CROSSING ISLANDS/RAISED MEDIANS

Designing for Pedestrian Safety
201
LIST ALL FEATURES THAT IMPROVE PEDESTRIAN SAFETY?

- Curb extension
- High visibility crosswalks
- Lighting
- Pulled back stop bar
- On street parking
- Bike lanes
- Zone system sidewalks
- ADA
- Raised crossing island
WHY RAISED ISLAND ARE SAFER FOR PEDESTRIANS

- Breaks up complex crossing into two simpler ones
- Medians and Pedestrian Crossing Islands in Urban and Suburban Aras
  - One of FHWA’s 9 proven safety countermeasures
Installing raised medians associated with a 25% reduction in pedestrian crashes in Florida (1)

Installing raised medians associated with a 46% reduction in pedestrian crashes at sites with marked crosswalks, and a 39% reduction at sites with unmarked crosswalks in a sample from 30 U.S. cities (2)

Installing refuge islands associated with a 56% reduction in pedestrian crashes (3)

RESEARCH


(3) Institute of Transportation Engineers. (2004). Toolbox of Countermeasures and Their Potential Effectiveness to Make Intersections Safer. Briefing Sheet 8, FHWA.
Recommended:

- **Midblock locations**
  - Crossing exceeds 60 feet
  - Limited number of gaps in traffic
- **Local roads with low speeds & volume**
  - Aesthetic reasons
  - Special pedestrian circumstances
- **Collector with moderate-to-high speeds & volume**
  - Strongly recommended
- **Midblock multilane arterials**
  - Desirable and consideration for supplementary traffic control devices

WHEN TO INSTALL

Guidance

- Curbed sections of multi-lane roadways in urban and suburban areas, particularly in areas where there are mixtures of significant pedestrian and vehicle traffic (more than 12,000 ADT) and intermediate or high travel speeds. ¹

1. **FHWA-SA-12-011**
   Proven Safety Countermeasures Medians and Pedestrian Crossing Islands in Urban and Suburban Areas
Problem/Background

- Wide 3 lane road
  - No marked crosswalks
- Intersection near curve
- Avoided by pedestrians, bicyclists, & motorists
- Increased traffic led to more collisions
- Highest crash intersection in the city
Solution

- Worked with CALTRANS and community
- Temporary traffic controls used to test measures
- Median island and crosswalk installed for pedestrian & bicyclist refuge
- Other islands channel vehicles and provide more refuge
- Street lighting and LED signs offer visibility

Signs, cones, and barricades were used to test the improvements before becoming permanent.
Results

- Reduced conflicts and enhanced safety
- No collisions reported since project completed in 2009
- New school, business, and housing increased foot traffic and activity

Intersection with the permanent improvements
WHERE TO PLACE ISLANDS
WHERE TO PLACE

- Where there is room
- Where people are crossing
- Intersections
- Midblock
CAN USE FOR ACCESS MANAGEMENT
LEFT TURNS PROHIBITED AT DRIVEWAY
LENGTH OF OPENING NEXT TO MEDIAN

- 6’–22’
- 20’–34’
- 32’–72’
- 65’–71’
- 68’–111’
WHAT TYPE OF MEDIAN OR ISLAND

Flush

6” Raised Curb

Low Profile Barrier
A TWLTL is not a crossing island
It’s an opportunity for pedestrians to use what’s already out there
TWLTL provides space for island
But better than yellow centerline
6-INCH RAISED

- Minimum 6 feet wide
- 8 feet to accommodate bicycles, wheelchairs, scooters, and groups of pedestrians
- Length parallel to street 20 feet minimum
### Table Notes

- [1] Six feet measured curb face to curb face is generally considered the minimum width for proper growth of small caliper trees (less than 4 inches).
- [2] Wider medians provide room for larger caliper trees and more extensive landscaping.
- [4] Includes a 10-foot turn lane and a 6-foot pedestrian refuge.

