



Montgomery County Travel/4 Model Travel Demand Forecast Model Development – Challenges and Lessons Learned

Acknowledgements

- **Eric Graye, AICP, PTP**

Planning Supervisor

Functional Planning and Policy Division

Travel Forecasting and Monitoring Unit

Maryland National Capital Park and Planning Commission

- **Yuanjun Li**

Planner Coordinator

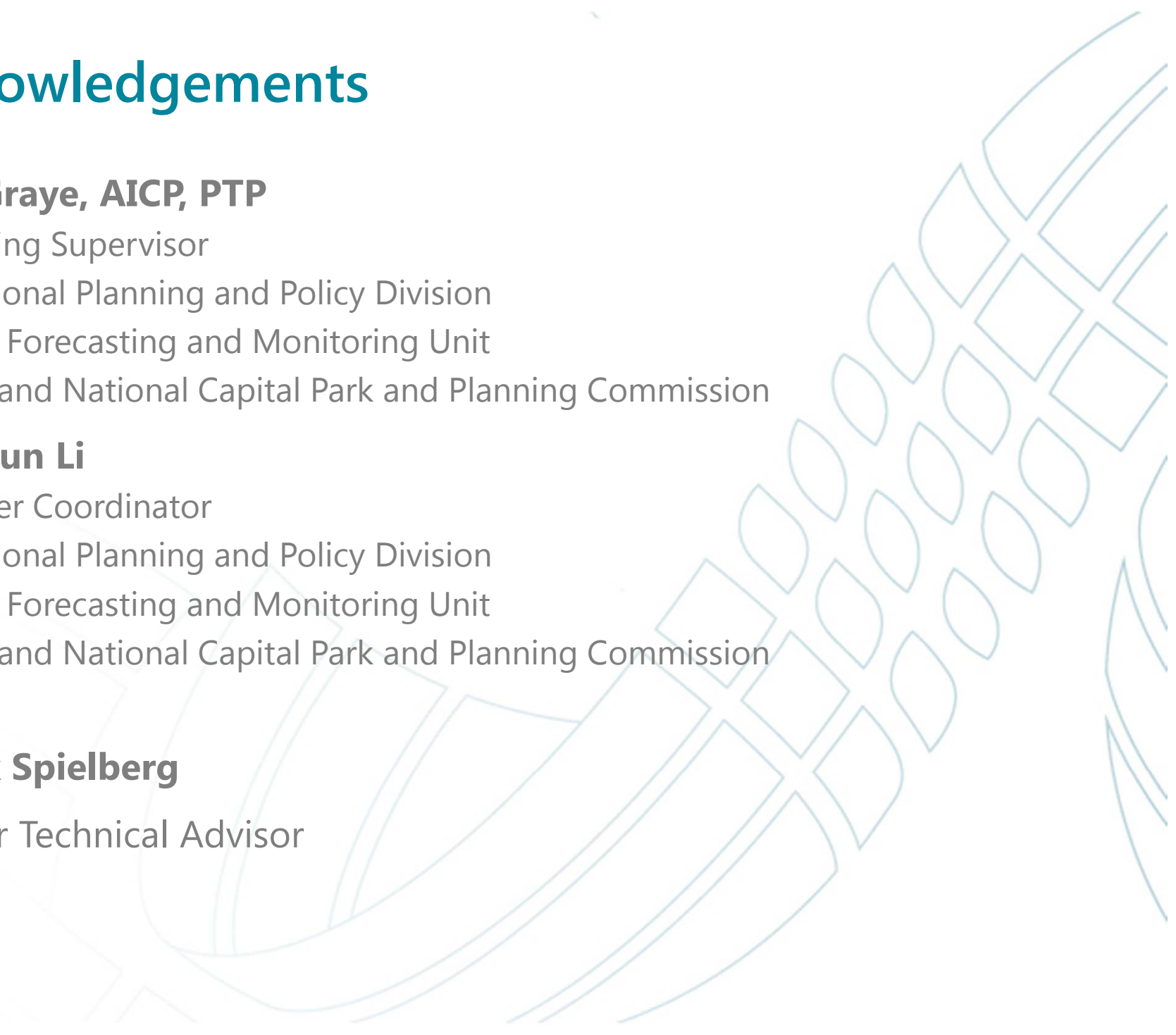
Functional Planning and Policy Division

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Maryland National Capital Park and Planning Commission

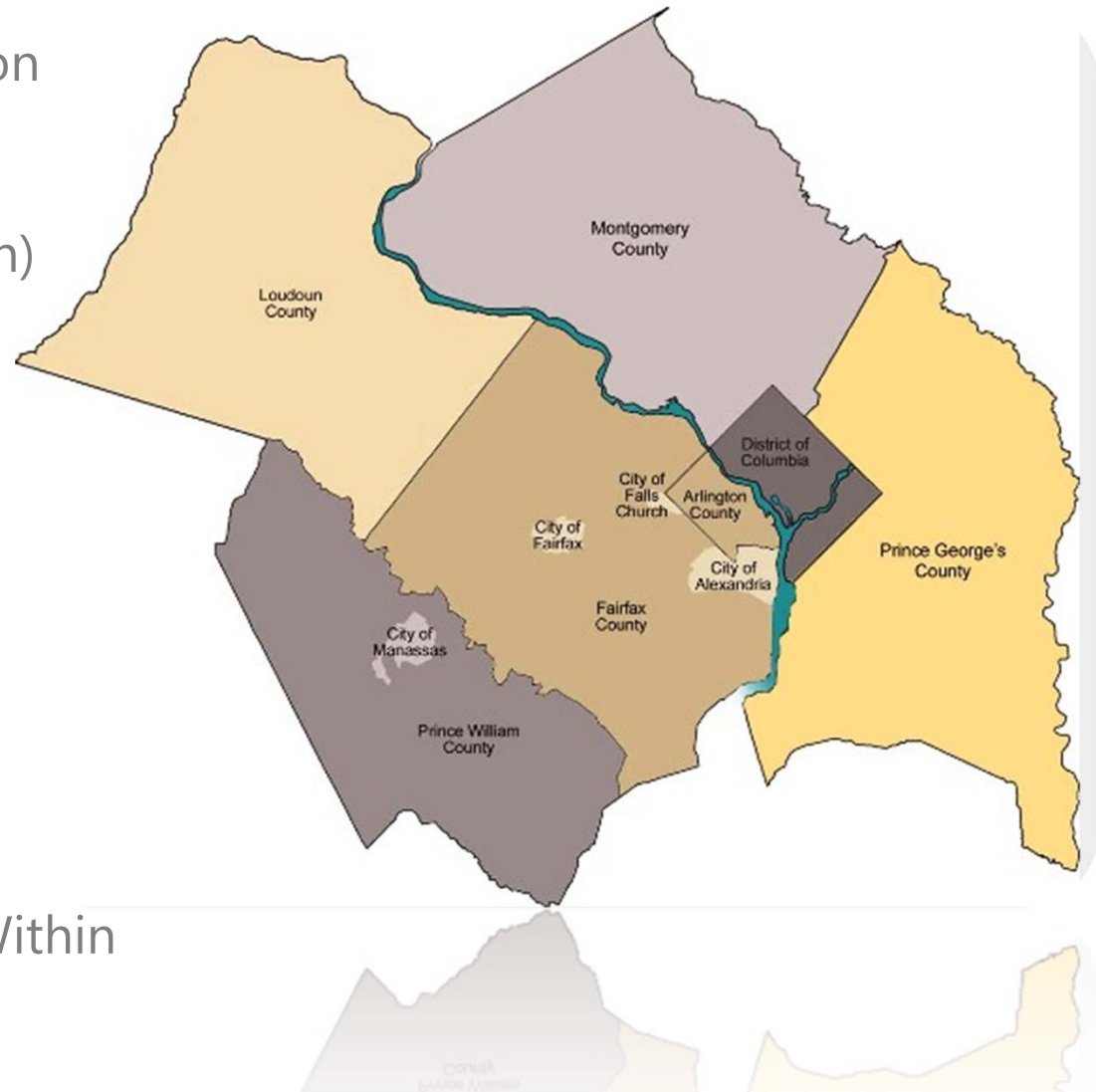
- **Frank Spielberg**

Senior Technical Advisor



Montgomery County, Maryland

- Population 1 Million
- $\frac{1}{6}$ of the Regional Population
- Median Household Income \$97,181 (4th highest in region)
- Education
 - 31% College Degree
 - 31% Graduate Degree
- 362,000 Households
- 510,000 Jobs
 - 60% Office, 15% Retail
- Commuting - 50% of Trips Within County & 30% Trips Into DC



Maryland National Capital Park and Planning Commission (M-NCPPC)

- Maryland National Capital Park and Planning Commission
- Formed in 1927
- Bi-County Agency - Montgomery County & Prince George's County
- Administration Combined
- Counties Operate as Separate Organizations
- Montgomery County Planning Board Appointed by the County Council
- Responsible for Planning
- Make Zoning Recommendations to the County Council

Project Objective

Migrate/Update the Department's regional travel forecasting model from a County-focused adaptation of the MWCOG's Version 2.1d#50 (i.e., "Travel/3") to a County-focused adaptation of the MWCOG's Version 2.3, Build 52 travel demand forecast model (i.e., "Travel/4").

MoCo Travel Demand Forecasting

■ Travel/1

- Developed in the late 1980's
- Michael Replogle Director of Planning
- EMME/2 on UNIX Platform
- PM Peak Period

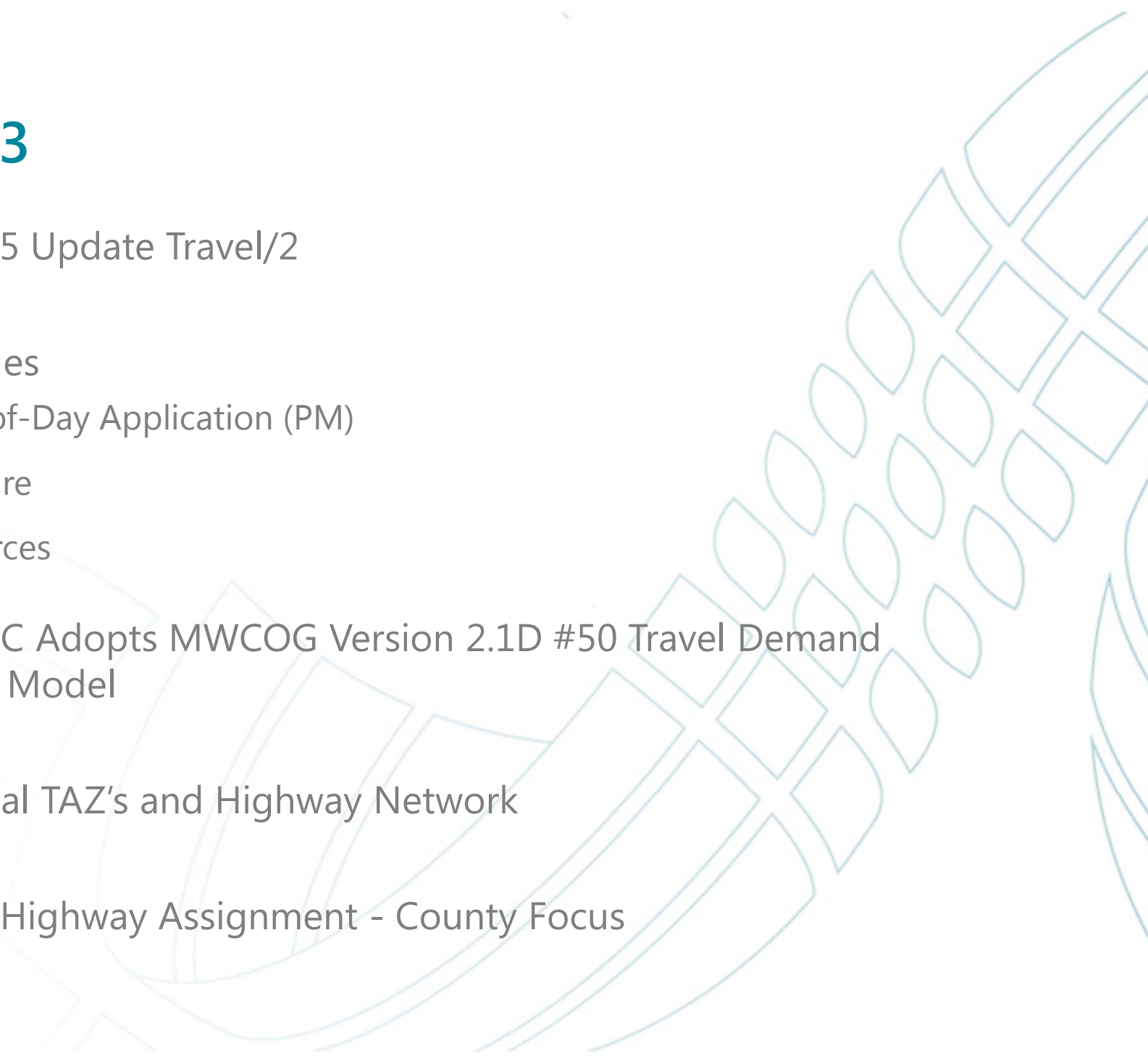
■ Travel/2

- Finished in July 2000
- Calibration and Validation – 1998 Base Year
- 1994 Household Travel Survey & 1990 CTPP
- Support of the County's Transportation and Policy Review Study
- EMME/2 software
- PM Peak Period

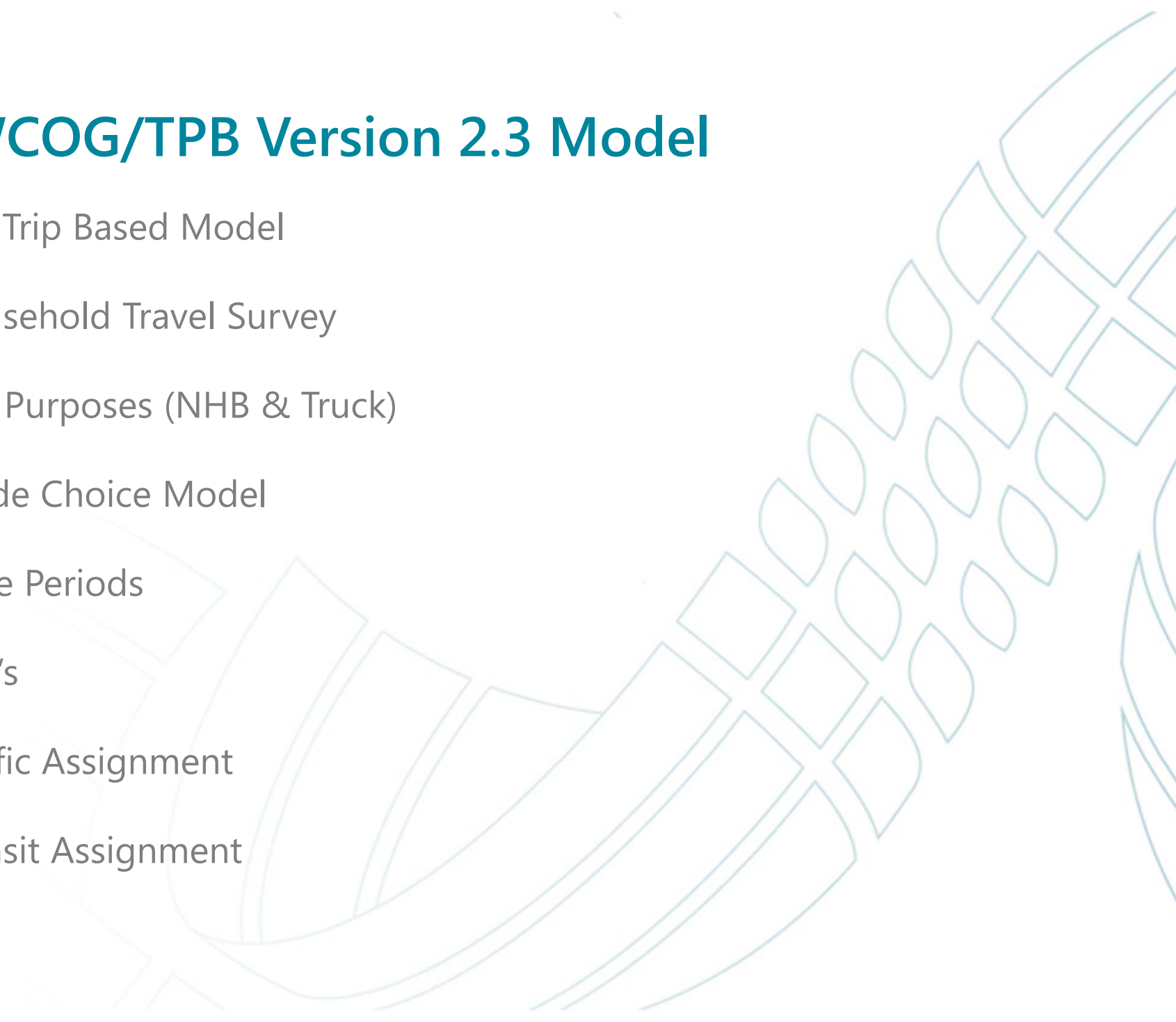
Regional Travel Demand Forecast Model

- Metropolitan Washington Council of Governments (MWCOCG)
- National Capital Transportation Planning Board (TPB)
- Travel Demand Forecasting Group
 - Applications
 - Development
 - Maintain the Regional Travel Demand Forecast Model
- Software
 - MinUTP
 - CUBE/Voyager
- Daily Trip End Model

