TOD 101: An Introduction to Transit Oriented Development

Sponsored by: the Greater Cleveland Regional Transit Authority
Transit Oriented Development: The Basics

- Transportation
- Land Use
- Zoning
- Design
- Coordination
Transit Oriented Development: The Basics

- Mixed-use projects

- Clustered around transit (rail stations, bus transfer centers, or passenger ferry terminals)

- Encourage access from the people outside (transit) and internal circulation (pedestrian, bike)
Boundaries: How Far Do People Walk?

Distance-Based Boundaries

Time-Based Boundaries
Transportation Elements

- **Access: Transit**
- **Connectivity:** Ideally multiple transit options
- **Circulation: Pedestrian and Bicycle**
  - Safe pedestrian routes to transit and all land uses
  - Bicycle parking, storage
  - Bicycles allowed on transit
- **Parking**
  - Least number of spaces needed
  - Maximize land for active uses
Transportation Elements

- Establish a walkable and pedestrian/bicycle-oriented district
- Encourage bicycle and other low impact transportation modes
- Minimize street widths
- Calm traffic
- Match the transit to the community
Transportation Element - Bus

- Suburban bus intermodal facilities are less TOD focused due to less frequent service
- Dynamic bus bays – common waiting area, signs tell riders what bay bus is in
- Competition for front door space – Parking? Bus? Kiss & Ride? Retail?
- Bus bays cannot block retail – pedestrian obstacle
Land Use Elements

- Encourage mixed uses: retail first floor, office, residential above
- Moderate to high density
- *Encourage* public facilities, theaters, recreational uses, and parks
- *Discourage* land uses that are highly dependent on automobiles for accessibility
Avoid Parking Oriented Development

Ground floor devoted to restaurant space, not a blank façade.

Upper floors of the garage look like a normal building.
Retail

- Big box retail OK if pedestrian oriented
- Retail attracts people to the TOD
- But retail follows development, thus some TODs subsidize retail to make housing more attractive.
  - Home Depot in Manhattan CBD
    - No parking spaces
    - Multi-floor
    - Fits scale of surrounding street
Where to Place the Retail?

- Retail must have arterial visibility
- Do not build retail facing train
- Typical TOD consists of station surrounded by surface parking – arterials at edges of site
- Retail facing train can work in older towns where arterial runs parallel to or crosses the train tracks
Housing

- Rental vs. For-Sale Housing
  - Transit agency favors rental in case of future station redesign
  - Community favors for-sale (NIMBY) because distrustful of renters
People Want to Live Near Transit

- Census says 6 million households live within ½ mile of transit station
- By 2025, expected that this will increase to 14.6 million
- Only 6 percent of housing stock is being built near transit
- Happening in large built up cities and smaller, growing areas
- Already happening in and around Cleveland
Future of TOD and Housing

- Demographics that prefer TOD lifestyle
  - Baby boomers, Echo boomers, Single person households, Immigrants

- Areas with small, medium, and large emerging transit systems have great potential to experience increases in TOD housing
# Future of TOD and Housing

## Case Study Region Results

<table>
<thead>
<tr>
<th>Region</th>
<th>2025 HHs</th>
<th>2025 TOD HHs</th>
<th>% TOD</th>
</tr>
</thead>
<tbody>
<tr>
<td>Denver</td>
<td>1,201,670</td>
<td>88,187</td>
<td>7 %</td>
</tr>
<tr>
<td>Chicago</td>
<td>3,968,737</td>
<td>1,447,012</td>
<td>36 %</td>
</tr>
<tr>
<td>Washington, D.C.</td>
<td>2,642,535</td>
<td>650,417</td>
<td>25 %</td>
</tr>
<tr>
<td>Los Angeles</td>
<td>7,185,742</td>
<td>1,751,841</td>
<td>24 %</td>
</tr>
<tr>
<td>Charlotte</td>
<td>887,721</td>
<td>64,743</td>
<td>7 %</td>
</tr>
<tr>
<td>Memphis</td>
<td>551,162</td>
<td>50,177</td>
<td>9 %</td>
</tr>
</tbody>
</table>

Source: Center for TOD
Housing Affordability Index

- Center for TOD - Housing and Transportation Affordability Index
- Measures hidden/unvalued cost of transportation

