Progettazione e realizzazione di strutture idrauliche

OPERE TRASVERSALI

Date 5 Maggio 2023

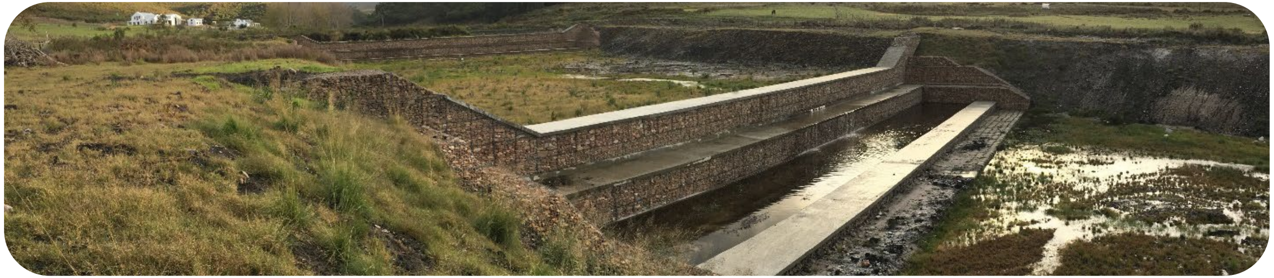
MACCAFERRI

TIPOLOGIE BRIGLIE

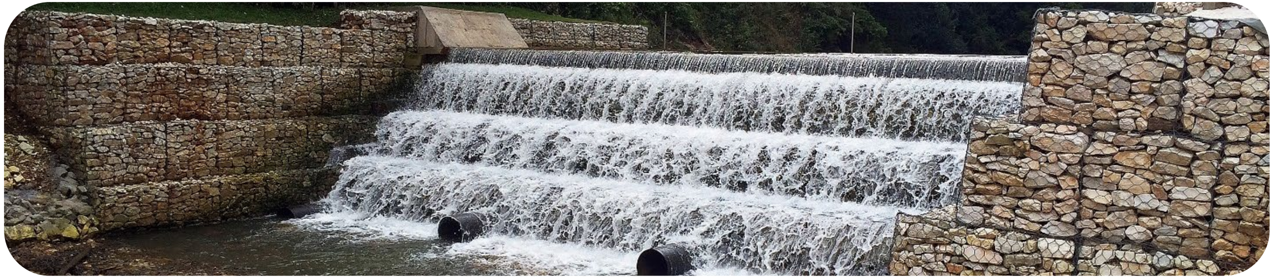
TIPOLOGIE DI BRIGLIE IN GABBIONI

MACCAFERRI

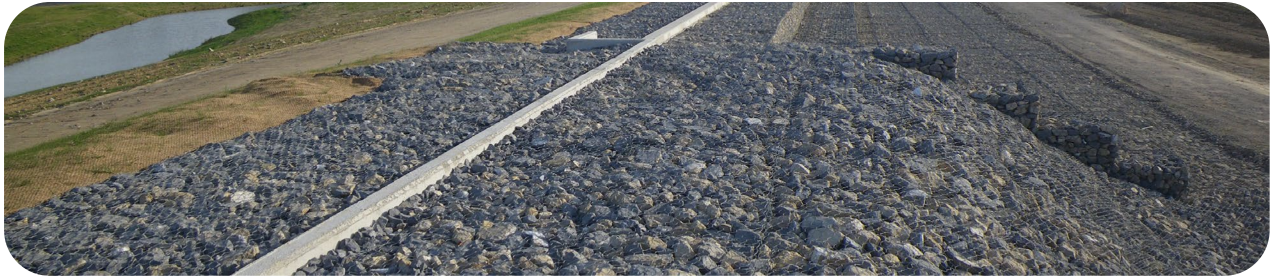
A PARETE VERTICALE



A GRADONI

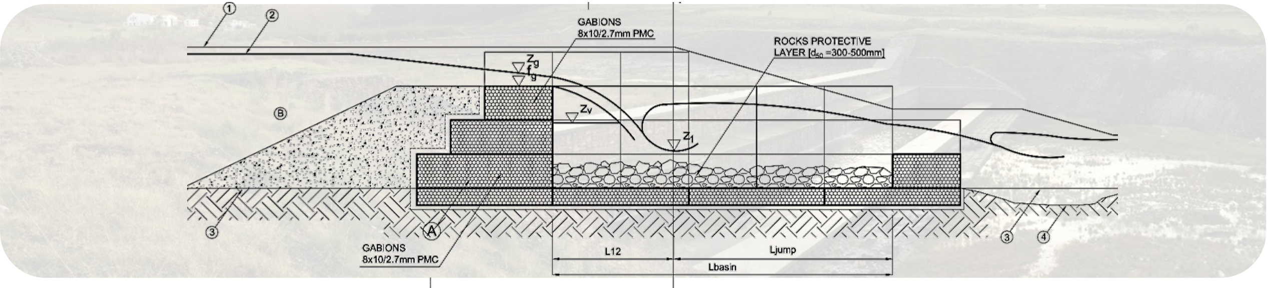


A SCIVOLO

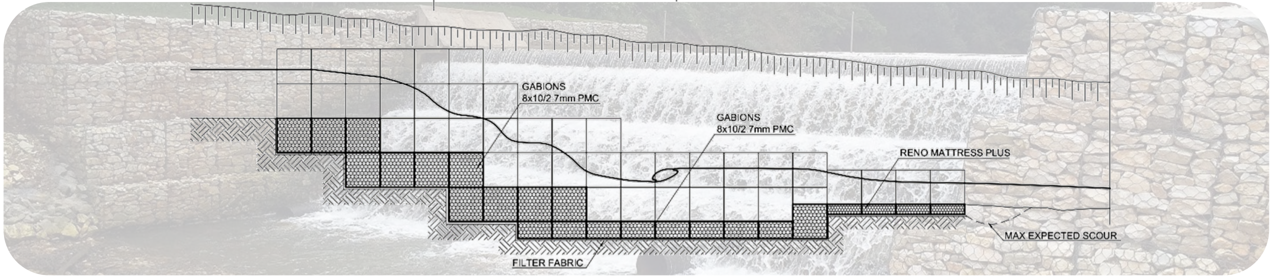


TIPOLOGIE DI BRIGLIE IN GABBIONI

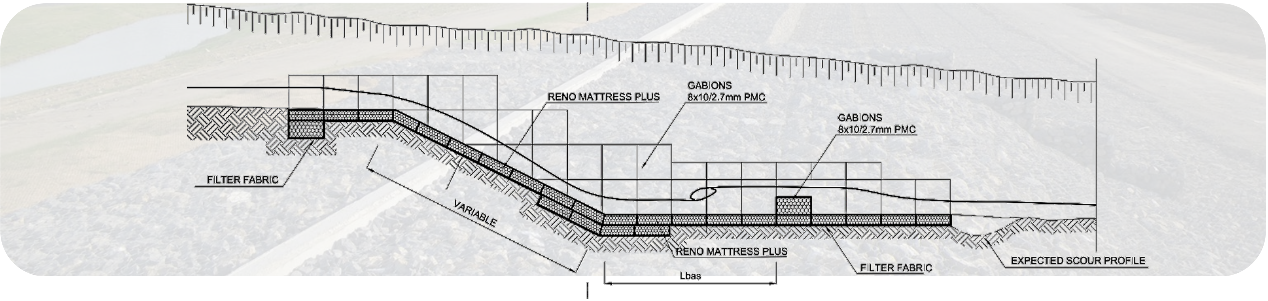
A PARETE VERTICALE


①
②
GABIONS
8x10/2.7mm PMC
ROCKS PROTECTIVE
LAYER [d_{50} =300-500mm]
Z_g
f
g
Z_v
Z_1
Ⓑ
Ⓐ
③
③
④
GABIONS
8x10/2.7mm PMC
L12
Ljump
Lbasin

A GRADONI


GABIONS
8x10/2 7mm PMC
GABIONS
8x10/2 7mm PMC
RENO MATTRESS PLUS
MAX EXPECTED SCOUR
FILTER FABRIC

A SCIVOLO


GABIONS
8x10/2.7mm PMC
RENO MATTRESS PLUS
GABIONS
8x10/2.7mm PMC
FILTER FABRIC
VARIABLE
RENO MATTRESS PLUS
Lbas
FILTER FABRIC
EXPECTED SCOUR PROFILE

