

# MatCon™ Modified Asphalt Cover Containment System Demonstration

David A. Carson, V. Rajaram, Ronald L. Terrel,  
Karl Yost, and Kenneth Grzybowski

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## MatCon™ Modified Asphalt Cover Containment System Demonstration

David A. Carson<sup>1</sup>, V. Rajaram<sup>2</sup>, Ronald L. Terrel<sup>3</sup>, Karl Yost<sup>4</sup>,  
and Kenneth Grzybowski<sup>5</sup>

Abstract: In order to make improvements to conventional paving asphalt to make it more suitable for containment applications, Wilder Construction Co. of Everett, WA offers MatCon, a polymer modified asphalt system comprised of proprietary binder, when coupled with a selected aggregate type and gradation, a specialized job mix formula and installation specifications results in a potentially superior substitution for conventional paving asphalt in cover containment applications. Under US EPA's Superfund Innovative Technology Evaluation (SITE) program, the system was installed and placed under study at two locations, with two more possible in 2001. MatCon is intended for use as a waste containment material, and can be configured to function as both a hydraulic barrier and as a drainage material, to comprise a single or multiple layer cover system. MatCon is noted for its superior engineering qualities and is designed for long-term performance, yet can be applied with conventional paving equipment. The hydraulic performance of the material was examined by both removing destructive samples for laboratory testing, as well as field evaluation. While the study focuses on hydraulic properties, accompanying engineering properties were evaluated in the laboratory. Finished MatCon can serve multiple purposes such as staging for trucks and construction equipment, pavement, and light industrial facilities. This presentation provides an overview of the research approach, application history, and initial results of 2 years of study.

US EPA's Superfund Innovative Technology Evaluation program as operated by The Office of Research and Development operates aims to match innovative remediation technologies to specific and active Superfund site technology needs. Under this program, technology vendors provide an application of their technique or material, and US EPA participates by monitoring technical performance and cost. At the conclusion of the demonstration, a series of technical reports are prepared describing observations made during the test period.

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<sup>1</sup> Project Officer, U.S. Environmental Protection Agency, National Risk Management Research Laboratory, 26 W. Martin Luther King Drive, Cincinnati, OH, 45268-3001, USA, Ph. 513.5697527, Fx 513.569.7879, [carson.david@epa.gov](mailto:carson.david@epa.gov) (corresponding author)

<sup>2</sup> Project Manager, Tetra Tech EM Inc., Suite D, 3550 Salt Creek Lane, Suite 105 Arlington, Heights, IL 60005, Ph. 847.818.7189, Fx. 847-255-8528, [rajarar@ttemi.com](mailto:rajarar@ttemi.com)

<sup>3</sup> President, Terrel Research, 9703 241<sup>st</sup> Place SW, Edmonds, WA 98020, Ph. 206.542.9223, Fx. 206-542-6159, [rterrel@u.washington.edu](mailto:rterrel@u.washington.edu)

<sup>4</sup> Environmental Division Manager, Wilder Construction Company, 1525 E. Marine View Drive Everett, WA 98201, Ph. 425.551.3100, Fx. 425.551.3116, [karlyost@wilderconstruction.com](mailto:karlyost@wilderconstruction.com)

