Making Great Urban Streets – Confessions of a Highway Engineer

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Isn’t this a Great Street?

Characteristics of a Great Street

- It is a transportation facility
  - transporting not just cars but people and goods
- It is integrated with the adjacent land uses
  - access
  - appearance
  - function
- It's totality enhances (indeed, enables) the corridor and area to thrive and prosper in a manner consistent with a community's goals and vision
- It's functionality reflects consideration and respect for the corridor's role and presence within the regional transportation system

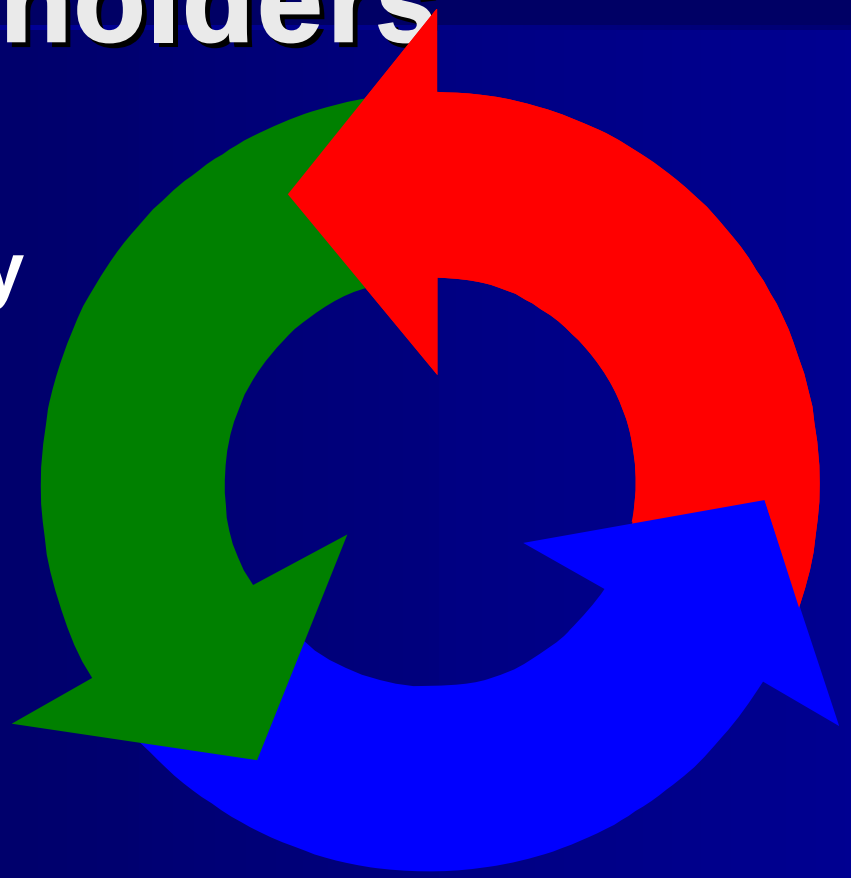
What defines the urban environment?

- Limited space
- Multiple modes
- Multiple needs

Where highway and traffic engineers need to go (to help you plan and design great streets)

- Embrace (not just tolerate) broader definitions of mobility
- Recognize openly the need to make hard choices
- Re-think the design process, our tools and approaches
- Foster creativity

Core Transportation Values Common to Most Stakeholders



Mobility, Accessibility and Safety

- How do we define these?
- How do we measure them?
- What are reasonable expectations?
- How do we provide all three?
- What is the relationship of access to mobility?
- What is the relationship of mobility to safety?
- What is the relationship of access to safety?

