

# Modeling Will County: Adapting CMAP model components for the 2050 LRTP

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- IDOT Fall Planning Conference



# Our Way Forward 2050

**Existing  
Conditions**

**Baseline Forecast**

**Stakeholder Input**

**Proposed  
Improvements**

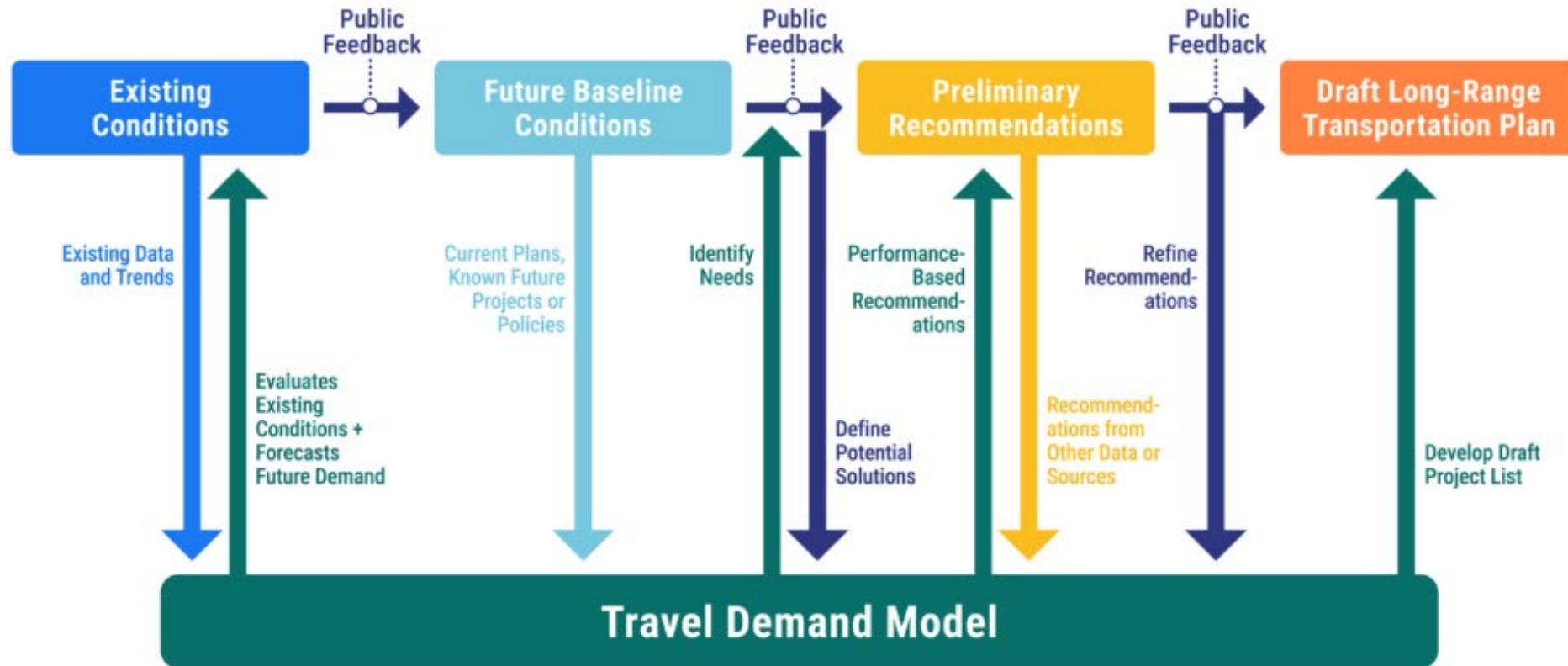


**All  
Together.**

**CEMPEL**  
INTERNATIONAL  
TRANSPORTATION  
CONSULTING

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the science of insight

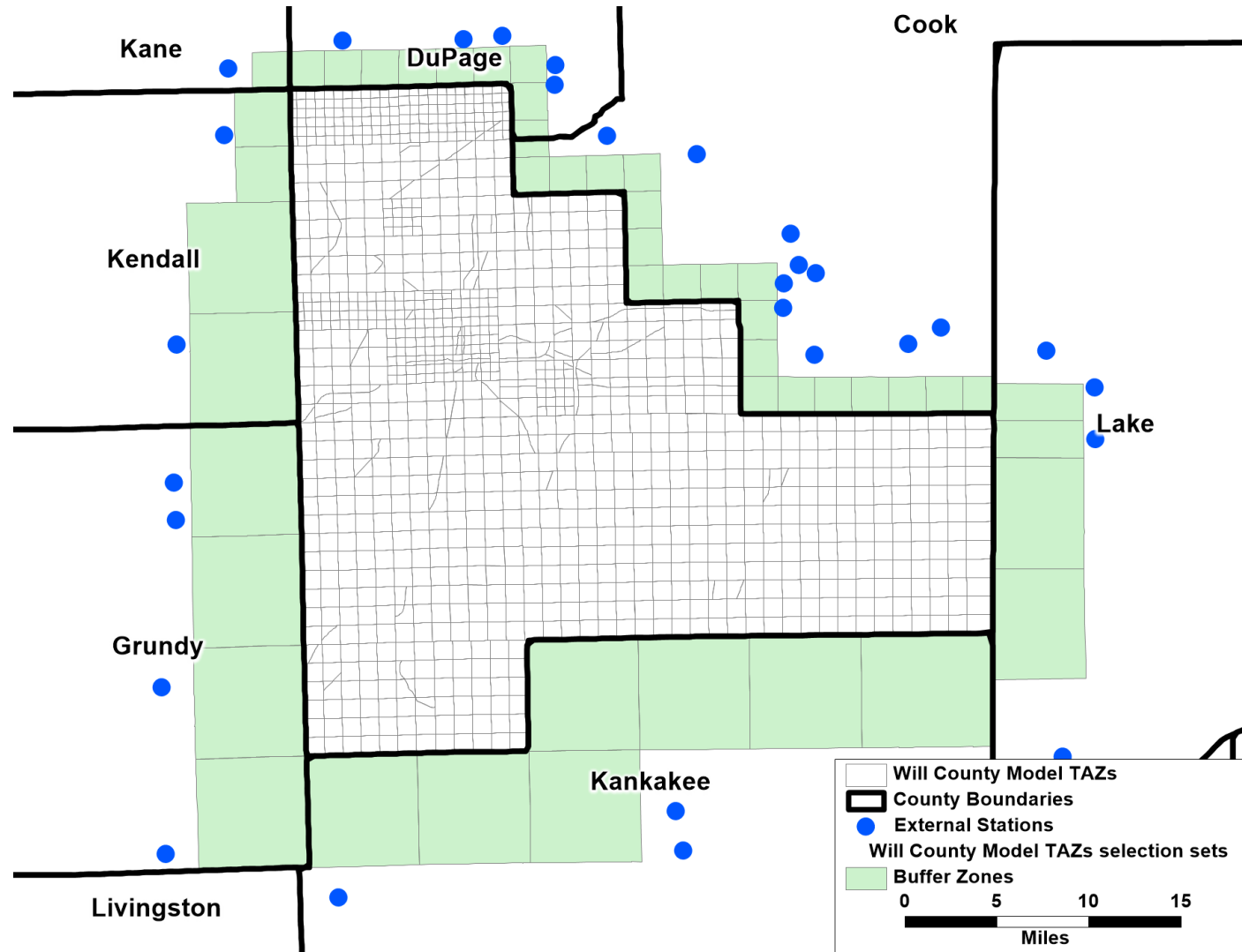
# Modeling and the LRTP Process



# Model Upgrades

- Existing model for a 2010 base year developed for TransCAD 6
- Updated codebase for TransCAD 9
- Update inputs to 2023 base year and 2050 horizon year
- Utilize 2019 CMAP “My Daily Travel” Household Travel Survey
- Represent school trips explicitly
- Multimodal networks, segmentation by auto sufficiency, and Mode Choice model add sensitivity to mode shift, including transit and active transportation
- Added sensitivity to tolls and auto operating costs in multi-class traffic assignment
- Add automated HTML reports

# Transportation Analysis Zone System



- 1,222 Internal Zones within Will County
- **48 Buffer Zones** in bordering counties
- **29 External Stations**

