Montana Department of Transportation
Research Program
October 2004

PRE-WINTER EVALUATION REPORT

Detectable Warning Devices (Truncated Domes) for use by the Visually Impaired

Location:	Great Falls – Cascade County
Project No.:	STPU 5201(11), 6th St. N. W.
FHWA No.	MT 00-05
Description:	Interim experimental analysis of various detectable warning devices for sidewalk curb ramps
Evaluation Date:	October 2004
Date Constructed:	July-August 2003
Participants:	Craig Abernathy Experimental Project Manager

Objective

Test the durability of several manufacturer designs in the use of truncated domes as preferred detectable warning devise (DWD) for use by the visually impaired. Report on the construction application of each treatment, durability and maintenance requirements of such products. This analysis is to document the condition of these devices from the summer use and as a base of documentation going into the 2004-2005 winter season. All treatments were installed during the months of July and August 2003.

Experimental Design

Seven similar types of truncated domes were installed at 15 random curb ramp locations in a seven block linear area of 6th St. N. W. The following are the names of the chosen manufacturers and the products selected. Refer to attachment 'A' at the end of this document to locate the approximate curb ramp locations of these devices.

1. **ADA Fabricators**
   Copolymer Composite Tiles (see page 3)

2. **Disability Devices**
   Wet Anchors Box Systems (see page 4)
   Polyurethane Detectable Warning Mat (see page 5)

3. **Vanguard ADA Products of America**
   Applied Truncated Domes (see page 6)

4. **Strongwarn Industries**
   Applied Latex Modified Mortar Domes (see page 7)

5. **Cote-L Industries**
   Safti-Trax Plastic Sheets (see page 8)
   Safti-Trax New Rubber Mat (see page 9)

Preliminary Analysis

Rating criteria for these products as performing good, fair, or poor is related to the reviewers experience while participating in the installation of these devices, initial performance documentation, several 'visual only' visits to these sites, and this evaluation. Performance can be based on a combination of quality of adhesion, loss of dome or relief of dome, torn bases, color retention, and the overall appearance of the feature. These devices are installed in an area that encompass both private and municipal ownership. No restrictions were given during winter season maintenance on snow removal. It is most likely that snow removal may be done by any means; shovel, blade, broom or no removal at all.

Most all treatments exhibited some form of distress during the fair weather months. The worst performers were the Cote-L Industries Safti-Trax New Rubber Mat and Disability Devices Polyurethane Detectable Mat. The best performers were Vanguard ADA and Strongwarn Industries products.

Treatments that rely on glues to secure them to the surface showed continued accelerated loss of adhesion. It can be assumed that this will continue to deteriorate over time. Those treatments that used surface paints or epoxies exhibit the best adhesion. Loss of color retention has not been an issue to date.

Research will continue to report on the performance of these systems. The next site visit will be conducted sometime in mid-winter after several snow events to document DWD condition. The post-winter evaluation will be available in April of 2005.

All reports to date can be found at: http://www.mdt.state.mt.us/research/projects/6th_street.shtml

Manufacturer: **ADA Fabricators**
Treatment: **Three installations of Copolymer Composite Tiles**
Site Location: **1A, 1B, 1C**

All three site installations were in fair condition at the time of this inspection. Minimum wear on domes. Loss of adhesion was observed with the interior seams of treatment 1C & 1B. The following images are the individual treatments with comments.

Installation 1A: Located on the northeast corner at the intersection of the east entrance to the Expopark adjacent to 5th Ave. N. W.

Adhesion tight. No dome loss. Minimum wear on domes. Color good. Abnormal accumulation of material on and around mat. This could minimize the tactile function of the DWD.

Installation 1A:

Example close-up of dome wear. Not considered at this time to be a detriment regarding resistance to slipping.

Installation 1B: Located on the southwest corner of the intersection 4th Ave. N. W. & 6th St. N. W.

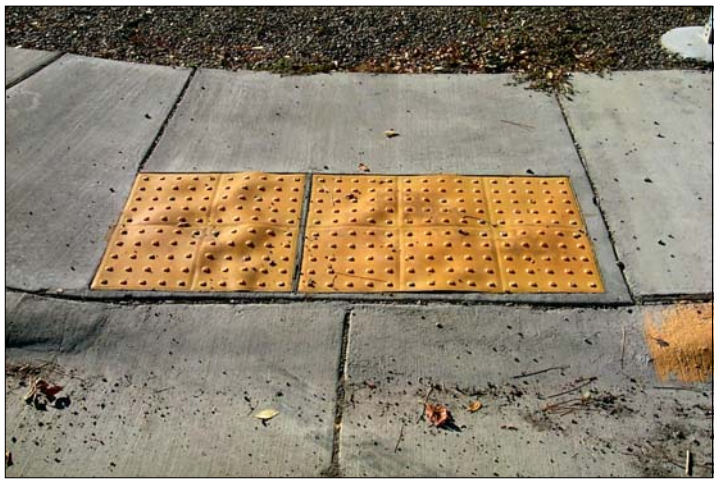
Adhesion fair. West interior seam beginning to curl and accumulate debris. Perimeter seam still tight. Color good. Minimum wear on domes.

