

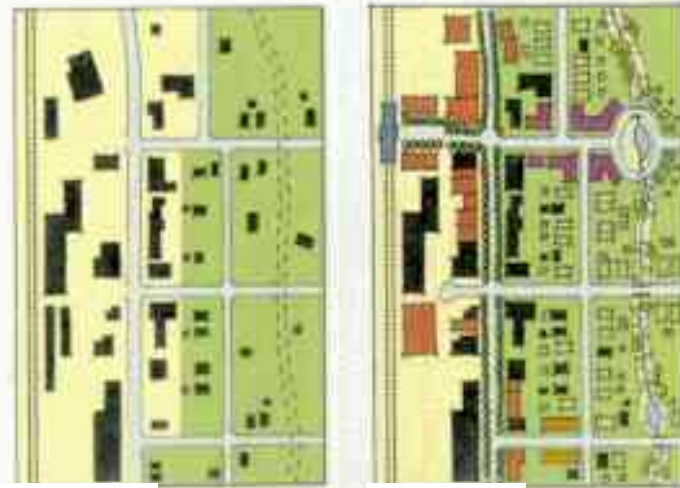
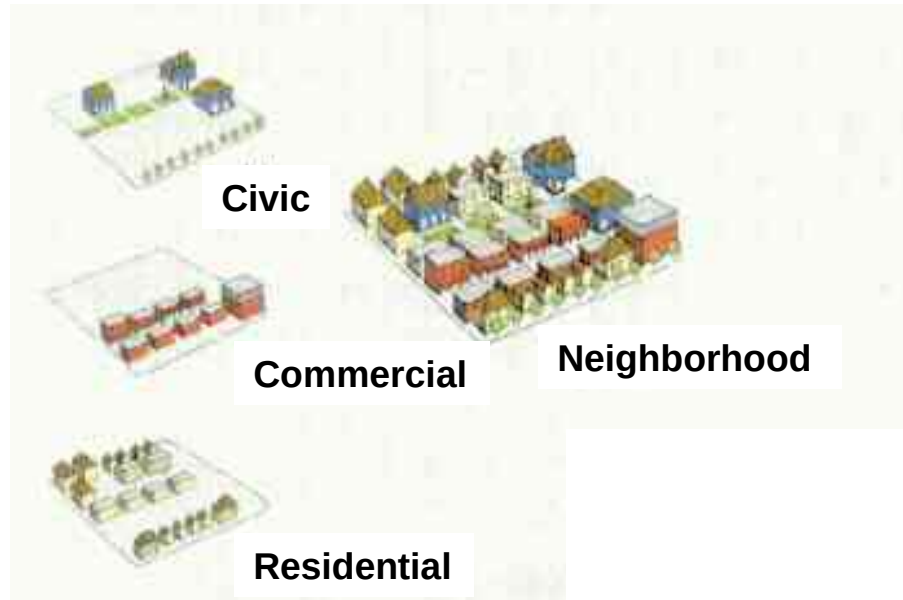
Urban Planning & Active Living Research

- Urban planning: long rooted in health concerns...
 - Density & crowding
 - Incompatible uses & exclusionary zoning
 - Sanitation
 - Building codes & public safety
 - Clean air mandates

- Increasingly inclusionary & trans-disciplinary
 - Bringing key stakeholders together – developers, citizens, employers, environmental advocates, public health officials



