FAST DANUBE

Technical Assistance for Revising and Complementing the Feasibility Study Regarding the Improvement of Navigation Conditions on the Romanian-Bulgarian Common Sector of the Danube and Complementary Studies

Co-financed by the Connecting Europe Facility of the European Union

Administrația Fluvială
a Dunării de Jos R.A. Galați

FAST DANUBE

TECHNICAL WORKSHOP

AFDJ / IAPPD / Halcrow Romania team

29 Aug 2018, Bucuresti

Technical Workshop (29 Aug’18)

- Revised options – Bechet / Corabia / Belene / Popina
- Design approach – morphological principles to option selection
- Design approach – river training structures / islands
- Design approach – bank stabilisation
- Options appraisal – modelling results
- MCA – multi-criteria (objective) analysis
- Adaptive management

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FAST DANUBE

Short presentation – TECHNICAL WORKSHOP
DESIGN APPROACH – RIVER TRAINING STRUCTURES / ISLANDS

29 Aug 2018, Bucuresti

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River training structures/islands

- Feasibility designs
- Geosynthetic tubes

Best practice:

- Mississippi, US
- Lower Columbia River, US
- Kootenai/Lower Meander River, US
- Rhine, Holland (Rijkswaterstaat)
- mid-Danube, Austria (Bad Deutsch Altenberg/Witzeldorf Project between Vienna and Bratislava – deregulation of the river ie environmental restoration involving Prof Habersack)

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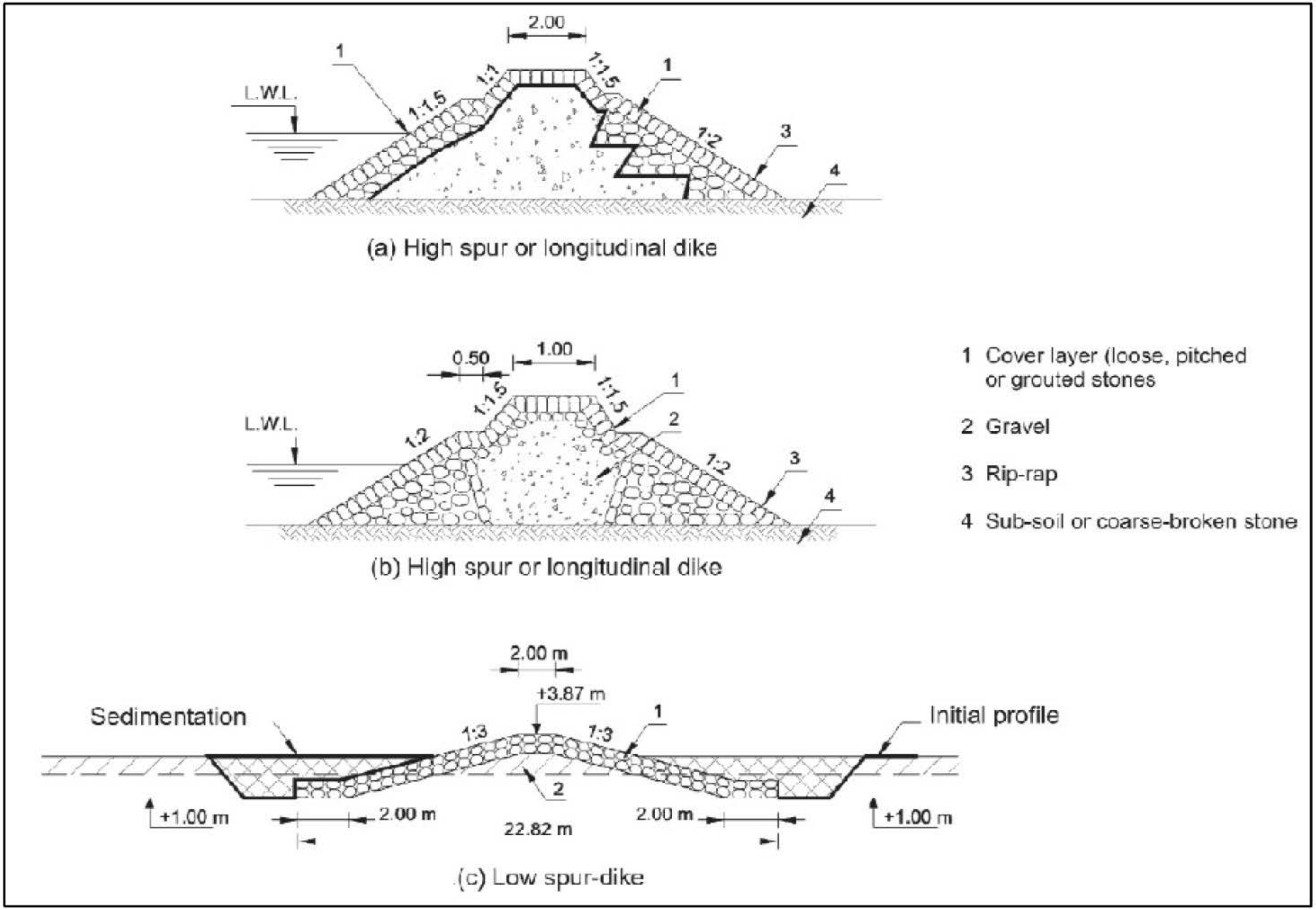

