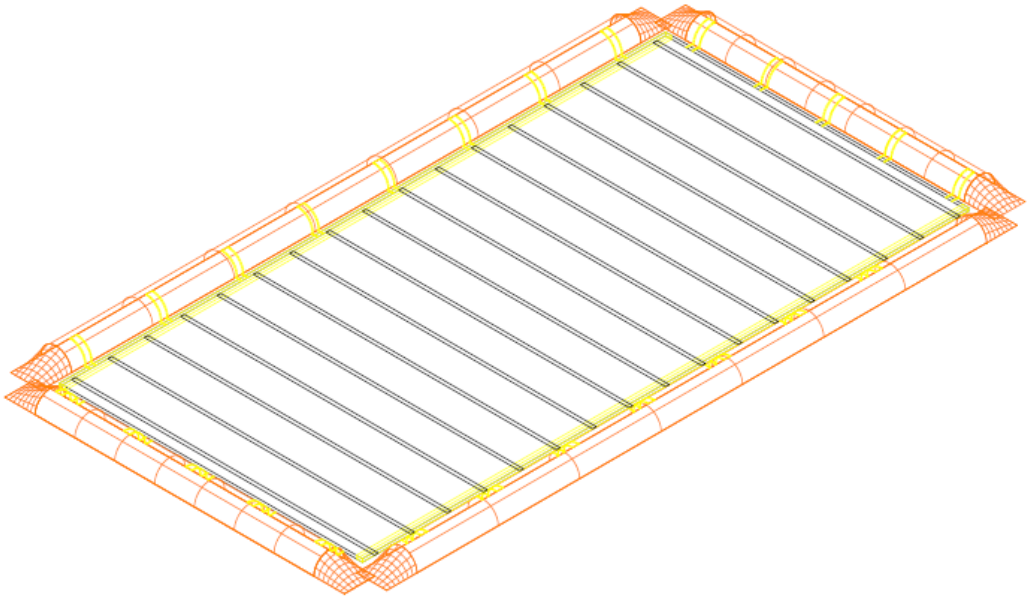
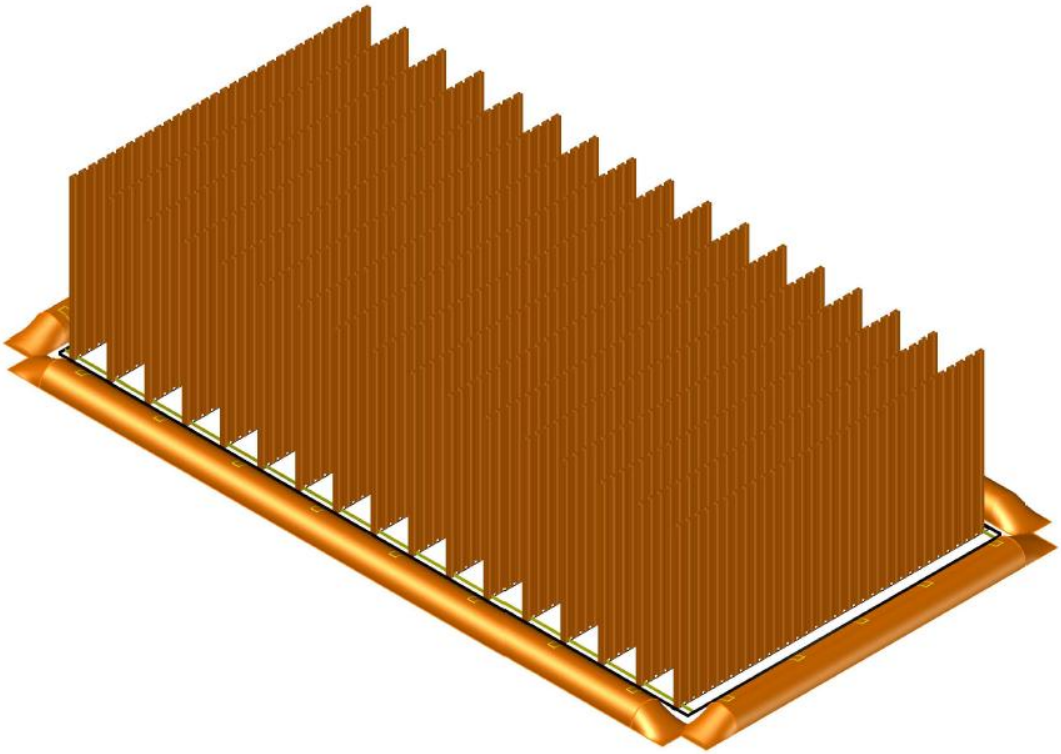
SSCS Weighted Frond Mat Specification and Installation Procedures