Affordability Index = \( \frac{\text{Housing Costs (H)} + \text{Modeled Transportation Costs (T)}}{\text{Income (I)}} \)

- Usually 30 percent income spent on housing
- Index shows percent of income consumed by housing AND transportation costs
Location Efficient Mortgage

- Fannie Mae-sponsored program in location efficient communities

- The program encourages home ownership through:
  - Low down payment
  - Competitive interest rates
  - Flexible financial qualification criteria

- What is a location efficient community?
  - Walkable (school, store, transit)
  - Less driving

- Offered in San Francisco, Los Angeles, Seattle, and Chicago
Design Places that Attract People

- Active uses for the first 15-20 feet of building height
- Smaller blocks
- Bring buildings up to the sidewalk
- Public space/green space in any breaks of building line
- Required uses within ¼ mile of focus area; allow a range of uses beyond
Zoning & Design

- Conventional zoning’s intent:
  - limit height & density
  - segregate uses
  - require setbacks
  - provide ample free parking
- Starting to be addressed well in form-based codes
- Solution: To provide assurance to developers and reduce risk:
  - Codes must allow transit-oriented development AS OF RIGHT
Challenge - Building Code

Many jurisdictions rely on the Building Officials and Code Administrators (BOCA) 1996/1999:

Establishes minimum requirements for materials and methods of construction, addresses loads and stresses, fire protection, special uses, lighting and ventilation, and means of egress.

Major issues when renovating old buildings:

- Many existing buildings were built to comply with an earlier building code or no code, yet are often still safe and sound
- Untapped housing stock in urban areas – old buildings must be brought into compliance with current building codes for new construction
- This is a very expensive process that may not result in better safety and frequently results in potential redevelopment sites remaining unimproved
Challenge - Building Code

- Ohio Building Code
- New Jersey Rehabilitation Subcode (1998)
- Los Angeles Adaptive Reuse Ordinance
- California’s State Historical Building Code
  www.dsa.dgs.ca.gov/StateHistoricalBuildingSafetyBoard/default.htm
- Rhode Island Rehabilitation Code www.rbfc.state.ri.us/
- Kansas City Building and Rehabilitation Code
  www.kcmo.org/codes.nsf/web/kcbc?opendocument
- Many others...
Challenge - Uniform Fire Code

“One critical component of a community’s transportation system is effective emergency response. In some instances, fire, ambulance, or police officials have expressed concerns with smart growth neighborhood street designs because of concerns about access.” (Source: Getting to Smart Growth II)

- Narrower streets
- Smaller intersections
- Shorter curve radii
- Fire equipments get larger and larger

UFC: One of several model codes, created by Western Fire Chiefs Association, NOT a national standard Adopted by California, Oregon, some other states Requires 20’ clear street width between parked cars
Challenge - Uniform Fire Code

Street Width and Injury Accident Rate

4th Order Polynomial (R^2 0.52)
Challenge - Uniform Fire Code

Traditional Neighborhood Development Mission:
Improve Overall Life Safety

<table>
<thead>
<tr>
<th></th>
<th>Fire</th>
<th>Traffic</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fatalities</td>
<td>3,671</td>
<td>41,611</td>
</tr>
<tr>
<td>Injuries</td>
<td>21,875</td>
<td>3,236,000</td>
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</tbody>
</table>

Sources:
Traffic Safety Facts 1999, Overview, Publication No. DOT HS 809 092
Fire Loss in the United States During 1999, Michael J. Karter, Jr.
Traditional Post-WWII Neighborhood, Palo Alto
Southgate Neighborhood, Palo Alto

24 feet
**Conventional**
- 30-35 mph speeds
- Bare, stark, uninviting
- Survivable, but not fun

**Traditional**
- 20-25 mph speeds
- Green, sustainable, inviting
- Pleasant for walking, bicycling and driving
Uniform Fire Code - Solutions

1997 Oregon law clarified authority to establish street standards

- Local government street standards shall “supersede and prevail over any specifications and standards for roads and streets set forth in a uniform fire code adopted by the State Fire Marshal, a municipal fire department or a county firefighting agency.”

