

# Designing for Pedestrian Safety

## Sidewalk Design

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# Learning Outcomes:

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

- ⇒ Describe the operational and safety benefits of shoulders and sidewalks
- ⇒ Select the appropriate design requirements for sidewalks

# Walking along the road accounts for 10-15% of pedestrian crashes:

- ⇒ Fewer in urban areas
- ⇒ More in rural areas
- ⇒ They're easily preventable
- ⇒ Crash Reduction Factor (CRF):
  - Paved shoulders reduce pedestrian crashes 70%
  - Sidewalks reduce pedestrian crashes 88% (most sidewalk crashes occur at driveways)
- ⇒ CRF: % fewer crashes experienced on a road with a given treatment than on similar road without treatment



# Shoulders improve safety for all users



**For motorists: room to avoid crashes**

# Shoulders improve safety for all users



**For bicyclists: a place to ride**

# Shoulders improve safety for all users



**For pedestrians: a place to walk**



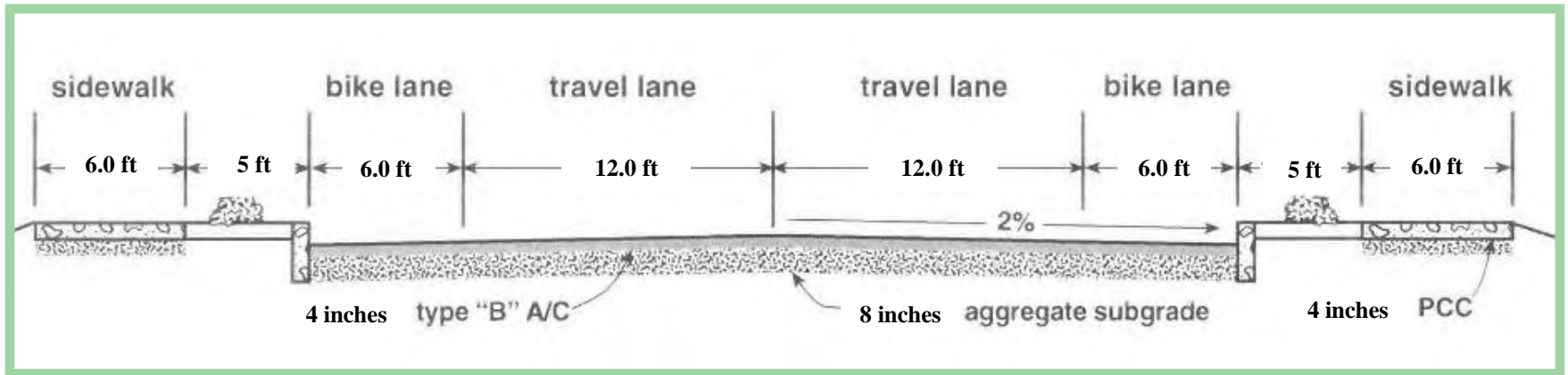
**At a certain point, sidewalks are needed**



**“Goat trail” indicates sidewalks are needed**



# The AASHTO “Green Book” states: “Sidewalks are integral parts of city streets”



**Sidewalks are not added to streets, they are part of the street**



**Sidewalks reduce pedestrian crash risk by 88%**

# Curbs & sidewalks slow traffic more than speed sign



**Sidewalks define an urban street**

# Discussion: Why are sidewalks discontinuous?



# Discussion: Why are sidewalks discontinuous?



**Because they're built by developers**

# A sidewalk on 1 side only is not OK



**Discussion: Why are sidewalks on one side not OK?**

# A sidewalk on 1 side only is not OK



**Discussion: Why are sidewalks on one side not OK?**

**Answer: Pedestrians walk in street, or cross twice**

# Sample Implementation Strategy

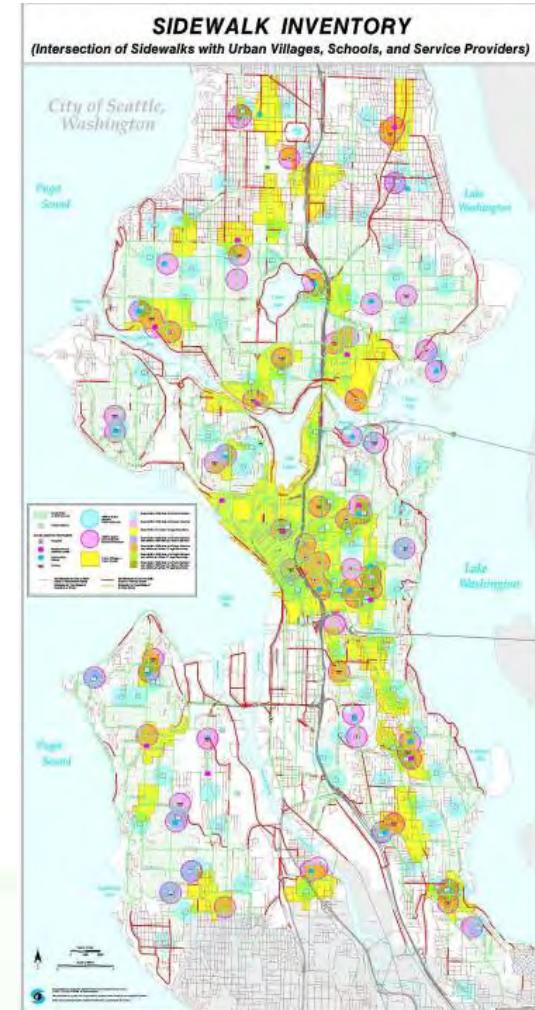


- ⇒ **Sample Implementation Strategy to retrofit existing streets with sidewalks**
- **how to develop a program to fill in missing sidewalks over 20 years**

