



OFFSHORE CONSTRUCTION SPECIALISTS

**OCS UTILITY BARGE UB-01 “MISS PENNIE”
AND MULTICAT “MISS BEE”**

**TECHNICAL AND PROJECT APPLICATION
INFORMATION**



OCS UTILITY BARGE UB-01 “MISS PENNIE” & MULTICAT “MISS BEE”

TECHNICAL AND PROJECT APPLICATION INFORMATION

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1.0 INTRODUCTION

This document provides technical details and typical project application information for OCS marine assets the Utility Barge UB-01 “Miss Pennie” and the Multicat Anchor Handler “Miss Bee”.

These vessels have been conceived, designed and constructed to fill a niche market in the marine construction sector primarily addressing near shore pipelines installation in a relative shallow water and the need for Pre-trenching, small Pipe lay, Backfill, Post Trenching and miscellaneous support work in areas that are not readily accessible to conventional equipment or where that equipment is prohibitively expensive.

The vessels have been constructed based on detailed knowledge of the constraints faced during marine construction operations and complement the range of portable equipment already available in the OCS inventory enabling OCS to take on projects on a “One Stop Shop” basis with no significant reliance on 3rd parties including design engineering (where necessary), construction support engineering and construction management.

Offshore Construction Specialists (OCS) was formed in 2007 from a core group of experienced marine construction engineers with an extensive track record working with major contractors. The company has grown steadily since incorporation and now employs approximately 60 personnel (of whom over 30 are civil/structural and mechanical engineers) with the head office at 36 Kian Teck Road, Singapore and satellite offices in Bangalore, India and Batam, Indonesia. OCS engineers and technicians work hand in hand to ensure all projects are properly engineered and approached in an operationally practical manner.

The company provides construction management, engineering and strategic support equipment services primarily to the marine oil and gas and renewable energy sectors focusing on the installation of pipelines, cables, platforms, wind turbines, tanker moorings and other related facilities. In addition to engineering, OCS also provides services for pipeline installation & burial, free span corrections, pipeline pre-commissioning, flexible flow line and umbilical installation.

Services are provided on a standalone basis to asset operators or on a subcontract basis to major contractors.

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2.0 UB-01 “MISS PENNIE”/ MULTICAT “MISS BEE” GENERAL TECHNICAL CAPABILITIES

The UB-01 “Miss Pennie” has been conceived based around a basic design that enables the vessel to be configured to different operating modes without significant effort.

Operational modes for which the vessel can be configured included:

- i) Pipeline pre-trenching or general trenching work.
- ii) Pipelay operations.
- iii) Pipeline post trenching.
- iv) Support vessel on which either Linear Pull Winch or Horizontal Directional Drilling equipment can be based.
- v) Shallow Water Decommissioning projects.
- vi) Miscellaneous Marine Construction support work such as dolphins & Jetty work etc.

The attendant Multicat “Miss Bee” is designed to perform shallow water anchor handling for the “Miss Pennie” and provide other general support services. Her extreme shallow draft, anchor handling winch / A-Frame and knuckle boom crane make her the ideal complementary vessel to the “Miss Pennie” with the two vessels working in tandem on shallow water projects.

In general, the clients will be pleasantly surprised at the standard of equipment available on the UB-01 “Miss Pennie”. For most of this vessels type, the support facilities are a temporary feature, but in the case of “Miss Pennie” these facilities are incorporated as permanent features. This has been made possible because the whole spread has been conceived, designed and constructed by OCS from the keel up.




The UB-01 has been designed such that it can be easily adapted to the selected mode of operations without significant effort.

OCS complements the UB-01 with a comprehensive suite of in-house support equipment including:

- i) 90 tonne deck crane to support all operations.
- ii) Long boom 100 tonne excavators with 2.0 m³ buckets for pre-trenching operations.
- iii) Trailing arm with submersible dredge pumps for pre-trenching in deeper water.
- iv) Pipelay ramp / tension machine, A-Frame & stinger for small pipelay.
- v) Feed pumps, pressure pumps, hose deployment system & jet sleds for post trenching.
- vi) Trailing arm option for post trenching.
- vii) Grout mixers, pumps, turntable for pipeline free span corrections.
- viii) Flooding pumps, hydrotest pumps, dewatering and drying equipment for pipeline pre-commissioning.

The robust below deck integrated 10 tonne mooring winches are air powered with large pressurised receiver tanks in the below deck machinery space providing an ample supply of air to power the winches. The mooring system comprises 8 x mooring winches and 3 separately driven spud piles giving **11 independent** mooring points.

The 60 tonne (DAF 2.0) stern A-Frame can be installed to support the stinger for pipelay or the jet sled for post trenching or for other special purpose applications.

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The OCS trailing arm is a unique OCS innovation providing pre-trenching and post pipelay burial options in deeper water where OCS long boom excavators cannot be employed.

In summary with the UB-01 “Miss Pennie” and Multicat “Miss Bee”, clients have access to a vessel spread that is capable of operating to a high level of efficiency in a range of water depths on a multiplicity of different project applications.

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3.0 UB-01 BASELINE CONFIGURATION

The baseline configuration of the barge incorporates the features that are essential (or at least highly desirable) in each of the designated operating modes.

i) Hull Design and Structural Features

- Basic Dimension : 160 ft x 45 ft x 10 ft (48.8 m x 13.7 m x 3.05 m).
- Hull and side shell strengthening on Keel and Sides for Grounding (16 mm plate).
- Deck strengthening (10mT/m²) to accommodate 100 tonne excavators for pre-trenching and crawler cranes up to 250 tonne for support lifting work and anchor handling etc.
- Specific strengthening for davit points for pipe lifting.
- Stern strengthening for stinger, A-Frame and other stern attachments.
- Integrated spud well structures.
- Integrated pad eyes to enable barge to be lifted by HLV or derrick crane with all equipment on board.
- Integrated water and air piping to distribute feed water and air for post trenching and utility applications.
- Large below deck machinery space to accommodate air receivers and mooring winches.
- Welding machines and cutting equipment included as part of the barge inventory.

ii) Deck Timbers

Heavy duty deck timbering is provided where required to facilitate tracking of excavators and deck crane.

iii) Air and Water Distribution Systems

The “Miss Pennie” uses large volumes of air to power the mooring winches and other support systems. Two large 22 m³ air receivers located in the below deck machinery room are charged using a electric deck compressor supplemented by large 1070cfm x 350 psi two stage air compressors when air demand is high. Pressure regulators distribute the air at the desired pressure to the mooring system, post trenching, air lifts, air driven ballast pumps etc.

Integrated water distribution pipe work makes it possible to control the large volumes of water used in pipeline post trenching or large pipeline flooding and gauging projects without taking up unnecessary deck space.

iv) Mooring System and Spud Piles

8 x 10 ton air driven mooring winches each with a capacity for 1000 metres of 1 1/8” (28 mm) diameter wire rope are located in the below deck machinery room. The winches can be configured to drive an eight (8) point mooring system with two (2) fairleads located at each corner. In addition independent deck winches are provided for three 18-metre spud piles used when the barge is employed for pre-trenching or for mooring in tight areas where shallow water restricts anchoring options. In summary the combined mooring winch / spud system provides flexibility to adapt the vessel to deal with any constraints that may be imposed by individual project requirements.

