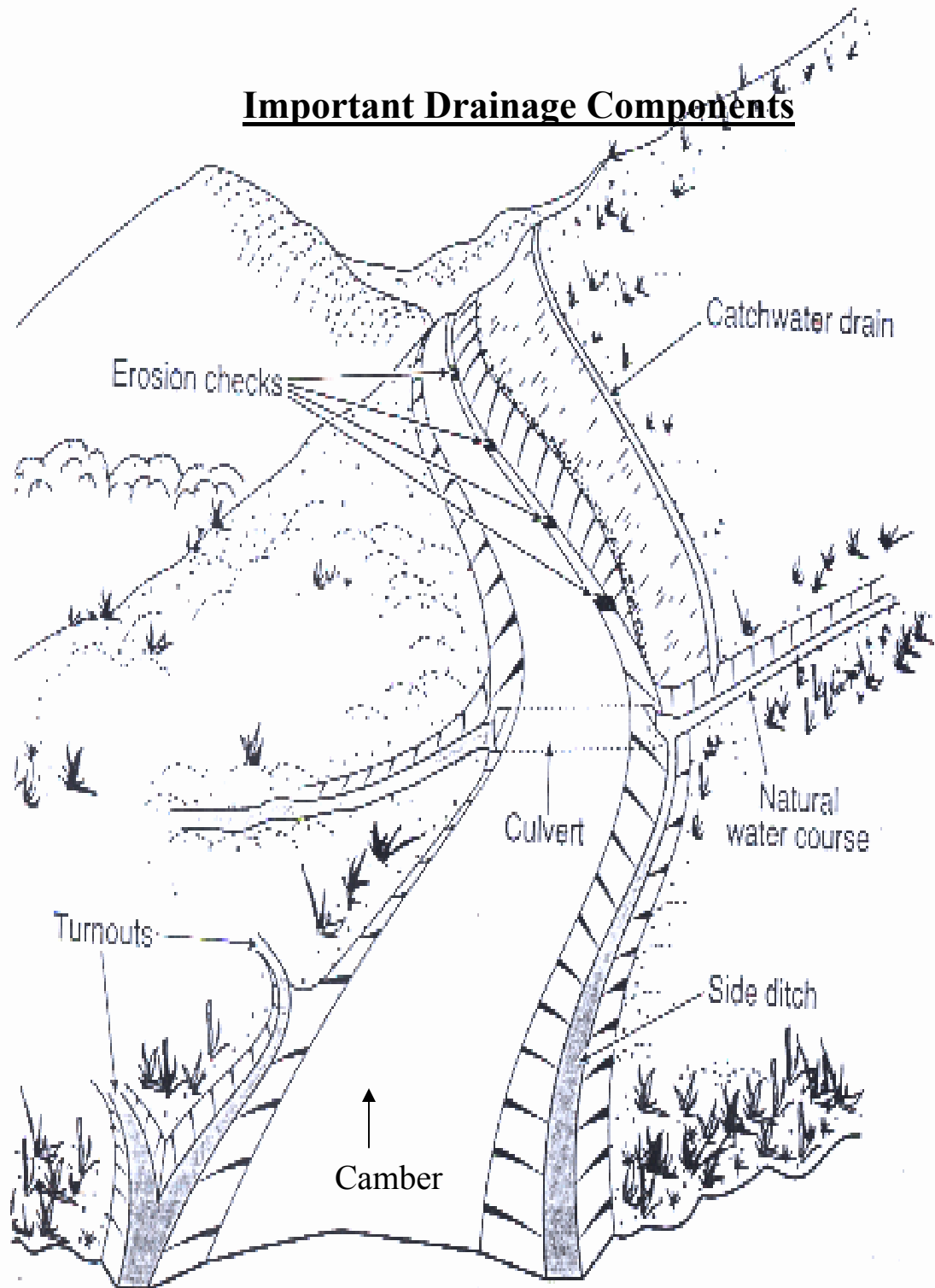


LABOR-BASED ROUTINE ROAD MAINTENANCE (LBRRM)



A GUIDE TO THE PRACTICAL TASKS

Important Drainage Components



THE IMPORTANCE OF DRAINAGE

Keep water off the running surface and clear of the road by:

**Preventing water getting on to the road
(CATCHWATER DRAINS)**

**Getting water off the road (SUITABLE CAMBER
OR DIVERSION HUMPS)**

**Getting water away from the road
(SIDE DRAINS & TURNOUTS)**

**Getting water across the road
(CROSS DRAINAGE eg CULVERTS)**

Control erosion:

**-of the road (eg SPEED CONTROL, HUMPS);
-of the ditches (eg SCOUR CHECKS);
-of culverts and adjacent land (eg
VEGETATION).**

**Control siltation in ditches and culverts
(MAINTENANCE).**

IMPORTANCE OF
ROUTINE/PREVENTATIVE
MAINTENANCE:

IF EFFECTIVELY DONE, IT CAN:-

- KEEP THE ROAD IN A PASSABLE CONDITION.***
- REDUCE THE LIKELIHOOD OF MAJOR DAMAGE & THEREFORE THE NEED FOR OUTSIDE ASSISTANCE IN THE FORM OF MACHINERY.***
- ALLOWS THE UPKEEP TO BE WITHIN THE CAPACITY OF THE BARANGAY.***
- ASSISTS THE LOCAL ECONOMY BY SPENDING THE FUNDS LOCALLY.***

TASKS INVOLVED IN ROUTINE/PREVENTATIVE ROAD MAINTENANCE):-

- **CONTROLLING SIDE VEGETATION [MONTHLY]**
- **FILLING RUTS AND POTHoles & MAINTAINING ROAD SURFACE [BI-MONTHLY OR AFTER HEAVY RAIN]**
- **CLEARING AND REPAIRING SIDE DITCHES [BI-MONTHLY OR AFTER HEAVY RAIN]**
-
- **CLEANING AND MAINTAINING CULVERTS [BI-MONTHLY OR AFTER HEAVY RAIN]**
- **MAINTENANCE OF EROSION PREVENTIVE MEASURES (VEGETATIVE/SIMPLE STRUCTURES) [MONTHLY OR WHEN NECESSARY]**

TOOLS REQUIRED

I SET PER WORKER CONSISTING OF:-

NORMALLY PRIVATELY OWNED BY WORKER:-

BOLO/SCYTHE (x 1)
AXE (x 1)

NEEDING TO BE SUPPLIED:-

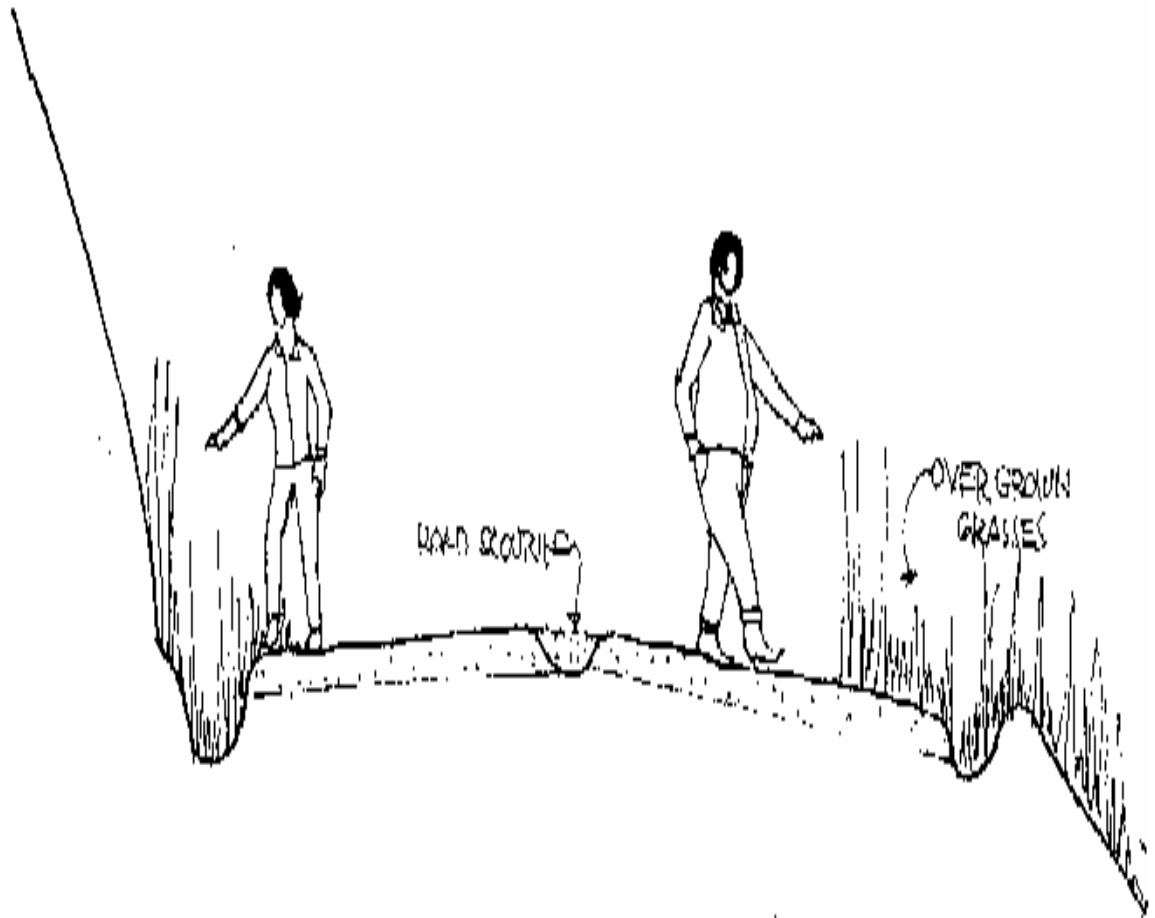
SPADE/SHOVEL (x 1)
PICK MATTOCK (x 1)
DIGGING BAR (x 1)
RAKE (x 1)

