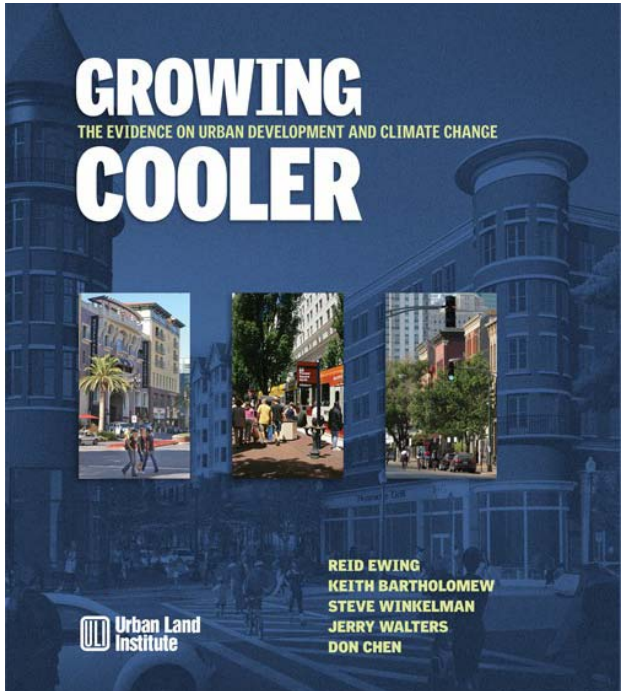
Quantifying GHG Reductions from Land-Use Policy

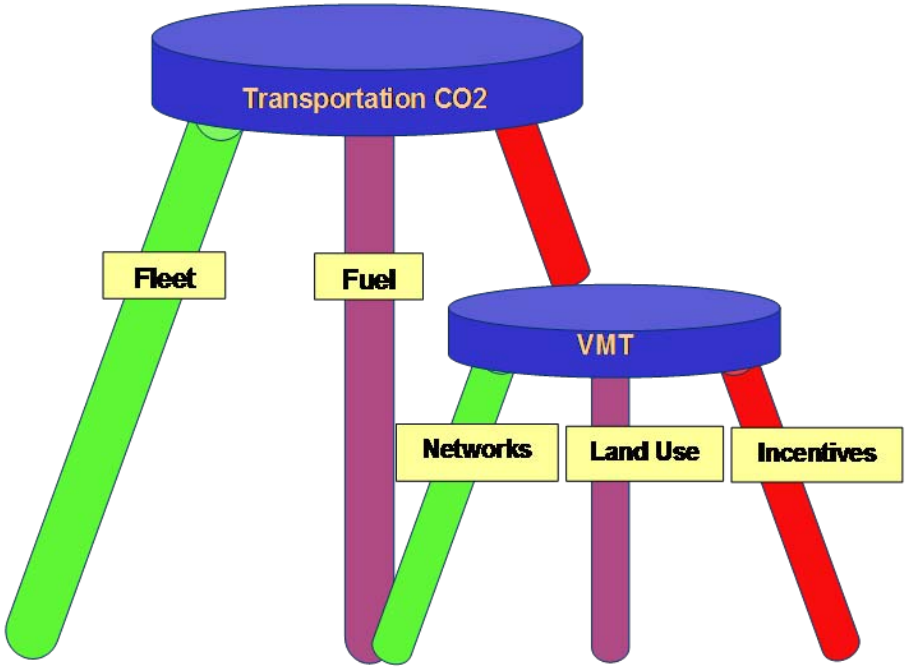
New York State
Climate Smart Communities Program
October 18, 2012

Tools for Local Governments

Jerry Walters
Fehr & Peers

VMT Reduction Essential for Meeting GHG Goals





- In addition to improved technology and fuel content, meeting GHG targets requires location-efficient land use and transport.
- Market conditions favor types of development that successfully reduce VMT and CO2

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National Development Prospects

"When homebuilding does finally resume, housing and development patterns will become more urban focused—incorporating **smaller lots, townhouses**, and **town-center mixed-use projects**, which include single-family housing and condominium buildings."

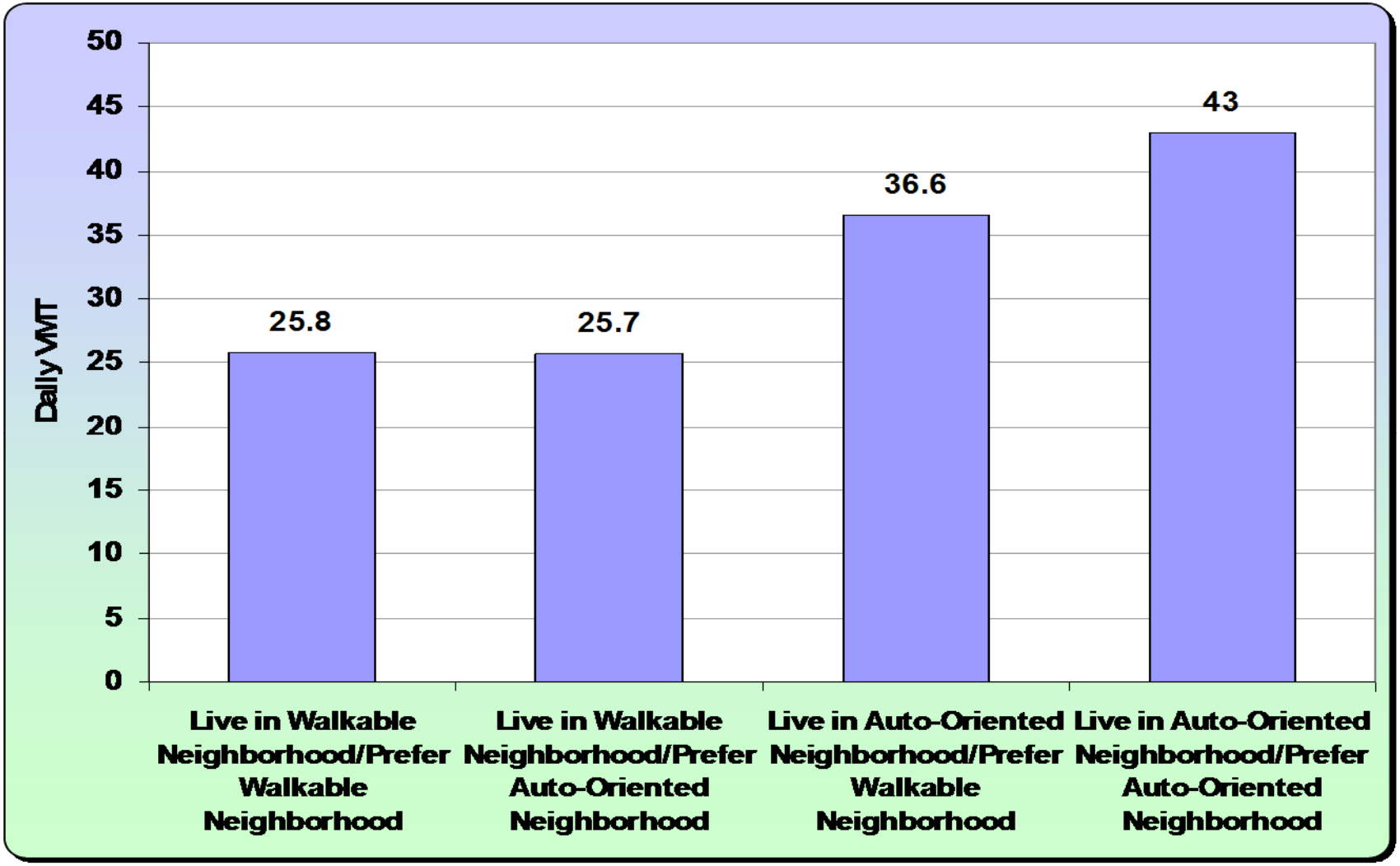
Price Waterhouse Coopers, Emerging Trends in Real Estate, 2010 Survey, ULI