Introduction and General Procedures

Seabed Scour Control Systems (SSCS) recommends that a pre-dive meeting be held between the diving supervisor, dive team (if available) and SSCS representative(s) to discuss the installation procedures and work scope prior to deployment.

SSCS Frond Mat deployment requires 2 divers working simultaneously.

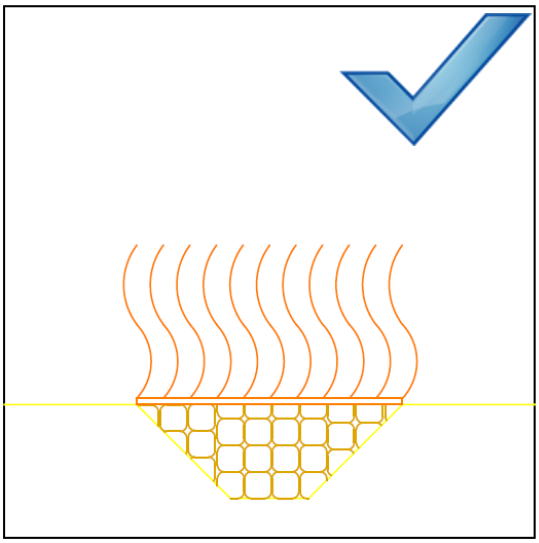
The SSCS Frond Mats will be installed according to the design layout provided by SSCS during the technical proposal stage, and as discussed in the pre-dive meeting.

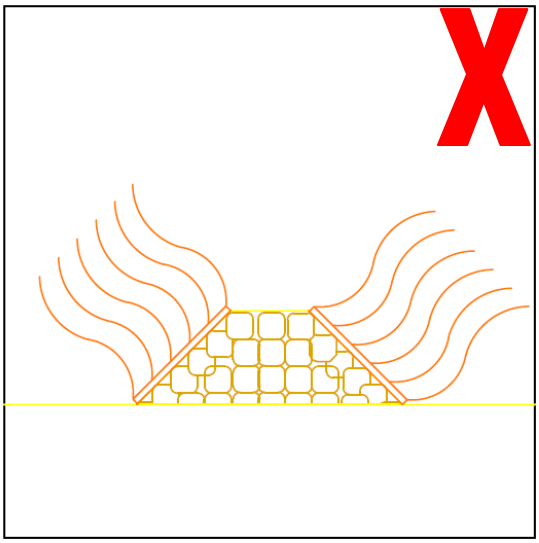
Divers are to test the hydraulic hammer and set the hammer and hydraulic hose before Mat deployment close to the work area on the seabed.

Deck personnel will remove the SSCS Frond Mat polythene protective cover **BEFORE** attaching the crane slings to lower the Mat to the seabed.

DO NOT remove anchor tie wraps or the 6 (six) banding strips that hold the Mat tight. These are marked by white loops).

