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# Technical Memorandum

**May 9, 2025** Project# 28476

To: Ozzy Arce, Senior Transportation Planner
City of Palo Alto, Office of Transportation

From: Kittelson & Associates, Inc.

CC: Sylvia Star-Lack, Transportation Planning Manager

RE: Bicycle and Pedestrian Transportation Plan Update

## REVISED DRAFT PRIORITIZATION FRAMEWORK

The City of Palo Alto (City) is updating the 2012 Bicycle and Pedestrian Transportation Plan (BPTP Update). This BPTP Update will serve as a comprehensive action plan for the City to provide improved bicycle and pedestrian facilities for its residents, employees, and visitors. This memorandum describes the prioritization framework proposed to be used as part of the BPTP Update. The prioritization criteria are intended to align with the BPTP Update objectives, which include the following:

- **Safe and Inclusive**: Prioritizing safety for all transportation network users regardless of age and ability, ensuring equitable access to pedestrian and bicycle infrastructure, and reducing fatal and severe injury crashes.
- **Connected and Accessible**: Providing a convenient and interconnected network of sidewalks, bike lanes, and trails that offer efficient travel options and easy access to transit and important destinations; encouraging a shift away from driving that reduces air pollution.
- **Comfortable and Enjoyable**: Enhancing the comfort and enjoyment of walking and cycling through amenities such as shade, greenery, and well-designed streetscapes.
- **Community-Led and Cooperative**: Fostering community engagement and participation in promoting active transportation through education, programming, and infrastructure investments to cultivate learning for all network users of all ages.
- **Integrated and Collaborative**: Collaborating with neighboring cities to create a seamless, integrated, and efficient regional network of pedestrian and bicycle infrastructure.

This memo includes the following topics:

- **Initial Prioritization** is the initial quantitative prioritization applied to assess the level of alignment with BPTP Update objectives of safety and connectivity.
- **Supplemental Evaluations** describes the additional qualitative assessments that will be applied to further differentiate projects that score high under the proposed prioritization methodology to develop an implementation order using the following three feasibility-oriented factors of project readiness, project cost and funding opportunities, and project support.
- **Next Steps** presents subsequent actions for the City and consultant team.

# Initial Prioritization

## Proposed Factors and Evaluation Criteria

The proposed evaluation process is informed by the framework from NCHRP Report 803: ActiveTrans Priority Tool[1] (APT), the result of a national research effort. The APT methodology was based on an extensive review of existing prioritization processes being used by agencies across the country at the state, regional, and local level. It uses a standard set of terms and definitions to describe the different steps in the process. The following definitions apply within the APT:

- **Factors** are the categories used to express community or agency values considered in the prioritization process and contain groups of variables with similar characteristics. The APT has selected nine primary factors commonly used by agencies across the country that are particularly suited for prioritization of active transportation needs.
- **Variables (or evaluation criteria)** are characteristics of roadways, households, neighborhood areas, and other features that can be measured, organized under each factor. The terms *variables* and *evaluation criteria* may be used interchangeably.
- **Weights** are the numbers used to indicate the relative importance of different factors based on community or agency values. In order to increase transparency and legibility in the weighting step, weights are applied to factors, not to variables (which are often much more technical in nature).

[1] Lagerwey, Peter A., et al. *Pedestrian and Bicycle Transportation Along Existing Roads—ActiveTrans Priority Tool Guidebook*. NCHRP Report 803. Project No. 07-17. 2015. Available online at http://onlinepubs.trb.org/onlinepubs/nchrp/nchrp_rpt_803.pdf

The proposed prioritization factors and criteria is informed by NCHRP Report 803 and by the BPTP Update's goals as referenced above.

