



OFFSHORE CONSTRUCTION SPECIALISTS

**PIPELINE SHORE APPROACH
PRE-QUALIFICATION DOCUMENT**



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Offshore Construction Specialists Pte Ltd (OCS)

36 Kian Teck Road,

Singapore 628781

Tel: +65 6898-0210

Fax: +65 6898-0209

Web: <http://www.offshore-ocs.com>

Contact Information

Contact:

Keith Jackson
Rakul Remanan
William Wijaya
Loke Kah Poh
Fery Wijaya
Ivan Chai
Henry Chuy

Company Position:

Managing and Technical Director
Engineering Director
Project Manager
Project Manager
Construction Manager
Construction Manager
Subcontracts & Procurement Manager

Email Address:

keith.jackson@offshore-ocs.com
rakulr@offshore-ocs.com
william.wijaya@offshore-ocs.com
kploke@offshore-ocs.com
fery@offshore-ocs.com
ivan.chai@offshore-ocs.com
chuy.chunfei@offshore-ocs.com






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1. INTRODUCTION

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.



OCS provides construction management, engineering and strategic support equipment services primarily to the offshore oil and gas sector focusing on the installation of pipelines, platforms, tanker moorings and related facilities. In addition to engineering, OCS also provides turnkey services for pre-trench and shore approach, post lay pipeline burial, pipeline pre-commissioning & drying, flexible flow line installation and umbilical installation on a subcontract basis to marine contractors.

The company has grown steadily since incorporation and now employs 60 personnel of whom over 36 are civil/structural and mechanical engineers along with an equipment group comprising of mechanics and technicians to operate in-house developed equipment. The engineers and technician work hand in hand to ensure all projects are properly engineered and operationally practical

OCS operates a new utility barge, a customised 160'x40'x10' (48768mm x 12192mm x 3048mm) flat top barge with 8 nos 10T air operated winches below deck and 3 nos spud wells, which can be utilised and complements all activities covering pre-trenching, shore approaches preparation, beach pull (as a pull barge) which facilitates the Company's pipeline near shore and shore approaches configuration including post trenching. This is drawn from the experience from 3 major projects that our personnel has executed under OCS as well as other shore approach projects while working for major contractor.

OCS utility barge can be configured for different conditions within the overall shore approach scope of work. For each different work scope/packages, OCS utility barge (OCS UB1) can be configured specifically to requirement, e.g.

- i. As a Shallow water Pre-trenching spread, equipped with two (02) Caterpillar 375 excavators with modified long arms and 2m³ buckets, an 80T crane for handling spuds and three (03) spuds for positioning. At shallow waters where station keeping using the spuds is challenging, the onboard mooring system can be used in complement to the spuds.
OCS has also designed and used a trailing dredge arm that can perform pre-trenching and post trenching at deeper waters where the excavators cannot reach in water depths between 15m to 30m. For more details on the pre trenching refer to Pre Trenching Pre-Qualification Document.
- ii. As a Pull barge, with project specific Linear pull winch capacity (300T/400T/450T) loaded onto her and used as a support/floating platform where site location/configuration prevent a proper LPW foundation to be set up.
- iii. Near shore supporting role – deployment of beach pull wire and trench maintenance prior and during beach pull – excavator/spuds and crane use.
- iv. For Back filling (if the need arises) – with the excavators configuration.
- v. Post trenching configuration where OCS's post trenching equipment can be mobilised and swap out with the excavators. The barge has 8-10T mooring winches built in below deck to allow for a mooring system. For more details on the post trenching refer to Pipeline Post Trenching Pre-Qualification Document

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vi. For Above Water Tie-in configuration (if necessary with portable A-Frames installed).

All the above can be made possible as the utility barge is mobilised once for a shore approach project, avoiding the need to separately mobilised additional expensive spreads for the different work scope within a project where one (same) spreads can be used.

Detail specification and information on UB01 “Miss Pennie” and multicat “Miss Bee”, refer to our other document OCS UTILITY BARGE “MISS PENNIE” and MULTICAT “MISS BEE” Technical and Project Application Information.

In short 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 minimum water depths on a multiplicity of different applications.

Our equipment is managed and operated by personnel who come from the same background as the main marine contractor. We help the major marine contractor plan the work such that the shore approach activities have the least impact on critical path operations. We are proactive in highlighting potential issues and ensuring both parties win. OCS understands the importance of getting the job done safely and efficiently to minimise operational costs for all concerned.


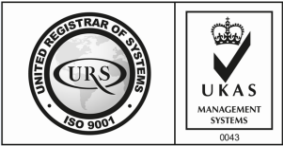
This document is prepared to outline the general planning and execution methodology, equipment and required preparation work and the equipment specification going into any shore approach project.

1.1 SHORE APPROACH EXPERIENCE


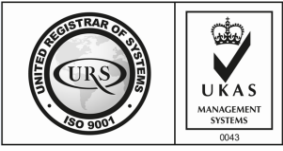
OCS has undertaken six (6) major shore approach projects for different customers, five (5) completed and one project currently in progress;

- a) Shell Exploration Pte Ltd (SEPL) SBM Bukom Pipeline Rejuvenation Phase II Project (Ongoing) – OCS is subcontracted by Sapura Offshore Sdn Bhd (S’pore Branch) for the shore approach support, onshore spool tie in replacement, construction and installation and pre-commissioning of the newly laid 2.7km pipeline:-
 - Shore approach preparation including construction of temporary access rockberm
 - Design and construction of 40m cofferdam with pre-trench,
 - 75m pre-trenching to design profile from cofferdam to offshore side
 - Beach pull hold back design and installation (actual beach pull by Sapura)
 - Backfill of cofferdam and nearshore pre trench
 - Onshore trench (tie in to existing trench)
 - Removal of existing 48” spool and construction, hydrotest and installation of new tie in spool to new pipeline at LFP.
 - Removal of 100m of existing 48” pipeline
 - Removal of temporary cofferdam and access rockberm
 - Reinstatement of landfall location

This project is currently on going at the time this document revision.

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- b) ESSO Thailand Ltd - Construction, Installation and Precommissioning of 48" Subsea pipeline at Sriracha Refinery in Chonburi Thailand (Completed Oct 2021).
OCS was contracted by PT Timas to provide construction management, engineering services and suitable equipment and personnel to prepare, plan, manage and execute the installation of a new 48" x 1.7km long Gas Pipeline including
- shore approach with landfall preparation,
 - design and construction of a 55m cofferdam with pre-trench,
 - 835m pre-trenching to design depth/profile from cofferdam to offshore up to water depth 25m (using trailer arm dredge)
 - beach pull hold back design and installation,
 - execute the 0.875km beach pull and
 - Backfilling at nearshore trench.
 - Removal of temporary cofferdam and landfall access
 - Reinstate of landfall location
- c) HCML (Husky CNOOC Madura Ltd) BD Project Pre Trench/Shore Approach Beach Pull/Post Trench (Completed Aug 2016) – 16" CWC pipeline, 52km long with 5.8km burial with 4.8km pre-trench and 1km post trench with 2m cover from T.O.P. Near shore location at Pasuruan City, Surabaya, Indonesia:
- Pre-Trenching of an open trench for a 4.8km beach pull. The trench depth was 2m T.O.P.
 - The end of pipeline is at the onshore (landfall point) and soil condition do not allow for a pulling winch foundation and calls for a customised pull barge.
 - Sheet pile Hold Back foundation behind pull barge (in clay environment)
 - 4.8 km beach pull using purpose built buoyancy foam as flotation for cable and pipe
 - Deployment of pull cable with floatations
 - Supporting operation during beach pull (trench maintenance)
 - Back filling of near shore trench.
 - Post Trenching at section after the pre-trench area
- d) Bukit Tua, Ketapang (Petronas, Completed Aug 2014) near shore at offshore Gresik in Surabaya, a 110km long of 12" CWC pipeline from shore LFP to offshore WHP, pre-trenching of first 4km pipeline for beach pull and post trenching of 27km of 12" CWC pipeline to 2m TOP:
- Sheet pile Cofferdam at the beach front due to sandy material from KP110.31 to KP110.2100.
 - Pre-Trenching of an open trench for a 4km beach pull. The trench depth is 2m T.O.P.
 - Land Fall Point at KP110.310
 - Sheet pile Hold Back foundation
 - Linear Pull Winch set up on beach front
 - 4km beach pull using purpose built buoyancy foam for cable and pipeline as flotation
 - Deployment of pull cable with cable bouys
 - Supporting operation during beach pull (trench maintenance)
 - Back filling of near shore trench.

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- e) MCJV Narrows Pipepull Project for APLNG/QCLNG, 42" Dual pipeline, API5LX65, 100mm CWC x 4km beach pull. Water depth maximum 16m. OCS was contracted by MCJV to provide:
- Pipepull Construction Engineering,
 - Pipepull Field Engineering,
 - Pipeline buoyancy fabrication and installation
 - Pipepull construction management to OCS.

The project was completed in early 2013.

- f) APD/Salamander (Serica Kambuna Development project) 2009/2010, 14" CWC pipeline x 13.000 km total burial distance (8km post trench), 2.0m TOP cover. Nearshore north of Medan, Sumatra, Indonesia; The scope involved the following:-
- Pre-Trenching of an open trench for a 5km beach pull. The trench depth was 2m T.O.P.
 - No sheet pile cofferdam was required.
 - The end of pipeline is at the onshore (landfall point) and soil condition do not allow for a pulling winch foundation and calls for a customised pull barge.
 - Sheet pile Hold Back foundation behind pull barge (in clay environment)
 - 5km beach pull using purpose built buoyancy foam as flotation for cable and pipe
 - Deployment of pull cable
 - Supporting operation during beach pull
 - Back filling of near shore trench.
- g) Other projects that OCS personnel were intimately involved in (while employed by major offshore contractor, with experience maintained within OCS) are
- John Brooks Project for Apache Energy Limited (Australia – 2005) – laying of one DN450 55km Gas export line with a 7km beach pull in Varanus Island, with rock bolting as the major stabilization method. Hold back for the Linear pull Winch was a drilled and grouted steel tendons.
 - Camau Gas Pipeline Project (PetroVietnam - 2006) for the installation of a 297km 18' gas pipeline from offshore (BRB platform to Land Fall Point in Camau) covering near shore excavation and pre trenching and backfilling, beach pull preparatory work (LPW on pull barge), hold back sheet pile wall and a 3 km beach pull operation.

Our in-house equipment spread capability is described in detail in this document. OCS is equipped to handle the full range of shore approach and pre-trenching activities with depth of cover ranges from one (1) to two (2) metres in shallow water.

OCS is equipped to handle large projects or discrete project elements depending on the specific needs of the customer. During the preparation for shore approach or any offshore work the safety of personnel, equipment and environment plays a vital role in the success of a project and as such, HAZID's shall be conducted prior to any operations. These meetings are attended by key engineers and supervisors and all potential risks are identified and mitigation measures put in place to ensure they are as low as reasonably practicable.

