Today's Presentation

⇨ **Introduction and housekeeping**

⇨ **Audio issues?**
Dial into the phone line instead of using "mic & speakers"

⇨ **PBIC Trainings and Webinars**
www.pedbikeinfo.org/training

⇨ **Registration and Archives at**
pedbikeinfo.org/webinars

⇨ **PBIC News and updates on Facebook**
www.facebook.com/pedbike

⇨ **Questions at the end**

The ActiveTrans Priority Tool (APT)

A flexible, data-driven methodology for prioritizing
bicycle and pedestrian improvements along existing roads
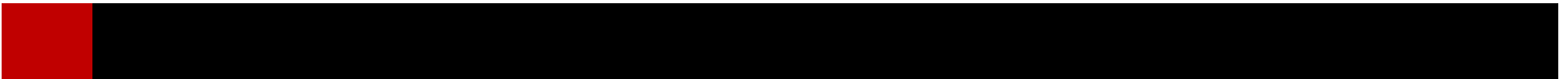
Presentation outline

- Why prioritize?
- What is the APT?
- Why prioritize with the APT?
- How the APT was developed
- APT Overview
- How the APT can help you
- The APT in Action
- APT resources

Photo by Michael Hintze

Why is prioritization important?

- Lots of needs, but limited resources
- Need to make wise choices about how resources are used
- Need to communicate choices to others
- Need to build public/political support for action
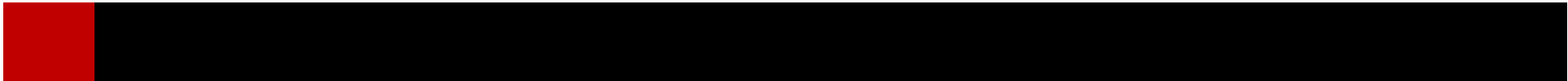- May be required for funding purposes

Photo by Michael Hintze

What's the APT?

- A method for prioritizing pedestrian and bicycle facility improvement locations along existing roads.

- APT Materials:
  - APT Guidebook
  - GIS guidance
  - Programmed Spreadsheet and User Guide
  - Screencast
  - Brochure/Poster
  - NCHRP 07-17 Final Report with research approach and findings

Uses of the APT

- Addresses pedestrian and bicycle improvements separately but can be used as part of a "complete streets" prioritization process

- Applies at state, regional, and local levels.

- May be applied once or iteratively

- *Does not provide guidance for determining pedestrian and bicycle facility design solutions*

Why prioritize with the APT?

- Transparent
- Flexible
- Responsive
- Supported by research

- **Save time and effort ($$$) versus creating a prioritization method from scratch**

Photo by Michael Hintze

The APT Research Process

- Literature review
- Survey
- Interviews with transportation agencies
- Feedback from NCHRP panel
- Pilot tests
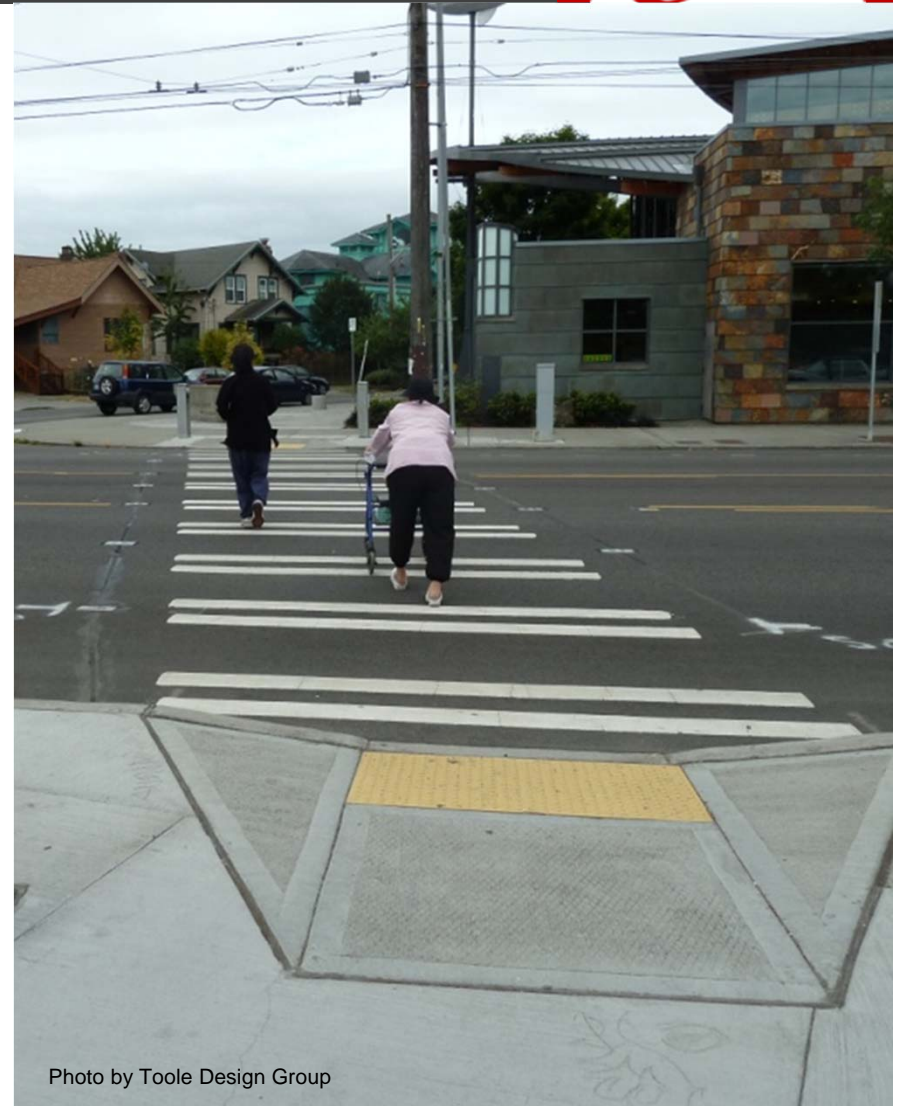
Photo by Toole Design Group

Agency Interviews

Agency	Type	Population
Yountville, CA*†	City	3,000
Breckenridge, CO	City	4,540
Cheverly, MD*	City	6,200
Madras, OR*	City	6,250
Houghton, MI	City	7,700
Salisbury, NC†	City	34,000
Burlington, VT†	City	42,000
Carmel, IN	City	79,000
Roseville, CA	City	119,000
French Broad River MPO (Asheville, NC area)	MPO	417,000
Portland, OR†	City	584,000
Wilmington Area Planning Council (DE-MD)†	MPO	640,000
Charlotte, NC†	City	731,000
Knoxville RTPO	MPO	850,000
Delaware DOT	State	907,000
Massachusetts DOT	State	6,587,000
North Carolina DOT†	State	9,656,000
Washington State DOT†	State	6,830,000
Michigan DOT	State	9,876,000

