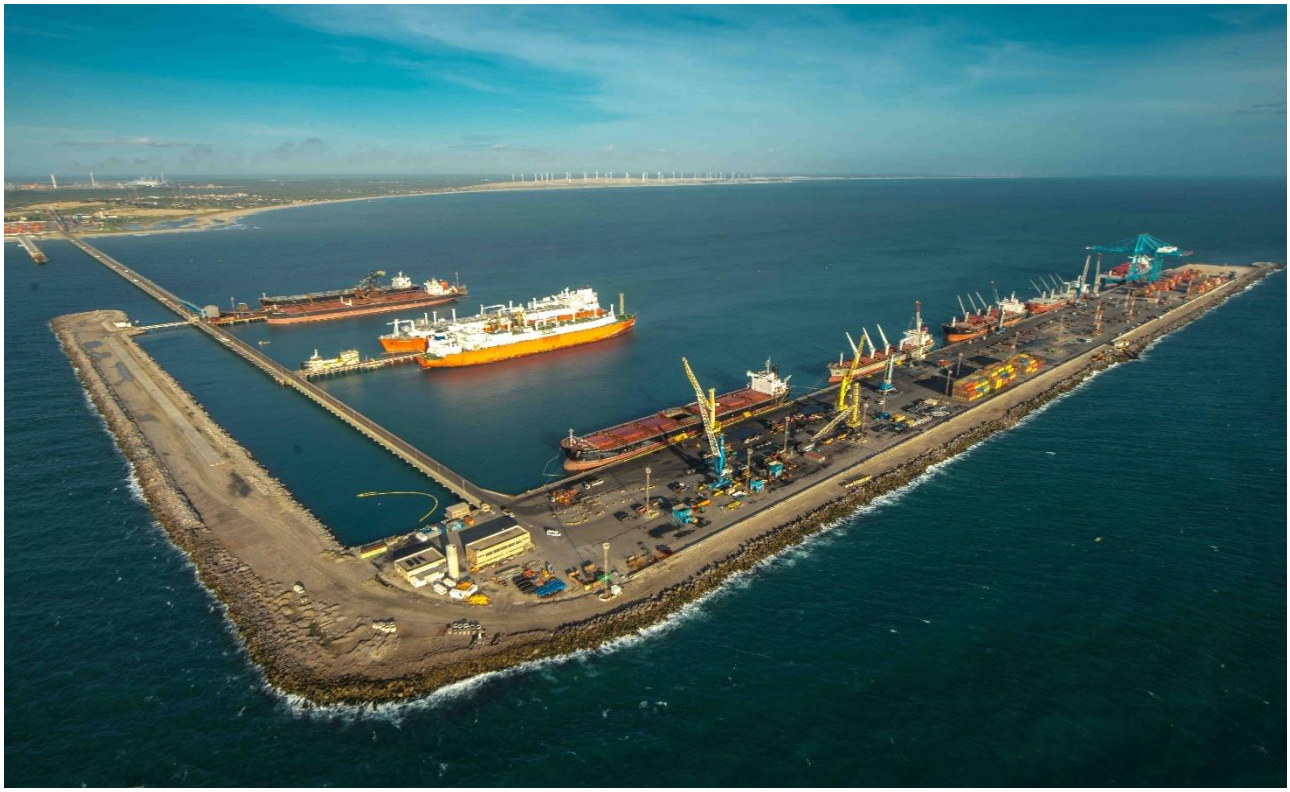
PORT INFORMATION

PECÉM TERMINAL



Review	Changes	Date	Prepared by	Approved by
0		09/2008	Josenildo/ Tavares	Jorge Luiz
1	Updating Procedures	02/2010	Josenildo/ Tavares	Francisco
2	Updated	03/2019	Marlon/Tavares	Mateus
3	Updated	07/2020	Marlon	Heronildes
4	Updated	05/2021	Michele	
5	Updated	12/2022	Santoro	

CONTENTS

1. INTRODUCTION

This Port Information was prepared by Petrobras Transporte S.A. (TRANSPETRO), which operates the Pecém LNG Flexible Terminal and Ship to ship operations, State of Ceará. It provides essential information for ships operating at the terminal. This document is also distributed internally in the organization, to interested parties at the port and to local and federal authorities.

Operations by ships should be in accordance with recommendations by SIGTTO/ISGOTT - Society of International Gas Tanker and Terminal Operators / International Safety Guide for Oil Tankers and Terminals, by Ship-to-ship transfer guide by petroleum, chemicals and liquefied gases, by OCIMF Marine Terminal Baseline Criteria and Assessment Questionnaire and International Conventions by the International Maritime Organization (IMO).

This Port Information has Portuguese and English versions.

The information contained in this publication is intended to complement and never to replace or change any kind of legislation, instructions, guidance, or official publications, domestic and international. Hence, whatever is opposed to any item in the above-mentioned documents should not be considered.

The Terminal reserves itself the right to change any of its operating features described herein without previous advice.

Should any erroneous information be found in need of updating, please get in touch with:

Coordination of the Terminal of the Pecem
Esplanada do Pecém, s/n - Distrito do Pecém
Postal Code 62674-000 São Gonçalo do Amarante – CE
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Avenida Presidente Vargas, 328, 9th floor Centro
20091-060 Rio de Janeiro – RJ
Phone: (+55 21) 3211-9085
Fax.: (+55 21) 3211-9067

This Port Information's most recent version and those of other Transpetro terminals may be obtained through the following address: http://www.transpetro.com.br

2. DEFINITIONS

BP (Bollard-Pull) – A Vessel's Static Longitudinal Traction.

CARRIER – Supply Ship.

CNG – Compressed Natural Gas**.**

DAM – Pier Mooring Bollards (without fenders)**.**

DAT – Pier Mooring Bollards (with fenders)**.**

DWT- Deadweight tonnage

ERP – Emergency Response Plan.

FSRU – Floating Storage and Regasification Unit**.**

GIAONT – Operational Inspection and Monitoring Group for Ships and Terminals.

IMO – International Maritime Organization.

ISGOTT – International Safety Guide for Oil Tankers and Terminals

ISPS Code – International Ship and Port Facility Security Code.

KOD – Knock Out Drum

LCP – Local Contingency Plan.

LNG – Liquefied Natural Gas.

OCIMF – Oil Company International Marine Forum

POB – Pilot on Board.

POAC- Person in Overall Advisory Control

SPRING TIDES – Condition whereby a tide reaches its maximum amplitude at certain times of the year.

STCW – Seafarers Training Certificate and Watchkeeping.

STS- Ship to ship operation

SQUAT EFFECT – Increase in a ship's draft due to the increase in speed when sailing in restricted waters.

SWL – Safe Working Load (Working Load Capacity).

TMUT- Terminal for Multiple Use

UTC – Universal Time Center (Standard Universal Time).

VTS – Vessel Traffic Service (Vessel Traffic Control Service).

VT2 – Vessel Type (Ship for stocking and regasification LNG).

3. REFERENCE NAUTICAL LETTERS AND DOCUMENTS

Information on the Pecém port ships may be obtained in nautical charts DHN-710/DHN-711 and nautical publications of DHN, which may be acquired by the Shipping Agency and made available to the interested party. Comments and information disclosed in Notices to seafarers at www.dhn.mar.mil.br.

4. DOCUMENTS AND EXCHANGE OF INFORMATION

The items listed below should be prepared by the Terminal or by the Ship, or both as shown in the table.

Information	Prepared by:			Delivered by:			Comments
	Terminal	Ship	Both	Terminal	Ship	Both	
Before Arriving							
Estimated Time Arrival (ETA) and Information on vessel		X		X			
Port Information	X				X		
Before Transfer of transshipment							
Details on cargo / slop / ballast on board		X		X			
Information essential to the operation *(complete on the spot)*	X				X		
Ship / Shore Safety Check List			X			X	*According to MOP*
During transshipment							
Repeat Ship / Shore Safety Check List			X			X	As established by ISGOTT
After transfer of cargo, before sailing							
Information necessary to unmooring ship			X			X	Amount of fuels and water on board
After unmooring, on way out of port							
Information on port exit data		X		X			Time pilot left ship and of departure from port

5. DESCRIPTION OF PORT AND ANCHORAGE

5.1 Overall Description

The LNG Terminal and STS operations in Pecem are managed and operated by Transpetro, whose facilities are close to the city of Fortaleza, in the state of Ceará.

In addition to Transpetro, there are other port operators in activity at the Pecem Port Terminal.

The Pecém Port Terminal is an artificial external port for mixed use owned by the Government of the State of Ceará and Port of Rotterdam, and the port authority is:

Port Complex of Pecém - PICC
Esplanada do Pecém, s/n - Distrito do Pecém
São Gonçalo do Amarante – Ceará
Postal Code: 62674-906.
Corporate Taxpayers' Enrollment: 01.256.678/0001-00
CGF: 06.983.506-3
Municipal Enrollment: 450058-0.
TelTerminal: 55 (85) 3372-1500 (24-hour assistance)
Email: comunicacao@complexodopecem.com.br

Pecém Port Terminal

The Port of Pecém is essentially made up of an L-shaped protection jetty – Berma style, paralleled to quay 868m away and another paralleled to the beach 2000 meters away from coastline with three berthing facilities, two in the shape of a pier, with two berths each and one with continuous berth, being pier 1 for commercial operations with no solid cargo bulk, pier 2 for LNG transshipment between vessels and pier 3 (Terminal for Multiple Use-TMUT) for commercial operations with general cargo, solid bulk and ship to ship operations.

The port works 24 hours per day during the entire year.

The Pecém LNG Flexible Terminal is responsible for transshipment of LNG between LNG tankers and for sending CNG to the GASFOR Pipeline. The STS provider is Transpetro for transshipment of oil products between oil tankers can take place in berths 7 to 9 of the TMUT.

Access by land to the Terminal can be made by means of the federal highways BR-116 and BR-222, and by state highway CE-422.

Local time in the region is three hours behind Greenwich Mean Time. The state of Ceará does not adopt summer time.

5.2 Location

5.2.1 Coordinates

Its geographical position is Latitude 03°32.981' S and longitude 38°48.669' W.

5.2.2 General Geographic Location

The Port of Pecem is located in a mixed-use port located at Esplanada do Pecém, s/n – District of Pecém, municipality of São Gonçalo do Amarante, on the west coast of Ceará, 56 km by road from the city of Fortaleza.

5.3 Approaches to the Terminal

5.3.1 Overall Description

The approach to the Pecém Port Terminal has well-defined approach points. The access channel to the Port is not signaled. The docking facilities are connected directly to the open sea.

Pier 2 where the LNG transfer operations are performed can receive ships of not more than 175,000 DWT. With depth that may vary from 14 to 18 meters, its use should respect a maximum draft of 15.5 meters.

TMUT where the ship-to-ship operations are performed can receive ships of not more 140,000 DWT and maximum draft of 15,30 meters.

5.3.2 Anchorages

Recommended or Designated Anchorages			
Number	***Location***	**Radius**	**Notes**
02	03°27,30' S 038°45,00' W	0.5 nm	There is an exclusive anchorage for LNG ships.
03	03° 27,00'S 038°43,50' W	0.5 nm	There is an exclusive anchorage for TANKER ships.
04	03° 31,00'S 038°45,50' W	0.5 nm	There is an exclusive anchorage for ships in condition of arrest or quarantine(ANVISA).

5.3.3 Navigation Aids

There is no signaled access channel and the docking facilities are connected directly to the open sea, limited by the breakwater and the west buoy in the maneuvering basin.

5.3.4 Port Limits

The authorized limits in the Pecém Port Terminal are 200 meters away from the port structure (piers, bridge, and breakwater), and extend to the buoys that limit the maneuvering basin as shown in the picture below:

5.3.5 Port Control or VTS

Maritime authority at the Port of Pecém is the State of Ceará Port Authority, from the Navy Ministry.

Marine Authority /Capitania dos Portos - CP-CE
Av. Vicente de Castro No. 4917- Mucuripe
Fortaleza/CE
Postal Code: 60180-410
Telephone (85) 3133-5100 / 31335106
Email: cpce.secom@marinha.mil.br

Use of the anchorage area and port access by ships will be authorized by CEARÁPORTOS, according to previous approval by the Maritime, Customs, Sanitary, and Maritime Police Authorities.

Except in the case of a stopover, the ship-owner, forwarder or its agent, as applicable, should apply for previous authorization and to this end should provide the following information at least 24 hours before the ship's arrival:

- Name of vessel;
- Flag under which it sails;
- Nature and direction of journey;
- Last port of call and next port of call;
- Name and address of the party responsible for the vessel and for payment of port fees;
- Characteristics of vessel: (1) total length and width; (2) deadweight tons, gross registered tonnage, and net registered tonnage; (3) maximum draft, draft on entry and estimated draft on exit;
- Nature of operation;
- Copy of the bill of lading to be unloaded or shipped, or a provisional detailed cargo list undersigned by the person in charge for the ship or its agent;
- Number of passengers coming ashore or boarding;
- Estimated arrival and departure dates;
- Any irregular or abnormal fact likely to affect navigation security or to jeopardize the efficient use of the port facilities;
- Indication of the need to use equipment and services, and the load / unload rate;
- Time estimated to handle and accommodate cargo;
- Ancillary services to be used.

In the case of vessels carrying hazardous goods, the ship-owner, the carrier or its agent should provide the following specific and additional data, jointly with the information contained in the above items:

- Name of goods according to the IMDG Code, by the United Nations Organization's International Maritime Organization – IMO, and flash point, if applicable;

The amount of hazardous cargo on board, describing which is to be unloaded at the Terminal and which will remain on board, with the latter's location in the vessel;

- The state of the hazardous goods and the likelihood of incidents taking place;
- Information on whether the vessel has an insurance certificate to carry hazardous goods.