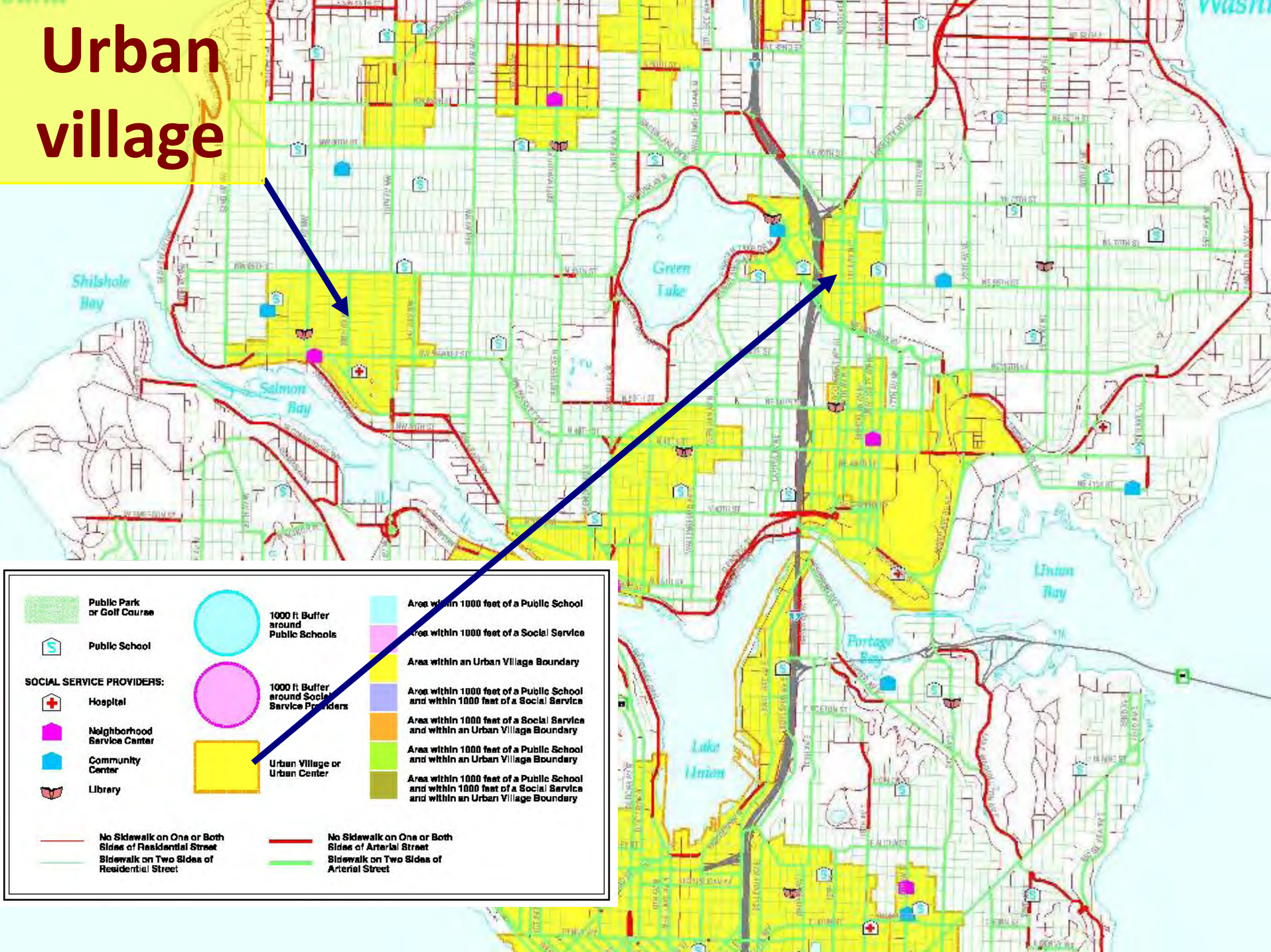


# How do you make such a daunting task manageable?

⇒ Seattle example: divide it into bite-size chunks, with overlapping priorities

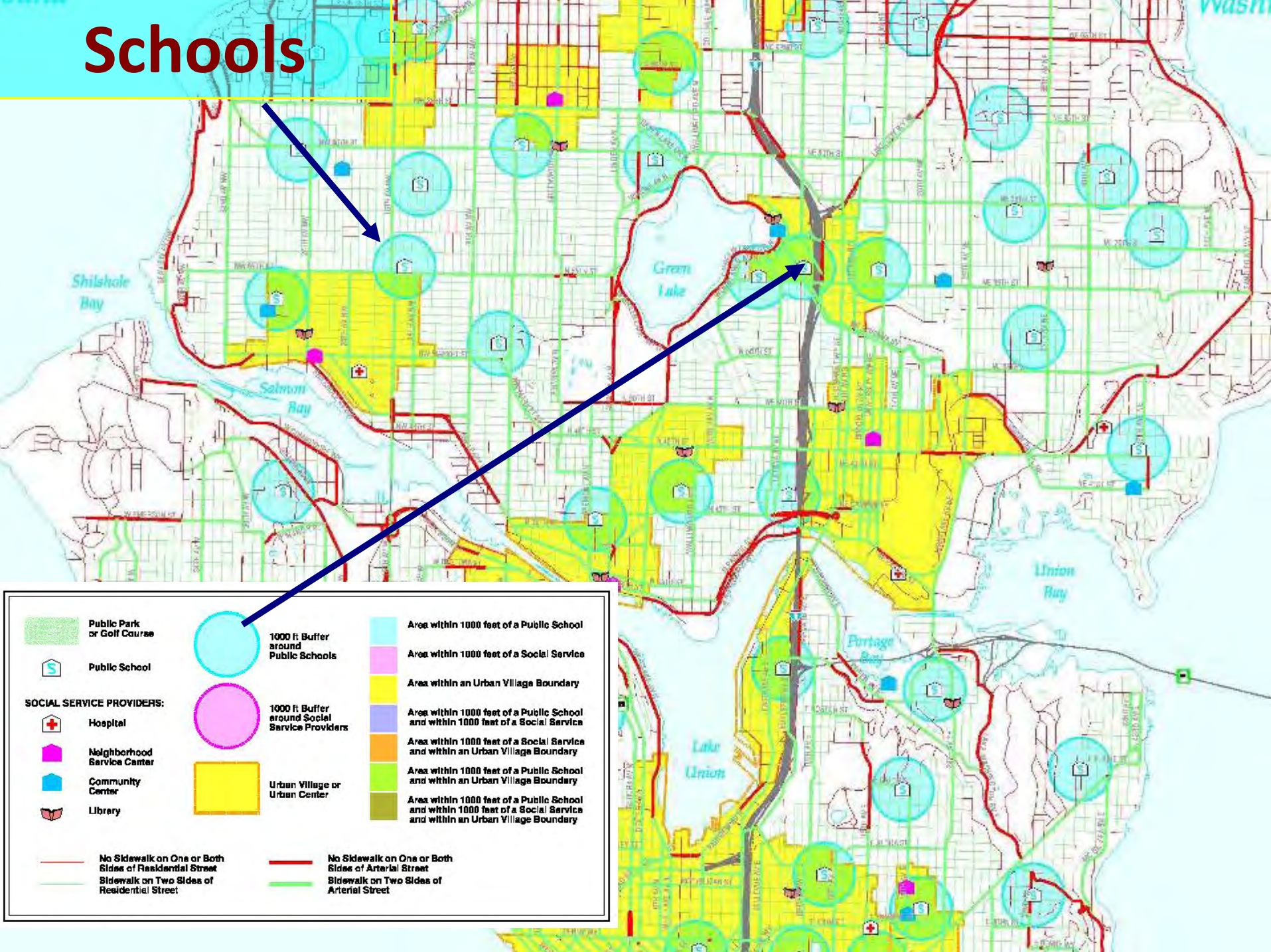


























# Urban village



	Public Park or Golf Course		1000 ft Buffer around Public Schools		Area within 1000 feet of a Public School
	Public School		1000 ft Buffer around Social Service Providers		Area within 1000 feet of a Social Service
<b>SOCIAL SERVICE PROVIDERS:</b>			Urban Village or Urban Center		Area within an Urban Village Boundary
	Hospital				Area within 1000 feet of a Public School and within 1000 feet of a Social Service
	Neighborhood Service Center				Area within 1000 feet of a Social Service and within an Urban Village Boundary
	Community Center				Area within 1000 feet of a Public School and within an Urban Village Boundary
	Library				Area within 1000 feet of a Public School and within 1000 feet of a Social Service and within an Urban Village Boundary
	No Sidewalk on One or Both Sides of Residential Street		Sidewalk on Two Sides of Residential Street		No Sidewalk on One or Both Sides of Arterial Street
	Sidewalk on Two Sides of Residential Street		Sidewalk on Two Sides of Arterial Street		Sidewalk on Two Sides of Arterial Street

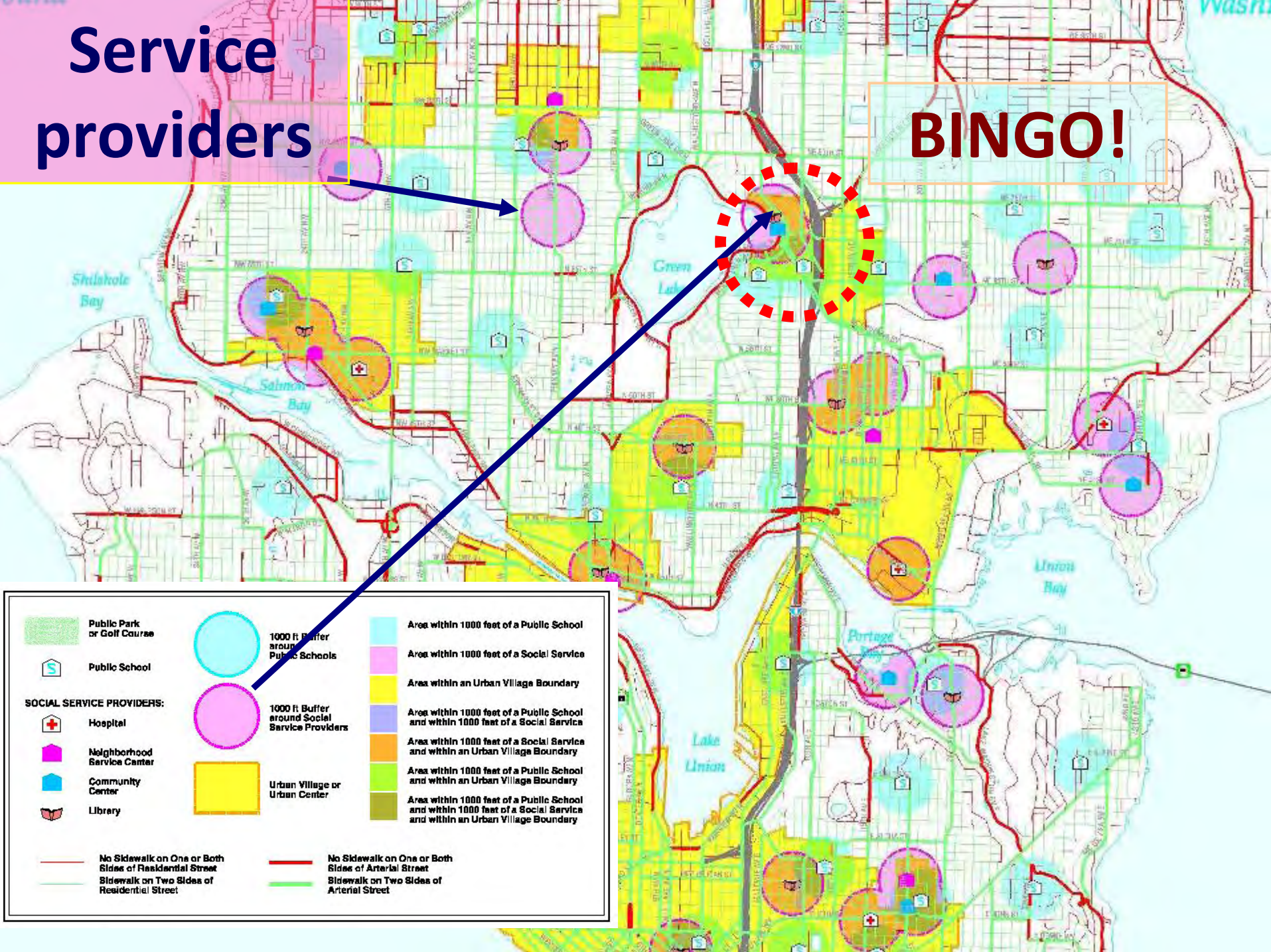
# Schools



	Public Park or Golf Course		1000 ft Buffer around Public Schools		Area within 1000 feet of a Public School
	Public School		1000 ft Buffer around Social Service Providers		Area within 1000 feet of a Social Service
<b>SOCIAL SERVICE PROVIDERS:</b>			Urban Village or Urban Center		Area within an Urban Village Boundary
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	No Sidewalk on One or Both Sides of Residential Street		No Sidewalk on One or Both Sides of Arterial Street		Sidewalk on Two Sides of Arterial Street
	Sidewalk on Two Sides of Residential Street				

