1. Introduction

This section presents preliminary engineering studies on **STS08A** lease area located in the Alamoa region, in the Port of Santos' right bank. The terminal is used for the handling, storage and distribution of liquid and gaseous bulk, especially petroleum by-products.

2. Description of The Operational Structure

The **STS08A** lease area will be focused on cabotage and long-haul operations, mostly on boarding petroleum by-products and onboarding LPG.

The terminal's total surface area is **297.349m^{2,}** with pipeline connection to Presidente Bernardes refinery and to Cubatão Terminal; the pipeline connects to the existing refineries in the State of São Paulo. **STS08A** also has a pipeline connection to Alamoa's public pier.

Currently, the project is classified as brownfield. Therefore, the enterprise will operate on a land with existing infrastructure.

Furthermore, the ownership of existing structures in **STS08A** falls under the three following categories: assets owned by Santos Port Authority, reversible assets owned by the Transpetro and non-reversible equipment owned by Transpetro.

Considering that one of the assumptions of the study is that the terminal may not incur in operational discontinuity, there will be a need to compensate Transpetro for its non-reversible assets.

Going forward, the new lease contract will establish that all planned future investments (see Appendix C-2: Capex) and all of Transpetro's equipment (Appendix C-2: Indemnification) will be **reversible** to the Port Authority upon the end of **STS08A's** lease.

All assets will be made available to the future lessee in their current condition. The lessee must make the necessary investments in order to guarantee that the terminal operates properly. The future lessee is also responsible for executing improvements.

In addition, the future lessee will be expected to make the planned investments specified in this study, including operational and safety improvements to the Terminal; new equipment to expand static capacity; segregation of operations in the delimited area; installation of land reception system and construction of a new pier in Alamoa.

I. Operational improvement and safety of existing facilities (execution between the 1st and 2nd contractual year):
    a. Treatment of existing Inspection Recommendations (IRs);
    b. Vapor Burning System in ship operations;
    c. New *Flare system;*
    d. Safety automation for berths used by barges ;

e. New firefighting system;
f. New loading arms for AL01 and AL02 berths (investments in the common area of the Organized Port);
g. Drainage system and effluent treatment;
h. Conforming electrical installations to NR-10;
i. Paving internal streets of the industrial area;
j. Reformulation of the Operations Control Room;
k. Relocation of CPLs and IFIX Servers.

II. Equipment for static capacity expansion and segregation of operations in the delimited area (execution between the 1st and 2nd contractual year):
   a. Installation of new storage tanks, total static capacity of 24,380 m^3;
   b. Installation of new pipeline (internal and access to the new pier);
   c. Installation of new pump complex;
   d. Installation of two truck loading stations;
   e. Installation of two truck unloading stations.

III. Expansion of berth capacity system in the Alamoa region (execution between the 1st and 5th contractual year),
   a. Construction of a new Pier on piles (new berths Alamoa 05 and 06);
   b. Access bridge to the new pier;
   c. Mooring dolphins of the new pier;
   d. Dredging of the new berths and their access basins; and
   e. Walkways of the new pier.

The current tenant ceded EPL its Santos Terminal Investment Plan 2019 to 2044, which was used for mapping the necessary operational and safety improvements. The plan also validates initial price estimates for these investments.[1]

The Plano de Investimentos Terminal de Santos 2019 a 2044 investment plan was used as the basis to establish the values resulting from operational and safety improvements executed for the Terminal. Details on this investment plan were provided by the current lessee[2].[3].

In order to elaborate on the eleven sub-items related to operational and safety improvements of existing facilities, the current tenant presented the description of each investment that would have to be made by the future **STS08A** tenant, as detailed below:

A. Treatment of existing Inspection Recommendations (IRs)

[1] Santos Terminal Investment Plan 2019 to 2044, reference in the Joint Technical Note.
[2] Plano de Investimentos Terminal de Santos 2019 a 2044 investment plan – reference in Joint Technical Note.
[3] Plano de Investimentos Terminal de Santos 2019 a 2044 investment plan – reference in Joint Technical Note.

Section C - Engineering

Description/Justification:

Facility Integrity inspections are an established and standard practice in the industry in its several business segments. They are the main management tools that ensure that the terminal can operate within the best technical standards of performance, safety and environmental preservation, avoiding the risk of accidents involving personnel, property and the environment. The Inspections plan is carried out annually by highly trained technicians who issue the Inspection Recommendations - IRs, a document that informs the conditions of the facilities, equipment and systems and the need for interventions, when applicable. Many such reports conclude that the best course of action is to replace existing systems or equipment. Reasons for deciding to replace the asset will generally include its obsolescence, lack of spare parts in the market or even the end of its useful life. In these cases, the intervention is classified as an investment, as is the case of the full replacement of the LPG Plant's Cooling Water Line due to the end of its useful life.

As the LPG refrigeration system operates constantly, an interruption in its operation for more than 10 hours places the storage system at risk, as the LPG heats up and will be released into the atmosphere by the flare. The release itself causes not only the loss of the product, but can also incur costly sanctions by the environmental agency. Also, there will be a premature loss of the equipment's exchangers due to erosion, internal contamination of the compressors caused by salt water and loss of performance due to pipe breakage resulting from corrosion and erosion.

In its latest iteration, the inspection recommendation report would require the following actions related to the LPG pipe refrigeration system:

- Total replacement of the seawater system;
- Replacement of large stretches of flare pipe;
- Replacement of large pipe segments of the nitrogen system;
- Replacement or repair of the metal structures of refrigerated tanks (access stairs, support, etc.);
- Structural recovery of LPG refrigeration plant;
- Replacement and painting of a stretch of pipeline for light and dark products.

Consequences of non-execution of the actions above:

- Risk of pipe disruption due to corrosion, with product loss and operational discontinuity of the entire plant.
- Risk of compromising the stability of the machine room structure with possible damage to local equipment and people.
- Risk of occupational incidents and the possibility of sanctions by the proper authorities.

B. Vapor Burning System During Ship Operations

Description/Justification:

The terminal must minimize the emission of volatile organic compounds in ship loading operations at the Santos Terminal. This is the Vapors Burning System emitted by ships when they are being loaded with

gasoline and diesel products. Under a clause in its license for operation, the environmental agency requires that the Terminal supply such a vapor burning unit, preventing the dispersion of fumes into the atmosphere during the handling operations of clear fuels.

The system will have an initial capacity to meet only the flow rates from the existing AL01 and AL02 berths. For AL05 and AL06, the additional flow will require the expansion of the terminal's reception/expedition network by installing a new blower, provided that the sum of the gasoline and diesel loading flows are compatible with this system´s capacity.

The installation site, defined in the original project, is close to the flare of the LPG refrigeration facilities. This system is intended to reduce the emission of volatile organic compounds from ships only during loading operations on non-pressurized ships and with light products such as gasoline and naphtha. For diesel, the incineration of VOC is possible when diesel is being loaded simultaneously with gasoline.

This project considers a rate of return of steam flow (piggyback) to be 25% higher than the maximum loading rate of ships. The amount of steam return flow for incineration will vary in composition and intensity, depending on the type of product being operated, the level of the ship's tanks and the atmospheric conditions in the region. The incineration of VOCs should consume about 2 t/month of LPG available in **STS08A**. In order to be burned, the returning steam passes through a hose connected to the outlet on the far right of the tanker manifold.

Consequences for not executing the above actions:

- Risk of suspension of terminal's license to operate;
- Risk of operational discontinuity;
- Risk of sanction by environmental authorities;

C. New Flare System

Description/Justification:

The LPG plant has a flare (torch) to burn LPG from the LPG liquefaction and pressurization process. The burning must be complete, that is, there cannot be black smoke emission above standards in the Riegelmann scale, as established in São Paulo State law. Thus, for the burning to be complete, it is necessary to atomize the flare with steam, ensuring a perfect and smoke-free burning. The generation of steam requires a boiler in the plant for its production. Throughout the terminal's existence, this was the model, with two boilers in operation. Now, the technology has evolved and there is the possibility of atomizing the flare with compressed air without affecting performance, just by replacing parts of the system.

The relieved in the system of the LPG which is received, stored and distributed in TA Santos is taken to the current TA-01 flare, which uses fuel oil in the pilot flame and water vapor, to dilute the smoke-soot stemming from two 12 t/h steam generators (boilers) that also use fuel oil.

The proposed project has the following joint objectives:

- Replace the current Santos Terminal Flare system, which works by water vapor atomization, with a new air-assisted TA-02 Flare system, maintaining the structural tower;
- Replace the current compartment sa-20 blow-down heating system by an electrical resistance;
- Eliminate the need for an electric boiler for the generation of water vapor in the terminal;
- Ensure the non-emission of black smoke by the flare system;
- The new flare (TA-02) will be installed in the same location as the current Flare TA01B.

Consequences of non-execution of the actions above:

- Sustain unnecessary cost with fuel oil in boilers;
- Sustain unnecessary maintenance cost for the two existing boilers;
- Non-relocation of operating technicians (5) from the boiler house to other terminal activities.

D. Barge Pier Safety Automation

Description/Justification:

Barge piers transfer operations are carried out using loading arms or hoses. However, the supervision is local and depends on monitoring by the operating technician. The automation of the systems will allow the system to gain operational safety, as any valve maneuvers, tank over-level, pump overpressure, etc., will automatically interrupt the transfer.

Furthermore, the automation of simultaneous barge loading processes will significantly improve operating safety. Indeed, the automation will enable the monitoring of loading operations by the Supervisory system. This system is equipped with adjustable interlocking level sensors that automatically stop upon being breached, avoiding overflow/leaks, and thus preserving the environment.

This is a ship-to-shore system, a shutdown emergency system that aims to increase reliability and safety during the product loading process. The system would be installed in two existing berths for barges and in the new pier where sensors would check the level of on-board tanks.

When a set level is breached during the loading of a barge's tank, a signal will be sent to the terminal via an electrical contact containing the summary of all on board high-level breaches. The same will happen when the emergency button is activated, from the ship-box delivered to the barge.

Through these signals, a complete lockdown can be activated. The lockdown will turn off loading pumps (zero volt) and will automatically close the valves upstream of the loading arms, thus avoiding bunker overflow and reducing the risk of environmental accidents.

Consequences of the non-execution of the actions above:

- Operational restriction - loading of only one barge at a time.
- Risk of overflow during loading.
- Risk of sanctions from environmental authorities.
- Damage to the company's image.

E. New FireFighting System

Description/Justification

The Santos Plant has a firefighting system that dates back to the 1970s. Since then, legislation and associated technology have evolved and set new benchmarks for new firefighting systems. Although modernization is not mandatory, best practices would favor its upgrade. Thus, a project to upgrade the existing system was carried out.

The new Fire Fighting System (FFS) borrows from the existing FFS while implementing a series of improvements.

The current fire-fighting system captures seawater using pumps B-305 A/B/C, located on the pile platform next to the junction of the piers, passing through the 16''-AF pipeline serving the OCB tank (TQ-631601 and 603). It also passes by the pipe bridge crossing AV.2, Rua do Píer and AV. 1.

The new seawater capturing pumps (2 Diesel + 1 Electric) must be installed in the location suggested by the auctioning document (see figure above - Sea capture pumps) and must be able to supply water to STS08's FFS independently from other areas.

Furthermore, pipes must have an internal epoxy coating, considering prevalent ph level in the port's brackish channel water. In addition, the weldable ends of the tubes must be internally metallized with zinc.

If installing 3 centrifugal collection pumps on the existing piled platform is impossible, it will be necessary to analyze the minimum submergence level and the insertion of an anti-vortex plate, in the first stage of the new pumps, considering the local depth of approximately 1 m and the minimum recorded tide of -0.2 m.

Given the fact that the low-sea current at the edges of the channel runs at 1.4 knots, it is not recommended to invest in a suction well for vertical pumps.

The FFS must also avoid interfering with the maneuverability of vessels. Given FFS's layout, the greatest potential interference would occur in the pier's internal berth AL04, mostly used for handling chemicals.

Figure 1: Location of FFS structures
Source: Transpetro

Figure 1's cross – referenced description of new FFS structures is listed below:

1. Water sourcing and pump room - replacement of pumps B and C and their respective diesel engines;
2. In LPG storage spheres - the installation of 6 water cannons, valves and hydrant;
3. In the refrigerated tank complex - realignment of FFS lines for correction and system operability;
4. Diesel tanks 631501/503 - Disassemble the existing arrangement and assemble a new one to meet the flow and pressure requirements of the new system. Install valves and filter. Foam generator - South - Automation and adjustment of compartments to comply with NR-13;
5. Dark fuels tank 631803, 804, 805 and 806 – new LGE house and readjustment of existing supports, bases for new supports, pipes, new AF system, quick opening valves, filter and 2 hydrants;
6. Heavy fuel oil tanks - complement the assembly, composed of valves and pipelines;
7. Diesel tanks 631601 and 603 - Disassembly of the existing arrangement and assembly of a new one to meet the flow and pressure requirements of the system. Complement existing pipelines that are currently exposed to the weather.
8. Heavy Fuel Oil tanks - complement the assembly, composed of valves and pipelines;
9. FLARE and S.A.O. area - construction of new bases, replacement of valves, and pipelines;
10. Foam generator - Central - complement the assembly, composed of valves, pipelines and adjustment of compartments to comply with NR-13;

11. Dark fuel tanks - readjustment of existing bases for new supports, pipes, new AF system, quick opening valves, filter and two hydrants;
12. TDC Area and Tank -443304 - installation of new pipes and hydrants (not yet completed);
13. Water Tower - bases for supports of two new pumps, two new suction lines and electrical infrastructure for feeding, monitoring and control of pumps;
14. Foam generator - North - support bases pipes and tank LGE;
15. Gasoline tanks and pipeline relief – assembly of filter, valve, cooling ring and sprinkler nozzles.

Consequences of non-execution of the actions above:

- In the event of a fire, there may be greater difficulty in extinguishing it since the system already has a certain degree of obsolescence.
- The remnants of salt water in the spheres and pipes will not be eliminated after any accidents or tests of the System.
- Inadvertent activation of the main firefighting pump will also occur if the jockey pump becomes temporarily inoperative.
- It will compromise the company's image.

F. New Loading Arms

Description/Justification

The terminal has 18 loading arms installed on the pier, connecting regular berths 1 and 2 as well as barge berths 1 and 2. This set of arms can operate clear and dark fuels as well as bunker and LPG. Regarding ownership, only the LPG arm is wholly owned by Transpetro, all the other arms are leased out from Santos Port Authority and were built in the 1970s. Therefore, although the arms are in full operation, they are technologically outdated.

In relation to the arms connecting barge's berth 1 and 2, this following item will quantify the number of necessary replacements, given that these arms were installed and have operated continuously since 1973.

Seven new arms for berth AL01 (São Paulo pier):

- 3 x (16'' 150# dark fuels);
- 4 x (12'' 150# clear fuels).

Seven new arms for berth AL02 (Santos pier):

- 3 x (16'' 150# dark fuels);
- 4 x (12'' 150# clear fuels).

In the barge's berth, there are currently 2 arms for clears with 8" and 2 arms for darks with 10".

One advantage of the newer models is that they can be repaired on the pier, thus reducing risk and maintenance costs. New arms also increase berth productivity, reducing demurrage and promoting greater operational flexibility.

Consequences of non-execution of the actions above:

- Increasing maintenance cost given the advanced age of the equipment (in use for more than 45 years).
- Increased risk and maintenance cost and increased vessel overstays.
- Reduction of flow in cases where 2 simultaneous arms could be coupled, generating even more overstays.

G. Effluent Drainage and Treatment System

Description/Justifications

The new system will allow adequate collection and correct segregation of rainwater/industrial effluents, thus generating a smaller amount of oily effluent and optimizing the effluent volume being treated, as required by current state regulations/legislation. In addition, this improvement will also reduce risk during routine operational maintenance.

The intervention will bring greater operational safety and environmental preservation as the risk of oil in the estuary on days of torrential rain will be minimal.

The adequacy of the system, with separate collection and disposal of rainwater and oily effluents, will generate a smaller amount of oily effluents and will also optimize the amount of effluents to be treated, in accordance with state legislation, as follows:

- Construction and assembly of boxes for segregation of rain and oil drainage;
- Improvement to tank containment basins gutters;
- Construction of pluvial gutters;
- Construction and assembly of buried pipes for oily drainage;
- Construction and installation of auxiliary drainage tanks and sump-tanks at the designated area for light fuels storage.

Consequences of non-execution of the actions above:

- Risk of contamination of the channel receptor during heavy rains;
- Risk of sanction by environmental authorities;
- Non-compliance of Petrobras NR-38;

H. Adequacy of Electrical Installations to NR-10

Description/Justifications

Adaptation of TA-Santos' Electrical Installations, in compliance with Regulatory Standard NR-10 (Regulatory Standard for Safety in Electricity Installations and Services), through the replacement of electrical equipment and systems at the end of their useful life.

