



# Alternative Solutions to Mid-Block Crossings

Group/Organization Name

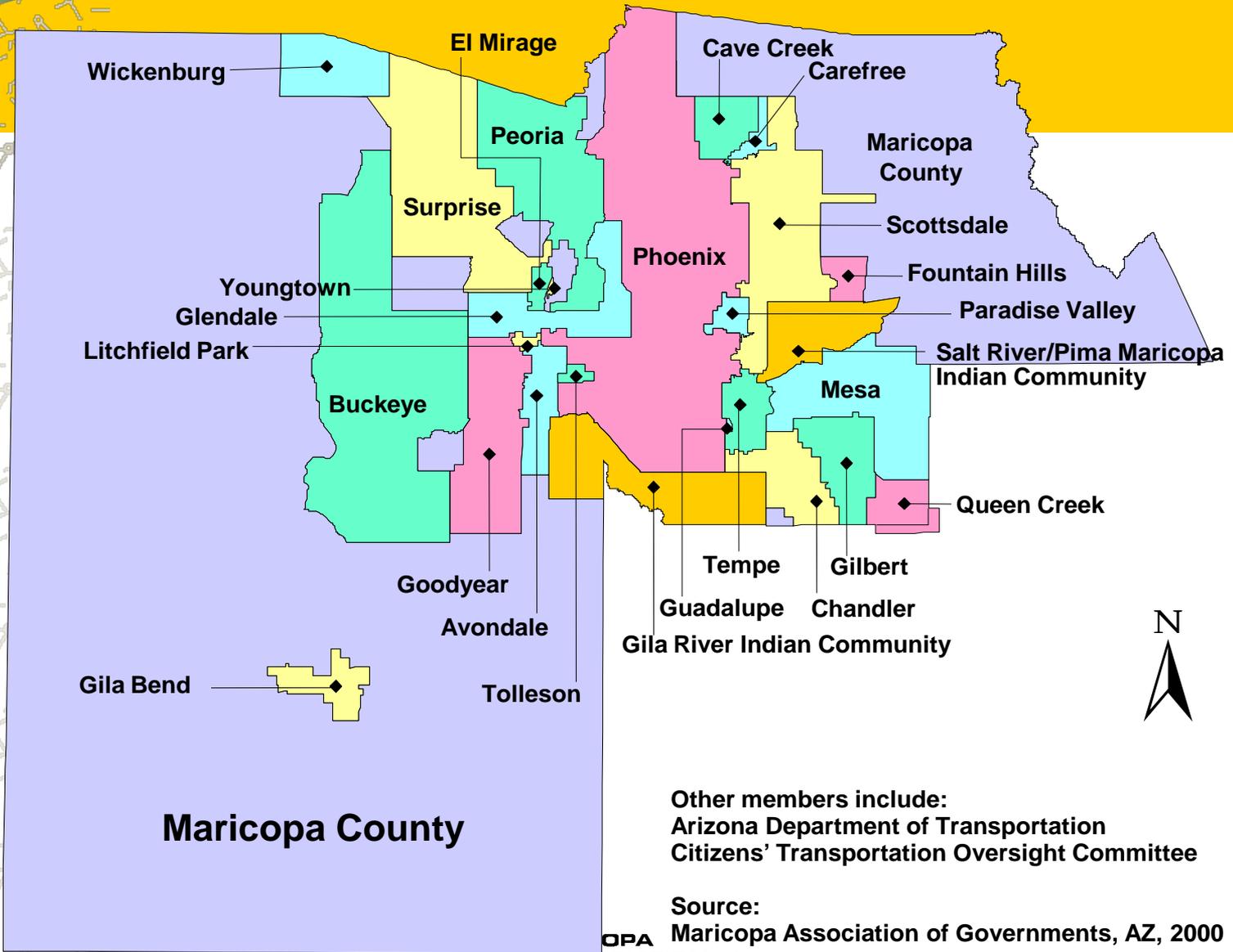
Date

# Maricopa Association of Governments

MAG is a Council of Governments (COG) that provides regional planning for the Phoenix Metropolitan Area.



