AFRICAN DEVELOPMENT BANK

GOVERNMENT OF MAURITIUS

CONTRACT
FOR
CONSTRUCTION
OF
BEAU BASSIN - PORT LOUIS LINK ROAD

CONFIDENTIAL VOLUME

SEPTEMBER 1980

Japan International Cooperation Agency

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1. INTRODUCTION

This confidential volume is aimed to build up construction planning and a cost estimate for the Beau Bassin - Port Louis Link Road Project.

Taking into account the period for land acquisition, prequalification or other tender preparations, the prospective award time will be around July of 1981. The construction of project of this magnitude will require at least 36 months from so as to distribute the various works moderately in both the constructional period and space from the common sense of civil works.

The schedule of each work item will be analyzed in detail in Chapter 2 based on an appropriate operation system considering the weather conditions.

In order to make a fair and reasonable cost estimate, the unit price analysis method is employed for each cost item. The analysis covers both the Cost Elements (labour, equipment, materials cost, and overhead/ profit) and Cost Components (foreign exchange, local currency cost and taxes).

It is based on the price level in September of 1979 (Base Date), so an adjustment of construction cost will be made for the prospective award time. The procedure is presented in detail in Chapter 3.

In every aspect the cost estimate policy is compared with those of present or previous projects of a similar nature.

In order to assist in the evaluation of the construction period and future budget needs, the recommended construction schedule is prepared together with anticipated phased expenditures.

2. CONSTRUCTION PLANNING

2.1 General

The fundamental concept for construction method of each work is presented in the Unit Price Analysis Sheet appended to this volume. Using the production rates or operation systems thereof, the construction term of each work will be analyzed and arranged in proper order in the recommended construction schedule.

A moderate total construction period will be estimated as 3 years considering the various working conditions such as the "density of work in time and space" and working days rate, etc.

As viewed from the standpoing of financing, some of structures, earthworks and other ancillary works within or around Motorway Junction shall be executed in the latter part of the total contract period. (Phased Construction) The constructional procedure for the "Phased Construction will be given in detail in the Drawings.

2.2 Analysis of Working Days Rate

2.2.1 Number of holidays

The following shows the number of public holidays subject to the "General Notice No. 1377 of 1977, Holidays in 1979." If Sunday overlaps on the public holiday, it will not be counted twice for the analysis of working days rate.

Date		Nos. of Public Holiday
Monday	1st January	
Tuesday	2nd January	3 days
Sunday	28th January	
Saturday	10th February	
*Saturday	10th February	3 days
Sunday	25th February	
Monday	12th March	
Wednesday	14th March	3 days
Thursday	29th March	

Date		Nos. of Public Holiday
Saturday	14th April	2 days
Monday	16th April	
Tuesday	1st May	1 day
Wednesday	15th August	3 days
Saturday	25th August	
Monday	27th August	
Friday	5th October	3 days
Saturday	20th October	
Wednesday	24th October	
Thursday	1st November	2 days
Thursday	1st November	
Sunday	4th November	3 days
Tuesday	25th December	
Wednesday	26th December	

2.2.2 Number of unworkable days due to weather conditions

The influential factors for the workability of the project are the intensity and duration of rainfall. Table 2.2-1 shows the average number of days per month on which rainfall reaches or exceeds the specified values on the 8 stations adjacent to the project road. These data derive from the Meteorological Service of Mauritius during the period 1931 ∿ 1960. And also shown in Fig. 2.2-1 is a relationship between the monthly average for evaporation and rainfall at Plaisance Station during the same period. Hence, the weather conditions can be divided into the following 4 phases depending on the above relationship.

Phase	Month	Rainfall	Evaporation
I	September November	increasing	increasing
II	December February	increasing (large)	decreasing (large)
III	March May	decreasing (small)	increasing (small)
IV	June July	decreasing	decreasing

The unworkable condition occurs on the rainy days and their succeeding, but not rainy days due to the charactristics both of rainfall and evaporation. So, the number of unworkable days during the period for each phase is summarized as follows according to the statistical data shown in "A Guide to Road Construction, 1976, Japan Road Association".

In case of earth-moving works:

Rainfall (mm)	Phase I		Phase II		Phase III		Phase IV	
	Nos. of unworkable days		Nos. of unworkable days		Nos. of unworkable days		Nos. of unworkable days	
	Rainy day	Succeeding day	Rainy day	Succeeding day	Rainy day	Succeeding day	Rainy day	Succeeding day
5-10	0	0	0.5	0	0	0	0.5	0
10-25	0.5	0	1	0.5	0.5	0	1	0.5
above 25	1	0.5	1	1.5	1	0.5	1	1.5

In case of bridge super-structure works:

5-10	0	0	0	0	0	0	0	0
10-25	0.5	0	0.5	0	0.5	0	1	0
Above 25	1	0	1	0	1	0	1	0

2.2.3 Working days rate

From the analysis, the working days rate for earth-moving works and bridge superstructure works are shown in Table 2.2-2 and 2.2-3 respectively. In the tables, it is assumed that some of the unworkable days be absorbed in the number of holidays given in the percentage of holidays against calender days. In Phase II, the working days rate is very low and in particular lowest during the period from September to November. This tendency was verified in the performance of the Northern Entrance Road project by site investigation in March of this year. The annual number of working days is 218, the annual mean working days ratio comes to approximately 60 % for the earth-moving works. On the other hand, for the bridge superstructure works the number of working days is 254 and the rate is approximately 70 %.

Table 2.2-1 Average Number of Days per Month on Which Rainfall Reached or Exceeded the Specified Values

Station : Albion Latitude : 20° 12.7'S Longitude : 57° 24.0'E Altitude : 40 feet

Month / Rainfall	J	F	M	A	M	J	J	A	S	O	N	D	Year
0.1 mm	8.1	10.7	13.0	7.9	5.0	5.2	5.5	4.0	3.0	3.6	4.2	8.6	78.8
1	6.3	9.0	6.3	6.3	4.2	2.9	3.0	2.5	1.8	2.2	2.9	8.0	60.2
5	3.7	4.5	5.6	3.3	1.5	1.5	1.2	0.5	0.6	0.6	1.6	4.4	29.1
10	2.2	2.9	4.0	1.7	0.8	0.9	0.5	0.2	0.5	0.2	0.8	2.9	17.6
25	0.8	0.9	1.2	0.7	0.1	0.2	0.0	0.0	0.1	0.0	0.3	1.4	5.7
50	0.7	0.5	0.4	0.1	0.0	0.0	0.0	0.0	0.1	0.0	0.1	0.7	2.6

Station : PLaine Lauzun Latitude : 20° 10.1'S Longitude : 57° 28.4'E Altitude : 80 feet

Month / Rainfall	J	F	M	A	M	J	J	A	S	O	N	D	Year
0.1 mm	7.5	9.3	10.6	6.4	3.9	3.7	5.4	4.1	3.7	3.6	4.1	8.1	70.4
1	7.1	9.1	10.4	6.2	3.9	3.6	5.0	3.8	3.5	3.1	4.1	7.6	67.5
5	6.5	7.7	8.2	5.1	3.2	2.2	3.1	2.3	1.7	2.2	2.8	5.3	50.3
10	4.6	5.7	6.5	3.4	2.5	1.4	2.2	1.1	0.9	1.3	2.1	4.1	35.0
25	3.0	3.0	3.6	1.5	1.2	0.8	1.0	0.3	0.4	0.3	0.9	2.8	18.8
50	1.9	1.2	1.4	0.5	0.5	0.1	0.5	0.0	0.1	0.1	0.2	0.9	7.4

Station : Reduit Latitude : 20° 13.9'S Longitude : 57° 29.3'E Altitude : 1.

Month / Rainfall	J	F	M	A	M	J	J	A	S	O	N	D	Year
0.1 mm	17.5	18.7	21.1	16.9	17.1	18.0	22.3	21.6	16.0	15.5	12.4	15.8	212.9
1	14.5	15.2	17.6	12.4	11.4	13.3	17.5	15.5	11.4	10.3	8.8	13.1	161.0
5	7.6	7.1	10.1	5.5	3.7	4.7	5.1	3.5	2.2	2.0	3.9	6.1	61.5
10	4.0	5.0	5.7	2.9	1.5	1.7	1.4	0.8	1.2	0.9	3.0	4.6	37.3
25	2.1	3.0	2.1	1.1	0.3	0.4	0.5	0.3	0.1	0.3	1.1	2.1	13.4
50	1.0	1.2	0.8	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	1.0	4.1

Station : Mon Desert (Alma) Latitude : 20° 13.3'S Longitude : 57° 31.6'E Altitude : 1.27 feet

Month / Rainfall	J	F	M	A	M	J	J	A	S	O	N	D	Year
0.1 mm	21.1	19.3	23.5	18.6	17.1	19.4	22.7	22.7	22.1	15.2	14.0	17.7	223.4
1	17.6	16.3	20.7	16.7	14.9	16.6	20.1	19.6	13.4	12.6	10.9	15.8	195.4
5	10.6	9.7	12.3	9.1	7.3	6.9	8.6	6.1	4.5	3.8	4.6	9.2	92.7
10	6.1	6.6	7.4	4.5	3.4	3.5	2.9	2.3	1.7	1.3	2.2	5.9	47.8
25	3.1	3.1	3.6	1.8	0.6	0.9	0.6	0.3	0.3	0.4	0.9	2.8	18.4
50	1.5	1.1	1.3	0.3	0.1	0.2	0.2	0.1	0.2	0.1	0.2	1.3	6.6

Station : La Ferme Latitude : 20° 15.2'S Longitude : 57° 24.3'E Altitute : 460 feet

Rainfall \ Month	J	F	M	A	M	J	J	A	S	O	N	D	Year
0.1 mm	10.8	12.0	13.0	8.4	6.5	7.7	7.9	6.7	6.0	6.0	5.9	10.6	101.5
1	9.0	10.9	12.4	8.0	4.9	5.8	5.0	4.8	3.2	4.3	5.1	9.7	83.1
5	4.5	6.0	7.5	3.8	1.6	1.9	1.3	1.0	1.0	1.3	2.5	5.9	38.3
10	3.2	3.9	5.1	2.4	0.8	1.0	0.6	0.4	0.5	0.5	0.5	3.7	23.8
25	1.6	1.8	1.9	0.5	0.2	0.2	0.1	0.1	0.3	0.0	0.3	1.9	9.1
50	0.8	0.5	0.8	0.1	0.0	0.1	0.0	0.0	0.1	0.0	0.2	0.6	3.2

Station : Vacoas Latitude : 20° 17.6'S Longitude : 57° 29.4'E Altitude : 1,390 feet

Rainfall \ Month	J	F	M	A	M	J	J	A	S	O	N	D	Year
0.1 mm	22.3	20.9	24.7	19.7	21.0	22.1	24.9	24.9	20.1	18.3	16.8	20.2	255.9
1	17.6	16.	20.3	4.8	14.1	16.0	20.4	19.6	13.5	12.6	11.1	14.4	191.0
5	9.8	9.3	13.2	8.1	6.0	8.0	10.2	8.5	5.3	4.7	4.4	8.5	96.1
10	6.6	6.6	8.5	4.5	2.6	4.1	4.8	2.9	1.9	1.9	2.7	5.3	52.4
25	2.9	3.5	3.6	1.7	0.7	0.6	0.7	0.9	0.2	0.4	1.4	2.6	19.2
50	1.4	1.5	1.3	0.8	0.1	0.2	0.0	0.0	0.2	0.0	0.3	1.1	6.9

Station : assin Latitude : 20° 17.7'S Longitude : 57° 26.8'E Altitude : 1.030 feet

Rainfall \ Month	J	F	M	A	M	J	J	A	S	O	N	D	Year
0.1 mm	13.0	15.0	17.1	12.5	10.9	12.9	14.8	12.5	8.8	8.8	8.8	11.7	146.8
1	11.8	14.2	16.1	11.1	8.6	11.8	13.5	10.9	7.5	7.6	7.8	11.3	131.2
5	5.2	8.0	10.1	4.8	3.3	3.6	3.9	2.2	2.3	1.6	3.7	6.9	55.6
10	3.6	4.7	7.0	3.3	1.6	1.6	1.1	0.5	0.5	0.4	2.7	4.6	31.6
25	1.8	1.5	2.3	1.4	0.5	0.2	0.3	0.2	0.2	0.0	1.0	2.0	11.2
50	0.6	0.6	1.1	0.5	0.1	0.1	0.0	0.0	0.2	0.0	0.0	0.6	3.8

Station : Henrietta Latitude : 20° 19.9'S Longitude : 57° 28.1'E Altitude : 1,540 feet

Rainfall \ Month	J	F	M	A	M	J	J	A	S	O	N	D	Year
0.1 mm	17.9	16.2	19.0	14.6	15.1	17.6	22.5	20.7	14.7	12.9	12.3	15.0	198.5
1	14.7	15.1	18.0	11.6	13.7	14.6	19.5	17.0	11.0	19.5	10.6	12.6	177.9
5	9.1	9.1	12.4	6.3	6.0	5.4	9.6	7.9	4.9	3.5	3.8	7.1	87.1
10	5.9	6.6	8.5	4.2	2.9	3.0	4.4	2.5	2.2	1.3	3.3	5.5	50.5
25	2.4	2.8	3.8	2.1	0.9	1.0	0.2	0.4	0.1	0.1	1.0	2.7	17.5
50	1.3	0.7	0.7	0.6	0.1	0.2	0.0	0.0	0.1	0.0	0.2	0.1	4.9

Fig. 2.2-1 Monthly Means for Evaporation and Rainfall (PLAISANCE)

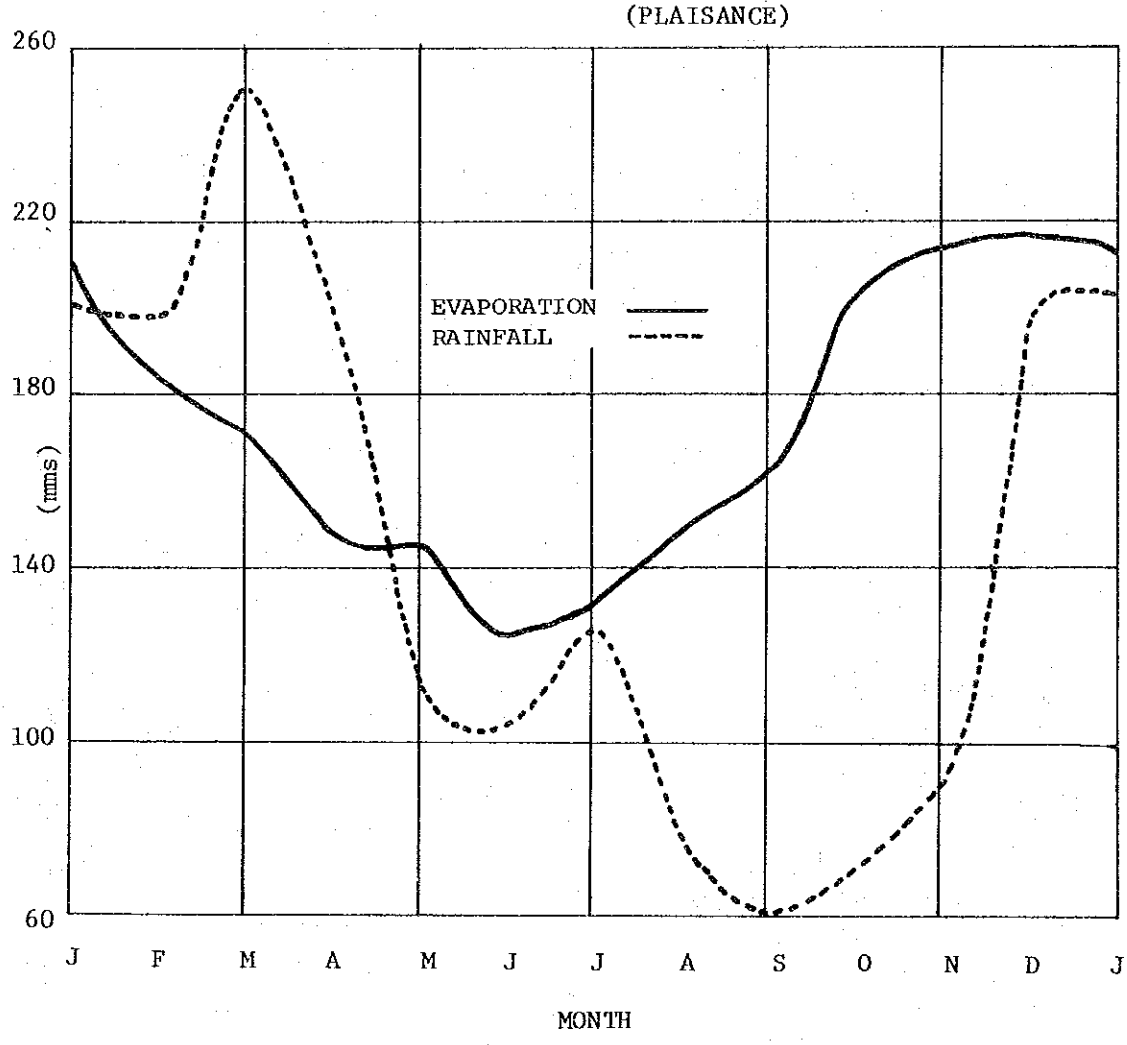


Table 2.2-2 Working Days Rate for Earthwork and Bridge Substructure Work

Month	Calend. days (1)	Holidays (2)	Calend. days excl. Holiday	Ratio of Holi-days (3)	Rainy days			Unworkable days due to rain				Unwork-able days but over-lapped on - Holidays (3)X(4)	Work-ing days (rate)
					5-10m/m	10-25m/m	above 25m/m	5-10m/m	10-25m/m	above 25m/m	Total (4)		
Jan	31	6	25	0.19	7.1	4.6	3.4	3.6	6.9	8.5	19.0	-3.7	9.7 (31%)
Feb	28	6	22	0.21	7.7	5.3	3.4	3.9	8.0	8.5	20.4	-4.4	6.0 (21%)
Mar	31	7	24	0.23	9.9	6.6	3.7	0	3.3	5.6	8.9	-2.0	17.1 (55%)
Apr	30	6	24	0.20	5.8	3.4	1.7	0	1.7	1.7	4.3	-0.9	20.6 (69%)
May	31	5	26	0.16	4.1	2.0	0.7	0	1.0	1.1	2.1	-0.3	24.2 (78%)
Jun	30	4	26	0.13	4.3	2.2	0.7	2.2	3.3	1.8	7.3	-1.0	19.7 (66%)
Jul	31	4	27	0.13	5.4	2.2	0.5	2.7	3.3	1.3	7.3	-0.9	20.6 (66%)
Aug	31	7	24	0.23	4	1.3	0.3	2.0	2.0	0.8	4.8	-1.1	20.3 (65%)
Sep	30	4	26	0.13	2.8	1.2	0.3	0	0.6	0.5	1.1	-0.1	25.0 (83%)
Oct	31	7	24	0.23	2.5	1.0	0.2	0	0.5	0.3	0.8	-0.2	23.4 (75%)
Nov	30	6	24	0.20	3.4	2.2	1.0	0	1.1	1.5	2.6	-0.5	21.9 (73%)
Dec	31	6	25	0.19	6.7	4.6	3.2	3.3	6.9	8.0	18.2	-3.5	10.3 (33%)
Total	365	67	298	0.18									218.6 (60%)

Table 2.2-3 Working Days Rate for Bridge Superstructure Work

Month	Calend. days (1)	Holidays (2)	Calend. days excl. Holiday	Ratio of Holi-days (3)	Rainy days			Unworkable days due to rain				Unwork-able days but over-lapped on - Holidays (3)X(4)	Work-ing days (rate)
					5-10m/m	10-25m/m	above 25m/m	5-10m/m	10-25m/m	above 25m/m	Total (4)		
Jan	31	6	25	0.19	7.1	4.6	3.4	0	2.3	3.4	8.7	-1.7	17.0 (55%)
Feb	28	6	22	0.21	7.7	5.3	3.4	0	2.7	3.4	6.1	-1.3	17.2 (61%)
Mar	31	7	24	0.23	9.9	6.6	3.7	0	3.3	3.7	7.0	-1.6	18.6 (60%)
Apr	30	6	24	0.20	5.8	3.4	1.7	0	1.7	1.7	3.4	-0.7	21.3 (71%)
May	31	5	26	0.16	4.1	2.0	0.7	0	1.0	0.7	1.7	-0.3	24.6 (79%)
Jun	30	4	26	0.13	4.3	2.2	0.7	0	1.1	0.7	1.8	-0.2	24.4 (81%)
Jul	31	4	27	0.13	5.4	2.2	0.5	0	1.1	0.5	1.6	-0.2	25.6 (83%)
Aug	31	7	24	0.23	4	1.3	0.3	0	0.7	0.3	1.0	-0.2	23.2 (75%)
Sep	30	4	26	0.13	2.8	1.2	0.3	0	0.6	0.3	0.9	-0.1	25.2 (84%)
Oct	31	7	24	0.23	2.5	1.0	0.2	0	0.5	0.2	0.7	-0.2	23.5 (76%)
Nov	30	6	24	0.20	3.4	2.2	1.0	0	1.1	1.0	2.1	-0.4	22.3 (74%)
Dec	31	6	25	0.19	6.7	4.6	3.2	0	2.3	3.2	5.5	-1.1	11.4 (34%)
Total	365	67	298	0.18									254.3 (70%)

2.3 Distribution Plan of Excavated Materials

Fig. 2.3-1 shows schematically a distribution plan of materials from the roadway and structure excavations subject to the mass curve shown in the Drawings. In order to minimize the haulage distance, surplus materials shall be deposited in the areas near the projected road. Two deposit areas are tentatively allocated in the crown lands around Sta. 45 and Motorway Junction. The Employer shall prepare those deposit areas parallel to the land acquisitions before the work starts.