# Will County TAZs developed from CMAP Subzones

Joliet

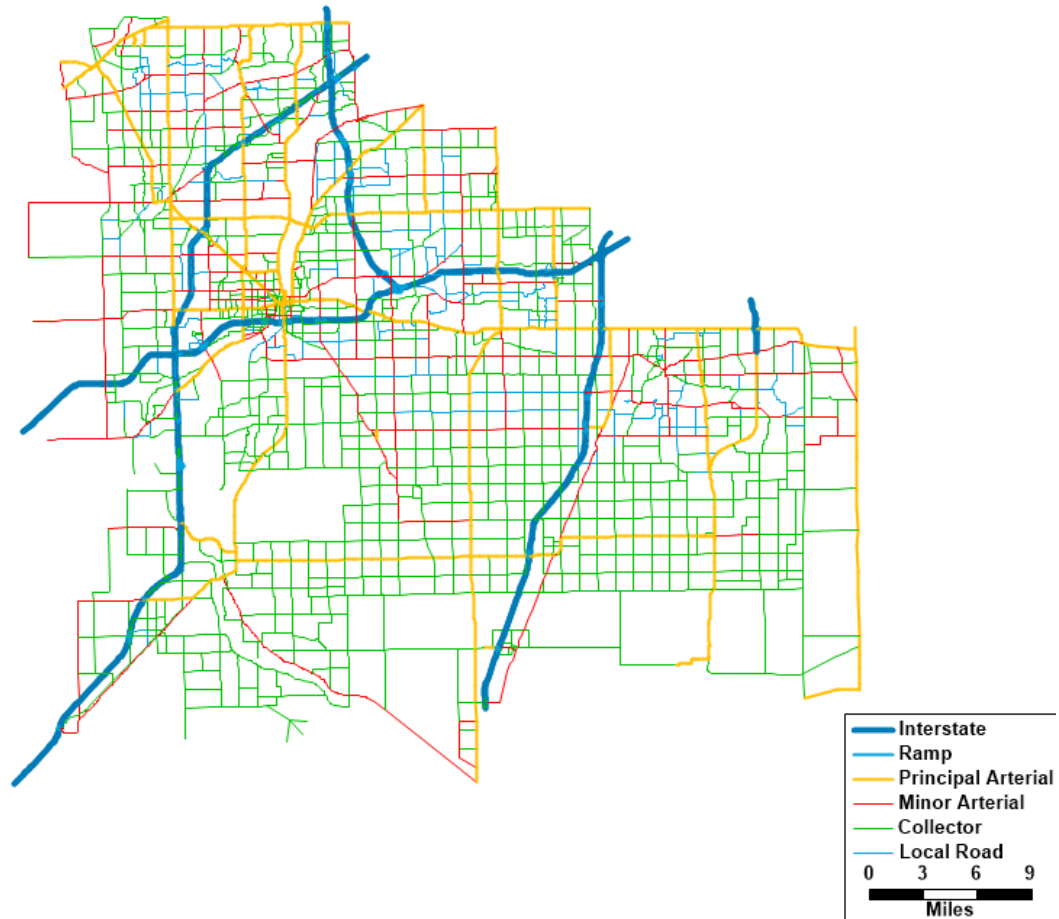


University Park