5.3.6 Pilotage

Pilotage inside and outside of the port area is mandatory for all ships bound for the Pecém Port Terminal. Pilots may be requested through the vessel's agent 24 before arrival. They may be requested by means of VHF radio-telephone channel 10 or 16. If the ship has a mobile telephone available, a pilot may be requested through the Agency by telephone.

The pilot's embark and disembark location is on position:

LAT = 03º 28,50' S and LONG = 038º 47,80' W.

Ships should have sufficient ballast and be duly equipped with mooring gear and the respective accessories.

When unmooring, pilots may be requested according to the operation's estimated conclusion and time for clearing cargo, informed by the ship.

Each captain is the only person responsible for maneuvers, and who will provide the pilot with all information on any particularity, specific conditions, or existing difficulties, such as: deficiency in engines, boilers, problems or failures in navigation aiding devices, mooring cables, or any other item likely to result in danger with regard to mooring, detaching mooring lines, loading and unloading the ship.

5.3.7 Tugboats and Port Services

Tugboat services are listed in item 8.3. "Tugboats and other Maritime Services"

5.3.8 Navigation Risks

The main obstacles to navigation are fishing boat traffic, such as *jangadas* (a type small wooden sailboats boat) and canoes nearby the port.

5.3.9 General Restrictions

There are no restrictions in maneuvering ships, which may moor and unmoor under any tide, unless specific conditions, such as the lack of lighted signaling, the existence of cyclical events, whether or not natural, or other joint decision between pilots and the companies involved, likely to require time restrictions.

In the case of LNG ships and STS ships, there are specific recommendations in the Maritime Authority (pilotage norms) to berth and unberth during day light.

Please note that it is the responsibility of CEARA PORTOS to define the times and sequence of maneuvers, according to its business interests. When defining maneuvering procedures, the parties involved (ship, terminal, and authorities) should attempt to reconcile the interests of the Norms the Port Authority, and safety operation.

5.4 Maneuvering Basin

Between Piers 1 and 2 - 300 meters
Among Piers 2 and TMUT - 350 meters

5.4.1 Assistance for Berth

For maneuverings mooring and unmooring, the Pecém Port Terminal has its own labor force with individual labor agreements.

5.4.2 Bathymetric surveys

The Ceará Basin is located on the continental platform on Brazil's equatorial shore, covering an area of roughly 34,000 km². The sea bottom morphology in this area is composed of three very distinct levels. The first, located on the inner platform of not more than 30 meters in depth, displays a surface leveled by sedimentation processes, with undulation marks of around 20 cm in height.

On the second level, from 30 to 50 meters in depth, there is topographical gradient, which varies from gradual to abrupt. The contours begin to appear irregular, probably resulting from erosive remnants, with the presence of coralline algae banks and dispersed depressions of gradual contours. The third level detected proceeds to as much as 70 meters in depth and displays a more abrupt topographical gradient with the presence of coralline algae banks.

The sea bottom topography in the Pecém Port Terminal region has a great occurrence of rocks in the surf area. Next to Ponta do Pecém there are considerable areas covered by such outcroppings.

The results of a seismic survey point to volcanic rocks that form a sea bottom base covered by sandy sediments and mud. Thickness of the sediment layer varies from zero to 16 meters for the on-shore and off-shore directions, and parallel to the coastline. This is cause chiefly by fluctuation of the limit level of the rocky base's lower layer.

Thickness of the sandy layer is not expressive at depths below 10 meters.

At depths of roughly 10 to 16 meters, volcanic rock prevails. At depths greater than 16 meters, the bottom's surface is covered predominantly by sandy sediments.

5.4.3 Minimum and Maximum Dimensions

In principle, the supply of LNG may be undertaken by ships between 70,000 and 210,000 m³ in capacity, with the following dimensions:

Minimum:

- Total length (LOA): 235 meters;

- Molded breadth: 34 meters;
- Molded draft: 10 meters;
- Deadweight (DWT): 48,500 tons;
- Cargo capacity: 70,000 m³.

Reference – Methane Arctic and Methane Polar LNG Ships

Maximum:

- Total length (LOA): 315 meters;
- Molded breadth: 50 meters;
- Molded draft: 15.50 meters;
- Cargo capacity: 218,000 m³.

Reference – Q-FLEX LNG Ship

5.5 Meteorological Conditions

5.5.1 Prevailing Winds

Strong winds are very common in the region and may prevent docking maneuvers as well as interrupt operations. The prevailing winds are described in the table below:

Direction	Frequency	Average speed
SE / NO	70%	15 Km/h

In the case of winds above 30 knots in the direction 67 – 112 degT, with a 2.4 meter wave height and Tp 15s period, operations with ships should be interrupted and above 35 knots the arms or hoses should be disconnected.

In the case of winds above 40 knots in the direction 67 – 112 degT, with a 2.4 meter wave height and Tp 23s period, ships should leave the pier.

5.5.2 Waves

In Pecém at latitude 03° 29’ 31” and longitude 38° 59’ 03”, there is a directional wave gauge.

The occurrence of waves above 3 meters is of 11.23%. Above 4 meters it is of 0,22%, and the maximum wave is in the 4.6 to 4.7 meter class, which occurred twice between March 13, 1997 and January 23, 1999.

The most frequent Significant Wave Height (Hs) varies in the Hs grouping between 0.90 and 2.10 meters and is of 96.32%. The maximum significant wave class varies from 2.4 to 2.5 meters, with three occurrences in the period from March 13, 1997 to January 23, 1999.

With regard to direction, there are two dominant groups:

- $90° \leq D \geq 120°$ with 66.74 % of occurrences;
- $30° \leq D \geq 60°$ with 21.19 % of occurrences;

5.5.3 Rainfall and Humidity

Rainfall varies and may rise to the monthly average from 13.4 mm (November) to 336.3 mm (March), with air humidity varying from 70% to 85%.

5.5.4 Atmospheric Pressure

- Minimum: 1.0074 bar
- Average: 1.0087 bar
- Maximum: 1,0100 bar.

5.5.5 Visibility

Normally considered from good to excellent, may be reduced during the rainy season. The months with a greater percentage of cloudiness extend from January to June.

5.5.6 Sea Currents

The tide's current has a 1-knot speed in the SE direction.
The current in the inner berths are weak owing to the protection by the NW arm.

5.5.7 Tides

- Average level: 1.42 meter;
- Average spring tide amplitude: 2.36 meters
- Average spring high tide: 2.70 meters
- Average neap high tide: 2.08 meters
- Maximum Amplitude: 3.20 m.

5.5.8 Measurements

The Terminal has available immediate information on the intensity and direction of winds and currents. Daily the Terminal sends to ships a Meteorological bulletin.

6. DESCRIPTION OF TERMINAL

6.1 Overall Description

The Pecém LNG Flexible Terminal has a type I pier for LNG transshipments, with an outer (north) and an inner (south) berth, both with a 15.4 meter draft.
In the Ship-to-ship operation has 3 wharfs for transshipment, numbers 7, 8 and 9 at the TMUT.

6.2 Physical Details of Berths

Pecém Pier						**Pecém Port Terminal**			
Berth's Name	**Type**	**Length** (m)	**Draft** (m)	**Tides** (m)		**Breadth** (m)	**Length of Vessel** (m)	**Goods Handled**	**Notes** ***(Describe any docking assistance)***
				Spring Tide	**Neap Tide**				
3 / 4	*Píer*	*482*	*15.4*	*3.20*	*1.9*	*46/52*	*290/310*	*LNG and CNG*	*North Berth: LNG unloading* *South Berth: loading LNG and unloading CNG* *Starboard side is preferred for mooring*
7 to 9	*Wharf*	*1700m*	*15,3*	*3.20*	*1.9*	*49*	*366*	*STS operation*	*Transshipment of oil fuel, gasoil s 10, naphtha, gasoline and aviation kerosene (QAV)* *Port side is preferred for mooring*

6.3 Docking and Mooring Arrangements

Docking Arrangements													
Berth	Pilot	Vessel Deadweight (DWT)	Tugboat No. and BP				Approach		Mooring Points		Mooring Cables		
			Docking		Sailing		Speed (maximum)	Angle (maximum	Bollard	Hook	Head / Aft Line	Breast	Spring
			Nº	BP	Nº	BP							
North *South*	*Yes* *Yes*	*100,000* *175,000*	*4*	*150t*	*4*	*150t*	*12 cm/s*	*005º*	*10*	*20* *22*	*4/4*	*2* *2*	*2* *2*
7 to 9	*yes*	*140,000*	*3- 4*	*150 t*	*2- 3*	*80t*	*06 cm/s*	*In parallel*	*26*	*-*	**4/4*	*2*	*2*

* STS operation the mooring can be changed in Master and Pilot agreement.

6.4 Fenders

Fenders of the type SUC-2000-H rubber grade RH are employed in Pier 2, and both berths have four of these. The maximum acceptable limit of final reaction per unit is 246.10 tons.

Fenders of the type pneumatic/Yokohama are employed between the vessels during STS operations, 4 larger fenders (6.50m x 3,5m) and 2 small fenders (3,5m x 2,0m). The fenders are positioned on the side by boat.

6.5 Characteristics of Loading and Unloading Berth

The outer berth (north) where the supply ship will dock, is endowed with three unloading arms with the following sequence LNG - Steam - LNG. The inner berth (south) where the VT will dock, is endowed with five unloading arms, two of which for LNG, one for steam return, and two for CNG. Manifolds and transfer lines interconnect both berths and allow transshipment of cargo and exports of natural gas. The table below contains technical data on the arms.

Arms on the LNG Pier							
Berth	Arm	Manufacturer	Product	Diameter	Flow (m^3/h)	Pressure (kgf/cm^2 g)	Temp (ºC)
NORTH	*MLA-01*	Emco Wheaton	LNG	16”	5,000	5.0	-162
	MLA-02	Emco Wheaton	Steam	16”	15,000	0.2	-140
	MLA-03	Emco Wheaton	LNG or Steam	16”	5,000/ 15,000	5.0	-162
SOUTH	*MLA-04*	Emco Wheaton	LNG or Steam	16”	5,000/ 15,000	5.0	-162
	MLA-05	Emco Wheaton	Steam	16”	15,000	0.2	-140
	MLA-06	Emco Wheaton	LNG	16”	5,000	1.6	-162
	MLA-07	Emco Wheaton	CNG	12”	7,000 m^3	58 to 100	5 to 50
	MLA-08	Emco Wheaton	CNG	12”	7,000 m^3	58 to 100	5 to 50

LNG Pier’s work performance

North berth’s LNG arms:

- Breadth – 8.9 meters
- Maximum height = 28.75 meters
- Minimum height = 15.89 meters

South berth's LNG arms:

- Breadth – 8.9 meters
- Maximum height = 26.20 meters
- Minimum height = 18.04 meters

South berth's CNG arms:

- Breadth = 8.9 meters
- Maximum height = 26.20 meters
- Minimum height = 18.04 meters

In Ship-to-ship operation are use four hoses (rubber/electrical semi-continuous) for transfer oil product from receiver vessel to supplier vessel:

Hose	Manufacturer	Product	Diameter	Flow (m^3/h)	Max Pressure (kgf/cm^2 g)	Lim.Temp. (ºC)	length(m)
STS 067	Yokohama	Liq. petroleum	08"	1500	15	-20 to 82	11,8
STS 068	Yokohama	Liq. petroleum	08"	1500	15	-20 to 82	11,8
STS 069	Yokohama	Liq. petroleum	08"	1500	15	-20 to 82	11,8
STS 070	Yokohama	Liq. petroleum	08"	1500	15	-20 to 82	11,8

6.6 Management and Control

The LNG Terminal has an entirely automated electronic operating supervisory control center, whereby all the terminal's operations are monitored 24 hours per day.

The points monitored encompass:

Item	Loading	Unloading	Transshipments	Supplies	Transfers to Companies
Pumps	X	X	X	--	--
Shore manifold	X	X	X	--	--
Ship manifold	X	X	X	--	--
Pier pipelines	X	X	X	--	--

The monitoring of Ship-to-Ship operation is made by the ships, with the Transpetro's operator responsible for the initial and final liberation.

6.7 Main Risks

Communications between supplier and receiver is immediate and made by means of a UHF(by LNG)/VHF(by LNG or STS) radio, in addition of the other secondary ways. In case of abnormal events, any of the parties, terminals, or ships may execute or request the immediate interruption of operations.

In case of leakages, pollution, pressure surges, or contamination of products, fluctuations in tensions of the mooring cables and/or electrical storms with rays in any periods during the day, the terminal or ship will stop operating immediately, isolate the area, activate the contingency plan (if required), and start mitigating the incident.

7. PROCEDURES

7.1 Before Arrival

7.1.1 Ships arrive Pecém terminal should inform their Estimated Arrival (ETA) 72, 48, 24, and 4 hours in advance directly to the respective agent and the operating area, by email or telephone. Changes to or confirmation of the ship's arrival should be informed at least 12 hours in advance. The ETA should always be informed, using UTC time.

7.1.2 The Terminal send by ships e-mail this port information and reserves itself the right to refuse berth or operations by any ship deemed to be inadequate. That does not comply with safety or mooring conditions, or any circumstances likely to put the Terminal at risk, caused by: Personnel, equipment, the environment, or non-compliance with recommendations provided for under the ISGOTT.

7.2 Arrivals

7.2.1 The port authorities will be activated by the ship agents owing to arrivals, who will also provide docking estimates. In general, visits will occur after docking.

