SB 743

Update, Methods, Approaches

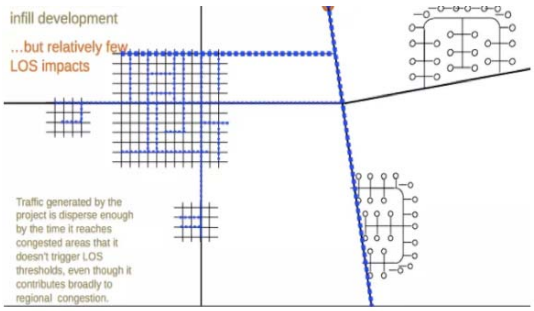


Image from CA OPR presentation on drawbacks of LOS

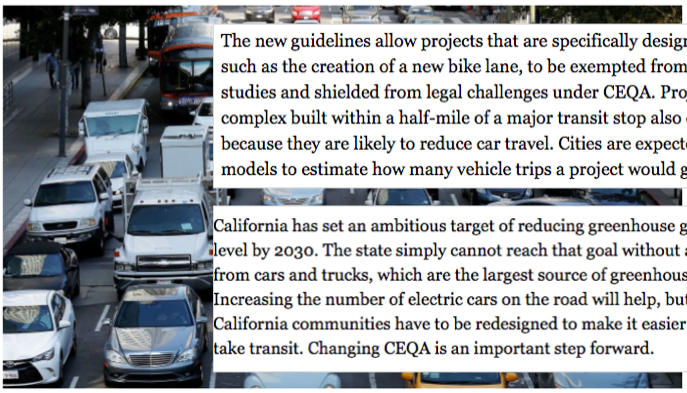
***2017 Civil Servant of the Year Award*: California Governor's Office of Planning and Research** (OPR).

In 2017, the little-known CA OPR shepherded the state's adoption of a new, more accurate way of measuring the actual environmental impact of automobile traffic. This is one of the wonkiest and most jargon-laden stories of the year: The CA OPR mandated that VMT replace LOS. Level of Service has been a major obstacle to improving California livability, walkability, sustainability, affordability, and equity. The team at the Office of Planning and Research deserves credit for achieving a hugely important shift that lays the groundwork for a healthier future.

EDITORIAL | EDITORIALS

If California is serious about climate change, the car can't be king of our roads

By THE TIMES EDITORIAL BOARD
DEC 16, 2017 | 5:00 AM



The new guidelines allow projects that are specifically designed to reduce vehicle trips, such as the creation of a new bike lane, to be exempted from lengthy transportation studies and shielded from legal challenges under CEQA. Projects such as an apartment complex built within a half-mile of a major transit stop also could escape lengthy study because they are likely to reduce car travel. Cities are expected to develop computer models to estimate how many vehicle trips a project would generate.

California has set an ambitious target of reducing greenhouse gases 40% below their 1990 level by 2030. The state simply cannot reach that goal without a dramatic cut in emissions from cars and trucks, which are the largest source of greenhouse gases in the state. Increasing the number of electric cars on the road will help, but that alone won't suffice. California communities have to be redesigned to make it easier for people to walk, bike or take transit. Changing CEQA is an important step forward.

Vehicle traffic backs up along 5th Street in downtown Los Angeles on June 29, 2016. (Los Angeles Times)

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Why the change?

City of Pasadena Department of Transportation

Aligning Metrics and Policies

Decreasing Emphasis

- Evaluating only street operations and traffic volume changes
  - Individual intersection performance
    - Level of Service (LOS)
- Mitigating only impacts to auto travel
  - Adding vehicular capacity via street widening

Increasing Emphasis

- Reduce Greenhouse Gas
  - Vehicle Miles of Travel metrics
- Elevating priorities for transit, pedestrian and bicycle travel
  - Enhance conditions for vulnerable users

PASADENA

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Old metric:

Transportation impact = **Level of Service (LOS)**

LOS	Signalized Intersection	Unsignalized Intersection
A	≤10 sec	≤10 sec
B	10–20 sec	10–15 sec
C	20–35 sec	15–25 sec
D	35–55 sec	25–35 sec
E	55–80 sec	35–50 sec
F	≥80 sec	≥50 sec

Worsens:

- Infill development
- GHG reduction efforts
- Environment (water, energy, flooding, ag land consumption, habitat consumption)
- Human health
- Affordability
- Access to destinations
- Regional congestion
- Economic growth
- Vibrancy
- Retention of small town character
- Fiscal health

Level of Service A

Level of Service F

Source: Neighborhoods.org

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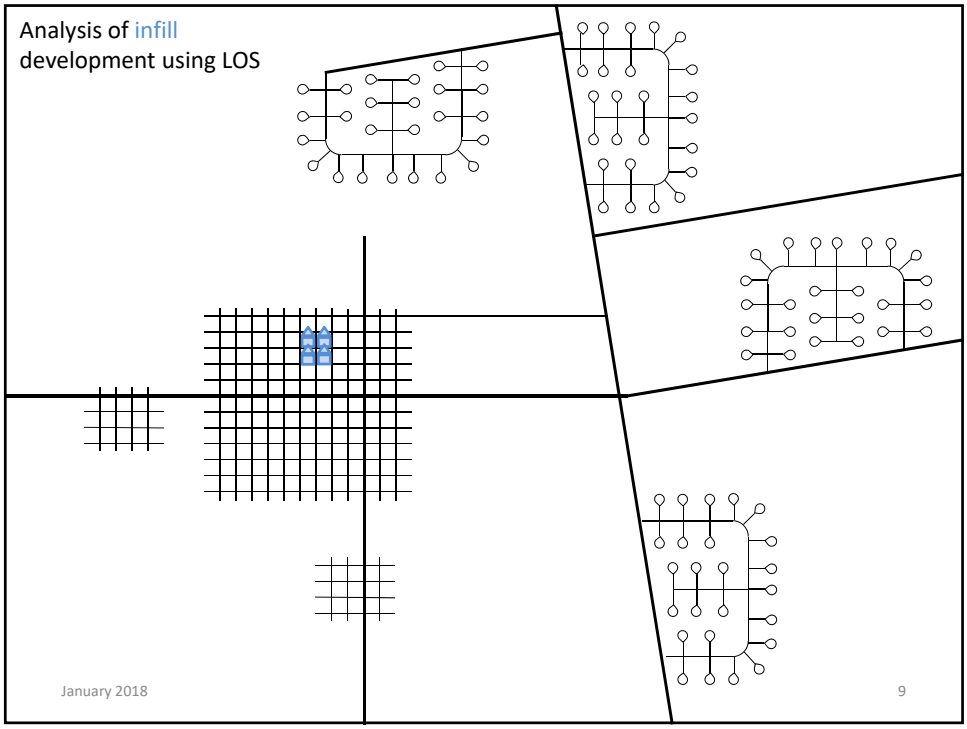
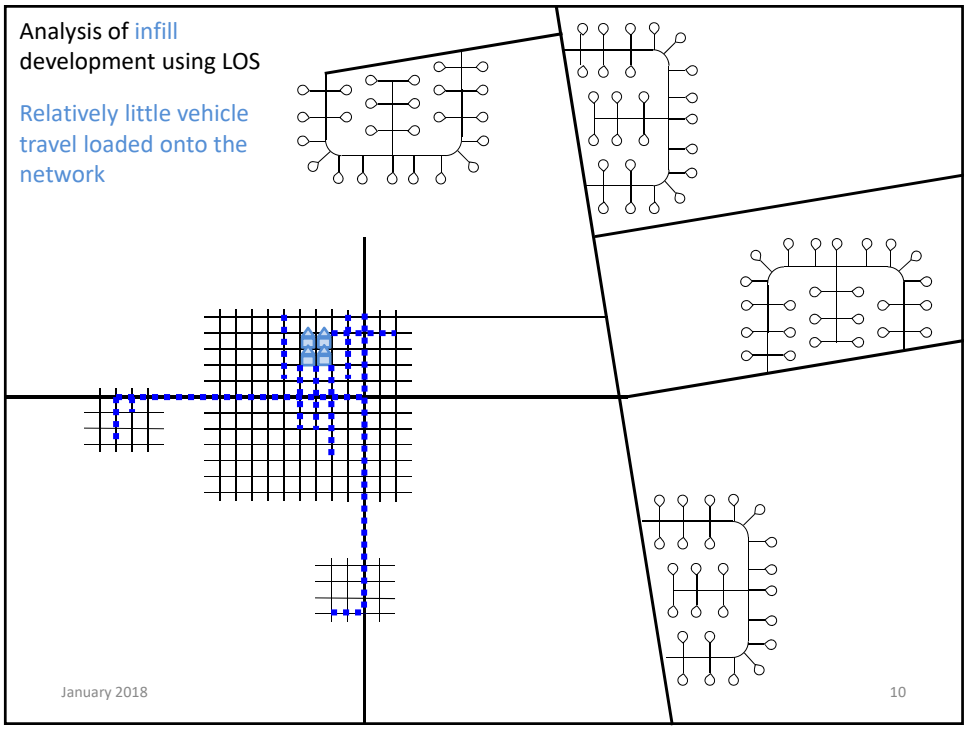
Analysis of infill development using LOS



Analysis of infill development using LOS

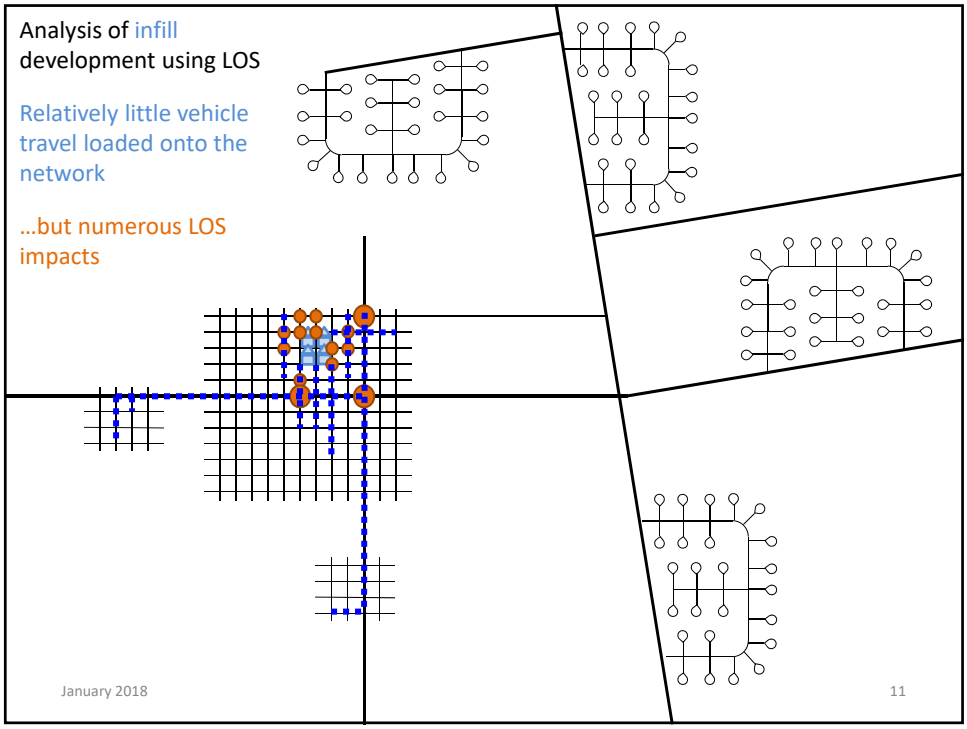
Relatively little vehicle travel loaded onto the network



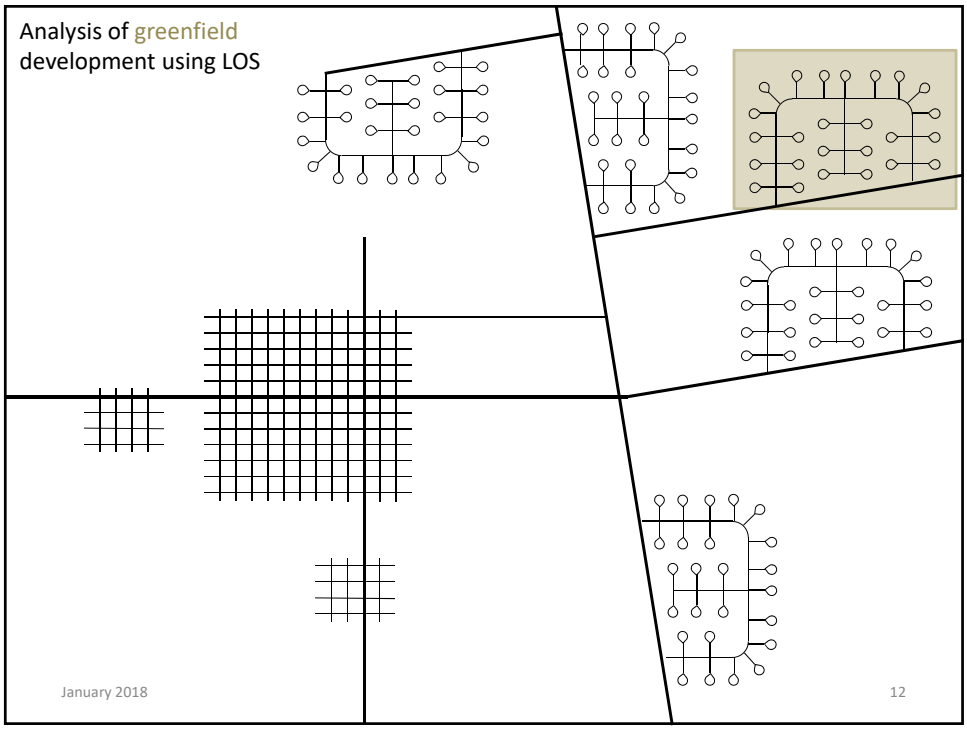
Analysis of infill development using LOS

