

Next-generation travel demand forecasting model for the TPB

Current plans for development (Phase 2 of the Strategic Plan)

Mark S. Moran
Manager, Models Development, COG/TPB staff

TPB Travel Forecasting Subcommittee
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Outline

- Background
 - Strategic plan for improving the TPB travel model
 - Model naming conventions
- Phase 2 of strategic plan: Devel. of NextGen model
 - Contracting issues
 - Plan for consultant procurement
- Modeling approaches to be considered
 - Trip-based, tour-based, activity-based, hybrid models
- Timeline
- Expected budget
- Next steps



Strategic plan for improving the TPB travel model

- Three reports (10/15/15):
 1. Identifying Potential Opportunities for Model Improvement;
 2. Status of Activity-Based Models and Dynamic Traffic Assignment at Peer MPOs;
 3. **Strategic Plan for Model Development**

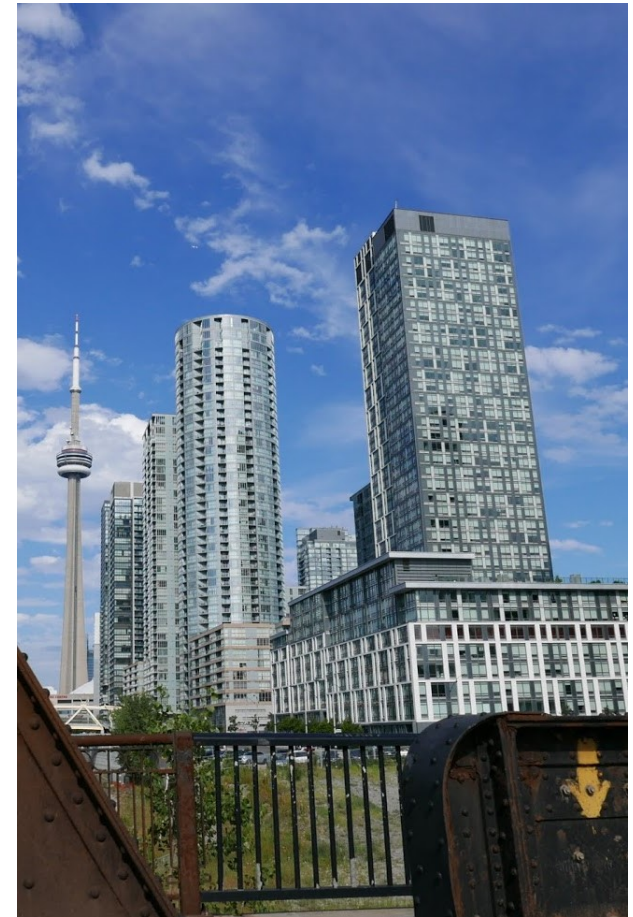


Image credit: Mark Moran



Strategic plan for improving the TPB travel model

- Strategic plan, 3 phases over 7 years

	Description	Fiscal Years
1	Updates to the existing four-step model (FSM)	2016-2017
2	Development of an ABM with existing data	2018-2020
3	Development of an ABM with new data *	2021-2022

* New household travel survey currently underway; To be ready for use in FY 20.



Strategic plan for improving the TPB travel model

- Phase 1: Updates to the existing FSM
 - End of FY 17, CS delivered proposed Ver. 2.5 travel model, with four main updates
 - Updated transit path-building software: TRNBUILD > Public Transport (PT)
 - Improved non-motorized model
 - Simplified mode choice model
 - Transit choice set reduced from 11 to 3 modes
 - Highway & transit assignment enhancements
 - Highway assignment: Uses 3 value-of-time stratifications
 - Transit assignment: Includes transit sub-mode choice, which used to be represented in mode choice model



Strategic plan for improving the TPB travel model: **Proposed revisions**

- Phase 1: Ver. 2.5 travel model
 - **One year added** to schedule for testing & sensitivity analyses
- Phase 2: **NextGen** model, estimated w/ existing data
 - Start **delayed** by one year (FY 18 => FY 19)
 - Still planned as a 3-year project
 - Development to be guided by product requirements document (PRD)
 - Could be trip-based, tour-based, activity-based, or hybrid of these
- Phase 3: **NextGen2** model, estimated w/ **new** data
 - Start **delayed** by one year (FY 21 => FY 22)
 - Still planned as a 2-year project



Strategic plan for improving the TPB travel model: **Proposed revisions**

- Strategic plan, 3 phases over **8** years

	Description	Fiscal Years
1	Updates to the existing four-step model (FSM)	2016-201 <u>8</u>
2	Development of <u>NextGen</u> model with existing data	201 <u>9</u> -202 <u>1</u>
3	Development of <u>NextGen2</u> model with new data *	202 <u>2</u> -202 <u>3</u>

* New household travel survey currently underway; To be ready for use in FY 20.



