

Designing for Pedestrian Safety

Introduction to Pedestrian Safety Design and Planning Principles

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Designing for Pedestrian Safety Workshop Outcomes

At the end of this workshop, you will be able to:

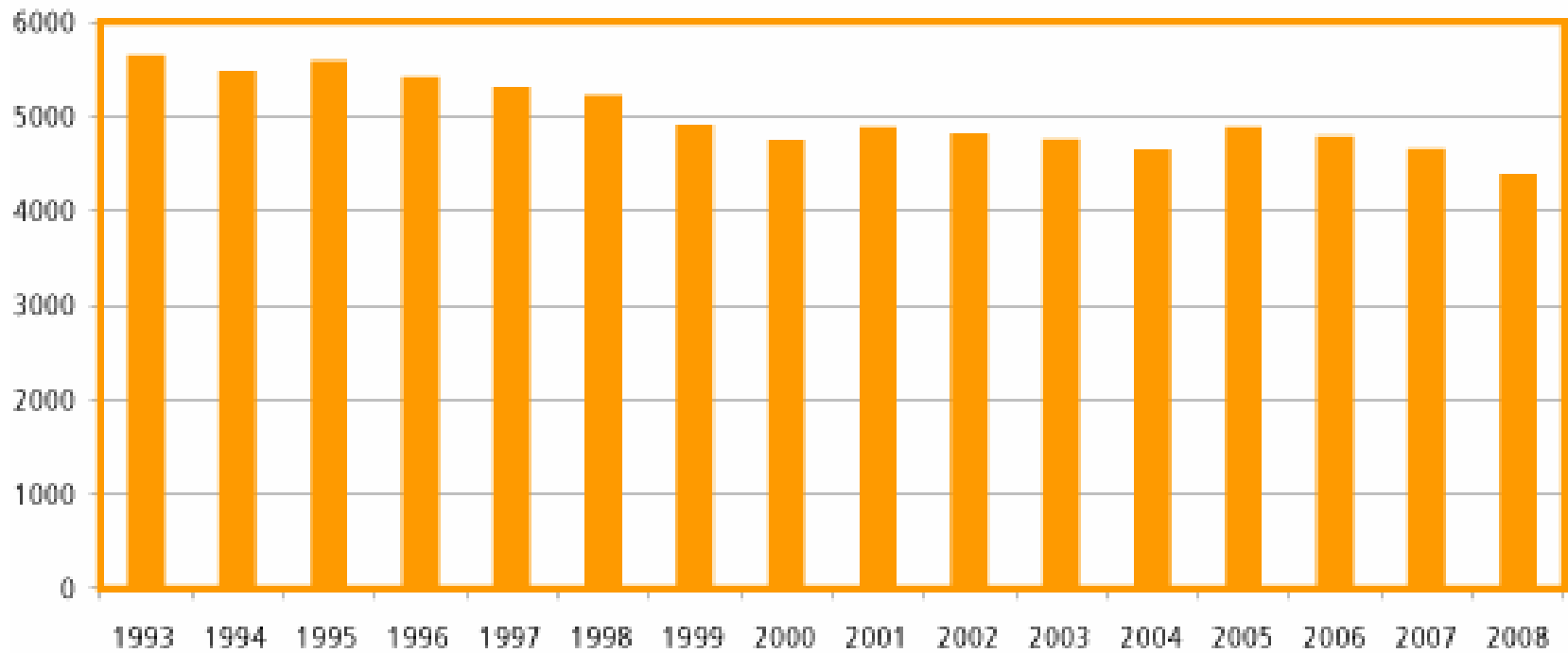
- ⇒ Describe the *influence of planning factors*: land use, street connectivity, access management, site design, and level of service.
- ⇒ Describe how *pedestrians should be considered and provided for* during the planning, design, work zone, maintenance, and operations phases.
- ⇒ Describe how *human behavior* affects the interaction between pedestrians and drivers
- ⇒ Identify *good practices and effective solutions to enhance pedestrian safety and accessibility*.

Overview of Pedestrian Safety Problem

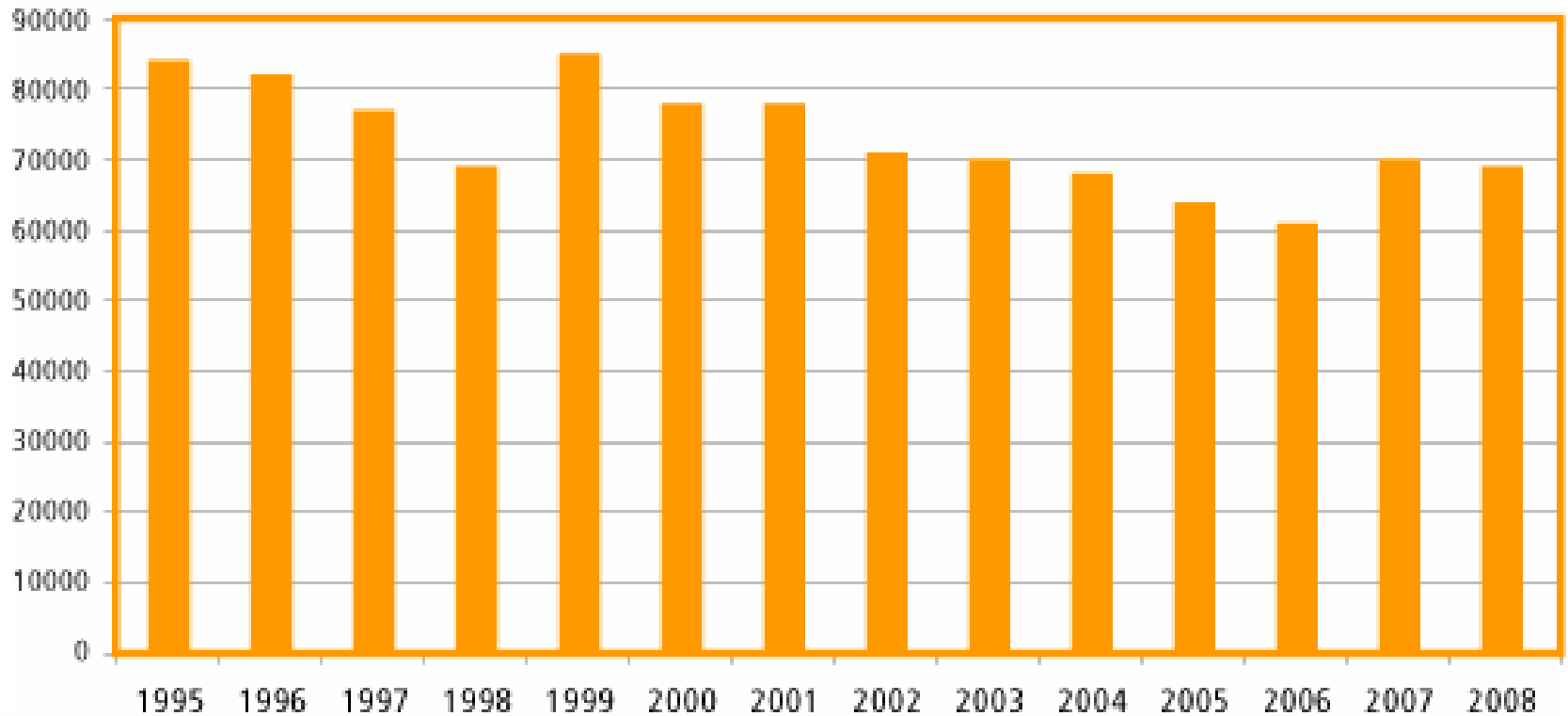
- ⇒ Annually almost 5,000 pedestrians are killed in traffic crashes, representing about 12% of all traffic deaths.
- ⇒ Nearly 70,000 pedestrians are injured each year
- ⇒ Most crashes occur when the pedestrian crosses a road
- ⇒ Most fatalities and serious injuries occur on roads designed *with little attention for pedestrian safety.*
- ⇒ Pedestrians are rarely killed in *walkable environments.*



