The ActiveTrans Priority Tool (APT)

Photo Sources: Toole Design Group

Using the APT Priority Tool

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

U.S. Department of Transportation
Federal Highway Administration

Agenda

- What is the APT?
- Why prioritize with the APT?
- How the APT was developed
- APT overview
- The APT in action
- APT resources
- Walk-through APT tool

If you have follow-up questions, please contact

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Question…

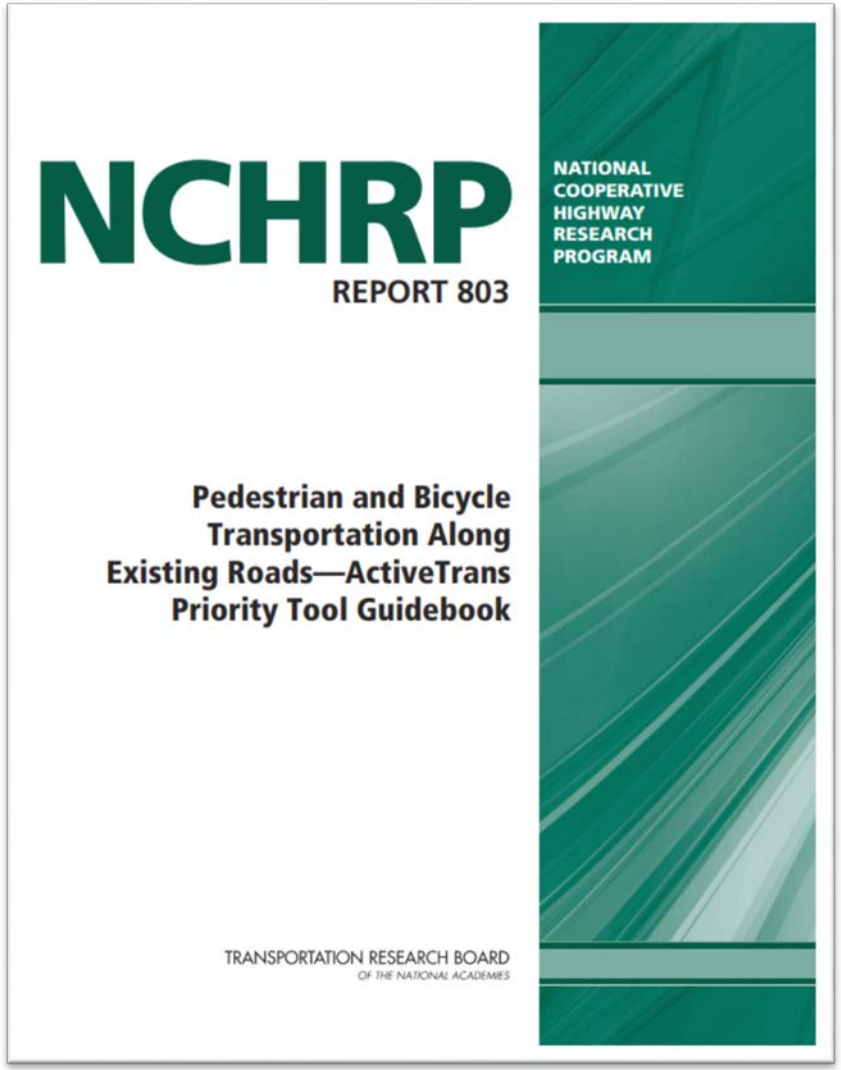
Describe your agency's current pedestrian and bicycle project prioritization methodology?

Photo by Toole Design Group

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



Why is prioritization important?

- To make wise choices about how resources are used
- To communicate choices to others
- To build public/political support for action
- May be required for funding purposes

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Uses of the APT

Use to:

- Prioritize locations for applying countermeasures (e.g. 10 corridors experience high pedestrian crash rates – prioritize)
- Prioritize locations for applying a selected countermeasure (e.g. 100 locations need curb ramps - prioritize)
- ***Does not provide guidance for determining pedestrian and bicycle facility design solutions***

Uses of the APT (continued)

- Originally designed to prioritize locations for pedestrian and bicycle improvements
- Can also be used to prioritize locations for other modes
- Can be applied at the state, regional, and local levels.
- May be applied once or iteratively

Uses of the APT (continued)

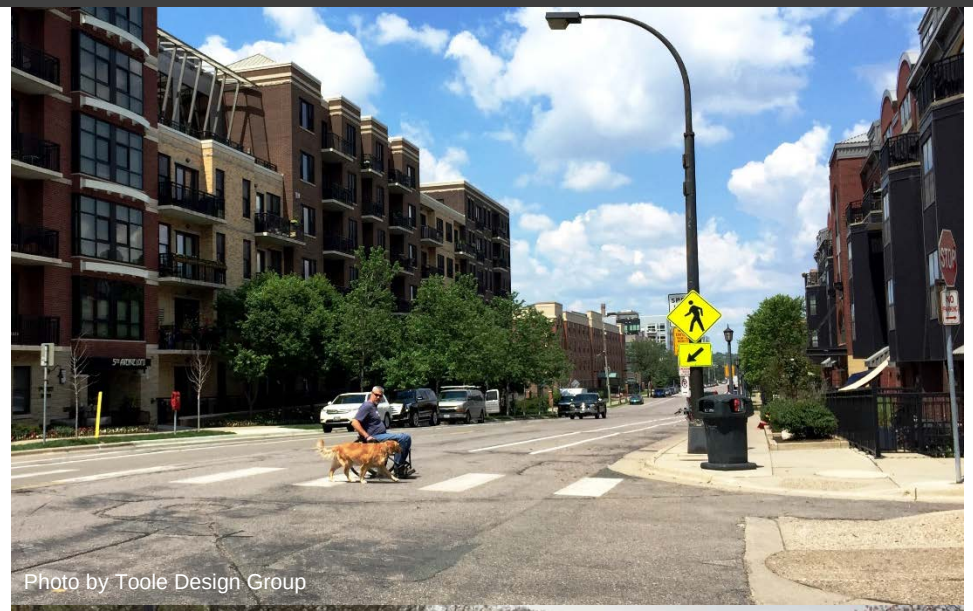
APT can prioritize pedestrian safety projects quickly, easily, and uses a clear methodology

- Intersections/Crossings
  - Pedestrian Hybrid Beacon, pedestrian refuge islands, crosswalks, curb extensions, etc.
- Roadway Segments
  - Closing sidewalk gaps, improved lighting, etc.
- Roadway Corridors
  - Road diet, etc.
- Neighborhoods/Areas
  - Installing sidewalk network, neighborhood greenway, etc.

