Montana Department of Transportation
Research Programs
July 2012

EXPERIMENTAL PROJECTS

EVALUATION OF TD5200 BOOMERANG AND THE FLEXI-GUIDE FG 300 UR REBOUNDABLE SURFACE MOUNT DELINEATORS FOR CENTERLINE TWO-WAY, TWO-LANE TRAFFIC CONTROL

Location:	Interstate 15 (C000015), Lewis & Clark County, Great Falls District
Project Name:	I-15: S287 Augusta Interchange - Craig (CN 6531001)
Project Number:	IM 15-4(129)129
FHWA Project Number:	MT-11-03
Type of Project:	Reboundable Delineator Evaluation
Principal Investigator:	Craig Abernathy, Experimental Program Manager (ExPM)

Objective

Determine the cost effectiveness, durability, and increased safety of using reboundable surface mount delineators for two-way two-lane traffic control detour phase on an interstate construction project.

Description

In order to facilitate the flow of very low, wide loads and reduce damage to the delineation on a project currently under construction, the contractor removes the top from the base as the wide load pass through. This causes concerns with safety, both for the traveling public and the contractor crews. Incorporating a reboundable surface mount delineator (aka channeling device) may eliminate the need to remove and reset the tube during a wide load pass, decreasing the contact of contractor crews with vehicular traffic. There is also a potential of lowering project costs and requiring fewer wide load closures.

Experimental Design

Two products selected for use on the project are the Pexco/Flexi-Guide FG 300 UR and the TrafficWorks/TD5200 Boomerang. The delineators will be installed homogeneously throughout the detour length in a consecutive sequence of one (1) Flexi-Glide and three (3) Boomerangs, respectively. The Flexi-Glide is the conventional delineator used for these types of detours. In past projects they have been removed and replaced for a wide load pass and have not been evaluated as a reboundable device. Manufacturer supplied information places greater confidence in the durability of the Boomerang, hence the 3:1 ratio in delineator placement. The posted speed limit in the detour phase is 50 mph (80 km).

Evaluation Procedures

This report will document the installation for best practice and any installation concerns germane to the performance of the product. Weekly site visits reported on delineator integrity and any other measurable outcomes.

Construction Documentation: Documentation will include information specific to the installation events of the delineator placement.

Detour Project Phase: Research will document the general condition of the delineator placements throughout the project length. The data elements for condition performance may include cracking, fraying, splitting, kinks, average degree of list, and estimated loss of reflective sheeting, and the number of replaced or repaired (reset) delineators.

Cost Analysis: Research has requested information to detail the cost of a conventional detour phase (related to the length and duration of the project) as compared to the final cost of the proposed experiment as this becomes available it will be added to the report. However, as stated in this report, the Boomerang delineator failed early on in the project and has been removed. A competent cost comparison may not be relevant.

April 2012 – Northbound (NB) I-15 Detour: TD5200 Boomerang Installation

🡸 The technician is preparing the installation of the Boomerang delineator. The Boomerang unit was preassembled prior to arriving on the job site.

🡸 The attachment hardware used in installing the delineators is the Tapper 1/4" x 2 3/4" slotted hex head screw.

🡸 The technician pre-drills four (4) holes in the existing pavement following the guide holes of the delineator.

🡐 Using an electric drill the technician attaches the delineator base to the surface of the pavement.

Not noticeable in this image, the base has embossed arrows to indicate the proper alignment of the base to pavement (red arrow). This keeps the post to base attachments perpendicular to the roadbed (yellow arrow) in case the delineator was hit straight-on, the bolts would not puncture a tire.

🡐 Image of completed attached Boomerang delineator to pavement.

🡅🡇 The technician demonstrates the flex attribute of the Boomerang delineator which centers at the base of the device.

April 2012 – Northbound I-15 Detour: Flexi-Guide FG 300 Installation

🡸 The Flexi-Glide base is placed on the pavement surface. The unit requires four screws for placement.