Pedestrian Fatalities by Year



Pedestrian Injuries by Year

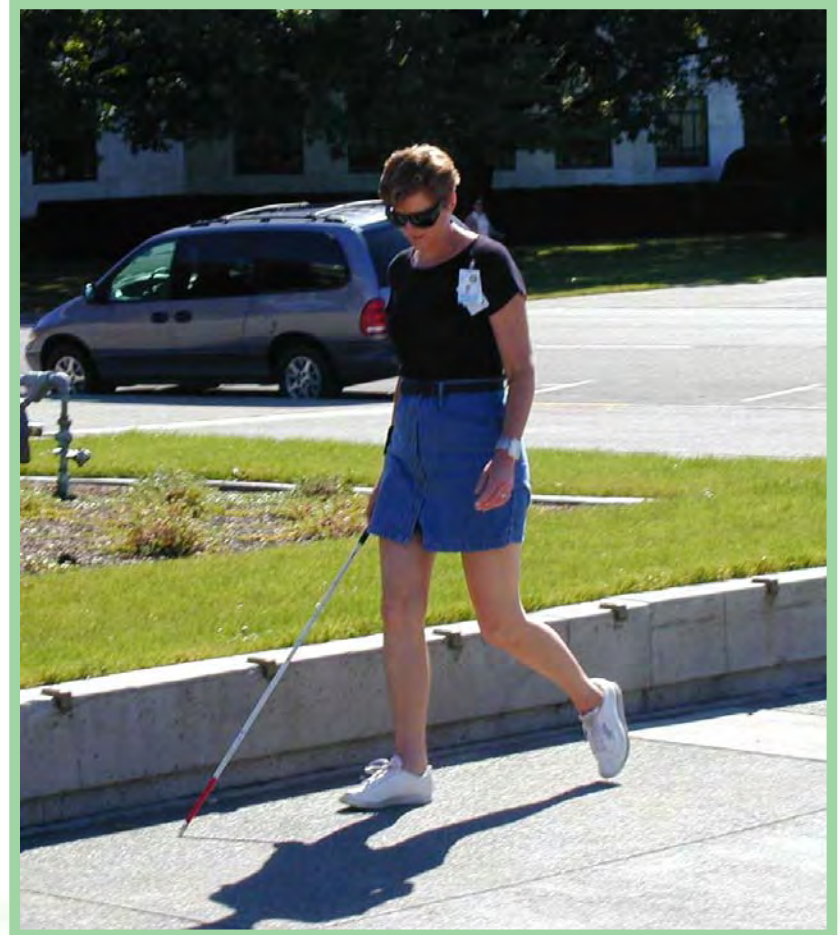


Why is it important to accommodate pedestrian safety and accessibility?



Because we are all pedestrians

Why?



Because many people do not drive

Why?



Because other modes depend on walking

Why?



Because it's good for business – people walk into stores

Why?



Because pedestrians *use* and *belong* on streets and highways

Why?



Because walking is healthy exercise

Why?



Because it will make roads safer for all road users

Why?



AASHTO: “Because of the demands of vehicular traffic in congested areas, it is often extremely difficult to make adequate provisions for pedestrians. Yet this must be done, because pedestrians are the lifeblood of our urban areas...” (1994 edition, page 97)

Why?

US Congressional Legislation/Policy of US DOT

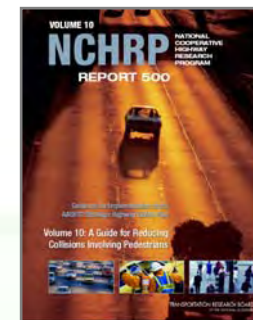
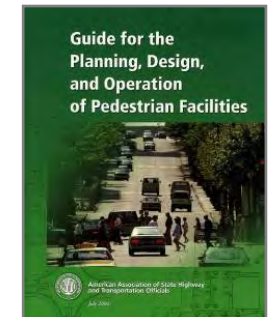
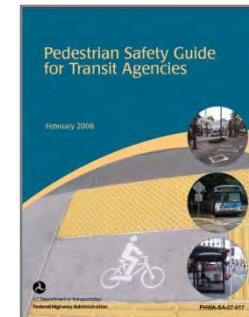
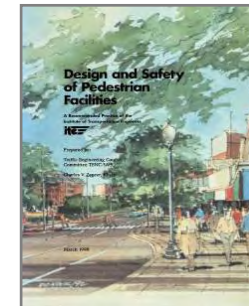
TEA-21 (1999):

- ⇒ “The non-motorized modes are an integral part of the mission of FHWA and a critical element of the local, regional, and national transportation system.”
- ⇒ “... mainstream bicycle and pedestrian projects into planning, design, and operation...”
- ⇒ “... bicycling and walking facilities *will be* incorporated into all transportation projects unless ‘*exceptional circumstances*’ exist.”

Because it's the LAW !!!

Resources

- ⇒ PBIC: www.walkinginfo.org
- ⇒ FHWA: safety.fhwa.dot.gov
- ⇒ NHTSA: nhtsa.dot.gov
- ⇒ ITE: www.ite.org
- ⇒ AASHTO/NCHRP: safety.transportation.org



Planning elements that affect pedestrian safety:

- ⇒ Land Use
- ⇒ Street Connectivity
- ⇒ Access Management
- ⇒ Site Design
- ⇒ Level of Service

Land Use

Why do we have cities?



To minimize travel & maximize exchange (to be closer together)

How have we built our urban roadway system?

