MRCagney

BETTER TRANSPORT • BETTER PLACES • BETTER CHOICES

Driving Miss Delay: Measure VKT instead

Lewis Thorwaldson
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Tuesday 11 May, 2021

Decarbonising Transport

Transportation Conference 9 - 12 May 2021 Hilton, Auckland

Source: Kenny Louie
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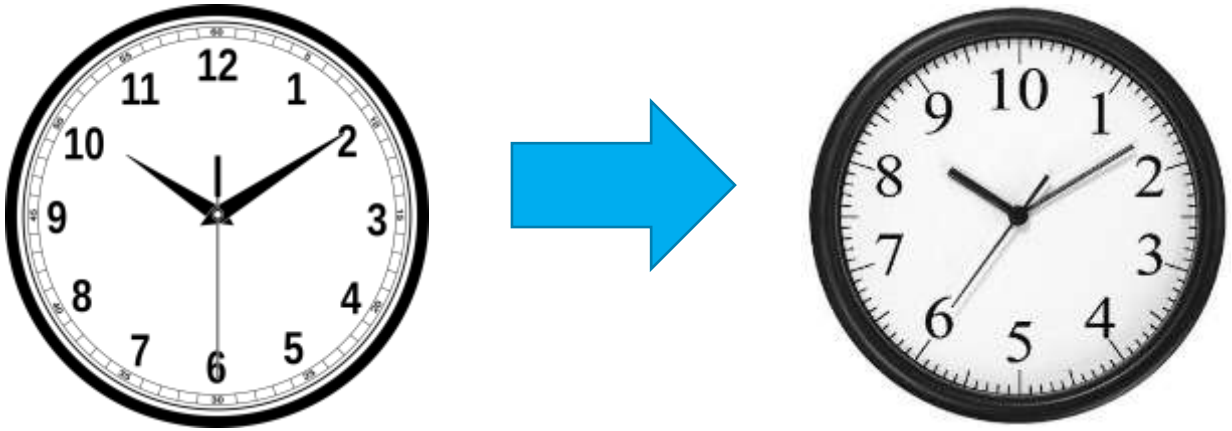
Induced Demand Quickly Erodes Travel Time Benefits

- Diverted traffic (no increase in Vehicle-km Travelled – VKT)
  - Shifting travel time



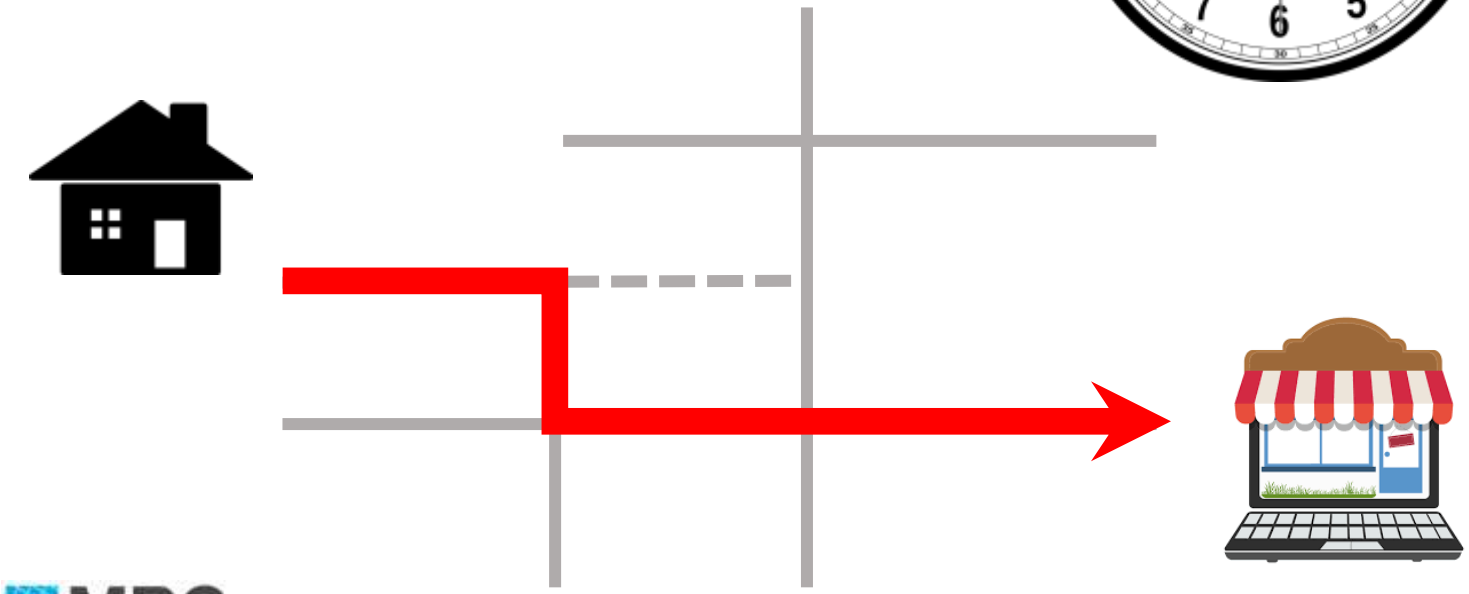


Image sources (public domain)

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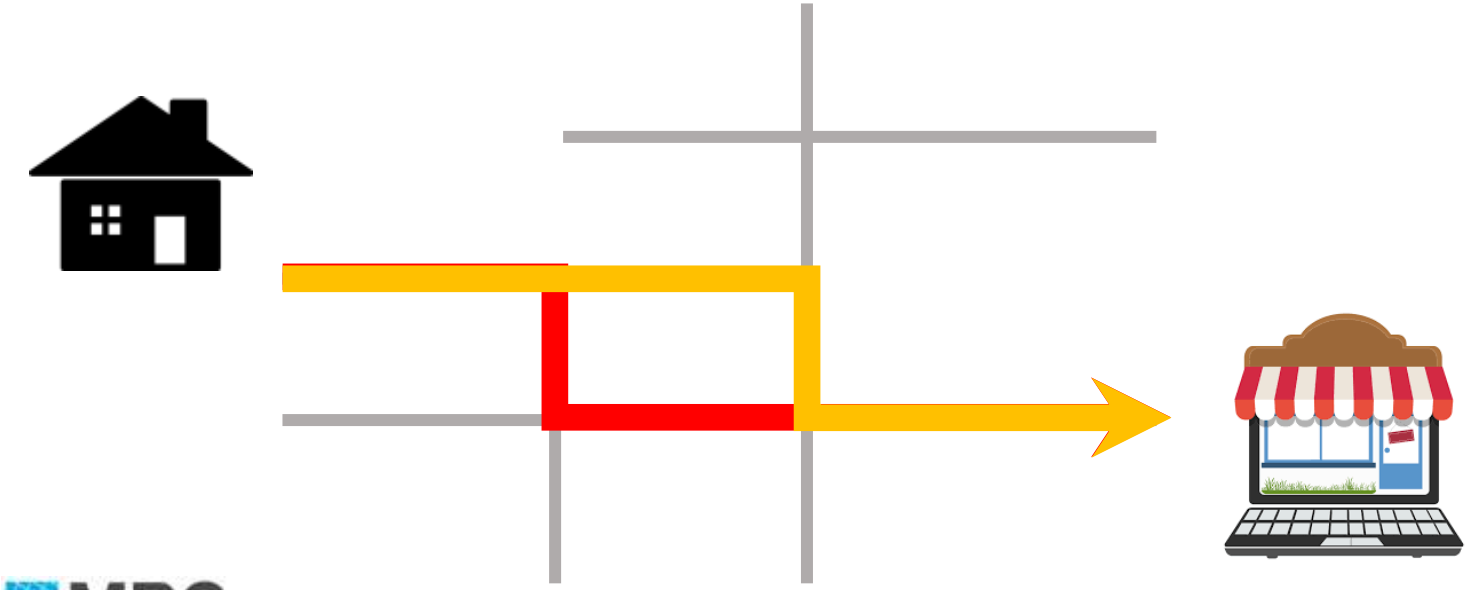

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  - Changing destination

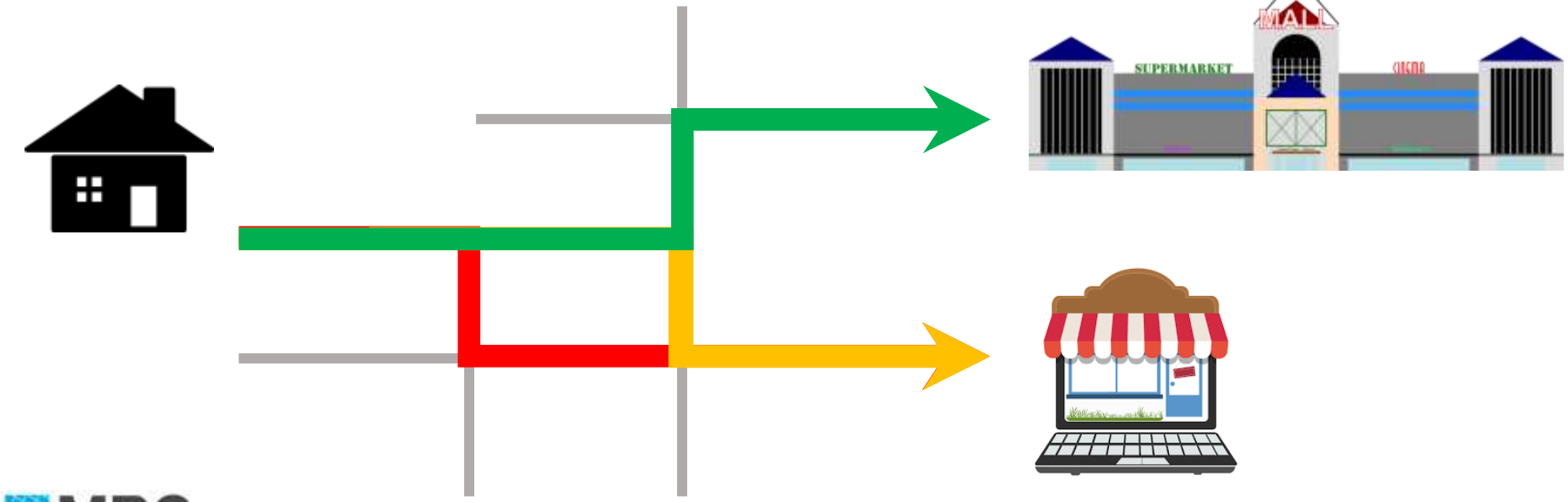

Image sources (public domain)