Model naming conventions

Model Type*	Name	Unit of Analysis	Version Num.	Strategic Plan	Estimation Data**
Production	TPB TDFM, Gen. 1	Trip-based	2.3.70	N/A	Existing
Developmental	TPB TDFM, Gen. 2	Trip-based	2.5	Phase 1	Existing
Devel., NextGen	TPB TDFM, Gen. 3	Trip-, tour-, or activity-based? Hybrid?	3.0	Phase 2	Existing
Devel., NextGen2	TPB TDFM, Gen. 4	Trip-, tour-, or activity-based? Hybrid?	4.0	Phase 3	New

* Model Type: Production or developmental model

** Estimation Data:

Existing data = 2007/2008 COG Household Travel Survey and transit on-board surveys;

New data = 2017/2018 COG Household Travel Survey and transit on-board surveys
(expected to be ready for model estimation in 2019 or 2020);



Focus of this presentation

- Phase 2 of the strategic plan
 - NextGen model, estimated w/ existing data
 - Also known as TPB TDFM, Gen. 3, or Ver. 3.0

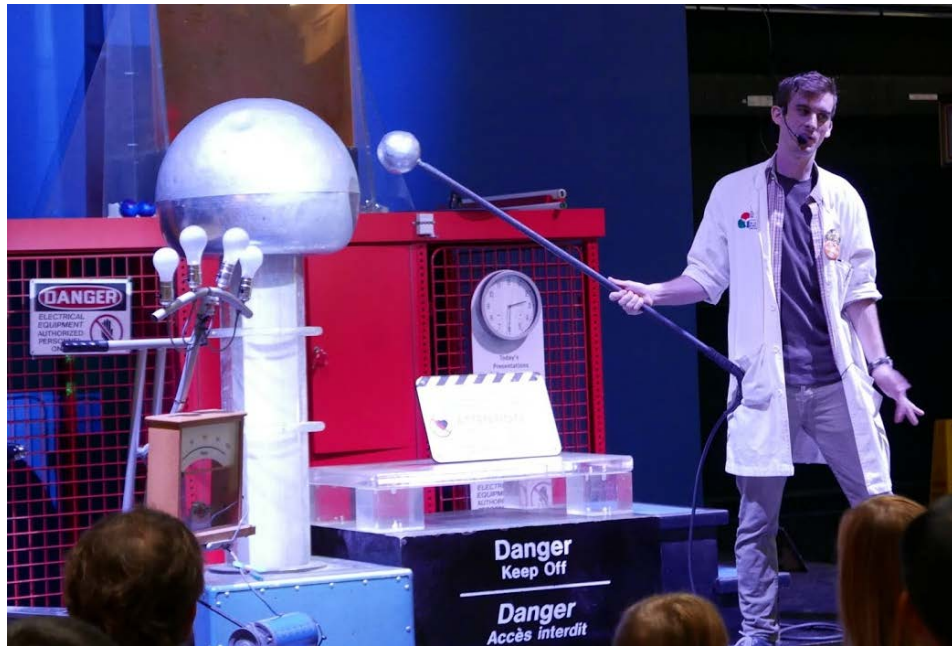


Image credit: Mark Moran



Contracting

- Ways to solicit bids from vendors
 - Request for quotes (RFQ)
 - Request for proposals (RFP)
 - Request for information (RFI)/Request for qualifications (RFQ)
- Historical approach use for TPB's on-call model development contractor: RFP
- Plan for NextGen model: RFI & RFP
 - Rationale



Plan for procuring consultant assistance w/ NextGen model (1)

