3.8 Gabion check dams from http://www.fao.org/docrep/006/AD082E/AD082e03.htm

In a gully network or multiple-gully system, continuous gullies can be treated with structural measures (check dams, earth plugs, etc.).If the catchment area of a gully is 20 ha or less and the length of the gully is about 1 000 m, channel erosion will be controlled by boulder check dams, but the first check dam and its counter-dam should be constructed as gabions. If the gully crosses a road, gabion check dams may be built above and below the road at the junction points. In addition, gabion check dams combined with gabion retaining walls can be used to stabilize landslides in the upper portions of the gully. Generally, it is neither necessary, nor economical to build a series of gabion check dams to control channel erosion along the gully beds.

Determining the dimensions of gabion check dams

1.For dams three m high or less

If the total height (effective height plus foundation depth) of the gabion check dam is three m or less and if the box gabions used are 1 x 1 x 2 m, or 0.85 x 0.85 x 2 m, or 0.75 x 1.5 x 3 m, it is not necessary to compute the dimensions of the dam (thickness of. crest and base) according to hydrostatic principles or empirical formulas. This is because the above-mentioned box gabions stabilize the dams against overturning, collapsing, sliding and breaking. Fig. 20 shows a gabion check dam constructed by using the box gabions of 0.85 x 0.85 x 2 m in size.

2.For dams three to five m high

If the total height of the gabion check dams is three to five m, the thicknesses of crest and base are calculated by the following formulas:

k = 0.4 H and, d = 0.6 H

k: thickness of the dam's crest at spillway level

d: thickness of the dam's base

H: total height of the dam including foundation.

These formulas provide stability against overturning, collapsing, sliding and breaking.

Other specifications and construction procedures for gabion check dams

-The depth of the foundation is equal to one-half of the effective height of the dam, which means that the foundation depth is one-third of the dam's total height. The foundation is longer than the spillway.

-After digging the foundation, a layer of box gabions are placed vertically. The vertical sides of the box gabions are tied with binding wire of the same diameter.