The quantity of deposited materials will reach to approximately 188,000 m^3, of which 162,000 m^3 will be originated in the section Sta. 55+80 - Sta. 59+80, 15,000 m^3 in the section Sta. 62+82 - Sta. 65+57 and 9,000 m^3 in the realignment excavation existing Motorway as shown in the Drawings.

Viewed from the point of material distribution, sectioning of earth-moving will be as follows:

Section 1: Sta. 0 - Sta. 34+20 and Access Road
(Excavation and embankment materials are balanced within the section)

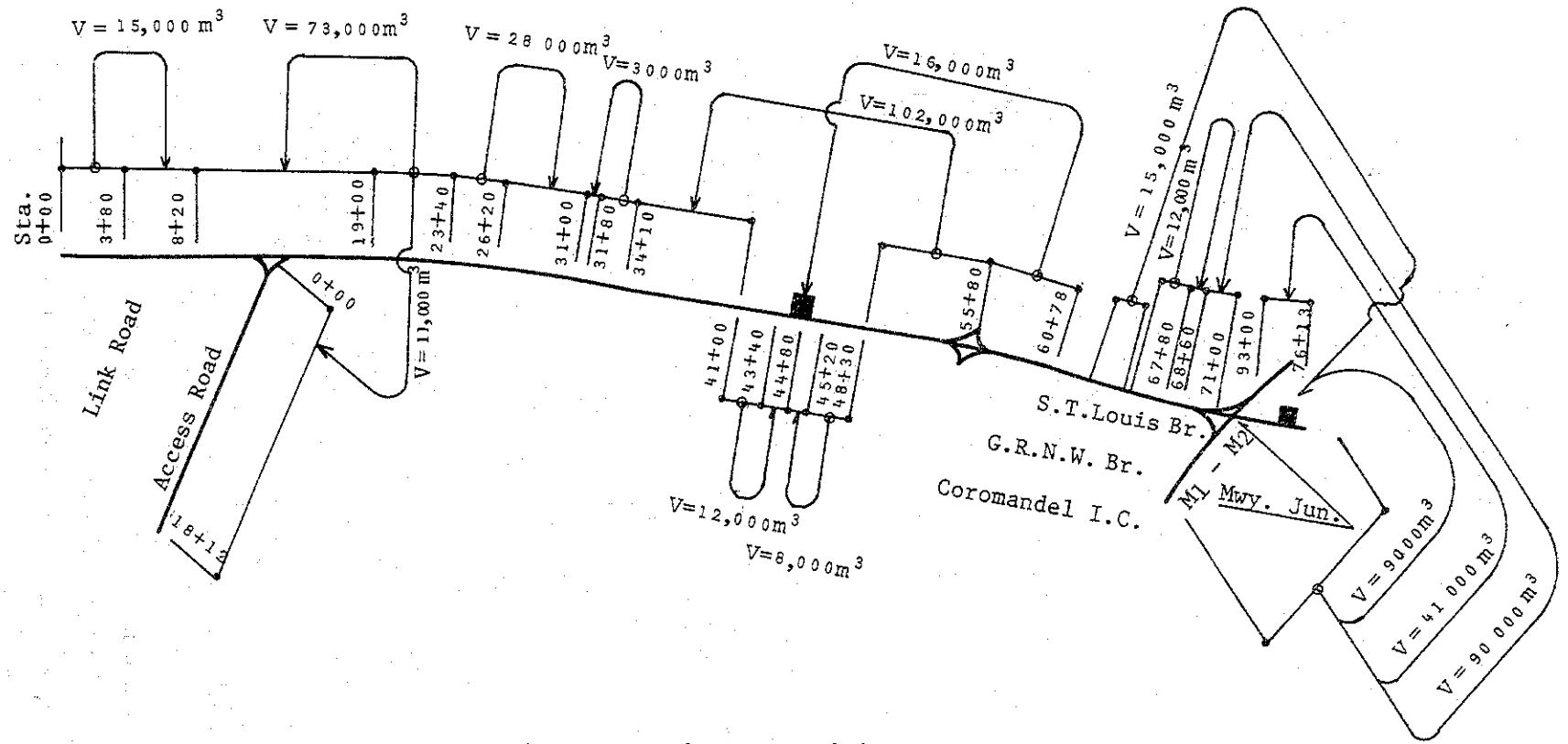
Section 2: Sta. 34+20 - Sta. 60+78 and Coromandel I.C.
(Surplus materials)

Section 3: Sta. 60+78 - Sta. 76+13, Motorway Junction and improvement of M_1 M_2 Road
(Surplus materials)

Table 2.3-1 summarized the haulage distance and quantity of materials subject to the haulage system. In the phased construction stage, the stockpiled materials within or around the Motorway Junction will be used to accomplish the works as specified in the Drawings and stipulations of the Contract.

Two temporary working roads will be proposed, crossing Grand River Northwest and St. Louis River respectively for the execution of the bridges' substructure. The latter road aims to serve the hauling of materials (Approx. 15,000 m^3) from the section Sta. 62+82 - Sta. 65+57 to the deposit area tentatively established in the vicinity of the Motorway Junction.

Fig. 2.3-1 Materials Hauling Diagram



■ : means the proposed deposit area in the Crown Land

Table 2.3-1 Roadway Excavation and Mean Haulage Distance

Hauling Distance (m)	Hauling Equipment	Sta0+00 - Sta34+20 & Access Road	Sta34+20 - Sta60+78 & Coromandal I C	Sta60+78 - Sta76+13 & M1 M2 Road	Total Q'ty & Mean Haulage Distance ($\bar{D}$)
$D \leq 50$	Bulldozer	$18,500m^3$	$5,200m^3$	$5,400m^3$	$29,100m^3$
	Bulldozer	$2,300m^3$ $\bar{D}=80m$	$2,100m^3$ $\bar{D}=80m$	$5,100m^3$ $\bar{D}=70m$	$9,500m^3$ $\bar{D}=75m$
$50<D\leq100$	Dozer shovel & Dump truck	———	———	$89,800m^3$ $\bar{D}=110m$	$89,800m^3$ $\bar{D}=110m$
$100<D\leq500$	ditto	$16,700m^3$ $\bar{D}=270m$	$20,400m^3$ $\bar{D}=220m$	$65,300m^3$ $\bar{D}=350m$	$101,400m^3$ $\bar{D}=310m$
$500<D\leq1000$	ditto	$83,800m^3$ $\bar{D}=620m$	———	———	$83,800m^3$ $\bar{D}=620m$
$1000<D\leq1500$	ditto	$27,800m^3$ $\bar{D}=1,320m$	$162,000m^3$ $\bar{D}=1,300m$	$15,300m^3$ $\bar{D}=1,060m$	$205,100m^3$ $\bar{D}=1,290m$
$1500<D\leq2000$	ditto	———	$102,300m^3$ $\bar{D}=1,760m$	———	$102,300m^3$ $\bar{D}=1,760m$
Total Q'ty		$149,100m^3$ $\bar{D}=633m$	$292,000m^3$ $\bar{D}=1,355m$	$180,900m^3$ $\bar{D}=274m$	$621,000m^3$ $\bar{D}=870m$

This analysis is exclusive of the haulage of material in the phased construction period.

2.4 Construction Schedule Analysis

2.4.1 Bridge works

The schedule analysis for major bridges is shown in Table 2.4-1 to 2.4-23. In the analysis, the required construction term for each bridge is calculated on the actual working days basis, hereupon, it is converted to the calendar days basis using the working days rate (70%) as above discussed. An hourly production rate for equipment or labour derives from assumptions established in the Unit Price Analysis Sheet respectively, which are attached hereto as an appendix.

2.4.2 Earthworks

The operation system of earthworks and production rate are assumed as shown in Table 2.4-24, and Fig. 2.4-1 and 2.4-2. Based on those assumptions the construction term for each section is represented in Table 2.4-25, 2.4-26, and 2.4-2.

2.4.3 Box culverts works

The schedule analyses for execution of box culverts are shown in the Table 2.4-28 and 2.4-29. The production rate of each work item such as concreting, form work or reinforcement bar work is based on the production speed set forth in the Unit Price Analysis Sheet, which is as follows.

Item	Equipment & Labourer	Nos.	Production rate
Foundation			
Excavation	Back hoe, 0.5 m^3	1 unit	40 m^3/h
Bedding	Labourer	5 men	1.2 m^3/h
Levelling concrete	Labourer	10 men	30 m^3/h
Reinforcement bar	Wheel crane, 5t Truck, 6t Labourer	1 unit 1 unit 10 men	0.25 t/h
Formwork	Truck, 6t Labourer	1 unit 5 men	3 m^2/h

Item	Equipment & Labourer	Nos.	Production rate
Concreting			
Scaffolding	Wheel crane, 5t Truck, 6t Labourer	1 unit 1 unit 5 men	20 m^3/h
Formworks	Wheel crane, 5t Truck, 6t Labourer	1 unit 1 unit 10 men	20 m^2/h
Reinforcement bar	Wheel crane, 5t Truck, 6t Labourer	1 unit 1 unit 10 men	0.25 t/h
Concreting	Concrete pump truck, 60 m^3/h	1 unit	40 m^3/h
	Concrete vibrator 4 kg	3 unit	
	Labourer	10 men	

2.4.4 Pavement works

The preparation on subgrade preceeding subbase work will be performed by the combination of a Motor grader (Blade width 3.7 m) and a 20 ton Tire roller, so that the hourly production is assumed to be approximately 500 m^2/h x 8 hr/day = 4,000 m^2/h.

The hourly production rate for the subbase work is assumed as 1,000 m^3/day and 500 m^3/day respectively for the carriageway and shoulder. The operational arrangement is as follows.

Item	Required number per 1,000 m^3/day
Motor grader, 3.7 m class	2 units
Tire roller, 20 t class	2 units
Tire roller, 28 t class	1 unit
Macadam roller, 12 t class	1 unit
Vibrating roller, 1 t class	2 units
Water lorry, 5,000 ℓ class	1 unit
Labourer	15 men

The hourly production rate for the asphalt binder and wearing course work is estimated as 390 ton/day, for which following equipment and labourers are required.

Item	Required number per 390 ton/day
Asphalt finisher, 4.5 m class	4 units
Macadam roller, 12 t class	4 units
Tandem roller, 20 t class	4 units
Tire roller, 28 t class	4 units
Labourer	30 men

As based upon the above production rates the construction term is shown in Table 2.4-30 to 2.4-35.

2.4.5 Recommended construction schedule

The recommended construction schedule is presented in Table 2.4-36 subject to the detailed analyses of construction term for main structures or sections of the project. From the contractual consideration the works around the Motorway Junction are to be assigned within the latter part of period for completion. (Phased construction)

In considering common civil engineering practices it will require at least three years for the completion of the project in order to distribute each work element over the project time and space.

In addition, the main equipment can be scheduled approximately as shown in Table 2.4-37.

Table 2.4-1 Summary of Construction Period of Bridge

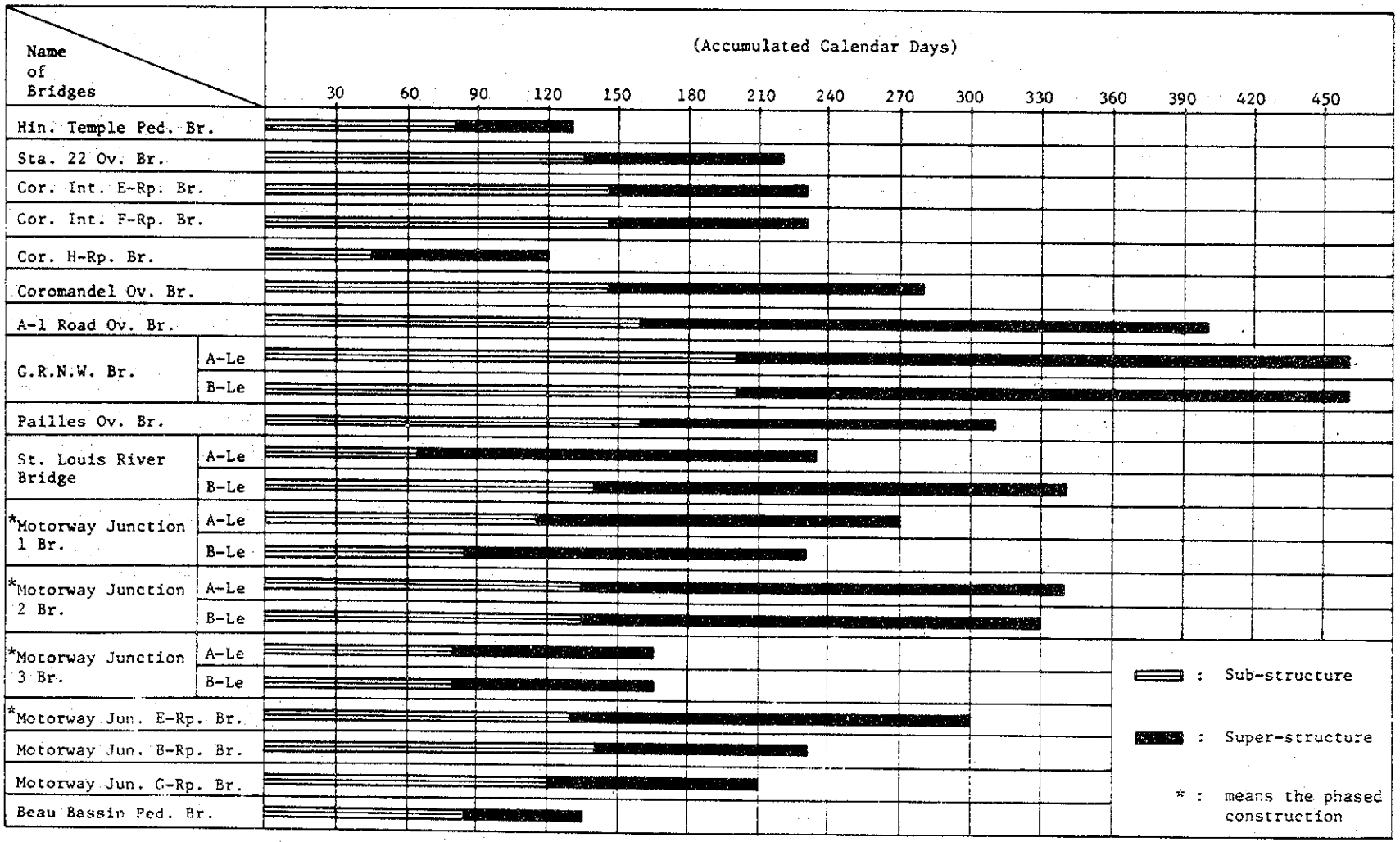


Table 2.4-2 Schedule Analysis of Bridge (Link Road Bridge)

Name of Bridge	Width	Length	Type
G.R.N.W. B-Le.	8.2 m	192.9 m	Simple post-tensioned girder

Sub-Structure	No.	Height (m)	Type	Execution of Foundation	Execution of Concrete	Remarks
Abutment	A 1			Improvement of Existing Structures		
	A 2					
Pier	P 1					
	P 2					
	P 3					
	P 4					
	P 5					
	P 6					

Super-Structure	Area of Bridge (m2)	Nos. of Girder	Erection of Girder		
			Erection Girder	Truck Crane	Staging
	1580	26.8m x 35 pcs.	x		

Analysis of Construction Duration (Actual Working Day Basis)

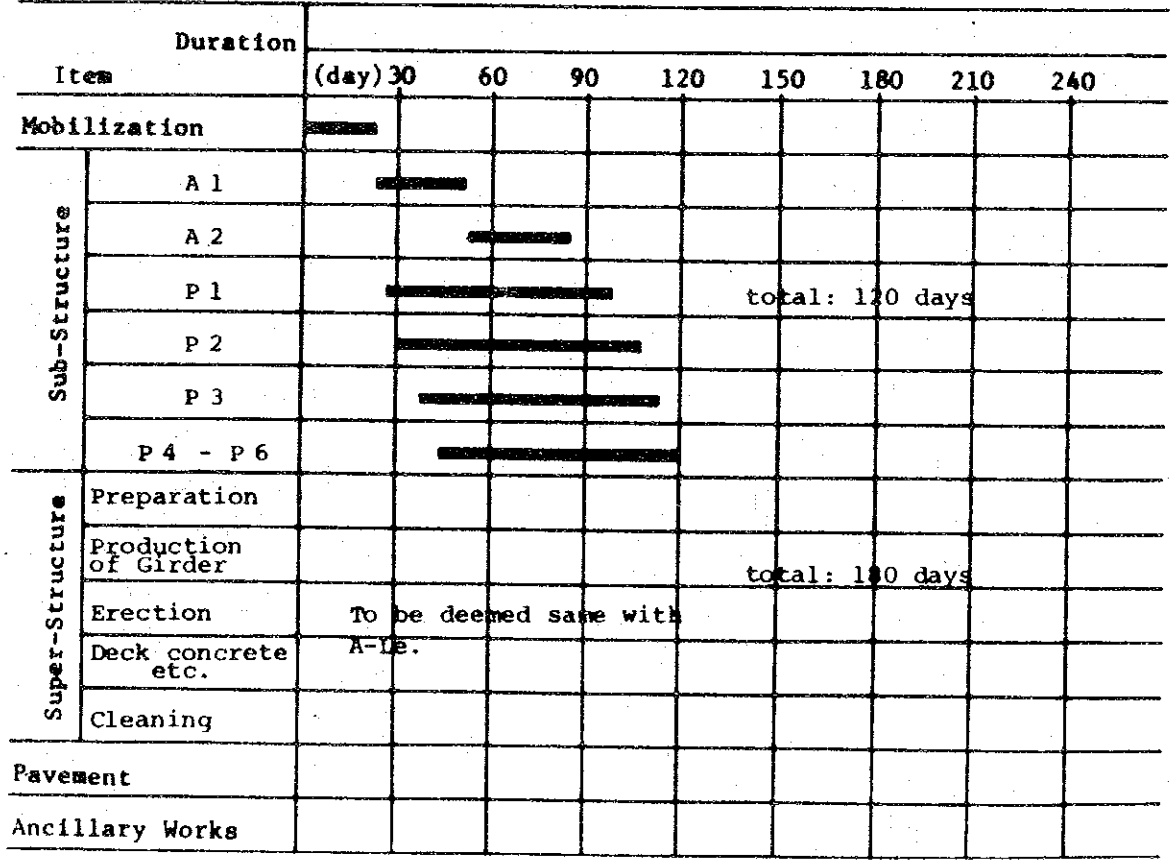


Table 2.4-3 Schedule Analysis of Bridge (Link Road Bridge)

Name of Bridge	Width	Length	Type
G.R.N.W.B-Le	8.2 m	192.9 m	Simple post-tentioned girder

Sub-Structure	No.	Height (m)	Type	Execution of Foundation	Execution of Concrete	Remarks
Abutment	A 1	7.5	Reverse T	Cofferdam Back hoe Dozer shovel	Concrete pump truck	
	A 2	10.0	"			
Pier	P 1	23.0	Column T			
	P 2	25.0	"			
	P 3	24.5	"			
	P 4	25.5	"			
	P 5	25	"			
	P 6	23.5	"			

Super-Structure	Area of Bridge (m2)	Nos. of Girder	Erection of Girder		
			Erection Girder	Truck Crane	Staging
	1580	26.8m x 35pcs.	x		

Analysis of Construction Duration (Actual Working Day Basis)

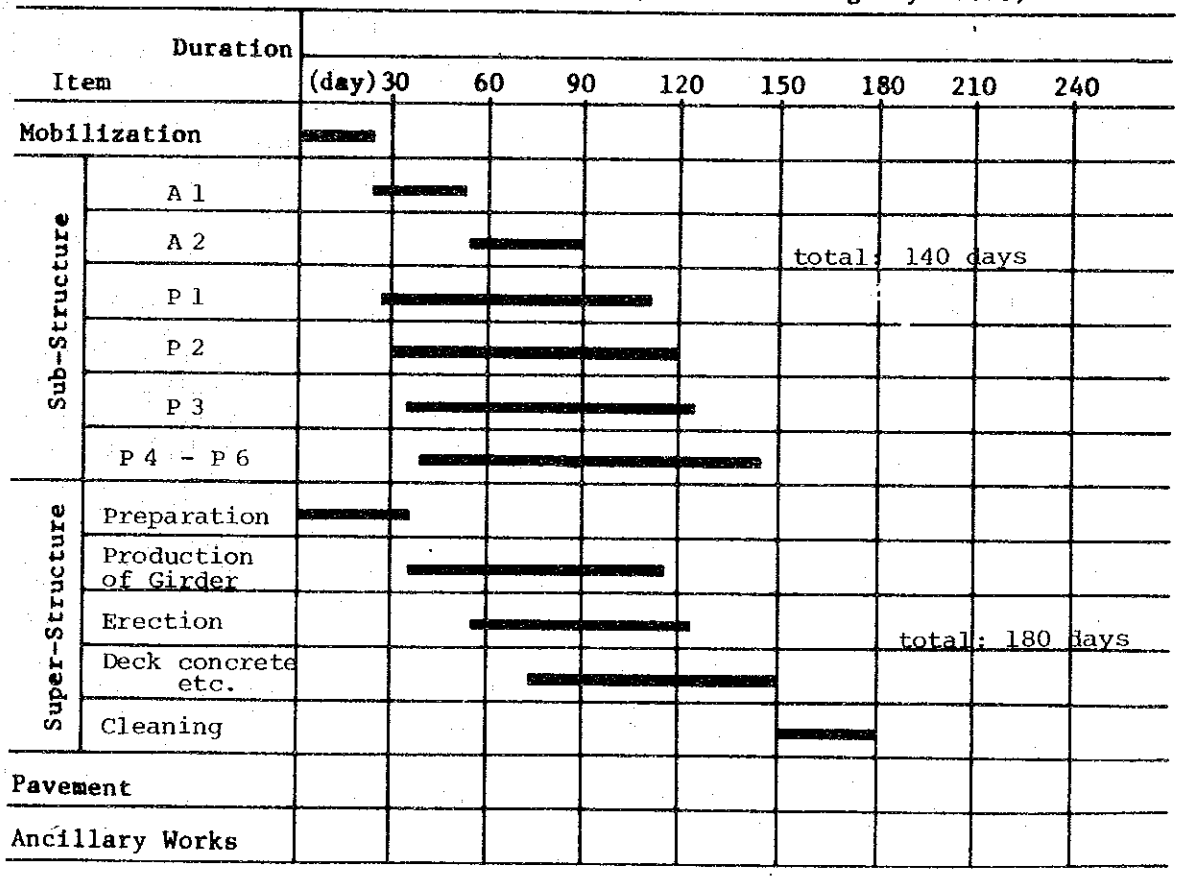


Table 2.4-4 Schedule Analysis of Bridge (Link Road Bridge)