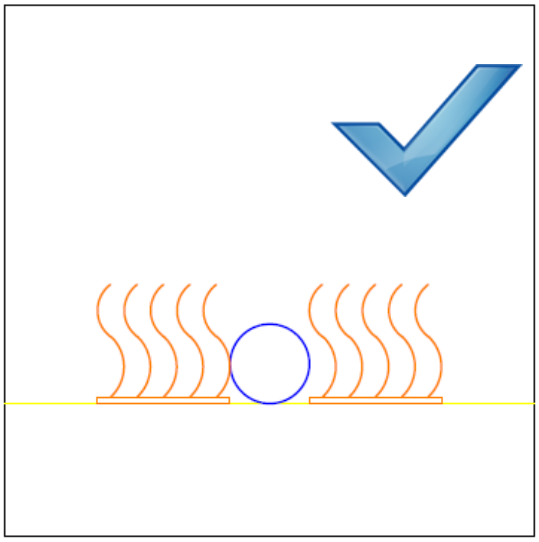
IMPORTANT DO's AND DONT's FOR SSCS FROND MAT DEPLOYMENT

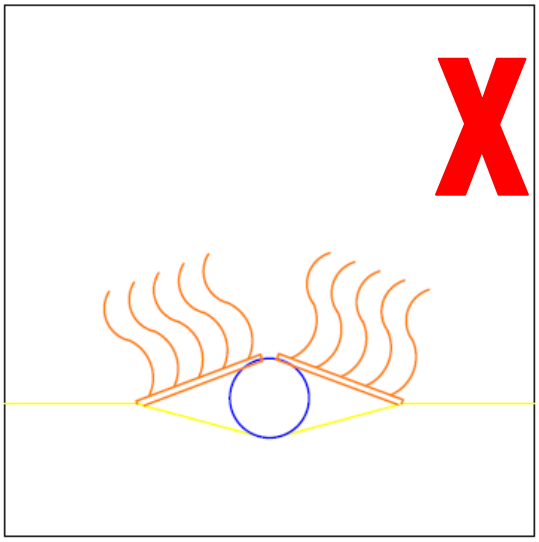




DO: **Place the SSCS Frond Mats FLAT on the seabed and / or FLAT over in-filled scour pits**

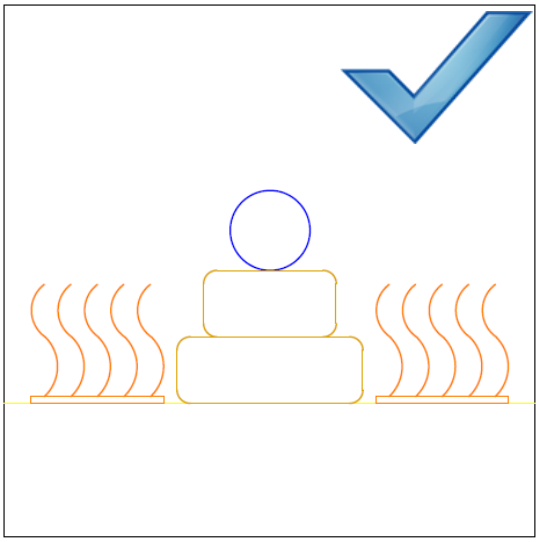
DO NOT: **Place the SSCS frond Mats on an incline / decline**

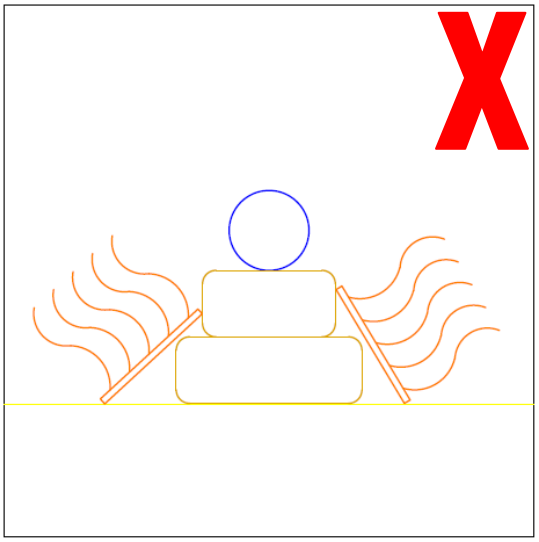




DO: Place the SSCS Frond Mats flat on the seabed along both sides of the pipeline

