

## **APPENDIX**





Year		1990	1993	2000
Transport demands in peak hour (one way) (passengers)		12,600	14,500	17,400
5 cars train	No. of trains	13	15	18
	Headway (minutes)	4.6	4.0	3.3
	No. of passengers	13,104	15,120	18,144
4 cars train	No. of trains	16	18	22(20)
	Headway (minutes)	3.8	3.3	2.7(3.0)
	No. of passengers transportable	12,800	14,400	17,600 (16,000)

At the initial stage, transport demand can be covered by 4 cars train, but in 1993 there is some problem in transport capacity and in 2000 it cannot cover the transport demand on condition that headway is 3 minutes or more.

Further, in case of 4 cars train, there is no "T" car in the train and so the train performance is somewhat higher than 5 cars train containing a T car, but the production cost per car of 5 cars train is cheaper than 4 cars train and it is more economical.

b. No. of cars

No. of cars required for the transportation is as shown on the following table and it is calculated with the formula shown on next page.

n'	5			4		
	(1990)	(1993)	(2000)	(1990)	(1993)	(2000)
t	4.6	4.0	3.3	3.8	3.3	2.7
t <sub>0</sub>	4.6	4.0	3.3	3.8	3.3	2.7
1	70	80	100	70	80	100
2	75	90	105	76	84	104
3	75	90	110	76	88	108

$$N = \frac{\left(\frac{L}{V} + t_0\right) \times 2}{t}$$

$$n = \frac{N \times n'}{(1-0.1)}$$

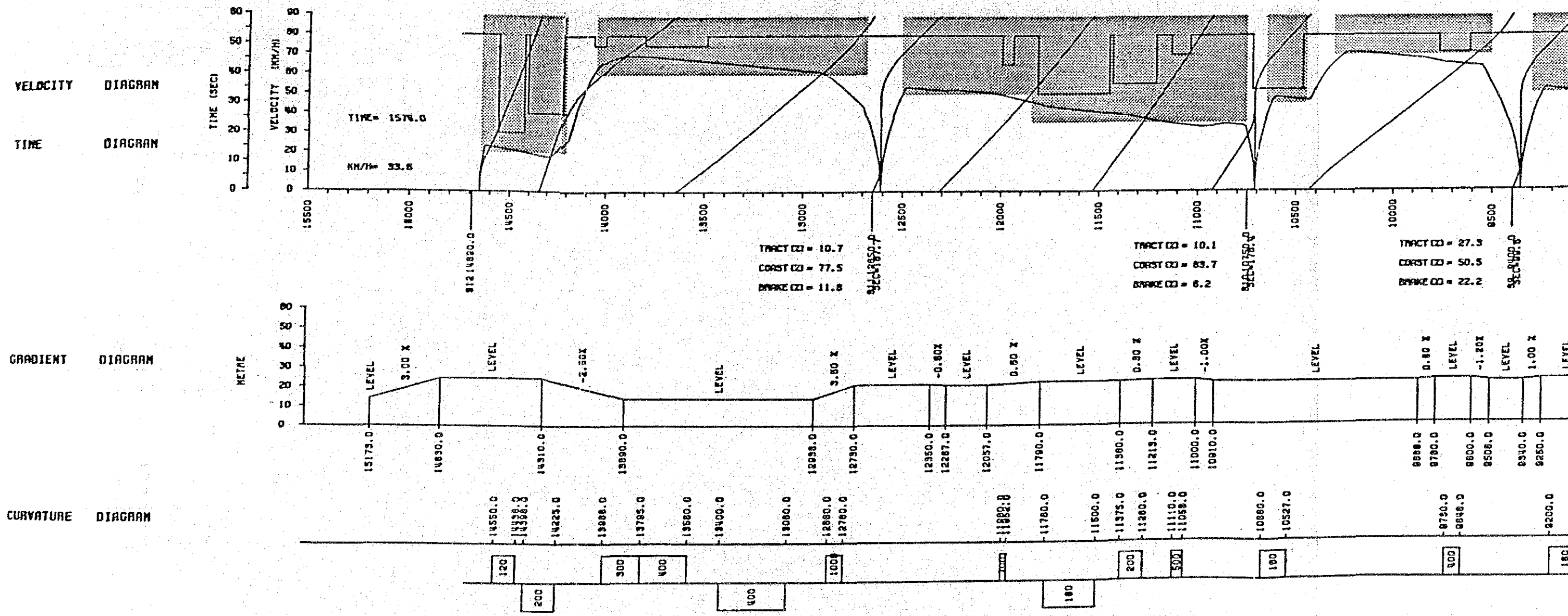
where,

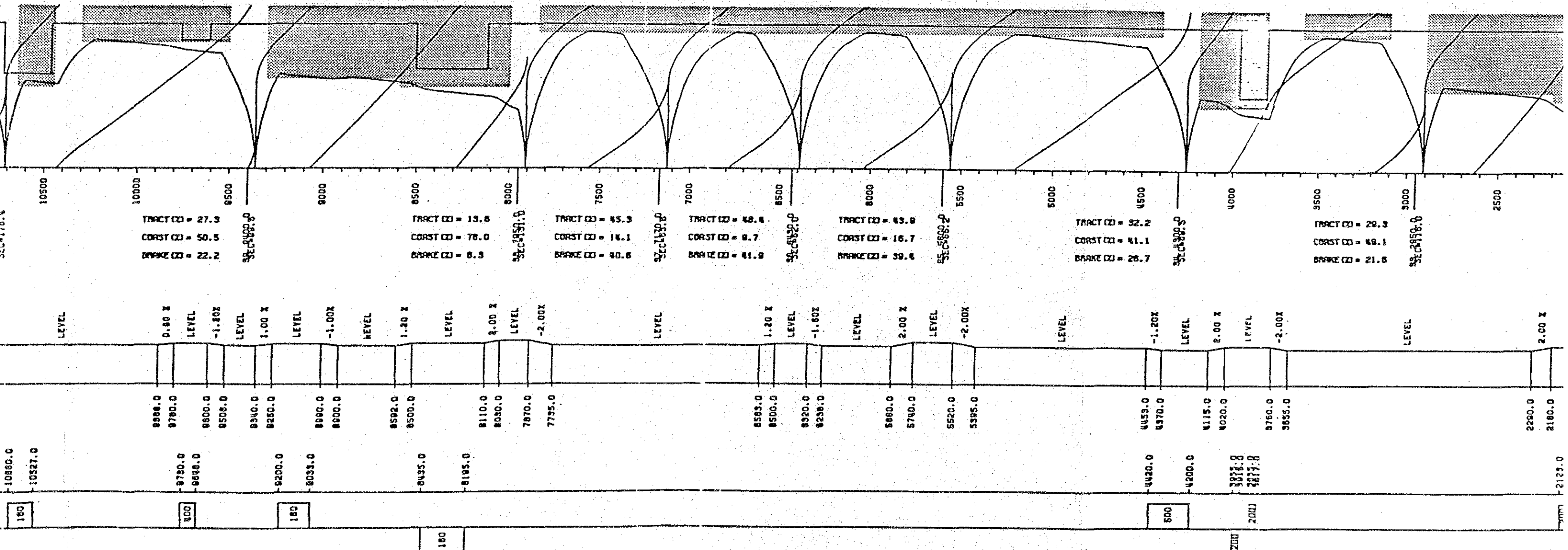
- N: No. of trains in peak hour
- L: Operating kilometrage (km)
- V: Schedule speed (km/min)
- t: Headway in rush hour (min)
- t<sub>0</sub>: Time required for setting back at the terminal station (min)
- n': No. of cars in a train
- n: No. of cars required

The table shows that there is no large difference in the number of cars between 4 cars formation and 5 cars formation.

According to the above a, b and c, a train formation of 5 cars is most recommendable for this project.

Appendix 1-2(1) RUN CURVE SIMULATION (NO. 12 ST → NO. 1 ST)