7.2.2 Information from Terminal to ship and vice-versa are described in item 4.

7.2.3 In order to optimize the transfer operation, it is recommended that supply ships arrive at the Terminal ready to operate. For the same reason, it is recommended that the cargo and transfer lines be cooled during berth procedures.

7.3 Berth

7.3.1 The ship's mooring system

- Mooring lines should be given permanent attention in order to always maintain the ship moored. All the lines should be kept under adequate tension during the operation, with winches blocked and monitored on board and at the terminal.
- All the mooring lines should be of the same type, gauge, and material (fiber or wire), and mixed mooring lines cannot be employed.
- Mixed mooring lines are those in which cables for the same functions are of different types, gauges, and materials.
- Mooring lines should be placed as symmetrically as possible in relation to the mid-ship section.
- Breast lines should be placed as perpendicularly as possible to the ship's longitudinal axis, and all other cables should be arranged in accordance with the type of mooring approved in item 6.3, according to the configuration shown in Annex F.

7.3.2 Ship to shore access

7.3.2 .1 - LNG Terminal

-The Terminal's inner (south) and Outer (north) berths have telescopic stairs for easy access to the docked ships.
-The accommodation ladder on the opposite side of the berth should be kept ready and hoisted next to the deck during all the time that the vessel is docked, for the terminals and the ship's safety. The accommodation ladder should be used only in emergency evacuation.

7.3.2 .2 - STS Operation

- The ship moored on the pier will use your accommodation ladder and the outside ship will use your accommodation ladder to have boat support.

- When coming ashore, crew members who wish to use the Terminal's facilities should comply with the procedures in the ISPS Code, hold on identification documents moving only in the marked areas and recommended to use closed footwear, long pants, and shirt with sleeves.

7.3.3 Previous information of berthing procedures

- In order to optimize assistance to ships, including support by tugboats, motorboats, lashers, and safety inspectors, the ship should inform the terminal through its VHF maritime channel 16 or channel 10 as soon as it moves on to the maneuvering basin for berth.
- The Terminal's recommendation that ships maneuvers is that they should begin at daybreak, and if possible, at least 30 minutes before the tide changes from low to high tide.

7.4 Before Transferring Cargo

7.4.1 Meeting before Operation

7.4.1.1 - LNG Terminal

-During the initial meeting with the mandatory attendance by the supply ship, receiving ship, and terminal, the following parameters, defined at MOP (Mutual Operation Procedures/ SIGTTO), will be agreed on and recorded: Connection, ESD tests, survey to custody transfer survey (CTS), authorization customer, opening of valves, cool down, return pressure, initial flow (ramp up), temperature, operating flow and pressure, Final flow (ramp down), purging, inertizing, disconnection, final release and unmooring.
-The ship should make personnel support available as soon as possible when loading in order to enable connecting the loading arms. Please note that the first arm to be connected should be the steam return line. After connecting the arms, these should be tested in sequence.

7.4.1.2 - STS Operation

- During the initial meeting with the mandatory attendance by the supply ship, receiving ship and terminal will hit the process variables.
- The necessary resources for connecting the hoses are right in the first contact of the ships with the superintendent.

- The ship's representative should monitor all the testing operations, remaining close to the ship's cargo intake.
- The operation will begin only after performance of the operating safety inspector, based on ISGOTT recommendations, performed by a terminal representative together with the receiving and supply ships' representatives and following the signature of the documents by all the parties involved in the operation, ensuring acceptance of the operating variables, emergency stops, and communications system discussed in the initial meeting.

7.4.2 In the case of the LNG operation the electrical insulation between ship and Terminal is done by means of an insulating flange installed on the loading arms, in order to ensure the connection's safety in accordance with ISGOTT recommendations.

7.4.3 The Ship/Shore Check List (ISGOTT) is checked and completed by a safety inspector and submitted to the Operator and ships during the initial meeting for signatures. Following this safety inspection, if there are any pending items that the crew is unable to solve, the ship will not be authorized by the Terminal to begin operations, and may or may not be requested to unmoor the ship, which will be accountable for all the implications and costs resulting from its non-conformity, and the already issued notice of readiness to operate will be cancelled.

7.4.4 It's forbidden blowing soot or cleaning boiler pipes with the ship moored. Care should be taken so that sparks do not escape from the stack. Non-compliance with these regulations will imply the issue of a letter of protest, which creates one of the following sanctions:

- The immediate interruption of operations;
- A fine by the competent authorities;
- The ship's mandatory unmooring from the pier;
- Notice of the violation to the ship-owners;
- The ship's accountability for fines, loss of time, and any other related expenses resulting from this fact.

7.4.6 The restriction on small unauthorized vessels remaining alongside or close to docked ships should be strictly respected. Only vessels authorized by the Terminal may remain close by or alongside, provided that they comply with every safety condition. This rule's violation will have to be informed to the competent authorities.

7.4.7 A berthed ship cannot turn its propeller(s) while it is connected to the arms or hoses. The ratchet may be used only after examination and permission by the terminal operator, but the propeller(s) should be turned slowly and in a controlled manner to ensure absolute safety. Ships will be held responsible for any damages arising from this maneuver.

7.5 Transferring Cargo

7.5.1 Monitoring of operations

• On the LNG operation, the process variables during cargo transfers are monitored and recorded by the supervision and control system in Transpetro CCO. The process variables on the operation's both sides are gauged every hour and compared by the parties, and according to the system employed there is a limit parameter for operating control. Full-time monitoring of the arms connected to the ship during operations.

• The monitoring the process variables in the Ship-to-Ship operation is made by the ships. At all times the connected hoses between ships should be monitored.

•Any change in operating conditions should be informed and documented by the parties. It is expressly forbidden to close valves during operations, likely to cause a counter-pressure in the system. Check communications with the ships so that operations do not start without perfect communications. Check the entire alignment before operations begin.

7.5.2 The ship's ballast/ deballast lines and tanks should be used for this purpose only, and they are isolated from all other on-board lines. When water ballast unloaded into the sea should be entirely free from oil, any oily residue, or other substances likely to cause pollution in the seawater. Ships will be responsible for controlling operations and the quality of ballast water discharged at the port.

7.5.3 The terminal does not have a system to discharge slop.

7.5.4 Normally, the conventional tank cleaning operation will not be accepted. So, any no planned operations depend on the previous approval by the Terminal Supervisor with focusing at operating safety.

7.5.5 Repairs or maintenance work of any kind cannot be performed when they involve or will involve a risk of sparks or other means of ignition, while the ship is in the terminal. In extreme cases, every safety rule should be respected and complied with. Repairs involving pier facilities or implying in any restriction to the ship during its stay, should be approved previously by the Terminal.

7.5.6 Intermediary inspections during transfers, as in the Annex – ISGOTT 6 Safety Check List, are performed by a GIAONT inspector and submitted to the Operator at intervals defined in the initial meeting and not in excess of ISGOTT recommendations (every 4 hours), and the daily presence should be recorded.

7.5.7 Interruption of loading and unloading by the ship should take place under any situation likely to be dangerous, either to the ship or to the Terminal. Operations may be temporarily suspended during electrical storms,

thunder and/or strong winds, pursuant to the limits defined in 5.5. The terminal's representative is authorized to interrupt or suspend operations in case of non-compliance with any rules and norms concerning safety, as universally accepted and adopted in the sea transportation of petroleum. The ship's captain is entitled to interrupt operations if he has reason to believe that on-shore operations do not provide safety, provided that he informs the pier operators in advance.

7.5.8 In any emergency situation, the terminal may interrupt operations in progress, so that all actions are directed to mitigating the occurrence. Actions and contacts for each type of emergency are provided for and described in the management's ERP from Terminal and the key telephones are listed for a communications flow in emergency situations.

7.6 Measuring Cargo and Documentation

7.6.1 Drain

• Once the LNG operation is concluded, the loading arms employed should be drained. Operators will drain the arms to the closed system on the pier. The ship's representative will be in charge of draining the on-board portion, as defined in the initial meeting.

• In the STS operation, when the operation is completed, the drains of the hoses must be carried out by the ship and accompanied by a terminal representative.

7.6.2 On-board measurements will take place by the ship's personnel and monitored by terminal representatives and other inspectors. The material employed should be duly grounded and measuring accessories should be explosion-proof.

7.6.3 The ship's liberation should occur after comparing the amounts handled and the stay documentation's complement.

7.7 Unmooring and Departure

7.7.1 During unmooring and port departure maneuvers, the channel limits should be respected as well as hazards listed in sub-item 5.3 and its correlated items.

7.7.2 The pilot normally disembarks at the same point of boarding described in sub-item 5.3.6, where a port pilot boat will wait for him.

7.8 Compliance with ISPS CODE

7.8.1 The Pecém Terminal is certified and has a Security Plan with measures implemented for the access control and managerial safety applicable to ships and port facilities, as required by the International Maritime Organization – IMO, by adopting the ISPS – International Ship and Port Facility code.

- In case of need, these protection measures may be mobilized by the ship through the terminal's PFSO – Port Facility Security Officer or through the VHF radio, channels 16, 06, or 10.
- The Pecém Terminal normally operates at safety level 01. For further details, the terminal's PFSO – Port Facility Security Officer may be reached at Telephone (55 85) 3372-1621 and Cell Phone (55 85) 99420-6499 or email: supervisorseguranca@cearaportos.ce.gov.br.

7.9 Drug and Alcohol Policy

7.9.1 According ISGOTT 6, item 13.4, for safety and health personnel reasons, the use of drugs and alcohol have dangerous effect on work performance, behavior and unsafety in the work place. Hence, consumption of alcohol or use of illegal drugs at the Transpetro Terminal is not permitted.

7.9.2 The Transpetro to support international authorities' efforts to combat illegal drug trafficking and use of alcohol in not permitted place, comply on relevant preventive measures to avoid use, possession, distribution these criminals substances.

8. PORT OR ANCHORAGE ORGANIZATION

8.1 Port Control or VTS and Maritime Authority

8.1.1 The Maritime Authority at the Pecém Terminal is exercised by the Norms of the Ceará State, the Brazilian Navy local representative, with Norms and Procedures established by means of CPCE Ordinance no. 15.

8.1.2 Use of the anchorage area and port access by ships will be authorized by CEARÁPORTOS, according to previous approval by the Maritime, Customs, Sanitary, and Maritime Police Authorities.

8.1.3 Except in the case of a stop-over, the ship-owner, forwarder or its agent, as applicable, should apply for previous authorization and to this end should provide the following information at least 24 hours before the ship's arrival.

8.2 Pilotage

8.2.1 Pilotage is mandatory for all ship maneuvers, as of the pilot's boarding point (sub-item 5.3.6).

8.2.2 Pilotage organizations that operate in the Port of Pecém may be freely selected by users, and the following are accredited:

- **Ceará Marine Pilots** – Empresa de Praticagem do Estado do Ceará Ltda, located at Street Osvaldo Cruz, no. 1, suites 1307/1308, Meireles, Fortaleza-CE, ZIP Code 60125-151, may be reached through telephone/fax (85) 3388-4638 and through VHF Channel 16/10. It acts as a Pilotage representative entity as provided for in item 0119 of NORMAM-12/DPC;

- **Ceará State Pilots** – Empresa de Praticagem do Estado do Ceará Ltda, located at Street São Paulo, 32, suites 1114, Centro, Fortaleza-CE, Postal Code 60030-100, and may be reached through telephone (85) 3321-9384 and through VHF Channel 16.

8.3 Tugboats and other Maritime Services

8.3.1 The Agent is responsible for make a contact with tugs approved to maneuver, at least 24 hours before the ship's arrival.

Wilson, Sons -Tugs
Av. Santos Dumont, 1789 – 13th floor, Edifice Potenza, room 1304, Aldeota
Fortaleza-CE Postal Code 60.150-160
Telephone +55 (85) 3268-1117
Email: wellington.leiros@wilsonsons.com.br

Saam Towage Brasil S.A
Pátio Dom Luis, Torre Business Center

Av. Dom Luis, 1200, rooms 1412, 1413, 1414, Meireles
Fortaleza-CE Postal code 60.160-230
Telephone +55 (85) 3312-2883
Email: pedro.veras@saamtowage.com

9. EMERGENCY AND COMBAT SAFETY AND PLANNING

9.1 Communications

Communications between ship and terminal in case of emergencies should take place by Hotline (use in LNG Terminal), VHF channel 06(use LNG or STS operation) or UHF(use in LNG) exclusive channel, the UHF equipment being loaned by the terminal during the initial visit. Emergency details should be informed as quickly as possible between the parties involved, according to the unit's ERP(Emergency Response Plan)

The LNG terminal has a SSL system has three kinds of connections: Optical, electrical, and pneumatic. The first choice should be the optical connection, and in case this fails, the electrical connection should be employed.

9.2 Areas Sensitive to the Environment

In the ERP, Emergency Response Plan, the areas most sensitive to environmental impacts are listed in pages containing environmental sensitivity maps, evidencing according to the area selected the points subject to a greater impact when this kind of event should take place in the neighborhood of the Pecém Port Terminal.