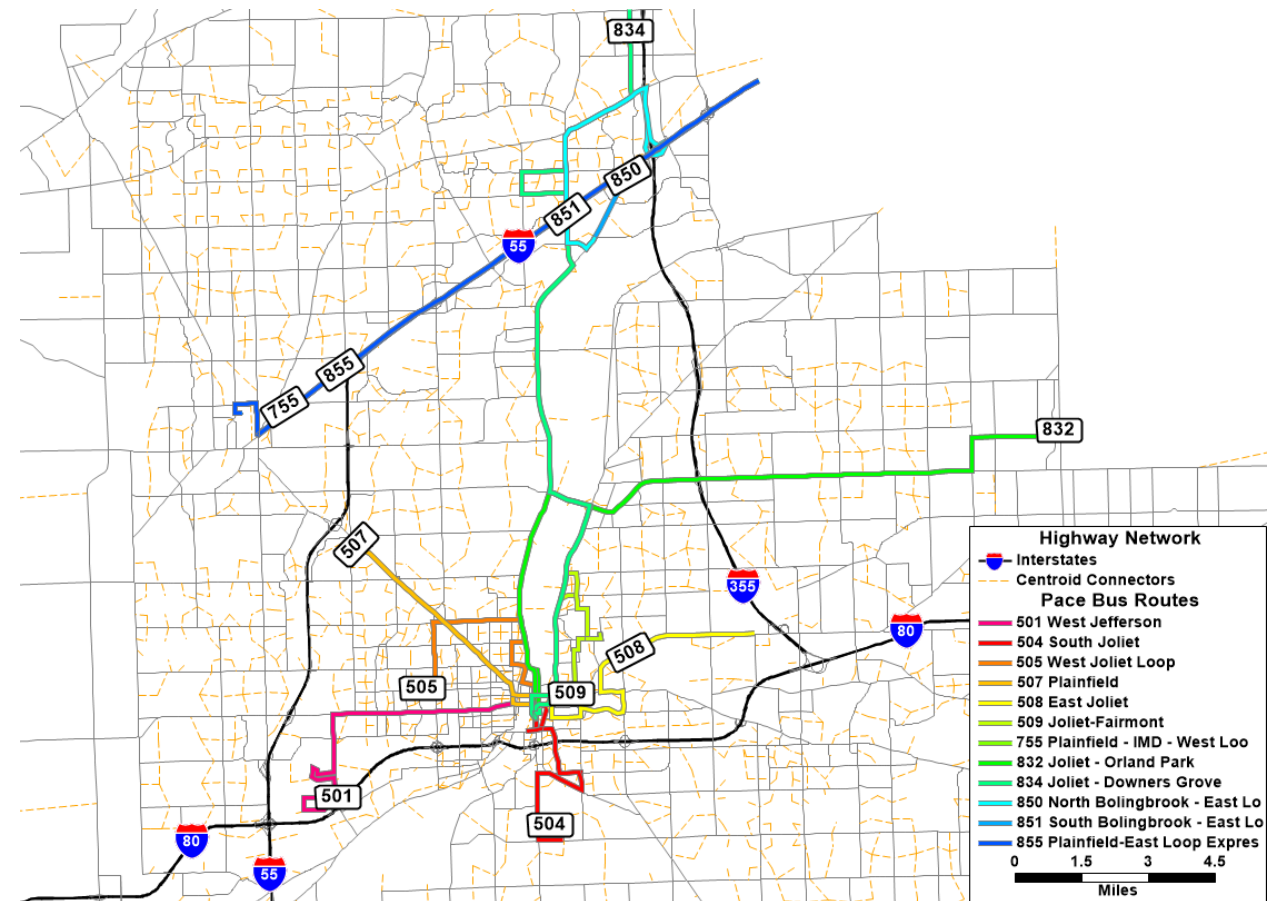
Both maps at same scale

# Multimodal Networks

## Highway Network

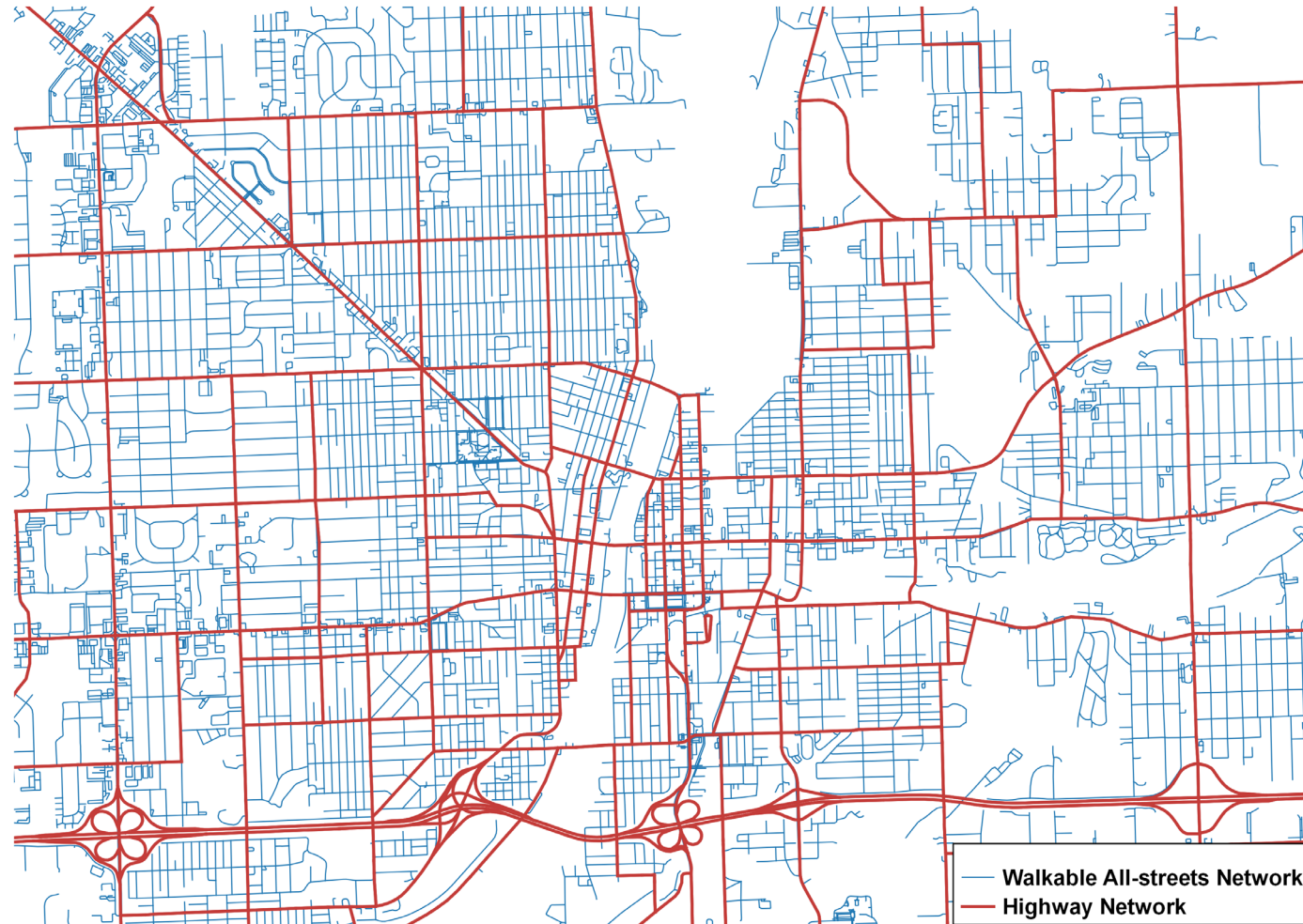


