

**THE REPUBLIC OF KENYA
KENYA PORTS AUTHORITY**



**PROPOSED CONSTRUCTION OF MOMBASA
BERTH 19B AND ASSOCIATED
INFRASTRUCTURE**

TENDER NO. KPA/004/2024-25/PDM

**BIDDING DOCUMENTS FOR
CONSTRUCTION OF CIVIL WORKS AND BUILDINGS**

VOLUME II

Part 2: Employer's Works Requirement

Section VI: Specifications

**Part 2A: Scope of Works & General and Technical Specification
of Construction of Civil Works and Utility Works**

YOOSHIN ENGINEERING CORPORATION

JUNE 2024

Bid Document

Part 2

Section VI. Works Requirements

Part 2A

Clause 1. Scope of Works

Clause 2. General

Clause 3. Technical Specification of Civil Works

Clause 4. Technical Specification of Utility Works

Part 2B

Clause 5. Technical Specification of Building Works and Demolition of KOT 1

Part 2C

Bidding Drawings of Construction of Civil Works and Utility Works, Demolition of KOT I and Building Works

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CLAUSE 1: SCOPE OF WORK

1. SCOPE OF WORKS

1.1 Summary of Scope of the works:

The summary of scope of works for Mombasa Port Berth 19B and Associated infrastructure 1: Construction of Civil Works and Buildings are followings:

1. General Requirement

- (1) Mobilization
- (2) Temporary works
- (3) Survey works
- (4) Soil Investigation
- (5) Security & Insurance
- (6) Environmental Management
- (7) HIV/AIDS Measurement (Provisional Sum)
- (8) Site Test Laboratory
- (9) Engineer Requirement (Provisional Sum)
- (10) Engineer Expense
- (11) Demobilization

2. Civil Works

- (1) Reclamation:(Sand Replacement)
 - a) Reclamation Area: 4.6 ha;
 - b) Reclamation Volume: approx. 607,230 m³ including Revetment Sand Volume; and
 - c) Top elevation + 5.5 m;
- (2) Excavation
 - a) Excavation: approx. 342,998 m³ including Dredging Volume;
- (3) Revetment
 - a) Western Revetment: Length 296.75 m
 - b) Southern Revetment: 240 m;
- (4) Container Berth No. 19B
 - a) Depth: -13.5 m; and
 - b) Foundation Piles: ϕ 900 mm 372 Nos. (Total Length:13,300m)

- (5) Soil Improvement:
 - a) Soil Improvement Area: 4.6 ha;
 - b) Vibro-floatation
- (6) Pavement for Container Terminal:
 - a) Pavement Area: 4.6 ha.
- (7) Storm Water Drainage and Flood Light Towers:
 - a) Storm Water Drainage: Drainage 336 m and others;
 - b) Flood Light Towers: High Mast Lighting Poles 8 Nos.

3. Utility Works:

- (1) Water Supply System,
- (2) Fire Fighting System,
- (3) Sewerage System,
- (4) Electrical Works

4. Building Works:

- (1) Pump House
- (2) Welfare Building
- (3) Substation

5. Demolition of KOT I:

- (1) Jetty Platform
- (2) Mooring dolphins
- (3) Old pumphouse etc.

6. Port and Terminal Security Measurement

7. ICT Communication System; and

I. Construction Period:

Six Hundred and Ninety (690) calendar days after commencement date

II. Defect Liability Period:

One (1) year (365 x 1 day) after completion of Construction Period

CLAUSE 2: GENERAL

2. GENERAL

2.1 GENERAL INFORMATION

2.1.1 General

This Clause provides the Contractor with general information and guidance for the execution of the Construction Works under the Mombasa Port Berth 19B construction Project.

The Conditions of Contract, the Drawings and the Bill of Quantities shall be read in conjunction with this Specification and matters referred to, shown or described in any one of these are not necessarily repeated in any other one.

Notwithstanding the sub-division of the Specification under different headings every part of it shall be deemed supplementary to and complementary of every other part and shall be read with it or into so far as if may be practicable to do so.

2.1.2 Details not to be published

The Contractor shall treat the details of the Contract as confidential for his own information only and shall not publish or disclose them in any trade or technical paper or elsewhere (except as necessary for the purpose hereof), without the previous consent in writing of the Employer.

2.1.3 Project Description

(1) Objective

The Berth 19B project and associated infrastructure was conceptualized from the need to increase the container handling capacity of Container Terminal I from the feasibility study conducted.

(2) Project Facilities

Project facilities are consisted of as follows.

a. Demolition of KOT I

(1) Jetty Platform	Concrete (15m x 40m)	Quantity approx..5,700m3
(2) Removal of piles	Steel pile pipes Sheet piles	Steel piles approx-106 Nos. Sheet piles approx.-152 Nos.
(3) Removal of pipelines	Oil pipelines	Approx length-2720m

b. Land Development

(1) Reclamation	Container Terminal area, (4.6 ha.)	Filling by sea sand material
(2) Soil Improvement by Sand Replacement under wharves	Until firm clay layer	
(3) Revetments	(1) Revetment 1 (L: 536.75m)	Rock protection

c. Port Facilities

(1) Container Berth No. 19B	L: 240 m, W:29.96 m, D: 13.5 m	Open type structure supported by steel pipe pile
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(2) Southern Revetment	L: 240 m	Rock Mound & In-situ Con. Behind of Berths
(3) Light Beacons	1- on No. 19B Berth	boundary of Berth

d. Yard and Pavement

(1) Soil Improvement by Vibrofloatation	Container Terminal	Improvement by vibrofloatation
(2) Pavement and Drainage	Container Terminal (6.03 ha)	RTG lanes, Container Stacking, Empty stacking

e. Utilities

Utilities (1) Water Supply (2) Fire Fighting System (3) Sewerage System (4) Electrical Works (5) ICT Communication System		
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f. Buildings

Buildings (1) Pump House, (2) Welfare Building, (3) Substation Utilities (1) Electric Supply (2) Water Supply (3) ICT	750 m2 (RC, 1 story) 132 m2 (RC, 2 story) 148 m2 (RC, 1 story)	
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2.1.4 Site Conditions

(1) Location

Mombasa is located at Longitude 39-degree 40 minutes East and Latitude 4 degree 4 minutes South (Headquarters of Kenya Ports Authority) on the east coast of Kenya, facing the Indian Ocean. Mombasa belongs to the tropical monsoon area.

Construction site of this project is located west side of Berth 19A which is near old KOT I jetty to be demolished.

(2) Meteorological Conditions

1) Wind

There is the Northeast Monsoon from December to February, which is “the dry season” and the Southeast Monsoon from May to August, “the rainy season”. There are the Inter Monsoon Season (March-April and September-November).

During the NE Monsoon, according to UNEP (2010), 50% of wind blow from the East, 29% from Northeast, 21% from the North, and maximum wind 17 m/sec from Northeast. In the Southeast monsoon, 75% of wind blow from the South, 25% from the Southwest, and maximum wind 15 m/sec. Average maximum wind/day in “dry season” was 11.0 m/sec. And average maximum wind/ day in “rainy season” was 10.9 m/sec.

The average maximum wind/day recorded at Moi International Airport in the past 22 years from 2001 to 2023, was 33 knots in March 2020. During one year, the wind from NE direction to SE exceeds, and the wind from South to North at land side is calm.

The above wind data imply that the operations in the Mombasa Port are seldom affected by wind.

Wind Highest per day at each month and year														
No.	Year	Month												Unit:Knt
		Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Ave.
1	2001	22.0	18.0	18.0	20.0	20.0	20.0	20.0	20.0	18.0	19.0	10.0	20.0	18.8
2	2002	20.0	20.0	18.0	20.0	25.0	22.0	20.0	18.0	22.0	21.0	16.0	15.0	19.8
3	2003	17.0	16.0	15.0	16.0	20.0	18.0	19.0	15.0	15.0	16.0	15.0	25.0	17.3
4	2004	15.0	17.0	15.0	20.0	18.0	18.0	17.0	15.0	15.0	16.0	14.0	20.0	16.7
5	2005	22.0	21.0	19.0	18.0	20.0	16.0	20.0	17.0	17.0	18.0	15.0	21.0	18.7
6	2006	21.0	21.0	16.0	19.0	20.0	21.0	18.0	18.0	18.0	18.0	18.0	16.0	18.7
7	2007	28.0	23.0	21.0	20.0	29.0	28.0	27.0	21.0	25.0	23.0	18.0	23.0	23.8
8	2008	21.0	22.0	21.0	21.0	22.0	26.0	23.0	22.0	20.0	20.0	20.0	25.0	21.9
9	2009	24.0	20.0	23.0	30.0	22.0	20.0	30.0	21.0	20.0	22.0	20.0	20.0	22.7
10	2010	28.0	22.0	25.0	20.0	22.0	28.0	25.0	24.0	25.0	20.0	20.0	20.0	23.3
11	2011	25.0	22.0	25.0	20.0	25.0	20.0	25.0	20.0	18.0	17.0	18.0	18.0	21.1
12	2012	20.0	22.0	20.0	22.0	22.0	21.0	24.0	17.0	17.0	16.0	16.0	18.0	19.6
13	2013	26.0	23.0	17.0	22.0	25.0	22.0	20.0	20.0	18.0	21.0	18.0	20.0	21.0
14	2014	22.0	24.0	20.0	18.0	23.0	22.0	22.0	20.0	20.0	-	18.0	16.0	18.8
15	2015	16.0	15.0	16.0	17.0	22.0	17.0	17.0	16.0	12.0	11.0	14.0	18.0	15.9
16	2016	16.0	11.0	18.0	22.0	20.0	16.0	13.0	13.0	12.0	12.0	12.0	-	13.8
17	2017	15.0	17.0	16.0	18.0	18.0	18.0	20.0	13.0	13.0	16.0	19.0	16.0	16.6
18	2018	19.0	15.0	16.0	19.0	16.0	17.0	21.0	13.0	15.0	17.0	12.0	17.0	16.4
19	2019	18.0	14.0	16.0	15.0	18.0	24.0	20.0	19.0	17.0	14.0	15.0	16.0	17.2
20	2020	17.0	14.0	33.0	15.0	25.0	18.0	21.0	18.0	18.0	12.0	12.0	14.0	18.1
21	2021	18.0	13.0	18.0	20.0	21.0	17.0	17.0	13.0	14.0	13.0	15.0	14.0	16.1
22	2022	22.0	19.0	18.0	21.0	20.0	31.0	24.0	17.0	20.0	17.0	13.0	14.0	19.7
23	2023	-	19.0	18.0	16.0	-	-	-	-	-	7.7	18.0	8.2	7.2
Total		452.0	428.0	442.0	449.0	473.0	460.0	463.0	390.0	389.0	366.7	366.0	394.2	422.7
Average		20.5	18.6	19.2	19.5	21.5	20.9	21.0	17.7	17.7	16.7	15.9	17.9	18.4

1 Knot:(1,852/3,600)m/sec=0.51444m/sec

2) Temperature

According to UNEP 2007, in Mombasa, the highest temperature of 35°C on average occurs in March, and the minimum temperature occurs in July, of about 19.4°C as shown in below Table:

MAXIMUM TEMPERATURE														
No	Year	Month												Unit:°C
		Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Ave.
1	2013	35.4	34.5	34.0	34.0	31.2	30.1	29.5	30.0	31.6	31.5	33.1	33.2	32.3
2	2014	34.7	35.7	34.2	33.6	32.3	30.7	30.0	29.7	30.0	31.2	33.0	33.0	32.3
3	2015	33.8	35.3	34.1	32.7	31.5	31.5	29.8	30.2	33.8	32.0	32.1	34.2	32.6
4	2016	35.1	35.7	35.6	34.8	32.1	31.0	29.5	29.7	29.7	32.1	33.3	33.8	32.7
5	2017	34.8	34.6	35.0	34.1	31.4	31.2	31.9	30.6	30.3	32.4	33.1	33.0	32.7
6	2018	33.2	34.6	35.5	32.7	32.0	30.8	29.2	29.5	31.5	31.4	32.4	34.5	32.3
7	2019	34.5	35.0	36.2	35.0	33.8	30.7	31.2	30.5	30.6	31.2	33.3	34.4	33.0
8	2020	34.9	34.6	35.2	34.2	31.9	32.2	31.1	30.1	31.2	32.1	34.4	33.4	32.9
9	2021	34.7	34.1	35.6	34.2	35.0	31.2	30.0	30.7	31.4	31.9	33.3	33.6	33.0
10	2022	34.3	35.6	34.5	33.8	32.6	30.6	29.6	29.4	30.0	31.1	33.2	34.3	32.4
11	2023	34.6	35.0	34.6	34.1	31.7	30.9	30.5	30.6	31.1	32.0	32.1	34.7	32.7
Total		380.0	384.7	384.5	373.2	355.5	340.9	332.3	331.0	341.2	348.9	363.3	372.1	359.0
Average		34.5	35.0	35.0	33.9	32.3	31.0	30.2	30.1	31.0	31.7	33.0	33.8	32.6

MINIMUM TEMPERATURE														
No.	Year	Month												Unit:°C
		Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Ave.
1	2013	22.4	23.1	22.9	22.2	20.0	19.7	19.0	18.9	19.0	20.5	21.9	22.5	20.9
2	2014	21.7	21.2	22.8	23.1	21.3	20.0	19.2	19.7	23.5	21.3	21.8	22.4	21.4
3	2015	20.8	22.0	22.4	22.0	21.4	20.7	20.1	18.8	20.8	21.2	22.1	21.4	21.1
4	2016	22.1	22.2	24.0	23.1	20.0	18.7	18.4	18.3	18.9	20.0	21.9	23.1	20.7
5	2017	22.5	23.4	24.2	23.0	21.1	20.6	19.0	20.1	19.1	21.3	22.6	22.4	21.5
6	2018	21.0	22.1	21.8	22.3	21.4	19.8	19.1	19.1	19.8	20.3	21.6	22.4	20.8
7	2019	24.1	22.2	23.2	23.6	21.0	20.4	19.7	20.0	21.5	22.2	22.6	22.3	21.9
8	2020	22.9	23.8	23.1	23.1	22.3	21.6	19.9	20.3	20.6	22.4	23.3	21.9	22.1
9	2021	22.2	22.6	24.0	23.6	22.2	20.5	20.3	20.5	21.9	22.4	22.5	23.7	22.1
10	2022	24.1	22.0	24.3	23.2	22.7	20.4	19.2	19.7	20.5	20.4	22.5	23.4	21.7
11	2023	22.8	23.4	23.2	23.2	22.2	20.9	19.7	20.6	21.4	21.8	22.0	23.3	21.9
Total		246.6	248.0	255.9	252.4	235.6	223.3	213.6	216.0	227.0	233.8	244.8	248.8	236.1
Average		22.4	22.5	23.3	22.9	21.4	20.3	19.4	19.6	20.6	21.3	22.3	22.6	21.5

3) Rainfall

In Mombasa, rainfall is relatively small. The maximum rainfall occurred in Nov 2023, 615.5 mm/day and minimum average rainfall in December and February, less than 62 mm/day.

