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TERRAZYME PROVES ITS VERSATILITY



Truck parking and storage facility, Röske, Hungary



Röske before stabilization



The town of Röske is located in southeastern Hungary, close to the Serbian border and the M5 turnpike. It is the site of one of the largest single uses of TerraZyme in Hungary during the 2006 road building season. The project consisted of a 22,000 m² truck parking lot, 6,000 m² of which were covered with decorative concrete blocks and the rest of which was left unsurfaced.

Before TerraZyme treatment, the area had an E₂ of between 10 and 15 N/mm². The water table in the area was between 50 and 70 cm below the ground surface. The existing soil at the site had a gradation consisting almost entirely of fine sand (83% of the gradation was retained on the

0.15 mm pan). In order to meet the project's design goals and support the anticipated weight of truck traffic, the E₂ of the TerraZyme treated material needed to be at least 75 N/mm².

The existing soil was amended with slag from a local steel mill and with a local clay that had a plasticity index of 16.6%. The amendments were added at a rate of approximately 32% slag and 12% clay using standard construction equipment and methods. Use of the slag instead of clean aggregate contributed to the significant cost savings achieved through use of

UTRS EUROPE TECHNICAL DIRECTOR PRESENTS TERRAZYME® AT THE 26TH INTERNATIONAL BALTIC ROADS CONFERENCE

On August 30, 2006, UTRS Europe Technical Director Kenneth M. Wright presented a paper entitled “Case Study of the Use of an Enzyme Soil Stabilizer in Central and Eastern Europe” at the 26th International Baltic Roads Conference in Kuressaare, Estonia. This conference, held every three years,



Ken Wright

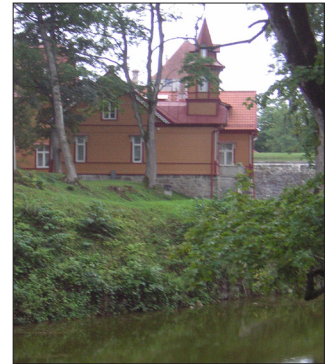
For a copy of the UTRS paper presented at the 26th International Baltic Roads Conference, contact Ken Wright at kwright@utrs.com.

is an opportunity for public and private members of the road construction and design sector throughout Estonia, Latvia, Lithuania, and surrounding countries to meet and discuss issues of the day.

Mr. Wright’s paper was 1 of 29 included in the Road

Management section of the conference. The paper focuses largely on UTRS Europe’s experience with TerraZyme® in Hungary. Copies of the paper are available by request at kwright@utrs.com. Based on the presentations at the conference, the conclusions of the conference’s Scientific Committee included the following statement:

“As there is a lack of soils suitable for road construction, more attention has to be paid for different techniques of soil stabilization for improving their structural properties.”



Kuressaare, Estonia

UTRS Europe is actively seeking projects to demonstrate the utility of TerraZyme in the Baltic states and throughout Europe. If you are interested in working with us on a project, please contact our Director of International Marketing, Frank S. Koos, at fkoos@utrs.com.

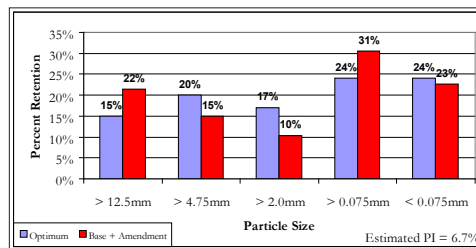
EXCERPT FROM MR. WRIGHT’S PAPER

This paper examines recent experiences using a liquid, enzymatic soil stabilizer in central and eastern Europe. It describes the technical requirements for successful use of the soil stabilizer, the modulus of elasticity (E_2) improvements attained, and the cost benefits realized.

UTRS Hungary, Kft., the Hungarian affiliate of Universal Technical Resource Services, Inc., introduced the TerraZyme® soil stabilizer to the Hungarian market in 2003. Between its introduction and the latter part of the 2006 road building season, TerraZyme has been successfully used to stabilize more than 100,000 m² of soil for projects ranging from secondary and tertiary and secondary roads to

turnpike construction service roads and sub-bases for parking lots. In central and eastern Europe, TerraZyme has also been used successfully in Romania and Serbia.