## Transit Network

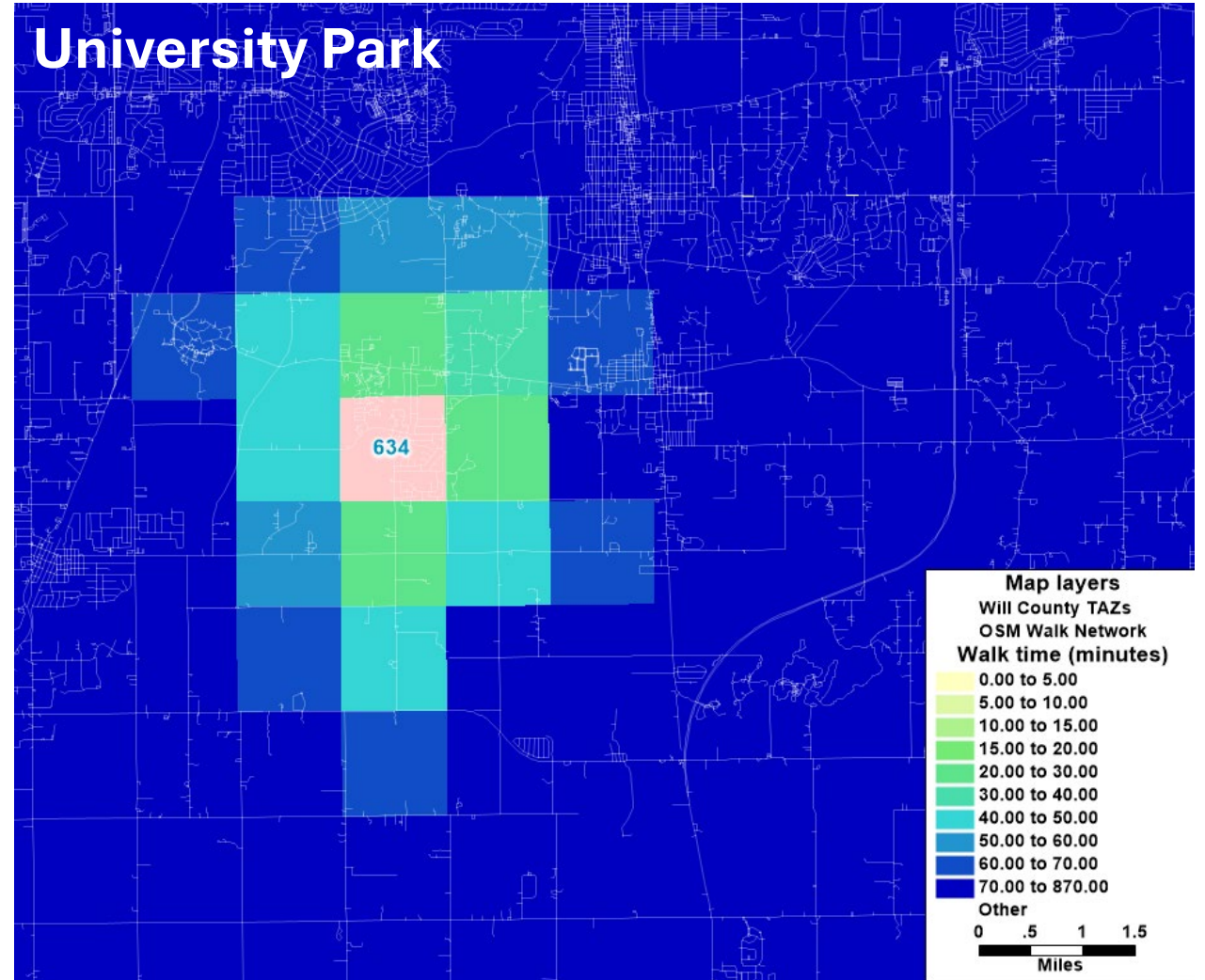
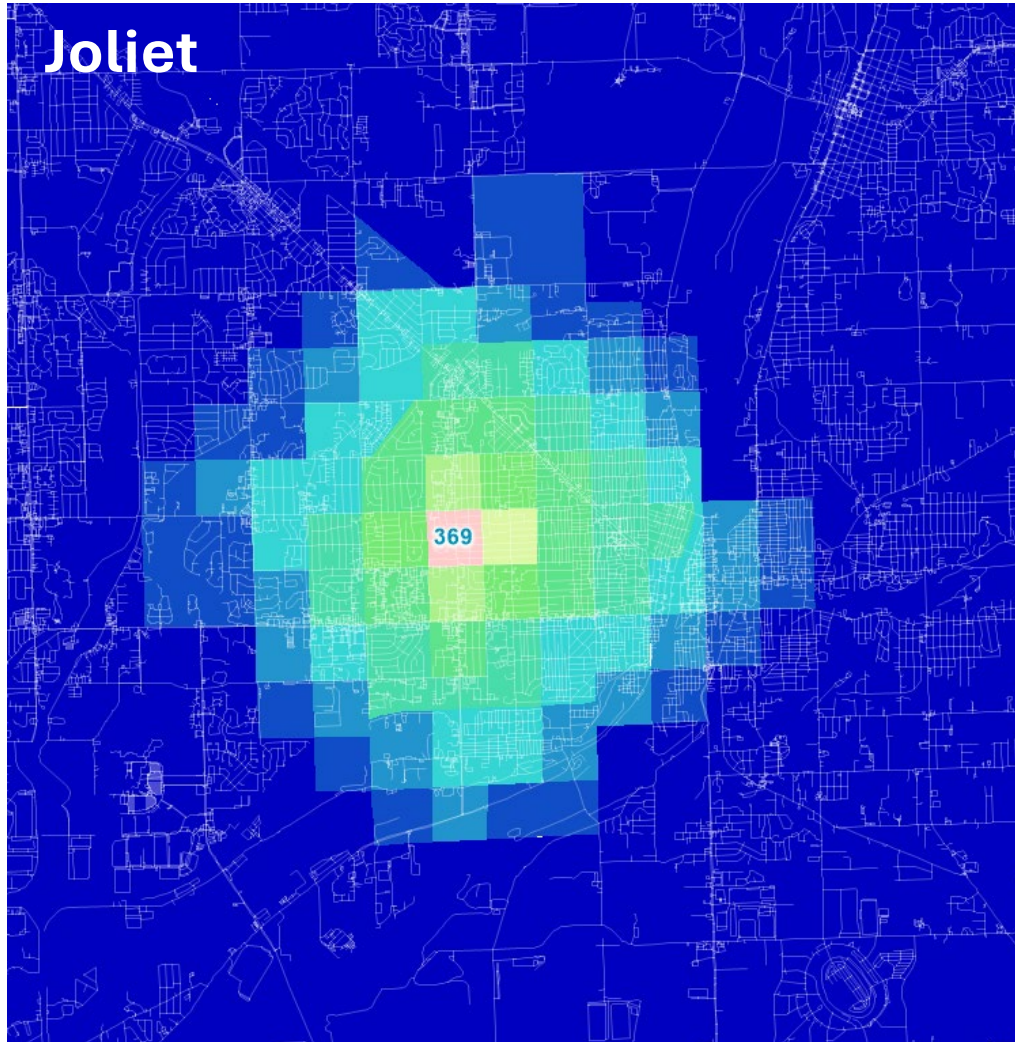


