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## Bikeway Design Options



## Improving route finding

Signage and pavement markings help identify bikeways, connections to destinations

## •Wayfinding/ destination signs



Destination signs make it easier to choose a safe bicycle route to major destinations.

## •'Sharrow' pavement markings



Sharrows help cyclists stay on bicycle routes, particularly ones that use multiple streets. They indicate to bicyclists the correct lane positioning. They also indicate to motorists that they are in a shared travel lane environment and to look out for bicycles.

## Improving safety at high traffic volume street crossings

A key safety issue with crossing high volume streets for both bicyclists and pedestrians is visibility. There are a variety of ways to improve motorist awareness.

## •Median refuge islands



Median refuge islands allow crossings for cyclists and pedestrians to happen one travel lane at a time instead of both, reducing complexity.

## •Curb extensions



Curb extensions provide better sight distance between motorists and cyclists or pedestrians waiting to cross.

## •Bike boxes



Bicycle Boxes help prevent the dangerous 'right hook' conflict with cars by improving positioning bicyclists in front of cars at signals.

## •Off-set turn lanes



Off-set turn lanes create a safe place for cyclists needing to make left turns at off-set intersections. On-street parking removal may be required.

## •Beacons



Rapid Flash Beacons are a new type of bicyclist or pedestrian activated beacon used to signal (flashing lights) to motorists the presence of a bicyclist or pedestrian waiting to cross. Research shows these devices to have motorist stopping compliance rates near that of a signal.

## •Traffic signals



Hybrid pedestrian/bicycle signals are a new type of pedestrian or bicycle activated signal that provides a 'red and yellow' indication when needed, but dwells in dark (no green) when not needed, minimizing delay for traffic.

## •Cross bike striping



'Cross Bike' markings are a new type of marking used to highlight the presence of high volume bicycle crossings to passing motorists, similar to a crosswalk markings. Their use is currently under consideration by the City of Portland.

## Reducing delay at major street crossings

At non-signalized intersections, delay is largely a function of the number of adequate gaps in the traffic flow for safe crossings. That number can be improved by reducing the crossing distance.

## •Median refuge islands



Median refuge islands reduce delay because the crossing distance for cyclists and pedestrians is shorter and the number of lanes to cross at one time is reduced, which increases the number of adequate gaps in traffic for safe crossings.

## •Curb extensions



Curb extensions reduce delay by shortening the crossing distance for cyclists and pedestrians and creating more acceptable gaps in the passing traffic for safe crossings.

## •Signalized intersections: bicycle detection



Push-buttons and bicycle loop detection at traffic signals allows the presence of waiting bicycles to be detected and the signal timing to be adjusted to reduce delay.

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## Bikeway Design Options



## Improving bicycle safety and comfort: arterial streets

## • Bicycle lanes

On streets with traffic volumes above 3,000 cars a day physical separation is needed for safe, comfortable cycling.



Bicycle lanes provide separation from faster moving vehicles, increasing safety for bicyclists and reducing conflicts with, and delay for, cars.

## • Buffered bicycle lanes



Buffered bicycle lanes are wider (8 ft) than standard bicycle lanes (5-6 ft), giving cyclists more distance between fast moving traffic and parked cars.

## • Colored bicycle lanes



Colored bicycle lanes highlight bicycle lanes in areas of high conflict with automobiles.

## Improving bicycle safety and comfort: residential streets

## • Speed bumps

On streets with relatively low traffic volumes, bicycles can mix with cars comfortably as long as speeds are kept at or below 25 mph.



Speed bumps are a very effective tool for reducing vehicle speeds.

## • Advisory bicycle lanes



Advisory bicycle lanes provide separation between bicycles and cars like a traditional bicycle lane, however also create a narrow, shared two-way travel lane for cars.

## • Chicanes



Chicane designs can lower the operating speed of streets, but require on-street parking removal.

## • Pinch points



Pinch points reduce the roadway from two travel lanes to one at select locations, requiring 'courtesy queuing' when cars pass each other. Some on-street parking removal is required.

## • Stop signs



Stop signs can be aligned to prioritize continuous travel along the bike way.

## Reducing traffic volumes: residential streets

Residential streets with relatively high volumes are usually the result of non-local, cut-through traffic. A variety of techniques can be used to either discourage non-local traffic or prevent it from using local streets.

## • Traffic calming approach:

Use a variety of tools identified above to reduce traffic speeds on residential streets and discourage non-local/through traffic.



Speed bumps and pinch points and other traffic calming tools that slow traffic can have an added benefit of discouraging non-local traffic from using the street as a through route.

## • Regulatory approach:

Change access regulations to prevent non-local/through traffic while allowing other modes (bus, bikes and pedestrians).



In situations where certain types of vehicle access are needed, such as buses, changes to the signage can divert traffic flow.

## • Diversion approach:

Use physical barriers to prevent non-local/through traffic.



Semi-diverters are a type of diversion that physically restrict traffic access of non-local use of local streets.

**Process:** These types of tools require additional public involvement with adjacent residents and businesses and testing to address potential side effects (such as moving cut-through traffic to an adjacent local street).

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## Design Options



### Design Options Development and Evaluation

- Using the Design Criteria (station 7), a design solution was developed for each issue identified in the analysis of existing conditions (station 9).
- Each design option was evaluated for technical feasibility. Some options are still under review for feasibility.
- Each design option was reviewed by the Citizens Advisory Committee.
- Several of the design options are still being studied for technical feasibility: Bike boxes, cross bikes, and advisory bicycle lanes.
- Several design options related to diversion/ reduction of traffic volumes would still be subject to additional public involvement. The additional public involvement would be focused on residents within the immediate vicinity of the proposed improvement. Prior to construction, the improvement will first be tested. If the test results are positive, the proposed improvement will be forwarded to City Council for adoption and final construction.

### Design Tools

- **NCHRP 562 Crossing Safety Analysis** (un-signalized locations)  
This nationally developed traffic engineering tool uses a variety of data inputs to assess the appropriate types of treatment to improve crossing safety.
- **Synchro**  
A program for analyzing capacity and level-of-service for signalized intersections.
- **SimTraffic**  
A modeling program that simulates traffic flow patterns.
- **Auto Turn**  
A turning movement program to aid in the design of corners for adequate turning radius.
- **License plate survey**  
Used to determine the origin and destination of vehicles moving through an area, primarily for quantifying cut-through traffic volumes and routes (not yet collected).

### Design Regulations

- **Manual of Uniform Traffic Control Devices (MUTCD)**  
This document dictates what traffic control devices can be used. It describes what the device must look like, operate, and under what conditions they may be used.
- **Oregon Department of Transportation- Speed Zones**  
Speed zones (commonly referred to as 'speed limits') are determined for every roadway by the state. The City of Portland may request a change, but the Oregon Dept of Transportation has sole authority to approve or deny the request.