

Wasson, Jason S. M.S.C.E., Purdue University, August 1998. Platoon Accommodation at Isolated Intersections. Major Professor: Darcy Bullock, P.E.

The use of microprocessor-based traffic signal controllers introduced in the 1960s have allowed for the development of many new strategies to make traffic signal systems more responsive to traffic conditions. Many efforts have focused on the development of real-time, adaptive control strategies. While some of these strategies have been shown to improve intersection performance, there are several factors that have limited their deployment. Some of these include substantial capital cost, complicated calibration procedures, and the reluctance of practicing engineers to deploy strategies radically different from those currently in use. Therefore, lower cost strategies that are compatible with existing infrastructure continue to be explored. This research effort is considered to be in this category. Isolated signalized intersections, which are operated by actuated type controllers, often do not allocate green time in an optimal manner when compared to the temporal distribution of arriving traffic. Current detection schemes are typically used to provide localized detection near the intersection. Current actuated controllers do not have the ability to distinguish between one call or several calls and therefore assign equal weight to both cases when making decisions regarding green time allocation. At isolated intersections, which do not have coordinated timing plans for allowing progression of platoons, timing decisions are based on the binary status of localized detectors. Therefore, when platoons are forced to stop to allow the passage of a few vehicles from a minor phase, excessive stops and delays are created at the intersection. The proposed strategy uses a detection device located several thousand feet

upstream from the intersection from which information is processed to identify platoons. When these platoons are detected, the controller is manipulated using low-priority preemption to allow for the platoon to progress through the intersection unimpeded. This research presents a study in which the platoon accommodation strategy was shown to reduce both the percent stops and delay for vehicles in the platoon without significantly impacting any of the minor approaches. This system is designed to be a retrofit to existing control equipment. This approach appears quite promising, however, further research is needed to examine the sensitivities of the various parameters used to configure the system.