Travel/3

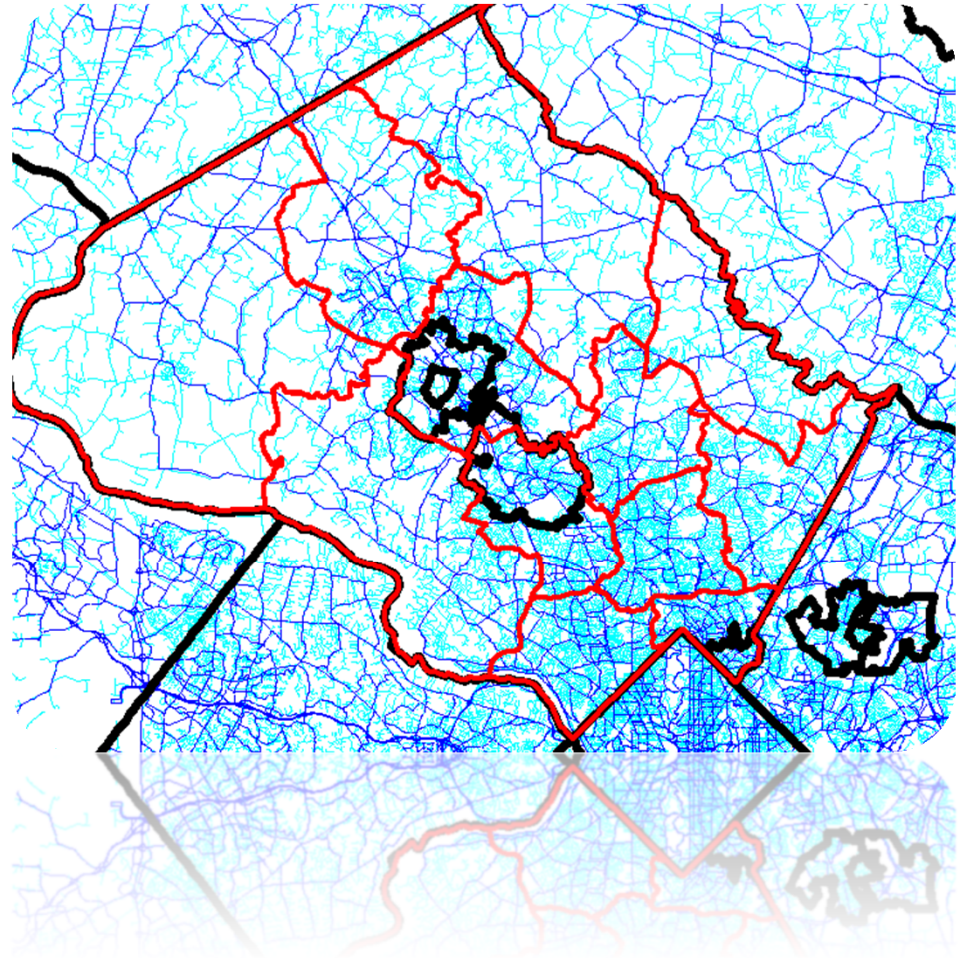
- Mid-2005 Update Travel/2
 - Challenges
 - Time-of-Day Application (PM)
 - Software
 - Resources
 - M-NCPPC Adopts MWCOCG Version 2.1D #50 Travel Demand Forecast Model
 - Additional TAZ's and Highway Network
 - Validate Highway Assignment - County Focus
- 

MWCOG/TPB Version 2.3 Model

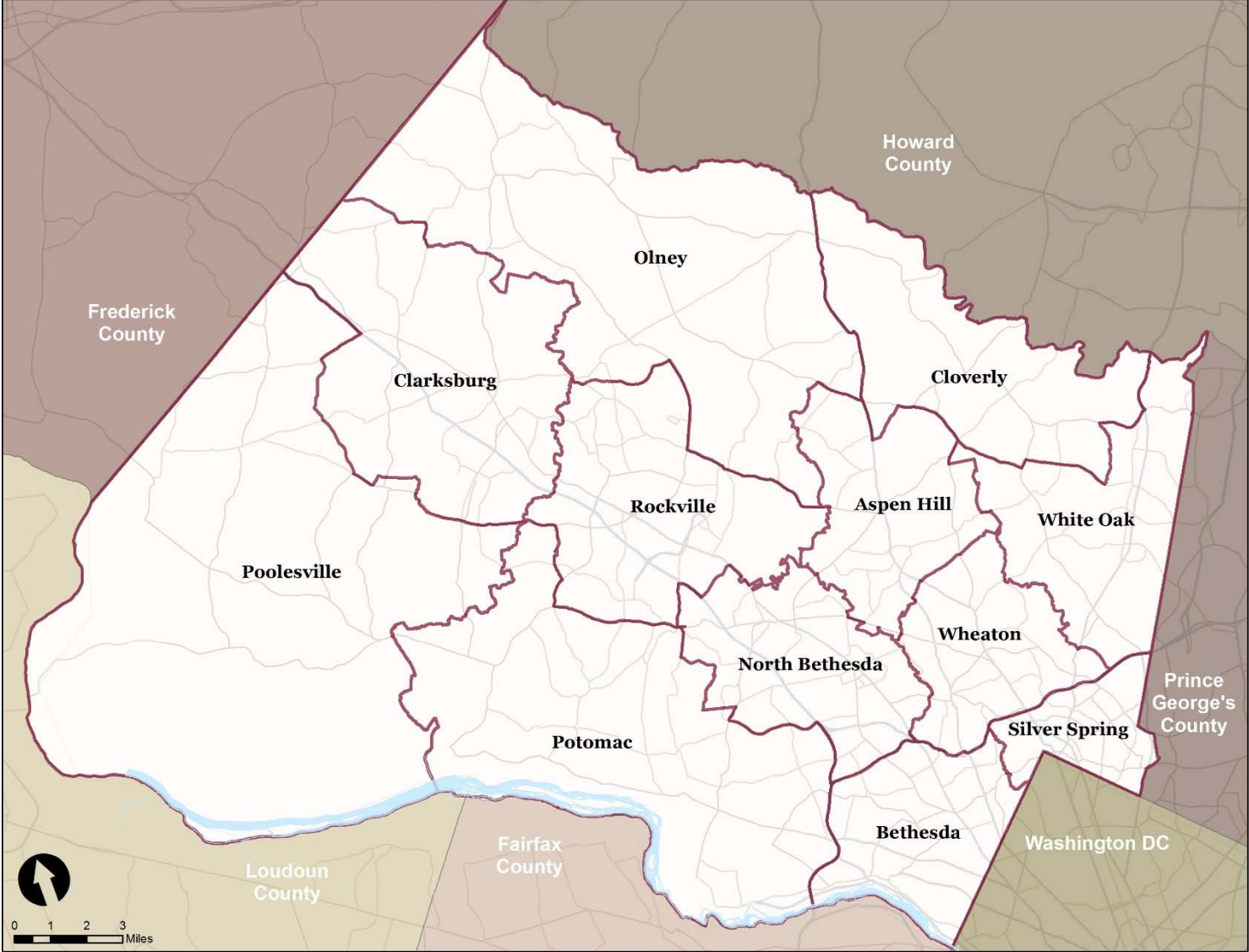
- Still Trip Based Model
 - Household Travel Survey
 - Trip Purposes (NHB & Truck)
 - Mode Choice Model
 - Time Periods
 - TAZ's
 - Traffic Assignment
 - Transit Assignment
- 
- A faint, light blue background graphic on the right side of the slide. It depicts a stylized road network with several intersecting lines. Overlaid on this network are several stylized tree shapes, each with a rounded canopy and a short trunk, arranged in a pattern that suggests a landscape or a specific urban area.

TAZ Structure

- **V2.1D #50**
 - 2191 TAZ's Total
 - 308 TAZ's Montgomery County
- **Travel/3**
 - 2191 TAZ's Total
 - 318 TAZ's Montgomery County
- **Version 2.3.52**
 - 3722 TAZ's Total
 - 376 TAZ's Montgomery County

