

BUILD YOUR WATERWAYS

WITH
A



FARM DOZER

IT'S **EASY!**



QUEENSLAND DEPARTMENT OF PRIMARY INDUSTRIES

This publication was prepared in 1977 by the Soil Conservation Branch of the former Queensland Department of Primary Industries (QDPI). The state agency now responsible for soil conservation matters is the Department of Environment and Resource Management (DERM).

Some construction methods may have been modified since the publication was written.

People using the information in this publication do so at their own risk.

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BUILD YOUR WATERWAYS WITH A FARM DOZER

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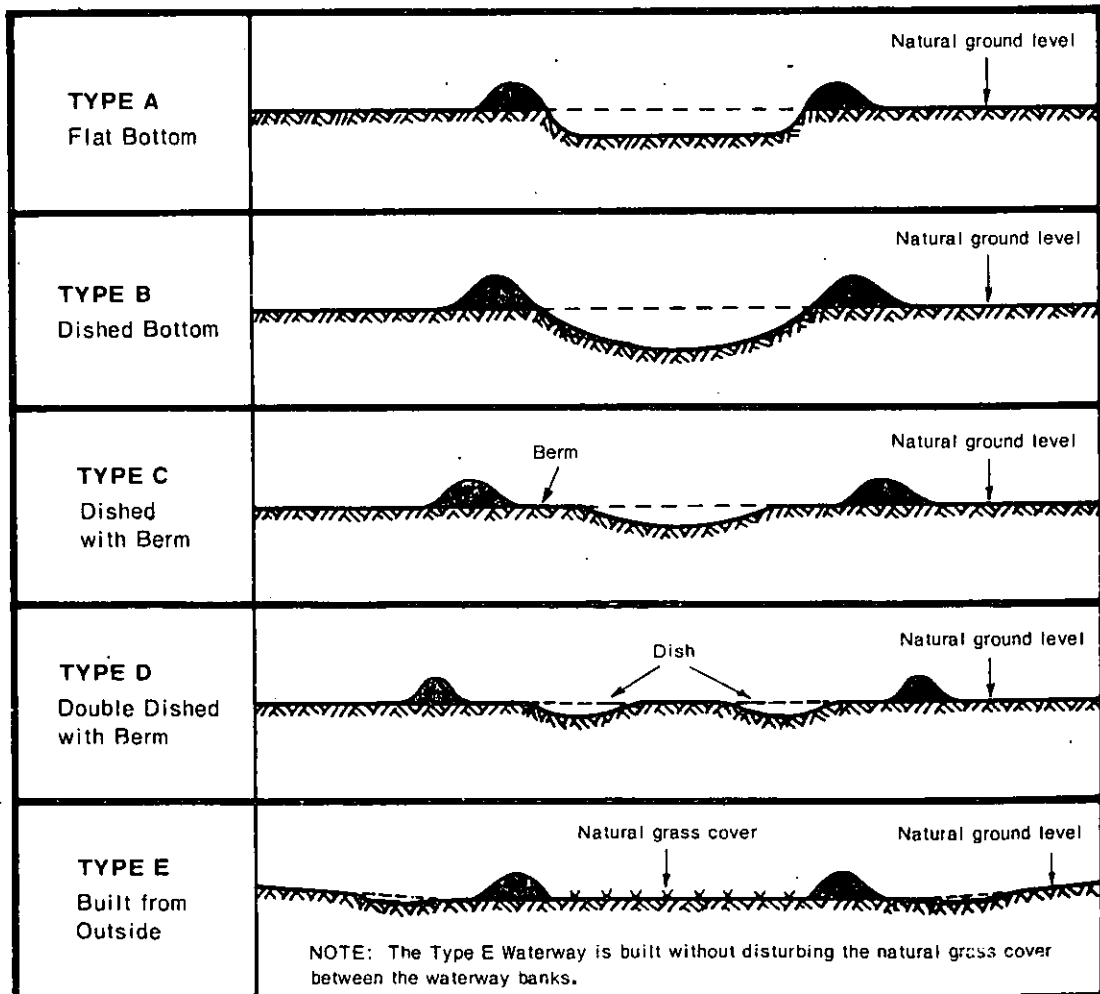
INTRODUCTION

A waterway is an earth channel constructed and grassed to safely carry storm runoff to a natural outlet. It is the most important link in a chain of erosion control works on a property and deserves the utmost care in its construction, grassing and maintenance.

This publication only describes the step by step construction of a waterway with a farm dozer (wheeled tractor or crawler). It is to be used as a guide only and may be modified to cater for local conditions.

Details on grassing and maintenance of waterways are available from your soil conservation officer.

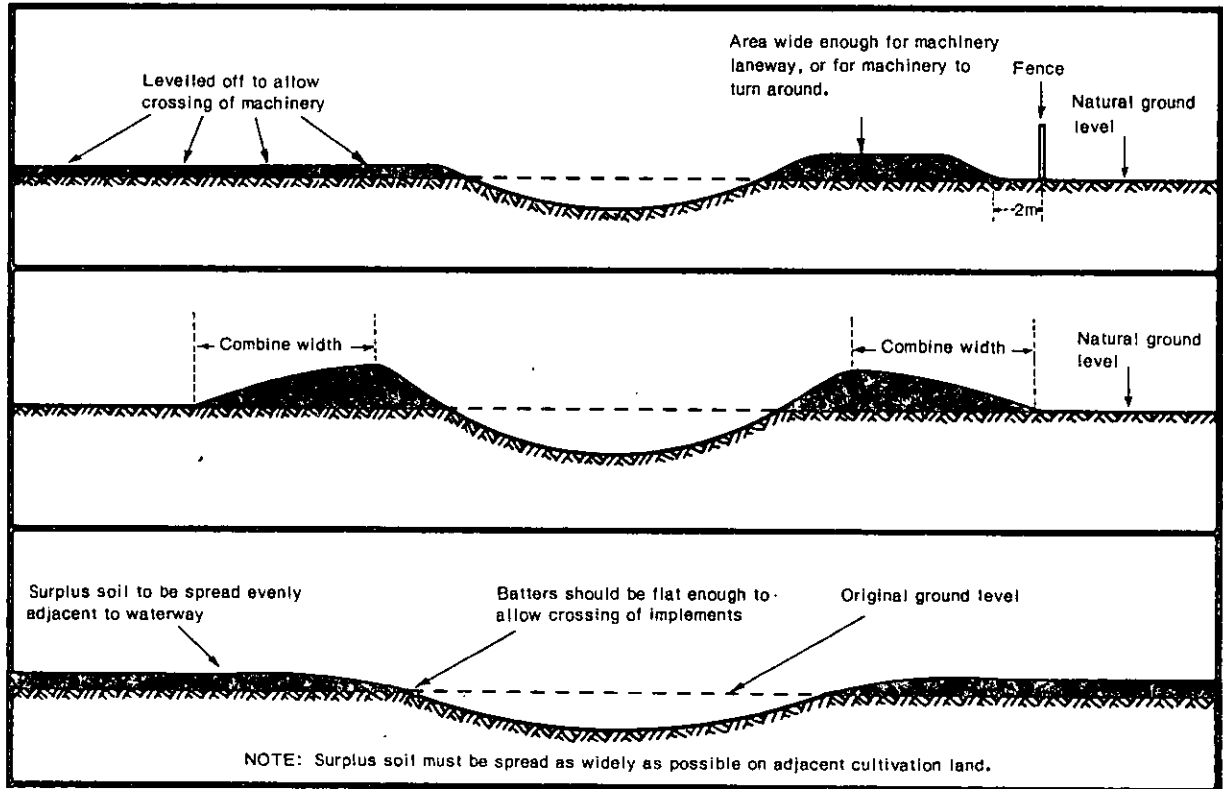
TYPES OF WATERWAYS



GENERAL NOTES ON WATERWAY SHAPES

1. The shape of waterway batters and banks can be varied according to the cultivation method used on the property. Under no circumstances must the specified dimensions be reduced.