Figure 8: River training structure typical cross sections (source: CIRIA C683)

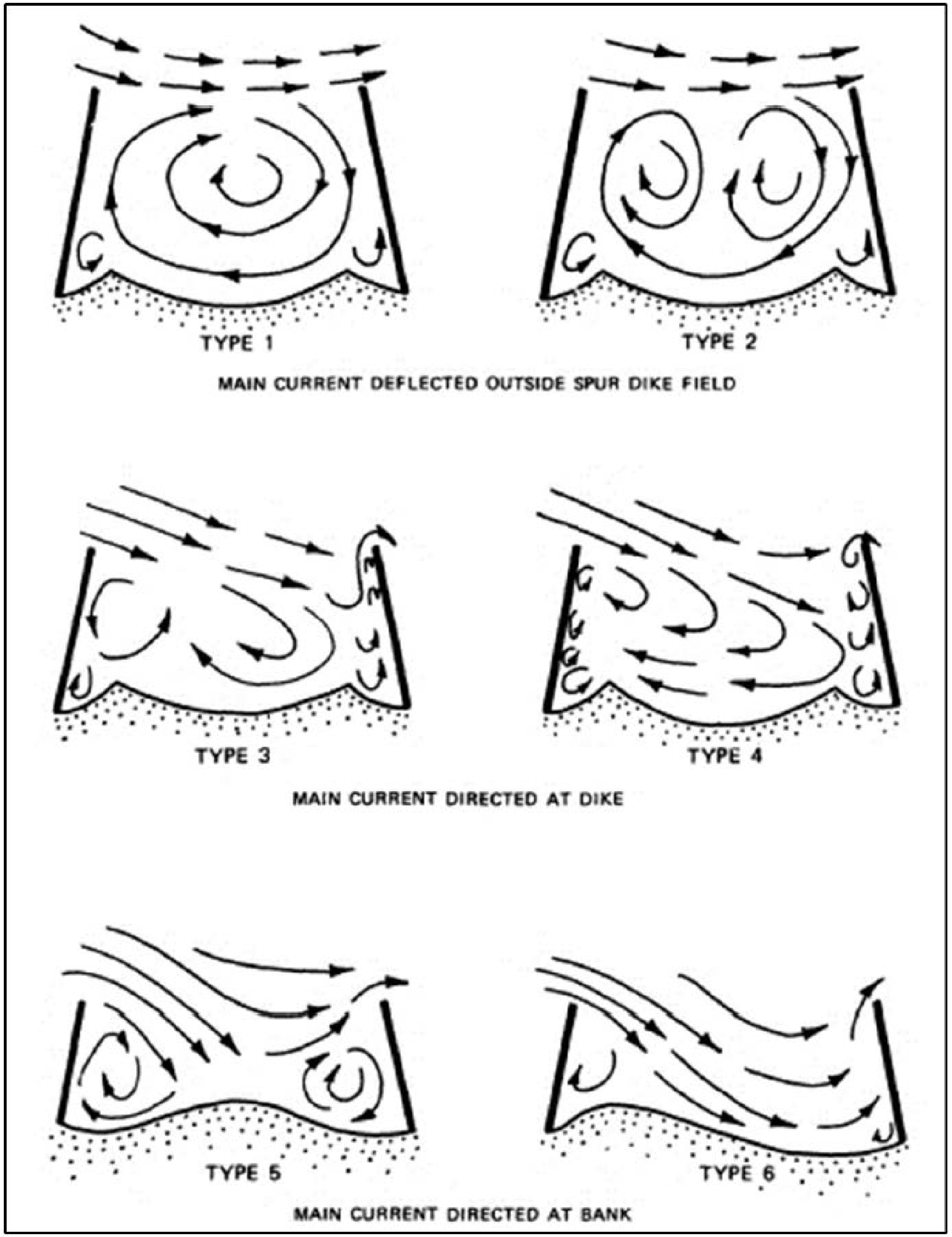

Figure 6: Flow patterns between dikes (source: Bank protection techniques using spur dikes)

Pilot project Witzelsdorf – all construction from river

Island building, Wachau, River Danube
(source: Life Nature Wachau, 2008)

Island building, Bonners Ferry Island project
(source: Lower Meander Project Design Report, RDG 2017)

Cutter suction dredging

Causeway construction

Core material

Options for sourcing the main core of a new island are:

- Dredged from the river channel: Sand and gravel dredged from the adjacent river bed using a cutter suction dredger and pumped directly onto existing sand bars. Some sand maybe swept downstream by the current during placement – construction should take place during low flow periods. Large earth moving equipment will be used to shape the island as required.