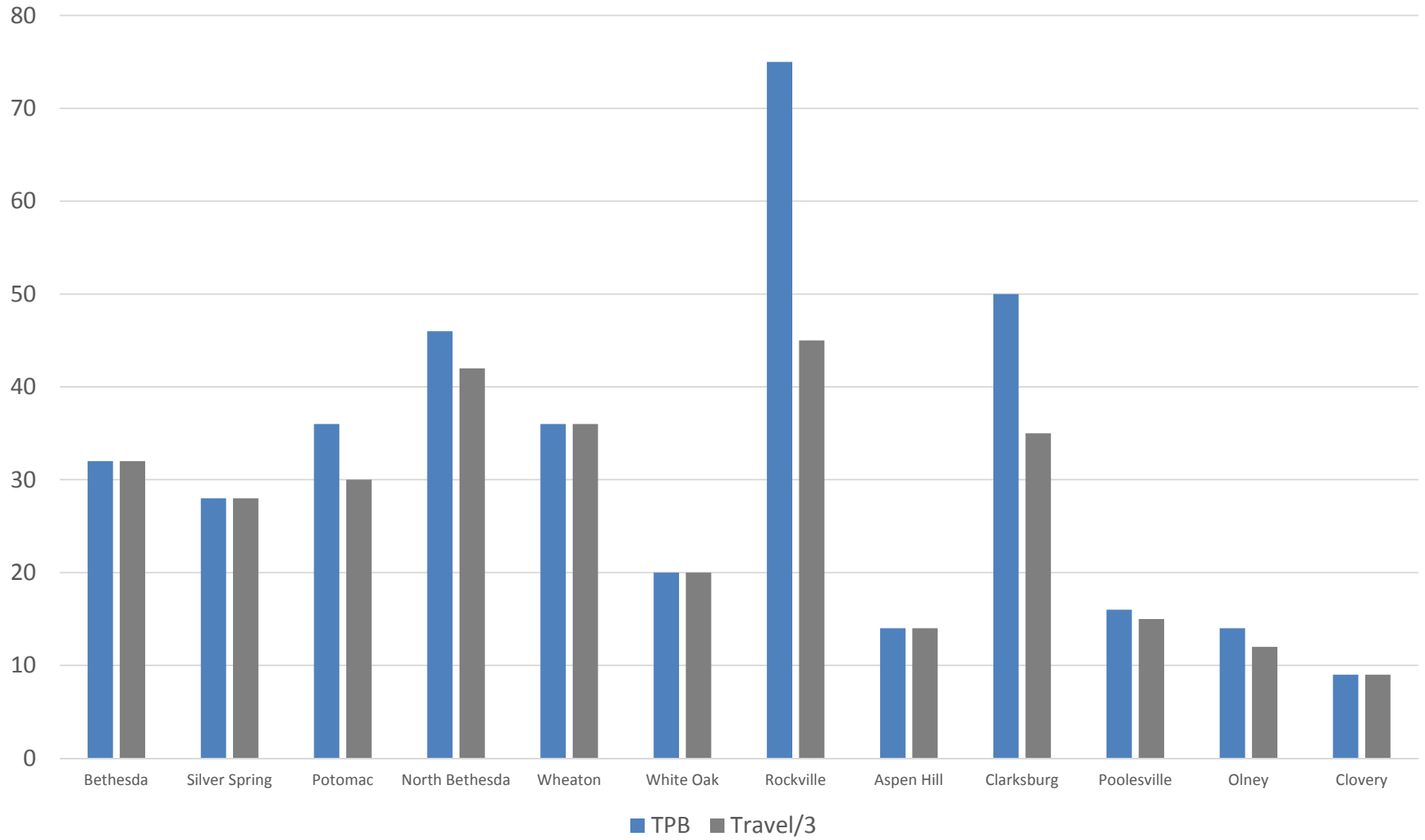


District Level Aggregation



TAZ Structure

Number of TAZ's by District



Trip Generation

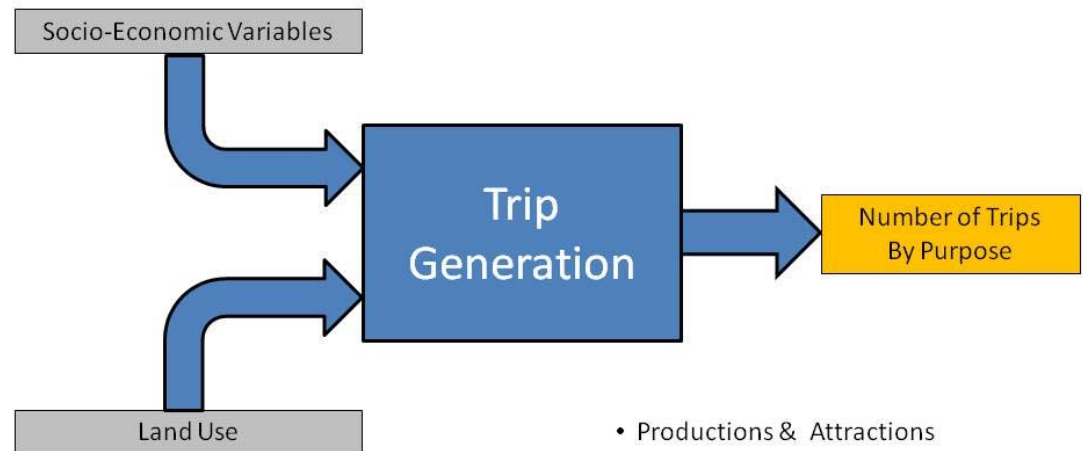
- Focus on HBW, HBS, & HBO
- Travel/3

Productions

HBW 8% Greater
HBS 20% Greater
HBO 40% Greater
Total 25% Greater

Attractions

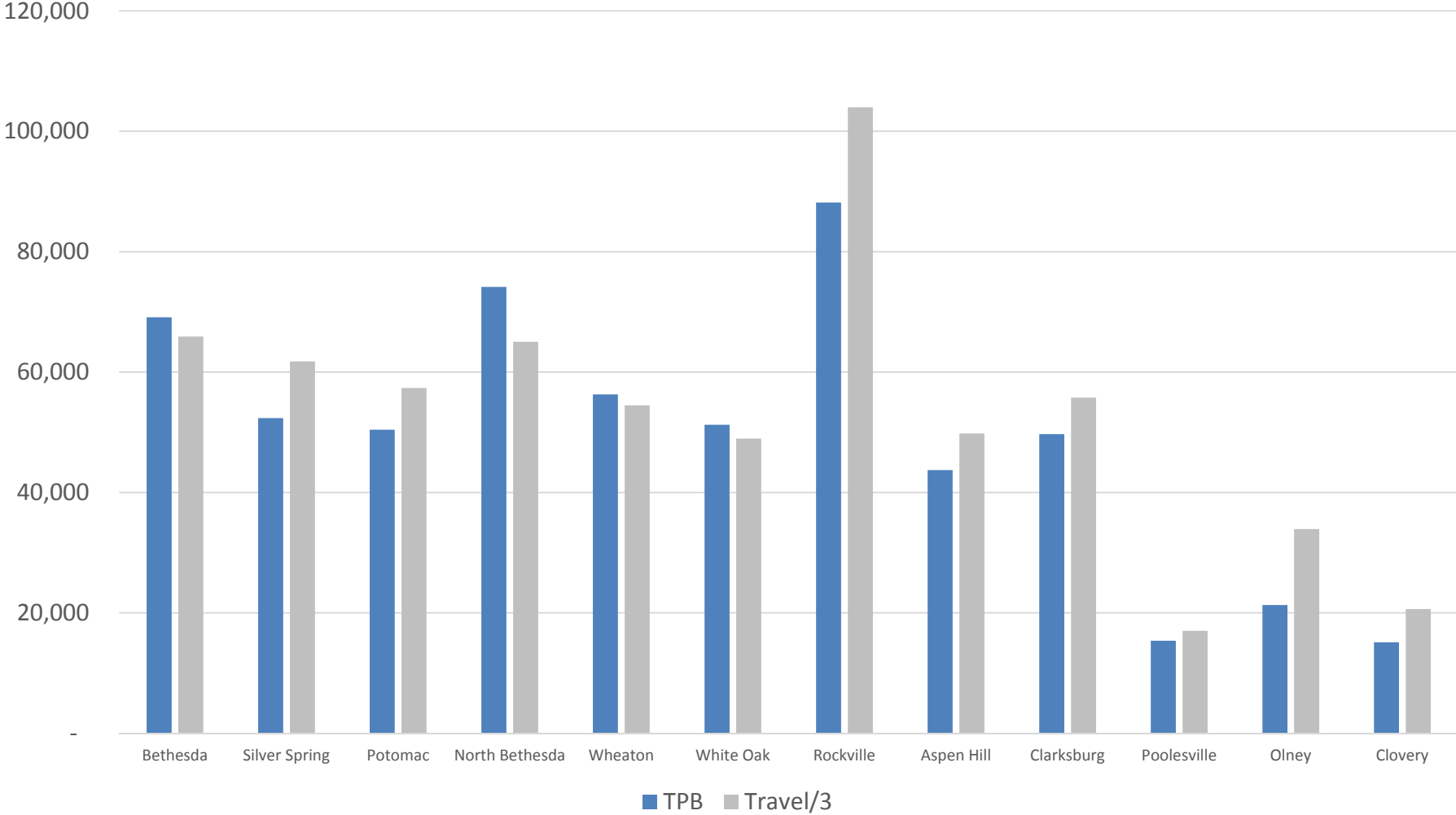
HBW 6% Less
HBS 22% Greater
HBO 30% Greater



- Productions & Attractions
or
- Activities (time of day specific)

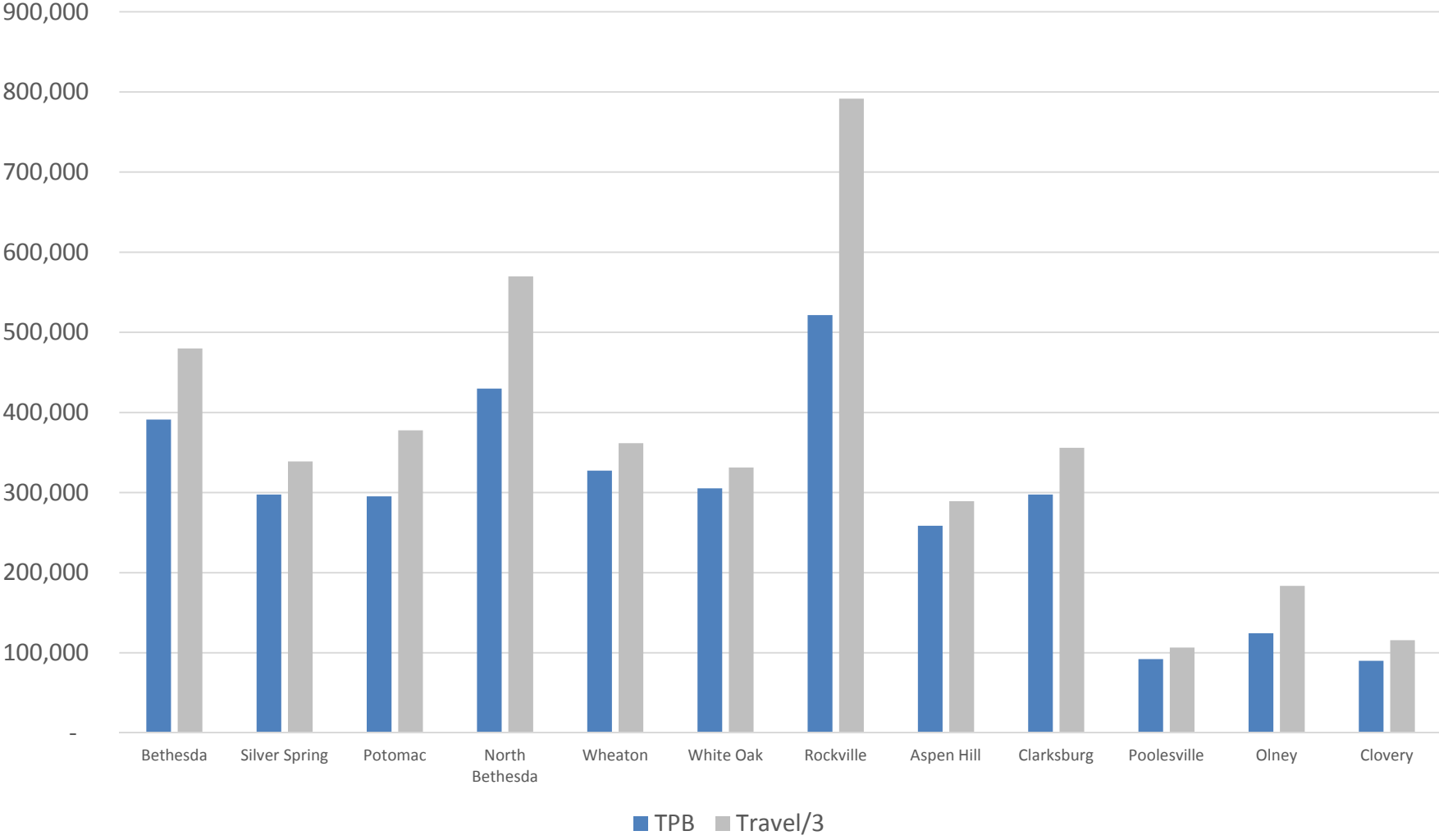
Trip Generation

HBW Productions by Montgomery County District



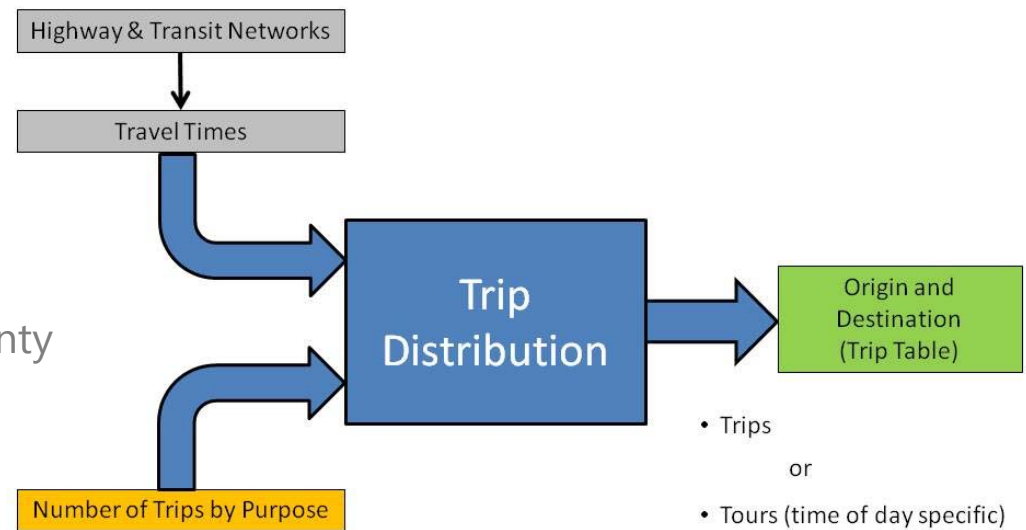
Trip Generation

Total Productions by Montgomery County District



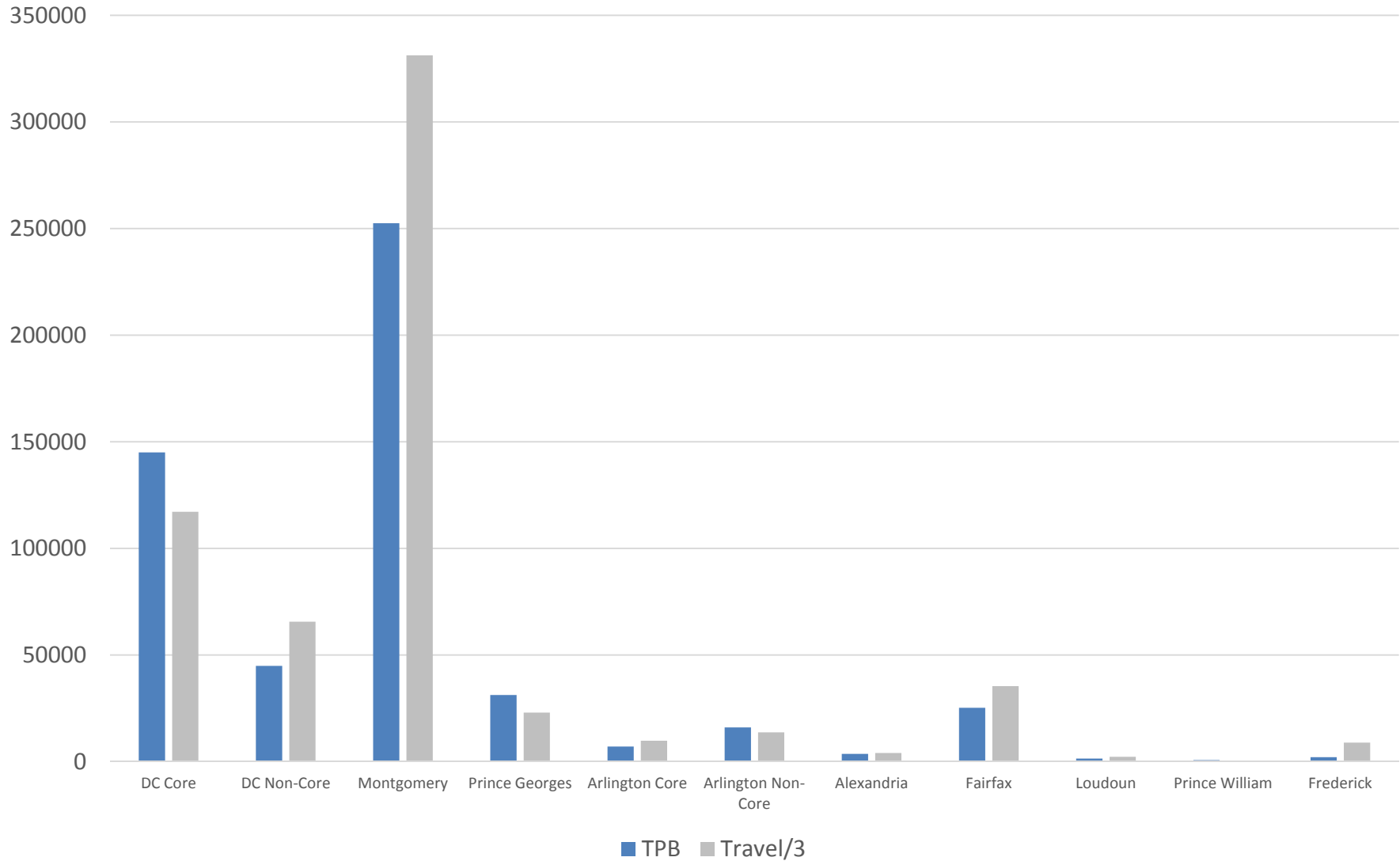
Trip Distribution

- HBW Longest Distance Trips
- Focus on MWCOG Jurisdictions
- Most HBW Trips Stay in County
 - Travel/3 - 54% Remain in County
 - TPB Version 2.3 - 48% Remain in County
- DC Core
 - Travel/3 - 22% Productions
 - TPB Version 2.3 - 19% Productions



