XI-3-3 Profitability

Thoroughly examining the break-even points and the economical indices obtained from DCF analysis and profit and loss statements, the profitability of the Project are described as follows.

(1) Although the Project is judged to be profitable for all the plant capacity, the more the plant capacity the better the profitability.

(2) Speaking in general the effect of interest rate is remarkable and especially in small plant capacity the profitability is lowered by high interest rate.

(3) The break-even points are favourable figures, except the case of high interest rate (9.5 %/y) for 750 and 1,000 t/d plant, showing 78 per cent at maximum and mostly less than 60 per cent.

They are lowered as reduction of interest due to the repayment of loan.

(4) The economical indices are generally in the favourable range.

(5) Judging from the results of the sensitivity analysis made for the plant capacity of 1,000 and 1,500 t·cl/d, the variations of condition of such ranges as assumed do not have so much effect on the profitability and in that regards the profitability of the Project is considered to be flexible.

XI-4 Sales Price

The breakdown of sales price are shown in Table 11-4-1 ~ 11-4-3.
As to the calculation base, refer to XI-2-1 and I-1 respectively.

(1) Interest rate for long term loan   9.5 %/y
                   for short term loan   9 %/y

Table 11-4-1 Breakdown of Sales Price (Rs/t·cement)

Plant capacity (clinker base)	750 t/d	1,000 t/d	1,500 t/d
Production cost	656.6	604.0	541.5
Profit	29.8	82.4	144.9
Excise duty	100.0	100.0	100.0
Sales tax	94.4	94.4	94.4
Ex-factory sales price	880.8	880.8	880.8
Transportation cost etc.	77.2	77.2	77.2
Retail price	958.0	958.0	958.0

Note. Transportation cost was estimated for average distance of 100 km. (Table 11-4-1 ~ 11-4-3)

(2)　Interest rate　for long term loan　7 %/y

for short term loan　9 %/y

Table 11-4-2　Breakdown of Sales Price (Rs/t·cement)

Plant capacity (clinker base)	750 t/d	1,000 t/d	1,500 t/d
Production cost	590.5	546.6	494.7
Profit	95.9	139.8	191.7
Excise duty	100.0	100.0	100.0
Sales tax	94.4	94.4	94.4
Ex-factory sales price	880.8	880.8	880.8
Transportation cost etc.	77.2	77.2	77.2
Retail price	958.0	958.0	958.0

(3)　Interest rate　for long term loan　3 %/y

for short term loan　9 %/y

Table 11-4-3　Breakdown of Sales Price (Rs/t·cement)

Plant capacity (clinker base)	750 t/d	1,000 t/d	1,500 t/d
Production cost	493.9	461.7	426.3
Profit	192.5	224.7	260.1
Excise duty	100.0	100.0	100.0
Sales tax	94.4	94.4	94.4
Ex-factory sales price	880.8	880.8	880.8
Transportation cost etc.	77.2	77.2	77.2
Retail price	958.0	958.0	958.0

Annexure 11-1

Calculation of Construction Interest

The construction cost is paid during the construction period according to the payment schedule.

For the Project, the construction interest was calculated based on a general payment schedule.

The results of calculation are shown in Table A 11-1-1 ~ A 11-1-3 by plant capacity (interest rate of long term loan : 7 %/y).

Table A11-1-1 Calculation of Construction Interest

Plant Capacity (clinker base) : 750 t/d,
Total Construction Cost 767,157,800 Rs

(Rs)

Month	Installment	Cumulated total	Interest(7 %/y)
0	153,431,560	153,431,560	9,845,192
⋮			
10			
11	115,073,670	268,505,230	1,566,281
12	24,409,566	292,914,796	1,708,670
13	24,409,566	317,324,362	1,851,059
14	62,767,456	380,091,818	2,217,202
15	24,409,556	404,501,374	2,359,591
16	24,409,556	428,910,930	2,501,980
17	24,409,556	453,320,486	2,644,369
18	24,409,556	477,730,042	2,786,759
19	24,409,556	502,139,598	2,929,148
20	24,409,556	526,549,154	3,071,537
21	24,409,556	550,958,710	3,213,926
22	24,409,556	575,368,266	30,206,813
23			
⋮			
30			
31	76,715,780	652,084,046	11,411,470
32			
33			
34	61,372,624	713,456,670	12,485,491
35			
⋮			
36			
37	53,701,046	767,157,716	
Total			90,799,488
			90,799,400

Table A11-1-2 Calculation of Construction Interest

Plant Capacity (clinker base) : 1,000 t/d,
Total Construction Cost 888,635,000

(Rs)

Month	Installment	Cumulated total	Interest(7 %/y)
0	177,727,000	177,727,000	11,404,149
⋮			
10			
11	133,295,250	311,022,250	1,814,296
12	28,274,750	339,297,000	1,979,232
13	28,274,750	367,571,750	2,144,169
14	72,706,500	440,278,250	2,568,290
15	28,274,750	468,553,000	2,733,226
16	28,274,750	496,827,750	2,898,162
17	28,274,750	525,102,500	3,063,098
18	28,274,750	553,377,250	3,228,034
19	28,274,750	581,652,000	3,392,970
20	28,274,750	609,926,750	3,557,906
21	28,274,750	638,201,500	3,722,842
22	28,274,750	666,476,250	34,990,003
23			
⋮			
30			
31	88,863,500	755,339,750	13,218,445
32			
⋮			
33			
34	71,090,800	826,430,550	14,462,434
35			
⋮			
36			
37	62,204,450	888,635,000	
Total			105,177,250
			105,177,200

- 342 -

Table A11-1-3   Calculation of Construction Interest

Plant Capacity (clinker base) : 1,500 t/d,
Total Construction Cost 1,086,675,500 Rs

(Rs)

Month	Installment	Cumulated total	Interest(7 %/y)
0	217,335,100	217,335,100	13,945,668
⋮			
10			
11	163,001,320	380,336,420	2,218,629
12	34,576,038	414,912,458	2,420,323
13	34,576,038	449,488,496	2,622,016
14	88,909,813	538,398,309	3,140,657
15	34,576,038	572,974,347	3,342,350
16	34,576,038	607,550,385	3,544,044
17	34,576,038	642,126,423	3,745,737
18	34,576,038	676,702,461	3,947,431
19	34,576,038	711,278,499	4,149,125
20	34,576,038	745,854,537	4,350,818
21	34,576,038	780,430,575	4,552,512
22	34,576,038	815,006,613	42,787,847
23			
⋮			
30			
31	108,667,550	923,674,163	16,164,297
32			
⋮			
33			
34	86,934,040	1,010,608,203	17,685,643
35			
⋮			
36			
37	76,067,285	1,086,675,488	
Total			128,617,090
			128,617,000

