



## Overview of CLRS Evaluations on STH 142 in Kenosha County, Wisconsin

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### Introduction

CLRS were installed on a nearly eight mile two-lane section of Wisconsin State Trunk Highway (STH) 142, from 1,400 ft west of I-94 to STH 75 in Kenosha County in late June of 2005. Two different CLRS patterns were installed:

- CLRS directly on the centerline (i.e., the “alternative” pattern - also referred to as “rumble stripe”) were installed in a 2,800 ft section of the project from 224<sup>th</sup> Ave. to 216<sup>th</sup> Ave. (see Figure 1a) and
- CLRS straddling the centerline (i.e., the “standard” WisDOT pattern - similar to Mn/DOT’s current pattern) were installed on the remaining 38,400 ft of the project (see Figure 1b).



a. Alternative Pattern (2800 ft installed)



b. Standard Pattern (38,400 ft installed)

Figure 1. CLRS Patterns Installed on STH 142.

### Tasks

Researchers from the Traffic Operations and Safety Lab at the University of Wisconsin-Madison performed two separate evaluations of the CLRS installations:

- Analyze before-and-after speed data to determine the effect of CLRS on vehicular speeds

- Survey road users, residents, and business owners to determine issues and opinions associated with the CLRS installation.

### **Before-and-After Speed Evaluation**

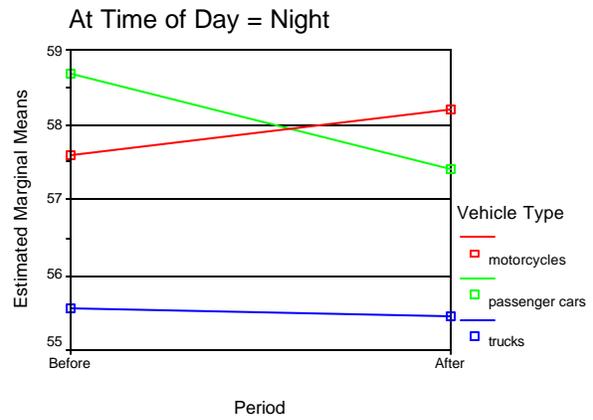
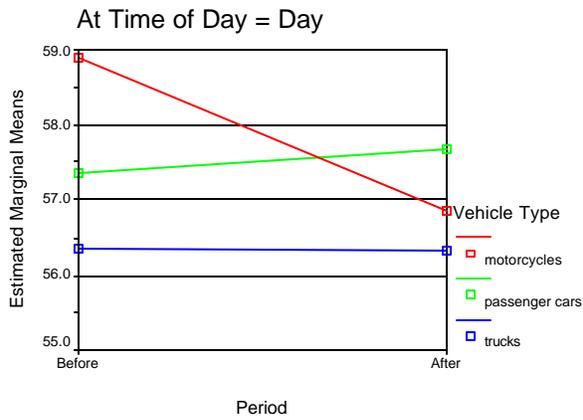
Vehicular speeds were measured both before and three months after the installation of CLRS. An analysis was performed to determine if the CLRS had an effect on speeds for various vehicle types (motorcycles vs. passenger cars vs. heavy trucks), times of day (day vs. night), horizontal alignments (tangent vs. curve), and CLRS patterns (standard treatment vs. alternative treatment). Figure 2 presents a summary of the significant changes in the before-and-after mean speeds determined from the speed data analysis.

Figures 2a-c shows that, for the most part, the CLRS appeared to have a different effect on different types of vehicles. The CLRS seemed to have the greatest effect on motorcycles. For example, based on the marginal means plots, the mean speed of motorcycles during daylight hours was approximately 2 mph lower after the CLRS installation. Similarly, when only tangent alignment was considered, 2 mph mean speed reductions occurred for both motorcycles and heavy trucks. Motorcycles also had a 2 mph reduction in mean speed after the CLRS were installed for the section with the alternative (on centerline) CLRS pattern. Passenger cars were only affected by the CLRS at night as marginal mean speeds were about 1.3 mph lower at night after the CLRS were installed.

