

IN-SERVICE EVALUATION
OF HIGHWAY SAFETY
APPURTENANCES
Experimental Project No. 7

David B. Woodham
Colorado Department of Highways
4201 East Arkansas Avenue
Denver, Colorado 80222

Interim Report
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86-3
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Federal Highway Administration

Interim Report

Roadside Appurtenances Evaluation in Colorado

Introduction

This report updates the experiences of three experimental roadside safety appurtenances in Colorado. A construction report¹ has previously detailed the initial conditions relating to the installations of the Self-Restoring Barrier (SERB) guardrail, the Modified Thrie Beam guardrail, and the Colorado Type 3F End Treatments. A previous interim report² has described the accident and maintenance histories of the above appurtenances.

SERB Installation

The SERB and Modified Thrie Beam guardrail were installed in mid 1983 at Floyd Hill west of Denver. The installation consists of 300' of Modified Thrie Beam guardrail, 500' of SERB, and 200' of Modified Thrie Beam all on the right shoulder of west-bound I-70. The guardrail site is near the bottom of a 1.9 mile long hill of 6.2% grade and on a left curve of 760' radius. This site has an accident history of guardrail impacts and was the location of a fatal accident when a tractor trailer went through the guardrail in 1981.

The SERB barrier was severely hit on July 16, 1985 by a 1985 Oldsmobile Cutlass (see attached accident report). The vehicle hit barriers 4 times. The initial impact was on the concrete jersey median barrier. The second impact was a

glancing blow to the modified thrie-beam guardrail (no damage to the thrie-beam). The vehicle hit the median barrier once more before impacting the SERB at an angle of approximately 45 degrees (based on skid marks). One 10.5 foot section was bent beyond repair and three posts will need to be re-alligned (see photos 1 and 2).

The accident report describes the damage to the vehicle as moderate and the injuries to the occupants of the vehicle as "Evident, Non-Incapacitating". The reporting officer estimated the driving speed at 65 mph.

This type of accident does not demonstrate the full capabilities of the SERB. Because of the steep angle of impact, the redirecting and energy absorbing capabilities of the SERB were not utilized.

Because of several delays in requesting additional footage of thrie-beam guardrail material, as of October, 1986 the necessary repairs have not been made. Repairs should be made this Fall.

Several small scrapes have appeared on the SERB which do not affect the functioning of the guardrail. No information is available on these minor vehicle strikes.

Modified Thrie Beam Installation

Colorado's first installation of the Modified Thrie Beam guardrail is the Floyd Hill site described above. One known hit on the Modified Thrie Beam guardrail has been documented in the last year. This was the glancing strike which occurred prior to the more severe impact with the SERB guardrail (as described above). The Modified Thrie Beam was not damaged and recieved only minor scrapes.

Since the last interim report, nearly 3500 feet of Modified Thrie Beam has been added to Colorado's highways. Project C55 550-8 near Silverton incorporated 438 feet of thrie beam guardrail. This installation protects motorists from the steep drop-offs between U.S. 550 and the valley floor.

Project HES 0005(10) west of Durango placed 3050 feet of Modified Thrie Beam on an outside radius near the bottom of Hesperus Hill (see photos 3 and 4). The long downgrade of Hesperus Hill has been a safety hazard--especially for large trucks.

The weighted average price was \$25.60 per lineal foot (installed) for the two projects.

No accidents have been reported at either of the new locations. Both installations will continue to be monitored in order to gain additional performance data.

Colorado Type 3F End Treatments

No hits have been reported or observed, within the past year, on the 25 type 3F end treatments which are currently under evaluation. The majority of 3F end treatments are used around bridge piers on divided highways. The end treatments can be integrated with either standard w-beam guardrail or New Jersey shaped concrete barrier (see photos 5 and 6).

During calendar year 1985 over 50 new 3F end treatments were installed in Colorado. This brings the total number of type 3F end treatments to almost 100. Efforts are under way to increase the number of end treatments which can be effectively observed.

Summary

The number of additional safety appurtenances which have been added to Colorado's highways reflects the success of this experimental program. These new features will increase the amount of performance data which can be gathered during the study.

All of the appurtenances covered by this study will be monitored until July, 1987. Performance data, gathered during the study period, will be used to form recommendations for future uses of these appurtenances.

