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March 22, 2018

California Air Resources Board
1001 "I" Street
Sacramento, CA 95814

Re: SB 375 Target Updates

Dear Chair Nichols and Members of the Board:

SANDAG continues to promulgate auto-centered transportation plans despite California's regulatory requirement to reduce future VMT and associated GHG emissions. SANDAG justifies this retrograde planning by hiding behind bad regional transportation modeling.

The SB 375 target update process assumes that MPOs can accurately forecast VMT and GHG emissions, and that the models are appropriately sensitive to alternatives. SANDAG has demonstrated that its model fails to meet these requirements.

The SANDAG model fails to properly account for induced travel from freeway expansion. In work for the CARB, researchers at the University of California and the University of Southern California reviewed the literature on induced travel and concluded:

> *Thus, the best estimate for the long-run effect of highway capacity on VMT is an elasticity close to 1.0, implying that in congested metropolitan areas, adding new capacity to the existing system of limited-access highways is unlikely to reduce congestion or associated GHG in the long-run.* [1]

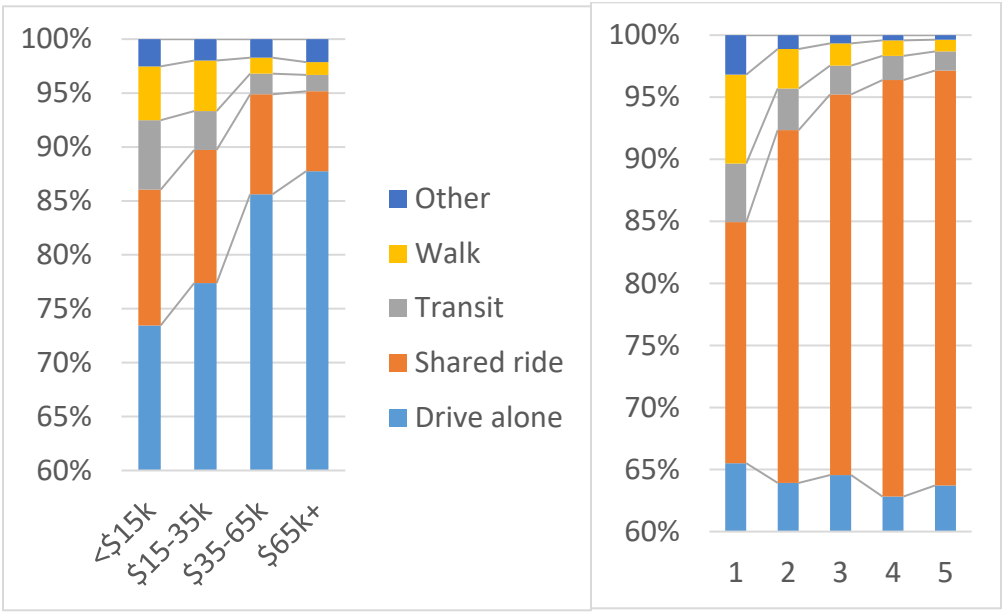
The SANDAG 2015 *Regional Transportation Plan* includes $42 billion in roadway expansion projects. The DEIR concluded that "the proposed Plan would not induce substantial vehicle travel."[2] This conclusion is based on SANDAG's travel demand model, and is inconsistent with real world data. This represents a test of the model, and the model failed. The model is incapable of accounting for the VMT and GHG emission impacts of the planned freeway expansion.

[1] Handy, Susan and Marlon G. Boarnet. "Impact of Highway Capacity and Induced Travel on Passenger Vehicle Use and Greenhouse Gas Emissions: Policy Brief" prepared for California Air Resources Board, September 30, 2014.
[2] SANDAG, Draft Environmental Impact Report San Diego Forward: The Regional Plan, p. 4.15-30, May 2015.

Between 2011 and 2015, road construction costs increased. The 2015 RTP maintained all the road projects that were in the 2011 RTP by reducing planned capital spending on transit. The transit budget appears to have been a sort of afterthought after committing road funds. More recently, it came to light that SANDAG's revenue forecasts have been a sham, and that large cuts in capital spending will be required. If planning continues along the course it has taken in the past, transit will continue to be grossly underfunded.

Proper accounting for the impacts of transit expansion requires accurate mode choice modeling. The SANDAG model is laughably bad in this area as shown in the figure below. In the real world, work trip carpooling is relatively uncommon, and declines with increasing income, i.e. the data are consistent with common understanding. In the SANDAG model, work trip carpooling is several times more prevalent than in the real world, and perversely increases with income. The SANDAG model is not very accurate for walk or transit trips either, although this is less obvious in the figure because of the smaller mode shares. The SANDAG model cannot properly evaluate transit alternatives.