- Removal of existing pipelines and installation of new ducts that, in addition to complying with current legislation, will remedy non-conformities in circuits with exposed wiring;
- Replacement of cable passage boxes;
- Improvement to existing grounding mesh, according to nbr5410 standards, with the installation of new rods and grounding cables.

Consequences of non execution of the actions above:

- Because it is a classified area, there is a risk of cabling becoming an ignition source;
- Risk of long stoppages due to lack of spare parts, due to the obsolescence of components and the end of the useful lifetime of equipment and materials.
- Risk of sanctions by the supervisory agency.

I. Pavement of internal streets of the industrial area

Description/Justifications:

Improvement of existing access conditions for people and vehicles by asphalting and leveling internal roadways as well as upgrading the terminal's rainwater drainage.

Some streets inside the terminal are still unpaved and are prone to generating dust during vehicle traffic, winds and rains. In addition, in dry weather, it is necessary to employ water trucks to reduce dust.

This project consists of asphalt paving, with leveling off the floor and improvement of rainwater drainage.

- Soil leveling;
- Drainage correction;
- Asphalt paving

Consequences of non-execution of the actions above:

- On-going expenses related to water supply trucks during dry season and earthmoving machines to fill potholes and eliminate puddles in the rainy season.
- Higher maintenance cost of vehicles circulating in the terminal due to higher frequency of damage to suspensions.
- Unhealthier environment that compromises staff´s respiratory system. Increased difficulty in evacuating personnel from the area during emergencies.

J. Redesign of the Operations Control Room

Description/Justifications

The terminal used to have 3 control rooms in the past. Currently, TRANSPETRO concentrates its systems in one single place. However, some technical and operational safety improvements remain to be implemented, such as:

- Adequation of the layout to concentrate the entire operating system and furniture in one room;
- New pressurization and air conditioning system;
- Installation of impact-proof/flameproof windows.

The terminal automation is based on SCADA, where the instrumentation is interconnected to field remotes that communicate with the PLCs via the PROFIBUS-DP network. The PLCs swap information via the CONTROLNET network and communicate with the supervisory system (IFIX) via the ethernet network, allowing local operation.

Consequences of non-execution the actions above:

- Greater accident risks for employees in the room
- Higher terminal insurance cost

Relocation of IFIX PLC and Servers

Description/Justifications

Relocate the programmable logic controllers and supervisory system servers out of the restricted terminal area at the LPG plant, increasing the system's operational safety during emergency situations.

Although there is a low probability, in the event of a critical emergency at the LPG plant, that the PLCs and IFIX Servers will be damaged, the control of the plant's supervisory system could be lost, resulting in potential damage to: facilities; environment; local people; and the terminal's surroundings.

Rockwells' Logix 5000 PLCs, are mounted on panels distributed in three distinct areas within the terminal: LPG area, TDC area and pier area. The IFIX supervisory system servers from GE Fanuc are installed in the LPG control room (SEGAS). The pier area has IFIX client machines for local operation. The PN-3028-80, which is in the LPG area, currently has 4-slot Racks, which makes it impossible to install new cards.

This investment consists of:

- Acquisition of materials and equipment;
- Construction of the necessary infrastructure;
- Relocation and adaptation of PLCs, servers and auxiliary devices;
- Testing and approval;
- "As built" technical documentation.

Consequences of not executing the actions above:

- Higher occupational risks for employees and property
- Partial/total loss of plant control and supervision
- Higher terminal insurance cost

The calculation of capacity in each operating subsystem is presented in more details in chapter "Compatibilization of Future Capacity of the Enterprise ".

For more operational details, see Section D - Operational.

2.1. Waterway Boarding/Disembarkation System

Lease areas STS08 and **STS08A** are currently served by berths AL 01 and AL 02, located in the Alamoa Pier.

The study retrieved the following information for berths AL01 & AL02 from the list of "BERTHS OPERATIONAL DRAUGHTS", revision No. 219 of 07/20/2019:[4]

Berth	TPB	Length (m)	Project Depth (m)	Operational Draught (m)	
				Low Tide	High Tide
1 AL	60,000	250	12,70	11,90	12,20
02 AL	60,000	250	12,70	11,50	11,80

Table 1 - Berth Characteristics for Alamoa liquid bulk terminals
Source: Port Authority

It is important to point out that berths AL 03 and AL 04, which are also part of the Alamoa pier, are currently used for receiving and embarking chemicals products, and were not considered in this study.

[4] The " BERTHS OPERATIONAL DRAUGHTS " is authored by the Traffic and Mooring Management of the Port Authority.

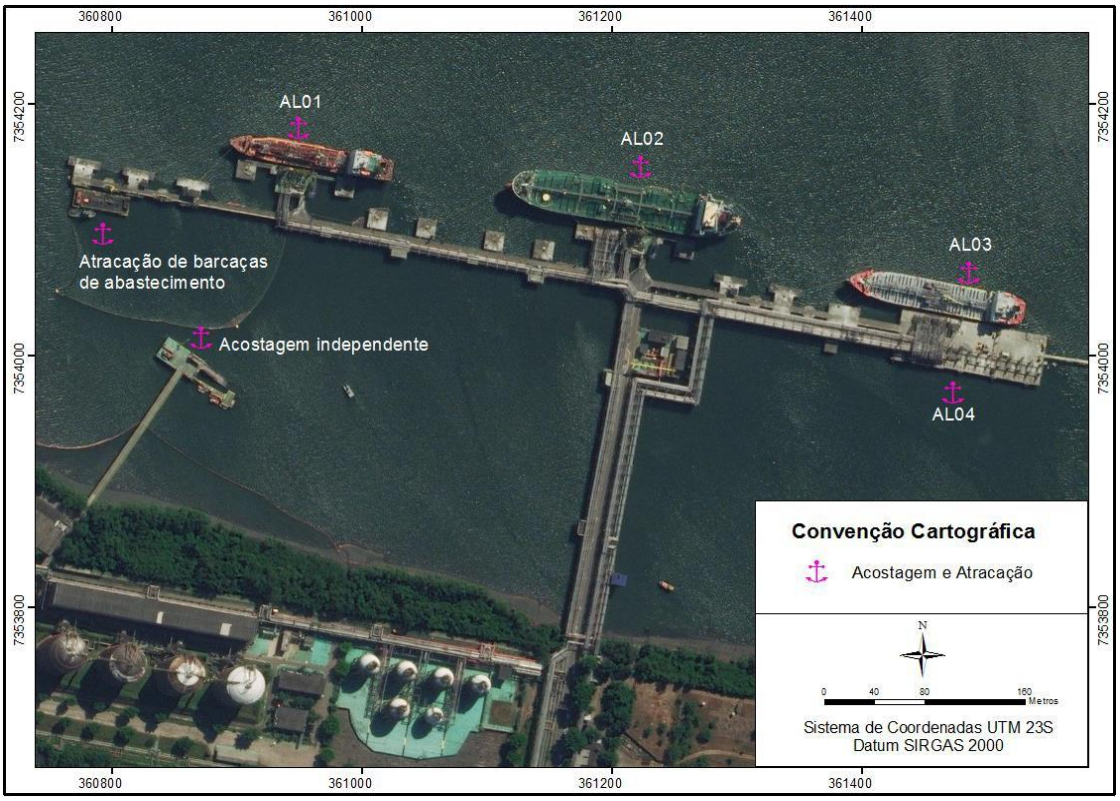

Figure 2: Illustration of Alamoa fluid berths
Source: Master Plan of the Port of Santos

In addition to the pier's regular berths, there are smaller vessels moorings at the inside part of the T structure, on the west side of the pier. This location is used for Bunker oil shipment on barges that supply vessels docked at the Port Complex.

In order to meet future demand, **STS08A's** next lessee will be responsible for building a new pier, adding two new berths - the Alamoa 05 (AL 05) and 06 (AL 06), upstream of the existing pier. The expansion's scope intends to guarantee adequate berth capacity for **STS08A's** new lessee contractual term.

The construction of the new pier on piles for berths AL 05 and AL 06 should be sized for vessels of at least a 100,000 TPB (250 m LOA, 43 m opening and 15.1 m draught). The location of the new superstructure should be in the northwest direction, close to AL01, with a slope so as to not interfere with the two upstream channel branches (Piaçaguera Channel to the north and future TUP Alamoa to the west). Additionally, there should also be a large enough gap between existing and new pier, allowing the passage and mooring of 4,000 TPB supply barges (at least 80 meters long and 6 meters of draught) on the inner part of the existing "T" structure's west side.

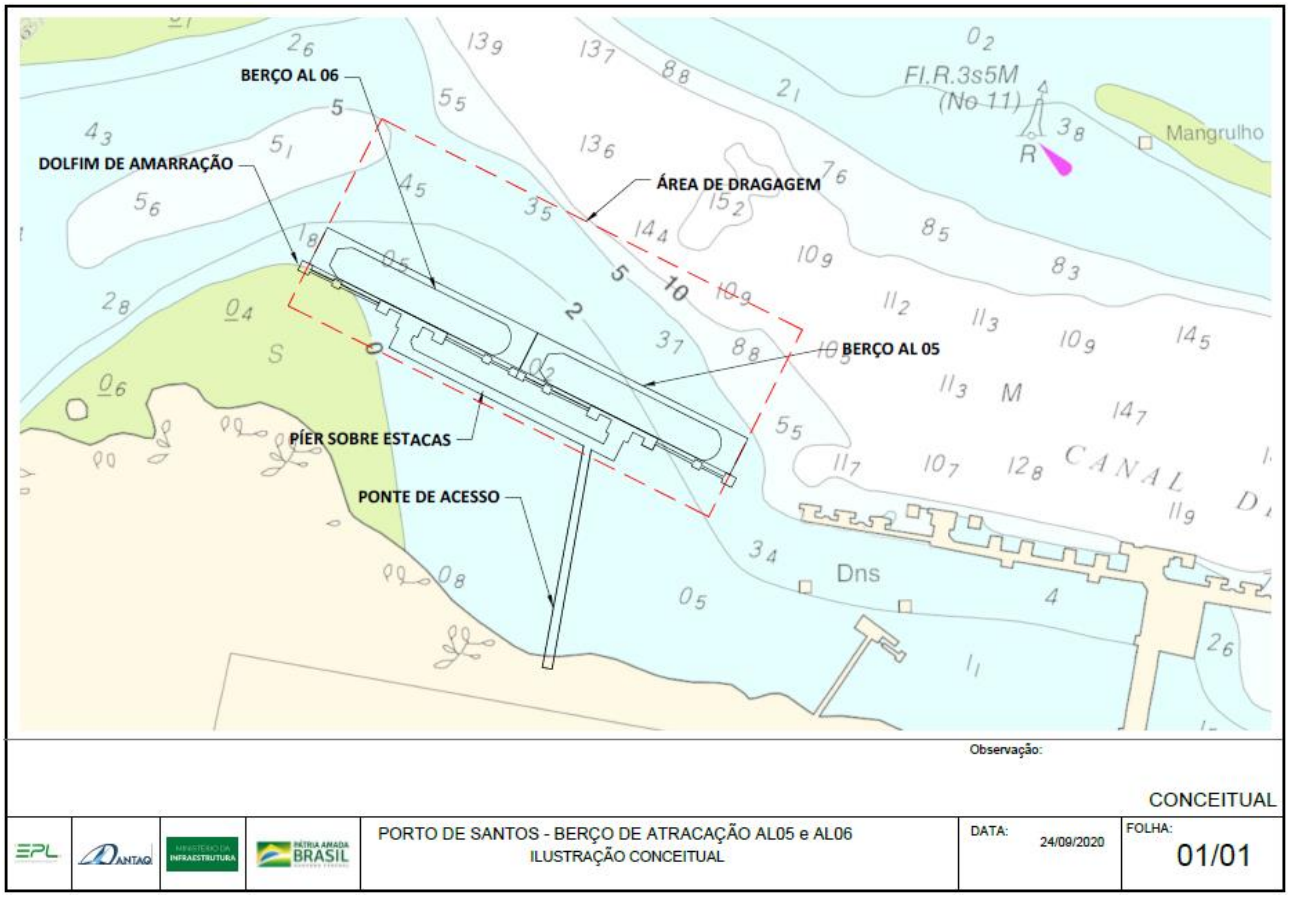

Figure 3: Illustration of the new mooring berths for Alamoa (AL05 and AL06)
Source: EPL

Dredging for new berths AL 05 and AL 06 and their respective access basins are to be carried out by the future lessee of **STS08A**. The study estimates that minimum dredging depth is of at least 15.0m (DHN). It is important to point out that this depth is lower than what would actually be required to fully comply with the project's ship draft, especially considering the current operational draught limitations of the access channel stretch (12.70 m in the low tide and 13.70 m during high tide). However, the Port Authority is expected to increase the depth of this particular stretch to 15 m before AL05 and AL 06 become operational.

The construction of a new Alamoa pier is the responsibility of **STS08A's** future tenant. Timewise, construction must occur between the 1st and 5th contractual year, allowing for operations to start in the new pier by the 6th contractual year.

It is important to stress that construction methodologies and values presented in this study are all estimates. Therefore, it is up to auction bidders to carry out field studies, data collection with the Port Authority and/or technical evaluations necessary to support their proposals.

At this point, it is worth elaborating on the study's expectations for the productivity at Alamoa's new pier. The following list contains the study's main berth operating assumptions:

- Reduction of non-operating times for liquid bulk vessel services;

- Replacement of the loading arms in the berth AL 01 and AL 02 and automation of the barge pier, increasing loading/unloading productivity;
- Construction of a new pier in Alamoa for the operation of two new berths, corresponding to the fifth and sixth berths at the Alamoa region;
- For the purpose of collecting relevant operational statistics, the study considered only the most productive period (2014-2018) in its sample.

Based on these assumptions, initial berth productivity rate for STS08 and **STS08A** was set for liquid and gaseous bulk at 670 t/h and 450 t/h, respectively. After the third contractual year, productivity at the existing pier, for liquid and gaseous bulk, will increase to 760 t/h and 530 t/h. By the sixth contractual year, the new pier will have been concluded and **STS08A** will migrate its operation to the new structure. As such, the average cargo handling rate for liquids will be 760 t/h during the remaining contractual term. As for berth occupancy, the study assumes a fixed 60% rate for the 25-year contractual period.

One main objective for the new contract is to foster a better level of service. Currently, berth AL 01 and AL 02 show consistently high occupancy and high average mooring time. Given increased demand projections and the investments foreseen in the construction of a new pier in Alamoa, it is reasonable to expect considerable improvements in the level of service for the STS08 and **STS08A**.

In accordance with the project's investment timeline, STS08 and **STS08A** will both share AL01 and AL02, until the fifth contractual year. Upon the completion of the new pier, **Terminal STS08A** will start handling liquid petroleum by-products at berths AL05 and AL06. As for the LPG operation, it will continue to be carried out at AL01 and AL02. Meanwhile, **STS08** will also continue to handle its products at berths AL01 and AL02.

In order to foster a more harmonious use of pier infrastructure and provide adequate capacity for the new tenants, the study suggests giving terminal **STS08 and STS08A** preferential status regarding berth utilization. When appropriate, this preferential mooring should also apply to more than one vessel if the other vessel is operating in the adjacent berth.[5]

The study expects berths AL05 and AL06 to come online by the start of the 6th contractual year. At this time, the new pier will also become integrated to STS08A's area. Hence, the following list presents the study's suggestions for setting mooring priorities, while observing the timetable of investment implementation by the new tenant:

period	1st and 2nd year	3rd to 5th year	6th to 25th year
STS08A	Preferential mooring at berths AL 01 and AL 02	Preferential mooring at berth AL 02	Berths AL 05 and AL 06 are part of the rental area STS08A
STS08	Not applicable	Preferential mooring at Berth AL 01	Preferential mooring at Berth AL 01

[5] Mooring order provided by SPA DIPRE Resolution No. 150/2020, based on the Santos Port Operating Regulations -REP 2020.

Table 2 - Priority mooring for Terminals **STS08** and **STS08A**
Source: EPL

Finally in relation to berth operational performance, the following indicators were of prime concern to the study: Average cargo per vessel, Productivity (average handling rate) and Occupancy Rate. These indicators aim at monitoring the health of the port's mooring capacity system, considered the most relevant and scarce asset in terms of infrastructure. For more information, see Section D - Operational.

2.2. Storage Capacity

A two-step transition rule is necessary given that area STS08's storage facilities are partially dependent on subsystems within **STS08A** leasing area. Hence, the study saw fit to devise a transition phase when both areas will work on becoming independent of each other.

The main assumptions for the transition phase are:

- Safeguard the continuity of the then existing port operation;
- Assimilate in the study the adjacent areas with low attractiveness or low technical viability;
- Propose petroleum by-product operation that is conducive of port infrastructure investments and encourage better use of potential areas for capacity expansion;

In the 1st phase of the transition, the implementation strategy has the following objectives: i) focus on existing operations in terminal **STS08A**, safeguarding continuity of operation through the addition of temporary areas and ii) start the expansion of tank capacity in currently unoccupied areas that will become STS08; and in the 2nd phase of the transition: iii) conclude the capacity expansion of STS08 in areas that were temporarily managed by **STS08A**, and iv) expansion of Alamoa's berth capacity through the construction of a new pier with two additional berths.