  This option requires a large quantity of material to be removed from the river bed and this could include a significant overdig of the fairway to ensure long term navigation improvements. Cutter suction dredging would not be suitable if the river bed is formed from cohesive material or rock. If necessary a sand filled bag/tube or rock containment bund could be placed around the perimeter of the island to provide tranquil conditions inside for depositing dredged material

- Borrow pit: Rock or earth will be excavated from a nearby landside borrow pit, transported to the river then along a causeway to the proposed island location and tipped in place. Large earth moving equipment will be used to shape the island as required

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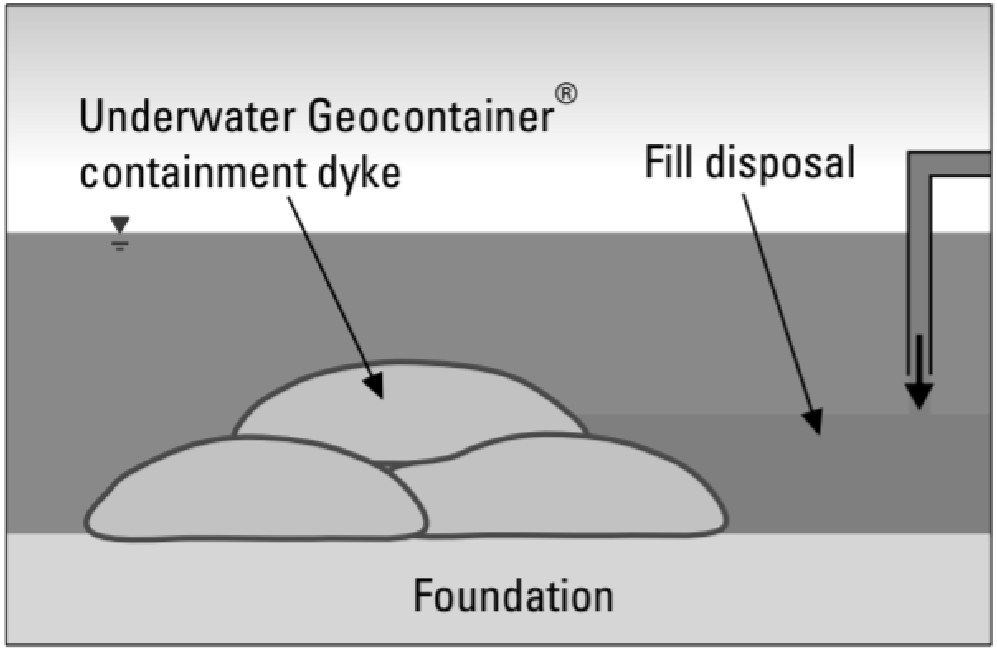
Geosynthetic tubes (geo-tubes)

Example of construction option using sand filled geosynthetic tubes for initial building of islands, dikes, groynes and chevrons:
https://www.rhmooreassociates.com/images/pdf/Geotube-BRO_CoastalAndMarine_tcm28-43898.pdf



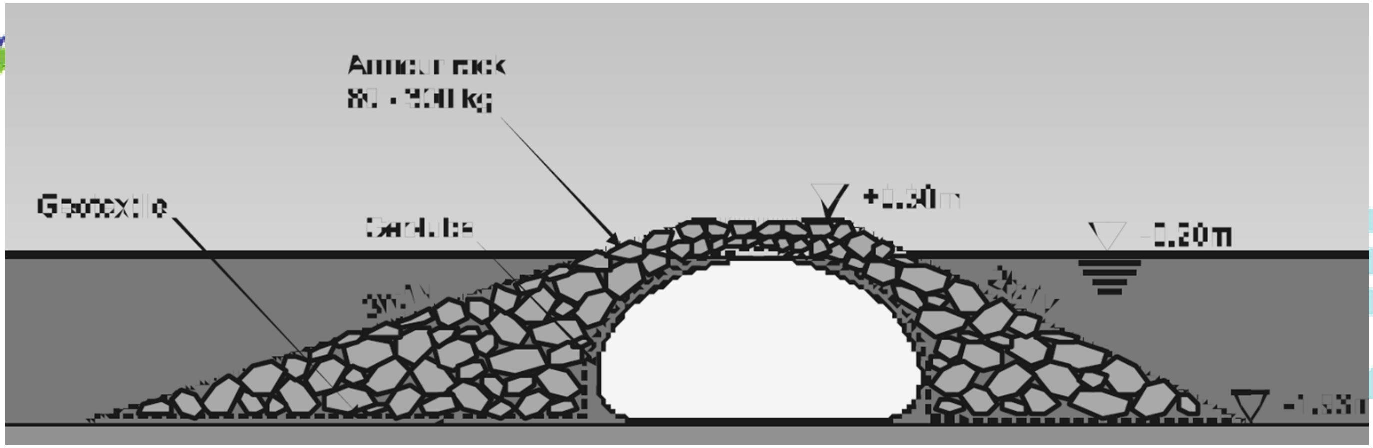
Underwater Geocontainer® containment dyke