The mooring system is operated from a central panel control room and load cells are provided for each winch. A central panel is provided in the above deck control room.

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Note that in congested marine complexes where existing subsea pipelines make anchoring difficult then high strength dynamax fibre anchor lines can be utilised on the winches in lieu of wire rope.

v) **Ballast Tanks**

Ballast tanks are located at the side of the vessel to trim the vessel in accordance with engineering and operational requirements.

vi) **Fresh Water and Fuel Storage**

Below deck freshwater and diesel fuel tanks are provided with liquid transfer pumps with above deck day tanks to service operations.

vii) **Control Tower and Office Accommodation**

A control tower/office is used for supervisory personnel with crew messing and ablution facilities.

viii) **Power Generation**

2 x 300kVA and 25kVA auxiliary generators and switchboard are provided.

ix) **Air Compressors**

Dedicated electric air compressor for automatic charging of air receivers with large diesel compressor to supplement during high air usage periods.

x) **Pedestal Knuckle Boom Crane**

Pedestal knuckle Boom crane with a capacity (max moment) of 32 tonne-metre.

xi) **Offloading Ramps**

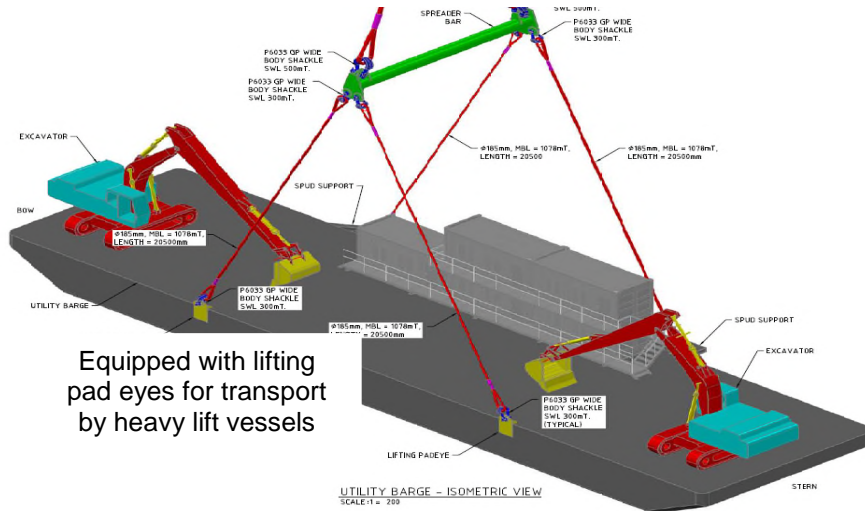
Dedicated offloading ramps with connection points are provided at the port bow of the vessel.

xii) **Emergency Rescue & Support Craft**

A twin engine dive support vessel is provided with the barge as part of the base inventory.

xiii) **Lift Padeyes**

Lift padeyes are provided for HLV transport to remote locations.



Equipped with lifting pad eyes for transport by heavy lift vessels

Figure 3-1 Integrated Padeyes to be Lifiable onto HLV for Dry Tow



Figure 3-2 General View of Miss Pennie – Configured for Pipelay (Stinger not installed)

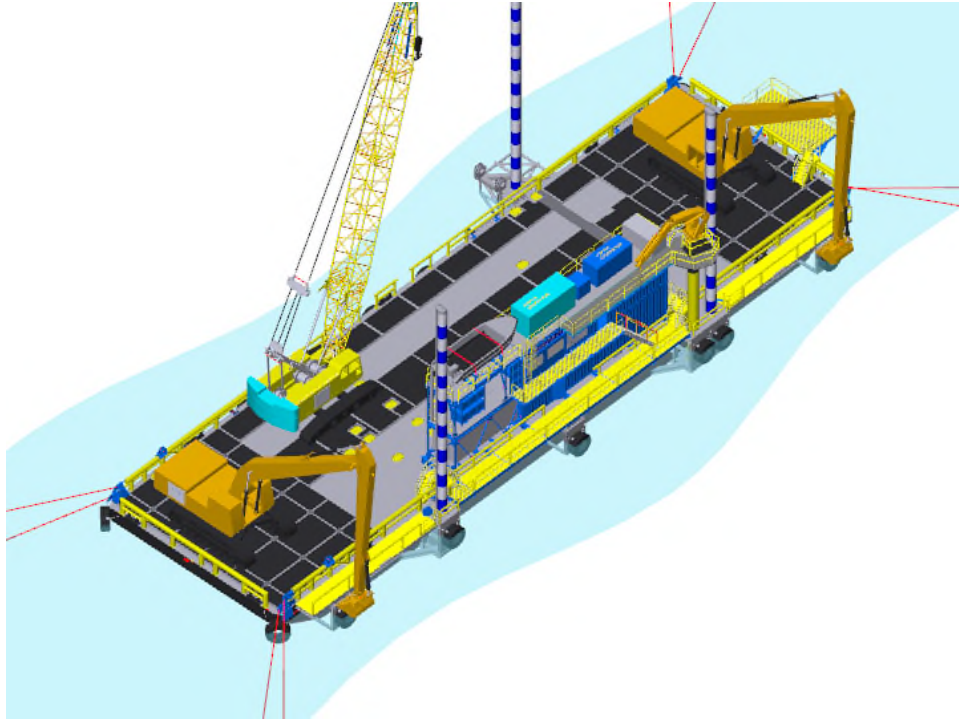


Figure 3-3 8-point below deck mooring system (10 tonne air driven winches) with 1.5 tonne delta flipper anchors



Figure 3-4 8 Nos. 10T Air Driven Mooring Winches (Below Deck)



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Figure 3-5 Below Deck Air Receivers



Figure 3-6 CAT390 Long Boom Excavators with 2m³ Buckets



Figure 3-7 SCX900 (90T) Deck Crane and CAT320 Excavator (Convertible to Amphibious)



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Figure 3-8 Generator & Knuckle Boom and Dive Support Boat

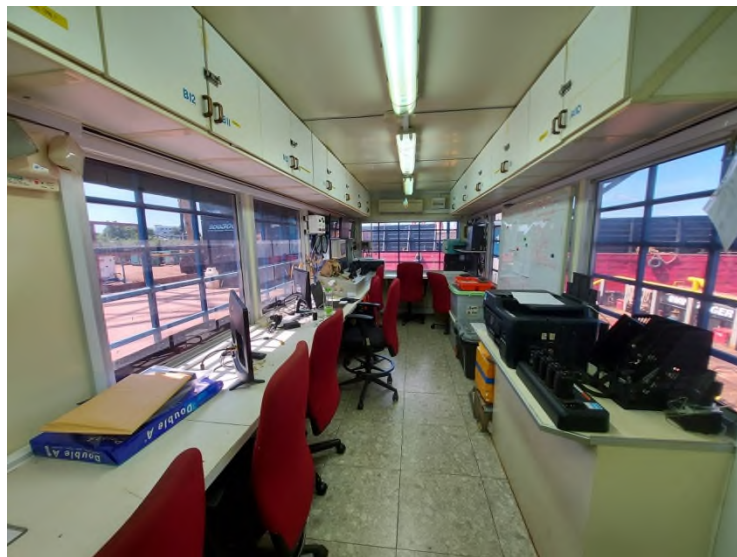


Figure 3-9 Office and Control Room

4.0 UB-01 PRE-TRENCHING

For pre-trenching in shallow waters the UB-01 operates with three x 18.0 metre spud piles controlled via multi part handling blocks located on the starboard side (2) and portside (1) of the vessel. In areas where spuds operations are difficult for station keeping the 8-point mooring system available on board UB-01 can be used to complement the spuds.

