

Transportation Modeling at OKI

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❑ **Model Maintenance and Update**

- ❖ Socio-economic and land use inputs
- ❖ Highway and transit networks
- ❖ Model validations

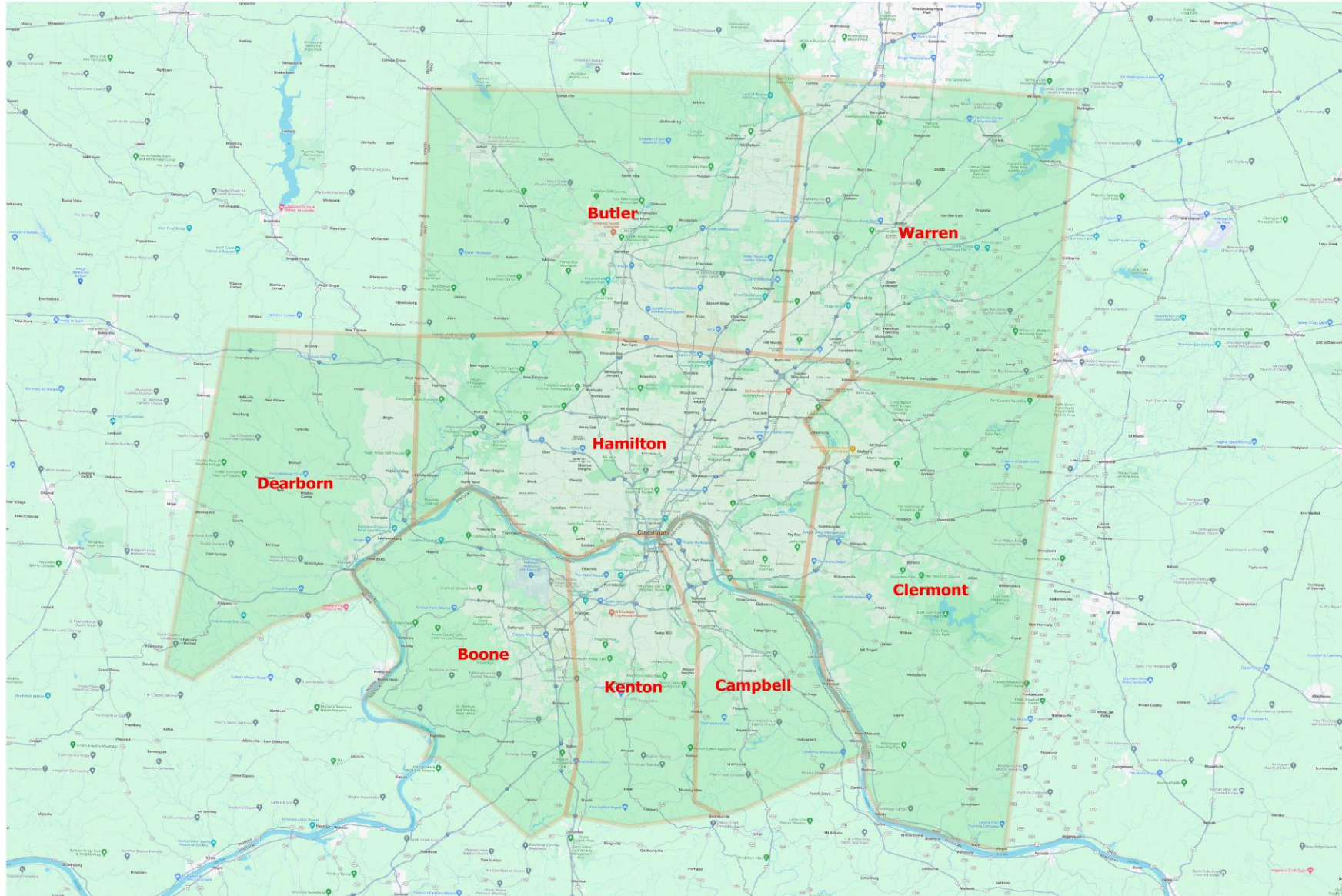
❑ **Model Application**

- ❖ Long and short-range transportation planning – LRTP and TIP
- ❖ Transportation and traffic studies
- ❖ Automobile emission modeling