Pilot Testing the APT

- Pilot Communities
  - Bellingham, WA
  - Bend, OR
  - Carmel, IN
  - Gastonia, NC
  - Miami, FL
  - Phoenix, AZ
  - Alameda County, CA Transportation Commission
  - Casper Area MPO, WY
  - Humboldt County, CA Association Of Governments
  - *New Mexico DOT*
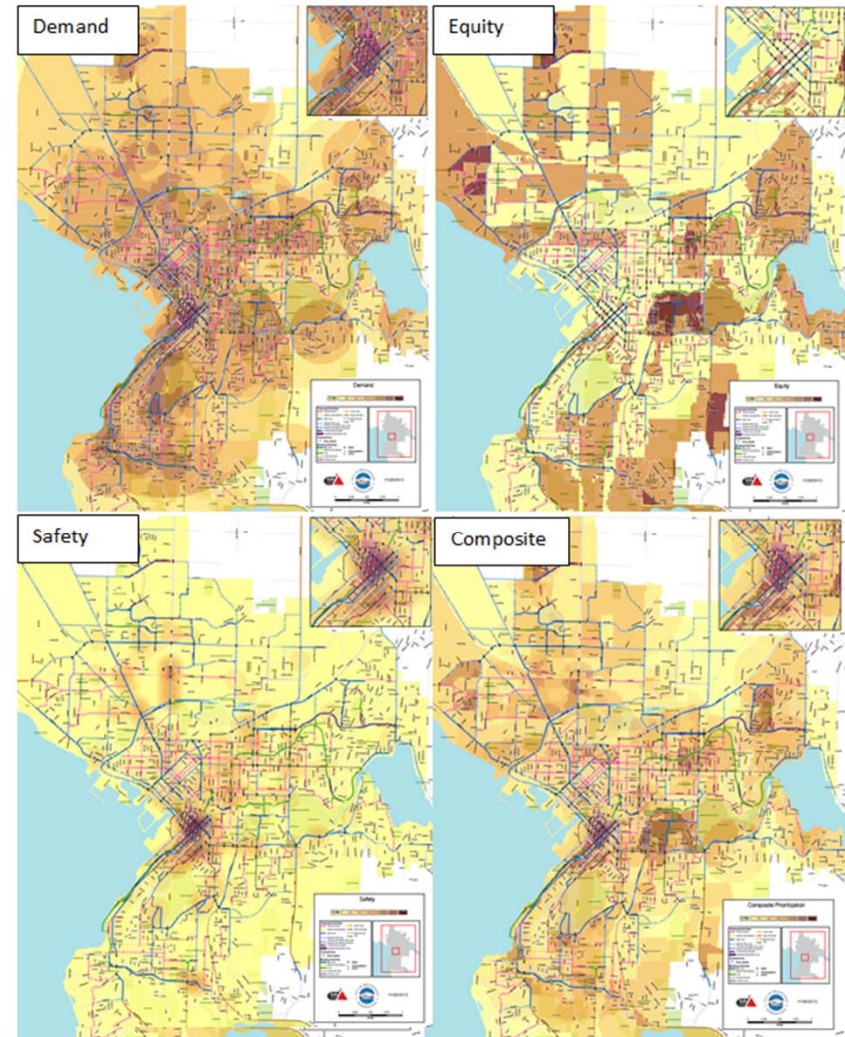
State of the Practice: Lessons Learned

- Prioritization is common among agencies (though some efforts are poorly documented)

- Wide range of methods, but similar frameworks

- Prioritization = balancing needs vs. feasibility

Photos by Robert Schneider

State of the Practice: Lessons Learned

- Pedestrian & bicycle modes sometimes prioritized separately; sometimes together
- Pedestrian & bicycle prioritization differed by scale, emphasis (segment vs. intersection; focus areas vs. connectivity)
- Different weights used for criteria; reflect agency goals
- Many methods are "data hungry"
- Data collection & analysis technologies evolving quickly
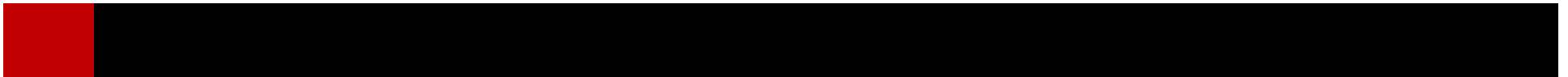
State of the Practice → APT

- Don't reinvent the wheel
  - Similar approach used by many agencies: common factors
  - But still provide flexibility
- Open the "black box"
  - qualitative, political → quantitative, transparent
- Develop common language
- Offer guidance for important decision points

Photo by Robert Schneider

What about "Complete Streets"?

- Some responded: Making ped/bike improvements as a part of other projects doesn't involve prioritization
- BUT: Opportunity to rethink overall transportation project prioritization → more weight to projects with ped/bike elements?

How does the APT work?

- ## Phase I: Scoping
  - Initial deliberation and preparation necessary to set up the prioritization process

- ## Phase II: Prioritization
  - Process of calculating prioritization scores for each improvement location based on scoping in Phase I

Photos by Robert Schneider

Common Language: Key Terms

- **Improvement Locations**
  - Specific intersections, roadway segments, corridors or areas that are prioritized.

- **Factors**
  - Categories used to express community/agency values and group variables with similar characteristics (e.g. equity, demand).

- **Variables**
  - Characteristics of roadways, households, neighborhood areas, and other features that can be measured (e.g. population density, sidewalk presence).

- **Weights**
  - Numbers used to indicate the relative importance of different factors based on community or agency values.

