Appendix A—ActiveTrans Priority Tool and Fairmount Line Station Area Selection

STATION AREA SELECTION

MPO staff used the ActiveTrans Priority Tool (APT) to determine which of the eight Fairmount Line stations outside of Boston's CBD were most in need of bicycle and pedestrian improvements. The original project budget allowed for assessment of four station areas, but additional funds made it possible to add a fifth station area to the assessment.

ActiveTrans Priority Tool

The (APT) is a National Cooperative Highway Research Program (NCHRP) Report guidebook, and programmed spreadsheet, that was released in 2015 by the Transportation Research Board. APT provides a transparent, systematic methodology for evaluating and prioritizing pedestrian and bicycle improvements, and its flexible approach can be customized to support different types of projects. The tool is unique in that it is built for separate and specific consideration of bicyclists and pedestrians' needs. APT calculates a score for each project under consideration—in this case, the eight Fairmount Line station areas—and assigns priority rankings that correspond to each project's score, with the highest scoring project receiving the highest ranking. MPO staff populated two APT programmed spreadsheets, one with pedestrian-specific data and the other with bicyclist-specific data. The scores calculated in each spreadsheet then were averaged to determine which station areas were the highest priorities for both bicyclists and pedestrians. The process MPO staff followed when using the APT to prioritize the Fairmount Line station areas is summarized below.

Define Factors

The first step when using APT is to define which factors to consider. APT factors are categories that reflect the values and priorities of the selection process.

The factors that staff used to select which Fairmount Line station areas were most in need of bicycle and pedestrian improvements are listed below:

- Connectivity
- Constraints
- Demand
- Equity
- Existing Conditions
- Safety
- Stakeholder Input

Importantly, the factor of "connectivity" could be quantified for bicyclists, but not pedestrians, because the MPO has network gap data for bicycle facilities only. Thus, the connectivity factor was omitted from the pedestrian priority rankings.

The stakeholders that MPO staff polled for the "stakeholder input" factor were as follows:

- Boston Redevelopment Authority (BRA)
- WalkBoston
- Fairmount Greenway Task Force of the Fairmount/Indigo Line CDC Collaborative
- Fairmount/Indigo Transit Equity Coalition of the Fairmount/Indigo Line CDC Collaborative
- Executive Directors of the Fairmount/Indigo Line CDC Collaborative

Select Variables

In order to illustrate the condition of each factor within a given station area in a quantifiable way, MPO staff selected variables. This process involved determining what data was available, calculating the variable values for each station area, and inputting the information into the APT spreadsheet. The variables for each factor are listed below.

- Connectivity
  - Number of Boston region bicycle network gaps within each station area (2014 Central Transportation Planning Staff, to the Boston Region MPO) Bicycle Network Evaluation study)
- Constraints
  - Whether or not there are multiple jurisdictions with control of roadways within a station area
- Demand
  - Employment Density (jobs per square mile)
  - Retail Activity Density (dollars of sales per square mile)
  - Population Density (population per square mile)
  - Transit Stop Density (number of bus stops per square mile)
  - Transit Boardings (number of boardings at transit stops each week)
  - 2040 Population (change in population by 2040)
  - 2040 Employment (change in employment by 2040)
  - 2035 Ridership Forecast (expected ridership in 2035[125])

[125] *Review and Update of Fairmount Line Ridership Forecasts*; Scott Peterson; Central Transportation Planning Staff to the Boston Region MPO; November 15, 2011; page 2.

- Equity
  - Percent Environment Justice Area (low-income and ethnicity)
  - Percent of Population Younger than Age 18 or Older than 64
  - Percent of Households without Vehicle Availability
- Existing Conditions
  - Number of Vehicular Crashes (2008–2012)
  - Number of Fatal Vehicular Crashes (2008–2012)
  - Number of Non-Fatal Injury Vehicular Crashes (2008–2012)
  - Number of HSIP-Eligible Vehicular Crash Clusters (2010–2012)
  - Number of Top 200 Vehicular High−Crash Locations (2010−2012)

