REPORT

regarding the official trip into Ianca town, Braila county, Romania, for „LIVE” preview of a communal road execution by alternative technology with soil stabilizer „EARTHZYMME” produced and distributed by canadian company CYPHER ENVIRONMENTAL LTD

Short introduction

During the period of 14-19 September 2011, at SISTEM CONSTRUCT 2007 SRL-Galati company invitation, it has been in place the office trip of undersigned Carmen Apostoiu, as Ministry of Regional Development and Tourism representative for the above mentioned road execution preview.

Road execution was contracted through auction by the Association: SC TANCRAD SRL-Galati, represented by Christian Stancic and SC SISTEM CONSTRUCT 2007 SRL-Galati represented by Valeriu Fasole. The road execution was supervised by the president of Canadian company mister Todd Burns which participate to this report with materials and photos of roads executed in other countries.

Solution presentation

EARTHZYMME is a soil stabilizer based on the enzymes, used on clay-based soils, non-toxic for the environment and created to combine the best properties of the soil.

Product info:

- EarthZyme is 100% biodegradable and after application the clay particles in the soil are no longer attracted to water, allowing for any water present in the soil to drain away freely resulting in the clay/soil particles settling closer together and producing lasting effects of soil stabilization.
- The product is super-concentrated, therefore making the product's cost negligible per kilometer of road treated compared to alternative products or standard maintenance costs of un-stabilized dirt roads.
- EarthZyme is used primarily to stabilize the base of an unsealed road but can also be used as a soil stabilizer under pavement of any kind.

Benefits obtained after this solution application:

- Reduced maintenance requirements and costs that are produced through an increased density, increased CBR value and a reduction in permeability after treatment
- Reduced reliance on expensive road building materials such as aggregates and sand;
- Reduced permeability allowing for a harder, more durable soil in wet weather
- Increased soil utility in humectation process. Through soil humectation the fine particles disappear and increase the hardness to the contact with other compounds of the product;
- Controlling hydration and dewatering cycles during the construction and stabilization process, through water resistance of soil matrix to it (water) penetration;
- Applicable using standard road building equipment;
Using EarthZyme with traditional techniques like recycled material from a construction road or the materials from the point of work;

**Utilization possibilities of EarthZyme:**

- Mine haul roads, mountain zones, hard accessible zones for any kind of terrestrial conveyance;
- Forests and lumber station roads: natural zones which need soil stabilizer solution in rainy periods;
- Cesspools and waste storage slots: through damming up of waste storage slots, zones are very good delimitate and kept away of contamination with toxic solutions or those spreading;
- Tourist roads and routes.
- **Highways (sub-base and sub-grade) and secondary / rural roads**

**EarthZyme was applied with success to roads executed in other countries like:**

- United States of America
- Canada
- Australia
- Europe
- Mongolia;
- Burkina Faso;
- Columbia;
- China;
- South Coreea;
- Dominican Republic
- Peru
- Ecuador etc.

**PARTICULARLY, EARTHZYME UTILISATION TO REHABILITATION OF A COMMUNAL ROAD INTO IANCA TOWN, BRĂILA COUNTY, ROMANIA, WITH LENGTH=1.040 km; Total Value of the work = 479.893,00 LEI (including VAT)=155.637,608 CAD**

Soil stabilization was realized on a depth of 20 cm, using the following execution technology, according to Technical Agreement no. 004-07/1204-2010:

- Scarification and break up of the road dowry on a depth of 5 cm;
- Fillings execution from soil mixed up with soil produce from scarification;
- Scarification and break up of the surface calculated for traffic road on a depth of 20 cm;
- Pulverisation with the tank of the mixture: water + enzyme, established in accordance with soil parameters;
- Mixing with the autograder of the soil with the EartZyme solution until homogenising;
- Soil levelling and compactation with compacting cylinders until the compactation parameter is reached.

**Geometrical elements** of the rehabilitated road are:

- Road platform: 8,00 m, of which:
  - traffic road: 2x3,00=6,00 m;
  - sideways: 2x1,00=2,00 m;
- transverse declivity: 3% for traffic road and 4% for sideways;
- triangular culvert for pluvial water gathering
A strength test was made with LUCAS equipment on the traffic road, two days after EarthZyme application and the obtained parameter was 50.4 t/sm, considering the fact that in depth the ionic link between the particles was not totally realised (working cycle of the enzyme is 28 days). Treated roads can be opened to traffic immediately, but small increases in strength will continue to be realized until 28 days after the compaction process.

In classical variant (pavement) the total value of the work is: 818,431,19 LEI (including VAT) = 265,431,404 CAD

Other works realised in Romania with EarthZyme:

- Street rehabilitation into Valea Nucarilor village, Tulcea county, Romania. At this work the final stabilized layer was covered with a treatment made of: bituminous emulsion + sieve refusal of stone.

Works in execution in Romania with EarthZyme sau de contractare, în România, cu soluția EarthZyme:

- Street rehabilitation into Cerna village, Tulcea county, Length = 1.250 km with a total value of 565,687.30 LEI (including VAT) = 183,462.185 CAD

Works in progress of contracting in Romania with EarthZyme:

- Touristic road fitting out into Sacele village, Constanta county, Length = 1.300 km with a total value of 327,980.00 LEI (including VAT) = 106,369.592 CAD

Exchange rate: 1 CAD = 3.0834 LEI

CONCLUSIONS

From the analyse of the materials and testing reports and from „LIVE” preview of the execution of communal road at Ianca town, Braila county, we may tug the following conclusions about the application of soil stabilizer EartyZyme:

- Reduce total costs of the work approximately with 40% as against classical variant;
- Reduce execution time of the works from few month to 12-15 days, and for highways it may reduce the time approximatively with 4 month;
- Using the existing material in road dowry. It may save approximately 200,000.00-300,000.00 cubic of aggregates like: ballast and key stone;
- The surface may be covered with any kind of pavement (bituminous treatment, asphalt, concrete etc);
- Using the standard equipment for road execution;
- Getting a consistent flat surface, without holes, ruts or water accumulations and a plane traffic road;
- Minimum deviation from big trucks circulation;
- Road life period can grow up to 16 years;
- Reduced maintenance requirements and costs;
- Road can be driven on immediately after the compaction process is complete
A final conclusion is: “THE KEY POINT OF „EARTHZYMÉ” LIKE SOIL STABILIZER IS IMPERMEABILITY GROWTH WITHOUT DEFER TO ATMOSPHERIC CONDITIONS”. The key point to remember is that the use of EarthZyme will save money. Further to that extent, when utilizing EarthZyme on a large scale, more roads can be completed with the same amount of budget, or the money saved by using EarthZyme can be spent on other infrastructure projects or social programs.

RECOMMENDATIONS

According to the above mentioned, the soil stabilizer EarthZyme may be used into National Program of Infrastructure Development or any program initiated by Ministry of Regional Development and Tourism.

Attached documents:
- Technical Agreement no. 004-07/1204-2010;
- Power point presentation of Cypher Environmental Ltd company;
- Photos from road execution at Ianca
- Materials and photos of roads executed in other countries

ELABORATED,
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evaluation-examination counselor on roads problem