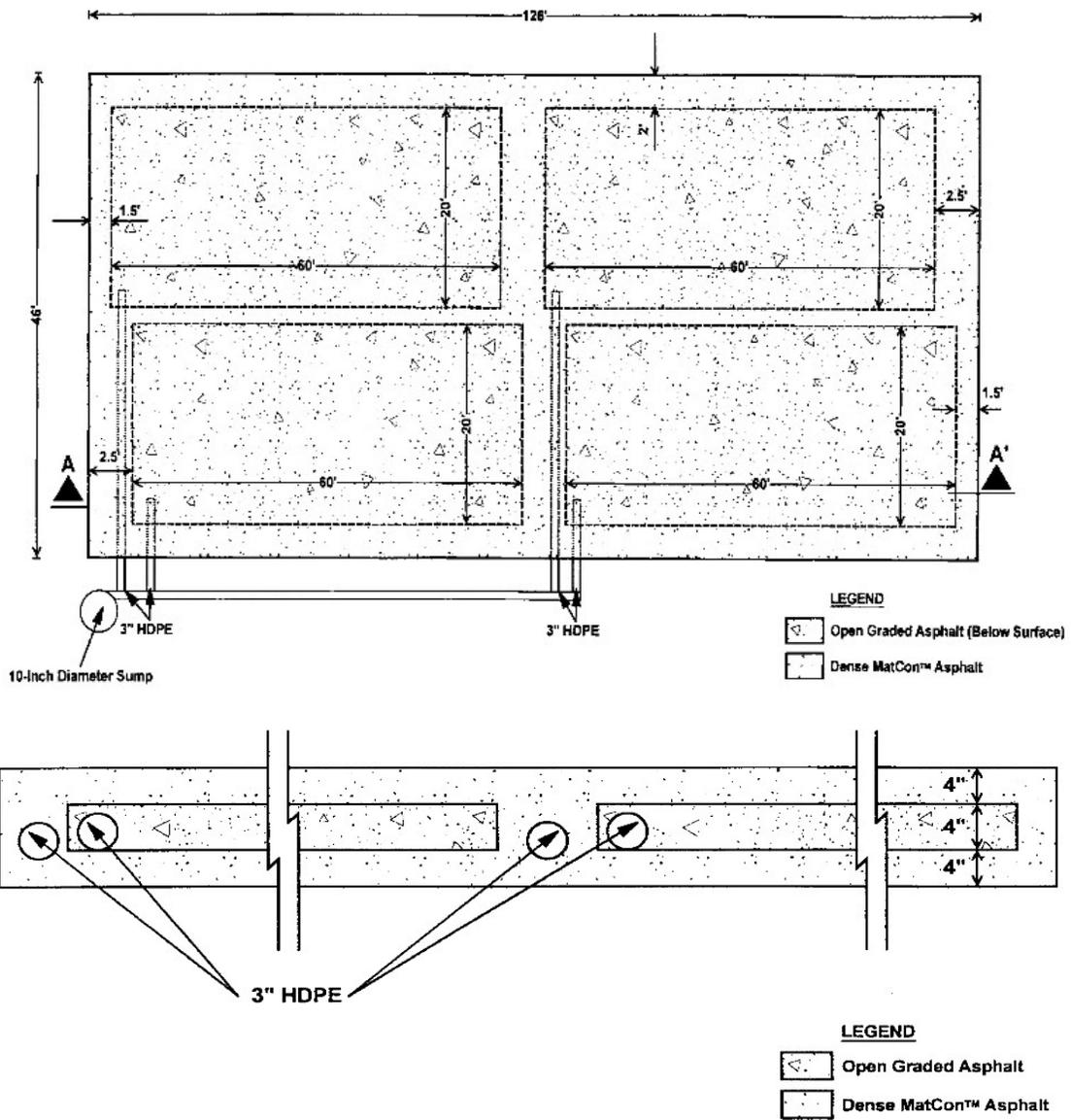
<sup>5</sup> President, PRI Asphalt Technologies, Inc., 6408 Badger Drive, Tampa, FL 33610, Ph. 813.621.5777, Fx. 813.621.5840, [k.grzybowski@priasphalt.com](mailto:k.grzybowski@priasphalt.com)

Current cover containment practice centers around the use of composite barriers comprised of geomembranes, geosynthetic clay liners (GCLs), compacted clay or amended site soils (US EPA, 1986, 1991 and 1993). Studies of instrumented comparative cover performance are ongoing (US Department of Energy, 2000). The theoretical benefits and weaknesses of asphalt barriers are understood, but relatively few studies have been conducted of the hydraulic properties of asphalt-based containment systems.

