

The Sight Distance Issues with Retrofitted Single-Lane HOV Facilities

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ABSTRACT

It is well-known that obstruction inside a highway horizontal curve will lead to impaired sight distance. Highway alignment design standards in terms of the minimum horizontal curve radius are specified to allow for adequate stopping sight distance at given design speeds. For a single-lane HOV facility, inside curve obstruction may occur no matter when the facility curves to the left (per travel direction) or right. A unique situation that calls for special attention is that the adjacent mixed-flow lane traffic, once queued, may become sight obstruction. Calculations indicated that such obstruction may govern the minimum curve radius design as long as the left shoulder is not less than 0.92 m, when the HOV lane is contiguous to the mixed-flow lanes. Such governance may necessitate design speed reduction, horizontal and cross-section design adjustment, or both.

1. INTRODUCTION

A High Occupancy Vehicle (HOV) lane is a dedicated facility for high occupancy vehicles. A HOV lane moves more people with fewer vehicles by requiring the minimum passenger occupancy level. For example, a typical occupancy requirement is two or more persons per vehicle. HOV lanes are well recognized as an effective congestion mitigation strategy. As of 2008, HOV facilities are operating in more than 34 metropolitan areas in North America [1].

Installation of a HOV lane can be accomplished through ‘take-a-lane’ or ‘add-a-lane’ strategies. ‘Take-a-lane’ means to designate one of the existing mixed-flow lanes for HOV purpose only; while ‘add-a-lane’ means to widen the existing facility and increase one additional lane for high occupancy vehicles. Certainly ‘take-a-lane’ would be easier to implement, but it may also lead to public complaints due to the reduced capacity in the remaining mixed-flow lanes. ‘Add-a-lane’ strategy is therefore preferred in practice.

Due to the possible financial, environmental, and right-of-way constraints, HOV lanes are typically retrofitted along the median of existing freeway facilities as single-lane facilities. On the left side (per travel direction), a single-lane HOV facility is installed right next to the median barrier with or without standard shoulder width. On the right side, the single-lane facility may be physically separated from the adjacent mixed-flow lanes either by a concrete barrier, or by a buffer area demarcated by pavement markings as shown in Figure 1. The buffer area may be as wide as a full lane, or as narrow as zero, so that the HOV lane becomes contiguous with the mixed flow lanes as shown in Figure 2. A physically separated HOV facility allows for access (in and out of the facility) only at designated access points; while a contiguous HOV facility allows for access at any point along the facility.



Figure 1. Buffer-Separated HOV lanes with tall median barrier.

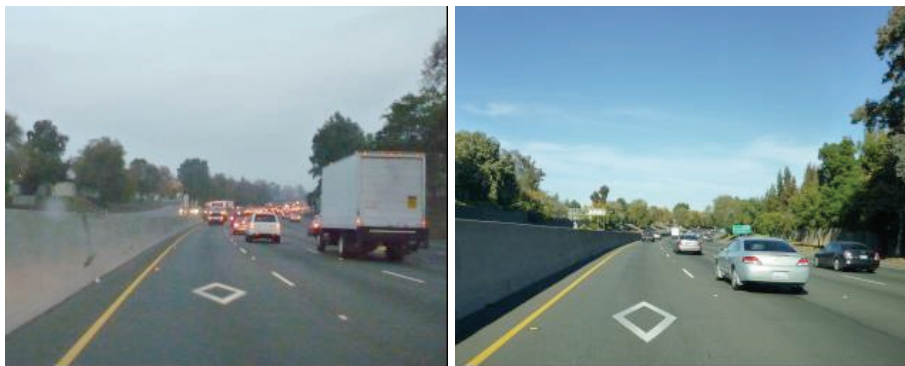


Figure 2. A HOV lane contiguous with mixed-flow lanes.

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