DO NOT: Place the SSCS Frond Mats over the pipeline





DO: Place the SSCS Frond Mats flat on the seabed around the perimeter of any pipe supports (support construction is irrelevant to Mat placement)

DO NOT: Place the SSCS Frond Mats on / over the supports or on sloping surfaces

SSCS Weighted Frond Mat Specifications

SSCS provides high tensile strength buoyant frond lines on a mat base complete with weighted edges to anchor the Mats in position on the sea/river bed.

All SSCS Mats (anchor retained and edge weighted) have the same continuous and significantly overlapping parallel lines of buoyant fibrillated polypropylene fronds attached to the base mat for the creation of viscous drag.

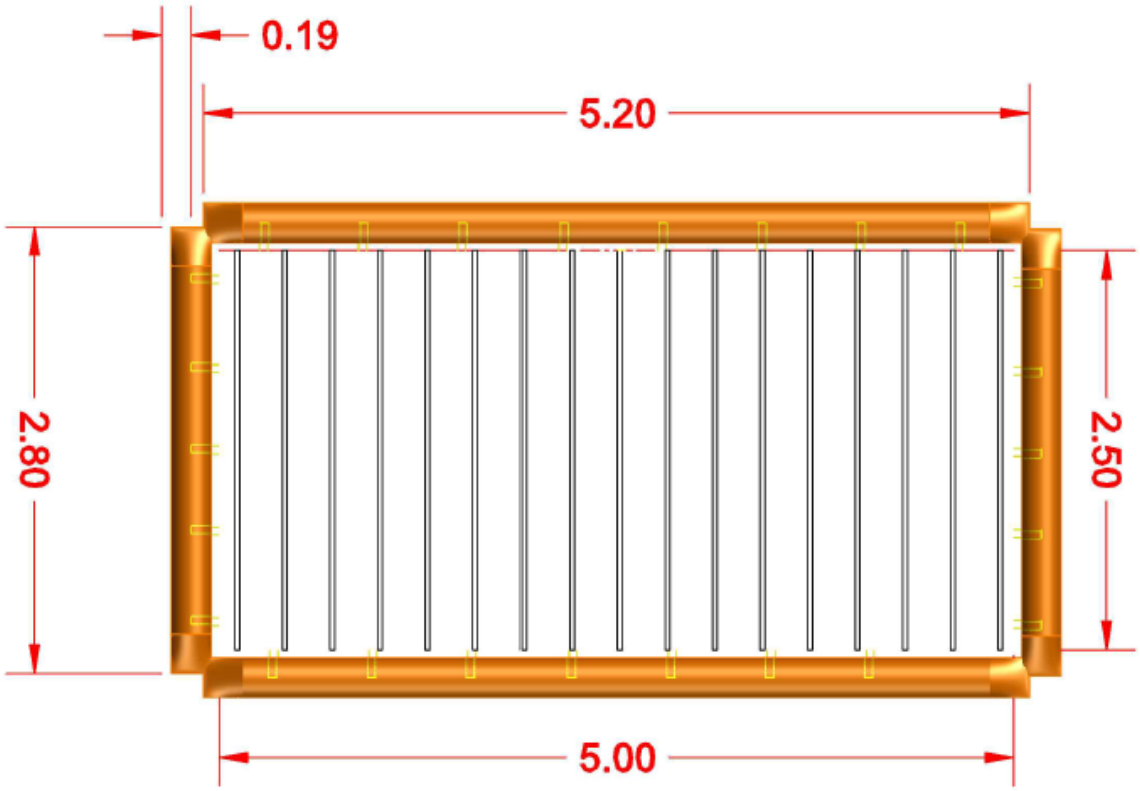
Instant scour protection is combined with the build up on a long term fibre reinforced compacted natural sediment bank over, and extending out from, the whole fronded area.