<table>
<thead>
<tr>
<th>Median Type</th>
<th>Minimum Width</th>
<th>Recommended Width</th>
</tr>
</thead>
<tbody>
<tr>
<td>Median for access control</td>
<td>4 feet</td>
<td>6 feet</td>
</tr>
<tr>
<td>Median for pedestrian refuge</td>
<td>6 feet</td>
<td>8 feet</td>
</tr>
<tr>
<td>Median for single left-turn lane and pedestrian refuge</td>
<td>16 feet [4]</td>
<td>16 feet</td>
</tr>
</tbody>
</table>
Signals should be timed so that pedestrians can cross entire street in one phase

No detectable warning strips in median

Graphic: San Francisco Better Streets Guide
LESS THAN 6 FEET MEDIAN
NO TRUNCATED DOMES
Pathway & waiting area should be at street grade

2 foot wide detectable warning strips on each end

2 foot wide clear zone (min.) in the center

Graphic: San Francisco Better Streets Guide
OK?
OK?
OK?
Refuge islands should be raised
  - more visibility for waiting pedestrians.

Raised islands should include two ramps
  - 8.3% (1 inch per foot)

Ramp ~6 feet long for 4 & 5 inch height curb
  - 2 foot wide detectable warning strips on each end & minimum 4 foot wide waiting area
MEDIANS 16 FEET WIDE OR GREATER
Islands with ramps – level landing min. 4x4ft
Ramp slope of 1V:12H (8.33%)
  - Island width ~16 feet needed if 6” curb height
Detectable warnings bottom of all ramps
Island length parallel to street min. 20ft
R302.3.1 Medians and Pedestrian Refuge Islands. The clear width of pedestrian access routes within medians and pedestrian refuge islands shall be 5.0 ft minimum.
TWO-STAGE CROSSING
TWO-STAGE CROSSING AT 10 FT WIDE ISLAND

Compromise:
- Reduce island height in pedestrian area (4"")
- Keep 6” height at each end of island

Railing in island must be crash worthy
TWO-STAGE ISLAND

Two-Stage PHB
- Decorative fencing
- Shade in median
- Decorative landscaping – does not block visibility
ANGLED CUT THROUGH
RIGHT OR WRONG?
- Blind use curb to find direction
- Finish curb to line up with crosswalk

Photo credit: Carl Sundstrom
Most UNSIGNALIZED 2-stage crossings are only staggered the width of the crosswalk.

- Some are staggered the width of the crosswalk plus about 10 feet

Amount of stagger need not be great

- Especially with wider medians (16 feet or wider)
- With medians of 20 feet or more the staggering may not be as important, even with signal or PHB-controlled

Every site is unique.

The greater the stagger, the less likely someone will use it
INFORMAL RESEARCH ON OFFSET CROSSWALKS

- For signal controlled crossings the width of the crosswalk plus 10 to 20 feet would typically be fine for narrower medians (in some cases to hold the pedestrians and to prevent pedestrians from viewing the wrong pedestrians signal head).
- Wider medians, greater than 16 feet, the width of the crosswalk should be sufficient.
- Most of the pedestrian signals should be equipped with “egg crate” visors so that they are seen by pedestrians in the crosswalk area and not outside the crosswalk.
- This will also encourage more pedestrians to use the crosswalk.
- With slip lanes, always use raised islands (not painted)
- Ramps must be at least 4 ft. wide
- For cut-through: must be 5 ft. wide
- Provide at least 5 feet of clear (turning) space or level landing
- Provide a 2-foot strip of detectable warnings at end of cut-through or at bottom of ramp
- Align cut-through or ramps with crosswalks
- Cut-through needs some slope
- Remember drainage at bottom of ramp
LANDSCAPING
LANDSCAPING

