

## Beach Nourishment combined with SIC Vertical Drain System in Malaysia.

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### Technology

The sic vertical drain system is used to prevent beach erosion by draining the beach and thus reducing water pressure in the beach. Sand is less likely to wash back to the sea and sediment is readily deposited on the beach.

The beach was drained with the SIC system prior to and after beach nourishment.

### Location

The site is at Teluk Chempedak on the East Coast of Malaysia near the town of Kuantan. Teluk Chempedak is placed in a pocket bay at the east coast of Malaysia.

The beach is placed in front of Hyatt- and Sheraton Hotel and has a total length of 900 metres.



### Construction Activities.

The beach in front of Hyatt- and Sheraton Hotel is pre-drained with the SIC system May to June 2004.

The beach was nourished with 176.000 m<sup>3</sup> sand in June, July 2004

The sand was placed in an equilibrium profile 90 metres wide.

The beach was drained again with the SIC System in July 2004.

### Evaluation.

The evaluation of the project is based on the average beach level ABL from the wall in front of the hotels and 70 metres towards the shoreline and out in the sea as illustrated in fig 1

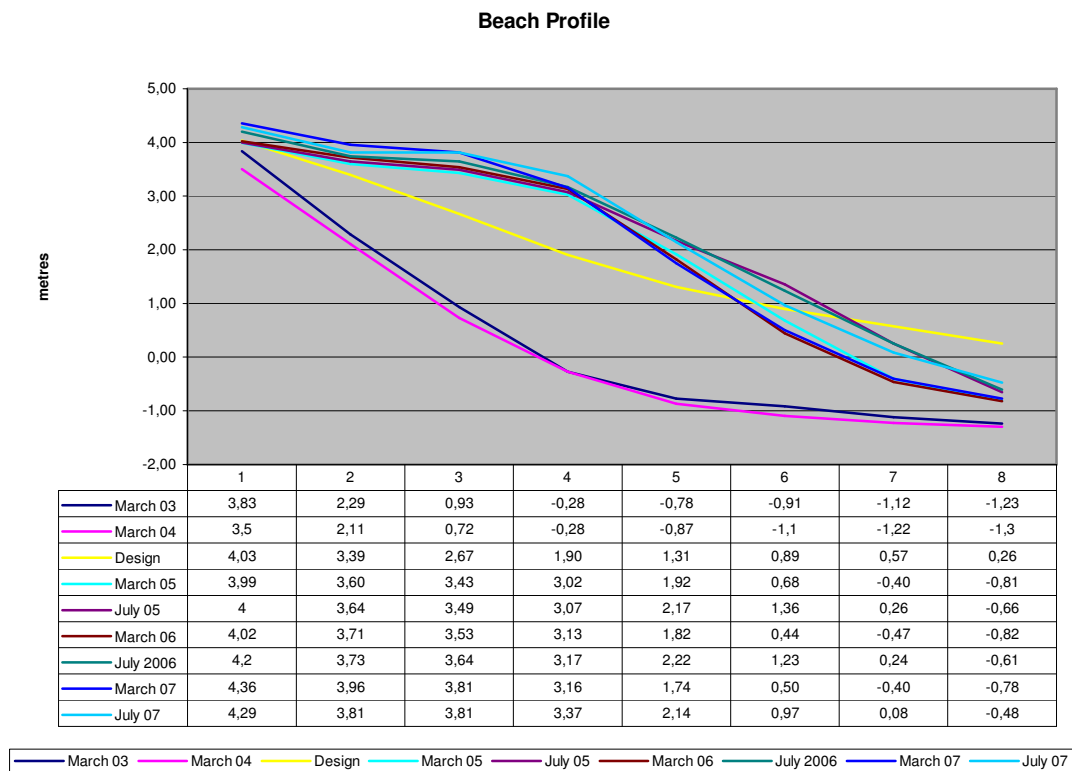


Fig. 1

### Result after 3 years.

We see in fig. 1, that the Beach is higher than the design level in July 2004 (yellow line). The Beach is now convex unlike earlier, where the beach was very low and concave.

