Democratic Socialist Republic of Sri Lanka

Preparatory Survey for the Project of Development of the East Container Terminal in the Colombo South Port in the Democratic Socialist Republic of Sri Lanka

Final Report

July 2021

Japan International Cooperation Agency (JICA)

The Overseas Coastal Area Development Institute of Japan

Japan Port Consultants, Ltd.

Oriental Consultants Global Co., Ltd.

4R
JR
21-035

Currency exchange rate
(as of Jun 2020)
USD 1 = 107.748 JPY
USD 1 = 184.680 LKR
LKR 1 = 0.58343 JPY

Contents

Contents of Figure

Contents of Table

Abbreviations

Abbreviation	Description
ADB	Asian Development Bank
AMP	Alternative Maritime Power
APMT	APM Terminals
BOI	Board of Investment
BOT	Build, Operate, Transfer
BS	British Standards
CCTV	Closed-circuit Television
CEDAW	Convention on Elimination of All forms of Discrimination
CFS	Container Freight Station
CICT	Colombo International Container Terminal
COVID-19	CoronaVirus Disease 2019
D/D	Detailed Design
D/E Ratio	Debt Equity Ratio
DGPS	Differential Global Positioning System
DPW	DP World
DSCR	Debt Service Coverage Ratio
DWT	Deadweight tonnage
EBITDA	Earnings Before Interest, Taxes, Depreciation and Amortization
ECT	East Container Terminal
EIA	Environmental Impact Assessment
EIRR	Economic Internal Rate of Return
EOI	Expression Of Interest
EPC	Engineering, Procurement and Construction
EqIRR	Equity IRR
ERD	Department of External Resources
e-RTG	Electric Rubber Tired Gantry Crane
FD	Floating Dock
FF	Fact Finding
FIRR	Financial Internal Rate of Return
FTZ	Free Trade Zone
GDP	Gross Domestic Product
GII	Gender Inequality Index
GNI	Gross National Income
GNSS	Global Navigation Satellite System
GRDP	Gross Regional Domestic Product
GHG	Greenhouse Gas

HIPG	Hambantota International Port Group
HIPS	Hambantota International Port Service
ILO	International Labour Organization
IMF	International Monetary Fund
IRR	Internal Rate of Return
ITR	Interim Report
JBIC	Japan Bank for International Cooperation
JCT	Jaya Container Terminal
JICA	Japan International Cooperation Agency
LOA	Length Overall
LPI	Logistics Performance Index
LWOST	Low Water of Ordinary Spring Tides
MHWS	Mean High Water Springs
MM	Man-month
MOFEPD	Ministry of Finance, Economy and Policy Development
MoWC	Ministry of Women and Child Development, Pre-schools & Pre-School Infrastructure & Education Services
MPS	Ministry of Ports and Shipping
MSL	Mean Sea Level
NVOCC	Non Vessel Operating Common Career
OCR	Optical Character Recognition/Reader
PAL	Ports and Airports Development Levy
PIANC	The World Association for Waterborne Transport Infrastructure (the Permanent International Association of Navigation Congresses)
PPP	Public-Private Partnership
PSA	PSA International Pte Ltd
PVD	Plastic Vertical Drain
QGC	Quay Gantry Crane
ROA	Return On Assets
RTG	Rubber Tired Gantry Crane
RMG	Rail Mount Gantry Crane
SAGT	South Asia Gateway Terminal
SDP	Strategic Development Project
SLPA	Sri Lanka Ports Authority
SVAT	Simplified Value Added Tax
SWOT	Strength Weakness Opportunity Threat Analysis
STEP	Special Terms for Economic Partnership
TEU	Twenty-foot Equivalent Unit
TOC	Terminal Operation Company

TOR	Terms of Reference
TOS	Terminal Operating System
TSHD	Trailing Suction Hopper Dredger
UCT	Unity Container Terminal
ULCS	Ultra-Large Container Ship
UNDP	United Nations Development Programme
USAID	United States Agency for International Development
WCT	West Container Terminal
WISTA	Woman's International Shipping & Trading Association

1. Introduction

1.1 Background of the Survey

In Sri Lanka, the amount of cargo handled in seaports has been rapidly increasing as its economy has grown steadily in recent years. Colombo Port, which is the largest port in the country, has functioned as a leading transshipment hub port in the South Asia region, and approximately 80% of the 2018 container throughput was transshipment freight to neighboring countries such as India. The annual container throughput at the Colombo Port doubled in the last ten years from 3.5 million TEUs in 2009 to 7.0 million TEUs in 2018 and is forecast to reach nearly 9 million TEUs by 2030 and approximately 16 million TEUs by 2050 (ADB, 2019). With such an increase in the cargo demand, unless urgent measures are taken, the capacity of Colombo Port would be saturated and the lack of additional port infrastructure would become a bottleneck for its economic growth.

Colombo Port needs to enhance its container handling function by increasing its cargo handling capacity to cope with the increasing demand of cargo in the future, strengthen its international competitiveness, and maintain a certain position as a container transshipment hub port.

Under the National Development Policy "Vision 2025", the Government of Sri Lanka (hereinafter referred to as "GOSL") has aimed to make Sri Lanka one of the world's leading logistics bases by 2025 and has focused on improving the infrastructure and service quality of the East Container Terminal (hereinafter referred to as "ECT") of the Colombo South Port. In addition, SLPA has formulated the "Port Development Master Plan" in 2016, giving high priority to the development of the ECT.

Based on the policy and plan above, GOSL, the Government of India and the Government of Japan signed a Memorandum of Cooperation (hereinafter referred to as "MoC") on May 28, 2019, confirming that the three countries shall cooperate in the development, operation and maintenance of the ECT in the Colombo South Port.

GOSL submitted to the Government of Japan the official request for a Japanese ODA loan for the “Project for the Development of the East Container Terminal in the Colombo South Port” on September 12, 2019 in accordance with MoC. However, the new administration, which took office after the presidential election in November 2019, announced that the BOT (Build-Operate-Transfer) method instead of the ODA loan would be adopted.

Given the situation above, JICA decided to conduct the Preparatory Survey (hereinafter referred to as “the Survey”) to collect information and data necessary for appraising the viability of applying the investment and financing by Japan for “the Project for the Development of the East Container Terminal in the Colombo South Port (hereinafter referred to as “the Project”) and for a desirable two-tiered system of the ECT, the draft framework of the concession agreement between SLPA and TOC and the business plan and financial model of TOC.

In the later phase, however, changes in the situation surrounding the East Container Terminal resulted in a reduced possibility of utilizing a Japanese ODA loan or JICA’s Private-Sector Investment Finance scheme for the Project. For this reason, JICA decided to cut down the scope of the Survey and

to terminate the Survey.

This Final Report compiles the results of the research conducted prior to the termination of the Survey.

1.2 Scope of the Project

1.2.1 Name of the Project

The Project for the Development of the East Container Terminal in the Colombo South Port

1.2.2 Objectives of the Project

The objective of the Project is to respond to the growing demand for container cargo at Colombo Port by developing the ECT of the Colombo South Port, thereby contributing to revitalizing the logistics and the industrial sector in Sri Lanka.

1.2.3 Outline of the Project (Tentative)

(1) Development of the ECT

1) Development of a container terminal with a quay length of 1,200m, a water depth of 18m and yard space of approximately 70 hectares.

2) Procurement of Cargo Handling Equipment and other necessary systems such as Quay Gantry Cranes (QGC), Rubber Tired Gantry Cranes (RTG), yard chasses with heads, terminal operating system (TOS), etc.

3) Consulting Services including Detailed Design, Tender Assistance, Construction Supervision, etc.

(2) Investment and financing by Japan to TOC

1.2.4 Site of the Project

East Container Terminal at the Colombo South Port

1.2.5 Executing, Implementing and Coordination Agencies

- Executing Agency: Minister of Ports & Shipping: MPS
- Implementing Agency: SLPA
- Department of External Resources: ERD

1.3 Purpose of the Survey

To collect information and data necessary for appraising the viability of applying the investment and financing by Japan for the Project.

To collect information and data necessary for a desirable two-tiered system of the ECT, the draft concession agreement between SLPA and TOC and the business plan and financial model of TOC.

1.4 Scope of the Survey (Terms of Reference)

The Survey shall cover the following items:

1. Preparation of the Inception Report (ICR)
2. Clarification of Background and Necessity of the Project
3. Demand Forecast
4. Survey on Installation of Cargo Handling Equipment on the Existing Jetty
5. Preparation of the Progress Report (PGR)
6. Conceptual Design of Port Facilities
7. Advantage of Japanese Technology and its Applicability to ECT
8. Construction Method (including Measures for Construction Safety)
9. Project Implementation Schedule
10. Gender Considerations
11. Support for Establishment of TOC
12. Preparation of the Final Report (FR)

2. Background and Necessity of the Project

2.1 Current Situation and Challenges of Socio-Economy, Transportation and Industrial Sectors of Sri Lanka

Sri Lanka is an island country with an area of 65,000 km2 and a total population of about 22 million. It consists of nine provinces; the Western Province has the largest population of about 6.1 million, followed by the Central Province (2.7 million) and the Southern Province (2.6 million) (see Table 2-1). In terms of population density, the Western Province has the highest population density of about 1,700 people/km2, while the Northern, Northern Central, Uva, and Eastern Provinces have a population density of less than 200 people/km2.

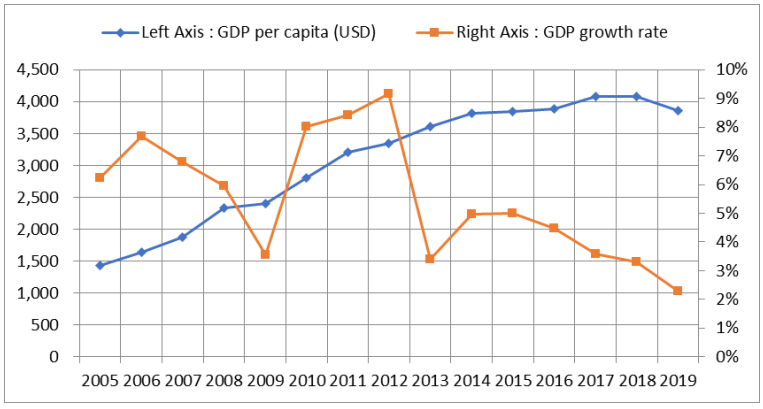
Table 2-1 Estimated Province-Wise Population of Sri Lanka (2019)

	(Unit)	Western	Central	Southern	Northern	Eastern	North Western	North Central	Uva	Sabara-gamuwa	Sri Lanka
Estimated Population (mid-year of 2019)	'000	6,149	2,766	2,654	1,143	1,729	2,551	1,377	1,376	2,058	21,803
(Shares)		28.2%	12.7%	12.2%	5.2%	7.9%	11.7%	6.3%	6.3%	9.4%	100%
Total Area	sq.km	3,593	5,575	5,383	8,290	9,361	7,506	9,741	8,335	4,921	62,705
Density of Population	/sq.km	1,711	496	493	138	185	340	141	165	418	348

Note : Data from Registrar General's Department. Based on Census of Population and Housing 2012. Provisional.

Source: Economic and Social Statistics of Sri Lanka 2020, Central Bank of Sri Lanka

Sri Lanka's economy achieved record high GDP growth rate of over 9% in 2012, as shown in Figure 2-1, due to reconstruction demand and revitalization of economic activity due to the end of the domestic conflict, and thereafter has continued stainable economic growth of 2% to 5%. As for income level, GNI per capita reached about 4,000 USD in 2019, and has thus become a middle-income country (World Bank).



Source: IMF World Economic Outlook Database, October 2020

Figure 2-1 GDP Growth Rate and GDP Per Capita of Sri Lanka

Exports of Sri Lanka increased from about 1.4 trillion LKR in 2015 to about 2.1 trillion LKR

in 2019, and imports increased from about 2.6 trillion LKR in 2015 to about 3.6 trillion LKR in 2019 as shown in Table 2-2. The trade balance has expanded from a deficit of about 1.1 trillion LKR in 2015 to a deficit of about 1.4 trillion LKR in 2018. The export/import ratio has increased slightly from 0.56 in 2015 to 0.60 in 2019. The main export items in 2019 are textiles and clothing (46.9%), tea (11.3%), and the main import items are intermediate goods (57.0%) such as raw materials for textiles and clothing, consumer goods (19.8%), investment goods (23.1%) such as general machinery and construction equipment. There is no significant change over time in the composition of major items.

The major export partners are the United States (26.7%), the United Kingdom (8.5%), India (6.5%), Germany (5.5%) and Italy (4.5%) in 2019 as shown in Table 2-3 and no significant change over time is seen. The major import partners are China (20.2%), India (19.6%), UAE (8.4%), Singapore (4.8%) and Japan (4.4%) in 2019 as shown in Table 24 and no significant change over time is seen.

Table 2-2 External Trade of Sri Lanka

(unit : LKR million)

	2015	2016	2017	2018	2019	2019 share
Exports	1,431,431	1,500,766	1,732,440	1,933,533	2,134,796	100%
Agricultural Exports	337,007	338,727	422,031	418,865	440,080	20.6%
Tea	182,054	184,778	233,338	231,750	240,637	11.3%
Rubber	3,548	4,758	5,920	5,088	4,321	0.2%
Coconut Products	47,745	53,283	53,037	50,465	58,852	2.8%
Other	103,660	95,907	129,736	131,561	136,270	6.4%
Industrial Exports	1,087,938	1,155,706	1,302,575	1,506,200	1,685,442	79.0%
Textiles and Garments	654,794	710,768	767,254	865,975	1,000,713	46.9%
Petroleum Prducts	50,461	41,794	66,280	101,467	93,194	4.4%
Other	382,684	403,144	469,041	538,759	591,535	27.7%
Mineral	3,826	4,219	5,263	5,570	6,063	0.3%
Other	2,660	2,114	2,570	2,898	3,212	0.2%
Imports	2,572,467	2,794,393	3,198,572	3,606,644	3,565,028	100%
Concumer Goods	640,352	628,862	686,424	806,608	707,594	19.8%
Intermediate Goods	1,309,234	1,438,156	1,743,719	2,027,460	2,032,997	57.0%
Investment Goods	620,730	725,473	746,175	760,942	822,954	23.1%
Unclassified	2,151	1,902	22,254	11,634	1,484	0.0%
Balance of Trade	-1,141,035	-1,293,627	-1,466,133	-1,673,111	-1,430,232	
Export / Import Ratio	0.56	0.54	0.54	0.54	0.60	

Note : Data in 2019 is provisional.

Source: Economic and Social Statistics of Sri Lanka 2020, Central Bank of Sri Lanka

Table 2-3 Main Trade Partners (Export)

Export Destination	2015	2016	2017	2018	2019
USA	26.6%	27.3%	25.6%	25.9%	26.7%
UK	9.8%	10.1%	9.1%	8.2%	8.5%
India	6.1%	5.4%	6.1%	6.5%	6.5%
Germany	4.5%	4.9%	4.8%	5.2%	5.5%
Italy	4.1%	4.2%	4.6%	4.8%	4.5%
Belgium-Luxemburg	2.7%	3.3%	3.1%	3.0%	3.0%
Netherlands	2.1%	2.0%	1.9%	2.2%	2.6%
Japan	2.0%	2.0%	1.8%	1.9%	2.4%
UAE	2.6%	2.3%	2.4%	2.4%	2.3%
China	2.9%	2.0%	2.2%	2.0%	2.0%
Others	42.1%	40.8%	43.0%	42.2%	40.3%
Total	100.0%	100.0%	100.0%	100.0%	100.0%

Note : Data in 2019 is provisional.

Source: Economic and Social Statistics of Sri Lanka 2020, Central Bank of Sri Lanka

Table 2-4 Main Trade Partners (Import)

Import Origin	2015	2016	2017	2018	2019
China	19.6%	20.8%	18.9%	18.5%	20.2%
India	22.5%	19.9%	21.6%	19.0%	19.6%
UAE	5.6%	5.8%	8.1%	8.3%	8.4%
Singapore	5.6%	6.1%	6.4%	6.2%	4.8%
Japan	7.3%	5.0%	4.9%	7.1%	4.4%
Malaysia	2.7%	3.3%	3.0%	3.6%	4.3%
USA	2.5%	2.8%	2.3%	2.3%	2.7%
Thailand	2.6%	2.7%	2.5%	2.2%	2.2%
Taiwan	2.4%	2.6%	2.3%	2.1%	2.1%
Germany	1.8%	2.3%	1.9%	2.2%	1.9%
Others	27.4%	28.7%	28.1%	28.5%	29.4%
Total	100.0%	100.0%	100.0%	100.0%	100.0%

Note : Data in 2019 is provisional.

Source: Economic and Social Statistics of Sri Lanka 2020, Central Bank of Sri Lanka

The GRDP by industry and province (2014 - 2018) is shown in Table 2-5. As for shares by industry, agriculture, forestry and fisheries remained at about the same level of 8.0% from 2014 to 2018, mining industry decreased from 28.3% in 2014 to 26.6% in 2018, and service industry increased slightly from 56.9% in 2014 to 57.1% in 2018. The GRDP by industry and province (2017, detailed mining and industry) is shown in Table 2-6.. In terms of share by province, Western Province accounts for 38.6% with the peculiarity that the textile, garment, and leather manufacturing industries, which are export industries, account for 75.4% of the whole country.

Table 2-5 GRDP by Industry and Province (2014 - 2018)

Industrial Origin	Western	Central	Southern	Northern	Eastern	North Western	North Central	Uva	Sabara-gamuwa	Sri Lanka	Share
GRDP in 2014 (unit : LKR Billion)											
Agriculture, Forestry and Fishing	89	118	158	47	77	124	72	80	66	830	8.0%
Industry	1,518	241	186	104	148	315	105	146	170	2,932	28.3%
Services	2,397	656	620	228	304	599	347	299	446	5,896	56.9%
GDP at Current Market Prices	4,295	1,089	1,033	407	568	1,112	561	563	732	10,361	100.0%
Provincial Share in 2014											
Agriculture, Forestry and Fishing	10.7%	14.2%	19.0%	5.7%	9.3%	14.9%	8.6%	9.6%	8.0%	100.0%	
Industry	51.8%	8.2%	6.3%	3.6%	5.1%	10.7%	3.6%	5.0%	5.8%	100.0%	
Services	40.7%	11.1%	10.5%	3.9%	5.2%	10.2%	5.9%	5.1%	7.6%	100.0%	
GDP at Current Market Prices	41.5%	10.5%	10.0%	3.9%	5.5%	10.7%	5.4%	5.4%	7.1%	100.0%	
GRDP in 2015 (unit : LKR Billion)											
Agriculture, Forestry and Fishing	93	125	161	55	82	134	82	91	73	896	8.2%
Industry	1,506	246	186	103	153	309	122	153	197	2,975	27.2%
Services	2,449	705	679	261	344	635	393	322	495	6,283	57.4%
GDP at Current Market Prices	4,365	1,161	1,105	453	624	1,163	645	610	825	10,951	100.0%
Provincial Share in 2015											
Agriculture, Forestry and Fishing	10.4%	14.0%	17.9%	6.2%	9.2%	14.9%	9.2%	10.1%	8.1%	100.0%	
Industry	50.6%	8.3%	6.2%	3.5%	5.1%	10.4%	4.1%	5.1%	6.6%	100.0%	
Services	39.0%	11.2%	10.8%	4.2%	5.5%	10.1%	6.3%	5.1%	7.9%	100.0%	
GDP at Current Market Prices	39.9%	10.6%	10.1%	4.1%	5.7%	10.6%	5.9%	5.6%	7.5%	100.0%	
GRDP in 2016 (unit : LKR Billion)											
Agriculture, Forestry and Fishing	95	128	162	63	84	129	74	87	68	891	7.4%
Industry	1,545	434	208	119	124	342	135	138	292	3,337	27.8%
Services	2,617	766	733	274	375	718	430	340	517	6,771	56.4%
GDP at Current Market Prices	4,643	1,449	1,203	496	635	1,297	697	617	957	11,996	100.0%
Provincial Share in 2016											
Agriculture, Forestry and Fishing	10.7%	14.4%	18.2%	7.0%	9.4%	14.5%	8.3%	9.8%	7.7%	100.0%	
Industry	46.3%	13.0%	6.2%	3.6%	3.7%	10.3%	4.0%	4.1%	8.8%	100.0%	
Services	38.7%	11.3%	10.8%	4.0%	5.5%	10.6%	6.4%	5.0%	7.6%	100.0%	
GDP at Current Market Prices	38.7%	12.1%	10.0%	4.1%	5.3%	10.8%	5.8%	5.1%	8.0%	100.0%	
GRDP in 2017 (unit : LKR Billion)											
Agriculture, Forestry and Fishing	101	149	185	77	107	144	84	103	94	1,044	7.8%
Industry	1,643	460	214	124	139	381	118	216	274	3,569	26.8%
Services	2,836	857	812	299	433	798	478	383	580	7,477	56.1%
GDP at Current Market Prices	5,050	1,616	1,335	551	749	1,458	749	774	1,045	13,328	100.0%
Provincial Share in 2017											
Agriculture, Forestry and Fishing	9.7%	14.3%	17.7%	7.4%	10.3%	13.8%	8.0%	9.8%	9.0%	100.0%	
Industry	46.0%	12.9%	6.0%	3.5%	3.9%	10.7%	3.3%	6.1%	7.7%	100.0%	
Services	37.9%	11.5%	10.9%	4.0%	5.8%	10.7%	6.4%	5.1%	7.8%	100.0%	
GDP at Current Market Prices	37.9%	12.1%	10.0%	4.1%	5.6%	10.9%	5.6%	5.8%	7.8%	100.0%	
GRDP in 2018 (unit : LKR Billion)											
Agriculture, Forestry and Fishing	109	137	187	89	135	167	105	111	98	1,138	7.9%
Industry	1,807	483	231	126	142	414	128	222	266	3,820	26.6%
Services	3,165	939	886	322	468	858	519	421	630	8,207	57.1%
GDP at Current Market Prices	5,544	1,700	1,423	587	814	1,570	821	823	1,084	14,366	100.0%
Provincial Share in 2018											
Agriculture, Forestry and Fishing	9.6%	12.0%	16.5%	7.8%	11.9%	14.7%	9.2%	9.7%	8.6%	100.0%	
Industry	47.3%	12.6%	6.0%	3.3%	3.7%	10.8%	3.4%	5.8%	7.0%	100.0%	
Services	38.6%	11.4%	10.8%	3.9%	5.7%	10.5%	6.3%	5.1%	7.7%	100.0%	
GDP at Current Market Prices	38.6%	11.8%	9.9%	4.1%	5.7%	10.9%	5.7%	5.7%	7.5%	100.0%	

Note : The data is based on the base year 2010 GDP estimates of the Department of Census and Statistics. Provisional.

Source: Economic and Social Statistics of Sri Lanka 2020, Central Bank of Sri Lanka

Table 2-6 GRDP by Industry and Province (2017, detailed mining and industry)

(unit : LKR Billion)

Industrial Origin	Western	Central	Southern	Northern	Eastern	North Western	North Central	Uva	Sabara-gamuwa	Sri Lanka	Share
Agriculture, Forestry and Fishing	106	149	185	75	110	143	86	97	93	1,044	7.8%
Industry	1,596	315	215	170	148	371	125	435	288	3,662	27.3%
Construction	395	100	103	78	93	106	56	53	58	1,041	7.8%
Manufacture of Food, Beverages and Tobacco Products	267	69	60	37	7	31	7	256	150	884	6.6%
Manufacture of Textiles, Wearing Apparel and Leather Related Products	319	46	25	24	1	111	28	4	36	595	4.4%
Mining and Quarrying	28	58	9	21	39	36	26	117	18	351	2.6%
Other Industry	587	43	18	10	8	86	8	5	26	791	5.9%
Services	2,886	841	792	305	420	793	470	394	572	7,474	55.7%
Gross Value Added (GVA), at Basic Prices	4,588	1,304	1,192	549	678	1,307	682	926	953	12,180	90.8%
Taxes Less Subsidies on Products	467	133	121	56	69	133	69	94	97	1,238	9.2%
Gross Domestic Product (GDP), at Current Market Prices	5,055	1,437	1,313	605	746	1,440	751	1,021	1,050	13,418	100%
(Provincial Shares)											
Industrial Origin	Western	Central	Southern	Northern	Eastern	North Western	North Central	Uva	Sabara-gamuwa	Sri Lanka	
Agriculture, Forestry and Fishing	10.2%	14.2%	17.7%	7.1%	10.5%	13.7%	8.3%	9.3%	8.9%	100%	
Industry	43.6%	8.6%	5.9%	4.6%	4.0%	10.1%	3.4%	11.9%	7.9%	100%	
Construction	38.0%	9.6%	9.8%	7.5%	8.9%	10.2%	5.4%	5.1%	5.5%	100%	
Manufacture of Food, Beverages and Tobacco Products	30.2%	7.8%	6.8%	4.2%	0.8%	3.5%	0.8%	28.9%	17.0%	100%	
Manufacture of Textiles, Wearing Apparel and Leather Related Products	53.6%	7.7%	4.3%	4.1%	0.2%	18.7%	4.7%	0.7%	6.0%	100%	
Mining and Quarrying	7.9%	16.6%	2.5%	6.0%	11.0%	10.2%	7.4%	33.4%	5.1%	100%	
Other Industry	74.2%	5.4%	2.2%	1.3%	1.0%	10.9%	1.0%	0.6%	3.3%	100%	
Services	38.6%	11.2%	10.6%	4.1%	5.6%	10.6%	6.3%	5.3%	7.7%	100%	
Gross Value Added (GVA), at Basic Prices	37.7%	10.7%	9.8%	4.5%	5.6%	10.7%	5.6%	7.6%	7.8%	100%	
Taxes Less Subsidies on Products	37.7%	10.7%	9.8%	4.5%	5.6%	10.7%	5.6%	7.6%	7.8%	100%	
Gross Domestic Product (GDP), at Current Market Prices	37.7%	10.7%	9.8%	4.5%	5.6%	10.7%	5.6%	7.6%	7.8%	100%	

Note : The data is based on the base year 2010 GDP estimates of the Department of Census and Statistics. Provisional.

Source: Economic and Social Statistics of Sri Lanka 2020, Central Bank of Sri Lanka

According to the Logistics Performance Index (LPI) by the World Bank, Sri Lanka is ranked 94th in the world, which is higher than Bangladesh (100th) and Pakistan (122nd), but far below Singapore (7th) and India (44th) as shown in Table 2-7.

Table 2-7 Logistics Performance Index (LPI, 2018)

Rank	Country	Score						
		overall LPI	Customs	Infrastructure	International shipments	Logistics quality and competence	Tracking and tracing	Timeliness
1	Germany	4.20	4.09	4.37	3.86	4.31	4.24	4.39
5	Japan	4.03	3.99	4.25	3.59	4.09	4.05	4.25
7	Singapore	4.00	3.89	4.06	3.58	4.10	4.08	4.32
44	India	3.18	2.96	2.91	3.21	3.13	3.32	3.50
94	Sri Lanka	2.60	2.58	2.49	2.51	2.42	2.79	2.79
100	Bangladesh	2.58	2.30	2.39	2.56	2.48	2.79	2.92
122	Pakistan	2.42	2.12	2.20	2.63	2.59	2.27	2.66

Source: World Bank

Gotabaya Rajapaksa took office following the presidential election in November 2019 and introduced the "National Policy Framework - Vistas of Prosperity and Splendour" (Dec. 2019), which calls for a productive citizenry, a contented family, a disciplined and just society and a prosperous nation based on 10 key policies such as priority for maintaining national security as shown in Table 2-8. The macroeconomic policy includes elimination of debt traps, reduction of budget deficits, reduction of trade deficits, reduction of import tariffs on machinery and equipment related to internationally competitive industries, etc. The economic growth rate is set at more than 6.5% as shown in Table 2-9.

Table 2-8 Outcome and Key Policies of the National Policy Framework

Fourfold Outcome	• Productive citizenry • Contented family • Disciplined and just society • Prosperous nation.
10 Key Policies	• Priority to National Security • Friendly, Non-aligned, Foreign Policy • An Administration free from corruption • New Constitution that fulfills the People's wishes • Productive Citizenry and a vibrant Human resource • People Centric Economic Development • Technology Based Society • Development of Physical Resources • Sustainable Environmental Management • Disciplined, Law Abiding and values based society

Source: National Policy Framework - Vistas of Prosperity and Splendour, Dec. 2019

Table 2-9 Macroeconomic Targets of the National Policy Framework

Item	Target
Economic growth rate	6.5% or higher
Per capita income	exceeding USD 6,500
Unemployment rate	at least less than 4%
Annual inflation rate	not exceeding 5%
Budget deficit	less than 4% of GDP
Interest rate	single digit
Exchange value of the rupee	maintaining at a stable level

Source: National Policy Framework - Vistas of Prosperity and Splendour, Dec. 2019

2.2 Port Development Policies of Sri Lankan Government and SLPA

In the national development policy "Vision 2025" , the Sri Lankan government aims to make Sri Lanka one of the world's leading logistics bases by 2025, and raises the need for infrastructure development and service improvement such as ECT of Colombo South Harbor. In addition, in the "Sustainable Sri Lanka 2030 Vision and Strategic Path" (Jan. 2019, Presidential Committee), which is the Sri Lankan implementation guideline for the "Sustainable Development Goals" adopted at the 2015 United Nations Summit, it is recommended to make the best use of Sri Lanka's geographical characteristics and aim to become a transit and logistics hub and commercial hub that connects regions.

In the "National Policy Framework - Vistas of Prosperity and Splendour" (Dec. 2019), port development policies are summarized as shown in Table 2-10. ECT of Colombo South Harbor is to be developed with priority.

Table 2-10 Port Development Policy of the National Policy Framework

Strategy	Activity
Development of Colombo Port	• Colombo sea ports as commercial and passenger ports and convert into free ports. • Upgrade Colombo port to double the transshipment handling capacity. • Prioritize the development of East Container Terminal (ECT). • Feasibility study to construct a new cross-berth terminal between ECT and SAGT • Develop West Container Terminal with private sector participation. • Use rail transportation to transport containers. • Develop road and rail based three container depots in Peliyagoda, Veyangoda and Ratmalana with the participation of private sector.
Development of Hambantota Port	• Revisit the signed agreement and explore possibilities to determine how best we could bring about a win-win situation for Sri Lanka and China. • Develop as an industrial and service port and establish facilities for local businesses to provide services such as ship maintenance, repair and ship chandelling. • Provide all physical infrastructure required for Hambantota Free Trade Zone.
Development of other Ports	• Develop Galle, Kankasanthurai and Trincomalee according to the requirement of each region and needs of national economy.

Source: National Policy Framework - Vistas of Prosperity and Splendour, Dec. 2019

SLPA is a corporation that develops, maintains, operates and provides port services for Sri Lanka's Colombo Port, Galle Port, Trincomalee Port, etc., based on the Sri Lanka Ports Authority Act (Act No. 51 of 1979). It was established by effecting the merger of the Colombo Port Commission Department and the Port Cargo Corporation, the Port Tally and Protective Services Corporation. The act stipulates SLPA's mission, authority, function, organization, staff, property, finance, fees, liability, violations and penalties, etc.

SLPA's vision is "Logistics Excellence in the Silk Route" shifting its original thought of container hub to global logistic hub, and strengthening a complex logistics approach with a "one-touch" information flow. In addition, with the mission of "Delivery of World-Class Services in a Sustainable Environment", SLPA focuses on creating a global logistics hub port and is expected to construct a multi-dimensional logistics system that integrates logistics functions as well as developing a deep-water port with excellent maritime access and specialized terminals that can accommodate large vessels. In the "Port Development Master Plan" formulated by SLPA in 2016, the expansion and maintenance of ECT in Colombo South Harbor is listed as a high-priority plan that should be implemented at an early stage.

2.3 Current Situation and Issues related to Container Handling at Colombo Port

The port facilities of Colombo Port are distributed in the main port (area 184 ha) and the recently developed deep-water South Port (area 285 ha). The approach channel to South Port is 20 m deep, 570 m - 680 m wide, and about 3.8 nautical miles long, allowing large vessels to make two way navigation. At South Port, a turning basin with a diameter of 1,300m is available. The approach channel to the main port includes the west channel (water depth 16 m, width 123 m to 450 m) and the north channel (water depth 13 m). The breakwaters include the South Port breakwater (length of about 6,800 m) and the northwest breakwater that protects the main port. The four container terminals shown in Table 2-11, JCT, UCT, SAGT and CICT, are in operation while ECT is under development.

The volume of containers handled at Colombo Port has increased sharply from about 3.5 million TEU in 2009 to about 7.0 million TEU, doubling in 10 years as shown in Figure 2-3. It is expected that the volume of containers will soon reach the capacity of the port. Colombo Port is one of the leading container transshipment hub port in South Asia, and about 80% of the container handling volume in 2018 is transshipment cargo for neighboring countries such as India.

Looking at each terminal, it is noteworthy that the handling volume of CICT reached the initial handling capacity of 2.4 million TEU only four years after its opening. Colombo Port, which faces the international maritime trunk route connecting Europe and Asia and where all three shipping alliances call, will be the first to be affected by increases in the size of container ships. In fact, the container ships calling at Colombo Port have become larger in draft and LOA, as shown in Table 2-12 and Table 2-13. On the other hand, the specifications of the existing terminals at Colombo Port are as follows: JCT-I and JCT-II have a depth of -12m to -13m and a length of 630m, JCT-III and JCT-IV have a depth of -15m and a length of 660m, and SAGT has a depth of -15m and a length of 940m. Container ships with a draft of more than 14.25 m cannot use JCT and SAGT due to shallow water. For this reason, it is likely that a part of container ships moved to CICT, which has a quay with a depth of -18 m and a length of 1,200 m, and has virtually no restrictions on draft and LOA of ships. However, since it is expected that three ULCS (ultra-large container ship) with a LOA of 400 m will berth at the same time in the future, CICT is requesting SLPA's approval to extend the quay by another 150 m.

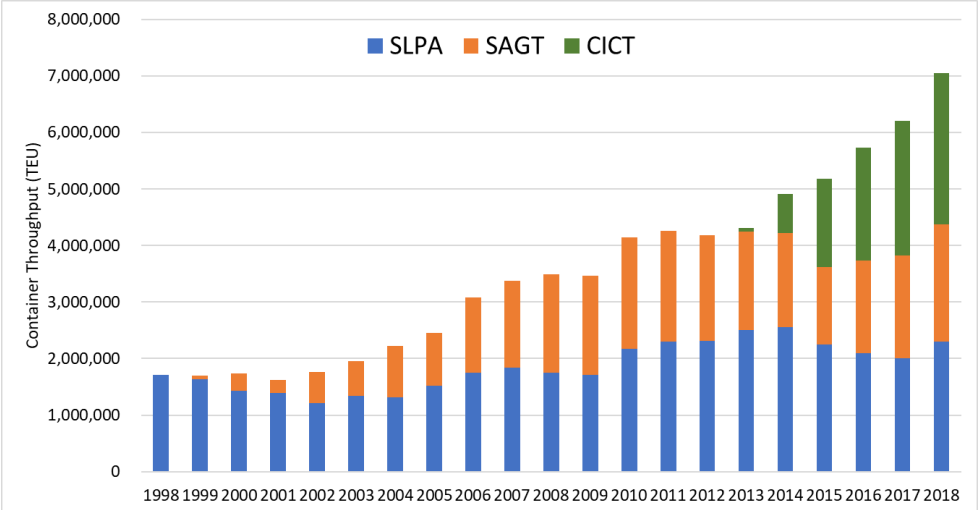
Source: Google Earth, processed by JICA Survey Team

Figure 2-2 Satellite Photo of Colombo Port

Table 2-11 Specifications of Container Terminal

Terminal	JCT	UCT	SAGT (QEQ)	CICT (SCT)
Operator	SLPA	SLPA	SAGT John Keells Holdings Plc (42%), A.P.Moller-Maersk Group (33%), Evergreen International SA (5%), Peony Investment SA (5%), SLPA (15%)	CICT China Marchant Port Holdings Ltd (85%), SLPA (15%)
Concession Agreement			30 year BOT（1999）	35 year BOT（2011）
OpenYear	1985 - 1996	1998 - 2003	2001 - 2003	2013 - 2014
Depth and Length of Berrth	JCT-III, IV: D=15m, L=660m JCT-I, II: D=12m, L=632m Feeder Berth: D=9m, L=350m	D=9 - 12m, L=590m	D=15m, L=940m	D=18m, L=1,200m
Terminal Area	45.5ha	7.5ha （depth=300m）	20.0ha （depth=220m）	58.0ha （depth=435m）
Yard Area	36.0ha	for container 1.53ha	12.0ha	35.0ha
Ground Slot	9,232	NA	5,500	11,480
Reefer Plug	1,548	NA	540	1,150
CFS	15,000sq.m			
QGC	13- 18 row 20 units	13 row 3 units	21 row 9 units, 19 row 3 units	26 row 2 units, 24 row 12 units
RTG/RMG	RTG 59 units, RMG 4 units	RTG 8 units	RTG 37 units	1 over 6 e-RTG 46 units
Other Equipment	Top Lifter 24 units		Reach Stacker 2 units	Reach Stacker 6 units
TOS	NAVIS 3.7		NAVIS N4	CTOS
QGC Productivity			29 move/h	33 move/h
Designed Capacity	2.45 million TEU	0.3 million TEU	1.95 million TEU	Initial 2.4 million TEU Revised 3.2 million TEU

Source: SLPA、CICT、Colombo Port Development Plan (Mar. 2019)



Source: SLPA, processed by JICA Survey Team

Figure 2-3 Container Throughput of Terminals in Colombo Port

Table 2-12 Draft Distribution of Container Ships Calling at Colombo Port

	d <10m	10m = d <14.25m	14.25m < d	Total
2010	1,453	1,623	0	3,076
2011	1,412	1,775	0	3,187
2012	1,352	1,740	0	3,092
2013	1,466	1,674	2	3,142
2014	1,541	1,644	54	3,239
2015	1,777	1,767	99	3,643
2016	1,735	1,837	232	3,804
2017	1,231	1,577	246	3,054
2018	1,447	1,984	308	3,739

Source: SLPA

Table 2-13 LOA Distribution of Container Ships Calling at Colombo Port

	L < 150m	150m = L <250m	200m = L <250m	250m = L <300m	300m = L <350m	L < 350m	Total
2010	547	884	575	880	187	3	3,076
2011	468	926	661	945	185	2	3,187
2012	272	1,031	590	900	297	2	3,092
2013	197	1,200	452	939	342	12	3,142
2014	248	1,239	470	752	443	87	3,239
2015	421	1,121	602	848	485	166	3,643
2016	219	1,218	538	1,013	545	271	3,804
2017	183	894	385	863	436	293	3,054
2018	168	1,154	342	1,004	676	395	3,739

Source: SLPA

There are several hub ports such as Singapore, Tanjung Perapas (Malaysia), Port Klang (Malaysia), Colombo, Salalah (Oman) and Jebel Ali (UAE) in South Asia and its adjacent area located in the middle of the international maritime trunk route connecting Europe and Asia as shown in Figure 2-4. On the other hand, the Adani group is developing a new port which it hopes to become a new transshipment hub port in Vizhinjam, Kerala, southwestern India as shown in Figure 2-5, Figure 2-6 and Figure 2-7. This company has signed a concession contract with the port management body, Vizhinjam International Seaport Limited, owned by Kerala. The Ministry of Shipping of India is also considering the development of a new port aiming for a transshipment hub port near Enayam - Colachel about 40 km east of Vizhinjam.

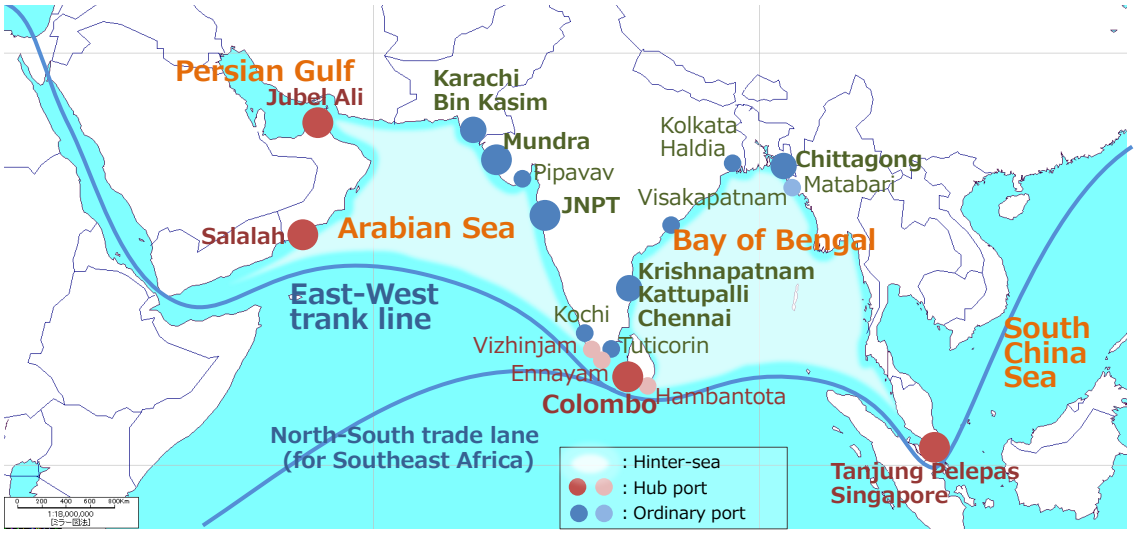
Colombo Port has potential as a transshipment hub port for the east coast of India / Bengal Bay, west coast of India / Arabian Sea, and East Africa, but it must compete with other hub ports including Vizhinjam Port which is being developed at the southern tip of India. Therefore, it is indispensable to continue to provide the terminal specification, quantity and services required by port users or the shipping alliances. If the required facilities and services cannot be provided, Colombo port

could be excluded from some routes and its status as a hub port could change.