Lanes and mobility are not necessarily the same thing

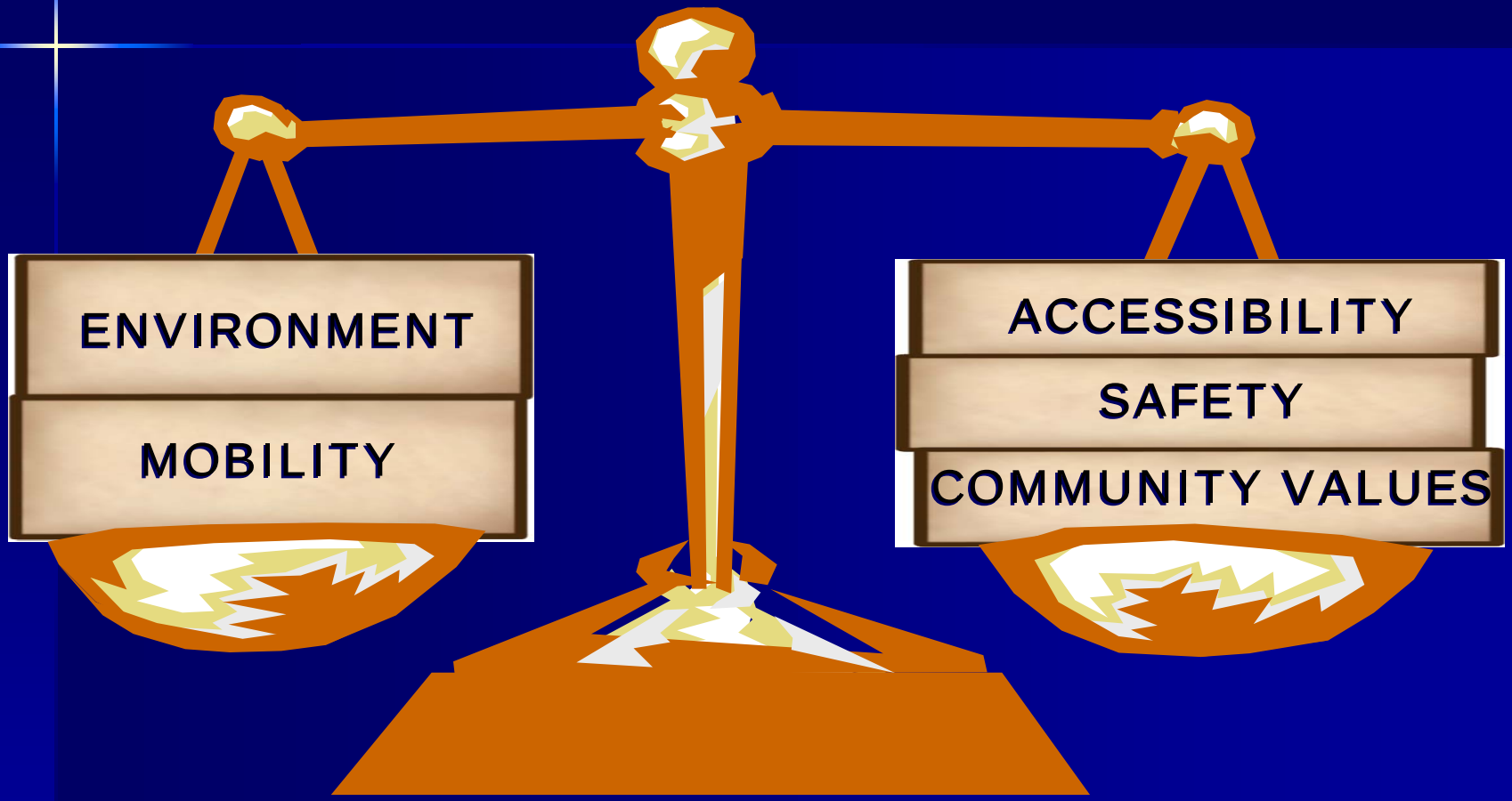
‘Road diets’ convert 4-lane to 3-lane streets with completely different resultant operations

Speed and mobility are not the same thing

- Travel time
- Reliability
- Availability of alternate routes

Pedestrian (not just vehicular) mobility may be a priority

Making great streets in the urban environment means making trade-offs



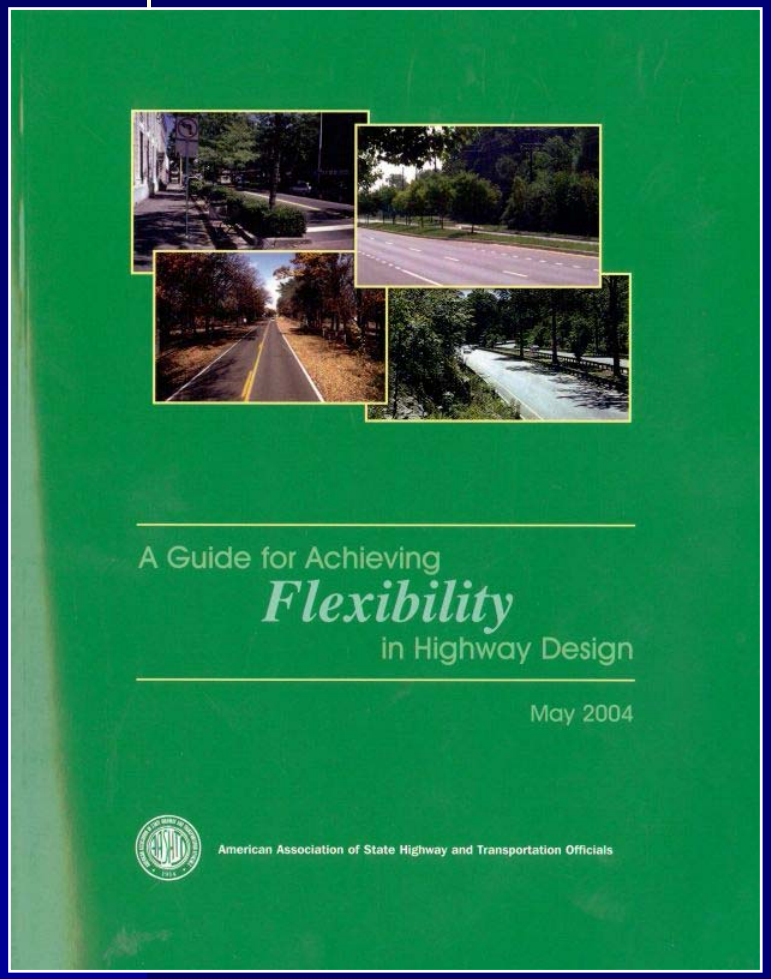
Urban stakeholders often have competing interests

