Breakwaters and Closure dams

Kust- en oeverwerken II

ct5308 Breakwaters and Closure Dams

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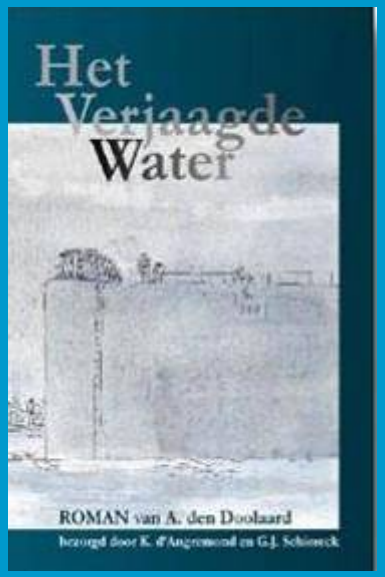
March 28, 2012

Faculty of Civil Engineering and Geosciences
Section Hydraulic Engineering

TU Delft
Delft University of Technology

elements

- Lectures
- Book:
  Breakwaters and Closure Dam
  Verhagen, d'Angremond & Van Roode
  published by Spon, UK £ 40 (paperback)
  available via VSSD (normal €39.50, members € 19)
  available as "netbook" via Library (only TU-ip)
- Website: via Blackboard
  go to course ct5308
  - practical information
  - PowerPoint presentations
  - additional texts
- Assessment:
  - via exercise
  - via oral examinations



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Netbook version

- goto http://discover.tudelft.nl
- type “breakwaters and closure dams”
- click on book (Spon version)
- click on “Go to full text”

- Good links, but only useful in online version

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$$\frac{H_{2\%}}{\Delta D_{n50}} = 1.4 P^{-0.13} \left(S/\sqrt{N} \right)^{0.2} \sqrt{\cot \alpha} . \xi_m^P \qquad (7.19)$$

Note that ξ does not change, since the wave steepness is always measured in deep water!

If one is sure that $H_{2\%}$ is reduced owing to breaking, it is possible to account for this fact by using the re-written formulae (see Equations (7.18) and (7.19) and substituting the actual value of $H_{2\%}$. It is stressed, however that even if extensive breaking has been observed at the location of the breakwater, the conditions may be different during the design storm as a result of higher water levels (storm surge) or a lower bed level (erosion and scour).

7.5.3 Shape of quarry stone

Hudson had already indicated by varying values of K_D, that the angularity of quarry stone has an influence on stability. Latham et al. [1988] investigated the influence of the shape of individual stones on their stability. They used designations like "fresh", "equant", ''semi-round", "very round", and "tabular". As compared with "standard" quarry stone, the coefficient in the Van der Meer formula changes slightly as shown in Table 7-7.

Table 7-7 Effect of stone shape on stability

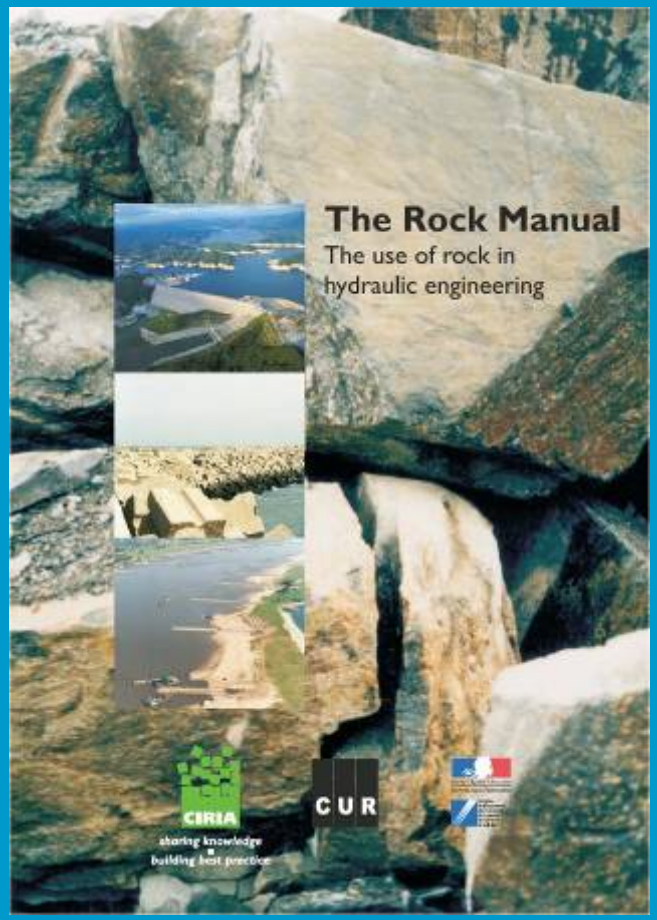
Rock shape	Plunging waves	Surging waves
Elongate/Tabular	6.59	1.28
Irregular	6.38	1.16
Equant	6.24	1.08
Standard v.d. Meer	*6.2*	*1.0*
Semi-round	6.10	1.00
Very round	5.75	0.80

For a visual impression of block shapes, one is referred to Figure 7-4.