ITEMS TO BE ISSUED PER TEAM (4/5 WORKERS):-

TAMPERS (USUALLY HOME-MADE WOODEN) (x 2)
WHEEL BARROW (x 1)
ROPE/ROD/BUCKET (FOR CLEANING CULVERTS)

CONTROLLING ROADSIDE VEGETATION

THE PROBLEM

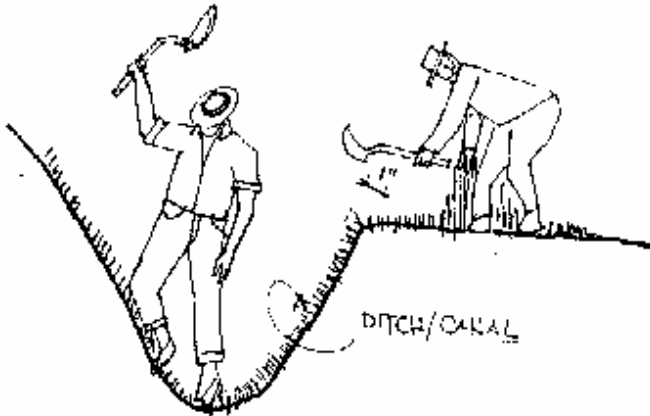


OVERGROWN GRASS AND VEGETATION WILL BLOCK THE DRAINS AND CAUSE WATER TO FLOW ONTO THE ROAD

Vegetation Control

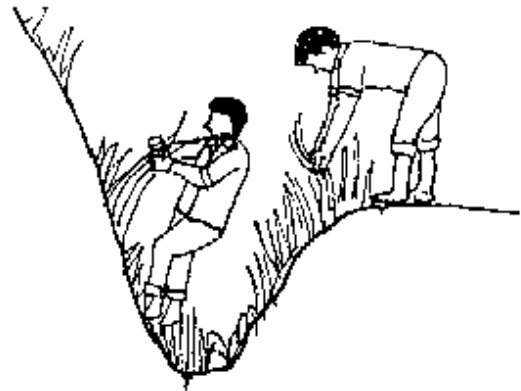
THE SOLUTION

DO THIS



Trim vegetation back to about 1 inch from ground. Remove and pile well away from the ditch

DONT DO THIS



AVOID PULLING THE GRASS OUT AS THIS LOOSENS THE SOIL AND WILL CAUSE EROSION

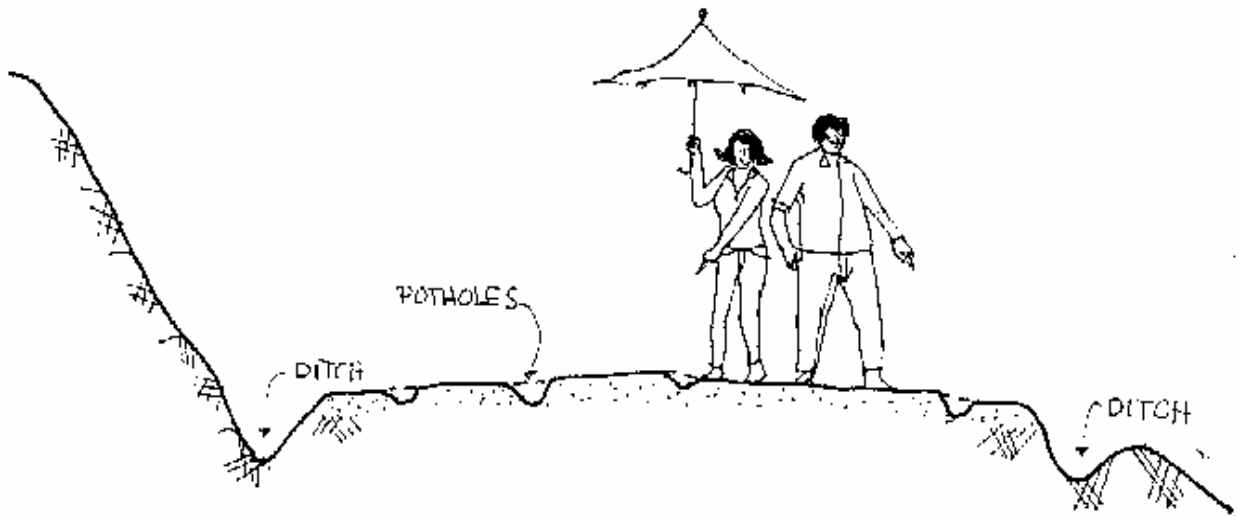
- **PURPOSE**
- **To maintain adequate site distance**
- **To prevent clogging of the drains**
- **To assist drying of the road**

PROCEDURE

1. **Cut vegetation from road shoulders, side slopes & ditches**
2. **Remove cut material from ditches**
3. **Pile away from road**

MAINTAINING THE ROAD SURFACE

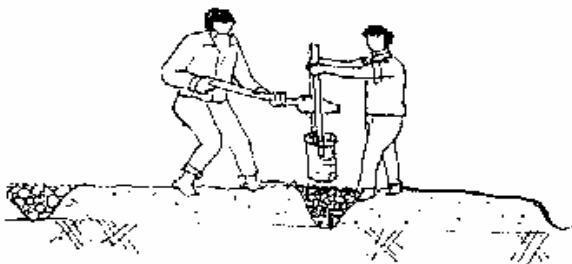
THE PROBLEM



Potholes start small but rapidly get bigger if not properly filled

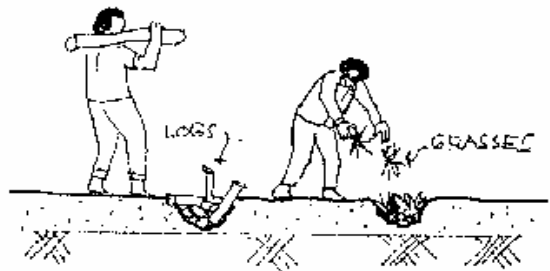
THE SOLUTION

DO THIS



Remove wet material, fill with proper aggregate and compact

NOT THIS



Never use organic matter and logs etc

FILLING OF POTHOLES AND RUTS

PURPOSE: To prevent the ponding and passage of water within the road and to improve the surface smoothness.

