Local Access Scores:
Active Transportation Network Utility Scores
Technical Documentation

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Abstract

Many public agencies across the country are eager to expand pedestrian and bicycle facilities or implement accessibility improvements to create more complete streets, but limited budgets force them to make tough choices about what to prioritize. Metro Boston's regional planning agency, the Metropolitan Area Planning Council, piloted a new method for creating Active Transportation Network Utility Scores to assist with these decisions, in a project called Local Access. Unlike many existing prioritization methods based on the *proximity* of street segments to important destinations, the Local Access approach ranks roadways based on their *connectivity* between specified origins and destinations. We use a simplified four-step travel demand model for four trip purposes (school, shopping/restaurants, parks, walk to transit) to estimate latent demand, expressed as the relative volume of pedestrian or bicycle trips likely to utilize each road segment, if safe and comfortable pedestrian and bike facilities were available. The model uses census blocks as analysis zones, which results in a high level geographical resolution adequate for local planning efforts. The resulting eight scores—one for each mode and trip type—are weighted and combined into a composite Local Access Score. Scores have been calculated for each roadway segment in Massachusetts. Planners and municipal staff can use the results, publicly available through a web map, in conjunction with information on current facilities, crash incidents, cost, and feasibility to set their priorities for bicycle and pedestrian infrastructure projects. The results have already been used by MAPC and others to guide multiple municipal bicycle and pedestrian plans, and are also informing statewide pedestrian planning.

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Introduction

From the federal level to individual cities and towns, there are an increasing number of policies promoting the creation and maintenance of "complete streets," which provide safe and convenient connections for pedestrians and bicyclists. Despite widespread interest in such infrastructure, the financial resources available to build sidewalks, bike lanes, and cycle tracks remain limited, making it essential to focus investments on roadways with the maximum benefits for safety, mode shift, and alternative mobility. Nevertheless, a recent survey of municipal public works officials across Massachusetts concluded that when it comes to infrastructure improvements, constituent requests and professional judgement play a larger role than any quantitative assessment of potential utilization. In response, the Metropolitan Area Planning Council (MAPC, Metro Boston's regional planning agency) set out to create a data-driven method for producing roadway-segment level estimates of latent demand for pedestrian and bicycle facilities, and to make the results available for local planning, infrastructure prioritization, and maintenance activities.

The resulting Local Access Scores provide a relative measure of how important any particular road segment would be for providing a connection for residents from their homes to public schools, shops and restaurants, parks, and transit stations. These trip destinations were selected because of their strong potential for walking and biking, combined with interest from municipal partners in encouraging active transportation in these arenas. The scores were created with a four-step travel demand model, using census blocks as analysis zones for a very high degree of spatial resolution. Scores are available for each trip purpose by two modes—cycling and walking. MAPC also compiled these eight basic scores into two composite scores, bike utility and walk utility, then finally combined these two composite scores into an overall measure of active transportation utility. The resulting total of eleven metrics are available for every street segment across the state of Massachusetts, and have been published in a webmap where the results can be viewed or downloaded.

The Local Access approach complements and improves upon previously existing tools and methods for targeting complete streets infrastructure investments. These tools use a number of inputs—travel speeds, pedestrian counts, crash data, or land use characteristics—to rank roadways or intersections according to where investments should be made first. These tools require some assessment of bicycle and pedestrian demand in order to work successfully. For planning purposes, especially in locations that do not yet have a mature bicycle or pedestrian network, an assessment of latent demand is more helpful than even direct count data, since many of those segments that cyclists and pedestrians avoid today because of poor infrastructure may be precisely the ones that should be targeted for improvement. However, most commonly-used measures of latent demand are based on *proximity* to origins and destinations, not on *connectivity* for potential users. As a result, these measures may overstate the importance of small unconnected roadways near activity centers while underestimating the importance of roadways leading to those activity centers. The Local Access approach seeks to address this deficiency through the use

of transportation modeling methods that produce trips and assign them to specific segments in order to estimate their relative utilization under ideal conditions.

Although a travel demand modeling software package was used to create the Local Access Scores, the scores do not attempt to model real human behavior, either current or projected. Model inputs were based on two major assumptions 1) all existing roadways constitute "complete streets," that are comfortable for cyclists and pedestrians, and 2) this idealized infrastructure would encourage people to walk or bike to local destinations, distance permitting. Essentially, MAPC used travel modelling software to answer the question: If most residents biked or walked via the most direct route to nearby schools, shops, restaurants, parks, and transit stations, which road segments would carry the most trips? To honor the first assumption, current quality and condition of bicycle and pedestrian infrastructure was excluded from the model. Excluding facility quality from the analysis makes it possible to use the scores for planning new facilities in communities that do not yet have bike facilities installed, and may not have sidewalks, crosswalks, or other pedestrian facilities either. If information on current facility quality was included as a guiding factor in route choice, poor bike infrastructure or poor design would contribute to a lower number of trips loading onto certain segments, which could be used as a justification for not investing in those segments. To honor the second assumption, trip generation rates were not based on current bicycle or pedestrian mode shares, but on trips for each purpose by any mode.

