# Intersection Crashes Part1

# Geometric concerns/solutions



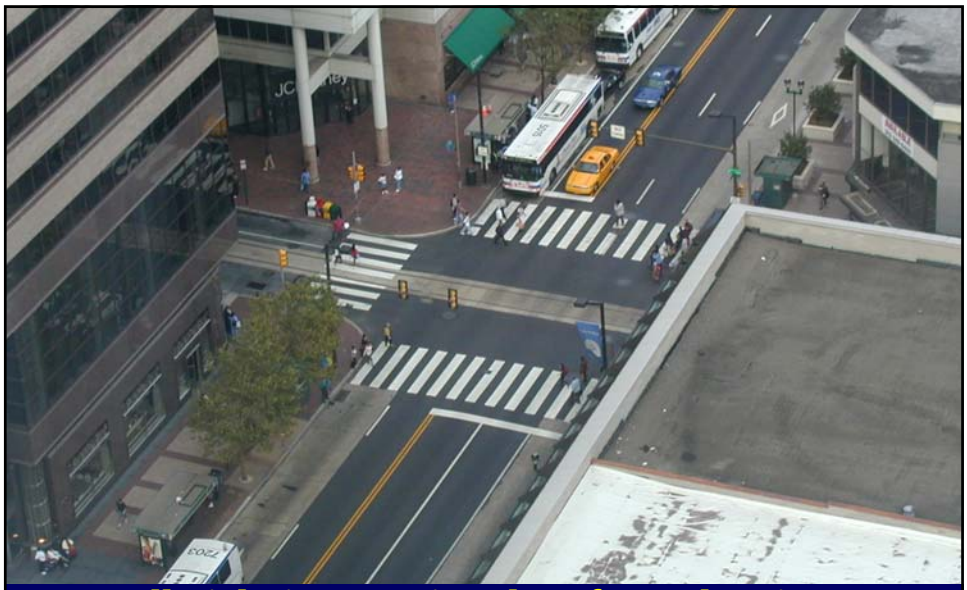
# Characteristics that make intersections safer for pedestrians

**Pedestrian-friendly intersections are**

- **Tight**
- **Simple**
- **Square**
- **Slow speed**
- **Easy to understand**
  - ***If complex, broken into smaller steps***
- **Avoid free-flow movements**

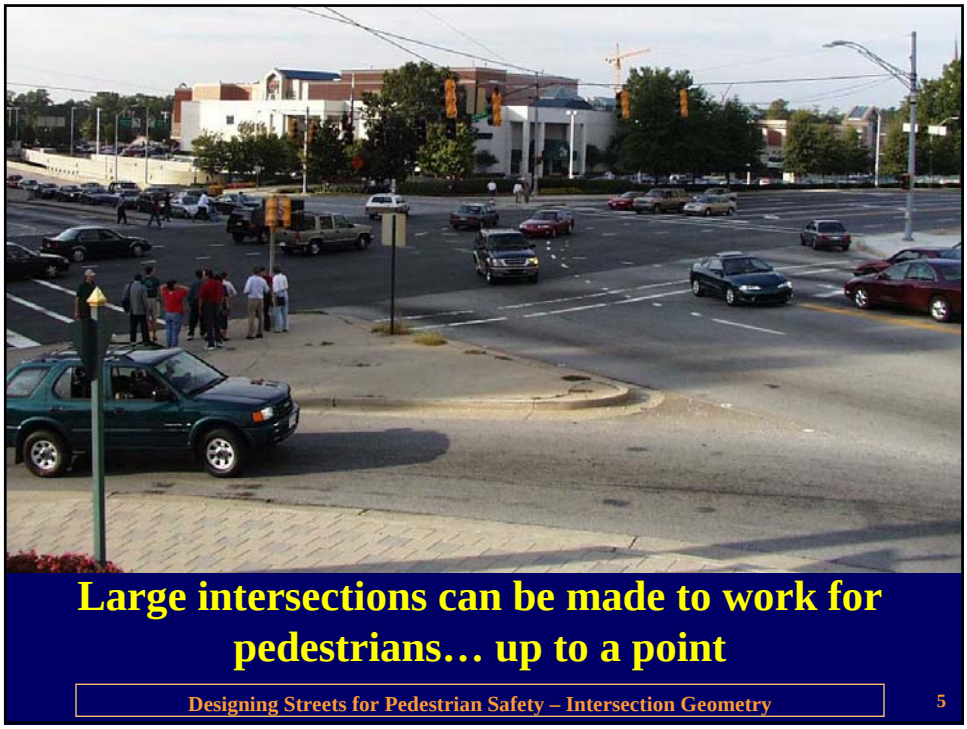


**Two bodies can't occupy the same space at the same time, right?**



**Small, tight intersections best for pedestrians…**
**Simple, few conflicts, slow speeds**

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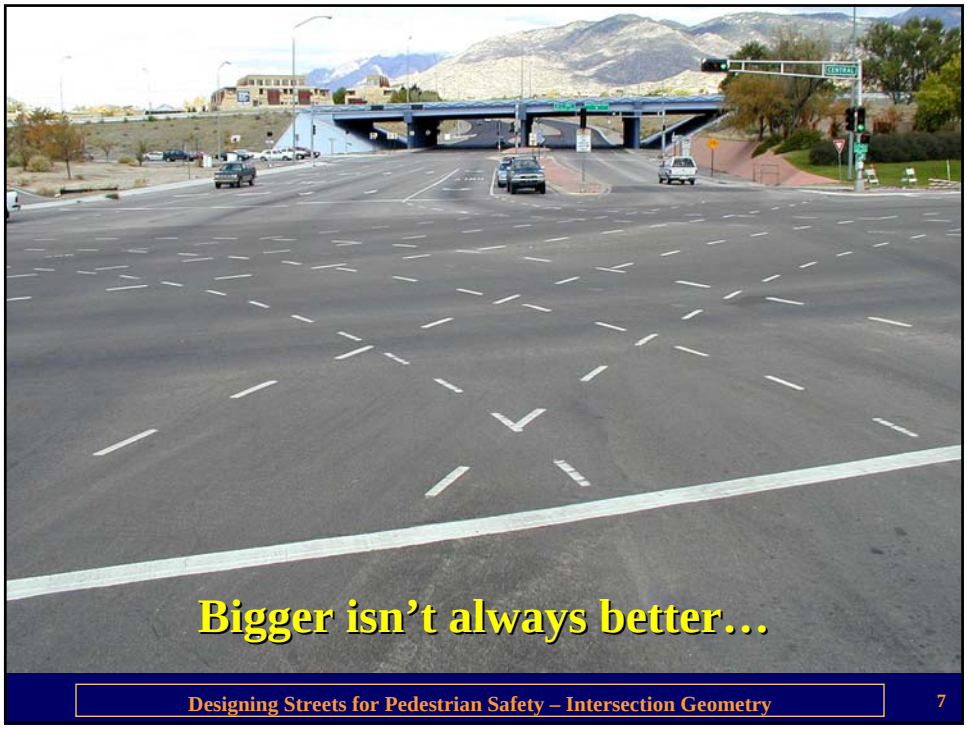
**Large intersections can be made to work for pedestrians… up to a point**

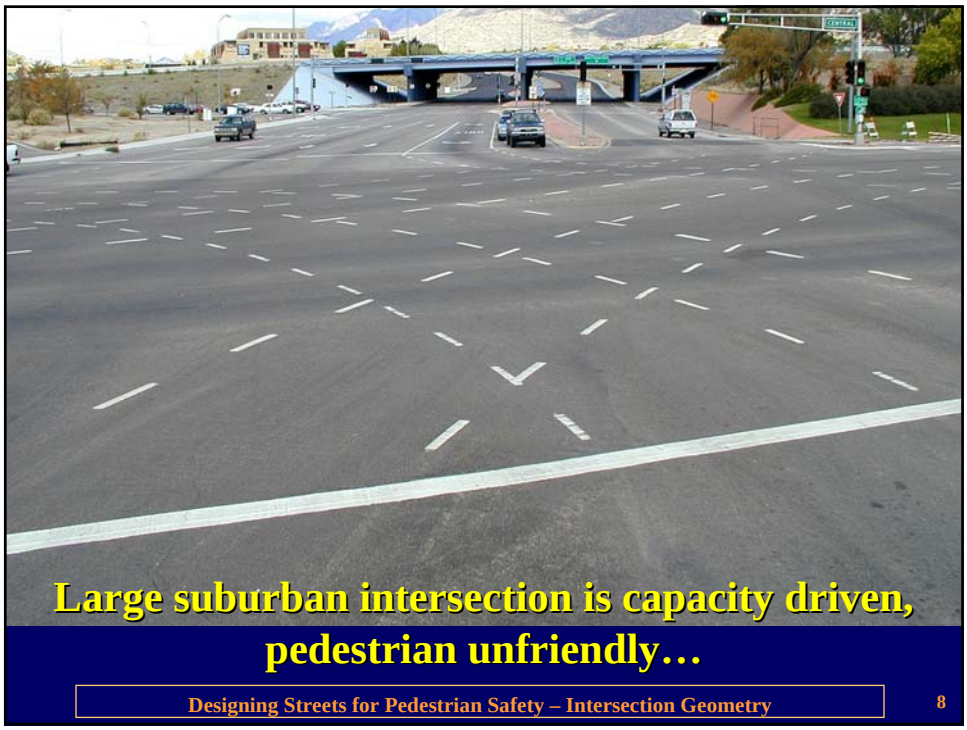
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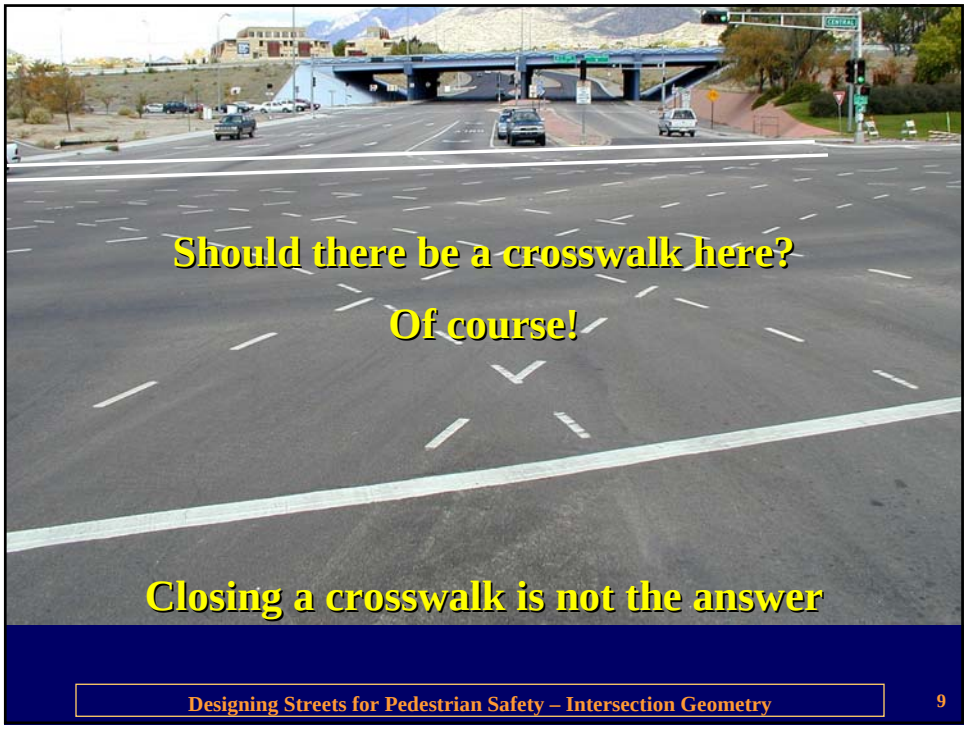