Induced Demand Quickly Erodes Travel Time Benefits

- Induced travel (increasing VKT)
  - Mode shift to car

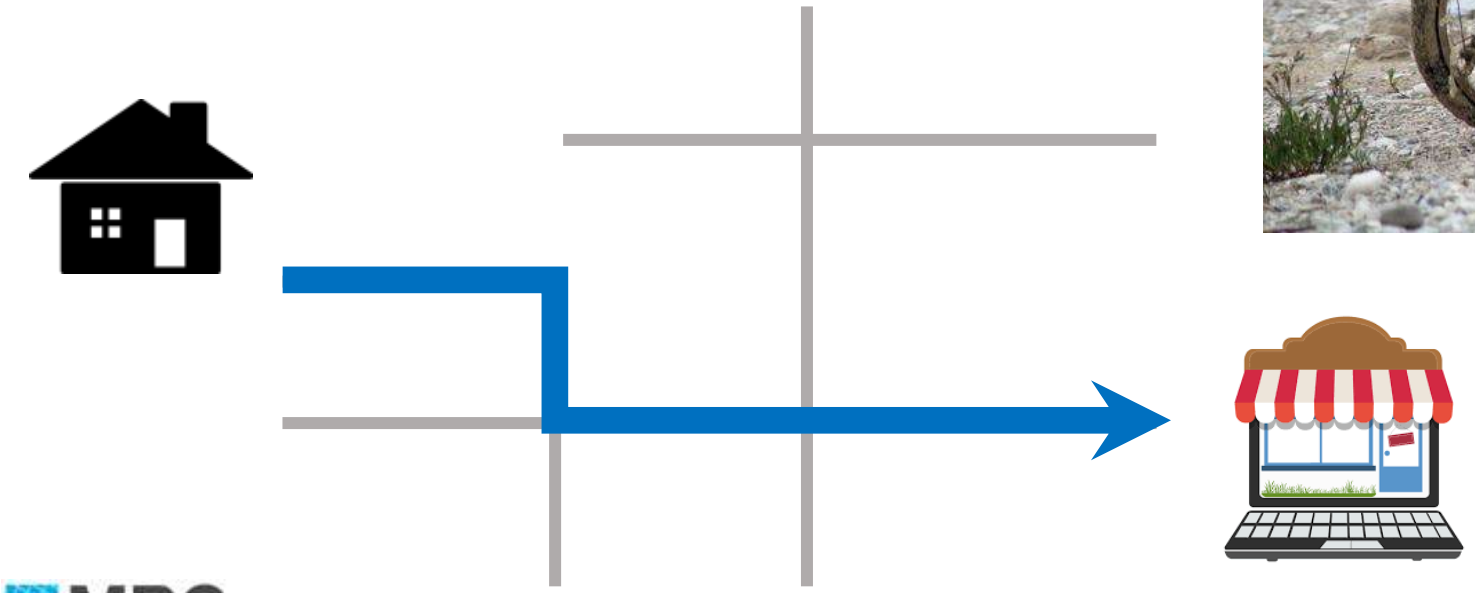

Image sources (public domain)

Induced Demand Quickly Erodes Travel Time Benefits

- Induced travel (increasing VKT)
  - Mode shift to car
  - Driving further

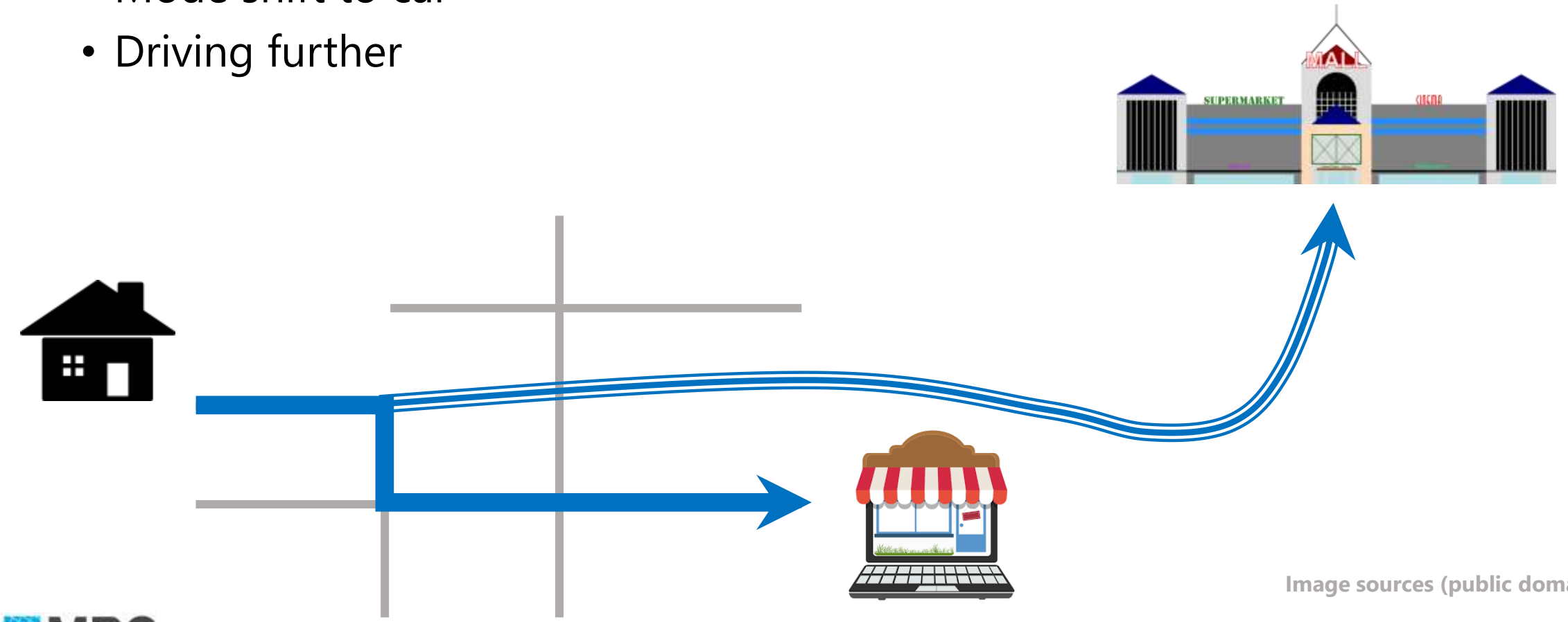

Image sources (public domain)

Induced Demand Quickly Erodes Travel Time Benefits

- Induced travel (increasing VKT)
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  - Longer route

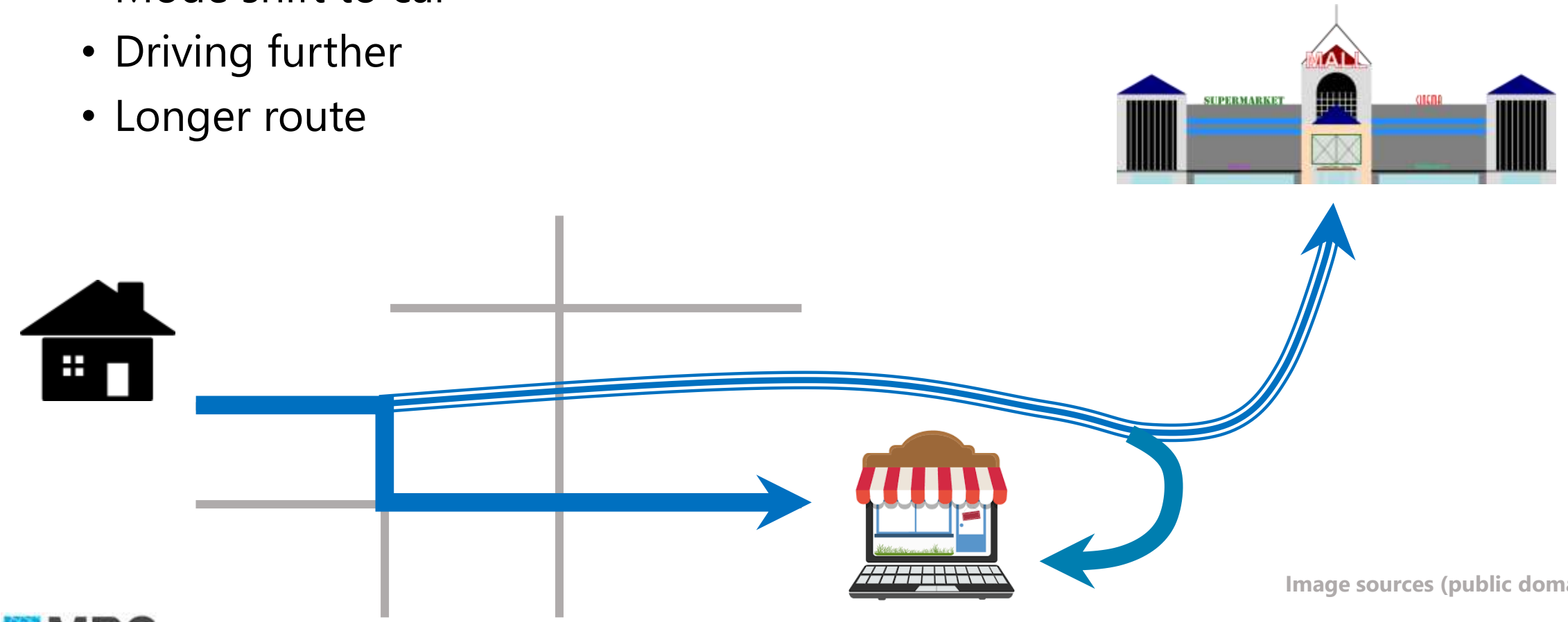

Image sources (public domain)