Name of Bridge	Width	Length	Type
ST.L.Ri.A-le.	8.2	27.6 m	Simple post-tensioned girder

Sub-Structure	No.	Height (m)	Type	Execution of Foundation	Execution of Concrete	Remarks
Abutment	Improvement of Existing			Abutment		
Pier						

Super-Structure	Area of Bridge (m2)	Nos. of Girder	Erection of Girder		
			Erection Girder	Truck Crane	Staging
	220	26.8m x 5 pcs.	x		

Analysis of Construction Duration (Actual Working Day Basis)

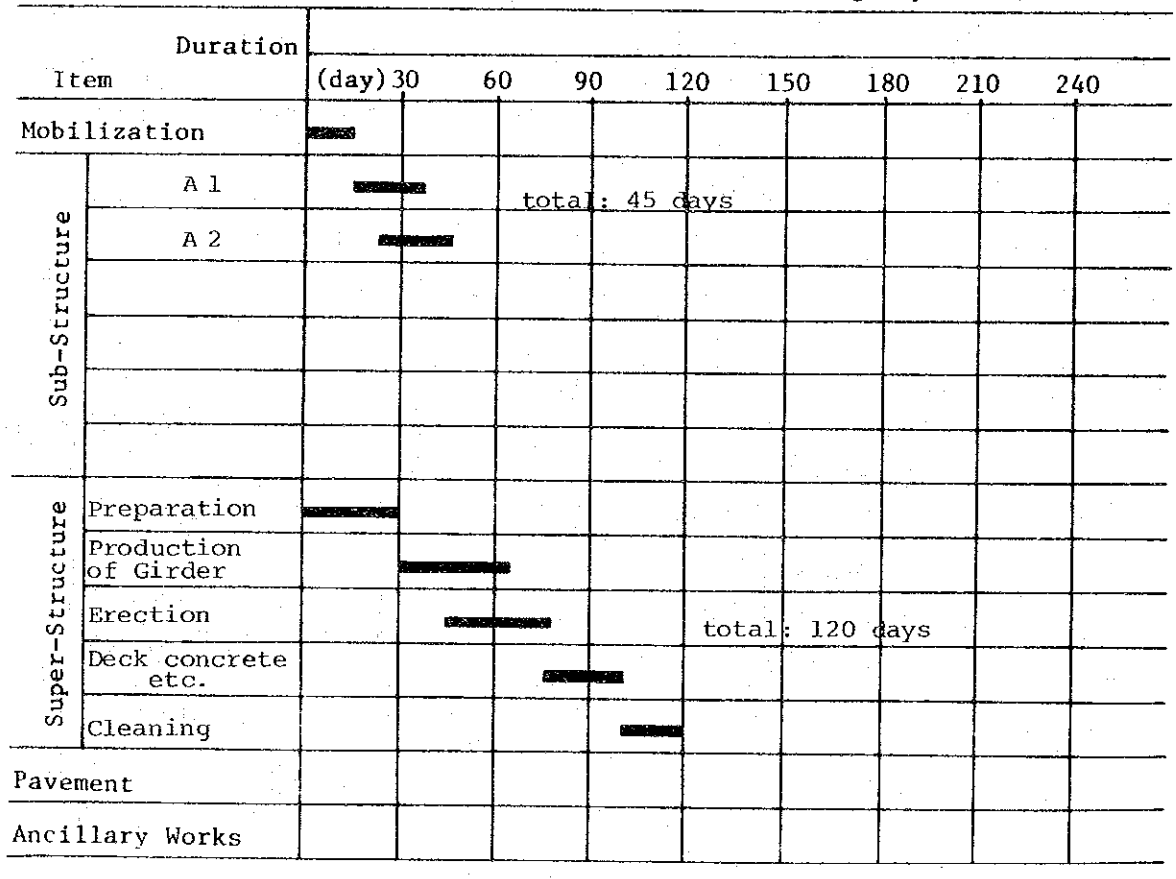


Table 2.4-5 Schedule Analysis of Bridge (Link Road Bridge)

Name of Bridge	Width	Length	Type
ST.L.Ri.B-Le.	8.2 m	82.7 m	Simple post-tensioned girder

Sub-Structure	No.	Height (m)	Type	Execution of Foundation	Execution of Concrete	Remarks
Abutment	A 1	10	Reverse T	Cofferdam Back hoe	Concrete pump truck	
	A 2	12	"			
Pier	P 1	14.2	Column T			
	P 2	14.5	"			

Super-Structure	Area of Bridge (m2)	Nos. of Girder	Erection of Girder		
			Erection Girder	Truck Crane	Staging
	659	26.8m x 15 pcs.	x		

Analysis of Construction Duration (Actual Working Day Basis)

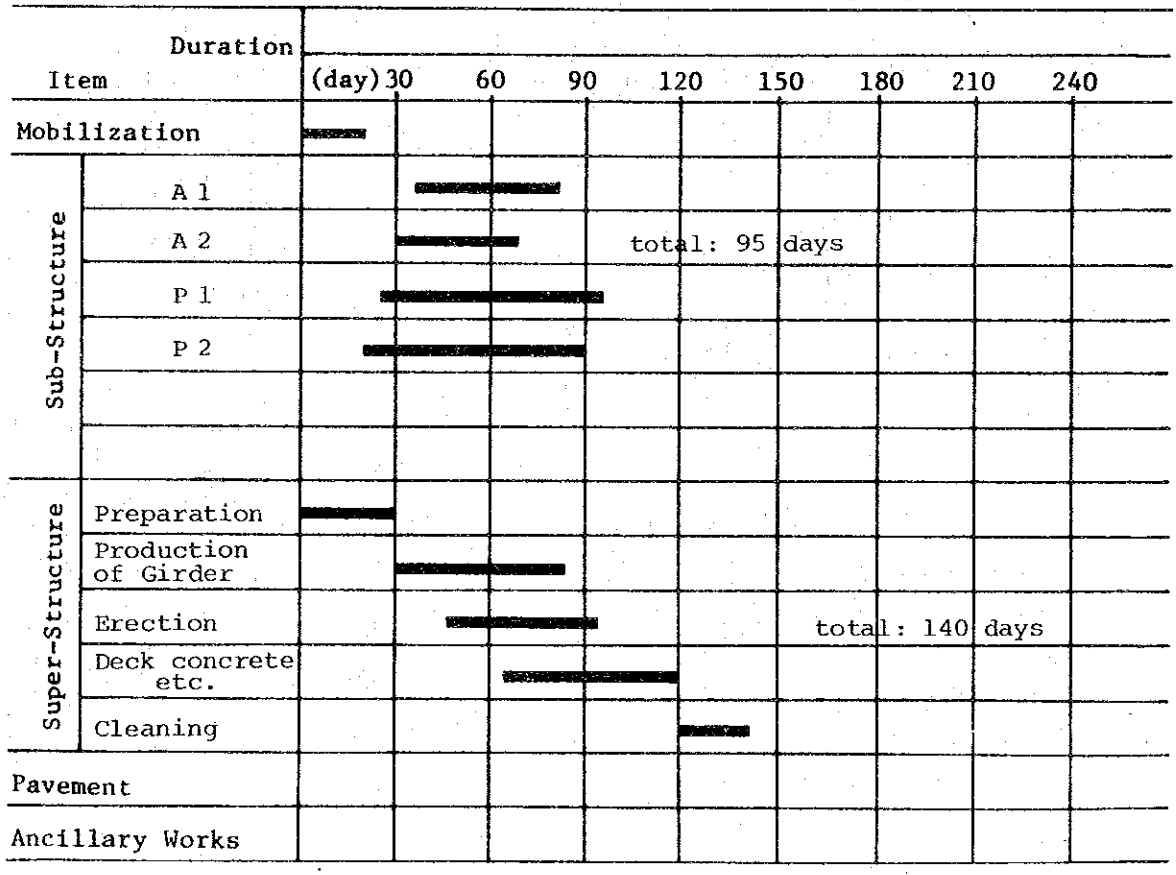


Table 2.4-6 Schedule Analysis of Bridge (Rampway Bridge)

Name of Bridge	Width	Length	Type
Mwy.Jun.B-Rp.Br.	9.1 m	53.8 m	2 continuous, simple RC voided slab

Sub-Structure	No.	Height (m)	Type	Execution of Foundation	Execution of Concrete	Remarks
Abutment	A 1	4.5	Gravity			
	A 2	4.5	"			
Pier	P 1	8.7	Rigid frame			
	P 2	8.6	"			
	P 3	10.0	"			

Super-Structure	Area of Bridge (m^2)	Nos. of Girder	Erection of Girder		
			Erection Girder	Truck Crane	Staging
	490			x 2200 m^3 in space	

Analysis of Construction Duration (Actual Working Day Basis)

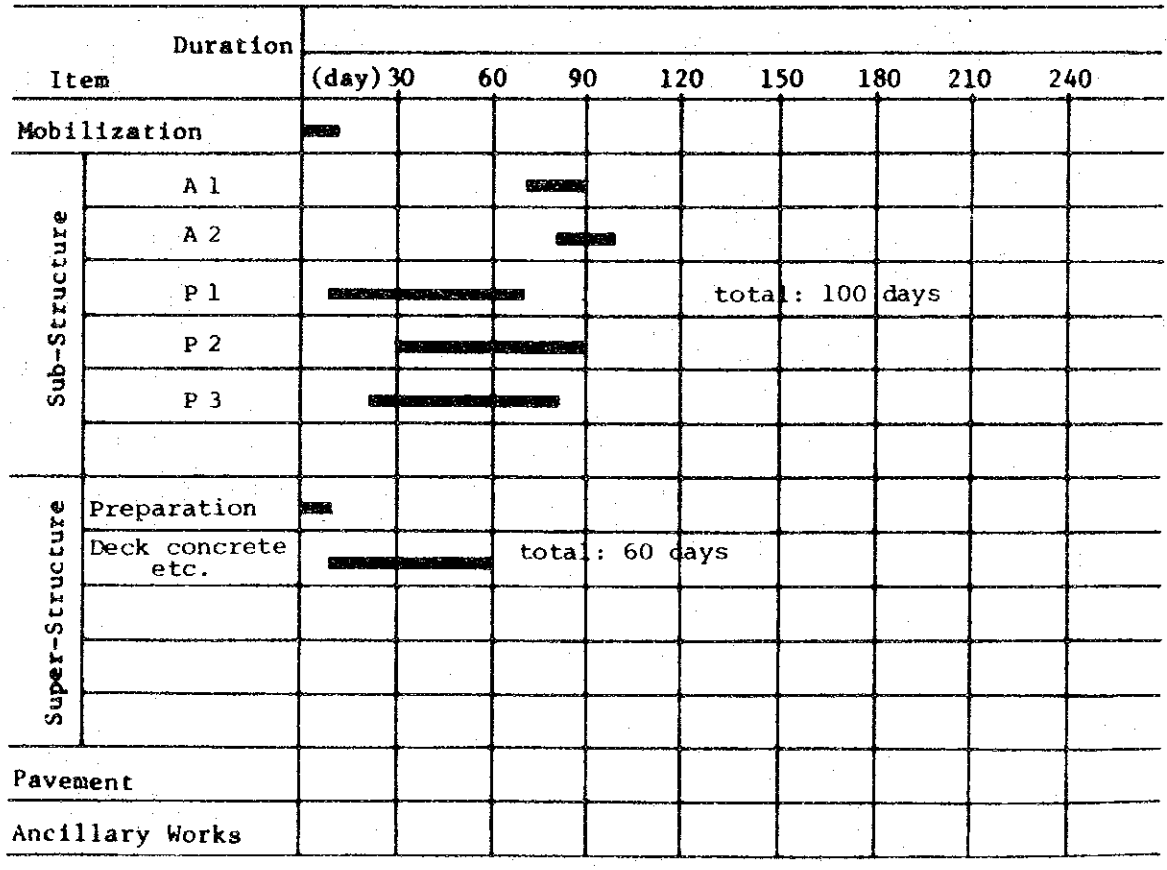


Table 2.4-7 Schedule Analysis of Bridge (Rampway Bridge)

Name of Bridge	Width	Length	Type
Mwy.Jun.G-Rp.Br.	7.8 m	39.35 m	2 continuous span, & simple RC voided slab

Sub-Structure	No.	Height (m)	Type	Execution of Foundation	Execution of Concrete	Remarks
Abutment	A 1	4.5	Gravity			
	A 2	12.5	Reverse T			
Pier	P 1	8.0	Rigid frame			
	P 2	9.0	"			

Super-Structure	Area of Bridge (m2)	Nos. of Girder	Erection of Girder		
			Erection Girder	Truck Crane	Staging
	306			x 2300 m^3 in space	

Analysis of Construction Duration (Actual Working Day Basis)

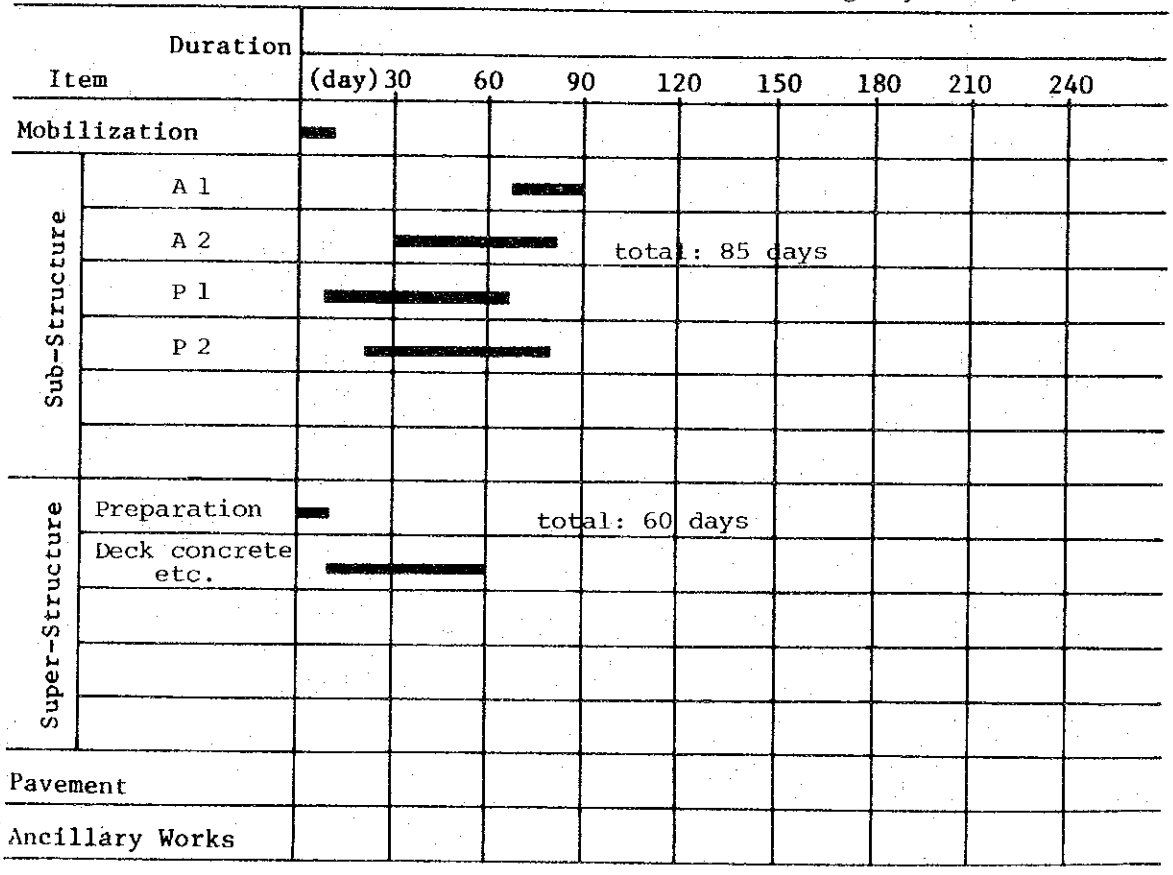


Table 2.4-8 Schedule Analysis of Bridge (Rampway Bridge)

Name of Bridge	Width	Length	Type
Cor.Int.E-Rp.	9.5 m	45.7 m	2 continuous span, simple RC voided glab

Sub-Structure	No.	Height (m)	Type	Execution of Foundation	Execution of Concrete	Remarks
Abutment	A 1	4.0	Gravity	Back hoe, Dozer shovel	Concrete pump truck	
	A 2	4.0	"			
Pier	P 1	9.0	Rigid frame			
	P 2	8.5	"			
	P 3	9.5	"			

Super-Structure	Area of Bridge (m2)	Nos. of Girder	Erection of Girder		
			Erection Girder	Truck Crane	Staging
	434			x 1500 m^3	

Analysis of Construction Duration (Actual Working Day Basis)

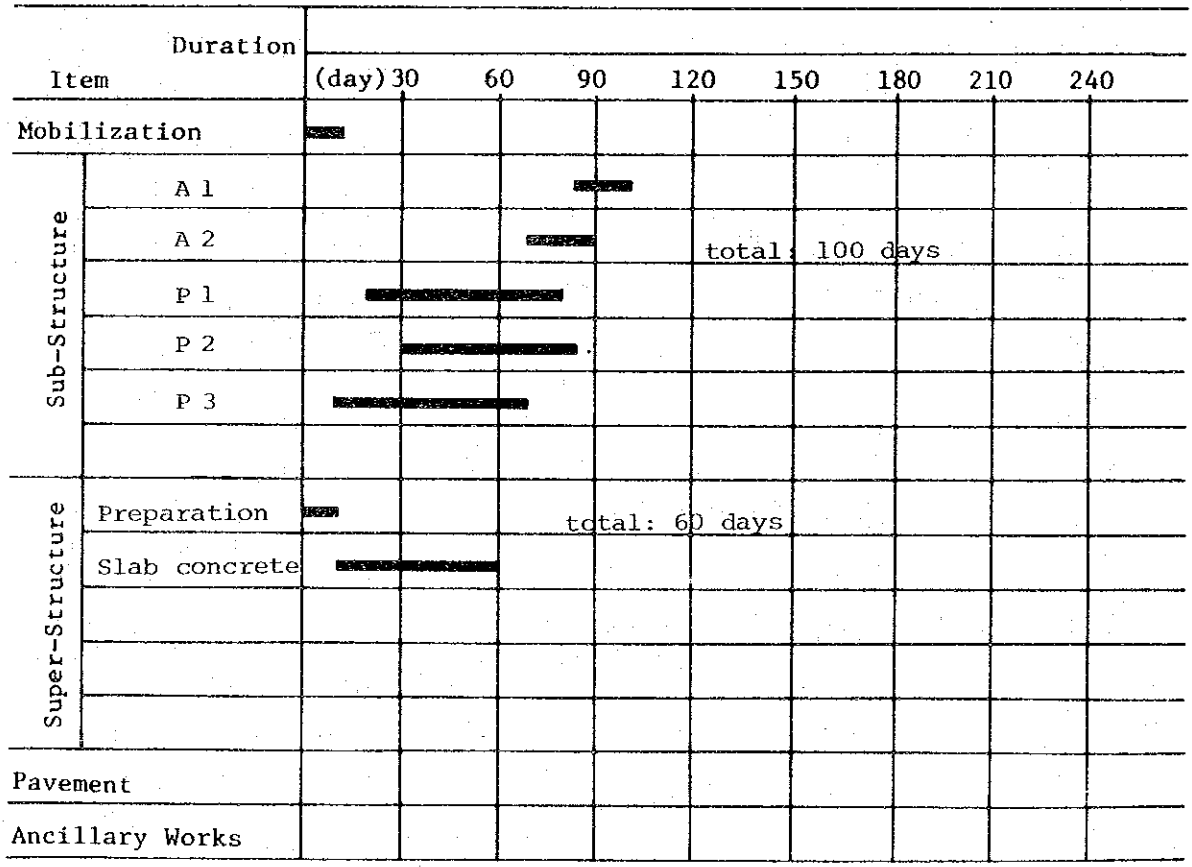


Table 2.4-9 Schedule Analysis of Bridge (Rampway Bridge)

Name of Bridge	Width	Length	Type
Cor.Int.F-Rp.	9.5 m	47.2 m	2 continuous span, simple RC voided Slab

Sub-Structure	No.	Height (m)	Type	Execution of Foundation	Execution of Concrete	Remarks
Abutment	A 1	4.0	Gravity	Back hoe, Dozer shovel	Concrete pump truck	
	A 2	4.0	"			
Pier	P 1	9.5	Rigid frame			
	P 2	9.0	"			
	P 3	10.5	"			

Super-Structure	Area of Bridge (m2)	Nos. of Girder	Erection of Girder		
			Erection Girder	Truck Crane	Staging
	449			x	

