

WHY WIDENING HIGHWAY 1 WON'T WORK

Summary

This paper provides information leading us to these conclusions:

- Adding lanes to Highway 1 (even HOV or “commuter” lanes) is highly unlikely to relieve traffic congestion, and is therefore not a solution to our traffic problem.
- Traffic congestion *can* be reduced through a variety of non-widening strategies, many of which are less costly, can be accomplished much more quickly than highway widening, and will provide long term solutions.
- Highway widening is highly likely to contribute to significant environmental degradation, especially through increased air, noise and visual pollution.

Widening Highway 1 will do little to relieve traffic congestion.

In Santa Cruz County, peak-hour traffic currently fills segments of Highway 1 to capacity. The segment between Morrissey Boulevard and Soquel Drive (a one-mile segment) has been especially annoying, reaching capacity over a longer time period than any other part of the route, with over 8000 vehicles per peak-hour on the four lanes of the road—over 4000 in each direction. While it may seem intuitively obvious to the average motorist that adding a lane will allow traffic to flow more freely, it is a short term solution at best. Historical data for traffic flow on this section of the route shows that it first reached peak-hour capacity in 1986—sixteen years ago. Since then the demand has increased, with the result that some motorists travel on parallel routes (*e.g.*, Soquel Avenue/Drive), others travel at earlier or later times (“peak-spreading”), others ride the bus, others just join the slow queue, and still others avoid the route entirely.

Approximately 15 percent of those currently traveling on this segment are HOVs (high-occupancy vehicles) with two or more occupants per vehicle; the remainder are SOVs (single-occupant vehicles) carrying only the driver. This fact becomes relevant when we consider whether an added HOV lane might work better than an added mixed-flow lane—see below.

However, our Regional Transportation Commission, having decided to award top priority to Highway 1 widening for available funds, has allocated \$22 million to widen the segment between Morrissey Boulevard and Soquel Drive (the “Auxiliary Lanes Project”).

Caltrans is currently scheduled to begin work on that segment in December, 2010.

Induced traffic must be taken into account, but so far it has not been.



Congestion

Induced traffic is an important fact—perhaps *the most important fact*—in transportation planning. It is defined as any increase in vehicle miles traveled (VMT), in either the short or long run, that results from an infrastructure change such as increase in road capacity.¹ If a mixed-flow lane were added, it would soon fill up, owing to the existing pent-up demand. Some who now carpool would choose to travel alone, some who now travel on parallel routes would travel on the freeway instead, some who now

travel earlier or later would revert to traveling at a more convenient time, some who ride the bus will choose to drive a car, and some who do not travel the route at all will be induced to travel on the newly freed-up road.

Not all of these behavioral effects will contribute to increases in VMT (*i.e.*, can be classified as induced traffic), but all *will* contribute to peak-hour traffic congestion on Highway 1.

The phenomenon of induced traffic has been well documented by recent studies.²

The potential for induced traffic is almost never considered by those who make future traffic projections. In particular, projections made for future traffic demand on Highway 1 do not account for induced traffic.³ General experience in nearby communities (Highway 85 in Santa Clara County, for example, was jammed within a year after it opened in 1994) shows that freeways built to relieve congestion rapidly fill to capacity.

“Build it and they will come” is the phrase often used to describe the situation. Former Bogotá (Colombia) Mayor Enrique Peñalosa recently used other words: **“International experience has made it clear that trying to solve traffic problems by building bigger roads is like trying to put out a fire with gasoline”**.⁴

¹ See R. B. Noland, *Relationships Between Highway Capacity and Induced Vehicle Travel*, Transportation Research Part A **35**, 47 (2001). Noland’s paper provides an excellent introduction to the subject of induced traffic, as well as providing extensive detailed analysis showing that it exists, and should be taken into account.

See also Todd Litman, *Generated Traffic and Induced Travel—Implications for Transport Planning*, Victoria Transport Policy Institute, June 8, 2011. This paper is available at <http://www.vtpi.org/gentraf.pdf>.

² A summary and other references may be found at <http://transact.org/Ca/congestion.htm>. See also <http://sierraclub.org/sprawl/transportation/seven.asp>.

³ As noted during the presentation to the Santa Cruz County Regional Transportation Commission on April 18, 2002, and again on May 2, 2002, by Wilbur Smith Associates, the Caltrans traffic projections for 2020, which were made using the “AMBAG” model, do not account for induced traffic.