Induced Demand Quickly Erodes Travel Time Benefits

- Induced travel (increasing VKT)
  - Mode shift to car
  - Driving further
  - Longer route
  - New vehicle trips

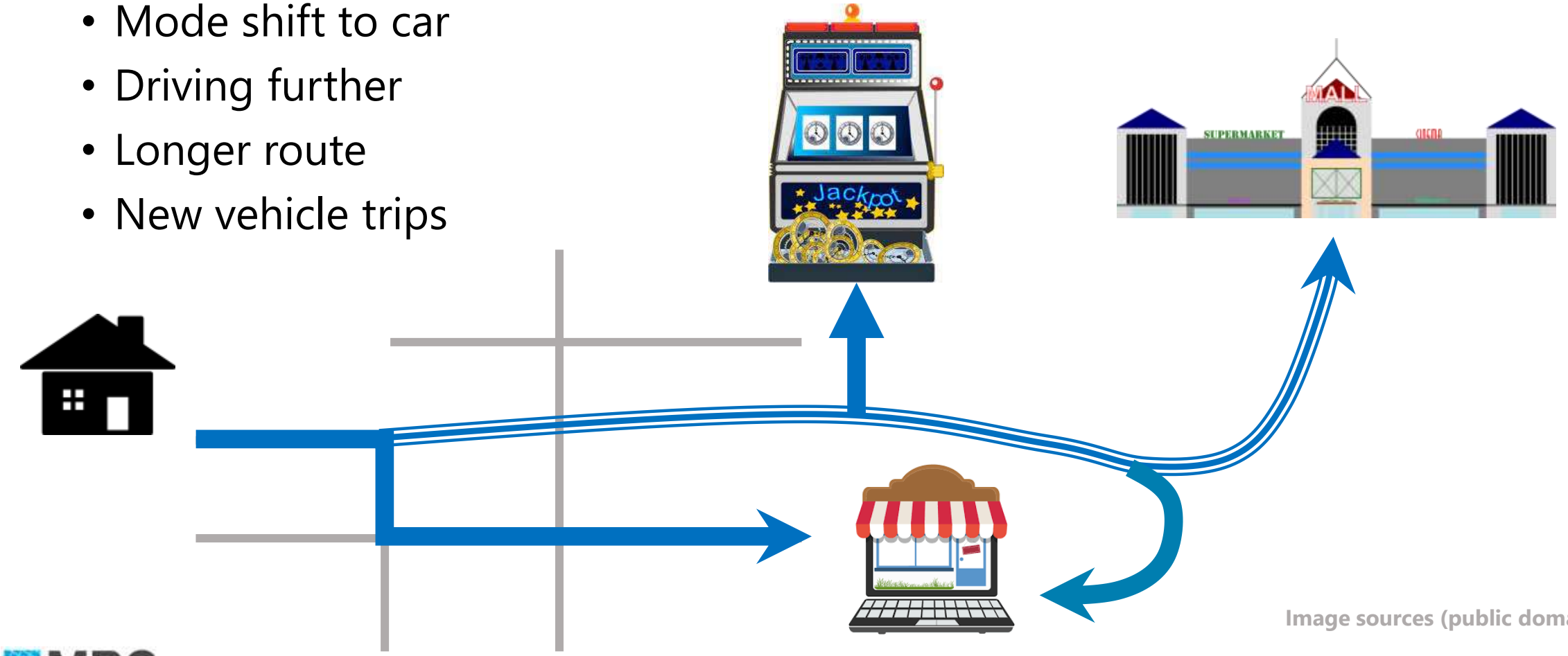

Image sources (public domain)

Impacts of Driving (Currey, et al., 2015)

- Increasing Vehicle-Kilometres Travelled (VKT) leads to:
  - Increased GHG / pollutant emissions
    - VKT used as proxy metric for GHG emissions

Image source (public domain)

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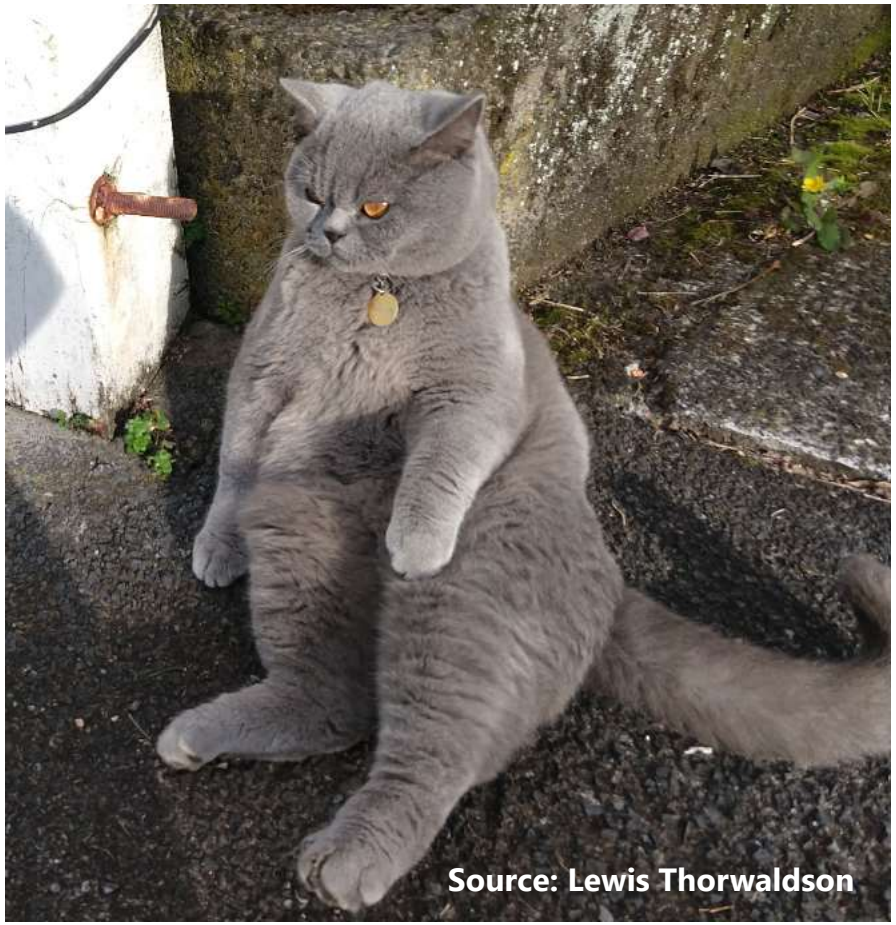
  - Reduced physical activity

Image source (public domain)



Source: Lewis Thorwaldson

Impacts of Driving (Currey, et al., 2015)

- Increasing Vehicle-Kilometres Travelled (VKT) leads to:
  - Increased GHG / pollutant emissions
    - VKT used as proxy metric for GHG emissions
  - Increased traffic DSIs
  - Reduced physical activity
  - Mental health impacts (Wild, et al., 2021)

Image source (public domain)

Impacts of Road Capacity Projects

- New barriers to non-car modes
  - Bus stops pushed away from intersections => reduced walking catchment

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Impacts of Road Capacity Projects

- New barriers to non-car modes
  - Bus stops pushed away from intersections => reduced walking catchment
  - W i d e r streets => more difficult / dangerous to cross
  - More continuous traffic flow => fewer gaps for crossing

Source: Lewis Thorwaldson

Impacts of Road Capacity Projects

- Increased traffic across network

  => Impacts to PT, walking, cycling elsewhere

What about electric?

