

# FREQUENTLY ASKED QUESTIONS ABOUT HOV LANES

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## HOV LANE RATIONALE

### **How are HOV Lanes Supposed to Work?**

HOV lanes are supposed to provide a timesaving incentive for people to form more carpools, thus removing cars from the road, which should reduce overall congestion, travel-time, emissions and fuel consumption.

### **That Sounds Reasonable.**

As far as it goes, yes. But that's only half the truth, the good-news half. HOV lanes cause a tiny amount of additional carpooling, but at the cost of a significant loss of capacity. This loss is due to the underutilization that is essential to insure that the lane is free flowing. The overall result is usually adverse to person carrying capacity, pollution, and energy consumption.

### **Isn't HOV Lane Effectiveness Obvious?**

Not at all. There are pluses and minuses. Only the pluses are obvious. But the minuses, degradation of the performance of the other lanes and the loss of capacity due to underutilization of the HOV lane are not as obvious, but are usually more significant. The HOV lane is effective if and only if the pluses are bigger than the minuses. The question of net overall effectiveness is well beyond anyone's intuitive ability. HOV lane effectiveness is obvious only at an overly simplistic level.

### **Are you opposed to carpooling?**

Not at all. Carpooling, removing some cars from the road, does help traffic, *all other things being equal*; but there's the rub. HOV lanes aren't carpools. HOV Lanes cause an almost immeasurably small amount of carpooling, but everything considered, usually more congestion, emissions, and fuel consumption.

### **Shouldn't we be trying to remove cars from the road?**

A more fundamental objective would be to improve congestion. HOV lanes always remove some cars from the road. But this is more often than not, at the

cost of significant *increase* of congestion and pollution, the very opposite of what they are supposed to accomplish.

Typically, on the SR-55 for example, about 800 cars per day are found to be removed from the road due to HOV lane motivated carpools. But the loss of capacity due to the lane underutilization is about 11,000 cars per day. So the net effect is a capacity loss of about 10,000 cars per day, or about 12000 persons per day, That's about half the potential lane capacity whether measured in vehicles or persons and leads to more emissions and more fuel consumption. . .

### **But shouldn't we be trying to move people, not cars?**

Yes. However, person capacity depends on the product of *two* factors:

(Average Vehicle Occupancy) times (Vehicle Capacity).

HOV Lanes cause a small increase in AVO and usually a larger decrease in vehicle capacity. The overall effect is commonly equivalent to the loss of about half the potential lane capacity.

### **We have to provide a Carpooling Incentive**

Why?. At what cost?

Carpooling is *sometimes* a means to improving person carrying capacity. But HOV lanes cause very little carpooling. Usually not nearly enough to make up for the loss of capacity due to the lane underutilization that's necessary to keep the lane free-flowing. HOV lanes increase carpooling by a tiny amount. But at the same time they decrease overall person carrying capacity of the freeway. That means increased overall congestion and emissions. So you have to decide which is the more basic goal: increase carpooling and increase overall travel delay and emissions, or increase person carrying capacity, and reduce congestion and emissions.

## **ARGUMENTS PRO HOV LANES**

### **Measurements show that HOV lanes move more people than one of the other lanes.**

Of course. This is almost always true even if there is no new carpooling, just because we have shuffled most of the low occupancy vehicles out of the lane and most of the high occupancy vehicles into the lane. But the implication or inference that the *freeway as a whole* is thus better off is a serious logical error.

Because of the HOV operation, the outside lane is carrying *more* persons in *less* cars and *less* congestion — as is always stated. But at the same time, each of the other lanes is carrying *fewer* people in *more* cars and *more* congestion —

which is never stated. Normally more persons and cars are adversely affected than are benefited by the lane

Comprehensive studies show that usually, overall person carrying capacity is reduced, and congestion, lost-time, emissions, accidents and fuel consumption increased by the HOV operation.

### **Occupancy of the freeway as a whole has increased since opening the lane.**

Of course. Population has grown and the relatively empty lane attracts pre-existing (“ambient”) HOVs from not only the adjacent lanes but, over a period of time, from the parallel arterials and freeways as well.

### **Traffic seems always to improve when they add an HOV lane.**

Of course. Adding a lane always helps, even adding an HOV lane. . But operating that lane unrestricted (mixed-flow) would usually afford even more improvement. Since the 1976 Santa Monica diamond lane debacle, Caltrans policy has been never to *take* a mixed flow lane for HOV but invariably to *bundle* the building of a new lane with the choice to operate it HOV. This is done for no other reason than to prevent a direct comparison of the operational alternatives; to hide from the public the fact of how much better the lane might operate as mixed-flow.

### **Measurements have shown that 60% of new carpools on the freeway were formed after the lane was opened.**

Of course. That happens on any freeway after about two years. The implication that those people are carpooling *because* of the lane is fore the most part, wrong and misleading. It’s simply a result of the natural dissolution and reformation rate of new carpools, whether or not there is an HOV lane.