- **Scaling**
  - Process of making variables comparable to one another (e.g. speed vs. ADT)

APT Overview—Phase I: Scoping
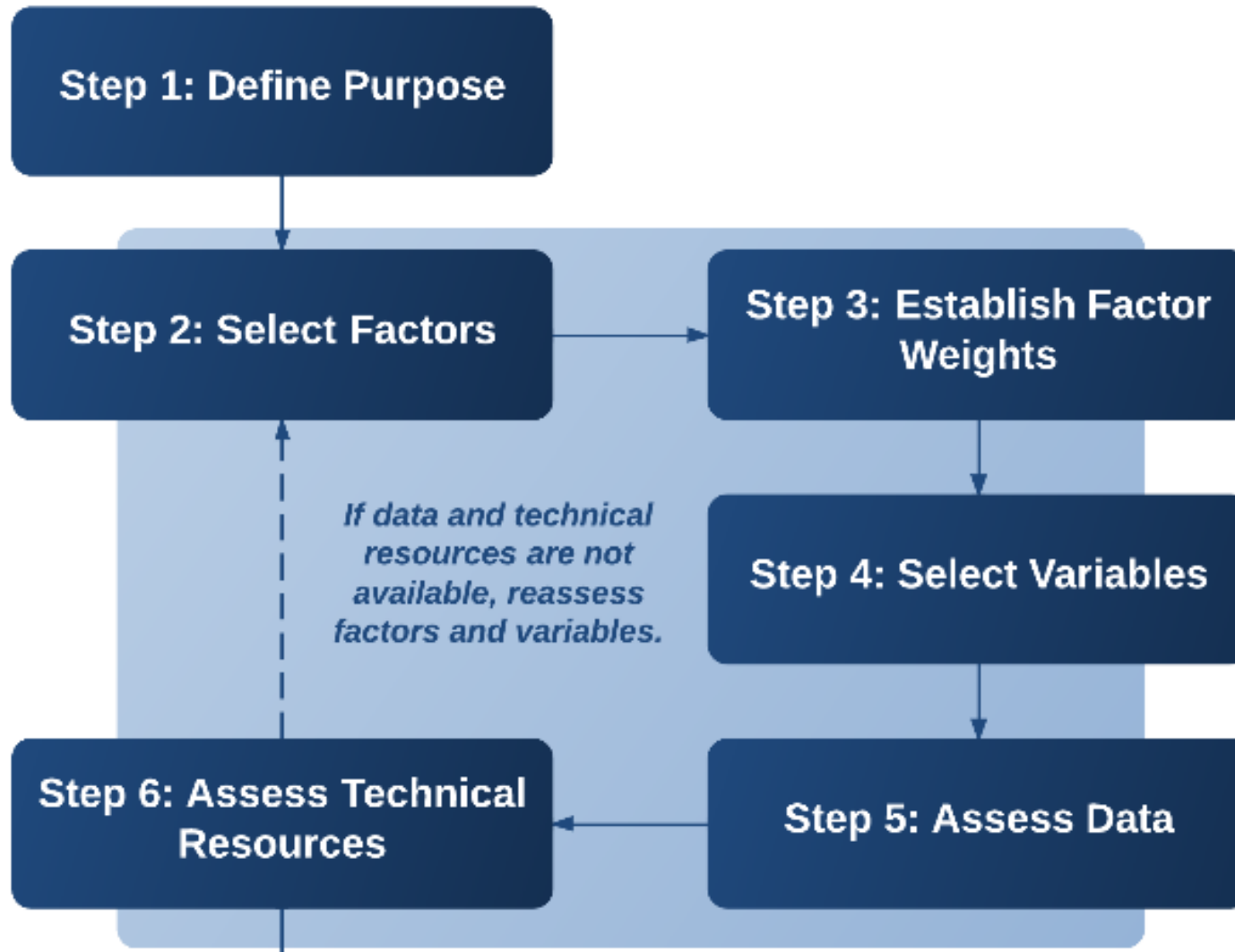
Step 1: Define Purpose

- Mode
- Goals
- Improvement-specific vs. general location
- Type/extent of improvement locations
- Number of improvement locations

Photo by Michael Hintze

Step 2: Select Factors
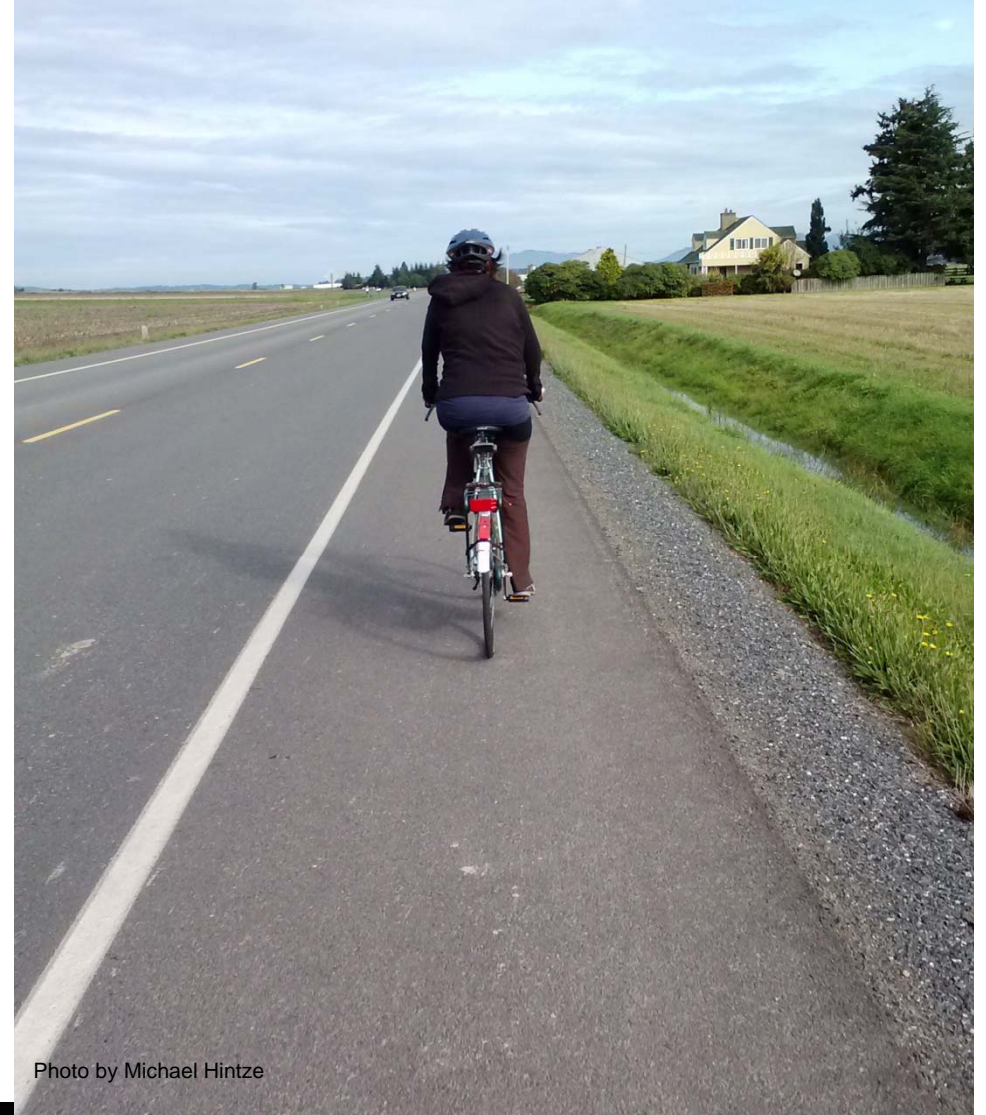
1. Stakeholder Input
2. Constraints
3. Opportunities
4. Safety
5. Existing Conditions
6. Demand
7. Connectivity
8. Equity
9. Compliance