OCS operates in-house equipment consisting of two (2) units of long arm CAT 390 (100 tonne) excavators with 2.0 cubic metre buckets and at a down reach of 17 metres below the barge deck and also an amphibious excavator CAT 320 with a long boom with a down reach of 9m below the carriage.

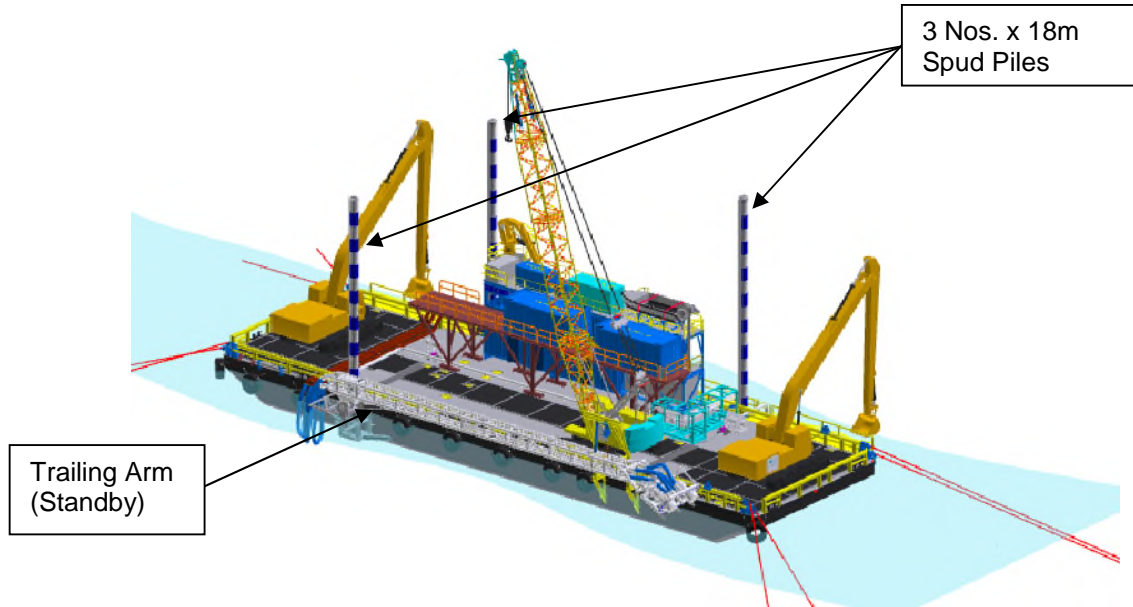


Figure 4-1 UB-01 with 3 Spuds, 2 x CAT390 Excavators, 90T Crane and Trailing Arm (Standby Position) for Shallow Water Pre-trenching



Figure 4-2 UB-01 Pre-trenching with Excavators in Sriracha Project (Thailand)

For Pre-trenching in water depths (up to 31 metres) which is not accessible by using OCS excavators or for trench maintenance activities the OCS designed bespoke trailing arm can be employed. The trailing arm can also be adapted for post lay pipeline burial. Attached photos are from the OCS Esso Thailand Sriracha Project.

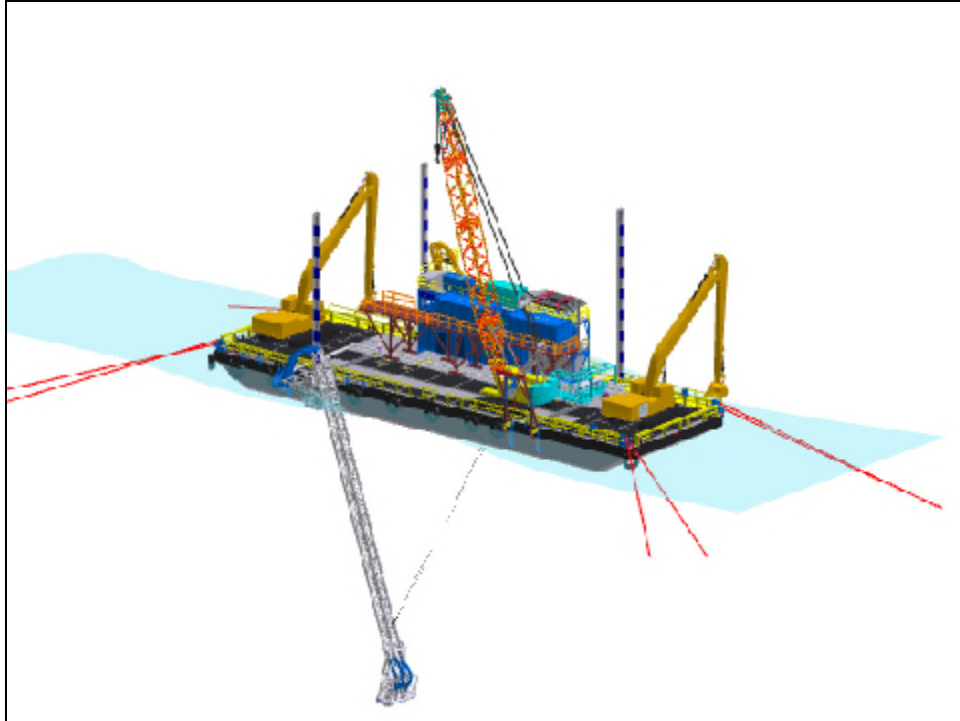


Figure 4-3 Miss Pennie Illustration Pre/Post Trenching Trailing Arm at Deeper Water up to ~31m



Figure 4-4 UB-01 Pre-trenching with Jetting Trailing Arm in Sriracha Project (Thailand)



Figure 4-5 UB-01 Loadout – 2x390 Excavators, 1x90T crane, Trailing Arm and Jetting Pumps for Sriracha Project

The excavator reach radius and capacity curve plus the crane capacity curve are included in the appendices.

OCS pre-qualification document for [Pipeline Shore Approach](#) and [Pipeline Pre-Trenching](#) can be referenced for further information.