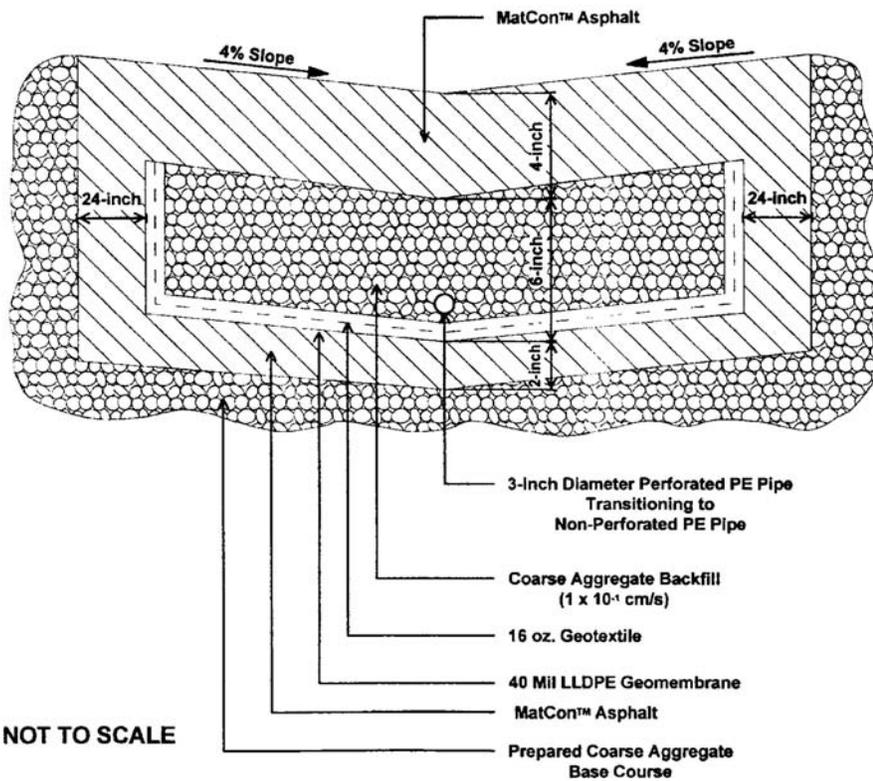
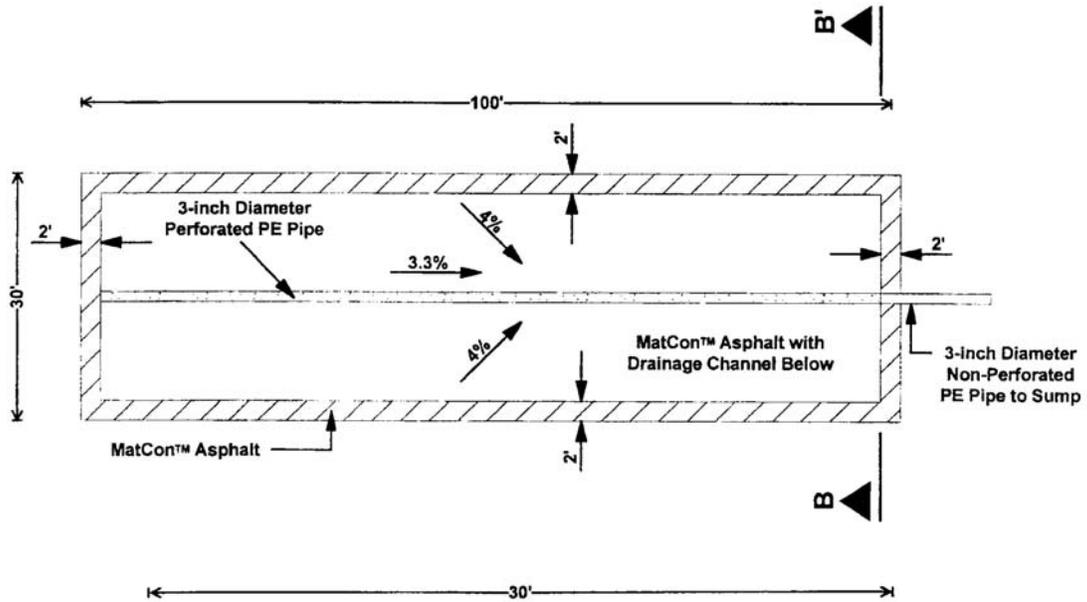
For the demonstration described in this presentation, sites were identified that required a conventional paving asphalt as part of the cover containments system agreed to by parties identified in the Record of Decision (ROD). In this study, a modified asphalt material, **Modified Asphalt Technology for CONtainment (MatCon™)**, was substituted for conventional paving asphalt with the intention of monitoring performance under field conditions. It is anticipated that the MatCon material will exceed the performance requirements at these sites in many ways, most importantly MatCon should outperform common paving asphalt with regard to hydraulic conductivity.