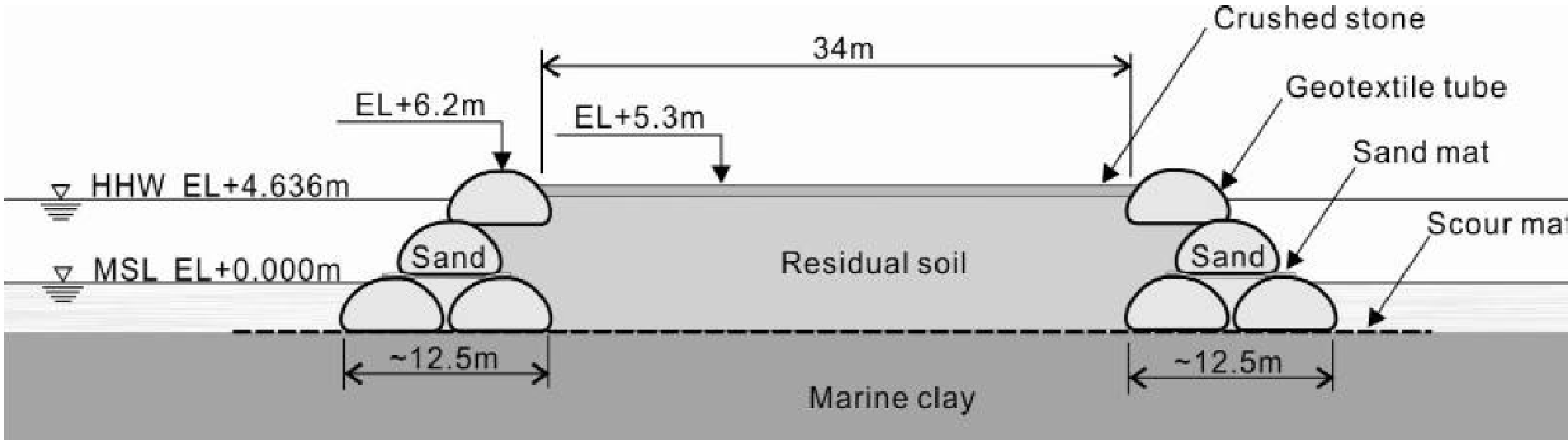
- Geobag system; 2 till 10 m³
- Geotube® system; 100 tot 750 m³
- Geocontainer® system; 100 tot 600 m³

Geosystems are sand filled elements made out of woven high strength textiles. The textiles used are special designed for Geosystems with the same strength in both directions.

In some instances, underwater containment dykes are constructed to retain spoil and other fills in an environmentally acceptable manner.


DREDGE AMERICA
www.dredgeamerica.com





Crushed stone
34m
Geotextile tube
EL+6.2m
EL+5.3m
Sand mat
HHW EL+4.636m
Scour mat
Sand
Sand
MSL EL+0.000m
Residual soil
~12.5m
~12.5m
Marine clay

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Geotube® system

- Will be filled on position.
- Filling hydraulically with a mixture of sand and water.
- Lengths vary between 30 till 100 meter.
- Diameter vary between 1,6 till 5 meter diameter.
- In relative short period a dam can be constructed.
- Essential is fabric strength and confection, seam strength.

diameter	circum	height	fill	width max	width base	recommended high strength fabric
D	C	H	F	W	Wb	
m	m	m	m3/m1	m	m	
1,60	5,0	1,0	1,7	2,0	1,7	GT 750 M
2,50	7,9	1,5	4,1	3,2	2,7	GT 750 M
3,25	10,2	2,0	6,9	4,2	3,5	GT 1000 M
4,00	12,6	2,4	10,4	5,1	4,3	GT 1000 M
5,00	15,7	2,7	16,3	6,4	6,0	GT 1000 M

Teignbridge
DISTRICT COUNCIL
South Devon

bmmjv
bam nuttall
MOTT MACDONALD

Environment Agency

Dawlish Warren Beach Management Scheme

September 2017

Project update

A total length of 460m of GeoTube defence

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Geotube

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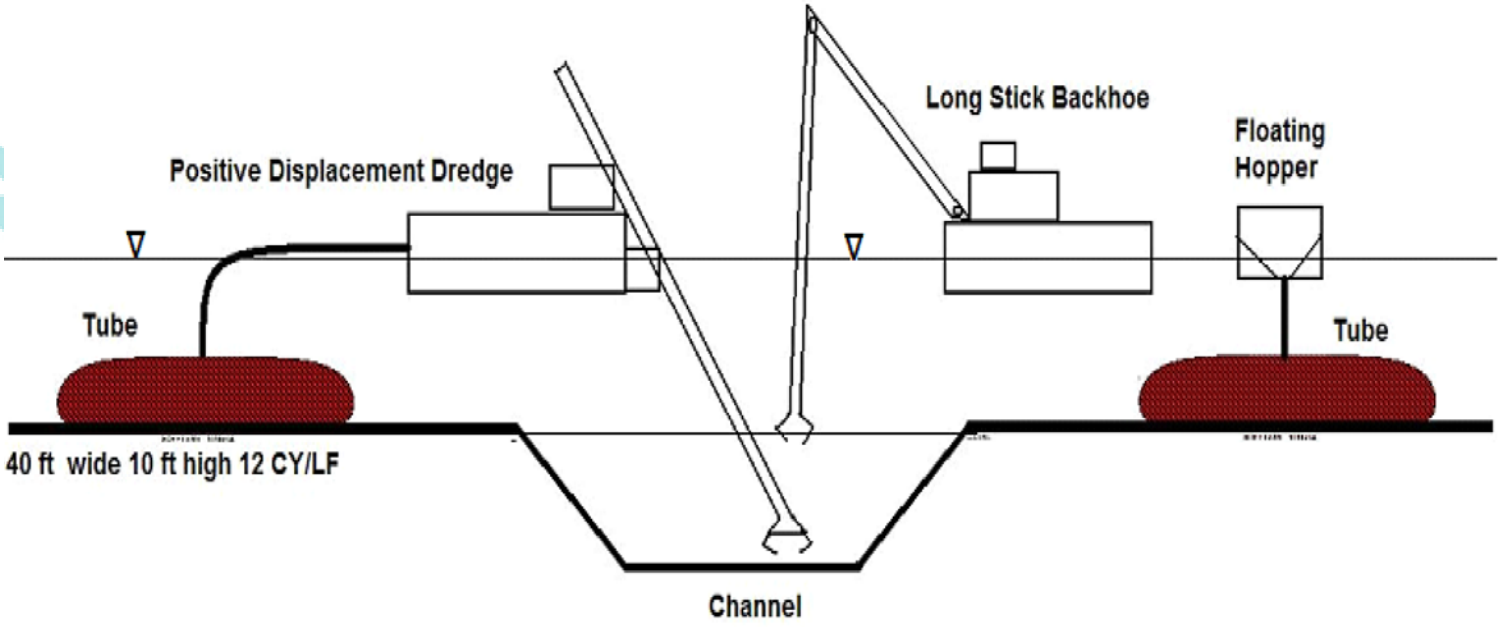
Filling Tubes Underwater