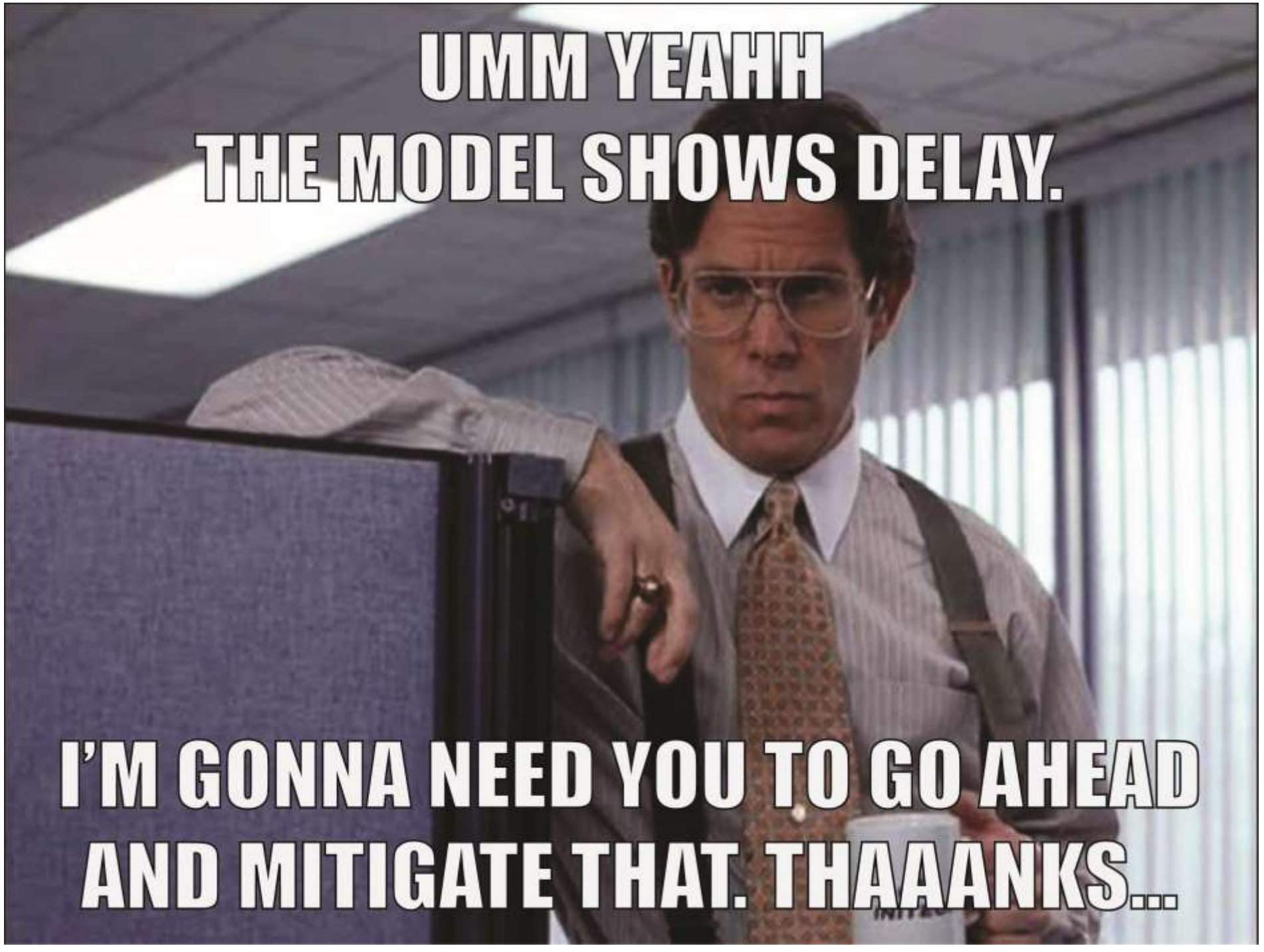
Source: Public Domain by pixabay.com/users/mysticsartdesign-322497/

What about electric?

Community Goals	Cleaner Vehicles	Vehicle Travel Reductions
Total Vehicle Travel	Increased	Reduced
Congestion reduction	Worse	Better
Roadway cost savings	Worse	Better
Parking cost savings	Worse	Better
Consumer savings and affordability	Mixed	Better
Traffic safety	Worse	Better
Mobility options for non-drivers	Worse	Better
Energy conservation	Better	Better
Pollution reduction	Better	Better
Physical fitness and health	Worse	Better
More compact development	Worse	Better
Source: Litman (2020) https://www.vtpi.org/wwclimate.pdf		

Build for traffic…

Image Source: https://at.govt.nz/media/1980686/urban-street-and-road-design-guide.pdf


UMM YEAHH
THE MODEL SHOWS DELAY.
I'M GONNA NEED YOU TO GO AHEAD
AND MITIGATE THAT. THAAANKS...

Mitigating General Traffic Delay (LOS)

Increasing capacity

Image Source: (1) https://www.flickr.com/photos/haljackey/6176716557 (https://creativecommons.org/licenses/by-sa/2.0/)

Mitigating General Traffic LOS

Increasing capacity

More driving

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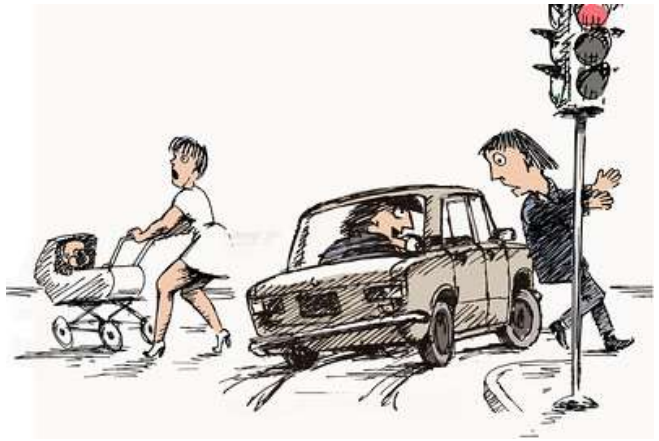
Mitigating General Traffic LOS

Increasing capacity → More driving → Less PT, walking & cycling



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But It's the Driving!!

VKT is the environmental impact!

NOT

Delay to:

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By User Minesweeper on en.wikipedia - Minesweeper, CC BY-SA 3.0, https://commons.wikimedia.org/w/index.php?curid=1302402

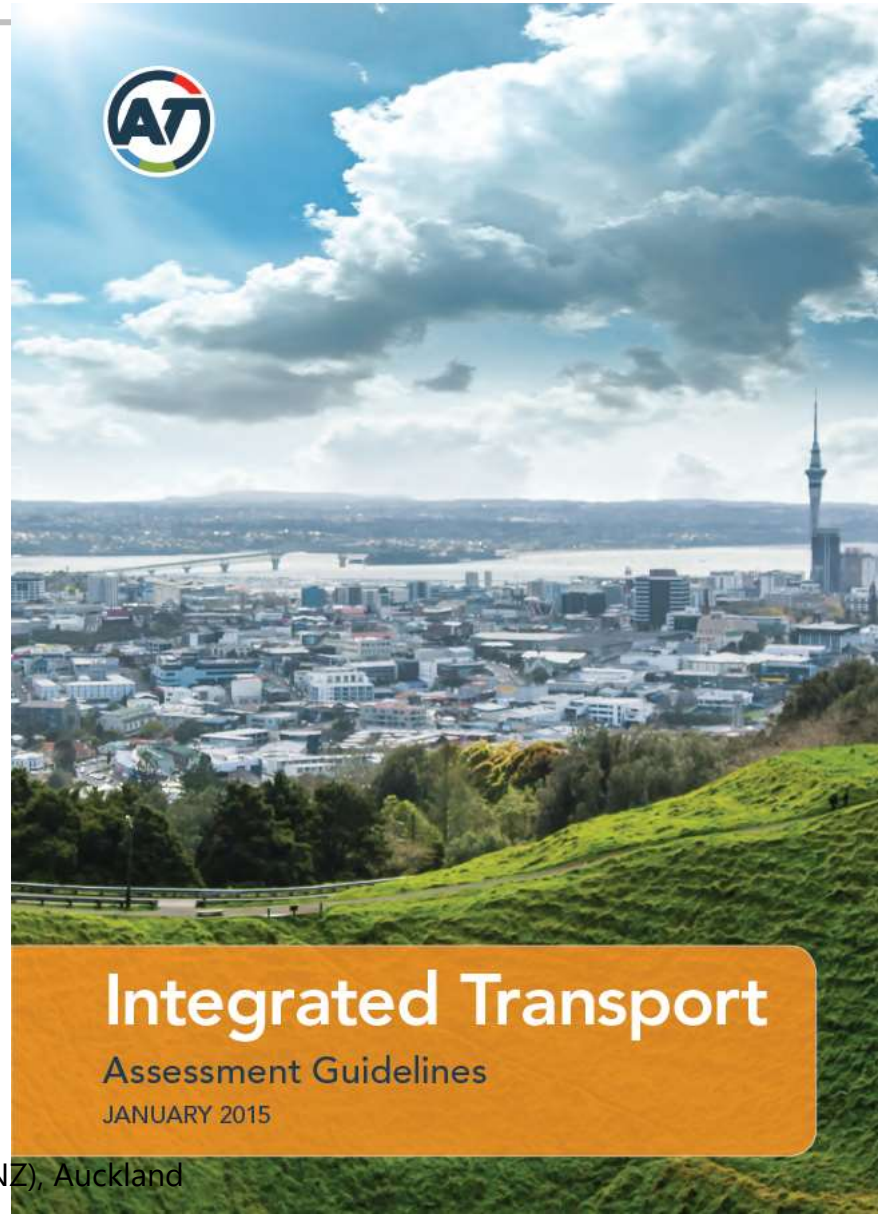
Integrated Transport Assessment (ITA)

- ITA guidance intention

  => multi-modal assessment

- But only provides vehicular LOS as means to measure.

  'Developments which are not aligned with planned and funded infrastructure should identify what methods will be used to achieve delivery of the necessary infrastructure via private means, or changes should be made to the proposal to reduce the scale of investment needed.'



What's the solution?

STREETSBLOG CAL

State Capitol Updates / Active Transportation Program / Transportation Fundin
Cap-And-Trade / Legislation / Climate Change / Bicycling

California Planners Have Already Been Swapping VMT for LOS

"Level of Service may not be as ingrained in local planning practice as generally assumed"