References

- 1 Colorado Report No. CDH-DTP-R-83-9
Self-Restoring Barrier (SERB) Guardrail
Demonstration Project No. 939
- 2 Colorado Report No. CDOH-DTP-R-85-3
In-Service Evaluation of Highway Safety Appurtenances

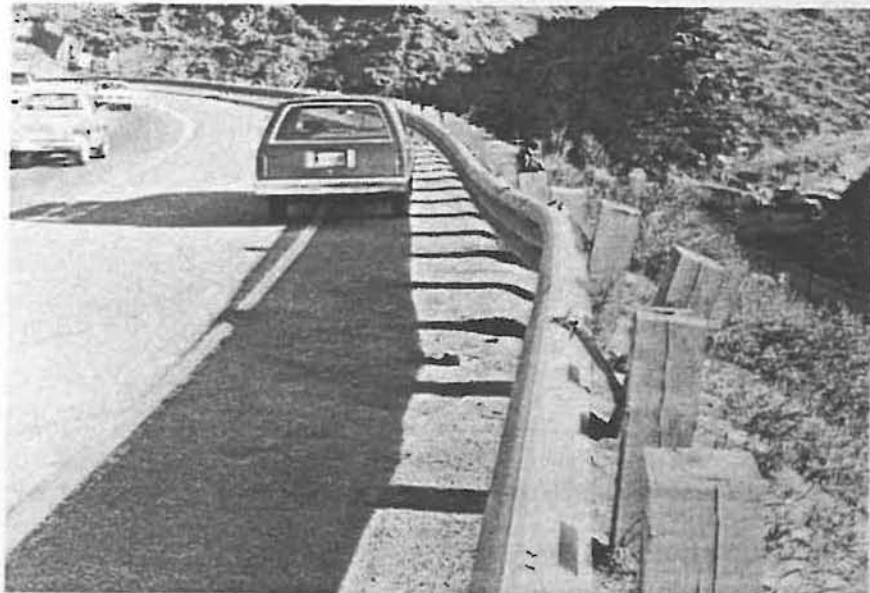


Photo 1. July, 1985 accident involving SERB.
Note steep impact angle indicated by
skid marks.

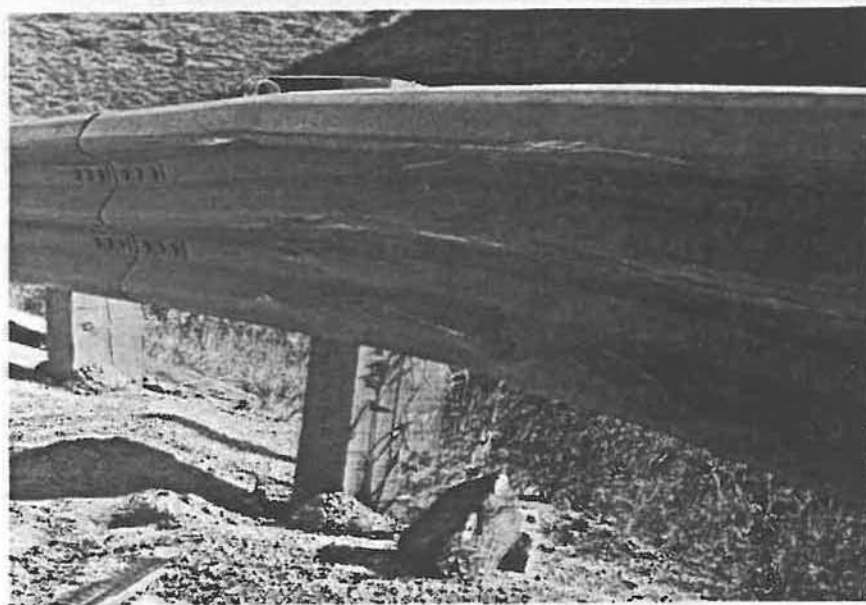


Photo 2. Closeup of point of impact on SERB.