Working Capital

Table A11-2-1   Estimated Working Capital Cost
Plant Capacity (clinker base) 750 t/d

	Day's storage	Total quantity (dry ton)	Unit price (Rs/ton)	Total amount (1,000 Rs)
Raw material				
Crushed limestone	40	37,560	21.4	804
Clay	60	9,990	49.4	494
Iron ore	30	293	180.0	53
Silica sand	20	1,170	20.7	24
Gypsum	60	2,250	366.0	824
Consumable stores	60			1,397
Coal	60	5,715	510	2,915
Bags	14	220,500 (bags)	3	662
Goods in process				
Raw meal	7	8,216	47.6	391
Clinker	10	7,500	190.0	1,425
Finished goods				
Unpacked cement	10	7,875	219.9	1,732
Packed cement	5	3,938	279.9	1,102
Net production cost	30	23,625	279.9	6,613
Cash	7			42
Total				18,478
Less : Credit purchases				
Bags	14	220,500	3	662
Total working capital requirements				17,816

Table A11-2-2 Estimated Working Cost

Plant Capacity (clinker base) 1,000 t/d

	Day's storage	Total quantity (dry ton)	Unit price (Rs/ton)	Total amount (1,000 Rs)
Raw material				
Crushed limestone	40	50,080	19.4	972
Clay	60	13,320	47.9	638
Iron ore	30	390	180.0	70
Silica sand	20	1,560	19.4	30
Gypsum	60	3,000	366.0	1,098
Consumable stores	60			1,862
Coal	60	7,620	510	3,886
Bags	14	294,000 (bags)	3	882
Goods in process				
Raw meal	7	10,920	45.2	494
Clinker	10	10,000	184.0	1,840
Finished goods				
Unpacked cement	10	10,500	213.9	2,246
Packed cement	5	5,250	273.9	1,438
Net production cost	30	31,500	273.9	8,628
Cash	7			56
Total				24,140
Less : Credit purchases				
Bags	14	294,000	3	882
Total working capital requirements				23,258

Table A11-2-3 Estimated Working Capital Cost
Plant Capacity (clinker base) 1,500 t/d

	Day's storage	Total quantity (dry ton)	Unit price (Rs/ton)	Total amount (1,000 Rs)
Raw material				
Crushed limestone	40	75,120	17.7	1,330
Clay	60	19,980	46.7	933
Iron ore	30	585	180.0	105
Silica sand	20	2,340	20.5	48
Gypsum	60	4,500	366.0	1,647
Consumable stores	60			2,793
Coal	60	11,430	510	5,829
Bags	14	441,000 (bags)	3	1,323
Goods in process				
Raw meal	7	16,433	43.3	712
Clinker	10	15,000	179.4	2,691
Finished goods				
Unpacked cement	10	15,750	209.3	3,296
Packed cement	5	7,875	269.3	2,121
Net production cost	30	47,250	269.3	12,724
Cash	7			84
Total				35,636
Less : Credit purchases				
Bags	14	441,000	3	1,323
Total working capital requirements				34,313

Construction Costs List

	Item	Specification	Unit	Prevailing Price		Price for the Project Cost Estimate		Remarks
				Rs	Yen	Rs	Yen	
Materials	Cement	50 kg bag *	t	900 ～ 1,000	18,000 ** ～ 20,000	1,000 ***	20,000 ***	Presently, jute bag, but for the Project, paper bag is considered.
	Concrete aggregate	Coarse	m³	70 ～ 135	600 ～ 2,700	120	2,400	
	Concrete aggregate	Fine	m³	30 ～ 35	600 ～ 700	30	600	
	Round bar steel	for concrete	t	3,200 ～ 3,800	64,000 ～ 76,000	3,500	70,000	
	Shape steel	Angle, channel	t	4,000 ～ 5,000	80,000 ～ 100,000	4,500	90,000	
	Galvanized iron sheet	Corrugated	t	10,000	200,000	12,000	240,000	
	Asbestos cement sheet	Corrugated	m²	55	1,100	65	1,300	* See foot note (1)
	Timber	for structure	m³	1,150 ～ 1,600	23,000 ～ 32,000	1,500	30,000	** See foot note (2)
	Brick	First class	pcs. 1,000	250	5,000	300	6,000	
	Cobble		m³	30 ～ 60	600 ～ 1,200	35	700	
	Petrol		ℓ	6.5	130	–*	–*	* See foot note (3)
	Light diesel oil		ℓ	2.18	44	–	–	
	Galvanized steel pipe	φ 3"	m	82.4	1,648	–	–	
	Galvanized steel pipe	φ 2"	m	47.6	952	–	–	
Works	Excavation	upto 2 m	m³	5 ～ 7	100 ～ 140	9	180	
	Excavation	upto 3 m	m³	9	180	12	240	
	Excavation	upto 5 m	m³	15	300	20	400	

	Item	Specification	Unit	Prevailing Price		Price for the Project Cost Estimate		Remarks
				Rs	Yen	Rs	Yen	
Works	Land levelling	Cutting, moving, filling	m^3	5 ~ 6	100 ~ 120	15	300	
	Concrete	Underground $F_{28}=150 kg/cm^2$	m^3	570 ~ 585	11,400 ~ 11,700	Ave. 750	Ave. 15,000	
	Concrete	Superstructure $F_{28}=150 kg/cm^2$	m^3	570 ~ 650	11,400 ~ 13,000			
	Concrete	Superstructure $F_{28}=200 kg/cm^2$	m^3	780	15,600			
	Reinforcing steel	Supply & erection	t	4,500 ~ 4,600	90,000 ~ 92,000	5,000	100,000	
	Concrete form	Supply & erection	m^2	29 ~ 38	580 ~ 760	45	900	
	Structural steel	Supply & erection	t	14,000	280,000	17,500	350,000	
	Asbestos cement sheeting	Supply & erection	m^2	90	1,800	110	2,200	
	Brick masonry	Supply & erection 1 : 4 mortar	m^3	300	6,000	–	–	
	Stone masonry	Supply & erection 1 : 6 mortar	m^3	200 ~ 250	4,000 ~ 5,000	–	–	
	Building	Warehouse without crane	m^2	650 ~ 800	13,000 ~ 16,000	1,000	20,000	inclusive of material, labour, temporary work, overhead
	Building	Office	m^2	800 ~ 1,250	16,000 ~ 25,000	1,500	30,000	
	Building	Residence	m^2	800 ~ 1,200	16,000 ~ 24,000	1,000	20,000	
Labour	Worker (Male)		man·day	6 ~ 10	120 ~ 200	–*	–*	* Refer to the following page.
	Worker (Female)		man·day	5 ~ 7	100 ~ 140	–	–	

