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July 27, 2011

Via Email

Mr. Rob Rundle
Principal Regional Planner
SANDAG
401 B Street, Suite 800
San Diego, CA 92101
rru@sandag.org

Re: Proposed 2050 RTP/SCS and Draft Environmental Impact Report

Dear Mr. Rundle:

We submit this letter on behalf of the Cleveland National Forest Foundation ("CNFF"), Save Our Forest and Ranchlands ("SOFAR"), and the Center for Biological Diversity to provide comments on the draft 2050 regional transportation plan/sustainable communities strategy ("RTP/SCS" or "Plan) and the accompanying draft environmental impact report ("DEIR"). CNFF and SOFAR have previously submitted comments on the draft RTP/SCS and, in fact, have participated in the planning process for the Plan on numerous occasions. With each letter and at meetings and hearings with SANDAG staff and the Board, CNFF and SOFAR have explained their concerns with SANDAG's proposed approach to regional planning.[1]

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[1] *Please see:* (1) Letter dated May 27, 2010 from SOFAR and CNFF to SANDAG relating to SANDAG's Draft Evaluation Criteria for Highway Corridors, Connectors, Transit Services, and Freight Projects; (2) Letter dated July 14, 2010 from SOFAR and CNFF to SANDAG relating to SANDAG's draft Unconstrained Transportation Network; (3) Letter dated December 16, 2010 from SOFAR and CNFF to SANDAG relating to SANDAG's Proposed Transportation Network Scenario for the 2050 RTP; (4) Letter dated March 9, 2011 from Shute, Mihaly & Weinberger, LLP to SANDAG
(footnote continued)

Inasmuch as SANDAG was tasked with preparing a plan that links transportation and land use planning in order to reduce greenhouse gas emissions ("GHG"), we had hoped for a marked shift in SANDAG's approach to regional transportation. Unfortunately, the draft RTP/SCS shows remarkably little improvement over the agency's previous transportation plans. The 2050 RTP/SCS claims to *focus* on transit and promote sustainable communities, yet it does not. If one attempts to piece together the overall transportation network contemplated by the draft RTP/SCS, the image that emerges of SANDAG's vision for growth is far from "sustainable." The Plan fails to include the actual transportation projects necessary to ensure the region's growth over the next forty years comprises compact, urban development. To the contrary, it includes myriad highway projects and defers many of the much-needed transit projects to the latter years of the 40-year plan.

As a result, the Plan does very little to move the San Diego region toward sustainability. Simply put, transit is "sustainable," highways are not. In fact, the RTP portends environmental disaster. By SANDAG's own admission, the Plan will have significant impacts in the following areas: aesthetic and visual resources; agricultural and forest resources; air quality; biological resources; geological, soils, and mineral resources; greenhouse gas emissions; hazards and hazardous materials; land use; noise; population and housing; public services; utilities and energy; recreation; transportation and traffic; and water supply. DEIR ES 3-5. Worse yet, rather than propose measures or policies to reduce these impacts, SANDAG appears resigned to their inevitability, deeming all of these impacts "unavoidable." In doing so, SANDAG is missing a critical opportunity for responsible planning and growth that both achieves the goals of SB 375 (and AB 32) and avoids long-term environmental damage.

A quick review of the RTP/SCS' vehicle miles travelled ("VMT") and GHG statistics confirms our worst fears. Rather than reducing VMT—the very goal of goal of SB 375—the RTP/SCS, VMT would increase by 50 percent between 2010 and 2050. *See* DEIR Table 4.3-4 at 4.3-17. It comes as no surprise, then, that the Plan would also fail to achieve any sustained reductions in GHG emissions. While SANDAG appears to exceed its regional target of 14 percent per capita GHG reduction in 2020, in

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relating to SANDAG's Transportation Modeling for the RTP and Memo dated March 7, 2011 by Smart Mobility Inc.
(5) Letter dated July 8, 2011 from SOFAR and CNFF, commenting on SANDAG's draft 2050 RTP/SCS. These letters and reports are hereby incorporated by reference into this letter.

2050 it only achieves a 9 percent reduction. RTP/SCS at 2-8. If the region were headed in a sustainable direction, one would expect increasing, rather than diminishing, reductions in GHG emissions. Thus, while SANDAG asserts that the building blocks of the SCS have formed the foundation of transportation planning in the region, the reality is just the opposite. The region's historical approach to transportation – and its proposed continuation of this practice – will *not* result in communities that are more sustainable and transit-oriented. Furthermore, as explained below, it seems quite likely that the RTP will likely not even achieve the GHG reduction targets identified in the DEIR, modest as they are.

Adoption of the RTP/SCS and certification of the EIR, moreover, would not just constitute bad planning; it would violate state law. Our review of the DEIR reveals serious violations of the California Environmental Quality Act ("CEQA") (Public Resources Code section 21000 *et seq.*) and CEQA Guidelines (California Code of Regulations, title 14 section 15000 *et seq.*). A discussion of some of the most egregious deficiencies follows.

I. The DEIR Is Legally Inadequate.

An EIR is "the heart of CEQA." *Laurel Heights Improvement Assn. v. Regents of University of California* 47 Cal. 3d 376, 392 (1988) ("*Laurel Heights I*"). "The purpose of an environmental impact report is to provide public agencies and the public in general with detailed information about the effect that a proposed project is likely to have on the environment; to list ways in which the significant effects of such a project might be minimized; and to indicate alternatives to such a project." Pub. Res. Code § 21061. The EIR "is an environmental 'alarm bell' whose purpose it is to alert the public and its responsible officials to environmental changes before they have reached ecological points of no return. The EIR is also intended 'to demonstrate to an apprehensive citizenry that the agency has, in fact, analyzed and considered the ecological implications of its action.' Because the EIR must be certified or rejected by public officials, it is a document of accountability." *Laurel Heights I*, 47 Cal. 3d at 392 (citations omitted).

Unfortunately, the DEIR for the draft RTP/SCS fails entirely to live up to this mandate. The document lacks a comprehensive description of the Project and fails to include sufficient detail about the SCS's land use forecasts and the RTP's proposed transportation projects. In the absence of a comprehensive and detailed description of the Project, the EIR is incapable of providing a meaningful analysis of the RTP/SCS's environmental impacts. Moreover, the DEIR never seriously grapples with the issue of how the transportation projects contemplated in the RTP/SCS will affect the region's lands and environment. While aptly acknowledging the Plan would result in significant environmental impacts, it fails to provide the analysis and evidence to support many of its conclusions. The DEIR fares no better in its approach to mitigation, which is either overly vague and unenforceable or improperly deferred. Finally, there is very little substantive difference between any of the RTP/SCS alternatives and the RTP/SCS itself. Consequently, the DEIR fails to present any valid option for sustainable transportation planning for the San Diego region. Nor does the DEIR provide sufficient analysis of the environmental consequences of each of the alternatives. SANDAG once again has chosen to play a game of "hide the ball," leaving the public and decision-makers with a profoundly distorted view of the RTP/SCS and its consequences.

A. The EIR's Description of the Project Violates CEQA.

In order for an EIR to adequately evaluate the environmental ramifications of a project, it must first provide a comprehensive description of the project itself. "An accurate, stable and finite project description is the sine qua non of an informative and legally sufficient EIR." *San Joaquin Raptor/Wildlife Rescue Center v. County of Stanislaus* 27 Cal. App. 4th 713, 730 (1994) (quoting *County of Inyo v. City of Los Angeles* 71 Cal. App. 3d 185, 193 (1977)). As a result, courts have found that even if an EIR is adequate in all other respects, the use of a "truncated project concept" violates CEQA and mandates the conclusion that the lead agency did not proceed in the manner required by law. *San Joaquin Raptor*, 27 Cal. App. 4th at 729-30.

Furthermore, "[a]n accurate project description is necessary for an intelligent evaluation of the potential environmental effects of a proposed activity." *Id.* at 730 (citation omitted). Thus, an inaccurate or incomplete project description renders the analysis of significant environmental impacts inherently unreliable. Here, the DEIR for the draft RTP/SCS does not come close to meeting these clearly established legal standards.

1. The Project Description Lacks Sufficient Information to Determine How It Would Achieve Plan Objectives.

The DEIR identifies as a fundamental objective for the 2050 RTP/SCS "making transportation investments that result in healthy and sustainable communities." DEIR at 2-10. To this end, the RTP/SCS explains that it "seeks to guide the San Diego region toward a more sustainable future by integrating land use, housing, and transportation planning to create communities that are more sustainable, walkable, transit-oriented, and compact." RTP/SCS at 3-2. Despite this lofty goal, there is no description anywhere in the EIR of how the transportation projects in the RTP, or SANDAG's actions, will achieve this result.

The RTP/SCS explains that SANDAG's 2050 Regional Growth Forecast ("Growth Forecast"), as the foundation of the SCS land use pattern, was used to plan the transportation network in the 2050 RTP. SCS at 3-6. The Growth Forecast is based on economic and demographic projections for the year 2050, existing land use plans and policies, and potential changes to those plans and policies. *Id.* According to the draft Plan, the SCS land use pattern will accommodate more than 80 percent of the new homes, and jobs projected within the Urban Area Transit Strategy ("UATS") Study Area. New development in the UATS study area will purportedly be more compact, and more accessible to public transit, and other travel choices, such as walking and bicycling. *Id.*

This land use pattern is an ambitious goal, especially in light of the region's existing pattern of decentralized development. Consequently, it is especially important that the EIR's Project Description contain the details as to how the RTP/SCS will ultimately result in 80 percent of jobs and homes within the UATS study area. Unfortunately, such detail is entirely lacking. In fact, at the same time that SANDAG forecasts a land use vision of compact development, the agency repeatedly explains that it has no land use authority. *See, e.g.*, DEIR at 4.8-14. Thus, while the DEIR suggests that SANDAG is promoting a dramatic shift in land use (*see* DEIR at 4.13-10), the reality is that SANDAG's land use planning effort simply relies on local jurisdictions' existing land use plans. *See* RTP/SCS at 3-7. If land use is to truly become more compact over the next 40 years, SANDAG must take action and *lead* the local agencies in this sustainable direction.

The DEIR (and the SCS) contain no details of the existing land use plans or the proposed changes to those plans that serve as the basis of the Growth Forecast and ultimately the transportation network. While the DEIR includes maps (Figures 3.2, 3.2A and 3.3 for 2020, 2035 and 2050) that purport to show the general location of lands uses and residential and commercial densities, the scale of these maps is too small to allow meaningful review and, of course, do not contain detailed existing and future land use data. The SCS text directs the reader to Appendix D for detail pertaining to the general location of uses, residential densities, and building intensities, yet a review of this appendix directs the reader back to the SCS text for this information. *See* RTP/SCS at 3-6 and Appendix D at 1 (pdf p. 19). Again, there is no comprehensible description of proposed land use designations, densities or intensities that could result in SANDAG's vision for the region.

Nor is there a description anywhere in the EIR of how the RTP's projects will translate into a development pattern where 80 percent of the region's growth will occur within the UATS study area. Which specific projects in the RTP will result in 80 percent growth in the UATS? How many transit projects are proposed within the UATS, and what are these projects? What is the timing for each of these projects? Do they occur early in the RTP timeframe or later? If transit projects are not frontloaded into the RTP, the concentrated and compact development patterns in the RTP/SCS will not materialize within the RTP's 40-year timeframe. Equally if not more important, what are the freeway and arterial highway projects that are proposed within the UATS? What specific policy actions is SANDAG proposing that will enable the region to achieve its land use vision and goal?

Finally, the DEIR fails to provide any detail on another critical Project objective: meeting the region's GHG emission reduction targets of 7 percent by 2020 and 13 percent by 2035. DEIR at 2-10. As discussed further below, the DEIR lacks the evidentiary basis to conclude that the RTP's projects will ensure the region complies with the SB 375 GHG emission reduction targets. In fact, the scant information that is provided raises more questions than it answers. For example, the DEIR states that "since SANDAG does not implement land use policy, decisions regarding how and when to implement land use strategies that will result in reduced GHG emissions outlined in the SCS will ultimately come from the local-agency level." DEIR at 4.8-14. This statement would seem to indicate that SANDAG is shifting the ultimate responsibility to local agencies, while not identifying the specific actions SANDAG has the authority to undertake to achieve its GHG targets.

The DEIR is silent on each of these critical Plan details. In the absence of this fundamental information, it is not possible to determine whether the RTP/SCS will meet the Plan's objectives. Nor is it possible to determine whether the DEIR adequately evaluates the RTP/SCS's environmental impacts or to compare Plan alternatives. Consequently, the DEIR must be revised to include this information.

2. The DEIR Fails to Adequately Describe the RTP's Proposed Transportation Projects.

An equally fundamental flaw in the DEIR is its failure to sufficiently describe the RTP's proposed transportation projects and, in particular, the proposed transit projects. For example, the document includes a list of transit projects (Table 2.05) that are proposed to be included in the RTP, but the DEIR does not actually state whether these routes would constitute new service or improvements to existing service. Without this distinction, it is not possible to determine how much *new* transit, if any, is being proposed. Nor does the DEIR identify the current service for each of the routes listed in Table 2.05. For example, Streetcar Route No. 554 calls for peak and off peak headways of 10 minutes (*Id.*), but does not identify the existing headways for this route. If the current headways are already 15 minutes, this proposed service change does not provide much of an improvement. If the current headways are 30 minutes, or even one hour, this service change would be a tremendous improvement. Finally, the DEIR does not identify the timing of the transit projects. The document provides the timing for the RTP's freeway, highway and arterial projects (Table 2.0-6); it must provide the same information for the transit projects. Without all of this information, it is not possible to determine what the "Project" is.

The DEIR also fails to adequately describe the RTP's proposed highway and arterial projects. For example, Table 2.0-7 identifies 67 arterial projects proposed for implementation, yet the DEIR does not identify the existing number of lanes, the proposed number of lanes, the existing number of arterial lane miles, or the proposed amount of arterial lane miles for each of these projects. Nor does the DEIR identify the existing number of freeway lane miles in the region and the number of lane miles that would be constructed with the RTP. Furthermore, the document states that the Project includes "bottlenecks/auxiliary lane projects" (at 2-61), but it does not identify these projects. The DEIR also does not specifically identify the arterial or highway improvements (including HOV, managed lanes or BRT projects) that would be constructed in the UATS study area boundary. Finally, the DEIR fails to identify the number of annual average daily trips ("ADT") and VMT currently in the SANDAG region, or the number of annual ADT and VMT that would occur in the region upon implementation of the RTP.

CEQA requires that this pertinent information be included in the DEIR's project description, so that decision-makers and the public can evaluate the environmental impacts of the RTP/SCS and compare Project alternatives. Accordingly, the revised DEIR must identify these details for the Project and each alternative. Ideally, this information will be provided in a tabular form for ease of comparison.

B. The DEIR's Analysis of and Mitigation for the Impacts of the Proposed RTP/SCS Are Inadequate.

The discussion of a proposed project's environmental impacts is at the core of an EIR. *See* CEQA Guidelines § 15126.2(a) ("[a]n EIR *shall* identify and focus on the significant environmental effects of the proposed project") (emphasis added). As explained below, the DEIR's environmental impacts analysis is deficient under CEQA because it fails to provide the necessary facts and analysis to allow SANDAG and the public to make informed decisions about the Project. An EIR must effectuate the fundamental purpose of CEQA: to "inform the public and its responsible officials of the environmental consequences of their decisions before they are made." *Laurel Heights Improvement Ass'n v. Regents of University of California*, 6 Cal.4th 1112, 1123 (1993) ("*Laurel Heights II*"). To do so, an EIR must contain facts *and* analysis, not just an agency's bare conclusions. *Citizens of Goleta Valley v. Board of Supervisors*, 52 Cal.3d 553, 568 (1990). Thus, a conclusion regarding the significance of an environmental impact that is not based on an analysis of the relevant facts fails to fulfill CEQA's informational goal.

Additionally, an EIR must identify feasible measures to mitigate significant environmental impacts. CEQA Guidelines § 15126.4. Under CEQA, "public agencies should not approve projects as proposed if there are feasible alternatives or feasible mitigation measures available which would substantially lessen the significant environmental effects of such projects. . . ." Pub. Res. Code § 21002.

Although it is clear that the RTP/SCS has the potential to be an extraordinarily environmentally degrading action, neither the public nor decision-makers have any way of knowing the magnitude of this harm. Often, the DEIR asks the wrong questions so that the Project's environmental impacts appear benign or non-existent. In other instances, the document lacks the necessary detail to verify the validity of its analyses. Consequently, the DEIR fails to provide decision-makers and the public with detailed, accurate information about the Project's significant environmental impacts and to analyze mitigation measures and alternatives that would reduce or avoid such impacts.

1. The DEIR Fails to Adequately Analyze and Mitigate the RTP/SCS's Transportation Impacts.

The DEIR's analysis of transportation impacts is flawed because it assumes incorrectly that the ultimate objective of the RTP/SCS is to accommodate automobile traffic rather than to move persons and goods through the region. While the "project" under consideration is both an RTP and an SCS, the DEIR's transportation analysis does not focus on sustainable forms of transportation. Instead, the transportation analysis is almost identical to those of prior versions of SANDAG RTP EIRs, focusing almost exclusively on performance indicators such as travel time and congestion.

Although the DEIR would have us believe these performance indicators apply to public transportation as well as highways, this is certainly not the case. Traffic-based measurements (such as traffic speed and roadway capacity) evaluate motor vehicle movement. Accessibility-based measurements, on the other hand, such as person-miles and generalized travel costs evaluate the ability of people and businesses to reach desired goods, services and activities. *See* Victoria Transport Policy Institute, "Measuring Transportation, Traffic, Mobility and Accessibility," March 1, 2011, attached as Exhibit A. Because accessibility is the ultimate goal of most transportation, it is the best performance indicator to use. *Id.* As discussed below, because the DEIR focuses on the wrong performance indicators, the document does not evaluate the RTP's impacts on public transit.

In addition, by focusing on congestion and travel time rather than on accessibility, the DEIR gives the mistaken impression that transit cannot achieve the region's mobility goals. Inasmuch as the region has an extensive highway system and an incomplete public transportation network, the only way that the RTP can truly improve on these performance indicators is by adding freeway and highway capacity.[2] As discussed below, this bias affects the DEIR's description of the environmental setting, the thresholds of significance, and thus renders the analysis of the RTP/SCS's transportation impacts analysis meaningless.

(a) The DEIR Lacks an Adequate and Informative Description of the RTP/SCS's Environmental Setting.

Every analysis of a project's environmental effects must begin with the description of the environmental conditions before the project – the baseline. *See Save Our Peninsula Committee v. Monterey County Board of Supervisors* (2001) 87 Cal. App. 4th 99, 122. An indispensible component of a complete assessment of project impacts is an accurate depiction of existing environmental conditions. Investigating and reporting existing conditions are "crucial function[s] of the EIR." *Save Our Peninsula Comm. v. Monterey County* 87 Cal. App. 4th 99, 122 (2001) ("*SOPC*"). "[W]ithout such a description, analysis of impacts, mitigation measures and project alternatives becomes impossible." *County of Amador v. El Dorado County Water Agency* 76 Cal. App. 4th 931, 953 (1999) . Decision-makers must be able to weigh the project's effects against "real conditions on the ground." *City of Carmel-by-the-Sea*, 183 Cal. App. 3d at 246. "Because the chief purpose of the EIR is to provide detailed information regarding the significant environmental effects of the proposed project on the physical conditions

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[2] The region's existing transportation network is dominated by roads; there are over 1600 miles of highways and arterials and only includes 123 miles of regional transit service. RTP/SCS at 6-2.

which exist within the area, it follows that the existing conditions must be determined." *SOPC*, 87 Cal. App. 4th at 120 (internal quotation marks omitted). Here, the DEIR's description of the region's current transportation network is lacking crucial information.

With the exception of one metric dedicated to transit use ("percentage of trips within 0.5 miles of transit stop"), the DEIR does not discuss the current operating characteristics of the region's existing public transit network.[3] Because the RTP/SCS promotes itself as sustainably-oriented, the DEIR must actually describe metrics geared toward alternative forms of transportation. Notably, the DEIR does assert that the RTP/SCS recognizes that the smooth flow of traffic on local streets and arterials is needed to improve mobility on highways and regional arterial networks, especially where public transit and other alternatives are not as feasible as they are in the region's urban areas. DEIR at 2-50. The DEIR then identifies a series of arterial improvement projects that would purportedly improve mobility. *See* Table 2.0-7. Yet, the DEIR does *not* describe the existing transit lines within the vicinity of each of the proposed arterial projects proposed for improvement.

How can SANDAG assert that public transit is "not as feasible" as arterial roadway widening projects when the DEIR fails to describe in detail the existing transit network, existing transit operations, and transit constraints in the vicinity of areas that are proposed for arterial improvements? To provide such a description, the EIR must use a metric that compares the current ease, convenience, and reliability of traveling by automobile to traveling by public transit.

At a minimum, the revised DEIR must identify the following information regarding the region's existing transportation network:

- a transportation metric that describes travel in "passenger-mile," rather than "vehicle-mile" units;
- the number of linear miles of rail, bus and trolley service that exist in the region (this should be identified for Coaster, Sprinter, Trolley, and bus);[4]

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[3] While the DEIR identifies the general parameters of the region's public transit service (*e.g.*, MTS, NCTD, and major rail facilities) (at 4.16-5 and 6), this omits any description of how the region's transit network actually operates.

[4] The DEIR currently identifies MTS and NCTD in square miles (at 4.16-4), rather than linear miles.

- the ease with which transit passengers can reach a wide range of destinations in the metropolitan area;
- the existing gaps in the local public transit network;
- the transit lines that operate at greater than 15 minute headways in the peak period;
- the number of the region's total trips that are within 3 miles or less;
- the total regional, and the per capita, VMT in 2000 and 2010;
- the percentage and dollar amount of *TransNet* funds that are currently earmarked for highway projects;
- the percentage and dollar amount of *TransNet* funds that are currently earmarked for public transit projects, including managed lanes or BRT; and
- the percentage and dollar amount of *TransNet* funds that are currently earmarked for public transit projects, not including managed lanes or BRT.

The DEIR must be revised to include a balanced description of the region's existing transportation setting, using the metrics identified above.

(b) The DEIR Lacks Appropriate Thresholds of Significance.

Determining whether a project may result in a significant adverse environmental effect is a key requirement of CEQA. CEQA Guidelines §§ 15064(a) (determination of significant effects "plays a critical role in the CEQA process"); 1502.16 (an EIR must describe direct and indirect effects *and their significance*). CEQA specifically anticipates that agencies will use thresholds of significance as an analytical tool for judging the significance of a Project's impacts. CEQA Guidelines § 15064.7. Because the requirement to provide mitigation is triggered by the identification of a significant impact, the DEIR's failure to identify all of the Project's significant impacts also results in a failure to mitigate these impacts.

The DEIR asserts that its thresholds of significance were developed to evaluate how well the transportation system would meet the RTP/SCS *themes* of Quality of Travel and Livability, and Sustainability. [5] DEIR at 4.16-16 (emphasis added). Yet, it comes as no surprise that the DEIR's thresholds of significance are based on the same

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[5] We question the validity of an approach in which SANDAG evaluated the ability of a transportation system to meet a "theme," since a theme is nothing more than a broad ideas or message. It would appear that the evaluation should, instead, be based on meeting a quantifiable goal.

highway-oriented performance indicators discussed above: congestion and travel time. *Id.* Thus, because the DEIR asks the wrong questions, the agency's answers point towards the need to widen highways.

The revised DEIR should modify its significance criteria to truly gauge the sustainability of the RTP's proposed transportation network. A proper set of criteria would assess: (1) the potential of the RTP to result in a substantial increase in VMT; (2) the ability of transportation network to achieve the targeted 25 percent increase in transit mode share assumed in the UATS planning process (*see* RTP/SCS at TA 7-17); (3) the change in the number and percentage of: (a) transit peak-period person trips; and (b) transit passenger miles. These same significance criteria should be used to evaluate the sustainability of the RTP/SCS alternatives.

(c) The DEIR Fails to Adequately Address the RTP/SCS's Impact on Public Transportation.

Although the DEIR asserts that the 2050 RTP/SCS focuses transportation network improvements on transit, systems management, and demand management (at 4.8-31), this is not the case. While this RTP does place a greater emphasis on transit than the 2007 RTP did—and may be beginning to head in a more sustainable direction—it nonetheless is entirely misleading to call it a transit-focused plan. Indeed, the DEIR remarkably fails even to analyze the effect that the RTP would have on the region's transit service.

Adding highway capacity affects public transit in several ways. First, funding that would otherwise be directed at public transportation is instead dedicated to highways. This is especially important because a substantial amount of funding is necessary to compensate for the region's long-term dependence on the automobile. Consequently, the region has an extensive highway system but an incomplete transit system. Without a comprehensive, well-integrated transit system, public transportation will never be able to become a truly viable alternative to the automobile in meeting the region's transportation mobility needs. The DEIR fails to acknowledge, let alone analyze, this impact.

Second, increasing highway capacity at the same time as the region is trying to grow its transit mode share is an inherently flawed approach to regional transportation mobility. Increases in highway infrastructure undercut transit ridership. Traffic congestion provides a significant incentive to seek alternative modes of transportation. High-quality public transportation tends to attract travelers who might otherwise drive. Once highways are widened, however, traffic congestion eases, travel speeds increase (at least for some period of time), and travelers again begin to drive. Moreover, if transit ridership continues to decline (because travelers are taking advantage of freed-up capacity on freeway lanes), regional transportation agencies earmark even less funding to transit systems and transit service. With less funding, transit agencies cut, or eliminate altogether, routes and transit headways, which in turn reduces transit ridership further. Once again, the DEIR fails to acknowledge or analyze this effect on public transit.

Third, investing in highways perpetuates development patterns that are inherently unsuited to alternative modes of transportation. Typical suburban development – characterized by low-density cul-de-sacs, wide, high-speed arterials, and massive intersections – makes it less cost-effective for transit to serve scattered destinations. Investing in transit capital and operational improvements, on the other hand, creates transit certainty which in turn is a critical factor for supporting the growth of compact communities. This will result in a *virtuous* cycle whereby transit investments encourage transit-oriented development, boosting transit ridership, and encouraging more transit investments. Here too, the DEIR fails to account for this phenomenon or to analyze the effect that continuing highway expansion has on this cycle.

The revised DEIR must analyze the RTP/SCS's impact on public transit in the region.

(d) The DEIR Fails to Analyze Impacts Related to Induced Traffic.

The proposed RTP/SCS would result in a substantial increase in freeway and arterial capacity and, as a result, would facilitate increased travel. With increased highway capacity comes a decrease in traffic congestion, at least in the short term. The reduction in traffic congestion causes increases in vehicle speeds, which will lead in turn to additional "induced" travel. Induced travel occurs when the cost of travel is reduced (*i.e.*, travel time reduction due to additional capacity), causing an increase in demand (*i.e.,* more travelers using the improved facility). The reduction in travel time causes various responses by travelers, including diversion from other routes, changes in destinations, changes in mode, departure time shifts, and possibly the creation of new trips all together.

