

AN ABSTRACT OF A THESIS

IMPROVED TRAFFIC SIGNAL EFFICIENCY IN RURAL AREAS THROUGH THE USE OF VARIABLE MAXIMUM GREEN TIME

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Queuing caused by exceeding capacity is one of the major problems for any signalized intersection. Variable Maximum Green Time (VMGT) feature which is available in several actuated controllers may be one of the solutions to the problem of queuing at intersections. The VMGT feature of several modern controllers can increase or decrease the maximum green time for any actuated phase by a step-size within specified upper and lower limits according to the fluctuating demand. Previously, it was difficult to evaluate such features in the field. Recent developments have made it possible to evaluate modern features like VMGT in a risk free environment using Software-in-the-Loop Simulation (SILS). SILS is a method of simulation in which traffic signal controller software is connected to traffic simulation software.

This study focuses on evaluating a generic set of VMGT parameters using SILS consisting of an Econolite ASC/3 controller and VISSIM microscopic traffic simulation model. This evaluation was done for three fully actuated isolated intersections: NC 11 and NC 5, Pinehurst, North Carolina; Dixie at 9th, Cookeville, Tennessee, Willow at Jackson, Cookeville, Tennessee by comparing different signal timing plans. For Site 1 and Site 2, the VMGT feature of the controller was compared with two different timing plans: 1. normal maximum green settings or the default settings, 2. optimized maximum green whereas for Site 3, VMGT was compared with existing timing plan in addition to the default and optimized timing plans. To check the robustness of the method each green setting was run for ten trials with ten different random numbers for each Site. The results indicated that the generic set of VMGT parameters could improve the traffic signal efficiency for both low and high volume isolated intersections.