



BALTIMORE METROPOLITAN COUNCIL

2019 BMC InSITE Update

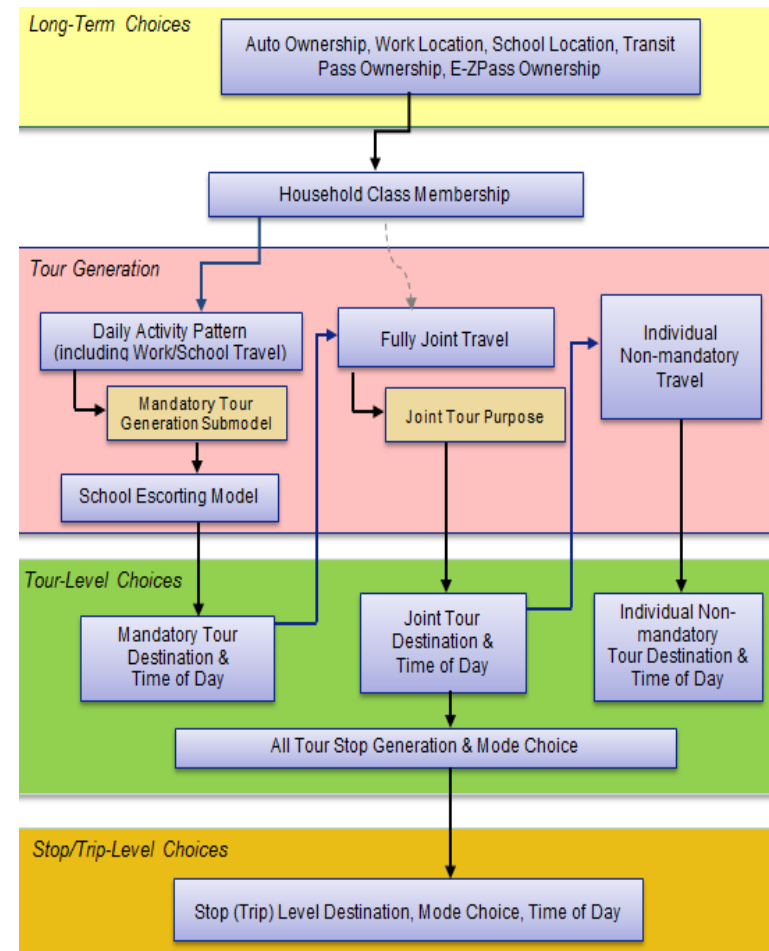
Validation and Model Improvements

November 18, 2022



Summary of InSITE Model

- Completed in 2017
- Covers
 - Baltimore City
 - 9 MD counties (including 4 in MWCOG region)
 - D.C.
 - 2 PA counties
- Simulates activities and travel through activity-based process
- Implemented using TourCast and Cube



Recent InSITE Updates

- 2019 base year
- Expansion of model region
 - Queen Anne's County (MD)
 - York and Adams Counties (PA)
- Data/network updates
 - 2019 updates
 - Maryland Travel Survey
 - LOCUS (LBS)
- Updates to model structure
 - E.g., eliminated E-ZPass transponder ownership model



InSITE Run Time Enhancements



- **Population sampling**
 - Determined that 25% sample produced accurate results
 - Implemented within TourCast
 - Decreased run time by 45%
- **TourCast multi-processing**
 - Split households and persons according to TAZ's
 - Run a number of independent TourCast processes, each tied to a unique subdirectory of input files and a matching database
 - Run a set of scripts that coalesce results back into a single common trip matrix and common database
 - Decreased run time by 32%

2019 Base Year Model Validation Process



- Assemble necessary data
- Set up processes for validation of every component expanded region
- Updated observed data to compare with base year model results
- Perform single-pass validation (no feedback) of all activity-based components, rFreight components, highway assignment, and transit assignment
- Perform validation of the complete base year model stream using full feedback



2019 Data Updates

- 2019 MTS
- Traffic count data
- Transit ridership
- Freight model
 - BEA IO table
 - CFO shipment size table
 - Payload/% empties
 - Distribution center locations
- LOCUS (LBS data)



Use of LOCUS

- **Advantages of LBS data**
 - Much larger sample size than surveys
 - Passively collected—no response bias/errors
 - Ability to infer home and work/school locations
- **Limitations**
 - No traveler characteristics
 - Modes not known
- **Types of comparisons:**
 - O-D comparisons of tours and trips
 - Home-work/school vs. other tours
 - Time of day

Sample Validation Results

Work Location Model

Average Home-Work Distance (miles)