So far, Local Access Scores have been used in multiple municipal bicycle and pedestrian planning efforts conducted by both MAPC and consultants. Infrastructure proposals informed in part by these scores recently secured $1.2 million in state funding for construction. The rapid adoption of this new resource demonstrates how much it was needed, and MAPC will continue to maintain and improve the dataset as a resource for Massachusetts municipalities as well as MassDOT, which intends to use the scores in its forthcoming statewide pedestrian plan.

Literature Review

The work presented here is informed by literature and applied tools related to bicycle and pedestrian priority ranking, measures of latent demand, and travel demand modelling, discussed below.

One example of a recent and relatively comprehensive tool for pedestrian and bicycle planning is the ActiveTrans Priority Tool (APT), which assists with data-driven ranking of bicycle and pedestrian infrastructure investments (1). The tool provides users with a spreadsheet-based means of calculating a priority score for a given set of roadways or intersections. A user moves through the tabs on the spreadsheet, inputting quantitative data on safety, equity, compliance, demand, and connectivity for each roadway being considered for improvements. The spreadsheet normalizes these factors and weights them according to their importance to provide an overall ranking. The tool is accompanied by robust documentation with suggestions for quantitative data that could be used as inputs.

Although APT identifies specific inputs for criteria such as safety and ADA compliance, measures of demand and connectivity are much more open-ended. Tool documentation suggests using metrics for connectivity such as intersection density, facility coverage, and whether a segment connects to an existing bicycle or pedestrian facility. The advantage to using these metrics is that they can be calculated easily using GIS. Because they are not network-based, however, they do not actually measure how well a particular road segment connects people with the places they want to go. An area with a denser road network may be more likely to have road segments that connect people more directly with places, but that metric will not allow the user to discern which roads or intersections provide that connectivity. Depending on the scale of the analysis, a dead-end street or side road may receive as high an intersection density score as a neighboring through-street. Regarding demand, the APT documentation suggests metrics such as bicycle or pedestrian counts, population density, employment density, and commercial retail density. According to the guide, "latent pedestrian and bicycle demand can be measured by considering the proximity of pedestrian or bicycle improvement locations to bicycle and pedestrian attractors or generators, such as schools, universities, parks, transit facilities, and mixed-use and high-density land uses." Again, the use of proximity may result in internal or unconnected roadways to have a higher demand score than streets leading to and from those major attractors from other nearby locations.

Perhaps the best-known measure of bicycle and pedestrian latent demand is the Latent Demand Score (LDS) developed by Landis in 1996 (2). The LDS is calculated using trip generation and distribution techniques similar to those used in travel demand modelling. Instead of assigning the trips exchanged between analysis zones to the network, however the participating roadways are treated as the destinations of the trips (3). The advantage to leaving out the mode split and assignment steps is that the scores can be calculated in GIS without using travel demand modelling software. It is perhaps for this reason that the LDS was quickly adopted and continues to be used, often with some modifications, in transportation planning (3). The disadvantage of not assigning trips to the network is that road segments proximate to analysis zones with a large number of trips may appear to be equally viable options, even if one option provides a more direct connection.

The Decatur Community Transportation Plan provides a recent example of how the LDS is still in use (4). The Decatur LDS is based on proximity to the following destinations: schools, parks, employment centers, retail centers, and transit stations. The authors began by estimating a number of trips that people would make to those destinations at .5, 1, 1.5, and 2 mile distances, then applied buffers around each destination. Then for each road segment, they summed the number of trips assigned to buffers that overlap that segment. This means that a road segment that is within a half mile of several important destinations will have a higher LDS than one that is further away from these important destinations.