In the table below, the study elaborates further on its transition implementation strategy for Terminals STS08 and **STS08A:**

Stages	Period	Description
1st Stage of Transition	1st to 3rd contractual year (3 years)	STS08: will receive an initial area of 82,363 m²; executing 1st phase investments (installation of new storage tanks with total static capacity of 67,500 m³ for petroleum by-products; installation of new pipeline (approximately 50%); installation of two new pump facilities, pipe racks, two new loading stations, two new unloading stations, investments in common area of the Organized Port; and segregation of environmental licensing, all within 3 years**.** Observation: not including port operation. In the third year, STS08 receives additional area of 69,962 m² from the Port Authority (with a static capacity for 39,525 m³). Up until the third year, **STS08A** will be temporarily responsible for this 69,692 m² area. With the transfer of the area, STS08A , will reach its definitive size corresponding to 152,324 m² and 107,025 m³ of static capacity.
		STS08A: will receive an initial area of 343,926 m² of which 297,349 m² are dedicated to storing petroleum by- products LPG with static capacity for 229,864 m³ and 83,002 m³, respectively. In addition, the terminal will also operate on 46,577 m² of temporary area with static capacity for 39,525 m³ of petroleum by-products. As mentioned before, **STS08A's** temporary stewardship of

		this areas aims at achieving the following objectives: safeguarding operational continuity of the fuel supply chain; necessary investments in the terminal's operational security; investments in static capacity expansion (static capacity of 24,380 m³ for petroleum by-products) and adequate segregation of operations between the sister terminals; and segregation of environmental licensing, all within a **2-year deadline**; observation: **STS08A** will provisionally run STS08 area so as to ensure continuity of the existing port operation. At the end of the 2nd contractual year, **STS08A** will return this area to the Port Authority, so it can be made available to the lessee of terminal STS08. Upon transferring its provisional areas, **STS08A** will be left with its final lease area of 297,349 m². By the 3rd contractual year, **STS08A** starts to operate with a total static capacity of 254,244 m³ for petroleum by- products and 83,002 m³ for "LPG".
2nd Stage of Transition	3rd to 5th contractual year (3 years)	STS08: During the second phase, STS08 receives its additional area, adding by up to the terminal's definitive area of 152,324 m². On its newly acquired land, STS08 is responsible for executing the 2nd phase of investments, including the installation of new storage tanks, with static capacity of 57,220 m³ for petroleum by-products (total terminal static capacity of 164,245 m³); installation of new pipeline (approximately 50%); installation of a new pump facilities); observation: STS08 starts its port operations.
		STS08A: the terminal finishes construction of the new Alamoa pier, equipped with two new berths (AL05 and AL06). STS08A is also responsible for executing the dredging work of deepening the new berths and access area to the berths until the deadline in the **5th contractual year.**
Definitive Situation	6th to 25th contractual year (20 years)	**STS08**: starts the port operation with total static capacity (164,245 m³ for petroleum by-products).
		STS08A: beginning of operation of Alamoa's 5th and 6th berths.

Table 3 - Transition strategy for Terminals **STS08 and STS08A**
Source: Own Development

At its definitive form, Terminal **STS08A** will consist of 12 tanks (see conceptual arrangement), totaling **254,244 m³ for petroleum by-products.** For storage of **"LPG",** the system will include 4 vertical tanks and 6 spheres, totaling **83,002 m³.**

Of this expected total amount, new asset storage units corresponding to only one tank totaling 24,380 m³ will be deployed by the future tenant. All other assets (229,864 m³ for petroleum by-products and 83,002 m³ for "LPG") are classified as non-reversible to the Port Authority. Therefore, these assets will be effectively bought from the current tenant by the future tenant **of STS08A** and will incorporate the list of reversible assets of the future lease.

It is important to note, however, that during the 1st transition phase (1st and 2nd contractual year), Terminal **STS08A** will temporarily operate 6 additional tanks totaling 39,525 m³. Such action aims at safeguarding the continuity of existing port operations. Later, these tanking units will be permanently transferred to **STS08**.

Furthermore, out of the six tanks that will temporarily be **made available to STS08A** in the 1st transition phase (1st and 2nd contractual year) with total static capacity of 39,525 m³. Four tanks are from the port authority and two tanks have to be bought by the future tenant of **STS08A.** Subsequently, these indemnified tanks will **be made available to STS08,** during the third contractual year, free of charge**.**

In addition to the tanks mentioned above, other relevant assets include piping and pumping systems, truck loading and unloading system, common port area investments, administrative and utilities areas.

All existing assets are reflected in the model under their current state of conservation, with the objective of allowing the bidder to formulate a more realistic proposal.

To estimate existing asset value, the study decided to use the Ross-Heidecke methodology, a traditional way of calculating economic depreciation by considering the asset's age (as a percentages of useful life) and classifying it under nine different levels of conservation (new, regular, simple repairs, important repairs and no value).

Despite the widely acceptance of Ross-Heidecke, the study recognizes the inherent uncertainty related to measuring an asset's remaining useful economic life. Moreover, the advance age of the assets makes the calculation even more challenging. Thus, in arriving at its own estimate, the study also considered the current lessee own assessment of its assets (Annex). The way this study approached the exiting tenant's assessment is shown in the Technical Note, Section C.

In this context, in order to estimate the necessary investments in existing operational assets, the study created a ratio of depreciated value of the asset in relation to the value of a new one, considering the observed state of conservation of each asset, as classified in the tenant's equity assessment report.

For conceptual layout purposes, the study tried to appropriate as many existing operational facilities as possible. Thus, from the existing capacity and available land, the study projected the additional capacity to meet growing demand. Concerning additional tank storage, the study followed sizing requirements for liquid bulk terminals, especially the following: ABNT NBR 17,505, parts 1 to 7, ABNT NBR 7,821, API 650 AND API 620 (American Petroleum Institute).

In **STS08A's** case, the required tank storage expansion is estimated to be 24,380 m³ in static capacity for petroleum by-products. The area already has existing tanks with 312,866 m³ (83,002 m³ for LPG and 229,864 m³ for petroleum by-products). Hence, in total, **STS08A** is expected to have a minimum static capacity of **337,246 m³** (83,002 m³ for LPG and 254,244 m³ for petroleum by-products).

Based on the current tenant's operational track record and the expected improvement potential, it is estimated that **STS08A** will have inventory turnover of 30 times per year for petroleum by-products and 23 annual turnover for "LPG", allowing for a dynamic capacity of 7,627,320 m³/year (6,902,971 t/year) for petroleum by-products and 1,909,046 m³/year (1,053,793 t/year) for "LPG".[6] In addition, total operational dynamic capacity for the terminal adds up to[7] **9,536,366 m³/year (7,956,765 t/year).**

Considering that the final size of area **STS08A** corresponds to **297,349 m³,** its utilization index (measured in m³/m²), is 1.13.[8]

The necessary size of the terminal considered its projected demand over 25 years and the capacity of its berth and storage systems. For more details on terminal sizing, see Section B - Market Studies.

[6] Considering a weighted average density of 0,905 t/m³ for petroleum by-products.
[7] Considering an average density of 0.55 t/m³ for "LPG".
[8] The area utilization index (utilization coefficient) is an indicator that, applied to the liquid bulk port sector, measuring the volume of tanking capacity allocated per square meter of area.

In estimating the necessity of tank storage, this study considered de expected volume for liquid bulk, especially petroleum by-products and LPG. However, excluding specific contractual constraints, the winning bidder will have the freedom to organize and size its storage capacity.

In estimating the unit cost of adding tank storage capacity to the terminal, the study used samples from national suppliers, estimates from other feasibility studies approved by the Federal Government and Antaq's Port Cost System - SICPORT.

For modeling purposes, the pricing of new tanks related to additional capacity adopted a parametric model that includes all associated works and equipment, such as:

- Foundations;
- Base of tanks;
- Drainage net;
- Valves;
- Protection system;
- Meters;
- Grounding;
- Basin containment wall;
- Containment basin;
- Floating seal; and
- Automation systems.

It is worth noting that the engineering solution presented, as well as its associated values, are used for the purpose of measuring maintenance and insurance costs, detailed in Section D- Operational.

Appendix C-2 shows the details of unit and quantitative values.

2.3. On-shore shipping/receiving systems

Currently the only way products access the terminal is through pipelines that connect terminal **STS08A** to the Presidente Bernardes refinery and the Cubatão Terminal. From Cubatão, products are also connected to other existing refineries in the State of São Paulo.

Figure 4: Location map of terminals and pipelines - "Southeast Detail"
Source: Transpetro (Dec/2017)[9]

The detailed description of the existing road infrastructure is in official letter Nª 1/2021, prepared by the National Agency for Petroleum, Natural Gas and Biofuels - ANP (ANNEX).

> 4. From the Organized Port of Santos, in the Alamoa area, a string of pipelines leads to Cubatão's land terminal. This terminal is also connected by pipelines to the Cubatão refinery (RPBC), the Mauá refinery (RECAP) and São Caetano do Sul land terminal. All these units have other pipelines that interconnect the other terminals and refineries of the Petrobras system in the state. In the metropolitan region of São Paulo, for example, there is product delivery infrastructure for distributors (either by pipelines connected to distribution centers, or by direct roadway access with truck loading at the terminals) at the terminals of São Caetano do Sul, Barueri and Guarulhos and at RECAP. In the current configuration, land terminals and the longer pipelines are operated by PETROBRAS TRANSPORTE S.A – TRANSPETRO, while refineries and some shorter transfer pipelines are operated by PETRÓLEO BRASILEIRO S.A. (PETROBRÁS). Other short transfer pipelines are operated by the distributors themselves. (...)

Considering that the pipelines to the Cubatão Terminal are private, it will be up to the future lessee to carry out the necessary negotiations with the pipeline operator to access the infrastructure.

In this sense, according to ANP Resolution No. 35/2012 and ANP Resolution No. 716/2018, the use of transport pipelines for the handling of oil, petroleum by-products and biofuels, by interested third parties is guaranteed, given the adequate remuneration and existing capacity. The regulations also establish that the Carrier will maintain on its website important updated user information. For example, the owner of the

[9] http://transpetro.com.br/transpetro-institucional/nossas-atividades/dutos-e-terminais.htm (accessed 11/29/2019).

infrastructure must publish information regarding the "Price for transporting Oil and petroleum by-products in Long Pipelines" (May/2019). ANP provides web links to the information of all authorized companies.[10][11]

Thus, the information provided by Transpetro, in compliance with ANP resolutions, is available at http://transpetro.com.br/transpetro-institucional/informacoes-legais/informacoes-em-atendimento-a-anp.htm (accessed 11/03/2020).

The study's legal and regulatory information concerning pipeline infrastructure usage by third parties is attributed to ANP. Specifically, the agency´s position on the matter is laid out in an official letter dated 1/2021 [12] (see appendix), as follows:

> 11. It is worth mentioning that the analysis requested by the Infrastructure Ministry, involves long and short transport pipelines, according to their length. The five pipelines connecting the Santos terminal to the Cubatão terminal, for example, are short pipelines subject to ANP Resolution No. 716/2018. In contrast, the three pipelines connecting the Cubatão terminal to the São Caetano do Sul terminal, as well as the LPG pipeline that connects Cubatão to the RECAP refinery, are long pipelines.
>
> 12. In both ANP Resolutions, the basic assumption is that the Carrier must serve, **in a non-discriminatory manner**, interested Third Parties, that is, any company or consortium of companies that formally requests to transport Products through pipeline infrastructure. The Carrier must also follow **the preferences of the owner of the infrastructure** in meeting the demand transportation services, as set forth in the laws and regulations. Additional clarifications are important in this respect.
>
> 13. In general terms, the model chosen by the Petrobras Group for managing its subsidiaries is as follows: PETROBRAS is the company that owns the transportation facilities operated by TRANSPETRO, including pipelines and terminals throughout the state of São Paulo. Thus, for all intents and purposes, PETROBRAS is the infrastructure owner, and may enforce its preferences when TRANSPETRO serves third parties.
>
> 14. The owner's preference is expressed differently between long and short lines, in accordance with the regulations for each type of pipeline.
>
> 15. For long pipelines, ANP Resolution No. 35 of 2012 initially highlights two important phases in a commercial relationship between Carrier and User.
>
> I – The first is the execution of the contract between Carrier and User, which can take place in the fixed or non-Fixed mode. In essence, Fixed Transportation is a " type of transportation service where the Carrier guarantees a certain capacity to the User. Hence, at volumes within the contracted capacity, the Carrier may not interrupt or reduce the User's volume" (Art. 2, XII). On

[10] http://transpetro.com.br/transpetro-institucional/canal-do-cliente/dutos-e-terminais/tarifas.htm (accessed 11/29/2019).
[11] http://www.anp.gov.br/terminais-de-petroleo-combustiveis-liquidos/5704-livre-acesso-de-terceiros (accessed 03/11/2020)

[12] CRAFT No. 1/2021/SIM-CAL/SIM/ANP-Rj-e, National Agency of Petroleum, Natural Gas and Biofuels - ANP

the other hand, Non-Fixed Transport is one "that may be interrupted or reduced by the Carrier, prior to the beginning of the user's batch of products being loaded to the infrastructure" (Art. 2, XIII);

II – The second phase is when the preparation of the monthly schedule (art. 19) takes place, beginning at least 30 days in advance, with Fixed contract users presenting their monthly transport schedules. After the allocation of these volumes and an agreement between both parties, there is also a window for allocating non-Fixed users' orders. Next, up to 5 days before the month of the actual transport, the allocation schedule is disclosed. Requests received after the schedule´s disclosure will be dealt with on case-by-case bases, and the possible transportation of the product (or its denial) must be communicated by the Carrier to the User within 7 days.

16. Regarding the Owner's Preference, current regulation defines this benefit as a "monthly volume of Products, between Receiving and Delivery Points that is guaranteed to the Owner of the Transportation Facility when handling its own Products" (art. 2, XVIII). Therefore, during the monthly scheduling process, the owner's volume allocation enjoys the same privileges as those awarded to user's volume under a Fixed contract, as both are taken into consideration during the first phase of allocation. However, it is important to emphasize that the owner's preference does not amount to an exclusive right to use the infrastructure: the Carrier must meet the requests of interested Third Parties, in a non-discriminatory manner, during both commercial phases - at any time in the contract (if there is Operational Available Capacity) and monthly in the schedule (if there is Idle Contracted Capacity, including that of Proprietary Volumes, allocated under Owner's Preference rights) (art. 3).

17. For long pipelines, there is a five-year review of the owner's preference volumes based on Carrier proposals and ANP subsequent evaluation (art. 8 to 12). In the latest owner preference review that ANP approved, the agency decided in favor of the Proprietary user (Petrobras), in relation to its early contracting with the Carrier (Transpetro). This resulted in the publication of ANP Order No. 170 of February 28, 2020 (annex). That decision, part of proceeding number 48610.218814/2020-07, is under administrative appeal. In any case, in the following table, the agency identified a set of pipelines with available capacity that may be of interest to any party that wishes to transport cargo between the Alamoa Terminal and the metropolitan region of São Paulo. For example, the OSSP pipelines that connect the Cubatão terminal to São Caetano do Sul have the following Operational Capacities and preferential volumes for the next five years (2018-2023), as shown in Table1:

Quadro 1 - Capacidade Operacional e Preferência do Proprietário alocadas a dutos selecionados, conforme Despacho ANP nº 170, de 2020.

Código DCPD	Nome	Diâm. (Pol)	Extensão (km)	Ano Início Operação	Origem	UF	Destino	UF	Produto (s)	Capacidade Operacional (m³/mês)	Preferência do Proprietário 2018-2023 (m³/mês)
000645	OSSP-A	14	46,2	1989	TT Cubatão	SP	TT São Caetano	SP	Claros/GLP	282.744	134.461
000646	OSSP-B	10	37	1972	Cubatão	SP	TT São Caetano	SP	GLP/Claros	129.989	61.200
000647	OSSP-OC	18	37,9	1980	Cubatão	SP	TT São Caetano	SP	O.C.	288.055	172.010
000648	OSSP-C	18	38	1952	Cubatão	SP	TT São Caetano	SP	Claros	277.328	152.408

18. Therefore, it is important to note that the owner's preference in these selected pipelines varies between 47-60% of the operational capacity, with space for contracting capacity beyond the owner's own preference.