Relatively little vehicle travel loaded onto the network

…but numerous LOS impacts

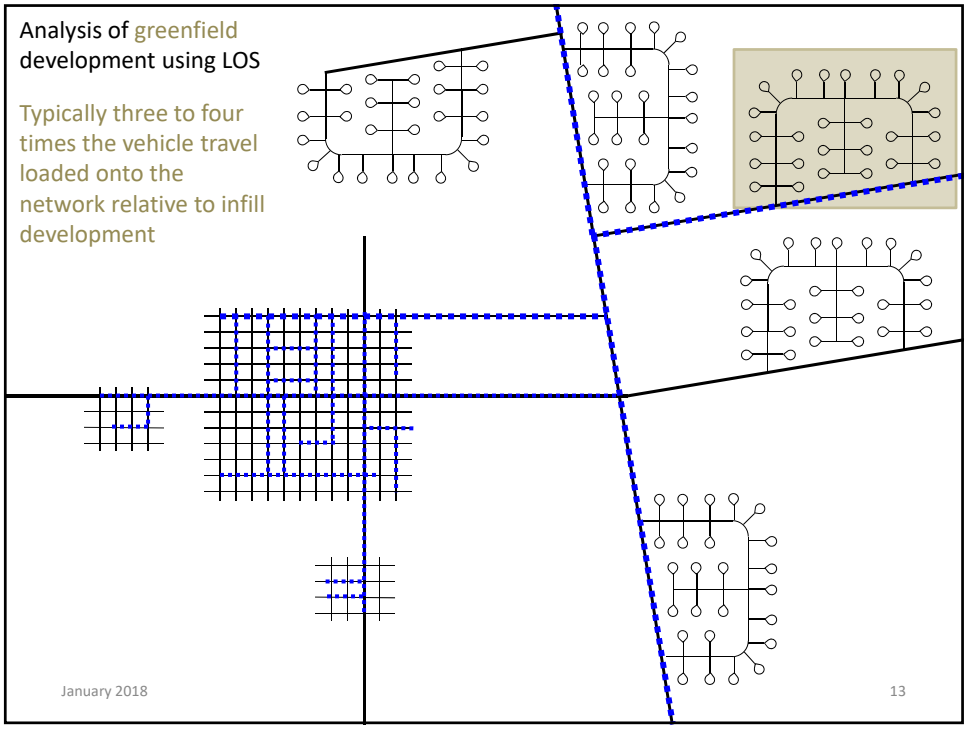


Analysis of greenfield development using LOS



Analysis of greenfield development using LOS

Typically three to four times the vehicle travel loaded onto the network relative to infill development



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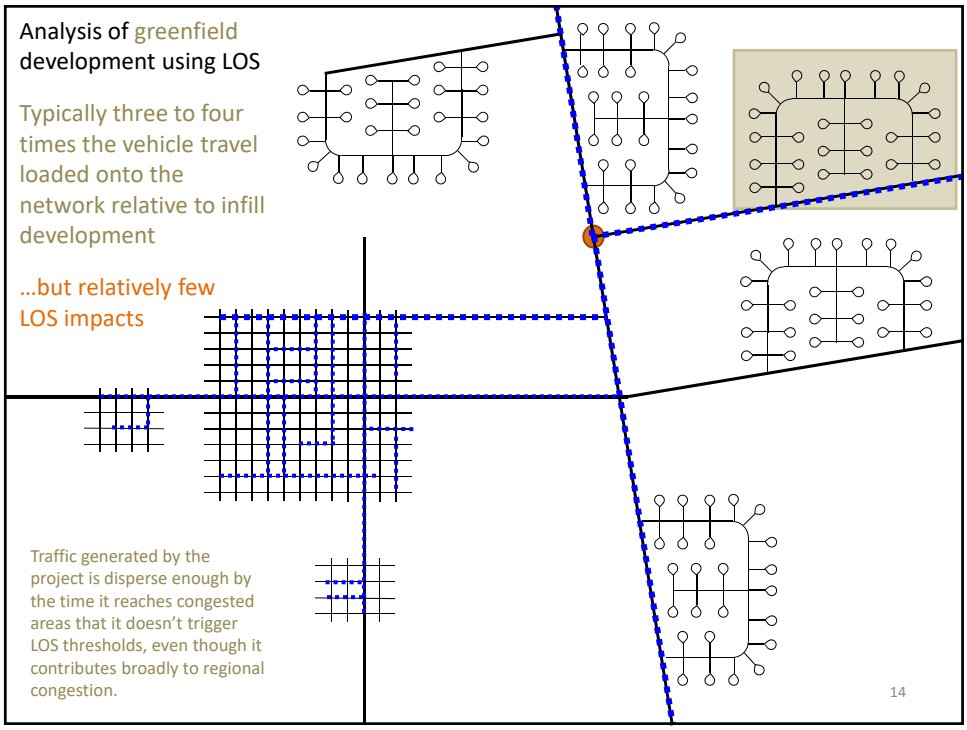
Analysis of greenfield development using LOS

Typically three to four times the vehicle travel loaded onto the network relative to infill development

…but relatively few LOS impacts



Traffic generated by the project is disperse enough by the time it reaches congested areas that it doesn't trigger LOS thresholds, even though it contributes broadly to regional congestion.

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Which is better?

45 min commute, including 5 min from congestion	20 min commute, including 10 min from congestion
↑	↑
Good LOS Grade	Bad LOS Grade
Bad Accessibility	Good Accessibility

Transportation Impact Analysis Today: Problems

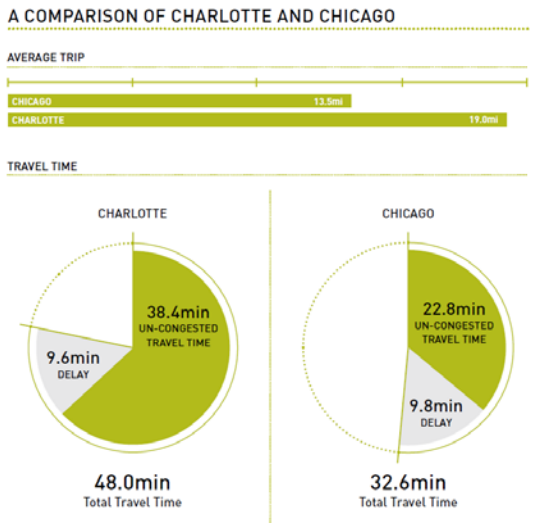
1. **Good grade in LOS ≠ Success in Transportation**

Denver 1982		Denver 2007
1.09	Travel Time Index	1.31
50.6 minutes	Average travel time	49.6 minutes
46.4 mins	Travel time without traffic	37.9 minutes
4.2 mins	Extra rush hour delay	11.7 minutes

http://t4america.org/2012/10/29/telling-only-half-the-story-of-congestion-travel-time-and-the-quality-of-our-metro-areas/

Transportation Impact Analysis Today: Problems

1. Good grade in LOS ≠ Success in Transportation



Driven Apart: How sprawl is lengthening our commutes and why misleading mobility measures are making things worse

Executive Summary:
http://www.opr.ca.gov/docs/Driven_Apart-How_Spral_Is_Legthening_Our_Communities.pdf

Technical Report:
http://www.opr.ca.gov/docs/Driven_Apart_-Technical_Report.pdf

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Transportation Impact Analysis Today: Problems

1. Good grade in LOS ≠ Success in Transportation

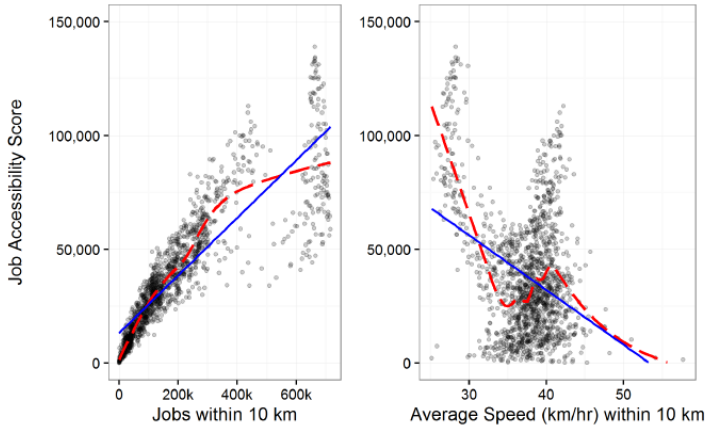

Figure 1 The Relationship between Proximity to Jobs and Job Accessibility (left) and Local Area Traffic Speeds and Job Accessibility (right) in the San Francisco Bay Area

Osman, Thomas, Mondschein, Taylor – MTC Area
http://www.its.ucla.edu/wp-content/uploads/sites/6/2016/08/Taylor-Not-so-Fast-04-01-2016_final.pdf

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Transportation Impact Analysis Today: Problems

1. Good grade in LOS ≠ Success in Transportation

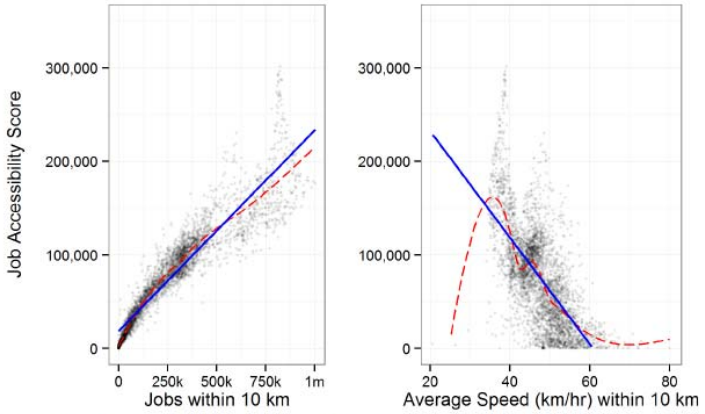

Figure 1 The Relationship Between Proximity To Jobs And Job Accessibility (left) and Local Area Traffic Speeds And Job Accessibility (right)

Mondschein, Osman, Taylor, Thomas – SCAG Area
http://www.its.ucla.edu/wp-content/uploads/sites/6/2015/11/Haynes_Congested-Development_1-Oct-2015_final.pdf

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Transportation Impact Analysis Today: Problems

1. Good grade in LOS ≠ Success in Transportation

"…time lost to commuter traffic delays is more than off-set by the greater opportunities to reach destinations over shorter distances to which high development densities gives rise."

Mondschein, Osman, Taylor, Thomas
http://www.its.ucla.edu/wp-content/uploads/sites/6/2015/11/Haynes_Congested-Development_1-Oct-2015_final.pdf

December 2017

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Transportation Impact Analysis Today: Problems

1. **Good grade in LOS ≠ Success in Transportation**

> **"…myopic focus on the traffic impacts of new developments is misguided and <u>may actually decrease accessibility and economic activity in an effort to protect traffic flows</u>."**

Mondschein, Osman, Taylor, Thomas
http://www.its.ucla.edu/wp-content/uploads/sites/6/2015/11/Haynes_Congested-Development_1-Oct-2015_final.pdf

Transportation Impact Analysis Today: Problems

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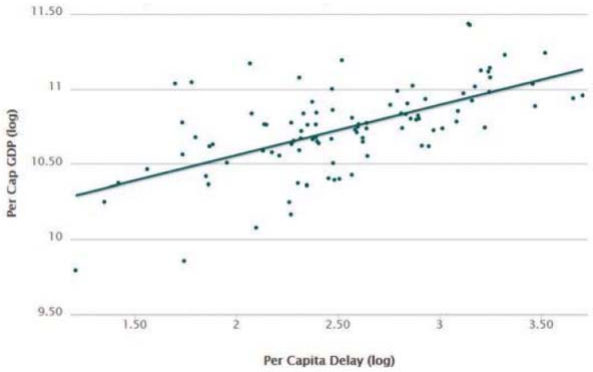

Figure 1: The Relationship between Traffic Delay and GDP in American Metros[6]

Dumbaugh et al., Decisions, Values, and Data: Understanding Bias in Transportation Performance Measures (ITE Journal, August 2014)

Transportation Impact Analysis Today: Problems

1. **Good grade in LOS ≠ Success in Transportation**

Amazon Chooses a Little Congestion – and Real Transportation Options

By Andy Clarke, Director of Strategy

There are twenty cities around the United States that must be pretty excited today at making it onto Amazon's short list for HQ2. Ironically, most of those cities are also awaiting their annual inclusion at the top of the naughty list for congestion – which might seem like a contradiction, especially thinking about a business that is built on the reliability of delivery services and wants to add up to 50,000 jobs to a local economy.

I take two things from this apparent contradiction. First, the Inrix Congestion Index is clearly measuring the wrong things if 8 of their "worst" ten cities are in the running for HQ2 (and the only ones missing are Seattle or HQ1, and San Francisco). Second, Amazon is sticking to its promise of looking for places with a truly multimodal transportation system, as most of the candidates also have mature and well-used transit systems, can boast among the most successful bikesharing systems, and are recognized as leading cities for walkability and bike-friendliness.