5.0 UB-01 PIPELAY

The UB01 capacity for pipe lay needs to be assessed on a case by case basis. The pipe handling equipment, tension machine and stinger can be upgraded for heavier pipe as required. For pipe lay the 60 tonne stern A frame is installed and the OCS stinger is suspended from the A frame and a portable pipe ramp is installed.

The following is a list of key equipment items owned in house by OCS to support pipe lay operations :

- 15 tonne tension machine.
- Ladder Stinger.
- 60 tonne stern A-Frame.
- Portable pipe ramp and rollers with 3 welding stations and one field joint station.
- Ready rack and line up station.
- A & R Winch.
- Air Diving system.
- 90 tonne Deck Crawler Crane.
- In-house survey and positioning equipment.

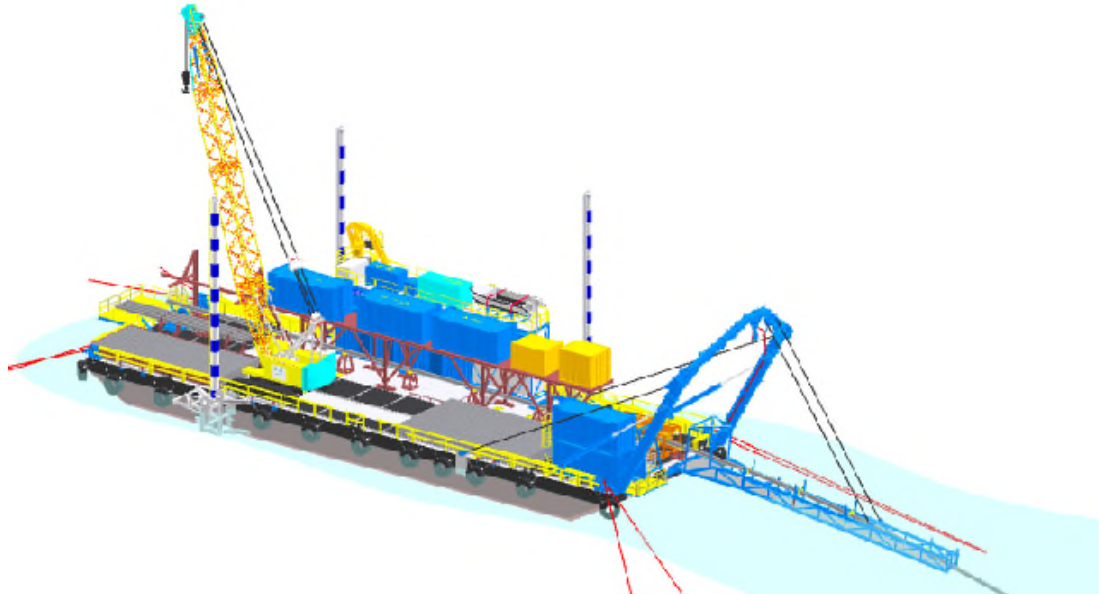


Figure 5-1 Illustration of UB-01 Configured for Pipelay

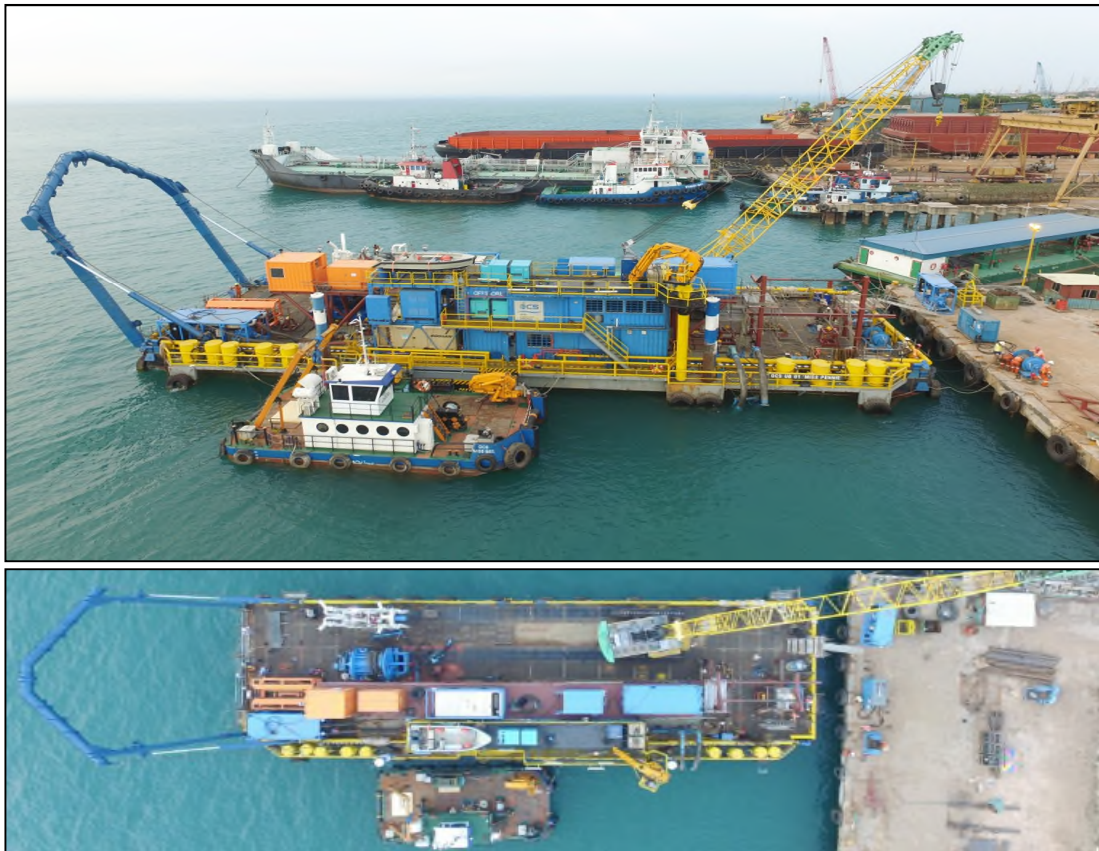


Figure 5-2 UB-01 Rigged up for Pipelay (Stinger not shown)

OCS pre-qualification document for [Shallow Water Pipelay Services](#) can be referenced for further information.

6.0 UB-01 POST TRENCHING

The UB01 has been designed with specific features for post trenching. The 8 point mooring with centralized control can be used with the well proven OCS suite of post trenching equipment. Integrated pipe work is included with the vessel to facilitate hook up of jetting and airlifting systems.

The following is a list of key equipment items owned in house by OCS to support post trenching operations:

- 90 tonne deck crane.
- 60 tonne stern A frame.
- High volume feed pumps.
- High Volume pressure pumps.
- Large volumes of compressed air.
- Well proven pontoon and pipe riding jet sleds.
- New trailing jetting arm (capable of reaching 31m water depth).
- Air diving system.

For all OCS equipment packages, refer to the document Equipment Packages and Bespoke Fabrication.

OCS pre-qualification document for post-trenching can be referenced for further information.

