Project Highclere Cable Details and Installation Method

Date:	7 April 2022
Project name:	Project Highclere
Project no:	IS416300
Company:	Vocus :
Prepared by:	Arne de Vos

Jacobs
8th Floor, Durack Centre
263 Adelaide Terrace
Perth, WA 6000
PO Box H615
Perth, WA 6001
Australia
T +61 8 9469 4400
F +61 8 9469 4488

Overview

Vocus is proposing to install and operate an offshore fibre optic cable and supporting components (Project Highclere). Project Highclere will form part of Vocus' fibre optic cable network connecting the existing North West Cable System (NWCS) and Australia Singapore Cable (ASC). The Proposed Action includes the installation and operation of the infrastructure only. The geophysical survey component of the Project was the subject of EPBC 2021/9023 which was deemed to be not a controlled action in August 2021 and has been completed without incident.

The Proposed Action includes:

- Installation of new cable to connect the existing NWCS to the existing ASC. This route will run from an existing stub cable of the NWCS (approximately 41 km north of Port Hedland) to an offshore existing branching unit of the ASC (approximately 450 km west of the Exmouth Peninsula).
- Installation of two branching units and two cables from the new cable to the edge of the petroleum safety zone of the proposed Scarborough Development, approximately 375km west of the Peninsula. The connection of the cable to the Scarborough infrastructure is not in the scope of this referral.
- Installation of two Cable Termination Assemblies (CTA) at the cable ends in close proximity to the Scarborough Development.
- Installation of a branching unit and 'stub' to allow for a future potential connection.
- Operation of the cable.

Figure 1 below shows the location of the proposed cable including the cable paths to the Scarborough Development.

Schedule

Installation of the cable is currently planned to commence in late Q4 2022 and will take ~ 60 days. Commissioning and testing of the cable is expected to take up to 2 months. The design life for the cable is ~25 years. Another mobilisation will occur in ~18 months or later for the installation of the two CTAs.

Cable details

The main cable route is 1025 km long and the Scarborough connection route is 69 km long. Installation accuracy will vary depending on depth. A 100 m buffer has been nominated on each side of the planned cable route to account for the inherent cable lay accuracy due to the water depths in which the cable will be laid. The cable will be laid as close as possible to the centre line.

Various Alcatel-Lucent cable types will be used. The diameter of the cable will vary between 14.0 mm to 35 mm along the cable length. The cable width is determined by the level of armoring that is applied, which in turn is determined by the depth of the water, risks to the cable and seabed type where the cable section is being laid. The cable will carry an electrical charge of up to 5000 volts (DC). The cable is surrounded by conductive and protective material and does not generate any electric field external to the cable. A description of the cable type is provided in Figure 2.

Installation

The cable laying will be conducted by the Ile de Re IMO: 8200278. This vessel deploys a cable burial sea plough ROV to assist cable deployment and other maintenance activities. The vessel power capacity is 10,500 KW and it has IMO dynamic positioning class 2 to assist the accuracy of cable deployment activities. Vessel specifications are provided as Figure 3.

Prior to cable lay, a clearance operation will be undertaken to remove debris along the route. This will be conducted by a Pre-Lay Grapnel Run (PLGR) which involves towing a grapnel device along the seafloor to remove marine debris from the route. Towing speeds will be approximately 1.5 km/hr. A PLGR will only be conducted within areas where the cable is planned to be buried. This method is not designed for deep penetration into the seabed. The method will be to launch the grapnel and pay out a towing line scope appropriate to the depth of water. The towing line is passed over a sensitive tension measurement device which is monitored continuously. Changes in recorded tension may indicate that debris has been encountered. The grapnel is recovered, and any debris cleared and retained on board for safe disposal onshore. The grapnel array is then redeployed.

In water depths up to 1000 m the cable will be buried to provide extra protection and stabilisation. This will be achieved via a means such as ploughing or post lay burial via jetting, dependent on location. Where plough or post lay burial is not possible due to seabed type, the cable will be directly laid on the seabed. In water depths deeper than 1000m, the cable will be laid directly on the seabed. A illustration of the cable lay technique and example plough system is provided in Figure 4.

Plough burial can be undertaken simultaneously to the laying of the cable and will be used where sufficient suitable sediment exists in waters up to 1000 m water depth. As the plough is lowered to the seafloor and pulled along by the vessel, the cable is simultaneously threaded through the plough. The plough creates a narrow trench approximately 200 mm wide into which it places the cable before burying it. Target cable depth for deployment by plough is 1m. Where sufficient sediment does not exist, target burial depth will be reduced. In other areas where ploughing is not possible, such the approach to branching units or pipeline crossing, a ROV using jetting techniques will be used to bury the cable.

The proposed cable route will cross an existing flowline associated with the Scarborough Development using standard installation techniques. The use of protective material between the flowline and cable is still to be determined. A solid polyurethane material is being assessed.

The CTA equipment will be installed by craning from a vessel with ROV assistance. This equipment is small in size (height = 3m) and includes a mud mat (3 m x 3 m), frame, cable connection module and cable leads for connection by others at a later date. Details of the CTA is provided in figure 5.

Commissioning, Operation and Maintenance

Commissioning of the new infrastructure including final network testing is expected to take 1-2 months post completion of installation. Operation of the cable will be managed remotely via the Proponent's existing operations centre in Melbourne. Once installed, it is not expected that the cable network will require any routine maintenance. In the event of damage or failure of the cable, relevant authorities and stakeholders will be consulted. In this case, it is likely that repairs will involve hauling the cable to the surface for repair.