Installation/filling time

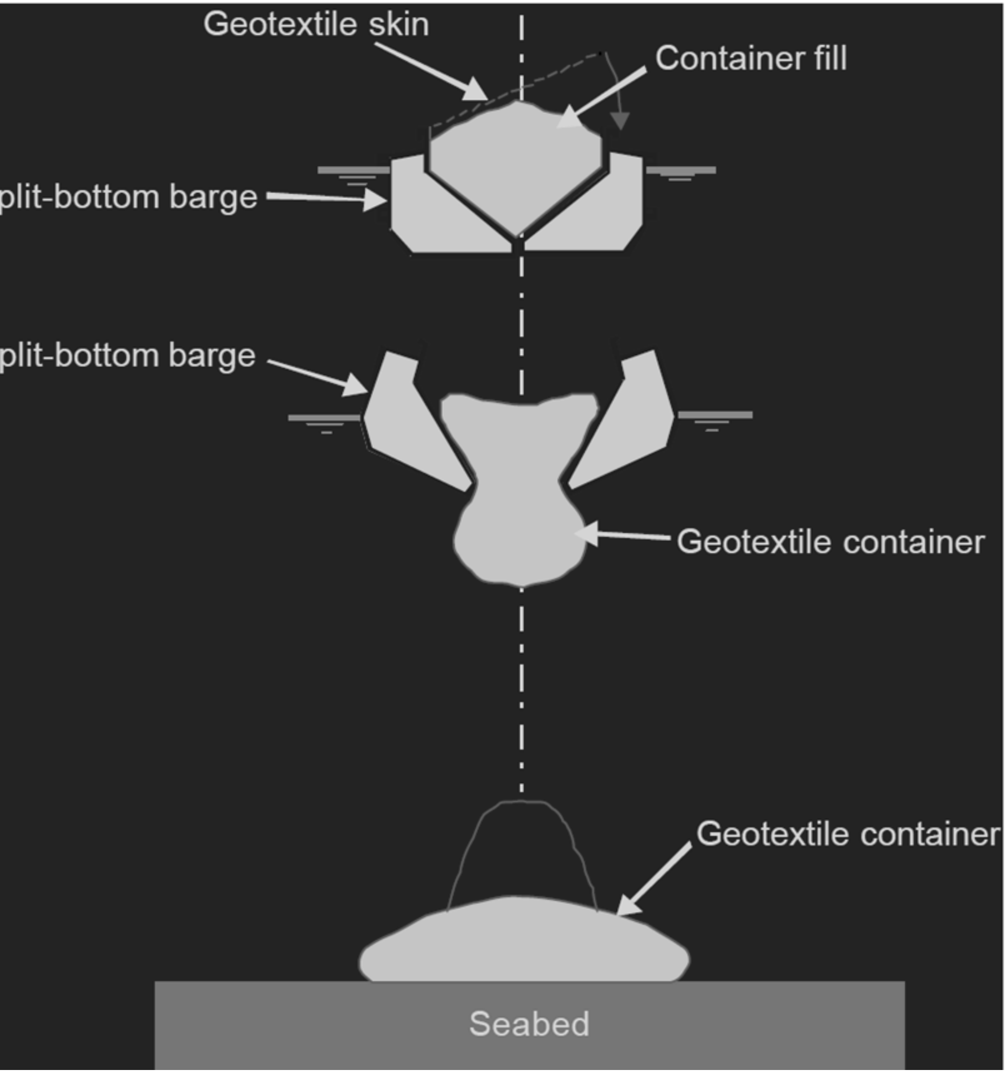
Giving: Geotube® diameter 4 meter
fillingheigth 2,4 meter, length 50 meters.