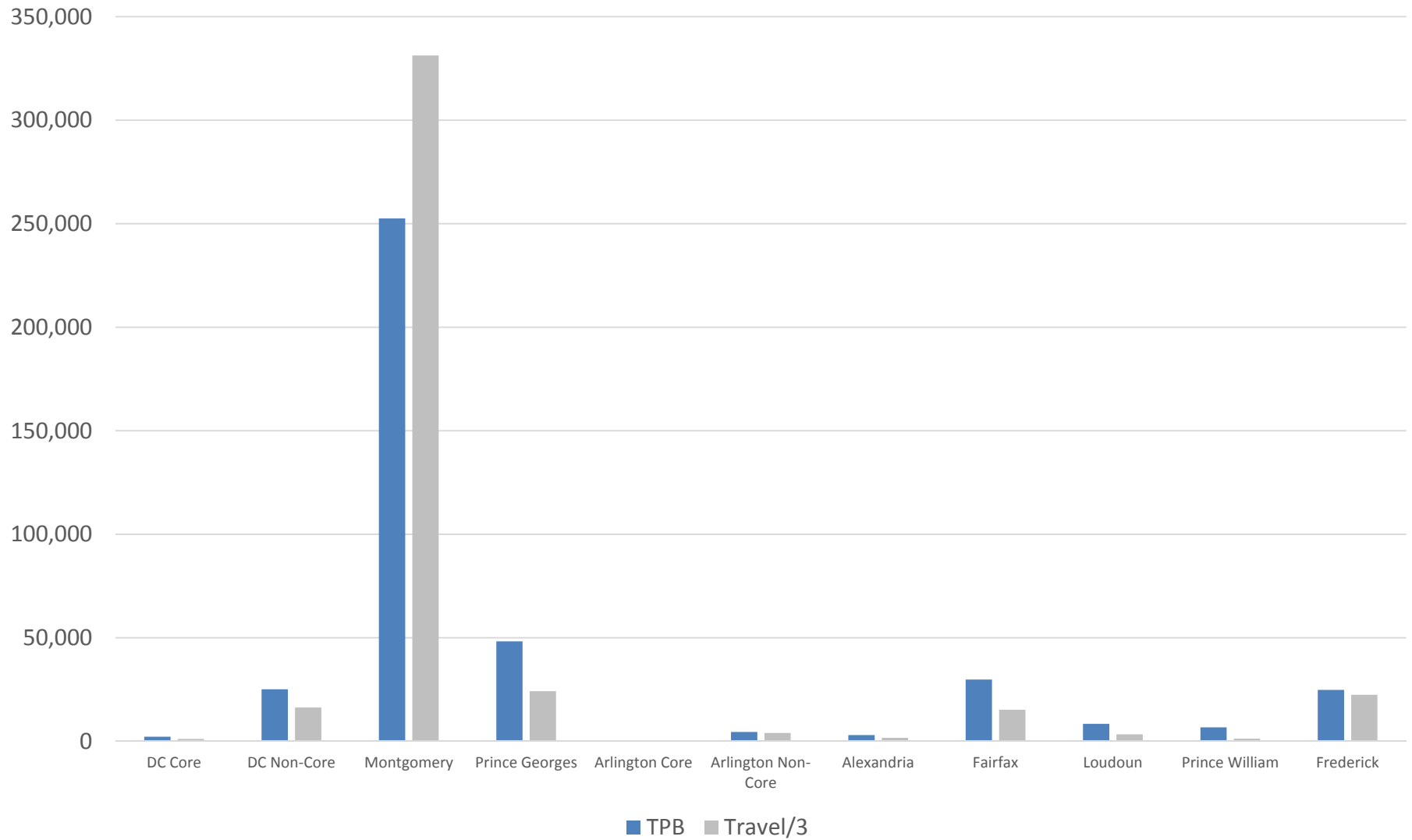
Trip Distribution

Montgomery County HBW Productions by Jurisdiction



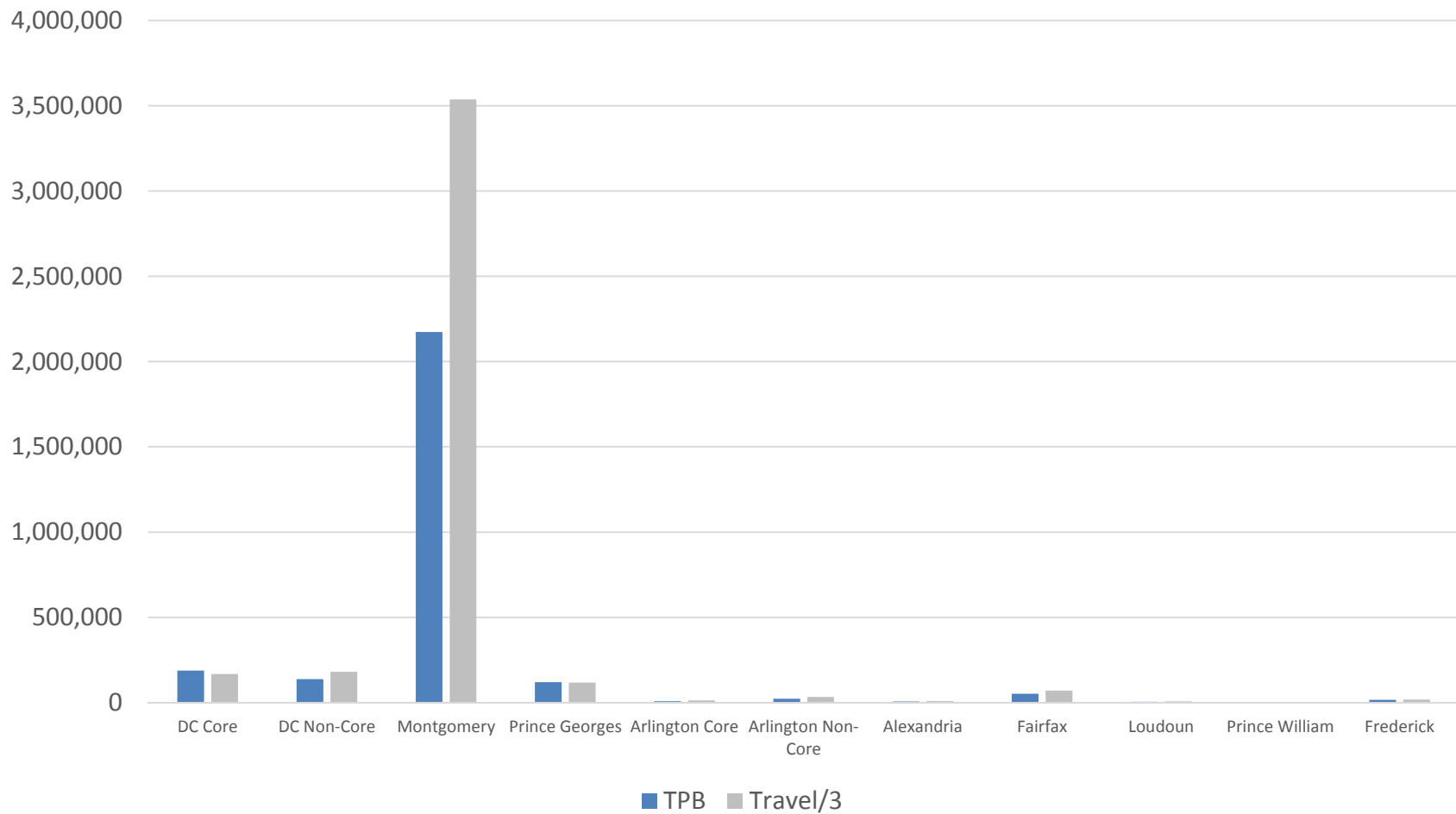
Trip Distribution

Montgomery County HBW Attractions by Jurisdiction



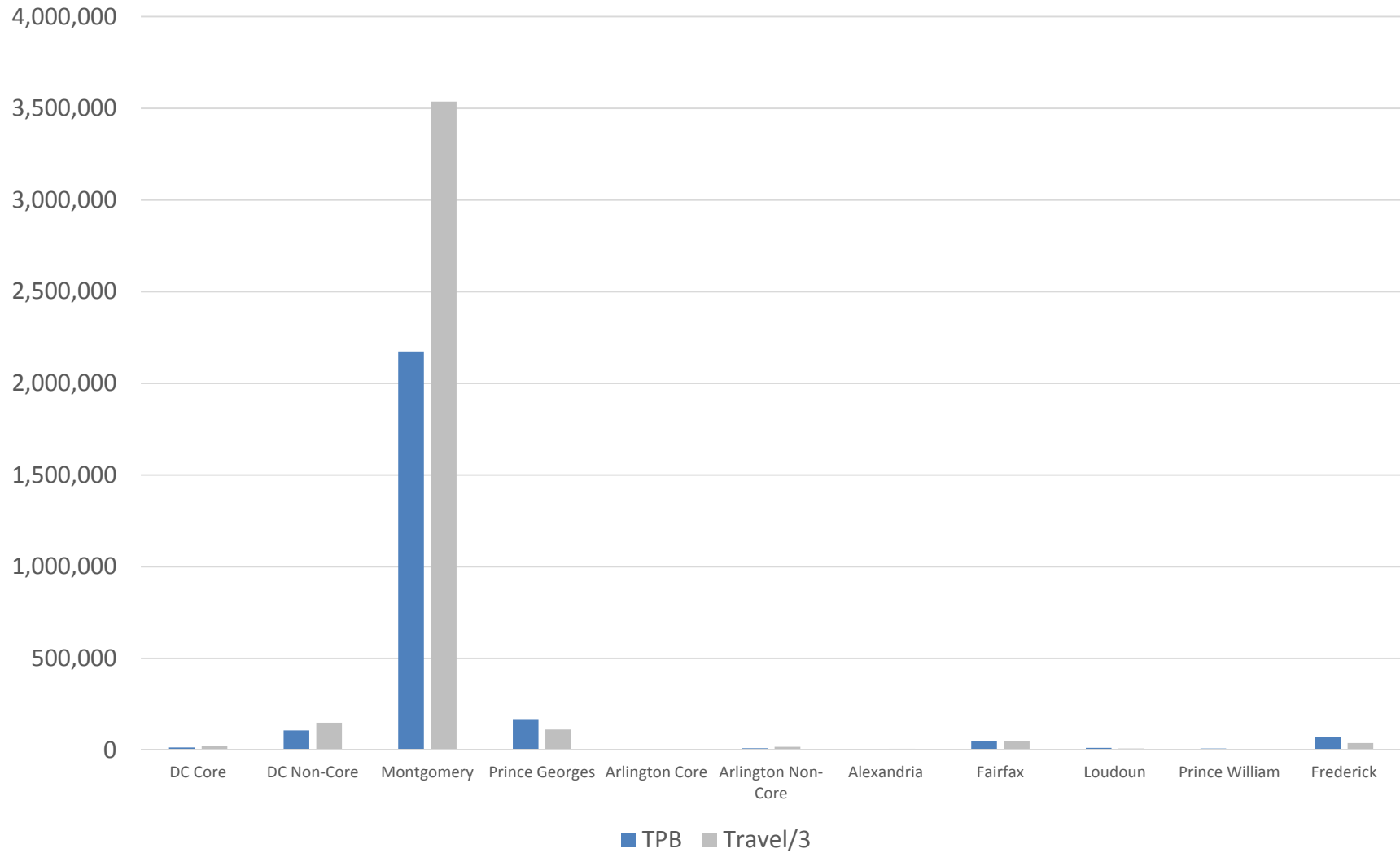
Trip Distribution

Montgomery County ALL Productions by Jurisdiction



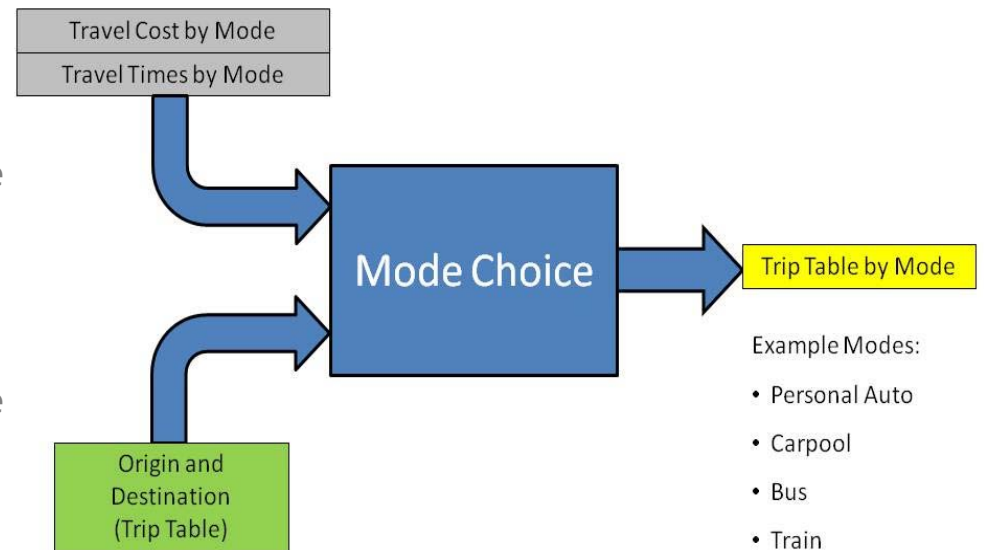
Trip Distribution

Montgomery County ALL Attractions by Jurisdiction



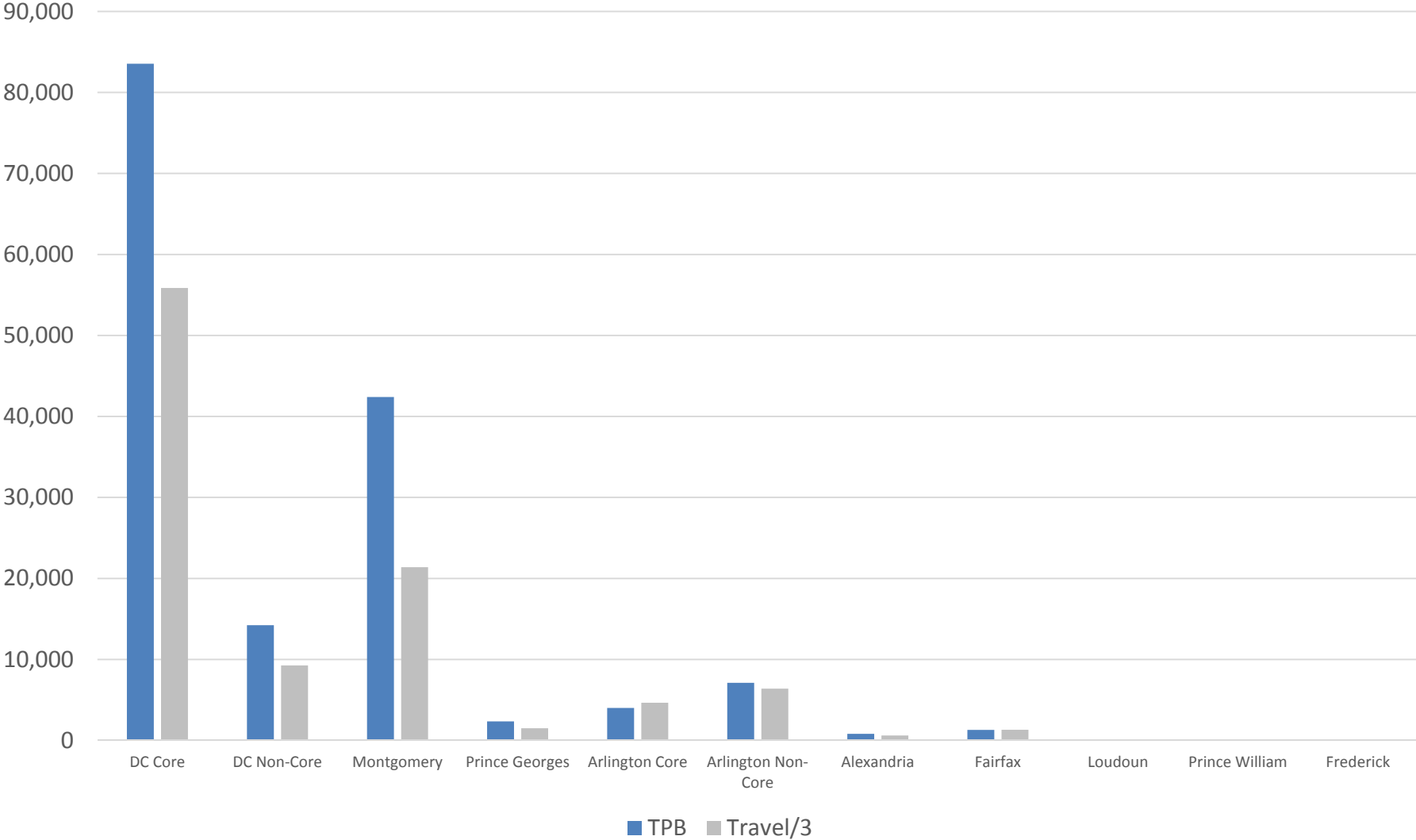
Mode Choice

- Home-Based Work Highest Non-SOV Mode Share
- Central Core Highest Transit Mode Shares
- DC Core
 - TPB Version 2.3.52 – 58% Transit Mode Share
 - Travel/3 – 48% Transit Mode Share
- Arlington Core
 - TPB Version 2.3.52 – 56% Transit Mode Share
 - Travel/3 – 47% Transit Mode Share
- All Trips Productions Montgomery County
 - TPB Version 2.3.52 – 8% Transit Mode Share
 - Travel/3 – 4% Transit Mode Share