Analysis of Construction Duration (Actual Working Day Basis)

Item	Duration (day) 30	60	90	120	150	180	210	240
Mobilization								
Sub-Structure								
	To be deemed same with Cor.Int.E-Rp.							
Super-Structure								
Pavement								
Ancillary Works								

Table 2.4-10 Schedule Analysis of Bridge (Over Bridge)

Name of Bridge	Width	Length	Type
PAILLES Ov.Br.	7.2 m	55.5 m	Simple post-tensioned girder

Sub-Structure	No.	Height (m)	Type	Execution of Foundation	Execution of Concrete	Remarks
Abutment	A 1	5	Wall			
	A 2	5	"			
Pier	P 1	9	Rigid frame			
	P 2	9	"			
	P 3	11	"			

Super-Structure	Area of Bridge (m2)	Nos. of Girder	Erection of Girder		
			Erection Girder	Truck Crane	Staging
	533	20.3m x 10 pcs. 7.0 x 5 5.05 x 5		x (preferable)	

Analysis of Construction Duration (Actual Working Day Basis)

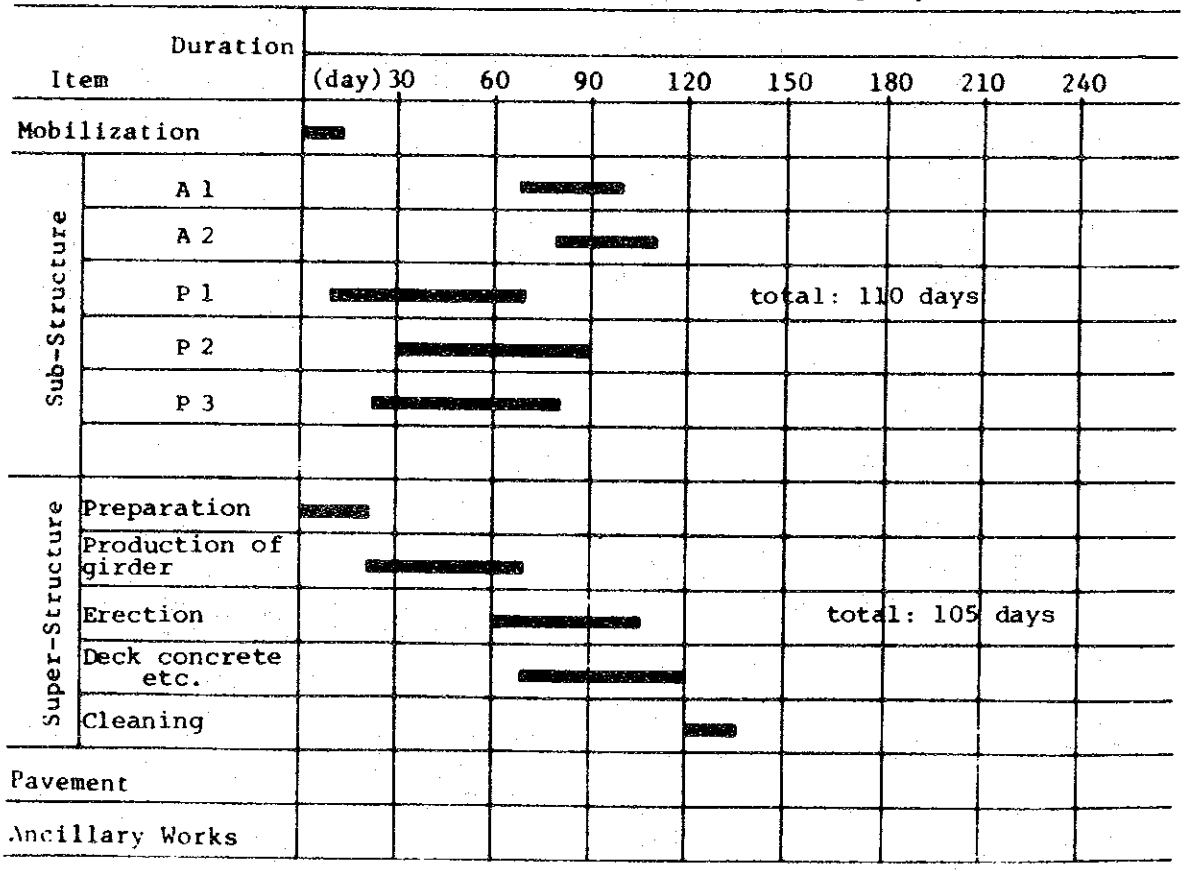


Table 2.4-11 Schedule Analysis of Bridge (Over Bridge)

Name of Bridge	Width	Length	Type
A-1 Road Ov.	25.5 m	57.9 m	Simple post-tensioned girder

Sub-Structure	No.	Height (m)	Type	Execution of Foundation	Execution of Concrete	Remarks
Abutment	A 1	4.0	Gravity	Back hoe, Dozer shovel	Concrete pump truck	To commence after detouring A-1 Rd.
	A 2	5.0	Reverse T			
Pier	P 1	8.0	Rigid frame			
	P 2	9.5	"			
	P 3	12.0	"			

Super-Structure	Area of Bridge (m2)	Nos. of Girder	Erection of Girder		
			Erection Girder	Truck Crane	Staging
		8.35m x 10 pcs. 19.9 x 10 21.4 x 12 5.3 x 12		x	

Analysis of Construction Duration (Actual Working Day Basis)

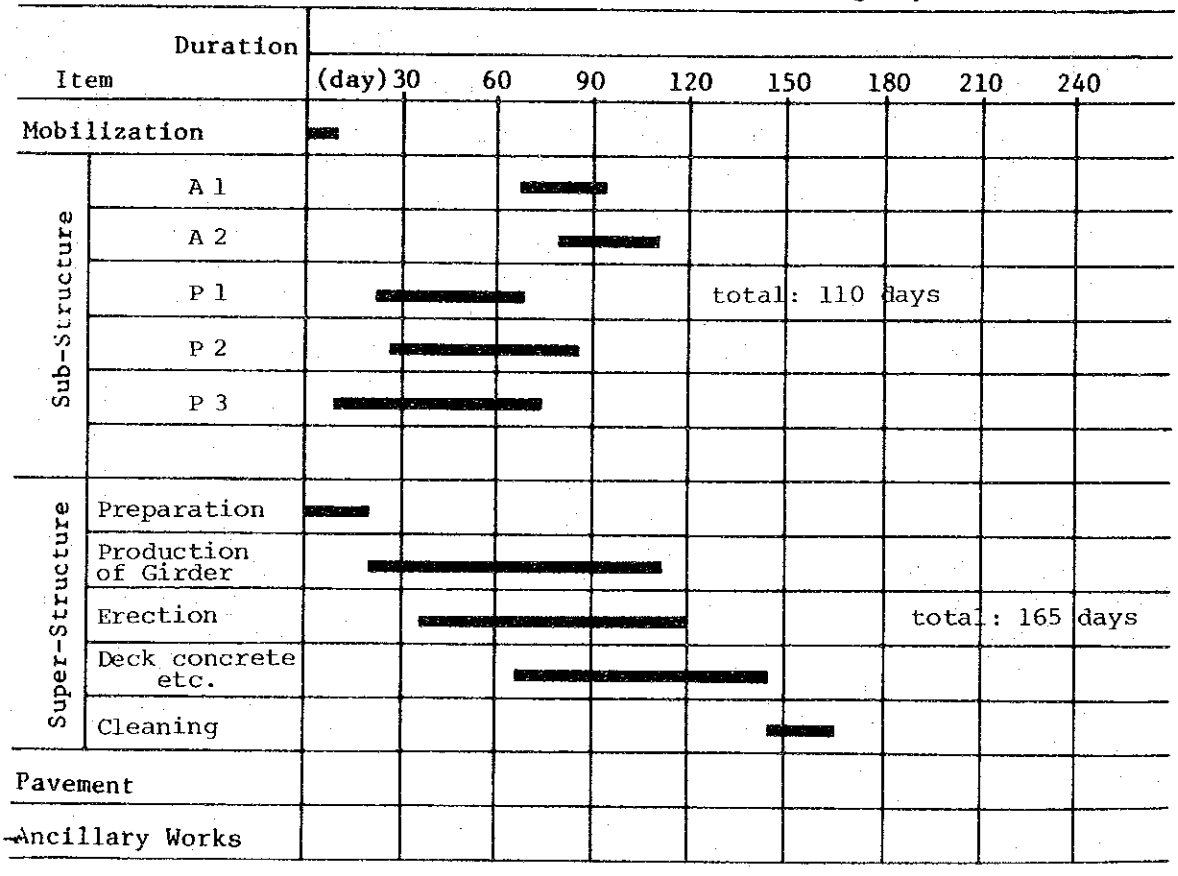


Table 2.4-12 Schedule Analysis of Bridge (Over Bridge)

Name of Bridge	Width	Length	Type
COROMANDEL Ov.Br.	5.91 m	69.1 m	Simple post-tensioned girder

Sub-Structure	No.	Height (m)	Type	Execution of Foundation	Execution of Concrete	Remarks
Abutment	A 1	5.0	Reverse T	Back hoe, Dozer shovel	Concrete pump truck	
	A 2	5.0	"			
Pier	P 1	8.5	Rigid frame			
	P 2	9.5	"			
	P 3	9.3	"			

Super-Structure	Area of Bridge (m2)	Nos. of Girder	Erection of Girder		
			Erection Girder	Truck Crane	Staging
	587	27.7m x 8 pcs. 4.4 x 4 6.25 x 4	x		

Analysis of Construction Duration (Actual Working Day Basis)

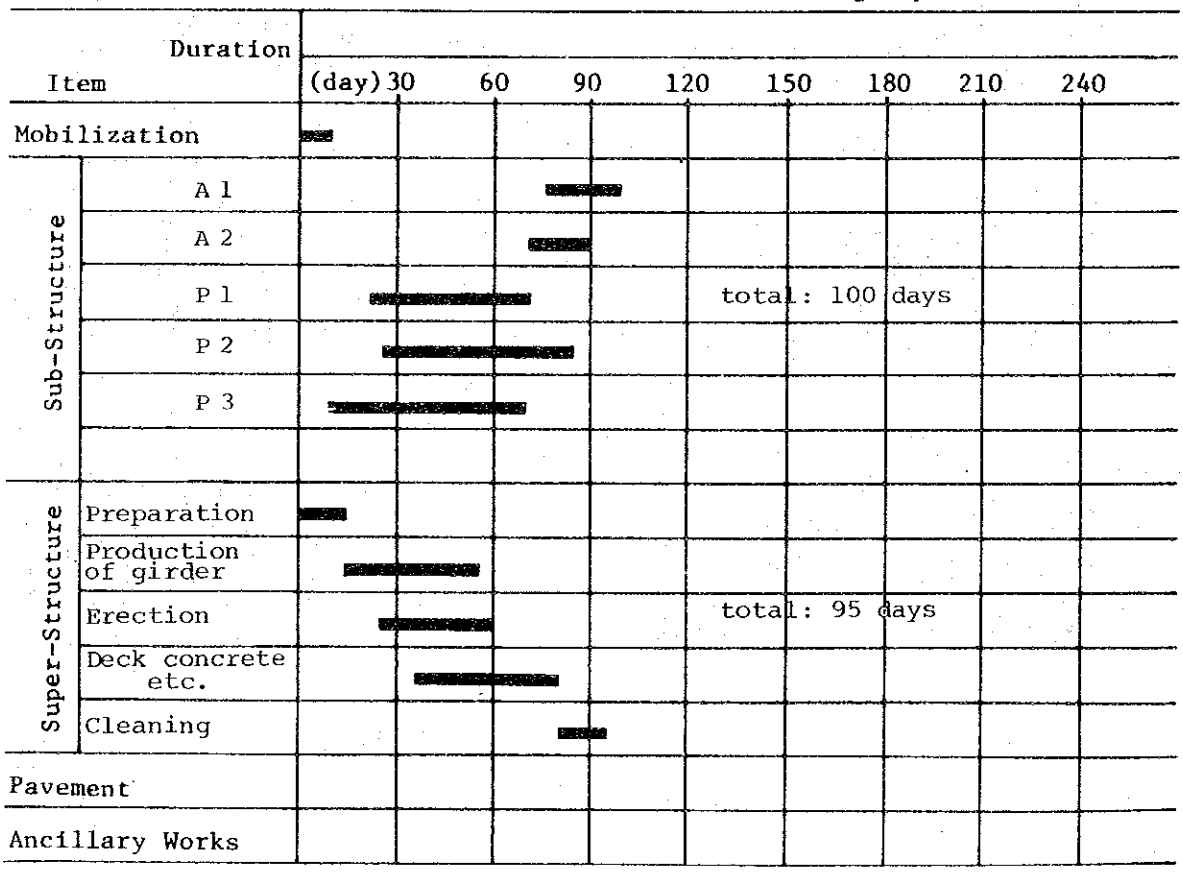


Table 2.4-13 Schedule Analysis of Bridge (Over Bridge)

Name of Bridge	Width	Length	Type
Cor.Int.H-Rp.	5.5 m	22.1 m	Simple post-tensioned girder

Sub-Structure	No.	Height (m)	Type	Execution of Foundation	Execution of Concrete	Remarks
Abutment	A 1	5.0	Reverse T			
	A 2	4.0	Gravity			
Pier						

Super-Structure	Area of Bridge (m2)	Nos. of Girder	Erection of Girder		
			Erection Girder	Truck Crane	Staging
	121	21.3m x 4 pcs.	x (preferable)	x	

Analysis of Construction Duration (Actual Working Day Basis)

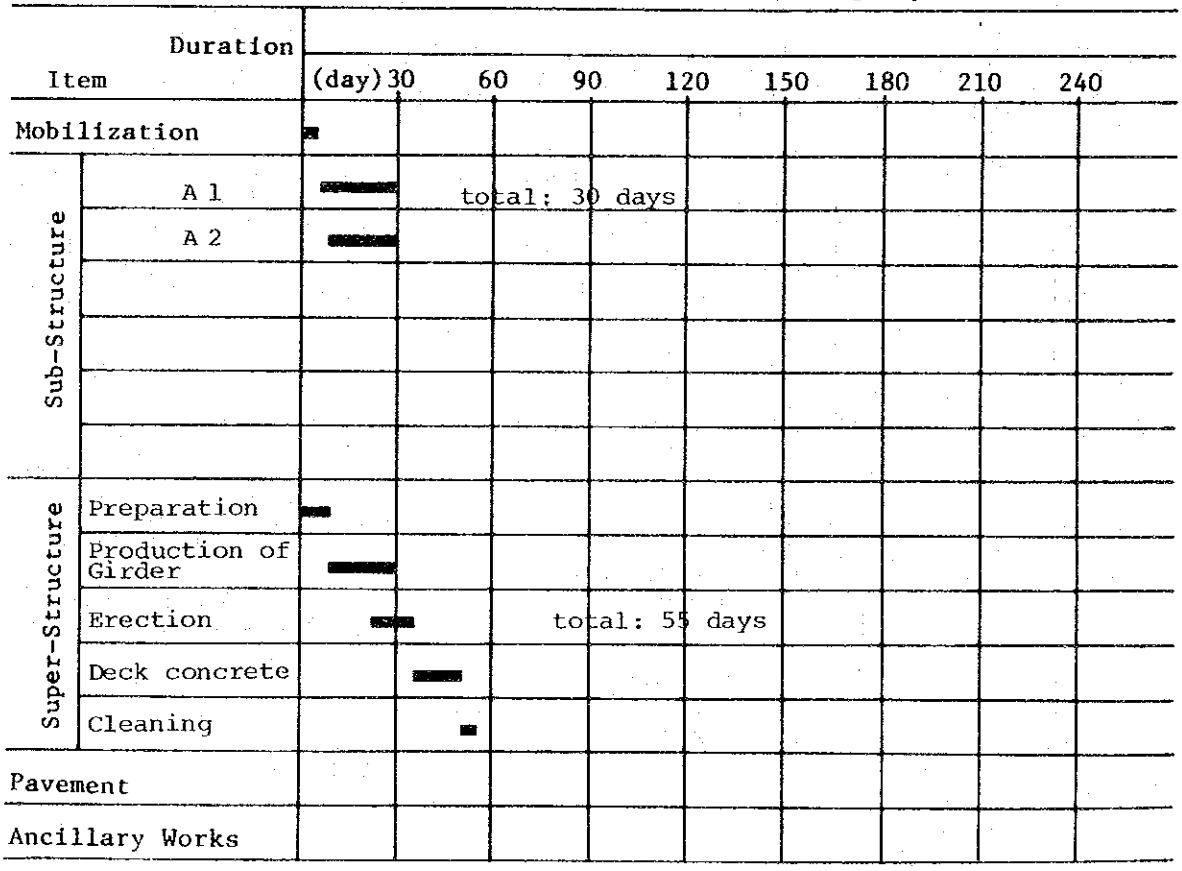


Table 2.4-14 Schedule Analysis of Bridge (Over Bridge)

Name of Bridge	Width	Length	Type
Sta. 22 Ov. Br.	5.5 m	46.0 m	2 continuous span, simple RC voided slab

Sub-Structure	No.	Height (m)	Type	Execution of Foundation	Execution of Concrete	Remarks
Abutment	A 1	4.0	Gravity	Back hoe, Dozer shovel	Concrete pump truck	
	A 2	4.5	"			
Pier	P 1	9.0	Rigid frame			
	P 2	9.0	"			
	P 3	10.0	"			

Super-Structure	Area of Bridge (m2)	Nos. of Girder	Erection of Girder		
			Erection Girder	Truck Crane	Staging
	308			x 2000 m^3 in space	

Analysis of Construction Duration (Actual Working Day Basis)

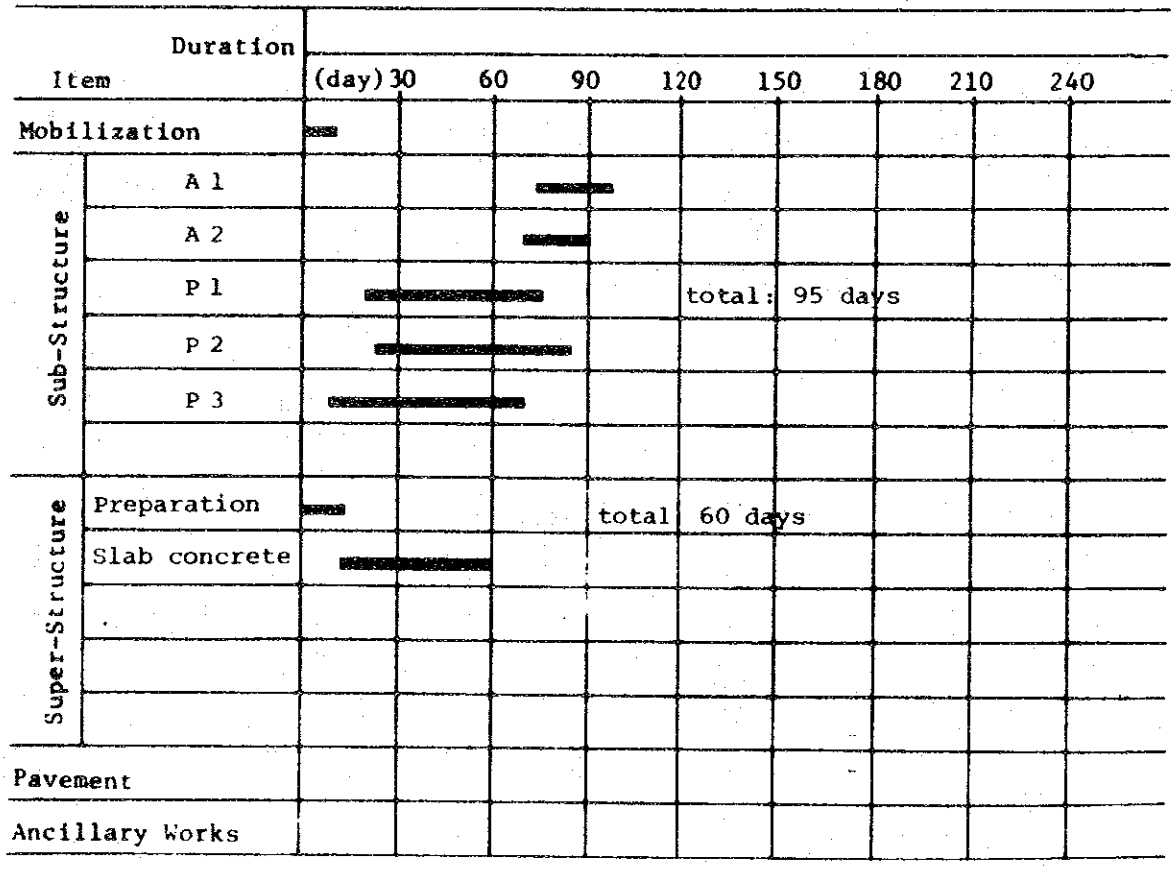


Table 2.4-15 Schedule Analysis of Bridge (Pedestrian Bridge)

Name of Bridge	Width	Length	Type
Hin. Temple Ped.	2.4 m	38.1 m	2 continuous span, RC voided slab

Sub-Structure	No.	Height (m)	Type	Execution of Foundation	Execution of Concrete	Remarks
Abutment	A 1	6.5	Reverse T	Back hoe, Dozer shovel	Concrete Pump truck	
	A 2	5.5	"			
Pier	P 1	7.3	"			

Super-Structure	Area of Bridge (m2)	Nos. of Girder	Erection of Girder		
			Erection Girder	Truck Crane	Staging
	137			x	

Analysis of Construction Duration (Actual Working Day Basis)