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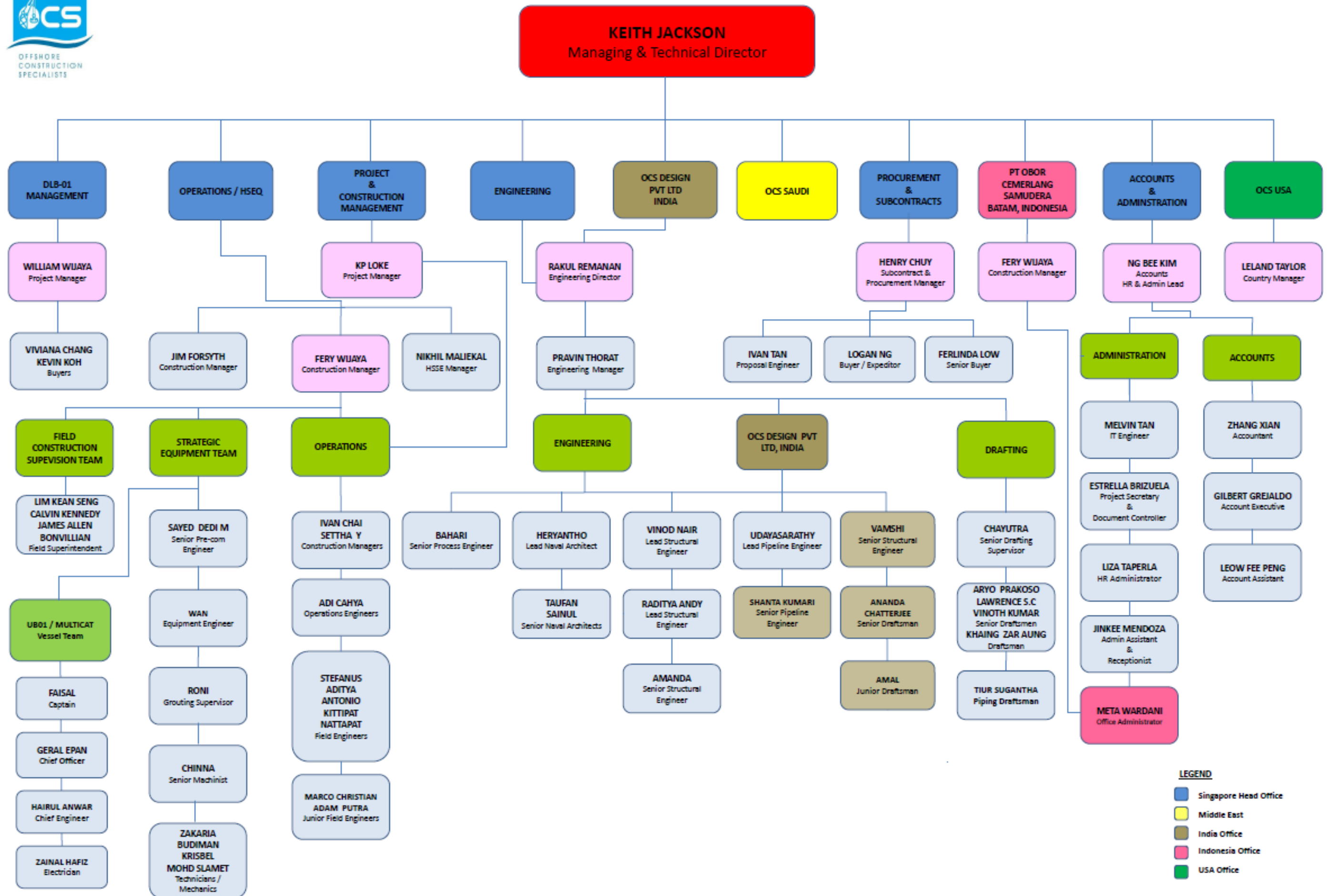
2.0 OCS ORGANISATION CHART

2.1 KEY PERSONNEL CONTACTS

Keith Jackson	Managing and Technical Director	keith.jackson@offshore-ocs.com
Rakul Remanan	Engineering Director	rakulr@offshore-ocs.com
William Wijaya	Project Manager	william.wijaya@offshore-ocs.com
Loke Kah Poh	Project Manager	kploke@offshore-ocs.com
Fery Wijaya	Construction Manager	fery@offshore-ocs.com
Ivan Chai	Construction Manager	ivan.chai@offshore-ocs.com
Henry Chuy	Subcontracts & Procurement Manager	chuy.chunfei@offshore-ocs.com

Refer to the next page for OCS Organisation Chart

OCS ORGANISATION CHART

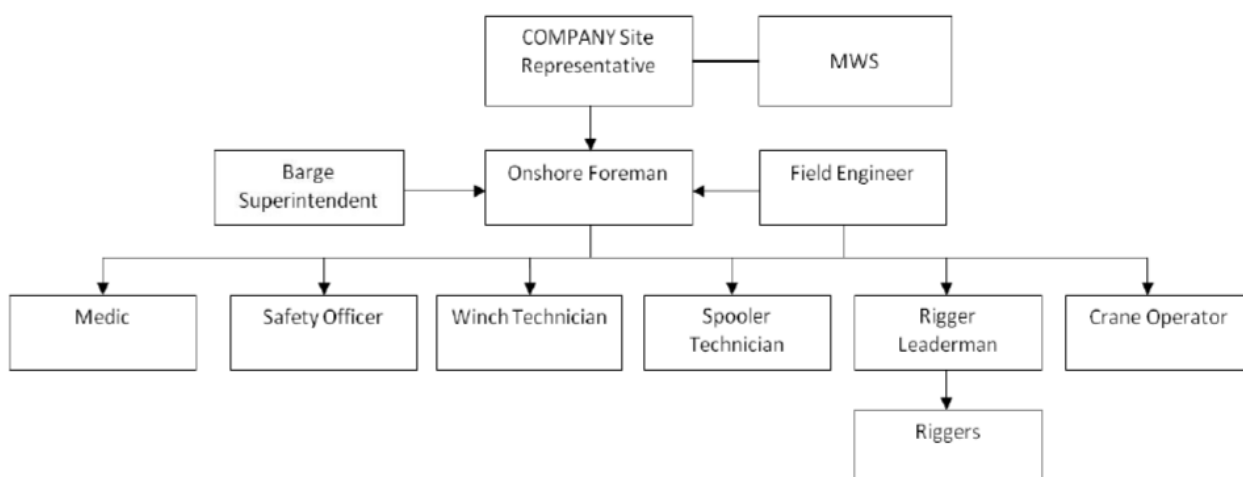


LEGEND

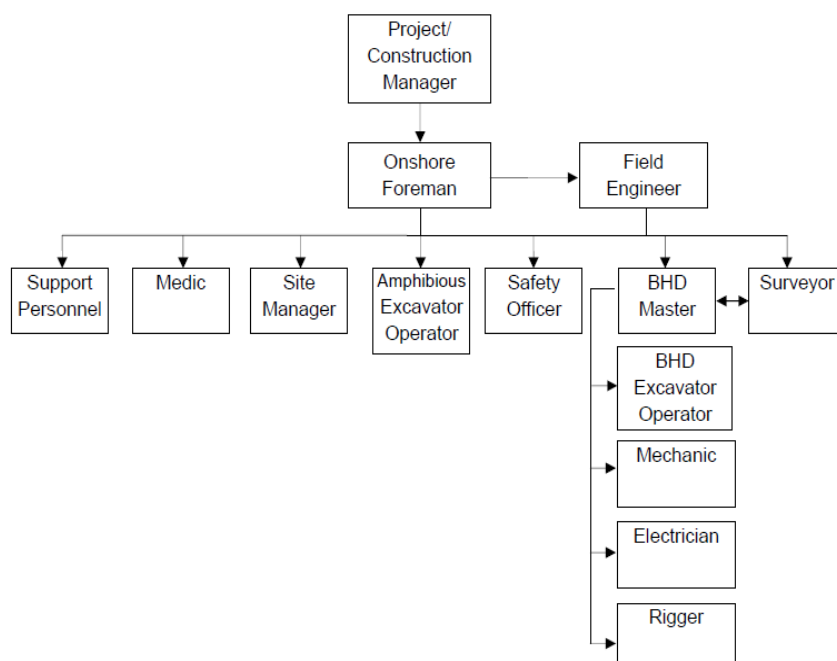
- Singapore Head Office
- Middle East
- India Office
- Indonesia Office
- USA Office

3.0 TYPICAL PIPELINE SHORE APPROACH ORGANISATION CHART

Typical onshore Land Fall Site set up during beach pulling operations:



Typical Organization Chart for pre-trenching operations



The final organization set up will depend on project specific requirement and OCS will tailor to suit.

4.0 PLANNING AND EXECUTION

For any shore approach projects, OCS will cover the following areas during planning and execution.

4.1 Planning Stage

The first activity on award, OCS will review the requirements, drawings, specification and environmental information – water depth, tides, currents, soil type and local site infrastructure to establish a shore approach execution plan which will be the basis for procedure and engineering to proceed.

- i. Buoyancy requirement based on beach pull length, pipe size, on bottom stability. These covers cable buoys and pipeline buoys.
- ii. Hold back beam and foundation design (typically sheet pile wall in trench able areas or drilled and grouted tendon hold back in hard rocky locations).
- iii. Linear Pull Winch foundation capacity design check
- iv. Pull head design
- v. Linear Pull winch capacity specification
- vi. Trench depth and wide design to suit equipment and soil type
- vii. Requirement of a cofferdam vs open trench
- viii. Mobilization plan for equipment and ancillaries
- ix. Major procurement plan/strategy
- x. Support equipment/vessels that are required

4.2 Pre-Trench

Pre-trenching works requires the excavation of bulk spoil and deposited to nearby area. Depending on the proximity of the shoreline, it can be defined either as a floatation trench or a pipe trench. A floatation trench is one that requires a trench to be excavated to enable the pre-trench barge to access toward shore line. Once the floatation trench is established the pipe trench can proceed. Depth of floatation trench depends on the tide and pipe trench will depend on the required cover. Where the water depth is sufficient for the trench barge to operate no floatation trench will be necessary.

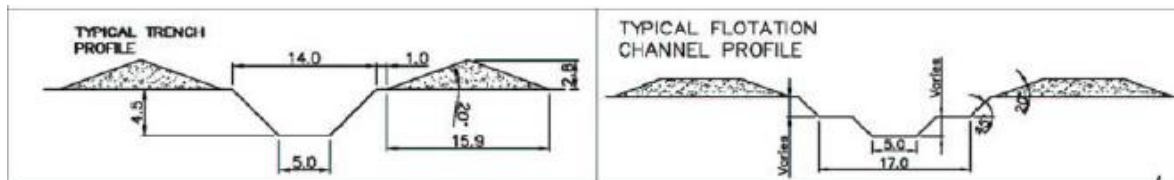


Figure 4.2.1 Type of pre-trench "Floatation trench" or "Pipe trench"

Prior to excavation works, a pre-engineering survey will need to be performed, which will map the bathymetry of the natural seabed, and to mark out the excavation limits. This survey will also mark out the winch location to ensure alignment with the offshore and onshore pipeline. Pre-trenching works will be planned with due considerations to the tides. Tides will be monitored during the works and compare to existing data available.

Pre-trenching is performed from Miss Pennie using the 2x CAT390 excavators with customised long arms and equipped with 2m³ buckets.

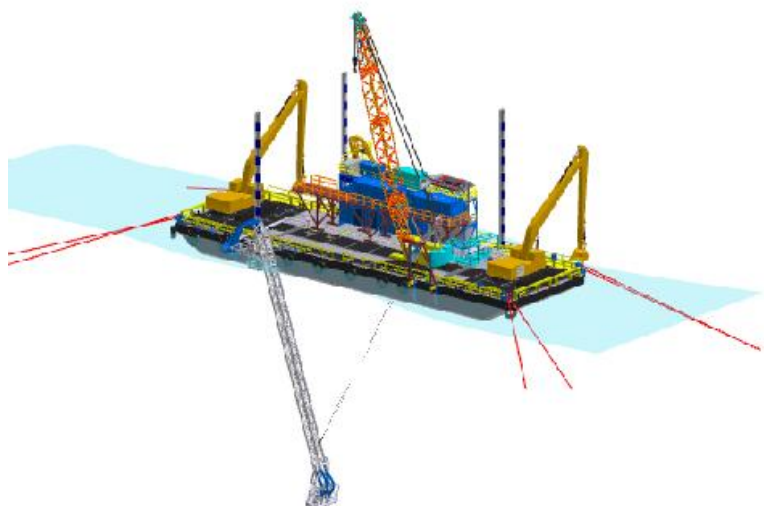


Figure 4.2.2 Miss Pennie with 2 x CAT390 Excavators bow and stern.



Figure 4.2.3 Miss Pennie with 2 x CAT390 Excavators

Using the spuds configuration Miss Pennie can excavator to water depth of 15m. For deeper water depths above 15-30m, pre trenching can be done using OCS bespoke trailing jetting arm (refer to above picture, trailing arm in white). Details pertaining to this deeper water pre-trenching (and post trenching if required), refer to the document Pre Trenching Services Pre-Qualification.



4.3 Cofferdams

Cofferdams are support structure erected at the beach head where pipeline is to be buried, to provide structural support to keep the open excavation from collapse due to unsuitable soil condition. A decision to erect a cofferdam is crucial as it is expensive and time consuming which requires a considerable amount of resources and cost as well as schedule sensitive and should only be decided if no alternative is available.