The sketches below are examples of different shapes of batters to suit certain cultivation methods.



IMPORTANT POINTS

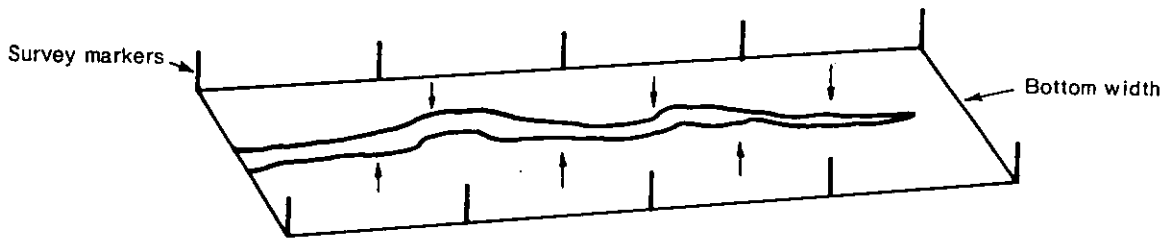
BEFORE YOU START BUILDING A WATERWAY WITH A FARM DOZER BLADE CHECK THESE POINTS FIRST:

Equipment

1. For ripping or ploughing the ideal equipment is a linkage or trailed mould-board plough and/or a three-tined ripper preferably with sweeps attached.
2. A wing attachment on the open end of the dozer blade will increase blade capacity and reduce soil spillage around the ends of the blade.

Site preparation

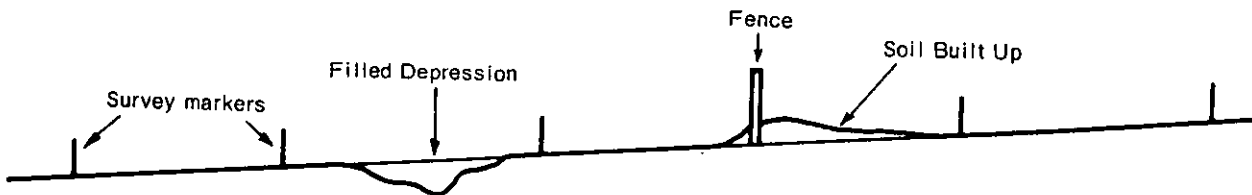
1. Cut soil from high spots to fill and level old gullies in the waterway construction area. Make sure to compact filled soil to reduce excess settling.



Small arrows indicate direction of push to fill and level gully.



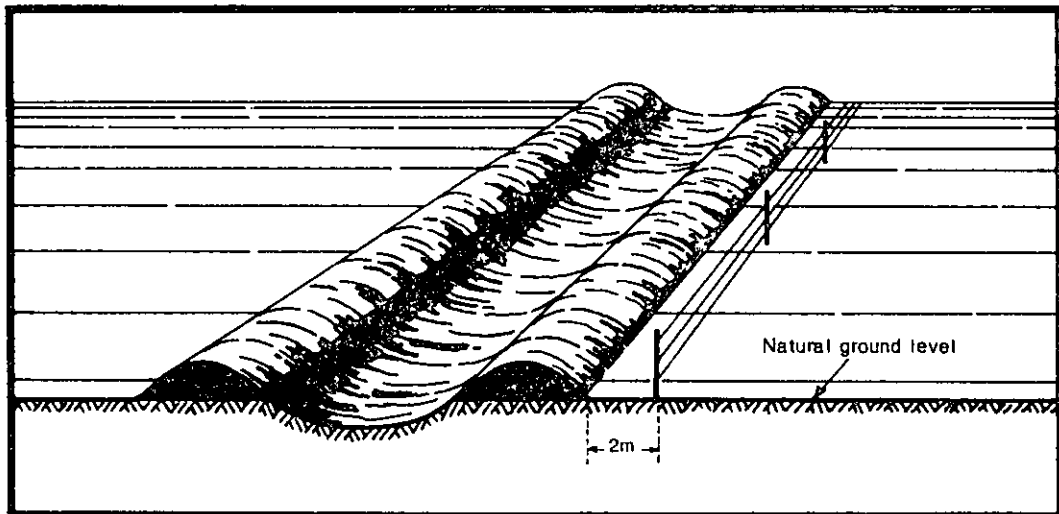
2. Level off high spots where soil has built up against a fence crossing the waterway construction area. Fill depressions or spread soil evenly over whole area.



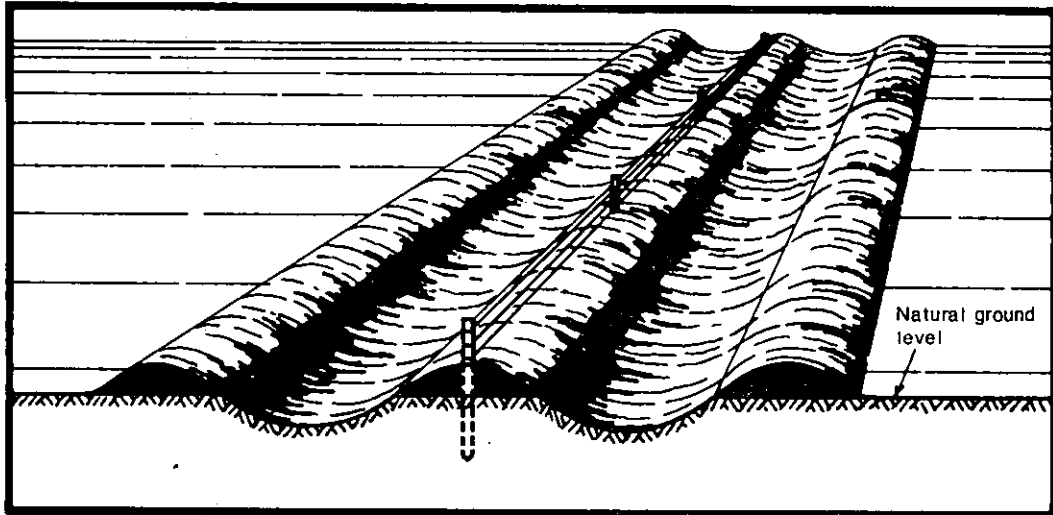
Cross section of slope at waterway site.

Other points

1. Make sure to use only half the width of the dozer blade when pushing soil.
2. Check the depth of soil in the waterway site to make sure enough suitable soil is left behind after excavation to enable grass to grow. Where the soil is shallow, push a layer of topsoil and stockpile. After the waterway is excavated, return the topsoil and spread evenly over the waterway area.
3. Unless otherwise specified by your soil conservation officer, survey markers give the exact measurements required for the waterway. Under no circumstances must these measurements be altered or modified during construction.
4. Make sure to leave at least a 2 m (6') space between a fence and the outside edge of the waterway bank. This will make it easier to maintain both the waterway and the fence.



5. Where a waterway site lies adjacent to a property boundary fence, it is wise to consult your neighbour about the possibility of a joint waterway. For example, such a joint waterway could be built in the manner shown below.
6. It is important not to rip or plough beyond the depth required to obtain adequate soil for the construction of the waterway banks.