❑ **Data Collection**

- ❖ Household travel survey
- ❖ Transit on-board survey
- ❖ Traffic data collection

Ohio-Kentucky-Indiana Regional Council of Governments



❑ OKI Activity-Based Model – Version 1

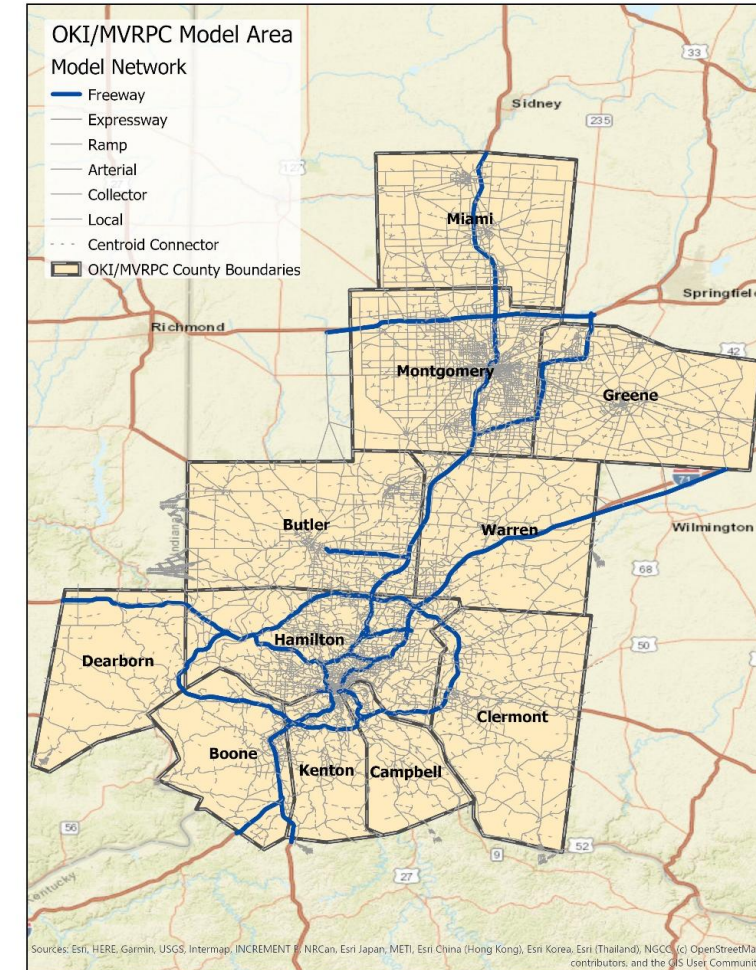
❖ Validated in 2019 to 2015 (Base Year) traffic condition

➤ 2015 land use and socio-economic input validation

- 2012-2016 American Community Survey (ACS) 5-Year Estimates
- Longitudinal Employer-Household Dynamics (LEHD) Origin-Destination Employment Statistics (LODES)
- Common Core of Data (CCD) and Private School Survey (PSS)
- Cincinnati/Northern Kentucky International Airport (CVG) air traffic statistics

➤ 2015 traffic condition

- 2012-2016 CTPP
- StreetLight Origin-Destination data
- 2015 traffic counts
- 2015 transit ridership data
- INRIX speed data



❖ Validated in 2019 to 2015 (Base Year) traffic condition

➤ Population synthesis

- 2012-2016 CTPP data
- Household distribution by Income, Car ownership, and Size
- Person statistics of Age, School enrollment, and Employment industry distribution

➤ Tour destination choice

- County trip flow (StreetLight OD data)
- Trip length distribution of work trips (CTPP Journey-to-Work data)

➤ Mode choice

- Mode shares of the work trips (CTPP JTW data)

❖ Validated in 2019 to 2015 (Base Year) traffic condition

➤ Time-of-day choice

- Work trip departure and arrival time distribution (CTP JTW data)
- Volume time-of-day distribution (2015 counts)

