

**THE PROJECT OF THE NEW PORT OF CAIO IN CABINDA**

**REPUBLIC OF ANGOLA**

# **LOT1 - PORT OF CAIO**

## **BUILDINGS - FREE ZONE GATE**

### **DESIGN REPORT**

#### **ARCHITECTURAL ENGINEERING**

Design Stage: Detailed Design

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**CHINA ROAD AND BRIDGE CORPORATION**

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### ARCHITECTURAL ENGINEERING

Design Stage: Detailed Design

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# 1 INTRODUCTION

Project Name: Projecto do Novo Porto do Caio.

Item Name: Free Zone Gate.

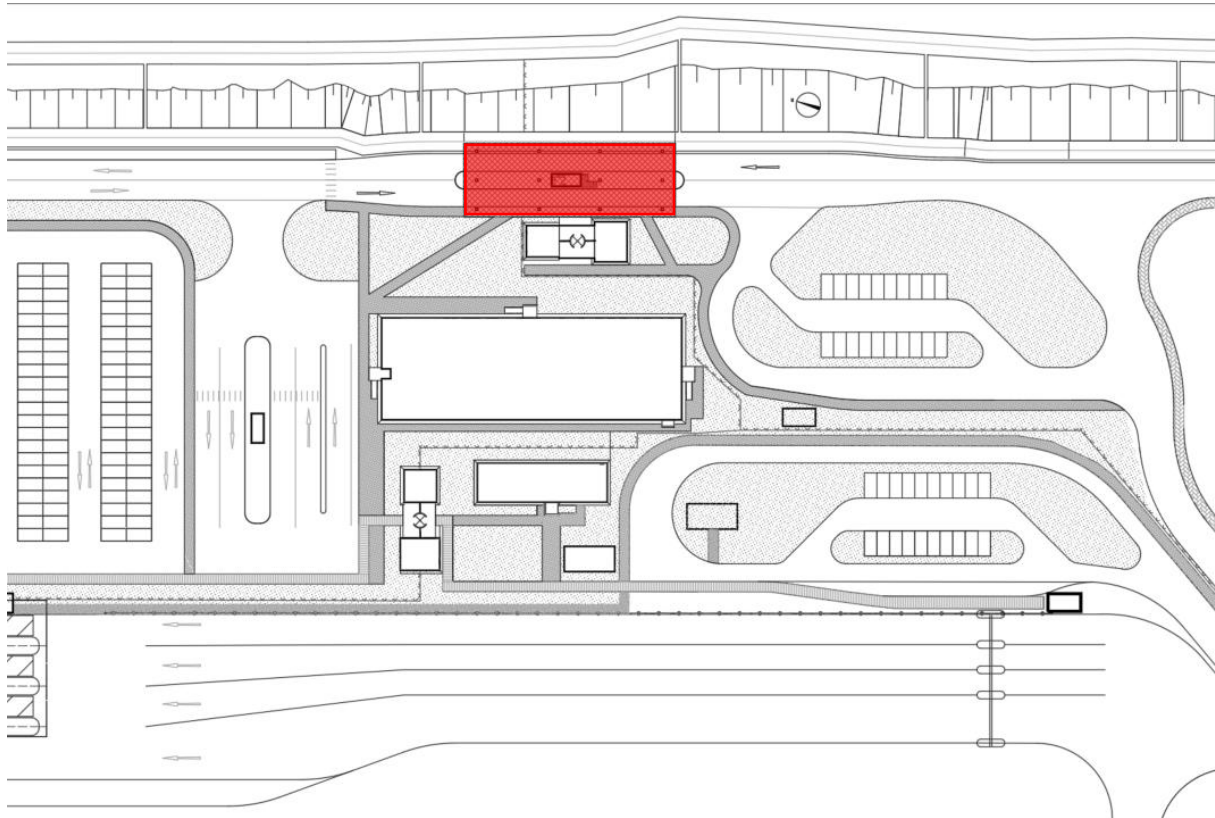


Figure 1-1 Location of the Free Zone Gate on the Onshore Terminal Layout

Project location: Cabinda of Angola.