Why prioritize with the APT?

- Transparent
- Flexible
- Responsive
- Supported by research

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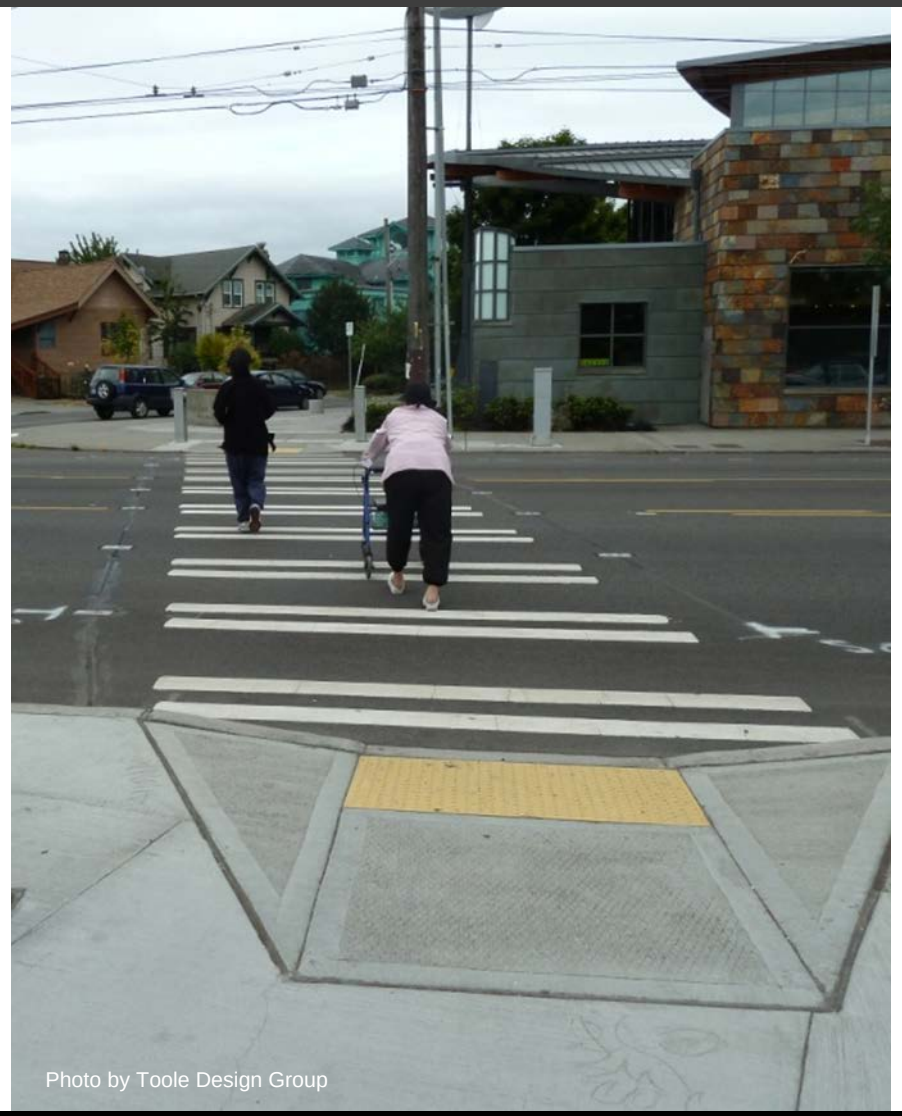
The APT Research Process

How was the APT developed?

- Literature review
- Survey
- Interviews with transportation agencies
- Feedback from NCHRP panel
- Pilot tests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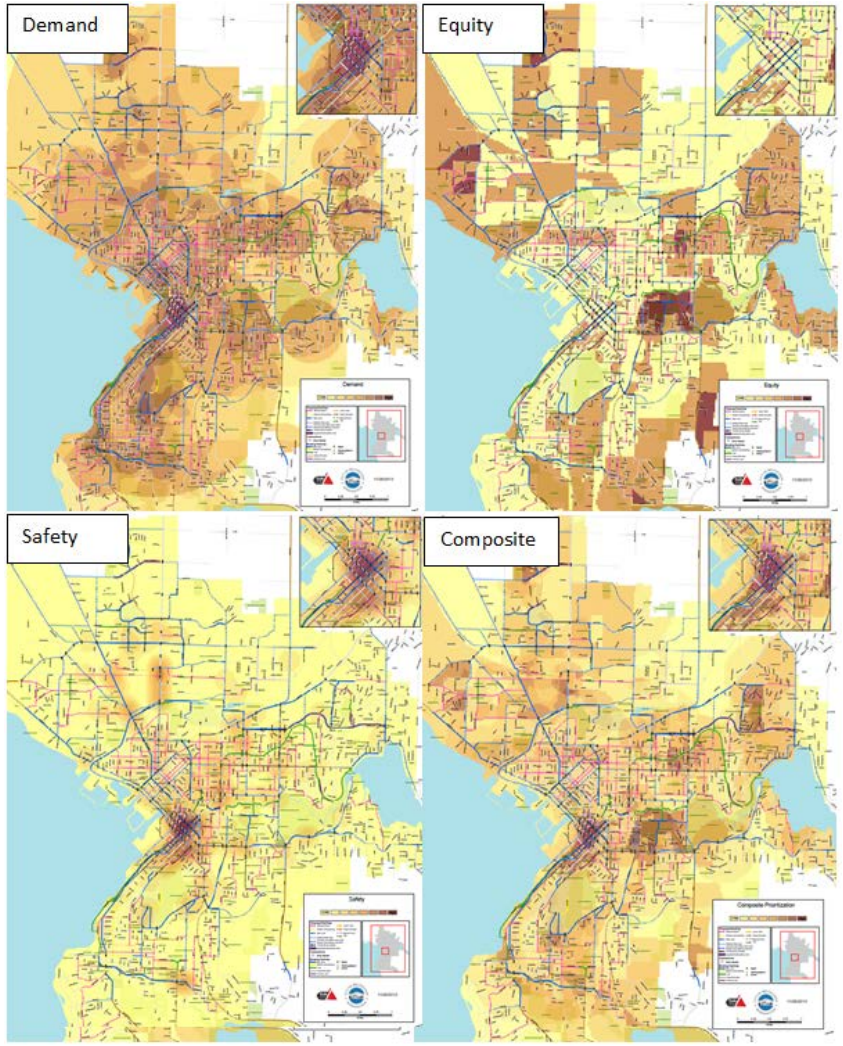
Pilot Testing the APT

