

TECHNICAL STANDARDS BRANCH

MATERIALS & TECHNICAL SERVICES

ABTR/MM/RR-99/04

STUDY to EVALUATE the PERFORMANCE of FLUORESCENT
RETROREFLECTIVE SHEETING (yellow green) for
CHEVRONS.

Materials & Technical Services

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Abstract Scotchlite Fluorescent Diamond Grade Sheeting (yellow green) (FYG) is a registered trade name for retro reflective sign sheeting product developed by 3M Canada Ltd. In 1998, FYG chevron signs were used at the Fort Macleod Interchange Southbound curve in the Southern Region. Daytime and nighttime viewing evaluations were conducted on site to assess the effectiveness of improving safety at this vehicle rollover prone curve. It has become evident that with the use of these chevron signs at this location that they are highly visible, easy to read and help improve motorist manoeuvring through this curve. (FYG signs should be considered for locations where early detection is required to heighten the travelling public's awareness of an unfamiliar or non-typical condition).			
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Fluorescent Retroreflective Sheeting (Yellow Green) for Chevrons to reduce Vehicle Rollovers

1.0 INTRODUCTION

The southbound to eastbound lane curve at the Highway 2/3 interchange, near Fort Macleod, was reported to have had several vehicle rollovers during the first 48 months of service. At the time of the rollovers there were only 4 chevron signs (with high intensity retroreflective sheeting material) fastened to the existing light standards along the curve. There are several speed reduction signs approaching the curve at the interchange including an oversize speed reduction sign with flashing lights. In May 1998, it was proposed to replace the existing chevron signs with chevron signs incorporating fluorescent yellow green (FYG) retroreflective sheeting.

2.0 OBJECTIVES

The objective of this project is to determine the effectiveness and monitor the performance of the FYG retroreflective sheeting in reducing vehicle speeds when approaching and travelling through this curve.

The primary objective supports the department's mandate to provide enhanced safety for the travelling public in areas prone to collisions.

3.0 BACKGROUND

Highway traffic safety is a priority for Alberta Transportation and Utilities. The southbound to eastbound lane curve at this interchange has had 7 vehicle rollovers, 3 were during nighttime and 4 during daytime.

The existing 4 chevron signs do not appear to be providing an effective means of traffic control for the travelling public.

The FYG retroreflective sheeting with its enhanced low light conspicuity and nighttime retroreflectivity is expected to provide more positive guidance for the travelling public.

4.0 PROJECT LOCATION

In July of 1998, 15 new FYG retroreflective sheeting chevron signs were installed along the southbound to eastbound lane curve at the Highway 2 and 3 Fort Macleod Interchange. The sheeting material used on these chevron signs is 3M Diamond Grade Fluorescent LDP (Long Distance Performance) Reflective Sheeting (yellow green), a registered trade name for 3M's high brightness retroreflective prismatic lens sheeting.

The fluorescent pigment and prismatic structure provides exceptional performance in low light and nighttime conditions. The unique fluorescent colour also provides a high level of contrast in daylight to make the travelling public more aware of a need to reduce speed.

5.0 EVALUATION SITE DESCRIPTION

The Fort Macleod Interchange evaluation site is located at the junction of Highways 2 and 3. The test site is on the southbound to eastbound lane curve approaching the interchange. Safety is a major concern on this curve due to the curve radius and length.

6.0 RESULTS

The site was first evaluated on July 27, 1998, shortly after 15 new chevron signs were installed along the curve. The weather was 25°C with sunny skies. Traffic was heavy with many recreation vehicles, which is normal for this time of year. The evaluation from this visit is as follows:

- There appears to be a greater awareness of the need to reduce speed when approaching this curve with the presence of the FYG retroreflective sheeting chevron signs.
- These signs provide earlier first detection of the curve.
- When comparing the effectiveness of the standard chevron signs (which are still in place attached to light poles) to that of the new signs, it was evident that the FYG signs are a dramatic improvement for daytime viewing.

A second evaluation was conducted on February 11, 1999, the weather was -5°C with overcast skies. The evaluation of this visit is as follows:

Day Time

- The FYG retroreflective sheeting chevron signs are detected much earlier by approaching traffic. Their unique appearance and early detection heightens the motorist's awareness and prepares the motorist for a response and reaction to the conditions ahead.