	Item	Specification	Unit	Prevailing Price		Price for the Project Cost Estimate		Remarks
				Rs	Yen	Rs	Yen	
Labour	Mason		man·day	15 ≀ 18	300 ≀ 360	—	—	
	Mason assistant		man·day	12	240	—	—	
	Carpenter		man·day	15 ≀ 18	300 ≀ 360	—	—	
	Plumber		man·day	18 ≀ 20	360 ≀ 400	—	—	Project cost estimate was made using the abovementioned price, and, therefore, labour wage rates are not set for the Project cost estimate.
	Mechanical fitter		man·day	20	400	—	—	
	Welder		man·day	20	400	—	—	
	Rivetter		man·day	20	400	—	—	
	Painter		man·day	20	400	—	—	
	Erection labour		man·day	18	360	—	—	
	Supervisor and foreman		man·day	800	16,000	—	—	
	Engineer		man·day	1,200	24,000	—	—	
Others	General temporary work On-cost Head office overhead		%	—	—	33 % of the work cost		

Note : (1) Conversion rate of the local currency to Japanese Yen has been set 1 Rs = 20 Yen (In other parts of this report, 1 Rs = 19.3 Yen)

(2) Prices for the Project cost estimate has been set, as a whole about 20 % greater than the prevailing ones. The reason are

(a) geographical location of the project site and (b) local and temporary supply-demand unbalance of labour and materials due to the Project implementation.

(3) The cost estimates for the items on which no prices are set
     hereabove for the Project cost estimate have been assumed
     by proportioning to the cost estimates of the items on which
     the prices are set hereinabove.

Estimated Cost

(1) Limestone delivered at plant

Table A 11-4-1

(Rs/t)

Plant capacity (clinker base)	750 t/d	1,000 t/d	1,500 t/d
Production (dry base)	309,870 t/y	413,160 t/y	619,740 t/y
Direct cost			
Explosives	1.425	1.425	1.425
Oil and lubricants	3.678	3.678	3.678
Others	0.727	0.727	0.727
Sub total	5.830	5.830	5.830
Fixed cost			
Repair expenses	13.096	11.304	10.277
Labour cost	1.956	1.772	1.268
Electricity	0.523	0.444	0.349
Sub total	15.575	13.520	11.894
Total	21.405	19.350	17.724

Note. Interest and depreciation have been excluded and added in the fixed cost of the production cost.

(2) Clay delivered at plant

Table A 11-4-2

(Rs/t)

Plant capacity (clinker base)	750 t/d	1,000 t/d	1,500 t/d
Production (dry base)	54,945 t/y	73,260 t/y	109,890 t/y
Direct cost			
Oil and lubricants	23.675	22.800	21.941
Labour cost (Direct)	9.855	9.820	9.839
Sub total	33.530	32.62	31.78
Fixed cost			
Repair expenses	13.887	13.541	12.940
Labour Cost	1.965	1.720	1.993
Sub total	15.852	15.261	14.933
Total	49.382	47.881	46.713

Note. Interest and depreciation have been excluded and added in the fixed cost of the production cost.

(3) Silica sand delivered at plant

Table A 11-4-3

(Rs/t)

Plant capacity (clinker base)	750 t/d	1,000 t/d	1,500 t/d
Production (dry base)	19,305 t/y	25,740 t/y	38,610 t/y

Direct cost
  Oil and lubricants
  Labour cost
	7.038
	6.762
		6.072
		7.728
			6.762
			7.038

Sub total	13.800	13.800	13.800

Fixed cost
  Repair expenses
  Labour cost
	6.434
	0.466
		5.233
		0.350
			6.434
			0.233

Sub total	6.900	5.583	6.667
Total	20.700	19.383	20.467

Note. Interest and depreciation have been excluded and added in the fixed cost of the production cost.

(4) Coal delivered at plant

FOR cost at Indian rail head (Jogbani)   Rs 362.8 (IC 261)

Handling charges at Jogbani   Rs   3.7

Transportation cost from Jogbani to Gaighat
 including Toll tax and Road tax   Rs 109.2

Handling charges at Gaighat   Rs   1.8

Handling loss and other expenses   Rs   32.5

Total   Rs 510.0

(5) Gypsum delivered at plant

Cost of gypsum at quarry including tax   Rs   68.0

Railway freight   Rs 185.1

Handling charges at Jogbani   Rs   3.7

Transportation cost from Jogbani to Gaighat
 including Toll tax and Road tax   Rs 109.2

Total   Rs 366.0

Loan Repayment Schedule

(Rs)

Plant capacity (clinker base)	1,000 t/d			1,500 t/d		
Year	Construction cost	Construction interest	Total	Construction cost	Construction interest	Total
1	–	–	–	–	–	–
2	–	–	–	–	–	–
3	–	–	–	–	–	–
4	–	–	–	–	–	–
5	–	–	–	–	–	–
6	31,102,225	3,681,202	34,783,427	38,033,642	4,501,595	42,535,237
7	31,102,225	3,681,202	34,783,427	38,033,642	4,501,595	42,535,237
8	31,102,225	3,681,202	34,783,427	38,033,642	4,501,595	42,535,237
9	31,102,225	3,681,202	34,783,427	38,033,642	4,501,595	42,535,237
10	31,102,225	3,681,202	34,783,427	38,033,642	4,501,595	42,535,237
11	31,102,225	3,681,202	34,783,427	38,033,642	4,501,595	42,535,237
12	31,102,225	3,681,202	34,783,427	38,033,642	4,501,595	42,535,237
13	31,102,225	3,681,202	34,783,427	38,033,642	4,501,595	42,535,237
14	31,102,225	3,681,202	34,783,427	38,033,642	4,501,595	42,535,237
15	31,102,225	3,681,202	34,783,427	38,033,642	4,501,595	42,535,237
16	31,102,225	3,681,202	34,783,427	38,033,642	4,501,595	42,535,237
17	31,102,225	3,681,202	34,783,427	38,033,642	4,501,595	42,535,237
18	31,102,225	3,681,202	34,783,427	38,033,642	4,501,595	42,535,237
19	31,102,225	3,681,202	34,783,427	38,033,642	4,501,595	42,535,237
20	31,102,225	3,681,202	34,783,427	38,033,642	4,501,595	42,535,237
21	31,102,225	3,681,202	34,783,427	38,033,642	4,501,595	42,535,237
22	31,102,225	3,681,202	34,783,427	38,033,642	4,501,595	42,535,237
23	31,102,225	3,681,202	34,783,427	38,033,642	4,501,595	42,535,237
24	31,102,225	3,681,202	34,783,427	38,033,642	4,501,595	42,535,237
25	31,102,225	3,681,202	34,783,427	38,033,642	4,501,595	42,535,237
Total	622,044,500	73,624,040	695,668,540	760,672,840	90,031,900	850,704,740

SECTION XII ECONOMIC EVALUATION

The economic   evaluation of the Project consists of two faces.
One is the effect of the Project to external economy, namely the
evaluation from national or regional economic   point of view, and
the other is the evaluation on the profitability of the Project.
Since the latter is described in Section XI, the evaluation on the
former is stated hereinafter.