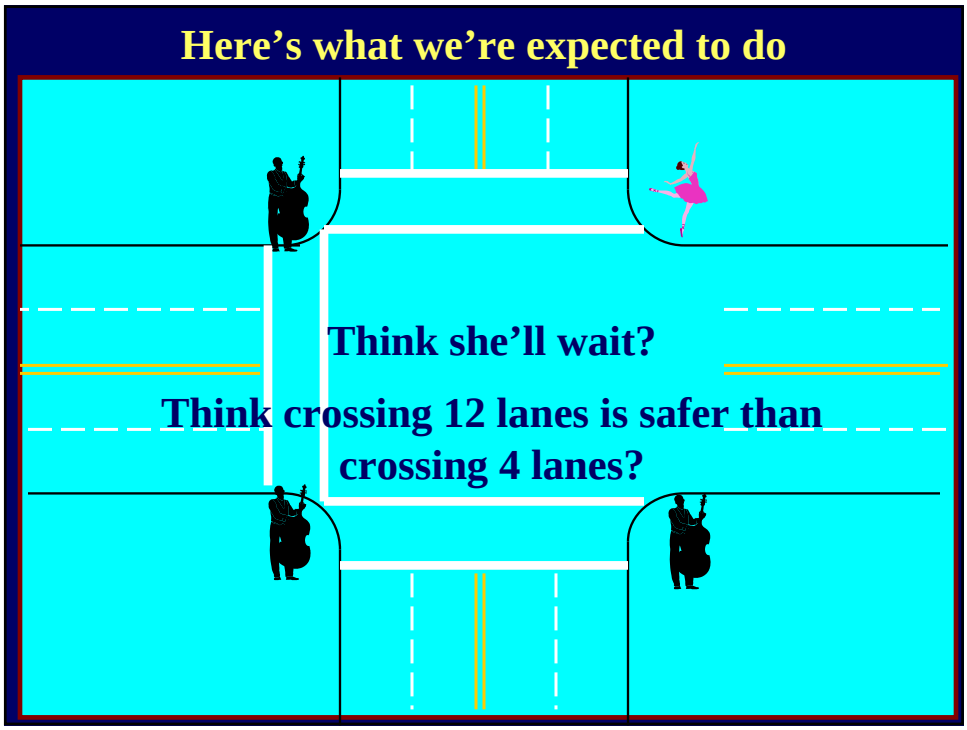

**Pedestrians should be able to cross all quadrants**

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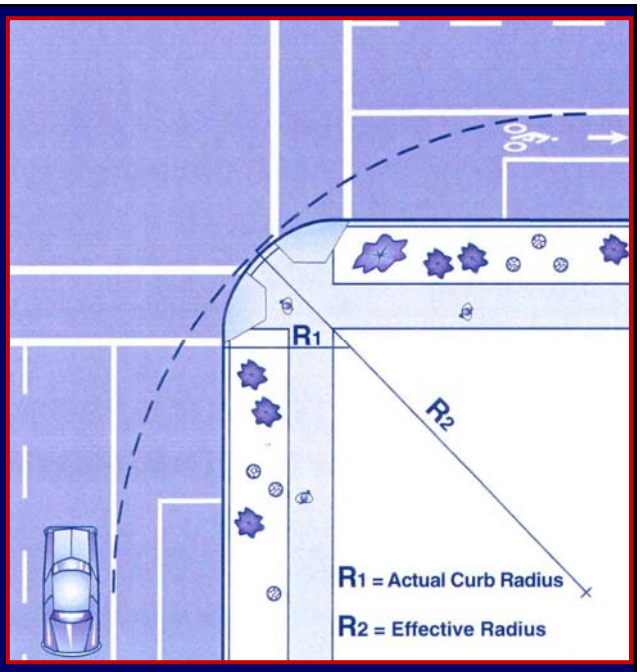

Bigger isn't always better…
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7


Large suburban intersection is capacity driven, pedestrian unfriendly…
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8


Should there be a crosswalk here?
Of course!
Closing a crosswalk is not the answer
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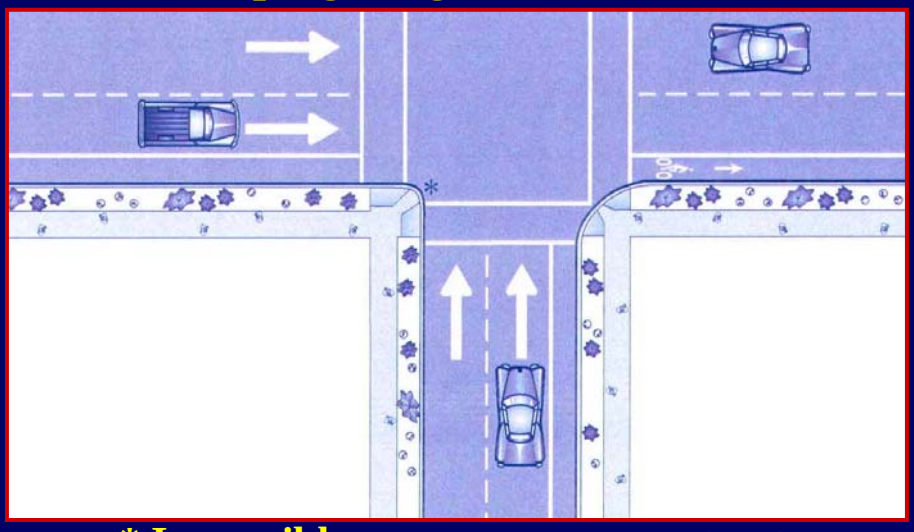

Here's what we're expected to do
Think she'll wait?
Think crossing 12 lanes is safer than crossing 4 lanes?

## Keeping it tight: Curb radii




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## Keeping it tight: Curb radii

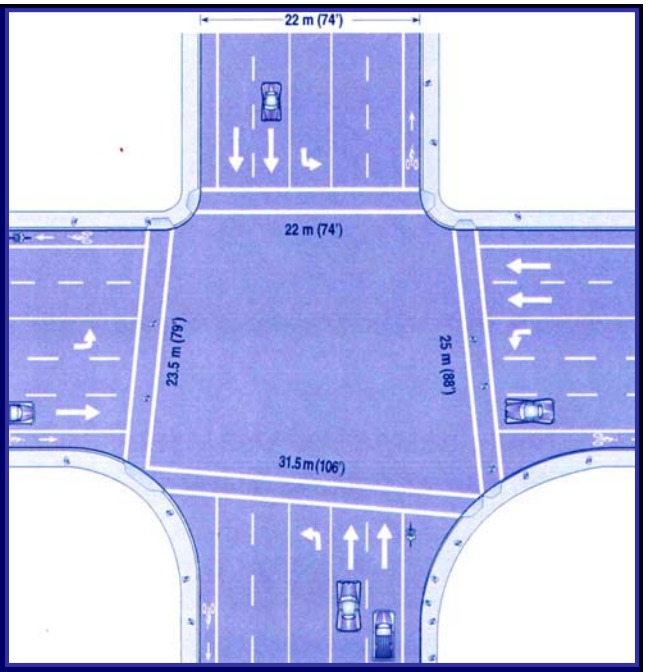


*** Impossible move on one-way street**

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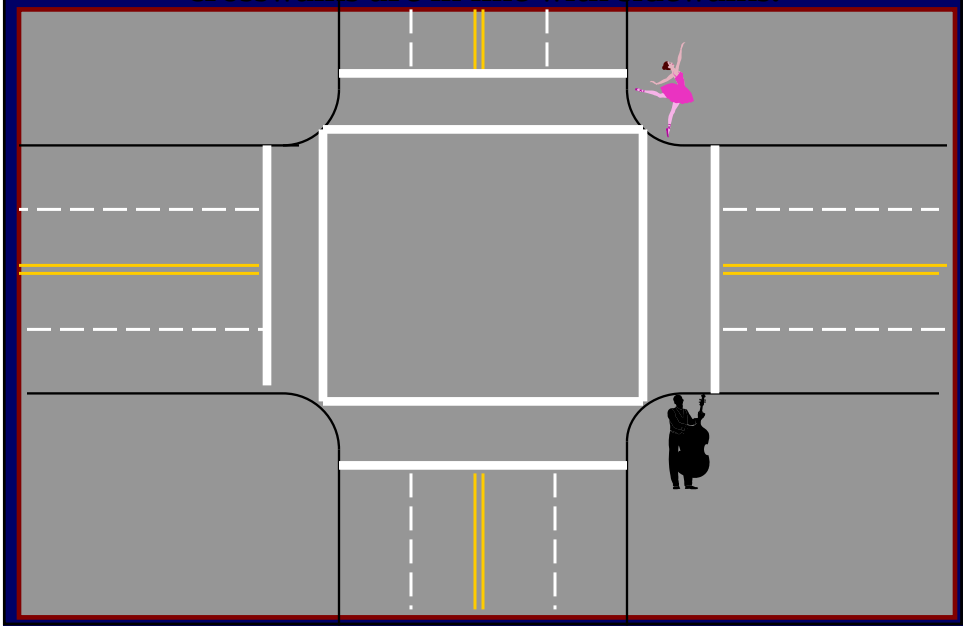
**Intersection geometry:**

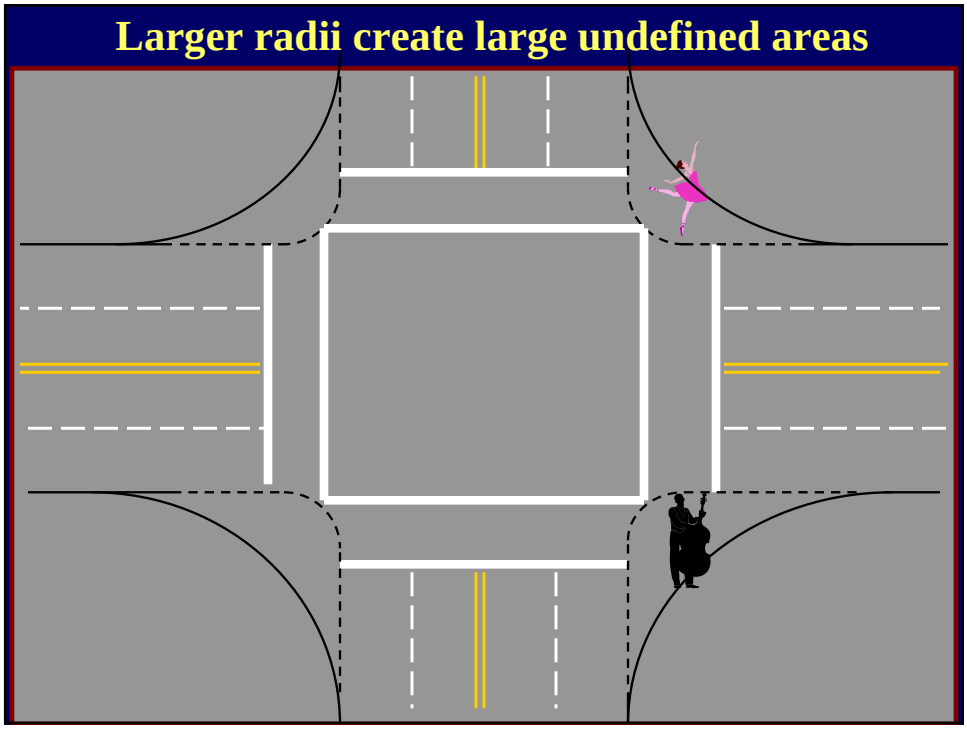
**Large radius increases crossing distance, and affects crosswalk & ramp placement**