Other references

- Rock Manual (2007)
- Closure of Tidal Basins (1987)
- Coastal Engineering Manual
- Various PIANC publications
- EN13383
- Manual on the use of...

- CD-ROM will be made available



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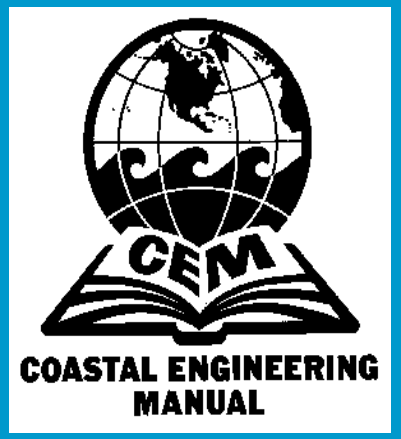
Coastal engineering manual (shore protection manual)



1. Introduction
2. Coastal Hydrodynamics
3. Coastal Sediment Processes
4. Coastal Geology
5. Coastal Project planning and design
6. Design of coastal project elements

7 Appendices (Glossary)

http://chl.erdc.usace.army.mil/cemtoc

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Design of Coastal Project Elements

(Hughes, updated 6/1/2006)

1 Introduction to Coastal Project Element Design
2 Types and Functions of Coastal Structures
3 Site Specific Design Conditions
4 Materials and Construction Aspects
5.1 Fundamentals of Design - Part 1
5.2 Fundamentals of Design - Part 2
5.3 Fundamentals of Design - Part 3
6 Reliability in Design
7 Design of Specific Project Elements - Case Studies
8 Monitoring, Maintenance and Repair of Coastal Projects

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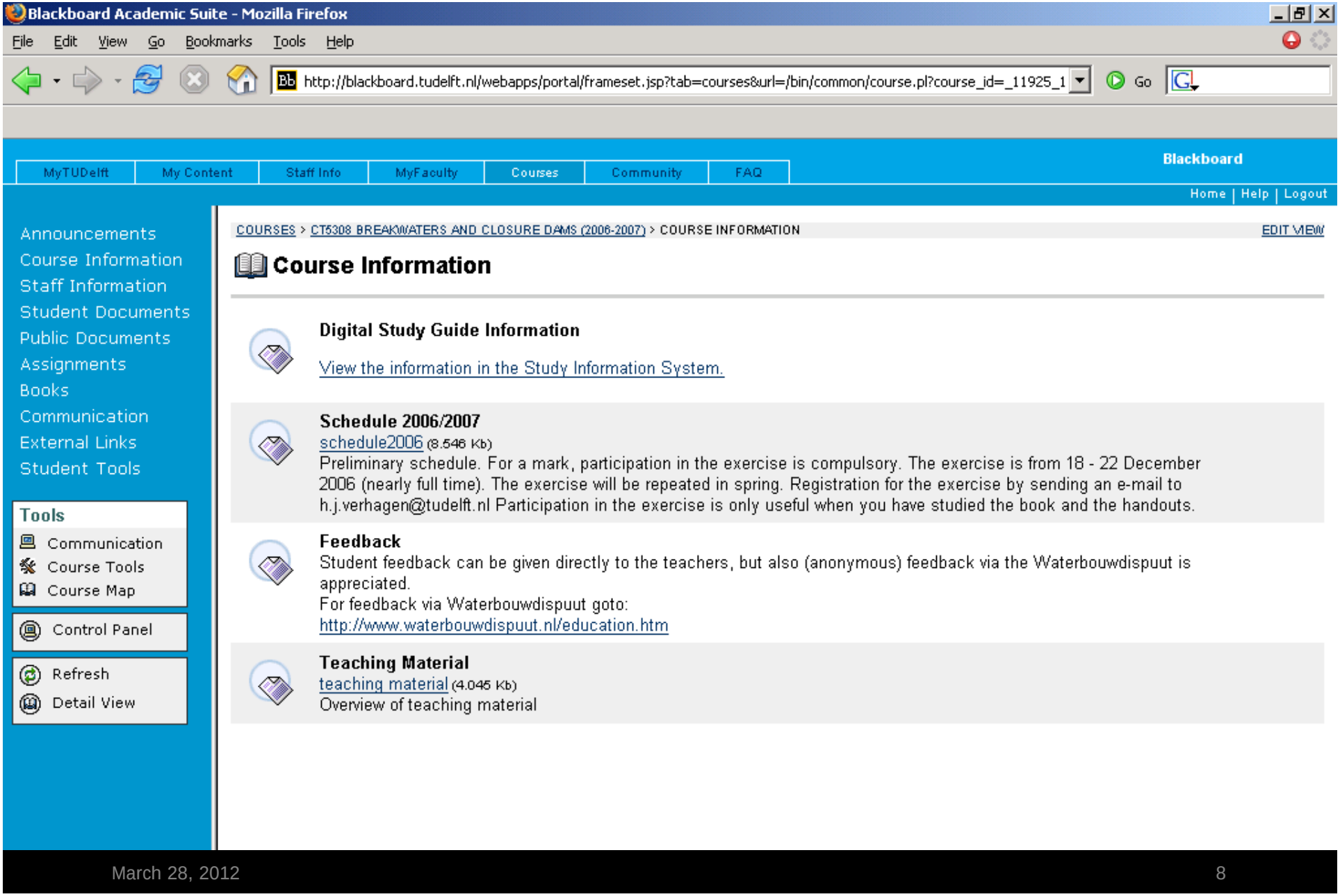
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Schedule 2006/2007
schedule2006 (8.546 Kb)
Preliminary schedule. For a mark, participation in the exercise is compulsory. The exercise is from 18 - 22 December 2006 (nearly full time). The exercise will be repeated in spring. Registration for the exercise by sending an e-mail to h.j.verhagen@tudelft.nl Participation in the exercise is only useful when you have studied the book and the handouts.
Feedback
Student feedback can be given directly to the teachers, but also (anonymous) feedback via the Waterbouwdispuut is appreciated.
For feedback via Waterbouwdispuut goto:
http://www.waterbouwdispuut.nl/education.htm
Teaching Material
teaching material (4.045 Kb)
Overview of teaching material