TerraZyme can stabilize existing soils within a broad range of gradations and



A comparison of the typical, amended gradation for Hungarian town roads (red) to the optimum gradation for TerraZyme treatment (blue).

plasticity indexes (PIs). In most cases, the TerraZyme-treated road base will be improved by amending existing

soils with sufficient amounts of structural gravel or plastic clay to bring the final mixture of materials close to the optimum gradation. In Hungary, the average quantity of stone amendment required was 25%; the average quantity of clay amendment was 13%. The proper technique to apply TerraZyme includes homogenization of soil and amendment, even distribution of TerraZyme and water, thorough mixing, proper grading, and compaction at optimum moisture content.

The E_2 of TerraZyme-treated soils averaged 110 N/mm², and the average treatment rate in Hungary was 0.01 liters/m². This treatment rate is directly attributable to the

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NEW PRODUCT

UTRS EUROPE BRINGS ASPHALT REINFORCEMENT TO EUROPE

UTRS Europe is pleased to announce that it has entered into a distribution agreement with FORTA®



FORTA AR fibers

Corporation of Grove City, Pennsylvania, to distribute the proprietary FORTA® AR® asphalt reinforcement product in Europe. FORTA AR fibers provide cost-effective three-dimensional

reinforcement to hot mix asphalt pavements

FORTA AR is a proprietary blend of fibrillated polypropylene and multi-filament aramid fibers. The fibers are added to the asphalt mill early in the dry mixing process. The polypropylene fiber aids in mixing and distributing the aramid fiber evenly throughout the asphalt pavement. FORTA AR fibers provide better reinforcement than other fiber reinforcement products (such as polyester, nylon, or fiberglass) and **will not** clump during mixing as other products do.

The use of FORTA AR fibers does not require any significant changes to current operating procedures. FORTA AR is added at a rate of 0.5 kg fiber per metric ton of asphalt. The addition of 0.1% bitumen to the standard asphalt design mix is recommended to account for the increased surface area of the fibers. FORTA AR does not require any changes in mix time, mix temperature, mixing equipment, laying equipment or procedures, or compacting equipment or procedures.

In manufacturer's tests, FORTA AR has been shown to increase the Marshall stability, tensile strength, compressive strength, and fatigue strength of treated asphalts. FORTA AR fibers also have been shown to reduce indirect tension (creep) and the propagation of load-induced and reflective cracking. Asphalt treated with FORTA AR is generally expected to last up to 20% longer than untreated pavements subjected to the same loading and environmental conditions.



Hot mix asphalt and aggregate with FORTA fibers hanging from shovel

FORTA AR fibers were also tested by TPA and AKMI in Hungary. The results of these tests showed that the addition of FORTA AR fibers resulted in an increase of 24% in Marshall stability test results and an increase of 17% in Marshall flow test results. The FORTA AR fibers also reduced the elasticity of treated asphalt and showed favorable results on the four-point loaded beam fatigue test.



Collecting samples

A copy of the test report is available upon request.

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the slag instead of clean aggregate contributed to the significant cost savings achieved through use of TerraZyme to complete the project.

The amended soil was treated at a rate of approximately 0.01 liters of TerraZyme per square meter of soil. Two weeks after TerraZyme stabilization, the treated layer had E_2 results ranging between 80 to 100 N/mm², thus exceeding

the design requirements by a significant margin.

The decorative concrete blocks were installed over a 5-cm layer of small gravel mixed with cement that was placed on top of the TerraZyme-treated soil. This gravel/cement base was moistened with water, and the concrete blocks were set using standard methods. Sand was then swept into the cracks between the blocks. The finished surface is both attractive and durable. A final 1,000 m² TerraZyme

treated section that will be used as storage space is planned for early in the 2007 road building season.



Röske after stabilization



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fact that the clay amendment used most often had an average PI of approximately 22%. With a PI in the range of 6% to 8%, the treatment rate can be reduced to 0.008 liter/m².

Construction costs for a traditional secondary road in Hungary (including labor, asphalt, drainage, etc.) are

approximately €34.47/m².

Average costs for a comparable TerraZyme road are €26.32/m², a savings of 23.6% due to reduced aggregate, amendment, asphalt requirements, and hauling costs. Similar cost benefits were realized in the construction of concrete-surfaced parking lots and chip/seal-surfaced tertiary roads.