Total volume to be filled with 50 x 10,4 = 520 m3

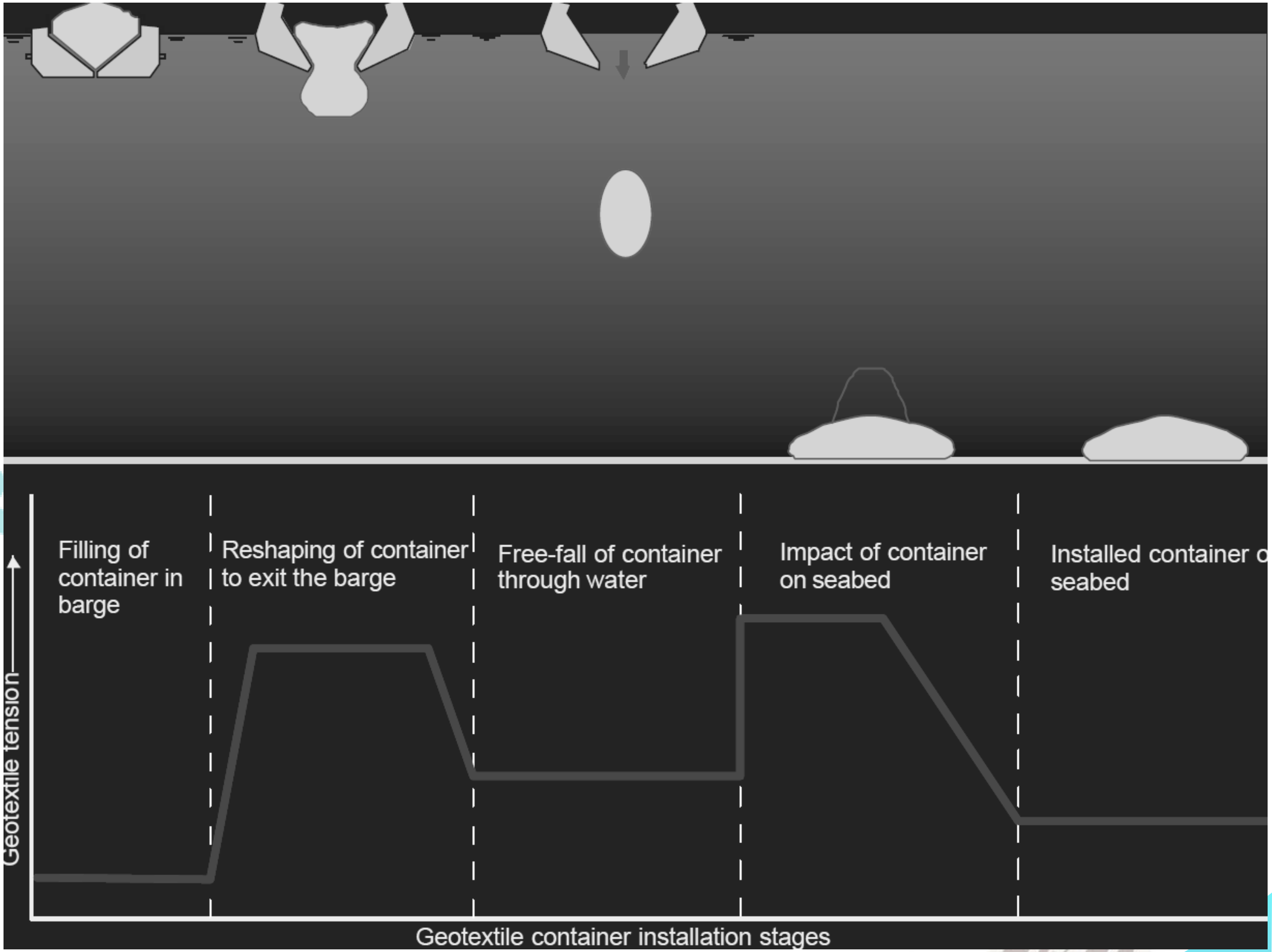
pumpcapacity 400 m3/hour at 15 % mixture (60 m3/hour)

It will take around 520/60= 9 hours to fill the Geotube®.

Geocontainer® system



- Geocontainer® are installed by split-bottom barges
- Two types of applications:
  - Structural, submarine, mass-gravity units
  - Contained, submarine disposal of contaminated sediments
- For hydraulic applications container volumes are in range 100 to 600 m^3
  - Smaller volumes give better installed tolerances and are more easily installed but are more costly