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Lecture Schedule

The following is the **preliminary** lecturing schedule for 2009/2010

lecture nr	room	lecture week	date	time		pages in book	subject
1	2.98	3.1	3/2	8:45	HJV	ch 1 - 4	Introduction and historical overview, design process
2	F	3.1	4/2	8:45	HJV	ch 5 + 6	Flow through gaps, waves, data collection
3	2.98	3.1	5/2	13:45	HJV	appendix 1	determination of design waves;
4	2.98	3.2	10/2	8:45	HJV	ch 7	Stability of the armour of rubble mound breakwaters
5	F	3.2	11/2	8:45	DMC	appendix 3	Stability of the armour of rubble mound breakwaters
6	2.98	3.2	12/2	13:45	HJV	ch 8 + 9	Dynamic stability, Caisson breakwaters
7	2.98	3.3	17/2	8:45	vdM	ch 10	Overtopping and Transmission (1)
8	F	3.3	18/2	8:45	vdM	ch 10	Overtopping and Transmission (2)
9	2.98	3.3	19/2	13:45	HJV	ch 12	Design practice closure dams
							22/2 - 26/2 is a holiday period
10	2.98	3.4	3/3	8:45	HJV	appendix 6	two-gully example from textbook, construction of bed protection
11	F	3.4	4/3	8:45			(lecture is moved to 5/3)
12	2.98	3.4	5/3	13:45	RB	handout	Pipelines and pipeline covers (this lecture will take the full afternoon)
13	2.98	3.5	10/3	8:45	HJV	ch 11	Design practice breakwater cross-sections
14	F	3.5	11/3	8:45	HJV	ch 15-17	failure modes, optimization
15	2.98	3.5	12/3	13:45	JvdB	ch 13 -14+ appendix 7	construction
16	2.98	3.6	17/3	8:45	HJV	appendix 5 handout	Optimization; the PIANC method for the design of armour units
17	F	3.6	18/3	8:45	HJV	appendix 2	Quarries and EN13383
18	2.98	3.6	19/3	13:45	HJV		Instruction exercise
		3.7	24/3				No lecture
		3.7	25/3				No lecture
19	1.96	3.7	26/3	8:45	HJV-JvdB		Final presentations exercise