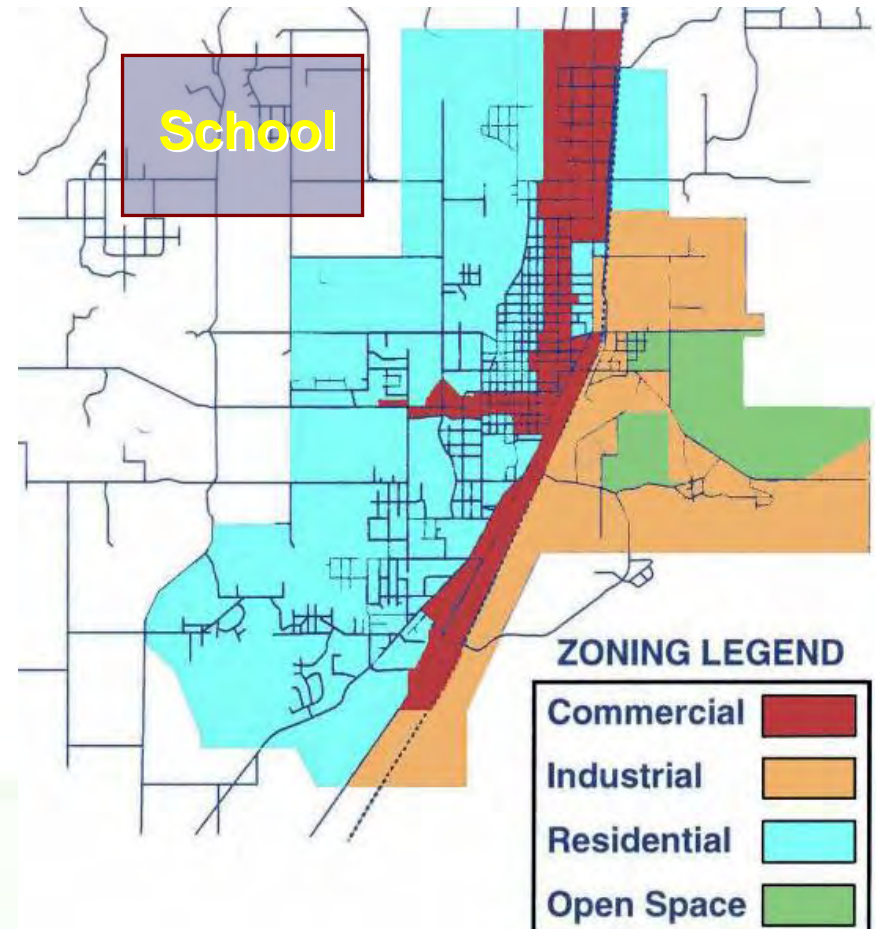


To facilitate travel over longer distances

Reducing travel demand is best achieved changing Land Use policies that bring destinations closer together

The problem:

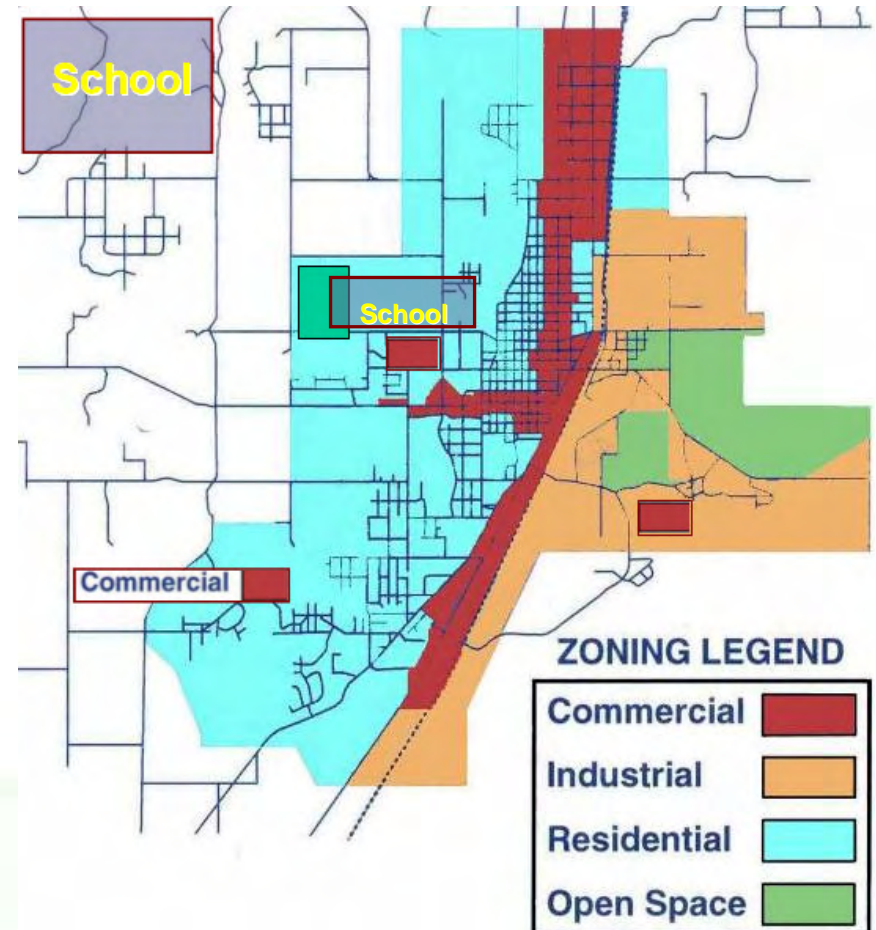
- ⇒ Commercial activities concentrated in auto-dominated corridors.
- ⇒ Segregated land uses
- ⇒ Result: long travel distances, not conducive to walking



Reducing travel demand is best achieved changing Land Use policies that bring destinations closer together

Potential solutions?

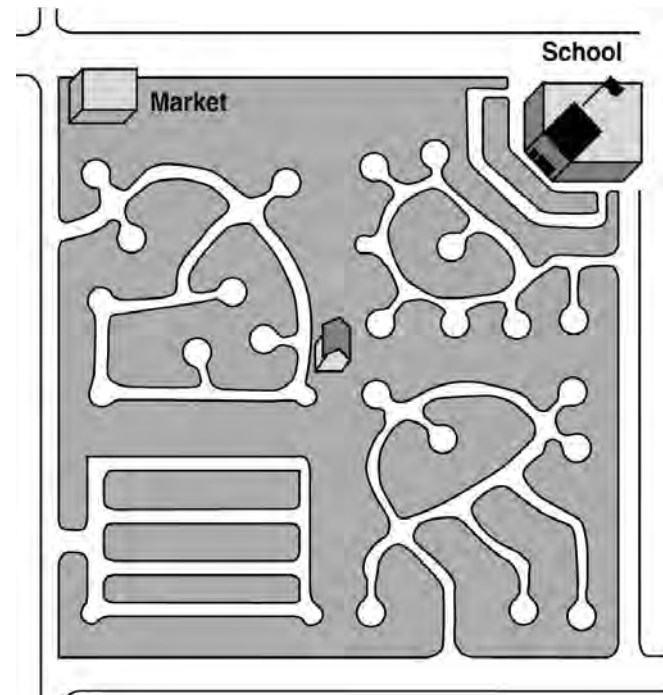
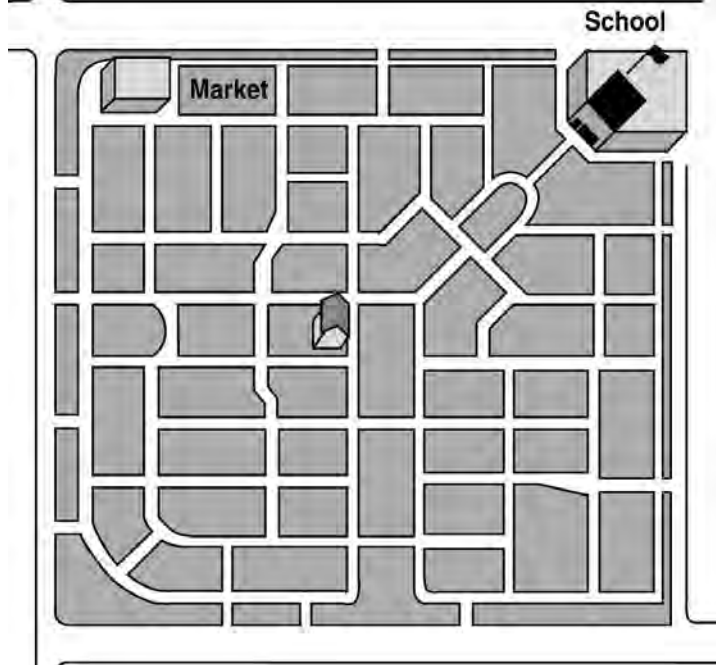
- ⇒ Allow small-scale retail in neighborhoods
- ⇒ Create neighborhood parks
- ⇒ Site school closer to residences & parks