Diversity & Inclusion



Before

After

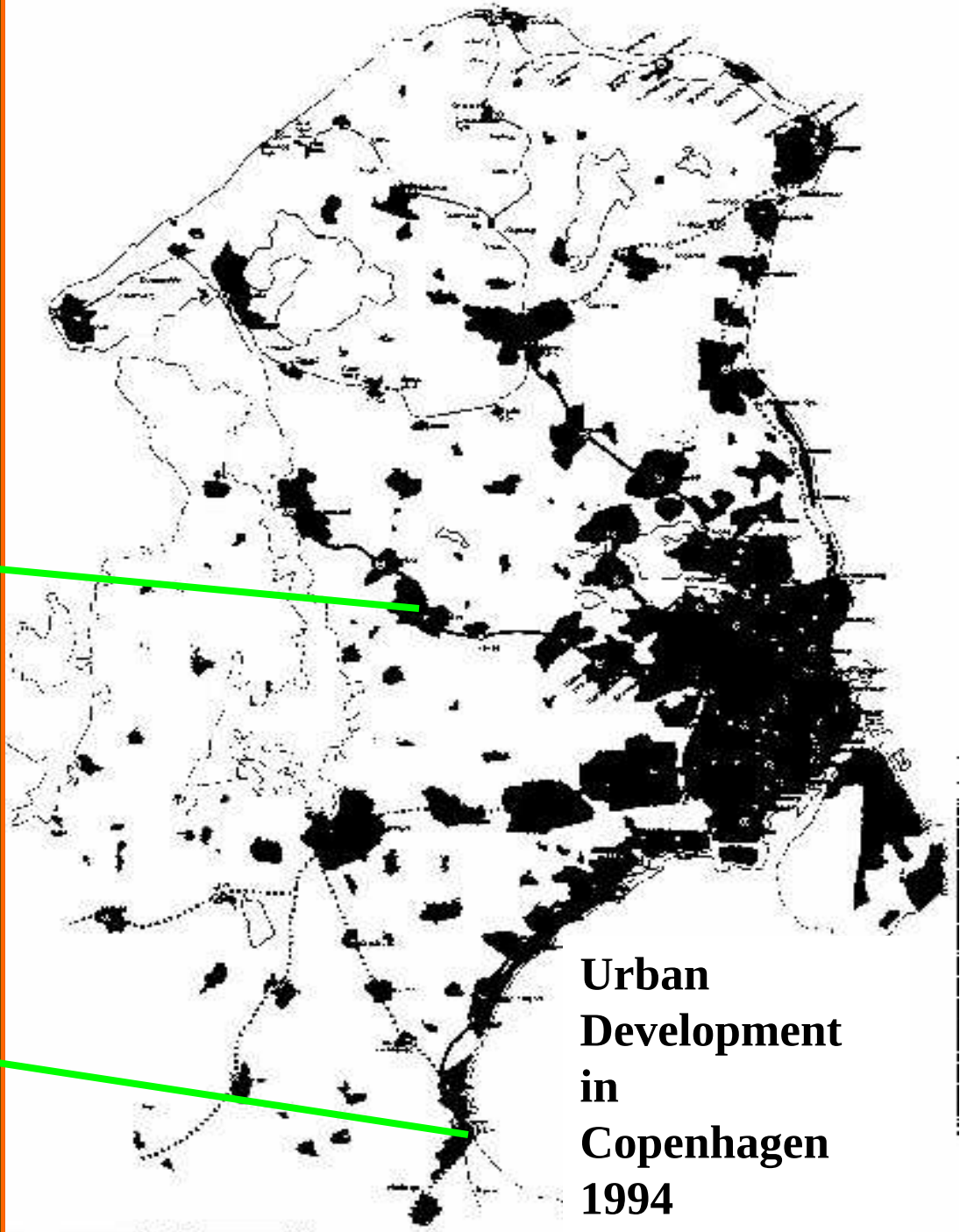


Re-Use & Selective Infill

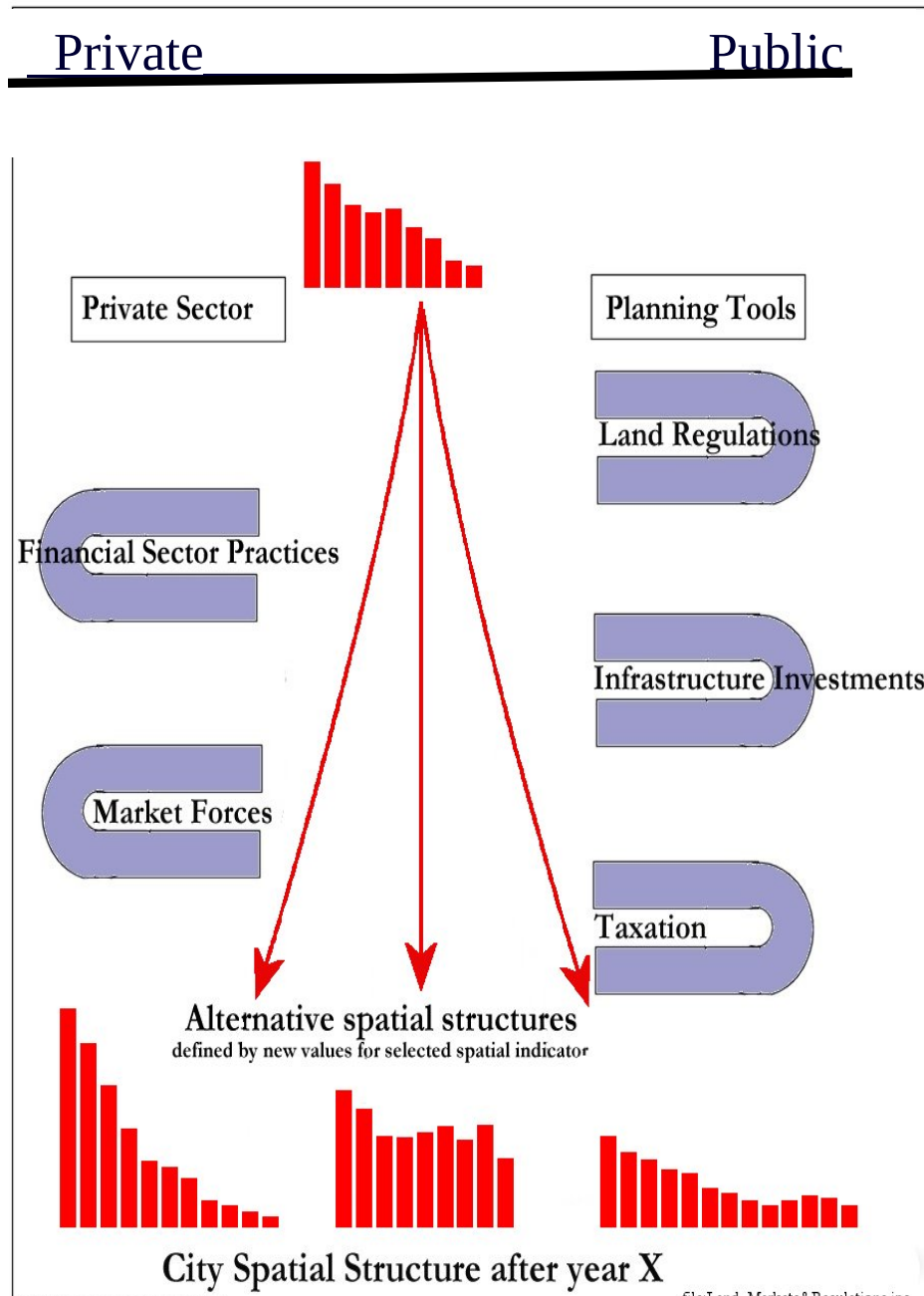
COPENHAGEN

**From Vision
to Plan**

**... to
Execution**



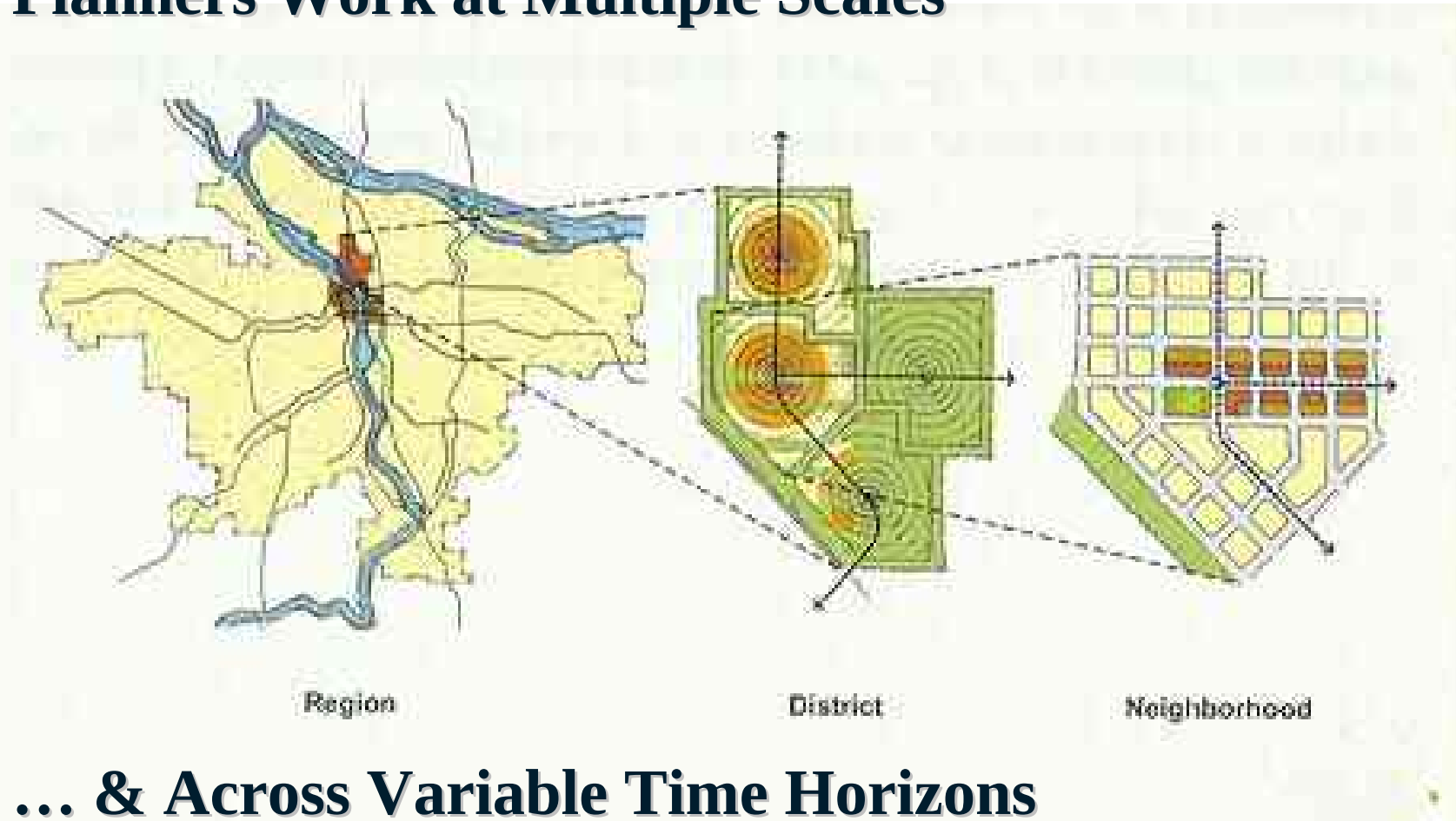
Urban Planning Implementation Tools



- General Plans/Neighborhood Plans
- Zoning, Subdivision Regulations, Building Codes
- Design Guidelines
- Impact & Environmental Review (NEPA/EIS)
- Land Banking/UGB
- Targeted Infrastructure Investment
- Tax Increment Financing
- Enterprise Zones
- Tax Abatement

Urban Planning: Temporal & Spatial Contexts

➤ Planners Work at Multiple Scales



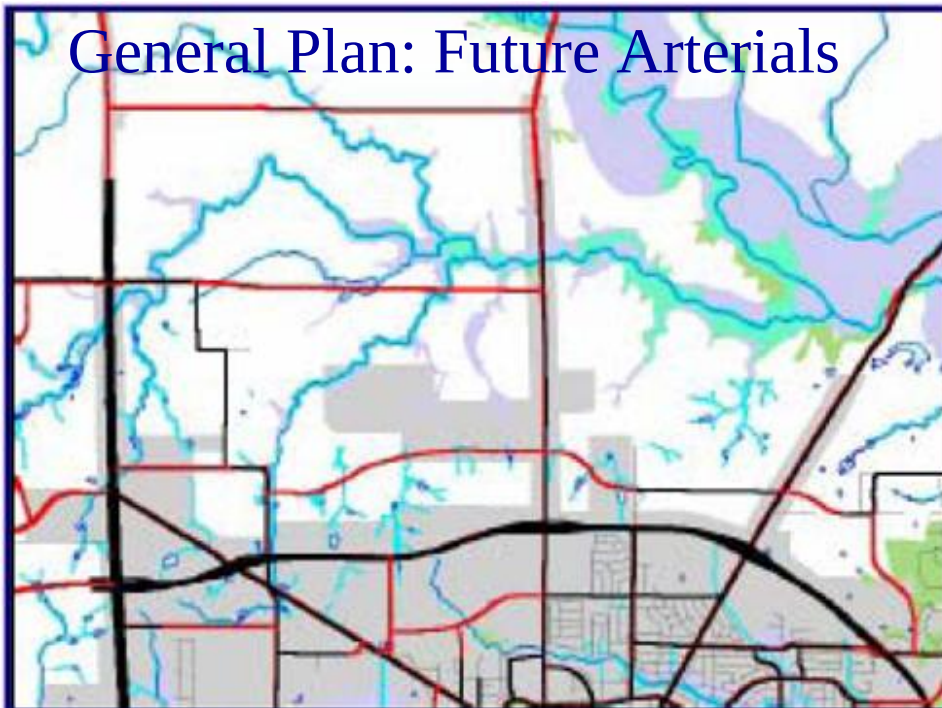
➤ ... & Across Variable Time Horizons

- Managing & regulating existing growth
- Forward-looking: anticipating & guiding future growth