Work Tour Mode Share by Income: ACS (left) vs. SANDAG Model (right)



Note: SANDAG model income categories are somewhat different than the ACS categories

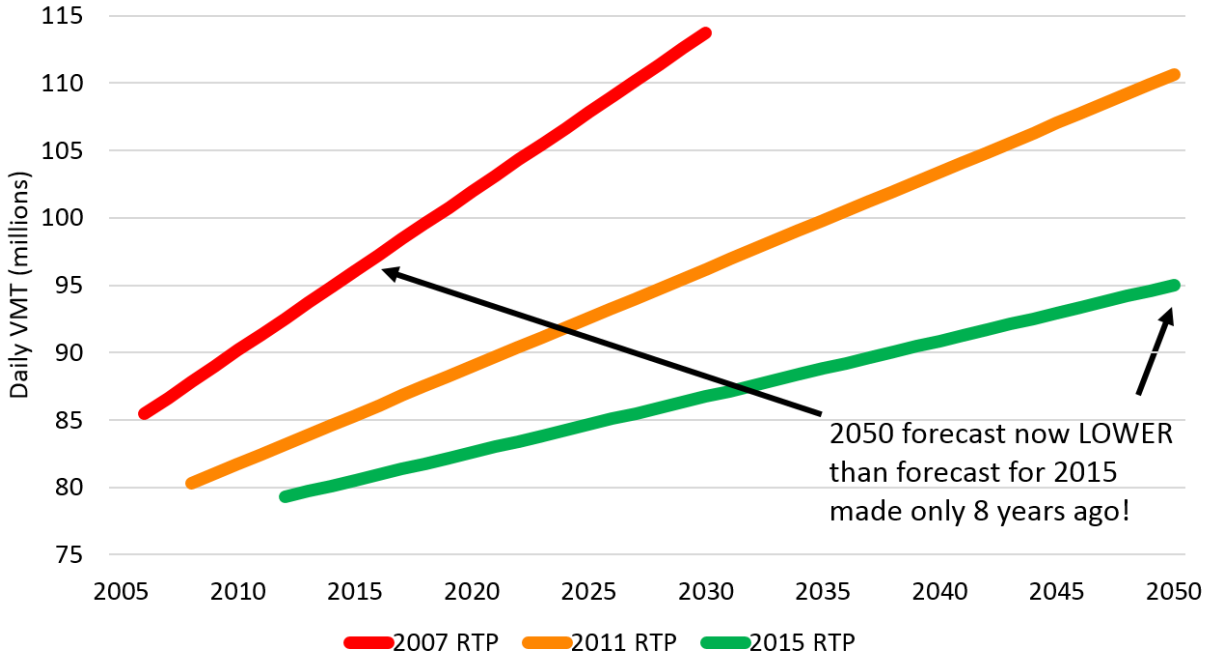
In the SANDAG region, any apparent commitments to compact land use appear to lack substance. In the recently adopted San Diego *Climate Action Plan*, any sprawl project can be added to the plan with onsite GHG mitigation that could be satisfied with projects anywhere in the world. Therefore, no confidence can be placed in the future land use assumptions in the SANDAG model.

The target setting process looks important, but the real decisions that determine future VMT and GHG emissions occur elsewhere in the planning process. Unfortunately, the ARB's decision of setting SANDAG's 2035 target at 18% or 19% or 25% will have little effect on the SANDAG region's future VMT and GHG emissions if bad planning is continued. What is needed is to end freeway expansion, curtail sprawl, and commit to building a

comprehensive high-quality transit system. If SANDAG is allowed to continue to use bad modeling to paper over bad transportation plans, there will be little real-world progress toward achieving the goals of AB 32 and SB 375.

In the eight years between the publication of SANDAG 2007 and 2015 Regional Transportation Plans, VMT decreased in most of the United States including the SANDAG region. SANDAG revised regional VMT forecasts downward. The figure below shows that the 2006 base year VMT in the 2007 RTP was higher than the 2010 base year VMT in the 2011 plan. The 2012 base year VMT in the 2015 RTP is even lower. The forecast VMT growth rate also has declined. The growth rate in the 2011 RTP was lower than in the 2007 RTP. The VMT growth rate in the 2015 RTP is lower still. Remarkably, the latest forecast for 2050 VMT is lower than what VMT would be today if the 2007 RTP were correct.

SANDAG VMT Forecasts in 2007, 2011 and 2015 Regional Transportation Plans[3]



The information in the figure above is mostly good news. However, since 2015, VMT growth has restarted and the region is not doing anything to stop this. Instead, it plans continued roadway expansion that will fuel additional growth in VMT and GHG emissions and encourage further sprawl, a vicious cycle.