- Trees in median & sides of streets can help narrow long range field of vision for drivers, encouraging slower speeds
- Trees placed in median should comply with AASHTO Roadside Design Guide
- Trees should not block visibility of pedestrians crossing the street
  - Small caliper trees
  - Trim up branches
  - Bushes in median should be trimmed low
PLACEMENT OF TREES WITH RESPECT TO MEDIAN OPENINGS

- Careful consideration should be given to the location & type of landscaping
- Plantings in narrow medians may create problems for maintenance activities
- Plantings may cause visual obstructions for turning motorists
- Plantings and objects in medians may constitute roadside obstacles

Source: AASHTO Green Book
Guidance to consider when planting trees/bushes in medians:

- **Non-signal median openings**
  - No shrubs with ultimate height over 30” within 50-ft of opening
  - No trees within 50 ft of opening
  - Second tree should be no closer than 100 ft from the first tree
  - No foliage between 2 ft and 6 ft above median

- **Median opening at traffic signals**
  - No shrubs with ultimate height over 30” within 50-ft of opening
  - No trees within 100 ft of opening
  - Second tree should be no closer than 100 ft from the first tree
  - No foliage between 2 ft and 6 ft above median

- **Same dimensions apply to median pedestrian crossings**

Objectives:

- Develop design guidelines for safe & aesthetic roadside treatments in urban areas
- Revised Chapter 10 of the Roadside Design Guide
- Identify 140+ miles of urban arterial roads
- Analyzed approximately 5 years of crash data
- Video tape corridor in both directions of travel and identify characteristics where crashes occurred (also compare to locations where the crashes did not occur)

<table>
<thead>
<tr>
<th>State</th>
<th>Number of Corridors</th>
<th>Miles</th>
</tr>
</thead>
<tbody>
<tr>
<td>California</td>
<td>7</td>
<td>47.3 miles</td>
</tr>
<tr>
<td>Georgia</td>
<td>9</td>
<td>23.8 miles</td>
</tr>
<tr>
<td>Illinois</td>
<td>7</td>
<td>48.5 miles</td>
</tr>
<tr>
<td>Oregon</td>
<td>8</td>
<td>23.7 miles</td>
</tr>
</tbody>
</table>
# EVALUATION OF FIXED OBJECT CRASHES
## URBAN CORRIDORS – RAISED CURB

<table>
<thead>
<tr>
<th>Lat. Dist.</th>
<th>Crashes</th>
<th>%</th>
<th>Cumul.%</th>
</tr>
</thead>
<tbody>
<tr>
<td>0-1’</td>
<td>129</td>
<td>28.3%</td>
<td>28.3%</td>
</tr>
<tr>
<td>1-2’</td>
<td>157</td>
<td>34.4%</td>
<td>62.7%</td>
</tr>
<tr>
<td>2-4’</td>
<td>90</td>
<td>19.7%</td>
<td>82.5%</td>
</tr>
<tr>
<td>4-6’</td>
<td>50</td>
<td>11.0%</td>
<td>93.4%</td>
</tr>
<tr>
<td>6-8’</td>
<td>23</td>
<td>5.0%</td>
<td>98.5%</td>
</tr>
<tr>
<td>8-10’</td>
<td>6</td>
<td>1.3%</td>
<td>99.8%</td>
</tr>
<tr>
<td>10-15’</td>
<td>1</td>
<td>0.2%</td>
<td>100%</td>
</tr>
<tr>
<td><strong>Total:</strong></td>
<td><strong>456</strong></td>
<td><strong>100%</strong></td>
<td></td>
</tr>
</tbody>
</table>

Over 80% of crashes with fixed objects 4’ or less from curb

Over 90% of crashes with fixed objects 6’ or less from curb

Source: NCHRP Report 612
Landscaping can be a positive feature

- Must not block sight lines of pedestrians and motorists at the crossing area
- Use of small trees, low shrubs, colorful native plants
MAINTENANCE