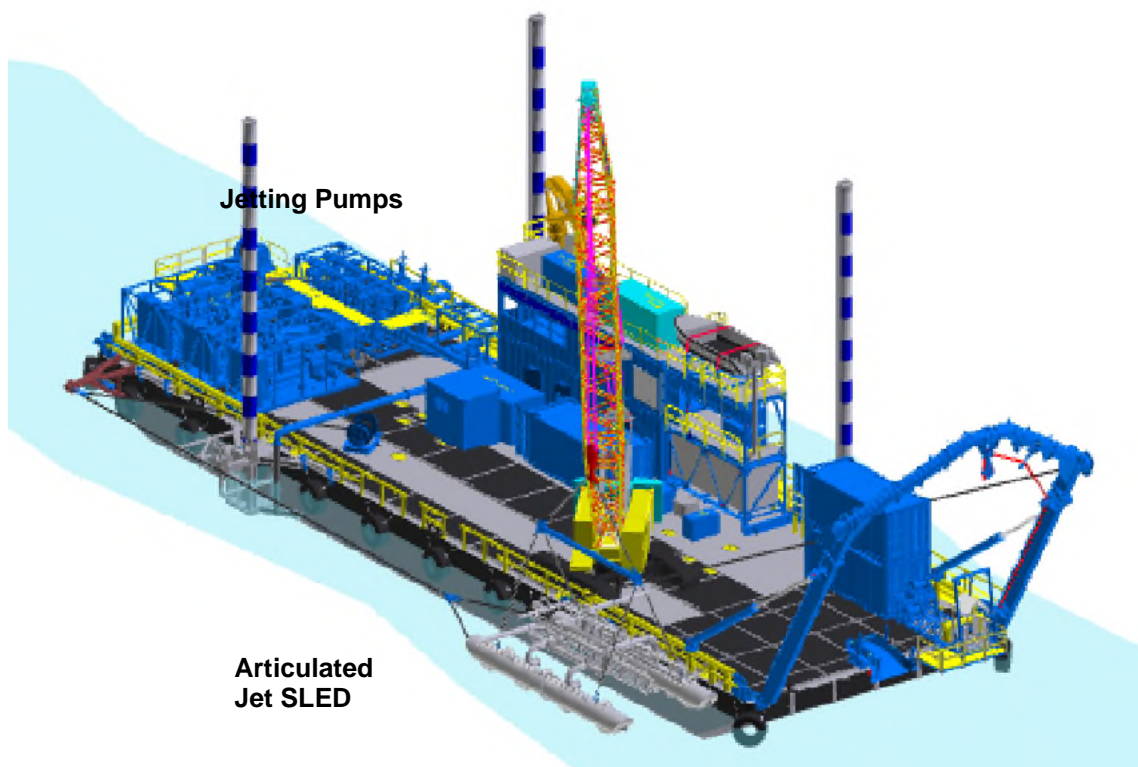


Figure 6-1 Post Trench using Crane and/or portable A-Frame from Portside

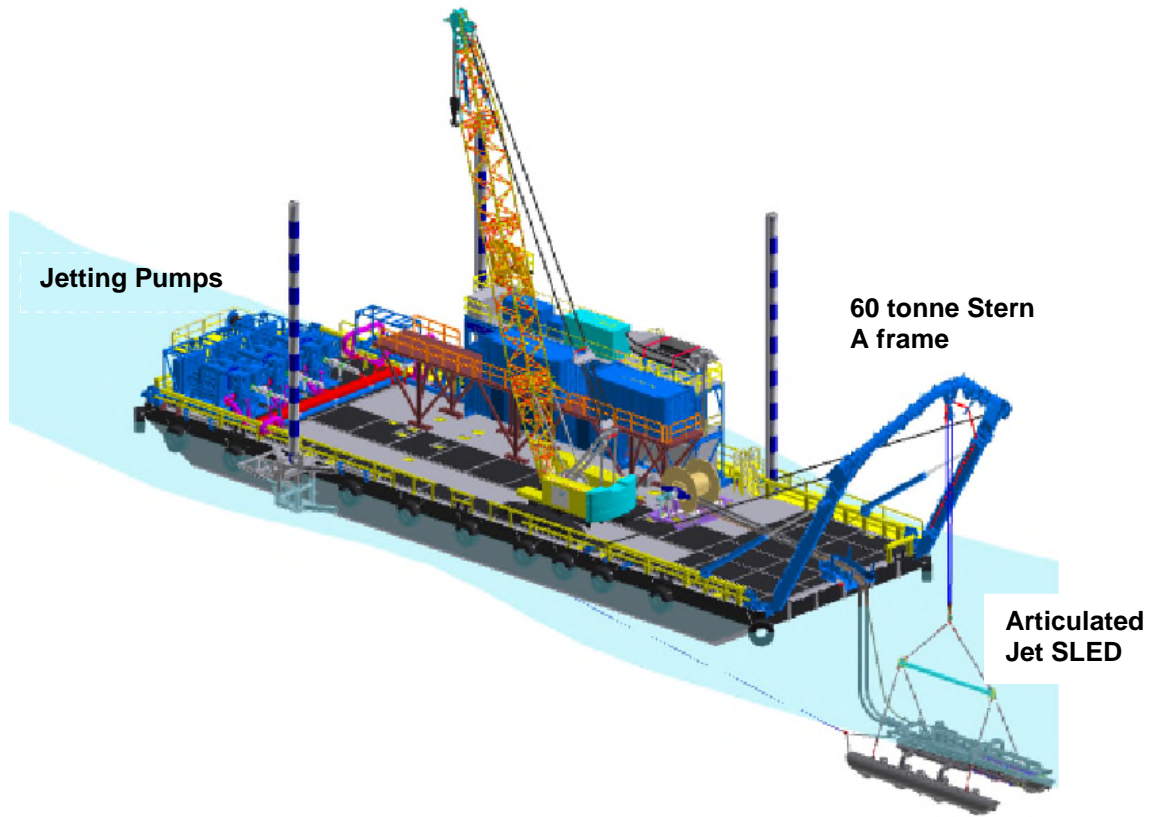


Figure 6-2 Post Trench using Stern 60T A-Frame



Figure 6-3 UB01 Miss Pennie rigged for Post Trench using Stern A-Frame



Figure 6-4 UB01 Miss Pennie rigged for Post Trench using Stern A-Frame

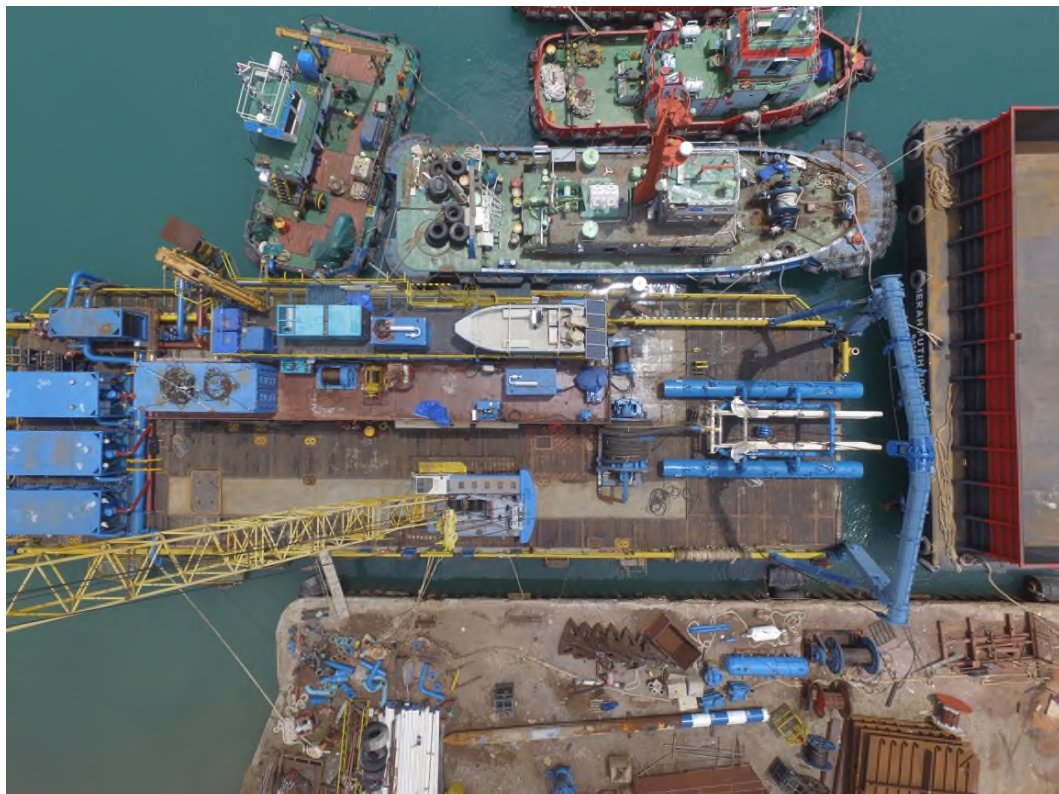


Figure 6-5 Overview UB01 Ms Pennie rigged for Post Trench using Stern A-Frame



Figure 6-6 Pontoon Articulated Arm function test from A-Frame for project



Figure 6-7 Pontoon Articulated Arm function test for project

It is to note that OCS post trenching sleds can also be utilized on other 3rd party installation vessels pending on the type of vessel available for the project, water depth and the post trenching requirements.