TRACT CZ = 27.3  
 CORST CZ = 50.5  
 BRAKE CZ = 22.2

TRACT CZ = 13.6  
 CORST CZ = 78.0  
 BRAKE CZ = 8.9

TRACT CZ = 45.9  
 CORST CZ = 18.1  
 BRAKE CZ = 40.6

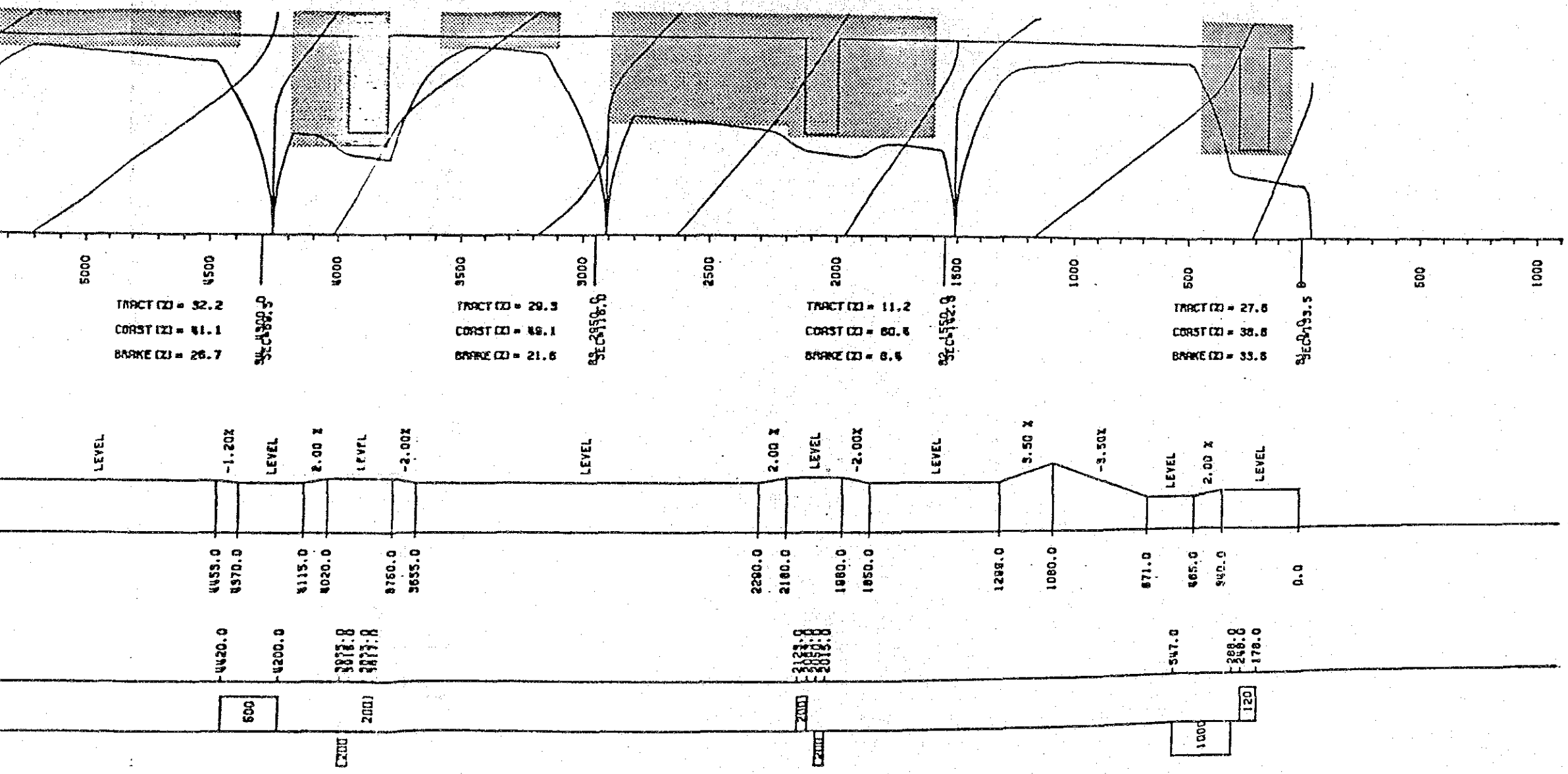
TRACT CZ = 48.8  
 CORST CZ = 8.7  
 BRAKE CZ = 41.8

TRACT CZ = 43.9  
 CORST CZ = 16.7  
 BRAKE CZ = 39.6

TRACT CZ = 32.2  
 CORST CZ = 41.1  
 BRAKE CZ = 26.7

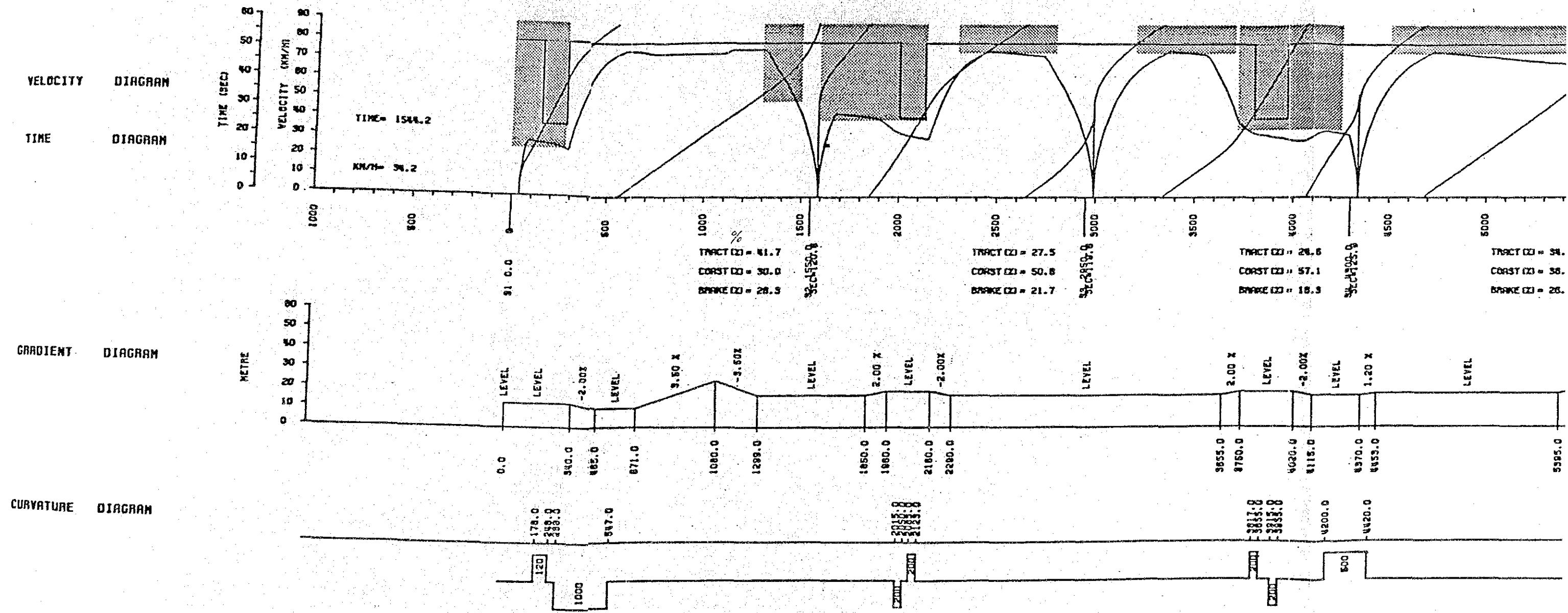
TRACT CZ = 29.3  
 CORST CZ = 48.1  
 BRAKE CZ = 21.8

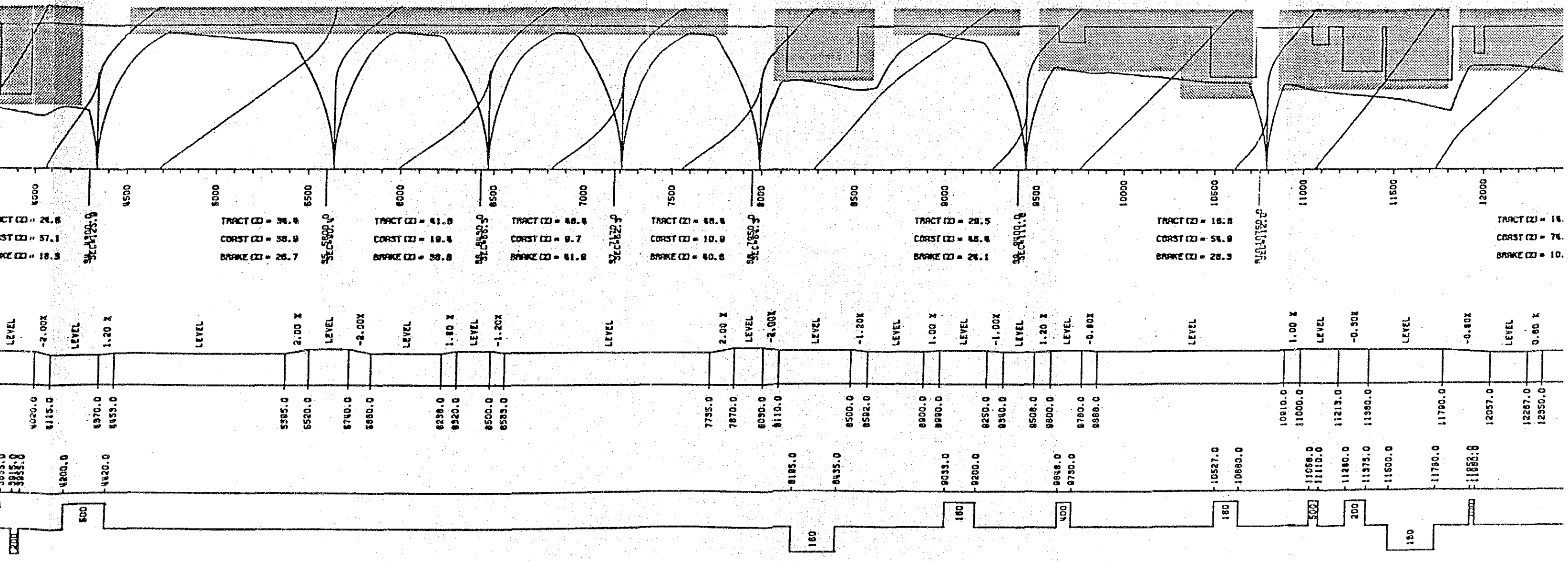
Station	Level	Grade	Elevation	Section
10500	LEVEL		10860.0	180
10327.0			10327.0	
9800.0	0.80 X		9800.0	180
9780.0	LEVEL		9780.0	
9600.0	-1.80 X		9600.0	180
9506.0	LEVEL		9506.0	
9340.0	1.00 X		9340.0	180
9280.0	LEVEL		9280.0	
8990.0	-1.00 X		8990.0	180
8600.0	LEVEL		8600.0	
8592.0	1.40 X		8592.0	180
8500.0	LEVEL		8500.0	
8110.0	3.00 X		8110.0	180
8030.0	LEVEL		8030.0	
7870.0	-2.00 X		7870.0	180
7795.0	LEVEL		7795.0	
6583.0	1.40 X		6583.0	180
6500.0	LEVEL		6500.0	
6320.0	-1.60 X		6320.0	180
6238.0	LEVEL		6238.0	
5880.0	2.00 X		5880.0	180
5780.0	LEVEL		5780.0	
5520.0	-2.00 X		5520.0	180
5395.0	LEVEL		5395.0	
4453.0	-1.20 X		4453.0	180
4370.0	LEVEL		4370.0	
4115.0	2.00 X		4115.0	180
4020.0	LEVEL		4020.0	
3760.0	-2.00 X		3760.0	180
3655.0	LEVEL		3655.0	
2290.0	2.00 X		2290.0	180
2160.0	LEVEL		2160.0	
2123.0			2123.0	180



