Review of Marin Sonoma Narrows (MSN) HOV Widening Project Draft Environmental Impact Report/Draft Environmental Impact Statement

Prepared for:
Transportation Solutions Defense and Education Fund

Prepared by:
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Summary

Cars and trucks emit over 35% of all greenhouse gases produced in California. Increasing roadway capacity increases vehicle miles traveled (VMT), and this causes higher greenhouse gas emissions. The Marin Sonoma Narrows (MSN) HOV Widening Project Draft Environmental Impact Report/Draft Environmental Impact Statement (DEIR/DEIS) fails to accurately disclose the increases in VMT that will result from the project. It is estimated that the project will increase traffic by 100 million vehicle miles per year, and result in a large increase in greenhouse gas emissions.

The traffic analysis in the DEIR/DEIS is also deeply flawed. Excluding induced travel from the analysis causes the benefits of the project to be overestimated because congestion relief appears to be greater than it really will be. It also fails to account for indirect traffic impacts on other roadways because not all of the additional VMT will be on the widened roadway.

With increased road capacity, jobs and housing disperse. Traffic metering points like the existing Marin-Sonoma Narrows area act as a brake on the decentralization of land use (a.k.a. “sprawl). Less sprawl and better jobs housing balances are planning goals in the Bay Area. Expanding roadway capacity as in this proposed project is contrary to these goals, and would undermine other planning initiatives aimed at improving the jobs/housing balance, increasing transit ridership, and preserving open space.

Greenhouse Gas Emissions and Vehicle Miles Traveled

California AB 32 requires the California Air Resources Board (CARB) to develop regulations and market mechanisms that will ultimately reduce California's greenhouse gas emissions by 25 percent by 2020. Mandatory caps will begin in 2012 for significant sources and ratchet down to meet the 2020 goals.[1] Cars and trucks are the source for the largest share of greenhouse gas emissions in California and the emissions are roughly proportional to vehicle miles traveled (VMT).

> Light duty vehicles and on-road diesel vehicles accounts for over 35% of all anthropogenic greenhouse gases (GHG) produced in California. Annual net greenhouse gas emissions from surface transportation are roughly equal to the product of the number of vehicles, the average number of miles traveled by each vehicle (vehicle miles traveled, or VMT), and the average net emissions of GHG per vehicle mile traveled. (California Climate Action Team, State Agency Work Plans Draft, p. 34 December 8, 2005).

Expanding highway capacity causes “induced traffic”, increasing VMT and increasing greenhouse gas emissions. DeCorla-Souza (of the Federal Highway Administration) and Cohen define “induced demand” as an: “increase in daily vehicle miles of travel (VMT), with reference

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[1] http://gov.ca.gov/index.php?/press-release/4111/

to a specific geographic context, resulting from expansion of highway capacity."[2] This definition includes both short-term effects and long-term effects. The short-term effects include more trips, longer trips, shifts from other travel modes to auto, and auto trips with lower occupancies. The long-term effects result from land development brought on by increased roadway capacity.

Induced demand effects are well known both to planners and laypeople, and there is a large and growing research literature quantifying the effects of induced demand. This process was kicked off in the United States with a 1997 study by Hansen and Huang that demonstrated large growth in VMT in California that resulted from increased freeway capacity.[3] Since then, there have been many other studies that have confirmed the importance of induced travel. These studies have become increasingly sophisticated in their use of statistical techniques. Robert Cevero of the University of California, Berkeley revisited the California freeway case in a major study that is particularly relevant to the DEIR/DEIS.[4] Cervero writes:

> The longer-run relationship appears fairly strong – every 10% increase in travel speeds is associated with a 6.4% increase in VMT. (p. 157)

Most regional transportation modeling does an incomplete job of accounting for induced travel. Cevero writes:

> In many parts of the United States, travel-forecasting models used by planning agencies are not up to the task of adequately accounting for induced travel and induced growth (Transportation Research Board, 1995). Long-range forecasting models are needed that are robust and sophisticated enough to capture both short-run behavioral shifts and long-run land use shifts triggered by road improvements. Indeed, the general consensus of attendees at a recent conference convened by the Eno Transportation Foundation Policy Forum on induced demand was that the greatest value added of research in this area is to inform the calibration of long-range travel forecasting and urban simulation models, such as MEPLAN, TRANUS, and TRANSIMS (Hunt, 2002). (p. 160)

The DEIR/DEIS purports to analyze the effects of the project on future VMT. In fact the modeling used is incapable of forecasting increases in VMT that would result from the proposed project, and the numbers given in the DEIR/DEIS are wrong. The actual impact on VMT from the project would be several times greater than that which has been disclosed.

Complete induced demand modeling requires accounting for each of the separate components of induced demand including:

1) shifts to longer routes
2) changes in destinations causing longer trips,

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[2]. DeCorla-Souza, P. and H. Cohen. *Accounting for Induced Travel in Evaluation of Metropolitan Highway Expansion*. TRB 77th Annual Meeting Preprint CD-ROM, TRB, National Research Council, Washington D.C., January 1998.

[3] Hansen, M. and Y. Huang. *Road Supply in California*. Transportation Research A, Vol. 31, No. 3, 1997, pp. 205-218.

[4] Cevero, Robert. Road Expansion Urban Growth, and Induced Travel: A Path Analysis. In Journal of the American Planning Association 69(2), p. 145-163, 2003.

3) changing travel mode to auto, and

4) changing home or work locations resulting in longer trips.

The DEIR/DEIS provides little information concerning how the modeling was done, but in the documentation, only one of the four components was accounted for – shifts to longer routes. The Marin/Sonoma model uses the four-step modeling process used in most regions in the United States. The four steps include:

1) trip generation – calculating the numbers of originals and destinations for each small geographic area,

2) trip distribution – linking the origins and destinations to form complete one-way trips,

3) mode choice – determining whether the trips are made by walking, biking, using transit, or in autos and if in autos, the number of people in the vehicle, and

4) assignment – assigning the autos to particular roadways.

The four step modeling process splits people's unified travel planning processes into four steps to facilitate computing. Good modeling practice requires feedback between the modeling steps until an equilibrium between the four steps is reached. If the sequence is computed only once, significant errors result. Both the trip distribution and mode choice stages depend on information on travel times. In the first model sequence, the roadway network appears to be uncongested, and longer trips will be chosen in the model. When these trips are assigned to the network, there appears to be severe congestion. The congested travel times are fed back into the trip distribution and mode choice steps, and resulting trip lengths are much shorter – too short in fact, and another feedback step is required. After several feedback stages, equilibrium values are achieved that properly replicate behavior. Modeling feedback is required by Federal regulations in air quality nonattainment areas.

If modeling is done with feedback, three of the four components of induced travel are accounted for – longer routes in the assignment stage, changes in destination in the distribution stage, and mode changes in mode choice. Therefore, it is good modeling practice to do modeling with feedback for each separate alternative.

The DEIR/DEIS documentation of the modeling process used is incomplete, but it indicates that Caltrans has taken a shortcut that makes VMT estimates invalid. It describes "2020 future year trip tables" and that "2010 and 2030 trip tables were developed by modifying the year 2020 trip tables" (p. 3.1-70). These appear to be references to the auto trip tables that are the output of the third stage of the four step modeling process. It is implied that these same trip tables were used for both the No Build and Build alternatives. In this case, the modeling does not account for either destination changes or mode choice changes. It can account only for routing changes.

The fourth effect, induced travel from land use changes cannot be accounted for in a four step model unless the model is coupled with a land use allocation model that results in different future land use projections for different transportation alternatives.

The state of the practice in transportation modeling is to include model feedback. As this was not done in the modeling relied on in the DEIR/DEIS, statistical results from the research literature on induced travel will be used to estimate the induced travel that will result from the proposed project. Two different approaches will be used. First, the model results will be adjusted based our research with models. Second, statistical relationships from observed growth in VMT will be applied.

