WORK PROGRAM

IMPROVING PEDESTRIAN VARIABLES IN
THE TRAVEL DEMAND MODEL

MARCH 4, 2021

Proposed Motion

The Boston Region Metropolitan Planning Organization (MPO) votes to approve this work program.

Project Identification

Unified Planning Work Program (UPWP) Classification
Boston Region MPO Planning Studies and Technical Analyses

Project Number 13302

Client
Boston Region MPO

Project Supervisors
Principal: Marty Milkovits
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Funding Source
MPO 3C Contract #112310

Schedule and Budget

Schedule: 16 weeks after work commences

Budget: $25,000
Schedule and budget details are shown in Exhibits 1 and 2, respectively.

Relationship to MPO Goals

The Boston Region MPO elected to fund this study with its federally allocated metropolitan planning funds during federal fiscal year (FFY) 2021. The work completed through this study will address the following goal areas established in the MPO's Long-Range Transportation Plan: safety, clean air and clean communities, transportation equity, and economic vitality.

Background

The pedestrian environment is important to understand for travel demand modeling, particularly how walking and biking trips function and how those trips connect to transit. The Central Transportation Planning Staff's (CTPS) regional travel demand model uses a variable known as the pedestrian environmental variable (PEV) as a metric to represent the quality of the pedestrian environment. The purpose of this research is to update and evaluate enhancements to the current PEV to include more built environment factors, bicycle environment factors, and other land use attributes that influence nonmotorized travel behavior.

The current PEV is composed of three elements: pedestrian level of service (PED LOS), sidewalk infrastructure (PEVsw), and truck routes (TrRt2STA). The three elements are combined into one pedestrian environmental value metric with the shares of 70 percent PED LOS, 20 percent PEVsw, and 10 percent TrRt2STA by reference to the Florida model:

- PED LOS is computed using the available pedestrian level of service information in the transportation analysis zone (TAZ).
- PEVsw is measured based on the proportion of roadways with sidewalks in the TAZ.
- TrRt2STA is calculated based on the proportion of all road segments in a TAZ that are state-designated truck routes.

There are several other built environment attributes not represented by the current PEV measures. People are highly likely to bike when there are biking trails or facilities available.Transit stations within walking and biking range and with good facilities would promote walking and biking trips and a better pedestrian environment. Higher local roadway density, intersection density, and a mix of land uses may stimulate more pedestrian travel. Also, the existence of parks and recreational space encourages people to make more trips by walking and biking. Neighborhoods with low vehicle crash and crime rates are more comfortable places for nonmotorized trips.

Objectives

The goal of this work is to develop new PEV metrics that allow CTPS's regional travel demand model to accurately reflect walking and biking travel behavior in the modeling process. The upgraded PEV metrics would stimulate in the modeling process how people react to the built environment in terms of their vehicle ownership and mode choice selection. There are three specific objectives to incorporate the upgraded PEV metrics into the regional travel model:

1. Represent details of the built environment across the region that influence the propensity to use nonmotorized modes (walking and biking) for the entire trip or for transit access and egress.

These details are not well represented in the regional model roadway network because many local streets and the walking and biking conditions (e.g. sidewalk presence and bike lane extent) are not represented.

Important details (some of which are in the current PEV) might include the following:

- Traffic volume
- Person throughput by mode
- Walking and biking trails
- Bike lanes and cycle tracks
- Parks and recreational space
- Roadway (by facility type or traffic), intersection density, and sidewalk density
- Land use mix and density (of the built area rather than zone)
- Transit accessibility and station (commuter rail, rapid transit, and bus) availability
- Safety (crash or crime rates)
- Zoning (residential, commercial, and industrial)
- Truck routes

2. Understand how well the current PEV represents walking and biking environments and how the metric agrees with or differs from the pedestrian and bicycle report cards produced by CTPS.

3. Formulate this representation as a variable or set of variables for use in the regional travel demand model within the mode choice component.

Work Description

Task 1 Internal coordination

CTPS will coordinate a group of internal stakeholders to understand complementary work, resource constraints, and potential approaches to evaluating and enhancing measures for the pedestrian and bicycling environment.