19. It is also important to note, in relation to the Carrier's capacity assumption calculations, that OSSP pipelines (SEI 0274808) have a two-way operational capability. However, the company only considers one flow direction. Indeed, the Carrier bases its rationale on the fact that, historically, OSSP-A, OSSP-B and OSSP-C generally operate cargo destined to São Caetano do Sul (or to RECAP, in the case of OSSP-A). The Carrier only considers an opposite flow in the case of OSSP-OC's capacity calculation. In the case of OSSP-OC, historical volumes point to refineries sending heavy oil to Cubatão. There is no doubt that changing flow direction several times in a month would impact the capacity of the pipeline in that month. For example, more inversions than planned could decrease the line´s productivity, thus reducing its available capacity. On the other hand, if third party operations follow the same direction considered in the Carrier's calculation, it is expected that operational capacities will resemble the ones highlighted above.

20. For short lines, according to ANP Resolution No. 716 of 2018, the regulatory system is simpler. As in the case of long lines, the Carrier must prepare a Prior Schedule in which it must consider the Owner's Preference and Contracted Capacities (art. 7). However, ANP will not validate the owner's preferred volume - this is expressed every month during the volume request made by the owner. Once the movement request is confirmed, the User must pay in full even for scheduled services that were not utilized (take or pay). The only obvious exceptions being when non-compliance is not the User's fault (art. 8).

21. It should be noted that, in the event of a request for Transportation by an Interested Third Party, if Operating Available Capacity is not sufficient to meet the service needs, and the Owner chooses not to make the necessary investments to expand the Operating Capacity, this Owner is obliged to accept investments made by Third Parties Interested in implementing the aforementioned expansion, both in long and short pipelines, as established, respectively, in art. 13, of ANP Resolution No. 35, of 2012, and in art. 3, § 1, of ANP Resolution No. 716, of 2018. The investment required for capacity expansion or duplication of short pipelines is generally lower than in its long counterparts. Hence, in conclusion, in the case of limited capacity and other physical restrictions of short pipelines, third party users may make the necessary improvements, and the owner will have to accept them.

22. Similarly, the owner of the transportation facilities is obliged to allow the interconnection of its facilities with other facilities owned by third parties, in compliance with the safety standards and operating conditions adopted by the Carrier, both in long and short lines, as provided for, respectively, in Article 6, of ANP Resolution No. 35, 2012, and in Art. 4, of ANP Resolution No. 716, 2018.

23. Finally, it should be made clear that, in all cases involving the regulation of transportation by pipelines, ANP reserves the right to deliberate on any doubts and disagreements, brought before the agency by Owners, Carriers, Current Users or Interested Third Parties. Indeed, the agency is tasked to mediate conflicts between interested parties and resolve them, according to ANP Ordinance No. 254, of September 11, 2001.

According to the pipeline operator, the Alamoa Connection has pipelines with 10'', 14'' and 18'', with a total operating capacity **of 2,400,000 m³ per month.**

The future lessee will be responsible for complying with operational parameters of pipeline reception as foreseen in the study.

It is important to highlight that the future lessee will not face any obstacle in regard to the implementation of equipment and pipes of different capacities according to its safety and operation criteria, provided that the future lessee complies with the operational parameters of pipeline reception required by its requesters.

In addition to the pipeline system, the study foresaw truck loading and unloading operations, to enhance the terminal's service flexibility. Regarding road reception of petroleum by-products , the study envisioned the implementation of two new unloading platforms that can service B-train trucks, with two unloading positions on each platform, enabling the simultaneous operation of Four trucks (one vehicle on each side). During the second phase of the lease, **STS08A's** future tenant is expected to implement new platforms.

As for the outbound shipment of petroleum by-products, the study planned for two new loading platforms able to comply with B-trains, with two loading positions on each platform, enabling the simultaneous operation of four trucks (one vehicle on each side). The implementation of the new loading platforms was also foreseen in the second phase of the lease.

At present, roadway access is available only for the terminal's workers and for the services flow.

There is no direct rail connection to the Alamoa terminals, and the study did not plan for such a connection. However, the railway network on the right bank is close to the terminal. Indeed, the railway access lies less than 500 m from the Terminal, and there are no constraints (other than new required investments) to the future lessee's option of developing a rail alternative.

Annex C-2 details values and quantitative estimates in this subchapter.

2.4. Other Operational Structures

To enable operations in the terminal, the study identified the following essential assets:

2.4.1. Pipelines

The current tenant owns the internal pipeline system in the Terminal. This pipeline system is classified as non-reversible to the Port Authority. Thus, in order to safeguard the continuity of port operations, the entire system will have to be acquired from the current tenant by the auction´s winning bidder. Therefore, upon the initiation of the new lease, the pipeline system will become part of the reversible assets to Port Authority.

Additionally, the existing pipelines on the pier are also non-reversible assets owned by the current tenant. Thus, in order to safeguard the continuity of the port operation, these pipelines must be bought by the future tenant of **STS08A.** However, these assets will be the property of the Port Authority, so that they can be made available to future STS08 and **STS08A** tenants **(**in isolation or shared), free of charge, in accordance

with the contractually defined mooring priority rules. It is worth noting that the study did not require new pipelines on the existing pier.

Pipes, Valves and Pipe Fittings, Metal Structures, Electrical Installations (wires, cables, circuit breakers, small frames and panels, accessories and miscellaneous) on the pier and in the leased area will be made available in their current conditions.

Besides existing assets, internal pipeline connections will be needed for new onshore and waterway assets. Namely, the study foresees new pipeline investments connecting the new storage tanks, pump room, truck loading and unloading stations and the existing system. The study also foresees the need for implementing three new pipelines connecting the terminal to its new pier. The following table shows the estimated quantity of pipelines.

Pipeline	Total (in linear meters)
External (between AL 01 and AL 05)	2.163
Internal (inside the terminal)	162
Total	**2.325**

Table 4: Sizing of the Pipeline System for **STS08A**
Source: EPL

The definition of the pipeline´s linear meter value came from price quotes by national suppliers, based on average prices quoted in different budgets and on values specified in feasibility studies assessed by ANTAQ.

2.4.2. Pump room

Since pump room capacity presents low variation when controlled for terminals of similar size, the study assumes a required static capacity in line with its market sample of 35,000m³, composed of six pumps.

From this estimate of required pump capacity, the study concluded that an additional set of pumps will be required, given **STS08A's** storage capacity expansion.

The study arrived at a value for the new set of pumps based on a sample of quotes from national suppliers.

2.5. Other Non-Operational Structures

In **STS08A**, the existing non-operating assets will be incorporated into the future lease. For modeling purposes, only expenses with maintenance of non-operational assets were considered.

2.6. Access to Terminal STS08A

The future tenant of STS08 will make investments in the common area of The Organized Port, in an adjacent region to the one expected to be occupied by STS08 and **STS08A** terminals. The referred investments will include the new access to the future **STS08A** Terminal.

There will be the possibility of segregating each terminal's respective road access ways. Thus, both terminals will have independent road access ways. No remuneration or right of access fee will have to be paid by **STS08A**. Figure Figure 5 the current access located inside **STS08** area, and the conceptual delimitation of the new access to **STS08A** terminal.

Figure 5: Phasing - Terminal Access
Source: Own preparation

The adjustments to be made by the future lessee **of STS08A** will take place in the first three years after the transfer date, coinciding with the 1st transition Stage. Hence, the new access would be available by the fourth contractual year, coinciding with the beginning of the 2nd transition Stage.

It is important to emphasize that the new access will not be exclusive to **STS08A** and will not be part of the area that integrates the future lease.

To enable the installation of the new access, it will be necessary to build an access gate. It should be noted that such access gate will also be used as one of the access ways to the public berths that exist in the region, as indicated in the Development and Zoning Plan of the Port of Santos.

To ensure road access to terminal **STS08A d**uring the first transition Stage, it will be necessary to use a temporary access located inside the future STS08 area, as shown in Figure 5.Figure 5

At the end of the 1st phase, the temporary access to the **STS08A** will no longer be necessary and will be returned to STS08.

To define the scope of interventions necessary to create this new access, the study considered projected roadway volume as well as SPA's own contributions regarding the area (Annex).[13]

3. Compatibilization of the Future Capacity of the Enterprise

After analyzing the individual capacities of each subsystem of the enterprise´s productive process, the next step is to estimate the Terminal's capacity, defined by the smallest capacity in its systems. The major subsystems considered are the terminal's berth capacity on the pier (boarding/unloading system) and the cargo storage capacity. The study assumes that the ability of the terminal to receive and ship product onshore is not a limiting system. Thus, taking all these assumptions in consideration, the table below shows the total annual capacity established at **7.420 kt.**

[13] Reports of Contributions SPA, STS08 and STS08A Santos-SP (17/06/2020, 17/09/2020 and 18/09/2010)

Section C - Engineering

MICRO-CAPACITY CALCULATION

Lease		STS08A					
			future				
	Unit	Base year	1st phase	1st phase	Phase 2	Phase 3	Notes
Beginning of the period		2018 (Equivalent to definitive area)	2021-2022	2023	2024-2025	2026-2045	
Waterway System							
Unloading System							
Number of berths	#	2	2	2	2	2	1
Occupation of the berth	%	60%	60%	60%	60%	60%	
Percentage of berth time allocated	%	22%	15%	11%	10%	9%	2
General Average Handling rate	t/h	380	450	530	530	530	
Annual Unloading capacity	**thousand t**	**870**	**710**	**620**	**540**	**510**	
Boarding System							
Number of berths	#	2	2	2	2	2	3
Occupation of the berth	%	60%	60%	60%	60%	60%	
Percentage of berth time allocated	%	70%	94%	86%	64%	100%	2
General Average Handling rate	t/h	570	670	760	760	760	
Annual boarding capacity	**thousand t**	**4.210**	**6.610**	**6.910**	**5.080**	**7.990**	
Boarding System Capacity and Unboarding	**thousand t**	**5.080**	**7.320**	**7.530**	**5.620**	**8.500**	
Storage System							
Liquid Bulk - Tanks							
Static capacity	m^3	229.864	269.389	254.244	254.244	254.244	
Density	t/m^3	0,91	0,91	0,91	0,91	0,91	
Static capacity	T	208.034	243.806	230.099	230.099	230.099	
Inventory turnover / year	#/year	28	30	30	30	30	
Annual storage capacity	**thousand t**	**5.820**	**7.310**	**6.900**	**6.900**	**6.900**	
Gaseous Bulk - Tanks and Spheres							
Static capacity	m^3	83.002	83.002	83.002	83.002	83.002	
Density	t/m^3	0,55	0,55	0,55	0,55	0,55	
Static capacity	T	45.817	45.817	45.817	45.817	45.817	
Inventory turnover / year	#/year	23	23	23	23	23	
Annual storage capacity	**thousand t**	**1.050**	**1.050**	**1.050**	**1.050**	**1.050**	
Total annual storage capacity	**thousand t**	**6.870**	**8.360**	**7.950**	**7.950**	**7.950**	
Onshore Systems							
Pipeline							
Pipeline operational capacity	thousand m^3/month	2.400	2.400	2.400	2.400	2.400	4
Percentage of pipeline allocated to the terminal	%	85%	100%	100%	70%	61%	5
Density	t/m^3	0,91	0,91	0,91	0,91	0,91	
Safety factor	%	50%	50%	50%	50%	50%	
Pipeline reception capacity	**thousand t**	**11.100**	**13.000**	**13.000**	**9.200**	**7.900**	
Roadway Reception							
Number of reception stations	Pcs.	0	2	2	2	2	
Points per station in simultaneous operation	Pcs.	0	2	2	2	2	
Hours of operation per day	Hr	0	16	16	16	16	

Unloading by truck	T	0	40	40	40	40
Productivity	t/h	0	119	119	119	119
Connection and maneuver time	Min	0	10	10	10	10
Truck operating time	Min	0	30	30	30	30
Security occupancy rate	%	0	60%	60%	60%	60%
Capacity Road Reception	**thousand t**	**0**	**790**	**790**	**790**	**790**
Roadway shipping						
Number of shipping stations	Pcs.	0	2	2	2	2
Points per station in simultaneous operation	Pcs.	0	2	2	2	2
Hours of operation per day	Hr	0	16	16	16	16
Unloading by truck	T	0	40	40	40	40
Productivity	t/h	0	119	119	119	119
Connection and maneuver time	Min	0	10	10	10	10
Truck operating time	Min	0	30	30	30	30
Security occupancy rate	%	0	60%	60%	60%	60%
Roadway shipping	**thousand t**	**0**	**790**	**790**	**790**	**790**
Total annual Onshore Reception Capacity	**thousand t**	**11.100**	**14.580**	**14.580**	**10.780**	**9.480**
TERMINAL LIMITING CAPACITY	**thousand t**	**5.080**	**7.320**	**7.530**	**5.620**	**7.410**

Notes:

1 Alamoa 1 and Alamoa 2 berths were considered in the 1st, 2nd and 3rd phases;
2 The percentage of berth time was scaled based on the expected market demands;
3 Considers berths Alamoa 1, Alamoa 2 in the 1st and 2nd phase and the new pier for the 3rd phase;
4 Data provided by the pipeline operator between the port terminal and the Cubatão terminal;
5 Proportion between the static capacities of the storage systems of terminals STS08 and STS08A.

Table 5**STS08A** Enterprise in the Port of Santos
Source: EPL

It is worth mentioning that the percentage of berth time allocated to the terminal boarding system is 100% for **the 3rd phase** (2026-2045). This percentage is justified because the new pier to be built by the lessee will be included in the lease itself**.** Therefore, **STS08A's** new tenant will have exclusive right of usage for the new berths.

Another relevant factor pointed out Table 5 the **limited capacity of the terminal** foreseen for the **3rd phase.** To determine the capacity, the study considered the limitation of each subsystem. The decisive factor was the limited capacity of unloading LPG (waterway subsystem) and the static capacity of liquid bulk (storage).

4. Sizing Parameters

The Lessee will be responsible for the implementation and development of the infrastructure and will be required to make the necessary improvements to achieve and maintain the performance parameters.

The lessee will undertake and be responsible for all technical studies, including, but not limited to, field investigations, feasibility studies, conceptual and final projects, planning documents and bidding/construction documents relating to the proposed improvements.

At its own expense and with appropriate notification to the Lessee, the Port Authority reserves for itself the right to hire independent consultants in order to monitor the quality of construction.

The terminal implementation project will comply with all applicable local, state, and federal codes and regulations, as well as the design standards indicated by the organizations below (note that Brazilian standards and codes will be the main design standards/codes. In the event of conflict with other international standards, the most restrictive code will be applied):

- ABNT, or where these are not available, appropriate and internationally recognized standards, including those listed above under the heading "Project Requirements";
- ISO;
- IMO;
- MARPOL, MARPOL, 2010.
- Port Authority;
- National Agency of Petroleum, Natural Gas and Biofuels - ANP;
- Local Fire Department;
- External Suppliers of Public Services, in accordance with national and international Building and Construction Codes;

In addition, the project will comply with the latest versions of all applicable design codes and standards established by the following organizations:

- *European Committee for Standardisation (Eurocode);*
- *Permanent International Association of Navigation Congress (PIANC)*
- *ASTM International (American Society for Testing and Materials);*
- *Oil Companies International Marine Forum (OCIMF); and*
- *American Petroleum Institute (API).*