The rainfall intensity is one of the most important construction conditions in this project. At Moi International Airport, according to Kenya Meteorological Department, the rainfall intensities recorded in the past 23 years from 2000 to 2023 are as follows:

RAINFALL MM/DAY														
No	Year	Month												Unit:mm/day
		Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Ave
1	2000	1.7	0.0	22.1	80.6	300.8	208.4	80.1	69.5	44.4	67.2	89.0	58.4	1022.2
2	2001	31.6	1.5	27.5	161.9	177.4	174.5	41.2	44.9	9.5	35.4	99.3	23.0	827.7
3	2002	72.9	21.4	63.7	134.8	132.4	32.9	57.9	48.8	143.6	178.3	79.6	84.1	1050.4
4	2003	0.1	0.0	34.6	96.0	237.4	56.6	63.7	37.8	59.7	31.0	45.5	18.6	681.0
5	2004	164.8	7.9	10.8	114.9	26.2	126.4	64.0	13.9	8.8	219.8	67.6	31.9	857.0
6	2005	41.8	0.0	38.1	142.0	138.8	37.2	68.2	47.6	34.3	43.4	224.8	19.8	836.0
7	2007	18.5	0.0	24.1	102.3	499.2	129.4	42.9	105.5	110.9	116.7	74.8	37.4	1261.7
8	2008	35.6	0.0	83.4	66.0	201.1	152.5	93.0	17.6	24.9	54.1	74.1	20.1	822.4
9	2009	4.5	6.5	30.9	36.4	67.2	117.9	37.1	30.7	3.1	281.6	12.5	30.5	658.9
10	2010	16.2	0.4	47.8	184.0	322.7	107.7	62.5	52.8	28.3	4.4	103.4	37.5	967.7
11	2011	0.9	66.3	14.8	-	154.9	36.9	21.8	30.0	65.9	234.5	106.1	19.2	751.3
12	2012	-	-	0.0	63.1	147.6	33.3	54.2	79.8	16.0	96.4	163.8	11.9	666.1
13	2013	8.5	0.0	146.7	71.4	312.3	54.7	52.2	55.8	61.1	77.2	50.8	66.9	957.6
14	2014	0.0	13.3	79.8	38.3	293.8	163.8	62.3	40.2	88.3	153.6	164.2	146.2	1243.8
15	2015	0.0	0.0	95.8	108.3	405.3	47.2	111.7	41.6	47.2	130.9	293.6	39.2	1320.8
16	2016	0.0	3.2	5.7	309.1	124.5	80.3	9.4	40.1	51.2	4.0	37.9	19.8	685.2
17	2017	0.0	0.3	31.0	74.0	524.8	54.8	38.9	48.1	66.8	51.5	197.7	53.4	1141.3
18	2018	0.1	0.4	175.0	156.7	358.9	116.9	45.9	38.4	189.5	278.3	48.0	93.7	1501.8
19	2019	0.3	1.7	25.5	10.6	336.9	11.7	36.5	39.1	85.0	338.3	309.1	118.1	1312.8
20	2020	52.8	7.9	95.5	190.3	213.2	110.8	36.0	20.6	56.2	80.8	148.8	101.5	1114.4
21	2021	10.9	10.6	0.0	46.5	36.3	53.7	33.0	13.9	24.5	42.0	34.6	177.2	483.2
22	2022	0.0	0.0	8.3	111.8	214.5	72.6	102.7	55.9	23.3	47.4	100.8	34.9	772.2
23	2023	34.8	0.0	45.3	323.4	184.7	54.2	106.3	36.5	34.6	132.0	615.5	186.9	1754.2
Total		496.0	141.4	1106.4	2622.4	5410.9	2034.4	1321.5	1009.1	1277.1	2698.8	3141.5	1430.2	22689.7
Average		22.5	6.4	48.1	119.2	235.3	88.5	57.5	43.9	55.5	117.3	136.6	62.2	993.0

Source: Moi International Airport

The rainy season (blue color) and dray season are clearly shown in above graph.

(4) Oceanographic and Hydraulic Conditions

1) Wave

At the sea side area of the Likoni area, i.e., the entrance to the Kilindini Harbor Channel, sea waves are usually generated by wind. The waves inside the Harbor are minimal due to the short fetch length in the creek. Hence, there is no probability of having high waves at the Kilindini Harbor.

The effect of the wave is minimal on the Construction Works in this Project.

2) Tide

Tide at Mombasa Port is probability semi-diurnal. According to the KPA publication, tidal level ranges from a highest level of 4.1 m to a lowest level of - 0.1 m. Table 2.1.5 below shown the tidal levels observed at Kilindini Harbor.

2.1.5 Tidal Levels in Mombasa Port

Place: Kilindini Harbour Lat. 4 deg. 04 sec South Long. 36 deg. 39 sec East Height: in meter above datum	HAT	+ 4.10 m
	MHWS	+ 3.80 m
	MSL	+ 1.80 m
	CDL	0
	LAT	- 0.10 m

The maximum speed of tidal current at the entrance area of the port is about 1.51 knots with the direction of 132 degrees (at Lat. 4 deg. 0.5 min 99 sec South and Long. 39 deg. 42 min 57 sec East near the Navigation Light Buoy No. 9 (Q.R. No. 2) in the Indian Ocean). The current at the planned face of the New Container Terminal were observed to be at the most 1.63 knots with direction 65 and 250 degrees (at Lat. 4 deg. 03 min 27 sec South and Long. 39 deg. 36 min. 90 sec East)

1) Bathymetric Conditions

Depth of face line of planned Container Berth No. 19B is -13.5 m (under CDL)

2) Geological Condition

Bedrock around Mombasa Port are composed of shale, limestone, sand, marl, coral shell, etc. The foundation materials under the seabed in front of the Project Site are generally hard and stable. The seabed soil layers consist of soft deposit, weathered shale and hard shale.

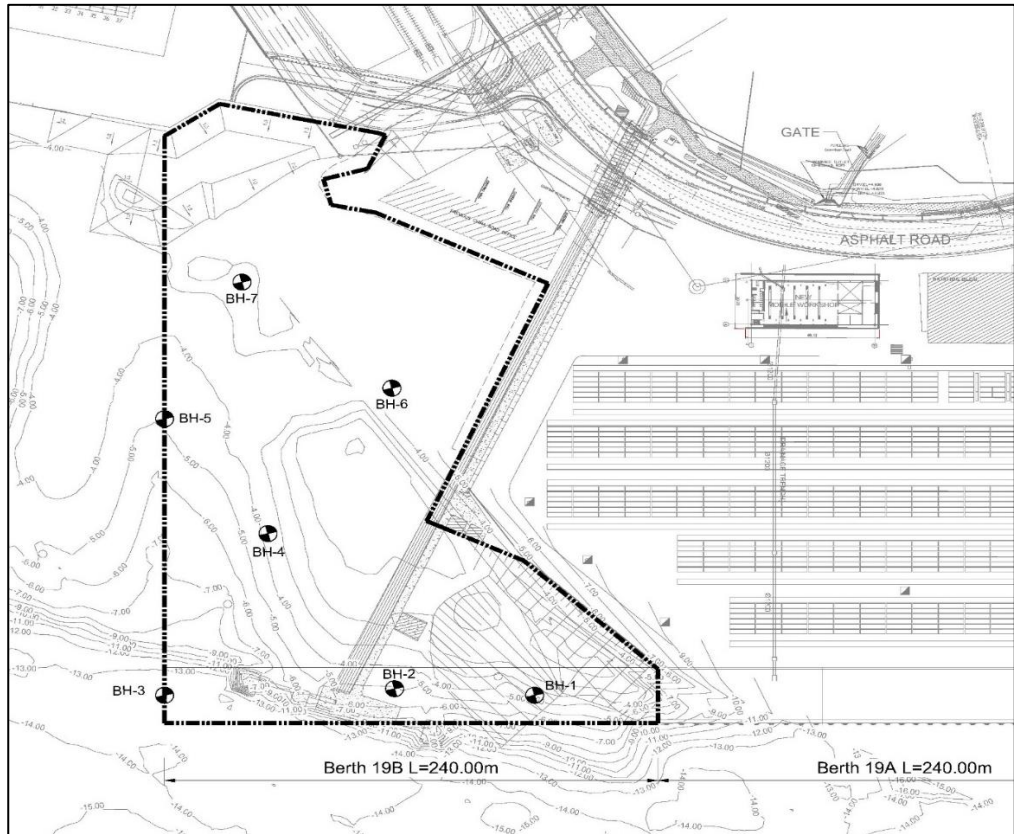
- a. The field investigation of the present condition of the planned Berth 19B construction was conducted by boreholes investigation in which the following was undertaken;

Exploratory boreholes advance by rotary auger drilling through soft strata and core drilling with continuous core recovery in rock strata.

Associated standard penetration tests in soft strata.

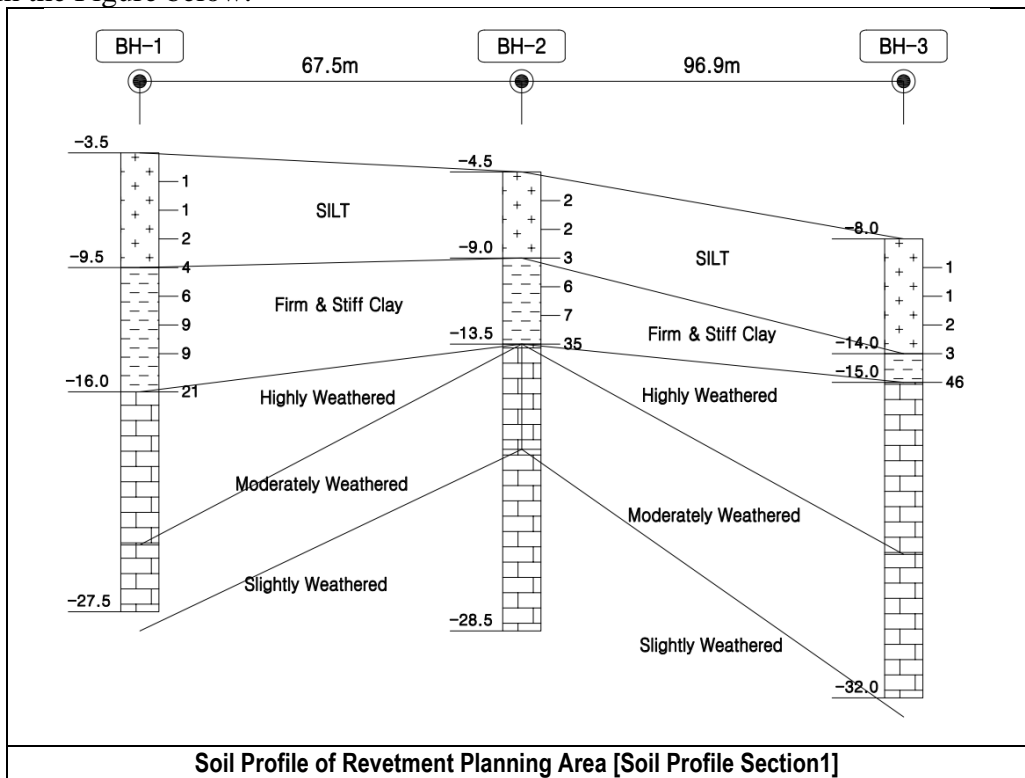
Disturbed bag and undisturbed U100 open tube sampling in soft strata.

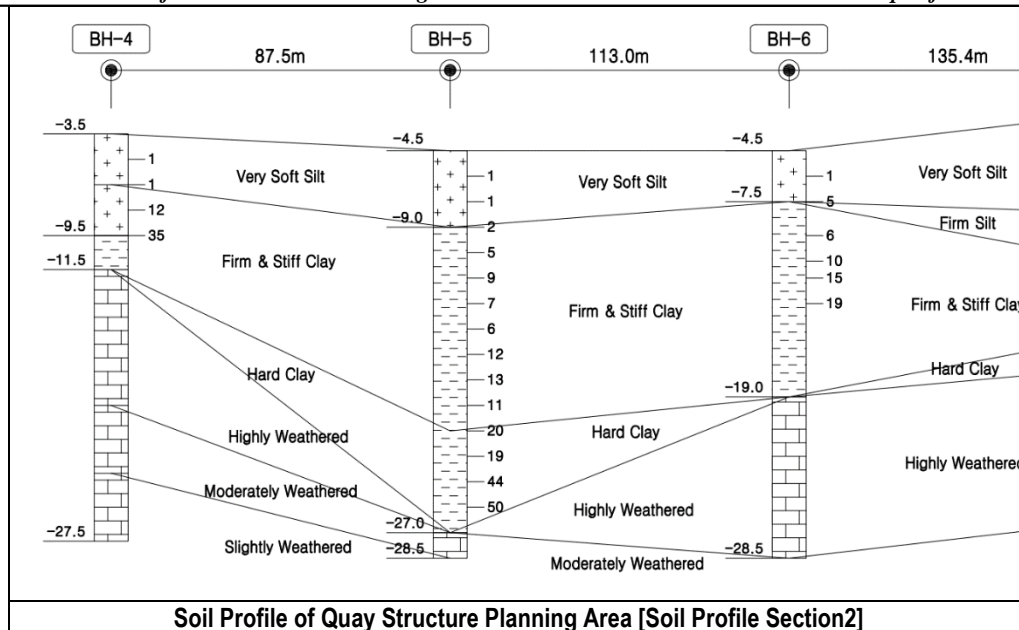
The layout of the boreholes investigated are shown in Figure below



b. Stratification

Illustration of the drilled samples and SPTs determined in -situ are represented in the Figure below.