The information in the figure should have alerted SANDAG planners to consider a possible modeling problem between a questionable road expansion program in the 2015 RTP and transportation mode share forecasts in SANDAG's activity-based travel demand model. The SANDAG model is premised on past trip behavior, not future GHG reduction goals or land use and transit infrastructure changes. Instead of focusing on modeling deficiencies, SANDAG continued the very same roadway programs in the 2011 and 2015 RTPs (shown in the

[3] 2007: *2030 San Diego Regional Transportation Plan: Final*, November 2007, Table 2.3, p. 2-7; 2011: *Our Region: Our Future: 2050 Regional Transportation Plan*, Table 2.2 p. 2-8 and Table 3.2, p. 3-8, October 2011; 2015: *Draft Environmental Impact Report San Diego Forward: The Regional Plan*, Table 4.15-7, p. 4.15-24, May 2015

figure below). The only significant difference is that the projected costs of the program increased between 2011 and 2015. Except for two roadway projects completed between 2011 and 2015, [4] over 99% of the budget in the 2011 and 2015 RTPs is for the same projects. The primary difference is that the estimated cost for the group of projects in both RTPs has increased by 27% ($9 billion) between 2011 and 2015. [5]

Comparison of Roadway Projects in 2011 and 2015 SANDAG RTPs

	2011		2015
Projects in 2015 Only			$118
Projects in 2011 Only	$47		
Projects Completed 2011-2015	$629		
Projects in Both RTPs	$32,835		$41,743

If the regional and County roadway expansion proceeds as planned, the failure of the SANDAG model to properly account for induced travel makes it likely that future VMT in the unincorporated area of the County is underestimated unless post-processing is done by SANDAG

How did the RTP propose to pay for the increased roadway construction costs? They did this by reducing planned capital spending on transit. All the roadway projects were kept, and it appears that the transit budget was developed by subtracting road funding from total funding; i.e. the money left over was assumed to be available for transit Compared to the 2011 RTP, the road projects that are common to both plans have increased

[4] As shown in Appendix A, the completed projects are I-15 managed lanes projects: 1) from SR 163 to SR 56 and 2) from Centre City Parkway to SR 78.
[5] The spreadsheet where 27% ($9 billion) are calculated is shown in Appendix A with the project descriptions and costs taken from 2011 RTP Appendix A and 2015 DRTP Appendix A..

in estimated cost by 27% ($9 billion). Planned transit investment is decreased in the 2015 RTP relative to the adopted 2011 RTP.[6] This haphazard approach to transit budgeting is evidence that there has been little attempt to consider what it would take to build a complete high-functioning transit system in the region.

The continued expansion of the regional roadway network is causing increased regional VMT and GHG. The increased VMT is called "induced travel." Researchers study induced travel using "elasticity," a term from economics. The elasticity is the ratio between the change in demand and the change in supply or price. For example, if gasoline price increased by 100% and gasoline consumption dropped by 10% (in the short run), the short-term elasticity of gasoline consumption to price would be 10%/100% = 0.10.

This conclusion is based on a thorough review of 20 research papers on induced travel published between 1997 and 2012. An elasticity of 1.0 between VMT and roadway capacity means that there is no net reduction in congestion. Instead there is a proportional increase in VMT and GHG emissions. For example, a 10 percent increase in freeway capacity would cause a 10 percent increase in VMT. (Roadway capacity is generally counted in terms of "lane miles" where a lane mile is 1 lane for 1 mile.) The California Office of Planning and Research (OPR) *Technical Advisory on Evaluating Transportation Impacts in CEQA* accepts this elasticity of 1.0.

It is often claimed that induced VMT will not translate directly into induced GHG because roadway expansion will reduce emissions per mile, but this argument is predicated on the assumption that there will be less congestion. Congestion bottlenecks may be alleviated in some areas, but will just be replicated elsewhere in the network. Research shows that roadway expansion will not reduce the level of congestion overall. Therefore, the assertion that emissions per mile will drop is wrong.

The elasticity research presented above is supported by three other types of evidence:

1) There is a well-established theory which explains how freeway expansion fails to reduce congestion. In 1992 Anthony Downs coined the term *triple convergence* to describe how peak period traffic congestion is inevitable because drivers will compensate for capacity increases by (a) shifting routes, (b) shifting travel time of travel, and (c) shifting travel mode.[7] After capacity expansion, the new equilibrium will be just as congested as the old equilibrium.