The weight and time of sediment build up of the sediment bank depends upon the local conditions and sea/river bed composition; typical submerged bank weight (over the mat area) is 10.4 to 12.5 ton.

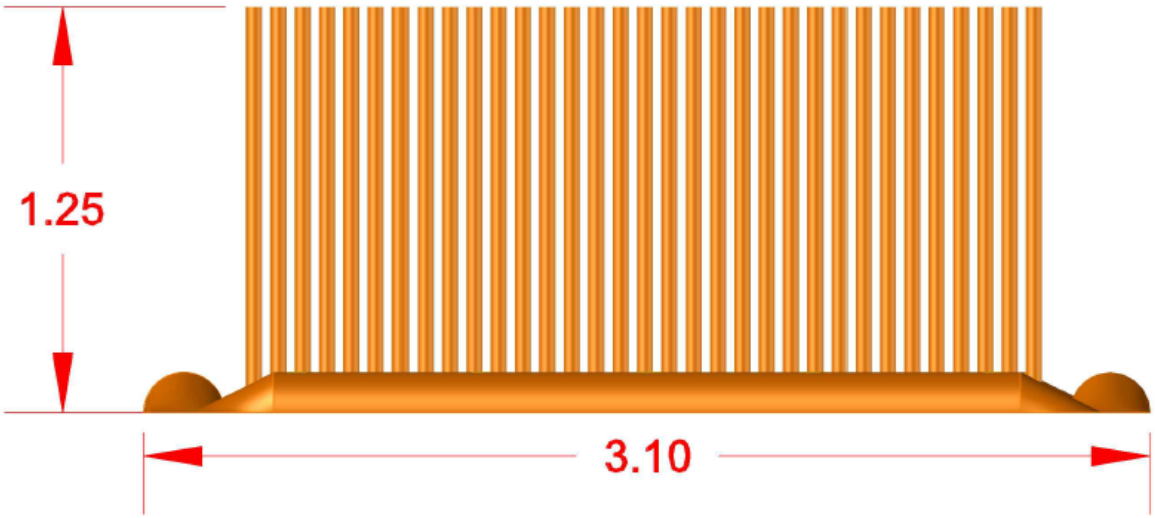
The SSCS Frond Mat systems have been approved as being totally environmentally acceptable.

Weighted Frond Mat	5,000mm x 2,500mm approx. 750kg
Frond Material	UV stabilised polypropylene; fully chemically resistant and tested. Specific gravity 0.905 and 0.915. Average tensile strength per strip 931N up to 1181N. Standard Frond length 1,250mm.
Frond Attachment	The fronds are attached to the mat base in successive continuous rows providing substantial and unbroken overlap of fronds to those in the neighbouring rows. Frond lines are machine sewn onto 6ton and 1.4ton MBS webbing members.
Chemical Resistance	The buoyant frond material is tested to “satisfactory” chemical resistance performance for long term deployment in sea water. SSCS materials have been tested by Shell Chemicals to be “satisfactory”.
Safety	All mats are fitted with a “Safe Net” cover (for frond restraint).
Weighted Edges	The weighted edges are constructed from 300mm wide polyester sleeving filled with a standard filling of 10ml gravel, however other filling materials have been tested by SSCS and deemed satisfactory for use including sand (for further information please contact SSCS).