Figure 4.3.1 Typical cofferdams (previous projects)

4.4 Linear Pull Winch, Spooler and Cables

The line pipes are pulled off from the Pipe Lay Barge from offshore location using a suitably sized Linear Pull Winch (Lucker Winch) positioned and secure at onshore. Lucker winch is design with either a 300mT, 400mT or 450mT capacity and is available in this region. Lucker winch is hydraulically powered and will required dedicated power pack which comes standard. To complement the use of Lucker winch, a suitably sized pull cable is required and dependant on the length of the beach pull, one or several reels of pull cables are required. When more than one reel of cable are required then factors like craneage at site, wire socket handling management, reel storage management must be carefully assessed. These reels are hydraulically operated to deploy the pull cable as well as during beach pull operations where the pull cable will be recovered and stored back into its storage reels. A powered spooler is also part of the standard equipment for every beach pull operation.

OCS has the expertise and can provide management support to hire this lucker winch package including power packs and spooler, as well as sourcing of the required and suitable pull wires.



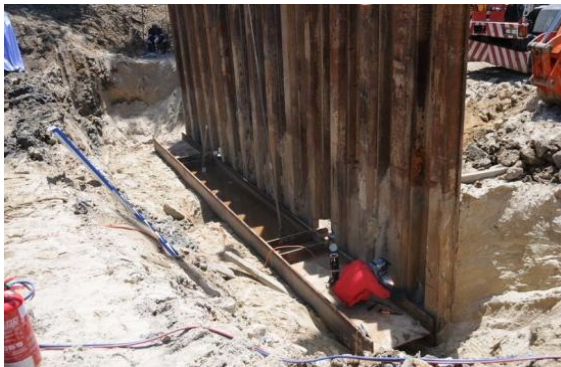
Figure 4.4.1 Typical Lucker Winch/Spooler set up on the beach head



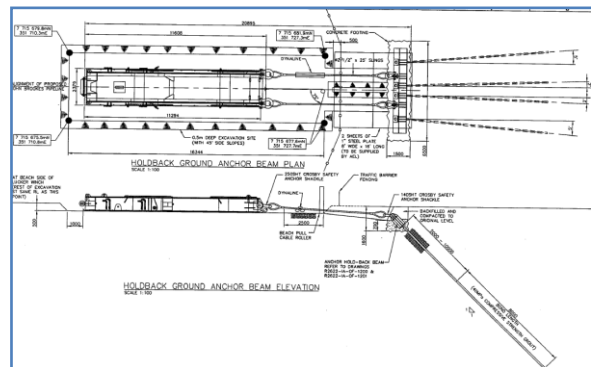
Figure 4.4.2 Lucker winch/Spooler can also be set up on the barge (pull barge option)

4.5 Lucker Winch Hold Back

During beach pull operation with the Linear Pull Winch (lucker winch), the winch will exert a significant amount of force onto an “anchor” to react with the pulling load of the pipe weight from the barge. A hold back foundation will need to be design and installed behind the lucker winch as a hold back “anchor”. Depending on the soil/ground condition, a sheet pile hold back wall is normally selected. For harder ground or rock formations, it is generally required a drilled and grouted foundation.



Typical Sheet Pile hold back



Drilled and grouted hold back

The lucker winch is tied back to the hold back foundation using wires that are also suitably sized.

OCS is very familiar with both type of foundation used and have designed and utilized these for a number of projects.

4.6 Land Fall Site (LFS) Set up

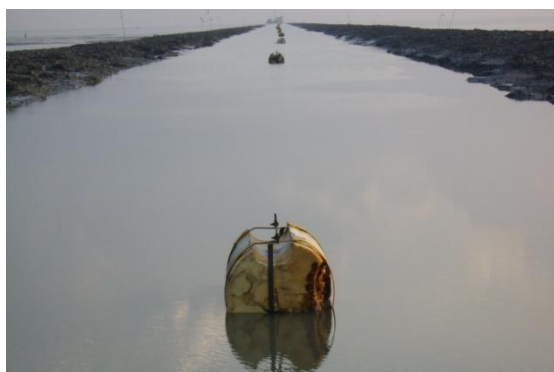
The landfall site will serve as the base of pre-trenching operations as well as beach pull activities. The landfall site will include site office, accommodation (if necessary), power and lighting, compressed air supply, communication with internet, logistics and transportation and amenities suitable for 24 hour manning, fire fighting and emergency facilities.. For safety and security purposes it is normal that border fences are erected around the work site. Proper layout including craneage will have to be planned to ensure coverage. The LFS set up is critical as it will support all preparation works for a successful beach pull to avoid delays to the critical path of the pipelay spread. A dedicated ERP will be prepared for each LFP set up to ensure compliance with regulatory requirement

4.7 Pull Wire deployment

Pull wire as noted will be suitably sized for the beach pull operation. Depending on the length required for the beach pull, several reels of wire may be required and suitable craneage to be available at the LFS or in the vicinity. For the beach pull operation, the pull wire will have to be deployed from the lucker winch on shore up till offshore location where the socket end will be recovered by the pipe lay barge to be connected to the start up head to commence beach pull operation. The pull wire deployment will be performed prior to the arrival of the main pipe lay barge.

Pull wire deployment is critical as an incorrectly deployed pull wire will have significant impact to the pulling operation and affects the final pull alignment making the pipeline to be outside the allowable corridor. In cases where a narrow corridor are imposed for the shore approach section, an incorrectly place pull wire may make contact to adjacent subsea asset posing a threat of damage.

OCS has successfully deployed pull wire using a shallow floating pontoon (in most instances, either a pull barge or a pre-trench spread) where the excavator and spuds positioning the pull cable along the required alignment while attaching the cable buoyancy on. At the final location where the end socket will be position (for recovery by the pipelay barge) a clump weight with a marker buoy will be installed. Timing of the pull wire deployment also plays a big part in the planning as the pull wire is to be deployed just in time for the pipe lay barge arrival. If deployed too early, the pull wire may risked being drifted away from current or disturbed by external factors (e.g., fishermen, fishing boat, etc)



Pull wire cable buoy



Pull wire cable buoy at end (awaiting recovery)

4.8 Buoyancy

Buoyancy is required for all beach pull operations to reduce pipe weight that generate drag force due to friction and results in higher pull load. Increase load will cause the pipe and cable to “bite” into the soil/mud and attract significant friction loads which could go beyond the designed pulling capacity of the Linear pull winch.

Two (02) types of buoyancy units are normal used during beach pull operation, one for pull wire and one for buoyancy for pipeline. Both may use the same buoyancy units (meant for pipeline) however the buoyancy for the pull wire will require a smaller dimension.

The buoyancy attached to the pull wire will be installed when the wire is deployed, with the purpose of keeping the wire out of the mud/seabed during the main pull. Without the buoyancy, the pull wire will likely lie on the seabed for the entire length of the pull and will subsequently attract very significant load. Size and location of the buoyancy unit on the cable will have to be properly assessed to ensure only sufficient (minimum) contact to the mud line and still keep the pull wire within the required corridor (against it being moved/drift due to current)

Larger buoys will be strapped onto the pipeline on board the pipe lay barge during welding out and pulling from the beach. The buoy will float the pipe reducing the pull load on the lucker winch set up at the LFS. The buoyancy units will be attached to the pipe with 32mm wide x 0.8mm thick steel strapping. The size, quantity and location of the buoyancy unit will be project specific depending on the pipe size weight, length of pull and pull capacity available.

OCS has successfully performed numerous beach pull with a correctly sized equipment (LPW, pull wire, buoyancy units, etc) for each project.





Pull Cable buoyancy



Pipeline Buoyancy

Pipeline buoyancy will house facility to allow it to be “stripped” from the water surface/subsurface without having divers in the water to cut the straps.

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4.9 Pull Barge Option

For locations where the ground foundation does not allowed for the setting of the Linear Pull Winch, a pull barge option is to be used. Where pull barge option is considered, the Linear pull winch are mobilised and secured on to a pull barge acting as a floating pontoon. All support equipment complementing the Linear Pull Winch (e.g., Power pack, Hydraulic spool, Cable reels) will be mobilised and secured onto the pull barge. The pull barge is then towed to location and it will then manoeuvre itself using spuds and excavator.

4.10 Execution Procedures

OCS will provide project specific execution procedures for every project which address all elements of the shore approach project. These procedures must be approved by the client. OCS will ensure that the procedures address all constraints posed by individual project site conditions and the specific scope of work.

4.11 Equipment Testing

OCS will ensure that all equipment mobilised is fully tested before leaving the OCS facility. Client representatives will be invited to witness the testing programme. For more difficult jobs, further specific testing may be required which will be determined on a case by case basis.

4.12 HAZID



Specific HAZID and risk identification sessions will be conducted to identify and propose mitigation measures for site hazards which may be posed by operations.

4.13 Equipment Mobilisation and Demobilisation

OCS will provide a procedure for equipment mobilization and demobilisation which will be in accordance with client requirements. The procedure will ensure the right equipment, properly prepared is in the right place at the right time.

4.14 Personnel

OCS will provide a team of qualified personnel to co-ordinate and operate the equipment on a 24 hour basis. Key personnel will be the same as those who tested and mobilized the equipment. The OCS proposed organization chart is in section 2.

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4.15 Site Operations

Typical procedures for site operations are included in this document. OCS will work closely with the client to ensure post trenching activities are closely coordinated with other activities on the project.



4.16 Surveys

Typically the pre-trenching barge will be fitted out during mobilisation with a survey spread including positioning system, land survey and echo sounder or similar to map the trenched seabed features. The position of the pre-trench barge relative to the proposed pipeline route will be shown on the survey screen/computer on the barge to ensure the barge is in correct position during excavation works. This will be supplemented with the land survey equipment based on the shore which will give a visual indication of pipeline route and barge position.

5.0 OCS CLIENT BASE

OCS has built up a significant customer base during fifteen (15) years of operations. OCS past and present clients are listed below. References can be provided on request:

NO	CLIENT NAME
1	Asia Petroleum Developments / Salamander Energy (Indonesia) [*]
2	Bumi Armada
3	Chevron (Thailand)
4	Clough Sapura JV (Australia) [*]
5	DOF Subsea.
6	EMAS (Singapore)
7	Franklin Offshore (Singapore)
8	Galoc (Philippines)
9	GFI (Thailand)
10	Global Industries (Malaysia)/Technip
11	Hako Offshore (Singapore)
12	Heerema (Netherlands)
13	HESS (Indonesia) [*]
14	Kangean Energy (Indonesia)
15	Larsen & Toubro (Malaysia/ India)
16	M3 Energy (Malaysia)
17	McConnell Dowell CCC JV (Australia)
18	MRTS Engineering Ltd (Russia)
19	Newfield Peninsula Malaysia (Malaysia)
20	Nippon Steel (Indonesia)
21	NorCE (Singapore)
22	NuCoastal (Thailand)
23	Offshore Marine Contractors
24	Origin Energy (Australia)
25	PT Timas Suplindo (Indonesia)
26	Petronas Carigali Ketapang 2 Ltd (Indonesia) – PCK2L [*]
27	Pacific Energy Aviation (PNG) Ltd
28	Sapura Acergy (Malaysia)
29	Sarku (Malaysia)
30	Sea Drill (Singapore)
31	Star Petroleum (Indonesia)
32	Swiber (Singapore)
33	TLO Sapura Crest (Malaysia) / Sapura Offshore Sdn Bhd (SOSB)
34	Vietsovetropetro (VSP) (Vietnam)
35	Esso Thailand Ltd

