Napa's Transportation Future:
A New Approach to Transportation and Land Use Planning

Prepared by Joseph Story and Eliot Hurwitz

Abstract

Napa County is a popular tourist destination, and experiences growth being on the outer edge of the larger San Francisco Bay metropolitan area. Each government there has strong land use controls in place to protect its suburban or agricultural character. Most growth is concentrated near the southern edge of the County.

The Napa County Transportation and Planning Agency (NCTPA) developed a new strategic long-range plan, called "Napa's Transportation Future", with extensive public outreach. The plan sets targets for higher mode shares of non-single occupancy vehicle mode shares, and lower vehicle miles traveled per capita. This plan contains 12 "supply" strategies and 9 "demand" strategies, with many of these innovative strategies are intended to promote more pedestrian and bicycle use for local trips, improved transit attractiveness, more strategic land use design, and limited roadway improvements.

NCTPA chose a 16-county travel forecasting model used by the agency to determine if proposed strategies would meet its ambitious targets. This model was developed primarily to simulate the larger peak hour, commuter travel flows that operate within Napa County as well as adjacent regions.

In the analysis, alternative approaches to analyzing the strategies were created, such as the use of trip-based versus link-base VMT. The plan also stressed the need for better micro-scale land use decisions and community programs to achieve pedestrian/bicycle mode shift for short-distance non-work trips. Ultimately, the model demonstrated that proposed strategies would not achieve the original targets, mostly because of the continued its slow-growth, lower-density character and the effects of assuming most development at its southern edge.

Setting

Napa County, California is a county of approximately 130,000 people on the northern edge of San Francisco Bay. The county is best known as a popular wine-growing area, with scenic vineyards in Napa Valley; this area contains most of the population of the County. The increased business activity associated with tourists and the wine industry has led to increased employment opportunities in the county. Similarly, the increased desirability to live in the Napa Valley combined with the high value of all land has resulted in an increased cost and a limited supply of housing there, particularly affordable housing.

The emphasis on the physical beauty and valuable vineyard land in the Napa Valley has also led to increasing conflicts between traffic from increased tourist and vineyard activity and the desire to keep from expanding the roadway system out of concerns for the environment.

Prior efforts to develop long-range plans for Napa County resulted in a project-focused plan. The outcomes of these plans were usually specific transportation projects, with estimated costs, priorities, and proposed funding methods. The plans did not usually present other mobility strategies. Because many of these projects were controversial, subsequent attempts to general local tax revenue (such as a sales tax) were not successful in with the electorate.

The New Approach: *Napa's Transportation Future*

With these challenges in mind, the County has developed a new approach to creating its transportation system. This new approach, entitled *Napa's Transportation Future*, was a two-year effort that approached the challenge of transportation system differently. The new plan focused around a central vision – *"For Napa County in 2035 we envision an attractive, flexible, fully integrated transportation system, with a broad range of options and modes, enabling individuals and goods to move throughout the county in an efficient manner."*

Much of the plan relates the transportation to the local, daily activity of Napa County residents. This includes the journey to and from work, as well as how residents shop, attend school, and run errands. In addition, the way that tourists travel in the County is also discussed.

The plan contains two general categories of strategies: supply strategies and demand strategies. Supply strategies address the traditional challenges of supplying basic transportation infrastructure to the community. These include:

- Maintain critical street and road infrastructure
- Invest in strategic road system expansion in South County
- Convert high frequency intersections into roundabout configuration
- Build bicycle paths and sidewalks
- Create satellite park-and-ride sites
- Promote bypass-road and transit strategies to address pass-through traffic
- Increase transit (bus) service
- Actively explore creating a passenger rail system
- Explore development of a bus rapid transit system
- Promote energy efficient and environmentally benign transit systems
- Utilize new technology for real-time bus tracking, traffic signal synchronization, "Dial 511" transportation information
- Plan for other modes: Maintain water transportation, promote freight rail in South County, and support a full integration of air transportation connections

Demand strategies take a complementary approach and attempt to reduce need for transportation services. In particular, these are strategies to reduce the demand for single occupancy vehicle travel. The demand strategies include:

- Promote workforce housing production near jobs
- Promote urban design and infrastructure development policies to encourage bicycle and pedestrian activity
- Promote safe non-auto routes to school, and after-school programs
- Promote well-located health and social service delivery to minimize travel
- Institute comprehensive growth management guidelines that cover all jurisdictions
- Work with the wine and hospitality industries to create and promote car-free tourism
- Address the special transportation needs of a growing senior population
- Work with employers to encourage alternatives for commuting and mid-day work trips
- Consider parking pricing strategies

Evaluation Methods and Tools

To test alternatives, seven scenarios were developed to illustrate the roles and relationship of the proposed plan. They were:

Scenario One: Baseline Trends. This scenario demonstrates what is anticipated to happen if a strategy is not adopted, and trends continue as projected.

Scenario Two: Adopt Strategies Without Land Use Changes. This scenario demonstrates what would happen if the strategic plan is implemented without land use pattern changes.