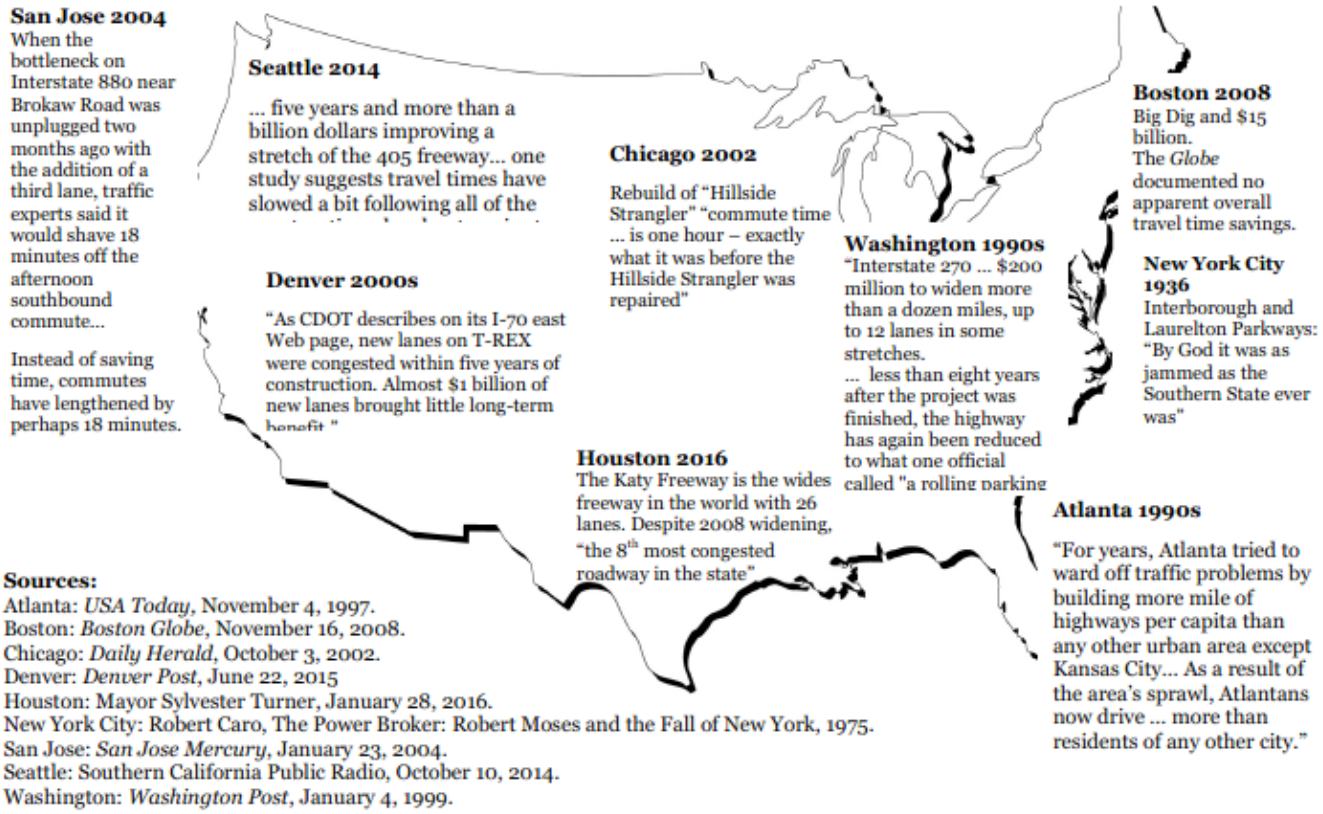
2) Now that there is a huge amount of real-time traffic data from cell phones and toll transponders, it is possible to compare congestion levels in different regions. In a statistical analysis of congestion data across 74 U.S. regions compiled by INRIX, the amount of freeway capacity in a region was found to be unrelated to the amount of congestion.[8]

3) There are countless stories in every corner of the United States where freeway expansion has failed to provide promised congestion relief because of induced travel over the past 80 years. A few of these

[6] There are both additions and subtractions of specific transit projects between 2011 and 2015, but total planned investment is lower in the 2015 DRTP (2011 RTP Appendix A and 2015 DRTP Appendix A)..
[7] Downs, A. Stuck in Traffic: Coping with Peak-Hour Traffic Congestion. Washington DC: Brookings Institution, 1992.
[8] Marshall, Norman. L. A Statistical Model of Regional Traffic Congestion in the United States. Presented at the Annual Meeting of the Transportation Research Board, 2016. https://trid.trb.org/view.aspx?id=1392295

stories are shown in Figure 8. It is useful to observe that the stories are from news reports. The agencies that made the false claims generally appear to be uninterested in understanding why their claims were false. Instead, they continue to make false claims about the benefits of future projects.

Figure 8: 80 Years of False Claims that Adding Freeway Capacity Can Eliminate Urban Freeway Congestion



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The SANDAG 2015 *Regional Transportation Plan* includes $42 billion in roadway expansion projects. The SANDAG DEIR concluded that "the proposed Plan would not induce substantial vehicle travel."[10] This conclusion

[9] SANDAG, Draft Environmental Impact Report San Diego Forward: The Regional Plan, p. 4.15-30, May 2015.
[10] SANDAG, Draft Environmental Impact Report San Diego Forward: The Regional Plan, p. 4.15-30, May 2015.

is based on SANDAG's travel demand model, and is inconsistent with real world data. This represents a test of the model, and the model failed.