Numerous studies document the concept of induced travel. One recent study, prepared by Todd Litman of the Victoria Transport Policy Institute, described the effects of vehicle-generated traffic. Set forth below is a summary of this research:

- Using data on California freeway expansion, traffic volumes, and various demographic and economic factors between 1980 and 1994, Cervero (2003) found the long-term elasticity of VMT [vehicle miles traveled] with respect to traffic speed to be 0.64, meaning that a 10 percent increase in speed increases VMT 6.4 percent. Thus, about 80 percent of added road capacity is filled with additional peak-period traffic.

- Time-series data indicates an elasticity of vehicle travel with respect to lane miles of 0.5 in the short run, and 0.8 in the long run (Noland, 2001). This means that half of increased roadway capacity is filled with added travel within about 5 years, and 80 percent of the increased capacity eventually fills. Urban roads, which tend to be most congested, had higher elasticity values than rural roads, as expected due to their greater congestion and latent demand.

- The medium-term elasticity of highway traffic with respect to California state highway capacity was measured to be 0.6-0.7 at the county level and 0.9 at the municipal level (Hansen and Huang, 1997). This means that 60-90 percent of increased road capacity is filled with new traffic within five years. Each 1 percent increase in highway lane-miles increased VMT about 0.65 percent.

- A major study found the following elasticity values for vehicle travel with respect to travel time: urban roads, -0.27 in the short-term and –0.57 over the long term; rural roads, –0.67 in the short term and –1.33 in the long term (Goodwin, 1996). These values are used by the U.S. Federal Highway Administration for highway project evaluation. Because of these effects it is unsurprising that urban highway expansion provides modest congestion reduction (STPP 2001).

See Victoria Transport Policy Institute, T. Litman, Smart Congestion Reductions: Reevaluating the Role of Highway Expansion for Improving Urban Transportation, February 2, 2010 at 8, attached as Exhibit B.

The RTP/SCS DEIR fails to even acknowledge the potential for the Project to induce travel. This failure has serious implications for the DEIR and for the Project itself. First, because many of the environmental impact analyses (*e.g.*, traffic, air quality, climate change and noise) are based on the RTP's trip generation, an underestimation in trip volumes necessarily results in an underestimation of the Project's environmental effects. Second, the DEIR fails to grapple with the fact that widening freeways and arterials are a temporary solution, at best, to the complex problems of traffic congestion.

The revised DEIR should evaluate the travel-inducing consequences of the RTP through proper travel-demand modeling. Only by modeling various land use, destination, mode choice and route choice scenarios is it possible to understand actual travel behavior.

(e) The DEIR Fails to Provide Sufficient Mitigation for the RTP/SCS's Transportation Impacts.

CEQA requires that mitigation measures be identified and analyzed. "The purpose of an environmental impact report is . . . to list ways in which the significant effects of such a project might be minimized . . . ." Pub. Res. Code § 21061. The Supreme Court has described the mitigation and alternative sections of the EIR as the "core" of the document. *Citizens of Goleta Valley v. Board of Supervisors,* 52 Cal. 3d 553 (1990).

Although the DEIR does not provide a balanced analysis of the RTP's transportation impacts, the document nonetheless concludes that the Project's transportation impacts would be significant in 2035 and 2050. *See* DEIR analysis beginning at 4.16-16. Thus, although the RTP calls for a substantial increase in highway capacity, the region would nonetheless experience significant traffic congestion-related impacts in 2050. Yet, rather than identify mitigation measures that would reduce the region's reliance on driving, the DEIR rejects as infeasible all but one proposed mitigation measure. *See* DEIR at 4.16-34 through 36. Even this measure, though, is inadequate because it merely calls for SANDAG to modify the timing and priority of transportation projects in future RTPs to reduce transportation impacts. *Id.* at 4.16-34.

The DEIR provides no explanation as to why SANDAG intends to wait for future iterations of the RTP, rather than modify this RTP/SCS to minimize the Plan's significant transportation impacts. Moreover, if a mitigation measure relies on development of a future plan to mitigate a project's significant impact, the lead agency must identify a verifiable goal and establish clear and objective performance standards. Because the RTP/SCS DEIR fails to do either, it fails to meet CEQA's requirements. "[F]or kinds of impacts for which mitigation is known to be feasible, but where practical considerations prohibit devising such measures early in the planning process . . . , the agency can commit itself to eventually devising measures that will satisfy specific performance criteria articulated at the time of project approval." *Sacramento Old City Ass'n v. City Council*, 229 Cal. App. 3d 1011, 1028-29 (1991). Consequently, the DEIR identifies no substantive mitigation for the significant transportation impacts that would result from the RTP/SCS.

The DEIR errs further by summarily rejecting other potential mitigation measures as infeasible. CEQA requires that an agency's conclusion that mitigation is infeasible be supported by substantial evidence. Pub. Res. Code §§ 21081, 21081.5. For example, the DEIR identifies a measure calling for an intensified land use scenario that increases employment and residential densities around transportation corridors. DEIR at 4.16-36. Yet, in direct contravention of SB 375, SANDAG rejects this measure, stating that it does not have the legal authority to implement such a scenario. *Id.* SANDAG's legal authority to implement land use changes is not relevant to the preparation of an SCS/APS or its consideration of alternative land use strategies that may or may not be consistent with existing land use designations. By its own terms, an SCS/APS is not intended to regulate land use. Gov't Code § 65080(b)(2)(J). Rather, it is intended to provide a vision of "alternative developmental patterns, infrastructure, or additional transportation measures or policies" necessary to meet emission reduction objectives. Gov't Code § 65080(b)(2)(H). A local government can then opt to conform to the SCS/APS or not. By rejecting the consideration of alternative land use patterns on the grounds that it does not have legal authority to implement them, SANDAG is subverting the entire purpose of SB 375 and improperly rejecting feasible mitigation measures.

In other instances, the DEIR appears to have identified measures with the express intent of rejecting them. For example, while the DEIR identifies a measure calling for an increase in parking fees, the document rejects this mitigation on the grounds that it would place an added economic burden on workers in the region. DEIR at 4.16-34 and 35. Yet, there are plenty of other feasible parking management measures that the DEIR never even considers. As the Victoria Transport Policy Institute explains, "[W]hen appropriately applied, parking management can significantly reduce the number of parking spaces required in a particular situation, providing a variety of economic, social and environmental benefits." *See* Parking Management Strategies, Evaluation and Planning at 2, attached as Exhibit C. As this report makes clear, there are myriad parking management strategies that SANDAG could pursue that would decrease the RTP's significant transportation impacts without an economic burden on the region's workers. The revised DEIR must evaluate the feasibility of such measures identified in Exhibit C.

The DEIR fails to consider altogether other feasible measures. For example, the Project's transportation impacts could be mitigated by implementing transit projects first, while delaying any highway expansion projects until later in the RTP timeline. As discussed below, in the alternatives section of this letter, CNFF and SOFAR have developed an alternative to the RTP/SCS that calls for 50 years of transit improvements to be implemented over the next decade.

In short, SANDAG must identify feasible measures to mitigate the Project's transportation impacts. The appropriate forum for the identification and evaluation of these measures is in a revised DEIR.

C. The DEIR Fails to Adequately Analyze or Mitigate the Project's Impact on Climate Change.

1. The DEIR Fails to Support its Conclusions With Facts and Analysis.

CEQA requires that an EIR be detailed, complete, and reflect a good faith effort at full disclosure. CEQA Guidelines § 15151. The document should provide a sufficient degree of analysis to inform the public about the proposed project's adverse environmental impacts and to allow decision-makers to make intelligent judgments. *Id.* Consistent with this requirement, the information regarding the project's impacts must be "painstakingly ferreted out." *Environmental Planning and Information Council of Western El Dorado County v. County of El Dorado*, 131 Cal.App.3d 350, 357 (1982) (finding an EIR for a general plan amendment inadequate where the document did not make clear the effect on the physical environment). Meaningful analysis of impacts effectuates one of CEQA's fundamental purposes: to "inform the public and its responsible officials of the environmental consequences of their decisions before they are made." *Laurel Heights II*, 6 Cal.4th at 1123.

Here, the DEIR's purported analysis of the RTP/SCS's impact on climate change lacks the evidentiary basis to support its conclusions. The document identifies the increase in GHG emissions that would be attributable to the land use component of the Project and separately identifies the increase in emissions purportedly from the transportation network component of the Project. The DEIR does not, however, include *any* of the land use or transportation assumptions used to develop the RTP/SCS's GHG emission inventory. In fact, the climate change chapter lacks *any* factual support for its conclusions. Instead, the document contains vague statements such as:

> Although the 2050 RTP/SCS focuses development in a compact pattern, development projects would occur, resulting in direct and indirect GHG emissions. Direct emissions include emissions from fuel combustion in transportation and natural gas combustion from stationary sources. Indirect sources include off-site emissions occurring as a result of operations such as electricity and water consumption. *Id.*

Given generic statements such as these and the lack of any descriptive land use information or travel data, it is simply not possible to verify the accuracy of the DEIR's GHG figures. Indeed, there is no evidence that the GHG model is actually analyzing the impacts of the RTP/SCS rather than some other scenario.

The DEIR's identification of GHG emissions that would result from the RTP's transportation network projects is particularly troubling. Rather than provide the necessary detail about the specific assumptions that were used to arrive at the GHG emission figures, the document contains indistinct references to the projects that would be constructed (*e.g.,* "continued widening along portions of I-5"). *See* DEIR at 4.8-18, 22, 25. The DEIR fails to identify any of the details typically associated with transportation-related GHG inventories. Specifically, it does not discuss the increase in overall or per capita VMT attributable to the land uses contemplated in 2020, 2035 and 2050; average trip lengths; average speed of on-road motor vehicles; or the volume of gasoline consumption.

In addition, although SANDAG clearly recognizes the importance of land use patterns in reducing vehicle travel and related GHG emissions, the DEIR lacks any detail as to how specifically the RTP/SCS's land use related GHG inventory was calculated. The document generally identifies the demographic information (*e.g.,* increase in population, housing units and population), but it does not identify the specific changes in land use patterns, types or areas where development is expected to occur in 2020, 2035 or 2050. Without a before and after comparison of land use patterns, it is simply not possible to determine whether the DEIR accurately identifies the land use GHG emissions inventory. The DEIR lacks other important data and assumptions, including, for example, the increase in GHG emissions from sources such as electricity and natural gas consumption.

2. The DEIR's Significance Determination is Fundamentally Flawed Because it Ignores California's Emission Reduction Targets.

One of the Draft EIR's significance criteria is whether the RTP/SCS would increase emissions from current levels. (4.8-15.) As a long-range planning document that addresses community-wide emissions, the appropriate criteria for determining significance is whether the RTP/SCS is consistent with California's emission reduction targets. These targets are to reduce emissions to 1990 levels by 2020 and 80% below 1990 levels by 2050. Indeed, the express purpose of SB 375 is to not to keep emissions at existing levels, but to improve land use and transportation policy "to achieve emission reduction goals of AB 32." (SB 375, § 1(c).) By claiming that impacts of the RTP/SCS in 2020 are not significant because emissions would not increase from existing levels, the RTP/SCS makes an erroneous significance determination and misleads decisionmakers and the public on the severity of project impacts. The Draft EIR's GHG criteria should be revised to compare transportation and land use emissions under the RTP/SCS in 2020 to 1990 levels, emissions in 2035 to 40% below 1990 levels,[6] and emissions in 2050 to 80% below 1990 levels.

The Attorney General and air districts have also concluded that an assessment of GHG impacts from long-range planning documents such as an RTP or General Plan should be based on whether the planning document functions to achieve reductions consistent with AB 32 and Executive Order S-3-05. For example, in Climate Change, the California Environmental Quality Act, and General Plan Updates, the Attorney General stated:

> Governor Schwarzenegger's Executive Order S-3-05, which commits California to reducing its GHG emissions to 1990 levels by 2020 and to eighty percent below 1990 levels by 2050, is grounded in the science that tells us what we must do to achieve our long-term climate stabilization objective. The Global Warming Solutions Act of 2006 (AB 32), which codifies the 2020 target and tasks ARB with developing a plan to achieve this target, is a necessary step toward stabilization. Accordingly, the targets set in AB 32 and Executive Order S-3-05 can inform the CEQA analysis.
>
> One reasonable option for the lead agency is to create community-wide GHG emissions targets for the years governed by the general plan. The community-wide targets should align with an emissions trajectory that reflects aggressive GHG mitigation in the near term and California's interim (2020) and long-term (2050) GHG emissions limits set forth in AB 32 and the Executive Order.[7]

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[6] 40% below 1990 levels is consistent with a trajectory to reduce emissions to 80% below 1990 levels between 2020 and 2050.

[7] Attorney General, FAQs: Climate Change, CEQA & General Plans at 4 (Mar. 2009).

In developing GHG thresholds, the Bay Area Air Quality Management District similarly determined that when analyzing the impacts of long-range plans, significance criteria should be based on AB 32 for the 2020 planning year and that, given the additional reductions needed beyond 2020, lead agencies should look to the more aggressive reductions set forth in Executive Order S-3-05 for later planning horizons.[8]

In addition, the fact that an SCS may or may not meet its per capita target has no bearing on whether the SCS has significant GHG impacts under CEQA. The per capita targets adopted by ARB are based on what is purportedly "ambitious but achievable" by an MPO, not whether the target functions to achieve emissions reductions needed to meet AB 32 and Executive Order S-3-05. Because SCS per capita targets are not derived from environmental objectives, compliance is not determinative of the significance of GHG impacts.

3. The RTP/SCS and DEIR Must Recognize that Uncontrolled, Sprawling Growth Undermines State GHG Reduction Goals.

The DEIR correctly determines that the RTP/SCS's increase in GHG emissions in 2035 and 2050 would be significant. DEIR at 4.8-23, 4.8-26. The DEIR is entirely wrong, however, when it concludes that this impact is unavoidable. *Id.* at 4.8-37. SANDAG has the ability to create and adopt an RTP/SCS that advances the goals of SB 375 (and AB 32), including the goal of sustainable land use and transportation planning.

Unfortunately, as the DEIR shows, while the RTP/SCS's GHG emissions would appear to decline until 2035, they begin to rise again by 2050. This pattern suggests that the RTP/SCS would not result in sustainable land use or transportation. The reality, then, is that the Plan will result in further decentralized, low density land use development and continued reliance on the private automobile. Thus, as the DEIR confirms, GHG emissions will continue to rise despite technological advances, because the increase in driving is projected to overwhelm planned improvements in vehicle efficiency.

The only way that the region will be able to achieve sustained reductions in GHG is by reducing VMT. Recognizing the unsustainable growth in driving, the American Association of State Highway and Transportation Officials, which represents state departments of transportation, is urging that the growth of vehicle miles traveled *be*

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[8] BAAQMD, CEQA Proposed Thresholds of Significance (May 2010) at 24-25.

cut in half. See "Growing Cooler: Evidence on Urban Development and Climate Change," Urban Land Institute, attached as Exhibit C (emphasis added). Slowing the growth of VMT, especially when many regions including San Diego County are facing substantial increases in population, is a daunting task. However, much of the rise in vehicle emissions can be curbed simply by managing land use in a way that makes it easier for people to drive less. *Id.* The Legislature and the people of California have decided that this state must move toward sustainable growth. SANDAG must take a far more aggressive role in working toward this goal. Consequently, as discussed below, the DEIR for the RTP/SCS must identify mitigation measures or Plan alternatives that promote sustainable growth as a mechanism for reducing VMT.

4. The EIR's Approach to Climate Change Mitigation Is Utterly Deficient.

The DEIR aptly concludes that the RTP/SCS's impacts would be significant. With this significance determination comes CEQA's mandate to identify and adopt feasible mitigation measures that would reduce or avoid the impact. CEQA Guidelines § 15126.3(a)(1); *see also Woodward Park Homeowners Ass'n, Inc. v. City of Fresno,* 150 Cal. App. 4th 683, 724 (2007) ("The EIR also must describe feasible measures that could minimize significant impacts.").

Here, SANDAG takes a step in the right direction by including a measure suggesting that San Diego region cities and the County government prepare Climate Action Plans ("CAP"). Yet, this measure is unlikely to be effective in reducing GHG emissions because it is voluntary, flexible, unenforceable and lacks performance standards. To comply with CEQA, the DEIR must identify measures ensuring that these local agencies actually adopt and implement substantive CAPs. For example, rather than simply suggest that local governments prepare a CAP, the DEIR mitigation measure should have called for SANDAG to vigilantly seek commitments from its 18 members to develop these plans. In addition, SANDAG could have included in the DEIR a model CAP that local agencies would then be able to tailor to fit their specific needs. This model CAP could include regional transportation and land use GHG measures and performance standards, that each jurisdiction would then adopt. Finally, the mitigation measure could have identified a source of funds to local agencies to further encourage the preparation of CAPs.

The DEIR offers only two other mitigation measures for the RTP/SCS's significant GHG impacts. The first measure does nothing more than promise to incorporate GHG reduction measures in future plans, including RTPs and SCSs. Oddly, the DEIR never explains why policies and measures intended to lead to GHG reductions could not be implemented in this RTP/SCS. This systematic deferral of mitigation is directly contrary to CEQA's requirements. *Citizens of Goleta Valley v. Bd. of Supervisors*, 52 Cal. 3d 553, 564 (1990). An EIR may not defer identification of mitigation for potentially significant effects until after the decision on the project has been made. CEQA Guidelines § 15126.4(a)(1)(B) ("Formulation of mitigation measures should not be deferred until some future time."); *Sundstrom v. County of Mendocino*, 202 Cal. App. 3d 296, 307 (1988).

The third and final measure simply calls for SANDAG to implement Best Available Control Technology during construction and operation of projects, and suggests that implementing agencies do the same. DEIR at 4.8-36. This measure is particularly disingenuous though since SANDAG does not actually construct or operate projects. Moreover, the DEIR provides no basis to judge the effectiveness of this measure. Rather it is a "mere expression[] of hope" that SANDAG will be able to ultimately devise a way around the problem of climate change. *Lincoln Place Tenants Ass'n v. City of Los Angeles*, 130 Cal.App.4th 1491, 1508 (2005). CEQA rejects such an approach to mitigating significant impacts. *Id.*

In essence, we can find no evidence that SANDAG is seriously committed to offsetting the RTP's substantial increase in GHG emissions consistent with AB 32 and SB 375. SANDAG must take aggressive action to reduce commute distances and commute times and increase the region's public transit network. To this end, the revised DEIR should establish a performance standard calling for a target VMT reduction figure. The revised DEIR should also include a transit mode share goal. Inasmuch as this RTP was prepared for the express purpose of reducing vehicular travel and promoting sustainable transportation, we can find no logical explanation as to why the DEIR did not take a more vigilant approach to reducing GHG emissions.

D. The DEIR's Analysis of Alternatives to the Draft RTP/SCS Is Inadequate.

As discussed above, this RTP/SCS will determine the region's transportation, and the shape of growth, in San Diego for decades to come. Determining which transportation projects become a part of the Plan is likely to be one of the most important decisions the current Board will make. It is thus crucially important that the Board and the public have all available information on this subject.

This DEIR, of course, is the main vehicle for that information. Indeed, the analysis of alternatives lies at the "core of an EIR." *Citizens of Goleta Valley*, 52 Cal. 3d at 564. "Without meaningful analysis of alternatives in the EIR, neither the courts nor the public can fulfill their proper roles in the CEQA process . . . . [Courts will not] countenance a result that would require blind trust by the public, especially in light of CEQA's fundamental goal that the public be fully informed as to the environmental consequences of action by its public officials." *Laurel Heights I*, 47 Cal. 3d at 404. An EIR therefore must analyze a reasonable range of alternatives to the proposed project. *Citizens for Quality Growth v. City of Mount Shasta* 198 Cal. App. 3d 433, 443-45 (1988). A reasonable alternative is one that would feasibly attain most of the project's basic objectives while avoiding or substantially lessening the project's significant impacts. *See* Pub. Res. Code § 21100(b)(4); CEQA Guidelines § 15126.6(a).

The DEIR's analysis of the RTP/SCS's alternatives—like almost all of its impact analyses—lacks a legally adequate evaluation of their environmental effects. A valid alternatives section must include meaningful analysis—including quantitative analysis, where possible—comparing the proposed Project's environmental effects with those of particular alternatives capable of reducing the Project's significant unmitigable impacts. *See* CEQA Guidelines § 15126.6(b); *Laurel Heights I*, 47 Cal. 3d at 401-04; *Kings County Farm Bureau*, 221 Cal. App. 3d at 732 ("[I]f there is evidence of one or more potentially significant impacts, the report must contain a *meaningful* analysis of alternatives . . . which would avoid or lessen such impacts.") (emphasis added). Although the DEIR includes a comparative chart for each of the Project alternatives, this chart contains no facts or analysis and devotes only a few sentences to its discussion of each of the impact categories. *See generally* DEIR at Chapter 6. Consequently, it is not possible to verify the accuracy of the DEIR's comparative evaluation of the alternatives. Importantly, the DEIR might have reached a different conclusion about the environmentally superior alternative if it had performed a more complete analysis of all the alternatives, as required by CEQA.

The DEIR refers the reader to an appendix for calculations relating to transportation and GHG emissions. DEIR at 6-32. While this chart identifies performance indicators for the operation of the region's transportation network, it does not provide the environmental analysis necessary to compare each of the alternatives with the draft RTP/SCS. Moreover, this appendix appears to indicate that there is very little substantive difference between any of the Project alternatives. *See* Appendix F.

For example, Alternative 2b: Modified Funding Strategy/Modified Land Use would appear to offer advantages over the 2050 RTP/SCS because it would result in fewer highway and more transit projects, increase transit service frequencies, and alter the phasing of transit projects so that they are implemented earlier than under the 2050 RTP/SCS. DEIR at 6-10,6-14. In addition, this alternative would modify the land use pattern assumed in the RTP/SCS, by calling for the addition of infill and redevelopment to increase (1) residential development density within the Urban and Town Center designations and (2) employment within the job centers. *Id.* at 6-20. Yet, the transportation and GHG performance indicators for Alternative 2b are almost identical to those of the RTP/SCS. For example, average work trip time in minutes is exactly the same for the RTP/SCS and Alternative 2b in 2020, 2035 and 2050. *See* DEIR, Appendix F. Given the nominal difference between this alternative and the RTP/SCS, SANDAG must redesign its alternatives so that they provide a discernable improvement in transportation and GHG performance indicators (as well as environmental impacts).

In Alternative 3b, the DEIR engages in a different sort of deception. While this alternative purports to be the "transit emphasis" option (DEIR at 6-23), in fact, as the DEIR concedes, this alternative would actually "implement the majority of highway projects in the 2050 RTP/SCS." *Id.* One would expect transit mode share to be substantially higher under an alternative that promotes itself as emphasizing transit. However, given the increase in highway capacity with Alternative 3b, it comes as no surprise that there is no substantive difference between this alternative and the 2050 RTP/SCS. In fact, in 2050, Alternative 3b would increase transit mode share by a mere 0.2 percent as compared to the RTP/SCS (transit mode share under 2050 RTP = 11.1 percent; transit mode share under Alternative 3b = 11.3 percent). *See* Appendix F. Clearly, based on the nominal increase in transit ridership, Alternative 3b does not emphasize transit.

As discussed above, CNFF and SOFAR encourage SANDAG to consider and adopt a transit alternative that truly prioritizes transit. Attached, as Exhibit D, is a report prepared by Smart Mobility Inc., describing such an alternative: the 50-10 Transit Plan. The premise of the Plan is quite simple: fifty years of transit improvements would be implemented over the next decade. The 50-10 Plan would largely implement the transit capital projects already planned in the urban core for the 2050 RTP/SCS, while also including the Sprinter and the Coaster.[9] At the same time, the Plan calls for halting any new freeway and/or tollway construction until the urban core transit system is fully functional. An equally critical element of the Plan calls for a modification of the *TransNet* program to re-prioritize transit over highway projects. Finally, the Plan promotes a land use pattern that increases residential development densities within the urban core. Thus, the Plan would foster two main goals: (1) to make transit time

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[9] The urban core consists of the geographical area comprising the San Diego Trolley Ring and National City.

competitive with the automobile within the urban core; and (2) to create neighborhoods that are close to needed services and amenities.[10]

Although SANDAG's Alternative 2b includes some element of the 50-10 Plan, it nonetheless includes substantial increases in highway capacity by 2020. Indeed, it calls for more than $4 billion of highway expansion on the following freeways and highways: I-15, SR 76, SR 905, SR 11, SR 15, SR 94, SR 241, and I-805 over the next decade. *See* DEIR Table 6.2-3.

Compared to the 2050 RTP/SCS and all alternatives discussed in the DEIR, the 50-10 Plan would result in shorter automobile trips on average, long-term reduction in traffic congestion, more housing and transportation choices, many more walk and bicycle trips, reduced GHG emissions, and improved public health and overall quality of life. Because the 50-10 Plan would reduce or eliminate many of the significant impacts of the 2050 RTP/SCS, we urge SANDAG to study this alternative in the revised DEIR.

E. The DEIR Must Be Revised and Recirculated.

CEQA requires recirculation of an EIR when significant new information is added to the document after notice and opportunity for public review was provided. Pub. Res. Code § 21092.1; CEQA Guidelines § 15088.5. *Laurel Heights II,* 6 Cal. 4th at 1130.

As this letter explains, the draft RTP/SCS clearly requires extensive revision, which will include new information and analysis. This analysis will likely result in the identification of new, substantial environmental impacts or substantial increases in the severity of significant environmental impacts. Consequently, SANDAG must revise and recirculate the EIR for public review and comment.

II. Conclusion

For the reasons set forth above, we respectfully request that SANDAG revise the draft 2050 RTP/SCS to incorporate transportation projects that are truly

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[10] The Portland, Oregon-based real estate firm Gerding Edlen describes such neighborhoods as "20 minute living," for everything residents need is within 20 minutes of their homes.
http://www.portlandonline.com/portlandplan/index.cfm?a=246917&c=46822

sustainable. To this end, SANDAG should move critical transit projects forward in the planning process and defer highway expansion projects until a transit network within the urban core is fully built-out. Additionally, we request that no further consideration be given to the RTP/SCS until an EIR is prepared that fully complies with CEQA.

Very truly yours,

Laurel Impett (AH)

Laurel L. Impett, AICP, Urban Planner

Rachel Hooper

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SHUTE, MIHALY & WEINBERGER LLP

Representing Cleveland National Forest Foundation & Save Our Forest and Ranchlands

Matthew Vespa

Matthew D. Vespa

Representing Center for Biological Diversity

Exhibits:

Exhibit A: Victoria Transport Policy Institute, "Measuring Transportation, Traffic, Mobility and Accessibility," March 1, 2011.

Exhibit B: Victoria Transport Policy Institute, T. Litman, Smart Congestion Reductions: Reevaluating the Role of Highway Expansion for Improving Urban Transportation, February 2, 2010.

Exhibit C: Urban Land Institute, Growing Cooler: Evidence on Urban Development and Climate Change.

Exhibit D: Smart Mobility, Inc., 50-10 Year Transit Plan, July 2011.

cc: Duncan McFetridge, CNFF and SOFAR

Exhibit A

EXHIBIT

Exhibit A

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Measuring Transportation

Traffic, Mobility and Accessibility

1 March 2011

By Todd Litman
Victoria Transport Policy Institute

The ultimate goal of most transportation is "access," people's ability to reach desired goods, services and activities. Transportation decisions often involve tradeoffs between different forms of access. How transport is measured can have a major impact on these tradeoffs.