TIPOLOGIE DI BRIGLIE IN GABBIONI

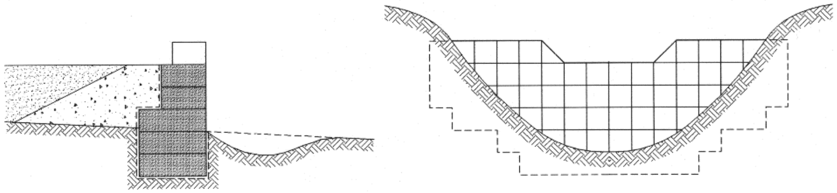
MACCAFERRI

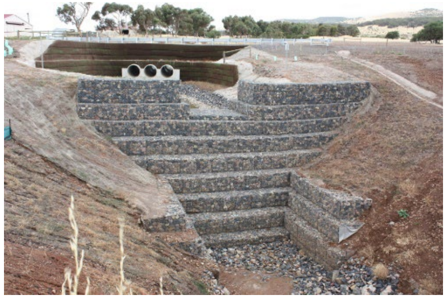
A PARETE VERTICALE

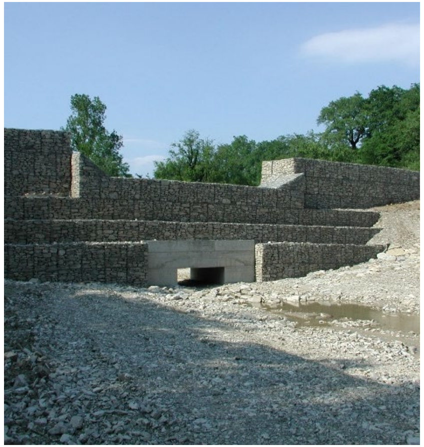
STEPPED WEIR

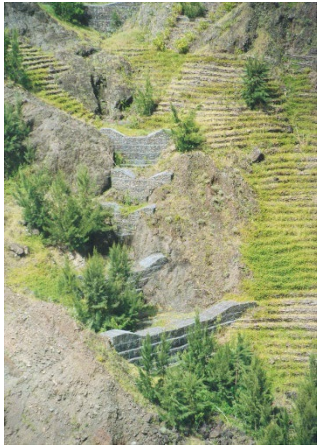
SLOPED WEIR

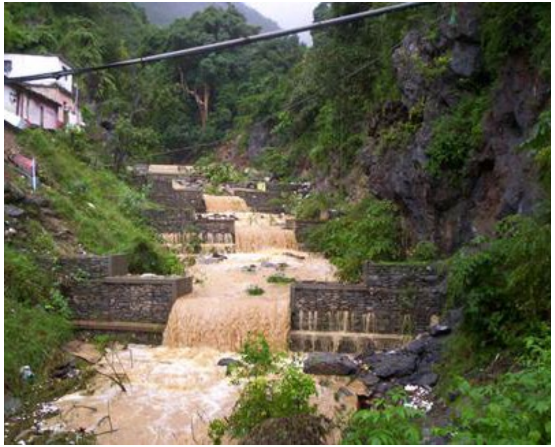
BACINO NON RIVESTITO











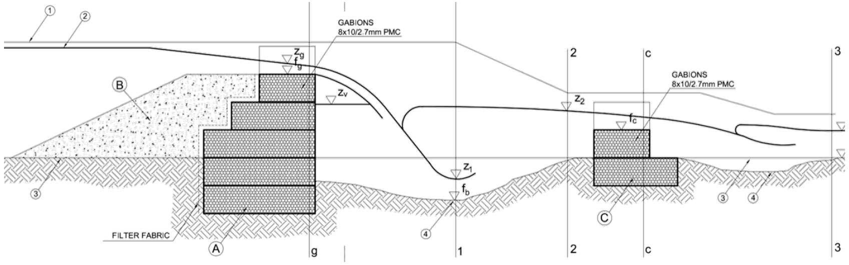
TIPOLOGIE DI BRIGLIE IN GABBIONI

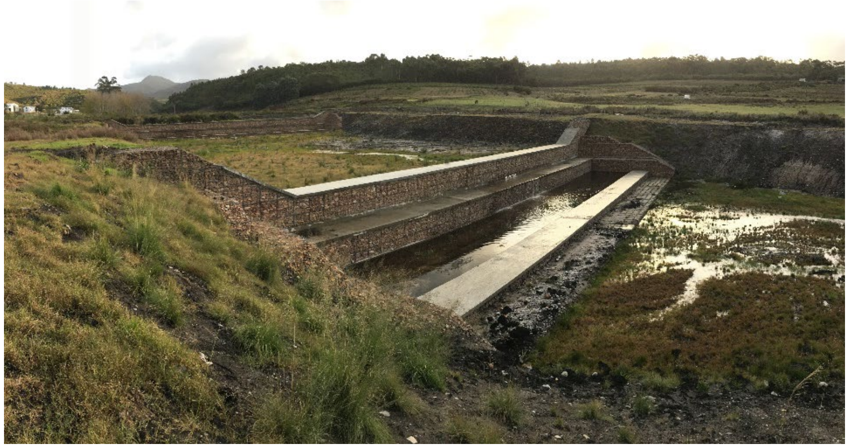
A PARETE VERTICALE

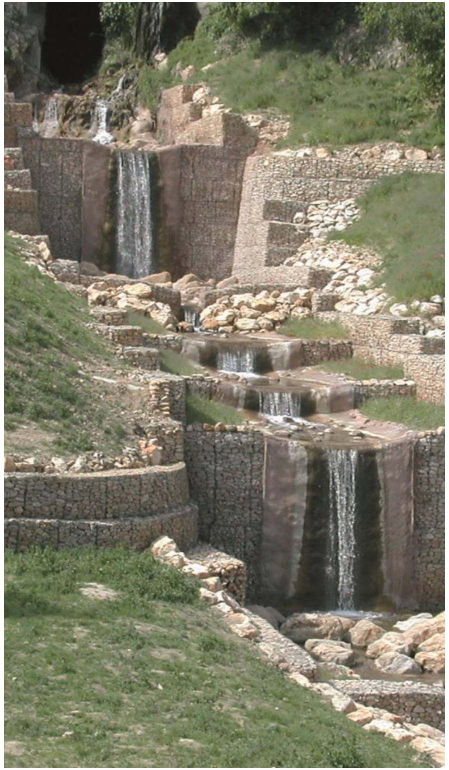
STEPPED WEIR

SLOPED WEIR

BACINO NON RIVESTITO & CONTROBRIGLIA


①
②
GABIONS
8x10/2.7mm PMC
Z_g
f_g
Z_v
Ⓑ
③
FILTER FABRIC
Ⓐ
g
Z_1
f_b
④
1
2
Z_2
c
GABIONS
8x10/2.7mm PMC
f_c
Ⓒ
③
④
3