Installation 1C: Located on the southwest corner of the intersection 5th Ave. N. W. & 6th St. N. W. This treatment connects the east-west pedestrian walkway.

Same condition as 1B.

Manufacturer: **Disability Devices**
Treatment: **One installation of the Wet Anchor Box system**
Site Location: **2**

This treatment performed poorly since construction. Approximately 25% of dome relief has been loss through use of a shovel or blade apparatus during the 2003-4 winter. Domes are wearing rapidly. The edges within the treatment and perimeter are beginning to loose adhesion. The tactile response is spongy, substantial air pockets beneath the mat, severe loss of adhesion. The setting pins are breaking off. Color is good. Research will monitor this product closely during the winter in case it becomes a trip hazard to the public.



Installation 2: Located on the southwest corner at the intersection of 6th Ave. N. W. and 6th St. N. W.

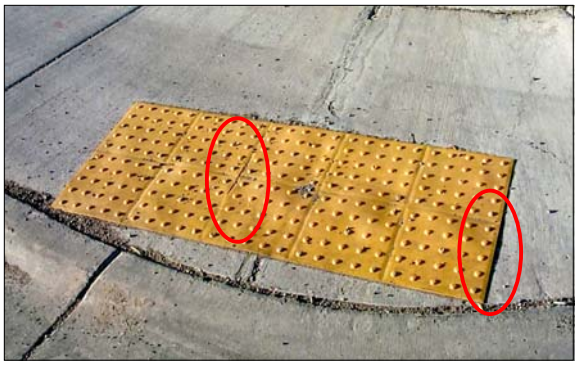
Installation 2: Close-ups of lost adhesion under mat at and edges.

Manufacturer: **Disability Devices**
Treatment: **Two installations of the Polyurethane Detectable Warning Mat**
Site Location: **3A, 3B**

Installation 3A was in fair condition at the time of this inspection. No additional loss of domes. Minor adhesion loss at panel edges and interior seams. Color good. Many of the plastic setting pins have broken off. Installation 3B has failed and become a trip hazard to the public. Research has asked for the panel to be removed.

Installation 3A: Located on the northwest corner of the intersection of 5th Ave. N. W. and 6th St. N. W.

This treatment connects the north-south pedestrian walkway.



Installation 3B: Located on the southwest corner of the intersection of 1st Ave. N. W. and 6th St. N. W.

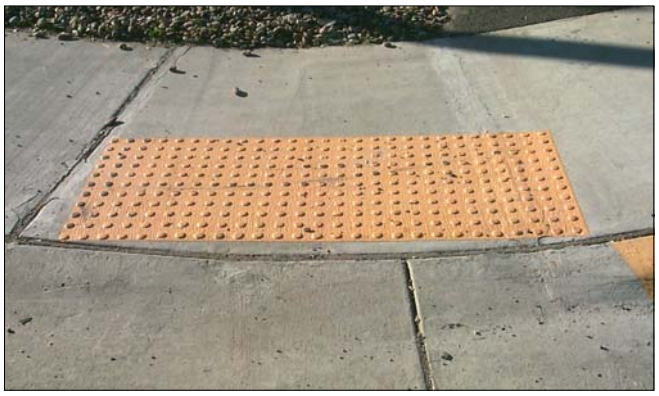
Severe loss of adhesion of panel to sidewalk. Gaps large enough at interiors seams to be a trip hazard (red circles).

Installation 3B:

Example image of loss of adhesion to sidewalk.

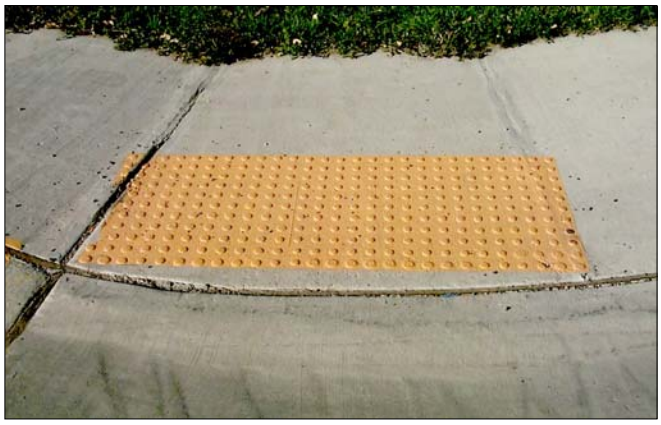
Manufacturer: **Vanguard ADA Systems**
Treatment: **Three installations of the Applied Truncated Domes**
Site Location: **4A, 4B, 4C**

All installations were in fair condition at the time of inspection. Color good. Treatment 4A displayed no deterioration. Treatment 4B & 4C have cracked at the mortar sidewalk joint, not associated with the performance of the product. Treatment 4C has lost one dome documented in the spring 2004 report.