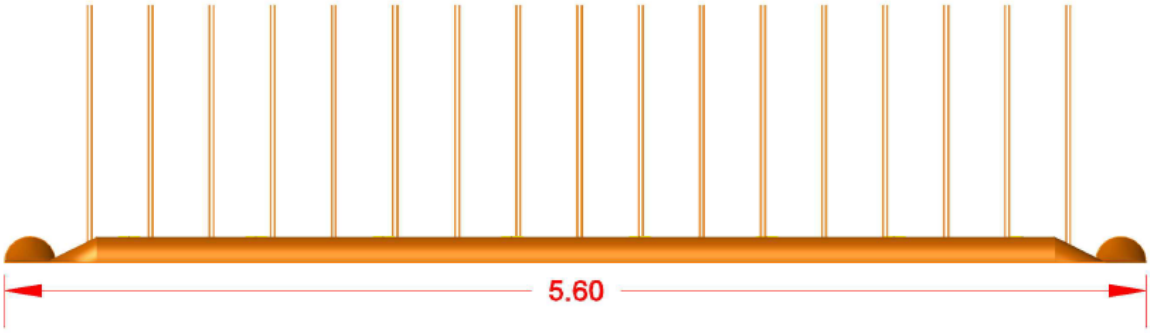
Plan



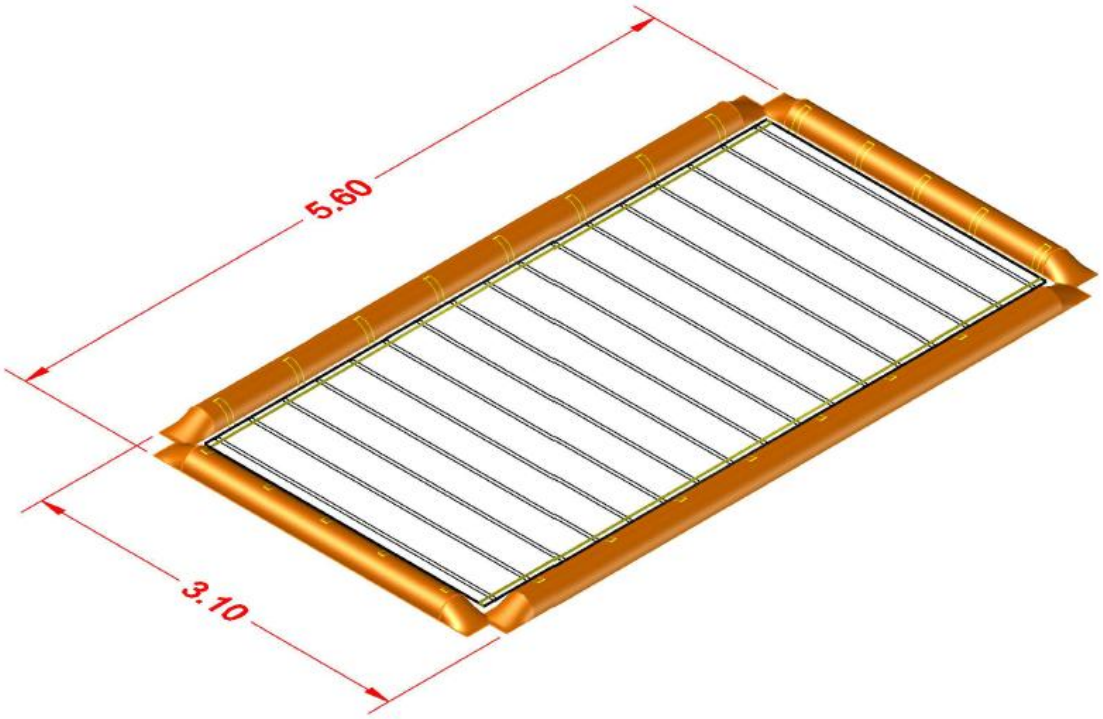
Front



Side



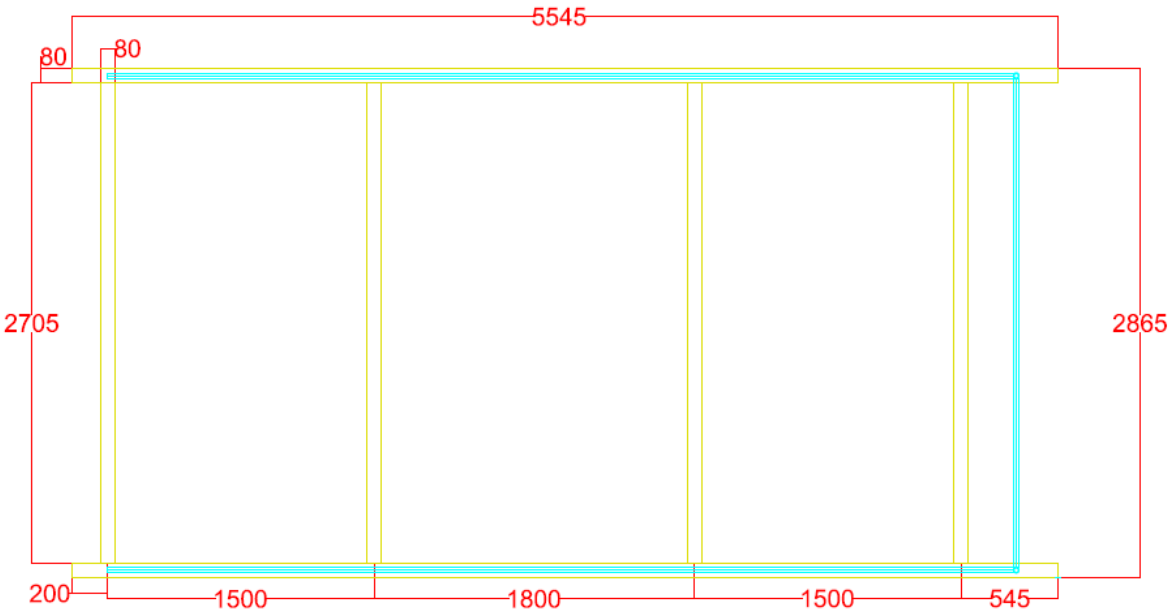
3D ISO



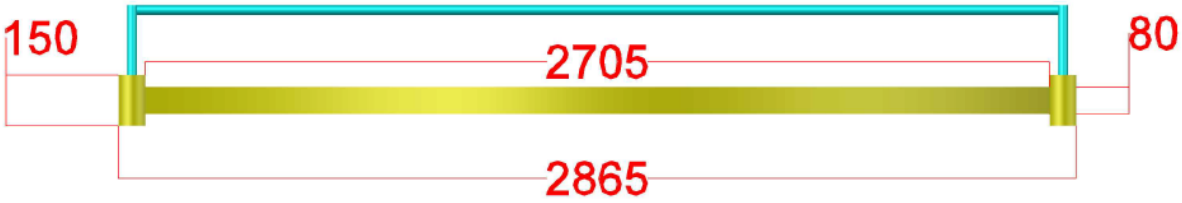
Installation Equipment and Specifications

SSCS Deployment Frame

Plan



Front



Side

Gross Weight: approximately 500kg

SSCS Weighted Frond Mat Installation Procedure

Contents (Per Frond Mat) supplied by SSCS:

- 1 x SSCS Frond Mat with pre-attached “weights” on the long sides
- 2 x Short side “weights” to be attached on site to allow rolling of the Frond Mats during transportation
- 1 x SSCS Deployment Frame
- Fittings required to attach the “weighted” sides and attach the Frond Mat to the Deployment Frame

Required (Per Frond Mat) to be available on deck:

- Minimum 2 personnel to assemble and manoeuvre the Frond Mats on deck
- Minimum 60m² deck space to assemble and manoeuvre the Frond Mats (storage space for the total quantity of Frond Mats will also be required)
- Deployment Frame (supplied by SSCS as per the quotation provided)
- Crane capable of lifting >1,000kg (and certified operator)
- Diver or ROV team to accurately position the Frond Mats on the seabed and release the Frond Mat from the Deployment Frame

Instructions:

(Images shown for reference only)