Photos by Robert Schneider

Step 2: Select Factors

Prioritization Purpose Examples	Stakeholder Input	Constraints	Opportunities	Safety	Existing Conditions	Demand	Connectivity	Equity	Compliance
Segment									
Given a neighborhood where sidewalks are absent, select 30 segments to construct new sidewalks over the next three years	●	◑	◑	●	●	●	◑	●	○
Intersection/Crossing									
Given a regional trail with 50 unsignalized roadway crossings, identify 12 crossings for safety enhancements	●	○	◑	●	●	◑	○	◑	●

● = Very relevant; ◑ = Less relevant; ○ = Not likely relevant
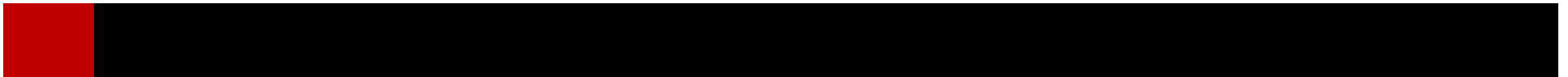
Step 3: Establish Weights
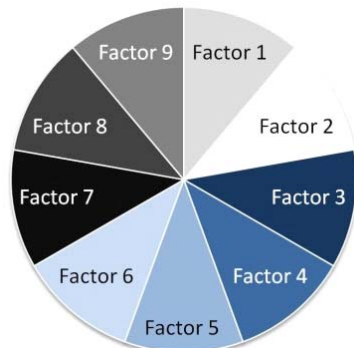
Nine Factors
Equally Weighted
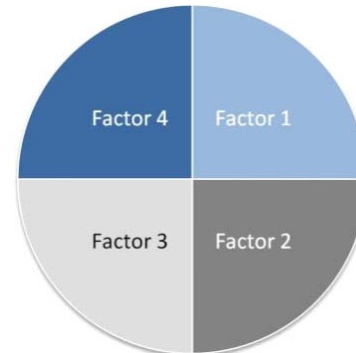
Four Factors
Equally Weighted
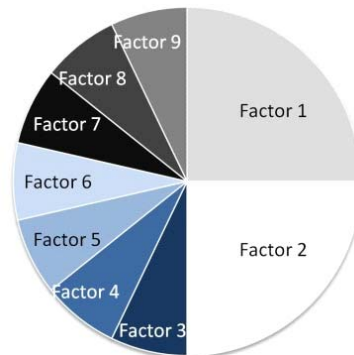
Nine Factors
Factors 1 and 2 weighted more heavily
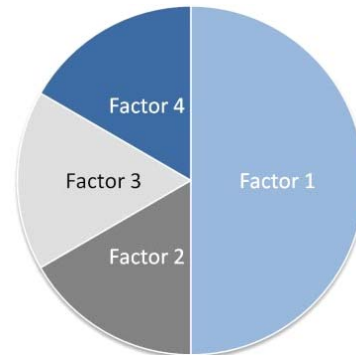
Four Factors
Factor 1 weighted more heavily

Relative impact of factors if weighted differently
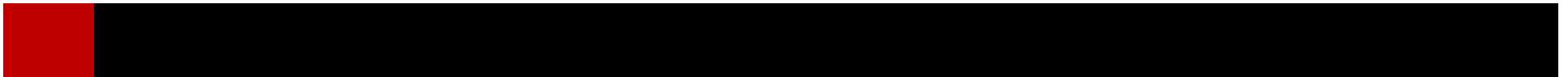
Step 4: Select Variables

- Set of possible variables is included for each factor category

- Possible variables came from:
  - Literature review
  - Agency survey
  - Best practice guidance from organizations such as NCHRP, FHWA, AASHTO, NACTO, and ITE.
  - Professional experience of research team

APT Variable Sources: Pedestrian Suitability Assessment

Variable	Pedestrian Level of Service (LOS) (Segment)	Pedestrian Level of Service (LOS) (Uncontrolled Crossing)	Pedestrian Level of Service (LOS) (Signalized Intersection)	FHWA Crosswalk Guidelines	Pedestrian Intersection Safety Index (ISI)	Pedestrian Crash Modification Factors
Traffic speed in the parallel direction of travel or roadway being crossed	X	X	X	X	X	
Traffic volume and composition (proportion heavy vehicles) in the parallel direction of travel or roadway being crossed	X	X		X	X	
Right-turn-on-red restricted/allowed			X			X
Signal timing (e.g., leading pedestrian interval, pedestrian clearance time, pedestrian and bicycle delay)						X
Presence/type of traffic control (e.g., traffic signal, stop sign)					X	
Presence of crosswalk warning signs or beacons (e.g., in-street crossing signs, rectangular rapid flashing beacons, pedestrian hybrid beacon)		X				X
Number of general-purpose (through) lanes in the parallel direction of travel or being crossed	X		X	X	X	

Note: A complete list of Existing Conditions variables is included in the APT Guidebook

APT Variable Sources: Pedestrian Demand Models

Variable	Maryland Meso-Scale Model of Pedestrian Demand	Charlotte, NC Signalized Intersection Pedestrian Volume Model	Alameda County, CA Intersection Pedestrian Volume Model	San Francisco Intersection Pedestrian Volume Model (1)	Santa Monica, CA Pedestrian Volume Model	San Diego, CA Pedestrian Volume Model	Montreal, QC Signalized Intersection Pedestrian Volume Model
Population or housing unit density	X	X	X	X		X	X
Employment density	X	X	X	X	X	X	
Commercial retail property density/accessibility/proximity	X		X		X	X	X
Transit station or stop density/accessibility/proximity		X	X	X	X	X	X
Density/accessibility/proximity of attractors (grocery stores, restaurants, coffee shops, banks, parks, schools)							X
Land use mix		X		X			

Note: A complete list of Demand variables is included in the APT Guidebook

APT Variables: Existing Conditions

| Example Variables	Relevance		Potential Location
	Ped	**Bike**	
Note: The relevance designations in this table are meant to provide general guidance. Ultimately, variable relevance depends on the prioritization purpose. Agencies are encouraged to review each variable and consider how relevant it may be considering their purpose. Appendix C provides references for the variables listed in this table to assist practitioners in finding additional information.	● = Very relevant ◑ = Less relevant ○ = Not likely relevant		S = Segment Cr = Crossing Co = Corridor A = Area
Traffic speed[1]	●	●	Cr, S, Co
Traffic volume and composition (percentage of heavy vehicles)	●	●	Cr, S, Co
Right-turning traffic volume	◑	●	Cr
Type of traffic control (e.g., traffic signal, stop sign)	●	●	Cr
Presence of crosswalk warning signage or beacons	◑	◑	Cr
Width of outside through lane	○	●	S, Co
Presence and width of buffer between sidewalk and moving traffic	●	○	S, Co