9.3 Overall Description of Combat and Emergency Organization

The bodies responsible for dealing with likely emergencies involving vessels arriving at the Terminal are listed below:

INCIDENTS WITHIN THE PECÉM TERMINAL'S AREA					
Type of Incident	**Organization Responsible**	**Other Organizations Involved**			
Collision in Channel	*Port Authority*	Maritime Authority	*TRANSPETRO*	*Civil Defense*	
Vessel Running Aground	*Port Authority*	*Civil Defense*	*TRANSPETRO*	Maritime Authority	
Collision in Berth	*Port Authority*	*TRANSPETRO*	*Civil Defense*	Maritime Authority	
Vessel Sinking	*Port Authority*	*Civil Defense*	*Fire Department*	*TRANSPETRO*	
Fire in Vessel	*Ship*	*Fire Department* Maritime Authority	*Port Authority*	*M. Authority Civil Defense*	*C. Defense*
Fire in Berth	*TRANSPETRO*	*Fire Department*	*Civil Defense*	*Port Authority*	Maritime Authority
Pollution	*TRANSPETRO (at sea) or Ship (on board)*	*Port Authority*	*IBAMA*	*Maritime Authority*	

9.4 Emergency Plan

The ERP is the plan to combat emergencies in all of its facilities. It is available in all the operating areas, on notice boards in the entries to operating and maintenance rooms, and managerial buildings. The area in charge of its updating is the local HSE (health, safety and the environment).

Actions to combat and control emergencies will be given priority over other activities in LNG and STS operations undertaken by TRANSPETRO, while the situation lasts.

Any occurrence with a potential impact on the environment should be immediately informed to the local government authorities and to the State and Federal environmental inspection bodies.

Actions to combat and neutralize the event's effects should be centralized under one sole coordination. The emergency's combat coordination will be exercised full-time and with exclusive dedication.

Berthed ships should keep their emergency fire wires attached to the on-board bollards and hanging down to the water line during the operation, on the side opposite to the berthing side, for STS operation it is not necessary to put an emergency fire wire. Emergency and fire-fighting equipment should be kept ready for use while the ship is berthed.

An anti-pollution kit should be maintained ready to use (sawdust, rags, buckets, transfer pumps, etc.) for use in case of an oil spill. Additional precautions should be taken in order to avoid oil pollution in the seawater.

9.5 Combat and Emergency Public Resources

In the Pecém Port Terminal, the TRANSPETRO has resources in the terminal and other operating units that may be employed in mitigating events of sea pollution.

The port authority, the maritime authority, the Fire Department and Civil Defense also have the necessary resources for their actions.

9.6 Mutual Support Plans

At the Pecém Port Terminal, TRANSPETRO is empowered by means of the sector management and has the means to get in touch with the port authority, represented by Ceará Portos, which will mobilize the other port operators in Mutual Support emergency situations and training.

9.7 Combating Oil and Chemical Spills

In the port of Pecem the operations under Transpetro are supported by rigorous risk management program which includes the availability of an emergency response center, for immediate performance of oil spill at sea.

This center of response has qualified personnel in combating oil pollution in the sea and firefighting, also having vessels, gathering oil equipment, containment barrier system, absorbent barrier system, temporary storage tanks of oily residue and other support contracts for allocation of these waste.

In addition, there is an EDC (Environmental Defense Center) in Fortaleza, roughly 70 km from the Pecém Port Terminal, and depending on the type of emergency and degree of seriousness the EDC may be mobilized and make available all of its human resources and equipment. The EDC operation is performed by regularly enabled and trained personnel.

The resources available at the Terminal for combating oil spills are listed in the ERP, which is available in all of the Terminal's managerial, operating and maintenance areas.

The Ceará Environmental Agency does not have resources for combating oil spills in the sea.

The EDC lists the actions and the persons in charge of each kind of event provided for and likely to occur in their units, pipeline segments, or vessels, and involving third parties. In case of events not covered by this document, TRANSPETRO / PETROBRAS will make available all the domestic and international resources within their reach.

9.8 Combating Other Large-Scale Emergencies

The Emergency Response Plan lists the actions and the persons in charge of each kind of event provided for and likely to occur in the Terminal's coverage area involving vessels or third parties. In case of events not covered by this document, TRANSPETRO / PETROBRAS will make available all the domestic and international resources within their reach.

10. CONTACTS

10.1 Transpetro Terminal

Location	Telephone	e-mail	VHF/UHF Channels
Control Room	**+55 85 39570011**	**oppcem@transpetro.com.br**	**06/16**

Terminal Coordinator	**+55 85 996590007**	**heronildesfilho@transpetro.com.br**	**06/16**
QHSE Manager	**+55 85 981292521**	**nadynni.soeiro@transpetro.com.br**	**----**

10.2 Port Services

Organization	Telephone	e-mail	VHF/UHF Channels
Maritime Authority	**+55 85 31335106**	**cpce.secom@marinha.mil.br**	**16**
Port Control	**+55 85 33721500**	**waldir.sampaio@complexdopecem.com.br**	**06/16**
Pilot Station - Atalaia	**+55 85 999850293** **+55 85 997160001**	**atalaia@cearapilots.com.br**	**10**
Tugboats	**+55 91 93343650** **+55 85 981228903**	**wellington.leiros@wilsonsons.com.br** **pedro.veras@saamtowage.com**	**10/16**

10.3 Selected Shipping Agents and Suppliers

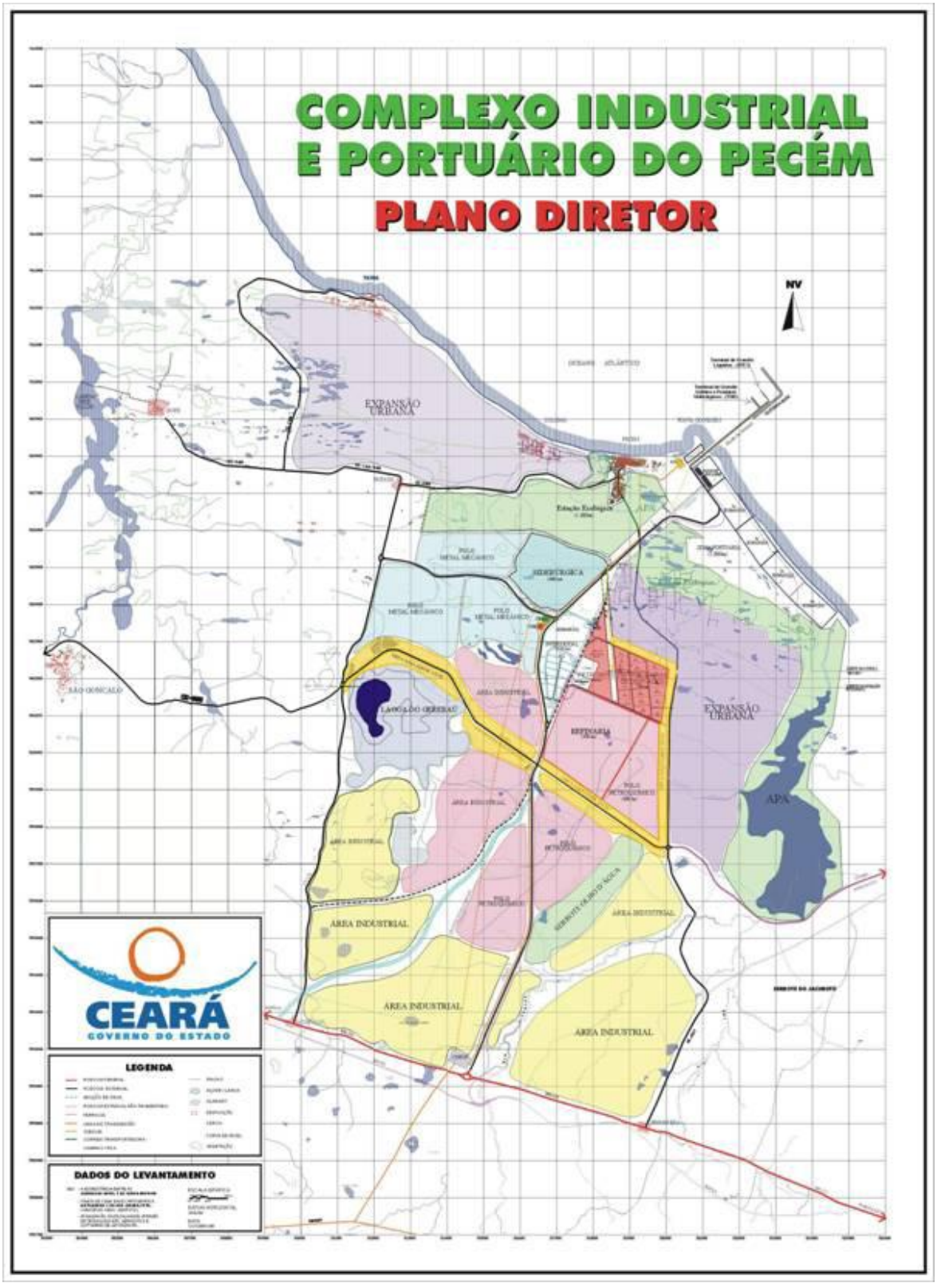
Company	Telephone	e-mail	VHF/UHF Channels
North Star - Petrobras Agency	**+55 85 31141568** **+55 85 998500016**	**fortaleza@nsshipping.com.br**	**-**
Muniz Agency	**+55 85 981050549**	**operations.for@munizagmar.com.br**	**-**

10.4 Local Officials

Organization	Telephone
Police	**190**
Health Service	**192**
Fire Department	**193**

ATTACHMENTS

ANNEX A – PECÉM PORT TERMINAL'S MASTER PLAN



ANNEX B – PHOTO OF TERMINAL

View of Piers

View of Pecém Port Terminal

ANNEX C – PECÉM PORT TERMINAL'S BASIC DATA

Date of Origin	November 2001
Administration	Companhia de Integração Portuária do Ceará – Ceará Portos
Address	Esplanada do Pecém, s/n - Distrito do Pecém
City, State, Postal Code	São Gonçalo do Amarante – Ceará, Postal Code 62674-000
Users' telephone	(85) 3372-1500
Home Page	www.complexodopecem.com.br
Email	comunicacao@complexodopecem.com.br
Coordinates	Lat 3º30'00"S Long 39º50'00"W

Access to Port

Highway	BR-222 / BR-116 / CE-422
Railway	Companhia Ferroviaria do Nordeste-CFN
By Sea	None

Access Channel

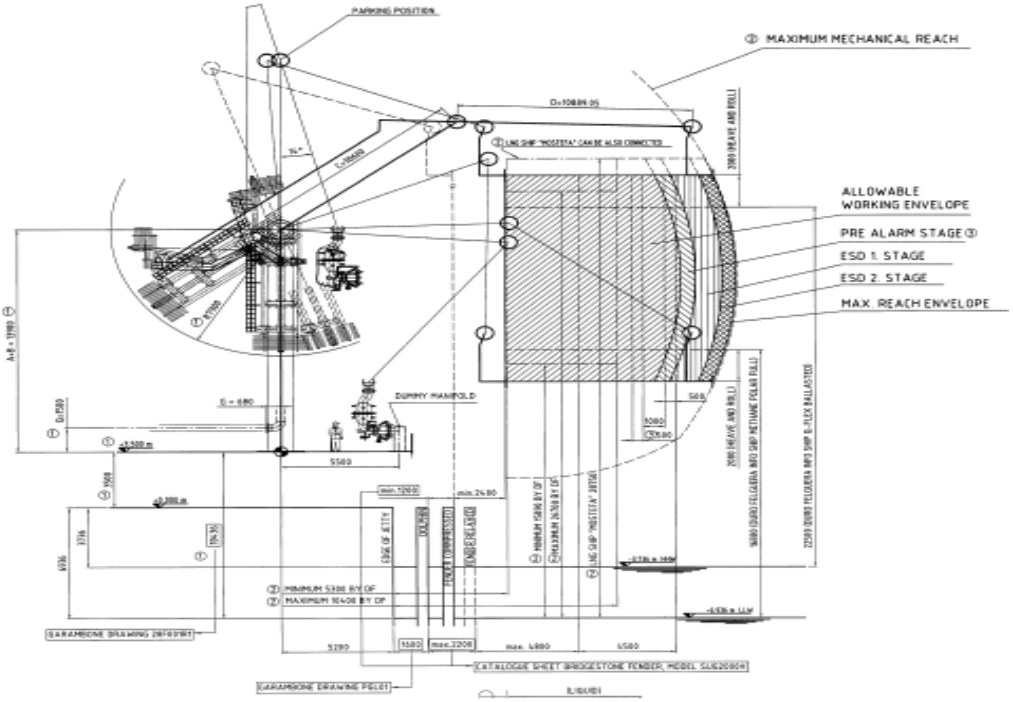
Length	None
Width	None
Maximum Depth	18,00m

Port Dimensions

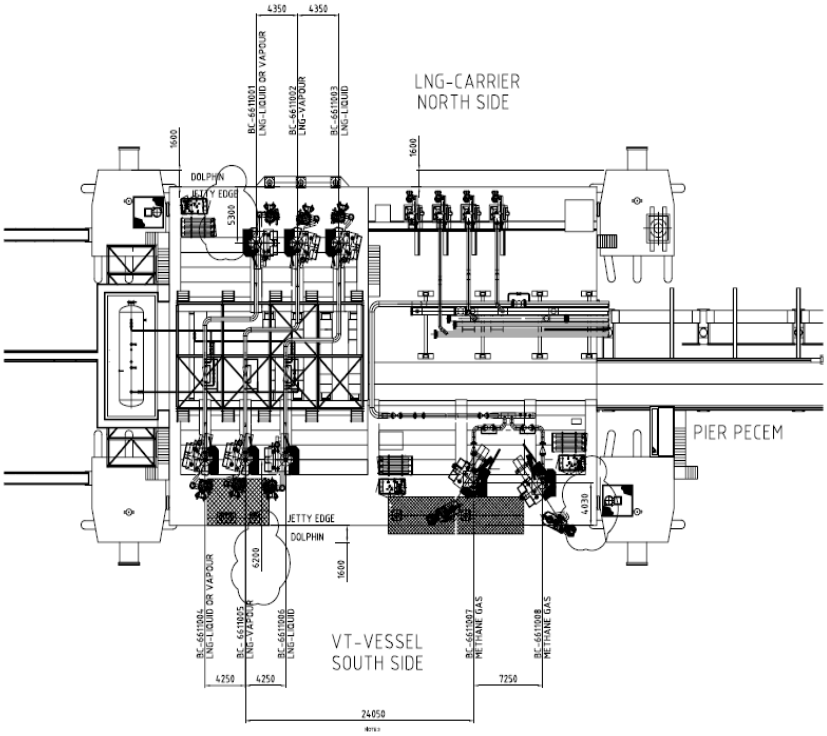
Total Area	75,000 m^2
Storage Area	380,000 m^2
Length of Quay	600 m
Number of Berths	10 (including TMUT)