TIPOLOGIE DI BRIGLIE IN GABBIONI

MACCAFERRI

A PARETE VERTICALE

STEPPED WEIR

SLOPED WEIR

BACINO NON RIVESTITO & CONTROBRIGLIA

TIPOLOGIE DI BRIGLIE IN GABBIONI

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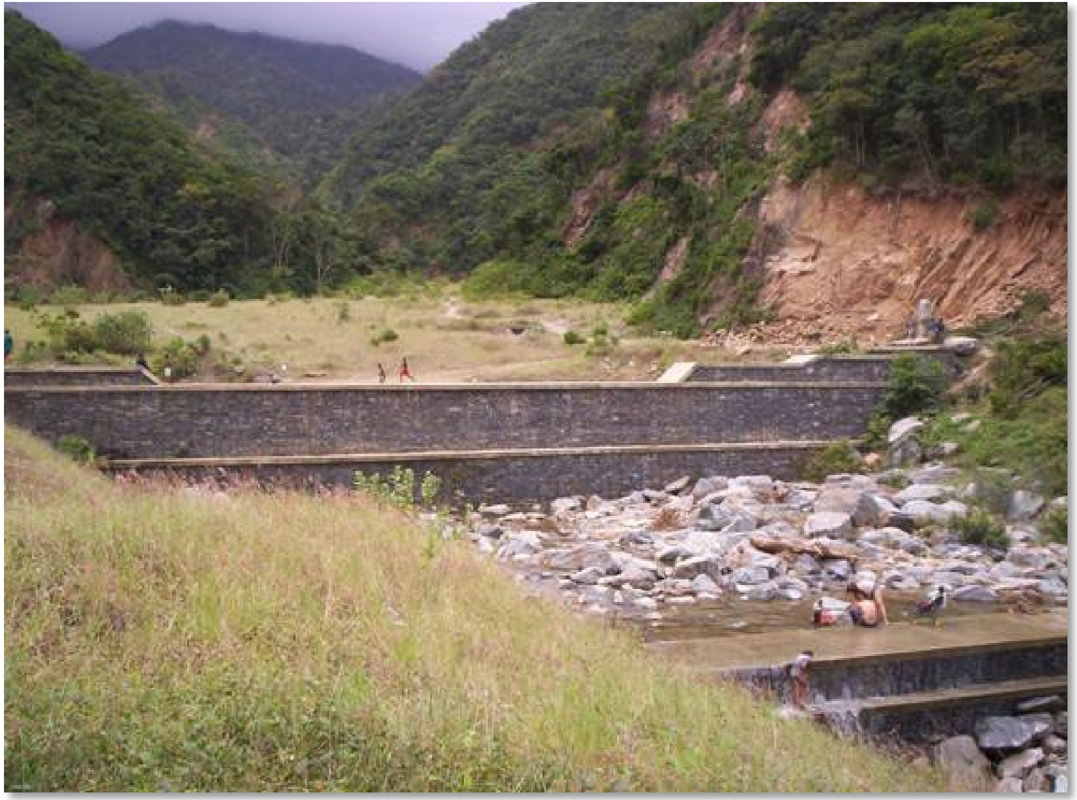
SLOPED WEIR

BACINO NON RIVESTITO & CONTROBRIGLIA



TIPOLOGIE DI BRIGLIE IN GABBIONI

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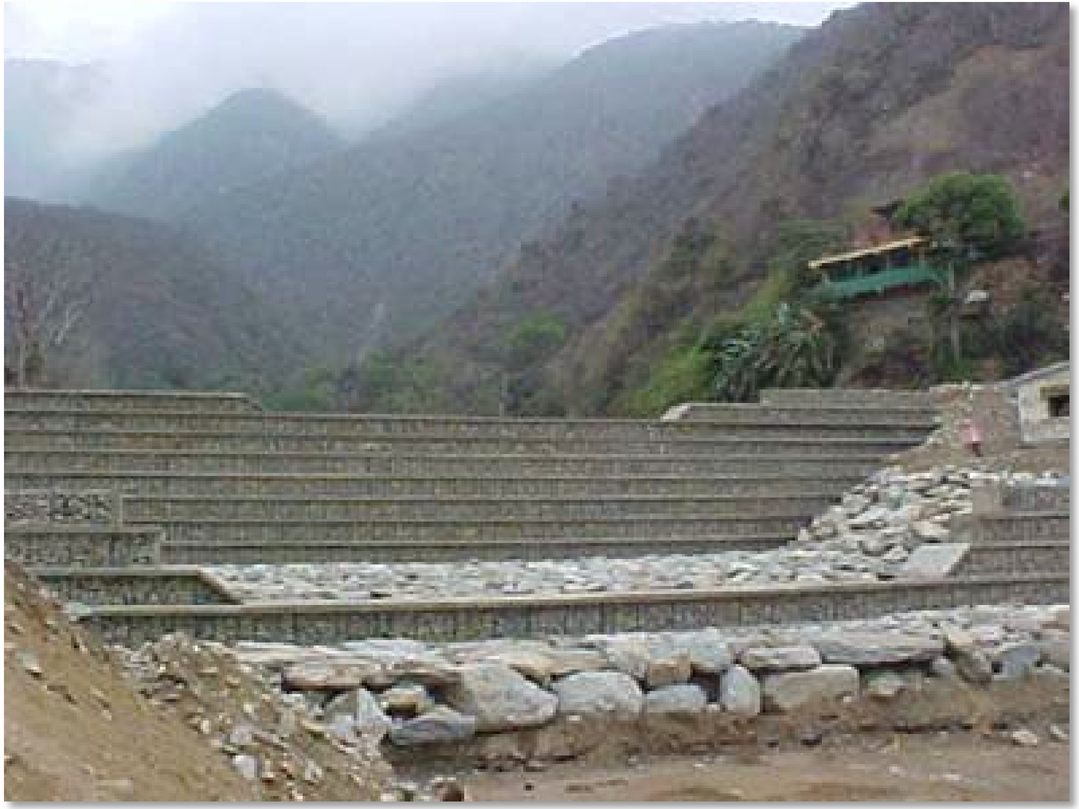
A PARETE VERTICALE

STEPPED WEIR

SLOPED WEIR

BACINO NON RIVESTITO & CONTROBRIGLIA



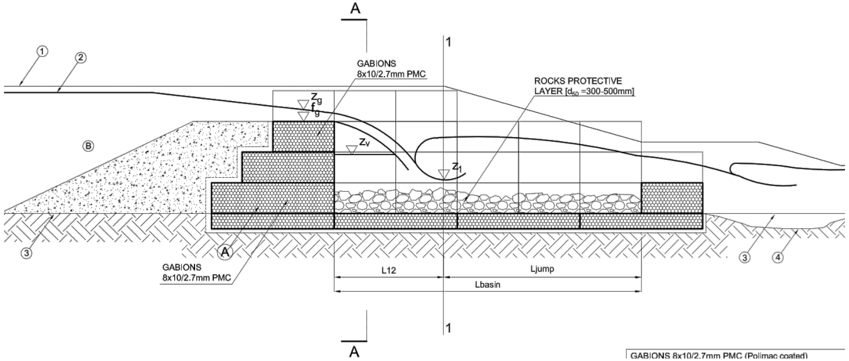
TIPOLOGIE DI BRIGLIE IN GABBIONI

A PARETE VERTICALE

STEPPED WEIR

SLOPED WEIR

BACINO RIVESTITO & CONTROBRIGLIA


A
1
①
②
GABIONS
8x10/2.7mm PMC
ROCKS PROTECTIVE
LAYER [d50 =300-500mm]
Zg
fg
Zv
Z1
Ⓑ
Ⓐ
③
④
GABIONS
8x10/2.7mm PMC
L12
Ljump
Lbasin
1
A
GABIONS 8x10/2.7mm PMC (Polimac coated)