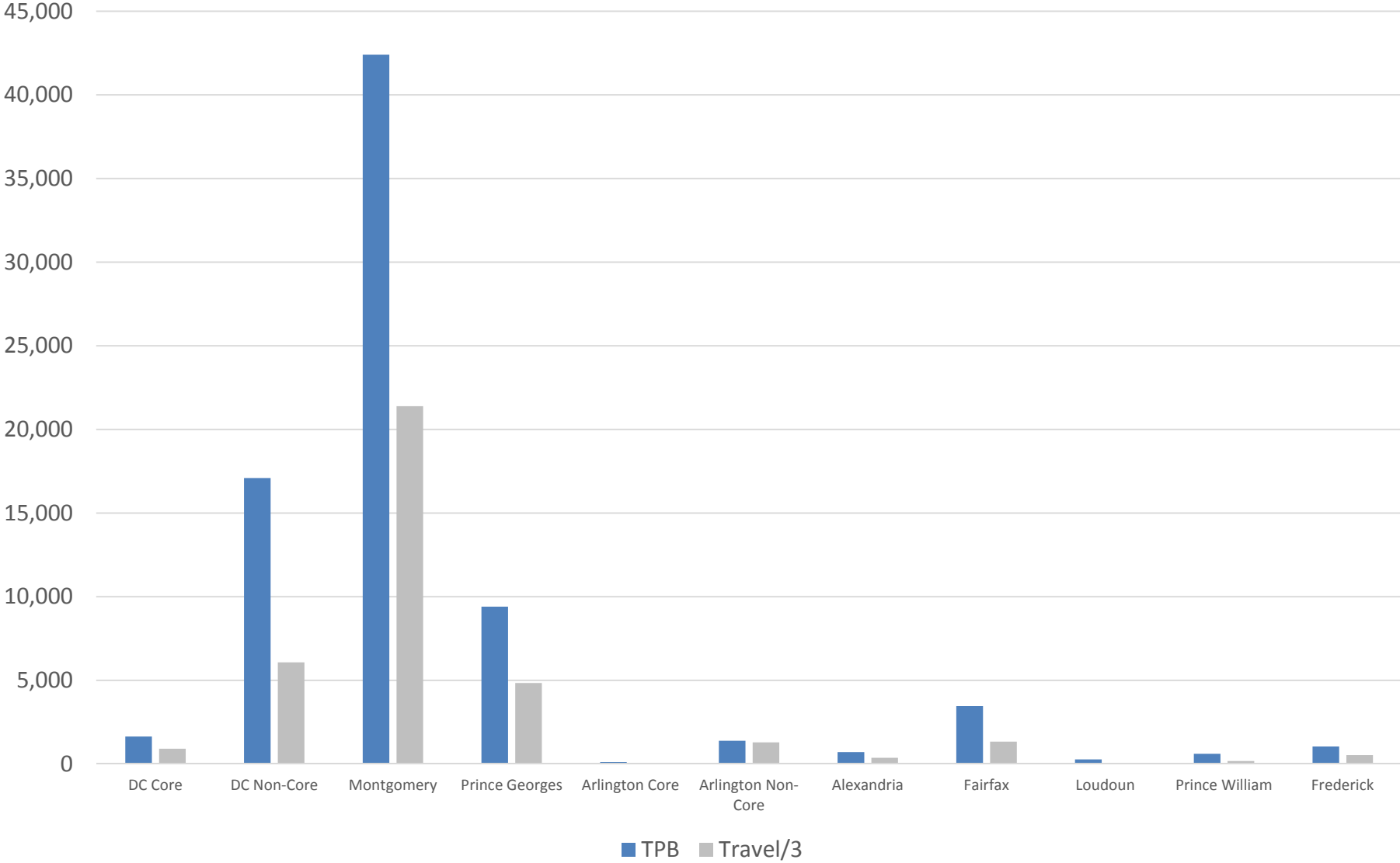
Mode Choice

Montgomery County HBW Transit Productions by Jurisdiction



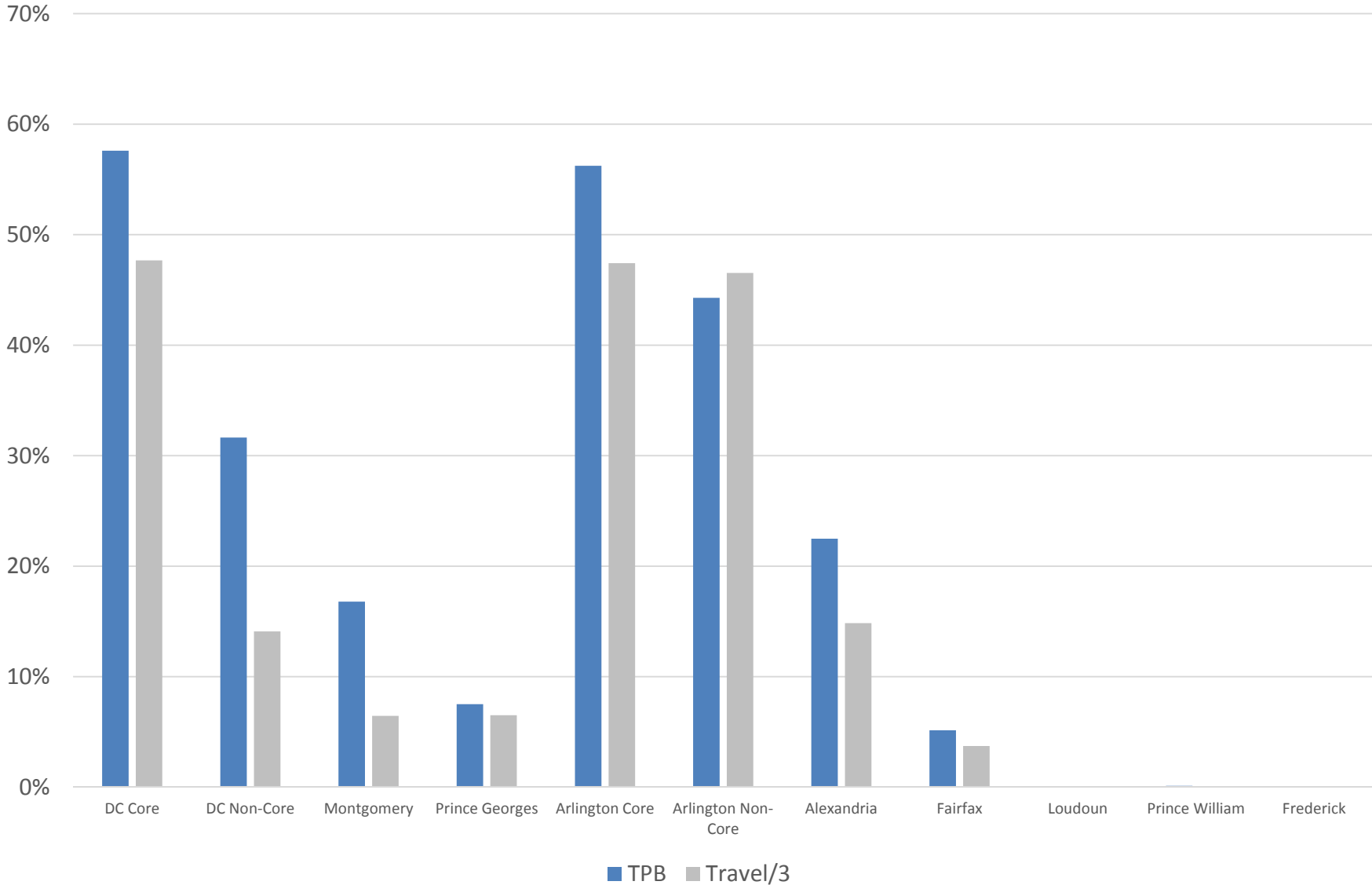
Mode Choice

Montgomery County HBW Transit Attractions by Jurisdiction



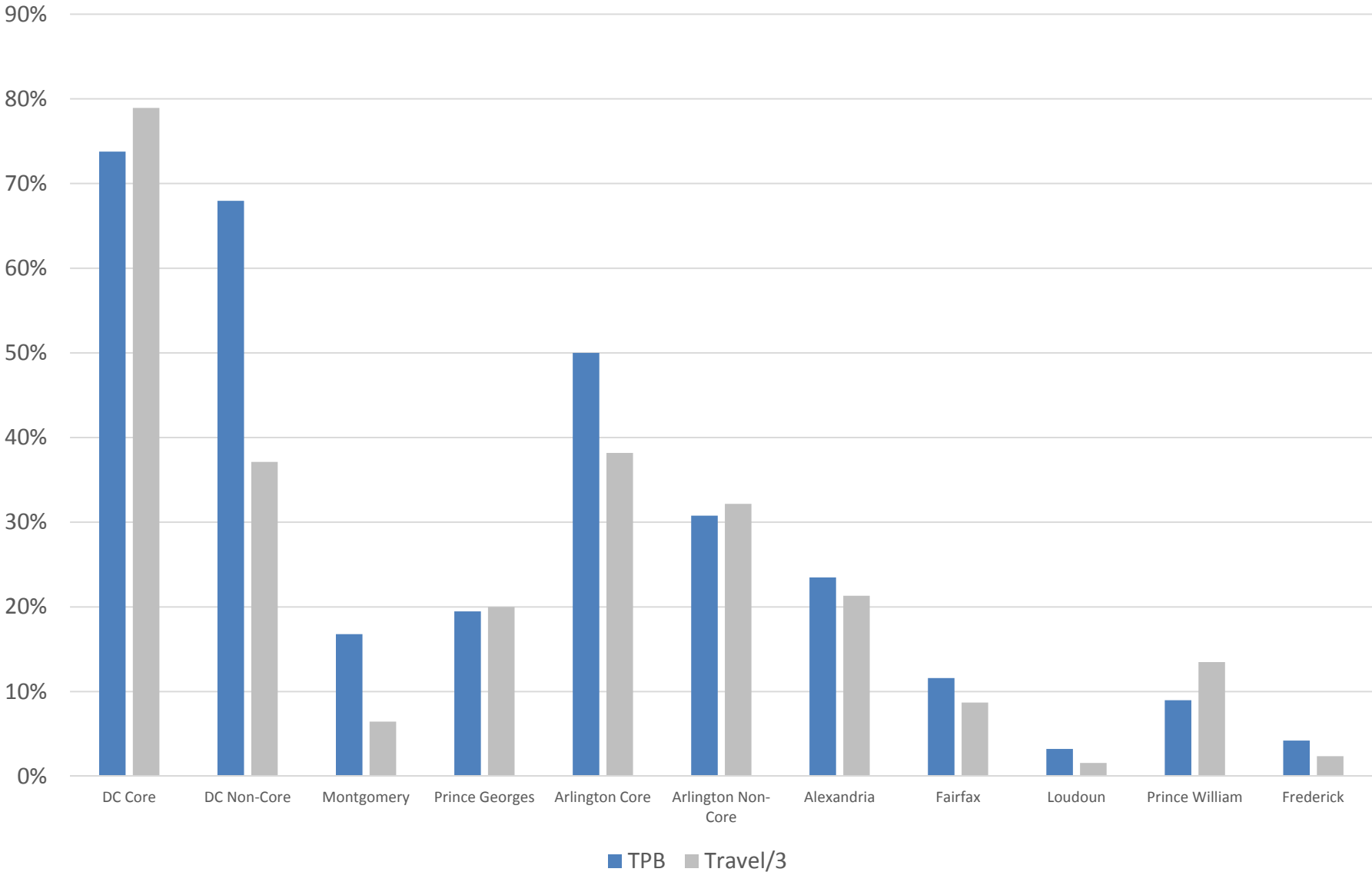
Mode Choice

Montgomery County Percent HBW Transit Productions by Jurisdiction



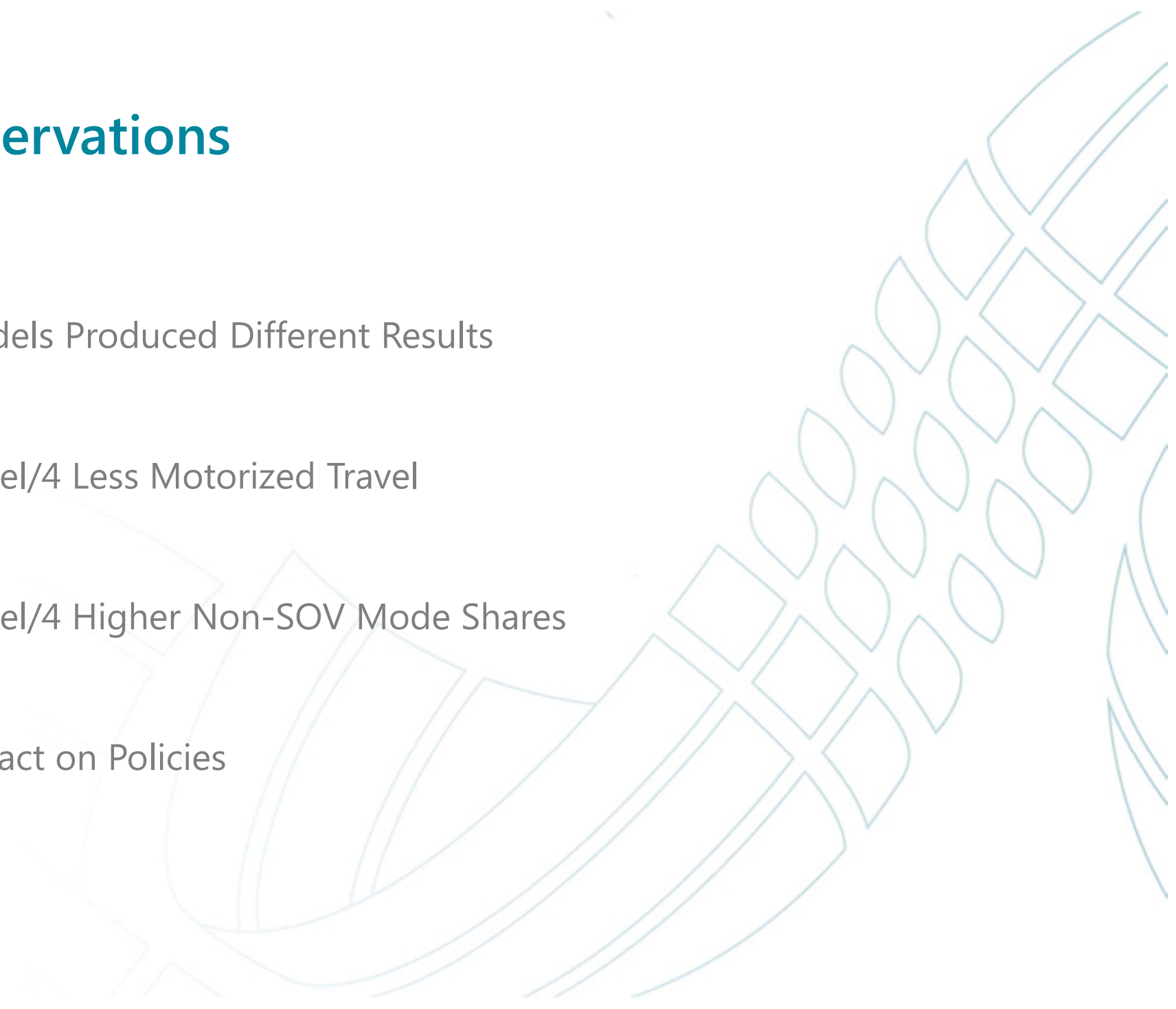
Mode Choice

Montgomery County Percent HBW Transit Attractions by Jurisdiction



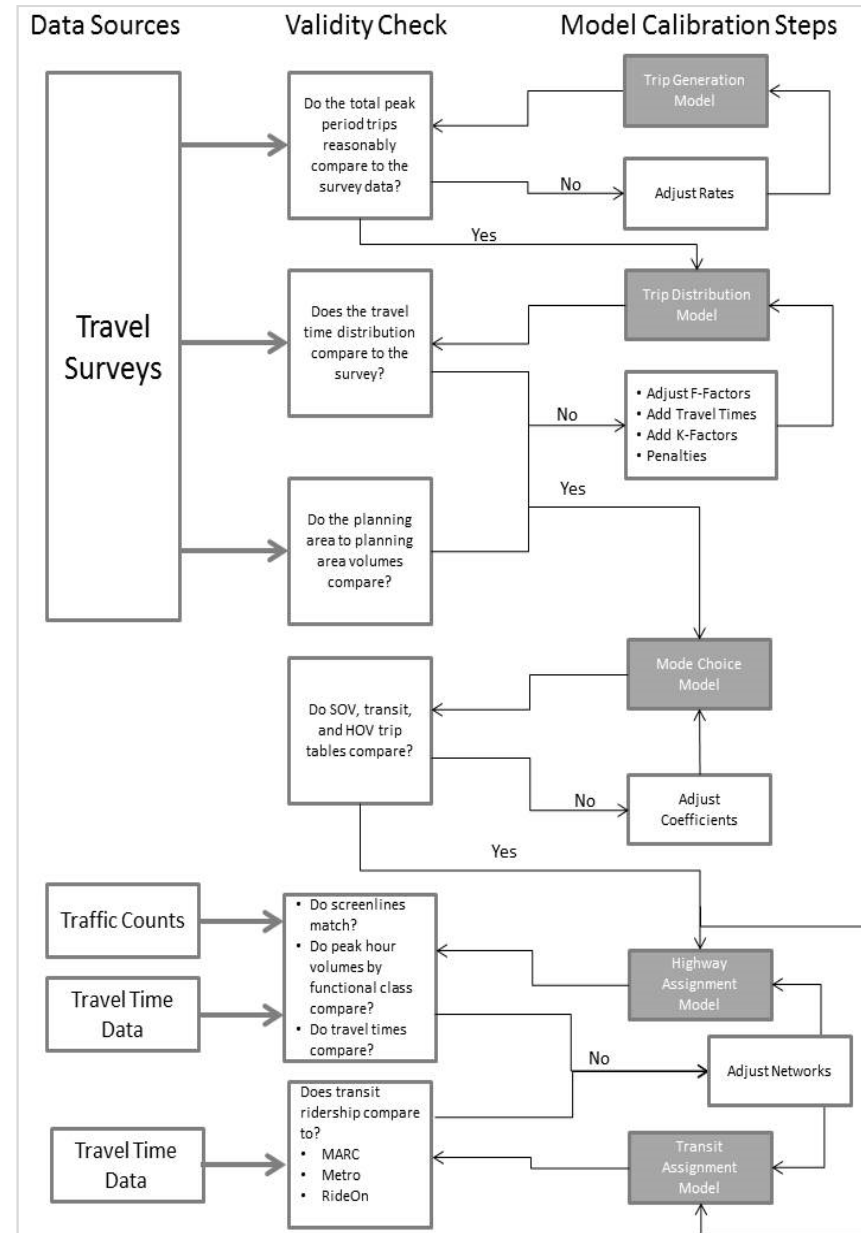
Observations

- Models Produced Different Results
- Travel/4 Less Motorized Travel
- Travel/4 Higher Non-SOV Mode Shares
- Impact on Policies



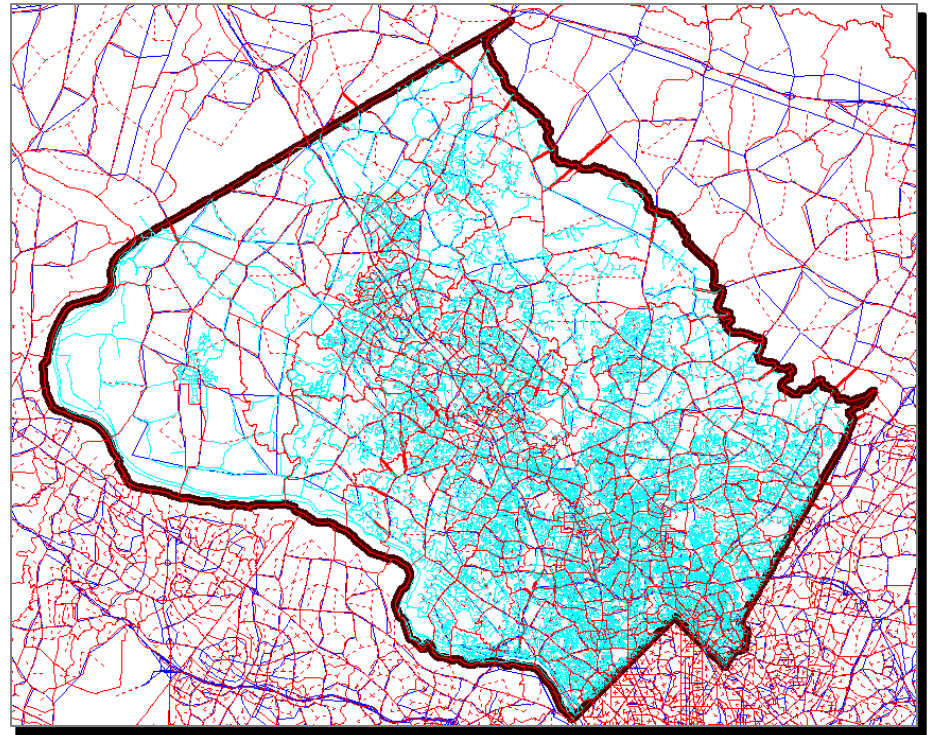
