ATTACHED PAPER
OF
FINAL REPORT
FOR
THE FEASIBILITY STUDY
ON
THE IMPROVEMENT PLAN
OF
NEW MANGALORE PORT

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JAPAN INTERNATIONAL COOPERATION AGENCY

CONTENTS

1. The Objectives of This Paper

This paper is prepared as an attached paper of "FINAL REPORT FOR THE FEASIBILITY STUDY ON THE IMPROVEMENT PLAN OF NEW MANGALORE PORT," August 1990, JICA (hereinafter referred to as the "FINAL REPORT"). This paper consists of a brief description of an additional Master Plan alternative (including rough cost estimation) and comments on its short-term implementation.

The Master Plan alternatives proposed in the "FINAL REPORT" have been studied under the precondition agreed by the Indian side that it would be possible to take over a part of the land area currently leased out for 20 years to M/S Mazagon Dock Limited (MDL) to use the land as a site for a coal terminal in future for the National Thermal Power Corporation.

However, the Indian side informed the Team in their comments on the Draft Final Report that it is unlikely that the MDL will part with the land area, and that there is the likelihood of strong objection from the MDL to the idea of handling coal adjacent to their yard. The Indian side asked the Team to study an additional Master Plan alternative in which the coal berths would be shifted to the opposite side adjacent to the KIOCL iron ore berth.

In complying with this unexpected request, which was received at the very end of the study period, the Team decided to conduct an additional study on another Master Plan alternative (Case-5) on the basis of a new arrangement of the coal berths. But the study result was inevitably rough due to lack of geological information of the site of the coal berths.

2. Review of the Master Plan

(1) Review of Layout for Coal Berths

According to the demand forecast, coal handling volume will increase to 6,240,000 tonnes in 1999/2000 and 12,120,000 tonnes in 2004/05 from 450,000 tonnes in 1994/95 (In the "FINAL REPORT," the Team proposed that this amount of coal be handled at a general cargo berth). Therefore, coal berths should be constructed no later than 1999/2000.

The ship size of coal carriers is assumed to be 50,000 DWT, the same size as that used in the existing master plan. Thus, three berths and

three unloaders will be required to receive 6,240,000 tonnes per annum and additional three unloaders will be needed to handle 12,120,000 tonnes per annum.

In a case where the coal berths have to be shifted to the site adjacent to the KIOCL iron ore berths, it will be necessary to excavate a new dock and construct three coal berths because only an area adjacent to the KIOCL iron ore facilities has enough room for coal-handling facilities. New stockyards would also be prepared behind the coal berths. Coal would be conveyed from the stockyards to the new railway and transported to the thermal power plant at Nandikur as in Case-1, 2, 3 and 4.

(2) Layout Plan Alternative (Case-5)

Based on the examinations above, the following alternative facility layout plan (Case-5) is drawn up (Figure-A.2.1).

--Improvement of the Existing Iron Ore Berth to 100,000 DWT Class (short-term)

The same as "Case-1".

--Reconstruction of the Existing Oil Products Jetty to Crude Oil Jetty of 100,000 DWT Class (short-term)

The same as "Case-1".

--Oil Products Jetty of 85,000 DWT Class (short-term)

A jetty of 85,000 DWT class would be constructed at the west side of the new dock adjacent to the crude oil jetty. The second oil products jetty of 35,000 DWT class could be constructed inside the southern breakwater (in the outer port area) if needed, because there is no room in the inner port area.

--Construction of Three Coal Berths of 50,000 DWT Class (long-term)

Three coal berths are planned at the proposed new dock. Two berths would be constructed at the east side of the new dock and one berth would be constructed at the south side of the new dock. If construction of one coal berth and dredging in front of it are completed no later than 1994/95, it will be possible to handle 450,000 tonnes of coal here.

--LNG Jetty (future)

The same as "Case-1".

--Reclamation of Southern Shore for LNG Terminal (future)

The same as "Case-1".

(3) Rough Cost Estimation

The rough cost of this alternative is shown in Table-A.2.1 (refer to Table-7.2.15 and Table-7.2.16 in the "FINAL REPORT"). It is assumed that the increase in annual maintenance dredging cost is the same as in "Case-1".

The cost of this alternative will be the most expensive among the alternatives for 100,000 DWT iron ore carriers and cheaper than the alternatives for 150,000 DWT iron ore carriers.