The Free Zone Gate includes a steel shed, a traffic island, and a office container. The floor area is 606.1 square meters, one storey in total; the length is 41.8m, the width is 14.5m and the height is 8.12m.

The function is serving the control and checking of all in and out going containers which reach or leave the terminal by truck.

The structural form is steel structure.

The absolute level of the building and the coordinates of the control points are shown in the general plan.

## 2 DESIGN SCOPE

This report is scoped with the architectural engineering for Port Buildings – Free Zone Gate.

## 3 DESIGN BASIS

### 3.1 CODES OF PRACTICE FOR ARCHITECTURE DESIGN

(1) BS 9999 Code of practice for fire safety in the design, management and use of buildings;

(2) Port of Caio Project -Republic of Angola Bidding Document-Phase 1:PART II-SECTION A: SPECIFICATIONS;

SERIES 3300 BUILDINGS;

SERIES 3600 MAIN GATE ; (reference)

(3) Conceptual design plan.

(4) BS EN 14351-1 2006 Windows and doors - Product standard, performance characteristics - Part 1: Windows

(5) BS EN 10346 2015 Coated steel products for building - Specifications

(6) ISO/FDIS 10456:2007(E) Thermal insulation - Determination of declared and design values of thermal resistance and related properties - In - situ measurements

(7) EN 12524:2000 Building hardware - Seals and gaskets - Requirements and test methods

(8) ASTM C645 Standard Specification for Precast Architectural Concrete Wall Panels

(9) EN 14195:2014 Building hardware - Electromechanical door - locking and door - closing devices - Requirements and test methods

(10) 2024-06-03\_Meeting Protocol CRBC Visit\_lhe

## 3.2 DEVIATIONS

(1) According to the meeting minutes document"2024-06-03\_Meeting Protocol CRBC Visit\_lhe", heat transfer coefficient of whole window U-value =1.7 W/m<sup>2</sup> K.

(2) According to the meeting minutes document"2024-06-03\_Meeting Protocol CRBC Visit\_lhe", internal sun blinds for the smaller buildings like main gate and Bus stop are used.

## 3.3 GENERAL LAYOUT

Free zone gate is adjacent to Personal gate freezone. There is one lane on each side of the traffic island, which is used for container trucks to enter and leave the free zone.

