

CASE STUDY

ROADSIDE DRAINAGE SYSTEM

Background

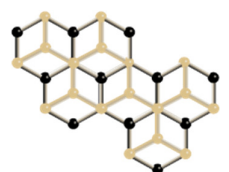
A Shire has a roadside drainage problems. The pictures, sourced from valid resources, clearly shows signs of road shoulder erosion. The concentrated runoff travelling along an unprotected shoulder or drain can progressively remove gravel and soil. This can create scouring, edge drop-offs and unstable shoulders, potentially reducing the usable road width and creating a safety hazard. Eroded soil and gravel are transported downstream and deposited in flatter sections of the drainage network. Sediment can gradually reduce the drainage capacity of drains and culverts, creating a cycle where poor drainage causes erosion, and erosion further reduces drainage performance. Eroded shoulders, washouts and damaged pavement edges can create additional hazards, particularly on higher-speed rural roads. If drainage deficiencies are addressed only by repeatedly grading drains, filling erosion or patching damaged pavement, the underlying drainage problem remains. The Shire may face increasingly frequent maintenance expenditure and eventually require substantially more expensive road or drainage reconstruction.



Fig. 1



Fig. 2



Solution to the issue

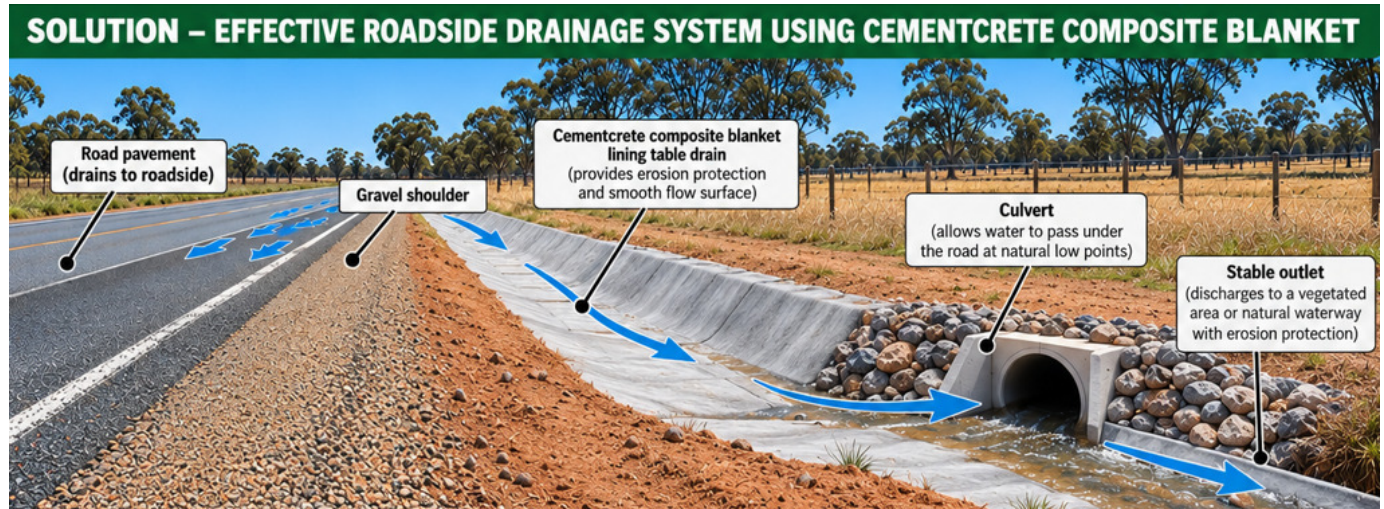


Fig. 3

Steps to lining the Cementcrete Composite Blanket on table drain

1. SUBSTRATE PREPARATION

A smooth uniform profile should be prepared to suit the design dimensions.

Remove vegetation, sharp or protruding rocks and fill large voids.

Excavate edge anchor trenches on side slopes and along the invert. Anchor trench dimensions must be a minimum of 150 mm x 150 mm (Fig. 4) but may need to be increased to suit the requirements. For example, if 6 mm (or 10 mm) thickness of cementcrete composite blanket is deployed, the anchor trench dimensions must be increased to 200 mm x 200 mm (or 250 mm x 250 mm).