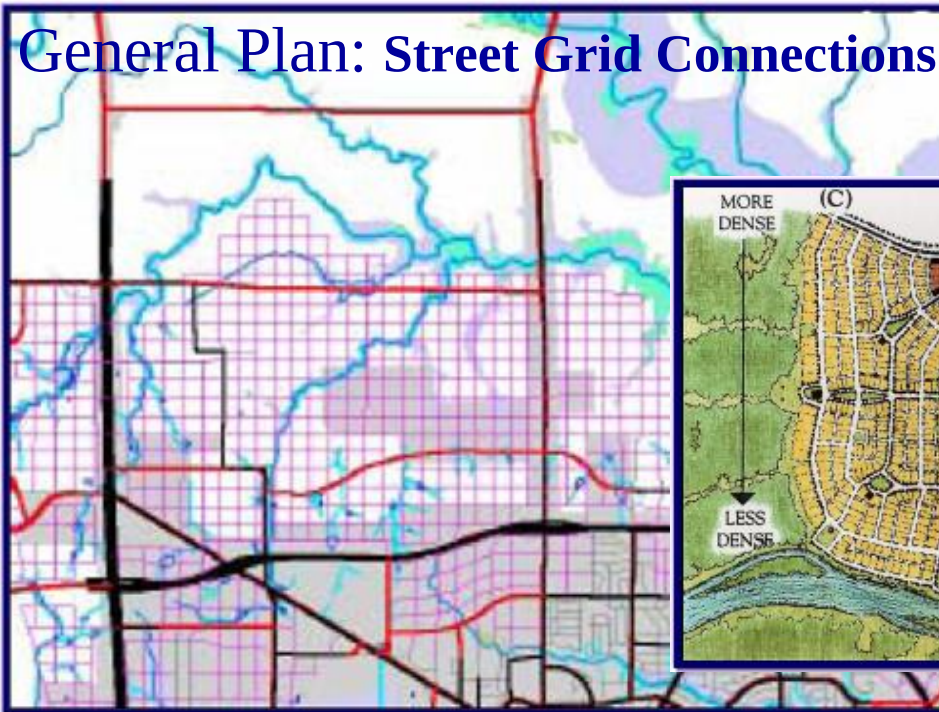
General Plan: Existing Conditions



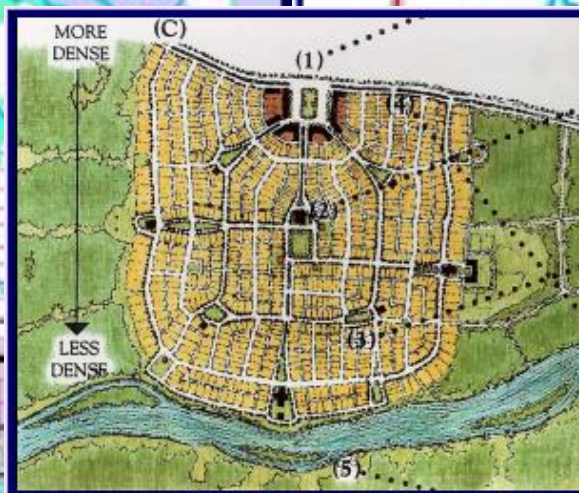
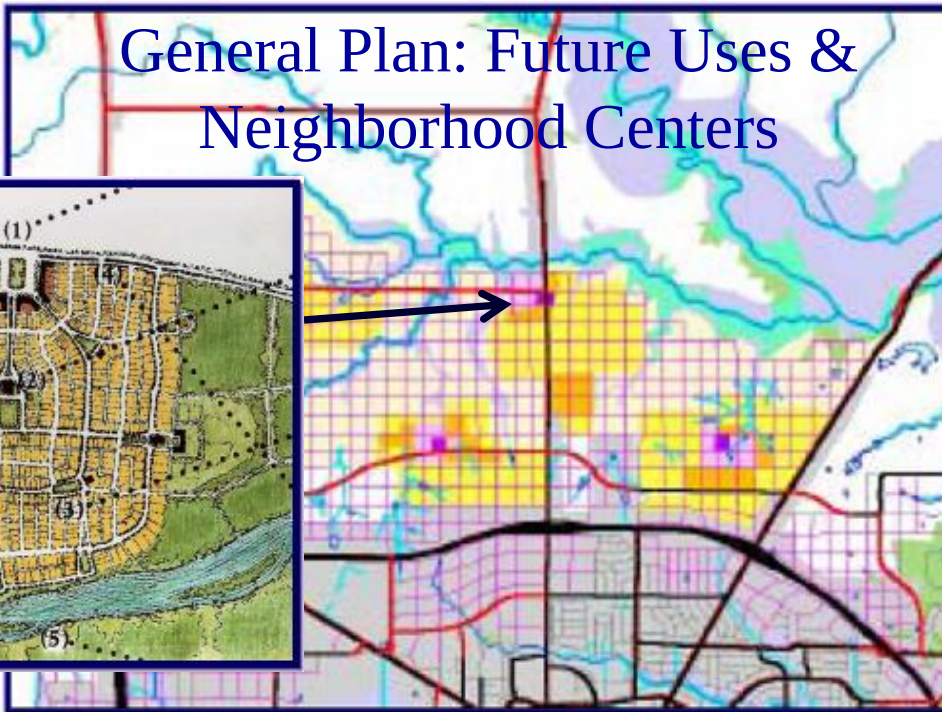
General Plan: Future Arterials



General Plan: Street Grid Connections



General Plan: Future Uses & Neighborhood Centers



Neighborhood Grocery Store Access

¼ Mile Isochrones, Imputed from City Block Data

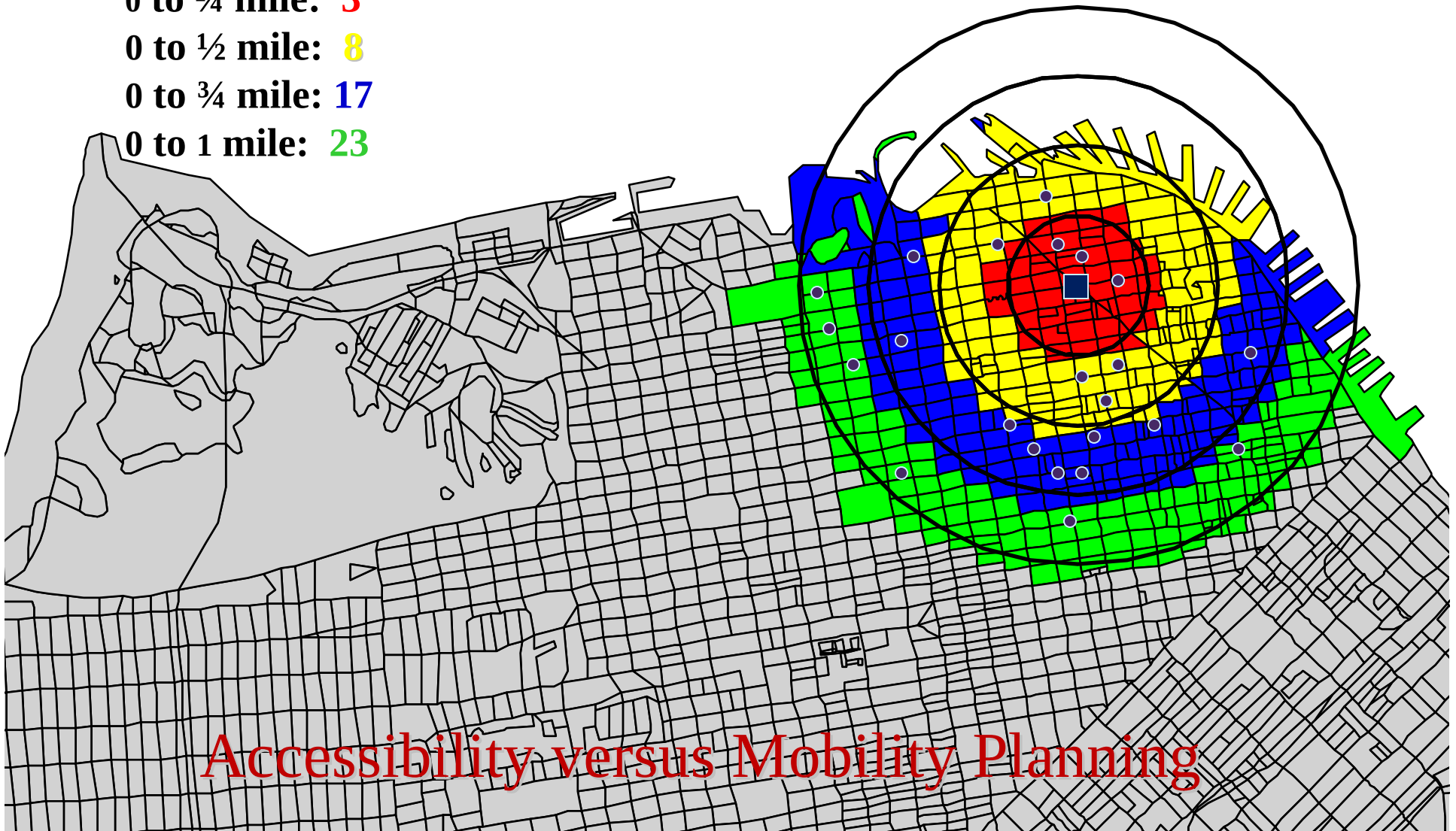
No. of Convenience Retail Stores (< 5000 ft.²) within Isochrone