(1) Improvement of international payments
     The Project would help Nepal not only to achieve import substitu-
     tion of cement but to export a part of cement produced to the
     neighboring countries.
     Thus the Project could contribute to the improvement of international
     payments by saving and/or acquiring foreign exchange.

     Calculating the amount in case plant capacity is 1,500 t/d (clinker
     base) it will reach as much as about 220.1×10^6 Rs/y.
     In this calculation as the unit price of cement to be imported or
     exported is assumed to be 52 US\$/t·cement (647.4 Rs/t·cement)which
     is the unit price of imported cement both in India and Bangladesh.

		$\times 10^6$ Rs
Sales volume	519,750 t	336.5
Foreign portion of direct cost *		49.2
Foreign portion of fixed cost **		67.2
Net foreign exchange saving (acquisition)		220.1

     Note. 1. * The foreign portion of direct cost consists of raw
              materials, fuel and various materials such as coal,
              gypsum, fire brick, grinding media, and explosives etc.
           2. ** The foreign portion of fixed cost mainly consists of
              interest etc. and in this calculation annual interest
              rate of 7 % was used.
           3. The proportion of foreign exchange saving to foreign
              exchange acquisition is proportionate to the proportion
              of the cement sold in the domestic market to the cement
              exported.

(2) Self-reliance in construction materials
     The Project will substantially increase the domestic availability

of cement in Nepal, and therefore help the country reduce its
dependence on cement imports, which are subject to uncertainties
in the international market unreliable deliveries.
Thus the Project would directly contribute to the development of
infrastructure in Nepal by ensuring a realiable supply of cement
to construction industries.

(3) Generation of employment opportunities

The Project will generate considerable employment opportunities.
In case, the plant capacity is 1,000 t/d (clinker base) number of
personnel to be directly employed will be about 450 and number of
workers of quarry contractors will be about 150 and the total will
amount to about 600.
Assuming 5.5 persons as the average family size those who are
benefited by the Project will reach as much as about 3,300.
Besides quite a few employment opportunities seem to be generated
indirectly through the related industries and transportation
industry etc.

(4) Minimization of regional economic imbalance

Udaipur district, in which the Project will be implemented, is
located in the eastern development region and is behind in develop-
ment and less active in economic activity as compared with the
central development region.
The Project thus would contribute to minimize the regional economic
imbalance.
Since the district headquarter is established in Gaighat where the
plant will be constructed, the effect mentioned above will be still
more.

(5) Improvement of technology

The cement industry is a modern large scale equipment industry
with various new technology.
Besides, various minor enterprises related will be established too.
The modern technology required to all of those enterprises would
help to improve the industrial technology in the area.

(6) Maximum utilization of natural resources

Sindali limestone deposit is a prominent deposit of good quality
in Nepal. (Refer to V-1 and V-2.)
Although this deposit is developed as a quarry for raw material of

ordinary portland cement in the Project other use such as the raw
material of precipitated calcium carbonate, slaked lime and special
cement can be expected.

Besides, there occur dolomite deposits including that of Sindali
deposit and the Project will make the development of these natural
resources easy.

(7) Economic rate of return

In order to estimate the national profitability, the calculation of
economic internal rate of return has been carried out under the conditions
mentioned below. Economic benefits from the Project is obtained from
the cement to be produced.

The economic benefits are represented as the difference between the
economic value of cement produced in the Project and the economic cost
required for the production.

(i) Conditions

(a) Construction cost

Refer to Table 11-1-1 ~ 11-1-3 and Annexure 11-1

(b) Production of cement

Refer to X1-3-2 -(1).

(c) Economic price of cement

684.75   Rs/t·cement   (55 US$/t·cement)

597.60   Rs/t·cement   (48 US$/t·cement)

498.00   Rs/t·cement   (40 US$/t·cement)

Note. Price of imported cement in Nepal: 50 ~ 60 US$/t·cement

Price of imported cement in India (1978): CIF 52 US$/t·cement

Retail price of cement in India (1978): about 45 US$/t·cement

(d) Production cost

Refer to X1-2.

(e) Infrastructure to be developed for the Project

(refer to X-1, X-2) is assumed to be constructed by other project.

(f) Others

Refer to Premise described in I-1.

(ii) Construction cost

(a) Plant capacity (clinker base) 1,000 t/d.

Table 12-1-1 Construction Cost (Rs)

Year	Financial construction costs	less Interest during * construction	less Working capital	Economic construction costs
-3	354,494,650	15,197,650	-	339,297,000
-2	389,477,950	62,298,700	-	327,179,250
-1	187,635,150	27,680,850	-	159,954,300
1	85,462,450	-	23,258,000	62,204,450
Total	1,017,070,200	105,177,200	23,258,000	888,635,000

Note. * Interest rate: 7 %/y

(b) Plant capacity (clinker base) 1,500 t/d

Table 12-1-2 Construction Cost (Rs)

Year	Financial construction costs	less Interest during * construction	less Working capital	Economic construction costs
-3	433,497,060	18,584,600	-	414,912,460
-2	476,276,660	76,182,500	-	400,094,160
-1	229,451,490	33,849,900	-	195,601,590
1	110,380,290	-	34,313,000	76,067,290
Total	1,249,605,500	128,617,000	34,313,000	1,086,675,500

Note * Interest rate: 7 %/y

(iii) Production cost and revenue
    (for 100 per cent capacity utilization)

Table 12-1-3 Production Cost and Revenue (1,000 Rs/y)

Plant capacity (clinker base)	1,000 t/d	1,500 t/d
Direct cost *	83,341	124,626
Fixed cost	11,574	15,346
Revenue (684.75 Rs/t·cement)	237,266	355,899

(iv) Economic internal rate of return
    The calculation procedures for economic price of 55 US$/t·cement are
    shown in Table 12-1-5 and 12-1-6 by plant capacity, and the results
    are show in Table 12-1-4.