In fact, port congestion at Colombo Port is getting worse, and both large container ships (main line ships) and feeder ships are waiting to enter the port. According to JCT statistics, the average waiting time for ships has increased from 2.2 hours in 2017 to 2.4 hours in 2018 and 2.5 hours from January to May 2019, and from 2.5 hours in 2018 to 3.0 hours in 2019 and 3.3 hours from January to May 2019 for feeder ships, respectively. Waiting to enter the port is a big loss for large container ships, and some shipping lines suggest that if the situation worsens as it is, the transshipment at Colombo Port may be transferred to another port. CICT and SAGT statistics are not shown, but according to interviews with both terminals through SLPA, it is reported that the average waiting time to enter the port is about 3 hours for CICT and 2.5-3.5 hours for SAGT respectively.

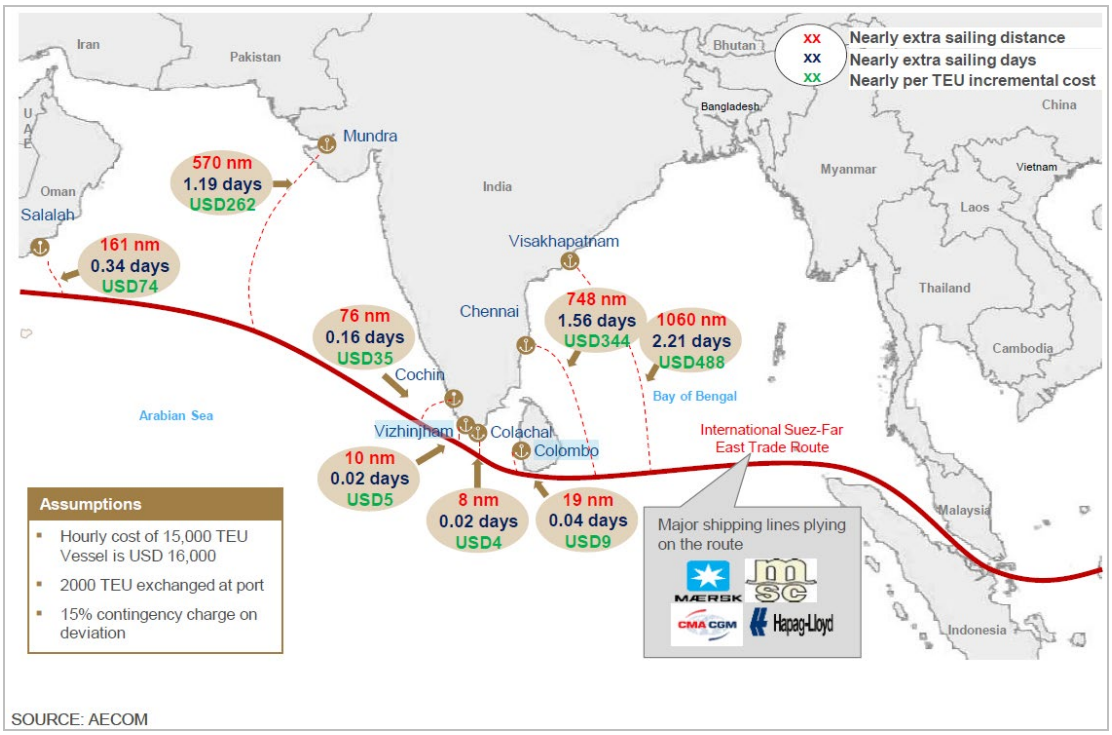
As described above, the container terminal at Colombo Port is becoming saturated with the cargo demand that is expected to increase further in the future, and there is concern that the lack of port infrastructure will become a bottleneck for economic growth. In addition, in order for Colombo Port to continue to be selected as a transshipment hub port by the shipping alliances, it is essential to secure a berth window by early operation of a container terminal compatible with ULCS, and to improve and eliminate waiting time to enter the port. There is an urgent need for Colombo Port to increase its cargo handling capacity while responding to the increase in size of container ships, and to further enhance its function as a transshipment port.

By continuing such measures, the risk of competition with Vizhinjam Port, etc. will be reduced, and Colombo Port will be able to maintain its position as a transshipment hub port. Under these circumstances, it is necessary to immediately resume the development of ECT, which has been stagnant for 6 years since the completion of the civil works of Phase-1 in 2015.



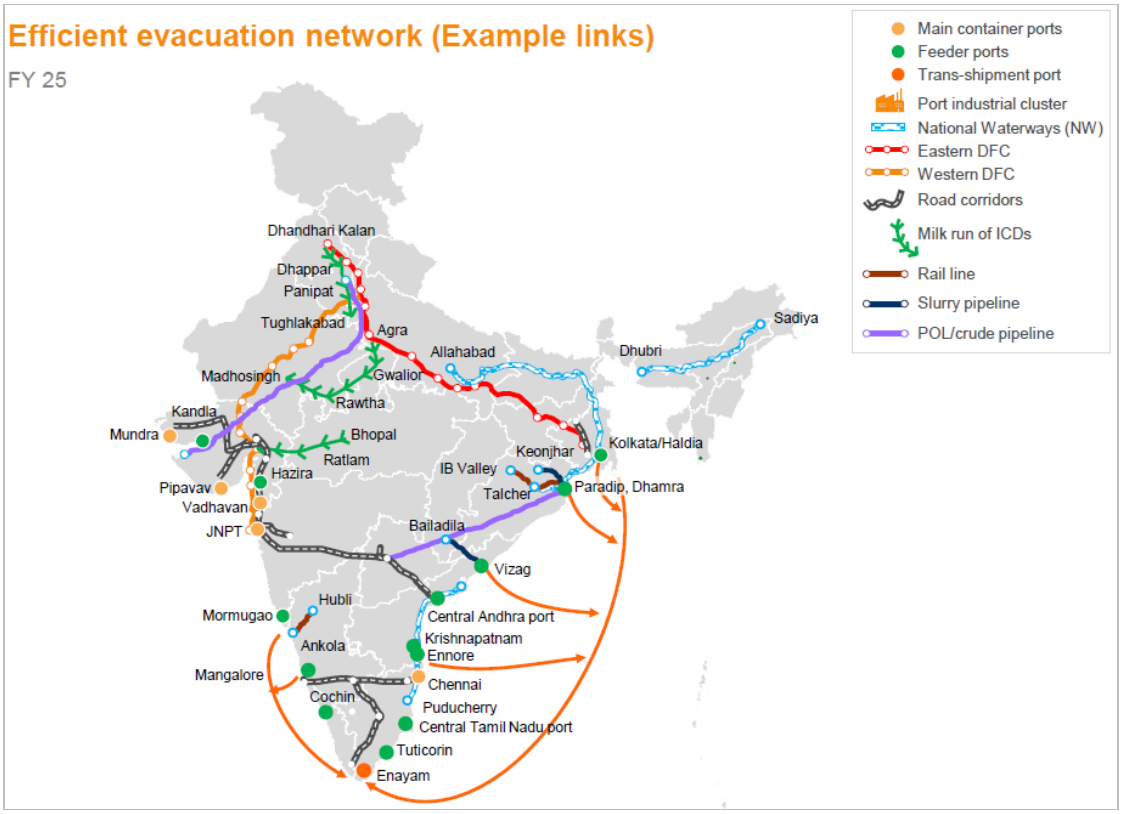
Source: JICA Survey Team

Figure 2-4 Colombo Port's Hinter-Seas and Littoral Ports



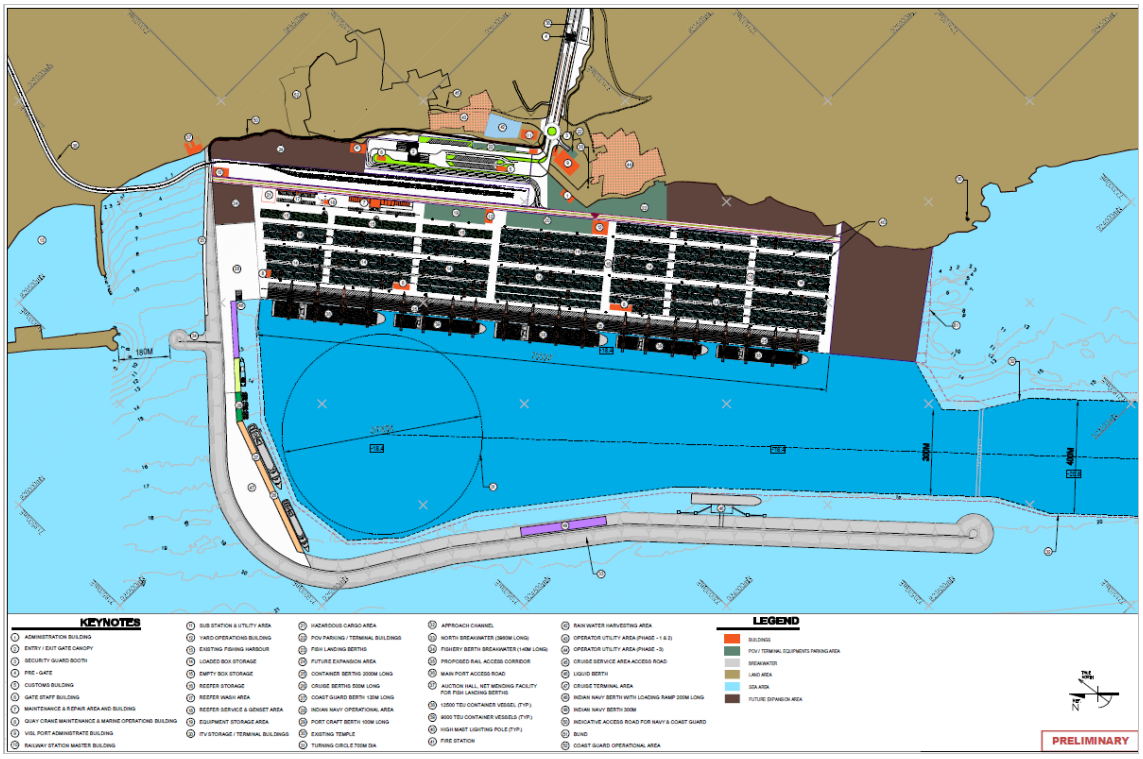
Source: National Perspective Plan, 2016, Indian Ministry of Shipping

Figure 2-5 East-West Trunk Route and Distances to/from Ports



Source: National Perspective Plan, 2016, Indian Ministry of Shipping

Figure 2-6 Efficient Domestic Transport Network in India



Source: Integrated Master Plan for Vizhinjam Port Report Addendam, May 2013, VISL/AECOM

Figure 2-7 Master Plan of Vizhinjam Port

2.4 Project Plans of Other Donors and Private Companies in the Port Sector of Sri Lanka

2.4.1 Colombo Port

(1) Development of JCT, etc. with the Cooperation of Japan

The JCT (I, II, III, IV) and the North Jetty were constructed with Japan's Yen Loan (1980 - 1999, totaling 85.50 billion yen).

(2) Development of SAGT on a BOT Scheme

SAGT entered into partial operation in 2001 and full operation in 2003 based on a 30-year BOT-based concession contract concluded in August 1999.

(3) Development of South Port with the Cooperation of ADB

A feasibility study for the South Port Development was implemented in 2000 with the cooperation of ADB, and based on this, a loan agreement of 300 million USD was signed in April 2007. The terms of the agreement were that the breakwater, harbor, etc. would be implemented by SLPA, and the terminal would be implemented through BOT scheme. Construction of the SLPA part started in April 2008 and was completed in October 2012.

(4) Development of CICT on a BOT scheme

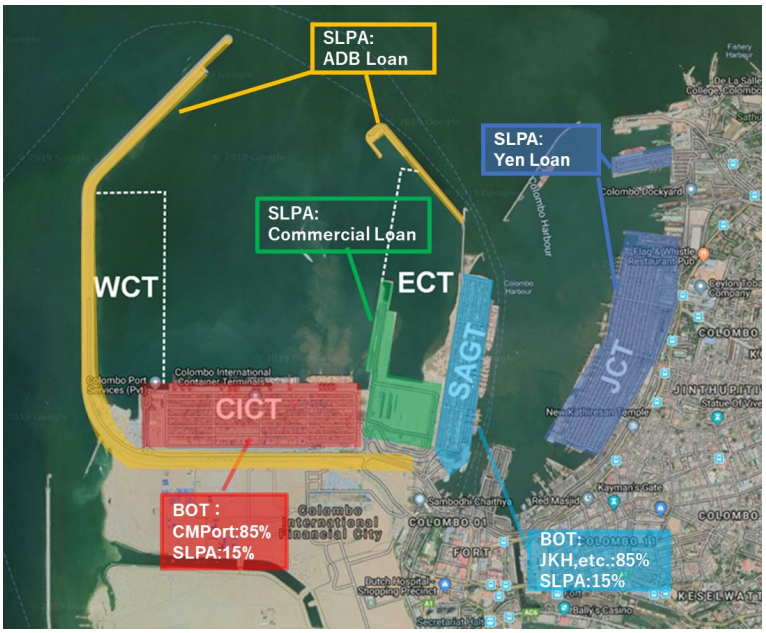
CICT started construction in December 2011, entered into partial operation in August 2013

and full operation in April 2014 based on a 35-year BOT-based concession contract concluded in August 2011.

(5) Cancellation of Development of ECT on a BOT Scheme

SLPA was to develop the 440m length jetty of ECT Phase-1 with its own funds (commercial loan), and construction started in August 2012 and completed in May 2015.

After that, it was decided to aim for a concession contract by the BOT scheme for the entire ECT including the existing 440m jetty and the existing yard, and the EOI procedure was started in June 2016. However, the government canceled the procedure in August 2017.



Source: JICA Survey Team

Figure 2-8 Development Status Map of Colombo Port

2.4.2 Other Ports

(1) Development of Hambantota Port with the Cooperation of China

SLPA developed Phase 1 (construction started in 2008 and was completed in December 2011), Phase 2 (completed in December 2016) and bunkering base were developed with loans from China's Export-Import Bank (971 million USD, 1,960 million RMB). The main facilities are a breakwater (length of 1,300 m), an approach channel (water depth of 17 m, width of 210 m), a basin (water depth of 17 m), a jetty with the length of 2,277 m for 100,000 DWT class vessel, 2 QGCs, a jetty with the length of 460 m for 20,000 DWT class vessel, an oil jetty with the length of 900 m for 100,000 DWT class tanker.

Initially, SLPA (a Magampura port management company wholly owned by SLPA) undertook the management and operation of Hambantota Port. Thereafter in July 2017, a contract was signed to lease Hambantota Port (including 1,235 acres of land) to China Marchant Port Holdings Ltd

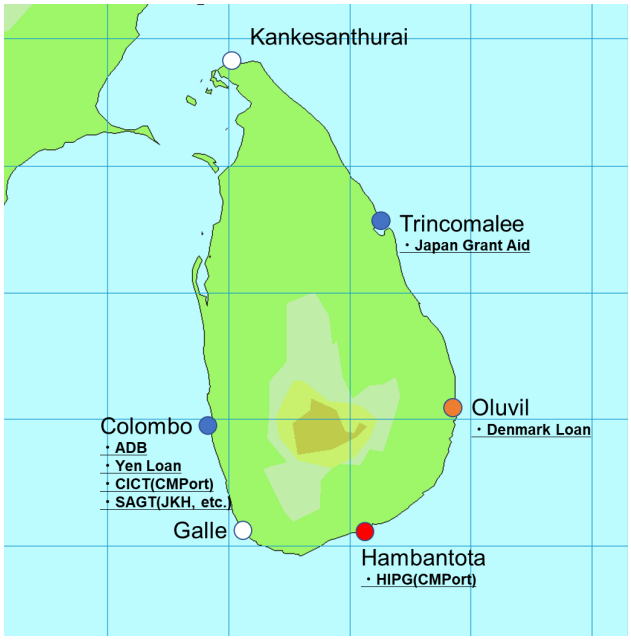
(CMPorts) for up to 99 years (contract amount: 1,120 million USD). Currently, the management and operation of Hambantota Port is undertaken exclusively by the Hambantota International Port Group (HIPG: CMPorts 85%, SLPA 15%), which is responsible for the planning, development, financing, operation, maintenance and management of the port, as well as by Hambantota International Port Services (HIPS: HIPG 58%, SLPA 42%), which is responsible for security and navigation-related services.

(2) Cooperation of Japan for Trincomalee Port

Port related equipment (pilot boat, buoys, etc., E/N in 2017 of 1,000 million yen) for Trincomalee Port was provided with Japan's grant aid (non-project type).

(3) Cooperation of Denmark for Oluvil

Development of a commercial port for 5,000 DWT class ship and fishing port at Oluvil Port on the east coast of Sri Lanka was carried out from 2006 to 2013 with a Danish loan (7,000 million LKR, interest-free).



Source: JICA Survey Team

Figure 2-9 Development Status Map of Sri Lankan Ports

2.5 Background and Contents of the Request of the Project

As mentioned in section 2.2, there is an urgent need for Colombo Port to increase its cargo handling capacity while responding to the increase in size of container ships, and to further enhance its function as a transshipment port. In particular, ECT of the Colombo South Port is positioned as an important and high-priority project in the policies and plans of the Sri Lankan government and SLPA. Based on the situation above, GOSL, the Government of India and the Government of Japan signed a

MoC in May 2019, confirming that the three countries shall cooperate in the development, operation and maintenance of the ECT in the Colombo South Port.

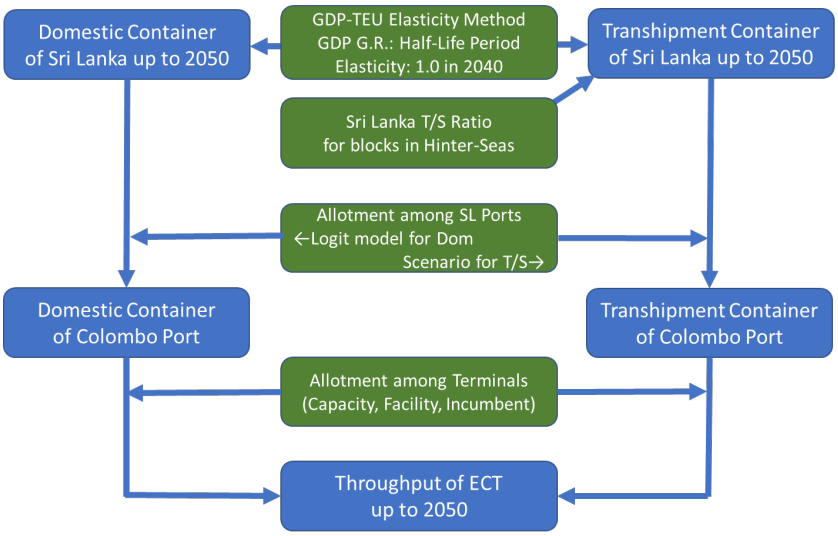
Against this background, GOSL submitted to the Government of Japan the official request for the Japanese ODA loan for "Project for the Development of the East Container Terminal in the Colombo South Port" in September 2019. However, the new administration that took office after the presidential election in November 2019 announced that a BOT method rather than an ODA loan would be adopted for the project.

3. Demand Forecast

3.1 Method of Demand Forecast

3.1.1 Flowchart of Demand Forecast

Demand forecast of containers handled at ECT was conducted separately for transshipment containers and domestic import/export containers as shown in Figure 3-1.



Source: JICA Survey Team

Figure 3-1 Flowchart of Demand Forecast

3.1.2 Demand Forecast of Transshipment Containers

In order to forecast the transshipment container of Colombo Port, first, container cargo in India, Bangladesh, Pakistan, and Maldives, which are located within the hinter-seas of Colombo Port, are predicted with the GDP-TEU elasticity method. Since cargo departing from and arriving at these four countries accounted for 48% (96% when transshipment is taken into account) of transshipment containers of Colombo Port in 2018, it is considered that the total transshipment container volume of Colombo Port can be accurately predicted by forecasting future cargo in these four countries.

As for the future GDP growth rate of the above four countries, the IMF forecast value (as of October 2020) that takes into account the impact of COVID 19 is adopted until 2025, and thereafter it is assumed to be gradually reduced using the half-life period as shown in Table 3-1. The launch pad for GDP-TEU elasticity is based on the average values from 2010 to 2018 (see Attachment A3.1), and it is assumed that it will linearly converge to 1 in about 20 years.

Regarding the Colombo Port transshipment ratio, first, India was divided into west, south and east, and the four countries were divided into 6 blocks, and the current value of the Colombo Port transshipment rate for each block was grasped. The reasons of India's block division are as follows; 1) There are multiple container handling ports in West India facing the Arabian Sea and in East India facing Bengal Bay, and as shown in Figure 2-4, the hub ports that cover them are different. 2) Due to

the shallow water depth of the Palk Strait between Sri Lanka and India, it is not suitable for the passage of container ships, so it is rational to divide it into west and east from the viewpoint of shipping. Further, the south is provided in consideration of its proximity to Colombo Port. Here, the Colombo Port transshipment ratio is a value obtained by dividing the Colombo Port transshipment cargo in each block in the hinterseas by their throughput. Next, the decrease in the Colombo Port transshipment ratio (increase in direct calling) due to the increase in demand for each block was set as a scenario as shown in Table 3-2. Regarding Hambantota Port, the possibility of handling transshipment containers is thought to be low due to the reasons below. Figure 3-2 shows the forecast results of transshipment containers handled at Colombo Port.

- In order to become a hub port for transshipment containers, in terms of facilities, a continuous plural berth and sufficient cargo handling equipment for 24,000 TEU type ULCSs operating on the East-West trunk route and feeder ships are required. The investment amount will be at least several million USD. In addition, Hambantota Port requires additional dredging work as the water depth of the approach channel and basin is 17m.
- At Colombo Port, in order to maintain the status of a hub port for transshipment containers, SLPA continues to secure berth windows for large vessels and develop facilities in response to demand.
- The origin and destination of import/export containers with high terminal handling charges is concentrated in the suburbs of Colombo, and the transshipment operation at Hambantota Port would bring about the phenomenon of cannibalism with terminals at Colombo Port. These factors would make it difficult to anticipate a profit that justifies large-scale investment at Hambantota Port.

Table 3-1 GDP Growth Rate Half-Life Period (years)

Case	Low	Middle	High
High Income Economies	20	30	40
Middle Income Economies	10	15	20

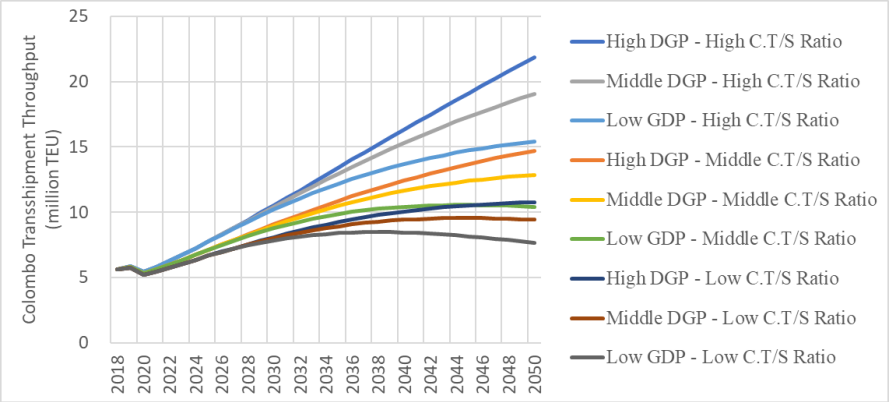
Note: India, Bangladesh, Pakistan and Maldives belong to Middle Income Economies.
Source: JICA Survey Team

Table 3-2 Colombo T/S Ratio of Blocks in Hinter-Seas

Block in Hinter-Sea	2018	2050 High	2050 Middle	2050 Low
West India	5.2%	5%	2%	2%
South India (Tuticorin)	73.1%	20%	15%	10%
East India	21.7%	20%	15%	10%
Su Total India	12.1%			
Bangladesh	22.4%	20%	15%	10%
Pakistan	2.3%	2%	2%	2%
Maldives	93.3%	90%	60%	50%
Total	12.3%			

Note: The Colombo Port transshipment ratio is a value obtained by dividing the Colombo Port transshipment cargo in each block in the hinterseas by their throughput.

Source: JICA Survey Team



Source: JICA Survey Team

Figure 3-2 Transshipment Container of Colombo Port (Forecast)

3.1.3 Demand Forecast of Import / Export Containers

Demand Forecast of import / export containers was conducted with the GDP-TEU elasticity method in the same manner as transshipment containers. The launch pads for GDP-TEU elasticity of trade partners (major export destinations) are shown in the Attachment A3.1. Allotment among domestic ports was made by using the logit model. Details are shown in the attached document "A3.2 Demand Forecast: Allotment of Import / Export Containers among Ports by Logit Model".

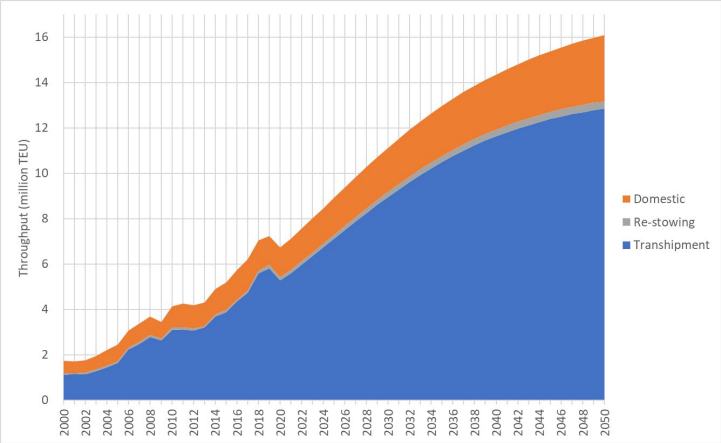
3.2 Results of Demand Forecast

The base case forecast of transshipment, restowing and import/export containers at Colombo Port is shown in Figure 3-3 and Table 3-3. It is projected to increase from 7.2 million TEU in 2019 to about 11 million TEU in 2030, 14 million TEU in 2040 and 16 million TEU in 2050. In addition, containers handled at each terminal of Colombo Port is shown in Figure 3-4. Here, the handling volume of the existing terminal is assumed to maintain the current level in the future, but in reality, the handling volume of JCT and SAGT can gradually decrease if the facility specification and appropriate

handling volume are taken into consideration. The handling volume of ECT is expected to reach 2.8 million TEU in the first few years after operation.

Here, the base case is a combination of the middle case of the setting of the half-life (year) of the GDP growth rate and the middle case of the setting of the Colombo Port transshipment ratio of each block in the hinterseas. In particular, in the case of transshipments, which have more demand fluctuation factors than import / export containers as can be seen from Figure 3-2, the future forecast range is large, and in the highest case it would grow linearly in the future, while in the lowest case it would peak out in the 2030s. In consideration of the above, it is recommended that the demand forecast be reviewed regularly, such as every three years, in order to reflect the latest trends in economy, shipping, port development, etc.

In addition, the main premise of demand forecasting is that there are no restrictions on the supply side such as container terminal specification, quantities, and services required by the shipping alliance, and it is possible to provide sufficient berth windows. By continuing such measures, the risk of competition with Vizhinjam Port, etc. will be reduced, and Colombo Port will be able to maintain its position as a transshipment hub port. Under these circumstances, it is necessary to immediately resume the development of ECT, which has been stagnant for 6 years since the completion of the civil works of Phase-1 in 2015.



Source: JICA Survey Team

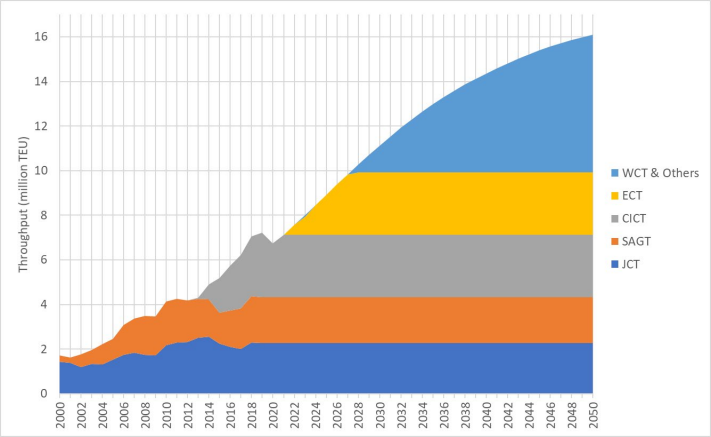
Figure 3-3 Containers handled at Colombo Port (Base-Case Forecast)

Table 3-3 Containers handled at Colombo Port (Base-Case Forecast)

(unit: millin TEU)

	2018	2019	2020	2021	2022	2030	2040	2050
Transhipment	5.602	5.813	5.293	5.606	5.984	8.960	11.634	12.847
Re-stowing	0.102	0.153	0.135	0.143	0.152	0.226	0.295	0.332
Domestic	1.343	1.273	1.314	1.379	1.441	1.945	2.417	2.909
Total	7.047	7.240	6.742	7.128	7.577	11.131	14.346	16.088

Source: JICA Survey Team



Source: JICA Survey Team

Figure 3-4 Containers Handled at Each Terminal of Colombo Port (Assumed)

4. Installation of Cargo Handling Equipment on Existing Quay Wall

4.1 Review of existing quay wall

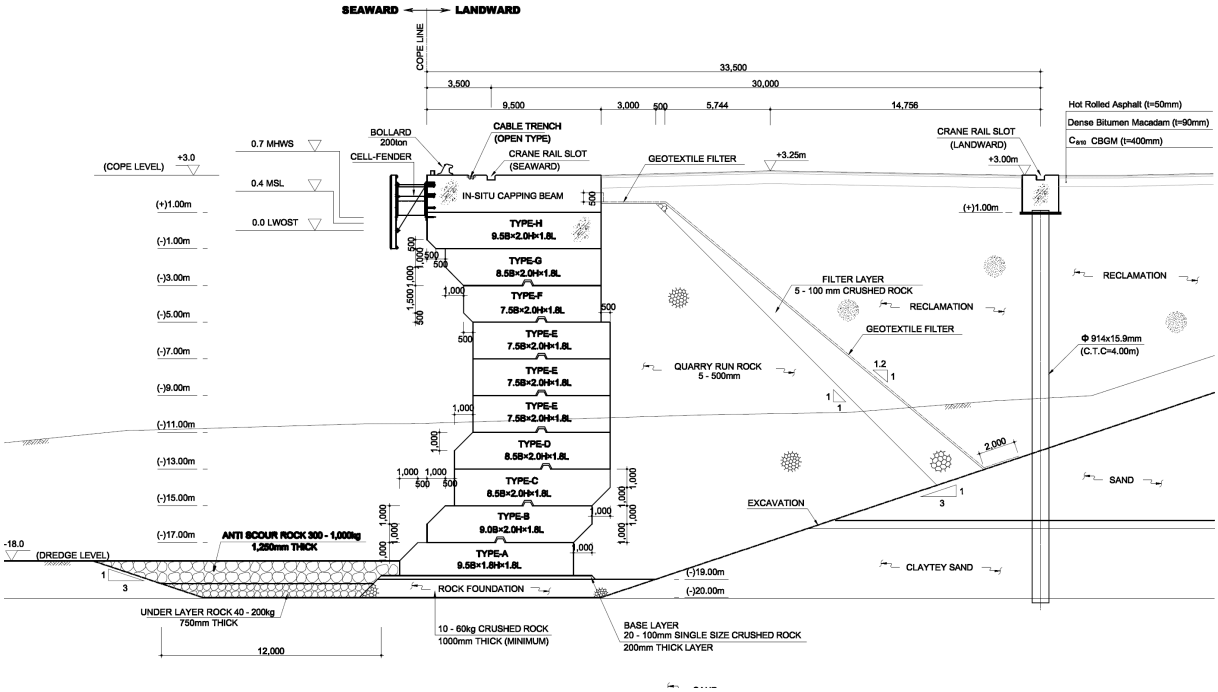
4.1.1 Design condition

The existing quay wall of ECT of Colombo South Port has a concrete block type structure, of which the extension of 440 m was constructed in Stage 1. Design conditions of the existing quay wall were compiled in the report "Colombo Port Expansion Project, East Container Terminal Stage 1 Report, Aug. 2013, SLPA". The QGC wheel loads will be modified from the design condition at Stage 1. Therefore, stability of the existing quay wall is reviewed and utilized for the design under the modified wheel loads in Clause 7.2. According to the report, design conditions are as shown in Table 4-1.

Table 4-1 Design Conditions of ECT Existing Quay Wall (Stage 1)

<table>
<tr><th>Item</th><th>Design Conditions</th></tr>
<tr><td>1. Design vessels</td><td>・Maximum 18,000 TEU container vessel
180,000 DWT, LOA=400 m, B=59 m, Full load draft d=16.0m
・Minimum 1,000 TEU container vessel
20,000 DWT, LOA=170-210 m, B=23-27 m, Full load draft d=9.0-10.0m</td></tr>
<tr><td>2. Number of berths and extension</td><td>・One (1) berth of 440 m in length (including a temporary portion of 40 m)</td></tr>
<tr><td>3. Tidal level</td><td>・MHWS= LWOST+0.70 m
・MSL= LWOST+0.40 m</td></tr>
<tr><td>4. Specifications</td><td>・Berth water depth: LWOST-18.0
・Cope level: LWOST+3.0 m
・Apron width: 33.5 m
・Terminal yard width: 370.5 m</td></tr>
<tr><td>5. Surcharge loads</td><td>・Stability calculation: 1.5 t/m^2 (15 kN/m^2) on the seaward of the crane
3.5 t/m^2 (35 kN/m^2) on the landward of the crane
・Overall slope stability: 5.0 t/m^2 (50 kN/m^2)</td></tr>
<tr><td>6. Quayside Gantry Crane (QGC)</td><td>・Rail gauge: 30 m
・Wheel load
<table>
<tr><th colspan="3">Classification</th><th>Wheel load (kN/Wheel)</th></tr>
<tr><td rowspan="4">Normal condition</td><td rowspan="2">Operation</td><td>Seaward</td><td>930</td></tr>
<tr><td>Landward</td><td>700</td></tr>
<tr><td rowspan="2">Non-operation</td><td>Seaward</td><td>960</td></tr>
<tr><td>Landward</td><td>1,060</td></tr>
<tr><td rowspan="4">Extreme condition</td><td rowspan="2">Operation</td><td>Seaward</td><td>1,170</td></tr>
<tr><td>Landward</td><td>790</td></tr>
<tr><td rowspan="2">Non-operation</td><td>Seaward</td><td>960</td></tr>
<tr><td>Landward</td><td>1,060</td></tr>
</table></td></tr>
<tr><td>7. Accessories</td><td>・Fender spacing: 14.4 m
・Bollard capacity:200 tons
・Bollard spacing: 21.6 m</td></tr>
<tr><td>8. Soil conditions</td><td>1) Backfill sand up to LWOST+2.30 m: γ=18 kN/m^3, C=5 kPa, φ=28.5º
2) Backfill stone -18.0 m from LWOST+2.30 m: γ=18 kN/m^3, γ'=10 kN/m^3, φ=40º
3) Clayey sand -20.0 m from LWOST-18.0 m: γ=20 kN/m^3, γ'=10 kN/m^3, C=5 kPa, φ=28.5º
4) Sand -28.30 m from LWOST-20.0 m: γ=18 kN/m^3, γ'=10 kN/m^3, C=10 kPa, φ=35º
5) Rock deeper than LWOST-28.30 m: γ=23 kN/m^3, γ'=13 kN/m^3, C=100 kPa, φ=35º</td></tr>
<tr><td>9. Seismic coefficient</td><td>・Horizontal design seismic coefficient: kh = 0.057g</td></tr>
</table>

Source: "Colombo Port Expansion Project, East Container Terminal Stage 1 Report, Aug. 2013, SLPA" arranged by JICA Study Team



Source: "Colombo Port Expansion Project, East Container Terminal Stage 1, As Build Drawing, SLPA" with revisions made by JICA Study Team

Figure 4-1 Typical Cross Section of ECT Existing Quay Wall

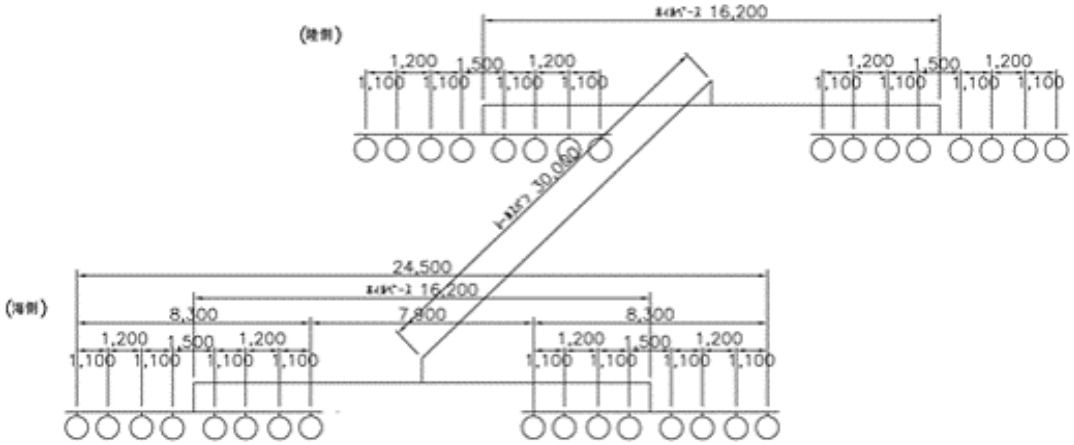
4.1.2 QGC Loads

Wheel load on QGC and direction applied in the existing quay wall are as shown in Table 4-2 and Figure 4-2.

Table 4-2 Wheel Load on QGC

Condition	Direction	Unit	Existing quay wall	
			Normal	Seismic
Operation	Seaside vertical	ton/wheel	93	117
	Landside vertical	ton/wheel	70	79
	Seaside horizontal – paralleled to rail	ton/rail	79	95
	Seaside horizontal – perpendicular to rail	ton/rail	60	83
	Landside horizontal – paralleled to rail	ton/rail	49	71
	Landside horizontal – perpendicular to rail	ton/rail	60	83
Non-operation	Seaside vertical	ton/wheel	96	-
	Landside vertical	ton/wheel	106	-
	Seaside horizontal – paralleled to rail	ton/rail	145	-
	Seaside horizontal – perpendicular to rail	ton/rail	146	-
	Landside horizontal – paralleled to rail	ton/rail	127	-
	Landside horizontal – perpendicular to rail	ton/rail	146	-
Uplift	Seaside	ton/corner	255	-
	Landside	ton/corner	100	-

Source: "Colombo Port Expansion Project, East Container Terminal Stage 1 Report, Aug. 2013, SLPA"



Source: "Colombo Port Expansion Project, East Container Terminal Stage 1 Report, Aug. 2013, SLPA"

Figure 4-2 QGC Wheel Loads

4.1.3 Review of quay wall stability

The stability and uneven settlement of the quay wall is reviewed at QGC loading. In case of a concrete block type quay wall to deep water, quality control of leveling of rock foundation and installation of blocks is quite difficult. However, the stability is reviewed by assuming that there will be no problem with these qualities.

(1) Review of quay wall stability

The reviewed results at QGC loading (safety factors for sliding, overturning and bearing capacity) have satisfied the values of the technical standards as shown in Table 4-3.

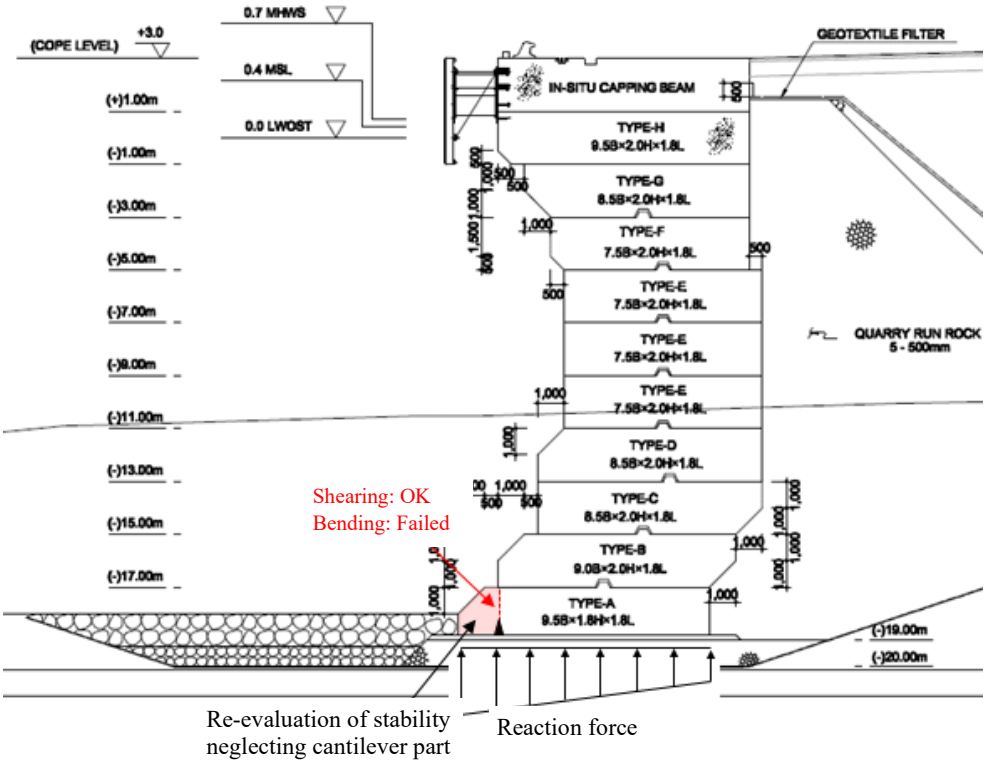
Table 4-3 Review Results of Quay Wall Stability

Item	Condition	Review results		
		Ratio of action/Strength	Standard value	Judgement
Sliding	Seismic	0.75	1.0 or less	OK
Overturning	Seismic	0.72	1.0 or less	OK
Bearing capacity (Bishop method)	Seismic	0.78	1.0 or less	OK

Source: JICA Study Team

Although the stability of the existing quay wall is verified, the bending tensile stress of the cantilever part of the lower concrete blocks due to the bending moment exceeds the allowable stress if the these blocks are unreinforced concrete. Since the allowable stress is set with a margin lower than the actual average strength, this does not mean immediate member failure (cracking, chipping) and the accompanying settlement, but it is a concern especially when an earthquake occurs. It is necessary to confirm with SLPA whether the lower blocks are reinforced concrete or unreinforced concrete. As a

result of re-evaluating the static stability with a model assuming member destruction and ignoring footing as a precaution, it was confirmed that sliding, overturning, and ground bearing capacity were satisfied. However, since the ground reaction force increases due to load concentration, there is a concern that settlement of the quay wall may occur. In view of the above, if the lower blocks are unreinforced concrete, it is proposed to monitor displacement and conduct a diving survey.