The stratification of subsoils confirmed along the proposed quay and revetment line with 4 deposits listed below:

- a) Very soft clayey SILT, Soft silty CLAY, N = 0~3
- b) Firm & Stiff silty CLAY, N = 4~20
- c) Hard silty Clay & Highly weathered SHALE Rock, N = 21~ 50
- d) Moderately weathered SHALE Rock, N > 50

3) Sand Resource

To reclaim the area for the port development, large quantities of fill materials is required for reclamation of the container terminal area and filling for sand replacement at the foundation of the revetment.

Fill material shall be either gravel, sand or other friction material of good quality having good draining properties and which is well suited for compaction. Suitable fill material locations are constrained by the distance of haulage from the source and as such will have cost implications to the project. Below are some of the sources that are commonly used in Mombasa construction:

1. Malindi river sand whose distance of travelling to Mombasa is approximately 130km by existing road network and haulage by road would have major time and cost impact to the project.
2. Sandy material along the south coast stretching from Mombasa entrance channel to Ras Mwachema in Tiwi with a distance of approximately 30km from the Berth 19B construction site.

The sand source in 2 above was investigated by JPC and BAC/GKA JV Engineers for the SAPROF Review Study to ascertain sand source for phase III of MPDP CT2. The volume of sand in the proposed sand harvesting area was found to be ten million cubic metres with sand meeting the 5% fines criteria being five million cubic metres. The source is however not approved by NEMA and previous environmental issues had resulted in stoppage of sand harvesting for the SEZ port. An EIA investigation by the MPDP phase III Engineer is underway and expected to be finalized soon. Considering the sand source investigated meets the project requirements for even phase 3 of MPDP, berth 19B would be better suited to adopt this sand source as this would cut the travel time haulage by trucks, instead offshore dredgers and reclamation equipment would be suitable for extracting the offshore sand and reclaiming in the planned

project location.



2) Dumping area

The allocated area for dumping of dredged materials by the Authority for the new KOT in collaboration with NEMA had the coordinates provided in the Table below which otherwise will be as well used for Berth 19B

Offshore dumping area coordinates drw. B19B-REC-006

Point	Eastings	Northings	Latitude	Longitude
1	578952.769	9544962.009	4° 6.9889249862 S	39° 42.679999182 E
2	579683.865	9544279.665	4° 7.3589240329 S	39° 43.075523578 E
3	579001.642	9543548.546	4° 7.7560845032 S	39° 42.707099844 E
4	578270.547	9544230.890	4° 7.3860825317 S	39° 42.311574501 E
Mid	578977.206	9544255.278	4° 7.3725045244 S	39° 42.693549411 E

For demolished debris during demolition works and any unsuitable materials from onshore will be proposed to be dumped off site in approved dumping pits furnished by the Authority. Common sumpsite in use by Mombasa County and its residents is the Mwakirunge dump site located in Latitude 3° 56' 18" South and Longitude 39° 40' 28" East that is a potential dumping area location for consideration.

2.1.6 Underwater Installations

There exist undersea services such as fibre optic cables in or near the Project area. Location, alignment and other details may be obtained from charts BA666, BA616 and BA3361 available locally or internationally. The Contractor should obtain the latest versions of the charts to confirm location of any services in their operation areas.

2.1.7 Units and Abbreviation

2.1.7.1 Units

The following units have been used throughout these Specifications.

m	-	meter
m ²	-	square meter
m ³	-	cubic meter
mm	-	millimeter
mm ²	-	square millimeter
cm	-	centimeter
cm ²	-	square centimeter
N	-	Newton
kN	-	kilo Newton
N/mm ²	-	Newton per square millimeter
N/m ²	-	Newton per square meter
Mpa	-	Mega Pascal
t	-	ton
t/m ³	-	ton per cubic meter
kg	-	kilogram
kg/m ³	-	kilogram per cubic meter
g	-	gram = kg x 10 ⁻³
%	-	percent
°C	-	degree Celsius

All unit measurement, unless otherwise stated or used on the Drawings, in the Specification and in the Bill of Quantities, shall be in accordance with the Metric System.

2.1.7.2 Abbreviations

The following abbreviations have either been used in these Specifications or may be applied during the execution of the Works. Other abbreviations have been shown on the Drawings.

ACV	-	Aggregate Crushing Value
AIV	-	Aggregate Impact Value
ALD	-	Average Least Dimension
CBR	-	California Bearing Ratio
CR	-	Crushing Ratio
DN	-	Nominal Diameter
FI	-	Flakiness Index
LAA	-	Los Angeles Abrasion
L.L	-	Liquid Limit
LS	-	Linear Shrinkage
MC	-	Moisture Content
MDD	-	Maximum Dry Density
OMC	-	Optimum Moisture Content
PI	-	Plasticity Index
PL	-	Plastic Limit
PM	-	Plasticity Modulus (PI x % passing 0.425 mm sieve)
RCP	-	Reinforced Concrete Pipe
SE	-	Sand Equivalent
SG	-	Specific Gravity
SI	-	International Standard (Units of Measurements)
SSS	-	Sodium Sulphate Soundness Test, (loss on cycles)
TS	-	Tensile Strength
UC	-	Uniformity Coefficient
UCS	-	Unconfined Compressive Strength
VIM	-	Voids in Mix
VMA	-	Voids in Mineral Aggregates
OPC	-	Ordinary Portland Cement
No.	-	Number (units)
w/c	-	Water cement ratio
wt	-	Weight
hr	-	Hour
max.	-	Maximum
min.	-	Minimum
sec	-	Second
DWT	-	Dead Weight Tonnage
TEU	-	Twenty-foot Equivalent Unit

2.1.8 Standards or Codes of Practice

Any standard or code of practice referred to in the Contract or any other standard or code of practice that may be substituted thereof shall be held to be the latest edition.

All relevant particulars and conditions in any standard or code of practice referred to in the Contract relating to material, quality and workmanship shall be completed with and all tests specified shall be conformed to the standards and codes.

Where any standard or code of practice is referred to in the Contract, other appropriate national or international equivalents may be substituted subject to the approval of the Engineer. Where other appropriate national or international equivalents are offered, the Contractor shall submit to the Engineer for approval a copy of the alternative standard or code of practice in English and shall provide such further information as is required to enable the Contractor to demonstrate to the Engineer that the alternative national or international equivalent may be substituted.

Unless otherwise specifically specified, Kenya Standard or British Standard (BS) or American Association of State Highway and Transportation Office (AASHTO) or American Society for Testing and Materials (ASTM) or equivalent shall be applied when where applicable.

The Contractor shall provide to the Engineer the Latest version of BS codes or equivalent

The standards and codes of practice listed below are the latest editions of the publications.

(1) Maritime Structures

Designation	Title of Standards/Code of Practice
BS 6349-1-1:2013	General. Code of practice for planning and design for operations
BS 6349-2:2019	Maritime structures. Code of Practice for design of quay walls, jetties and dolphins
BS 6349-4:2014	Maritime structures. Code of Practice for design of fendering and mooring systems
BS 6349-5:2016	Maritime structures. Code of Practice for dredging and land reclamation
BS 6349-1-4:2021	Maritime works. General. Code of practice for materials

(2) Concrete Work

Designation	Title of Standards/Code of Practice
BS 8500-1:2015+A1:2016	Concrete. Complementary British Standard to BS EN 206. Method of specifying and guidance for the specifier
BS 8500-2:2015+A1:2016	Concrete. Complementary British Standard to BS EN 206. Specification for constituent materials and concrete

BS EN 206:2013+A1:2016	Concrete. Specification, performance, production and conformity.
BS EN 12350-1:2009	Testing fresh concrete. Sampling
BS EN 12350-2:2009	Testing fresh concrete. Slump-test
BS EN 12350-3:2009	Testing fresh concrete. Vebe test
BS EN 12350-4:2009	Testing fresh concrete. Degree of compactability
BS EN 12350-5:2009	Testing fresh concrete. Flow table test
BS EN 12350-6:2009	Testing fresh concrete. Density
BS EN 12350-7:2009	Testing fresh concrete. Air content. Pressure methods
BS EN 12350-8:2010	Testing fresh concrete. Self-compacting concrete. Slump-flow test
BS EN 12350-9:2010	Testing fresh concrete. Self-compacting concrete. V-funnel test
BS EN 12350-10:2010	Testing fresh concrete. Self-compacting concrete. L box test
BS EN 12350-11:2010	Testing fresh concrete. Self-compacting concrete.
BS EN 12350-12:2010	Testing fresh concrete. Self-compacting concrete. J-ring test

(3) Structural Steel Work

Designation	Title of Standards/Code of Practice
BS 4449:2005+A3:2016	Steel for the reinforcement of concrete. Weldable reinforcing steel. Bar, coil and decoiled product. Specification.
BS EN 10080:2005	Steel for the reinforcement of concrete. Weldable reinforcing steel. General.
ISO 6935-2:2015	Steel for the reinforcement of concrete. Ribbed bars
ISO 6935-1:2007 Ed 2	Steel for the reinforcement of concrete. Plain bars
BS 8666:2005	Scheduling, dimensioning, bending and cutting of steel reinforcement for concrete. Specification.
BS 4483:2005	Steel fabric for the reinforcement of concrete-Specification

BS 4190:2014	ISO metric black hexagon bolts, screws and nuts. Specification.
BS 4320:1968	Specification for metal washers for general engineering purposes. Metric series.
BS EN ISO 18286:2010	Hot-rolled stainless steel plates. Tolerances on dimensions and shape

(4) Paving

Designation	Title of Standards/Code of Practice
BS EN 14227-3:2013	Hydraulically bound mixtures. Specifications. Fly ash bound granular mixtures
BS EN 13286-1:2003	Unbound and hydraulically bound mixtures. Test methods for laboratory reference density and water content. Introduction, general requirements and sampling
BS EN 13286-47:2012	Unbound and hydraulically bound mixtures. Test method for the determination of California bearing ratio, immediate bearing index and linear swelling
BS EN 13286-50:2004	Unbound and hydraulically bound mixtures. Method for the manufacture of test specimens of hydraulically bound mixtures using Proctor equipment or vibrating table compaction
BS EN 13286-41:2003	Unbound and hydraulically bound mixtures. Test method for determination of the compressive strength of hydraulically bound mixtures
BS EN 13877-1:2013	Concrete pavements. Materials
BS EN 13877-2:2013	Concrete pavements. Functional requirements for concrete pavements
BS EN 13877-3:2004	Concrete pavements. Specifications for dowels to be used in concrete pavements
BS EN 1338:2003	Concrete paving blocks. Requirements and test methods
BS EN 14227-3:2013	Hydraulically bound mixtures. Specifications. Fly ash bound granular mixtures
BS EN 13286-1:2003	Unbound and hydraulically bound mixtures. Test methods for laboratory reference density and water content. Introduction, general requirements and sampling

(5) Drainage

Designation	Title of Standards/Code of Practice
BS 5911-1:2002+A2:2010	Concrete pipes and ancillary concrete products. Specification for unreinforced and reinforced concrete pipes (including jacking pipes) and fittings with flexible joints (complementary to BS EN 1916:2002)
BS 5911-3:2010+A1:2014	Concrete pipes and ancillary concrete products. Specification for unreinforced and reinforced concrete manholes and soakaways (complementary to BS EN 1917:2002)
BS EN 1917:2002	Concrete manholes and inspection chambers, unreinforced, steel fibre and reinforced
BS EN 1610:2015	Construction and testing of drains and sewers.
BS EN 1916:2002	Concrete pipes and fittings, unreinforced, steel fibre and reinforced.
BS EN 1295-1:1997	Structural design of buried pipelines under various conditions of loading. General requirements

2.1.1 Bid and Contract Drawings

The following Drawings, together with other Bid and Contract Documents, shall be taken as being descriptive of the extent and character of the Works under the Contract for Mombasa Port Berth 19B Development Project and associated infrastructure

It shall be anticipated that minor revisions of alignment of locations, sections and details may be made during the works. The Contractor shall perform the works in accordance with the intent of the Drawings and Specifications, and shall take no advantage of any errors or omission in the Drawings or discrepancy between the Drawings and Specifications. The Engineer will make such corrections and interpretations, which are deemed necessary for the fulfillment of the Specifications and Drawings. Where dimensions on the Drawings are given or can be computed, scaled measurements shall not be used except where approved by the Engineer. Any deviation from the Drawings due to field conditions not anticipated will be determined by the Engineer and authorized in writing.

2.2 GENERAL REQUIREMENTS

2.2.1 General

- (1) Work under this Contract shall be subject to Conditions and Particulars Conditions of Contract, preceding these Technical Specifications.
- (2) The provisions and requirements of this Part 1 shall apply to all Clauses in Technical Specifications whether or not specifically therein.
- (3) This Clause set forth supplementary and additional general requirements for this Contract.
- (4) All works specified by the Contract shall be subject in every respect to the approval of the Engineer.
- (5) The Contractor shall perform all works required in these Specifications. Failure to specify certain works items does not relieve the Contractor of his responsibility to provide a workable installation.
- (6) In the event of ambiguity between the Drawings and Specifications, it shall be settled as specified in Volume I, Form of Agreement.