Abstract

This article compares three approaches to measuring transportation system performance and discusses their effects on planning decisions. *Traffic-based* measurements (such as vehicle trips, traffic speed and roadway level of service) evaluate motor vehicle movement. *Mobility-based* measurements (such as person-miles, door-to-door traffic times and ton-miles) evaluate person and freight movement. *Accessibility-based* measurements (such as person-trips and generalized travel costs) evaluate the ability of people and businesses to reach desired goods, services and activities. Accessibility is the ultimate goal of most transportation and so is the best approach to use.

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Introduction

Management experts often say that, "you can't manage what you can't measure." What is measured, how it is measured, and how data are presented can affect how problems are evaluated and solutions selected.

For example, a baseball player's performance can be evaluated based on batting averages, base hits, runs batted in, and ratio of wins to losses, plus various defense statistics that depend on the player's position. Performance statistics can be calculated per at-bat, per inning, per game, per season, or for a career. A player can be considered outstanding according to one set of statistics but inferior according to another.

This is just one example of how different measurement methods can give very different impressions about a person, group or activity. Often, there is no single method or unit that conveys all the information needed for evaluation. Different measurement units represent different perspectives and assumptions. A coach needs to consider several different statistics when evaluating how a particular player fits into a team. It is important that decision-makers understand the different perspectives and assumptions implicit in the measurement units they use.

This article discusses three common methods used to measure transportation, the perspectives they represent, and how the selection of one or another method can affect planning decisions.

Accuracy Versus Precision

Statisticians make a distinction between *accuracy* and *precision*. "Accurate" means truthful or correct. "Precise" means measured using small units. Data can be very precise, but inaccurate.

For example, doctors often measure their patients' weight to help evaluate their health. But weight by itself is an inadequate indicator of health. It would be inaccurate to say that everybody who weighs less than 175 pounds is healthy and everybody who weighs more than 175 pounds is unhealthy. People with different heights and builds have different optimal weights, so medical professionals must use weight-height tables or body-mass indices to interpret the health implications of a particular person's weight.

A standard medical scale can measure a person's weight within about 0.5 pound of accuracy. A more expensive scale can provide greater precision, but there is little point in purchasing a super-precise scale simply to track body weight. Knowing that you weigh exactly 168.305 pounds rather than about 170 pounds does little to improve your health assessment. Weight is relatively easy to measure and understand, but focusing too much attention on weight may distract doctors and patients from considering other health factors that are equally important but more difficult to measure, such as whether you eat a balanced diet or get sufficient exercise.

Similarly, vehicle traffic volumes and speeds are relatively easy to measure and so are often used to evaluate transport system quality. But other more difficult factors may be equally important, such as walking conditions, the distribution of common destinations, and the ease with which non-drivers can perform activities such as commuting and shopping. An *accurate* assess of transport system quality requires that these factors be considered even if their measurement is less *precise* than those measuring traffic.

Evaluation Perspectives

Transportation systems can be evaluated in various ways that reflect different perspectives concerning users, modes, land use, transport problems and solutions, how transport activity is measured, and the type of performance indicators used.[1] Three perspectives, called *traffic*, *mobility* and *accessibility*, are compared below.

Traffic

Definition

Traffic refers to vehicle movement. This perspective assumes that "travel" means vehicle travel and "trip" means vehicle-trip. It assumes that the primary way to improve transportation system quality is to increased vehicle mileage and speed.

Users

From this perspective, transportation users are primarily motorists (including drivers and passengers). Non-motorists are considered a relatively small and unimportant minority, defined as members of households that do not own an automobile.

Modes

This perspective focuses on automobile travel. It places little value on transit and cycling, since they represent a small portion of vehicle-mileage and are relatively slow. It considers walking primarily as a way for motorist to access parking facilities or as a form of recreation, and so devotes little transportation funds to nonmotorized facilities.

Figure 1 **Traffic**

"Traffic" refers to vehicle movement. A traffic perspective measures vehicle traffic speeds and volumes, using Level of Service ratings and average traffic speeds as indicators. This tends to favor high-speed, high-volume roadways, resulting in more automobile-dependent transportation systems and land use patterns.

Land Use

This perspective evaluates land use primarily in terms of proximity to highways and parking supply. The best location for a public facility is along a major arterial or freeway intersection. Downtown locations are undesirable due to excessive roadway congestion and parking costs.

Transport Problems and Solutions

This perspective defines transportation problems in terms of costs, barriers and risks to motorists. It favors solutions that increase road and parking capacity, roadway traffic speeds, vehicle ownership, and the affordability of driving. From this perspective, the best way to benefit non-drivers is to help them become motorists, by making automobile and taxi travel convenient and inexpensive.

Measurement
Vehicle traffic is relatively easy to measure. Most jurisdictions have data on motor vehicle registrations, drivers' licenses, and vehicle mileage. Performance indicators include traffic volumes, average traffic speeds, roadway Level of Service (LOS), congestion delay, parking supply, vehicle operating costs and crash rates.

Mobility

Definition
Mobility refers to the movement of people or goods. It assumes that "travel" means person- or ton-miles, "trip" means person- or freight-vehicle trip. It assumes that any increase in travel mileage or speed benefits society.

Users
From this perspective, transport users are mainly motorists, since most person- and ton-miles are by motor vehicle, but recognizes that some people rely on non-automobile modes, and some areas have large numbers of transit, rideshare and cycling trips.

Figure 2 **Mobility**

"Mobility" refers to the movement of people and goods. This recognizes both automobile and transit modes, but still assumes that movement is an end in itself, rather than a means to an end. It tends to give little consideration to nonmotorized modes or land use factors affecting accessibility.

Modes
This perspective considers automobiles most important, but values transit, ridesharing and cycling where there is sufficient demand, such as downtowns and college campuses, and so justifies devoting a portion of transport funding to transit, HOV and cycling facilities. It supports an integrated view of the transportation system, with attention to connections between modes. For example, it considers walking and transit complementary modes since most transit trips involve walking links.

Land Use
From this perspective, convenient highway access and parking is most important, but transit and HOV access are also desirable in areas where density and demographics concentrate enough riders. The best location for public facilities has a combination of convenient roadway access, adequate parking, transit service, and cycling routes.

Transport Problems and Solutions
A mobility perspective defines transportation problems in terms of constraints on physical movement, and so favors solutions that increase motor vehicle system capacity and speed, including road and parking facility improvements, transit and ridesharing improvements, high-speed train, aviation and intermodal connections. It gives little consideration to walking and cycling except where they provide access to motorized modes, since they represent a small portion of person-miles. From this perspective, the best way to benefit non-drivers is to improve motorized transport, including automobile, transit and taxi modes, with more modest consideration of walking and cycling.

Measurement
Mobility is measured using travel surveys to quantify person-miles, ton-miles, and travel speeds, plus traffic data to quantify average automobile and transit vehicle speeds. In recent years techniques have become available to evaluate multi-modal transportation system performance, such as transit and cycling Level of Service (LOS) ratings.[2]

Accessibility

Definition
Accessibility (or just *access*) refers to the ability to reach desired goods, services, activities and destinations (collectively called *opportunities*).[3, 4] Access is the ultimate goal of most transportation, except a small portion of travel in which movement is an end in itself (jogging, horseback riding, pleasure drives), with no destination. This perspective assumes that there may be many ways of improving transportation, including improved mobility, improved land use accessibility (which reduce the distance between destinations), or improved mobility substitutes such as telecommunications or delivery services.

Users
From this perspective, transportation users consist of people and businesses that want to reach a good, service, activity or destination. It recognizes that most people use various access options, and so cannot be classified as simply a motorist or transit rider.

Figure 3 **Accessibility**

Accessibility reflects both mobility (people's ability to travel) and land use patterns (the location of activities). This perspective gives greater consideration to nonmotorized modes and accessible land use patterns. Accessibility tends to be optimized with multi-modal transportation and more compact, mixed-use, walkable communities, which reduces the amount of travel required to reach destinations.

Modes

This perspective considers all access options as potentially important, including motorized and nonmotorized modes, and mobility substitutes such as telecommunications and delivery services. It supports an integrated view of transportation and land use systems, with attention to connections among modes and between transport and land use conditions. It values modes according to their ability to meet users' needs, and does not necessarily favor longer trips or faster modes if shorter trips and slower modes provide adequate access. It supports the broadest use of transport funding, including mobility management and land use management strategies if they increase accessibility.

Land Use

From this perspective, land use is as important as mobility in the quality of transportation, and different land use patterns favor different types of accessibility. The distribution of destinations, land use mix, network connectivity and walking conditions all affect transportation system performance. The best location for public facilities has a combination of convenient proximity, roadway access, transit service and walkability.

Transport Problems and Solutions

Accessibility-based planning expands the range of transport problems and potential solutions that can be considered. From this perspective, transport problems include any cost, barrier or risk that prevents people from reaching desired opportunities. Solutions can include traffic improvements, mobility improvements, mobility substitutes, (such as telecommuting and delivery services), and more accessible land use.

Measurement

Accessibility is evaluated based on the time, money, discomfort and risk (the *generalized cost*) required to reach opportunities. Access is relatively difficult to measure because it can be affected by so many factors. For example, access to employment is affected by the location of suitable jobs, the quality and cost of travel options that reach worksites, and the feasibility of telework (which may allow employment for a firm that is physically difficult to reach). Activity-based travel models and integrated transportation/land use models are most suitable for quantifying accessibility.[5]

Land Use Accessibility

Land use patterns affect mobility and accessibility in various ways:[6]

1. *Density* (number of people or jobs per unit of land area) increases the proximity of common destinations, and the number of people who use each mode, increasing demand for walking, cycling and transit.
2. *Land use mix* (locating different types of activities close together, such as shops and schools within or adjacent to residential neighborhoods) reduces the amount of travel required to reach common activities.
3. *Nonmotorized conditions*. The existence and quality of walking and cycling facilities can have a major effect on accessibility, particularly for non-drivers.
4. *Network connectivity* (more roads or paths that connect one geographic area with another) allows more direct travel.

Access can be evaluated at different geographic scales. At a fine-grained scale, accessibility is affected by the quality of the pedestrian conditions and the clustering of activities within a site, mall or commercial center. At the neighborhood level, accessibility is affected by the quality of sidewalks and cycling facilities, street connectivity, geographic density and mix. At the regional level, accessibility is affected by street connectivity, transit service, geographic density and mix. Interregional accessibility refers to the quality of highways, air service, bus and train service, and shipping services to other regions.

Figure 4 **Land Use Affects Transportation**

Land use patterns have major impacts on transportation system performance. Automobile-oriented land use has dispersed destinations, wide roadways and a generous portion of land devoted to parking. A more multi-modal land use pattern has destinations clustered into walkable centers.

Travel time maps use *isochrones* (lines of constant time) to indicate the time needed to travel from a particular origin to other areas.[7] For example, areas within one hour may be colored a dark red, within two hours a lighter red, within three hours a dark orange, and within four hours a light orange. Maps can indicate and compare travel times by different modes. For example, one set of maps could show travel times for automobile travel and another for public transit travel. Travel time maps are an indication of accessibility.

The Role of Different Modes

How transportation is measured affects the perceived value of different modes. Different modes play different roles in providing mobility and accessibility.[8] For example, nonmotorized modes serve shorter-distance trips and motorized modes serve longer-distance mobility. Some modes are more suitable for people with physical disabilities or low incomes. Some modes are particularly important for industrial activity.

Standard transport statistics indicate that in North America more than 90% of households own an automobile, and more than 90% of trips are made by automobile, while only about 5% of trips are made by nonmotorized modes and less than 2% by transit.[9] This suggests that private vehicle travel is by far the most important form of transport, and that improving other modes can do little to address transport problems.

But the high priority given automobiles and the low priority given other modes is partly an artifact of how data are collected and presented. Most travel surveys only count the primary mode used between relatively large Transportation Analysis Zones (TAZs), and some only count peak-period travel or commute trips. As a result, they undercount shorter trips (those occurring within a TAZ), nonmotorized links of motorized trips, off-peak trips, non-work trips, travel by children, and recreational travel.[10] For example, most surveys would not count a walking trip from a parking space to a worksite, or a walk to a restaurant during a lunch break. If a traveler cycles 10 minutes to a bus stop, rides a bus for five minutes, and walks another 5 minutes to their destination, this *bike-transit-walk* trip is usually coded simply as a transit trip, even though the nonmotorized links take more time than the motorized link.

Although only about 5% of trips are made exclusively by nonmotorized modes, four to six times as many involve at least some walking or cycling on public right-of-way.[11] Similarly, although only about 2% of total trips are made by public transit, about 5% of US adults report that they rely primarily on public transit for transport, and 12% used public transit at least once during the previous two months.[6, 12] According to a U.K. survey, walking represents 2.8% of total mileage, 17.7% of travel time, and 24.7% of trips, as indicated in Table 1 and Figure 5. If measured simply in terms of distance, walking seems insignificant, but not if evaluated in terms of trips, travel time, or exposure to street environments. Walking conditions therefore have a major impact on how people perceive the transportation system and the local environment, since we experience activities by the amount of time they take, not just distance traveled.

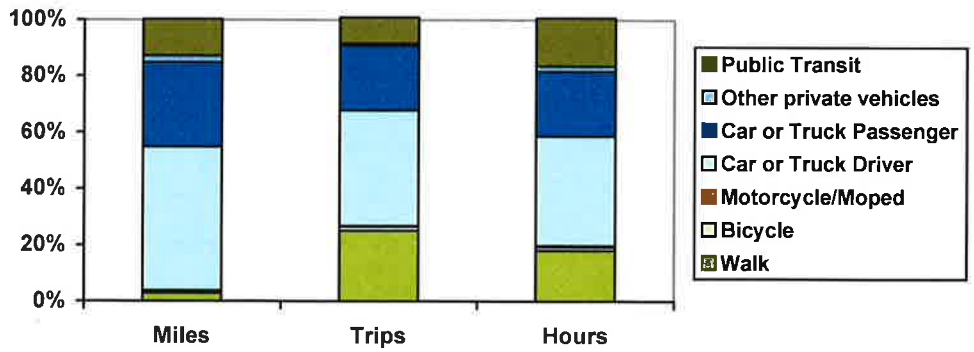
Table 1 **Average Annual Travel By Mode, UK**[13]

	Travel		Travel Time		Trips	
	Miles	*Percent*	*Hours*	*Percent*	*Trips*	*Percent*
Walk	192	2.8%	64	18%	245	25%
Bicycle	34	0.5%	5	1.3%	14	1.5%
Motorcycle/Moped	36	0.5%	1	0.4%	3	0.3%
Car or Truck Driver	3,466	51%	140	39%	401	41%
Car or Truck Passenger	2,047	30%	82	23%	226	23%
Other private vehicles	162	2.4%	7	1.9%	8	0.8%
Public Transit	897	13%	62	17%	92	9.3%
Totals	*6,833*	*100%*	*361*	*100%*	*990*	*100%*

Walking represents just 2.8% of personal mileage, but a much larger portion of travel time and trips.

Figure 5 compares how the choice of measurement units can affect the perceived importance of different modes. When measured by miles, walking is of less significance than when measured by trips or time. People tend to perceive travel based on time, not distance. A short walking trip often replaces a longer automobile trip, for example, walking to a local store rather than driving across town to a supermarket. Motorists tend to travel far more annual miles than people who do not have a car. As a result, it is often most appropriate to compare travel based on time and trips than miles.

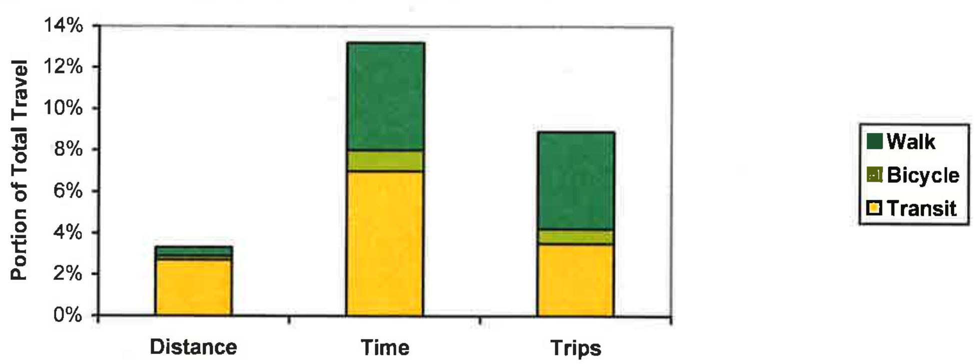
Figure 5 **Portion of Travel By Various Units**



This figure shows how the portion of travel by different modes from Table 1 varies significantly depending on the units used for measurement.

The U.S. National Household Travel Survey shows similar patterns, as indicated in Figure 6. The relative importance of walking, cycling and public transit travel is much higher when measured based on travel time or trips rather than distance. Transportation planners often evaluate travel based on mileage, which tends to favor motorized modes at the expense of walking and other slower modes.

Figure 6 **Portion of Travel By Various Units**[14]



The portion of travel by different modes varies depending on how it is measured.

Trade-offs Between Different Types of Accessibility

There are inherent trade-offs between different forms of accessibility. This occurs because roadway design and land use patterns optimal for one mode are generally less suited for other modes. As a result:

1. Highways designed for maximum vehicle mobility have poor accessibility (few offramps, driveways or cross-streets), while roads designed for maximum accessibility (many driveways and intersections) cannot safely accommodate higher-speed traffic.
2. Land use patterns that maximize automobile access (low density development with activities located along arterials and highway intersections) tend to have poor transit and nonmotorized access, while transit-oriented development (clustered development with limited parking and good pedestrian access) may increase traffic and parking congestion.
3. Wide roads and higher traffic speeds tend to create barriers to walking, so vehicle and pedestrian street design objectives often conflict.

Figure 7 **Transportation Decisions Involve Trade Offs**

Transportation decisions often involve tradeoffs between different forms of access, such as how much road space to devote to different modes and how much parking to require at destinations. A transport and land use system optimized for vehicle traffic often provides poor access by other modes.

Because of these trade-offs, traffic-based performance indicators tend to favor of automobile access over other modes. For example, roadway "improvements" that increase vehicle traffic volumes and speeds tends to create barriers to walking, and therefore to transit travel since most transit trips involve walking links. Such projects are considered beneficial from a *traffic* perspective which focuses on vehicle travel conditions, but not from an *accessibility* perspective which also considerers impacts on other modes. It is important that planners understand these tradeoffs and take them into account when making transportation and land use decisions.

Assumptions About Travel Demand
Conventional transport planning and modeling is based on the concept of *travel demand*, which assumes that consumers have freely chosen one possibility over all other, and so observed travel patterns represent the best possible set of actions that individuals could have taken given their preferences and the spatial structure of the city.[15] However, current travel demand also reflects existing constraints, such as inadequate alternatives to driving. Given other options, such as improved walking, cycling and public transit conditions, or different price structures, travel demand could be quite different.

Reference Units

Reference units are measurement units normalized to help compare impacts per mile, per trip, per vehicle, per dollar or per capita. Which reference units are used can affect how problems are defined and which solutions are considered. Measured one way, a particular program or project may seem costly and inefficient. Measured another way and the same proposal may seem affordable and worthwhile.

For example, a project may seem expensive if measured in total lifetime expenses, but cheap if measured as "cents per day" per person. It is generally best to report costs and benefits in real (inflation adjusted) per-capita-annual-dollars, which is relatively easy to understand and compare with other expenditures. Exactly which costs are included, and the group included in the denominator (residents, taxpayers, households, users, etc.) should be clearly defined. It is also helpful to compare costs with similar programs or with peers. For example, a new transportation program can be compared with current transportation expenditures, or with what other jurisdictions spend on similar services. If possible, projects should be evaluated based on incremental costs and benefits.

It is important to be comprehensive and realistic when comparing different modes. For example, when comparing the cost efficiency of road and transit improvements, it is important to estimate the full incremental costs of each option in a particular situation, such as on a particular corridor. It would be unfair to compare the full cost of providing urban transit services with just the cost of adding a roadway lane, since automobile trips also require parking spaces at destinations, and they require each traveler to pay vehicle ownership and operating costs.[16]

Different measurement units reflect different perspectives:

1. *Vehicle-mile* units reflect a *traffic* perspective that gives high value to automobile travel.
2. *Passenger-mile* units reflect a *mobility* perspective that values automobile and transit travel, but gives less value to nonmotorized modes because they tend to be used for short trips.
3. *Per-trip* units reflect an *access* perspective which gives equal value to automobile, transit, cycling, walking and telecommuting.
4. *Travel time* units reflect an *access* perspective that gives higher priority to walking, cycling and transit travel, because they tend to represent a relatively large portion of travel time.
5. *Generalized costs* (time and money costs) units reflect an *access* perspective.

Transportation professionals often use distance-based reference units, such as emissions per vehicle-mile or crash fatalities per billion vehicle-kilometers, although this ignores the increases in these costs that result from increased per capita vehicle travel, and the benefits of mobility management strategies that reduce total vehicle mileage. For example, urban highway expansion tends to reduce emissions and crashes per vehicle-kilometer, but by stimulating increased total vehicle travel it often increase per capita emissions and crash costs. It is usually best to measure these impacts per capita. Other reference units may be appropriate for project evaluation. For example, the mobility and congestion reduction impacts of improvements to various modes (automobile, ridesharing and public transit) can be compared *per additional peak-period person trip.*

Summary

Table 3 summarizes differences between these three ways to measure transportation, including their planning perspectives and assumptions.

Table 3 **Comparing Transportation Measurements**

	Traffic	Mobility	Access
Definition of Transportation	Vehicle travel.	Person and goods movement.	Ability to obtain goods, services and activities.
Unit of measure	Vehicle-miles and vehicle-trips	Person-miles, person-trips and ton-miles.	Trips.
Modes considered	Automobile and truck.	Automobile, truck and public transit.	All modes, including mobility substitutes such as telecommuting.
Common performance indicators	Vehicle traffic volumes and speeds, roadway Level of Service, costs per vehicle-mile, parking convenience.	Person-trip volumes and speeds, road and transit Level of Service, cost per person-trip, travel convenience.	Multi-modal Level of Service, land use accessibility, generalized cost to reach activities.
Assumptions concerning what benefits consumers.	Maximum vehicle mileage and speed, convenient parking, low vehicle costs.	Maximum personal travel and goods movement.	Maximum transport options, convenience, land use accessibility, cost efficiency.
Consideration of land use.	Favors low-density, urban fringe development patterns.	Favors some land use clustering, to accommodate transit.	Favors land use clustering, mix and connectivity.
Favored transport improvement strategies	Increased road and parking capacity, speed and safety.	Increased transport system capacity, speeds and safety.	Improved mobility, mobility substitutes and land use accessibility.

This table compares the three major approaches to measuring transportation.

Evaluating transportation based on *traffic* and *mobility* tends to place little value on mobility substitutes and land use management strategies, because they reduce the need for physical travel. From this perspective, higher density, clustered development is usually considered harmful because it tends to increase congestion and reduce roadway level-of-service, even if this is offset by improved access that reduces per capita vehicle travel and congestion delay. Only by measuring transport in terms of *access* can all impacts and transportation improvement options be considered, as illustrated in Table 4.

Table 4 **Comparing Transportation Improvement Strategies**

Transportation Improvement Strategies	Traffic	Mobility	Access
Roadway improvements	✓	✓	✓
Transit improvements		✓	✓
Ridesharing		✓	✓
Pedestrian and cycling improvements		✓	✓
Delivery services			✓
Telework			✓
Location-Efficient Development			✓

When measured in terms of ***vehicle traffic****, the main way to improve transportation is to increase roadway capacity and speeds. When measured in terms of* ***mobility****, transit, ridesharing and nonmotorized transportation improvements are also recognized as potential solutions. When measured in terms of* ***access****, the widest possible range of solutions can be considered, including strategies that substitute for physical travel and increase land use accessibility.*

Examples

Three examples of how measurement methods can affect evaluation are discussed below.

Comparing Modes

Consider the daily travel of somebody who commutes by car but walks and bikes for errands, as summarized in Table 5. A *traffic* perspective, which only counts motor vehicle travel, classifies her as an auto-commuter and measures her car mileage. A *mobility* perspective also counts walking and cycling trips, but since driving represents 87% of person-miles, considers nonmotorized modes of little importance. However, an *access* perspective indicates that driving represents just 50% of her travel time and only 20% of her trips, suggesting a more important role for alternative modes.

Table 5 **Example of Daily Person Trips**

Purpose	Mode	Distance (miles)	Time (minutes)
To work	Drive	15	30
From parking to office.	Walk	0.2	4
To restaurant for lunch.	Walk	0.5	10
From restaurant after lunch.	Walk	0.5	10
From office to parking.	Walk	0.2	4
To home.	Drive	15	30
To commercial center.	Bike	1	6
Errands (travel between shops)	Walk	0.5	10
Home from shopping center.	Bike	1	6
Walk dog.	Walk	0.5	10
Drive	*2 trips (20%)*	*30.0 (87%)*	*60 (50%)*
Walk	*6 trips (60%)*	*2.4 (7%)*	*48 (40%)*
Bike	*2 trips (20%)*	*2.0 (6%)*	*12 (10%)*
Totals	***10 trips (100%)***	***34.4 (100%)***	***120 (100%)***

(Assumes Drive = 30 mph, Walk = 3 mph, Bike = 10 mph. Values in parentheses indicate percentage of total travel.)

Different perspectives give different conclusions as to how best to improve transport. A pedestrian shortcut that reduces walking distance from an office to nearby restaurants by 0.2 miles provides only a 1% reduction in travel *distance*, and so appears to have little value if evaluated in terms of mobility. But this saves 12% of total travel *time*, the same time savings that might be provided by a major roadway improvement that increases average traffic speeds from 30 to 38 mph for a 15-mile commute.

Similarly, a particular road might carry 5,000 cars with 6,000 passengers, 100 transit buses carrying 2,000 passengers, 500 pedestrians, 200 bicycles, and have 100 adjacent homes and businesses. Traffic-based analysis, measured in vehicle-trips, considers motorists the dominant road user group, justifying road designs that maximize vehicle volume and speed. Mobility-based analysis, measured in person-mile, gives greater value to buses and rideshare vehicles, and so may justify HOV priority features. Access-based analysis, measured in person-minutes-of-exposure, gives greater value to pedestrians, cyclists and residents, since they spend more time on the roadway. This justifies greater emphasis on nonmotorized improvements, traffic calming and landscaping.

Evaluating Problems and Solutions

Say a community experiences growing peak-period traffic congestion. A *traffic* perspective, which evaluates transport system performance based on roadway level-of-service or average traffic speeds, justifies adding traffic lanes. This primarily benefits motorists. Improvements to other modes, such as transit, cycling and walking, are only considered worthwhile if they significantly reduce vehicle traffic congestion.

A *mobility* perspective, which measures multi-modal level-of-service and travel speeds, considers delays, risks and costs to all travelers, and expands the range of solutions to include improvements to alternative modes and connections between modes. This tends to result in a wider distribution of benefits.

An accessibility perspective expands the range of problems and solutions further. It takes into account land use factors, the quality of travel modes and mobility substitutes. From this perspective, traffic congestion is just one indicator of transport system quality. Some areas with high levels of traffic congestion have good accessibility, and areas with little congestion have poor accessibility. Accessibility can be improved not only by increasing vehicle flow and personal mobility, but also by increasing land use clustering and mix, improving walkability, and improving mobility substitutes such as telecommunications and delivery services.