- On-street parking vs. space for through traffic
- Driveway access vs. mobility (both vehicles and pedestrians)
- Right turn delay vs. pedestrian conflicts
- Left turn safety and delay vs. capacity
- Space for roadside activity vs. space for moving traffic
- Mobility vs. accessibility for truck, freight, local deliveries
- Community plan vs. individual property owner's desires or interests

Unintended consequences of trying to meet everyone's 'needs'; or undervaluing one or more need

PHOTO: SEATTLE TIMES 11/3/2001

A confession – 'The Book' does not mandate one approach or solution



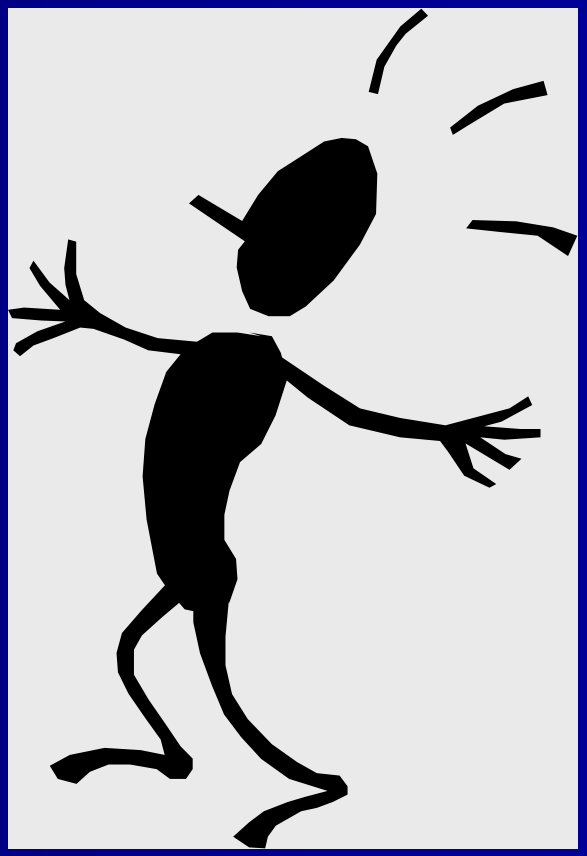
- Greatest opportunities for flexibility are in the early, planning phases
- Highway designers have choices (not mandates)
- Designers should understand the functional basis of design criteria and standards
- AASHTO Green Book is flexible
- Be creative and innovative

What do you mean you want me to be ‘creative’?

- ADT -> Number of Lanes
- Functional class -> Design speed and width
- Design speed and ADT -> alignment and clear zone

We have choices! (not mandates)

- Number, use or type, and width of lanes
- Medians (type, width)
- Timing of signals
- Level of service
- Design vehicles
- etc.

