Creating Walkable, Bikeable Communities
Developing Effective Active Transportation Projects and Programs

Module 4: ATP Project Design and Prioritization

Overview
- Effective interventions that can improve conditions for active transportation
- Cutting edge approaches, new techniques
- Recent support for innovative bicycle and pedestrian facilities
- Project prioritization techniques

Overview

Engineering – Education – Enforcement
- Working Together — 3 E’s approach
- Comprehensive — Communicative — Cooperative
- Synergy: Each makes the other more effective
  “Right design invites right use”
Good, Safe Cycling Streets Have:
- Protected Space, with
  - Minimal conflicts at intersections
  - 20 mph design speed
- Or...
  - Shared Space, with
    - Low Vehicle Speed
    - Low Traffic Volume

And Always...
- Smooth surfaces
- Direct Connections

General Principle to Support Active Transportation: Reduce Vehicle Speeds
- Drivers’ field of vision and ability to see pedestrians
- Drivers’ ability to react and avoid a crash
- Crash Severity

As speed increases, driver focuses less on surroundings

As speed increases, driver focuses less on surroundings
Speed Affects Crash Avoidance

High speeds equate to longer reaction and stopping distance

Curbs and sidewalks slow traffic more than speed sign

Speed Affects Crash Severity


Making Room for Bicycles and Pedestrians

Road Diet or Road Right-Sizing
- Lower vehicle speeds
- Reduce number of conflicts
- Reduced conflicts/crashes
- Increase in parking utilization
- Increase in walking/bicycling

FHWA Road Diet Informational Guide
3 crash types can be reduced by going from 4 to 3 lanes: 1 – rear enders

3 crash types can be reduced by going from 4 to 3 lanes: 2 – side swipes

3 crash types can be reduced by going from 4 to 3 lanes: 3 – left turn/broadside

“Classic” Road Diet — Edgewater Drive, Orlando

- 34% Reduction in Vehicle Crashes
- 68% Reduction in Injury Crashes
- Speeding reduced throughout corridor
- Traffic Volumes: 20,500 before, 21,000+ after
- On-Street Parking Utilization increased from 29% to 41%
- Pedestrian volumes increased by 23%
- Bicycle volumes increased by 30%
Making Room for Bicycles and Pedestrians
- Reducing lane widths of urban streets
  - 10’ and 11’ lanes are just as safe as 12’ lanes on urban arterials with speeds 45 mph and less
- AASHTO Green Book allows narrower lanes:
  - 10’ on lower speed arterials & collectors
  - 11’ for streets with high truck volumes

Countermeasures for Crossing Crashes
- Crosswalks
- Illumination
- Signs
- Striping
- Medians/pedestrian islands
- Signals

Increase Effectiveness Of Crosswalks With:
- Proper location
- High Visibility Markings
- Illumination
- Signing
- Advance Stop Bars
- Median Islands
- Curb Extensions
- Signals

Marked crosswalk must be visible to the DRIVER

*Relationship of Lane Width to Safety for Urban and Suburban Arterials*: Study by Potts, Harwood, and Richard

What the pedestrian sees…
Marked crosswalk must be visible to the DRIVER

What the driver sees (same crosswalk)

Crosswalk Visibility

Crosswalk Marking Types

Use High Visibility Crosswalks

Longitudinal markings are more visible to driver from afar

Illumination – Essential For Any Crossing

Marked crosswalk?
— Light it.
Up to 50% of pedestrian crashes occur at night
Lighting Location is Important


Multiple Threat Crash Problem
Explanation for why crashes increase at marked crosswalks
- 1st car stops to let pedestrian cross, blocking sight lines
- 2nd car doesn’t stop, hits pedestrian

Multiple Threat Crash Solution
Advance stop/yield line
- 1st car stops further back, opening up sight lines
- 2nd car can be seen by pedestrian

Advance yield line (shark’s teeth) and sign
Tustin, CA
**Raised Median or Median Island**

Breaks long complex crossing into two simpler crossings

**Curb extensions**

Most focus has been on reduced crossing distance

Other advantages:
- Better visibility between pedestrians, cyclists and motorists
- Traffic calming
- Room for street furniture
- Reduced delay for motorists at stop-controlled intersections

Curb extensions should be the width of the parking lane and not encroach on bike lanes or travel lanes

**Crossing island at marked crosswalk — same principle:**

*Breaks long complex crossing into two simpler crossings*
Curb Extensions calm traffic and provide room for street furniture

Temporary Curb Extensions
San Francisco, CA

Trail Crossings

Lead Pedestrian Interval (LPI)
Looks like a regular signal to drivers: green-yellow-red
Salem ORs
lpi: walk comes on at least 3 seconds prior to the green signal; pedestrians enter crosswalk before turning vehicles arrive there.

rectangular rapid flashing beacons (rrfb)
- supplement warning signs at unsignalized intersections or mid-block crosswalks.
- increase driver yielding behavior

pedestrian hybrid beacon aka “hawk”
(high intensity activated crosswalk)

drivers see hybrid beacon
pedestrians see pedestrian signal head

2009 MUTCD Chapter 4F Pedestrian Hybrid Beacons
Tucson AZ
Pedestrian Hybrid Beacon Sequence

1. Blank for drivers
2. Flashing yellow
3. Steady yellow
4. Steady red
5. Wig-Wag
Return to 1

California MUTCD, 2014 Edition, Chapter 4F

Example: Reconfigured Ramp Terminus

- Old ramp alignment
- Large angle = wide crossing and high-speed turns
- Tight angle = short crossing and slow speed turns

Recently Approved Design Innovations & Improvements

- More Flexible Design Guideline
- Protected Bikeways
- 3-Foot Passing Law
- Revisions to CA Highway Design Manual (HDM) and CA Manual on Uniform Traffic Control Devices (MUTCD)
- Upcoming Revisions to HDM

http://nacto.org/docs/usdg/complete_intersections_caltrans.pdf
Caltrans Endorsement of NACTO Guides

National Association of City Transportation Officials (NACTO) Guide may be used in addition to (or in place of) the Caltrans HDM if:

- Approved by registered engineer
- Its use is adopted by resolution at public hearing.