School Location Decisions

From a *traffic* perspective, the best location for a public school (or other major public facility) is adjacent to a major roadway at the urban fringe where land is available for abundant parking. This assumes that most staff and students will arrive by car or school bus. From a *mobility* perspective, the best location is on a major urban street with adequate parking, frequent public transit service, and perhaps a bike lane. This assumes that most staff and students will arrive by automobile, but some will bicycle or use transit. From an *accessibility* perspective, the best location for a school may be within a residential neighborhood, even if driving is inconvenient, because most students and some staff will walk or bicycle.

Figure 8 **How Transport Is Measured Affects School Location And Design**

A school designed for convenient automobile access is located on a busy street, at the urban fringe where there is abundant land for parking. A school optimized for multi-modal access is located in the center of a residential neighborhood, where most children can walk, although this may be inconvenient for access by automobile.

Biased Transport Planning Language[17]

Many transport planning terms unintentionally favor motor vehicle travel over other forms of access. For example, increased road and parking capacity is often called an "improvement," although wider roads and larger parking facilities, and the increased traffic volumes and speeds that result, tend to degrade pedestrian and cycling mobility. Calling such changes "improvements" indicates a bias in favor of one mode over others. Objective language uses neutral terms, such as "added capacity," "additional lanes," "modifications," or "changes."

The terms "traffic" and "trip" often refer only to motor vehicle travel. Short trips, non-motorized trips, travel by children, and non-commute trips are often undercounted or ignored in transport surveys, models, and analysis. Although automobile and transit trips often begin and end with a pedestrian or cycling link, they are often classified simply as "auto" or "transit" trips.

The term "efficient" is frequently used to mean increased vehicle traffic speeds. This assumes that faster vehicle traffic always increases overall efficiency. This is not necessarily true. High vehicle speeds can reduce total traffic capacity, increase resource consumption, increase costs, reduce transportation choice, create less accessible land use patterns, and increase automobile dependency, reducing overall system efficiency.

Transportation professionals often rate the overall quality of the roadway network based on Level of Service (LOS) ratings that evaluate conditions for automobile traffic, but apply no comparable rating for other travel modes. It is important to indicate which users are considered when level of service values are reported.

Biased	**Neutral Terms**
Traffic	Motor vehicle traffic, pedestrian, bike traffic, etc.
Trips	Motor vehicle trips, person trips, bike trips, etc.
Improve	Change, modify, expand, widen
Enhance	Change, increase traffic speeds
Deteriorate	Change, reduce traffic speeds
Upgrade	Change, expand, widen, replace
Efficient	Faster, increased vehicle capacity
Level of service	Level of service for…

Examples:
Biased: "*Level of service* at this intersection is rated 'D.'' The proposed *improvement* will cost $100,000. This *upgrade* will make our transportation system more *efficient* by *enhancing* capacity, preventing *deterioration* of *traffic* conditions."

Neutral: "*Level of service* at this intersection is rated 'D' *for motorists* and 'E' *for pedestrians*. A *right turn channel* would cost $100,000. This *road widening project* will *increase motor vehicle traffic speeds and capacity* but may *reduce safety and convenience to pedestrian travel.*"

Conclusions

There are many ways to measure transportation system performance, each reflecting particular perspectives concerning who, what, where, how, when and why. Different methods favor different types of transport users and modes, different land use patterns, and different solutions to transport problems.

Vehicle traffic is easiest to measure, but this approach only considers a narrow range of transportation problems and solutions. *Mobility* is more difficult to measure, since it requires tracking people's travel behaviour. It still considers physical movement an end in itself, rather than a means to an end, but expands the range of problems and solutions considered to include alternative modes such as transit, ridesharing, cycling and walking.

Accessibility is most difficult to measure, because it requires taking into account land use, mobility and mobility substitutes, but most accurately reflects the ultimate goal of transportation, and allows widest range of transport problems and solutions to be considered. For example, an accessibility perspective may identify low-cost solutions to transportation problems, such as improving local walkability; encouraging land use mix so common destinations such as stores, schools and parks are located near residential areas; and improving communications services for isolated people and communities.

There is no single way to measure transportation performance that is both convenient and comprehensive. Transportation professionals should become familiar with the various measurement methods and units available, learn about their assumptions and perspectives, and help decision makers understand how they are best used to accurately evaluate problems and solutions.

Figure 9 **How Transport Is Measured Affects Planning Decisions**

Conventional ways of measuring transportation system performance, such as roadway Level of Service and traffic speed, tend to favor vehicle travel over other forms of access. Only by developing better methods of measuring mobility and accessibility will the full value of multi-modal transport systems and more accessible land use patterns, be recognized.

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Exhibit B

Exhibit B

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Smart Congestion Reductions

Reevaluating The Role Of Highway Expansion For Improving Urban Transportation

2 February 2010

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Summary

This report investigates claims that highway capacity expansion is a cost effective and desirable solution to urban traffic congestion problems. It identifies errors in proponents' analysis that overestimate the congestion reduction impacts and economic benefits of roadway capacity expansion, overlook negative impacts of induced travel, and ignore more cost effective alternatives. This is a companion to the report, *Smart Transportation Reductions II: Reevaluating The Role Of Public Transit For Improving Urban Transportation* (www.vtpi.org/cong_reliefII.pdf).

Introduction

Recent publications argue that expanding urban highways is a cost effective and desirable way to reduce traffic congestion (TDA 2003; AHUA 2004; Cox and Pisarski 2004; Hartgen and Fields 2006; Poole 2006). They claim that highway expansion provides *congestion relief*, a seductive term since congestion is stressful and costly. People understandably want *relief*. But this may be an example of a misguided solution that exacerbates the problem it was intended to solve and has undesirable unintended consequences.

As an analogy, consider the role laxatives should play relieving constipation. Laxatives are sometimes appropriate, but it is generally best to address constipation by changing diet (more fiber and liquids) and exercise (take a walk), because laxatives' effectiveness declines with frequent use, they can hide more severe diseases, and they can exacerbate other medical problems. A physician who prescribes laxatives without investigating why the patient is constipated or considering other solutions is guilty of malpractice.

Similarly, chronic traffic congestion is often a symptom of more fundamental problems, such as inadequate mobility options that force people to drive for every trip, and dispersed land use patterns that increase travel distances. Where this is true, expanding roads may reduce symptoms in the short term but exacerbate problems over the long term.

Although roadways projects (particularly safety and surface quality improvements) can be an appropriate part of a city's transport program, continually expanding congested highways tends to be inefficient. The first highways in an area often provide large economic returns, but marginal benefits diminish as more capacity is added for the following reasons:

- The first highways projects are generally the most cost effective, because planners are smart enough to prioritize investments. For example, if there are several possible highway alignments on a corridor, those with the greatest benefits and lowest costs are generally built first, leaving less cost effective options for subsequent implementation.
- Interregional highways (those connecting cities) are generally constructed first. They tend to provide greater economic benefits and have lower unit costs than local highway expansion, due to numerous conflicts and high land costs in urban areas.
- Adding capacity tends to provide declining user benefits, since consumers are smart enough to prioritize trips. For example, if highways are congested consumers organize their lives to avoid peak automobile period trips. As highway capacity increases they travel more during peak periods, perhaps driving across town during rush hour for an errand that would be deferred, or moving further away from their worksite. Each additional vehicle mile provides smaller user benefits, since the most valued vehicle-miles are already taken.

This paper investigates claims that highway expansion is a cost effective way to reduce urban traffic congestion, and evaluates the role that roadway capacity expansion should play in improving transportation. This is a companion to the report *Smart Transportation Investments II: Reevaluating The Role Of Public Transit For Improving Urban Transportation* (Litman 2006b).

Context

Highway expansion advocates are responding to changes in transportation planning practices during the last two decades. Traditional transport planning is *reductionist*; individual organizations are expected to solve narrowly defined problems. For example, transport agencies (then called *highway departments*) were responsible for improving vehicle traffic flow, while transit agencies were responsible for providing mobility for non-drivers, and environmental agencies were responsible for reducing pollution emissions. This type of planning often results in organizations implementing solutions to problems within their mandate that exacerbate other problems facing society, and tends to undervalue strategies that provide multiple benefits.

Modern planning is more comprehensive, taking into account additional impacts and options. It measures transport system performance differently (Litman, 2003). Traditional planning primarily measures *vehicle traffic* using indicators such as roadway level of service (LOS) ratings, average traffic speeds, and travel time indices that only reflect roadway conditions. Planners increasingly evaluate transport based on *mobility* (the movement of people and goods) and *accessibility* (the ease of reaching desired goods, services and activities), which expands the range of possible solutions to transport problems. For example, measuring transport based on *mobility* allows improvements to alternative modes to be considered, and based on *accessibility* allows more accessible land use development to be considered as possible solutions to transport problems.

Highway expansion advocates contend that efforts to increase transport system diversity and encourage more efficient use of the transportation system have been tried and failed, or are harmful to users, and so advocate a return to older transportation planning practices that define transportation simply in terms of motor vehicle traffic.

There is an alternative narrative. During the last century the U.S. built an extensive roadway system that serves users relatively well. Motorists can drive to most destinations with relative convenience, comfort and safety, except under urban-peak conditions. The main transport problems in most urban communities are traffic congestion, inadequate mobility for non-drivers, and various external costs of motor vehicle traffic, including road and parking facility costs, accidents and pollution emissions, all problems reduced with improved travel options, more efficient travel behavior, and more accessible land use development. With a mature roadway system, it may be better to increase transport diversity and encourage efficiency rather than continuing to expand highway capacity.

Evaluating Congestion

Highway expansion advocates tend to exaggerate congestion costs and bias their analysis to favor highway expansion over other types of transportation improvements.

Traffic congestion can be measured in various ways, some of which only reflect motorists' perspective and ignore congestion reduction benefits to travelers who shift modes or from more accessible land use patterns. Table 1 compares various congestion indicators and indicates whether they are comprehensive in terms of considering impacts of alternative modes and more accessible land use.

Table 1 **Roadway Congestion Indicators** (Litman, 2006)

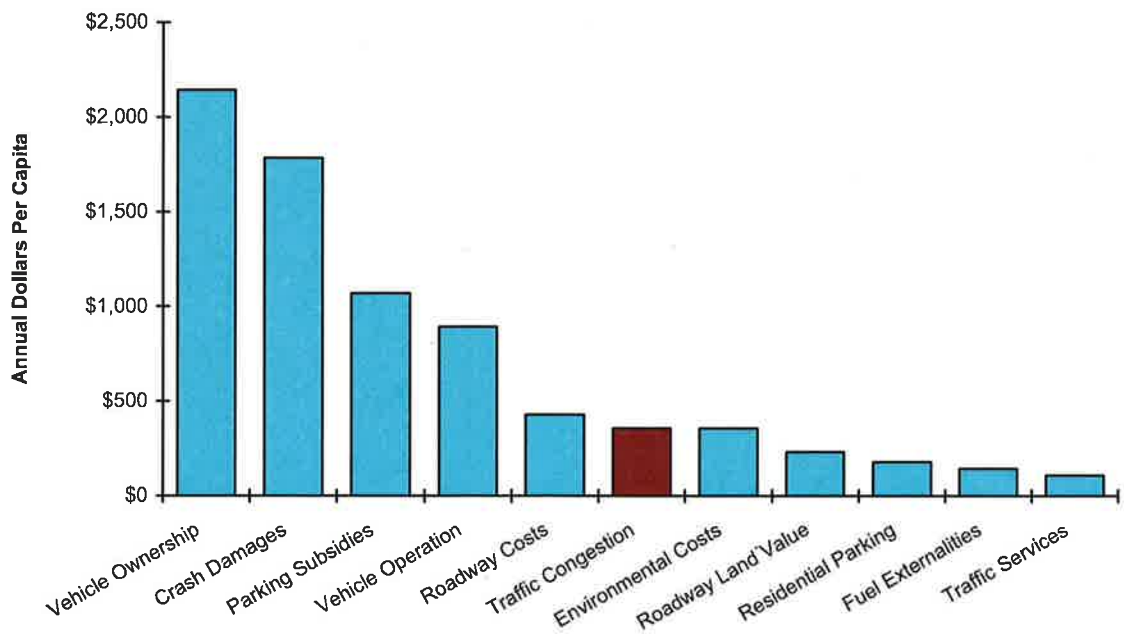
Indicator	Description	Comprehensive?
Roadway Level Of Service (LOS)	Intensity of congestion delays on a particular roadway or at an intersection, rated from A (uncongested) to F (most congested).	No
Travel Time Rate	The ratio of peak period to free-flow travel times, considering only reoccurring delays (normal congestion delays).	No
Travel Time Index	The ratio of peak period to free-flow travel times, considering both reoccurring and incident delays (e.g., traffic crashes).	No
Percent Travel Time In Congestion	Portion of peak-period vehicle or person travel that occurs under congested conditions.	No if for vehicles, yes if for people.
Congested Road Miles	Portion of roadway miles that are congested during peak periods.	No
Congested Time	Estimate of how long congested "rush hour" conditions exist	No
Congested Lane Miles	The number of peak-period lane miles of congested travel.	No
Annual Hours Of Delay	Hours of extra travel time due to congestion.	No if for vehicles, yes if for people.
Annual Delay Per Capita	Hours of extra travel time divided by area population.	Yes
Annual Delay Per Road User	Extra travel time hours divided by peak period road users.	No
Excess Fuel Consumption	Total additional fuel consumption due to congestion.	Yes
Fuel Per Capita	Additional fuel consumption divided by area population	Yes
Annual Congestion Costs	Hours of extra travel time multiplied times a travel time value, plus additional fuel costs. This is a monetized value.	Yes
Congestion Cost Per Capita	Additional travel time costs divided by area population	Yes
Congestion Burden Index (CBI)	Travel rate index multiplied by the proportion of commuters subject to congestion by driving to work.	Yes
Avg. Traffic Speed	Average peak-period vehicle travel speeds.	No
Avg. Commute Travel Time	Average commute trip time.	Yes
Avg. Per Capita Travel Time	Average total time devoted to travel.	Yes

This table summarizes various congestion cost indicators. Some only consider impacts on motorists and so ignore congestion reduction benefits of shifts to alternative modes and more accessible land use.

For example, indicators such as the *Travel Time Index* (*TTI*, the ratio of actual vehicle travel times over freeflow travel times) measure roadway congestion *intensity* but ignore *exposure*. They do not consider the degree to which travelers can avoid roadway congestion by shifting to alternative modes (such as grade-separated High Occupancy Vehicles and public transit, or telecommuting), nor the effects of land use patterns on trip distances. The TTI actually implies that congestion declines if vehicle mileage on uncongested roadways increases, as can occur if urban fringe highway expansion stimulates more dispersed land use patterns. Other indicators, such as *Congestion Costs Per Capita*, are more comprehensive, because they account for alternative modes and travel distance, and so expand the range of possible solutions.

In addition, the TTI calculates delay relative to freeflowing traffic speeds. Most economists consider this is inappropriate, since it is equivalent to suggesting that a restaurant should be sized to accommodate all the patrons it could attract if it gave food away. This methodology exaggerates congestion cost values. A more appropriate approach is to measure delays beyond a moderate level of congestion (LOS C or D), reflecting what is economically optimal (Bertini, 2005). Winston and Langer (2004) estimated that congestion costs are actually about half of those published by the Texas Transportation Institute. Through intention or ignorance, highway expansion advocates generally select the Travel Time Index and therefore exaggerate congestion problems and undervalue alternative modes and smart growth as congestion reduction strategies.

Figure 1 **Costs Ranked by Magnitude** ("Transportation Costs," VTPI, 2005)



This figure compares various costs of automobile transportation. Congestion is a moderate cost, far lower than vehicle costs, crash damages, parking and roadway costs.

Congestion is a moderate cost compared with other transportation costs, as indicated in Figure 1. Per capita vehicle expenses average about $4,000, crash costs (including lost productivity and monetized values for pain) more than $1,500, parking facilities costs more than $1,000, and roadway costs total about $400, compared with approximately $350 per capita congestion costs estimated by the Texas Transportation Institute.

Highway expansion advocates argue that because VMT grew faster than lane-miles in recent years, there is a roadway capacity "deficit." But highway lane-miles growth rates during the Interstate Highway development period (1950s-70s) should not be compared with later periods, after the highway system was complete, when capacity expansion is only needed to address specific problems. In addition, the greatest increases in VMT involved personal and off-peak travel, and increased urban-peak travel means that more corridors achieve volume thresholds needed for efficient transit and HOV facilities. It is therefore wrong to assume that roadway lane-miles should increase with VMT.

Highway expansion advocates often extrapolate past trends to predict huge future growth in vehicle travel and traffic congestion, although demographic (aging population), economic (rising fuel prices), market (increase consumer preferences for alternative modes), transportation (declining per capita vehicle travel) and management (increased application of transportation systems management) trends are likely to reduce future traffic growth rates (Litman, 2005a). They often use older traffic models that exaggerate future congestion problems by ignoring the tendency of congestion to be self-limiting: congestion tends to limit peak-period traffic growth, as consumers respond by shifting travel time, route, mode and destination ("Traffic Model Improvements," VTPI, 2006). Predictions that roads will reach "gridlock" are generally wrong. This indicates that congestion problems will only increase significantly in areas with rapid population or freight traffic growth, and only if they fail to implement mobility management strategies.

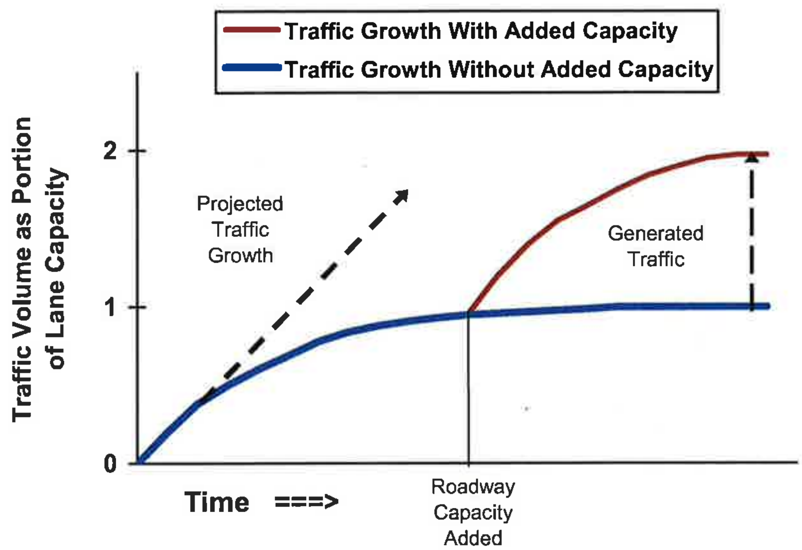
Advocates use exaggerated analysis to justify highway expansion. For example, Cox and Pisarski (2004) cite an obscure French study (Prud'homme and Lee 1998) showing a positive relationship between employment accessibility and regional productivity to predict huge economic returns from highway capacity expansion. Although the basic concept is appropriate – urban economists find plenty of evidence that improved accessibility increases productivity (Haughwout 2000) – the particular application is inappropriate since urban highway expansion tends to stimulate more dispersed development that *reduces* rather than *increases* accessibility (Muro and Puentes 2004).

This is not to suggest that congestion problems should be ignored and congestion reduction efforts are unwarranted, but other costs should be considered when evaluating congestion reduction strategies. For example, it would be misguided to implement a policy or program that reduces congestion costs by 10% if doing so increased vehicle expenses, road or parking facility costs, crashes or environmental damages by just 3% each. On the other hand, a congestion reduction strategy provides far more total benefit it also helps reduce these other costs even by small amounts.

Congestion Reduction Impacts

As mentioned earlier, traffic congestion tends to maintain self-limiting equilibrium: it grows to the point that congestion delays constrain further peak-period vehicle trips, causing travelers to shift to alternative times, routes and mode, and forego lower-value trips. For example, when roads are congested you might choose a closer destination or defer a trip until later, but if congestion is reduced you make those peak-period trips. Similarly, when considering a new home or job you might accept a maximum commute 20 miles if the main highway is congested, but up to 30 miles if the highway is widened and congestion reduced. Figure 2 illustrates this effect. As a result, congestion seldom gets as severe as worst-case predictions warn, and expanding roadways tends to *generate traffic* (increase peak-period vehicle travel, including shifts in time and route) and *induce travel* (increase total vehicle mileage) compared with what would otherwise occur (Litman 2001).

Figure 2 **How Road Capacity Expansion Generates Traffic** (Litman, 2001)



Traffic grows when roads are uncongested, but growth rates decline as congestion develops, reaching a self-limiting equilibrium (indicated by the curve becoming horizontal). If capacity is added, traffic growth continues until it reaches a new equilibrium. The additional peak-period vehicle travel that results is called "generated traffic." The portion that consists of absolute increases in vehicle travel (as opposed to shifts in time and route) is called "induced travel."

This additional vehicle travel provides direct benefits to travelers, which can be calculated and incorporated into economic evaluation using consumer surplus analysis, and imposes various external costs (Litman 2001).

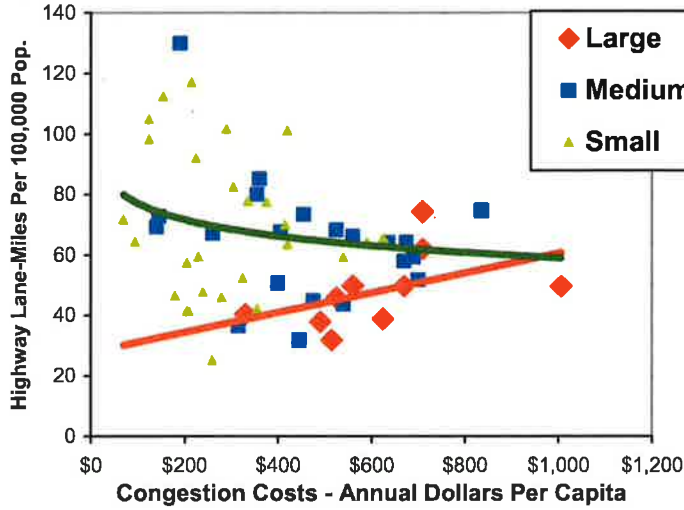
Various studies have quantified the amount of vehicle travel generated and induced by roadway expansion (TRB, 1995; Litman, 2001). Below are summaries of this research.

- Using data on California freeway expansion, traffic volumes, and various demographic and economic factors between 1980 and 1994, Cervero (2003) found the long-term elasticity of VMT with respect to traffic speed to be 0.64, meaning that a 10% increase in speed increases VMT 6.4%, so about 80% of added road capacity is filled with additional peak-period traffic.
- Time-series data indicates an elasticity of vehicle travel with respect to lane miles of 0.5 in the short run, and 0.8 in the long run (Noland, 2001). This means that half of increased roadway capacity is filled with added travel within about 5 years, and 80% of the increased capacity eventually fills. Urban roads, which tend to be most congested, had higher elasticity values than rural roads, as expected due to their greater congestion and latent demand.
- The medium-term elasticity of highway traffic with respect to California state highway capacity was measured to be 0.6-0.7 at the county level and 0.9 at the municipal level (Hansen and Huang, 1997). This means that 60-90% of increased road capacity is filled with new traffic within five years. Each 1% increase in highway lane-miles increased VMT about 0.65%.
- A major study found the following elasticity values for vehicle travel with respect to travel time: urban roads, -0.27 in the short-term and –0.57 over the long term; rural roads, –0.67 in the short term and –1.33 in the long term (Goodwin, 1996). These values are used by the U.S. Federal Highway Administration for highway project evaluation.

Because of these effects it is unsurprising that urban highway expansion provides modest congestion reduction (STPP 2001). As stated in the *Urban Mobility Study* (TTI 2005), "This analysis shows that it would be almost impossible to attempt to maintain a constant congestion level with road construction alone." Winston and Langer (2004) calculate that each dollar spent on highway expansion provides 11¢ worth of congestion reduction the first year, and this value declines rapidly in subsequent years. Zupan (2001) found that each 1% increase in VMT in a U.S. urban region was associated with a 3.5% increase in congestion delays in that region during the 1980's, but this relationship declined during the 1990s, so a 1% increase in VMT increases delays only 1%. This change may reflect increased ability of travelers to avoid peak-period driving, through flextime, telework and suburbanization of destinations, reducing the congestion delay caused by increased travel.

Highway expansion advocates generally ignore or severely understate generated traffic and induced travel impacts. For example, Cox and Pisarski (2004) use a model that only accounts for diverted traffic (trips shifted in time or route) but ignores shifts in mode, destination and trip frequency. Hartgen and Fields (2006) assume that generated traffic would fill just 15% of added roadway capacity, a figure they base on generated traffic rates during the 1960s and 1970s, which is unrealistically low when extremely congested roads are expanded. They also ignore the incremental costs that result from induced vehicle travel, such as increased downstream traffic congestion, road and parking costs, accidents and pollution emissions. They claim that roadway capacity expansion reduces fuel consumption, pollution emissions and accidents, because they measure impacts per vehicle-mile and ignore increased vehicle miles. As a result they significantly exaggerate roadway expansion benefits and understate total costs.

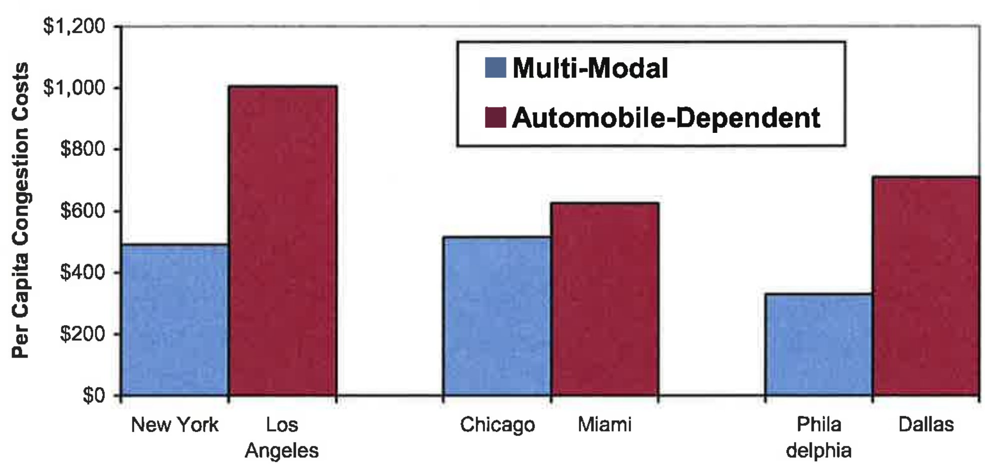
Figure 3 **Congestion Costs Versus Highway Supply** (TTI 2003; FHWA 2002)



This figure illustrates the relationship between highway supply and congestion costs. Overall, increased roadway supply provides a small reduction in per capita congestion costs (green line), but among large cities, congestion increases with road supply (orange line).

Figure 3 illustrates the relationship between highway lane-miles and congestion costs. Considering all cities, congestion declines with highway supply but the relationship is weak (green line): a large supply increase provides modest congestion reduction. Among the ten largest cities (orange diamonds) the relationship is negative (orange line): those with more highways tend to have more congestion. Congestion costs are significantly lower in cities with multi-modal transport systems, as illustrated in Figure 4.