# Service providers

# BINGO!



# Discussion:

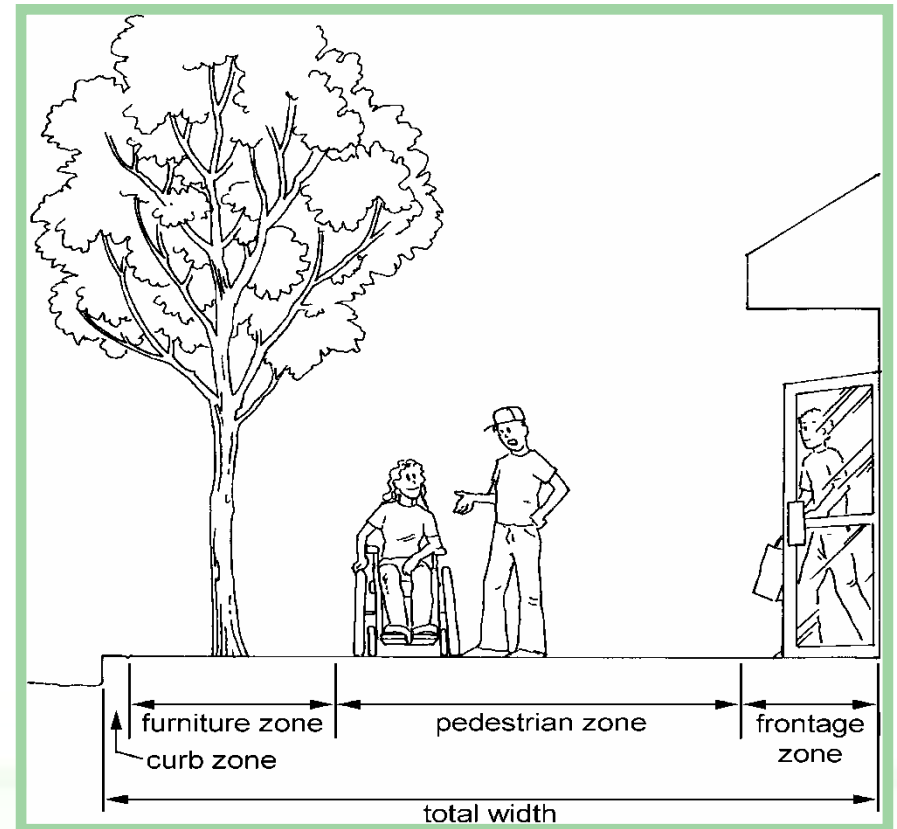
What are your requirements for sidewalks:

1. What are the triggers?
2. Who pays for them?
3. Who maintains them?

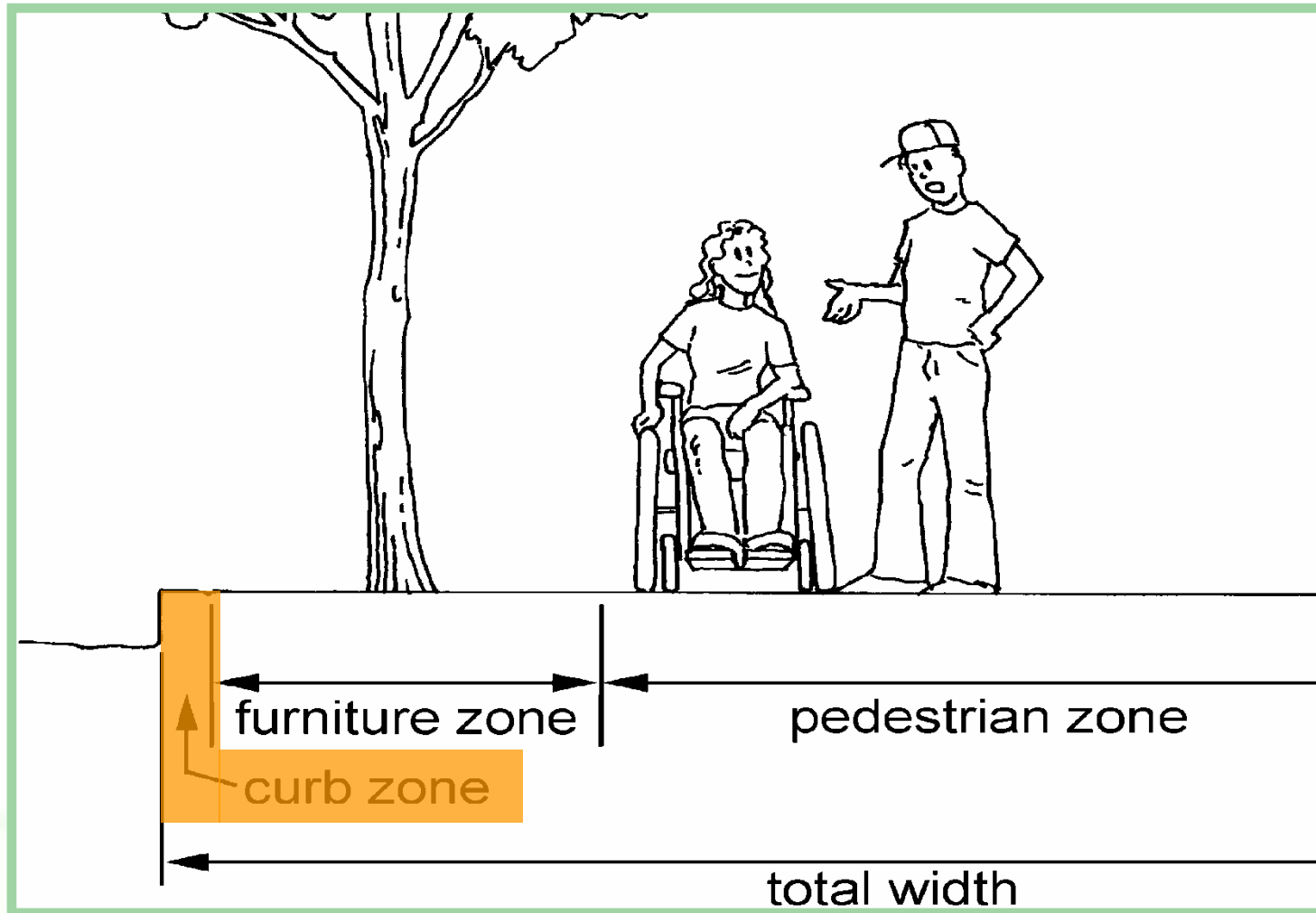
# Sidewalk Corridors – The Zone System

⇒ The sidewalk corridor extends from the edge of roadway to the right-of-way and is divided into 4 zones