Note: A complete list of Existing Conditions variables is included in the APT Guidebook

Step 5: Assess Data

Inventory readily available data

(e.g., roadway data, land use, traffic counts)
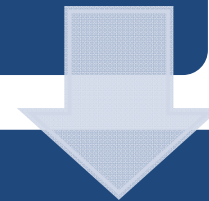
Seek other data sources (if necessary)

(e.g., regional, state or federal agency data, open data sources)
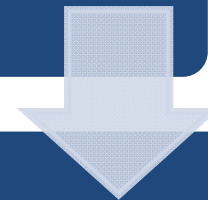
Collect new data (if necessary)

- Generate data from GIS analysis (see Step 8)
- High-level collection (e.g., using aerials, Street View imagery)
- Field verification/assessment
- Automatic (counters, video)

Or- don't use that variable if no data is available!

Guidance on Data Sources

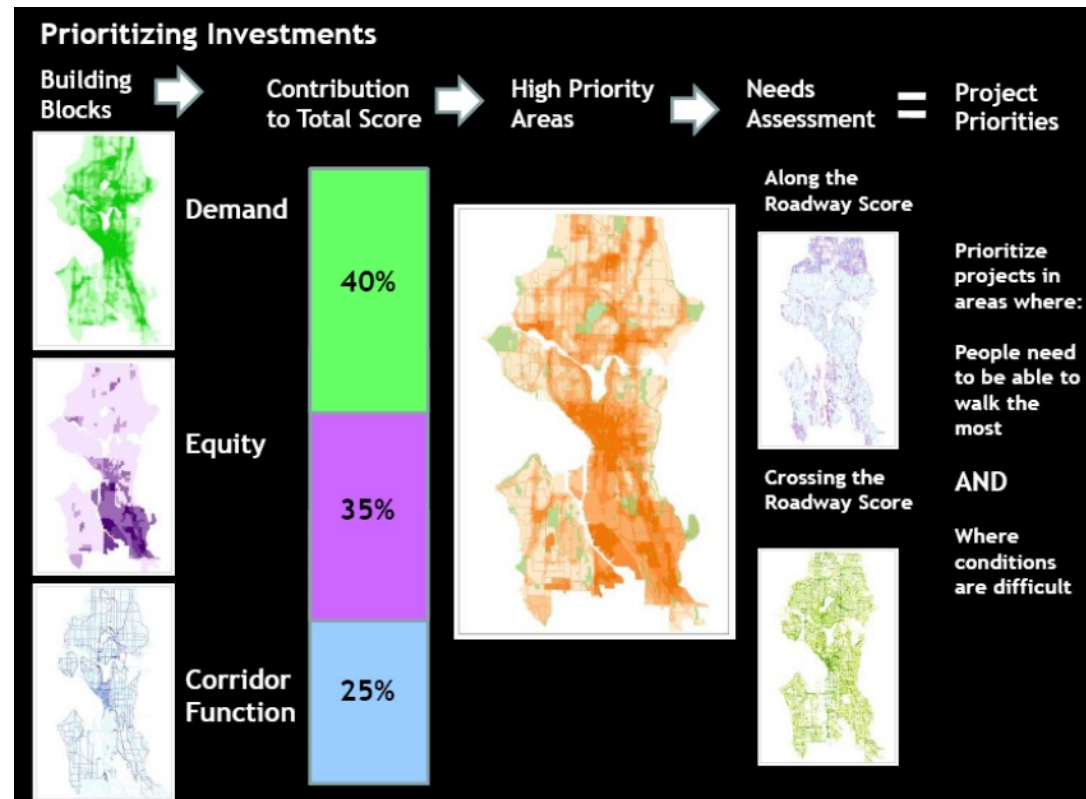| Example Demand Proxy Variables	Data Considerations/Sources
Population density	Population of given geography divided by its area, U.S. Census
Employment density	Employment is often compiled at the regional level and made available to local agencies by request from the Census Transportation Planning Package for traffic analysis zones. Density is calculated by dividing the number of employees by a measure of area. Longitudinal Employer-Household Dynamics (LEHD) is another U.S. Census program that can provide employer/employee data estimates.
Transit station or stop density/proximity/accessibility	Point data typically maintained by transit agency
Socioeconomic characteristics (e.g., proportion of neighborhood residents living in poverty or without access to an automobile)	U.S. Census data (block group-level data may be most appropriate for projecting demand). Note: This type of data may also be used for variables within the Equity factor.
Proximity to or number of bike share docking stations	Point data layer of bike share stations

Guidance on Data Collection

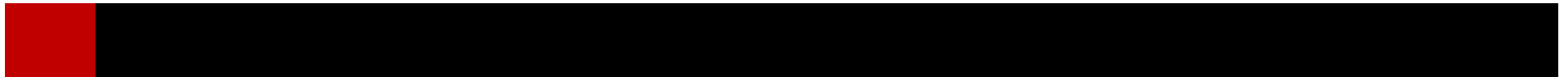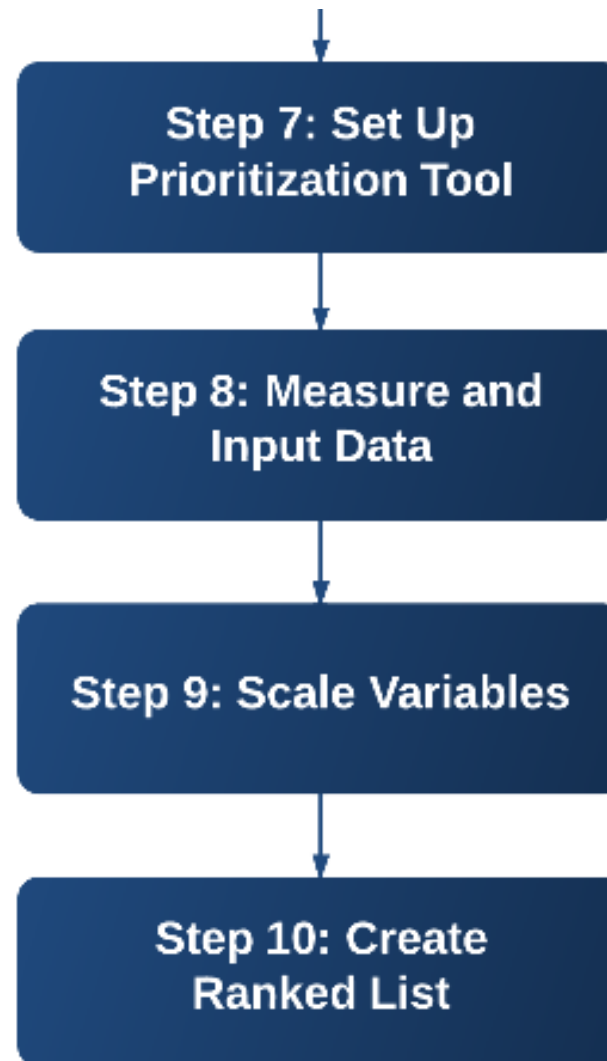| Inventory Data Source/Tool	Can be used to inventory data for these variables
Aerial Imagery	• Sidewalk and buffer presence and width • Marked crosswalk presence and type • Median island presence and width • Bicycle facility presence and width • Lane width/shoulder width • Pedestrian crossing distance
Street-Level Imagery (e.g. video log, Street View)	• Curb ramp presence • Truncated domes presence • Pedestrian/bicycle-related signage • Major sidewalk obstructions • Pedestrian signal heads • Pedestrian push buttons
Direct Field Observation (using technological data collection tools or manual observations)	• More precise lane width/shoulder width • Traffic volume • Traffic speed • Sidewalk condition • Crosswalk condition • Pavement condition • Curb ramp slope • On-street parking presence and occupancy