- RFI
 - Includes a Product Requirements Document (PRD)
 - PRD would be reviewed by TFS
 - Provides an opportunity for vendors to propose solutions based on the PRD, and for a dialog between COG and vendors about proposed solutions
 - Planned advertisement period: 20 business days (ca. 1 mo.)
 - TPB staff will choose preferred modeling approach (e.g., model type A, B, or C)



Plan for procuring consultant assistance w/ NextGen model (2)

- RFP
 - Includes a scope of work (SOW), based on PRD and chosen modeling approach
 - May be presented to TFS, but all questions will go to COG contracting office, to assemble Q&A addendum to RFP
 - Planned advertisement period: 22 business days (ca. 1 mo.)
 - Pre-bid conference about 10 days after release of RFP



Modeling approaches considered (1)

- Product requirements document (PRD) will specify the specifications needed in NextGen model, but not the model form per se
 - Some examples listed on slides 16-18 of 11/17/17 presentation to TFS
- Model form: We are open to a variety of model forms, provided they satisfy the PRD
 - Trip-based
 - Tour-based
 - Activity-based
 - Hybrid of these

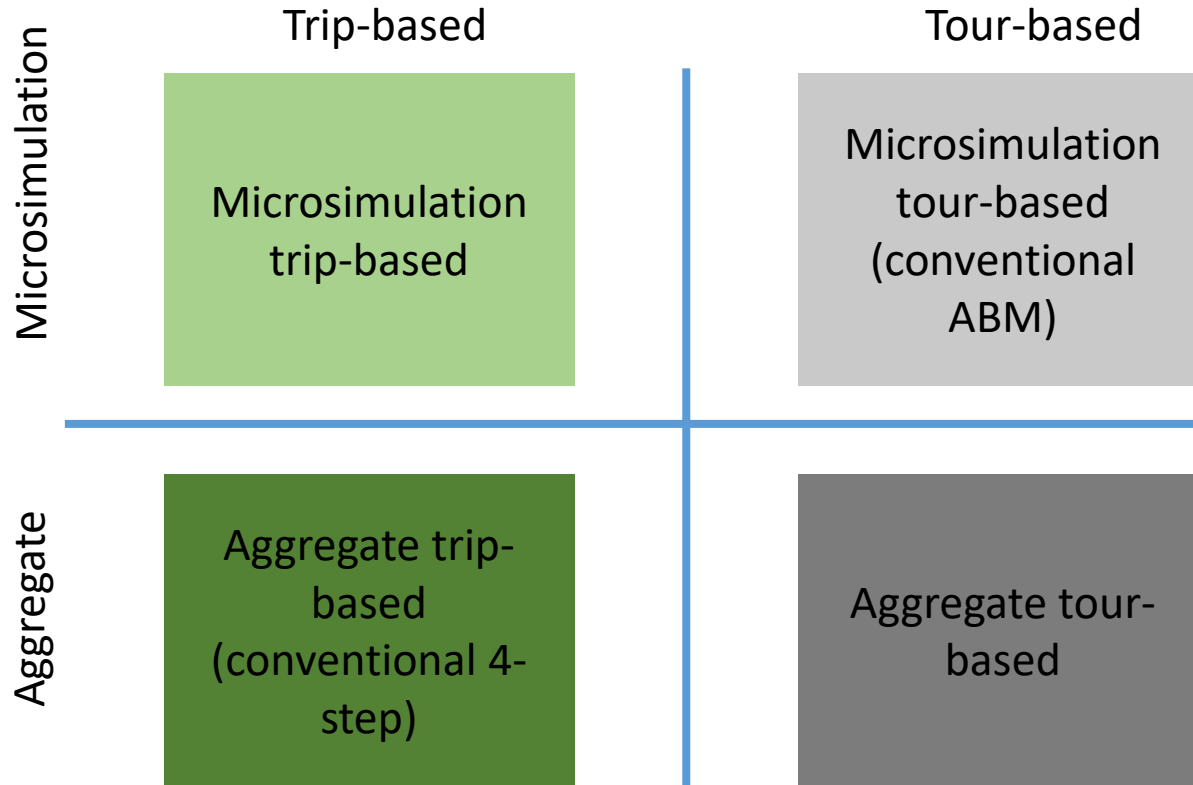


Modeling approaches considered (2)

- Most TFS members are familiar with trip-based and activity-based models, but fewer may be familiar with hybrid models
 - Slide 6 of my 11/17/17 TFS pres. compared TBM & ABM
- Thus, it might be instructive to discuss some concepts about hybrid travel demand models, which were the subject of an interesting presentation at the TRB Annual Meeting
 - Vyas, Gaurav. “Comparison of Hybrid 4-Step and Activity-Based Models.” presented at the Transportation Research Board 97th Annual Meeting, January 7-11, 2018, Washington, D.C., January 10, 2018.