Source: JICA Study Team

Figure 4-3 Re-evaluation of Bottom Blocks

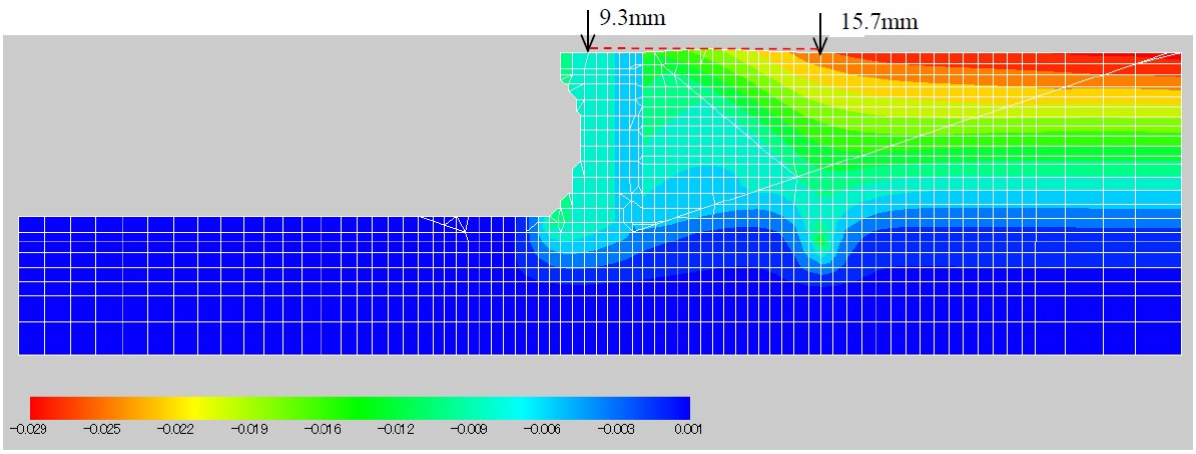
(2) Review of uneven settlement at loading QGC

Assuming the bottom blocks have no cracks, the uneven settlement at loading QGC was calculated using the Soil Analysis General Program (GeoFem) developed by the Port and Airport Research Institute, Japan. The uneven settlement was a few millimeters different from the Stage 1 design. This may be due to the difference in the impact of the applied program. In addition, the uneven settlement at the rail positions on the landside and the seaside is about 6 mm, and it seems that there is almost no effect on QGC operation.

Table 4-4 Review of Uneven Settlement

Seaside rail settlement		Landside rail settlement	
Stage 1 design	Reviewed results	Stage 1 design	Reviewed results
8.1 mm	9.3 mm	21.9 mm	15.7 mm

Source: JICA Study Team



Source: JICA Study Team

Figure 4-4 Results of Uneven Settlement Analysis

(3) Summary of Review

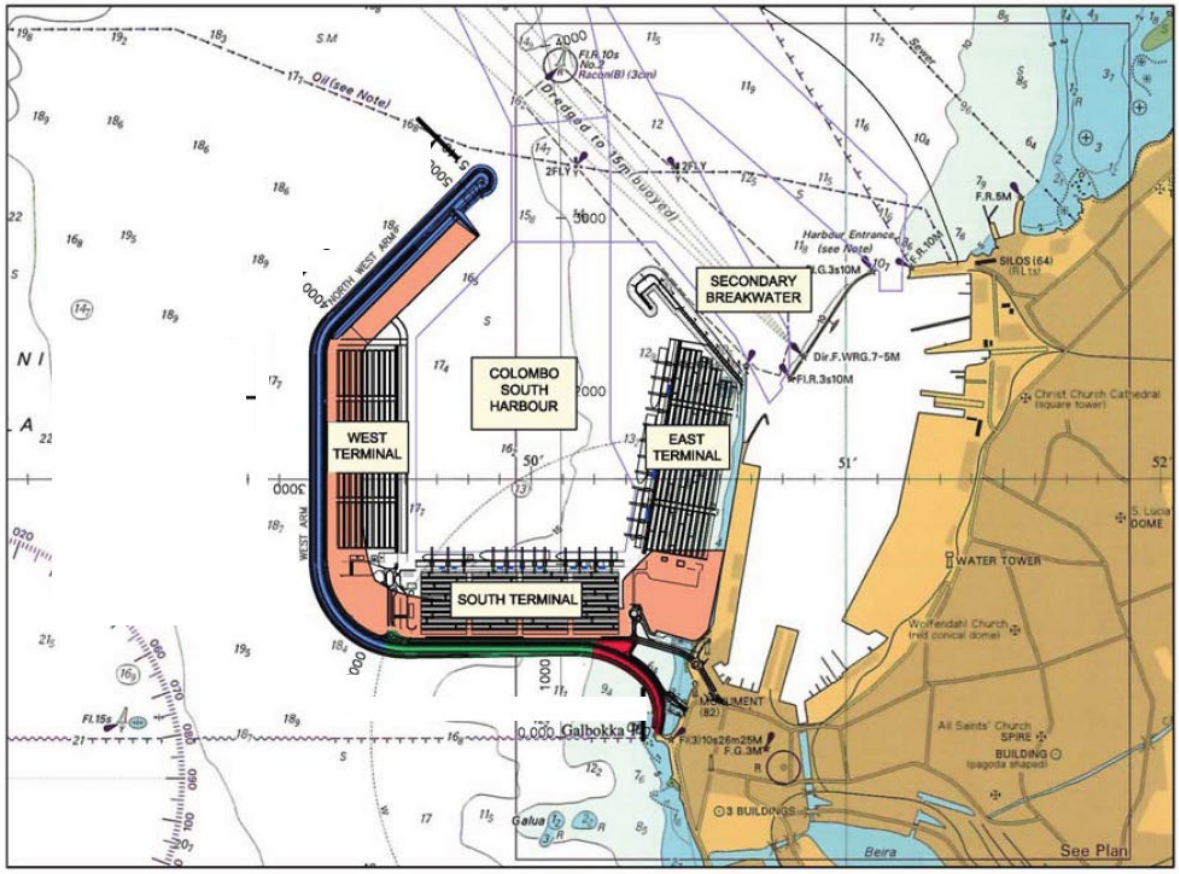
Although the stability of the existing quay wall is verified, the bending tensile stress of the cantilever part of the lower concrete blocks due to the bending moment exceeds the allowable stress if the these blocks are unreinforced concrete. Since the allowable stress is set with a margin lower than the actual average strength, this does not mean immediate member failure (cracking, chipping) and the accompanying settlement, but it is a concern especially when an earthquake occurs.

In view of the above, if the lower blocks are unreinforced concrete, JICA Survey Team proposes to monitor displacement and conduct a diving survey.

5. Conceptual Design of Port Facilities

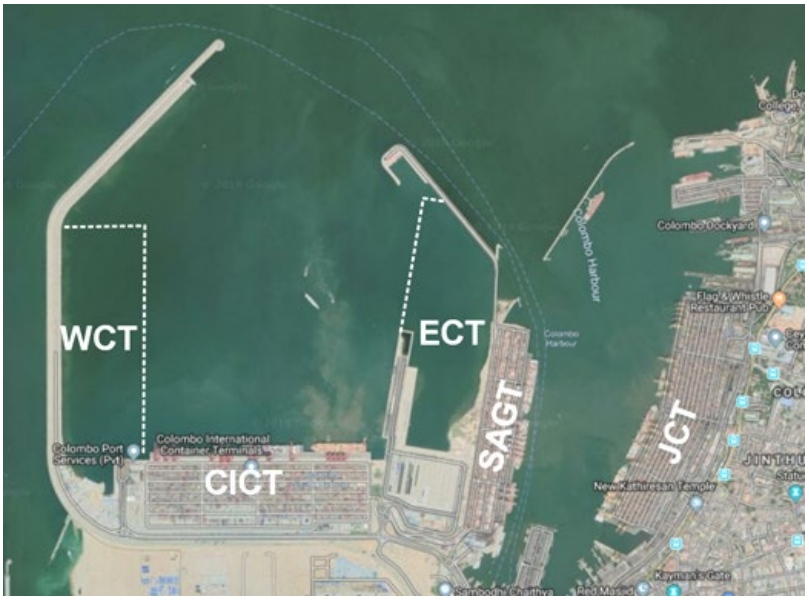
5.1 Layout of Port Facilities

The Colombo South Port, of which the construction began in 2008, has a long breakwater and a vast calm water area, and it has three container terminals: SCT, ECT and WCT. Each of them has a quay depth of 18 m, a quay length of 1,200 m, and a handling capacity of 2.4 million TEUs. The breakwaters and water basin were constructed by SLPA from 2008 to 2012 with ADB's financial assistance. SCT was developed by CICT under a BOT scheme and started operation in 2013. The part of ECT (Phase 1, quay depth 18m, quay length 440m, container yard 20ha, etc.) was constructed by SLPA in 2012 to 2015. Figure 5-1 shows Colombo South Harbour terminal layout plan as of 2012, and Figure 5-2 shows the satellite image of the current Colombo Port.



Source: Coastal Engineering 2012

Figure 5-1 Colombo South Harbour Terminal Layout Plan (2012)



Source: Google Map, added terminal names by JICA Survey Team

Figure 5-2 Satellite Image of Current Colombo Port

5.1.1 ECT Quays

The original plan of ECT has a quay depth of 18m and a quay length of 1,200m. Currently, the largest container ship has a total length about 400 m, a width about 62 m, a full draft about 16.5 m, and a maximum load capacity about 24,000 TEUs. The vessels under construction in the world shipyard are also about 24,000 TEUs.

Assuming that the necessary water depth of the quay is 1.1 times of the draft, if the planned water depth is 18 m, there will be no problem for normal operation.

Assuming that the necessary length of the quay is the ”total length + width of the ship”, the quay length of 1,380 m will be required for the simultaneous berthing of three Ultra-Large Container Ships (ULCS). Two ULCC ships and one small feeder ship can berth in the length of 1,200 m, as originally planned. Since there is a breakwater near the quay and small vessels frequently navigate to and from the pilot station, it is difficult to provide 1,380m quay in between the breakwater and existing quay. Assuming that 7 QGCs will be furnished to one ULCS in order for quick dispatch of vessels, 21 QGCs would be necessary for 1,380m quay with 3 ULCSs. Investment efficiency would be low unless 3 ULCSs were always docked at the terminal.

Based on the above, specifications of ECT are proposed as shown in the table below.

Table 5-1 Specifications of ECT

Depth of the Quay	LWOST -18.0m
Length	1,200m
QGC	14 Units
Capacity	2.80 million TEU
Berthing Style	Entry Berthing (Port side mooring)

Note, Handling Capacity＝(Box/hr)*(Gross ratio)*(Box ratio)*(Operation hr)*(day/year)*(BOR)*(No. of QGC)
＝ 31 * 0.85 * 1.46 * 22 * 365 * 0.65 * 14＝ 2,800,000 TEU/year
Source：JICA Survey Team

5.1.2 Terminal Layout

The key points in planning the terminal layout are as follows.

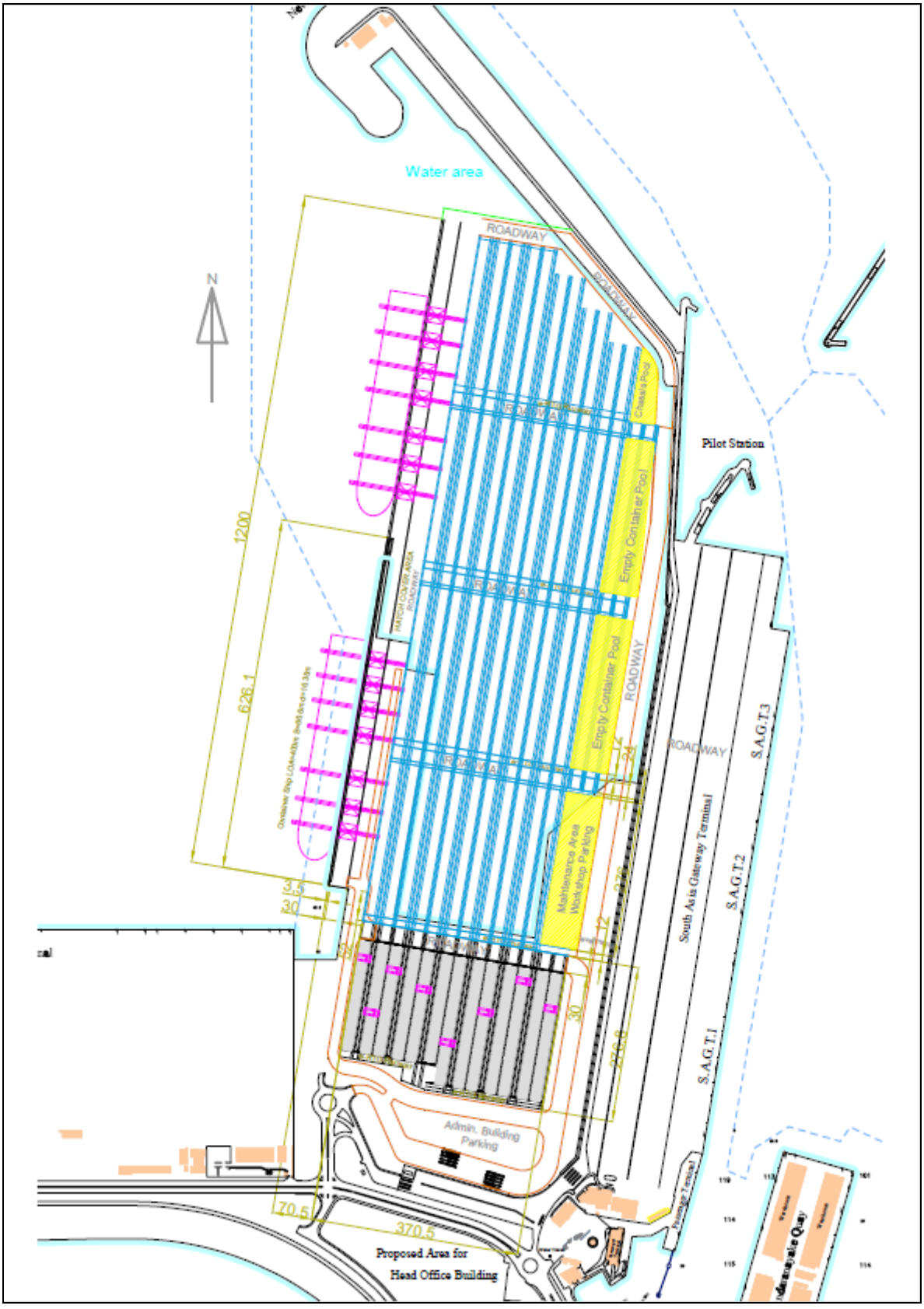
- The annual handling capacity of the terminal should not be lower than 2.8 million TEUs.
- Securing the continuity with the existing Phase-1 quay.
- For cargo handling in the stacking area, SLPA will introduce an environment-friendly e-RTG that does not emit exhaust gas, and it is necessary to lay a bus-bar for power supply. In addition, e-RTG is planned to be operated remotely.
- Assuming the entering berthing (port side berthing), the traffic direction of the yard chassis is southward under the QGCs on the quay, northward in the stacking area, and counterclockwise as a whole. On the other hand, the traffic direction of the chassis from the outside is clockwise as a whole.

Based on the above considerations, the terminal layout plan is shown in Figure 5-3.

The yard layout plan of lateral direction with the jetty (from south to north) is shown in Table 5-2. The width of the Roadway should be 24 m (6 lanes) or more, and 4 locations (excluding both ends) should be placed in the stacking area. An e-RTG Runway with the width of 12m, which is a passage for changing lanes of e-RTG, will also be placed adjacent to the Roadway. In addition, a slight extra space with the width of 6 m will be secured for smooth left and right turns of the chassis in entering and exiting, and for various work and equipment installation.

The yard layout plan of vertical direction with the jetty (from sea/west to land/east) is shown in Table 5-3. This yard layout plan is basically the same as the existing Phase-1. Assuming continuity with the existing Phase-1, the distance from the quay to the first e-RTG Lane is 70.5m in which the hatch cover storage width of 18 m and the roadway of 16 m (4 lanes) can be planned. An alternative plan to slightly shift the e-RTG Lane to eastward is possible, if an additional margin is necessary. It is assumed that 2 bays of stacking area on the opposite side of the quay will be used as maintenance area / workshop / parking lot (including container cleaning facility, container repair facility, employee lounge, if necessary), empty container pool, chassis pool. It is assumed that the gate, power receiving facility, and water and sewage system of the existing Phase-1 have already been constructed, and that a management building will be constructed next to the gate. Since the handling of LCL containers is expected to be performed by SLPA, the existing SLPA-owned CFS will be used for this purpose.

The total number of ground slots in this terminal layout is about 11,400 TEU for dry containers and about 1,100 TEU for reefer containers, for a total of about 12,500 TEU for Phase-1 and Phase-2. This number of ground slots is almost the same as that of CICT, which handled 2.9 million TEU in 2019.



Source: JICA Survey Team

Figure 5-3 ECT Terminal Layout Plan

Table 5-2 Yard Layout: Lateral Direction (from South to North)

Phase	Land Use	No. of TEUs	Length (m)
Phase-1	e-RTG Runway		12.0
	Stacking Block	34	224.0
	Space		10.8
	Roadway		30.0
	(sub-total)	34	276.8
Phase-2	e-RTG Runway		12.0
	Stacking Block	42	276.0
	Space		6.0
	Roadway		24.0
	e-RTG Runway		12.0
	Stacking Block	42	276.0
	Space		6.0
	Roadway		24.0
	e-RTG Runway		12.0
	Stacking Block	42	276.0
	Space		6.0
	Roadway		24.0
	e-RTG Runway		12.0
	Stacking Block	40	263.0
	Space		6.0
	Roadway		30.0
	(sub-total)	166	1265.0
Total (Phase-1 + Phase-2)		200	1541.8

Source: JICA Survey Team

Table 5-3 Yard Layout: Vertical Direction (from Sea/West to Land/East)

	Land Use	No. of TEUs	Length (m)
	Jetty to Rail		3.5
	QGC Span		30.0
	clearance		3.0
	Hatch Cover		18.0
	Roadway *		16.0
	e-RTG Lane		2.0
Module	Stacking Block	6	17.74
	Roadway/e-RTG Lane		16.02
	Stacking Block	6	17.74
	e-RTG Lane		6.0
Module		12	57.5
Module		12	57.5
Module		12	57.5
Module		12	57.5
Module		12	57.5
	Stacking Block	6	17.74
	Roadway/e-RTG Lane		5.76
	Total	78	441.0

Source: JICA Survey Team

Table 5-4 Planned Ground Slots

(unit : TEU)

Phase	Full Container	Reefer Container	Total
Phase-1	2,226	156	2,382
Phase-2	9,166	1,000	10,166
Total	11,392	1,156	12,548

Source: JICA Survey Team

5.2 Quay wall and other facilities

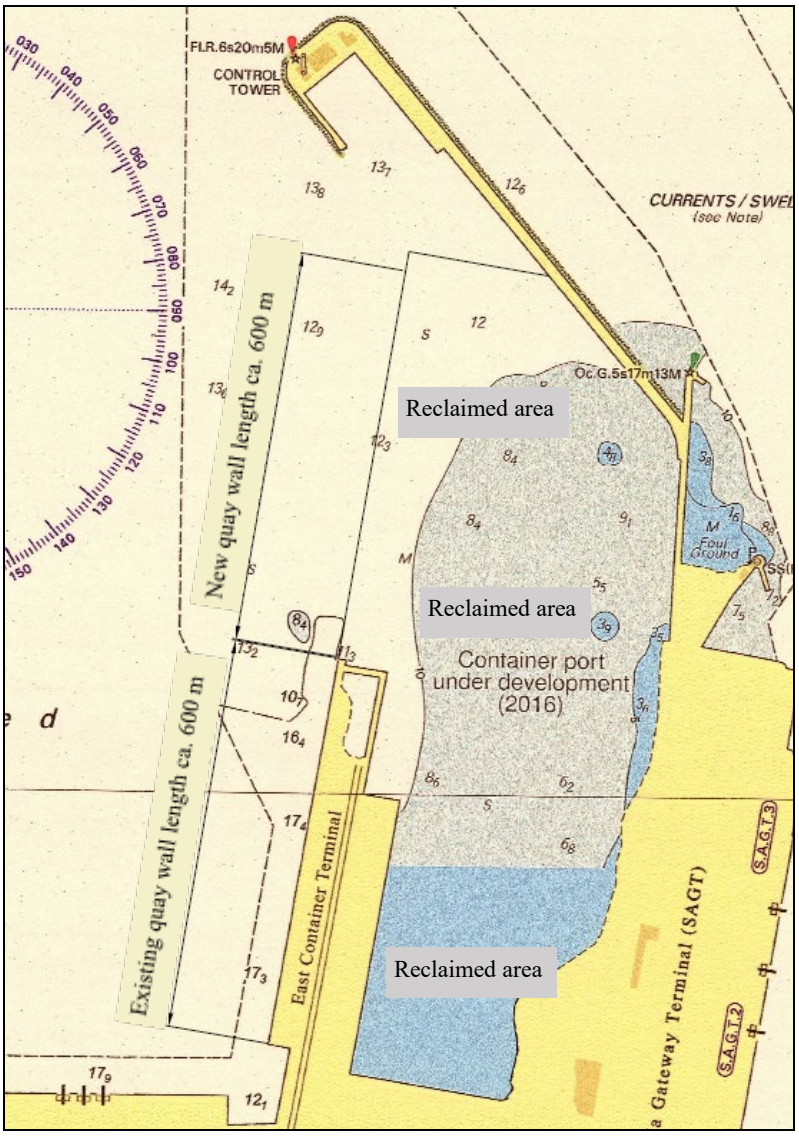
5.2.1 Quay wall facility

The design conditions recommended by JICA Study Team for the quay wall design proposed in Colombo South Port East Container Terminal Development Project are compiled as follows:

(1) Structural dimensions

1) Total length of berth

The existing quay wall of East Container Terminal (ECT) has already constructed a 440-meter long crane rail and a concrete block type quay wall of about 600 m in length. Hence the length of about 600 m will become the object of the new quay wall length in this project.



Source: ADMIRALTY CHART revised by JICA Study Team

Figure 5-4 Location of New Quay Wall

(2) Meteorological and wave conditions

1) Tidal level

Mean High Water Springs: CD + 0.70 m

Mean High Water Neaps: CD + 0.50 m

Mean Sea Level: CD + 0.40 m

Mean Low Water Neaps: CD + 0.30 m

Mean Low Water Springs: CD + 0.10 m

L.W.O.S.T: + 0.00 m Chart Datum

2) Wave conditions

Wave conditions at the project site are normally calm throughout the year. Therefore, there is no difficulty in productive execution of offshore works, such as pile driving (normally workable under

the wave conditions of less than 0.5 m) or installation of concrete blocks or caissons (workable under the wave height of 0.7 m)

3) Design seismic coefficient for the quay wall

Seismic coefficient: Kh=0.057 g was applied in implementing ECT Stage 1 in accordance with the Eurocode standards. JICA Study Team will also apply kv=1/2 kh at the same time following the provisions of Eurocode 8.

- Horizontal seismic coefficient kh = 0.057 g
- Vertical seismic coefficient kv = 0.029 g

4) Design wind speed

- Design wind speed 40 m/sec
- Work limit wind speed 16 m/sec

(3) Subsoil conditions

Subsoil condition is an important factor in selecting a suitable structure from the viewpoints of stability and workability. On the basis of the existing geotechnical surveys at near the planned area, design subsoil conditions proposed by JICA Study Team are compiled as follows:

Table 5-5 Subsoil Conditions of Container Berth (Section A-A, South Section)

Layer	Depth (LWOST)	Hardness	Soil properties			
	(m)		N value	Unit weight γ t (kN/m^3)	Internal frictional angle and Cohesion of soil	Lateral ground reaction coefficient Kh (N/cm^3)
Backfill sand	-			18	28.5° C= 5 kN/m^2	30
Backfill stone	-			18	40°	75
Clayey sand	-18 to -21		20	18	28.5° C= 5 kN/m^2	30
Weathered rock layer	-21 to -23	Hard	N>50	21	35° C= 10 kN/m^2	75
Base rock layer	> -23	Very dense	N>50	23	35° C= 100 kN/m^2	150

Table 5-6 Subsoil Conditions of Container Berth (Section B-B, North Section)

Layer	Depth (LWOST)	Hardness	Soil properties			
	(m)		N Value	Unit weight γt (kN/m^3)	Internal frictional angle and Cohesion of soil	Lateral ground reaction coefficient Kh (N/cm^3)
Backfill sand	-		20	18	28.5° C= 5 kN/m^2	30
Backfill stone	-		50	18	40°	75
Clayey sand	-18 to -27		20	18	28.5° C= 5 kN/m^2	30
Weathered rock layer	-27 to -30	Hard	N>50	21	35° C= 10 kN/m^2	75
Base rock layer	> -30	Very dense	N>50	23	35° C= 100 kN/m^2	150

Source: JICA Study Team

On the basis of the analysis of standard penetration test and laboratory test results, classification of soil layers and soil properties are determined. The strength properties of major soil layers are obtained from shearing strength test such as uniaxial compression test. However, in case no result from laboratory test has been obtained, internal frictional angle (φ) of sandy soil, cohesion of soil (Cu) and lateral ground reaction coefficient (Kh) of pile are calculated from the following equation in relation with the N value of standard penetration test.

Table 5-7 Relation between N Value and Design Soil Modulus

1) Internal frictional angle of sandy soil: $\varphi = \sqrt{(12xN)} + A$

where φ: Internal frictional angle (^{o})

N: Hammering number of times at standard penetration test

A: Experimental coefficient obtained from sandy soil properties

15: Sandy soil containing round grains with a good particle size quality

20: Sandy soil containing round grains with a good particle size quality or angular grains with a bad particle size quality

25: Sandy soil containing angular grains with a good particle size quality

2) Cohesion of soil: $Cu = qu/2 = 100 \times N/B$

where Cu: Cohesion of soil (kN/m^2)

qu: Unconfined compression strength (kN/m^2)

N: Hammering number of times at standard penetration test

B: Experimental coefficient obtained from viscous soil properties

3.2 to 8: Very soft viscous soil

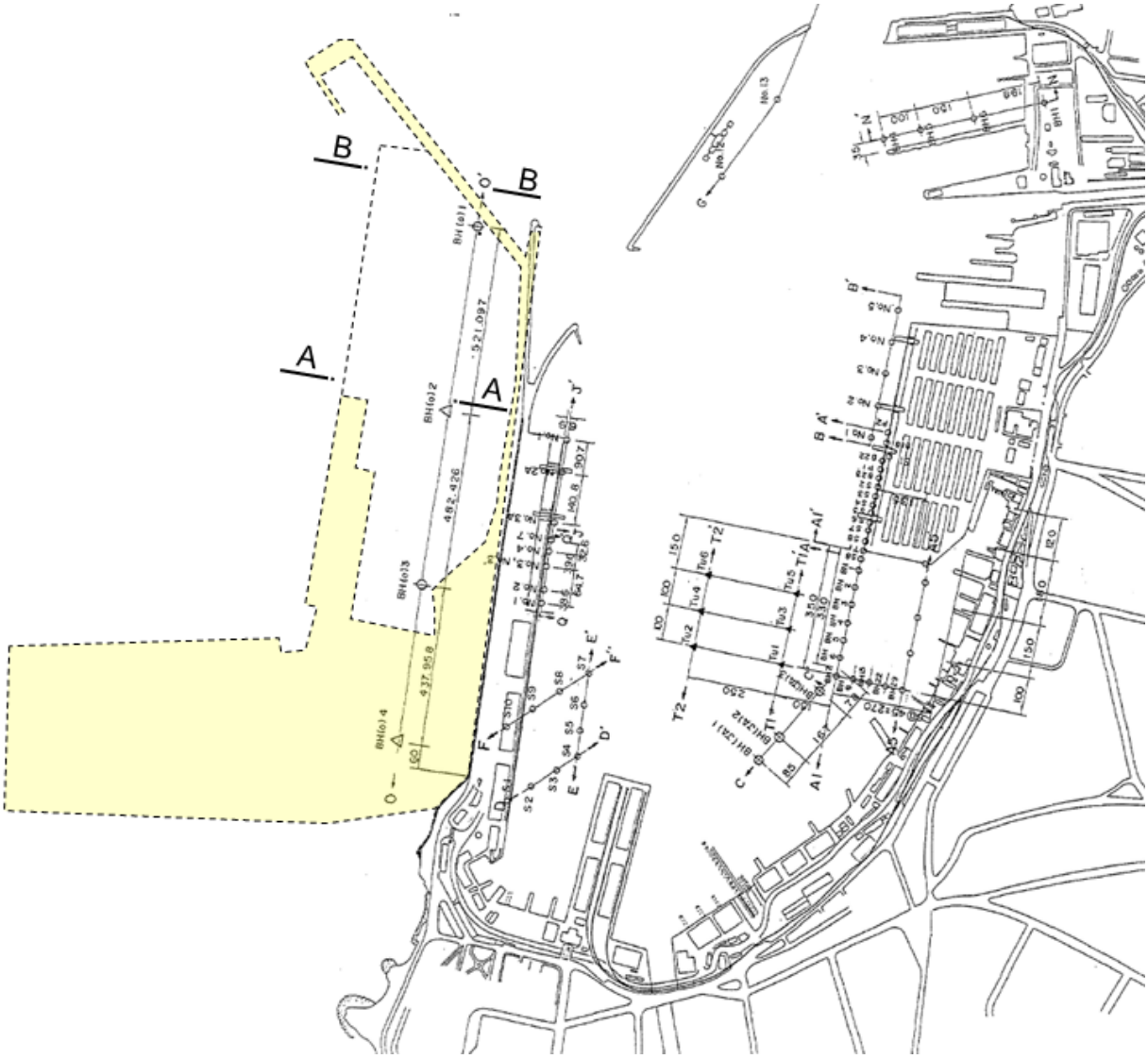
8: Silty viscous soil or viscous soil of medium hardness

8 to 16: Very hard viscous soil

3) Lateral ground reaction coefficient of pile (Kh): $Kh = 1.5N$ (N/cm^3)

where N: Hammering number of times at standard penetration test

Source: JICA Study Team



Source: Report of Study on Colombo Port Development Project, 1989 revised by JICA Study Team

Figure 5-5 Locations of Geotechnical Survey

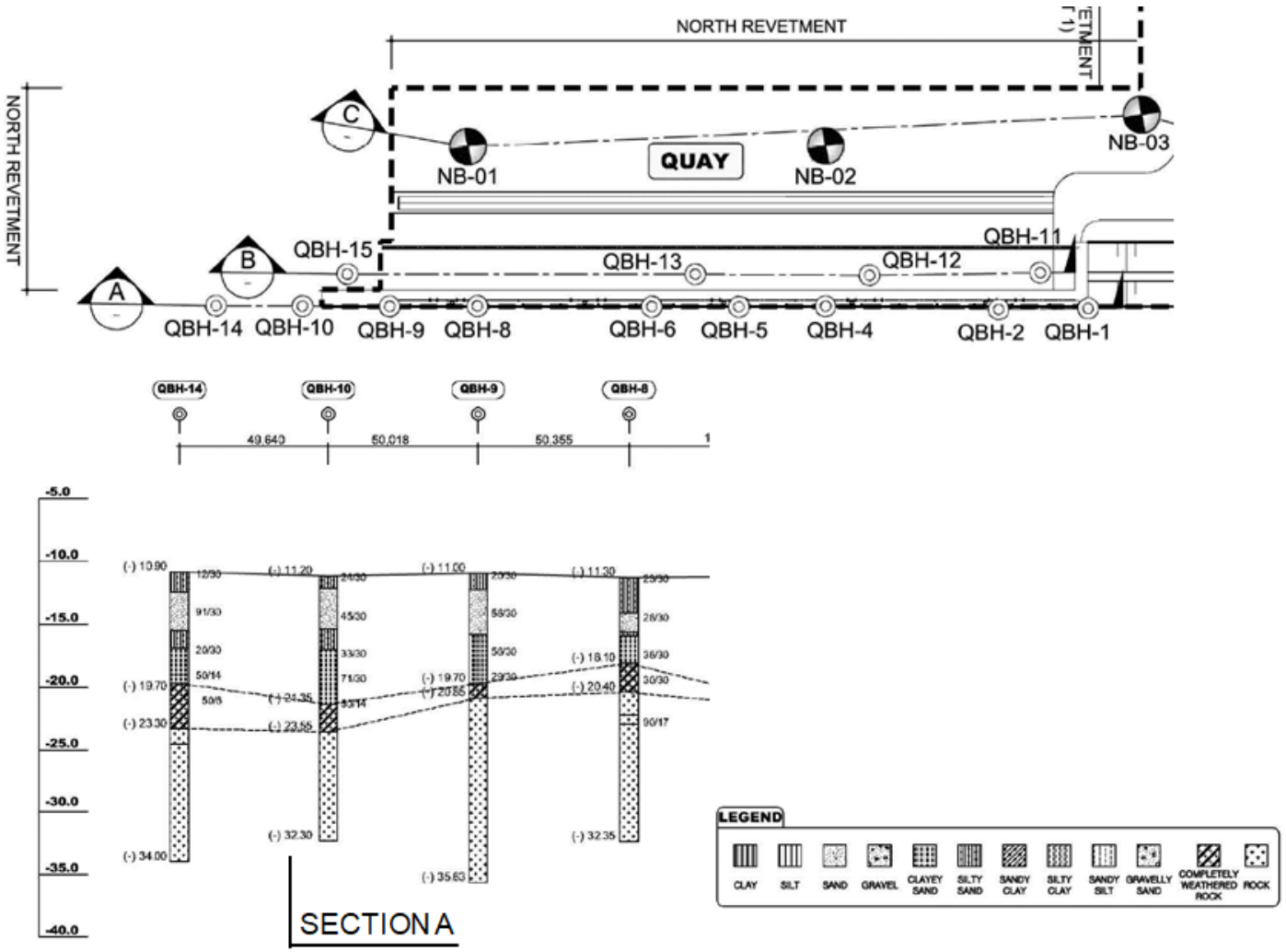
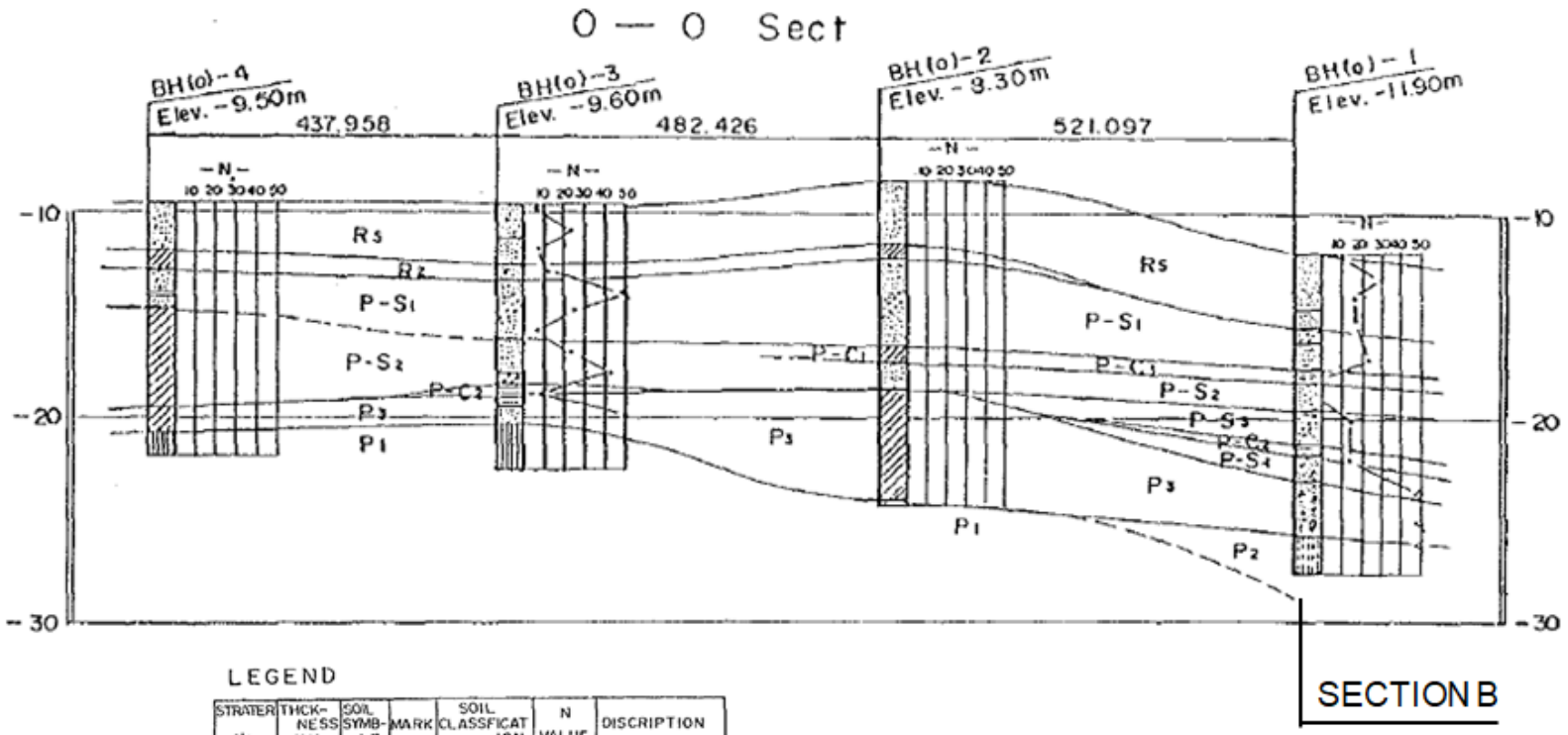


Figure 5-6 Assumed Soil Layers



LEGEND

STRATER No.	THICK-NESS (M)	SOIL SYMB-LE	MARK	SOIL CLASSFICATION	N VALUE	DISCRIPTION
1 st	1 to 4		R2	SILTY CLAY (MUD)	PRESSED BY ROD	SEDGEMENTALY STRATER
2 st	0 to 2		R1	SAND COARSE&MEDIME	N < 30	D O
3 st	2 to 7		P-S	SAND CLAY	N < 25	D O
4 st	2 to 8		P-C	CLAY & SILTY CLAY	N < 10	
5 st	1 to 9.5		P3-S	SANDY CLAY	N < 20	WEATHERED ROCK SOIL
			P3-C	CLAYEY SAND	N < 25	
6 st	0 to 8		P3	CLAYEY SAND	N > 25 TO N 50	D O
7 st	0 to 7		P2	WEATHERED ROCK	N > 50	
8 st	–		P1	BED ROCK	CORE BORING	

Figure 5-7 Assumed Soil Layers

(4) Design conditions of container berth

1) Design vessel

The design vessel assumes relevant vessels in the future.

- Design vessel: 24,000 TEU
- LOA=400 m
- Breadth＝Approx. 62 m
- Draft=16.5 m (assuming full load for the quay design)

2) Geometry of the container berth

The proposed quay wall requires a water depth of -19 m to sufficiently accommodate 24,000TEU class vessels.

