

Central Queensland AgNote

August 1986

Broad Base Bank Construction with Drawn Graders

Compiled by PA Bass and NJ Booth

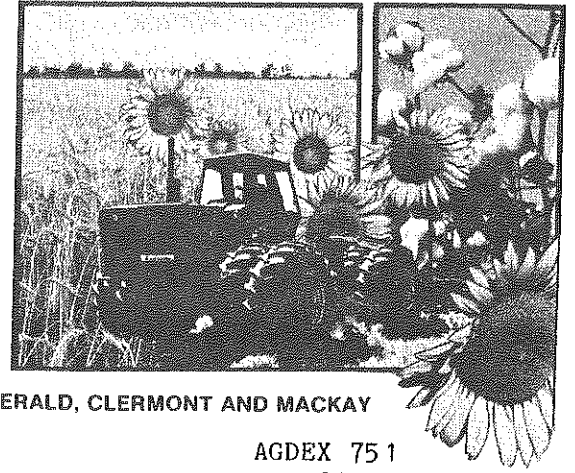
This publication was prepared in 1987 by the Soil Conservation Branch of the former Queensland Department of Primary Industries (QDPI). The state agency now responsible for soil conservation matters is the Department of Environment and Resource Management (DERM).

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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FOR THE DISTRICTS SERVICED BY ROCKHAMPTON, BILOELA, MOURA, EMERALD, CLERMONT AND MACKAY

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BROAD BASE BANK CONSTRUCTION WITH DRAWN GRADERS

Drawn grader blades are used extensively on the Central Highlands to build contour banks. The farm tractor can be used to pull the grader.

Broad base banks are recommended for the cracking clay soils of the Central Highlands so as to

- * Minimise bank failure through cracking;
- * Allow for easier weed control;
- * Maximise the area of cultivation.

Generally, broad base banks on the Highlands should be built at least 0.75 metres high with a base width of 10 metres. The aim should be to have a cross sectional area of not less than five square metres.

On slopes greater than 4%, banks will need to be higher than 0.75 metres. The height and capacity of banks built on these slopes should be checked with Soil Conservation Services staff.

This Agnote outlines a method of broad base bank construction using a drawn grader blade. The method can require 24 to 32 runs of the grader depending on blade size, soil conditions and operator experience. This method is not the only method to build contour banks with a drawn grader blade. However, these guidelines can be adapted to suit the operator.