CONSTRUCTION DETAILS

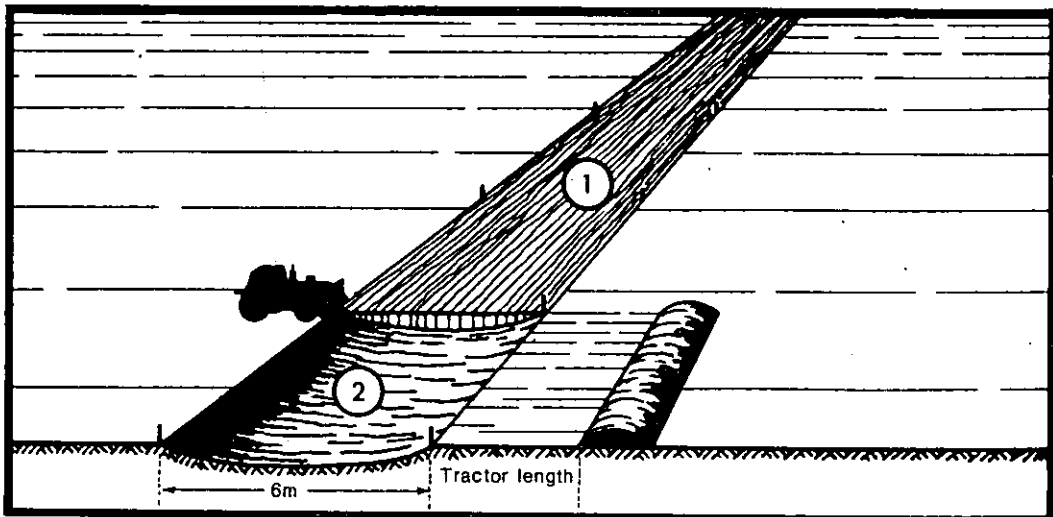
Type A (flat bottom)

Construction details are the same as for Type B (dished bottom) waterways EXCEPT THAT RIPPING AND/OR PLOUGHING ARE CARRIED OUT AT THE SAME DEPTH OVER THE FULL WIDTH OF THE WATERWAY.

Type B (dished bottom) up to 6 m (20') wide - alternative 1

STEP 1 Rip or plough full width of waterway making sure to rip deeper in centre section.

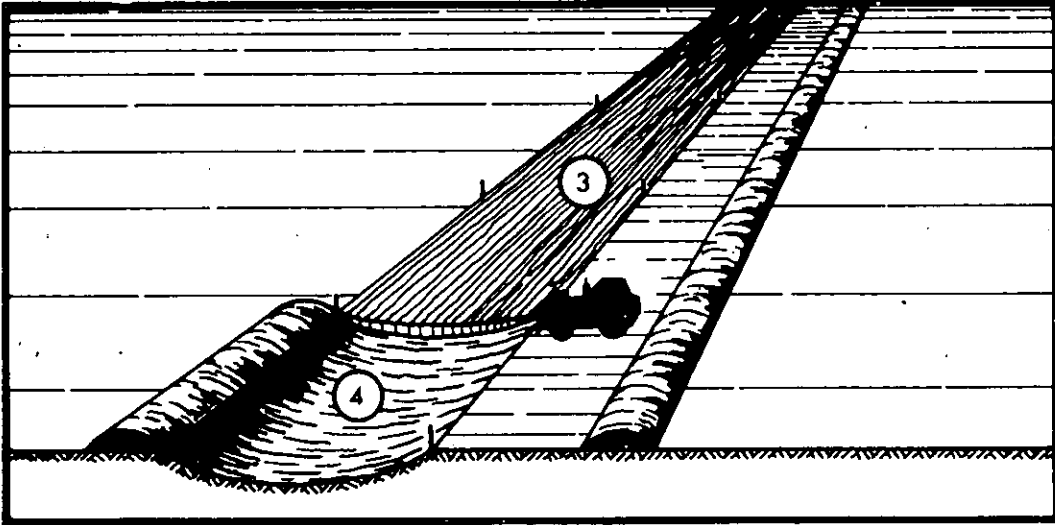
STEP 2 Push soil at least one tractor length outside the line of markers as shown in sketch.



STEPS 1 AND 2

STEP 3 Again rip or plough the full width of the waterway, deeper in the centre section.

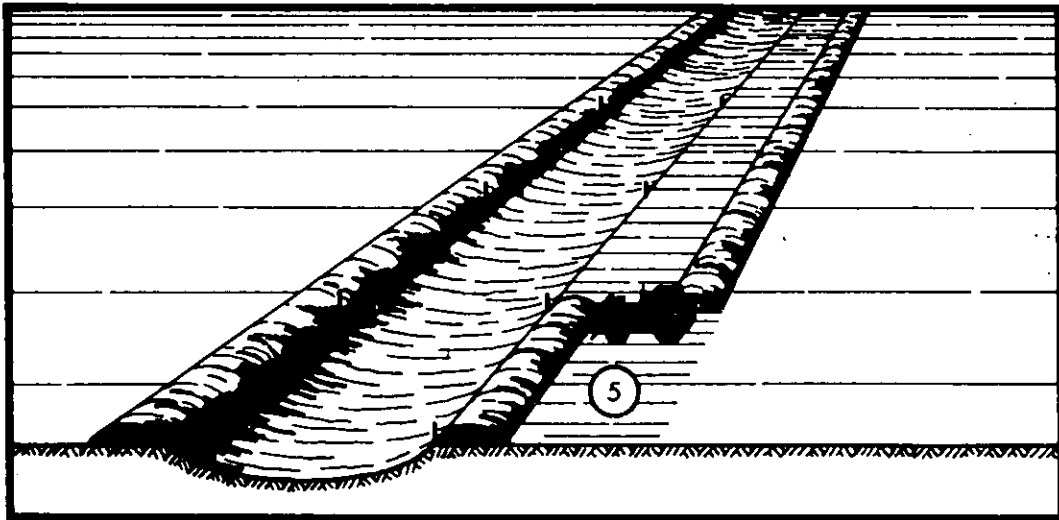
STEP 4 Push soil to other side of line of markers as shown in sketch.



STEPS 3 AND 4

NOTE: IF GREATER CAPACITY IS NEEDED REPEAT STEPS 1, 2, 3 and 4 BEFORE ATTEMPTING STEP 5.

STEP 5 Push mound of soil from STEP 2 back to the line of markers to complete the waterway.



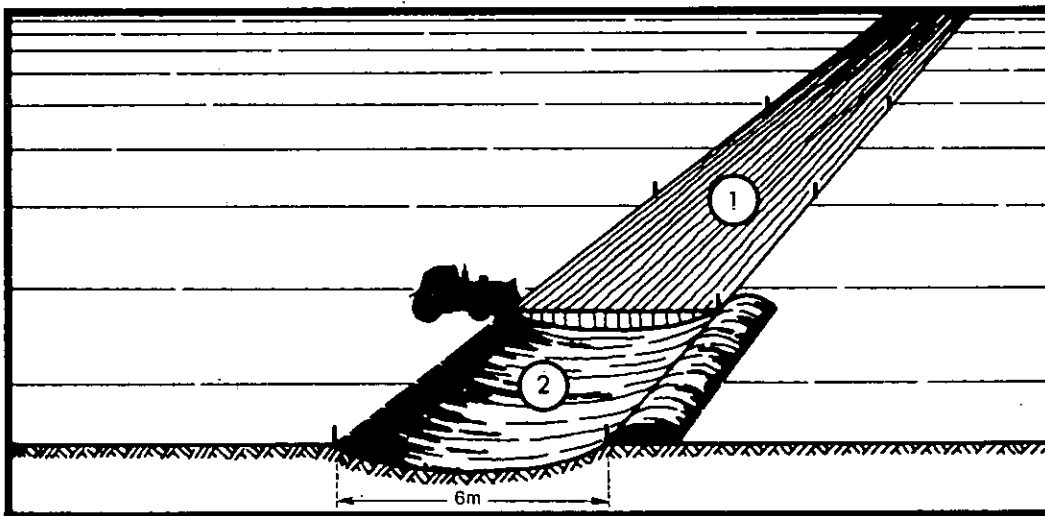
STEP 5

Type B (dished bottom) up to 6 m (20') wide - alternative 2

STEP 1 Rip or plough full width of waterway, deeper in centre section.