HH Income	Observed	Model	Difference	% of workers
<\$50,000	9.1	10.3	1.2	17%
\$50,000-\$99,999	12.1	12.6	0.4	29%
>\$100,000	13.6	13.5	-0.1	54%
All workers	12.6	12.7	0.1	

Sample Validation Results

Non-Mandatory Tour Mode Choice Model

Mode Shares by Autos per Worker

Tour Mode	Observed				Model			
	Zero	< 1	1	>1	Zero	< 1	1	>1
Drive Alone	1.1%	17.6%	33.9%	51.5%	0.7%	25.2%	36.7%	48.0%
Shared Ride 2	12.9%	31.5%	30.9%	24.6%	19.8%	32.7%	28.0%	26.5%
Shared Ride 3+	3.0%	24.5%	21.5%	15.6%	14.3%	21.6%	20.6%	16.0%
Walk to Transit	42.8%	5.7%	1.7%	1.4%	33.8%	4.7%	2.0%	1.3%
Drive to Transit	0.9%	0.5%	0.3%	0.3%	0.2%	0.1%	0.5%	0.4%
Walk	36.8%	17.3%	10.6%	5.8%	29.9%	12.4%	10.9%	7.2%
Bike	1.9%	2.8%	0.8%	0.5%	1.4%	3.3%	1.3%	0.6%

Sample Validation Results

Highway Assignment

VMT by County

County	% Difference	% VMT
Baltimore City	-2%	6%
Baltimore County	-2%	18%
Anne Arundel	-8%	13%
Howard	-6%	8%
Carroll	0%	2%
Harford	-15%	5%
Montgomery/Prince George's/Frederick	-4%	43%
Queen Anne's	45%	3%
Model Region	-4%	

Sample Validation Results

Transit Assignment

	MTA Bus			Rail (LRT & Metro Subway)		
Trips	Target	Model	% Diff	Target	Model	% Diff
Linked	140,489	125,820	-10%	48,324	49,312	2%
Unlinked	211,605	203,620	-4%	79,341	90,832	14%

	Commuter Rail (MARC)			Total		
Trips	Target	Model	% Diff	Target	Model	% Diff
Linked	30,440	26,108	-14%	219,253	201,240	-8%
Unlinked	55,959	72,508	30%	362,832	366,960	1%



Next Steps

- BMC application support
- Additional detailed validation
- Improve transit access coding



Planning Area Dashboards

- Builds off of BMC's COVID Recovery Dashboards
- Planning Areas – Air Quality, InSITE, Demographics, TIP, Freight, System Performance, Transit, Crash Data
- Engaging and Interactive
- Ability to Download, Save, and Print
- Leverage Available Data
- Easy to Maintain
- Draft Dashboards -

<https://public.tableau.com/app/profile/charles.baber/viz/InSiteDRAFT6/InSITE-Flow>



InSITE- Trend Analysis

Two Tabs

InSITE - Flow | InSITE - Trend Analysis

BMC InSITE Dashboard
Yearly Trend Analysis

Planning Horizon Years

Year	DM	2M	4M	6M	8M	10M	12M	14M	16M	18M	20M	22M
2019	44%									22%	6%	17,903.9K
2025	44%									22%	6%	18,582.7K
2035	43%									23%	5%	19,636.4K
2045	42%									23%	5%	20,503.6K

Total Population

Year	0M	1M	2M	3M	4M	5M	6M	7M	8M	9M
2019	30%	43%	21%	6%	6,326.1K					
2025	32%	42%	21%	6%	6,534.5K					
2035	33%	41%	21%	5%	6,959.9K					
2045	34%	41%	20%	5%	7,327.6K					

Total Households

Year	DK	500K	1000K	1500K	
2019	20%	38%	31%	11%	2,559.8K
2025	21%	38%	31%	10%	2,678.4K
2035	22%	37%			
2045	22%	37%			

2025 | Auto Ownership
1,018,264 Households
38% of 2025 Households

Trips by Trip Distance

Year	0-1 miles	1-2.5 miles	2.5-5 miles	5-7.5 miles	7.5-10 miles	10-15 miles	15-20 miles	20+ miles
2019	6%	24%	28%	15%	9%	8%	4%	6%
2025	6%	23%	27%	14%	8%	4%	9%	8%
2035	6%	23%	27%	14%	9%	4%	9%	8%
2045	6%	23%	27%	14%	8%	9%	4%	8%

Trips by Trip Mode

Year	Drive	Non-Motorized	Transit
2019	73%	22%	5%
2025	82%	13%	4%
2035	82%	14%	4%
2045	82%	14%	4%