By Melanie Curry | Dec 4, 2019 | 5 COMMENTS

THIS POST IS SUPPORTED BY GJEL

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VKT

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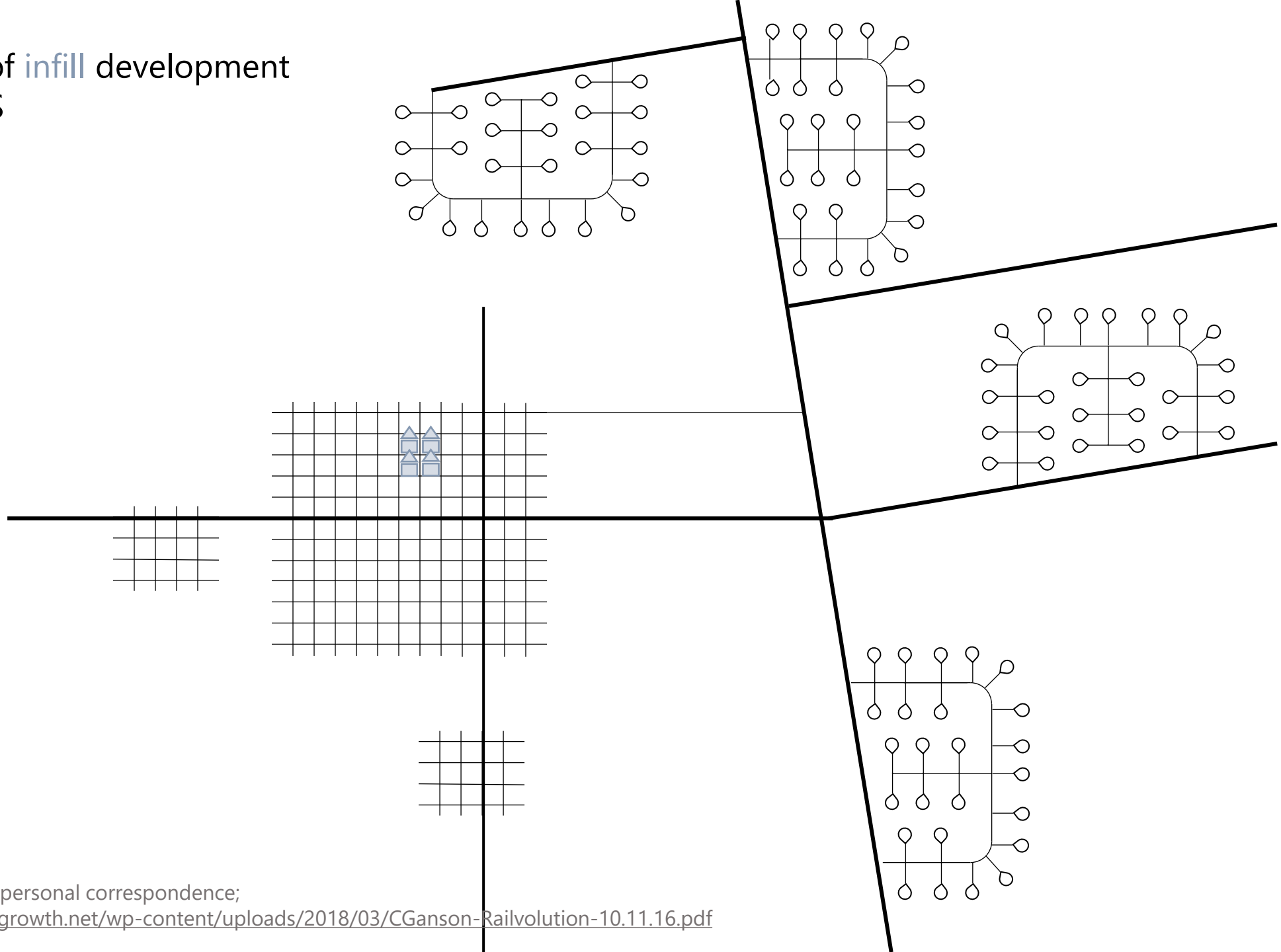
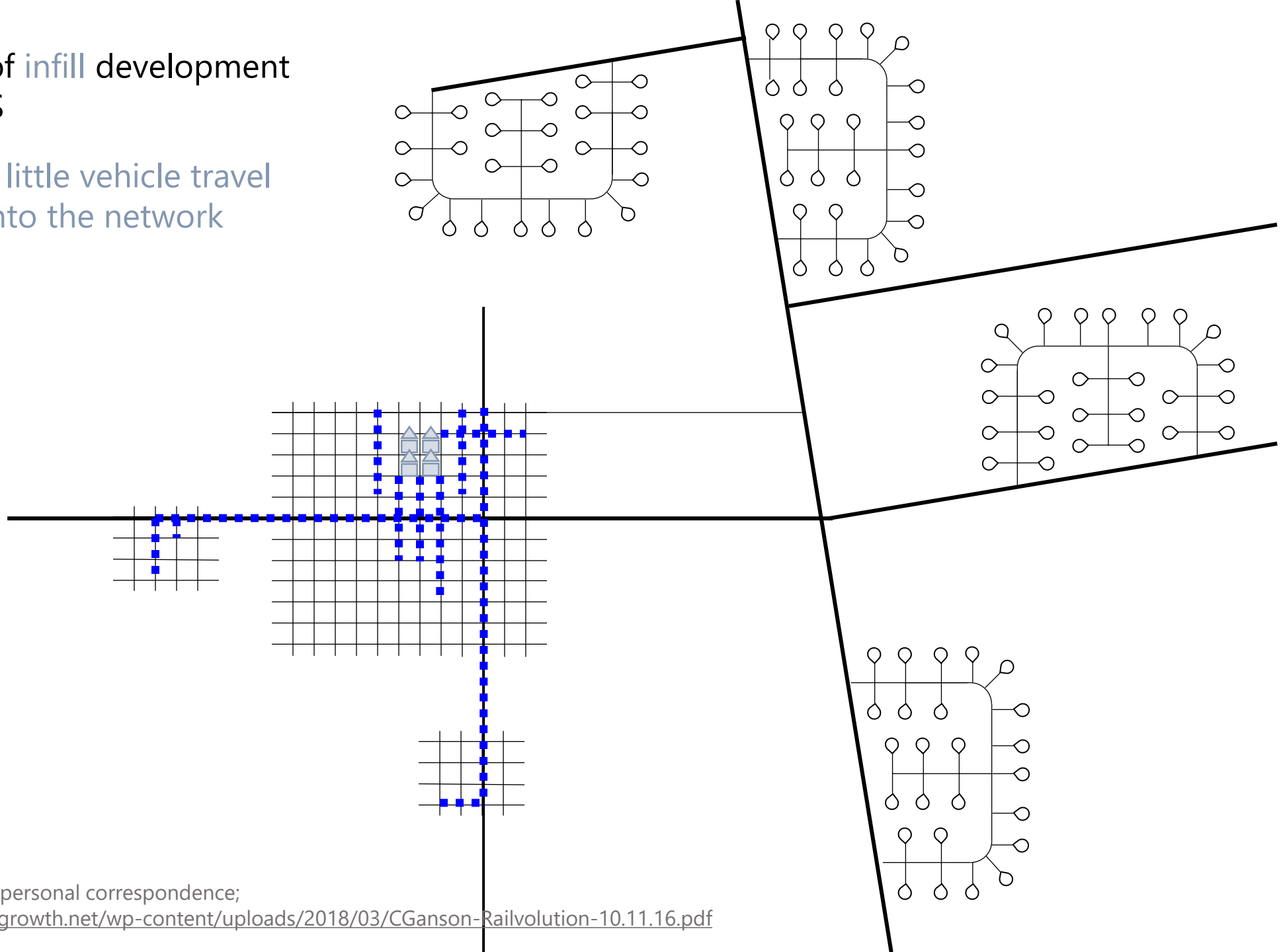
Analysis of infill development using LOS



Source: Ganson, C. personal correspondence;
http://www.smartergrowth.net/wp-content/uploads/2018/03/CGanson-Railvolution-10.11.16.pdf

Analysis of infill development using LOS

Relatively little vehicle travel loaded onto the network



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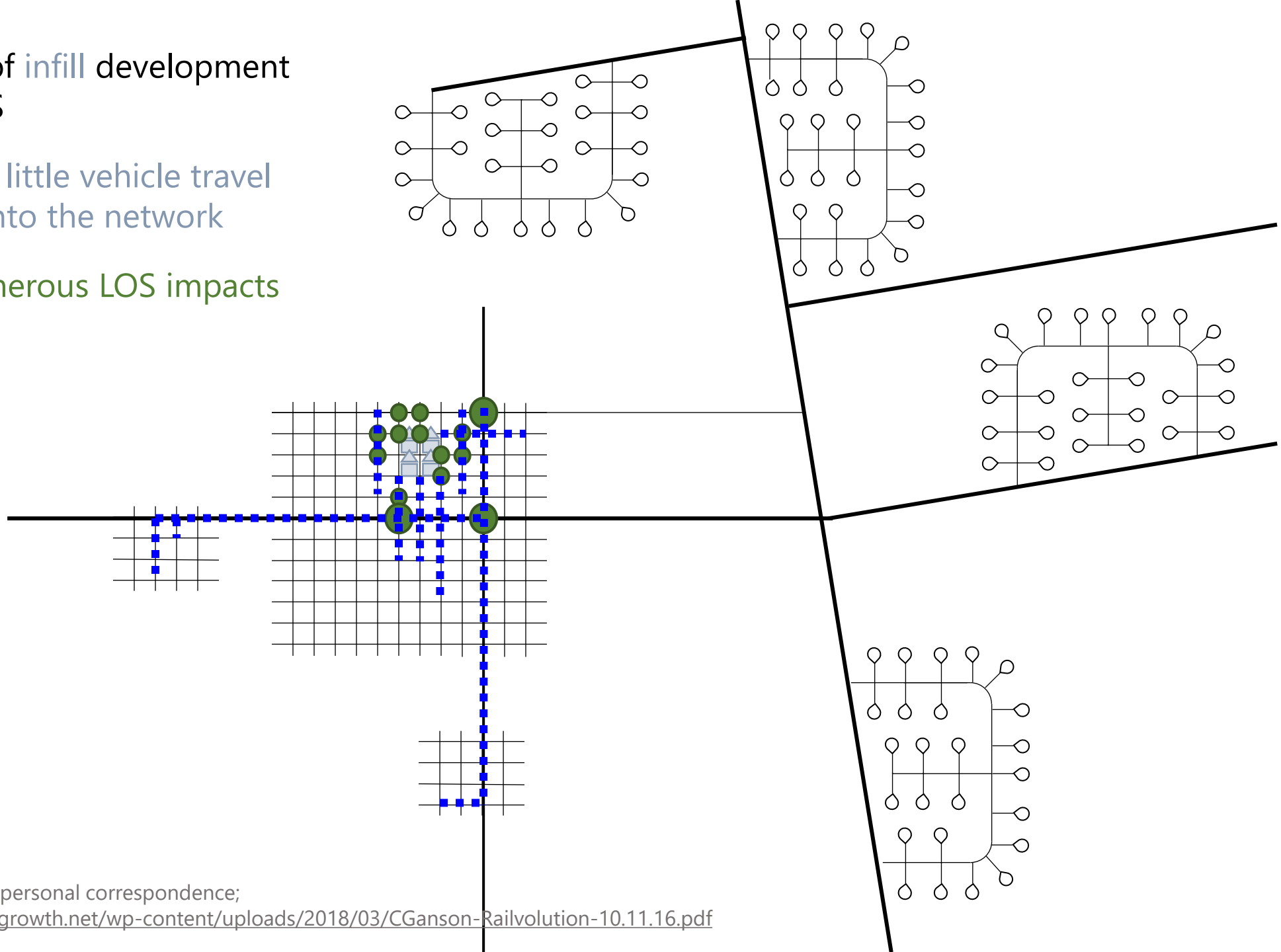
Analysis of infill development using LOS