If the model cannot properly account for induced travel, it cannot accurately forecast GHG emissions. In November 2017, the California Office of Planning and Research (OPR) published a *Technical Advisory on Evaluating Transportation Impacts in CEQA*. In strong contrast to the Caltrans silence on induced travel, this advisory recommends:

> *Whenever employing a travel demand model to assess induced vehicle travel, any limitation or known lack of sensitivity in the analysis that might cause substantial errors in the VMT estimate (for example, model insensitivity to one of the components of induced VMT described above) should be disclosed and characterized, and a description should be provided on how it could influence the analysis results. A discussion of the potential error or bias should be carried into analyses that rely on the VMT analysis, such as greenhouse gas emissions, air quality, energy, and noise.* [11]

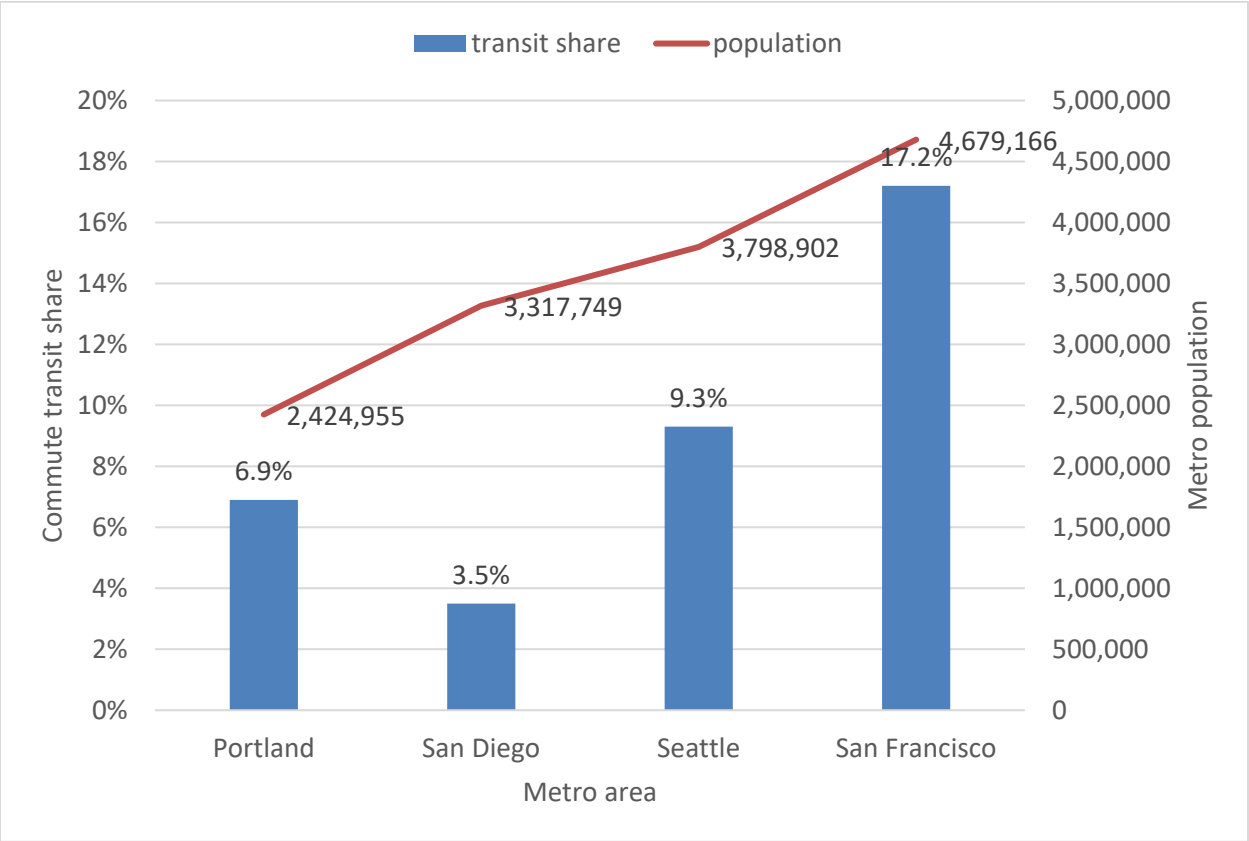
OPR is to be commended for recognizing a severe deficiency in the regional transportation models, and recommending that these limitations should be disclosed and discussed. SANDAG should have included post-processing to account for induced travel using the 1.0 elasticity documented in the CARB Policy Brief.