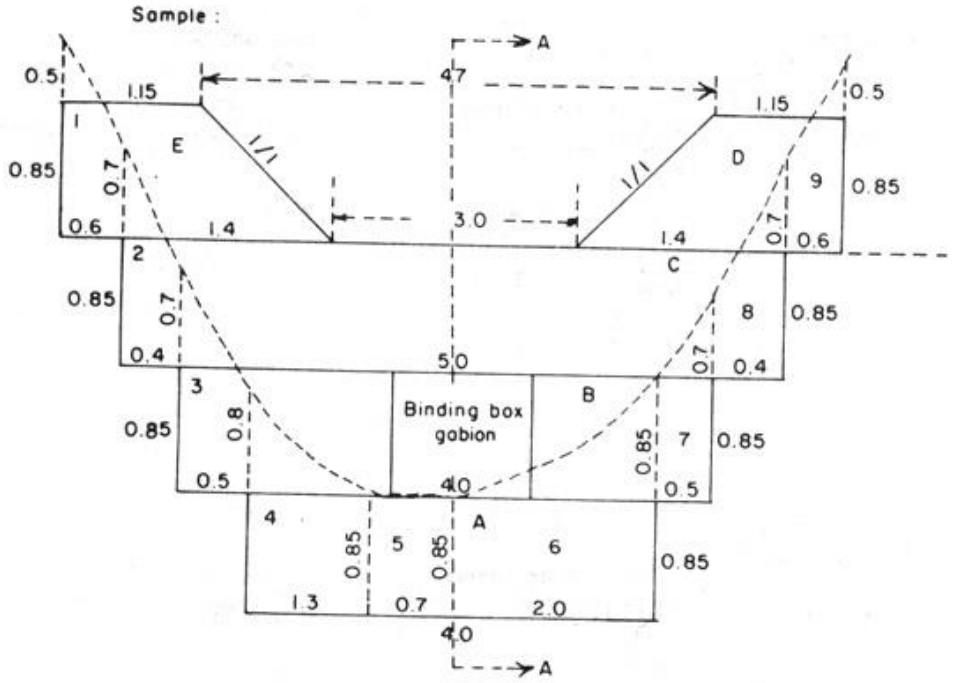
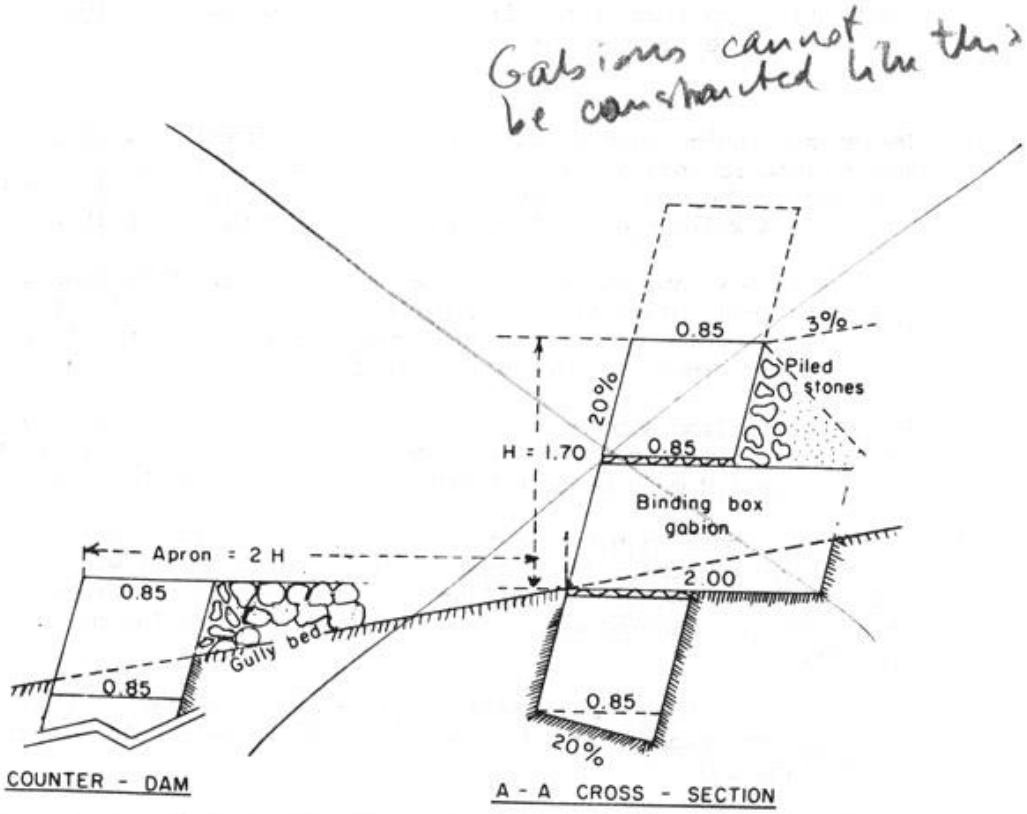


Fig. 18A Front view of the first gabion check dam.