- 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*



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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 Michael Ronkin

State of the Practice: Lessons Learned

- Found that there is a demand for an adaptable method
- 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
- Existing tools cost money to use and are not transparent
- Pedestrian prioritization = safety (crash data)
- Bicycle prioritization = public input and opportunity

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

Questions?

Questions before covering how the APT tool works?

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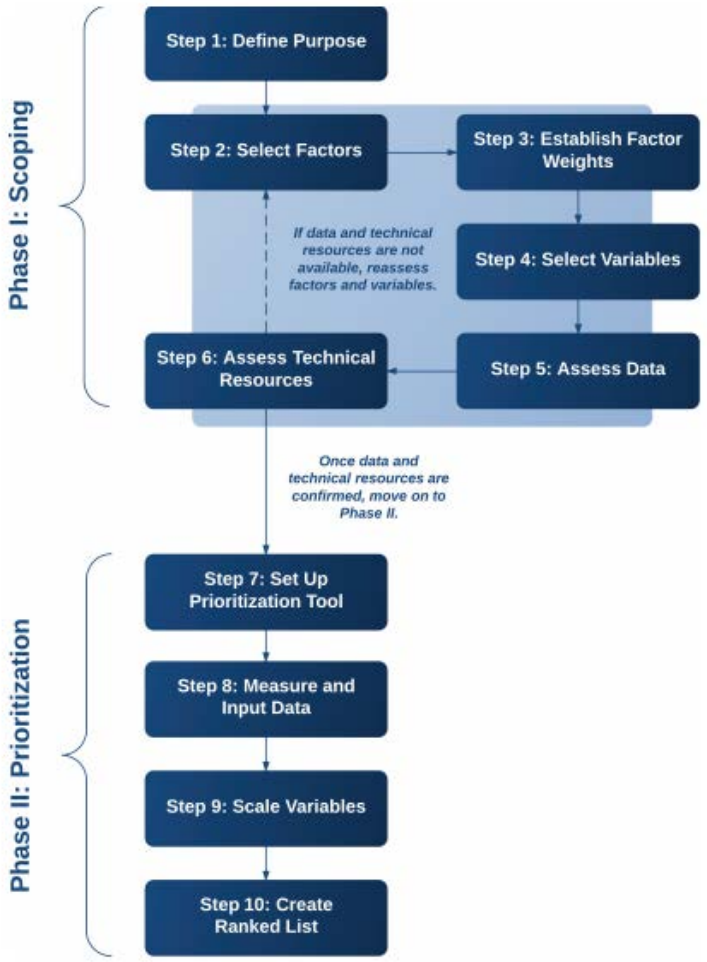
How does the APT work?

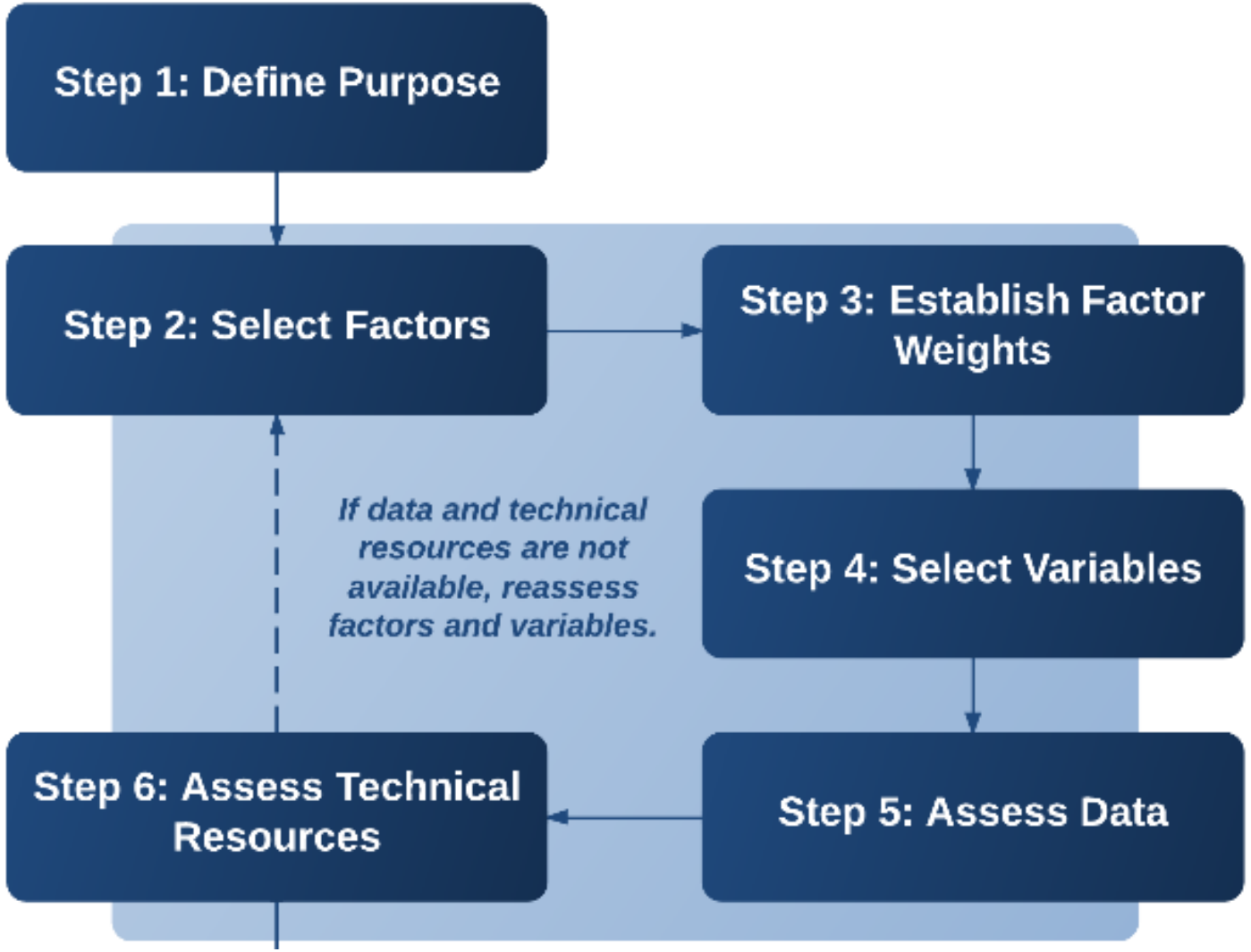
- Phase I: Scoping
  - Initial deliberation and preparation necessary to set up the prioritization process
- Phase II: Prioritization
  - Process of calculating prioritization scores for each improvement location based on scoping in Phase I