ANNEX D – LNG TERMINAL ARMS AND MANIFOLD

Arms

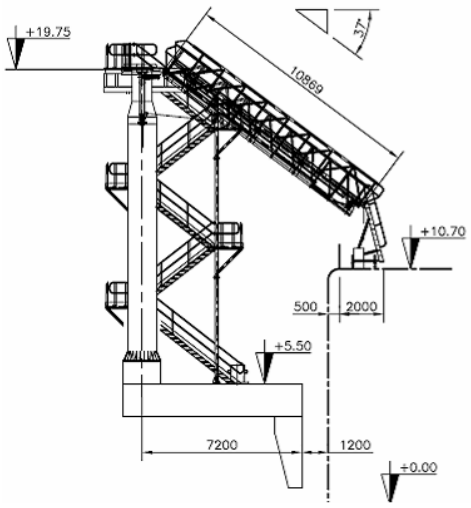


Location of Arms

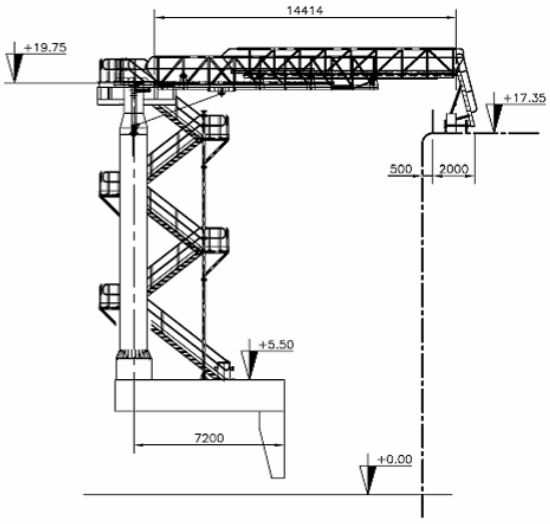


ANNEX E – LNG TERMINAL ACCESS STAIRS

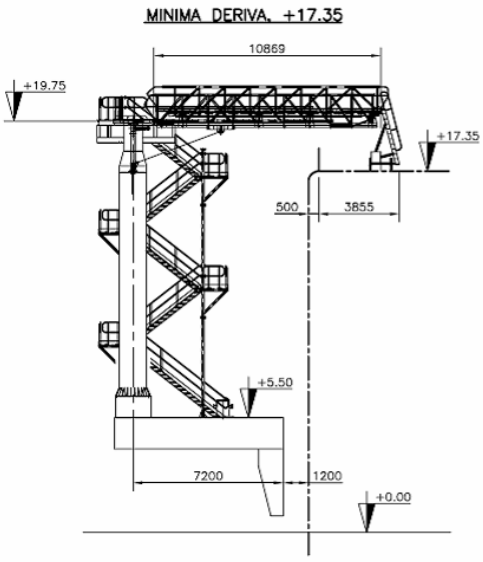
MINIMA DERIVA, MINIMO FRANCOBORDO



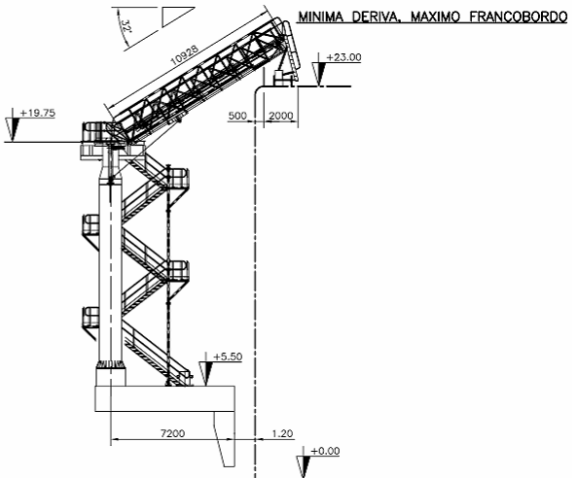
MAXIMA DERIVA, +17.35



MINIMA DERIVA, +17.35

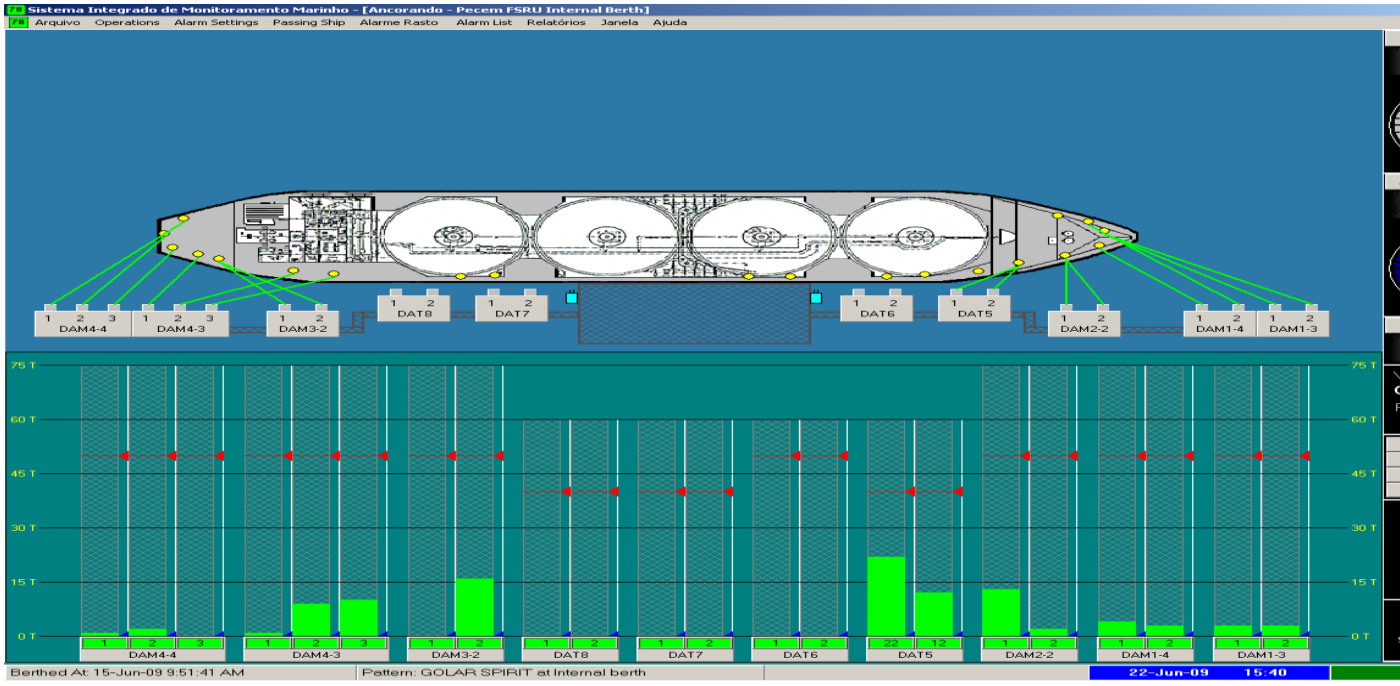


MINIMA DERIVA, MAXIMO FRANCOBORDO

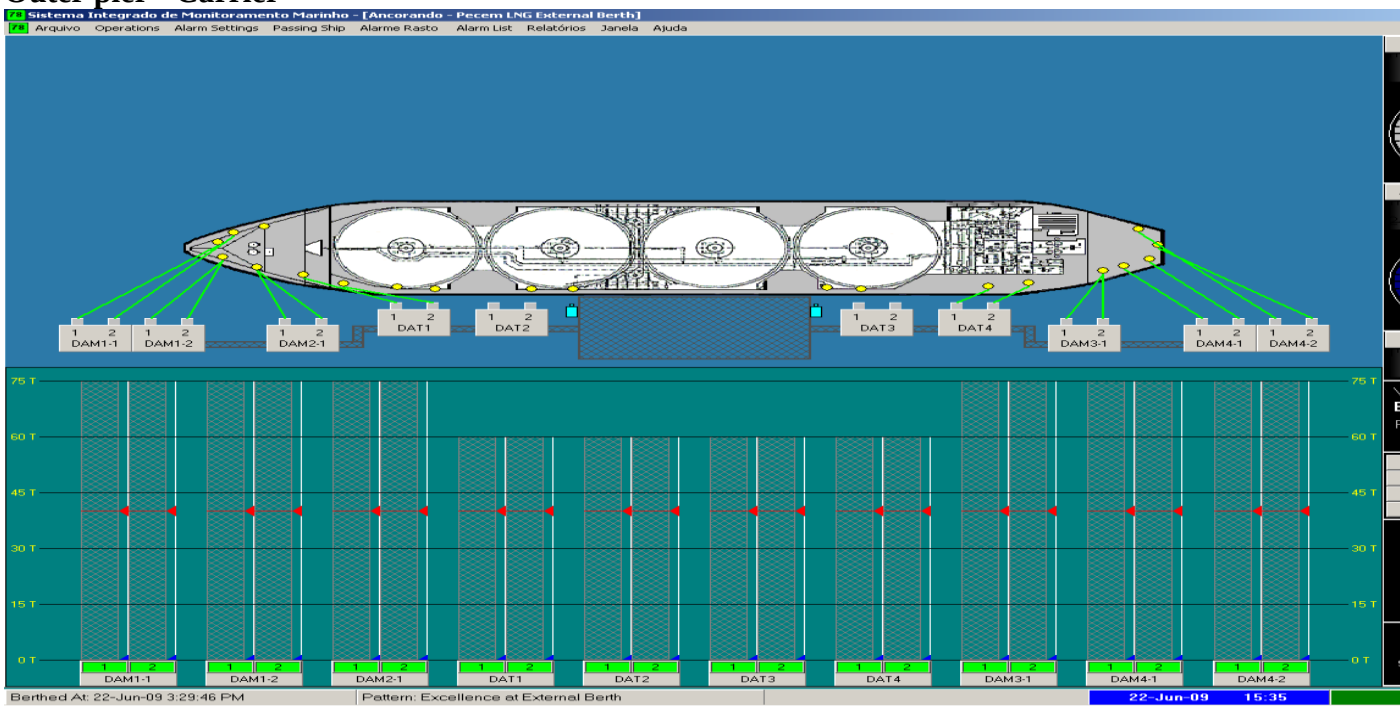


ANNEX F – LNG TERMINAL LAYOUT OF MOORING CONCEPTUAL PLAN

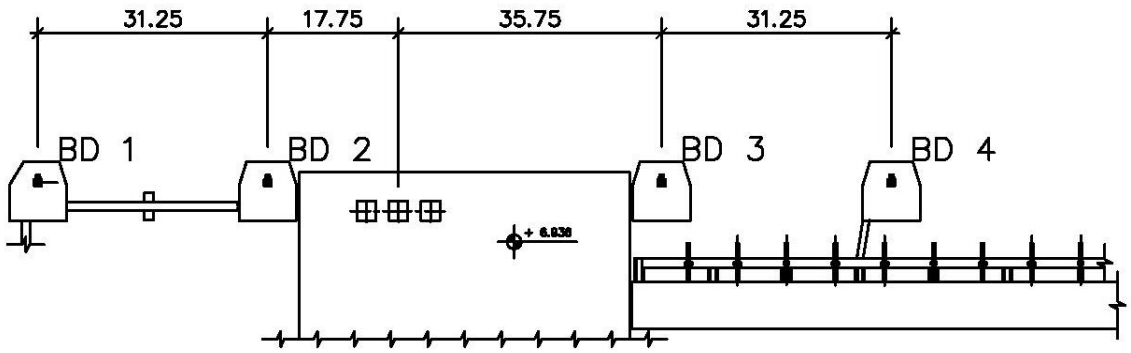
Inner pier – FSRU ship



Outer pier - Carrier



Fenders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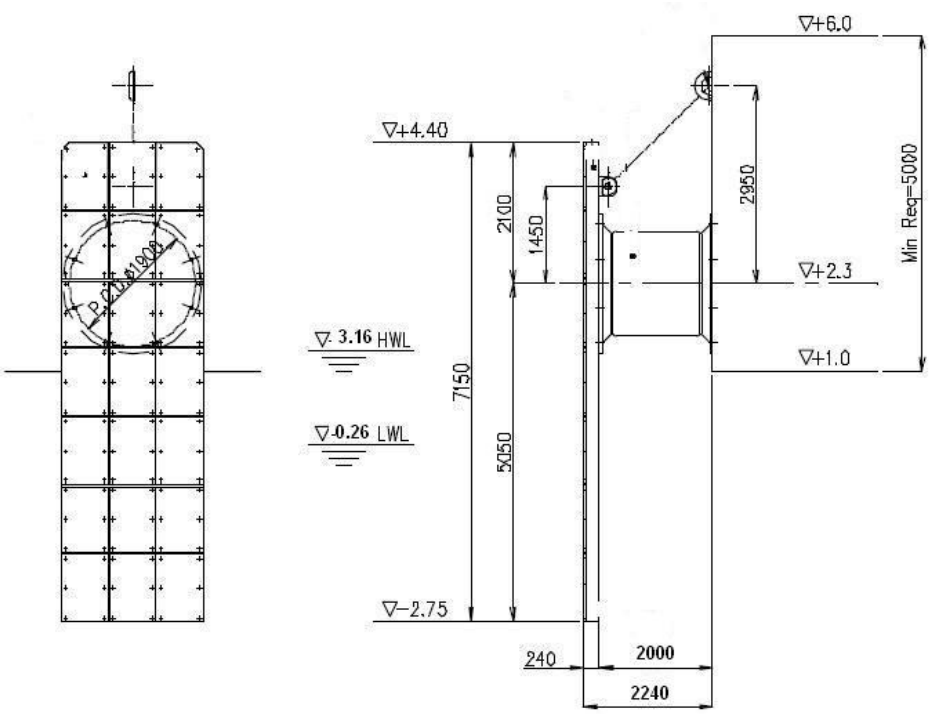
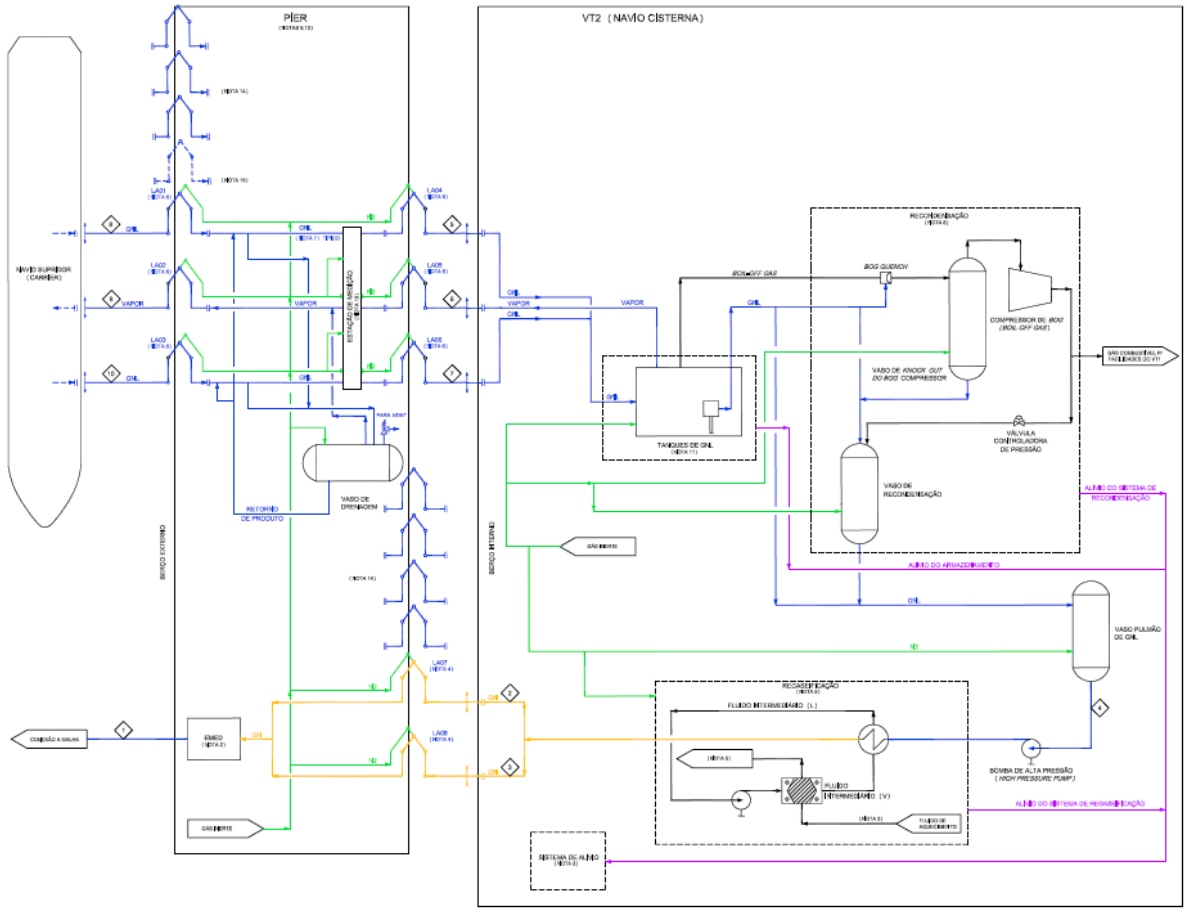
17.75
35.75
31.25
BD 1
BD 2
BD 3
BD 4


▽+6.0
▽+4.40
2100
1450
2950
Min Req=5000
▽+2.3
▽+1.0
▽ 3.16 HWL
▽-0.26 LWL
7150
5050
▽-2.75
240
2000
2240

ANNEX G – SIMPLIFIED DIAGRAM OF LNG – PECÉM SYSTEM



ANNEX H – QUICK GUIDE FOR LNG TRANSFERENCE

Quick Guide for LNG Transference

P E C E M

PMO ATTACHMENT

TO THE CARRIER MASTER:

DIFFERENCES BETWEEN PECEM LNG TERMINAL AND A CONVENTIONAL LNG TERMINAL

In the Pecém Terminal, the LNG is transferred to another vessel, referred to as **FSRU** (Floating Storage and Re-gasification Unit), instead to shore tanks as in conventional LNG Terminals. The supplier vessel is referred to as **Carrier**.

The **FSRU** operating at this pier is the ***GOLAR SPIRIT***.

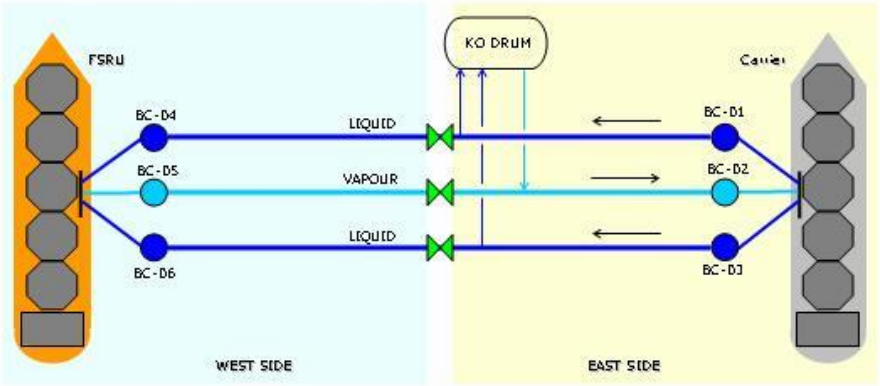
The **FSRU** is a conventional LNG vessel provided with a re-gasification plant to convert LNG into CNG, pumping it subsequently to the **TRANSPETRO** gas pipeline network. **FSRU** retain all original capabilities of a LNG vessel, however its engine will be temporarily disabled.

The re-gasification and CNG dispatch can occurs simultaneously with the LNG transference.

The emergency shutdown system activated by the Ship-Shore Link (SSL) will operate in a similar way as a conventional LNG terminal with pumps shutoff and valves closing.

The cool-down process, which consists on cooling shore lines and loading arms, is expected to take around four hours. The terminal operator will control the process so that flow rates should be slow enough to avoid damaging stresses on the lines being cooled. The resulting BOG will be returned to the vessel.