Relatively little vehicle travel loaded onto the network

…but numerous LOS impacts



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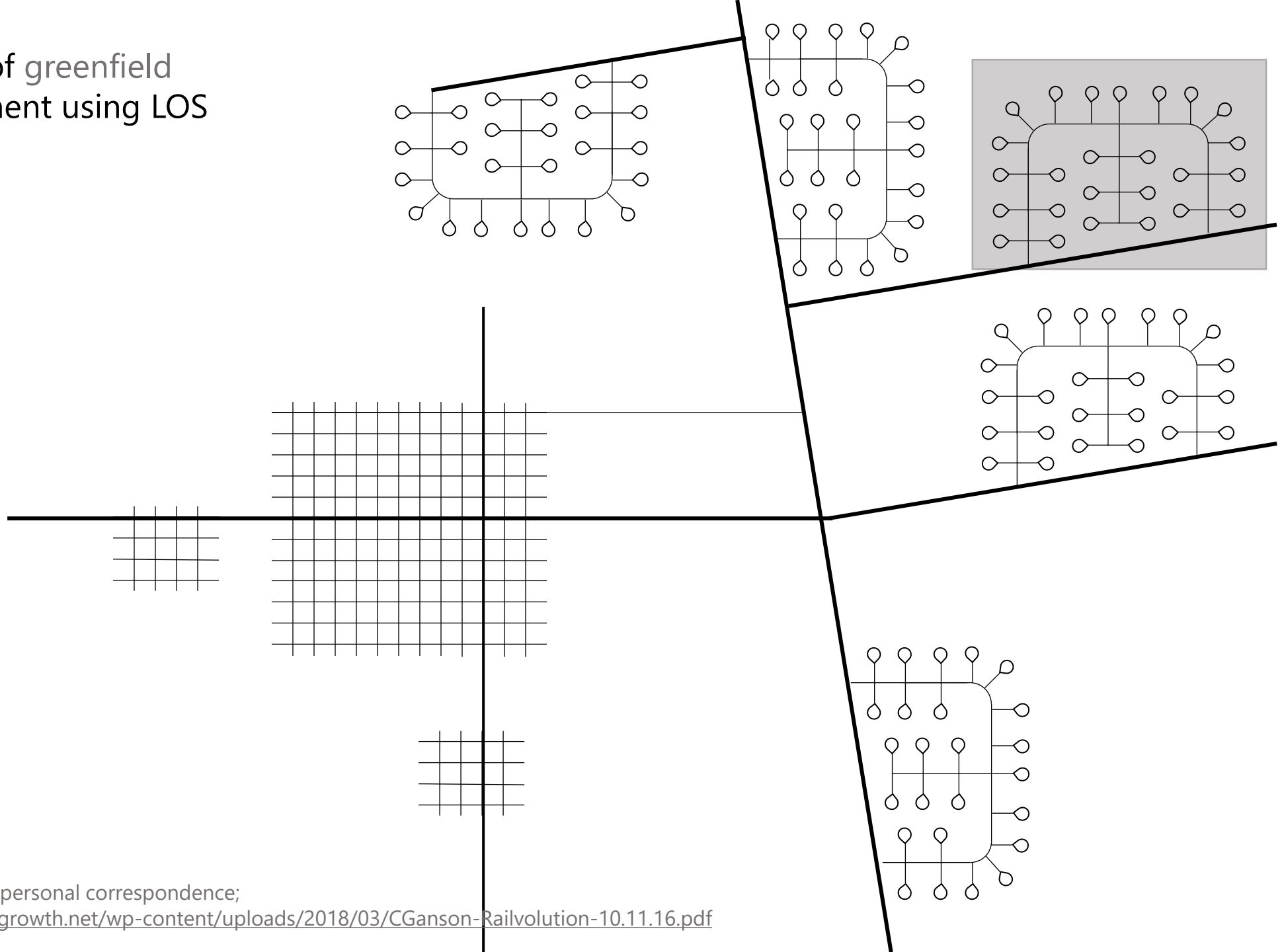
Analysis of greenfield development using LOS



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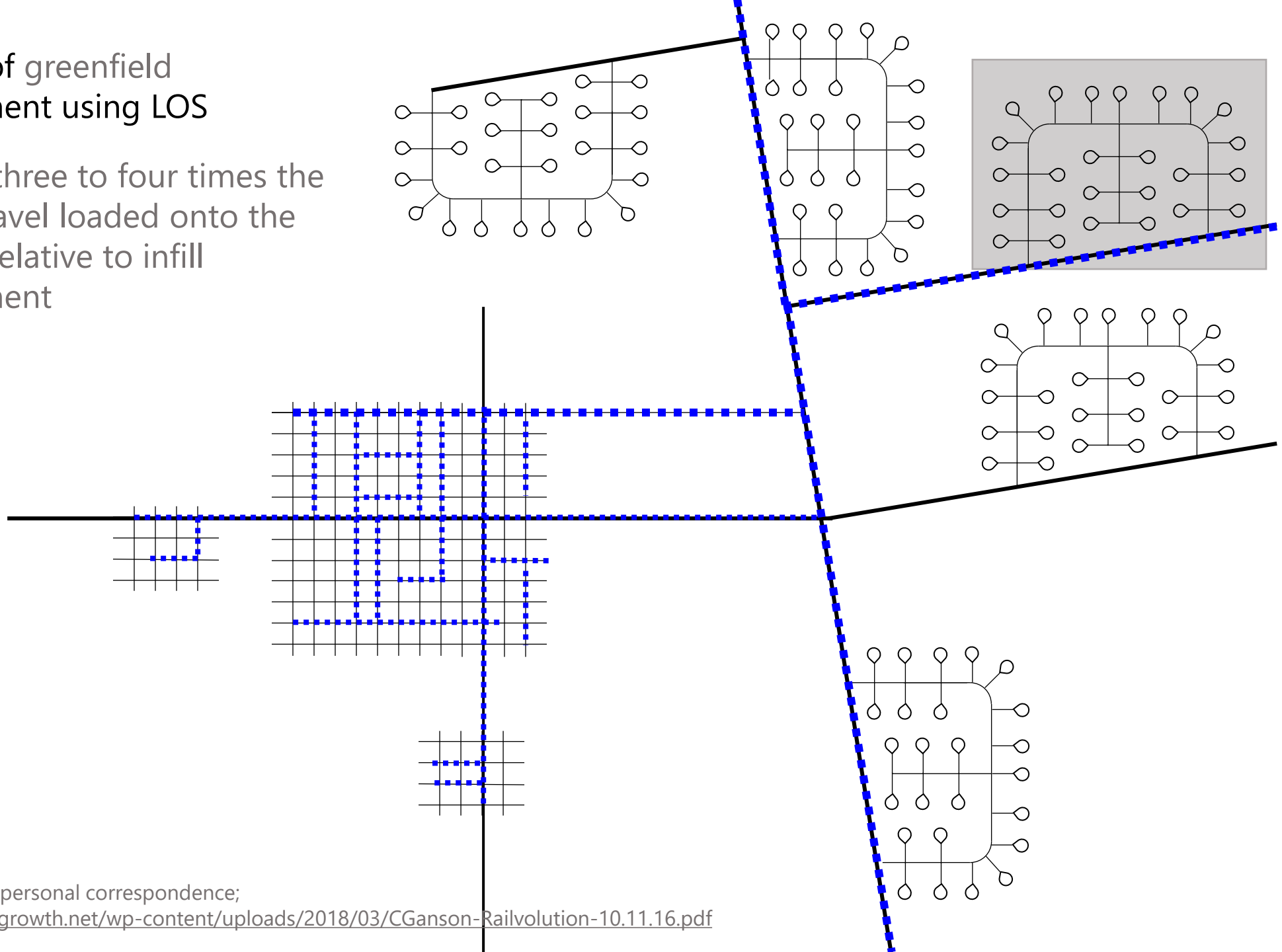
Analysis of greenfield development using LOS

