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DEPARTMENT OF TRANSPORTATION

Research Project # 2006-051
Evaluation of Prismo Imprint

Final Report
May 2009

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Evaluations and Research Section
Engineering Technology and Information Division
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16. Abstract

The purpose of this research project is to evaluate the constructability and performance of Prismo Imprint synthetic overlays (manufacturer later changed to Ennis Paint, Inc.). Imprint is being evaluated as an alternative to brick pavers. This product can be installed in a few hours compared to days with brick pavers.

Imprint is a hot applied wearing course comprising of a synthetic asphalt based compound, incorporating pigment, graded rubber granules and granite aggregate, reinforced with metal and glass fibers.

The top layer of asphalt within the crosswalk area is milled. The molten imprint material is placed on the pavement and spread with a heated iron. Fine sand is spread over the recently laid asphalt, and then a metal mold is used to press the brick design.

The Imprint can be installed quickly and easily. The product's performance depends on the condition of the underlying pavement. The Imprint crosswalk is exhibiting some reflective cracking, but the pavement prior to milling had extensive alligator cracking with rutting. The road condition of the Imprint crosswalk is improved compared to the pavement leading up to the crosswalk.

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The authors would like to thank Prismo for donating the material that was used for this research project. This study will help to evaluate the installation and performance of the material.

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METRIC CONVERSION FACTORS		
Convert From	**To**	**Multiply By**
Length		
Foot	Meter (M)	0.3048
Inch	Millimeter (mm)	25.4
Yard	Meter (M)	0.9144
Mile (Statute)	Kilometer(KM)	1.609
Area		
Square Foot	Square Meter (M^2)	0.0929
Square Inch	Square Centimeter (CM^2)	6.451
Square Yard	Square Meter(M^2)	0.8361
Volume		
Cubic Foot	Cubic Meter (M^3)	0.02832
Gallon (U.S. Liquid)	Cubic Meter (M^3)	0.003785
Gallon (CAN. Liquid)	Cubic Meter (M^3)	0.004646
Ounce (U.S. Liquid)	Cubic Centimeter (CM^3)	29.57
Mass		
Ounce-Mass (AVDP)	Gram(G)	28.35
Pound-Mass (ADVP)	Kilogram (KG)	0.4536
Ton (Metric)	Kilogram (KG)	1,000
Ton (Short, 2,000 LBM)	Kilogram (KG)	907.2
Density		
Pound-Mass/Cubic Foot	Kilogram/Cubic Meter (KG/M^3)	16.02
Mass/Cubic Foot	Kilogram/Cubic Meter (KG/M^3)	0.5933
Pound-Mass/Gallon (U.S.)	Kilogram/Cubic Meter (KG/M^3)	119.8
Pound-Mass/Gallon (CAN)	Kilogram/Cubic Meter (KG/M^3)	99.78
Temperature		
Degree Celsius (C)	Kelvin (K)	$T_K = (T_C + 273.15)$
Degree Fahrenheit (F)	Kelvin (K)	$T_K = (T_F + 459.67)/1.8$
Degree Fahrenheit (F)	Degree Celsius (C)	$T_C = (T_F – 32)/1.8$
Illumination		
Foot-Candles	Lux (LX)	10.76
Foot-Lamberts	Candela/Meter sq. (CD/M^2)	3.426
Force and Pressure or Stress		
Pound-Force	Newton (N)	4.45
Pound-Force/sq. in.	Kilopascals (KPA)	6.89

EXECUTIVE SUMMARY

The purpose of this research project is to evaluate the constructability and performance of Prismo Imprint synthetic overlays (manufacturer later changed to Ennis Paint, Inc.). Imprint is used for crosswalks, medians, bus zones and roadway hazard zones to provide increased warning to motorists and provide aesthetic improvements to the community. Imprint is being evaluated as an alternative to brick paver. This product can be installed in a few hours compared to days with brick pavers.

Imprint is a hot applied wearing course comprising of a synthetic asphalt based compound, incorporating pigment, graded rubber granules and granite aggregate, reinforced with metal and glass fibers.