Such proximity-based analyses of latent demand may not highlight specific road segments that provide the best connectivity, as illustrated in Figure 1. Based on proximity, roadways that lead from a school to an industrial area (B Street), might receive a score as high as the score for D or E Streets, which lead directly from the school to dense residential communities. Furthermore, a dead-end side street like A Street might score higher than important connectors such as D and C Streets.
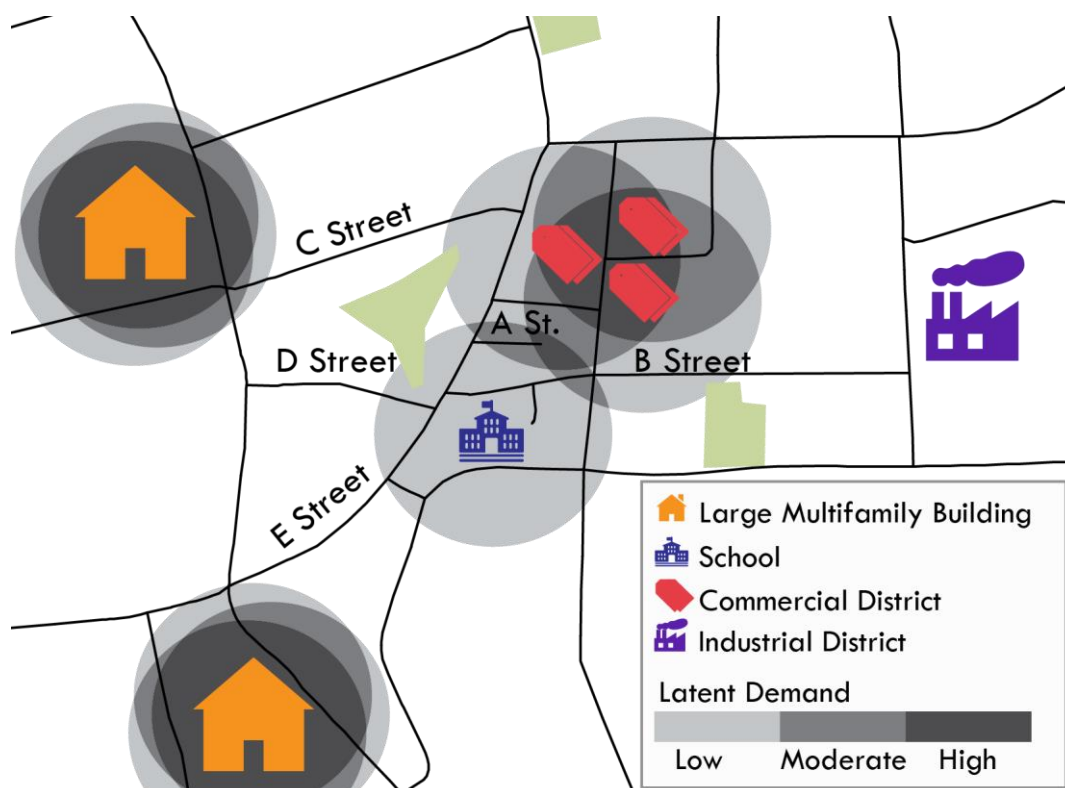

FIGURE 1 Illustration of the buffer-based approach to latent demand.

The "existing facility" inputs into a tool such as APT can draw on a wide variety of measures designed to quantify the quality of bicycle and pedestrian facilities. Bicycle Level of Service (BLOS) is commonly used as a measure of the safety of bicycle facilities. It is primarily based on a number of factors such as effective speed, effective lane width, and pavement condition (5, 6). Another such metric is the Level of Traffic Stress (LTS) scoring methodology is also a networked assessment of bicycle connections (7). This score assesses how well a bicycle facility network currently meets the needs of cyclists by providing connections that less aggressive cyclists would be comfortable using. The score renders certain trips "impassible" for users if any link within that trip rises above a certain "stress" threshold. While measures such as BLOS and LTS provide robust and defensible methods for assessing the geographic accessibility afforded by existing facilities, they do not explicitly incorporate information about the destinations reachable by those facilities or the "opportunity value" of alternative new facilities. Ideally, such level of service measures could be combined with network-based utility measures that would indicate which low-quality segments *could* serve large numbers of users if adequate facilities were available.

The lack of network-based demand and connectivity scores for pedestrian and bicycle planning can be attributed in part to the historically poor representation of those modes in much travel demand modeling. However, travel models have become increasingly adept at incorporating bicycle and pedestrian demand predictions in recent years. Kuzmyak, Walters, Bradley, and Kockelman have recently provided a comprehensive literature review and assessment of the best practices for modeling bicycle and pedestrian demand (8). They report that while traditional travel demand models have either wholly neglected bicycle and pedestrian modes, or have not incorporated them adequately given constraints such as larger, coarser analysis zones, a number of models have begun to rectify these problems. In directing travel demand modeling towards better predicting bicycle and pedestrian trips, many models have increased the number of factors that they incorporate into their mode or route choice estimates (9). These models are primarily intended to achieve the highest level of accuracy for estimating the number of trips taken by pedestrians and cyclists on particular road segment, and are used for a variety of applications, such as arriving at an appropriate value for normalizing bicycle- or pedestrian-involved crashes. One of the approaches featured in Kuzmyak et al's review, the MoPeD approach, took the opposite approach by pairing down the model by eliminating mode choice entirely (10).