Figure 4 **Congestion Costs Compared** (Litman 2004)

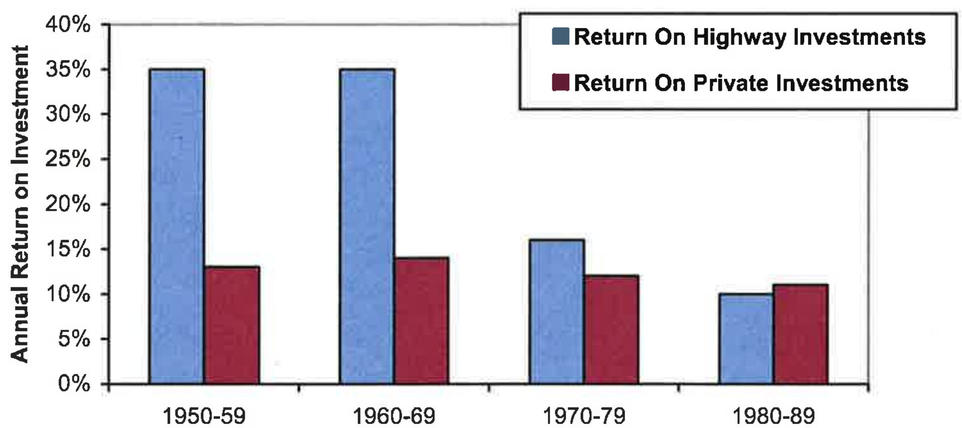


This matched pair analysis indicates that multi-modal cities have much lower per capita congestion costs than automobile-dependent cities with comparable population size.

Economic Value of Roadway Expansion

Advocates claim that highway expansion provides huge economic benefits, but their economic analysis is faulty. If roadway capacity expansion significantly increased economic productivity this effect would be easy to measure, but numerous studies show that economic returns on highway expansion investments are modest and declining (Boarnet and Haughwout 2000; Shirley and Winston 2004, "Economic Development Impacts," VTPI 2006). Figure 5 shows how highway investments provided high annual economic returns during the 1950s and 60s, far higher than returns on private capital, but these declined to below that of private capital investments by the 1980s. This is what economic theory would predict, since the most cost-effective investments have already been made, so more recent projects provide less value at a higher cost.

Figure 5 **Annual Rate of Return** (Nadri and Mamuneas 1996)



During the 1950s-70s, highway expenditures provided a high return on investment, but this has declined over time as economic theory predicts.

Hymel (2009) examined the impact of traffic congestion on employment growth in large U.S. metropolitan areas. The study found that congestion dampens subsequent employment growth: particularly over the long run in highly congested places. The analysis suggests that in a highly congested city such as Los Angeles (50 annual hours of delay per capita) a 10% increase in congestion would reduce subsequent long-run employment growth by 4%. The author concludes that reducing inefficient traffic congestion by expanding highways or efficient road pricing has the added benefit of increasing employment growth.

To the degree that highway expansion induces additional vehicle travel and stimulates sprawl it tends to be economically harmful since this increases public infrastructure and service costs ("Land Use Evaluation," VTPI 2006) and shifts consumer expenditures to goods that provide relatively small regional business activity and employment, as indicated in Table 2. Other congestion reduction strategies provide more positive economic impacts ("Economic Development Impacts," VTPI 2006).

Table 2 **Economic Impacts of $1 Million Expenditure** (Miller, Robison and Lahr 1999)

Expenditure Category	Regional Income	Regional Jobs
Automobile Expenditures	$307,000	8.4
Non-automotive Consumer Expenditures	$526,000	17.0
Transit Expenditures	$1,200,000	62.2

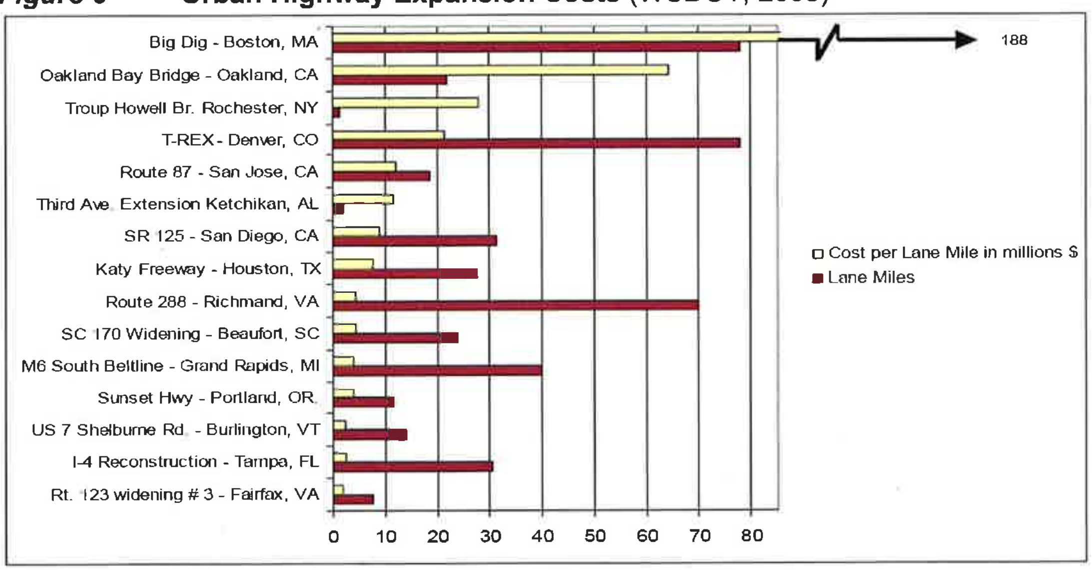
This table shows economic impacts of consumer expenditures in Texas.

Urban Highway Expansion Costs

Highway expansion advocates understate the true costs of the projects they propose. For example, Cox and Pisarski (2003) assume that highway widening costs would average $3 million per lane-mile for arterials and $6 million per lane-mile for freeways, and Hartgen and Fields (2006) assumes that severely congested highways could be expanded for $3.8 million per lane-mile on average, although these projects are mostly in dense urban areas, often requiring land acquisition, complex intersections, bridges, tunneling and community mitigation, plus the delay costs during project construction.

Many recent urban highway projects have much higher unit costs, as illustrated in Figure 6. Of 36 highway projects studied by the Washington State Department of Transportation 13 of them had costs in excess of $10 million per lane mile (WSDOT, 2005). Future projects are likely to have higher unit costs since most jurisdictions have already implemented the cheapest highway projects, and both construction costs and urban land values have increased much faster than inflation in recent years.

Figure 6 **Urban Highway Expansion Costs** (WSDOT, 2005)



This figure illustrates costs per lane-mile for recent U.S. highway projects.

Economic Principles

Economic principles require that costs be borne directly by users unless subsidies are specifically justified ("Market Principles," VTPI 2006). This means that roadway expansion is only efficient and equitable if projects are fully financed by peak-period tolls. Few highway expansion projects could meet this test. Current U.S. road user revenues (fuel taxes, vehicle registration fees and road tolls) only finance about two-thirds of roadway expenditures – a growing portion of roadway funding comes from general taxes (Wachs 2003; Litman 2006a). Highway expansion advocates recommend increasing these taxes to finance their proposed projects. This is inefficient and unfair.

Proponents argue that roadway expansion would only cost a few cents per vehicle-mile, but only about 20% of total vehicle travel occurs under urban-peak conditions, only about half of this (10%) takes place on highways (as opposed to surface streets), less than half of this (<5%) experiences congestion, and less than half of this (approximately 2%) experiences severe congestion. Highway expansion proposals therefore significantly increase taxes on all consumers (even non-motorists would pay increased general taxes) to finance projects that only improve approximately 2% of vehicle mileage.

Assuming, as proponents optimistically claim, that urban highway expansion costs average just $3.8 million per lane-mile, or $140,000 annualized (assuming 7% interest over 30 years), that such lanes normally carry up to 2,000 vehicles per hour, and each lane is congested two hours daily, 300 days a year, the costs would average 12¢ per peak vehicle-mile, or about $1.00 per 8-mile trip. This is the minimum toll needed to efficiently finance the project. Of course, motorists would sometimes willingly pay such a fee for uncongested travel, but experience indicates that tolls exceeding 10¢ per vehicle-mile cause demand to decline significantly as travelers shift time, mode, route or destination to save money ("Road Pricing," VTPI 2006).

The most effective and efficient solution to traffic congestion is to apply variable tolls on existing highways, with higher prices under congested conditions, to manage demand and test users' willingness to pay for roadway improvements, called *congestion pricing* or *value pricing* ("Road Pricing," VTPI 2006; PSRC 2008). This gives motorists an incentive to reduce peak period vehicle trips to the level a roadway can accommodate. This is more efficient than letting congestion limit traffic, as currently occurs because it allows higher-value vehicle trips (emergency, high-occupant, freight and service vehicles) outbid lower value trips (vehicle travel that is lower value or could shift relatively easily to another modes, routes or times), and provides revenue. Such pricing has proven successful in several cities, including Singapore, London and Stockholm.

In practice, revenues are seldom sufficient to finance major highway expansion since pricing reduces travel demand. Tolls can generally only finance a minor portion of total expansion costs. This represents an economic trap, since highway expansion is justified when road use is underpriced but demand is insufficient to finance expansion. Current proposals to fund highway expansion using other funding sources will be ineffective at reducing traffic congestion, are economically inefficient and unfair.

Road Pricing Traps

Road pricing (road tolls) can help reduce traffic congestion in two different and sometimes conflicting ways. In some cases, road pricing policies can create a trap, resulting in inefficient and unfair tolls. It is important that decision-makers understand these differences and their ultimate impacts when evaluating road pricing options.

Congestion pricing refers to tolls structured to reduce peak-period vehicle traffic, and therefore congestion, with higher rates during peak periods and lower rates during off-peak periods, plus features to encourage travelers to shift to alternative routes and modes. Congestion pricing and public transit improvements are complements since improved transit service reduces the fee needed to convince some travelers to shift from driving to public transit, therefore reducing the congestion toll needed to achieve a given reduction in traffic congestion. As a result, congestion pricing revenues are often used to improve public transit services.

Roadway financing tolls are designed to fund highway expansion projects. This type of road pricing is designed to maximize revenue, and so tolls are applied during both peak and off-peak periods (even though off-peak travelers do not benefit from roadway expansion), and sometimes include provisions that intentionally discourage development of alternative routes or modes, in order to force travelers to pay tolls.

Congestion pricing is a preventive strategy: it reduces congestion on existing roads and avoids the need to expand highways. It is comparable to a healthy diet, exercise and cholesterol reduction medicine, which prevent medical problems. Highway tolling to finance roadway capacity expansion is a more difficult and costly treatment, comparable to major heart surgery. Because highway capacity expansion projects have high costs, require maximum revenues (so tolls are applied to off-peak travel, and are often augmented by general taxes), sometimes include provisions that reduce route and mode options, and tend to induce additional travel that imposes additional downstream external costs, using tolls only for highway expansion is inefficient, unfair and generally undesirable.

However, there is often institutional and political resistance to pricing existing roadways. This creates a trap: efficient pricing can only be implemented after problems develop and high costs are incurred, rather than as a preventive strategy to avoid major costs. The result is comparable to a medical system that only major surgery, but not cost-effective preventive health programs.

Only if peak-period toll revenues can fully fund roadway capacity expansion can such projects be considered efficient and equitable. In practice, peak-period road toll revenues are seldom sufficient to fully fund roadway capacity expansion, typically they can finance only 20-40% of project costs. As a result, additional funds are needed from off-peak users or general taxes. The result is inefficient and unfair highway expansion projects.

If highways expansion projects are to be implemented, it is more efficient and equitable to fund them through tolls as much as possible, to prevent induced demand from quickly filling the additional capacity and creating downstream traffic problems, and so that the costs are born directly by users. But it is even more efficient to apply congestion pricing on existing highways *before* implementing expansion projects, in order to avoid or defer the need to expand highways, and test motorists willingness-to-pay for additional capacity. Efficient congestion reduction therefore requires reforms to allow congestion pricing on existing roadways.

Efficient Investment Example

Here is a simple example illustrating "smart" congestion reduction investments. Imagine a four-lane highway is on a corridor with demand of 5,000 peak period trips at zero price (if use of the road is free). Because the road can only accommodates a maximum of 4,000 peak period users (2,000 vehicles per lane) it experiences congestion that causes 1,000 potential peak-period travelers to shift to other times, routes or modes.

The efficient solution to this congestion is to price peak-period use of the highway with tolls set to maintain optimal traffic flow. This also causes 1,000 potential peak period trips to shift, preventing congestion and providing revenue. The optimal toll would vary from minute to minute and day to day to reflect demand, perhaps 2¢ per vehicle-mile for most of the commute period (such as 7:00 until 9:00 in the morning, and 4:00 until 6:00 in the evening), but up to 10¢ per vehicle-mile at the maximum peak (such as 7:50 until 8:00 in the morning, and 5:10 until 5:20 in the evening).

Expanding the highway would only be efficient if peak-period revenues are sufficient to repay all additional costs, which tests users' willingness-to-pay. Highway expansion advocates often violate efficiency principles by requiring off-peak highway users to also pay for such projects, but it is inefficient and unfair to force them to pay for projects that provide them no benefit. Off-peak users should only be required to pay for project features that benefit them, such as improved safety guards.

Assume that highway expansion would cost $8 million per lane-mile, which equals approximately $300,000 per lane-mile in annual costs, or $1,000 per day if there are 300 congested days per year. Since the expanded highway can efficiently carry up to 6,000 vehicles per hour, tolls would need to average at least 17¢ per vehicle-mile ($1,000/6,000 = $0.17) if each lane is only congested and priced one hour per day (inbound in the morning, outbound in the evening), or 8.5¢ per vehicle-mile if congested and priced twice daily. If tolls high enough to recover costs would reduce peak-period travel below 4,000 vehicles the project would not be cost effective; users would be better off with a four-lane highway and lower tolls than a six-lane highway with higher tolls.

It may be efficient to use some toll revenue to improve travel options on the corridor, such as subsidizing vanpool and bus service, contributing to construction of a rail-transit line, or supporting commute trip reduction programs (VTPI 2006) if doing so reduces peak-period automobile travel demand and therefore highway congestion (Litman 2006b). Many factors affect the degree to which such services reduce congestion, including their quality and speed, the ease of accessing destinations (such as worksites) by these modes, and community attitudes about their use. In some situations, alternative modes may attract few motorists and do little to reduce congestion, so highway widening is more cost effective. On the other hand, improving alternative modes provides other benefits besides highway congestion reduction, including improved mobility for non-drivers, reduced downstream congestion, parking cost savings, consumer cost savings, accident reductions, energy conservation and reduced pollution, and so may be the preferred solution even if highway widening is cheaper (Litman 2005b).

Comparing Roadway Expansion With Alternatives

There are various possible congestion reduction strategies ("Congestion Reductions," VTPI 2006). The best is the one with the largest net benefits per dollar invested ("Least Cost Planning," VTPI 2006). Highway expansion advocates often fail to compare their proposals with alternatives so it is impossible to determine which is truly optimal.

Public transit improvements can reduce congestion and provide other benefits (Litman 2006b). Virtually any corridor with enough travel demand to experience congestion has enough to support high quality vanpooling and public transit services. High quality public transit services cost about $100 annually per capita in additional subsidies but reduce consumer costs about $500 annually per capita, reduce congestion 30-50% (Figure 4); and reduce traffic fatality rates 36% compared with peer cities (Litman 2004).

Road pricing reduced congestion in Singapore, London and Stockholm ("Road Pricing," VTPI 2006). Reduced traffic volumes provide proportionately larger reductions in delay: pricing in London and Stockholm reduced vehicle traffic about 20% and congestion delays about 30%. Harvey and Deakin (1996) predicted that in Southern California:

- A 1¢ per vehicle-mile congestion fee reduces VMT 2.3% and congestion delay 22.5% (a 9.8 ratio).
- A $3.00 (1991 dollars) daily parking fee reduces VMT 2.7% and delay 7.5% (a 2.8 ratio).
- A 2¢ per vehicle-mile VMT fee reduces VMT 4.4% and congestion delay 9.0% (a 2.0 ratio).

Smart growth development tends to increase the *intensity* of costs such as congestion and roadway construction, due to increased density, but reduces per capita *costs*, since residents drive less and have better travel options.

As more impacts and options are considered, the value of roadway capacity expansion tends to decline and the relative benefits of alternative congestion reduction strategies increases (IEDC 2006; VTPI 2006), as illustrated in Table 3.

Table 3 **Roadway Expansion and Mobility Management Benefits** (Litman 2006a)

Planning Objective	Expand Road Capacity	Public Transit Improvements	Mobility Management	Smart Growth Land Use
Congestion reduction	✓	✓	✓	×/✓
Roadway cost savings	×	✓	✓	×/✓
Parking savings	×	✓	✓	×/✓
Consumer cost savings	×	✓	✓	✓
Transport diversity	×	✓	✓	✓
Improved traffic safety	×	✓	✓	✓
Reduced pollution	×	✓	✓	✓
Energy conservation	×	✓	✓	✓
Efficient land use	×	✓	✓	✓
Improved fitness & health	×	✓	✓	✓

(✓ = helps achieve that objective. × = Contradicts that objective.) Roadway capacity expansion helps reduce congestion but by inducing additional vehicle travel it exacerbates other transport problems. Transit improvements, mobility management and smart growth help achieve many objectives.

What Does Modeling Indicate?

Older four-step traffic models are not very accurate at predicting long-term traffic congestion effects because they have fixed trip table which assume the same number of trips will be made between locations regardless of the level of congestion between them. As a result, they account for shifts in route and mode, and sometime in time, but not in destination or trip frequency ("Model Improvements," VTPI 2006).

Newer models incorporate more factors and so are more accurate at predicting impacts of specific transportation and land use policies. Johnston (2006) summarizes results from more than three dozen long-range modeling exercises performed in the U.S. and Europe using integrated transport, land use and economic models. These indicate that the most effective way to reduce congestion is to implement integrated programs that include a combination of transit improvements, pricing (fuel taxes, parking charges, or tolls) and smart growth land use development policies. These studies indicate that a reasonable set of policies can reduce total vehicle travel by 10% to 20% over two decades, maintain or improve highway levels-of-service ratings (i.e., they reduce congestion), expand economic activity, increase transport system equity (by distributing benefits broadly), and reduce adverse environmental impacts compared to the base case. Many studies indicate that roadway expansion increases long run congestion by stimulating vehicle travel, dispersed development, and reduced travel options. Expanding road capacity, along with transit capacity, but without changing market incentives to encourage more efficient use of existing roads and parking, results in expensive transit systems with low ridership.

Recent traffic modeling of Puget Sound region transportation improvement options reached similar conclusions (WSDOT 2006). It found that neither highway widening nor transit investments are by themselves cost effective congestion reduction strategies (although the model has fixed trip tables so it exaggerates highway expansion benefits and underestimates transit improvement benefits). The most effective congestion reduction program includes both transit service improvements and road pricing to give travelers better options and incentives. Table 4 summarizes estimated congestion reduction benefits and project costs. Both have costs that exceed congestion reduction benefits, but transit improvements are more cost effective overall since they provides many additional benefits including road and parking cost savings, consumer cost savings, crash reductions, improved mobility for non-drivers, energy conservation, emission reductions, and support for strategic land use.

Table 4 **Congestion Reduction Economic Analysis** (WSDOT, 2006)

	Congestion Reduction Benefits		Direct Project Costs	
	Lower Estimate	Higher Estimate	Lower Estimate	Higher Estimate
Highway Expansion	$1,500	$2,200	$2,500	$3,700
Transit Improvements	$480	$730	$1,200	$1,500

This table indicates estimated highway and transit congestion reduction benefits and costs, in millions of annualized dollars. Neither approach provides congestion-reduction benefits that exceed costs, but transit provides many additional benefits.

Have Alternatives Failed?

A common theme among highway expansion advocates is that alternatives, such as transit service improvements and mode shift incentives, have been tried but have failed and so should be abandoned in favor of highway expansion. They are wrong.

Only a small portion of total transportation funding is devoted to alternative modes and mobility management programs. For example, in 2004 governments in the U.S. spent about $140 billion on roads and about $26 billion dollars to support public transit. Transit therefore receives about 16% of the total (FHWA 2005). About half of transit funding is intended to provide basic mobility to non-drivers, such as special mobility services and bus services in suburban and rural areas, so only about 8% of surface transportation budgets are spent on transit services to attract discretionary travelers (people who have the option of driving). In addition, U.S. consumers, businesses and governments devote more than $300 billion in resources to off-street parking, so only about 3% of total investment in surface transport is devoted to transit services intended to attract discretionary users. Nonmotorized transport receives an even small portion of transportation budgets, probably less than 1%, although it represents 5-10% of total trips ("Evaluating Walking and Cycling," VTPI 2006). This does not include other external costs, such as accidents and pollution impacts, which are often reduced when travel shifts from automobile to transit (Litman 2006).

Similarly, it is wrong to claim that mobility management strategies, such as commute trip reduction programs, HOV priority and parking pricing have been tried and failed. Although many communities have implemented some mobility management programs, most efforts are modest, representing a minority of employees, roads and parking facilities. Where appropriately implemented such programs have been successful, typically reducing vehicle trips by 10-30% among affected travelers, usually with lower total costs than accommodating an additional urban peak trip, taking into account road, parking and vehicle costs (USEPA, 2005; VTPI, 2006).

Highway expansion advocates exaggerate the portion of transportation resources devoted to alternative modes and mobility management programs because they focus on particular budgets, such as regional capital investments in cities developing major new transit systems, where more than half of total expenditures may be devoted to alternative modes for a few years. However, when all transportation budgets are considered, including parking facility expenditures, and averaged over a longer time period, the portion devoted to alternative modes is generally reasonable. Proportionately large investments in alternative modes can be justified in most communities to offset decades of planning and investments skewed toward automobiles.

Highway expansion advocates argue that it is unfair and inefficient to devote significant resources to improve public transit that carry only a small portion of total trips. But transit carries a much greater portion of travel on major urban corridors, where roadway expansion is costly and transit demand is high, and so is often the most cost effective way of reducing congestion and improving mobility.

Conclusions

Modern transportation planning considers a wider range of impacts and options than was previously common, which supports policies and programs that improve transport options, encourage more efficient travel patterns, and increase land use accessibility. These provide multiple benefits. Some people want to return to traditional planning practices that favor automobile travel and ignore other planning objectives. They advocate highway expansion to reduce congestion. Their analysis tends to:

- Exaggerate highway expansion congestion reduction impacts and economic benefits.
- Ignore or understate generated traffic and induced travel effects.
- Overlook many economic, social and environmental costs of wider highways, increased vehicle traffic and sprawled land use.
- Underestimate the true costs of expanding major urban highways.
- Fail to compare highway expansion with other transportation improvement options.

Some of these errors are subtle, technical, and even counter-intuitive. It is therefore important that decision makers and the general public become informed about issues such as the implications of different congestion indicators, the impacts of generated traffic and induced travel, the economic returns on roadway capacity expansion, and more comprehensive planning techniques.

Such projects are only cost effective if they can be funded by peak-period users. Even based on proponents' optimistic projections, highway expansion projects would cost $200 to $400 annually per urban commuter. When faced with such tolls motorists often prefer to shift route, mode or destination, so such projects cannot recover their costs. As a result, they would require funding from people who do not directly benefits, which is inefficient and inequitable. Described differently, traffic congestion results from market distortions that underprice driving and stimulate sprawl, resulting in economically excessive motor vehicle travel ("Market Principles," VTPI, 2006). Under such circumstances, expanding highways cannot reduce long term congestion, and would increase other transport problems such as downstream congestion, parking demand, accidents, pollution emissions, sprawl, and inadequate mobility for non-drivers.

Alternative strategies can reduce traffic congestion and provide other benefits. Advanced modeling indicates that the most cost effective solution to traffic congestion reduction includes a combination of transit improvements, road pricing and smart growth land use policies. This is most efficient and equitable overall because it reflects market principles, including viable consumer options, cost-based pricing and more neutral public policies.

This is not to suggest that driving is bad or that highways should never be improved. However, when all impacts and options are considered, highway expansion is significantly more costly than advocates claim and provides less overall benefit than many alternative policies and programs.

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Exhibit C

Exhibit C

Growing Cooler:

Evidence on Urban Development and Climate Change

Reid Ewing, Keith Bartholomew, Steve Winkelman,
Jerry Walters and Don Chen

with Barbara McCann and David Goldberg

Urban Land Institute

Smart Growth America
Better Choices For Our Communities

Center for Clean Air Policy
Dialogue. Insight. Solutions

National Center for Smart Growth Research & Education

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- Fostering collaboration within and beyond ULI's membership through mentoring, dialogue, and problem solving;
- Exploring issues of urbanization, conservation, regeneration, land use, capital formation, and sustainable development;
- Advancing land use policies and design practices that respect the uniqueness of both built and natural environments;
- Sharing knowledge through education, applied research, publishing, and electronic media; and
- Sustaining a diverse global network of local practice and advisory efforts that address current and future challenges.

Established in 1936, the Institute today has some 38,000 members in over 90 countries, representing the entire spectrum of the land use and development disciplines. ULI relies heavily on the experience of its members. It is through member involvement and information resources that ULI has been able to set standards of excellence in development practice. The Institute has long been recognized as one of the world's most respected and widely quoted sources of objective information on urban planning, growth, and development.

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Steve Winkelman is director of the Transportation Program at the Center for Clean Air Policy (CCAP). He coordinated transportation analyses of climate change plans for New York and several other states, culminating in the CCAP Transportation Emissions Guidebook, which quantifies savings from 40 transportation policies. In February 2007 Steve launched a national discussion, "Linking Green-TEA and Climate Policy," to craft policy solutions that address travel demand.

Jerry Walters is a principal and chief technical officer with Fehr & Peers Associates, a California-based transportation planning and engineering firm. He directs integrated land use/transportation research and planning for public entities and real estate development interests throughout the United States and abroad.

Don Chen is the founder and executive director of Smart Growth America (SGA) and has worked for the Surface Transportation Policy Project, the World Resources Institute, and the Rocky Mountain Institute. He has been featured in numerous news programs and publications; has lectured in North America, Europe, Australia, and Asia; and has written for many magazines and journals, including "The Science of Smart Growth" for Scientific American.

Executive Summary

The phrase "you can't get there from here" has a new application. For climate stabilization, a commonly accepted target would require the United States to cut its carbon dioxide (CO_2) emissions by 60 to 80 percent as of 2050, relative to 1990 levels. Carbon dioxide levels have been increasing rapidly since 1990, and so would have to level off and decline even more rapidly to reach this target level by 2050. This publication demonstrates that the U.S. transportation sector cannot do its fair share to meet this target through vehicle and fuel technology alone. We have to find a way to sharply reduce the growth in vehicle miles driven across the nation's sprawling urban areas, reversing trends that go back decades.

This publication is based on an exhaustive review of existing research on the relationship between urban development, travel, and the CO_2 emitted by motor vehicles. It provides evidence on and insights into how much transportation-related CO_2 savings can be expected with compact development, how compact development is likely to be received by consumers, and what policy changes will make compact development possible. Several related issues are not fully examined in this publication. These include the energy savings from more efficient building types, the value of preserved forests as carbon sinks, and the effectiveness of pricing strategies—such as tolls, parking charges, and mileage-based fees—when used in conjunction with compact development and expanded transportation alternatives.

