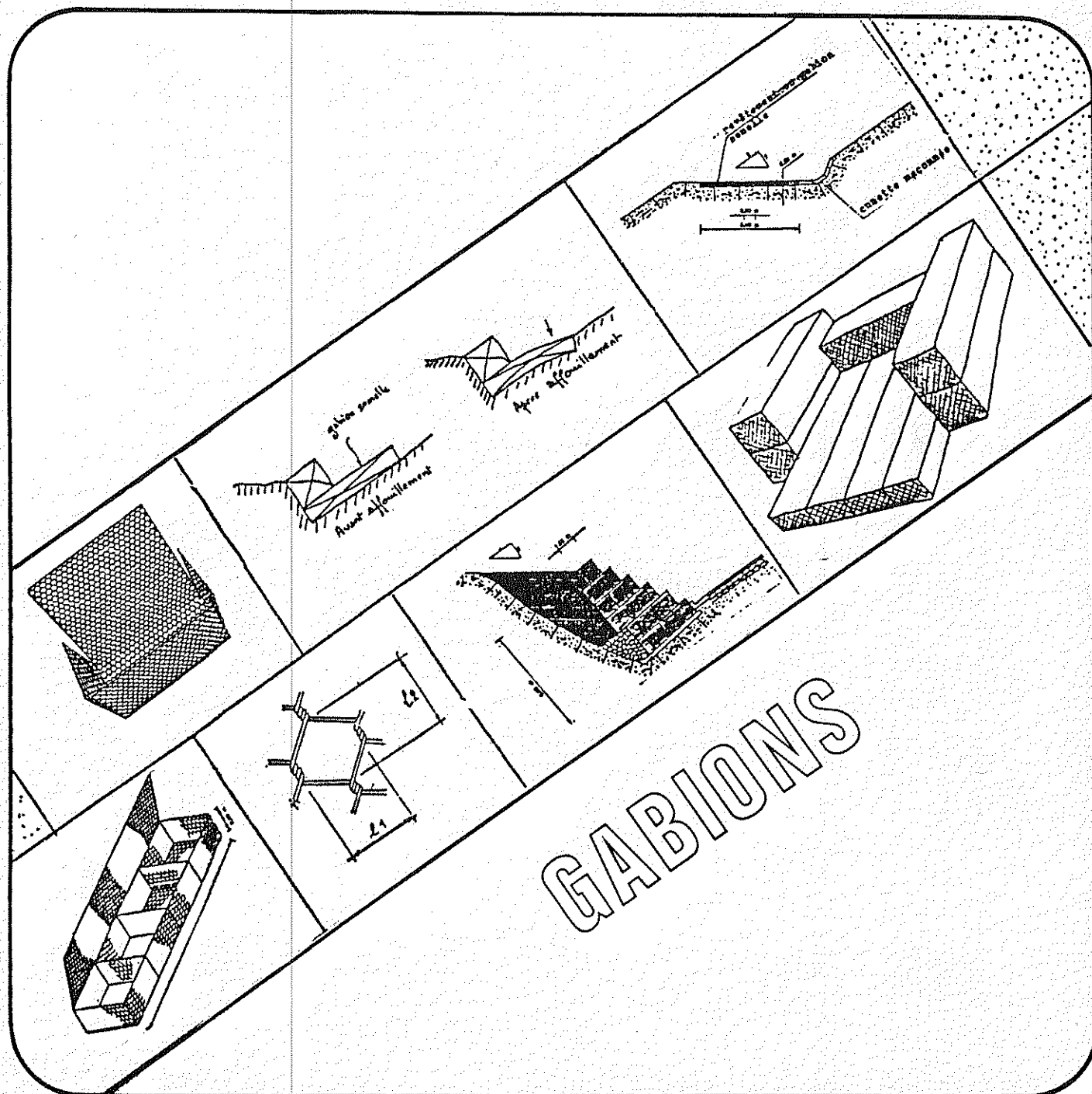




# SPECIAL PUBLIC WORKS PROGRAMMES . **SPWP.**



TRAINING ELEMENT AND  
TECHNICAL GUIDE FOR SPWP  
WORKERS **BOOKLET N° 3**



United Nations Development  
Programme



International Labour  
Organisation

SPECIAL LABOUR-INTENSIVE  
PUBLIC WORKS PROGRAMMES

**Training element and technical guide  
for SPWP workers**

**Booklet no 3**

**GABIONS**

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## 1. GENERAL

### DEFINITION

The technique of gabionwork is much valued in development projects.

The material used is inexpensive and the simple assembly techniques involved require no special tools or skills.

Nevertheless, a certain amount of care needs to be taken as far as the conception and execution of projects using gabions are concerned.

Indeed, even minor mistakes made in the planning and implementation stages of gabionwork can bring about the rapid destruction of the work. This occurrence, which gives rise to a certain distrust and dislike of the technique, is unfortunate since, when properly designed and executed, gabionwork provides an economical solution to the construction of numerous types of structure.

Moreover, the decision to adopt this technique benefits unemployed or underemployed communities since it necessitates the mobilisation of a large workforce of unskilled labour.

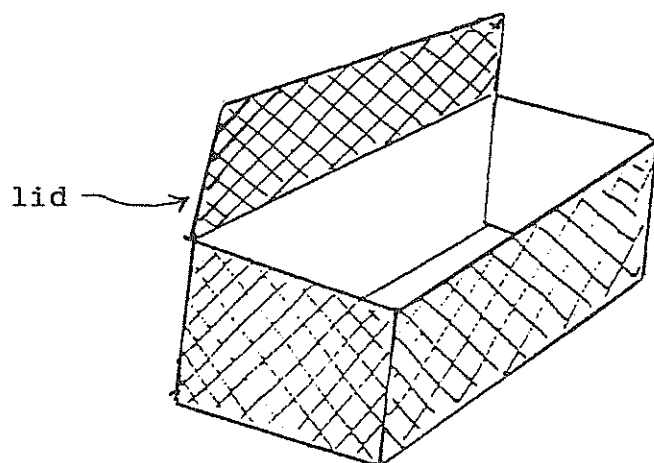
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notes

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The use of gabionwork, besides offering considerable cash savings, contributes to the alleviation of unemployment and under-employment, while the work is underway.

A gabion is a wire mesh cage or basket filled with stones of appropriate dimensions (see pp. 37, 38 and 39).



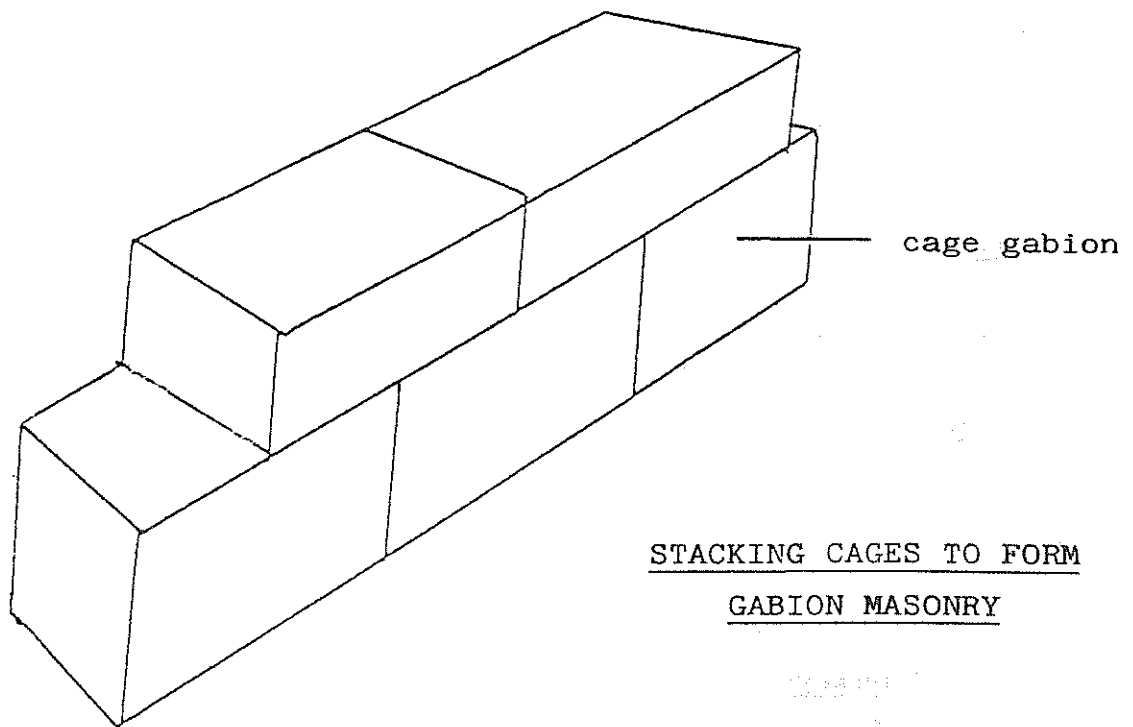
GABION CAGE OR  
BASKET

Once the gabion is filled, its lid is lowered and bound to the adjacent side of the box (see pp. 27-32). In this way, the gabion becomes a single unit with definite and relatively stable dimensions.

Gabion masonry can be defined as a collection of blocks arranged, following certain rules, in stacks or successively juxtaposed. (Juxtaposition: in the context of gabionwork: two gabions placed side by side, with nothing separating them.)

notes

Gabionwork can thus be likened to bonded drystone masonry work.



STACKING CAGES TO FORM  
GABION MASONRY

#### ADVANTAGES OF USING GABIONS

The use of gabions offers several advantages over that of other construction materials, especially where work on soft or unstable ground is to be undertaken.

The application of this technique in thousands of instances worldwide has proved its different merits, notably:

notes



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### Ease and flexibility of their use

Gabionwork can be interrupted at any stage without any risk to the solidity of the finished structure. This means that the progress of work can be modified according to the labour actually available in the project area.

### Uniformity of the structures

The structures are made up of large blocks, joined one to another and are, therefore, extremely stable. Gabionwork resists remarkably well to erosion and undercutting by water.

### Elasticity

The elastic quality of gabionwork is one of its main advantages. The use of hexagonal wire mesh allows a gabion to modify its form to compensate for irregularities in the natural ground on which it lies, without weakening.

Its suppleness makes its use particularly appropriate on soft ground which is prone to erosion and undercutting.

A gabion moulds itself perfectly to the profile of the ground without any prior levelling of the ground being called for.

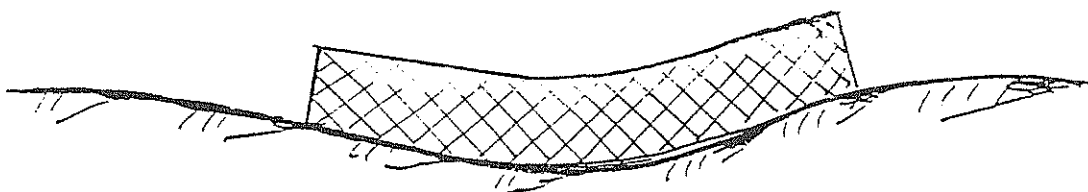
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### notes

Any subsidence of the ground under the gabion will be absorbed by the gabion's mass, with no significant risk to the stability of the structure as a whole.



BEFORE UNDERMINING



AFTER UNDERMINING

notes

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### Simplicity of gabionwork

The conception of gabion structures is very simple. Stability can be increased by using oversized gabions, without pushing up the cost of manufacture unduly.

### Increased utilisation of local resources

Apart from wire mesh which, in the majority of cases, is imported, entailing foreign currency spending, the rest of the resources needed for the manufacture of gabions is available locally.

These resources are:

- unskilled labour;
- skilled labour;
- gangleaders;
- materials (stones and pebbles);
- tools for stone extraction and gabion-handling.

The overall cost of a gabion cage with a volume of 2 m<sup>3</sup> can be estimated as being roughly equivalent to the cost of twenty unskilled workdays.

The cage is the one element of the cost which is payable in currency.

---

### notes

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GABIONS		3	7

### Ease of modifying, raising and repairing the structures

The simple conception of gabion structures means that, in certain instances, work can be undertaken in stages, for example:

- raising an overflow lip (spillway);
- raising a bank protection wall;
- extending a bank protection groin;
- etc.

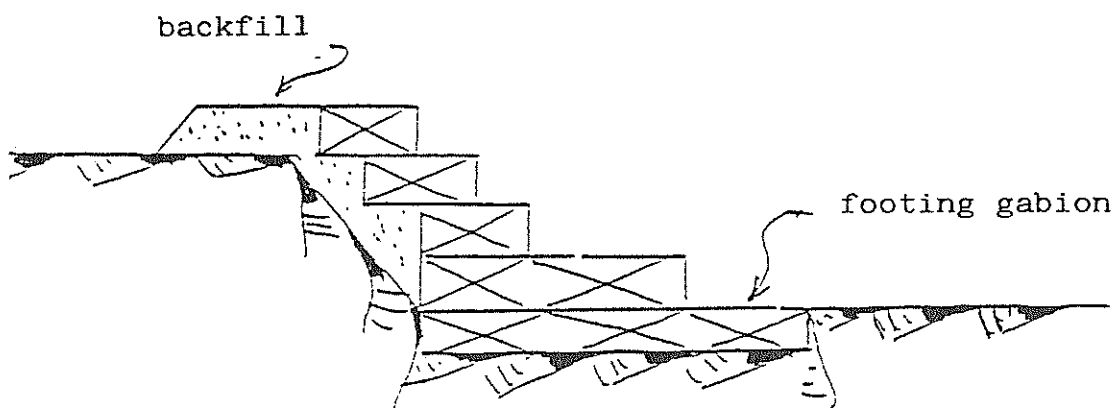
### AREAS OF USE

Gabions may be used to meet the requirements of the majority of rural development projects.

