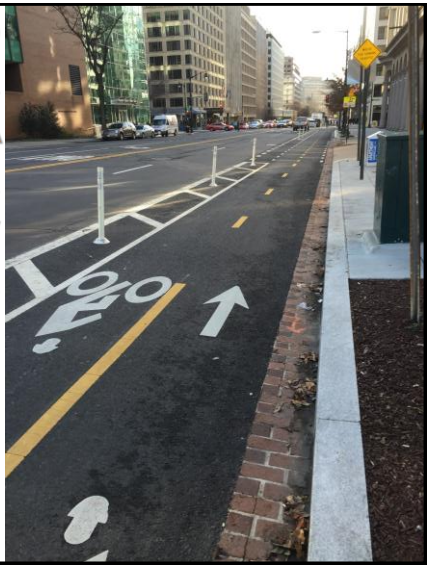
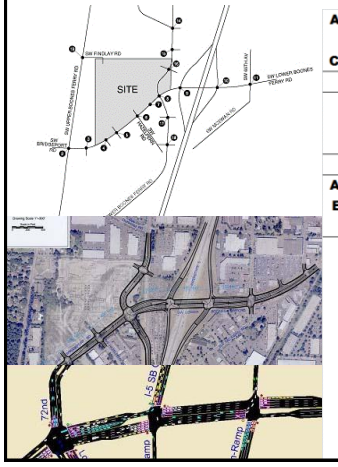
How to Complete a Street in TIA using Smart Mobility Concept

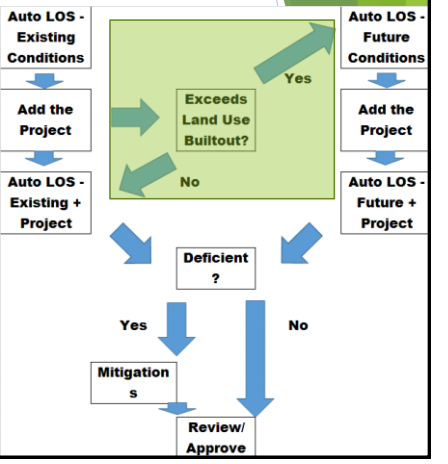


Vasin Kiattikomol, Ph.D., P.E.

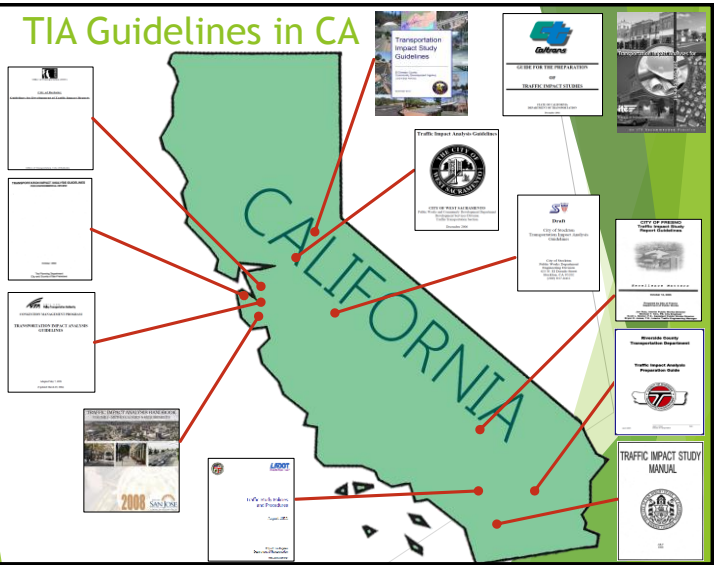
King Mongkut's University of Technology Thonburi

Traditional Traffic Impact Analysis in US





TIA Guidelines in CA



TIA Changed?

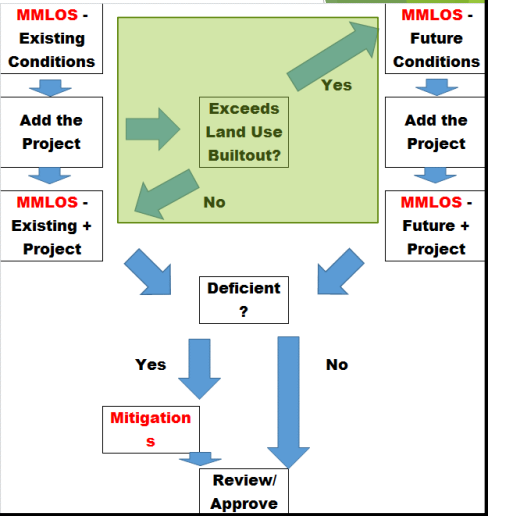
Now – not just vehicle LOS

--but--

Multimodal LOS (MMLOS)

