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Rural Roads Manual

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DEPARTMENT OF PUBLIC WORKS

SELF-HELP AND RURAL IMPROVEMENT
ROADS

CONSTRUCTION MANUAL
(1976 EDITION)

ADVISORY SERVICE TO LOCAL GOVERNMENT
COUNCILS

PUBLIC WORKS DEPARTMENT
LOCAL GOVERNMENT ADVISORY SERVICE

RURAL ROADS MANUAL
SIMPLE ENGLISH VERSION

A CONSTRUCTION AND MAINTENANCE BOOK FOR OVERSEERS
OF RURAL IMPROVEMENT OR LOCAL GOVERNMENT COUNCIL ROADS.

THIS BOOK USES METRIC MEASURES.

WHAT YOU WILL FIND IN THIS BOOK:

SECTION 1: FIRST WORDS

Page 1

SECTION 2: GENERAL TALK

Page 5

A. Gradient

Page 6

B. Drainage

Page 7

C. Surfacing Material

Page 13

D. Formation of the Road

Page 16

E. Horizontal Alignment

Page 16

F. Summary

Page 18

SECTION 3: SURVEYING A ROAD

Page 19

A. Different sorts of surveys

Page 21

1. A survey for a road that is already built

Page 21

2. A survey for a new road

Page 21

3. A survey for a road for an area that is
very steep and broken

Page 22

4. A survey for a hairpin bend

Page 23

B. The Surveyor's Field Book

Page 23

C. Four important points about survey

Page 24

SECTION 4: MARKING THE PLACE WHERE THE ROAD WILL GO

Page 26

A. How do you mark the route permanently?

Page 26

B. How big must you make the track?

Page 27

C. How do you make a benched road track?

Page 28

D. Making a good even gradient with boning rods

Page 29

E. Using a gradient template

Page 30

SECTION 5: BEGINNING TO MAKE THE ROAD

Page 33

A. How to make a bench-cut road

Page 34

1. Clearing the bush

Page 34

2. Cutting the bench

Page 35

3. Camber and Drainage

Page 41

4. Batter

Page 45

5. Hairpin bends

Page 46

B. How to construct a road on flat country or
country that is nearly flat

Page 48

1. Clearing the bush

Page 48

2. Clearing the topsoil

Page 49

3. Formation of the road - camber

Page 51

FÖREWORD TO THE SIMPLE ENGLISH

EDITION OF THE ROAD CONSTRUCTION MANUAL

Exactly three years ago the Local Government Engineer of the Department of Public Works produced a comprehensive Manual dealing with the construction and maintenance of Rural Roads. It was issued to the Councils. They read it and asked for more copies. The success of the book made us very happy. Knowing that we have many keen students of our book, we decided to improve on our work. Readers brought to our attention shortcomings of the first edition, making it possible to make improvements. At the same time the localisation of Council Advisors and the knowledge of technical English by Council staff made it apparent to us that while broadening the technical contents of the book, we should also attempt to remove less known technical words and replace them with every day English. Mrs. Rock, the wife of our Local Government Engineer, being a highly qualified teaching expert, came to our assistance. Painstakingly she went sentence by sentence, paragraph by paragraph and turned all the technical paragraphs into correct but non-technical sentences. The result of this excellent work is offered now back to the Councils as the Second Edition of our original Manual.