0 to ¼ mile: **3**

0 to ½ mile: **8**

0 to ¾ mile: **17**

0 to 1 mile: **23**

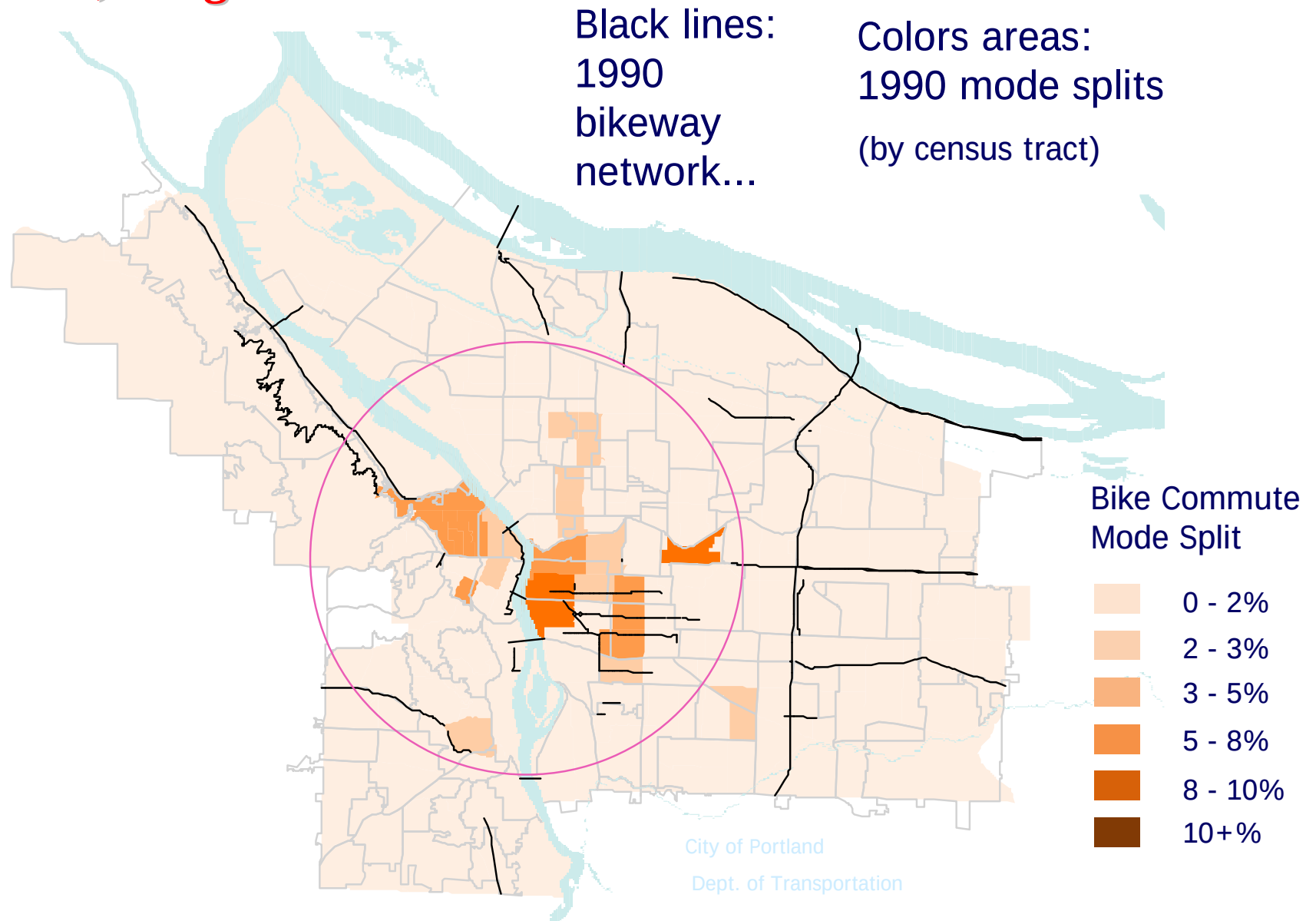


Accessibility versus Mobility Planning

BUILDING A NETWORK

Bike lanes encourage bike commuting:

Portland, Oregon 1990

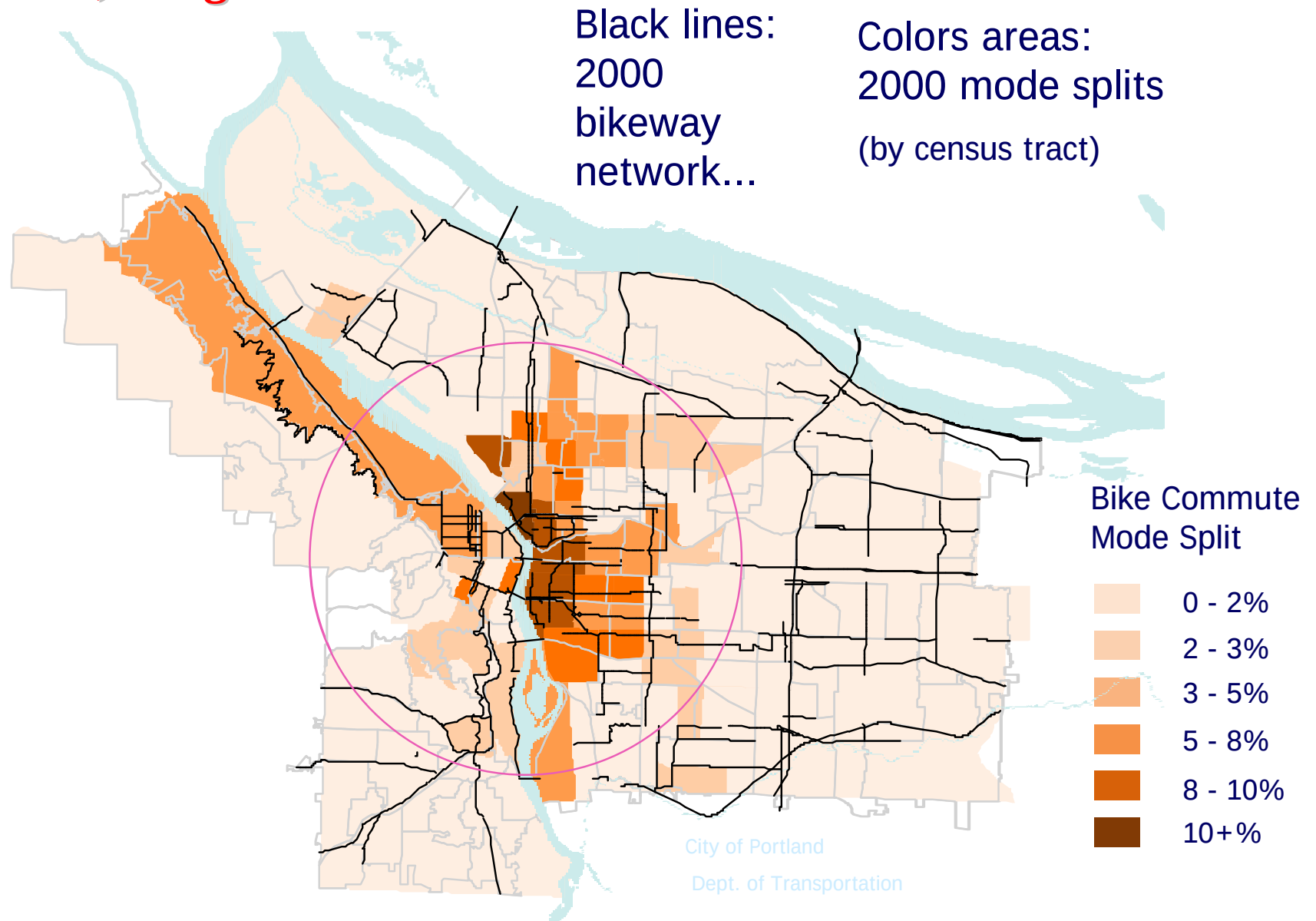


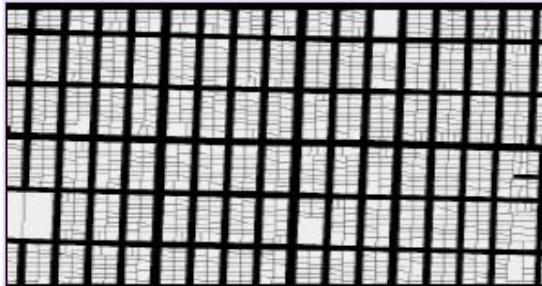
BUILDING A NETWORK

Bike lanes encourage bike commuting:

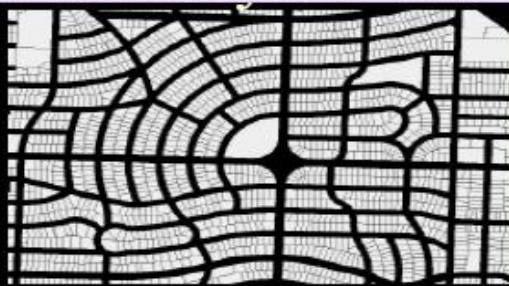
Portland, Oregon 2000

**Build It &
They Will Come**





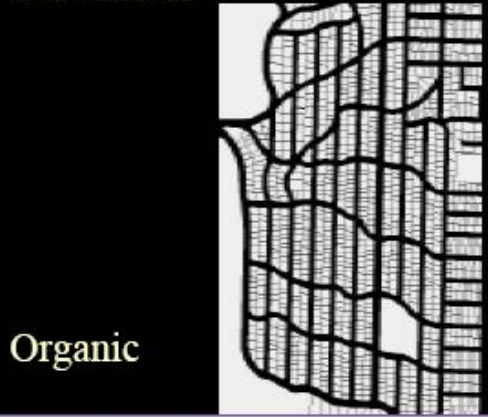
Gridiron



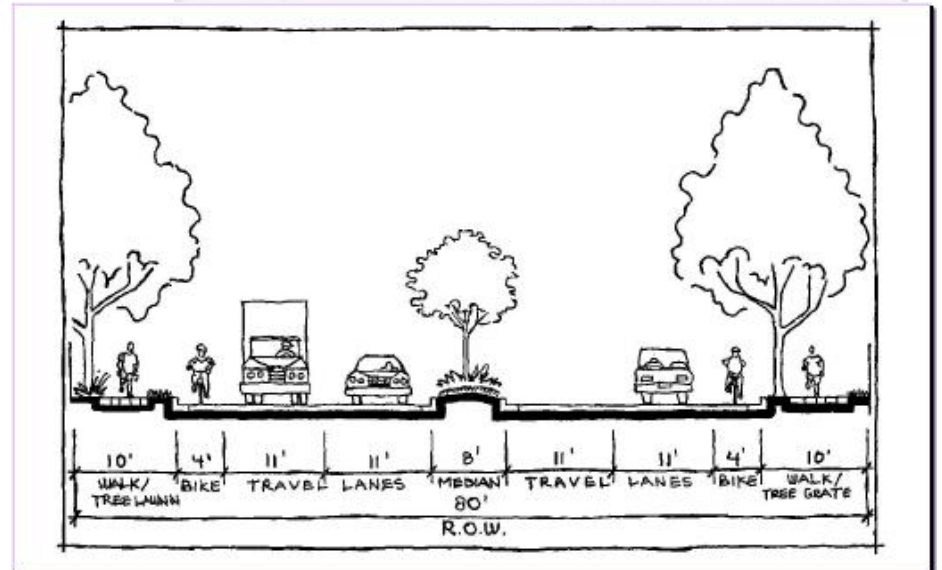
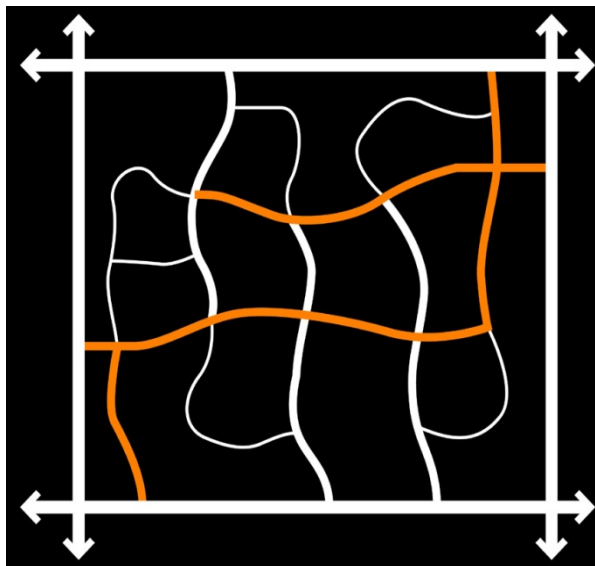
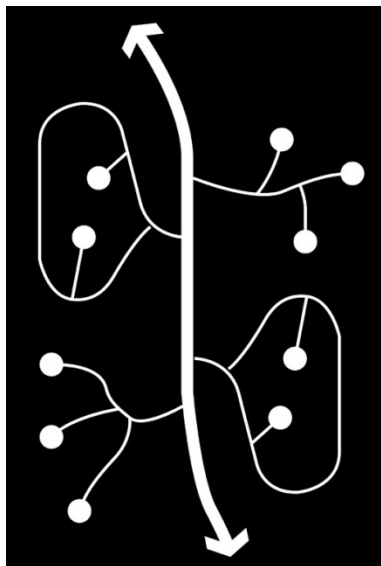
Curvilinear



Radial



Organic

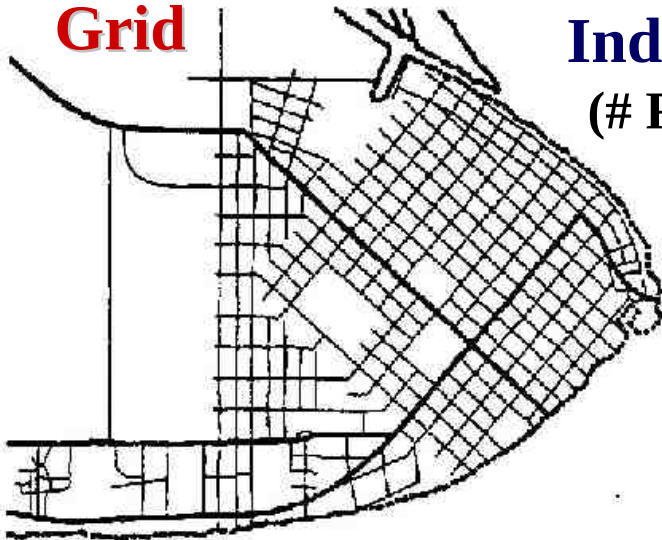


Measuring Connectivity

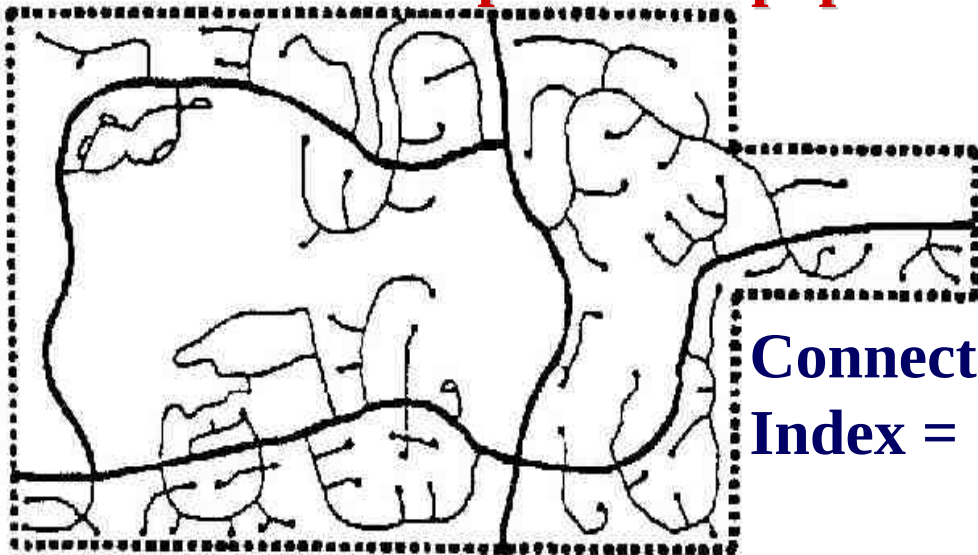
Connectivity

$$\text{Index} = \frac{(\# \text{ Roadway Links})}{(\# \text{ Nodes})} = 1.7$$

Grid



Curvilinear: Loops & Lollipops



$$\text{Connectivity Index} = 1.2$$

Traditional Urbanism

New Urbanism

	ELMWOOD (1905)	KENTLANDS (1989)	LAGUNA WEST (1990s)
Street Patterns			
Intersections			
Lineal Feet of Streets	18,000	24,000 (alleys 7,000)	19,000
Number of Blocks	23	24 (w.o. alleys 14)	16
Number of Intersections	20	41 (with alleys)	20
Number of Access Points	17	22	14
Number of Loops & Cul-de-sacs	1	10	15