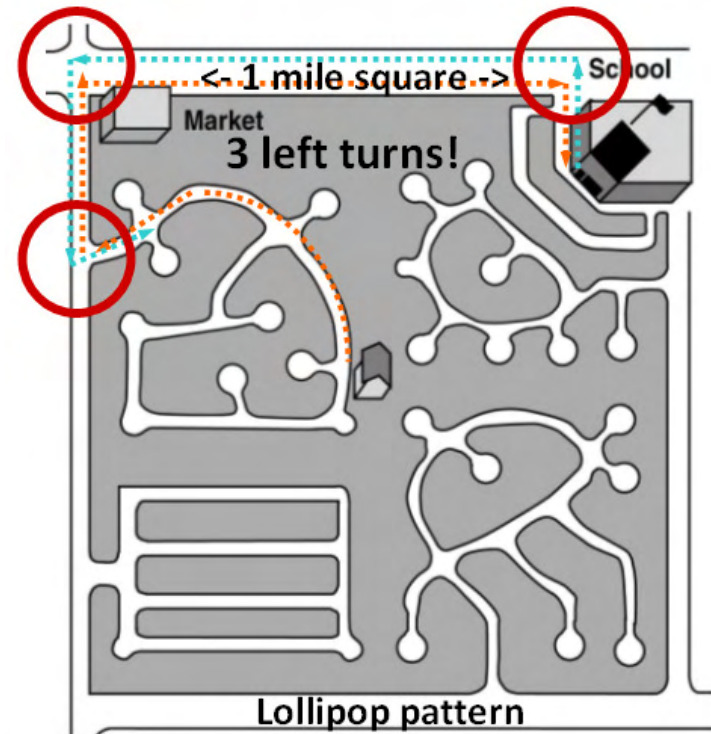
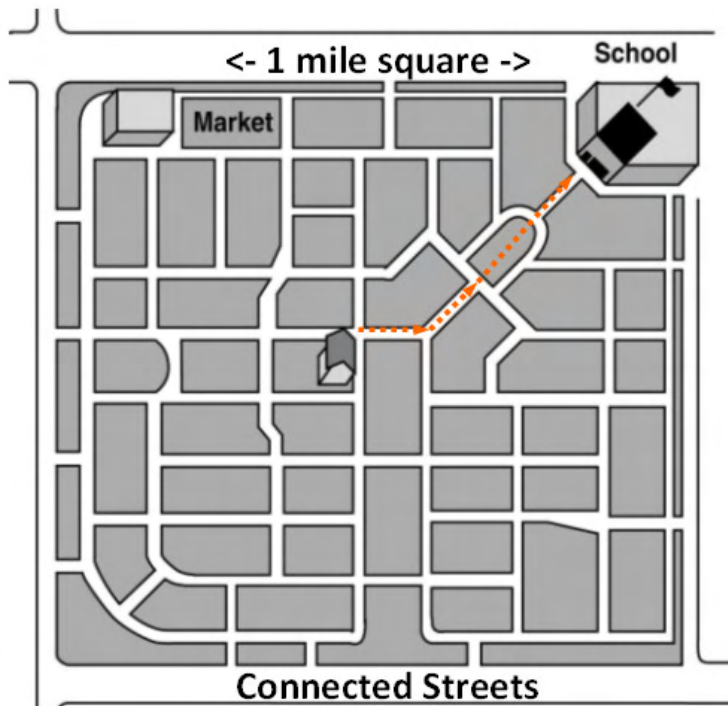
**Neo-traditional development:
destinations are close to residential areas**

Street Connectivity



Connectivity creates a pedestrian-friendly street system by:

- ⇒ **Reducing walking distances;**
- ⇒ **Offering more route choices, more quiet local streets;**
- ⇒ **Dispersing traffic – reducing reliance on arterials for all trips**



Connectivity creates a pedestrian-friendly street system by:

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Can you increase connectivity with paths, greenways?

Reduces walking distances:

⇒ YES

Offers more route choices:

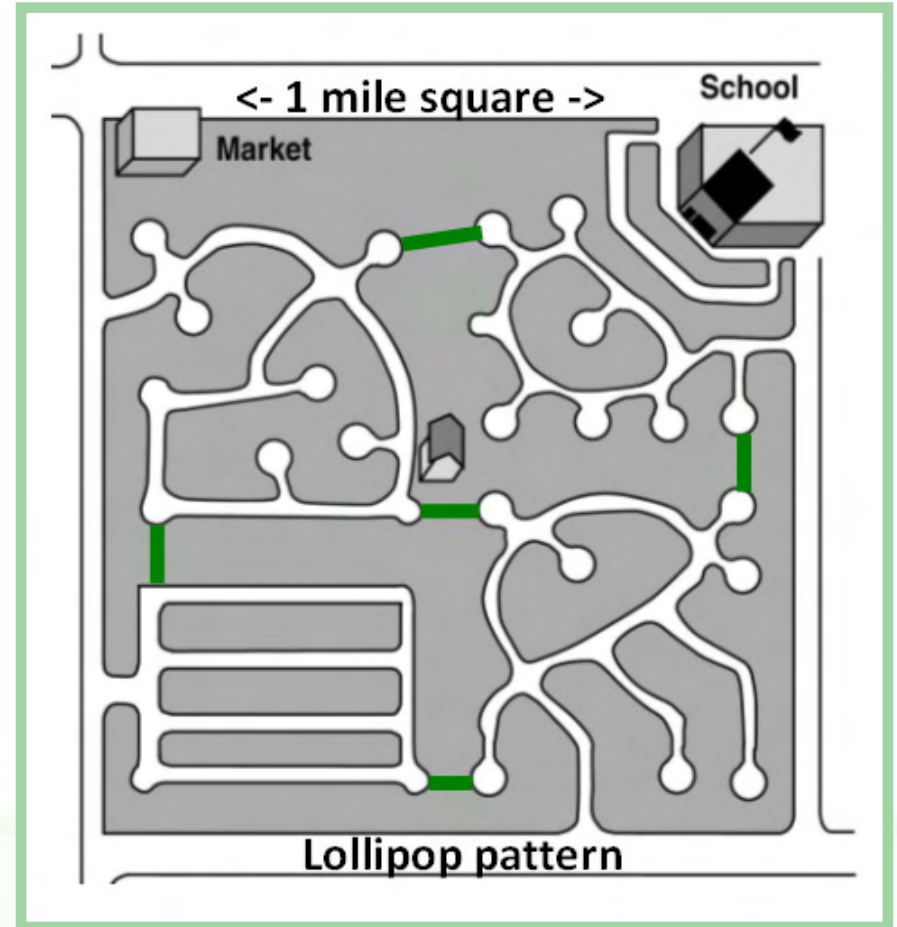
⇒ YES

Reduces motor vehicle traffic:

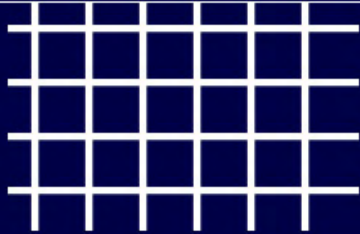
⇒ YES

Disperses motor traffic:

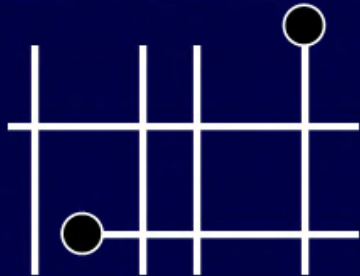
⇒ NO



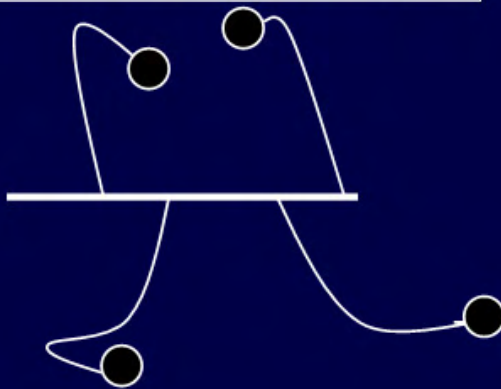
High Connectivity



Moderate Connectivity



Low Connectivity



Travel Lanes Required



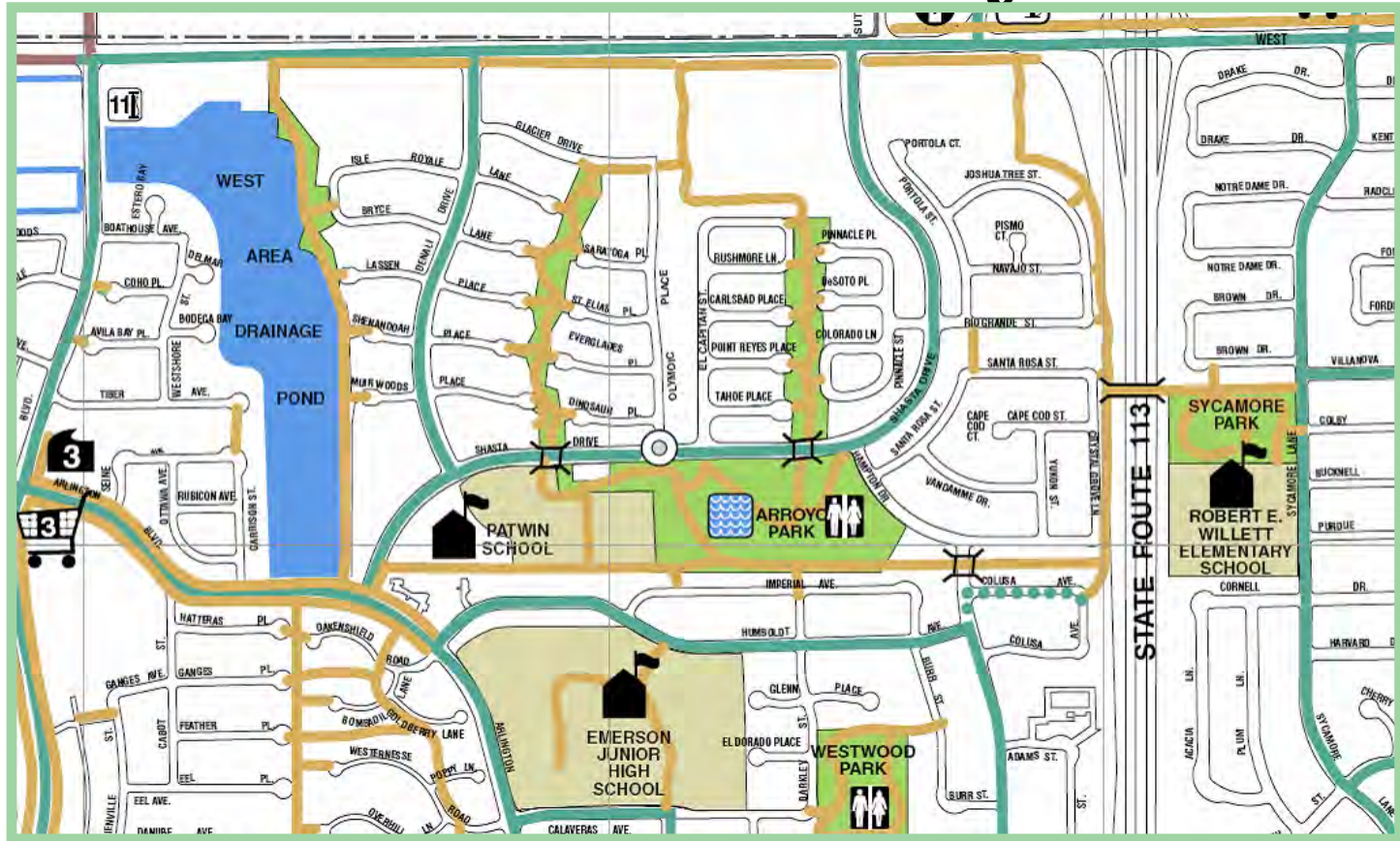


Lack of connectivity => overly wide streets



Lack of connectivity => few but large intersections

Land Use & Connectivity



⇒ Schools next to parks.