➤ Highway and transit assignment

- Volume/Counts statistics
- Screen-lines
- Major corridor volume and speed
- Transit ridership

❑ OKI Activity-Based Model – Version 2

❖ Developed in 2023

- Covers only the eight counties in OKI region
- Updated 2020 land use and socio-economic input
 - 2020 Decennial Census, Infogroup, and
 - 2020 Quarterly Census of Employment and Wages (QCEW)
- Future year SE dataset
 - County population projections from the Ohio Department of Development, the Kentucky State Data Center, and life tables for Dearborn County
 - Employment projections were generated at the County level with data from Woodes and Poole and were allocated to TAZ based on local changes in land use, employment gains and losses, and changes in the labor force.

❖ Developed in 2023

➤ Highway and transit networks

- TANK 2021 comprehensive redesign and SORTA 2022 Phase I of Reinventing Metro were incorporated into the E+C and Future Year transit networks
- Intersection control data from OpenStreetMap was incorporated to update and refine highway networks
- Updated the Park-and-Ride information
- Turning control file has been reviewed and updated
- Projects in OKI Plan2050 were coded to generate the Future Year networks

❖ Validated in 2023/2024

- To 2020 (Base Year) traffic condition
 - 2021/2022 Household Travel Survey Data
 - 2018 and 2019 traffic counts
 - 2023 transit ridership data
- Activity pattern and tour frequency validation

Daily activity pattern

Person Type	Daily Activity Pattern					
	Mandatory		Non-Mandatory		at-Home	
	Model	RHTS	Model	RHTS	Model	RHTS
Full-time Worker	79%	75.7%	10%	15%	11%	9%
Part-time worker	55%	69.1%	28%	19%	17%	12%
University Student	61%	72.1%	17%	20%	22%	8%
Non-worker/Retiree	0%	11.9%	63%	59%	37%	30%
Driving-age Student	80%	74.6%	9%	12%	11%	13%
Pre-driving-age Student	82%	60.9%	11%	25%	7%	14%
Preschool Child	25%	29.2%	43%	52%	32%	19%

❖ Validated in 2023/2024

➤ Activity pattern and tour frequency validation

Mandatory tour frequency

Person Type	Tour Pattern							
	1 Work Tour		2 Work Tours		1 School Tour		2 School Tours	
	Model	RHTS	Model	RHTS	Model	RHTS	Model	RHTS
Full-time Worker	93%	94%	7%	6%	0%	0%	0%	0%
Part-time worker	88%	87%	10%	3%	2%	10%	0%	0%
University Student	11%	40%	0%	0%	78%	52%	10%	7%
Non-worker	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Driving-age Student	6%	17%	0%	0%	88%	70%	6%	13%
Pre-driving-age Student	0%	5%	0%	0%	100%	91%	0%	4%
Preschool Child	0%	0%	0%	0%	100%	99%	0%	0%

❖ Validated in 2023/2024

➤ Activity pattern and tour frequency validation

Average household daily tours by purpose

Purpose	Total Tours		Tour Percentage		Average # Tours per Household	
	Model	RHTS	Model	RHTS	Model	RHTS
Work	771,404	726,513	30%	29%	1.06	0.95
University	61,063	22,991	2%	1%	0.08	0.03
School	297,358	231,178	11%	9%	0.41	0.30
Escort	350,526	400,293	13%	16%	0.48	0.52
Shopping	365,895	369,692	14%	15%	0.50	0.48
Maintenance	293,274	173,956	11%	7%	0.40	0.23
Eating Out	225,056	166,265	9%	7%	0.31	0.22
Social	91,978	226,014	4%	9%	0.13	0.30
Discretionary	148,526	167,027	6%	7%	0.20	0.22
Total	2,605,080	2,483,930	100%	100%	3.59	3.24