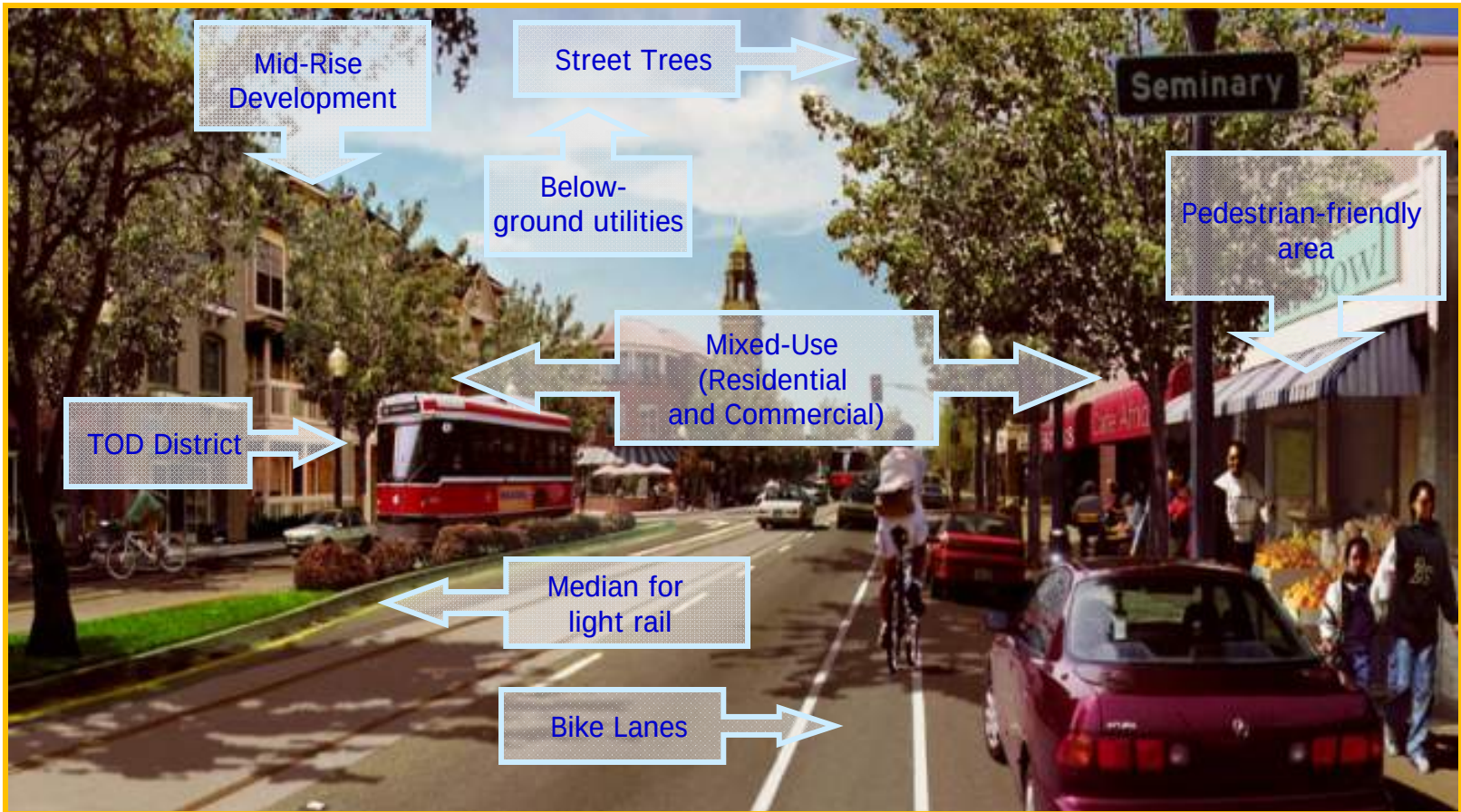
Ped-Friendly TOD: Fruitvale BART



Smart Growth Street Design



Smart Growth Street Design



Urban Planner's Role in Transdisciplinary Research

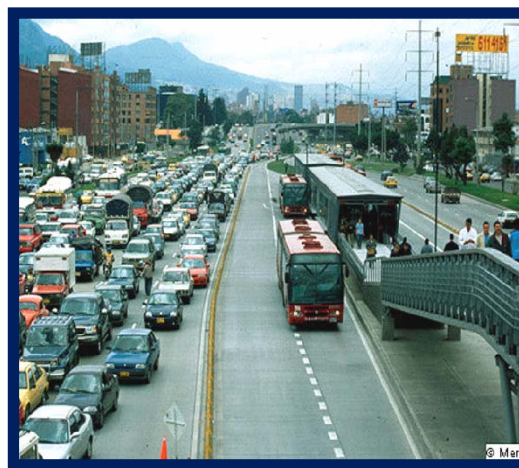
Influences of Built Environments on Walking and Cycling: Lessons from Bogotá

Robert Cervero, Ph.D., University of California, Berkeley

Olga L. Sarmiento, M.D., Los Andes University, Bogotá

Enrique Jacoby, M.D., PanAmerican Health Organization, Washington

Luis Fernando Gomez, M.D., Fundacion Social, Bogotá



Research Design

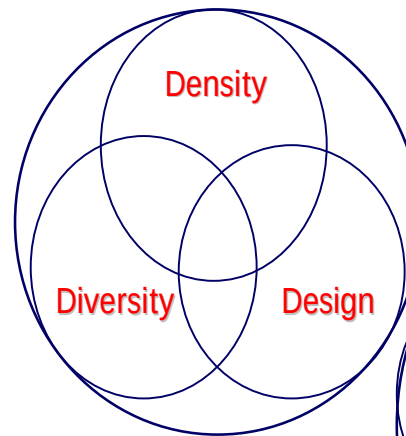
1. **Physical Activity & Travel Data:** weekly diaries compiled from International Physical Activity Survey (IPAQ) of 1335 HHs; validated by accelerometers
2. **Built Environment Data:** 5 D's compiled using cadastral data & GIS

3. Modeling:

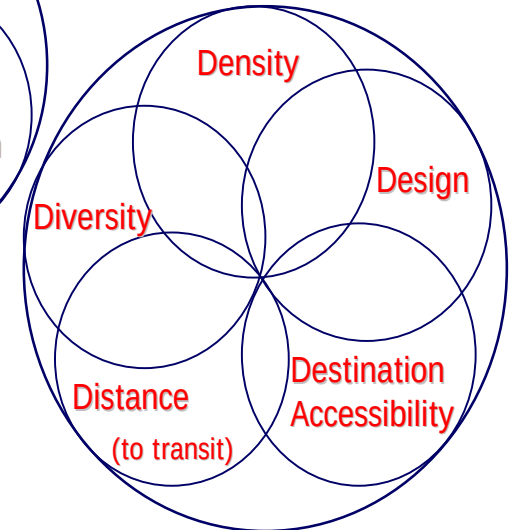
Ecological Approach –

- * Socio-economic factors
- * Attitudinal factors
- * Policy variables
- * Environmental factors
 - Built Environment
 - Natural Environment

3 D's of the Built Environment

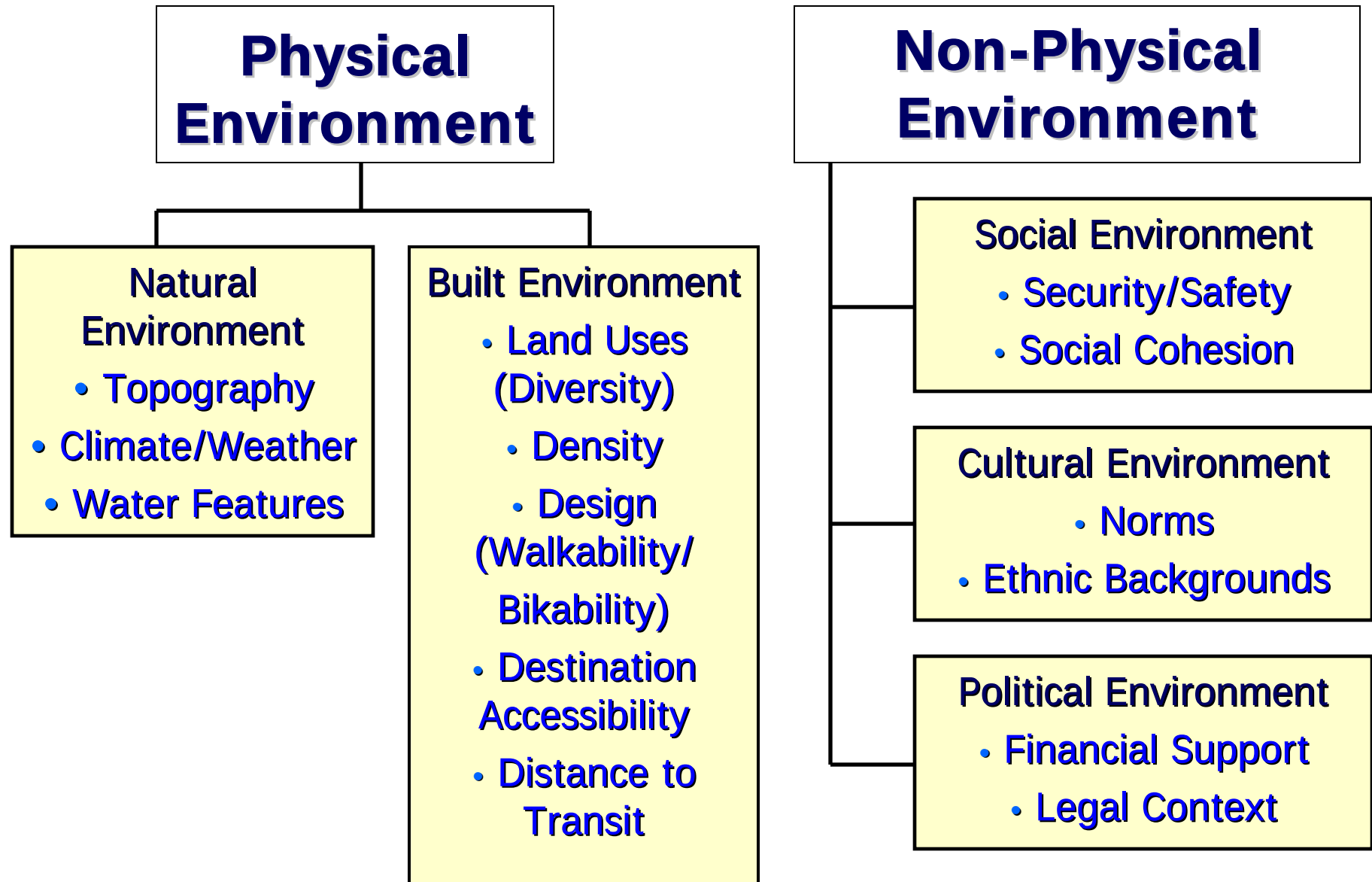


5 D's of the Built Environment



Used Multi-Level Modeling: People nested within Neighborhoods

Defining Environments



Scales of Analysis for Built Environment Variables

BLOCK
500 meter buffer
around the block
centroid
(immediate
neighborhood
environment)



DISTRICT
1000 meter buffer
from the
neighborhood
boundaries
(expanded
neighborhood
environment)



Dimension	Candidate Variables
(1) DENSITY	Persons per hectare; dwelling units per hectare; % of land area occupied by buildings; average building floor height; plot ratio (building m ² /land m ²)
(2) DIVERSITY	Entropy index of land-use mix (0-1 scale); proportion of buildings vertically mixed; proportion of total floorspace in buildings with 2+ uses
(3) DESIGN <i>Amenities</i>	Public park area as % of total land area; average park size (hectares); % of road links with median strips; traffic light density (traffic lights/street length); tree density (trees/street length);
(3) DESIGN <i>Site & Street Design</i>	Average lot size (m ²); quadrilateral lots as % of total; percent of blocks with contained housing and access control; street density (street area/land area); proportion of intersections with: 1 point (cul de sac), 3 points, 4 points, 5+ points; bike lane density (lineal m of bikelane/lineal m of streets); route directness (0-1 scale measuring shortest street distance/straightline distance between neighborhood centroid and 8 compass points); connectivity index (intersection nodes/street links); number of bridges; ciclovía two-way length (lineal m)
(3) DESIGN <i>Safety</i>	Number of pedestrian bridges; pedestrian accidents per year; average automobile speeds on main streets; deaths (all types) in traffic accidents per year; number of reported crimes per year
(4) DESTINATION ACCESSIBILITY	Number of: public schools; hospitals; public libraries; shopping centers (> 500m ²); churches; banks
(5) DISTANCE TO TRANSIT	Number of TransMilenio (BRT) stations; shortest network distance to closest TransMilenio station; number of feeder TransMilenio stations.