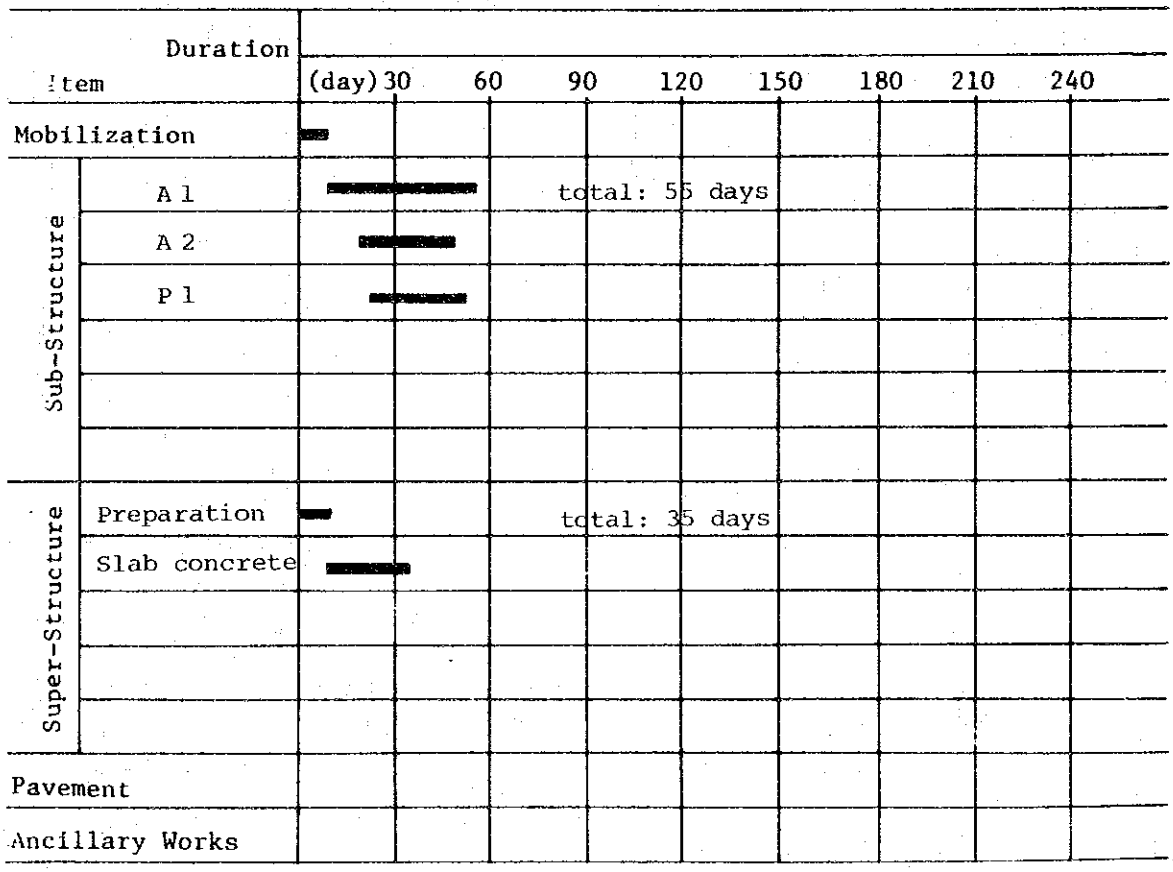


Table 2.4-16 Schedule Analysis of Bridge (Pedestrian Bridge)

Name of Bridge	Width	Length	Type
B.B. Ped. Br.	2.4 m	19.1 m	Simple RC voided slab

Sub-Structure	No.	Height (m)	Type	Execution of Foundation	Execution of Concrete	Remarks
Abutment	A 1	8.5	Reverse T			
	A 2	8.5	"			
Pier						

Super-Structure	Area of Bridge (m2)	Nos. of Girder	Erection of Girder		
			Erection Girder	Truck Crane	Staging
				x	

Analysis of Construction Duration (Actual Working Day Basis)

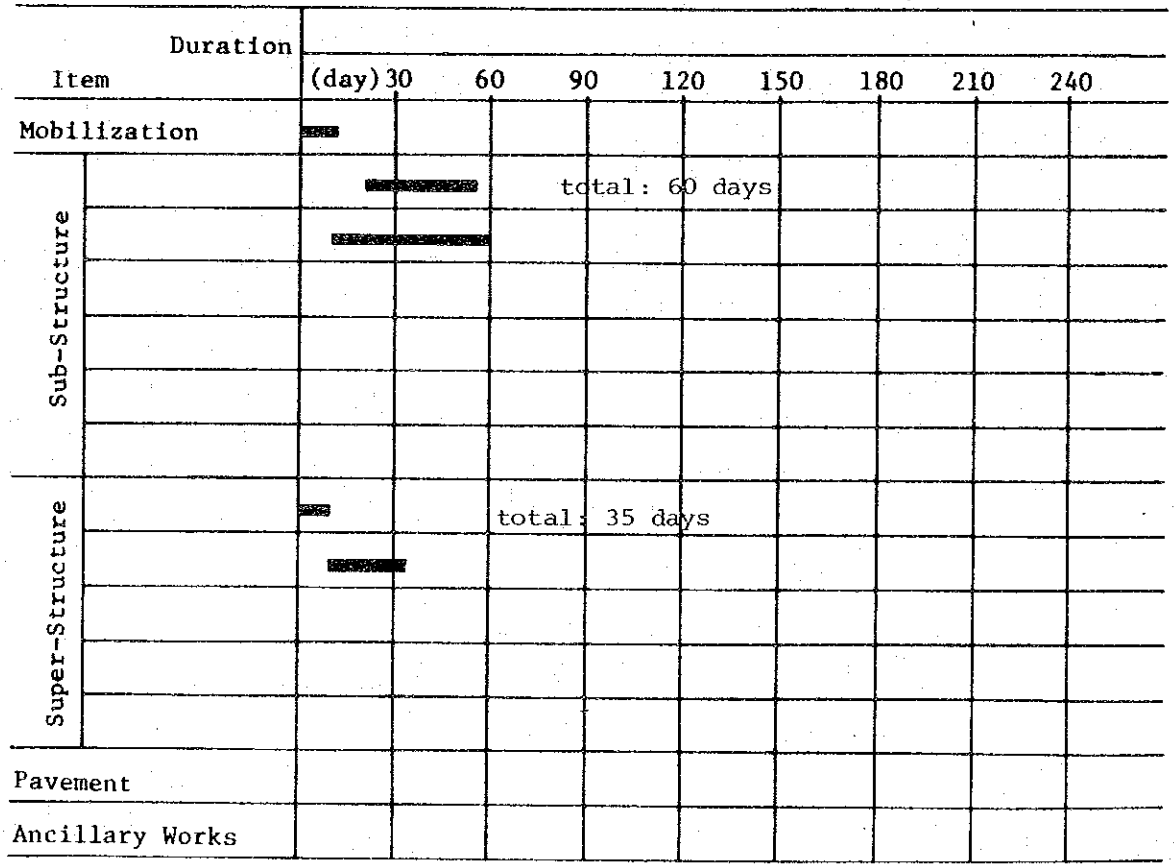


Table 2.4-17 Schedule Analysis of Bridge (Motorway Junction Bridge)

Name of Bridge	Width	Length	Type
Mwy.Jun.A-Le. 1 Br.	8.9 m	30.1 m	Simple post-tensioned girder

Sub-Structure	No.	Height (m)	Type	Execution of Foundation	Execution of Concrete	Remarks
Abutment	A 1	10.2	Reverse T			
	A 2	12.5	"			
Pier						

Super-Structure	Area of Bridge (m2)	Nos. of Girder	Erection of Girder		
			Erection Girder	Truck Crane	Staging
	268	30m x 5 pcs	x (preferable)	x	

Analysis of Construction Duration (Actual Working Day Basis)

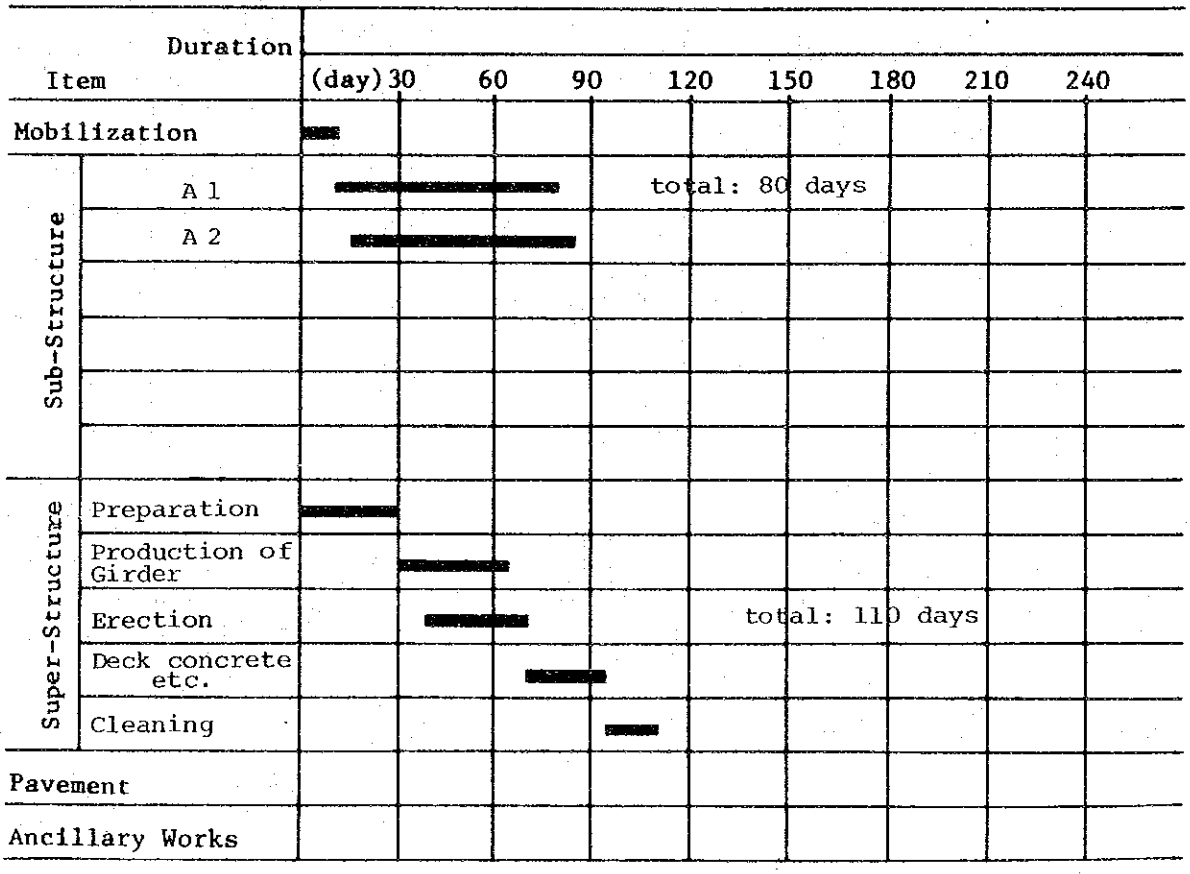


Table 2.4-18 Schedule Analysis of Bridge (Motorway Junction Bridge)

Name of Bridge	Width	Length	Type
Mwy.Jun.B-Le. 1 Br	8.9 m	20.1 m	Simple post-tensioned girder

Sub-Structure	No.	Height (m)	Type	Execution of Foundation	Execution of Concrete	Remarks
Abutment	A 1	10.7	Reverse T			
	A 2	12.5	"			
Pier						

Super-Structure	Area of Bridge (m2)	Nos. of Girder	Erection of Girder		
			Erection Girder	Truck Crane	Staging
	179	19.4m x 5 pcs.	x (Preferable)	x	

Analysis of Construction Duration (Actual Working Day Basis)

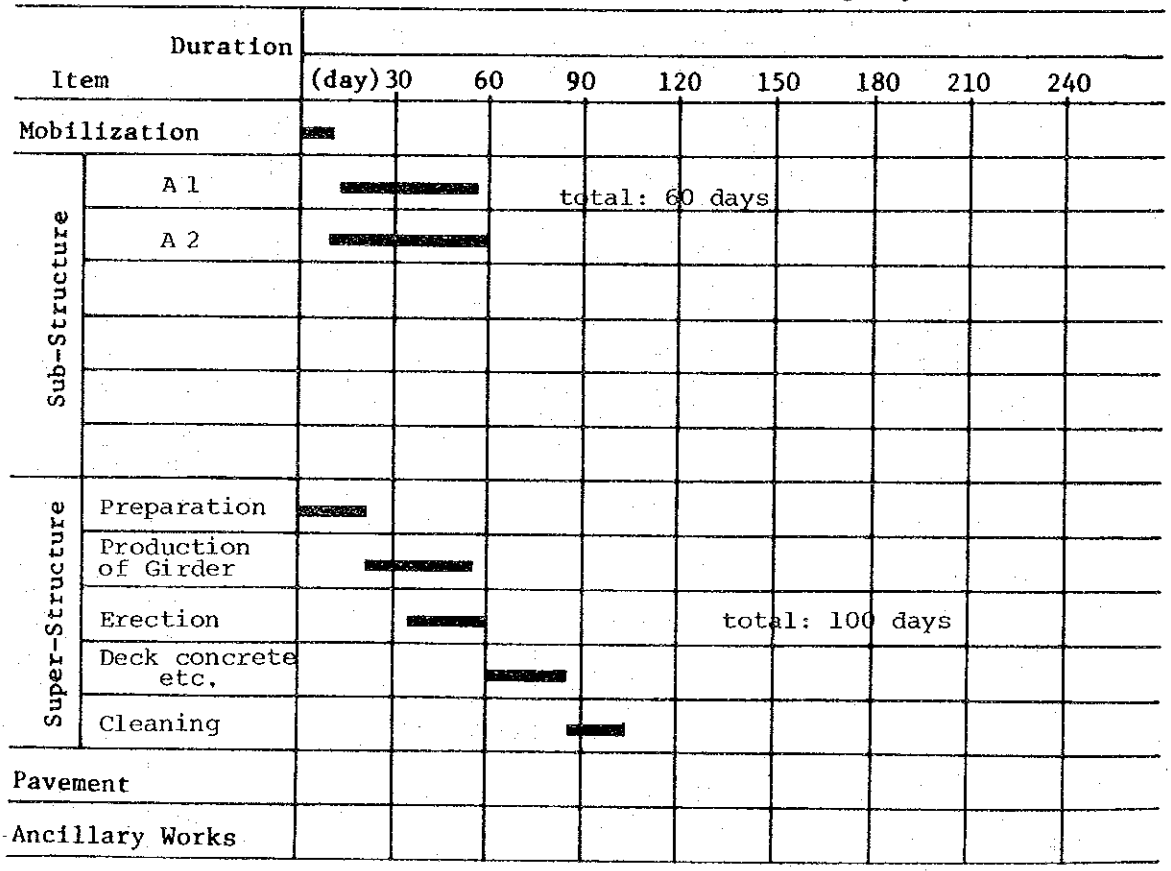


Table 2.4-19 Schedule Analysis of Bridge (Motorway Junction Bridge)

Name of Bridge	Width	Length	Type
Mwy.Jun.A-Le. 2 Br.	8.9 m	89.2 m	Simple post-tensioned girder

Sub-Structure	No.	Height (m)	Type	Execution of Foundation	Execution of Concrete	Remarks
Abutment	A 1	14.0	Buttress			
	A 2	13.0	"			
Pier	P 1	18.4	Column T			
	P 2	16.3	"			

Super-Structure	Area of Bridge (m2)	Nos. of Girder	Erection of Girder		
			Erection Girder	Truck Crane	Staging
	794	26.8m x 10 pcs. 33.2 x 5	x (Preferable)	x	

Analysis of Construction Duration (Actual Working Day Basis)

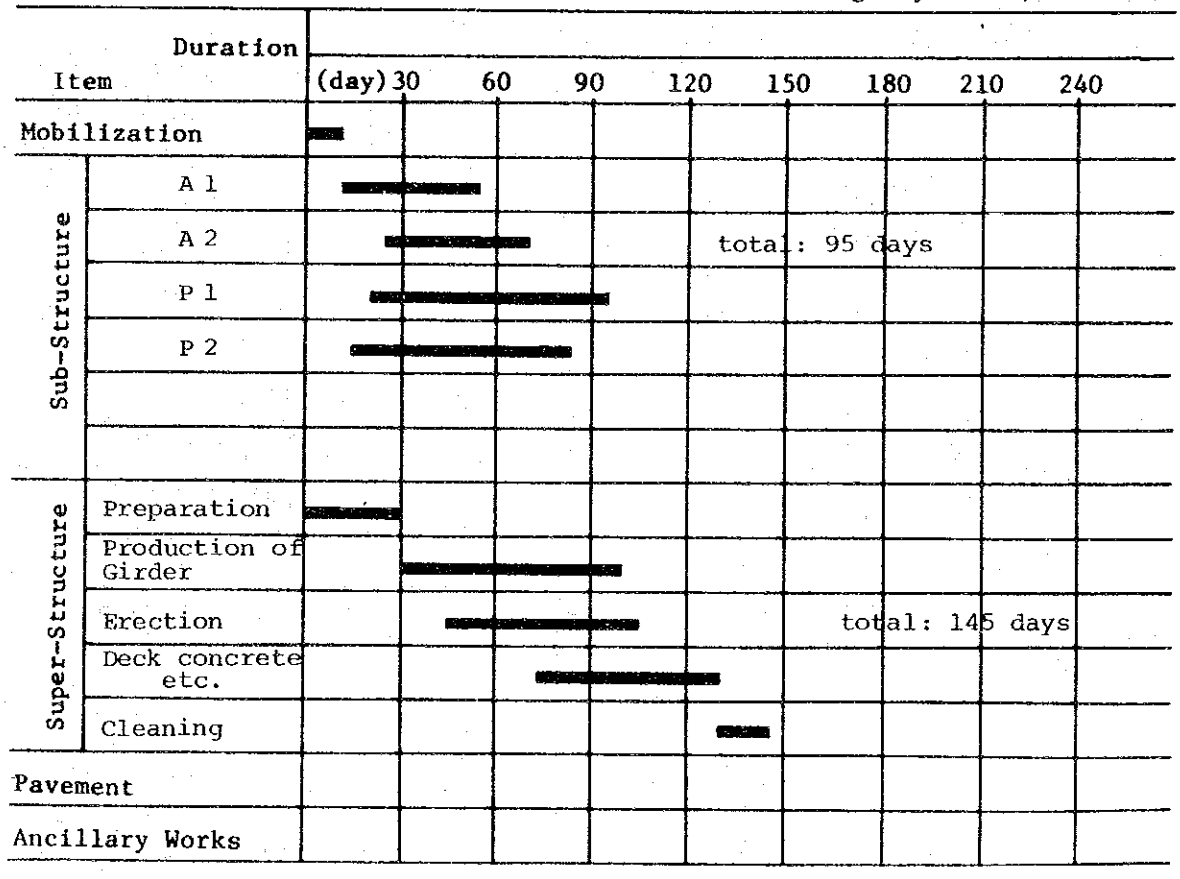


Table 2.4-20 Schedule Analysis of Bridge (Motorway Junction Bridge)

Name of Bridge	Width	Length	Type
Mwy.Jun.B-Le. 2 Br	8.9 m	91.7 m	Simple post-tensioned girder

Sub-Structure	No.	Height (m)	Type	Execution of Foundation	Execution of Concrete	Remarks
Abutment	A 1	14.5	Buttress			
	A 2	14.0	"			
Pier	P 1	19.5	Column T			After roadway excavation
	P 2	15.8	"			

Super-Structure	Area of Bridge (m2)	Nos. of Girder	Erection of Girder		
			Erection Girder	Truck Crane	Staging
	818	26.8m x 5 pcs. 29.2 x 5 33.2 x 5	x (Preferable)	x	

Analysis of Construction Duration (Actual Working Day Basis)

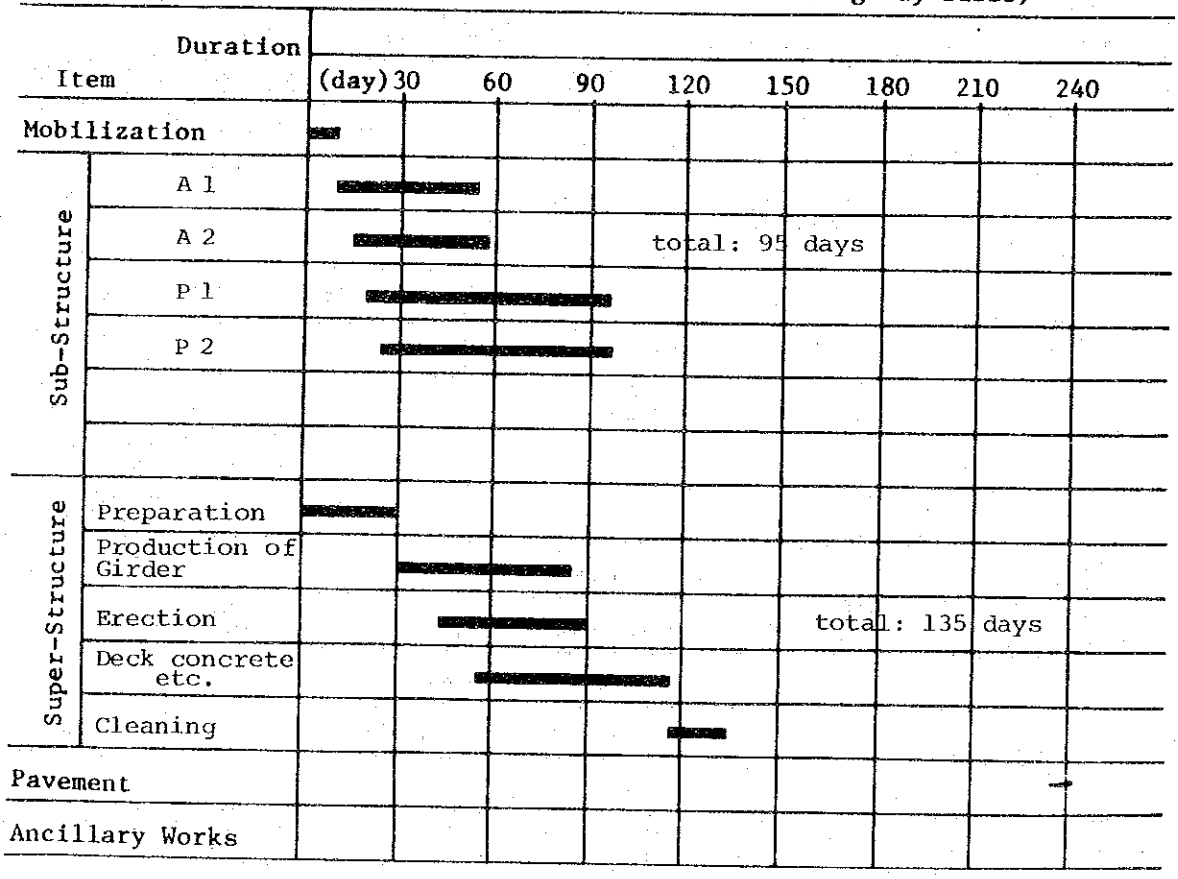


Table 2.4-21 Schedule Analysis of Bridge (Motorway Junction Bridge)