Increase in property value per 1 point increase in Walk-Score			
Office	Retail	Apartments	Residential
0.8%	0.6%	0.5%	$700-$3000

Cortright, 2009; Pivo and Fischer, 2009

Accommodating Real Estate Preference Reduces VMT

… regardless of underlying preferences



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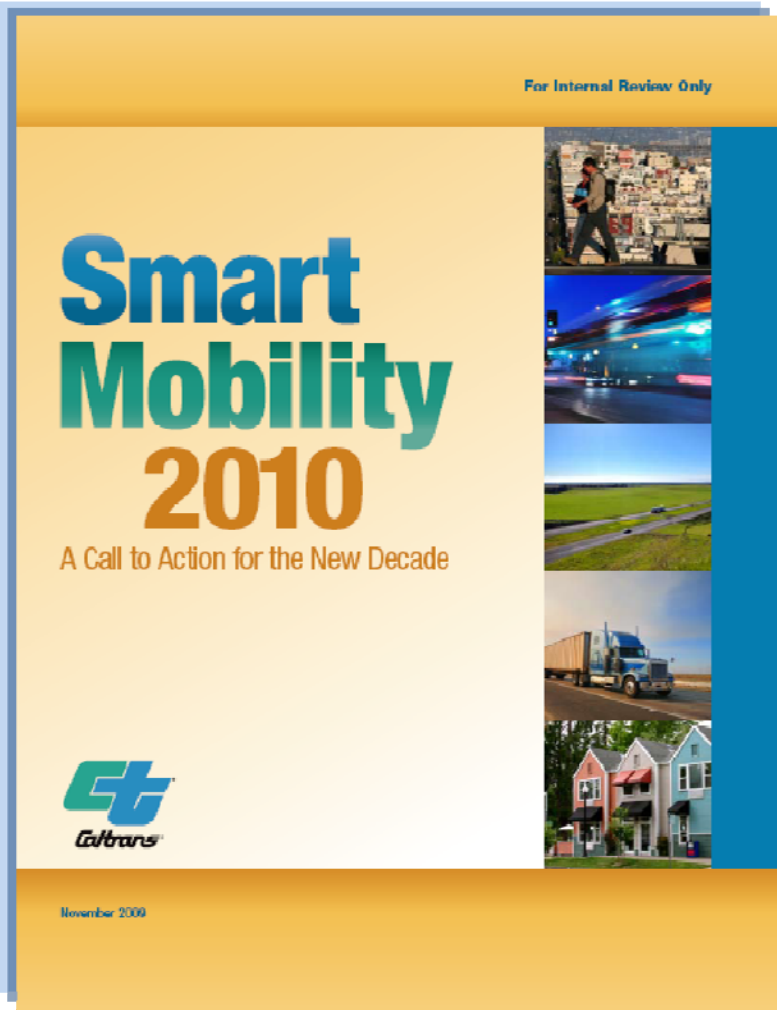
California – GHG Reduction under the Force of Law

- AB 32 – Greenhouse gas reduction targets, Cap + Trade
- SB 97 – CEQA requirements for GHG assessment
- SB 375 - Linkages among:
  - ❑GHG targets
  - ❑regional transportation
  - ❑sustainable communities strategies
- SB 732 – Grant funding for sustainable communities
- SB226 –Approval streamlining for infill development

Objectives-Oriented DOT Performance Measures

- **Location Efficiency**
- **Multi-Modal Focus**
- **Speed Suitability**
- **Network Management**



The Growing Demand / Capacity Gap

20-30% Traffic Growth / 0-10% Capacity Growth

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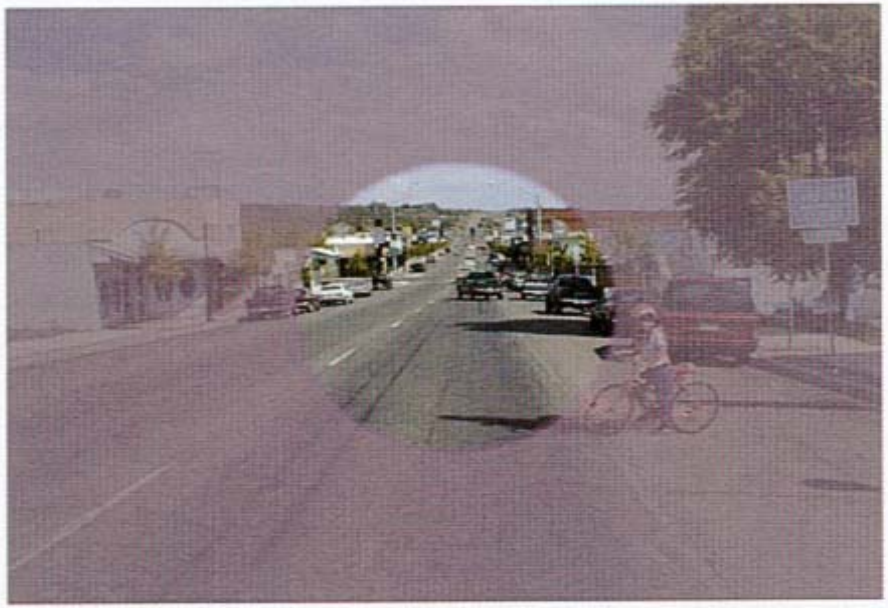
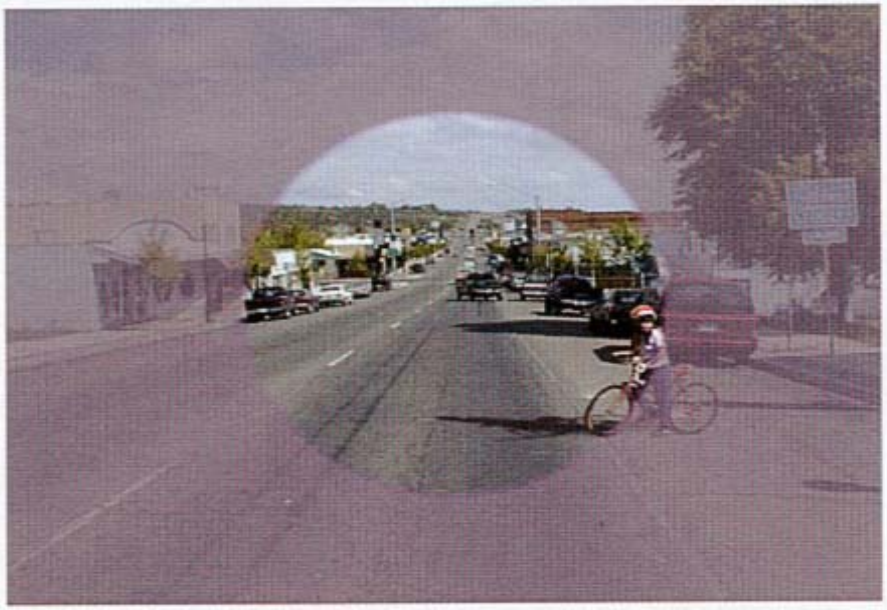
Speed Suitability – Safety for all Users