Task 2 Update and analyze the existing PEV metric

The current PEV is calculated based on model networks in which the local roads are not well represented. The latest road inventory files (RIF) will be used in the program for computing the PEV.

Subtask 2.1 Utilize complete set of latest roadway and sidewalk data from RIF

CTPS will make use of the data items from the latest RIF and prepare the data for computing the current PEV.

Subtask 2.2 Update the current PEV components of pedestrian LOS, sidewalk infrastructure, and truck routes

CTPS will calculate the three components that are identified in the current PEV metric using the latest RIF data.

Products of Task 2

The products of this task will be the results of the current PEV that are represented by the three components of pedestrian LOS, sidewalk infrastructure, and truck routes.

Task 3 Evaluate the biases and limitations of the existing formulation

The updated current PEV will be evaluated by checking its correlation to the pedestrian report card score and the recent household survey and/or other available observations of walking and biking activity.

Subtask 3.1 Compare correlation of metrics to pedestrian and bicycle report card findings

CTPS will compare the resulting PEV, based on the RIF, to the pedestrian report card score and summarize the findings.

Subtask 3.2 Compare correlation of metric to observed walking and biking activity

CTPS will compare the resulting PEV, based on the RIF, to the pedestrian behavior observed from the recent household survey and/or other available observations of walking and biking activity.

Subtask 3.3 Examine cases where correlation is weakest

CTPS will identify the areas where the PEV contradicts data in report cards and observed activity. These cases may indicate that the PEV should be enhanced with other variables.

Products of Task 3

CTPS will produce tables and figures to show the correlation between the current PEV and data from the pedestrian report card score and the observed walking and biking trips from the household survey. The areas with mismatched correlation will be highlighted in a map. These results will be for internal review.

Task 4 Identify feasible enhancements to the PEV

CTPS will identify feasible enhancements to the PEV based on the limitations of the current PEV formulation identified in Task 3, data availability, and forecastibility.

Subtask 4.1 Identify key variables to describe walking and biking environment

CTPS will examine potential variables, including those listed in the objectives above, and test the correlation to the limitations of the current PEV to explain pedestrian and bicycling activities.

Subtask 4.2 Describe forecasting approach to produce these variables for scenarios

CTPS will explain the feasibility of forecasting each new variable for inclusion in the enhanced PEV metric. All variables must be produced reasonably for future scenarios in order to be useful for travel demand modeling applications.

Subtask 4.3 Coordinate with mode choice estimation to incorporate variables into the walking and biking utilities

As part of a separate effort, CTPS will incorporate the enhanced PEV in the mode choice model formulation. This work will support that effort through data preparation and the explanation of expected model response.

Products of Task 4

The final products will be internal documentation of the feasible enhancements to the PEV, explaining how the new variables could be modified to represent different scenarios, and an initial formulation for use in mode choice estimation.

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Exhibit 1
ESTIMATED SCHEDULE
Improving Pedestrain Variables in the Travel Demand Model

Task	Month			
	1	2	3	4
1. Internal coordination	░	░	░	░
2. Update and analyze existing metric	░			
3. Evaluate biases and limitations		░		
4. Enhancement and incorporation				░

Exhibit 2
ESTIMATED COST
Improving Pedestrain Variables in the Travel Demand Model

Direct Salary and Overhead								$25,009

Task	Person-Weeks					Direct Salary	Overhea (106%)	Total Cost
	P-5	P-4	P-3	P-2	Total			
1. Internal coordination	0.8	0.0	0.0	0.2	1.1	$1,820	$1,930	$3,750
2. Update and analyze existing metric	0.4	0.0	0.0	1.4	1.8	$2,216	$2,349	$4,566
3. Evaluate biases and limitations	0.9	0.1	0.0	2.0	3.0	$3,934	$4,170	$8,104
4. Enhancement and incorporation	1.2	0.1	0.0	1.8	3.0	$4,169	$4,419	$8,580
Total	3.3	0.2	0.0	5.4	8.9	$12,140	$12,868	$25,000

Other Direct Costs	$0

TOTAL COST	$25,000

Funding

MPO §5303 Planning Contract #112310