Better Data for Forecasting
Transportation Air Quality Impacts
STAQS
August 20, 2019
Data for Travel Model Validation and Improvement

- MioVision - Turning movements at congested intersections
- INRIX – travel speeds
- Ohio River bridges traffic counts
- Census Transportation Planning Pack
- Streetlight
- ATRI Truck Data
- Uber Mobility
# MIOVISION Intersection Analysis

<table>
<thead>
<tr>
<th>#</th>
<th>Intersection</th>
<th>County</th>
<th>Jurisdiction</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>SR32 @ Glen Este-Withamsville</td>
<td>Clermont</td>
<td>Union Township</td>
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<tr>
<td>2</td>
<td>US 50 @ SR 131</td>
<td>Clermont</td>
<td>City of Milford</td>
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<tr>
<td>3</td>
<td>Columbia Pkwy @ Delta Ave</td>
<td>Hamilton</td>
<td>City of Cincinnati</td>
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<tr>
<td>4</td>
<td>Montgomery Rd @ Kenwood Rd.</td>
<td>Hamilton</td>
<td>Sycamore Township</td>
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<tr>
<td>5</td>
<td>US 42 @ Galbraith Rd.</td>
<td>Hamilton</td>
<td>City of Reading</td>
</tr>
<tr>
<td>6</td>
<td>SR 747 @ Kemper Rd.</td>
<td>Hamilton</td>
<td>City of Springdale</td>
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<tr>
<td>7</td>
<td>Beechmont Ave @ Five Mile Road</td>
<td>Hamilton</td>
<td>Anderson Township</td>
</tr>
<tr>
<td>8</td>
<td>Mason-Montgomery @ Tylersville Rd.</td>
<td>Warren</td>
<td>City of Mason</td>
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<tr>
<td>9</td>
<td>SR 4 @ By-Pass 4</td>
<td>Butler</td>
<td>City of Fairfield</td>
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<tr>
<td>10</td>
<td>SR 4 @ Muhlhauser Rd.</td>
<td>Butler</td>
<td>City of Fairfield</td>
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<tr>
<td>11</td>
<td>SR 4 @ SR 129</td>
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<td>City of Hamilton</td>
</tr>
<tr>
<td>12</td>
<td>SR 747 @ Muhlhauser Rd.</td>
<td>Butler</td>
<td>West Chester Township</td>
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<td>US 50 @ IN 350</td>
<td>Dearborn</td>
<td>City of Aurora</td>
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<tr>
<td>14</td>
<td>US 50 @ SR 1 (Bellevue)</td>
<td>Dearborn</td>
<td>City of Greendale</td>
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<tr>
<td>15</td>
<td>US 25 @ KY 536</td>
<td>Boone</td>
<td>Boone County</td>
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<tr>
<td>16</td>
<td>US 42 @ KY 842</td>
<td>Boone</td>
<td>City of Florence</td>
</tr>
<tr>
<td>17</td>
<td>KY 18 @ KY 842</td>
<td>Boone</td>
<td>City of Florence</td>
</tr>
<tr>
<td>18</td>
<td>US 27 @ I-471</td>
<td>Campbell</td>
<td>City of Fort Thomas / City of Southgate</td>
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<tr>
<td>19</td>
<td>KY 17 @ KY 1072</td>
<td>Kenton</td>
<td>City of Fort Wright</td>
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</tbody>
</table>
MIOVISION – KY 18 @ Mall Rd.

MioVision video June2019
INRIX Travel Time Data

Data source

• Regional Integrated Transportation Information System (https://ritis.org/)
• National Performance Management Research Data Set (https://npmrds.ritis.org/)
  ✓ Monthly archive of average travel times, reported every 5 minutes when data is available
  ✓ Travel times are based on vehicle probe-data data
  ✓ Average travel times have been collected monthly since July 2013
  ✓ INRIX travel time data is available from January 2017
TMC Code to Model Highway Network Link

- INRIX travel times are reported by roadway segments which are identified by Traffic Message Channel Code
- NPMRDS Traffic Message Channel Codes are linked to model highway network link based on the road segment start points
Model Speed Validation

- INRIX speeds are averaged by Time-of-Day (AM, MD, PM, NT)
- Model speeds are validated against the observed speeds for each time period and by facility types

![Graph showing the relationship between estimated and observed speeds with R² = 0.9609]
Ohio River Bridge Radar Count Station

- 24/7 Vehicle Counts and Speeds at 7 Ohio River Bridges
- Equipment
  - Side-Fire Radar
  - Software
  - Modems
- Five Vehicle Classifications
- $300,000 Installation (OKI-STBG funds)
- $25,000 budget for yearly maintenance

www.oki.org /okiregional /okircog
ORBCS Locations

- I-71/75 (Brent Spence) Northbound and Southbound
- I-275 (Carroll Cropper) Eastbound and Westbound
- I-275 (Combs-Hehl) Northbound and Southbound
- I-471 (Dan Beard) Northbound and Southbound
- KY 17 (Roebling)
- US 27 (Taylor Southgate)
ORBCS Vehicle Classifications