Our review of the existing literature and available tools concludes that robust attention has been paid to the need for comprehensive and data-driven methods for prioritizing pedestrian improvements, and considerable research has gone into level-of-service measures that can identify where adequate facilities are lacking. However, existing prioritization tools still rely on proximity-based measures of demand and connectivity, and have not yet utilized recent advancements in travel demand modeling approaches to incorporate network-based measures of latent demand for pedestrian and bike facilities where they do not yet exist.

Development of the Local Access Scores

As the regional planning agency for Greater Boston, MAPC has for many years collaborated with member cities and towns on the development of pedestrian and bike plans and complete streets policies. Meanwhile, state support for active transportation has been on the rise, with the adoption of Active Streets legislation in 2014. In 2015, MAPC received a grant to work with three municipalities west of Boston with the specific goal of developing more quantitatively robust and scalable methods for prioritizing local complete streets investments and maintenance activities. A survey of public works and engineering staff members in over 50 Massachusetts municipalities of various sizes sought to assess how they made decisions about where to build sidewalks and bike facilities. Over three quarters of the respondents (77%) indicated that "Public Requests" were one of the top inputs regarding the location of new facilities; the other top inputs were "Ad Hoc Basis (based on individual project funding)" (48%) and "Available Right of Way" (46%). Only one-quarter of the respondents indicated that infrastructure investments were based on a pedestrian and bicycle master plan or facilities priority list. These survey results suggest that active transportation infrastructure investments at the local level are more opportunistic and constituent-driven than strategic and targeted. Municipal officials explained that this was due in

part to the lack of any complete and comprehensive measure of the active transportation value related to any particular street segment, making it hard to evaluate public requests for infrastructure. In other words, if municipalities had more data about latent demand, they would be in a better position to deny or defer low-value public requests and focus limited resources on the highest-value locations.

To help address this identified need, MAPC set out to develop network-based measures of latent demand for pedestrian and bicycle utility, which could be incorporated into local capital planning and maintenance efforts. In consultation with participating municipalities, MAPC decided to focus on three home-based trip purposes which coincided with local objectives and feasibility assessments for mode shift: school trips, shopping/restaurant trips, and trips to outdoor recreation.

After evaluating existing options for network-based measures of latent demand, MAPC decided to develop new a new measure of Local Access Scores using transportation modeling software. Our method uses a simplified four-step travel demand model that includes network creation, trip generation, trip distribution, mode choice, and assignment components. The method differs from typical regional travel demand models, however, in several key respects:

1. The focus of the tool is on bicycle and pedestrian trips. Trips by other modes are produced, but not assigned to the network. (In contrast, typical travel demand models produce but do not assign nonmotorized trips.)
2. The model operates at a significantly more detailed geographic scale than a traditional travel demand model: trips are generated and distributed between Census Blocks, and assigned to an all-streets network that excludes freeways and limited-access facilities.
3. Because the Local Access Scores are intended as *relative* comparisons between street segments within a given study area for purposes of project prioritization, and not an *absolute* prediction of actual pedestrian travel, no attempt was made to calibrate the outputs to actual surveyed mode shares or link counts of pedestrian and bicycle utilization. (However, future efforts may use the utility scores as a sampling frame for actual pedestrian counts.)
4. Only a subset of all trip purposes are considered in the Local Access model. In effect, this means that the comparison of alternative segments in project prioritization is assumed to be based upon their value for only certain kinds of trips: school, shopping, recreation, and transit (through as described below, results for transit trips should be considered preliminary).

The following sections describe in further detail how each of the model steps works.

Trip Generation
As the Local Access model is not tour-based, trip productions and attractions are generated based upon block-level land use and demographic variables. In order to ascertain how many trips of each purpose would originate in each census block, MAPC mined household-level

responses from the 2011-2012 Massachusetts Household Travel Survey (MHTS) for data on how many trips of each purpose are made by households based on the following criteria:

- For the School trip purpose, productions were taken to be equivalent to the entire school-age population, with attractions based upon school enrollment data;
- For the Shopping/Restaurant trip purpose, productions were based upon a linear function of households by size, and attractions were a function of employment by two-digit NAICS (employment sector codes), described below;
- For the Recreation trip purpose, productions were based upon a different linear function of households by type, and attractions were proportional to open space acreage.
- For the Transit trip purpose, productions were based on a linear function of households by size, and attractions were a function of transit frequency by block, described below.

The trip rates calculated using the travel survey are not conditional on non-motorized travel; rather they are generic daily person-trips for all modes.