Decommissioning

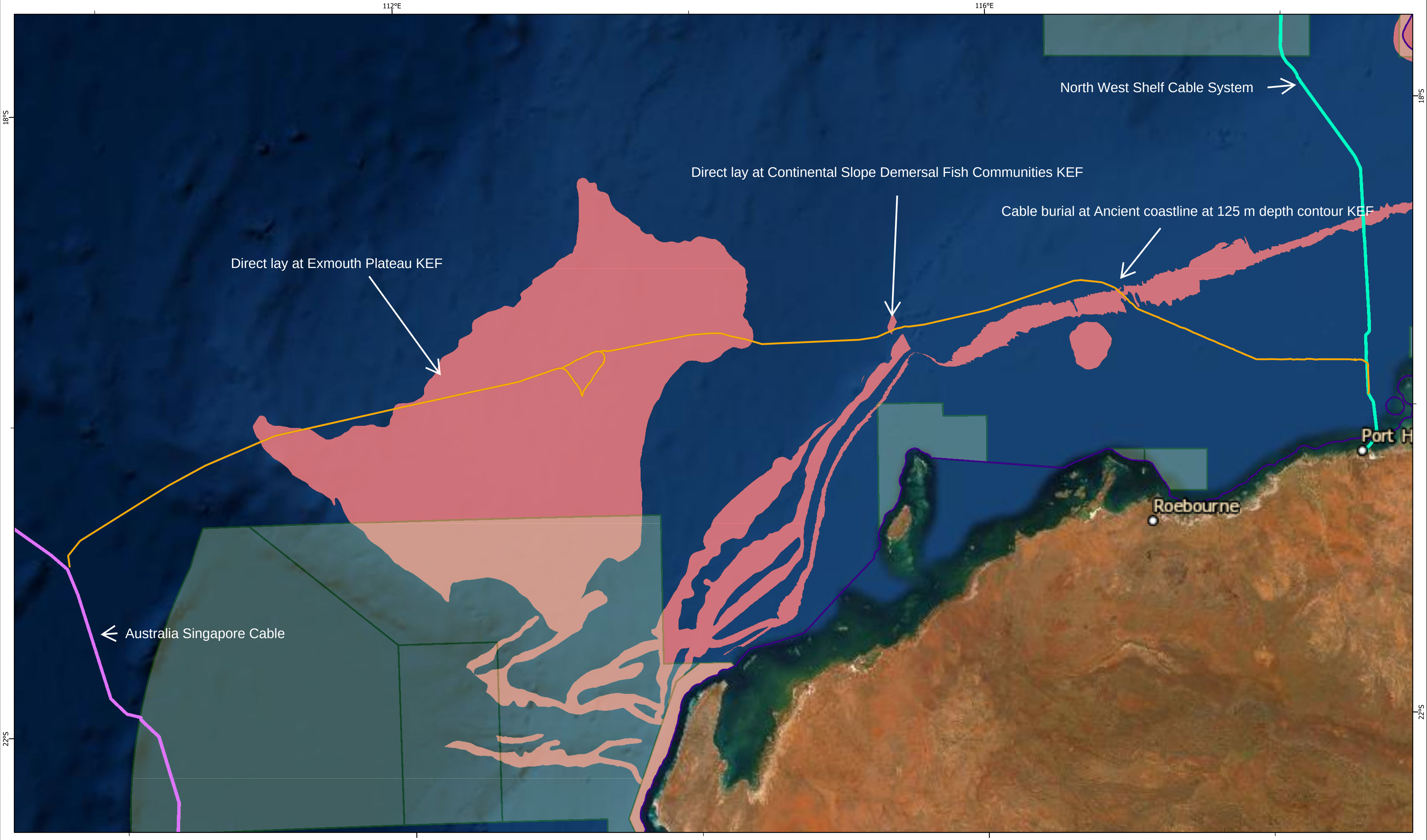
The life of the cable is a ~25 years and removal of the decommissioned cable is not considered feasible as:

- The potential environmental impacts of the retrieval and disposal of 1,094 km of buried cable are likely to significantly outweigh the impacts of leaving an inert cable in place.
- The commercial cost of retrieval and disposal of 1,094 km of cable are likely to significantly affect the commercial viability of the Project.
- Developing technology may extend the life of the cable or lead to recommissioning of the cable being a viable option.

Customer connections

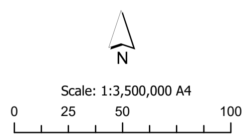
The Proposed Action does not include connection to the Scarborough Development which would be via a 130 m cable from the CTA to the Development connected via ROV with little seabed disturbance. Requirements for this connection will be managed either by the Proponent or the Customer.

Figure 1. Proposal Location



Project Highclere Cable Route

- NWCS
- ASC
- Highclere Cable Route
- WA State Waters Boundary
- National Marine Parks
- Key Ecological Feature

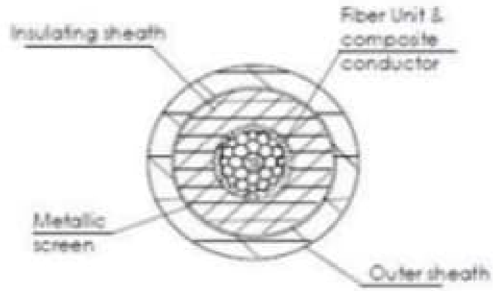


JACOBS, 263 Adelaide Terrace, Perth WA 6000
Tel: +61 8 9469 4400 Fax: +61 8 9469 4488

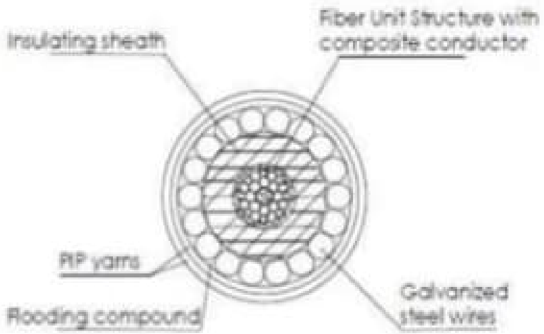
\\ausyd0vs01\GISWork\WA_Vocus_Highclere\Apps\ArcPro\Figures\Project Highclere.aprx

Figure 2. Description of Cable

The cross section to the right shows a lightweight protected cable that will be utilised in water depths greater than 700 m for surface lay activities. The lightweight cable includes a metallic screen and polyethylene outer jacket applied over the core cable for basic protection from moderate abrasion and/or attack by marine life (Alcatel Lucent, 2013a). This method of protection is applied when there are no known risks to the cable from human factors (Worley Parsons, 2011). The external sheath consists of High Density Polyethylene (HDPE) dielectric and the metallic screen protects the cable from electromagnetic emissions (ICPC, 2011).



The cross section to the right shows a single armour cable that will be utilised within the HDD and in water depths up to 700 m. The single armour cable includes a light to heavy armour wire layer (galvanised steel) applied to the core cable, with additional abrasion protection consisting of a PIP yarns (Alcatel Lucent, 2013a). This level of protection also includes a 'flooding compound' that consists of a bituminous based material blended with synthetic polymers for bonding and corrosion protection between the armouring wires and plastic sheath (ICPC, 2011 and H&R ChemPharm Ltd, 2006). This type of protection is applied in areas with a moderate to high risk of trawler damage (Worley Parsons, 2011).



The cross section to the right shows a double armour cable that will be utilised during shallow water lay operations (less than 500 m deep). It consists of the same protective measures applied to the cable core as the previous cable cross section however; it also includes a second armour wire layer. This type of protection is required in areas with a high risk from trawler damage as it substantially reduces the potential for a cable being snagged (Alcatel Lucent, 2013a). It also protects the cable in areas exposed to harsh wave conditions as with the coastline.