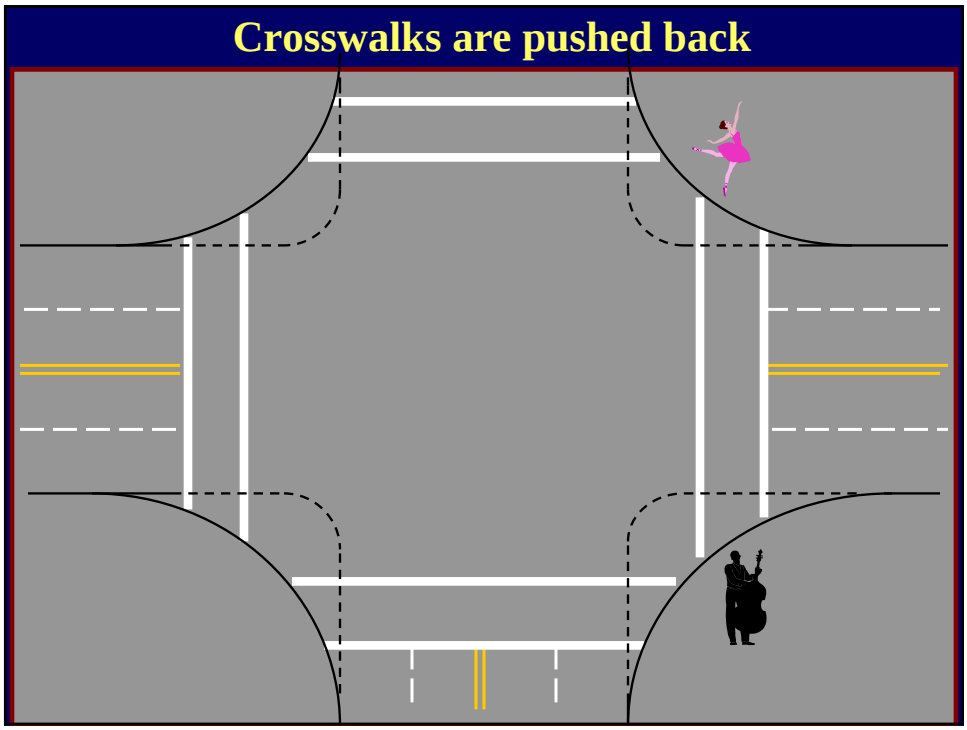


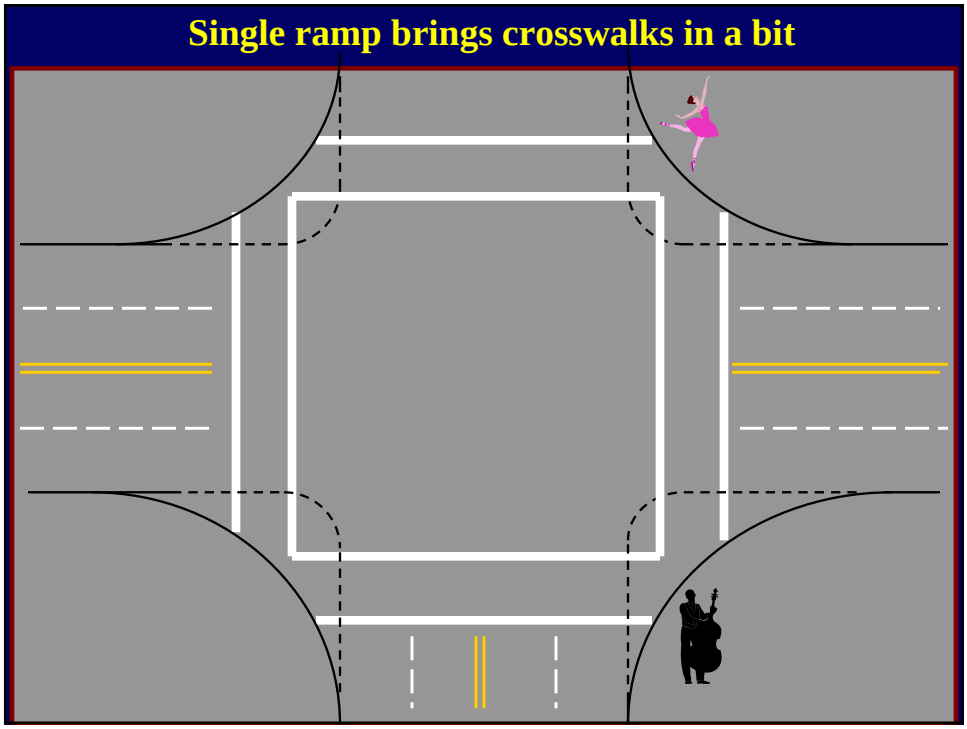

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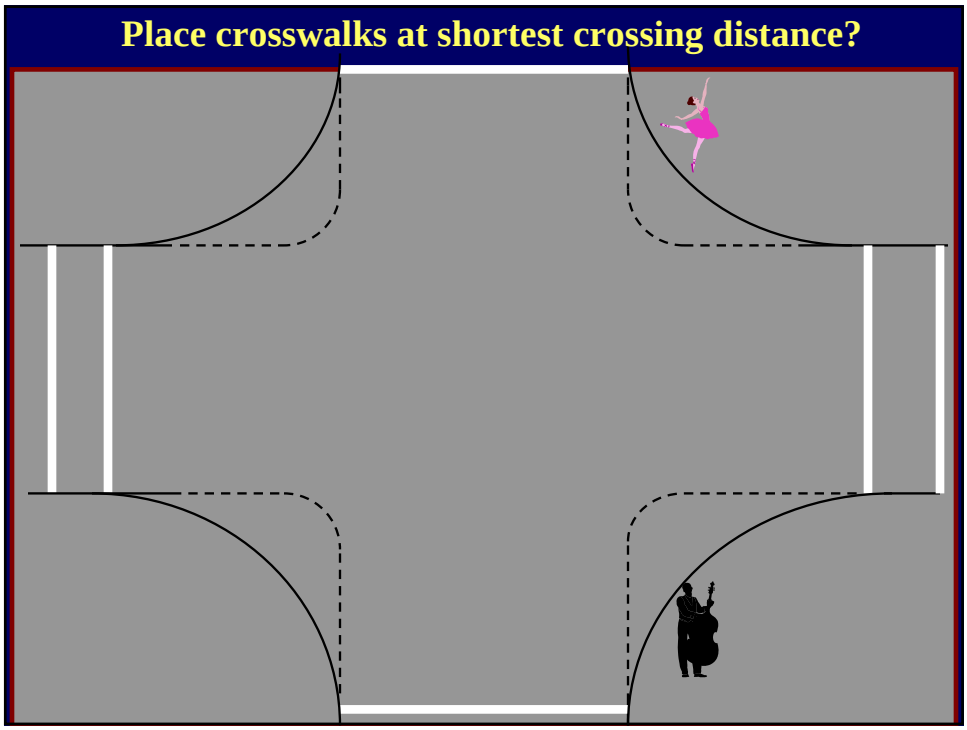
**With tight radii, crossing distance = width of the road; crosswalks are in line with sidewalks.**




Larger radii create large undefined areas


Crosswalks are pushed back


Single ramp brings crosswalks in a bit


Place crosswalks at shortest crossing distance?

## Effect of large radius on crosswalk




**It's more than the distance…**

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## Effect of large radius on crosswalk

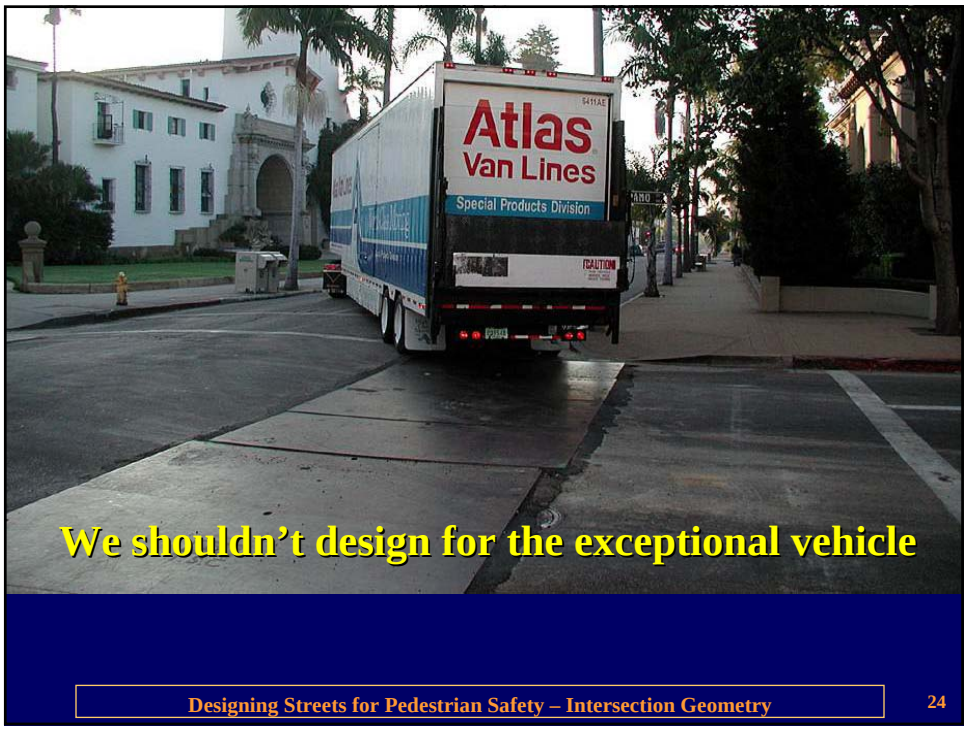



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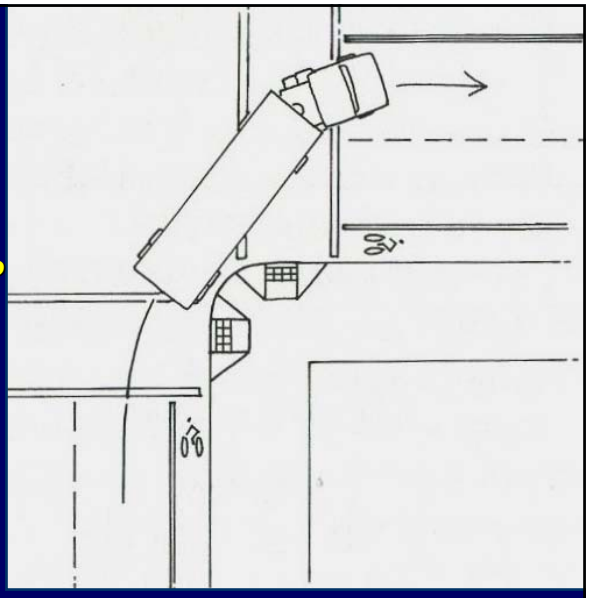

Effect of large radius on drivers
They drive fast…
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21


… ignoring pedestrians
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TIRED OF CAR GAMES?
Call to Join Us! NORTHSTAR 1-877-339-1068
Must consider design vehicles, but don't choose larger vehicle than necessary
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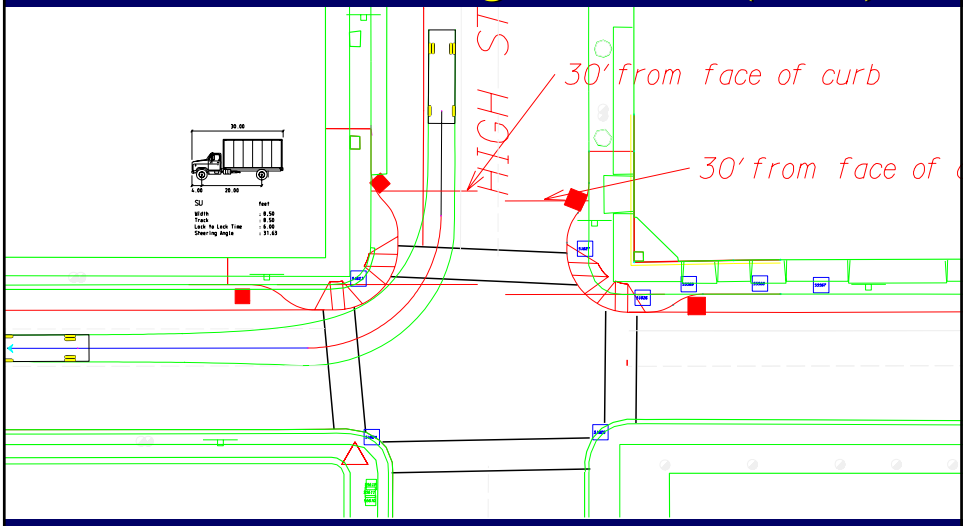