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6.0 PIPELINE PRE-TRENCH AND SHORE APPROACH - TRACK RECORD

YEAR	PROJECT	CLIENT / OPERATOR	SCOPE OF WORK
2022	SBM Pipeline Rejuvenation Phase II Project	Client: Sapura Offshore Sdn Bhd (Singapore Branch) Operator: Shell Eastern Petroleum (Pte) Ltd	OCS was contracted by Sapura Offshore Sdn Bhd (Singapore Branch) to provide Onshore Beach Pull services where the scope entails access rockberm design and preparation, design and construct a 40m temporary cofferdam and 75m of pre trenching outside the cofferdam and design and installation of a hold back anchor for Linear Pull Winch. The scope also includes new trench to replace the existing onshore Tie In Spool with a new 48" spool to the new pipeline which will be installed by SOSB. Additionally, the scope includes precommissioning of the prefabricated spools and a final leak test for the completed pipeline. (Project is on going)
2021	ESSO Sriracha Thailand Construction, Installation and Precommissioning of 48" Subsea pipeline at Sriracha Refinery Chonburi.	Client: PT Timas Suplindo Operator: Esso Thailand Ltd	OCS was contracted by PT Timas to provide construction management, engineering services and suitable equipment and personnel to prepare, plan, manage and execute the 48" x 1.7km long Gas Pipeline including shore approach with landfall preparation, construction of a 55m cofferdam with pre-trench, 835m pre-trenching to design depth/profile from cofferdam to offshore, beach pull hold back design and installation, 0.875km beach pull and backfilling. Project was completed in Oct 2021
2016	HCML BD Project Pre-Trenching / Shore Approach Beach Pull / Post Trench	Client: PT Timas Suplindo Operator: Husky-CNOOC Madura Ltd (HCML)	OCS was contracted by PT Timas to provide management, engineering services and suitable equipment and personnel to prepare, plan and manage and execute the 16" Gas Pipeline shore approach with 4.8km pre-trenching, hold back design and installation, 4.8km beach pull and a 1km post trench section. Project was completed in August 2016
2014	Petronas Ketapang (Indonesia)	Client : PT Timas Suplindo Operator : Petronas (PCK2I) Indonesia	OCS was contracted by PT Timas laying 110km of 12" pipeline from on shore to offshore with pre-trenching for first 4km and subsequent 4km beach pull The work was completed in 2014
2012	MCJV Narrows Pipepull project (Queensland Australia)	Client: MCJV (McConnell Dowell Constructors (Aust) Pty Ltd., Consolidated Contracting Company Australia Pty Limited) Operator: QGC Pty	OCS was contracted by MCJV to provide: 1) Pipepull Construction Engineering, 2) Pipepull Field Engineering, 3) Pipeline buoyancy fabrication and installation 4) Pipepull construction management to OCS. The project was completed in early 2013.
2009	Serica Kambuna Field	Client: PT Timas Suplindo	<ul style="list-style-type: none"> 14" x 39.0 km pipeline, including 5500m beach pull section for nearshore approach



OFFSHORE CONSTRUCTION SPECIALISTS

PIPELINE SHORE APPROACH PRE-QUALIFICATION DOCUMENT



YEAR	PROJECT	CLIENT / OPERATOR	SCOPE OF WORK
	Development	Operator: Asia Petroleum Development (APD) / Salamander Energy	<ul style="list-style-type: none"> • Super duplex pipeline section, expansion spool and riser in the platform approach area (400m) • Pipeline pre-commissioning (flood, pig, testing) • Pre-trenching and pipe burial (jet) for 13.0 km section of 14" pipeline, 2.0m TOP cover • Seabed: Black stiff consolidated silt clay •
2006	John Brooks Field Development	Client : Apache Energy Ltd (Australia) Operator : Apache Energy Ltd (Australia)	<ul style="list-style-type: none"> • Laying of DN450 55km Gas export line with a 7km beach pull in Varanus Island, with rock bolting as the major stabilization method. • Hold back for the Linear pull Winch was a drilled and grouted steel tendons. • Manage by OCS personnel while they were employed by major offshore contractor
2005	Camau Gas Pipeline Project	CLIENT : VSP OPERATOR : PVGAS	<ul style="list-style-type: none"> • Installation of a 297km 18' gas pipeline from offshore (BRB platform to Land Fall Point) covering near shore excavation and pre trenching, beach pull preparatory work (LPW on pull barge), hold back sheet pile wall. • Manage by OCS personnel while they were employed by major offshore contractor

**PROJECT : ESSO SRIRACHA SUBSEA CRUDE PIPELINE CAPACITY
MAINTENANCE PROJECT AT SRIRACHA REFINERY CHONBURI**

Project Details:-

Esso Thailand Ltd (ETL) owns and operate the Sriracha Refinery in Chonburi, which has been processing imported crude since late 1960s. The existing subsea loading system includes a PLEM located in 22m water depth and is approximately 1.7km offshore from the refinery. In order to sustain a throughput capacity of 174kbd through to year 2050, a new 48" crude pipeline including a PLEM will replace the existing loading system.

The new replacement pipeline will be trenched and buried (backfill with the indigenous soil) along its full length including the new subsea PLEM at the new offshore MBM location. The new PLEM is located at 22m water depth below MSL and 25m north of the existing PLEM.

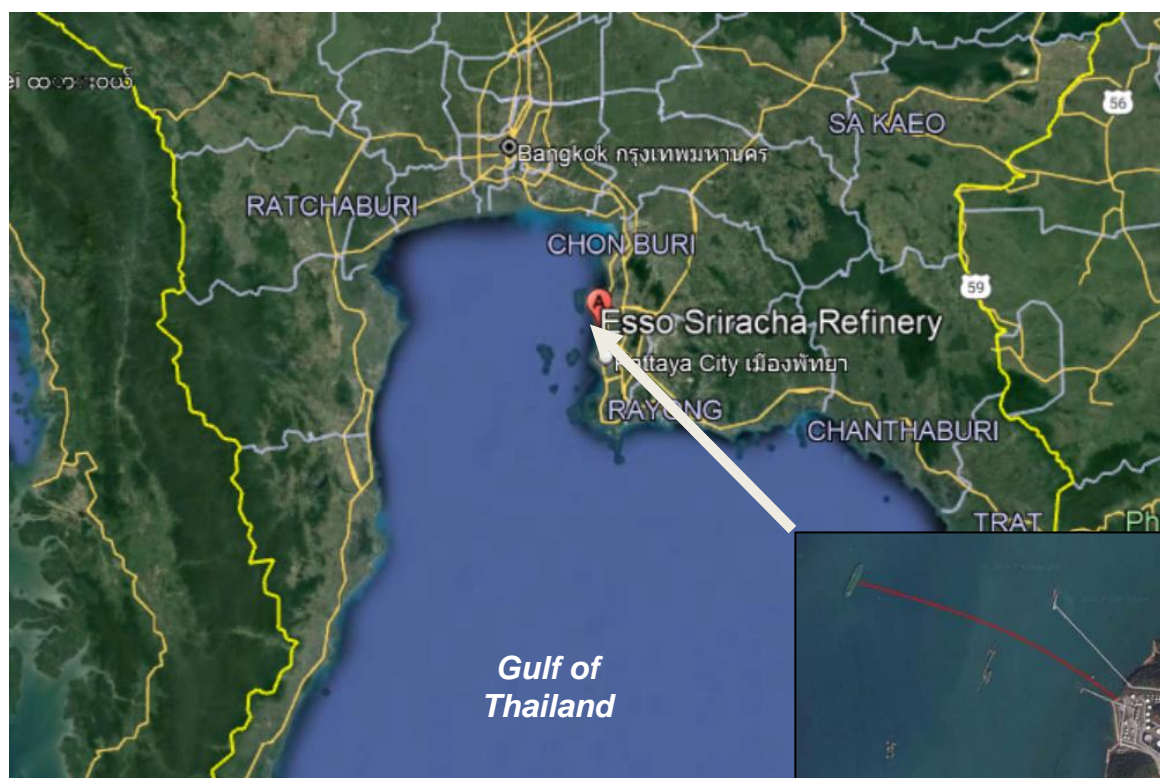
Pipeline/Trench Information:-

Pipeline Size:-	48" (1219mm)
Pipeline wt:	22.23mm
Pipeline Grade	API 5LX60
Concrete thk & density	100mm thk, 3040 kg/m3
Linear Winch	300 mT
Pipeline length	1.715km
Water Depth	22m @ PLEM
Beach Pull Length	0.875km
Pre-trench	4.8km

Project Scope:-

OCS scope for this project is to provide construction management, engineering services and suitable equipment and personnel to prepare, plan, manage and execute the 48" crude pipeline replacement shore approach with 1.7km pre-trenching, beach pull hold back design and installation, 0.875km beach pull and backfilling. The new 48" pipeline was laid by PT Timas using the DLB01. OCS also provided the construction management for the pipelaying operation. Project was completed in October 2021

Pictures



General Site location

Pictures (continued)



Landfall location

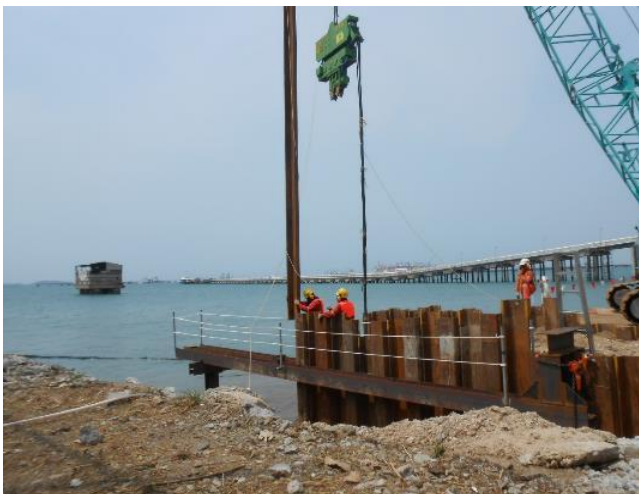


Landfall Before



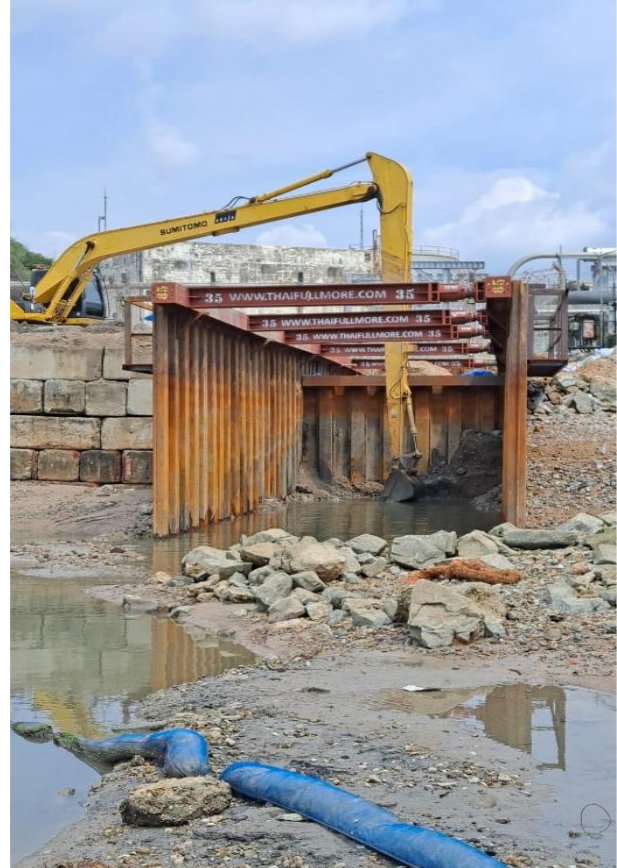
Landfall after preparation

Pictures (continued)



Cofferdam Installation

Pictures (continued)



Cofferdam

Pictures (continued)



Lucker Winch Installation

Pictures (continued)



Pre Trenching using UB01 Ms Pennie including the use of the trailing arm dredge

Pictures (continued)



Beach pull / pipelay using DLB01

PROJECT : HCML BD PROJECT PRE TRENCH/SHORE APPROACH BEACH PULL/POST TRENCH

Project Details:-

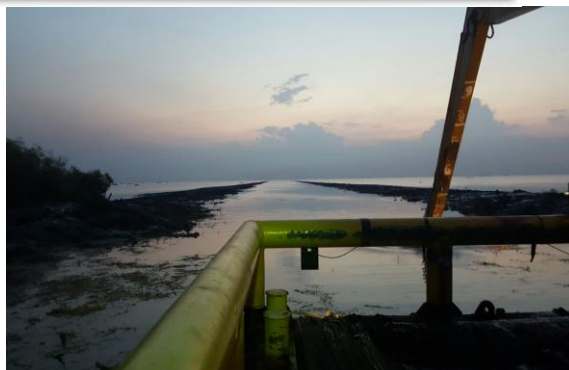
Husky-CNOOC Madura Ltd. (HCML), plans to develop the Madura Strait Block BD gas reserves for sales gas to buyers in Java Island. This field is located offshore in the Madura Strait East Java, about 65 km east of Surabaya and about 16km south of Madura Island. The project includes development of a wellhead platform; an offshore spread moored Floating, Production, Storage and Offloading (FPSO) with gas processing facilities; Gas metering Station (GMS); flexible risers from wellhead platform to FPSO; and a 16" x 52.924km export gas pipeline from WHP to GMS