The MatCon system is an alternate environmental liner and cap technology suited for RCRA landfill or waste containment where surface reuse is also a desired benefit. Wilder Construction Company, first developed and installed MatCon in 1989 as a combined cap and liner for bottom ash. After 10 years of continued use as a cap and ash staging work surface that required no maintenance, the MatCon was resampled in 1999. The resultant permeability hydraulic conductivity coefficient of less than  $1 \times 10^{-8}$  cm/sec, the same as when it was first installed, which encouraged Wilder to offer this system nationwide.

Two project locations, Dover AFB, DE (shown in figures 1 and 2), and Elgin, IL (as shown in Figures 3 and 4) were selected to focus on evaluating MatCon attributes and properties claimed by Wilder. Low hydraulic conductivity was foremost, since the MatCon had to act as a barrier with low permeability. MatCon is utilized in two manners in this study, in one formulation as a hydraulic barrier, and in another formulation as a drainage layer. Engineering properties evaluated includes load capacity, shear, load deformation (resilient modulus), joint integrity, flexural properties, freeze/thaw, degradation and weathering, and crack resistance were selected. The overall testing intent was to determine MatCon's efficacy on low permeability, strength and elasticity, flexibility, and longevity. These properties were considered in light of comparing them to both conventional RCRA covers and conventional asphalt pavement, which might also be considered as an alternative by some engineers.



Plan and cross-sectional views of The Dover AFB Test Site layout.



NOT TO SCALE

Plan and cross-sectional views of Elgin, IL demonstration site lysimeter.

A large number of samples were taken at Dover AFB and tested in the laboratory. Permeability (ASTM D 5084) for the dense-graded MatCon was  $<1 \times 10^{-8}$  cm/sec, and  $5 \times 10^{-5}$  cm/sec for the conventional pavement. The hydraulic conductivity for the rapid draining open-graded leak detection layer was approximately  $1 \times 10^{-1}$  cm/sec. The low permeability of the dense-grade MatCon is attributed to the very low air voids in the MatCon, a key feature that also contributes to longevity by preventing air and water from entering the matrix. An important benefit of MatCon is the potential for multi-use as parking, storage of materials, and even recreational sites such as soccer fields, created by the more durable surface that does not need to be covered by soil or other protective materials. The modified MatCon contributes to improved properties over conventional asphalt by rendering the binder less susceptible to deformation or rutting, and less likely to crack in cold climates. The short-term results of this testing show that MatCon specimens were not adversely affected and conventional asphalt mixtures deteriorated over the 100-day test duration.

This is a long-term research effort, but preliminary results from both laboratory and field surface ponding tests show that the MatCon cover system yields hydraulic conductivity results that exceed fundamental baseline targets for RCRA Subtitle D cover systems. Research will continue to assess performance over the long-term.

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