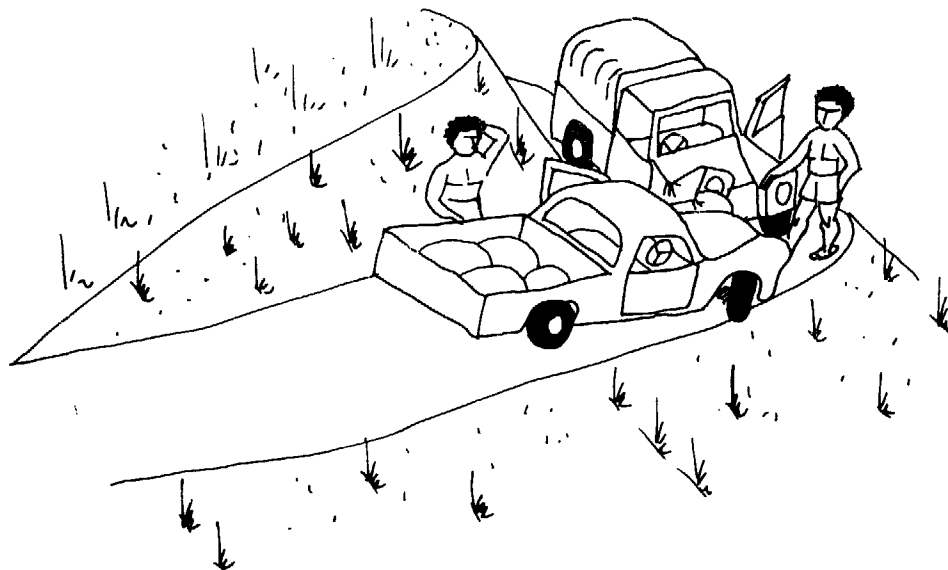
I am proud to be associated with this book and hope that readers in the far distant areas of our country, far from assistance and advice of professional engineers and experienced road foremen, will be able with the help of this book, get most of the answers they may be looking for in solving the never ending problems of road builders. At the same time I invite all readers to send any constructive criticism and advice they may have so, that if needed, we may be able in time to issue a third edition of the same book brought up to date at some future date.

Good luck.



E. ROBIN SAFITUA

Director of Department of Public Works



For these reasons, Councils and the people should not try to build too much new road at one time. It is better to build a few kilometres properly, than to try too much and do it badly. Bad roads should be improved in small sections. These are not too hard to get finished. When the old roads have been fixed, new ones can be added to them each year.

Do not waste money. Ask the Local Government Engineer.

It costs a lot of money to improve a road and build permanent bridges and culverts.

If these things are not done the right way, the improvements will not be very good and the money will be wasted. A good council does not want to waste its money or the Rural Improvement money that the Government gives.

Two things will help a Council not to waste money: First, roads should be built in the fashion this Construction Manual talks about. Secondly, a Council can get help from Local Government Engineering field staff in its own District, or write to the

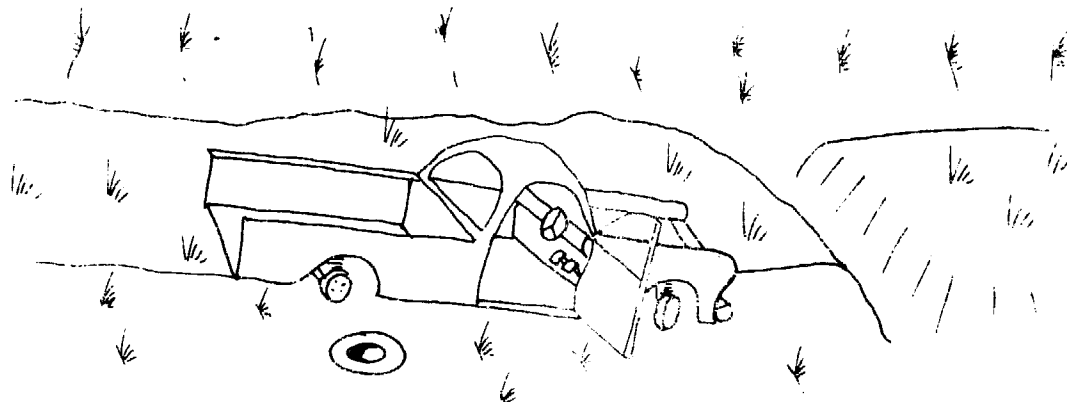
Director,
Department of Public Works,
P.O. Box 1108,
BOROKO.

making the letter "Attention : Local Government Engineer", and ask for technical help. The Local Government Engineer can send surveyors, men who will measure high hills, and who will tell the Council the best place to build a road on a high hill.