Prior to following instructions 1-9 please ensure the below has been completed:

i. Lifting Frame has been assembled on deck

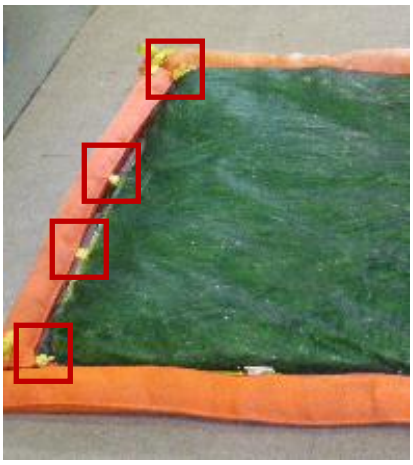
Note that steps 1-4 can be completed simultaneously to steps 5-9 running on the previous Frond Mat

1. Position the rolled up Frond Mat onto the deck space reserved for assembly using the crane.

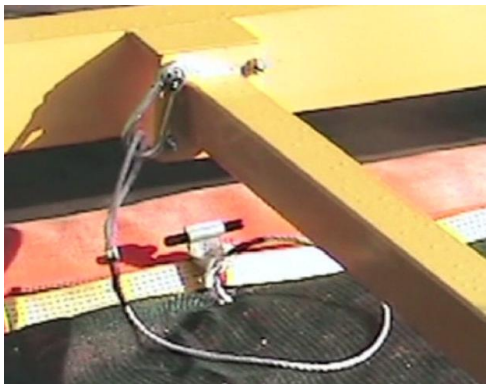
2. Remove the sling holding the Frond Mat in the rolled up formation.

3. Unroll the Frond Mat.

4. Attach the “weighted” short sides (2 off) via the toggles and loops provided (4 off on each side).



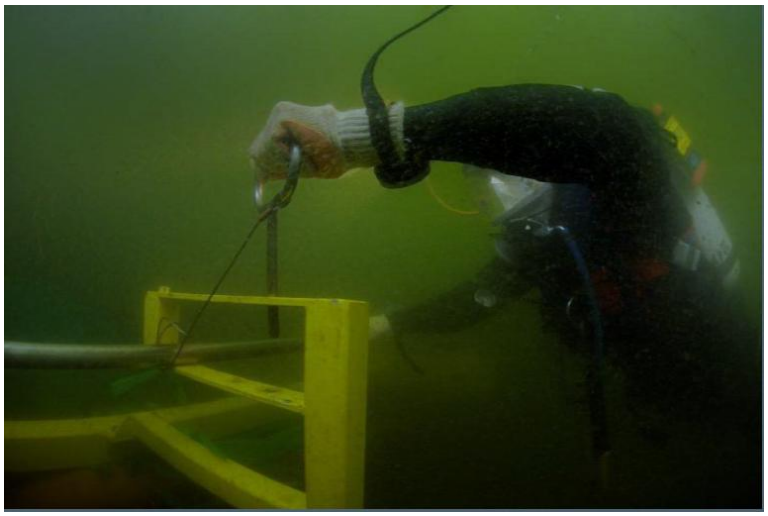
5. Suspend the Deployment Frame above the Frond Mat using the crane and attach the Frond Mat to the Deployment Frame via the toggles, pin and loops provided ensuring that the net protecting the Fronds has also been attached to the Deployment Frame via the cable / wire provided.



6. Lift the Deployment Frame with Frond Mat attached using the crane and suspend overboard.

7. Lower the Frond Mat into position on the seabed using the crane in conjunction with the diver or ROV to ensure more accurate placement of the Frond Mat on the seabed.

8. Have the diver or ROV pull the release pin on the Deployment Frame to release the Frond Mat, or remotely via a wire/rope-line.



9. Retrieve the Deployment Frame using the crane. As the frame is lifted from the seabed the protective net covering the Frond Mat will be removed activating the Fronds. Repeat steps 1 to 9 as required for additional Frond Mats.