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

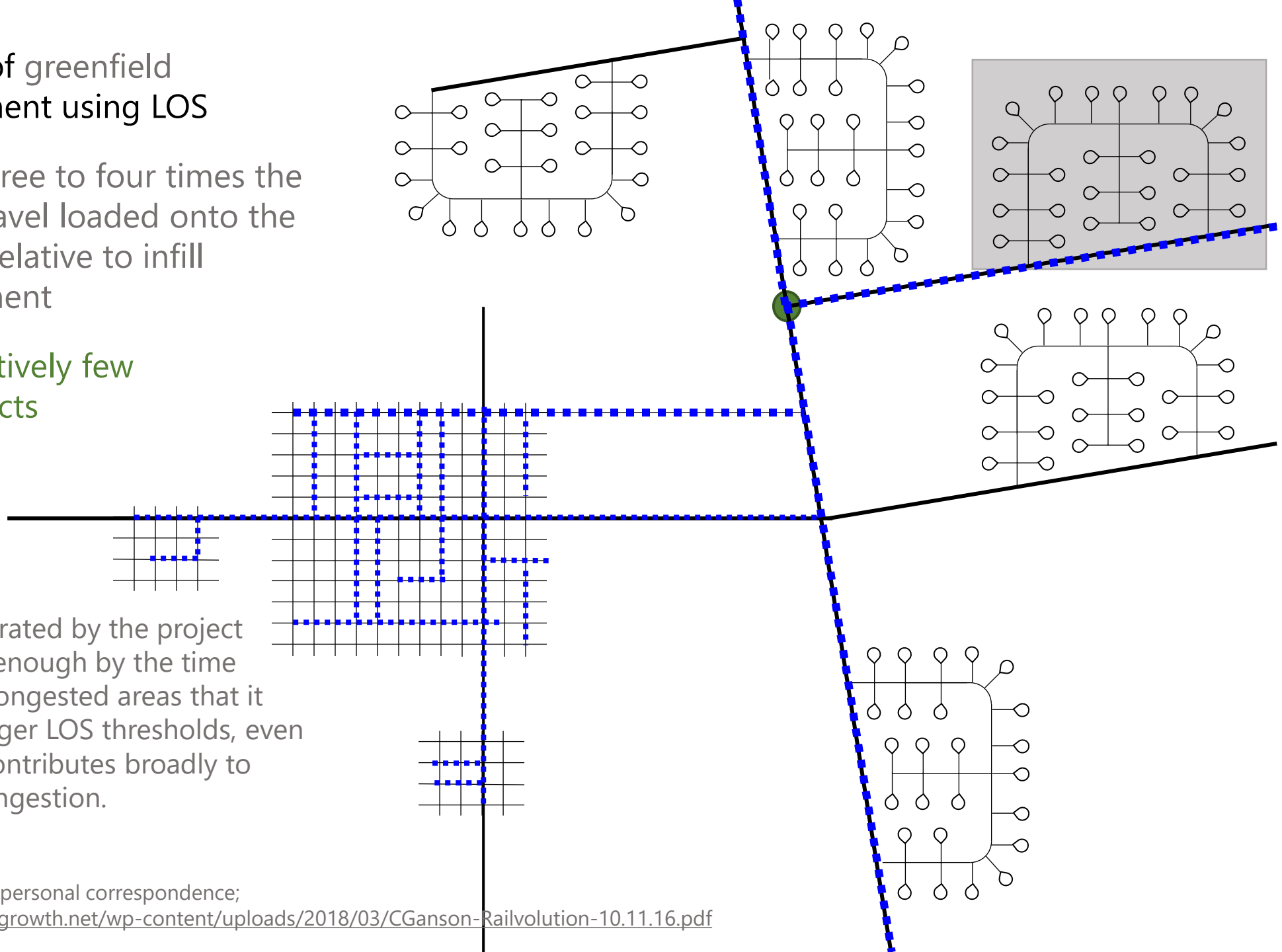


Source: Ganson, C. personal correspondence; http://www.smartergrowth.net/wp-content/uploads/2018/03/CGanson-Railvolution-10.11.16.pdf

Analysis of greenfield development using LOS

Can be 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.

Source: Ganson, C. personal correspondence; http://www.smartergrowth.net/wp-content/uploads/2018/03/CGanson-Railvolution-10.11.16.pdf

Lee & Handy (2018)

Contents lists available at ScienceDirect

Research in Transportation Business & Management

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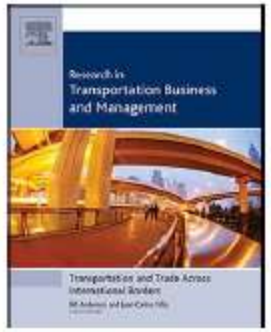


Leaving level-of-service behind: The implications of a shift to VMT impact metrics

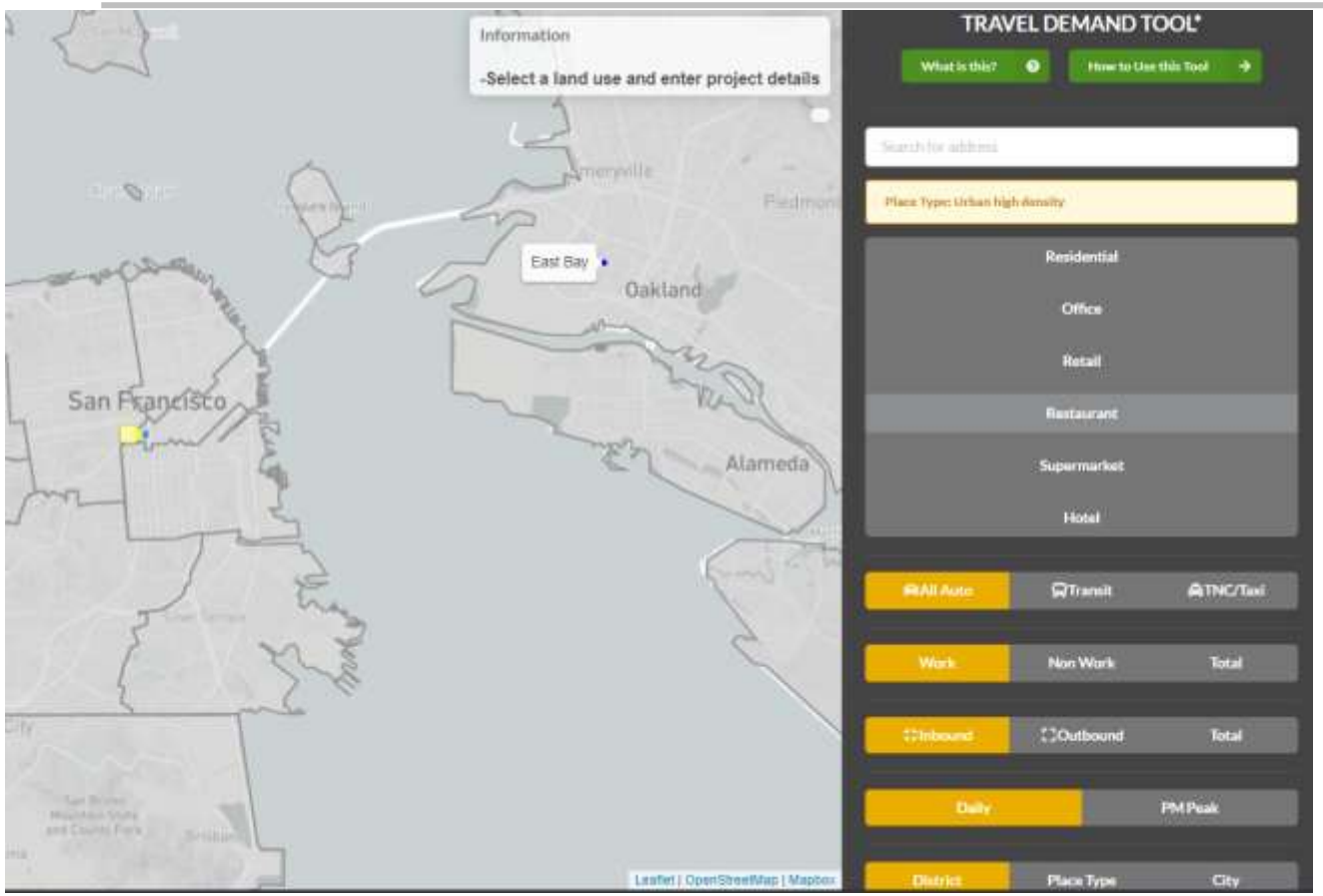
Amy E. Lee*, Susan L. Handy

Institute of Transportation Studies, University of California at Davis, 1 Shields Avenue, Davis, 95616 CA, United States

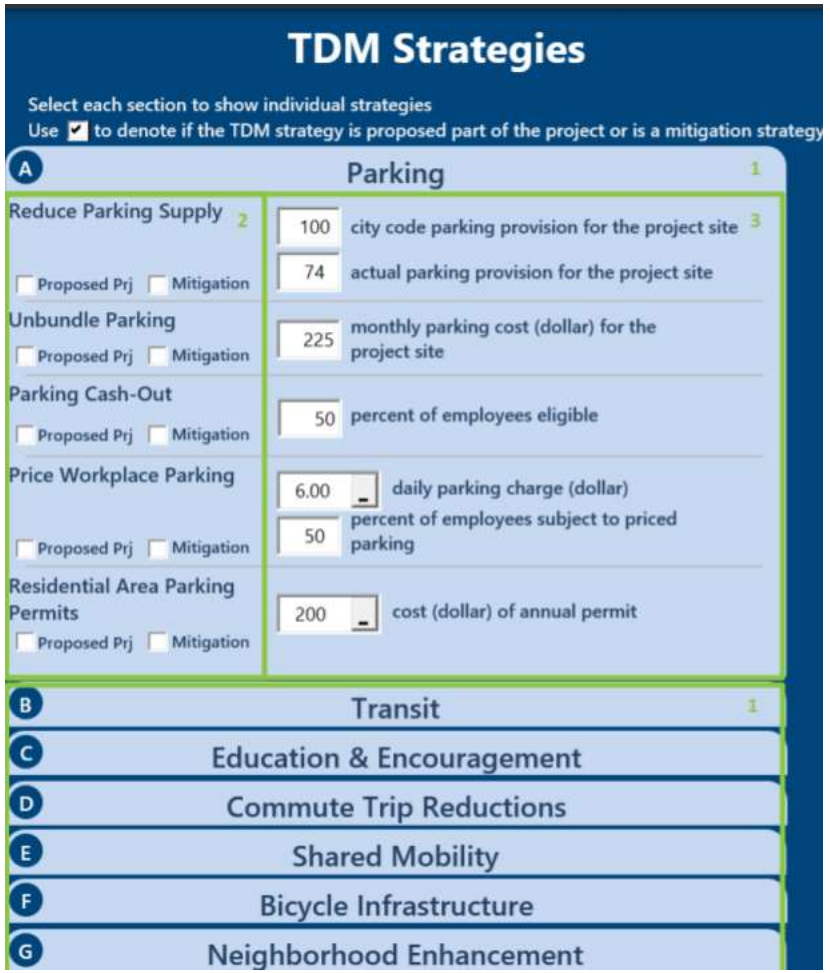
Lee & Handy (2018)