- Portland, other cities now allow safer streets

- Leads to “Consensus Guidelines” book (pictured)
Uniform Fire Code - Solutions

  - Supersedes the NCDOT standards in all TND neighborhoods
  - “A street should be no wider than the minimum width needed to accommodate the usual vehicular mix desired of that street”
  - “A high level of accessibility is offered to emergency vehicles by an interconnected TND network”

Source: http://www.doh.dot.state.nc.us/operations/tnd.pdf
Uniform Fire Code - Solutions

- Sprawl:
  - One fire route
  - Long distances
  - Access shut down with one double-parked car

- Smart Growth
  - Many fire routes
  - Better response time
  - Redundant system can’t be blocked
Challenge: Planning and Coordination

Levels of Government
- Federal
- State
- City

Department & Agencies
- Transportation Planning
- Transit Agency
- Police
- Fire
- Public Works/Engineering
- Environmental

Representatives & Associations
- Council
- Neighborhoods & Civic
- Developers
- Chambers of Commerce
Role of Transit Agencies

- Revise joint development policies – particularly parking replacement
- Consider the total *ridership potential* of the project
- Housing and commercial development generate more ridership per acre than surface commuter parking
- Encourage projects that minimize parking and focus on the transit resources
Role of Regional Agencies

- Promote best practices
- Follow up studies of parking demand at completed developments
- Condition major transportation investments on supportive land uses policies – particularly parking
- Direct TLC/HIP funds to projects that minimize parking
Interacting with the Public

*How do you deal with community opposition to parking fees, new residential development, etc.?*

- Appeal to social responsibility
- Unveil real costs of parking, driving
- Fees will go toward improved transit and local improvements
- Emphasize continued convenience of transit
Overcoming Obstacles – In-Fill

California’s SB1636 (Figueroa, signed 2002) “infill opportunity zones” law for counties of 400,000+

- Designates infill opportunity zones which are zoned for compact residential or mixed-use within 1/3 mile of a transit stop with frequent service.
- These zones can be declared exempt from LOS traffic standards specified in State Congestion Management Act.
- Cities can either employ alternative LOS standards or approve a list of flexible LOS mitigation options that would enhance walkability and transit service.
Impact Fees

- Powerful tool for:
  - Encouraging good development
  - Discouraging bad development
  - Raising funds for Smart Growth improvements

- Problems with some fees:
  - Raise money only for roadway widening and traffic “improvements”
  - Base impact calculation on square footage, not auto trips. No discount for good location or TDM
San Joaquin County Impact Fee

- Based on forecast NOx and PM10 emissions
- Requires developers to reduce NOx emissions by 33% and PM10 by 50% or pay fee for off-site mitigation.
- Grants substantial reductions for density, transit accessibility, pedestrian connectivity, as calculated by URBEMIS – www.urbemis.com
- Baseline fee of ~$780 per home doubles in later years.
Benefits - Environmental Clean Water Act – Section 303

- Requires states to set and then achieve Total Maximum Daily Load limits, limiting total pollution into each waterbody
- Problem: Resulting state and/or local requirements discourage infill
  - On-site storm water retention requirements even on downtown lots
  - Lot coverage limits (often 45% max.) favor sprawl on outlying farmland
  - River setbacks even in town centers
- Solution: Think regionally, act locally
  - Build vital, compact towns

Source: Belle Hall Study
http://www.doverkohl.com/project_graphic_pages/Belle%20Hall%20project%20page.pdf
Benefits – Environmental Water Quality and Smart Growth

The lower density scenario creates more run-off and consumes 2/3 more land than the higher density scenario.

Reference: Department of Community and Economic Development
Benefits - Activity Centers
Provide a Community “Place”
Benefits - Financial

Downtown Petaluma, CA

- Parking standards that recognize mixed-use and transit-oriented nature, and encourage preservation and re-use of historic buildings.

- Established a 'Park Once' district of public garages, and phased out entirely the use of minimum parking requirements.