Carolyn Rodier of the Mineta Institute and the University of California has researched how well land use models and transportation models with feedback account for induced travel. She concludes:

> The body of literature on the ability of existing travel and land use models to represent induced travel indicates that when travel times are fed back to a land use model and/or the trip distribution step, then (1) models can represent induced travel within the range documented in the empirical literature and (2) the effect of new highway capacity on land use and trip distribution significantly contributes to the models' representation of induced travel. If induced travel is not represented in travel and land use models, then the need for, and the benefit of, the project will be overstated (e.g., 16% to 236% of VHT [vehicle hours of travel]), and negative environmental effects will be understated (e.g., 72% to 192% of NOx emissions).[5]

Rodier also reports on the share of induced travel caused by each of the four components of induced travel. Changes in destination produced the largest share of the total induced travel. In a Sacramento region case study with an integrated land use allocation model (MEPLAN), the land use component produced the second highest amount of induced travel. Changes in routing, the only one of the four components modeled in the DEIR/DEIS was the third highest factor.

The relative proportions of the components varied depending on the study. However, Rodier's research results suggest that routing changes alone represent probably represent only about 1/5 to 1/3 of total induced travel , especially in cases like the one considered in the DEIR/DEIS where the project is in a bottleneck area with few parallel routes.

Therefore, the DEIR/DEIS VMT estimates will be multiplied by a factor of 3 to 5 to correct for the missing modeling factors. DEIR/DEIS Table 3.1-15 (p. 3.1-78) is labeled "Projected Vehicle Miles Traveled (per 1,000 miles) Year 2030. This title is meaningless due to the inclusion of the word "per." The units in Table 3.1-15 really are thousands of VMT per peak hour per weekday.

The right hand side of Table 3.1-15 gives values for Marin County and Sonoma County and the left hand side gives values for the "Project Area." It is unclear what is meant by "Project Area" It would be expected that the project area would be smaller than the two-county area, but the VMT numbers are larger. Therefore, it is either a very large project area or the numbers are wrong. Unless this is clarified and/or corrected, the left-hand side of Table 3.1-15 should be ignored.

The values given on the right-hand side of the table give 4,000 additional VMT per weekday in the morning peak hour and 12,000 additional VMT per weekday in the afternoon peak hour, or 16,000 for the total of the two hours. The table makes these appear small by showing them as "4" and "12" and then emphasizing that it represents a small fraction of a very large number – total VMT for Marin and Sonoma Counties.

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[5] Rodier, Carolyn J. A Review of the Representation of Induced Highway Travel in Current Travel and Land Use Models, p. 8.

Induced travel demand does not affect just the peak hours, but all 24 hours in the day. The morning and afternoon peak hours combined represent about 16% of daily weekday travel. Therefore, the Difference numbers in Table 3.1-15 for Marin and Sonoma Counties (16,000) translate into about 100,000 VMT per weekday. As discussed above, these estimates include only one of four different components of induced travel and total induced travel is likely to be about 3-5 times as great, i.e. 300,000 - 500,000 additional VMT per weekday.

Statistical relationships from the induced travel literature can be applied as an independent check on this estimate. Induced travel is commonly represented as the elasticity of VMT with respect to lane miles (the length of added roadway capacity times the number of lanes added). Hansen estimated this as 0.9 for freeways in California. Cervero calculates a total long-term elasticity of about 0.8 but concludes that some of the increases are due to other factors such as employment growth and rising incomes. Therefore, he recommends using a value of 0.39.

In this case of the proposed project, two HOV lanes would be added for a length of 16.1 miles, so there would be 32.2 additional lane miles. This is a conservative indicator of increased capacity because it does not include the additional capacity that would result from expanding the general purpose lane capacity by converting an expressway into a freeway. A lower end for daily traffic volumes on congested freeways in California is 20,000 vehicles per lane per day. An elasticity of 1.0 would result in 640,000 VMT per weekday (32.2 x 20,000 x 1.0). With an elasticity of 0.9, the calculated increase is 580,000 VMT per weekday. Using the lower value of 0.39, the result is 250,000 VMT per weekday. These estimates are consistent with the estimates calculated independently based on Rodier’s research.

