DGIS/DANIDA FAP-5B GOB

MINISTRY OF WATER RESOURCES

BANGLADESH WATER DEVELOPMENT BOARD

MEGHNA ESTUARY STUDY

TECHNICAL NOTE MES-020

INSTALLATION OF HAIM CHAR EROSION CONTROL PROJECT

August 1998

DHV CONSULTANTS BV

in association with

KAMPSAX INTERNATIONAL
DANISH HYDRAULIC INSTITUTE

DEVELOPMENT DESIGN CONSULTANTS
SURFACE WATER MODELLING CENTRE
AQUA CONSULTANTS AND ASS. LTD.

DGIS/DANIDA GOB

MINISTRY OF WATER RESOURCES

BANGLADESH WATER DEVELOPMENT BOARD

MEGHNA ESTUARY STUDY

TECHNICAL NOTE MES-020

INSTALLATION OF HAIM CHAR EROSION CONTROL PROJECT

August 1998

DHV CONSULTANTS BV

in association with

KAMPSAX INTERNATIONAL
DANISH HYDRAULIC INSTITUTE

DEVELOPMENT DESIGN CONSULTANTS
SURFACE WATER MODELLING CENTRE
AQUA CONSULTANTS AND ASS. LTD.

Technical Note on:

INSTALLATION REPORT
HAIM CHAR EROSION CONTROL PILOT SCHEME

Dhaka, June 1998

Project Name	:	Meghna Estuary Study (MES)
Location	:	Meghna River, 20 km south of Chandpur
Key words	:	Installation techniques open spurs Installation techniques under water screen Description of activities and timing Evaluation installation methodology

Evaluation of the pilot scheme

Twin Hull pontoon (THP)

The lifting boom has not been used during the installation of screens and spurs. It is advised to remove it together with the 3 tons winches.

The lifting hooks on top of the I-beams are in the wrong position. The should be paced such that they are directly below the tackle blocks attached the THP's lifting frame.

Steel wires should be used as anchor wire of the THP as manilla rope proved to wear quickly and eventually break.

A small easy to maneuver tugboat is essential for smooth handling of the THP. Winch facilities on this tugboat would also speed up the process of repositioning the THP anchors.

The 5 ton winches used to lift the anchors and caisson is relatively slow in operation. Presently there seems to some problems with the safety catch of the winches, especially during lowering of the screen anchors. It is advised to have the winches revised.

Screens

One of the I-beams collapsed during lifting of 4 screen anchors at a time. The I-beams have therefore not been used any more for lifting of screen anchors, reducing the installation capacity of the THP to 1 screen at a time. To increase installation speed it is recommended to re-analyze the installation procedure in order to place 2 screens at a time. It might be necessary to strengthen the existing I-beams or design a totally new frame work.

When installing screens at low water spring, the top of screens previously placed might only barely be submerged. Care should be taken when positioning the small pontoon with the screen anchors, that the tugboat does not damage the previous installed screens.

Spurs

The location of the spurs has to be well marked, as during monsoon high tides the spurs will be completely submerged and will be a unseen obstacle for passing ships.

All seams of the geobags should been sewn by skilled cobblers.

Having lifted the side panels of the caisson with the I-beams and having assembled the caisson, the bottom part of the panels was still sticking in the water. This hampered the positioning of the geotextile mattress under the caisson. By cutting of all bamboo poles sticking out beyond the bullah frame and reducing the height of the panels to 5.7 meter, the caisson could be lifted fully out of the water.

Before placing the geotextile mattresses and ProFix on the bank, the bank profile generally has to be re-shaped. It is advised to compact the reshaped profile to prevent instability of the riverbank after installation of the protection.

Monday 30-3

Main activity: Preparing geotextile 1B on shore (bamboo's fixed), figure 3.2 and 3.16

Waterboard Chandpur: Rent of a self propelled pontoon, meant for transport of concrete anchors, not possible due to a insurance problem.
In the evening we studied the results of the soundings done at the proposed installation site. We planned to place two full caissons, 8 - 20 and 20 - 32 meter from the shore. However, the slope in the area 20 -32 meter was to steep and not flat enough for the caisson. The caisson should damage when filling it with gunny bags. Therefore we canceled this caisson.