UB-01 can also perform pre and post trenching using a jetting trailing arm which is constructed and supported on the side of the UB-01. Refer to Figure 4-5.

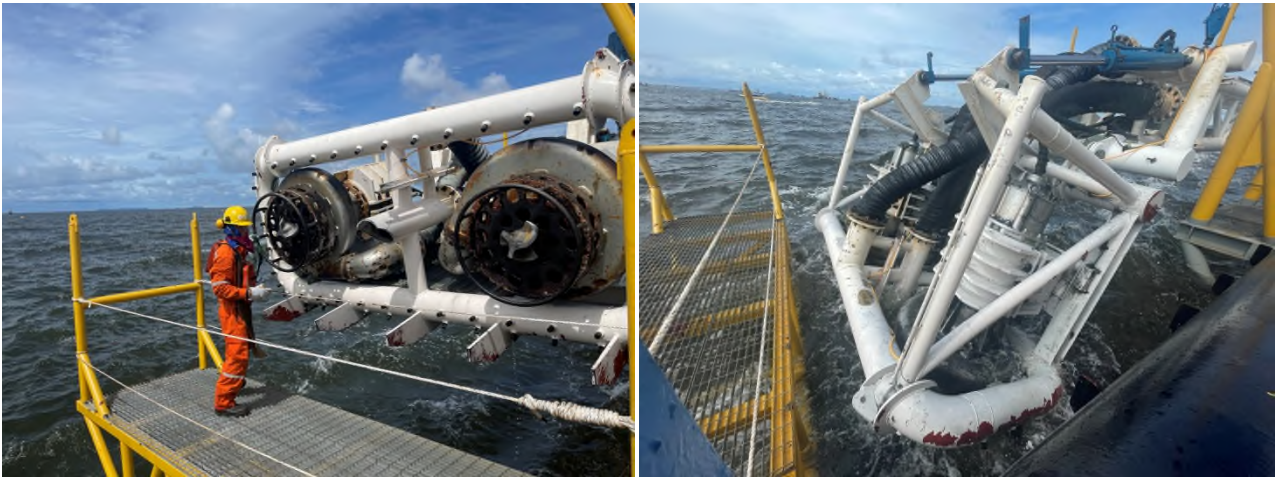


Figure 6-8 Pre-trenching Trailing Arm with Submersible Dredge Pump Components (Bottom section)



Figure 6-9 Trailing Arm Components (Arm Section)



Figure 6-10 Trailing Arm for Pre-Post trenching

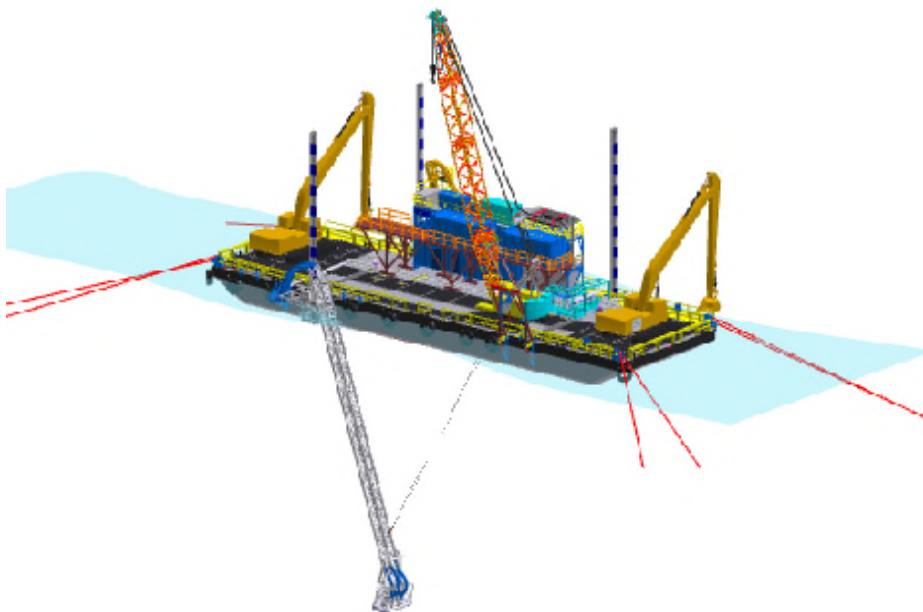


Figure 6-11 Trailing Arm Pre-Post trenching (Illustration)

For Post trenching using the trailing arm the principles employed are the same as those used for with jet sleds using high pressure jetting pumps and an eduction / airlifting system. Dredge pumps can also be added to the arm to assist removal of the dredged material.

