

# Structural Soils

## EROSION CONTROL TECHNIQUE

Revegetation	✓	Temperate Climates	✓	Short-Term	
Non Vegetation		Wet Tropics	✓	Long-Term	✓
Weed Control		Semi-Arid Zones		Permanent	✓



Symbol



**Photo 1 – Stage 1: placement of aggregate**



**Photo 2 – Stage 1: fill voids with soil, then seed (non-traffic period)**



**Photo 3 – Stage 1: Establishment of grassed surface (vehicular traffic allowed)**



**Photo 4 – Grassed structural soil used for erosion control under a rural bridge**

### Key Principles

1. The appropriate combination of soil, rocks and vegetation allows the formation of a hard-wearing surface that can be used for erosion control on light traffic areas.
2. The long, non-traffic, establishment time generally makes this treatment option unsuitable for construction sites; however, when sufficient establishment time exists, it can be used to stabilise long-term construction site car parks.
3. The key to long-term performance is to avoid compaction of the soil component, thus the percentage of soil fill must not exceed the void volume of the loosely placed aggregate.
4. It is very important to prevent sediment deposits on the vegetated surface, thus good sediment control measures are required around the treated area.

## **Design Information**

Typically 20 to 50mm aggregate. Aggregate must be near uniform in size (uniform grading) with no fines. Depth of aggregate is ideally the depth of the root system of the ground cover, but practically a depth of 150 to 200mm should be sufficient.

Aggregate void volume can be determined by placing a sample of aggregate in a volumetric (measuring) jar, filling with water to the top of the aggregate, then measuring the retained water.

Important to ensure that the treated area suitably drains (i.e. good sub-surface drainage) such that waterlogging does not occur that may adversely affect vegetation growth.

Vegetation establishment phase requires **no** traffic movement over a period of around 2 to 3 months depending on the expected duration of the plant establishment phase.

## **Description**

An aggregate-soil mixture that produces a soil profile resistant to compaction caused by light traffic movement.

## **Purpose**

Stabilisation of vegetated swales that are occasionally subjected to vehicular traffic.

Porous pavements that can be used for occasional overflow parking, such as vehicular parking on grassed parks.

Long-term, temporary car parking on construction sites where there is sufficient planning time to allow a 3-months non-traffic vegetation establishment period.

Traffic-induced damage to the grass is minimised by preventing compaction of the soil located within the aggregate layer. This in-turn minimised damage to the plant's root system. Soil compaction is prevented by allowing the weight of vehicles to be spread through the soil profile by direct aggregate to aggregate contact.

## **Limitations**

Required a long, non-traffic establishment period of around 2 to 3 months. Any vehicular traffic movement during the vegetation establishment period can result in root damage.

## **Advantages**

Porous surface that can capture and treat many of the pollutants associated with motor vehicles and car parks.

Formation of a trafficable surface that is stronger than grass or aggregate on its own.

Well-vegetated structural soils (as shown in Photo 3) can generally withstand infrequent, construction traffic, such as loaded trucks, without damage to the surface or to the vegetation.

Aggregate continues to provide effective erosion control properties even during periods of drought when grass die-back occurs.

## **Disadvantages**

Long establishment period of 2 to 3 months.

Grass within the treated area is most susceptible to die-back (browning) during periods of drought compared to traditional grassed surfaces.

## **Common Problems**

Sediment deposits on the treated surface can result in soil compaction and failure of the plant cover.

## **Special Requirements**

It is essential for the aggregate to have a near uniform in size with little or no fines. This maximises the potential void volume, thus maximising the volume of soil infill without allowing soil compaction.

Requires good perimeter control of sediment to prevent sediment deposition of the surface.

## **Location**

Grassed surface that may experience regular heavy pedestrian traffic or occasional vehicular traffic.

## **Site Inspection**

Check for sediment deposits on the treated surface that may compact and damage the vegetation cover.

## **Performance Indicators**

Check for healthy, continuous vegetation cover.

## **Construction**

1. Refer to approved plans for location, extent, and application details. If there are questions or problems with the location, extent, or method of application contact the engineer or responsible on-site officer for assistance.
2. Prior to placement of the aggregate, determine the expected void spacing of the loose aggregate, if not already specified on the plans.
3. Spread enough aggregate to completely cover the surface of the soil at the density or thickness specified in the approved plans. If the application density is not supplied, then apply at a thickness of at least 150mm.
4. Ensure the soil pH is within the specified range.
5. Apply sufficient topsoil to completely fill, but not exceed, the void space within the aggregate. Where conditions allow, the soil and aggregate can be pre-mixed before placement.
6. Using a hand or machine broadcasting method, apply one-half the specified quantity of seed while moving back and forth across the area, making a uniform pattern. Then apply the second half in the same way, but moving at right angles to the first pass. Cover broadcast seed by raking or chain dragging; then firm the surface with a roller to provide good seed contact.
7. Even out (level) any disturbances in the aggregate that have occurred during the topsoil and seeding process such that the final design levels and surface profile are achieved.
8. Mulch the seeded area as specified in the approved plan.
9. Make all necessary adjustments to ensure run-on stormwater flow is allowed to pass freely across the treated area following its natural drainage path.
10. Where required, establish appropriate sediment controls up-slope of the treated area to prevent sediment deposition on the surface.

## **Maintenance**

1. Inspect all treated surfaces fortnightly and after runoff-producing rainfall.
2. Check for rill erosion, or dislodgment of the aggregate.
3. If wash-outs occur, repair the slope and reinstall surface cover.
4. If the treatment is not effective in containing the soil erosion it should be replaced, or an alternative erosion control procedure adopted.

## **Maintenance of grass**

1. Watering the vegetation periodically is essential, especially in the first 7 days after establishment. Use low-pressure sprays because high-pressure jets can wash away the seed and mulch cover.
2. Watering should start immediately after planting. Watering should comply with specifications provided with the approved plans. Generally watering should vary according to weather and soil conditions. A typical watering schedule may consist of the following:
  - 25mm every second day for the first three waterings;
  - 25mm twice a week for the next three weeks; and
  - 25mm once weekly for a further two weeks.
3. Monitor site revegetation, particularly after rainfall, and appropriate maintenance and/or amendment to ensure that the revegetation is controlling erosion and stabilising soil slopes as required.
4. Areas must be re-seeded and mulched if the vegetation fails to establish or is damaged by runoff or construction activities.
5. If the temporary vegetation cover or erosion control measure (e.g. mulch cover) should fail for any reason before establishment of the permanent vegetation cover, then it must be replaced with an appropriate type of cover sufficient to control soil erosion.
6. If the permanent vegetation should fail to establish or to adequately restrain erosion for any reason during the construction or maintenance period, the area should be reseeded.