# Multimodal Networks

Walk time calculated using OpenStreetMap



# Multimodal Networks



# Model Parameters

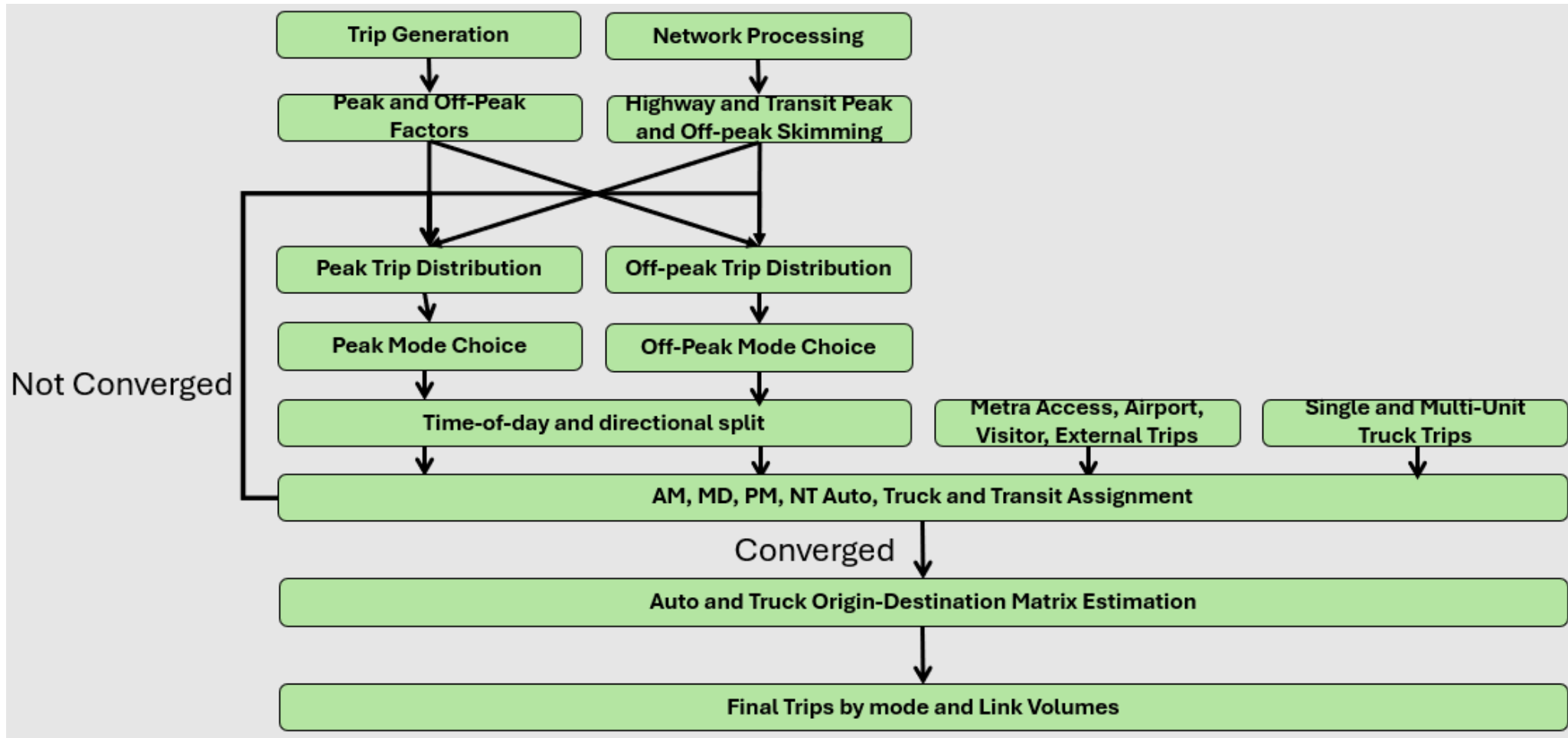
## Borrowed from CMAP Trip-based Model

- **Base and Future year Households, Population, and Household Characteristics by TAZ**
- **Employment by TAZ** supplemented by data from the Will County Center for Economic Development
- **Mode Choice coefficients**
- **External Auto trip distribution:** seed matrix of trips into, out of, and passing through Will County
- **Auxiliary model trips:** Airport, Visitor, drive access to Metra stations
- **Truck Trip distribution:** seed matrix of base and future year truck trips

## Estimated using CMAP 2019 HTS

- **Trip Generation rates**
- **Trip Distribution** gravity model parameters
- **Peak and Off Peak** shares by purpose
- **Time of Day and Direction** factors

# 4-step Model Design



# Passenger Model Design

|               | Trip Purpose                         | Description                                                 |
|---------------|--------------------------------------|-------------------------------------------------------------|
| <b>HBW</b>    | <b>Home-based Work</b>               | Trips between home and work                                 |
| <b>HBU</b>    | <b>Home-based College/University</b> | Trips between home and College or university                |
| <b>HBSch</b>  | <b>Home-based School</b>             | Trips between home and school (pre-school through grade 12) |
| <b>HBShop</b> | <b>Home-based Shop</b>               | Trips between home and shopping                             |
| <b>HBO</b>    | <b>Home-based Other</b>              | Trips between home and any other type of destination        |
| <b>NHB</b>    | <b>Non-Home-based</b>                | Trips between two non-home locations                        |

| Travel Modes                   |
|--------------------------------|
| Drive Alone (SOV)              |
| Shared ride (HOV) 2 persons    |
| Shared ride (HOV) 3+ persons   |
| Transit                        |
| Walk                           |
| Bike                           |
| School bus (School trips only) |

# Model produces fast HTML-based reports



Will County LRTP

Model Summary

Internal Generation

Internal Distribution

Internal Mode Choice

County Flows

## Socioeconomic Data

|            | Base    | 2050    | Change  | % Change |
|------------|---------|---------|---------|----------|
| Employment | 263,861 | 303,016 | 39,155  | 14.8%    |
| Population | 701,613 | 916,065 | 214,451 | 30.6%    |
| Households | 252,299 | 371,198 | 118,899 | 47.1%    |

## Vehicle-miles traveled (VMT)

|           | Base       | 2050       | Change    | % Change |
|-----------|------------|------------|-----------|----------|
| Total VMT | 19,017,472 | 24,668,691 | 5,651,218 | 29.7%    |
| Auto VMT  | 15,926,170 | 20,064,436 | 4,138,266 | 26.0%    |
| Truck VMT | 3,091,302  | 4,604,255  | 1,512,953 | 48.9%    |

## Vehicle-miles traveled (VMT) (ME Post-processed)

|           | Base       | 2050       | Change    | % Change |
|-----------|------------|------------|-----------|----------|
| Total VMT | 19,065,736 | 24,714,714 | 5,648,978 | 29.6%    |
| Auto VMT  | 16,395,378 | 20,531,632 | 4,136,254 | 25.2%    |
| Truck VMT | 2,672,704  | 4,185,822  | 1,513,118 | 56.6%    |

## Vehicle-hours traveled (VHT) and Vehicle-hours of delay (VHD)

|                                   | Base    | 2050    | Change  | % Change |
|-----------------------------------|---------|---------|---------|----------|
| Accumulated VHT (congested)       | 534,202 | 792,209 | 258,007 | 48.3%    |
| Theoretical VHT (free-flow)       | 428,227 | 560,379 | 132,152 | 30.9%    |
| VHD                               | 105,975 | 231,830 | 125,856 | 118.8%   |
| Auto Accumulated VHT (congested)  | 457,839 | 662,719 | 204,880 | 44.7%    |
| Auto Theoretical VHT (free-flow)  | 365,506 | 466,611 | 101,104 | 27.7%    |
| Auto VHD                          | 92,333  | 196,108 | 103,775 | 112.4%   |
| Truck Accumulated VHT (congested) | 76,363  | 129,490 | 53,128  | 69.6%    |
| Truck Theoretical VHT (free-flow) | 62,721  | 93,768  | 31,048  | 49.5%    |
| Truck VHD                         | 13,642  | 35,722  | 22,080  | 161.9%   |