- Quay wall length 600 m＋600 m = 1,200 m
- Cope level at quay wall face-line CD +3.0 m
- Planned water depth CD -18.0 m
- Design water depth CD -19.0 m

3) Load conditions

- Surcharge loads 15/35 kN/m^2
- Ditto (overall slope stability) 50 kN/m^2
- Load acting on the bollard Mooring force of 2,000 kN
- QGC Able to load containers in 26 rows on the deck of a container vessel
- Other cargo handling equipment on the quay apron

Table 5-8 Design Specifications of QGC

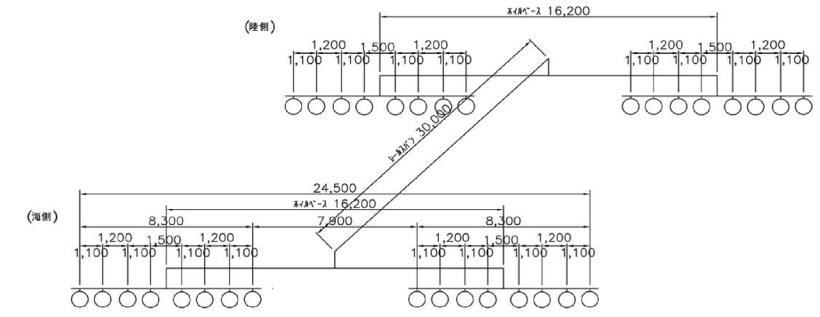
Design vessel	24,000 TEU; Breadth=62 m
Number of container loading rows on the deck	26 rows
Lifting capacity	65 tons with a spreader
Outreach	73 m
Back reach	20 m
Lifting height above the track	55 m
Rail span	30 m
Number of wheels per leg	8 wheels at intervals of 1.0 to 1.1 m
Total weight	1,600 tons
Design wind speed at operation	16 m/s
at non-operation	40 m/s

Source: JICA Study Team

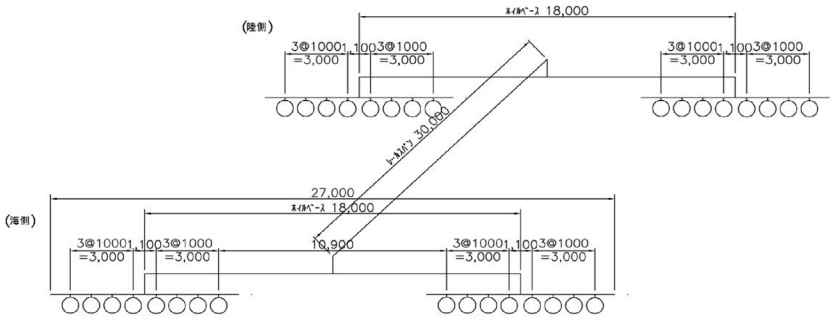
SLPA's specifications of those designed at the existing quay wall in the Table below are applied to crane loads.

Table 5-9 Wheel Load of QGC

Condition	Direction	Unit	SLPA		MADE IN JAPAN		REMARK
			Normal	Seismic	Normal	Seismic	
Operation wheel load	**Seaside vertical**	**tonne/wheel**	**93**	**117**			
	Landside vertical	tonne/wheel	70	79			
	Seaside horizontal parallel to rail	tonne/rail	79	95			
	Seaside horizontal perpendicular to rail	**tonne/rail**	**60**	**83**			
	Landside horizontal parallel to rail	tonne/rail	49	71			
	Landside horizontal perpendicular to rail	tonne/rail	60	83			
Non-Operation wheel load	**Seaside vertical**	**tonne/wheel**	**96**	**------**			
	Landside vertical	tonne/wheel	106	------			
	Seaside horizontal parallel to rail	tonne/rail	145	------			
	Seaside horizontal perpendicular to rail	**tonne/rail**	**146**	**------**			
	Landside horizontal parallel to rail	tonne/rail	127	------			
	Landside horizontal perpendicular to rail	tonne/rail	146	------			
Uplift	Seaside	tonne/corner	255	------			
	Landside	tonne/cornner	100	------			

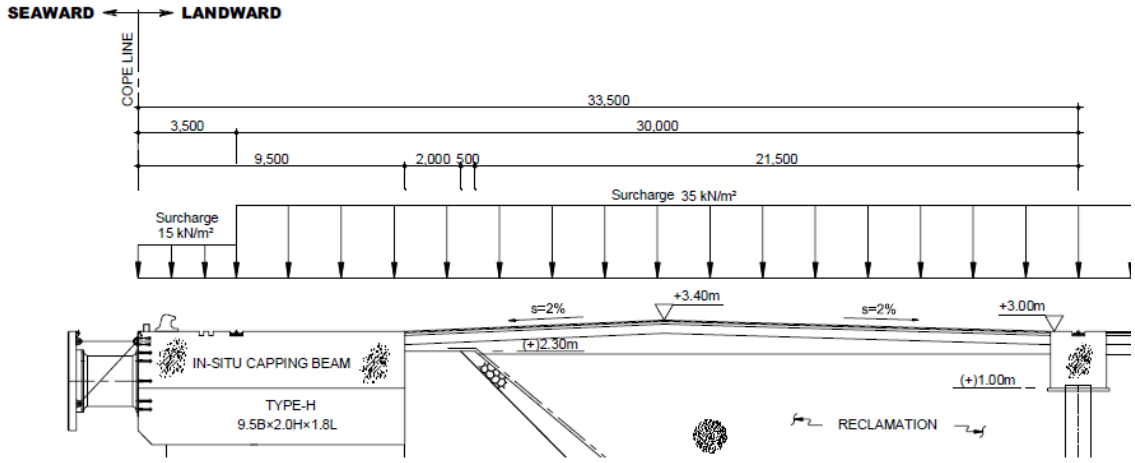


SLPA



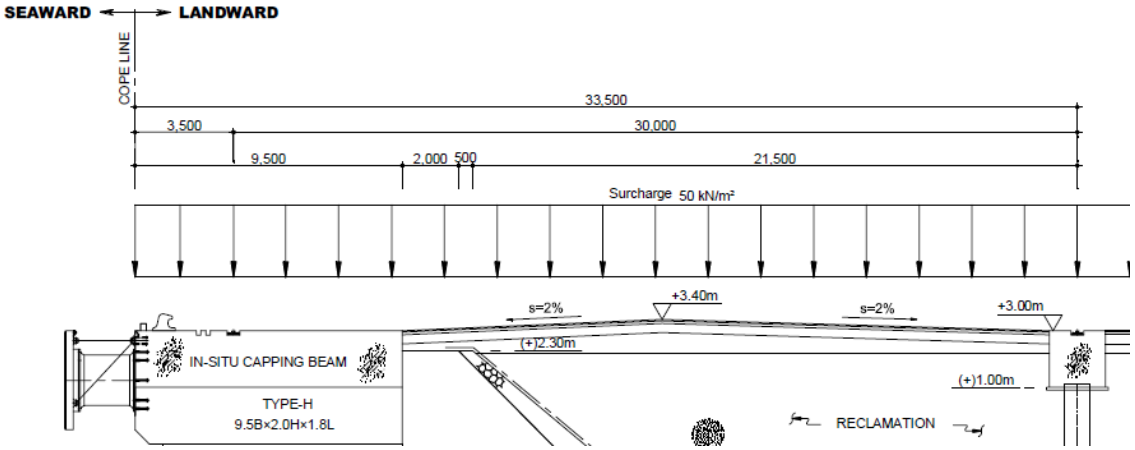
MADE IN JAPAN

Source: Colombo Port Expansion East Container Terminal Stage 1, 2013, SLPA



Source: Colombo Port Expansion East Container Terminal Stage 1, 2013, SLPA

Figure 7-5 Surcharge Loads (for Study of Stability)



Source: Colombo Port Expansion East Container Terminal Stage 1, 2013, SLPA

Figure 5-8 Surcharge Loads (for Overall Slope Stability)

4) Service life

Provisions of BS 6349-1: 2000 stipulate as follows:

- The design working life of a structure is regarded as a specific period of its use for an intended purpose and under planned maintenance;
- Normally, design working life of the order of 50 years or more is expected for marine structures such as quay wall, pier and jetty, but their design service life does not need necessarily to be equal to the renewal period that considers design.

This container quay wall structure will be designed in a manner to be consistent with the above provisions and the design conditions of the existing quay wall and anticipating a 50-year service life.

5) Design standards and codes of practice

- Technical Standards and Commentaries for Port and Harbour Facilities in Japan,2019

- British Standards Code of Practice for Marine Structures (BS 6349)
  Part 1: General criteria 2000
  Part 2: Design of quay walls, jetties and dolphins 1988
  Part 4: Code of Practice for designing fendering and mooring system 1994
- Design of structures for earthquake resistance (Eurocode 8)

(5) Comparative evaluation on suitable type of structure

Typical types of berthing structure have their own structural characteristics for suitability to the specific subsoil condition and the requirements of the facility such as quay wall water depth. Consequently, these structural characteristics should be technically evaluated and reflected from the viewpoints of structural stability, workability, construction cost, easiness of maintenance during post-construction stage.

The type of berth structure can be classified into rigid structure (gravity type or sheet pile wall) or open-piled suspended deck.

In the first place, several types being generally applied to berth structure are examined from the following viewpoints:

- Structural suitability
- Suitability for subsoil condition
- Durability
- Construction method
- Construction cost

As regards the quay wall structure in Colombo Port expansion works, caisson type structure was applied to South Container Terminal, and concrete block type structure to East Container Terminal Stage 1. JICA Study Team agrees to select the same kind of structure as the one adopted as the structure of the existing quay wall.

Then, we will compile the results of comparison among several structural types that are judged to have suitability for the quay wall facilities in the expansion work of ECT. After all, caisson type or concrete block type structure is one of the most common and practical types, and is recommended as the berth structure in this project.

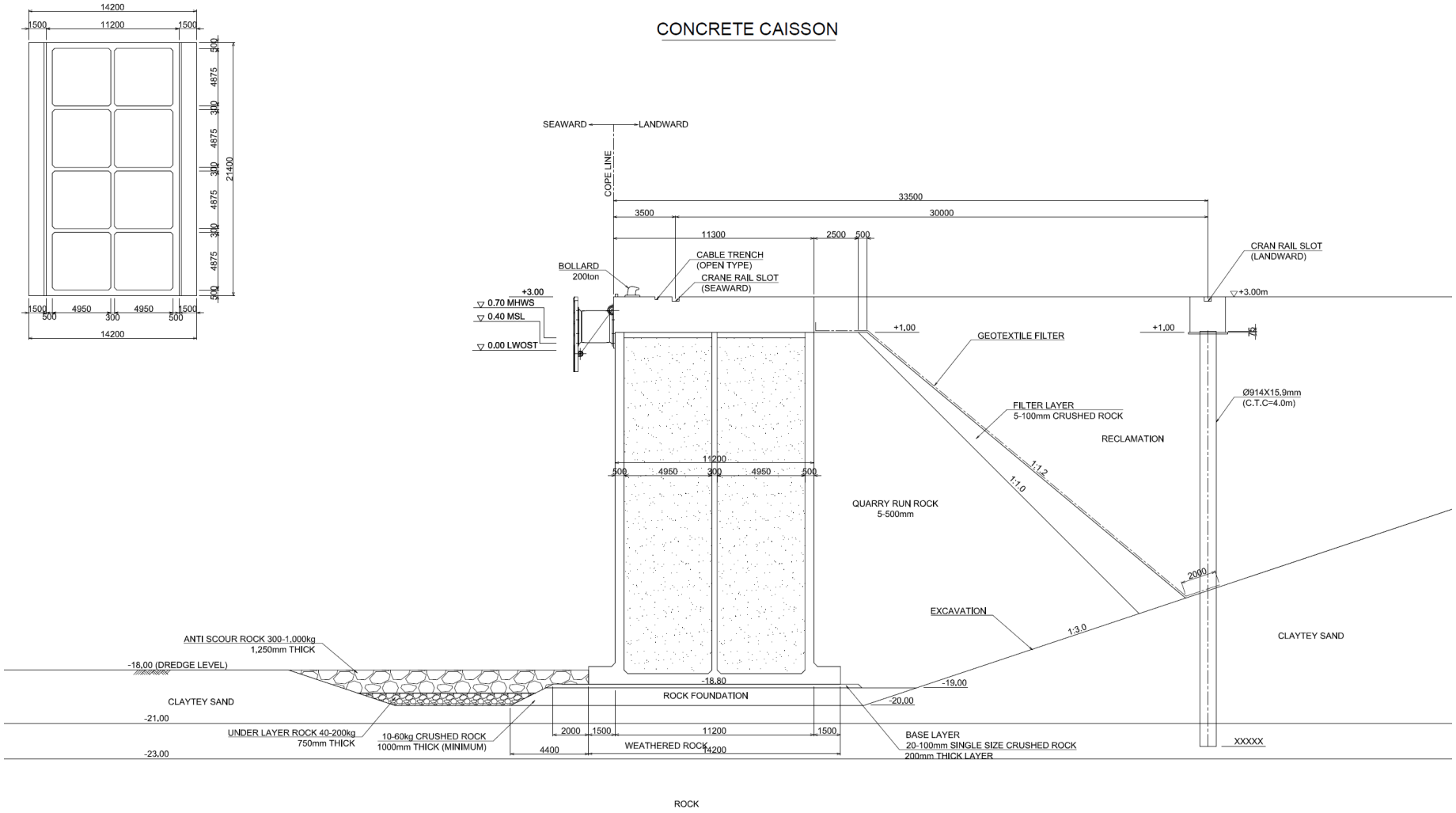
Since the caisson type structure and the concrete block type structure do not have a large difference in respect to structural suitability, suitability for the nature of the subsoil and durability, it is desirable to select the most suitable structure taking into account easy procurement of equipment and material, as well as construction cost.

Here, the most lightweight concrete block is selected as the recommendable option of JICA Study Team.

Table 5-10 Comparative Evaluation for Various Types of Berth Structure

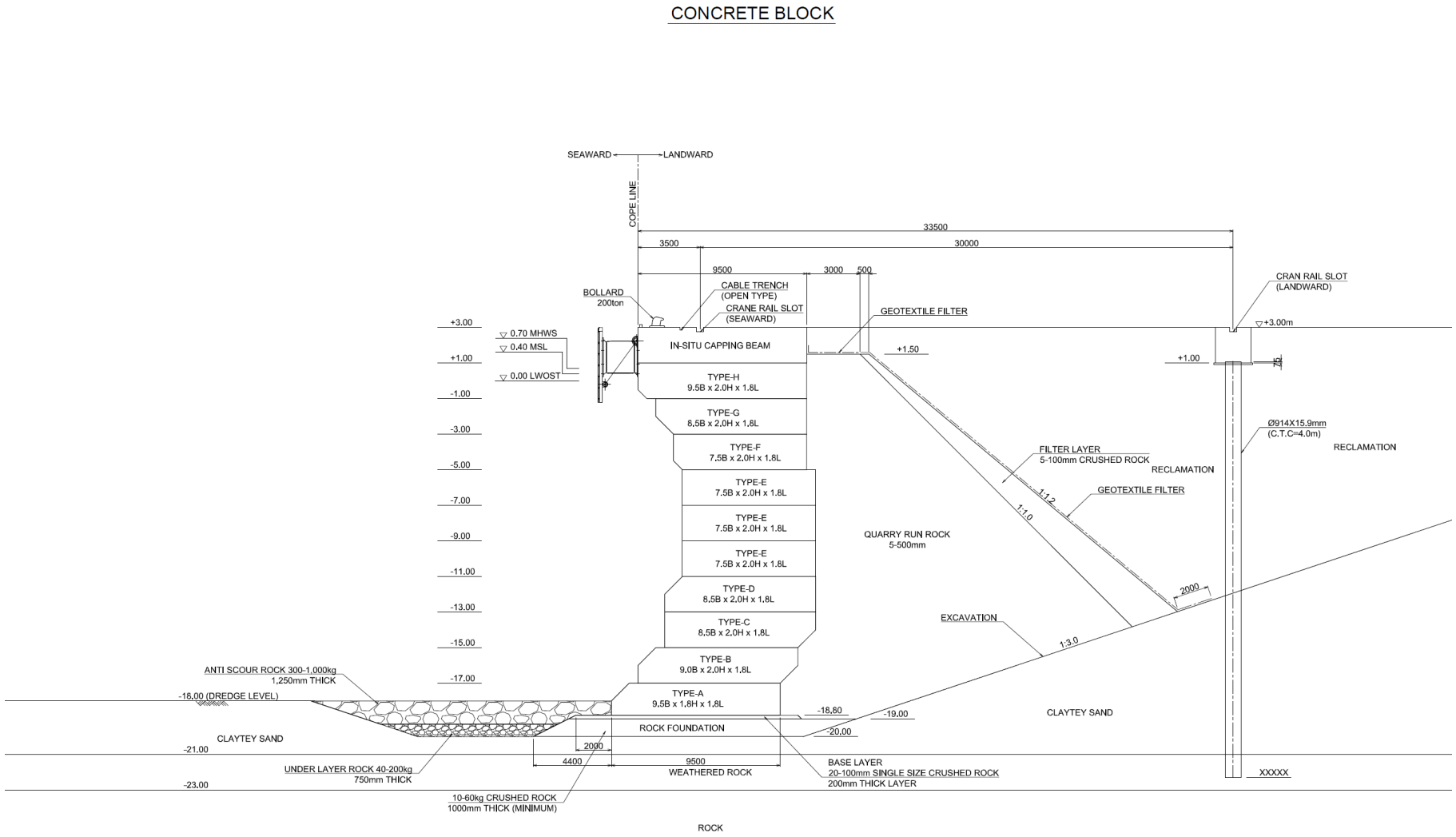
	A. Gravity Wall						B. Steel pile Wall	
	A1. Concrete caisson		A2. Concrete block		A3. Hybrid Concrete L-type block		B1. Continuous steel pipe jacking method	
Structural Adaptability	○	Concrete caissons can be applied to deep water in excess of -18 m, and has many application results in Asia and Europe where floating docks can be easily procured. Concrete block has a lot of application results to dry construction in the Middle East. In case dry construction is difficult, securing installation accuracy becomes a crucial point. Hybrid concrete L-type block is Japanese technology. Factory-manufactured skeleton steel is assembled at site and concrete is also placed. In case of deep water, and unitary weight increases.					△	Normally less -10 m water depth. However, steel pipe pile is applicable to deeper water depth.
Suitability to subsoil conditions	△	This is suitable for hard soil layers. It is not suitable for soft soil layer, and in case there is a soft layer like Section B-B, soil improvement such as replacement method is required.					△	Penetration of steel piles into hard soil needs supplementary construction method.
Durability	○	Use only concrete members. No need to take corrosion protection for steel. In general, it is maintenance-free.			△	Steel members subject to corrosion.	△	Steel product subject to corrosion.
Construction method	△	A floating dock is necessary for fabrication and launching of caisson	△	250-ton class lifting equipment is necessary to transport and install fabricated blocks	△	1,600-ton class lifting equipment is necessary to transport and install fabricated blocks	○	Steel pipe is a comparatively lightweight material, and its handling in construction is easy.
Construction cost	△	Expensive	○	Relatively expensive	△	Expensive	△	Steel pipe jacking supplementary method is necessary; expensive
Evaluation	△	Not recommendable	○	Recommendable	△	Not recommendable	△	Not recommendable

Source: JICA Study Team



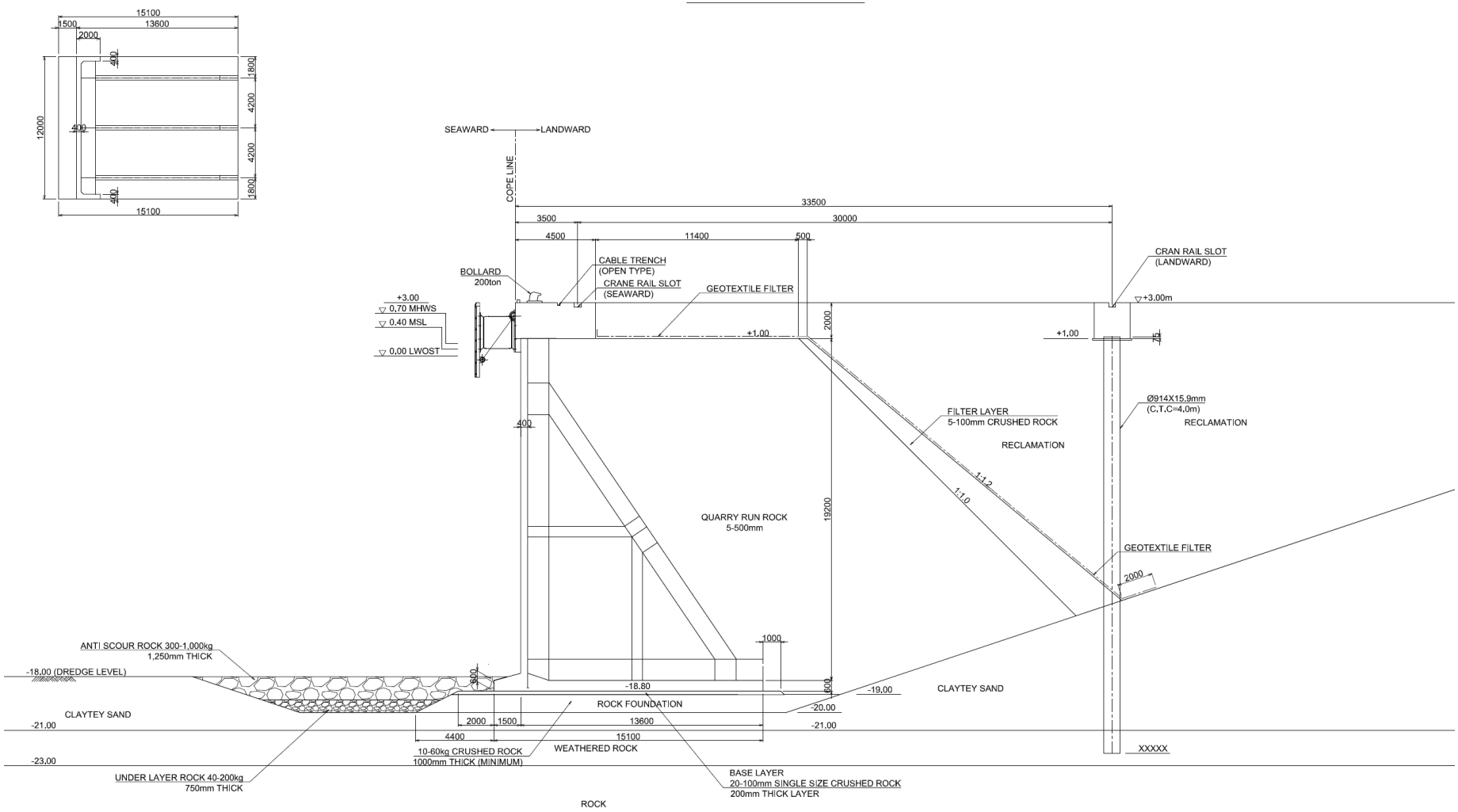
Source: JICA Study Team

Figure 5-9 Concrete Caisson Type Quay Wall Structure



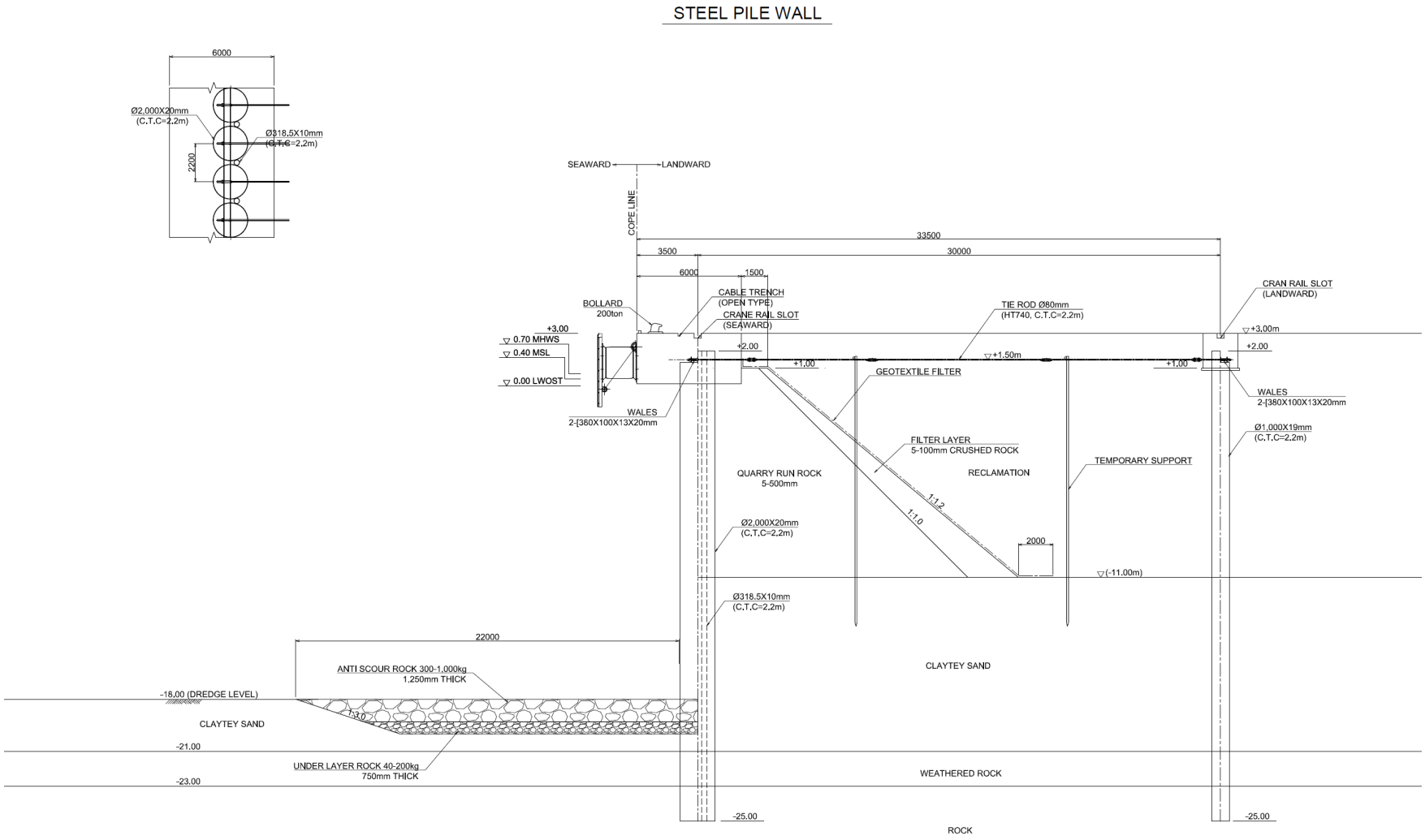
Source: JICA Study Team

Figure 5-10 Concrete Block Type Quay Wall Structure



Source: JICA Study Team

Figure 5-11 Hybrid Concrete L-Type Block Quay Wall Structure



Source: JICA Study Team

Figure 5-12 Continuous Steel Pile Wall Structure

5.2.2 Reclamation and Soil Improvement

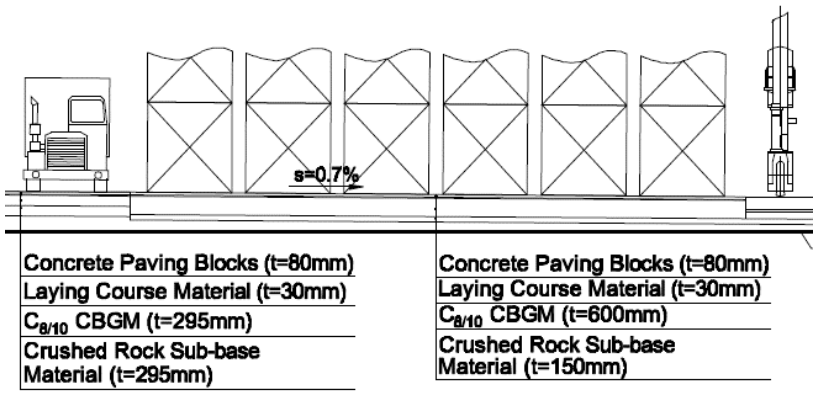
After constructing quay wall, land reclamation for terminal yard and improvement of soft soil, if required, should be completed.

5.2.3 Pavement

(1) Container terminal yard

Interlocking Concrete Block (ICB) heavy duty pavement will be applied. Paving surfacing is covered by the use of 8cm thick heavy duty Interlocking Concrete Blocks above 3cm bedding sand layer.

A 60cm cement treated base and 15cm crushed stone base layer is placed on well compacted in-situ material



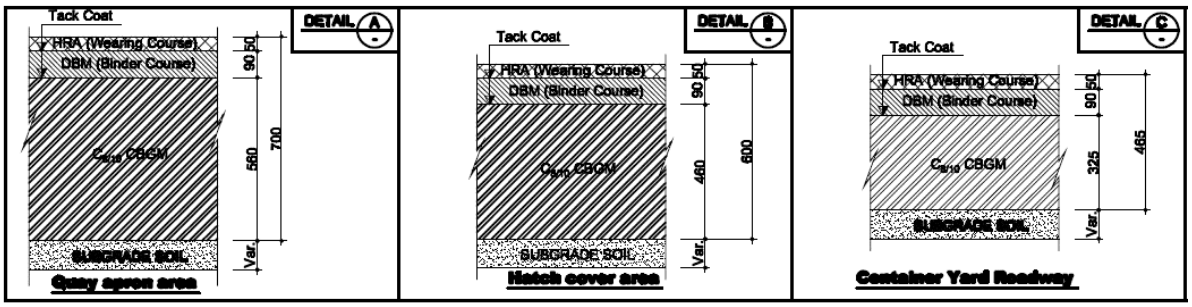
Source: Colombo Port Expansion East Container Terminal Stage 1, 2013, SLPA

Figure 5-13 Container Terminal Yard Pavement Structure

In container yard, E-RTG crane foundation is used to support higher loads of crane wheels. E-RTG crane foundation will be of cast-in-place type, pre-stressed with post-tensioning system or RC slab structure.

(2) Access road and around building

Asphalt pavement is applied to access road and around building pavement in view of economy for construction. Heavy duty two (2) bituminous layer of surface with bituminous stabilized base layer is placed on cement treated base.



Source: Colombo Port Expansion East Container Terminal Stage 1, 2013, SLPA

Figure 5-14 Access Road and around Building Pavement Structure

5.2.4 Utilities

The following utilities will be required.

- Power supply system
- Lighting system
- Freshwater supply system
- Water drainage and sewage treatment system and others

5.2.5 Other facilities

The following facilities will be required.

- Managing office
- TOS
- CCTV
- Bus-bar System：power supply for e-RTG
- Emergency generator: TBC
- Maintenance shop (Workshop, Worker House, parking for equipment)
- Fuel station
- CFS: TBC

5.3 Cargo Handling Equipment

QGCs will be able to cope with the world's largest container vessels in service on the East-West trunk route and will have an outreach of 26 container rows since vessel size is expected to increase in future. In addition, in order to improve the efficiency of ship cargo handling, twin lift specifications will be adopted.

RTG is an e-RTG type with less environmental load and an automated operation / remote control system. RTG remote operation system allows unmanned operation of RTGs. Based on job instructions from the TOS, automatic RTG crane operation for lane shift, stacking, traveling, bay travelling etc. is performed. However, for safety reasons, the container landing operation on the truck is performed by remote control by the RTG driver. By automated operation, the optimum placement of RTGs by TOS is achieved and since an automated RTG will avoid the bad habits of a careless operator such as poor handling, reckless driving, useless motions etc., the performance of cranes will remain as high as possible at all times. Moreover, by eliminating human error the reliability of storage location (address) management will be improved resulting in fewer cases of lost containers and more reliable operation. The RTG operator performs landing operation by remote control while viewing images on the remote-control console in the administration building. The occupancy time per cycle is several tens of seconds. In addition, one driver can operate multiple RTGs, and the optimum placement of drivers by TOS can be performed which minimizes the number of drivers, reduces fatigue and improves efficiency.

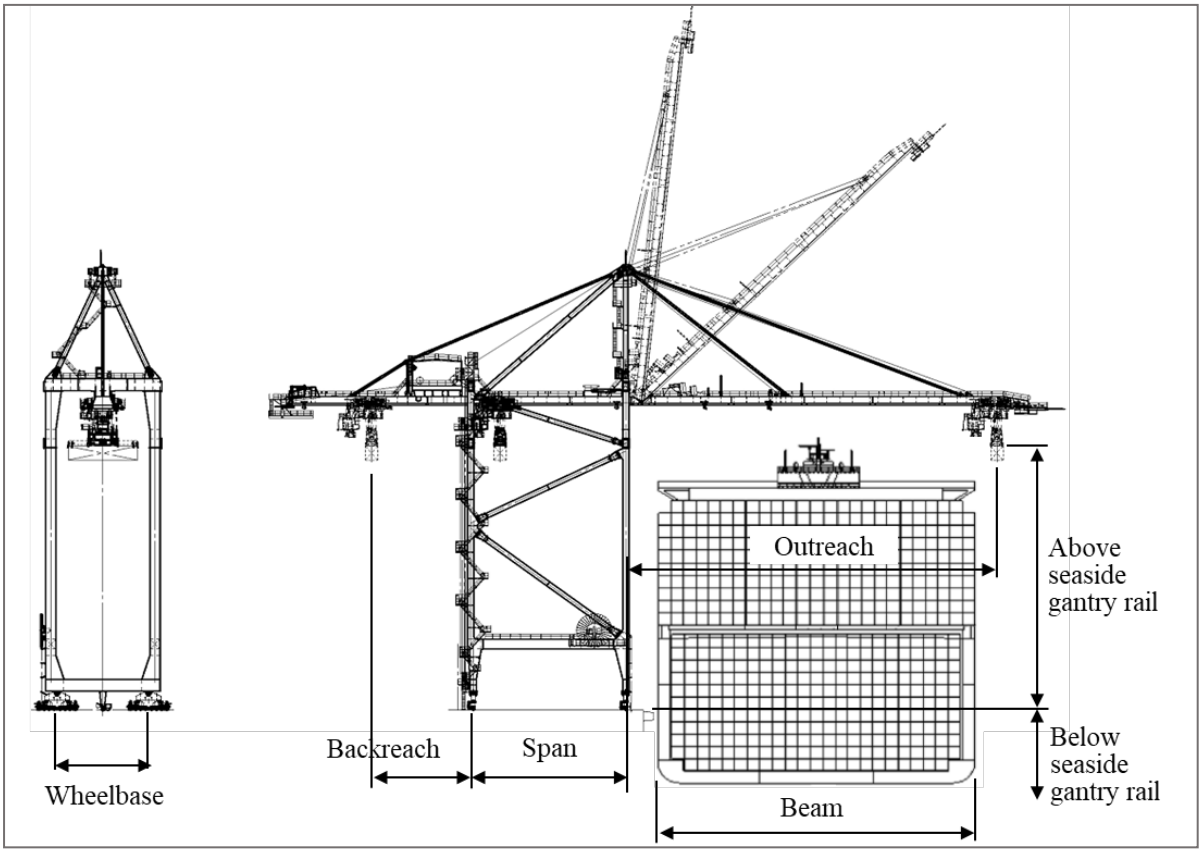
The types, main specifications and quantities of cargo handling equipment to be installed on the existing quay of Colombo South ECT are shown in Table 5-11. The general arrangement of QGC and e-RTG are shown in Figure 5-15 and Figure 5-16. The layout of the main equipment such as the detection device, camera, automated control system, and manual operation / automatic operation selection switch required for automatic operation/remote control of the e-RTG are shown in Figure 5-17.

Table 5-11 Specifications of Cargo Handling Equipment

Types of Cargo Handling Equipment	Main Specifications	Quantity (Phase-1)	Quantity (Additional)
QGC	Rated Load: 65 tons (under Twin-lift Spreader) : 50 tons (Single-lift Spreader) Span: 30.0m Outreach: 73.0 m (Response to Container Ship with 26 row containers on Deck Backreach: 20.0 m Lift: 55.0m above the sea side Gantry rail, 21.0 m below the sea side Gantry rail Clearance between Legs: 18.3 m Number of Gantry wheels: 32 wheels (8 wheels per Corner) Speed: Hoisting/Lowering: 180 m/min (Spreader only, Acceleration and Deceleration: 5 sec.) 90 m/min (Rated load, Acceleration and Deceleration: 2 sec.) Trolley Traversing: 240 m/min (Acceleration and Deceleration: 8 sec.) Gantry Travelling: 46 m/min (Acceleration and Deceleration: 8 sec.) Power Supply: Main Supply: AC11kV, 50Hz, 3-phase Sub Supply: AC400-230V, 50 Hz, 3-phase	6 units	8 units
e-RTG	Rated Load: 40.6 tons (under Spreader) Lift: I over 6 (21.0 m) Span: 23.47 m (6-row storage + 1 chassis lane) Wheel Base: 6.4 m Number of Gantry Tyres: 8 wheels (2 wheels per Corner) Remote operation and Manual operation from Operator's Cabin Speed: Hoisting/Lowering: 58 m/min (Spreader only, Acceleration and Deceleration: 5 sec.) 26 m/min (Rated load, Acceleration and Deceleration: 2 sec.) Trolley Traversing: 70 m/min (Acceleration and Deceleration: 5 sec.) Gantry Travelling: 90/135 m/min (Acceleration and Deceleration: 10.5 sec.) Power supply method: Bas-bar power supply, AC440V, 50 Hz, 3-phase, equipped with a battery	18 units	24 units
Spare Spreader	For QGC: 20'/40'/45'/2-20' Telescopic Spreader	2 units	2 units

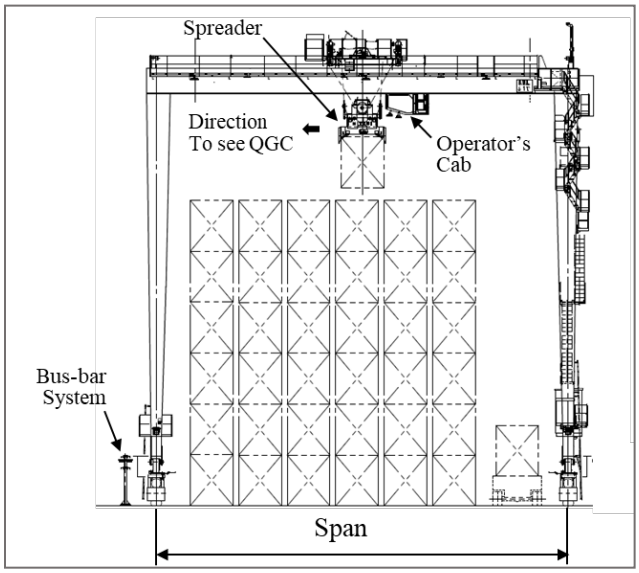
for QGC & e-RTG	For e-RTG: 20'/40'/45' Telescopic Spreader	2 units	2 units
Spare Parts for 2 year operation	Including 2 sets of Spare Programming Panel	1 set	1 set
Reach Stacker	For laden container handling	2 units	4 units
Yard Chassis with Head		30 units	40 units

Source: JICA Survey Team



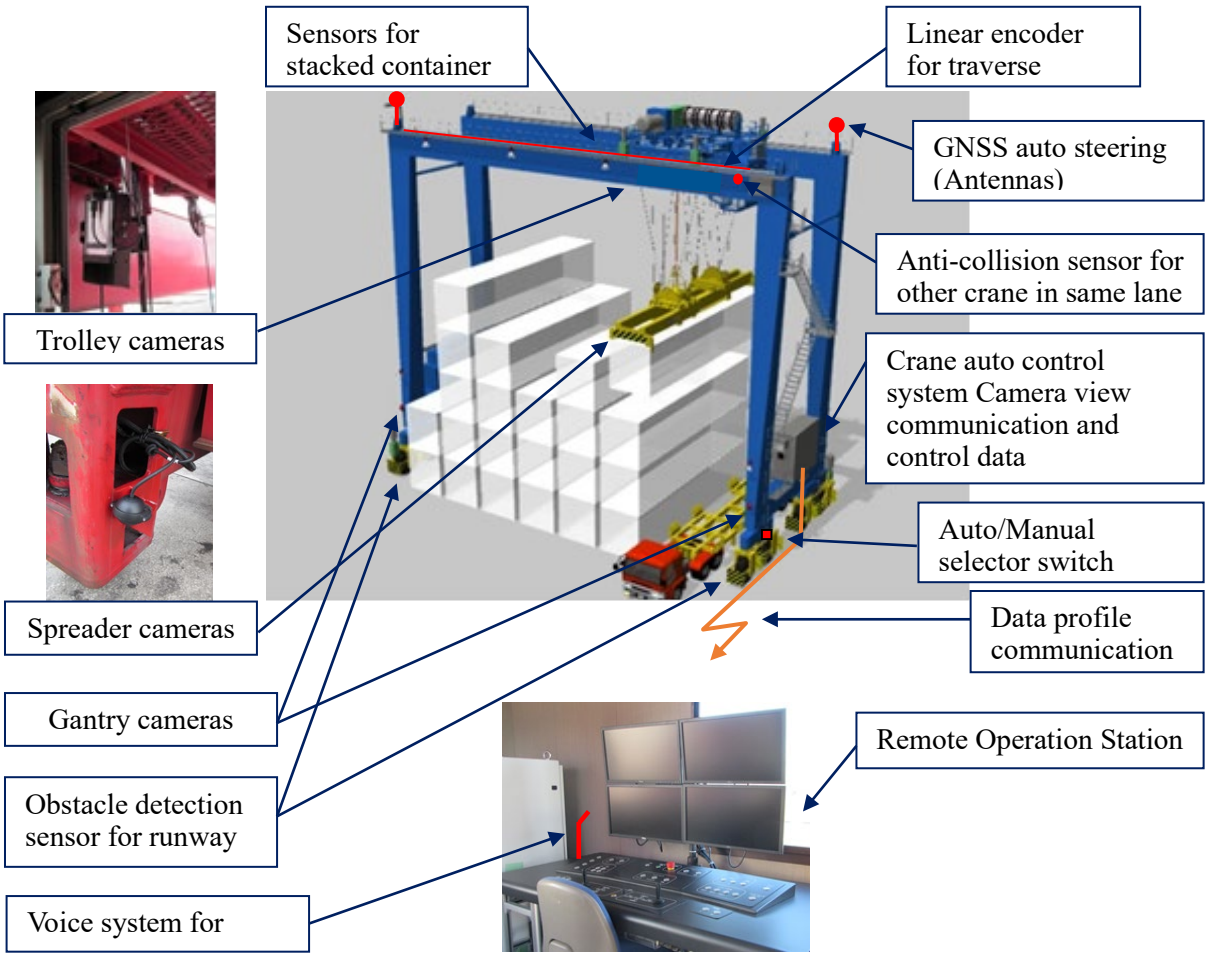
Source: Japanese Company A

Figure 5-15 QGC General Arrangement



Source: Japanese Company A

Figure 5-16 e-RTG General Arrangement



Source: Edited by JICA Survey Team based on materials of Japanese company A

Figure 5-17 Main Equipment for e-RTG Remote-Automation

6. Japanese Technology and Applicability to ECT

6.1 Features of Japanese Technology and Applicability to this Project

Japan's port construction technology is typically applied for construction works in the open sea where waves are high, construction works on soft ground often found in large bays, dredging works and seismic resistant design. However, in the Colombo South Harbor, the port is calm, the ground is solid, and it is not an earthquake-prone area, and therefore the strengths of Japanese construction technology may not be fully demonstrated. In addition, construction periods in Japan are sometimes shortened by making use of large crane vessels, however, such vessels are not available at Colombo Port.