Trips by Time of Day

Year	AM Peak	Midday	PM Peak	Night Time
2019	21%	29%	31%	19%
2025	20%	29%	29%	22%
2035	19%	30%	29%	22%
2045	19%	30%	29%	22%

Trips by Tour Purpose

Year	Work	School	Fully Joint	Non-Mandatory
2019	44%	16%	6%	34%
2025	41%	16%	7%	36%
2035	40%	16%	7%	37%
2045	39%	16%	7%	38%

Tooltip on Mouse Hover

- (All)
- Work
- School
- Fully Joint
- Non-Mandatory

Socioeconomic and Demographic Filters

Gender
(All)

Person Type
(All)

Employment Status
(All)

Poverty Status
(All)

Household Size
(All)

Number of Cars in Household
(All)

Household Income
(All)

Trip Attribute Filters

Origin County
(All)

Destination County
(All)

Origin RPD
(All)

Destination RPD
(All)

Trip Mode
(All)

Trip Distance
(All)

Tour Purpose
(All)

Reset Filters

Auto Ownership
PMT
VMT
PHT
VHT

Segmentation Attribute
Auto Ownership

Cambridge Systematics

Baltimore Metropolitan Council

Filters:

- (All)
- Child (0-5)
- Child (6-15)
- Child (16-17)
- Adult Student
- Part Time Worker
- Full Time Worker
- Non-Working Adult
- Senior

Geographic Filters:

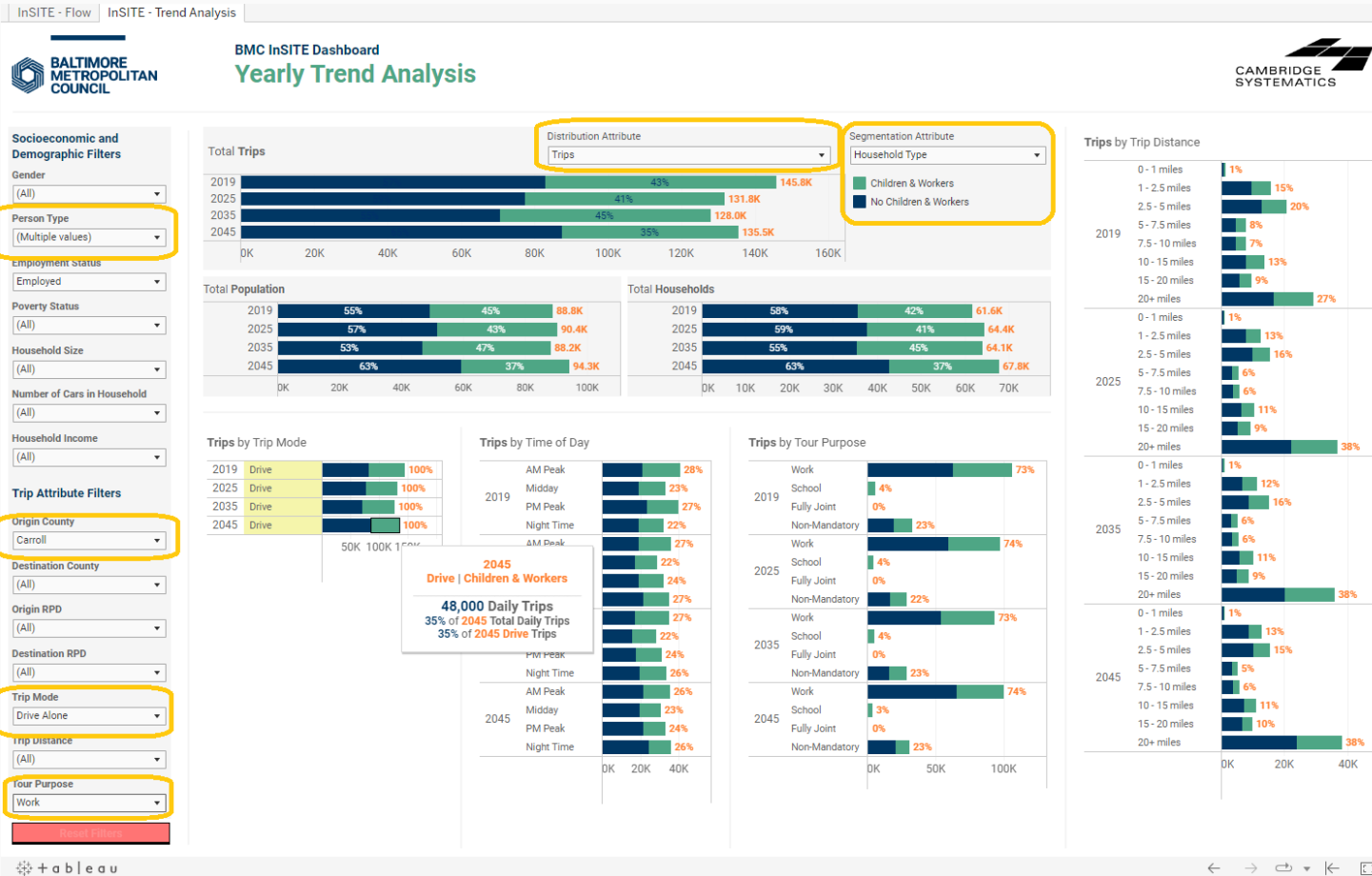
- (All)
- Adams, PA
- Anne Arundel
- Baltimore
- Baltimore City
- Carroll
- District of Columbia
- Frederick
- Harford
- Howard
- Montgomery
- Prince George's
- Queen Anne's
- York, PA