# MAG Membership



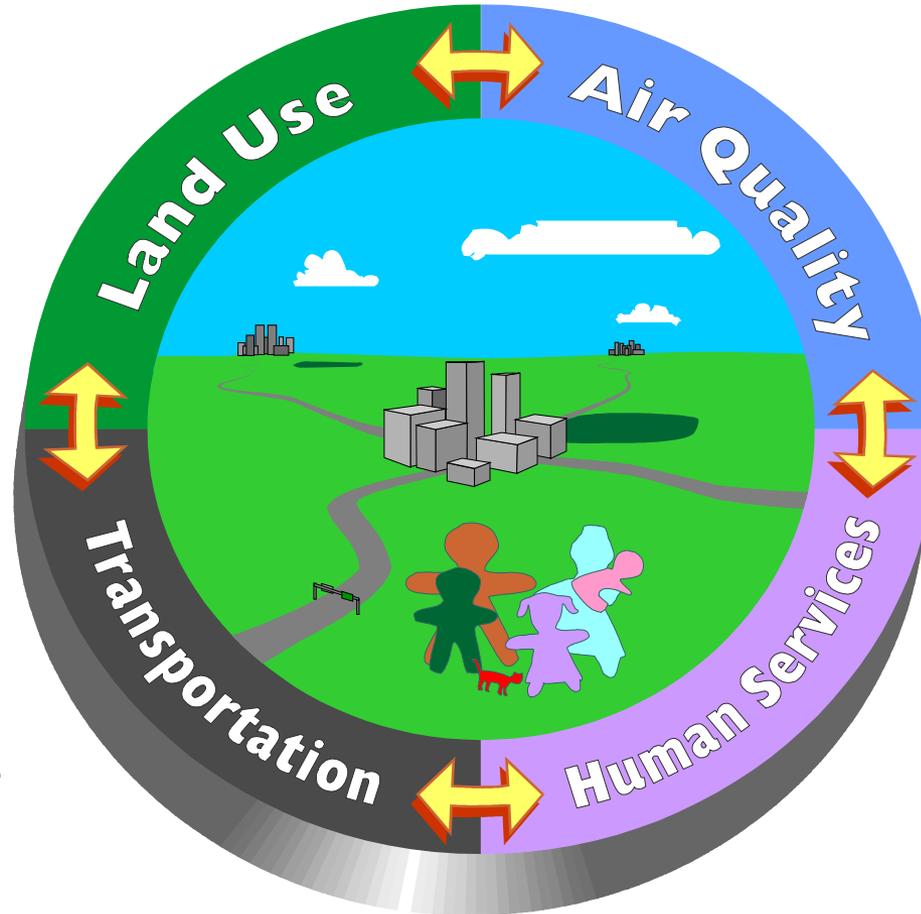
Other members include:  
Arizona Department of Transportation  
Citizens' Transportation Oversight Committee