A. Culverts	Page 90
1. What sort of pipe?	Page 90
2. How big should a culvert be?	Page 90
3. How deep should you put the pipe?	Page 94
4. How to prepare a bed for the pipe?	Page 95
5. How do you lay the pipe?	Page 96
6. How do you back-fill a trench round the pipe?	Page 97
7. Headwalls	Page 100
8. Aprons	Page 102
B. Timber Bridges	Page 104
1. First words	Page 104
2. What timber do you need?	Page 104
3. How high should a bridge be?	Page 105
4. How do you measure the log?	Page 106
5. How do you prevent rot?	Page 106
6. How high should the bridge be?	Page 106
7. Abutments	Page 108
8. Stringers and Decking	Page 114
9. Kerbing	Page 116
10. Guide posts	Page 117
11. General information about log bridges	Page 117
12. Summary	Page 118
C. Low-level crossings	Page 120
1. What is a good place for a crossing?	Page 120
2. What materials do you need?	Page 120
3. How to build a ford	Page 122
4. Causeways	Page 124
5. Girder bridges	Page 125
6. Lattice bridges	Page 126
7. Bailey bridges	Page 126
8. Suspension bridges	Page 127
9. Cable swing bridges	Page 127
10. Need for survey and design	Page 128

Many roads in Papua New Guinea are not good enough

All round Papua New Guinea there are plenty of roads that have been built by village people. A lot of these roads are no good and others can only be used some of the time. Many months of work, and much of the money of the Government, Councils and people have been wasted on roads not built properly.



This has often happened because the people building the roads did not know the right way to do the work. The other big trouble has been that there were not enough skilled men, or supervisors, to show the people what to do and stop mistakes from being made. This book, called a Construction Manual, has been written because the Government wants to try to help the people build better roads, and to talk about things that can go wrong when roads are being built.

As well as the need to save money and work from being wasted, there are other reasons why self-help roads should be built better.

Good roads do not need a lot of maintenance.

The first reason is maintenance. When we talk about "maintenance" in road work, the word means work that is done and money spent to fix up a road or bridge when it has been worn or damaged, either from being used or by too much rain. Section 7 of this book is about maintenance. You can read about it on pages 81 to 89. Some money is being given by the Government to help Councils maintain their roads, but Councils will have to help too with their own money and work. There will always be a shortage of money for this work, but roads built properly, the way this book says, will not cost as much to maintain as roads built badly. Bad roads on steep slopes will cost a lot more to keep in use than roads that were well made in the first place.

Good roads are safer

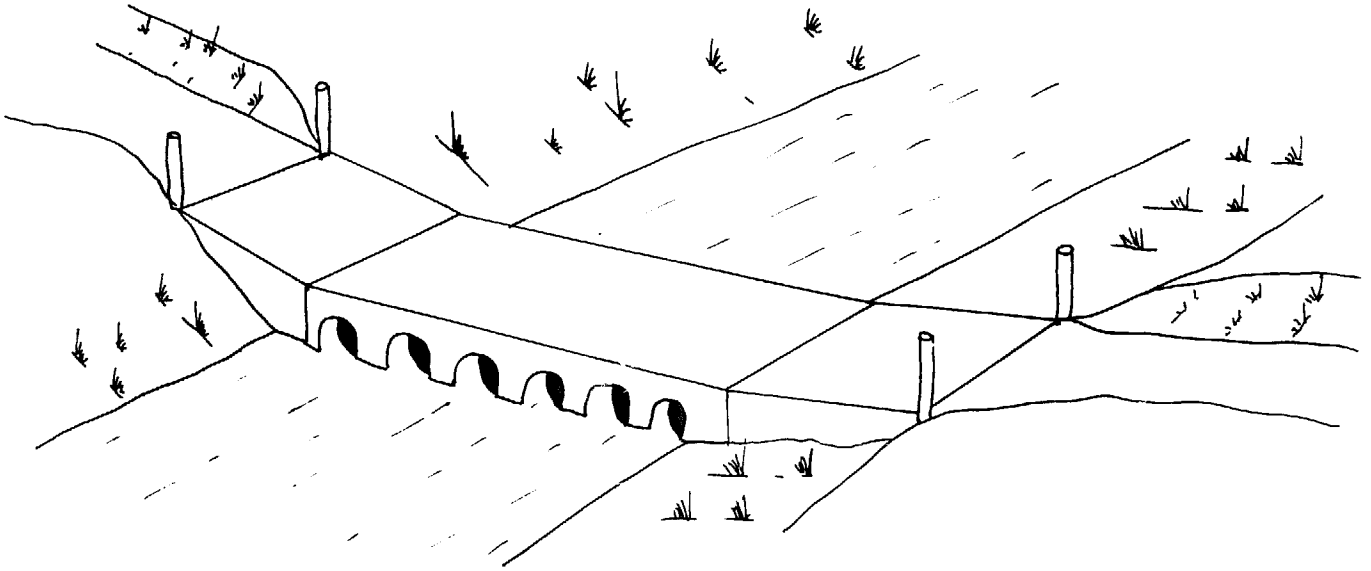
Also, a well-built road is safer than a badly built one, and people are not so likely to get hurt in accidents, or have their cars and trucks damaged, broken or stuck.