Travel/4 Development

- Adoption of the MWCOG/TPB Version 2.3.52 Model Set
- Focus County Level
- Add Zones
- Add Network
- Recode Transit
- Review of the Calibration
- Validation Effort

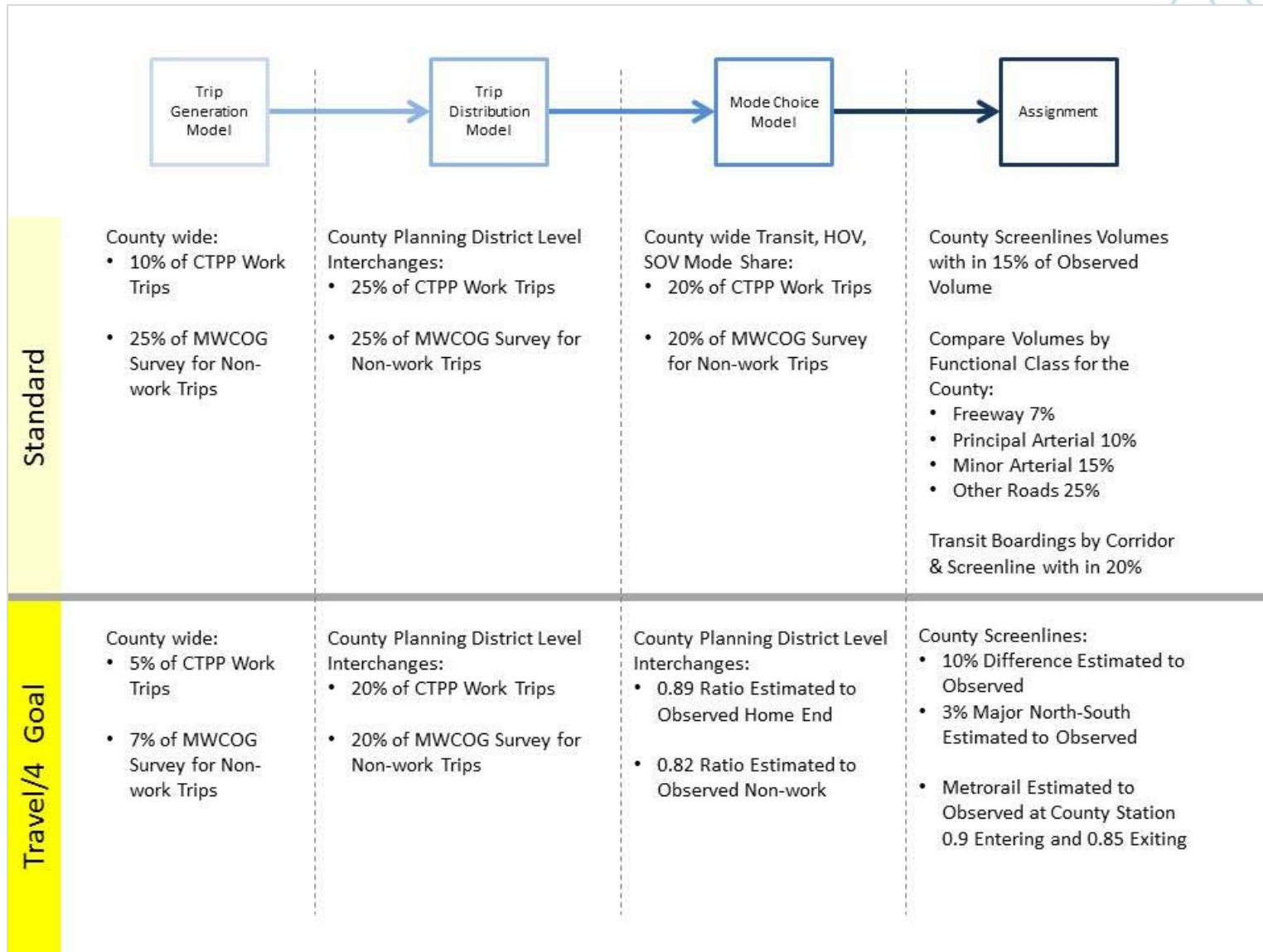


Network Edits

- Added New Zones Total 466 Zones
- Drivers
 - New Barriers (e.g., Freeways)
 - Transit Representation
 - Highway Network Additions
DOT Required
- Added +300 Miles of Highway
- Iterative Process

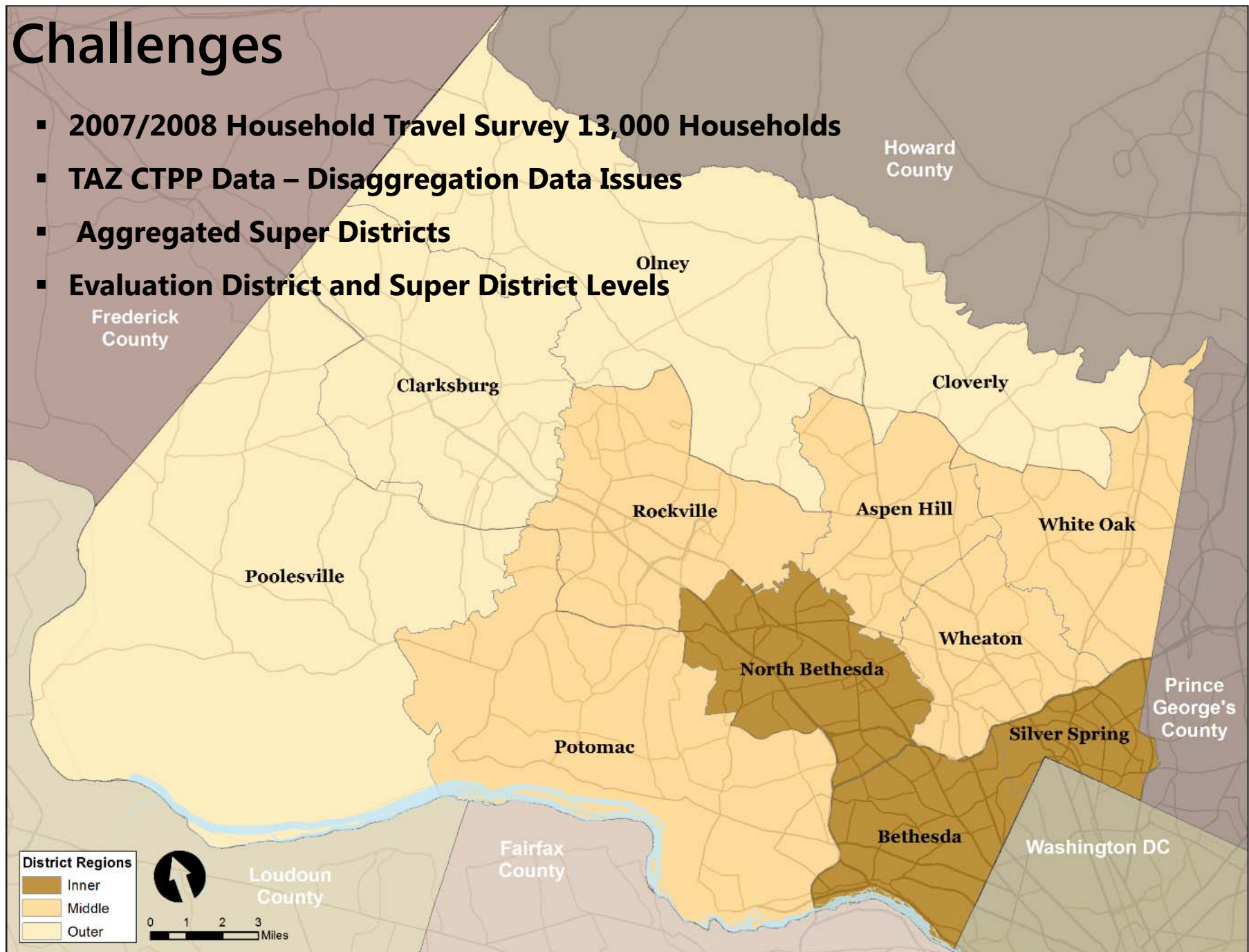


Validation Targets



Challenges

- 2007/2008 Household Travel Survey 13,000 Households
- TAZ CTPP Data – Disaggregation Data Issues
- Aggregated Super Districts
- Evaluation District and Super District Levels