Source:  
Maricopa Association of Governments, AZ, 2000

# Principal Planning Elements

*Regional  
Development  
& Land Use*

*Multi-Modal  
Transportation  
Planning*



*Air Quality,  
Water &  
Waste  
Management*

*Human  
Services &  
Socioeconomic  
Planning*

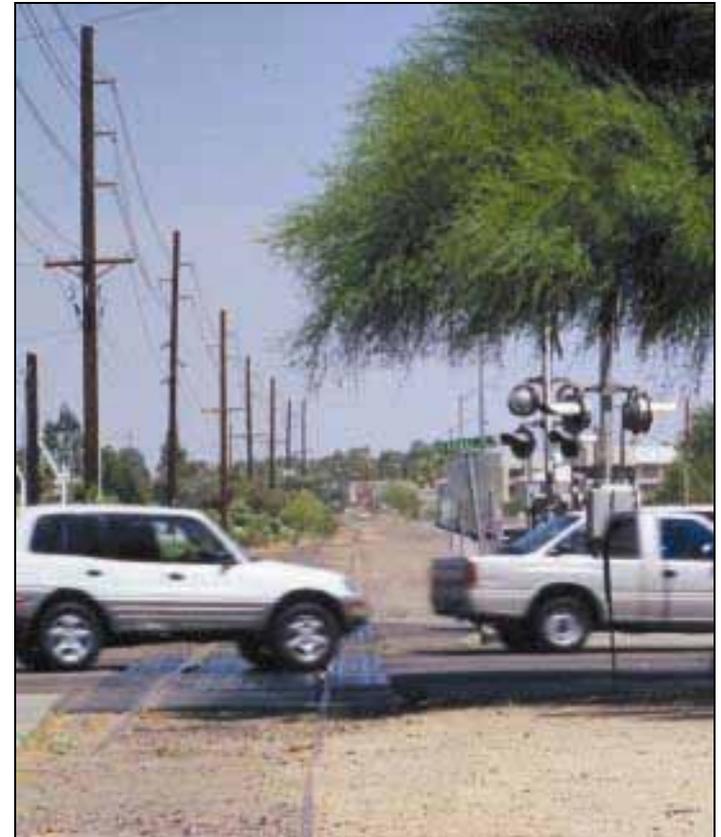


# Overview

- 1993 Pedestrian Plan
- Pedestrian Working Group
- Walking/Bicycling in the 21st Century Conferences
- Pedestrian Area Policies & Design Guidelines
- Design Assistance Program
- Pedestrian Plan 2000

# Problem Definition

- ✦ Canals intersect more than 150 arterial streets in a mid-block location away from a signalized intersection.
- ✦ Not consistently marked or protected.
- ✦ Can pose a threat to trail users.
- ✦ Pedestrian Design Assistance Program report.



*Mid-Block Crossing near the Creamery Branch in Tempe.*

# Benefits of Mid-Block Crossings

- Allow pedestrians to determine their own level of safety, rather than relying on drivers.
- Allow intersections to operate better for vehicles.
- Fewer potential conflict points for vehicles.
- Allow more sight visibility.



*Mid-Block Crossing along the Roosevelt Water Conservation District Canal in Queen Creek.*

# Design Considerations

- ✦ Connections to bikeway systems.
- ✦ Minimize conflicts.
- ✦ Clear sight distance and visibility.
- ✦ Cost effective.
- ✦ Safe for all users.
- ✦ Regional applicability.
- ✦ Sufficient lighting.
- ✦ Heighten driver awareness.
- ✦ Accommodate equestrians.
- ✦ Strive for parity.