The top layer of asphalt within the crosswalk area was milled to a depth of 0.75 to 1.25 inches. A furnace is used at site to melt and agitate the synthetic asphalt and coloring components. The molten imprint material is placed on the pavement and spread with a heated iron. Fine sand is spread over the recently laid asphalt and a metal mold is used to press the brick design.

The Imprint can be installed quickly and easily. The product's performance depends on the condition of the underlying pavement. The Imprint crosswalk is exhibiting some reflective cracking, but the pavement prior to milling had extensive alligator cracking with rutting. The road condition of the Imprint crosswalk is improved compared to the pavement leading up to the crosswalk. The Ennis Imprint product is recommended for approval and use by the Department.

Table of Contents

SUBJECT ..... PAGE

EXECUTIVE SUMMARY VI

INTRODUCTION 1

PROJECT SUMMARY 2

CONSTRUCTION SUMMARY 3

FIELD PERFORMANCE 7

CONCLUSIONS 7

RECOMMENDATIONS 8

REFERENCES 8

APPENDIX A 9

List of Figures

FIGURE 1, RESEARCH PROJECT LOCATION MAPS 3

List of Photographs

PHOTO 1, AN IMPRINT INSTALLATION 1

PHOTO 2, MILLING EXISTING PAVEMENT 3

PHOTO 3 FURNACE USED TO MELT AND AGITATE THE SYNTHETIC ASPHALT 4

PHOTO 4 SAMPLE OF RAW IMPRINT MATERIAL 4

PHOTO 5 SAWING A STRAIGHT EDGE 4

PHOTO 6 REMOVING ASPHALT AROUND EDGES 4

PHOTO 7, REMOVAL OF LOOSE ASPHALT 5

PHOTO 8, MOLTEN ASPHALT IS LAID AND SPREAD 5

PHOTO 9, BRICK DESIGN IMPRINTING 6

PHOTO 10, COMPLETED OVERLAY AND IMPRINTING. 6

PHOTO 11, APPLICATION OF THERMO-PLASTIC STRIPS. 6

PHOTO 12, CONDITION OF ROAD PRIOR TO PLACEMENT OF PRODUCT. 7

PHOTO 13, ADDITIONAL DETERIORATION OF ROAD AFTER PLACEMENT. 7

INTRODUCTION

The purpose of this project was to evaluate the effectiveness of Prismo's (manufacturer later changed to Ennis Paint, Inc.) synthetic imprint overlay. This product is used in crosswalks, medians, bus zones, and even roadway hazard zones, to provide adequate warning and increased traction for motorists, in addition to being aesthetically pleasing. The manufacturer claims the product has the following advantages: quick to install, requires no excavation, can be installed year round, exhibits full depth color as well as long lasting color, has high skid resistance and durability, and is cost effective, maintenance free, and aesthetically pleasing.

Imprint is a hot applied wearing course comprising of a synthetic asphalt based compound, incorporating pigment, graded rubber granules and granite aggregate, reinforced with metal and glass fibers.

Photo 1, An Imprint Installation

The product was evaluated in Engineering Districts 8-0 on Walnut Street in Camp Hill, PA.

PENNDOT is often responsible for road work in towns and urban areas where aesthetics are a concern. Crosswalks provide an opportunity to include aesthetic elements in these improvements. Block and brick pavers offer a pleasing appearance in these settings, but are slow to install and difficult to maintain.

Imprint is a synthetic, colored overlay manufactured by Ennis Paint, Inc., 5910 N. Central Expressway, Suite 1050, Dallas, Texas 75206. The Imprint is stamped with a pattern to give the effect of brick or block pavers (Photo 1). This project evaluated the installation and performance of the Imprint product in Pennsylvania. Imprint is expected to deliver appealing results in less installation time than brick, without the associated maintenance issues and with less risk to motorists and pedestrians in the event of material failure.