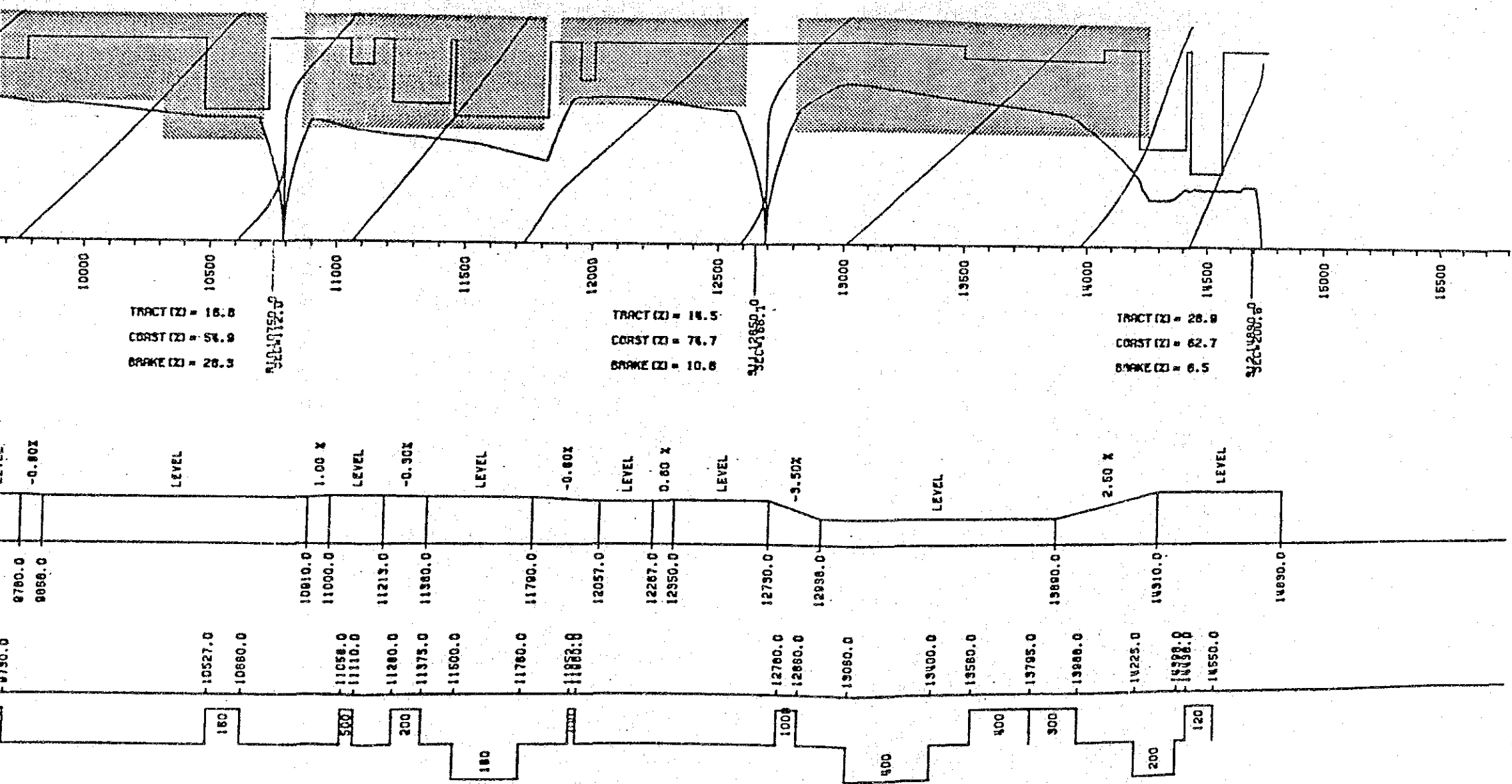


Appendix 1-2(2) RUN CURVE SIMULATION (NO. 1 ST → NO. 12 ST)





TRACT (Z) = 24.6  
 CORST (Z) = 57.1  
 BRKKE (Z) = 18.3  
 TRACT (Z) = 34.6  
 CORST (Z) = 38.9  
 BRKKE (Z) = 28.7  
 TRACT (Z) = 41.8  
 CORST (Z) = 19.4  
 BRKKE (Z) = 39.8  
 TRACT (Z) = 46.4  
 CORST (Z) = 9.7  
 BRKKE (Z) = 41.8  
 TRACT (Z) = 46.4  
 CORST (Z) = 10.8  
 BRKKE (Z) = 40.8  
 TRACT (Z) = 28.5  
 CORST (Z) = 45.4  
 BRKKE (Z) = 24.1  
 TRACT (Z) = 16.8  
 CORST (Z) = 54.8  
 BRKKE (Z) = 28.3  
 TRACT (Z) = 14.0  
 CORST (Z) = 74.0  
 BRKKE (Z) = 10.0





### Appendix 1-3 MINIMUM HEADWAY

Minimum headway is derived from the minimum time required for shuttle operation at Terminal Terrestre, where the distance between the station and the scissors crossing is long (about 270m) and curve radius is small ( $R = 120m$ ).

It is calculated by following expression:

$$T = t_1 + t_2 + t_3 + t_4 + t_5$$

IN the above expression,

T : Minimum headway (sec)

$t_1$ : The time required after an outgoing train has started until the rear part of the train goes out of the blocking section (until the rear part of the train passes the turnout)

$t_2$ : The time required for route making, change of signal display and signal confirmation & brake arrangement

- Route making:  $t_{2-1} = 5$  sec  
(Class 1 relay interlocking device)

- Change of signal display:  $t_{2-2} = 1$  sec

- Signal confirmation & brake arrangement:  $t_{2-3} = 3$  sec

Therefore,  $t_2 = 5 + 1 + 3 = 9$  sec

$t_3$ : The time required for an incoming train running at its designed speed throughout the distance required for decelerating from the designed speed (speed at the train operation curve) to the speed indicated by signal display for control of distance spacing.

$t_4$ : The time required for an incoming train running throughout the distance between the rear No. 1 block signal and the home signal

$t_5$ : The time required after the front head of an incoming train has come in inward the yard signal until the train stops.

From the run-curve simulation,

$t_1 = 60$  sec ( $L = 300$ m,  $v = 0$  to  $25$  km/hr,  $t_0 = 18$  sec,  
thenceforth,  $v = 25$  km/hr constantly)

$t_4 = 43$  sec ( $L = 400$ m (average  $v = 33$  km/hr)), in the run-  
curve,  $V = 53$  to  $20$  km/hr)

$t_5 = 75$  sec ( $L = 460$ m (average  $v = 22$  km/hr))

Calculation of  $t_3$ :

Designed speed (from the run-curve) :  $v = 55$  km/hr

Indicated speed :  $v = 45$  km/hr

Deceleration :  $4.0$  km/hr/sec

$t_3' = (55 - 45)/4.0 = 2.5$  sec

$L = (55 + 45) \times 2.5 / (2 \times 3.6) = 35$  m = brake distance

$t_3 = 35 (55 \times 1/3.6) = 2$  sec

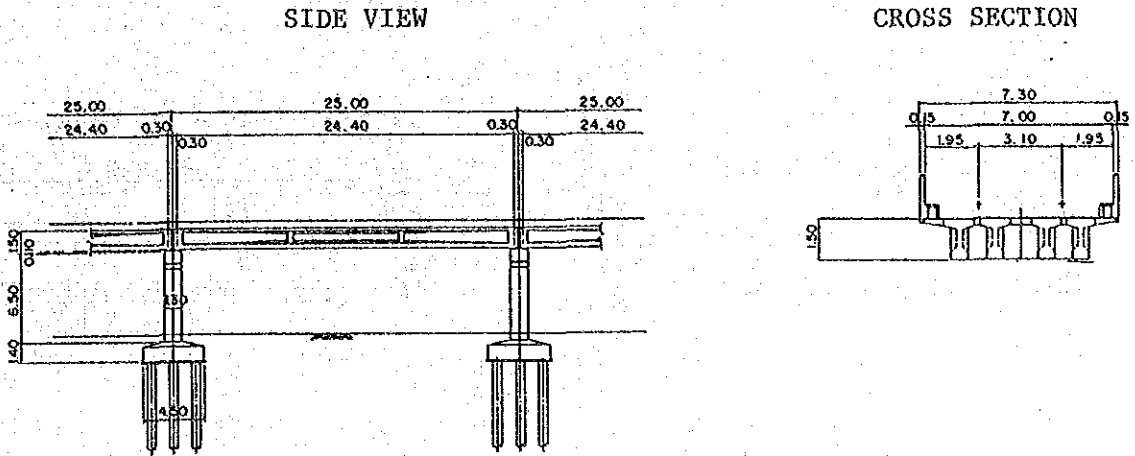
From the above,

$t_0 = 60 + 9 + 2 + 43 + 75 = 189$  sec =  $3'09'' \approx 3'$  (minute)