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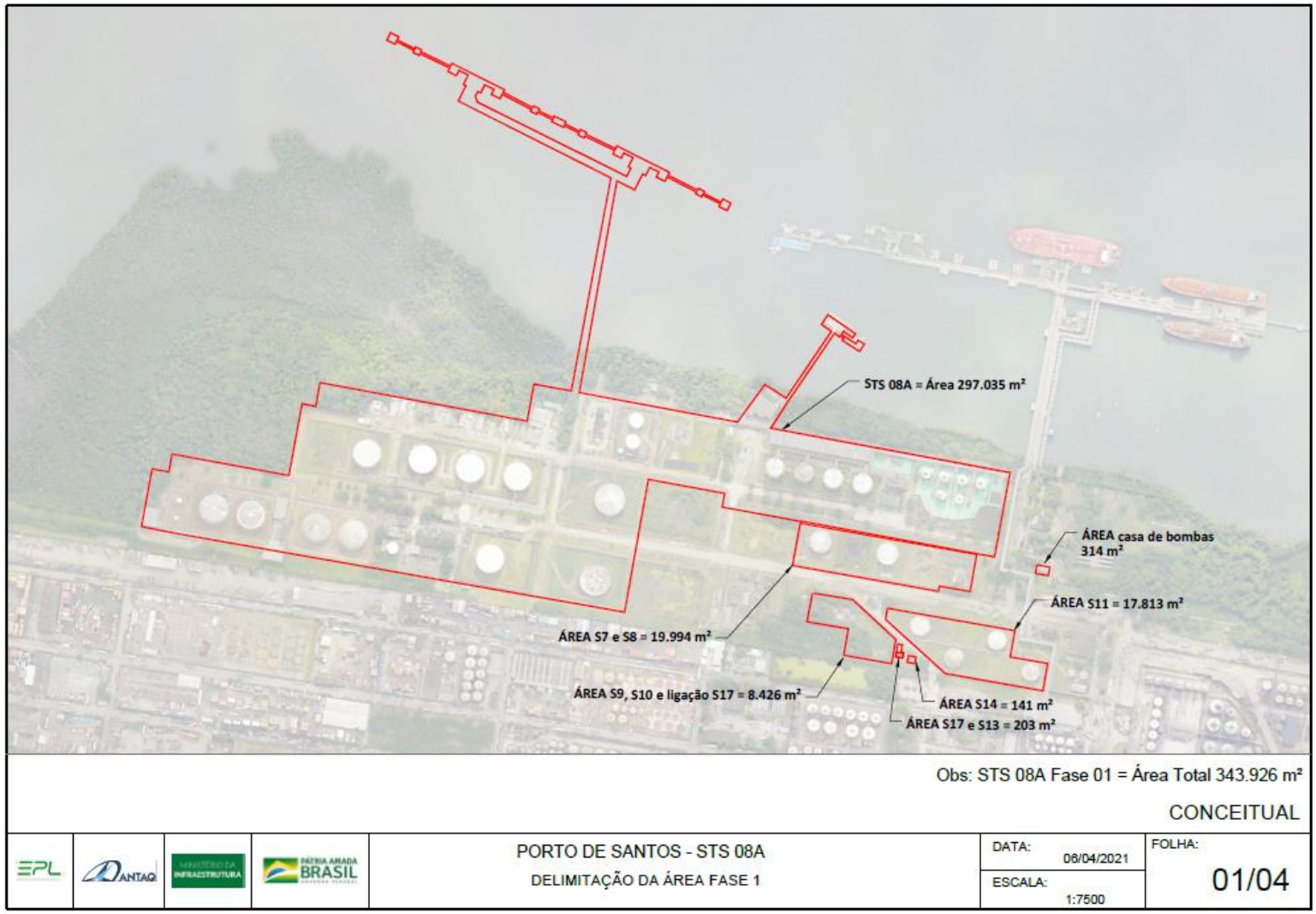
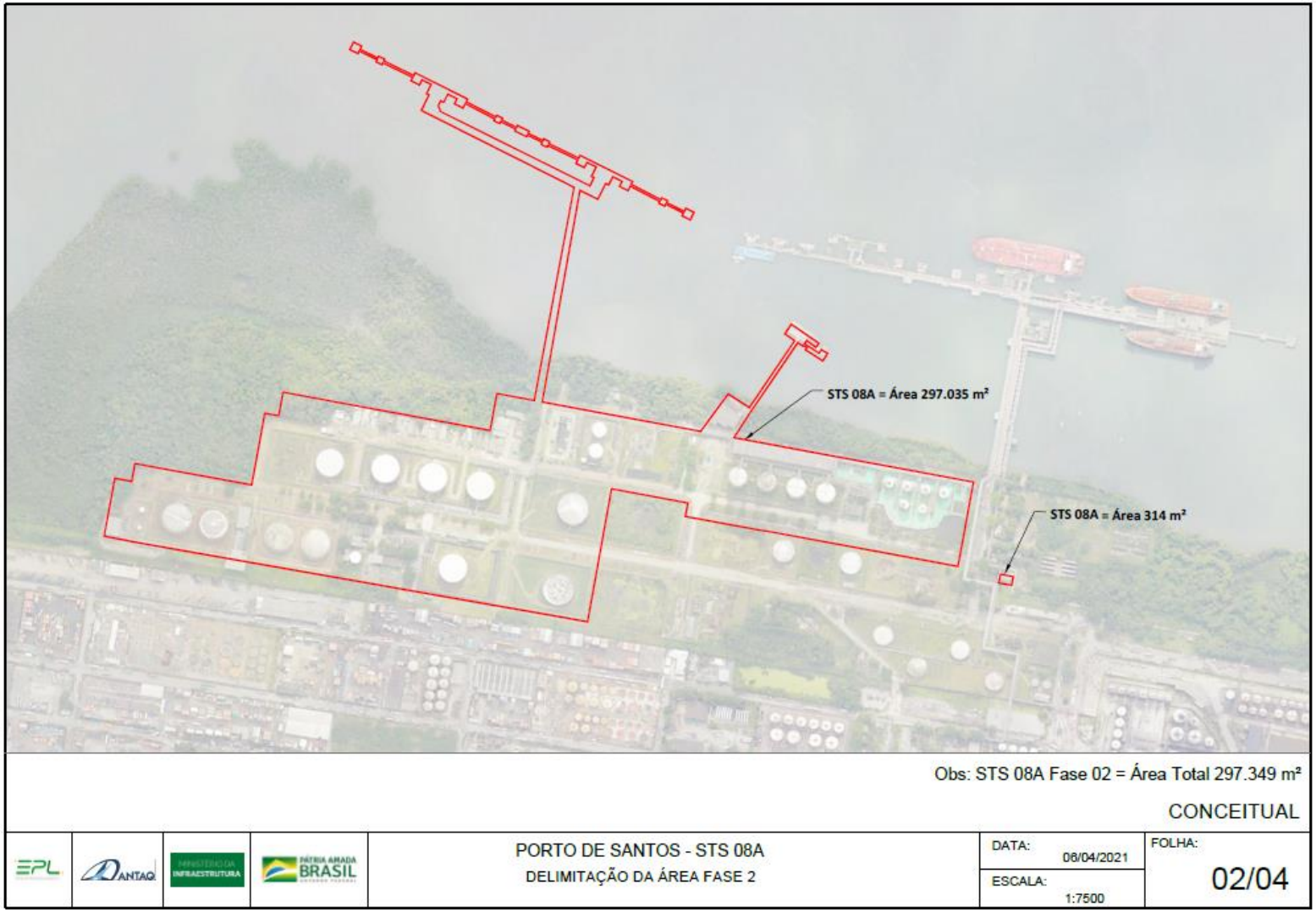
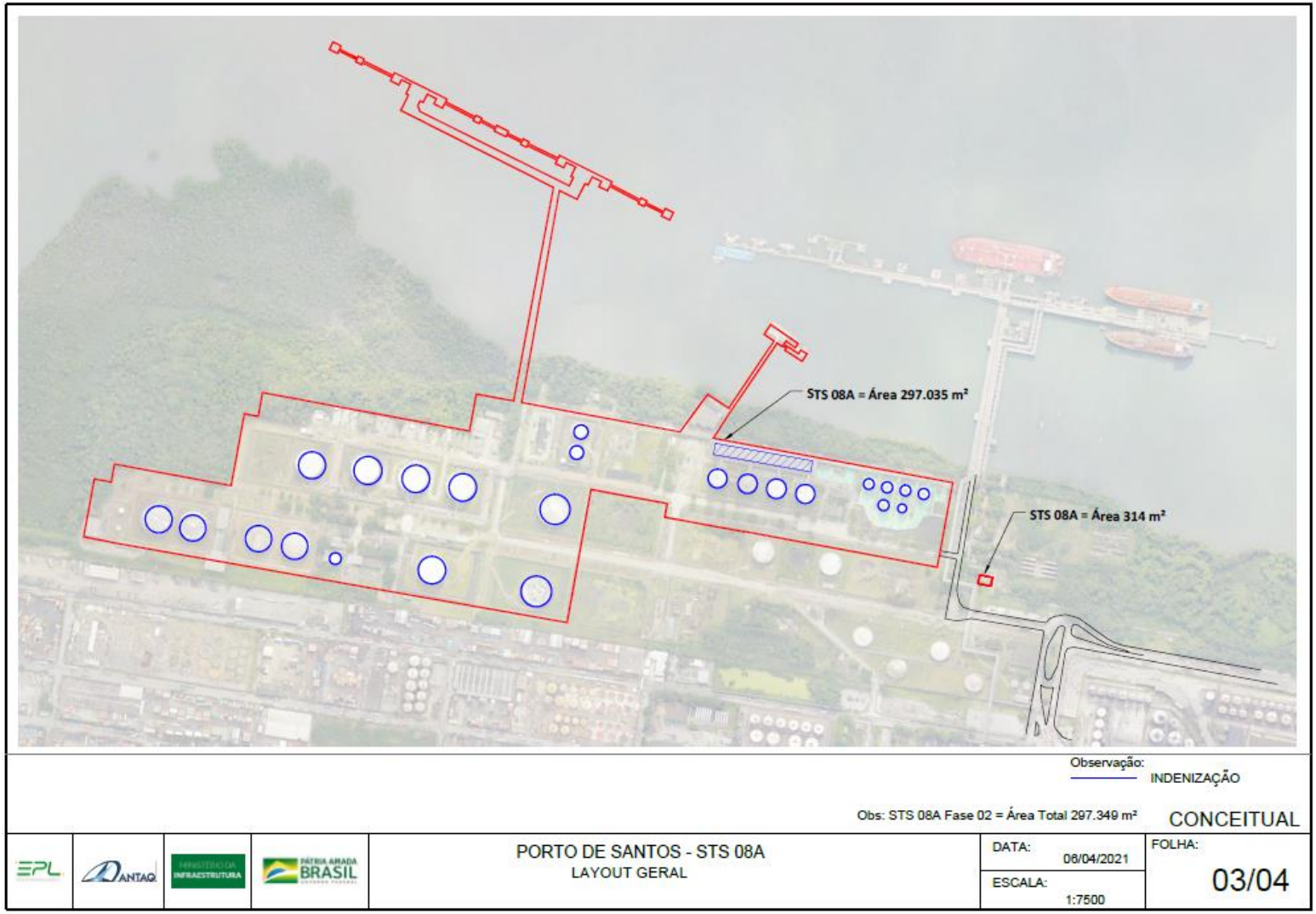
Annex C-1: Figure 1



Annex C-1: Figure 2



Annex C-1: Figure 3



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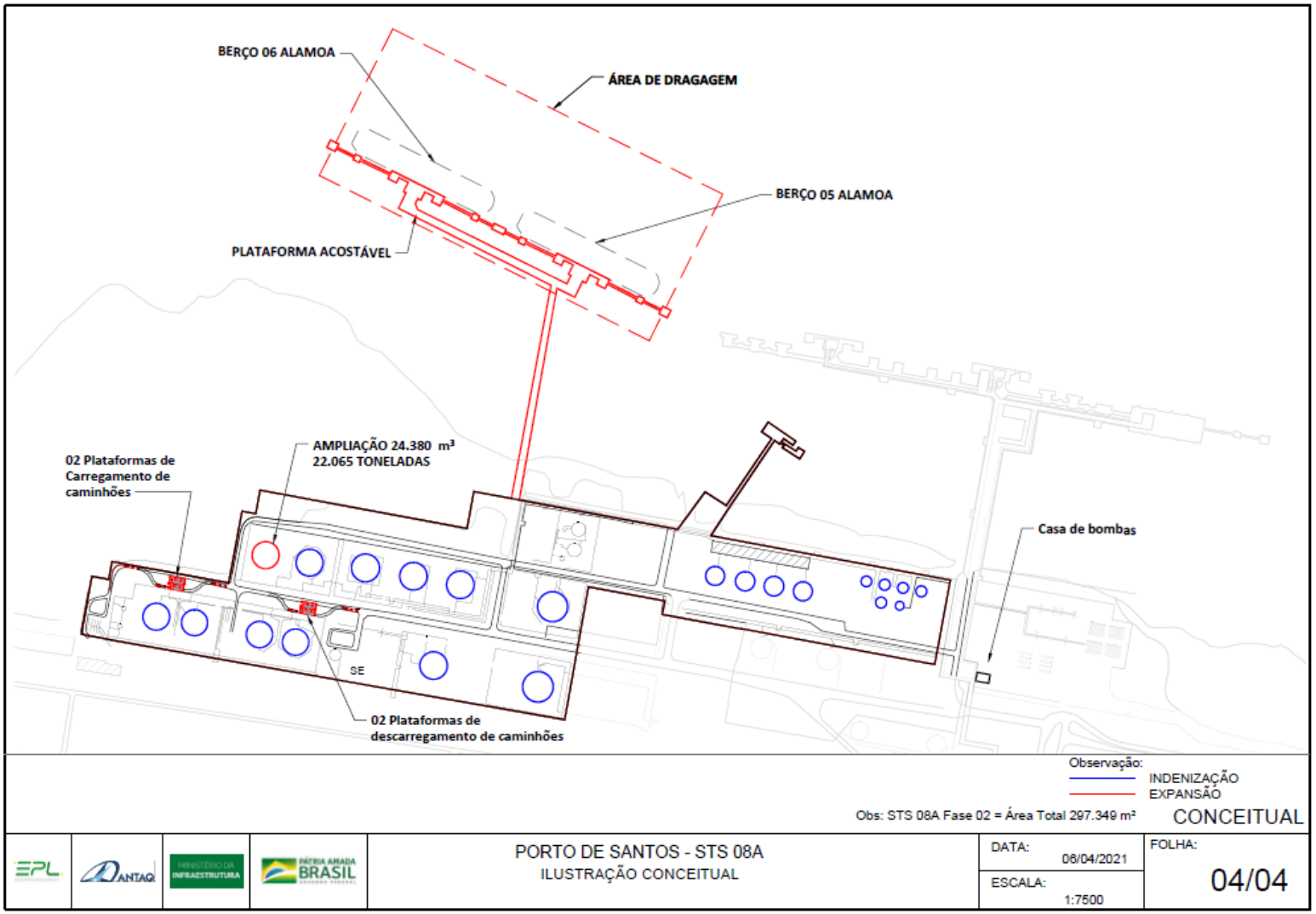
Annex C-1: Figura 4