STEP 2 Push soil as shown in sketch.

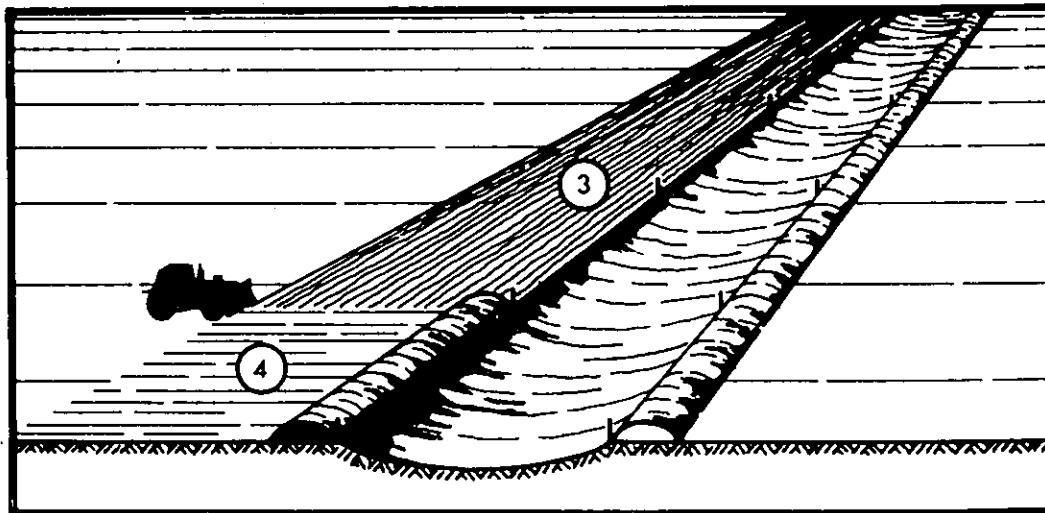
NOTE: REPEAT STEPS 1 AND 2 IF GREATER CAPACITY IS NEEDED.



STEPS 1 AND 2

STEP 3 Rip or plough an area at least as wide as the waterway OUTSIDE the line of survey markers.

STEP 4 Push soil from OUTSIDE onto line of markers to complete the job. REPEAT STEPS 3 AND 4 IF GREATER CAPACITY IS NEEDED.



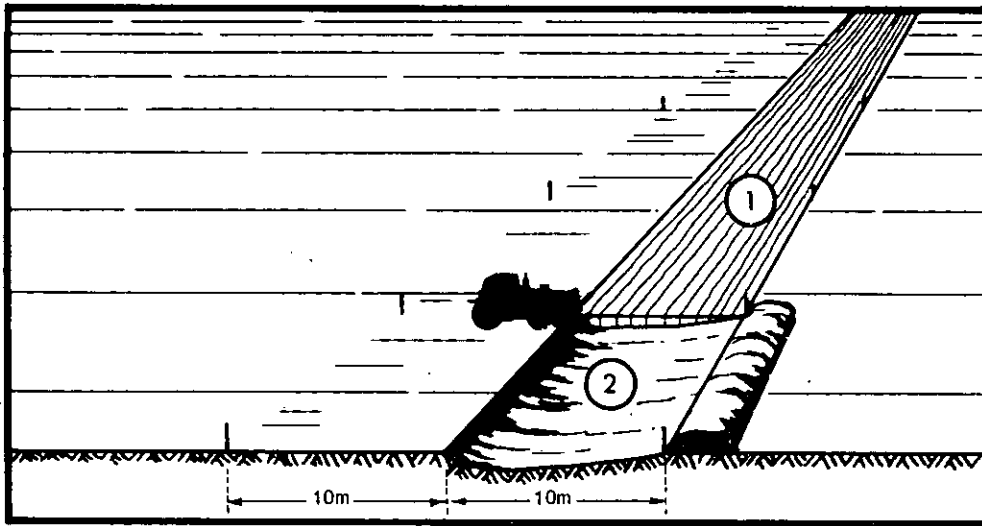
STEPS 3 AND 4

Type B (dished bottom) from 6 m to 20 m (20' to 66') wide

Example below assumes width of 20 m.

STEP 1 Rip or plough half the width of waterway, deeper towards the centre.

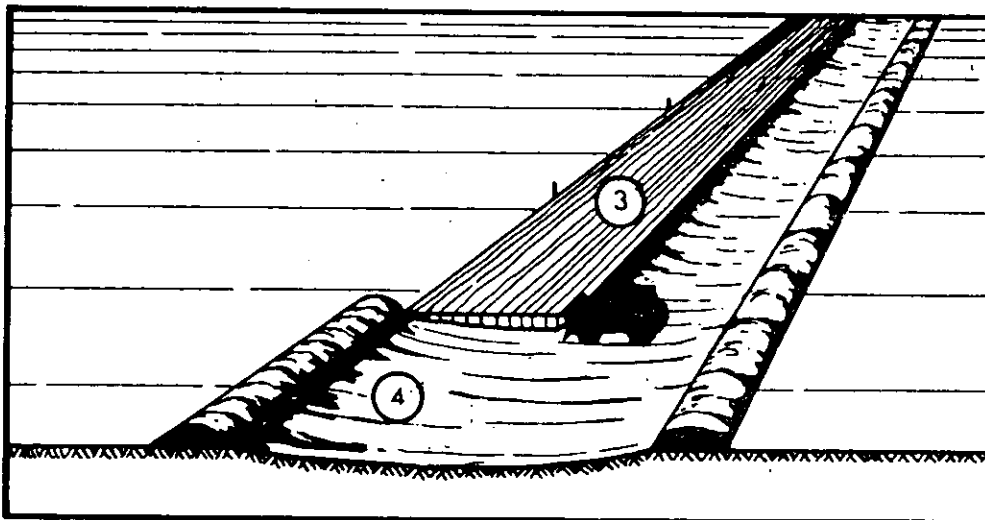
STEP 2 Push soil as shown in sketch.



STEPS 1 AND 2

STEP 3 Rip or plough other half of waterway, deeper towards the centre.