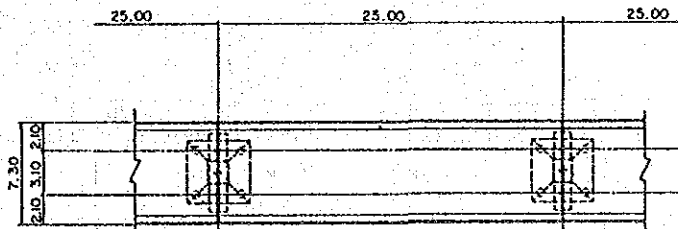
Appendix 1-4 EXAMPLE OF STRUCTURAL ANALYSIS (1)

Prestressed Concrete Girder

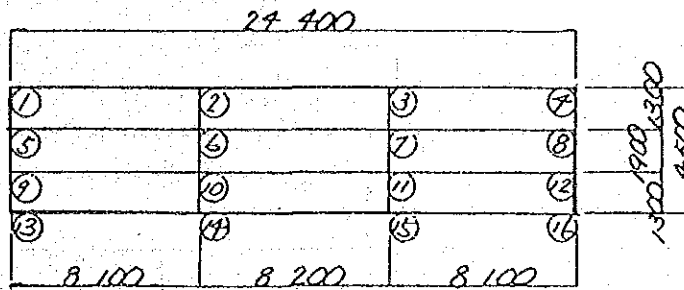
(1) General View



PLAN



(2) Frame Diagram







(5) Analytical Data

MEMBER FORCE (UNIT - TON,TON\*PK) \*\*

CASE - 1					CASE - 2				
NAME OF GIRDER ; G 2					NAME OF GIRDER ; G 2				
DISTANCE	MEMBER	TORSION	MOMENT	SHEAR	DISTANCE	MEMBER	TORSION	MOMENT	SHEAR
0.000	4 (I)	0.0	0.002	25.444	0.000	4 (I)	-0.018	0.022	2.965
3.050	***	0.0	65.961	17.956	3.050	***	-0.018	8.181	2.385
6.100	***	0.0	110.432	11.353	6.100	***	-0.018	14.571	1.806
8.100	(J)	0.0	129.224	7.503	8.100	(J)	-0.018	17.802	1.426
8.100	5 ***	0.0	129.225	7.503	8.100	5 ***	0.0	17.807	0.779
9.150	***	0.0	136.093	5.582	9.150	***	0.0	18.52	0.58
12.200	***	0.0	144.605	0.0	12.200	***	0.0	19.404	0.0
15.250	***	0.0	136.093	-5.581	15.250	***	0.0	18.52	-0.579
16.300	(J)	0.0	129.224	-7.503	16.300	(J)	0.0	17.807	-0.779
16.300	6 ***	0.0	129.223	-7.503	16.300	6 ***	0.018	17.802	-1.426
18.300	***	0.0	110.432	-11.353	18.300	***	0.018	14.571	-1.806
21.350	***	0.0	65.961	-17.956	21.350	***	0.018	8.181	-2.385
24.400	(J)	0.0	0.0	-25.444	24.400	(J)	0.018	0.022	-2.965
NAME OF GIRDER ; G 3					NAME OF GIRDER ; G 3				
DISTANCE	MEMBER	TORSION	MOMENT	SHEAR	DISTANCE	MEMBER	TORSION	MOMENT	SHEAR
0.000	7 (I)	0.0	0.002	25.444	0.000	7 (I)	-0.011	-0.022	2.976
3.050	***	0.0	65.961	17.956	3.050	***	-0.011	8.172	2.397
6.100	***	0.0	110.432	11.353	6.100	***	-0.011	14.598	1.817
8.100	(J)	0.0	129.224	7.503	8.100	(J)	-0.011	17.853	1.437
8.100	8 ***	0.0	129.225	7.503	8.100	8 ***	0.0	17.849	0.779
9.150	***	0.0	136.093	5.582	9.150	***	0.0	18.562	0.58
12.200	***	0.0	144.605	0.0	12.200	***	0.0	19.445	0.0
15.250	***	0.0	136.093	-5.581	15.250	***	0.0	18.562	-0.579
16.300	(J)	0.0	129.224	-7.503	16.300	(J)	0.0	17.849	-0.779
16.300	9 ***	0.0	129.223	-7.503	16.300	9 ***	0.011	17.853	-1.437
18.300	***	0.0	110.432	-11.353	18.300	***	0.011	14.598	-1.817
21.350	***	0.0	65.961	-17.956	21.350	***	0.011	8.172	-2.397
24.400	(J)	0.0	0.0	-25.444	24.400	(J)	0.011	-0.022	-2.976
NAME OF GIRDER ; G 4					NAME OF GIRDER ; G 4				
DISTANCE	MEMBER	TORSION	MOMENT	SHEAR	DISTANCE	MEMBER	TORSION	MOMENT	SHEAR
0.000	10 (I)	0.0	0.002	25.444	0.000	10 (I)	0.011	-0.022	2.976
3.050	***	0.0	65.961	17.956	3.050	***	0.011	8.172	2.397
6.100	***	0.0	110.432	11.353	6.100	***	0.011	14.598	1.817
8.100	(J)	0.0	129.224	7.503	8.100	(J)	0.011	17.853	1.437
8.100	11 ***	0.0	129.225	7.503	8.100	11 ***	0.0	17.849	0.779
9.150	***	0.0	136.093	5.582	9.150	***	0.0	18.562	0.58
12.200	***	0.0	144.605	0.0	12.200	***	0.0	19.445	0.0
15.250	***	0.0	136.093	-5.581	15.250	***	0.0	18.562	-0.579
16.300	(J)	0.0	129.224	-7.503	16.300	(J)	0.0	17.848	-0.779
16.300	12 ***	0.0	129.223	-7.503	16.300	12 ***	-0.011	17.853	-1.437
18.300	***	0.0	110.432	-11.353	18.300	***	-0.011	14.598	-1.817
21.350	***	0.0	65.961	-17.956	21.350	***	-0.011	8.172	-2.397
24.400	(J)	0.0	0.0	-25.444	24.400	(J)	-0.011	-0.022	-2.976
NAME OF GIRDER ; G 5					NAME OF GIRDER ; G 5				
DISTANCE	MEMBER	TORSION	MOMENT	SHEAR	DISTANCE	MEMBER	TORSION	MOMENT	SHEAR
0.000	13 (I)	0.0	0.002	25.444	0.000	13 (I)	0.018	0.022	2.965
3.050	***	0.0	65.961	17.956	3.050	***	0.018	8.181	2.385
6.100	***	0.0	110.432	11.353	6.100	***	0.018	14.571	1.806
8.100	(J)	0.0	129.224	7.503	8.100	(J)	0.018	17.802	1.426
8.100	14 ***	0.0	129.225	7.503	8.100	14 ***	0.0	17.807	0.779
9.150	***	0.0	136.093	5.582	9.150	***	0.0	18.52	0.58

12.200	***	0.0	144.605	0.0	12.200	***	0.0	19.409	0.0
15.250	***	0.0	136.093	-5.581	15.250	***	0.0	18.52	-0.579
16.300	(J)	0.0	129.224	-7.503	16.300	(J)	0.0	17.807	-0.779
16.300	15 ***	0.0	129.223	-7.503	16.300	15 ***	-0.018	17.802	-1.426
18.300	***	0.0	110.432	-11.353	18.300	***	-0.018	14.571	-1.806
21.350	***	0.0	65.961	-17.956	21.350	***	-0.018	8.181	-2.385
24.400	(J)	0.0	0.0	-25.444	24.400	(J)	-0.018	0.022	-2.965

NAME OF GIRDER ; C 1

NAME OF GIRDER ; C 1

DISTANCE	MEMBER	TORSION	MOMENT	SHEAR	DISTANCE	MEMBER	TORSION	MOMENT	SHEAR
0.000	19 (I)	0.0	0.0	-0.830E-03	0.000	19 (I)	0.0	0.0	0.0
1.400	(J)	0.0	-0.001	-0.830E-03	1.400	(J)	0.0	0.0	0.0
1.400	20 (I)	0.0	-0.001	0.890E-03	1.400	20 (I)	0.022	0.018	0.475
2.700	(J)	0.0	0.0	0.880E-03	2.700	(J)	0.022	-0.319	-0.994
2.700	21 (I)	0.0	0.0	0.0	2.700	21 (I)	0.0	-0.308	1.073
4.600	(J)	0.0	0.0	0.0	4.600	(J)	0.0	-0.308	-1.074
4.600	22 (I)	0.0	0.0	-0.880E-03	4.600	22 (I)	-0.022	-0.319	0.994
5.900	(J)	0.0	-0.001	-0.880E-03	5.900	(J)	-0.022	0.018	-0.475
5.900	23 (I)	0.0	-0.001	0.830E-03	5.900	23 (I)	0.0	0.0	0.0
7.300	(J)	0.0	0.0	0.830E-03	7.300	(J)	0.0	0.0	0.0