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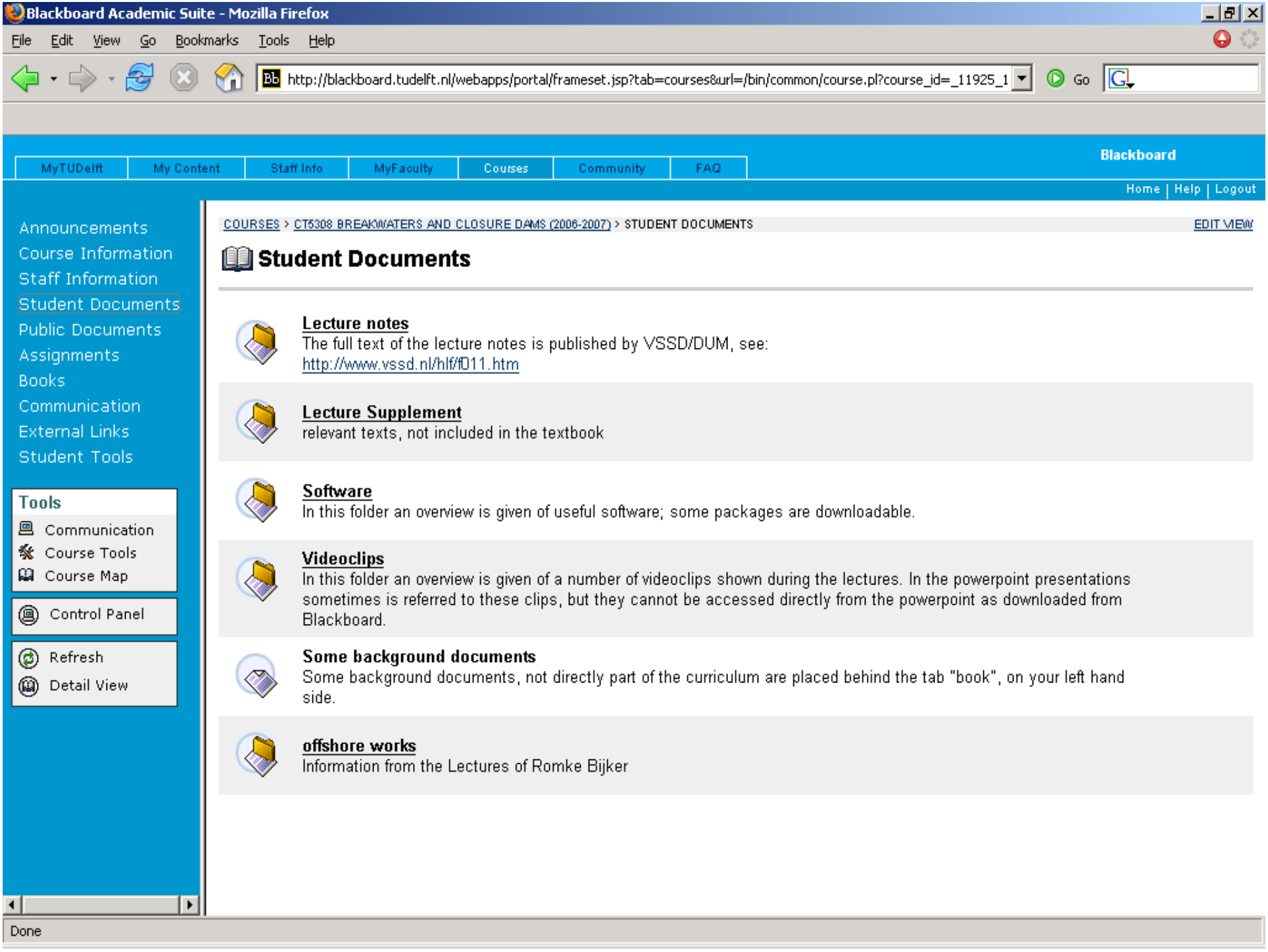
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Lecture notes
The full text of the lecture notes is published by VSSD/DUM, see:
http://www.vssd.nl/hlf/f011.htm
Lecture Supplement
relevant texts, not included in the textbook
Software
In this folder an overview is given of useful software; some packages are downloadable.
Videoclips
In this folder an overview is given of a number of videoclips shown during the lectures. In the powerpoint presentations sometimes is referred to these clips, but they cannot be accessed directly from the powerpoint as downloaded from Blackboard.