Transportation Impact Analysis Today: Problems

1. Good grade in LOS ≠ Success in Transportation
2. **Calculating LOS is expensive and inaccurate**

Van Ness BRT analysis (28MB)

Table VM-13
Intersection Critical Movement Analysis (CMA) and Level of Service (LOS) Summary
Existing (2008) and Future (2005) Conditions

No.	Intersection	Peak Hour	Existing CMA	Existing LOS	Without Project CMA	Without Project LOS	With Project CMA	With Project LOS	With Project Impact	With Project + Mi CMA	With Project + Mi LOS
1.	Sunset Boulevard & Beverly Glen Boulevard (E.)	AM	0.894	D	1.036	F	1.037	F	-0.001	1.036	F
		PM	1.023	F	1.225	F	1.216	F	-0.009	1.215	F
2.	Sunset Boulevard & Beverly Glen Boulevard (W.)	AM	1.169	F	1.385	F	1.388	F	0.003	1.385	F
		PM	1.062	F	1.264	F	1.251	F	-0.013	1.249	F
3.	Wilshire Boulevard & Beverly Glen Boulevard	AM	0.868	D	1.030	F	1.030	F	0.000	1.029	F
		PM	0.854	D	1.140	F	1.133	F	-0.007	1.133	F
4.	Santa Monica Boulevard (N.) & Overland Avenue	AM	0.861	D	1.076	F	1.080	F	0.004	1.078	F
		PM	0.814	D	1.082	F	1.054	F	-0.028	1.054	F
5.	Santa Monica Boulevard (S.) & Overland Avenue	AM	0.478	A	0.358	A	0.358	A	0.000	0.358	A
		PM	0.428	A	0.465	A	0.465	A	0.000	0.465	A
6.	Santa Monica Boulevard (N.) & Beverly Glen Boulevard	AM	0.849	D	1.099	F	1.107	F	0.008	1.104	F
		PM	0.823	D	1.139	F	1.130	F	0.009	1.128	F
7.	Santa Monica Boulevard (S.) & Beverly Glen Boulevard	AM	0.849	D	0.464	A	0.464	A	0.000	0.464	A
		PM	0.884	D	0.575	A	0.575	A	0.000	0.575	A
8.	Santa Monica Boulevard (S.) & Century Park West	AM	0.325	A	1.006	F	1.007	F	0.001	1.005	F
		PM	0.397	A	0.984	E	0.969	E	-0.015	0.969	E
9.	Santa Monica Boulevard (N.) & Club View Drive	AM	0.613	B	0.213	A	0.213	A	0.000	0.213	A
		PM	0.707	C	0.408	A	0.408	A	0.000	0.408	A
10.	Santa Monica Boulevard (N.) & Avenue Of The Stars	AM	0.825	D	1.191	F	1.205	F	0.014	1.199	F
		PM	0.755	C	0.967	E	0.956	E	-0.011	0.955	E
11.	Santa Monica Boulevard (S.) & Avenue Of The Stars	AM	0.508	A	NA		NA			NA	
		PM	0.544	A	NA		NA			NA	
12.	Santa Monica Boulevard (N.) & Century Park East	AM	0.759	C	0.950	E	0.955	E	0.005	0.953	E
		PM	0.686	B	0.846	D	0.805	D	-0.041	0.804	D
13.	Santa Monica Boulevard (S.) & Century Park East	AM	0.771	C	NA		NA			NA	
		PM	0.646	B	NA		NA			NA	
14.	Santa Monica Boulevard (N.) & Wilshire Boulevard	AM	1.096	F	1.261	F	1.263	F	0.002	1.263	F
		PM	1.046	F	1.294	F	1.288	F	-0.006	1.287	F

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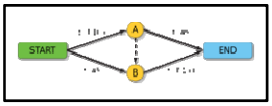
Transportation Impact Analysis Today: Problems

1. Good grade in LOS ≠ Success in Transportation
2. Calculating LOS is expensive and inaccurate
3. **"Fixing" LOS simply moves congestion elsewhere**

http://www.opr.ca.gov/docs/ITE_Journal_Article_-_Decisions_Values_and_Data.pdf

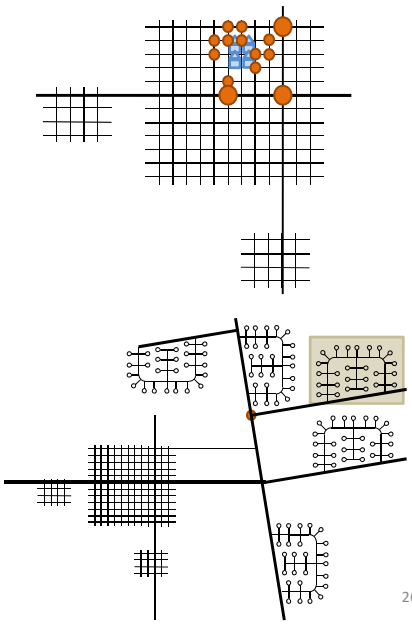


Braess's Paradox

Transportation Impact Analysis Today: Problems

1. **Punishes last-in, inhibits infill, pushes development outward**

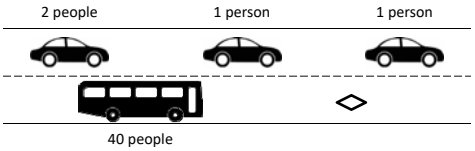
http://www.opr.ca.gov/docs/ITE_Journal_Article_-_Decisions_Values_and_Data.pdf



Transportation Impact Analysis Today: Problems

1. Punishes last-in, inhibits infill, pushes development outward
2. **Inhibits transit and active transportation**

http://www.opr.ca.gov/docs/ITE_Journal_Article_-_Decisions_Values_and_Data.pdf



Transportation Impact Analysis Today: Problems

1. Punishes last-in, inhibits infill, pushes development outward
2. Inhibits transit and active transportation
3. **Forces more road construction than we can afford to maintain**

http://lgc.org/wordpress/docs/events/first_thursday_dinners/ftd_2013_Protecting_Transportation-june.pdf

Transportation Impact Analysis Today: Problems

1. Punishes last-in, inhibits infill, pushes development outward
2. Inhibits transit and active transportation
3. Forces more road construction than we can afford to maintain
4. **Generates an array of environmental impacts**

https://ncst.ucdavis.edu/white-paper/cutting-greenhouse-gas-emissions-is-only-the-beginning-a-literature-review-of-the-co-benefits-of-reducing-vehicle-miles-traveled/

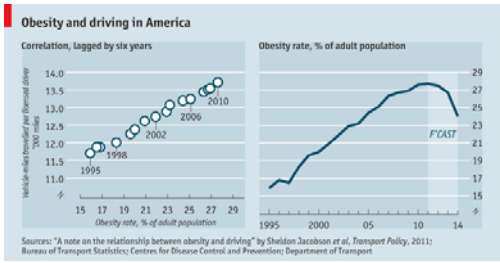
Peer-reviewed research on environmental impacts from high VMT projects:

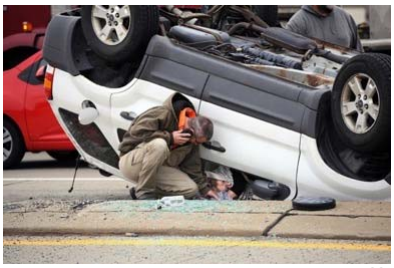
- Emissions
  - GHG
  - Regional pollutants
- Energy use
  - Transportation energy
  - Building energy
- Water
  - Water use
  - Runoff – flooding
  - Runoff – pollution
- Consumption of open space
  - Sensitive habitat
  - Agricultural land

Transportation Impact Analysis Today: Problems

1. Punishes last-in, inhibits infill, pushes development outward
2. Inhibits transit and active transportation
3. Forces more road construction than we can afford to maintain
4. Generates an array of environmental impacts
5. **Worsens public health and safety**

https://ncst.ucdavis.edu/white-paper/cutting-greenhouse-gas-emissions-is-only-the-beginning-a-literature-review-of-the-co-benefits-of-reducing-vehicle-miles-traveled/



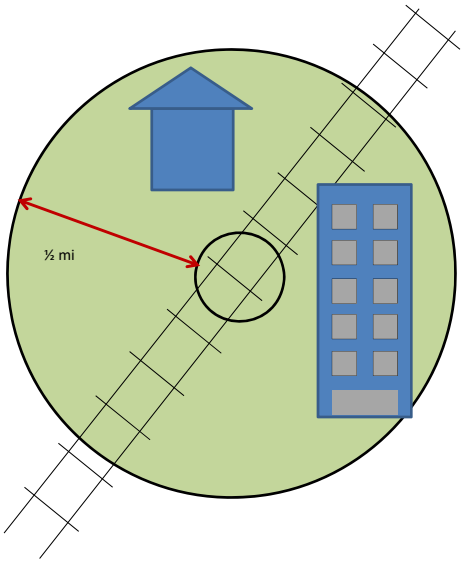


New Metric:

Transportation impact = **Vehicle Miles Traveled (VMT)**

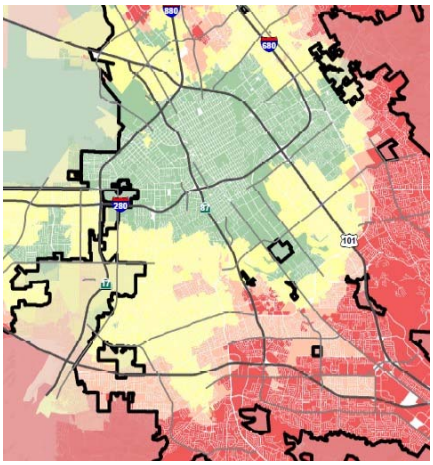
Benefits of VMT as a Measure of Transportation Impact

1. **Streamline TOD**



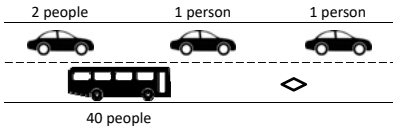
Benefits of VMT as a Measure of Transportation Impact

1. Streamline TOD
2. **Streamline infill**



Benefits of VMT as a Measure of Transportation Impact

1. Streamline TOD
2. Streamline infill
3. **Streamline transit projects**



Benefits of VMT as a Measure of Transportation Impact

1. Streamline TOD
2. Streamline infill
3. Streamline transit projects
4. **Streamline active transportation projects**

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Benefits of VMT as a Measure of Transportation Impact

1. Streamline TOD
2. Streamline infill
3. Streamline transit projects
4. Streamline active transportation projects
5. **Streamline locally-serving retail**

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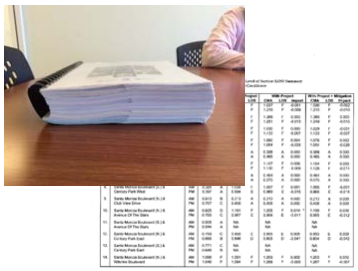
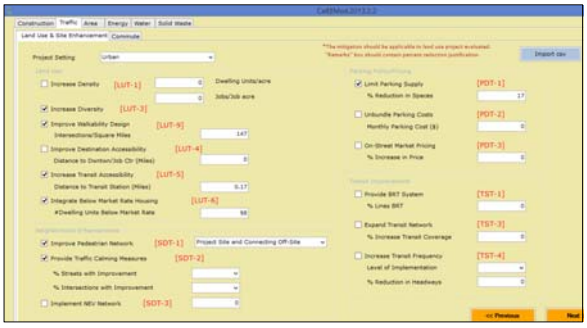
Benefits of VMT as a Measure of Transportation Impact

1. Streamline TOD
2. Streamline infill
3. Streamline transit projects
4. Streamline active transportation projects
5. Streamline locally-serving retail
6. **Streamline modeling for remaining projects**





http://www.caleemod.com/

Benefits of VMT as a Measure of Transportation Impact

1. Streamline TOD
2. Streamline infill
3. Streamline transit projects
4. Streamline active transportation projects
5. Streamline locally-serving retail
6. Streamline modeling for remaining projects
7. **Attack regional congestion more effectively**

http://www.opr.ca.gov/docs/ITE_Journal_Article_-_Decisions_Values_and_Data.pdf

Benefits of VMT as a Measure of Transportation Impact

1. Streamline TOD
2. Streamline infill
3. Streamline transit projects
4. Streamline active transportation projects
5. Streamline locally-serving retail
6. Streamline modeling for remaining projects
7. Attack regional congestion more effectively
8. **Reduce future pavement maintenance deficits**

http://lgc.org/wordpress/docs/events/first_thursday_dinners/ftd_2013_Protecting_Transportation-june.pdf

Benefits of VMT as a Measure of Transportation Impact

1. Streamline TOD
2. Streamline infill
3. Streamline transit projects
4. Streamline active transportation projects
5. Streamline locally-serving retail
6. Streamline modeling for remaining projects
7. Attack regional congestion more effectively
8. Reduce future pavement maintenance deficits
9. **Massive public health improvements**

> 21,000 deaths/y attributable to physical inactivity in California

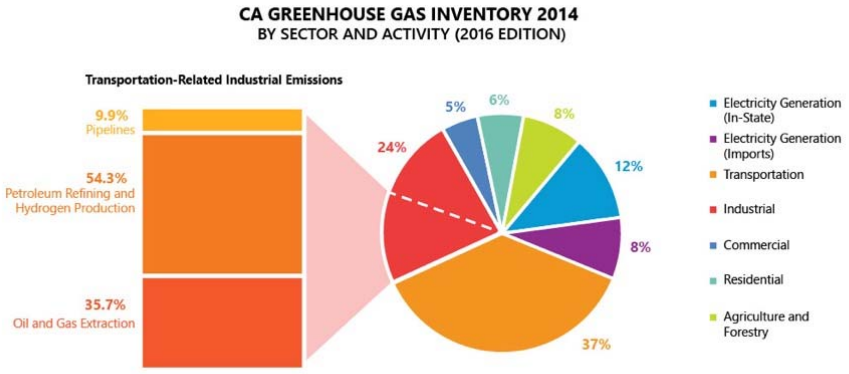
Achieving CA's mode share targets:

- **2,095 fewer deaths annually**
- **$1 billion-$15 billion/y prevented premature death and disability**

Maizlish N. ***Increasing Walking,*** *Cycling, and Transit: Improving Californians' Health, Saving Costs, and Reducing Greenhouse Gases. Final Technical Report to the California Department of Public Health (CDPH)*. Berkeley, CA; 2016. https://www.cdph.ca.gov/programs/Documents/IncreasingWalkingCyclingTransitFinalReport2016rev2017-01-28.pdf

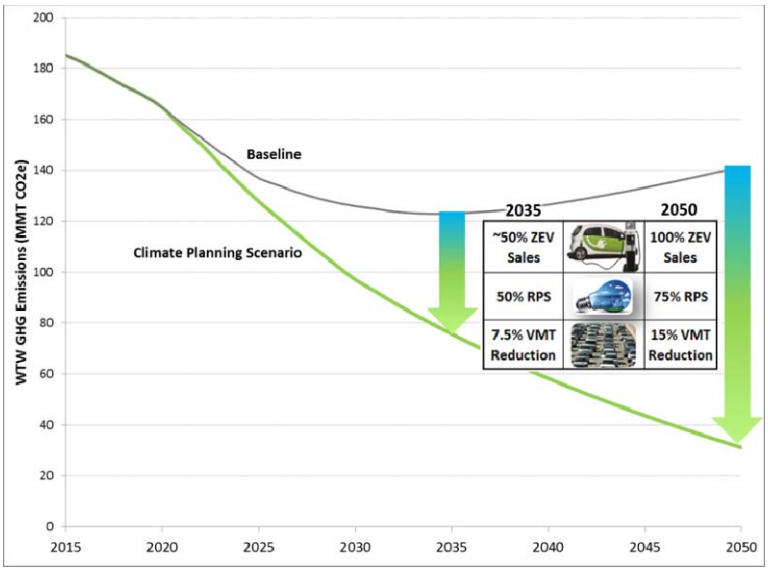
Benefits of VMT as a Measure of Transportation Impact

1. Streamline TOD
2. Streamline infill
3. Streamline transit projects
4. Streamline active transportation projects
5. Streamline locally-serving retail
6. Streamline modeling for remaining projects
7. Attack regional congestion more effectively
8. Reduce future pavement maintenance deficits
9. Massive public health improvements
10. **Reduction in GHG and other emissions**



http://ca50million.ca.gov/Transportation/transportation.html

Background – State GHG Goals



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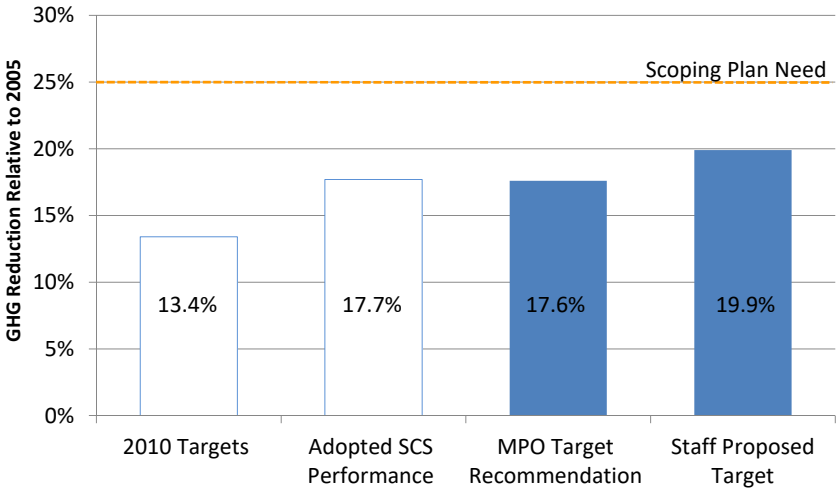
Background – State GHG Goals



https://www.arb.ca.gov/cc/sb375/final_staff_proposal_sb375_target_update_october_2017.pdf

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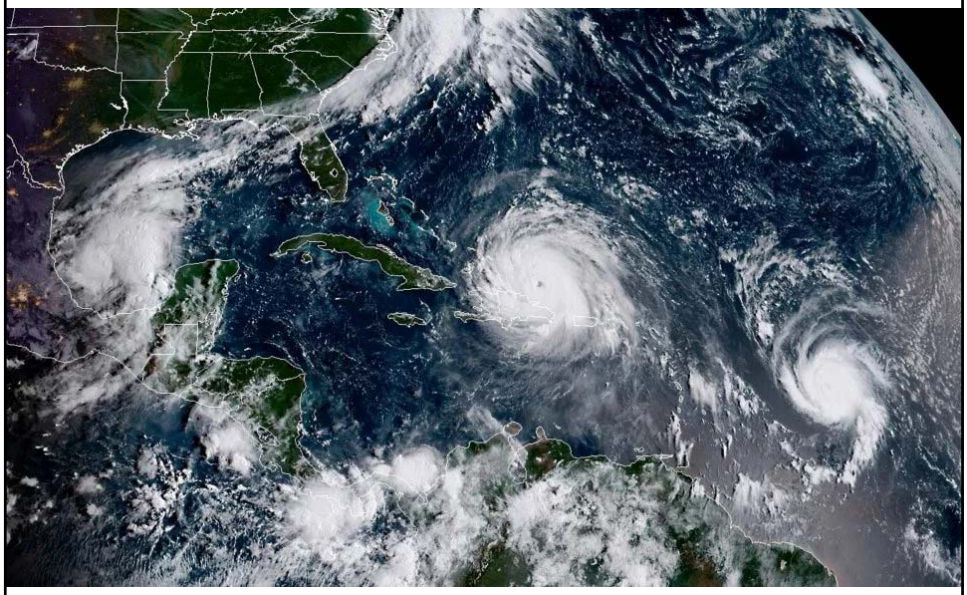

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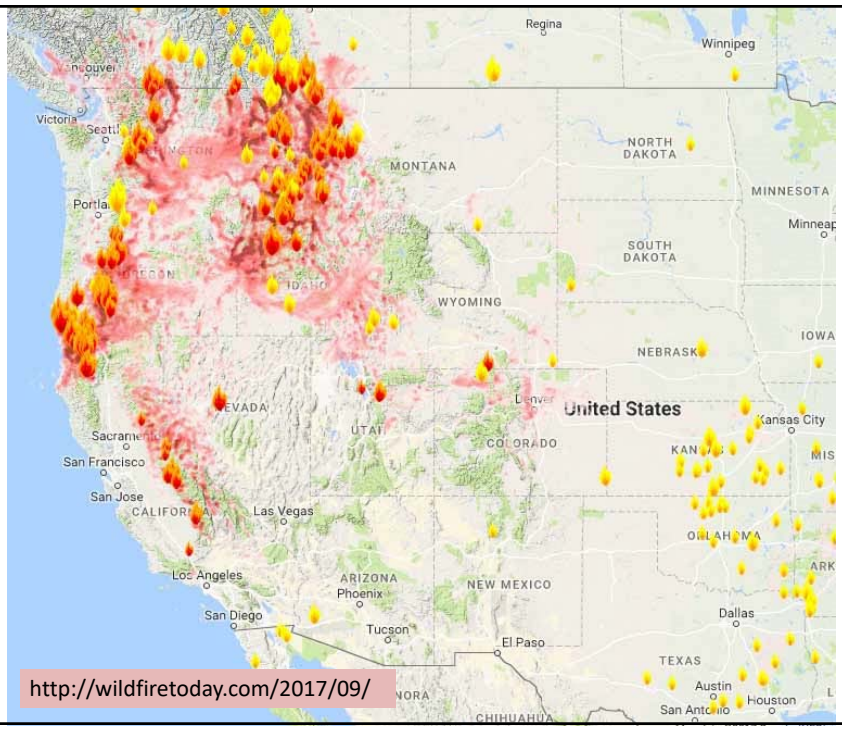


VMT in Case Law

NEPA

Conservation Law Fdn. v. FHA (2007) 630 F. Supp. 2d 183

CEQA

Cal. Clean Energy Comm. v. Woodland (2014) 225 Cal.App.4th 173

Ukiah Citizens for Safety First v. City of Ukiah (2016) 248 Cal.App.4th 256

Cleveland Nat'l Forest Fdn. v. SANDAG (2017) 17 Cal.App.5th 413

Benefits of VMT as a Measures of Transportation Impact

Picturing a low-VMT future

Image Credit: Urban Advantage, Roma Design Group, City of Dana Point

Benefits of VMT as a Measures of Transportation Impact

Picturing a low-VMT future

Image Credit: Urban Advantage, Roma Design Group, City of Dana Point

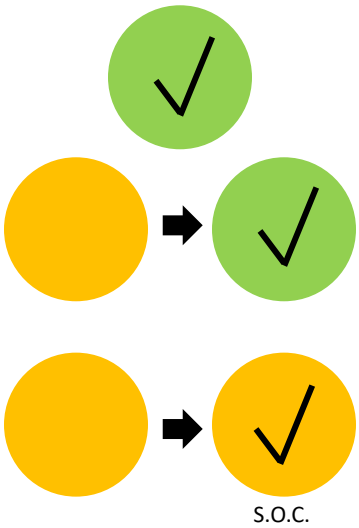
Benefits of VMT as a Measures of Transportation Impact

…as well as for rural areas

September 2017

743: Three Cases

1. Project streamlined
2. Project mitigates VMT to less than significant
3. Project mitigates VMT as feasible, but VMT remains significant



Updates to 743 CEQA Guidelines and Technical Advisory

Guidelines

- Use of VMT optional for highway capacity projects

Technical Advisory

- Don't need to analyze freight VMT
- Only the num. of residential units prescribed in SCS can reference city average
- Mixed use projects may examine just the dominant use
- Redevelopment projects: LTS if decrease VMT; otherwise apply recommended thresholds
- New small project threshold
- Recommend studying a reduced-VMT alternative

Overview and streamlining approaches

OPR Recommendations – Overall Approach

Land Use Projects

Streamline low VMT projects

Mitigate high VMT projects

Transportation Infrastructure Projects

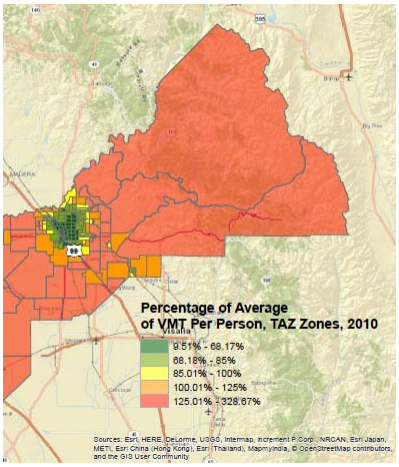
Streamline VMT-reducing projects

Streamline projects which increase VMT only marginally

Mitigate projects which substantially increase VMT

Guidelines and Recommendations - Overview

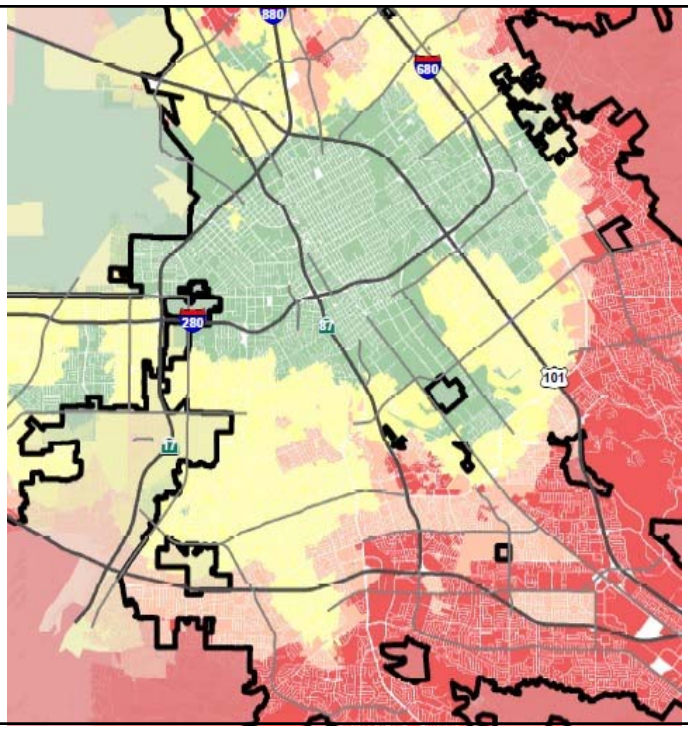
- Primary metric of transportation impact statewide is VMT*
- Use VMT screening maps for residential and office projects
- Presume development near transit leads to a less than significant impact**
- Recommendation that transit, active transportation projects presumed less than significant
- More stringent thresholds may be applied at lead agency discretion



VMT Map of Fresno COG, generated by the California Statewide Travel Demand Model

* Roadway capacity projects at lead agency discretion

**Exceptions:
- FAR < 0.75
- Parking > minimum requirements
- Inconsistent with SCS



Land Use Projects: Methods and Thresholds

OPR Recommendations – Residential and Office

Residential project recommendations:

- Assess residential with trip-based approach
- Threshold: *15 percent below regional or city* VMT/capita*

* For above-average VMT cities

Office project recommendations:

- Assess office with trip-based approach
- Threshold: *15 percent below regional VMT/employee*

OPR Recommendations – Retail

Retail project recommendations:

- Assess retail with "Net VMT" approach
- Retail which increases VMT compared to previous shopping patterns may be considered significant
- Local-serving retail presumed less than significant

OPR Recommendations – Mixed Use

Mixed-use development

- Consider each use separately, compare to threshold for that use, or focus on predominate use
- Either way, each use should take credit for internal capture due to proximity of other uses in project

Streamlining common. For example, Residential-retail—if near transit, locally serving retail, recommend presumed less than significant

OPR Recommendations – Plans

Land Use Plan recommendations:

- Specific plans: *Same methods and thresholds as land use projects*
- General plans: *Consistency with SCS*

Analyze over full area over which the plan may substantively affect travel patterns, including beyond the boundary of the plan or jurisdiction's geography

OPR Recommendations

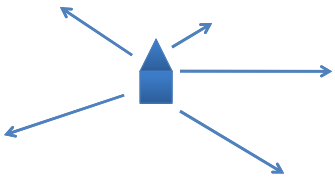
Other recommendations:

- **Rural projects** choose thresholds on a case-by-case basis
- **Small projects** screening threshold – 110 vehicle trips per day
- Addition of **transit** riders not an impact; blocking stations or routes may be an impact

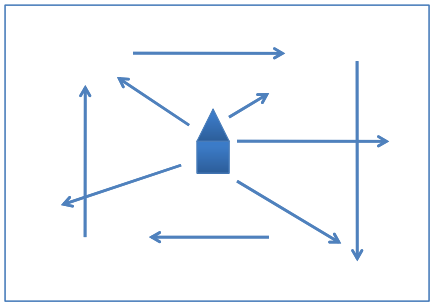
Measuring and Modeling VMT

What VMT to Count

- Trip-based
  - Residential: VMT/capita
  - Office: VMT/employee

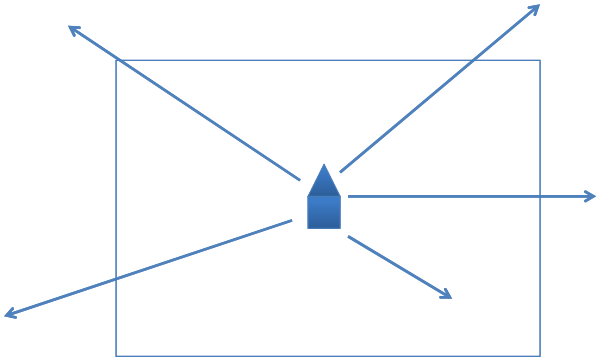


- Net VMT
  - Retail: Net VMT
  - Transportation infrastructure projects: Net VMT



What VMT to Count

CEQA Rule of Reason requires capturing spillover VMT

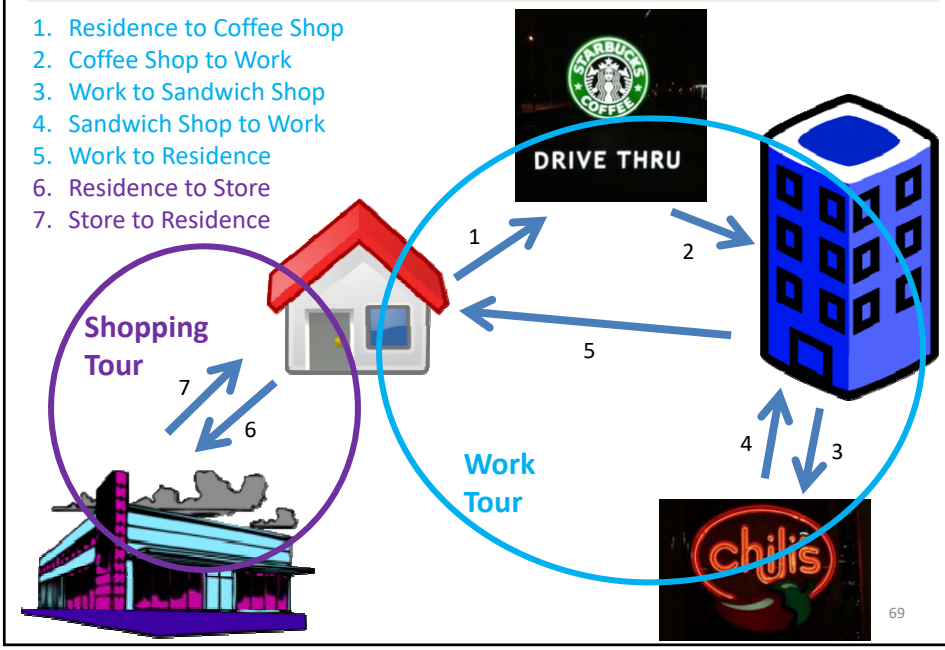


Estimating *tour-based* VMT

1. Residence to Coffee Shop
2. Coffee Shop to Work
3. Work to Sandwich Shop
4. Sandwich Shop to Work
5. Work to Residence
6. Residence to Store
7. Store to Residence

Estimating *tour-based* VMT

1. Residence to Coffee Shop
2. Coffee Shop to Work
3. Work to Sandwich Shop
4. Sandwich Shop to Work
5. Work to Residence
6. Residence to Store
7. Store to Residence



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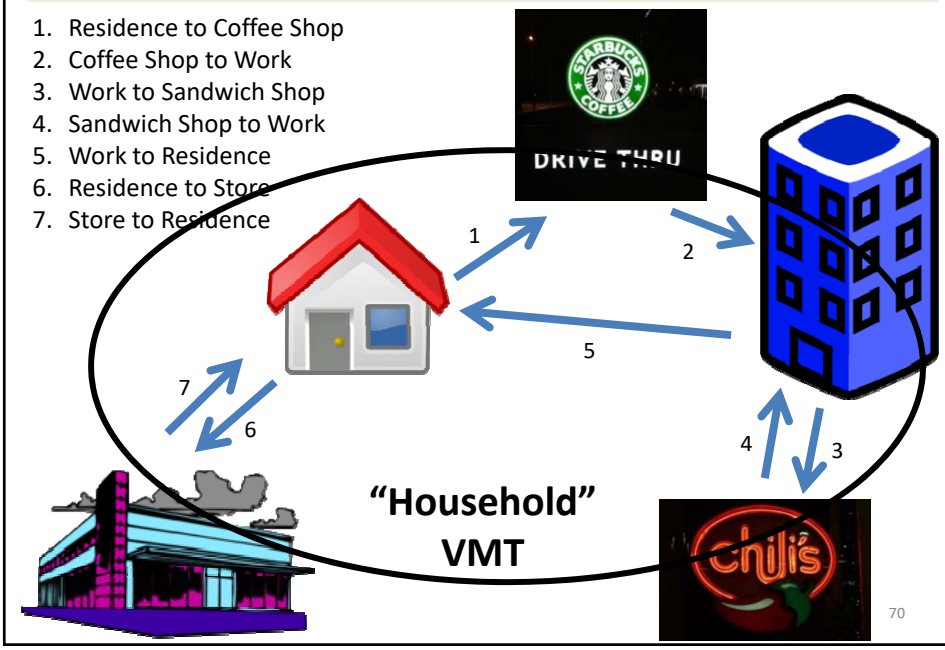
Estimating *tour-based* VMT

1. Residence to Coffee Shop
2. Coffee Shop to Work
3. Work to Sandwich Shop
4. Sandwich Shop to Work
5. Work to Residence
6. Residence to Store
7. Store to Residence



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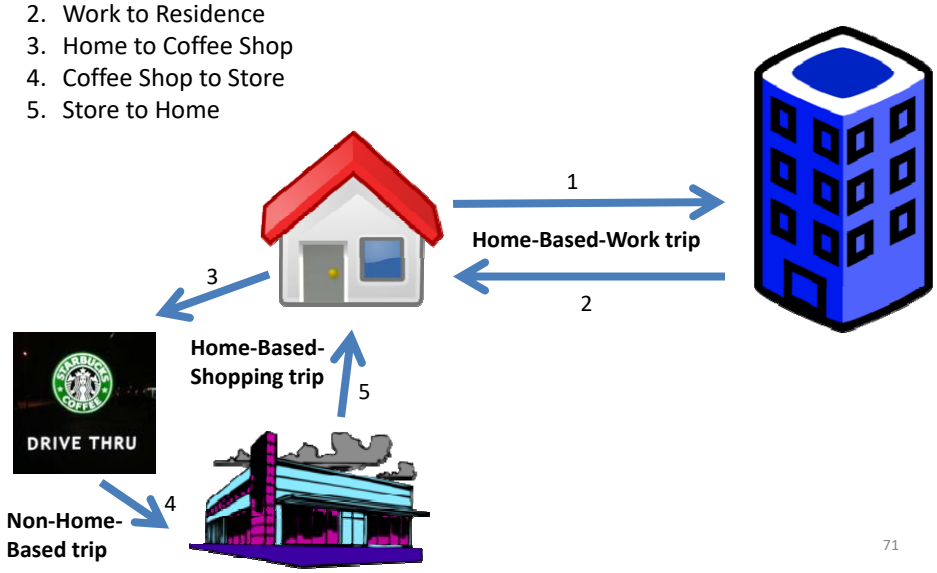
Estimating *trip-based* VMT

1. Residence to Work
2. Work to Residence
3. Home to Coffee Shop
4. Coffee Shop to Store
5. Store to Home



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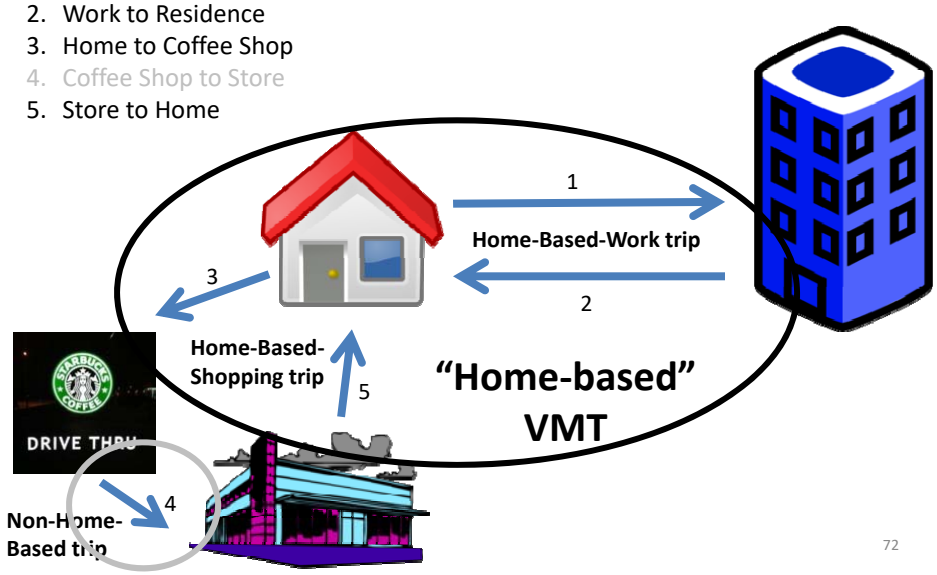
Estimating *trip-based* VMT

1. Residence to Work
2. Work to Residence
3. Home to Coffee Shop
4. Coffee Shop to Store
5. Store to Home



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OPR Recommendations

Methodologies for…

1. Threshold determination
2. Project Assessment
3. Project Mitigation

…must be apples to apples

Transportation projects

OPR Recommendations – Transportation Projects

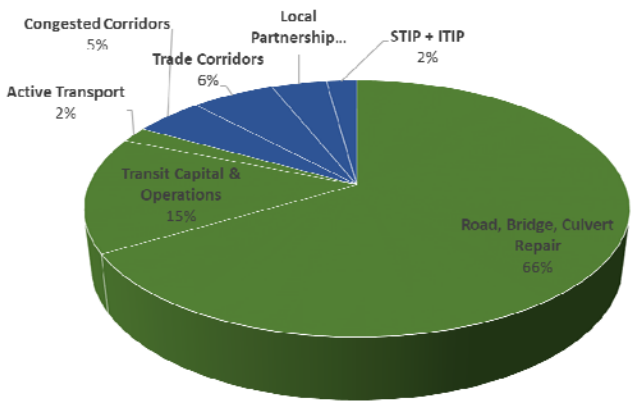
Transportation Project recommendations:

- Presume transit and active transportation projects lead to less than significant VMT
- Projects which substantially increase roadway capacity may induce vehicle travel
- If employing the VMT metric, analyze with "Net VMT" approach
- Roadway projects which add only marginally to capacity presumed to lead to less than significant VMT
  - Examples on next slide…

Roadway projects which add only marginally to capacity presumed to lead to less than significant VMT:

- Rehabilitation, maintenance, replacement and repair
- Roadway shoulder enhancements
- Addition of an auxiliary lane of less than one mile
- Installation, removal, or reconfiguration of traffic lanes that are not for through traffic, such as left, right, and U-turn pockets, or emergency breakdown lanes
- Addition of roadway capacity on local or collector streets
- Conversion of existing general purpose lanes (including ramps) to managed lanes or transit lanes
- Reduction in number of through lanes
- Grade separation
- Installation, removal, or reconfiguration of traffic control devices
- Timing of signals
- Installation of roundabouts
- Installation of traffic calming devices
- Adoption of or increase in tolls
- Addition of tolled lanes, where tolls are sufficient to mitigate VMT increase
- Initiation of new transit service
- Conversion of streets from one-way to two-way
- Removal of off-street parking spaces
- Adoption or modification of on-street parking or loading restrictions
- Addition of traffic wayfinding signage
- Any lane addition under 0.3 miles in length

CEQA Assessment and Mitigation on SB 1-Funded Projects Under SB 743



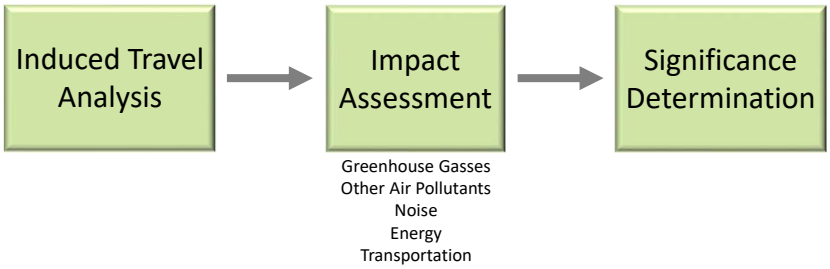
83.2% **Streamlined.** No transportation assessment or mitigation required.