Trip attraction rates for the restaurant and shopping trips and transit trips were based on two statewide linear regressions (one for each destination type.) The independent variable was the number of employees in restaurants and retail stores (respectively) in each municipality, and the dependent variable was the number of such trips attracted to each municipality based on the MHTS. The regression for transit trips was conducted at the Census Tract level rather than the municipal level. The independent variable was frequency of transit service.

Table 1 summarizes the trip production and attraction rates, and also provides the concordance between the trip purposes as defined in the MHTS, and the NAICS codes for businesses. Data sources are indicated with parentheses. Variables HH1 through HH7 represent numbers of households by size starting with a single person and going through 7 or more household members.

TABLE 1 Trip Generation Rates by Trip Purpose

Trip Purpose	Trip Production Rate	Trip Attraction Rate
Shopping & Restaurant (MHTS codes 16,17) (MHTS code 18)	HH1*0.58 + HH2*1.05 + HH3*1.35 + HH4*1.46 + HH5*1.57 + HH6*2.19 + HH7*1.87 (Census 2010)	Restaurant Employees (NAICS code 72) * 3.75 + Retail Employees (NAICS codes 44 and 45)* 4.9 (InfoGroup USA)
School (MHTS code 6)	Number of Children age 5 to 17	Public school enrollment (Mass Department of Education)

	(Census 2010)	
Outdoor Recreation (MHTS code 21)	HH1*0.14 + HH2*0.28 + HH3*0.38 + HH4*0.28 + HH5*0.55 + HH6*1.30 + HH7*1.21 (Census 2010)	Acres of open space (MassGIS open space layer)
Transit	HH1*0.13 + HH2*0.21 + HH3*0.32 + HH4*0.26 + HH5*0.37 + HH6*0.30 + HH7*0.30 (Census 2010)	Transit frequency * 2.06 (GTFS, EPA Smart Location Database)

Trip Distribution

Doubly-constrained gravity models were used for trip distribution, with the input impedance based upon a distance skim of the network excluding limited-access facilities. Separate negative exponential distribution parameters for each trip purpose were calibrated to MHTS data. Mathematically this particular type of gravity model is equivalent to a destination choice model with the log of the attraction term included in the utility for each destination. This translation permitted the estimation of the parameters using the open-source Biogeme 2.4 discrete choice analysis software (11).

For example, for the school trip purpose the estimated coefficient on distance was found to be -0.485, in a destination choice model with a coefficient on the natural logarithm of attractions (i.e. enrollment) and no constant. The t-test value is -57.06, with a p-value < 0.001, and the overall adjusted Rho-squared for the model is 76.7%. Additionally, the distribution model was constrained so that school trips cannot cross district boundaries. (Massachusetts does offer a school choice program, but no school trips crossing districts were observed in the travel survey dataset used to calibrate the model.) For the other purposes, the distribution model generally attempts to find attractions satisfying the target trip purpose within a reasonable distance of the production zone, although this sometimes may result in trips that are too long to comfortably walk or even cycle. This condition is handled by the mode split model, described below.