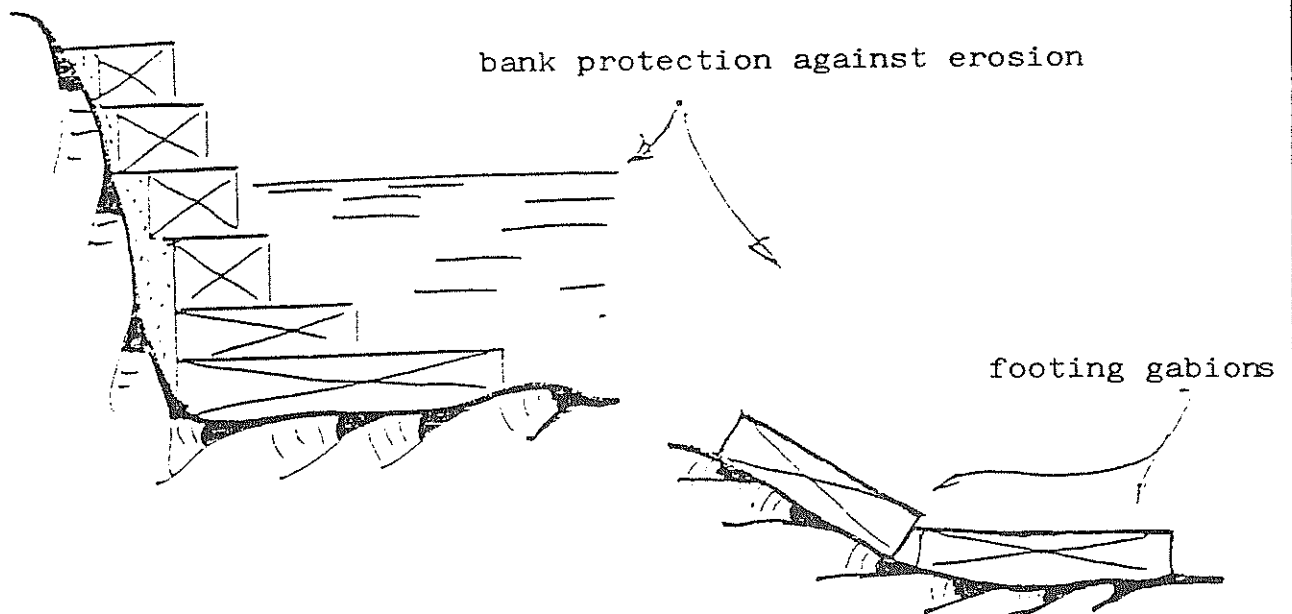
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notes

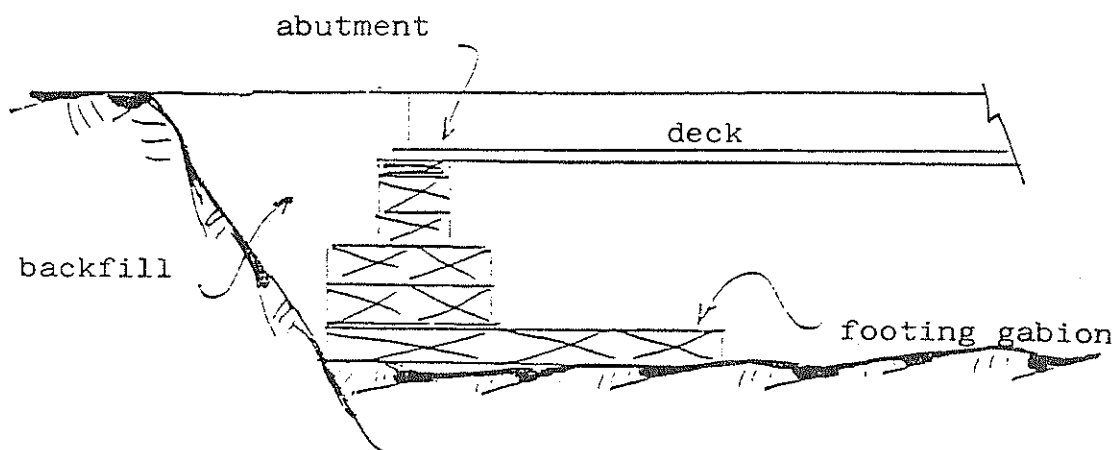
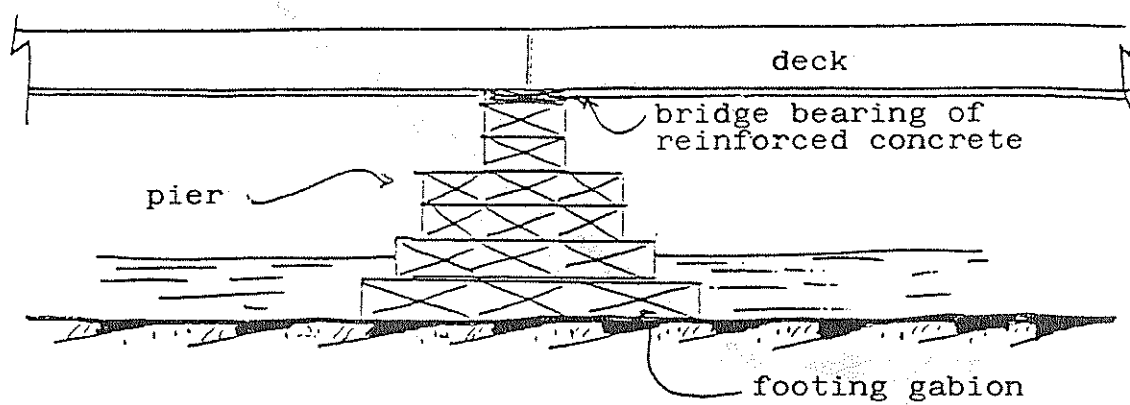
Bank protection against flooding



bank protection against erosion

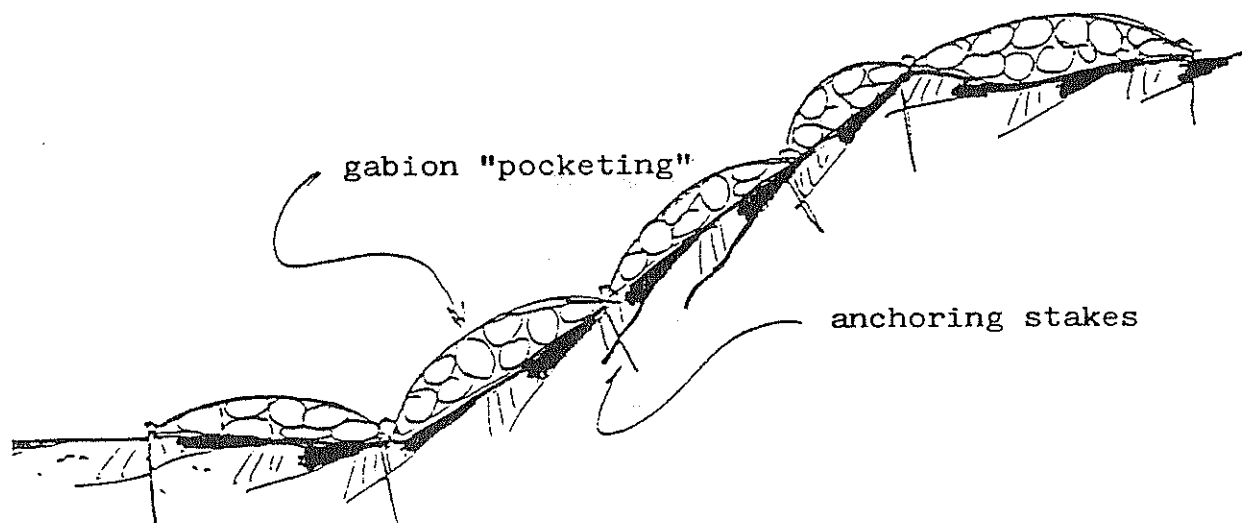


notes

Bridgesnotes

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### Protective bank covering



### Hydro-agricultural structures

Dams

Slope retaining banks

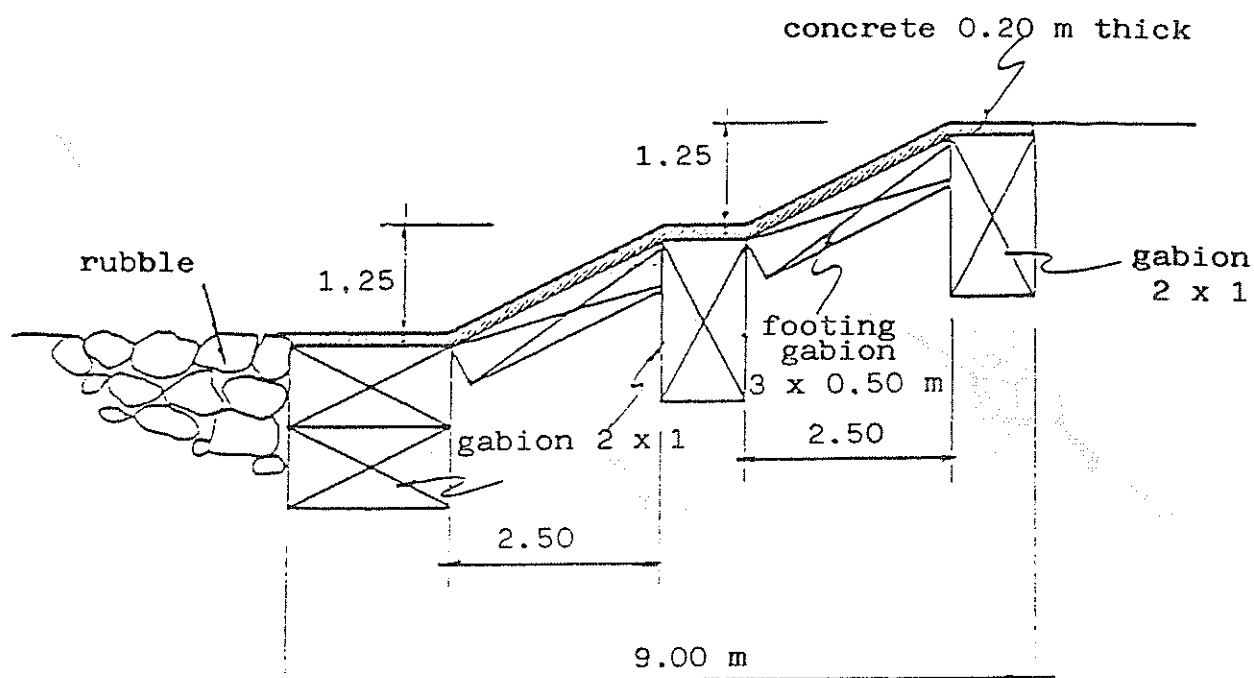
Spillway weirs

Water intakes in rivers

Slope-correcting weirs

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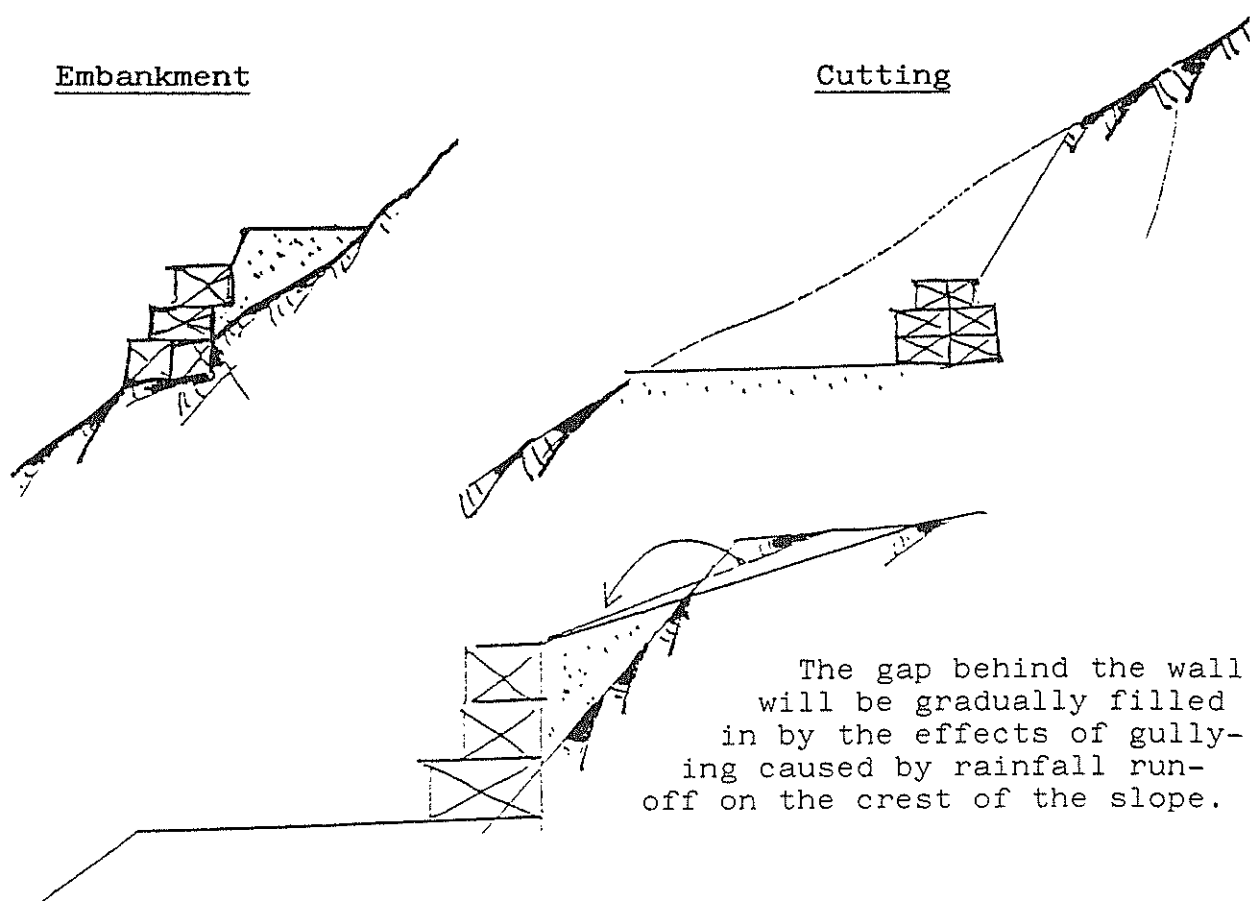
notes

WeirWEIR MADE FROM GABIONS AND CONCRETEnotes



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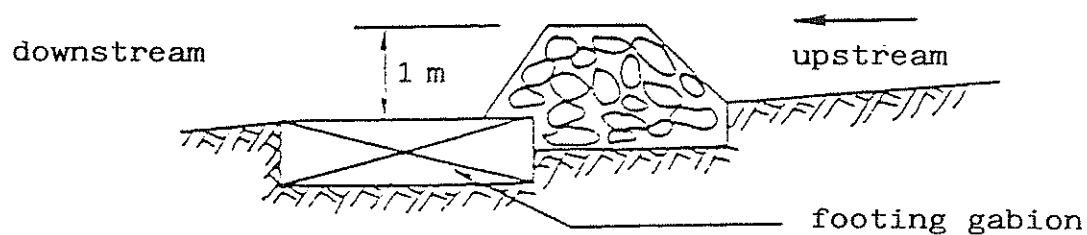
### Roadway retaining walls



notes

Soil conservation works

Gully correction



DRYSTONE AND GABION WEIR

notes

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	GABIONS	3	14

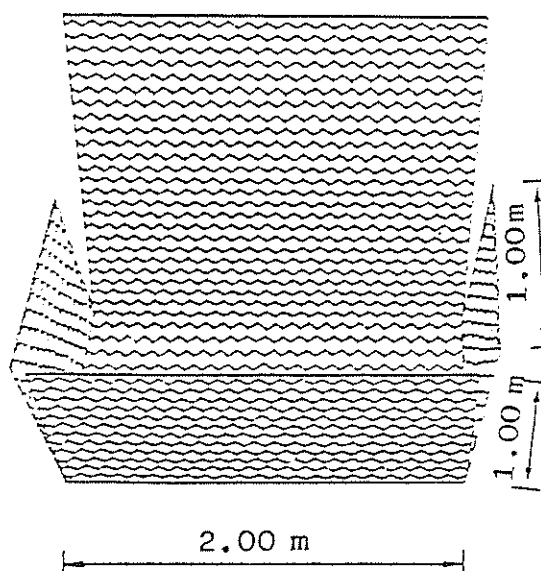
## 2. CHARACTERISTICS

### TYPES OF GABION

The most common and versatile gabion is a rectangular parallelepiped in form, 1 metre high and wide and between 2 to 5 metres long, according to specific requirements.