2.2.2 Interface with Other Contractor(s)

- (1) The Contractor shall bear the sole responsibility to arrange his construction plan and schedule for the works at the interface with other contractor(s) within his construction plan and schedule for the whole works required under the Contract.
- (2) Any miss-arrangement with other Contractor(s) for such part of the work on the part of the Contractor shall not affect the terms of the Contract, until prices and lump sum prices entered by the Contractor.

2.2.3 Contractor's Area

- (1) There will be no area made available to the Contractor for a yard or offices in the port premises in the Mombasa Port. The Contractor makes his own arrangements for storage and working area of materials and plant and for the mixing of concrete materials, casting yard, and offices. Such areas shall be sited to the satisfaction of the Engineer.
- (2) The Contractor shall make every effort to keep the areas in reasonably clean and tidy during the period of the works.
- (3) The Contractor shall make his own arrangements for the supply of fresh water, electricity, telephone, e-mail and other services for temporary works and concrete plant, and shall maintain them at his own expense.
- (4) The Contractor shall, at his own expense, erect and maintain in good condition temporary fences and gates along the boundaries of the areas assigned to him for the purpose of the execution of the works. He shall thereafter confine his personnel, plant and materials within the fenced areas and access shall only be made to such areas by way of such approved gateways.
- (5) Upon completion of the works, the Contractor shall clean up all areas affected by his works, to the approval of the Engineer.

2.2.4 Program of Works

- (1) Within twenty-eight (28) calendar days after issuing date of Commencement of Works, the Contractor shall submit fully detailed construction program and method statement of construction including temporary works such as arrangement of site offices, storage yard, houses, utilities, Engineer's facilities, etc. and materials procurement and labor employment schedule for the works to the Engineer for checking and approval.
 - i. The Construction Program shall show the generally planned progress of the entire works commencing with the site installation and ending with the site clearance upon completion of the works, and shall include dates of commencing and finishing of the various stages of the works and also contain dates of issuing purchase orders, manufactures, shipping arrival and installation of facilities permanently installed.
 - ii. Material procurement and labor employment schedule shall show the delivery dates required construction materials and number of labors at work in accordance with the planned progress of the entire works.
- (2) The preliminary construction schedule which the Contractor has already submitted in outline with his Tender is subject to further adjustment, but are binding in so far as the important and key dates are concerned.
- (3) The total construction schedule is to be adjusted from time to time according to the actual progress of the works will subject to the condition that the date of completion of the respective works will remain unchanged, unless extension of time for completion is approved in accordance with the Contract.
- (4) The following paragraphs specify the specific type of program required under Sub-Clause 8.3 of the Conditions of Contract.
 - i. The Program shall include the time schedule of all works in the form of PERT (Program Evaluation and Review Technique) and in the conventional bar chart or other equivalent approved by the Engineer, consisting of sufficiently detailed and subdivided "activities" and "events" so that the time schedule of portion of any item of works can be identified within an accuracy of one month or a shorter range of time such as may be specially required by the Engineer for a particular portion of the Works. The large quantity items of works shall be divided into a number of suitable sections, and the relationship of preceding and succeeding events shall be clearly indicated. The time schedule shall indicate the time when the Contractor shall submit all shop drawings, data or other documents and samples or other matters in accordance with the provisions for the Specifications, and also describes the reasonable time to be spent by the Engineer for the approval of the Contractor's documents including time for the reply with comments.
 - ii. The programs shall be accompanied with sufficient data and information including all necessary particulars of the Contractor's equipment, temporary works, method of operation, labor forces to be employed, etc. for all activities on all critical paths to indicate the "conservative time" of such activities.
 - iii. Should the Engineer consider it necessary to make any alternation of addition in the programs and time schedule, the Contractor shall conform thereto without additional cost to the Employer in so far as such alternations or additions are reasonable.
 - iv. When the programs and time schedule are approved, they shall be called the original schedule and they shall be considered as an integral part of the Contract and the Contractor shall ensure that all works will be completed within the times indicated on the time schedule except where the Engineer's written approval is obtained beforehand.

2.2.5 Contractor's Equipment

- (1) The Contractor shall submit a detailed list of Contractor's equipment that he undertakes to bring into the site for the execution of the works in accordance with the progress schedule. This list shall satisfy the Engineer as to date of arrival, type, size, capacity or power and quantities of items included. For each item of equipment the type, make, identification number and year of manufacture, whether or not reconditioned, shall be stated. The Contractor shall, in due time mobilize on the site all Contractor's equipment listed.

In no case shall the Contractor remove equipment, or portions thereof from the site without written approval of the Engineer.

- (2) The Contractor shall furnish all the Contractor's equipment necessary for performing each phase of the work, and it must be on the site and inspected and approved by the Engineer before work is commenced on any particular phase. Any plant or equipment or portion thereof that becomes unduly worn, or defective, shall be immediately repaired or replaced to the satisfaction of the Engineer.

2.2.6 Notification and Information Required from the Contractor

(1) Test and Inspection

During the course of this Contract, and as required by these Specifications, various tests and inspections are required and scheduled, the Contractor shall notify to the Engineer in advance of such tests and inspections to allow the Engineer to make preparations. Minimum advance notice shall be as follows:

- 1) When at or near the site: Notify to the Engineer not less than two (2) working days in advance.
- 2) When remote from the Site: Notify to the Engineer not less than seven (7) working days in advance.

Normal working hours for inspection shall be 0800 to 1700 Monday to Friday. Inspections outside normal working hours shall be paid by the Contractor, at his own expense, to the Engineer at a rate of KES 1500 per hour for each Inspector and KES 2,000 per hour for each Engineer required.

(2) Notice of Construction Delays

- 1) Delays in work progress that may or may not become the subject or basis of claims for time extensions shall be immediately reported to the Engineer as soon as such conditions become apparent.
- 2) The Contractor shall set forth and outline the circumstance in written form and submit to the Engineer within two (2) working days of its discovery. The Contractor shall indicate in his report what step are being taken or suggested by the Contractor to rectify the situation.

(3) Notice of Accident and Fire

The Contractor shall immediately report to the Engineer of any accident, fire or other emergencies which has arisen on the site, at temporary work yard or at adjacent areas, irrespective as to whether of the incident may affect the progress of the works or not. The Contractor shall indicate in his report what steps are being taken or suggested to improve the situation.

(4) Meteorological Information

The Contractor shall provide, maintain and operate throughout the construction period such meteorological equipment as necessary for the daily observation of the following.

- a) Rainfall
- b) Wind (direction and velocity)
- c) Temperature
- d) Tide

2.2.7 Care and Supply of Documents

- 1) The Specification and Drawings shall be in the custody and care of the Employer. Unless otherwise stated in the Contract, two copies of the Contract and of each subsequent Drawing shall be supplied to the Contractor, who may make or request further copies at the cost of the Contractor.
- 2) Each of the Contractor's Documents shall be in the custody and care of the Contractor, unless and until submitted to the Engineer. The Contractor shall supply to the Engineer one paper-original, one electronic copy (in the form as stated in the Specification or, if not stated, a form acceptable to the Engineer) and additional paper copies (if any) as stated in the Contract Data of each of the Contractor's Documents.

The Contractor shall keep at all times, on the Site, a copy of:

- a) the Contract;
- b) the records under Sub-Clause 6.10 [Contractor's Records] and Sub-Clause 20.2.3 [Contemporary records];
- c) The publications (if any) named in the Specification;
- d) the Contractor's Documents;
- e) the Drawings; and Variations, Notices and other communications given under the Contract.
- f) The Employer's Personnel shall have right of access to all these documents during all normal working hours, or as otherwise agreed with the Contractor.

2.2.8 Drawings to be submitted by the Contractor

(1) Shop Drawings

- 3) The shop drawing shall mean and include all kind of shops, assembly, installation, and other working drawings inclusive of detailed calculation, specification, data, catalogues and other information accompanying the shop drawings.
- 4) The Contractor shall, if required under the respective sections or where necessary for the proper execution of the works, prepare and submit for the Engineer's approval full detail shop drawings in accordance with the time schedule specified or, if not fixed therein well advance of the commencement of the pertinent works.
- 5) The Engineer will approve or return with comments the submitted shop drawings in accordance with the said schedule
- 6) The shop drawings shall fully illustrate the requirements of the Contract Drawings and Specifications, and shall accurately show kinds and quantities of materials, methods of assembly workmanship and other information required for fabrication, erection and installation. The relationship with adjoining works also is properly shown.

All shop drawing shall be prepared with the scale of the drawing unless otherwise permitted by the Engineer.

- (a) Works, titles and numbers bound in sets, shall identify the drawings inclusive of any printed materials, illustration, etc.
 - (b) No drawings will be checked by the Engineer unless they bear a stamps and signature indicating that the Contractor has checked them and that they have been carefully prepared by competent person familiar with the works and that studies have been made of related works.
- 7) If any of the drawings is rejected or returned with comments for corrections, the Contractor shall submit corrected drawings as directed by the Engineer and shall obtain, in all cases, the Engineer's approval before proceeding with the works. No claim for delay caused by the rejection of drawings will be accepted if such rejection is due to non-compliance of the works shown therein or of the Contractor's responsibilities under the Contract requirements or the procedures specifies herein.
- 8) The submission of the drawings, in either the original submission or resubmission with corrections, shall constitute the evidence that the Contractor has checked all descriptions hereupon, has accepted them and is willing to carry out the works as shown in a workmanlike manner and in accordance with the best standard practice.
- 9) The Engineer's approval of the shop drawings shall not relive the Contractor from any of the responsibilities and duties required under the Contact.

(2) As-built Drawings

- 1) The Contractor shall prepare and keep up-to-date a complete set of "As-built" record of all Permanent Works on the blue prints or CD - R which shall be corrected daily and shall show every change from the Contract Drawings or approved Shop Drawings including the exact as-built locations, size and kinds of works, etc. This set of Drawings shall be kept at the site office of the Contractor and shall be made available at any time for the inspection of the Engineer. These Drawings shall be used only for the purpose of record.
- 2) In addition, the Contractor shall, at his own expense, prepare and submit to the Engineer As-built Drawings of the Permanent Works required under the Contract, which shall show the entire Permanent Works as they have been executed. Such Drawings shall be prepared for the portions of the works completed as the works proceed and shall be submitted to the Engineer for his inspection and approval whenever required. The Drawings shall be identified by the works, title, serial number, etc. and the final drawing numbers shall be entered when all As-built Drawings are completed and are arranged in proper order.
- 3) The Contractor shall submit (6) sets of As-built Drawings with CD – R files upon completion of the Works. Prior to the preparation of the Drawings, the Contractor shall obtain the approval from the Engineer as to the size of the drawings, quality of transparent sheets, method of preparing drawings and other details. No certificate of completion of the works shall be issued by the Engineer before the Contractor submits As-built Drawings specified herein.

2.2.9 Performance Required before Commencement of the Work

The Contractor shall perform the followings prior to the commencement of particular type or kind of work.

- (1) Examine for relevant information, all Contract Documents and subsequent data issued to him.
- (2) Carry out site investigations, survey and sounding, observations as required by the Contract Documents.
- (3) Submit detailed shop drawings of the various works forthe Permanent Works as well as the temporary works.

- (4) Check of approved submittal and verify dimensions at the job site.
- (5) Submit manufacturer's instructions applicable to conditions under which work is to be done.
- (6) Inspect areas, surfaces or constructions receiving the work. Commencement of work shall signify compliance with the above requirements and acceptance of previously completed works as being in satisfactory condition in achieves proper installations and first quality workmanship as intended by these Specifications.

2.2.10 Damage and Restoration

- (1) Damage to existing or newly placed facilities caused by movement of equipment or other operations, whether accidental or made necessary by reason of the requirements of the Contract, shall be restored or replaced as specified or as directed by the Engineer at the expense of the Contractor.
- (2) Restoration shall be equal to structural qualities or performance capacities of original works, and finishes shall match, as nearly as possible, existing adjacent work. Restorations shall be subject to approval of the Engineer.
- (3) Work not properly restored or where not capable of being restored as intended under these Specifications shall be removed and replaced as directed by the Engineer at no added expense to the Employer.

2.2.11 Miscellaneous Provisions

- (1) The Contractor shall immediately inform to the Engineer of any matters described or specified in provisions of the Contract, which the Contractor deems necessary to be revised, modified and corrected on the followings:
 - 1) Not equal to industry standard for achieving a first-class quality installation as intended,
 - 2) Excessive in cost effort to effect the intended results,
 - 3) Below standard for proper enforcement of guarantees required, or
 - 4) At variance with governing laws, regulations, codes or standards.
- (2) The Contractor shall thoroughly examine all Contract Drawings and make a statement that he has satisfied himself as to the form nature and extent of work to be performed in accordance with Contract requirements. Should he discover any imperfection of Drawings, he immediately inform them to the Engineer to correct.
- (3) Work operations relative to any matter referred to the Engineer for consideration shall not proceed until receipt of instruction from the Engineer.

(4) Inspection of Works and Materials

The Contractor shall immediately make a close and thorough inspection of all materials as delivered and all works in progress and shall promptly reject and return all defective materials and redo any substandard work without waiting for their rejections by the Engineer. The Contractor shall check and verify adequate performance or satisfactory results of all tests and inspections before allowing subsequent work to proceed.

2.2.12 Survey and Setting Out

- (1) The Contractor shall provide and maintain survey stations, setting-out beacons and buoys that he may require carrying out the works, and shall remove the same completion of the works.
- (2) The Contractor shall be responsible for all the necessary surveys, measurements and setting-out of the works and shall for this purpose engage qualified and competent surveyors whose names and qualifications shall be submitted to the Engineer for his

approval.