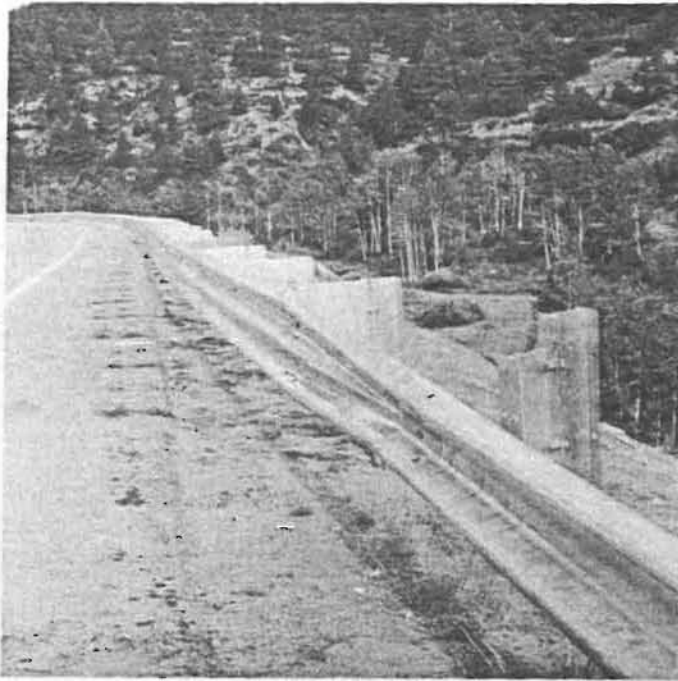


Photo 3. Hesperus Hill thrie-beam installation.



Photo 4. Thrie-beam to w-beam transition at lower end of Hesperus project.

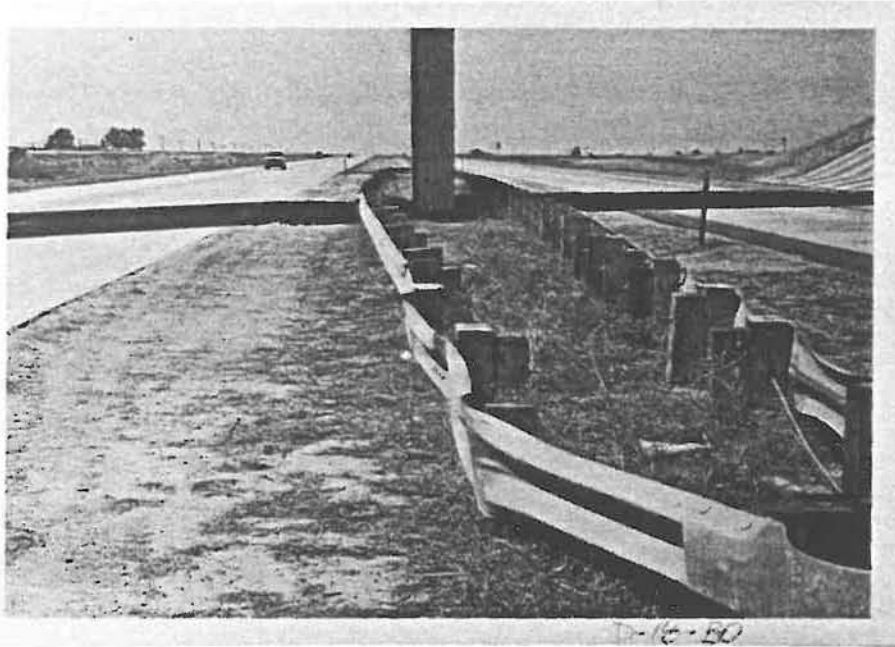


Photo 5. Colorado Type 3F end treatment on I-76 at milepost 29. End treatment ties in to Type 3 guardrail.



Photo 6. Type 3F on I-76 at milepost 16.95. End treatment transitions to concrete jersey barrier.

STATE OF COLORADO
 INVESTIGATOR'S
 TRAFFIC ACCIDENT REPORT

STATE SERIAL NUMBER 561796 JUL 29 1985

ROAD CODE 1-070A-74530 CITY SERIAL NUMBER 53070 MP245 M-02
 DATE OF ACCIDENT 07-15-85 TIME 2330 DAY OF WEEK MONDAY CITY COLORADO COUNTY CLEAR CREEK CO
 LOCATION, ROUTE, STREET, ROAD COLORADO 70 AT INTERSECTION WITH MILE POST 34.5
 X MILES N X E
 FEET S W

TOTAL VEHICLES 1 NUMBER KILLED 0 NUMBER INJURED 3 RAILROAD CROSSING 0 CONST. ZONE 0 WILD GAME 0 PUBLIC PROPERTY OR PUBLIC EMPLOYEE X PRIVATE PROPERTY 0 INCOMPLETE REPORT 0
 DATE NOTIFIED OF ACCIDENT 07-16-85 TIME 0010 DATE ARRIVED AT SCENE 07-16-85 TIME 0034 INVESTIGATED AT SCENE X PHOTO TAKEN X DISTRICT NUMBER 6-A