Trip Generation

1st Run

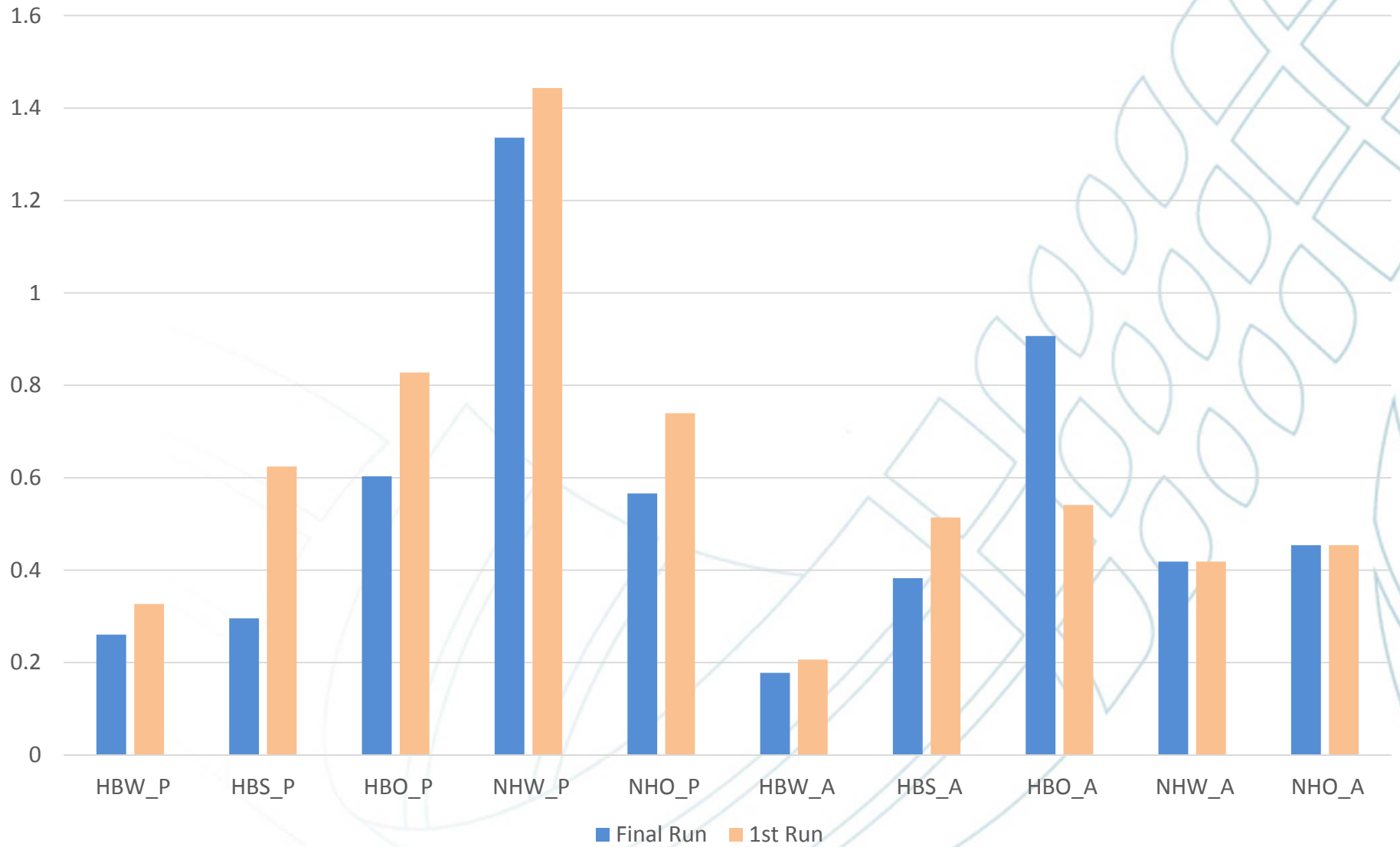
Super District	Productions			Attractions		
	HBW	HBS	HBO	HBW	HBS	HBO
Inner	-5%	-26%	-21%	7%	-25%	-9%
Middle	-15%	8%	6%	-16%	15%	10%
Outer	13%	24%	46%	1%	-8%	31%
County	-4%	3%	10%	7%	-1%	-12%

Final Run

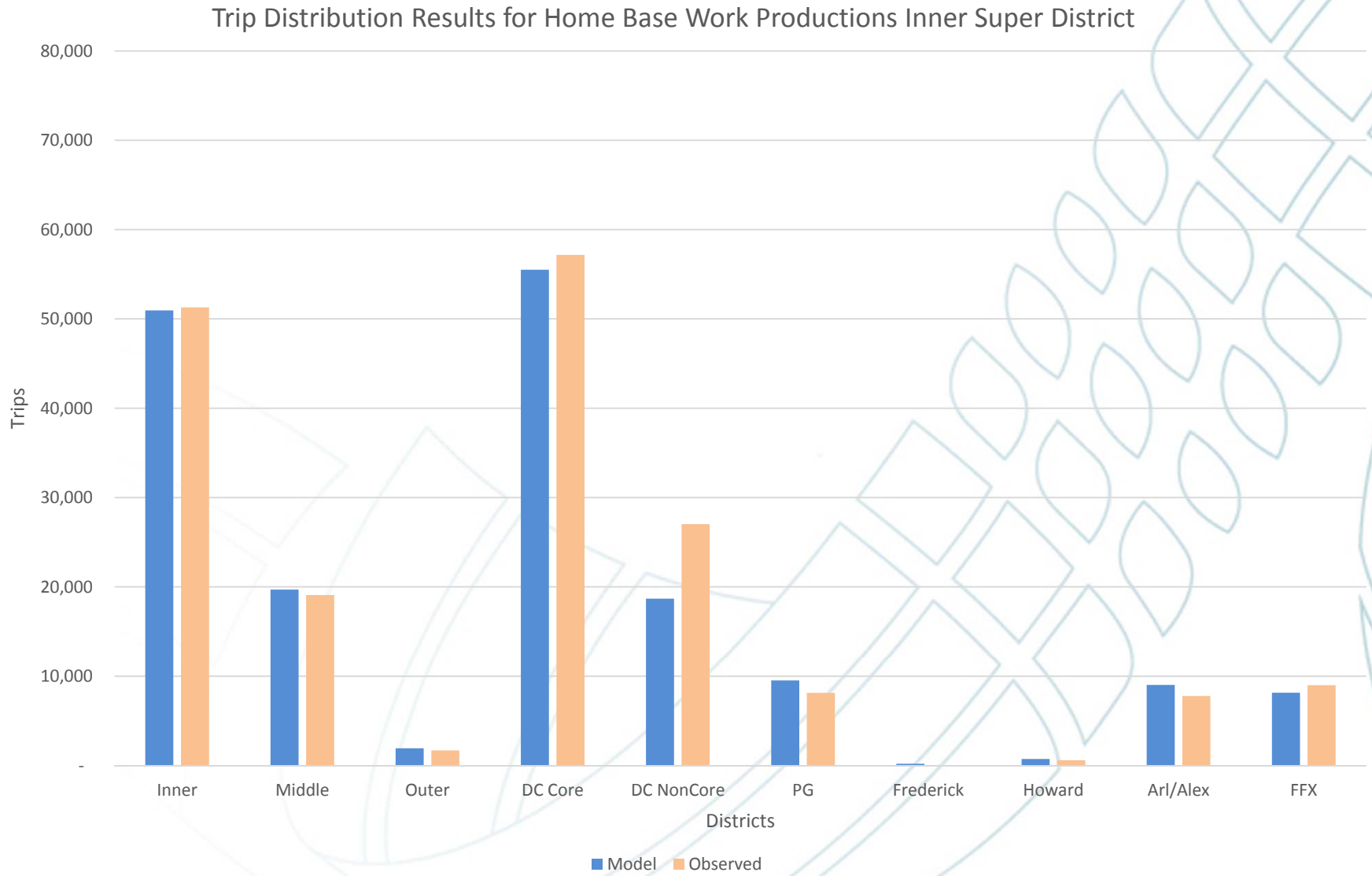
Super District	Productions			Attractions		
	HBW	HBS	HBO	HBW	HBS	HBO
Inner	-2%	-9%	-8%	2%	-12%	29%
Middle	-14%	2%	9%	-13%	-18%	-38%
Outer	10%	18%	43%	3%	-8%	24%
County	-4%	3%	10%	7%	-1%	-12%

Trip Generation Redistribution

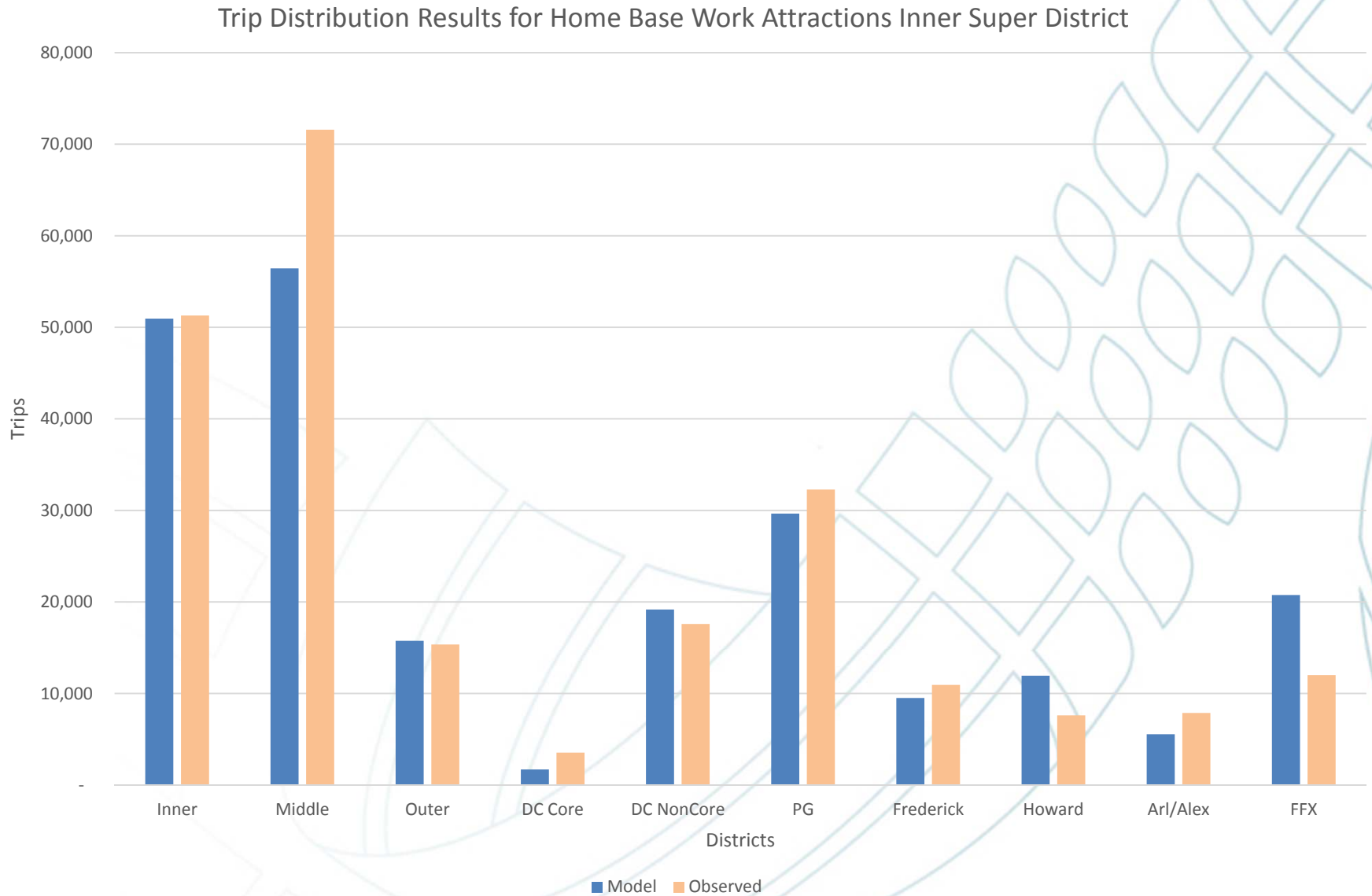
Trip Generation Composite Score



Trip Distribution (HBW)

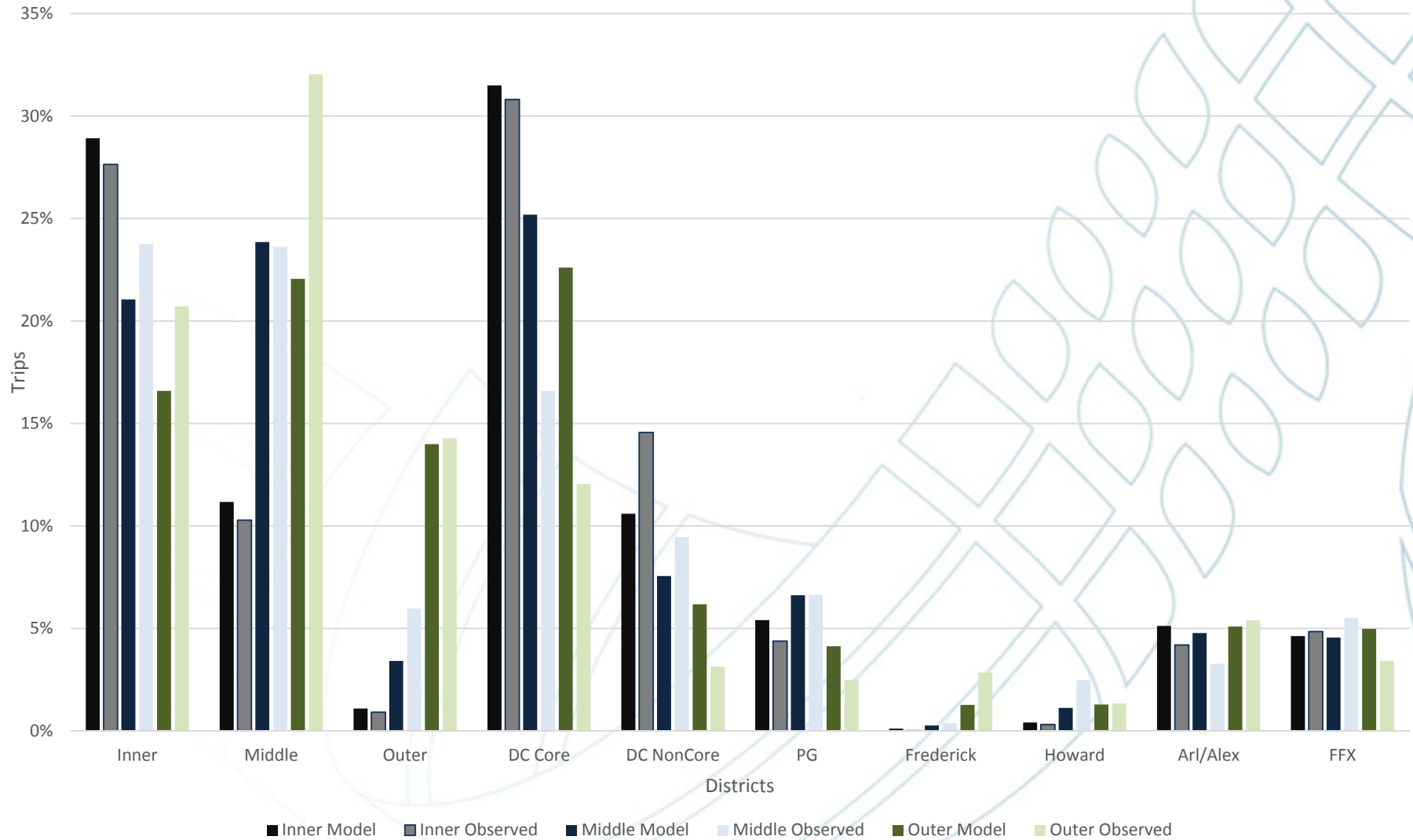


Trip Distribution (HBW)



Trip Distribution (HBW)