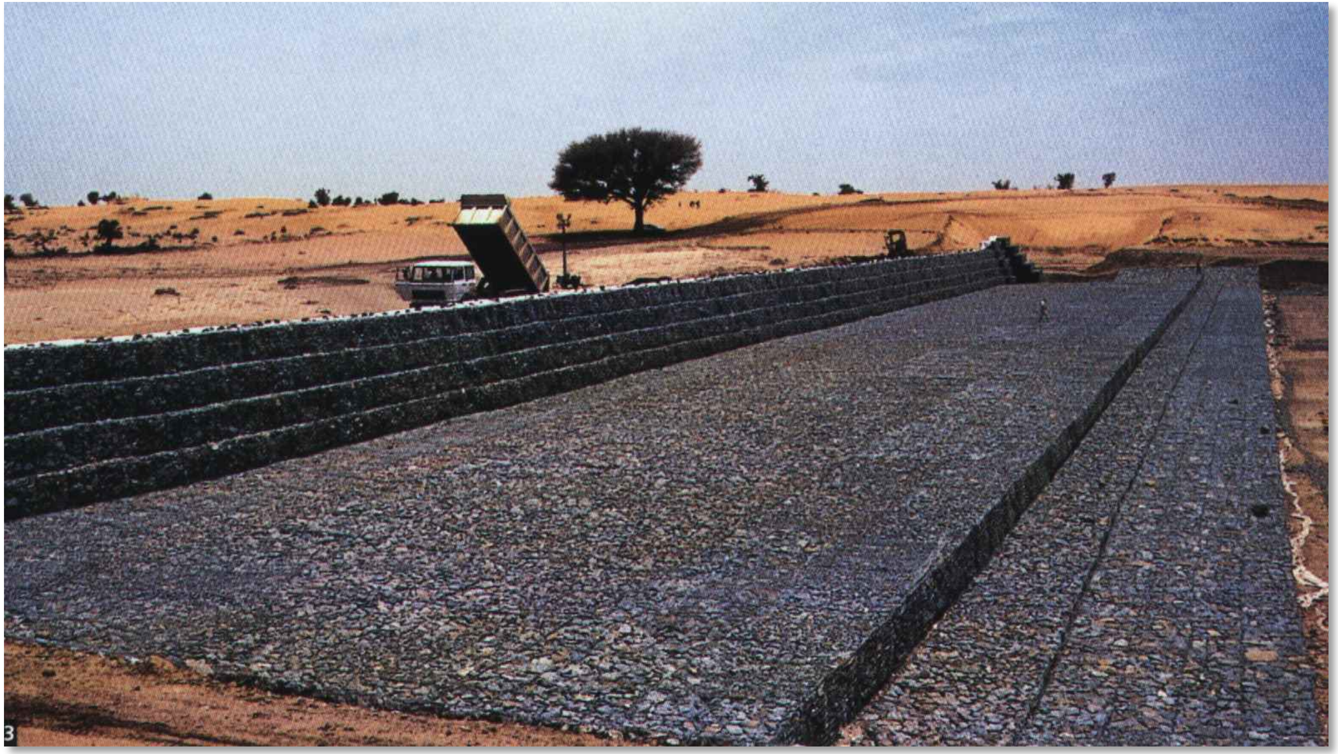
TIPOLOGIE DI BRIGLIE IN GABBIONI

A PARETE VERTICALE

STEPPED WEIR

SLOPED WEIR

BACINO RIVESTITO & CONTROBRIGLIA



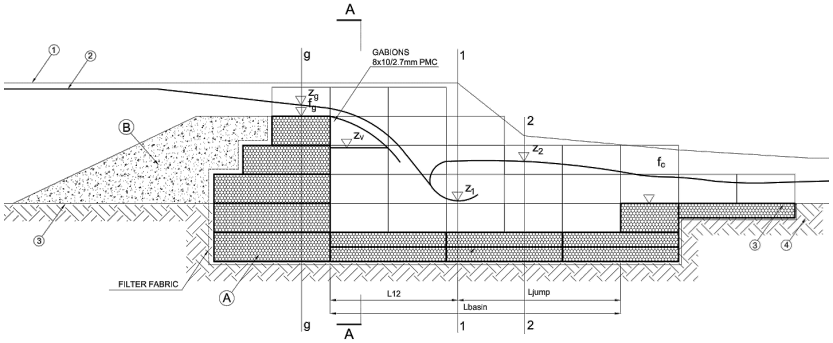
TIPOLOGIE DI BRIGLIE IN GABBIONI

A PARETE VERTICALE

STEPPED WEIR

SLOPED WEIR

BACINO RIVESTITO & CONTROBRIGLIA


A
①
②
g
GABIONS
8x10/2.7mm PMC
1
z_g
f_g
Ⓑ
z_v
2
z_2
f_c
z_1
③
③
④
FILTER FABRIC
Ⓐ
L12
Ljump
Lbasin
g
A
1
2