Caltrans Endorsement of NACTO Guides

- Urban Bikeway Design Guide
  - Innovative treatments for bike boulevards, signs, pavement markings, and intersections

Caltrans Endorsement of NACTO Guides

- Urban Street Design Guide
  - Design of streets, intersections, and “design controls” (includes functional classification, performance measures and design speed)

Available free, online at nacto.org/usdg
Class IV Separated Bikeway approved
- Design standards developed December 2016
- Also known as a “protected bike lane”
- Serves the “interested but concerned”

AB 1193 – Protected Bikeways Act
- Created Class 4 “protected bikeway” or “cycle track”
- Caltrans developed design standards in early 2016

Protected Bikeway without Parking

California Examples of Cycletracks
Caltrans Class IV Bikeway Guidance

- Class IV Separated Bikeway Design Webinar
  - Coming Soon

3-Foot Passing Law

Photo Credit: Napa County Bicycle Coalition
CA Manual on Uniform Traffic Control Devices (MUTCD)

- Buffered bicycle lanes
- Contraflow bicycle lanes
- Bicycle lane extensions through intersections
- Updated crossing time guidance for seniors and people with disabilities
- Crosswalk enhancements across uncontrolled intersections

Buffered Bicycle Lanes

- Provides greater distance between bicyclists and motor vehicles.
- Contributes to bicyclist perception of safety

Contraflow Bicycle Lanes

- Provides additional connectivity for bicycle facility network
- Reduces wrong-way riding

Bicycle Lane Extension through Intersection

- Helps guide bicyclists through intersections
- Reduces conflicts between bicyclists and turning motorists
Bicycle Signal Faces
- Separates bicycle movements from other modes at signalized intersections

Bike Boxes
- Improves visibility of bicyclists to motorists
- Facilitates bicyclist left turns
- Reduces right-hook conflicts with turning vehicles

Pedestrian Updates to MUTCD
- Updated crossing time guidance for seniors and people with disabilities
  - 2.8 feet/second should be used where older or disabled pedestrians routinely use the crosswalk (Sec. 4E.06.10a)
- Crosswalk enhancements across uncontrolled intersections
  - Should include additional safety enhancements designed to reduce traffic speeds, shorten crossing distances, enhance driver awareness, and/or provide active warning of pedestrian presence (Sec. 3B.18.09)

Future HDM Revisions
Currently approved for experimental use
- 2-stage turn queue boxes
- Green sharrows
2-Stage Turn Queue Boxes

- Assists bicyclists making 2-stage left turn
- Reduces conflicts between bicyclists and motor vehicles

Green Sharrows

- Increase visibility of sharrows to all roadway users

Project Prioritization Tools

- Humboldt County Association of Governments SRTS Prioritization Tool
- San Francisco SRTS Prioritization Tool
- National Center for SRTS: Safety-based prioritization of schools for SRTS Infrastructure Projects
- New York City DOT Safe Streets for Seniors

Humboldt CAG Prioritization Tool

www.hcaog.net/sites/default/files/hcaog_sr2s_prioritzn_tool_report_final_draft_0.pdf

- Combines GIS-based spatial data and qualitative matrix to understand school's readiness to proceed with SR2S programs. Three categories of criteria:
  - School readiness for SR2S projects and programs (gathered through school SR2S inventory calls and SR2S parent surveys).
  - School internal need (demographic factors within the school that may indicate need for SR2S programs).
  - School external need (physical and socioeconomic factors in the immediate vicinity of school)
San Francisco SRTS Prioritization System

- **Infrastructure changes:**
  - Prioritize schools with a lot of kids walking and safety concerns
  - Step 1: Compile Data (enrollment, % who walk, pedestrian crashes)
  - Step 2: Classify schools into 5 tiers (Calculate quartiles walkers and ped crashes)
  - Step 3: Reality Check
  - Step 4: Rank within tiers OR Feasibility screen

San Francisco SRTS Prioritization System

- **Non-Infrastructure projects:**
  - Prioritize schools with the highest potential for more walkers
  - Step 1: Compile Data (enrollment, % w/in 1 mile, % who walk, # non-walkers)
  - Step 2: Rank by non-walkers
  - Step 3: Solicit participation

National Center for SRTS Prioritization Tool for Infrastructure Projects

- **Step 1: Prioritize Schools**
  - Worksheet to record key factors
    - Crash history
    - Safety concerns
    - Current or potential use
  - Assign schools to groups
- **Step 2: Conduct field reviews of highest priority schools**

NYC Safe Streets for Seniors

- 12% of population are seniors; 36% of traffic fatalities are senior pedestrians
- Identified senior pedestrian issues
  - Not enough time to cross
  - Broken/Missing ped ramps
  - Faded/Hard-to-see markings
  - Poor drainage in crosswalks
  - Turning vehicles fail to yield
NYC Safe Streets for Seniors

- GIS mapping of Senior Severe Injury Density
  - Used to select top priority focus areas
- Developed Toolbox
  - Daylighting
  - Countdown Signals
  - Signal Timing
  - Ped Safety Islands
  - Road Diet
  - Sidewalk Extension

NYC Safe Streets for Seniors

- Tracked results by year

Questions/Comments?