The term "compact development" does not imply high-rise or even uniformly high density, but rather higher average "blended" densities. Compact development also features a mix of land uses, development of strong population and employment centers, interconnection of streets, and the design of structures and spaces at a human scale.

The Basics

Scientific consensus now exists that greenhouse gas accumulations due to human activities are contributing to global warming with potentially catastrophic consequences (IPCC 2007). International and domestic climate policy discussions have gravitated toward the goal of limiting the temperature increase to 2°C to 3°C by cutting greenhouse gas emissions by 60 to 80 percent below 1990 levels by the year 2050. The primary greenhouse gas is carbon dioxide, and every gallon of gasoline burned produces about 20 pounds of CO2 emissions.

Driving Up CO_2 Emissions

The United States is the largest emitter worldwide of the greenhouses gases that cause global warming. Transportation accounts for a full third of CO_2 emissions in the United States, and that share is growing as others shrink in comparison, rising from 31 percent in 1990 to 33 percent today It is hard to envision a "solution" to the global warming crisis that does not involve slowing the growth of transportation CO_2 emissions in the United States.

The Three-Legged Stool Needed to Reduce CO_2 from Automobiles

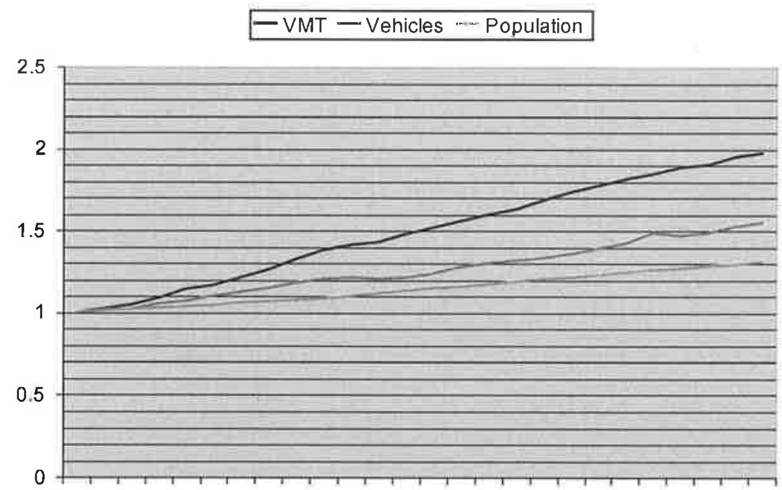
Transportation CO_2 reduction can be viewed as a three-legged stool, with one leg related to vehicle fuel efficiency, a second to the carbon content of the fuel itself, and a third to the amount of driving or vehicle miles traveled (VMT). Energy and climate policy initiatives at the federal and state levels have pinned their hopes almost exclusively on shoring up the first two legs of the stool, through the development of more efficient vehicles (such as hybrid cars) and lower-carbon fuels (such as biodiesel fuel). Yet a stool cannot stand on only two legs.

As the research compiled in this publication makes clear, technological improvement in vehicles and fuels are likely to be offset by continuing, robust growth in VMT. Since 1980, the number of miles Americans drive has grown three times faster than the U.S. population, and almost twice as fast as vehicle registrations (see Figure 0-1). Average automobile commute times in metropolitan areas have risen steadily over the decades, and many Americans now spend more time commuting than they do vacationing.

This raises some questions, which this report addresses. Why do we drive so much? Why is the total distance we drive growing so rapidly? And what can be done to alter this trend in a manner that is effective, fair, and economically acceptable?

Figure 0-1

Growth of VMT, Vehicle Registrations, and Population in the United States relative to 1980 Values



Source: FHWA 2005.

The growth in driving is due in large part to urban development, or what some refer to as the built environment. Americans drive so much because we have given ourselves little alternative. For 60 years, we have built homes ever farther from workplaces, created schools that are inaccessible except by motor vehicle, and isolated other destinations—such as shopping—from work and home. From World War II until very recently, nearly all new development has been planned and built on the assumption that people will use cars virtually every time they travel. As a larger and larger share of our built environment has become automobile dependent, car trips and distances have increased, and walking and public transit use have declined. Population growth has been responsible for only a quarter of the increase in vehicle miles driven over the last couple of decades. A larger share of the increase can be traced to the effects of a changing urban environment, namely to longer trips and people driving alone.

As with driving, land is being consumed for development at a rate almost three times faster than population growth. This expansive development has caused CO_2 emissions from cars to rise even as it has reduced the amount of forest land available to absorb CO_2.

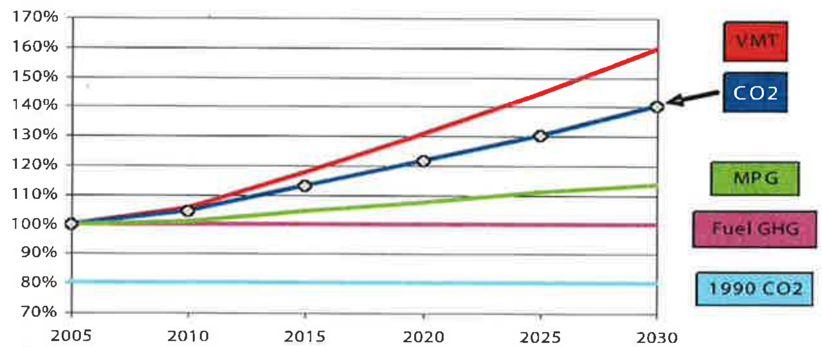
How Growth in Driving Cancels Out Improved Vehicle Fuel Economy

Carbon dioxide is more difficult to control through vehicle technology than are conventional air pollutants. Conventional pollutants can be reduced in automobile exhaust with sophisticated emission control systems (catalytic converters, on-board computers, and oxygen sensors). Carbon dioxide, meanwhile, is a direct outcome of burning fossil fuels; there is no practical way to remove or capture it from moving vehicles. At this point in time, the only way to reduce CO_2 emissions from vehicles is to burn less gasoline and diesel fuel.

An analysis by Steve Winkelman of the Center for Clean Air Policy, one of the coauthors of this publication, finds that CO_2 emissions will continue to rise, despite technological advances, as the growth in driving overwhelms planned improvements in vehicle efficiency and fuel carbon content. The U.S. Department of Energy's Energy Information Administration (EIA) forecasts that driving will increase 59 percent between 2005 and 2030 (red line, Figure 0-2), outpacing the projected 23 percent increase in population. The EIA also forecasts a fleetwide fuel economy improvement of 12 percent within this time frame, primarily as a result of new federal fuel economy standards for light trucks (green line, Figure 0-2). Despite this improvement in efficiency, CO_2 emissions would grow by 41 percent (dark blue line, Figure 0-2).

FIGURE 0-2

PROJECTED GROWTH IN CO2 EMISSIONS FROM CARS AND LIGHT TRUCKS



Center for Clean Air Policy

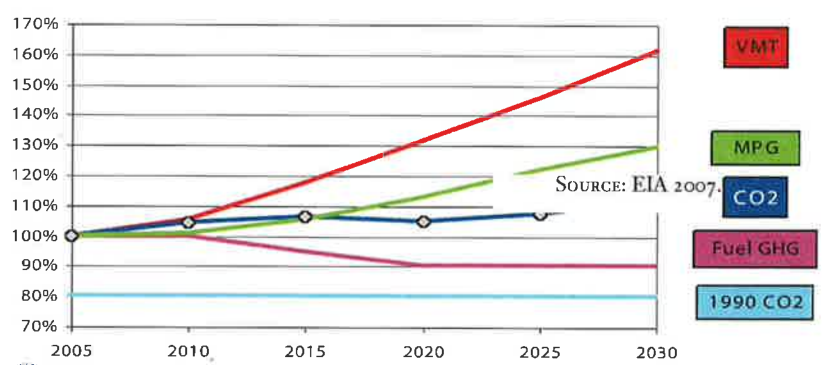
SOURCE: EIA 2007.

U.S. fuel economy has been flat for almost 15 years, as the upward spiral of car weight and power has offset the more efficient technology. Federal and state efforts are underway to considerably boost vehicle efficiency and reduce greenhouse gas emissions. In June 2007, the U.S. Senate passed corporate average fuel economy (CAFE) standards that would increase new passenger vehicle fuel economy from the current 25 miles per gallon (mpg) to 35 mpg by 2020. (As of this writing, the House has not acted.). California plans to implement a low carbon standard for transportation fuels, specifically a 10 percent reduction in fuel carbon content by 2020.

Even if these more stringent standards for vehicles and fuels were to go into effect nationwide, transportation-related emissions would still far exceed target levels for stabilizing the global climate (see Figure 0-3). The rapid increase in driving would overwhelm both the increase in vehicle fuel economy (green line) and the lower carbon fuel content (purple line). In 2030, CO_2 emissions would be 12 percent above the 2005 level, and 40 percent above the 1990 level

FIGURE 0-3

PROJECTED GROWTH IN CO2 EMISSIONS FROM CARS AND LIGHT TRUCKS ASSUMING STRINGENT NATIONWIDE VEHICLE AND FUEL STANDARDS*



SOURCE: EIA 2007.

Center for Clean Air Policy

Sources: VMT: EIA with 10% rebound MPG: US Senate, Fuels: C (turquoise line). For climate stabilization, the United States must bring the CO_2 level to 15 to 30 percent below 1990 levels by 2020 to keep in play a CO_2 reduction of 60 to 80 percent by 2050.

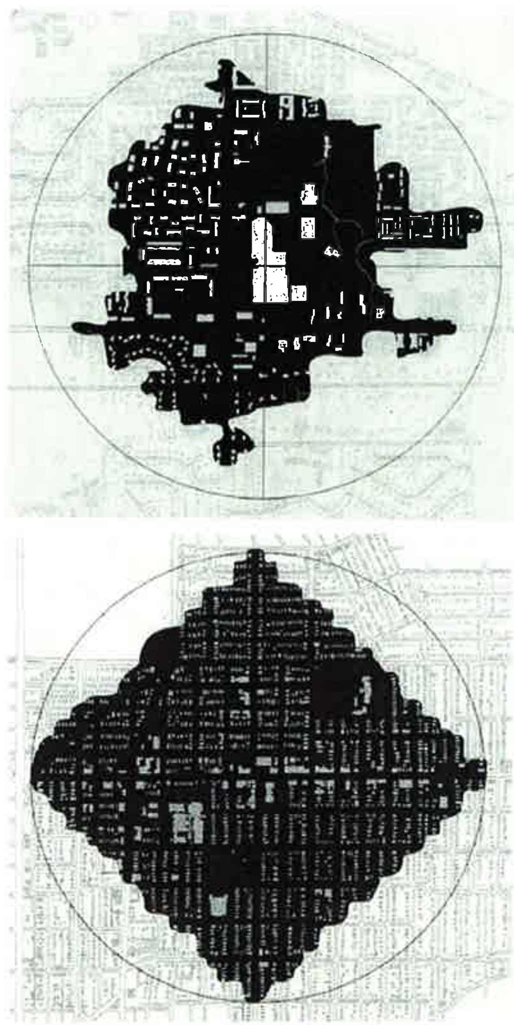
As the projections show, the United States cannot achieve such large reductions in transportation-related CO_2 emissions without sharply reducing the growth in miles driven.

Changing Development Patterns to Slow Global Warming

Recognizing the unsustainable growth in driving, the American Association of State Highway and Transportation Officials (AASHTO), representing state departments of transportation, is urging that the growth of vehicle miles driven be cut in half. How does a growing country—one with 300 million residents and another 100 million on the way by mid-century—slow the growth of vehicle miles driven? Aggressive measures certainly are available, including imposing ever stiffer fees and taxes on driving and parking or establishing no-drive zones or days. Some countries are experimenting with such measures. However, many in this country would view such steps as punitive, given the reality that most Americans do not have a viable alternative to driving. The body of research surveyed here shows that much of the rise in vehicle emissions can be curbed simply by growing in a way that will make it easier for Americans to drive less. In fact, the weight of the evidence shows that, with more compact development, people drive 20 to 40 percent less, at minimal or reduced cost, while reaping other fiscal and health benefits.

FIGURE 0-4

DESTINATIONS WITHIN ONE-QUARTER MILE OF CENTER FOR CONTRASTING STREET NETWORKS IN SEATTLE



SOURCE: MOUDON ET AL. 1997.

How Compact Development Helps Reduce the Need to Drive

Better community planning and more compact development help people live within walking or bicycling distance of some of the destinations they need to get to every day—work, shops, schools, and parks, as well as transit stops. If they choose to use a car, trips are short. Rather than building single-use subdivisions or office parks, communities can plan mixed-use developments that put housing within reach of these other destinations. The street network can be designed to interconnect, rather than end in culs-de-sac and funnel traffic onto overused arterial roads. Individual streets can be designed to be "complete," with safe and convenient places to walk, bicycle, and wait for the bus. Finally, by building more homes as condominiums, townhouses, or detached houses on smaller lots, and by building offices, stores and other destinations "up" rather than "out," communities can shorten distances between destinations. This makes neighborhood stores more economically viable, allows more frequent and convenient transit service, and helps shorten car trips.

This type of development has seen a resurgence in recent years, and goes by many names, including "walkable communities," "new urbanist neighborhoods," and "transit-oriented developments" (TODs). "Infill" and "brownfield" developments put unused lots in urban areas to new uses, taking advantage of existing nearby destinations and infrastructure. Some "lifestyle centers" are now replacing single-use shopping malls with open-air shopping on connected streets with housing and office space as part of the new development. And many communities have rediscovered and revitalized their traditional town centers and downtowns, often adding more housing to the mix. These varied development types are collectively referred to in this publication as "compact development" or "smart growth."

How We Know that Compact Development Will Make a Difference: The Evidence

As these forms of development have become more common, planning researchers and practitioners have documented that residents of compact, mixed-use, transit-served communities do less driving. Studies have looked at the issue from varying angles, including:

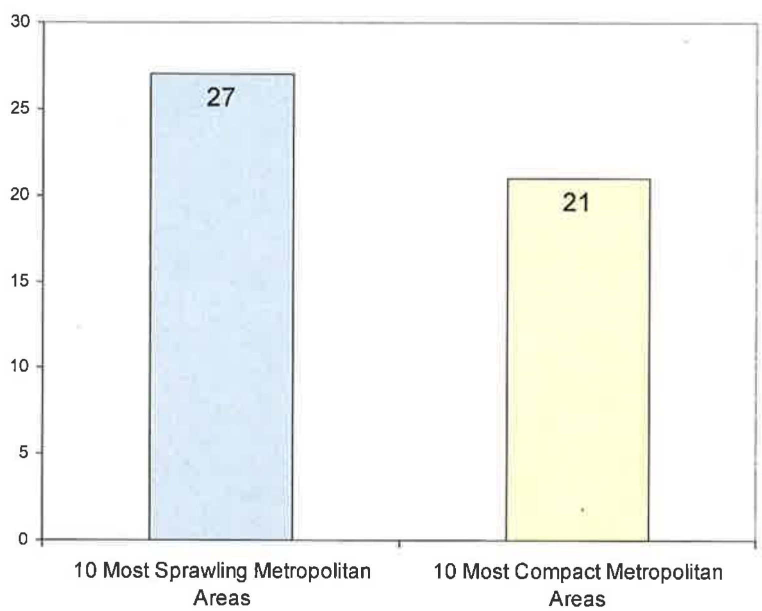
- research that compares overall travel patterns among regions and neighborhoods of varying compactness and auto orientation;
- studies that follow the travel behavior of individual households in various settings; and
- models that simulate and compare the effects on travel of different future development scenarios at the regional and project levels.

Regardless of the approach, researchers have found significant potential for compact development to reduce the miles that residents drive.

A comprehensive sprawl index developed by coauthor Reid Ewing of the National Center for Smart Growth at the University of Maryland ranked 83 of the largest metropolitan areas in the United States by their degree of sprawl, measuring density, mix of land uses, strength of activity centers, and connectedness of the street network (Ewing, Pendall, and Chen 2002, 2003). Even accounting for income and other socioeconomic differences, residents drove far less in the more compact regions. In highly sprawling Atlanta, vehicles racked up 34 miles each day for every person living in the region. Toward the other end of the scale, in Portland, Oregon, vehicles were driven fewer than 24 miles per person, per day.

FIGURE 0-5

AVERAGE DAILY VEHICLE MILES TRAVELED



SOURCE: EWING, PENDALL, AND CHEN 2002, P. 18.

This relationship holds up in studies that focus on the travel habits of individual households while measuring the environment surrounding their homes and/or workplaces. The link between urban development patterns and individual or household travel has become the most heavily researched subject in urban planning, with more than 100 rigorous empirical studies completed. These studies have been able to control for factors such as socioeconomic status, and can account for the fact that higher-income households tend to make more and longer trips than lower-income families.

One of the most comprehensive studies, conducted in King County, Washington, by Larry Frank of the University of British Columbia, found that residents of the most walkable neighborhoods drive 26 percent fewer miles per day than those living in the most sprawling areas. A meta-analysis of many of these types of studies finds that households living in developments with twice the density, diversity of uses, accessible destinations, and interconnected streets when compared to low-density sprawl drive about 33 percent less.

Many studies have been conducted by or in partnership with public health researchers interested in how the built environment can be better designed to encourage daily physical activity. These studies show that residents of communities designed to be walkable both drive fewer miles and also take more trips by foot and bicycle, which improves individual health. A recent literature review found that 17 of 20 studies, all dating from 2002 or later, have established statistically significant relationships between some aspect of the built environment and the risk of obesity.

Two other types of studies also find relationships between development patterns and driving: simulations that project the effect of various growth options for entire regions and simulations that predict the impact of individual development projects when sited and designed in different ways. In regional growth simulations, planners compare the effect of a metropolitan-wide business-as-usual scenario with more compact growth options. Coauthor Keith Bartholomew of the University of Utah analyzed 23 of these studies and found that compact scenarios averaged 8 percent fewer total miles driven than business-as-usual ones, with a maximum reduction of 31.7 percent (Bartholomew 2005, 2007). The better-performing scenarios were those with higher degrees of land use mixing, infill development, and population density, as well as a larger amount of expected growth. The travel models used in these studies would be expected to underestimate the impacts of site design, since most only crudely account for travel within neighborhoods and disregard walk and bike trips entirely.

Of the project-level studies, one of the best known evaluated the impact of building a very dense, mixed-use development at an abandoned steel mill site in the heart of Atlanta versus spreading the equivalent amount of commercial space and number of housing units in the prevailing patterns at three suburban locations. Analysis using transportation models enhanced by coauthor Jerry Walters of Fehr & Peers Associates (Walters, Ewing, and Allen 2000), and supplemented by the EPA's Smart Growth Index (to capture the effects of site design) found that the infill location would generate about 35 percent less driving and emissions than the comparison sites. The results were so compelling that the development was deemed a transportation control measure by the federal government for the purpose of helping to improve the region's air quality. The Atlantic Station project has become a highly successful reuse of central city industrial land.

What Smart Growth Would Look Like

How would this new focus on compact development change U.S. communities? Many more developments would look like the transit-oriented developments and new urbanist neighborhoods already going up in almost every city in the country, and these developments would start filling in vacant lots or failing strip shopping centers, or would revitalize older town centers, rather than replacing forests or farmland. Most developments would no longer be single-use subdivisions or office parks, but would mix shops, schools, and offices together with homes. They might feature ground-floor stores and offices with living space above, or townhomes within walking distance of a retail center. Most developments would be built to connect seamlessly with the external street network.

JACOBY DEVELOPMENT COMPANY

ATLANTIC STATION TODAY.

The density increases required to achieve the changes proposed in this publication would be moderate. Nelson's work shows that the average density of residential development in U.S. urban areas was about 7.6 units per acre in 2003. His predictions of shifting market demand indicate that all housing growth to 2025 could be accommodated by building condominiums, apartments, townhomes, and detached houses on small lots, while maintaining the current stock of houses on large lots. Under this scenario, while new developments would average a density of 13 units per acre, the average density of metropolitan areas overall would rise modestly, to about nine units per acre. Much of the change would result from stopping the sprawling development that has resulted in falling densities in many metropolitan areas.

Several publications provide a glimpse of what this future might look like. Images of compact development are available in This is Smart Growth (Smart Growth Network 2006) and Visualizing Density (Lincoln Institute of Land Policy 2007).

The Potential of Smart Growth

The potential of smart growth to curb the rise in greenhouse gas emissions will, of course, be limited by the amount of new development and redevelopment that takes place over the next few decades, and by the share of it that is compact in nature. There seems to be little question that a great deal of new building will take place as the U.S. population grows toward 400 million. According to the best available analysis, by Chris Nelson of Virginia Tech, 89 million new or replaced homes—and 190 billion square feet of new offices, institutions, stores, and other nonresidential buildings—will be constructed through 2050. If that is so, two-thirds of the development on the ground in 2050 will be built between now and then. Pursuing smart growth is a low-cost climate change strategy, because it involves shifting investments that have to be made anyway.

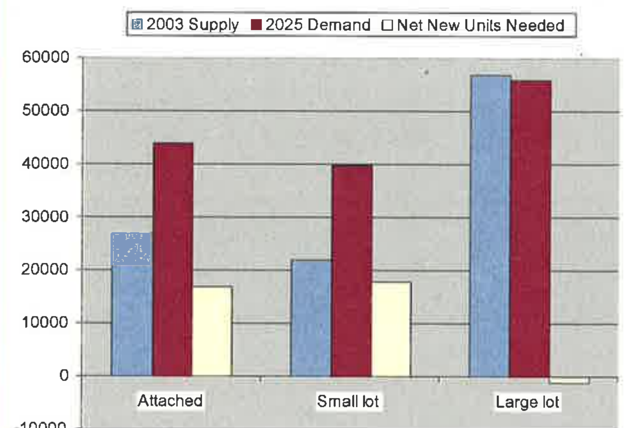
Smart Growth Meets Growing Market Demand for Choice

There is no doubt that moving away from a fossil fuel–based economy will require many difficult changes. Fortunately, smart growth is a change that many Americans will embrace. Evidence abounds that Americans are demanding more choices in where and how they live—and that changing demographics will accelerate that demand.

While prevailing zoning and development practices typically make sprawling development easier to build, developers who make the effort to create compact communities are encountering a responsive public. In 2003, for the first time in the country's history, the sales prices per square foot for attached housing—that is, condominiums and townhouses—was higher than that of detached housing units. The real estate analysis firm Robert Charles Lesser & Co. has conducted a dozen consumer preference surveys in suburban and urban locations[1] for a variety of builders to help them develop new projects. The surveys have found that in every location examined, about one-third of respondents prefer smart growth housing products and communities. Other studies by the National Association of Homebuilders, the National Association of Realtors, the Fannie Mae Foundation, high-production builders, and other researchers have corroborated these results—some estimating even greater demand for smart growth housing products. When smart growth also offers shorter commutes, it appeals to another one-quarter of the market, because many people are willing to trade lot or house size for shorter commutes.

Figure 0-6

2003 Housing Supply versus 2025 Housing Demand



Source: Nelson 2006.

Because the demand is greater than the current supply, the price-per-square foot values of houses in mixed-use neighborhoods show price premiums ranging from 40 to 100 percent, compared to houses in nearby single-use subdivisions, according to a study by Chris Leinberger of the Brookings Institution.

This market demand is only expected to grow over the next several decades, as the share of households with children shrinks and those made up of older Americans grows with the retiring of baby boomers. Households without children will account for close to 90 percent of new housing demand, and single-person households will account for a one-third. Nelson projects that the demand for attached and small-lot housing will exceed the current supply by 35 million units (71 percent), while the demand for large-lot housing will actually be less than the current supply.

[1] These locations include Albuquerque, Atlanta, Boise, Charlotte, Chattanooga, Denver, Orlando, Phoenix, Provo, Savannah, and Tampa.

Total Estimated VMT Reduction and Total Climate Impact

When viewed in total, the evidence on land use and driving shows that compact development will reduce the need to drive between 20 and 40 percent, as compared with development on the outer suburban edge with isolated homes, workplaces, and other destinations. It is realistic to assume a 30 percent cut in VMT with compact development.

Making reasonable assumptions about growth rates, the market share of compact development, and the relationship between CO_2 reduction and VMT reduction, smart growth could, by itself, reduce total transportation-related CO_2 emissions from current trends by 7 to 10 percent as of 2050. This reduction is achievable with land-use changes alone. It does not include additional reductions from complementary measures, such as higher fuel prices and carbon taxes, peak-period road tolls, pay-as-you drive insurance, paid parking, and other policies designed to make drivers pay more of the full social costs of auto use.

This estimate also does not include the energy saved in buildings with compact development, or the CO_2-absorbing capacity of forests preserved by compact development. Whatever the total savings, it is important to remember that land use changes provide a permanent climate benefit that would compound over time. The second 50 years of smart growth would build on the base reduction from the first 50 years, and so on into the future. More immediate strategies, such as gas tax increases, do not have this degree of permanence.

The authors calculate that shifting 60 percent of new growth to compact patterns would save 85 million metric tons of CO_2 annually by 2030. The savings over that period equate to a 28 percent increase in federal vehicle efficiency standards by 2020 (to 32 mpg), comparable to proposals now being debated in Congress. It would be as if the fleetwide efficiency for new vehicles had risen to 32 mpg by 2020. Every resident of a compact neighborhood would provide the environmental benefit expected from, say, driving one of today's efficient hybrid cars. That effect would be compounded, of course, if that person also drove such an efficient car whenever he or she chose to make a vehicle trip. Smart growth would become an important "third leg" in the transportation sector's fight against global warming, along with more efficient vehicles and lower-carbon fuels.

A Climate-Sparing Strategy with Multiple Payoffs

Addressing climate change through smart growth is an attractive strategy because, in addition to being in line with market demand, compact development provides many other benefits and will cost the economy little or nothing. Research has documented that compact development helps preserve farmland and open space, protect water quality, and improve health by providing more opportunities for physical activity.

Studies also have confirmed that compact development saves taxpayers money, particularly by reducing the costs of infrastructure such as roads and water and sewer lines. For example, the Envision Utah scenario planning process resulted in the selection of a compact growth plan that will **save** the region about **$4.5** billion in infrastructure spending over a continuation of sprawling development.

Finally, unlike **hydrogen**-fueled **vehicles and cellulosic** ethanol, which **get a lot of** attention in the climate-change debate, the "technology" of compact, walkable communities exists today, as it has in one form or another for thousands of years. We can begin using this technology in the service of a cooler planet right now.

Policy Implications

In most metropolitan areas, compact development faces an uneven playing field. Local land development codes encourage auto-oriented development. Public spending supports development at the **metropolitan** fringe more than in already developed areas. Transportation policies remain focused on accommodating the automobile rather than alternatives.

The key to substantial GHG reductions is to get all policies, funding, incentives, practices, rules, codes, and regulations pointing in the same direction to create the right conditions for smart growth. Innovative policies often are in direct conflict with the conventional paradigm that produces automobile dependence.

Here, we three major policy initiatives at the federal level that would benefit states, metro regions, cities and towns in their efforts to meet the growing demand for compact development. These initiatives, as well as potential actions on the part of state and local governments, discussed more fully in Chapter 7 of *Growing Cooler*.

Federal Actions

Require Transportation Conformity for Greenhouse Gases. Federal climate change legislation should require regional transportation plans to pass a conformity test for CO_2 emissions, similar to those for other criteria pollutants. The Supreme Court ruling in Massachusetts v. EPA established the formal authority to consider greenhouse gases under the Clean Air Act, and a transportation planning conformity requirement would be an obvious way for the EPA to exercise this authority to produce tangible results.