At 40 mph the driver's focus is on the roadway in the distance.



At 30 mph the driver begins to see things at the road edges in the background.

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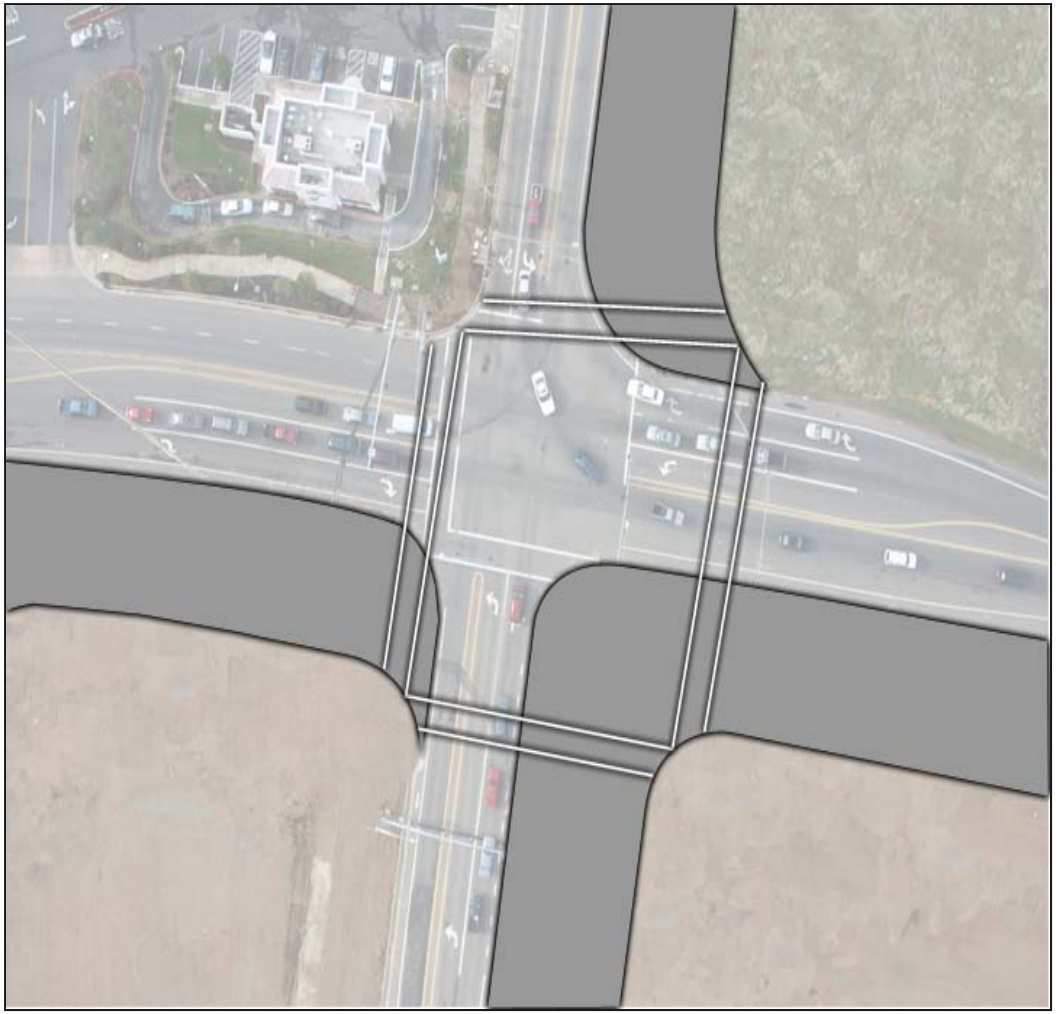
Multi-Modal Level of Service (LOS) to Reduce Cost and Impact



- LOS is predominant transportation impact measure
- Typical LOS analysis represents only the driver perspective
- LOS based analysis generates impacts to other modes and the environment