Pipeline/Trench Information:-

Pipeline Size:-	16"
Pipeline wt:	11.1mm
Pipeline Grade	API 5LX65
Concrete thk & density	90mmthk, 3044 kg/m3
Linear Winch	400 mT
Pipeline length	52.9km
Water Depth	60m @ Pltf
Beach Pull Length	4.8km
Pre-trench	4.8km
Post trench	1km
Cover	2m T.O.P

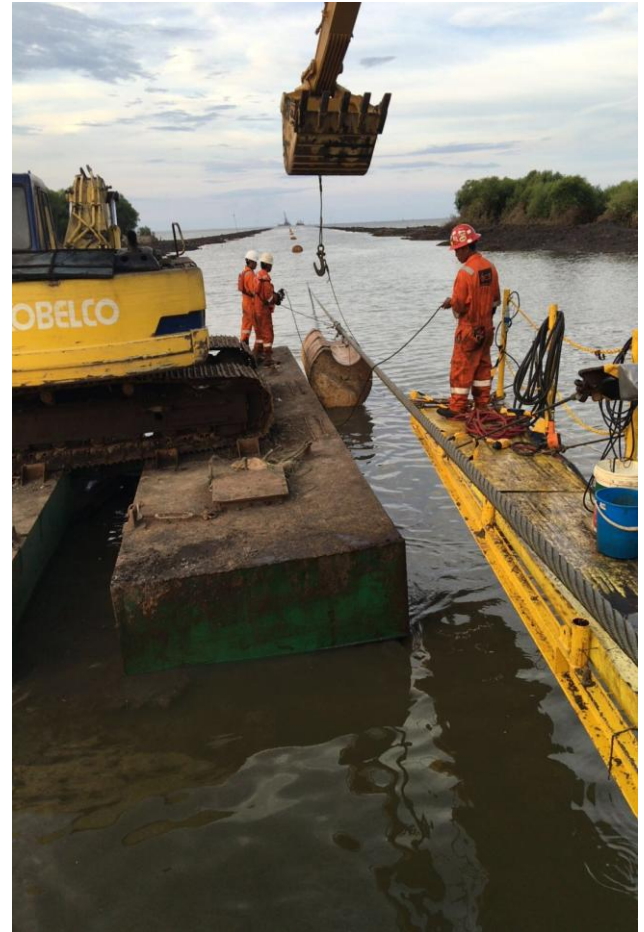
Project Scope:-

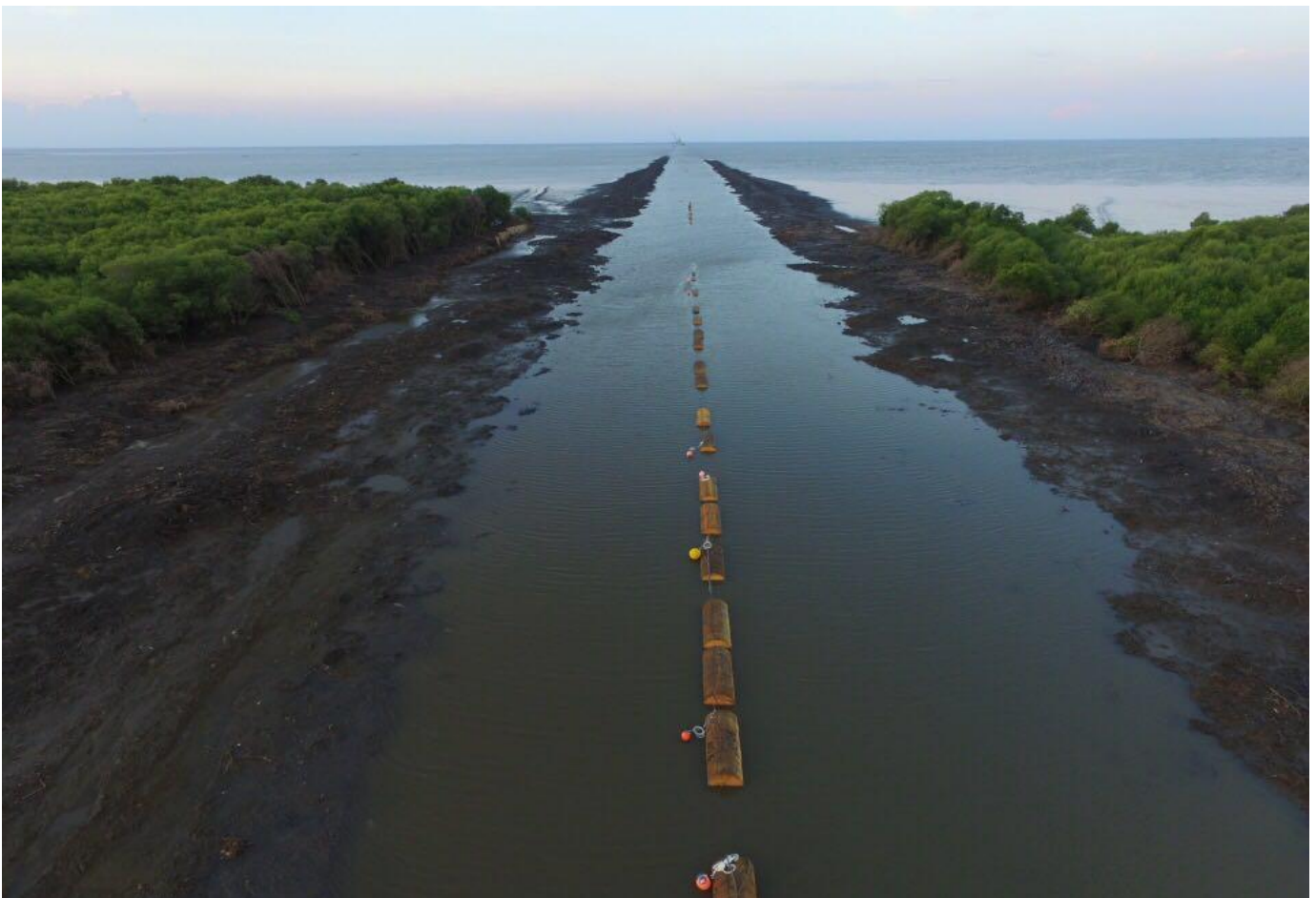
OCS scope for this project is to provide management, engineering services and suitable equipment and personnel to prepare, plan and manage and execute the 16" Gas Pipeline shore approach with 4.8km pre-trenching, hold back design and installation, 4.8km beach pull and a 1km post trench section. Project was completed in August 2016





PRE TRENCH AND PULL BARGE





PROJECT : KETAPANG BUKIT TUA (PETRONAS) PRE TRENCH/SHORE APPROACH BEACH PULL

Project Details:-

PC Ketapang II Ltd (PCK2L) is developing the Bukit Tua Field, in Ketapang Block, East Java. Bukit Tua, is located 35 km north of Madura Island and 110 km northeast of Gresik at a water depth of approximately 57m.

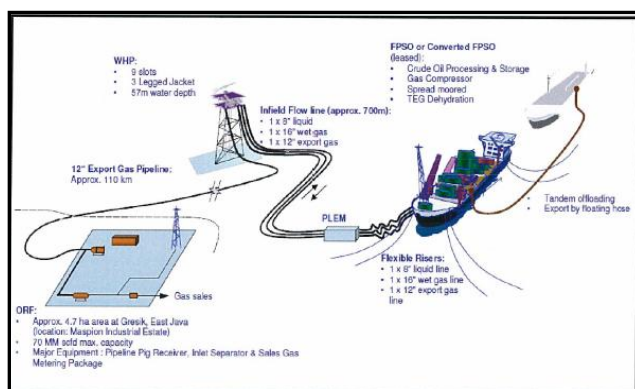
The development consist of unmanned Well Head Platform (WHP) which is tied back to a spread-moored Floating Production, Storage and Offloading (FPSO), anchored approximately 900 m from the WHP. The Full Well Stream (FWS) from the wells are separated into gas and liquid streams in the production separator on WHP. The gas and liquid are evacuated to the FPSO via two separator single phase 16" and 8" liquid infield flowlines. Associated gas is compressed and conditioned on the FPSO and exported via a 12" gas pipeline to WHP and there onwards via a 12" gas export pipeline to the Onshore Receiving Facilities (ORF) in Gresik.

Pipeline/Trench Information:-

Pipeline Size:-	12"
Pipeline wt:	varies
Pipeline Grade	API 5LX60
Concrete thk & density	70mm, 3044 Kg/m3
Linear Winch	450 mT
Pipeline length	110km
Water Depth	57m @ Pltf
Beach Pull Length	4km
Pre-trench	4km
Post trench	25km
Cover	2m T.O.P

Project Scope:-

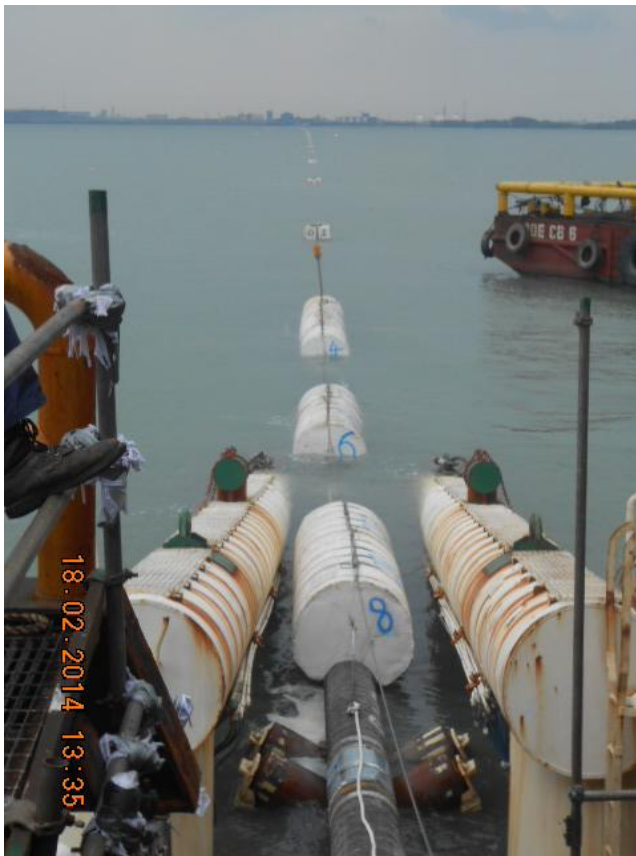
OCS scope for this project is to provide project management and engineering services to prepare, plan and manage the installation of the new facilities comprising WHP platform, 1x12"x110km pipeline and 3x in field pipelines (8", 12" and 16") including shore approach and preparation with 4km pre-trenching, 4km beach pull, pipelay, post trenching and pre-commissioning. Project was completed in 2014



PRE-TRENCH, PULL WIRE DEPLOYMENT AND RECOVERY



BEACH PULL / PIPELAY FROM PIPELAY BARGE DLB01)



BEACHPULL OPERATION AND COFFERDAM



LPW HOLD BACK AND SPOILER



PROJECT : MCJV NARROWS PIPEPULL

Project Details:-

MCJV was awarded a contract with QGC for the installation of two (2) 42" (DN1050) pipelines with 100mm concrete thickness from the Queensland coal seam gas fields in the Surat Basin to the Curtis Island LNG facility near Gladstone, Queensland. The pipelines must cross the Narrows seaway passage and adjacent marshlands between the Australian mainland and Curtis Island. The crossing construction work was performed using pipe pull method through the Marshland cofferdam, open cut trench through the Narrows, to the Curtis Island cofferdam (shore approach). The dual 42" pipeline strings (APLNG and QCLNG) was pulled using a 450 MT Linear Pull Winch and Ø90mm pull wire.