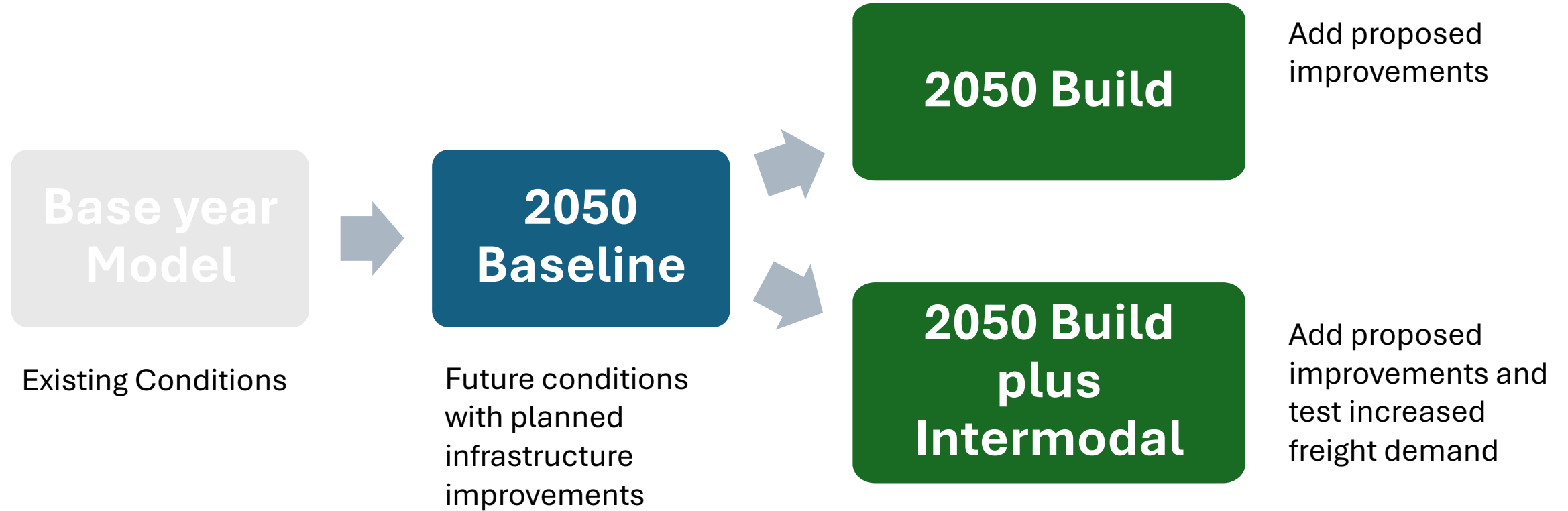
## Vehicle-miles traveled (VMT) by functional class

|                                            | Base      | 2050      | Change    | % Change |
|--------------------------------------------|-----------|-----------|-----------|----------|
| Interstates (FCLASS = 1)                   | 6,920,146 | 8,713,044 | 1,792,898 | 25.9%    |
| Principal Arterials (FCLASS = 3)           | 4,057,157 | 4,940,275 | 883,118   | 21.8%    |
| Minor Arterials (FCLASS = 4)               | 3,011,686 | 4,003,737 | 992,052   | 32.9%    |
| Major Collectors (FCLASS = 5)              | 2,104,345 | 2,879,315 | 774,970   | 36.8%    |
| Minor Collectors (FCLASS = 6)              | 990,837   | 1,581,965 | 591,128   | 59.7%    |
| Local Road or Streets (FCLASS = 7)         | 531,285   | 789,125   | 257,840   | 48.5%    |
| Ramps (FCLASS = 8)                         | 496,586   | 570,394   | 73,808    | 14.9%    |
| Internal Centroid Connectors (FCLASS = 99) | 905,431   | 1,190,836 | 285,405   | 31.5%    |

## Vehicle-miles traveled (VMT) by functional class (ME Post-processed)

|                                            | Base      | 2050      | Change    | % Change |
|--------------------------------------------|-----------|-----------|-----------|----------|
| Interstates (FCLASS = 1)                   | 6,454,831 | 8,247,729 | 1,792,898 | 27.8%    |
| Principal Arterials (FCLASS = 3)           | 4,184,043 | 5,066,488 | 882,445   | 21.1%    |
| Minor Arterials (FCLASS = 4)               | 3,213,425 | 4,205,476 | 992,052   | 30.9%    |
| Major Collectors (FCLASS = 5)              | 2,189,105 | 2,964,485 | 775,380   | 35.4%    |
| Minor Collectors (FCLASS = 6)              | 805,072   | 1,396,947 | 591,876   | 73.5%    |
| Local Road or Streets (FCLASS = 7)         | 570,946   | 828,804   | 257,858   | 45.2%    |
| Ramps (FCLASS = 8)                         | 566,194   | 637,102   | 70,908    | 12.5%    |
| Internal Centroid Connectors (FCLASS = 99) | 1,082,120 | 1,367,682 | 285,562   | 26.4%    |