Accordingly, the survey team believes that the concrete block, which is the structural type adopted for the existing ECT quay, has an advantage in terms of cost. It is generally accepted that concrete blocks are inexpensive and simple to pile up.

Based on the above background, the survey team selected the following four structural types that are thought to be suitable for the site.

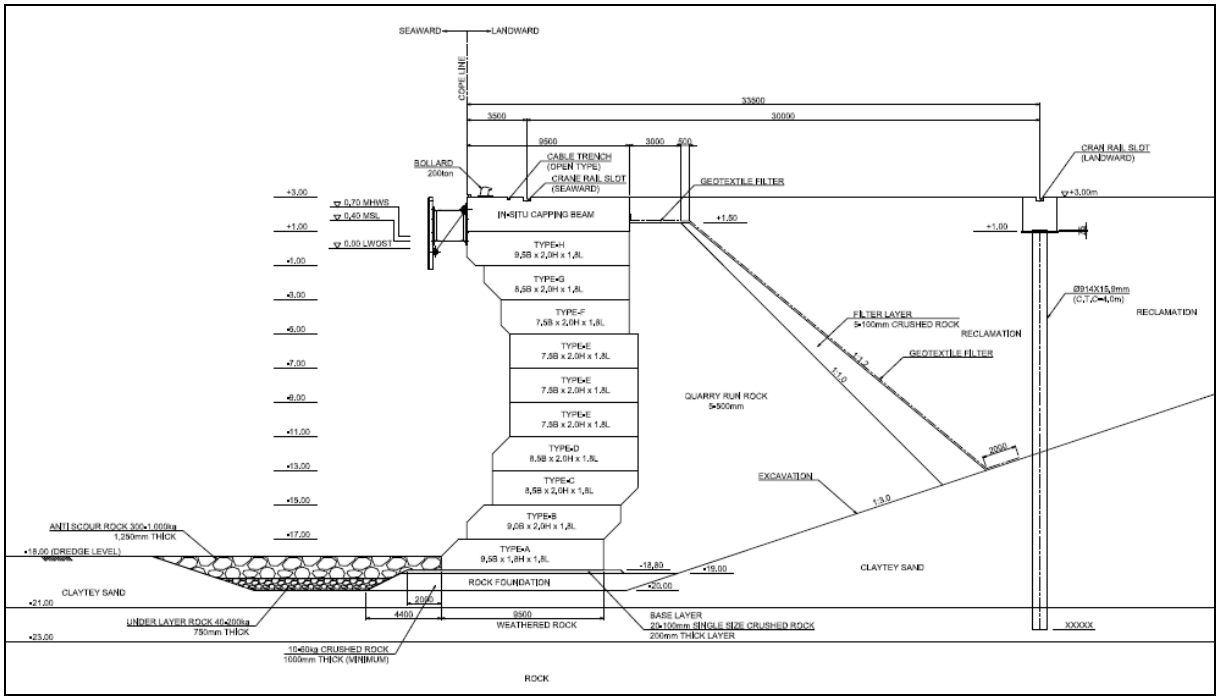
- Concrete block (lower blocks reinforcement, environment-friendly type)
- L-shaped block with buttress wall
- Retained steel pipe pile wall (rotary press-inserting method)
- Concrete caisson

Since the soil survey for the extension section of the ECT has not yet been conducted, a rough comparison of each structural type/construction method will be conducted, assuming the rock mass would appear at a water depth of around -20m.

6.2 Selected Structural Types

6.2.1 Concrete Block (Lower Blocks Reinforcement, Environment-Friendly Type)

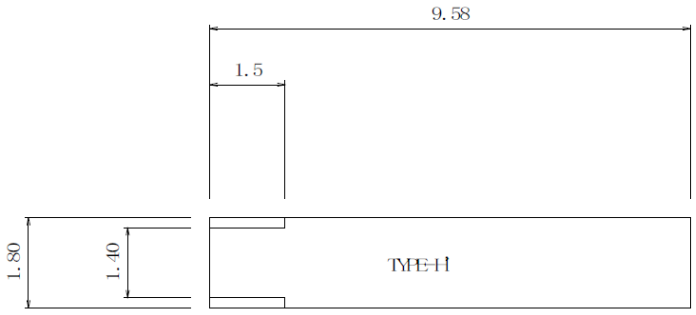
Based on the concrete block type used in the existing ECT quay, reinforcing bars are added at the lower blocks to reinforce the weaknesses of the plane concrete blocks, and cavities are provided on both sides of the upper block (TYPE-H) to add the environment-friendly function (see Fig. 8.1 and Fig. 8.2). The assumed dimensions of the concrete block are 1.8m to 2.0m in height, 7.6m to 9.6m in width, 1.8m in lateral direction, and the maximum weight is about 76 tons. The concrete blocks will be manufactured in the yard and piled up in the sea up-to10 layers on the rubble mound foundation using a small crane vessel. Cast-in-place concrete with a height of 2 m is placed on the top of the piled blocks. The back area of the installed concrete block is filled with quarry and sand.



Note: The upper block (TYPE-H, etc.) will be of environmentally friendly type, and the two lower blocks will be reinforced concrete.

Source: JICA Survey Team

Figure 6-1 Concrete Blocks (Lower Blocks Reinforced, Environment-Friendly Type)

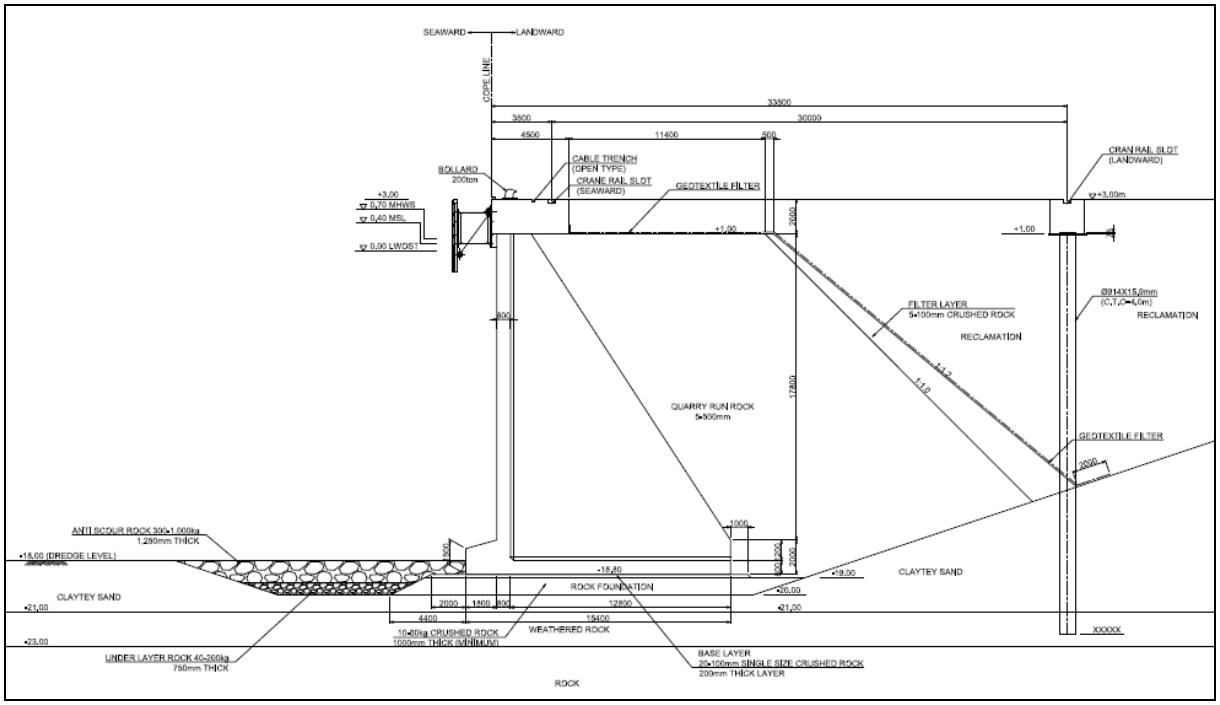


Source: JICA Survey Team

Figure 6-2 Plan View of the Environment-Friendly Type Block

6.2.2 L-Shaped Block with Buttress Wall

The assumed dimensions of the L-shaped block are as follows: a height of 19.5 m, a width of 16.3 m, a length of 5.0 m in the lateral direction, and a weight of about 625 tons. L-shaped blocks will be manufactured in a yard. The manufacturing time can be reduced if the parts of the L-shaped block can be produced on flat ground and assembled as a solid. Complete L-shaped block with a buttress wall will be installed in the sea on a prepared rubble mound using a medium-sized crane vessel, and the back area of the L-shaped block will be filled with quarry and sand. Cast-in-place concrete with a height of 2 m is placed on the top of the L-shaped block.

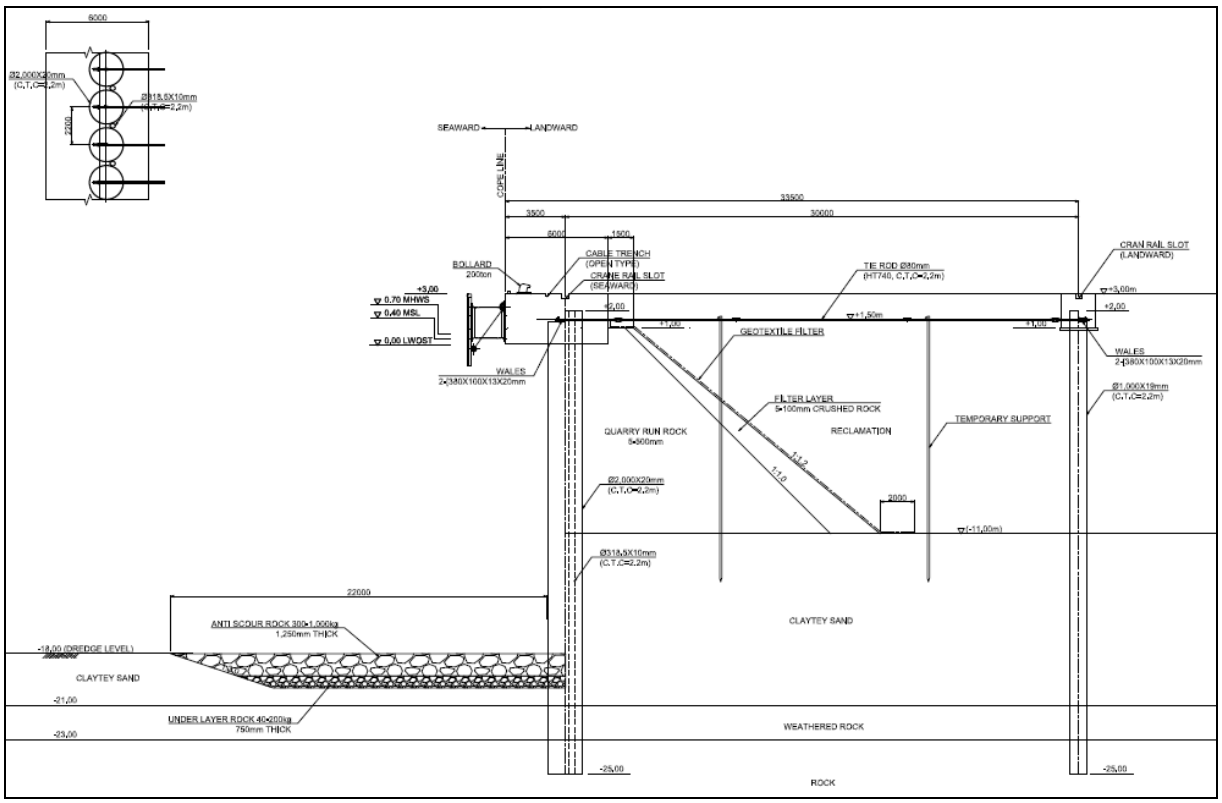


Source: JICA Survey Team

Figure 6-3 L-Shaped Block with Buttress Wall

6.2.3 Retained Steel Pipe Pile Wall (Rotary Press-Inserting Method)

The soil condition of the extension section of the ECT quay can be assumed to be the same as that of the existing section, while it is also assumed that rock mass will appear at a water depth of around -20m. Based on these assumptions, steel piles are rotary press-inserted into the bedrock. The technology used in the rotary press-inserting method for steel pipe piles originated in Japan. The assumed dimensions of the steel pipe pile are 2,000 mm in diameter, 20 mm in wall thickness, and 27.0 m in length, and its weight is about 26 tons. The steel pipe piles are rotary press-inserted at a pitch of 2.2 m, and the gaps between the steel pipe piles are filled with a steel pipe pile with a diameter of 318.5 mm. The rear piles to retain the front piles will also be rotary press-inserted and will be connected by tie wire to prevent deformation of the front steel pipe piles. As for the corrosion protection measures for steel pipe piles, the area of splash zone (water depth -1m or more) will be covered with concrete. Other parts of the steel piles will be protected by electric corrosion protection (service life of 50 years). After the tie rod is connected, the back area will be filled with the quarry stones and sands, and cast-in-place concrete with a height of 2 m will be placed on the top of the front piles. Since it is difficult to excavate the rocks adjacent the steel pipe pile, it is necessary to excavate the rocks in advance. In addition, since the piles are very tall, some stabilization measures during the construction of the steel pipe pile may be necessary.

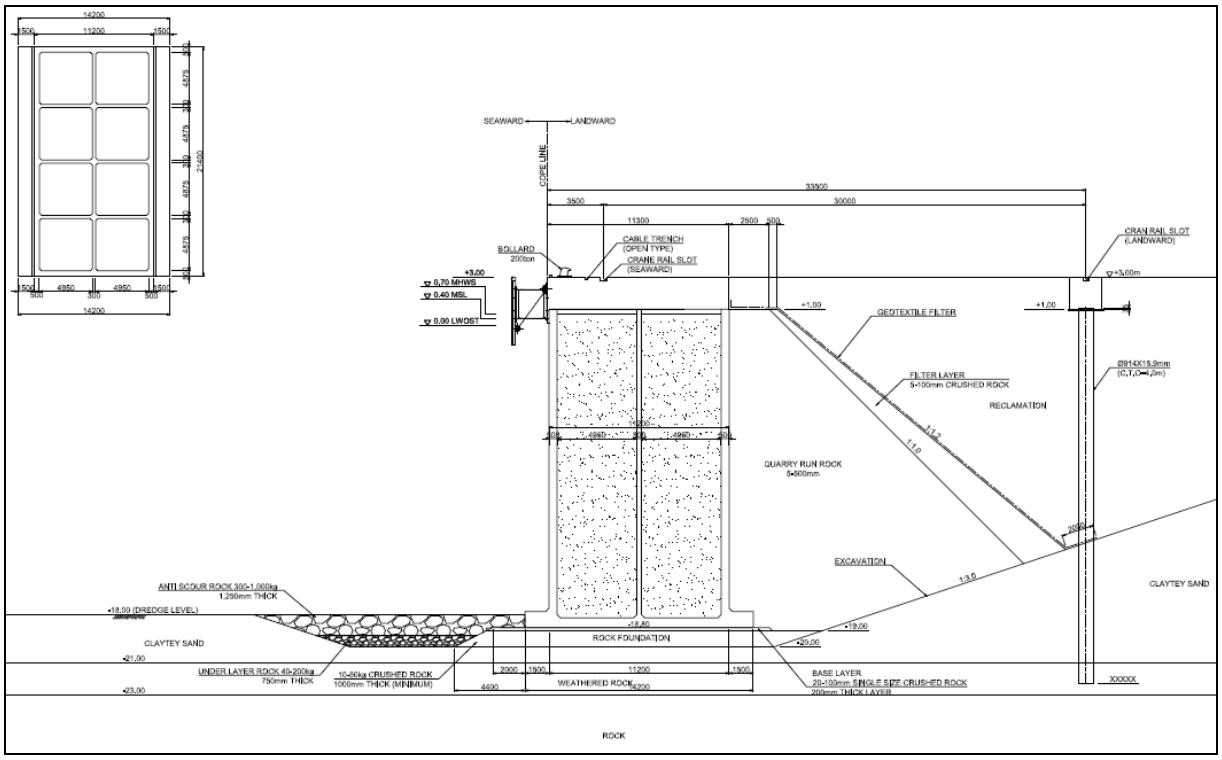


Source: JICA Survey Team

Figure 6-4 Retained Steel Pipe Pile Wall (Rotary Press-Inserting Method)

6.2.4 Concrete Caisson

Concrete caisson is a traditional structural type in Japan and is also used in Colombo Port. The assumed dimensions of the concrete caisson are as follows: height of 19.8m, width of 11.2m, and a length of 21.4m in the lateral direction. The weight is about 2,740 tons. FD (Floating Dock) will be used for manufacturing the caissons. The caissons will be launched and towed from the FD. They will be placed on the prepared rubble mound foundation. The chambers of the caisson are filled with sand and covered by the top concrete. The area behind the caisson will be filled with the gravel and sand.



Source: JICA Survey Team

Figure 6-5 Concrete Caisson

6.3 Comparison of Each Structural Type and Construction Method

Although the soil survey of the ECT quay has not yet been conducted, it is assumed that the soil condition of the extension section is the same as that of the existing section, and that rock mass will appear at a water depth of around -20 m.

Under the assumed soil conditions, concrete blocks (lower blocks are reinforced concrete, environmentally friendly type) have an advantage in terms of the estimated construction period. However, this evaluation may be modified when the soil conditions are clarified.

Table 6-1 Results of Comparison of Each Structural Type and Construction Method (provisional)

Quay wall type and construction method	Place of Fabrication	Construction period (month)
Concrete block (lower blocks reinforced, environmentally friendly type)	Land yard	24
L-shaped block with buttress wall	Land yard	30
Retained steel pipe pile wall (rotary press-inserting method)	Overseas factory	24
Concrete caisson	FD	30

Source: JICA Survey Team

7. Construction Plan

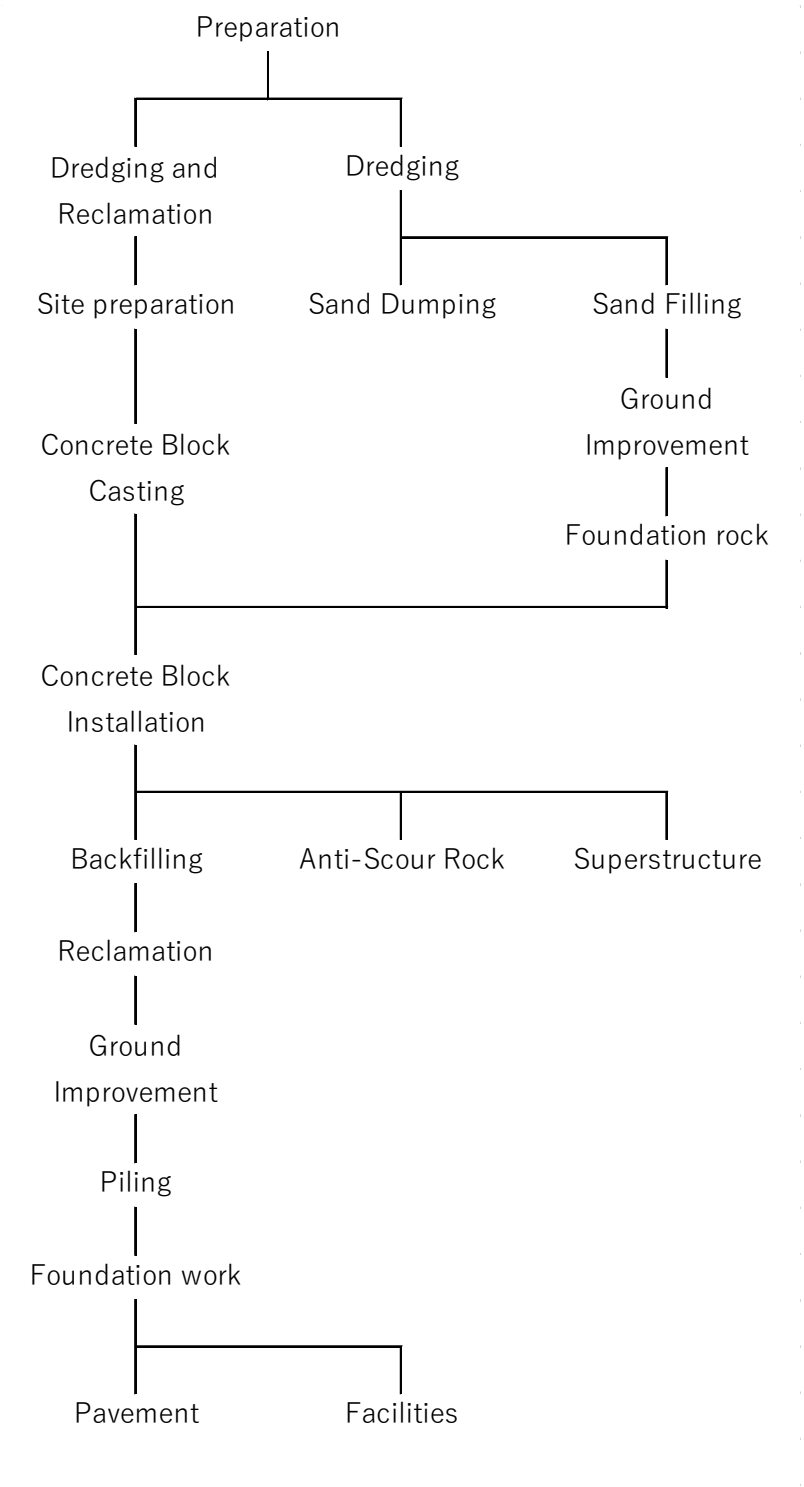
7.1.1 Construction Plan

The overall schedule, flowchart, and cross section of the quay structure (when concrete block type is adopted) are shown Table 7-1, Figure 7-1, and Figure 7-2, respectively.

Table 7-1 Overall Schedule (Concrete block)

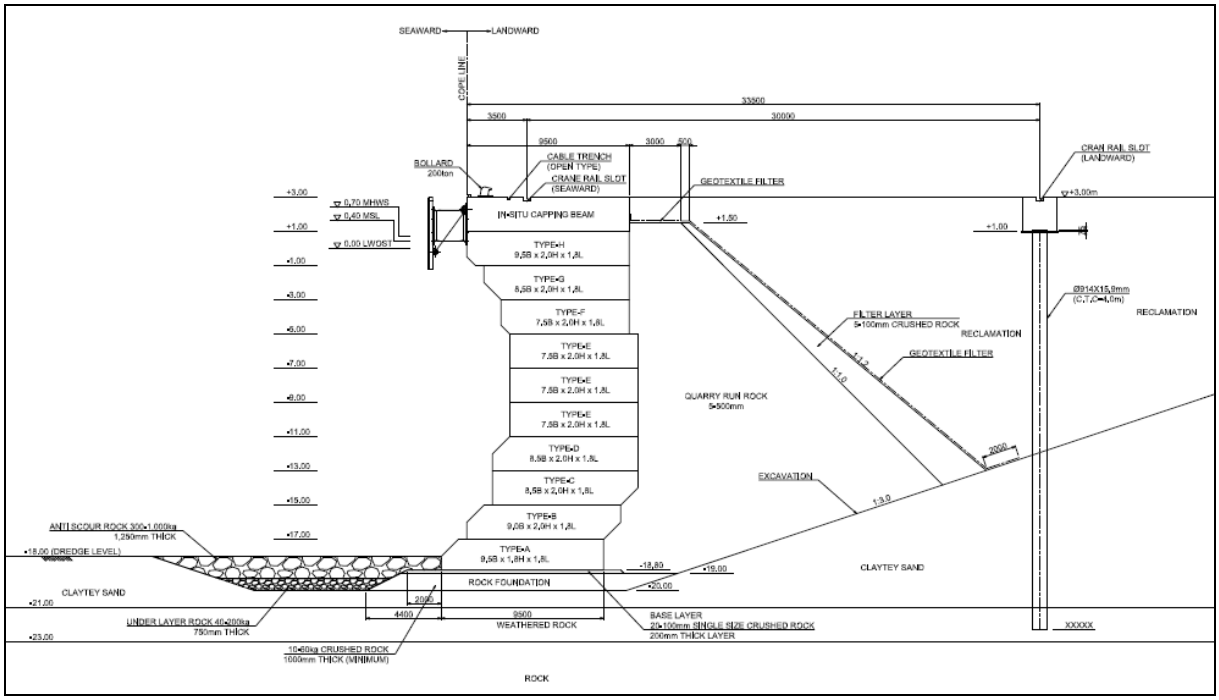
Work Item	Volume (m3)	Productivity (m3/day)	Duration (days)	1												2											
				1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24
Preparation			60																								
Dredging and Reclamation (TSHD)	4,361,137	44,755	100			For Block Casting Area											Including back filling										
Ground Imporovement			120																								
Dredgin (Pump Barge)	712,189		169																								
Dredging (Grab dredger)	556,424		160																								
Rock Foundation	11,928	300	40																								
Concrete Block Casting	4,530	25	240					start casting																			
Concrete Block Installation	4,530	-	414								by 2 vessels																
Back Filling	182,564	1,000	183																								
Anti-Scour Rock	18,700	300	60																								
Piling	225	3.3	68																								
Crane Foundation			90																								
Superstructure			150																								
Pavement			210																								
Facilities			270																								
Cargo Handling Equipment																					50%				100%		
Equipment installation and testing																						50%				100%	

Source: JICA Survey Team



Source: JICA Survey Team

Figure 7-1 Flow Chart



Source: JICA Survey Team

Figure 7-2 Cross Section（Concrete Block Type）

7.1.2 Material Procurement

Procurement materials will be carried in through the gate on-site. The materials and equipment from the other countries are expected to be unloaded at ECT and brought to the construction site.

7.1.3 Preparation and Temporary work

Before construction works commence, preparatory work to acquire the necessary permits and documents such as work drawings and construction plans will be carried out. The installation of temporary fences and gates as well as surveying works will also be conducted. In addition, the temporary works considered necessary are as follows.

- Installation of temporary fences and gates, site offices and accommodations at the temporary yard
- Temporary access road for transporting and carrying the equipment

Works to be carried out at the temporary yard are as follows.

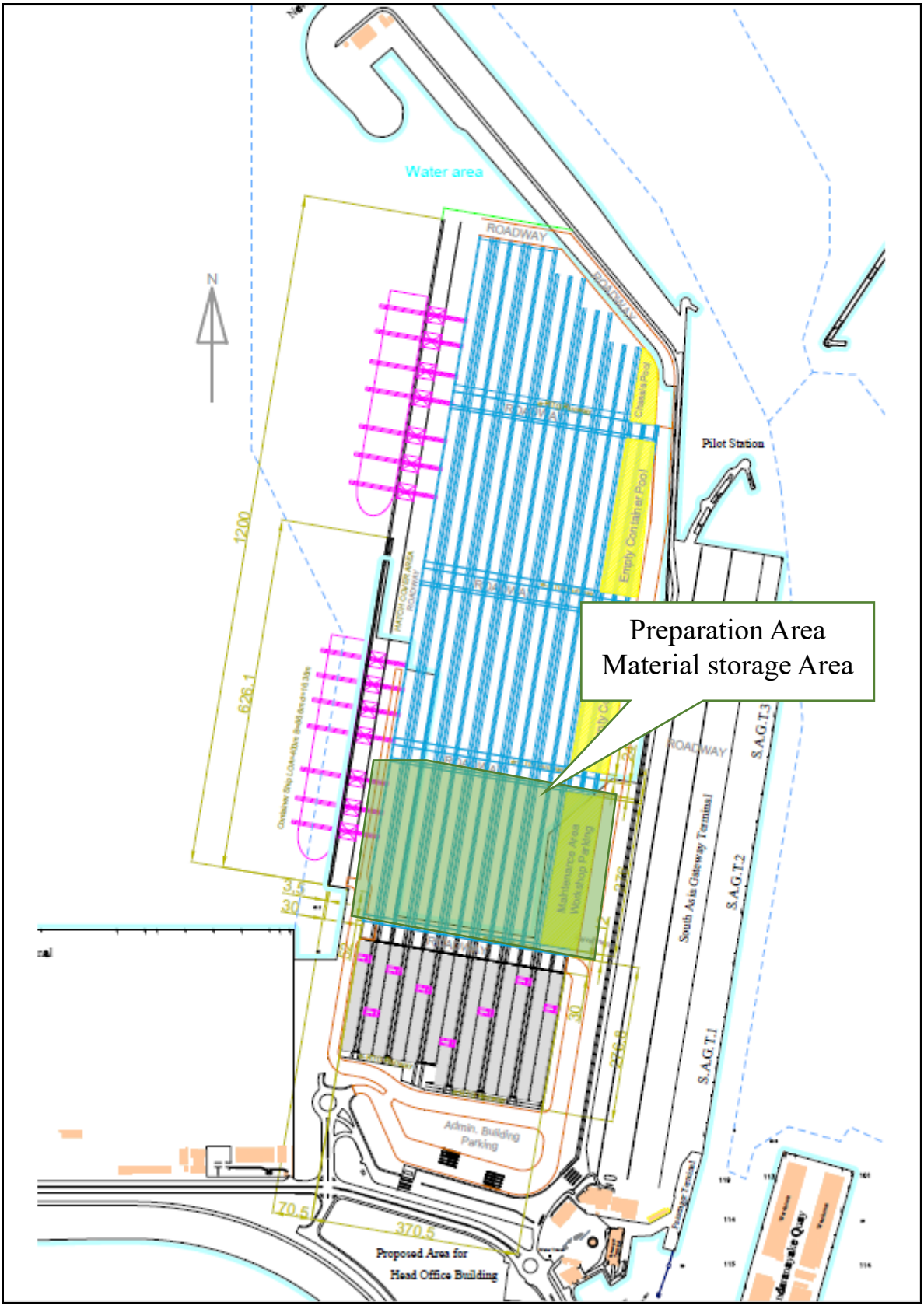
- Temporary placement of reinforcing bars
- Temporary placing the reinforcing bar with form
- Manufacturing and temporary storage of concrete blocks
- Storage of heavy machinery and other equipment

• Pipes using for reclamation works by TSHD/suction dredger

The temporary yard shall be able to withstand the load generated by heavy equipment and vehicles and the temporary storage of materials. It is necessary to fence the area around the temporary yard to prevent people and cars from entering. In addition, the following factors are also important for the location of the temporary yard.

• Transportation method and transport time to the temporary yard
• Transportation method and transport time from the temporary yard
• Required area and working duration

The temporary yard is required for temporary placement of pipes and preparation for landfill before the start of construction. After the start of construction, it will be used for concrete block casting. A final decision on the location of the temporary yard should be made during detailed design.



Source: JICA Survey Team

Figure 7-3 Preparation Area and Material Storage Area

7.1.4 Planning of dredging and reclamation

(1) Planning of dredging

1) Quantity of dredged soil

Dredging area, which is shown by blue-colored section in the figure shown below, spans between the east of planned new quay and existing anchorage. The total area is approximately 22ha (220,000m2) and design water depth is -18m. Since average water depth is -12.234, dredging thickness is estimated at approximately 5.766m, so dredging volume is estimated at 1,268,613m3.

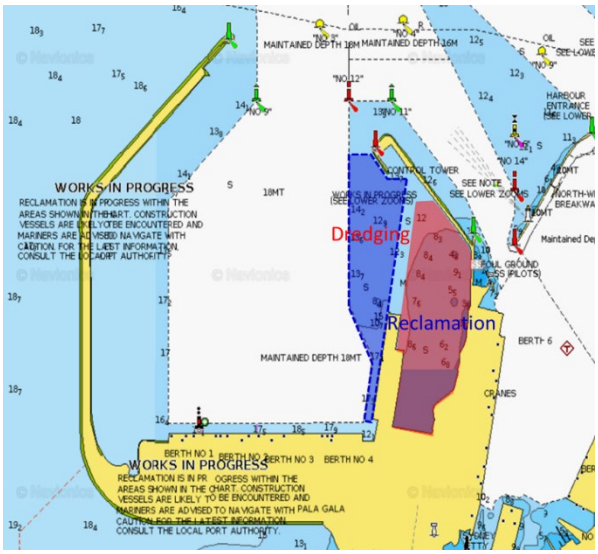


Figure 7-4 Areas for dredging and reclamation

Source: Navionics Edited by JICA Survey Team

2) Appropriate dredging method

For the selection of an appropriate dredging method and dredger for use, the following conditions are taken into account:

a) Characteristics and thickness of dredged soil
b) Access to dredging area
c) Design water depth
d) Geometry of dredging site
e) Oceanographic conditions
f) Impact on navigation ships
g) Soil dumping site
h) Dredging capability

a) Characteristics and thickness of dredged soil

Characteristics of dredged soil are depicted in the table shown below:

Table 7-2 Characteristics of dredged soil

Soil characteristics	Sandy soil	Silty clay
N value	30 to 50	50 or more
Thickness	6m	4m
Sea depth	-16m or shallower	-16m to -20m

Source: Edited by JICA Survey Team based on materials of Local Japanese company

b) Access to dredging area

Accessibility to the dredging area is a critical factor to select the type of dredger. The sea depth of navigation channel and anchorage in Colombo south port is designed to be -18m. The dredging area is in the anchorage, so the sea condition there is generally calm.

c) Design water depth

Likewise with the design water depth of anchorage in use, that of new anchorage is -18m.

d) Geometry of dredging site

Geometry can be almost compared to triangle. Even though it contains long and thin parts, it is not infeasible to secure appropriate dredging width. As per Page 3 of Section 3-1-18 of Guideline for the cost estimation of port civil contracting work, planar shape of dredging site is judged as normal (planar shape performance coefficient E3:1).

e) Oceanographic conditions

Since the dredging area is behind the breakwater, it is not subject to out-of-port sea waves. Besides, tide level gap is not so significant. As per Page 5 of Section 3-1-19 of Guideline for the cost estimation of port civil contracting work, a classification of oceanographic condition: E5 is judged as 1.

f) Impact on navigation ships

In case that navigation ships pass near anchor wires for dredgers, dredging work is temporarily suspended with loosening up those wires, so as to secure navigation.

g) Soil dumping site

Since dredged soil contains a large volume of silt and clay, it cannot be used for reclamation. Thus, it needs to be dumped into SLPA-specified soil dumping site located approximately10km offshore. The dumping site is available free of charge.

h) Dredging capability

In the consideration of the above-mentioned, the dredging capability is estimated as per the table shown below.

Table 7-3 Capabilities of dredgers

Sand characteristics	Sandy soil	Silty clay
Dredger	Hydraulic dredger	Grab dredger
Specification	Steel D3,200PS	Steel D30m^3
Dredging capability (m^3/day)	6,400	1,300

Source: Edited by JICA Survey Team based on materials of Local Japanese company and Guideline for the cost estimation of port civil contracting work

3) Planning of dredging

a) Configuration of fleet

The fleet is configured as depicted in the table shown below.

Table 7-4 Configuration of fleet

Dredger	Hydraulic dredger	Grab dredger
Specification	Steel D3,200PS	Steel D30m^3
Anchor handling boat (1 boat)	20t lifting capacity	N/A
Soil carrier (2 carriers)	1,300m^3	N/A
Pusher tug	Steel D2,000PS	N/A

Source: Edited by JICA Survey Team based on materials of Local Japanese company and Guideline for the cost estimation of port civil contracting work

Since no appropriate dredgers are available in Colombo, both dredgers and supporting vessels, which are depicted in the table shown above, are chartered in Singapore (distance from Singapore to Colombo: approximately 1,620n-mile or 3,000km). After the completion of work, those vessels are assumed to return to Singapore. In addition, for the transportation of both dredgers, the employment of semisubmersible barges is required.

b) Procedure and area of dredging

-16m or less depth area is dredged by D3200ps type hydraulic dredger. Dredging starts in the quay section and moves to the anchorage. Since -16m or more depth area cannot be dredged by hydraulic dredger, it needs to be dredged by D30m3 type grab dredger down to bed excavation. At the time of the completion of bed excavation, it moves to the dredging of -16m to -18m depth area (See the Figure 7-5 shown below).

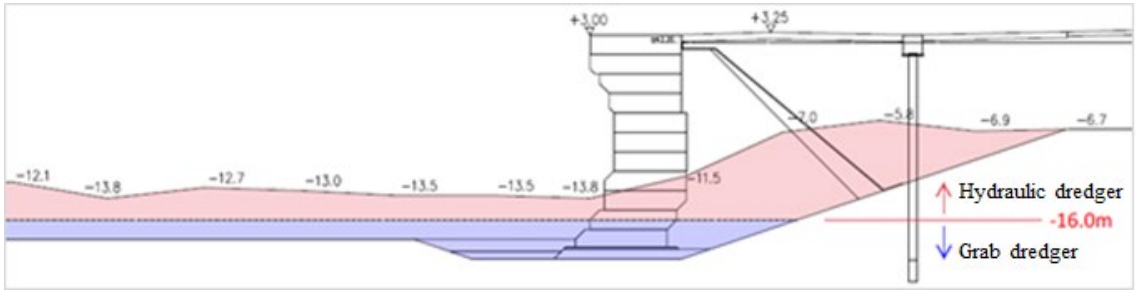


Figure 7-5 Allocation of dredging methods

Source: JICA Survey Team based Existing data

c) Soil dumping

One-cycle of soil dumping is defined as a sequence of action ranging from transporting soil to the dumping site to returning to the reclamation site. Time breakdown is shown in Table 7-5 shown below.

Table 7-5 Amount of time required for one cycle of soil dumping

		Remarks
Distance from dredging site to soil dumping site	10km	As per SLPA's specification (10km offshore from Colombo port)
Operation speed of pusher tug	10knot	Min. speed in the navigation channel
Round-trip transportation time	1.0hour	
Transportation set-up time	0.15hour	
Soil dumping time	0.15hour	
One-cycle time except dredging time	1.3hour	

Source: Edited by JICA Survey Team based on materials of Local Japanese company and Guideline for the cost estimation of port civil contracting work

d) Dredging days

Days required for dredging is estimated in the table shown below.(Table 7-6)

Table 7-6 Estimated days required for dredging work

Dredger	Soil volume in total for dredging	Daily dredging capability	Days req.
Hydraulic dredger	1,088,000m^3	6,447m^3	169days
Grab dredger	212,000m^3	1,327 m^3	160days

Source: Edited by JICA Survey Team based on materials of Local Japanese company and Guideline for the cost estimation of port civil contracting work

(2) Planning of reclamation

Reclamation area is indicated in the brown-colored section of Figure 7-4. Total area is estimated at approximately 48.09ha (480,900m2). Average sea depth is -6.9m. Assumed that average coping top elevation is +3.0m and average pavement thickness is 80cm, total volume of reclaimed soil can be estimated at approximately 4,361,137 m3. Soil for the reclamation is acquired from the sea area recommended by SLPA, the area located 30km north from the south port and 3km offshore. The north end of existing quay is used as effluent outlet. So, after the effluent in the reclaimed soil is fully drained, new quay top structure can be constructed

1) Selection of appropriate reclamation method

The characteristics of reclaimed soil are depicted in the table shown below:

Table 7-7 Characteristics of reclaimed soil

Soil type	Sandy soil
N value	< 30
Average sea depth	-16m
Thickness	3m or less

Source: Edited by JICA Survey Team based Existing data

2) Access to reclamation area

Accessibility to the reclamation area is a critical factor to select the type of dredger for reclamation. The sea depth of navigation channel and anchorage in Colombo south port is designed to be -18m. Borrow pit, which is located 3km from the coast line, had been used for the reclamation of Colombo south port. Sea condition there is generally calm.

3) Sea depth at the borrow pit

Sea depth at the borrow pit is -16m, whereas that in port is -18m, indicating that it is deep enough for the entry of dredgers.

4) Geometry of borrow pit

In terms of soil acquisition, the geometry of borrow pit has no issues.

5) Oceanographic conditions

Since the reclamation area is behind the breakwater, it is not subject to out-of-port sea waves. Thus, sea condition there is regarded as calm.

6) Impact on navigation ships

The operation of Trailer suction hopper dredger (TSHD), which needs no anchor wire, does not impact on the navigation of ships

7) Reclamation area

Reclamation area is 48ha behind newly constructed quay wall.