TIPOLOGIE DI BRIGLIE IN GABBIONI

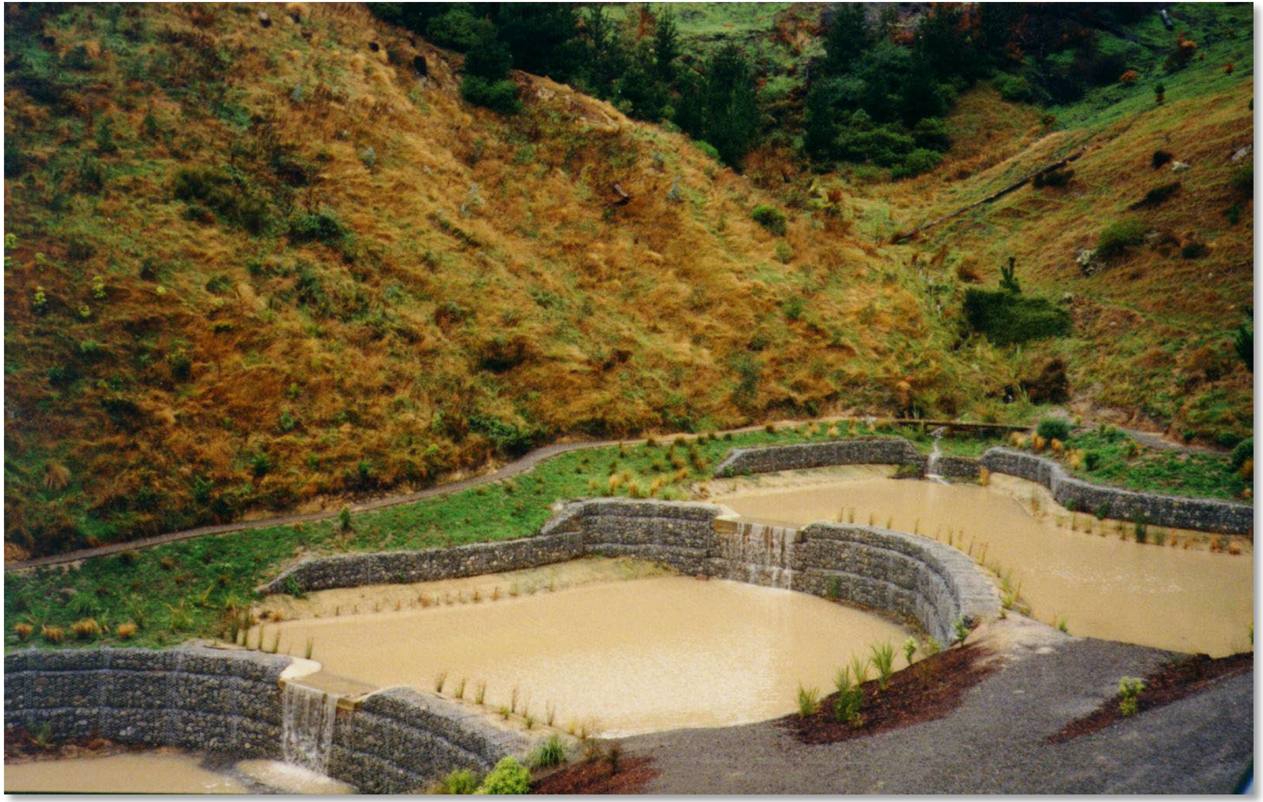
MACCAFERRI

A PARETE VERTICALE

STEPPED WEIR

SLOPED WEIR

BACINO RIVESTITO & CONTROBRIGLIA

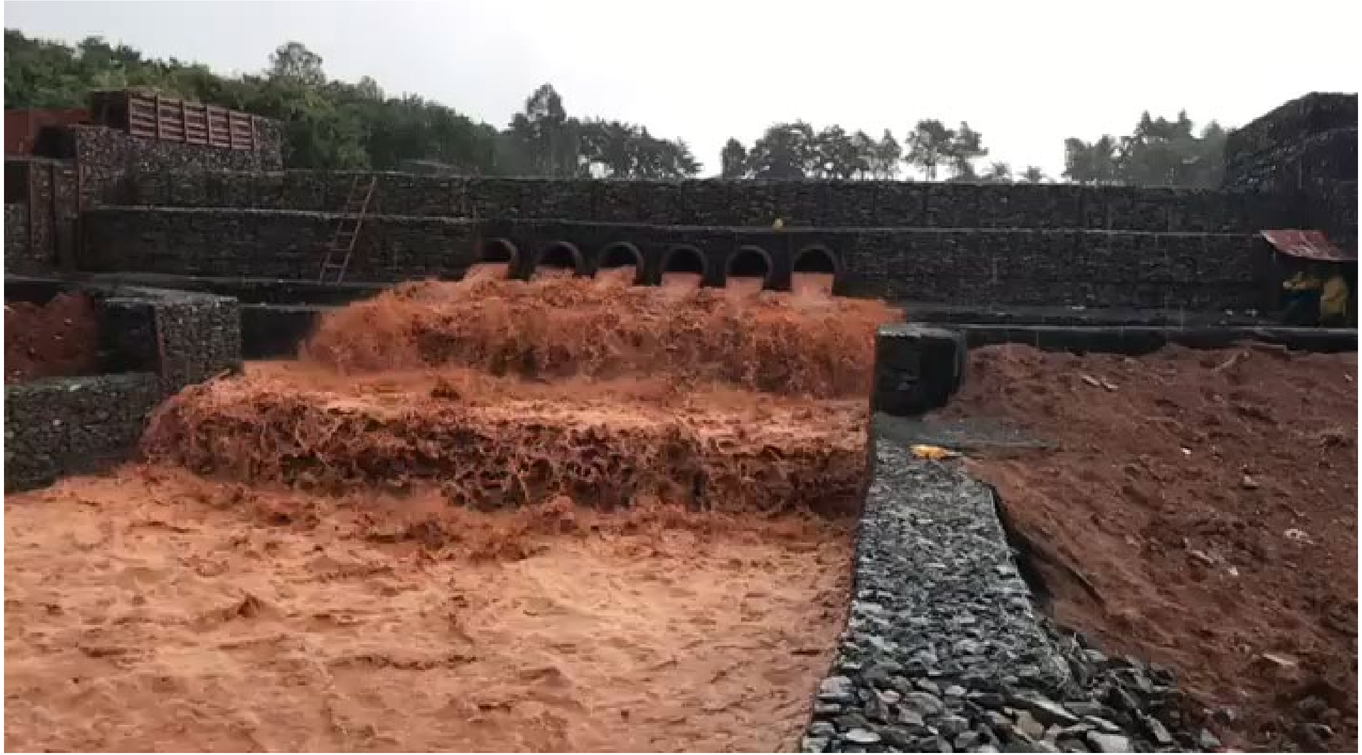


TIPOLOGIE DI BRIGLIE IN GABBIONI

A PARETE VERTICALE

STEPPED WEIR

SLOPED WEIR

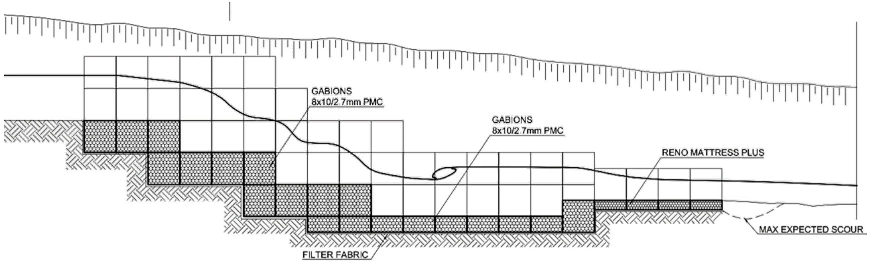


TIPOLOGIE DI BRIGLIE IN GABBIONI

SINGLE VERTICAL DROP

A GRADONI

SLOPED WEIR

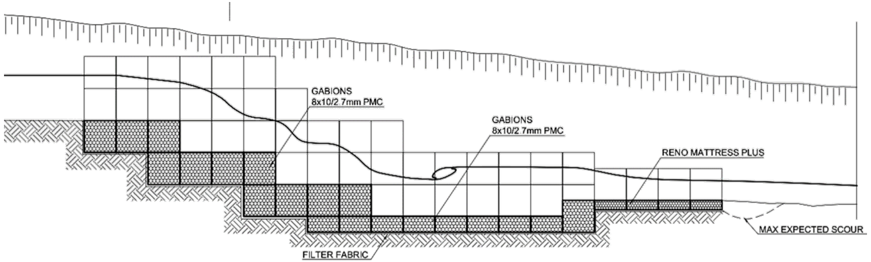

GABIONS
8x10/2 7mm PMC
GABIONS
8x10/2 7mm PMC
RENO MATTRESS PLUS
MAX EXPECTED SCOUR
FILTER FABRIC

TIPOLOGIE DI BRIGLIE IN GABBIONI

SINGLE VERTICAL DROP

A GRADONI

SLOPED WEIR

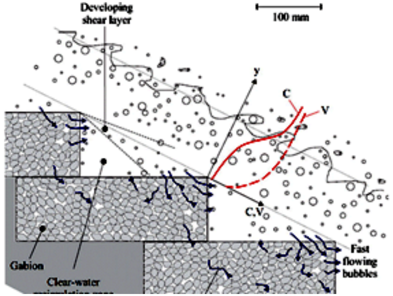

GABIONS
8x10/2 7mm PMC
GABIONS
8x10/2 7mm PMC
RENO MATTRESS PLUS
MAX EXPECTED SCOUR
FILTER FABRIC

LIMITI DI APPLICAZIONE

Step ratio (1/1, 1/2, 1/3, 1/5)
Flow type: NAPPE or SKIMMING

Positive features

- better stability
- dissipation on each step (stilling pool reduced)


Developing
shear layer
100 mm
y
C
V
C.V.
Gabion
Clear-water
Fast
flowing
bubbles

Critical issues

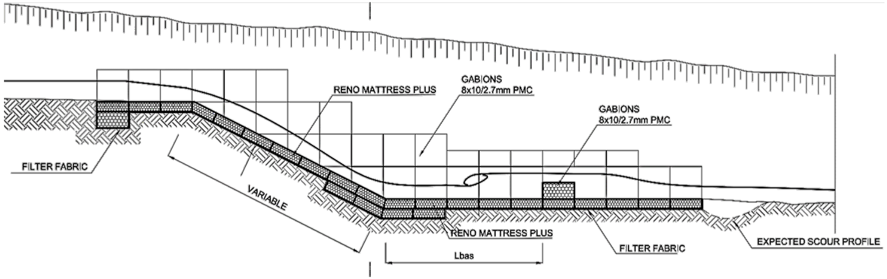
- possible damage/abrasion on the steps
- determination of energy on each step & residual difficult
- the water can move stones hitting the step, causing damage

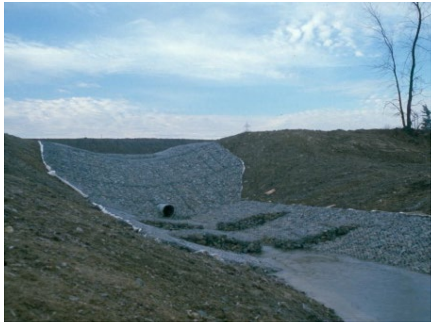
TIPOLOGIE DI BRIGLIE IN GABBIONI

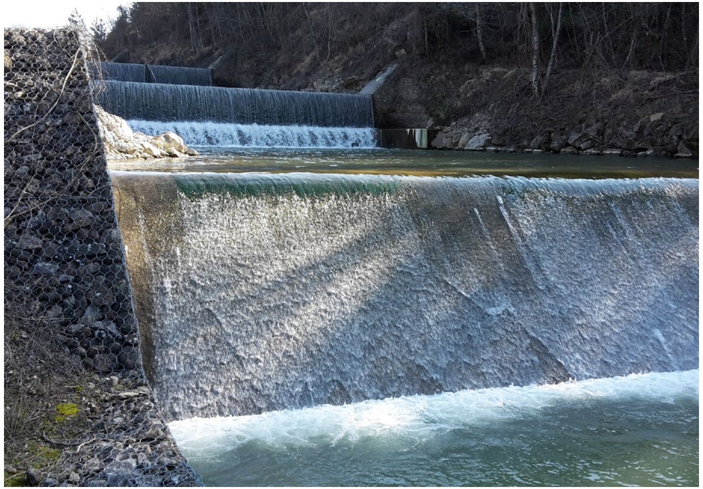
SINGLE VERTICAL DROP

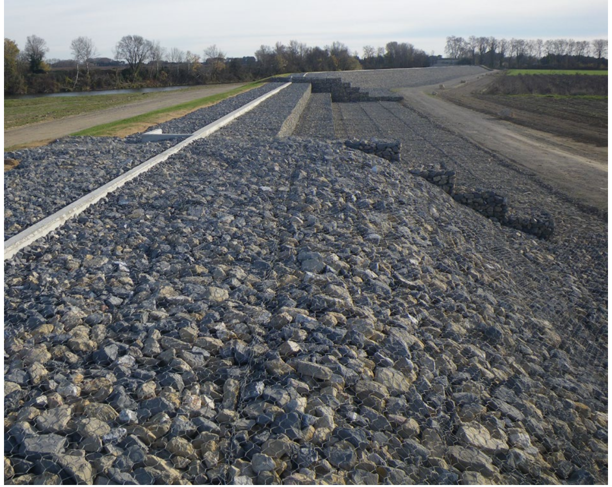
STEPPED WEIR

A SCIVOLO


RENO MATTRESS PLUS
GABIONS
8x10/2.7mm PMC
GABIONS
8x10/2.7mm PMC
FILTER FABRIC
VARIABLE
RENO MATTRESS PLUS
Lbas
FILTER FABRIC
EXPECTED SCOUR PROFILE