- Curb zone
- Furniture zone
- Pedestrian zone
- Frontage zone



# Curb zone



# Why the curb zone matters:



**Mountable curbs are inappropriate on local streets**



# Why the curb zone matters:



**It's where pedestrians transition from/to the street**

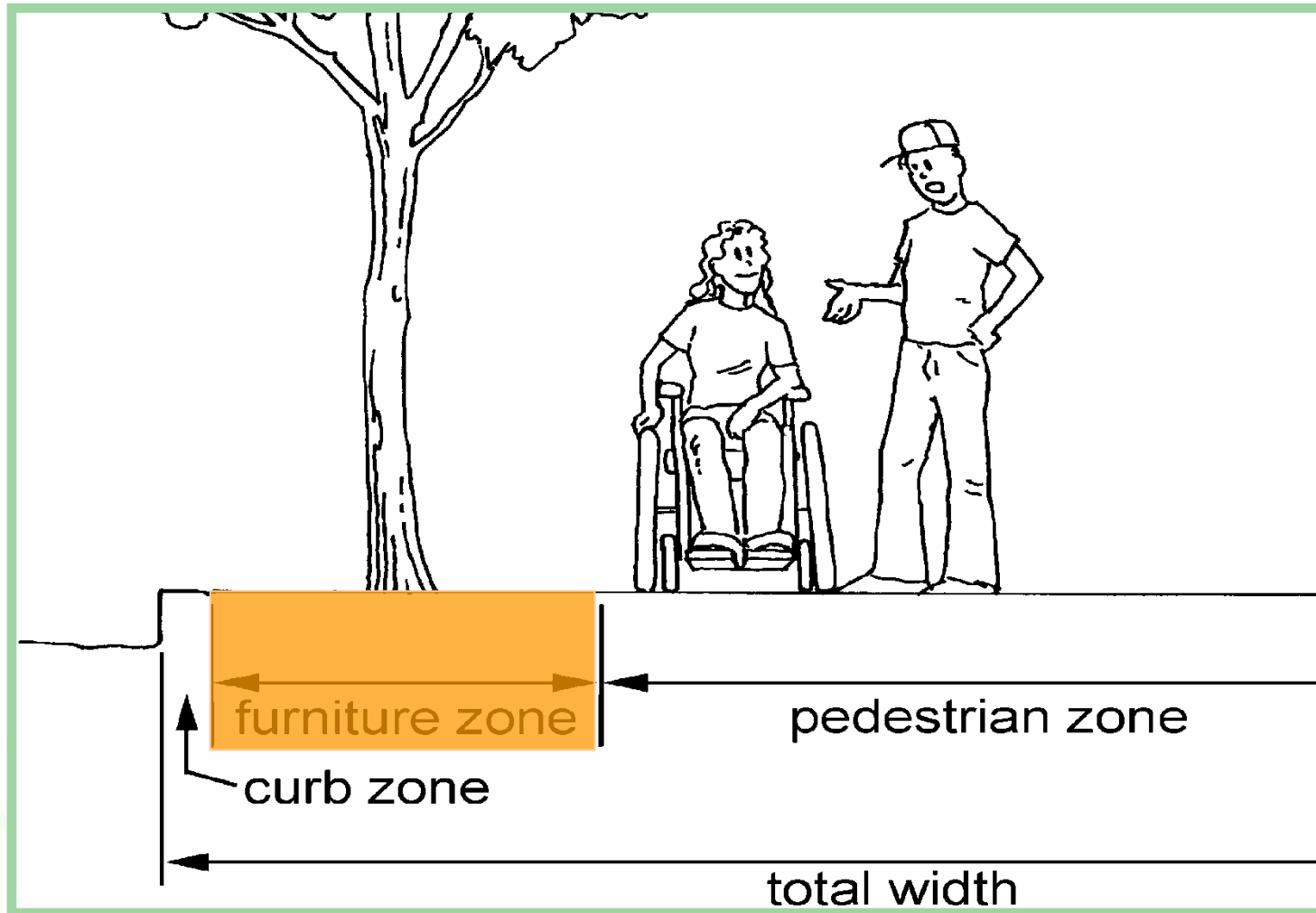
# Curbs & drainage are the greatest sidewalk cost



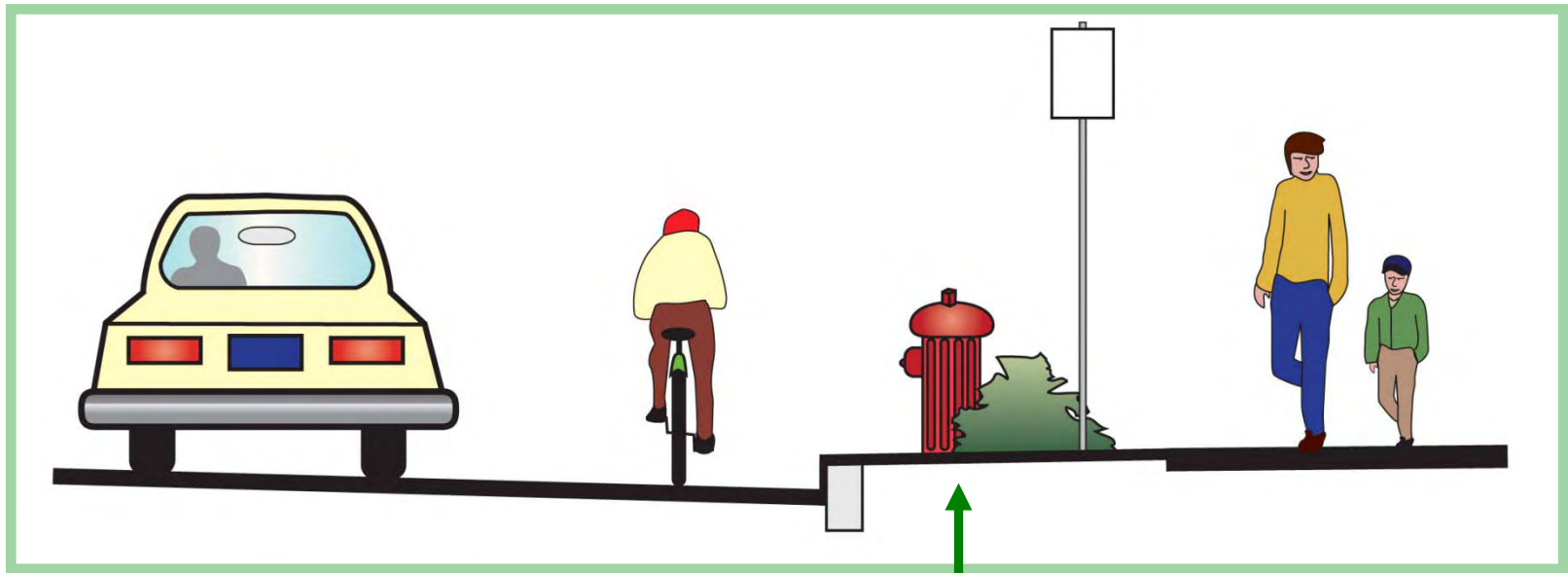
# This sidewalk cost little to install without the curb



# Furniture zone



# All the “stuff” goes in the furniture zone



All these things go here!

# The furniture zone keeps the sidewalk clear



# Sidewalk with furniture zone is pleasant to walk on



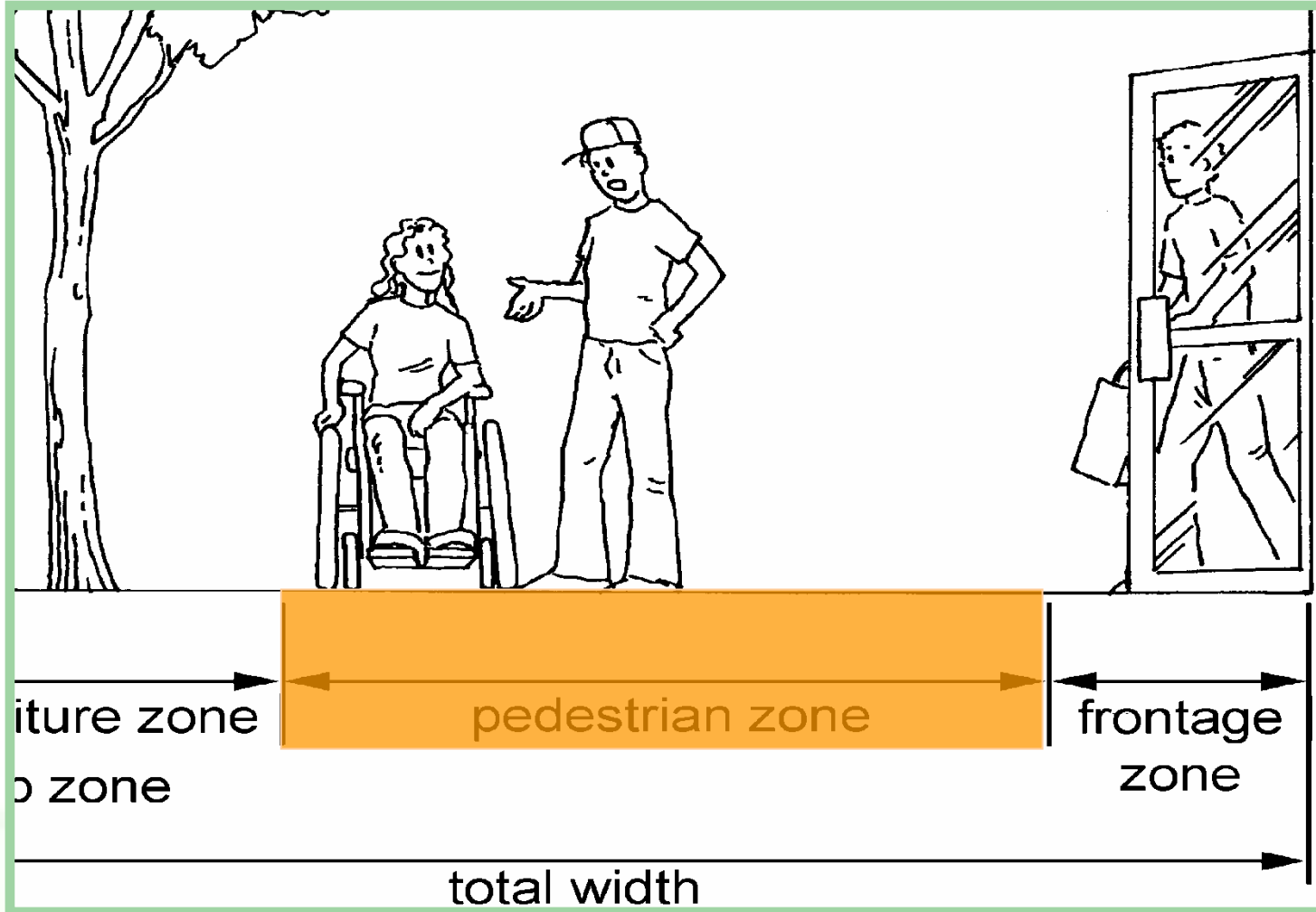
# Planter strip helps define driveways



- ⇒ It's easier for drivers to find driveways
- ⇒ Drivers are more likely to yield to pedestrians