**Table 1: Proposed Prioritization Factors and Evaluation Criteria**

| Factor | Criteria | Notes | Ped | Bicycle |
|---|---|---|---|---|
| Safety | High-Injury Corridors | This criterion will prioritize locations based on analysis and network screening of bicycle- and pedestrian-related collisions. This criterion aligns with the **Safe and Inclusive,** and **Comfortable and Enjoyable** objectives**.** | X | X |
| | Safe Routes to School | This criterion will prioritize projects on the Walk and Roll Suggested Route Maps available on the City of Palo Alto Safe Routes to School website. This criterion aligns with the **Safe and Inclusive,** and **Connected and Accessible** objectives. | X | X |
| Connectivity | Bicycle Level of Traffic Stress | This criterion will prioritize locations based on the presence of high-stress bicycle facilities. The level of traffic stress for this criterion analysis was already conducted for this project. This criterion aligns with the **Safe and Inclusive,** and **Comfortable and Enjoyable** objectives. | | X |
| | Access to Transit | This criterion will prioritize locations near major transit stops. This criterion aligns with the **Connected and Accessible,** and **Integrated and Collaborative** objectives. | X | |

## Framework for Applying the Criteria

For the application of the factors and criteria discussed above, Kittelson will use the process from NCHRP Report 803. This report is accompanied by a pre-programmed APT spreadsheet tool[2] that can be tailored to project, segment, or geographic area inputs. The spreadsheet tool may be used for the entire process, or it can be supplemented with calculations from GIS or performed manually. Given the spatial nature of pedestrian and bicycle planning, it is common to perform GIS calculations to create input variables—as is proposed for the factors identified in this section. The tool's 10-step process is outlined and briefly annotated in *italics* below.

[2] Available at: https://www.pedbikeinfo.org/topics/tools_apt.cfm

1. **Define purpose.** An agency first determines the purpose of the prioritization process. *This prioritization process will prioritize locations at the segment level. The scored segments will then be linked to projects. This aligns with the scale at which data is available and allows for aggregation of segment-specific factors.*
2. **Select factors**. An agency next selects the factors to be used in prioritization that align with their goals for the prioritization process. *The proposed factors for the BPTP Update are identified in the preceding section.*
3. **Establish factor weights.** Each factor is weighted on a scale of 1 to 10 to indicate its relative importance to other factors. *The proposed weights are identified in the following section.*
4. **Select variables (criteria) for each factor.** For each selected factor, agencies may select one or more variables to measure the factor. *Kittelson has proposed two variables or indicators for each factor. See more details in the subsequent section.*
5. **Assess data availability.** *For all proposed factors and criteria, the project team has access to the necessary data.*
6. **Assess technical resources.** Agencies assess their existing technical resources and capabilities to determine if existing resources are sufficient. *The project team will use a combination of GIS software and the APT spreadsheet tool to perform calculations.*
7. **Set up prioritization tool.** Having established the purpose, factors, variables, and required data, the next step is to set up a tool to implement the prioritization method. *The project team will use the APT spreadsheet tool.*
8. **Input data.**
9. **Scale variables.** Scaling involves selecting a common numeric scale and adjusting raw values to fit the common scale. Scaling should not be confused with weighting. Scaling is a more objective, technical function, while weighting is based on community/agency values. Scaling is necessary so that variables have a comparable impact on the prioritization score in the absence of weighting. Scaling methods should be chosen carefully depending on the distribution and range of the data points. For example, this would be applied when applying a low-medium-high scale to a numeric variable such as household income, in order to categorize census tracts in a city as having low, medium, or high household income. *This step is not necessary for BPTP Update project prioritization as the variables are on a binary scale.*
10. **Calculate priority scores.** Finally, agencies sum the weighted values for each factor to derive a total score for each location. The segments can then be ranked based on the prioritization score. In some cases, agencies may wish to revisit factors, variables, and/or weighting, and make adjustments to their prioritization based on additional input or evolving prioritization purposes. *The spreadsheet used for this project allows for adjustment of factor weights and comparison of results.*

## Initial Prioritization Analysis Methodology

This section discusses the proposed methodology for each of the proposed initial prioritization criterion.