- The city has attracted more than $75 million in new private sector investments within the code area.
Benefits - Financial

- Tax Increment Financing – local property taxes go toward investment that will raise land values

Taxes with build – Taxes without build = Tax Increment
Benefits - Transit Ridership

*TOD* = more transit ridership throughout the day

Ridership trends “Before” TOD and parking management

- Overloads station infrastructure (stairs, platforms) morning peak
- Under capacity midday
- Rush to find free parking spots morning peak

Ridership trends “After” TOD and parking management

- Marginal cost per rider decreases
- Spreads out peak ridership
- Efficient midday utilization
- Parking pricing evens out morning rush
Benefits – Transit Agency Perspective

- Agency TOD goal = increase ridership
- Capital budget from federal government – use constrained by strict rules
- Operating budget from fares, parking charges, etc. – always very tight
  - Agency wants to turn a capital investment (like a parking lot) into a revenue-generating use (housing) that can boost operating budget
Benefits: Land Use

- Reducing/Eliminating parking requirements allows underused parcels to be redeveloped.
- Increased densities encourage in-fill development.
- Reducing the number of parking lots improves the streetscape by avoiding curb cuts and returning the sidewalk to the pedestrian.
Benefits - Quality of Life

- Community Character: There is a “there” there
- Economic Development: Increases tax revenue, which can be reinvested back to meet the community’s priorities
- Safety: People = Presence
- Environment: Increased transit, pedestrian, and bicycle usage improves air, water, noise
Parking for TOD’s (And Non-TOD’s)
What’s the Nexus Between Land Use and Transportation?

How we dedicate the land tells us the real orientation:

- **Restaurant Table** 5’ x 5’ = 25 ft²
- **Office Cubicle** 8’ x 9’ = 72 ft²
- **Parking Space** 10’ x 20’ = 200 ft²
Rethinking Parking Demand

- Continued over-reliance on ITE *Parking Generation Manual*. Use this only for isolated, auto-oriented uses.
- Requirements often set **50-100% higher** than average demand seen in *Parking Generation* manual.

**Strategies**
- Adjust based upon local conditions
- Incentivize parking strategies to reduce traffic and improve design
- Abolish minimums
- Establish maximums

**Examples...**
Tailored Parking: Palo Alto

- Existing Requirement: 4.0 spaces per 1000 s.f.
- Need 5,744 spaces above observed demand to bring all downtown to 4.0 standard. At $51K/space, $293 million
- Downtown, Observed peak: 1.9 spaces per 1000 s.f.
- Palo Alto updating its zoning code to vary parking requirements by
  - Density
  - Transit Access
  - Income
  - Household size
Incentivized Parking

- Strategies to reduce parking demand:
  - Pricing
  - Unbundling
  - Car-Sharing
  - Other demand management (e.g. EcoPasses)

- Strategies to reduce parking impacts:
  - Shared parking
  - Structured parking
  - Stacked parking/parking lifts
  - Design requirements (e.g. wrap parking in active uses)
Incentivized Parking: Boulder

- Downtown developers discouraged from building parking
- Instead, they pay a parking and transportation in lieu fee
- Fees used to build well managed public garages – and fund transit, bicycle and pedestrian improvements
- Program managed by downtown Business Improvement District, CAGID
Constrain Parking Supply

- Overall principle: encourage less auto-oriented development
- Promotes self-selection – residents with fewer cars live close to transit
- Different approaches:
  - Parking maximums
  - Requirements/incentives for demand management
- Needs to be complemented with Residential Permit Parking or other strategies to stop overspill
Parking Maximums

- Promote alternatives to the private automobile
- Can tackle congestion if related to roadway capacity or mode shift goals
- Maximize land area for other uses
- Appropriate in areas with strong real estate market where priority is to minimize auto dependence
- Examples: downtown San Francisco, Portland, Cambridge
# Parking: High & Low Traffic Strategies

<table>
<thead>
<tr>
<th>Typical Tools</th>
<th>Typical Minimum Requirements</th>
<th>‘Tailored’ Minimum Requirements</th>
<th>Abolish Minimum Requirements</th>
<th>Set Maximum Requirements</th>
</tr>
</thead>
<tbody>
<tr>
<td>□ Requirement</td>
<td>□ Density</td>
<td>□ Market decides</td>
<td>□ Limit parking to road capacity</td>
<td></td>
</tr>
<tr>
<td>□ &gt; Average Demand</td>
<td>□ Transit</td>
<td>□ Garages funded by parking revenues</td>
<td>□ Manage on-street parking</td>
<td></td>
</tr>
<tr>
<td>□ Hide all parking costs</td>
<td>□ Mixed Use</td>
<td>□ ‘Park Once’ District</td>
<td>□ Market rate fees encouraged/required</td>
<td></td>
</tr>
<tr>
<td></td>
<td>□ On-street spaces</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>□ …etc.</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

- Adjust for:
  - Density
  - Transit
  - Mixed Use
  - ‘Park Once’ District
  - On-street spaces
  - …etc.