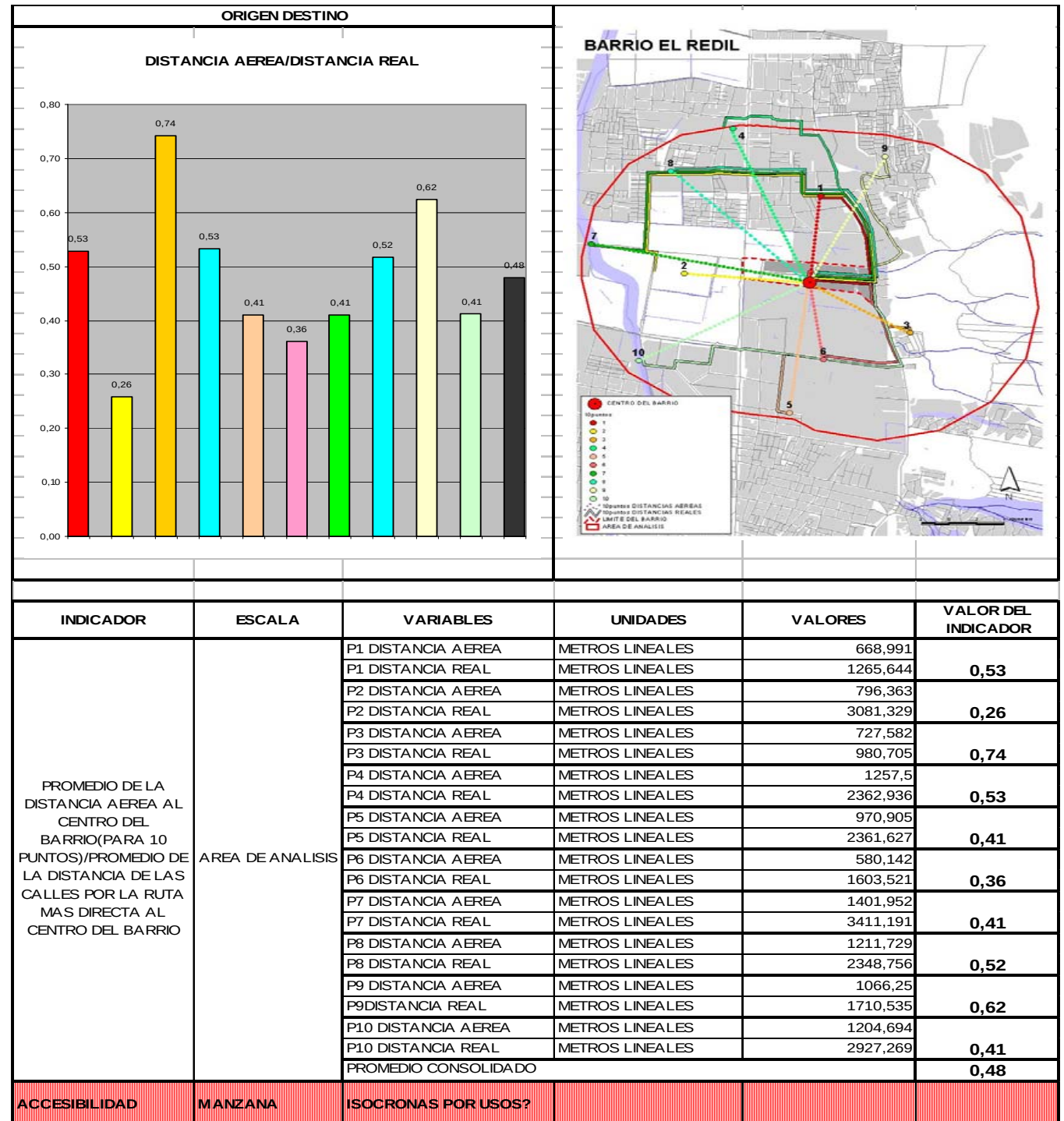


Measure: DESIGN Walking/Biking Quality



- **Network Connectivity Indicator** = $(\# \text{ links})/(\# \text{ nodes})$
- **Sidewalk completeness** = Length of sidewalks/Length of public street (centerline distances)
- **Bikelane completeness** = Length of bikelanes/Length of public streets (centerline distances)
- **Route directness** = avg. straight-line distance to neighborhood center/avg. shortest road distance to neighborhood center
- **Proportion of blocks (or block faces) with:**
 - sidewalks; street trees; overhead street lights; quadrilateral shape; bicycle lanes; mid-block crossings

“Route Directness”



Measure: DESIGN Walking Quality

- **Lighting:** # street lights/road length (centerline)
- **Trees:** # street trees/road length
- **Furniture:** # benches/road length
- **Prop. of signals with:**
 - Ped phase
 - Marked crosswalks
- **Ped Signal Lengths:** average of:
(Duration of Ped. Lights / Total Signal Cycle Length)
- **Average block length**
- **Average street width**
- **Prop. of road links with median strips**
- **Bike-lane density:** bikelane distance
(centerline) / km² of land
- **Distance between overhead lights**
- **Ped. Accident rates**
- **Average auto speeds**