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 (or normalizing)
  - Process of making variables comparable to one another, such as using a scale of 0 to 10

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 Toole Design Group

Step 2: Select Factors

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

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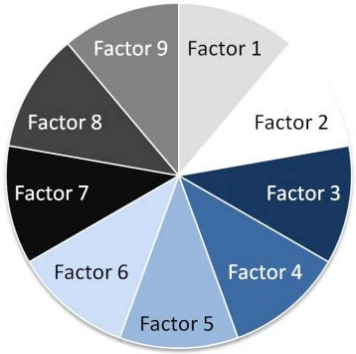
Step 2: Select Factors

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	●	○	◐	●	●	◐	○	◐	●

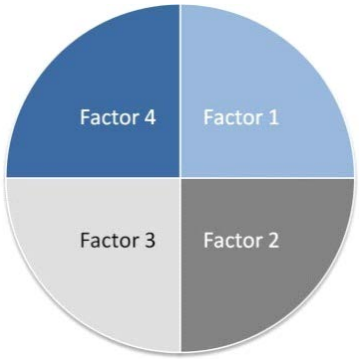
● = Very relevant; ◐ = Less relevant; ○= Not likely relevant

Step 3: Establish Weights

Equal Weights

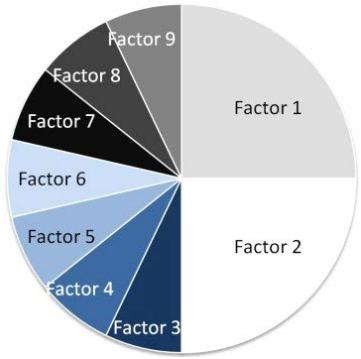


Nine Factors
Equally Weighted

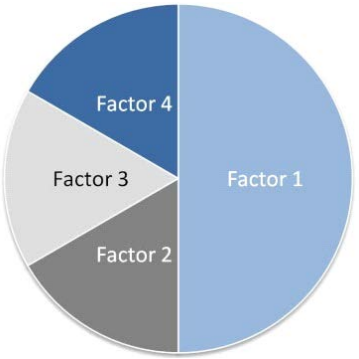


Four Factors
Equally Weighted

Different Weights



Nine Factors
Factors 1 and 2weighted 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

Question…

What is your biggest challenge with prioritizing projects?

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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

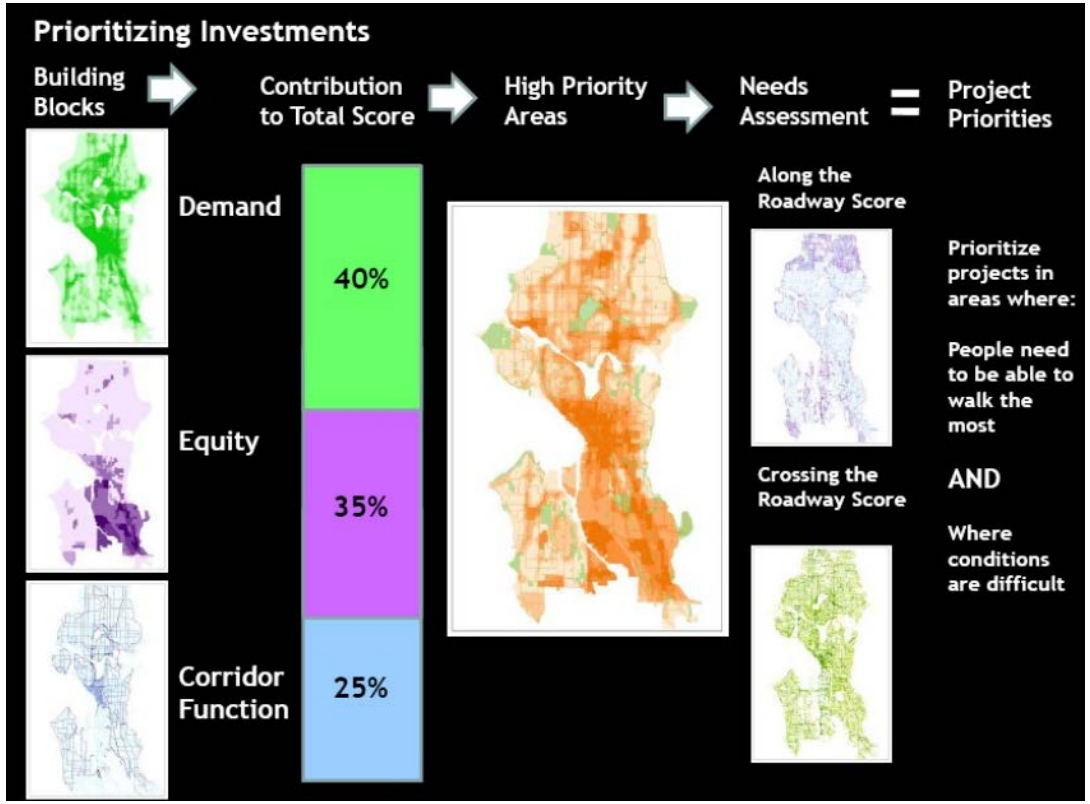
Inventory Data Source/Tool	Can be used to inventory data for these variables
Aerial Imagery	• Sidewalk and buffer presence and width • Marked crosswalk presence and type • Median island presence and width • Bicycle facility presence and width • Lane width/shoulder width • Pedestrian crossing distance
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