🡸 The technician predrills the holes.

🡸 The same type screws (as used in the Boomerang delineator) attach the base to the pavement.

🡸 The T-shaped delineator post is inserted into the T-slotted base.

🡸 Two steel pins are hammered into the existing holes of the base and delineator post.

🡸 Close-up of post to base attachment.

🡸 Completed attached Flexi-Glide delineator to pavement.

Note that the T-shape configuration is facing the direction of the two-way traffic (yellow arrows).

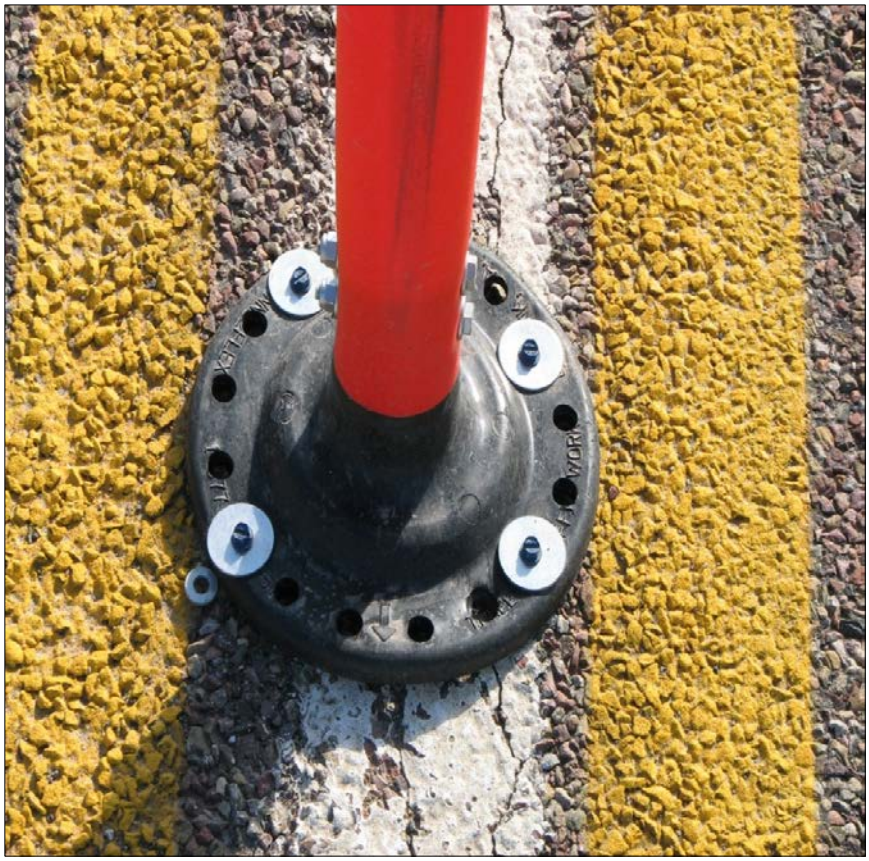
🡻 The image below shows the flexural property of the Flexi-Glide post.

🡅 Overview of detour phase on northbound lanes; view north.