Table 12-1-4 Economic Internal Rate of Return (%)

Plant capacity (clinker base)		1,000 t/d	1,500 t/d
Economic price	684.75 Rs or 55 US$/t·cement	11.4	14.4
	597.60 Rs or 48 US$/t·cement	8.3	11.1
	498.00 Rs or 40 US$/t·cement	4.2	6.7

(v) Consideration

The results (Table 12-1-6) shows that:

(a) In case the economic price is higher than 597.60 Rs (48 US$)/t·cement the Project will bring sufficient profit, and

(b) in case the economic price is between 597.60 Rs (48 US$) ~ 498.00 Rs (40 US$)/t·cement, the profitability will be lowered.

However, if 50 % of production is sold at this price and the rest is sold at 684.75 Rs (55 US$)/t·cement, sufficient profit can be obtained.

(vi) Economic internal rate of return

    (a) Plant capacity (clinker base) 1,000 t/d,
        Economic price 684.75 Rs/t·cement

Table 12-1-5 Economic Internal Rate of Return (1,000 Rs)

Year	Production x 1,000 t	Construction cost	Direct cost	Fixed cost	Revenue	Salvage value	Net benefit	Discounted at 10 %	12 %
-3	-	339,297	-	-	-	-	(339,297)	(308,455)	(302,958)
-2	-	327,179	-	-	-	-	(327,179)	(270,381)	(260,827)
-1	-	159,954	-	-	-	-	(159,954)	(120,173)	(113,855)
1	242,550	62,204	58,339	11,574	166,086	-	33,969	23,201	21,587
2	277,200	-	66,673	11,574	189,813	-	111,566	69,271	63,303
3	311,580	-	75,007	11,574	213,539	-	126,958	71,668	64,317
4	346,500	-	83,341	11,574	237,266	-	142,351	73,055	64,385
5	346,500	-	83,341	11,574	237,266	-	142,351	66,407	57,496
6	346,500	-	83,341	11,574	237,266	-	142,351	60,371	51,332
7	346,500	-	83,341	11,574	237,266	-	142,351	54,876	45,837
8	346,500	-	83,341	11,574	237,266	-	142,351	49,894	40,926
9	346,500	-	83,341	11,574	237,266	-	142,351	45,353	36,542
10	346,500	-	83,341	11,574	237,266	-	142,351	41,239	32,627
11	346,500	-	83,341	11,574	237,266	-	142,351	37,481	29,125
12	346,500	-	83,341	11,574	237,266	-	142,351	34,079	26,008
13	346,500	-	83,341	11,574	237,266	-	142,351	30,976	23,217
14	346,500	-	83,341	11,574	237,266	-	142,331	28,157	20,726
15	346,500	-	83,341	11,574	237,266	-	142,351	25.609	18,506
16	346,500	-	83,341	11,574	237,266	-	142,351	23,274	16,527
17	346,500	-	83,341	11,574	237,266	-	142,351	21,153	14,762
18	346,500	-	83,341	11,574	237,266	23,258	165,609	22,374	15,329
								+79,429	-35,088

Economic internal rate of return: 11.4 %

(b) Plant capacity (clinker base) 1,500 t/d,

Economic price 684.75 Rs/t·cement

Table 12-1-6 (1,000 Rs)

Year	Production x 1,000 t	Construction cost	Direct cost	Fixed cost	Revenue	Salvage value	Net benefit	Discounted at 13 %	Discounted at 15 %
-3	–	414,912	–	–	–	–	(414,912)	(367,197)	(360,807)
-2	–	400,094	–	–	–	–	(400,094)	(313,314)	(302,511)
-1	–	195,602	–	–	–	–	(195,602)	(135,572)	(128,608)
1	363,825	76,067	87,238	15,346	249,129	–	70,478	43,224	40,299
2	415,800	–	99,701	15,346	284,719	–	169,558	92,036	84,304
3	467,775	–	112,163	15,346	320,309	–	192,800	92,602	83,347
4	519,750	–	124,626	15,346	355,899	–	215,927	91,791	81,167
5	519,750	–	124,626	15,346	355,899	–	215,927	81,232	70,587
6	519,750	–	124,626	15,346	355,899	–	215,927	71,882	61,388
7	519,750	–	124,626	15,346	355,899	–	215,927	63,612	53,377
8	519,750	–	124,626	15,346	355,899	–	215,927	56,292	46,403
9	519,750	–	124,626	15,346	355,899	–	215,927	49,814	40,357
10	519,750	–	124,626	15,346	355,899	–	215,927	44,092	35,088
11	519,750	–	124,626	15,346	355,899	–	215,927	39,018	30,510
12	519,750	–	124,626	15,346	355,899	–	215,927	34,527	26,537
13	519,750	–	124,626	15,346	355,899	–	215,927	30,554	23,083
14	519,750	–	124,626	15,346	355,899	–	215,927	27,034	20,060
15	519,750	–	124,626	15,346	355,899	–	215,927	23,925	17,447
16	519,750	–	124,626	15,346	355,899	–	215,927	21,182	15,180
17	519,750	–	124,626	15,346	355,899	–	215,927	18,742	13,193
18	519,750	–	124,626	15,346	355,899	34,313	250,240	15,039	13,295
								+80,515	-36,304

Economic internal rate of return: 14.4 %

LITERATURE AND INFORMATION CITED

1. General

    IMF : International Finance Statistics, Dec., 1977

    UN : Economic Bulletin for Asia & the Pacific, Sept. ~ Dec., 1974

    Far Eastern Economic Review : Asia 1978 Yearbook

2. Nepal

    National Planning Commission : The Fifth Plan, 1975

    Ministry of Finance : Budget Speech of the Fiscal Year 1976/77, July, 1976

             Economic Survey, July, 1977

             Budget in Brief, 1977/78

    Ministry of Industries and Commerce :

             Nepal Industry and Commerce during the Fifth Plan, 1977

    Department of Housing and Physical Planning :

             Construction, Labour and Material Costs, 1978

    Department of Electricity :

             Hydro-Power Potentiality of Nepal 1971-copied

             Plan for Distribution of Electricity in Nepal

             Single Line Diagram (Central Region)

             Regional Power Demand Forecast (Diagram)

             Estimated Cost for 11/33 kV Power Transmission Lines

             Long-term Electricity Demand

    Department of Mines and Geology :

             Cement Market Review, Nepal, 1972

             Cement Market in Nepal, Sept., 1977

             Development Plan and Mining Policy, Nov., 1977

             Investigation Report of Udaipur (Sindali) Limestone Deposit 033/34

             A Report on Beltar Clay Deposit, 033/34

    Department of Roads : Nepal Road Network 1/1,000,000 , 1978

    Central Bureau of Statistics :

             Statistical Pocket Book, 1974

             Population Census, 1971

Eastern Electricity Corporation :

                    Rate and Price for Industrial Supply

                    Summary of Load Forecast for Next Ten Years

                    Single Line Diagram (Eastern Region)

Industrial Services Center :

                    Investors' Guide to Nepal.