- Market decides
- Garages funded by parking revenues
- Manage on-street parking
- Residential pkg permits allowed by vote

<table>
<thead>
<tr>
<th>Traffic</th>
<th>High</th>
<th>Low</th>
</tr>
</thead>
<tbody>
<tr>
<td>Housing Costs</td>
<td>High</td>
<td>Low</td>
</tr>
<tr>
<td>Pollution</td>
<td>High</td>
<td>Low</td>
</tr>
</tbody>
</table>
Evaluating Parking at Transit Stations

- Effects on transit ridership
  - Transit Oriented Development (TOD): New households & transit trips
  - Parking: Park-&-Ride participants
  - Implications for encouraging future growth in ridership

- Effects on traffic congestion
  - Walking, cycling & transit trips to station
  - Proportion and amount of vehicle trips to station
  - Implications in allocating of street right-of-way

- Effects on revenue generation
  - Lease or sale of land: Land value with higher density & mixed use compared to parking
  - Development of land: Joint development, economic vitality
  - Productive use of land: Economic productivity, sales tax
Strategies for Reducing Transit Parking

- SkyTrain system in Vancouver, BC (TransLink)
  - Land use concentration around SkyTrain
  - Transportation supply
  - Transportation demand including low to no parking
- Metrorail stations in Arlington County, VA (WMATA)
  - Urban village development
  - Multimodal transportation
  - Shared parking only (No park-&-ride)
- South Hayward station in Northern California (BART)
  - Plans to develop area around station and improve pedestrian, bicycle and bus access
  - Determining amount of replacement parking
Translink SkyTrain System
Lessons & Results in Greater Vancouver

- Increasing ridership and cost recovery
  - 41% increase in ridership since 1994
  - 20% increase in ridership since 2002
  - Ridership of 200 million by 2010 (33% increase)

- Park-&-ride generally discouraged at stations
  - Allows access to transit & extends system BUT
  - Sterilizes land around stations
  - Disconnects city from system
  - Promotes low density urban development
  - Discourages all-day rides
  - Raises safety, personal security issues
Reducing Replacement Parking

South Hayward BART Station Study – Transit-Oriented Design Plan
South Hayward BART Station Study

Reducing Replacement Parking

• Benefits:
  – BART’s surface parking lots represent prime transit-oriented development sites
  – Ridership growth can be achieved through transit oriented development
  – Existing parking does not fill up.
  – Expensive costs of providing parking can be used for access improvements instead.
    – Annual cost per surface space: $353.04
    – Annual cost per structure space: $537.62
  
• But - BART has commitment to existing riders
BART Access Policy Methodology

- Addresses key barrier to joint development – replacement parking
- Analyzes ridership and revenue impacts of different scenarios
- Provides quantitative answer: does more joint development outweigh reduced parking?
## Example: South Hayward

<table>
<thead>
<tr>
<th></th>
<th>Scenario A - Maximized Parking</th>
<th>Scenario B - Lower Parking Ratios</th>
<th>Scenario C - Maximized Density</th>
</tr>
</thead>
<tbody>
<tr>
<td>Gross density (units/acre)</td>
<td>56</td>
<td>77</td>
<td>100</td>
</tr>
<tr>
<td>Residential parking (spaces/unit)</td>
<td>1.5-2.1</td>
<td>1.0-1.3</td>
<td>1.0</td>
</tr>
<tr>
<td>% replacement parking</td>
<td>102%</td>
<td>73%</td>
<td>55%</td>
</tr>
</tbody>
</table>
Example: South Hayward