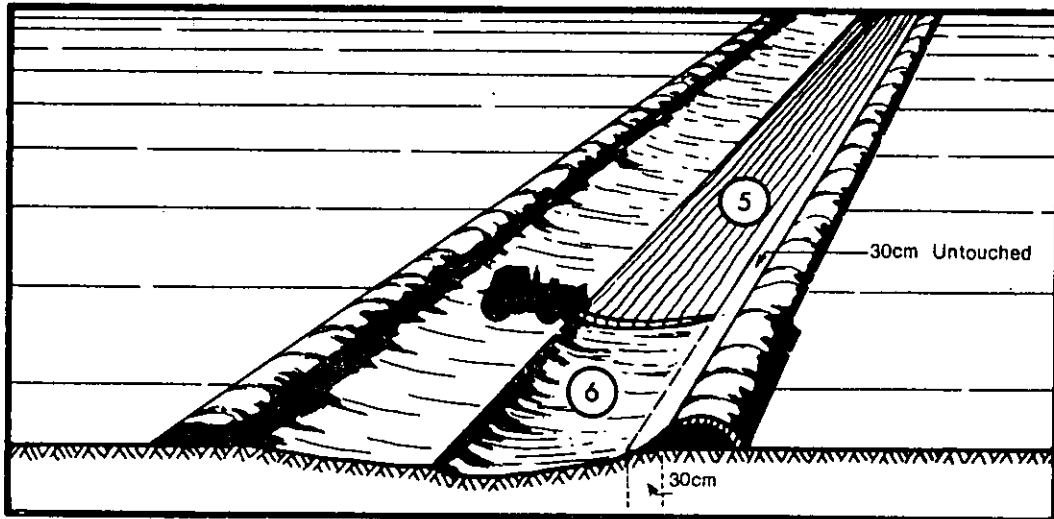
STEP 4 Push soil as shown in sketch.



STEPS 3 AND 4

STEP 5 Again rip or plough half the width of the waterway, this time leaving a 30 cm (1') wide strip untouched as shown.

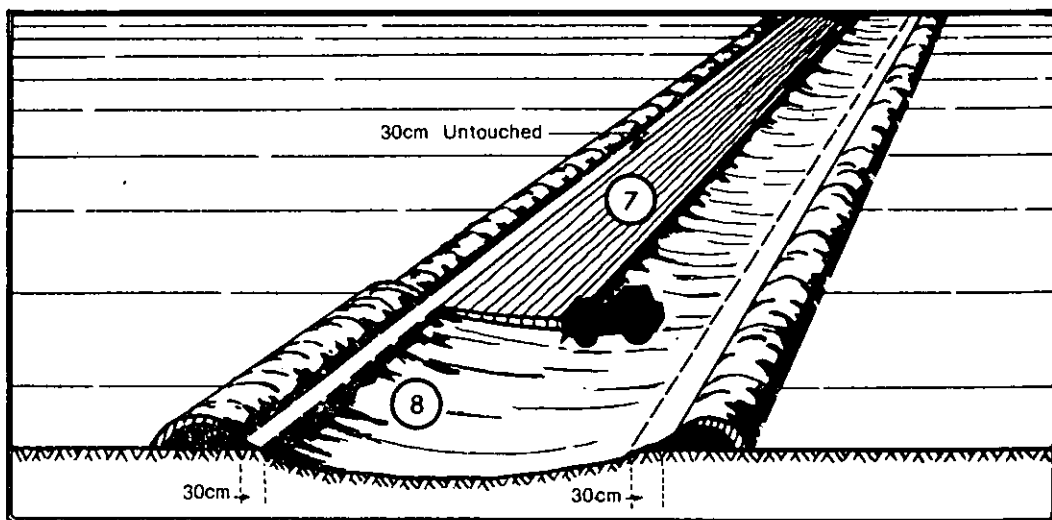
STEP 6 Push soil as shown in sketch.



STEPS 5 AND 6

STEP 7 Repeat STEP 5 for other half of waterway, leaving a 30 cm (1') wide strip untouched as shown.

STEP 8 Repeat STEP 6 for other half of waterway to complete the job.



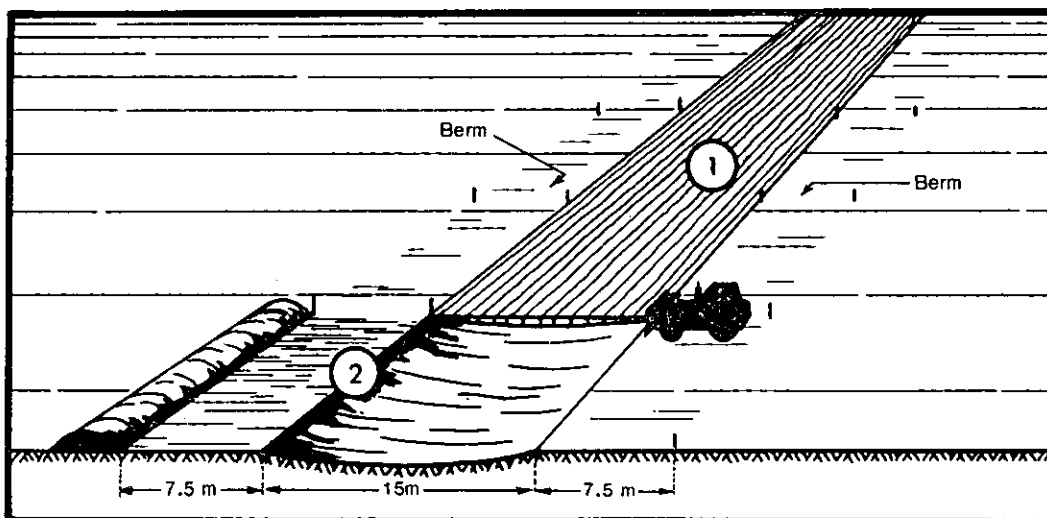
STEPS 7 AND 8

Type C (dished with berm) from 20 m to 40 m (66' to 132') wide

This example assumes waterway width of 30 m.

STEP 1 Rip or plough a 15 metre section in the centre of waterway as shown.

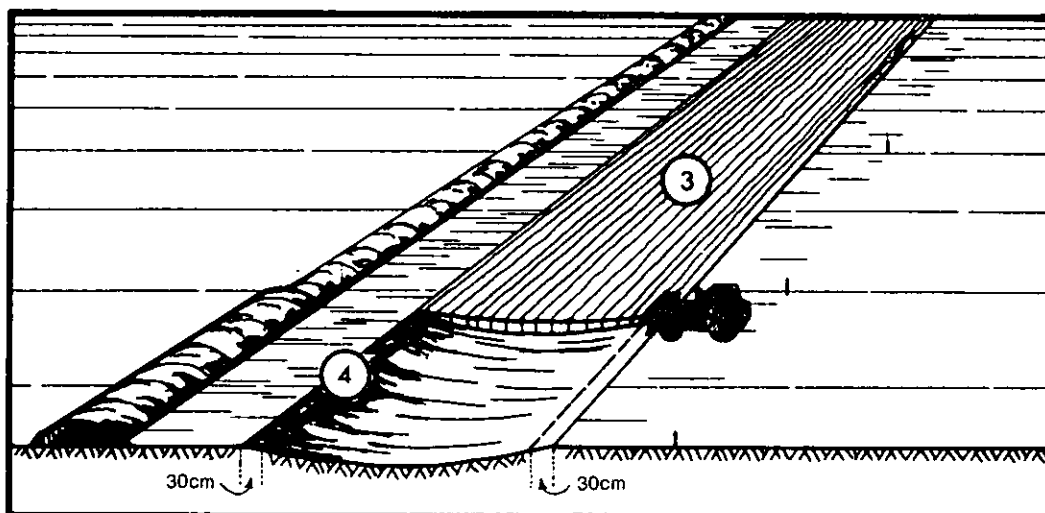
STEP 2 Push soil as shown in sketch.



STEPS 1 AND 2

STEP 3 Again rip or plough the centre section, this time adding a 30 cm (1') strip on either side as shown.