MATERIALS: Aggregates (From road side or gravel sources)

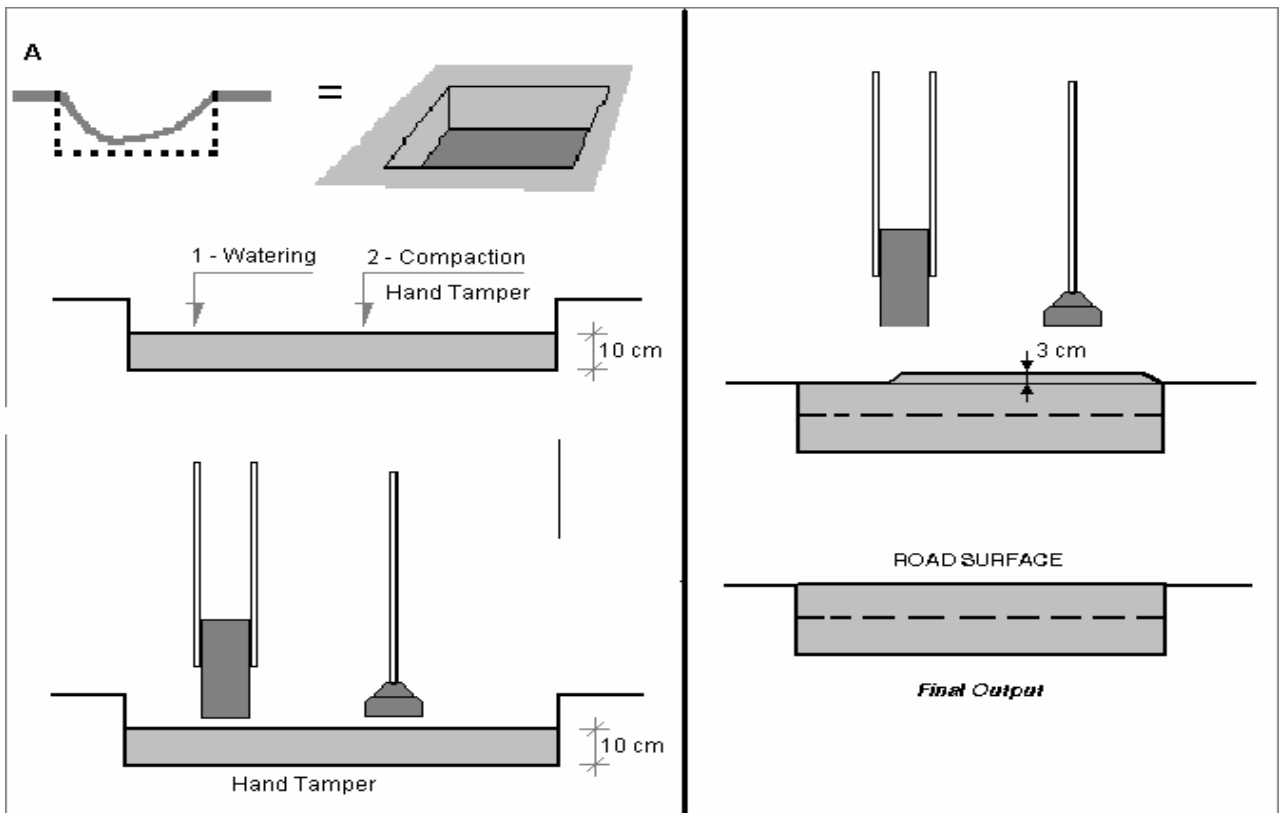
PROCEDURE: (As soon as ponded water is observed)

1. Remove water and soft material from the patch area.
2. Clean loose materials from the edges of potholes, making the side vertical
3. Place aggregate in several layers, hand tampering each layer.
4. Rake final layer so the top of the patch is slightly above the surrounding road surface.

Where long RILLS run down the steeper sections, follow steps 2 – 4

CROSS HUMPS should be repacked, so that the flow of water does not break through and flow down the road.

METHOD OF UNDERTAKING: Experienced paid labour



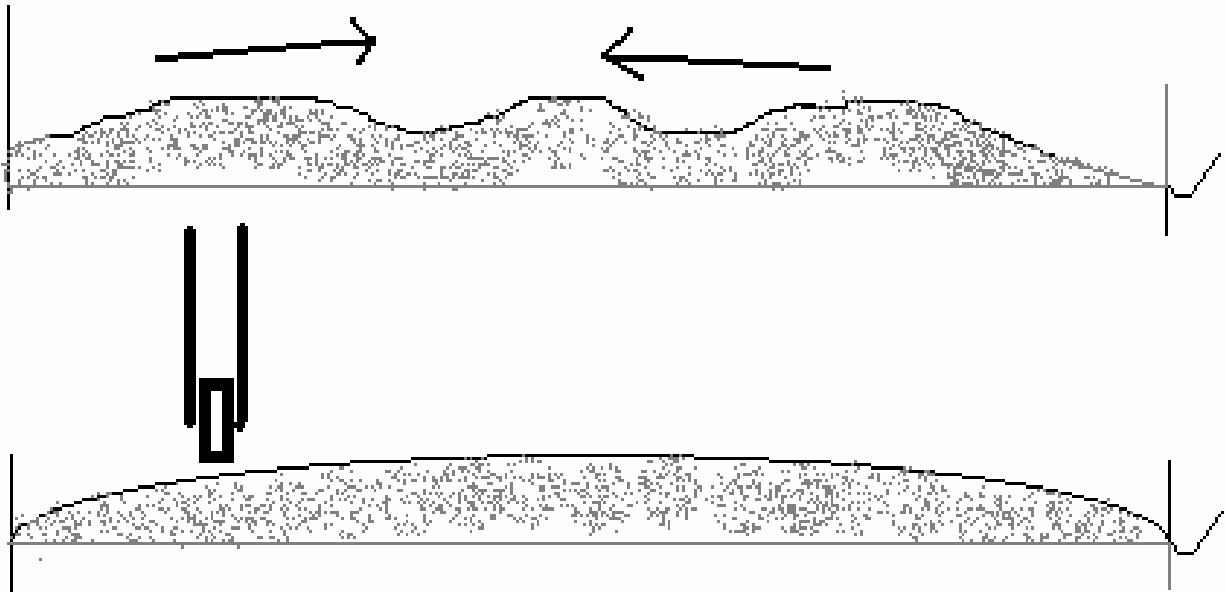
RESTORING THE ROAD SURFACE

Purpose: To maintain the shape of the road so that water is quickly removed, as well as maintaining the surface strength.

Procedure:

- 1. Return gravel from side to the roadway surface (The Middle)**
- 2. Spread material with rakes and shovels**
- 3. Compact road surface with hand tampers**

Shovel to the middle, rake and tamper



Restored camber

CLEANING/REPAIRING/RESHAPING SIDE DITCHES

PURPOSE: To ensure the efficient interception and removal of water from the locality of the road.

HAND TOOLS: Pick/mattock, Axe, Shovel, wheelbarrow, Tamper

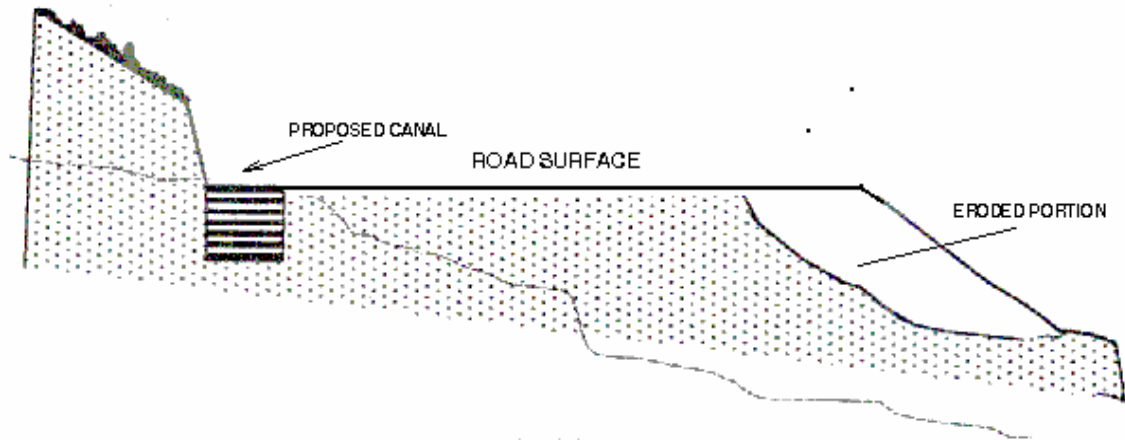
PROCEDURE:

- 1. Remove rocks, logs, and other obstructions from the ditch, esp. land slips.**
- 2. Excavate silt or sand to make the bottom of the ditch flat or slightly rounded.**
- 3. Shape the sides of the ditches as flat as possible. This will provide better water flow and minimise future erosion.**
- 4. Dispose of excess materials by spreading it well clear of the ditch, otherwise in the middle of the roadway to help maintain the camber. Use rake to spread it.**
- 5. Do not pile the material or leave as ridges in the roadway. This prevents surface water from flowing to the ditch.**