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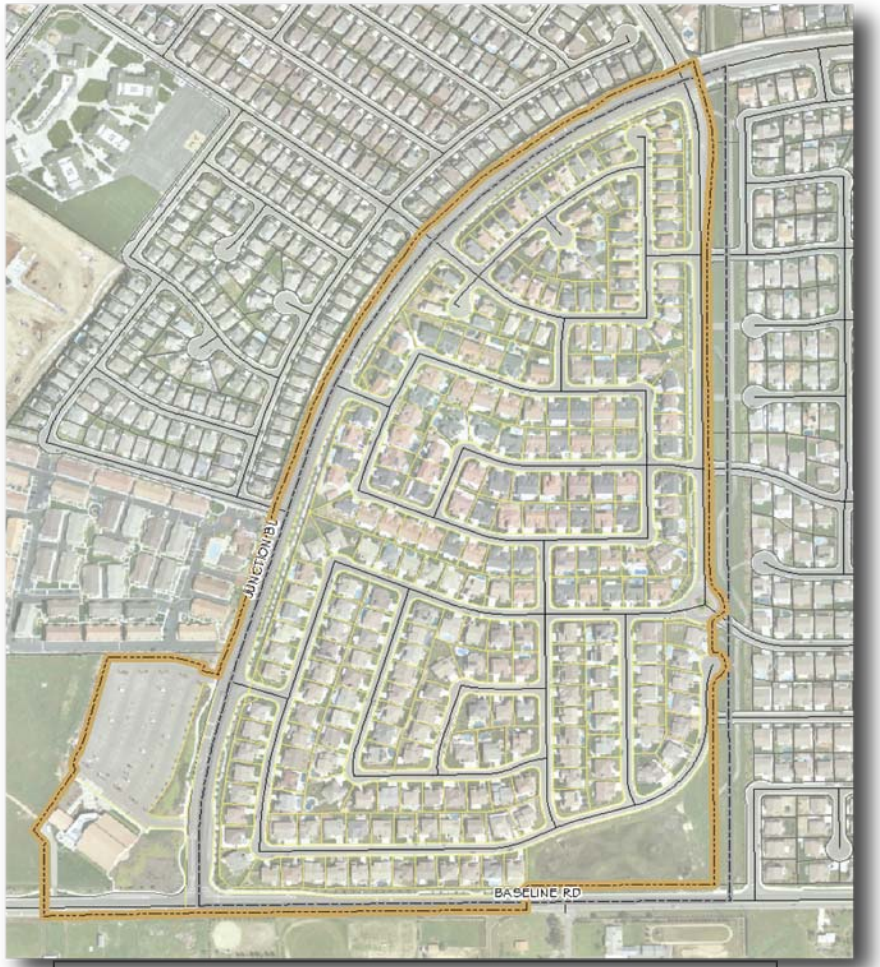
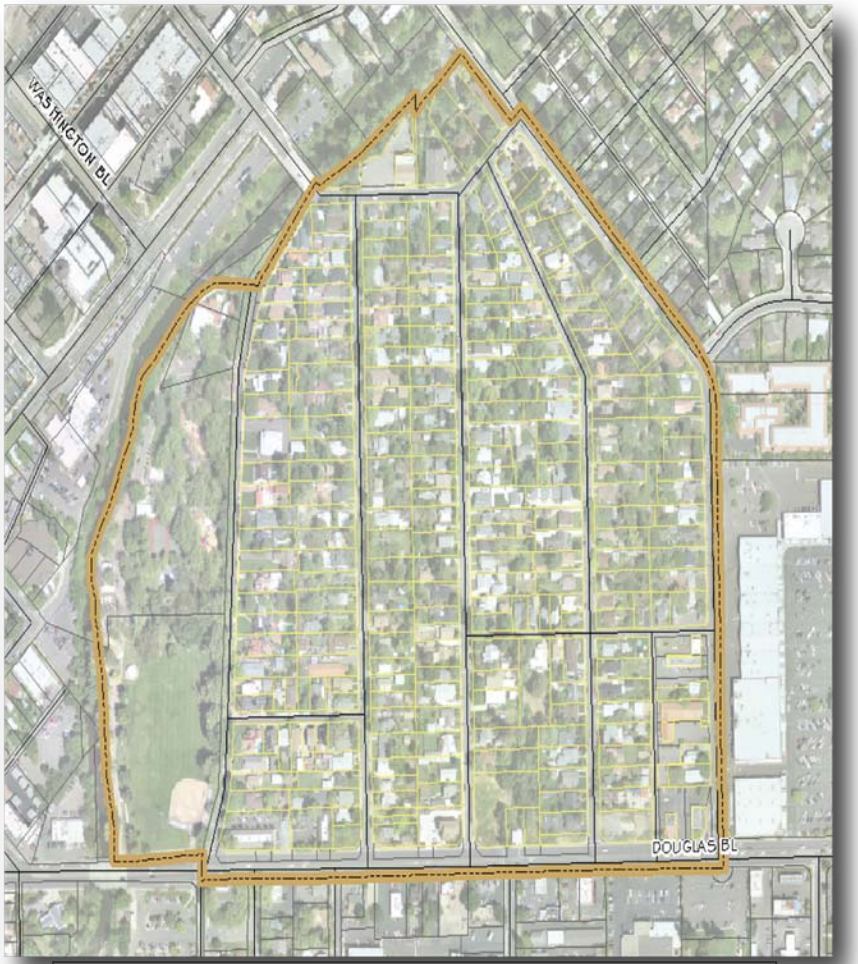
Network Connectivity Reduces Land Consumption, VMT

Area Dedicated to Driving and Parking



Early 21st Century: 37.5%



Early 20th Century: 21.5%

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Network Management Strategies

Congestion Mitigation

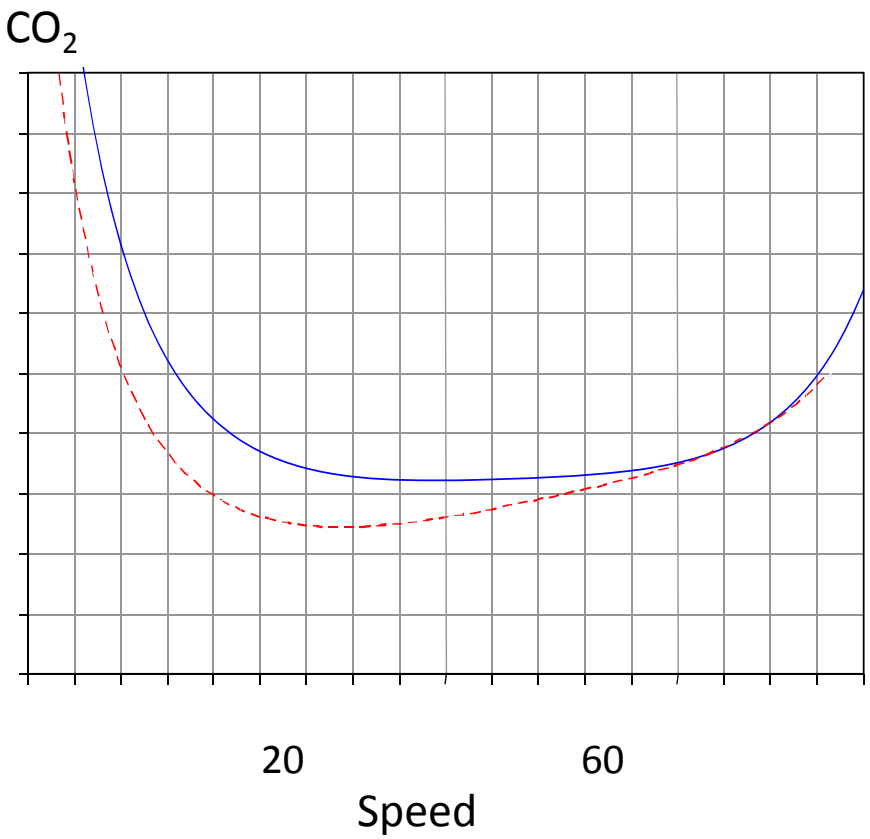
- Judicious capacity increases
- Signal coordination
- Ramp metering
- Incident management