16.8% **No change required.** Requirements for analysis and mitigation unchanged. May analyze VMT at lead agency's discretion.

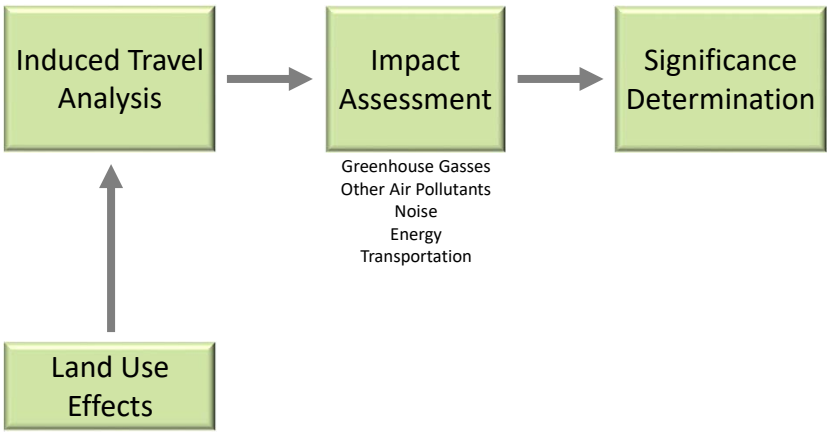
Roadway Capacity Project Analysis in CEQA

Impact Assessment → Significance Determination

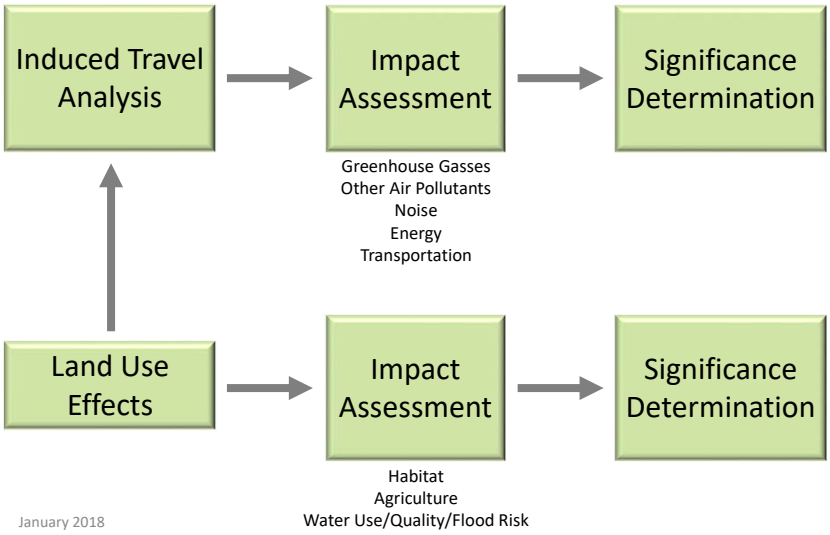
Roadway Capacity Project Analysis in CEQA



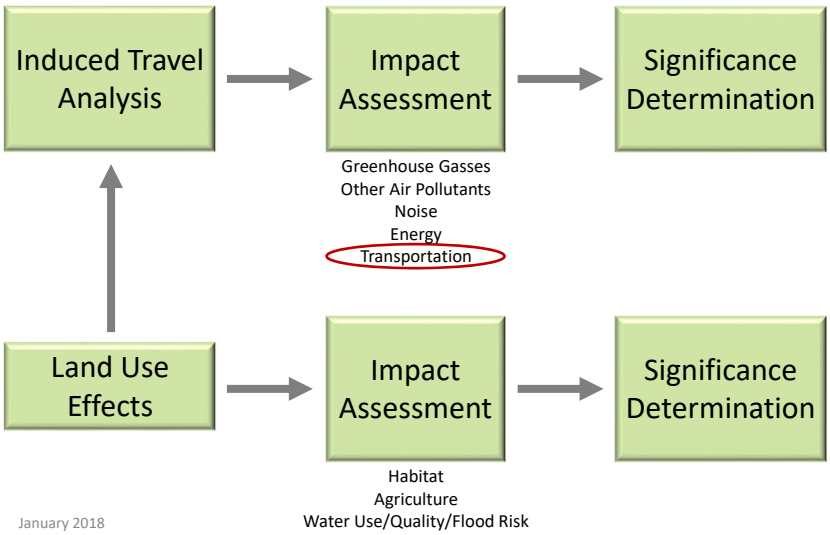
Roadway Capacity Project Analysis in CEQA



Roadway Capacity Project Analysis in CEQA



Roadway Capacity Project Analysis in CEQA

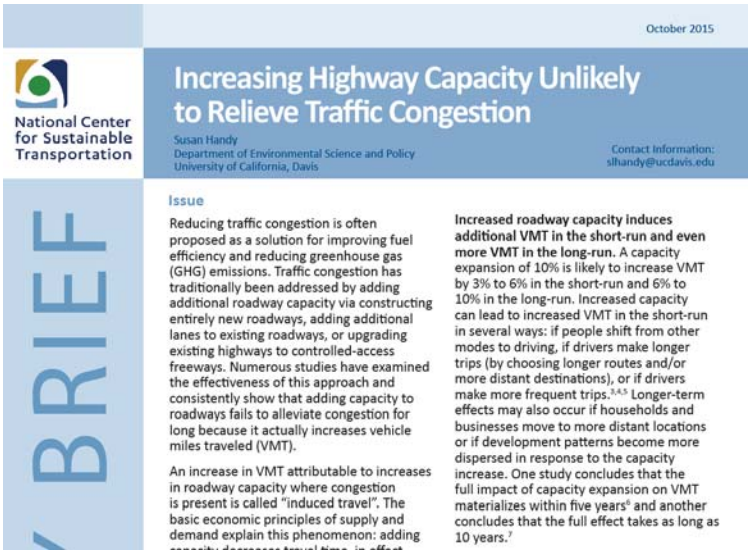


Research on Induced Travel

Summary:

- Adding highway capacity induces VMT
- The Quality of evidence on this phenomenon is high
- Each 1% increase in lane miles causes VMT to ultimately rise by 0.6 to 1.0%
- The research controls for other factors such as population and economic growth; the added VMT results from the capacity increase
- The added VMT is truly new, not shifted from elsewhere
- The new VMT tends to increase GHGs
- The new highway capacity does not increase overall employment or economic activity

Research on Induced Travel



October 2015

National Center for Sustainable Transportation

Increasing Highway Capacity Unlikely to Relieve Traffic Congestion

Susan Handy
Department of Environmental Science and Policy
University of California, Davis

Contact Information:
slhandy@ucdavis.edu

BRIEF

Issue

Reducing traffic congestion is often proposed as a solution for improving fuel efficiency and reducing greenhouse gas (GHG) emissions. Traffic congestion has traditionally been addressed by adding additional roadway capacity via constructing entirely new roadways, adding additional lanes to existing roadways, or upgrading existing highways to controlled-access freeways. Numerous studies have examined the effectiveness of this approach and consistently show that adding capacity to roadways fails to alleviate congestion for long because it actually increases vehicle miles traveled (VMT).

An increase in VMT attributable to increases in roadway capacity where congestion is present is called "induced travel". The basic economic principles of supply and demand explain this phenomenon: adding

Increased roadway capacity induces additional VMT in the short-run and even more VMT in the long-run. A capacity expansion of 10% is likely to increase VMT by 3% to 6% in the short-run and 6% to 10% in the long-run. Increased capacity can lead to increased VMT in the short-run in several ways: if people shift from other modes to driving, if drivers make longer trips (by choosing longer routes and/or more distant destinations), or if drivers make more frequent trips.[3,4,5] Longer-term effects may also occur if households and businesses move to more distant locations or if development patterns become more dispersed in response to the capacity increase. One study concludes that the full impact of capacity expansion on VMT materializes within five years[6] and another concludes that the full effect takes as long as 10 years.[7]

Assessing Induced Travel

Capacity added → travel time initially reduced →

1. Longer trips (↑ VMT)
2. Mode shift toward automobile (↑ VMT)
3. Newly generated trips (↑ VMT)
4. Route changes (can ↑ or ↓ or VMT)
5. More disperse land use development (↑ VMT)

Assessing Induced Travel

Two methods:

1. Elasticity (long run)
   - – Not customized to project
   - + Can't be gamed
   - + Includes all components of induced travel (including land use)
2. Travel demand model
   - – Easily gamed
   - – Omits land use changes (and sometimes trip generation changes)
   - + Customized to project

Assessing Induced Travel

Assessing induced VMT using elasticities:

$$\text{Elasticity} = \frac{\%\Delta\text{VMT}}{\%\Delta\text{ Lane Miles}}$$

$$\downarrow$$

$$\%\Delta\text{ Lane Miles } \times \text{Existing VMT } \times \text{Elasticity} = \text{Project VMT}$$

Assessing Induced Travel

Assessing induced VMT using a travel demand model:

A travel demand model can estimate

1. Longer trips
2. Mode shift toward automobile
3. Newly generated trips [in some cases]
4. Route changes

But not:

5. Land use changes
6. Newly generated trips [in some cases]

Assessing Induced Travel

OPR-recommended methods for incorporating land use changes, when using a travel demand model:

A. Use elasticities from the research directly

B. Adjust model results to align with empirical research

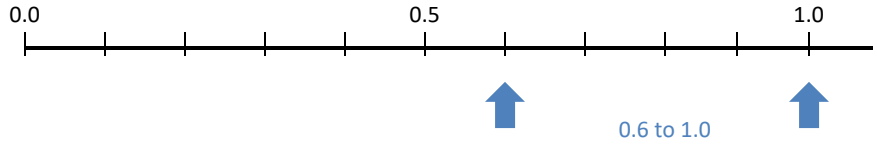
C. Employ an expert panel

D. Employ a land use model, iterate with travel model

Verify with empirical research

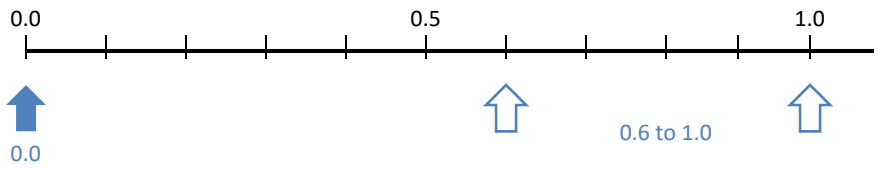
Assessing Induced Travel

Uncertainty and accuracy



Assessing Induced Travel

Uncertainty and accuracy



Assessing Induced Travel

16 disP 190 · 48.3 (3/2012)

"You can't build your way out of congestion." – Or can you?

A Century of Highway Plans and Induced Traffic

Brian Ladd

Brian Ladd is a Research Associate in history at the University at Albany, State University of New York, and the author of books on German urban history as well as *Autophobia: Love and Hate in the Automotive Age* (University of Chicago Press, 2008).