Mode Choice

Data from the MHTS are shown below summarizing the variation in percentage of cycling and walking shopping trips by distance (Figure 2). While walk mode shares decrease monotonically with distance, bicycle mode shares peak between one-half and three-quarters of a mile. Neither mode captures a significant portion of travel for trips longer than 2.5 miles.
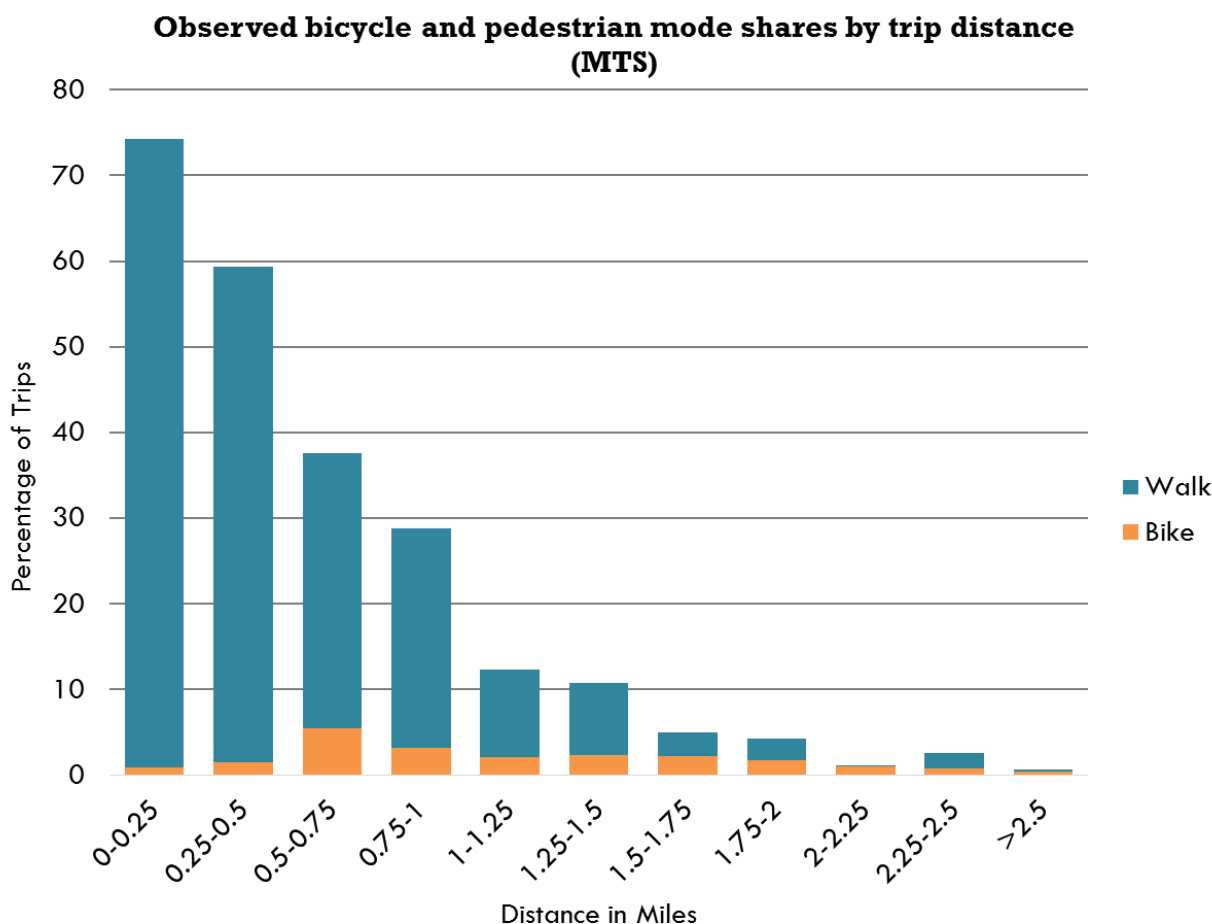
Observed bicycle and pedestrian mode shares by trip distance (MTS)

FIGURE 2 Bicycle and pedestrian mode share by trip distance for shopping trips.

To prevent excessively long trips from being assigned to the network, and to reflect the observed preference of walking for shorter trips, multinomial logit mode choice models were implemented for each trip purpose. Each mode choice model has three alternatives: walk, bicycle, and other travel modes (i.e. any motorized form of transport). WalkScore (™) data for both the production and attraction trip ends were also used to moderate the impact of trip distance on predicted mode shares. Nonetheless, the main effect of the mode choice step is to divert long trips from walking or bicycling modes before being assigned to the network (as well as to shift longer trips from walking to bicycling). The mode choice model estimation results are summarized in Table 2.

TABLE 2 Mode Choice Model Estimation Results

Model Parameter	School: Walking	School: Bicycling	Shopping: Walking	Shopping: Bicycling	Recreation: Walking	Recreation: Bicycling
Constant	-6.1047	-8.3973	-6.9397	-6.6096	-3.6973	-3.5565
Natural log of Distance	-1.2565	-0.3864	-1.1514	-0.4451	-1.4086	-0.8033
Walk Score at Origin	0.0327	0.0436	0.0345	0.0185	0.0309	0.0198
Destination Walk Score	0.0255	0.0256	0.0311	0.0234	*NA*	*NA*
Note: All estimated coefficients have p-values < 0.001						

Trip Assignment

Although bicyclists and pedestrians prefer certain types of environments in practice, no attempt to correct for this behavior (e.g. using a route choice model) was made in trip assignment. The modeled walk and bicycle trips were simply assigned to the network excluding freeways and limited-access facilities. This is in keeping with the overall intention of assigning scores to network segments based upon their relative potential utilization under circumstances of ideal improvement as complete streets.

Creating composite scores

In order to make the Local Access Scores available across the state of Massachusetts, the model was run repeatedly over a moving window of study areas consisting of no more than 30,000 Census Blocks each, using a previously-developed statewide master layer of roadways, centroids, and centroid connectors. The network & trip production data was buffered out at least two miles to account for trips into or out of the study area. The resulting scores were clipped back down to the study areas, and then they were merged back together to form a single dataset.