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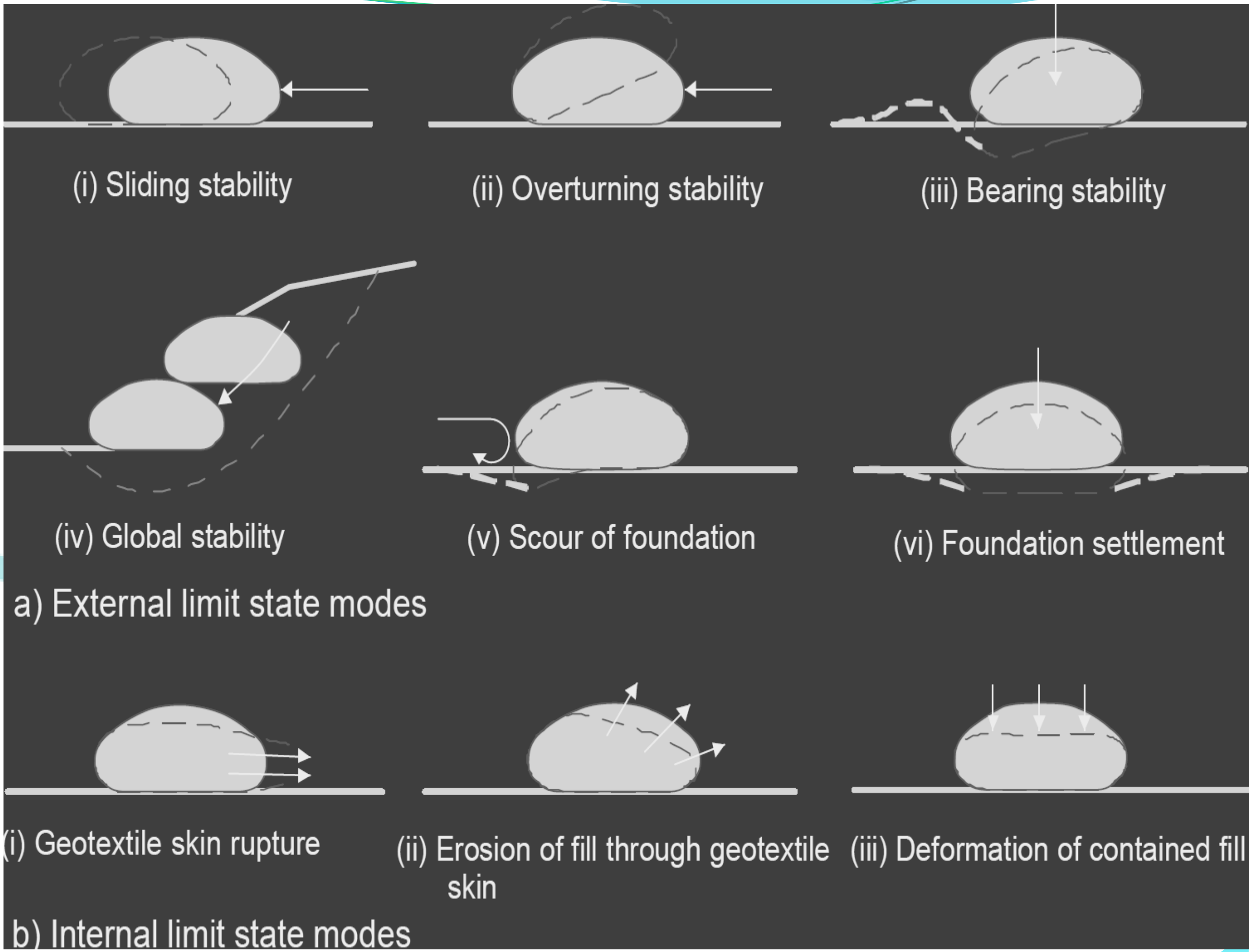

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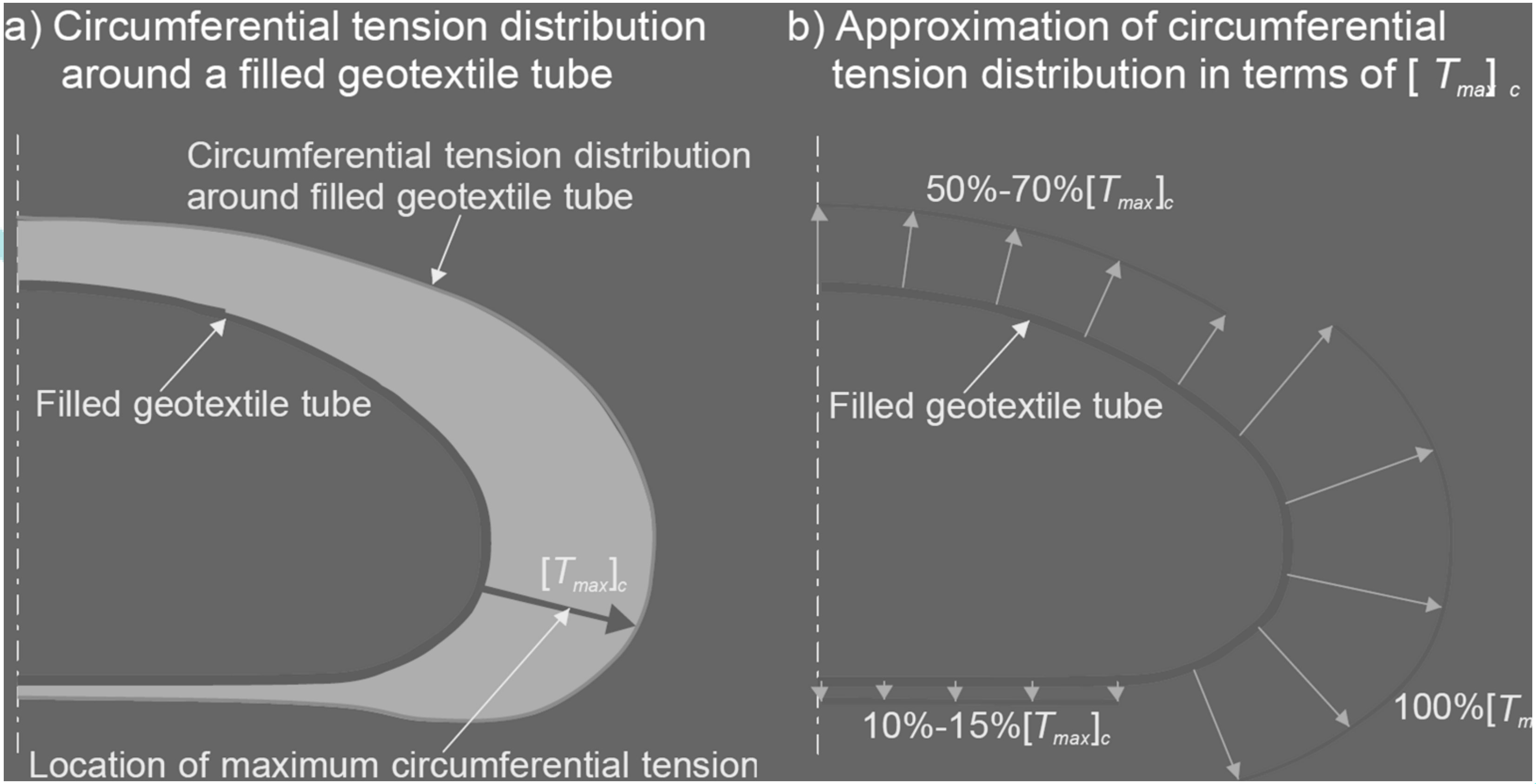