1. Motorcycles
2. Passenger Cars
3. Small Trucks (2-axles)
4. Large Trucks (Single-Trailer)
5. Large Trucks (Multi-Trailer)
Census Transportation Planning Products

About Census Transportation Planning Products Programs (CTPP)
- State DOT-funded, cooperative program
- Produces special tabulations of Census Bureau’s American Community Survey (ACS) data for transportation planning, analysis, and strategic direction.
- More about the CTPP can be found at the CTPP homepage https://ctpp.transportation.org/.

CTPP data include
- Demographic characteristics at the residence
- Demographic characteristics at the workplace
- Journey to work (JTW) travel flows

CTPP data versions
- The latest data is 2012-2016 5-Year CTPP based on 2012-2016 ACS, which is available at http://data5.ctpp.transportation.org/ctpp1216/Browse/browsetables.aspx.
- Older versions include 2006-2010 5-Year CTPP, 2000 CTPP, and 1990 CTPP.
CTPP Data Format

- **2012-2016 CTPP data tabulations (198 tables in total)**
  - 116 residence-based tables: Household and personal characteristics, travel mode, travel time, and departure time at the residence
  - 57 workplace-based tables: Industry and occupation, travel mode, travel time, and arrival time at the workplace (57 tables)
  - 25 flow tables: Flows of the home-to-work commute

- **2012-2016 CTPP available geographies**
  - Nation
  - State
  - County
  - Minor Civil Division (MCD)
  - Place
  - Public Use Microdata Area (PUMA)
  - Metropolitan Statistical Area (MSA)
  - Census Tract
  - Traffic Analysis District (TAD)
  - Traffic Analysis Zone (TAZ)
CTPP Data Applications for Model Validation

- Validate population synthesis such as household distribution by income and car ownership and population distribution by age, gender, ...
- Validate the Journey to Work (Home Based Work Trip) flow:
  - Departure time distribution
  - Destination choice
  - Mode choice

Note: The household and trip distributions from the model are not the final results. They are only examples here to illustrate the application of CTPP data in travel demand model validation.
StreetLight Origin-Destination Data

- Origin-Destination information derived from big samples:
  - Auto location records from smart phones
  - Truck location records from navigation devices (GPS)

Weekday County to County Auto Trip Flow within OKI Region based on StreetLight May 2016 Data:
StreetLight Origin-Destination Data

StreetLight Trip (Auto) Length Distribution with OKI Region:

![Graph showing trip frequency by distance (Daily II Trip)](chart)

- 0-1
- 2-3
- 4-5
- 6-7
- 8-9
- 10-11
- 12-13
- 14-15
- 16-17
- 18-19
- 20-21
- 22-23
- 24-25
- 26-27
- 28-29
- 30-31
- 32-33
- 34-35
- 36-37
- 38-39
- 40-41
- 42-43
- 44-45
- 46-47
- 48-49
- 50-51
- 52-53
- 54-55
- 56-57
- 58-59
- 60-65
- 70-75
- 80-85
- 90-95
- >120

Trip Frequency - by Distance (Daily II Trip)

- Trip Percentage
- Trip Distance (mile)

Graph models show:
- Model
- StreetLight
ATRI Freight Monitoring

- Truck GPS tracking
- OKI developing algorithms and procedures to convert raw GPS data into truck trip database
- OKI developing O-D truck table to validate/calibrate truck model components of regional travel demand model.
City officials, transportation planners & consultants rely on easily accessible data and tools to work with in order to generate insights for operational and strategic planning.

“The Uber Movement Speeds initiative addresses the increasing vulnerability of pedestrians and cyclists as they interact with cars and trucks. It does this by providing an invaluable metric for evaluating traffic safety to local governments. It is our unshakable belief that the OKI-Uber Movement Speeds partnership will reduce injuries and save lives.”

Mark Policinski, CEO, Ohio-Kentucky-Indiana Council of Governments

City planners can:
- Identify and measure congestion in their jurisdictions
- Calibrate and validate travel demand models
- Measure the efficacy of policies and infrastructure investments
- Build a ‘transportation scorecard’ for a city or across a region
Uber/OKI Travel Survey

- Trip Start Time
- Pick-up/drop-off locations
- # of Household vehicles
- How did you take trip before Uber
- Reasons for choosing Uber
- Trip purpose
- How did you complete other parts of your trip
- Optional: Age, income, race/ethnicity
Contact Information

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