7.0 UB-01 UTILITY APPLICATIONS

Other possible applications for the UB-01 include:

- Support for Horizontal Directional Drilling (HDD) operations.
- Installation of pipeline crossings.
- Installation of Mooring or PLEM piles.
- Installation of subsea facilities using stern A- frame.
- Pipeline Free span corrections
- Hook up/demolition/decommissioning support on existing platforms.

8.0 OCS MULTICAT MISS BEE

The OCS Multicat Miss Bee has been designed to complement the operations of the Miss Pennie and is designed to handle anchors in shallow water. The vessel is twin engine and equipped with a knuckle boom crane, anchor handling winch and A frame.

Engine Specification: 2 x 380 HP Iveco Engines
 Anchor Handling: 15 ton winch and a frame
 Knuckle Boom: 22 ton-metres
 Operating Draft: 1.5 metres



Figure 8-1 Miss Bee Moored On Starboard Side Of Miss Pennie



Figure 8-2 Miss Bee Handling 5mT Delta Flipper Anchor in Tra Vinh Wind Farm Installation Project (Vietnam)

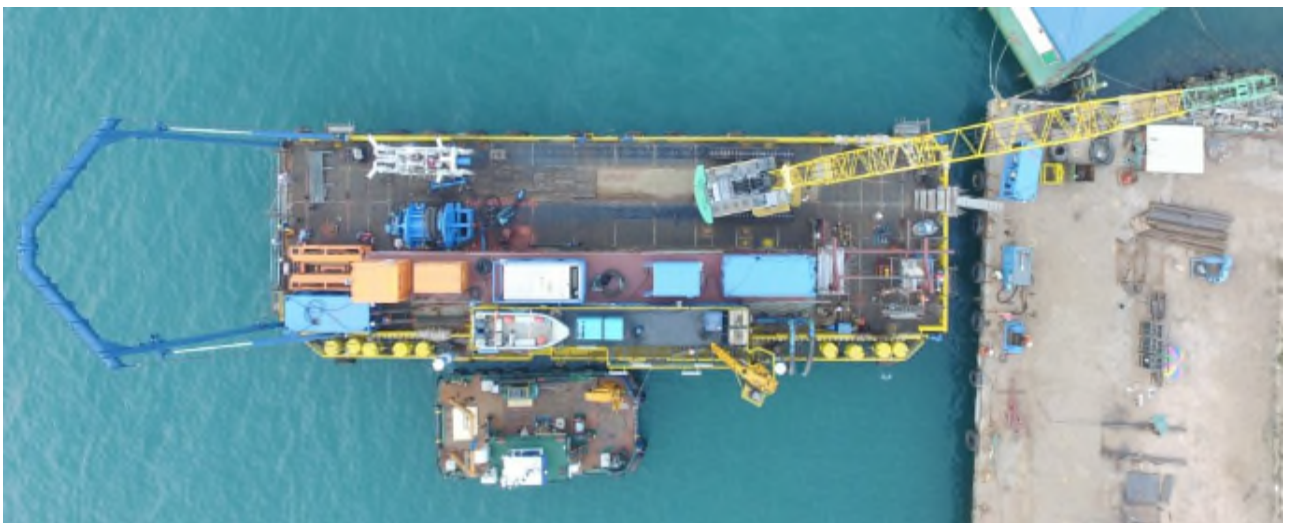
9.0 APPENDICES

- 9.1 Photo log of UB-01 Miss Pennie
- 9.2 Photo log of Multicat Miss Bee
- 9.3 SX900 Crane Chart
- 9.4 CAT 390 Excavator Arm chart
- 9.5 OCS Certification (ISO)
- 9.6 OCS Certification (NATA)
- 9.7 OCS Certification (BCA)

9.1 Photo log of UB-01 Miss Pennie



MISS PENNIE / MISS BEE FROM STARBOARD QUARTER



AERIAL PHOTO OF MISS PENNIE / MISS BEE



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MISS PENNIE FROM STERN



MISS PENNIE FROM PORT SIDE



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9.2 Photo log of Multicat Miss Bee



MISS BEE FROM PORTSIDE



MISS BEE FROM BOW



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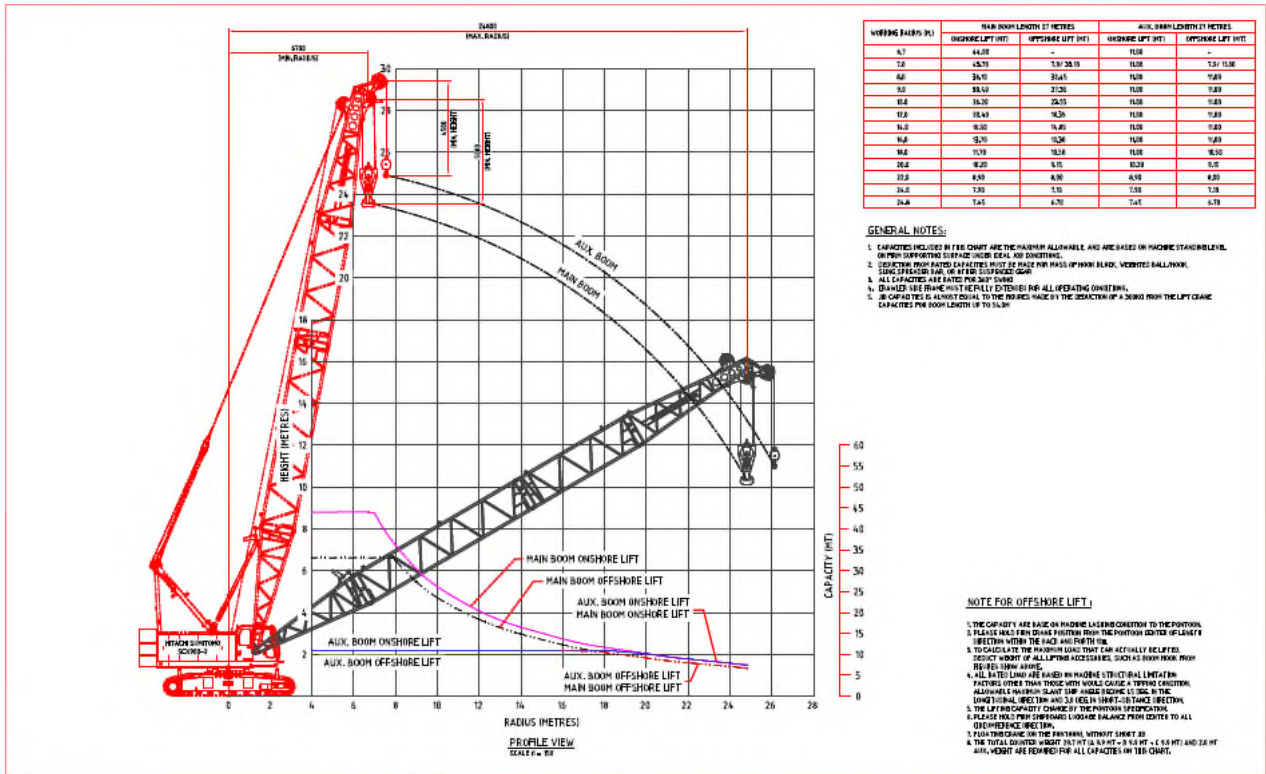