# Types of Mid-Block Crossings

- Grade-Separated
  - Overhead Bridges
  - Underground Tunnels



*Existing bridge used by motorized vehicles and cyclists and pedestrians*

# Types of Mid-Block Crossings

## At-Grade

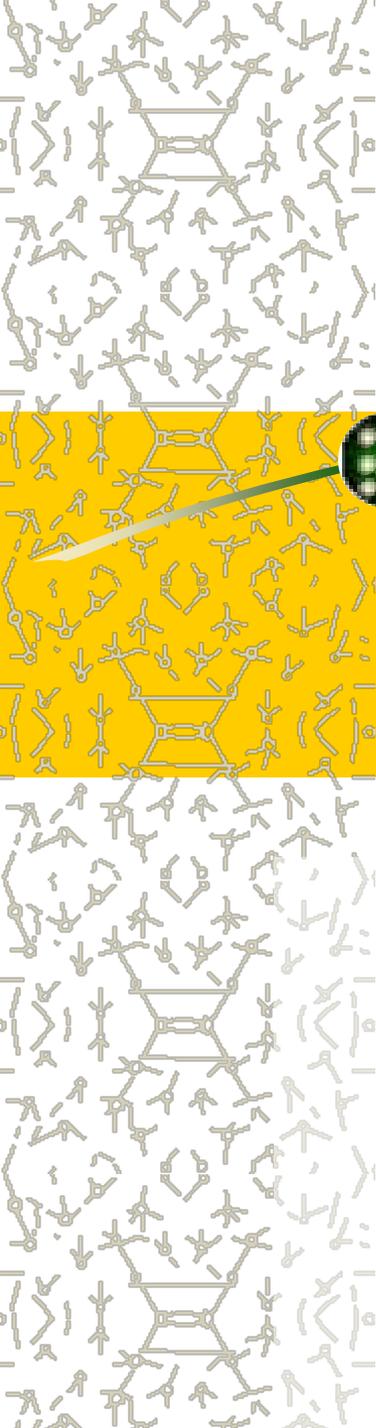
- Curb extensions (bulb-outs).
- Pedestrian refuges (medians).
- Pedestrian-activated traffic signals and flashers.
- Raised crosswalks.
- Warning and regulatory signing and striping.
- Textures.
- Inpavement Lighting.
- Combinations.



*At-grade crossing over an arterial along a canal.*

# Crossing Type Considerations

- ✦ Each crossing type should be considered based on:
  - Street characteristics, such as number of lanes and traffic speed.
  - Types of users.
    - Pedestrian.
    - Bicyclists.
    - Equestrians.
  - Potential number of trail users.
  - Physical constraints – what is possible?
  - Cost.



# Grade-Separated Crossings

# Overhead Bridge/Overpass

*Bridges across washes, such as this bridge across Cave Creek Wash, help connect people to destinations.*



# Overhead Bridge/Overpass

*Grade  
separated  
walkway  
over a  
seven lane  
arterial.*



# Overhead Bridge/Overpass

*Grade  
separated  
walkway  
over a  
three lane  
arterial.*



# Overhead Bridge/Overpass

## Advantages

- No impediments in volume or speed of traffic.
- Pedestrian security from vehicular collision.

## Disadvantages

- Requires sufficient space for ramps and utilities.
- Can create a visual intrusion on nearby backyards.
- Costly.

**Estimated Cost: \$1.0 million or more (2001 dollars).**

# Overhead Bridge/Overpass

Not everyone uses overhead walkways.



# Underground Tunnel/Underpass

*At grade  
and below  
grade  
walkways  
across a  
six lane  
arterial.*



# Underground Tunnel/Underpass

*Underpass  
adjacent to  
a river.*



# Underground Tunnel/Underpass

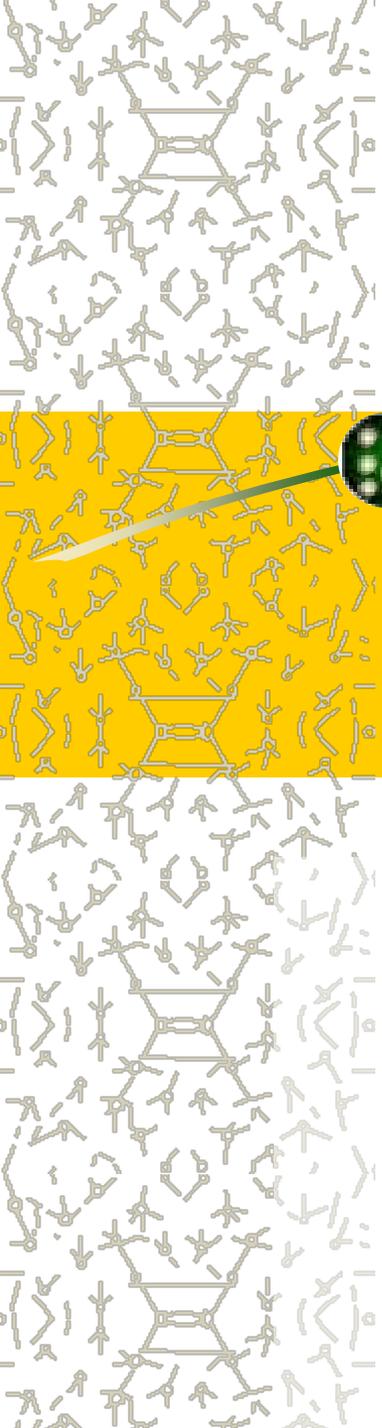
## Advantages

- No impediments in volume or speed of traffic.
- Pedestrian security from vehicular collision.