Trip Mode Filters:

- (All)
- Drive Alone
- Shared Ride 2
- Shared Ride 3
- Walk to Transit
- Drive to Transit
- Walk
- Bike
- School Bus

Reset Filters

InSITE – Trend Analysis Selection



InSITE - Flow



Two Tabs

InSITE - Flow | InSITE - Trend Analysis

Score Card

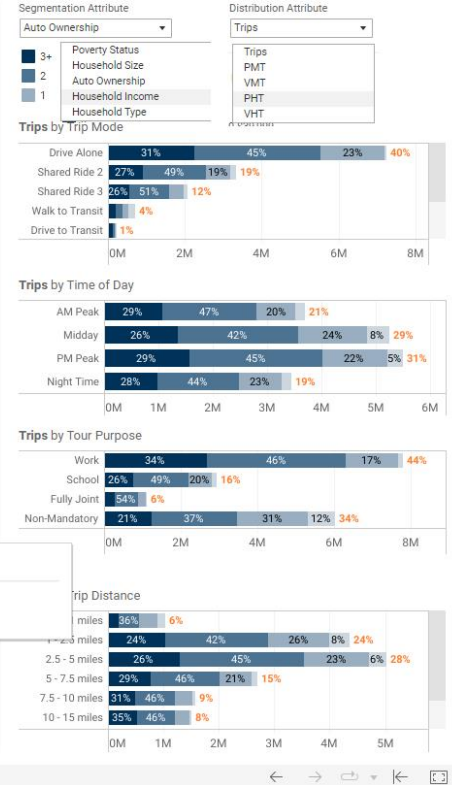
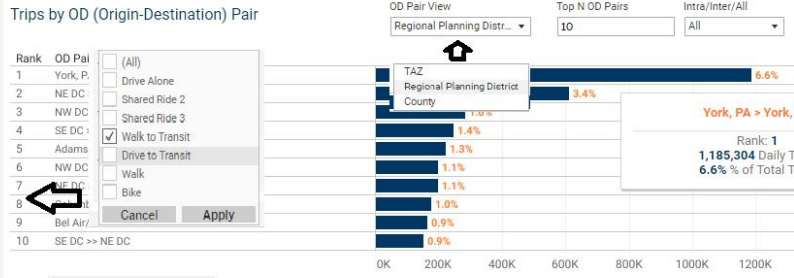
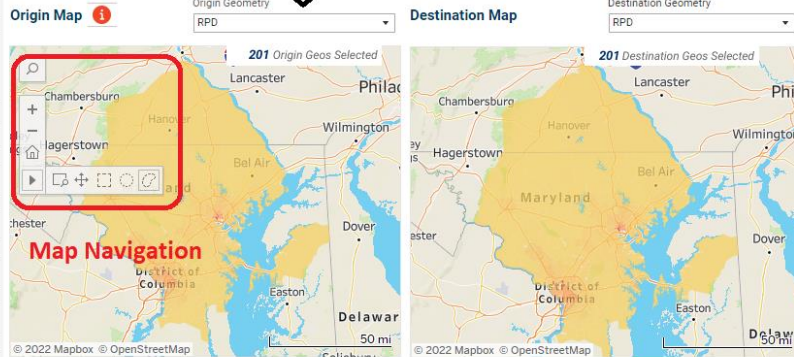
Daily Person Hours Traveled **7,047,949**
 Daily Person Miles Traveled **121,847,337**
 Daily Vehicle Hours Traveled **2,179,984**
 Daily Vehicle Miles Traveled **80,341,354**
 Daily Trips **17,903,888**