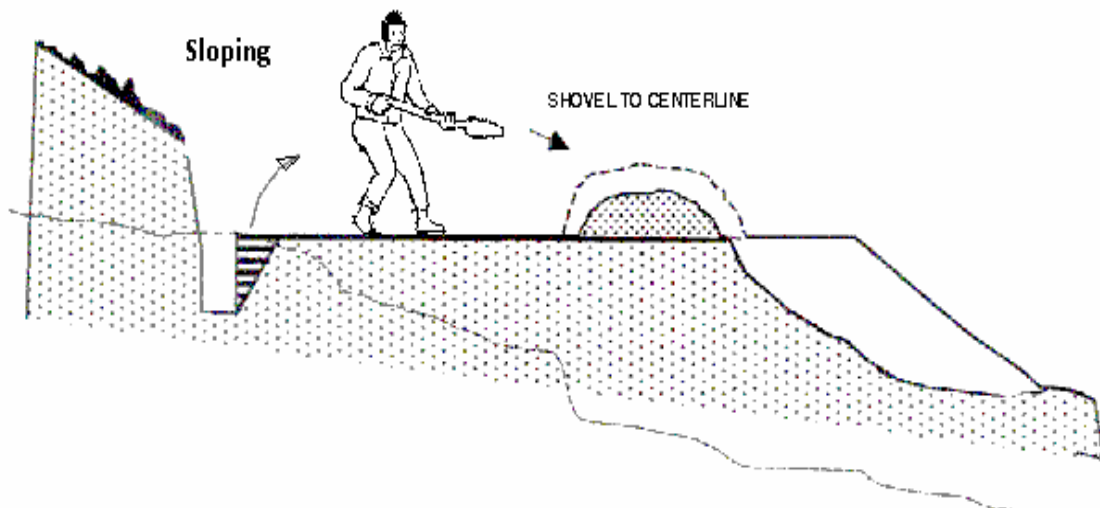
LIKELY FREQUENCY : Twice monthly or after heavy rain

DITCHING

DITCHING (1)

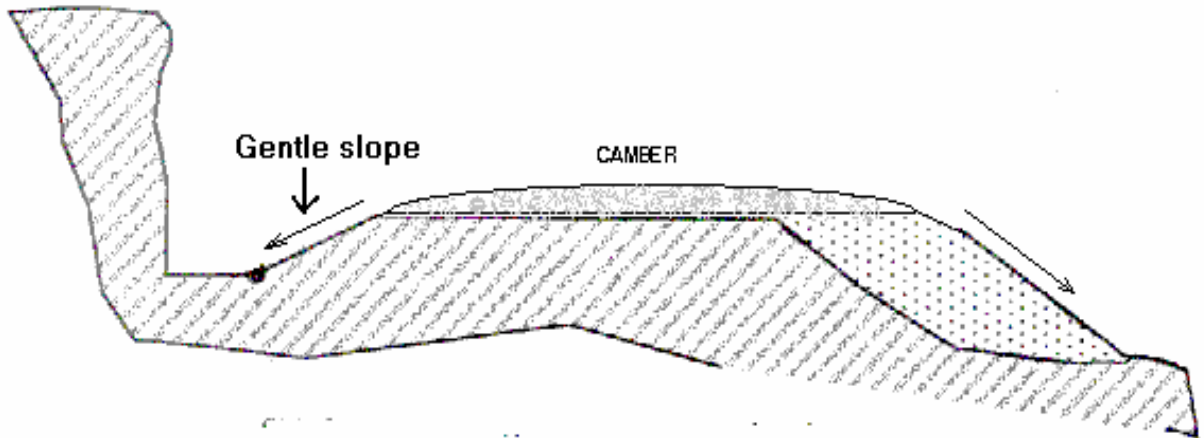


DITCHING (2)

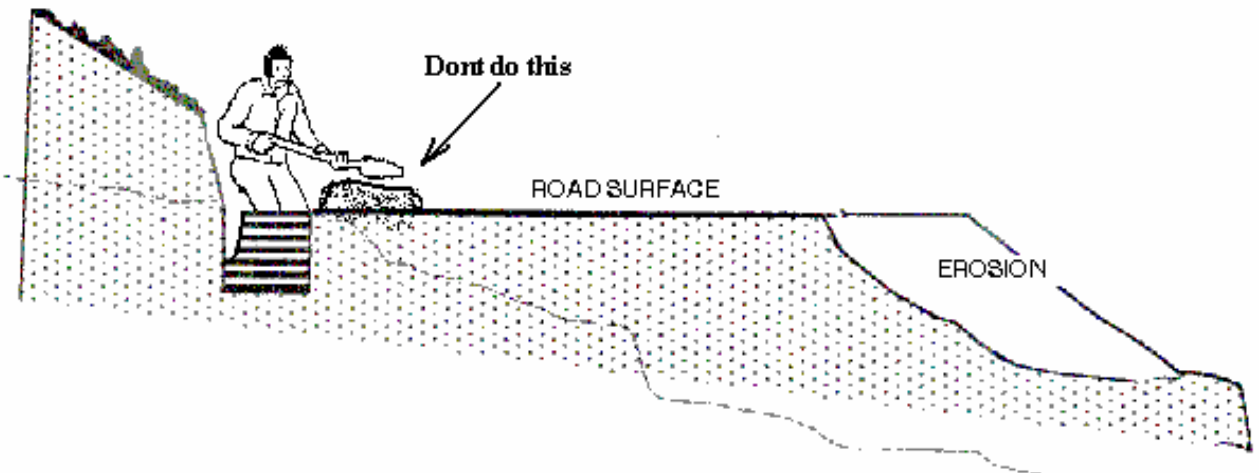


DITCHING [2]

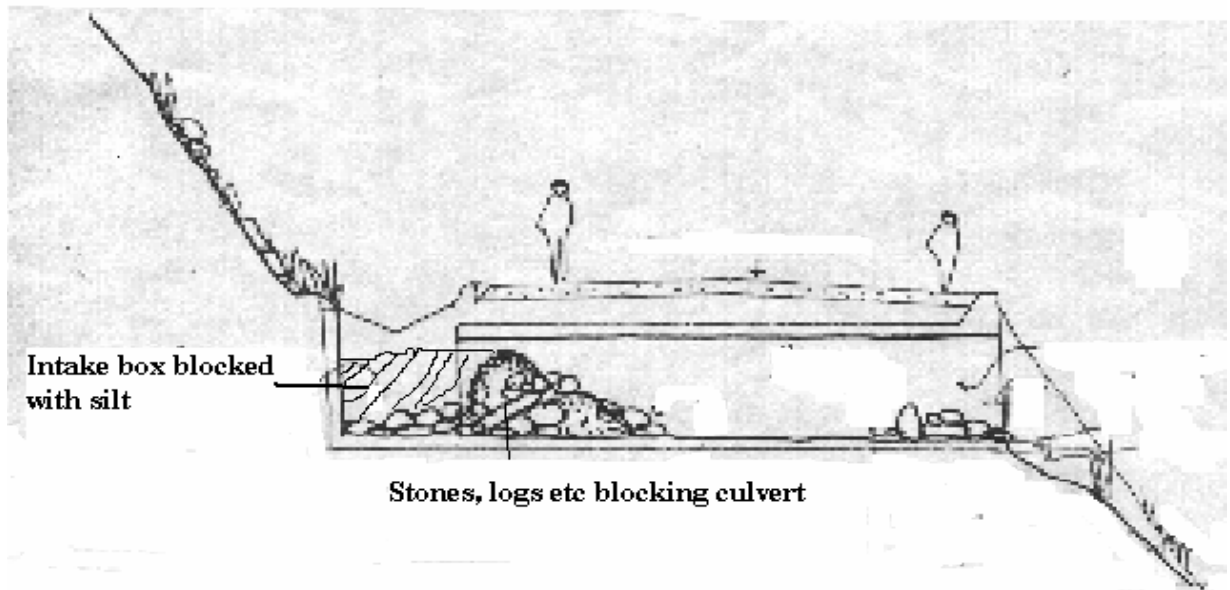
RESTORED DITCH



DITCHING



Cleaning Culverts & Other Structures



Procedures

- 1. Remove logs, stones, other obstructions from ditches/culvert inlet.**
- 2. Excavate silt and debris from intake box and culvert by hand or with a rope pulling a drag or bucket through**
- 3. The outlet ditch must be cleaned so water can flow easily**
- 4. Load all debris and surplus material and dispose away from site**

EROSION CONTROL

PURPOSE: To avoid damage to the road and its drainage system.