Some background documents
Some background documents, not directly part of the curriculum are placed behind the tab "book", on your left hand side.
offshore works
Information from the Lectures of Romke Bijker
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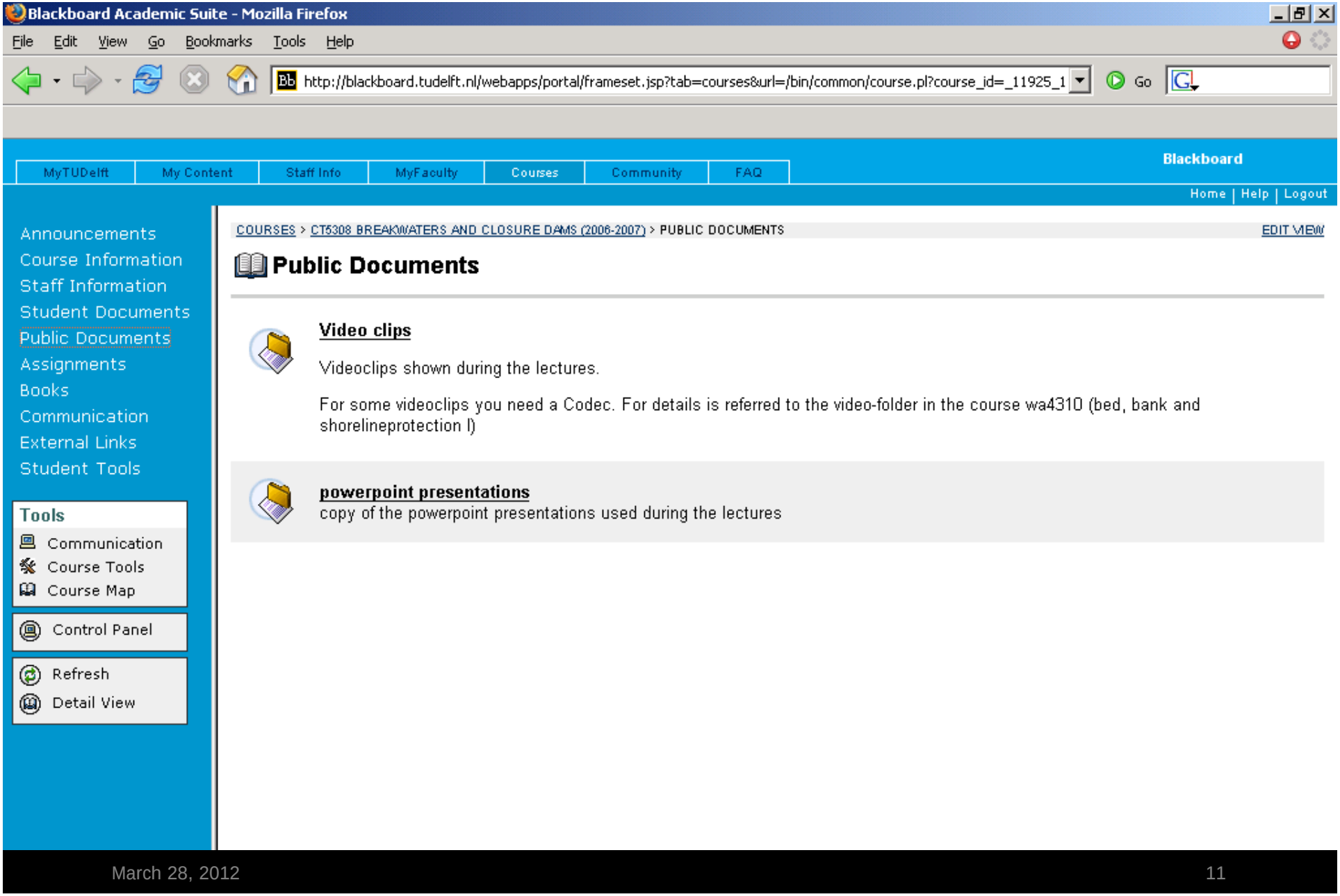
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Video clips
Videoclips shown during the lectures.
For some videoclips you need a Codec. For details is referred to the video-folder in the course wa4310 (bed, bank and shorelineprotection I)
powerpoint presentations
copy of the powerpoint presentations used during the lectures