## Disadvantages

- Requires sufficient space for ramps and utilities.
- Strong security objections.
- One of the most costly alternatives.
- High maintenance and cleaning cost.

Estimated Cost: \$500,000 to \$1 million or More  
(2001 dollars).



# At-Grade Crossings

# Curb Extension (Bulb-Out)

*Curb extensions can also be used for traffic calming as along Fifth Street in Tempe.*



# Curb Extension (Bulb-Out)

## Advantages

- Barrier at roadway edge slows down drivers.
- Driver recognition of bicycle/pedestrian facility – uses extra caution
- Users better seen by drivers
- Less travel distance across roadway for users.

# Curb Extension (Bulb-Out)

## Disadvantages

- Only works on streets with lanes wider than 11 feet.
- Additional accommodations for bicyclist space needed.

## Combinations

- Pedestrian refuges.
- Signals.
- Raised crosswalks.
- Signing and striping.

**Estimated Cost: \$1,660 (2001 dollars).**

# Pedestrian Refuge (Median)



# Pedestrian Refuge (Median)

## Advantages

- Reduced vehicle speed.
- Enhanced pedestrian safety and visibility.
- May prevent passing at pedestrian and bicycle crossings.
- Provides space to wait for gaps in traffic.
- Added attention to canal trail system.
- Low-cost approach with a low impact on vehicle delay or safety.

# Pedestrian Refuge (Median)

## Disadvantages

- Lanes must be wider than 11 feet.
- Limited effect on speed of traffic.
- Limited access for canal maintenance vehicles.
- Possible maintenance costs.
- Lack of bicyclist space along roadway.

## Combinations

- Curb extensions.
- Signals.
- Raised crosswalks.
- Signing and striping.

**Estimated Cost: \$40,000 to \$279,000 (1998 dollars).**

# Signals

*Signal  
with a  
pedestrian  
refuge  
median.*



# Pedestrian Activated Signals

*Pedestrian activates the signal. The signal automatically returns to green after pedestrian crosses the street.*



# Signals

• Dictated by Manual of Uniform Traffic Control Devices (MUTCD)

• Advantages

- Enhanced safety and visibility of pedestrians.
- Motorists understand and respond to this device.
- Increased user control.
- Improved sight distances.
- No turning movement conflict points.
- Mid-block flashing signal provides warning to drivers.

# Signals

## Disadvantages

- Most crossings will not meet warrant conditions.
  - Approximately 200 to 300 pedestrians per hour.
- High installation cost.
- Additional maintenance involved.
- Flashing signal does not provide a barrier for safe crossing.

## Combinations

- Curb extensions.
- Refuge medians.
- Raised crosswalks.
- Striping.

**Estimated Cost: \$50,000 to \$80,000 (2001 dollars).**

# Raised Crosswalks

## Advantages

- Reduced vehicle speeds.
- Easier crossing for pedestrians and wheelchair users.
- Crosswalks are more visible to drivers.

**Estimated Cost: \$16,600  
(2001) dollars).**

## Disadvantages

- Somewhat expensive.
- May impact bicyclists.
- May impact drainage.
- Recommend only in specific situations.

## Combinations

- Curb extensions.
- Refuge medians.
- Signing and striping.

# Signing and Striping Combination



*Pedestrian Crossing (signing & striping) with pedestrian - activated signal.*



# Signing and Striping

## Advantages

- Cost efficient.
- Widely recognized by motorists.
- Enhances visibility of crosswalks for drivers.