# Pedestrian zone



# Sidewalk width



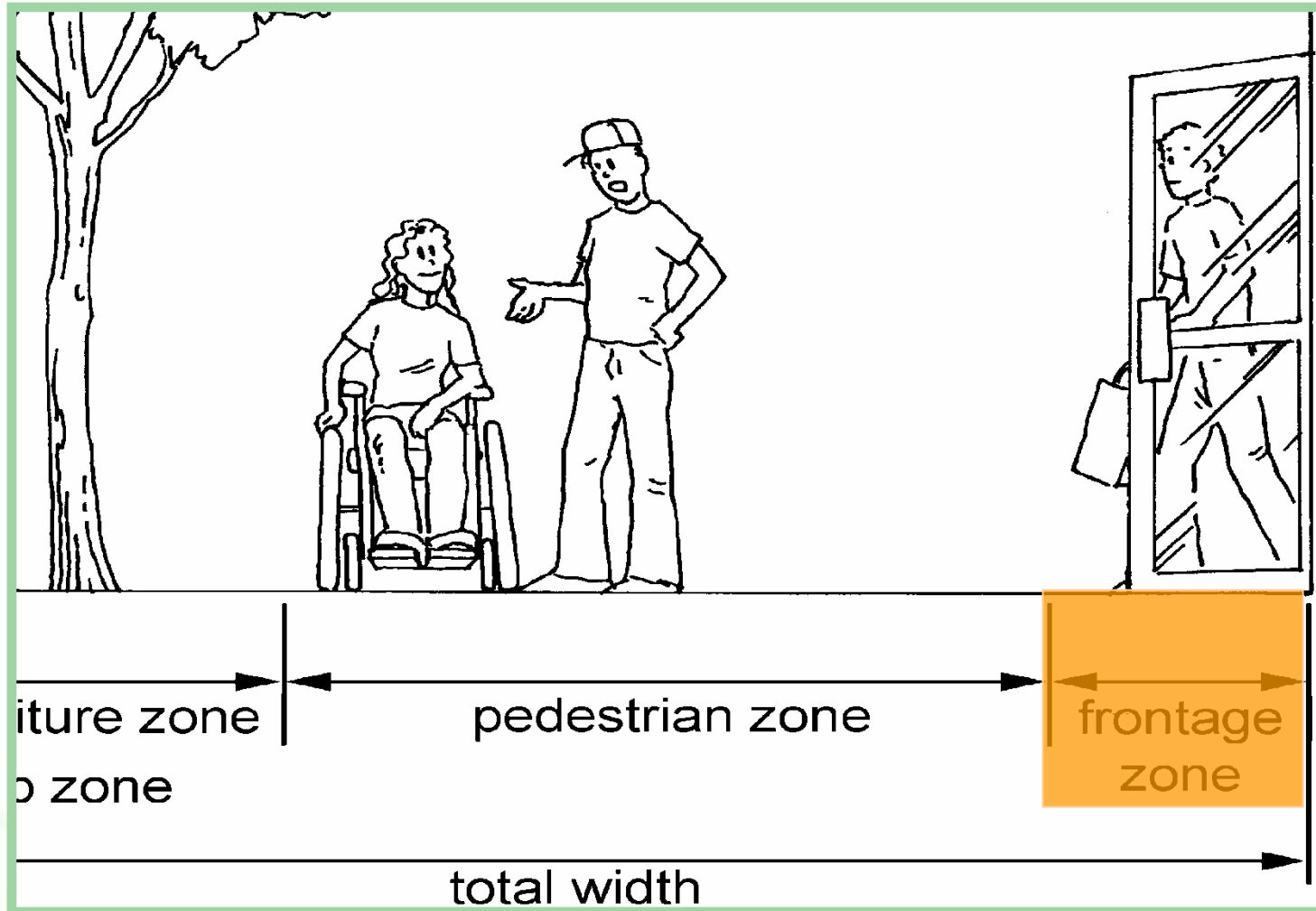
- ⇒ **5-foot width is necessary for two people to walk comfortably side by side or to pass each other**
- ⇒ **6-foot width is preferred**

# Sidewalk width



⇒ A sidewalk should be as wide as needed to serve anticipated pedestrian use (*use HCM ped LOS*)

# Frontage zone

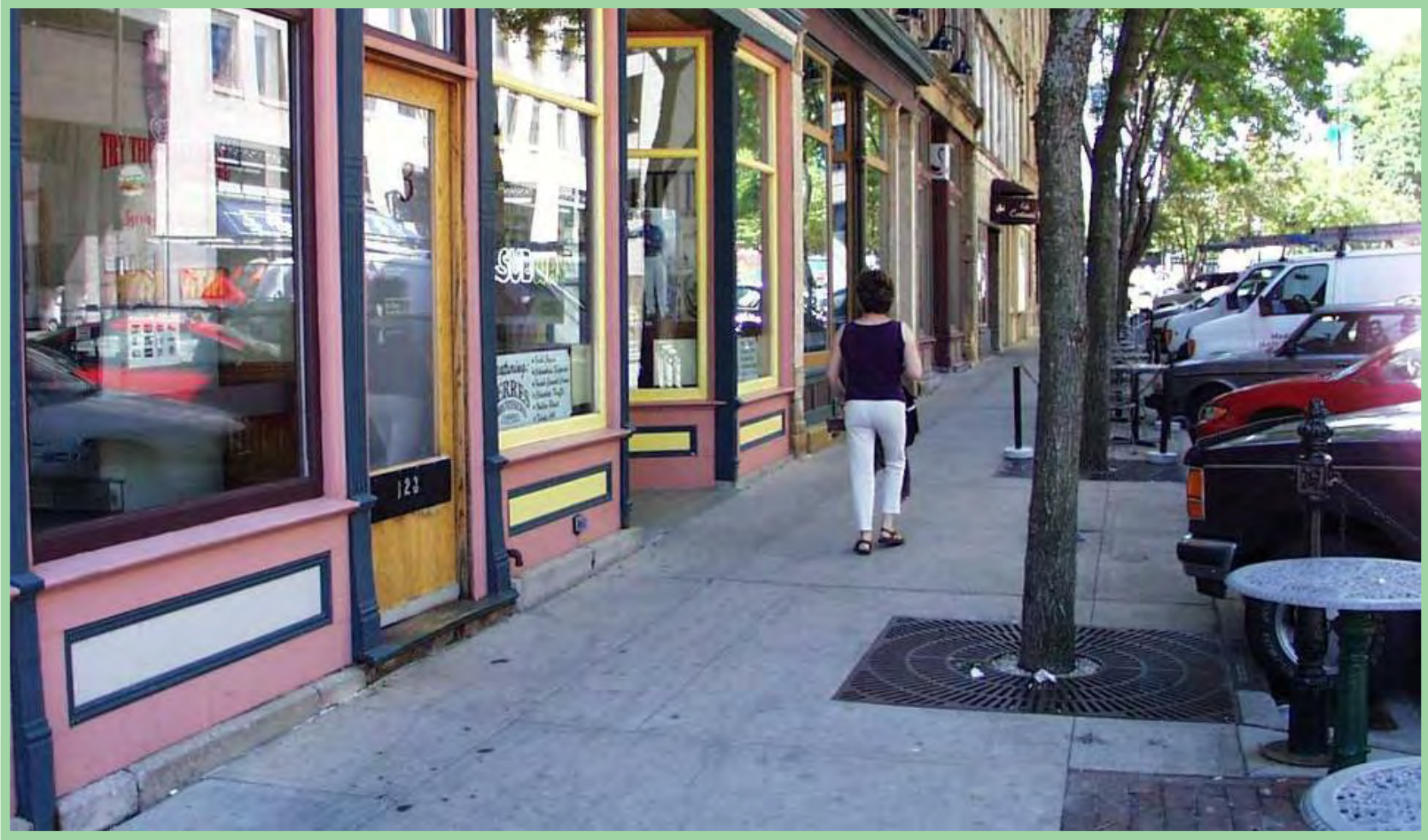


# Shy Distance



⇒ Shy distance concept applies to pedestrians, who will shy away from a vertical face; extra width is needed