MISS BEE A FRAME TEST

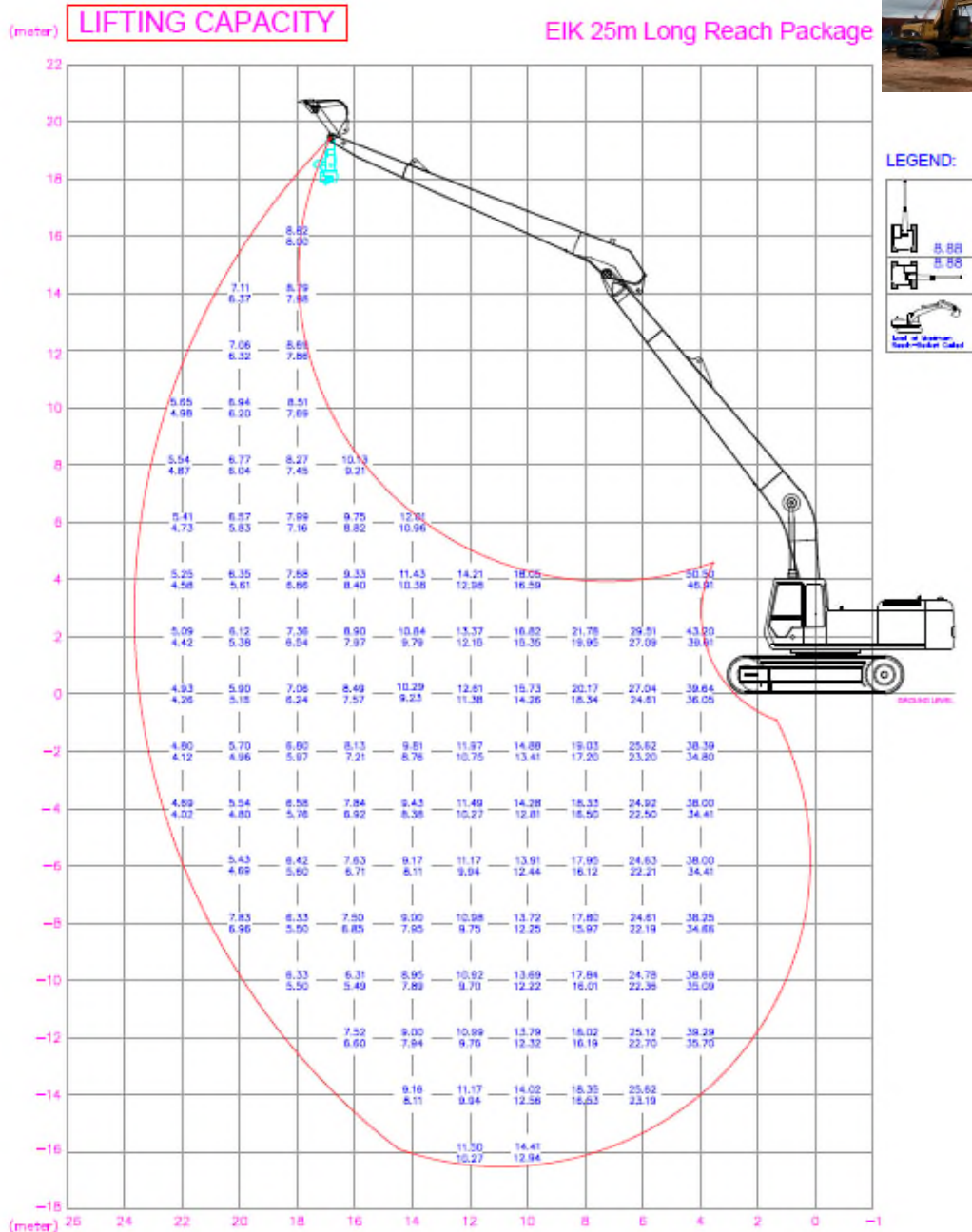


MISS BEE KNUCKLE BOOM CRANE TEST

9.3 SCX 900 Crane Lift Chart



9.4 CAT 390 Excavator Arm Chart



LEGEND:

- NOTE:**
- 1) The above loads do not exceed 75% of tipping capacity and not limited by hydraulic capacity.
 - 2) The loads only valid when the machine is on the firm and flat ground.
 - 3) The loads point is at the stick end and is the net material weight it can lift. Bucket weight is 2150kg.
 - 4) Excavator model is CAT 390D with 650mm track shoes and 3510mm track gauge.
 - 5) Without Additional counterweight.



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9.5 OCS Certifications (ISO CERTIFICATION)



Certificate of Registration

This certificate has been awarded to

Offshore Construction Specialists Pte Ltd
36 Kian Teck Road, Singapore 628781, Singapore

in recognition of the organization's Quality Management System which complies with

ISO 9001:2015

The scope of activities covered by this certificate is defined below



**Provision of Project Management and Consultancy Services for Oil and
Gas Construction Facilities**

Certificate Number:	Date of Issue: (Original)	Date of Issue:
41578/B/0001/SA/En	04 November 2016	04 November 2019
Issue No:	Expiry Date:	
2	03 November 2022	

Issued by:  On behalf of the Director



If there is any doubt as to authenticity of this certificate, please do not hesitate to contact the Head Office of the Group via info@urscertification.com.
URS is a member of United Registrar of Systems (Holdings) Ltd, United House, 4 Finlay Road, Douremouth, BH1 2BB, UK. Company Registration no. 5208485
URS Far East Pte Ltd, 700A, Beach Road #05-02, The Plaza, Singapore 109961

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9.6 OCS Certifications (NATA)



ACCREDITED LABORATORY

NATA
WORLDWIDE ACCREDITATION

ILAC-MRA

NATIONAL ASSOCIATION OF TESTING AUTHORITIES, AUSTRALIA
has accredited:

Offshore Construction Specialists Pte Ltd
Singapore

Following demonstration of its technical competence to operate in accordance with:



ISO/IEC 17025

This facility is accredited for the tests shown on the Scope of Accreditation issued by NATA.

Jennifer Evans
Jennifer Evans
Chief Executive Officer, NATA

Date of issue: 28 January 2022 | Date of Accreditation: 15 July 2013 | Accreditation number: 19122 | Site number: 21555

The Commonwealth recognises NATA as the national authority for accreditation of laboratories, and a leader in accreditation internationally. NATA is a signatory to the mutual recognition arrangements of the International Laboratory Accreditation Cooperation (ILAC) and the Asia Pacific Accreditation Cooperation (APAC). (ABN 59 004 379 746) Limited by guarantee. AFS-147/Issue 8/1 October 2021

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9.7 OCS Certification (BCA)