NAME OF GIRDER ; C 2

NAME OF GIRDER ; C 2

DISTANCE	MEMBER	TORSION	MOMENT	SHEAR	DISTANCE	MEMBER	TORSION	MOMENT	SHEAR
0.000	24 (I)	0.0	0.0	0.830E-03	0.000	24 (I)	0.0	0.0	0.0
1.400	(J)	0.0	0.001	0.830E-03	1.400	(J)	0.0	0.0	0.0
1.400	25 (I)	0.0	0.001	0.0	1.400	25 (I)	-0.004	-0.018	0.647
2.700	(J)	0.0	0.001	0.0	2.700	(J)	0.004	0.332	-0.107
2.700	26 (I)	0.0	0.001	0.0	2.700	26 (I)	0.0	0.321	0.551
4.600	(J)	0.0	0.001	0.0	4.600	(J)	0.0	0.321	-0.551
4.600	27 (I)	0.0	0.001	0.0	4.600	27 (I)	-0.004	0.332	0.107
5.900	(J)	0.0	0.001	0.0	5.900	(J)	-0.004	-0.018	-0.647
5.900	28 (I)	0.0	0.001	-0.830E-03	5.900	28 (I)	0.0	0.0	0.0
7.300	(J)	0.0	0.0	-0.830E-03	7.300	(J)	0.0	0.0	0.0

NAME OF GIRDER ; C 3

NAME OF GIRDER ; C 3

DISTANCE	MEMBER	TORSION	MOMENT	SHEAR	DISTANCE	MEMBER	TORSION	MOMENT	SHEAR
0.000	29 (I)	0.0	0.0	0.830E-03	0.000	29 (I)	0.0	0.0	0.0
1.400	(J)	0.0	0.001	0.830E-03	1.400	(J)	0.0	0.0	0.0
1.400	30 (I)	0.0	0.001	0.0	1.400	30 (I)	-0.004	-0.018	0.647
2.700	(J)	0.0	0.001	0.0	2.700	(J)	-0.004	0.332	-0.107
2.700	31 (I)	0.0	0.001	0.0	2.700	31 (I)	0.0	0.321	0.551
4.600	(J)	0.0	0.001	0.0	4.600	(J)	0.0	0.321	-0.551
4.600	32 (I)	0.0	0.001	0.0	4.600	32 (I)	0.004	0.332	0.107
5.900	(J)	0.0	0.001	0.0	5.900	(J)	0.004	-0.018	-0.647
5.900	33 (I)	0.0	0.001	-0.830E-03	5.900	33 (I)	0.0	0.0	0.0
7.300	(J)	0.0	0.0	-0.830E-03	7.300	(J)	0.0	0.0	0.0

NAME OF GIRDER ; C 4

NAME OF GIRDER ; C 4

DISTANCE	MEMBER	TORSION	MOMENT	SHEAR	DISTANCE	MEMBER	TORSION	MOMENT	SHEAR
0.000	34 (I)	0.0	0.0	-0.830E-03	0.000	34 (I)	0.0	0.0	0.0
1.400	(J)	0.0	-0.001	-0.830E-03	1.400	(J)	0.0	0.0	0.0
1.400	35 (I)	0.0	-0.001	0.880E-03	1.400	35 (I)	-0.022	0.018	0.475
2.700	(J)	0.0	0.0	0.880E-03	2.700	(J)	-0.022	-0.319	-0.994
2.700	36 (I)	0.0	0.0	0.0	2.700	36 (I)	0.0	-0.308	1.073
4.600	(J)	0.0	0.0	0.0	4.600	(J)	0.0	-0.308	-1.074
4.600	37 (I)	0.0	0.0	-0.880E-03	4.600	37 (I)	0.022	-0.319	0.994
5.900	(J)	0.0	-0.001	-0.880E-03	5.900	(J)	0.022	0.018	-0.475
5.900	38 (I)	0.0	-0.001	0.830E-03	5.900	38 (I)	0.0	0.0	0.0
7.300	(J)	0.0	0.0	0.830E-03	7.300	(J)	0.0	0.0	0.0

\*\* MEMBER FORCE (UNIT = TON,TON\*H) \*\*

CASE - 3

CASE - 4

NAME OF GIRDER ; G 2					NAME OF GIRDER ; G 2				
DISTANCE	MEMBER	TORSION	MOMENT	SHEAR	DISTANCE	MEMBER	TORSION	MOMENT	SHEAR
0.000	4 (I)	0.671	0.3	21.232	0.000	4 (I)	0.028	0.428	26.433
3.050	***	0.671	52.255	17.07	3.050	***	0.028	62.27	19.954
6.100	***	0.671	96.94	11.994	6.100	***	0.028	112.67	11.96
8.100	(J)	0.671	124.98	9.912	8.100	(J)	0.028	143.277	8.635
8.100	5 ***	0.0	124.281	5.73	8.100	5 ***	0.0	141.955	9.009
9.150	***	0.0	128.557	4.63	9.150	***	0.0	147.173	7.311
12.200	***	0.0	142.536	-0.242	12.200	***	0.0	163.966	-0.312
15.250	***	0.0	128.699	-4.847	15.250	***	0.0	147.478	-7.59
16.300	(J)	0.0	124.859	-5.73	16.300	(J)	0.0	143.096	-9.009
16.300	6 ***	-0.671	124.41	-9.912	16.300	6 ***	-0.028	142.051	-8.635
18.300	***	-0.671	96.973	-12.355	18.300	***	-0.028	112.741	-12.424
21.350	***	-0.671	52.197	-17.526	21.350	***	-0.028	62.146	-20.54
24.400	(J)	-0.671	0.67	-21.232	24.400	(J)	-0.028	1.854	-26.433

NAME OF GIRDER ; G 3					NAME OF GIRDER ; G 3				
DISTANCE	MEMBER	TORSION	MOMENT	SHEAR	DISTANCE	MEMBER	TORSION	MOMENT	SHEAR
0.000	7 (I)	0.313	1.159	21.124	0.000	7 (I)	0.042	1.3	25.781
3.050	***	0.313	53.329	16.772	3.050	***	0.042	61.634	19.757
6.100	***	0.313	98.073	11.51	6.100	***	0.042	112.279	12.326
8.100	(J)	0.313	126.249	9.375	8.100	(J)	0.042	143.493	9.237
8.100	8 ***	0.0	125.446	5.947	8.100	8 ***	0.0	143.209	8.374
9.150	***	0.0	129.316	4.79	9.150	***	0.0	147.553	6.795
12.200	***	0.0	141.587	-0.286	12.200	***	0.0	163.162	-0.292
15.250	***	0.0	129.557	-5.046	15.250	***	0.0	147.632	-7.056
16.300	(J)	0.0	126.429	-5.947	16.300	(J)	0.0	143.527	-8.374
16.300	9 ***	-0.313	125.277	-9.375	16.300	9 ***	-0.042	143.179	-9.237
18.300	***	-0.313	98.13	-11.936	18.300	***	-0.042	112.298	-12.761
21.350	***	-0.313	53.231	-17.309	21.350	***	-0.042	61.803	-20.305
24.400	(J)	-0.313	2.131	-21.124	24.400	(J)	-0.042	1.614	-25.781

NAME OF GIRDER ; G 4					NAME OF GIRDER ; G 4				
DISTANCE	MEMBER	TORSION	MOMENT	SHEAR	DISTANCE	MEMBER	TORSION	MOMENT	SHEAR
0.000	10 (I)	-0.313	1.561	21.124	0.000	10 (I)	-0.042	0.388	25.781
3.050	***	-0.313	53.304	16.772	3.050	***	-0.042	61.692	19.757
6.100	***	-0.313	98.079	11.51	6.100	***	-0.042	112.266	12.326
8.100	(J)	-0.313	126.249	9.375	8.100	(J)	-0.042	143.493	9.237
8.100	11 ***	0.0	125.852	5.947	8.100	11 ***	0.0	142.286	8.374
9.150	***	0.0	129.403	4.79	9.150	***	0.0	147.356	6.795
12.200	***	0.0	141.587	-0.286	12.200	***	0.0	163.162	-0.292
15.250	***	0.0	129.545	-5.046	15.250	***	0.0	147.661	-7.056
16.300	(J)	0.0	126.429	-5.947	16.300	(J)	0.0	143.527	-8.374
16.300	12 ***	0.313	125.679	-9.375	16.300	12 ***	0.042	142.267	-9.237
18.300	***	0.313	98.112	-11.936	18.300	***	0.042	112.338	-12.761
21.350	***	0.313	53.247	-17.309	21.350	***	0.042	61.568	-20.305
24.400	(J)	0.313	2.131	-21.124	24.400	(J)	0.042	1.614	-25.781

NAME OF GIRDER ; G 5					NAME OF GIRDER ; G 5				
DISTANCE	MEMBER	TORSION	MOMENT	SHEAR	DISTANCE	MEMBER	TORSION	MOMENT	SHEAR
0.000	13 (I)	-0.671	0.314	21.232	0.000	13 (I)	-0.028	1.194	26.433
3.050	***	-0.671	52.254	17.07	3.050	***	-0.028	62.222	19.954
6.100	***	-0.671	96.94	11.994	6.100	***	-0.028	112.681	11.96
8.100	(J)	-0.671	124.98	9.912	8.100	(J)	-0.028	143.277	8.635
8.100	14 ***	0.0	124.296	5.73	8.100	14 ***	0.0	142.631	9.009
9.150	***	0.0	128.56	4.63	9.150	***	0.0	147.339	7.311
12.200	***	0.0	142.536	-0.242	12.200	***	0.0	163.966	-0.312
15.250	***	0.0	128.699	-4.847	15.250	***	0.0	147.453	-7.59