Time	Duration	Action	Comments / Tide
3.30			0.85 m: Low water slack
7.30			2.07 m: High water slack
8.00	8 h	Geotextile prepared on shore.	Bamboo's fixed
8.00	8 h	Gunny bags filled.	
15.45			0.85 m: Low water slack
19.45			2.07 m: High water slack

Tuesday 31-3

Main activity: Lifting a panel in THP.

The planning of this day was to lift the anchors from the auxiliary pontoon with the boom on the THP and place them already on the riverbed. Because we needed this pontoon for transport of the anchors from Khorki to Haimchar. However maneuvering with the pontoon and the tugboat went so difficult and took so much time that we canceled the operation. Therefore we decided to use the largest fisherman anchors instead of the concrete anchors for the geotextile under the caisson.
In the afternoon we lifted for trial a panel in the THP.
After this we placed the anchors of the THP with the engine boat and marked them with buoys.

Time	Duration	Action	Comments / Tide
4.15			0.88: Low water slack
8.15			1.99: High water slack
8.00	2 h	Tried to unload auxiliary pontoon.	
14.00	1 h	Panel lifted in THP.	Trial
15.00	2 h	THP anchors placed and marked with buoys.	
16.30			0.81: Low water slack
20.30			2.05: High water slack

Wednesday 1-4

Main activity: Lifting panels in THP and assembling caisson 1B.

During high water slack we moved the THP with his anchor winches to the correct position. This moving lasted about an hour. Then we lifted the panels in the THP and assembled the caisson.
We made the connections first with ropes and after that with bolts.
The labor didn't use pulleys to pull the panels together in spite of our explanation.

Time	Duration	Action	Comments / Tide
5.00			0.88 m: Low water slack
9.00			1.86 m: High water slack
9.00	1 h	THP positioned.	
10.00	1 h	Panels lifted.	
11.00	4 h	**Assembling of caisson 1B.**	
16.00	5 h	Bolt-connections.	50% completed.
17.00			0.82 m: Low water slack
21.15			1.93 m: High water slack

Thursday 2-4

Main activity: Installation of caisson 1B, installation of geotextile 1C, figure 3.16.

During rising tide we rolled the geotextile mattress in the water, pulled it before the caisson and unrolled the geotextile under the caisson.
Although we lifted the caisson as much as possible, we couldn't lift it completely out of the water. It was very difficult, therefore, to pull the geotextile under the caisson and stretch it. So the height of the next panels have to be 5.7 in stead of 6 meter.

There are only bamboo's sewed on the middle part of the geotextile 1B, meant for spreading the weight of the caisson. We folded the edges on this middle part. Once unrolled under the caisson, we had to pull this edges aside to fix the bamboo's to the caisson. At that time the current pulled a part of the upstream edge under the middle part. It was rather difficult to pull it back, so we have to be aware of it.
During lowering of the caisson the back part (a full caisson consists of two panels of 6 meter wide) turned a little, most probably because of the irregularity of the riverbed.

We placed after that the geotextile 1C on the shore and fixed geobags on it. Then we started building the gunny bag dam and filling the caisson spur with gunny bags. It proved to be difficult to walk on the geotextile on the slope so we made a steps of gunny bags.

Time	Duration	Action	Comments / Tide
5.45			0.89 m: Low water slack
7.00	3 h	Geotextile 1B pulled under the caisson.	
10.00			1.70 m: High water slack
10.00	4 h	**Installation of caisson 1B and geotextile anchors fixed.**	
14.00	1 h	**Installation of geotextile 1C.**	
17.45			0.84 m: Low water slack
22.30			1.77 m: High water slack

Friday 3-4

Main activity: Installation of geotextile 1A, figure 3.16.