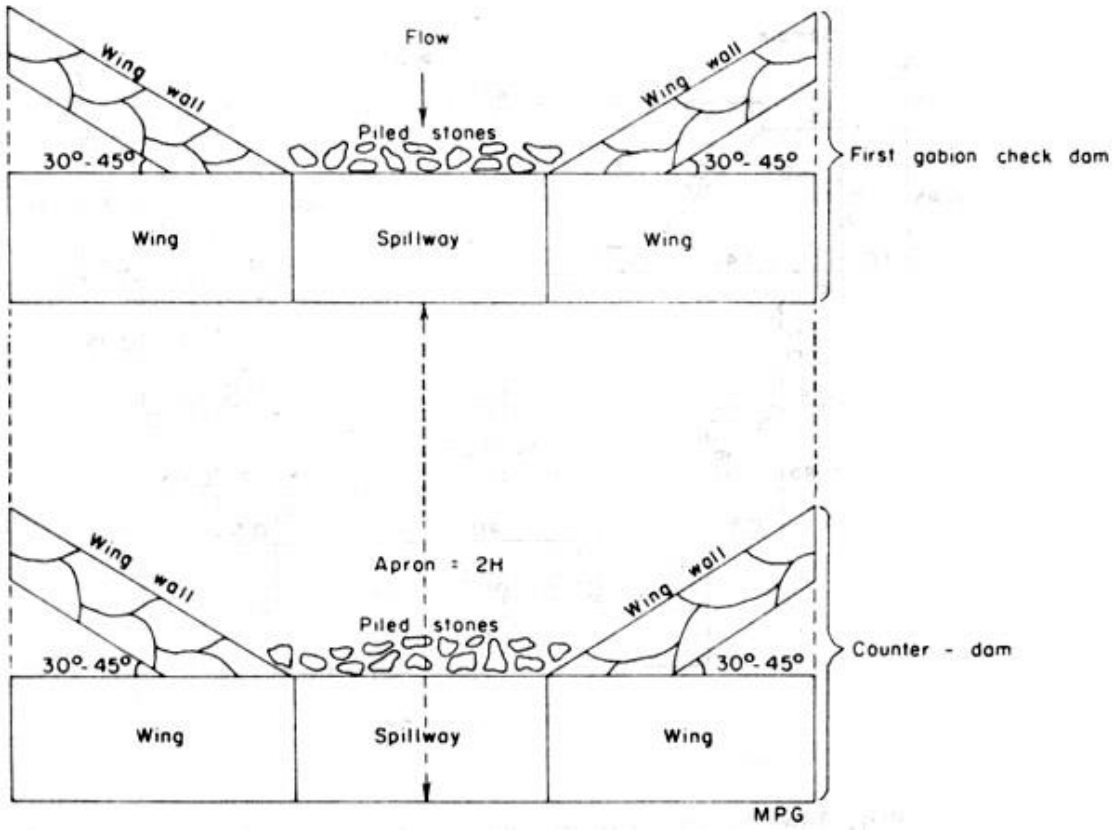


Fig. 18C Top view of the first gabion check dam including the counter-dam.

-The stones, which must be hard enough to with stand abrasion, non-disintegrating, and resistant to weathering, are packed inside the boxes. The bigger stones should be put along the sides of the box gabions while the smaller ones are filled in the middle.

-When using box gabions which are two meters long, after they are one-third full, place five parallel ties between their inner and outer sides. Five more are placed when the boxes are two-thirds full. Four corner ties are also placed as indicated in Fig. 18.

-After overfilling a box gabion slightly to allow for subsequent settlement, a lid is laced with binding wire to the top of all the sides. The lid must be stretched to fit exactly to the sides.

-If there is more than one layer of boxes in a gabion check dam, the ones in the upper layer must be laced to those below.A strong inter-connection of all units is an important feature of the technique. Therefore, it is essential that the lacing is done correctly.

-When a gabion check dam has three layers and is no higher than three meters, place a "binding box gabion" in the middle or top layer (Fig. 19).

-The space behind the dam and wing walls should be filled with soil excavated for the foundation and from the gully bed.

-Wings should enter at least 50 cm into each side of the gully and they should be protected against flash water by wing walls. The angle between the wing and wing wall is 0 to 45 degrees. The height of a wing wall is equal to the depth of the spillway.

-Box gabions used for check dams can be assembled using ready wire meshes as indicated in Fig. 20.

-Box gabions can be prepared directly by netting galvanized wires (diameter three to four mm or eight to 10 guage).If No. eight guage (four mm) is used, the size of the mesh should be 15 by 15 cm.If No. 10 (three mm) is used, the mesh should be 10 by 10 cm in size.

-Counter-gabion dams are constructed in the same manner as main gabion check dams.

Calculation of the volume of gabion check dams

1.Volume of soil excavated from foundation and wings

Sections	Length m	Height m	Width m	Volume cubic m
1	0.60	(1.35+0.70)/2	1.20	0.738
2	0.40	1.55+0.70)/2	1.20	0.540
3	0.50	(1.55+0.80)/2	1.20	0.705
4	1.30	(1.65+0.85)/2	1.20	1.950
5	0.70	0.85	1.20	0.714
6	2.00	(0.85+1.70)/2	1.20	3.060
7	0.50	(0.85+1.55)/2	1.20	0.720
8	0.40	(0.70+1.55)/2	1.20	0.540
9	0.60	(0.70+1.35)/2	1.20	0.738

Total sum of soil excavation:9.705

2.Construction volume of gabion check dam

Section	Length m	Height m	Width m	Volume cubic m
A	4.00	0.85	0.85	2.890
B	5.00	0.85	0.85	3.612
C	5.80	0.85	0.85	4.190
D	(1.15+2.00)/2	0.85	0.85	1.138
E	(1.15+2.00)/2	0.85	0.85	1.138
Binding box gabion	1.15	0.85	0.85	0.831
Total volume of the gabion body				13.799