# Modeled Scenarios



# Modeled Improvements

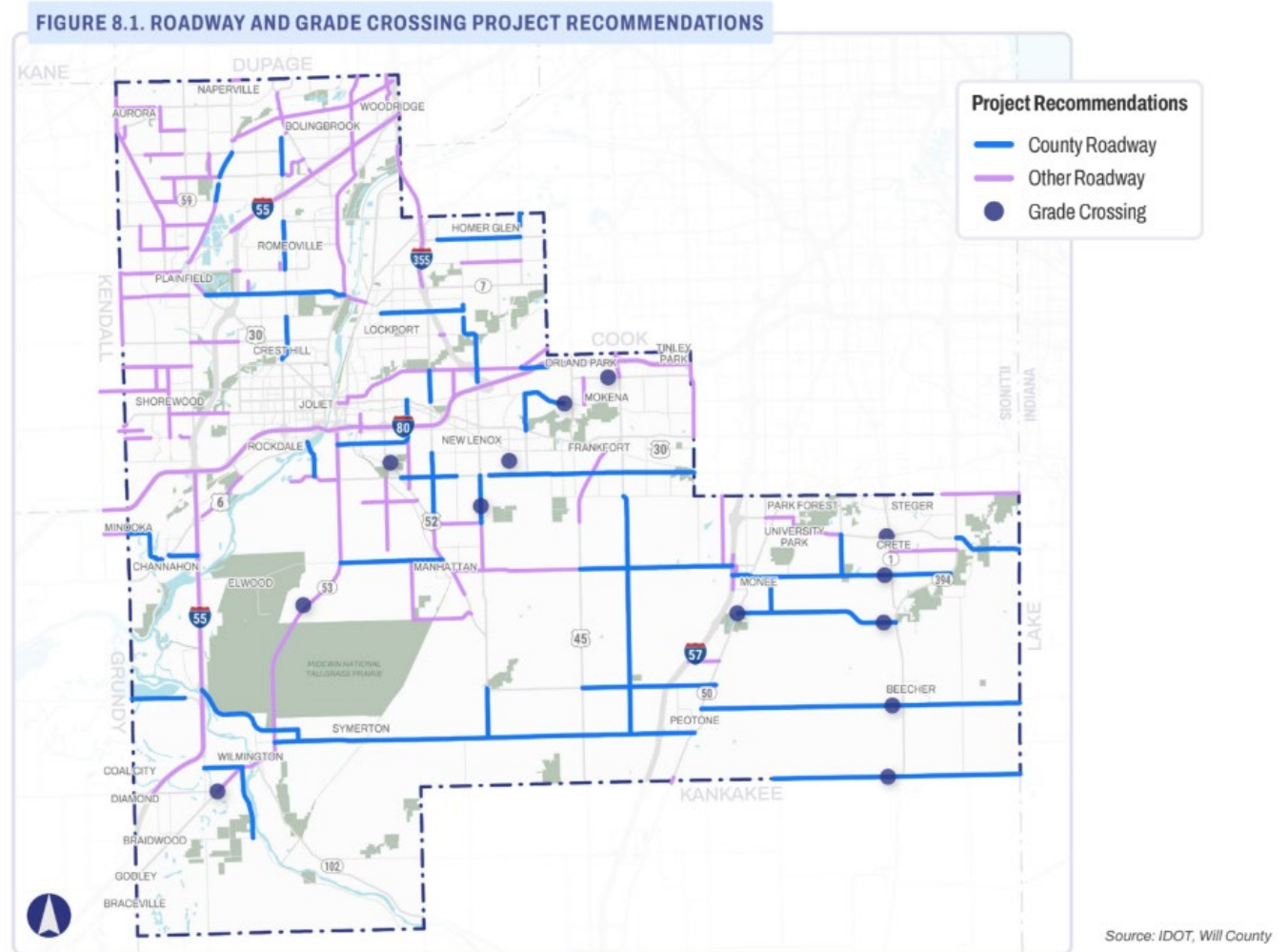
## 2050 Baseline (Expected + Committed)

- I-80 improvements at Larkin Ave
- I-55 improvements at IL Route 59
- I-55 improvements at IL Route 126 and Airport/Lockport Rd
- New interchange at I-57 and Eagle Lake Rd
- 3 lane reconstruction of Manhattan-Monee Rd and Wilmington-Peotone Rd
- 5 lane reconstruction of Laraway Road from US 52 to Nelson Rd

# Modeled Improvements

## 2050 Build

- **All projects included in 2050 Baseline, plus:**
- 60 proposed modelable projects
  - 19 IDOT jurisdiction
  - 2 Tollway
  - 11 Will County DOT
  - 28 municipal projects
- Of these 60 projects
  - 50 adding lanes/capacity
  - 2 new interchanges
  - 8 new roads



# Scenario results

| Scenario                                           | Will County Population | Will County Employment | Vehicle Miles Traveled | Vehicle Hours Traveled | Vehicle Hours of Delay | Road Network                          |
|----------------------------------------------------|------------------------|------------------------|------------------------|------------------------|------------------------|---------------------------------------|
| 2023 Base                                          | 701,613                | 263,861                | 19,083,578             | 534,355                | 105,939                | 2023 existing                         |
| 2050 Baseline                                      | 916,065                | 303,016                | 24,724,777             | 792,422                | 231,974                | 2023 existing plus committed projects |
| 2050 Build (2A)                                    | 916,065                | 303,016                | 25,153,296             | 748,174                | 183,046                | Baseline plus proposed projects       |
| 2050 Build with Intermodal growth (2B)             | 920,917                | 308,186                | 25,703,674             | 773,532                | 195,844                | Baseline plus proposed projects       |
| <b>Difference</b>                                  |                        |                        |                        |                        |                        |                                       |
| 2050 Baseline vs 2023 Base                         | 214,452                | 39,155                 | 5,641,199              | 258,067                | 126,035                |                                       |
| 2050 Build (2A) vs Baseline                        | 0                      | 0                      | 428,519                | -44,248                | -48,928                |                                       |
| 2050 Build with Intermodal growth (2B) vs Baseline | 4,852                  | 5,170                  | 978,897                | -18,890                | -36,130                |                                       |
| <b>Percent Difference</b>                          |                        |                        |                        |                        |                        |                                       |
| 2050 Baseline vs 2023 Base                         | 31%                    | 15%                    | 30%                    | 48%                    | 119%                   |                                       |
| 2050 Build (2A) vs Baseline                        | 0%                     | 0%                     | 2%                     | -6%                    | -21%                   |                                       |
| 2050 Build with Intermodal growth (2B) vs Baseline | 1%                     | 2%                     | 4%                     | -2%                    | -16%                   |                                       |



## Contacts

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