Additional partition walls, known as diaphragms can be fitted to strengthen the gabion, preventing it from becoming too misshapen on ground which is liable to subsidence.

STANDARD CAGE  
GABION



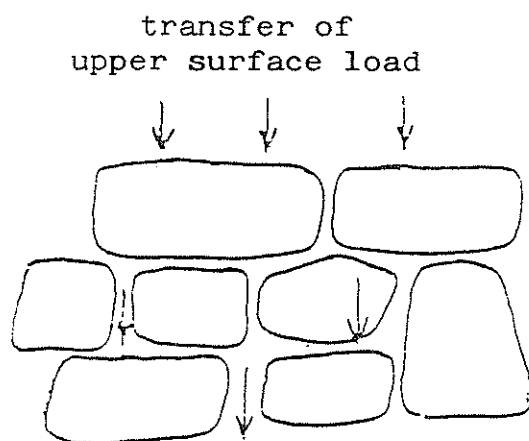
notes

The part played by the stones contained within gabion cages is to absorb compression which is the only constraint gabion constructions have to withstand.

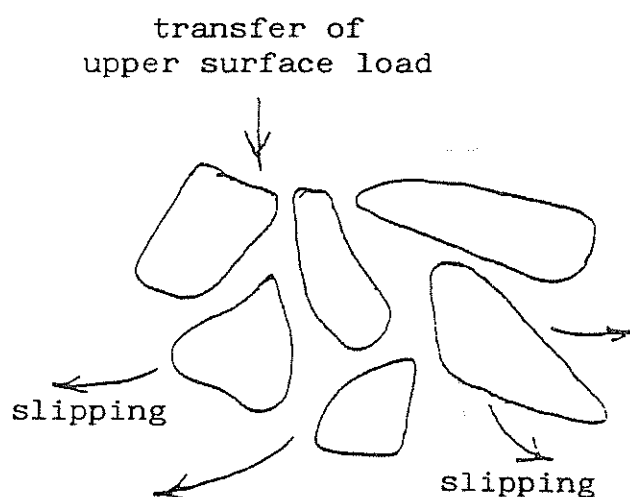
Traction caused by stones sliding against each other is absorbed by the wire mesh of the cage.

The main consideration is to prevent too much movement within the cage by carefully arranging the stones in such a way that there is the maximum contact between their surfaces.

If care is not taken when stacking the stones, they will slide about, deforming the mesh cage and even breaking it.



CORRECTLY PACKED STONES



BADLY PACKED STONES

notes

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	GABIONS	3	16

Nevertheless, even when every precaution is taken in filling them, gabions have a tendency to deform when the stonework suffers other forces than that of compression.

To combat this eventuality, the gabion can be trussed using galvanised wire to link opposite and adjacent walls together, which will help reduce the tendency of the gabion to become misshapen.

#### OTHER TYPES OF GABION

Other types of gabion than the standard cage gabion exist, less frequently employed, but adapted to meet the specific requirements of certain types of structure.

#### Footing gabion

The only distinction between the footing gabion and standard gabion is its height which is generally 50 centimetres.

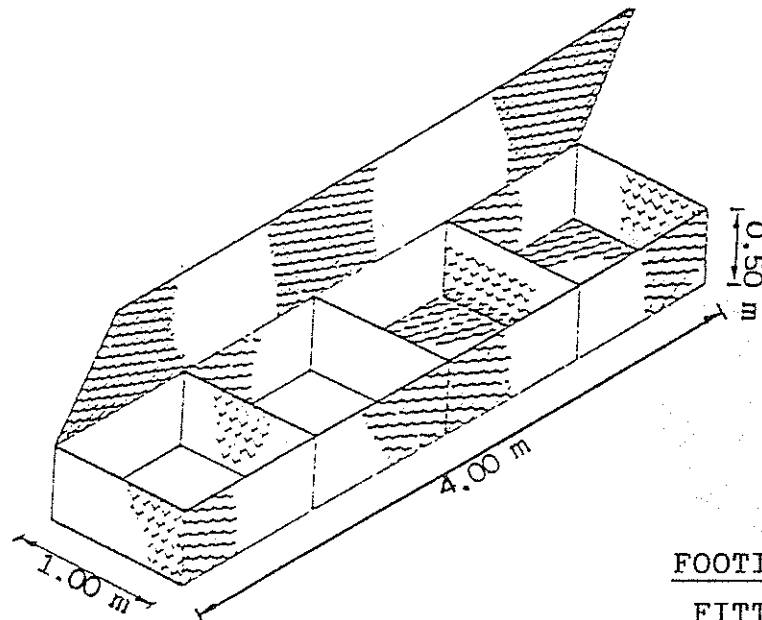
Footing gabions also exist in heights of 15, 23, 25 and 30 centimetres (see annex).

Such gabions are especially suitable for bank protection work and for reinforcing canal banks.

---

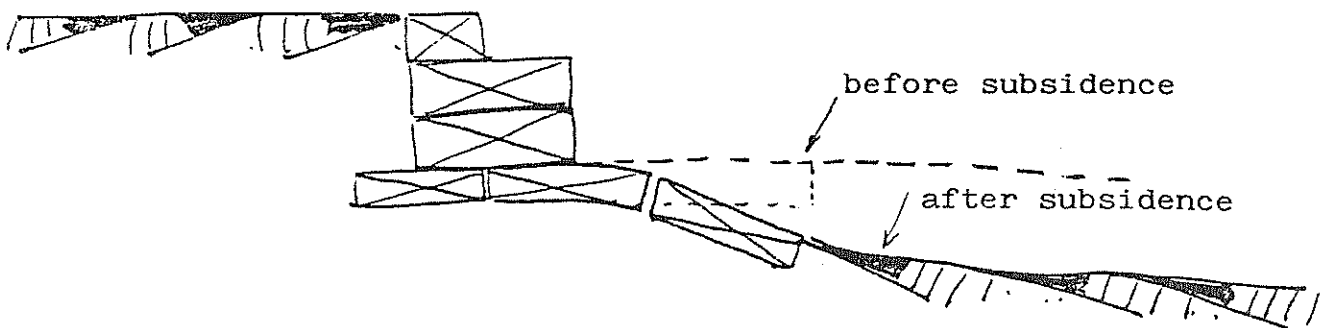
notes

Like ordinary gabions, footing gabions can be fitted with diaphragm walls inside, for use on unstable ground.



FOOTING GABION  
FITTED WITH  
DIAPHRAGMS

By merit of its ability to modify its shape, moulding itself to the form of the ground, the 50 cm deep footing gabion is very useful for foundation work.

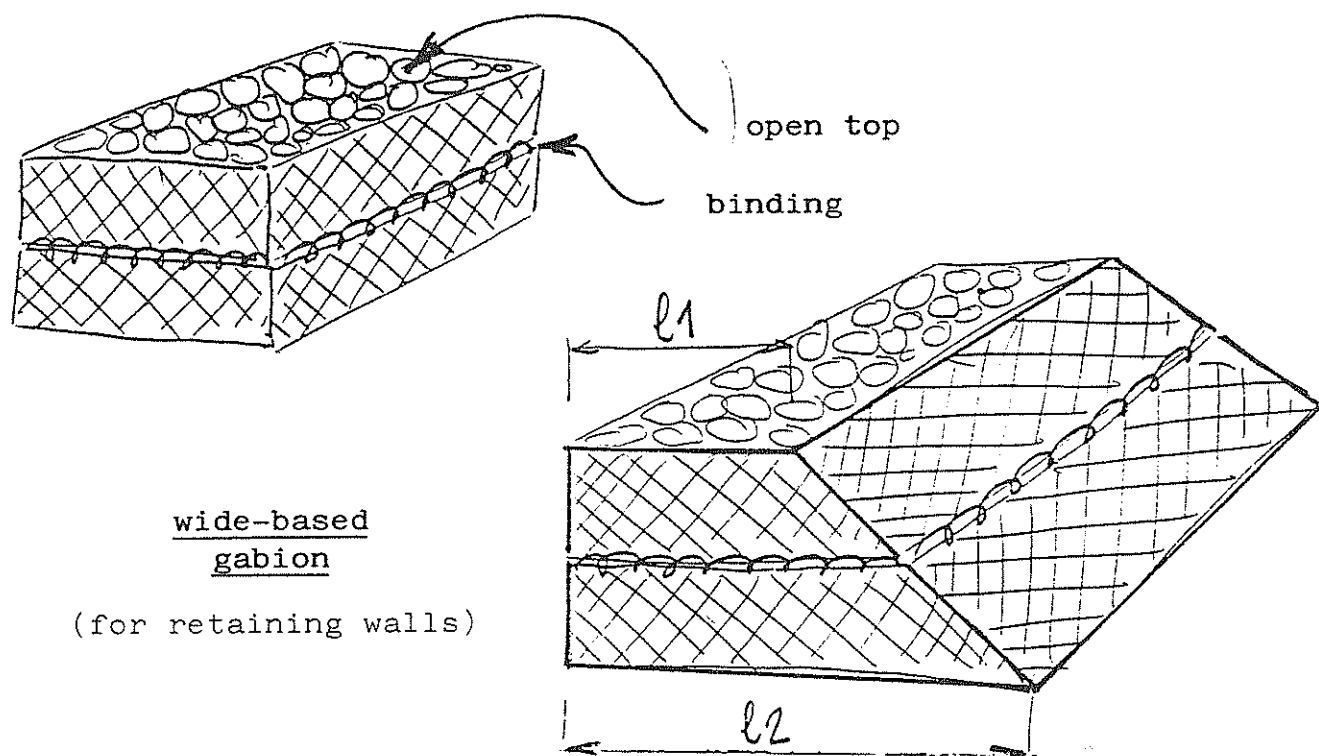


notes

### Open-topped gabion

This is a gabion of standard dimensions, but which does not possess a lid.

When two such gabions rest one on top of the other, the base of the uppermost gabion acts as a lid for the lower gabion.



wide-based  
gabion

(for retaining walls)

The advantage of the open-topped gabion is economy since one wire mesh side of the cage is spared. However, it is not advisable to use this type of gabion for structures which will undergo considerable stress.

### notes

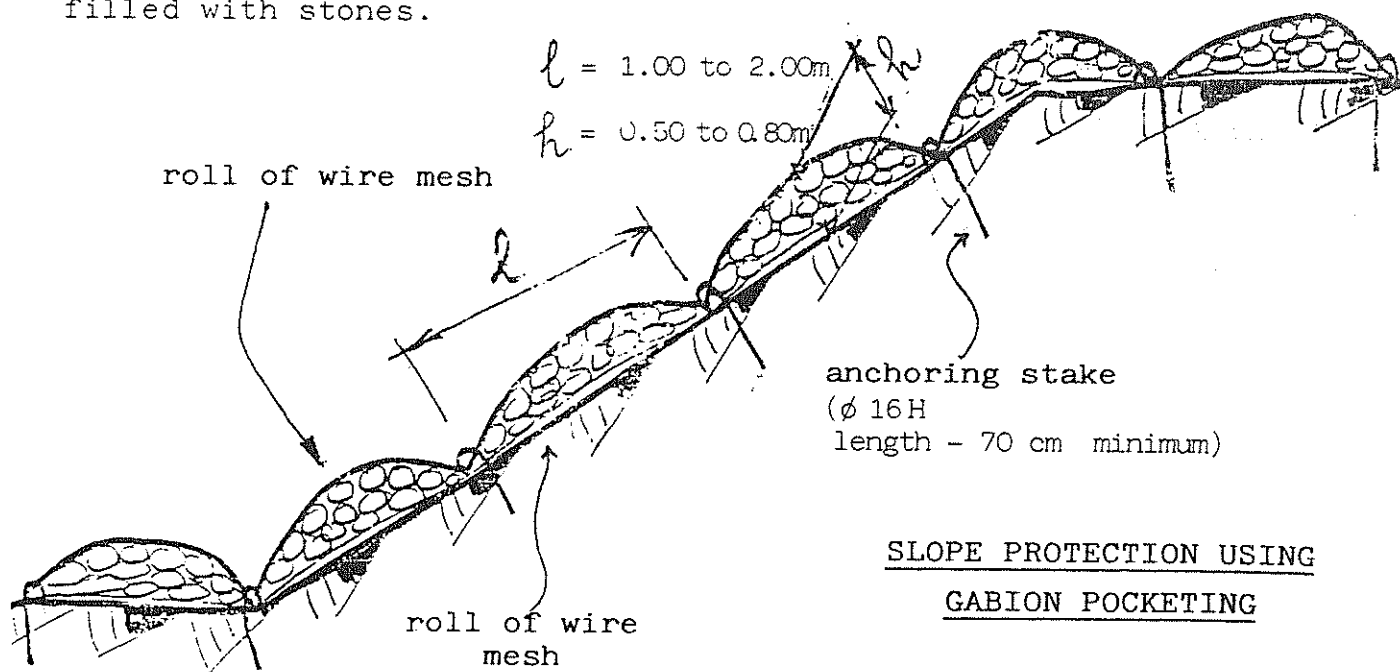
Gabion pocketing

This gabion variation is particularly useful and economical for slope and bank protection and stabilisation work.

It is much less commonly used than the cage gabion which means that it may be difficult to obtain the materials required for its manufacture.

Procedure

Rolls of wire mesh are unwound and staked to the ground using strong, hooked, iron stakes. Other rolls of mesh are unwound and staked into place to form pockets which are subsequently filled with stones.



SLOPE PROTECTION USING  
GABION POCKETING

notes



### SIZES AND SPECIFICATIONS

The most common specifications for gabions are the following (hexagonal wire mesh):

#### Standard gabions

length m	width m	height m	volume m <sup>3</sup>	weight of basket (kg)
2	1	1	2	14
3	1	1	3	20
4	1	1	4	25
5	1	1	5	31
6	1	1	6	37

#### Footing gabions

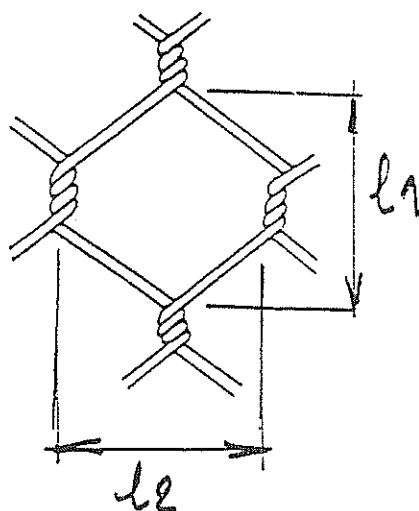
length m	width m	height m	volume m <sup>3</sup>	weight of basket (kg)
2	1	0.5	1.0	10
2	1	0.3	0.6	7
3	1	0.5	1.5	14
3	1	0.3	0.9	11
4	1	0.5	2.0	18
4	1	0.3	1.2	13
5	1	0.5	2.5	23
6	1	0.5	3.0	27

#### notes

Smaller-sized mesh exists - 80 x 110 mm, 50 x 70 mm - but is reserved for instances where only small stones or pebbles are available or where a structure needs to be exceptionally resistant.

