9 percent. This modest increase is a result of congestion on the roadway decreasing and travel in the area becoming more desirable for travel. Despite the slight VMT increase, VHT decreases with the addition of the roadway projects by 14 percent, and VHD decreases by 27 percent. Figure 9-2 shows the relative improvements in congestion for roadway segments, assuming implementation of the full plan.

Provision of collector road networks will further relieve congestion on the Kane County roadway system. The effect of a collector road is localized to the area in its immediate vicinity. This localized effect results because collector roads are not intended to carry regional trips, but provide alternative routes to the arterial system for local trips. The planning area studies within Kane County illustrated that collector roads may reduce congestion by as much as 10 percent. This level of reduction would be realized in areas where a complete and efficient collector road system is in place.

Alternative Transportation Strategies

The alternative transportation strategies of Transportation Systems Management (TSM) and Travel Demand Management (TDM) would be complementary to the development of the overall transportation systems in Kane County.

TSM is the concept of more efficiently using existing transportation systems by means other than large-scale construction. It is recommended that roadway improvements in Kane County would be accompanied by TSM actions. For example, traffic operations might be improved by interconnection of signals. The following are locations in Kane County where traffic signal interconnects are already operating:

- Randall Road
- Orchard Road
- Fabyan Parkway
- Kirk Road
- Big Timber Road (portion)
- Main Street (portion)
- IL 64
- IL 38

As traffic volumes increase, TSM strategies will be increasingly important in improving traffic operations by better managing the flow of traffic. The County should continue to identify locations where signal interconnects are appropriate. Ultimately, as further monitoring of Kane County roads occurs, consideration should be given to implementation of a countywide coordinated ITS that would relay information to the County for evaluation and management of traffic operations.

Summary

The recommended projects included in the 2050 LRTP involve widening a range of arterials and tollways, creation of new bridge and road corridors, realignments, and promotion of a local collector road system. In total, approximately 360 new lane miles would be added to the roadway system in Kane County. The road projects identified in the CMAP 2050 transportation plan and the Kane County Impact Fee CRIP are included in the 2050 LRTP. The plan also embraces multi-modal components and transportation demand strategies, such as TSM and TDM. Exhibits 9-1 and 9-2 show the locations of plan improvements and the performance benefit derived from implementation of the plan.