As there is no LNG storage tank on shore, the cool-down of the transfer lines will have to be carried out by the two vessels alongside. The **FSRU** will be in charge of cooling the lines on the western side of the berth whereas the **Carrier** will be in charge of cooling lines in the eastern side.



All relevant safety and operational information will be exchanged and registered during the initial clearance, as usually occurs; except that in this case the terminal operators will be accompanied by the **FSRU** officers.

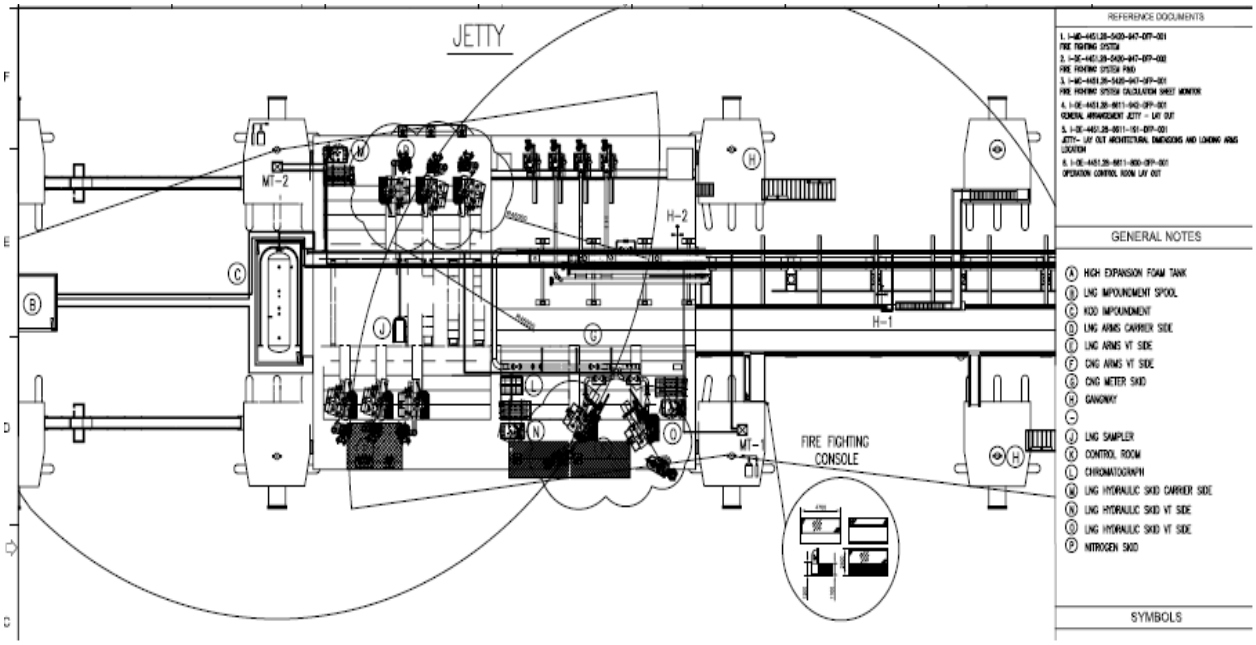
During operation **FSRU** and **Carrier** will communicate directly by radio while terminal operating staff will follow the communication.

Terminal operating staff, as well as the **FSRU** personnel, will be at your assistance for further enquires.

PETROBRAS TRANSPORTE S.A. TRANSPETRO

GOLAR LNG LIMITED

ANNEX I – LNG TERMINAL FIREFIGHTING SYSTEM

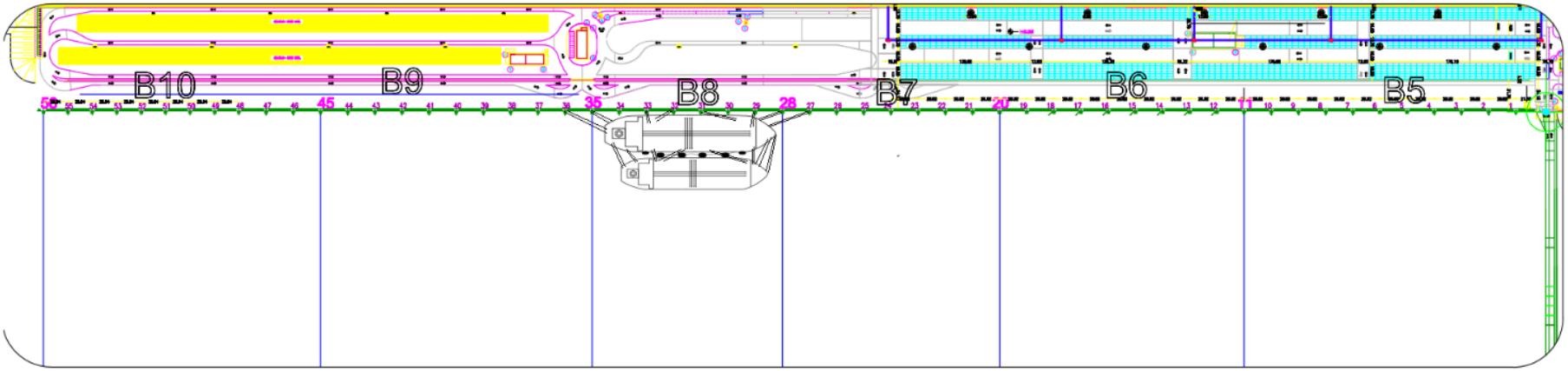


ANNEX J – TERMINAL – SHIP INFORMATION EXCHANGE

_____ PORT AND TERMINAL		
Request for Information on Vessel		
Name of Ship: **Flag:** **Name of Captain:** **Ship-owners:**		**Estimated Arrival (ETA):** **Last Port of Call:** **Next Port of Call:** **Agents:**
Is the ship fitted with an inert gas system? **Oxygen content:**		
Total length (LOA): **Length between Perpendiculars:** **Breadth:**		**Draft on Arrival:** **Maximum Draft during Transfer:** **Draft on Departure:**
Number of engines: **Number of screws:**	**Sideways Propulsion:** **Bow (no. and power)** **Stern (no. and power)**	**Tugboats – the least required:** **(No. and static traction (Bollard pull)**
Number and Size of Manifold Flanges: • **Cargo** • **Ballast** • **Bunkers**	**Distances:** • **Bow to Manifold** • **Side to Manifold** • **Height from Manifold to Main Deck**	
PROGRAMMING LOADING (complete as applicable)		
Appointment: **Type and amount** **Type and amount** **Type and amount**	**Discharge of ballast into sea:** **Amount:** **Estimated time:**	**Discharge of slop / ballast on shore** **Amount:** **Estimated time:**
PROGRAMMING UNLOADING (complete as applicable)		
Type and amount **Type and amount** **Type and amount**	**Ballast:** **Volume:** **Time:**	
Fuelling requested (bunkers)		
Type and amount	**Type and amount**	
Additional information (if any):		