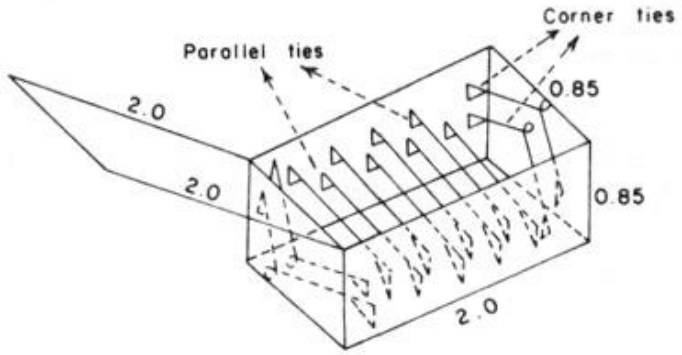


Fig. 19 Stabilization of a box gabion.

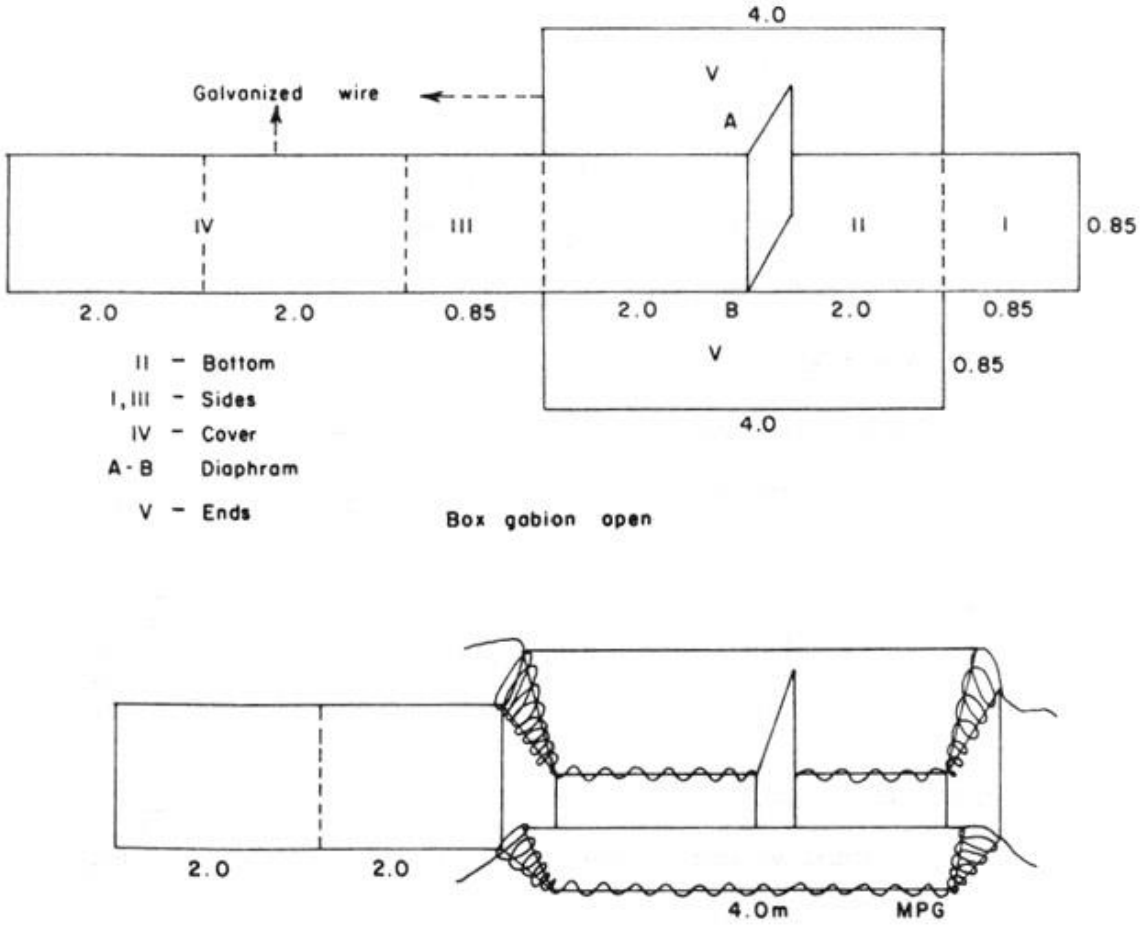


Fig. 20 Assembly of a box gabion with a central diaphram.