Walkability

Western Sustainability and Pollution Prevention Network
March 8, 2011

WALKABILITY

• What is it?
• Why is it important?
• What influences it?

WALKABILITY

What is it?

A measure of pedestrian safety, accessibility and friendliness.

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?

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

Stillwater MN
Because pedestrians use and belong on streets and highways

Stillwater MN
Because it's a healthy exercise

Physical Inactivity
Among Nevada adults…
• 27% report NO physical activity in past month.
• 49% do not meet recommended levels of physical activity.
• 64% are overweight or obese

Economic Impact
• Healthcare costs attributed to overweight & obesity:
  – $51.5 billion in the US
  $78.5 billion when institutionalized populations are included
  – $337 million in Nevada

The Built Environment Makes a Difference
• People who report having access to sidewalks are more likely to be physically active than people who don’t.

Centers for Disease Control & Prevention, Behavior Risk Factor Surveillance Survey, 2005 & 2006
Walkable Neighborhoods have Happier People

- People in walkable neighborhood's are more socially engaged and trusting.
- Residents reported being happier and healthier and more apt to volunteer, work on community projects or entertain friends at home.

PRODUCTIVITY GAINS!

Dade County Teachers Credit Union

- Set up walking routes, competitions, and support systems.
- Participating employees earned extra vacation days; however, management reported that employees ended up taking fewer sick days than they earned in vacation days resulting in a net gain in productivity.

PRODUCTIVITY GAINS!

Canada Life Assurance Company

- Realized a 4% increase in productivity after starting an employee fitness program.

Pacific Bell

- Fitness program decreased absent days 0.8% which saved the business $2 million in one year.
- Fitness program participants also spent 3.3 days less on short-term disability for an additional savings of $4.7 million.

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…”
- “… cycling and walking facilities will be incorporated into all transportation projects unless ‘exceptional circumstances’ exist.”

Because it’s the LAW !!!

Lesson Traffic Congestion

- Almost one third of Reno residents found travel times to work and shopping unacceptable in 2007.

The Hidden Epidemic

- Washoe County cost of congestion in 2007?
  - $72 million
- Cost of crashes in 2007?
  - $525 million, about seven times the cost of congestion

(Cost per Fatality $15.7 M and Cost per Injury $72K)
Decrease Wear & Tear on Our Roads

Save Money

- New 4-lane roads cost up to $7 million/mile.
- Pavement replacement can run between over $25,000 to up to ½ million per mile.

Improve Air Quality

Air pollution is linked to heart disease, respiratory ailments, and cancer.

Reduce Global Warming

Why?

Because it will make roads safer for all road users

Because “Pedestrians Belong”...
Overview of Pedestrian Safety Problem

- Annually almost 5,000 pedestrians are killed in traffic crashes, representing 11% of all traffic deaths.
- Approximately 64,000 pedestrians are injured.
- 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.

Utilities & poles should not obstruct sidewalk

Planning and street design elements that affect pedestrian safety:

- Land use
- Street connectivity
- Access management
- Site design
- Level of Service

Transportation & Land Use Cycle

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

Potential solutions?
1. Allow small-scale retail in neighborhoods
2. Site school closer to residences

Activity Scale and Distribution

• The average size of an elementary school in the U.S. has grown from 155 students in 1950 to 473 in 2000.
• America has gone from having 81 grocery stores per million persons in 1977 to 35 per million in 1997.
• In 1970, there were 34 hospitals per million persons. In 2000 there were 20.

Do Business Economics Contradict Travel Minimization?

• 1940 - Went to the Doctor
• 2008 - Went to the General practitioner who referred you to the specialist who sent you to the scanning center, the pharmacist, and the physical therapist - each of which required significant travel to find one participating in your insurance coverage.

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

Discussion

Can you increase connectivity with paths, greenways?

- Reduces walking distances: YES
- Offers more route choices: YES
- Disperses traffic: NO

Convoluted, discontinuous street patterns make it hard for emergency providers to access homes.

Access Management

The systematic control of the location, spacing, design, and operation of:
- Driveways and Street Connections
- Medians
- Median Openings
- Turn Lanes
- Traffic Signals
- Interchanges

Every driveway is a potential conflict.
Drivers and pedestrians must make choices: Walk in front or in back? Pull forward or back up?