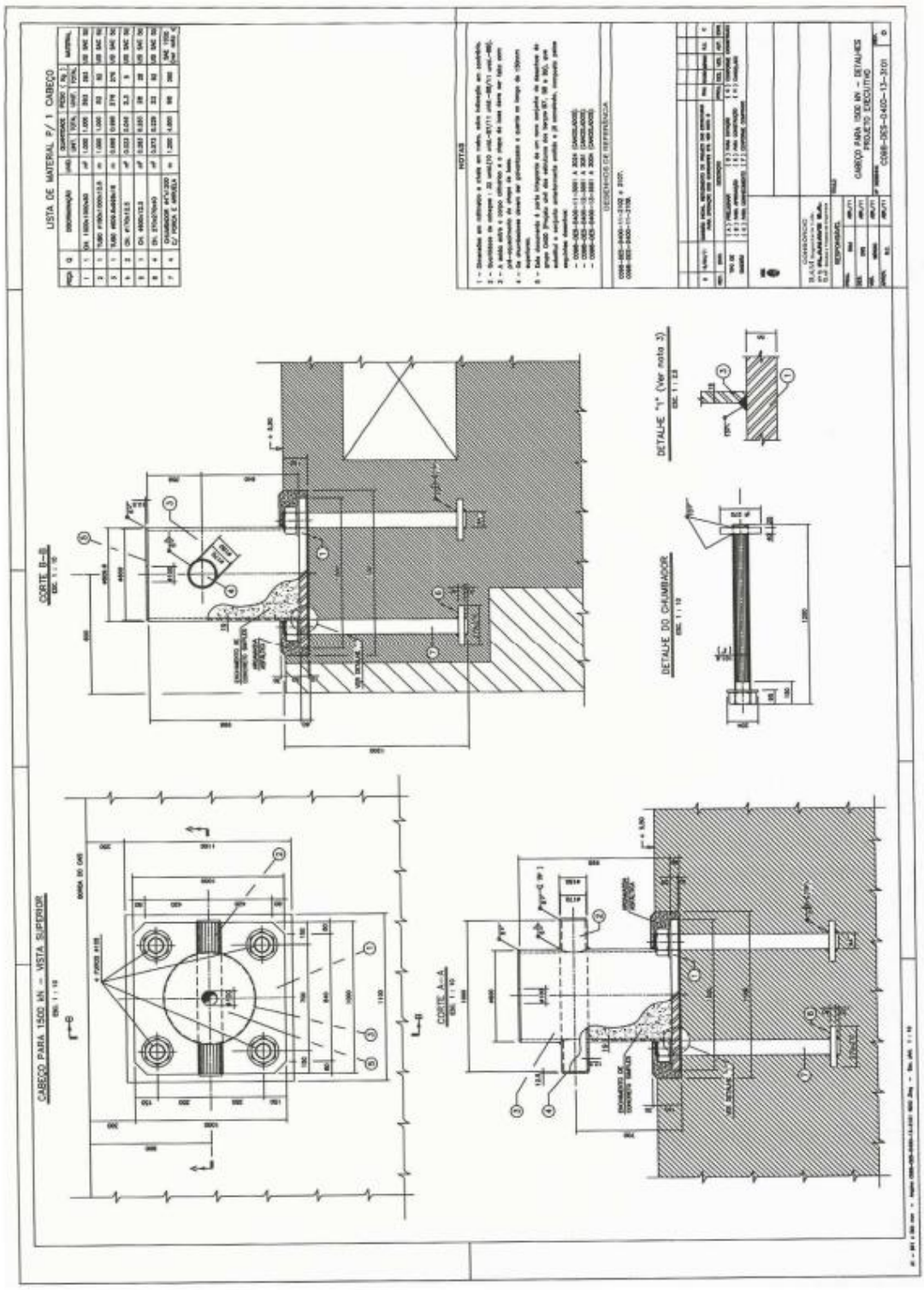
Please remit by email to Terminal Coordinator,
Email: heronildesfilho@transpetro.com.br

ANNEX K – TMUT MOORING ARRANGEMENT SHIP TO SHIP

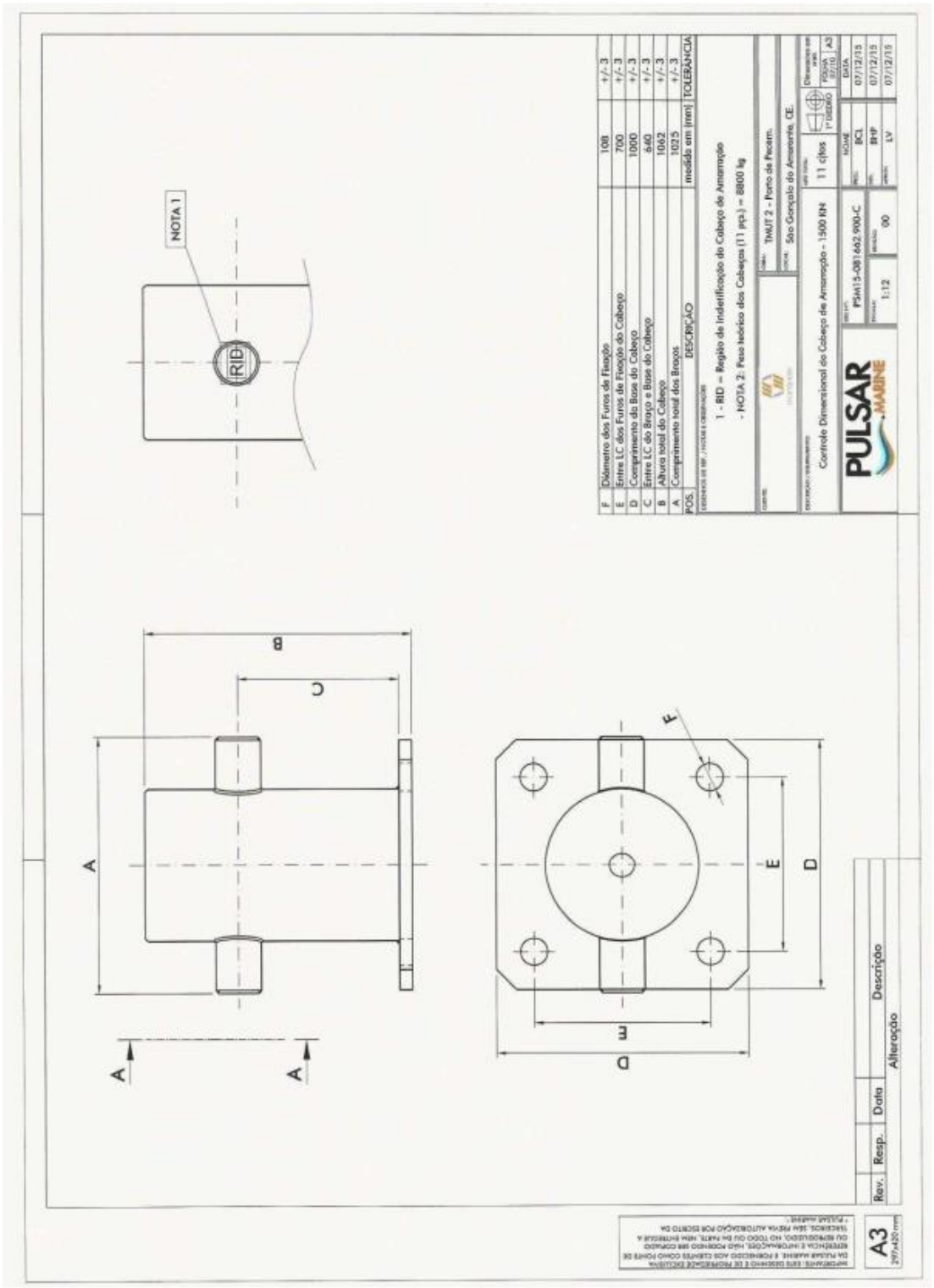


ANNEX L – TMUT BOLLARDS DESIGNE

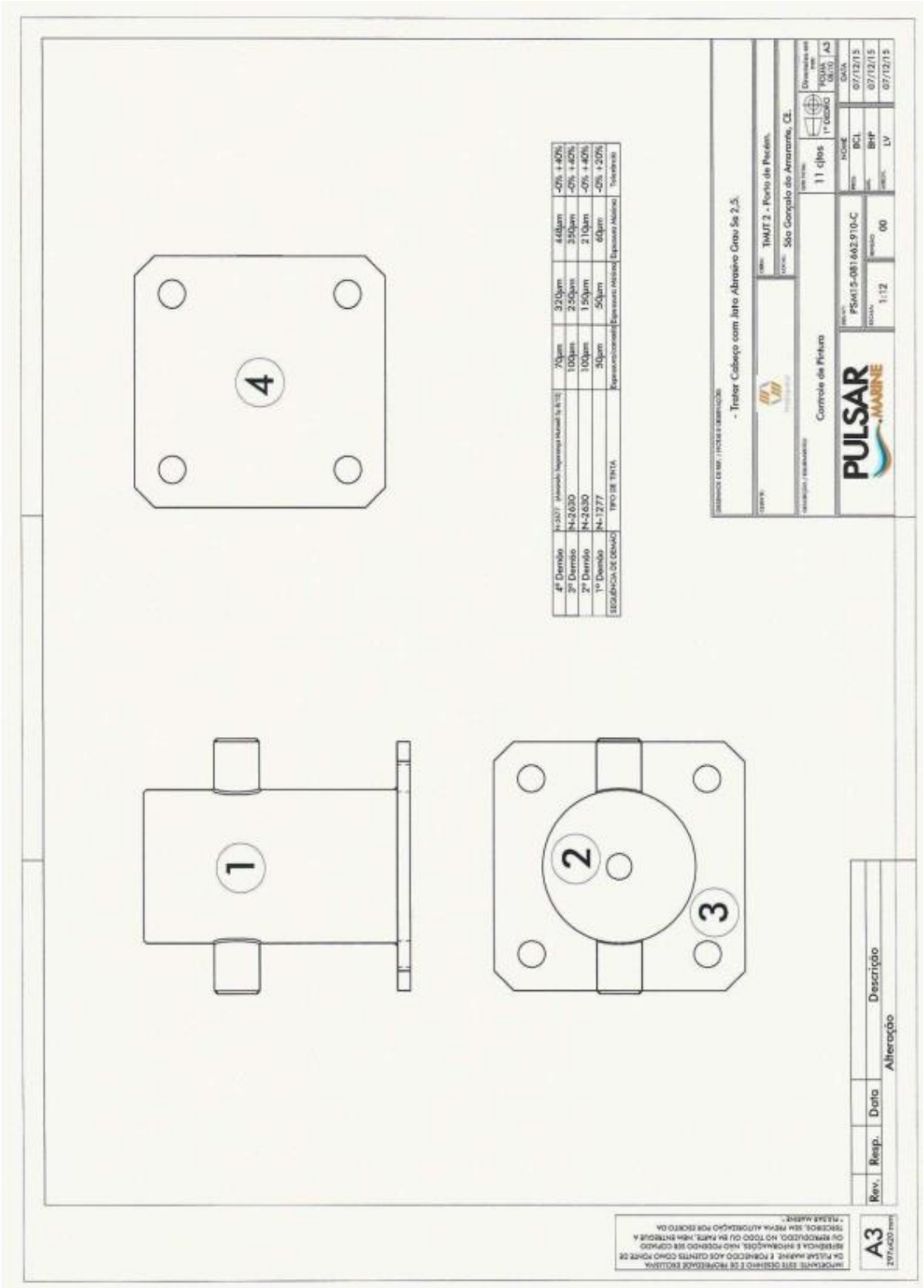
CO98-DES-D400-13-3101 – **general arrangement**