TASKS:

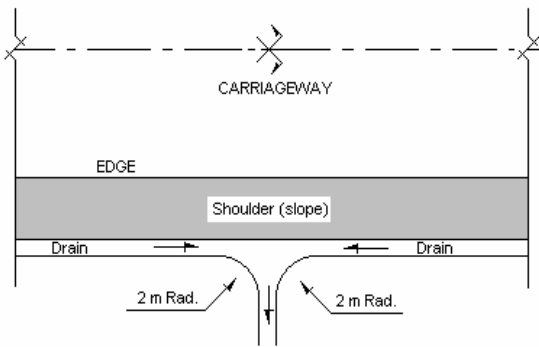
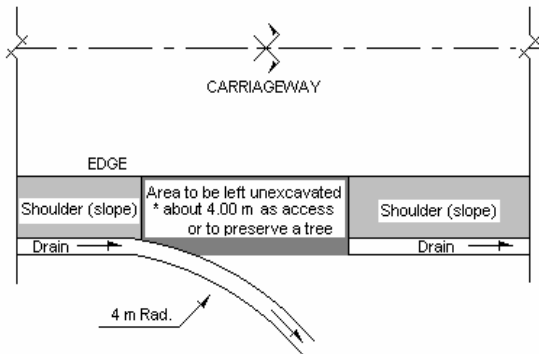
- 1. Repair eroded areas by filling with gravelly soil/boulders & compacting.**

- 2. Rectify conditions causing erosion, with actions such as:**
 - Widening and flattening of ditches;**
 - Providing new turnouts to reduce concentration of water;**
 - Placing and maintaining sods and vegetation over erodable areas;**
 - Lining ditch channels with rock;**
 - Protecting the ends of culverts and bridges;**
 - Constructing scour checks to reduce velocity of water in ditches with long steep gradients;**
 - Repairing smaller embankment slips with stakes, rocks and planting material.**

LIKELY FREQUENCY : Monthly or when necessary

METHOD OF UNDERTAKING: Skilled labour

TURNOUTS (MITRE DRAINS)



TURNOUTS (MITRE DRAINS)

These lead water away from the sidedrains for dispersal in the surrounding area.

INDICATIVE SPACINGS

| | |
|--------|-------|
| Steep | = 10m |
| Medium | = 20m |
| Gentle | = 50m |

The spacing is indicative only and really depends on volume to be removed. In fact, the more turnouts the better as this means less volume at each turnout, meaning less erosion in the drains and especially in the surrounding area.

THE WIDER THE TURN OUT, THE LESS SCOURING THERE WILL BE



CORRECT



INCORRECT



CORRECT



INCORRECT

DIVERSION BANKS (HUMPS)

These are a useful means of diverting water off the road in turnouts and they can be constructed with maintenance labor. The material (soil/aggregate) must be put on in layers and well tampered.

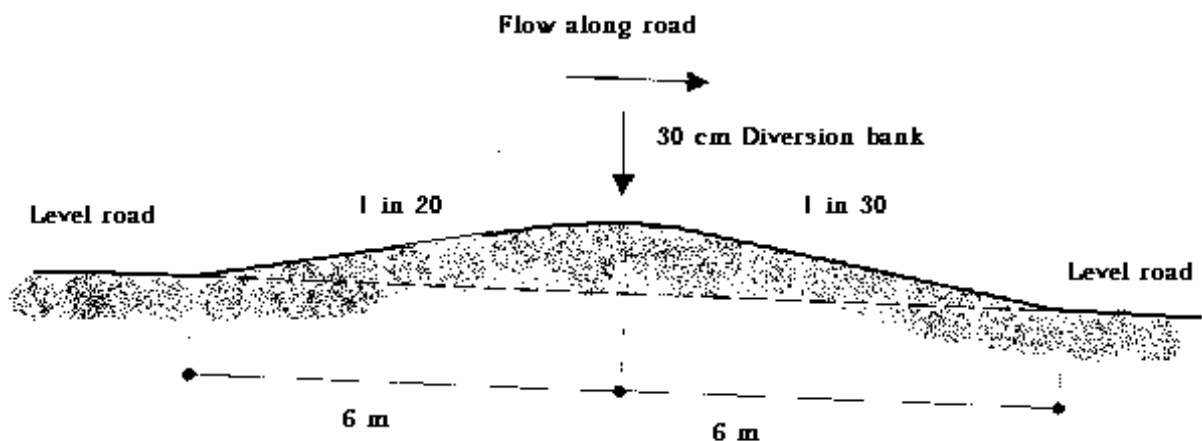
The distance between banks will vary. In hilly areas it can be as short as 40m and in fact the more the better so as to reduce the amount of water flowing off each one and therefore the erosion.

They should be set at a diagonal (45° angle) to guide the water off the road.

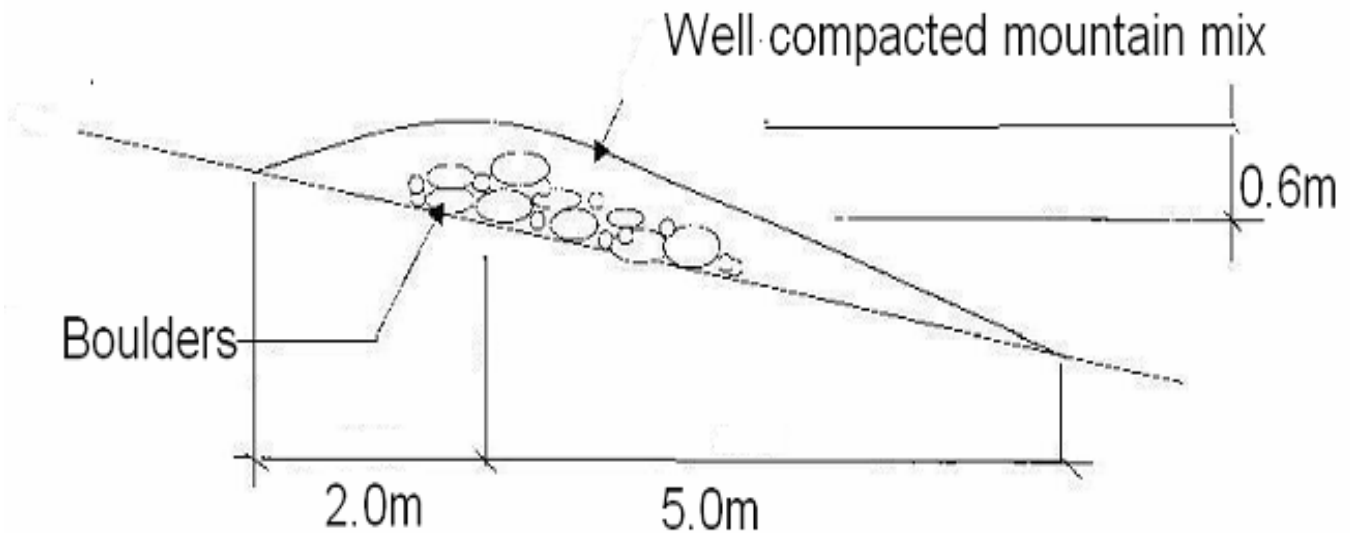
It is important to maintain the 30 cm height, otherwise it may be overtopped.

On hilly terrain, the shape on the downhill side is steeper than the road itself (ie slope of the road is 1 in 10, slope of bank is 1 in 6)