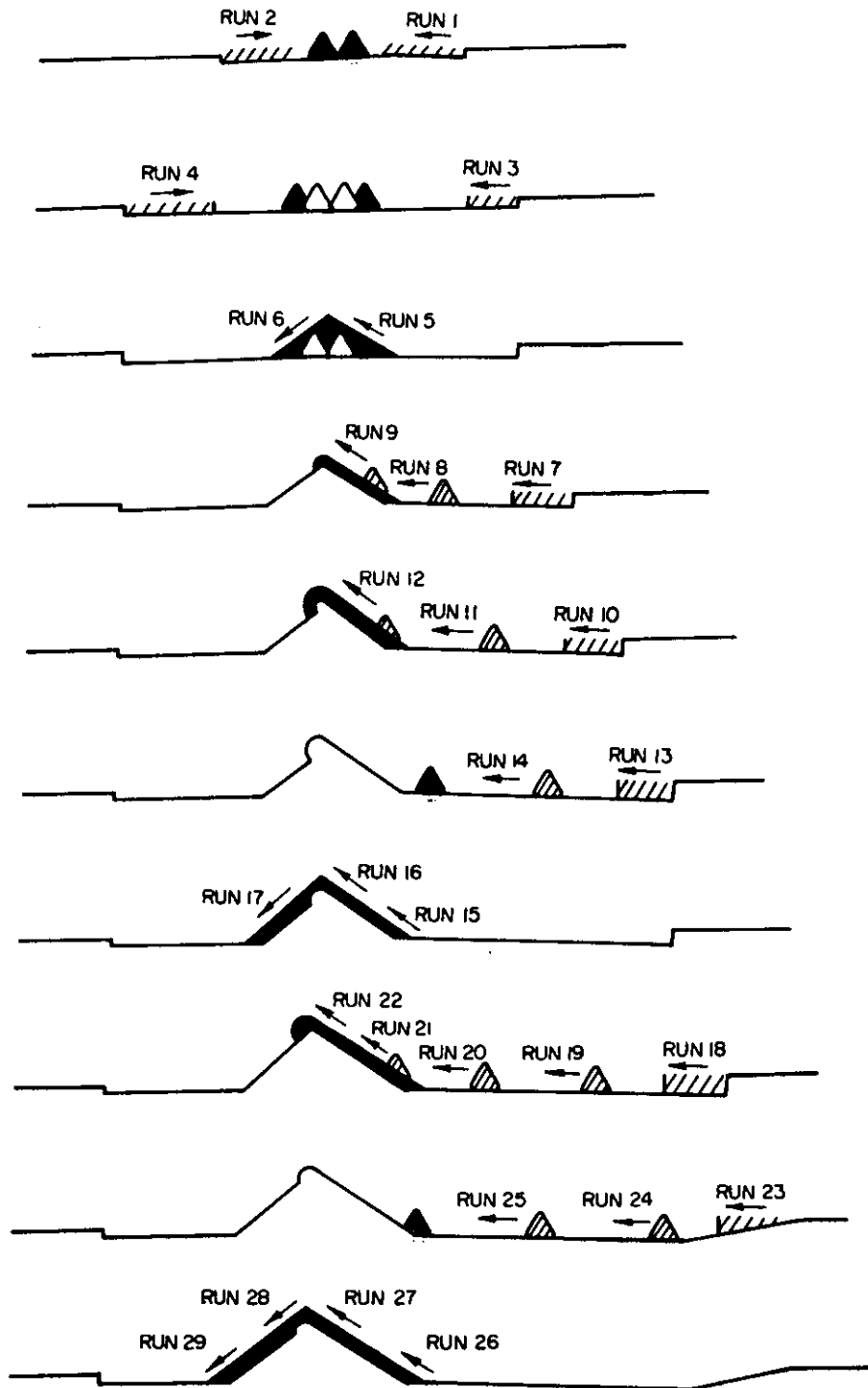
CONSTRUCTION METHOD

Before construction commences, sharp bends on the survey line should be adjusted slightly to improve workability. Gullies should be levelled along the line by moving soil from either side of the gully to allow smooth passage of the drawn grader.




With loose soil the speed and efficiency of blade operation increases. Ripping or ploughing may be necessary throughout construction.

Generally, banks are constructed by shifting three quarters of the soil from the topside and one quarter of the soil from the bottomside. Banks built to the specified height may be built completely from the topside, resulting in greater channel capacity. However, these will take longer to build. Runs from below the survey lines provide a better shaped slope on the lower side of the bank.





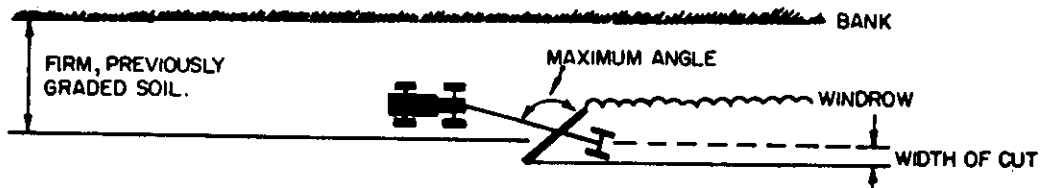
LEGEND:

-  AREA OF NEW CUT
-  POSITION OF INTERMEDIATE RUNS
-  FINAL POSITION OF RUNS
- * Diagrams Not to Scale

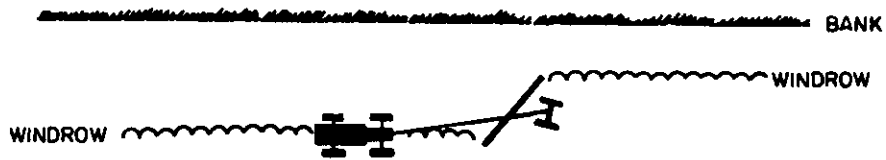
The first diagram shows how a broad base bank can be built from the top and bottom side by using 29 runs of a drawn grader. One kilometre of bank of this type can take 6 to 10 hours to build.