- Compared 3 developments using VKT & LOS metric
  - LOS metric ➔ $$$ roadway capacity mitigations
    - Further encourage driving
    - More barriers to PT, walking & cycling
  - Possible outcomes (developer):
    - Reduce number of units
    - Increase $$
    - Abandon project

California VKT



San Francisco



Los Angeles

Would NOT Preclude Capacity Projects

- First look to reduce driving
- Need to include impacts of induced demand
  - Delay reduction benefits cannot be projected far into future
  - Increased VKT counted as a disbenefit
  - Increased VKT considered as environmental impact requiring mitigation

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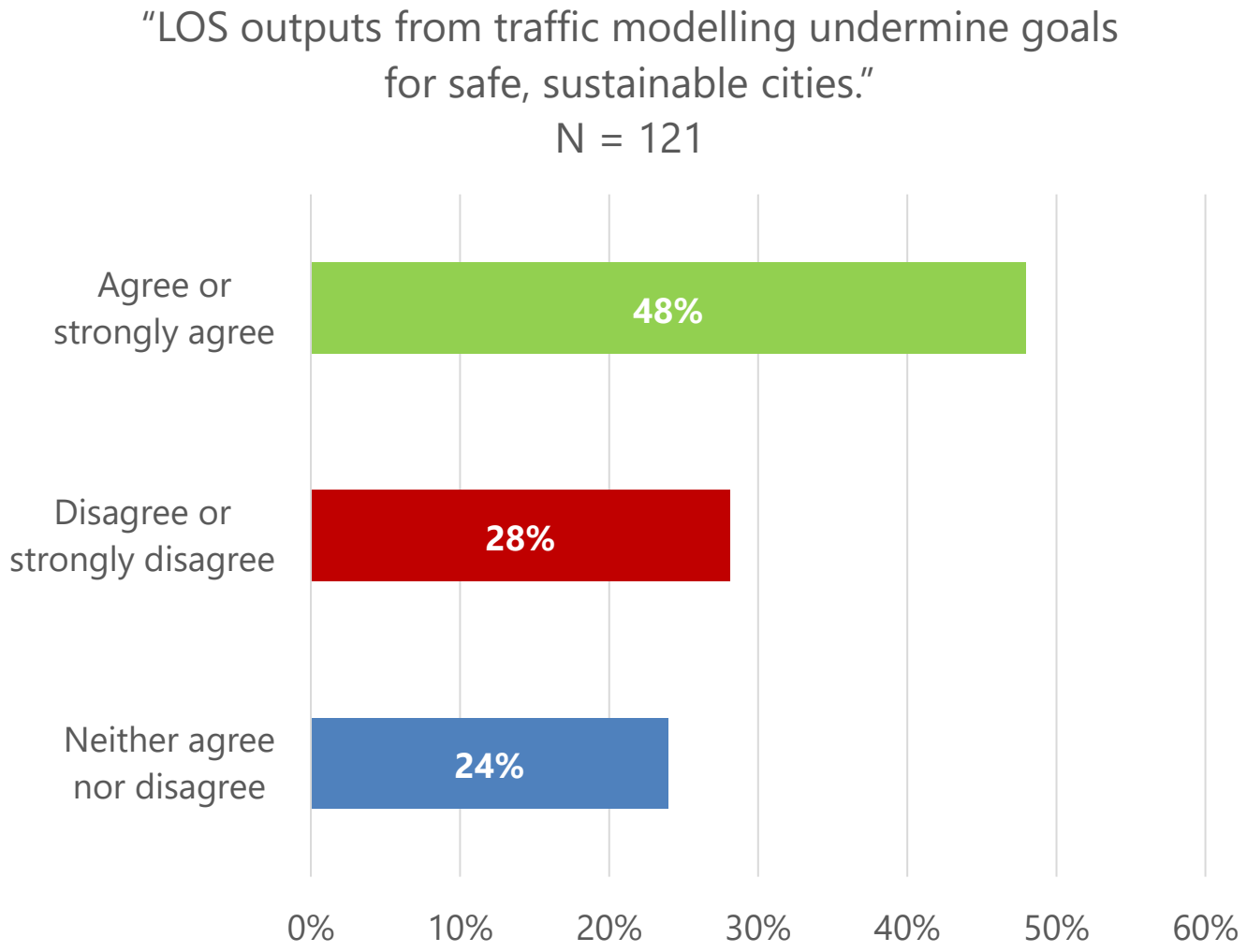
Survey of New Zealand Practitioners



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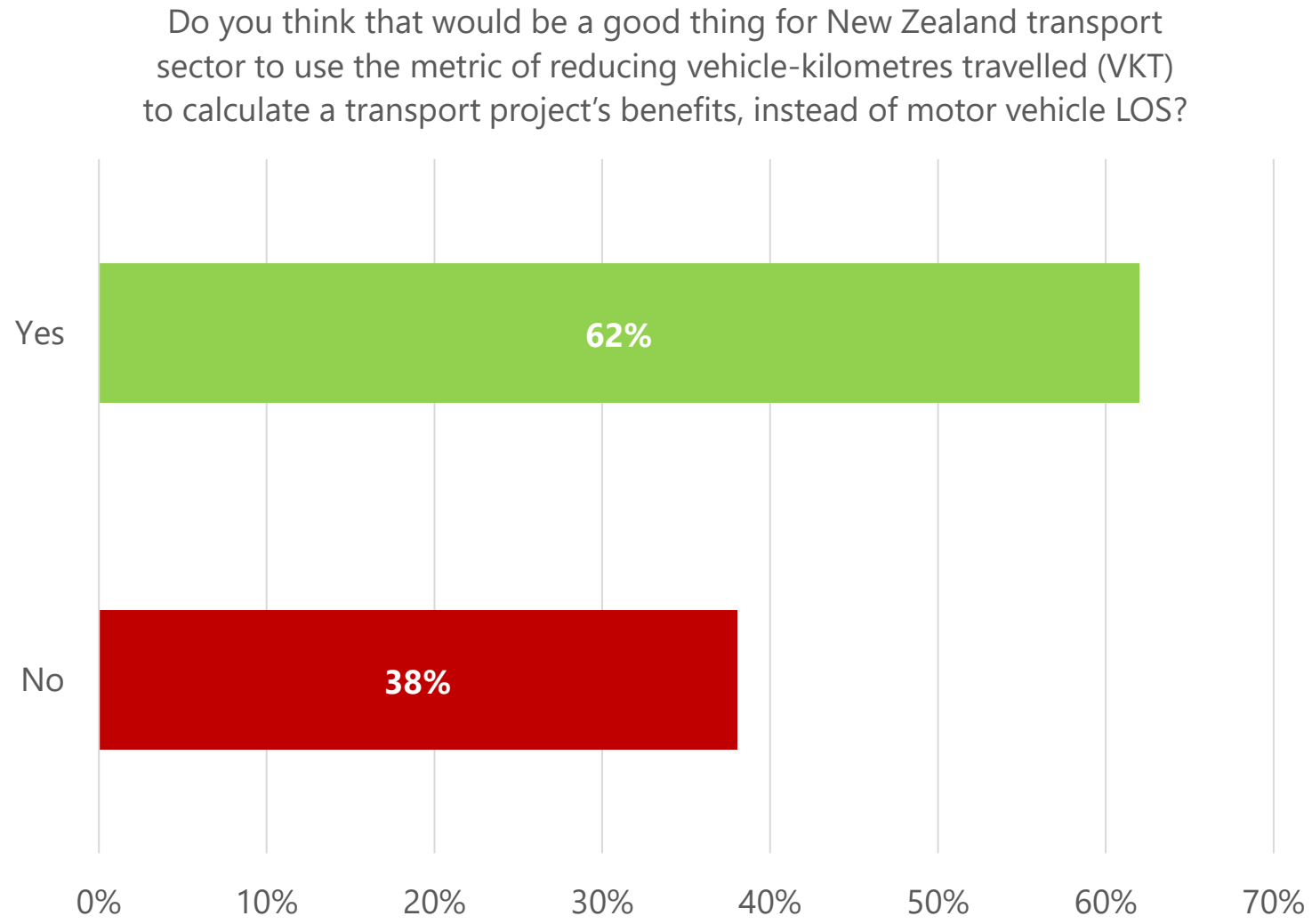

What's next?

DRIVING MISS DELAY:
VKT for URBAN DEVELOPMENT

THANK YOU!

Lewis Thorwaldson

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Selected Additional Resources

- **THORWALDSON, L. (2020). LOS-less Planning, VKT for Equitable Outcomes** https://az659834.vo.msecnd.net/eventsairaueprod/production-harding-public/8cc0018e551f4ea3bc001538654ce9e0
- California Governor's Office of Planning & Research: Transportation Impacts http://www.opr.ca.gov/ceqa/updates/sb-743/
- GANSON, C. (2016). Shifting from LOS to VMT in California presentation http://www.smartergrowth.net/wp-content/uploads/2018/03/CGanson-Railvolution-10.11.16.pdf
- Victoria Transport Policy Institute. (1998-2021). Generated Traffic & Induced Travel https://www.vtpi.org/gentraf.pdf
- Braess' Paradox (when adding roads to congested network slows traffic) https://en.wikipedia.org/wiki/Braess%27s_paradox
- LEE, A.E. and HANDY, S.L. (2018). Leaving level-of-service behind: The implications of a shift to VMT impact metrics https://doi.org/10.1016/j.rtbm.2018.02.003
- DURANTON, G. and TURNER, M.A (2011). The Fundamental Law of Road Congestion: Evidence from US Cities, *American Economic Review*, 101 (6): 2616-52.

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