It is always more economical to use large-sized mesh gabions (120 x 100 mm) filled with large stones.

Mesh should be of the hexagonal double-twist type.

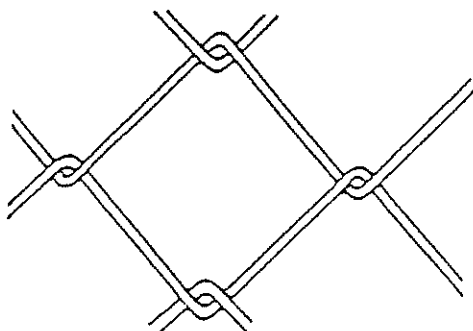


DOUBLE-TWIST  
HEXAGONAL MESH

notes

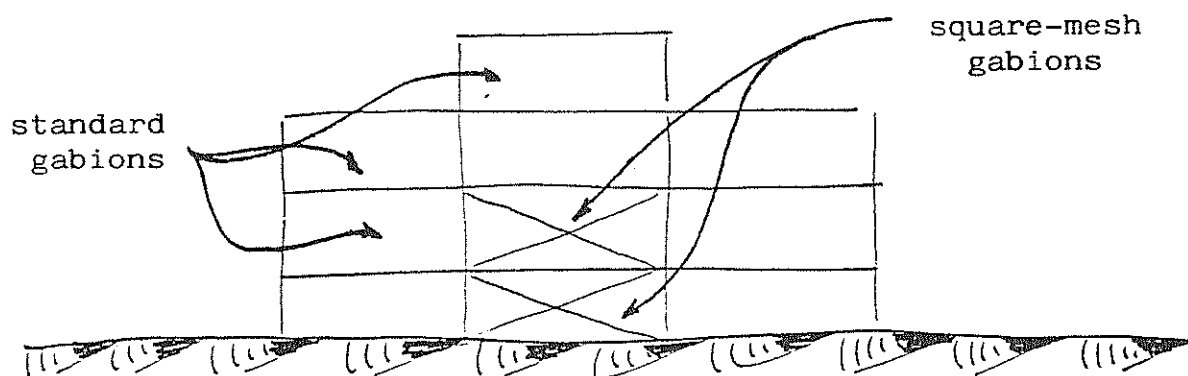
Gabions may also be made using single-twist square mesh which can be manufactured locally from imported rolls of iron wire.

Although less expensive, this type of gabion is not recommended for large constructions or for those which will have to stand up to great stress. Its use can, however, be envisaged in constructing low-stress structures, e.g. small supporting walls, 1-2 m high.



SINGLE-TWIST  
SQUARE MESH

A fairly economical compromise can be found in incorporating these lighter single-twist mesh gabions in larger works built with standard double-twist hexagonal mesh gabions.

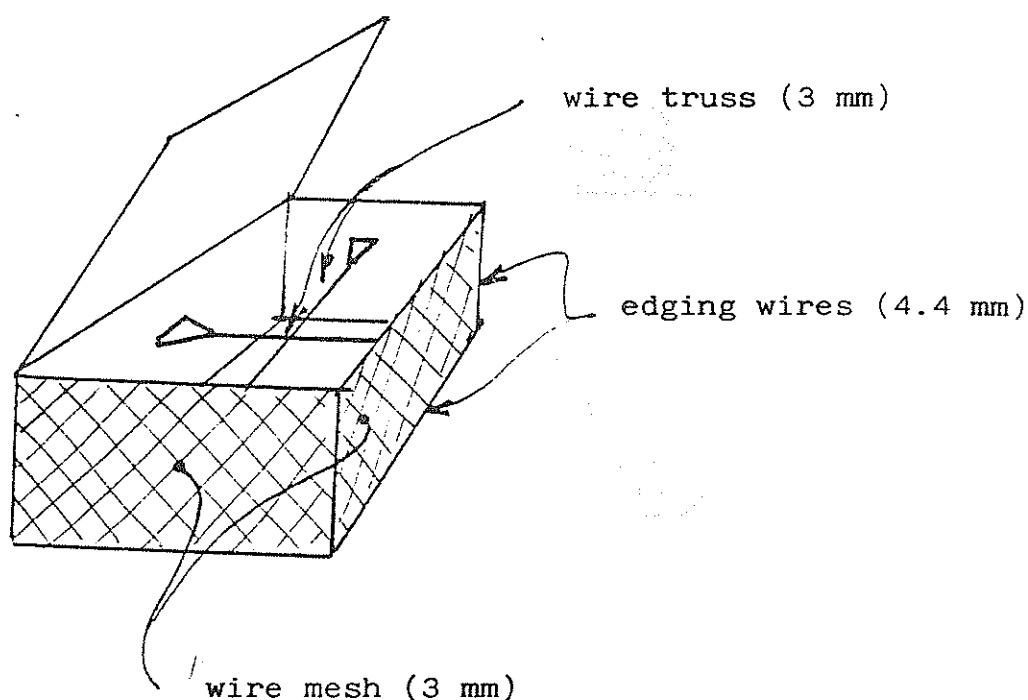


notes

It is imperative that gabion cages be made from galvanised steel wire. Plastic- (PVC) covered galvanised steel mesh is used to advantage in corrosive environments (e.g. for marine structures).

### Wire specifications

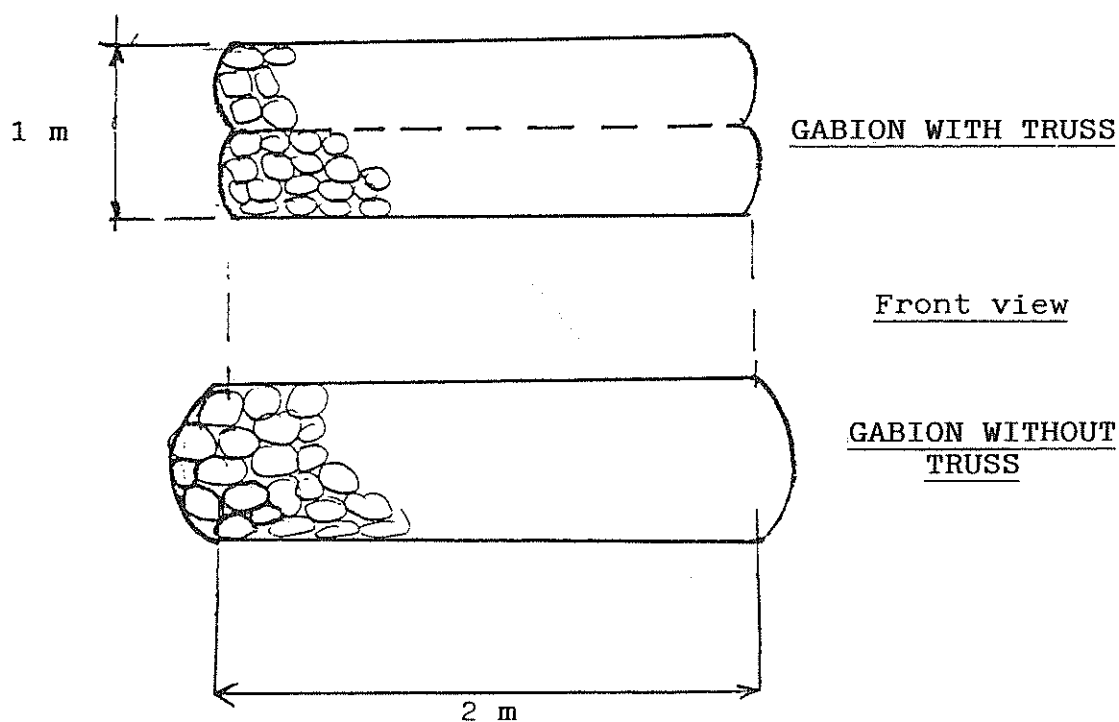
Binding wire, which is used to secure the lid of the cage, should be of 3.8 mm diameter. However, 3 mm diameter wire may be used as this is easier to manipulate when tying.



notes

### Diaphragms and trusses

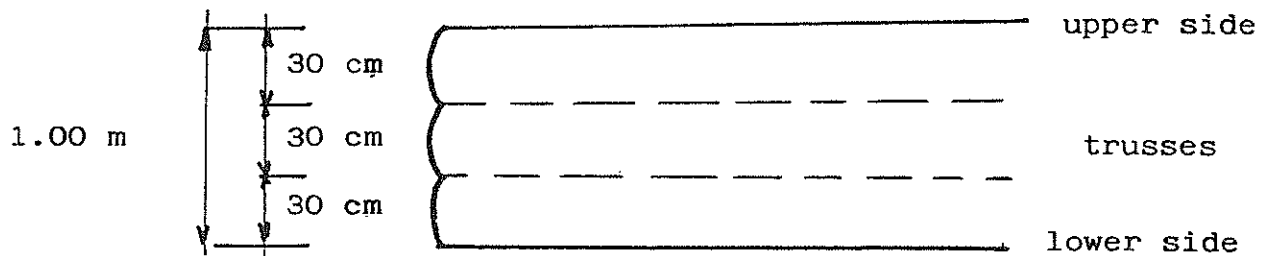
Diaphragms and trusses strengthen the wire mesh cage and help the gabion keep its shape during and after filling. Trusses also contribute to the even distribution of stones after stacking. The addition of trusses should always be envisaged for gabions over two metres in length.



notes

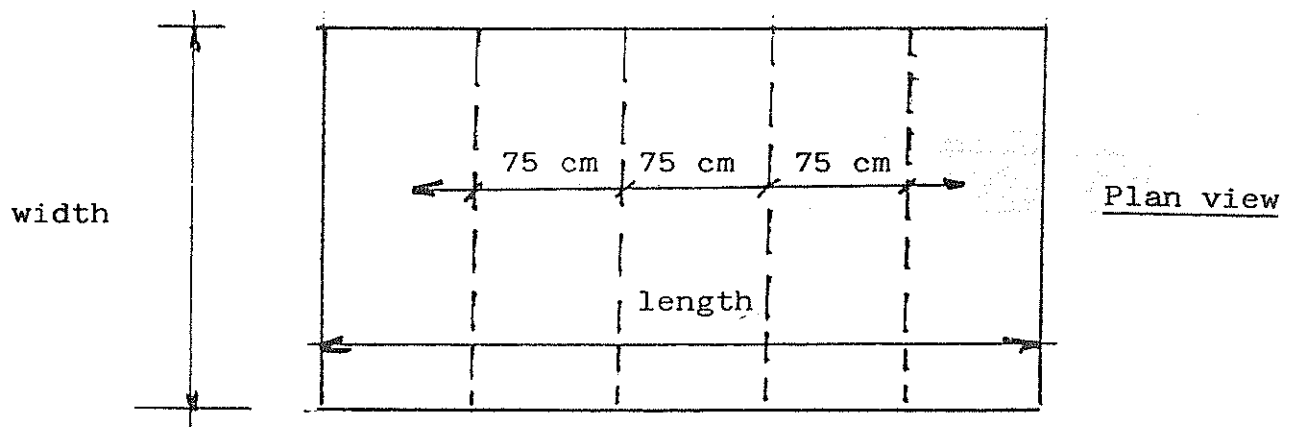
Horizontal trusses are placed at 30 cm intervals:

a 1 metre high gabion will be fitted with two trusses.



Front view

These same trusses are spaced 75 cm apart along the length of the gabion.

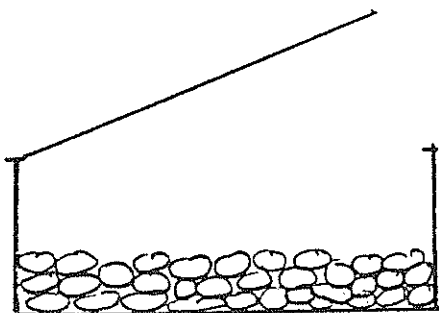


Horizontal trusses are fitted one at a time while the gabion is being filled with stones.

notes

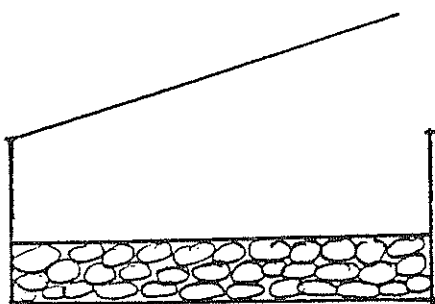
Sequence for fitting trusses

1.



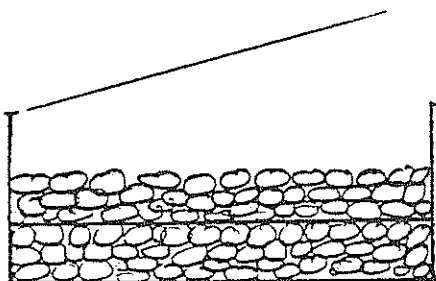
Fill up to level of first truss.

2.



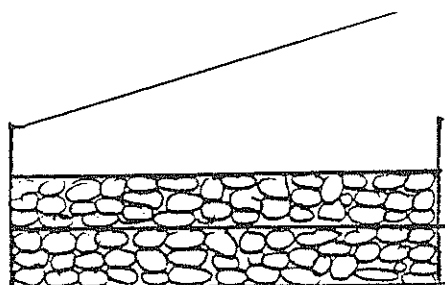
Fit first truss.

3.



Fill with layer of stones up to level of second truss.

4.



Fit second truss.

notes

### 3. PLACING THE GABIONS

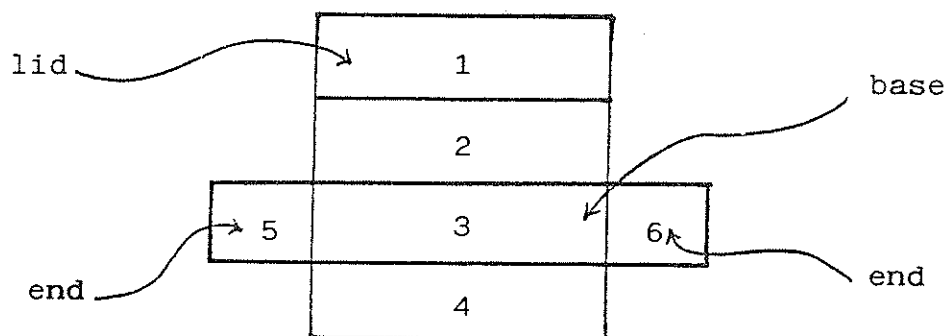
The first operation to be undertaken is the unpacking of the wire cages, which are usually delivered in flat parcels of five to ten gabions, weighing up to 200-300 kg.

After checking that the goods conform to the order, the parcels should be unpacked before being unloaded. Unless some form of hoist exists on the worksite, this will mean that the lorry will have to remain stationary for a considerable length of time.

The parcels of gabion cages should be unloaded directly in the place where they will be used so as to save time and effort.

