

**MATERIALS & RESEARCH SECTION**

**Research & Technology Implementation**

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**RESEARCH UPDATE**

U2013-03

**Assessment of Detectable Warning Products**

**References – Report on Spring 2006 Evaluation of Detectable Warning Products Installed 2003-2005**

**OVERVIEW**

In an effort to comply with regulations required in the 2002 draft version of the Public Rights of Way Accessibility Guidelines, VTTrans conducted a three year evaluation study to determine long-term durability and installation practices of several detectable warning panels. At the conclusion of the study, recommendations were made and acceptable products were listed on the Approved Products List (APL) with either conditional or full approval. Since the end of the study, the panels have not been revisited; therefore another site visit was desired because many of the products are still listed as having conditional approval. During the proposed site visit it was desired to evaluate the current condition of the detectable warning panels evaluated in the previous study in an effort to determine if any of the products could move from conditional to full approval or if any product exhibited additional failures from the last site visit conducted in 2006 and should be removed from the list. Six products are located at six sites throughout Montpelier, Winooski, and South Burlington. All products and corresponding locations are listed on the following page:

| Manufacturer                            | Product Name   | Location         |   |
|---|--|------------------|---|
|   |  | Town             | Street                                  |
| Engineered Plastics, LLC.               | Armor-Tile Surface Applied Truncated Dome Detectable Warning Panel | Montpelier       | Int. of Hubbard St and Park St.         |
| EJ Group, Inc. (East Jordon Iron Works) | Detectable Warning Plate   | Montpelier       | Int. of US 2/Berlin St. and School Ave. |
| Neenah Foundry Co.                      | Detectable Warning Plate - 4984-0001                               | Winooski         | VT 15                                   |
| MetaDome, LLC.                          | MetaPanel - Asphalt  | South Burlington | Dorset Street                           |
| MetaDome, LLC.                          | MetaPanel - Concrete   | Montpelier       | Bailey Avenue (High School)             |
| Advantage Tactile Systems, Inc.         | Stainless Steel Panel  | Montpelier       | Spring Street                           |

## **OBSERVATIONS**

Site visits were conducted in June of 2009 and August of 2013. A total of six types of detectable warning panels were documented. All panels were visually examined for color contrast and integrity including snow plow damage to the domes, intactness of the panel as a whole and delamination of the panel from the underlying surface. There were two panels examined per manufacturer. All product and manufacturer names are listed in the Table above. Current conditions are described below as written at the time of each visit. Please note that all panels are listed by their manufacturer.

### **Engineered Plastics:** Intersection of Park St. and Hubbard St., Montpelier Colored Plastic Panels

#### 2006:

Originally installed in 2004, the surface applied Armor-Tile panel exhibited good overall condition and appearance. The color had not significantly faded and the joint seams were all intact. Very few missing domes were documented. Scraping, especially on the leading edge of the panels was evident. In 2006, this product was listed as conditionally approved and has remained at this status since.

#### 2009:

The panel system was still fairing well. The domes on the leading and trailing edges of the panel were missing. The corners show additional wear from the 2006 observations. The joints began to show some wear. Since this is the only surface applied panel on the APL and the overall condition is fair, the product was listed on the APL with conditional approval. It was determined that annual monitoring will be conducted.

#### 2013:

The site visit revealed some significant corner and edge loss. Since the panel is surface applied, the updated pictures reveal the pieces of the panel are missing along where the cracked sidewalk has been removed. The domes are in fairly good shape except for ones closer to the edge which experienced much more wear. The panel continues to exhibit satisfactory friction. The years have faded the color slightly, but overall the panel is in fair shape. The panel could be a viable option if more care was taken during construction.



2009



2013

**Figures 1-2: Engineered Plastics - Armor-Tile Surface Applied Panel.**

**East Jordan Works:** Intersection of Berlin St./U.S. 2 and School Ave., Montpelier  
Unpainted Cast Iron Panels

2006:

These panels were installed in 2005. The panels exhibited no damage and all domes were intact. The color contrast was good however there was some bleeding of the rust onto the surrounding concrete sidewalk. In 2006, this product was listed as fully approved and has remained at this status since.

2009:

The panels were in good condition with some domes sheared on the perimeter. There were some concerns over color contrast. It was recommended to leave the product with full approval on the APL. Annual monitoring will continue to be conducted with special attention to the color.

2013:

After 8 years of its installation, one of the panels is structurally in good condition. The other panel appears to have been replaced between the years of 2009 and 2013 for unknown reasons. The side walk has begun to crack and wear away on its edges and is beginning to wear underneath the panel. Dirt and grass are also covering approximately  $\frac{1}{4}$  of the panel. Both panels have experienced wear and are slightly slick on the domes. Slight rust bleeding has occurred and the color is all but gone on the original panel. The replaced panel still has some of its yellow coating.