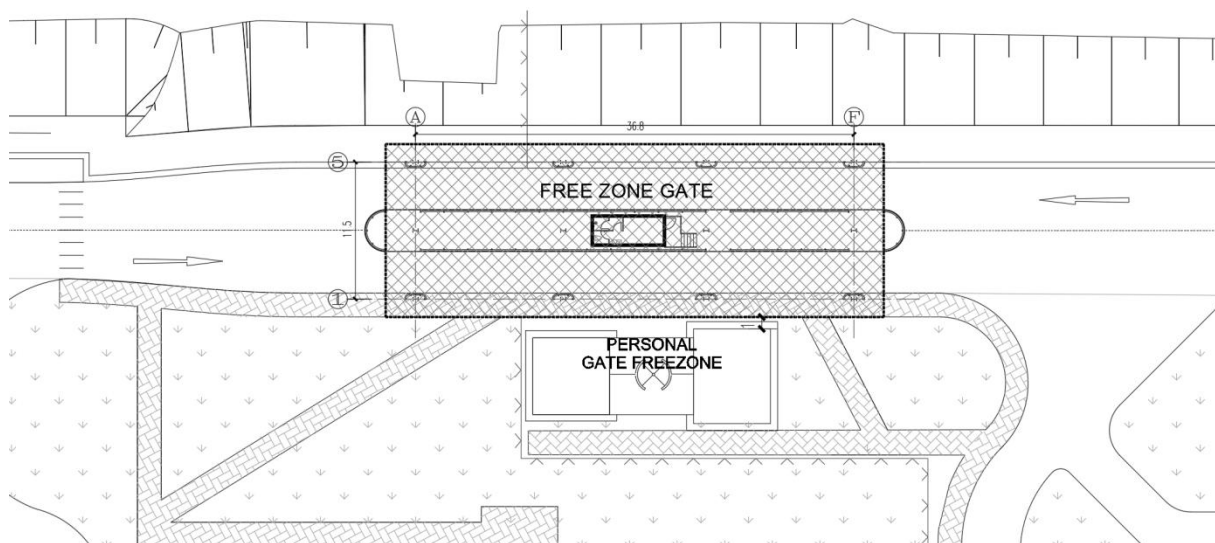


Figure 3-1 Plan of the Free Zone Gate

## 4 ARCHITECTURE DESIGN

### 4.1 TRAFFIC ISLAND

There is a traffic island equipped with a office container, 45.3 m long and 3.5 m wide, with a height difference of 0.12 m from the road. The outer

surface shall be made of reinforced concrete with a 2% slope outward.

To direct the truck traffic towards the gate lines each traffic island shall be extended with cross striped self reflecting white or yellow road markings, painted 25 m in front and after each island. The paint has to be resistant against abrasion and ultraviolet radiation and has to be approved by the Engineer.

Safety rails of 70cm height ,extended with cross striped self reflecting black and yellow road markings,are installed to surround the island.The paint has to be resistant against abrasion and ultraviolet radiation and has to be approved by the Engineer.

The safety rails, which also serve as crash barriers for the office containers, shall be of strong, galvanized steel with vertical posts every 2.00 m. The necessary concrete foundation for each post has a thickness of 50 cm of C20/25.

## **4.2 STEEL SHED**

### **4.2.1 PLAN DESIGN**

The steel shed is of steel frame structure with 12 steel columns on the traffic island and sidewalks.

The dimensions of the steel shed are detailed in the table below:

Length	41.80m
Width	14.50m

### **4.2.2 ELEVATION AND SECTION DESIGN**

The exterior wall color is light gray,and ral 9006 color number should be selected.

The height of the steel shed is 8.12 m.

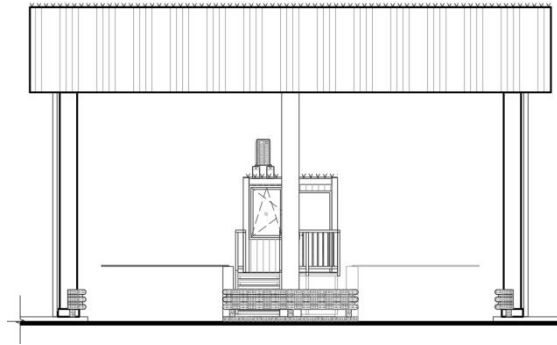


Figure 4-1 Elevation of the Free Zone Gate

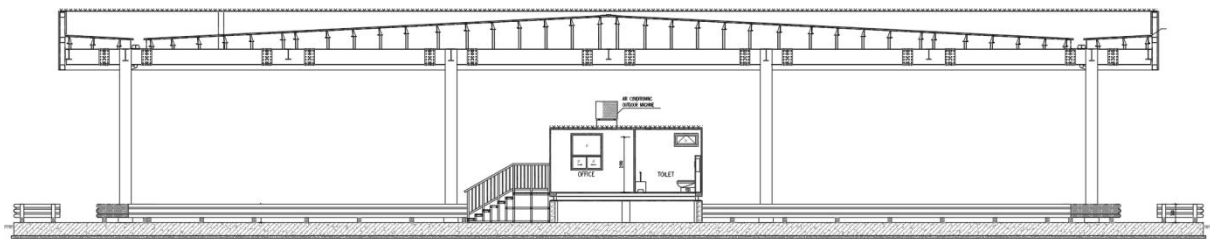


Figure 4-2 Section of the Free Zone Gate

### 4.2.3 EXTERIOR WALL ENGINEERING

0.5mm thick profiled steel plates were used as exterior walls between levels 5.8 and 8.0.