--How?--

Smart Mobility Concept



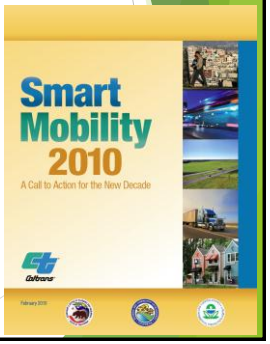
Moving Towards Smart Mobility

In California:

- Transportation sector produces 40% of State's total GHG emissions
- SB375 – Sustainable Communities Act of 2008

To reduce GHG emissions through coordinated transportation and lad use planning for more sustainable communities

- Requires MPOs to prepare "sustainable communities strategy"
- Require changes in the 1) vehicle fleet, 2) fuel, and 3) vehicle use
- Smart mobility addresses the "vehicle use" by reducing SOV usage



What is Smart Mobility Concept

- Moves people and goods while enhancing economic, environmental, and human resources
- Emphasizing:
  - Convenient and safe multimodal travel
  - Speed suitability
  - Accessibility
  - Well managed circulation network
  - Efficient use of land

Caltrans, 2010

Smart Mobility Framework

Location Efficiency	• The fit between land use and transportation system • To achieve high level of non-motorized travel and transit use, reduce vehicle trips, shorten average trip length
Reliable Mobility	• Manage and reduce congestion by emphasizing multi-modal options • Provide predictability and capacity increase for travels that support economic activity
Health and Safety	• Design, operate, and manage transportation system to reduce serious injuries and fatalities, lessen exposure to pollution
Environmental Stewardship	• Reduce Greenhouse Gases (GHGs) emissions from the transportation system
Social Equity	• Provide mobility for disadvantaged people, economically, socially, or physically
Robust Economy	• Invest in transportation improvements that support the economic health, businesses, and welfare of residents

Smart Mobility Performance Measures

Complete Streets

- Streets must accommodate all users
  - Safe
  - Convenient
  - Comfortable
- Cannot sacrifice pedestrian or bicycle accommodation for sake of auto-mobility

Why Complete Streets?

Too young to drive…

Why Complete Streets?

Not able to drive…

Why Complete Streets?

Vibrant economy

Why Complete Streets?

Social Exchange

Why Complete Streets?

Efficient transportation

Streetsblog USA

Autos are important too

Freight

Autos are important too

Emergency Vehicles

Photo: Portland Office of Transportation

Autos are important too

Sometimes cars just make sense

Benefits of Complete Streets

- Improve safety for all users
- Improve access for non-motorized users
- Improve comfort-level for all users

Photo: Michael Ronkin

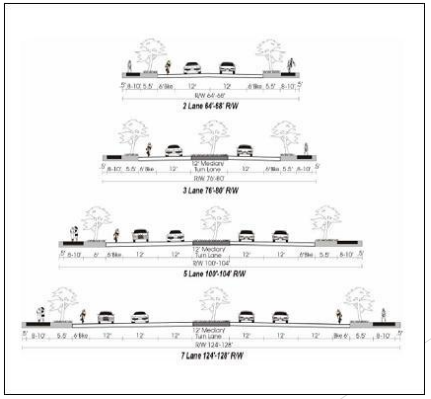
Photo: www.car-accidents.com

Planning Complete Streets

- Separating modes can work

Planning Complete Streets

- Separation consumes land

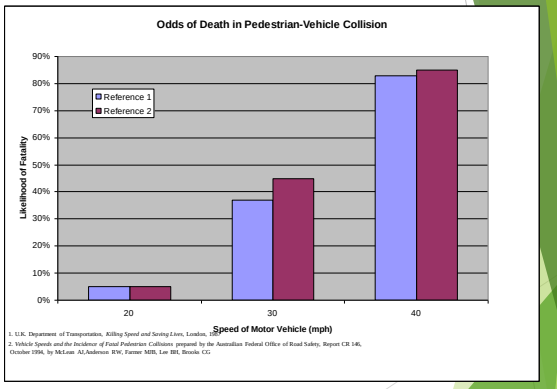


- And land is expensive…

Planning Complete Streets – Sharing is OK

Safe Sharing

- Speed kills pedestrians



1. U.K. Department of Transportation, *Killing Speed and Saving Lives*, London, 1987
2. *Vehicle Speeds and the Incidence of Fatal Pedestrian Collisions* prepared by the Australian Federal Office of Road Safety, Report CR 146, October 1994, by McLean AJ,Anderson RW, Farmer MJB, Lee BH, Brooks CG

- < 30 mph for streets where pedestrians are permitted

Pedestrian Safety (Speed)