**Figure 3: East Jordan Works – Detectable Warning Plate in 2009**



**Figure 4-5: East Jordan Works – Detectable Warning Plates 2013**

**Neenah Foundry Co.:**  
Unpainted Cast Iron Panels

VT 15, Winooski

2006:

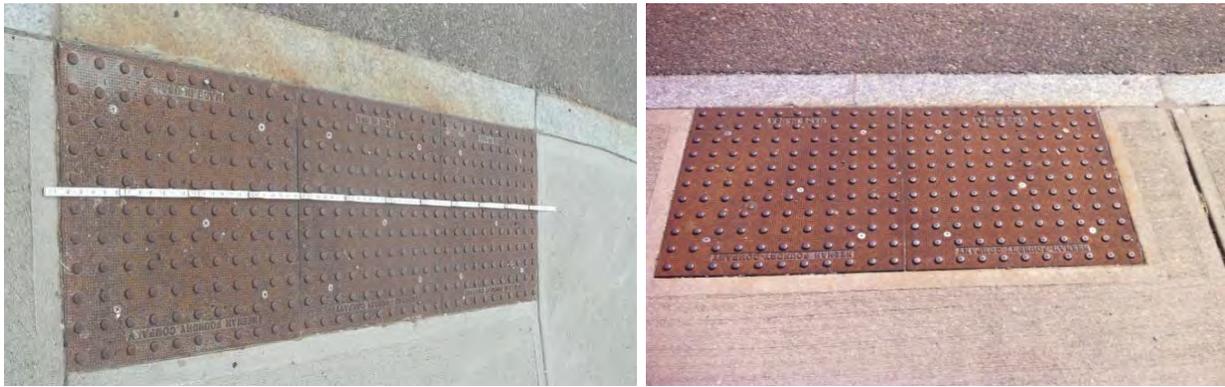
Installed in 2005 the cast-in-place panels were given full approval on the APL in 2006. At this time, the panels were in excellent condition, showing full resistance to snow plows. The only concern at the time was the excessive rust bleeding onto the surrounding concrete sidewalk.

2009:

The panels were in great condition. The rust bleeding has diminished and all domes are intact. It is recommended to keep the product as approved without conditions on the APL. Annual monitoring will be conducted.

2013:

Still in excellent condition, the panels show little wear and only minor rust bleeding. The texture on top of the domes is slightly worn away making it possibly slippery in wet conditions. The brown rust colors of the panels stand out well against the pale grey sidewalk. The panel will be continued to be monitored.



2009

2013

**Figures 6-7: Neenah Foundry Co. – Detectable Warning Plate.**

**MetaDome, LLC. – Asphalt:**  
Coated Stainless Steel Panels

Dorset St., South Burlington

2006:

The stainless steel panels were installed in 2005 on a reconstructed asphalt shared use path. The panels were designed so that if they failed, another panel could be placed directly on top of the damaged panel. In theory, this saves time and money. In 2006, the leading edge had received the most damage, with several domes sheared resulting in missing coating. Sand and gravel had accumulated between the domes on portions of the panels. It was noted that a void had formed under the panel, allowing it to deflect when pressure is placed on the surface. The panels were considered to be in good condition and received conditional approval on the APL.

2009:

The original panels were in poor condition. Additional panels had been added to three of the four original panels. The new panels were not bonded well to the underlying panels, causing the panels to deflect. This could potentially cause a safety hazard. The coating had severely diminished, causing the panels to be extremely slippery when wet. At the time it was recommended that the product be removed from the APL. This was the only asphalt panel that was on the APL.

2013:

Site visited in early June. Panels have lost virtually all color and covered with sand and gravel. Roughnesses of panels are low and quite slick. It appears the underlying panels are still not bonded well and in some places can be pulled up. Since 2009, the product has been removed from the APL.



**Figures 8-9: MetaDome, LLC. – Asphalt. 2009**



**Figures 10-11: MetaDome, LLC. – Asphalt. 2013**

**MetaDome, LLC. – Concrete:**      Intersection of Bailey St. and High School Dr., Montpelier  
Coated Stainless Steel Panels

**2006:**

The stainless steel panels were installed in 2004. The durability of the panels was very good. A minimal amount of damage was documented. One dome on the leading edge had been sheared and the coating of the panel was delaminated in this area. In 2006, the panels received conditional approval on the APL.

**2009:**

Although much of the surface coating had delaminated, the panels were considered to be in good condition. The panels were accumulating a fair amount of dirt and debris. This is presumably due to the nearby construction project. It is recommended that the product remains conditional on the APL. It was decided that annual monitoring would be conducted.

**2013:**

The panels are in fairly good shape. The prominent yellow color has retained its vibrancy on the face of the plate. Most of the color has worn off of the domes, making them significantly more visible. The plate appears to provide some friction, but with rain the panels could

potentially become slightly more slippery due to the steel. Just about all edges are intact though they display slightly more wear than the middle of the panel. A few of the domes experienced significant removal most likely due to a sidewalk plow. Overall the panel has endured excellently.



2009



2013



2013

Figures 12-14: MetaDome, LLC. – Concrete.

**Advantage Tactile Systems, Inc.:**  
Coated Stainless Steel Panels

Spring St., Montpelier

**2006:**

Installed in 2005, the panels in 2006 were in very good overall condition. Some the coating had been removed from winter maintenance, which exposed some of the underlying

steel. The panels had collected a fair amount of dirt and debris. The panels were given conditional approval on the APL.

2009:

The panels received minimal additional wear. The coating was faring well and had little delamination since 2006. It was recommended to leave the product as conditional approval on the APL. Annual monitoring would be conducted.

2013:

The two panels on the side street have mixed results. One panel is in fairly good condition with excellent color and structural intactness. The other panel appears to have been slightly ripped up possibly due to plowing, and then was cut out. The color and dome integrity is still good on the rest of the panel. Both panels have good roughness and are not that slippery, though conditions could be different when wet. If placed in another location, these panels have potential to a viable product.



2009



2013



2013

**Figures 15-17: Advantage Tactile Systems, Inc. – Stainless Steel Panel.**