Atlas
Van Lines
Special Products Division
We shouldn't design for the exceptional vehicle
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24

**Other important design decision:** ***What lane does the turn the trucks into?***



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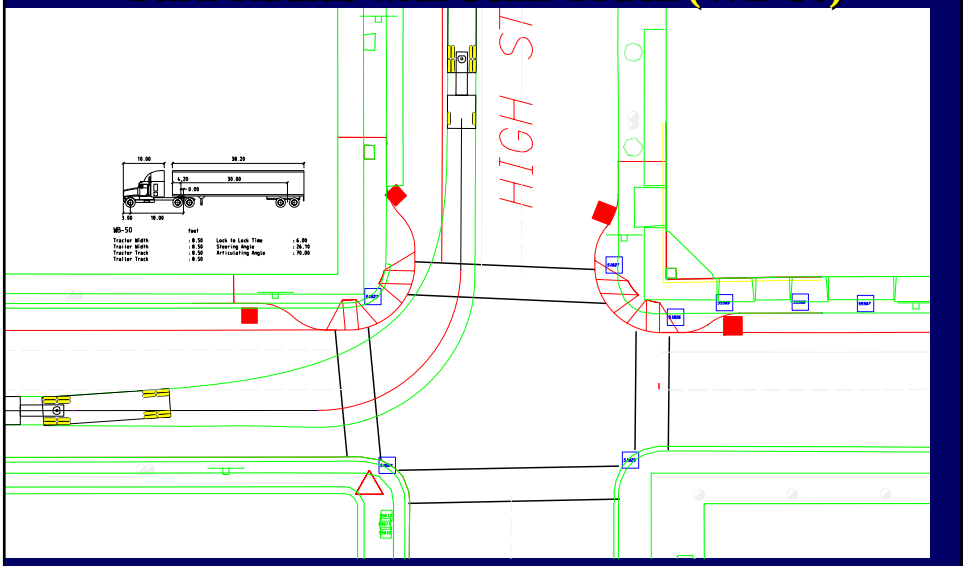
## Turn Radius with Single unit truck (SU-30)




**Turn the more common SU into the near lane**

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## Turn Radius with Semi-Truck (WB-50)




**Turn the less common semi into the 2nd lane**

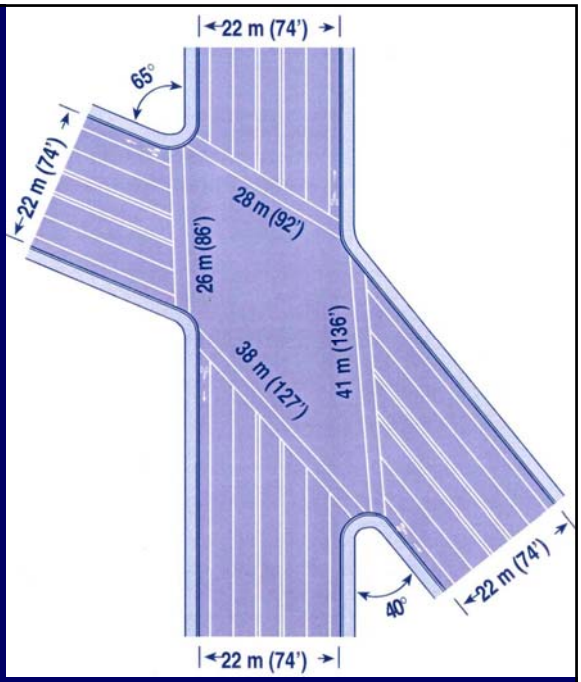
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**Trucks can make surprisingly tight turns at slow speeds**

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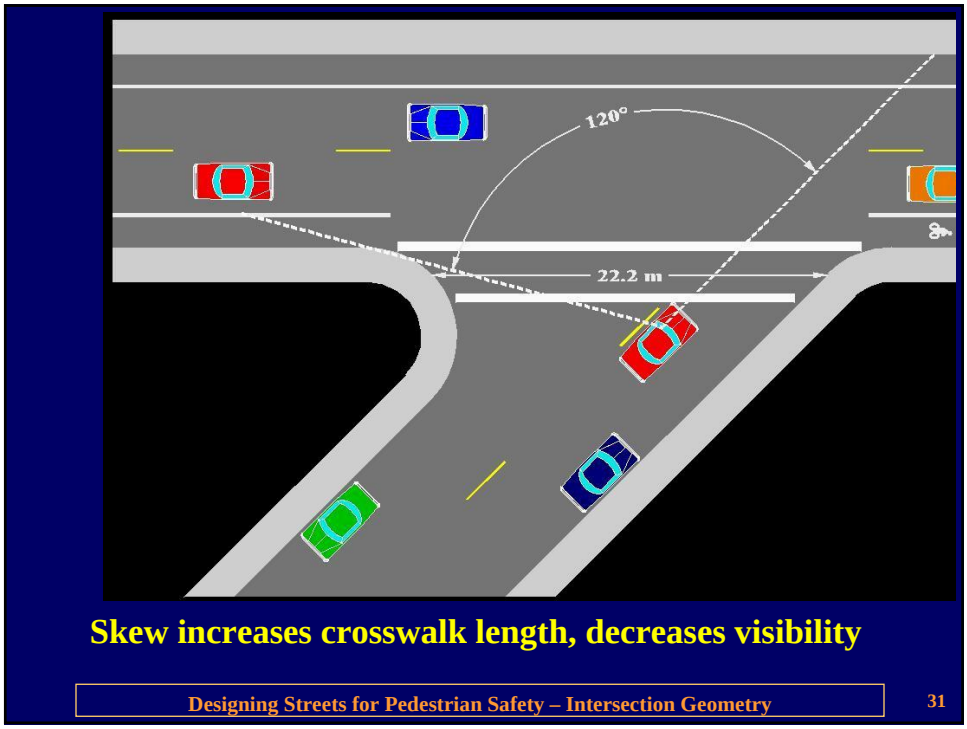
**Skews increase crossing distance & speed of turning cars**

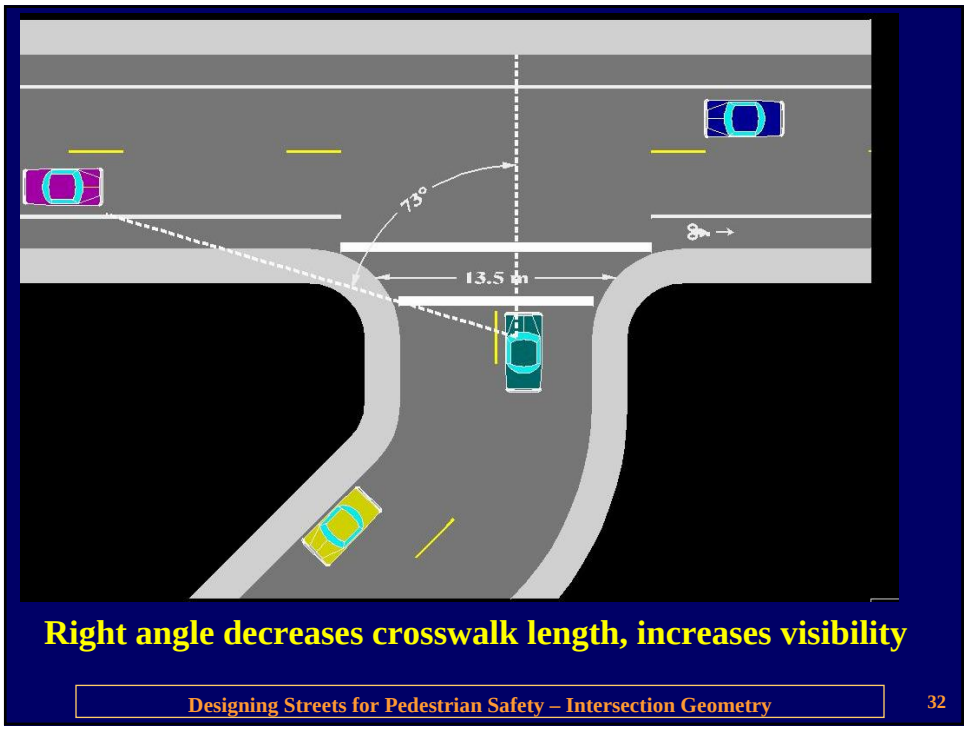



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Designing Streets for Pedestrian Safety – Intersection Geometry 30


120°
22.2 m
Skew increases crosswalk length, decreases visibility
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31


73°
13.5 m
Right angle decreases crosswalk length, increases visibility
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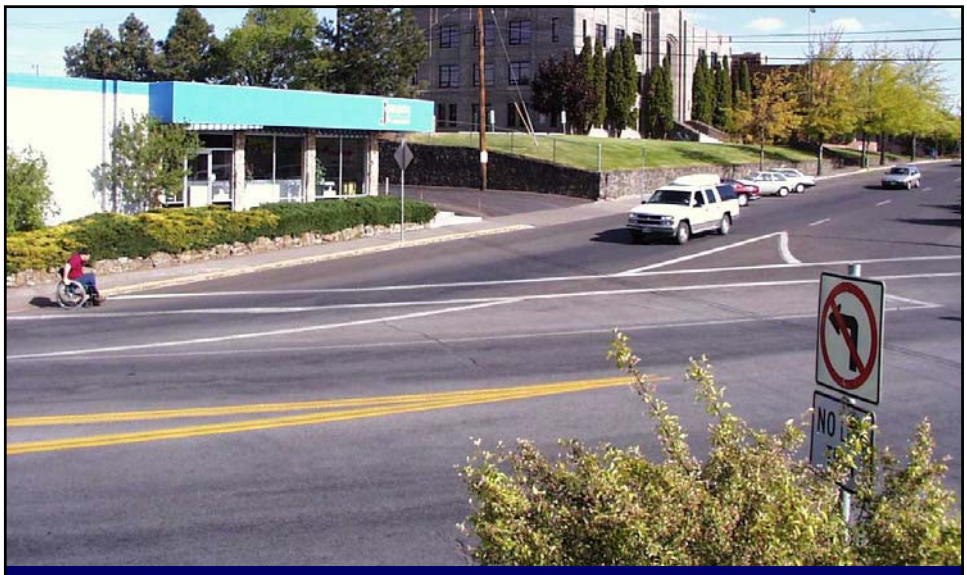

Old curb line
Recapturing a sea of asphalt
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33