4. Formation of the road - side drains	Page 52
5. Formation of the road - relief drains	Page 53
6. Why do all roads need drainage?	Page 54
C. How to build a road in swampy country	Page 54
1. Roads in swampy country are hard	Page 54
2. What is ground-water-level?	Page 54
3. How to construct an embankment	Page 55
4. Camber on an embankment road	Page 59
5. What can you use to make a road stable?	Page 59
6. What to do when you have trouble	Page 59
D. Other information about how to make a new road	Page 59
1. Vertical alignment	Page 59
2. Horizontal alignment	Page 61
3. Temporary culverts and bridges	Page 61
4. Side drains	Page 62
5. Filling	Page 63
6. Surfacing	Page 67
7. Removing solid rock	Page 70
8. Razor-back ridges	Page 70
9. When can trucks use the road?	Page 73
10. What to do with the workmen	Page 73
11. Summary - a list of important things	Page 74

<u>SECTION 6: UPGRADING A ROAD</u>	Page 75
A. Why do you upgrade a road?	Page 75
B. Upgrading an old road	Page 75
C. Very steep country	Page 76
D. New culverts	Page 77
E. Improving the Line and Grade	Page 77
F. Improving curves - Super-elevation	Page 78
G. You must make new drains when you upgrade	Page 80

<u>SECTION 7: MAINTAINING A ROAD</u>	Page 81
A. Need for maintenance	Page 81
B. Things that go wrong	Page 81
1. Potholes	Page 81
2. Loss of surfacing material	Page 81
3. Loss of camber	Page 82
C. Other maintenance jobs	Page 83
D. Road gangs on sections	Page 84
E. Government help for Council road maintenance	Page 84
F. Minor roads	Page 89

The Local Government Engineer can also send engineers, men who plan bridges and causeways that will go over rivers.

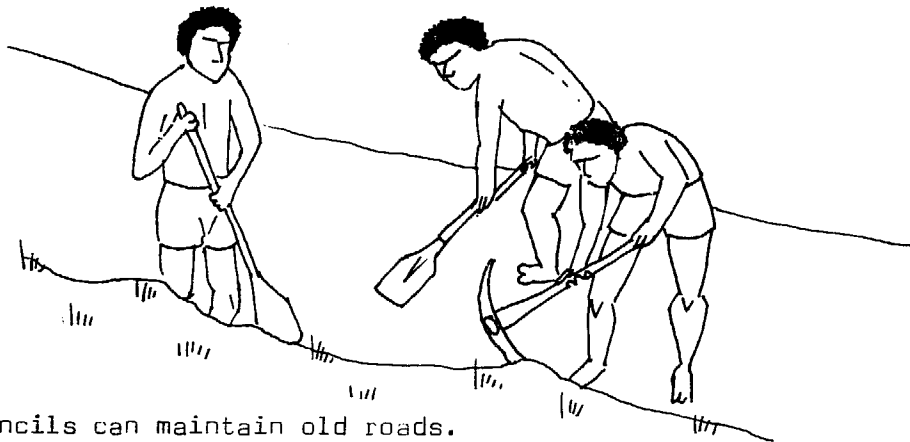


The Council does not have to pay these men for their help. The Local Government Engineer sends them out to help Councils build roads that are being built with Rural Improvement Fund money.