PSM15-081662.900-C –Dimensional control

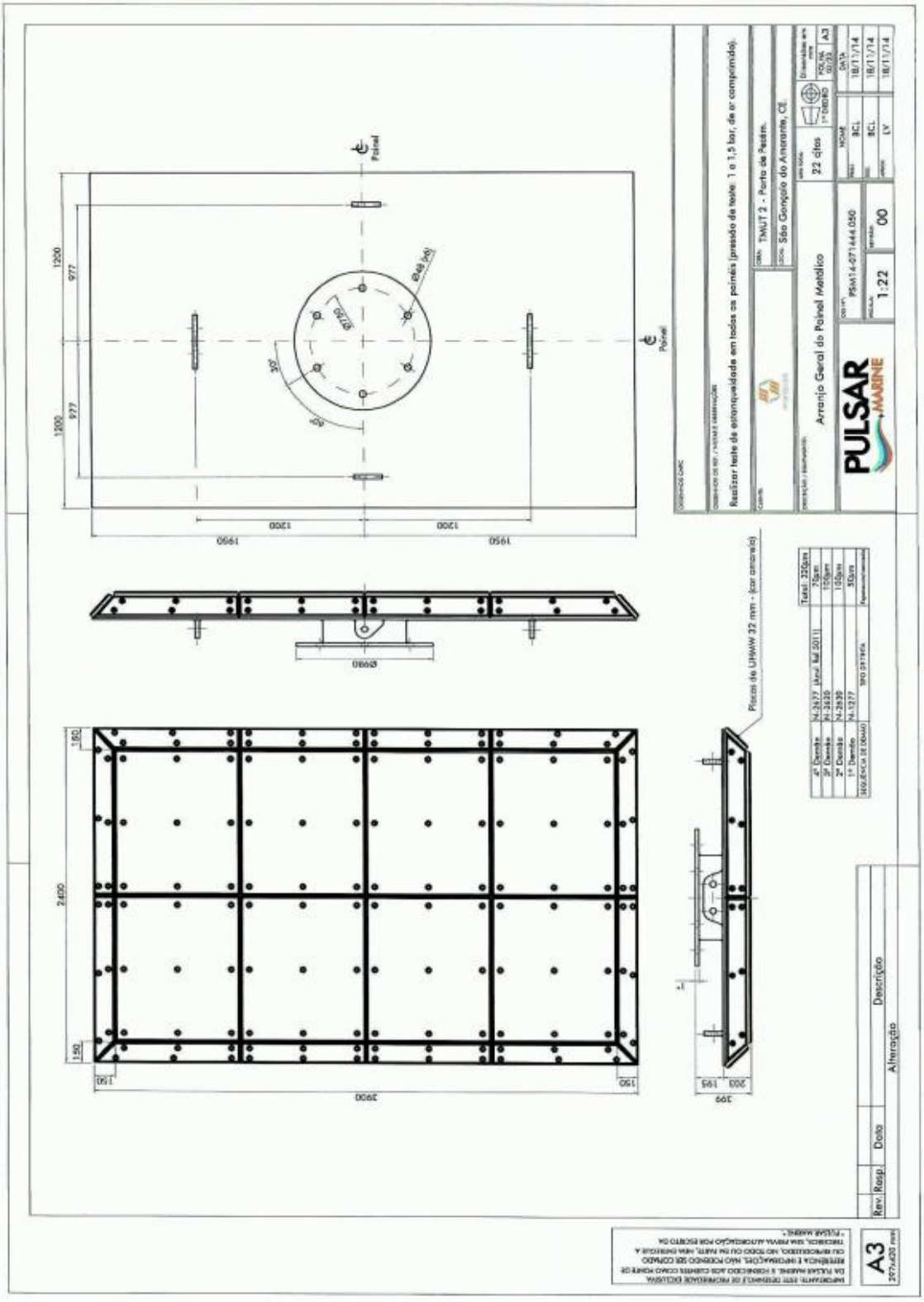


PSM15-081662.910-C – Paint control

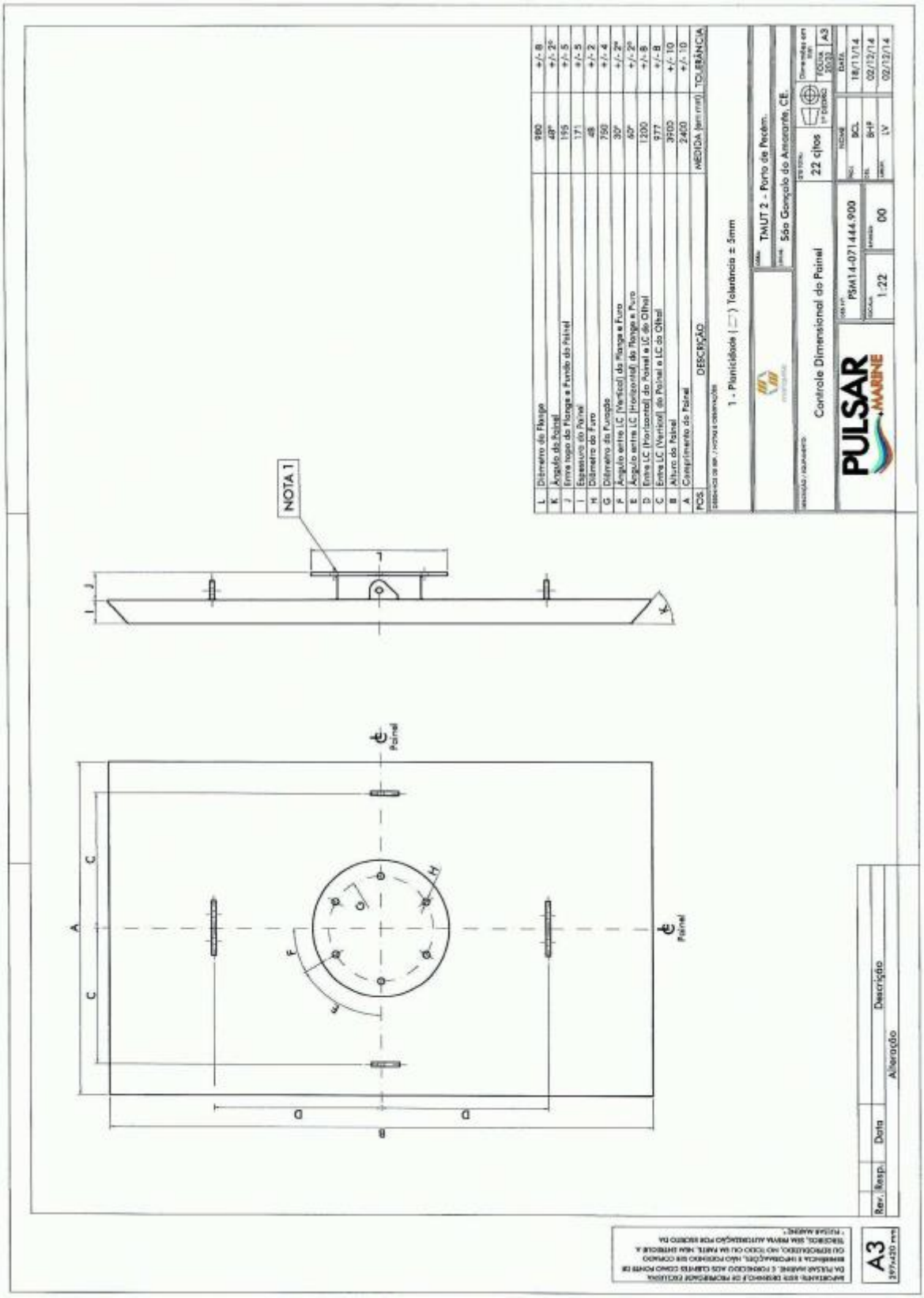


ANNEX M – TMUT GENERAL ARRANGEMENT FOR MARITIME FENDER

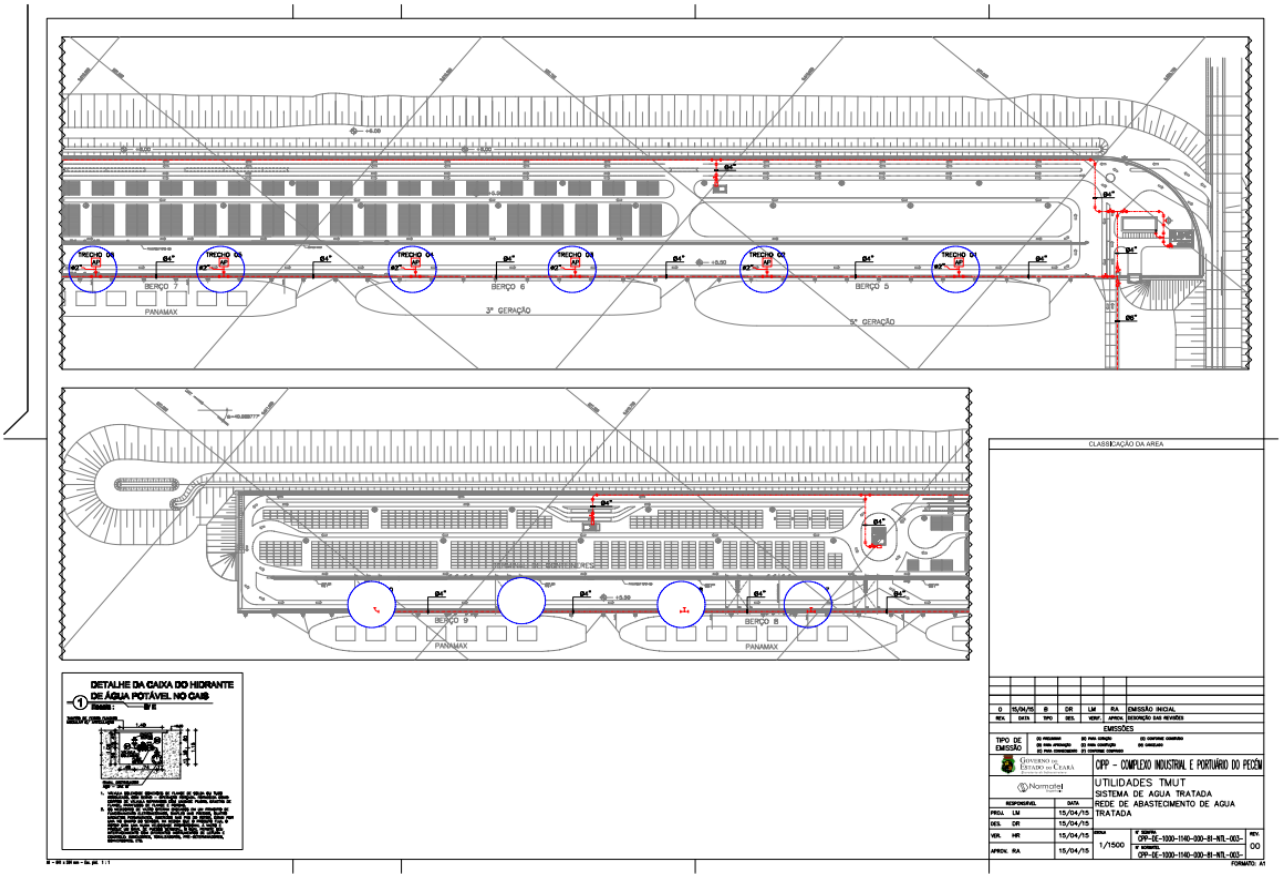
PSM14-071444.050



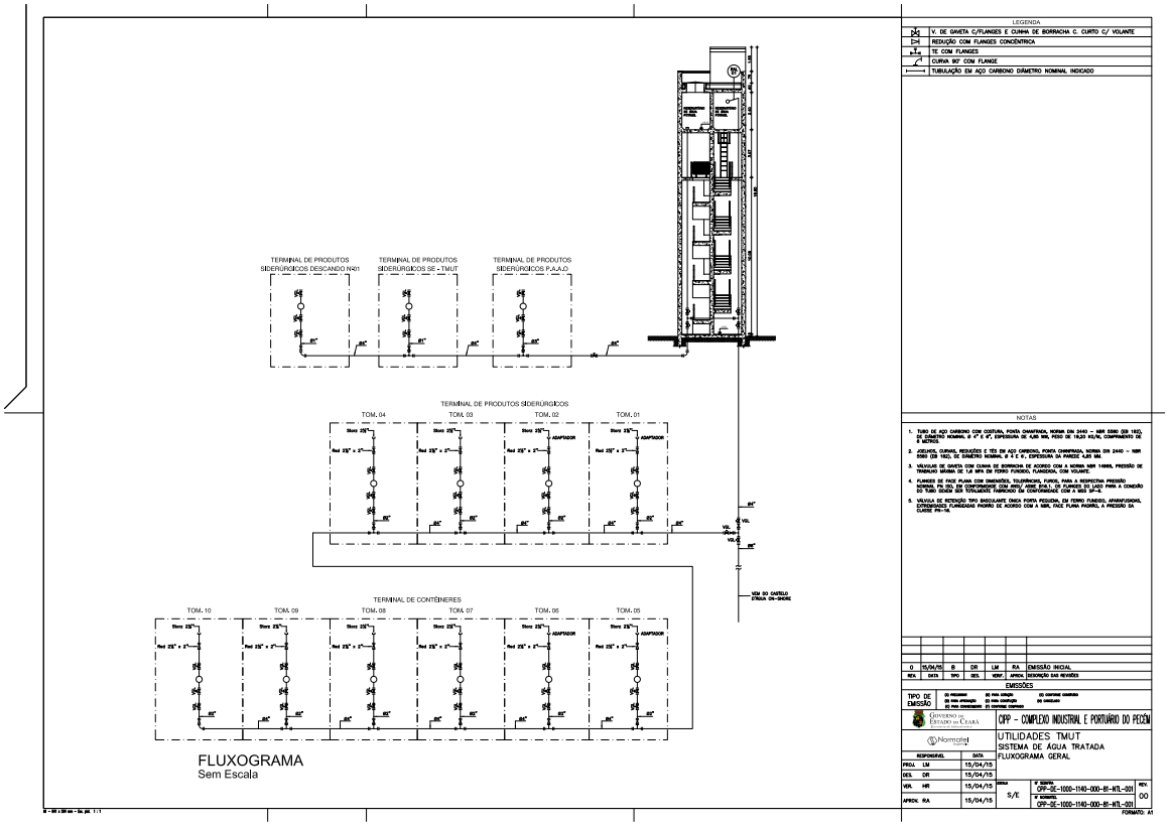
PSM14-071444.900 – Dimensional control



ANNEX N - TMUT WATER TREATMENT SYSTEM- SUPPLY NETWORK



ANNEX O – TMUT WATER TREATMENT SYSTEM - GENERAL FLOWCHART



ANNEX P – TMUT FIREFIGHTING SYSTEM - REACH OF HOSES