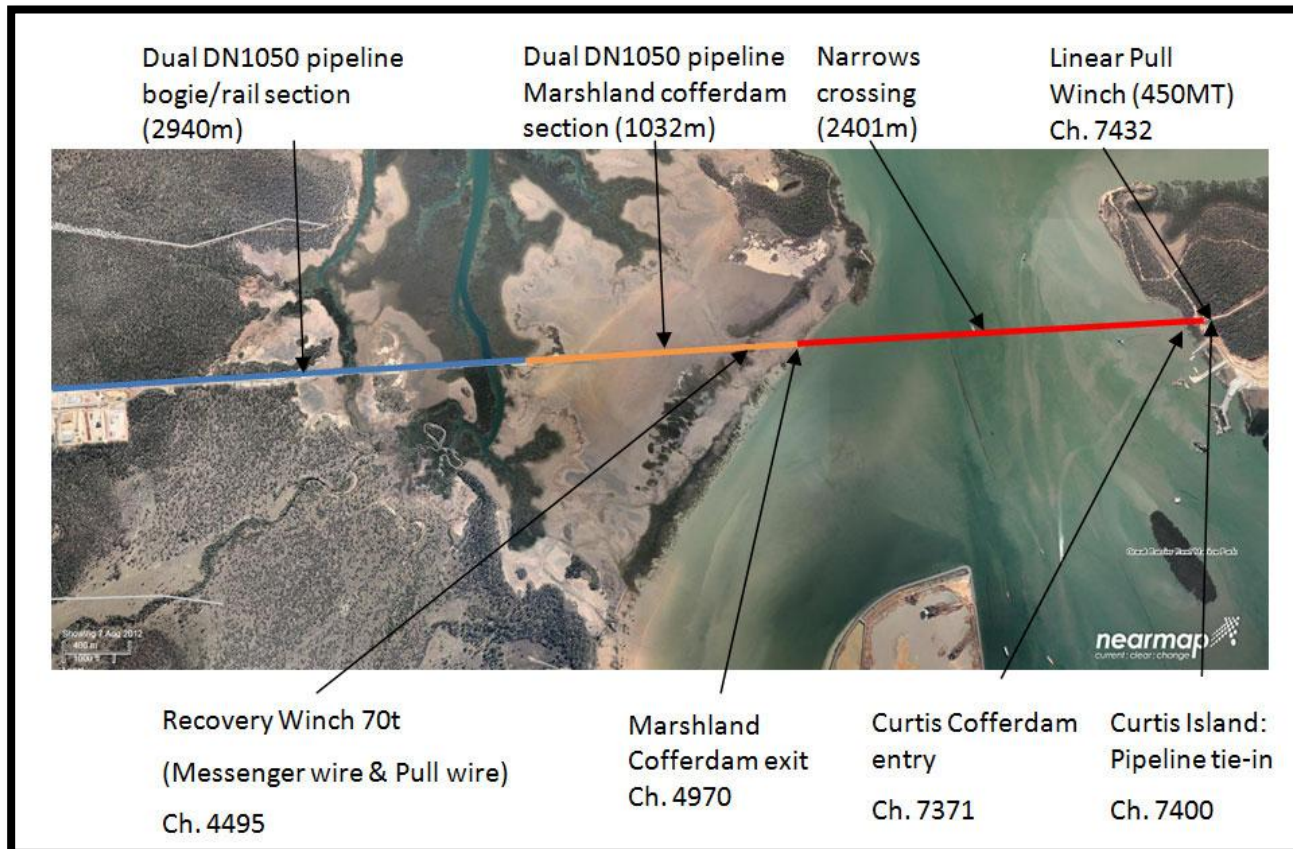
Project Scope:-

MCJV awarded the following scope to OCS

- 1) Pipepull Construction Engineering,
- 2) Pipepull Field Engineering,
- 3) Pipeline buoyancy fabrication and installation
- 4) Pipepull construction management to OCS.

Pipeline/Trench Information:-

Pipeline Size:-	42" (Dual)
Pipeline wt:	varies
Pipeline Grade	API 5LX65
Concrete thk & density	100mm, 3044 Kg/m ³
Linear Winch	450 mT
Pipeline length	2.45km
Water Depth	16m
Beach Pull Length	4km



Overall Layout



Pipeline on bogies



Pipe-pull into cofferdam



Foam Buoyancy Installation



In-hauling of pipe string with Linear Winch Puller



Pipe string exiting mainland cofferdam

PROJECT : KAMBUNA (APD/SERICA) PRETRENCHING AND SHORE APPROACH & BEACH PULL

Project Details:-

Asia Petroleum Development (APD) Ltd developed the Glagah Kambuna Field located approximately 70km North East of Medan, North Sumatera. An offshore wellhead platform (WHS-A) will produce gas and condensate, which will transport to the Onshore Receiving Facilities (ORF) by a 14" Pipeline for further processing. The Pipeline is 42km long from the Kambuna platform in the straits of Malacca to the landfall site.

OCS was contracted by PT Timas Suplindo (Main contractor to APD) for the installation of the export pipeline from the wellhead platform to shore crossing at Pangkalan Brandan, North Sumatera.

Pipeline/Trench Information:-

Pipeline Size:-	14"
Pipeline wt:	11.5mm to 11.9mm
Pipeline Grade	API 5LX65
Pipeline length	42km
Water Depth	53m deepest
Beach Pull Length	5km pull
Pre-trench	5km to nearshore
Post trench	8km till 13m WD
Cover	2m T.O.P

Project Scope:-

OCS scope for this project is to provide management and engineering and technical services to prepare, plan and manage the installation of the 14" pipeline including shore approach, beach pull preparation, nearshore preparation, beach pull execution, pipelay, pre an dpost trenching and pre-commissioning. The project was completed in 2009

Pictures:-

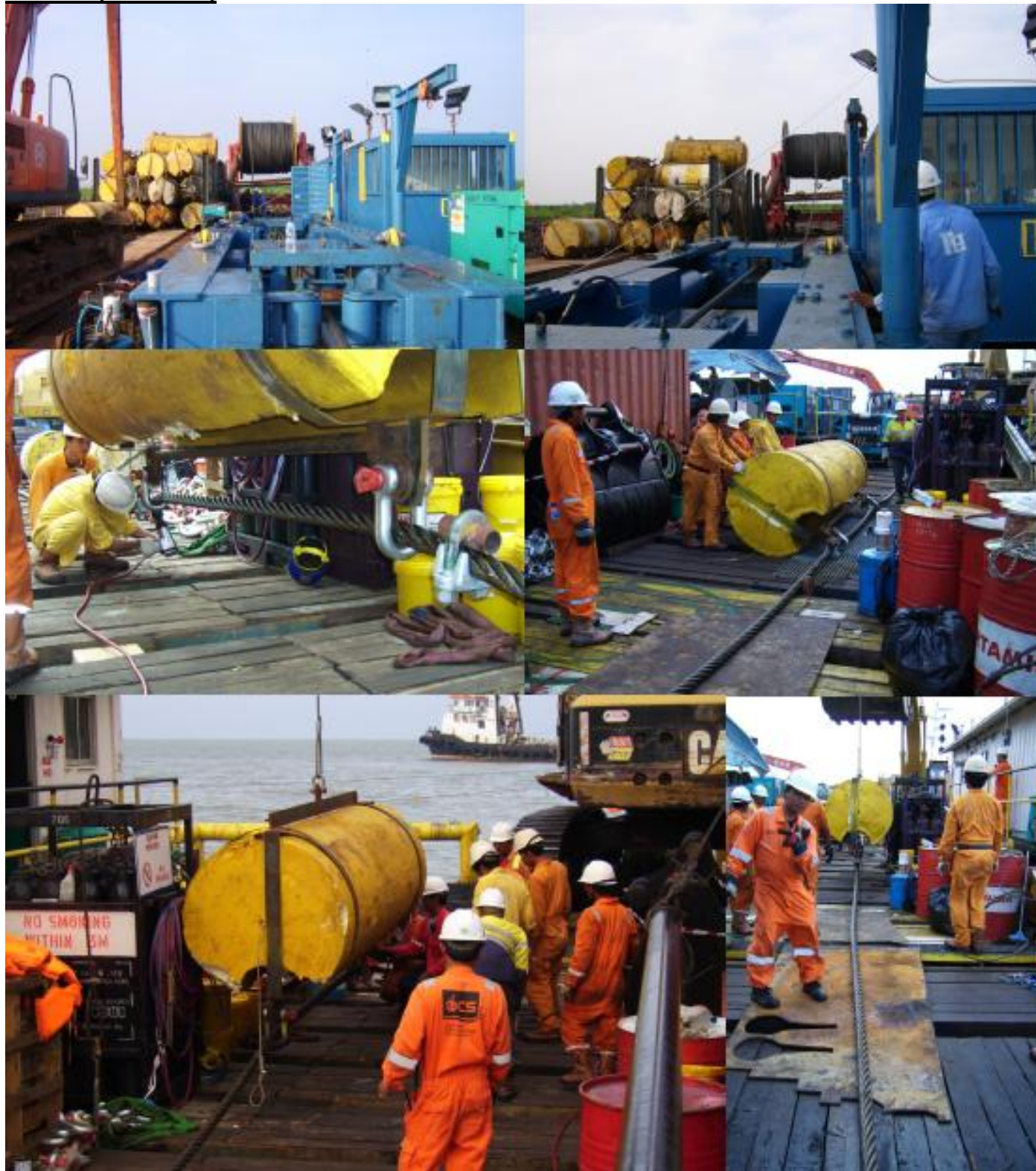


Pictures (continued)



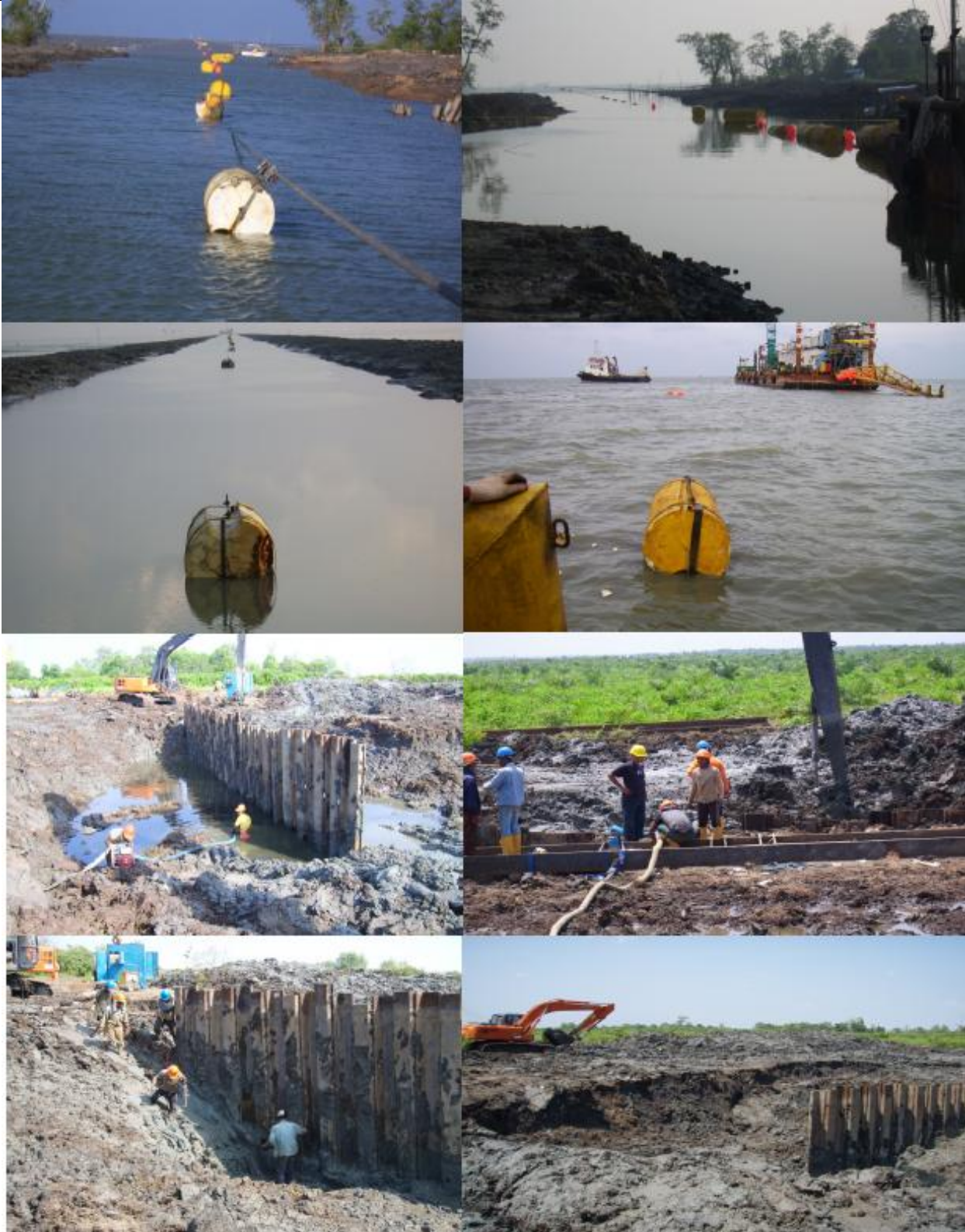
Pre Trench Barge 5km excavation to start of beach pull location, spoil bank on both side for back filling, and pull barge set/up with linear winch, spooler, HPU and Cable buoys