- (3) The Contractor shall obtain in writing from the engineer the locations and elevations of the permanent fixed control points and bench marks to be used as reference for the survey and setting-out of the works.
- (4) The Contractor shall, for the purpose of checking the survey and setting-out, provide to the Engineer all the assistance, which he may require. The chainmen shall be selected for appropriate experience, and as far as possible the same chainmen shall be provided throughout the Contract period.
- (5) Before commencing any works at any location, the Contractor shall give the Engineer not less than twenty four (24) hours' notice of his intention to set out or give levels for any part of the works in order that arrangements may be made for inspection.

2.2.13 Temporary Works, Utilities and Safety Measures

(1) General

- 1) This Clause set forth supplementary and additional provisions relating to temporary works, facilities and safety measures required for execution of the works under the Contract.
- 2) Temporary works, facilities and safety measures specified or required, including coordination in change of services and like activities, shall be provided for proper performance of the works, necessary to comply with all statutory regulations, and as necessary to expedite and promptly execute the works.
- 3) Temporary construction shall be adequate for intended uses and for all loads imposed without excessive settlement, deflection or deformation. All parts and members shall be properly supported, wedged, braced, and secured to prevent displacement of failure.
- 4) Temporary and Permanent utilities to be used for construction shall be adequately supplied to much for the intended uses and shall not be overloaded, used or arranged in any manner endangering persons, premises or work. Constructions shall be properly made with lines and writing securely anchored in place and protected against accidents.

(2) Site Clearance

- 1) The Contractor shall carry out the site clearance on the whole site before the subsequent works under the Contract are commenced. Debris, tree roots, used wire ropes and all the unsuitable materials for the reclamation, piling work and whatsoever shall be removed from the site and disposed at the disposal area designated by the Engineer in a manner satisfactory to the Engineer.
- 2) Any sand soil in the site shall not be used or taken out from the site without prior permission of the Engineer.
- 3) Completion
 - (a) Upon or before completion of the works, if so required or directed, temporary structures installations and utility service shall be disconnected and removed from the premises.
 - (b) Exterior areas used for temporary installations or works shall be returned to their original conditions as much as possible or otherwise completed as required at such areas.

(3) Temporary Work Yard, Utilities and Services

1) Temporary Work Yard

The Contractor shall arrange the temporary work yard by himself as his own expense

and responsibility

2) Water

The Contractor shall provide adequate capacity of water for construction purposes and living necessities as listed below at his own expense.

(a) Drinking Water

The drinking water shall be supplied by the Contractor at his expense and responsibility. The Contractor shall provide and maintain canister cooler or connected drinking fountain of sufficient number to reasonably serve the works.

(b) Construction Water

The Contractor shall provide and maintain temporary water service and distribution of adequate capacity for construction purposes, including portable units reservoir, etc. as necessary at his own expense. .

3) Power and Lighting

(a) The Contractor shall provide and maintain temporary electrical system for distribution of adequate capacity of power, lighting and other construction needs including wiring, transformers, safety devices, connections, etc. as necessary at his own expense.

(b) The Contractor shall provide temporary lighting as necessary to properly and safely performing the works at enclosed spaces or hazardous conditions. Likewise night illumination shall be provided for as necessary.

(c) Temporary electric system shall comply with the local codes and requirements.

4) Sanitary

(a) The Contractor shall provide and maintain temporary toilet facilities of the type in sufficient quality for the service of the temporary working yard and the site.

(b) These facilities shall be maintained daily with cleaning and supplies.

5) Waste and Rubbish

(a) The Contractor shall provide regular daily clean up and removal of trash, waste, construction debris, etc., from the site and temporary work yard.

(b) Transportation to disposal areas and disposal of waste and rubbish shall be arranged by the Contractor.

(4) Temporary Jetty

There will be no areas made available to the Contractor for temporary jetty/load out facilities. The Contractor shall make arrangements as necessary at his own expense to secure such facilities in the vicinity of work area. The locations of the area proposed shall be subject to the approval of the Engineer. The Contractor will be responsible for the provision and maintenance during of the Works, of all temporary jetties and mooring necessary for the Engineer's launch, safe transfer of all personnel, and safe operation of all floating plant and craft. All such jetties and moorings shall comply with all relevant regulations and by-laws and be subject to the approval of the Engineer.

(5) First Aid and Fire Protection

1) Emergency Calls

The list of locations of the nearest available police, hospital or medical services shall be maintained at the Contractor's site office for emergency calls.

2) Fire Protection

- (a) The Contractor shall establish appropriate emergency routes and procedures and submit such plans to the Engineer.
- (b) Fire extinguishers, connected hoses and other facilities necessary for reasonable fire extinguishing action shall be maintained at the site and the temporary work yard.

3) **Minor Injuries**

The Contractor shall provide and maintain at the site office a reasonable number of bandages and sterilized materials for first and treatment of minor injuries.

(6) Safety Measures during the Construction

- 1) Trenches intersecting thoroughfares shall be provided with bridges or other crossing suitable for safety carrying the type of the traffic involved as necessary.
- 2) Open shafts, opening in floor, ramps, platforms and other such conditions shall be protected by barricades or railings.
- 3) Scaffolding, ladders, ramps, hoists and other facilities shall be provided, maintained and operated as necessary.
- 4) Storage and shop area shall be provided, arranged and maintained as designated approved locations as necessary to properly store, handle and fabricate the various materials and equipment required.
- 5) Only persons certified and experienced in handling boats shall be allowed to operate boats of any type. The maximum number of persons that each boat can safely carry shall be plainly marked thereon, so that it is readily visible. Each craft shall be provided with life vest for the maximum number of persons than can safely be carried.
- 6) All men at work over water where there is a possibility of drowning shall wear life vests. In additions all barges, boats and power-propelled boats shall be equipped one or more readily available ring life preservers with at least 18 meter of line attached.

(7) Interruption of Work due to Safety Precaution

- 1) Refer to Sub-Clause 4.8 of General Condition of Contract
- 2) When, in the opinion of the Engineer, any operation, works or working conditions are such as to present danger to persons and/or property, such work shall be immediately interrupted and Engineer's action shall, by no means, be interrupted as relieving the Contractor of any of his responsibilities in the execution of his work, nor shall any compensation by extension of time be made to the Contractor on account of any interruption of the works due to implementation of safety measures.

(8) Safety Traffic Conditions with City Traffic

The Contractor shall recognize the current city traffic pattern and conditions near the entrance and exit of the port to/from the Site. The Contractor shall minimize disturbance to city traffic due to increase in traffic flows for his works.

The Contractor shall prepare general transportation plan and submit to the Engineer.

(9) **Application for Construction**

The Contractor shall be responsible for application for construction of the respective works required under the Contract to the related governing authorities.

(10) Miscellaneous

- 1) The Contractor shall provide adequate means of communications between the working boats, job site and the Contractor's office.
- 2) The Contractor shall provide all temporary navigational aids, markers, light and notice as may be required for the safe executions of the works or by laws, regulations, and all authorities.
- 3) Temporary enclosure shall be built using suitable materials to surround the site and also other places where the Engineer designates. The Contractor shall also provide entrance of the enclosure where the Engineer designates.
- 4) If the Engineer judges necessary, the Contractor shall provide suitable protection for the construction objects adjacent buildings, land road, etc. to protect them from damage.
- 5) It shall be the responsibility of the Contractor to provide by himself temporary facilities with sufficient strength, capacity and safety for the construction of all works or unloading of the Contractor's equipment, plant and materials required under the Contract.
- 6) The Contractor shall prepare "Port Pass" for all his staff and workers at his own cost, if necessary.

2.2.14 Survey Works

(1) General

Before the works or any part thereof is commenced, the Contractor shall carry out the topographic survey and hydrographic survey on the designated area and sub-soil investigation required under the Contract, at his own cost.

All survey shall be carried out in reference to bench marks or monuments, and chart datum designated by the Engineer.

All survey shall be carried out by licensed and well-experienced surveyors. The Contractor shall submit in advance true copies of licenses and qualifications of the surveyors to be employed for the works to the Engineer for approval.

Prior to the commencement of any survey work, the Contractor shall submit the work program describing general work arrangement, equipment to be employed and time schedule of the works to the Engineer for approval.

(2) Topographic Survey

- 1) The Contractor shall carry out the topographic survey of the project areas such as container terminal area, existing KOT I area to be demolished and access road as shown on the Drawings.
- 2) The Contractor shall prepare topographic maps on approved plastic sheets in 1/500 and 1/1,000 scales. The maps shall show all existing facilities, structures and other salient features of the area within an accuracy of 1/3,000 in respect of their positions and shall have contour lines of 50 cm vertical intervals or directed by the Engineer.
- 3) All stations shall be established by closed traversing with an error of closure of not more than 1/3,000 and return or closed leveling within an accuracy of 20 mm in 1 (one) kilometer.
- 4) The survey shall be carried out in the presence of the Engineer in 20 m intervals grid established prior to the commencement of the works.
- 5) Field notes, calculation sheets and other documents shall be prepared in English language and submitted by the Contractor in a manner approved by the Engineer for the inspection thereof.

(3) Hydrographic Survey (Type HS-1)

- 1) The contractor shall carry out the hydrographic survey of the project area as shown Drawings.
- 2) The sounding shall be carried out by an echo sounder of approved manufacturer

capable of sounding the depth within in accuracy of 10 cm. The recording paper shall be of dry type. Tidal observation shall be carried out continuously during the sounding operation.

- 3) The sounding shall be made by the Contractor under the supervision of the Engineer along the lines of sounding from the existing shoreline at every 20m intervals established prior to the commencement of the works unless otherwise directed by the Engineer. The sounding shall, as far as possible, be performed in calm weather condition.
- 4) Recorded data shall be corrected by the fraction index of underwater acoustic velocity. In order to obtain the value of correction, bar check shall be performed before and after sounding in one-way work.
- 5) After survey, the Contractor shall immediately prepare sounding maps on approved plastic sheets in 1/500 and 1/1,000 scales. The maps shall have contour of 1.0m vertical intervals.
- 6) Fields notes and other documents shall be prepared and submitted as specified Sub-Clause (2) above.

(4) Sub-soil Investigation

1) General

- (a) Objective of this sub-soil investigations are confirmation of tip of foundation piles of Berths and index of soil improvement by Vibrofloatation methods
- (b) The Contractor shall carry out the sub-soil investigation in accordance with the following requirements
A-1219 Method for standard penetration test or latest edition of BS Standard.

2) Boring and In Site Test

- (a) The Contractor shall locate the site for the work where instructed by the Engineer. The Contractor shall be solely responsible for the accuracy of such setting out of the works. The locations and their necessary depth of boring will give an outline as followings;
 - i) Sand Source Area (Five (5) Locations)
 - ii) Container Berth No. 19B; (Four (4) locations)
This will be located on the alignment along the face line of Container Berth No.19B. The boring will be stopped at weather rock stratum that will be considered as bearing stratum of the foundation piling.
 - iii) Container Terminal; (six (6) locations)
They will be located on the container stacking yard. The Contractor shall confirm thickness of soft stratum under original seabed by the boring tests.
- (b) Boring shall be made by use of rotary drilling methods with suitable length of casing tubes. The Contractor shall be solely responsible for a proper execution of borings and shall provide necessary arrangement and provisions to prevent

bored hole from cave in during the operation.

- (c) During the boring operations, the standard penetration tests shall be carried out as every 2m intervals and at any depth where sub-soil changed in characters. Samples of the soils taken therefrom shall be sealed and labeled in accordance with the requirements of latest BS or equivalent for identification of the soils. All the samples of soils shall be submitted to the Engineer in the sealed bottles with description of number and depth of borehole.
- (d) The Contractor shall take undisturbed samples of soils from layers where clayey materials exist or minimum 5 samples from one borehole unless otherwise directed by the Engineer by means of thin wall tube sampler. All undisturbed samples shall be properly sealed and transported to the approval laboratory for laboratory tests.

3) Laboratory Tests

- (a) The Contractor shall perform the following tests on samples of soils taken at the laboratory approved by the Engineer.

Unit weight

Water contents

Water contents Liquid limit and Plastic limit

Grain size

Specific weight

- (b) The Contractor shall also perform the following tests on undisturbed samples.

Unconfined compression test

Triaxial compression test

Consolidation test

4) Reports

Within 1 (one) week after completion of borings and tests or at such time as may be directed by the Engineer, the Contractor shall submit 5 copies of sub-soil investigation report which shall cover all particulars of the investigation including drawings to indicate locations and elevations of the borings, boring logs and laboratory test results. File notes, calculation sheets and all related documents shall be prepared by the Contractor and submitted to the Engineer as he requires.

2.2.15 Material and Workmanship

(1) Materials

1) General

All materials used in the Permanent Works shall unless otherwise stated in the respective sections or the Specifications, be of first-class quality, brand new, never used and comply with the following general requirements and shall be procured in accordance with the procedures outlined in the following paragraphs.

2) Grade of Materials

When reference to standards is made without indications of specific grade, the materials shall comply with the suitable grade thereof to be selected in consideration of their purposes and approval by the Engineer.

3) Schedule of Materials

Schedule of materials starting full details of materials to be procured and to be used

in the Permanent Works shall be submitted by the Contractor to the Engineer for approval prior to placing the order. In all cases where the name of a particular type of make of materials is referred to in the Contract, this indicates the acceptable standard. The Contractor may offer materials other than those specified and in all such cases, the Contractor's offer shall be of as least equal quality. When alternatives are offered, the Contractor shall submit to the Engineer for approval a statement detailing the alternatives, and shall include full technical descriptions, drawings and specifications, and shall provide such further information as is demonstrate to the Engineer that the alternatives are equivalent or better to the items specified. The Engineer has the right to reject materials, which have already installed but not in compliance with the approved schedule. The Contractor shall replace such materials in accordance with the instructions of the Engineer without any added expense to the Employer.

4) Other of Materials

After obtaining the Engineer's approval, the Contractor shall place the order for materials in accordance with the time schedule or at such other times as may be necessary. The Contractor shall forward copies to the Engineer of all orders placed by him for the supply of materials to be used in the Permanent Works.