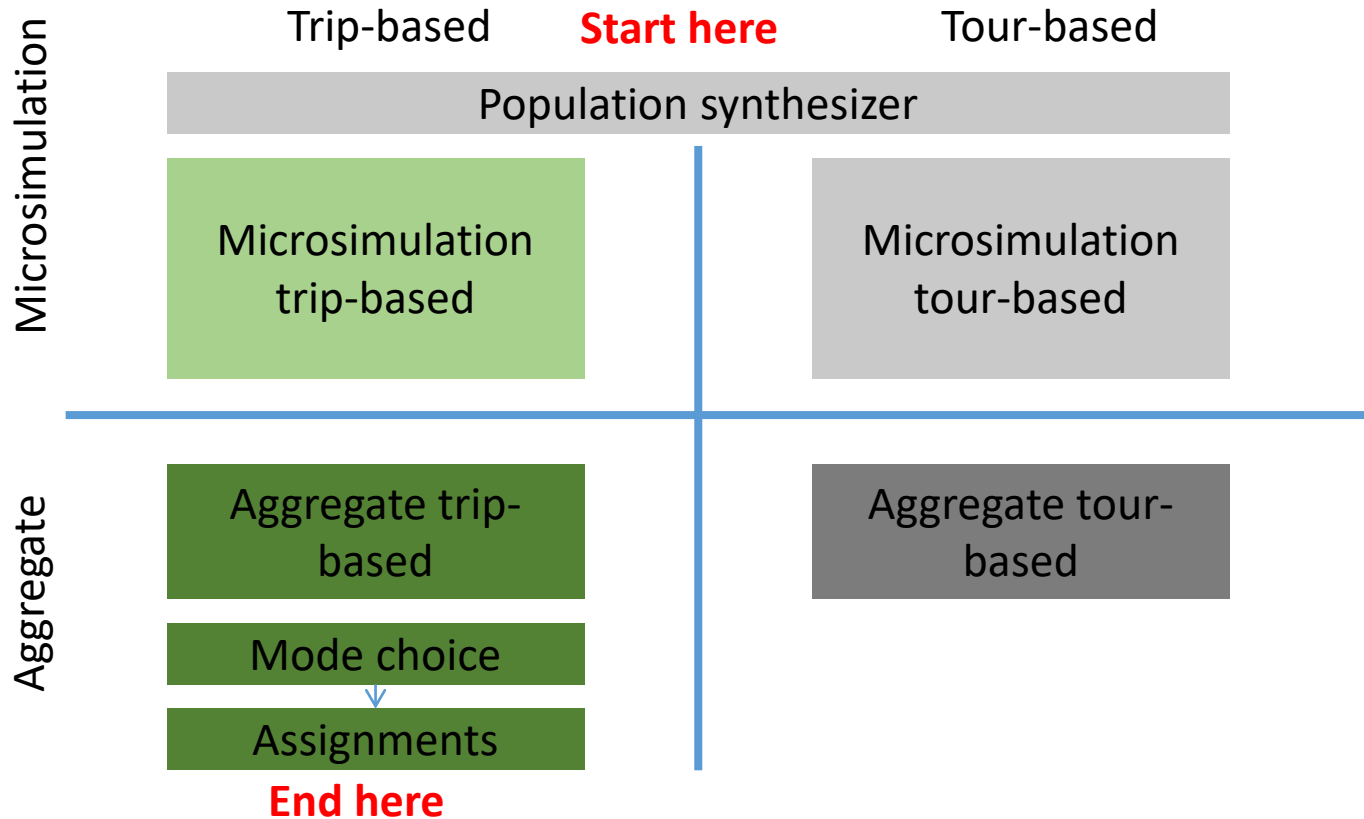
General classification of travel demand models



Source: Vyas, Gaurav. "Comparison of Hybrid 4-Step and Activity-Based Models." presented at the Transportation Research Board 97th Annual Meeting, January 7-11, 2018, Washington, D.C., January 10, 2018.