⇒ Dedicate R.O.W. to link cul-de-sacs with linear parks

Access Management



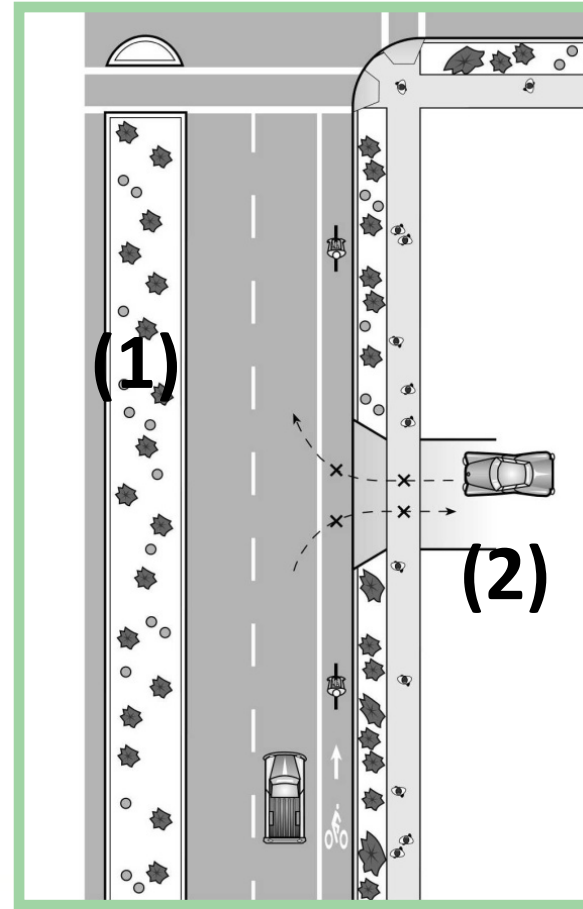
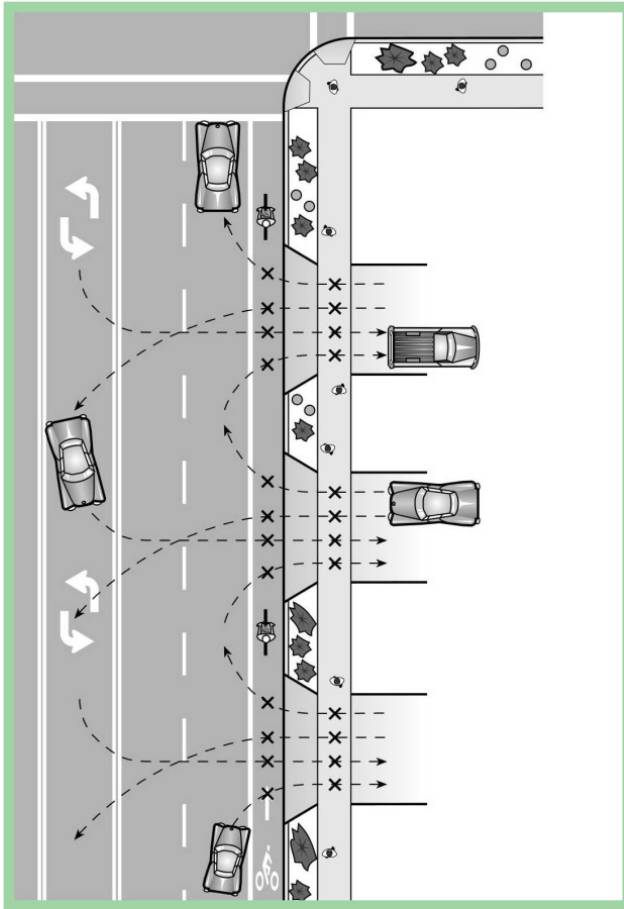
Every driveway is a potential conflict

Drivers and pedestrians must make choices:



Walk in front or in back? Pull forward or back up?

Access Management => fewer conflicts at driveways



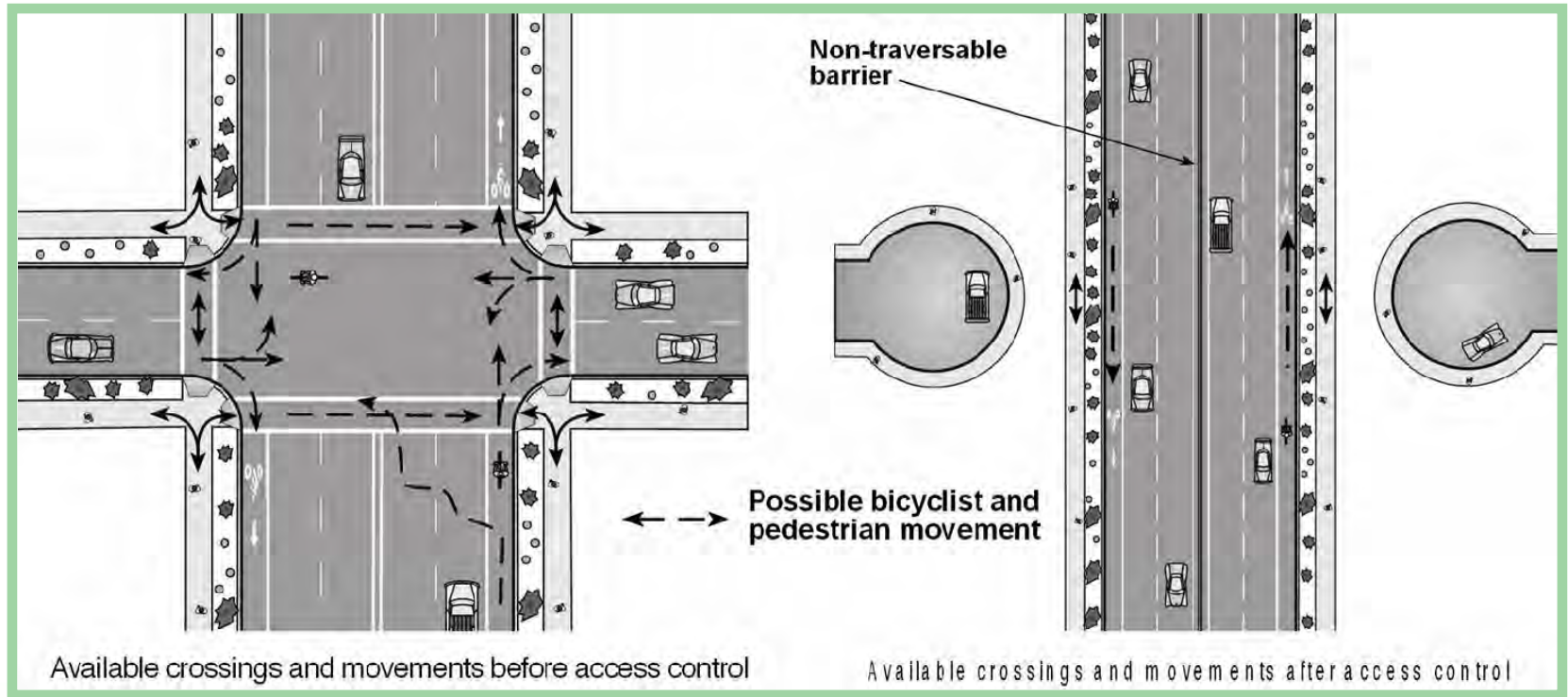
Two techniques:

(1) median (no left turns) and (2) consolidate driveways

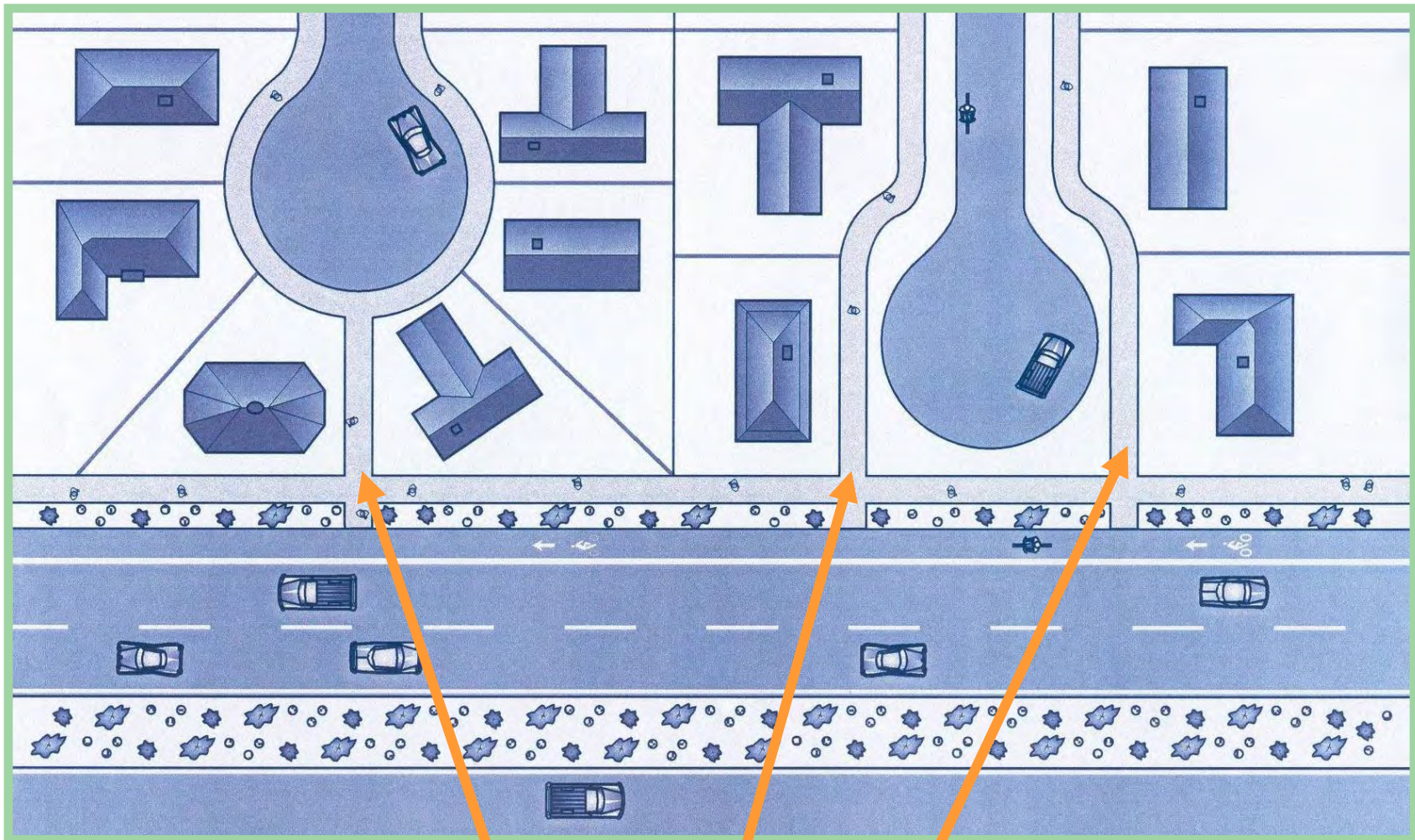
Driveways can be closed for safety



Severing public streets not a desirable access management technique



This limits people's ability to walk or bicycle



Connecting severed streets reestablishes walking routes



Severed street can be reconnected for pedestrians

Site Design

- ⇒ **Bringing Buildings closer to the Street**
- ⇒ **Makes access for pedestrians safer and easier**
- ⇒ **Creates a street where drivers know to expect pedestrians**





Parking between sidewalk and building is not pedestrian-friendly



Building at back of walk: pedestrian-oriented design



⇒ **Fast food typically favors drive-thru over walk-ins**

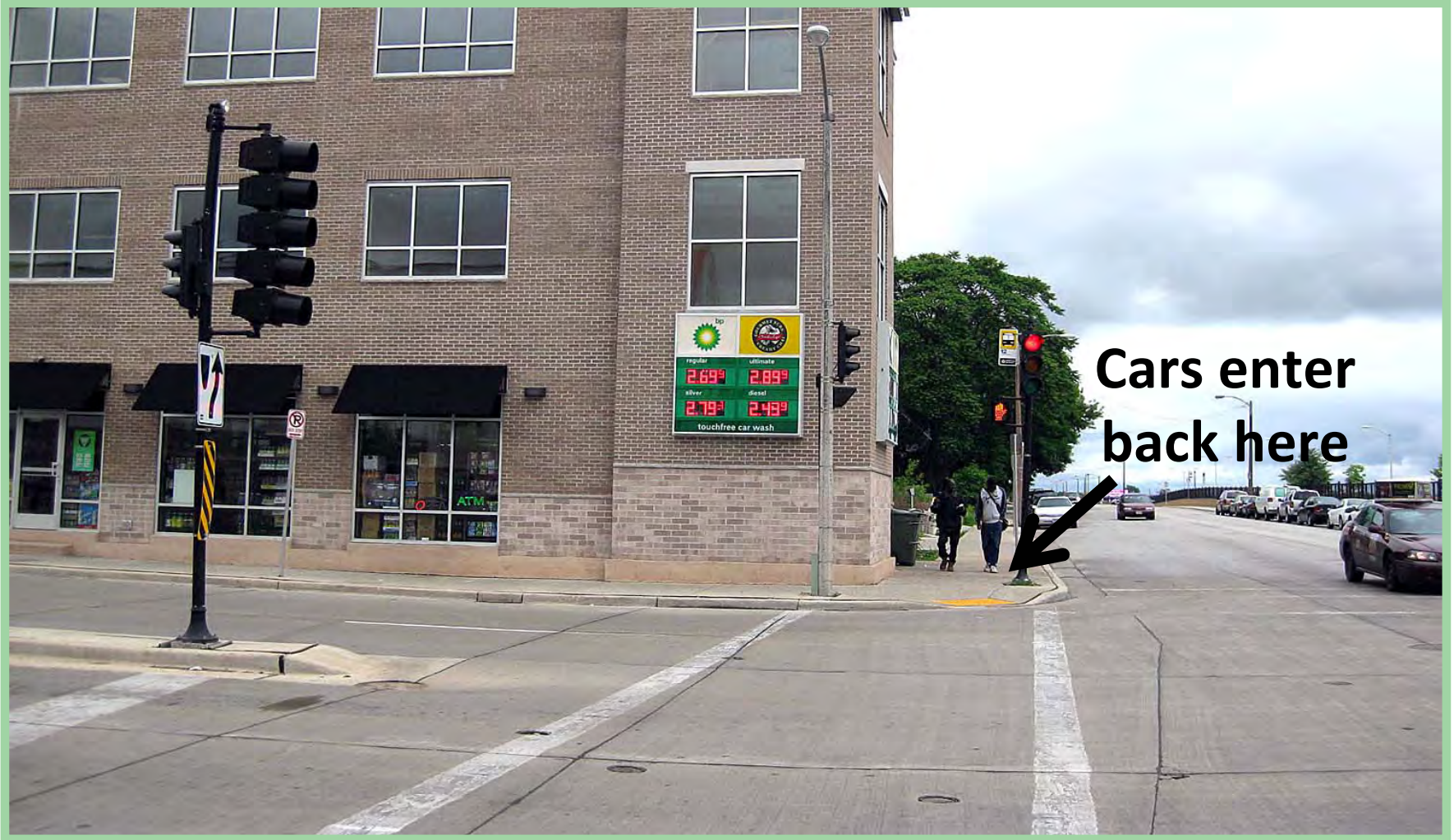
⇒ **Pedestrians must cross drive-thru lane**