Pictures (continued)



Pull Barge and cable buoyancy deployment

Pictures (continued)



Cable buoys deployed and hold back sheet pile wall

Pictures (continued)



Pipelay barge and buoyancy attachment, pull barge with head arrival

PIPELINE SHORE APPROACH
PRE-QUALIFICATION DOCUMENT

Pictures (continued)



Pipeline pulling head at target location

PROJECT : JOHN BROOKS (APACHE ENERGY LTD) SHORE APPROACH & BEACH PULL

Project Details:-

Apache Energy Limited (AEL) were developing of the John Brookes Field. The field consist of a 18" diameter x 55km Gas Export pipeline from John Brooks field to Varanus Island. John Brooks gas field lies in 47m-60m of eater, 55km north west of Varanus Island. Varanus Island is located in the North West Shelf of Western Australia. The development consist of a single ynmanned six (06) slot wellhead platform tied back to the extsting Varanus Island hub, The work scope includes

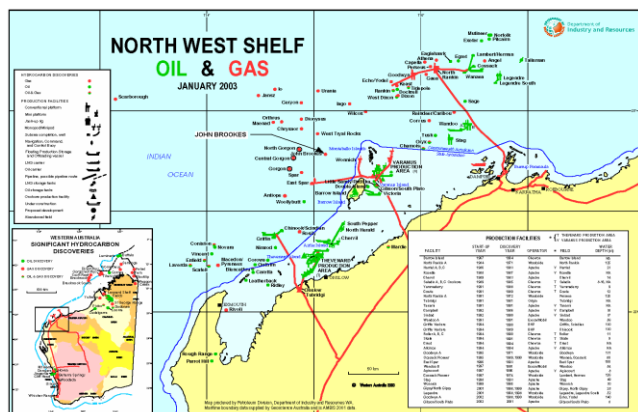
- Transportation, installation, stabilization, tie-in, testing and pre-commissioning of the 457.2mm (18") Ø x 55km long export pipeline system, including 100m CRA spools, crossing and localized stabilization and free span correction.
- Jacket, Piles and Torside Fabrication, Transportation and Installation.

Pipeline/Trench Information:-

Pipeline Size:-	18"
Pipeline wt:	11.5mm
Pipeline Grade	DNV HFW 450 IDU
Concrete thk & density	Nil
Linear Winch	300 mT
Pipeline length	55km
Water Depth	60m deepest
Beach Pull Length	7km pull
Pre-trench	NA
Post trench	NA
Cover	Not applicable as stabilization were using rock bolting

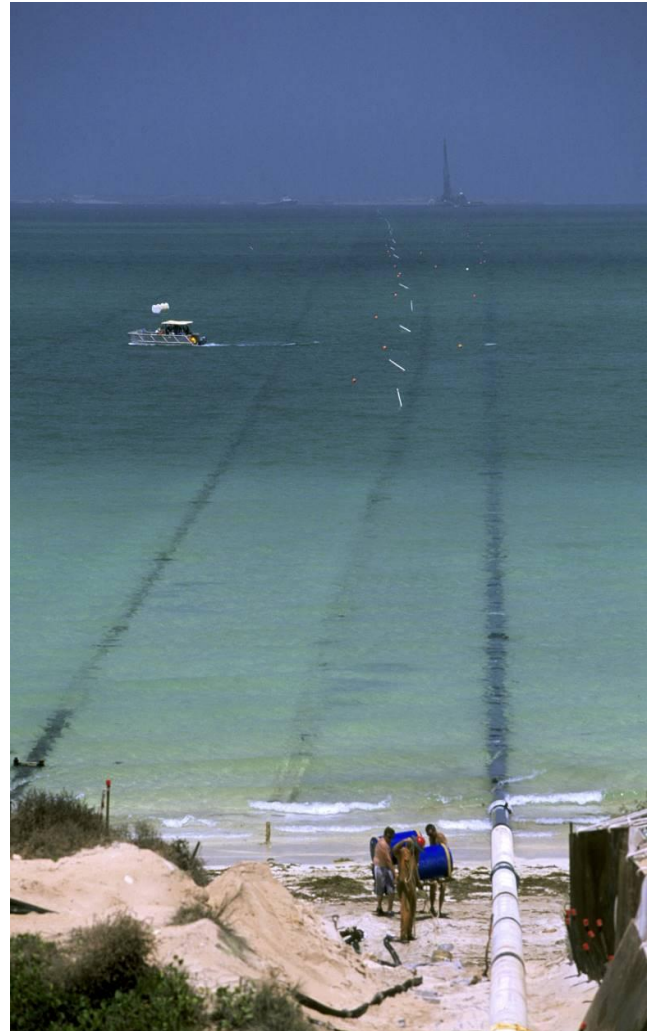
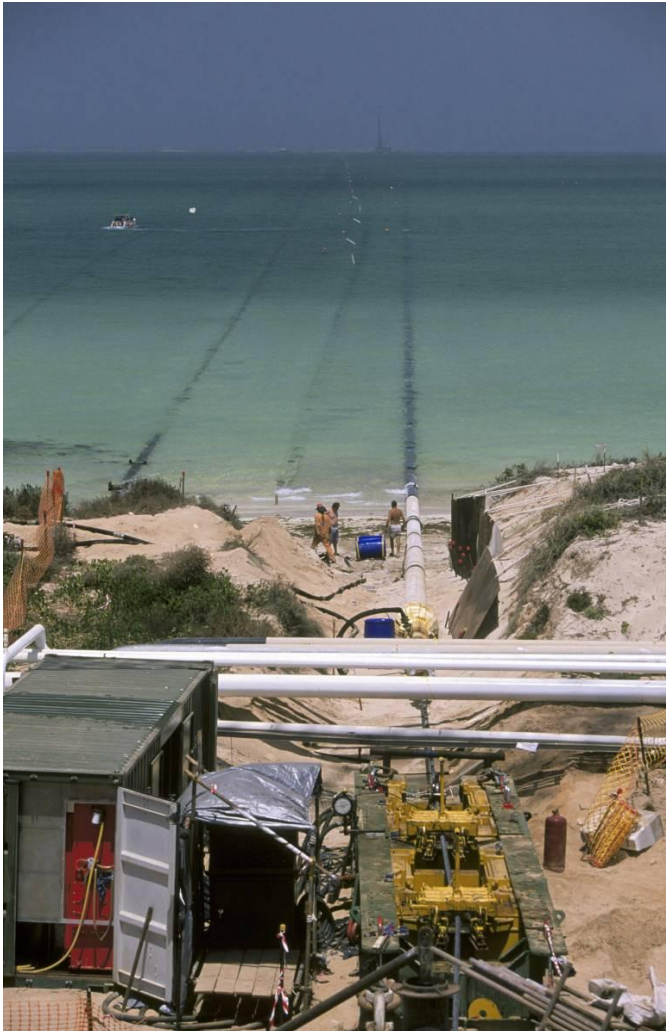
Project Scope:-

This scope were managed and completed by OCS personnel while their careers were still with McDermott, however the experience stays with the people with the significant relevance being a record 7km beach pull. The project was completed in 2006





BEACH PULL OPERATION



BEACHPULL PIPE ARRIVAL AND COMPLETION

PROJECT : CAMAU (PETRO VIETNAM) SHORE APPROACH & BEACH PULL

Project Details:-

The PM3 – CaMau Gas Pipeline Project is part of the Gas Power Fertilizer Coordination Project to supply natural gas to the Integrated Power and Fertilizer Plants in CaMau province of Vietnam. PetroVietnam – CaMau Gas Power Fertilizer Project management Board (CPMB) is the owner of the gas pipeline. The CaMau development consist of an 18" pipeline that stretches from the on shore tie in point at Trung Uong Dyke to PM3 BR-B platform approximately 297km away.

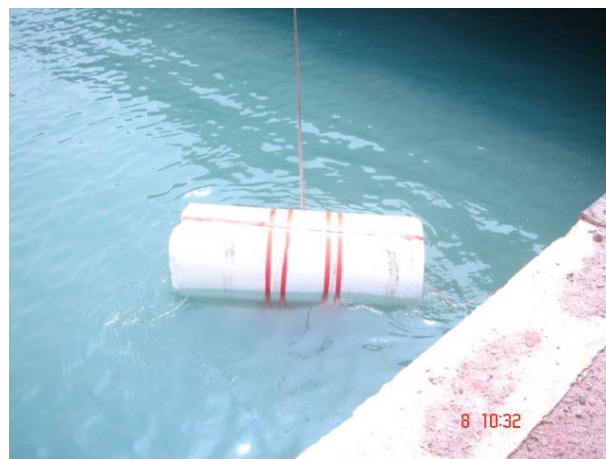
Pipeline/Trench Information:-

Pipeline Size:-	18"
Pipeline wt:	12.7mm (varies)
Pipeline Grade	API 5LX65
Concrete thk & density	45mm, 3040 kg/m3
Linear Winch	300 mT
Total Pipeline length	297 km
Water Depth	varies
Beach Pull Length	3km pull
Pre-trench	3.5km to nearshore
Post trench	7km from pre-trench

Project Scope:-

This scope were managed and completed by OCS personnel while their careers were still with McDermott, however the experience stays with the people with the significant relevance being a shore approach in very soft soil condition.

The scope of works involved beach and nearshore preparation (pre-trenching with excavator barge), beach pull execution (with pull barge), pipelay, pre-trenching and pre-commissioning. The project was completed in 2005





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PIPELINE SHORE APPROACH PRE-QUALIFICATION DOCUMENT



URS is a member of Registrar of Standards (Holdings) Ltd.

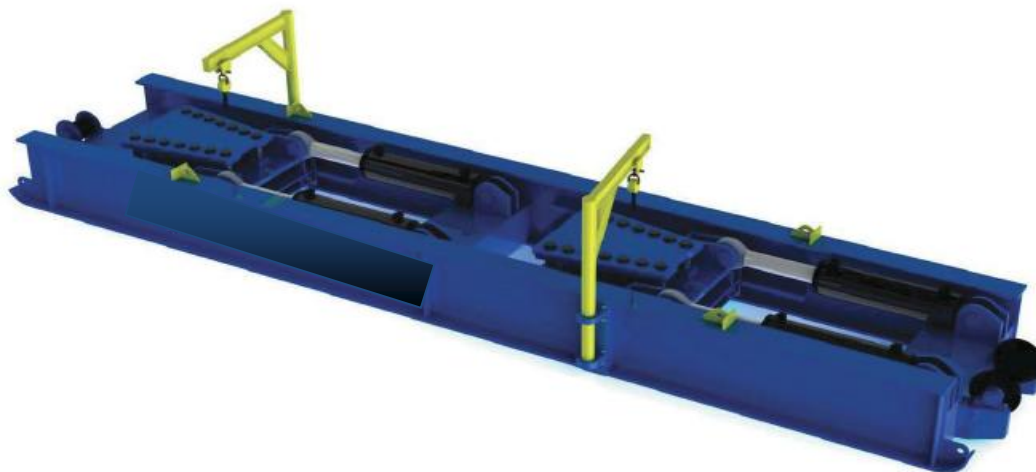








7.1 Linear Pull Winch (Typical)



The 400 Tonne linear winch can haul in horizontal loads under automatic or manual mode. The unit is equipped with contactless limit switches which aids in continuous operation without delay.