We moved first the THP with his anchors in front of the caisson spur and brought the geotextile in the THP. This time we planned to stretch the edges from the geotextile by pulling on the anchor ropes with bamboo's while people stand on deck of the THP. The first time the divers stretched the geotextile, but that was difficult because of the soft riverbed. So we pulled first the anchor ropes along the bottom of the THP and fixed bamboo's to them. Then we lowered the middle part of the geotextile with the I-beams and dumped gunny bags upon it. And after that we stretched the edges and fixed anchors and geobags to it. When the tide turned we did the other edge.

Time	Duration	Action	Comments / Tide
6.45			0.91 m: Low water slack
7.00	1 h	THP moved.	
8.00	2 h	Geotextile brought in THP.	
10.00	1 h	Bamboo's to stretch the geotextile fixed.	
11.00	30 min	**Installation of geotextile 1A.**	
11.15			1.52 m: High water slack
11.30	4 h	Edges stretched, anchors and geobags fixed.	
18.30			0.85 m: Low water slack
23.45			1.61 m: High water slack

Tuesday 7-4

This day there was a storm (north-west) in Haimchar. Because of this storm the caisson spur deformed more, like leaning ahead. The storm attacked especially the gunny bag dam just behind the caisson spur at the north side. Also a lot of gunny bags all around washed out.

Friday 17-4

Main activity: Installation of geotextile 2A, figure 3.2, 3.12 until 3.15, 3.17.

This morning we prepared everything for placing the outer geotextile 2A. However, when the diver checked the riverbed he found great heaps of bricks of old gabions. Some of them were about a meter high. These gabions and the remains of steel wire would certainly damage the geotextile. We decided not to place the geotextile also because the bricks would give some protection to the spur.
About 18.00 a storm came. This kind of storms people call a "Norwester". The anchors of the THP dragged and after the storm the pontoon lay on the shore. This time there appeared a real gap in caisson spur 1. The width of the gunny bag dam decreased half a meter, at the same point as during the previous storm. Further we lost about 200 gunny bags that laid on the rafts.

Time	Duration	Action	Comments / Tide
7.30	3 h	Geotextile prepared on shore (bamboo's fixed).	
	1 h	THP positioned for placing geotextile 2a.	
9.00	1 h	Gunny bags laid ready on THP.	
9.15	3 h	Geotextile anchors placed.	
9.30			1.87 m: High water slack.
11.30	30 min	Geotextile floated in THP.	
12.00	30 min	Anchor wires fixed to geotextile.	
15.00	30 min	Bottom checked for gabions by diver.	
15.30	1 h	**Installation of geotextile 2A.**	**Canceled due to gabions**
17.15			0.96 m: Low water slack.
18.00			**Norwester.**
21.45			2.04 m: High water slack.

Saturday 18-4

Main activity: Lifting panels in THP and assembling of caisson 2B, figure 3.7 and 3.8.

We used the high tide about 9.00 for pulling the THP from the shore. Lifting of the THP-anchors took much time and about seven peoples pulling on the engine boat. It was also difficult to find people for it.
Maybe concrete anchor bases could be used. There are enough of them, their grip is better and the are heavier. These anchors could be placed with the auxiliary pontoon and the crane and left behind after use.
Floating the panels in the THP was difficult. The THP was positioned far from the shore (part 2B of the caisson spur) and the current was strong.
We shortened the out sticking bamboo's at the top of the caisson and lifted the caisson as much as possible to make floating the geotextile under it easier.
We agreed at the end of the day with the contractor he would finish connecting the panels before the next day. However the next day it was not completed because of to much wind during the night.

Time	Duration	Action	Comments / Tide
6.00			6.00 m: Low water slack.
6.30	2.5 h	Two anchors of the THP lifted.	
8.30	8 h	Filling gunny bags.	
9.00	1.5 h	THP positioned.	
	1.5 h	Panels pulled in the water.	
10.15			1.80 m: High water slack.
10.30	1 h	THP-anchor moved.	
11.30	1 h	Panels floated in THP.	Difficult due to current
12.30	1 h	Panels lifted.	1st 15 min, 2nd 45 min
14.45	2 h	**Caisson 2B assembled.**	Out sticking bamboo's shortened
16.30	1.5 h	Panels drilled.	
18.00			0.97 m: Low water slack.
22.30			1.97 m: High water slack.