PROJECT SUMMARY

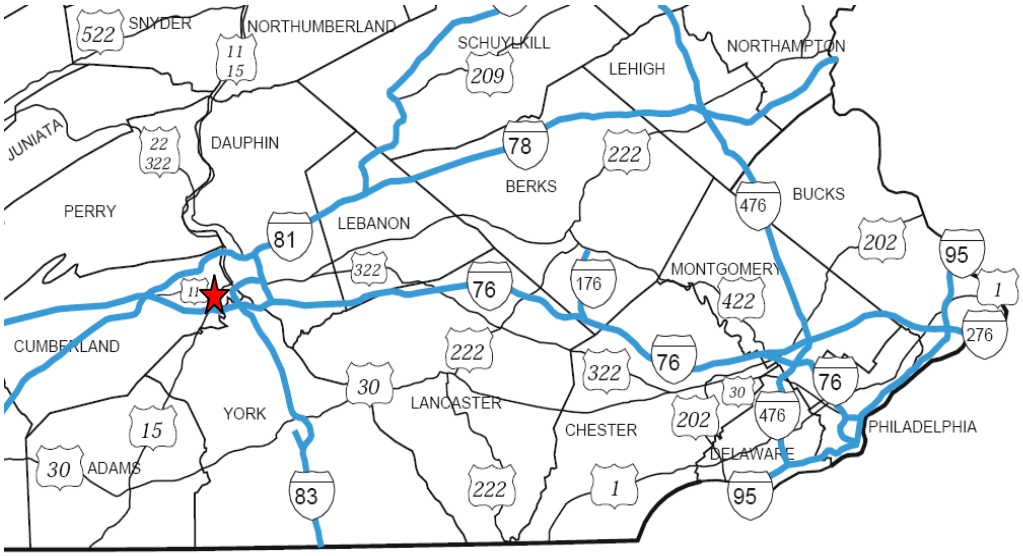
The initial placement of the Prismo Imprint synthetic overlays was monitored for any construction issues, through and including opening to traffic. A sample of unmelted material was collected to confirm selected material properties addressed by the product specifications (Appendix A). A sample duplicating the in-place material was also fabricated on-site on a piece of plywood measuring at least 18" by 18".

A distress survey was made of the sections before placement, and in the spring of 2008. The finished surface of the experimental sections will be inspected for snowplow damage, raveling, flushing, polishing, reflective cracking, and delamination.

The project is in Cumberland County in the borough of Camp Hill. The material and installation was donated for the research project. The average installation cost is $135 per sq. yd. The crosswalk was placed at 2145 Walnut Street in front of the Camp Hill Borough office (Figure 1).

Installation was performed by Dynamic Surface Applications, Ltd. of Pennsdale, PA. Imprint was evaluated as a decorative wearing surface only, not as a traffic control device.