It is well known that the funding required to build the road program in the SANDAG 2015 RTP is not available.[12] An alternative should have been included in the CAP that included less expansion of County roads and regional roads.

mode share. The data suggest that the San Diego region should at least double its transit share to be competitive with the peer regions. Furthermore, those peer regions are all working to expand their transit systems and to increase transit ridership.

[11] California Office of Planning and Research. Technical Advisory on Evaluating Transportation Impacts in CEQA, p. 29, November 2017. http://opr.ca.gov/docs/20171127_Transportation_Analysis_TA_Nov_2017.pdf
[12] San Diego Tribune. Embattled SANDAG leader, Gary Gallegos, to step down by end of the year. August 8, 2017.

Figure 11: Transit Work Mode Share in Four West Coast Regions



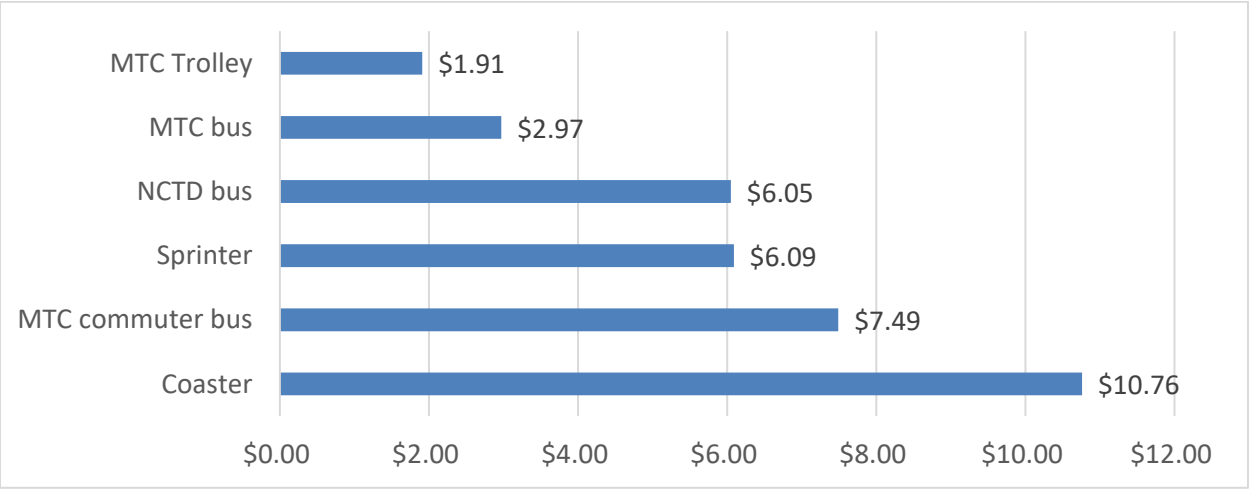
Notes: There is better data for work trips than other trips, and there is a strong correlation between transit work trip share and transit non-work share. 2015 transit mode share from https://usa.streetsblog.org/2016/09/16/where-car-commuting-is-shrinking-and-where-its-not/. Population from https://en.wikipedia.org/wiki/List_of_metropolitan_statistical_areas

Higher transit usage would translate into lower VMT and lower transportation GHG emissions – as a direct effect of moving people from cars to transit, and because regions with high transit usage also have high walk and bike share, especially for non-work trips.

CAP Strategy T-1.3 *Update Community Plans* is to: "*Focus growth in the county villages to achieve mixed- use, transit-oriented village centers by updating 10 community plans by 2030 and an additional 9 community plans between 2031 and 2040.*" (CAP, p. 3-14) While expanding transit is the region is critical, there is likely little transit potential in most of the unincorporated area and focusing scarce transit resources in such areas is likely counterproductive.

Figure 12 shows 2016 transit operating costs per passenger trip in San Diego region for its two larger transit providers: San Diego Metropolitan Transit System (MTS) and North County Transit District (NCTD).

Figure 12: Operating Expenses per Passenger Trip[13]



As shown in Figure 12, the MTC Trolley and MTC bus services are much more economically efficient than the transit that serves lower density parts of the region. Attempting to expand transit to outlying areas that are not currently served would be even more expensive – due to a combination of long distances and low ridership.

The Urban Area Transit Strategy (UATS) completed for SANDAG in 2010 states:

> *The overarching goal of the UATS was to create a world-class transit system for the San Diego region in 2050, with the aim of significantly increasing the attractiveness of transit, walking, and biking in the most urbanized areas of the region.*
>
> *The vision called for a network of fast, flexible, reliable, safe, and convenient transit services that connect our homes to the region's major employment centers and destinations. Achievement of this vision would make transit a more appealing option for many trips, reducing the impact of vehicular travel on the environment and on public health. Other key goals included:*
>
> - *Making transit more time-competitive with automobile travel;*
> - *Maximizing the role of transit within the broader transportation system; and*
> - *Reducing vehicle miles traveled and greenhouse gas emissions in the region. (p. TA 7-5)*[14]

The UATS shows a high potential for transit ridership in the region's urban core (Figure 13).