Local Access Scores are available for each of four trip purposes and two modes, making eight basic scores. The suitability wizard in a GIS-based decision support software package for planners was used to rescale the scores to a range of 0 to 100. Then these scores were given a weight between 0 and 10, and combined into a set of overall scores based on mode. Trip purposes were weighted as follows: school, 10; shops and restaurants, 7; parks, 5; transit, 5. These trip purposes were combined by mode into composite bike and composite walk utility scores. Then the bike and walk utility scores were weighted 5 and 10, respectively, and combined into an overall utility score. The weights selected for this analysis were based on input from municipal staff, and could easily be changed depending on local priorities, without any need to re-run the travel demand model. Both raw and rescaled scores are published, so users could combine and weight the scores according to their needs.

Results

We calculated Local Access Scores for the entire Massachusetts local roadway inventory (49,116 miles, 79,045 kilometers). The model encompasses 154,622 Census Blocks housing 2.54 million households. The complete dataset of roadway segments, census blocks, and destinations is available via data.mapc.org/datasets. Data can be viewed on a web map, re-symbolized, exported as a PDF, and downloaded along with a User Guide and Data Dictionaries for both the Local Access Scores and the analysis zone inputs. The User Guide describes production of the dataset and provides recommendations for local applications.

Figure 3 provides an example of a set of Local Access Score outputs using the Walk to Shopping score in Winchester town center, eight miles north of Boston. Areas 1 and 2 are residential areas, while area 3 contains the commuter rail station and a concentration of shops and restaurants. Area 1 has a lower population density than area 2, so side streets like Stone Ave. and Prince Ave. have lower Local Access Scores than Oak St. This image also illustrates how Local Access Scores generally increase with proximity to destinations, but not universally (see area Area 4, or compare Washington Street with the parallel Elm Street).
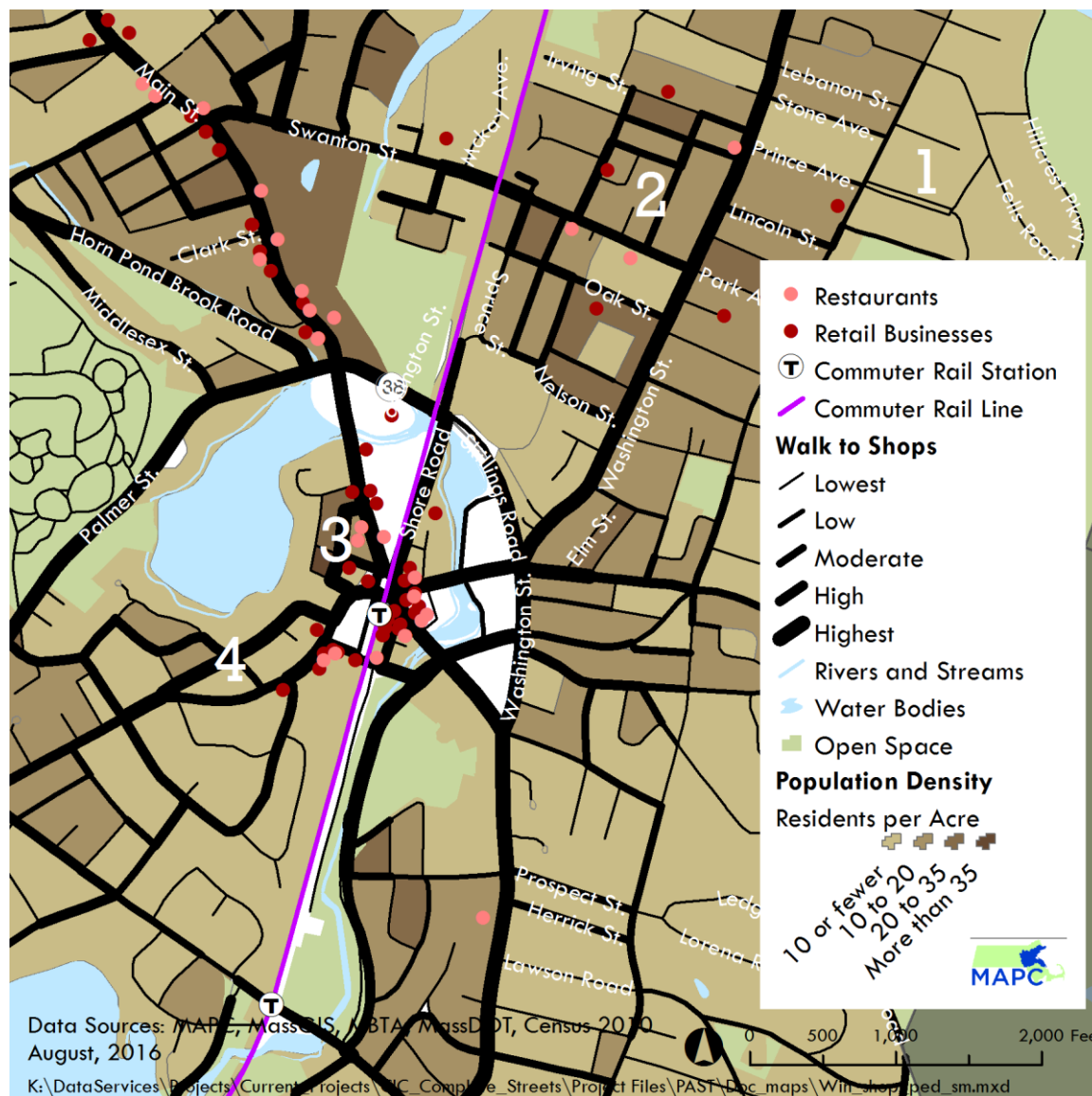
FIGURE 3 Walk to Shops and Restaurants Network Utility Scores for Winchester town center.