Portland OR

Access Management => fewer conflicts at driveways
2 techniques: (1) median (restrict left turns) (2) consolidate driveways

Discussion: which has greater crash reduction factor:
(1) Median (no left turns) or (2) consolidate driveways?

UPS saving money, fuel just by turning right

Delivery-size trucks use about 7% of their fuel idling.
UPS saved 3 million gallons of gas nationwide in one year and shaved 30 million miles off its delivery routes by reconfiguring its routes to turn right as often as possible.

Cutting out left turns means less waiting at lights, more miles per gallon and safer deliveries because trucks are not crossing traffic lanes in intersections.

Left-hand turns increases idle time, increases emissions, fuel consumption

Severing public streets not a desirable access management technique

This limits people’s ability to walk or bicycle

Connecting severed streets reestablshes walking routes
Severed street can be reconnected for pedestrians

Salem OR

Fast food typically favors drive-thru over walk-ins. Pedestrians must cross drive-thru lane to access entrance.

Sweet Home OR

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

Portland OR

Bringing Buildings Closer To The Street

Creates a street where drivers know to expect pedestrians.

Buildings fronting walkways: pedestrian-oriented design.

Doylestown PA
Transforming a Street

Los Angeles CA

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

Bring in buildings that face the street

More buildings: infill

The street now has a life and is safer for pedestrians

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.
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

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

Las Vegas NV

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

HCM says ped LOS = A; few people walking

Boston MA

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

HCM says ped LOS = F; too many peds!
Reinventing the roadway:
Transform a 5-lane commercial strip to Portland OR

...a safer road for everyone
What changed?
What didn't change?

Engineering Strategies:
- Pedestrian Signals
- Advanced Warning & Safe Intersections
- Road Diets / Speed
- Transit

Pedestrian Signals
1. Median reduces crashes by 40%
2. Pedestrians over 65 are over-represented in crosswalk crashes
3. Pedestrians are not less vigilant in marked crosswalks:
   - Looking behavior increased after crosswalks installed

**Significant Findings**

- Crashes correlate with ADT & number of travel lanes.
- Other studies have shown same results
- One explanation of higher crash rate at marked crosswalks: multiple-threat crash
  - 1st car stops too close, masks visibility for driver in 2nd lane

**Advanced Warnings & Safe Intersections**

- Advance Stop Bar – helps prevent Multiple Threat crash
  - Problem:
    - 1st car stops to let pedestrian cross;
    - 1st car masks 2nd car, which doesn’t stop, hits pedestrian at high speed.
Advance Stop Bar – helps prevent Multiple Threat crash

Solution:
Advance stop bar, so 1st car stops further back; 1st car no longer masks 2nd car, which can be seen by pedestrian.

Example of advanced yield line (shark’s teeth) (first included in the 2000 MUTCD)

Example of advanced stop line

Ped crossing signs: old vs. new MUTCD standards
Primary Location: in advance of crosswalk

Pedestrian Beacon aka “Desert HAWK” (High Intensity Activated Crosswalk)

In-street pedestrian crossing signs

➢ Recently approved following experimental use
Drivers sees the Beacon

Peds see the Pedhead

HAWK Sequence

1. Blank for drivers
2. Flashing yellow
3. Steady yellow
4. Steady red
5. Wig-Wag
6. Return to 1

Characteristics To 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

Keep corner radii small

Large corner radii:
- Increase crossing distance, and
- Affect crosswalk & ramp placement
- Allow high-speed turns by cars

Keeping it tight: curb radius

Effective radius is larger than built radius if travel lanes are offset from curb w/ parking/bike lane

Must consider design vehicles, but don’t choose larger vehicle than necessary
Refuge Islands at Intersections

Benefits:
- Separate conflicts/decision points
- Reduce crossing distance
- Improve signal timing
- Reduce crashes

Right-Turn Slip Lane: Design for pedestrians

Old Way
- High speed, head turn low visibility of pedestrians

New proposal
- Slower vehicle speeds, good visibility of pedestrians

Permissive left turns
Pedestrians cross at same time as left-turning car; Drivers turning left on a green ball don’t look for pedestrians.