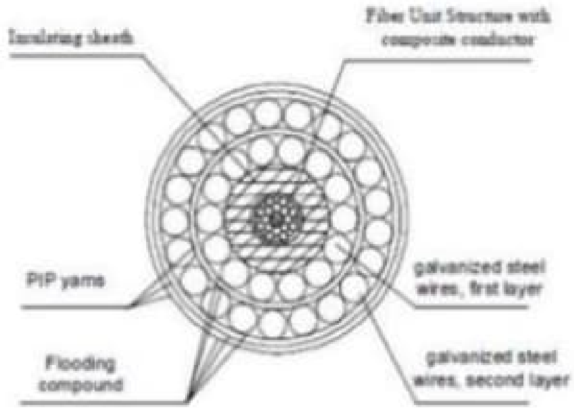


Figure 3. Vessel and Plough Specifications

LouisDreyfus ARMATEURS

SHIP'S PARTICULARS - CABLE SHIP

☐ Issued ☒ Updated

Document to be managed as a certificate (cf. FO-ALL-MGT003E) On 28/11/2020 By CAPTAIN

Underkeel extension *Stern thrusters under keel structure, depth* ***1.30 m*** *(extension included in aft draft scale)*

Ship's Name	**ILE DE RE**	Call Sign	YBTT2	LDA IMO N°	0286031
Hull	WISMAR N°151	Official N°	2017 Pst N°. 9380/L	Ship Flag	INDONESIAN
Port of Registry	**JAKARTA**	MMSI	525 100 486	Ship IMO N°	8200278

	E.Mail	master@iledere.lda.fr	Classification	Bureau Veritas	Class: Cable Repair / Laying Vessel
	E.Fax	33 562 168 078	Registre n°	02085T - ERS 17/069	BV I ✠HULL, ✠MACH
IRIDIUM	Tel	+881 6777 095 39			Cable laying ship
IRIDIUM	Tel	+881 6777 095 40	Satcom C	*452 504 526*	Unrestricted navigation
VSAT	Tel	+47 2367 4841		*452 504 133*	✠AUT-IMS
VSAT	Tel	+47 2367 4834			✠ DYNAPOS-AM-AT, MON-SHAFT

Keel layed	15/07/1981	Launched	23/07/1982	Converted	18/03/2002

	Disponent Owner	Ship Manager (ISM)	Operator
Name	**PT PELAYARAN LINTAS OPTIK**	**LOUIS DREYFUS ARMATEURS S.A.S.**	**Optic Marine Services International Limited Sdn. Bhd**
Address	Gama Tower 19th floor, Jalan H.R. Rasuna, Said Kav. C22, Jakarta Selatan, 14094 - INDONESIA	21, quai Gallieni 92158 SURESNES Cedex France	No. 3B-13-01, Level 13, Tower 3B, UOA Business Park, No 1, Jalan Pengaturcara U1/51A, Seksyen U1, 40150 Shah Alam, Selangor Darul Ehsan - MALAYSIA
Tel	(+62) 21 2598 1466	(+33) 1 70 38 60 00	(+60)3-5518 3888
Fax		(+33) 1 70 99 33 92	

Dimensions					
LOA	143,400	m	Height of antenna on foremast on BL	32,200	m
LPP	123,000	m	Height of antenna on wheelhouse on BL	41,960	m
Breadth Moulded	20,500	m	Height of antenna on aftmast on BL	37,200	m
Extreme Breadth	23,300	m	Depth from hangar deck to baseline	14,600	m
Depth Mouled	14,600	m	Depth from bridge to baseline	27,75	m

Drafts	Drafts		Deadweight		Freeboard		TPC	
Winter	7,323	m	5 448,260	mt	0,272	m	25,3	mt
Summer	7,478	m	5 841,180	mt	0,117	m	25,4	mt
Tropical	/	m	/	mt	/	m	/	mt
Tropical Fresh	/	m	/	mt	/	m	/	mt
Fresh Water	7,608	m	5 841,180	mt	-0,013	m	25,5	mt

Allowance 155 mm (at summer draft) Lightship 7 311,02 mt

Tonnage		International	Suez	Panama
Gross	UMS	14 091	12 246	11 823
Nett	UMS	4 227		

Engines	
Main engine	2 x SKL 12VDS48/42 AL2 - 2 x 5295 KW at 500 RPM
Diesel Generator(s)	2 x WARTSILA 9L26A - 2 x 2925 KW at 1000 RPM / 2 x WARTSILA 8L20 - 2 x 1440 KW at 1000 RPM
Gear box	500 / 221
Propeller	Controllable Pitch
Alternator(s)	Emergency Generator MAN D2866TF - 150 KW at 1500 RPM
Bow thruster	2 x 1500 KW
Stern thruster	2 x 1500 KW

Cable Equipment

1 x Crane 5T/25m Hydralift + 1 x Heila Crane 21T + 1 x Heila Crane 13,5T + 1 x SMD A-Frame 35T
2 x Drums Cables Engines 25 T + 2 x DOHB 6T
3 x Transporters 2T
2 x Tugger winches 10T + 1 Tow winch 60T
1 x Buoy davit 10T
1 x ROV Perry Slingsby Systems Triton ST206 + 1 x 2M/3M Plough Gamma upgraded
3 x MainTanks 4100mT + 3 x Spare Tanks 600mT

Anchoring & Mooring 2 x Anchor Capstans 160kN + 4 x Mooring winches 80kN

Endurance 32 days

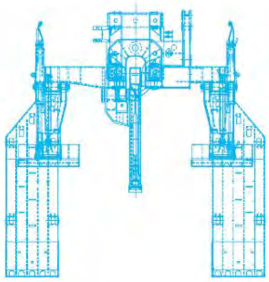
			Laying		Passage		At port	
		Speed	0 - 6	Kts	15,4	Kts		
Capacity	**Daily Consumptions**							
1 979	← DO →		25 to 35	m3	30 to 50	m3	5	m3