Abstract: The pheno
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has it rarely been fac
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had emerged by the
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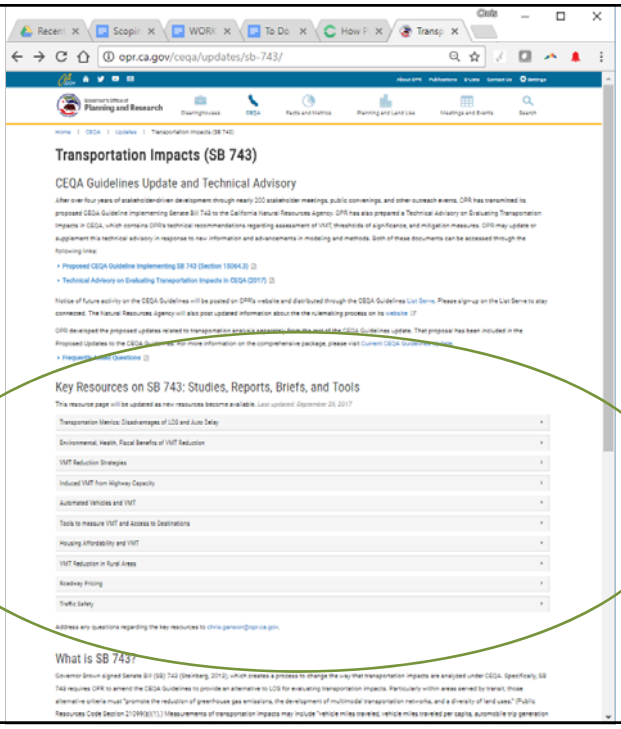
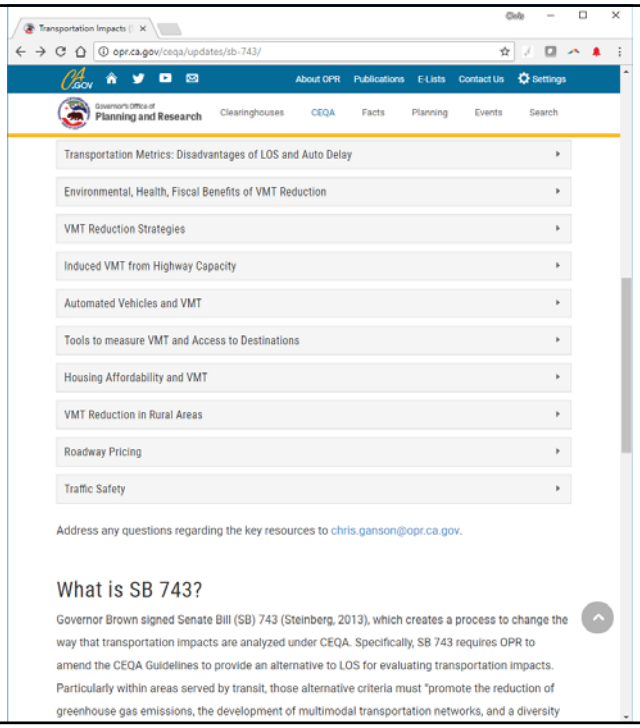
"The phenomenon of induced traffic was recognized (if rarely measured) even before the automotive age. Its existence calls into question the effectiveness of road construction as a solution to traffic congestion. Why, then, has it rarely been factored into highway investment decisions? An examination of references to induced traffic suggests that it posed an inconvenient complication to a consensus that had emerged by the 1920s. That consensus endorsed automotive mobility along with a commitment to keep building road space as long as traffic grew to fill it. Recent research challenges the factual assumptions underlying that consensus, but has not yet overturned the deeper beliefs upon which it rests."

http://www.opr.ca.gov/docs/You_can't_build_your_way_out_of_congestion_-_or_can_you.pdf

Resources on OPR Website





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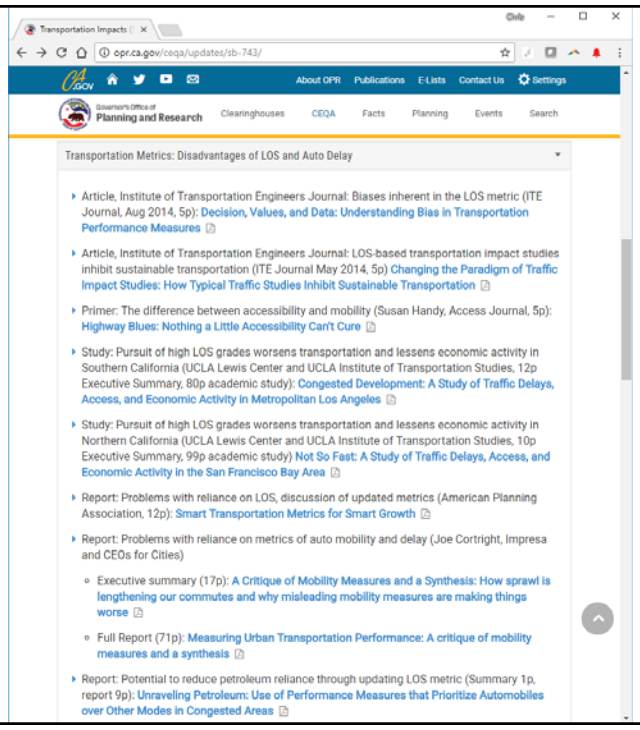

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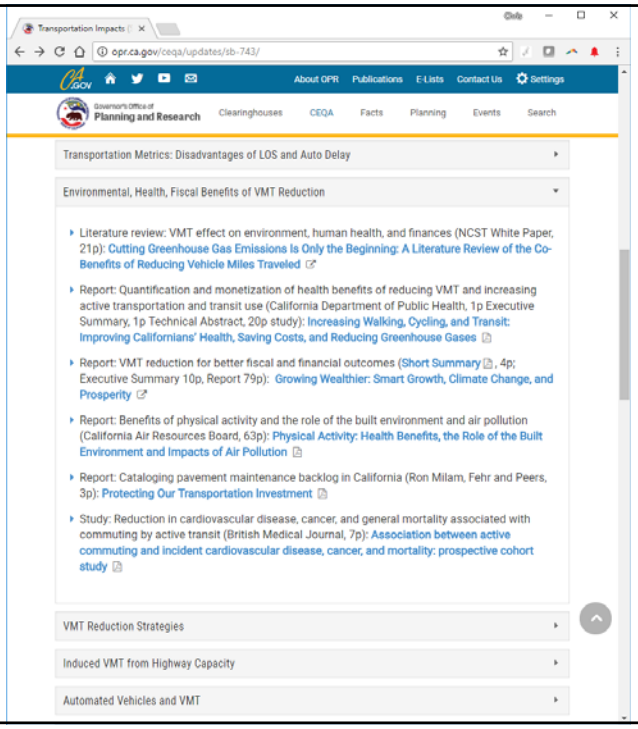

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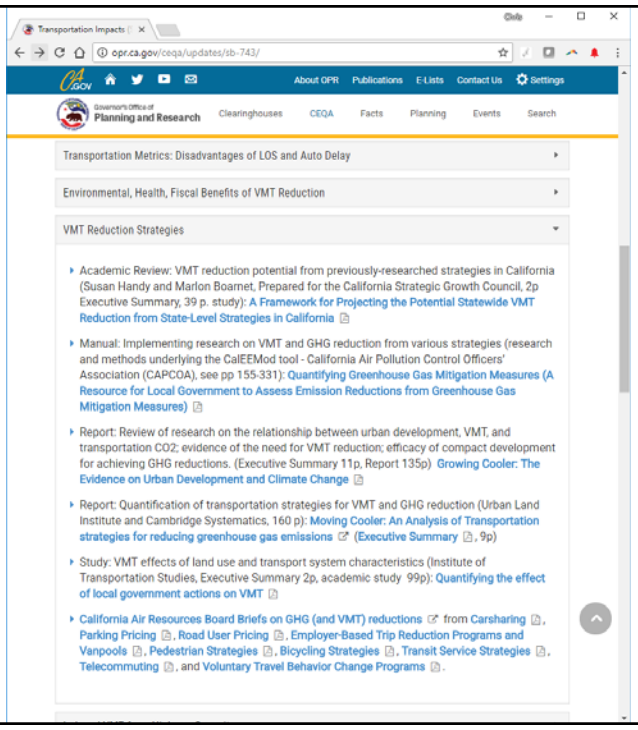

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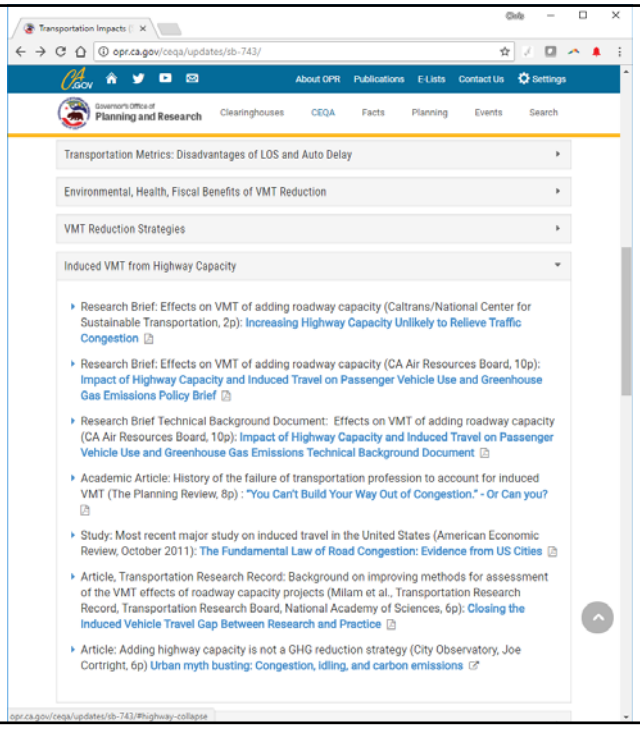

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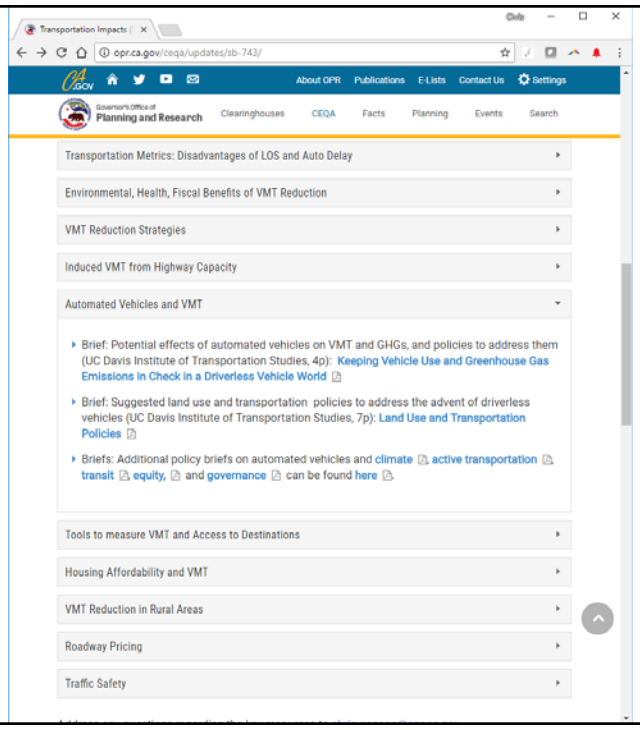

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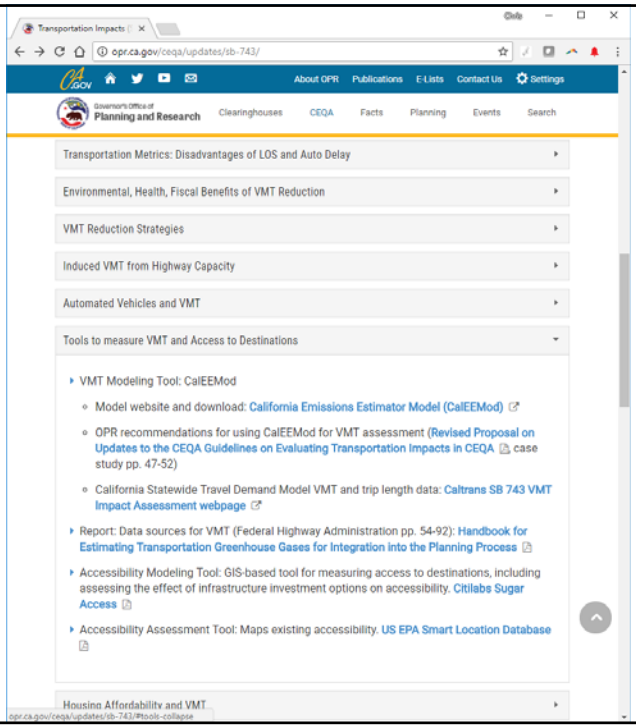

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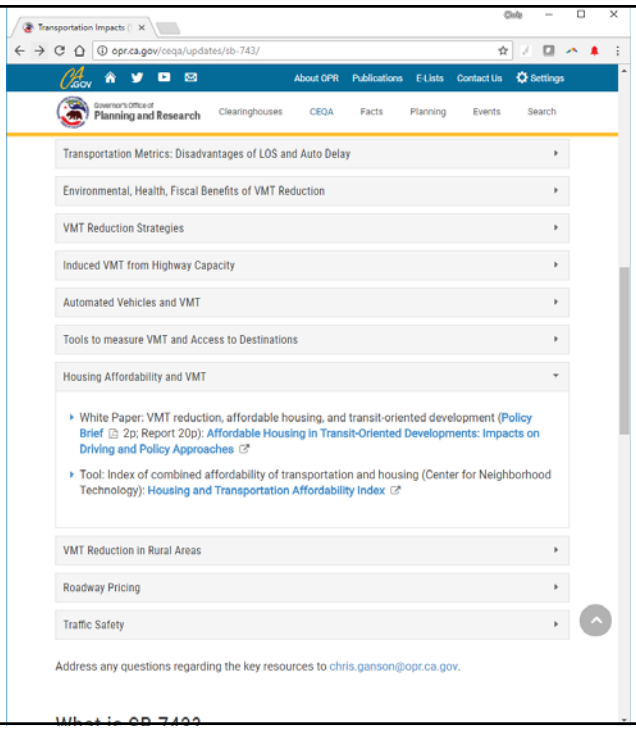

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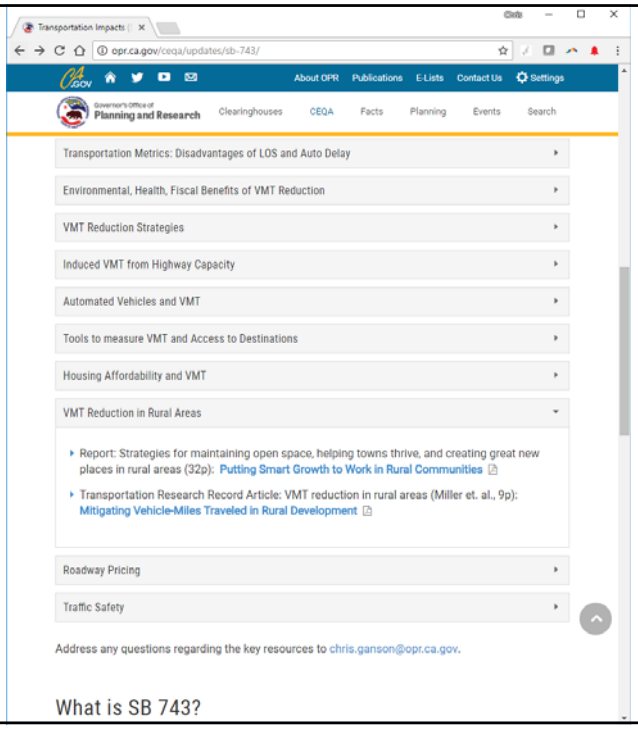

January 2018

What is SB 743?