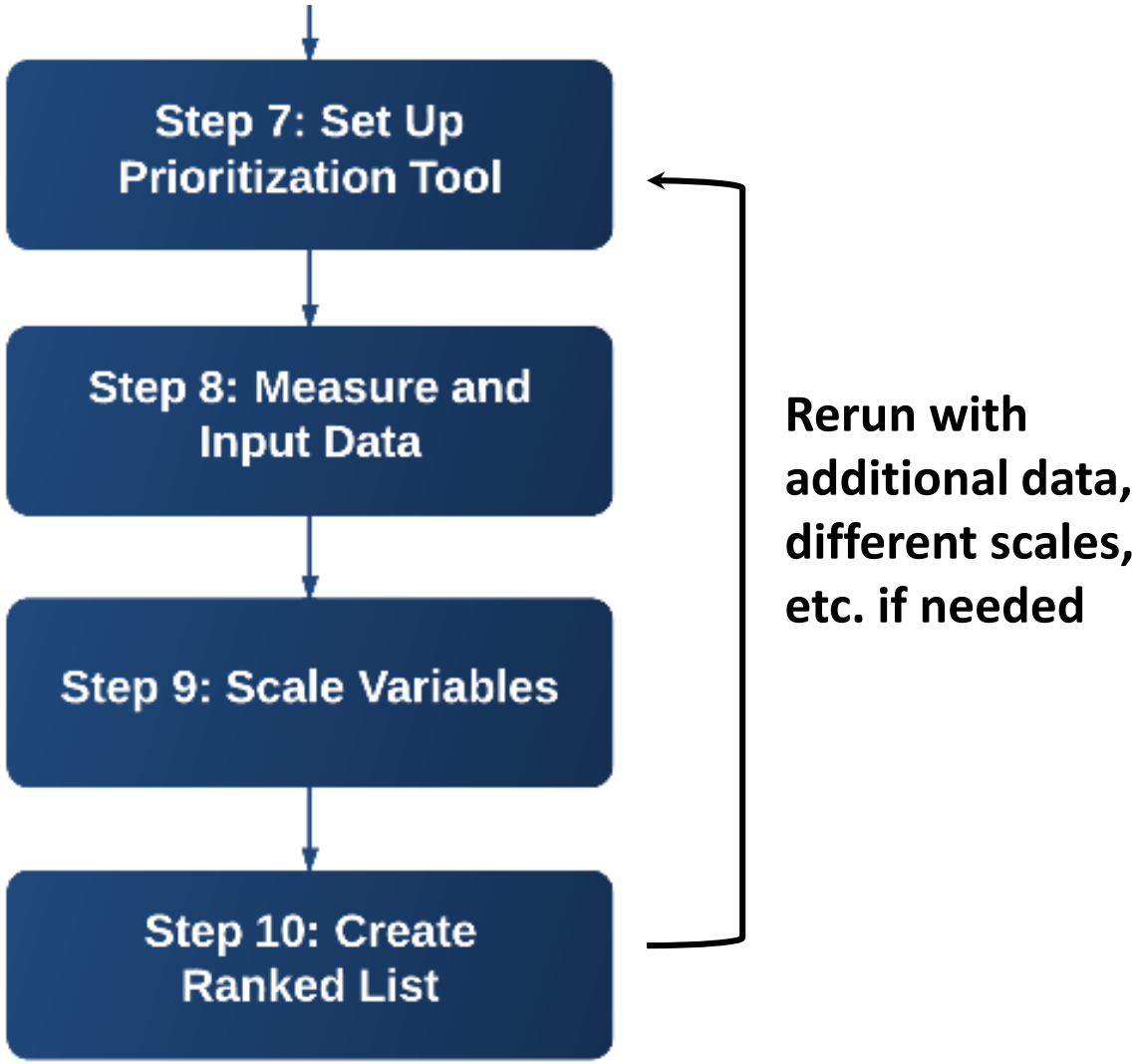
ID	LOCATION	Safety SCORE	Safety WEIGHTED SCORE	Demand SCORE	Demand WEIGHTED SCORE	Prioritization Score
1	Pine St	0.0	0.0	2.5	25.0	25.0
2	Marion St	10.0	100.0	3.0	30.0	130.0
3	Hinds St	0.0	0.0	5.0	50.0	50.0
4	Lander St	7.0	70.0	9.5	95.0	165.0
0		0.0	0.0	0.0	0.0	0.0

APT is intended to work for a range of technological capabilities



GIS Example Source: Seattle Pedestrian Master Plan, 2009

APT Overview—Phase II



Questions?

Questions before we discuss a pilot community's APT experience?