Night Time

- Nighttime retroreflectivity is superior to standard chevron signs in the area. The highly retroreflective sheeting used on these chevron signs is visible from a further distance. The travelling public is drawn to the brightness and unique colour of these signs, which again heightens awareness and reaction to the conditions ahead.

The regional staff has also evaluated this site and found the signs to provide improved performance characteristics. They have also received favourable comments from the travelling public regarding the new signs.

7.0 COST

The increase in cost is estimated to be 30% per sign over the standard High Intensity sheeting.

8.0 DISCUSSION OF RESULTS

The FYG retroreflective sheeting is being used in several communities in Ontario to enhance their visibility at school and pedestrian crossings. Results have shown that the signs have improved motorist recognition of these signs, especially at twilight and in overcast conditions. They provide greater visibility by day as well as high performance nighttime retroreflectivity.

The candlepower of the different sheeting material types is:

High Intensity (HI)
170 (yellow)

Fluorescent
700 (yellow green)

9.0 CONCLUSIONS AND RECOMMENDATIONS

Since the installation of the FYG retroreflective sheeting chevron signs (9months) there has been one vehicle run-off at the Fort Macleod interchange (southbound to eastbound lane) location. The reason for the run-off was determined to be driver error (the driver fell asleep at the wheel) and not a result of excessive speed.

Prior to installing the FYG signs the southbound to eastbound lane curve has had 7 vehicle rollovers, (3 at night and 4 during daylight hours) in the first 48 months of service.

There is a need for highly visible; easy to read signs and symbols that help drivers of all ages make safe driving decisions that help reduce collisions or crashes.

FYG signs are recommended for locations where early detection is required for conspicuity to heighten the travelling public's awareness of an unfamiliar or non-typical condition.

The benefits of the FYG retroreflective sheeting cannot be directly compared in this study due to the vast number of chevrons put up along the curve. The Region may want to reduce the number of chevron signs and assess different signing configurations. This may aid us in determining how many chevron FYG signs are required to be effective and would give a better comparison to the original configuration of 4 standard chevrons.

To determine the deterioration of the fluorescent pigment over time these signs should be monitored yearly. This will guide us in determining when signs of this nature require replacement.

10.0 ACKNOWLEDGEMENTS

The author would like to thank the following for their assistance:

Dennis Adamkewicz,	Alberta Transportation and Utilities
Rich Lemire,	Alberta Transportation and Utilities
Allan Russell,	Alberta Traffic Supply

Appendix A

FIELD EVALUATION and PHOTO'S

Note To File

File: 1522-4
Date: March 11, 1999

**RE: Reflective Sheeting for Traffic Control
Highway 2 and 3 Fort Macleod Interchange
(Chevron Alignment Signs, Fluorescent
LDP Reflective Sheeting "Yellow Green")**

Vehicle rollover problem at highway 2 and 3 Fort Macleod Interchange. The southbound lane curve at this interchange has had 7 vehicle rollovers, 3 at night, and 4 during daylight hours. At the time of the rollovers there were only 4 chevron signs which were fastened to the light standards along the curve (see attached photo's). There are also several speed reduction signs prior to approaching the curve at the interchange including an oversize with flashing lights.

A solution was proposed in May 1998 to replace the existing signs with fluorescent (yellow green) (FYG) reflective sheeting. The objective in using this sheeting at this location is to determine their effectiveness of reducing vehicle speeds on accident prone curves.

In July of 1998, 15 new chevron signs were installed along the curve using the fluorescent (yellow green) (FYG) reflective sheeting (see attached photo's). Since the installation of these signs there has been one vehicle run-off at this location. The reason for the run-off was determined to be driver error (the driver fell asleep at the wheel) and not a result of excessive speed.

Field observations were made on February 11, 1999:

Day Time

- The fluorescent (yellow green) reflective sheeting chevron signs are detected much earlier by approaching traffic. Their unique appearance and early detection heightens your awareness and prepares you for a quicker response.

Night Time

- Nighttime reflectance is superior to standard chevron signs in the area. The highly reflective sheeting used on these chevron signs is visible from a further distance. The travelling public is drawn to the brightness and unique colour of these signs, which again heightens your awareness and reaction to the conditions ahead.

The regional staff has received favorable comments from the travelling public regarding these signs.



Joe Filice

CC: Ted Harrison
Terry Willis







