ECORoads – DS
APPLICATION INSTRUCTIONS FOR DUST CONTROL
NY STATE DEPARTMENT OF ENVIRONMENTAL CONSERVATION
IN CONSULTATION WITH THE
NY STATE DEPARTMENT OF HEALTH
FOR NY STATE DEPARTMENT OF TRANSPORTATION

Application Rates (per 160 cubic yards)

EcoRoads-DS concentrate: 1 gallon
Water: 500 gallons

Road construction under optimum conditions should consider the following:

1. Road base materials using EcoRoads should have a gradation mix (size distribution) that will result in good load bearing values and contain approximately 18% to 30% non-granular fines (-200 mesh size and be cohesive in nature). Some clays and “fines” are silty in nature and are not useful for road construction. Also, excessive fines can cause problems as a result of high plasticity or low bearing value.

2. Proper moisture must be maintained during compaction. EcoRoads works best between 2% - 3% below optimum moisture. Do not compact above optimum moisture. Add one gallon of EcoRoads concentrate to the required amount of water needed to bring 160 cubic yards of material up to optimum moisture (1 liter will treat 30 cubic meters). The amount of water needed will depend on how wet or dry your material is. A general starting rule for dry material is 1 gallon to 500 gallons water. After applying EcoRoads to the road “material” additional water can be applied to bring the moisture content closer to the amount needed for proper compaction.

3. Generally, roads should not be compacted in lifts greater than 3”. The size and type of compaction equipment, plus the type of material being compacted determine lift thickness. Sufficient compactive effort must be maintained during road construction to obtain maximum density. Less compactive effort will be required using EcoRoads.

4. The road should be allowed to cure prior to use if possible (and final testing). However, the road can be used sooner if necessary. Drying of the base material will create less plasticity, decreased permeability and greater strength.

STEP 1. Blade or rip the existing road to a minimum depth of six inches and then windrow the loose material. If the road requires greater depth, work the material in the lifts. If additional aggregate is needed, use less expensive material (with more fines). Check the overall gradation of the material to insure it is within the design limits. Overall depth to be treated depends upon designed axle load requirements.

STEP 2. For each 160 cubic yards of the road base material add one gallon of EcoRoads to the amount of water to obtain optimum moisture. Refer to the worksheet contained in this manual. Spray both the bladed surface and the windrow to obtain optimum moisture. Blend the EcoRoads treated material using a grader blade, working the soil & aggregate back and forth to blend in the EcoRoads and water. If the material is too wet, blade dry. If too dry, add water without EcoRoads to bring the material up to optimum moisture. After thoroughly mixing spread the material to grade. The road
can be left in a windrow over night to allow complete moisture absorption. This will result in better compaction with less effort.

STEP 3. Extend and crown the road surface with a blade. If your material dries out on a hot day, spray again with a diluted ECOroads mixture. Compact with a compactor such as a sheepsfoot or pneumatic roller. Vibratory rollers may be used for the first and second passes, however further compaction should be done without vibrator action to avoid cracking. Compact 3” or 8 cm lifts (layers) in insure maximum compaction.

After allowing the road surface to dry (cure), it is ready for use. If an asphalt or other surface is desired, better bonding will be achieved by moistening the surface with a diluted application of ECOroads and water at one to ten thousand (1:10,000) dilution rate. This surface application may be applied anytime after a three (3) day curing period.

**IMPORTANT - DETERMINE APPROX MOISTURE IN SOIL BEFORE STARTING**

<table>
<thead>
<tr>
<th>SIEVE SIZE</th>
<th>GRADATION (%) PAssing</th>
<th>GRADATION LIMITS</th>
<th>UPPER</th>
<th>LOWER</th>
</tr>
</thead>
<tbody>
<tr>
<td>1”</td>
<td>100%</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1/2”</td>
<td>85%</td>
<td>89%</td>
<td>81%</td>
<td></td>
</tr>
<tr>
<td>NO. 4</td>
<td>62%</td>
<td>66%</td>
<td>58%</td>
<td></td>
</tr>
<tr>
<td>NO. 16</td>
<td>48%</td>
<td>52%</td>
<td>44%</td>
<td></td>
</tr>
<tr>
<td>NO. 200</td>
<td>24%</td>
<td>30%</td>
<td>18%</td>
<td></td>
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</tbody>
</table>

To achieve effective stabilization, materials containing approximately 20% cohesive fines (nongranular) have been found a satisfactory target. Additionally, the soil should contain a wide range of material sizes to provide shear strength and internal friction which increases load bearing values.
ROAD DESIGN

Construction of new & existing roads must consider several design elements, some of which are listed below:

1. Traffic Loads (wheel weight & frequency of use)
3. Topography & sub-base soil conditions (soft or firm).
4. Moisture (rain, snow & ground water)
5. Long term use and maintenance requirements.

The attached “General Guidelines for Road Construction” has been graphically depicted to show the required thickness required to support different ranges on wheel loads.

**Soft sub-base conditions require greater thickness** - in some cases as high as 24 inches (60 cm.). Where the sub-base is firm a minimum thickness of 6 inches (15 cm.) can be used. Roads with truck traffic require greater thickness to support the high wheel loads of 20,000 lbs. to 30,000 lbs (9,000 to 13,000 kilos). Analysis of the sub-base conditions and testing for load bearing capacity may be required to achieve proper design specifications.

**Traffic loads and speed** also affects the life of the road. In many instances a hard “wearing” surface cover is necessary. High speed traffic increases the mechanical forces applied to the road surface. *To prevent wear a protective cover such as asphalt, concrete or a chip seal coat may be necessary.*

**Surface and sub-surface moisture conditions** also enter into the equation for a good road design. It is important that the road have adequate drainage and that the sub-base and the road base be kept as dry as possible to prevent structural failure. Side drainage channels are important as well as crowning of the road surface to allow water to flow away from the road surface. Where ground water is near the surface it may be necessary to place a rock sub-base or other engineered treatment. It is up to the engineer to evaluate these conditions.

**Road building materials** also affect the design of a road. The type and properties of the material greatly affect the performance of the road. *Well-graded gravel and soil give maximum performance. Cohesive fines enhance the performance of a road (less rutting and potholes).*