[13] Federal Transit Administration. 2016 National Transit Profiles.
[14] SANDAG. Urban Area Transit Study. http://www.sandag.org/index.asp?projectid=368&fuseaction=projects.detail

Figure 13: SANDAG Urban Area Transit Study Figure TA 7.8

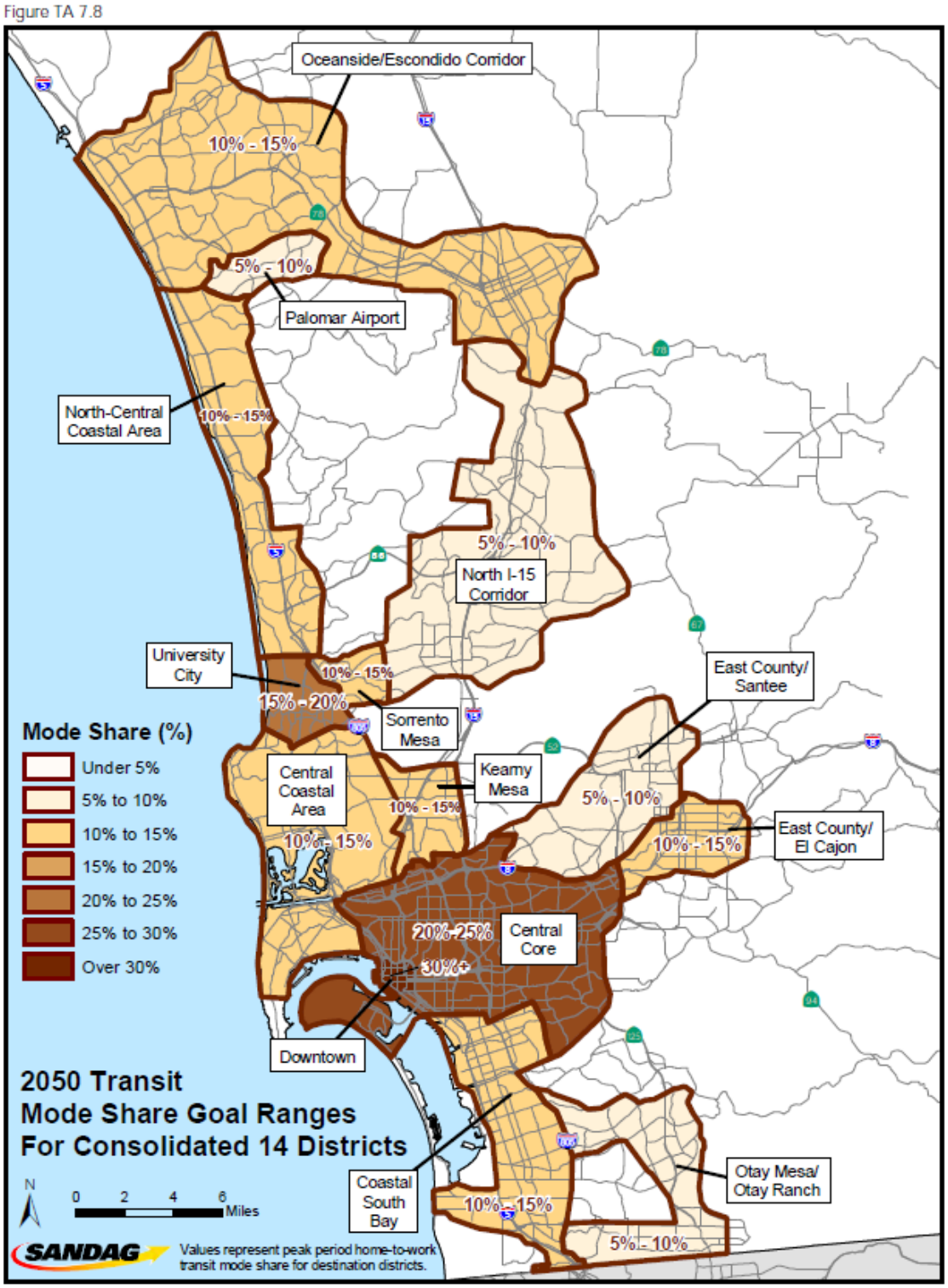
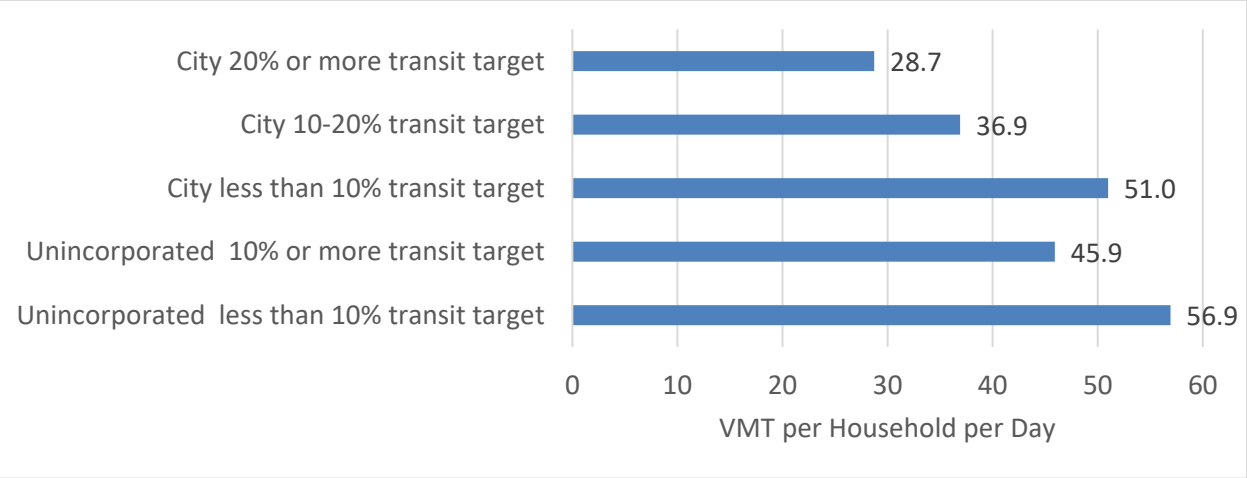