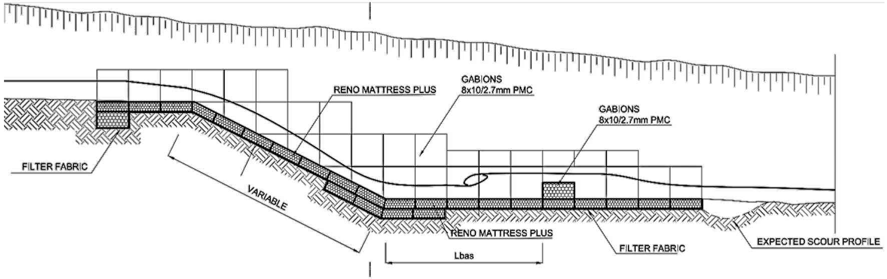


TIPOLOGIE DI BRIGLIE IN GABBIONI

SINGLE VERTICAL DROP

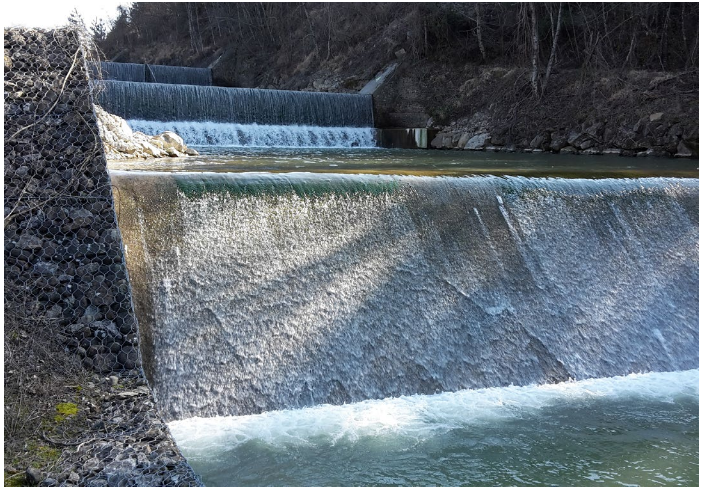
STEPPED WEIR

A SCIVOLO


RENO MATTRESS PLUS
GABIONS
8x10/2.7mm PMC
GABIONS
8x10/2.7mm PMC
FILTER FABRIC
VARIABLE
RENO MATTRESS PLUS
Lbas
FILTER FABRIC
EXPECTED SCOUR PROFILE

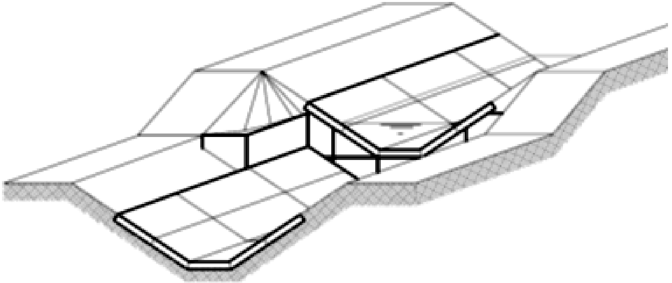
LIMITI DI APPLICAZIONE

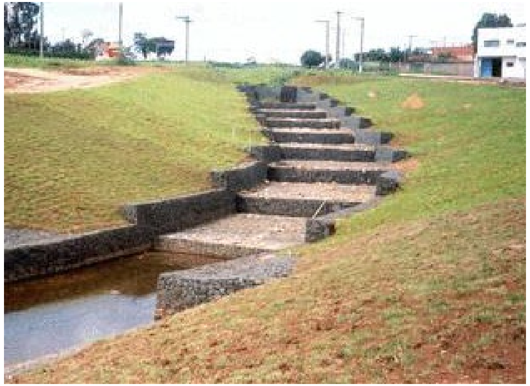
q = Q/L = 0.5-5 m3/s/m
Slope ratios (1/2, 1/3, 1/4)
Total spillway height 2-3-4-5m

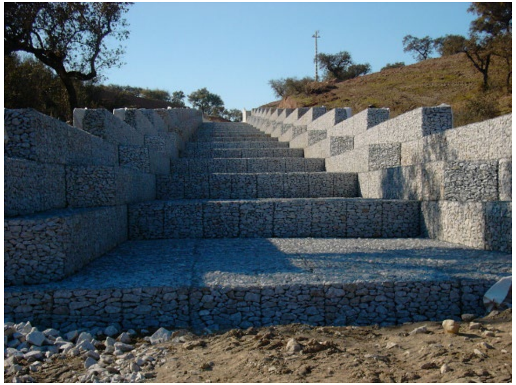


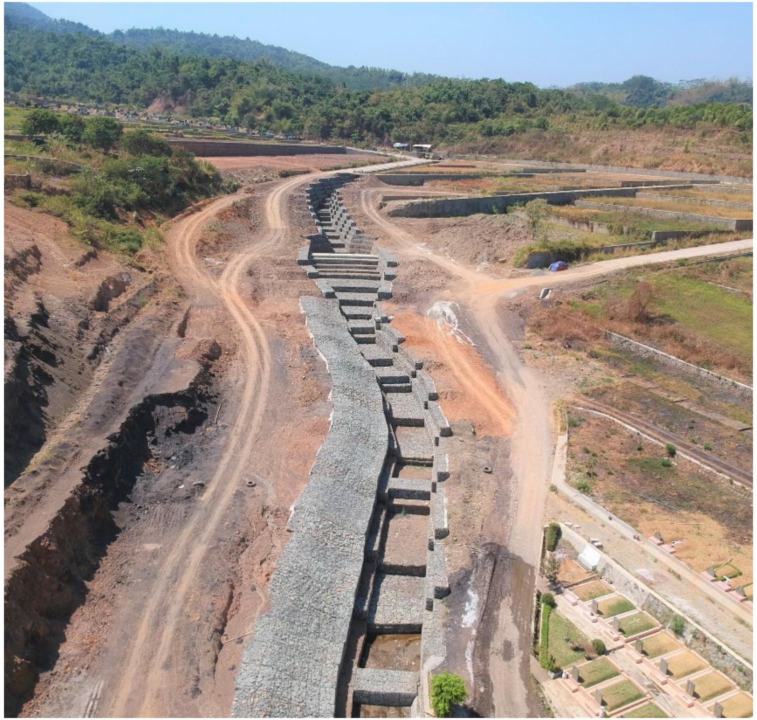
TIPOLOGIE DI BRIGLIE IN GABBIONI

RIVESTIMENTI DI CANALI A GRADONI MULTIPLI (DROP STRUCTURES)