New crosswalk
Old crosswalk
Crossing distance greatly reduced
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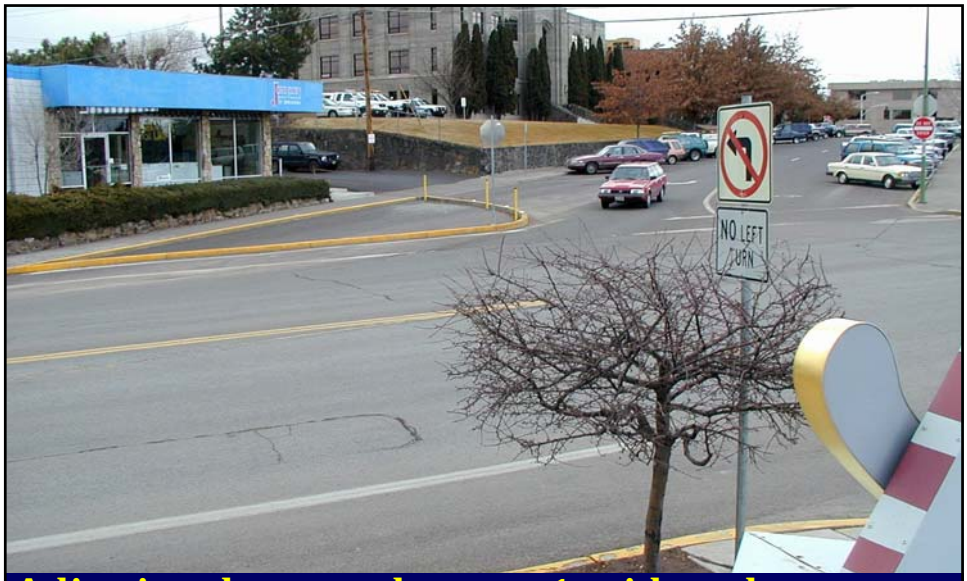
**Skew forces driver to look one way…**

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**… not looking for pedestrian on right…**

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**Adjusting skew step-by-step: 1. with curb**

Designing Streets for Pedestrian Safety – Intersection Geometry 37




**Adjusting skew step-by-step: 1. with curb**

Designing Streets for Pedestrian Safety – Intersection Geometry 38



**Adjusting skew step-by-step: 2. add plants**

Designing Streets for Pedestrian Safety – Intersection Geometry 39




**Adjusting skew step-by-step: 2. add plants**

Designing Streets for Pedestrian Safety – Intersection Geometry 40

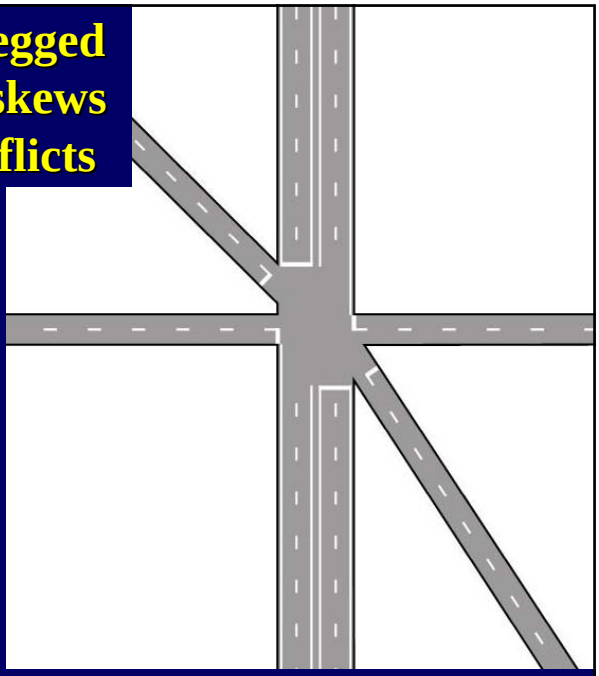

Result: driver behavior change
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KUM-YONS
All this space was asphalt!
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Making better use of urban space & helping drivers
More benefits than simply reducing crossing distance
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43


Paint seems to work as temporary measure
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44

**Complex multi-legged intersection has skews and multiple conflicts**



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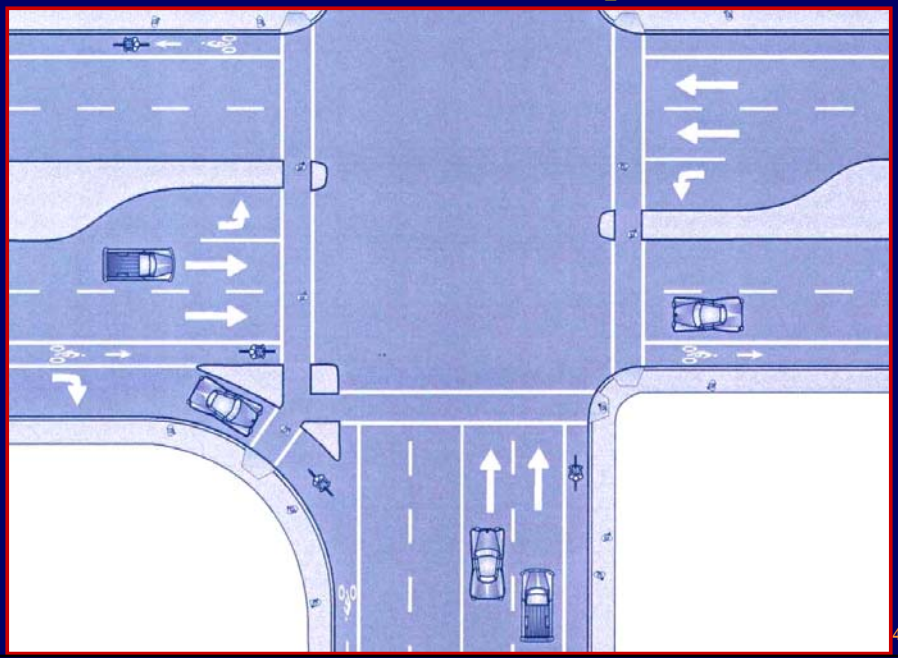


**People prefer direct route**

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Designing Streets for Pedestrian Safety – Intersection Geometry 47

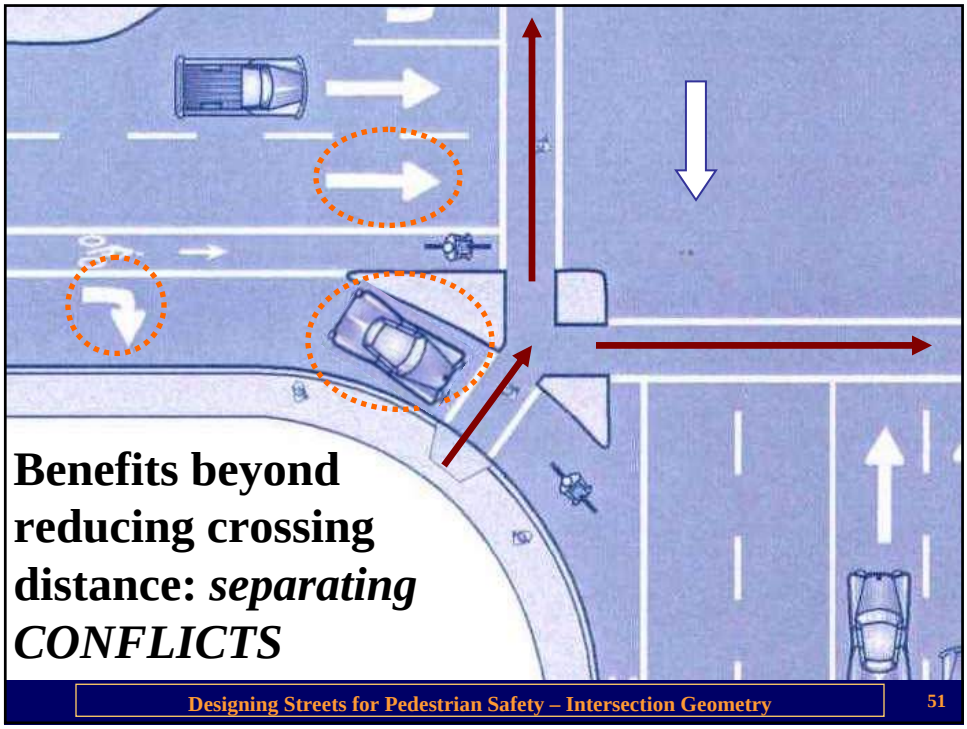
## Raised islands at intersection separate conflicts