Sunday 19-4

Main activity: Installation of caisson 2B, figure 3.9 until 3.11.

Depth soundings were made around caisson spur 1.
After floating the geotextile in the THP it proved to be easier to fix the upstream edge on deck of the THP in stead of folding it next to the caisson (fig 3.9). Pulling the upper ends of the panels in position went faster using ropes in stead of chain-tackles. When chain-tackles are used they have to be connected with extending-ropes. Using winches is also not preferable because their operation is very slow.
During floating the geotextile under the caisson in the THP, the end folded under the geotextile but with a rope around a caisson-bullah, we could pull it back easily.
The divers fixed most geotextile anchors in old gabions or trees on the riverbed, because this way they couldn't be lifted by the winches (fig. 3.9). They fixed the other anchors behind bamboo's which they placed in the riverbed.

Time	Duration	Action	Comments / Tide
6.45			1.02 m: Low water slack.
8.00	3 h	Connecting upper end of panels and diagonals.	25% completed
9.30	2 h	Gunny bags laid ready on THP.	
9.45	1 h	Geotextile pulled under caisson.	
10.45	30 min	Geotextile fixed to caisson.	
	45 min	Anchor wires fixed.	
11.00	20 min	Extra ropes fixed between panels.	
11.15			1.72 m: High water slack.
11.15	30 min	Panels made heavier with gunny bags.	
	30 min	Edges geotextile pulled out with winches.	
11.45	15 min	**Installation of caisson 2B.**	
12.00	2 h	Caisson ballasted with gunny bags.	
	1 h	Position geotextile checked.	
15.30	3 h	Geotextile anchors and geobags fixed.	
16.30	1.5 h	Panels for caisson 2C shortened to 5.7 m.	
16.45	1.5 h	Upper end of panels drilled.	
19.00			0.99 m: Low water slack.
23.30			1.87 m: High water slack.

Monday 20-4

Main activity: Installation of caisson 2C, figure 3.7 until 3.11.

This morning again a heavy Norwester passed which pushed the THP against caisson 2B. Because of this the north side of the caisson lifted about 10 to 20 centimeter. The anchors of geotextile 2B also moved. When it was possible we pulled the THP from the caisson spur and detached the anchors.
During repositioning after the storm a shore anchor broke and the THP hit again the caisson spur. But the engine boat pushed immediately the THP away so there was no damage.
The divers lifted the anchors from geotextile 2B and placed them for the installation of geotextile 2C. Installation of caisson 2C went smoothly. During evening slack they placed the anchors of geotextile 2B again.

Time	Duration	Action	Comments / Tide
7.45	15 min	Divers prepare for fixing geotextile anchors.	
8.00			1.02 m: Low water slack.
8.00	15 min	**Norwester**	Divers couldn't work.
8.15	30 min	THP repositioned for installation of caisson 2C.	
	1.5 h	Panels lifted in THP.	1st 1 h, 2nd 30 min
	2 h	Geotextile anchors lifted and placed for geotextile 2C.	
8.30	8 h	Filling gunny/geobags.	
9.30	8 h	Preparing slope for geotextile on the shore.	
9.45	2 h	Gunny bags laid ready on THP.	
	30 min	Pulling ropes fixed and panels pulled together.	
10.15	30 min	Bolt-connection lower end made.	
11.30	1 h	Anchor wires connected to geotextile.	
12.00	30 min	Panels made heavier with gunnybags.	
12.30			1.65 m: High water
slack.			
12.45	15 min	**Installation of caisson 2C.**	
	3,5 h	Gunny bags dropped in spur.	
13.00	3,5 h	Anchors and geobags (south side) connected.	
	3,5 h	Geotextile 2D prepared on shore (bamboo's fixed).	
17.30	1 h	THP moved to the shore.	
20.00			1.02 m: Low water slack.

Tuesday 21-4

Main activity: Installation of geotextile 2A, figure 3.12 until 3.14.