❖ Validated in 2023/2024

➤ Activity pattern and tour frequency validation

Average daily person tours by person type

Person Type	Tours		Tour Percentage		Persons		Person Percentage		Avg # of Tours/Person	
	Model	RHTS	Model	RHTS	Model	RHTS	Model	RHTS	Model	RHTS
Full-time Worker	1,108,035	1,027,054	42.5%	41.3%	771,812	753,655	37.4%	38.8%	1.44	1.36
Part-time worker	268,817	273,484	10.3%	11.0%	191,802	180,424	9.3%	9.3%	1.40	1.52
University Student	112,863	105,614	4.3%	4.3%	89,625	77,698	4.3%	4.0%	1.26	1.36
Non-worker	586,930	612,726	22.5%	24.7%	524,593	530,683	25.5%	27.4%	1.12	1.15
Driving-age Student	99,104	74,183	3.8%	3.0%	69,700	59,864	3.4%	3.1%	1.42	1.24
Pre-driving-age Student	359,407	278,051	13.8%	11.2%	271,556	227,031	13.2%	11.7%	1.32	1.22
Preschool Child	69,924	112,818	2.7%	4.5%	141,836	110,822	6.9%	5.7%	0.49	1.02
Total	2,605,080	2,483,930	100.0%	100.0%	2,060,924	1,940,178	100.0%	100.0%	1.26	1.28
Total without Preschool Child	2,535,156	2,371,112			1,919,088	1,829,356			1.32	1.30

❖ Validated in 2023/2024

➤ Activity pattern and tour frequency validation

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☐ Model Maintenance – Next

❖ Model update

- Update the zone system
 - Was developed 15 years ago
 - To align the TAZ boundaries with that of the census blocks
 - New MAZ system
- Update the network

❖ Model Validation

- 2025 Base Year
- Transit no-board survey data
- Household travel survey data

□ Model Application

- ❖ LRTP and TIP
- ❖ Transportation and traffic studies
- ❖ Automobile emission modeling
- ❖ Other applications

❖ LRTP and TIP

- System performance measures
- Air quality conformity
- Scenario analysis
 - OKI Plan2050 (2020)
 - TIP 2021-2024 (2021)
 - Plan2050 and TIP amendments (2020-2023)
 - OKI Plan2050 update (2024)
 - TIP 2024-2027 (2024)

❖ Traffic and transportation studies

➤ Roadway improvement projects

- Mall Road Connection traffic study (2019, KYTC)
- Reading Road traffic study (2019, City of Cincinnati)
- Western Hills Viaduct traffic analysis (2019, City of Cincinnati)
- ...
- Provided traffic forecasts for more than 25 roadway improvement projects since 2019

➤ Traffic impact analysis

- Background traffic growth estimates

➤ Other transportation studies

- SORTA BRT study
- City of Fairfield sustainability planning
- ...

❖ Automobile emission modeling

- Motor Vehicle Emission Simulator (MOVES)
- EPA
 - 2015 Ozone attainment redesignation (2021)
 - 2008 Ozone maintenance plan update (2024)
- Other applications
 - EPA Climate Pollution Reduction Grants (CPRG) green gas inventory
 - Truck emissions for OKI freight planning

□ Data collections

❖ Surveys

- Household travel survey
 - ODOT managed the survey
 - Data collected between October 2021 and May 2022
 - The survey covered 4,193 households (0.51%) and 7,969 persons (0.38%)

- Transit on-board survey
 - Data collected between February 2024 and May 2024
 - 4 transit agencies
 - 85 routes surveyed
 - 5,583 surveys completed (~10% of daily riders)

❖ Traffic counts

➤ 2021 counts

- Data collected between September to November 2021
- 2-day vehicle classification counts (151 locations)

➤ 2023/2024 counts

- Data collected between October 2023 and May 2024
- 3-day vehicle classification (Around 350 locations) , occupancy (30 locations), and pedestrian counts (38 locations)

➤ 2025 counts (FY25, expected)

➤ Ohio River permanent count stations

❖ Transportation data

- INRIX and StreetLight data
 - Frequent user of the StreetLight data
 - Access to the INRIX waypoints data
 - Tools to process the GPS data
- ATRI truck waypoints data
 - Freight planning
 - Truck parking study
 - CVG traffic study

Comments/Questions?