**Estimated Cost: \$500 to \$3,000 (2001 dollars).**

## Disadvantages

- Give users a false sense of security.
- Do not physically prevent or high vehicle speeds or driver inattention.

## Combinations

- Curb extensions.
- Refuge medians.
- Traffic signals.
- Raised crosswalks.

# Textures -- Combination

*Traditional traffic signal with textured crosswalk.*



# Textures -- Intersection

*Four-way  
stop  
intersection  
with textured  
pavement on  
Fifth Street  
in Tempe.*



# Textures

## Advantages

- Increased alertness for users and drivers.
- Aesthetically pleasing.

## Disadvantages

- No physical prevention of high vehicle speeds.
- Lack of accessibility to pedestrian in crossing.
- Noisy.
- Not favored by bicyclists.

## Combinations

- Curb extensions.
- Signing and striping.
- Refuge medians.
- Traffic signals.
- Raised crosswalks.

**Estimated Cost: \$10,000  
(2001 dollars).**

# In-pavement Lighting



In-pavement lighting across a 5 lane arterial.

# In-pavement Lighting

## Advantages

- Increased visibility to drivers.
- Some user control over traffic gaps.
- Activated only when needed.

**Estimated Cost: \$15,000  
to \$23,000 (2001 dollars).**

## Disadvantages

- Somewhat expensive to build.
- Relatively new technology.

## Combinations

- Refuge medians.
- Signing and striping.
- Textured paving.
- Raised crosswalks.

# Railroad Arm Crossing

*Trail users  
are safer at  
intersections  
with signals  
or other  
traffic  
control  
devices.*



# Railroad Arm Crossing

## Advantages

- Drivers will stop for the arms.
- Users will have good control over traffic gaps.
- Readily recognizable to drivers.
- Activated only when it is needed.

## Disadvantages

- Relatively expensive to install.
- Not previously used in this type of application.