5) Trade Names

Trade names of the materials indicated in the Contract Documents, if any, are intended only to show the standard of the materials on which the design of the particular work is based and also to avoid ambiguous description of the materials on the Drawings and the Specifications. The indications of the trade names, therefore shall in no way be considered to limit the acceptability of other products of equal or better functions, performances, liability and durability.

6) Packing

All materials shall be delivered to the site in such packages as are normally used for transporting the same to a tropical country and shall be identifiable in a manner to be acceptable to the Engineer.

(2) Workmanship

- 1) The workmanship employed in all works shall be of first-class grade in terms of internationally recognized standards of practice and the works shall be subject to the approval of the Engineer.
- 2) The Contractor shall make available highly experienced and reliable foremen and equipment operators specially trained to handle such works as dredging (excavation), replacement, berth structure, retaining wall, revetment, soil improvement, road and railway construction, reinforced concrete works and pile driving works.

2.2.16 Test and Inspection

(1) Test Laboratory

- 1) The Contractor shall construct a site laboratory or provide an authorized laboratory at a convenient place approved by the Engineer, where all required laboratory tests specified in various Clauses of the Specifications shall be carried out.
- 2) The laboratory shall have sufficient working area and shall be equipped with all-necessary facilities, equipment, apparatus, tools, furniture etc., and shall also be provided with a suitable storeroom.
- 3) The Contractor shall run and maintain the laboratory. The Engineer shall, however, have the right to use the laboratory at any time he wishes. If so directed by the

Engineer, the Contractor's activity in the laboratory shall be limited to the normal working hours and in the presence of the Engineer.

(2) Tests

- 1) The Contractor shall carry out all tests required in the various Clauses of the Specifications except for the tests expressly stipulated to be made by others in the presence and under the supervision of the Engineer, and the Contractor shall submit to the Engineer five copies of the fully detailed test reports within one (1) week from the completion of the respective tests or within such time as may be specifically directed by the Engineer.
- 2) The Contractor shall supply and maintain complete set of testing equipment, apparatus, tools, gauges, instruments, etc., and shall provide all necessary materials, specialists and labor required for carrying out the tests.
- 3) The Contractor shall prepare and supply, as directed by the Engineer, all samples, test pieces, specimens, etc., required for the test to be made by others as well as for the test to be carried out by him.
- 4) Testing equipment, specialists and labors shall be provided in consideration of the program of the works and on the basis that all specified tests can be completed within the normal working hours of one shift only except for the tests of such nature that they are to be carried out continuously.
- 5) All test shall generally be carried out in accordance with the requirements and procedures of referenced standards or as directed by the Engineer. As for the testing methods, other approved equivalent standards may be applied. In such case, the Contractor shall submit beforehand copies of such standards for the Engineer's approval.
- 6) The test shall be considered as particularized, if the purpose or normal title of such test is specified.
 - (a) For estimation purposes, the requirements of Kenyan Standard, BS, ASTM or similar standards shall be taken into account.
 - (b) Where the test are specified to be carried out in a manner directed by the Engineer, the requirements of the above mentioned standards for similar tests shall be taken into account for estimation purposes.
- 7) Unless otherwise expressly stated, all tests and the Works in connection therewith shall be considered as incidental to the Permanent Works which require such tests and all costs thereof shall be deemed to be included in and covered by the Schedule of Rate for each items of the Permanent Works.
- 8) Laboratory equipment shall cover, but shall not be limited to the following tests:
 - (a) Equipment for testing of Concrete
 - (b) Equipment for testing of Aggregates and Rock Materials for general properties according to BS standards
 - (c) Equipment for testing of cathodic protection according to 12696
 - (d) Testing of Fill
 - Equipment for determination of particle size distribution in accordance with BS 1377
 - Equipment for execution of compaction tests in accordance with BS 1377
 - (e) Welds and Coatings
 - Equipment for inspection of welds for surface flaws (magnetic particle techniques)

- Equipment for inspection of coating thickness in accordance with ISO/DIS Standard 2178.

(3) Inspection and Test at Mill

- 1) If so specified or directed by the Engineer, materials to be used in the Permanent Works such as
 - Steel Pipe Piles
 - Fenders
 - Equipment for firefighting pump house
 - Crane Rail
 - Anodes for cathodic protection
 - Grating covers/Manhole covers
 - Switch Gears
 - Generator
 - Transformer

shall be subject to the tests at the mills (factory inspection) by inspecting engineers who may be dispatched by the Employer or the Engineer at the Contractor's expense. The Engineer shall decide factory inspections for what kind of material will be and factory inspections with 4-5 inspectors will be carried out at max. 10 times. Per diems shall be paid by the Contractor at Employer's applicable rates and air travel shall be business class. All costs related to the trips shall be borne by the Contractor.

The Contractor shall ensure in his Contracts with suppliers or sub-contractors that inspecting engineers will have access at all reasonable times to manufactures and supplier's premises and be afforded all facilities and conveniences for marking inspection, taking samples, testing, etc.

- 2) Where certificate are required, four (4) copies of such submittal shall be furnished to the Engineer at the expense of the Contractor not later than thirty (30) calendar days prior to the time that the materials represented by such certificates are needed for incorporation into any Permanent Works. Certificates shall be subject to approval and material represented by such certificate shall not be manufactured, delivered to the Site or incorporated into any Works without such approval.
- 3) Certificate shall clearly identify the material being certified and shall included but not be limited to providing the following information:

Contractor's name, Project name, name of item, manufacturer's name, and reference to the appropriate drawing, related Clauses and Sub-Clause number of Specifications, all as applicable.
- 4) The sample shall be taken and the tests shall be carried out in the presence of the inspecting engineers to be arranged by the Contractor or by the manufacturers without cost to the Employer, all in accordance with practice normally employed for the procurement of respective materials, unless requirements are otherwise specified in the respective Clauses of the Specifications.
- 5) The Contractor shall submit five copies of test reports of the manufacturer as soon as practicable after the tests are completed.

(4) Sample of Material and Workmanship

- 1) After sampling and testing materials as the mills, the Contractor shall furnish, at his cost, samples of materials and workmanship in accordance with the requests of the Engineer for his approval of materials and workmanship. Such samples may be retained

by the Engineer and used as the basis for approving the works and materials at the fields.

- 2) Where samples are required, they shall be submitted at the expense of the Contractor. Such submittal shall be made not less than thirty (30) calendar days prior to the time that the materials represented by such sample are needed for incorporation into any Permanent Works.

Sample shall be subject to approval and material represented by such samples shall not be manufactured, delivered to the Site or incorporated into any Works without such approval.

- 3) Each sample shall bear a label showing the Contractor's name, Project name, name of the item, manufacturer's name, brand name, model number, supplier's name, and reference to the appropriate drawing, related Clauses and Sub-Clause number of Specifications, all as applicable.
- 4) Samples that have been approved may, in the Engineer's option, be returned to the Contractor for incorporation into the Works.

(5) Test at Site

- 1) Notwithstanding any previous inspections and tests, materials delivered to the Site shall be subject to examinations and tests, if so directed by the Engineer.
 - (a) All such examinations and tests shall be carried out by the Contractors at his cost in the presence and under the supervision of the Engineer. In accordance with normal practice in respect of such examinations and tests, if the same may be carried out by the Contractor with his staff and equipment available at the Site.
 - (b) Otherwise, the tests shall be made at a laboratory approved by the Engineer at the Contractor's cost.
- 2) The Contractor shall submit the test report if all the tests are made by him, as specified in item (3) above.
- 3) The Engineer shall have the right to reject any materials, which do not comply with the requirements of the Contract notwithstanding any previous approval thereof.
- 4) The Contractor shall not be entitled to any extra payment or extension of time for completion of the Works on account of the rejection of materials due to their noncompliance with the requirements or of the waiting time reasonably required for carrying out the examinations and tests.

2.2.17 Environmental Management and Monitoring Plan

(1) General

The Contractor shall prepare the Environmental Management and Monitoring Plan (EMMP) and submit to the Engineer for approval within 60 days from the receipt the notice of proceed in accordance with Specifications. The EMMP shall be based on the Environmental Impact Assessment (EIA) Report, 2009 by KPA and take into consideration the Contractors method of construction.

The EMMP is a management manual for the Contractor's use. it shall present in detail how the Environmental Management and Monitoring shall be conducted with the required resources and implementation schedule.

The plan shall cover all the requirements in the specification and relevant licenses (NEMA), laws, regulations and official guidelines of Kenya.

- The general format of the EMMP shall include:
- Policy on Environmental Protection
- Objective
- Work Plan and schedule
- Monitoring Plan
- Organization structure of Environmental Management.
- Mitigation Measures
- Contingency plan for any mishaps related to the other construction work activities.
- Safety Policy
- Waste Management Plan

The Contractor shall implement the EMMP measures as approved by the Engineer. All the cost of preparing and implementing the EMMP shall be deemed to be included in the respective pay items of Bill of Quantities.

An Environmental Management Plan (EMP) was developed and approved by KPA. All monitoring and mitigation measures requested in the EMP shall be followed in the EMMP which shall be approved by the Engineer.

The Contractor shall retain a person in charge of environmental management with at least 10-year experience in the field of marine environmental study and Impact Assessment during the entire construction period.

The measurement of sea water quality, air quality, noise and vibration, traffic and others shall be conducted with the presence of Inspector, who shall be a Engineer Representative so that any particular requirement can be instructed unless otherwise instructed by the Engineer that it is judged not necessary. The Contractor shall

inform the Engineer of the schedule of each monitoring activity at least a week before the day of the monitoring in writing.

(2) Siltation/ Pollution of Surrounding Sea and Seabed Area

The Contractor shall be solely and fully responsible for any siltation, pollution or coloration of sea waters which shall be ascertained to be directly or indirectly caused by any of the Contractor's action such as sand harvesting, sand filling, sand replacement, dumping and reclamation works.

When the quality of sea water near the project area including sand harvesting and dumping area, deteriorates beyond the project allowable limits for water quality, the Contractor shall immediately stop the works and confirm the source of pollution. If it is due to the construction work, the Contractor shall take appropriate actions to mitigate the diffusion of sea water pollution at the Contractor's own cost to the satisfaction of the Engineer.

The Contractor shall not be entitled to any compensation or extension of the Contract Period due to such stoppage of the works resulting from the occurrence of the aforesaid diffusion of sea water pollution, and the necessary investigations and remedial works. The Engineer shall have the right to suspend the works for any indefinite period until the confirmation of the source of the pollution is completed or remedial actions are carried out.

(3) Monitoring Water Quality

1) General

The Contractor shall constantly conduct water quality monitoring survey during excavation, sand filling, reclamation, dumping, sand harvesting works and any other activities which has potential risks to the sea water pollution. In the event the monitoring results exceed the project limits allowable for water quality, the Contractor shall immediately stop operations and mitigate to reduce the rate of diffusion/ turbidity.

The following mitigation measures shall be included in the EMMP.

- Reduce operations (sand/ sediment amount or frequency or otherwise) to reduce the rate of diffusion or turbidity within the project limits.
- Installing silt curtains to prevent the increase and propagation in Turbidity at sensitive habitats.

The Contractor shall submit in detail the proposed turbidity meter to be used to monitor sea water during the works in the EMMP.

The Contractor shall establish the baseline conditions by monitoring turbidity of the sea water with the approved equipment, every day for at least 2 weeks before the commencement of the excavation, dumping, sand harvesting and reclamation works at 50cm, 3m, 6m below the surface at 5 monitoring stations in the proposed project site

A Turbidity meter shall remain on Site at all times shall be periodically calibrated by the direction of the Engineer and shall be available for use by the Engineer at any time.

Monitoring parameters are shown as follows.

SS, pH, COD, DO, Temperature, Salinity and Perspective Degree

2) Relation between Turbidity and Suspended Sediment

Prior to the commencement of the work, the Contractor shall take 3 water samples at 50cm, 3m, 6m below the surface and measure turbidity by the approved equipment at 5 stations in the presence of the Engineer for at least 30days continuously.

The samples shall be sent to a laboratory approved by the Engineer for analysis of Suspended Sediment (SS). From the data collected, the Contractor shall present the relation between turbidity and SS, and the background average value of SS and other parameters at each monitoring station shall be proposed by the Contractor to be approved by the Engineer.

3) Monitoring Suspended Solid Content and other parameters

The concentration of suspended solids in the sea water shall be controlled so that the SS concentration at 50cm, 3m, 6m below surface at 100 meters in any direction from the working points generating turbidity will not exceed the target, +60mg/L from the baseline conditions within the port and + 2mg/L from the baseline conditions offshore outside the port. Measurements shall be made of “mg/L of total suspended solids” using a direct-reading portable turbidity meters which shall be supplied by the Contractor to the Engineer for approval. Measurements shall be conducted 2 times a day at each location so as to cover a range of tidal and current conditions The Contractor shall submit data to the Engineer every day and compile the results into a report every week as will be directed by the Engineer.

The approved turbidity meter shall remain on Site at all times shall be periodically calibrated at the direction of the Engineer and shall be available for use by the Engineer at any time. The Calibration shall be conducted at least once in 4 months.

If at any time the measurements indicate the turbidity level to be exceeded, the Contractor shall take all reasonable measures to mitigate it. Such measures will include modification of construction method or provision of silt curtains. Under no circumstances, if the levels of turbidity specified in this Clause shall be exceeded. The

If mitigation doesn't return monitoring parameters to within the project allowable limits the work shall be suspended. Should such suspension be ordered, it shall not be allowable for the Contractor to claim additional cost and time extension.

Other monitoring parameters shall be measured at the same points and the same depth except for the perspective degree.

4) Silt Curtain/ Fence

As one of the mitigation measures, when the results of monitoring exceed the target and the Engineer judges it necessary, the Contractor shall provide, install and maintain adequate silt curtains to prevent diffusion of water pollution occurred by the excavation, sand filling, reclamation, etc.