#### Assembling the cages

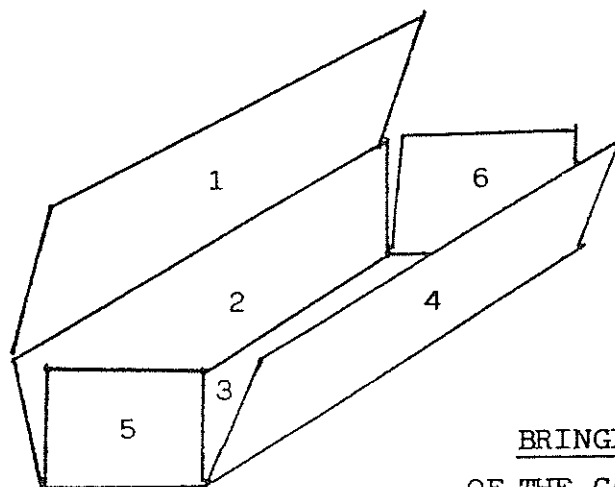
STEP 1 Unfold the cage and place it a few metres away from the place where it will be used.



notes

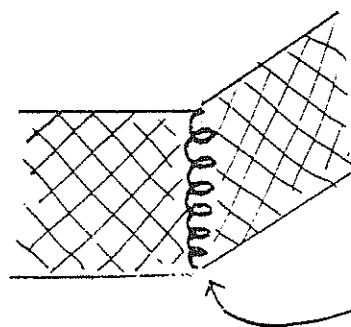


STEP 2 Bring sides 2, 5, 4 and 6 together to form a box, leaving the lid open.



BRINGING THE SIDES  
OF THE GABION TOGETHER

STEP 3 Bind the sides together using wire.



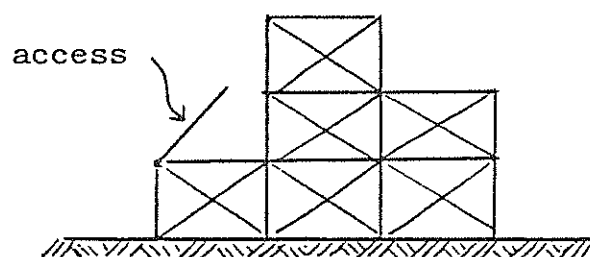
binding wire  
4.4 mm

Wirecutters should not be used for this. Pliers alone must be used as these will not nick the wire. To ease binding, 4.4 mm binding wire can be replaced by a double binding of 3 mm wire.

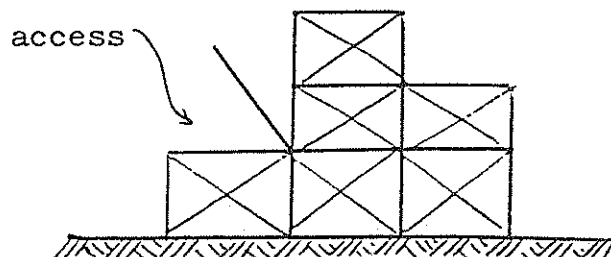
### notes

STEP 4 Put the empty cage in place in the construction.

Care should be taken that the open lid does not hamper the filling of the cages.

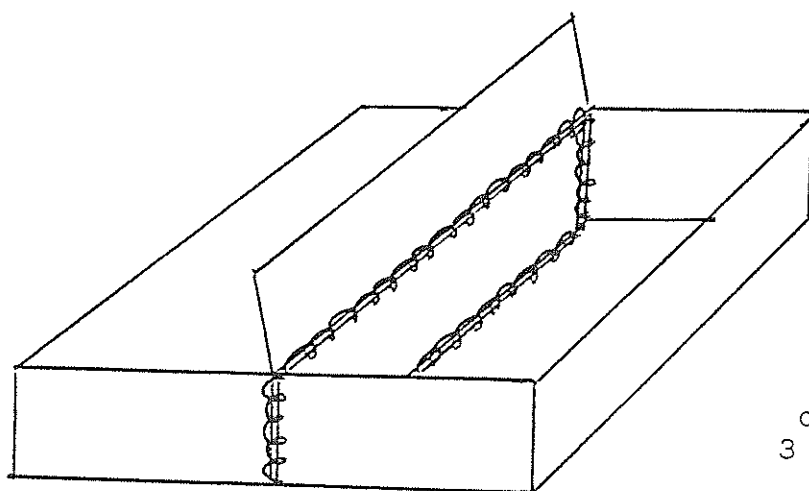


NO



YES

STEP 5 Bind the gabion by its edges to those of the gabions which are already in place. This step is of particular importance as it helps ensure the solidity of the structure.



CAGE BEFORE  
FILLING

The cage is secured by binding adjacent edges together using 4 mm wire or a double binding of 3 mm wire.

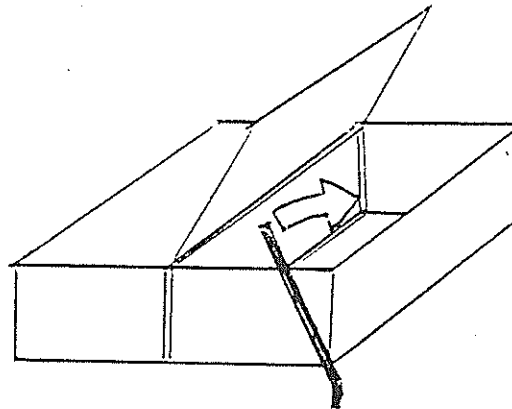
notes

SPWP	TRAINING ELEMENT/TECHNICAL GUIDE	booklet	page
	GABIONS	3	30

STEP 6 Using a jumper bar (a concrete iron bar of 18 or 22 mm diameter), the base of the cage is stretched into its final position.

The bar is used as a lever. It is placed through a hole in the mesh near a corner and pressure is exerted on it to force the free sides of the cage into their final positions.

The alignment of the cage should be checked.



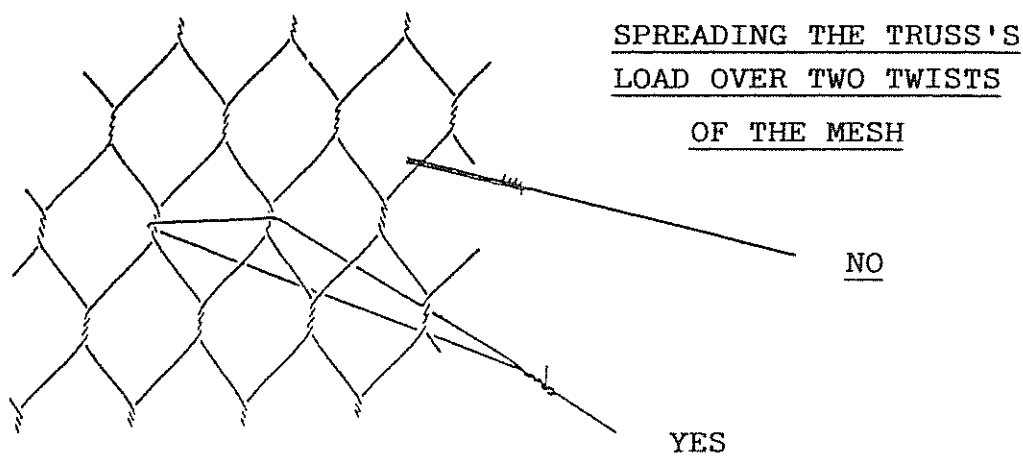
USING A JUMPER BAR TO STRETCH THE BASE INTO POSITION

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notes

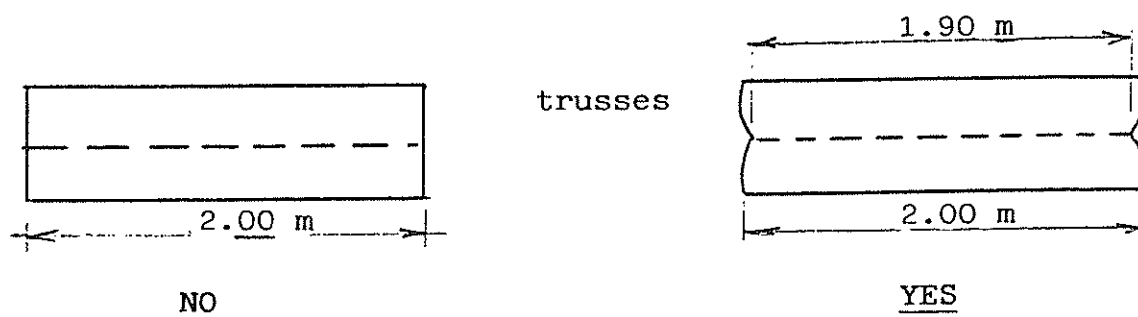
STEP 7    Fitting the trusses

Precaution should be taken during this operation. The trusses should be attached to two or three wires of the mesh to prevent them stretching or breaking, by spreading the traction borne by them over an area of the mesh.



Longitudinal trusses should be slightly shorter than the distance between the sides they join. A 5 per cent reduction in the length of the truss is provided for normally.

notes



STEP 7 Angle trusses are then fitted, taking the same precaution.  
(cont'd)

Vertical trusses are attached to the bottom of the wire mesh cage, their other end being left free until the gabion has been filled with stones. They are then attached to the closed lid.

It should be borne in mind that the ultimate strength and rigidity of the finished structure depends, to a great extent, on the care taken in assembling and preparing the gabion cages.

notes

### Workers' productivity

The productivity of workers engaged in unpacking and assembling gabion cages can be estimated using the following mean values (time taken unloading gabion parcels and positioning assembled gabions within the construction is not included in these indications).

### Productivity in m<sup>3</sup>/mandays

volume of the cage	dimensions	surface area of wire mesh	productivity
1.00 m <sup>3</sup>	2 x 1 x 0.5	7 m <sup>2</sup>	8 m <sup>3</sup> /md
1.50 m <sup>3</sup>	3 x 1 x 0.5	10 m <sup>2</sup>	6 m <sup>3</sup> /md
2.00 m <sup>3</sup>	2 x 1 x 1	10 m <sup>2</sup>	4 m <sup>3</sup> /md
4.00 m <sup>3</sup>	4 x 1 x 1	18 m <sup>2</sup>	3 m <sup>3</sup> /md

notes

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### CHOOSING THE STONES AND FILLING THE GABION

To be chosen for gabion-filling, stones need to have the following qualities:

- they should be non-porous;
- they should be sufficiently hard.

These three conditions fulfilled, most stones are suitable for gabion-filling, provided they are of suitable dimensions.

The stones selected should weigh between 5 and 10 kg apiece.

#### Stone collection

Stones may be obtained from quarries, riverbeds or gathered and extracted from the ground.

The workers unearth and collect stones, making piles of different sized stones beside a road, track or right-of-way.

The stones will then be loaded and transported to the place where they will be used to fill gabions.

Payment of workers is easily calculated, provided the quantity, that is to say, the volume of each pile is known.

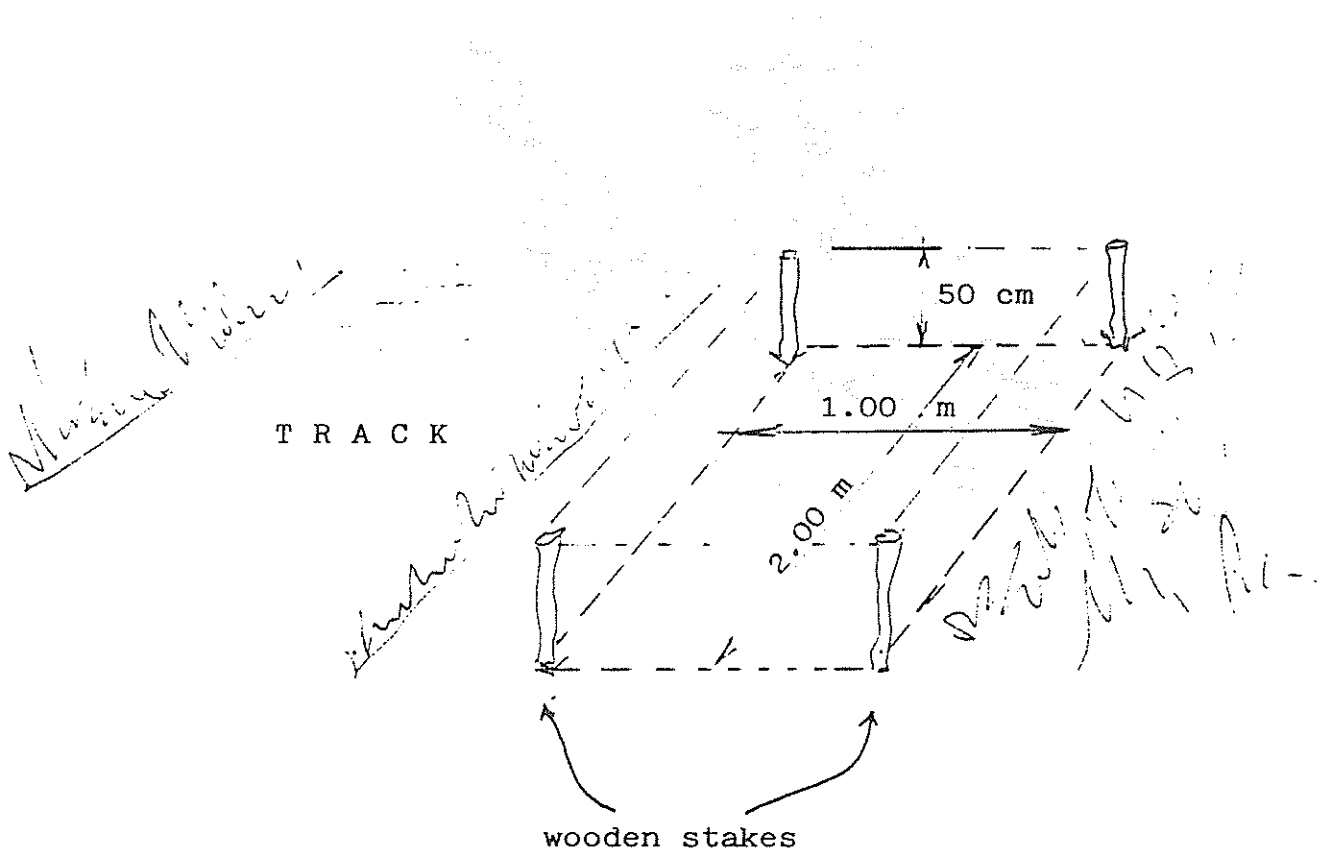
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notes

Making stone-piles of know volume

Four wooden stakes are driven into the ground to form the corners of a rectangle, sited beside the road or track.

