

Road Rehabilitation Projects in Mongolia

International Seminar on the appropriate use of Natural Materials in Roads

Ulaanbaatar, Mongolia
18-21 June, 2002

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by

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Road Rehabilitation Projects in Mongolia

Our work in Mongolia is the Technical Assistance to the Supervision Teams on 4 projects:

1. 215 km of Rehabilitation the road between Erdenesant and Arvaiheer.
2. The upgrading 86 km to an all weather road between Kharkhorin and Tosontsengel.
3. The upgrading of 93 km to an all weather road between Arvaiheer and Khovd.
4. Technical Assistance for the preparation of 3 year rolling maintenance plan.

Map of our Project Roads

The detail of the specified types of reconstruction used on the project are as follows:

Type 1:

- **Crack sealing**
- **Patching**
- **Surface dressing**
- **Shoulder treatment**

The detail of the specified types of reconstruction used on the project are as follows:

Type 2:

- **Crack sealing**
- **Patching**
- **Shoulder treatment**
- **Tack coat and asphalt regulating**
- **50 mm of asphalt wearing course**

The detail of the specified types of reconstruction used on the project are as follows:

Type 3:

- **Excavation of existing surface**
- **150 mm of crushed stone basecourse**
- **Prime coat**
- **50 mm of asphalt wearing course**

The detail of the specified types of reconstruction used on the project are as follows:

Type 4:

- **Excavation of existing surface**
- **200 mm Nonfrost layer**
- **200 mm Subbase**
- **200 mm Basecourse**
- **Prime coat**
- **50 mm of asphalt wearing course**

Potholes and shoulders

Wheel tracks – asphalt shoving

Excavation of existing road showing the depth of the old pavement

Base course laying

Compaction of base course

Close up of finished base course surface

Base course segregation

Segregation probably causes:

- less bearing capacity of the E-modulus in the layer which will cause faster deterioration of the above layers and relatively thicker overlay thickness when needed
- also risk particles break down and will penetrate into the voids between the other particles settlement and lower bearing capacity in the above unbound layer.

Unbound layer requirements

Property	Requirement
Los Angeles	< 25%
Compaction degree, modified Proctor	> //////////

Asphalt aggregate requirements

Property	Requirement
Los Angeles Abrasion	Max 25
Aggregate Crushing Value	Max 25
Sodium Sulphate Soundness	Max 12
Water Absorption	Max 2%
Flakiness Index	Max 20

Result of segregation

- Less bearing capacity probable of lower E-modulus in the layer which cause relatively faster deterioration of the above layers and result in a thicker overlay being required in the future.
- Risk that particles break down and penetrate into the voids between the other particles causing settlement within the layer.
- Risk that the fines from the above unbound layer penetrate into the segregated layer, causing settlement and lower bearing capacity in the above unbound layer.

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Graded crushed stone base material

Property	Requirement
Plasticity Index	Max 6
Plasticity Product	Max 45
Sodium Sulphate Soundness	Max 12
Los Angeles Abrasion Value	Max 30
Flakiness Index	Max 35
Ten percent Fines Value	Min 110 kN
CBR after 4 day soak at 100% MDD	Min 90%

Necessary quality of natural aggregates means the appropriate quality level for aggregates for roads are the level which is based on technology financial and environmental matters are taken into consideration:

- Technological consideration**
- Environmental consideration**
- Economical consideration**

Under the right construction conditions aggregates of lesser quality can be used for highways as well as heavy duty pavements.

Typical defects seen in older and new roads:

- **Shoving**
- **Rutting**
- **Cracks**
- **Deformation**
- **Potholes**
- **Deterioration**
- **Shoulder erosion**

Road defects are primarily caused by:

- Frost heave
- Freeze / thaw
- Water penetration
- Low compaction degrees
- Improper material composition
- Weak materials
- Hard binders / soft binders

How to avoid the problems?

- **Appropriate use of the materials and what does it mean:**
 - **Appropriate design**
 - **Appropriate material requirements**
 - **Appropriate quality control by the Contractor**
 - **Appropriate quality control by the Client**

Acknowledgements:

- **Directors of the Department of Roads**
- **Mr. Chuluun Damdin,
World Bank Coordinator**
- **Mr. Lhamjav Gombo,
Head of Planning Research Division DoR**
- **Mr. D. Baasankhuu,
The Project Manager**
- **Mr. N. Adilbish,
Head of Maintenance Division DoR**