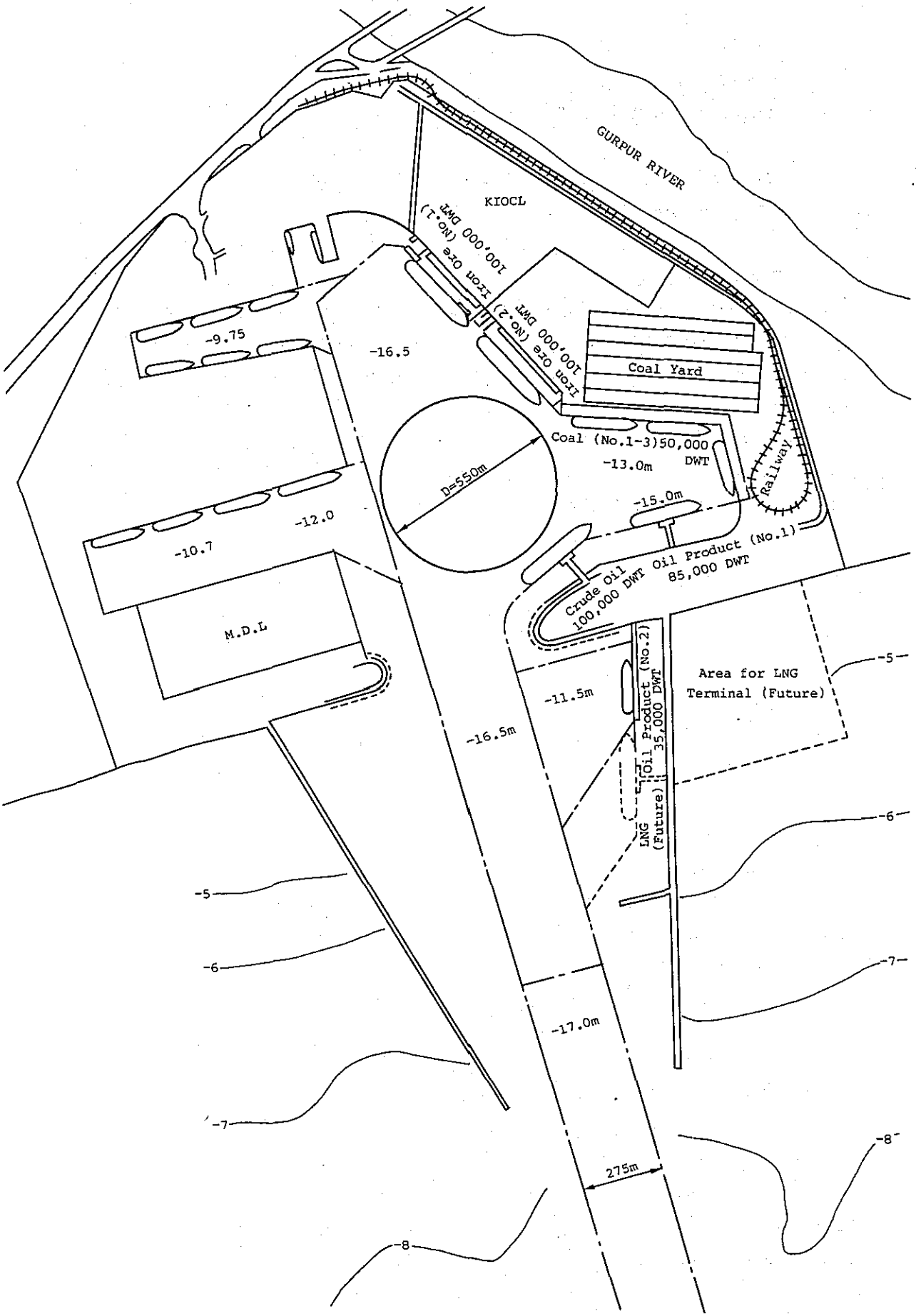

Figure-A.2.1 Master Plan Alternative (Case-5)

Table-A.2.1 Rough Capital Costs

Case		5
Iron Ore Berth ('000 DWT)	(long-term)	100+100
	(short-term)	(100)
Iron Ore Berth		
Improvement		3.5
Construction		9.7
Crude Oil Jetty		3.7
POL Jetty		9.3
(Coal Berths(3)*		23.1)
Dredging		78.9
Breakwater		22.0
Total		127.1
(coal berths included)		(150.2)
(for short-term plan only)		(104.1)
Equipment for Iron Ore		80.7
(for short-term plan only)		(21.6)
Other		7.3
(for short-term plan only)		(7.3)
Grand Total		215.1
(coal berths included)		(238.2)
(for short-term plan only)		(133.0)

* This cost is prepared for your reference. Cost of three coal berths was not estimated for case-1, 2, 3 and 4 because planning of coal berths is out of the S/W (Scope of the Work). Geological Conditions, etc. for cost estimation of the coal berths were assumed from the neighbours.