Trip Distribution Results for Home Base Work Productions Super District

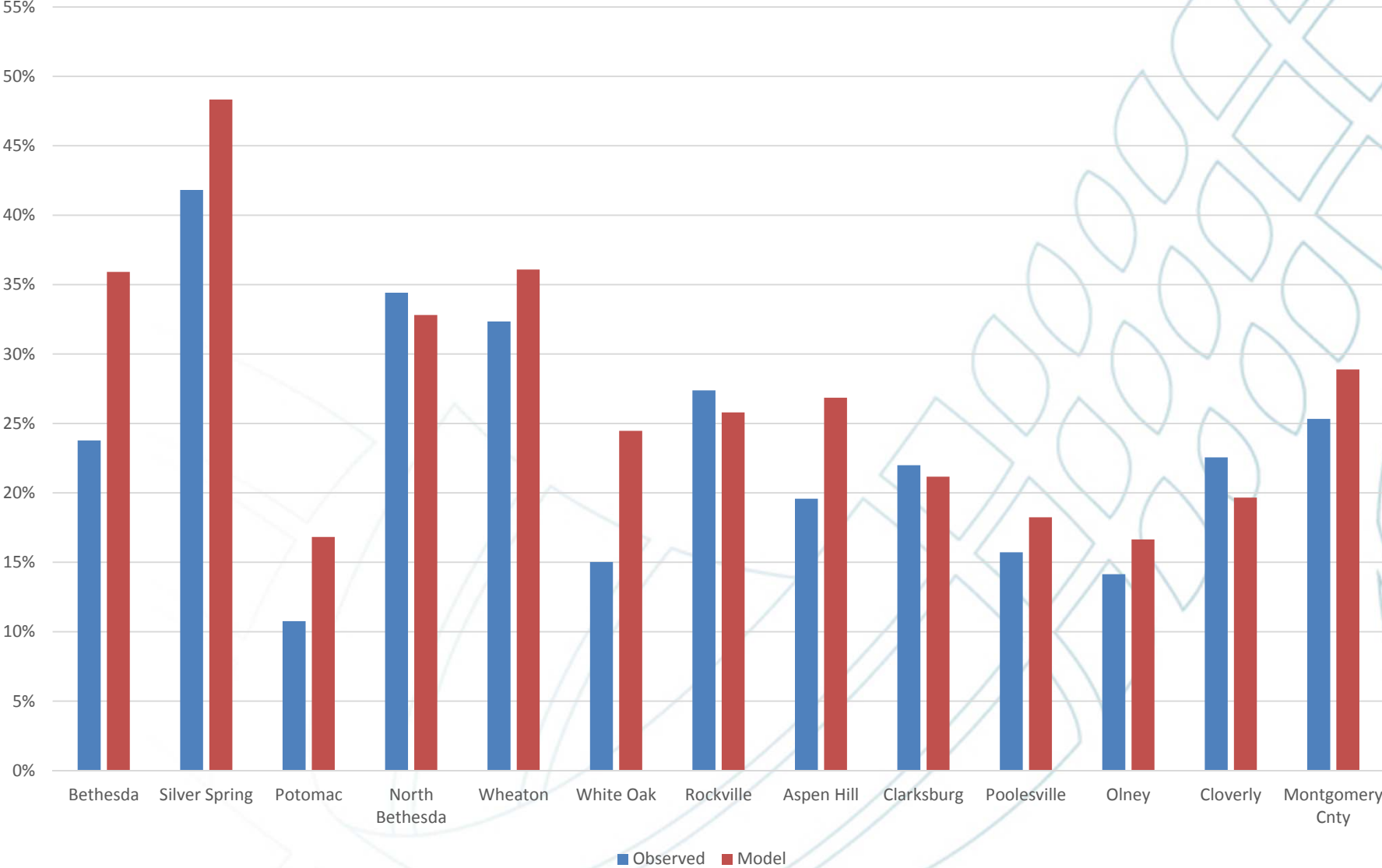


Mode Share

	HBW				HBS				HBO			
Percent Transit	Productions		Attractions		Productions		Attractions		Productions		Attractions	
District	Observed	Model	Observed	Model	Observed	Model	Observed	Model	Observed	Model	Observed	Model
Bethesda	24%	36%	26%	35%	1%	1%	0%	3%	3%	5%	3%	7%
Silver Spring	42%	48%	36%	36%	3%	3%	2%	4%	6%	9%	7%	8%
Potomac	11%	17%	9%	5%	0%	0%	3%	1%	1%	1%	0%	1%
North Bethesda	34%	33%	16%	14%	1%	2%	1%	2%	3%	4%	4%	3%
Wheaton	32%	36%	16%	14%	1%	2%	6%	1%	5%	5%	2%	3%
White Oak	15%	24%	8%	6%	2%	1%	1%	1%	3%	2%	2%	1%
Rockville	27%	26%	7%	9%	1%	1%	1%	1%	5%	3%	2%	2%
Aspen Hill	20%	27%	7%	7%	2%	1%	1%	1%	4%	2%	1%	1%
Clarksburg	22%	21%	5%	5%	1%	1%	1%	1%	3%	2%	2%	1%
Poolesville	16%	18%	5%	1%	1%	0%	0%	0%	1%	1%	0%	0%
Olney	14%	17%	2%	1%	1%	0%	1%	0%	1%	0%	1%	0%
Cloverly	23%	20%	5%	2%	0%	0%	0%	0%	2%	1%	0%	0%
Montgomery Cnty	25%	29%	16%	17%	1%	1%	1%	1%	4%	3%	3%	3%

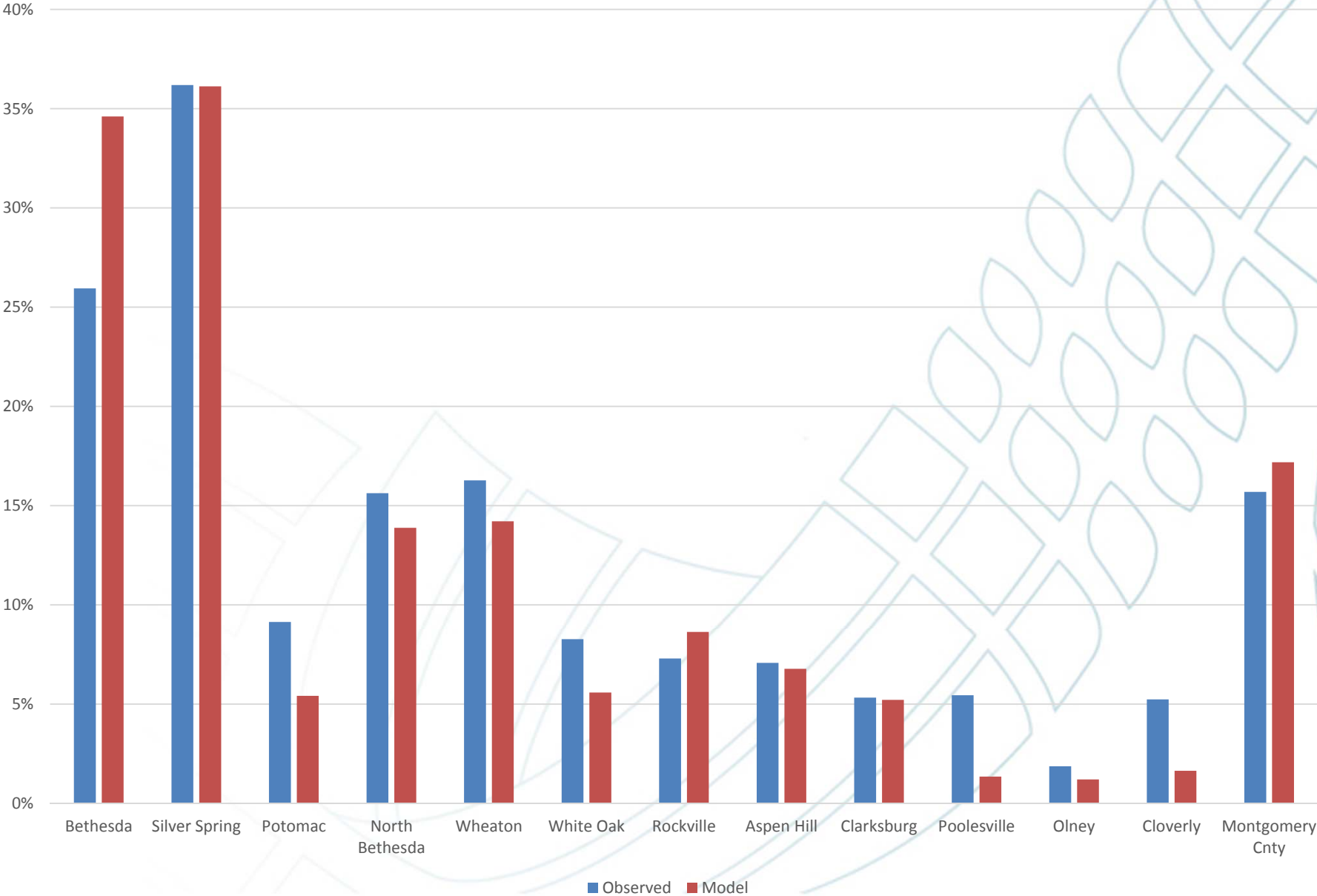
Mode Share

HBW Productions Transit Mode Share

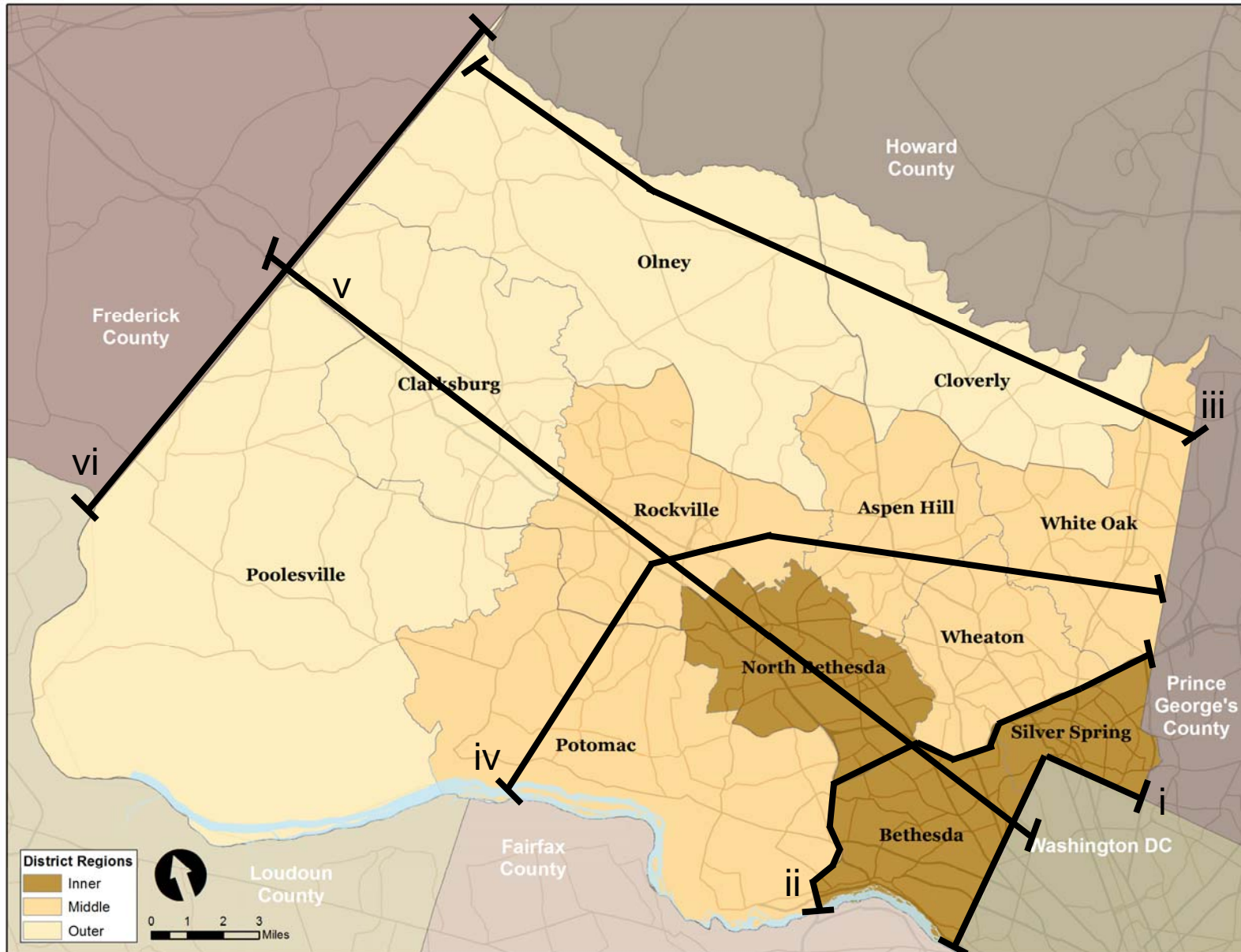


Mode Share

HBW Attractions Transit Mode Share



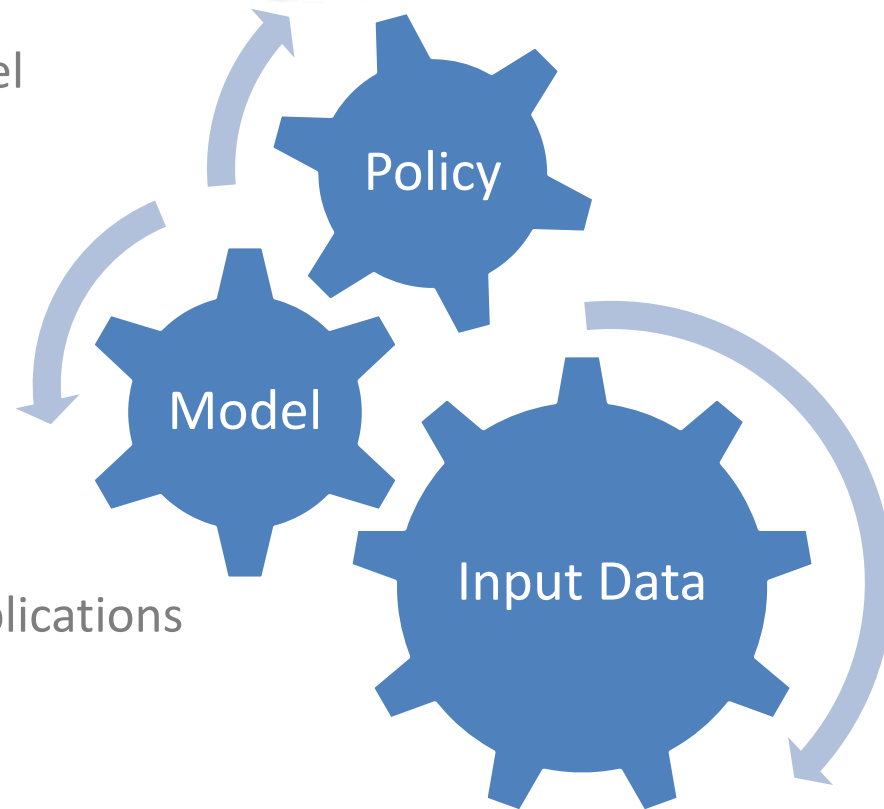
Assignment Highway Screenlines



Assignment (On-Going)

- Compare Transit and Highway Volumes
- Aggregate Level (Countywide)
 - VMT by Facility Type
 - All Highways $\pm 5\%$
 - Freeways $\pm <10\%$
 - Major Arterials $\pm <20\%$
 - Transit Boardings by Mode
 - Segmented Beltway
 - CBD & TOD Areas
- Disaggregate Level
 - Screenlines RMSE
 - Total Work Trips $\pm 15\%$
 - Cutlines match Standard for Deviation in NCHRP 765

- ✓ Good Use of Regional Resources
- ✓ County Application Linked to Regional Model Feasible
- ✓ Good Starting Point for Model Development
- ✓ Understand Client's Needs
- ✓ Client's Objectives and Goals
- ✓ Focus on Tool's Required Applications



Next Steps

- Data Collection and Support – County HTS
- Linkage to Sector Plans Needs
- Increase Area and Facility Types
- Population Synthesizer



Questions



vhb