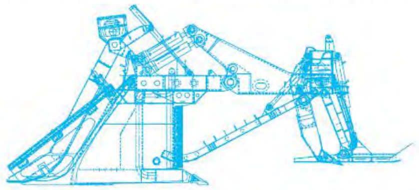
SMD Heavy Duty HD3 Plough

Ploughs

Technical Specifications

GENERAL SPECIFICATION AND OPERATION	
DIMENSIONS	10.82 m long (skids down, plough hinged, depressor down) 4.80 m high (plough hinged) 5.96 m wide (over rear stabilisers)
SUBMERGED WEIGHT	25 tonnes (excluding ripper and jetting package)
OPERATION	Pulled by tow wire from surface vessel
CONTROL	Full remote control from shipboard control cabin or from remote control console whilst being towed
STEER ANGLE	+/- 16º
BURIAL DEPTH	2.30 m trench depth at zero share pitch (soil dependent) 3.00 m achievable in soft soils with plough pitched aft Optional interchangeable share 1.5 m available A forward mounted Rock Tooth can cut the trench in rock usually with a layer of soil above it
OPERATING DEPTH	1500 m maximum
REPEATER BURIAL	Repeater burial depth 50-90% of plough burial depth, dependent on soil conditions
SOIL TYPE	Any, within limits of pull force (130 tonnes)
SOFT MUD CAPACITY	5 kPa minimum
PLOUGHING SPEED	Recommended maximum 2 knots depending on seabed conditions
HYDRAULIC SYSTEM	RESERVOIR: Flexible pressure compensated, 100 litres working capacity SYSTEM HYDRAULIC OIL: Houghton Vaughan Hydrodrive HPE 22
CYLINDERS	Heavy duty marine type with welded swivel eyes
SURVEILLANCE EQUIPMENT	The surveillance equipment comprises CCTV cameras, associated lamps, pan and tilt units CAMERAS: 3 x SIT LAMPS: 5 x 150 W 24 V incandescent SONAR: Mesotech 1000 digital sonar head (range up to 100 m) HYDROPHONE: A hydrophone is provided with an integral pre-amplifier ACOUSTIC POSITIONING: Provision is made for responder/ transponder unit





Alcatel·Lucent

Figure 4. illustration of the cable lay technique and example plough system

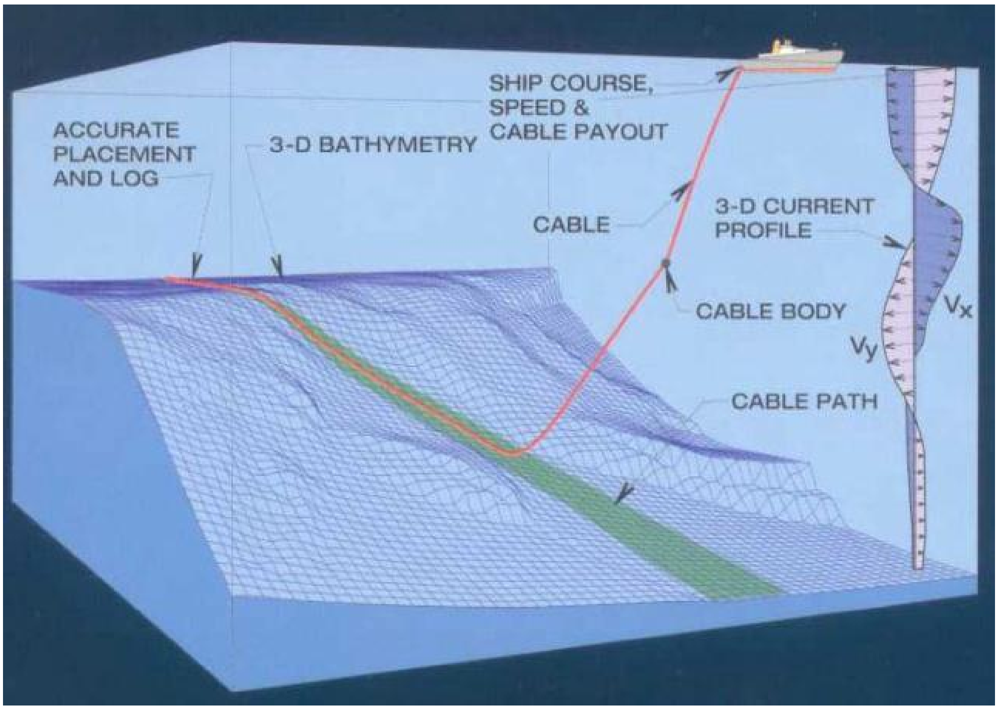
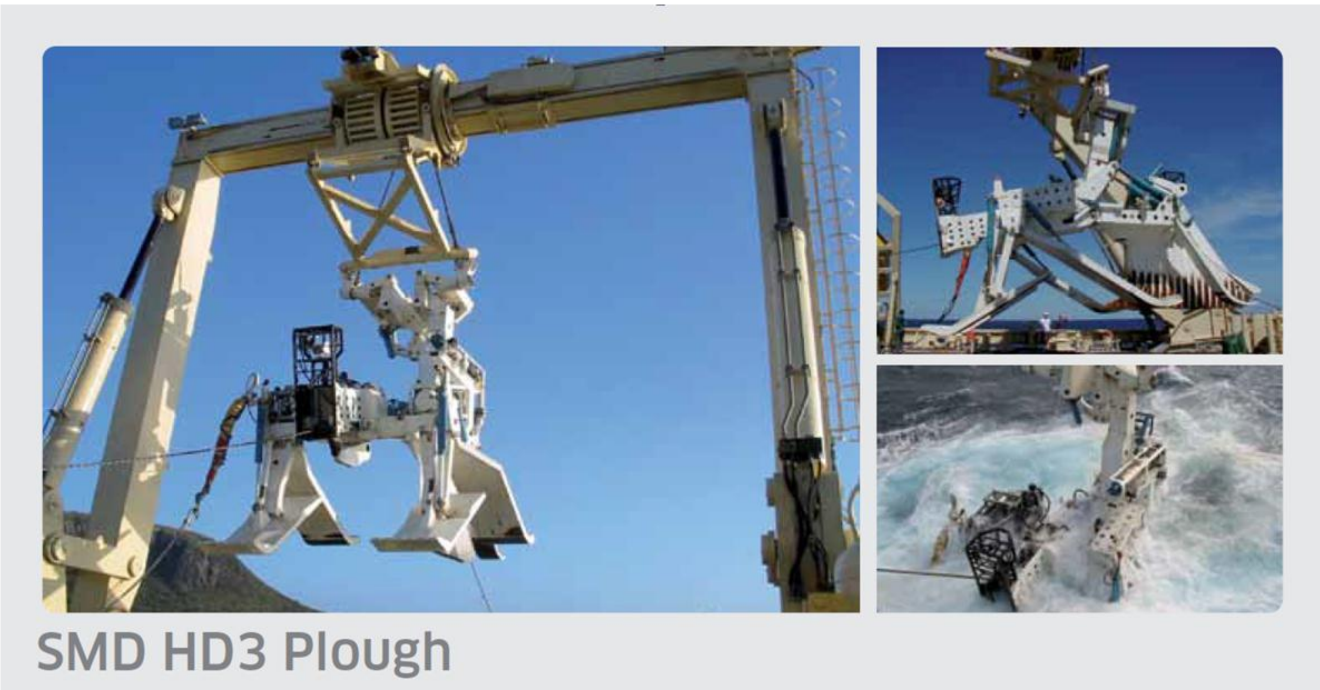