Flow Smoothing Techniques

- Variable speed limit
- Intelligent speed adaptation

Speed Management

- Improved enforcement
- Speed limiters
- Active accelerator pedal



Source: Barth, Matthew; *ITS and the Environment,* UC Riverside, 2008

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Integrating Transportation and Land Use to Reduce VMT

1. **D**ensity
2. **D**iversity (mix of uses)
3. **D**esign (form, connectivity)
4. **D**istance to transit
5. **D**estinations accessibility
6. **D**evelopment scale
7. **D**emographics
8. **D**emand Management

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D1. Density (jobs and dwellings per acre)

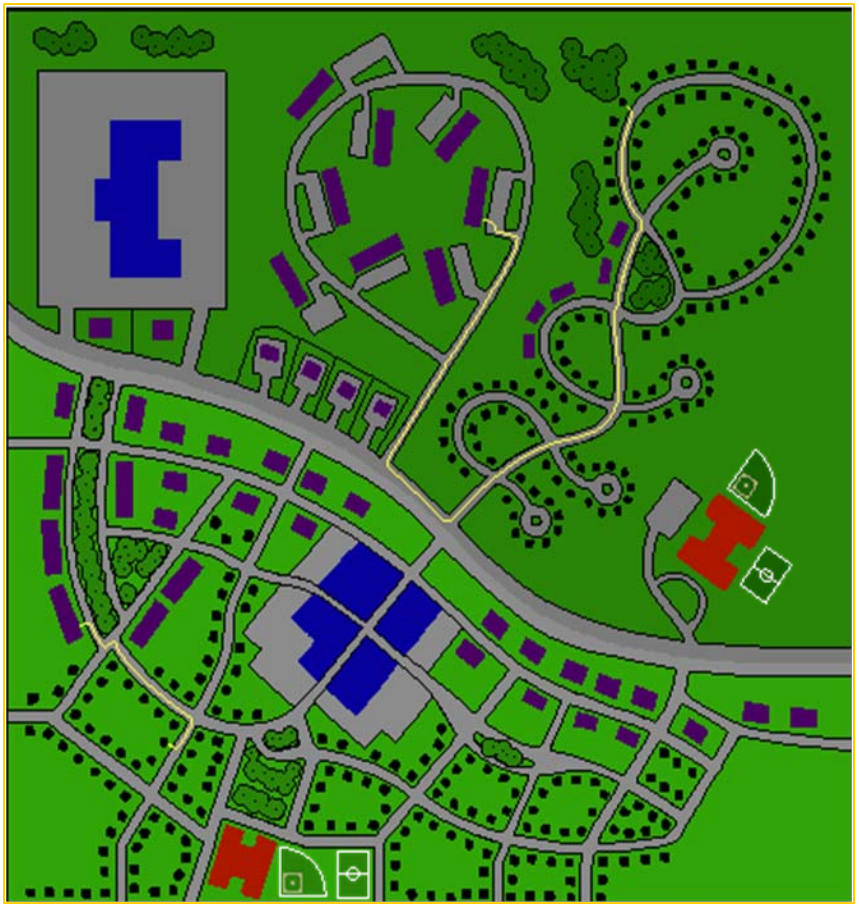
- **Shortens trip lengths**
- **More walking/biking**
- **Supports quality transit**

D2. Diversity (mix of housing, jobs, retail)

- **Links trips, shortens distances**
- **More walking/ biking**
- **Allows shared parking**

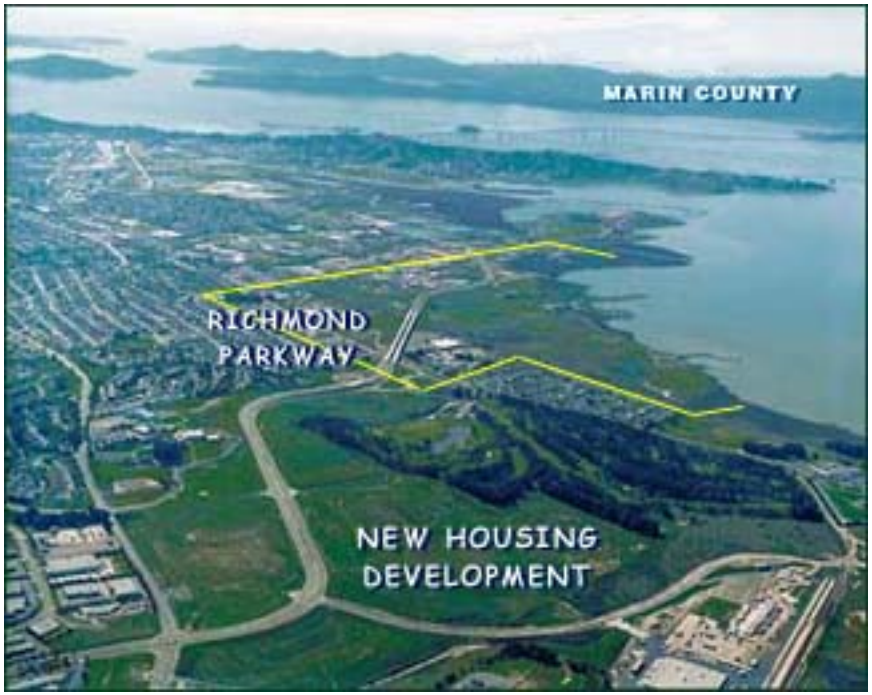
D3. Design (connectivity, walkability)

Urban form, amenity, connectivity shorten trips, encourage slow modes



D4. Destinations (accessibility to activities)

Development at infill or close-in locations reduces trip lengths, capitalizes on transit investment, inter-connects existing uses



D5. Transit Proximity and Service Level

- Access accommodations for transit, cycling, walking
- Trade-offs between parking and TOD

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Findings on Smart Growth Trip Generation

	MXD	TOD	Infill
Trip Discount	30%	44%	36%

Examples: San Diego, Seattle, Portland, Sacramento, Houston, Atlanta, Boston
Sources: EPA MXD, SANDAG SG TG, TCRP 128, Caltrans Urban Infill

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Nationwide Survey of Mixed-Use Travel -- MXD

239 MXD: Seattle, Portland, Sacramento, Boston, Atlanta, Houston
Validation: Northern and So. Cal, Texas, Georgia, Florida, Utah