**Estimated Cost: \$118,000  
(2001 dollars).**

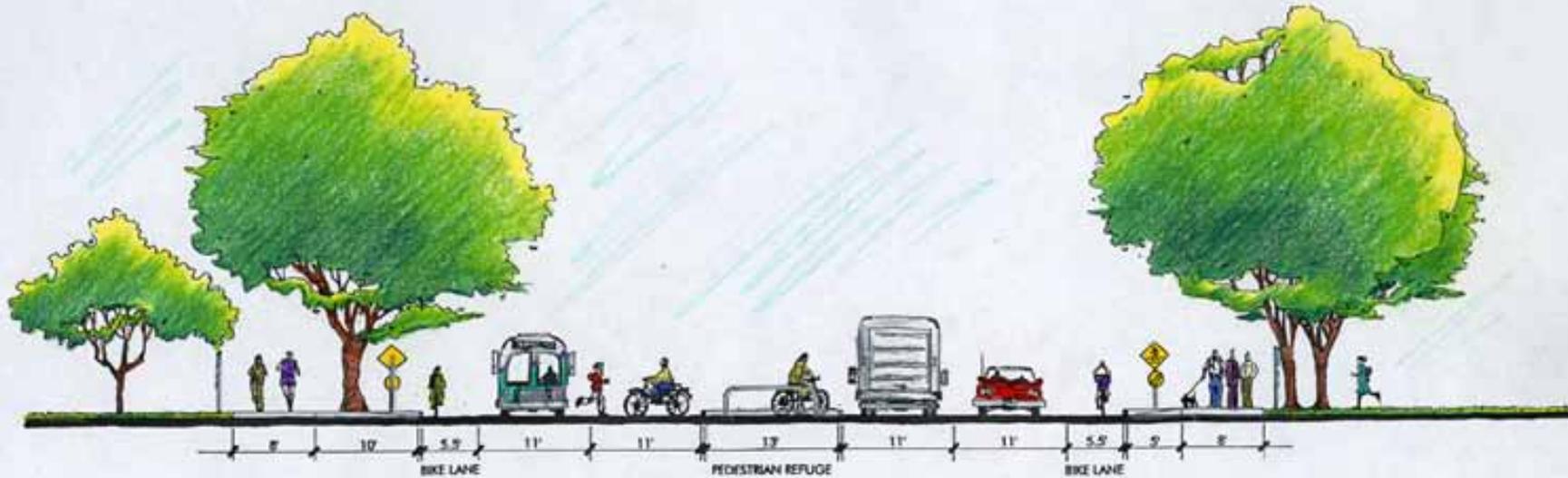
# Minimum Design Criteria

- Provide heightened awareness to the vehicle driver of the crossing through traffic calming or signalization.
- Provide some boundaries for the trail user by enhancing the visibility of the crossing.
- Reduce the crossing distance to two lanes at a time.

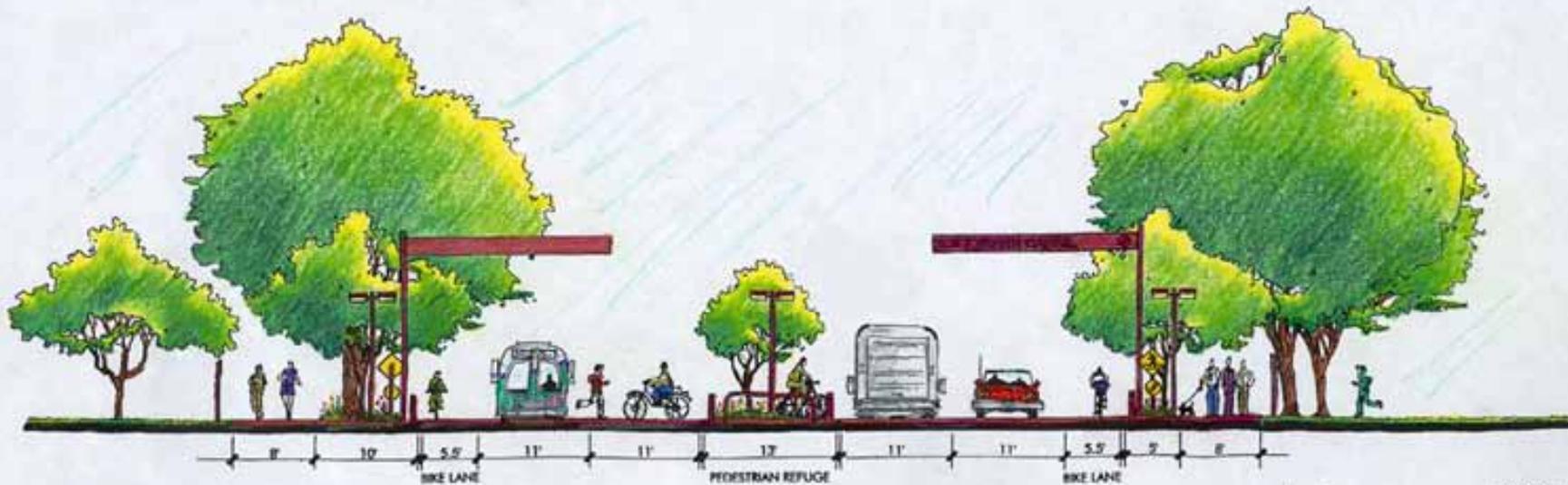
# Recommended Approach

- Curb extension to narrow lane width, raised sidewalk, rumble strip.
- Median island refuge and surface textures on approach, with traditional signing, and an option for in-pavement lighting.
- Pedestrian activated traffic signal device with traditional striping.

**Estimated Cost: \$40,000 to \$279,000 (1998 dollars).**



PROTOTYPE B  
PROPOSED MINIMUM STANDARDS



PROTOTYPE B  
PROPOSED ENHANCEMENTS

# Mid-Block Crossing

*This mid-block crossing could be enhanced with a median treatment.*





## For More Information:

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