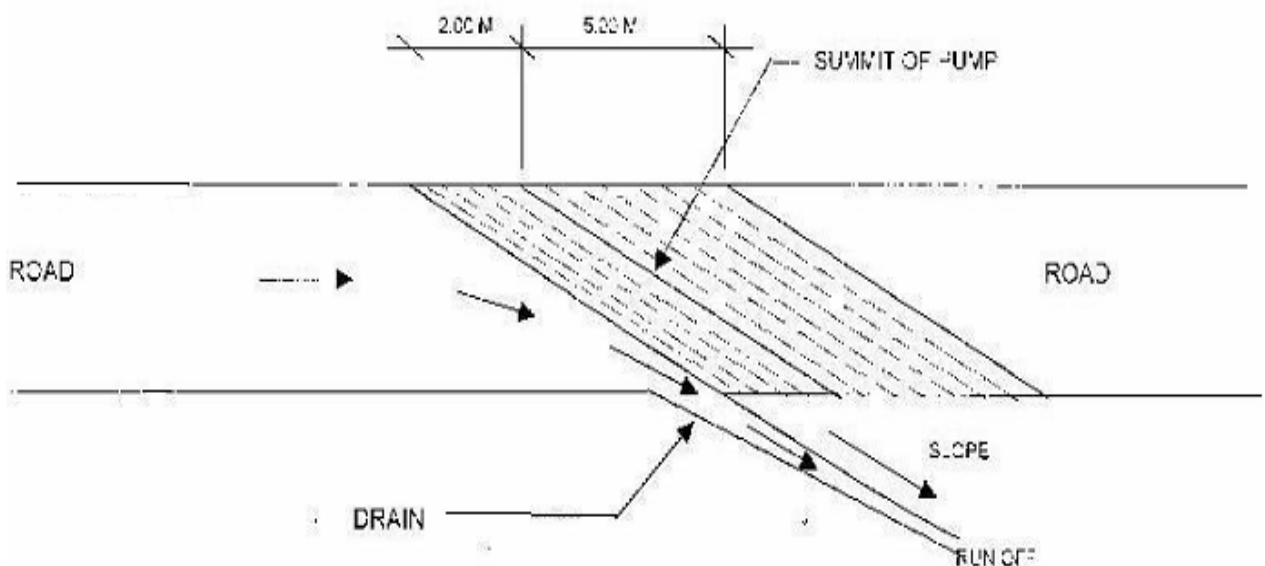
Hump on level/gentle slope



Diversion Bank (Hump) On Slope

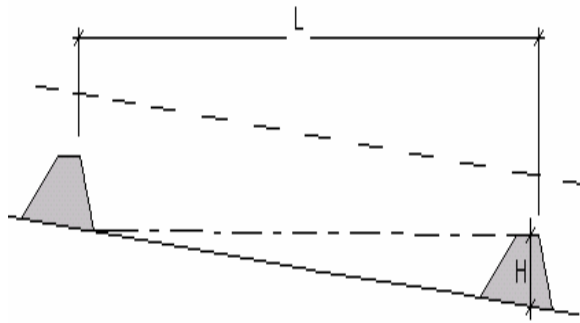


Typical Longitudinal Section (Not to scale)

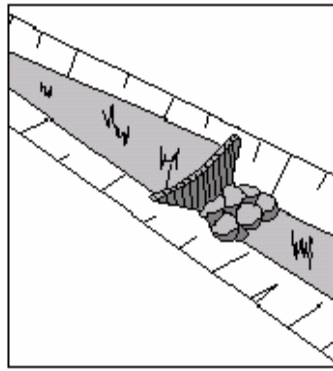


Plan (Not drawn to scale)

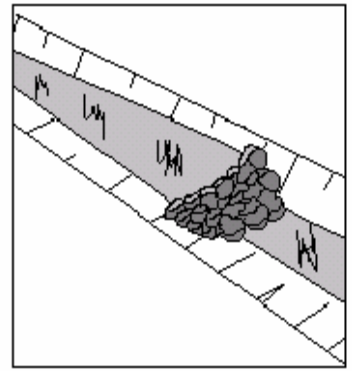
SCOUR CHECKS



Wooden or Bamboo stakes



Stones



CONSTRUCTION

Use on steep gradients where concentrated water is eroding the ditch & there is nowhere to place turnouts.

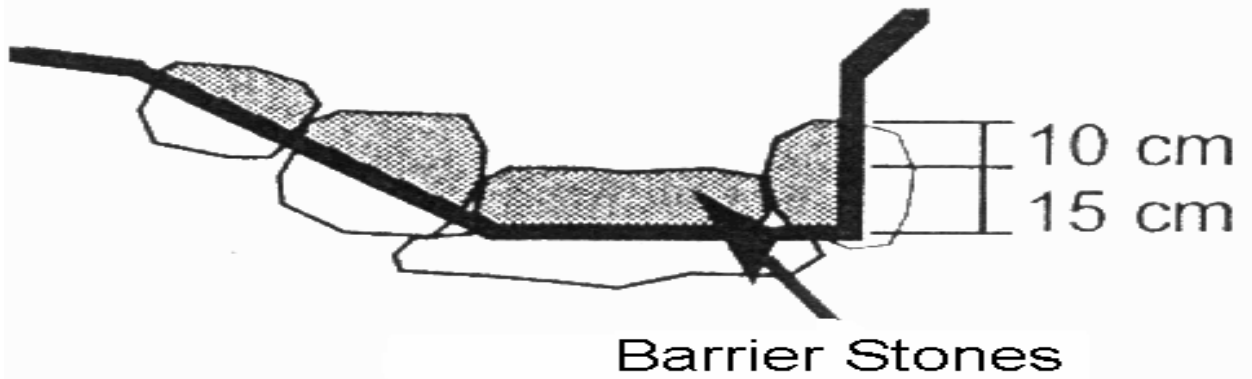
The distance between the scour checks depends on the gradient and the soil condition of the road. The steeper the slope or the softer the soil, the closer the spacing of the scour checks.

Use stones if available, otherwise bamboo or wooden pegs, which are supported by planting grass above and below the scour check.

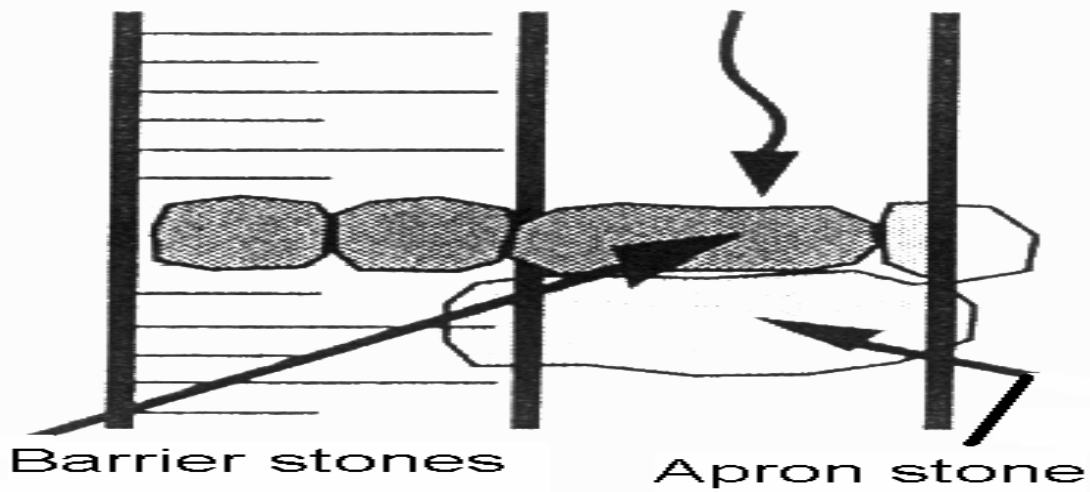
The height at the edges of the scour check must be higher than the water flow height and the water flows over the middle, not around the edges, otherwise it will erode the side of the scour check.