- Step 1: Assess ridership change
Example: South Hayward

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<th>Scenario C - Maximized Density</th>
</tr>
</thead>
<tbody>
<tr>
<td>New riders from TOD</td>
<td>798</td>
<td>1,047</td>
<td>1,324</td>
</tr>
<tr>
<td>Riders lost from reduced parking</td>
<td>0</td>
<td>76</td>
<td>291</td>
</tr>
<tr>
<td>Net change in ridership</td>
<td>798</td>
<td>971</td>
<td>1,033</td>
</tr>
<tr>
<td>Net fare revenue</td>
<td>$637,000</td>
<td>$776,000</td>
<td>$826,000</td>
</tr>
</tbody>
</table>
Example: South Hayward

- **Step 1:** Assess ridership change
- **Step 2:** Assess land value and parking costs
### Example: South Hayward

<table>
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<tr>
<th></th>
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<th>Scenario B - Lower Parking Ratios</th>
<th>Scenario C - Maximized Density</th>
</tr>
</thead>
<tbody>
<tr>
<td>Land Value</td>
<td>($7,770,000)</td>
<td>$15,332,000</td>
<td>$15,242,000</td>
</tr>
<tr>
<td>Replacement parking capital costs</td>
<td>$32,424,000</td>
<td>$22,932,000</td>
<td>$18,144,000</td>
</tr>
<tr>
<td>Net ground rent after replacement parking</td>
<td>($4,019,000)</td>
<td>($760,000)</td>
<td>($290,000)</td>
</tr>
<tr>
<td>Reduction in parking operations costs</td>
<td>($218,000)</td>
<td>($36,000)</td>
<td>$72,000</td>
</tr>
</tbody>
</table>
Example: South Hayward

- Step 1: Assess ridership change
- Step 2: Assess land value and parking costs
- Step 3: Assess total costs and benefits
Example: South Hayward

- Net New Riders
- Net Annual Revenue

A - 102% Replacement: $800,000
B - 73% Replacement: $800,000
C - 55% Replacement: $800,000
Example: South Hayward

- Step 1: Assess ridership change
- Step 2: Assess land value and parking costs
- Step 3: Assess total costs and benefits
- Step 4: Develop preferred scenario (in progress)
Results of Replacement Parking Analysis:

- More ridership will be generated if less land is occupied for replacement parking.
- The cost of building replacement parking is expensive. BART generates more net annual revenue the less replacement parking built.
- Improving pedestrian, bike and bus access to the station will increase ridership.
Why Provide Parking at Rail Stations?

- Land banking for future joint development
  - Danger: may be politically difficult to eliminate later!
- Only effective use of land
  - Freeway interchange
  - Airport zone
  - Toxins
- But why put rail line here at all?
- Free capital money from FTA to build parking, no operating money to run shuttle connections
- Appeal to affluent suburban voters
- Appeal to sprawl developers and building trades
Why Require Replacement Parking?

- Replacement parking puts huge cost burden on joint development projects, oftentimes precluding them.
- Replacement parking reduces development envelope, resulting in less JD ridership.
- At most urban rail stations, eliminating station parking for more JD would result in higher ridership and revenue.
- Reducing replacement parking reduces congestion
- Reducing replacement parking reduces peak transit capacity problems and introduces more off-peak trips
- Remember that for existing retail, station redevelopment can have major impacts – success/failure margin is 10 percent
  - Reducing parking spaces available during construction could negatively affect business owners
  - Provide parking management to ensure existing retail survival
Transportation Demand and Parking Management

- Residential Parking Permit Districts
  - Critical for addressing spillover parking concerns of infill development
  - Requires neighborhood vote on parking district

- Austin Parking Benefit Districts
  - [http://www.ci.austin.tx.us/parkingdistrict/default.htm](http://www.ci.austin.tx.us/parkingdistrict/default.htm)
  - Allows residents to sell surplus neighborhood parking capacity to commuters
  - Revenue returned to neighborhood for community improvements
Transportation Demand and Parking Management

- Parking management in Old Pasadena
  - $1/hour meters installed 1993
  - Garage fees
  - Annual revenues of $5.4 million
  - Tiny in-lieu of parking fees

- Revenues fund garages, street furniture, trees, lighting, marketing, mounted police, daily street sweeping & steam cleaning

- Focus on availability, not price

Old Pasadena, 1992-99: Sales Tax Revenues Quadrupled
Transportation Demand and Parking Management

Redwood City, CA: Meter and garage rates vary to achieve 15% vacancy on all blocks at all times.

Bicycles and Pedestrians
How do people get to the train without being hit by a car?