Local Access Scores can combined with additional information to identify infrastructure gaps and improvement priorities. The simplest method is to conduct a "sidewalk gap analysis" to identify high-utility road segments lacking sidewalks. In the Town of Framingham, Massachusetts, residents indicated that making sure children can walk to school safely was a top priority. MAPC conducted a gap analysis by combining the Walk to School Local Access Scores with a binary (yes/no) sidewalk indicator based on the statewide roadway inventory. Local Access Scores were divided into general low, moderate, and high categories based on percentile (cutoffs were the 50th and 75th percentiles). Symbolizing these two fields together, as in Figure 4, indicated that a roadway by a high school on Fountain Street had a high Local Access Score, but no sidewalk. Zooming in closely to a street view photograph of this area shows that a clear path has been worn into the grassy area next to the roadway where people have been walking, providing visual confirmation of sidewalk need (Figure 5). As data are available, similar comparisons could be made with

level-of-service measures such as BLOS and LTS to identify high-utility, high-stress segments that should be candidates for intervention.

FIGURE 4 Walk to School Local Access Scores near Fountain Street in Framingham.

FIGURE 5 Street view photo facing northwest on Fountain street.

The principal application of this dataset is to inform local complete streets planning and operations, a process which has already begun. MAPC recently prepared Complete Streets Prioritization Plans for three municipalities (including Winchester) as part of a new MassDOT certification and funding program. Planners at MAPC used maps of the scores and sidewalk gap analysis along with information on crashes, past planning efforts, and cost to assist municipal staff in setting their five year plan for complete streets improvements. Based on the resulting plans, the municipalities applied for and received $1.2 million of competitive state funding for sidewalks, curb cuts, bike lanes, traffic calming, and other efforts.

Customization and Additional uses
The model used to create Local Access Scores can be modified in a number of ways to meet the needs of local planners, with a modest amount of effort from MAPC staff. The network can be altered to better reflect the local pedestrian network, by adding or deleting centroid connectors; indicating mid-block connectors, stairways, and important walking trails not on the road inventory; or removing redundant and infeasible pedestrian routes. Analysis zone inputs can be changed to reflect projected trip attractors or generators, such as an additional estimate of school age

children in a planned development, or new jobs planned for a new commercial center. Once changes are made to inputs or to the network, the analysis can be rerun within the study area for a before/after comparison.

In addition to capital planning, Local Access Scores can also be used for maintenance and programmatic, applications. Municipal snow removal efforts or code enforcement related to snow clearance ordinances could be prioritized based on utility score. High utility corridors might be candidates for traffic calming pilot programs or speed indicators. Local Access Scores could also influence local land use regulations, which might, for example, limit the frequency of curb cuts on high utility roadways so as to promote a safe and comfortable pedestrian environment.

Limitations

The model and resulting dataset do contain certain limitations and inaccuracies. We recognize that park acreage may be a poor proxy for park attractiveness, yet no other standardized variable is available across the state. Similarly, the transit station attraction rates would improve with information about actual boardings, yet such information is not currently available statewide. Other known issues are easily resolved through modification of the model inputs: observed network errors can be modified, walking routes can be added, and centroid connectors can be altered to reflect actual entry locations.

Discussion

Local Access Scores are a new and complementary metric that can be used to prioritize complete streets and active transportation efforts. This model expands greatly upon prior efforts to quantify latent demand and delivers an informative, accessible, and actionable dataset to inform local action. The scores have already been adopted to inform planning and funding decisions in Massachusetts, which provides an indication of how much such a metric was needed. MAPC will continue to refine the model, investigate new applications, and will use the results as a framework for further investigation into pedestrian activity measures.

Acknowledgement

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