SCOUR CHECK

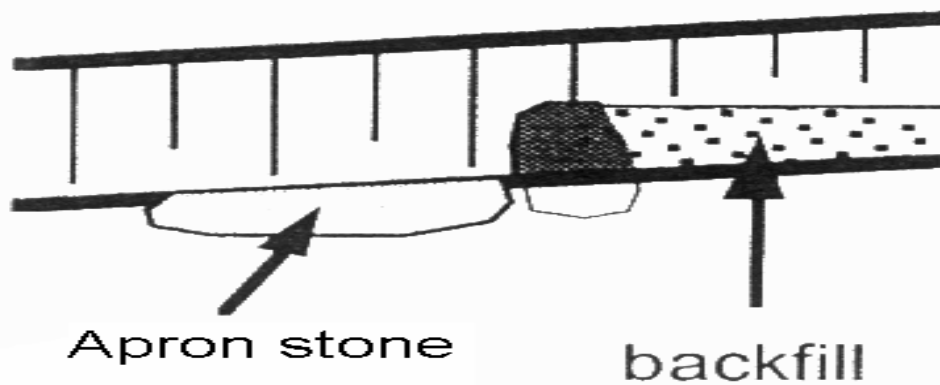
FRONT VIEW



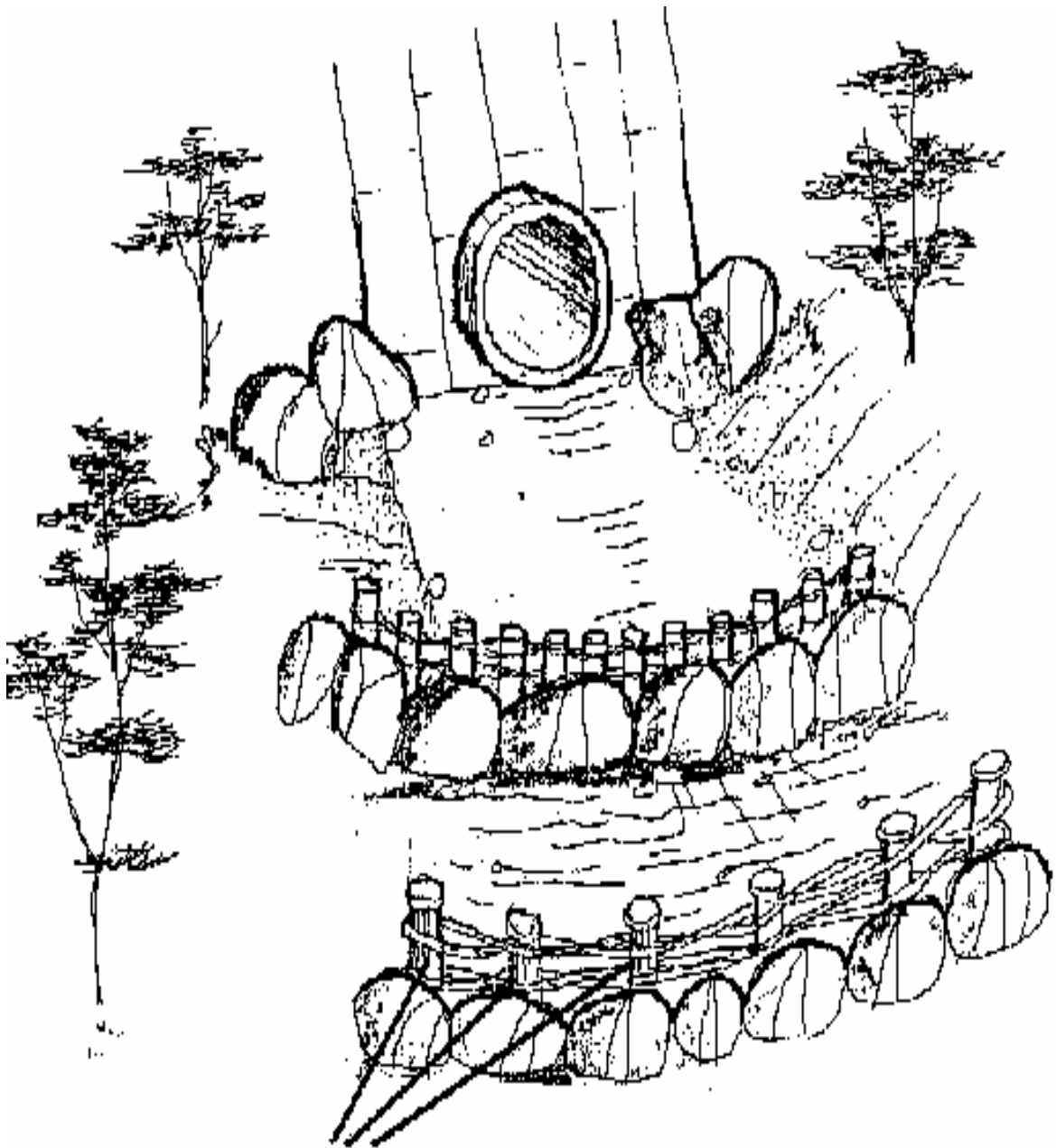
plan view



SIDE VIEW



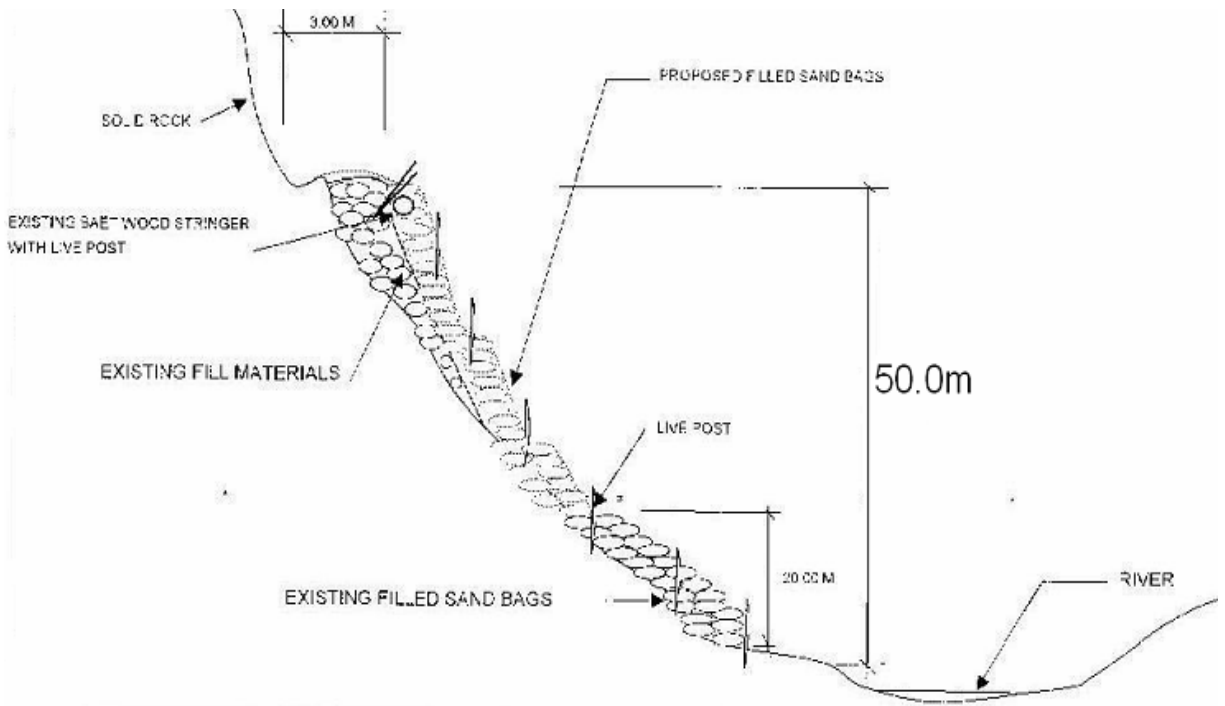
LIVE CHECK DAMS



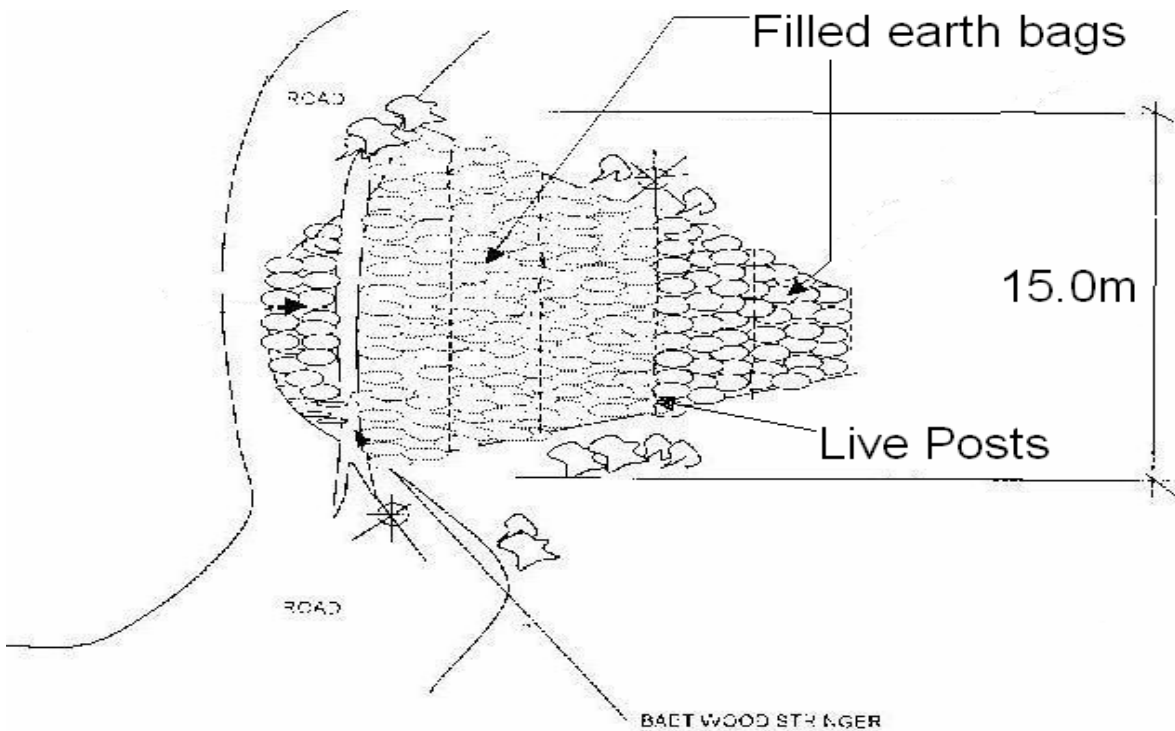
ENERGY DISSIPATOR

Mix of live Bamboo & Madre de Cacao

ROADSIDE EMBANKMENT/LANDSLIP REPAIR



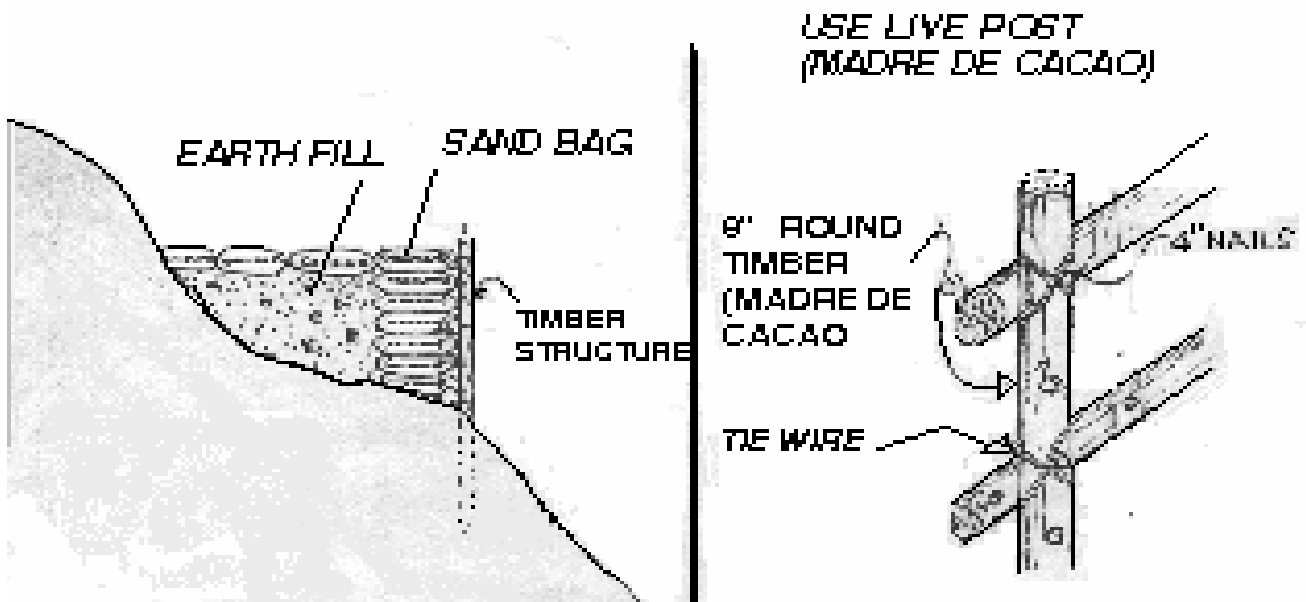
Typical Section of Roadside Embankment



Plan (Not to scale)

REPAIR OF LANDSLIP (2)

LANDSLIP REPAIR



USEFUL PLANTS FOR EROSION CONTROL

Plants can serve to slow down the movement of water and anchor the soil.

Some available plants which are very effective:-

IPIL-IPIL. Anchors the soil and prevents landslips, especially along the shoulders, outer edges of roads. A useful tree, which coppices well. Should be pruned regularly to avoid increased load on the slope

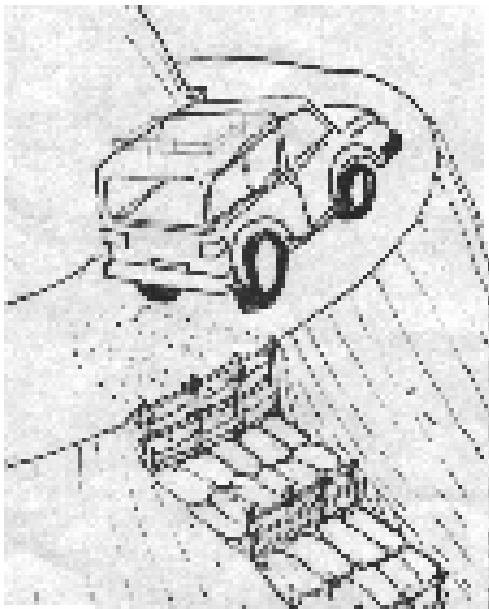