The Contractor shall propose in the EMMP the specification of silt curtain including structural details, quantity to be supplied, anchoring system, and method of installation and maintenance procedures. The membrane, which constitutes the main component of silt barriers, shall have properties for effective siltation control.

The Contractor shall comply with any modification required by the Engineer to ensure the effectiveness of the siltation, at no extra cost during the execution of the work.

On completion of the works, the Contractor shall completely remove the silt curtain including sinkers/anchor blocks from site at his own cost.

Notwithstanding the above, the Contractor shall be solely and fully responsible for any adverse siltation or any coloration in the surrounding sea waters and navigation

channel arising out of in connection with excavation, sand filling, reclamation and dumping operations.

(4) Monitoring Air Quality

Air quality monitoring survey shall be conducted 4 times a year to measure the extent of the impact due to the construction activities.

The Contractor shall comply with "The Environmental Management and Co-ordination (Air Quality) Regulations, 2009".

The following mitigation measures shall be included in the EMMP:

- Monitoring pollutant/dust of air quality stations to be proposed at site to confirm the concentration is under the target value. When the measured value exceeds the target value, the mitigation plan to install net-fence of appropriate height and width or watering the construction area generating dust, or examine the construction method/schedule to meet the target value. The detail mitigation plan shall be submitted to the Engineer for approval in advance.

The Contractor shall monitor air quality with approved equipment for 24 hours. The measurements shall start with the baseline study before construction.

Monitoring items are shown as follows.

Oxygen, Carbon Dioxide, (CO₂), Nitrogen Dioxide (NO₂), Nitrogen Oxide, Sulfur Dioxide (SO₂), Suspended Particulate Matter (SPM), Carbon Mono-oxide (CO), Hydrogen Sulfide (H₂S)

The standard specified target values for the purpose of environmental monitoring and protection are shown below.

- Nitrogen Oxide: 80 microgram/m³
- Suspended Particulate Matter (PM₁₀): 200 microgram/m³
- Sulfur Dioxide: 80 microgram/m³

The analysis shall be conducted by the designated laboratory approved by National Environmental Management Authority (NEMA).

The result of the monitoring shall be submitted to the Engineer within one month from each sampling date with the calibration record for the approval from the Engineer.

(5) Monitoring Noise and Vibration

Noise and Vibration monitoring shall be conducted 4 times a year to measure the extent of the impact due to the construction activities.

The Contractor shall comply with “The Environmental Management and Coordination (Noise and Excessive Vibration Pollution Control) Regulations, 2009.”

The following mitigation measures shall be included in the EMMP:

- To monitor noise and vibration at various stations in the site
- The mitigation plan is to install barrier of appropriate height or examine the construction method/schedule to meet the requirement of the above- mentioned regulation. The detail contingency plan shall be submitted to the Engineer for approval in advance.

The Contractor shall submit in detail the proposed equipment to be used to monitor noise and vibration in the EMMP for approval of the Engineer.

The Contractor shall monitor noise and vibration with approved equipment for 24 hours. The measurements shall start with the baseline study before construction. Monitoring items are shown as follows.

- Noise level (LAeq, 12 hours, 6:00a.m. -6p.m., 6p.m. -6a.m.)
- Noise level (LAeq, 1 hour)
- Noise level (L5, L50, L95)
- Vibration velocity (Maximum value during 10 minutes hourly)
- Record of noise and vibration source

The result of the monitoring shall be submitted to the Engineer in 2 weeks after each field survey with the calibration record for the approval from the Engineer.

The sound level meter and vibration meter shall remain on Site at all times, shall be periodically calibrated by the direction of the Engineer and shall be available for use by the Engineer at any time.

(6) Monitoring Traffic Volume

Traffic survey shall be conducted every month during major construction work to measure the extent of the impact due to the construction and any other activities which could alter the current traffic conditions and traffic safety.

- To avoid congestion and accidents, the Contractor shall control vehicles, taking into account the social conditions, such as the time for commuting to and from school, the peak traffic time and other social activities.
- Monitoring traffic volume at the junction of the Berth 20,21,22 & Berth 19B

The Contractor shall submit in detail the proposed methodology to be used to monitor traffic volume for approval of the Engineer.

The Contractor shall monitor traffic volume with approved counters for 24 hours, every month by visual observation. The number of cars for all the directions shall be counted hourly with the following classification.

(7) Classification:

- Passenger cars: Passenger vehicles with less than nine seats
- Light goods vehicles: Land rovers, minibuses and goods vehicles of less than 1,500kg unloaded weight with payload capacities of less than 760kg.
- Medium goods vehicles: Maximum gross vehicle weight 8,500kg
- Heavy goods vehicles: Gross vehicle weight greater than 8,500kg
- Buses: All passenger vehicles larger than mini-buses.
- Motorcycle: All

The result of the monitoring shall be submitted to the Engineer within a week after each field survey

(8) Mangrove Planting and Waste management

The Contractor shall propose the plan for these activities in the EMMP.

The Contractor shall employ an expert of at least 3-year experience in this field for the work. The expert shall be approved by the Engineer. The Contractor shall work with local groups (CBO's) in the plantation area in order to have community involvement.

The plantation and maintenance activities including selection of seedlings, planting, and so on shall be conducted with the presence of Inspector, who shall be an Engineer Representative so that any particular requirement can be instructed.

Required cost for the implementation of Mangrove plantation and maintenance, waste related activities shall be included in the Contractor's Bid Price

2.2.18 Prevention of HIV/AIDS

1) General

The HIV/AIDS prevention plan “HIV/AIDS prevention plan” shall be done in accordance with “the HIV /AIDS Prevention Plan for Construction workers” and KPA AIDS and Drug responsive Intervention (KADRI)Program”

The Contractor shall strictly observe the stipulations in “HIV/AIDS prevention plan” and prepare “HIV/AIDS prevention program”. All the activities, but not limited to, stipulated in the “HIV/AIDS prevention plan” shall be included in the “HIV/AIDS prevention program”.

In the program, the contractor shall install provisional VCT center that meets the national standards on the site within 2 months after receiving the notice under Sub-Clause 8.1 [Commencement of Works] of General Conditions as stipulated in the HIV/AIDS prevention plan and conduct such activities as Condom distribution, IEC material distribution, Voluntary Testing and Counseling Service and other activities as stipulated in the HIV/AIDS prevention program under the supervision of the Engineer.

The Contractor shall conduct “KADRI” program through nominated sub-contractor/service provider

2) Scope of Work

The works covered under this section of the Specification shall include, but not limited to:

Preparation and submission of “HIV/AIDS prevention program” for the approval

Installation of a provisional VCT center that meets the national standards on the site
Execution of the HIV/AIDS prevention measures by implementing “HIV/AIDS prevention program” and “to increase HIV/AIDS awareness among the construction workers in the project, promote behavior change and practices and minimize new HIV/AIDS infections.

Execution of activities such as Condom distribution, IEC material distribution, Voluntary Testing and Counseling Service, Peer education and so on.

Monitoring of the HIV/AIDS prevention measures to examine whether or not the planned activities are implemented effectively.

HIV/AIDS prevention program among the surrounding area including, but not limited to Berth 19B project site, Shimanzi, portreiz and Docks

3) Monitoring

The contractor shall carry out the monitoring activities in accordance with “HIV/AIDS prevention program”. The monitoring report shall be submitted to the Engineer and concerned parties monthly.

4) Promotion of participation into the HIV/AIDS prevention activities

The Contractor shall instruct the Contractor’s Personnel (including all the Contractor's employees, all Sub-Contractors and Engineers' employees, and all truck drivers and crew making deliveries to Site for construction activities) to attend

the Peer education program and other activities stipulated in “HIV/AIDS prevention program” in the course of their employment and during their normal working hours or any period of overtime provided for in the relevant employment contracts and uses all reasonable endeavors to ensure this instruction is followed.

The Contractor shall provide suitable space for the implementation of “HIV/AIDS prevention program” and does nothing to dissuade the Contractor’s Personnel from attending the HIV Prevention Program.

The Contractor shall encourage Contractor’s Personnel to take voluntary HIV/STI testing and provide information on services concerning counseling, support and care of those that are infected.

The Contractor shall ensure that Condoms be provided without charge on Site

5) Timing of Commencement of Work

The contractor shall initiate the HIV/AIDS prevention program as soon as practicable after the Contractor’s Personnel arrive at the Site but in any case, within two weeks after the Contractor’s Personnel arrive at Site.

2.2.19 Engineer’s Office Expenses, Accommodation’s Expenses and Their Services for Engineer’s Staff

(1) General

- 1) This Clause sets forth temporary facilities and equipment, which shall be provided and maintained by the Contractor for the Engineer and his staff.
- 2) Clause 1.2.12, “TEMPORARY WORKS” described the temporary work required to the Contractor for the execution and maintenance of the work.
- 3) The Contractor shall construct, provide, supply, maintain, demolish and clear away, as required and when directed by the Engineer, the temporary facilities and equipment specified herein for the Engineer and his staff, all at the Contractor’s expense and responsibility during the entire period of the Works, This period means until the issuance of the Taking-Over Certificate stipulated in Clause 10 of Conditions of Contract for the whole of the Works, or where so instructed by the Engineer, whichever longer, from the Date of Commencement to the Works.
- 4) The Contractor shall submit, for the Engineer’s approval, the drawings, catalogs and brochures of the temporary facilities and equipment required herein within three (3) weeks after issuance of the Notice to Proceed.

(2) Engineer’s Site Office

- 1) The Contractor shall provide, equip and maintain air-conditioned office, which will include access roads, services, equipment, fittings, furnishings and everything specified insofar as required by the Engineer for the sole use of the Engineer, his representatives and other persons authorized by him. The Contractor shall provide such offices as soon as practically possible within sixty (30) days after issuance of the Notice to Proceed. The Contractor shall provide each one (1) Engineer’s office having a total area not less than 400 m².
- 2) Location of the site office shall be within the temporary working yard of the Contractor or as directed by the Engineer. The site office shall cover, but not limited to at least the following:
 - (a) Two independent office rooms with a floor area of 30 m² respectively

- (b) One office room with a floor area of 200 m²
- (c) One conference room with a floor area of 50 m²
- (d) One kitchen with a floor area of 18 m²
- (e) Store room with a floor of 10 m²
- (f) Toilets and shower rooms (separate Ladies and Gents)
- (g) Sheltered car park for six mobiles

3) Construction

The Contractor shall construct and furnish the office in accordance with the following Specifications and as directed by the Engineer. All materials, equipment, furniture, etc. to be used in the work shall be brand new unless otherwise specially permitted by the Engineer.

- (a) The office shall be of a construction and design suitable for the climate conditions prevailing. The office shall be constructed of suitable materials with reinforced concrete foundation or equivalent. The office shall be properly air-conditioned and protected against weather, insects and burglars.

The eaves shall project at least 1.5 m beyond the office and the space between roof and ceiling shall be properly ventilated.

All rooms shall have ceilings and the minimum internal headroom at the rooms shall be 2.8 m.

The floors shall be constructed of concrete. The floors of the office rooms shall be covered with approved ceramic floor tiles. The floors and walls of the washrooms and kitchen shall be tiled with ceramic tiles. The walls shall be of approved suitable material and finishing. The doors shall be flush doors with external flyscreen and cylinder lock. The window shall be standard sliding windows with clear glass and blinds for office and obscured glass for toilets with external flyscreen.

- (b) The office shall be adequately provided with electric light and power and their ancillaries such as power sockets and LAN outlets, WLAN etc., running water and portable water and fuels for kitchen.

Each washroom shall be fitted with a washbasin with shelf and mirror and a water closets with a plastic hinged seat and flap as well as urinal for gents toilet all supplied with running water and connected to septic tank.

The kitchenette shall be fitted with a sink with adequate and suitable waste disposal and supplied with running water, with means for boiling water and with one unit of 450 liters electric refrigerator, adequate lockable cupboards, shelves, drawers, kitchen utensils and the like.

The Contractor shall install at least ten (10) air-conditioners, each with a capacity of 18,000 BTU/Hr (AI Standard 110-58) in the office, as indicated by the Engineer.

- (c) The Contractor shall arrange for, provide, install and construct adequate and sufficient means of telecommunication system for the sole use of the Engineer's offices. The offices of the Engineer shall be connected with the international telecommunication system by telephone, email and fast internet connection.

4) Furniture and Equipment

The Contractor shall provide the following furniture and equipment for the Engineer's site office. All furniture and equipment are subject to approval of the Engineer prior to installation to the office.

<u>Furniture and Equipment</u>	<u>Q'ty required</u>
- Chairs for conference table	24 nos.
- Conference Table	1 no
- Office workstations and chairs	36 sets
- Filing cabinet, steel, size 90 x 180 x 45cm min.	8 nos.
- Filing cabinet, steel, size 90 x 100 x 45cm min.	5 nos.
- Full color printer/photocopier/scanner all-in-one machine max. size A3 w/sorter, min. 3 paper trays, duplex/documents feeder (e.g. Konica Minolta bizhub)	3 nos.
- Desk top type computer, Intel core i9 or later, min. 16gb RAM, MS Office, Auto-CAD infrastructure Design Suite Premium and Windows 11 or later installed	10 nos.
-Laptop type computer (Ultrabook type), HP omen Intel core i9 or later, min. 16gb RAM, 512 SSD, MS Office, Auto-CAD infrastructure Design Suite Premium and Windows 11 or later installed	9nos
- White board w/180cm width	5 nos.
- Electric water dispenser (hot and cold)	3 nos.
- Apple iPhone latest pro max 256GB ram 5G(Sub-6GHZ) or its equivalent	5nos.
- PWS -4500 Sony Pro Video Camera	1nos.
- A1 color HP Design jet T650 36-inch	1nos.

5) The Contractor shall provide all supplies, consumables, the cost of which including all running cost such as electricity, water supply, cooking gas, telephone, e-mail charges, portable water, fuel for office cars, stationary, sanitary goods, kitchen utensil, washing powder, expenses for working permit, other expenses for requests by the Kenya Government or related authorities, etc. shall be scheduled against the appropriate item in the Bill of Quantities.