8) Reclamation capability

TSHD, which is able to store soil in its vacant space, need no soil careers and pusher tugs. Its capabilities are depicted in the table shown below.

Table 7-8 Capability of dredger

Dredger	TSHD
Capacity	10,000m^3
Dredging capability (m^3/day)	39,000

Source: Edited by JICA Survey Team based on materials of Local Japanese company and Guideline for

the cost estimation of port civil contracting work

(3) Dredger for use

Trailer suction hopper dredger (TSHD) is used for reclamation work. Since TSHD is self-navigation vessel, it needs no towing vessels.

(4) Procedure and region of reclamation work

Soil for reclamation is acquired by TSHD at the site located in 30km north from the port and is transported to the reclamation site. The reclamation is implemented by connecting to TSHD the sand drain pipes installed at the north end of existing 440m length quay. The reclamation area is approximately 48ha, which is behind the newly constructed quay wall.

(5) Days required for reclamation work

Physical conditions to determine the operation period of TSHD are presented as follows:

a) Daily operating time 24hrs (three shifts around the clock)
b) Distance to borrow pit 30km
c) Operating speed of vessel 10knot (1knot=1.852km/hr.)
d) Outward navigation 1.62hours
e) Reclamation and turning around 0.3hours (Reclamation: 0.15hours; t/a: 0.15hours)
f) Soil acquisition and turning around 0.75hours (Soil acquisition: 0.5hours; t/a: 0.25hours)
g) Homeward navigation 1.62hours
h) Soil occupancy rate in TSHD 80%

Days required for the reclamation work are estimated in the table shown below:

Table 7-9 Days required for reclamation work

Dredger	Soil volume in total for reclamation	Daily reclamation capability	Days req.
TSHD	4,361,137m^3	44,755m^3	98days

Source: Edited by JICA Survey Team based on materials of Local Japanese company and Guideline for the cost estimation of port civil contracting work

7.1.5 Ground Improvement

Ground improvement work will be conducted by the following methods.

- Excavation and replacement method
- Consolidation and drainage method（surcharge using by PVD）
- Compaction method（Sand compaction piling method）
- Surface Compaction

The excavation and replacement method is adopted when the thickness of the soft ground

layer is 3 m or less. The consolidation / drainage method is used when the thickness of the soft ground layer is 3 m or more, and when it is considered that the consolidation settlement will not be completed within the specified period, the sand compaction pile method will be adopted instead of PVD.

7.1.6 Block Casting And installation

1) Rock Foundation

After the dredging work is carried out, the necessary areas will be backfilled with sand before placing the foundation rock.

After dredging, foundation Rock will be discharged and levelling on the bottom of the concrete block will be carried out. Secondary layer will be used the big size rock for rough leveling (Thickness: 2m, Rock size : 10-60kg/piece) and primary layer will be used small size rock for final levelling (Thickness:0.2m, Rock size:20-100mm). The final top level is -18.8m.

2) Concrete Block Casting

It is assumed that the block casting will be carried out at the area where the sand filling has been completed. Before start, the area for casting will be decided after checking the ground condition. It is necessary to set up the access for the transportation properly not to interfere with other work. If ground erosion occurs due to squalls, etc., it should be repaired to maintain good condition. During block casting, it is important to prevent rainwater using temporarily drain water with regular intervals.

3) Block Installation

Block Installation will be carried out after sand filling is completed. As with dredging, work will be carried out from the south side to the north side. A land crane will be used to move the blocks from the casting area to the installation area, after which they will be loaded onto the vessels and installed by a floating crane.

7.1.7 Anti-Scour Rock Installation

After installing the blocks, crushed rocks will be placed at the front of the quay wall to prevent scouring. The crushed rock is divided two layers: and under layer (40-200 kg, 750mm thick) and an anti-scour layer (300-1,000 kg, 1,250mm thick). The total layer thickness is 2m. At the time of installation, care must be taken to prevent damage to the lower part of the block.

7.1.8 Piling

Piles will be transported and carried from sea side and installed using marine equipment. At the time of installation, anchors will be installed in front and behind the vessel to prevent tipping over. If divers are required, a contact system should be established to prevent diving accidents.

7.1.9 Pavement

Paving work will be carried out from the area where landfill has been completed. Asphalt will be leveled and paved at the construction site. It is necessary to perform leveling, primary

compaction, and secondary compaction in that order while controlling the temperature at each stage. In addition, it is necessary to install drainage facilities to ensure safe operations during rainy weather.

7.1.10 Facilities

Ancillary facilities will be installed parallel to the pavement. If there is a cable under the ground, it needs to be removed before pavement works commence.

7.2 Measures for Construction Safety

7.2.1 Overall for construction

Construction safety measures are as follows.

① Understand and share the situation of the working area
② Wear protective equipment suitable for each activity
③ Reduce congestion and interference in each working area
④ Set working conditions in the land-to-sea and sea-to-land boundary areas

7.2.2 Marine construction works

(1) Grasping construction conditions

The following construction conditions should be grasped in advance.

① Water depth, topography, geological condition
② Regional characteristics of sea conditions and weather
③ Actual traffic conditions at working areas
④ Presence or absence of obstacles such as sunken ships
⑤ Buried objects such as communication cables, power cables, gas pipes, and water pipes
⑥ Status of above facilities such as overhead lines and facilities near construction activities

(2) Construction methods

Based on the construction conditions, the construction method and supervisors for the marine work will be decided in advance.

(3) Protective equipment

Workers should wear life jackets, helmets, safety boots and gloves. Workers need to use safety belts when working at height.

(4) Safety issues related to marine construction works

① During marine construction work, the following measures should be taken.
1) Protective measures to prevent workers from falling into the water
2) Establish a rescue system in the event that workers fall into the water

② Ensure that work is conducted by more than one person
③ Take safety measures against floods, storms, waves, etc.
④ Constantly collect water level and tide level information.
⑤ Establish emergency measures in advance and explain them to relevant workers.
⑥ Install protective equipment such as life-saving equipment and ropes in a place that can be immediately accessed.
⑦ When working at night, pay particular attention to lighting and assign observers as necessary.
⑧ When using a boat, do not exceed the load capacity.
⑨ Install life-saving equipment in the proper position on the boat and carry out regular maintenance.
⑩ Stop work in bad weather such as heavy rain or strong wind.
⑪ Install a construction buoy to prevent contact with other work vessels and commercial vessels.
⑫ Keep proper distance so as not to be hit by the anchor wire of the work boat.
⑬ Observe international rules when sailing.

7.2.3 Construction works on land

(1) Grasping working conditions

It is necessary to grasp the following working conditions.

① Ground condition
② Working condition
③ Physical condition

(2) Construction methods

Based on the working conditions, the construction method and supervisors will be decided in advance.

(3) Protective Equipment

Workers must wear helmets, safety boots and gloves. Workers need to use safety belts when working at height.

(4) Safety issues related to construction works on land

① All materials and tools should be cleaned and organized.
② Workers need to check the equipment and tools before starting work.
③ Only authorized personnel should be able to enter the area.
④ Working alone is prohibited.
⑤ Lashing is required to prevent accidents.
⑥ A scaffold should be erected when working at a height of 2m or more. Workers should wear safety belts when erecting the scaffold.
⑦ Up and down work should be avoided to prevent falling accidents. The frame of the scaffold

should not be thrown or dropped.

⑧ To ensure safe access to the site by separating passages for vehicles and workers. Ensure that materials used for steps are secure.

⑨ Lighting should be sufficient for the working conditions.

⑩ The speed limit for vehicles should be set and written on signs to ensure operators comply.

⑪ Slinging work should be done by a person who has the relevant qualifications as stipulated by the laws of the country.

⑫ Workers should select slinging tools sufficient for the weight of the suspended load.

8. Project Implementation Schedule

8.1 Overall Schedule (Concrete block)

The overall schedule for the concrete block type is shown below. To create the area for block casting, sand filling and dredging will be carried out by TSHD. At the same time, dredging under the quay wall will be started. After sand filling at the block casting yard is completed, blocks will be installed and the sand filling and dredging work will be carried out again by TSHD when the block installation is completed. In the area where the sand filling has been completed, soil improvement work, piling work, pavement work, and facility work will be carried out. The overall construction period is expected to be two years.

Table 8-1 Overall Schedule(Concrete block)

Work Item	Volume (m3)	Productivity (m3/day)	Duration (days)	1												2											
				1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24
Preparation			60																								
Dredging and Reclamation (TSHD)	4,361,137	44,755	100			For Block Casting Area											Including back filling										
Ground Imporovement			120																								
Dredgin (Pump Barge)	712,189		169																								
Dredging (Grab dredger)	556,424		160																								
Rock Foundation	11,928	300	40																								
Concrete Block Casting	4,530	25	240					start casting																			
Concrete Block Installation	4,530	-	414								by 2 vessels																
Back Filling	182,564	1,000	183																								
Anti-Scour Rock	18,700	300	60																								
Piling	225	3.3	68																								
Crane Foundation			90																								
Superstructure			150																								
Pavement			210																								
Facilities			270																								
Cargo Handling Equipment																					50%				100%		
Equipment installation and testing																						50%				100%	

Source: JICA Survey Team

8.2 Schedule for Cargo Handling Equipment

The installation of cargo handling equipment will take place approximately 14 to 18 months after the contract with the manufacturer is finalized (see Table 8-1).

9. Gender Considerations

As the leading country of the gender equality in South Asia, Sri Lanka could continuously lead the further improvement of the gender disparities and promote benefits of the gender consideration into planning and project implementation. In this chapter, the present status of the gender inequality in general and specific issues in the port sector in Sri Lanka are studied, and potential opportunities to integrate some gender equality programmes for the development of the East Container Terminal are discussed.

As this chapter was prepared only based on information available in public domains without consultations with SLPA and TOC, assessment of the gender equality status in SLPA and TOC has not been conducted.

9.1 Status of Gender Inequality and Efforts of Realizing Gender Equality

9.1.1 Status of Gender Inequality

(1) The Status of Gender Inequality in Sri Lanka and South Asia

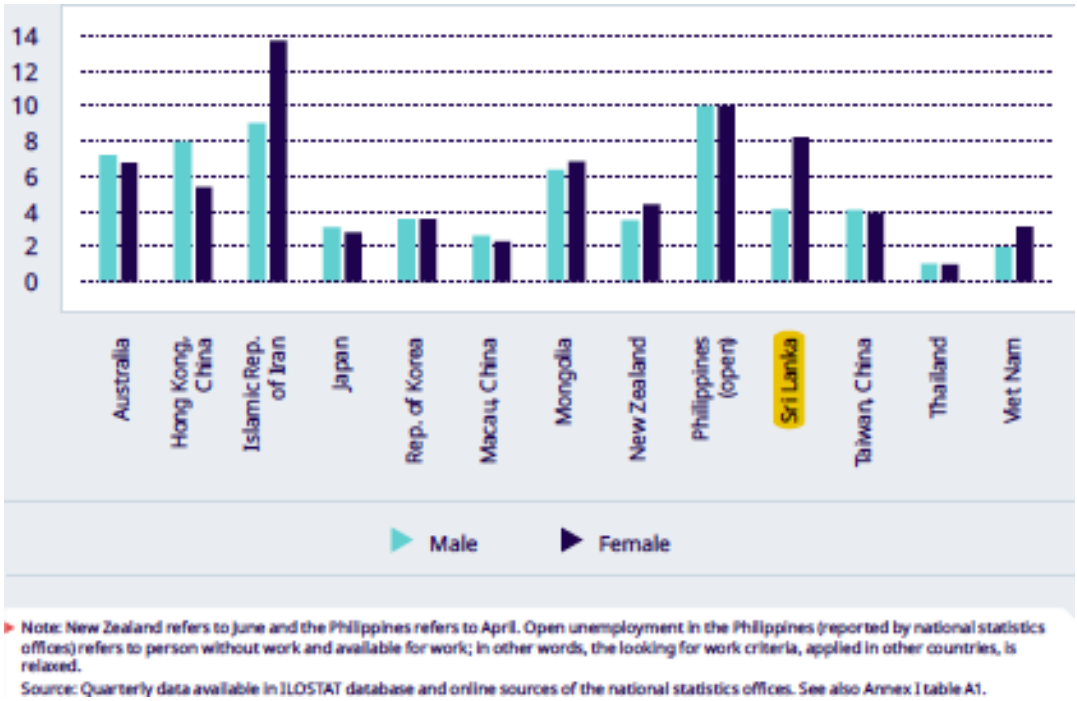
Based on the UNDP's latest Human Development Reports 2020, the value of the Gender Inequality Index[1] (GII) of South Asia was the third worst values (lower value is better) among 6 regions, namely 1) Sub-Saharan Africa (0.570), 2) Arab States (0.518), 3) South Asia (0.505), and World average (0.436). Among the South Asian countries, the value of the GII for Sri Lanka is 0.401 and ranked 90 in the world (out of 162 ranked countries/territories) and the highest rank in South Asia followed by Bhutan (BTN: ranked 99), Nepal (NPL: 110), India (IND: 123), Bangladesh (BGD: 133), and Pakistan (PAK: 135). In addition, the basic education level (population with at least some secondary education) for female of Sri Lanka is 81.0% and far above other South Asian countries (BGD: 39.8%, NPL: 29.3%, IND: 27.7%, PAK: 27.6%, and BTN: 23.3%).

Despite the highest GII and basic education level in South Asia, share of female seats in parliament is only 5% and lowest in South Asia (NPL: 33.5%, BGD: 20.6%, PAK: 20.0%, BTN: 15.3%, and IND: 13.5%). Also, the labour force participation of Sri Lanka is only 35.4% and ranked 4th in South Asia (NPL: 82.8%, BTN: 58.9%, BGD: 36.3%, PAK: 21.9%, and IND: 20.5%). Furthermore, international labour organization's (ILO) Employment and Social Outlook (2020)[2] clearly demonstrates that gender gaps in labour force participation rate and higher unemployment rates in Sri Lanka have been constantly evidenced and significantly different form world average level. The female unemployment rates have been also higher in neighbouring countries in South Asia, but gaps between males and females have been lower than Sri Lanka.

[1] http://hdr.undp.org/en/composite/GII
[2] https://www.ilo.org/asia/publications/apeso/2020/lang--en/index.htm

(2) Effect of COVID-19 Impacts

Due to the nature of female vulnerability in working condition in societies as well as heavy duties of household cares, many statistical data and studies have found that the pandemic of COVID-19 has been unequally and more significantly impacted on female than men. Based on "The Asia–Pacific Employment and Social Outlook 2020" by ILO, more severe impacts on female workers were observed, in particular the female unemployment rate was 2 times higher than the male rates (Figure 9-1 Unemployment rate, by sex, Q2 2020 (%)).



Source: Asia Pacific Employment and Social Outlook 2020, ILO, 2020

Figure 9-1 Unemployment rate, by sex, Q2 2020 (%)

9.1.2 Key Efforts to Promote Gender Equality and Key Organizations

(1) International Efforts for Gender Equality

1) UN Convention on the Elimination of All Forms of Discrimination against Women (1979)

The Convention on the Elimination of All Forms of Discrimination against Women (CEDAW) was adopted in 1979 by the UN General Assembly. Consisting of a preamble and 30 articles, it defines what constitutes discrimination against women and sets up an agenda for national action to end such discrimination. The Convention provides the basis for realizing equality between women and men through ensuring women's equal access to, and equal opportunities in, political and public life -- including the right to vote and to stand for election -- as well as education, health and employment. States parties agree to take all appropriate measures, including legislation and temporary special measures, so that women can enjoy all their human rights and fundamental freedoms. Countries that have ratified or acceded to the Convention are legally bound to put its provisions into practice. They are also committed to submit national reports, at least every four years, on measures

they have taken to comply with their treaty obligations.

Government of Sri Lanka ratified CEDAW in 1981 and subsequently also its optional protocol. The concluding observations of the UN Committee on the 2011 report have indicated the gaps in policies that need to be filled.

2) Other International Coordinated Efforts for Gender Consideration

The Beijing Declaration and Platform for Action[3] was declared in the Fourth World Conference on Women in 1995. The Platform for Action covers 12 critical areas of concern i.g., poverty; education and training; health; violence; armed conflict; economy; power and decision-making; institutional mechanisms; human rights; media; environment; and the girl child. For each critical area of concern, strategic objectives are identified, and a detailed catalogue of related actions to be taken by Governments and NGOs. Through notable milestones, such as the United Nations Millennium Declaration (2000) and Sustainable Development Goals (2016), women empowerment and gender equality have been continuously in placed.

(2) The Policy for Gender Consideration of JICA[4]

JICA has been adopting gender mainstreaming as the key strategy for promoting gender equality and women's empowerment taking the needs and issues generating from the difference of social role and power balance of men and women across its operations. In this regard, JICA supports establishing regulation and policy for gender equality, maternal and child health, female education and supporting female entrepreneurs to promote women's empowerment, prevention of violence for women and girls, and protection self-reliance support against trafficking. Simultaneously, JICA has been adopting the gender mainstreaming through the efforts and activities to be achieved in the various field, e.g. agriculture, nature conservation, disaster prevention, governance and development of infrastructure and many others.

Five priority areas

i. Promote Women's Economic Empowerment
ii. Ensure Women's Rights and Security
iii. Promote Women's health and Education
iv. Promote Gender Responsive Governance
v. Promote Gender Responsive Infrastructure

(3) National Port Master Plan (2020)

As the execution agency, SLPA established the National Port Master Plan[5] in 2020 assisted by ADB technical assistance through the Japan Fund for Poverty Reduction. The master plan is

[3] https://www.un.org/womenwatch/daw/beijing/platform/
[4] https://www.jica.go.jp/english/our_work/thematic_issues/gender/index.html
[5] https://www.adb.org/projects/50184-001/main#project-overview

comprised of six volumes, covering Vol.1: National Port Directions, Vol.2 Colombo Port Development Plan, Vol.3 Trincomalee Port Development Plan.

Considering the gender consideration into the master plan and integration for future project development, there are no statement regarding integration of gender consideration in the master plan in Vol.1, and Vol.4-6. However, requirements of the gender consideration during project development is stated in Vol.2 (Colombo Port) and Vol.3 (Trincomalee Port) as a part of environmental and social safeguard consideration, in particular consideration of gender programmes into the resettlement planning and rehabilitation programme development. Appendix VIII Mitigation Measures for Land Acquisition and Resettlements, Vol.2 of the master plan, specifies reequipments of a gender analysis related to resettlement impacts and risks, and institutional arrangement for gender concerns. Also, Appendix IX Organisational Arrangements for the Implementation of RAP, Vol.2 specifies a project management unit's (PMU) responsibility to develop a gender action plan and its implementation.

9.1.3 Essential Legal and Policy Frameworks and Key Organizations for Gender Equality

(1) National Legal and Policy Frameworks for Realizing Gender Equality

1) Constitution of Democratic Socialist Republic of Sri Lanka

Chapter III of the Constitution (amendment up to 2015) defines eight fundamental rights, and the third fundamental right, Article 12, sets the principles of the "Right to equality" in particular no discrimination based on race, religion, language, caste, sex, political opinion, place of birth. In addition, the article 12 specifically mentions that even the constitution shall not prevent special provision being made, by law, subordinate legislation or executive action, for the advancement of women, children or disabled persons. In other words, even the Constitution recognizes the importance of promoting gender equality in the fundamental rights of the nation.

2) Principal laws on gender equality

There are no principal laws, particularly focusing on enhancement of gender equality.

3) Policies on gender equality

Based on the competent authority's website (MoWC: Ministry of Women and Child Development, Pre-Schools & Primary Education, School Infrastructure & Education Services), there are no official policies yet there has been a draft national policy on women. However, the link of the national policy is not accessible, and the timeframe of the finalization is unknown from the MoWC website.

(2) Primary Stakeholders for Gender Equality Realization in Sri Lanka and Maritime Transport Sectors

Unlike other countries in South Asia, institutional and other specialised organizations to enforce legal/policy framework and promote gender equalities have been placed and well established in Sri Lanka.

1) Ministry of Women and Child Development, Pre-Schools & Primary Education, School

Infrastructure & Education Services (MoWC)

Government of Sri Lanka has set Ministry of Women and Child Development, Pre-Schools & Primary Education, School Infrastructure & Education Services (MoWC) to protect and enhance the right of women and children. After the reform of the ministries and government agencies after the general election in 2020, MoWC remains as one of key ministries and it's roles are defined in the Special Gazette 2020[6] (Performed Ministries and State Ministries of current Government). MoWC oversees following six organizations, and Sri Lanka Women's Bureau[7] and National Committee on Women[8] are the primary authorities for gender equality.

1. Department of Probation and Childcare Services
2. National Child Protection Authority
3. Children's Secretariat
4. Sri Lanka Women's Bureau
5. National Committee on Women
6. Sri Lanka Thriposha Co. Ltd.

2) ILO Sri Lanka[9]

Sri Lanka is one of 187 member states of ILO. Sri Lanka became a member in 1948. Each state ILO is uniquely comprised of tripartite, namely governments, employers and trade unions all participate in its work and in its decision-making processes. The ILO aims to ensure that its efforts are rooted in the needs of the working women and men. It does that by bringing together governments, employers and workers (the social partners) who set labour standards, supervise their implementation, raise awareness, develop policies and devise programmes.

3) Women's International Shipping & Trading Association (WISTA)

Formed in 1974, the Women's International Shipping & Trading Association (WISTA) is a global organization connecting female executives and decisionmakers around the world. 53 countries support a National WISTA Association (NWA) is guided by WISTA. NWAs provide in-country and regional networking, business and skill-building opportunities, corporate visibility, and also facilitate relationships within the industry.

WISTA Sri Lanka was established in 2015 and has worked towards implementing many initiatives in accordance with the WISTA mandate on improving gender parity and women empowerment in the Industry. WISTA Sri Lanka has actively communicated with the relevant ministry officials[10] as well as SLPA officials[11,12,13] to promote gender equalities in the maritime industry.

---

[6] http://www.childwomenmin.gov.lk/storage/app/media/2187-27_E.pdf
[7] http://www.childwomenmin.gov.lk/institutes/womens-bureau
[8] http://www.childwomenmin.gov.lk/institutes/national-committee-women/about-us
[9] https://www.ilo.org/colombo/areasofwork/lang--en/index.htm
[10] https://wistainternational.com/news/women-who-move-the-world-wista-sri-lanka-5th-year-anniversary-agm/
[11] https://wistainternational.com/news/wista-together-with-casa-celebrates-womens-day-with-a-difference/
https://wistainternational.com/news/wista-srilanka-exco-meeting-the-srilanka-port-authority-slpa-officials/

9.2 Consideration of Potential Gender Equality Programmes for the Development of the East Container Terminal

9.2.1 Methodologies for Gender Assessment and Gender Equality Programme Consideration

(1) Resettlement and Livelihood Recovery

As per the national port master plan, (2020), gender consideration is required if a project involves resettlement. However, the development of the east container terminal will not involve any resettlement due to the land reclamation within the port area surrounded by breakwaters. Also due to the construction within the operating port area, no livelihood impacts, in particular fisheries, are expected. Therefore, gender consideration will not be applicable as per the national port master plan.

(2) SLPA and TOC's Enhancement of Female Labour Participation

As shown in previous sections, participation of female labour force in Sri Lanka has been constantly underrepresented and severely impacted by COVID-19 pandemic. SLPA could take advantage of this opportunity to integrate gender consideration into the infrastructure planning and development activities as well as terminal operation and management.

9.2.2 Methodologies for Gender Assessment and Gender Equality Programme Consideration

In order to integrate such programmes in time, it is important to utilize appropriate assessment tools/guidelines suitable for development of the east container terminal. Most importantly, in order to steadily implement the gender programme by SLPA and TOC, it is essential to clearly demonstrate the benefits for SLPA and TOC form the expected outcomes and practical means of actions to achieve the outputs and eventually lead the outcomes. Recommended gender assessment tools/guidelines are shown below (Table 9-1 Reference Guidelines for Gender Consideration).

[12] https://www.slpa.lk/port-colombo-page/53a09483c1f13b6f9762a2fe135ffd31/a05b6aba16f931ba4991d7887c63244690711a82

[13] https://news.slpa.lk/index.php/tag/wista-sri-lanka/

Table 9-1 Reference Guidelines for Gender Consideration

Name	Contents
ADB Gender Tool Kit: Transport - Maximizing the Benefits of Improved Mobility for All (2013) [14]	The tool kit provides guidance for transport sector specialists and gender specialists by drawing attention to the gender dimensions of transport, and how to mainstream gender equality issues into transport project design, implementation, and policy engagement. It guides users (ADB staff, consultants and government counterparts) in designing project outputs, activities, inputs, indicators, and targets to respond to gender issues in transport sector operations. The users can use the tool kit in identifying social and gender issues to be considered and integrated into project planning, design, and implementation.
JICA Guidelines for Promoting Gender Mainstreaming in JICA Projects (Transportation) (2016)[15]	These Guidelines explain gender perspectives and how such perspectives should be reflected to operations so that JICA officials and other related parties understand gender perspectives related to the field of transportation and gender-responsive measures are taken in each stage of formulation, implementation, monitoring, and evaluation of projects.
JICA Guidance Note "Establishing Gender-Responsive Approaches to COVID-19 Response and Recovery" (2020)[16]	While COVID-19 continues to have devastating impacts on women and girls, JICA's guidance note shows how to enhance its gender-responsive initiatives in its development cooperation to support all women and girls. '
MoWC Manual on Gender Mainstreaming and Gender-Responsive Budgeting (2020) [17]	MoWC established a Manual on Gender Mainstreaming and Gender-Responsive Budgeting to eradicate gender-based violence in 2020 assisted by the United States Agency for International Development (USAID). The manual provides instructions and guidance on the establishment of the Gender Mainstreaming Programme in respective Ministries providing women as well as men with the opportunity of acting with equity and equality, achieving Sustainable Development Goals, and minimizing harassment against women in public institutions.

Source: JICA Survey Team

[14] https://www.adb.org/documents/gender-tool-kit-transport-maximizing-benefits-improved-mobility-all

[15] https://www.jica.go.jp/activities/issues/gender/materials/ku57pq00002hdtvc-att/guidance_02_transport_eng.pdf

[16] https://www.jica.go.jp/english/our_work/thematic_issues/gender/COVID-19.html

[17] www.childwomenmin.gov.lk/news/post/establishing-gender-mainstreaming-programme-ministry-level

10. Assistance for TOC

10.1 Sri Lankan Government Policy and Related Regulations

10.1.1 Sri Lankan Government's Policy on Duties and Responsibilities of TOC

The Terminal Operation Company (TOC) of the container terminals currently operating at the Port of Colombo can roughly be divided into two types of operation: those operated by SLPA itself (JCT), and those operated jointly with private companies including foreign capital (SAGT, CICT).

For ECT, it is envisioned that a TOC established jointly by the three countries of Sri Lanka, Japan and India will operate the terminal after entering into a concession contract with SLPA, the Port Management Body. Similar operation schemes were adopted in SAGT and CICT. In the case of SAGT, SLPA entered a concession contract with a TOC composed of Maersk AP Moller, John Keels and other private companies (SLPA is a shareholder of the TOC). In the case of CICT, SLPA entered a concession agreement with a TOC consisting of CM Ports and SLPA.

In drafting the concession agreement for ECT, it would be prudent to use the existing agreements applied at other terminals in Colombo Port as a reference for preparing the new contract (although necessary modifications would be required based on the specific situation of ECT). However, the contents of the agreements of SAGT and CICT are confidential in nature and thus not open to the public.

In this regard, the activities of the World Bank (WB) may be useful. The WB is developing and disseminating various solutions for national infrastructure development in the world. In the port and harbor sector, WB is implementing port development strategy through public-private partnership schemes. And for that purpose, WB publishes reference materials for the development of new port projects and makes them available to the public. Among those documents, examples of port concession contracts in developing countries (in South Asia, Central America and Sub-Saharan Africa) have been compiled by the "Resource Center on Contracts, Laws and Regulations Associated with Infrastructure Development in Public-Private Partnerships (PPPIRC)", which is part of the WB organization.

In these documents, certain words are redacted so that the original source of the document cannot be identified. However, meticulous reading of the South Asian version of the document reveals that the document is obviously dealing with SAGT in Colombo Port. (On the other hand, the contents of the CICT contract remain totally unknown.)

Therefore, in preparing the contents of the concession agreement applicable to ECT, the study team will refer to the South Asia concession sample contract provided in WB document (hereinafter "WB sample document").

The WB sample document consists of the Concession Agreement and Schedules from No. 1 to 18 which form an integral part of the Agreement. Substantive matters, such as Royalty Payment, Employment, Insurance, are stipulated in the respective Schedules. In addition to the Concession Agreement and Schedules, following contracts and agreement supports the principal scheme of the project as the Project Documents as shown in the table below. It is also noted that there is a Direct

agreement between SLPA and the Lenders, and a Shareholders agreement among the investors in relation to establishment of TOC.

Table 10-1 The Project Documents

	Name of Agreement/Contract	Contents
1	Concession Agreement	Main Agreement for Concession including Schedules
2	BOI Agreement	Agreement between Concessionaire and BOI concerning the availability of certain economic benefits to the concessionaire and commensurate responsibilities of the concessionaire.
3	Building Contract	Phase1facilities construction contract
4	Design Contract	Phase1facilities design contract
5	Inter-Terminal Operations Agreement	Agreement on movement of containers between the various terminals in Colombo Port
6	Management Contract	Management service contract between the Concessionaire and P&O Ports in the agreed terms.
7	Port Service Agreement	Agreement between SLPA and the Concessionaire for the provision of port services provided by SLPA.
8	Site Lease and Terminal Access Agreement	Lease of the land constituting the Concession Area and agreement between SLPA and the Concessionaire giving SLPA rights of access to concession area for berthing/unberthing of passenger vessels.

Source: JICA Study Team based on WB PPPIRC ”Schedules to Sample Concession Agreement for port South Asia”

10.1.2 Relevant Laws and Rules for the Establishment of TOC

(1) Outline

In Sri Lanka, direct investment by foreign companies is governed by the procedures of the BOI Act. In addition, the Strategic Development Project Act (SDP) must be followed in order to be exempted from the application of specific laws. However, due to the decline in foreign exchange reserves, the Minister of Finance announced the suspension of the tax benefits under the BOI Act and the SDP Act in his Budget Speech 2016 which was delivered on 20th Nov. 2015 in the national parliament.

The Companies Act No. 7 of 2007 applies when starting a company in Sri Lanka. Depending on the activities of the company, it may be necessary to comply with the Exchange Control Act, obtain a professional license, and obtain the necessary permits for its activities. In addition, taxation is governed by the Internal Revenue Act, Land Act. This section outlines the laws and rules related to the establishment of a TOC.

It also outlines the procedures required for TOCs to apply for PPP projects, from project solicitation to contracting, based on PPP guidelines.

Table 10-2 Relevant Laws and Rules for the Establishment of TOC

	Rules	Contents
FDI	BOI Act	Frames and Rules of FDI
Exemptions of Law Application	SDP Act	Tax Exemptions for strategic development projects
Company Establishment	Company Act	Rules and procedure to establish a new company
Restriction of FDI	Exchange Act	Restrictions of FDI for specific businesses
License	Freight Forwarders Act	Restrictions of FDI and professional license for cargo transportation
License	Shipping Act	Professional license for TOC
License	Customs Ordinance	License for customs house agent
Permission	SLPA Act	Management and issue permits for the use of vessels, equipment, vehicles and services in the port
Tax	Inland Revenue Act	Tax rate for business categories
Tax	Land Act	Restrictions on Land Transfer to Foreign Holding Companies and Lease Tax
PPP	PPP Guide Line	Process of recruitment and contract for PPP project

Source: JICA Survey Team based on Sri Lankan Laws and Rules

(2) Board of Investment Act 1978

1) Composition

The Board of Investment Act 1978 sets out the legal framework for direct investment in Sri Lanka. This Act was originally constituted as the basis for the Greater Colombo Economic Commission (GCEC), which was organized to promote the economy in the vicinity of Colombo, but the GCEC was reorganized into the BOI for the whole of Sri Lanka in 1992.

The composition of the act is shown below;

Table 10-3 Composition of BOI Act

Article	Theme
Article 1-3	Purpose of the organization's establishment, etc.
Article 4-14	Jurisdiction and organizational structure, etc.
Article 15-29	Authority over investors and conditions, etc.
Article 30-35	Details on the operation of the organization, etc.

Source: JICA Survey Team

2) Article 16 & 17

The most important provisions of the BOI Act for investors are Article 16 (General Power of the Commission) and Article 17 (Power of Commission in relation to any agreement with any

enterprise). Based on these two clauses, investors can apply for and obtain approval from the BOI to receive tax benefits, visas, and other benefits.

a) Article 16

Projects approved under article 16 of BOI Act don't receive fiscal preferential treatments, but entry of foreign investment in the projects is permitted. These projects are governed under normal laws of the country and are subject to Inland Revenue Act, Customs Ordinance and the Exchange Control Act. This permission is limited only for facilitating entry of foreign investment.

b) Article 17 (1)

BOI shall have the power to enter into Agreements with any enterprise and mandated to grant exemptions from any law referred to in Schedule B thereof or to modify or vary the application of any such laws to such enterprises in accordance with such regulations as may be made by the Minister under Article 24 of BOI Act. The acts referred to under Schedule B are as follows:-

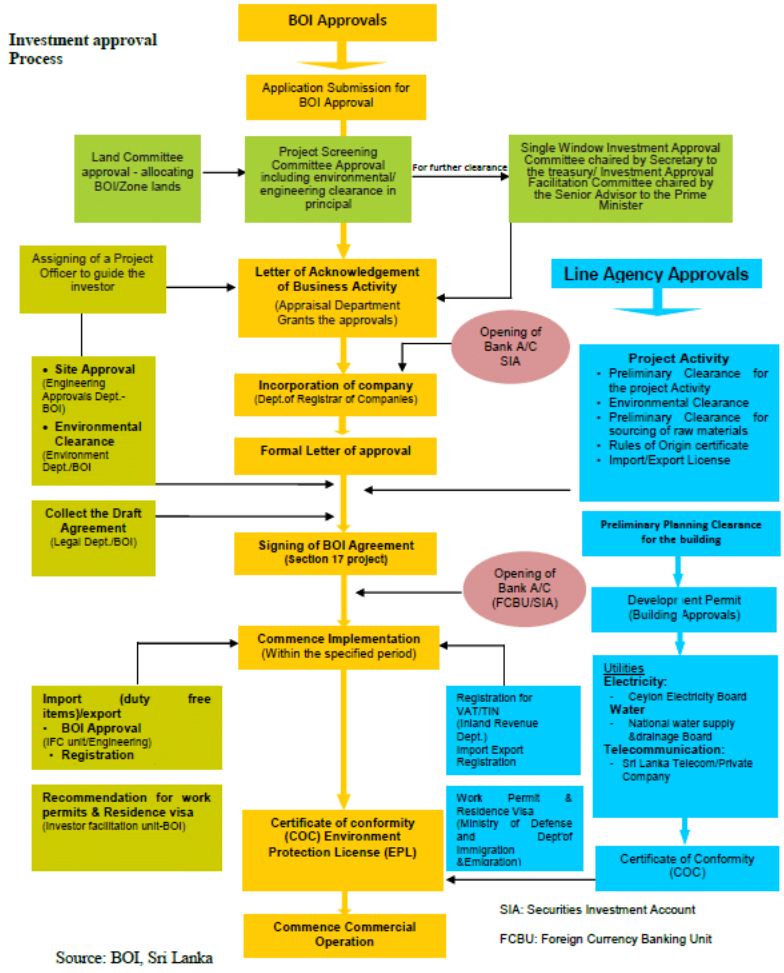
- Inland Revenue Act, No. 10 of 2006 as amended
- Customs Ordinance (Chapter 235)
- Exchange Control Act (Chapter 423)
- Companies Act No. 7 of 2007
- Merchant Shipping Act, No. 52 of 1971
- Finance Act, No. 65 of 1961 as amended
- Air Navigation Act (Chapter 365)
- National Film Corporation of Sri Lanka Act No. 47 of 1971

c) Safety of Investment

The safety of foreign investment is guaranteed under Article 157 of the Constitution of Sri Lanka. Among exempted laws and regulations, tax incentives were prescribed in the BOI Act, but after the enactment of IRA (Internal Revenue Act) in 2011, tax incentives are prescribed in this act.

d) Authority to Grant Incentives

In considering incentives, the establishment of so-called tax exemptions measures is constrained by Sri Lanka's fiscal situation, and measures such as corporate tax exemptions for large investments are left to the discretion of the Ministry of Finance or the Prime Minister's Office, not the authority of the BOI.



Source：BOI Sri Lanka

Figure 10-1　Project Approval Flow under BOI Act Article 17

(3)　Strategic Development Projects Act, No. 14 of 2008

1)　Outline

Projects identified as strategic development projects under the Strategic Development Projects Act No. 14 of 2008 and the Strategic Development Act (Amendment) No. 12 of 2011, effective January 1, 2011, shall be granted exemptions from the laws listed in the Schedule. The period of the exemptions granted under this section shall in no case exceed a period of twenty-five years (the exemption shall cease after a maximum of twenty-five years).

2)　Strategic Development Projects

The definitions of strategic development projects in article 6 are as follows.

- the strategic importance attached to the proposed provision of goods and services, which will be of benefit to the public ;
- the substantial inflow of foreign currency to the country ;

- providing the employment and income-earning opportunities; and
- the envisaged transformation in terms of technology;

3) Laws and Regulations Exempted from Application

- Inland Revenue Act, No. 10 of 2006
- Value Added Tax Act, No. 14 of 2002
- Finance Act, No. 11 of 2002
- Finance Act, No. 5 of 2005
- Excise (Special Provision) Act, No. 13 of 1989
- Economic Service Charge Act, No. 13 of 2006
- Debits Tax Act, No. 16 of 2002
- Customs Ordinance (Chapter 235)

4) Suspension of Tax Incentives

Due to the decline in foreign exchange reserves, suspension of the tax incentives under the BOI Act and SDP Act was announced in the Budget Speech 2016 by the Minister of Finance in 2015.

(4) Companies Act No. 7 of 2007

1) Outline

Companies Act No. 7 of 2007 governs the establishment of a business in Sri Lanka. The Companies Act consists of 23 chapters and 534 articles. Companies Act provides for equal treatment of investors regardless of nationality. Companies Act provides for the establishment of companies (corporations) in two main forms: public companies and private companies, and also provides for branch offices and representative offices as forms of business that do not qualify as corporations. In addition, there are project offices and offshore companies, which are temporary offices.

2) Number of Shareholders

A private company can be incorporated if it has at least two shareholders. The maximum number of shareholders (not including those who are employees of the company and so on) is set at 50 (Article 27b). If the number of shareholders exceeds this limit, the company is no longer a private company (Article 28).

A public company, on the other hand, must have at least seven shareholders. There is no upper limit to the number of shareholders.

3) General Meetings of Shareholders

a) General Meeting of Shareholders

There are two types of shareholders meetings: Annual General meetings and Extraordinary General meetings.

b) Meeting Notice

A company is required to send meeting notice to its shareholders when it holds a general meeting of shareholders. The meeting notice must include the agenda and business report. The meeting notice must be sent to the registration office at the same time (Article 137, Section 2).

c) Resolution of Meeting

Unless otherwise provided in the articles of incorporation, the number of voting rights of shareholders differ by poll methods. (Article 136 f)

- Show of hands method; each shareholder shall have one voting right per a person.
- Polling method; each shareholder shall have one voting right per a share he or she has.

However, voting rights are not allowed for shares that have not been fully paid up. (Article 136e)

Table 10-4 Equity Share and Control Power

Share	Control Power	Article
85%	Resolution in writings	143(1) ,144
More than 75%	Special resolution Company Articles of Incorporation Amendment, Main Transactions, Company Merger, Capital Reduction, Company Dissolution, Name Change, Voted Matters	142, 92*
Absolute Majority	General resolution	143
More than 10%	call an extraordinary general meeting to consider and vote on	134, 136 b
More than 1/20	Requisition for resolution	142 (2) a b

Note: It is thought that the buying and selling of shares of major investors falls under "Major Transaction" in Article 92, but confirmation will be done on-site. With a new special resolution, it is possible to change or add special resolution matters.

Source: JICA Survey Team based on Companies Act of Sri Lanka

4) Board of Directors

a) Number of directors

A company shall have at least one director, except a public company which should have at least two directors. (Article 201)

b) Nationality and Residency of Directors

There is no explicit provision in Companies Act regarding nationality or residency. In practice, a person who is not a citizen or resident of Sri Lanka can be a director.

c) Appointment and Dismissal of Directors

i) Appointment

Directors appointed at the time of incorporation shall assume the duties of directors from the date of incorporation. Thereafter, they shall be elected by ordinary resolution of the general meeting of shareholders, unless otherwise provided in the articles of incorporation. (Article 223) After the election, the company must prepare a letter of consent for the appointment of the directors and documents certifying that there are no disqualifying factors as follows. (Article 203)

ii) Disqualified Persons (Article 202)

- a person who is under eighteen years of age
- a person who is an undischarged insolvent
- a person who violated laws
- a person who has been adjudged to be of unsound mind
- a corporation
- a person who does not comply with qualifications for directors prescribed in the articles of incorporation

iii) Age Limit for Directors

No person shall be capable of being appointed a director of a public company or of a private company which is a subsidiary of a public company, if he or she has attained the age of seventy years. (Article 210) Nothing shall prevent the appointment of a director who has attained the age of seventy years, or require a director who has attained that age to retire, if his or her appointment is or was made or approved by a resolution passed by the company at a general meeting which declares that the age limit referred to in section 210 shall not apply to that director, However, any resolution approved at a general meeting will be valid only for one year from his or her appointment. (Article.211)

iv) Dismissal

Unless otherwise provided for in the Articles of Incorporation, directors may be dismissed by ordinary resolution of a general meeting of shareholders. However, the agenda for the dismissal of directors must be included in the notice of convocation of the general meeting of shareholders. In addition to the above, a director must resign his or her position if any of the following events occur.