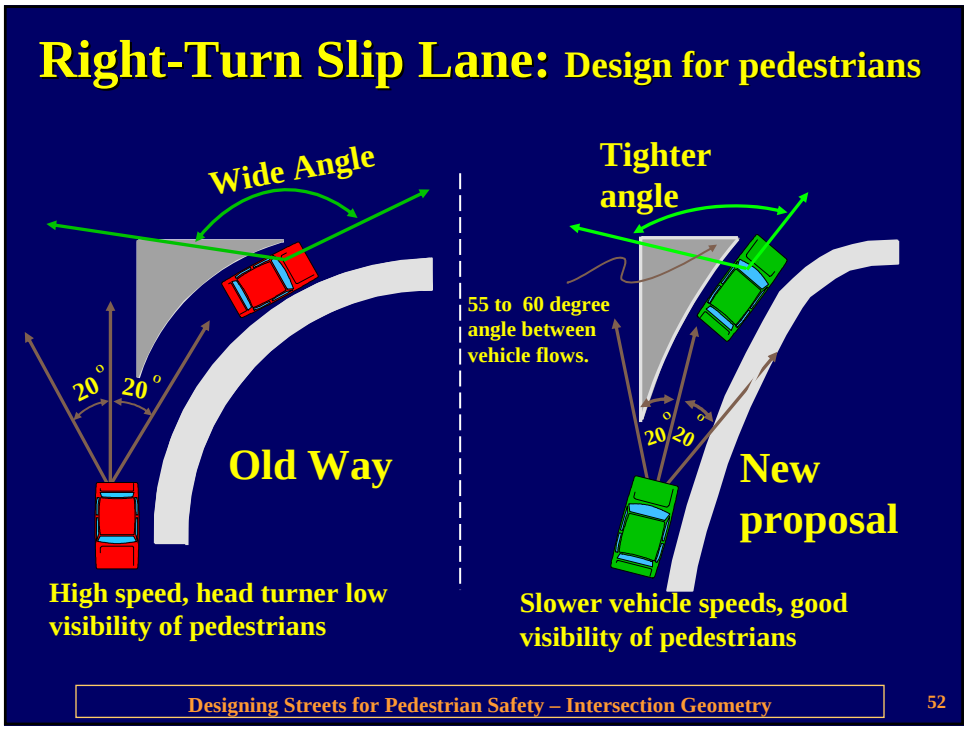


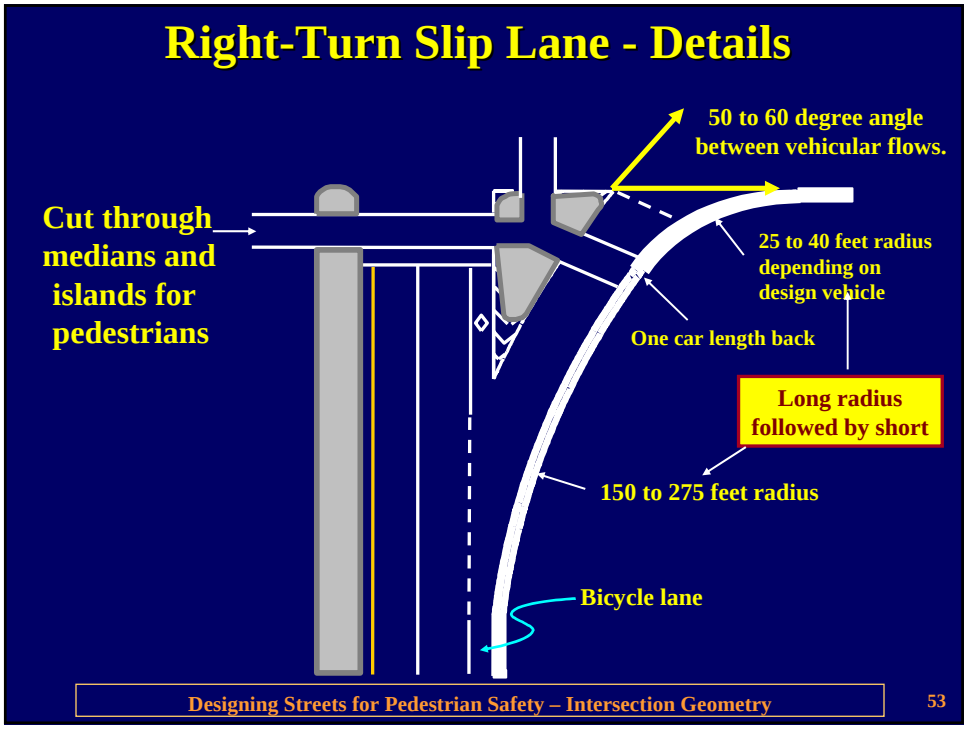
48


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49

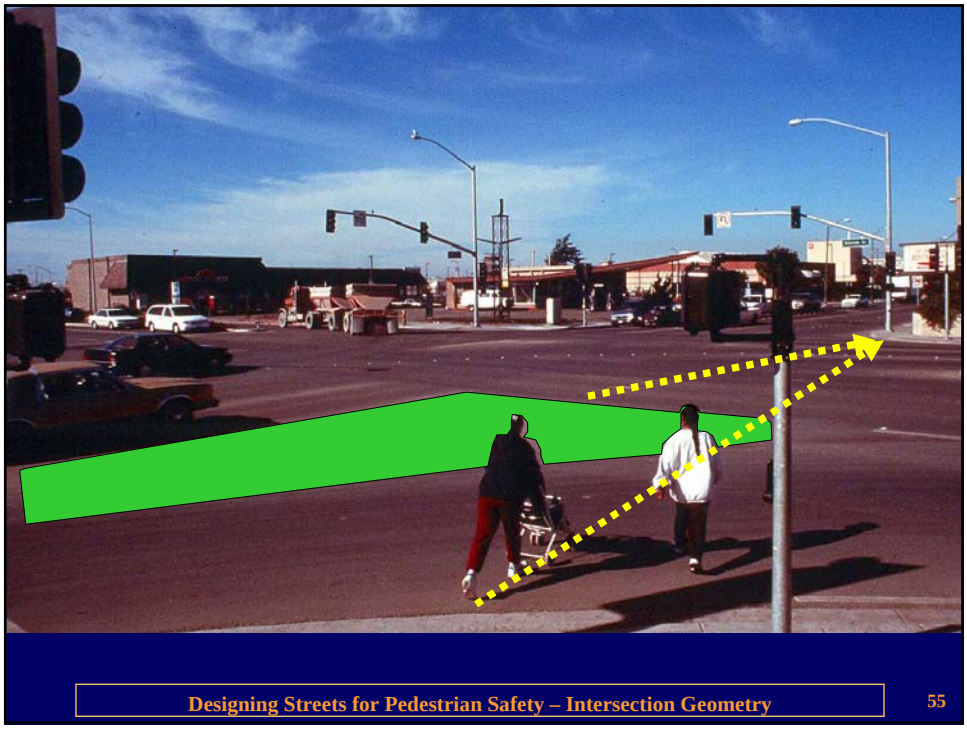

Imagine the signal timing without island…
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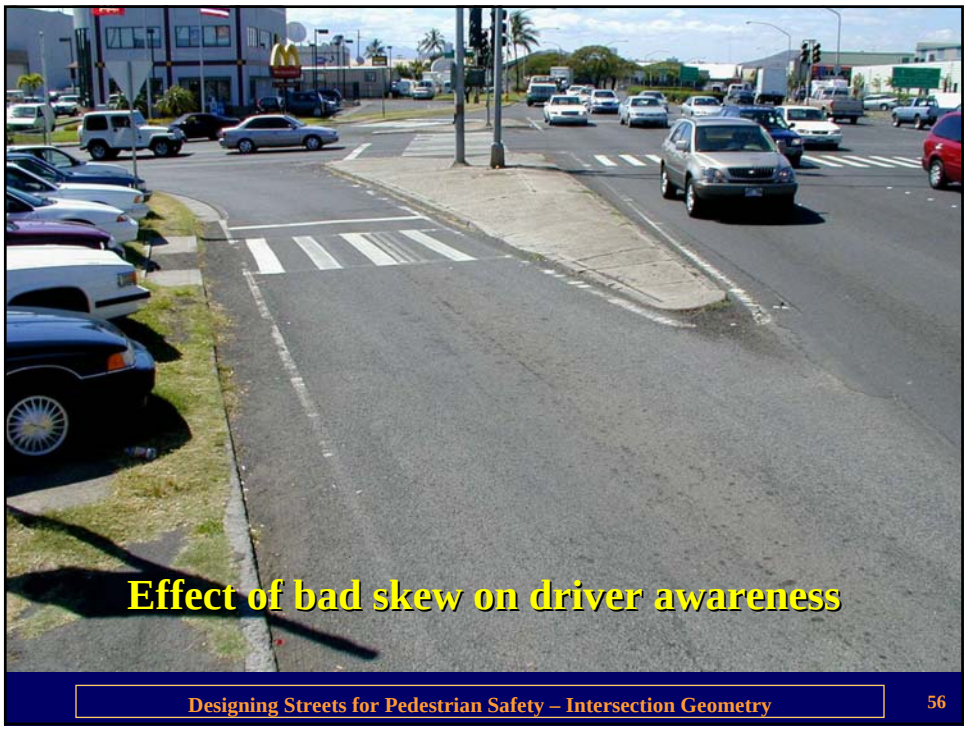

Benefits beyond reducing crossing distance: *separating CONFLICTS*
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Right-Turn Slip Lane: Design for pedestrians
Wide Angle
20°
20°
Old Way
High speed, head turner low visibility of pedestrians
Tighter angle
55 to 60 degree angle between vehicle flows.
20°
20°
New proposal
Slower vehicle speeds, good visibility of pedestrians
Designing Streets for Pedestrian Safety – Intersection Geometry
52


Right-Turn Slip Lane - Details
50 to 60 degree angle between vehicular flows.
Cut through medians and islands for pedestrians
25 to 40 feet radius depending on design vehicle
One car length back
Long radius followed by short
150 to 275 feet radius
Bicycle lane
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Drivers naturally trace perfect island…
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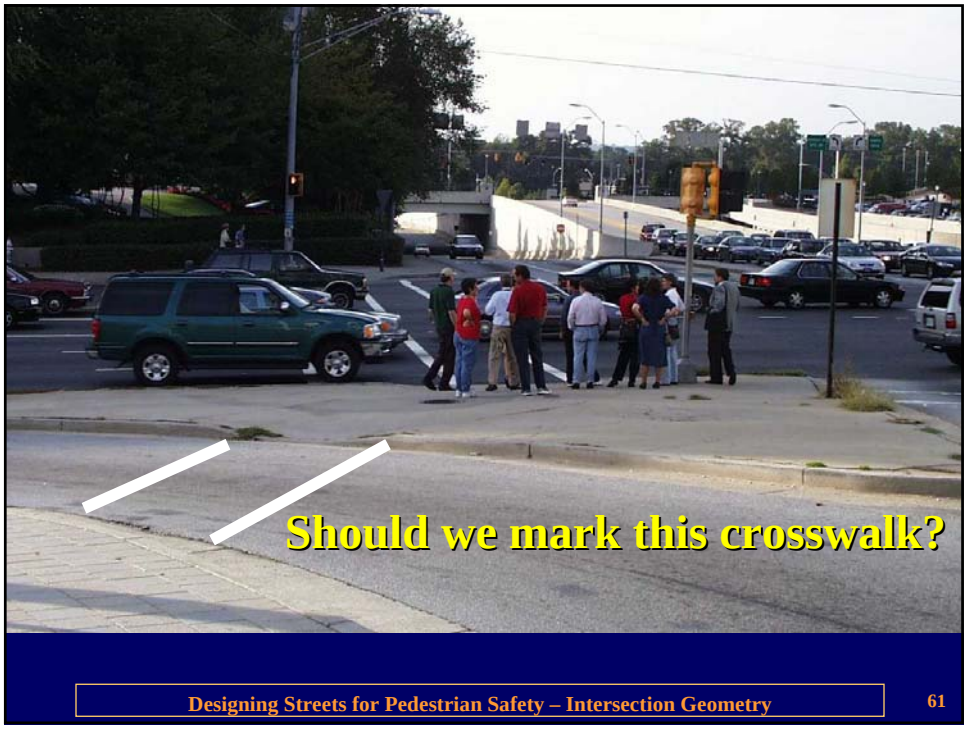

Effect of bad skew on driver awareness
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EDU 420
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Island with fairly good geometry
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60



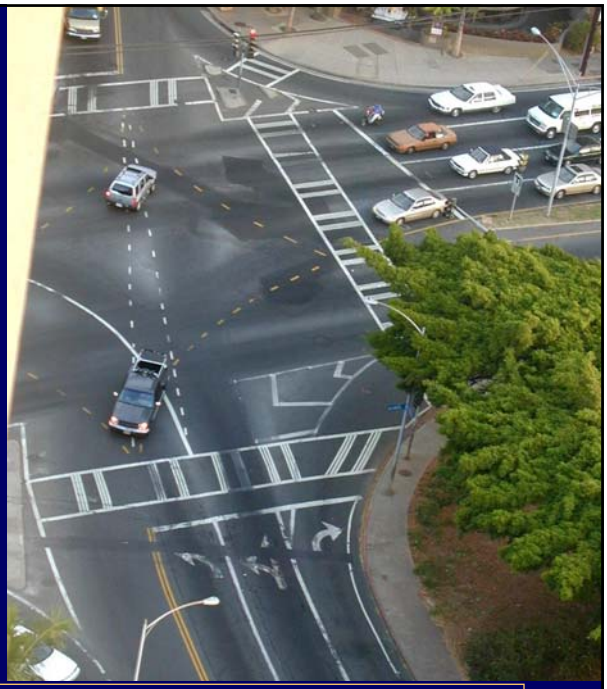

## Should we mark this crosswalk? What does the MUTCD say?

- Crosswalks should be marked at all intersections where there is substantial conflict between vehicular and pedestrian movements.
- Marked crosswalks also should be provided at other appropriate points of pedestrian concentration, such as loading islands, midblock pedestrian crossings, or where pedestrians could not otherwise recognize the proper place to cross.

➢ What's your policy?