16.300	(J)	0.0	124.859	-9.73	16.300	(J)	0.0	143.096	-9.009
16.300	15 ***	0.671	124.424	-9.912	16.300	15 ***	0.028	142.817	-8.635
18.300	***	0.671	96.973	-12.355	16.300	***	0.028	112.708	-12.624
21.350	***	0.611	52.198	-17.526	21.350	***	0.028	62.175	-20.54
24.400	(J)	0.671	0.87	-21.232	24.400	(J)	0.028	1.654	-26.433

NAME OF GIRDER ; C 1					NAME OF GIRDER ; C 1				
DISTANCE	MEMBER	TORSION	MOMENT	SHEAR	DISTANCE	MEMBER	TORSION	MOMENT	SHEAR
0.000	19 (I)	-0.105	-0.176	-3.812	0.000	19 (I)	-0.004	-0.003	-0.245
1.400	(J)	-0.105	-4.123	-3.812	1.400	(J)	-0.004	-0.531	-0.245
1.400	20 (I)	-0.726	-4.945	4.728	1.400	20 (I)	-0.054	-0.724	0.04
2.700	(J)	-0.726	0.304	4.728	2.700	(J)	-0.054	-0.682	0.04
2.700	21 (I)	0.0	-0.119	0.0	2.700	21 (I)	0.0	-0.684	0.0
4.600	(J)	0.0	-0.119	0.0	4.600	(J)	0.0	-0.684	0.0
4.600	22 (I)	0.726	0.304	-4.728	4.600	22 (I)	0.054	-0.682	-0.04
5.900	(J)	0.726	-4.945	-4.728	5.900	(J)	0.054	-0.724	-0.04
5.900	23 (I)	0.105	-4.123	3.812	5.900	23 (I)	0.004	-0.531	0.245
7.300	(J)	0.105	-0.176	3.812	7.300	(J)	0.004	-0.003	0.245

NAME OF GIRDER ; C 2					NAME OF GIRDER ; C 2				
DISTANCE	MEMBER	TORSION	MOMENT	SHEAR	DISTANCE	MEMBER	TORSION	MOMENT	SHEAR
0.000	24 (I)	-0.072	-0.015	-7.609	0.000	24 (I)	-0.003	-0.541E-03	-0.489
1.400	(J)	-0.072	-8.819	-7.609	1.400	(J)	-0.003	-1.171	-0.489
1.400	25 (I)	-0.141	-8.372	-3.428	1.400	25 (I)	-0.01	-1.149	-0.863
2.700	(J)	-0.141	-12.389	-3.428	2.700	(J)	-0.01	-2.108	-0.863
2.700	26 (I)	0.0	-12.171	0.0	2.700	26 (I)	0.0	-2.082	0.0
4.600	(J)	0.0	-12.171	0.0	4.600	(J)	0.0	-2.082	0.0
4.600	27 (I)	0.141	-12.389	3.428	4.600	27 (I)	0.01	-2.108	0.863
5.900	(J)	0.141	-8.372	3.428	5.900	(J)	0.01	-1.149	0.863
5.900	28 (I)	0.072	-8.819	7.609	5.900	28 (I)	0.003	-1.171	0.489
7.300	(J)	0.072	-0.015	7.609	7.300	(J)	0.003	-0.541E-03	0.489

NAME OF GIRDER ; C 3					NAME OF GIRDER ; C 3				
DISTANCE	MEMBER	TORSION	MOMENT	SHEAR	DISTANCE	MEMBER	TORSION	MOMENT	SHEAR
0.000	29 (I)	0.072	-0.015	-7.609	0.000	29 (I)	0.003	-0.541E-03	-0.489
1.400	(J)	0.072	-8.819	-7.609	1.400	(J)	0.003	-1.171	-0.489
1.400	30 (I)	0.141	-8.372	-3.428	1.400	30 (I)	0.01	-1.149	-0.863
2.700	(J)	0.141	-12.389	-3.428	2.700	(J)	0.01	-2.108	-0.863
2.700	31 (I)	0.0	-12.171	0.0	2.700	31 (I)	0.0	-2.082	0.0
4.600	(J)	0.0	-12.171	0.0	4.600	(J)	0.0	-2.082	0.0
4.600	32 (I)	-0.141	-12.389	3.428	4.600	32 (I)	-0.01	-2.108	0.863
5.900	(J)	-0.141	-8.372	3.428	5.900	(J)	-0.01	-1.149	0.863
5.900	33 (I)	-0.072	-8.819	7.609	5.900	33 (I)	-0.003	-1.171	0.489
7.300	(J)	-0.072	-0.015	7.609	7.300	(J)	-0.003	-0.541E-03	0.489

NAME OF GIRDER ; C 4					NAME OF GIRDER ; C 4				
DISTANCE	MEMBER	TORSION	MOMENT	SHEAR	DISTANCE	MEMBER	TORSION	MOMENT	SHEAR
0.000	34 (I)	0.105	-0.176	-3.812	0.000	34 (I)	0.004	-0.003	-0.245
1.400	(J)	0.105	-4.123	-3.812	1.400	(J)	0.004	-0.531	-0.245
1.400	35 (I)	0.726	-4.945	4.728	1.400	35 (I)	0.054	-0.724	0.04
2.700	(J)	0.726	0.304	4.728	2.700	(J)	0.054	-0.682	0.04
2.700	36 (I)	0.0	-0.119	0.0	2.700	36 (I)	0.0	-0.684	0.0
4.600	(J)	0.0	-0.119	0.0	4.600	(J)	0.0	-0.684	0.0
4.600	37 (I)	-0.726	0.304	-4.728	4.600	37 (I)	-0.054	-0.682	-0.04
5.900	(J)	-0.726	-4.945	-4.728	5.900	(J)	-0.054	-0.724	-0.04
5.900	38 (I)	-0.105	-4.123	3.812	5.900	38 (I)	-0.004	-0.531	0.245
7.300	(J)	-0.105	-0.176	3.812	7.300	(J)	-0.004	-0.003	0.245

\*\* MEMBER FORCE (UNIT - TON,TON\*H) \*\*

CASE - 5 (1 + 2 + 3)

CASE - 6 (1 + 2 + 3 + 4)

NAME OF GIRDER ; G 2					NAME OF GIRDER ; G 2				
DISTANCE	MEMBER	TORSION	MOMENT	SHEAR	DISTANCE	MEMBER	TORSION	MOMENT	SHEAR
0.000	4 (I)	0.653	0.325	49.641	0.000	4 (I)	0.691	0.753	76.074
3.050	***	0.653	126.396	37.411	3.050	***	0.681	189.666	57.365
6.100	***	0.653	221.943	25.152	6.100	***	0.691	334.613	37.112
8.100	(J)	0.653	272.006	18.84	8.100	(J)	0.691	415.283	27.475
8.100	5 ***	0.0	271.313	14.012	8.100	5 ***	0.0	413.168	23.021
9.150	***	0.0	283.171	10.791	9.150	***	0.0	430.344	18.102
12.200	***	0.0	306.544	-0.242	12.200	***	0.0	470.51	-0.555
15.250	***	0.0	283.312	-11.008	15.250	***	0.0	430.79	-18.598
16.300	(J)	0.0	271.889	-14.012	16.300	(J)	0.0	414.986	-23.021
16.300	6 ***	-0.653	271.435	-18.84	16.300	6 ***	-0.681	413.456	-27.475
18.300	***	-0.653	221.976	-25.513	18.300	***	-0.681	334.718	-37.937
21.350	***	-0.653	126.338	-37.867	21.350	***	-0.691	188.494	-58.407
24.400	(J)	-0.653	0.893	-49.641	24.400	(J)	-0.691	2.547	-76.074

NAME OF GIRDER ; G 3					NAME OF GIRDER ; G 3				
DISTANCE	MEMBER	TORSION	MOMENT	SHEAR	DISTANCE	MEMBER	TORSION	MOMENT	SHEAR
0.000	7 (I)	0.302	1.14	49.544	0.000	7 (I)	0.344	2.439	75.325
3.050	***	0.302	127.462	37.125	3.050	***	0.344	189.096	56.882
6.100	***	0.302	223.103	24.68	6.100	***	0.344	335.383	37.006
8.100	(J)	0.302	273.326	18.315	8.100	(J)	0.344	416.819	27.552
8.100	8 ***	0.0	272.519	14.229	8.100	8 ***	0.0	415.728	22.603
9.150	***	0.0	283.971	10.951	9.150	***	0.0	431.524	17.746
12.200	***	0.0	305.637	-0.286	12.200	***	0.0	468.8	-0.578
15.250	***	0.0	284.212	-11.207	15.250	***	0.0	431.844	-18.262
16.300	(J)	0.0	273.502	-14.229	16.300	(J)	0.0	417.029	-22.603
16.300	9 ***	-0.302	272.353	-18.315	16.300	9 ***	-0.344	415.532	-27.552
18.300	***	-0.302	223.16	-25.106	18.300	***	-0.344	335.458	-37.867
21.350	***	-0.302	127.364	-37.662	21.350	***	-0.344	188.966	-57.968
24.400	(J)	-0.302	2.109	-49.544	24.400	(J)	-0.344	3.722	-75.325

