Transportation to What Ends?

Chris Ganson
Governor’s Office of Planning and Research

June 2017
Old metric:

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

<table>
<thead>
<tr>
<th>LOS</th>
<th>Signalized Intersection</th>
<th>Unsignalized Intersection</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>( \leq 10 \text{ sec} )</td>
<td>( \leq 10 \text{ sec} )</td>
</tr>
<tr>
<td>B</td>
<td>10–20 sec</td>
<td>10–15 sec</td>
</tr>
<tr>
<td>C</td>
<td>20–35 sec</td>
<td>15–25 sec</td>
</tr>
<tr>
<td>D</td>
<td>35–55 sec</td>
<td>25–35 sec</td>
</tr>
<tr>
<td>E</td>
<td>55–80 sec</td>
<td>35–50 sec</td>
</tr>
<tr>
<td>F</td>
<td>( \geq 80 \text{ sec} )</td>
<td>( \geq 50 \text{ sec} )</td>
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</tbody>
</table>
Analysis of infill development using LOS
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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
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Typically three to four times the vehicle travel loaded onto the network relative to infill development.
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.
Figure 1: The Relationship between Traffic Delay and GDP in American Metros

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

45 min commute, including 5 min from congestion

Good LOS Grade
Bad Accessibility

20 min commute, including 10 min from congestion

Bad LOS Grade
Good Accessibility
Transportation Impact Analysis Today: Problems

1. Good grade in LOS ≠ Success in Transportation

Denver 1982
- Travel Time Index: 1.09
- Average travel time: 50.6 minutes (46.4 mins + 4.2 mins)

Denver 2007
- Travel Time Index: 1.31
- Average travel time: 49.6 minutes
- Travel time without traffic: 37.9 minutes
- Extra rush hour delay: 11.7 minutes

1. Good grade in LOS ≠ Success in Transportation

A COMPARISON OF CHARLOTTE AND CHICAGO

<table>
<thead>
<tr>
<th></th>
<th>Average Trip</th>
<th>Travel Time</th>
</tr>
</thead>
<tbody>
<tr>
<td>CHICAGO</td>
<td>13.5mi</td>
<td>22.8min</td>
</tr>
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<td>CHARLOTTE</td>
<td>19.0mi</td>
<td>9.8min UN-CONGESTED TRAVEL TIME</td>
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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_Comunities.pdf](http://www.opr.ca.gov/docs/Driven_Apart-How_Spral_Is_Legthening_Our_Comunities.pdf)

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
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
1. Good grade in LOS ≠ Success in Transportation

Speed and proximity included as predictors in a multi-factor statistical model to simultaneously account for effects within and between communities.

The effects of proximity (i.e. nearby jobs) on overall job accessibility are far greater than the effects of faster travel speeds due to lower levels of congestion.
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.”

“...myopic focus on the traffic impacts of new developments is misguided and may actually decrease accessibility and economic activity in an effort to protect traffic flows.”

Mondschein, Osman, Taylor, Thomas
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)
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
Transportation Impact Analysis Today: Problems

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

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

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Transportation Impact Analysis Today: Problems

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


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

Auto-mobility remains of fundamental importance to transportation for the foreseeable future.

Our current approach—centered on improving auto mobility rather than access to destinations—slows development, harms the economy, renders other modes unviable, harms health, harms the environment, is unaffordable...and fails to deliver auto mobility.
New Metric:
Transportation impact = **Vehicle Miles Traveled (VMT)**
Benefits of VMT as a Measures 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
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http://www.caleemod.com/
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> 23,000 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 deaths and disability

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Picturing a low-VMT future

Image Credits- Urban Advantage, Roma Design Group, City of Dana Point
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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 project impacts*

Weigh your jurisdiction’s transportation interests with livability, safety for vulnerable road users, long-term fiscal viability, land consumption, energy/water use, GHG emissions, etc.
Roadway expansion reduces travel time, which leads to:

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)

We would expect each of these effects as a result of basic supply and demand.
Inconvenient Truth #2: Induced VMT

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 capacity decreases travel time, in effect.

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. 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 and another concludes that the full effect takes as long as 10 years.
Inconvenient Truth #2: Induced VMT

- Adding highway capacity induces VMT
- The Quality of evidence on this phenomenon is high
- For each 1% increase in lane miles, VMT goes up by 0.6 to 1.0%
- The added VMT is truly new, not shifted from elsewhere
- The new VMT increases GHGs
- The new highway capacity does not increase overall employment or economic activity
- California resources on induced VMT:
  - ARB brief: http://www.arb.ca.gov/cc/sb375/policies/hwycapacity/highway_capacity_brief.pdf
  - ARB Technical Background: http://www.arb.ca.gov/cc/sb375/policies/hwycapacity/highway_capacity_bkgd.pdf
  - “You can’t build your way out of congestion.” – Or can you? A Century of Highway Plans and Induced Traffic: http://www.opr.ca.gov/docs/You_can't_build_your_way_out_of_congestion_-_or_can_you.pdf
“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.”
Resources:
https://www.opr.ca.gov/docs/Key_Publications_on_VMT.pdf

- Disadvantages of using LOS/Auto Delay metrics
- Impacts of VMT & high VMT development
- VMT reduction strategies
- Research of induced VMT from added highway capacity
- Automated vehicles and VMT
- Tools for measuring VMT and access to destinations
- Housing affordability and VMT
- VMT reduction in rural areas
- Roadway pricing and equity

Thanks!
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