Figure 9-1. 2050 LRTP Roadway Improvements

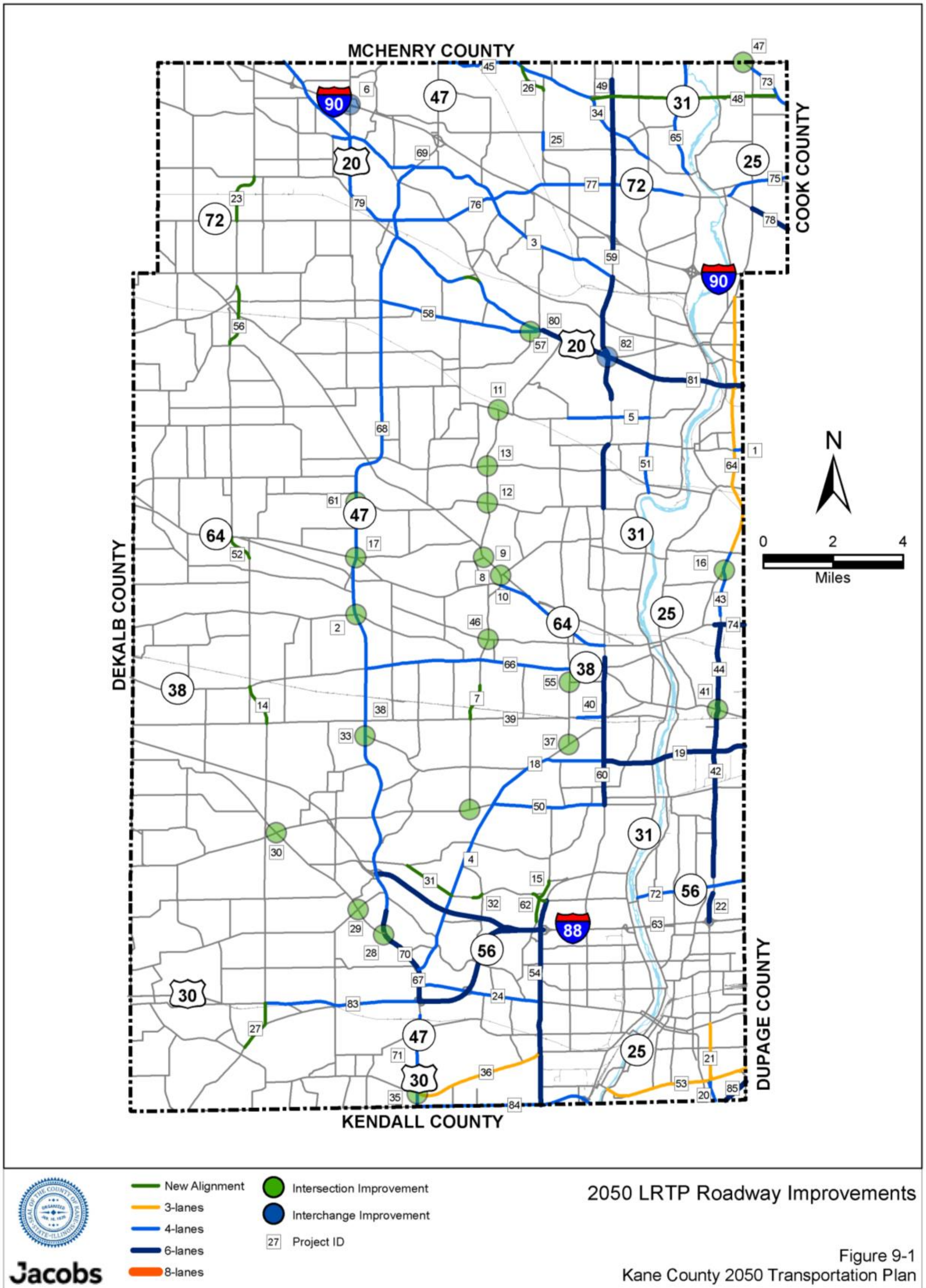

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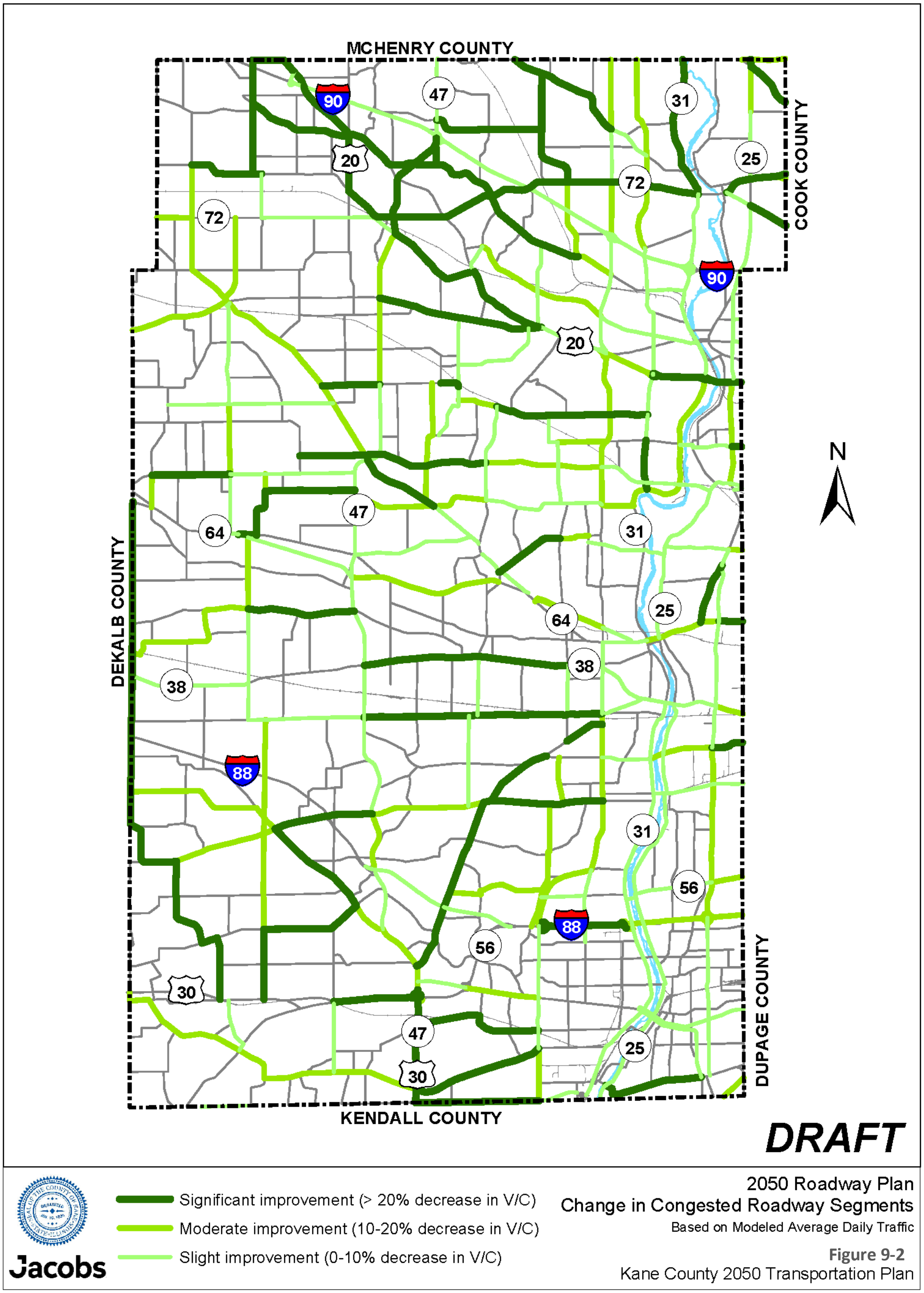
Figure 9-2. 2050 Roadway Plan Change in Congested Roadway Segments



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