Name of Bridge	Width	Length	Type
Mwy.Jun.A-Le. 3 Br	15.9 m	17.1 m	Simple RC voided slab

Sub-Structure	No.	Height (m)	Type	Execution of Foundation	Execution of Concrete	Remarks
Abutment	A 1	11.5	Buttress			
	A 2	8.5				
Pier						

Super-Structure	Area of Bridge (m2)	Nos. of Girder	Erection of Girder		
			Erection Girder	Truck Crane	Staging
	267			x 1300 m^3 in space	

Analysis of Construction Duration (Actual Working Day Basis)

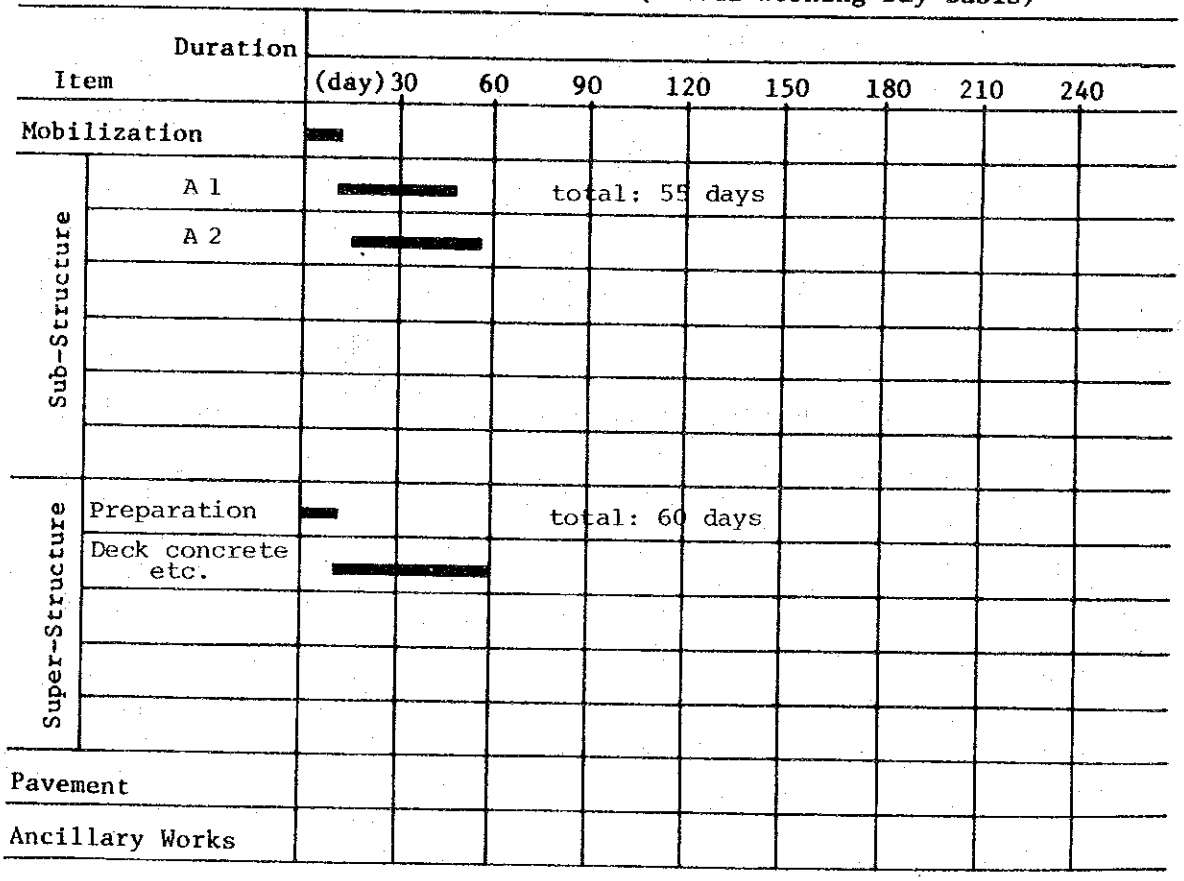


Table 2.4-22 Schedule Analysis of Bridge (Motorway Junction Bridge)

Name of Bridge	Width	Length	Type
Mwy.Jun.B-Le. 3 Br.	8.9 m	17.1 m	Simple RC voided slab

Sub-Structure	No.	Height (m)	Type	Execution of Foundation	Execution of Concrete	Remarks
Abutment	A 1	13	Buttress			
	A 2	9	Reverse T			
Pier						

Super-Structure	Area of Bridge (m2)	Nos. of Girder	Erection of Girder		
			Erection Girder	Truck Crane	Staging
				x 800 m3 in space	

Analysis of Construction Duration (Actual Working Day Basis)

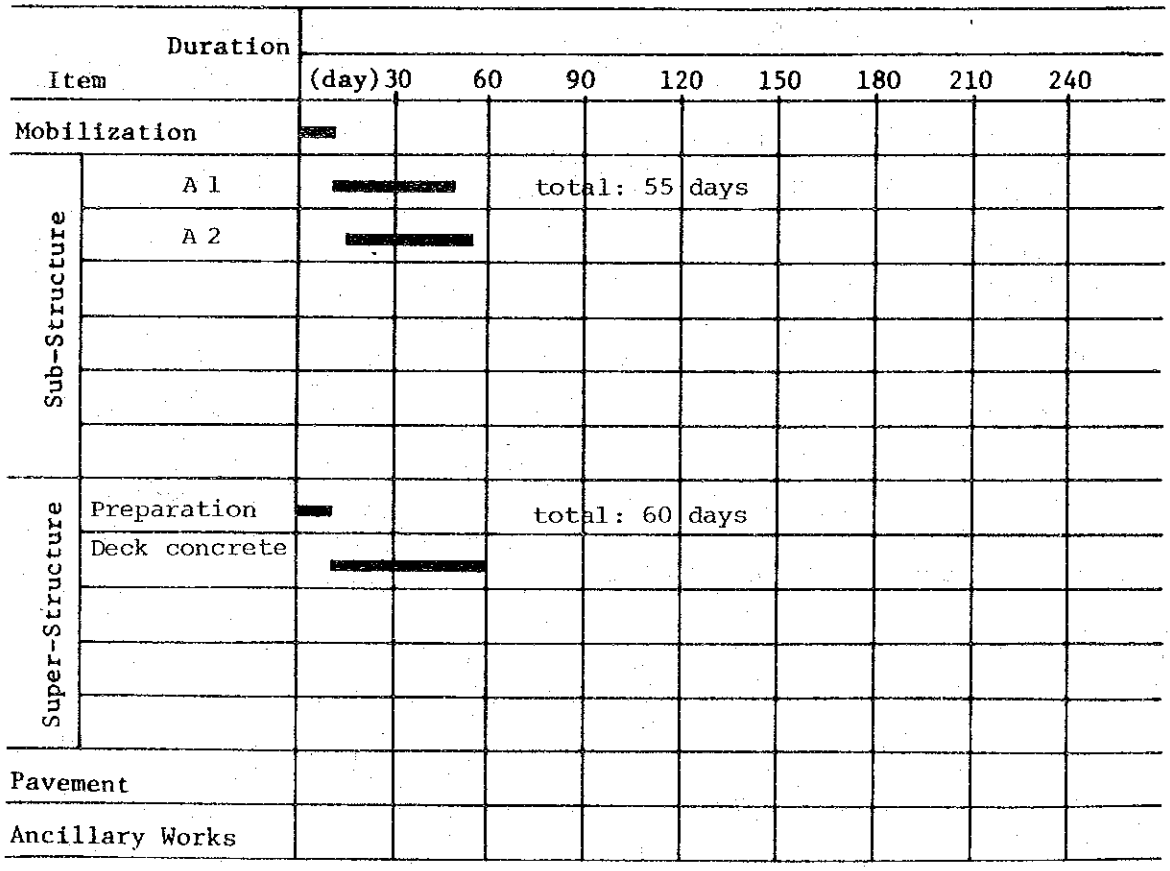


Table 2.4-23 Schedule Analysis of Bridge (Motorway Junction Bridge)

Name of Bridge	Width	Length	Type
Mwy.Jun.E-Rp. Br.	6.1 m	85 m	Simple post-tensioned girder

Sub-Structure	No.	Height (m)	Type	Execution of Foundation	Execution of Concrete	Remarks
Abutment	A 1	8.0	Reverse T			
	A 2	13.0	Buttress			
Pier	P 1	15.5	Collumm T			
	P 2	18.5	"			

Super-Structure	Area of Bridge (m2)	Nos. of Girder	Erection of Girder		
			Erection Girder	Truck Crane	Staging
				x (preferable)	

Analysis of Construction Duration (Actual Working Day Basis)

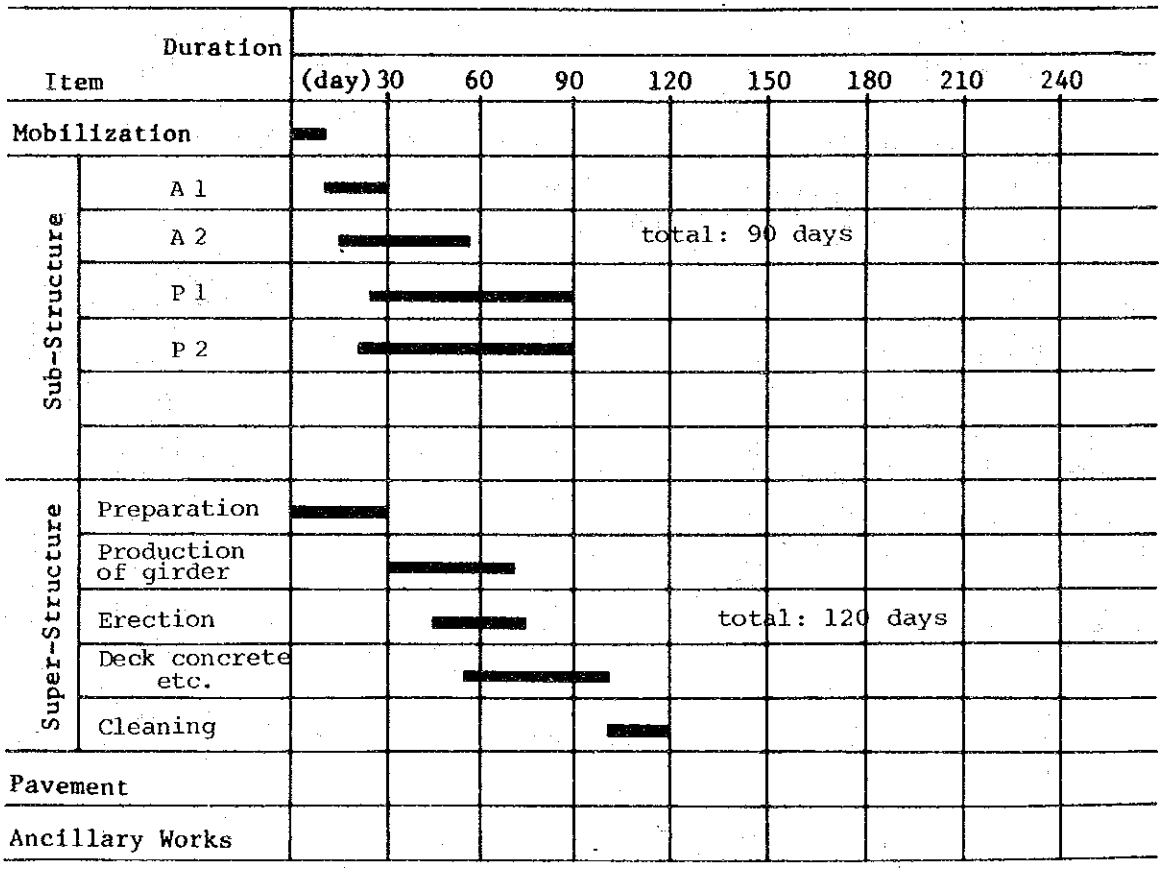


Table 2.4-24 Excavating and Collecting Material Rate

Materials	Combination of Equipment	Hourly Production		
Excavation of Soil Material (Dl = 5Dm)	Bulldozer 34 ton, 1 unit Bulldozer 24 ton, 1 unit Bulldozer 17 ton, 1 unit	65m^3/h 35m^3/h 30m^3/h	130m^3/h 1040m^3/day (1 day = 8 h)	Average 113m^3/h (=900m^3/day)
Excavation of Unsound Rock by ripping (Dl = 50m)	Bulldozer 34 ton, 1 unit Bulldozer 24 ton, 1 unit Bulldozer 17 ton, 1 unit	45m^3/h 30m^3/h 20m^3/h	95m^3/h (=760m^3/day)	
Excavation of Sound Rock by blasting (Dl = 50m)	Jack hammer 20 kg, 8 units Air compressor 7.5m^3/min, units Bulldozer 17 ton, 1 unit		20m^3/h (=160m^3/day)	

Fig. 2.4-1 Hauling System and Hourly Production

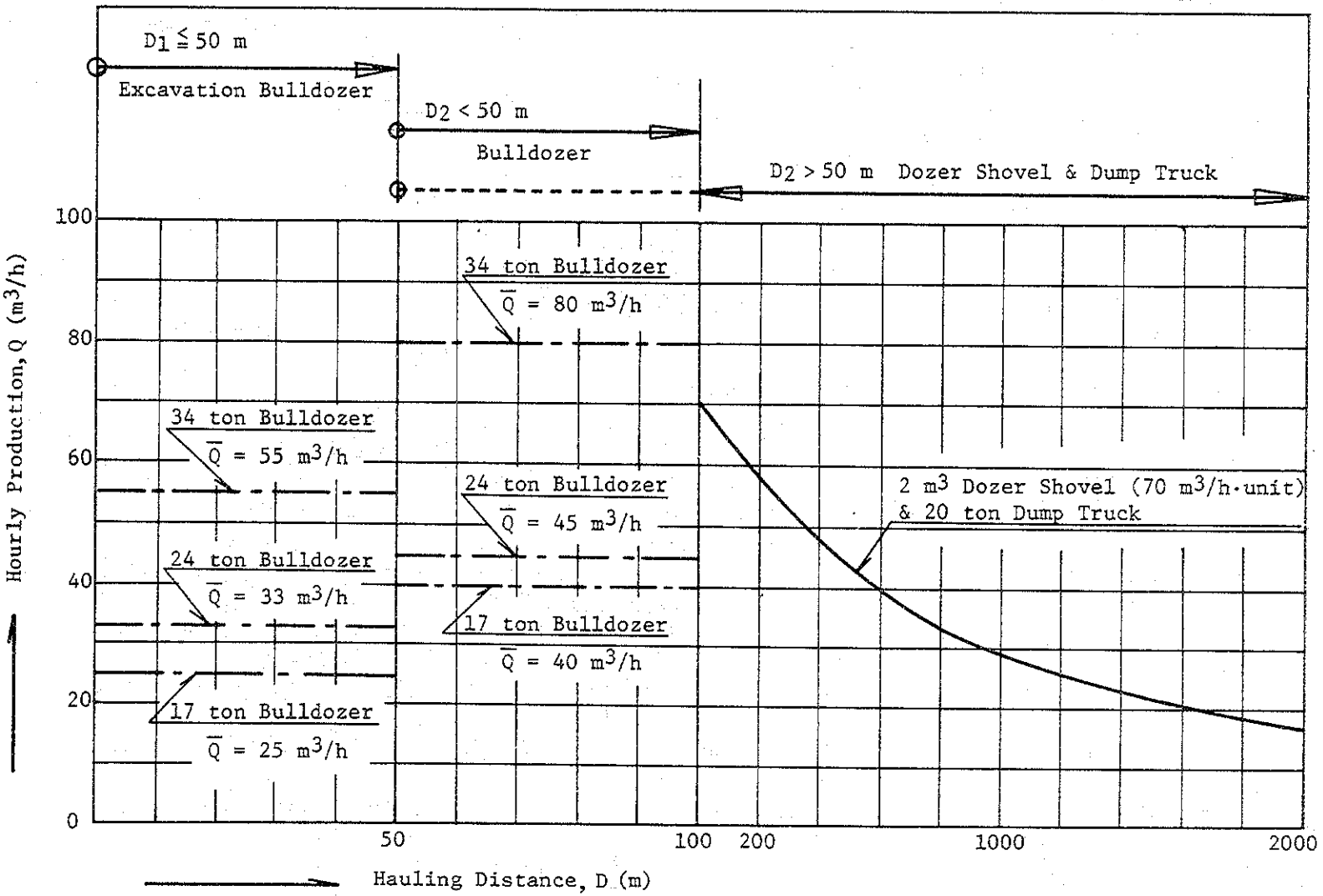


Fig. 2.4-2 Embankment System and Hourly Production

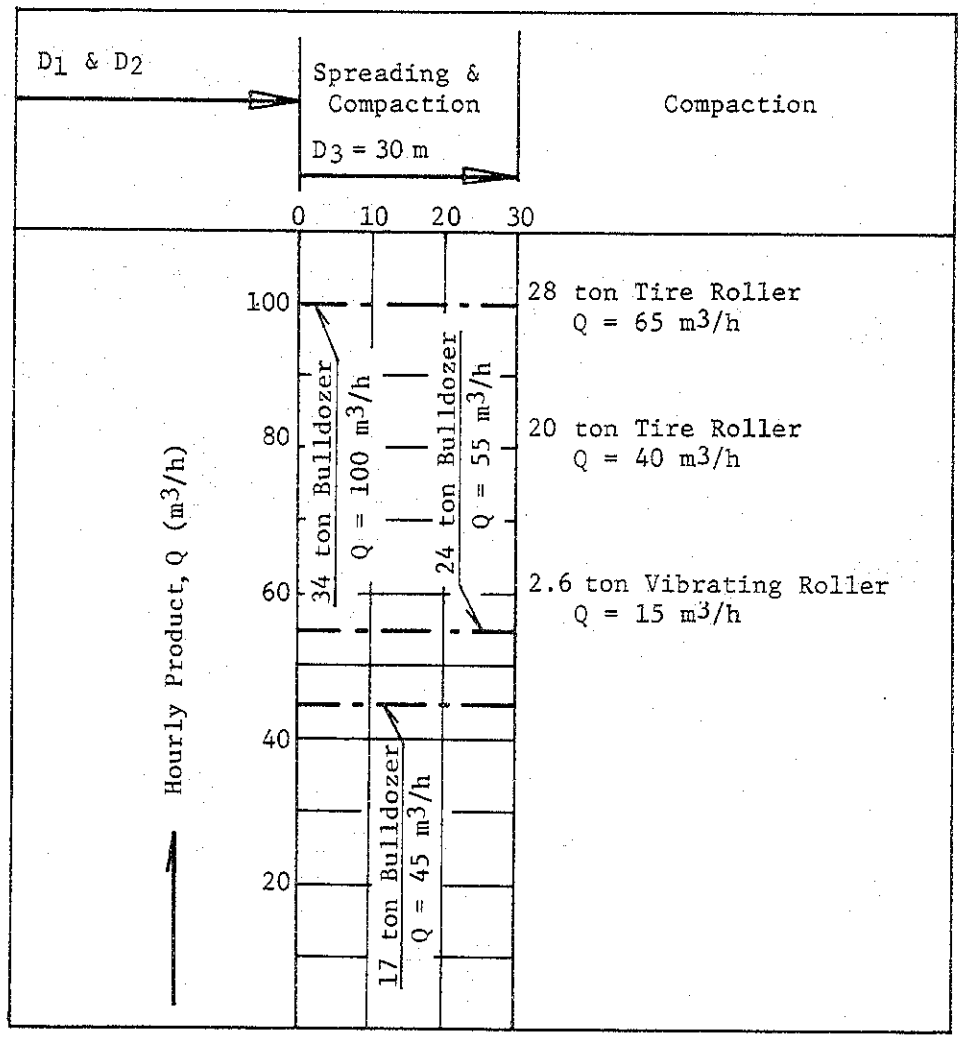
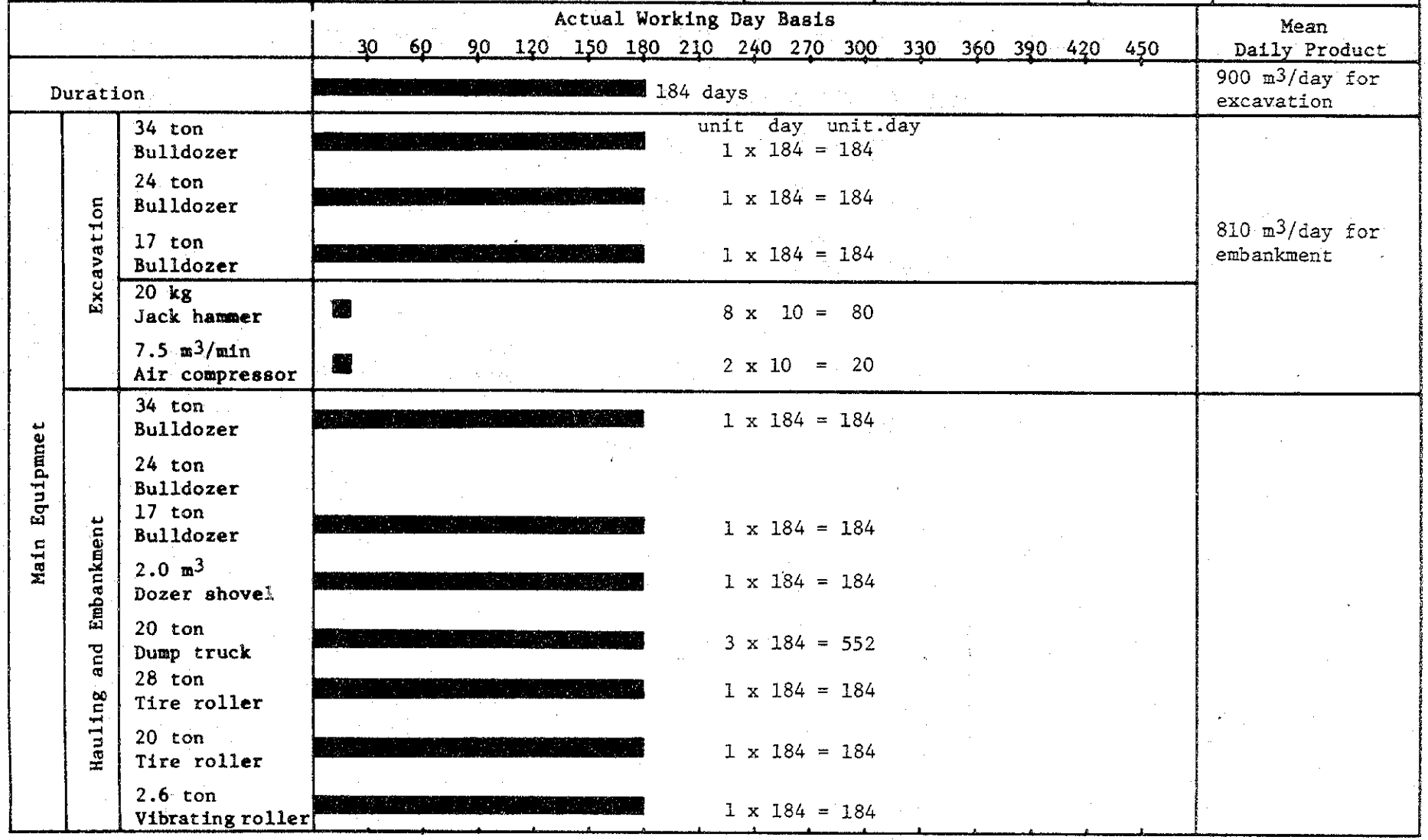