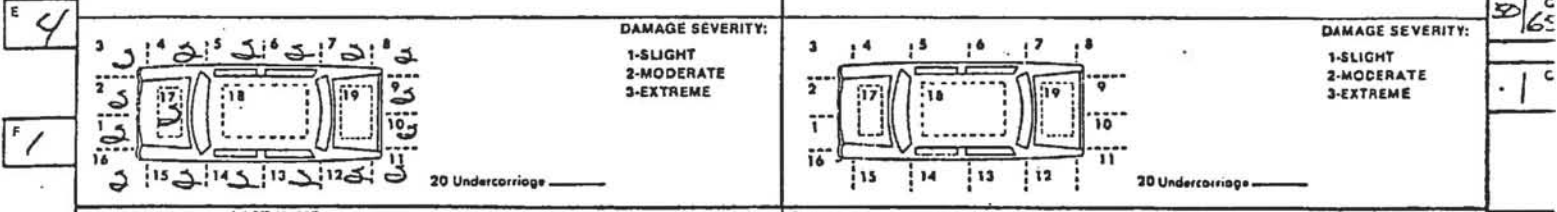
OFFICER NUMBER 8435 SIGNATURE [Signature] DETAIL 60413 OFFICER NUMBER [Blank] SIGNATURE [Blank] DETAIL [Blank]
 DATE OF REPORT 07-17-85 LAW ENFORCEMENT AGENCY COLORADO STATE PATROL REVIEWING OFFICER Sgt Koehler 720 CODE [Blank]

VEH #1 OR PARKED PEDESTRIAN # [Blank] VEH #2 OR PARKED PEDESTRIAN # [Blank]
 LAST NAME FIRST MI [Blank]
 STREET ADDRESS RES. PHONE [Blank]
 CITY STATE ZIP CODE BUS. PHONE [Blank]
 DRIVER LIC. NO. STATE SEX AGE DATE OF BIRTH [Blank]

VIOLATION(S) CARELESS DRIVING VIOLATION CODE(S) 43-4-1204 CITATION NUMBER(S) 0526173 COMMON CODE(S) 141
 VIOLATION(S) [Blank] VIOLATION CODE(S) [Blank] CITATION NUMBER(S) [Blank] COMMON CODE(S) [Blank]

YEAR MAKE MODEL BODY TYPE YEAR MAKE MODEL BODY TYPE
 1985 OLDS CUTLASS SUPREME 3DR [Blank] [Blank] [Blank] [Blank]
 REGISTRATION NO. STATE VEH. IDENT. NO. REGISTRATION NO. STATE VEH. IDENT. NO.
 649 2JX FLA 1K36R47A2FR319446 [Blank] [Blank] [Blank] [Blank]

VEH. OWNER LAST NAME NATIONAL RENT-A-CAR VEH. OWNER LAST NAME [Blank]
 STREET ADDRESS CITY STATE ZIP CODE STREET ADDRESS CITY STATE ZIP CODE
 8333 BEAR RD. ORLANDO FLA 32812 [Blank] [Blank] [Blank] [Blank]



OWNER OF DAMAGED PROP LAST NAME FIRST MI OWNER OF DAMAGED PROP LAST NAME FIRST MI
 COLORADO STATE HIGHWAY DEPT [Blank] [Blank] [Blank] [Blank]
 ADDRESS CITY STATE ZIP CODE ADDRESS CITY STATE ZIP CODE
 4501 E. ARK. ST. DENVER, CO 80222 [Blank] [Blank] [Blank] [Blank]

DESCRIBE ACCIDENT
 VEHICLE #1 WAS WEST BOUND ON COLORADO 70, IN LEFT LANE, WHEN IT ROUNDED A CURVE AND LOST CONTROL. FOR 56.9' BEFORE IT RAN OFF LEFT SIDE OF ROAD AND HIT MEDIAN BARRIER. VEHICLE #1 ALONG MEDIAN BARRIER FOR 89.3' BEFORE IT CROSSED BOTH LANE FOR 79.1 HITTING GUARD RAIL. FINAL POSITION OF ITS WHEELS.