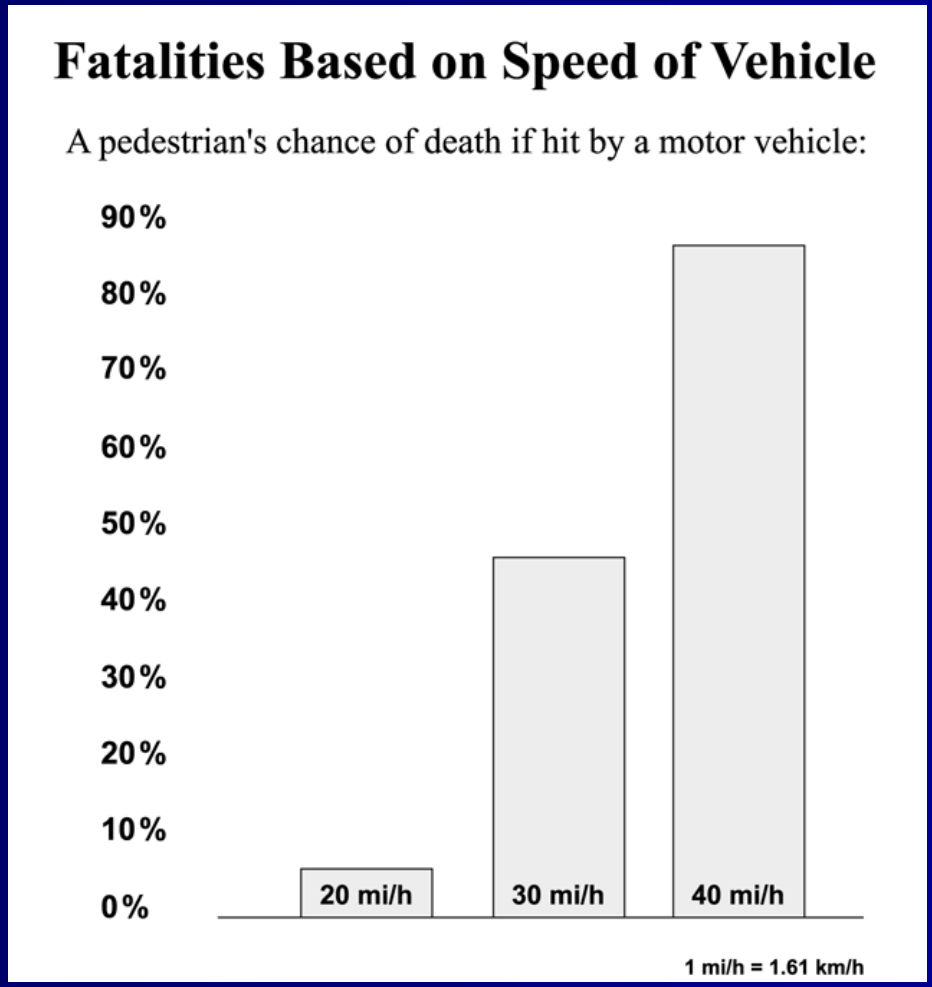


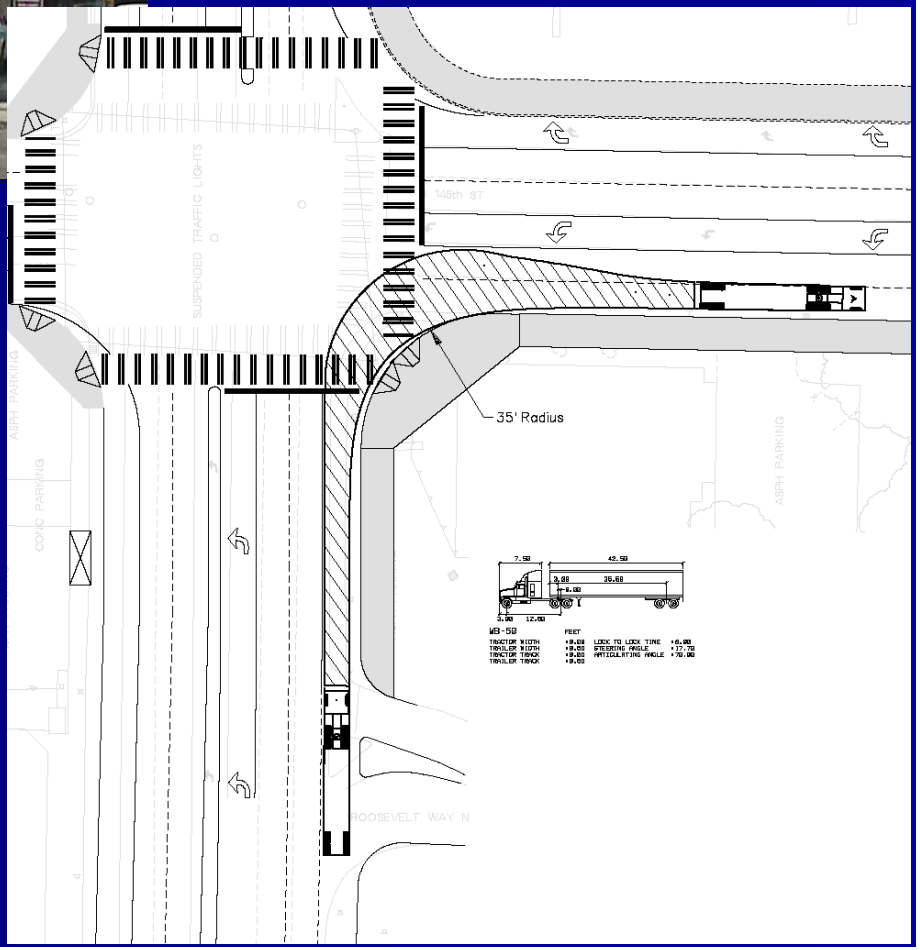
A confession – higher design speeds are not always best

"Design speed is a selected speed used to determine the various geometric design features of the roadway. The assumed design speed should be a logical one with respect to the topography, the adjacent land use, and the functional classification of highway."

AASHTO Policy on Geometric Design (2001)

Where pedestrian mobility and accessibility is a primary concern, *low speed is better*





Design Vehicle **is a choice that affects intersection design and operations**

We have guidelines, not mandates for design Levels of Service (per AASHTO)

- Higher LOS means
  - Improved safety (sometimes)
  - Larger "footprint" (greater adverse impacts and costs)
- Lower LOS
  - Lesser R/W and other physical impacts
  - More operation under congestion
  - Less reliability
  - Less flexibility (future uncertainty)

Highway Type	Type of Area and Appropriate Level of Service			
	Rural Level	Rural Rolling	Rural Mountainous	Urban and Suburban
Freeway	B	B	C	C
Arterial	B	B	C	C
Collector	C	C	D	D
Local	D	D	D	D

NOTE: General operating conditions for levels of service (Source: Ref. 11):
A - free flow, with low volumes and high speeds.
B - reasonably free flow, but speeds beginning to be restricted by traffic conditions.
C - in stable flow zone, but most drivers restricted in freedom to select their own speed.
D - approaching unstable flow, drivers have little freedom to maneuver.
E - unstable flow, may be short stoppages.