Protected left turns
Pedestrians cross after left-turning car, with thru-traffic; Pedestrian and car not in conflict

Protected/permissive left turns
Pedestrians cross after LT-turning car (protected phase); Pedestrian and 2nd car are in conflict (permissive phase)

LPI: WALK comes on 3 seconds prior to the vehicular green; pedestrians can enter crosswalk before turning vehicles arrive there.
What about crash reduction?

Results from San Francisco study are promising: CRF = 25% after countdown signals installed

NEW Recommended Signal
New meaning of Flashing upraised hand when pedestrian countdown signals are present

Ped may enter the intersection on the flashing upraised hand when a countdown pedestrian signal indication is present if able to travel to the far side of the traveled way by the time conflicting traffic receives a green signal

2009 MUTCD
Recommended Countdown displays required for all new pedestrian signals

Significant reductions in pedestrian-vehicle crashes, as well as all types of crashes

Road Diets & Speed

Road Diets

3 crash types can be reduced by going from 4 to 3 lanes: which ones?

Classic Road Diet

Before Conversion to Road Diet

After Conversion to Road Diet
3 crash types can be reduced by going from 4 to 3 lanes: 1 – rear enders

3 crash types can be reduced by going from 4 to 3 lanes: 2 – side swipes

3 crash types can be reduced by going from 4 to 3 lanes: 3 – left turn/broadside

Safety Effect of Converting 4-Lane Roads to 3-Lane and TWLTL (Road Diet)

Mission District, San Francisco North-South ADTs

Valencia Street Bicycle Volumes PM peak hour counts
Wells Ave, Reno, NV
Before Diet....

Wells Ave...after diet.

Wells Ave...after diet.

Wells Avenue Comparisons

- **Crashes:**
  - Pre-project 2001-2002 = 123
  - Post-project 2004-2005 = 85
    (31% reduction)

- **Speeds (posted 30 mph):**
  - Pre-project 2002 85th percentile = 39.0 mph
  - Post-project 2007 85th percentile = 30.8 mph
    (24% reduction)

Road Diets

- Which road carries the most traffic?
- Which road produces the highest speed?
  - With a 4-lane road a fast driver can pass others
  - With a 2-lane road the slower driver sets the speed
- Which road produces the highest crash rate?
- Which is better for bicyclists, pedestrians, businesses?

Reclaiming road space creates room for islands
Benefits of Road Diet for Pedestrians

- Reduces crossing distance
- Reduces “multiple threat” crash types
- Provides room for crossing island to break crossing into 2 simpler crossings
- Reduces top end travel speeds
- Buffers sidewalk from travel lanes (parking or bike lane)
- Reclaims street space for “higher and better use” than moving peak hour traffic

Speed

**Speed affects:**
- Drivers’ ability to see pedestrians
- Drivers’ ability to react and avoid a crash
- Crash severity if a crash occurs

Speed management is the single most effective way to increase safety for all modes

Transit

- Ensure transit stops are convenient and accessible;
- Ensure users can safely cross the street at transit stops.
- Many pedestrian crashes are associated with transit

Walkability

- Saves energy
- Is good for the environment
- Promotes public health
- Is financially sound
Homes in Walkable Neighborhoods Are Worth More

A new analysis out by CEOs for Cities quantifies the value of walkability in real estate transactions, using the popular Walk Score measure.

The report, "Walking the Walk: How Walkability Raises Housing Values in U.S. Cities", examined 94,000 real estate transactions in 15 metro areas, and found that homes with above-average Walk Scores sell for more, between $4,000 and $34,000 more, depending on the metro area.
Complete Streets
- Sidewalks
- bike lanes
- special bus lanes
- comfortable and accessible transit stops
- frequent crossing opportunities
- median islands
- accessible pedestrian signals
- curb extensions
- narrower lanes
- tight curb radii
- and more

Most designs are available in:
- ITE: www.ite.org
- AASHTO: www.safety.transportation.org
- PBIC: www.walkinginfo.org
- NHTSA: nhtsa.dot.gov
- FHWA: safety.fhwa.dot.gov

Gateways to Information
- Website for collecting and disseminating information on program development and effectiveness, and in-depth technical background; maintain currency of knowledge base.
- Printed Guides for developing programs to address fatal crashes
  safety.transportation.org

Guidance and Strategic Initiatives

Questions?
Thanks for joining me.
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