⁴ The full text of Peñalosa’s address, recorded April 8, 2002, may be found at <http://socrates.berkeley.edu:7001/Events/spring2002/04-08-penalosa/index.html>.

Even an added HOV lane is not likely to work well to relieve congestion.

HOV (“commuter”, or “diamond”) lanes have been constructed recently in many locations in the Bay Area, and in southern California. Recent studies⁵ demonstrate that for an added HOV lane to be successful, there must be a sufficient number of HOVs already traveling on the route. For the addition of an HOV third lane in either direction to a road with two existing mixed-flow lanes, the fraction of existing HOVs must be on the order of 30 percent of the vehicles. Even at peak hours, the current fraction of HOVs is about half of this, as noted above. Therefore in our situation, an added HOV lane is not likely to perform better than an added mixed-flow lane, and as noted above, the addition of a mixed-flow lane is not likely to relieve congestion for more than a year. Furthermore, the addition of *any* lane is likely to result in a *reduction* of HOVs, since drivers will tend to shift from the less-convenient car-pooling mode to the more convenient drive-alone mode.

Moreover, for an HOV lane to function effectively, *there must be congestion in the mixed-flow lanes*; otherwise drivers will choose to drive alone in the mixed-flow lanes.

Adding HOV lanes is not likely to result in improved bus service.

Intuitively one might believe that the addition of HOV lanes will enable better bus service within the Highway 1 corridor. However, this is not likely to occur. First, bus traffic on Highway 1 is low, with only a fraction of the Highway 17 Express buses traveling between the Soquel Avenue intersection and the fishhook—an insufficient number to warrant the existence of an HOV lane. Second, and perhaps more significantly, studies have shown how reductions in transit service can occur because of increases in road supply.⁶ This effect, known as the Downs-Thomson paradox, results when an increase in road capacity makes traveling by auto preferable to transit alternatives. The transit agency then either raises fares or reduces service, resulting in a further decrease in transit usage and perhaps even worse congestion than before the capacity expansion.⁷

⁵ See J. W. Dahlgren, *The Prospects for High Occupancy Toll (HOT) Lanes: Where Should They be Implemented?*, Final Report for MOU 361, Institute of Transportation Studies, Berkeley (2001). Dahlgren models the relative behavior of HOT, HOV, and mixed-flow lanes, noting that “Adding an HOV lane is a good choice only if the initial proportion of HOVs and the initial maximum delay are very high”.

⁶ See R. B. Noland, *Simulated Relationships Between Highway Capacity, Transit Ridership, and Service Frequency*, *Journal of Public Transportation* **3**, 1 (2000).

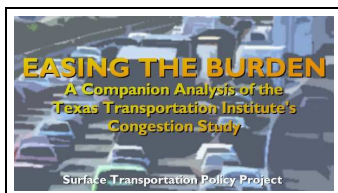
⁷ See R. Arnott and K. Small, *The economics of traffic congestion*, *American Scientist* **82**, 446 (1994).

Widening Highway 1 will not reduce traffic on local streets.

Widening proponents assert that widening Highway 1 will reduce traffic on local parallel streets such as Soquel Drive and Freedom Boulevard. However, both studies and experience demonstrate that road widening reduces local traffic for only a short time, after which local traffic builds up to at least its former level. Hansen and Huang⁸ find results that “suggest that increasing [highway capacity] does not reduce traffic on other roads to any great extent, and may even cause it to increase. The latter possibility is not so implausible as it may seem, since local roads and streets serve as complements as well as substitutes to state highways. A large majority of trips involving state highways begin and end on non-state facilities. It appears that this complementary relationship compensates for, or even outweighs, the substitution effect stemming from traffic diversion.”

Widening Highway 1 will divert funds from projects that would work more effectively to relieve congestion.

The widening of Highway 1 from the fishhook to beyond Morrissey Boulevard (La Fonda Avenue)—a two-and-a-half mile project known as the “Merge Lanes Project” now completed—cost over \$50 million. Widening Highway 1 between Morrissey Boulevard and San Andreas Road, including providing space for a full eight-lane width in some locations, is currently estimated to cost over *half a billion dollars*. An Environmental Impact Report for this project has been under preparation for the past several years, and has cost to date approximately \$12 million, has yet to be released. Even this widening is not likely to relieve congestion for more than a few years. *After the road reaches capacity, then what?*