Depth soundings were made in the screen area of caisson spur 2.
In the morning the divers checked all edges of the geotextile mattresses. The edges were stretched and a continuous row of geobags is placed along the edges. Today also the pontoon arrived from Khorki with screens and screen anchors.
After a discussion with the teamleader we decided to place geotextile 2A in spite of the gabions. The reason is the strong current at this point.
When we installed geotextile 2A, there was a strong wind and high waves. The lifting frames pushed the geotextile under water but they slipped from bamboo's because of the waves. When the connection with caisson 2B broke and the geotextile floated out of the THP, it almost tangled in the anchor wires of the THP. Therefore we canceled the installation. For safety we moved the THP to the shore.

Time	Duration	Action	Comments / Tide
1.00			1.80 m: High water slack.
7.00	1 h	THP repositioned for geotextile 2A.	
7.30	2 h	Gunny bags laid ready on THP.	
	1 h	Bamboo's on geotextile cut in 3 parts	Because of brick-heaps.
	2 h	Geotextile anchors placed.	
9.15			1.04 m: Low water slack.
14.15			1.67 m: High water slack.
15.00	2 h	**Installation of geotextile 2A.**	**Canceled due to waves**
21.15			1.06 m: Low water slack.

Wednesday 22-4

Main activity: Installation of geotextile 2D, figure 3.12 until 3.14.

Today we pulled 6 concrete beams from the auxiliary pontoon and started sewing them in the screens. In the afternoon we tried to rearrange screen anchors on the auxiliary pontoon with the tripod. It went rather slow: two slabs in 2.5 hour. Installation of geotextile 2D went successfully.

Time	Duration	Action	Comments / Tide
2.45			1.84 m: High water slack.
7.45	1.5 h	THP repositioned for geotextile 2D.	
9.00	8 h	Concrete beams sewed in screens.	
9.15	1 h	Geotextile brought in THP.	
10.30			1.05 m: Low water slack.
10.30	1.5 h	**Installation of geotextile 2D.**	
15.00	2.5 h	Screen anchors on the auxiliary pontoon arranged.	2 slabs
15.45			1.81 m: High water slack.
16.45	30 min	THP moved for placing screens.	
22.30			1.11 m: Low water slack.

Thursday 23-4

Main activity: Installation of screen 1,2,3 and 4, failed.

In the morning we prepared the four screen-anchors complete with geobags on top of them. We connected the chain tackles at the I-beams and placed the slabs on the bases. This went very fast, three slabs in 45 minutes.
We fixed the chain tackles for lifting of the anchors at the end of the I-beams to provide a distance of four meter between them. Then we started lifting. During lifting one of the I-beams bended. This happened because of many forces in the I-beams, in different directions. First the eyes for the hooks on the I-beams were not placed straight under the pullys. Also the chain tackles should have been fixed above the anchors at the I-beam.
In a discussion with the teamleader we decided to place the two screens without the I-beams and the THP pulled in an angle of 45 degrees.
Today we started also to cover the gunny bag dam of caisson spur 1 with geotextile.

Time	Duration	Action	Comments / Tide
4.00			1.97 m: High water slack.
8.00	3 h	Start covering the gunny bag dam of caisson spur 1 with geotextile.	
9.00	45 min	Three anchor slabs placed on bases.	
9.45	2 h	Four bags on screen anchors filled and sewed.	
11.45			1.06 m: Low water slack.
12.00	2 h	**Start lifting screen anchors**	Operation canceled
16.30			2.00 m: High water slack.

Friday 24-4

Main activity: Installation of screen 1 and 2 and geotextile 2E, figure 2.8 - 2.15 and 3.12 - 3.14.

Screen 1 and 2 installed with the new method described above. The first attempt failed because of the difficulty of turning the THP with an angle of 45 degrees. Also a strong wind and high waves made the situation worse. The next try we found out another anchor line had to be loosened. Because we had to turn the THP, it was too difficult to lower the screens with the right orientation. The THP tended also to lay in an angle less than 45 degrees. This had to be corrected this with the engine boat.
Therefore it was decided to place the screens the next days one by one. This way it is possible to assemble the screen in the an angle of 45 degrees (See Figure 2.14). Shifting the THP 5 meter for the next screen proved to be easy.