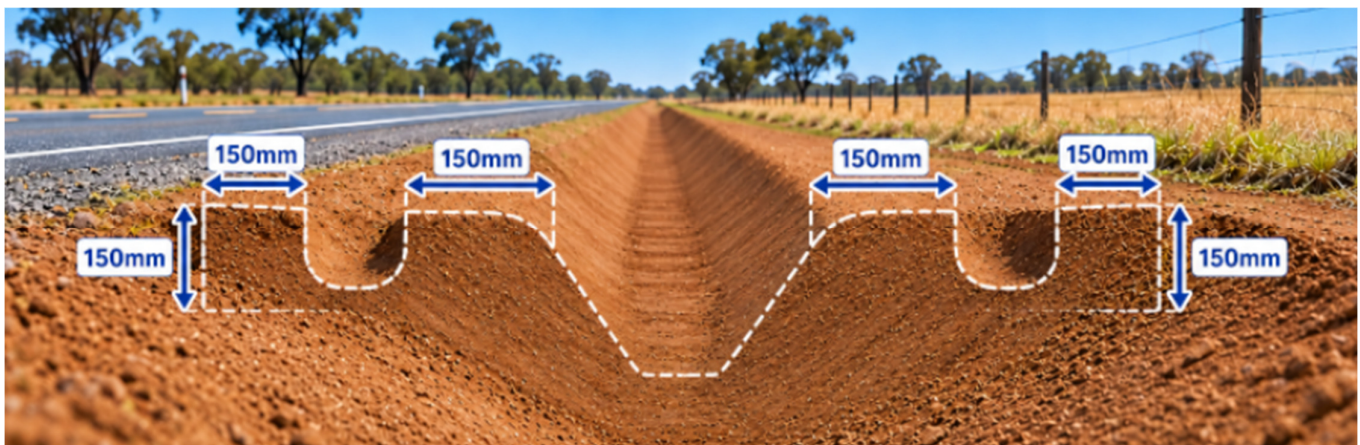


Fig. 4

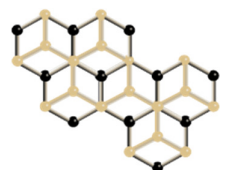




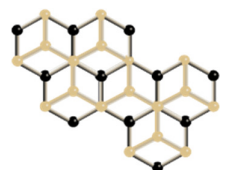
Fig. 5 and 6 Anchor trenches dug out on side slopes along the invert

2. EQUIPMENT REQUIRED

The following equipment is required to complete the job (**Fig. 7**).



Fig. 7



3. DEPLOYMENT

A spreader beam (rated to 4500lbs SWL) is required to assist in deploying bulky rolls of cementcrete composite blanket.

Begin downstream end of channel, with overlapping the layers by 100 mm. Ensuring the fibrous top surface faces upwards, with the woven textile membrane in contact with the ground.



Fig. 8 Cementcrete composite blanket lay by begin at the downstream end of channel



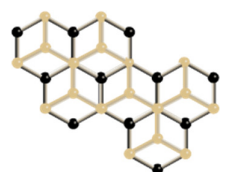
Fig. 9 Overlapping the layers by at least 100mm

Overlapping the material in the direction of water flow (see Fig. 15).

Adjust the cementcrete composite blanket to remove any wrinkles and ensure it conforms to the shape of the substrate when hand repositioning. Cementcrete composite blanket must be in direct contact with the surface to prevent air pockets.



Fig. 10 Adjusting cementcrete composite blanket with hand repositioning



Avoid walking on the material to prevent staining and creating depressions in the material. If walking on the material is necessary, the surface can be protected using timber boards.

Tuck the edge of the cementcrete composite blanket into the anchor trench before cutting to length. Create 15-20 mm allowance from the cut edge due to potential loss of fill.

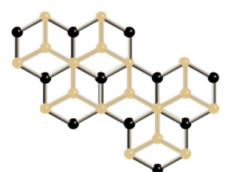
Ensure the first layer and the last layer of the cementcrete composite blanket is tucked into the anchor trench and backfilled to prevent ingress of water under the cementcrete composite blanket. Anchor trenches must be backfilled with poured concrete (if available) or road base and compacted. This will prevent ingress of water under the material lining.



Fig. 11 & 12 First layer of the cementcrete composite blanket is tucked into the anchor trench



Fig. 13 & 14 Last layer of the cementcrete composite blanket is tucked into the anchor trench



4. JOINTING

On the overlapping layers, apply stainless steel screws 30 mm from the edge of the top layer and autofeed the screw at 100 mm apart to each other along the edge of the top layer.

Sealant applied at 70 mm from the edge of the bottom layer where the screws will be positioned.