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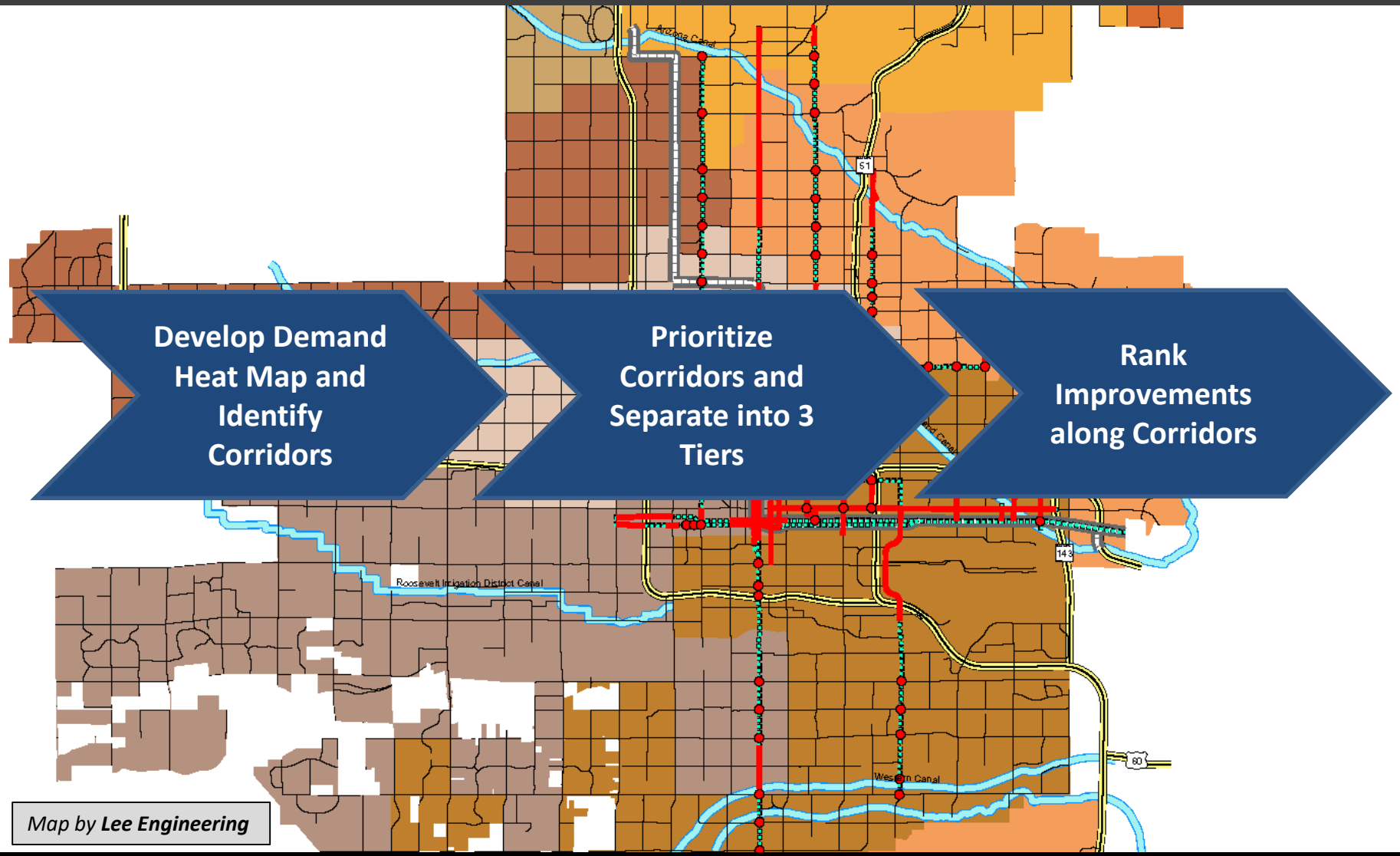
The APT in Action-Phoenix

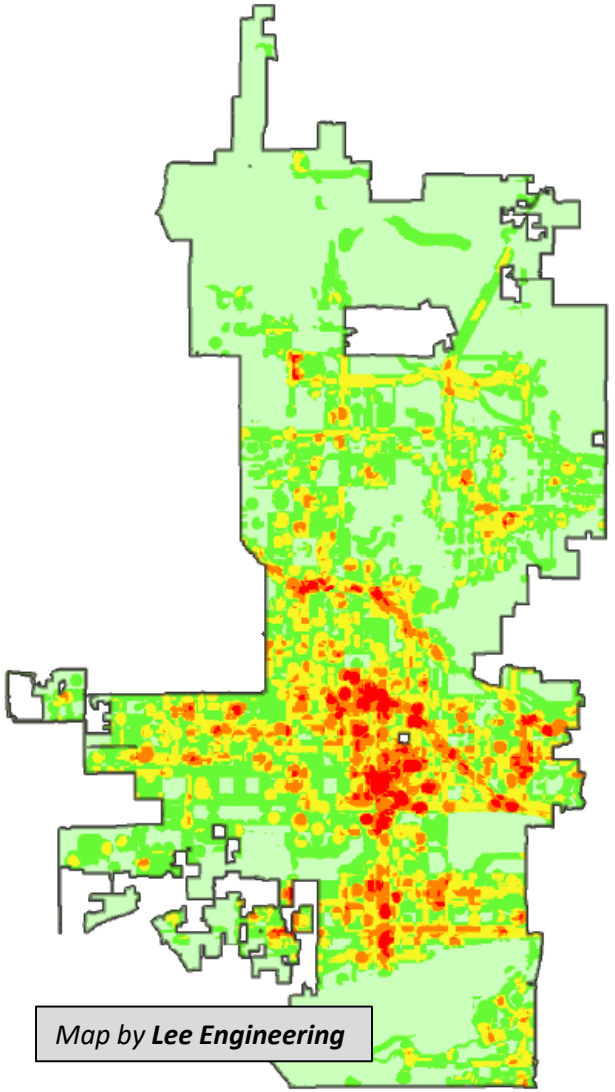


*Map by **Lee Engineering***

Phoenix – Iteration 1
Identify High Demand Areas

Calculating DEMAND

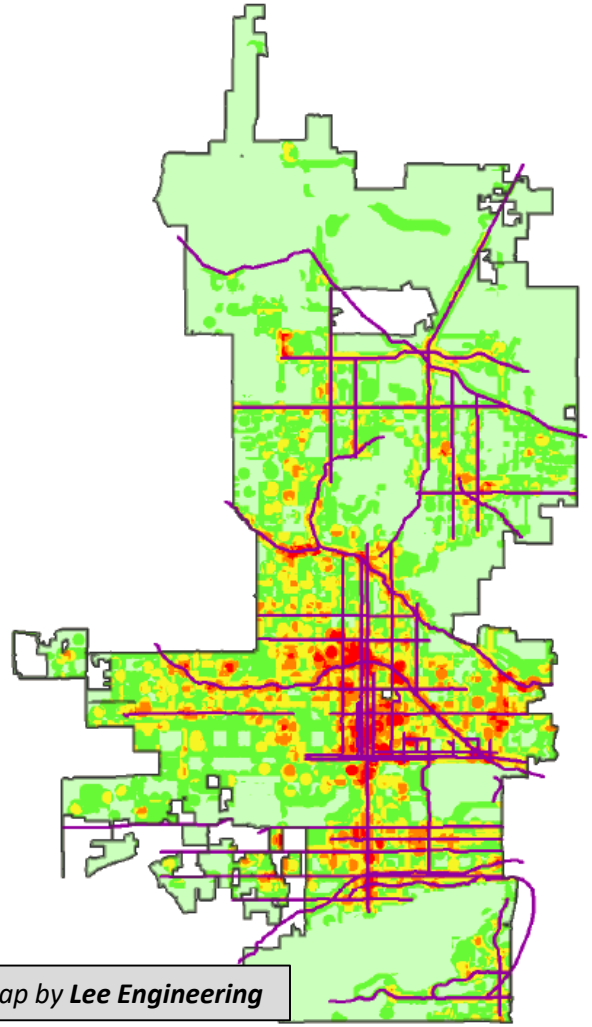
Variable	Source
Schools	City of Phoenix
Bus Stops	City of Phoenix
City Facilities (e.g. libraries, municipal offices, etc.)	City of Phoenix
Community Centers	City of Phoenix
Light Rail Stops	Valley Metro
Park and Rides	Valley Metro
Parks	City of Phoenix
Existing Bikeways	City of Phoenix
Wikimap Routes	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