Scenario Three: Adopt Strategies with Land Use Changes. This scenario demonstrates what would happen if the full package of strategies is implemented with housing shifted to be closer to jobs.

Scenario Four: Slower Growth – Shift Job Growth to Solano County. This scenario demonstrates what is anticipated to happen with no employment growth beyond that already underway in Napa County, with the same increment of Napa's projected employment growth transferred to Solano County.

Scenario Five: Adjust Jobs/Housing Projections for Solano and Sonoma Counties. This scenario looks at potential mitigation of congestion that is projected as a result of future increase in commute traffic between Solano and Sonoma counties.

Scenario Six: Auto Operating Costs Increase. This scenario demonstrates what would happen if automobile operating costs increase significantly to the point where behavioral changes occur. This has been tested on the base of Scenario 3 – Strategy Adoption with land use changes.

Scenario Seven: "What It Would Take". This scenario was designed to show what could be achieved if all conditions are assumed in the strategies. This scenario demonstrates one way to imagine the scope of changes that might be required to reach our goals by aggressively pursuing the full range of strategies.

Results of the Evaluation

There are a number of potential benefits that the new approach offers. Part of this testing involved performance measures that could be generate from a travel demand model. The area has a multi-modal travel demand forecasting model that was available for the analysis.

Beyond typical traffic congestion measures, there were several area-wide measures examined -- primarily vehicle miles of travel (VMT), vehicle hours of travel (VHT), average speeds (VMT/VHT), total trips, and average distance and time per trip (VMT/trip and VHT/trip). These measures are needed to show the relationships between trip making, trip length and congestion.

The travel demand model provided an estimate the vehicle miles of travel reduction and mode shares (% of trips by auto, transit, bicycle, walking). It also provided information on congestion, mode share, VMT and VHT. Still, the results of all strategies could not be fully reflected in the model and there were other transportation quality measures, such as changing pavement conditions or accident rates. Limitations included trip starting times as a fixed attribute in the model. The model was not able to show greenhouse gas emission results because many of this benefit should include technological which the travel model does not directly consider. For this reason, the benefits identified for the plan included both travel model and non-travel model examples, depending on the benefit measure involved.

The measure of VMT and VHT posed a particular challenge in that many measures were designed to affect local land uses rather than through traffic, of which the County has. The result was that the VMT and VHT measures were developed as area-wide measures (using the peak hour trip tables) rather than link-based calculations. In this way, the measures were able to be directly compared to the VMT and VHT per trip, which was the best available way to represent per capita VMT and VHT changes.

Forecasts of Scenario Seven: "Whatever it Takes"

This scenario demonstrated the model forecasts if the strategies in the plan are pursued aggressively, and if an additional parking charge is levied for commuting to further add disincentives to driving. In this scenario, all local bus routes were assumed to operate every 10 minutes. The bicycle attractiveness was increased to what is reflected in Davis, California today. The pedestrian accessibility was increased by 5 times what it is considered today. The parking costs are assumed to be $1.50 per hour for workers. This assumption builds upon Scenario 3.

The overall findings shown in **Table 1** were that the peak hour vehicle miles of travel and vehicle hours travel by Napa residents between Napa County and other counties would increase, and would fall about 4 to 6 percent for both the AM and PM time periods, for the rest of the trips with at least one end within Napa County. Also, the model showed a slight increase in the average distance (vehicle miles per trip and vehicle hours per trip) at peak hours. The number of peak vehicle trips rises, resulting in higher VMT and VHT per vehicle trip. This occurred because the bulk of these strategies were designed to shift persons from driving for intra-community trips, so that the remaining vehicle trips on the system were those that are traveling to other communities and counties, effectively raising the VMT and VHT per vehicle trip.

Table 1
Vehicle Miles and Vehicle Hours of Travel Comparison – Strategy with Whatever It Takes (High Frequency Transit, Easier Walk, Bicycle Cultural Change and Local Parking Cost) Scenario to Baseline Scenario