### 4.2.4 ROOF ENGINEERING

(1) The roof of the building is a sloped roof made of 0.5mm thick profiled steel sheet with a slope of 5%.

(2) The lighting equipment has to be designed to generate 300 lx within the truck checking area. The works include delivery and installation of all necessary floodlights, bulbs, tubular fluorescent lamps, cables, fuses and switches. All the electrical installations ready for operation.

(3) The rainwater pipe is made of galvanized steel, the drawings will be prepared and detailed by the supplier. The anti-corrosion performance should be C5 grade. The rainwater pipe clamp is made of metal and can



firmly fix the riser with a spacing of less than 1,500 mm.

(4) The detailed roofing system (solar panels supports included) will be prepared and detailed by the supplier, and its metal components should meet the C5 corrosion resistance requirements, fasteners should be effectively secured and firmly fixed. The waterproof level and performance of sealing components of solar supports should be consistent with that of the roof, and the original waterproof system should not be damaged.

(5) All galvanizing works where specified shall be hot-dip galvanized and shall conform to the requirements of en iso 1461:2009. The minimum coating thickness is 85µm (Steel 5mm thick and over) . The minimum coating thickness is 64µm (Steel under 5mm thick but not less than 2mm).

(6) Down pipes have be protected from accidental traffic loads by safety rail.

## **4.3 OFFICE CONTAINER**

### **4.3.1 PLAN DESIGN**

(1) Container: Length 5.80m', Height 2.59m, Width 2.44m

(2) Flooring: PVC floor covering

(3) Finished PVC white interior

(4) Rain gutters with interior steel tubing from roof to ground. The anti-corrosion performance should be C5 grade, and the component anti-corrosion paint ndft thickness should be  $\geq 240\mu\text{m}$ , including 70µm of primer, 70µm of intermediate coating, and 100µm of final coating.

(5) Insulation: 75-mm-thick rock wool sandwich panels for external wall / 50-mm-thick glass wool sandwich panels for roof.

(6) Six electrical outlets

(7) Four fluorescent lighting fixtures

(8) Air conditioning

- (9) Post height: 1.00 m above surface
- (10) Stairway with platform for entrance to the container, made of steel gratings.
- (11) The container is equipped with twist locks on each corner. This construction again allows easy change and moving if necessary.
- (12) For easy communication with the truck drivers the windows of the office containers shall be at the same height as the seats of the truck drivers. Therefore each container shall be raised 1.00 m above the surface of the ready laid pavement. The works include the post and beam construction with the foundations, the stairways with hand-rails on both sides of the stairs and gratings as shown in the drawing, all made of hot-dipped galvanized steel, the statically calculations as well as the complete installation ready for operation.
- (13) The posts shall be connected with the bottom twist locks in the same way like containers are fixed to the load floor of the road trucks, so that the container can be moved just by opening the twist lock.
- (14) The container shall be connected to the electric cable pipe system (LT and IT) and be equipped with internal lighting, at least 6 wall-socket, fuses and switches as well as 2 IT-wall-sockets for personal computers.
- (15) The office container should be supplied by the supplier and relevant manuals when the material specifications has to be define or reports should be provided. purchase orders can be placed and construction can be commenced only after the approval of product by the engineer.

#### **4.3.2 DOORS AND WINDOWS ENGINEERING**

- (1) All doors and windows are equipped with matching hardware accessories. doors and windows and all metallic components (hardware, leafs, thresholds, profiles etc) has to meet the C5 anti-corrosion requirements. doors and windows has to be sealed on all four sides.
- (2) The exterior side of the access door and external window frames is gray, and the interior side is white.