Meteorological Station at Biratnagar Airport :

                    Meteorological Data such as Atmospheric Pressure,

                    Temperature, Humidity, Precipitation, Wind Direc-

                    tion and Wind Force, etc.

The National Construction Company Nepal Ltd. :

                    Construction Costs, Jan., 1978

National Trading Company Ltd. :

                    Prices of Construction Materials, Jan., 1978

National Transportation Corporation :

                    Transportation Cost, Jan., 1978

Nepal Electricity Corporation :

                    Central Nepal Power System

                    Single Line Diagram (Kathmandu District)

                    Tariff List

                    Generating Capacity in Nepal

Nepal Industrial Development Corporation :

                    Prospects of Industrial Investment in Nepal,

                    1973

Nepal Rastra Bank :   Quarterly Economic Bulletin, Vol. XI, No. 1 ~ 4

                    Main Economic Indicators, Dec., 1977

Trade Promotion Center :

                    Nepal – India Treaty of Trade, Treaty of Agreement

                    of Co-operation, March, 1978

Other Information Collected by Department of Mines and Geology

3. India

Cement Controller (India) :

Cement Production and Despatches, 1976

Tata Service Ltd. (India) :

Statistical Outline of India, 1978

Ministry of Information and Broadcasting (India) :

India, 1976

4. Bangladesh

Bangladesh Bureau of Statistics :

Statistical Pocket Book of Bangladesh, 1978

University Press Ltd. (Bangladesh) :

Geography of Bangladesh, 1977

5. Japan

Institute of Developing Economies :

Asian Trend Yearbook, 1978

Association for Promotion of International Co-operation :

Present Economic and Social Situation in Nepal

Japan External Trade Organization :

Overseas Markets, Jan., 1977
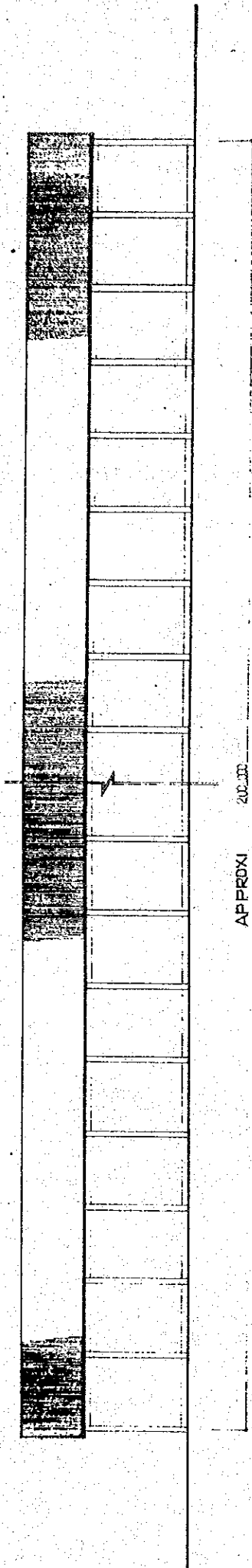
WEST ELEVTION 1:600
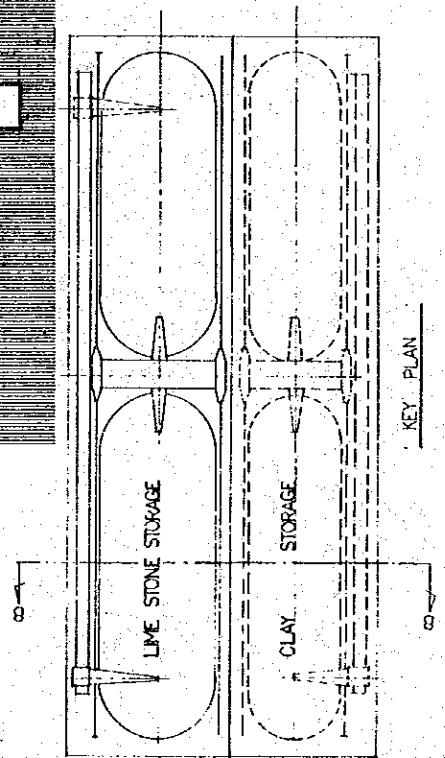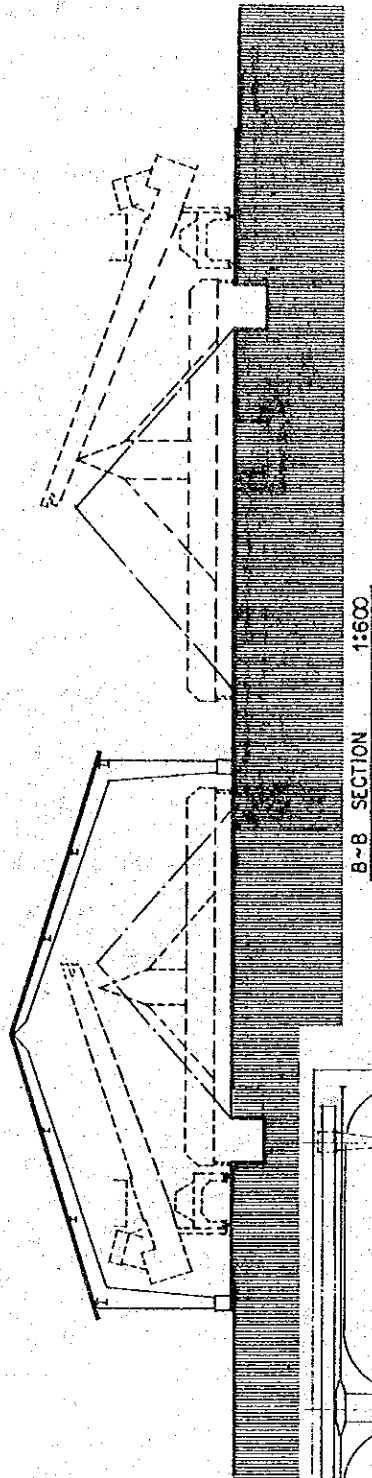
APPROXI 200.000

