

Narrow overpasses and bridges likewise present some imposing barriers which have a high accident frequency. We, in Texas, have long believed that all structures should be wide enough to accommodate the full width of approach roadway and shoulders. A crown width bridge does, of course, cost more than does a restricted width structure; however, considering the length of time the structure will be in service, it is an exercise in false economy to permit the initial cost to dictate design. Traffic safety and operation are enhanced by the wider roadway. The driver is more comfortable on a wide structure. In the event of an emergency stop, the wide structure can accommodate the parked vehicle without obstructing a traffic lane. Studies have indicated that emergency stops along a conventional facility occur each 10,000 to 12,000 vehicle miles which means approximately eighty million stops per year on the Nation's highways. If we are willing to spend millions of dollars to construct parking shoulders on the highways in between bridges, why should we shrink at spending a little more to extend this refuge area across our structures?

When guardrail is required on the approaches to a structure, it should be continuous across the structure, anchored securely to the bridge and at the end of the rail. The bridge should not have any curbs if there are none on the approaches. In particular, construction of a so called "Safety Walkway" should be avoided. While on the subject, I might offer the observation that altogether too much curbing has been used in the past along our highways. As a general rule, curbs should be used only where required for drainage and, in such cases, should be easily mounted by traffic. An acceptable curb would be a laydown type with a suggested rise of three inches in a width of twelve to eighteen inches. Any higher curb can throw a vehicle out of control or impart a dynamic action that tends to project the vehicle onto or over a protective rail.

Bridge parapets and rails should be designed so as to provide unimpeded sight distances to side roads or ramps beyond the structure. On many of our existing facilities, we have discovered that traffic on an exit ramp or frontage road, stopped at the intersection, cannot see a through vehicle on the crossroad structure until they pull out into the intersection. As a result, a number of collisions, several involving fatalities, have resulted. These existing situations can only be corrected by altering the traffic patterns or, at great expense, modifying the design.

DRAINAGE STRUCTURES

Our highway cross sections are replete with death traps for the unwary or errant driver. Among the most common are our installations for handling surface or cross drainage. Openings in medians and outer separations, between culverts, are prevalent in all areas of the Nation. If the culvert is continuous, any number of drop inlet designs with raised covers are encountered. Such hazards can be rather easily eliminated by extension of the culverts and installation of flush inlets. Admittedly, a flush inlet is a maintenance headache since it is susceptible to being plugged by loose brush, debris or even a newspaper; however, a raised inlet or an open ditch is an even greater headache to anyone unfortunate enough to run into it. The only exception to the use of flush inlets would be where they are located thirty feet or more away from the edge of pavement.

Curb inlets also present a hazard to drivers if they are located adjacent to the travel way. As a general rule, the use of curb inlets should be avoided; however, where they are absolutely necessary, they should be located on the back side of the curb.

The ends of culverts, headwalls and headwall curbs, etc., should be located well beyond the shoulder edge and behind protective guardrail rather than adjacent to or projecting into the roadway. Again, the guardrail should be of sufficient length, with anchored ends, in order to enable it to develop full ribbon strength if it is struck by a vehicle. Too often, a short length of rail, usually 12' 6" is installed at culverts. These short rails cannot contain a vehicle. Thus the only purpose they serve is to delineate the hazard; however, they are a hazard in themselves.

TREES

For the past several years we and the highway industry have been maligned both publicly and privately for our lack of appreciation of nature's beauty. We have been accused of willfully and unfeelingly wreaking havoc on areas of natural beauty by construction of highways which disfigure the landscape.

Unfortunately, there have been cases where overzealous engineers have disregarded the amenities; however, I do not agree that this is the case rather than