Pedestrian improvements are often:

- Simple
- Isolated
- Site-specific
- Human scale

Someone just has to pay attention.
Choose a Crosswalk

A  B  C
Connectivity

Look Familiar?
What’s Safe is Also Better Site Design
Street Furniture
Sidewalk width and condition
Effective Width
Walkway LOS

From Highway Capacity Manual
Sidewalk or Driveway?
Leading Pedestrian Interval

26% fewer pedestrian injuries
36% less severe
Crossing Delay

- Over 30 sec. ... “risky behavior”
- Max. 60 sec. Delay
  - USA, Germany, Australia
- Compare to Elevators
Pedestrian Delay LOS

<table>
<thead>
<tr>
<th>LOS</th>
<th>delay (sec)</th>
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<tbody>
<tr>
<td>A</td>
<td>0-9</td>
</tr>
<tr>
<td>B</td>
<td>10-20</td>
</tr>
<tr>
<td>C</td>
<td>21-30</td>
</tr>
<tr>
<td>D</td>
<td>31-40</td>
</tr>
<tr>
<td>E</td>
<td>41-60</td>
</tr>
<tr>
<td>F</td>
<td>61+</td>
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5 minute Crossing Rule

☐ 3-5 ft/sec walking speed
☐ 5 minutes to divert
  ■ 3 minutes to get to/from crosswalk
  ■ 2 minutes to cross street
☐ crossing locations ~540-900’
  ■ commercial areas ~ 270-450’
  ■ NYC blocks every 260’
Desire Lines
Kuala Lampur Desire Lines
Curb extensions
Vehicle Speed

- Significant determinant of crash severity.
- Critical factor where modes conflict.
- Should be logical with respect to context.
Vehicle Speed v. Pedestrian Injury

Bikes and Transit

Bikes Extend Transit Capture Area:
- Pedestrian capture is ~ ¼ to 1/3 mile
- Bike capture is 1 to 2 miles

*How can we facilitate biking to transit?*
- Secure/protected bike parking at transit
- Taking bikes on board transit
- Secure bike parking at final destination
- Shower facilities at/near final destination.
  - Included in development codes for new office buildings
Bicycle Parking

Secure bike parking at transit hubs and final destinations

- Bike Stations at Transit Hubs
- Bike lockers
- Bike parking in public garages
- Bike rooms in office buildings
- Secure bike parking in new residential developments

Berkeley, CA

Assen, Netherlands
Bicycle Parking

Short-term bike parking
- Protection from inclement weather
- Curb extensions, wide sidewalks, squares, or even parking spaces
- Pedestrian travel space

Corvallis, OR
Chico, CA
Washington, DC
Bikes on Transit

Buses and light rail

- Improve multi-modal transportation system and increase ridership
- Reduce vehicle capacity
- Remove vehicles from service to retrofit

Caltrain

San Diego, CA

Lightrail in Switzerland
Making Streets Safer for bikes

☐ Are bicyclists pedestrians or vehicles?
  ■ CVC states that they are vehicles. Usually.
  ■ Bicycle comfort LOS

☐ Vehicle speeds
  ■ Bikes travel at speeds closer to motor vehicles, but this is still an issue

☐ Vehicle conflicts
  ■ Marking bike facilities through intersections
  ■ Bicycle signals, phases, or advance stop lines
Bicycle Preferential Streets: Bike Boulevards

- Reduce vehicles speeds to bicycle speeds
- Limit stop and go
  - Removing/rotating stop signs, traffic circles
- Provide signals at major intersections
- Periodically divert motor vehicle traffic from streets
- Parallel to major arterials
Street Design Codes

- AASHTO *Green Book*: NOT a standard, fairly flexible
- But state DOT manuals often adopt largest dimensions in *Green Book*
- Major confusion between California Highway Design Manual and local street codes.
- Highway Design: Safe for high-speed rural roads where few pedestrians are present. Accommodates “driver error.”
- Urban streets: Accommodating fast auto speeds creates danger for everyone.
- Arterial/Collector/Local framework – no place for main streets or boulevards
A Legal Highway
The Esplanade, Chico, CA: Safe, Beloved and Illegal
The Esplanade, Chico, CA: Safe, Beloved and Illegal
Street Design Codes - Solutions