B~B SECTION 1:600

KEY PLAN

LIME STONE STORAGE

CLAY STORAGE

JAPAN
INTERNATIONAL
COOPERATION
AGENCY

UDAIPUR CEMENT PLANT PROJECT

LIMESTONE & CLAY STORAGE

(1500 T/D)

SCALE 1:600   DATE 5-1978   C-04

A~A SECTION   1:600

KEY PLAN

CLAY DRYER

ELECTROSTATIC
PRECIPITATER

A

A

RAW MEAL SILO

RAW GRINDING HOUSE

A~A SECTION   1:500

KEY PLAN

A~A SECTION   1:600

BURNING HOUSE   KILN   CYCLONE TOWER

KEY PLAN

—367—

A—A SECTION   1:600

CEMENT SILOS   CLINKER SILOS

CEMENT GRINDING HOUSE
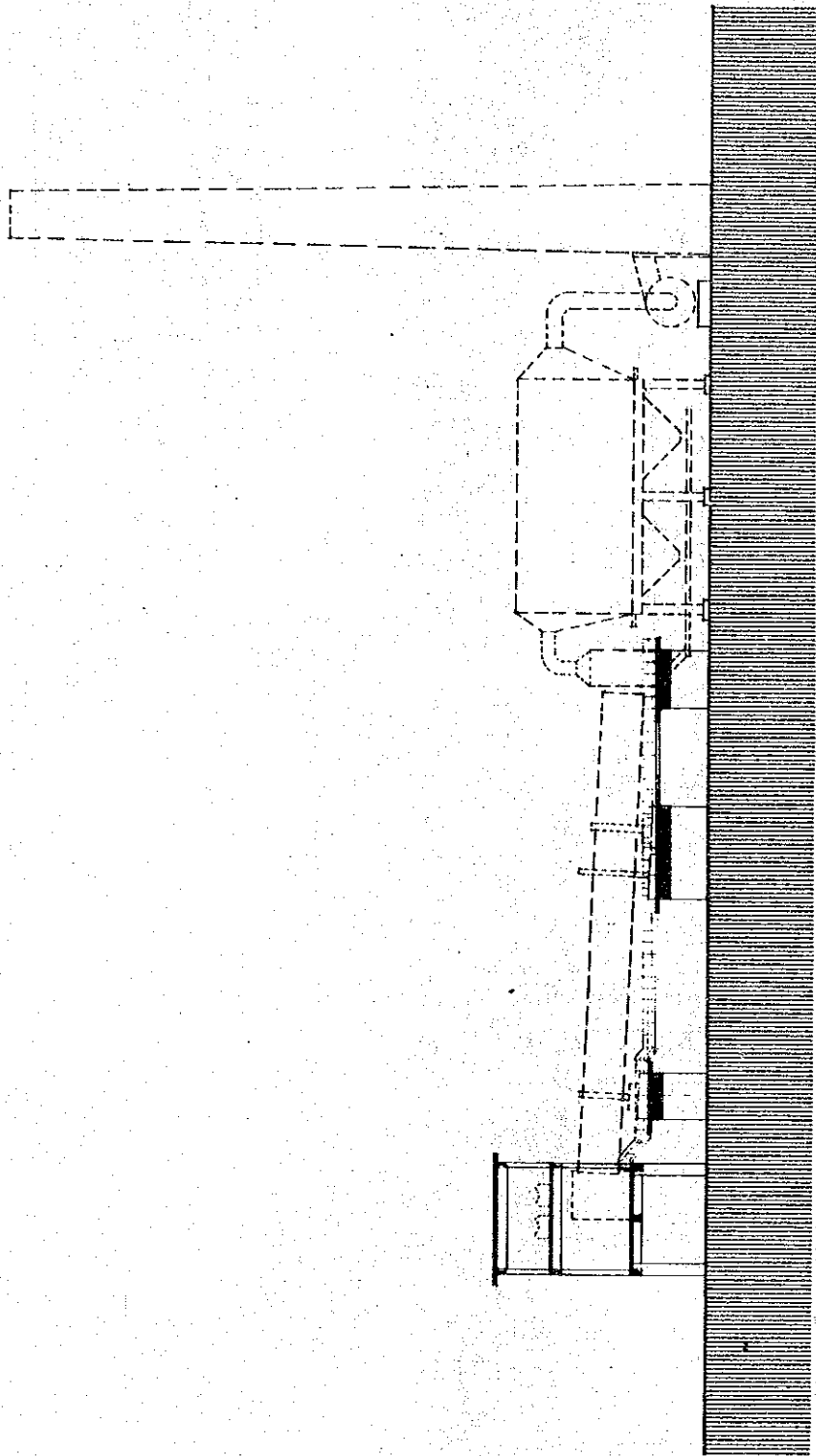
KEY PLAN

JAPAN INTERNATIONAL COOPERATION AGENCY	OWNER/CODE NO.		
	UDAIPUR CEMENT PLANT PROJECT		
	CEMENT MILL DEPARTMENT		
	(1500 T/D)		
APPROVED	CHECKED	REVISED DRAWN	SCALE 1:600	DATE 5-1978	DWG. NO.	C-08	FILE NO.

—368—

B~B SECTION   1:500

A~A SECTION   1:600

CEMENT PACKING HOUSE

KEY PLAN

JAPAN	UDAIPUR CEMENT PLANT PROJECT		
INTERNATIONAL	CEMENT PACKING HOUSE		
COOPERATION	(1500 T/D)		
AGENCY	SCALE 1:500	DATE 5-1978	DWG. NO. C-09
	APPROVED	CHECKED	DESIGNED DRAWN

APPROX)