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November 01, 2005 - November 08, 2005

Wed, Feb 04, 2004 -- ***M.Sc.Presentations*** — Posted by Hendrik Verhagen

All M.Sc. students are requested to announce their final presentation also via this Community; send your announcement to Jaap van Thiel de Vries, he will place the announcement under the heading "events".

Tue, Jan 27, 2004 -- ***Target Group*** — Posted by Hendrik Verhagen

This Community is to allow all M.Sc.-students withing Hydraulic Engineering to communicate with each other and with the staff. Details are behind the button: info

Mon, Nov 07, 2005 -- ***Appointments with Prof. Stive*** — Posted by Chantal van

Done

Making a mattress

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Bed protection

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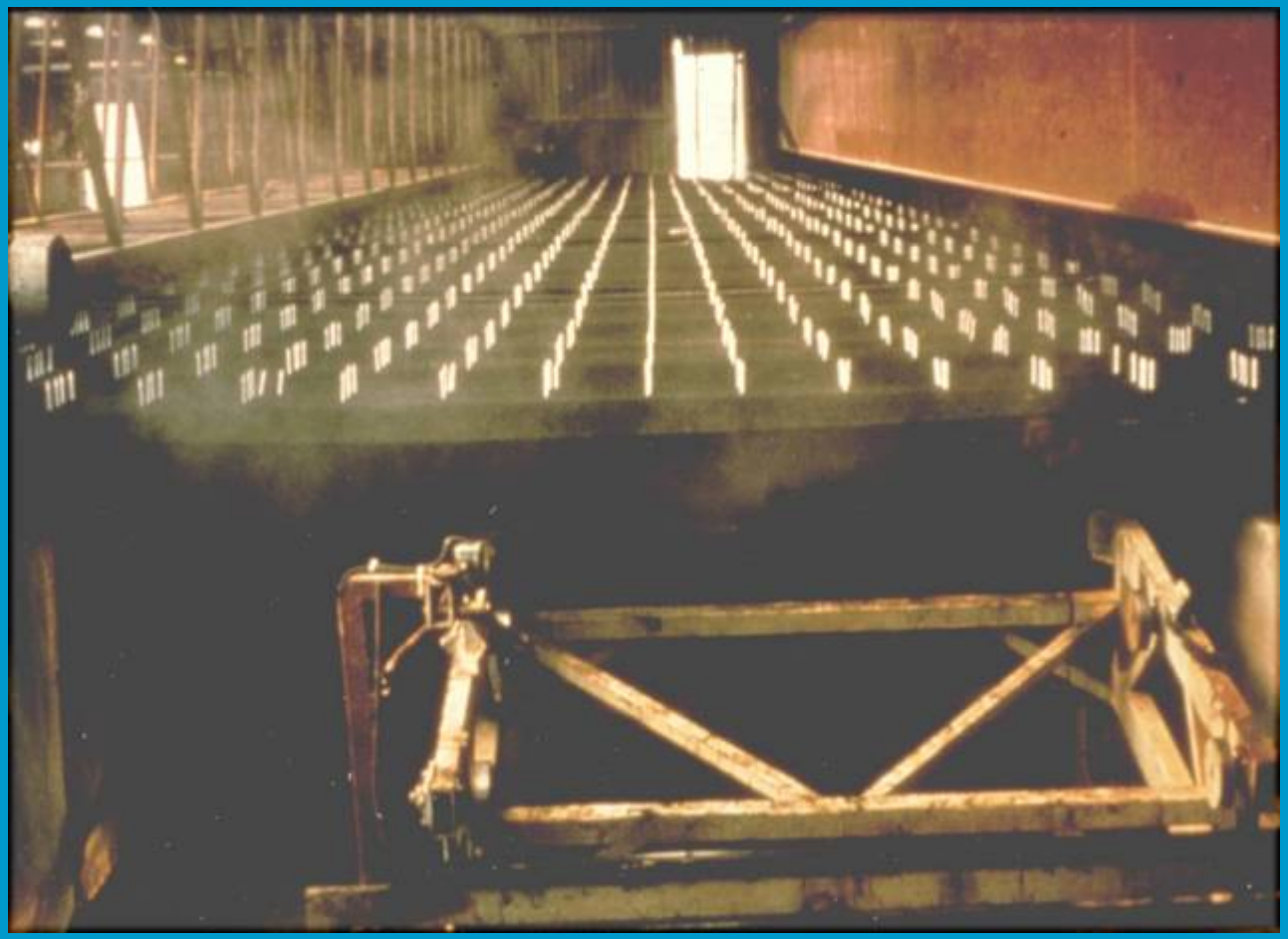