Enact "Green-TEA" Transportation Legislation that Reduces GHGs. The Intermodal Surface Transportation Efficiency Act of 1991 (known as ISTEA) represented a revolutionary break from past highway bills with its greater emphasis on alternatives to the automobile, community involvement, environmental goals, and coordinated planning. The next surface transportation bill could bring yet another paradigm shift; it could further address environmental performance, climate protection, and green development. We refer to this opportunity as "Green-TEA."

Provide Funding Directly to Metropolitan Planning Organizations (MPOs). Metropolitan areas contain more than 80 percent of the nation's population and 85 percent of its economic output. Investment by state departments of transportation in metropolitan areas lags far behind these percentages. The issue is not just the amount of funding; it is also the authority to decide how the money is spent. What is necessary to remedy the long history of structural and institutional causes of these inequities is a new system of allocating federal transportation funds directly to metropolitan areas. The amount of allocation should be closer to the proportion of an MPO's population and economic activity compared to other MPOs and non-MPO areas in the same state.

Exhibit D

Exhibit D

The 50-10 Transit Plan:

A World Class Transit System for the San Diego Region

Prepared for:

Cleveland National Forest Foundation

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July 2011

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Executive Summary

> *The vision for our region's future has evolved, changing from one that pictured steady expansion to the east, to one that placed a greater value on protecting open space, to one that now focuses on a compact urban core where more people live and use fewer resources. Local governments have been working toward this vision for decades.* (SANDAG April 2011 *Draft 2050 Regional Transportation Plan* p. 1-2)

Achieving this vision would result in enormous benefits for the San Diego region. Unfortunately, however, the fine words in SANDAG's *Draft 2050 Regional Transportation Plan* (RTP) are not adequately supported by the agency's actions. For many decades, the SANDAG's approach to planning the region's transportation network has been almost exclusively automobile-oriented. The current RTP would continue SANDAG's past policies of expanding the region's highway system, and, even though the RTP would provide some modest increases in transit investment, this investment would be spread out over a 40-year period.

Consequently, consistent with past SANDAG policy, the current RTP promises a complete automobile network—one that will serve any possible trip in the region. In contrast, the region's transit network, as envisioned by SANDAG, will remain woefully deficient in both coverage and quality of service.

Partly due to such inadequate planning, the San Diego region is in a transportation crisis. Roadway congestion wastes time and energy, tailpipe pollution causes environmental and health problems, and our dependence on foreign oil continues to grow. Road building must now be put on hold while the region directs its resources toward developing a comprehensive transit system.

As an alternative to SANDAG's RTP, the 50-10 Transit Plan would initiate a transformation in the region's transportation system and land use patterns. The premise of the Plan is quite simple: fifty years of transit improvements would be implemented over the next decade. This comprehensive, integrated transit system initially would be constructed within the region's urban core, while also including the Sprinter and the Coaster.[1] At the same time, the Plan calls for halting any new freeway and/or tollway construction until the transit system is fully functional. An equally critical element of the Plan calls for a modification of the *TransNet* program to re-prioritize transit over highway projects.

The 50-10 Plan would largely implement the transit capital projects already planned in the urban core for the 2050 RTP. The Plan also promotes a land use pattern that increases residential development densities within the urban core. Thus, the Plan would foster two main goals: (1) to make transit time competitive with the automobile within the urban core; and (2) to create neighborhoods that are close to needed services and amenities.[2]

The benefits of the 50-10 Transit Plan, compared to the 2050 RTP, include: shorter automobile trips on average, reduction in transportation costs and traffic congestion, more housing and transportation choices, many more walk and bicycle trips, and improved public health and overall quality of life. The enormous resource and demographic challenges facing our region, indeed facing the world, require that we act now to reach these goals. To delay implementing a transit-first policy is tantamount to not acting at all.

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[1] The urban core consists of the geographical area comprising the San Diego Trolley Ring and National City.

[2] The Portland, Oregon-based real estate firm Gerding Edlen describes such neighborhoods as "20 minute living," for everything residents need is within 20 minutes of their homes. http://www.portlandonline.com/portlandplan/index.cfm?a=246917&c=46822

The 50-10 Transit Plan in a Nutshell:

- Compact, walkable development has enormous environmental, public health and economic benefits
- Achieving compact, walkable development requires world-class transit system
- Developing world-class transit system requires that almost all transportation investment be dedicated to transit over the next decade[3]
- Diverting funds to further expand roadway capacity undermines both the transit system and the land use objectives
- A two-thirds vote by the SANDAG Board of Directors is required to prioritize transit projects over highway expansion in *Transnet*.

1) Introduction

The Urban Land Institute (ULI) is a respected trade association of land use and real estate development disciplines. In June 2010, ULI released its *Senate Bill 375 Impact Analysis Report,* which reviewed the expected economic impacts of California's pioneering S.B. 375.[4] The summary of this report states:

> *SB 375 requires Regional Transportation Plans (RTPs) to include the SCSs [sustainable communities strategies] and be internally consistent, and thereby better align transportation, housing, and land use planning as part of the plan to reduce transportation emissions. Regions have broad freedom to design SCSs that align those plans and reduce emissions. The SCSs are expected to respond to SB 375 by:*
>
> - *Promoting compact development patterns located near transit;*
> - *Coordinating between the location of employment and housing;*
> - *Supporting transit use;*
> - *Concentrating economic activities into existing communities; and*
> - *Incorporating a mix of housing types.*
>
> *This, in turn, is expected to produce:*
>
> - *Shorter commutes, vehicle miles traveled (VMT) reduction, and congestion relief;*
> - *Reduced greenhouse gases (GHG) emissions and air pollution;*
> - *Less fossil fuel consumption;*
> - *Greater conservation of farmlands and habitat;*
> - *Opportunities for more housing choices for all economic segments of the population including anticipated population and employment growth;*
> - *Reduced infrastructure costs;*
> - *Higher quality of life; and*
> - *Greater certainty for the development community.*

Adopting the 50-10 Transit Plan will maximize these benefits in the San Diego region by effecting a transition to a multi-modal future as quickly as possible. In contrast, following the recommendations of SANDAG's RTP would perpetuate a business-as-usual future and the benefits described in the ULI report would not be realized.

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[3] The 50-10 Plan acknowledges that deficiencies causing unsafe highway conditions may need to be corrected. Safety-related highway improvements cannot, however, be used as a pretext for expansion in highway capacity.

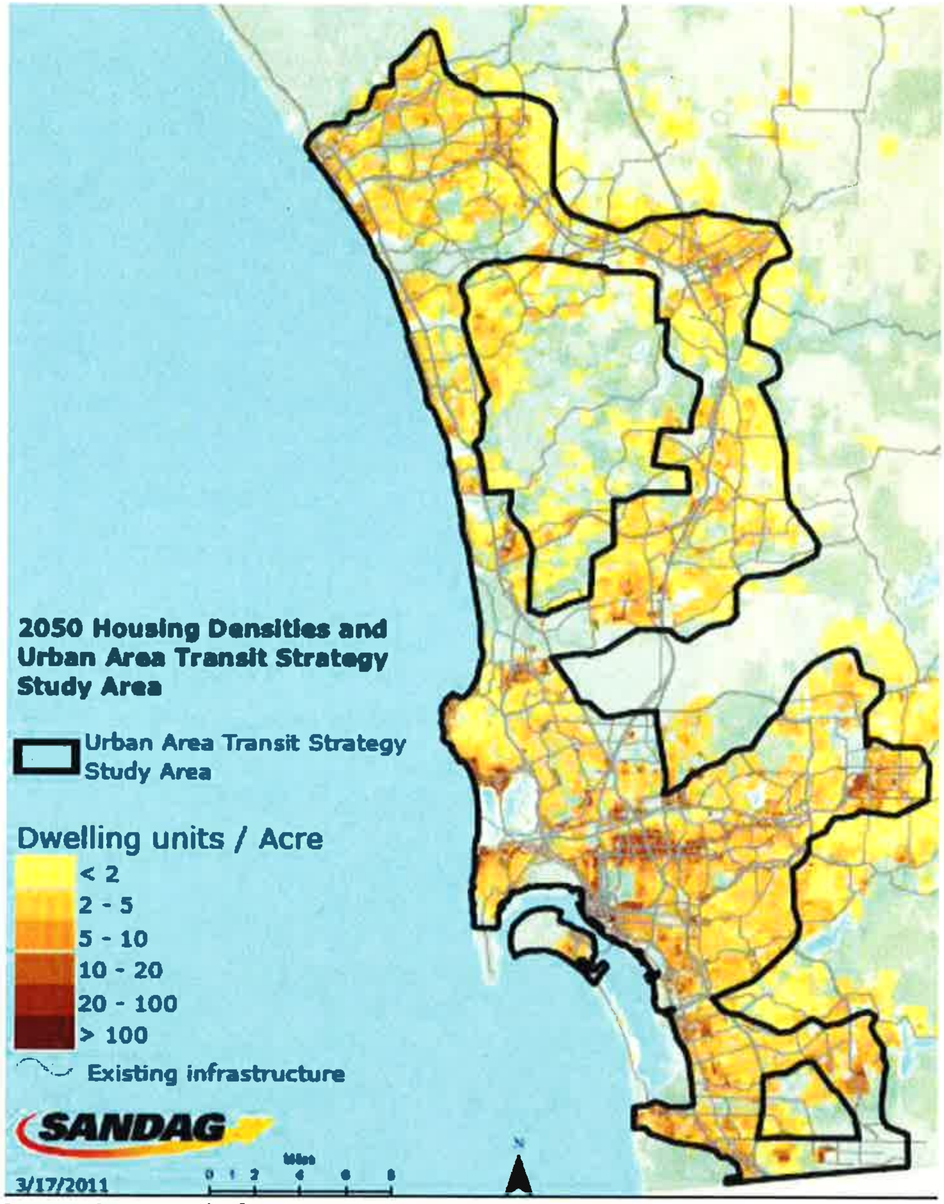
[4] *www.sandiego.**uli**.org/pdf/**SB375**ImpactAnalysisReport.pdf*

The sections of this report generally follow the framework of the ULI report. Section 2 focuses on the importance of compact development in achieving a wide range of benefits. Section 3 provides a sketch of what a world class transit system would look like in the San Diego region, and how that transit system would build on current regional planning efforts. Section 4 discusses how *TransNet* funding can be redirected. Section 5 describes why SANDAG's analysis tools are inadequate to evaluate the benefits of the 50-10 Transit Plan. Section 6 describes the benefits of the 50-10 Transit Plan.

2) The Benefits of Compact Development

The draft 2050 RTP states:

> *The forecasted growth in housing is projected to increase by approximately 33 percent, by about 388,000 additional units, totaling 1.53 million homes in 2050. Of the 388,000 units, nearly 85 percent are expected to be multi-family homes. Over 80 percent of all homes in 2050 are projected to be located within the UATS [Urban Area Transit Study] boundary (Figure TA 7.3).*
>
> *The region is also projected to experience an increase of approximately 500,000 jobs over the next 40 years, resulting in a total of nearly two million jobs in 2050. Of the two million total jobs, over 85 percent are projected to be located in the UATS study boundary in 2050 (Figure TA 7.4).*



Source: SANDAG draft 2050 RTP, Figure TA 7.3, p. TA 7-9.

The Vision California project, funded by the California High Speed Rail Authority in partnership with the Strategic Growth Council, is developing two new modeling tools – the "Urban Footprint" map-based model and the "Rapid Fire" spreadsheet-based tool – to formulate and compare scenarios for how California can accommodate growth. The Vision California project has estimated that there are enormous benefits to higher density development. As shown in the table below, "compact" development results in less than half as much auto travel as "standard" development, and "urban" development results in only about one fifth as much auto travel as "standard". [5]

[5] Vision California: Charting our Future: Statewide Scenarios Report (March 2011) http://www.visioncalifornia.org/reports.php

Land Development Categories

	Land Use Characteristics	Transportation Infrastructure
URBAN	Most intense and most mixed LDC, often found within and directly adjacent to moderate and high density urban centers. Virtually all 'Urban' growth would be considered infill or redevelopment. The majority of housing in Urban areas is multifamily and attached single family (townhome), with some small-lot single family homes. These housing types tend to consume less water and energy than the larger types found in greater proportion in less urban locations.	Supported by high levels of regional and local transit service. Well-connected street networks and the mix and intensity of uses result in a highly walkable environment and relatively low dependence on the automobile for many trips. Per-capita VMT range: ~ 1,500 to 4,000 per year.
COMPACT	Less intense than Urban LDC, but highly walkable with rich mix of retail, commercial, residential, and civic uses. The Compact form is most likely to occur as new growth on the urban edge or large-scale redevelopment. Rich mix of housing, from multifamily and attached single family (townhome) to small- and medium-lot single family homes. Housing types in Compact areas tend to consume less energy and water than the larger types found in the Standard LDC.	Well served by regional and local transit service, but may not benefit from as much service as Urban growth, and is less likely to occur around major multimodal hubs. Streets are well connected and walkable, and destinations such as schools, shopping, and entertainment areas can typically be reached via a walk, bike, transit, or short auto trip. Per-capita VMT range: ~ 4,000 to 7,500 per year.
STANDARD	Represents the majority of separate-use auto-oriented development that has dominated the American suburban landscape over the past decades. Densities tend to be lower than Compact LDC, and are generally not highly mixed or organized to facilitate walking, biking, or transit service. Can contain a wide variety of housing types, though medium- and larger-lot single family homes comprise the majority of this development form; these larger single family tend to consume more energy and water than those in the Urban or Compact LDCs.	Not typically well served by regional transit service and most trips are made via automobile. Per-capita VMT range: ~ 9,500 to 18,000 per year.

CALTHORPE ASSOCIATES
URBAN DESIGNERS PLANNERS ARCHITECTS

A fundamental problem in the 2050 RTP is that it takes credit for the benefits of more compact development while assuming that such a future will be achieved regardless of what transportation system is provided – whether auto-oriented, transit-oriented or a mix of the two. In reality, developers, home buyers and renters, and business owners are all strongly influenced by transportation investments. Investments in freeways have encouraged sprawl. This phenomenon has resulted in a vicious cycle whereby sprawl causes high traffic growth leading to more freeway investments leading to more sprawl. The RTP is in error when it assumes that compact development can be achieved with continued investments in suburban freeways. Accordingly, the agency is taking credit for benefits that will result from compact land use that will not result if the RTP is followed.

For many years, SANDAG and Caltrans have over invested in highways while under investing in transit. Consequently, the region has an extensive highway system but an incomplete transit system. Without a comprehensive, well-integrated transit system, public transportation has been unable to meet the region's transportation mobility needs. The 50-10 Plan would break this cycle by authorizing the funds for a transit system that is capable of replacing travel by the automobile.

While San Diego ultimately needs a comprehensive regional transit system throughout the region, the 50-10 Plan, would begin by building out a complete transit network within the urban core. Transit investments in the urban core will encourage compact and urban development. This will result in a *virtuous* cycle whereby transit investments encourage transit-oriented development, boosting transit ridership, and encouraging more transit investments. There will be many benefits that may not be readily apparent at the outset. For example, the story below shows how better regional transit results in large public and private savings in parking costs and a much more vibrant urban life.

A Tale of Two Cities – Los Angeles and San Francisco

For a downtown concert hall, Los Angeles requires, as the minimum, 50 times more parking spaces than San Francisco allows as the maximum. These different priorities help explain the very different parking arrangements for Louise Davies Hall (home of the San Francisco Symphony) and Disney Hall (home of the Los Angeles Philharmonic). San Francisco built Louise Davies Hall with no parking garage, while Los Angeles completed Disney Hall's 2,188-space, $110 million parking garage three years before it had raised the $274 million needed to start building the 2,265-seat Disney Hall itself.

Los Angeles County borrowed the money to finance the $50,000-per-space parking garage, with the debt to be repaid from the expected revenues. Because the garage was completed in 1996, but Disney Hall did not open until 2003, parking revenues fell far short of the debt payments for seven years. As a result, the county had to subsidize the garage from general revenues at a time when it was nearly bankrupt...

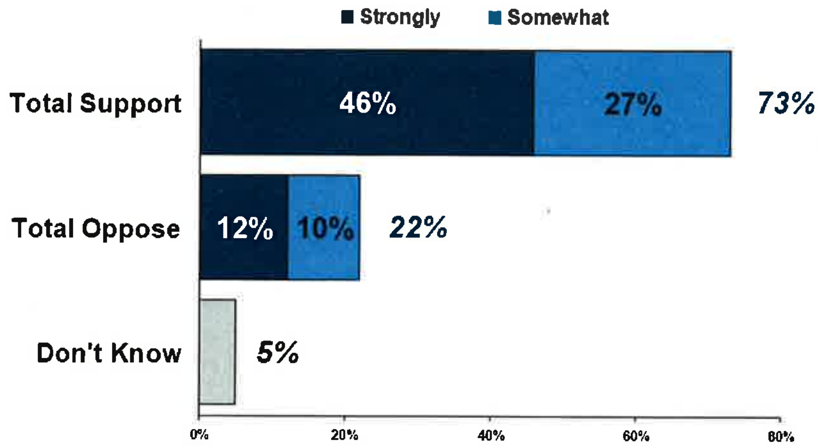
The difference in parking policy helps explain why almost everyone prefers downtown San Francisco to downtown Los Angeles. After a concert or theater performance in San Francisco, people stream out onto bustling sidewalks where all the restaurants, bars, bookstores , and flower shops seem to be open and busy, and where it is a long walk to your parking space, if you even drove. In Los Angeles, the sidewalks are empty and threatening at night. Even a spectacular new concert hall does not help to create a vibrant downtown if every concertgoer drives straight into its underground garage and feels the sidewalks a block away are unsafe.

From Shoup, Donald. *The High Cost of Free Parking*, p. 160-161, Chicago: Planners Press, 2004

The public strongly supports compact transit-oriented development as shown in a recent county-wide survey.

Voters Support for More Compact and Transit-Friendly Development

Would you support or oppose locating more homes and jobs closer together and near transit in your community, providing people with more choices to shorten commute times and reduce pollution?



Source: "Key Findings from Recent Countywide Survey on Climate Change", Fairbank, Maslin, Maullin, Metz and Associate, prepared for the San Diego Foundation, September 14, 2010.

3) Development-Oriented Transit

If compact, transit-oriented development is favored by the public, why hasn't it been occurring? The simple answer: lack of transit service. The 50-10 Transit Plan is necessary to achieve the compact land use future assumed in the RTP. This Plan can be considered the inverse of transit-oriented development, i.e., "development-oriented transit." SANDAG and other regional planning agencies often lament that they do not have land use planning authority but are subject to the decisions of developers' residential and business location choices. In fact, SANDAG does have an enormous influence on land use through its transportation investments, but has failed to use that power for the region's good. Instead, the agency has continued to expand freeway and highway capacity, which projects have has resulted in more and more sprawl development.

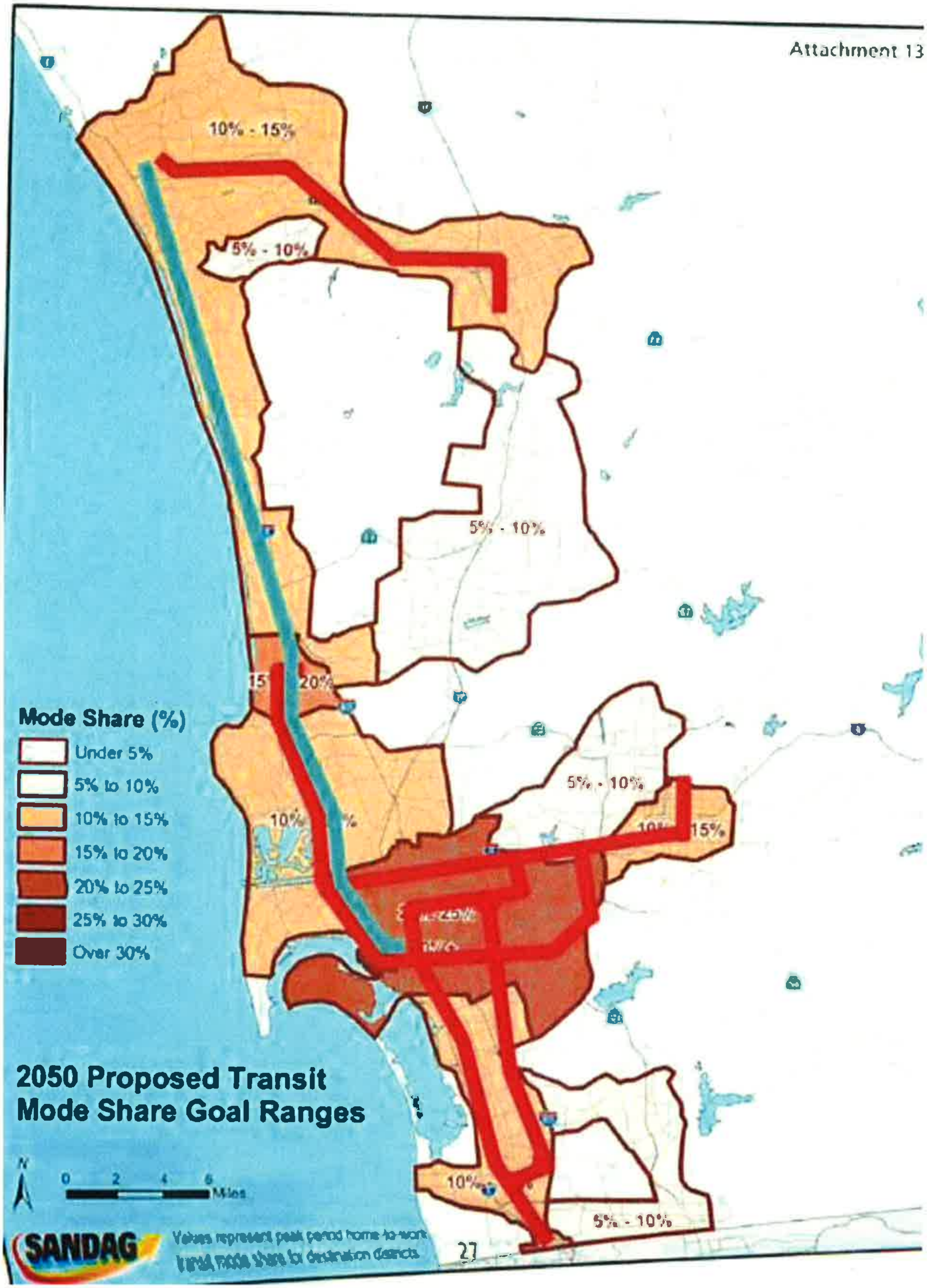
Transit-Oriented Development: A Conundrum

Transit-oriented development will be successful only with the existence of adequate public transit. Yet, highway-oriented development needs only a road to be successful. Highway-oriented development quickly becomes the default. While no agency can afford to run empty buses, no one ever complains about an empty highway. Thus, developers won't build transit-oriented development until there is transit service, while transit agencies won't provide service until there is sufficient demand. So land use developers flock toward highway sites, where they don't have to contend with this uncertainty. By implementing transit, especially in the urban core, developers will have an incentive to build compact, walkable development.

Adoption of the 50-10 Transit Plan will result in a complete transit network for the urban core that:

- Is high quality, frequent and serves most regional trips,
- Is accompanied by walk and bicycle infrastructure investments,
- attracts travelers in all income groups,
- promotes transit-oriented development patterns, and
- will operate within a decade or sooner.

The transit projects included in the 50-10 Transit Plan would be generally consistent with the transit projects proposed for implementation over a 40-year period in the 2050 RTP. They include service improvements for the Trolley, Coaster, Sprinter and development of new light rail and streetcar lines in the urban core. The difference between the 50-10 Plan and the 2050 RTP is that the former (1) would fund several of the most important transit projects within 10 years, and (2) any future roadway expansion would be postponed until after a complete high-quality transit network is established in the region's urban core. The 50-10 transit system would be designed to achieve, at minimum, the transit mode share goals identified in the 2050 RTP, but would achieve them much earlier than 2050. These mode share goals are shown in the adjacent figure, which overlays important transit corridors on top of the draft RTP Figure TA7-7. (Note: The Coaster is identified as the blue line, while the red lines show the light rail system).



Attachment 13
10% - 15%
5% - 10%
5% - 10%
Mode Share (%)
Under 5%
5% to 10%
10% to 15%
15% to 20%
20% to 25%
25% to 30%
Over 30%
5% - 10%
15%
10%
5% - 10%
2050 Proposed Transit
Mode Share Goal Ranges
0 2 4 6 Miles
SANDAG
Values represent peak period home-to-work transit mode share for destination districts
27

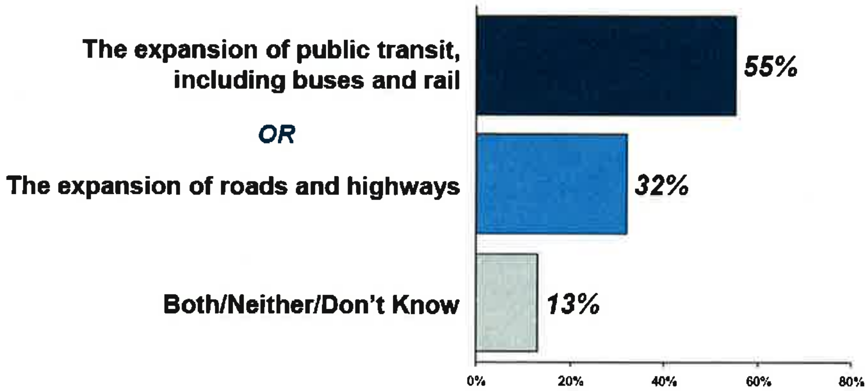
The transit projects identified in the draft 2050 RTP serve as the core of the 50-10 Plan. Additional effort will be required to flesh out a complete transit system; this effort is beyond the scope of this report. Focusing too early on specific transit projects too often leads to "analysis paralysis," as projects move on and off project lists while the roadway system continues to be expanded. These analyses are often unsatisfactory because transit projects cannot achieve their full potential without a comprehensive system that makes transit a practical alternative to driving for a large share of regional trips. The intent of this report, then, is to focus on the "big picture." It proposes a critical change in the timing and implementation of transit: a complete transit system must be implemented first within the urban core; SANDAG would then build a comprehensive system from that initial program.

Accordingly, the concept of "transit before highways" is the critical component of the 50-10 Plan. While SANDAG is proposing, in the 2050 RTP, to fund transit simultaneously with highway expansion, this approach to regional transportation is doomed to fail. In addition to the land use considerations discussed above, substantial increases in highway capacity significantly undermine transit patronage, since the presence of traffic congestion is an incentive to transit usage. Moreover, we are aware of other transportation planning agencies' empty promises when it comes to future transit funding. For example, in the early 1990s, the Atlanta region included major rail transit expansions in its long-term transportation plan, including construction of a new comprehensive commuter rail system. However, these projects were in the "out years" of the long-range plan and the focus of studies only in the initial years. Not surprisingly, none of these projects were ever constructed, and they have since been omitted from recent plans. In fact, because of the large roadway investments and resulting sprawl over the past 20 years, providing transit to the Atlanta region has become even more difficult than it was two decades ago.