6) Upon the completion or termination of the Contract, the office and office furniture and equipment shall remain the property of the Employer.

7) Office Staff

The Contractor shall provide two office assistant staff for the Engineer's office as required.

(3) Engineer's Residences

1) The Contractor shall provide, equip and maintain air-conditioned residence within a distance of 15km of the project site for sole use of the Engineer, his representatives and other persons authorized by him. The Contractor shall provide such residences as soon as practically possible within sixty (60) days after issuance of the Notice to Proceed. The Contractor shall provide one (1) for Foreign Engineer's residence. The exact location and their residences shall be subjected to the approval of the Engineer.

2) Residence with three bed rooms complete with dining, living, kitchen, bathroom/toilet, and utilities such as electricity, emergency generator set, telephone, Internet WIFI, TV (with Korean channels and Netflix), portable water supply, cooking gas and sanitary shall be provided.

3) The following furniture and equipment shall be furnished for each residence designated for three (3) expatriate staff. All furniture and equipment shall be subject to the approval of the Engineer.

Furniture and Equipment	Q'ty required
Working desk, wood, w/drawers	3
Chair for above w/arm rest	3
Bed including mattresses, bedclothes and pillows	3 set
Dining table w/6 or more chairs	1 set

Living furniture including sofas and table	1 set
Cupboard, wood, size 90 x 180 x 45cm min.	2
Bookshelf, wood, size 90 x 180cm min.	1
Wardrobe	3
Chest of drawers	3
Table lump	3
Refrigerator, 450 liter capacity min.	2
Kitchen utensils	1
Table wear for min.4 persons	1 set
Emergency generator, 2 KVA	1 set
Cleaning Machine	1 set

- 4) All living, dining and bedroom areas shall be provided with air-conditioner with sufficient capacity. A combination of cook-steward or one cook and one steward shall be provided for each residence.
- 5) The Contractor shall bear the expense providing the Engineer and his staff with hotel accommodations until completion of above-mentioned residences from the date of Commencement of the Works stipulated in Clause 8.5 of the General Condition of Contract.

(4) Transportation

(4)-1 Vehicles

- 1) The Contractor shall provide and maintain transport as listed below for the exclusive use at all times of the Engineer, his representatives and those persons authorized by

him.

The Contractor shall provide following vehicles with licensed drivers:

- 3 Nos. Sedan Type Cars (2000 cc class) with air-con.;
- 2 No. 4WD Land Cruiser class V6 (4,000 cc), and
- 1 Nos. 4WD High Ace Wagon class (2,700 cc, 10 persons) with air con.

- (a) license and comprehensively insure the vehicles for carriage of authorized passengers, goods and samples on the public road;
 - (b) provide fuel, oil, servicing, spare parts and tires, as necessary and in accordance with the manufacturer's recommendations;
 - (c) provide each vehicle with a spare wheel, wheel wrench, jack and handle , tool kit, tow rope, first aid kit, a fitted fire extinguisher and seat belts.
- 2) The vehicle shall be new and shall be provided within one month of an instruction from the Engineer and shall be fueled, oiled and maintained as aforesaid during the entire period of the Works. This period means until the issuance of the Taking-Over Certificate stipulated in Clause 10.1 and 10.2 of General Conditions of Contract for the whole of the Works, or where so instructed by the Engineer, whichever longer, from the Date of Commencement to the Works.
 - 3) The Contractor shall provide competent and licensed drivers approved by the Engineer for the vehicles indicated above. Sufficient drivers shall be available at night and at weekends.
 - 4) In the event of a breakdown, the Contractor shall provide equipment replacement vehicle immediately upon the request of the Engineer.
 - 5) Until the arrival of the above transportation, the Contractor shall provide the Engineer with rented transportation of equivalent standard and number. Such temporary transportation shall be subject to the approval of the Engineer.
 - 6) After completion of construction works exclusive of Defect Liability Period, the

vehicles above mentioned shall be handed over to the Engineer.

7)

(4)-2 Sea transport

- 1) The Contractor shall provide for the exclusive use of the Employer & Engineer when required, a minimum 15 ft motor boat with shallow draft and a minimum 40-60 HP outboard, reversible, of a type and manufacture approved by the Engineer, together with an experienced crew. The Contractor shall provide all consumable stores and pay all mooring and other fees required. The payment will be made authorized for the hours actually used.

(5) Survey Instruments

- 1) The Contractor shall supply and maintain each one (1) set of following survey instruments for the sole use of the Engineer. The Contractor shall supply such survey instruments as soon as practically possible within sixty (60) days after issuance of the Notice to Proceed.
 - (a) Portable GPS 2 Nos.
 - (b) One Total Station, completes with tripod and other accessories.
 - (c) One automatic level, 10 minutes readings, completes with tripod and other accessories.
 - (d) Three leveling staffs, 3 meter long, center-hinged.
 - (e) Ten ranging poles, 2 meter long.
 - (f) Two each of measuring steel tapes and nylon tapes calibrated, 50 meter long, thermometer and other accessories.
 - (g) Four walkie-talkies possible to communicate between the site office and the site (approx. 2 to 3 km)
- 2) Upon the completion or termination of the Contract, the survey instruments shall remain the property of the Employer.

(6) Delay of Work

If there is any delay in providing the temporary facilities specified herein, the Contractor shall provide, at his cost, the under-mentioned to the Engineer for immediately purposes until they are completed or become available for use.

- 1) Temporary office until the required office is completed or made available for use.
 - 2) Hotel accommodation until the residences are completed or become available for use.
 - 3) Rental mobiles with drivers, fuel and other necessary maintenance until the required mobiles are delivered or become available for use.
 - 4) The Engineer reserves the right to suspend any relevant works of the Contract which, in the opinion of the Engineer, cannot be executed without supervision of the Engineer, should the completion of the temporary works required herein be delayed.
- (7) Removal and Clearing of Works**
- 1) Upon completion of the Contract or termination of the Contract or at such time as may be directed by the Engineer, the Contractor shall remove temporary works specified herein from the Site in a manner directed by the Engineer.
 - 2) Some of temporary works herein specified as supplied may be requested to remain at Site for the future use of the Employer, of which details shall be as directed by the Engineer.

3)

2.2.20 Submittals

(1) Documents to be supplied by the Contractor

The Contractor shall prepare and submit, to the Engineer for approval the following Documents in a manner specified herein, unless otherwise required under various Clauses of the Specifications or unless otherwise required under various Clauses of the Specifications or unless otherwise requested by the Engineer.

1) Reports, Instructions and the like

- (a) Reports and records of all tests on materials to be used the Permanent Works carried out by the Contractor or by his suppliers shall be submitted to the Engineer not later than fourteen (14) days or as directed by the Engineer before they are to be applied to the respective works.
- (b) Brochures and technical literatures of all equipment and fixtures which are to be permanently installed in the works shall be submitted to the Engineer not later than fourteen (14) days or as directed by the Engineer prior to their installations.
- (c) All instructions, in the form of lists, manuals and the like which are required by the Engineer for the purpose of operation, maintenance and repair of equipment, structures and facilities shall be submitted to the Engineer within fourteen (14) days after the receipt of the Engineer's order.

2) Drawings and Calculations

- (a) Survey and sounding drawings as required by the Specifications shall be submitted to the Engineer within seven (7) days after the completion of the works concerned.
- (b) Drawings and calculations for all temporary works including drawings and calculations for any part of Permanent structures which are fully or partially used as temporary works or as a support thereof shall be submitted to the Engineer at least fourteen (14) days prior to the commencement of the temporary works.
- (c) General layout plan of the temporary works yard shall be submitted to the Engineer within (30) days after the date of issuance of the Notice to Proceed the Works.
- (d) Structural calculation for temporary construction and erection stages of the Permanent Structures shall be submitted to the Engineer not later than seven (7) days prior to such occurrence, inclusive of determination of the strength and stability of already completed structural members in so far as additional loads occur to them in the course of the execution of the construction works.
- (e) Drawings and calculations in connection with any alternative proposals for design and execution of the special construction method of sequence for construction of erection of the Permanent structures or parts thereof, shall be submitted to the Engineer not later than seven (7) days prior to applying such alternation and special construction methods or sequence.
- (f) Shop drawings, calculations and specifications for all special equipment or construction materials, for which, the manufacturing firms normally do not supply shop drawings shall be submitted to the Engineer not later than fourteen (14) days prior to the commencement of related works. At least brochures with sketches on basic shape, installation dimensions and the like must be supplied in order to enable the Engineer to make an evaluation and a check.
- (g) Detailed shop drawings as required under the various Clauses of the

Specifications shall be submitted to the Engineer not later than seven (7) days prior to the commencement of the respective works.

- (h) Drawings of site measurement and quantity calculations listed and the like shall be submitted to the Engineer within seven (7) days after the completion of the measurement of respective works.
- (i) As-built Drawings for all works showing all changes undertaken in the course of the Construction Work shall be submitted to the Engineer until the issuance of the Taking-Over Certificate of the Works.

(2) Procedure of Approval

- 1) Document to be submitted by the Contractor and to be approved by the Engineer shall be subject to the following procedures principally. The time for submission of the documents described in Sub-Clause 1.2.20 (1) shall be interpreted in conjunction with necessary period for obtaining the approval from the Engineer as detailed hereunder. The Engineer however, reserves the right to reasonably extend the period for his check and review, upon written notice of his intention to the Contractor, of the documents submitted depending on the importance and volume, in the opinion of the Engineer of such documents. In no case, the Contractor shall be entitled to claim any extension of time for completion of the works arising therefrom.
- 2) The Contractor shall submit two (2) preliminary sets of all documents required to the Engineer's site office. All such documents shall be marked "Preliminary". After reviewing and checking, the Engineer will return one (1) set of documents with comments to the Contractor within seven (7) days after receipt of documents.
- 3) The Contractor shall correct or supplement the documents as required by the Engineer, after which he will submit four (4) copies to the Engineer for his review.
 - (a) If still not approved by the Engineer, documents will again be returned to the Contractor within seven (7) days after receipt of second submission of the documents for correcting supplementation and re-submittal.
 - (b) If approved, the Engineer will mark each documents "Approved" and distributed them within seven (7) days after receipt of re-submission as follows.
 - i) Retain one (1) copy for Engineer's file.
 - ii) One (1) copy to Head Office or Site Office of the Engineer.
 - iii) Two (2) copies to the Contractor
 - (c) The Contractor shall submit reproducible copies of approved Documents or Drawings when required by the Engineer.

(3) Submittal Forms

- 1) The Contractor shall prepare and submit to the Engineer for approval the forms of submittal to be used for all submittals required under the Contract to simplify the exchange of letter between the Engineer and the Contractor.
- 2) Forms shall contain at least the following descriptions.
 - a) Name of Project and Contract Number
 - b) Type of form
 - c) Address to and attention to
 - d) Serial number
 - e) Date
 - f) Reference

- g) Title, item and quantity of submittal
- h) Identification such as for review and comments, for approval, for record or for information, etc.
- i) First submission of re-submission
- j) Remarks
- k) Name, title and signature of the person who is authorized to submit the Documents under the name of the Contractor

(4) Daily Log, Weekly Report and Monthly Report

- 1) The Contractor shall maintain a daily log describing important events and activities pertaining to the works, the working hours, the number of labors employed, effective operation time of equipment, over time hours, delays due to meteorological and maritime conditions, the lack of labors, materials or equipment, progress made, and instructions notification and recommendations made by the Engineer. The Log shall be submitted daily and approved by the Engineer.
- 2) The Contractor shall submit to the Engineer five (5) copies of the weekly report on Tuesday of every week indicating progress made, equipment and materials employed or used, labors employed and all-important events in relation to the works.
- 3) The Contractor shall furnish to the Engineer ten (6) copies of the monthly progress report within seven (7) days after the end of every month, indicating progress made, inventories of material used and stored on job site, numbers of labors, equipment, available and hours utilized, the summary of the daily log of the month and all important events in relation to the works.
- 4) All items described in and form of the daily log, weekly report and monthly progress report shall be subject to the approval of the Engineer.

(5) Progress Photographs

- 1) The Contractor shall include, in the monthly progress report mentioned above, photographs relevant to the work progressed during the period.
- 2) Whenever required by the Engineer, the Contractor shall submit two (2) copies of photographs relevant to the works, necessary to record in the opinion of the Engineer, that the work has been in accordance with the Specifications or other necessities record, within ten (10) days after the said photographs were taken of as directed by the Engineer.
- 3) The Contractor shall take panorama view photographs of the Site from two (2) different points and locations to show the whole activities and progress of the works. Such photographs shall be taken monthly after the Commencement of the Works up to the Completion of the whole Works. Points and locations where such photographs are taken from shall not be changed unless otherwise permitted by the Engineer. The Contractor shall submit such photographs monthly at the time of monthly report being submitted in two (2) sets and in size sufficient to understand the activity and progress of the works. Each print shall be accurately dated and identified for future reference.
- 4) The Contractor shall provide and submit three (3) sets of albums showing all photographs taken during the construction period according to the sequence of the works progressed, at the time of submitting the As-Built Drawings to the Engineer.

(6) Documentary Film

The Contractor shall at his expense, prepare and submit documentary films of the construction of the works under the Contract within thirty (30) days after the date of issuance of Taking-Over Certificate of the Works. The films shall be thirty (30)

minutes long video color film (VHS) with English narration and shall show the exact progress and the method of construction for demonstration/advertising the activity of the construction. The Contractor shall, within thirty (30) days after the date of issuance of the Notice to Proceed of the Works, submit to the Engineer his method and sequence of documentary film for approval.

2.2.21 Project Management

This Clause sets forth Employers project management which shall be provided and maintained by the Contractor for the Employer.

- Ad hoc technical expert
- additional project management services
- additional project engineering services
- Training and knowledge transfer through internship
- Dispute Avoidance/Adjudication Board Expenses