Winch Specifications:	
Two gripper wedges can be fitted with adapters to suit:	115mm diameter wire rope
	87mm diameter wire rope
	74mm diameter wire rope
	64mm diameter wire rope
	Special sizes are available upon request
Effective pull in speed	4mt/min
Cylinder Stroke	1000mm
Linear Winch Dimensions	
Width	2375mm
Length	11800mm
Flange Diameter	900mm (without davits installed)
Weight	40,000kgs

WEDDING BARS (IN)	NEAR BOOK LENGTHS (27 HETES)		AUX. BOOK LENGTHS (27 HETES)	
	ORIGINAL (IN)	UPPINKIE (IN)	ORIGINAL (IN)	UPPINKIE (IN)
6.7	44.70	-	FL08	-
7.0	46.70	7.50 26.10	FL08	7.50 15.00
8.0	50.40	20.40	FL08	10.40
9.0	55.10	27.10	FL08	10.80
10.0	58.20	28.20	FL08	10.80
10.5	59.40	28.20	FL08	10.80
11.0	60.20	28.40	FL08	10.80
11.5	61.20	28.20	FL08	10.80
12.0	62.20	28.50	FL08	10.80
12.5	63.20	28.50	FL08	10.80
13.0	64.20	28.50	FL08	10.80
13.5	65.20	28.50	FL08	10.80
14.0	66.20	28.50	FL08	10.80
14.5	67.20	28.50	FL08	10.80
15.0	68.20	28.50	FL08	10.80
15.5	69.20	28.50	FL08	10.80
16.0	70.20	28.50	FL08	10.80
16.5	71.20	28.50	FL08	10.80
17.0	72.20	28.50	FL08	10.80
17.5	73.20	28.50	FL08	10.80
18.0	74.20	28.50	FL08	10.80
18.5	75.20	28.50	FL08	10.80
19.0	76.20	28.50	FL08	10.80
19.5	77.20	28.50	FL08	10.80
20.0	78.20	28.50	FL08	10.80
20.5	79.20	28.50	FL08	10.80
21.0	80.20	28.50	FL08	10.80
21.5	81.20	28.50	FL08	10.80
22.0	82.20	28.50	FL08	10.80
22.5	83.20	28.50	FL08	10.80
23.0	84.20	28.50	FL08	10.80
23.5	85.20	28.50	FL08	10.80
24.0	86.20	28.50	FL08	10.80
24.5	87.20	28.50	FL08	10.80
25.0	88.20	28.50	FL08	10.80
25.5	89.20	28.50	FL08	10.80
26.0	90.20	28.50	FL08	10.80
26.5	91.20	28.50	FL08	10.80
27.0	92.20	28.50	FL08	10.80
27.5	93.20	28.50	FL08	10.80
28.0	94.20	28.50	FL08	10.80
28.5	95.20	28.50	FL08	10.80
29.0	96.20	28.50	FL08	10.80
29.5	97.20	28.50	FL08	10.80
30.0	98.20	28.50	FL08	10.80
30.5	99.20	28.50	FL08	10.80
31.0	100.20	28.50	FL08	10.80
31.5	101.20	28.50	FL08	10.80
32.0	102.20	28.50	FL08	10.80
32.5	103.20	28.50	FL08	10.80
33.0	104.20	28.50	FL08	10.80
33.5	105.20	28.50	FL08	10.80
34.0	106.20	28.50	FL08	10.80
34.5	107.20	28.50	FL08	10.80
35.0	108.20	28.50	FL08	10.80
35.5	109.20	28.50	FL08	10.80
36.0	110.20	28.50	FL08	10.80
36.5	111.20	28.50	FL08	10.80
37.0	112.20	28.50	FL08	10.80
37.5	113.20	28.50	FL08	10.80
38.0	114.20	28.50	FL08	10.80
38.5	115.20	28.50	FL08	10.80
39.0	116.20	28.50	FL08	10.80
39.5	117.20	28.50	FL08	10.80
40.0	118.20	28.50	FL08	10.80
40.5	119.20	28.50	FL08	10.80
41.0	120.20	28.50	FL08	10.80

GENERAL NOTES

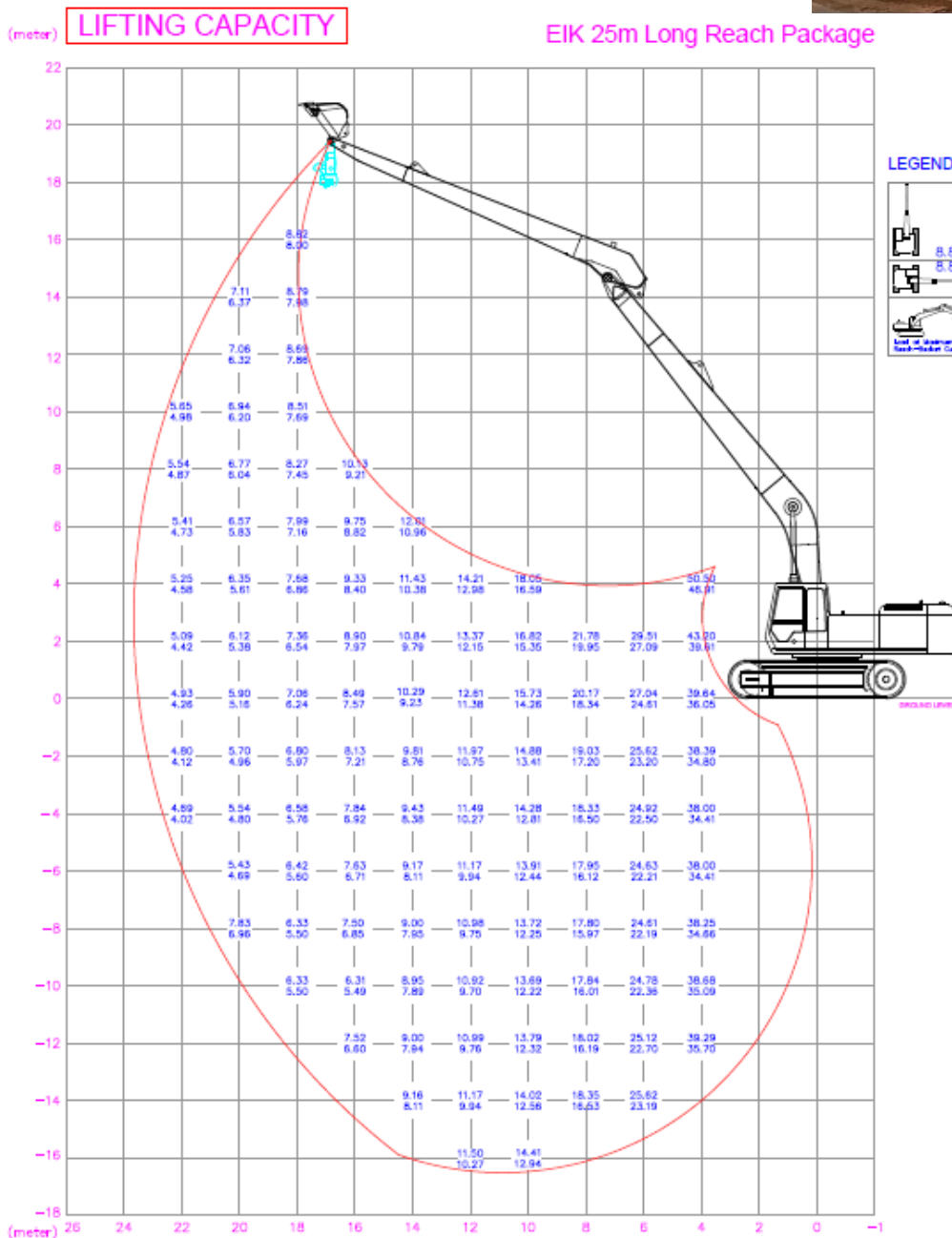
1. CAPACITIES INCLUDED IN FREE CHART ARE THE MAXIMUM ALLOWABLE, AND ARE BASED ON MACHINE STANDINGS LEVEL, OR FROM SUPPORTING SURFACE UNDER IDEAL JOINT CONCENTRATIONS.
2. REDUCTION FROM RATED CAPACITIES MUST BE MADE FOR MASS OF HOON BLIND, WEIGHTED BALL, HORN, SLING, SUPPORTING BAR, OR OTHER REDUCING GEAR.
3. ALL CAPACITIES ARE RATES PER 30" STROKE.
4. DRIVEN END OF FRAME MUST BE FULLY EXTENDED FOR ALL OPERATING CONDITIONS.
5. CAPACITIES ARE SUBJECT TO THE FORCES MADE ON THE REDUCTION OF A STROKE FROM THE LIFT CHAIR. CAPACITIES FOR DRIVEN END ARE TO BE 1/30."

NOTE FOR OFFSHORE LIFT:

3. THE CAPACITY ARE BASED ON MAXIMUM LASER IRRADIATION TO THE POINTS OF
3. PLEASE HOLD FIRM CLAMP POSITION FROM THE POSITION CENTERED OVER THE
DIRECTION WITHIN THE BACK AND FORTH
3. TO CALCULATE THE MAXIMUM LOAD THAT CAN ACTUALLY BE OBTAINED
REQUIRE A KNOWLEDGE OF ALL THE ACCESSORIES, SUCH AS: HOW MUCH FROM
REQUIRES TENSURE ARISE.
4. ALL WELDED ARE BASED ON MAXIMUM STRUCTURAL LIMITATION
FACTORS SUCH AS: STRESS, DEFLECTION, VIBRATION, ETC.
5. THE MAXIMUM ALLOWABLE MAXIMUM CLAMP SIZE AND ANGLES ARE LISTED IN THE
LONGITUDINAL SECTION AND 3/4 INCH IN SHORT-TURNANCE SECTION.
6. THE LIFT AND CAPACITY CHANGE OF THE BALANCE SPECIFICATIONS
DEPEND ON THE SIZE OF THE LONGITUDINAL BALANCE FROM CENTER TO ALL
QUADRANT SECTION.
7. LOAD TENSURE ON THE POINTS, WITHOUT SHORT RUN
8. THE MAXIMUM ALLOWABLE MAXIMUM CLAMP SIZE AND ANGLES ARE LISTED IN THE
LONGITUDINAL SECTION AND 3/4 INCH IN SHORT-TURNANCE SECTION.
9. THE LIFT AND CAPACITY CHANGE OF THE BALANCE SPECIFICATIONS
DEPEND ON THE SIZE OF THE LONGITUDINAL BALANCE FROM CENTER TO ALL
QUADRANT SECTION.

7.11 CAT390 Excavation Chart

OCS prequalification document for pipeline shore approaches can be referenced for further information.



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:

41578/B/0001/SA/En

Date of Issue: (Original)

04 November 2016

Date of Issue:

04 November 2019

Issue No:

2

Expiry Date:

03 November 2022

Issued by:





On behalf of the Director



Please be wary of counterfeit copies of this certificate. Please do not hesitate to contact the Head Office of the Group via info@urs-certification.com.
URS is a member of United Registrar of Systems (Holdings) Ltd, United House, 4 Pion Road, Doverland, B41 2S, UK. Company Registration no. 5258485.
URS Pte Ltd, 36 Kian Teck Road, Singapore 628781.

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 <p>OFFSHORE CONSTRUCTION SPECIALISTS</p>	<p>OFFSHORE CONSTRUCTION SPECIALISTS</p> <p>PIPELINE SHORE APPROACH PRE-QUALIFICATION DOCUMENT</p>	 <p>URS is a member of Registrar of Standards (Holdings) Ltd.</p>
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NATA CERTIFICATION




**ACCREDITED
LABORATORY**

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: 21585

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
A/19-1-9 / Issue 6 / October 2021

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BCA CERTIFICATION

Serial No : C2108038



Building and Construction Authority

CERTIFICATE OF LICENCE

This is to certify that

**OFFSHORE CONSTRUCTION SPECIALISTS
PTE LTD**

(Unique Entity Number / ACRA Registration Number : 200720801G)

is licensed as a

General Builder Class 1
(24 Aug 2021 to 24 Aug 2024)

under Part VA of the Building Control Act and Building Control
(Licensing of Builders) Regulations 2008



Commissioner of Building Control
Singapore

Date: 25 Aug 2021