Alternative design: Direct pedestrian access is provided with no vehicular conflicts



Parking and drive through are still provided



**Cars enter
back here**

**Even a gas station / convenience store can be built
with pedestrian friendly design at back of walk**



Pedway retrofitted from sidewalk to building through parking



Same principles apply to large-scale developments:

⇒ **Direct, safe & convenient access is provided**

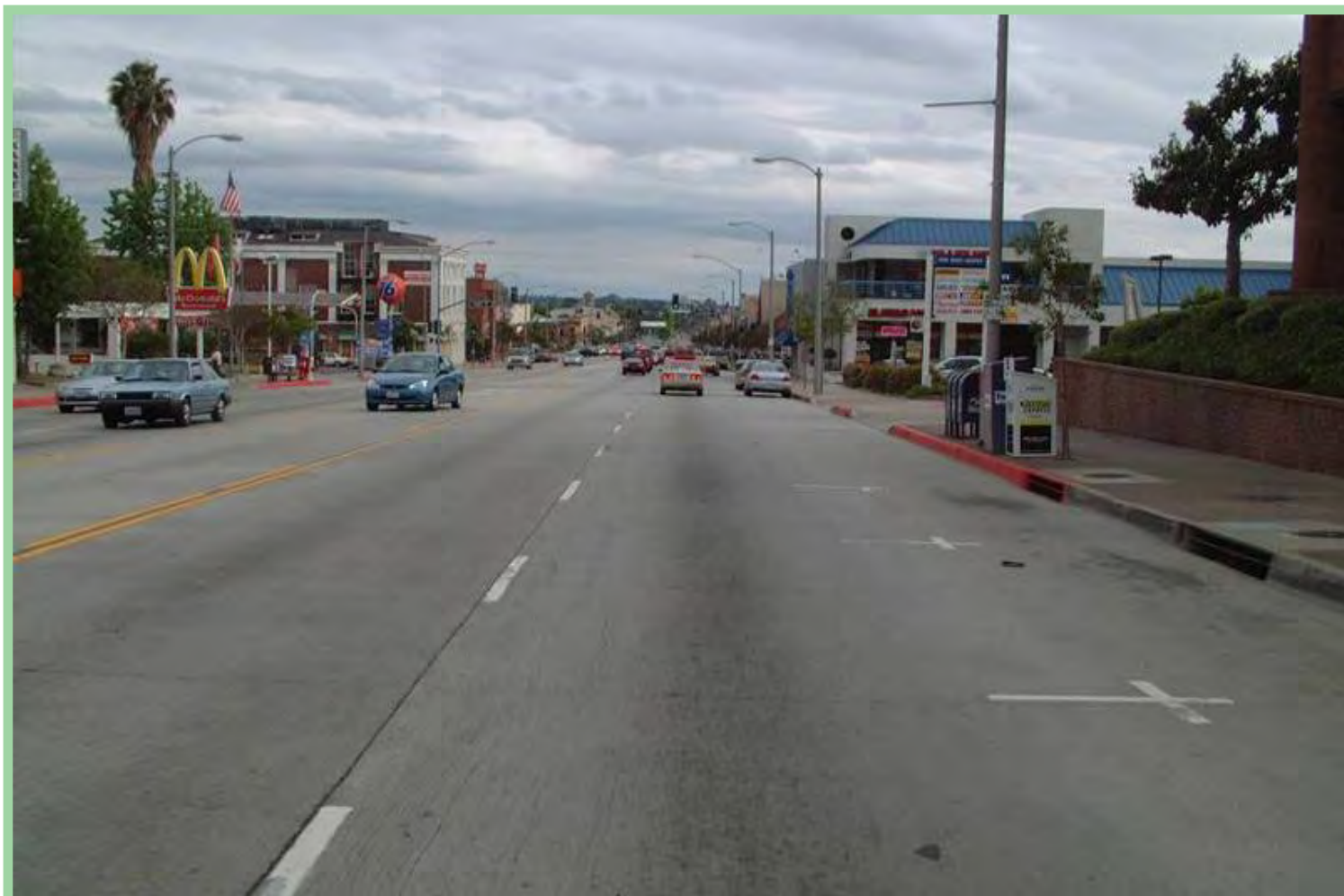
- ⇒ **These goals are achieved by local ordinances, which must be enforced.**
- ⇒ **They are beyond the scope of road designers, yet contribute greatly to the safety, comfort and aesthetics of the walking experience.**
- ⇒ **Do your local ordinances support pedestrian-oriented planning and design?**

Rethinking The Role of Urban Streets



A “complete street” accommodates many uses and provides for all purposes of a street:

- **Mobility (all modes)**
- **Access to destinations**
- **Thriving businesses**
- **Beauty**



Transforming a street



Narrow lanes; add bike lanes, median, trees, texture



Bring in buildings that face the street



More buildings: Infill



The street now has life and is safer for pedestrians

The impact of Level of Service (LOS) standards on street design and pedestrian safety



- ⇒ HCM says LOS = A; little traffic, no impediments
- ⇒ Result: very wide roads that reduce pedestrian safety



**A new ped LOS is needed
to reflect quality of
walking experience**

HCM says ped LOS = A; few people walking



A new ped LOS is needed to reflect quality of walking experience

HCM says ped LOS = F; too many peds!

Why are pedestrians at high risk on this street?



Multi-lane roadway, high speeds

Why are pedestrians at Low risk on this street?



Narrow roadway, low speeds, busy

What is the core safety issue?

Pedestrians and drivers must use the streets together

What does the driver see that says “slow down, watch for pedestrians”?

- ⇒ **On-street parking**
- ⇒ **Narrow cross-section**
- ⇒ **Buildings close to street**
- ⇒ **Sidewalks**
- ⇒ **Crosswalk**
- ⇒ **People!**



Reinventing the roadway:



Transform a 5-lane commercial strip to ...

Reinventing the roadway:



...a safer road for everyone

Discussion Questions: What changed? What didn't change?

Let's Recap

- ⇒ **Why is it important to accommodate pedestrian safety and accessibility?**
- ⇒ **How does the street environment influence drivers' and pedestrians' expectations and interactions?**
- ⇒ **Where is the information?**
- ⇒ **What planning factors influence pedestrian safety and accessibility?**

Questions?