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Annex C-2: Capex

CAPEX STS08A

	Description	Uni	Quantity	Unit Cost	Total Cost		2ª phase
1	**Inspection Recommendations (IRs)**					**11%**	
1.1	Replacement of the Sea Water System	LS	1,00	24.747.151,77	24.747.151,77	4%	
1.2	Replacement of flare pipe sections, Nitrogen and LPG park	LS	1,00	4.779.492,83	4.779.492,83	1%	
1.3	Replacement/repair of metal structures of refrigerated tanks (access ladders and supports)	LS	1,00	3.543.763,05	3.543.763,05	1%	
1.4	Replacement/painting of clear and dark plant lines	LS	1,00	4.248.438,07	4.248.438,07	1%	
1.5	Structural recovery of the LPG plant	LS	1,00	3.717.383,31	3.717.383,31	1%	
1.6	Other IRs - Forecast	LS	1,00	24.109.886,06	24.109.886,06	4%	
2	**Steam Burning System for Ship Operations**					**6%**	
2.1	Acquisition of Burning Unit	LS	1,00	12.214.259,46	12.214.259,46	2%	
2.3	Installation of Burning Unit	LS	1,00	23.069.803,02	23.069.803,02	4%	
3	**New Flare System**					**2%**	
3.1	Acquisition of materials	LS	1,00	4.535.207,64	4.535.207,64	1%	
3.3	Construction and Assemblage	LS	1,00	6.146.647,69	6.146.647,69	1%	
4	**Automated Safety System for Barge Mooring**					**0%**	
4.1	Installation of supports, structures, sensors and interconnections	LS	1,00	1.173.631,02	1.173.631,02	0%	
5	**New Fire Fighting System**					**6%**	
5.1	Spheres - installation of 6 monitor cannons, valves and hydrants	LS	1,00	3.692.470,47	3.692.470,47	1%	
5.2	Coolant Tanks. - realignment of the SCI lines for correction and operability of the system started in 2004	LS	1,00	5.990.972,12	5.990.972,12	1%	
5.3	Fuel Oil Tanks - complement the assembly of the 2004 basic project consisting of valves and lines	LS	1,00	1.349.227,46	1.349.227,46	0%	
5.4	Diesel Tanks 631501/503 - Disassemble existing arrangement and assemble a new one to meet system flow and pressure requirements. Install valves and filters.	LS	1,00	1.349.227,46	1.349.227,46	0%	
5.5	FLARE and SÃO area - construction of new bases, replacement of valves, lines and filters	LS	1,00	2.679.239,23	2.679.239,23	0%	
5.6	Pump Collection and House - replacement of pumps B and C and their diesel engines	LS	1,00	4.443.358,53	4.443.358,53	1%	
5.7	Administrative Area - replacement of pumps to meet required system flow	LS	1,00	1.587.952,51	1.587.952,51	0%	
5.8	Diesel Tanks 601 to 605 - complement the lines that were partially assembled from the 2004 project and that are currently exposed to weather	LS	1,00	3.344.245,12	3.344.245,12	1%	
5.9	Foam Center in the CODESP area - new foam house to serve Tanks 803 to 806 and 601 to 603, currently precariously served by the CODESP system	LS	1,00	1.022.766,86	1.022.766,86	0%	
5.10	Tanks for dark fuels - readjustment of existing sleepers, bases for new supports, piping, new AF system, quick opening valves, filter and two hydrants	LS	1,00	351.718,63	351.718,63	0%	
5.11	TCD and TQ-443304 area - installation of new pipes and hydrants	LS	1,00	1.016.724,52	1.016.724,52	0%	
5.12	Castelo D'agua - bases for supports of 2 new pumps, 2 new suction lines and electrical infrastructure for power, monitoring and control of the North Foam Center - piping support bases and TQ LGE	LS	1,00	887.320,28	887.320,28	0%	
5.13	Central Foam Central - complete the assembly of the 2004 basis project consisting of valves, lines and tanks	LS	1,00	554.817,34	554.817,34	0%	
5.14	North Foam Center - piping support bases and TQ LGE	LS	1,00	554.817,34	554.817,34	0%	
5.15	Castelo D'agua -bases for support of 2 new pumps, 2 new suction lines and electric infrastructure for power, monitoring and control of the North Foam Center - piping support bases and TQ LGE	LS	1,00	831.608,39	831.608,39	0%	
5.16	Gasoline and Relief Tanks - assembly of filter, valve, ring mount and sprinkler nozzles	LS	1,00	7.243.066,48	7.243.066,48	1%	
6	**Investment in the Common Area of the Organized Port - New Loading Arms**					**3%**	
6.1	Acquisition of arms	LS	1,00	11.948.732,08	11.948.732,08	2%	
6.2	Installation of Arms	LS	1,00	8.707.750,90	8.707.750,90	1%	
7	**Drainage and Effluent Treatment System**					**3%**	
7.1	Construction and Assembly of Boxes for Segregation of Rainwaer and Oily Drainage	LS	1,00	3.735.953,98	3.735.953,98	1%	
7.2	Adequacy of drainage grooves in containment dams, construction and installation of rainwater drainage grooves and underground piping for oil drainage	LS	1,00	4.245.401,46	4.245.401,46	1%	
7.3	Installation of TADs and Sump Tanks in clear petroleum tanks	LS	1,00	8.490.803,95	8.490.803,95	1%	
8	**Adaptation of Electrical Installations to NR-10**					**2%**	
8.1	Substitution of existing conduits to comply with current legislation and resolve non-conformities with respect to electrical wiring	LS	1,00	3.232.037,32	3.232.037,32	1%	
8.2	Substitution of existing conduits to comply with current legislation and resolve non-conformities with respect to electrical wiring	LS	1,00	3.145.271,22	3.145.271,22	1%	
8.3	Replacement of TDC Substation Q-4D and Q-4B Electrical Panels	LS	1,00	7.700.491,61	7.700.491,61	1%	
8.4	Adequacy of grounding grid according to NBR-5410 Standard with installation of new ground rods and ground cables	LS	1,00	558.437,48	558.437,48	0%	
9	**Paving of internal streets in the industrial area**					**1%**	
9.1	Ground Leveling	LS	1,00	1.236.735,73	1.236.735,73	0%	
9.2	Drainage correction	LS	1,00	1.545.919,66	1.545.919,66	0%	
9.3	Asphalt Laying	LS	1,00	3.091.839,33	3.091.839,33	1%	
10	**Redesign of the Operations Control Room**					**0%**	
10.1	Adequate layout to bind the entire operating system and equipment	LS	1,00	902.793,09	902.793,09	0%	
10.2	New pressurization and air conditioning system	LS	1,00	446.086,00	446.086,00	0%	
10.3	Installation of impact and fire resisant glass windows	LS	1,00	254.906,28	254.906,28	0%	
11	**Relocation of CLPs and IFIX Servers**					**0%**	
11.1	Acquisition of necessary equipmentos	LS	1,00	254.906,28	254.906,28	0%	
11.2	Infrastructure Construction	LS	1,00	163.910,61	163.910,61	0%	
11.3	Adaptation relocation of CLPs, servers and auxiliary devices	LS	1,00	339.875,05	339.875,05	0%	
11.4	Begun consecutively, final tests and updating of technical documentation and operating manuals	LS	1,00	42.484,38	42.484,38	0%	
12	**Capacity Expansion Equipment**					**7%**	
12.1	Fixed roof carbon steel tanks without foundation	m3	24.380,00	1.239,39	30.216.331,91	5%	
12.2	Line of ducts for liquid bulk (including supports)	m	2.325,00	3.447,46	8.015.344,26	1%	
12.3	Pump Square	Unid.	1,00	1.051.470,32	1.051.470,32	0%	
13	**Receiving and Dispatching system**					**1%**	
13.1	Truck Unload Station	Unid.	2,00	1.771.823,75	3.543.647,49	1%	3.543.647,49
13.2	Truck Load Station	Unid.	2,00	3.230.366,38	6.460.732,75	1%	6.460.732,75
14	**Investment in the Common Area of the Organized Port - New pier**					**48%**	
14.1	Pier stakes and mooring dolphins - expansion of the new 5 and 6 Alamoa berth	m2	**7.639,00**	19.532,33	149.207.436,25	25%	149.207.436,25
14.2	Access Bridge	m2	**3.294,00**	8.523,30	28.075.743,76	5%	28.075.743,76
14.3	Mooring Dolphins	Unid.	**8,00**	1.581.837,12	12.654.696,97	2%	12.654.696,97
14.4	Dredging	m3	1.622.683,50	59,82	97.070.783,36	16%	97.070.783,36
14.5	Gangway	m	**334,94**	6.100,72	2.043.376,52	0%	2.043.376,52
15	**Other**					**9%**	
15.1	Engineering and Administration	%	5%		27.378.454,83	5%	14.952.820,86
15.2	Contingencies	%	5%		27.378.454,83	5%	14.952.820,86
16	**TOTAL**				**602.326.006,31**	100%	**328.962.058,82**

Base-date: June/2020.

Section C - Engineering

Annex C-2: Indemnity (1/5)

STS08A Indemnity

	Description	Unit	Quantity	Unit Cost	Total Cost
1	**Indemnification of non-reversible assets that will be used**				
	Petrobras assets within the leased area				
1.1	**Edifications**				
1.1.1	TQ-451701 -Cylindrical steel tank, store treated fresh water, capacity: 3,360 m³ and diameter of 18.84m, conical roof, 12m high..	Unit	1,00	1.434.558,48	1.434.558,48
1.1.2	TQ-468501 - Extract storage tank capacity: 4,500l; height 33.50m LGE product LGE - South Area	Unit	1,00	4.664,98	4.664,98
1.1.3	TQ-468502 - Extract storage tank - capacity:7,500l. LGE - Central Area	Unit	1,00	7.667,93	7.667,93
1.1.4	TQ 1404001 - Horizontal tank for storage of alcohol type LGE, capacity:7,500; height 59m; LGE product. LGE - North Area	Unit	1,00	7.769,27	7.769,27
1.1.5	EF- 347001 - LPG spheres capacity: 1.593m³, height 23.78m. Estimated internal pressure 17 atm; Estimated weight 253,884 kg.	Unit	1,00	3.493.167,62	3.493.167,62
1.1.6	EF- 347002/3 - LPG spheres capacity: 3.193m³ ; height : 23,78m. Estimated internal pressure 17 atm , Estimated weight 508.884 kg	Unit	2,00	7.001.689,22	14.003.378,44
1.1.7	EF- 347004/5/6 -LPG spheres capacity: 3,198m³, height 23.78m. Estimated internal pressure 17 atm, Estimated weight 509,681 kg	Unit	3,00	7.012.655,24	21.037.965,72
1.1.8	TQ - 349001/2/3/4 - Insulated tanks for LPG storage, refrigerated capacity: 16.795m³ with a diameter of 30m; CBI manufactured, dome ceiling, height 23,78m, Product GLP/refrigerado, chaparia com isolamento térmico, pressure interna 1 atm, fundação especial com cravação de estacas.	Unit	4,00	11.059.314,38	44.237.257,52
1.1.9	S-4 - Special Propane Reservoir, length 13.781m, diameter 2.286m, material ASTM A-515 Gr 70 and A-285-Gr C, design pressure 17.9 kgf/cm², design temperature 60°C, empty weight 19,200 kg.	Unit	1,00	330.563,62	330.563,62
1.1.10	TQ 464101/2 - Slop tank; capacity:489m³ diameter: 7.70m; height 16.90m; fixed roof .	Unit	2,00	230.829,90	461.659,79
1.1.11	TQ 464401 - Slop tank; capacity:489m³ diameter: 7.70m; fixed roof	Unit	1,00	228.995,59	228.995,59
1.1.12	TQ 443301/2/3/4 - Fuel oil tank, diameter 44.45m, fixed roof, capacity:22.469m³ and 22452m³, fixed roof; height 14.49m, products: fuel oil, gasoline.	Unit	4,00	9.100.010,66	36.400.042,64
1.1.13	TQ 443305 - Fuel oil tank, 43.43m diameter, fixed roof, 20.000m³ capacity, fixed roof; product: fuel oil; height 14.49m..	Unit	1,00	9.633.374,59	9.633.374,59
1.1.14	TQ 443307/8/9/10 - Gasoline Storage tank diameter: 43,43m; fixed roof; capacity: 20.000m³ fixed roof with floating seal.products: ethanol and gasoline; height: 14,50m.	Unit	4,00	10.026.569,48	40.106.277,94
1.1.15	TQ 464.101/2 - Ballast storage tanks, fixed roof, capacity: 6.651 and 6.649m³, diameter: 22,37m. ballast product height: 16,90m.	Unit	2,00	2.796.078,03	5.592.156,05
1.1.16	TQ 631501 -Diesel Storage Tank , fixed roof, capacity:22.500m³ and diameter: 48,74m.	Unit	1,00	14.695.919,87	14.695.919,87
1.1.17	TQ 631503 - Gasoline Storage tank, fixed roof, capacity: 22.500m³ ; diameter: 48,75m; gasoline product, height: 12,04m.	Unit	1,00	16.939.314,54	16.939.314,54
1.1.18	TQ 468501 - Extract Storage Tank; capacity: 4500l, diameter: 1,4m. height: 33,5m LGE product.	Unit	1,00	4.664,98	4.664,98
1.1.19	TQ-1404001 - Extract Storage tank capacity: 16,7m³, horizontal cylinder, diameter: 1,9m, LGE product, material ASTM A-36	Unit	1,00	17.100,29	17.100,29
1.1.20	TQ-468515 - Extract Storage tank capacity: 2m³, horizontal cylinder, diameter: 0,9m, LGE product, material ASTM A-283 Gr C, Manufacturer: Kide, Project Pressure: 1,0 Kgf/cm²	Unit	1,00	6.487,02	6.487,02
1.1.21	TQ 453102 - Boiler House Tanks capacity: 2260l, diameter: 0,60m. product: diesel oil; height: 20,00m.	Unit	1,00	2.405,56	2.405,56
1.1.22	TQ 140405 - Storage tank for clear products, diameter: 7,83m conical fixed roof 400m³	Unit	1,00	377.094,97	377.094,97
1.1.23	TQ 140406 - Storage tank for dark products, diameter: 7,83m conical fixed roof 400m³	Unit	1,00	377.094,97	377.094,97
1.1.24	TQ 453101 - Fuel Oil Tank; capacity: 100m³ diameter: 4.75m fixed roof; product: fuel oil; height: 6,07m.	Unit	1,00	53.036,50	53.036,50
1.1.25	TQ 631601/3 - Diesel Storage Tanks, capacity: 9.484 and 9.386m³, diameter: 34,94m. product: fuel oil. height: 9,84m.	Unit	2,00	7.328.369,28	14.656.738,55
1.2	**Main Equipment**				
1.2.1	Indemnified equipment within the leased area				
1.2.2	COMPRESSOR - HSE - 2NL2: Manufactured by Ingersoll Rand - 17.1/ 2-10'x9 capacity: 500m³/h, power: 250cv gasket sealing/teflon - Product GLP electric engine GE 250 cv - 1780 RPM.	Unit	4,00	716.752,04	2.867.008,16
1.2.3	P-02A/B/C/D - Permutadores. pressure 36 Kg/Cm² typeAEM, 017"x 192"e 1 jogo de sobresalentes composto de 200% juntas de vedação, 10% estojos e porcas. Clean interchange area 128Kcal/m² h C, in operation 131,35 Kcal/m² h C, At ..... m2.	Unit	4,00	-	-
1.2.4	P04/A/B/C/D - Exchangers. Pressure 36 Kg/Cm² Type AEM, 017"x 192" and 1 set of spare parts composed of 200% gaskets, 10% cases and nuts. Clean Exchange Area 554.6Kcal/m² h C, in operation 454Kcal/m² h C+C52, At 667 m2	Unit	4,00	24.232,76	96.931,06
1.2.5	SA- 01/A/B/C/D - Vertical LPG Suction Vessel. Maximum pressure - 15.0 Kg/Cm² fluid LPG density. Saturated Steam. Pres. operating temperature 01.Kg/ Cm² minimum operating temperature - 45º C diameter: 609 mm, thickness 4.8 mm, stainless steel hull ASTM-A-240.C Product LPG/R, empty weight 750 kg	Unit	4,00	29.717,94	118.871,77
1.2.6	SD-01A/B/C/D - Propane tank temperature 41ºC, pressure 24 Kg/Cm² hydrostatic test 36Kg/Cm² diameter: 508mm, thickness 9.5mm, hull ASTM-A.285.C - Product GLP/R, weight 640 kg.	Unit	4,00	18.991,50	75.966,02
1.2.7					
1.2.8	C-02A/B/C - Compressor - HSE - 2NL2 from Ingersoll Rand - 17.1/ 2x13.1/ 2x9 capacity: 500m³/ l. power: 250cv gasket sealing/teflon - Product GLP electric engine GE 250 cv - 1780 RPM.	Unit	3,00	710.846,72	2.132.540,15
1.2.9	C-03A/B/C - Compressor - HSE - 2NL2 from Ingersoll Rand - 17.1 / 2x13.1/ 2x9 capacity: 500m³ / l. power: 250hp gasket sealing/teflon - Product LPG electric engine GE cv - 1780 RPM.	Unit	3,00	710.846,72	2.132.540,15
1.2.10	P-06A/B/C, P-07A/B/C/ , P-08A/B/C - Exchangers - Jaraguá brand. Project Pressure: - 20Kg/Cm, test pressure 30Kg/Cm², temperature 100ºC. height: manometric 640 Kcal/m²/h C, in operation 510 Kcal/m² h C, At ..... m2.	Unit	9,00	21.504,32	193.538,87
1.2.11	SA-02A - Vertical LPG Suction Vessel. Maximum Pressure - 15,0 Kg/Cm² LPG fluid density saturated steam.. pressure de operação 01,Kg/ Cm² temperature mínima de operação - 45ºC diameter: 750mm, thickness 4,8mm, hull ASTM-.285.C, Product GLP/R, weight total 711kg.	Unit	1,00	21.098,84	21.098,84
1.2.12	SA-02B/C - Vertical LPG Suction Vessel. Maximum Pressure - 15,0 Kg/Cm² LPG fluid density saturated steam.. pressure de operação 01,Kg/ Cm² temperature mínima de operação - 45ºC diameter: 750mm, thickness 4,8mm, hull ASTM-.285.C, Product GLP/R, weight total ..... kg.	Unit	2,00	72.344,56	144.689,11