The Research Project Location



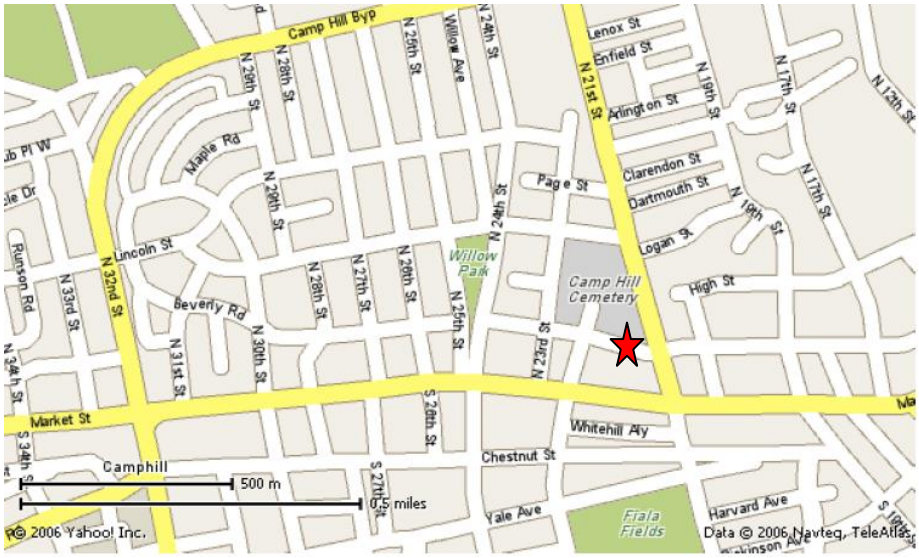


Figure 1, Research Project Location Maps

CONSTRUCTION SUMMARY

Upon arriving at the project site on May 16, 2006, the laborers from Dynamic Surface Applications, Ltd. from Pennsdale began milling the top layer of asphalt off the old crosswalk location at an average depth ranging from 0.75 to 1.25 inches (Photo 2). It was noted that the condition of the pavement prior to milling was poor, with extensive alligator cracking, rutting, and block cracking. Although some installations are keyed in by milling only the edges of the crosswalk, the installation at Camp Hill was inlayed the full depth of the crosswalk.

Photo 2, Milling existing pavement

Meanwhile a furnace was being used to melt (Photo 3) and agitate the synthetic asphalt (Photo 4) and coloring components to be used once the site was ready.

Photo 3
Furnace used to melt and agitate the synthetic asphalt

Photo 4
Sample of raw Imprint material

Then two straight lines perpendicular to the side-walk were cut with a saw (Photo 5) and remaining asphalt was chipped away using a jack-hammer (Photo 6).

Photo 5
Sawing a straight edge

Photo 6
Removing asphalt around edges

After this was completed it was noted that a large section of milled asphalt was loose and needed to be removed to provide a sounder base (Photo 7). A normal application is 5/8" to 1" in depth, however removing this additional material resulted in material depths up to 1 ½". This could reduce the flexibility of the overlay.

Photo 7, Removal of loose asphalt

Once all remaining asphalt had been removed, a power broom and a compressed air nozzle were used to clear the site of dust, rock and other debris in preparation for the overlay.

Now successfully milled, edged, and cleared the site was ready for the overlaying process to begin. Starting on one end of the crosswalk, the workers began dumping the molten Imprint material onto the pavement and spreading it with a heated iron. (Photo 8)

Photo 8, Molten asphalt is laid and spread

Following that process, fine sand was spread over the recently laid asphalt, and then a metal mold was used to press a brick design into the hot material. (Photo 9)

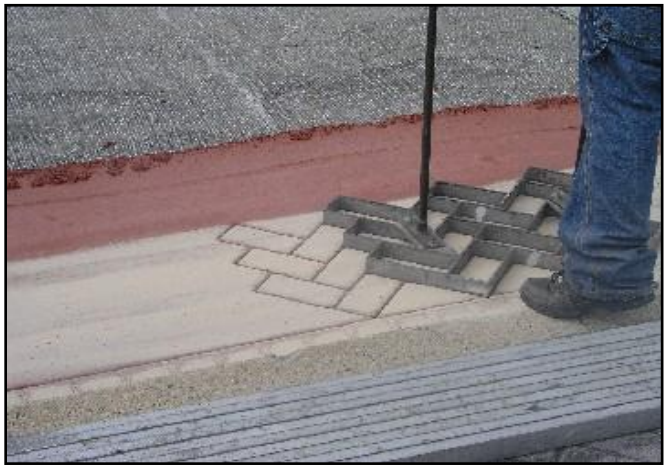


Photo 9, Brick design imprinting

Photo 10, Completed overlay and imprinting.

Once the entire crosswalk surface had been imprinted, (Photo 10) excess sand was cleared and two white thermo-plastic strip borders were applied to the crosswalk (Photo 11).

Photo 11, Application of thermo-plastic strips.

FIELD PERFORMANCE

The Imprint crosswalk exhibited reflective cracking in the areas where alligator cracking was present prior to milling. The road had cracking and rutting prior to milling and placing the Imprint product. Photo 12 shows the condition of the road prior to milling. Photo 13 shows the reflective cracking through the Imprint product.

Photo 12, Condition of road prior to placement of product.

Photo 13, Additional deterioration of road after placement.

CONCLUSIONS

The product only performs as well as the underlying road surface. The crosswalk in Camp Hill has developed reflective cracks, but the Imprint is in better condition than the surrounding pavement.