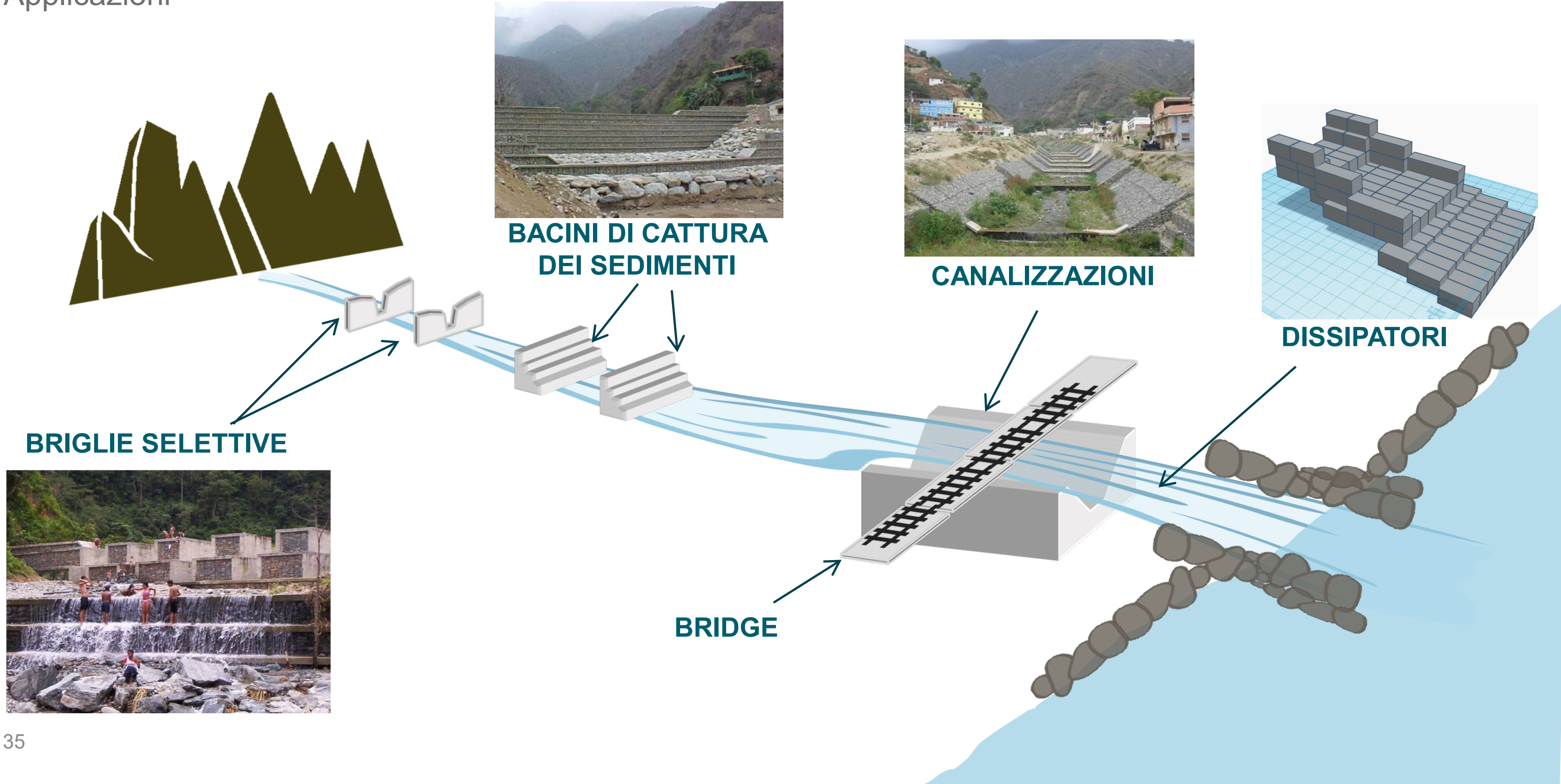






TIPOLOGIE DI BRIGLIE IN GABBIONI

Applicazioni



BACINI DI CATTURA DEI SEDIMENTI

CANALIZZAZIONI

DISSIPATORI

BRIGLIE SELETTIVE

BRIDGE

SFIORATORI LATERALI

SFIORATORI LATERALI

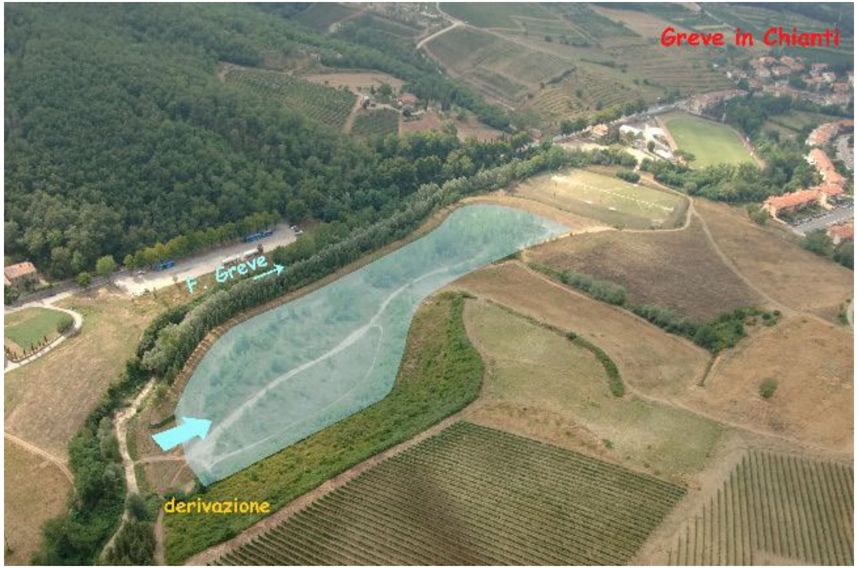
Sfioratore sul Vidourle (Francia)

SFIORATORI LATERALI

CASSE DI ESPANSIONE

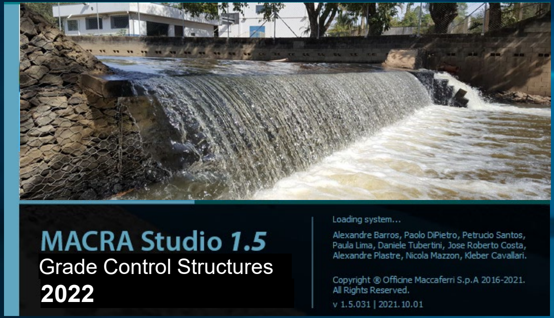
Le casse di espansione sono opere di accumulo dei volumi idrici che consentono di ottenere la riduzione della portata di colmo di un'onda di piena attraverso il temporaneo invaso di parte del suo volume

Le casse possono essere in **linea** o in **derivazione**


Greve in Chianti
F. Greve
derivazione

The Levee Handbook, CIRIA, 2014

SOFTWARE



MACRA Studio *1.5*
Grade Control Structures
2022

Loading system...

Alexandre Barros, Paolo DiPietro, Petrucio Santos, Paula Lima, Daniele Tubertini, Jose Roberto Costa, Alexandre Plastre, Nicola Mazzon, Kleber Cavallari.

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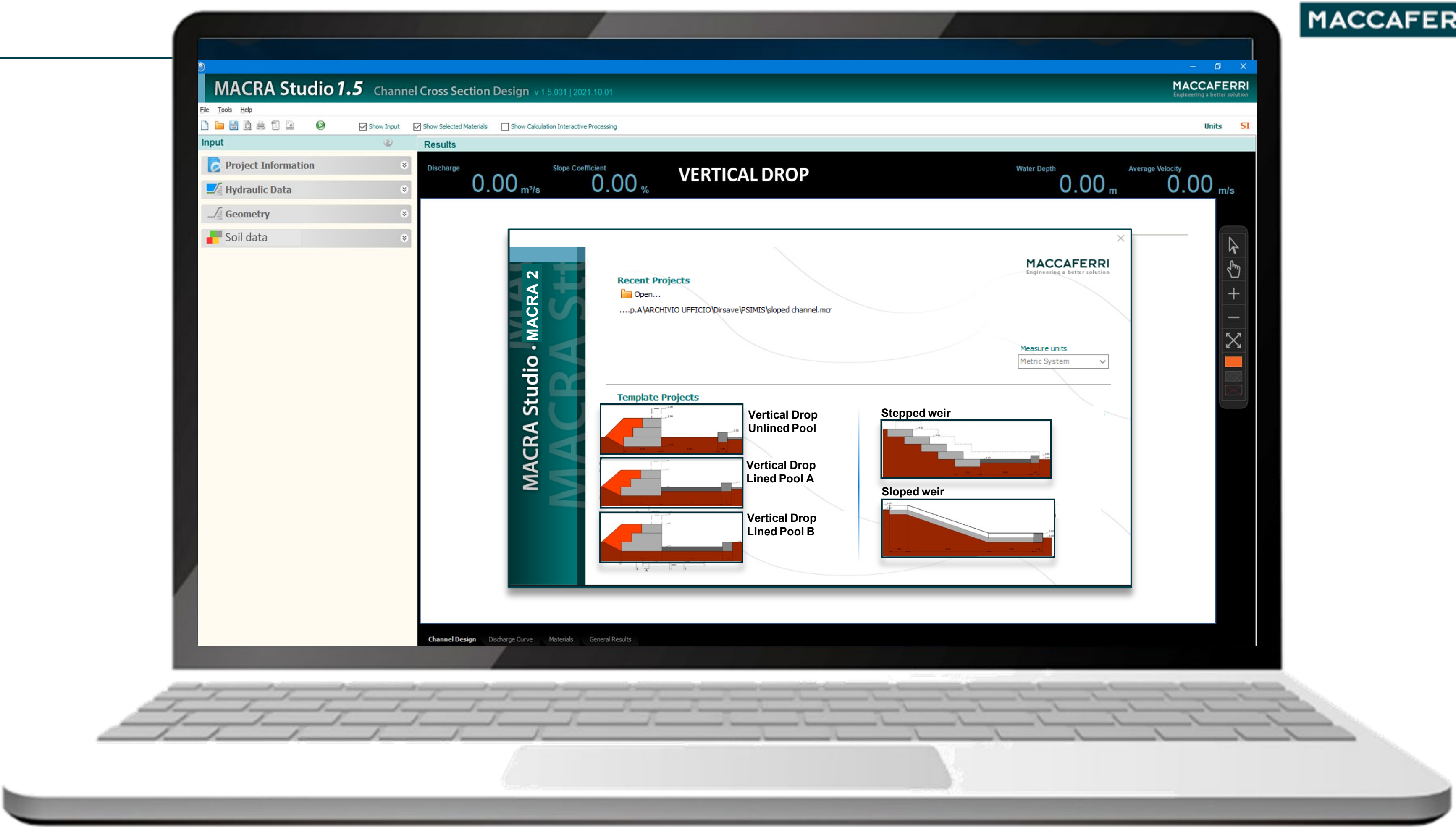
v 1.5.031 | 2021.10.01