### Table 2: Safety Criterion

| High Injury Network | |
|---|---|
| Description | This measure uses the results of the pedestrian and bicycle collision and high injury network screening analysis. The screening process used a severity-weighted collision score on the roadway network to identify locations associated with risk for people walking or biking. |
| Data Needs | The spatial files representing the high-injury network analysis. |
| Proposed Methodology | The methodology will use the presence on the high injury network. Locations on the high injury network will be assigned a value of 1. Locations not on the high injury network will be assigned a value of 0. |
| Scoring | Recommended method: Scoring will be binary:<br>1 = On the Pedestrian or Bicycle High Injury Network<br>0 = Not on the Pedestrian or Bicycle High Injury Network |
| Limitations | Pedestrian and bicycle collision data used for this analysis will only include collisions that were reported to the California Statewide Integrated Traffic Records System database. Collisions that do not result in injury, death, or over a sufficient amount of property or vehicle damage are not required to be reported in California and would not necessarily be recorded in the data. As a result, not all pedestrian and bicycle collisions are represented in this data and the quality of collision data is limited by the amount of detail provided by the person completing the collision report form.<br>Pedestrian and bicycle count data are not consistently and completely available; therefore, pedestrian or bicycle exposure could not be accounted for in developing this criterion.<br>Finally, because numbers of pedestrian- and bicycle-involved collisions are typically low relative to all collisions and may represent random and/or behavioral/human factor causes where the specific location is not inherently a factor in the collision, this criterion alone represents only a partial assessment of bicycle and pedestrian safety. |

| Safe Routes to School | |
|---|---|
| Description | This measure uses the Walk and Roll Suggested Route Maps. |
| Data Needs | The spatial files representing the recommended walk and roll routes to school. |
| Proposed Methodology | The methodology will use the presence on the network of Walk and Roll Suggested Route Maps. Locations on the suggested walk and roll routes to school will be assigned a value of 1. Locations not on the suggested walk and roll routes to school will be assigned a value of 0. |
| Scoring | Scoring will be binary:<br>1 = On the Suggested Walk and Roll Routes to School<br>0 = Not on the Suggested Walk and Roll Routes to School |
| Limitations | The suggested walk and roll routes to school used for this analysis include streets identified and mapped over five years ago. As a result, this does not reflect changes that have occurred (e.g., streetscape modifications that have been implemented, development that has occurred) since the map was created. Additionally, this map represents a subset of streets in the City and not all streets that students use to walk and roll to school on are represented. |

### Table 3: Connectivity Criterion

| Bicycle Level of Traffic Stress | |
|---|---|
| Description | This measure incorporates the results of previously-conducted bicycle level of traffic stress (LTS) analysis conducted for this project to assess low-stress bike network connectivity. Bicycle level of traffic stress was developed at the Mineta Transportation Institute in 2012 to estimate the level of stress a bicyclist may feel while riding along a particular roadway. In the method adopts a “worst case scenario” approach whereby the roadway characteristic with the highest stress level determines the score for the segment. Scores range from 1 (a comfortable facility for users of all ages and abilities) to 4 (a facility that only strong and fearless cyclists would feel comfortable using). |
| Data Needs | The spatial files representing the output of the bicycle level of traffic stress analysis conducted for this project. |
| Proposed Methodology | Kittelson will assign the computed LTS score to each roadway segment. If a prioritization segment is connected to multiple LTS analysis segments, it will be assigned the higher (i.e., more stressful) LTS score. |
| Scoring | Scoring will be binary:<br>1 = High-stress biking facilities (LTS score of 3 or 4)<br>0 = low-stress biking facilities (LTS score of 1 or 2) |

| | |
|---|---|
| Limitations | The LTS analysis was conducted using roadway data provided by the City and supplemented with Open Street Map (OSM) data. In general, OSM data varies in quality and completeness by area. This variation exists because the data are open source and supplied by volunteers. OSM data also typically lacks extensive metadata, making it challenging to assess when the data was last updated. |
| **Access to Transit** | |
| Description | This measure prioritizes locations within walking distance (0.25-mile network distance, or 10-minute walk) of transit stops. |
| Data Needs | The spatial location of transit stops. |
| Proposed Methodology | The methodology will use the network distance (rather than straight-line distance) from the centroid of each roadway segment to the nearest among transit stops. The road segments will be evaluated for whether they are within 0.25-mile or a ten-minute walking distance to the nearest stop. |
| Scoring | Scoring will be binary:<br>1 = Within a ten-minute walk (0.25-mile) of a transit stop<br>0 = Greater than a ten-minute walk (0.25-mile) of a transit stop |
| Limitations | This methodology prioritizes proximity to transit stops within Palo Alto. It is possible that ridership demand for walking connections exist at other locations. |