What do we mean by ‘creativity’ in the context of designing ‘great streets’?

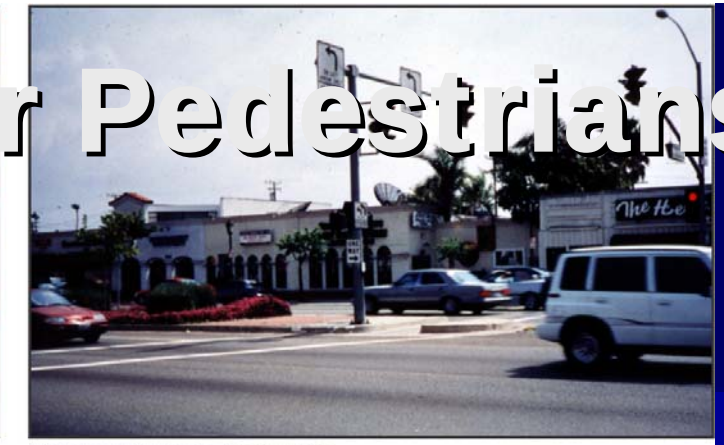
Sharing limited space – what other applications might make sense?

Hastings Street HOV and parking shared use
(East Vancouver, BC)

Sharing space between cars and transit

Designing for Pedestrians

Tucson, Arizona



Newport Beach, California

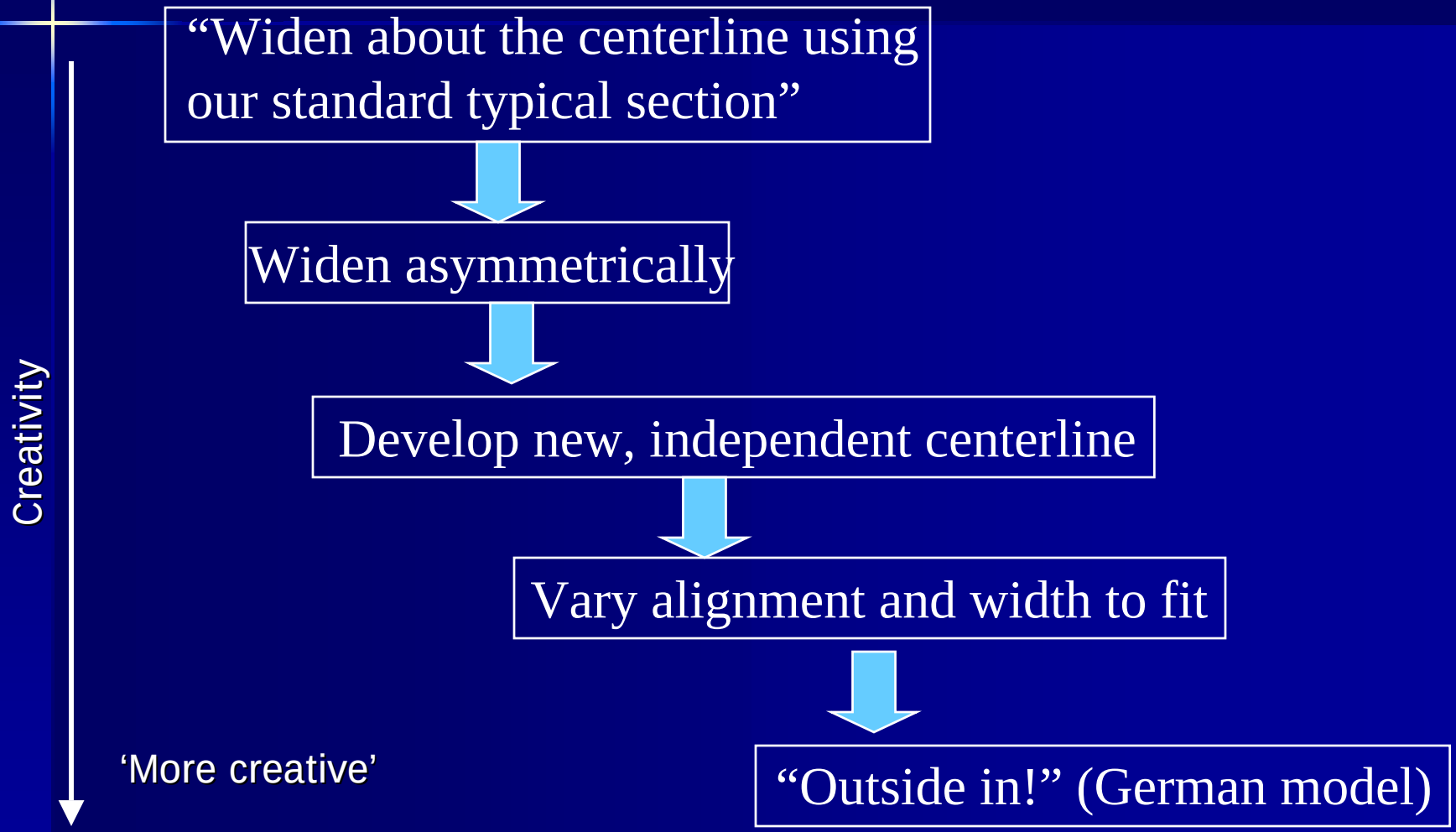
New York, New York