BMC InSITE Dashboard
Trip Flows

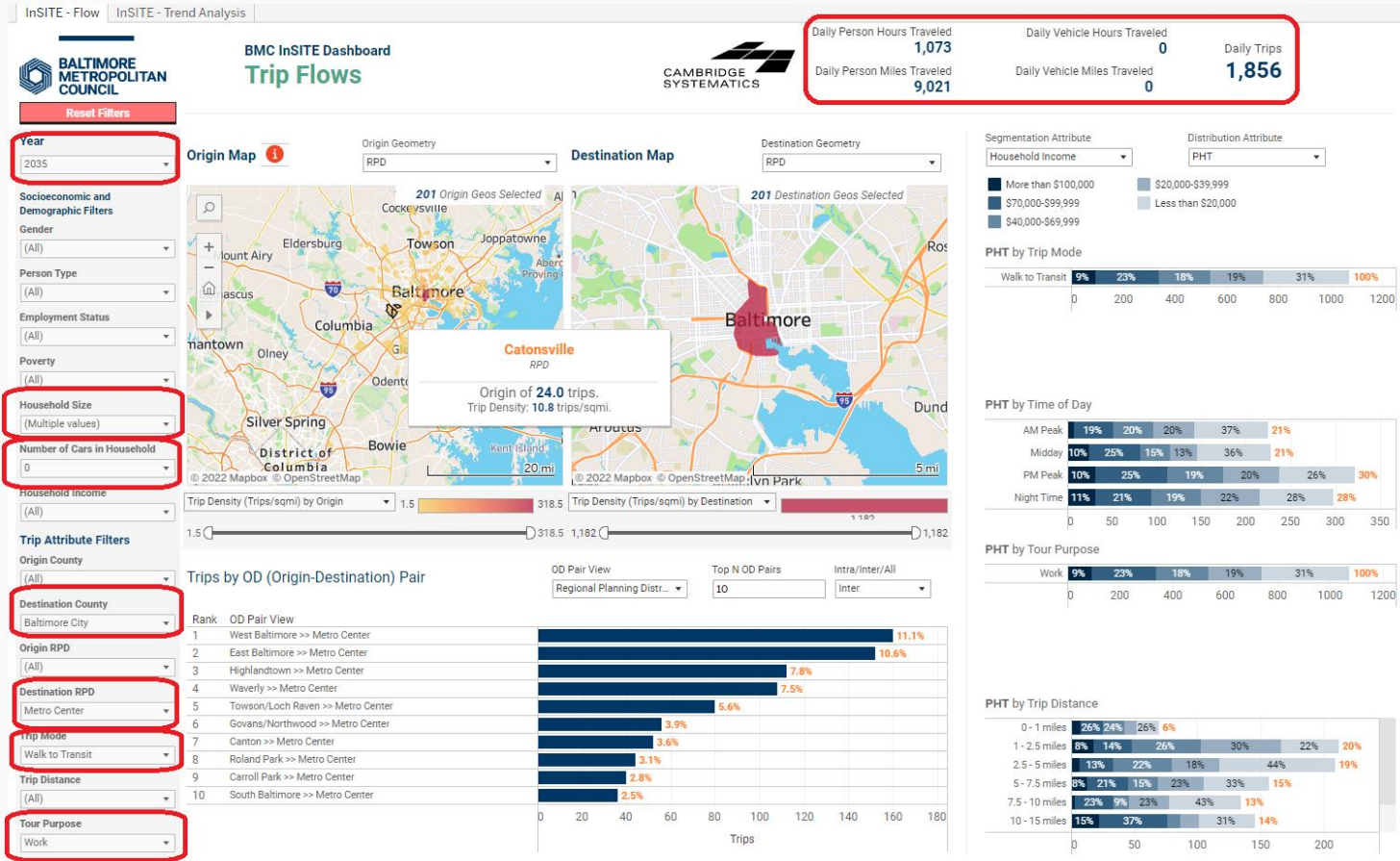


- Year: 2019
- Socioeconomic and Demographic Filters: Gender, Person Type, Employment Status, Poverty, Household Size, Number of Cars in Household, Household Income, Trip Attribute Filters: Origin County, Destination County, Origin RPD, Destination RPD, Trip Mode, Trip Distance, Tour Purpose
- Liberty/Lochearn, LIERTYTOWN, Lower Park Heights, Lutherville, Manchester, Marley Neck, Maryland City, Metro Center, MICHIGAN PARK HILLS, Midds River, MONTGOMERY VILLAGE, MORNINGSIDE, Mcrrell Park, Mcourt Ary, Mcourt Washington, MT ZION, MYERSVILLE, NE DC, NEW MARKET, North Point, NORWOOD, NW DC, OAKLAND





InSITE – Flow Analysis Selection



For More Information

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