In order to be conservative, a value on the lower end of the estimates will be used, 300,000 additional VMT per weekday. To get total annual VMT, a factor of 330 -340 is typically used because there is somewhat less travel on the weekend days, on average, than on weekdays. A value of 333 will be used because it leads to a round number estimate of 100 million additional VMT per year with the project than without. This would result in a large increase in greenhouse gas emissions between the No Build and Build alternatives.

TRAFFIC ANALYSIS

The traffic analysis in the DEIR/DEIS is poorly documented and also appears to be deeply flawed. The largest problem is again the failure to account for induced travel. As was pointed out above in an excerpt from Cervero, excluding induced travel from the analysis causes the benefits of the project to be overestimated because congestion relief appears to be greater than it really will be.

In addition, failure to account for induced traffic hides indirect traffic impacts on other roadways because not all of the additional VMT is on the widened roadway. No trip begins or ends on a freeway. If freeway volumes are higher, there also are higher volumes on connecting roadways. Impacts on connecting roadways have not been modeled, they have not been examined, and they have not been disclosed. In many cases, these impacts are great and lead to future construction projects that are expensive and inflict additional construction delays on area residents.

Instead, the DEIR/DEIS purports that these effects are minimal based on incorrect modeling. It states:

> The Traffic Operational Analysis Report (February 2005) for future years of 2010 and 2030 indicates that traffic impacts at nearby intersections would be minimal. Most intersections would experience a less than 5 percent difference in future predicted traffic volumes between the Build and No Build conditions. This difference is not significant given the accuracy of the prediction methodology. (DEIR/DEIS p. 3.2-78)

The DEIR/DEIS says only that "most" would increase less than 5 percent, and does not describe what the worst cases are. The decreases calculated are without induced travel. With induced travel accounted for properly, the increases would be much greater. Even 5 percent increases are significant. Traffic delay increases exponentially with traffic volume, so that 5 percent increases in traffic can result in 10-20 percent or even higher increases in delay. The comparison of a 5 percent threshold with the "accuracy of the prediction methodology" is confusing apples with oranges. There is uncertainty concerning the exact magnitude of future traffic, but there is certainty that traffic volumes will be higher with the proposed project than with the No Build alternative.

Most of the 8-page traffic impacts section in the DEIR/DEIS (p. 3.1-69 - 3.1-78) is devoted to "bottlenecks and queues." The Marin/Sonoma Model is the only transportation model referenced in the DEIR/DEIS and it cannot calculate queues. A queue is traffic that backs up behind a bottleneck. Similar to the narrow part of a funnel, the bottleneck meters traffic so that there is a maximum flow through the bottleneck. As with a funnel, the flow through the bottleneck itself is fast. The problem is that traffic behind the bottleneck moves slowly. With extreme congestion, the queues can get very long. Static assignment models like the Marin/Sonoma Model show delays at the bottleneck location and smooth flows upstream of the bottlenecks. This is completely backwards.

There are several references in the DEIR/DEIS to the "Caltrans Traffic Operational Analysis Report, February 2005" which does include a reference to FREQ12, which is a macroscopic traffic simulation model. It estimates queue lengths based on volume-to-capacity ratios, and is an improvement over the regional model. However, it is an old model whose description includes "over 30 years of practical real-life application." As computers have become faster and more powerful, macroscopic models like FREQ12 have generally been supplanted by microsimulation models. Microsimulation models account for bottlenecks and queues accurately – showing smooth flow in the bottleneck and queues upstream. Microsimulation likely would give more accurate queue estimates than the macroscopic FREQ12 model. However, there is a larger problem than the difference between models. The modeled queues with either type of model would be higher if induced travel were properly accounted for. The DEIR/DEIS failed to do this so its analyses of "queues" are invalid.

The discussion of bottlenecks in the DEIR/DEIS identifies some indirect traffic impacts, i.e. roadway sections that would be bottlenecks in the Build alternative that are not bottlenecks in the No Build alternative.