Denver, Colorado

London, England

Paris, France

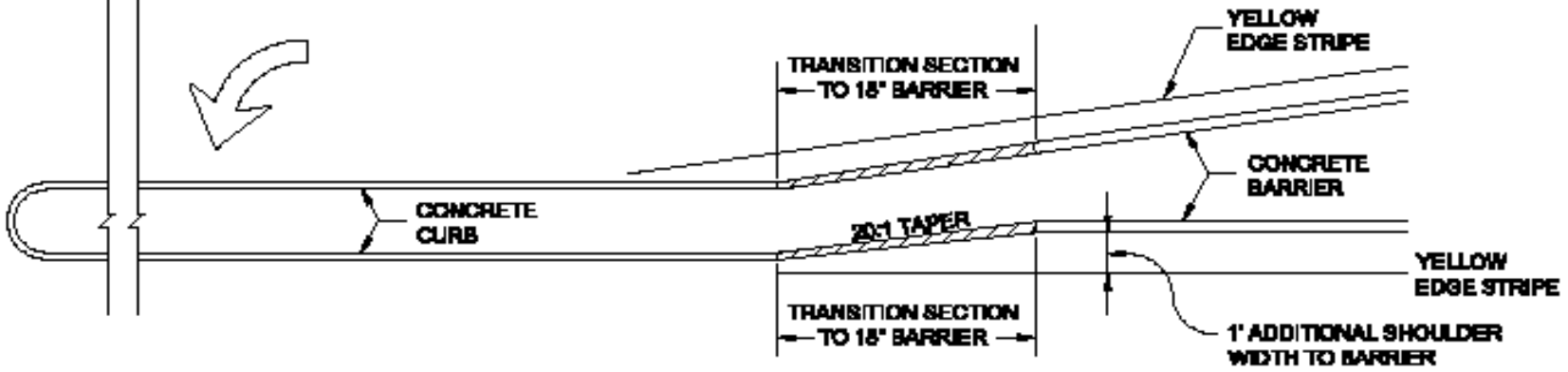
A confession – too few highway engineers think like this

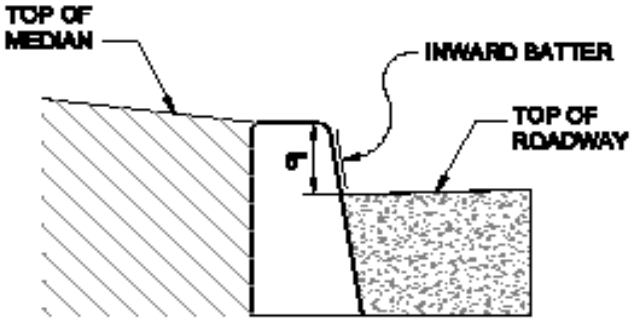


If we want to we can be ‘creative’ within our design processes

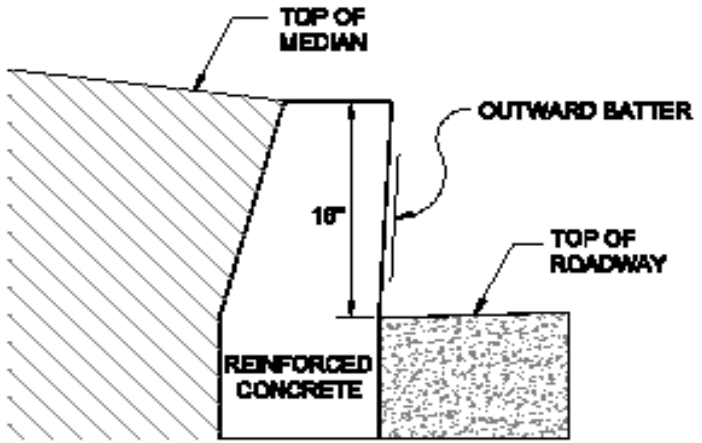
WashDOT responded to repeated requests by communities for tree plantings by developing NCHRP 350 compliant median curb design