- Resignation by himself/herself
- When required by laws or the articles of incorporation
- When a disqualifying event occurs
- In the event of death
- When resigning from office in accordance with other provisions of the articles of incorporation

If there is only one director, a general meeting of shareholders must be held to elect a new director in order for that director to resign. (Article 208)

iv) Board of Directors

The Companies Act does not mention the obligation to establish a board of directors. If there is only one director, that director will make decisions. If there is more than one director, the board of directors will make decisions by consensus. (Interpretation of Article 529)

However, certain important transactions, such as those dealing with amounts exceeding 50% of the company's total assets, must be approved by the shareholders by a special resolution at a general meeting of shareholders, unless otherwise provided in the articles of incorporation. (Article 185)

In Sri Lanka's Companies Act, there are few provisions on the board of directors.

5) Auditor

In principle, every company must have an auditor. An auditor is a person who audits the financial statements prepared by a company and prepares an audit report.

a) Qualifications

The person appointed as auditor must be a member of the Chartered Accountants of Sri Lanka or a registered auditor. (Article 157(1)) However, in the case of a public company, he or she must be a member of the Chartered Accountants of Sri Lanka (Chartered Accountants). (Article 157(2))

In addition, the following persons shall not be allowed to become an auditor. (Article 157(3))

- a partner, director or employee of the company
- a liquidator, an administrator or a person who is a receiver in respect of the property of the company
- a corporation
- a person of affiliated companies who is applicable to the above bullet 1, 2
- a person who was applicable to the above bullet 1, 2 in 2 years

b) Appointment

The first auditor of a company may be appointed by the board of directors before the first annual general meeting, and if so appointed, will hold office until the conclusion of the first meeting. (Article 159)

c) Access to Information

An auditor of a company is entitled to require from a director or employee of the company such information and explanations as he or she thinks necessary for the performance of his/her duties as auditor. A director or employee, who fails to comply with this requirement or provides false information, shall be guilty of an offence and be liable on conviction to a fine. (Article.164)

d) Attendance at General Meetings of Shareholders

An auditor may attend general meetings of shareholders of the company. Directors of a company shall send notice on the venue and time of the meetings to an auditor in order to ensure that the auditor of the company attends every meeting. And Directors shall provide opportunities of

questions for the auditor. Where the board of a company fails to comply with this, every director of the company who is in default shall be guilty of an offence and be liable on conviction to a fine. (Article.165)

e) Fees and Expenses

The fees and expenses of an auditor of a company shall be fixed —if the auditor is appointed at a meeting of the company, by the company at such meeting or in such manner as the company determines at the meeting; / if the auditor is appointed by the directors, by the directors; or / if the auditor is appointed by the Registrar, by the Registrar. (Article.155)

6) Procedures for Establishing a Company

The registration (incorporation) of a company is carried out in the following steps;

i) Decide a name of the company to be registered and apply to the Registrar of Companies to reserve the name.

ii) Draft the articles of incorporation of the company to be registered.

iii) Receive approval from the Registrar of Companies for the company name requested to be put on hold. (If rejected, he or she shall apply again with the other name)

iv) Upon approval of the proposed articles of incorporation, submit the following documents;

- Names, addresses, and occupations of shareholders
- Names, addresses, and occupations of directors
- The address of the company to be registered

v) After receiving approval of the proposed Articles of Incorporation from the Director of the Registrar of Companies, print five copies of the final version of the Articles of Incorporation.

vi) Fill out the following forms and submit them to the Registrar of Companies;

- Form 1 (Application for company registration (incorporation) in accordance with Companies Act No. 7 of 2007)
- Form 18 (List of persons who have consented to be appointed as directors)
- Form 19 (List of persons who have consented to be appointed as directors, company secretary and joint company secretary)

vii) Obtain the signatures of the shareholders, directors and company secretary on the articles of incorporation and form 6.

viii) The signatures must be authenticated by a notary public.

ix) Submit the articles of incorporation with the forms to the Registrar of Companies.

x) Receive a certificate of registration from the Registrar of Companies. This will serve as proof of incorporation.

xi) A newly registered company shall notify the public of its incorporation within 30 days.

(5) Exchange Control Act (Gazette No 1232/14 of 19/04/2002)

The Sri Lankan government has prepared a list of business activities that are prohibited from foreign capital investment and those that require the approval of government agencies. The degree of restriction varies by investment sector.

1) Business Activities Reserved for Sri Lankans (industries where foreign capital investment is not allowed)

- Money lending
- Pawn broking
- Retail trade with a capital of less than one million US Dollars
- Coastal fishing
- Provision of Security services for individuals or private organizations

2) Industries that Require Approval or Conditional Approval by the Government of Sri Lanka

Investments in the following industries may be approved for foreign investors up to a limit of 40% equity participation. Investments for more than 40% equity participation shall require approvement of BOI. It should be noted that in relation to the establishment of TOC, the cargo transportation industry is included in the following list.

- Production of export items which fall under the allocation limit prescribed internationally
- Growing and primary processing of tea, rubber, coconut, cocoa, rice, sugar and spice
- Mining and primary processing of nonrenewable national resources
- Forestry using local timber
- Fishing (deep sea fishing) in accordance with the ministry of fishery
- Mass communication
- Education
- Freight Forwarding
- Travel agencies
- Shipping agencies

3) Restricted Industries

Investments in industries as follows shall require approvement of the administration. Although not directly related to the establishment of TOC, the coastal shipping industry is a regulated industry.

- Air transportation
- Coastal shipping
- Any industry manufacturing arms, ammunitions, explosives, military vehicles and aircrafts and other military hardware
- Any industry manufacturing poisons, narcotics, alcohols, dangerous drugs and toxic, hazardous or carcinogenic materials
- Any industry producing currency, coins or security documents
- Large scale mechanized mining of gems
- Lotteries

(6) Freight Forwarding Act (THE LICENSING OF SHIPPING AGENTS FREIGHT FORWARDERS, NON-VESSEL OPERATING COMMON CARRIERS AND CONTAINER OPERATORS ACT, No. 10 OF 1972)

1) Foreign Investment Restrictions

No company shall be eligible for a license to carry on the business of freight forwarding or non-shipping freight forwarding unless it is a limited liability company, public company or private company duly incorporated under the Companies Act No. 7 of 2007 and the majority of its directors are Sri Lankan citizens and at least 60% of the issued shares with voting rights are owned by Sri Lankan citizens. No company is eligible for a license to operate as a freight forwarder or non-shipping freight forwarder unless it is a Sri Lankan citizen and at least 60% of its issued shares with voting rights are owned by Sri Lankan citizens.

Therefore, the proposed TOC will be 51% Sri Lankan and 49% foreign-owned and will be required to obtain a special permit "Class A" for a license to operate as a freight forwarder or non-shipping freight forwarder.

2) License

a) Article 5

A freight forwarder or non-vessel operating common carrier "Class A" category license must be issued to provide a waybill or forwarder's cargo receipt and all other related services in connection with the international carriage of goods.

b) Article 6

Any person engaged in freight forwarding-related services, other than issuing transport documents for international freight forwarding, shall be issued a license in the "Class B" category.

(7) Merchant Shipping Act (Merchant Shipping Act No.52 of 1971, Licensing of Shipping Agents act No. 10 of 1972)

The Merchant Shipping Secretariat is responsible for ensuring the safety of life and property

at sea; maritime education, training, testing, and certification; registration of ships under the Sri Lankan flag, licensing of shipping agents, container depot operators, container terminal operators, container freight stations, freight forwarders, or non-vessel operating common carriers. It is responsible for the licensing of carriers and the implementation of all applicable international maritime conventions and national regulatory provisions. Container terminal operators and freight forwarders are regulated under the Shipping Act.

(8) Customs Ordinance

1) Port Due

Port dues shall be leviable and payable for entry inwards and for clearance outwards, on all ships arriving at or departing from any port of Sri Lanka, and upon cargo imported to or exported from Colombo, according to the table of port dues set forth in figures in Schedule C: (Custom Ordinance supplementary III)

2) Customs House Agents

- Every person licensed as a customs house agent shall have an office registered with the customs.
- Every person licensed as a customs a house agent shall be conversant with the law and practice relating to customs.
- Every person licensed as a customs house agent shall give security in cash in an amount determined by the director-general or such other security as the director-general may approve, for the payment of all charges including penalties and forfeiture that may be imposed upon him for any offense under the customs ordinance.

(9) SLPA Act

The SLPA is based on the principle that the entire port operations should be carried out by itself, and a permit is required for outside contractors to do so.

1) Article. 7 (j)

To carry on the functions of builders and repairers of vessels and machinery, removers or salvagers of wrecks, ship breakers, carriers of passengers, vehicles and goods by land or sea, stevedores, wharfingers, warehousemen, lighter men, dealers in coal and other kinds of fuel, suppliers of water and stores to shipping and dealers in stores and equipment connected with, or required for, any of the aforesaid activities.

2) Article. 7 (u)

To control the use of, and to issue licenses in respect of all craft, equipment, vehicles and services that are operated within the limits of any specified port.

(10) Inland Revenue Act: IRA

1) Corporation Income Tax

Corporate income tax is levied in accordance with the Internal Revenue Act (Law No. 10 of 2006, as amended eight times to date). Corporate income tax is levied based on the principle of residence. A resident is taxed on its worldwide earned income while a non-resident is taxed on its profits and income arising in or derived from Sri Lanka.

The form of business of the corporation determines the corporate tax liability in Sri Lanka. (For example, a limited company incorporated in Sri Lanka is considered resident for tax purposes, while an overseas office that is not managed or controlled by a Sri Lankan company is considered non-resident.)

Under the terms of the Double Tax Avoidance Agreement (DTA), a Japanese resident is liable to pay tax on profits arising from business and commerce through the facility in Sri Lanka (a Permanent Establishment (PE)) .

2) Tax Rate

The corporate income tax as indicated in Internal Revenue Act No. 24 of 2017 has been revised as follows with effect from January 1, 2020 as directed by the Inland Revenue Department. The tax rate on taxable income of enterprises for the relevant year shall be 24% (standard rate).

a) Tax Rate 14%

- Small and Medium enterprises
- Conducting a business of sale of goods or services where the payment for such sale is received in foreign currency
- Agriculture
- Educational services
- Promotion of tourism
- Construction services
- Healthcare services
- Dividends received from domestic companies

b) Tax Rate 18%

- Manufacturing

c) Tax Rate 40 %

- Betting and gaming
- Manufacturing, import and sale of any liquor or tobacco products

3) Exemption of Foreign Currency Income Tax

Sri Lankan President Gotabaya Rajapaksa, who took office in November 2019, is implementing a review of the tax system between the end of 2019 and January 2020, which was a

manifesto during his election.

Section 7 of the Commissioner-General of Inland Revenue's published Notice to Taxpayers states that "Income earned from the supply of services for the purpose of receiving foreign exchange shall be exempt from income tax with effect from December 1, 2019." Income earned from the supply of services for the receipt of foreign currency shall be exempted from income tax, with effect from December 01, 2019. However, it is necessary to confirm the application to TOC.

(11) Land Act

1) Land Act No.38 of 2014

The Act, consisting of 25 articles, provides for restrictions on the transfer of land in Sri Lanka to foreigners, foreign companies, and certain institutions with foreign shareholdings, provides for circumstances in which exemptions may be granted, imposes a land lease tax on the lease of land to foreigners, foreign companies and certain institutions with foreign shareholdings and makes provisions for granting concessions to certain development projects.

There was no restriction on the duration of the land lease, but it had to be for a maximum of 99 years and subject to the payment of a land lease tax (LLT) of 15% of the total rent paid over the entire term (Article 6 of the law).

2) Land Act amended in 2017

Pursuant to article 2(1)(a) and (b) of the Land (Restriction of Transfer) Act No. 38 of 2014, the transfer of land to a company incorporated in Sri Lanka shall be permitted in the following cases Pursuant to the Land Act No. 3 of 2017, effective January 17, 2016 (as amended with respect to restrictions on transfers), the land lease tax imposed on the leasing of land to foreigners was abolished with effect from January 8, 2017.

However, upon entering into a land lease agreement, the lessee is required to pay the applicable stamp duty and any other taxes payable in respect of similar transactions under the Stamp Duty Act. Stamp duty is levied at 3% to 4% of the property value.

(12) PPP Guideline

1) Outline of the Guideline

In 2006, the Ministry of Finance published "Guidelines for Private Sector Infrastructure Projects". This clarified the roles and responsibilities of agencies involved in future PPPs and spelled out the PPP process. The chapters are organized as follows;

- Chap.14 General Provisions
- Chap.15 PROCEDURE FOR PROCESSING OF PROPOSALS
- Chap.16 PROCEDURES FOR ISSUING REQUEST FOR PROPOSALS (RFP) AND ASSISTING BIDDERS
- Chap.17 PRELIMINARY EVALUATION OF PROPOSALS
- Chap.18 EVALUATION CRITERIA

- Chap.19 FINAL REPORT OF THE PROJECT COMMITTEE
- Chap.20 NEGOTIATIONS AND AWARD OF CONTRACT
- Chap.21 FINALISING THE PROJECT

The PPP guidelines do not mention the participation of state-owned enterprises (SOEs) in PPP projects, but there are projects in the port sector in which SOEs (SLPA) have participated (SAGT, CICT, HBT).

2) Bidder Selection Process

a) Request for Proposal (RFP)

After approval by the Cabinet, the responsible ministry will prepare a Request For Proposals (RFP) and solicit proposals from the private sector through international competitive bidding.

CANC will need to ensure that the RFP contains sufficient information for potential bidders. The method of issuing the RFP will be to advertise and solicit responses from interested bidders based on international competitive bidding. The RFP will contain the following items.

- All relevant information about the project
- The specific information required to evaluate the proposal
- A defined format for bidders to follow in submitting their proposals

Prequalification PQ: The Cabinet Appointed Negotiating Committee (CANC) may decide whether to conduct a prequalification of proponents (optional). This is a mandatory requirement, especially for large projects (with estimated costs exceeding $100 million) or complex projects.

b) Time for Submission of Proposals

The period for submitting proposals will normally be three months. This may be increased to six months depending on the nature of the project. Proposals received after the stipulated closing date and time or due to the reasons of critically non-conformity with the RFP, (e.g. non submission of a proposal guarantee) should be rejected by the CANC.

c) Evaluation of Proposal

The proposals received by the deadline specified in the RFP will be evaluated by the PC in three stages:

- Assessment of the adequacy of the proposal – whether all the identified key requirements, such as the bid bond etc., have been met.
- Assessment of the responsiveness to the requirements of the RFP and confirmation of qualification.
- Evaluation of proposals in order to rank the competing bids, on a clear and objectively verifiable criterion and in all cases where possible based on the tariff structure adjusted for any costs to be borne by the Government.

The evaluation shall be completed within three months from the date of receipt of the proposal. The period of time from invitation to conclusion viz. The issue of a Request for Proposals (RFP) to signing of an Implementation Agreement (IA) should be limited to one year (12 months). However, the time frame may be extended with Cabinet approval depending on the complexities of the project proposal on a case by case basis.

d) Final Report

The Project Committee will issue a final report to the CANC, which will consist of the interim reports issued during the evaluation phase (Pricing, Technical, Financing Plan and General).

3) Authority of Cabinet Negotiating Committee (CANC)

The Cabinet will appoint a Negotiating Committee to handle all matters pertaining to BOO/BOT projects and make recommendations on the selection of a proponent. The composition of CANC shall be determined by the Cabinet. Generally the Chairman of CANC may be Secretary to the Treasury or Deputy Secretary to the Treasury. The Secretary of the relevant line Ministry/Ministries and Chairman/BOI may be the other members. CANC's mandate is as follows;

① The composition is determined by the Cabinet.
② The chairperson is generally the Secretary of the Treasury or the Undersecretary of the Treasury.
③ Depending on the project, the PC decides whether or not to conduct a preliminary review of the proposer.
④ Approves the EOI evaluated by the PC.
⑤ Approves the Request for Proposal (RFP) prepared by the PC.
⑥ Approves RFP question responses if they have a significant impact on the RFP.
⑦ May reject proposals received after the deadline date and time, and responses that are not in conclusive conformity.
⑧ Receive regular reports from the PC on the progress of project procedures.
⑨ Receive the final project report from the PC.
⑩ The PC may grant exclusive rights to the agreed proposal for a period not to exceed one year.
⑪ Approve the content of the implementation agreement.

4) Project Committee (PC)

The Project Committee will be constituted once the Cabinet in principle approves the project. The Project Committee will be appointed by the Secretary to the Treasury at the request of the Secretary of the line Ministry in liaison with BII. Its membership will include representatives of the following Ministries/Departments:

① Line Ministry

② Ministry of Finance & Planning
③ BOI/BII
④ Relevant State Agency(ies)
⑤ Attorney-General's Department
⑥ Any other Ministry/Department/Agency as appropriate
⑦ Central Environmental Authority

PC may co-opt consultants/experts from time to time to obtain expert advice. A representative of BII will function as the Secretary/Convener to the Project Committee.

5) Final Negotiation and Signing of LOI

The CANC will conduct the final negotiations with the selected bidder. If necessary, the assistance of PC may be obtained for negotiations.

After the negotiations are successfully completed, the PC with the relevant Line Ministry will prepare a draft Letter of Intent (LOI) for approval by the CANC and finally by the Cabinet . Attorney-General's concurrence for draft Letter of Intent (LOI) should be obtained before the approval by the CANC and the Cabinet.

The purpose of the LOI is to grant to the bidder exclusivity in relation to the project for an agreed period. The LOI is signed by the Secretary of the line Ministry and the Head of the Line Agency involved and is countersigned by the bidder accepting the LOI.

(13) Summary

From the review of laws and regulations, the necessary permissions for establishing a TOC can be summarized as follows.

Table 10-5 Relevant Authorities for TOC Establishment

Permission Items	Relevant Authorities
Registration of TOC	Corporate Registration Office, BOI
Project Permission	Cabinet, CANC
Construction Permission	Colombo City Council, Urban Development Authority
Environmental Assessment	Central and Local environmental authority
Land Lease	Ministry of Land and Land Development
Professional Business License	Ministry of Port and Shipping, Custom Office
Employment, Taxation	Ministry of Internal Affairs, Immigration Office, Inland Revenue Department

Source: JICA Survey Team based on Sri Lankan Laws and Rules

The following points, which are frequently revised in laws and regulations or changed in operation, need to be reconfirmed with the latest information.

1) Preferential Treatment

The tax incentives granted to investors under Article 17 of the BOI Law and the Strategic Development Law were transferred to the Domestic Revenue Law in 2011.

However, the Budget Speech 2016 suspended the granting of new tax incentives provided for in the said law.

2) Tax System

In Sri Lanka, tax rates and targets change frequently depending on economic conditions, government policies, and elections. It is necessary to confirm the latest information on the Domestic Revenue Act, Land Act, etc., in particular, if there are any special provisions for companies with foreign currency income.

3) Foreign Currency Remittance

Under the current system, payments for services that fall under the category of the balance of payments transactions are allowed freely. Considering the Sri Lankan government's recent emphasis on foreign currency acquisition, it will be necessary to check the existence of regulations on the remittance of foreign currency profits out of the country in the future.

10.2 Division of Responsibility and Concession Agreement

10.2.1 Duty and responsibility of TOC and associated risk

(1) Duty of TOC

The duty of TOC mainly covers the whole function related to container terminal operation. Generally, the container terminal operation is composed of the following three areas:

1) Wharf-side work, such as docking and undocking the vessels, and loading and discharging containers to/from the vessel.

2) CY-side work, such as storing and marshalling the containers after landing, and positioning and stacking the containers in preparation for loading.

3) Interface with outside, such as receiving export containers from customers for loading, and delivering import containers to the customer after discharging from the vessel.

With one exception, the tasks above are commonly performed by TOC: In the case of 1), however, it is the Port Authority that undertakes the work of guiding the vessel to the wharf on arrival and removing the vessel from the wharf on departure at most ports in the world. This work is performed by the Port Authority for all the vessels entering and departing the port regardless of the designated terminals. More specifically, pilotage, tug boat service, mooring and unmooring, navigation safety, installation of navigation aids and channel dredging are the responsibilities of the Port Authority.

According to WB sample document, duties of TOC and the Port Authority (SLPA) at Colombo Port are assumed to be as follows.

Table 10-6 Duties of TOC under the Concession Scheme in Colombo Port

1	Procuring supply of water in the concession area
2	Procuring supply of electricity in the concession area
3	Procurement and operation of telecommunications, control and administrative system necessary for the operation
4	Deciding the service tariff and collection from customers
5	Deciding the terms and conditions on which it provides its services to customers
6	Marketing of the terminal facilities to customers
7	Deciding staff recruitment and training
8	Deciding working practices and conditions
9	Deciding other employment policies and dealing with industrial relations generally
10	Procurement and implementation of fire fighting systems and services in the concession area.
11	Maintaining working safety and avoid injury and illness in the concession area
12	Environmental protection in the concession area.
13	Garbage and waste disposal
14	Carrying out temperature checks on reefer containers
15	Checking the conditions of containers (and chassis)
16	Ship and yard planning
17	Preparing Equipment Interchange Receipt
18	Ship-to-shore transfer operations, including hatch cover lifting and container lashing
19	Stacking and unstacking of containers
20	Transfer of containers within the concession area
21	Delivery and receipt of loaded containers
22	Documentary control
23	Inventory control of all containers, chassis and other assets
24	Communication with shipping lines and agents
25	Implementation and adherence to IMDG code for dangerous goods
26	Transit storage of containers
27	Weighing of containers
28	Cleaning, washing and disinfection of containers
29	Transfer of containers between terminals
30	Allocation and sequencing of containers
31	All other matters internal to the terminal facilities
32	Firefighting in the concession area
33	Berth front dredging (initial dredging only)
34	Buy necessary insurance
35	Construction and procurement of terminal facilities and equipment
36	Maintenance and repair of terminal facilities and equipment
37	Pay land lease and royalty

Source: WB PPPIRC ” Sample Concession Agreement for port South Asia, Port Service Agreement

Table 10-7 Duties of SLPA under the Concession Scheme in Colombo Port

1	Pilot
2	Tug boat
3	Moring and unmooring
4	Navigation safety, installation of navigation aids
5	Channel Dredging
6	Berth front dredging (maintenance dredging)
7	Port Security
8	Firefighting (all port area except concession area)
9	Handling of LCL cargo (import)

Source: WB PPPIRC " Sample Concession Agreement for port South Asia, Port Service Agreement

Duties shared by the port authority (SLPA) and TOC regarding land, facilities and equipment are envisaged as follows.

Table 10-8 Duties shared by SLPA and TOC regarding land, facilities and equipment

Operation by SLPA in 2020

	Phase-1						
	Land	Facility	Existing Equipment				
Construction/Procurement	SLPA	SLPA	SLPA				
Operation	SLPA	SLPA	SLPA				
Maintenance	SLPA	SLPA	SLPA				
Replacement	-	SLPA	SLPA				
Own	SLPA	SLPA	SLPA				

Operation by TOC according to Concession Agreement

	Phase-1				Phase-2		
	Land	Facility	Existing Equipment	Additional Equipment	Land	Facility	Equipment
Construction/Procurement	SLPA	SLPA	SLPA	TOC	TOC	TOC	TOC
Operation	TOC	TOC	TOC	TOC	TOC	TOC	TOC
Maintenance	TOC	TOC	TOC	TOC	TOC	TOC	TOC
Replacement	-	TOC	TOC	TOC	-	TOC	TOC
Own	SLPA	SLPA/TOC	SLPA/TOC	TOC	SLPA	TOC	TOC

Note: Some part of existing infrastructure in Phase-1 is provided by SLPA in the form of investment in kind and the rest is considered as leased asset from SLPA.

Source: JICA Study Team

Duties shared by the port authority (SLPA) and TOC regarding port services are envisaged as follows.

Table 10-9 Duties shared by SLPA and TOC regarding port services

Port Services as the Duty of SLPA under 6.(1) of SLPA Act	Provider for ECT	
	SLPA	TOC
(a) to provide in any specified port, efficient and regular services for stevedoring, lighterage, shipping and transshipping, landing and warehousing of dry and wet cargo and cargo in bulk; for wharfage, the supply of water, fuel and electricity to vessels, for handling petroleum, petroleum products and lubricating oils to and from vessels and between bunkers and depots; for pilot age and the mooring of vessels; for diving and under-water ship repairs and for other services incidental thereto;	●	●
(b) to provide in any specified port, efficient and regular tally and protective services;		●
(c) to regulate and control navigation within the limits of, and the approaches to, the specified ports;	●	
(d) to maintain port installations and to promote the use, improvement and development of the specified ports;		●
(e) to co-ordinate and regulate all activities within any specified port excluding the functions of the Customs;	●	
(f) to establish and maintain on and off the coast of Sri Lanka such lights and other means for the guidance and protection of vessels as are necessary for navigation in and out of the specified ports;	●	
(g) to perform such other duties as are imposed on the Ports Authority by this Act;	●	
(h) to conduct the business of the Ports Authority in such manner and to make in accordance with this Act such charges for services rendered by the Authority as will secure that the revenue of the Authority is not less than sufficient for meeting the charges which are proper to be made to the revenue of the Authority, to replace assets, make new investments and to establish and maintain an adequate general reserve.	●	

Note: TOC will provide port service (a) within the scope specified "Tariff Items and Service Providers for ECT".

Note: TOC will provide port service (d) within the scope with regard to ECT.

Source: JICA Study Team

Sorting of income items based on SLPA tariff is envisaged as follows.

Table 10-10 Income items of SLPA and TOC based on SLPA Tariff

Section	Description of Port Services	Provider for ECT	
		SLPA	TOC
Section I	Navigation and Related Services		
	A. Navigation Dues		
	01.Light dues, 02.Entering & Over - hours dues, 03.Pilotage, 04.Professional pilot fees, 05.Tug services, 06.-08.Outer anchorage, 09.Stream anchorage, 10.Dockage	●	-
	B. Licensing of Harbour Crafts, Occupation & OPL Charges		
	11.Licensing of Harbour Crafts, Occupation & OPL Charges	●	-
Section II	Stevedoring and Harbour Tonnage Dues		
	A. Container Operations (Domestic & Transhipment)		
	12.-14.Discharging / loading domestic containers (all inclusive) etc., 16.Movement of containers, 17.Mounting or de-mounting containers, 19.Shut-out charges on containers, 20.Other container services, 21.Electric supply to reefer containers, 22.Storage on domestic containers, 23.Transhipment / re-stow container composite stevedorage, 24.Storage on transhipment / restow containers, 25.Transhipment special operations, 28.General conditions etc for container handling (Indirect charges (Handling of hatch covers, Tally services, Plan, Ship planning services by executives at terminals, Provision of security guards), ITT charges, T/S storage, etc.)	-	●
	15.Harbour tonnage dues (payable by ship in addition to stevedorage), 18.Stuffing / de-staffing containers, 26.-27.Multi country consolidation container operations	●	-
	B. Conventional Cargo Operations (Domestic & Transhipment)		
	29.Bagged & general cargo, 30.Cool room, dangerous and dirty cargo, 31.Bulk cargo, 32.motor vehicles, 33.Animals etc, 34.Shifting of cargo, 35.Mail handling, 36.Detentions & cancellation of booked gangs, 37.Shut-out charges, 38.Harbour tonnage dues, 39.Transhipment and re-shipping cargo	–	-
Section III	Wharfage and Shipping		
	40.Basic / primary food products and agricultural products, 41.Dangerous cargo, reefer & liquor, 42.Cruide oil / petroleum products, 43.All other cargo, 44.Shut-out charges for exports, 45.Basis for levy of charges, 46.Occupation charges, 47.Extra container handling. 48.Crane charges, 49.Cargo shifted / open / re-packing charges for custom examination, 50.Bonding and entrepot charges	▲	▲
Section IV	General Services & Facilities		
	51.Fire fighting services, 52.Supply of fresh water, 53.Occupation of slip-ways, 54.Shipwrite diver, 55.Railway facilities, 56.Chain testing, 57.Canal locks, 58.Oil facilities, 59.Sundry services, 60.Miscellaneous facilities, 61.Labour fee	●	-
Section V	Hiring Services		
	62.Hire of floating craft, 63.Hire of Forklifts, tracks & cranes, 64.Hire of trucks, trailers, prime-movers & other equipment, 65. Hire of other equipment, 66.Hire of gear, 67. Conditions	●	-
Section VI	Guidelines to the Tariff		
Section VII	Rebates and Waivers		
	68.Conventional cargo operations, 70.Navigation	–	-
	69.Container handling	-	●
	70.Navigation	●	–
Section VIII	Coastal Shipping		
	72.Coastal cargo operations	-	●
Section IV	Jaya Container Terminals Limited Colombo Oil Bank		
	73.Occupational charges, 74.Pumping charges, 75.Heating charges, 76.Overtime charges, 77.Handling of Lubricants, 78.Penalty for non performance, 79.General guidelines	-	-

Note: Tariff items refer to SLPA Tariff 2019 under 37(1) of SLPA Act No.51 of 1979.
Note: Refering to the article 18 of the sample of concession agreement by PPPIRC, TOC shall not handle LCL cargo.
Note: ▲ means while wharfage is considered to be the price for common service infrastructure (roads, etc.), whether SLPA or TOC will obtain the tariff could not be confirmed in this survey.

Source: JICA Study Team

(2) Sphere of Responsibility for TOC

In the concession of ECT, the sphere of responsibility for TOC covers entire activities performed by TOC in the area prescribed in the concession agreement (concession area).

According to a WB sample, there are some exceptions to this principal. Firefighting activities within the concession area is primarily TOC's responsibility. However, in the case of a fire on board a ship moored in the concession area, Port Authority (SLPA) shall be entitled to provide firefighting services. Port Authority (SLPA) is also entitled in its sole discretion to intervene and provide its equipment and/or personnel for extinguishing major fires anywhere within the port including the concession area. Port Authority (SLPA) is generally responsible for the dredging work in the port, but the initial (opening) dredging of berth front area prior to commencement of terminal operation is done by TOC.

(3) Risk Management of TOC

According to the World Bank Port Reform Toolkit (Module 5_ Financial Implications of Port Reform_4. Risk Management), following risks are envisaged in an overseas port concession project.

Table 10-11 Risk associated with overseas port concession project

Country Risk:	Legal Risk	Project Risk:	Construction Risk
	Monetary Risk		Hand-over Risk
	Economic Risk		Operating Risk
	Force Majeure		Procurement Risk
	Interference Risk		Financial Risk
	Political Risk		Social Risk
Commercial Risk (Traffic Risk)		Regulatory Risk	

Source: Prepared by JICA Study Team based on World Bank Port Reform Toolkit Module 5

Contents of each risk and application to Colombo port concession, based on WB sample documents, are described hereinafter:

1) Country Risks：

a) Legal Risk

Legal risks arise in connection with the lack of precision and possibility of future changes in the legislation and regulation governing the project. Insufficient precision in applicable laws and regulations can lead to disputes and misinterpretations and thus creates risk. Consequently, a thorough legal analysis should be undertaken prior to the implementation of the project. The risk of noncompliance by the operator with legal or regulatory requirement through ignorance is exclusively carried by the operator.

In the WB sample document, a possible measure to mitigate any adverse financial outcome

resulting from the change in law event is provided (Cl. 21: Change in Law). In case the IRR as contemplated at the initial stage is negatively affected by 5% or more, a reduction in lease rent and Royalties shall be mutually discussed as a possible solution. A Change in Law is considered as one of the force majeure events (Cl. 22: Force Majeure). Also, preventive measure for Bribery or Corruption is provided in the legal compliance clause (Cl. 20: Legal Compliance).

b) Monetary Risk

In a country where the national economy is not strong enough for stable growth, macroeconomic problems or fiscal rules imposed by the country create a risk. As a consequence, the project becomes unable to generate sufficient income in strong currencies. The main monetary risks that can create this situation are, among others, exchange rate fluctuations, non-convertibility of local currency and non-transferability of income out of the project country.

As for the exchange risk, this can be partially hedged by ensuring that the majority of expenses are paid in local currency, however, this will not be sufficient to mitigate exchange risk. If the project can generate foreign currency from foreign customers, it might be easily overcome without going through local currency. The best way of hedging the transferability risk is using an account opened outside of the project country. However, this arrangement usually requires government approval. Prior written agreement, if obtainable, at the outset of the project is important. After all, the ultimate solution for non-convertibility and non-transferability is to obtain a guarantee from the government or central bank.

c) Economic Risk

The macroeconomic situation of the project country and expected future development is one of the major elements of the risk. The container cargo volume moving through the terminal is closely related with macroeconomic factors such as population, consumption, production, exports, imports and so on. It is essential to take these elements into account in the demand forecast at the beginning of the project. This risk is closely related with commercial risk (traffic risk) as analyzed in a later section.

d) Interference Risk

Interference risk covers those risks that relate to the direct intervention of the government or public authorities in the management of the project. In the port operation under concession, Conceding Authority (Government or Port Authority) frequently intervenes in the name of public service or for the protection of users, for reasons of national security, for the protection of the environment, or on any other justifiable ground. Such interference can take the form of imposition of new operating requirements, additional investment, the result of which for the Concessionaire (Operator) is to increase operating costs or reduce revenue.

The best way to mitigate the interference risk is to have a concession agreement that not only states the objectives of the parties, but also specifies the limits of government intervention. It is effective to include the provisions in the concession agreement that obviate the need for arbitrary government intervention, for example, price escalation clauses or obligation to increase capacity above

certain traffic or throughput level.

It is impossible to foresee all the events of government intervention. Hence, it is worth trying to include the provisions in the agreement that call for holding periodic meeting among the parties to discuss the status of the agreement and allow for renegotiation to account for significant changes in circumstances.

In the WB sample contracts, the provision of "Increase of TEU Fees" are set out in Schedule 6 (Payment of royalties) enabling the parties to discuss the upward revision of the TEU Fees. And in the Cl. 23 of the concession agreement (Emergency Port Authority Intervention), Port Authority's access to the concession area is allowed in the case of safety and security concerns. This is an example of setting the limit of government intervention in an explicit and restrictive manner in advance in the applicable concession agreement.

e) Political Risk

Political risk generally refers to a decision by the government of the project country which is disadvantageous to the TOC. This risk brings the financial standing of TOC to an unhealthy situation and in the worst case, TOC has to discontinue project activities. The political risks include the delay of approval of the project documents by the government, delay of issuance of permit by the authorities concerned, and non-compliance with the terms and conditions of the agreement by the conceding authority or the government. The risk of expropriation and nationalization are also grouped under the designation of political risk.

One of the countermeasures for the political risk is to set the effective dispute settling provisions in the agreement. Recourse to international arbitration such as those of International Chamber of Commerce (ICC) is desirable. However, in practice, the arbitration phase of dispute is rarely reached, but when reached, it reflects the degradation of relations to such extent that the future of the project is threatened. The inclusion of international organizations such as the World Bank, International Finance Corporation (IFC), or influential private companies and the governmental institutions of the project country is an effective measure to provide protection for the operator.

2) Project Risks

a) Construction Risk

Risks associated with the construction of a container terminal involve unforeseen increases in construction cost (cost overrun), delays in construction work (time overrun), failure in meeting construction specifications and others. This risk is closely related with Hand-Over Risk that is discussed in the next section. As a result of such incidents, the operator has to pay penalties to conceding authorities under its contractual commitments, the operator suffers a loss of earnings due to delay in opening of the facilities, the operator has to bear increased interim interest cost during the construction period.

Principal causes of this risk are design errors leading to underestimation of cost and time required to complete the job, inadequate assessment of the condition of construction site, poor management of the construction schedule, and others.

In the BOT contract, design and construction tasks are under the full responsibility of operator. There is no room for the operator to hedge the part of the risk to conceding authorities (port authority). The operator should carry these associated project risks.

A common method of managing these risks is to transfer them to the construction company or equipment supplier. The construction contract concluded between the operator (ordering party) and construction company (contractor) should include the clauses to make it possible for the operator to transfer the risk to construction company. "Design and build" type of contract or "Turn-key" contract has an effect to clearly define the scheme of transferring all the associated risks to the contractor.

Another idea is the inclusion of the primary construction company among the project sponsors. The construction risk is then allocated to the shareholding construction company, enabling the non-construction company shareholders to avoid bearing a risk for which they have little or no control. In any case, it should be noted that careful selection of a technically competent and financially sound construction company makes it possible to reduce the construction risk.

In the WB sample document, it is confirmed throughout the extensive Cl. 9 (Design & Construction) that design and construction tasks are under the full responsibility of the operator.

b) Hand-over Risk

Hand-over risks arise when the operator starts operation of the newly built terminal (BOT) or when the operator takes over the management of existing infrastructure and facilities (Operation concession).

In the case of BOT terminal, this risk is closely related with Construction Risk as previously discussed. Hand-over risk forms an integral part of the construction risk thus the operator has to be fully responsible for orderly hand-over as described in the concession agreement. In the latter case, the general rule is that the operator takes over the existing facilities at its own risk and peril. In order to minimize the risk, the operator is authorized to carry out prior inspection of the facilities to assess their condition and estimate the rehabilitation and maintenance costs to which it will be exposed.

Hand-over risks also arise when the operator transfers the terminal facilities to the port authority at the expiry of the agreement or termination of the agreement. In this case, the risk is mitigated by describing details of the condition of the facilities at the time of hand-dover in a fair and precise manner for both the operator and port authority.

c) Operating Risk

Since the operation of the terminal is solely in the hands of the operator, operating risk shall be allocated to the operator (concessionaire) in full. Operating risk principally comprises non-performance risk, operating cost overrun risk, loss of revenue risk, and others. Non-performance risk leads the operator to payment of penalties and adversely affects commercial operations, resulting in financial loss. Operating cost overrun risk stems from underestimating operating costs in the proposal stage or inefficient management of the project by the operator. Loss of revenue risk in this case is not related with the decrease of traffic which is dealt with in Commercial Risk to be discussed later. Loss of revenue in operating risk is a result of non-collection of revenue, fraud and theft and

other such matters caused by the misconduct of operator personnel.

In any case, an effective measure to minimize the risk is the careful selection of a technically competent and financially sound operator at the initial stage and prudent operation by the entrusted operator during the operation period. And that makes it possible to reduce the operation risk.

In the WB sample document, duty and responsibility of both parties are clearly defined in Cl 12 (Operational functions by concessionaire), Cl 13 (Operational performance standards) and Cl 14 (Maintenance). For the performance standards, mention is made of "maintaining international standard and standard expected by international container shipping lines" but there are no quantitative indicators as usually seen in other concession agreements. However, in Schedule 6 (Payment of Royalties) minimum guaranteed amount of royalty payment to port authority is stipulated, regardless of the actual number of containers handled, which brings the same effect as performance standard target.

d) Procurement Risk

Procurement risks arise due to the potential unavailability of critical goods and services, such as power and water supply to the terminal, and unforeseen increases in the cost of such utilities necessary for the project. There are two ways to help the operator reduce or eliminate this procurement risk. One is that the operator makes arrangements to produce the critical resource by itself. For example, the installation of a dedicated generator in a specific area in the terminal makes it possible to reduce the cost of the resource to some extent and limit the risk of power cuts. Alternatively, the operator can sign a long-term purchase contract with the producer of the resource. This makes it possible to set the purchase cost using a predetermined price escalation formula, and to limit the risk of a unilateral price adjustments or restrictions on supply. Further, the contract may include a clause to indemnify the operator against losses incurred in the event of interrupted supply of a critical resource. This is referred to as a "put or pay" contract.

In many countries, supplier of power or water is a governmental institution. It might be a good idea to try to involve port authority in establishing a system that provides a stable supply of utilities to the terminal. Where the procurement of imported supplies (gantry cranes and RTGs) is concerned, the procurement risk can stem from customs-related problems. Thus, it becomes a component of the country risk. In such cases, the port authority may reasonably bear a portion of the risk. In WB sample documents, uncontrollable failure to obtain connections for utilities required to perform operator's obligation under the agreement is subject to force majeure provisions under Cl. 22 (Force Majeure).

e) Financial Risk

Financial risks include the risk associated with raising shareholders' equity or obtaining loans required for funding the project, and establishment of standby credit from financial institutions. Theoretically, the operator should bear all the financial risk. This risk is closely related with monetary risks that was already discussed in the Country Risk.

f) Social Risk

Social risk arises when operators need to restructure the workforce in the terminal. Operator has to prepare to bear the cost of severance payments, retraining, and other employee issues.

Operator seeks to manage and operate the terminal with a limited number of workers for the sake of efficient and cost-conscious operation, but at the same time, the operator is often requested by the port authority to employ the existing workforce as much as possible. Dock workers often enjoy a special status under national law, although these special treatment situations are disappearing in some countries, but where they still exist, they are a source of risk and excess cost for the operator.

Although the government (port authority) may give the operator free hand to rationalize the port workforce, this alone is not sufficient to eliminate the social risk. The operator must also be assured that the government will undertake the task of managing the social situation thus generated by means of, for example, retraining of workers, early retirement funding, relocation allowance, and other programs. This will help to mitigate social risk of the operator.

WB sample documents describe the arrangement of re-employment of existing workforce in detail in Cl. 7 (Employment) and related Schedule 7 (Employment provisions).

3) Commercial Risks

Commercial risks arise from potential shortfalls in projected traffic and from constraints in price setting mechanism. These risks are affected by the operator's pricing decisions and by any price regulation imposed by government.