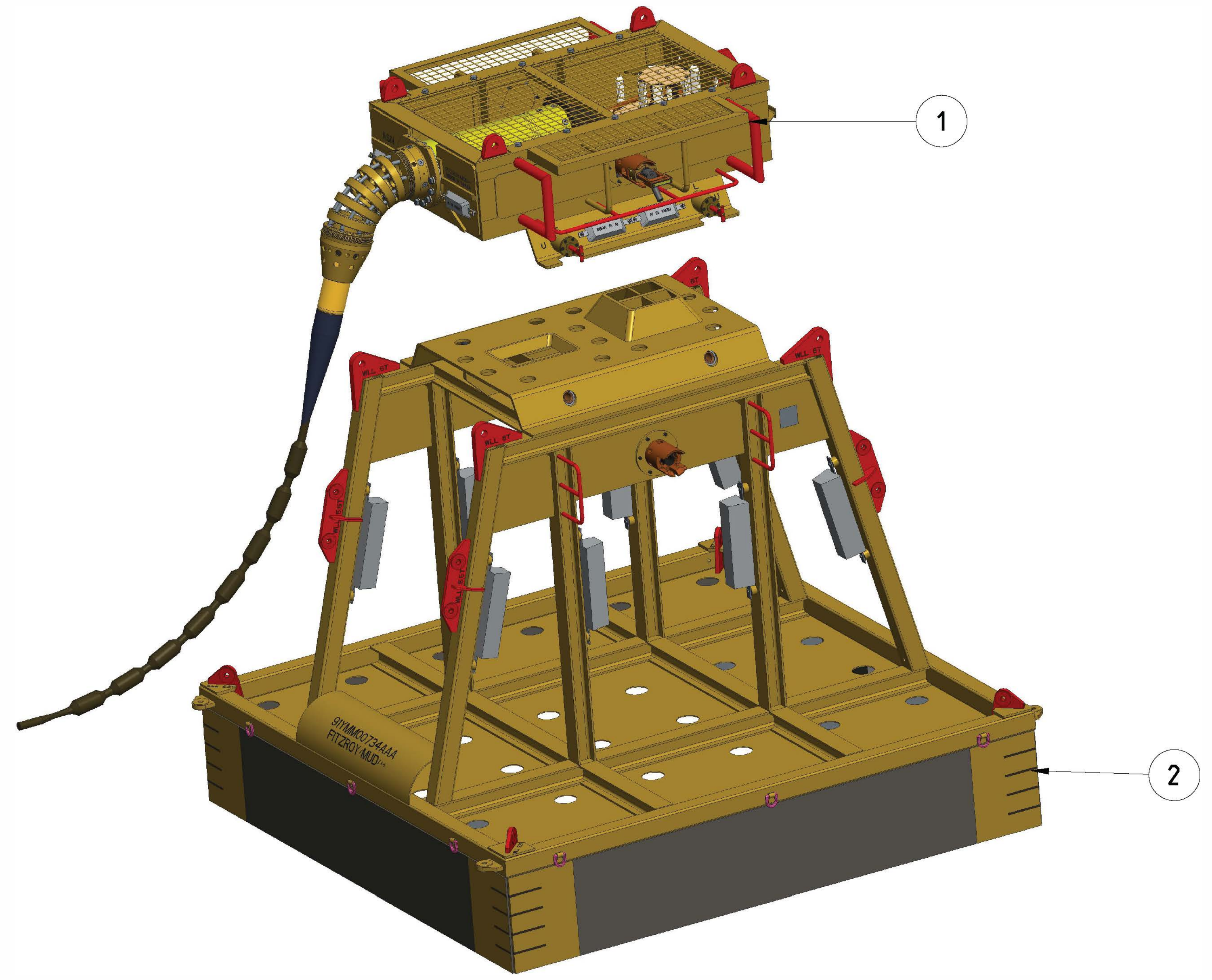
Illustration of Cable Lay Technique (Source - www.makai.com)