Table 2.4-25 Actual Working Day Analysis for Earth-moving Section

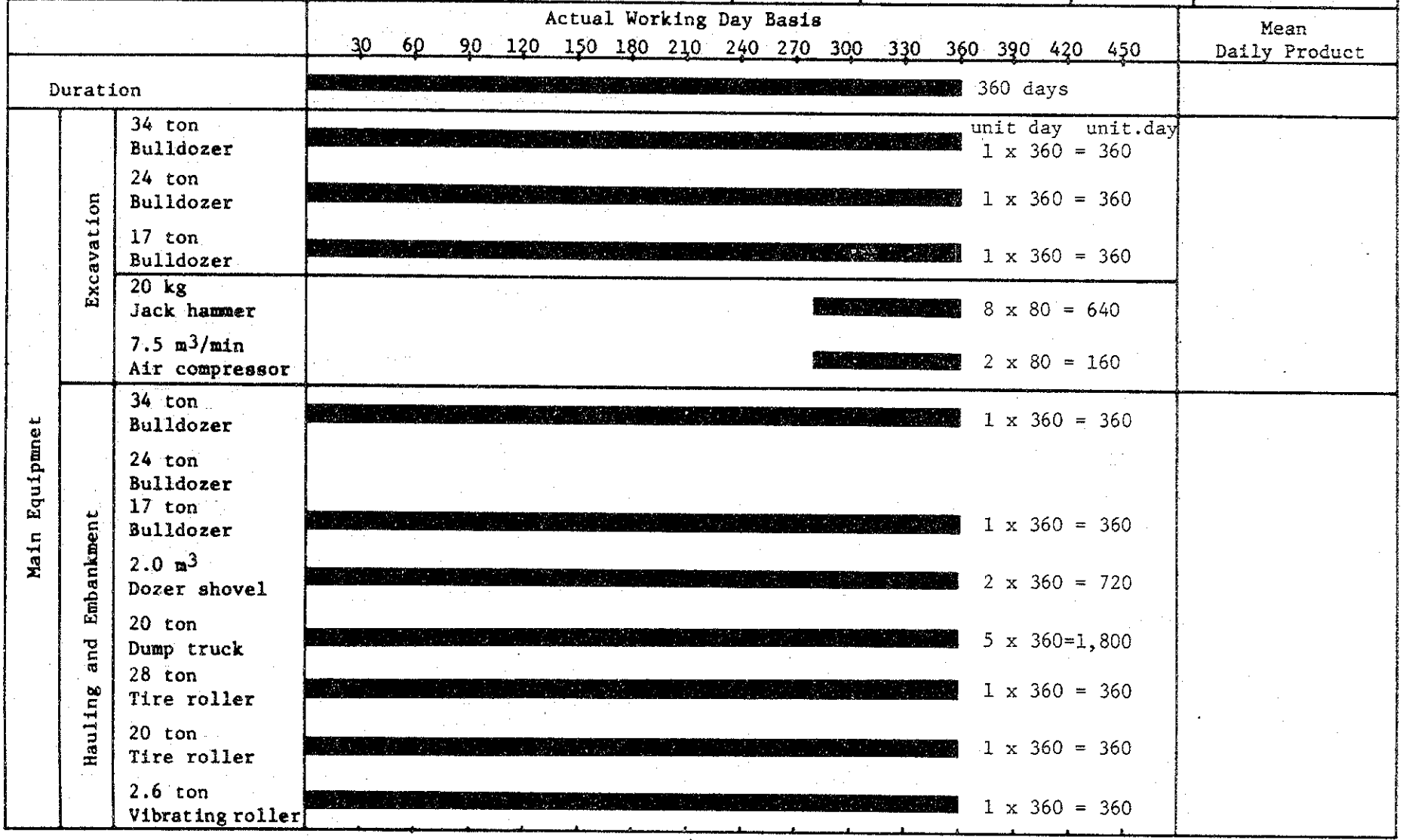
Section	Sta.0+00 ∿ Sta.34+80 & Access Road	Excavation	165,000 m^3	Embankment	149,000 m^3



/1 Volume of sound rock: 6,400 m^3

Table 2.4-26 Actual Working Day Analysis for Earth-moving Section

Section	Sta.34+20 ∿ Sta.60+78 & Coromandel I.C.	Excavation	322,000 m3	Embankment	292,000 m3



/1 Volume of sound rock: 12,500 m3

Table 2.4-27 Actual Working Day Analysis for Earth-moving Section

Section	Sta.62+82 ∿ Sta.76+13 & M_1-M_2 Road	Excavation	125,000 m³	Embankment	167,000 m³

Actual Working Day Basis: 30 60 90 120 150 180 210 240 270 300 330 360 390 420 450

Mean Daily Product

Duration			206 days	
Main Equipmnet	Excavation	34 ton Bulldozer	unit 1	
		24 ton Bulldozer	1	
		17 ton Bulldozer	1	
		20 kg Jack hammer	unit × day = unit.day 8 × 22 = 176	
		7.5 m³/min Air compressor	2 × 22 = 44	
	Hauling and Embankment	34 ton Bulldozer	unit 1	
		24 ton Bulldozer		
		17 ton Bulldozer	1	
		2.0 m³ Dozer shovel	$\frac{760}{70 \times 8\ h}$ = 2 unit	
		20 ton Dump truck	$\frac{760}{53 \times 8\ h}$ = 2 unit	
		28 ton Tire roller	1 unit	
		20 ton Tire roller	1	
		2.6 ton Vibrating roller	1	

/1 Volume of sound rock: 3,500 m³

Table 2.4-28 Summary of Construction Period for Box Culvert

S T A.	Dimension	Nos. of span	(Calendar day basis) 10 20 30 40 50 60 70 80 90 100
9 + 37.20	4.0 x 4.8 x 49.66	4	
13 + 95.00	5.5 x 4.8 x 28.40	2	
15 + 13.40	2.5 x 1.5 x 40.60	3	
15 + 66.00	2.5 x 1.5 x 39.60	3	
27 + 22.00	1.5 x 1.5 x 31.82	2	
30 + 73.20	5.5 x 4.8 x 32.03	2	
38 + 20.00	4.3 x 5.4 x 28.40	2	
Feeder Road 2 + 65.00	4.3 x 3.0 x 17.36	1	
Feeder Road 8 + 00	1.8 x 1.8 x 18.13	1	
68 + 88.00	5.5 x 4.8 x 28.22	4	

Table 2.4-29 Actual Working Day Analysis for One Span of Box Culvert

		Mean Q'ty for 1 span	Duration for 1 span (Actual Working day basis) 5 10 15 20
Foundation	Excavation	375.4 M^3	
	Foundation & Leveling Concrete	14.3 M^3 7.2 M^3	
	Formwork	65.0 M^2	
	Reinforcement	870.0 Kg	
	Concreting	31.0 M^3	
Structure	Scaffolding	361.4 M^3	
	Formwork	301.0 M^2	
	Reinforcement	7.86 Ton	
	Concreting	93.3 M^3	
	Curing & Removal of Form		
total			8 days 13 days
Duration for 1 Box Culvert			8 days + (13days x Nos. of span)

Table 2.4-30 Schedule Analysis of Pavement Work, Sta.0 + 00 ∿ 76 + 13

Works	Daily Production	0 20 40 60 80 100 120 140 160 180 200 220 240 260 280
Preparation on subgrade	4,000 m^2/day	25
Subbase course	1,000 m^3/day	30
Base course (carriage way)	1,000 m^3/day	20
Base course (shoulder)	500 m^3/day	7
Asphalt binder course	390 ton/day	31
Asphalt wearing course & surface course	390 ton/day	40
Others		50
Total		160

Table 2.4-31 Schedule Analysis of Pavement Work, Phased Construction Part of Link Road

Works	Daily Production	0	50	100
Preparation on subgrade	4,000 m^2/day	3		
Subbase course	1,000 m^3/day			
Base course (carriage way)	1,000 m^3/day	2		
Base course (shoulder)	500 m^3/day	1		
Asphalt binder course	390 ton/day	5		
Asphalt wearing course & surface course	390 ton/day	5		
Others		20		
Total		35		

Table 2.4-32 Schedule Analysis of Pavement Work, Coromandel I.C.

Works	Daily Production	0 50 100
Preparation on subgrade	4,000 m^2/day	5
Subbase course	1,000 m^3/day	5
Base course (carriage way)	1,000 m^3/day	2
Base course (shoulder)	500 m^3/day	2
Asphalt binder course	390 ton/day	5
Asphalt wearing course & surface course	390 ton/day	6
Others		20
Total		45

Table 2.4-33 Schedule Analysis of Pavement Work, Motorway Junction

Works	Daily Production	0	50	100
Preparation on subgrade	4,000 m^2/day	10		
Subbase course	1,000 m^3/day	10		
Base course (carriage way)	1,000 m^3/day	3		
Base course (shoulder)	500 m^3/day	2		
Asphalt binder course	390 ton/day	12		
Asphalt wearing course & surface course	390 ton/day	14		
Others		30		
Total		72		

Table 2.4-34 Schedule Analysis of Pavement Work, Phased Construction Part of Motorway Junction

Works	Daily Production	0 50 100
Preparation on subgrade	4,000 m^2/day	2
Subbase course	1,000 m^3/day	
Base course (carriage way)	1,000 m^3/day	2
Base course (shoulder)	500 m^3/day	1
Asphalt binder course	390 ton/day	2
Asphalt wearing course & surface course	390 ton/day	2
Others		15
Total		21

Table 2.4-35 Schedule Analysis of Pavement Work, Access Road

Works	Daily Production	0	50	100
Preparation on subgrade	4,000 m^2/day	4		
Subbase course	1,000 m^3/day	4		
Base course (carriage way)	1,000 m^3/day	4		
Base course (shoulder)	500 m^3/day			
Asphalt binder course	390 ton/day			
Asphalt wearing course & surface course	390 ton/day	7		
Others		20		
Total		39		

Table 2.4-36 Proposed Work Schedule

Bill No. Works	The 1st Half Year			2nd						3rd						4th						5th						6th					
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36
A. GENERAL ITEMS																																				
Mobilization																																				
B. DEMOLITION AND CLEARANCE																																				
Clearance, etc.																																				
Phased Construction Part of the Above																																				
C. EARTH WORKS																																				
Roadway Excavation and Ancillary Works				Sta. 0+0 ~ Sta. 34+20										Sta. 34+20 ~ Sta. 60+78 & Coromandel I.C.																							
																												St. 62+82 ~ Sta. 76+13 & Motorway Junc.								
Phased Construction Part of the Above																																				
Structure Excavation and Ancillary Works																																				
Phased Construction Part of the Above																																				
D. STRUCTURAL CONCRETE AND ANCILLARIES																																				
Box Culverts and Ancillary works					Sta. 9+37.2																															
								Sta. 13+95																												
										Sta. 15+13.4																										
											Sta. 15+60																								
												Sta. 27+82																						
				F. Rd. 2+65										Sta. 30+73.2																				
				F. Rd. 8+00																														
																		Sta. 68+88																
Link Road Bridges										A-Le Br.																								
G.R.N.W. Bridge (2 nr) and Ancillaries				B-Le Br.																														
ditto																						A-Le Br.												
St. Louis River Bridge (2 nr) and Ancillaries																B-Le. Br.																		
Rampway Bridges (4 nr) and Ancillaries																													Cor. Int. E-Rp. Br.					
														Cor. Int. F-Rp. Br.																				
								Mwy. Jun. G-Rp. Br.																					Mwy. Jun. B-Rp. Br.					
Over Bridges (5 nr) and Ancillaries					(Abutment)																									Sta. 22 Over Br.				
									Cor. Int. H-Rp. Ov. Br.																										
							A-1 Road Ov. Br.																							Coromandel Ov. Br.					
																														Pailles Ov. Br.				
Pedestrian Bridges (2 nr)																																		
Aquaduct Bridges (2 nr) and Ancillaries			Sta. 57 Aq.					Sta. 22 Aq.																										
Motorway Junction Bridges																																		
A-Le 1 Br.																																		
B-Le 1 Br.																																		
A-Le 2 Br.																																		
B-Le 2 Br.																																		
A-Le 3 Br.																																		
B-Le 3 Br.																																		
E-Ramp Br.																																		
Ancillary Works incl. R. Wall, etc.																																		
Any other Works of Phased Construction																																		
E. PAVEMENT AND ANCILLARY WORKS																			Sta. 0+00 ~ Sta. 76+13															
Pavement, etc.																										Coromandel I.C								
																					Access Road												
Phased Construction Part of the Above																												Mwy. Junction						
F. STORM DRAINAGE WORKS																																		
Pipe Culverts																																		
Other Drainage																																		
Phased Construction Part of the Above																																		
G. MASONRY WORKS																																		
All Structures and Ancillaries																																		
Phased Construction Part of the Above																																		
H. LIGHTING INSTALLATIONS																																		
Point aux Sable / Coromandel Interchabge																																		
Phased Construction Part of the Above																																		
Mortorway Junction																																		
Phased Construction Part of the Above																																		

Table 2.4-37 Arrangement Schedule of Main Constructional Equipment

Item \ Accum. Calendar Month	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36
Bulldozer 34 ton				4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	2	2											
ditto 24 ton				2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	1	1											
ditto 17 ton				4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	2	2											
Dozer Shovel 2.0m^3				3	3	3	3	3	3	3	3	3	4	4	4	4	4	4	4	4	4	4	4	2	2	2	2	2	2	2	2	2				
Dump truck 20 ton				8	8	8	8	8	8	8	8	8	8	7	7	7	7	7	7	7	7	7	7	3	3	3	3	3	3	3	3	3				
Tire Roller 28 ton				2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4
ditto 20 ton				2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	5	5	5	5	5	5	5	4	4	4	4	4	4	4	4	4	4	4
Vibrating Roller 2.6 ton				2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	1	1											
ditto 1 ton																			2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2
Motor Grader 3.7m																			2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2
Macadam Roller 12 ton																			4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4
Water Tank Lorry 5000																			1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
Asphalt Finisher 4.5m																			4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4
Back Hol 1.5m^3						1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1											
ditto 1.0m^3				1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	
ditto 0.5m^3				2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	
Truck Crane 80 ton										1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	
Wheel Crane 10-20 ton							2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	
ditto 5-10 ton				1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	
Truck 6 ton				2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	
Erection Girder 35 ton										1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	
ditto 50 ton																										1	1	1	1	1	1	1				

3. ESTIMATE OF CONSTRUCTION COST

3.1 General

3.1.1 Bill classification

With respect to the Clause 4.3.5 Construction Quantities of Scope of Work, it is recommended that the bill classification be modified as below in order to cover the characteristics of works in more detail for both the contracts of Roadway and Bridge Sections.

(a) General items
(b) Demolition and clearance works
(c) Earthworks
(d) Structural concrete and concrete ancillaries works
(e) Pavements and road ancillaries works
(f) Storm drainage works
(g) Masonry works
(h) Lighting installations
(i) Daywork schedules

3.1.2 Cost estimate

The cost estimate of the project stands on the basis of the price level of September, 1979 (Base Date). In connection with the consultancy service of the Clause 4.3.6 Cost Estimate Scope of Work, the following unit price analysis method is employed. The Unit Price Analysis of Work Item Sheet appended to this volume consists of:

Cost elements vertically on the analysis sheet;

(a) Equipment cost
(b) Labour cost
(c) Material cost
(d) Overhead cost, and
(e) Profit

Elements (d) and (e) are fixed as 20% and 5% of the sum of (a) to (c) respectively for all work items.

Cost components horizontally on the sheet;

(a) Local currency cost

(b) Foreign currency cost, and

(c) Taxes (to be included in local cost component)

In the cost element column, the fuel consumption cost will be shown separately to conduct the sensibility analysis of its impact on total cost by inflation or any other reason, and as for the taxes in the cost component row they will be analyzed into import duties, corporate taxes and income taxes to give the option for financial cost reduction from the amount of the construction cost by the Employer.

(1) Labour costs

The basic data is wholly obtained from local sources. The costs by categorized labour are shown in Table 3.2-6. They include allowances and fringe benefits, but exclude indirect overburdens for the performance of work, almost all of which are billed in relevant items of General Items.

(2) Equipment costs

All information is derived from the Site investigation in September of 1979. Additional information is from the effective makers of plant/ equipment in Japan or other countries.

The costs are all indicated on the delivered hourly cost basis, but exclude the operator's hourly wages and allowances which are included in the labour cost element.

The results are summarized in Table 3.3-34 attached thereto and correspond well to the realistic prices of Mauritius at the Base Date.

(3) Material Costs

The material costs are shown on the basis of delivered cost to the Site. The material costs are classified into:

Imported material (e.g. cement)

Domestic products of which raw materials are imported (e.g. reinforcing steel bar)

Domestic products of which raw materials are produced locally (e.g. aggregate)

Domestic products which consist of the above material elements (e.g. concrete)

Imported materials are classified into several classes by their rate of import duties. Analyses of cost components for materials are made in a manner principally the same as those for Work Items. The equipmnt cost which relates to the manufactureing or transporting process of materials will be taken into account.

(4) Taxes

The tax components shown separately on the Analysis Sheet are corporate tax, income tax and import duties. The technical possibility to extract the 3 tax factors from the tax cost element is shown schematically in the attached figures.

3.1.3 Adjustment of construction cost

All costs are expressed in Mauritius Rupee and are based on the price level of September 1979 (Base Date). Therefore, the financial analysis for the adjustment of the estimated amount so as to correspond to the influence of price fluctuations which may, for any reason occur. By the results of Unit Price Analysis, the following variation factors will be considered.