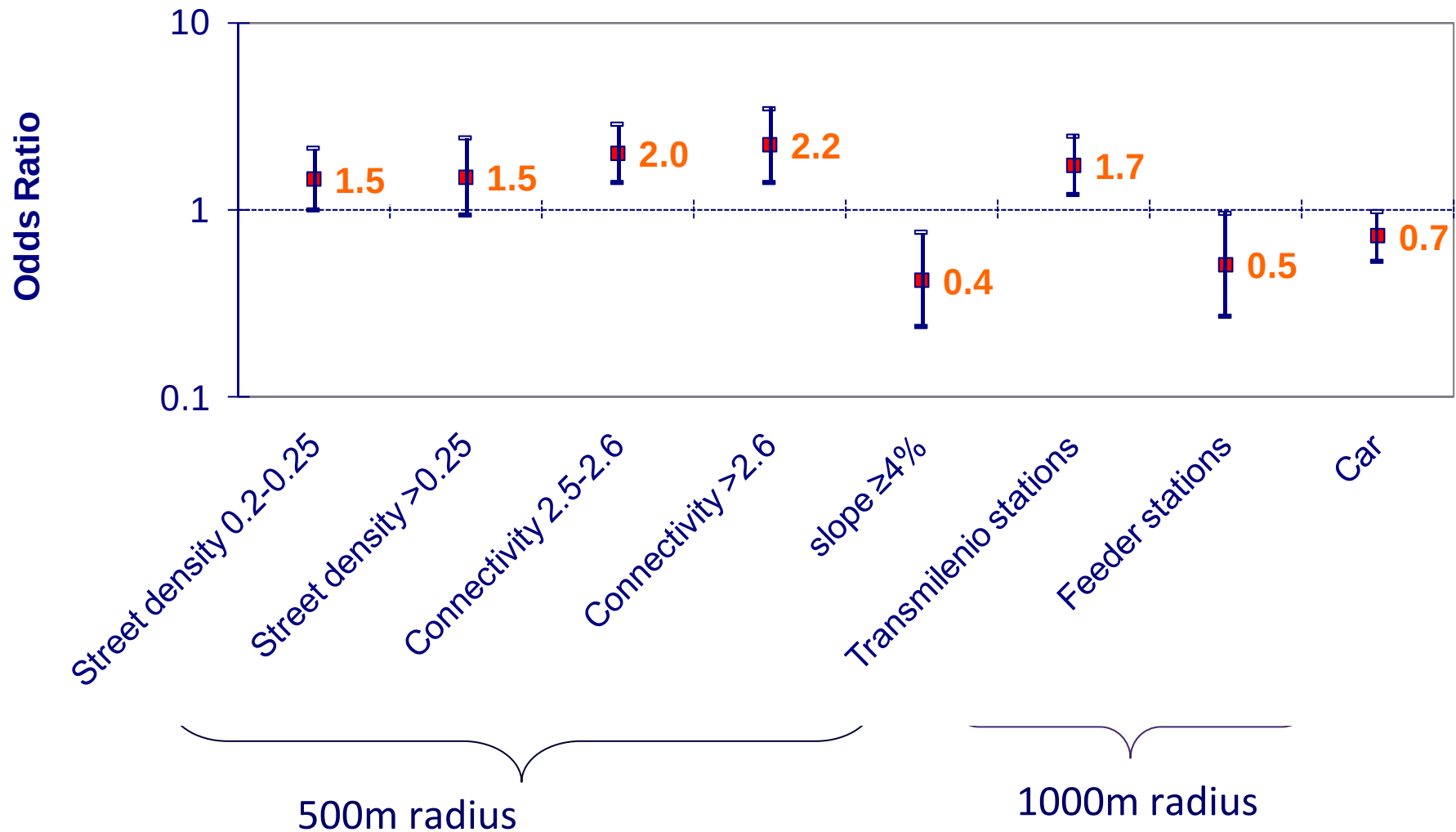
Diverse Streetscapes

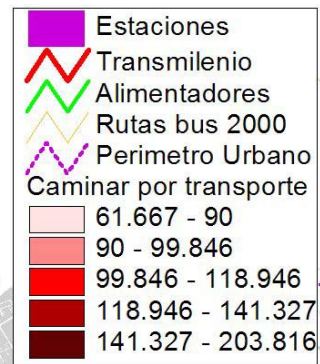


Distance to Transit and Destination accessibility



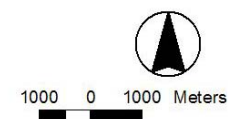
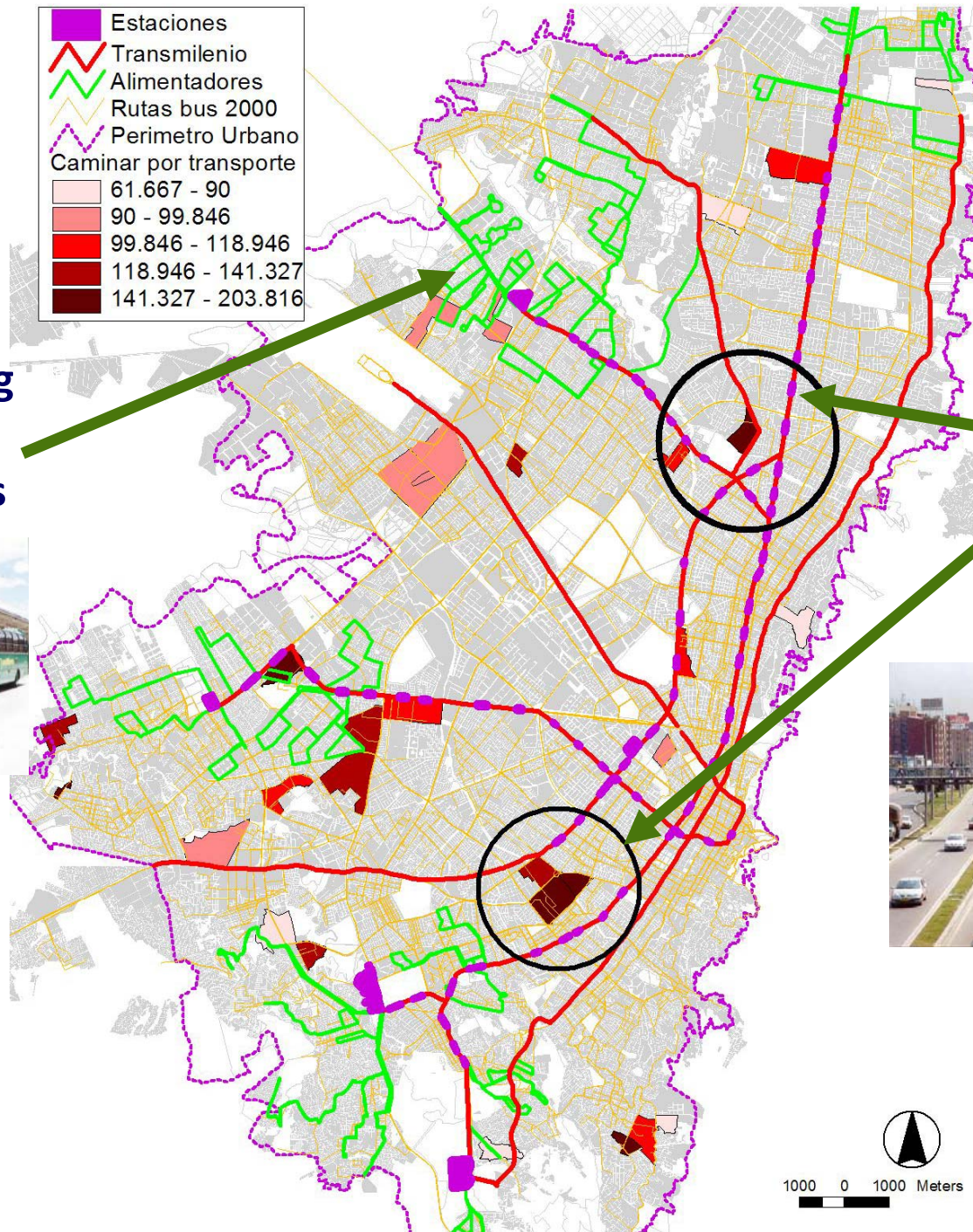
Odds Ratios & 95% Conf. Intervals for MLM on
Walking ≥ 30 Minutes per Weekday
for Utilitarian Purposes





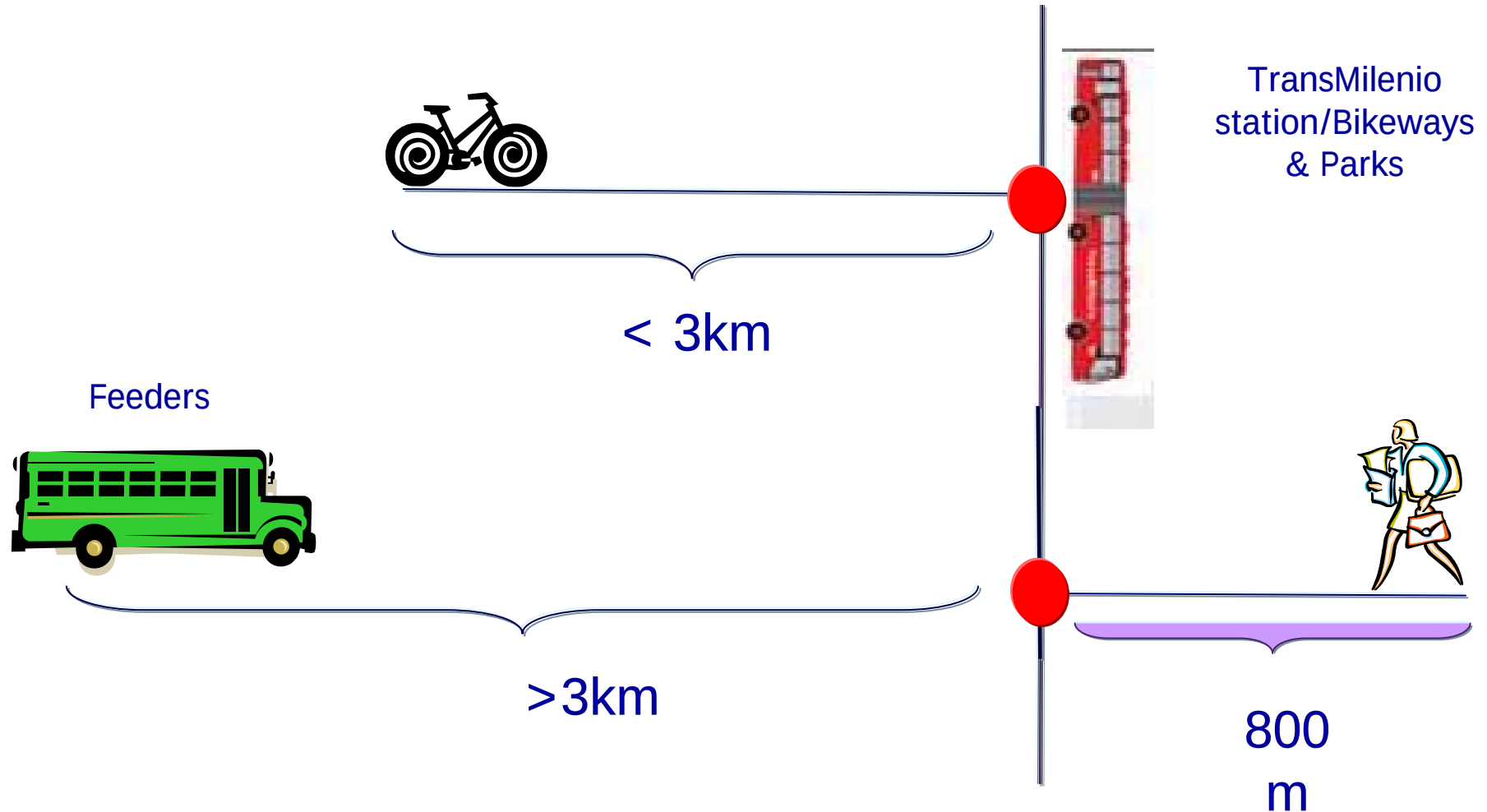
**Low walking
incidence &
Bus Feeders**

**High walking
Incidence
&
Transmilenio
Stations**



TransMilenio Offers Physical Activity Opportunities

Multi-Modal Planning & Design



Policy Choices:
Invest in Feeder Buses or “Green Connectors”?