- Many European cities adopt 30 km/h (18 mph) speed limits in residential areas
  - Stockholm - Zurich
  - Copenhagen - Freiburg
- With major arterials posted no higher than 50 km/h (31 mph)

Pedestrian Safety (Speed)

- And then design for that speed…

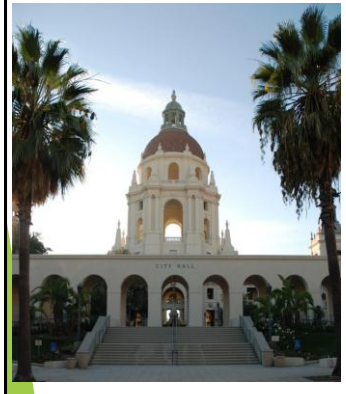
Pedestrian Convenience

- Provide frequent crossings
- Signals every .25 miles (1,320 ft. or 400 m.) doesn't work for pedestrians – too far away!
  - 1,320 ft. ÷ 4 ft./sec. = 330 seconds of delay for pedestrians to walk to the next crossing
  - Remember? Delay > 80 seconds is LOS F for autos

Development Impact Analysis

Pasadena, California

Traffic Impact and Sensitivity Case Studies



- Worked with the City of Pasadena to analyze multimodal impacts of a redevelopment project in 2011
- City's facts
  - 140,000 population
  - 59 km^2
  - Home of Caltech

Traffic Impact and Sensitivity Case Studies – Mixed Use Development

Development Impact Analysis

- Impact studies generally only consider auto
- The City of Pasadena interested in impacts to level of services for all modes
- How MMLOS can be used as a tool
- The mixed-use development project was evaluated using multimodal LOS
- City's impact threshold criteria:
  - Autos – changes in V/C based on the City's TIA guidelines
  - Non-autos – not specified, set at LOS C

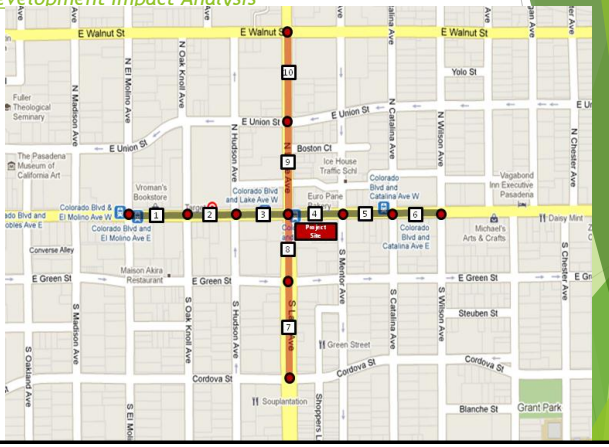
Traffic Impact and Sensitivity Case Studies

Development Impact Analysis

- Project consisted of:
  - **156 room hotel**
  - **38,000 ft² of dining**
  - **14,000 ft² retail**
  - **103,000 ft² office**
  - **8,000 ft² of bank**
- Generated 4,900 daily trips
- 289 trips in the AM peak hour
- 488 trips in the PM peak hour

Traffic Impact and Sensitivity Case Studies

Development Impact Analysis



Traffic Impact and Sensitivity Case Studies

Development Impact Analysis

Facility Level Results for Colorado Blvd.

Direction	Mode	AM Peak			PM Peak		
		Existing	2015	2015 + Proj	Existing	2015	2015 + Proj
Eastbound	Auto	2.97 (C)	2.99 (C)	2.99 (C)	3.04 (C)	3.08 (C)	3.09 (C)
	Transit	1.29 (A)	1.32 (A)	1.32 (A)	1.36 (A)	1.43 (A)	1.44 (A)
	Pedestrian	2.46 (B)	2.52 (B)	2.54 (B)	2.65 (B)	2.77 (C)	2.79 (C)
	Bicycle	3.39 (C)	3.42 (C)	3.42 (C)	3.47 (C)	3.50 (C)	3.51 (D)
	Overall	2.53 (B)	2.56 (B)	2.57 (B)	2.63 (B)	2.70 (B)	2.71 (B)
Westbound	Auto	3.02 (C)	3.05 (C)	3.05 (C)	3.02 (C)	3.06 (C)	3.06 (C)
	Transit	1.26 (A)	1.32 (A)	1.33 (A)	1.47 (A)	1.54 (A)	1.54 (A)
	Pedestrian	2.58 (B)	2.67 (B)	2.68 (B)	2.61 (B)	2.71 (B)	2.72 (B)
	Bicycle	3.29 (C)	3.32 (C)	3.32 (C)	3.30 (C)	3.33 (C)	3.33 (C)
	Overall	2.54 (B)	2.59 (B)	2.60 (B)	2.60 (B)	2.66 (B)	2.66 (B)