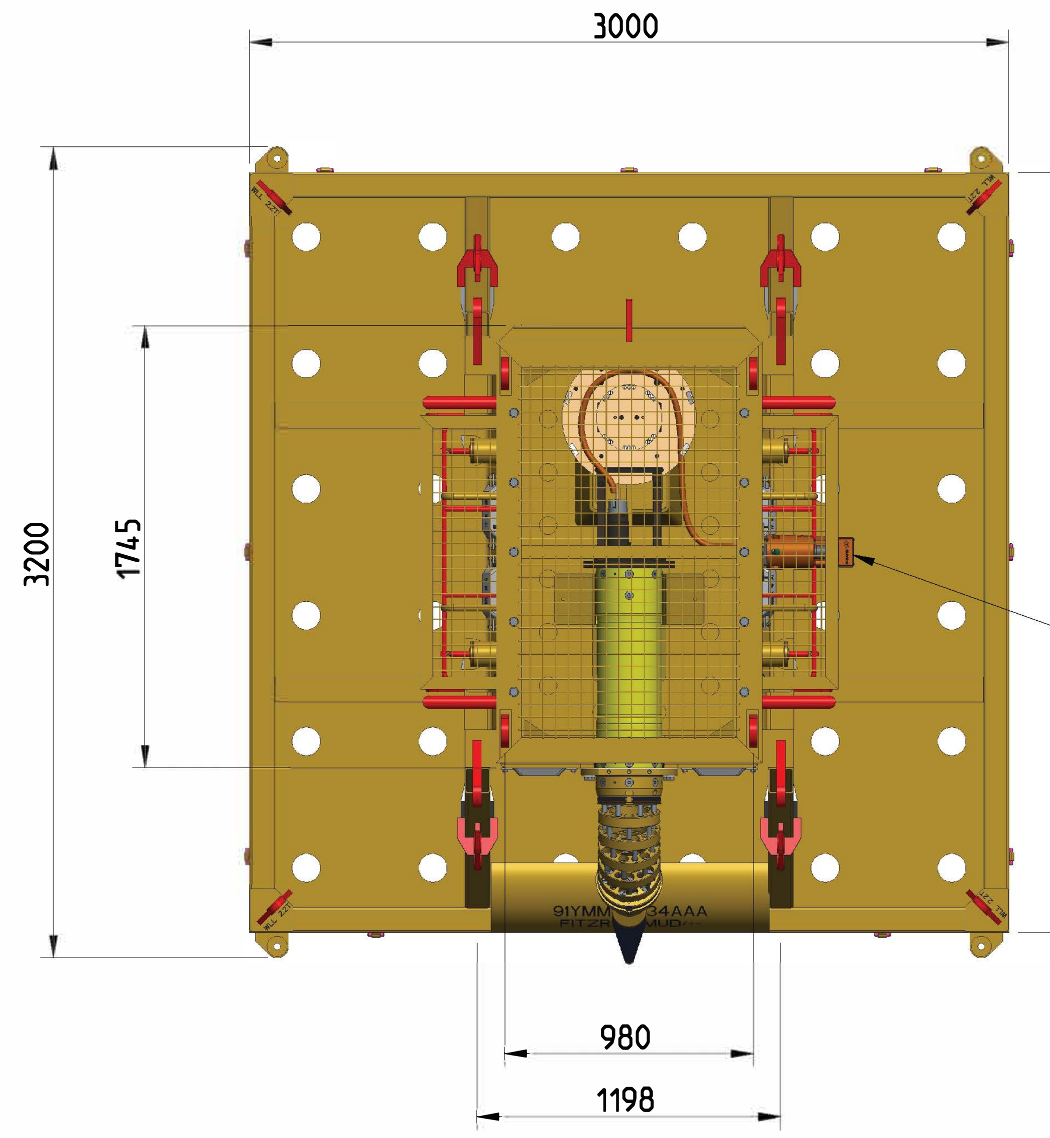


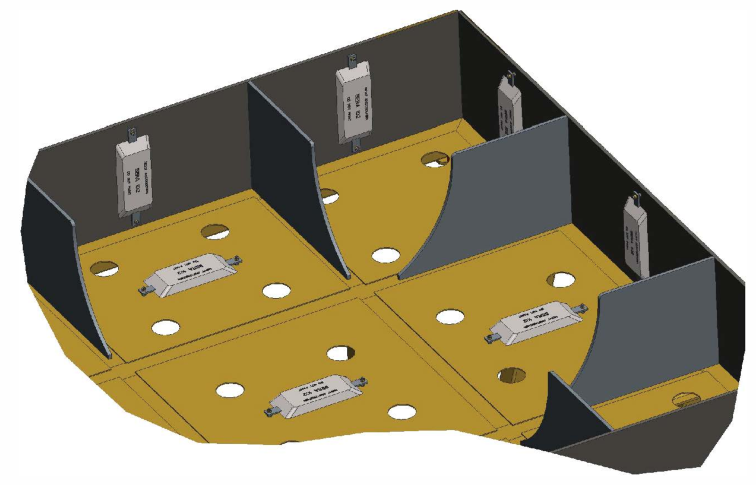
Example Plough System

Figure 5. CTA Design

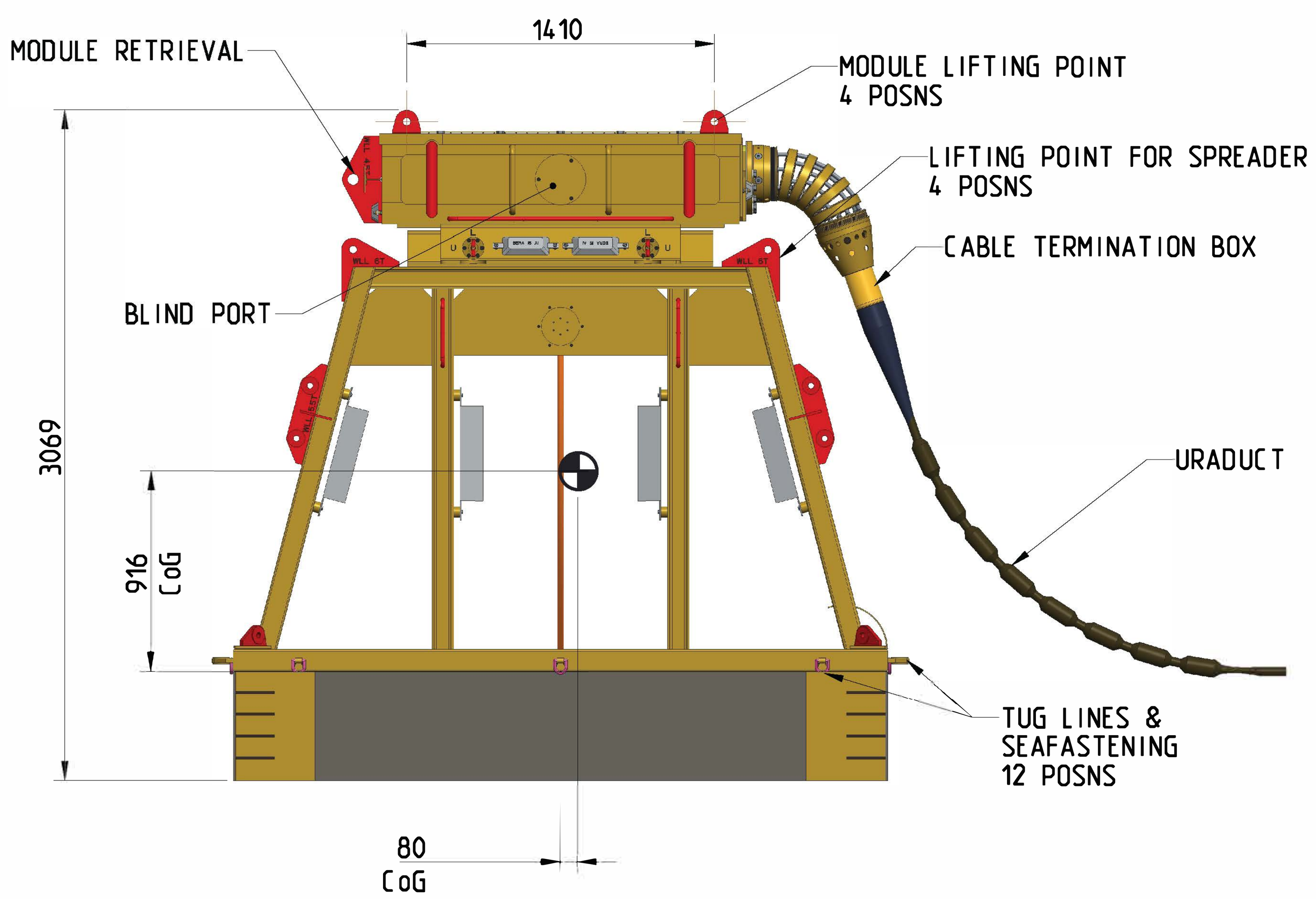
Alcatel·Lucent

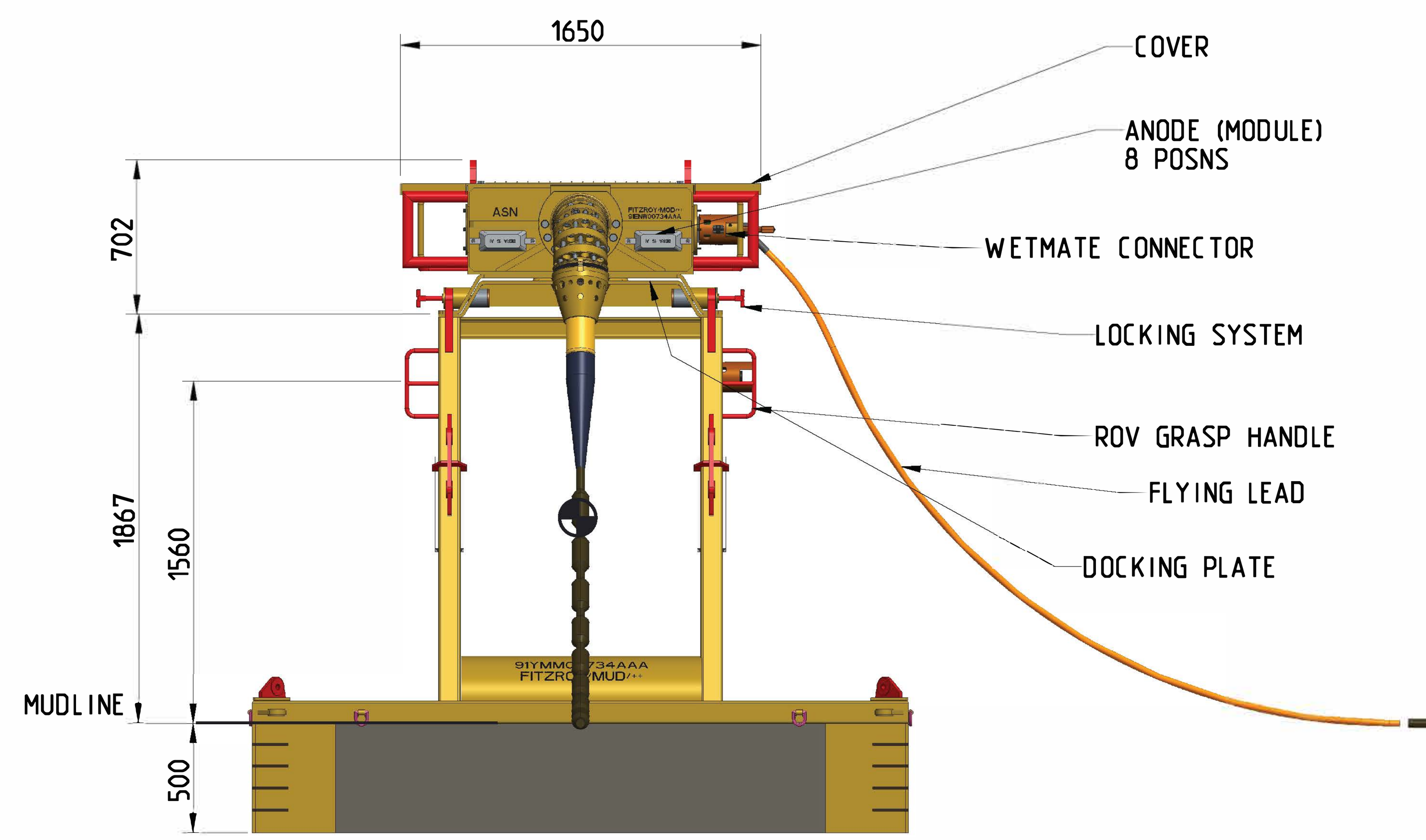


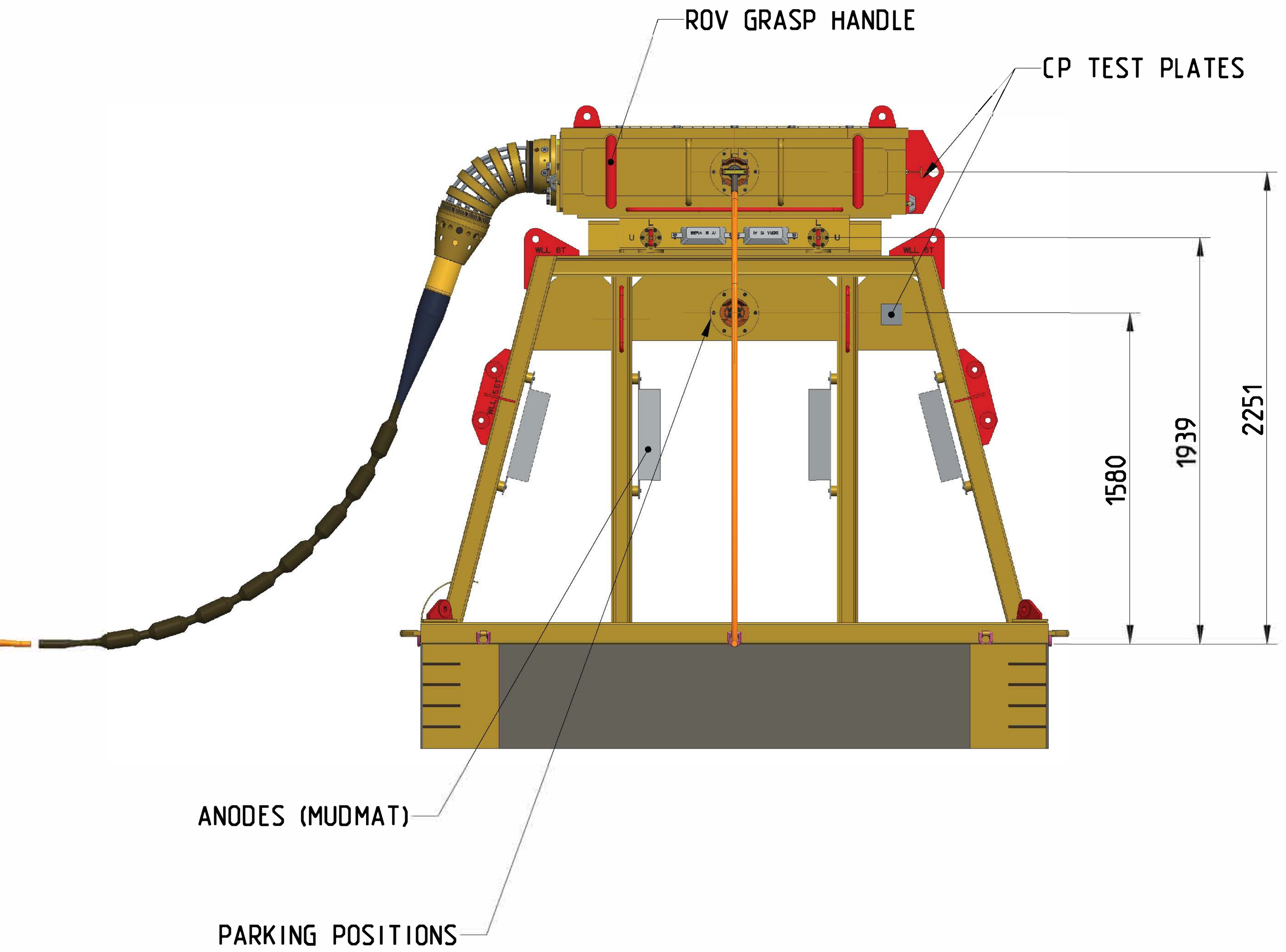


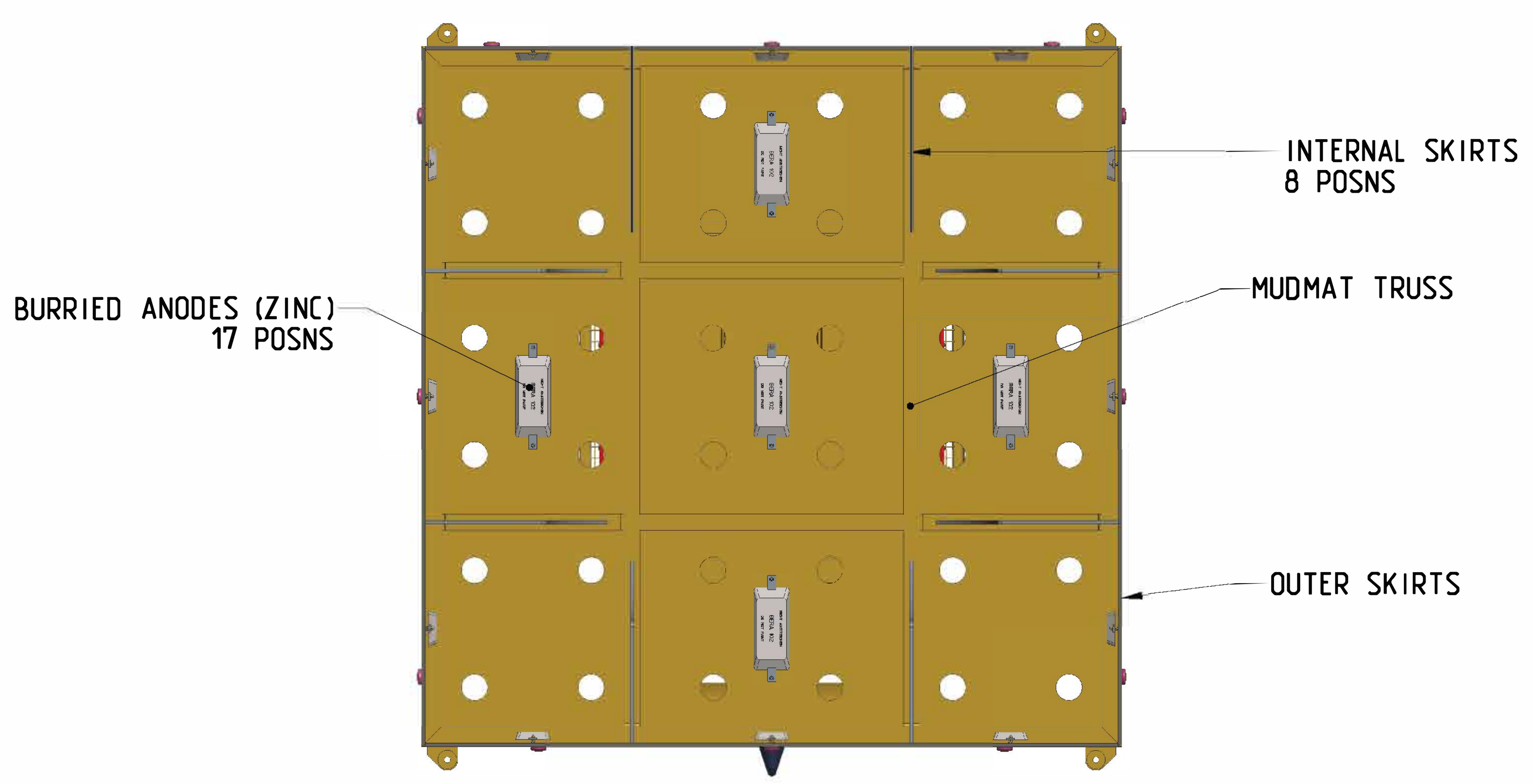


ISOMETRIC VIEW OF THE BOTTOM