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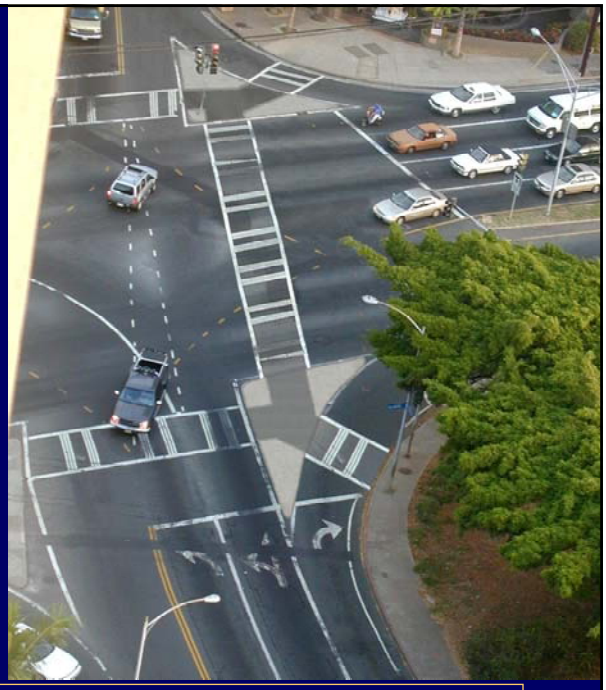
**How raised islands can help a large multi-lane intersection:**



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**How raised islands can help a large multi-lane intersection:**

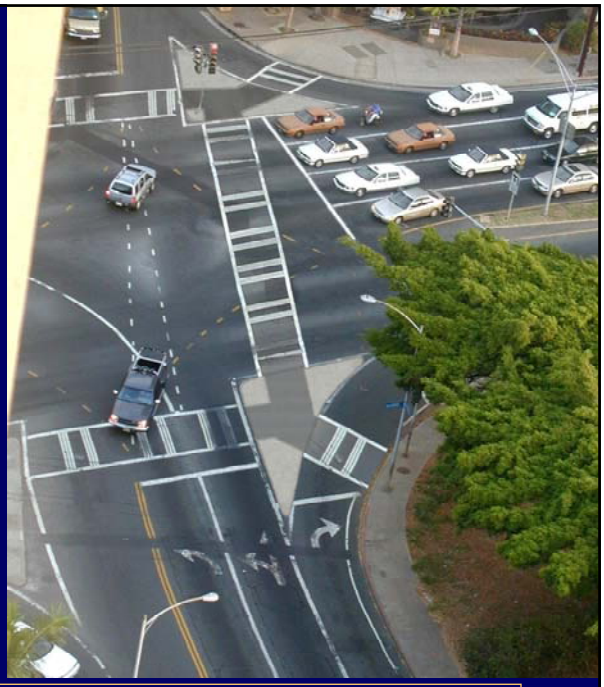
**1. Construct raised islands between thru & right turn lanes; this separates pedestrian conflicts.**
**Provide cut-throughs; this makes the islands accessible**



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**How raised islands can help a large multi-lane intersection:**

**2. Move stop bar forward; this improves capacity and safety for motorists**



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**Lost potential**

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**Pedestrians cross long crosswalk**

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**Pedestrians still crossing after light has changed**

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Peds could be waiting here
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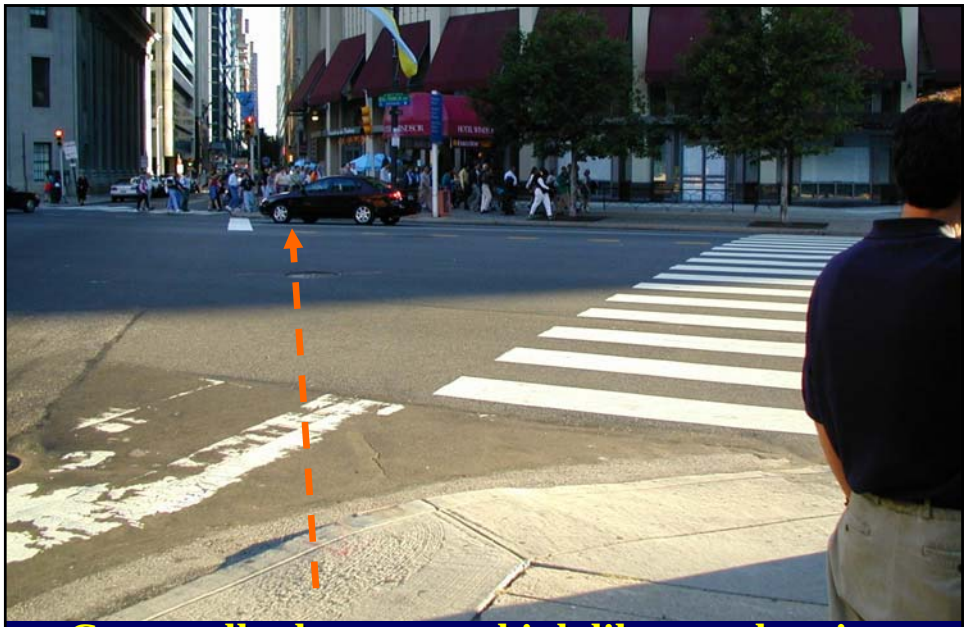

Cut-through preferred over ramps
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With ramps, provide at least 48” level area
Cut-through preferred over ramps
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71


With ramps, provide at least 48” level area
NOT Okay
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72


Not acceptable
Acceptable, not great
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Crosswalk placement:
Observe pedestrians
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**Crosswalk placement: think like a pedestrian**

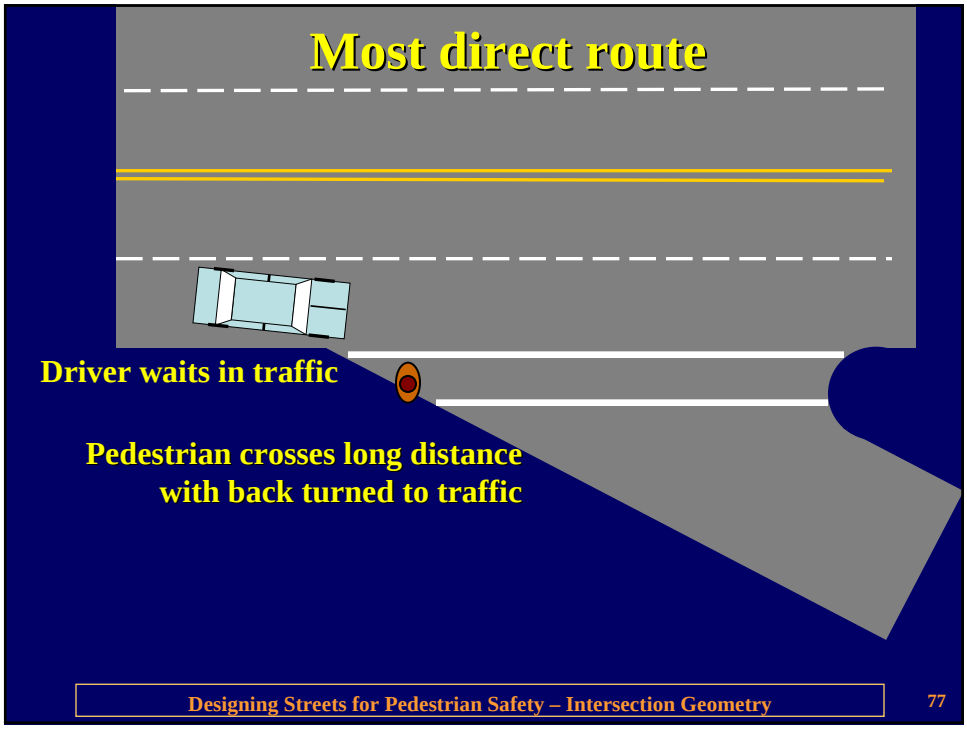
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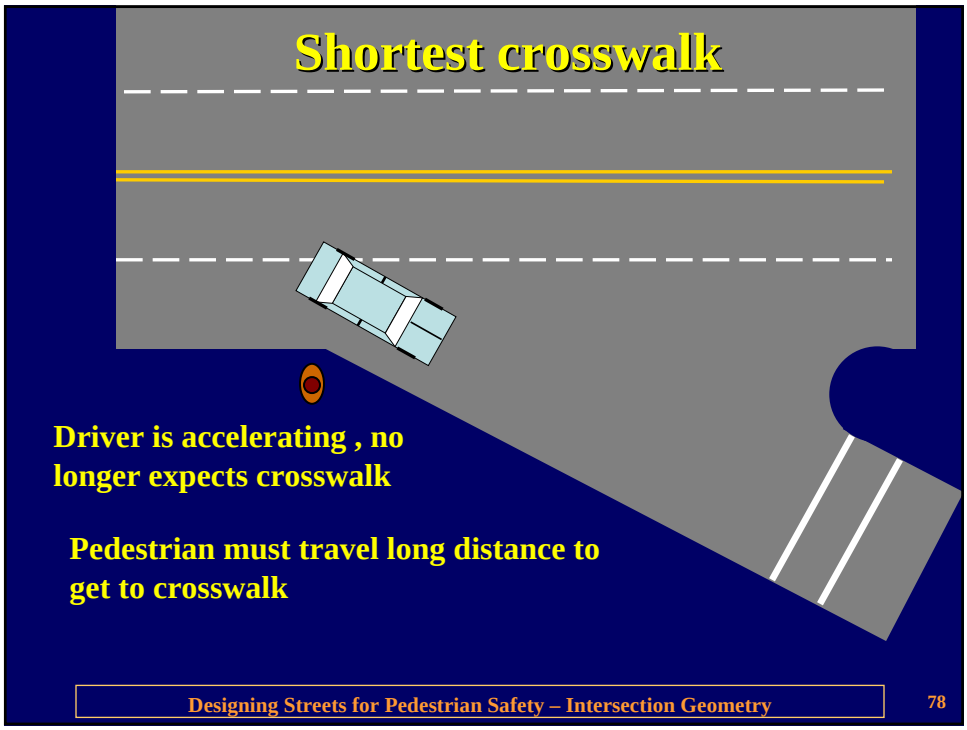
**Choosing the best crosswalk placement where it's not clear what's most logical for the driver or the pedestrian:**

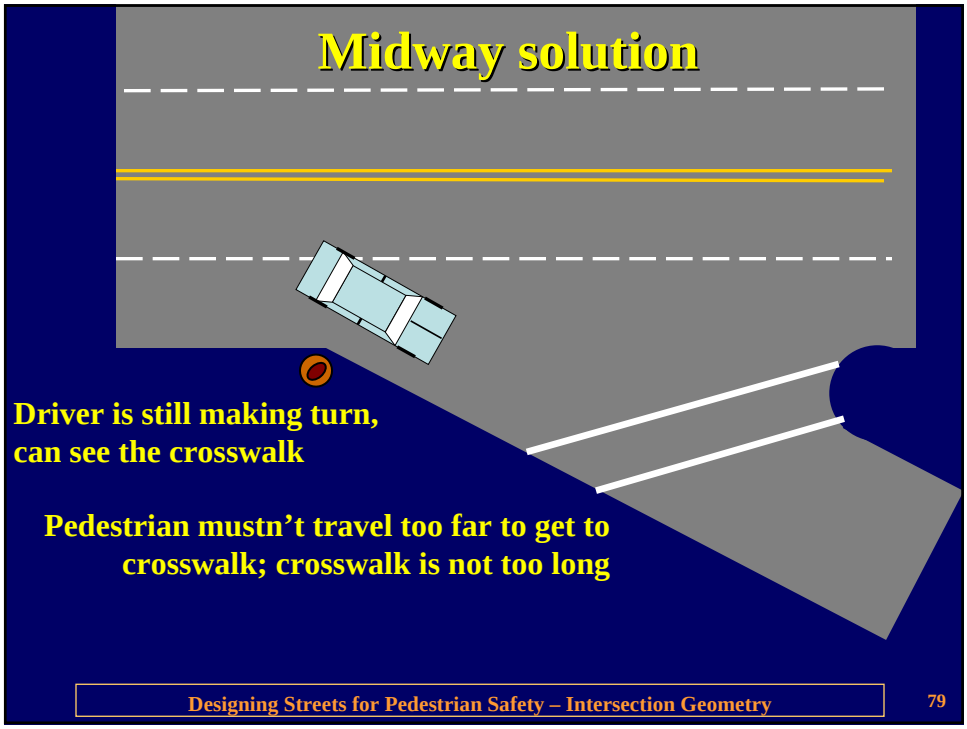
**3 choices:**

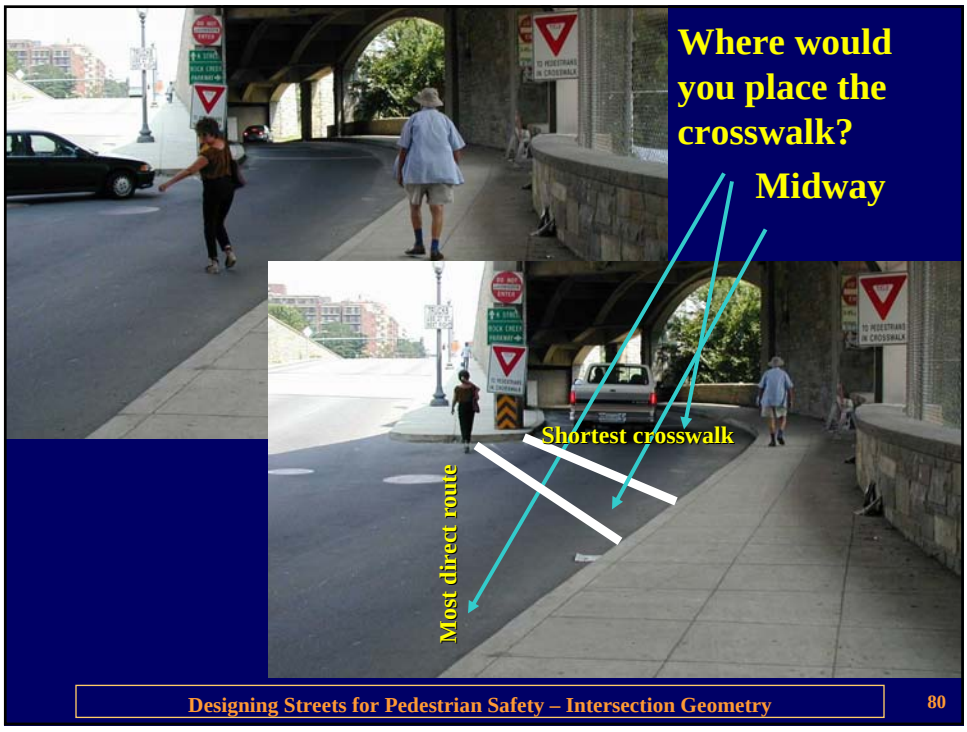
1. **Most direct route**
2. **Shortest crosswalk**
3. **"Compromise" - midway solution**