There are much more cost-effective ways to relieve traffic congestion. Many are “demand-reduction” strategies, designed to keep the freeway traffic below the road capacity so it flows smoothly. As described in a report by the Surface Transportation Policy Project,⁹ *providing a choice of transportation modes is the key to reducing traffic congestion.*

Transportation choices that need to be provided are:

- **Provide needed funding for buses:** The Santa Cruz Metropolitan Transit District operates the most heavily used bus system in the United States for communities our size, but is under-funded. It is currently planning service cuts and increases in fares, owing to serious recent decreases in state funding.
- **Make use of the 32-mile rail corridor—the Santa Cruz Branch Line:** The rail corridor acquisition was approved earlier this year by the State Transportation Commission, and the final step—the close of escrow—is expected to occur prior to

⁸ Mark Hansen and Yuanlin Huang, *Road Supply and Traffic in California Urban Areas*, Transportation Research Part A **31**, 205 (1997).

⁹ See <http://transact.org/Reports/tti2001/default.htm>

September 1, 2011. The corridor will then be owned by Santa Cruz County via our Regional Transportation Commission.¹⁰

Acquisition of the rail corridor will provide the opportunity to construct a bicycle and pedestrian path adjacent to the tracks (sufficient space exists for almost its entire 32-mile length), and to plan for future passenger use on the line. However the needed funding for such improvements has yet to be programmed.

The City of Santa Cruz, in its *Master Transportation Study*¹¹ completed in 2003, provides initial analyses¹² of transit modes that could use the rail corridor, including Bus Rapid Transit, rail cars, and a path adjacent to the tracks for bicyclists and pedestrians.

Current plans for the rail corridor envision a recreational train, operated by Sierra Northern Railway¹³, the new freight operator on this rail line, along with occasional freight trains. In the near term, a rail trail adjacent to the tracks is in the early planning stages, as part of the *Monterey Bay Scenic Sanctuary Trail Network* linking Santa Cruz with Monterey, but for which the needed funding is yet to be programmed.

- **Provide funding for programs that decrease car trips:** Opportunities exist for large employers such as UCSC, Cabrillo College, city and county governments and others to reduce trips by their employees by *as much as 20 percent if meaningful incentives are offered*. Furthermore such measures can be put in place *immediately*, without having to wait for (and be inconvenienced by) lengthy planning and construction periods.

Locally, Texas Instruments paid employees not to drive to work in the year 2000. That program reduced single-passenger vehicle trips by TI employees by 16,000 for the year 2000. Participants earned from one to three dollars per day for carpooling, bicycling or walking. In Southern California solo drivers were reduced by 17 percent at eight firms studied by Shoup.¹⁴ These programs provided the cash equivalent of a parking space to commuters who did not use a parking space. In Australia, David Engwicht doubled the number of children who walked instead of being driven to school through a system of walking activities and adult escorts. These cost-effective programs greatly reduced traffic congestion around schools, and provided increased health benefits.

The above-described programs demonstrate that we can provide increased mobility for far less money than the more than \$500 million estimate for widening a mere

¹⁰ See <http://sccrtc.org/> for news updates regarding the rail corridor.

¹¹ See <http://www.cityofsantacruz.com/index.aspx?page=113>

¹² See Chapter VI, Section 2 at <http://www.cityofsantacruz.com/Modules/ShowDocument.aspx?documentid=2996>

¹³ See <http://en.wikipedia.org/wiki/SierraNorthernRailway>

¹⁴ See D. Shoup, *Evaluating the Effects of Cashing Out Employer-paid Parking: Eight Case Studies*, Transport Policy, 4, No. 4, 201 (1997).

seven-mile segment of Highway 1.

- **Encourage programs that facilitate flextime and telecommuting employment modes:** Many employees commute to work to spend much of their time at a computer terminal—work that might be more effectively accomplished from an at-home location.
- **Ramp metering:** In neighboring Santa Clara County, ramp metering has been demonstrated to reduce time delays by up to a factor of two. Such cost-effective solutions need to be seriously considered here.

The widening of Highway 1 is causing major environmental impacts.

Among them are:

- **Noise:** The largest noise source in Santa Cruz County is the roar of the freeway. This noise will greatly increase if the highway is widened. Sound walls will reduce the noise for some, but will increase the noise for others, especially those above (and on) the freeway. Arrol Gellner, in an April 24 article in the San Francisco Chronicle, writes that “at least one study has shown that sound walls are marginally effective at best, and that they may actually increase freeway noise in homes some distance away.”¹⁵
- **Air pollution:** Currently motor vehicles constitute the largest source of air pollutants in the county. Widening Highway 1 simply results in more traffic, with major increases in air pollutants.