Develop new ‘standards’ for Great Streets





CONCRETE CURB



CONCRETE BARRIER

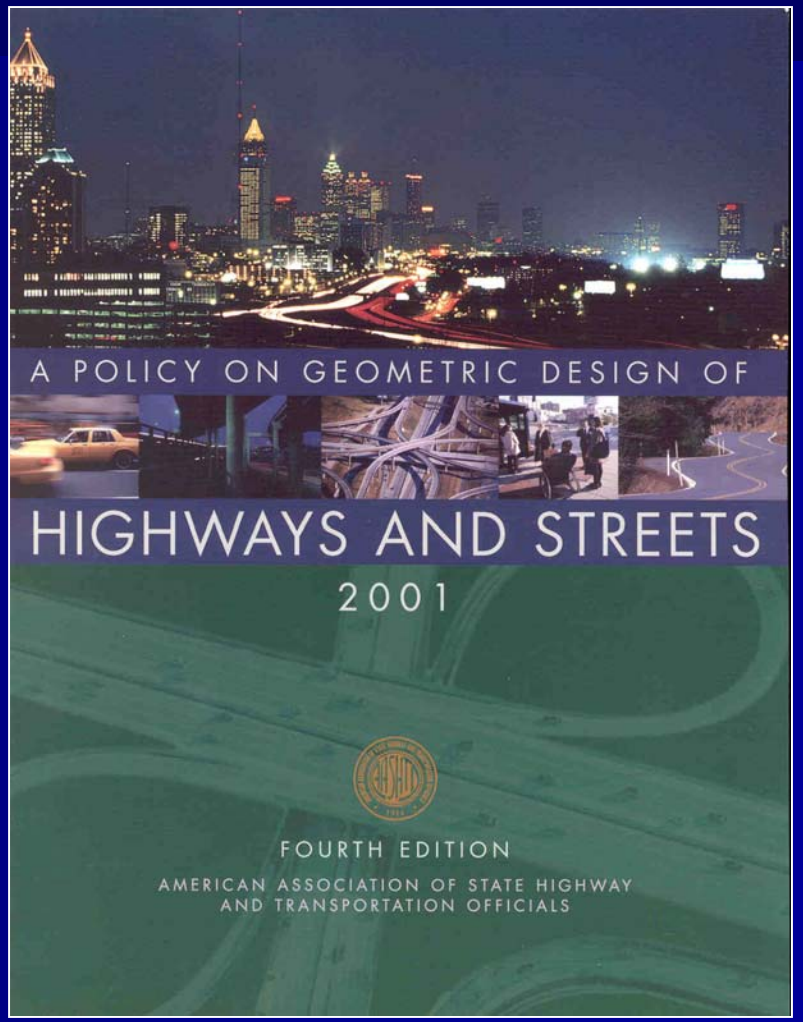
LOW PROFILE CRASH TESTED BARRIER

But what about safety?

- ‘Nominal’ versus ‘substantive’
- For which user groups?
- How do we define and measure it?
- What are reasonable expectations?
- How are safety and mobility related?

A confession – Too many of us think ‘the book’ is a safety manual

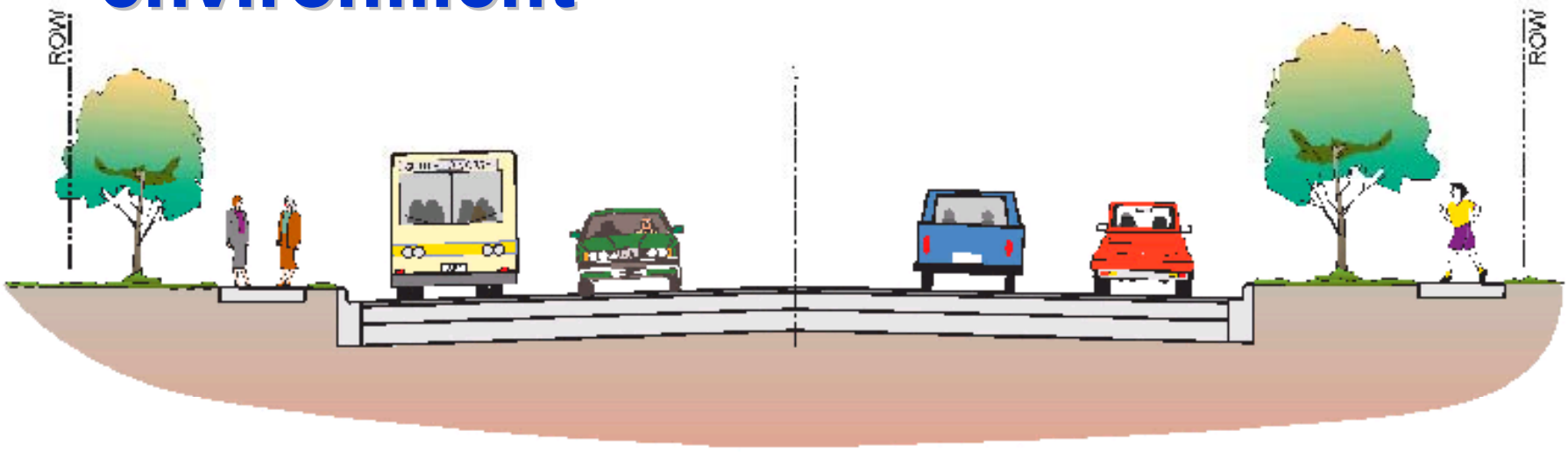
- Criteria are based on:
  - Safety
  - Costs and cost effectiveness
  - Traffic operations
  - Maintenance
  - Constructability
  - Tradition