HELPFUL HINTS

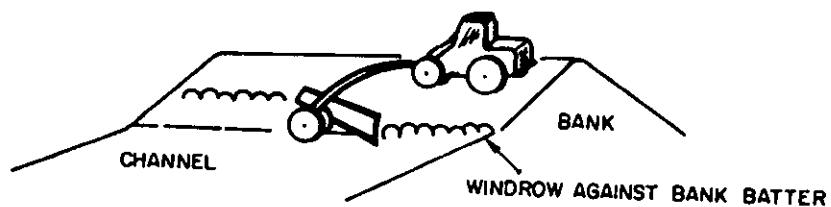
- * Tractor horsepower must be matched to grader blade size to avoid damage to either machine.
- * For new cuts, position the grader blade at maximum angle between draw bar and blade as shown. In the runs that follow, blade angle may be reduced. Offset the grader so that the tractor runs on firm soil to reduce wheel slip.



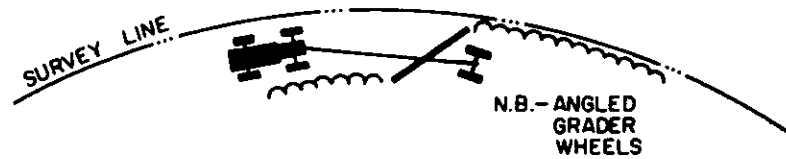
- * Soil should only be removed to plough depth below the survey line to avoid leaving a depression.
- * When moving a windrow towards the bank, lightly peel the subsurface with the leading edge of the blade. This will improve the flow of loose soil across the blade.
- * Position the tractor so that it straddles the windrow, and slightly offset the grader towards the bank to reduce strain on the tractor.



- * When moving a windrow on to the bank batter, position the leading edge of the blade in the channel bottom. Offset the tractor so that it is higher up the bank than the grader. The weight of the tractor improves compaction.



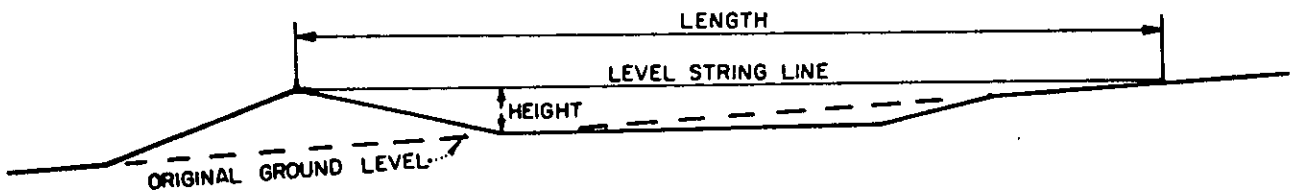
- * Correct position and direction of grader wheels are essential for efficient bank construction. To counteract the sideways force of soil against the blade, the wheels should be directed towards the bank. Wheel angle should be increased on concave curves and when soil is pulled on to the bank batter.



- * Special attention should be given to bank outlets to ensure correct bank height and capacity. Bank height is often lost at outlets due to turning and lifting. Extra runs may be needed.
- * Extra bank height is essential across depressions to allow for increased settlement and safety. An extra 30-50% is needed.
- * Keep the grader blade full to maintain efficiency. Reduce the width of cut to achieve this when cutting deeper.
- * Singles, rather than dual wheels may make the tractor more manoeuvrable.

CHECKING THE BANK

To check the dimensions of a newly constructed bank, use a line level and rule.



$$\text{Cross section area (m}^2\text{)} = \frac{\text{length (m)} \times \text{height (m)}}{2}$$

$$\text{For example: Cross section area} = \frac{20 \times 0.75}{2} = 7.50 \text{ m}^2$$

To calculate the capacity of the settled bank multiply by 0.7

$$\text{Settled} = 7.5 \times 0.7 = 5.25 \text{ m}^2$$

Bank capacity is sufficient as the cross sectional area exceeds 5 square metres.