Traffic Impact and Sensitivity Case Studies

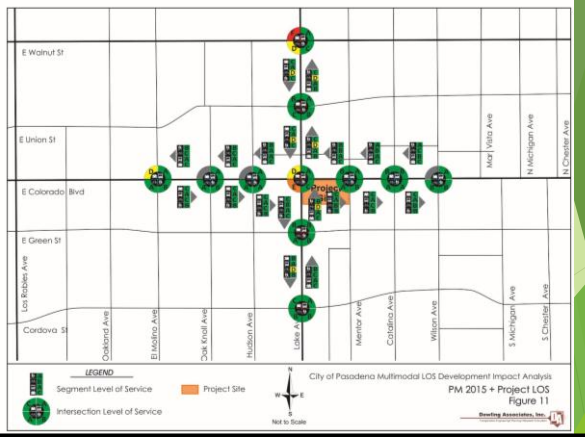
Development Impact Analysis

Link results for Colorado Blvd.

Colorado Boulevard - Worst Direction PM Segment LOS							
Segment	Mode	Direction	Existing	2015	2015 + Proj	Diff.	% Change
El Molino Ave to Oak Knoll Ave	Auto	EB	2.88 (C)	2.90 (C)	2.91 (C)	0.01	0.3%
	Transit	WB	1.54 (A)	1.61 (A)	1.61 (A)	0.00	0.0%
	Pedestrian	EB	1.80 (A)	2.16 (B)	2.21 (B)	0.05	2.3%
	Bicycle	EB	2.98 (C)	3.10 (C)	3.12 (C)	0.02	0.6%
Oak Knoll Ave to Hudson Ave	Auto	EB	3.10 (C)	3.17 (C)	3.19 (C)	0.02	0.6%
	Transit	EB	1.44 (A)	1.53 (A)	1.54 (A)	0.01	0.7%
	Pedestrian	EB	1.83 (A)	2.19 (B)	2.24 (B)	0.05	2.3%
	Bicycle	EB	2.68 (B)	2.80 (C)	2.81 (C)	0.01	0.4%

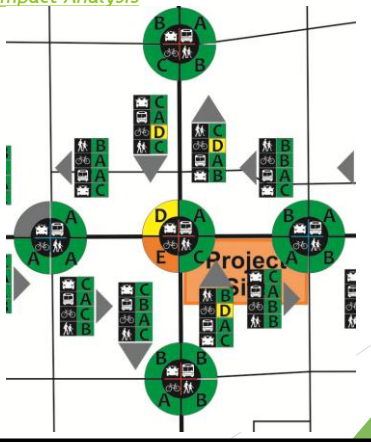
Traffic Impact and Sensitivity Case Studies

Development Impact Analysis



Traffic Impact and Sensitivity Case Studies

Development Impact Analysis



Traffic Impact and Sensitivity Case Studies

Development Impact Analysis

Project Impacts (+ = positive, - = negative):

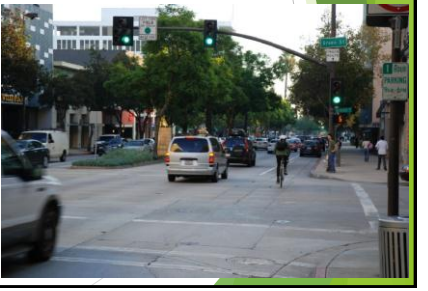
- Transit Passenger
  - Minimal effect, transit speed slightly slower (-)
  - Pedestrian LOS slightly worse (-)
- Bicyclist
  - Slower auto speeds (+)
  - Increased volume (-)
- Pedestrian
  - More vehicles in lane nearest pedestrians (-)
  - Slower auto speeds (+)
- All impacts minor, volume has only small effect on LOS for non-auto modes

Traffic Impact and Sensitivity Case Studies

Development Impact Analysis

Mitigations for bicycle LOS:

1. Prohibiting on-street parking during the AM and PM peak periods
2. Providing bicycle lanes



Traffic Impact and Sensitivity Case Studies

Conclusions

Lessons Learned:

- Multimodal LOS not very sensitive to volume changes
- MMLOS can be used to show impacts to all four modes resulting from physical attributes such as:
  - Cross section changes (Pedestrians/Bikes)
  - Trees or other buffers (Pedestrians)
  - Pavement condition (Bikes)

Traffic Impact and Sensitivity Case Studies

Developed Site

Conclusions

- Streets…
  - Have many purposes to fulfill
  - Many user groups to accommodate
- Good planning negotiates a successful compromise (but its not always easy…)
- Always best to evaluate alternative's impacts on multi-modal travels for all range of transportation projects