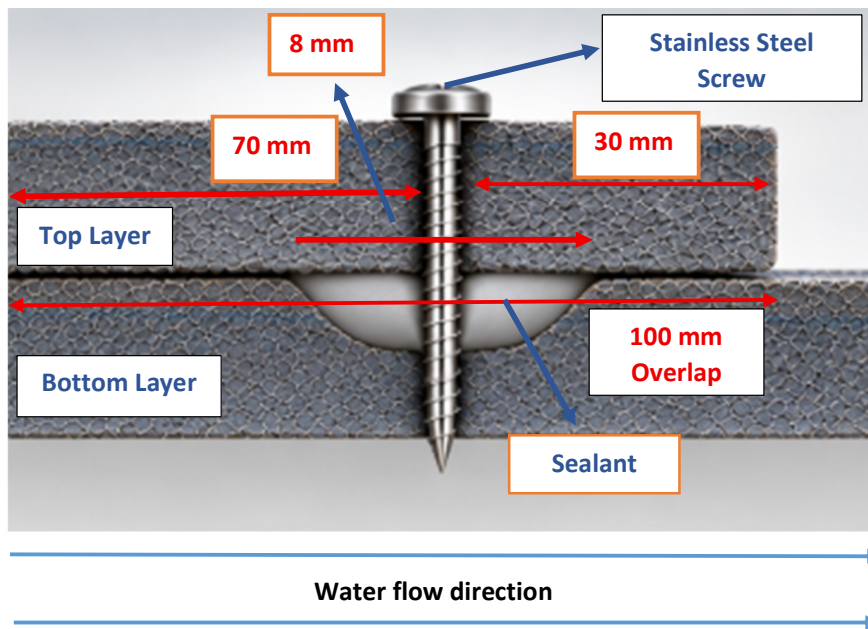


Fig. 15

5. ANCHOR EDGE FIXING

Position the cementcrete composite blanket over the shoulder of the channel and into the anchor trench.

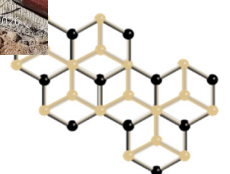
Fix the material in the anchor trench by inserting fixing pegs through each overlap (Fig. 16 & 17).



Fig. 16



Fig. 17



The cementcrete composite blanket should be hydrated before backfilling with non-erodible backfill. In this case, it is recommended to backfill with poured concrete (if possible) or road base and compacted.



Fig. 18 The cementcrete composite blanket is hydrated with water



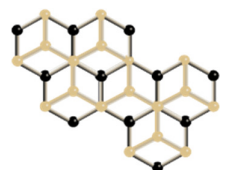
Fig. 19 Once the cementcrete composite blanket was hydrated, it is backfilled with road base material

6. INTERMEDIATE FIXINGS

Additional intermediate fixings may be required to profile the cementcrete composite blanket on uneven substrate to ensure it conforms to the underlying surface and remove voids (**Fig. 20**). 'Round head' fixing pegs can be used if necessary and should be galvanised mild steel, 12-16 mm shaft diameter, up to 400mm long and have a minimum of 50 mm diameter head.



Fig. 20



7. HYDRATION

After fixing and jointing, the surface of the cementcrete composite blanket can be brushed and clean to remove marks and debris before spraying with water to hydrate.

Spray the material until it is fully saturated.

Avoid spraying with high pressure water directly onto the material as this may wash a channel in the material.

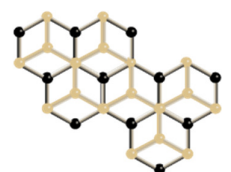
The material can be hydrated using fresh water or salt water, it is not possible to over hydrate the material.

A minimum volume of water per square meter equal to 40% of the material weight is required.

To check proper hydration, the material should feel wet to the touch several minutes after hydration. Press your thumb into the material and release. If water is present in the depression in the material, it has been sufficiently hydrated. If no water is observed, then more water must be applied.



Fig. 21 The cementcrete composite blanket is hydrated with water after joining, fixing and backfilling



8. SETTING

Backfill anchor trenches with non-erodible fill to encourage surface water runoff to flow over the anchor trench and into the cementcrete composite blanket channel. The material hardens to strength in 24 hours.

Allow the material to cure for at least 48 hours before applying any post installation surface treatments.

If installation continues the following working day, protect the edge of the last layer with a waterproof sheeting and temporary ballast prior to hydrating the rest of the structure.



Fig. 22 The finishing layout of cementcrete composite blanket on roadside drainage channel

CONTACT DETAILS

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