A recent study found that “children living near heavily traveled street or highways are at significantly greater risk of developing cancer, including childhood leukemia.”¹⁶ This study “showed that homes adjacent to street corridors carrying 20,000 or more vehicles per day had roughly a six-fold increase in risk for children contracting cancer, including childhood leukemia.” (Highway 1 carries over 100,000 vehicles per day.)

What is particularly noteworthy is that the environmental analysis of “Phase 1” (the “Merge Lanes Project” of the Highway 1 widening project (from the fishhook to the La Fonda over-crossing), now completed, took no account of any health related studies, including the above-mentioned one.

- **Aesthetics:** Many trees (the number has yet to be revealed) and much vegetation will be removed. The tree corridor along Highway 1 is a dominant feature of Santa Cruz’s beauty and must be protected.

Sound walls are unsightly; their presence has the effect of transforming the freeway into a concrete channel. The “Phase 1” project that would widen Highway 1 between

¹⁵ See <http://www.sfgate.com/cgi-bin/article.cgi?file=/chronicle/archive/2002/04/24/H0239831.DTL>

¹⁶ R. L. Pearson, H. Wachtel and K. Ebi, *Distance-Weighted Traffic Density in Proximity to a Home is a Risk Factor for Leukemia and Other Childhood Cancers*, Journal of the Air & Waste Management Association **50**, 175 (2000).

See also <http://www.colorado.edu/PublicRelations/NewsReleases/2000/534.html>

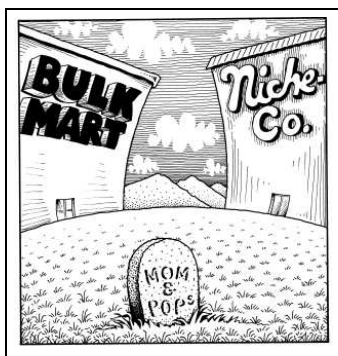
the “fishhook” and La Fonda Avenue proposes to erect sound walls along the entire two-and-a-half mile length of this segment.

Gellner¹⁰ notes that sound walls continue to be built, with the result that “here, in the most beautiful state in the nation, vast stretches of once-panoramic roadway are pointlessly hemmed in on both sides by monstrous barriers, whose complete visual boredom is only feebly relieved by the occasional use of colored or patterned block.”

He concludes his piece: “Should the public support sound wall building programs that, while surely enriching concrete block manufacturers, provide only marginal benefits for a handful of landowners, and at the same time blight freeways used by millions of commuters?”

- **Impact on wildlife:** Any road is a barrier to the movement of wildlife. Hundreds of animals are currently killed by moving vehicles every year in Santa Cruz County, and this number will be increased if a road is widened. Furthermore, the construction of roads is bound to decrease wildlife habitat. Highway 1 crosses several riparian corridors, and little care has been taken to preserve those corridors.

Widening Highway 1 will encourage sprawl.



What do we want in Santa Cruz County? Do we really want land development on our farm land and open space? Do we want large housing developments? A widened freeway would make it easier for Wal-Marts, Home Depots, Targets and sprawling housing development, all of which increase our dependency on the private automobile. Furthermore, local retailers and businesses would suffer from the incursion of big-box stores.

Widening Highway 1 will cause additional pressure for further road expansion.

The more we expand our roads, the more pressure there is to keep expanding them. There are always “bottlenecks” in any road system. A current bottleneck that has become annoyingly evident in recent years is the two-lane, nine-mile segment of Highway 1 in the agricultural area just south of the Santa Cruz County line. The California Coastal Act mandates that Highway 1 be a two-lane road in rural and scenic areas. Expanding Highway 1 to six lanes in Santa Cruz County will increase pressure to widen this nine-mile stretch as well, and political pressure will surely build to remove the Coastal Act restriction for this segment.

Mission Street in Santa Cruz will also be impacted from the increase in traffic, and traffic on Highway 1 north of Santa Cruz will be similarly impacted.

Additional references

1. Paul Hawken, Amory Lovins and L. Hunter Lovins, *Natural Capitalism*, October, 2000. Chapter 2, which may be downloaded as a pdf file from <http://natcap.org/sitepages/pid20.php>, contains relevant material, particularly in the latter part of the chapter.

2. Many references may be found at <http://sierraclub.org/sprawl/transportation/>.

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