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Completed block mat

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Block mat factory

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Transport of the block mat

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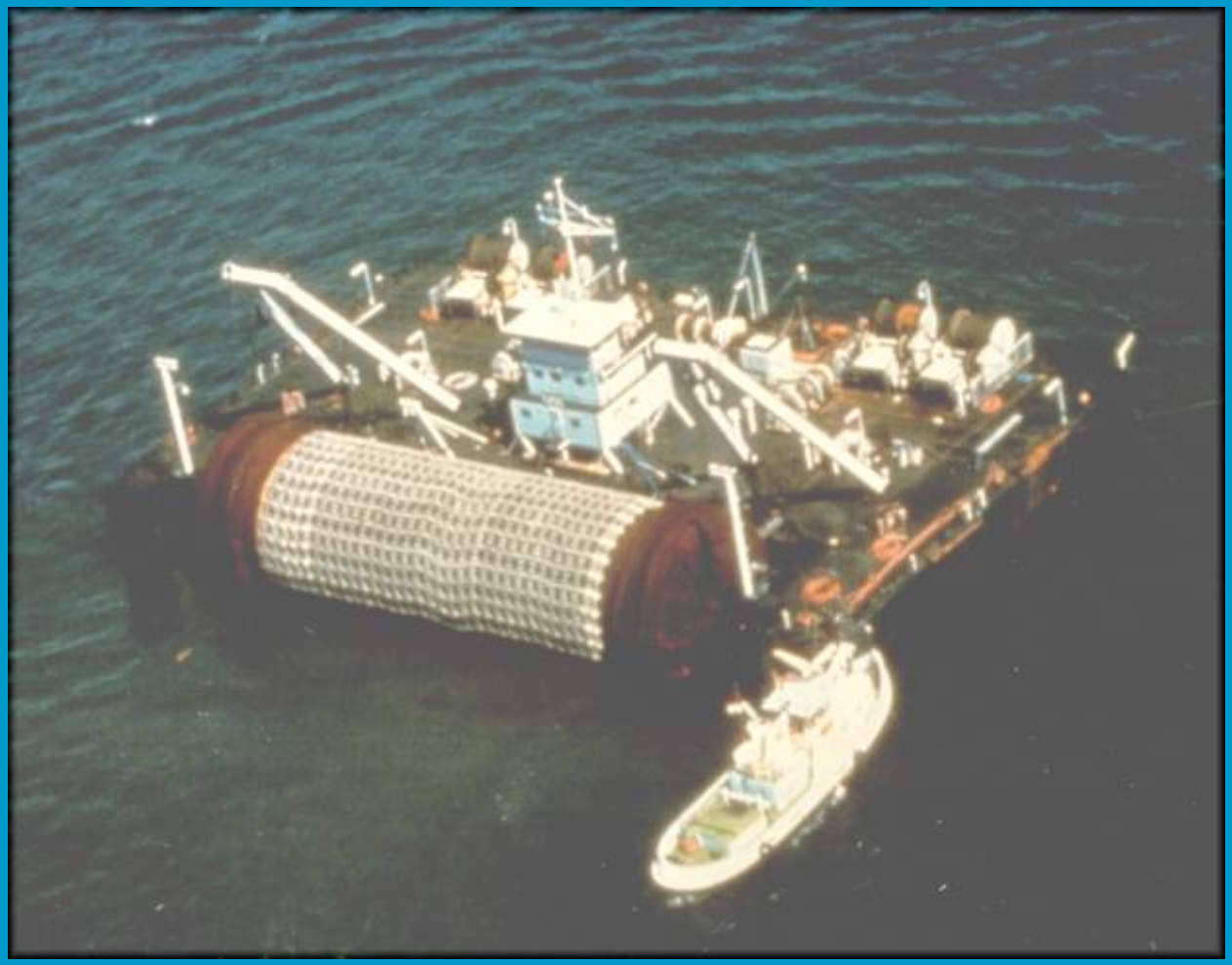
Placing the block mat



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Caspian quarry, Dubai

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Quarry in Bulgaria

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Larvik, Norway

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Loading a quarry train

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Quarry train for the Maasvlakte 1

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Loading a stone barge (Palm I, Dubai)

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The split barge

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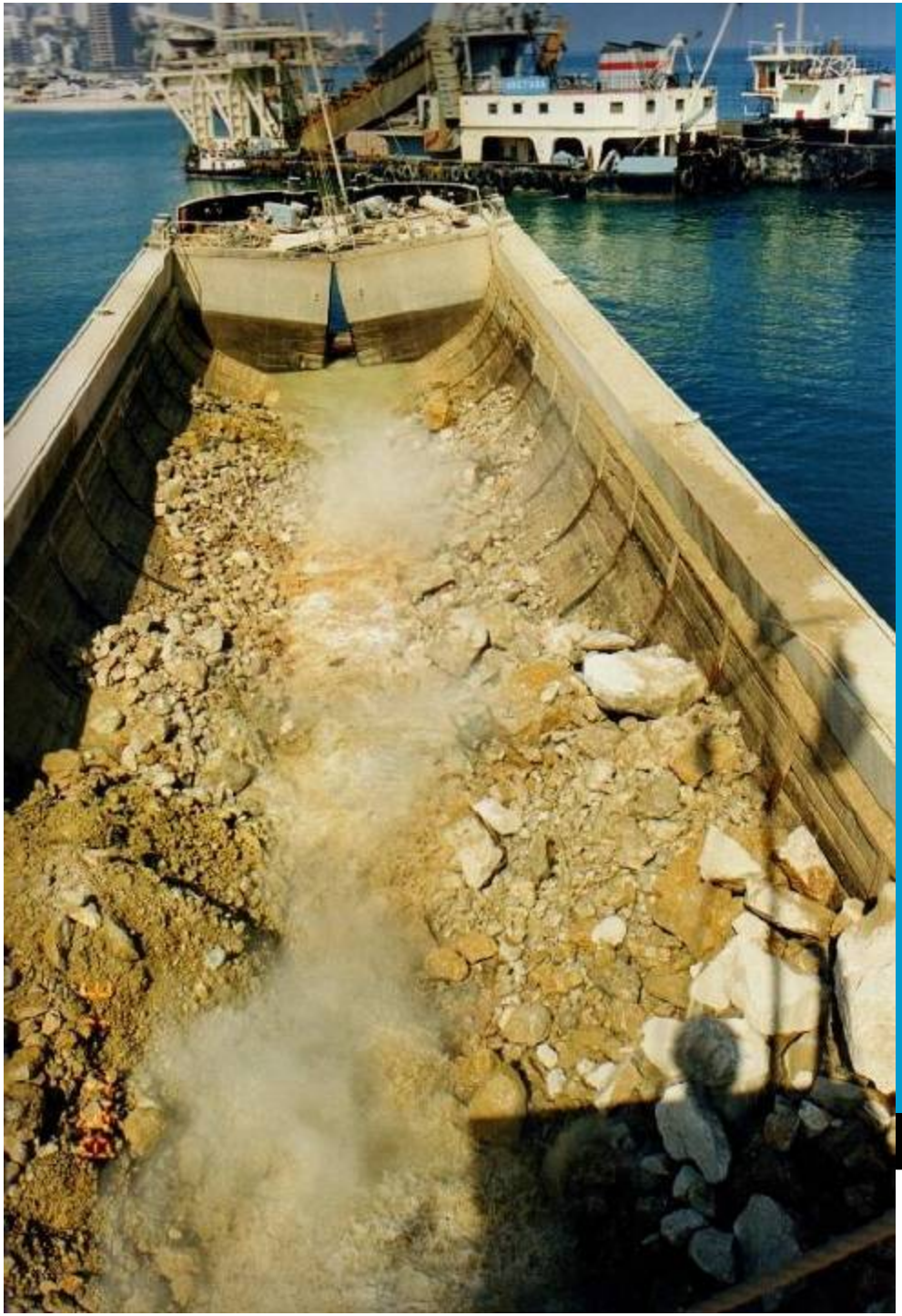