Figure 5 showed that, on average, households in the unincorporated area produce 29% more VMT than households in the County's 18 cities. The differences are even more pronounced it the region is segmented also by the UATS areas (Figure 14).

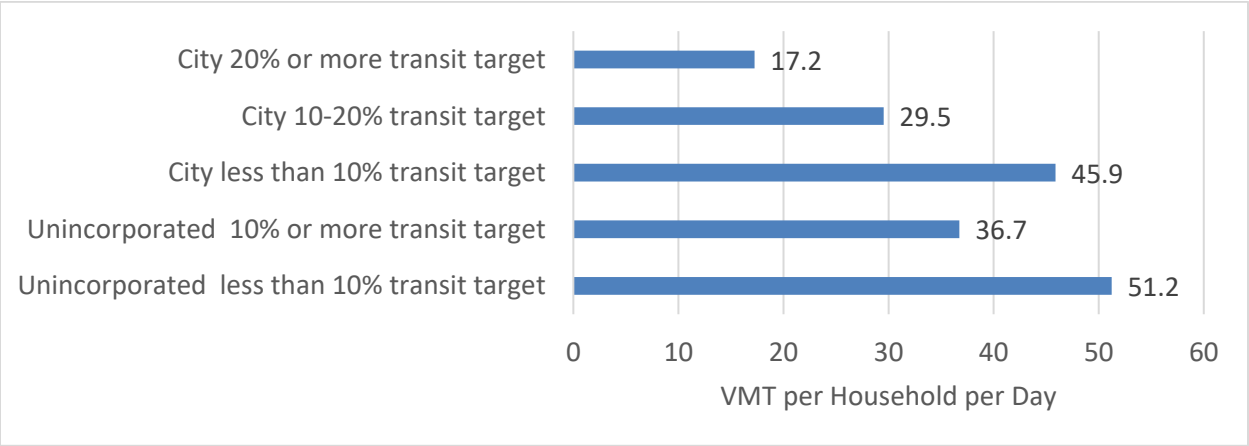
Figure 14: Average Household VMT per Day by Jurisdiction and UATS Group (CHTS)



As shown in Figure 14, households in the areas of the region with the greatest transit potential average only half as much VMT today as the areas with the least transit potential, i.e. most of the unincorporated portion of the County. Furthermore, these numbers are for the current condition with a relatively poor transit system. The City of San Diego should be the top priority for improved service because it has set a 2035 target of 25 percent transit mode share, 18% walk mode share, and 7% bike mode share (50% total) for Transit Priority Areas (within a half mile of a major transit).[15] If the City's and the UATS transit goals were achieved, the VMT numbers in Figure 14 would shift down considerably in the transit-priority areas (Figure 15). The range from areas with the most transit potential to the least increases to a factor of 3. If sprawl is constructed, the higher VMT resulting will be a permanent condition that cannot be mitigated.

[15] City of San Diego. Climate Action Plan, 2016. https://www.sandiego.gov/sites/default/files/final_july_2016_cap.pdf

Figure 15: Estimated Average Household VMT per Day with Transit Targets Met



Thank you for your consideration of these comments.

Sincerely,

Duncan McFetridge
Director, CNFF
President, SOFAR