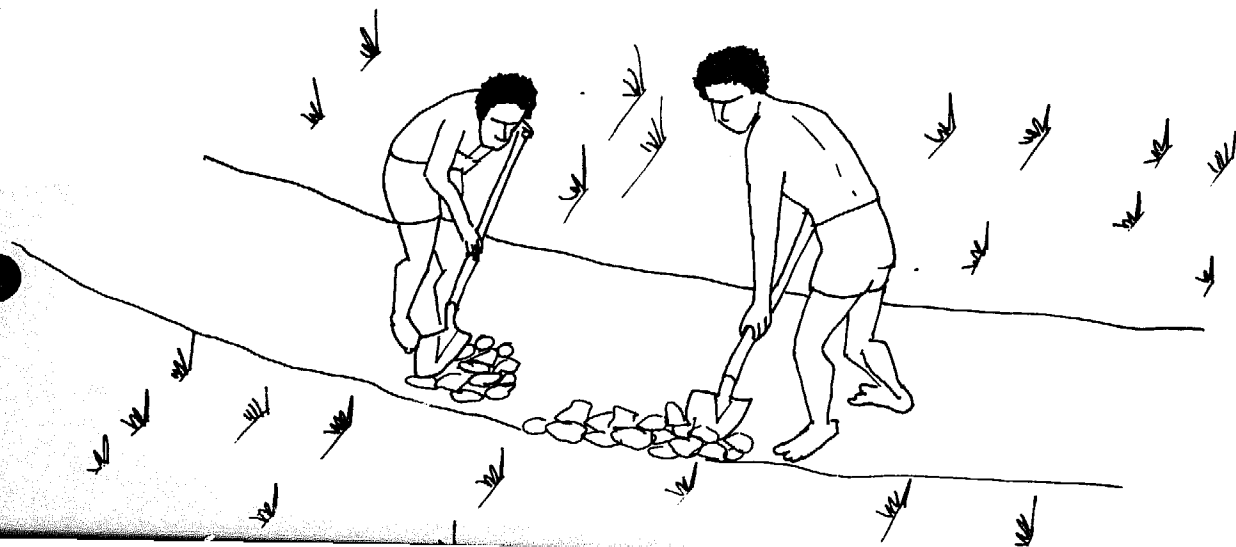
If you want technical help from surveyors and engineers for a job that is not paid for by Rural Improvement Fund money, you will have to wait a while.

It is not good for Papua New Guinea to have bad roads.