In the operation of a container terminal, operator naturally desires to have maximum free discretion in terms of price setting and contents of service for the aim of maximizing profit. Port Authority on the other hand tries to restrict the operator's activities and free discretion from the viewpoint of equal access and common user basis. The nature of the partnership between the operator and the port authority leads, in practically every case, to sharing of traffic risk, both in terms of responsibility and consequences. The terms of the concession agreement are supposed to effectively allocate these risks between the two parties. However, even though they are partners in the port project, there is a natural tension between the port authority as a custodian of the public interest and the operator as a profit-maximizing business.

A practical measure to find a solution for the sharing of commercial risk can be pursued by establishing the good concession mechanism which enables coexistence of regulatory enforcement and market-oriented business practice through the meaningful discussion among the parties.

Risk related to cargo volume handled at the terminal is sometimes called Traffic Risk or Cargo Demand Risk. This risk deals with general trend of cargo market, shipping line customers and behavior of competing ports (terminals). In the cargo market, stability of cargo movement, accuracy of cargo demand forecasts, and inducement of transshipment cargo are the main factors which determine the risk. There is also a risk that cargo movement trends will change in longer terms encompassing the entire period of the concession agreement which is brought from changes in the microeconomic situation in surrounding areas.

Dealing with major shipping lines is one of the major factors of the commercial risk.

Inducement of potential shipping lines that bring substantial volume of cargo to the terminal is the key to success of the terminal operation. The large shipping lines will frequently become project sponsors. In such cases, the customer-shareholder carries part of the commercial risk. However, this arrangement has a number of disadvantages, particularly the risk of discrimination against normal non-shareholder customers. And other potential shipping lines tend to avoid using the terminal due to the advantageous position of the shareholder shipping line of the terminal.

Behavior of competing ports (terminal) is another risk in the commercial area. It is common practice in the operator selection stage (Pre-qualification) that certain restrictions be set on the bidders (possible operators) as a condition to enter into the concession. The condition is usually designed to avoid the participation of possible competitors in the terminal operation.

As to the cargo demand (traffic) risk, WB sample document includes a provision in Schedule 6 (Payment of Royalty) guaranteeing the minimum payment amount of royalty paid by the operator. WB sample documents also include limited restrictions on developing a new terminal in the port for the benefit of operators. The definition of rival ports (competing ports) in WB sample document is described as “a port which handles more than 1.5 million TEU per year and 40% of capacity is used for transshipment cargo” in Schedule 1 (Definitions). Limited restriction of developing new facility in the port (grace period) is set as “5 years” in Cl. 4 (Exclusivity).

4) Regulatory Risks

The relationship between the concessionaire and the port authority is important and sensitive in defining the rules of the game for the concessionaire and, hence, its risks. The concessionaire generally desires to limit the scope of the vertical partnerships with the port authority, taking the view that operator activity should be regulated predominantly by market conditions.

Consequently, the operator seeks greater freedom of action in the management of its project to be in the strongest possible position to manage risks.

The port authority is concerned with protecting the port user, safeguarding the general national interest, and avoiding operator’s abuse of dominant market positions. The port authority, consequently, seeks to restrict the operator’s freedom of action through technical or economic regulatory measures.

The search for a fair balance between regulation and market discipline by the mutual efforts of the port authority and operator is important for effectively determining how the commercial risk will be shared.

In WB sample documents, principal of fair usage of the berth is determined in Cl. 12.4 (Equal access rules) in which duty of Harbor Master and principle of berth allocation is described. Fair treatment of port users is determined in Cl. 12.5 (Common User basis) in which the concessionaire and the port authority are obliged to refrain from unfair or discriminatory practices against port users. For the effective implementation of these principals, Cl. 12,6 (Regulator) states that a regulatory framework should be newly established by the government to oversee the rigid implementation of the principals.

10.2.2 PPP Port Projects in Sri Lanka

(1) PPP Frame in Sri Lanka

The Guidelines on Government Tender Procedure-Part II on Private Sector Infrastructure Projects (BOO/BOT/BOOT Projects), in its revised edition of January 1998, constitute a broad frame for the implementation of PPP.

In July 2017, a new National Agency for Public–Private Partnership (NAPPP) was established, by decision of the cabinet of Sri Lanka, following the proposal of the Minister of Finance and mass media. In the cabinet's decision, the new agency is referred to as an "independent institution with adequate legal, administrative and financial powers," designed to select and implement projects based on PPP collaboration, and to provide guidance to the line ministries and agencies in respect of PPP.

The new cabinet has approved the proposal in January 2020 to close down the operations of the agency established by the previous regime in 2017 to fast-track Sri Lanka's economic development agenda.

(2) Port PPP Projects in Sri Lanka

The PPP guidelines are silent on state-owned enterprise (SOE) participation in PPP projects and institutional PPPs. SLPA is involved in three port projects as SOE.

There is currently no standardized PPP model or standard concession agreement template available for port projects. However, recent BOT/PPP concession agreements for the South Asia Gateway Terminal (SAGT), and Colombo International Container Terminals(CICT), at Colombo Port, can be considered successful model templates for future projects. Three examples of port PPP projects are outlined below.

In addition, what preferential treatment is granted under the SDP and BOI laws, or the suspension of such treatment, should be confirmed with the latest information.

1) SAGT

The expansion of Queen Elizabeth Quay terminal in Colombo Port was conducted through a PPP contract that was signed between SLPA and SAGT in 1999. SAGT was created by SLPA and several companies to expand, improve, and operate the Queen Elizabeth Quay terminal through a 30-year BOT concession. The SLPA owns 15% of SAGT shares.

The first PPP reached financial close in 1999. It aimed to expand the Queen Elizabeth Quay terminal of Colombo Port from the original capacity of 250,000 TEUs per year to a capacity of 1.1 million TEUs and to improve port efficiency.

It consisted of a BOT contract signed between SLPA and SAGT partnership created by several private companies and SLPA itself. The construction was completed in 2003, and led to a 30% increase in the Colombo Port capacity. The total cost of the project was estimated at $240 million.

Initially the shareholdings of the SAGT partnership were allocated so that 41.25 percent of holdings were owned by Sri Lankan shareholders and only 26.25 percent were owned by foreign port management companies. Of the 41.25 percent Sri Lankan owned shares, 15 percent were owned by

SLPA and the other 26.25 percent were owned by the Sri Lankan private investment group. The three lending institutes were the Asian Development Bank, the International Finance Corporation, and the Commonwealth Development Corporation, each of whom owns 7.5 percent of the shares. The final 10 percent was owned by a foreign shipping company.

2) CICT

In 2011, another PPP contract was closed to achieve the construction of the South Container Terminal of the Colombo Port Expansion Project. It was signed between SLPA and CICT, a joint venture of which the SLPA owned 15% of the shares.

The project involved the expansion of the Colombo Port South Container Terminal One (Phase I, Stage II), through a 30-year BOT agreement between SLPA and China Merchants Port Holdings Company Limited (CM Ports). The total investment was $500 million. CICT is jointly owned by CM Ports and SLPA, with shares of 85 percent, and 15 percent respectively.

3) Hambantota Port

The third PPP consisted of a 99-year lease contract of the Hambantota Port to CM Ports, a company based in the People's Republic of China. The third PPP reached financial close in 2017.

In order to meet IMF bailout conditions, the Sri Lankan government transferred the 99-year patent management rights to CM Ports in 2017 under a PPP arrangement. At that time, CM Ports held an 85% stake in HIPG with an investment of $1.12 billion, HIPG acquired a 58% stake in HIPS, and SLPA held a 15% stake in HIPG and a 42% stake in HIPS.

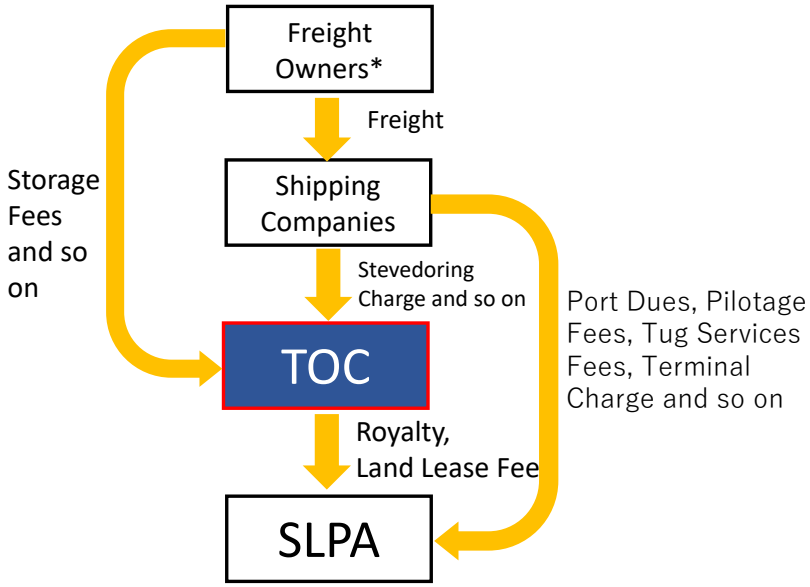
10.2.3 Proposal on Demarcation of Duties and Responsibilities between SLPA and TOC in ECT Project

(1) Policy on Demarcation of Duties and Responsibilities between SLPA and TOC in ECT Project

Policy on the demarcation of duties and responsibilities between SLPA and SAGT will be prepared based on WB sample documents. Details are described in 22.2.1.

(2) Assumed Fund Flow related to Port Services among Shipping Companies, Freight Owners, SLPA and TOC

The assumed fund flow related to port services among shipping companies, freight owners, SLPA and TOC is shown in Figure 10-2. It is necessary to confirm which party is to receive Landing, Delivery and Shipping Charges.



*: Either the import side or the export side
Note: Who obtains Landing, Delivery and Shipping Charges should be confirmed in the site survey.

Source: JICA Survey Team

Figure 10-2 Assumed fund flow among shipping companies, freight owners, SLPA and TOC

(3) Income / Expenditure Items of TOC

As described in Table 10-10, when TOC conducts the terminal operation, Stevedoring Charge (Tariff 12:00, 23:00, etc.), Mounting and Demounting Charge (Tariff 17:00), Landing, Delivery and Shipping Charges (Tariff 43:00) and storage fee (Storage Fees Tariff 22:00, 24:00) are considered to be the main income. It should be noted that (Tariff 00:00) represents the Tariff item number in the Tariff table of SLPA.

The main operating expenditures of the terminal operation are considered to be electricity / fuel costs, labor costs, general and administrative costs, maintenance and repair costs, borrowing interest payments, depreciation and amortization costs, royalty paid to SLPA, and land lease fee.

10.2.4 Royalty Imposed on TOC

Regarding the royalty paid by TOC to SLPA, the amount (and method) paid by CICT and SAGT to SLPA can be used as a reference.

On the other hand, royalty is determined for each individual case by competitive bidding, etc. related to operating rights based on the business environment at that time, and for this reason SLPA's intentions concerning the royalty related to this case should be confirmed. Also, upfront royalty may be required depending on the contract.

10.2.5 Concession Agreement

(1) Representative Features of a Port Concession Agreement

Compared with other port-related contracts such as lease or management contract, the most

remarkable difference in a concession agreement is the operator's (concessionaire's) vast range of discretion in conducting business at the terminal. The salient representative features of a Port Concession Agreement are described as follows:

1. Activities

Basically, most of the activities in the terminal are managed by the concessionaire with some exceptional areas which are handled by port authority. Duty and responsibility of the parties are therefore clearly defined in the agreement and strictly limit what the concessionaire is allowed to do.

2. Investment

Contrary to other forms of port-related contracts, concessionaire is subject to mandatory investment requirements associated with the concession agreement. Under the BOT type concession contract, concessionaire is required to invest in port infrastructure including wharf facilities and yard development and superstructures such as cargo handling equipment, buildings and software for operation system. Generally, the total amount of investment by the concessionaire is large.

3. Duration

As a concession agreement involves a large initial investment by the concessionaire, including necessary superstructure such as gantry cranes and other cargo handling_equipment and buildings, duration of the agreement is generally longer than other port-related contracts for the recovery of the investment. Normally, a term of 20-30 years is set in the agreement. Subject to mutual agreement, extension of the original term is possible in most cases.

4. Exclusivity

Conceding Authority (Port Authority) transfers its operation right in the terminal to the concessionaire (operator) and affirms that the concessionaire is the exclusive party that has the right to manage the terminal. In return, conceding authority receives a concession fee from the concessionaire. Conceding authority usually requires some form of guarantee in order to maintain the level of income.

5. Performance

Concessionaire gives the guarantee to the conceding authority in exchange for enjoying the exclusive right of management of the terminal. Guarantee takes the form of cargo volume guarantee (minimum number of containers handled) or income amount guarantee (minimum amount of concession fee). Conceding Authority is assured to gain the benefit from terminal operation without its own involvement in the terminal operation.

6. Labor

Except in the case of a greenfield port project, the port authority and operator are required to make a decision on the disposal of existing port labor. If the decision is the transfer of existing labor to the terminal under a new management scheme, details of the transfer should be carefully articulated

including wages and new working conditions. Before an agreement between the port authority and operator can be reached, consent of the industrial union which represents the existing port labor is necessary in most cases.

7. Tariff

Concessionaire will establish service tariff applicable at the terminal. Generally, tariff established by the port authority is used. For the inducement of new customers to the terminal and for maintaining the fair consistency with other terminal tariffs in the same port, rules for offering discounts should be also agreed upon between the port authority and operator (concessionaire).

8. Concession Fee

Concessionaire pays the commission to the conceding authority (port authority) in the form of concession fee in exchange for operation right of the terminal. The concession fee has a variety of forms including Lump sum rate, combination and fixed and variable rate, etc. The commonly used method is the dual rate system of fixed portion and variable portion. Fixed portion represents land lease portion for the exclusive use of the port authority's land and variable portion represents return of business carried out in the terminal. Fixed portion is usually calculated based on the port authority's initial investment amount for the preparation of the land for the terminal. As to variable portion, there are several ways to determine the amount. One way is to initially fix the percentage of yearly gross revenue of the terminal as the conceding authority's portion while another way is to initially fix a certain amount (US$) per container as the conceding authority's portion and then the annual amount is calculated based on the actual number of containers handled at the terminal.

(2) Analysis of a Reference Case of Concession Agreement of ECT

For the preparation of draft concession agreement of ECT, the WB sample documents are judged to be suitable for use as a base of the ECT draft concession agreement, in view of the similarity of whole concession scheme, formation of participating shareholders, and other various aspects. Therefore, we analyze the WB sample documents.

In the WB sample documents, concession agreement is composed of the following three parts:

1. Special Conditions pertaining to the Agreement

In this part, specific conditions of the agreement which are unique to this agreement and need to be identified at the outset are described. It includes object of concession, duration of concession, exclusivity, labor arrangement and others.

2. Details of BOT Scheme

Here, clauses related to BOT arrangement are described, starting from Terminal Construction (B: Build part), and then Terminal Operation (O: Operation Part), and Terminal facility transfer at the end of the agreement (T: Transfer Part).

3. General Terms and Conditions

Duties and responsibilities of conceding authority and concessionaire are described, followed by the boilerplate clauses such as Confidentiality, Entire agreement, Severability, and so on.

Contents of the Concession Agreement and Schedules in the WB sample documents are as follows:

Main Body of Concession Agreement

Clause Nos.	Title	Contents
(Special conditions pertaining to the agreement)		
Cl. 1	Interpretation	Definition and interpretation、Details in Schedule 1
Cl. 2	Scope	Phase 1facilities, Details in Schedule 3, part 1
Cl. 3	Duration	Concession Period 30 years
Cl. 4	Exclusivity	Competition and restriction of activities in rival ports
Cl. 5	Establishment of Concessionaire	Formation of SPC, project documents compliance
Cl. 6	Warranties	Warranties of both parties, Details in Schedule 2
Cl. 7	Employment	Treatment of existing labor, details in Schedule 7
Cl. 8	Asset Injections	Disposal of 3 cranes owned by Port Authority
(B: Build, facility construction part)		
Cl. 9	Design and Construction	
Cl. 9.1	Functional requirements	Function of the facility, details in Schedule 8 part 1
Cl. 9.2	Design solution	Design of the facility, details in Schedule 8 part 2
Cl. 9.3-4	Design development	Intervention of port authority to facility design
Cl. 9.5-6	Design flaws	Necessary procedure in the case of design change
Cl. 9.7	Consents	Rules for getting approval on construction related matter
Cl. 9.8-9	Concession area conditions	Acknowledgement of the physical condition of the site
Cl. 9.10	Archaeological items	Belongs to port authority
Cl. 9.11	The Building Contract	Appointment of contractor at concessionaire's discretion
Cl. 9.12-14	Construction Program	Strict adherence of the program, details in Schedule 9 part 1
Cl. 9.15	Progress reviews	Observation scheme of progress, reporting requirement
Cl. 9.16-19	Extension Events	Delay of construction
Cl. 9.20	Sanctions for late completion	Port authority's right to cancel the concession agreement for the reason of delay of construction program
Cl. 10	Commissioning	Hiring of Test Certifier, details in Schedule 11
(O: Operation, management and operation part)		
Cl. 11	Port Service by Port Authority	Listing of routine service by port authority
Cl. 12	Operational function by Concessionaire	Listing of terminal services to be offered by concessionaire Equal access rules, common user facility concept
Cl. 13	Operational performance standards	Maintain International Standard
Cl. 14	Maintenance	Formulate annual maintenance schedule

Cl. 15	Operational sub-contracting	Provisions in the case of concessionaire unable to perform duty
Cl. 16	Tariff	Details in Schedule 12
Cl. 17	TEU Royalties	Details in Schedule 6
Cl. 18	Storage	CY free storage limit 21 days, LCL handling by Port Authority
Cl. 19	Reporting	Reporting requirement to Port Authority on operation and financial
Cl. 20	Legal compliance	No bribery and corruption
Cl. 21	Change in Law	Bailout measures in the case of taxation change
Cl. 22	Force Majeure	Listing of force majeure events or circumstances
Cl. 23	Emergency PA intervention	Emergency access right of port authority to the terminal
Cl. 24	Insurance	Requirement of taking out insurances, details in Schedule 13
Cl. 25	Late capex	Concessionaire's capital expenditure during the final 15 years
Cl. 26	Hand-back	(refer to T: Transfer)
Cl. 27	Performance monitoring	Procedures in case of performance failure by concessionaire
Cl. 28	Corporate changes	Restriction on change of shareholding scheme formation
Cl. 29	Refinancing	Restriction on refinancing of concessionaire
Cl. 30	Termination by Port Authority	Listing of port authority termination circumstances
Cl. 31	Termination by Concessionaire	Listing of concessionaire termination circumstances
Cl. 32	Termination by Force Majeure	Refer to Force Majeure circumstances
Cl. 33	Termination by national interest	By the direction of Minister on account of national interest
(T: Transfer, terminal facility transfer at the end of agreement)		
Cl. 26	Hand-back	Facility transfer, details in Schedule 14
Cl. 34	Termination procedure	Details of procedure on termination
Cl. 35	Other effects on termination/expiry	Other procedure on termination
Cl. 36	Termination compensation	Compensation procedure pertaining termination
Cl. 37	Transfer on termination	Detail in Schedule 15
(General Terms and Conditions)		
Cl. 38	Responsibility	Responsibility of Port Authority & Concessionaire
Cl. 39	Liability	Liability of Port Authority & Concessionaire
Cl. 40	Disclosed Data	Limitation of liability on disclosed data
Cl. 41	Confidentiality	Treatment of information
Cl. 42	Assignment of rights/obligations	Restriction on assignment of rights in the agreement
Cl. 43	Entire agreement	General terms
Cl. 44	Variations, etc.	Only the written change is valid
Cl. 45	Severability	General terms
Cl. 46	Notices	General terms
Cl. 47	Relationship of parties	Both parties are independent principals
Cl. 48	Applicable law, Arbitration	Identification of applicable law to the agreement, arbitration rules
Cl. 49	Counterparts	Signatories of the agreement (port authority & concessionaire)

Schedules to the Concession Agreement

Schedule Number	Title	Contents	Cross-reference Agreement clause
1	Part 1 Definitions	Definition of words	
	Part 2 Interpretation	Interpretation of words	Cl. 1
2	Part 1 Concessionaire Warranties	Warranties by concessionaire Legal capacity No litigation, No Corruption	Cl. 6
	Part 2 Port Authority Warranties	Warranties by Port Authority Legal capacity, Transfer of labor, Ownership of cranes	Cl. 6
3	Part 1 Phase 1 Facilities & Passenger Berth	(contents unknown)	
	Part 2 Phase 2 Facilities	(contents unknown)	
4	Identified Permits	(contents unknown)	
5	Phase 1 Condition Precedent	Documents to be supplied by phase I effective date	Cl. 3.2-6
6	Payment of Royalties	Amount of Royalty, increase, payment method	Cl. 17
7	Employment Provisions	Rules for employment of existing labor	Cl. 7
8	Part 1 (title unknown)	(contents unknown)	Cl. 9.1
	Part 2 Design Solution	(contents unknown)	Cl. 9.2
9	Part 1 Construction Program	(contents unknown)	Cl. 9.12
	Part 2 Milestone Sunset Dates	(contents unknown)	Cl. 9.12 & 20
10	The Regulator	Establishment of Regulator in the port	Cl. 12.6
11	Commissioning Tests	Procedure of Gantry cranes trial and examination	Cl. 10
12	Setting of tariffs	Rules of cargo handling tariff Concessionaire's freedom after the 5th year	Cl. 16
13	Part 1 Description of Pre-commissioning Insurance	Details of insurances to be taken out before operation	Cl. 24
	Part 1 Description of Post-commissioning Insurance	Details of insurances to be taken out during operation	Cl. 24
14	Part 1 Hand-back requirements	Delivery of equipment in good condition	Cl. 26
	Part 2 Expiry date inspection	Procedure of examination at hand-back	Cl. 26
	Part 3 Form of Hand-back Certificate	Hand-back certificate by hand-back expert	Cl. 26
15	Transfer Arrangements	Establishment and function of transfer committee	Cl. 30-33, 37
16	Form of Commissioning Certificate	(contents unknown)	Cl. 10
17	Plan showing Concession Area	(contents unknown)	
18	Concessionaire Maintenance Policy	Maintenance term, Computerized Maintenance System interlocked with Management Accounting System	Cl. 14

10.3 TOC Operation

10.3.1 Competitive Analysis of Major Overseas Terminals

The world's major terminal operators are expanding their business globally. When analyzing the competitiveness of a company, it is generally better to use profitability (net income) as an index, but when comparing and analyzing the competitiveness of companies in different countries, this method is not as reliable since the tax rate, the depreciation method (the basis for calculating depreciation) and the useful life differ from country to country. For this reason, EBITDA (Earnings Before Interest Taxes Depreciation and Amortization) which refers to the profit calculated by adding interest expense and depreciation to the profit before tax will be used for analyzing the competitiveness of global companies (competitors in the same industry in multiple countries). EBITDA Margin is EBITDA divided by the sales amount, and is used to evaluate the profitability of a company.

Eurokai, Hutchison Ports, ICTSI, PSA, APMT, Cosco Shipping Ports, DPW and CM Ports are the world's major global terminal operators. The outlines of these major terminal operators are also shown in Table 10-12. Based on their latest operational and financial data (container handling volume, sales, EBITDA), the index of EBITDA Margin, Sales per container, and EBITDA per container were calculated and their competitiveness was analyzed in Table 10-13.

In the cases of the largest operators, namely, PSA and Hutchison Ports, the index of their transaction volume, sales per container, and EBITDA per container are 85.2 million TEUs, 47.9 USD/TEU, 28.7 USD/TEU for PSA, and 62.7 million TEUs, 72.4 USD/TEU and 27.5 USD/TEU for Hutchison Ports. These two companies are surely competitive because their unit price (USD/TEU) is low while EBITDA/TEU is stable. Figures for second largest operators (DPW, Cosco Shipping Ports, APMT, and ICTSI) can be referred to in the table below. Eurokai, the middle-size operator in developed countries, handled 3.4 million TEUs in 2019.

Comparing the EBITDA Margin per container in 2019, PSA is 60% and ICTSI is 54%, which are higher than 30-40% of other terminal operators. This seems to reflect the effects of business investment and corporate acquisitions that PSA and ICTSI have developed based on their global strategies.

Comparing the profit per container (EBITDA/TEU) in 2019, Cosco Shipping Ports is 7.5 USD/TEU, PSA 28.7 USD/TEU, and ICTSI 78.6 USD/TEU. Since Cosco Shipping Ports handles the majority of China's import/export containers, it is a particularly low price, and therefore difficult to compare with others. In general, the transshipment type terminal operators have lower profit margins than those of gateway type operators. This is because the former is exposed to competition with neighboring ports and under pressure to reduce prices while the latter can increase profit by adding value with peripheral business operations such as freight forwarder, domestic transportation, etc. This accounts for the difference in profit between PSA (transshipment type) and ICTSI (gateway type).

Table 10-12 The Outlines of Major Overseas Terminal Operators

Company Name	Country (City)	Major Shareholder	Terminals
Eurokai	Germany (Bremerhaven)	Eurokai Group and BLG Logistics hold Eurogate.	12 terminals in 6 countries, major terminals are Germany (Bremerhaven, Hamburg, etc.).
Hutchison Ports	China (Hong Kong)	CK Hutchison Holdings Limited	52 terminals in 24 countries, major terminals are China (Hong Kong, Shanghai, etc.), Thailand (Laem Chabang), Korea (Busan, etc.), England (Felixstowe, etc.), Netherlands (Rotterdam), Spain (Barcelona), Panama (Balboa) .
ICTSI	Philippines (Manilla)	Enrique K. Razon, Jr (61.33%), Public (38.14%)	25 terminals in 18 countries, major terminals are Philippines (Manilla, etc.), Mexico (Manzanillo, etc.), Ecuador (Guayaquil), Iraq (Umm Qasr) .
PSA International	Singapore (Singapore)	Temasek	50 terminals in 18 countries, major terminals are Singapore (Pasir Panjang, Brani,etc), Korea (Busan,etc), India (Chennai, Jawaharlal Nehru, Kolkata), Belgium (Antwerp).
APMT	Netherlands (Rotterdam)	AP Moeller-Maersk Group	59 terminals in 37 countries, major terminals are Netherlands (Rotterdam), German (Bremerhaven,etc), Spain (Algeciras, etc), USA (Los Angeles, New York, etc.), Oman（Salalah), Sri Lanka (Colombo), India (Jawaharlal Nehru, etc.).
Cosco Shipping Ports	China	China COSCO SHIPPING Corporation Limited	52 terminals in 14 countries, major terminals are China (Shanghai, Dalian, etc.), Greece (Piraeus), Spain (Valencia, Bilbao), USA (Long Beach, etc.).
DPW	UAE (Dubai)	Dubai World	52 terminals in 31 countries, major terminals are UAE (Dubai), Saudi Arabia (Jeddah), China (Qingdao, etc.), Korea (Busan), Belgium (Antwerp), England (Southampton, etc.), Peru (Callao).
CM Ports	China (Hong Kong)	China Merchants Group	25 terminals in 8 countries, major terminals are China (Shenzhen, Qingdao, etc.), Sri Lanka (Colombo, Hanbantota), Brazil (Paranaguá).

Note: Companies above are all listed.

Source: JICA Survey Team

Table 10-13 Competitive Analysis of Major Overseas Terminals

Company Name	Year	Container Handling Volume	Sales	EBITDA	EBITDA Margin	per Container	
						Sales	EBITDA
		Mil TEU	Mil USD	Mil USD		USD/TEU	USD/TEU
Eurokai	2018	3.4	301	82	27.3%	88.4	24.2
	2019	3.4	233	71	30.3%	68.5	20.7
Hutchison Ports	2018	60.6	4,491	1,710	38.1%	74.1	28.2
	2019	62.7	4,542	1,721	37.9%	72.4	27.5
ICTSI	2018	9.7	1,386	838	60.5%	142.3	86.1
	2019	10.2	1,481	800	54.0%	145.5	78.6
PSA	2018	81.0	4,086	2,361	57.8%	50.4	29.2
	2019	85.2	4,077	2,445	60.0%	47.9	28.7
APMT	2018	11.4	2,873	998	34.7%	252.0	87.5
	2019	11.8	3,103	1,107	35.7%	263.0	93.8
Cosco Shipping Ports	2018	37.1	1,000	326	32.6%	27.0	8.8
	2019	39.7	1,028	298	29.0%	25.9	7.5
DPW	2018	36.8	5,646	2,611	46.2%	153.6	71.0
	2019	39.9	7,686	2,998	39.0%	192.5	75.1
CM Ports	2018	41.0	1,220	557	45.7%	29.8	13.6
	2019	41.2	1,058	491	46.4%	25.7	11.9

Source: Drewry [Global Container Terminal Operators, Annual Review and Forecast, Annual Report 2020/21], JICA Survey Team

Appendix

A3 Demand Forecast

A3. Demand Forecast

A3.1 GDP-TEU Elasticity of Countries (year 2010-2018)

Table A3- 1 GDP-TEU Elasticity of Countries (year 2018-2018)

Country	GDP-TEU Elasticity	Export Country from Sri Lanka	GDP-TEU Elasticity
India	1.08	United States	1.77
Bangladesh	1.45	India	1.08
Pakistan	1.42	Germany	1.08
Maldives	1.71	United Kingdom	0.49
Sri Lanka	1.09	Japan	1.83
		China	0.52
		France	1.44
		United Arab Emirates	0.49
		Netherlands	3.40
		Belgium	2.86
		Russia	0.35
		Mexico	2.89
		Italy	1.08
		Canada	2.19
		Pakistan	1.42
		Maldives	1.72
		Iraq	0.76
		Bangladesh	0.89
		Australia	1.30
		Islamic Republic of Iran	-8.35
		Turkey	0.63
		Korea	1.08
		Spain	3.26
		Egypt	0.20
		Saudi Arabia	0.77
		Malaysia	1.11
		Singapore	0.52
		Qatar	6.35
		Hong Kong SAR	-0.85
		Vietnam	0.95
		Azerbaijan	-1.74
		Taiwan Province of China	0.27
		Libya	0.41
		Chile	0.49
		Brazil	2.05
		Peru	1.12
		Thailand	1.53
		Austria	1.33
		Poland	2.63
		South Africa	1.92
		Sweden	0.55
		Kenya	1.27
		Switzerland	2.73
		New Zealand	1.65
		Ireland	0.59
		Myanmar	1.39
		Kuwait	2.26
		Ukraine	0.10
		Jordan	0.98

Note: GDP-TEU elasticity was calculated by dividing the annual average growth rate of TEU from 2010 to 2018 by the annual average growth rate of GDP of each country.

Source: JICA Survey Team

A3.2 Allotment of Import / Export Containers among Sri Lankan Ports by using Logit Model

Demand Forecast of import / export containers was conducted with the GDP-TEU elasticity method. Thereafter, allotment of import / export containers among Sri Lankan Ports is conducted by using Logit Model in this section.

A3.2.1 Logit Model

First, container shares handled at Colombo Port, Hambantota Port and Trincomalee Port are set to *PCi*, *PHi* and *PTi* respectively for containers whose origin / destination (OD) is block number *i* in Sri Lanka. Here, *PCi* plus *PHi* plus *PTi* equals 1. Container shares handled at these 3 ports are calculated using the Logit Model. Utilities in using Colombo Port, Hambantota Port and Trincomalee Port are set to *UC*, *UH* and *UT* respectively. Utility is the degree of satisfaction in using something; for example, the lowness of transport cost or the shortness of transit time can be its evaluation indicator. Estimating and comparing utilities of these 3 ports, if *UC* is larger than *UH* and *UT*, for instance, shippers / consignees will use Colombo Port. Utility *U* consists of the indicator *V*, common indicator for shippers / consignees, and the indicator ε, fluctuating indicator for each shipper / consignee, and is expressed as $U=V+\varepsilon$. Here, common indicator *V* and fluctuating indicator ε are called utility fixed member and utility probability member respectively. Utility fixed member *V* is defined as a function of transport cost, transit time, etc., while utility probability member ε is subject to a stochastic distribution. Based on the assumption above, *PCi*, *PHi* and *PTi* or container shares handled at Colombo Port, Hambantota Port and Trincomalee Port for containers whose origin / destination (OD) is block number *i* in Sri Lanka can be expressed as follows:

$$PCi = \frac{exp\,(\theta \cdot VCi)}{exp\,(\theta \cdot VCi) + exp\,(\theta \cdot VHi) + exp\,(\theta \cdot VTi)}$$

$$PHi = \frac{exp\,(\theta \cdot VHi)}{exp\,(\theta \cdot VCi) + exp\,(\theta \cdot VHi) + exp\,(\theta \cdot VTi)}$$

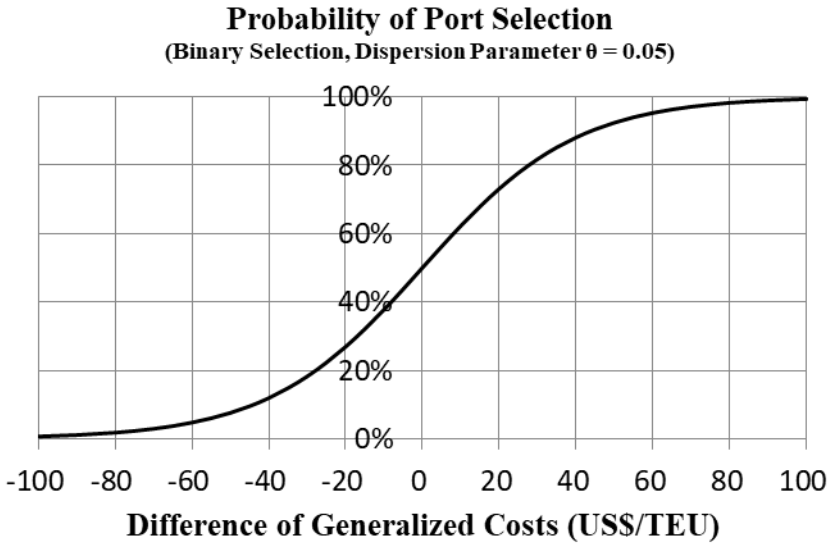
$$PTi = \frac{exp\,(\theta \cdot VTi)}{exp\,(\theta \cdot VCi) + exp\,(\theta \cdot VHi) + exp\,(\theta \cdot VTi)}$$

Utility fixed member (*VCi*, *VHi*, *VTi*) is defined as the following which is negative of the generalized cost consisting of transport cost and transit time:

$$VCi = -FCi - vt \cdot TCi$$
$$VHi = -FHi - vt \cdot THi$$
$$VTi = -FTi - vt \cdot TTi$$

Here, *FCi*, *FHi* and *FTi* express transport cost (freight charge) between OD block number *i*

and each port, while *TCi*, *THi* and *TTi* express transit time between OD block number *i* and each port. Time value of shippers / consignees *vt* and dispersion parameter θ related to relative largeness of utility probability member ε accounting for of utility *U* is set to *vt*＝0.5 (US$/TEU/hr) and θ=0.05 respectively based on "Model Development and Policy Analysis of Intermodal International Container Cargo Shipping Focused on South Asia" (Ryuichi Shibasaki, Tomoya Kawasaki, NILIM Research Report No.58, Sept. 2016). By adopting θ=0.05, probabilities of port selection become 73% to 27%, 92% to 8% and 99% to 1% for differences of generalized costs of 20 US$/TEU, 50 UES$/TEU and 100 US$/TEU respectively.



Source: JICA Survey Team

Figure A3- 1　Probability of Port Selection by Logit Model (Dispersion Parameter θ= 0.05)

A3.2.2　Container OD Distribution by Block, Transport Distance and Transit Time

Container OD distribution by block is shown in Table A3- 1. Here, it is assumed that the share of each block of container OD distribution is proportionate to its industrial output. Transport distances and transit times between 25 blocks and 3 ports are acquired by using Google Route Search (the average of 5 weekday's daytime data).

Table A3- 2 Container OD Distribution by Block, Transport Distance and Transit Time

Province	District	Industrial Output	Containers	Distance (km)			Travel Time (hrs)		
				CP	HP	TP	CP	HP	TP
Western	Colombo	34%	34%	9	213	268	0.4	3.7	6.1
	Gampaha	20%	20%	38	232	230	1.0	3.7	5.2
	Kalutara	5%	5%	45	178	305	1.5	3.1	6.4
Central	Kandy	3%	3%	125	252	178	3.9	5.8	4.2
	Matale	1%	1%	156	272	153	4.3	6.3	3.2
	NuwaraEliya	3%	3%	176	168	295	5.1	4.0	6.2
Southern	Galle	5%	5%	128	117	361	2.5	2.2	7.0
	Matara	2%	2%	157	75	390	2.8	1.9	7.3
	Hambantota	0%	0%	243	13	388	3.9	0.3	7.6
Northern	Jaffna	1%	1%	374	536	236	7.5	10.2	4.1
	Mannar	0%	0%	288	468	196	6.4	9.2	3.6
	Vavuniya	0%	0%	257	397	99	5.5	7.8	1.7
	Mullaitivu	0%	0%	332	472	129	6.8	9.1	2.9
	Kilinochchi	0%	0%	333	474	175	6.8	9.4	3.0
Eastern	Batticaloa	1%	1%	326	281	129	7.1	5.7	2.7
	Ampara	1%	1%	338	218	195	7.3	4.3	4.2
	Trincomalee	0%	0%	265	390	3	5.9	7.5	0.1
North Western	Kurunegala	6%	6%	103	296	163	2.7	5.3	3.3
	Puttalam	3%	3%	140	354	185	3.4	6.3	3.4
North Central	Anuradhapura	2%	2%	204	381	109	4.5	7.2	2.0
	Polonnaruwa	1%	1%	231	292	130	5.4	5.9	2.5
Uva	Badulla	2%	2%	246	136	255	6.2	3.0	5.1
	Moneragala	1%	1%	323	123	278	5.5	2.3	5.5
Sabaragamuwa	Ratnapura	4%	4%	96	122	274	3.0	2.9	6.2
	Kegalle	5%	5%	88	282	197	2.4	5.0	4.2
Total		100%	100%						

Note 1: CP indicates Colombo Port, HP indicates Hambantota Port and TP indicates Trincomalee Port.

Note 2: The share of industrial output by district was calculated from the "Annual Survey of Industries 2015, Department of Census and Statistics". The share of container by district is assumed to be proportional to the share of industrial output.

Note 3: For the transportation distance and transit time, the average value of the data for 5 days during the daytime on weekdays measured by Google Route Search was used.

Source: JICA Survey Team

A3.2.3 Generalized Cost

Freight charge of a truck is set as follows with reference to "Sri Lanka Multimodal Transport Project Final Report, June 2012, ADB".

$$\text{Freight Charge (US\$/TEU)} = 60\ (\text{US\$/TEU}) + 0.89\ (\text{US\$/TEU/km}) \times \text{Transport Distance (km)}$$

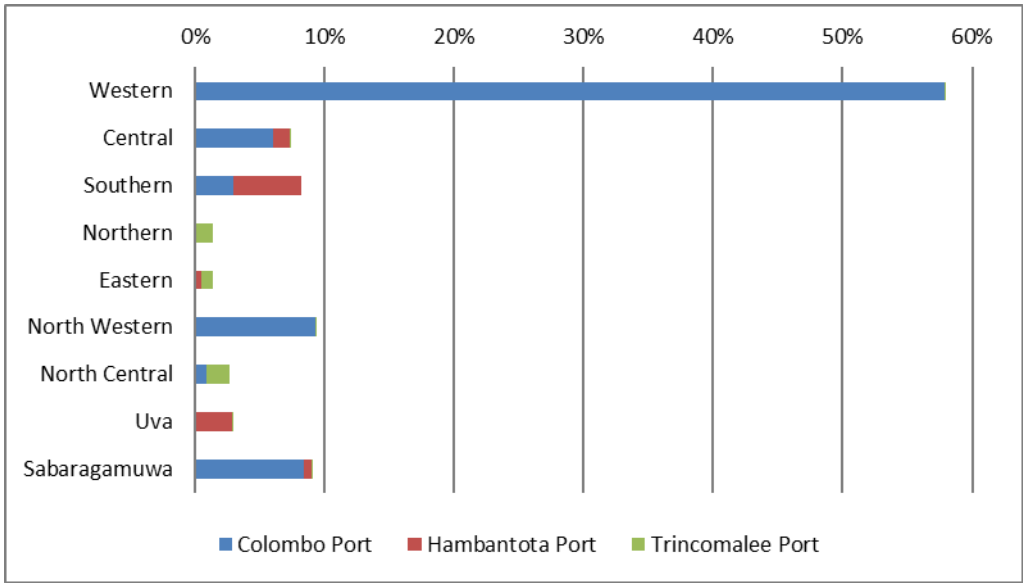
Time cost is set as follows based on time value of shippers/consignees *vt* mentioned above.

$$\text{Time Cost (US\$/TEU)} = 0.5\ (\text{US\$/TEU/hr}) \times \text{Transit Time (hrs)}$$

In addition, as an additional consideration of generalization costs, an additional time cost of 1 day for Hambantota Port and 6 days for Trincomalee Port are added compared to Colombo Port where container ships frequently call.

A3.2.4 Share of Import / Export Containers by Province and Port

Shares of import / export containers by province and port (2050) estimated by using Logit Model is shown in Figure A3- 2. The nationwide shares of Colombo Port, Hambantota Port and Trincomalee Port in 2050 are estimated to be 86%, 10% and 4% respectively.



Source: JICA Survey Team

Figure A3- 2 Share of Import / Export Containers by Province and Port (2050)