Step 6: Assess Technical Resources

Step 10A: Calculate Priority Score						
ID	LOCATION	Safety SCORE	Safety WEIGHTED SCORE	Demand SCORE	Demand WEIGHTED SCORE	Prioritization Score
1	Pine St	0.0	0.0	2.5	25.0	25.0
2	Marion St	10.0	100.0	3.0	30.0	130.0
3	Hinds St	0.0	0.0	5.0	50.0	50.0
4	Lander St	7.0	70.0	9.5	95.0	165.0
0		0.0	0.0	0.0	0.0	0.0

- APT is intended to work for a range of technological capabilities

GIS Example Source: Seattle Pedestrian Master Plan, 2009

APT Overview—Phase II

Step 7: Set Up Prioritization Tool

Step 8: Measure and Input Data

Step 9: Scale Variables

Step 10: Create Ranked List

The APT in Action--Phoenix

Develop Demand Heat Map and Identify Corridors

Prioritize Corridors and Separate into 3 Tiers

Rank Improvements along Corridors
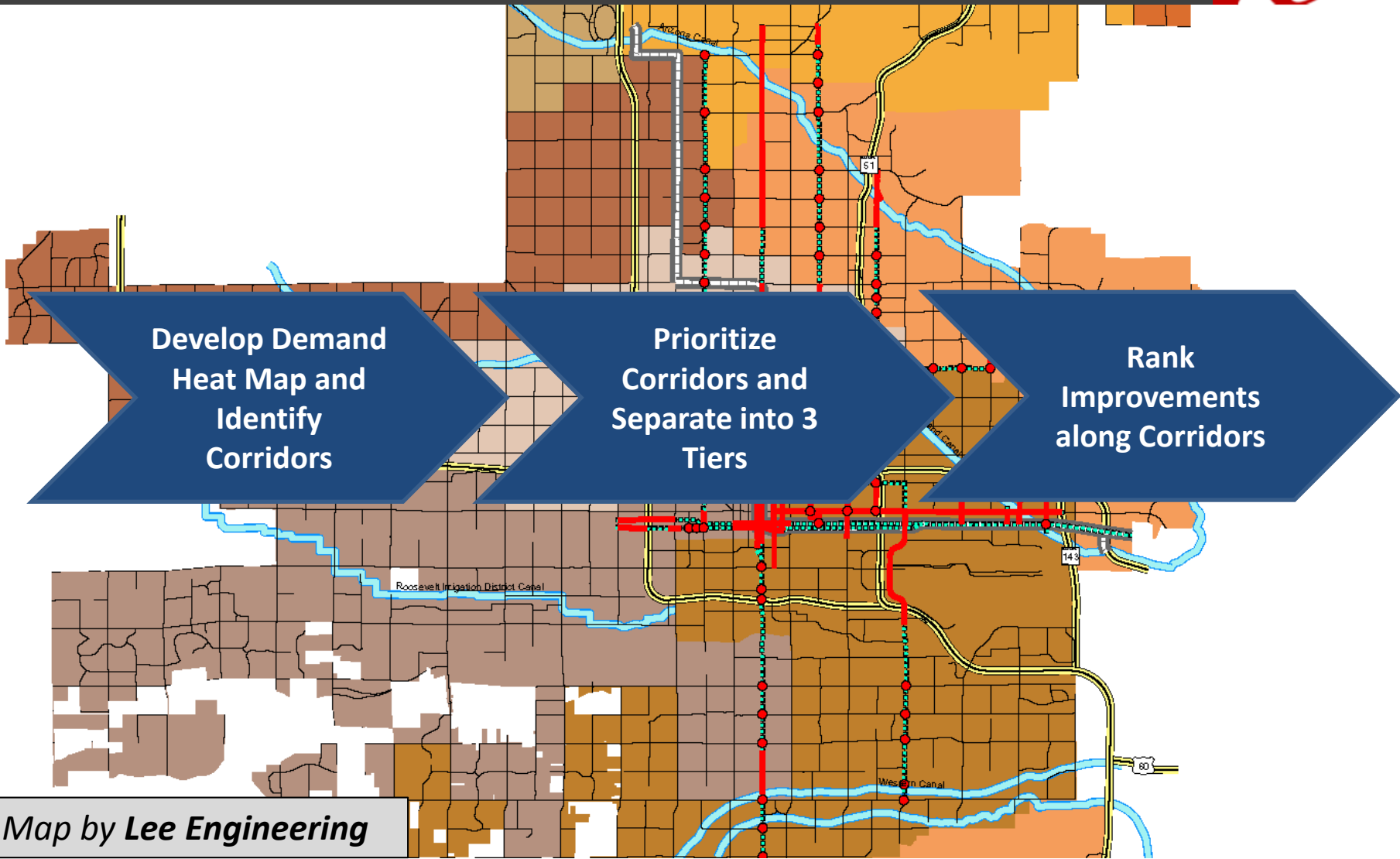
*Map by **Lee Engineering***