Split barge

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Heavy stonework (Palm I, Dubai)

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Large construction cranes

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Placing riprap by crane

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Placing riprap by crane

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Using the orange peel grab

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Side stone dumping vessel

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side stone dumping vessel

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ship for placing concrete cubes

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Placing cubes by helicopter

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Helicopter in action

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Emergency closure in New Orleans

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Closure with a cable car

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Horizontal closure by tipping (Korea)

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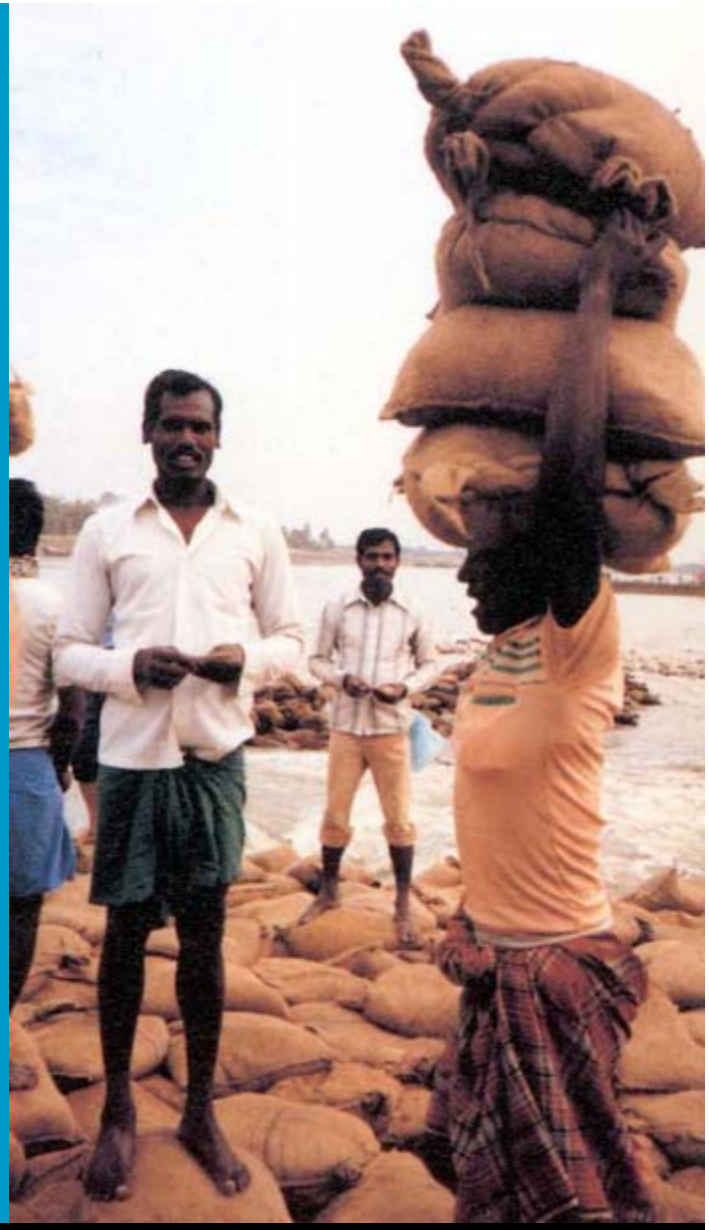
Closing with sand bags and sack-gabions



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Sirevåg Berm breakwater

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Antifer blocks at Sines (Portugal)

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Breakwater under construction

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Xbloc armour units in Bar Beach

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