Installation 4A: Located on the southwest corner of 5th Ave. N. W. and 6th St. N. W.

This treatment connects the north-south pedestrian walkway.



Installation 4B: Located on the northwest corner of 5th Ave. N. W. and 6th St. N. W.

This treatment connects the east-west pedestrian walkway.

South end of treatment deteriorating at mortar joint.

Installation 4C: Located on the northwest corner of 2nd Ave. N. W. and 6th St. N. W.

East mortar joint failing.

Manufacturer: **Strongwarn Industries**
Treatment: **Three installations of the Applied Latex Modified Mortar Domes**
Site Location: **5A, 5B, 5C**

These installations are performing well, no new dome loss since last inspection. Adhesion is good. Color retention is fair. Minor accumulation of debris on 5B.

Installation 5A: located at northwest intersection of 1st Ave. N. W. and 6th St. N. W.

Installation 5B: Located at the southwest intersection of 3rd Ave. N. W. and 6th St. N. W.

Note accumulation of debris.

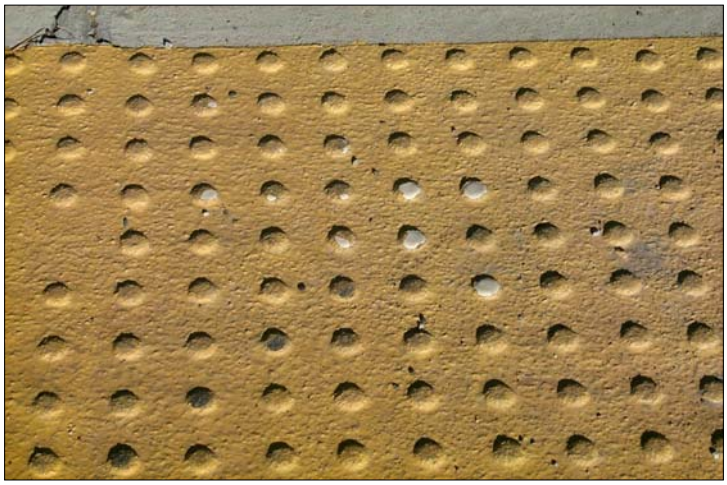
Installation 5C: Located on the southeast corner of the east Expopark entrance and 6th St. N. W.

Manufacturer: **Cote-L Industries**
Treatment: **Two installations of Safti-Trax Plastic Sheets**
Site Location: **6A, 6B**

All installations were in fair to poor condition at the time of inspection. Treatment 6A is continuing to lose adhesion around the edges of the mat. The anti-skid coating over the top of the rubber domes with treatment 6B is continuing to flake off. It is unclear if this is a result of blade damage, sunlight deterioration or through the action of freeze-thaw.

Installation 6A: located on the southwest corner of the intersection 2nd Ave. N. W. and 6th St. N. W.

Installation 6B: located on the northwest corner of the intersection 4th Ave. N. W. and 6th St. N. W.

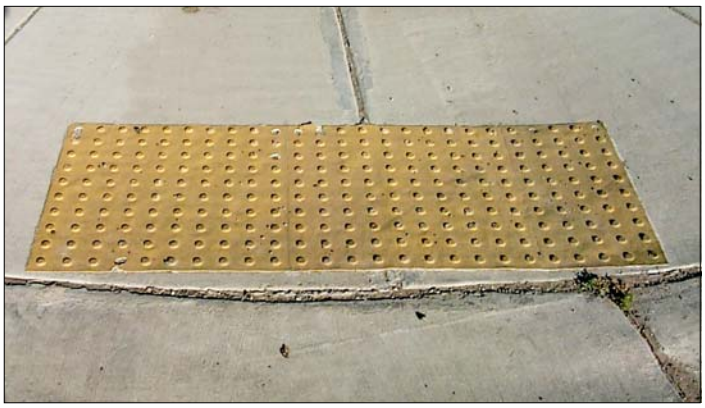


Installation 6B: Example of delaminating and cracking surface application of the rubber domes.