If the objective for a community is to have a crosswalk treatment, then the Imprint is more economical and lower maintenance risk. Brick pavers have a longer installation time, than the Imprint product that

can be installed in hours instead of days. If the brick pavers are not installed correctly, they can settle and shift.

During winter weather conditions, Imprint held the ice and snow in the crevices. A normal pavement crosswalk could be plowed clean. This freezing could cause the crosswalk to be more slippery than a normal crosswalk.

RECOMMENDATIONS

Ennis Imprint is recommended for approval. The Imprint crosswalk will require additional work when a road surface is replaced. There will have to be breaks in the milling of the surface and paving of surface.

REFERENCES

Ennis Paint, Inc. "Traffic Paint and Thermoplastic Road Markings". 2003-2006. (accessed May 2009) <http://www.ennispaint.net/products/product.asp?ID=10>

Dynamic Surfacing Applications, Ltd. "IMPRINT® Synthetic Surfacing". 2005. (accessed May, 2009) <http://www.dsa-ltd.com/imprint.htm>

APPENDIX A

INTEGRALLY COLORED HOT APPLIED SYNTHETIC ASPHALT CROSSWALKS

Description – This work shall consist of the installation of ¾" thick Integrally Colored Hot Applied Synthetic Asphalt Crosswalks.

Material – Imprint® Grade 45

Color: To be determined by Project Owner

Pattern: To be determined by Project Owner

Installation – As indicated below. Modify as needed at the discretion of the installer to accommodate specific project details.

Roadway Preparation: Inspect road surface for detrimental deficiencies prior to the start of work. The surface is to be clean and dry. Any excessive contaminants like oil or grease are to be removed. Mark out and sawcut the crosswalk edge lines. This sawcut should be made at a depth of approximately 1".

For inlaid applications, the crosswalk area is to be milled to an average depth of ¾" with a cold planer. For raised applications, a keyway approximately 1" deep and 4"-10" wide needs to be cut along the edge line. Once complete, the installation area should be cleaned thoroughly with compressed air and a Hot Compressed Air (HCA) Lance, if necessary.

Material Preparation: Imprint material should be heated in a diesel-fired, air-jacketed horizontally mounted kettle with a minimum capacity of 4,000lbs. Pre-heat kettle to approximately 250°F and begin adding bags of material in 5-10 bag increments until full. When adding material to the kettle, add one packet of color per bag of material. Heat Imprint material to approximately 400°F. Be sure to maintain constant agitation and avoid overheating the material.

Tool Preparation: Heat the smoothing irons in a propane flame until red hot.

Material Application: Discharge the material into buckets treated with a suitable release agent and apply it in the desired area. Using the hot smoothing irons, spread the material to the desired thickness and tool it to a smooth bubble-free surface. If required, battens can be applied to the surrounding wearing course to aid in the determination of thickness. Once the desired surface texture has been achieved, apply a thin layer of dry silica sand to the surface.

If joining new material to some already in place, be sure to heat the existing material to a temperature of approximately 300°F with a propane torch before ironing the new material into place to ensure a tight bond and prevent joint shrinkage.

Imprinting the Material: Once the sand has been applied, begin imprinting the material with the appropriate mold. Press the mold into the material to a depth of .2"-.5" unless otherwise requested. Imprint in such a manner that the pattern is straight from beginning to end. Avoid excessive material

displacement while imprinting. Periodically inspect the mold and remove any adhered material. Complete the pattern along the edge lines using detail tools. These tools may be heated if necessary.

If the pattern needs to be corrected, it can sometimes be reheated and smoothed with the irons before being reprinted. In extreme cases, the material will have to be removed and reapplied.

Submittals/Mockups – The installer will provide technical specifications, MSDS sheets and color and pattern samples as needed. Typical color samples are round disks approximately 2" in diameter. Mockups and pattern samples are typically 3'x3' samples that have been mounted and delivered to the Project Owner.

Installer Qualifications – Installer must have at least 3 years of successful installation experience and be able to provide references for projects similar in size and scope.

Measurement and Payment – Square Foot.