1.2.13	SD-02AB/C - Propane Reservoir temperature 41ºC, pressure 24 Kg/Cm² hydrostatic test 36Kg/Cm².capacity: 0,8m³ diameter: 610mm, thickness 9,5mm, hull inox ASTM-A.304, Product GLP/R. Manufacturer:: Techlabor, weight total 1100 kg.	Unit	3,00	40.802,07	122.406,20
1.2.14	SD-03A/B/C - Propane Reservoir temperature 41ºC, pressure 24 Kg/Cm² hydrostatic test 36Kg/Cm².capacity: 0,8m³ diameter: 850mm, thickness 12.5mm, hull ASTM-A.285.C, Product GLP/R, weight total 2400 kg.	Unit	3,00	71.218,31	213.654,94
1.2.15	Cooling Unit				
1.2.16	P-20A/B/C - Exchangers Jaragua Brand, project pressure 20Kg/Cm², test pressure 30Kg/Cm², temperature - 46ºC. Interchange area in operation 510 Kcal/m²/h C, At M2	Unit	3,00	-	-
1.2.17	P-21A/B/C - Exchangers Jaragua Brand, project pressure 20Kg/Cm², test pressure 30Kg/Cm², temperature - 46ºC. Interchange area in operation 640 Kcal/m²/h C, At M2	Unit	3,00	-	-
1.2.18	P-22A/B/C - Exchangers Jaragua Brand, project pressure 20Kg/Cm², test pressure 30Kg/Cm², temperature - 46ºC. Clean interchange area 667 Kcal/m²/h C, in operation 540,7 Kcal/m²/h C, At m2	Unit	3,00	-	-
1.2.19	SA-16A/B/C - Pressure Vessel - project pressure 20Kg/Cm², temperature 7ºC, Admissible Maximum Pressure 20Kg/Cm², for hydrostatic test30Kg/Cm². diameter: 1200mm weight 1900 Kg. thickness 19mm, hull ASTM-A.285.C prod. GLP.	Unit	3,00	-	-
1.2.20	SD-15A/B/C - Propane Reservoir temperature 41ºC, pressure 24 Kg/Cm² hydrostatic test 36Kg/Cm².capacity: 0,8m³ Manufacturer: CBEI. diameter: 980 mm weight 3300Kg. thickness 14mm, hull ASTM-A.285.C, Product GLP.	Unit	3,00	-	-
1.2.21	SA 14 - A/B/C - Propylene storage vessel before compressor suction, SAURER brand, operating temperature -4ºc - pressure 30Kgf/cm² diameter: 1200mm, height: 4200mm, weight 1900Kg, material A.285.C.	Unit	3,00	-	-
1.2.22	COOLING UNIT. BUTANE/ENE				
1.2.23	C 91 - Ingersoll Rand Model HHE Stage 4 Compressor (13½"x22½"x12"), estimated flow rate 1800 m3/h, power: 900hp - 360 RPM - gasket/teflon, propylene fluid, GE 900hp 1780 RPM electric engine w/ 1800RPM input reducer and 362 RPM output reducer.	Unit	1,00	-	-
1.2.24	P-92 - Exchangers Jaragua Brand, project pressure 20Kg/Cm², test pressure 30Kg/Cm², temperature - 46ºC. Interchange area 410 Kcal/m2 h C.	Unit	1,00	-	-
1.2.25	P-93 - Exchangers Jaragua Brand, project pressure 20Kg/Cm²,test pressure 30Kg/Cm², temperature - 46ºC. height: manometric 646 Kcal/m² h C, in operation 527 Kcal/m² h C.	Unit	3,00	-	-
1.2.26	SA-91 - Pressure Vessel - project pressure 20Kg/Cm², temperature 7ºC, Admissible Maximum Pressure 20Kg/Cm², for hydrostatic test 30Kg/Cm². diameter: 1000mm weight 1300Kg thickness 14mm hull ASTM-A.285.C , Product GLP.	Unit	1,00	-	-
1.2.27	SD-91 - Propane Reservoir temperature 41ºC, pressure 24 Kg/Cm² hydrostatic test 36Kg/Cm².capacity: 0,8m³ Manufacturer: CBEI. diameter: 1000 mm weight 3300Kg thickness 10mm, hull ASTM-A.285.C, Product GLP.	Unit	1,00	-	-
1.2.28	COOLING UNIT BUTADIENE				
1.2.29	C-60 - Ingersol Rand compressor, type HSE-2NL2 - 13 1/2" x 10 1/2" , capacity: 315 hp, 500 rpm, gasket sealing/teflon, butadiene fluid - electric engine GE 350hp, 1800 rpm with FALK reducer with input 1750 rpm and 500 rpm output.	Unit	1,00	-	-
1.2.30	C - 16 A/B/C -Ingersoll -Rand 12" stoke compressor - type 4HHE-FB.2.NL.2 17"x17"x14.50"x12 with FALK gearbox model YF1.FC 4.9 input reduction 1:4 rpm outpur reduction 362.	Unit	3,00	-	-
1.2.31	P-60 - Jaraguá Exchangers, project pressure 20Kg/cm², Maximum Project Pressure 20Kg/cm², Project temperature 40°C. height: manometric 549 Kcal/m² h C, in operation 507 Kcal/m² h C.	Unit	1,00	-	-
1.2.32	SD-60 - CBEJ-manufactured dryer - project pressure 20Kg/cm², Project Maximum Pressure . 20Kg/cm²,Project temperature. 40°C. diameter: 1000mm weight 350Kg thickness 12,5mm, hull ASTM-A.516-78, Butadiene product.	Unit	1,00	-	-
1.2.33	P-61 - Exchanger: lenght 3,7m , diameter 06" height: clean manometric 588,6 Kcal/m² h C, in operation 488 Kcal/m² h C.	Unit	1,00	-	-
1.2.34	DEHYDRATION UNIT				
1.2.35	AD1/2 - Hercules drying tower, test pressure 42,5 kg/cm²- capacity: 47,4m³ .	Unit	2,00	-	-
1.2.36	E1/2 - Heat regenerated vessel, length 11.18m and 0.65m band diameter.	Unit	2,00	-	-
1.2.37	H1 - Hercules oven, water pressure 2,500 PSI, length 6.00m..	Unit	1,00	-	-
1.2.38	S-1 - Hercules dehydration vessel: band diameter: internal 0.6m by 3.5m in length. diameter: external 1733 mm; weight 18.350Kg..	Unit	1,00	-	-
1.2.39	S-2 - Hercules dehydration vessel: band diameter: internal 0.6m by 3.5m in length; diameter: external 1441 mm weight 5000Kg.	Unit	1,00	-	-
1.2.40	S-3 -Hercules dehydration vessel: band diameter: internal 0.6m by 3.5m in length; diameter: external 626 mm weight 470Kg.	Unit	1,00	-	-
1.2.41	COMPRESSED AIR SYSTEM				
1.2.42	C-400A/B/C - Air compressors, Ingersoll Rand brand, model NL (ESU) stage 01-10x9, capacity: - 6.4 m³/min, power: 75hp - 750 RPM - Electric engine GE 75hp - 1775 RPM.	Unit	3,00	43.176,12	129.528,35
1.2.43	V-400A - Air storage vessel, working pressure - 8 atm, diameter: 1.219 mm, empty weight: 1450Kg. compressed air reservoir	Unit	1,00	43.027,71	43.027,71
1.2.44	V-400B - Air storage vessel. working pressure 10 atm, diameter: 1.219 mm weight empty 5000 kg, compressed air tank.	Unit	1,00	148.371,55	148.371,55
1.2.45	S 400 A/B - Cylindrical body dryer; resistance 55,000 to 65,000 psi; Project Pressure: 17.9 kg/cm²; Project temperature 60°C, working temperature 40°C; diameter: 310mm, height: 2560mm; thicknes: 9.5mm; hull ASTM-A.285.C, moist air product, empty weight 750 kg..	Unit	2,00	22.255,67	44.511,35
1.2.46	P-400A/B/C - Hull tube heat exchanger, compressed air/water, capacity: 40Nm³/h, Manufacturer: Jaraguá, project pressure and temperature: hull side (7kgf/cm² and 60ºC), tube side (9 kgf/cm2 and 204ºC), diamete: 102mm x 3676mm length.	Unit	3,00	62.678,45	188.035,34
1.2.47	Compressed Air Accumulator Vessels - V-28 - Compressed Air Reservoir, height: 1.85 m, diameter: 0.6m, weight: 513 Kg, Project Pressure: 10.5 kgf/cm², project temperature: 80°C, cylinder vertical, volume 0.3m³.	Unit	30,00	17.541,79	526.253,85
1.2.48	MEASUREMENT STATION - EMED				
1.2.49	ELPG Measuring Station composed of 2 lines with the following items: 4 PSV'S (THERMAL RELIEF VALVES), 2 LINE FILTERS, 2 DT's (density transmitter), 2 TURBINES, 2 MANOMETERS, 2 PDT's (pressure differential transmitter), 2 PT's (pressure transmitter), 2 TT's (temperature transmitter), 2 MOKVELD 6" 300# FLOW CONTROL VALVES, 12 CLASS 300# 6" DOUBLE LOCK VALVES , 1 TASTER ASSEMBLY composed by1 CYLINDER 12" 60 lts WITH PISTON, 2 PT's (pressure transmitter), 2 TT's (temperature transmitter), 1 HYDRAULIC MOTOR PUMP, 3 FLOW COMPUTERS (for custody transfer), LEWA Odorization System consisting of a 240 liter methyl mercaptan odorizing product reservoir (stainless steel) and metering pump.	Unit	1,00	6.173.726,89	6.173.726,89
1.2.50	NITROGEN SYSTEM				
1.2.51	S-500A/B - Cryogenic vessels for nitrogen; maximum working pressure 17.6 Kg/Cm², Manufacturer: White Martins. diameter: V2159 mm; weight 12,610Kg; hull ASTM-A-282.C- nitrogen product (N2): empty weight: 5336 kg.	Unit	2,00	158.341,96	316.683,93
1.2.52	MACHINE WATER SYSTEM				
1.2.53	B-120A/B - Worthington pump; rotation: 3500 RPM, flow: 105m³/h, height: 36m manometric, fluid density: 1.03 Kg/dm³; external material: cast iron and internal material carbon steel.	Unit	2,00	2.686,05	5.372,10
1.2.54	V-120 -CBEI treated water tank, project temperature: 45ºC, project pressure 1Kg/Cm², capacity: 12.55m³ Maximum Pressure ADM 2.3Kg/Cm², diameter: 1712 mm, weight 2450Kg thickness: 6.3mm, hull ASTM-SA.283 .C, water product.	Unit	1,00	8.608,15	8.608,15
1.2.55	P-59 - Water exchanger, Project Pressure: 7Kg/Cm²; project temperature 45ºC, Jaraguá test pressure 10.5Kg/Cm²; height: manometric 1009 Kcal/m²/h C, in operation 2036 Kcal/m² h C.	Unit	1,00	-	-
1.2.56	P-59A/B - Water exchanger, Project Pressure: 8Kg/Cm²; project temperature 50ºC, Manufacturer: GEA, diameter: nominal 0.5 m, length: 3048 mm, empty weight: 1713 kg, volume 0.18 m³.	Unit	2,00	33.450,41	66.900,82
1.2.57	ETHANOL SYSTEM				

Annex C-2: Indemnity (3/5)

1.2.58	V-59 Pressure vessel for hydrated/anhydrous ethyl alcohol storage. capacity: 1.90m³, maximum working temperature: 40ºC; measuring 2m between horizontal position caps; diameter: 1112 mm; weight 950K; thickness 6.3mm, hull ASTM-A.616-60, ethanol product	Unit	1,00	31.664,25	31.664,25
1.2.59	WATER SYSTEM DRINKING/STEAM				
1.2.60	B- 180 Worthington brand vertical pump 7.5 hp, 3,500 rpm; height: 50m manometric; fluid density 1.0 Kg/dm³; material internal components in carbon steel and volute in gray cast iron; electric engine GE 75 hp with 3,520 rpm.	Unit	1,00	8.225,70	8.225,70
1.2.61	B-451802A/B - Sulzer pump 15 hp 3500 rpm flow 29m³/h; height: manometric 70m fluid density 1.0 Kg/dm³; material internal components of carbon steel and volute in gray cast iron; electric engine GE 15hp 3540 RPM..	Unit	2,00	10.734,14	21.468,27
1.2.62	B-451803 - KSB 200 hp 1750 RPM pump; flow: 120m³/h; height: 250m manometric; fluid density 1.03 Kg/dm³; material internal components in carbon steel and volute in gray cast iron; electric engine GE 200hp 1780 RPM.	Unit	1,00	77.359,66	77.359,66
1.2.63	FIRE FIGHTING SYSTEM				
1.2.64	B-301A/B - Worthington pump 8.61hp 3530 rpm; height: 70m manometric; fluid density 1.0Kg/dm³; material internal components in carbon steel, volute in gray cast iron. 10hp and 3500 rpm GE engine.	Unit	2,00	9.108,41	18.216,83
1.2.65	B 468501A - Sulzer pump of 44hp and 1800 rpm; flow 15.26m³/h and height: manometric 89.2m; fluid density 1.165 Kg/dm³ material internal components in carbon steel and volute in gray cast iron. Engine GE 30hp 1750 rpm.	Unit	1,00	16.188,53	16.188,53
1.2.66	LGE - South Area	Unit	1,00	13.332,56	13.332,56
1.2.67	B-468502A/B - Sulzer foam extraction pump 20 hp and 7.5 hp 1800 rpm height: 89.2 m manometric; fluid density 1.165 Kg/dm³; material internal components in carbon steel and volute in gray cast iron. electric engine GE 20 hp, 3530 rpm.	Unit	2,00	15.830,94	31.661,88
1.2.68	LGE - Central Area B 1404001 A - KSB 65/9 brand LGE pump capacity: 4.36m³/h and 10 hp, 1750 rpm gasket sealing; fluid density 1.165 Kg/dm³; material internal components in carbon steel and volute in gray cast iron; electric engine Buffalo 40 hp 1760 rpm.	Unit	1,00	11.423,85	11.423,85
1.2.69	LGE - North Area B 1404001 B - KSB 65/9 brand LGE pump; capacity: 3.36m³/h and 7.5 hp, 1800 rpm gasket sealing; fluid density 1.165 Kg/dm³; material internal components in carbon steel and volute in gray cast iron. Agrale diesel engine 8.5 hp and 1800 rpm.	Unit	1,00	3.829,26	3.829,26
1.2.70	LOADING ARMS				
1.2.71	ELECTRICAL SUBSTATION				
1.2.72	MG-5A - Grab-manufactured generator, 300 Kva, 480/277v 1800 rpm; Cummins diesel engine model NTA 855 P6 - 400 hp 1800 RPM	Unit	1,00	131.328,13	131.328,13
1.2.73	TF 5A/B/C/D - ITEL PTOCS transformers frequency 50 Hz phase 3, group 2, angular displacement 30 degrees, power: in continuous regime 5,000Kva (LN) and 6250Kva (VF).	Unit	4,00	82.443,14	329.772,58
1.2.74	TF 5 E/F - ITEL PTOCS Transformers frequency 60Hz, grupo 2, angular displacement: 30 degrees, power: in continuous regime 5.000Kva(LN) and 6.250Kva(VF).	Unit	2,00	82.443,44	164.886,88
1.2.75	CCM - Q 5 A/B - GE manufactured power switch panel, type AM4.16.250.9H, 4.76Kv, 1200Hz. 18 outputs - 10 MVA - 3 MVA.	Unit	2,00	62.895,13	125.790,26
1.2.76	CCM - Q 5 D - Power Switch Panel manufactured by Marini and Danimell S.A. 3.200 A, rated voltages 600v. 20 outputs 2 MVA - 0,96 MVA.	Unit	1,00	-	-
1.2.77	CCM - Q 5 D - Schneider Electric Panel - Blokset - Rated voltage 480 V, rated current 3000A, Icc=50KA, 20 outputs	Unit	1,00	228.906,87	228.906,87
1.2.78	CCM - Q 5 E - Power Switch Panel 62 outputs 650KVA - 130KVA.	Unit	1,00	-	-
1.2.79	CCM - Q 5 E - Panel Schneider Electric - Blokset - Rated Voltage 480V, nominal current 1250A, Icc 50KA, 62 outputs.	Unit	1,00	722.640,39	722.640,39
1.2.80	CCM - Q 5 F - Power Switch Panel 5 outputs 2,1 MVA - 0,58 MVA.	Unit	1,00	17.470,87	17.470,87
1.2.81	CCM - Q 5 G - Power Switch Panel 15 outputs 300 MVA - 90 MVA.	Unit	1,00	52.412,61	52.412,61
1.2.82	TRANSFER PUMPS				
1.2.83	B-01 A/C - Worthington pumps, rotation: 1750 rpm, flow rate: 690m³/h, height: 120 m manometric fluid density: 0.60Kg/dm³, material 316 stainless steel internal components, cast steel volutes and rotors for low electric engine GE 300 hp rotation 1780 rpm. Motorized Pump "B" disabled.	Unit	2,00	-	-
1.2.84	B-02D - Ingersol Rand model vertical centrifugal pump, Ingersoll Rand 15L-110/10C, Engine: 185 kW and 1770 rpm, roller bearings, nominal flow rate of 233 m³/h and height: manometric 326 meters.	Unit	1,00	-	-
1.2.85	B-02 A/B/C -Worthington Pumps rotation1750 rpm flow rate: 310m³/h height: manometric 345m fluid density 0,60 Kg/dm³ material, stainless steel internal components 316,m volutas e rotores aço carbono baixa temperature. electric engine GE 250 hp rotation1780 rpm.	Unit	3,00	97.568,88	292.706,63
1.2.86	B-03 A/B/C -Worthington Pumps rotation1750 rpm flow rate: 275m³/h height: manometric 340m fluid density 0,44/0,60 kg/dm³, stainless steel internal components 316, cast steel volutes and rotors classe 25. electric engine GE 300 hp rotation1780 rpm.	Unit	3,00	115.433,64	346.300,93
1.2.87	B-04 A/B/C -Worthington Pumps; power: 38cv rotation:1750 rpm ;flow rate: 115m³/h; electric engine GE 40 hp; rotation: 1770 rpm; GLP fluid	Unit	3,00	-	-
1.2.88	B-05 A/B/C -Worthington Pumps potencia 300cv rotation1750 rpm flow rate: 273m³/h height: monom. 340m dens. fluido 0,44/0,60 kg/dm³, componentes interno em aço inox 316, volutas e totores em ferro fundido classe 25. electric engine GE 300 hp rotation1780 rpm.	Unit	3,00	115.433,64	346.300,93
1.2.89	B-05D - B-05D - Ingersoll Rand Vertical Pump, model: 15L-110/10C, Engine: 224 kW and 1760 rpm, rolling bearings, flow rate: nominal of 280 m³/h and height: manometric 335 meters.	Unit	1,00	-	-
1.2.90	B-06A/B - Ingersoll Rand Vertical Pump, model 15L-110/10C, Engine: 185 kW and 1770 rpm, roller bearings, flow rate: nominal of 233 m³/h and height: manometric 326 meters	Unit	2,00	99.865,17	199.730,34
1.2.91	B-61 A/B/C -Worthington Pumps power: 78cv; rotation: 1750 rpm; flow rate: 185m³/h; height: manometric. 120m; density 0,653 kg/dm³, stainless steel internal components 316, cast steel volutes and rotors class 25/ electric engine GE 100 hp rotation 1775 rpm.	Unit	3,00	-	-
1.2.92	B-81 A/B/C -Worthington Pumps power 125cv; rotation 1750 rpm; flow rate: 216m³/h; height: manometric 145m fluid density: 0,555/0,635 kg/dm³;stainless steel internal components 316, cast steel volutes and rotors class 25. electric engine GE 125 hp rotation1775 rpm.	Unit	3,00	53.044,50	159.133,51
1.2.93	CR-01 - Overhead crane over perimetral beams with a span of 15.84m and capacity: load of 15 tons; manufactured by MELT model M-15T-TE 30hp; lift motor with 3hp steering and 5hp translation.	Unit	1,00	58.515,28	58.515,28
1.2.94	PURGING SYSTEM				
1.2.95	C-17 A/B - B-300H and B-200H LPG purge compressor, Fuller brand 600/500 rpm, Maximum Pressure 110 lbs rotor with vanes power: 150 hp electric engine GE 150CV 3570 rpm.	Unit	2,00	-	-
1.2.96	SA 70 - Codistil-manufactured blowers, Project Pressure: 17,5Kg/cm². diameter: 825 mm weight 650Kg.	Unit	1,00	-	-
1.2.97	BLOWERS				