- Safety
  - Number of Bicycle Crashes (2008−2012)
  - Number of Pedestrian Crashes (2008−2012)
  - Number of Fatal Bicycle Crashes (2008−2012)
  - Number of Fatal Pedestrian Crashes (2008−2012)
  - Number of Non-Fatal Injury Bicycle Crashes (2008−2012)
  - Number of Non-Fatal Injury Pedestrian Crashes (2008−2012)
  - Number of Bicycle Crash Clusters (2002−2012)
  - Number of Pedestrian Crash Clusters (2002−2012)
- Stakeholder Input
  - Number of Stakeholder Recommendations
  - BRA Recommendation

A few of the variables listed above, such as the jurisdiction variable under the constraints factor, are qualitative instead of quantitative. The first step in addressing this issue is to assign numeric values to qualitative variables. In the case of the jurisdiction variable, station areas that did not include multiple jurisdictions were given a value of 1, while station areas with multiple jurisdictions were assigned a value of 0.

Scale Variables

The variables used to quantify factor conditions in the Fairmount Line station areas have different units and are therefore not comparable. Evaluating raw numbers of pedestrian crashes against dollars of sales per square mile, for example, would lead to an assessment that disproportionately values retail activity density because sales numbers are large, while crash incident totals are much smaller by nature. In order to assess the variables equitably, they must all be adjusted to a common scale. MPO staff selected 0 to 10.

Depending on the variable being scaled, MPO staff chose either proportionate scaling or quantile scaling from the APT spreadsheet drop-down menus. Proportionate scaling was used when the range of values did not include outliers.[126] This scaling process assigns the highest value in the common scale to the greatest raw value and the lowest common scale value to the lowest raw value.[127] When there were outliers in the range of values, however, MPO staff scaled the numbers based on quantiles.[128] In each case, four quantiles for the common scale were used, with the raw data values assigned to the 0, 3.3, 6.7, or 10 quantile. The lowest raw values belonged to the 0 quantile while the highest raw values composed the 10 quantile.

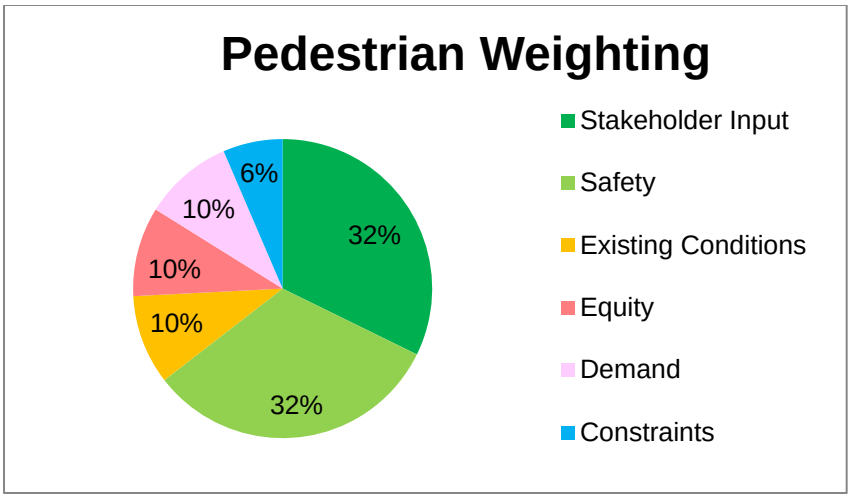
Establish and Apply Factor Weights

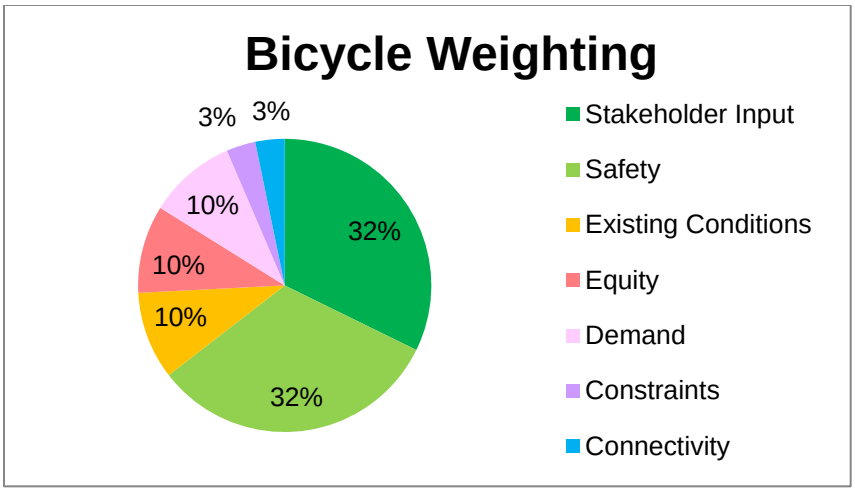
The importance of each factor in the decision-making process was taken into consideration by weighting. The weights assigned to the factors indicate their importance in the decision-making process based on the values and purpose of the study. Each scaled variable value was multiplied by the weight assigned to its factor when compiling the station area scores. MPO staff weighted safety and stakeholder input as the most important factors when calculating the pedestrian and bicycle priority scores, assigning each 10 weights. Existing conditions, equity, and demand were each given 3 weights. In the pedestrian priority calculations, constraints were given 2 weights. The bicycle priority calculations, however, gave 1 weight to both the constraints and connectivity factors in order to account for the fact that the bicycle priority calculations included an additional factor. The weighting is illustrated as percentages below.