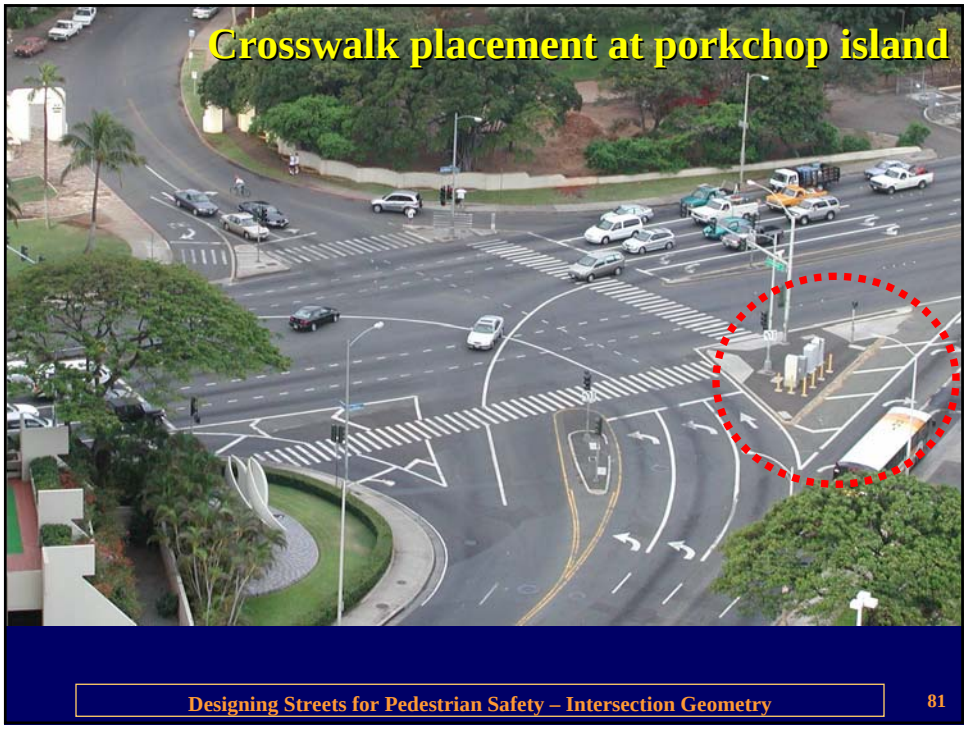
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Most direct route
Driver waits in traffic
Pedestrian crosses long distance with back turned to traffic
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Shortest crosswalk
Driver is accelerating , no longer expects crosswalk
Pedestrian must travel long distance to get to crosswalk
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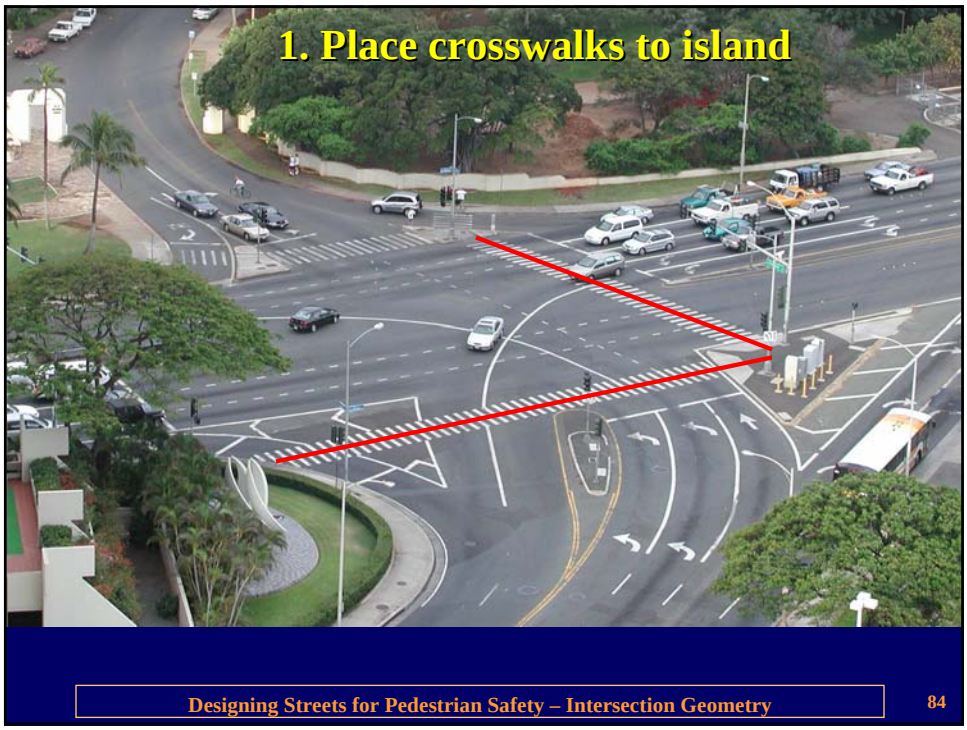

Midway solution
Driver is still making turn, can see the crosswalk
Pedestrian mustn't travel too far to get to crosswalk; crosswalk is not too long
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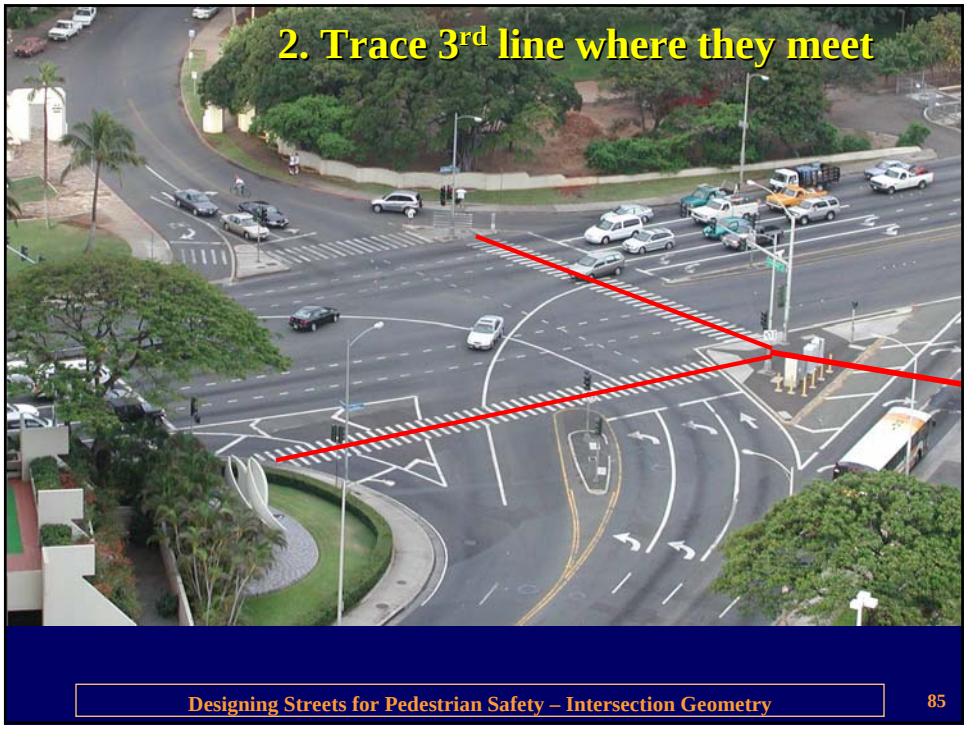

Where would you place the crosswalk?
Midway
Shortest crosswalk
Most direct route
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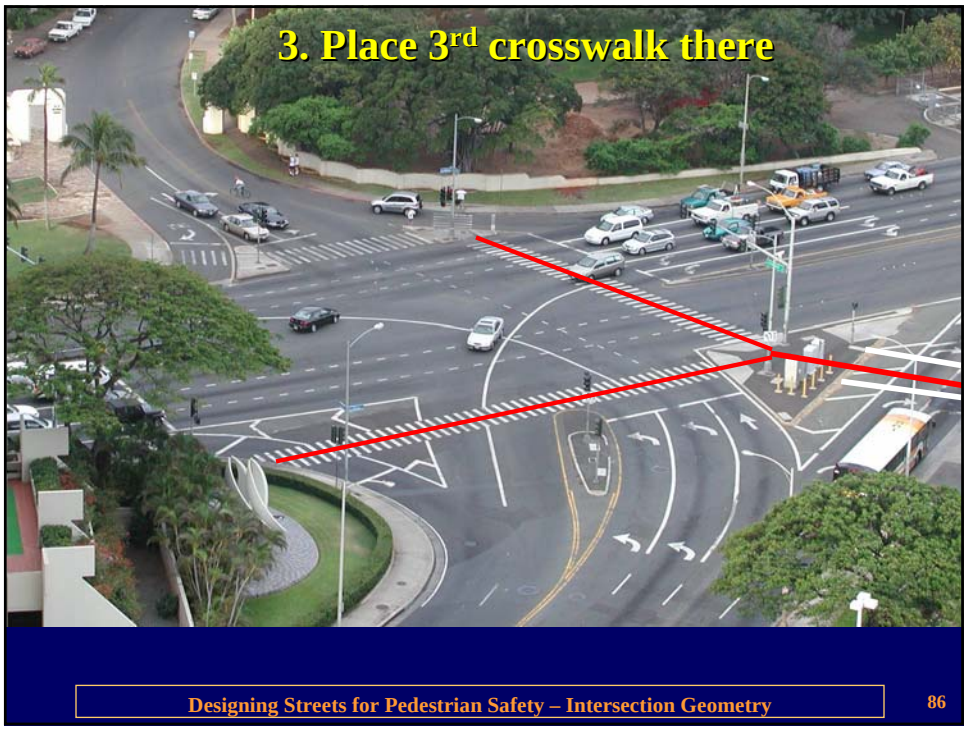

Crosswalk placement at porkchop island
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Observe peds: no one uses crosswalk
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ATKINSON
Observe peds: no one uses crosswalk


1. Place crosswalks to island
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2. Trace 3rd line where they meet
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3. Place 3rd crosswalk there
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When in doubt,
paint it out!
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