NAME OF GIRDER ; G 4					NAME OF GIRDER ; G 4				
DISTANCE	MEMBER	TORSION	MOMENT	SHEAR	DISTANCE	MEMBER	TORSION	MOMENT	SHEAR
0.000	10 (I)	-0.302	1.541	49.544	0.000	10 (I)	-0.344	1.929	75.325
3.050	***	-0.302	127.436	37.125	3.050	***	-0.344	189.128	56.882
6.100	***	-0.302	223.109	24.68	6.100	***	-0.344	335.375	37.006
8.100	(J)	-0.302	273.326	18.315	8.100	(J)	-0.344	416.819	27.552
8.100	11 ***	0.0	272.925	14.229	8.100	11 ***	0.0	415.211	22.603
9.150	***	0.0	284.058	10.951	9.150	***	0.0	431.414	17.746
12.200	***	0.0	305.637	-0.286	12.200	***	0.0	468.8	-0.578
15.250	***	0.0	284.2	-11.207	15.250	***	0.0	431.84	-18.262
16.300	(J)	0.0	273.502	-14.229	16.300	(J)	0.0	417.029	-22.603
16.300	12 ***	0.302	272.755	-18.315	16.300	12 ***	0.344	415.022	-27.552
18.300	***	0.302	223.142	-25.106	18.300	***	0.344	335.45	-37.867
21.350	***	0.302	127.379	-37.662	21.350	***	0.344	188.947	-57.968
24.400	(J)	0.302	2.109	-49.544	24.400	(J)	0.344	3.722	-75.325

NAME OF GIRDER ; G 5					NAME OF GIRDER ; G 5				
DISTANCE	MEMBER	TORSION	MOMENT	SHEAR	DISTANCE	MEMBER	TORSION	MOMENT	SHEAR
0.000	13 (I)	-0.653	0.339	49.641	0.000	13 (I)	-0.681	1.534	76.074
3.050	***	-0.653	126.395	37.411	3.050	***	-0.681	188.617	57.365
6.100	***	-0.653	221.943	25.152	6.100	***	-0.691	334.624	37.112
8.100	(J)	-0.653	272.006	18.84	8.100	(J)	-0.681	415.283	27.475
8.100	14 ***	0.0	271.327	14.012	8.100	14 ***	0.0	413.958	23.021
9.150	***	0.0	283.174	10.791	9.150	***	0.0	430.513	18.102

12.200	***	0.0	306.344	-0.242	12.200	***	0.0	470.51	-0.555
15.250	***	0.0	283.312	-11.008	15.250	***	0.0	430.765	-18.598
16.300	(J)	0.0	271.889	-14.012	16.300	(J)	0.0	414.986	-23.021
16.300	15 ***	0.653	271.449	-18.84	16.300	15 ***	0.681	414.267	-27.475
18.300	***	0.653	221.976	-25.513	18.300	***	0.681	334.683	-37.937
21.350	***	0.653	126.339	-37.867	21.350	***	0.681	188.514	-58.407
24.400	(J)	0.653	0.893	-49.641	24.400	(J)	0.681	2.546	-76.074

NAME OF GIRDER ; C 1					NAME OF GIRDER ; C 1				
DISTANCE	MEMBER	TORSION	MOMENT	SHEAR	DISTANCE	MEMBER	TORSION	MOMENT	SHEAR
0.000	19 (I)	-0.105	-0.176	-3.812	0.000	19 (I)	-0.109	-0.179	-4.058
1.400	(J)	-0.105	-4.124	-3.812	1.400	(J)	-0.109	-4.655	-4.058
1.400	20 (I)	-0.703	-4.928	5.204	1.400	20 (I)	-0.758	-5.652	5.244
2.700	(J)	-0.703	-0.014	3.735	2.700	(J)	-0.758	-0.696	3.775
2.700	21 (I)	0.0	-0.426	1.074	2.700	21 (I)	0.0	-1.11	1.074
4.600	(J)	0.0	-0.426	-1.073	4.600	(J)	0.0	-1.11	-1.073
4.600	22 (I)	0.703	-0.014	-3.735	4.600	22 (I)	0.758	-0.696	-3.775
5.900	(J)	0.703	-4.928	-5.204	5.900	(J)	0.758	-5.652	-5.244
5.900	23 (I)	0.105	-4.124	3.812	5.900	23 (I)	0.109	-4.655	4.058
7.300	(J)	0.105	-0.176	3.812	7.300	(J)	0.109	-0.179	4.058

NAME OF GIRDER ; C 2					NAME OF GIRDER ; C 2				
DISTANCE	MEMBER	TORSION	MOMENT	SHEAR	DISTANCE	MEMBER	TORSION	MOMENT	SHEAR
0.000	24 (I)	-0.072	-0.015	-7.608	0.000	24 (I)	-0.075	-0.015	-8.097
1.400	(J)	-0.072	-8.818	-7.608	1.400	(J)	-0.075	-9.988	-8.097
1.400	25 (I)	-0.137	-8.389	-2.781	1.400	25 (I)	-0.148	-9.538	-3.644
2.700	(J)	-0.137	-12.055	-3.535	2.700	(J)	-0.148	-14.163	-4.398
2.700	26 (I)	0.0	-11.848	0.551	2.700	26 (I)	0.0	-13.93	0.551
4.600	(J)	0.0	-11.848	-0.551	4.600	(J)	0.0	-13.93	-0.551
4.600	27 (I)	0.137	-12.055	3.535	4.600	27 (I)	0.148	-14.163	4.397
5.900	(J)	0.137	-8.389	2.781	5.900	(J)	0.148	-9.538	3.643
5.900	28 (I)	0.072	-8.818	7.608	5.900	28 (I)	0.075	-9.988	8.097
7.300	(J)	0.072	-0.015	7.608	7.300	(J)	0.075	-0.015	8.097

NAME OF GIRDER ; C 3					NAME OF GIRDER ; C 3				
DISTANCE	MEMBER	TORSION	MOMENT	SHEAR	DISTANCE	MEMBER	TORSION	MOMENT	SHEAR
0.000	29 (I)	0.072	-0.015	-7.608	0.000	29 (I)	0.075	-0.015	-8.097
1.400	(J)	0.072	-8.818	-7.608	1.400	(J)	0.075	-9.988	-8.097
1.400	30 (I)	0.137	-8.389	-2.781	1.400	30 (I)	0.148	-9.538	-3.644
2.700	(J)	0.137	-12.055	-3.535	2.700	(J)	0.148	-14.163	-4.398
2.700	31 (I)	0.0	-11.848	0.551	2.700	31 (I)	0.0	-13.93	0.551
4.600	(J)	0.0	-11.848	-0.551	4.600	(J)	0.0	-13.93	-0.551
4.600	32 (I)	-0.137	-12.055	3.535	4.600	32 (I)	-0.148	-14.163	4.397
5.900	(J)	-0.137	-8.389	2.781	5.900	(J)	-0.148	-9.538	3.643
5.900	33 (I)	-0.072	-8.818	7.608	5.900	33 (I)	-0.075	-9.988	8.097
7.300	(J)	-0.072	-0.015	7.608	7.300	(J)	-0.075	-0.015	8.097

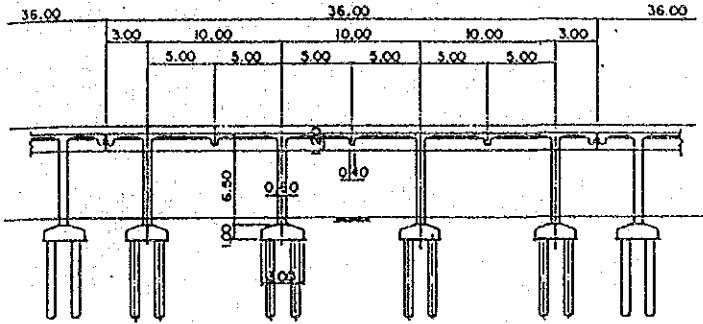
NAME OF GIRDER ; C 4					NAME OF GIRDER ; C 4				
DISTANCE	MEMBER	TORSION	MOMENT	SHEAR	DISTANCE	MEMBER	TORSION	MOMENT	SHEAR
0.000	34 (I)	0.105	-0.176	-3.812	0.000	34 (I)	0.109	-0.179	-4.058
1.400	(J)	0.105	-4.124	-3.812	1.400	(J)	0.109	-4.655	-4.058
1.400	35 (I)	0.703	-4.928	5.204	1.400	35 (I)	0.758	-5.652	5.244
2.700	(J)	0.703	-0.014	3.735	2.700	(J)	0.758	-0.696	3.775
2.700	36 (I)	0.0	-0.426	1.074	2.700	36 (I)	0.0	-1.11	1.074
4.600	(J)	0.0	-0.426	-1.073	4.600	(J)	0.0	-1.11	-1.073
4.600	37 (I)	-0.703	-0.014	-3.735	4.600	37 (I)	-0.758	-0.696	-3.775
5.900	(J)	-0.703	-4.928	-5.204	5.900	(J)	-0.758	-5.652	-5.244
5.900	38 (I)	-0.105	-4.124	3.812	5.900	38 (I)	-0.109	-4.655	4.058
7.300	(J)	-0.105	-0.176	3.812	7.300	(J)	-0.109	-0.179	4.058

Appendix 1-4 EXAMPLE OF STRUCTURAL ANALYSIS (2)