> … a new queue [actually a new bottleneck] would appear between Miller Creek and Nave Drive (south of the project limits) in the southbound direction during the A.M. peak period with the implementation of either the Fixed HOV Lane Alternative of the Reversible HOV Lane Alternative. However, this queue would not develop under the NO Build alternative (p. 3.1-71)

This certainly underestimates the severity of the new bottleneck because induced traffic is underestimated. Large amounts of money are commonly spent to improve bottlenecks with little increase in traffic speeds. Here is an example from the Chicago region:

> **Hillside Strangler: $140 Million To What End?**
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> The "Hillside Strangler"—the point at which the East-West Tollway and the Tri-State Tollway converge with the Eisenhower Expressway—was long a notorious traffic bottleneck. After a $140 million construction project to "fix" the problem, the Daily Herald posed this question: "Many millions have been spent to change that evil Hillside Strangler. So, has it been rehabilitated?" This was the answer:
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> 1. Getting through the Strangler is now about 15 minutes faster.
> 2. But the bottleneck has merely been pushed further up the road to a point where the Eisenhower funnels into three lanes.
> 3. And more motorists are now using the expressway since the Strangler work was completed.
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> The net effect? The Daily Herald concluded: "Overall, then, 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." (*More Costly Roadwork, and Travel Still Tough*, Daily Herald, October 3, 2002)[6]

Without accounting for induced travel, the DEIR/DEIS greatly overestimates any traffic benefits from the proposed project.

Regional Context

Expanding roadway capacity encourages land use decentralization as described by Boarnet and Haughwout:

> New highways that link the outlying residential areas to the CBD lower the cost of commuting into the employment concentration in the center of the city. This increases land values in the suburban fringe while reducing the "accessibility premium" that central locations had previously enjoyed. The urban area will grow geographically as commuters can live farther from work without increasing their travel budgets. Densities will fall as the premium for the densely developed locations near the CBD is reduced.[7] (p. 4)

Traffic metering points like the existing Marin-Sonoma Narrows area act as a brake on land decentralization (a.k.a. "sprawl) and support better jobs/housing balances. Less sprawl and better jobs housing balances are planning goals in the Bay Area. Expanding roadway capacity as in this proposed project is contrary to these goals, and would undermine other planning initiatives aimed at increasing transit ridership and preserving open space. Land use decentralization causes a wide range of environmental problems

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[6] Chicago Metropolis 2020: The Metropolis Plan: Choices for the Chicago Region, p. 10. Chicago, IL: 2003.

[7] , Marlon and Andrew Houghwout. *Do Highways Matter? Evidence and Policy Implications of Highways Influence on Metropolitan Development*, p. 4. The Brookings Institution Center on Urban and Metropolitan Policy, 2000.

including more water use, more impervious surface, runoff and water pollution, conflicts with agriculture, and habitat fragmentation.

The DEIR/DEIS fails to consider this broader regional planning context and a broader range of alternatives. Rail transit with medium- to high-density mixed walkable land use at stations can serve as a powerful force for shaping future growth towards a desired land use vision. Increasing roadway capacity would reduce potential rail ridership, thereby reducing the potential benefits of rail transit on shaping future land use. It should be noted, though, that high capacity rail transit can result in some of the same negative forces (although to a lesser extent) if the service is focused on serving suburban households with large park-and-ride lots at stations.

Resume

NORMAN L. MARSHALL, PRINCIPAL

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EDUCATION:

Master of Science in Engineering Sciences, Dartmouth College, Hanover, NH, 1982
Bachelor of Science in Mathematics, Worcester Polytechnic Institute, Worcester, MA, 1977

PROFESSIONAL EXPERIENCE:

Norm Marshall helped found Smart Mobility, Inc. in 2001. Prior to this, he was at Resource Systems Group, Inc. for 14 years where he developed a national practice in travel demand modeling. He specializes in analyzing the relationships between the built environment and travel behavior, and doing planning that coordinates multi-modal transportation with land use and community needs.