Gateway Oaks, Sacramento

River Place, Portland

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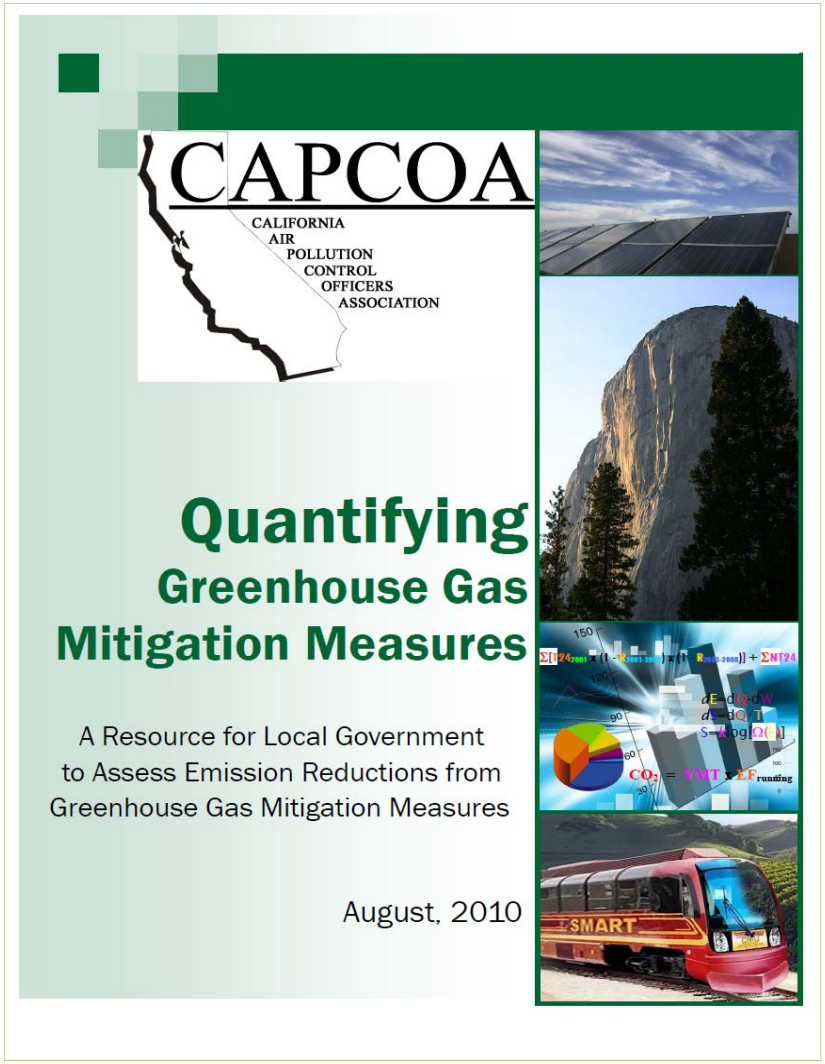
MXD Acceptance

http://www.epa.gov/smartgrowth/mxd_tripgeneration.html

Best Management Practices: TDM, TSM, Land Use



http://www.capcoa.org/wp-content/uploads/2010/11/CAPCOA-Quantification-Report-9-14-Final.pdf

VMT Reduction BMP -- Land Use

Land Use/ Location *Max Reduction = 65% (urban), 30% (compact infill), 10% (suburban center), 5% (suburban)*	**Neighborhood/ Site Enhancements** *Max Reduction = 5% (without NEV) 15% (with NEV)*
Density (30%)	**Pedestrian Network** (2%)
Design (21.3%)	**Traffic Calming** (1%)
Location Efficiency (65%)	**NEV Network** (14.4%) <NEV Parking>
Diversity (30%)	**Car Share Program** (0.7%)
Destination Accessibility (20%)	**Bicycle Network** <Bike Lanes> <Bike Parking> <Land Dedication for Bike Trails>
Transit Accessibility (25%)	**Urban Non-Motorized Zones**

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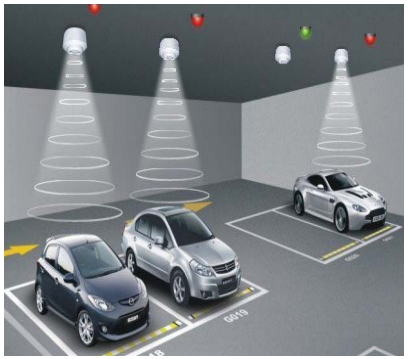
VMT Reduction BMP – Parking, Transit



Parking Policy/ Pricing *Max Reduction = 20%*	**Transit System Improvements** *Max Reduction = 10%*
Parking Supply Limits (12.5%)	**Network Expansion** (8.2%)
Unbundled Parking Costs (13%)	**Service Frequency/Speed** (2.5%)
On-Street Market Pricing (5.5%)	**Bus Rapid Transit** (3.2%)
Residential Area Parking Permits	**Access Improvements**
	Station Bike Parking

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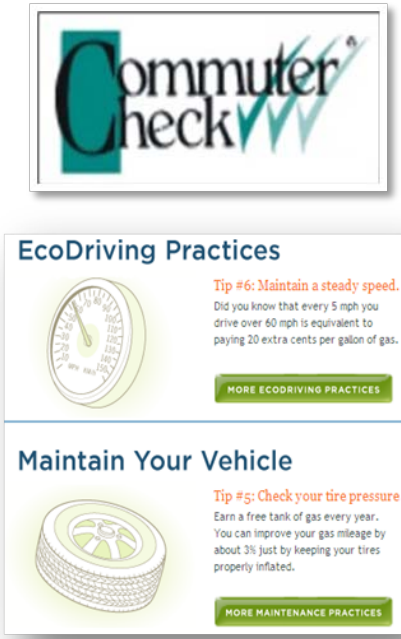
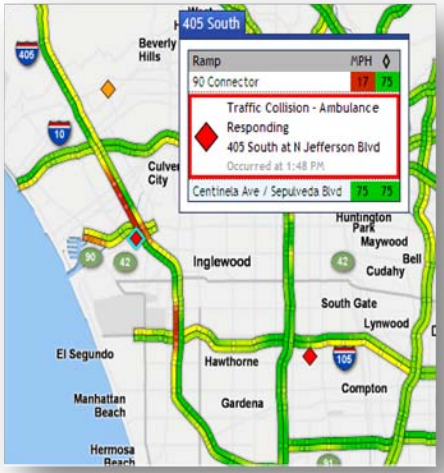
VMT Reduction BMP – Employer, Network



Commute Trip Reduction (CTR) Progams *Max Reduction = 25% work VMT*	**Road Pricing/ Management** *Max Reduction =25%*
CTR Program <Required> (21% work VMT) <Voluntary> (6.2% work VMT)	**Cordon Pricing** (22%)
Transit Fare Subsidy (20% work VMT)	**Traffic Flow Improvements** (45% CO_2)
Employee Parking Cash-Out (7.7% work VMT)	**Required Contributions by Project**
Workplace Parking Pricing (19.7% work VMT)	
Alternative Work Schedules and Telecommute Program (5.5% work VMT)	
CTR Marketing (4.0% work VMT)	



CAPCOA VMT-Reduction Strategy Framework

Global Max Reduction (all VMT)
75% (urban), 40% (compact infill), 20% (suburban center or suburban with NEV), 15% (suburban)