Phoenix – Iteration 1
Identify High Demand Areas

Calculating DEMAND

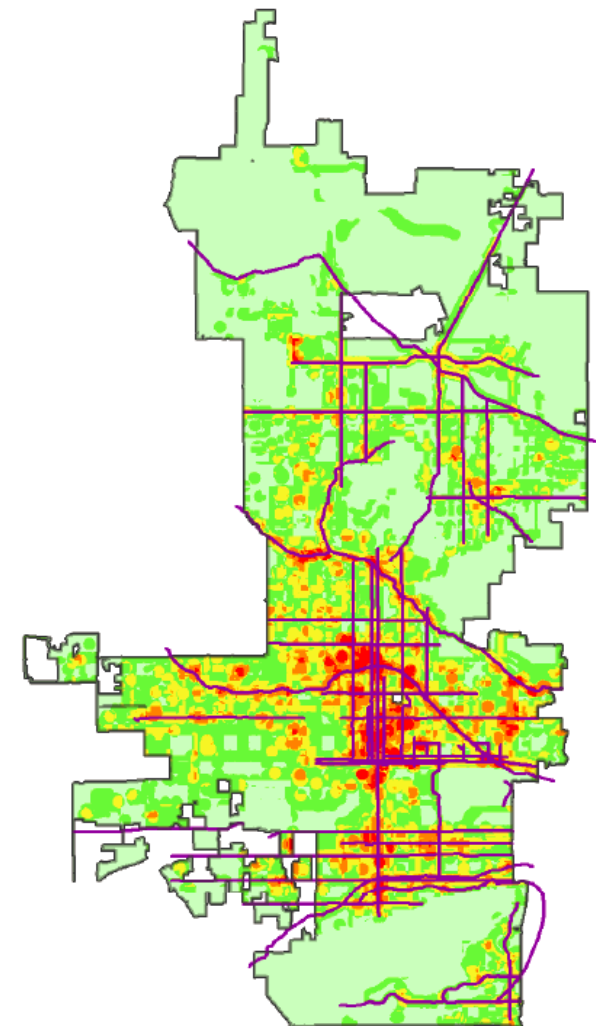| Variable	Source
Schools	City of Phoenix
Bus Stops	City of Phoenix
City Facilities (e.g. libraries, municipal offices, etc.)	City of Phoenix
Community Centers	City of Phoenix
Light Rail Stops	Valley Metro
Park and Rides	Valley Metro
Parks	City of Phoenix
Existing Bikeways	City of Phoenix
Wikimap Routes	Wikimap
Wikimap Destinations	Wikimap
% of Households in Poverty	U.S. Census
% of Population under 18	U.S. Census
% Households with No Vehicle	U.S. Census
Population Density	City of Phoenix
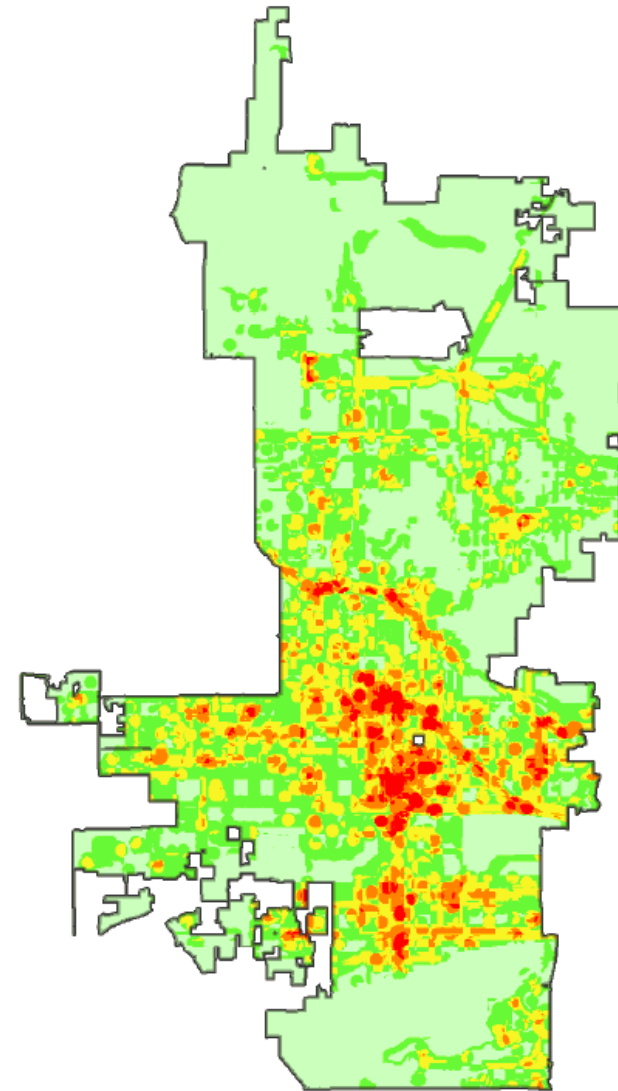
Phoenix – Iteration 2
Identify Priority Corridors

Factor	Weight	Variable	Source
Connectivity	10	Number of times corridor intersects other corridors	N/A
		Number times corridor intersects bicycle facilities	N/A
		Presence of existing bicycle facilities	City of Phoenix
Demand	7	Primary attractors (light rail stops, colleges/universities) within 1 mile of the corridor	Valley Metro Google Maps
		Secondary attractors (schools, city facilities, community centers, park and rides, parks) within ¼ mile of the corridor. Also includes bus stops directly on the corridor	City of Phoenix
			Valley Metro
		Land Use (commercial and high-density housing)	City of Phoenix
		Population Density	City of Phoenix
		% Households in Poverty	U.S. Census
		% Households with No Vehicle	U.S. Census
		% of Population under 18	U.S. Census
		Bicycle Trip Origin and Destination Zip Codes from the Maricopa County Trip Reduction Survey	MAG
Stakeholder Input	3	Wikimap Destinations (included public meeting input and transit center surveys)	Wikimap
		Wikimap Routes (included public meeting input)	Wikimap
		Ad Hoc Task Force input	Task Force
		Technical Advisory Committee input	TAC