(3) Access doors:

a) double-skinned insulated steel door, single-leaf, tight-fitting, warp and weather resistant.

b) galvanized steel sheets  $\geq 1.5$  mm.

c) U-value  $\leq 5.00$  W/m<sup>2</sup>K (heat transfer coefficient) of whole door.

d) resistance to wind pressure as required in accordance to EN 12424 and static calculations. Wind pressure resistance level of the door is 3.

e) Sound insulation  $\geq 35$  dB.

f) Sealed continuous on all four sides.

(4) Double glazing windows:

a) tilt and turn windows, opening inwards.

b) plastic steel and double glazing (6low-e+12Ar+6) with clear insulation glass, argon-filled void between, UV-Transmission  $\leq 20\%$ .

c) U-value  $\leq 1.70$  W/m<sup>2</sup>K (heat transfer coefficient) of whole window.

d) glass is grey.

e) resistance to wind pressure as required in accordance to EN 12424 and static calculations. The wind pressure resistance level of the window is level 3, the deformation deflection control level of the window is level b, the fire resistance performance is level c, and the water tightness level is level 7a, drop height (mm): 450, with an air tightness level of 3. Sound insulation  $\geq 35$  decibels.

(5) Internal sunblinds are installed in front of the office windows.

(6) All the door and windows should be supplied by the supplier and relevant manuals when the material specifications have to be defined (type of sound reduction and wind resistance, etc) or reports should be provided. Purchase orders can be placed and construction can be commenced only after the approval of product by the engineer.

### 4.3.3 SANITARY WORKS

(1) All sanitary material and equipment are according to EN regulations.

(2) Sanitary Objects and equipment

WC: wall mounted toilet of vitreous china, incl. concealed Cistern and Push Button

Dual Flush, seat with cover, paper holder, spare paper holder, brush set.

Wash basin: approx. 40 cm wide cold water tap and towel hook.

Mirror: 80 x 100 cm, above wash basin.

#### **4.4 OTHERS**

(1) The main steel elements (such as steel columns, steel beams, roof purlins, wall purlins...) should be derusted in the factory. The steel components of the building and the exposed metal components of the building all meet the C5 anti-corrosion requirements. The NDFT of the anti-corrosion paint should be  $\geq 240 \mu\text{m}$ , including  $70 \mu\text{m}$  of primer,  $70 \mu\text{m}$  of intermediate coating, and  $100 \mu\text{m}$  of final coat.

(2) All galvanizing works where specified shall be hot-dip galvanized and shall conform to the requirements of en iso 1461:2009. The minimum coating thickness is  $85 \mu\text{m}$  (Steel 5mm thick and over). The minimum coating thickness is  $64 \mu\text{m}$  (Steel under 5mm thick but not less than 2mm).

(3) The detailed roofing system (solar panels supports included) will be prepared and detailed by the supplier, and its metal components should meet the C5 corrosion resistance requirements, fasteners should be effectively secured and firmly fixed. The waterproof level and performance of sealing components of solar supports should be consistent with that of the roof, and the original waterproof system should not be damaged.

(4) The rainwater pipe is made of galvanized steel, the drawings will be prepared and detailed by the supplier. The anti-corrosion performance should be C5 grade. The rainwater pipe clamp is made of metal and can firmly fix the riser with a spacing of less than 1,500 mm.

(5) Steel components such as roof purlins and structural beams for steel

structures of the building will be finalized by the supplier in the form of manufacturing drawings and confirmed by the consultant before purchase orders can be placed and construction can commence.

(6) Sanitary ware Ceramic sanitary ware is adopted for the toilet, urinal and washbasin. Finished shower room using 8mm thick toughened glass. The toilet is equipped with a mirror is installed above the wash basin.

(7) The sanitary wares and equipment in the bathroom shall be determined by the manufacturer in the form of shop drawings, including the characteristics of the materials in terms of durability, impact resistance, water resistance, chemical resistance and fire resistance.