Variations on hybrid model (1)

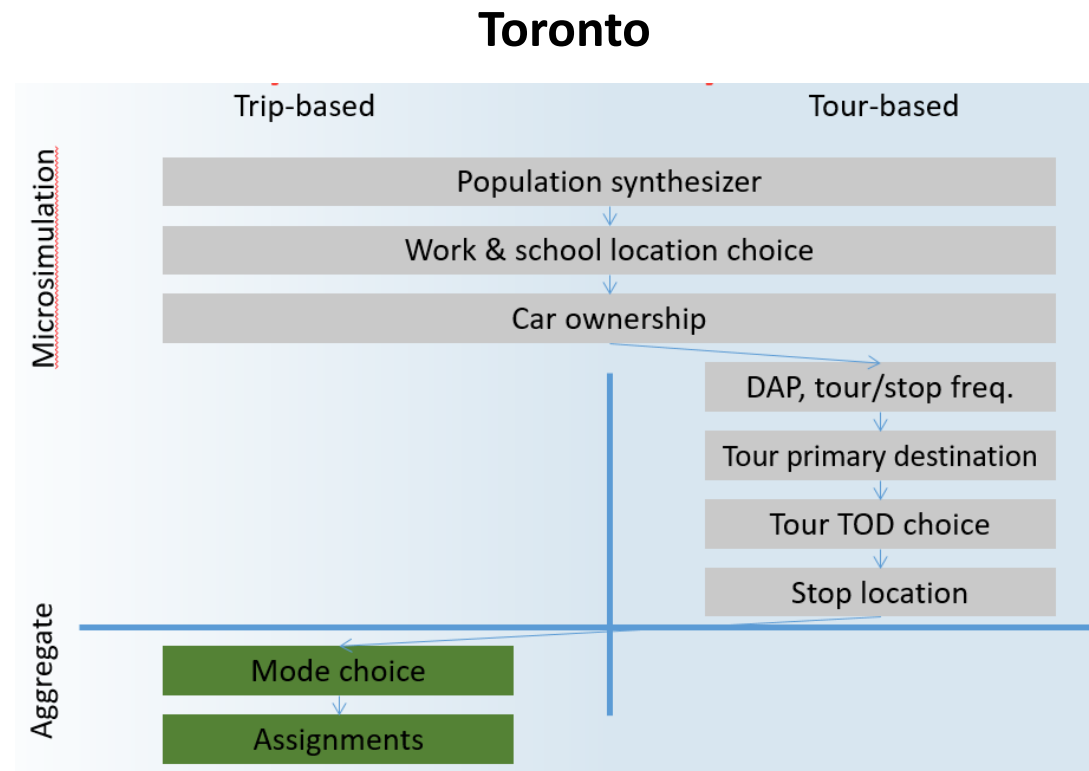


Source: Vyas, Gaurav. "Comparison of Hybrid 4-Step and Activity-Based Models." presented at the Transportation Research Board 97th Annual Meeting, January 7-11, 2018, Washington, D.C., January 10, 2018.



Variations on hybrid model (2)

- TRB presentation gives examples of three hybrid models
 - Light trip-based hybrid (Jerusalem)
 - Light tour-based hybrid (Ottawa)
 - Heavy tour-based hybrid (Toronto)



Source: Vyas, Gaurav. "Comparison of Hybrid 4-Step and Activity-Based Models." presented at the Transportation Research Board 97th Annual Meeting, January 7-11, 2018, Washington, D.C., January 10, 2018.

Current proposed timeline: Overview

Step	Date(s)
Request for Information (RFI)	Jan. to Apr. 2018
Request for Proposals (RFP)	May to Jul. 2018
Vendor selection	Jul. 2018
Start of contract	Aug. 2018
Investigations (consultant)	Aug. to Nov. 2018
Decisions (TPB staff)	Nov. to Dec. 2018
Development and implementation of NextGen model	Dec. 2018 to Mar. 2020
Testing, sensitivity analyses, and updates	Mar. 2020 to Jun. 2021
Final decision: Is NextGen model ready for use?	Jun. 2021
End of contract	Jun. 2021



Current proposed timeline (1)

- RFI
 - Write PRD & RFI (Jan. – Feb. 2018)
 - Review by TFS (10 days, early Mar.; TFS, Mar. 23)
 - Advertise RFI & PRD (20 days, Mar. – Apr.)
 - Vendor responses due (mid-Apr.)
 - TPB staff review of responses (10 days, late Apr.)