Regional Land Use/Transportation Scenario Planning

Chicago Metropolis Plan and Chicago Metropolis Freight Plan (6-county region)— developed alternative transportation scenarios, made enhancements in the regional travel demand model, and used the enhanced model to evaluate alternative scenarios including development of alternative regional transit concepts. Developed multi-class assignment model and used it to analyze freight alternatives including congestion pricing and other peak shifting strategies. Chicago Metropolis 2020 was awarded the Daniel Burnham Award for regional planning in 2004 by the American Planning Association, based in part on this work.

Envision Central Texas Vision (5-countyregion)—implemented many enhancements in regional model including multiple time periods, feedback from congestion to trip distribution and mode choice, new life style trip production rates, auto availability model sensitive to urban design variables, non-motorized trip model sensitive to urban design variables, and mode choice model sensitive to urban design variables and with higher values of time (more accurate for “choice” riders). Analyzed set land use/transportation scenarios including developing transit concepts to match the different land use scenarios.

Mid-Ohio Regional Planning Commission Regional Growth Strategy (7-county Columbus region)—developed alternative future land use scenarios and calculated performance measures for use in a large public regional visioning project.

Baltimore Vision 2030—working with the Baltimore Metropolitan Council and the Baltimore Regional Partnership, increased regional travel demand model’s sensitivity to land use and transportation infrastructure. Enhanced model was used to test alternative land use and transportation scenarios including different levels of public transit.

Burlington (Vermont) Transportation Plan – led team that developed Transportation Plan focused on supporting increased population and employment without increases in traffic by focusing investments and policies on transit, walking, biking and Transportation Demand Management.

Transit Planning

Regional Transportation Authority (Chicago) and Chicago Metropolis 2020 – evaluating alternative 2020 and 2030 system-wide transit scenarios including deterioration and enhance/expand under alternative land use and energy pricing assumptions in support of initiatives for increased public funding.

Capital Metropolitan Transportation Authority (Austin, TX) Transit Vision – analyzed the regional effects of implementing the transit vision in concert with an aggressive transit-oriented development plan developed by Calthorpe Associates. Transit vision includes commuter rail and BRT.

Bus Rapid Transit for Northern Virginia HOT Lanes (Breakthrough Technologies, Inc and Environmental Defense.) – analyzed alternative Bus Rapid Transit (BRT) strategies for proposed privately-developing High Occupancy Toll lanes on I-95 and I-495 (Capital Beltway) including different service alternatives (point-to-point services, trunk lines intersecting connecting routes at in-line stations, and hybrid).

Central Ohio Transportation Authority (Columbus) – analyzed the regional effects of implementing a rail vision plan on transit-oriented development potential and possible regional benefits that would result.

Essex (VT) Commuter Rail Environmental Assessment (Vermont Agency of Transportation and Chittenden County Metropolitan Planning Organization)—estimated transit ridership for commuter rail and enhanced bus scenarios, as well as traffic volumes.

Georgia Intercity Rail Plan (Georgia DOT)—developed statewide travel demand model for the Georgia Department of Transportation including auto, air, bus and rail modes. Work included estimating travel demand and mode split models, and building the Departments ARC/INFO database for a model running with a GIS user interface.

Roadway Corridor Planning

Working with the Capital District Transportation Committee (the Albany regions Metropolitan Planning Organization) and the New York State Department of Transportation to analyze future needs and operations of the I-90 crossing over the Hudson River, including effects on other roadways.

Developing Regional Transportation Model

Pease Area Transportation and Air Quality Planning (New Hampshire DOT)—developed an integrated land use allocation, transportation, and air quality model for a three-county New Hampshire and Maine seacoast region that covers two New Hampshire MPOs, the Seacoast MPO and the Salem-Plaistow MPO.

Chittenden County, Vermont (Chittenden County Metropolitan Planning Organization)—developed a land use allocation model and a set of performance measures for Chittenden County (Burlington) for use in metropolitan planning.