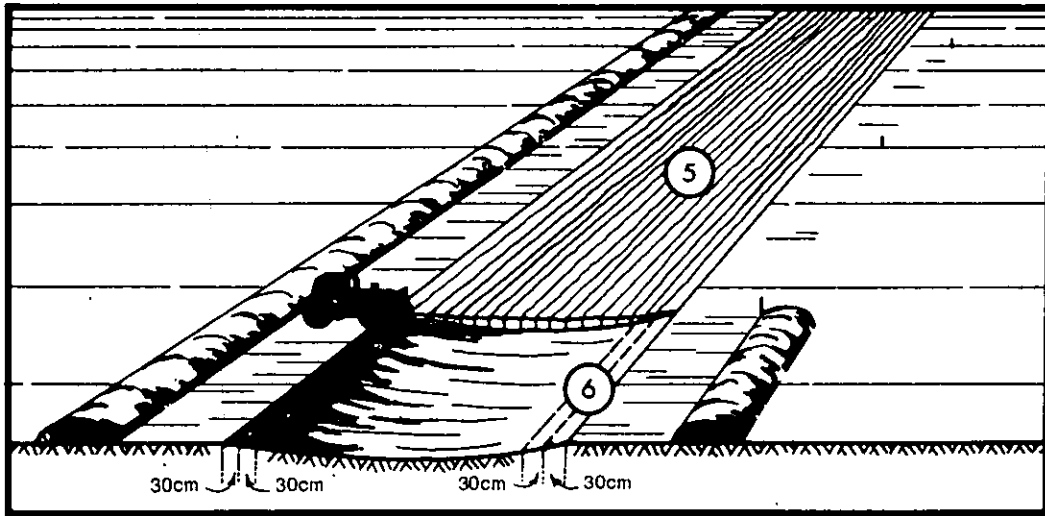
STEP 4 Push soil as shown in sketch.



STEPS 3 AND 4

STEP 5 Again rip or plough the centre section this time adding another 30 cm (1') wide strip on either side as shown.

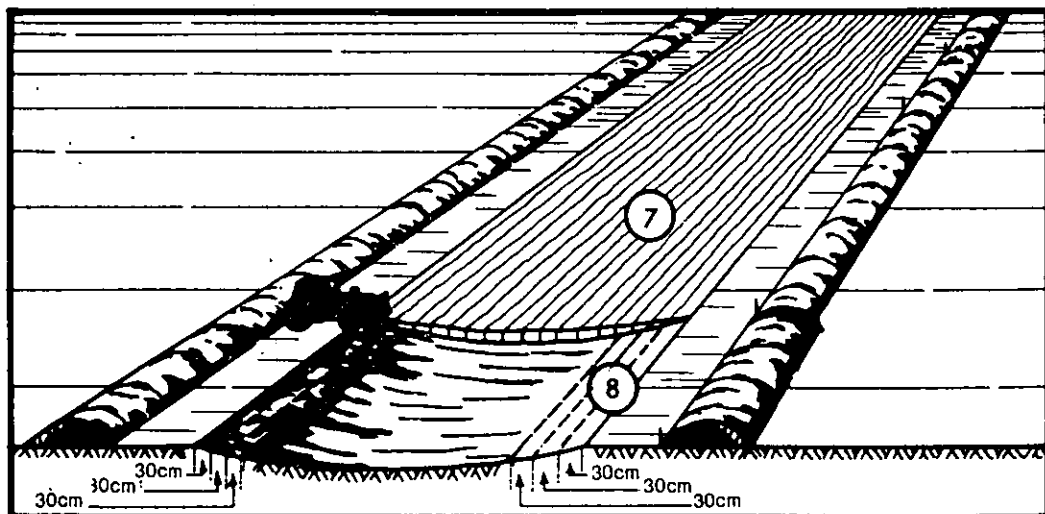
STEP 6 Push soil as shown in sketch.



STEPS 5 AND 6

STEP 7 Again rip or plough the centre section adding another 30 cm (1') wide strip on either side as shown.

STEP 8 Push soil as shown to complete the job.



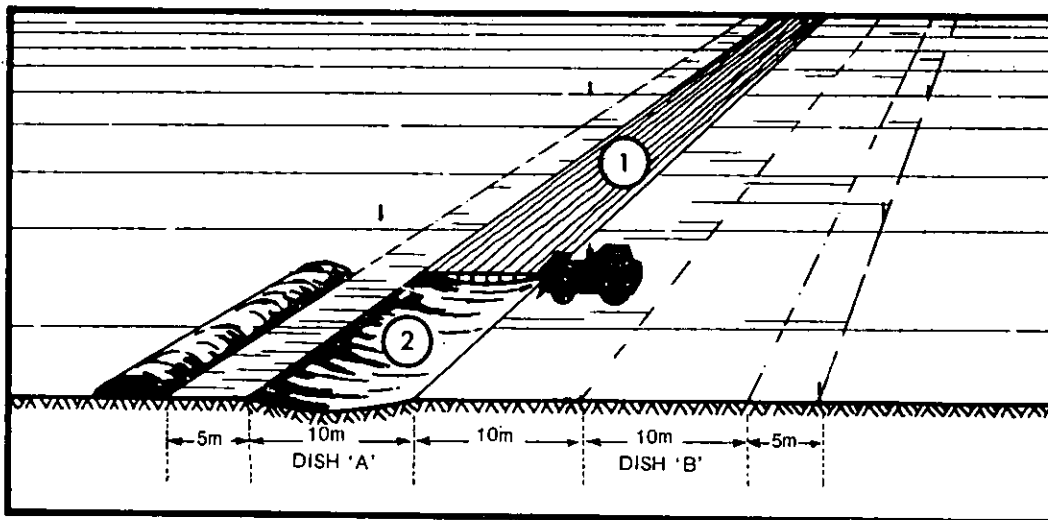
STEPS 7 AND 8

Type D (double dished with berm) wider than 20 m (66')

This example assumes width of 40 m.

STEP 1 Rip or plough a 10 metre section for DISH 'A', starting 5 metres from markers.

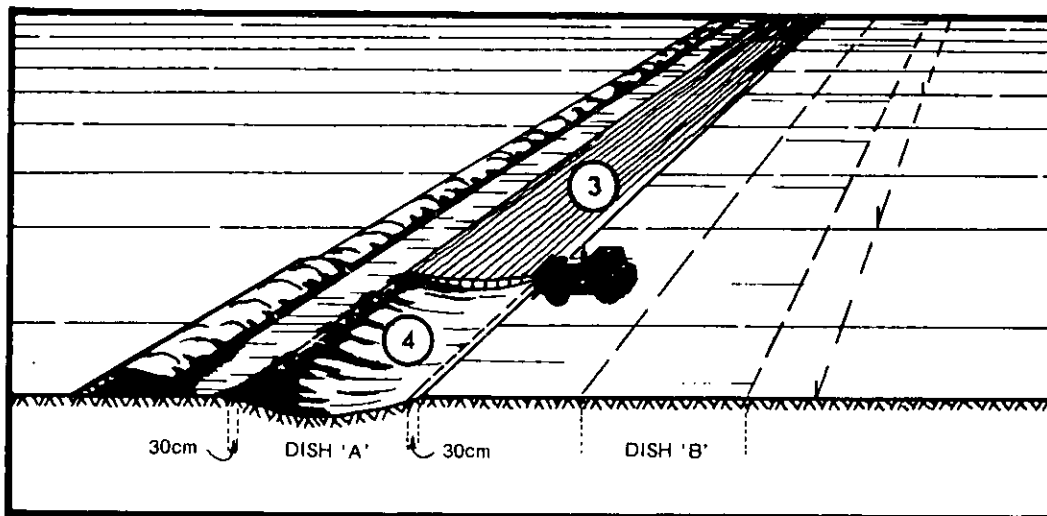
STEP 2 Push soil as shown on sketch.