## Weightings

This section revisits the framework with a few considered weightings, including the factor weighting ultimately selected by the City. The City has provided its feedback and chosen the weightings presented in the far-right column in **Table 4**.

**Table 4: Possible Factor Weighting for Prioritization[1]**

| Factor | Criteria | Equal Weights Method | Safety Focus | Connectivity Focus | Suggested Weights (Safety Focus) | Final Weights |
|---|---|---|---|---|---|---|
| Safety | High-Injury Network | 50% | 66% | 34% | **70%** | **70%** |
| | Safe Routes to School | | | | | |
| Connectivity | Bicycle Level of Traffic Stress | 50% | 34% | 66% | **30%** | **30%** |
| | Access to Transit | | | | | |
| Total | | 100% | 100% | 100% | **100%** | **100%** |

[1] The overall score is the sum of weighted scores, which range from 0 to 1

## Supplemental Evaluation

The initial prioritization is used to develop scores for each segment location in Palo Alto. Projects are then assigned numerical scores based on their respective locations on the scored segments. Through this quantitative approach, the City can consistently compare the level to which different projects align with the BPTP Update goals of Safety and Connectivity and do so in a repeatable way.

After the initial prioritization, the Project team will further assess the top ranked bikeways, crossings, intersections, studies, and special projects (those scoring higher than 70 points) through a supplemental evaluation that is more qualitative in nature and intended to further differentiate projects with similar scores to create an implementation order. Each of the higher scoring projects will be evaluated against the same subset of criteria and scored qualitatively using a scale of high, medium, and low, for its performance. This supplemental evaluation provides a more nuanced and in-depth understanding of the factors of Project Readiness, Project Cost and Funding Opportunities, and Project Support to allow for more informed decisions about implementation. The draft supplemental evaluation metrics and scoring rubric are outlined in Table 5.

**Table 5: Draft Supplemental Evaluation Metrics and Scoring Rubric**

| Factor | Evaluation Metrics | Scoring Scale | | |
|---|---|---|---|---|
| | | Low | Medium | High |
| **Project Readiness** | What stage of development is the project in? | The project is not on the repaving plan, GSI priority street, or CIP list.<br>The project requires reconstruction or right-of-way acquisition. | The project may be on the repaving plan, GSI priority street, or the CIP list.<br>The project may require reconstruction or lane reconfiguration or right-of-way acquisition. | The project is on the repaving plan, GSI priority street, or the CIP list. Concept or construction plans have been developed.<br>The project does not require right-of-way acquisition but may require lane reconfiguration or reconstruction. |
| **Project Cost and Funding Opportunities** | What is the likelihood of receiving funds for the project? | The project is not on the repaving plan or the CIP list.<br>The project is far from housing opportunity sites.<br>The project may not be competitive for various funding sources. | The project may be the repaving plan or the CIP list.<br>The project may be close to housing opportunity sites.<br>The project may be competitive for multiple funding sources. | The project is on the repaving plan or the CIP list.<br>The project is close to housing opportunity sites.<br>The project is expected to be competitive for multiple funding sources. |
| **Project Support** | What level of support does the project have? | Support for the project has not been expressed. | Some support for the project has been expressed. | Strong support for the project has been expressed. |

## Next Steps

Kittelson will apply the initial prioritization methodology to develop a preliminary ranking of the project list. After the projects are ranked, Kittelson will collaborate with City staff to review the initial evaluation list and identify additional projects that may warrant further review as part of the supplemental evaluation. After the project list for supplemental evaluation has been finalized, Kittelson will conduct the supplemental evaluation and develop a near-term action plan that identifies the top priority projects for implementation.