MUDMAD INTERNAL SKIRTS ARE NOT PAINTED









ITEM NO	CODE	QTY	DESCRIPTION	MASS [Ton]
1	91EMD00734AAA	1	EQUIPPED MODULE	1.000
2	91YMM00734AAA	1	MUDMAT ASSY	2.750

TOTAL MASS : 3.8T
SUBMERGED WEIGHT : 3.3T

DIFFERENCES		REFERENCES FIRST USED ON / ORIGINATING REF No 69529				DERIVED FROM :-	
MATERIAL /		FINISH /				GEN. TOL. +/- 0.2 Holes +/- 0.1 Ang +/- 0.5°	SCALE 1:25
ED	DATE	01	12/05/2015				
CHANGE NOTE		/					
APPRA. AUTHO.		SNWVX					
ORIGINATOR		SNWVX					
Alcatel·Lucent	DRAWN R.M.	ENG R.M.	CHECKED	I.E. APPR.	P.D.C.	TITLE CTA NODE	
DIMENSIONS IN MILLIMETRES		0.1	CODE 91ENW00734AAA 3.N			SHT No. 1 / 1	

DISTRIBUTION;- R1 RELEASE LEVEL;- Design stage

DRG VER;- 01.0 DRG OF MODEL 91ENW00734AAA MODEL VERSION 01.0