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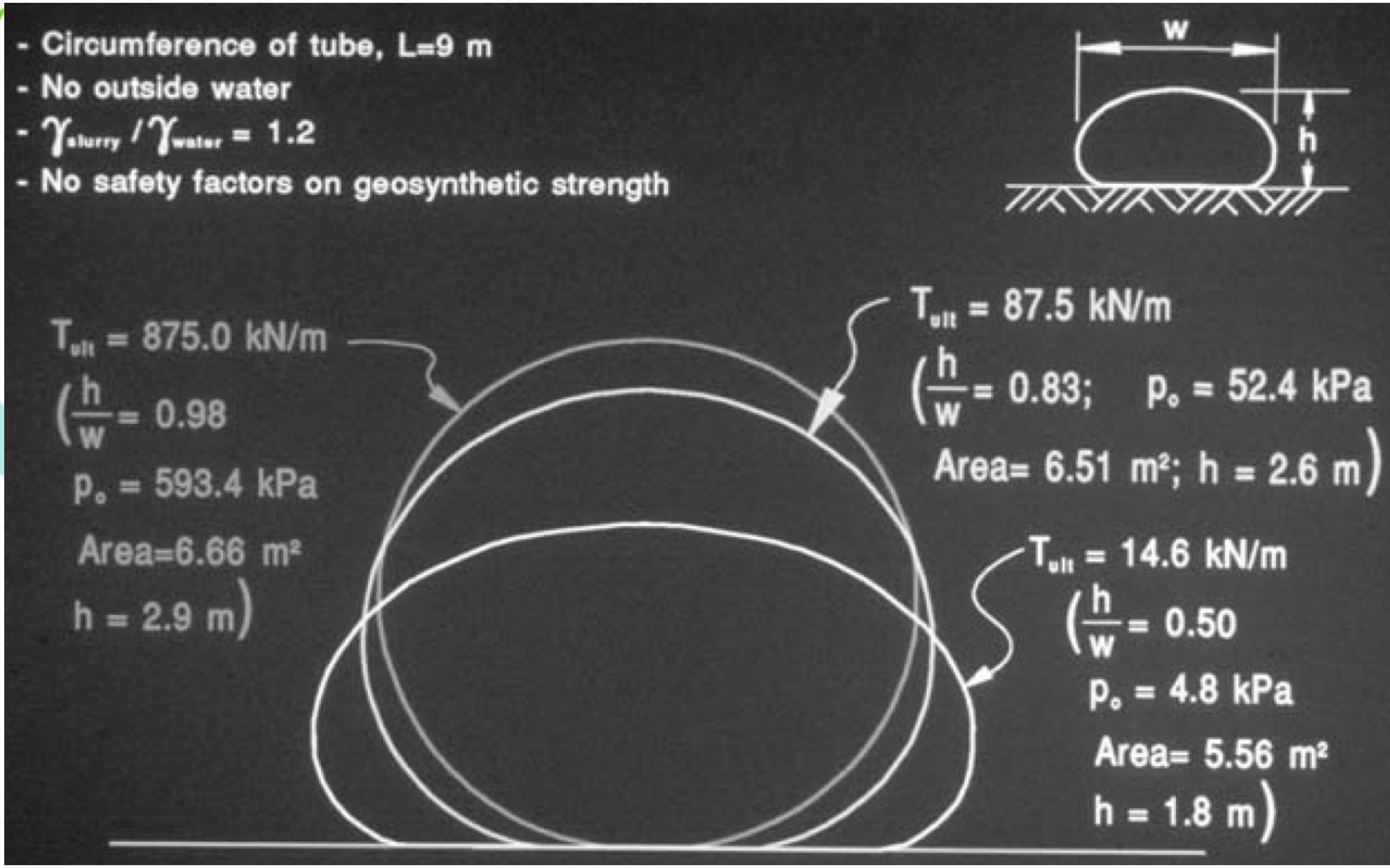

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