*Map by **Lee Engineering***

Phoenix – Iteration 2
Identify Priority Corridors

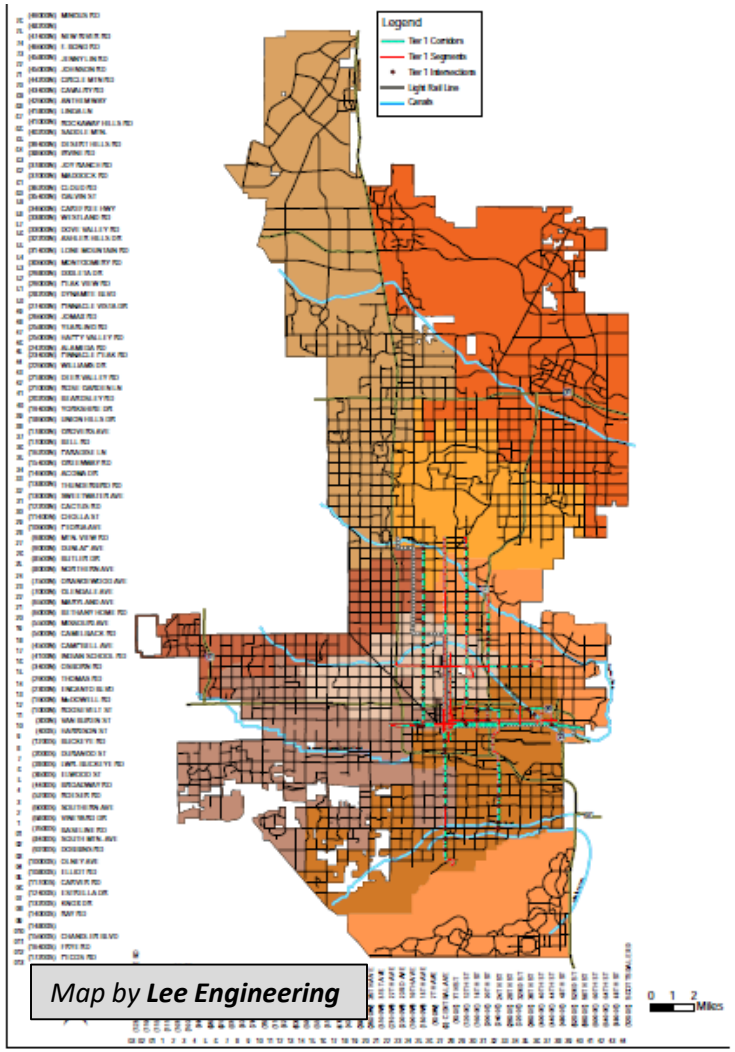
Factor	Weight	Variable	Source
Connectivity	10	Number of times corridor intersects other corridors	N/A
		Number times corridor intersects bicycle facilities	N/A
		Presence of existing bicycle facilities	City of Phoenix
Demand	7	Primary attractors (light rail stops, colleges/universities) within 1 mile 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



*Map by **Lee Engineering***

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



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APT Resources

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

www.pedbikeinfo.org/apt

How the APT can help you

- Prioritize pedestrian or bicycle improvements for the first time.
- Update /compare an existing prioritization process
- Identify areas most in need of investment for walking or biking (Planning Level Prioritization)
- Prioritize walking or biking investments at specific identified locations (Project Prioritization)
- Conduct funding-decision prioritization
- Engage stakeholders/express community values in prioritization decisions.