Global Cap Road Pricing

Cross-Category Max Reduction (all VMT)
70% (urban), 35% (compact infill), 15% (suburban center or suburban with NEV), 10% (suburban)

Max Reduction Work, School:
25%/ 65%

Max Reduction (all VMT): 25%

Land Use/ Location *Max Reduction = 65% (urban), 30% (compact infill), 10% (suburban center), 5% (suburban)*	**Neighborhood/ Site Enhancements** *Max Reduction = 5% (without NEV) 15% (with NEV)*	**Parking Policy/ Pricing** *Max Reduction = 20%*	**Transit System Improvements** *Max Reduction = 10%*	**Commute Trip Reduction (CTR) Progams** *Max Reduction = 25% work VMT*	**Road Pricing/ Management** *Max Reduction =25%*
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Location Efficiency (65%)	**NEV Network** (14.4%) <NEV Parking>	**On-Street Market Pricing** (5.5%)	**Bus Rapid Transit** (3.2%)	**Employee Parking Cash-Out** (7.7% work VMT)	**Required Contributions by Project**
Diversity (30%)	**Car Share Program** (0.7%)	Residential Area Parking Permits	**Access Improvements**	**Workplace Parking Pricing** (19.7% work VMT)	
Destination Accessibility (20%)	**Bicycle Network** <Bike Lanes> <Bike Parking> <Land Dedication for Bike Trails>		**Station Bike Parking**	**Alternative Work Schedules and Telecommute Program** (5.5% work VMT)	
Transit Accessibility (25%)	**Urban Non-Motorized Zones**		**Local Shuttles**	**CTR Marketing** (4.0% work VMT)	

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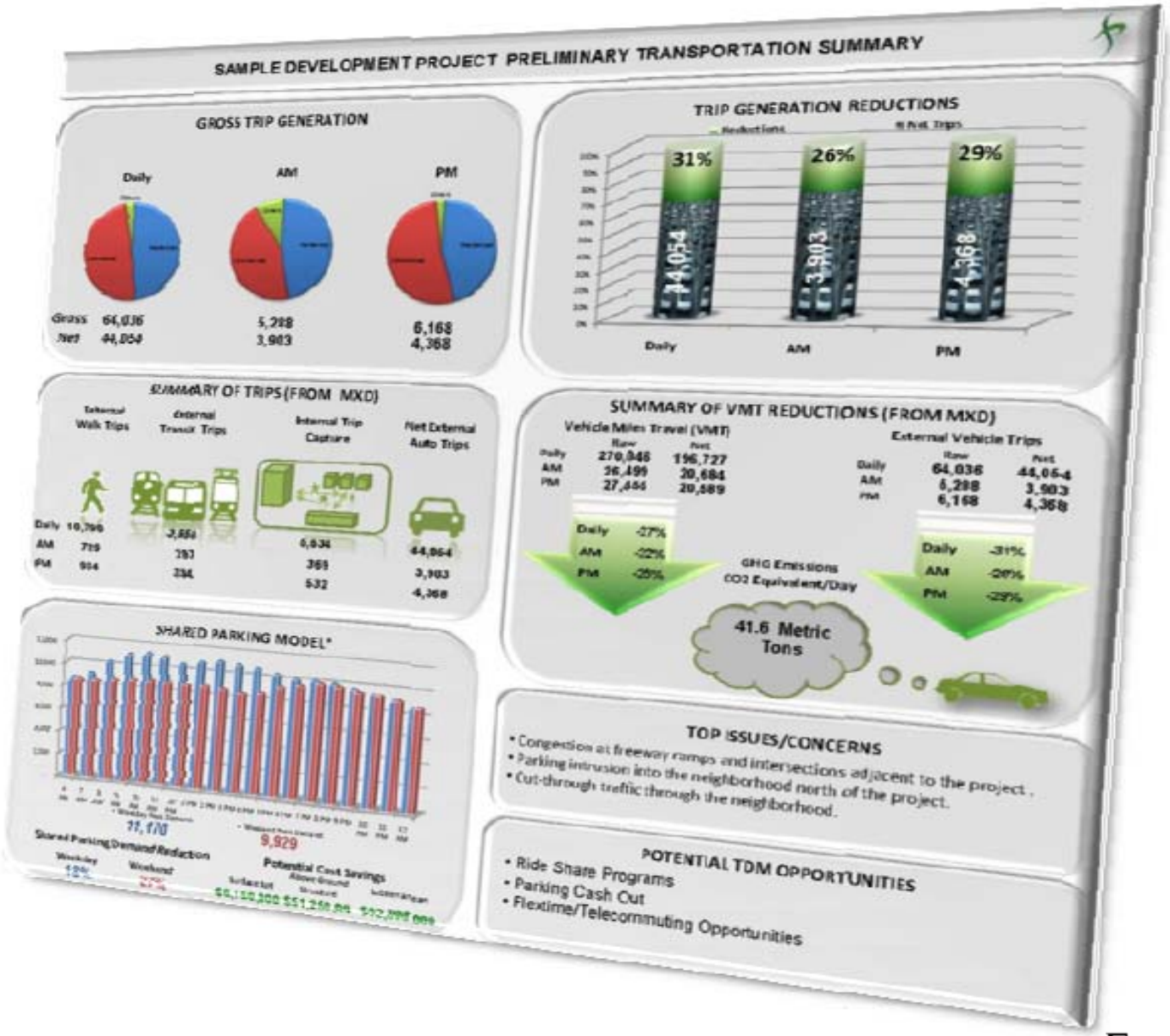
Development Impact Tools