STEPS 1 AND 2

STEP 3 Again rip or plough in the section of DISH 'A', this time adding 30 cm (1') on either side as shown.

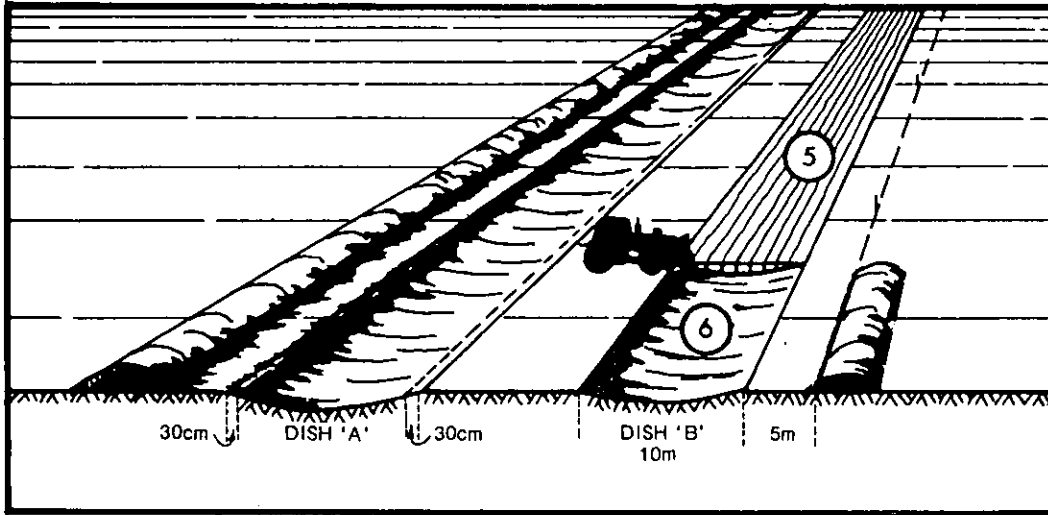
STEP 4 Push soil as shown on sketch.



STEPS 3 AND 4

STEP 5 Rip or plough a 10 metre section for DISH 'B' starting 5 metres from survey markers.

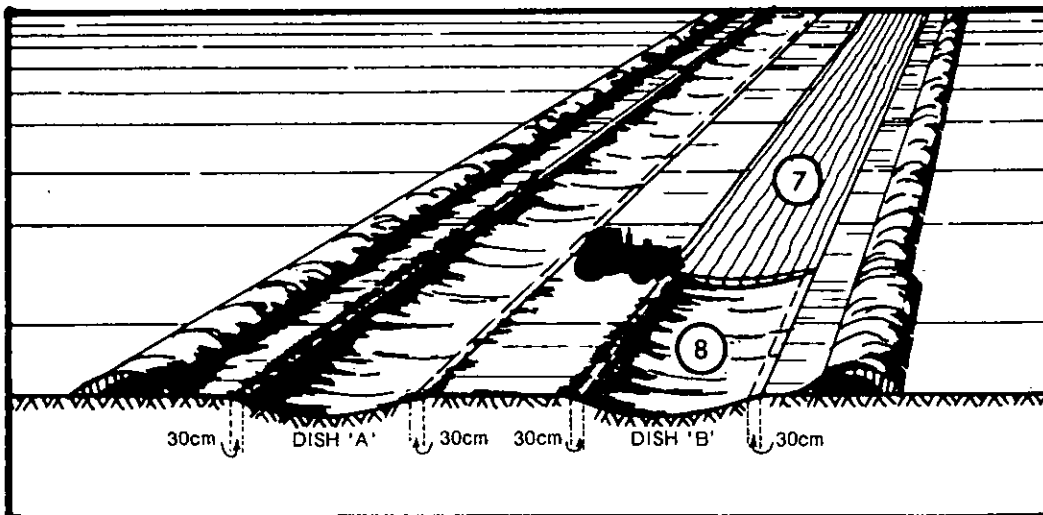
STEP 6 Push soil as shown in sketch.



STEPS 5 AND 6

STEP 7 Again rip or plough in the section of DISH 'B', this time adding 30 cm (1') on either side as shown.

STEP 8 Push soil as shown to complete the job.

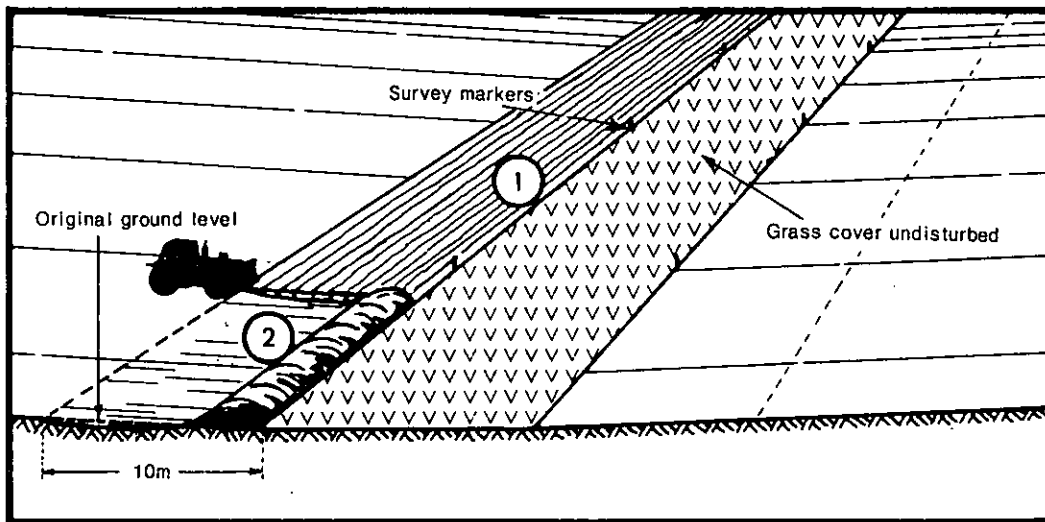


STEPS 7 AND 8

Type E (built from outside)

STEP 1 Rip or plough at least a 10 metre wide strip outside the line of survey markers as shown. Ripping should not be too close to edge of waterway bottom and just adequate to ensure bonding below bank.

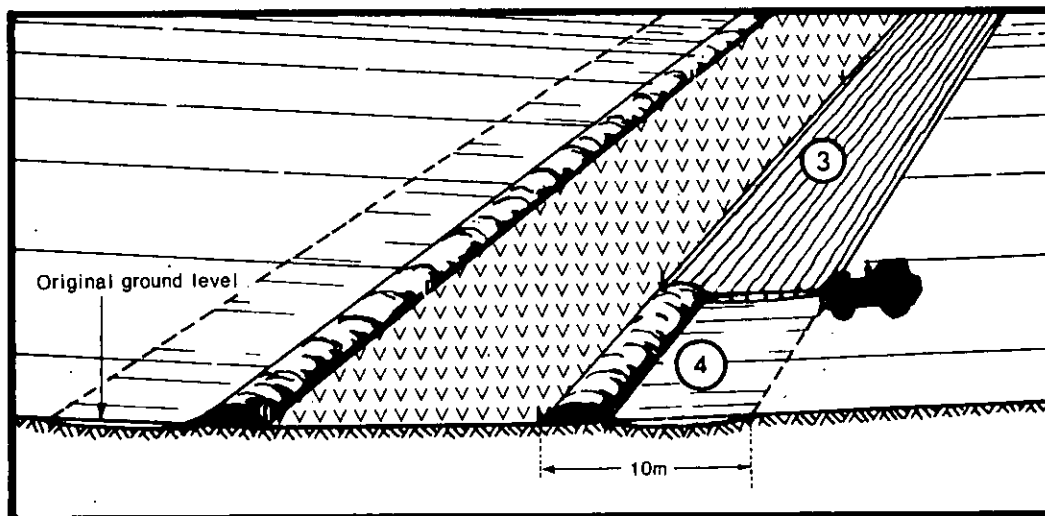
STEP 2 Push soil from outside onto line of markers as shown.