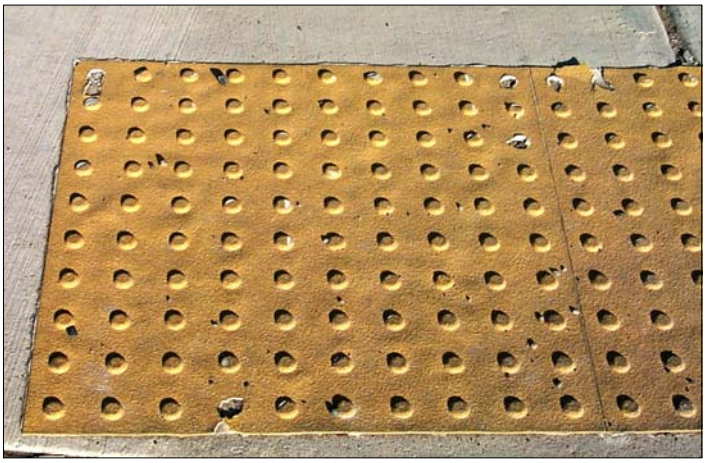
Although not seen as a slip hazard, this will facilitate future loss of domes.

Manufacturer: **Cote-L Industries**
Treatment: **One installation of Safti-Trax New Rubber Mat**
Site Location: **7**

This treatment is failing rapidly. The surface of the mat has continued to rip and tear. There is additional dome loss since the spring evaluation. Edges are loosing adhesion. Color is fair. At this it is time not a trip hazard.

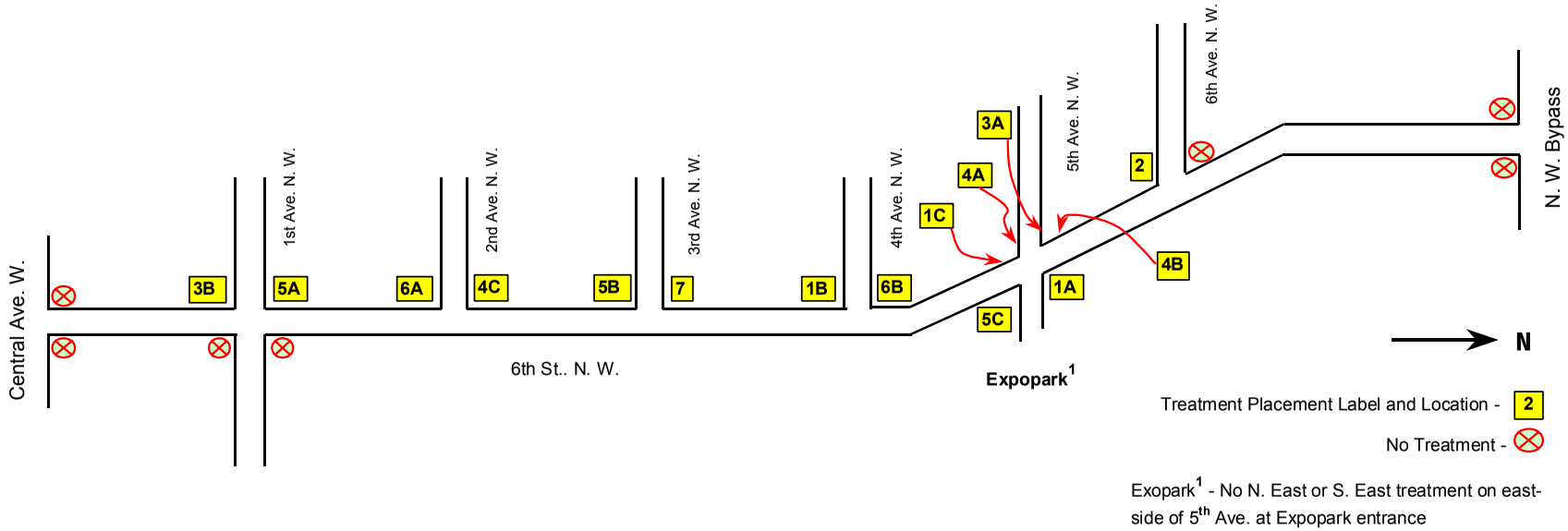


Installation 7: Located on the northwest corner of the intersection of 3rd Ave. N. W. and 6th St. N. W.



Installation 7: Close-up of damaged mat. Loss of domes and torn surface.

Treatment Type	Manufacturers	Label	Frequency
Copolymer Composite Tiles	ADA Fabricators	**1**	3 (a, b & c)
Wet Anchor Box System	Disability Devices	**2**	1
Polyurethane Detectable Warning Mat	Disability Devices	**3**	2 (a & b)
Applied Truncated Domes	Vanguard ADA Systems	**4**	3 (a, b & c)
Applied Latex Modified Mortar Domes	Strongwarn Industries	**5**	3 (a, b & c)
Safti-Trax Plastic Sheets	Cote-L	**6**	2 (a & b)
Safti-Trax New Rubber Mat	Cote-L	**7**	1



Experimental Layout
Detectable Warning Devices
Truncated Domes for Curb Ramps
Project STPU 5201(11)
Great Falls

Attachment A