MADRE DE CACAO (Kakawati). A good soil anchor, can form strong barriers and is useful to prevent erosion around the edges of structures. Establishes quickly. Another useful species.

BAMBOO (Kawayen). Forms a strong & thick barrier and useful to prevent erosion around and below structures. Also a useful species.

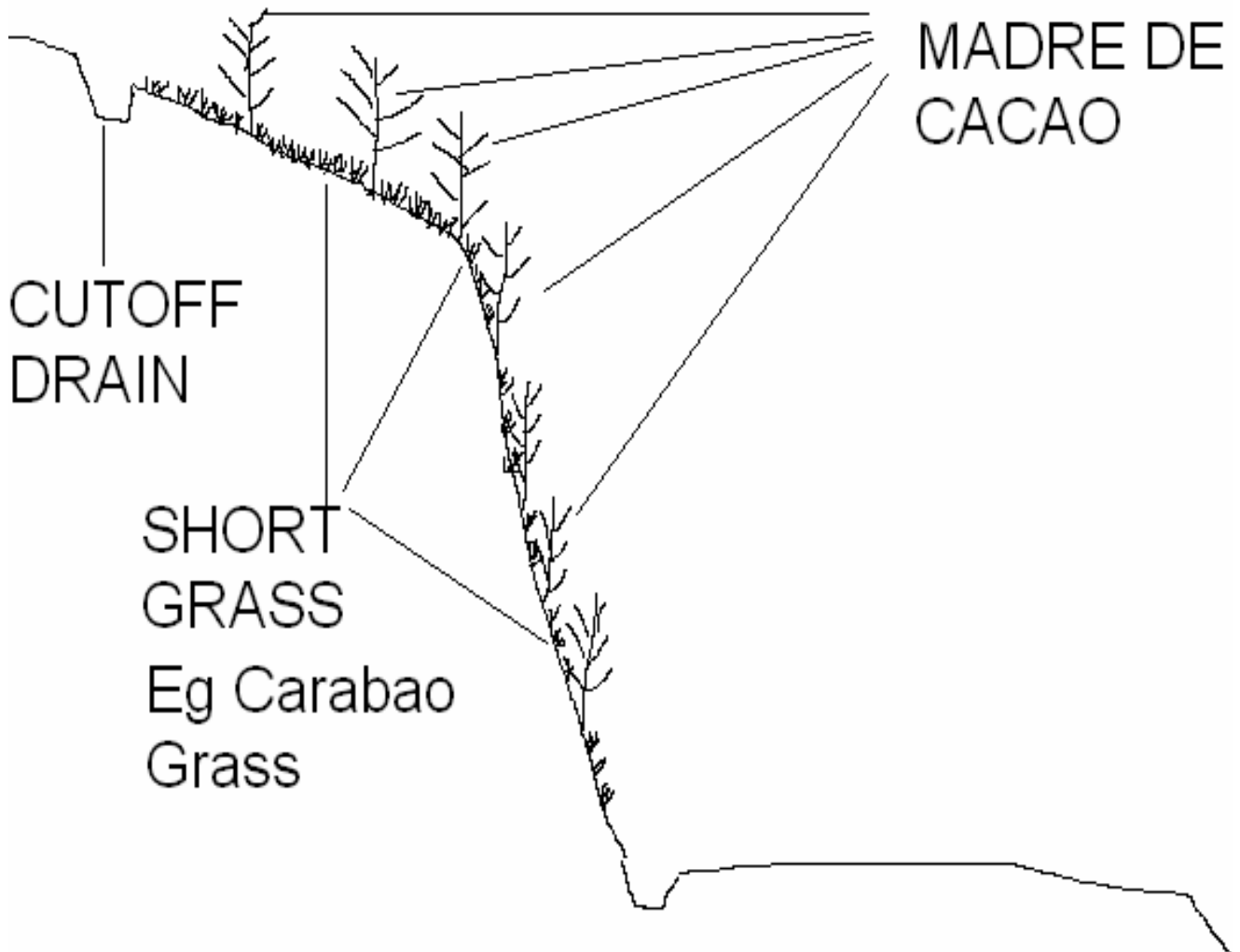
GROUND COVER LEGUMES. Eg Pueraria, Centro. Can form a thick mass over the ground and can be useful at the edges of turnouts etc.

CARABAO GRASS. Provides an armor against surface erosion on slopes and around the edge of structures.

Fruit trees should not normally be used along road sides



BLACKSLOPE PROTECTION



- It is important to reduce the water soaking into the soil at the top of the slope and minimise the risk of slumping
- The **cutoff drain** leads water away
- Madre de Cacao **anchors** the soil
- Carabao grass provides an **armour** against erosion
- It is important to routinely prune the Madre de Cacao to reduce weight surcharge and to keep the grass short