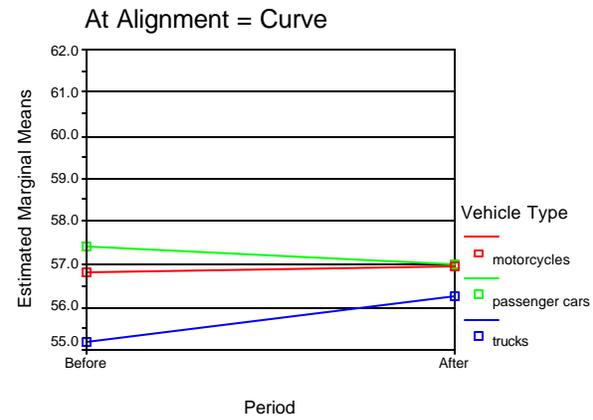
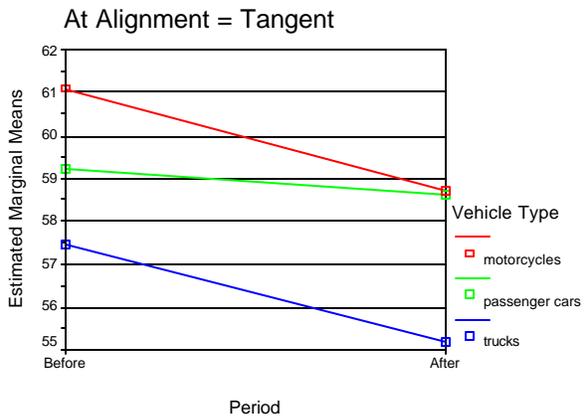
### **Survey Results**

The researchers obtained numerous survey responses from residents/business owners, general roadway users, and special users (i.e., motorcyclists, fire/rescue drivers, police officers) in mid-September 2005 pertaining to the use of CLRS on STH 142. Nearly all of the roadway users experienced no physical problems with the CLRS when driving over them (i.e., discomfort, handling problems, overcorrection, instrument problems). One motorcyclist did complain of discomfort and another driver commented on the CLRS effect being quite strong. Many found the rumble effect to be similar to that of shoulder rumble strips, but weaker than in-lane rumble strips. With the exception of motorcyclists, commercial truck drivers, and some residents, nearly all roadway users that were interviewed had a favorable opinion of CLRS. The researchers identified three primary relevant issues that interviewees had with the CLRS:

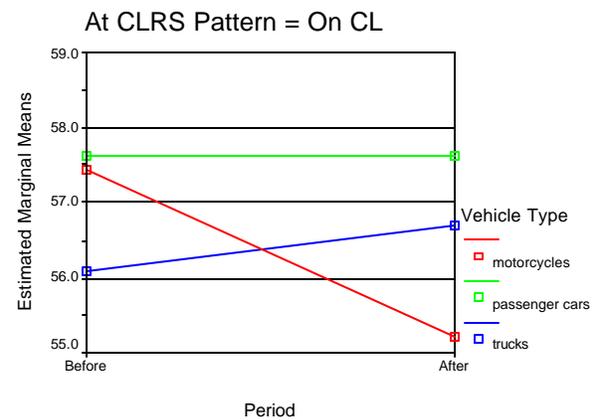
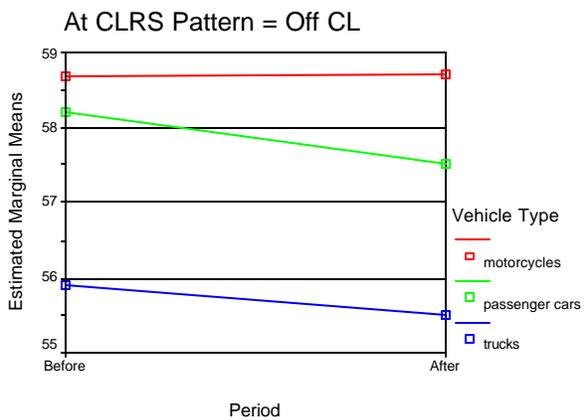
- They generate noise that is audible from nearly every residence/business along the CLRS sections of STH 142, although the nuisance-level of this noise is debatable;
- They may create discomfort/handling problems for motorcyclists; and
- They may present winter maintenance issues (i.e., holding water/ice, durability, etc.), although it will not be possible to verify winter issues until winter.



**a.) Speeds vs. Period\* Vehicle Type\*Time of Day**



**b.) Speeds vs. Period\* Vehicle Type\*Alignment**



**c.) Speeds vs. Period\* Vehicle Type\*CLRS Pattern**

**Figure 2. Statistically Significant Three-way Interactions with Data Collection Period**

## **Conclusions**

The CLRS did not have a consistent significant impact on vehicular speeds except for those of motorcycles, who experienced approximately 2.0 mph reductions in speeds under most conditions. Furthermore, nearly all of the roadway users experienced no physical problems with the CLRS when driving over them (i.e., discomfort, handling problems, overcorrection, instrument problems), although noise was an issue for some residents. Although not enough time has passed to accurately verify the safety effects of the CLRS, based on the information currently available (including the before/after speed analysis and the driver surveys), the researchers currently see no substantial safety issues that have manifested in the first three months since the CLRS were installed at STH 142. As a result, the researchers believe that CLRS are a viable safety countermeasure for use elsewhere in Wisconsin.

## **Remaining CLRS Evaluations**

Remaining evaluations at STH 142 include:

- The effect of CLRS on vehicular lateral placement and
- Short and long-term changes in crashes due to the CLRS.

Installation at other sites in Wisconsin may be necessary to determine CLRS effectiveness.