# An interesting façade makes narrow sidewalks feel wider

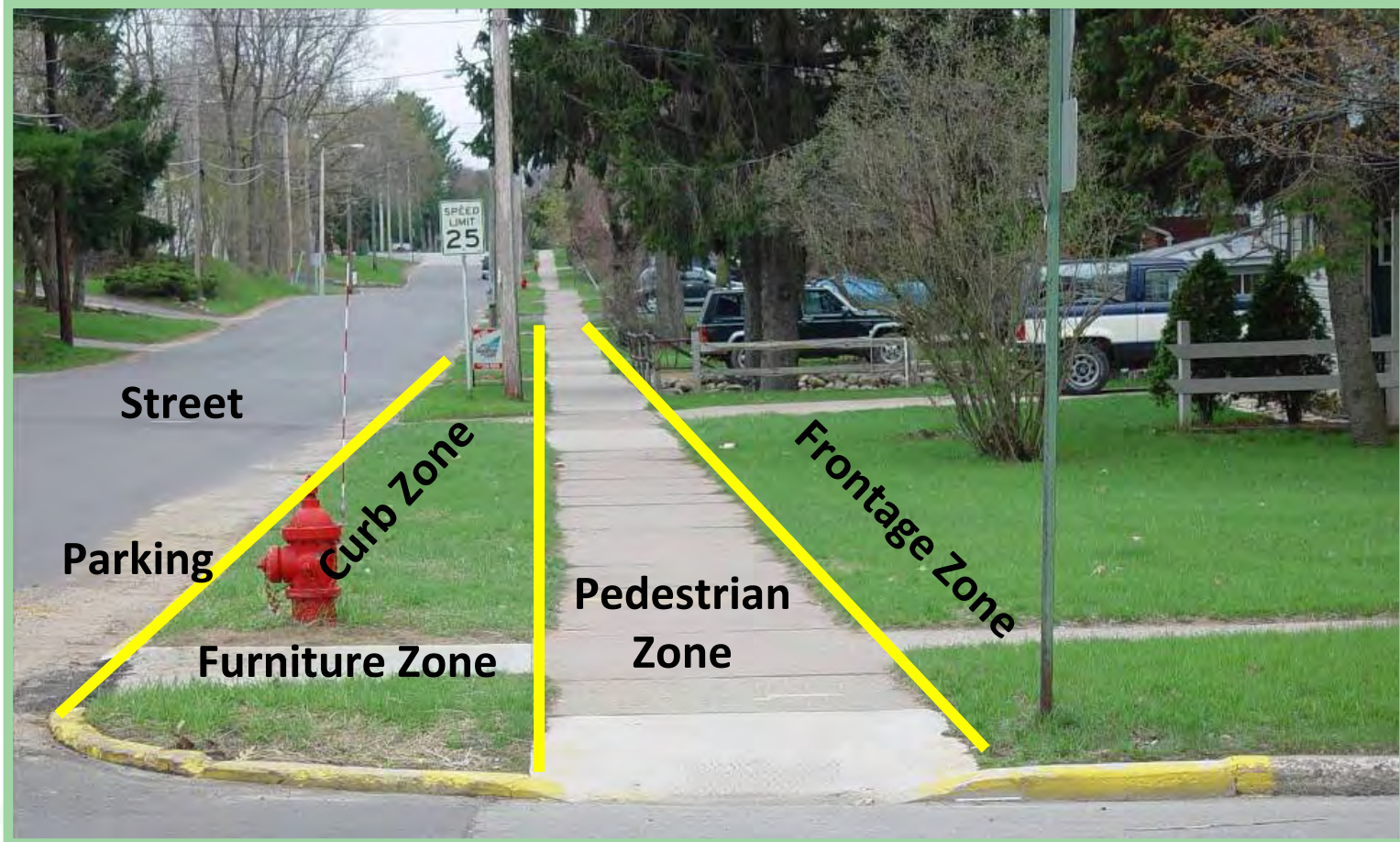


# The type of fence material impacts pedestrian comfort



⇒ The sidewalk on the left is wider, but feels constrained because of high chain link fence

# The Zone System – Summary



Residential street



# The Zone System – Summary



**Commercial street**

# With Zone System



**Street furniture arranged in zones leaves sidewalk clear**

# Without Zone System



**Randomly placed street furniture clutters sidewalk**

# Without Zone System



**No buffer between pedestrians and traffic**

# ADA requirements for sidewalks

Well-designed sidewalks meet ADA:

- ⇒ Sidewalks should be clear of obstructions:
  - 3' min clearance, 4' proposed
- ⇒ Sidewalk should have smooth surface
- ⇒ Sidewalk should be at 2% max cross-slope including at driveways
  
- ⇒ The zone system creates a safer and more pleasant place to walk, *and* makes it easier to meet ADA requirements.
- ⇒ Note: many slides include older photos that show non-compliant sidewalk features, especially ramps without the truncated domes



# Options for ADA training

## ⇒ Designing Pedestrian Facilities for Accessibility (DPFA) Web Based Course from FHWA

- To request a course or learn more contact
  - Jodi Petersen at [jodi.petersen@dot.gov](mailto:jodi.petersen@dot.gov)
  - Peter Eun at [peter.eun@dot.gov](mailto:peter.eun@dot.gov)

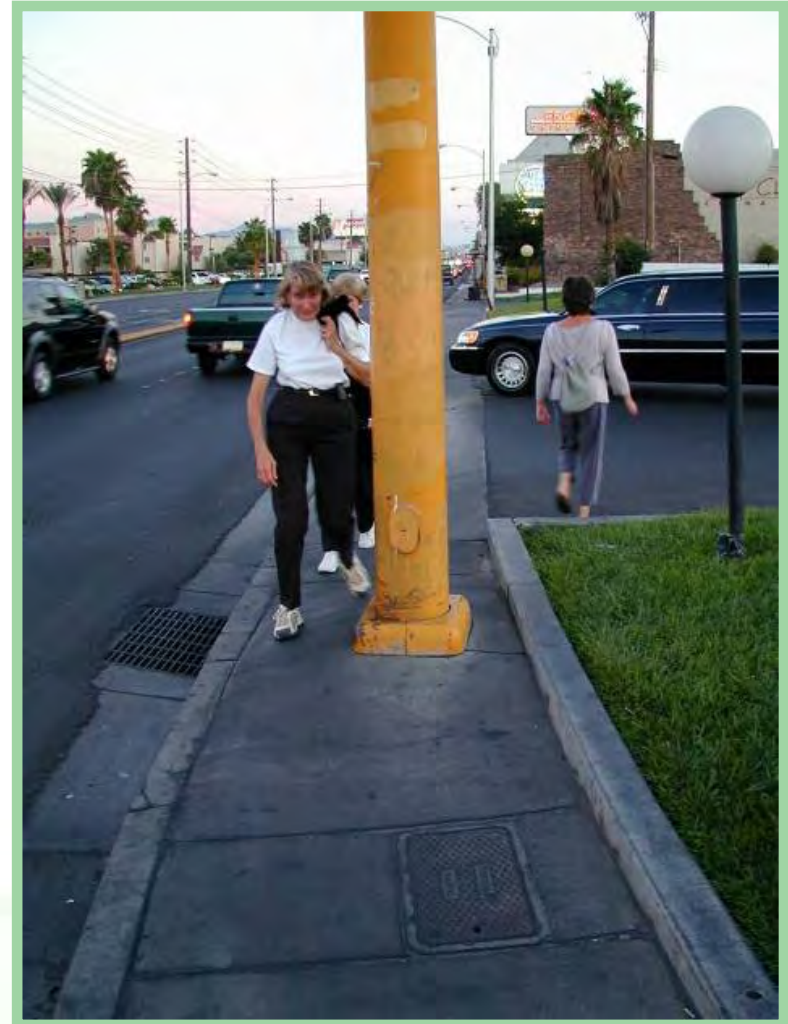
## ⇒ Designing Pedestrian Facilities for Accessibility training course from APBP (in person):

- To request a course see link below
  - [http://www.apbp.org/?Access\\_Course](http://www.apbp.org/?Access_Course)
  - Agenda: [http://www.apbp.org/resource/resmgr/dpfa/dpfa\\_one-page\\_flyer.pdf](http://www.apbp.org/resource/resmgr/dpfa/dpfa_one-page_flyer.pdf)

# Agenda for DPFA Web Based Course

1. Introduction - Live web conference
  - a) ADA Statistics
  - b) Policies / Legal Background
  - c) Walking Environment
2. Pedestrian Access Route – self paced
3. Curb Ramps and Blended Transitions – self paced
4. Detectable Warning Services – self paced
5. Pedestrian Crossings – self paced
6. Accessible Pedestrian Signals – self paced
7. Street Furniture and Parking – self paced
8. Work Zones – self paced
9. Wrap Up - Live web conference
  - a) Q & A
  - b) Knowledge Test