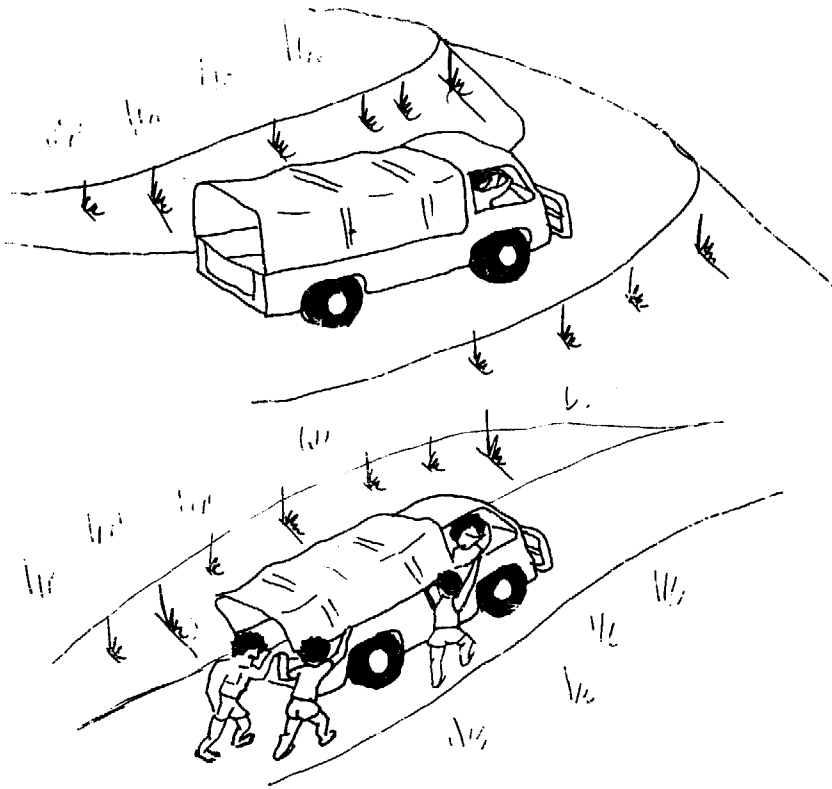
Councils can construct new roads.



Councils can maintain old roads.



A. GRADIENT



A Truck can easily go up this road because the road is not too steep. This road has a low gradient.

A truck cannot go up this road easily, because the road is very steep. This road has a high gradient.

The gradient of a road talks about the steepness of a road. If your first work on a road follows the right gradient, then you can easily look after the road and improve it later.

There are five reasons why you should not build roads that are very steep.

1. It is hard to improve a steep road. Suppose you want to make a small road bigger. If the road is not too steep you can just make the road wider. You will need some more money and work, but not too much. But if the small road is a very steep road, you cannot make it wider. You have to make a new road that is not so steep. This costs a lot of work and money.
2. Not all trucks can go up very steep roads. Suppose a truck tries to go up a road that has only a little bit of surfacing material on it. An ordinary truck can go up the road if it is not too steep. But an ordinary truck cannot go up the road if it is too steep. You need a 4-wheel-drive truck to go up a very steep road and 4-wheel-drive trucks cost a lot of money.

SECTION 2 : GENERAL TALK ABOUT HOW TO CONSTRUCT ROADS

This book is to help people supervise work on self-help and Council roads. If you have a hard problem that this book does not help you with, men from the Department of Public Works will help you. You can ask the District Works Officer or the District Works Engineer in your own District, or you can write to the Local Government Engineer in Port Moresby. His address is on Page 2.

What are these self-help roads used for?

They are built so that a man can drive a truck to a town or to a Council or Sub-District Office, trade stores, aid post, coffee co-operative, cocoa fermentary, air-strip, wharf, resettlement area, quarry, ferry, mission headquarters or school, or to join a Highway or big road. Papua New Guinea needs a lot of roads like these, but there is not much money.

Four things are important when you build Council roads and Rural Improvement Roads.

These roads should be :