Urban cross section substantive safety issues

- Number and arrangement of lanes
- Presence and type of medians
- Intersections (frequency, type of control, design features)
- Presence and use of driveways
- Allocation of width
- Transit lanes, stops
- Pedestrian crossings

A ‘confession’ – we don’t really know which design is ‘safer’ in the urban environment



OPTION “A”

Fixed objects away from roadway

Sidewalk adjacent to roadway

OPTION “B”

Sidewalk away from roadway

Fixed objects adjacent to roadway

EXHIBIT 11. URBAN STREET CROSS SECTION OPTIONS

NCHRP Project 20-7, Task 171, Conflicts Related to Clear Zones in AASHTO Publications

ITE's view of the nominal safety of the border area

'The setback distance of the sidewalk from the roadway is another important safety and design factor. ...sidewalks too close to high-speed traffic discourage pedestrian travel due to .... and the perception of hazard. ..(wider) Setbacks allow for landscaping, traffic signs, hydrants, lighting ....'

Control of access affects mobility and safety of both vehicles and pedestrians

Making good choices means understanding the *substantive performance* of urban streets

- Spacing, control, and capacity of intersections is more important to mobility than typical section
- Traffic signals may increase crash frequency (but lower crash severity)
- Lower speeds are safer (produce lower severity)
- 12-foot lanes are NOT substantively safer than 11-ft lanes; and 10-ft lanes may be almost as good as 11-ft lanes in some contexts
- Any median is better than none; raised medians are substantively safer
- Access management has a substantial safety benefit (as well as operational benefits)

A final confession – We're trying hard to address the paradigms we grew up with

- Speed equals quality (the higher design speed, the better)
- Keep traffic moving (minimize need to stop)
- Non-motorized travel is an afterthought or extra (deal with after solving the traffic problem)
- Referring to beyond the edge of pavement as the border area or 'clear zone'

Conclusions -- Some insights and common themes

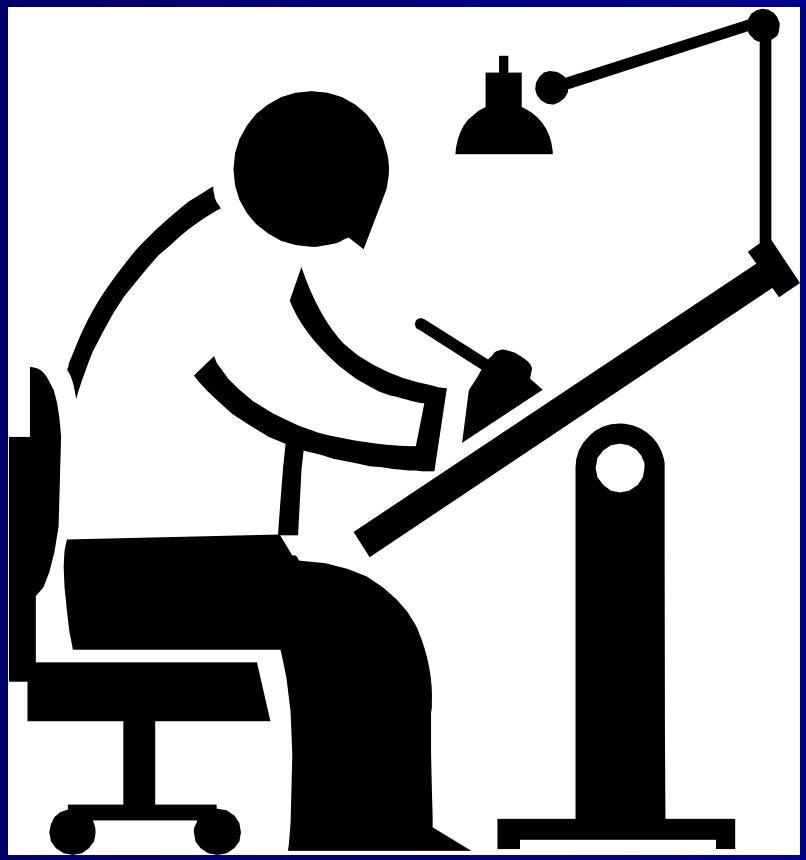
- **Successful (i.e., effective and supported) solutions address multiple stakeholder objectives**

  - •Consider shared or multiple uses of space (e.g., parking and transit lanes; time of day on-street parking)
  - •Raised medians provide access control and can support landscaping
  - •Signal coordination provides mobility at desirable

Conclusions -- Some insights and common themes

- Dimensions should be tailored to the the context -- use the full flexibility offered by AASHTO and other design guidance
  - Select a reasonable design speed and other design controls
  - Establish reasonable roadside design criteria
- Functionality (not physical dimensions) is the key to success

Thanks for listening to an engineer's confessions



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