EAST ELEVATION 1:600

B~B SECTION 1:600

KEY PLAN

COAL STORAGE YARD

ELEVATION 1:600

ELEVATION 1:600

EAST ELEVATION 1:600

B~B SECTION 1:500

OFFICE

LABORATORY AND
ENGINEERING
OFFICE

WORK SHOP

KEY PLAN

East-West Highway - The Vicinity of Kalyampur

(Width of Pavement 3.7 m)
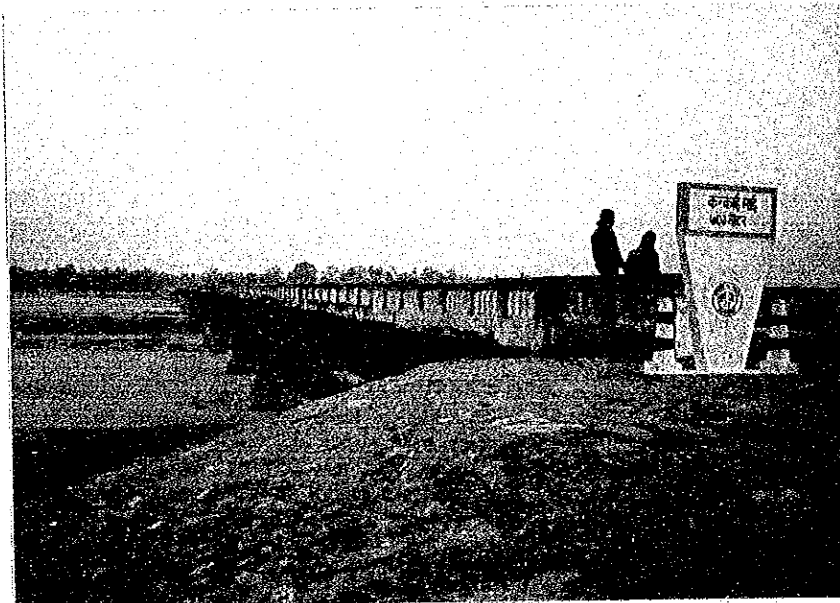
Example of Bridge of East-West Highway
(Spanning Kankai River, Length : 680 m)

Example of Bridge of East-West Highway

Spanning Kosi River along Dam

Length : 1,200 m, 56 Spans

Road Bridge between Kanchanpur and Fatehpur

Composed of Concrete Slab (60 cm thick),

Span : 7 m, Width : 7.1 m

Road Bridge between Biratnagar and Itahari

(Spanning Buri River, Load Limit : Dry Season   15 t

Rainy Season   8 t)
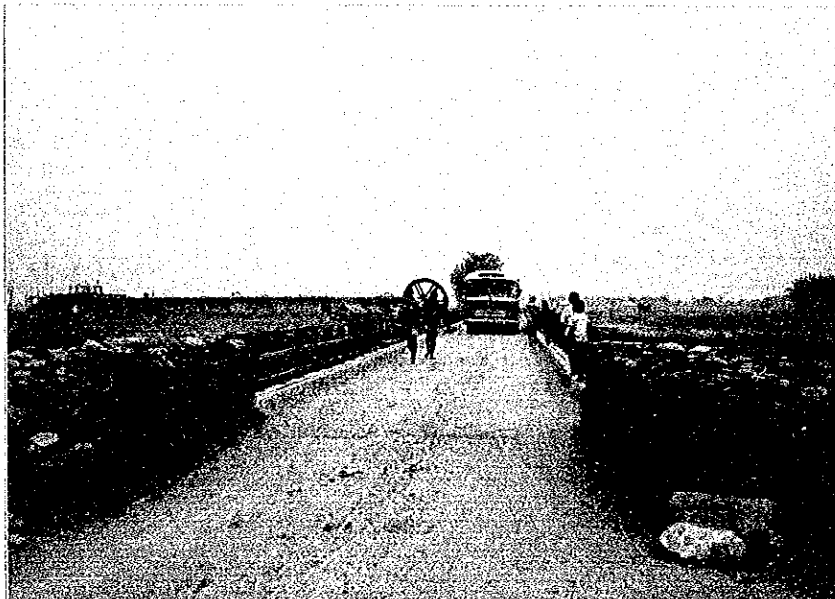
Ditto

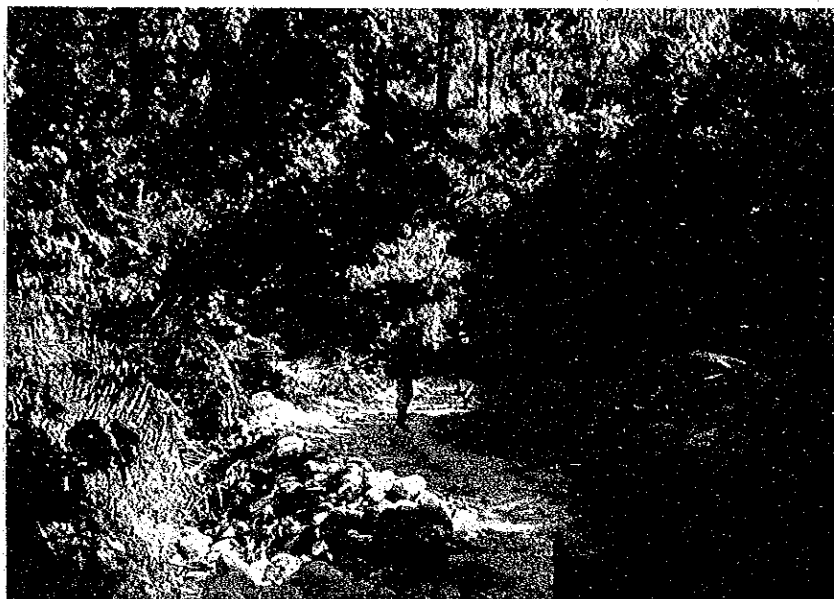(Effective Width   3.9 m)
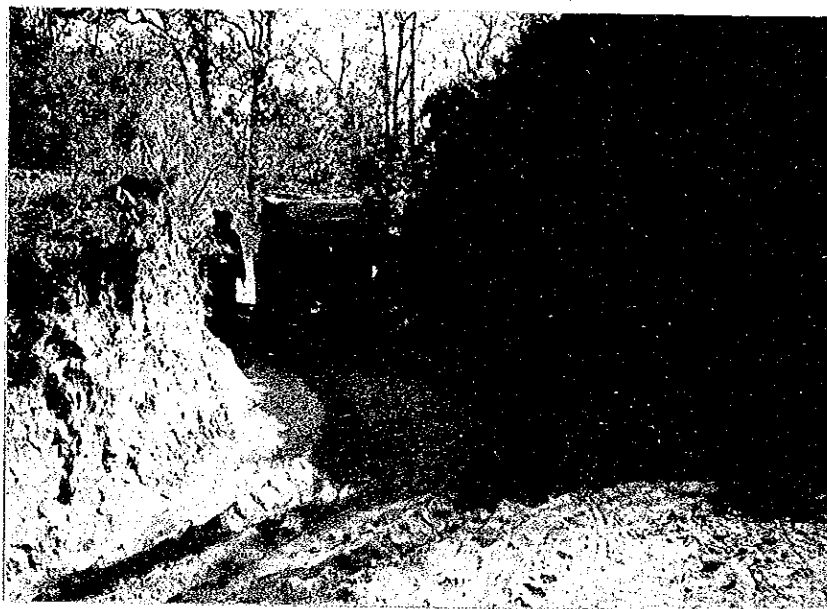
Seasonal Road between Gaighat and Lahan

(Mountain Pass of Gaighat Side)

Ditto

(Open Cut of the Pass)

JICA