- ITE “Traditional Neighborhood Street Design Guidelines – A Recommended Practice”
- ITE “Traffic Calming: State of the Practice” – its standards directly challenge/contradict old practices
- Vermont – New flexible state standards invite departures from AASHTO, senior agency engineers transferred
- Maryland – dumped state standards, reverted to Green Book

Useful Articles: “From Highway to My Way”
- http://www.its.berkeley.edu/techtransfer/resources/newsletter/01spring/myway.html
- http://user.gru.net/domz/main.htm
- http://www.citebc.ca/Nov97_Asphalt.html

Context Sensitive Solutions In Designing Major Urban Thoroughfares

October 28, 2005

Prepared for:
Federal Highway Administration
Environmental Protection Agency
Institute of Transportation Engineers
Congress for the New Urbanism

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Street Typologies and Performance Measures

- Definitions buried in code language part of the problem, particularly “arterial,” “collector,” “local” suburban classifications that only describe the auto flow function of streets.
- Seattle’s proposed new street typologies include:
  - Priority for each mode
  - Urban context
  - Physical form
Best National Practices
Arlington County
Metrorail Service in Arlington County

- 11 Metrorail stations within Arlington County
- Approximately 200,000 people/weekday entering these stations
- 61 million one-way trips/year to, from and within the county
- Development planned or under construction in the county
  - 6,000 housing units
  - 3 million sq ft office
  - 1 million sq ft retail
Urban Villages in Rosslyn-Ballston Corridor

- 5 urban villages developed around Metro stations in the Corridor
  - 3 miles long and 2 square miles in area
  - Medium-high density mixed use villages
  - Surrounded by well established low-moderate density neighborhoods

- Supported by multimodal transportation facilities
  - Walkable, pedestrian/bike-friendly environment
  - 5 closely spaced Metrorail Stations that are below grade
  - Local and feeder bus service
  - Extensive, connected network of highways, arterials and local streets

- Close to the center of Downtown DC
- No distinct park-&-ride facilities, only public shared parking
Development Patterns, 1960s – 1970s

- Loss of status as Northern Virginia’s main retail district
  - Declining retail sales
  - Declining population as families moved to the suburbs
  - Disinvestment in residential neighborhoods, absentee landlords, land speculation
- New shopping centers emerging instead in Fairfax County
- Large scale office development and increasing employment in Rosslyn
Redevelopment Initiative

- Use Metrorail transit investment as catalyst for intensive redevelopment of the commercial spine of central Arlington
- Concentrate density and promote mixed use at 5 stations
  - Rosslyn, Courthouse, Clarendon, Virginia Square, Ballston
- Taper development down to adjacent neighborhoods
- Preserve and reinvest in established residential neighborhoods adjacent to the corridor
Household, Population & Employment Trends

![Bar chart showing trends in HH, Population, and Employment from 1972 to 2003, with estimated figures for 2003.]
Metrorail Access at 5 R-B Corridor Stations

39,500 daily boardings

Source: WMATA May 2002 weekday Metrorail ridership and access data
Access at 4 Orange Line Stations outside Arlington

29,250 Daily Boardings

Sources: WMATA May 2002 weekday Metrorail ridership and access data
No Park-and-Ride

- All parking charged at market-rate
- Prepaid ParkSmart debit cards can be used to pay for metered parking
- Parking brochure
  - Locations of all public on- and off-street parking in the 5 villages
  - Information on alternative transportation options
Boulder, CO: TOD Without the Train

- Medium density corridors
- City focuses on bus service and infrastructure (transit villages)
- Developers focus on as-of-right development up to the first 15,000 SF
Boulder, Co: Providing Transit People Can Use

- Frequent
- All Day
- Fast and Reliable
- Easy to Figure Out, Access, and Use
- User Amenities
Local Case Studies

- GCRTA hopefuls
- Examples from area spearheaded by others
Lee/Van Aken Blue Line – Shaker Heights

- New construction – 50 “luxury lofts” called Avalon Station
- Surrounded by public buildings – library, police
- Pedestrian-oriented
- Senior living complex close by
- Retail nearby
Brooklyn Garage

- Walkable neighborhood
- Near major stores and restaurants
- Community school near station
- Currently served by bus