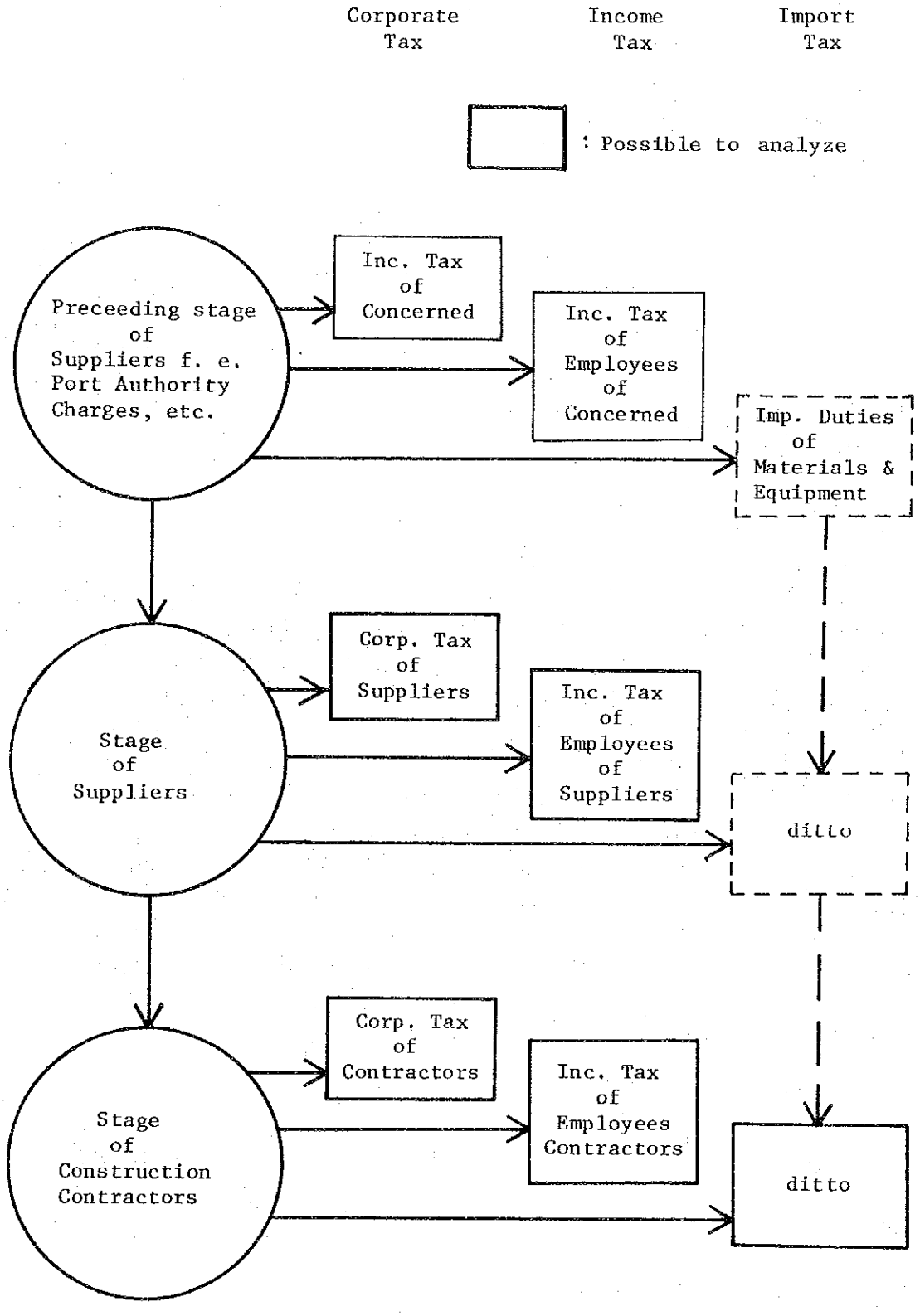
(a) Influences of the currency devaluation in October of 1979

(b) Influences of annual inflation factor

(c) Influences of the remittance of foreign contractors:

The unit price analysis is based on the assumption that the construction is performed solely by local contractors. So, the rate of contract amount of the total amount for prospective foreign contractors shall be taken into consideration and reasonable adjustment for the foreign portion will be prepared.

Fig. 3.1-1 Taxes separately shown on Cost Element Analysis



3.2 Labour Cost

3.2.1 Description

The Labour Cost means the cost of the labour element computed in the Unit Plice Analysis of Work Item Sheets, which is required for the performance of a specified quantity of itemized work. The labour cost shall be shown in an appropriate classification according to the quality of labour. For the sake of convenience of analysis, each classified labour cost will be shown on an hourly cost basis.

The Labour Cost will be inclusive of hourly distributed wages, fringe benefits and expenses whatever directly or indirectly paid to the employee, but it excludes indirect overburden costs for the work performance such as labour control costs, insurances, facility costs for labourers, etc. These latter expenditures will be summed up in the overhead costs of each work item or separately in the relevant items of General Item of Bills of Quantities.

An analysis of labour cost is based on the information and data collected during Site Investigations in Mauritius in September of 1979. Consequently, the applicable labour cost at the prospective time of construction will be forecast on the basis of the above data.

The cost will be therefore reviewed and modified, if necessary, in another part of this volume for the proposed commencement date of construction taking into consideration the cost fluctuation factors such as the annual mark-up trend inflation, etc. which are in effect after the abovementioned base date for the analyses.

At the first step of analysis, almost all of the labour cost may be deemed as a local currency cost component on the assumption that the Contract be awarded only to a local contractor(s). In this respect, an additional review for the component analysis will be made together with contractual considerations for the awarding policies.

3.2.2 Mark-up trand of basic wage

Fig. 3.2-1 derives from the analyzed data during the period 1975 to 1978 by the Builders' Association of Mauritius. From this, the mark-up trend of the basic wage for each category of labour may be approximately 6 per cent per annum, so the wage level of 1979 and thereafter can be forecast as shown respectively in parentheses. Those forecast figures will be checked reckoning with the actual mark-up trand after the base date.

3.2.3 Classification of labour and labour cost

Table 3.2-1 shows the amount of labour employed in the construction field of Sugar Millers' Estate, and their lowest and highest monthly wages both in 1977 and 1978 subject to the labour category.

In the table, the wages of 1979 are forecasted by multiplying 1.06 to the figures of 1978. Also the hourly wages are based on an assumption that the number of working days of a calender month is 26 and working hours of a calender day is 8.

In a same manner, the information on the wages by category for the constructional labour of the Central Government are arranged in Table 3.2-2. The wage level shown above is deemed to be inclusive of the fringe benefits.

Table 3.2-3 shows the analyzed result of labour costs depending on the governmental guided basic wage in the Notice of 1979. The cost includes fringe benefits shown in Table 3.2-4 which are based on the analysis concept by Builders' Association of Mauritius.

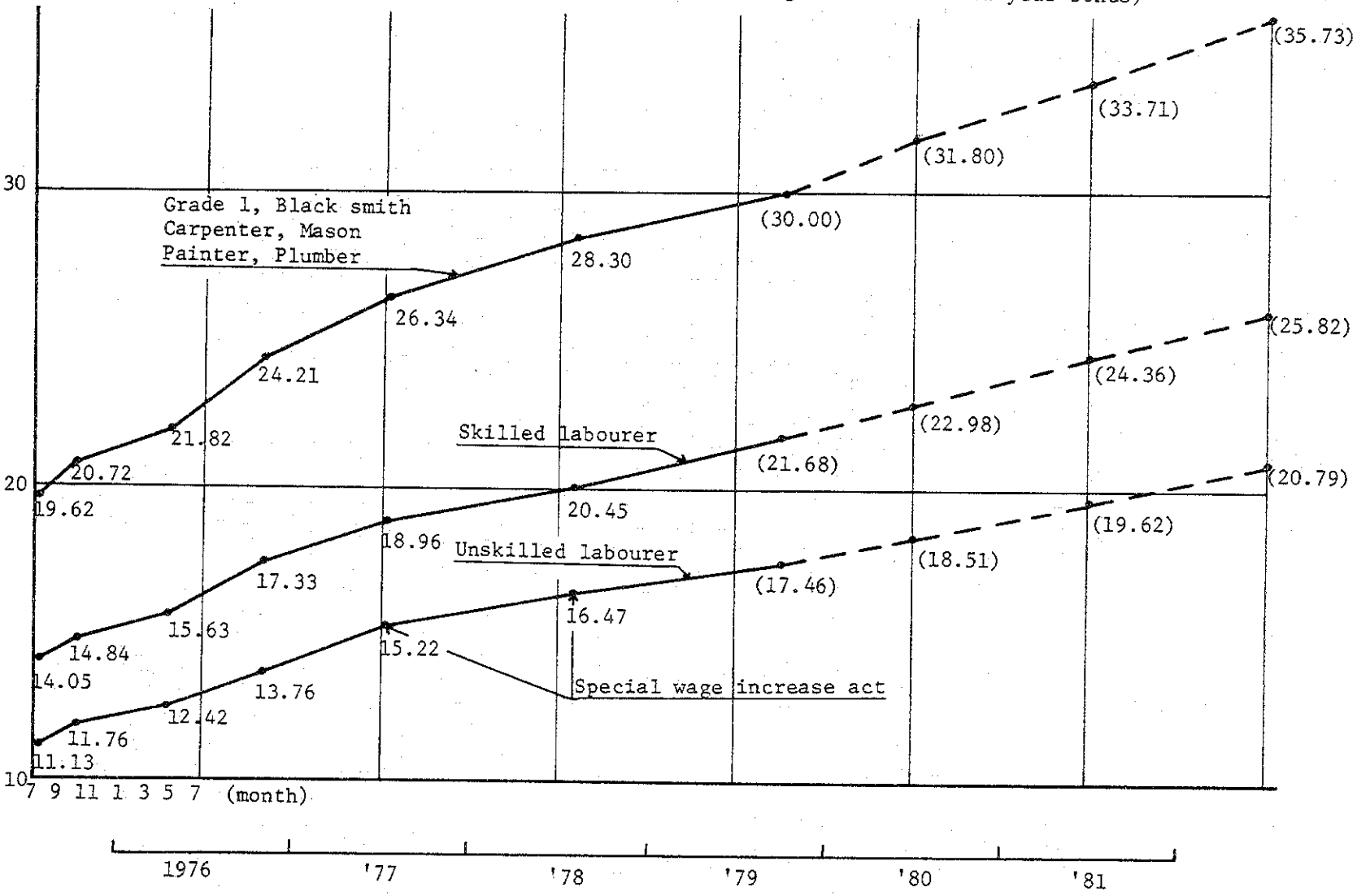
In the table labour is classified into seven groups based on the hourly cost level. Also the various kinds of labourer in both the Sugar Estates and Central Government discussed above are classified into relevant classes by cost level.

3.2.4 Income tax rate for labour cost

The calculation of the income tax rate against labour cost is attempted in a manner as shown in the Table 3.2-5, which is referred to "A Consolidated Version of the Labour Act 1975" and "Year of Assessment 1979-1980, Notes for the Completion of Year Return."

From these foregoing analyses the hourly labour costs and income tax component rates are concluded as in the Table 3.2-6.

Fig. 3.2-1 MARK-UP TREND OF BASIC WAGE (including COLA and end of year bonus)



/1 Source: Buiders' association of Mauritius
Analysis of standing incrase, 6 Sep. 1978

Table 3.2-1 Hourly Wages by Labour Category in Sugar Millers' Estate

Category	Grade	1977 /1			1978 /1			Monthly salalies (mean)		1978/1977 (mean)	1979	1979
		Nos. employed	Monthly salaries (Rs)		Nos. employed	Monthly salaries (Rs)		1977 (Rs)	1978 (Rs)		Houry wage (Rs)	Houry wage (mean) (Rs)
			Lowest	Highest		Lowest	Highest					
Motor mechanic (automobile)	Chief	14	1,456.50	1,865.00	11	1,539.50	1,539.50	1,660.75	1,539.50	0.927	7.85	5.69
	Superior	84	1,108.00	1,254.24	81	1,185.00	1,481.22	1,181.12	1,333.11	1.129	6.79	
	I	97	983.75	1,010.30	99	1,056.75	1,056.90	997.03	1,056.83	1.060	5.39	
	II	62	777.50	777.66	78	835.50	983.84	777.58	909.67	1.170	4.64	
Welder	Chief	13	1,177.50	1,237.35	14	1,254.50	1,316.38	1,207.43	1,285.44	1.065	6.55	5.38
	Superior	41	1,108.00	1,133.00	41	1,185.00	1,210.00	1,120.50	1,197.50	1.069	6.10	
	I	50	983.75	1,034.90	46	1,056.75	1,115.00	1,009.33	1,085.88	1.076	5.53	
	II	54	777.50	880.88	69	835.00	978.90	829.19	906.95	1.094	4.62	
Carpenter	Chief	20	1,048.50	1,319.22	20	1,123.50	1,214.61	1,186.86	1,214.06	1.026	6.19	4.66
	I	94	815.75	965.38	100	877.75	1,038.44	890.57	958.10	1.076	4.88	
	II	79	749.00	749.00	91	803.00	803.14	749.00	803.07	1.072	4.09	
Driver (heavy mechanical unit)	Superior	66	899.50	1,057.42	53	998.00	1,170.00	978.46	1,084.00	1.108	5.52	4.75
	I	96	761.00	899.34	90	840.00	965.00	830.17	902.50	1.087	4.60	
	II	37	687.00	737.00	38	762.25	819.00	712.00	790.63	1.110	4.03	
Driver (lorries, vans, buses cars, lollers, wheel fractors, light loaders)	Superior	33	844.25	1,077.35	30	927.00	998.00	960.80	962.50	1.002	4.91	4.37
	I	942	761.00	915.88	951	840.00	906.25	838.44	873.13	1.041	4.65	
	II	214	687.00	728.00	327	762.25	835.64	707.50	798.95	1.129	4.07	
Fitter	Chief	33	1,177.50	1,456.50	32	1,254.50	1,539.50	1,317.00	1,397.00	1.061	7.12	5.58
	Superior	90	1,108.00	1,163.75	97	1,185.00	1,240.72	1,135.88	1,212.86	1.068	6.18	
	I	91	983.75	1,034.90	93	1,056.75	1,121.00	1,009.33	1,088.88	1.079	5.55	
	II	104	777.50	894.50	104	835.50	962.00	836.00	898.75	1.075	4.58	

/1 Source: BI-ANNUAL DIGEST OF STATISTICS, December 1978, Ministry of Economic Planning and Development, Central Statistical Office.

Table 3.2-2 Hourly Wages by Labour Category in the Central Government

Daily wages / Year / Category	Daily wages lowest (Rs)		Daily wages highest (Rs)		Hourly wages
	1977	1978	1977	1978	1979
Fitter	28.88	31.11	49.96	53.00	5.26
Mechanic	28.88	31.11	49.96	53.00	5.26
Carpenter	28.88	31.11	49.96	53.00	5.26
Mason	28.88	31.11	49.96	53.00	5.26
Driver	25.53	27.50	40.65	43.53	4.44
Skilled labourer	19.73	21.26	25.53	27.50	3.05
Unskilled labourer	18.88	20.26	23.50	25.30	2.85

Table 3.2-3 Analysis of Labour Cost

Category	Daily basic wage in 1978 (Rs)	Supposed daily basic wage in 1979 (1)x1.06 (Rs)	Fringe benefit in 1979 (2)x0.53 (Rs)	Daily supposed payment in 1979 (2)+(3) (Rs)	Hourly cost (4)/8 hr (Rs)	Classification		Remarks
						Class	Rounded up hourly cost (Rs)	
	(1)	(2)	(3)	(4)	(5)		(6)	
Chief forman	50.5	53.16	28.17	81.33	10.17	1	10.5	
Foreman (2nd year)	34.15	36.20	19.19	55.39	6.92			
Stone mason	31.61	33.51	17.76	51.27	6.41	2	7.0	
Leading hand artisan	30.18	31.99	16.96	48.95	6.12			
Mechanic grade 1, Driver grade 1	26.72	28.32	15.01	43.33	5.42			Rs ** Welder (5.38) ** Motor Mechanic (5.69) ** Fitter (5.58) * Fitter (5.58) * Mechanic (5.58) * Carpenter (5.58) * Mason (5.58)
Black smith, Carpenter, Mason, Painter, Plumber grade 1	26.12	27.69	14.67	42.36	5.30	3	5.5	
Bar bender grade 1	25.37	26.89	14.25	41.14	5.14			
Mechanic grade 2, Driver grade 2, Black smith, Carpenter, Mason, Painter, Plumber grade 2	22.69	24.05	12.75	36.08	4.60	4	5.0	** Carpenter (4.66) ** Driver, Heavy Unit (4.75) * Driver (4.71) * Driver (4.37)
Bar bender grade 2	21.72	23.02	12.20	35.22	4.40			
Driver (others)	19.18	20.33	10.78	31.11	3.89			* Specialized labourer (3.23)
Plant operator	19.56	20.73	10.99	31.72	3.97	5	4.0	
Skilled labourer	18.88	20.01	10.61	30.62	3.83			
(Semiskilled labourer)						6	(3.5)	
Unskilled labourer	15.20	16.11	8.54	24.65	3.08	7	3.0	* Unskilled labourer (3.02)

/1 Data for Labour Calssification and Daily Basic Wage derive from the Governmental Notice No. 5 of 1979.

/2 In column "Remark", the Hourly Wages for both Sugar Millers' Estate and Central Government employees are shown as references marked by ** and * respectively.

Table 3.2-4 Analysis of Ratio of Fringe Benefits for Basic Wage

	Effective working hours	Effective pay hours
Normal working hours in the year : assumed 52 weeks x 45 hours/week ;	2,340	2,340
Extra working hours : assumed 5% of the above hours ;	117	176
	2,457	2,516
Less : Statutory paid leave		
Public holidays ; 20 x 8	-160	-
Annual leave ; 12 x 8	- 96	-
Sick leave		
on full pay ; 12 x 8	- 96	-
on half pay ; 24 x 8	-192	-96
	1,889	2,420
Add :		
Severance allowance ; 15 x 8	-	120
End of year bonus ; 26 x 8	-	208
6% contribution to National Pension Fund : assumed 6% x 2,420 hours ;	-	145
	1,889	2,893

The following ratio is considered with effect from 1 July 1978;

Table 3.2-5 Analysis of Income Tax Ratio for Hourly Labour Cost

Description \ Category	Local							Expa-triate
	1	2	3	4	5	6	7	
Hourly cost (1)	10.5	7.0	5.5	4.0	3.5	3.0	3.0	45.0
Annual net income (2) (1) x 2748 hrs	Rs 28,854	19,236	15,114	13,740	10,992	9,618	8,244	123,660
Deductions								
. Emolument relief 5% of (1), but limited to Rs5,000	Rs 1,443	962	756	687	550	481	412	5,000
. Unmarried dependent children, assume 2 in nos., Rs4,500	Rs 4,500	4,500	4,500	4,500	4,500	4,500	4,500	4,500
. Dependent relatives assume 1 in nos., Rs1,000	Rs 1,000	1,000	1,000	1,000	1,000	1,000	1,000	1,000
. Contribution to N.P.F., assume (1) x 73 hrs	Rs 767	511	402	365	292	256	219	3,285
. Medical expences & contribution, assume 5% of (1), but limit to Rs1,500	Rs 1,443	962	756	687	550	481	412	1,500
. Provision for retire-mentannuities, 10% of (1), but limit to Rs5,000	Rs 2,885	1,924	1,511	1,374	1,099	962	824	5,000
. Relief for Life insurance premiums, 3.3%, but limit to Rs5,000	Rs 952	535	499	453	363	317	272	1,000
Total of deduction (3)	Rs 12,990	10,394	9,424	9,066	8,354	7,997	7,639	21,285
Chargeable income (4)	Rs 15,864	8,842	5,690	4,674	2,638	1,621	605	102,375
Tax payable								
5% of first Rs5,000	Rs 250	250	250	234	132	81	30	
10% of next Rs5,000	Rs 500	384	69					
20% of next Rs10,000	Rs 1,173							
Total of tax payable (5)	Rs 1,923	634	319	234	132	81	30	41,281
Taxation ratio (5)/(2)	6.6	3.3	2.1	1.7	1.2	0.8	0.4	33.3

Table 3.2-6 Cost Component of Hourly Labour Cost

Category	Hourly labour cost (Rs)	Component		
		Local (Rs)	Foreign (Rs)	Tax (Rs)
Local				
Class 1	10.5	100% 10.5	0	7% 0.7
Class 2	7.0	100% 7.0	0	3% 0.2
Class 3	5.5	100% 5.5	0	2% 0.1
Class 4	5.0	100% 5.0	0	2% 0.1
Class 5	4.0	100% 4.0	0	0
Class 6	3.5	100% 3.5	0	0
Class 7	3.0	100% 3.0	0	0
Expatriate	45.0	47% 21.0	53% 24.0	33% 14.9

/1 Local component includes taxes.

3.3 Equipment Cost

3.3.1 Descriptions

The Equipment Cost means the cost of equipment element put into the Unit Price Analysis Sheet, which is required for the performance of specified quantity of itemized work. The cost will be analyzed on an hourly cost basis on assumptions that the equipment is delivered on to Site and ready for normal operations.

3.3.2 Current hourly cost of main construction equipment

The Table 3.3-1 shows the prevailing hourly use rate of main construction equipment at the base date i.e. September of 1979, which are obtained from the interviews with local contractors and the analyses of tender documents of previously executed projects in Mauritius.

In the table, it is noted that the mark-up trend of hourly costs between 1977 to 1979 is approximately 20-30 per cent. The tendency gives an index to the estimate of cost of construction equipment for the Works.

3.3.3 CIF Port Louis value of imported construction equipment

The Table 3.3-2 shows the CIF values at Port Louis in September 1979 of heavy equipment, which are quoted by a major Japanese construction machine maker. The relationship between the delivered price in Japan and FOB value in Japan, or the rate of insurances/freight costs against the FOB value in Japan may be useful for the estimation of CIF value in Port Louis of general equipment.

So far as limited in the table, the CIF value goes 10 to 20 per cent higher than the FOB value in Japan, and the freight/insurance cost accounts for approximately 20 per cent of the FOB value in Japan. By comparing the CIF value at Port Louis with the delivered price in Japan for each item, the rate of increase becomes approximately 10 per cent. The trial calculation of hourly costs of main equipment which may be imported from Japan coincide with the prevailing cost levels in Mauritius shown in the Table 3.3-1.