Questions & Discussion

Photos by Toole Design Group

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GIS

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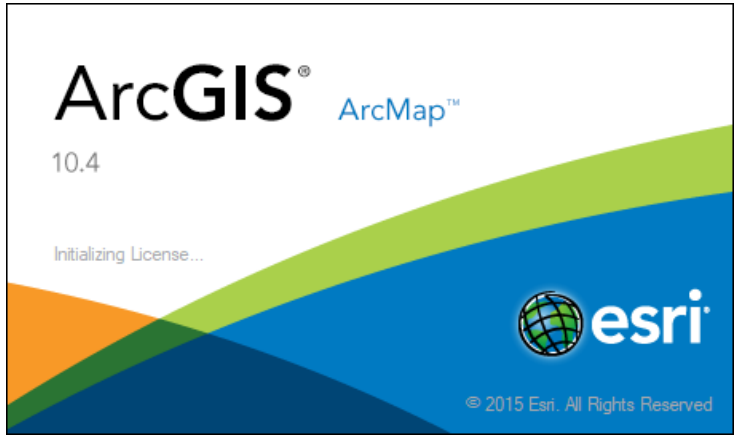
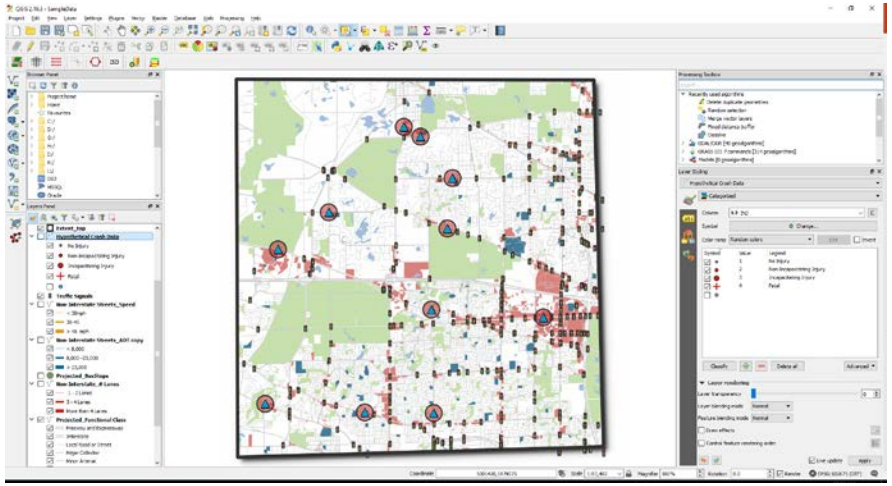
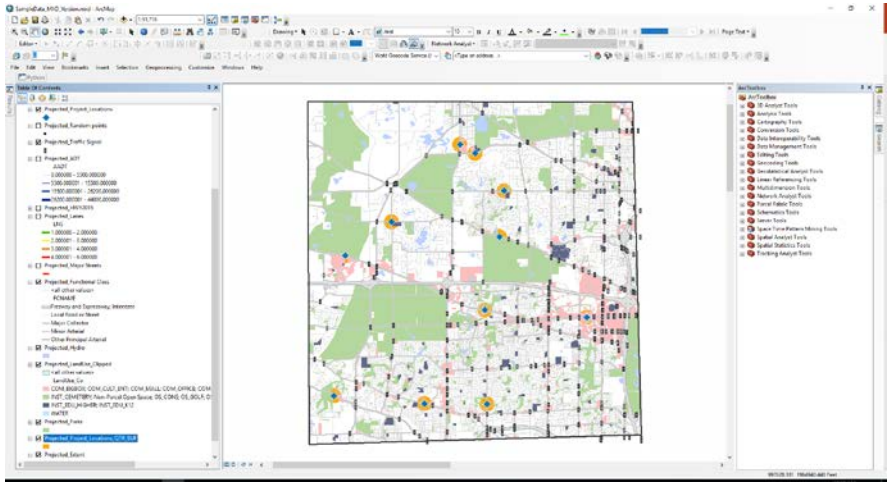
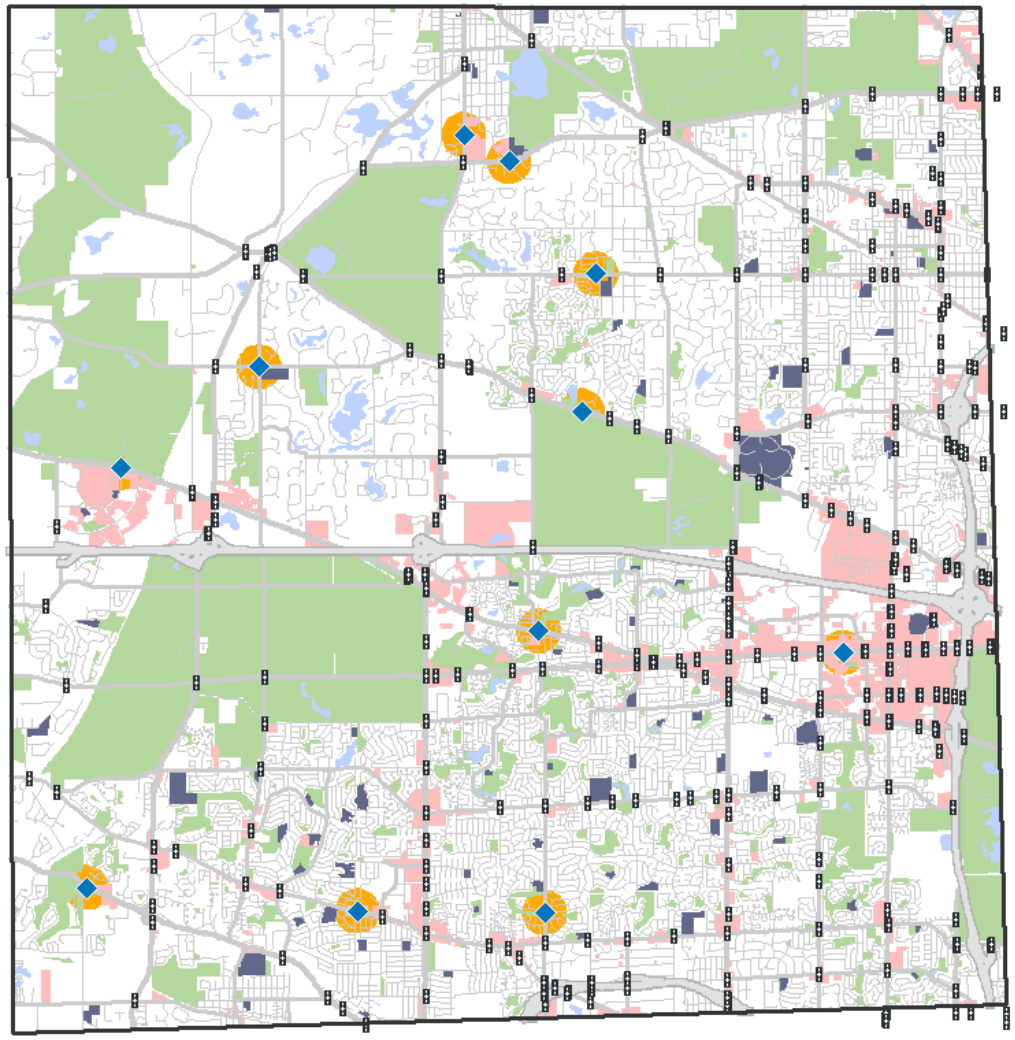






Programmed spreadsheet and GIS Tutorial Outline

- Walkthrough Phase I of spreadsheet
- Use GIS to pull data
- Input data into programmed spreadsheet
- Scale variables
- Calculate priority scores
- Rank projects
- Discussion



Question…

I would like to know how experienced you are using GIS and Microsoft Excel

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