The average beach level ABL in a 70 metres wide beach is now stable and over design level, see fig.2

Average Beach Level 70 meters wide

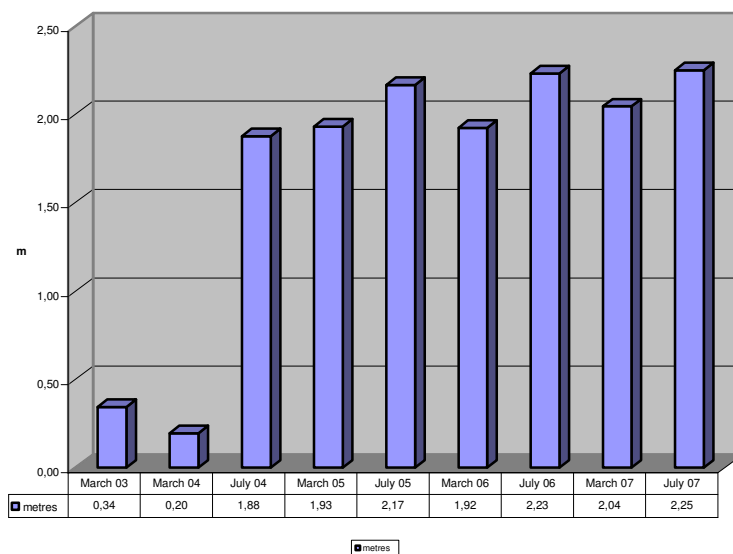


Fig 2

Average Volume per meter

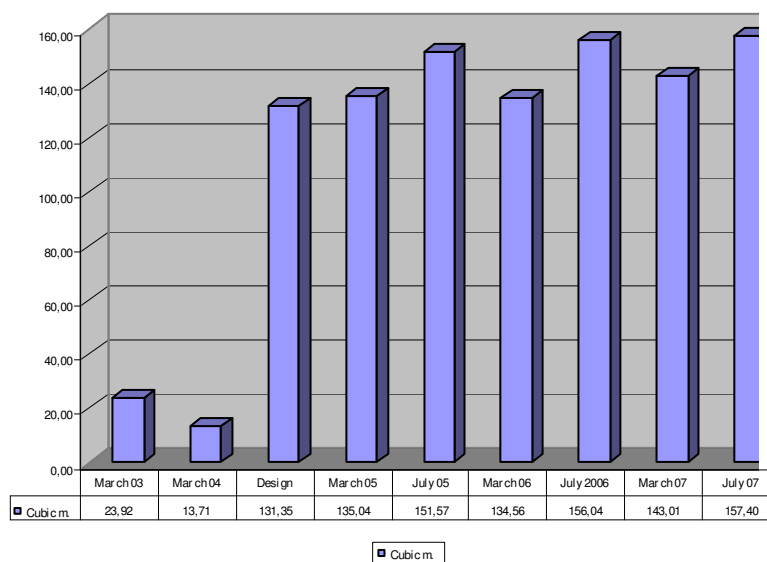


Fig 3

The design for a 70 metres wide beach in July 2004 was ABL 1.88 m and 131 cubic metres per metre, fig. 3. After 2 years the ABL is 2.23 m, and the average volume of sand are 156 cubic metres per metre along the coastline.

### Survey.

The survey is done by a licensed surveyor appointed by MRCB Malaysia on behalf of DID Malaysia.

### Conclusion.

A beach nourishment has normally a life time of 3 years on the east coast of Malaysia, but the field test shows, that the lifetime can be extended, when we combine the nourishment with the SIC vertical drain system.

The Survey for year 3 is finished on the 6 July 2007, and the results will be available in the end of July 2007 and will be reported in the final paper for the conference.

### References.

- Jakobsen, P. *Pressure Equalisation Modules For Environmentally Friendly Coastal Protection .Conference Yamba 2000 Australia.*
- Jakobsen, P. *SIC systemet løsningen på den globale vandstandsstigning. Geologisk Nyt 1/07 Aarhus University page 4 - 8.*
- Jakobsen P. *Trykudligningsmoduler skaber brede ligevægtsprofiler. Geologisk Nyt Aarhus University 1/07 page 10 -17.*
- Jakobsen P. and Brøgger *Environmentally Friendly Coastal protection based on vertical drains.*