	AM Peak Hour					
Trip Ends by Scenario	**VMT**	**VHT**	**VMT/VHT**	**Trips**	**VMT/ Trip**	**VHT/ Trip**
Baseline Scenario						
Only Beginning in County	170,630	9,100	18.7	3,733	45.7	2.44
Only Ending in County	69,079	4,747	14.6	2,383	29.0	1.99
Beginning+Ending in County	170,661	7,950	21.5	38,745	4.4	0.21
Total	**410,370**	**21,797**	**18.8**	**44,861**	**9.1**	**0.49**
Whatever It Takes Scenario						
Only Beginning in County	165,719	8,883	18.7	3,684	45.0	2.41
Only Ending in County	68,927	4,689	14.7	2,375	29.0	1.97
Beginning+Ending in County	158,277	6,854	23.1	34,409	4.6	0.20
Total	**392,924**	**20,426**	**19.2**	**40,467**	**9.7**	**0.50**
Percent Difference						
Only Beginning in County	-3%	-2%	-1%	-1%	-2%	-1%
Only Ending in County	0%	-1%	1%	0%	0%	-1%
Beginning+Ending in County	-7%	-14%	8%	-11%	4%	-3%
Total	**-4%**	**-6%**	**2%**	**-10%**	**6%**	**4%**
	PM Peak Hour					
Scenario	**VMT**	**VHT**	**VMT/VHT**	**Trips**	**VMT/ Trip**	**VHT/ Trip**
Baseline Scenario						
Only Beginning in County	77,393	5,154	15.0	2,970	26.1	1.74
Only Ending in County	153,496	9,541	16.1	3,529	43.5	2.70
Beginning+Ending in County	154,262	6,186	24.9	34136	4.5	0.18
Total	**385,152**	**20,881**	**18.4**	**40,636**	**9.5**	**0.51**
Whatever It Takes Scenario						
Only Beginning in County	76,766	5,042	15.2	2,951	26	1.71
Only Ending in County	151,323	9,405	16.1	3,469	43.6	2.71
Beginning+Ending in County	140,202	5,220	26.9	29,027	4.8	0.18
Total	**368,291**	**19,667**	**18.7**	**35,447**	**10.4**	**0.55**
Percent Difference						
Only Beginning in County	-1%	-2%	1%	-1%	0%	-2%
Only Ending in County	-1%	-1%	0%	-2%	0%	0%
Beginning+Ending in County	-9%	-16%	8%	-15%	7%	-1%
Total	**-4%**	**-6%**	**2%**	**-13%**	**10%**	**8%**

Source: Napa's Transportation Future

Table 2 illustrates more significantly how a great investment in strategies resulted in lower mode shares for driving. The bulk of this advantage is shown for trips within Napa County, as these would be these intra-community trips. The estimated combined mode share between transit, bicycle and walk would rise from 7 percent (in the baseline scenario) to 27 percent. The aggregate effect was dampened somewhat by persons traveling to and from other counties, as that mode share would grow from less than 1 to almost 2 percent.

Table 2
Mode Share Comparison – Strategy with Whatever It Takes (High Frequency Transit, Easier Walk, Bicycle Cultural Change and Local Parking Cost) Scenario to Baseline Scenario

	Internal Napa Trips		Trips Entering and Leaving Napa County	
Scenario	**Trips by Mode**	**Percent of Total Trips**	**Trips by Mode**	**Percent of Total Trips**
Baseline Scenario				
Persons in Single Occupant Vehicles	67,797	71.5%	63,181	83.6%
Persons in Vehicles of 2 people	14,194	15.0%	8,164	10.8%
Persons in Vehicles of 3 or more people	5,632	5.9%	3,713	4.9%
Persons in Transit, Walking or Bicycling	7,162	7.6%	562	0.7%
Totals	**94,785**		**75,620**	
Whatever It Takes Scenario				
Persons in Single Occupant Vehicles	54,065	57.1%	62,610	82.8%
Persons in Vehicles of 2 people	10,576	11.2%	7,997	10.6%
Persons in Vehicles of 3 or more people	4,228	4.5%	3,650	4.8%
Persons in Transit, Walking or Bicycling	25,895	27.3%	1,404	1.9%
Totals	**94,764**		**75,660**	
Difference				
Persons in Single Occupant Vehicles	-13,732	-14.5%	-572	-0.8%
Persons in Vehicles of 2 people	-3,618	-3.8%	-167	-0.2%
Persons in Vehicles of 3 or more people	-1,404	-1.5%	-63	-0.1%
Persons in Transit, Walking or Bicycling	18,733	19.8%	842	1.1%
Totals	**-21**		**40**	

Source: Napa's Transportation Future

Lessons Learned

The travel modeling testing in this process has resulted in a increased awareness of how information from models can be used, and what kinds of core model design limitations limit the flexibility of the models with a different approach to long-range planning. These lessons include the following:

1. The overall design of items such as trip distribution friction factors is not effectively sensitive to encourage walking or bicycling for short-distance trips, particularly school and shopping trips.

2. Assuming "smart growth" land use changes may result in a VMT or VHT increase, particularly if the land uses are shifted from less congested to more congested areas; location and land use mix are important factors in achieving incremental changes in a typical travel model.

3. Calculating link-based VMT and VHT and comparing them to trips is a problem; regional through trips can easily be attracted into the subarea network that would take up any additional roadway capacity that may be created from local VMT and VHT reduction.

4. The measures of a successful transportation system should not be primarily focused on relieving congestion, but need to register the non-congestion benefits of a more effective transportation system developed in the community such as community health, accessibility and safety.

Author Information

Joseph Story, AICP, is a Principal with DKS Associates in Oakland. He was the project manager for the consultant effort in developing *Napa's Transportation Futures*, including leading travel forecasting studies and co-authoring the document. He has 26 years of experience in transportation planning including travel demand forecasting, corridor studies, transit planning and long-range transportation planning. He has a Master of City and Regional Planning from the Ohio State University.

Eliot Hurwitz is the Transportation and Land Use Program Manager for the Napa County Transportation and Planning Agency and has been with the agency for seven years. He was the project manager for the agency effort in developing *Napa's Transportation Futures* including providing key stakeholder outreach and community relations, and co-authoring the document. He has a Bachelor's degree in Anthropology from Harvard University.