MACcaferri River Analysis of Gabion Weirs

MACRA 2
Maccaferri River Analysis

SOON AVAILABLE!
UPDATED DESIGN SOFTWARE FOR MACRA STUDIO

MACCAFERRI



MACRA Studio 1.5 Channel Cross Section Design v 1.5.031 | 2021.10.01

☑ Show Input ☑ Show Selected Materials ☐ Show Calculation Interactive Processing

Units SI

Discharge 0.00 m³/s

Slope Coefficient 0.00 %

VERTICAL DROP

Water Depth 0.00 m

Average Velocity 0.00 m/s

Recent Projects

Open...

....p.A\ARCHIVIO UFFICIO\Dirsave\PSIMIS\sloped channel.mcr

Measure units: Metric System

Template Projects

Vertical Drop Unlined Pool

Vertical Drop Lined Pool A

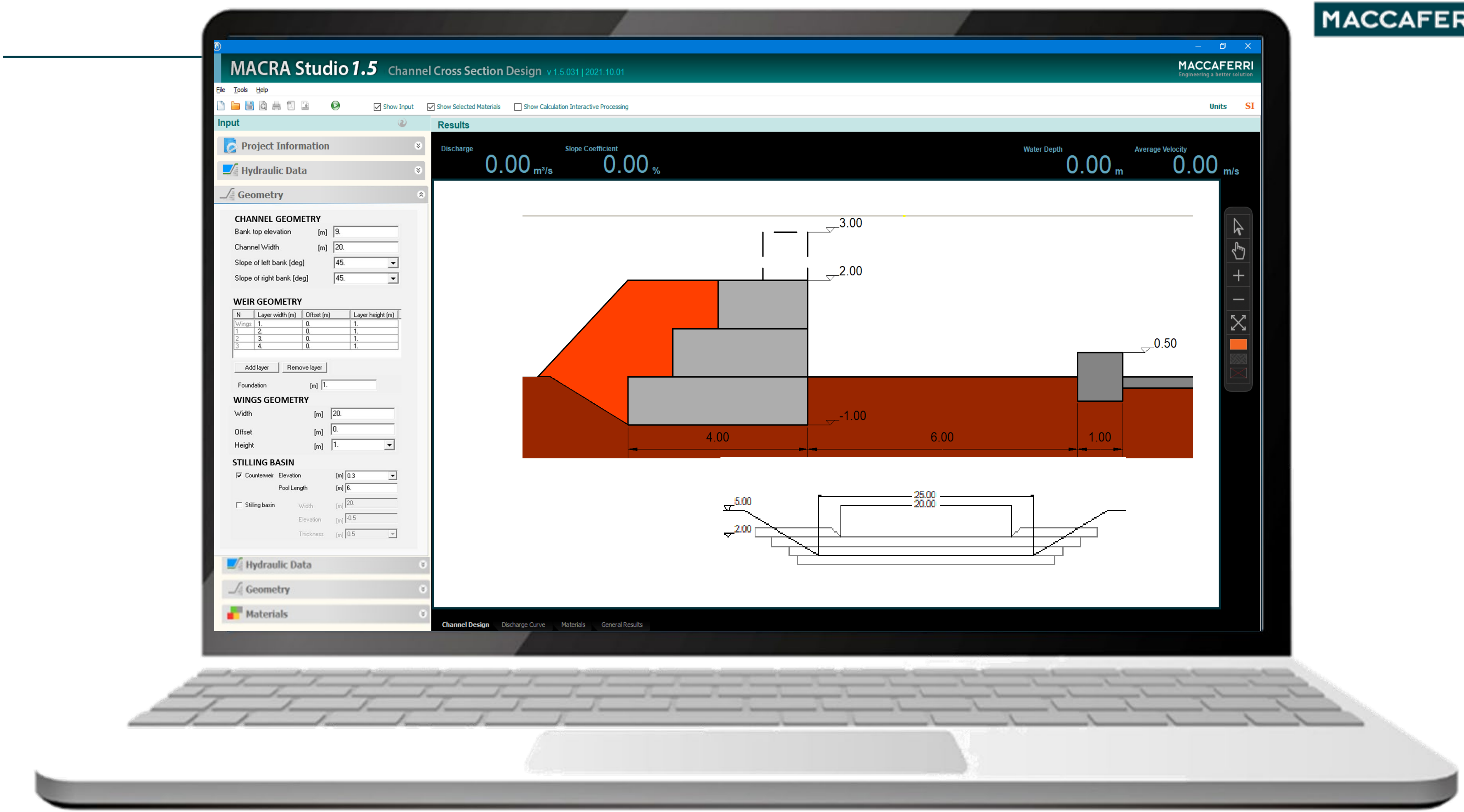
Vertical Drop Lined Pool B

Stepped weir

Sloped weir

MACCAFERRI
Engineering a better solution
File
Tools
Help
Input
Results
Project Information
Hydraulic Data
Geometry
Soil data
MACRA Studio • MACRA 2
Channel Design
Discharge Curve
Materials
General Results

MACCAFERRI


MACRA Studio 1.5 Channel Cross Section Design v 1.5.031 | 2021.10.01
MACCAFERRI Engineering a better solution
File Tools Help
☑ Show Input ☑ Show Selected Materials ☐ Show Calculation Interactive Processing
Units SI
Input
Project Information
Hydraulic Data
Geometry
Results
3.00
2.00
0.50
-1.00
4.00
6.00
1.00
5.00
2.00
25.00
20.00
Hydraulic Data
Geometry
Materials
Channel Design
Discharge Curve
Materials
General Results

Discharge 0.00 m³/s

Slope Coefficient 0.00 %

Water Depth 0.00 m

Average Velocity 0.00 m/s

CHANNEL GEOMETRY

Bank top elevation [m] 9.

Channel Width [m] 20.

Slope of left bank [deg] 45.

Slope of right bank [deg] 45.

WEIR GEOMETRY

N	Layer width (m)	Offset (m)	Layer height (m)
Wings	1.	0.	1.
1	2.	0.	1.
2	3.	0.	1.
3	4.	0.	1.

Add layer Remove layer

Foundation [m] 1.

WINGS GEOMETRY

Width [m] 20.

Offset [m] 0.

Height [m] 1.

STILLING BASIN

☑ Counterweir Elevation [m] 0.3

Pool Length [m] 6.

☐ Stilling basin Width [m] 20.

Elevation [m] -0.5

Thickness [m] 0.5