Research

Obesity and the Built Environment (National Institutes of Health and Robert Wood Johnston Foundation) – Working with the Dartmouth Medical School to study the influence of local land use on middle school students in Vermont and New Hampshire, with a focus on physical activity and obesity.

The Future of Transportation Modeling (New Jersey DOT)—Member of Advisory Board on project for State of New Jersey researching trends and directions, and making recommendations for future practice.

Trip Generation Characteristics of Multi-Use Development (Florida DOT)—estimated internal vehicle trips, internal pedestrian trips, and trip-making characteristics of residents at large multi-use developments in Fort Lauderdale, Florida.

Improved Transportation Models for the Future—assisted Sandia National Laboratories in developing a prototype model of the future linking ARC/INFO to the EMME/2 Albuquerque model and adding a land use allocation model and auto ownership model including alternative vehicle types.

Critiques

C-470 (Denver region) – Reviewed express toll lane proposal for Douglas County, Colorado and prepared reports on operations, safety, finances, and alternatives.

Intercounty Connector (Maryland) – Reviewed proposed toll road and modeled alternatives with different combinations of roadway capacity, transit capacity (both on and off Intercounty Connector) and pricing.

Foothills South Toll Road (Orange County, CA) – Reviewed modeling of proposed toll road.

I-93 Widening (New Hampshire) – Reviewed Environment Impact Statement and modeling, with a particular focus on induced travel and secondary impacts, and also a detailed look at transit potential in the corridor.

Stillwater Bridge – Participated in 4-person expert panel assembled by Minnesota DOT to review modeling of proposed replacement bridge in Stillwater, with special attention to land use, induced travel, pricing, and transit use.

PUBLICATIONS AND PRESENTATIONS (partial list)

Understanding the Transportation Models and Asking the Right Questions. Lead presenter on national Webinar put on by the Surface Policy Planning Partnership (STTP) and the Center for Neighborhood Technologies (CNT) with partial funding by the Federal Transit Administration, 2007.

Sketch Transit Modeling Based on 2000 Census Data with Brian Grady. Presented at the Annual Meeting of the Transportation Research Board, Washington DC, January 2006, and *Transportation Research Record*, No. 1986, "Transit Management, Maintenance, Technology and Planning", p. 182-189, 2006.

Travel Demand Modeling for Regional Visioning and Scenario Analysis with Brian Grady. Presented at the Annual Meeting of the Transportation Research Board, Washington DC, January 2005, and *Transportation Research Record*, No. 1921, "Travel Demand 2005", p. 55-63, 2006.

Chicago Metropolis 2020: the Business Community Develops an Integrated Land Use/Transportation Plan with Brian Grady, Frank Beal and John Fregonese, presented at the Transportation Research Board's Conference on Planning Applications, Baton Rouge LA, April 2003.

Evidence of Induced Travel with Bill Cowart, presented in association with the Ninth Session of the Commission on Sustainable Development, United Nations, New York City, April 2001.

Induced Demand at the Metropolitan Level – Regulatory Disputes in Conformity Determinations and Environmental Impact Statement Approvals, Transportation Research Forum, Annapolis MD, November 2000.

Evidence of Induced Demand in the Texas Transportation Institute's Urban Roadway Congestion Study Data Set, Transportation Research Board Annual Meeting, Washington DC: January 2000.

Subarea Modeling with a Regional Model and CORSIM with K. Kaliski, presented at Seventh National Transportation Research Board Conference on the Application of Transportation Planning Methods, Boston MA, May 1999.

New Distribution and Mode Choice Models for Chicago with K. Ballard, Transportation Research Board Annual Meeting, Washington DC: January 1998.

Land Use Allocation Modeling in Uni-Centric and Multi-Centric Regions with S. Lawe, Transportation Research Board Annual Meeting, Washington DC: January 1996.

MEMBERSHIPS/AFFILIATIONS

Member, Institute of Transportation Engineers
Individual Affiliate, Transportation Research Board
Member, American Planning Association
Member, Congress for the New Urbanism