ASSESSMENT OF HYDROPLANING CRASH CONDITIONS IN FLORIDA'S HIGHWAYS

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Abstract: Vehicle hydroplaning occurs due to water pressure build-up under a moving vehicle tire resulting in an uplift force sufficient to separate the tire from the pavement. The consequent loss of drag force and steering ability can cause the vehicle to lose control. During high intensity rainfall events, a significantly thick water film can build up on roads depending on the highway geometry and pavement surface types thereby increasing the risk of hydroplaning. In addition, travel speed is found to be a significant attribute of the hydroplaning phenomenon even with the expected reduction of speeds due to the decreased visibility and the drivers' perception of reduced traction. Furthermore, multi-lane facilities produce longer drainage paths for rain water increasing the probability of occurrence of this safety hazard when additional lanes are constructed to cater to the present and future traffic demand. Therefore, it is important to evaluate the significance of the above factors that contribute to hydroplaning particularly in managing multilane pavement facilities.

It is known from previous analysis that the incipient hydroplaning speed depends on the Water Film Thickness (WFT), pavement surface material (i.e. Open Graded Friction Course (OGFC), Dense Graded Asphalt Concrete (DGAC), or Portland Cement Concrete (PCC)), tire pressure, tire depth and several other secondary factors. In this study the specific effects of the water film thickness, different pavement types and the travel speed on Florida's hydroplaning crashes during the past seven (7) years were investigated using a number of databases maintained in the Florida Department of Transportation.

Although a relatively higher number of hydroplaning crashes have occurred on the OGFC compared to other pavement surface types, an extended analysis shows that the hydroplaning potential with respect to the *crash rate* can be reduced significantly with OGFC surfaces up to a speed of 65 mph. However, it is seen that the paving material did not have any bearing on the crash rate for high speed related crashes. It was also revealed that in two lane facilities, hydroplaning crashes are primarily based solely on the paving material while in multilane facilities it depends on the paving material and the travel speed.

Key words: Hydroplaning, WFT, OGFC, DGFC, PCC