Annex C-2: Indemnity (4/5)

1.2.98	C-11 A/B Ingersol Rand manufactured compressors, type ESH-1 NL-2, 17" x 9", flow rate: 1333 m3/h, power: 392 bhp, 334 rpm gasket sealing/teflon, 500 hp electric engine, 1775 rpm LPG blower	Unit	2,00	1.303.048,01	2.606.096,02
1.2.99	SA - 11 - EBSE- manufactured separator, project temperature: -50°C, working temperature: -45°C, project pressure: 2 Kg/cm², pressure test: 3 Kg/cm². diameter: 1620mm; empty weight : 320 kg; thickness: 4.7mm, stainless steel hull ASTM-A-24 , .type 304; LPG Product .	Unit	1,00	11.870,25	11.870,25
1.2.100	FLARE SYSTEM				
1.2.101	TC-01 A/B - Smokeless gas burner band diameter: 18" SELMEC standard with steam ring, project pressure: 4.5 kg/cm²; project temperature: -25º to 120ºC, estimated weight: 8000 kg.	Unit	2,00	237.393,65	474.787,31
1.2.102	SA 20 -Recovery Knock out drum separator; working pressure 0.21Kg/cm²G; capacity: 5.57 m;project pressure: 1.05kg/cm² project temperature 140/-45ºC and working temperature 120/-36ºC; empty weight 2123 kg.	Unit	1,00	62.998,14	62.998,14
1.2.103	SA 30 A/B - EBSE-manufactured separator; Water Seal service; temperature: -25 to +120°C; diameter: 1700mm, empty weight 4974 Kg; thickness 11.2 mm material ASTM-A-285.C flare system.	Unit	2,00	147.599,54	295.199,08
1.2.104	SA 31 - EBSE-manufactured separator; service Gas-SEAL; project temperature -25 to +120°C, project pressure: 4,5 kg/cm² , diameter: 930mm, empty weight: 2042 kg. ASTM-A-285.C material; flare system.	Unit	1,00	60.594,49	60.594,49
1.2.105	V-33 - Ethylene Glycol Replacement Vessel; diameter: 1m, material A283GRc, weight 1500 Kg, Project Pressure: 1,03 Kgf/cm², project temperature: 70ºC, volume 1,1 m³.	Unit	1,00	29.717,65	29.717,65
1.2.106	V-34 - Ethylene glycol storage vessel, height: 2m, diameter: 0.8 m, flat cover; weight 1500 Kg, project pressure: 1.03 kgf/cm², project temperature: 70°C.	Unit	1,00	29.717,65	29.717,65
1.2.107	TDC SUBSECTOR				
1.2.108	PUMP HOUSE - DARK PRODUCTS				
1.2.109	B-432.301 - A/B/C - 700hp horizontal centrifugal pump powered by 700 hp GE electric engine, height: monometric 106m, fluid density 0.94 kg/dm³, internal components in carbon steel and volute in gray cast iron.	Unit	3,00	258.903,56	776.710,69
1.2.110	B-463.101 A/B - KSB pump, 3,500 rpm, power: 10.3hp, flow rate: 80m³/h with electric engine WEG 15hp, height: manometric 25m; fluid density 1.0 kg/dm³, internal components in carbon steel and volute in gray cast iron	Unit	2,00	14.104,57	28.209,15
1.2.111	B-3027-03 Vertical pump, power: 0.75 hp, 1750 rpm, height: 12.37m manometric, fluid density 0.83kg/dm³, internal components in carbon steel, volute in gray cast iron. Electric engine 3/4hp.	Unit	1,00	8.293,19	8.293,19
1.2.112	B-3027-04 Vertical pump, power: 2.1 hp, 1698 rpm, height: 12.37m manometric, fluid density 0.60kg/dm³, internal components in carbon steel, volute in gray cast iron. Electric engine 2 hp	Unit	1,00	10.158,09	10.158,09
1.2.113	B-432701A/B - B-702,horizontal pump, bunker product, flow rate: 500 m³/h, project temperature: 50°C, height: manometric 56.1 m, model RPH250-630, KSB, driver 250 HP, 1180 rpm.	Unit	3,00	124.775,91	374.327,73
1.2.114	BOILER HOUSE				
1.2.115	GV-453101 A/B - DEDINI-manufactured watertube type boilers, capacity: 12ton/h, working pressure 10kg/cm², Maximum Pressure 15kg/cm², surface area 36m²; steam water - fuel oil.	Unit	2,00	-	-
1.2.116	B-453101 A/B/C/D - Power pumps: 20 hp, rotation: 3,500 rpm; flow rate: 19.3 m³/h, height: manometric 143m; fluid density 0.95 kg/dm³, internal components in carbon steel and volute in gray cast iron. 20Hp GE manufactured electric engine	Unit	4,00	-	-
1.2.117	B-456201 A/B/C/D - Pump 3 hp, flow rate: 35m³/h. height: monometric 10m, fluid density 0,94 kg/dm³, internal components in carbon steel and volute in gray cast iron. Electric engine manufactured by GE with 3 hp and 1145 rpm..	Unit	4,00	-	-
1.2.118	B-456202 A/B - Power Pump: 1/3 hp flow rate: 80m³/h height: manometric 10m, fluid density: 0.85 kg/dm³, internal components in carbon steel and volute in gray cast iron, electric engine Brazil 1/3 Hp 1750 rpm.	Unit	2,00	-	-
1.2.119	B-453102 A - Boiler dosing pump, power: 1/6 hp, height: manometric 143m, fluid density: weight 0.95kg/dm³, internal components in carbon steel and volute in gray cast iron. Electric engine 1/4 hp.	Unit	1,00	-	-
1.2.120	D-453201 - Deaerator, Jaraguá company, product: softened water and steam, material A516Gr60, weight: 12800kg, Project Pressure: 2.5 Kgf/cm², project temperature: 135ºC, cylindrical vessel, volume 9m³.	Unit	1,00	-	-
1.2.121	FUEL OIL HEATING				
1.2.122	P-1404213/4 - Fuel oil/steam exchangers, PMTA 23.5 kgf/cm², operating pressure: 21 kgf/cm², project temperature: 94°C, Manufacturer: Jaragua, Length: 7125mm, diameter: 8", hull material: ASTM A285GrC	Unit	2,00	23.001,63	46.003,27
1.2.123	ALCOHOL UNLOADING PLATFORM/RARE				
1.2.124	TQ-6441001/6441002 - Deaerator Reservoir, Manufacturer: Palmpetro, pressure: 1,05 kgf/cm², volume :0,3 m³, diameter: 0,62, height: 0,96m.	Unit	2,00	880,94	1.761,89
1.2.125	B-17101A/B - Manufacturer: Netzsch, model LNA106/198, horizontal assemblage, Motor : 40 CV and 1150 rpm,roller bearings, flow rate: nominal of 92,8 m³/h and requested NPSH: 2,28 meters.	Unit	2,00	30.770,28	61.540,56
1.2.126	TDC ELECTRIC SUBSTATION				
1.2.127	MG 4 A - Moto generator set manufactured by Cummins type NTA 855 PG400 - 420 Hp 2300rpm, Stoltz generator, type GRAB400, 300 kva.	Unit	1,00	130.769,25	130.769,25
1.2.128	TF 4 A/B -Transformer manufatured by Tusa, typeTL 10000/138 - power: nominal 10000(12500) Kva; rated voltage138/88 - 13,8Kv.	Unit	2,00	160.113,92	320.227,83
1.2.129	TF 4 C/D -Transformer manufatured by Induselet, tree-phase 3750 Kva - class 5/15Kv.	Unit	2,00	62.288,30	124.576,59
1.2.130	TF 4 E -Transformer manufatured by Induselet, three phase 1.000Kva - class 1,2/5Kv.	Unit	1,00	20.988,72	20.988,72
1.2.131	TF 4 F - Transformer manufatured by Trafo typeTEC 225/15/1,2 - 225 Kva - 4,16/0,48Kva.	Unit	1,00	11.042,58	11.042,58
1.2.132	Q 4 B - CCM manufatured by SACE; 15 Kv. 24 outputs 20 MVA - 7 MVA.	Unit	1,00	83.211,31	83.211,31
1.2.133	Q 4 C - CCM manufatured by Promon de 4,16Kv. 24 outputs 7,5 MVA - 2,3 MVA.	Unit	1,00	83.211,31	83.211,31
1.2.134	Q 4 D - CCM manufatured by Sace 480/220/127v 60Hz. 34 outputs 1 MVA - 0,27 MVA.	Unit	2,00	117.881,89	235.763,79
1.2.135	Q 4 E - CCM 10 outputs, 0,22 MVA - 0,077 MVA..	Unit	1,00	34.671,77	34.671,77
1.2.136	TF 140400/1/2/3 - Transformer manufatured by Trafo typeTEC30/1,2/1,2 - 1,2/1,2 Kv, 30 kva.	Unit	3,00	2.203,54	6.610,63
1.2.137	MG-5C - Moto generator set STEMAC/WEG, 115/106 KVA, 1800 rpm, 220V, 60Hz, Model GTA 200. -M26, weight 1140 Kg.	Unit	1,00	127.474,00	127.474,00

Annex C-2: Indemnity (5/5)

1.2.138	WATER DISTRIBUTION SYSTEM				
1.2.139	B-451801 A/B - Power Pump: 15 cv rotation 3450 rpm, flow rate: 50m³/h height: manometric 25m, fluid density: 1.0 kg/dm³, internal components in carbon steel and volute in gray cast iron. Buffalo electric engine 15 Hp 3500rpm	Unit	2,00	10.902,86	21.805,73
1.2.140	SEPARATOR				
1.2.141	B 464501 A/B - Power Pump: 40hp, 1,750 rpm, flow rate: 60m³/h, height: monometric 105m, fluid density 0.95kg/dm³, internal components in carbon steel and volute in gray cast iron. Electric engine GE 40 hp 1770 rpm.	Unit	2,00	22.691,41	45.382,82
1.2.142	B 464601 A/B Power Pump: 75 hp 3500 rpm, flow rate: 90m³/h, height: 50m monometric, fluid density 0.95kg/dm³, internal components in carbon steel and volute in gray cast iron. Electric engine manufactured by GE 75Hp 3570 rpm.	Unit	2,00	34.784,26	69.568,52
1.2.143	PUMP HOUSE - CLEAR PRODUCTS				
1.2.144	B 432201 A/B/C Power Pump: 700Hp 1750 rpm, height: manometric 140m, fluid density 0.85 kg/dm³, stainless steel shaft DIN.DK 60/70, cast iron rotor and cast iron housing DIN.GGG 42, electric engine GE 700Hp - 1780rpm.	Unit	3,00	255.532,93	766.598,78
1.2.145	B - 140404 - Pump height: 70m manometric, fluid density 0.98 kg/dm³, internal components in carbon steel, volute in gray cast iron. Electric engine WEG 20 hp 3520 rpm.	Unit	1,00	17.058,82	17.058,82
1.2.146	SUBSTATION 01				
1.2.147	TF 5144004 - Transformer manufatured by Itel type mineral oil 440/220 V - 225 Kva	Unit	1,00	9.946,14	9.946,14
1.2.148	TF 5144004 A/B- Transformer manufatured by Francisco Matarazzo type mineral oil 13800/440 V - 750 Kva	Unit	2,00	23.623,86	47.247,72
1.2.149	Q 5 E - Low voltage CCM, manufatured by Schneider, model Gamma Blockset IP-31 form 4B, 480v, 1250A, 41 outputs	Unit	1,00	965.237,41	965.237,41
1.2.150	BUNKER PUMP HOUSE SUBSTATION				
1.2.151	TF 140305- Transformer manufatured by Easa, type: dry, 480/220 - 112,5 Kva	Unit	1,00	4.652,19	4.652,19
1.2.152	TF 140304-A - Transformer manufatured by WEG, type: mineral oil, 13800/440 V - 750 Kva	Unit	1,00	26.335,96	26.335,96
1.2.153	PN 140302 - CCM 17 outputs	Unit	1,00	58.941,54	58.941,54
1.2.154	Piping, Valves and Piping Accessories, Metallic Structures, Electrical Installations (wires, cables, switches, circuit breakers, small panels and panels, accessories and miscellaneous items). According to drawings: DE-4300.27-6000-944-PTP-001 Rev: T and DE-4300.37-5420-944-PTP-001 Rev: B	conj	1,00	104.710.502,05	104.710.502,05
2	**Petrobras assets on the pier**				
2.1.1	B 100 A/C - Worthington Pump, flow rate: 1960m³/h, height: manometric 45m, fluid density 1.03 Kg/dm³, volute material and rotor in cast bronze, 316 stainless steel shaft and carbon steel piping. GE 450 hp engine, rotation 1185 rpm.	Unit	2,00	166.162,12	332.324,24
2.1.2	FT 100 A/B HERO brand filters for water operation, project pressure 150 psi - temperature 222.5 psi, normal pressure: 60 psi maximum: 150 psi		2,00	26.669,87	53.339,73
2.1.3	B-305A - Bomba KSB, 1750 rpm, . height: manométrica 106/69m densidade do fluído 1,03 Kg/dm³ material Volutas e rotores em bronze fundido, eixo em aço inox 316. Motor 700 cv 1750 rpm.		1,00	396.816,67	396.816,67
2.1.4	B-300B/C - KSB pump model B200, vertical centrifuge, salt water, flow rate: 1140 m3/h, height: manometric 105 mca, powered by Caterpillar model C18 diesel engine, power: 800 hp, 1750 rpm		2,00	912.724,16	1.825.448,32
2.1.5	LA-03-A - BLoading arm manufactured by Gilardini, pressure: 17kgf/cm², Product LPG steam cooled, diameter: nominal 12", flow rate: 1200m³/h.		1,00	-	-
2.1.6	LA-03-B - Loading arm manufactured by FMC , diameter: 12" x 16" x 75", pressure 17kgf/cm², Product LPG liquid cooled		1,00	-	-
2.1.7	UM-803 - Bunker mixture Unit , p/ 5 a 50%, c/ 680m3/h.		1,00	673.382,13	673.382,13
2.1.8	LA-02-A (BC-28001A)- Loading arm manufactured by FMC, pressure 17Kgf/cm², Product LPG steam cooled, diameter: nominal 12" flow rate: 2000m³/h.		1,00	1.314.536,40	1.314.536,40
2.1.9	BC-28002A - Woodfield Loading Arm, 12", LPG fluid, project pressure: 19 kgf/cm², Model MK9, Length: 10500mm, hydraulic drive, load line and steam phase coupled, emergency release, remote control with manual joystick.		1,00	2.300.072,23	2.300.072,23
2.1.10	TF 5 H - GORDON Transformer GORDON, typeT0015/66, 15Kva, 60Hz, 504 volts.		1,00	1.988,04	1.988,04
2.1.11	CR-02 - Overhead crane on rails, Manufacturer: MELT, capacity: 10 tons, lift motor 9,5hp, direction 75hp and translation 2hp, span: 23 m		1,00	66.519,55	66.519,55
2.1.12	Piping, Valves and Piping Accessories, Metallic Structures, Electrical Installations (wires, cables, switches, circuit breakers, small panels and panels, accessories and miscellaneous items). According to drawing: DE-4300.27-6000-944-PTP-007. Rev: T		1,00	2.437.550,39	2.437.550,39
	2 Other				
	3 TOTAL				**365.490.678,00**