- Most likely swept by hand
- If swept by machine
  - Know width of sweepers
  - Know turning radius of sweepers
- Landscaping maintenance is essential
LANDSCAPING AS BARRIER

- May be used to prohibit midblock crossings at times
  - Traffic volumes and or speeds make intersection crossing preferred option
- Midrise shrubs and other types of planting alternatives for fencing
  - Used to divert the adjacent intersections
- Requires a commitment to maintain/water/repair
PEDESTRIAN FENCES IN MEDIANS

- Should be attractive
- Appropriate length to prevent crossings
- Treatments to prevent crossing as end points & median openings
- Visibility limitations for left turning motorists
- Must be crash worthy
Median fence was added when it was found that police could not force pedestrians to use overpass.
Signals should be timed so that pedestrians can cross the entire street.

If the street is “too wide”, and there is a sufficient median width, a 2-stage crossing may be considered:
- Median width min 6 feet – preferably 8 to 10 feet wide
- What crossing distance is “too long” to warrant median installation?
  - Crossing distance may be based on cycle length & distance to nearest signal

For 2-stage crossings, a pedestrian pushbutton must be installed in median:
- Consider APS pushbuttons
## COST (2013)

<table>
<thead>
<tr>
<th>Infrastructure</th>
<th>Description</th>
<th>Median</th>
<th>Average</th>
<th>Minimum</th>
<th>Maximum</th>
<th>Cost Unit</th>
<th>No. of Observations</th>
</tr>
</thead>
<tbody>
<tr>
<td>Island</td>
<td>Median Island</td>
<td>$10,460</td>
<td>$13,520</td>
<td>$2,140</td>
<td>$41,170</td>
<td>Each</td>
<td>17 (19)</td>
</tr>
<tr>
<td>Island</td>
<td>Median Island</td>
<td>$9.80</td>
<td>$10</td>
<td>$2.28</td>
<td>$26</td>
<td>Sq Ft</td>
<td>6 (15)</td>
</tr>
</tbody>
</table>

**Source:** “Costs for Pedestrian and Bicyclist Infrastructure Improvements: A Resource for Researchers, Engineers, Planners, and the General Public”, October 2013
POSSIBLE ISSUES WITH RAISED MEDIANS

- Construction detours when half street is closed
- *Installing medians on existing streets with lots of driveways*
- Need room to make U-turns (narrow cross-sections)
  - Check turning templates
- Street width consideration (medians result in wider streets)
  - ROW cost/Maintenance/Traffic signal timing
- Prohibiting crossing may require median fencing
  - Aesthetics (wrought iron)
  - Make sure fencing does not block driver visibility
  - Fencing should be crash worthy
  - Provide about 200 feet fencing on either side of main crossing point (Rule of Thumb)
  - Issues at the end points of fencing
U-TURN POINTS FOR CONTINUOUS MEDIANS

- U-Turn points were designed into continuous median
- Delineator posts discourage U-Turns for average drivers
- Emergency Vehicles run over delineators then replace
- Crossover point when roadwork is being done on one side of the roadway
QUESTIONS? RESOURCES

- AASHTO Policy on Geometric Design of Highways and Streets
- Public Right-of-Way Accessibility Guidelines
- Model Design Guide for Living Streets Los Angeles County 2011
  - http://www.modelstreetdesignmanual.com/download.html
- Update of Florida Crash Reduction Factors and Countermeasures to improve the Development of District Safety Improvement Projects
QUESTIONS? RESOURCES

- Safety Effects of Marked vs. Unmarked Crosswalks at Uncontrolled Locations FHWA-RD-01-075.
- Toolbox of Countermeasures and Their Potential Effectiveness to Make Intersections Safer
  - http://library.ite.org/pub/e26c7e9c-2354-d714-5181-4cc79fba5459
- Informational Report on Lighting Design for Midblock Crosswalks FHWA-HRT-08-053
- NCHRP Report 612
- Washington State DOT Low Profile Barrier