## **ARGUMENTS CON HOV LANES**

### **Surely they must have been shown to work?**

No, they haven’t. There has never been a study here or nationally, that has shown an HOV lane does as much or more good than a regular unrestricted lane in terms of overall freeway congestion or environmental benefits. On the other hand, there have been a number of complete, competent studies, including by the Orange County Transportation Authority (OCTA), and the Southern California Association of Governments (SCAG) that show they don’t work nearly as well regular unrestricted lanes. (see “Best Evidence...” at <<http://hov-lane.org>>)

## **What are the Factors Involved in a Competent HOV Lane Effectiveness Study?**

It's a fairly complex problem. You have to take into account:

1. The diversion of HOV and LOV (Low Occupancy Vehicle) traffic volume among the lanes of the freeway and parallel arterials depending on the amount of carpooling..
2. The congestion and traffic speeds resulting from that computed volume in each lane
3. The speeds and time saving for HOV lane occupants resulting from those volumes.
4. The amount of carpooling that would be motivated by those time savings.
5. All the above in a complex network of interdependent freeway and road lanes.

This is a problem well beyond anyone's ability to solve intuitively.

Anyone that thinks the result as to HOV effectiveness is obvious or provable with simplistic observations like "more people in the lane" simply doesn't understand the problem.

## **Are there any sound studies that show HOV inferior to MF operation?**

Yes. I know of just eight comprehensive analyses that have used complete computer traffic models of the *overall* net effects, taking into account the best state-of-understanding of all the above factors. Every one of these actual case studies have shown that HOVL operation is actually counterproductive to all the claimed congestion, mobility, air-quality, and fuel consumption goals. On the average an HOV lane is found to provide about 1/3 the benefit in terms of congestion, environment and energy benefits. Details are at <<http://hov-lane.org>> click "Best Evidence...".

## **There seems to be disagreement between analysts as to whether they work or not. How can we tell for sure?**

There is a relatively simple experiment. Select a 10 mile or so segment of HOV freeway, e.g. the SR-55 northbound, for a test and conversion of HOV to mixed flow or vice-versa. Publicize the test transition date and prepare appropriate signage. Carefully instrument and measure traffic volumes and speeds on each freeway lane and alternative arterials within two miles to both sides for two weeks before the test. Convert the freeway from HOV to unrestricted or vice-versa. Measure traffic volumes and speeds for two weeks afterward. Determine increase or decrease of average volume and speed. Infer increase or decrease in overall travel-time (congestion), emissions, and fuel consumption using standard VMT and speed methodology of California Air Resources Board (CARB).

## **Since this experiment takes place over a short time, it may not properly include the effect of carpool motivation which occurs over a longer time.**

Good comment, and right. But

1) that effect is almost insignificantly small typically 5 to 10% as compared to the traffic diversion effects which take place almost immediately. Benefit carpooling occurring as a result of the HOV lane is a second order effect as compared to the traffic diversion effects, and,

2) the actual magnitude of ultimate carpooling can be estimated and compensated quite well in the analysis, by well known and accepted discrete choice models of carpooling as a function of travel time saving

## **Haven't such experiments been done in California?**

Not recently nor in a valid scientific experimental environment with adequate before and after traffic measurement and data analysis. The closest thing has been the Santa Monica Diamond lane experiment in 1976, and the Marin –Richardson Bay bridge closure. In both cases an existing unrestricted lane was converted to mixed-flow or vice-versa. In both cases the comparison was obviously and dramatically in favor of unrestricted mixed-flow operation. The Santa Monica experiment led to huge public outrage, lawsuit, and court decision reverting to unrestricted mixed-flow operation. HOV lane construction was set back 10 years or more.

## **Why didn't we learn from this experience?**

In time, the public forgot this experience, but Caltrans never did. Ironically, the lesson Caltrans and transportation planners took from it was not the superiority of mixed flow operation, but never to “take an existing lane” in order

to establish an HOV lane. Since that time, HOV lanes in California have been established only by *bundling* the HOV operation with the building of a *new lane* in order that the public never again have an opportunity to observe a direct A-B effectiveness comparison. Of course adding *any* new lane does some good, even if it's only 1/3 to 1/2 as effective as a regular lane would have been. Then the proponents inevitably point to this modest improvement and attribute it to the *HOV* rather than to the *new* lane. The public is thus never given a chance to observe that two or three times as much improvement might have been realized if the lane had been operated as a regular unrestricted lane.

### **But don't the laws favor or mandate HOV construction?**

Yes, Existing legislation governing new highway construction mostly assumes that HOV operation will produce greater mobility and environmental benefits. But the weight of solid evidence is to the contrary. This legislative presumption should be reversed and all new highway construction operated as unrestricted mixed-flow, unless it can be shown competently that HOV would produce greater mobility and environmental benefits in any particular case.

### **What do you really think of HOV lanes?**

1. As H. L. Menken said: "For every complex problem there is a simple solution — and it is usually wrong."
2. In my opinion, HOV lanes are the perhaps the biggest mass delusion since the emperor's new clothes.