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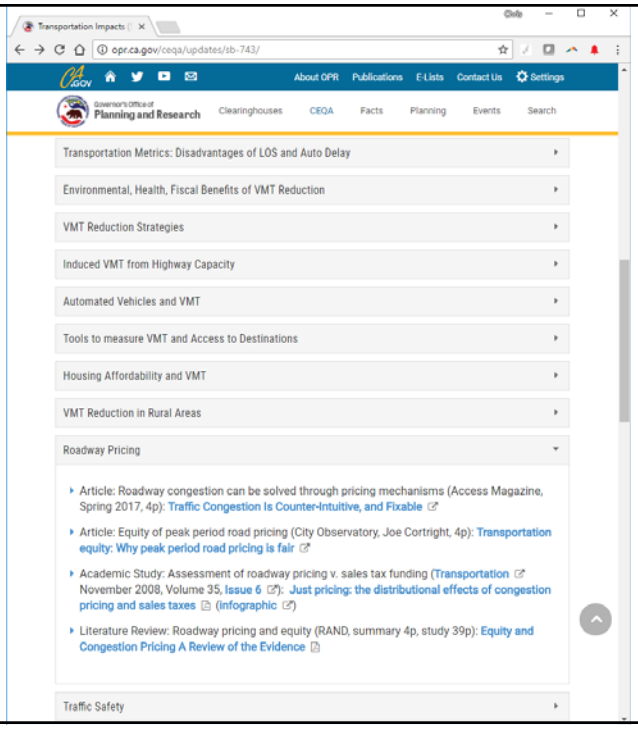

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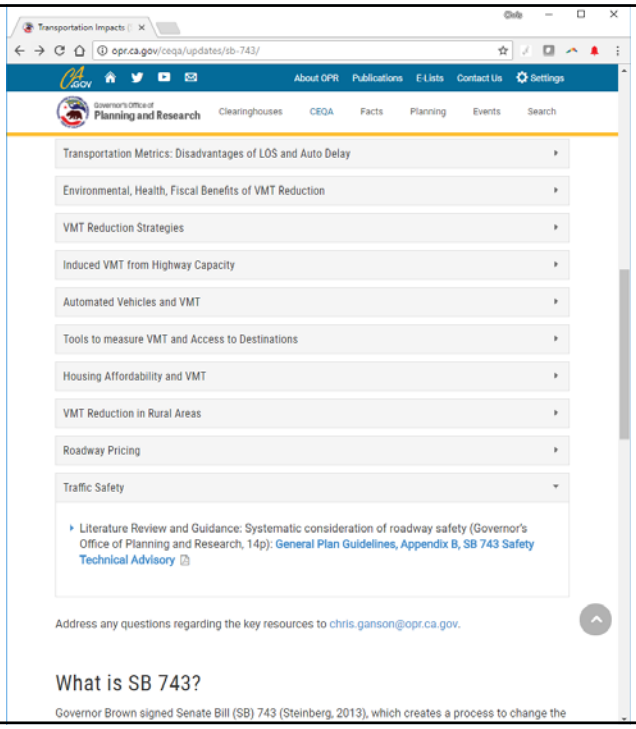


Recommendations for Transportation planning

Plan Transportation for the Well-Being of Your City (Not Vice Versa)

Stop using LOS for Transportation Impact Studies

Thinking/Visioning : what kind of city (region, etc.) do we want?

What transportation infrastructure forwards that vision?

Replace Ad-hoc, LOS-based charges with impact fee program based on VMT

Plan Transportation for the Wellbeing of Your City (Not Vice Versa)

Stop using LOS for Transportation Impact Studies

Thinking/Visioning : what kind of city (region, etc.) do we want?

What transportation infrastructure forwards that vision?

Replace Ad-hoc, LOS-based charges with impact fee program based on VMT

Plan Transportation for the Wellbeing of Your City (Not Vice Versa)

What transportation infrastructure forwards that vision?

Direct measures of access, e.g.

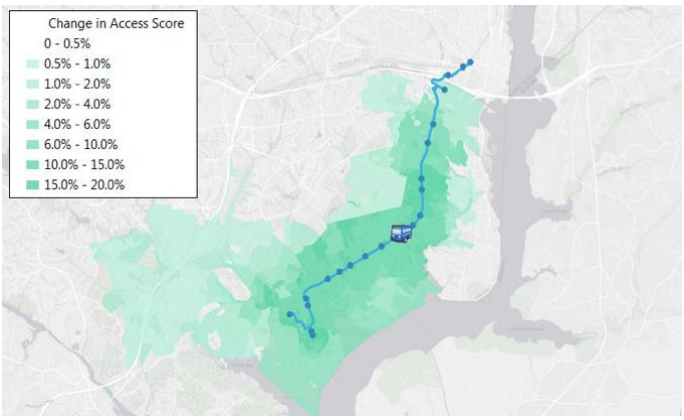
- Sugar Access (Citilabs) tool
- Rails to Trails Low-Stress Bikeways tool

Use LOS as a stopgap metric to inform planning, *not* to assess impacts to development

Weigh your jurisdiction's transportation interests alongside livability, safety for bikes and pedestrians, fiscal viability, land consumption, energy/water use, GHG emissions, etc.

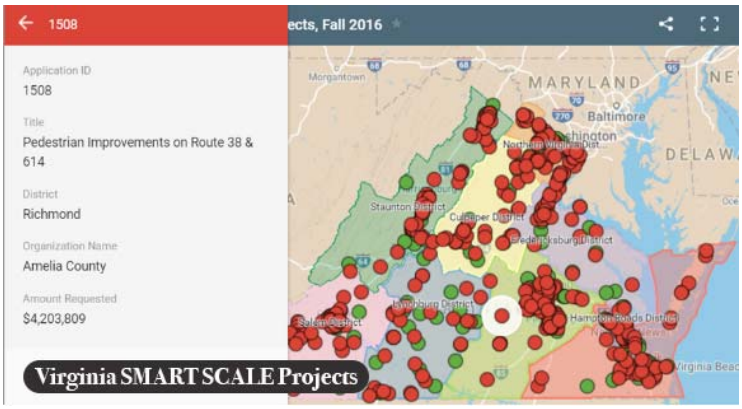
Plan Transportation for the Well-Being of Your City (Not Vice Versa)

Assess transportation infrastructure investments by how much they will improve Access to Destinations



Plan Transportation for the Well-Being of Your City (Not Vice Versa)

Assess transportation infrastructure investments by how much they will improve Access to Destinations



Planning for Safety in Transportation

Planning for safety in transportation

Old:

- Streamlining automobile flow
- Accommodate driver error

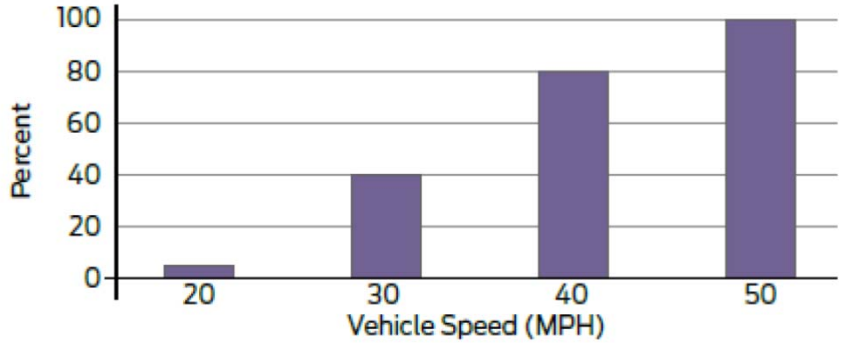
Updated:

- Reduce speed and increase driver attention
- Protect vulnerable road users
- Reduce overall VMT and sprawl

Country	*Road traffic deaths per 100 000 pop*
Sweden	2.8
United Kingdom	2.9
Switzerland	3.3
Netherlands	3.4
Denmark	3.5
Singapore	3.6
Spain	3.7
Norway	3.8
Ireland	4.1
Germany	4.3
Iceland	4.6
Japan	4.7
Finland	4.8
France	5.1
Austria	5.4
Canada	6.0
New Zealand	6.0
Italy	6.1
United States of America	10.6

World Health Organization
http://apps.who.int/gho/data/node.main.A997

Risk of Pedestrian Fatality by Auto Speed



Source: Federal Highway Administration

Planning for safety in transportation

Higher speeds increase both the likelihood and severity of collisions

- "Speed is likely to be the single most important determinant of the number of traffic fatalities."
- "…[S]peed has a major impact on the number of accidents and the severity of injuries and that the relationship between speed and road safety is causal, not just statistical."
- "Changes in speed are found to have a strong relationship to changes in the number of accidents or the severity of injuries."
- "The relationship between speed and road safety is robust and satisfies all criteria of causality commonly applied in evaluation research."

Elvik R et al. *Safety-in-numbers: A systematic review and meta-analysis of evidence.* Safety Science. 2015; doi:10.1016/j. ssci.2015.07.017.

Image by Urban Advantage, Raimi & Associates

Planning for safety in transportation

Lane width is key to safety

- Wider lanes (over 10.8 to 11.2 feet) are associated with 33% higher impact speeds and higher crash rates
- Both narrow (less than 9.2 feet) and wide (over 10.2 to 10.5 feet) lanes have proven to increase crash risks, with equal magnitude. Wider lanes (wider than 10.8 feet) adversely affect overall side-impact collisions
- The overall capacity of narrower lanes is higher
- For large vehicles, no difference on safety and carrying capacity is observed between narrower and wider lanes
- Pedestrian volumes decline as lanes widen
- Intersections with narrower lanes provide the highest capacity for bicycles

Karim, D. M. *Narrower Lanes, Safer Streets* (2015)

Planning for safety in transportation

Prioritize protection of vulnerable road users

- Safety of vulnerable road users (e.g. pedestrians and bicyclists) should be given relatively more attention, due to their vastly increased risk of serious injury and fatality.
- Improving safety is key to increasing biking and walking mode shares
- Increased biking and walking mode shares leads to improved public health

Planning for safety in transportation

Build low VMT development

- Higher VMT increases crash exposure
- Reducing VMT reduces collision exposure and improves safety (Dumbaugh and Rae, 2009, p. 325; Ewing, Scheiber, and Zegeer, 2003).
- As a result, low VMT infill development itself provides safety benefits by reducing motor vehicle collision exposure, lowering speeds, and increasing pedestrian and cyclist volumes leading to “safety in numbers” (in addition to substantially improving overall health).

County	Sprawl Index*	All-mode traffic fatality rate (per 100,000)
Counties with more compact urban form		
New York, NY (New York)	352	4.42
Kings County, NY (New York)	264	4.46
Bronx County, NY (New York)	250	4.20
Queens County, NY (New York)	219	4.58
San Francisco County, CA (San Francisco)	209	6.31
Hudson County, NJ (Jersey City)	190	5.91
Philadelphia County, PA (Philadelphia)	188	8.04
Suffolk County, MA (Boston)	179	4.49
Richmond County, NY (New York)	163	5.63
Baltimore City, MD (Baltimore)	163	7.68

Most compact counties:
4 to 8 fatalities per 100,000 population

Most sprawling counties:
13 to 39 fatalities per 100,000 population

County	Sprawl Index*	All-mode traffic fatality rate (per 100,000)
Counties with more sprawling urban form		
Stokes County, NC (Winston Salem)	71	15.66
Miami County, KS (Kansas City)	71	38.80
Davie County, NC (Winston Salem)	71	25.84
Isanti County, MN (Minneapolis St. Paul)	70	12.78
Walton County, GA (Atlanta)	70	19.77
Yadkin County, NC (Winston Salem)	69	38.52
Goochland County, VA (Richmond)	68	35.58
Fulton County, OH (Toledo)	67	38.02
Clinton County, MI (Lansing)	67	16.99
Geauga County, OH (Cleveland)	63	20.90

*Lower sprawl index values indicate more sprawling urban form.
Source: Ewing et al., 2003.

Sprawl measured by
- Lowness of density
- Lack of mixing of uses
- Absence of activity centers such as strong downtowns or suburban town centers
- Largeness of block sizes/poorness of street connectivity

Planning for safety in transportation

To improve safety:
- Improve visibility at intersections
- Shorten corner radii
- Add pedestrian safety islands
- Reducing signal cycle lengths
- Providing a leading pedestrian interval
- Provide a “scramble” signal phase where appropriate
- Add curb extensions or bulb-outs
- Add bicycle facilities (On higher speed roads, add protected bicycle facilities)
- Reduce travel lane width below 10.8 feet (but not below 9.2 feet)
- Add traffic calming measures
- Add landscaping features
- Provide mid-block crossings
- Reduce VMT
  - Increase density and/or diversity of land uses
  - Provide travel demand management measures
  - Provide transit
  - Provide pedestrian facilities
  - Provide bicycle facilities

Thanks!

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