Current proposed timeline (2)

- RFP
 - Write SOW & RFP (early May)
 - Present to TFS (mid-May). Questions to COG contracting office
 - Advertise RFP (22 days, Jun. – Jul.)
 - Pre-bid conference (Mid-Jun.)
 - Vendor bids due (early Jul.)



Current proposed timeline (3)

- Vendor selection (Jul. 2018)
 - Form Technical Selection Committee (TSC)
 - TSC reviews bids and selects vendor
- Develop contract (Jul. to Aug.)



Image credit: Mark Moran



Current proposed timeline (4)

- Contract start (early Aug. 2018)
- Investigations by consultant (4 mon., Aug. – Nov.)
- Decisions by TPB staff (15 days, Nov. – Dec.)
- Development of NextGen travel model by consultant (16 mon., Dec. 2018 – Mar. 2020)
 - Data collection for NextGen2 model?
- Consultant delivers NextGen model to TPB staff (Mar. 2020)
- Testing & sensitivity analyses by TPB staff (12 mon., Mar. 2020 – Feb. 2021)



Current proposed timeline (5)

- Updates to NextGen model based on testing (2 mon., Feb. 2021 – Apr. 2021)
- Testing of revised model by TPB staff (2 mon., Apr. – Jun.)
- Decision point: Is model ready for production use? (Jun. 2021)
- Close of contract (Jun. 2021)



Expected budget

- It is expected that there will be a funding level of \$300k per year for each of three years.
- Total across three years: \$900k.



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Next steps

- TPB staff, working w/ COG contracting office, write PRD & RFI
- TFS review of PRD in March
- Develop SOW & RFP
- Advertise RFP (Jun.)
- Select vendor (Jul.)
- Begin contract (Aug.)

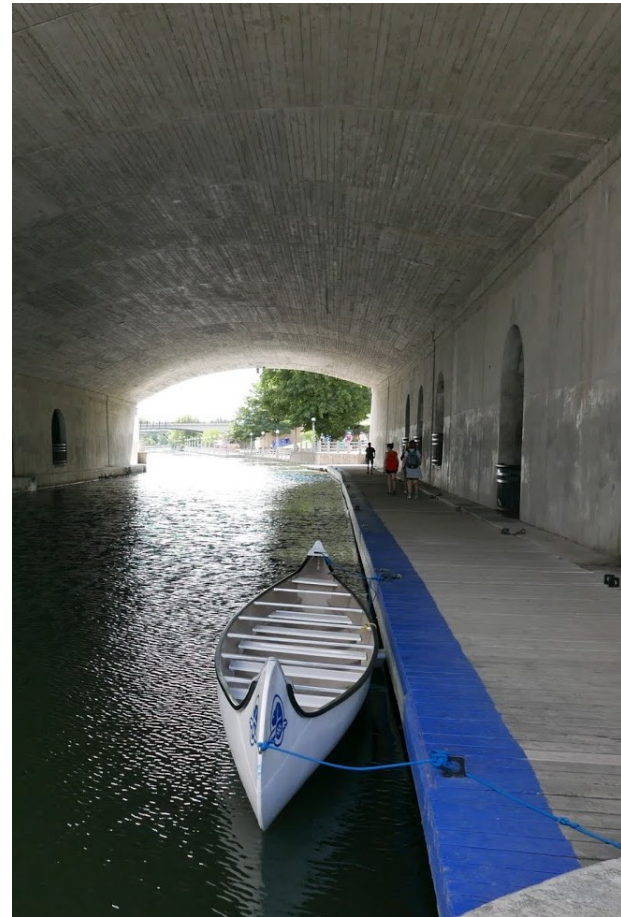


Image credit: Mark Moran



Acknowledgements

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Mark S. Moran

Manager, Models Development, COG/TPB staff

(202) 962-3392

mmoran@mwkog.org

mwkog.org/TPB

Metropolitan Washington Council of Governments

777 North Capitol Street NE, Suite 300

Washington, DC 20002