3. *Dredging*

(1) Estimation of Volume Dredged

a) Hard rock

The same as "Case-1".

b) Weathered rock and grit

The same as "Case-1".

c) Soil for capital dredging

The volume to be dredged in the lagoon is estimated based on the "Layout Plan Alternative (Case-5)" in Chapter 2 of this paper. The side slopes in the lagoon are to be basically 1:3, except for the slope at the rear of the existing oil berth area, which will be 1:5. The volume to be dredged in the outer approach channel is estimated based on the chart for the area off the coast of Mangalore.

The dredging volumes of soil in the lagoon for the Master Plan and the Short-term Plan are estimated at 6,750,000 m3 and 5,060,000 m3, respectively. The dredging volumes of soil in the channel is estimated at 9,330,000 m3.

The extra depth to be dredged is assumed to be 50 cm.

Table-A.3.1 Volumes Dredged for the Proposed Development Scheme

(unit: m3)

		Case-5 100,000DWT (-17.0m)
Hard Rock	Area (m2)	76,000
	Volume (m3)	116,100
Soft Rock	Weathered Rock	20,000
	Grit	47,600
	(Sum)	67,600
Soil	(Lagoon)	5,060,000
Soil	(Channel)	9,330,000

d) Soil for maintenance dredging

It is the same as "Case-1".

e) Summary of volumes dredged

Summary of the volumes dredged for the Short-term Plan is shown in Table-A.3.1.

(2) Capital Dredging Method

a) Channel

The same as "Case-1".

b) Lagoon

The main items of dredging work in the lagoon involved in the Short-term Plan are:

* Widening the turning circle from the existing diameter of 490 m to 550 m and deepening it from -13.0 m from CD to -16.5 m from CD.

* Deepening the area of existing iron ore berth from -13.0 m from CD to -16.5 m from CD.
* Deepening the area of the existing oil berth from -9.75 m from CD to -16.5 m from CD.
* Deepening the area of the future iron ore berth from -13.0 m from CD to -16.5 m from CD.
* Excavating the new dock up to -15.0 m for the area of the new oil products berth (for the Short-term Plan) and up to -13.0 m for the area of three coal berths (for the Master Plan).

A cutter suction dredger with a total installed horsepower of 15,000 is to be used in the south-west part of the lagoon (including the new dock area). This includes the slope of the area of the new oil products berth. The volume to be dredged in these area is estimated at 2,320,000 m3. Sandy materials of 1,000,000 m3 sucked up by a dredging pump are transported to the seashore area located south of the southern breakwater through floating/shore pipelines because erosion caused by sand littoral drift occurs to some extent in this area. Others of 1,320,000 m3 sucked up by a dredging pump are dumped at the designated deeper area near the dredger through a short floating pipeline to be rehandled with the trailer suction hopper dredger.

A grab dredger with a grab capacity of 1.91 m3 is to be used in the area in front of the existing iron ore berth in order to avoid any damage to the structure. The area has a width of 20 m or more and a length of about 340 m. The volume to be dredged in this area is estimated at 30,000 m3. Dredged materials are transported and dumped at the designated offshore disposal area by this dredger.

The trailer suction hopper dredger is used in other areas. The volume to be dredged is estimated at 2,710,000 m3. Dredged materials are transported and dumped at the designated offshore disposal area.

The total volume dredged in the lagoon is 5,060,000 m3.

4. Comments on the Short-term Plan

According to our study, it is predicted that the EIRR and FIRR values of this Plan will decrease slightly because of increase of the total cost. The cost could not be estimated precisely because planning of the coal berths is out of the S/W (Scope of Work) and geological conditions for the coal berths of this plan had to be assumed from the neighbours. So, we have not calculated the EIRR and FIRR values.

Therefore, verifying the characteristics of the materials at the new dock and restudying dredging methods including the selection of the type of dredgers should be carried out before the execution of the work.


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