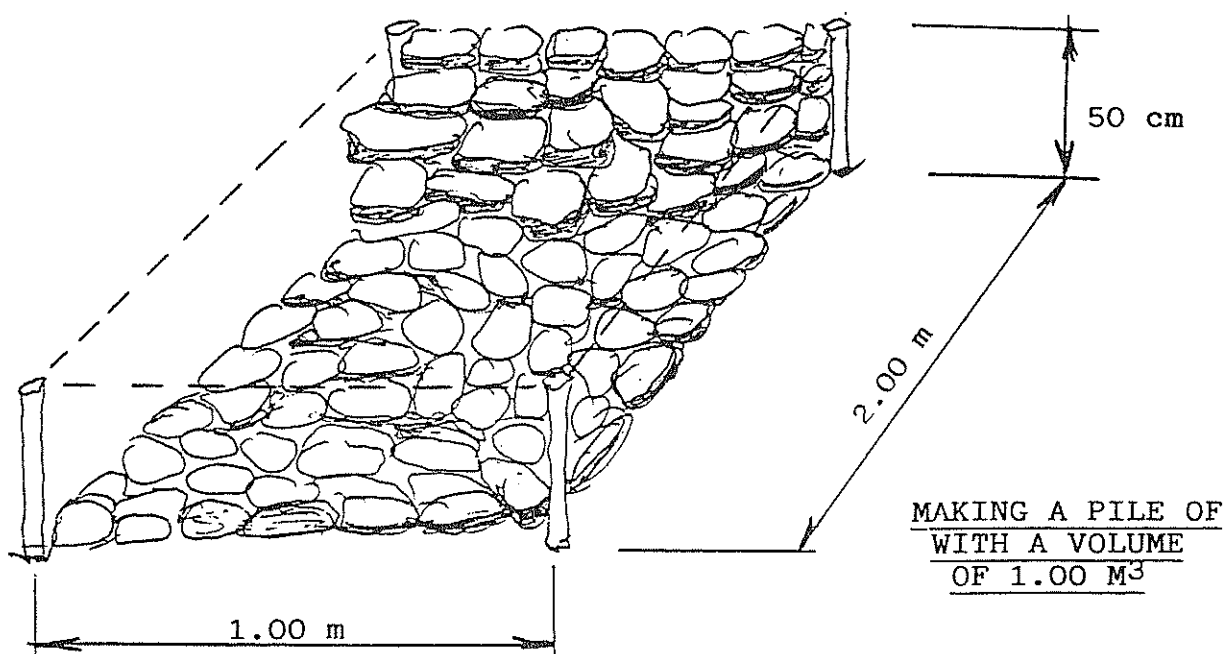
The rectangle could be of the following dimensions:



notes



The stones which have been dug up or collected from nearby fields are unloaded and stacked in layers on the area of ground marked out by the four posts, stopping when the stones are level with the top of the posts.



The worker will settle his rate of pay with the site foreman. A wage will be fixed for each pile of stones he completes. The worker is also able to work at his own pace.

notes

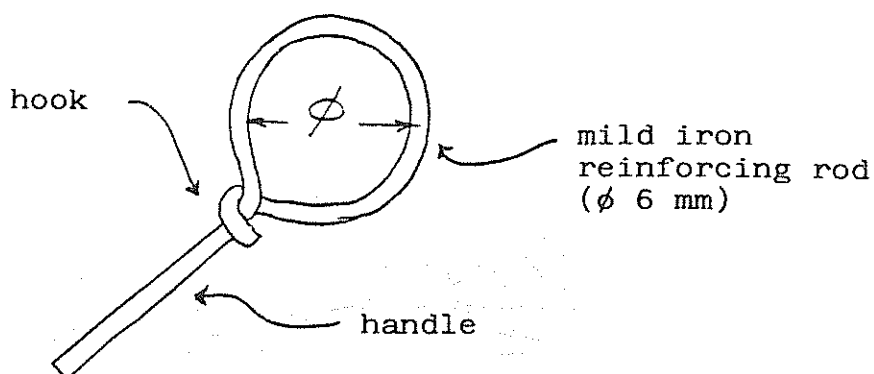
### Dimensions of the stones

The stones which will be placed next to the walls of the gabion must be at least one-and-a-half times larger than the largest size of the wire mesh.

### Examples:

<u>mesh</u>	<u>stones</u>
80/110	 165 mm
100/120	 180 mm
etc.	

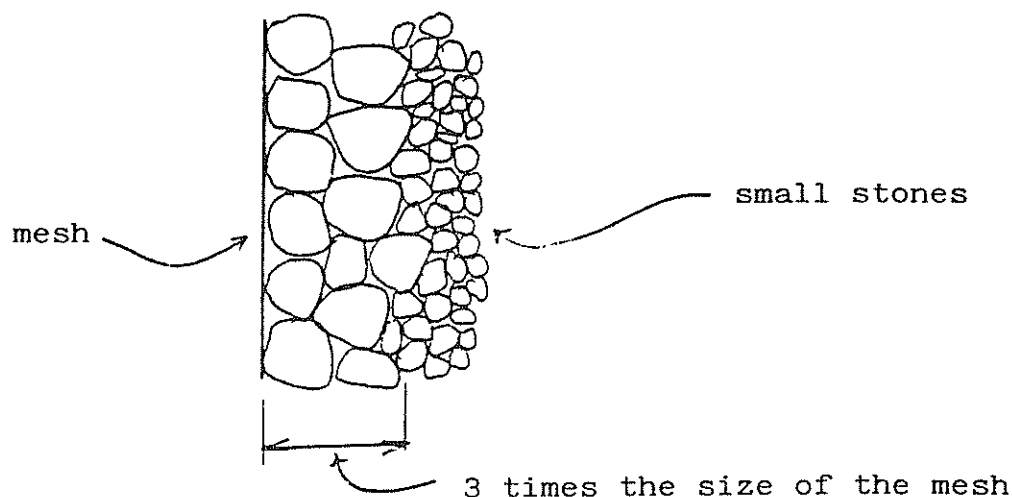
The size of the stones can be checked using an iron ring (a gauge made from a mild iron reinforcing rod), the diameter of which is 1.5 times larger than the size of the wire mesh.



### notes

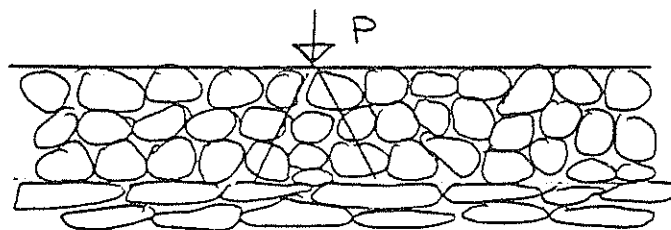
Smaller-sized stones may also be used, provided they are not placed next to the mesh but are put at a distance at least three times the size of the wire mesh.

However, on no account must small stones of less than 8 cm diameter (using an iron ring gauge to check) be used to fill the gabion, not even if they are placed well inside.



#### Flat stones

Where structures have to be withstand considerable stress, care should be taken to avoid, as far as possible, placing flat stones outermost in the gabion, since flat stones are less resistant. For this reason, they should be placed beneath a layer of rounded stones which will spread the load.



#### notes

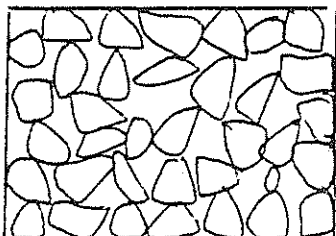
SPWP	TRAINING ELEMENT/TECHNICAL GUIDE	booklet	page
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### Pebbles

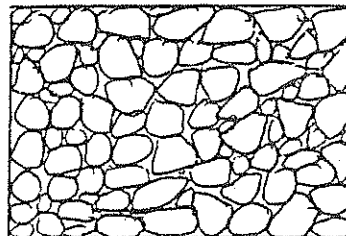
Pebbles are particularly suitable for filling footing gabions, since they increase the flexibility of the gabion and thus its ability to mould itself to the irregularities of the ground.

### Packing the gabion

Stones must be packed inside the gabion in such a way as to leave the least possible space. The worker should strive to pack the stones so that they touch as much as possible.



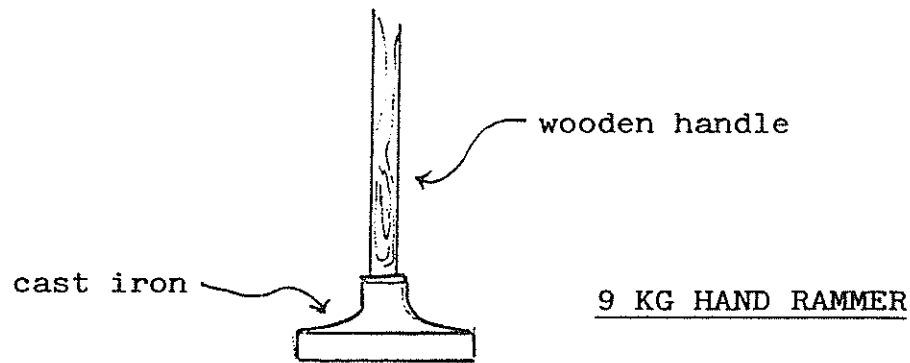
WRONGLY FILLED GABION



CORRECTLY FILLED GABION

From time to time during filling, it may be helpful to use a hand rammer to pack the stones down, taking care not to break the stones or deform the gabion walls.

notes

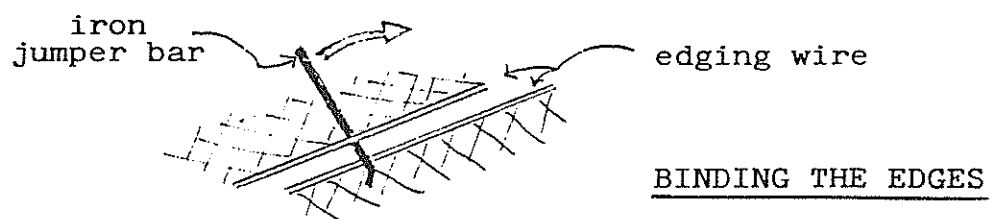


The final layer of stones should be level with the top of the cage, although a difference of 4 or 5 cm either way can be allowed.

STEP 8 The final operation consists of:

- lowering the lid;
- tying the vertical trusses to the lid ;
- binding the edges of the lid to the body of the gabion.

The edging wires of the gabion are twisted together using a small iron lever, to join the lid to the rest of the gabion.



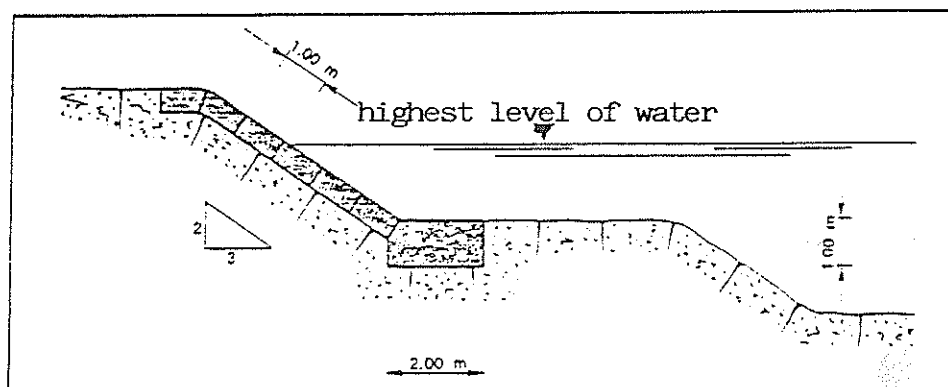
Twists are made every 20 cm. The lid is finally secured by binding the join using a single length of 3mm wire.

notes

#### 4. COMMON LAYOUTS FOR CONSTRUCTIONS USING GABIONS

##### Bank protection

This operation consists of constructing a protective lining for banks which have to withstand the erosive force of a current. The lining is made of a covering of footing gabions, 0.30 to 0.50 m deep, which is securely anchored to the ground using strong iron stakes.



A layer of cage gabions is laid at the base of the footing gabions to stabilise the structure.

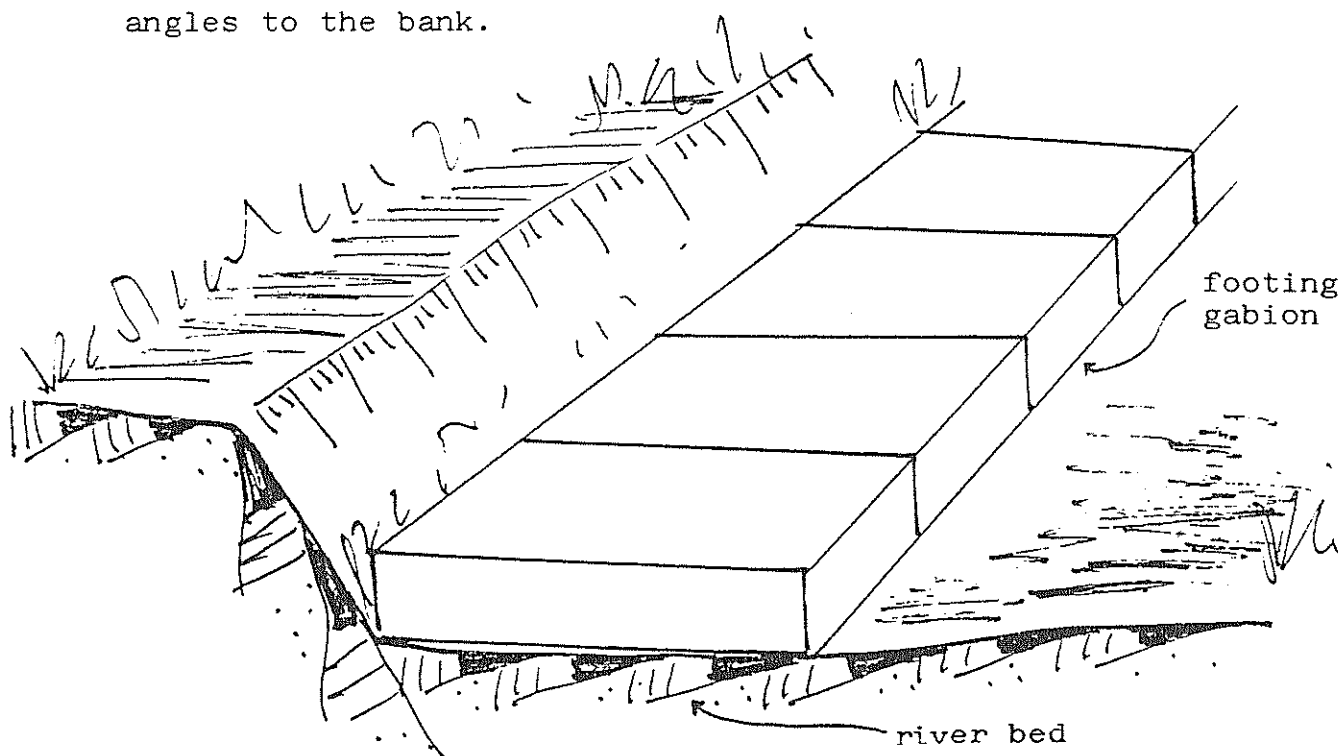
This type of work can only be undertaken during the dry season (when the water level is low).

notes

The bank to be protected should be no more than 3-4 m high, otherwise the protective covering of gabions is likely to slip gradually out of position.