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Resources

Oregon Department of Transportation

Climate Change, Transport & Land Use

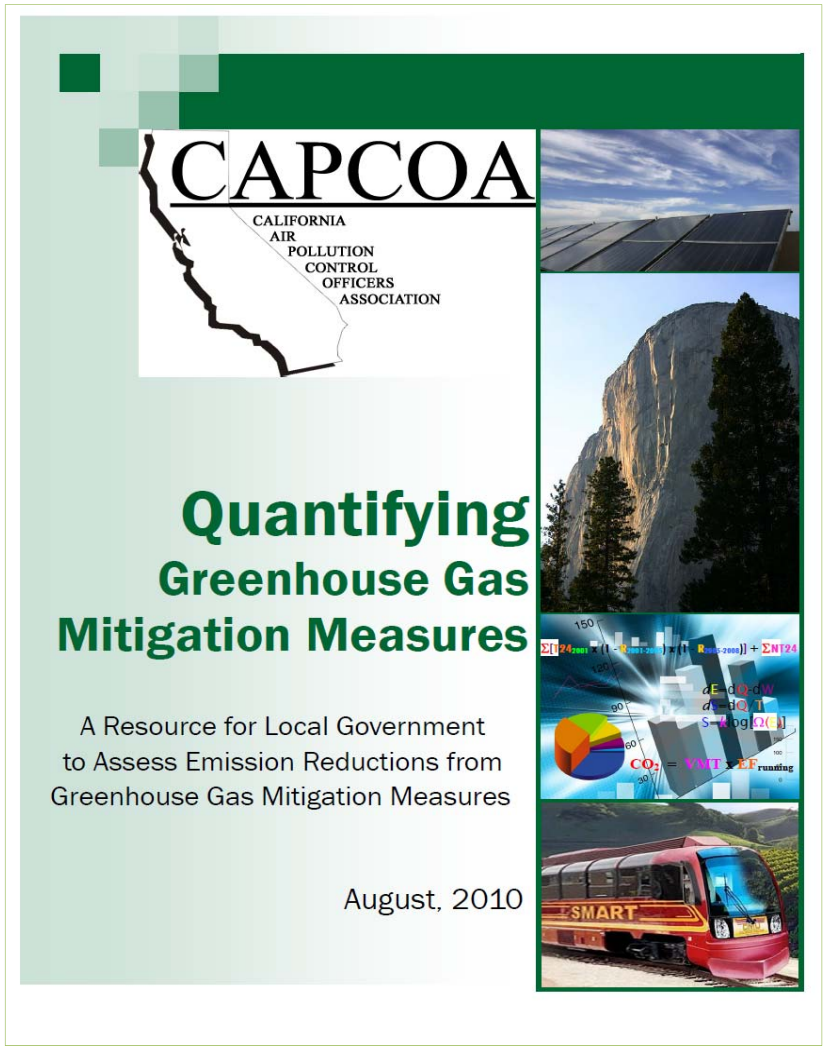
By making it easier for people to take short trips by foot or bicycle – and longer trips by public transit – state and local governments can help communities reduce CO2 emissions. Listed below are resources and publications that address the role of land use, transportation choices, and community design in reducing greenhouse gases.

Oregon

Cool Planning: A Handbook on Local Strategies to Slow Climate Change, a handbook and toolkit by the Oregon Transportation and Growth Management Program (TGM) to help local governments apply land use, community design, and transportation planning strategies to the reduction of transportation-related greenhouse gas emissions
Addressing Climate Change Through Great Communities, the Portland Metro web site
Keep Oregon Cool Oregon Global Warming Commission
Land Conservation & Development Commission: LCDC Interim Climate Change Strategy
Oregon Strategy for Greenhouse Gas Reductions
Oregon Sustainable Transportation Initiative

Other States

California Climate Change Portal
New England Climate Change Coalition
New Jersey: Climate Change and Land Use: Recommendations from New Jersey Future
New Hampshire Climate Action Plan
Washington: Leading the Way: A Comprehensive Approach to Reducing Greenhouse Gases in Washington State



http://www.capcoa.org/wp-content/uploads/2010/11/CAPCOA-Quantification-Report-9-14-Final.pdf
http://www.oregon.gov/ODOT/TD/TP/Pages/GHGToolkit.aspx
http://www.oregon.gov/ODOT/TD/OSTI/pages/reports.aspx

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Thank You!

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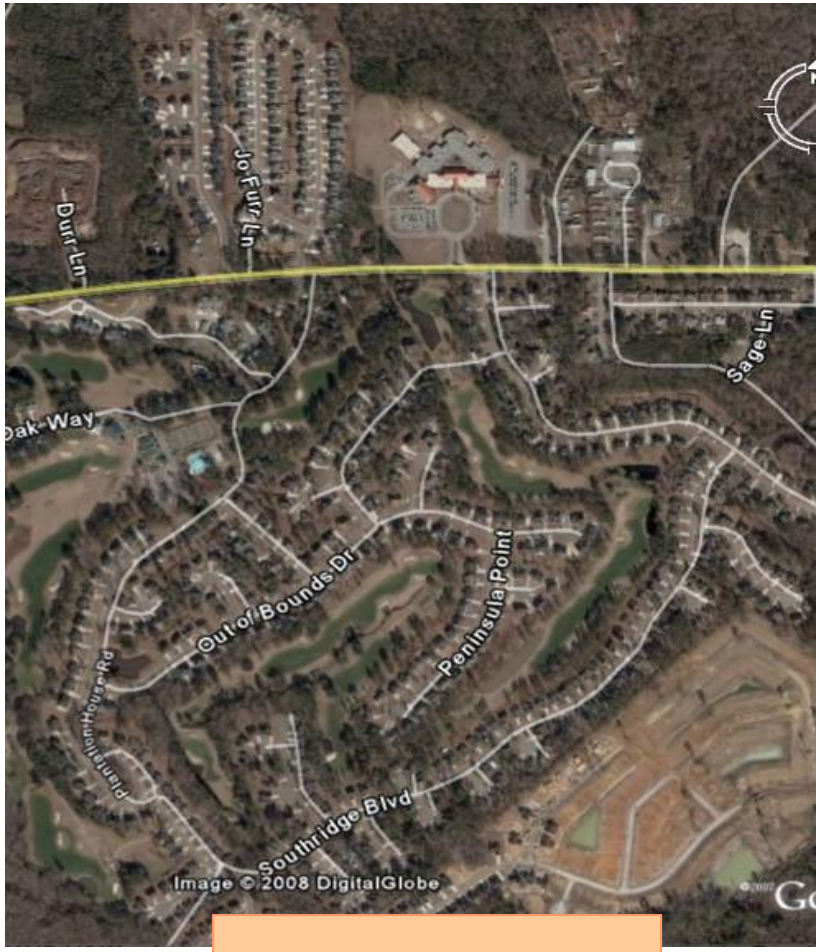

Conventional

Village

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	Resid. Density	Jobs Density	Job/ DU Diversity	Job Mix	Urban Design
Conventional Development	1.5	20	0.15	0.25	1270
Village	4.2	24	0.62	0.76	440
Percent Improvement	180%	20%	313%	205%	65%
Trip Reduction %	9.0%	1.2%	12.5%	12.7%	3.3%

Total Reduction 38.8%

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ICT Elements – Regional

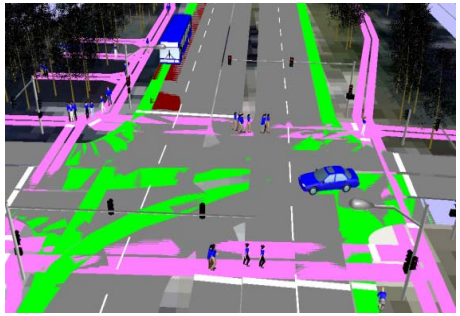
- Express-lane bottleneck removal through GPS-calibrated simulation

- Regional traffic modeling through video and cell O/D identification

- Transit ridership optimization through fare card analytics

ICT Elements – Local

- Micro-simulation of campus operation, expansion options



- LPR-enhanced neighborhood parking management enforcement

- Bike station analytics: opportunity effectiveness assessment

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