[126] *NCHRP Report 803: Pedestrian and Bicycle Transportation Along Existing Roads – ActiveTrans Priority Tool Guidebook*; Peter A. Lagerwey, Michael J. Hintze, James B. Elliott, Jennifer L. Toole (Toole Design Group), Robert J. Schneider (University of Wisconsin-Milwaukee), Kittelson & Associates, Inc.; Transportation Research Board; 2015; page 43.

[127] *NCHRP Report 803: Pedestrian and Bicycle Transportation Along Existing Roads – ActiveTrans Priority Tool Guidebook*; Peter A. Lagerwey, Michael J. Hintze, James B. Elliott, Jennifer L. Toole (Toole Design Group), Robert J. Schneider (University of Wisconsin-Milwaukee), Kittelson & Associates, Inc.; Transportation Research Board; 2015; page 43.

[128] *NCHRP Report 803: Pedestrian and Bicycle Transportation Along Existing Roads – ActiveTrans Priority Tool Guidebook*; Peter A. Lagerwey, Michael J. Hintze, James B. Elliott, Jennifer L. Toole (Toole Design Group), Robert J. Schneider (University of Wisconsin-Milwaukee), Kittelson & Associates, Inc.; Transportation Research Board; 2015; page 44.





Selected Station Areas

The APT helped MPO staff identify which five station areas were most in need of bicycle and pedestrian safety and comfort improvements. The prioritization ranks for the combined bicycle and pedestrian calculations were as follows:

1. Newmarket
2. Morton Street
3. Four Corners/Geneva Avenue
4. Talbot Avenue
5. Upham's Corner
6. Blue Hill Avenue
7. Fairmount
8. Readville

Location	Connectivity	Constraints	Demand	Equity	Existing Conditions	Safety	Stakeholder Input	Priority Score	Priority Rank
Newmarket	3	15	18	13	22	83	100	255	1
Morton Street	0	15	16	26	30	60	100	247	2
Four Corners/ Geneva Ave	3	15	22	27	15	53	63	199	3
Talbot Avenue	3	15	16	20	4	39	100	197	4
Upham's Corner	5	8	21	27	13	49	0	123	5
Blue Hill Avenue	3	8	14	18	6	10	50	109	6
Fairmount	3	0	12	17	9	19	38	97	7
Readville	3	0	7	0	2	22	0	34	8

The four station areas with the highest priority rankings were immediately selected for assessment. Even when the factors were not weighted, the same four station areas were identified as being of the highest priority for bicycle and pedestrian improvements on the Fairmount Line. The selection of the fifth station took additional factors into consideration. The Boston Redevelopment Authority, which had created Station Area Plans for Upham's Corner and Blue Hill Avenue, specifically requested that MPO staff assess the Blue Hill Avenue station area. There were not stakeholder requests for an assessment of Upham's Corner but WalkBoston and the BRA both had expressed the opinion that the Blue Hill Avenue station area is need of improvement.

These circumstances were compounded by the fact that Blue Hill Avenue Station is anticipated to have the most boardings of all the Fairmount Line stations in 2035,[129] and that it is forecasted to experience the largest percentage of population growth by 2040. As a result, MPO staff selected Blue Hill Avenue as the fifth and final station area for assessment in the Fairmount Line Station-Access Analysis.

[129] *Review and Update of Fairmount Line Ridership Forecasts*; Scott Peterson; Central Transportation Planning Staff to the Boston Region MPO; November 15, 2011; page 2.