Time	Duration	Action	Comments / Tide
0.00			1.13 m: Low water slack.
5.00			2.11 m: High water slack.
8.00	30 min	Auxiliary pontoon sailed in THP.	
8.30	1.5 h	Anchors on auxiliary pontoon arranged.	
	2 h	Gunny bag dam of caisson spur 1 covered with geotextile.	
10.30	3 h	**Installation of screen 1 and 2 tried but canceled.**	
11.30	2 h	**Installation of geotextile 2E.**	
12.45			1.07 m: Low water slack.
15.15	1 h	**Installation of screen 1 and 2.**	With help of engine boat.
16.30	30 min	Concrete beams unloaded.	
17.00	2 h	Bags on screen anchors filled and sewed.	
17.15			2.19 m: High water slack.

Saturday 25-4

Main activity: Installation of screen 3 until 6, figure 3.8 until 3.15.
Installation of geotextile 1F.

Everything went as planned today. After installation of geotextile 2F on the shore people started building the gunny bag dam.

Time	Duration	Action	Comments / Tide
1.00			1.13 m: Low water slack.
5.30			2.24 m: High water slack.
8.00	15 min	Auxiliary pontoon placed inside THP.	
8.15	45 min	Screen anchors lifted from pontoon.	
9.00	15 min	Pontoon removed.	
9.15	15 min	Anchors pulled together (5,2 meter).	
9.30	1 h	Screen fixed between anchors (much current).	
10.30	3 h	**Installation of geotextile 2F.**	
10.45	2 h	THP positioned.	
12.45	1.25 h	**Start screen 3, start screen 4: 14.00, start screen 5: 16.00, start screen 6:17.00.**	
13.15			1.09 m: Low water slack.
17.45			2.35 m: High water slack.
18.00	6 h	12 anchors positioned on the auxiliary pontoon.	

Sunday 26-4

Main activity: Installation of screen 7 until 10, figure 8-10.

Time	Duration	Action	Comments / Tide
1.45			1.14 m: Low water slack.
6.00			2.34 m: High water slack.
8.00	4 h	Slabs placed on screen anchors.	
	1.5 h	Screens towed to THP.	
	4 h	Profix sewed and slope prepared.	
	8 h	Gunny bag dam further build.	
14.00			1.11 m: Low water slack.
18.00			2.48 m: High water slack.

	Screen 7	**Screen 8**	**Screen 9**	**Screen 10**
	(13.00-14.30)	(14.30-16.45)	(16.45-17.30)	(18.00-18.50)
Anchors lifted.	30 min	15 min	15 min	10 min
Pontoon rem., anchors lowered.	15 „	15 „	15 „	10 „
Screen and chain tackles fixed.	15 „	15 „	15 „	10 „
THP positioned.	15 „	5 „	15 „	10 „
Screens lowered and detached.	15 „	10 „	15 „	10 „
Total time:	1.5 h	1.25 h	1.25 h	50 min

Monday 27-4

Main activity: Installation of screen 11 and 12.

Installation of screen 11 took about two hour. It took so long because we found again heaps of gabions. We placed this screen east of this gabions.

Time	Duration	Action	Comments / Tide
2.30			1.15 m: Low water slack.
6.30			2.39 m: High water slack.
8.30	2 h	Installed screens marked with bamboo's.	
	8 h	Profix filled.	
	8 h	Gunny bag dam further build.	
	5 h	Slabs placed on screen anchors (4 numbers).	
9.00	1.75 h	THP positioned.	
14.30			1.12 m: Low water slack.
18.30			2.56 m: High water slack.

	Screen 11	Screen 12
	(10.45-12.30)	(12.30-13.40)
Anchors lifted.	30 min	20 min
Pontoon rem,, anchors lowered.	15 „	10 „
Screen and chain tackles fixed.	15 „	15 „
THP positioned.	already done	10 „
Screen lowered and detached.	45 „	15 „
Total time:	1.75 h	1.25 h