Without a commitment to the 50-10 Transit Plan, the Atlanta scenario is the likely outcome for the San Diego region. Roadway expansions will proceed forward now. Planning studies will be done for transit, but those projects will be postponed into the future. Meanwhile, sprawl development will continue its outward march, making the implementation of a comprehensive transit solution that much more difficult.

SANDAG promotes its "Hybrid" scenario in the 2050 RTP as balanced. However, such a balanced plan has little support in the general public, as shown by the following 2010 countywide survey.[6]

Voters' Preferences between Expanding Public Transit or Roads and Highways



Source: "Key Findings from Recent Countywide Survey on Climate Change", Fairbank, Maslin, Maullin, Metz and Associate, prepared for the San Diego Foundation, September 14, 2010.

Instead, a majority of respondents favor the expansion of public transit over road expansion or a mix. The public is *not* supporting the "balanced" approach— they want to get the transit system built. Because of the past emphasis on roadway expansion, directing 100 percent of capital funding to transit is what is needed for balance.

4) A Dramatic Shift In Transportation Is Not Possible Without Modifications in Transportation Funding Priorities.

Building a fully functional, regional transit network is impossible without a long-term revenue source. The region *has* a revenue source. The problem is that it is targeted at the automobile.

The *TransNet* extension, a regional half-cent sales tax for transportation that was approved by more than two-thirds of San Diego County voters in 2004, runs to 2048.[7] This tax is expected to raise $32 billion to help fund transportation projects.[8] Most of these projects, however, are strictly highway-oriented. Accordingly, SANDAG currently proposes to use *TransNet* to fund major highway expansion projects along I-5, I-8, I-15, I-805, SR-52, SR-54, SR-56, SR-67, SR-SR-76, SR-78, SR-94, and SR-125.

Importantly, *TransNet* is not locked in stone. The measure allows flexibility in the event of changing technology, new priorities, or other factors during its 40-year term. The San Diego region has clearly experienced a dramatic change in

[6] SANDAG's "Hybrid Transportation Scenario" contains a variety of multi-modal projects with an emphasis on "Fusion" and "Highway Emphasis" scenarios. Draft 2050 RTP, Technical Appendix 7, page TA 7-71. The "Fusion Scenario" includes an emphasis on new public transit services (rail and bus), highway improvements (bottleneck relief and new lanes), and increased frequencies to existing transit routes. *Id.*, page TA 7-57.

[7] The initial 20-year *TransNet* program was initially approved by voted in 1987.

[8] The projected *TransNet* revenue is calculated in year of planned expenditure. 2050 RTP/SCS DEIR, page 4.16-15.

priorities since the *TransNet* ballot measure was drafted in 2004. Specifically, global climate change, escalating energy costs, long commutes, and concern about dependence on foreign oil are causing the public to demand alternatives to the private automobile.

With a two-thirds vote, the SANDAG Board can add, delete or change (with the exception of those policies or projects that must be resubmitted to the voters) the timing of projects from *TransNet. Our* current situation requires such a change.

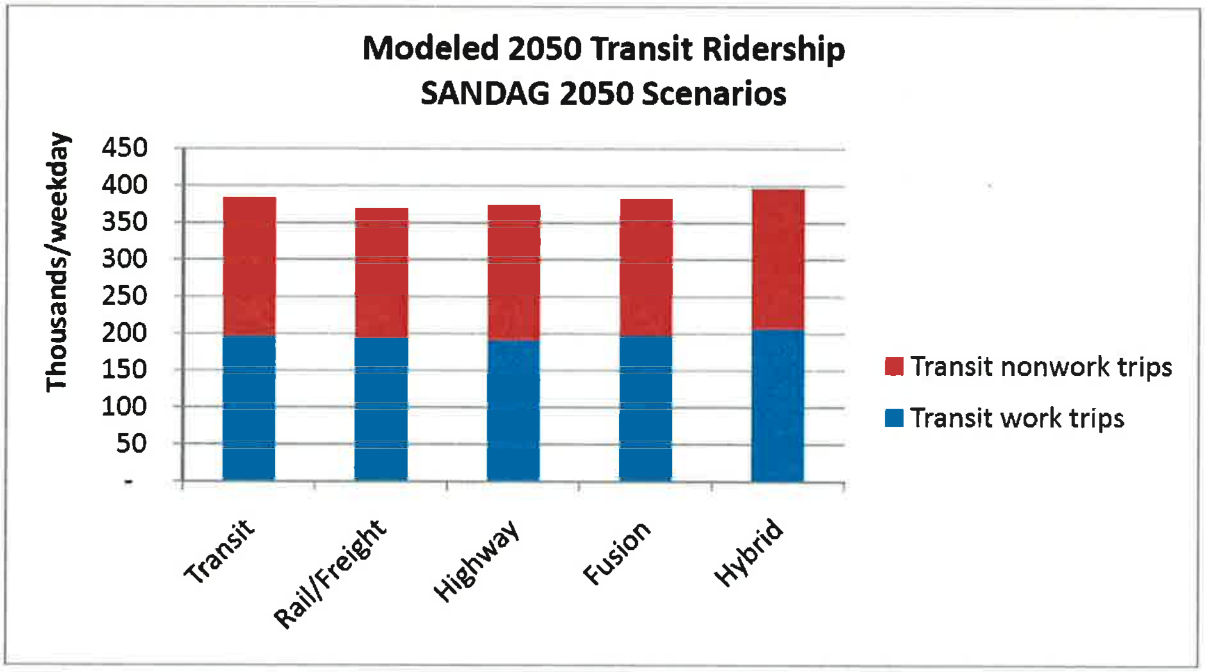
Finally, it is important to recognize, that while *TransNet* was passed by the voters, they were not given the opportunity to choose between transit or freeways. They were simply offered a form of "congestion relief" that promotes highway expansion. A more accurate assessment of the voters' preference would have been to give them a choice between the two methods of transport, as was done in a recent poll conducted by Fairbank, Maslin, Maullin, Metz and Associate. When given the choice, voters overwhelmingly preferred transit over freeway expansion.

A New Gimmick: Highways Funding Transit

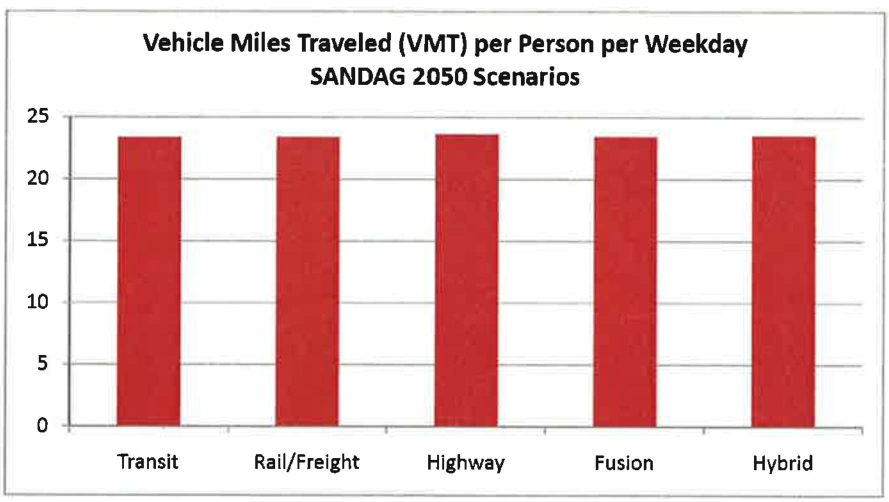
The RTP focuses on constructing a network of managed lanes. SANDAG claims that certain of the fees charged for use of these lanes would be used to fund transit. This approach is misguided for two reasons. First, the revenue from these tolls will be far less than what would be required to pay for the construction of the new managed lanes themselves. Second, the construction of additional roadway capacity, including managed lanes, serves to undermine rather than support transit ridership. It is impossible to implement effective transit in areas of low density sprawl, and buses running in express lanes will attract a very small share of total regional travel. The small amount of revenue that may be earmarked for transit service will not begin to compensate for the harm to the region's transit system. Accordingly, the 50-10 Transit Plan calls for spending all of the capital investment on transit now.

5) *SANDAG's Tools Are Inadequate to Evaluate the 50-10 Transit Plan*

SANDAG relies on a computer simulation model to evaluate the outcome of the RTP. This model has serious deficiencies making it almost useless for modeling future transit ridership. [9] As shown in the figure below, SANDAG's modeling shows there is a only a minor difference in future transit ridership between a transportation alternative that emphasizes transit compared to one that emphasizes highway expansion.

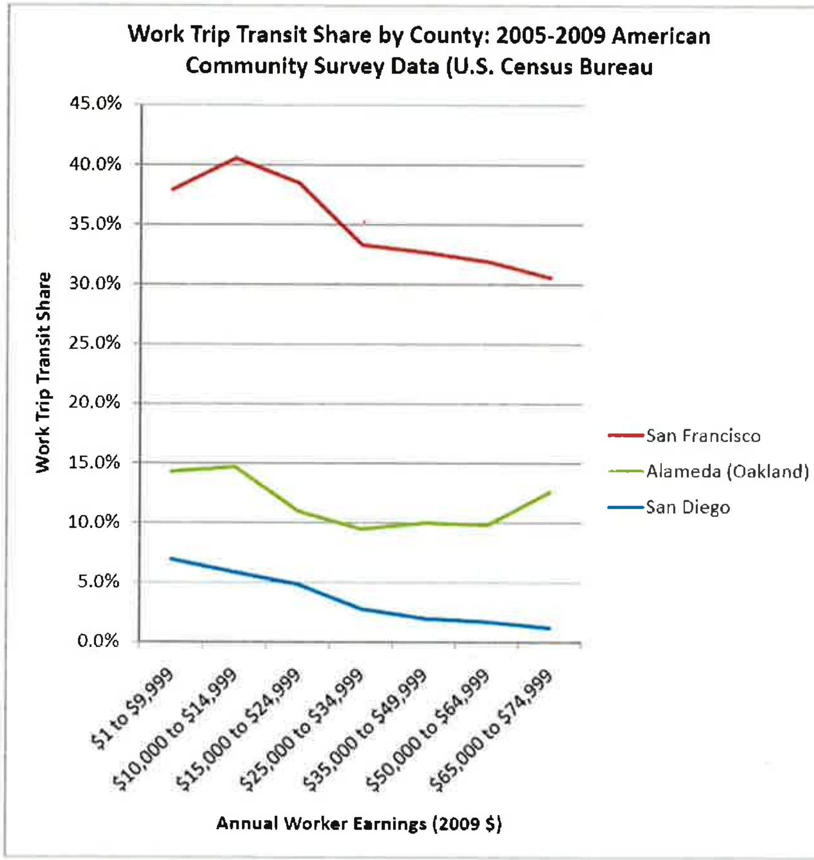


Similarly, the SANDAG computer model estimates that automobile travel would be almost identical across these alternative scenarios.



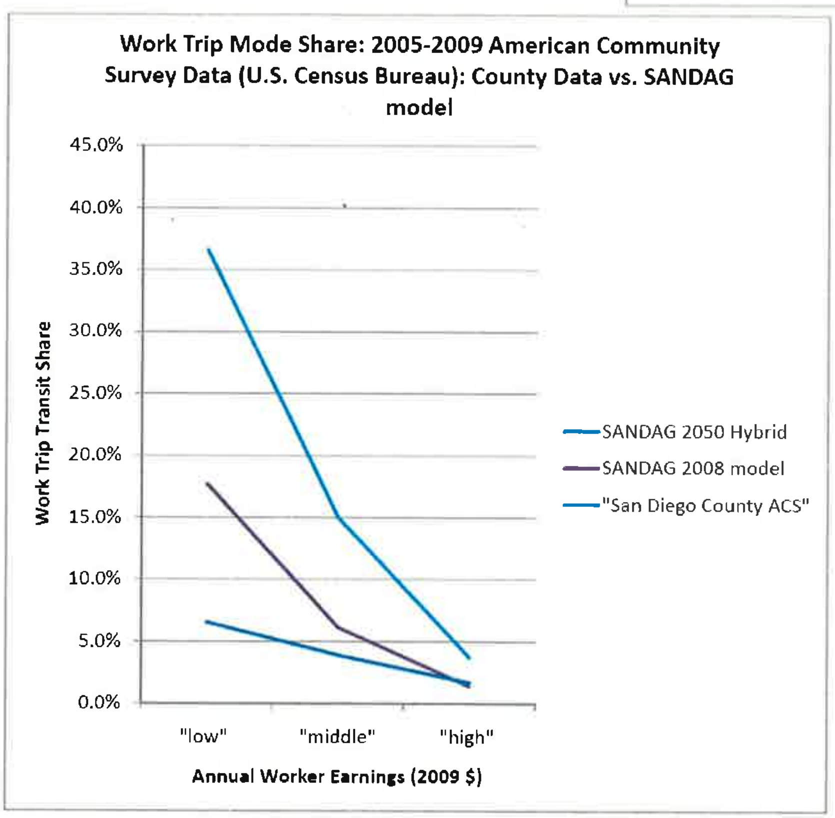
[9] For a more detailed discussion of SANDAG's modeling issues see Smart Mobility, Inc. Report entitled "Deficiencies in SANDAG's Transit Modeling," March 7, 2011, attached.

A primary cause of this model insensitivity is the extremely exaggerated emphasis on income in the model's transit assumptions. SANDAG assumes that higher income people will not use transit, despite contrary data for the SANDAG region and for regions with higher-quality transit systems. The adjacent graphic shows the transit mode share for residents' work trips in three California counties. As shown, higher income residents are slightly less likely to use transit for commuting, especially in San Diego County, which has the poorest transit system of the three counties.



Nevertheless, the SANDAG model assumes that income produces a much greater effect on transit use. The figure below shows the San Diego County data from the figure above (grouped by the three model categories) along with SANDAG's modeled transit shares for 2008 and 2050.

As shown, SANDAG greatly exaggerates the importance of income today and then expands that differential to a highly unrealistic level in the future, as compared to the data shown for other California regions. In 2050, SANDAG presents the low income transit share as 10 times that of the high income share, even though only small differences exist in San Francisco and Alameda Counties today.



The non-work trip transit share for high income travelers in the SANDAG model is even smaller –only 0.2 percent – despite the assumption that billions of dollars would be spent to upgrade rail [and other transit] in high income areas in the San Diego region. These assumptions about "high income" residents dominate the 2050 results because the model presupposes, based on optimistic economic assumptions, that 73% of all trips will be made by "high" income residents.

In summary, SANDAG is relying on a crude and unrealistic modeling tool to evaluate the 2050 RTP transportation alternatives. Modeled transit ridership is based almost entirely on income. The modeling assumes that lower income residents have a propensity to use transit even if service is relatively poor. The modeling also assumes that lower income residents will become much less prevalent in the future. At the same time, the modeling assumes that high income residents are increasing in numbers and that these residents will *not* use transit even if it is high quality. According to SANDAG, then, the level and quality of transit service have little consequence on overall transit ridership. Consequently, SANDAG lacks a valid tool for evaluating its own proposed RTP, let alone the 50-10 Transit Plan. It is essential that the flaws in SANDAG'S modelling be corrected so that the 50-10 Transit Plan can be evaluated properly.

6) Benefits of the 50-10 Transit Plan

Adoption of the 50-10 Transit Plan will result in the following benefits, based on criteria articulated in the ULI report (excerpted above):

Shorter commutes, reduction of vehicle miles traveled (VMT), and congestion relief

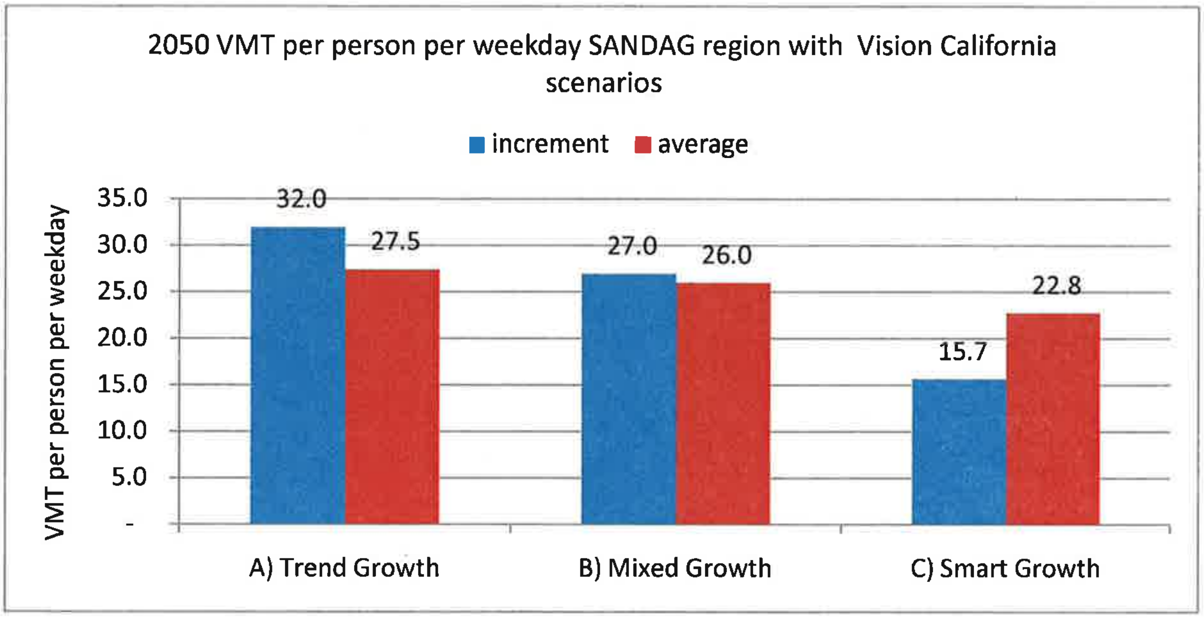
The 50-10 Plan's investment in public transit will achieve these benefits through encouraging a more compact and walkable land use future.

The Vision California report, discussed above, describes three general land use futures for the state of California: (A) Trend Growth, which represents a future based on past market trends, development patterns and transportation investments, (B) Mixed Growth which combines past and future patterns of growth and investment, and (C) Smart Growth, which aggressively meets the shift towards compact growth with corresponding investments in transit infrastructure.

The Report concludes that Trend Growth is not likely to continue due to dramatic shifts in the economy. Instead, Mixed Growth is likely to occur due to "changing demographics and lifestyles, trends in construction, the undersupply of compact units on the market, and projected energy price increases." Notably, the Mixed Growth scenario assumes that "growth will be supported by transportation investments that balance roadway and transit infrastructure, and a move towards planning for compact development by regions and cities." This "Mixed Growth" approach exactly summarizes the SANDAG RTP because it attempts to balance traditional demand for freeway expansion simultaneously with demand for transit infrastructure.

But how does a community achieve Smart Growth, the optimal planning objective? Accordingly to ULI, "significant investments in transit and other infrastructure will be made to support smart growth." The Vision California "Smart Growth" approach thus contemplates aggressive transit investment to strengthen and lead future trends while abandoning past development patterns. The 50-10 Transit Plan is designed to foster this vision for Smart Growth.

The Vision California graphic (reproduced on p. 4 of this report) shows that Mixed Growth will result in much less growth in vehicle miles traveled (VMT) than Trend Growth, and Smart Growth will result in even less VMT growth. The figure below applies the Vision California data to the SANDAG region. Using direct calculations from the Vision California the blue columns show about half as much VMT per person for new residents in the Smart Growth future as compared with the Trend Growth future. The red columns make a very conservative assumption that this regional transformation will not change the behavior of those living in residences that exist today; in other words, they will continue to generate 25.7 VMT per person per day, (according to the RTP).



As this graphic shows, the Mixed Growth future is not sufficient to lower VMT per person. Instead, it would increase from today's value of 25.7 percent. In contrast, the RTP assumes (due to optimistic land use assumptions) that VMT per person will drop in the future with the RTP. These decreases in VMT are not realistic if the highway expansion projects identified in the RTP are implemented.

With the extremely conservative assumption discussed above, regional VMT would be 12.4% less in 2050 in the Smart Growth future (i.e., the 50-10 Transit Plan) than in SANDAG's Mixed Growth scenario This is because the Smart Growth scenario will result in more walk and bike trips, more transit trips, and shorter auto trips. The actual reduction in VMT is likely to be considerably greater because the multimodal infrastructure and new multimodal behavior will have far-reaching effects on older neighborhoods as well.

Despite the large scale nature and expense of the highway expansion program contemplated by the 2050 RTP, it would not result in reduced congestion compared to today's congestion levels. It would not even result in less future congestion than if the 50-10 Transit Plan were followed with no highway expansion.[10] This may seem counterintuitive but an analogy might help. Expanding roadways is equivalent to fighting a weight problem by buying larger pants. Clearly, one must address the weight problem directly by reducing calorie intake. As illustrated in the box below, the 50-10 Transit Plan addresses the highway congestion problem directly by getting cars off the road; it does not contemplate filling more roads and wider roads with more cars.

[10] The RTP does increase freeway lane miles by more than 12.4% but adds little capacity to the larger arterial and local roadway system. No trip begins or ends on a limited access highway. The impacts of implementing the RTP would include greatly increased congestion on the arterial and local roadway system. Yet these impacts are seldom disclosed or analyzed in freeway project EIS/EIR documentation.

The Futility of Widening Highways

In the Chicago area, one particularly bad bottleneck on the Eisenhower Expressway, referred to as the "Hillside Strangler," was improved at a cost of $140 million. According to many local sources, the congestion at that particular location improved, but the traffic bottleneck only shifted to adjacent areas. In fact, "the commute time from the suburbs to the Loop, via the Eisenhower and its extension, is one hour - exactly what it was before the Hillside Strangler was repaired."[11]

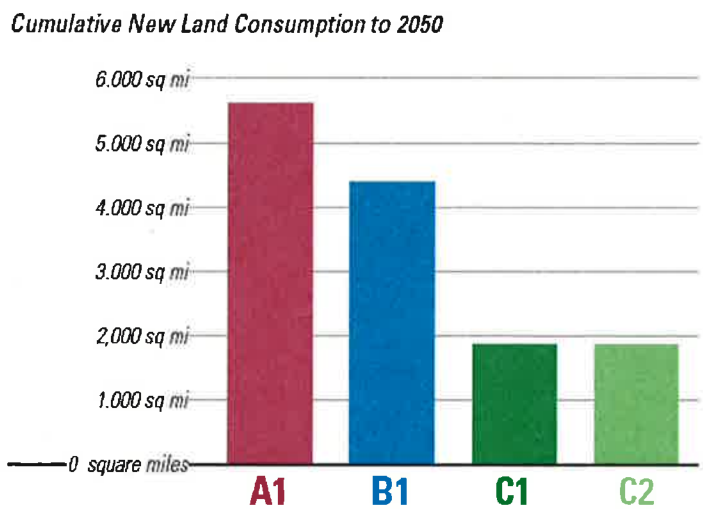
The *Boston Globe* reported that the $15 billion invested by the state and federal taxpayers for the "Big Dig" increased mobility on the expanded roadway. "But most travelers who use the tunnels are still spending time in traffic jams – just not in the heart of the city, where bumper-to-bumper was a way of life on the old elevated artery."[12] The *Globe* documented no apparent overall travel time savings; rather, it reported a number of trips where travel times have increased, including one case where peak period travel time has doubled from 12 minutes to 25 minutes.

Reduced greenhouse gases (GHG) emissions and air pollution

The 12.4 percent reduction in VMT would translate into a similar reduction in greenhouse gas emissions and criteria air pollutants.

Less fossil fuel consumption

The 12.4 percent reduction in VMT would translate into a similar reduction in gasoline consumption. At $4/gallon, the region is currently spending approximately $5.6 billion per year on automobile fuel. 12.4 percent of that would be $700 million in savings for the region's households, a similar number to annual capital expenditures in the RTP.



Greater conservation of farmlands and habitat

As shown to the right, Vision California estimates that the Smart Growth future will involve less than half as much additional land consumption as the Mixed Growth future. The impacts in San Diego County would be similar to those shown statewide. (Note: C1 and C2 are two slightly different Smart Growth scenarios that both involve the same land consumption.)

[11] More costly roadwork, and travel still tough, *Daily Herald*, October 3, 2002.

[12] *Boston Globe*. Big Dig pushes bottlenecks outward: Artery has cleared, but commutes longer on several major routes. November 16, 2008.

Parks for People – Not for Cars

There is a current debate in San Diego about Balboa Park. There is widespread agreement that cars should be removed from the plaza outside the San Diego Museum of Art, which was a key concept in the 1989 Park Master Plan. The problem with the proposed solution is that it is too auto-centric, for it emphasizes a new roadway and a new parking garage, both of which would be very costly and create undesirable new impacts on the park. The real solution must focus on getting people in and out of the park rather than accommodating automobiles. The 50-10 Transit Plan is intended to address this need. It will increase transit access to Balboa Park, and walking and bicycling will become the primary modes of transportation within the Park, thus allowing a much improved park ambiance.

<u>Opportunities for more housing choices for all economic segments of the population</u>

The draft RTP states:

> *The number of people aged 65 and older is expected to increase by 143 percent. The number of people older than 85 is projected to increase by 214 percent. This increase in the region's older population will require the development of neighborhoods that are more walkable and have a variety of services that meet daily needs. (p. 3-15)*

The ULI report states:

> *The number and type of housing units delivered to market in California over the past 20 years have not kept up with demand or population growth rates. Due to strong demand, the state has one of the highest-priced housing markets (both for-sale and rental) in the nation, causing a higher percentage of households to allocate a significant portion of their incomes to housing. Compact developments can provide the type of units that appeal to first-time renters and buyers and empty nesters, who are currently underserved.*

The 50-10 Transit Plan provides the best platform for addressing these housing issues.

<u>Reduced infrastructure costs</u>

The Vision California report states:

> *Increased land consumption leads to higher costs for local and sub-regional infrastructure, as new greenfield development requires significant capital investments in new local roads, water and sewer systems, and parks. Conversely, growth focused in existing urban areas takes advantage of existing infrastructure and capitalizes on the efficiencies of providing service to higher concentrations of jobs and housing. When comparing Scenario A1 to Scenarios C1 and C2, local and sub-regional infrastructure cost savings add up to more than $4,000 per new household by 2050*

Applying the Vision California infrastructure numbers to the SANDAG region, it is evident that going beyond Mixed Growth to Smart Growth would save well over $1 billion between now and 2050.

Higher quality of life

The 2050 RTP includes a vision of a more sustainable, livable future:

> *The Plan envisions most of these new jobs and homes situated in environmentally sustainable communities that are more conducive to walking and bicycling. They also will have more access to public transit. (p. 1-2)*
>
> *The Plan envisions an ambitious and far-reaching transit network that significantly expands the role that transit plays in meeting our region's needs for mobility. The goal is to create the kind of public transit infrastructure and services offered by "world-class" transit systems. (p. 1-5)*

Yet, as discussed in this report, SANDAG's Plan will fall far short of achieving this vision.

Conclusion

By prioritizing public transit, the 50-10 Transit Plan would result in long-term sustainability for the San Diego region. The longer we wait to commit to transit as a significant source of the region's transportation, the more difficult it becomes to achieve such a system. With each additional highway expansion project comes an increase in suburban sprawl. As sprawl development continues its outward march, it becomes less and less feasible to serve this sprawl with effective public transportation. We can wait no longer to reverse this dangerous cycle; the region must implement a comprehensive transit network now.