April 2012 – TD5200 Boomerang Condition Approximately One Week in Service

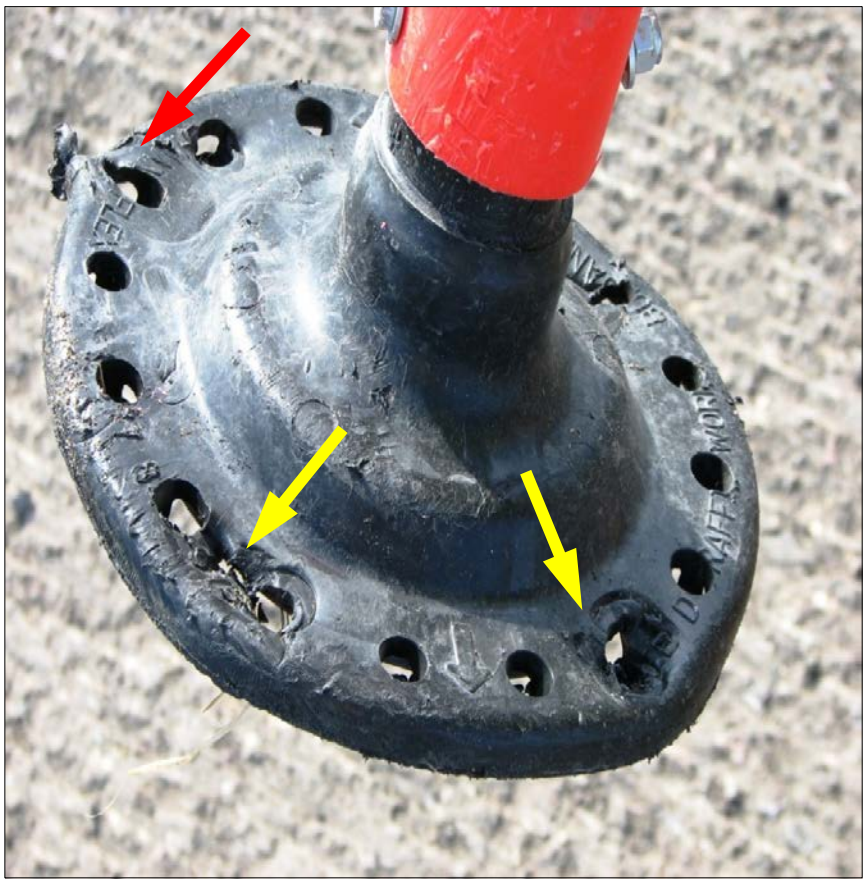
🡸 🡻 The following images show the condition of the Boomerang delineators after approximately one week of opening the northbound lanes detour phase.

At this time roughly twenty (20) percent of the delineators exhibited this type of damage. Loss of the top black cap, cracked or shattered sections of the post and damage to the base of either splitting of the base at the screw attachment or the screw (and washer) being pulled through the base when struck by a vehicle.



🡐 The contractor attempted to add larger washers to the base attachments in an effort to keep the delineator base from being separated from the pavement during a hit.

🡓 As seen below, even the larger washers did not prevent the base from separating from the pavement. The washer and screw attachment either ripped (red arrow) or pulled through (yellow arrow) the base during impact.



April 2012 – TD5200 Boomerang Condition Approximately One Month in Service

🡅🡄 During a site visit by Research staff it was found that a large percentage of the Boomerang delineators were no longer in use on the detour phase and had been replaced by the Flexi-Glide delineators.

It was also found that the Boomerang delineators that were unable to be reused were assembled together on a section of the right-of-way (ROW).

Performance to Date

Per information received from the contractor, the northbound detour phase used 550 channelizing delineators; 300 of the Boomerang and 250 of the Flexi-Glide.

During approximately one month after the initial placement of the Boomerang delineators on the northbound detour phase 184 units have failed representing a loss of 61%. 14 Flexi-Glide units have been replaced representing a loss of .05%. Note that the Flexi-Glide units were solely used at the approaches (or merge areas) of the detour phase. The delineator layout through the active two-lane detour had the Boomerangs placed three for every one Flexi-Glide; this would marginally increase percentage of Flexi-Glide loss greater that .05%. Regardless the 61% failure of rate of the Boomerang units is substantial.

Based on this severe rate of failure the District has elected to discontinue use of the TD5200 Boomerang for the rest of the northbound project detour and including the southbound detour phase. The remaining Boomerang units, as they become too damaged to be effective, will be replaced by the more durable Pexco unit.

During the timeframe of this report thirty-six (36) wide loads passed though the NB detour phase at an average speed of 25-35 mph.