# Utilities & poles should not obstruct sidewalk





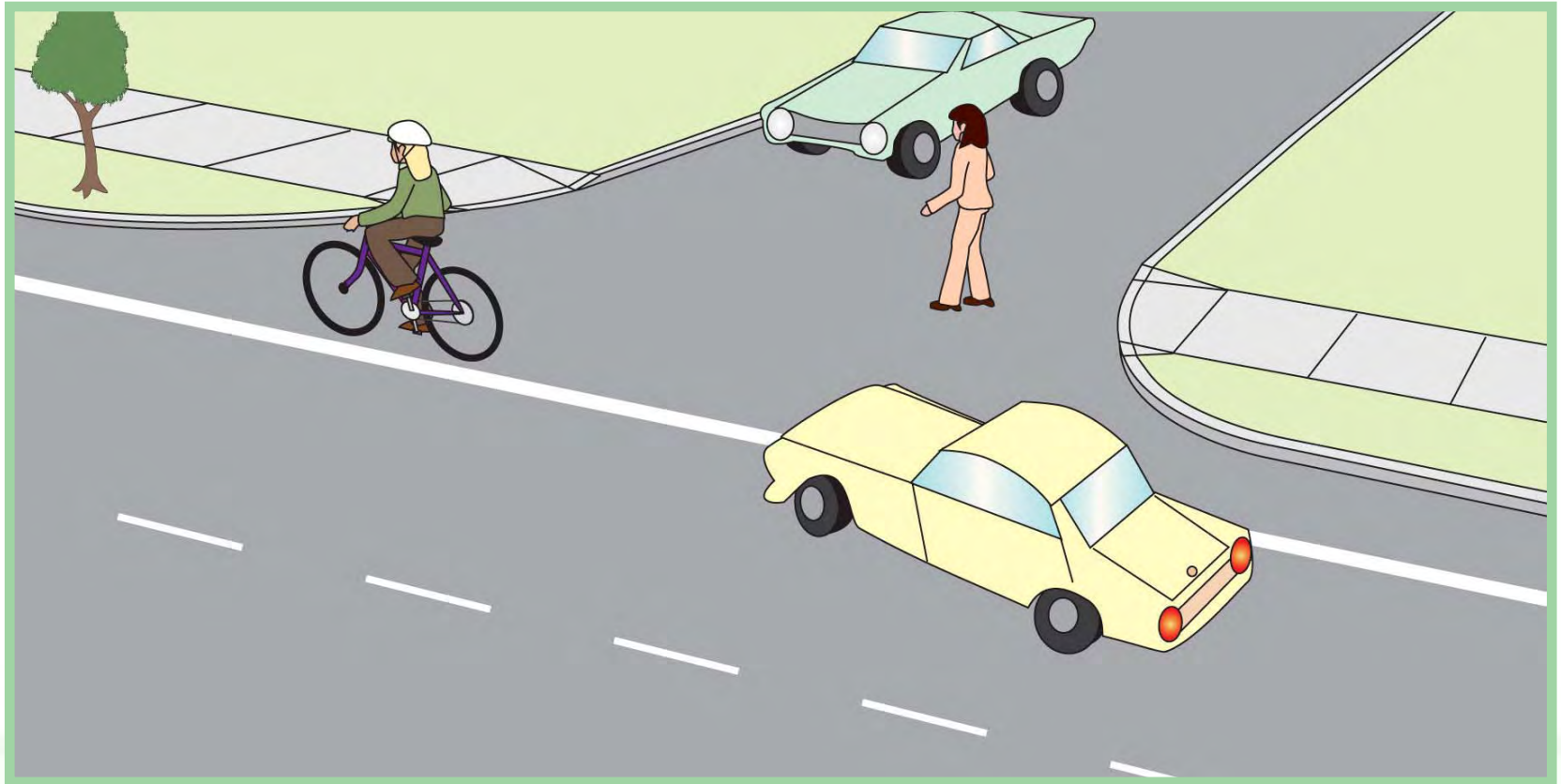
# Mitigate around obstacles on narrow curbside sidewalk



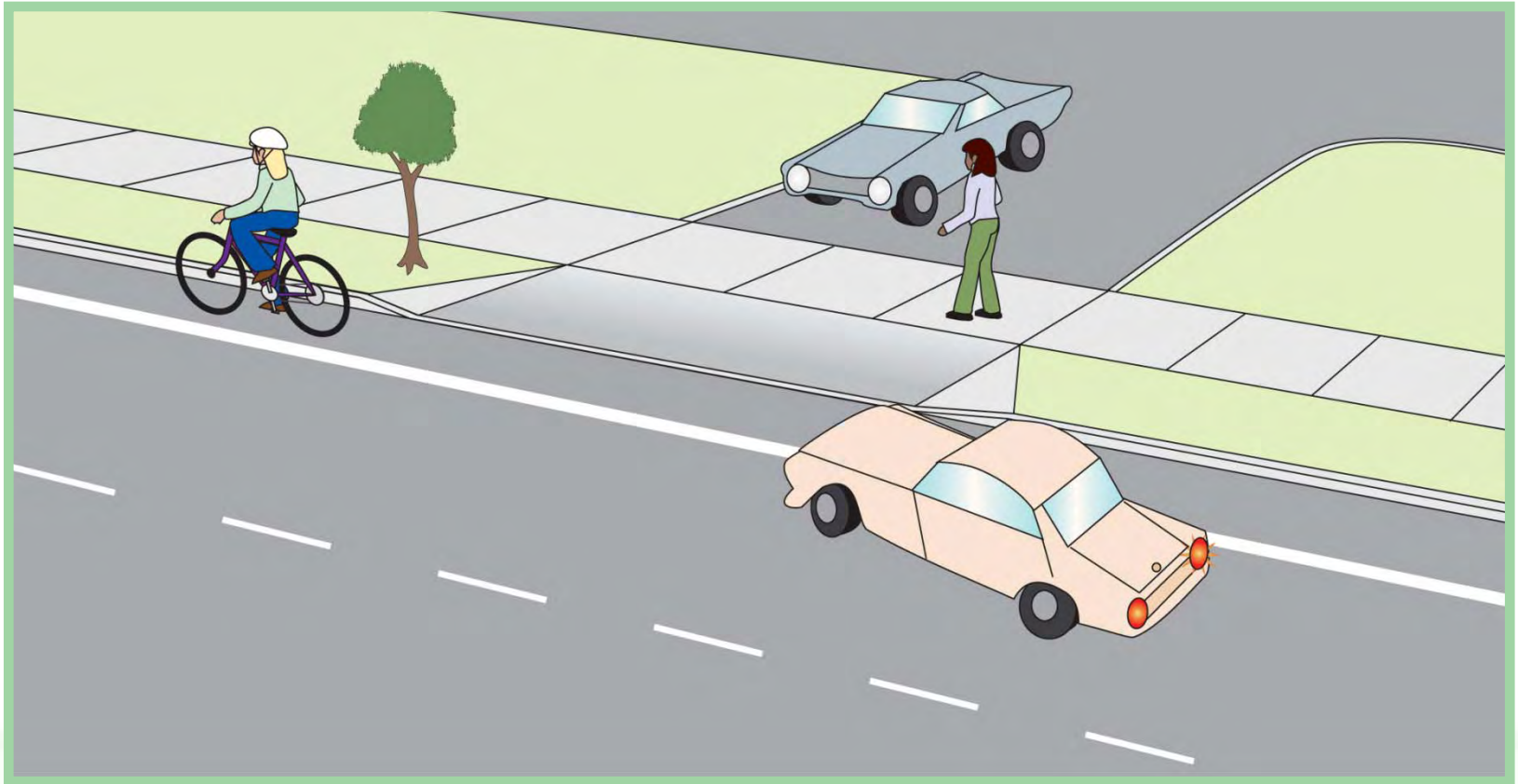
# Driveways

⇒ **Driveways are the source of most conflicts with motor vehicles on sidewalks**

# Driveways built like intersections encourage high-speed turns



# Driveways built like driveways encourage slow-speed turns



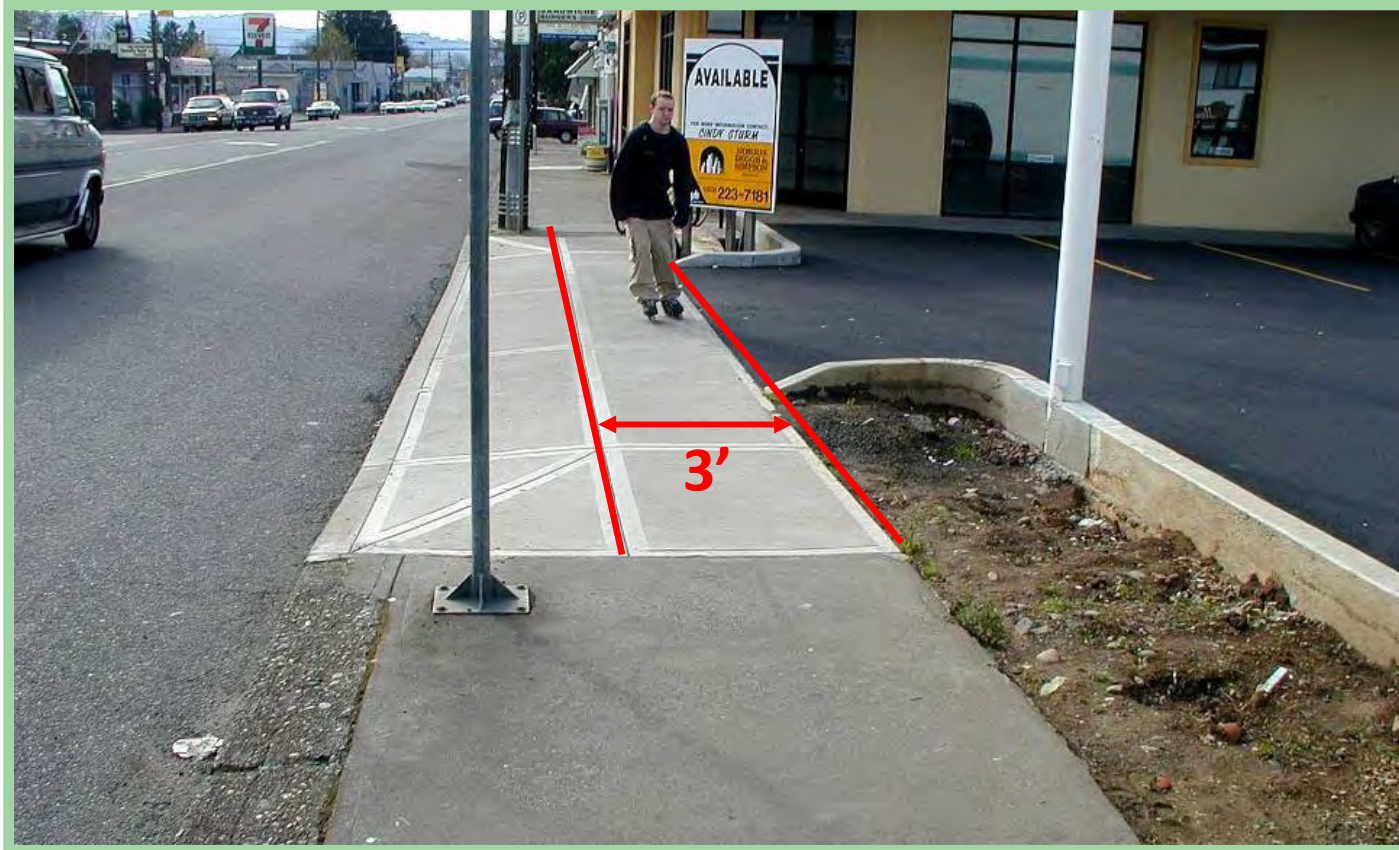
# This driveway was built like an intersection