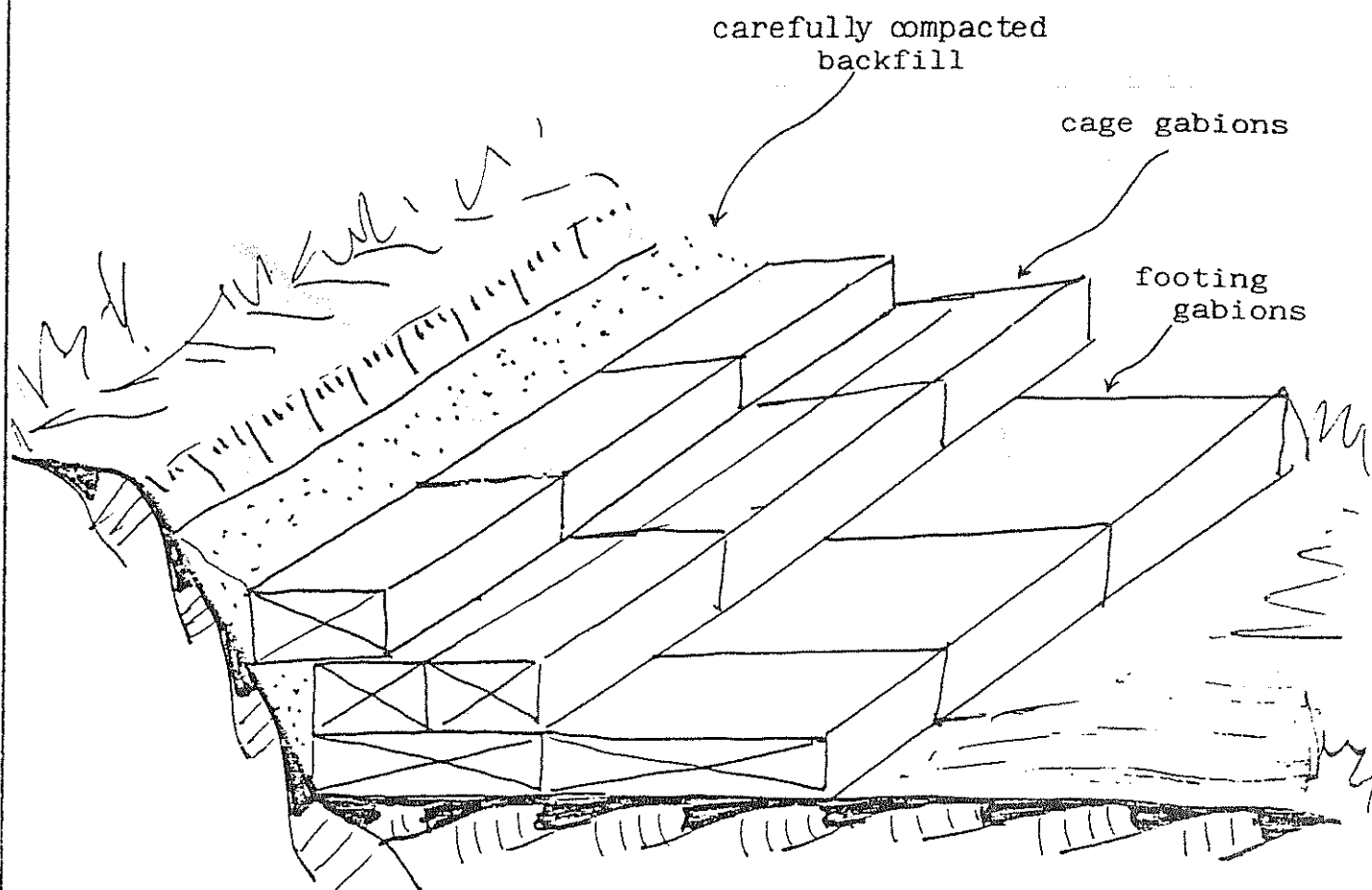
Another, more expensive, type of protective work using gabions exists for use in places where there is considerable erosion to guard against.

1. A row of footing gabions is laid on the river bed at right angles to the bank.



2. Place rows of standard cage gabions in steps parallel to the bank, on top of the footing gabions.

notes

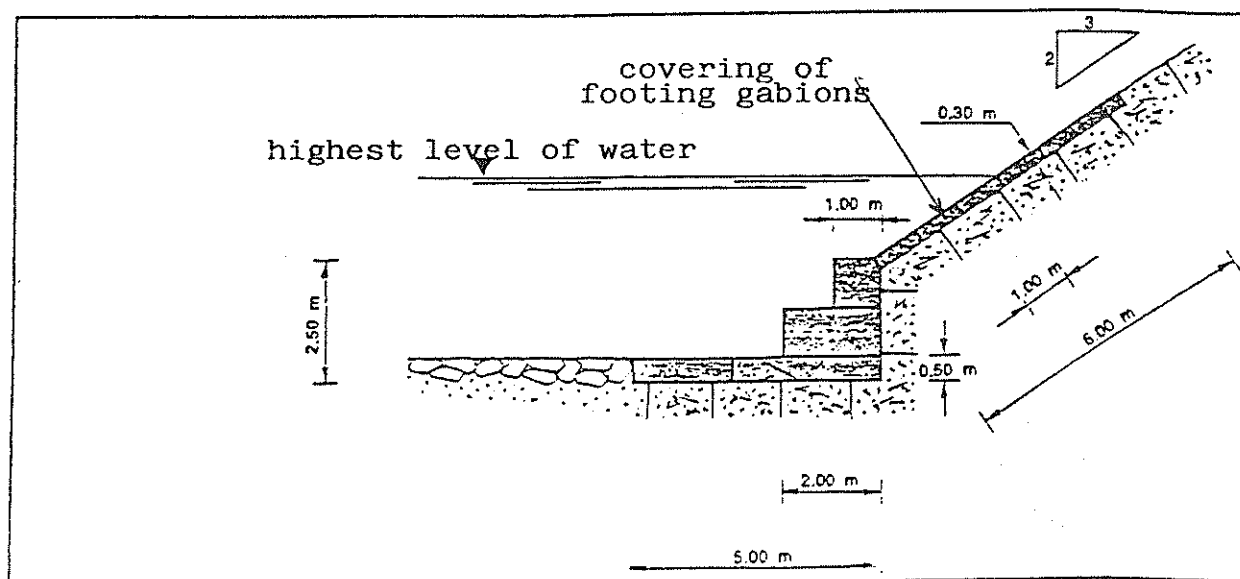


3. The gap between the last row of gabions and the bank is back-filled, compacting the backfill carefully whilst filling.

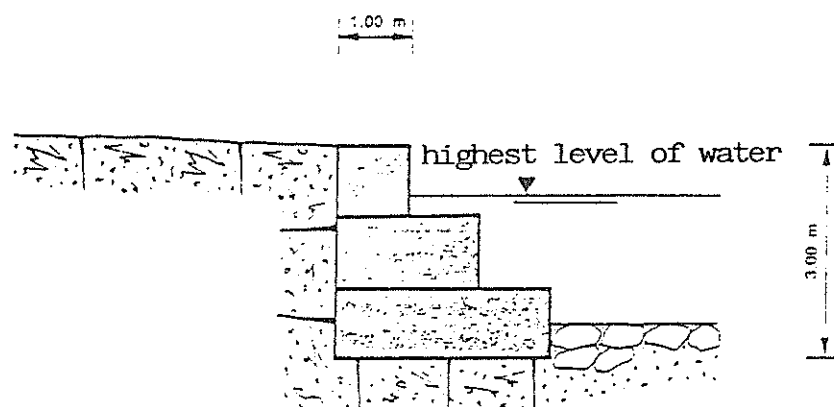
notes



## OTHER EXAMPLES OF THE USE OF GABIONS

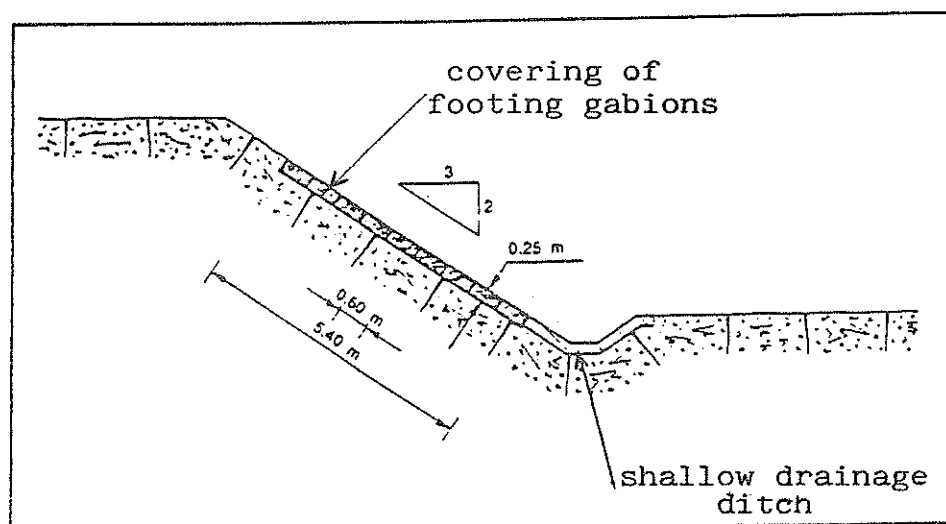


## BANK PROTECTION

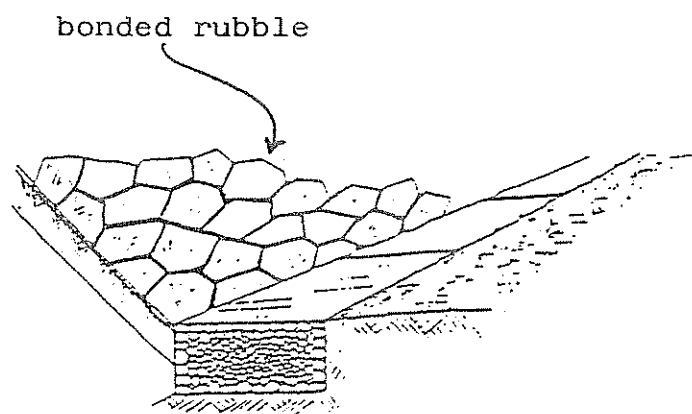


## CANAL BANK PROTECTION

## notes

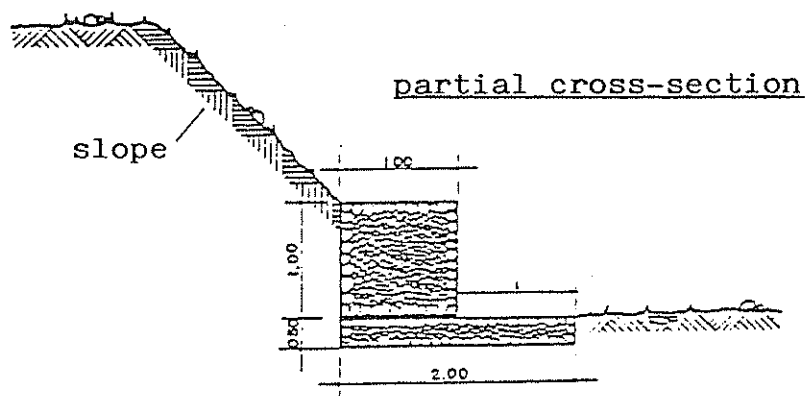


### ROADSIDE BANK PROTECTION

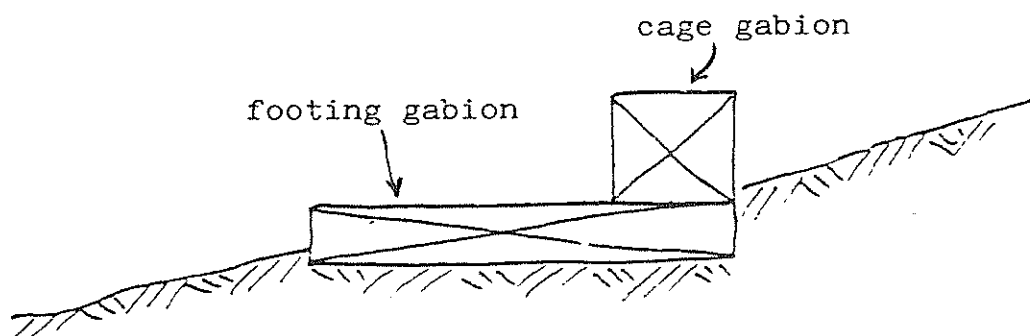


### SLOPE PROTECTION USING GABIONS AND BONDED RUBBLE

notes

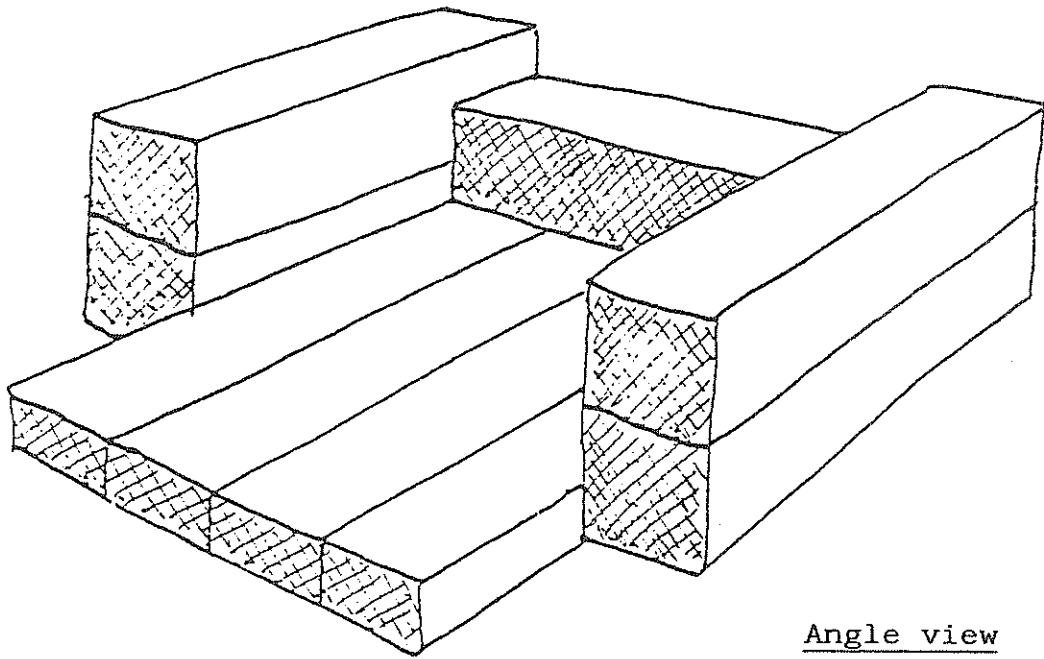
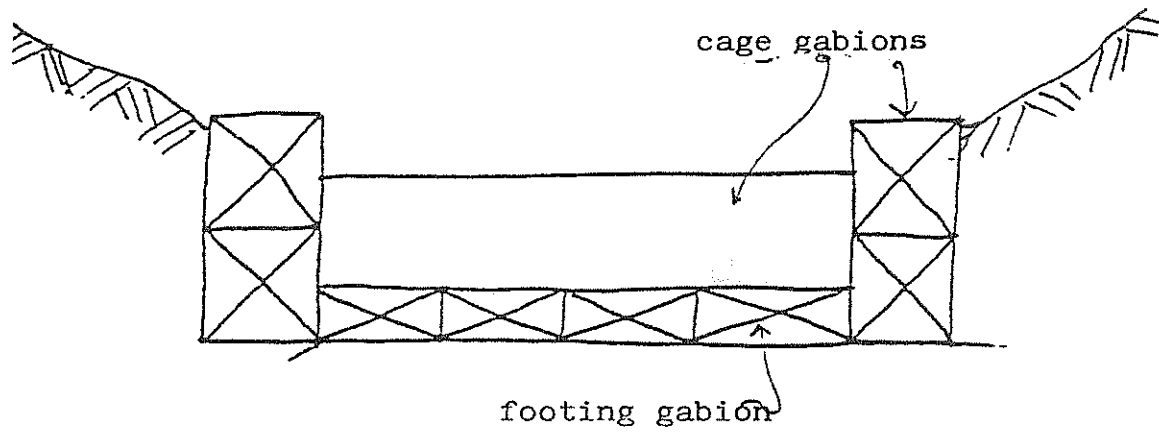