Phoenix — Iteration 3
Identify Priority Projects

Factor	Variable	Source
Connectivity	Bicycling Barriers	Wikimap
	Existing Bikeways	City of Phoenix
Safety	Bicycle Crashes	MAG
	% of Population under 18	U.S. Census
Existing Conditions	Posted Speed Limit	City of Phoenix
	Street Classification	City of Phoenix
Constraints	Order of Magnitude Cost	Lee Engineering
	Available Rights of Way	City of Phoenix
Demand	Tier 1 Attractors (light rail stops, colleges/universities, schools)	Valley Metro / Google Maps
	Tier II Attractors (bus stops, bikeshare stations, city facilities, community centers, park-and-rides, parks)	City of Phoenix / Valley Metro
	Population Density	City of Phoenix
	Land Use (commercial and high-density housing)	Maricopa County
Equity	% Households in Poverty	U.S. Census
	% Households with No Vehicle	U.S. Census
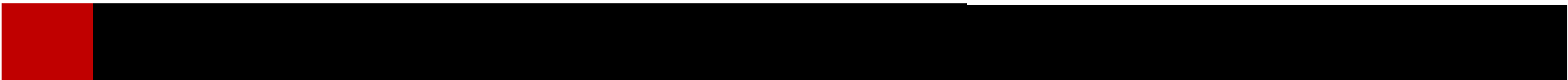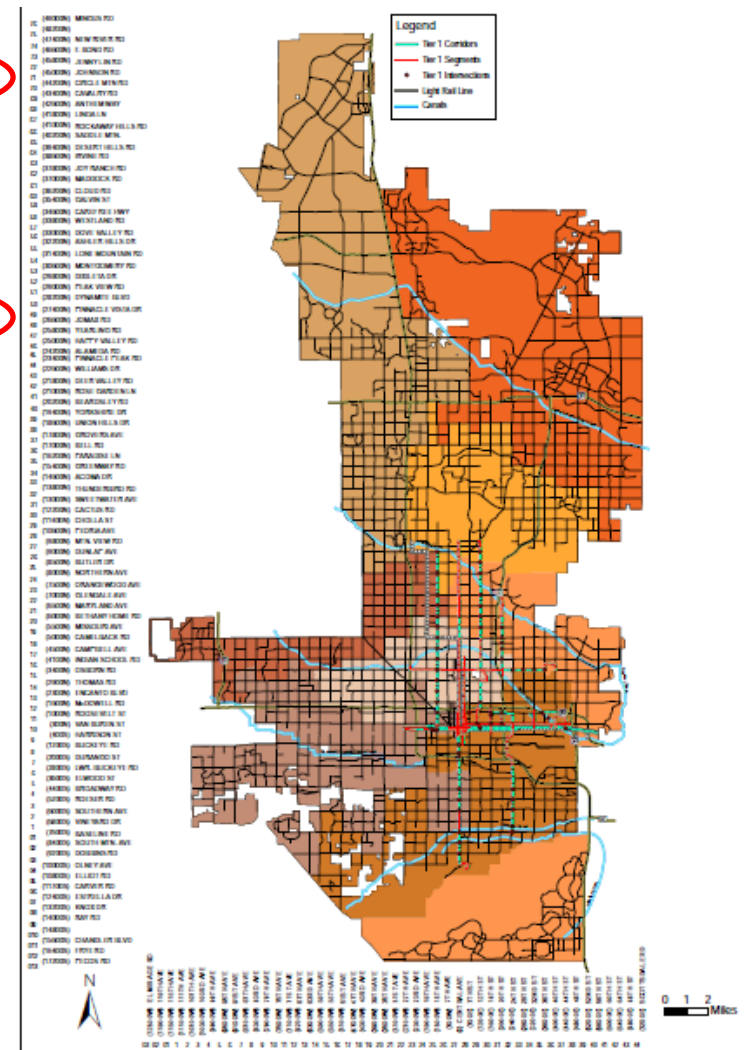
APT Resources

- APT Guidebook
- Programmed Spreadsheet and User Guide
- GIS guidance
- Screencast
- Brochure
- NCHRP 07-17 Final Report with research approach and findings

www.pedbikeinfo.org/apt

How the APT can help you

| What do you want to do?	How the APT can help
Prioritize pedestrian or bicycle improvements for the first time	• Offers guidance for practitioners in local, regional, and state agencies that want to establish a prioritization process that is flexible, transparent, and incorporates agency/community values. • Guides users through a logical sequence of steps and provides tips intended to save agencies time by facilitating important decisions around factor and variable selection; data collection, organization, and analysis; and tools and techniques for calculating prioritization scores.
Update /Compare an Existing Prioritization Process	• Provides research-based guidance on additional factors and variables that may be used. • Offers ideas for integrating data that is more qualitative into a quantitative framework.
Identify areas most in need of investment for walking or biking (Planning Level Prioritization)	• Suggests variables for identifying areas (e.g., corridors, neighborhoods, communities) for further analysis.
Prioritize walking or biking investments at specific identified locations (Project Prioritization)	• Suggests variables for prioritizing specific project locations (e.g., intersections, roadway segments, corridors).

How the APT can help you

What do you want to do?	How the APT can help
Express community values in planning and project priorities	• Provides a method for incorporating variables based on community values and available data. • Offers ideas for integrating data that is more qualitative into a quantitative framework.
Engage stakeholders/public in prioritization process	• Establishes a transparent, data-driven decision-making process. • Provides framework for integrating stakeholder/public input.
Conduct funding-decision prioritization	• Establishes a transparent, data-driven funding decision-making process. • Communicates objective prioritization method and results to the public and other stakeholders.
Prioritize list of "Complete Streets" projects to maximize benefits for walking or biking.	• Identifies variables that are applicable to both pedestrian and bicycle modes. • Allows pedestrian and bicycle improvements to be prioritized separately and then combined to identify locations most in need of complete streets improvements.

Questions & Discussion

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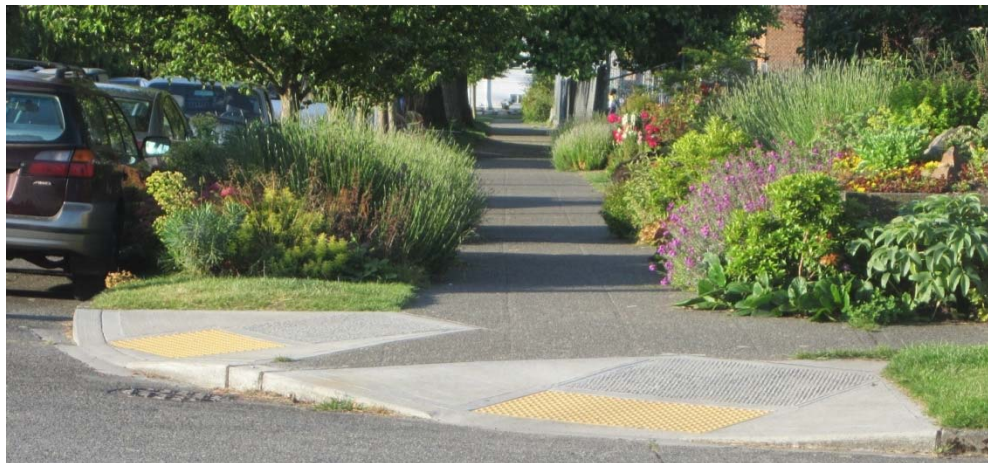
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