STEPS 1 AND 2

STEP 3 Rip or plough at least a 10 metre wide strip on other side of waterway markers as shown.

STEP 4 Push soil as shown to complete the job.

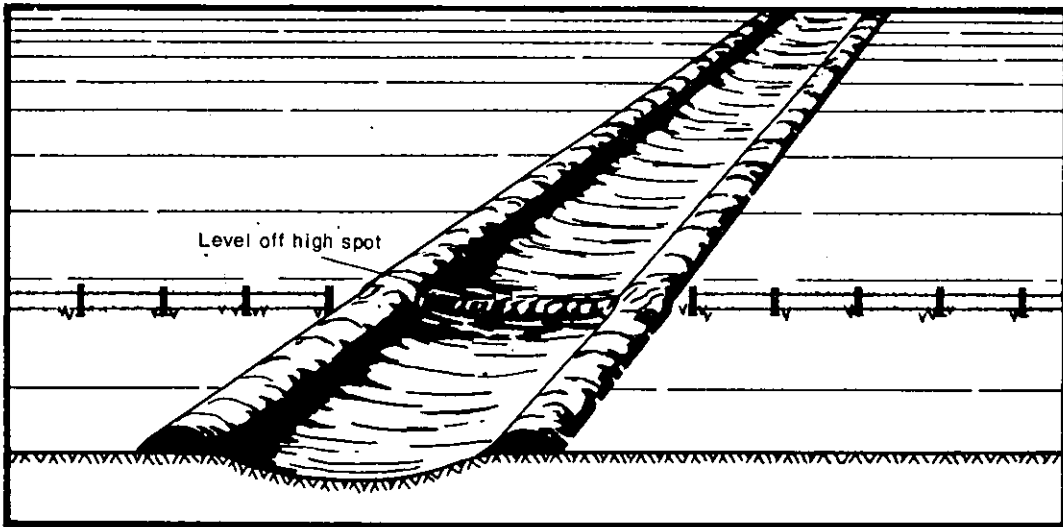


STEPS 3 AND 4

NOTE: IF GREATER BANK HEIGHT IS NEEDED, REPEAT STEPS 1 and 2, and 3 and 4.

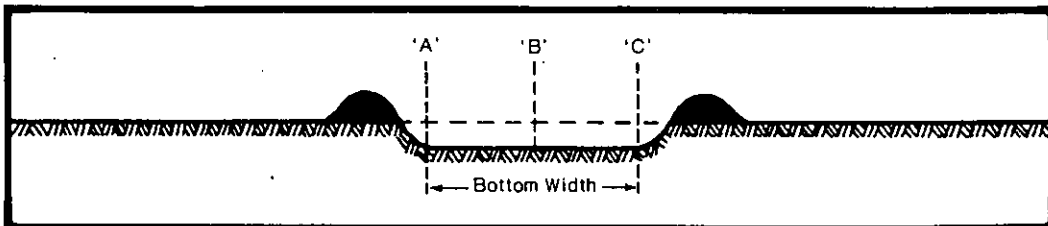
CHECKING THE JOB

1. Make sure there are no high or low areas in the channel of the waterway. In particular, check those sections where a fence was removed and level off any remaining high spots.

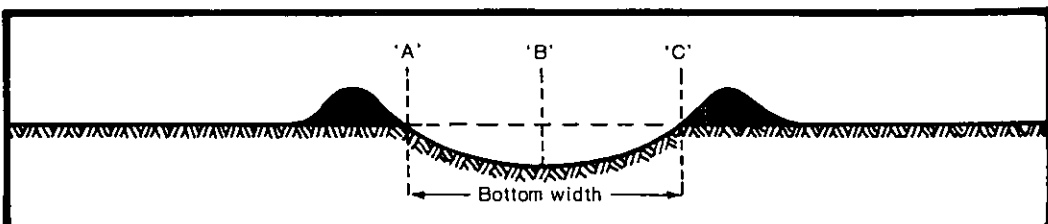


2. Make sure the channel is not tilted one way or the other as this will cause undue concentration of runoff and will lead to erosion of the channel or banks. Check channel levels as follows:

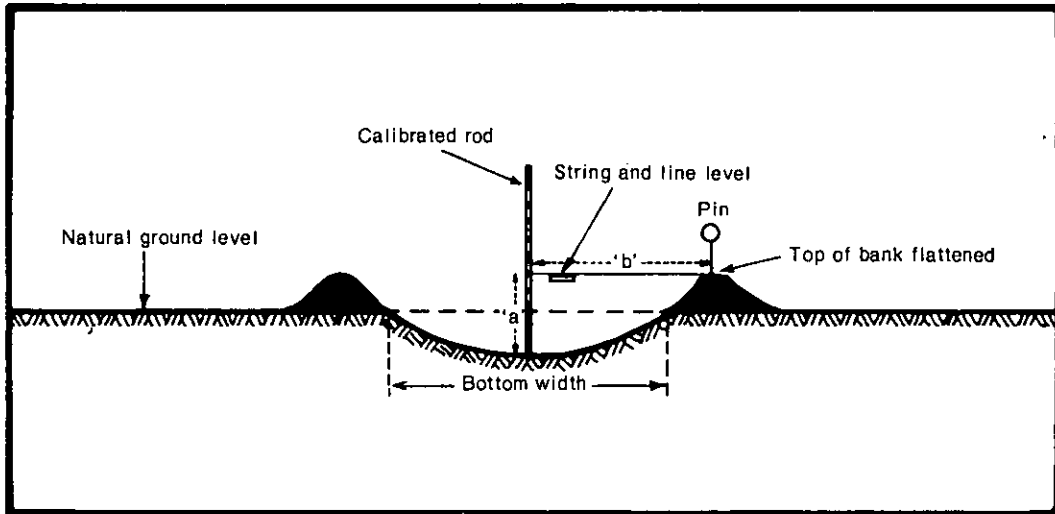
- (a) TYPE A (FLAT BOTTOM): Points 'A', 'B' and 'C' should be approximately on the same level.



- (b) TYPE B (DISHED BOTTOM): Points 'A' and 'C' should be approximately on the same level, and must be the same distance from point 'B' (centre of waterway).



3. Make sure that bottom width, bank height and side slope of batters are according to specifications. Use the checking method below.



- (i) Flatten top of bank by trampling before checking bank height.
 - (ii) Keep string taut when checking dimensions.
 - (iii) For dished waterways multiply distance 'a' by distance 'b' to obtain cross sectional area.
 - (iv) For flat bottomed waterways multiply average width by depth.
4. Make sure the outlet area is clear of debris and surplus soils. Spread soil evenly by blading.
 5. Make sure to close off top inlet of waterway to prevent stray runoff from entering while the waterway is being stabilised with grass cover.
 6. CONSULT YOUR SOIL CONSERVATION OFFICER BEFORE PREPARING TO GRASS THE WATERWAY.