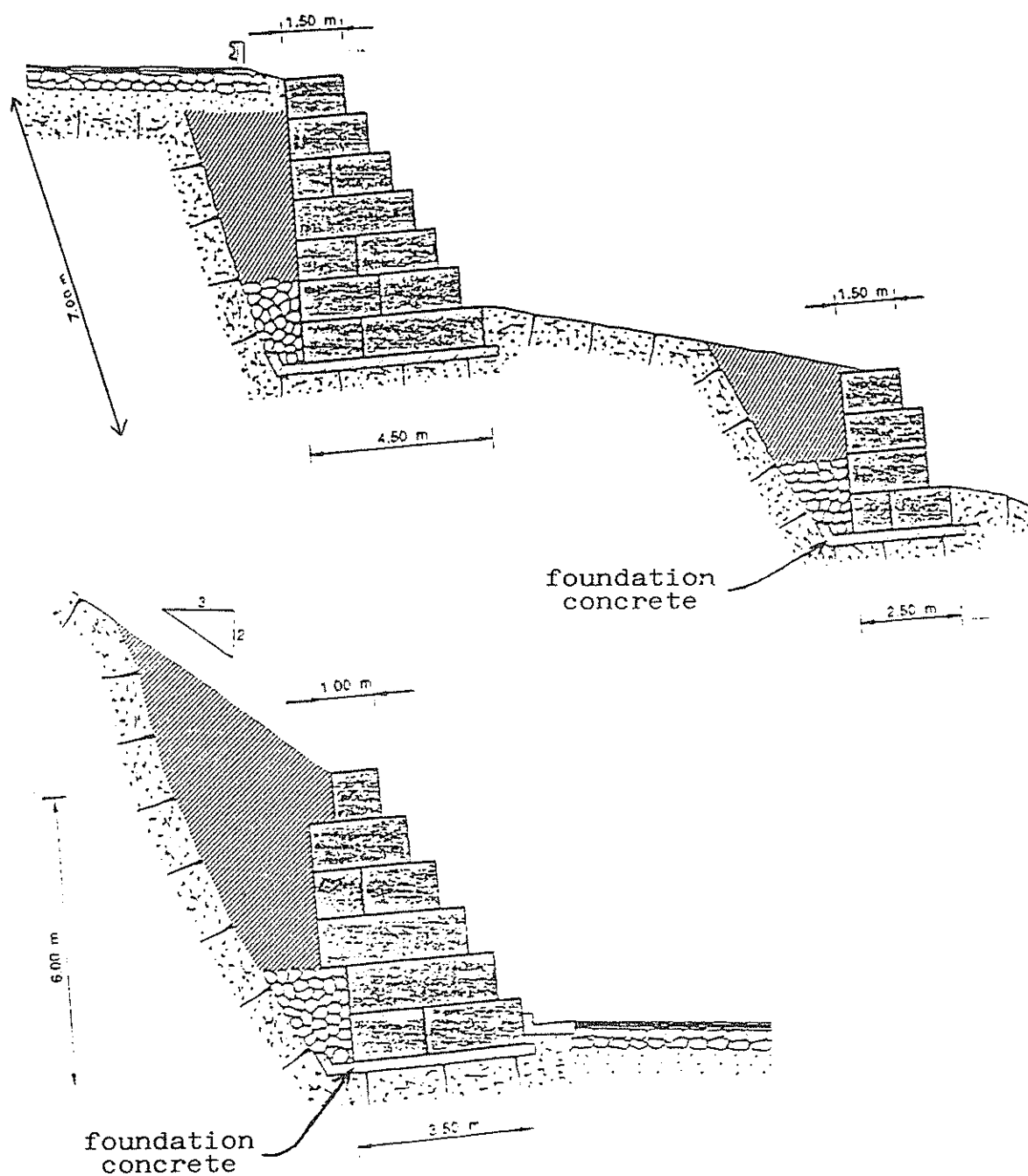
BANK PROTECTION BESIDE A STRUCTURE



GABION WEIR

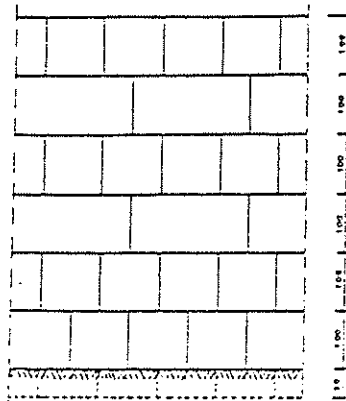
notes

GABION WEIR (cont'd)Angle viewnotes

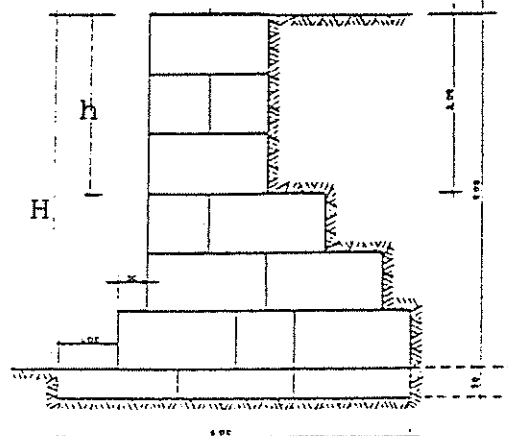
RETAINING WALLSnotes

RETAINING WALLSTYPE I

front view



cross section

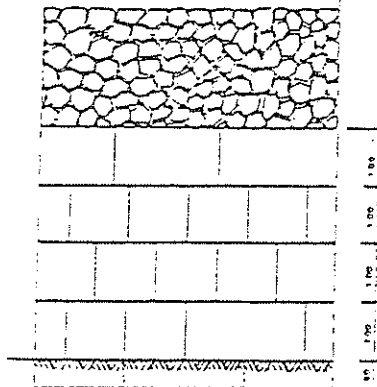


$$h = 3 \text{ m}$$

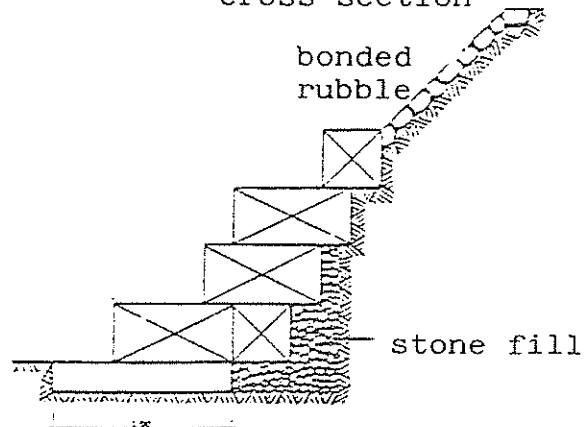
$$H = 6 \text{ m}$$

TYPE II

front view



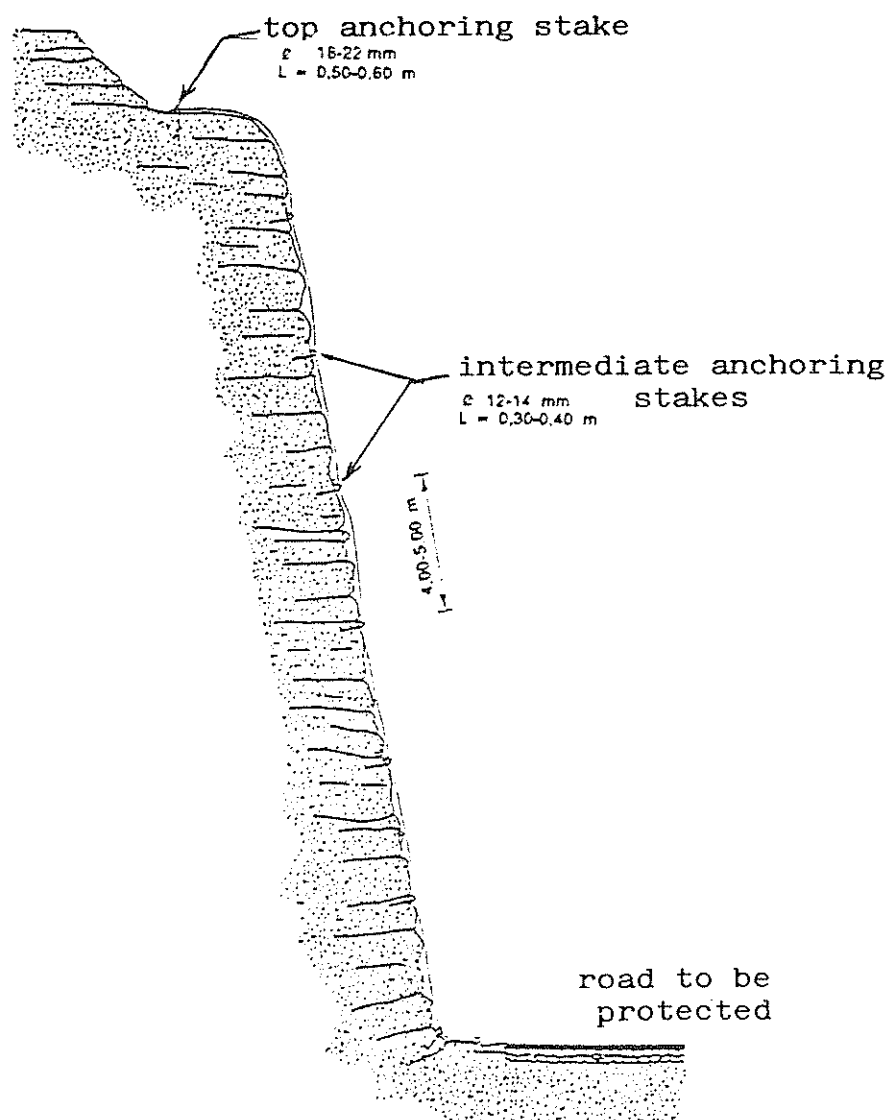
cross section

wall at foot of slope

		Type I	Type II
Gabions	m <sup>3</sup>	21	9.5
Stone fill	m <sup>3</sup>	—	2

Quantity for 1 mnotes

# SLOPE PROTECTION



A roll of wire mesh is unwound down the length of the rockface and secured using iron stakes. In this way, the road which is situated at the foot of the rockface is protected against falling rocks.

## notes

<b>SPWP</b>	<b>TRAINING ELEMENT/TECHNICAL GUIDE</b>	<b>booklet</b>	<b>page</b>
<b>GABIONS</b>		<b>3</b>	<b>51</b>

### SPECIFICATIONS OF MAIN GABIONS ON THE MARKET

Gabion cages of galvanised iron wire

WIRE MESH SIZE 10 x 12

DIMENSIONS			volume m <sup>3</sup>	APPROXIMATE WEIGHT IN KILOS				diaphragms no.
length m	width m	height m		without diaphragms		with diaphragms		
				wire ϕ 2.7 mm	wire ϕ 3.0 mm	wire ϕ 2.7 mm	wire ϕ 3.0 mm	
2	1	0.5	1	10.000	12.000	11.000	13.500	1
3	1	0.5	1.5	14.000	16.700	15.300	19.500	2
4	1	0.5	2	17.300	21.200	19.300	24.500	3
1.5	1	1	1.5	11.600	13.800	—	—	—
2	1	1	2	13.600	16.600	15.000	18.000	1
3	1	1	3	18.500	22.500	20.500	26.000	2
4	1	2	4	23.500	28.500	27.000	33.500	3

WIRE MESH SIZE 8 x 10

DIMENSIONS			volume m <sup>3</sup>	APPROXIMATE WEIGHT IN KILOS						diaphragms no.
length m	width m	height m		without diaphragms			with diaphragms			
				wire ϕ 2.4mm	wire ϕ 2.7mm	wire ϕ 3.0mm	wire ϕ 2.4mm	wire ϕ 2.7mm	wire ϕ 3.0mm	
2	1	0.5	1	9.300	11.500	14.300	10.000	12.500	15.000	1
3	1	0.5	1.5	12.600	15.700	19.400	14.500	17.500	21.500	2
4	1	0.5	2	15.900	20.200	24.600	18.800	23.000	28.000	3
1.5	1	1	1.5	10.200	12.800	15.500	-	-	-	-
2	1	1	2	12.500	15.700	19.200	13.700	17.000	21.000	1
3	1	1	3	17.000	21.300	26.000	20.000	24.500	30.000	2

notes



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Gabion cages of galvanised iron wire

MESH SIZE 6 x 8

DIMENSIONS			volume m <sup>3</sup>	APPROXIMATE WEIGHT IN KILOS				diaphragms no.
length m	width m	height m		without diaphragms		with diaphragms		
				wire ϕ 2.2 mm	wire ϕ 2.7 mm	wire ϕ 2.2 mm	wire ϕ 2.7 mm	
2	1	0.5	1	10.000	13.500	10.900	15.200	1
3	1	0.5	1.5	13.500	19.200	15.200	22.000	2
1.5	1	1	1.5	10.300	15.000	—	—	—
2	1	1	2	12.400	18.500	13.900	20.600	1
3	1	1	3	17.000	25.500	19.900	30.700	2

MESH SIZE 5 x 7

DIMENSIONS			volume m <sup>3</sup>	APPROXIMATE WEIGHT IN KILOS		diaphragms no.
length m	width m	height m		without diaphragms	with diaphragms	
				wire ø 2.0 mm	wire ø 2.0 mm	
2	1	0.5	1	9.200	10.000	1
3	1	0.5	1.5	13.000	14.800	2
1.5	1	1	1.5	10.700	—	—
2	1	1	2	13.000	14.500	1
3	1	1	3	18.000	21.000	2

notes

PRICES (1983)

dimensions	weight	factory price (Italy)
2 x 1 x 0.5	12.5 kg	US\$ 12
2 x 1 x 1.0	17.0 kg	US\$ 16
4 x 1 x 1.0	31.0 kg	US\$ 30

LIST OF GABION MANUFACTURERS

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Head Office and Factory,  
Governor Lane Blvd.,  
R.R.2 Box 43 A,  
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(USA)

Tel: (301) 223 6910

Cable: Maccaferri Manufacturing  
Williamsport, Md.

Telex: 893422 Mama Wmst

MACCAFERRI GABIONS OF CANADA, LTD  
Head Office,  
797, Don Mills Road,  
Don Mills - Ont. M3C 1V2  
(Canada)

Tel: (416) 429 3380

Cable: Maccaferri Toronto

Telex: 6966885 Gabions Tor

notes

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Telex: 1133783 MGBL BR

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 26, Boersenstrasse,  
 P. O. Box 4673,  
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notes