1. Cheap to build
2. Cheap to maintain
3. Safe
4. Open for trucks to use in most weather

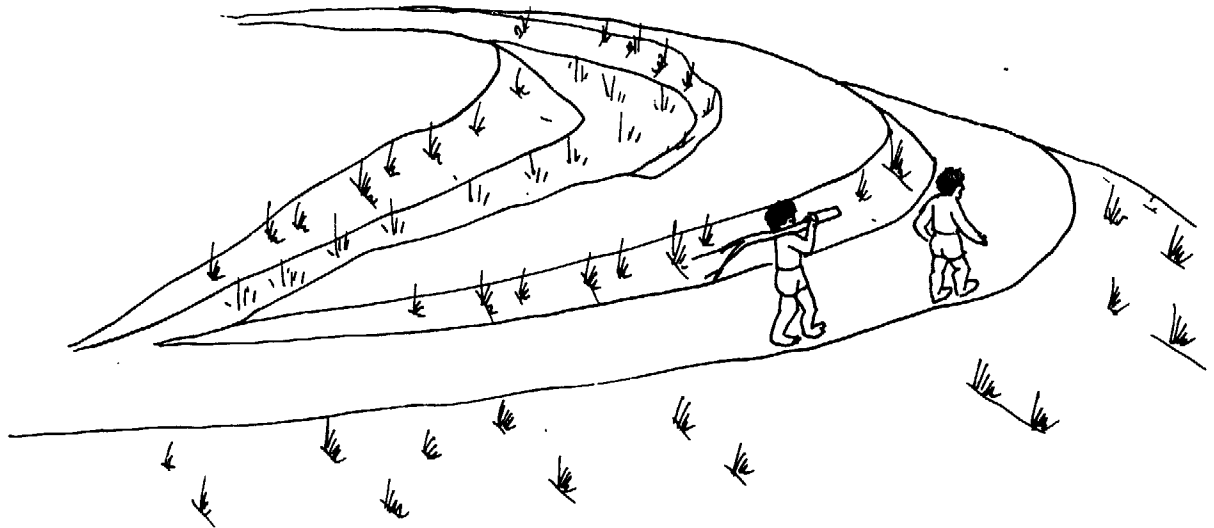
How can Councils build roads that are cheap and safe and almost always open for use?

The things that help most have special names. Here are five of these names.

- A. Gradient - the steepness of road. You can read about this on pages 6 and 7.
- B. Drainage - getting water off the road. You can read about this on pages 7 to 13.
- C. Surfacing or Sheeting - putting material on the road to make it stronger. You can read about this on pages 13 to 15.
- D. Formation of the Road - how wide it should be and the distance between the drains. Read page 16.
- E. Horizontal Alignment - building roads with no sharp bends. Read pages 16 and 17.

We will talk about these things one by one. First we will help you to understand them; then we will help you to learn how to use them to make roads that are cheap and safe and good roads.

Councils can upgrade old roads.



This book will help Council supervisors do these things well
In all this work, Councils need men who have read this Construction Book
because it tells them the best way to construct roads, and maintain them
and upgrade them. These men must understand this book and do what it says.

3. A truck has to work hard on a road that is too steep and it will damage the road. A truck has to work very hard on a steep road. This has two bad results. The first bad result is that the wheels throw out the loose surfacing material from on top of the road. This is dangerous. The second bad result is that the wheels work hard and they make deep holes and cuts in the road. You have seen the deep cuts that a tractor makes on a road that is steep or soft. The village people or the Council men have to keep on working hard to fix the road. Also, if there is not much surfacing material in that area, you do not want to waste it by fixing up the same roads all the time.
4. Very steep roads are dangerous. When you are going down a steep hill in a truck, you have to go down very slowly. You put on the brake to go slow, and this can make you slide. Sliding downhill in a truck is very dangerous because you cannot control the truck. You might have an accident. An accident like this can easily happen when there is only a little bit of surfacing material.
5. Rain water damages very steep roads more than it damages roads that are not so steep. Why is this true? When it rains, water falls on the road. The water runs off a flat road slowly. The water runs off a steep road very fast. When water runs off fast, it makes holes and cuts in the road and it washes off the surfacing material.

If a councillor wants you to build a very steep road because he says it is a short road, will you be able to tell him why his idea is not a good one? I have given you five (5) reasons why very steep roads are bad. I will say them again now:

- 1: It is not easy to make a very steep road bigger:
- 2: Not all trucks can use a steep road.
- 3: A truck has to work hard on a steep road and the truck damages the road.
4. Very steep roads are dangerous when you go downhill with the brake on.
5. Rain water falls off steep roads very fast, and this damages the road.

B. DRAINAGE

Water is bad for roads.

Here are three reasons why water is bad for roads:

1. When it rains, trucks can get bogged if the water stays on the road.
2. Water that stays on a road makes deep holes and cuts in the road.
3. Water makes the ground near the road soft and loose. When the ground is loose, it can fall on the road and block it.