# Driver exits at high speed, not looking at pedestrians

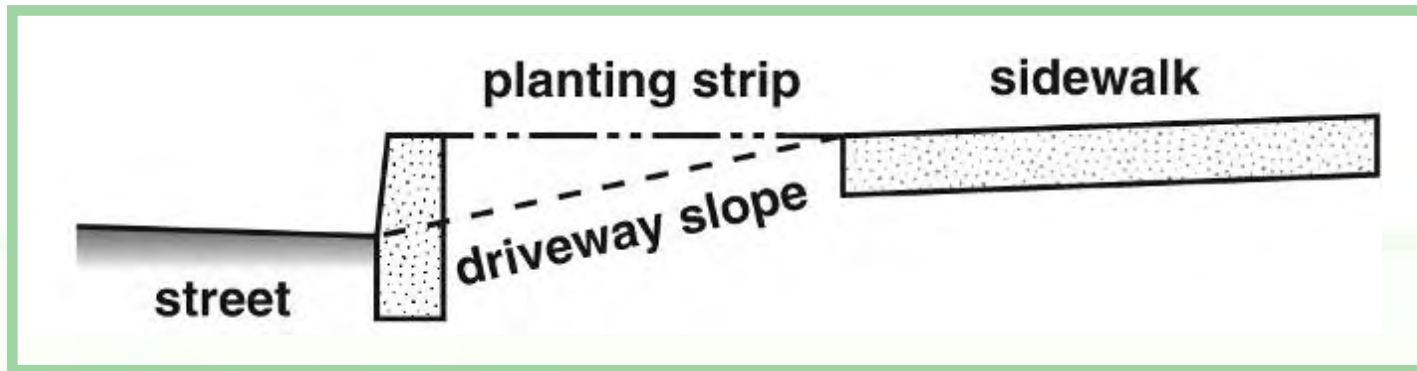
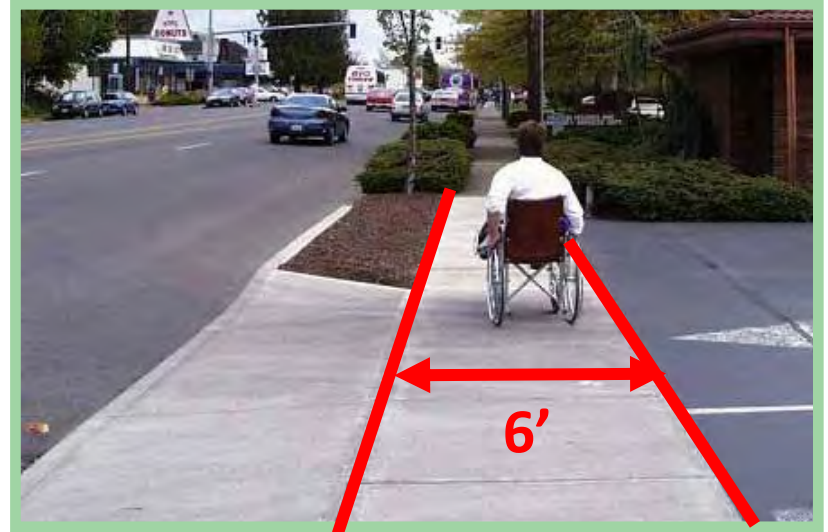
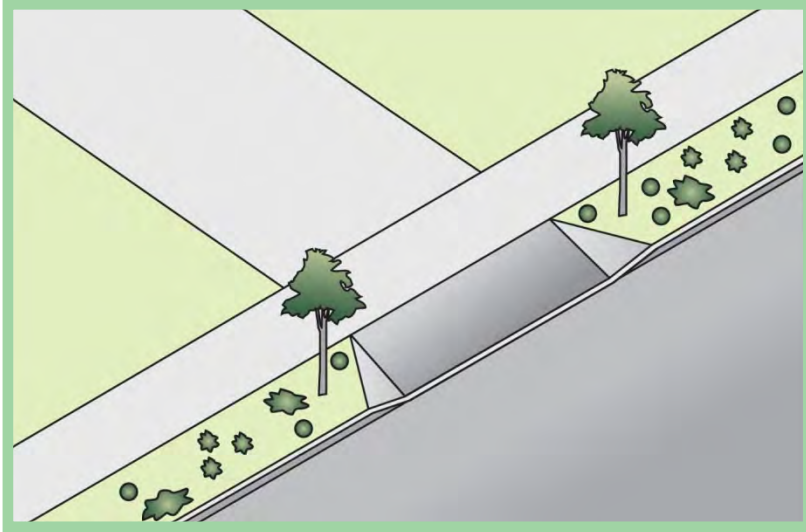


# ADA requirements for driveways:



Minimum passage of 3' (soon to be 4') at 2% max cross-slope

# Easier to maintain level passage with separated sidewalks

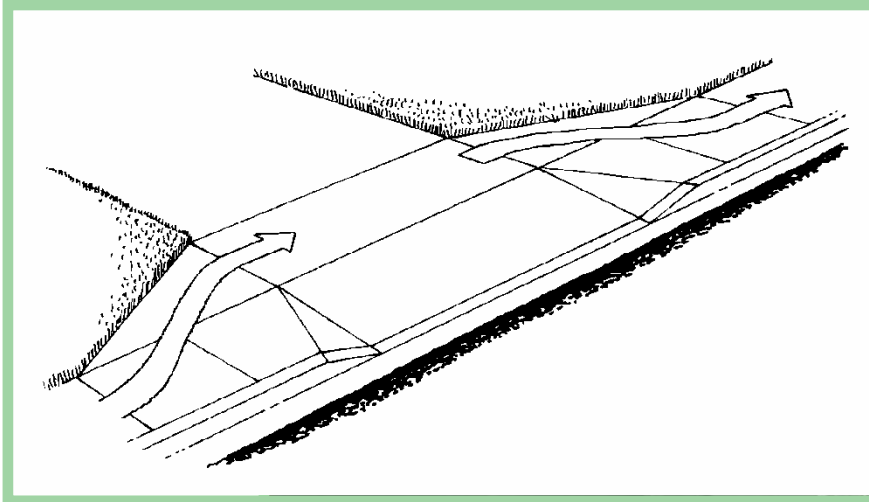




# Without zone system (curbside sidewalk) hard to meet ADA



# For narrow curbside sidewalks, wrap sidewalk around apron



# Walking Along the Road – Let's Recap

## 1. Crash Reduction Factors:

### ⇒ Rural environments:

- Paved shoulders reduce ped crashes up to 70%

### ⇒ Urban environments:

- Sidewalks reduce ped crashes up to 88%
- (most sidewalk crashes occur at driveways)

# Walking Along the Road – Let's Recap

## 2. Sidewalk Design: The zone system

⇒ What are the 4 zones?

1. The curb zone
2. The furniture/planter/buffer zone
3. The pedestrian/walking zone
4. The frontage zone

# Walking Along the Road – Let's Recap

## 3. Sidewalk Design: Key characteristics

⇒ How should the walking zone be designed?

- Smooth
- Separated from traffic
- Clear of obstructions
- Level cross-slope (max 2%)
- Wide enough to accommodate expected pedestrian volumes

# **Walking Along the Road – Learning Outcomes:**

**You should now be able to:**

- ⇒ **Describe the operational and safety benefits of shoulders and sidewalks**
- ⇒ **Select the appropriate design requirements for sidewalks**

# Questions?