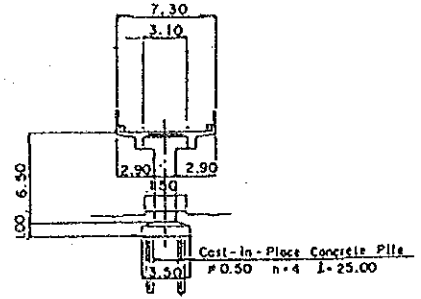
Reinforced Concrete Rigid Frame

(1) General View

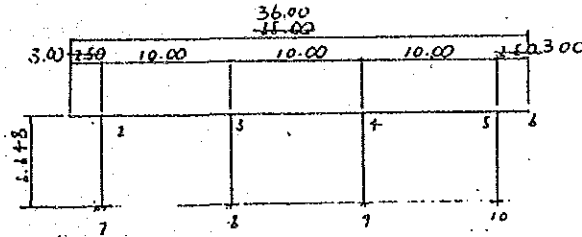
SIDE VIEW



CROSS SECTION

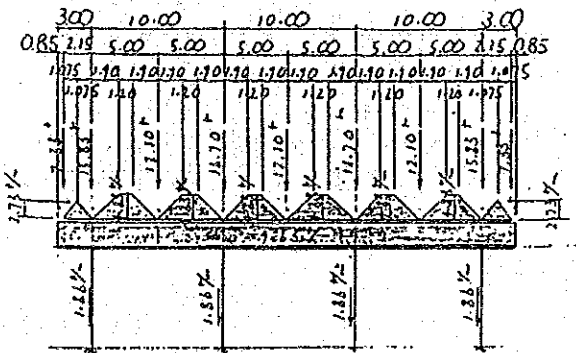


(2) Frame Diagram

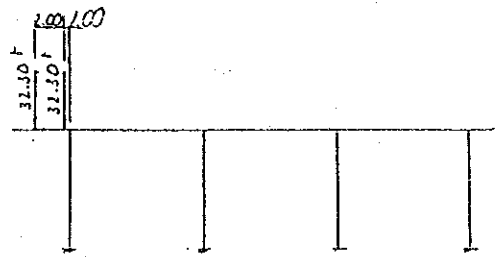


(3) Load Diagram

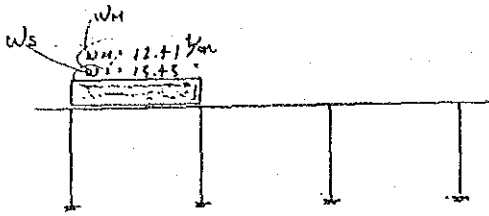
Case 1 Dead Load



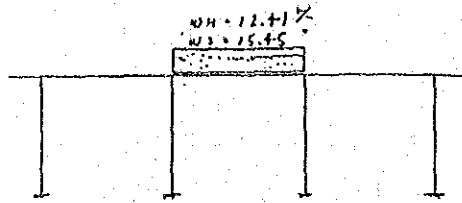
Case 2 Train Load + Impact (1)



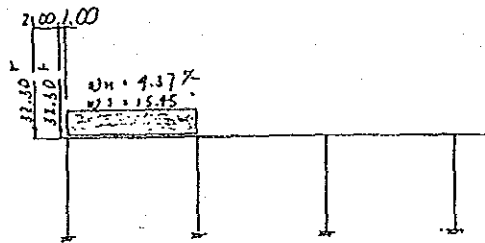
Case 3 Train Load + Impact (2)



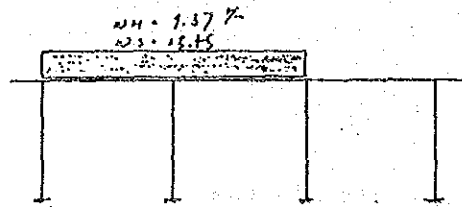
Case 4 Train Load + Impact (3)



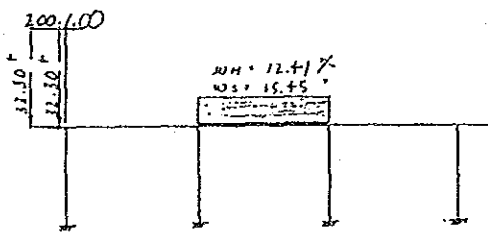
Case 5 Train Load + Impact (4)



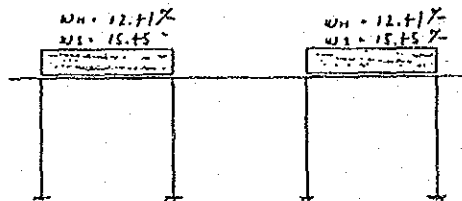
Case 6 Train Load + Impact (5)



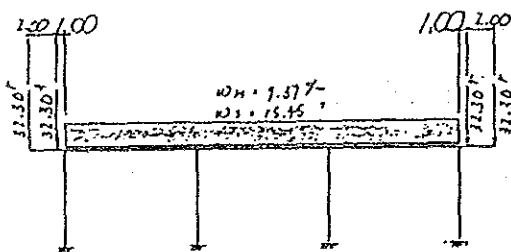
Case 7 Train Load + Impact (6)



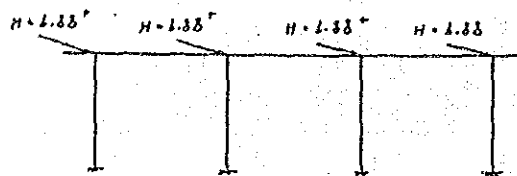
Case 8 Train Load + Impact (7)



Case 9 Train Load + Impact (8)



Case 10 Braking Load

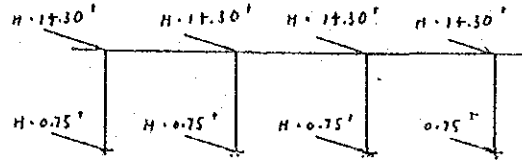
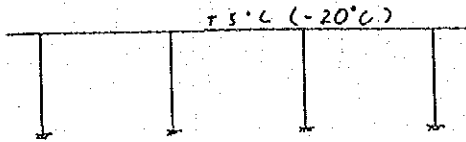




Case 11 Temperature Change (+5°C)

Case 12 Temperature Change  
+ Drying shrin.

Case 13 Effect of earthquake



(4) Load Combine

Case No	required over-design factor	load combine	remarks
1		1	$D_e$
2		2	$T_r + \lambda$ (1) TTTT
3		3	" (2) TTTT
4		4	" (3) TTTT
5		5	" (4) TTTT
6		6	" (5) TTTT
7		7	" (6) TTTT
8		8	" (7) TTTT
9		9	" (8) TTTT
10		10	$B_r$ TTTT
11		11	$T_e$ TTTT
12		12	$T_e + DS$ TTTT
13		13	$E$ TTTT
14	1.000	1 + 2	$D_e + T_r + \lambda$
15	"	1 + 3	"
16	"	1 + 4	"
17	"	1 + 5	"
18	"	1 + 6	"
19	"	1 + 7	"
20	"	1 + 8	"
21	"	1 + 9	"
22	$\frac{1}{1.15}$	1 + 9 + 10	$D_e + T_r + \lambda + B_r$
23	"	1 + 9 - 10	"
24	"	1 + 11	$D_e + T_e$
25	"	1 + 12	"
26	$\frac{1}{1.50}$	1 + 13	$D_e + E$
27	"	1 - 13	"

(5) Analytical Data

\* BASIC MEMBER FORCES

00 CASE-- 1

MEMBER	DISTANCE	MOMENT	SHEAR	AXIAL	MOVED MOMENT
1-- 2	0.000	0.00	-0.00	0.00	
0 1	1.650	-23.58	-25.24	0.00	
0 2	2.200	-39.15	-31.34	0.00	
2-- 1	2.500	-49.01	-34.34	0.00	
MAX	2.500	-49.01	-34.34	0.00	
2-- 3	0.000	-59.83	61.70	-2.44	
0 1	0.300	-44.77	58.70	-2.44	
0 2	0.850	-11.12	52.60	-2.44	
0 3	2.900	-68.70	24.36	-2.44	
0 4	5.000	90.87	-1.82	-2.44	
0 5	7.100	37.32	-39.30	-2.44	
0 6	9.150	-73.13	-67.54	-2.44	
0 7	9.700	-111.99	-73.64	-2.44	
3-- 2	10.000	-134.54	-76.84	-2.44	
MAX	4.855	90.98	0.00	-2.44	
3-- 4	0.000	-131.77	69.17	-1.81	
0 1	0.300	-111.56	66.17	-1.81	
0 2	0.850	-76.71	60.07	-1.81	
0 3	2.900	18.43	31.83	-1.81	
0 4	5.000	56.29	-5.05	-1.81	
0 5	7.100	10.43	-31.83	-1.81	
0 6	9.150	-76.71	-60.07	-1.81	
0 7	9.700	-111.56	-66.17	-1.81	
4-- 3	10.000	-131.77	-69.17	-1.81	
MAX	5.000	56.29	6.05	-1.81	
4-- 5	0.000	-134.54	76.64	-2.44	
0 1	0.300	-111.99	73.64	-2.44	
0 2	0.850	-73.13	67.54	-2.44	
0 3	2.900	37.32	39.30	-2.44	
0 4	5.000	90.87	13.52	-2.44	
0 5	7.100	68.70	-24.36	-2.44	
0 6	9.150	-11.12	-52.60	-2.44	
0 7	9.700	-44.77	-58.70	-2.44	
5-- 4	10.000	-39.83	-61.70	-2.44	
MAX	5.144	90.98	0.01	-2.44	
5-- 6	0.000	-49.01	34.34	-0.00	
0 1	0.300	-39.15	31.34	-0.00	
0 2	0.850	-23.58	25.24	-0.00	
6-- 5	2.500	0.00	0.00	-0.00	
MAX	0.0	-49.01	34.34	-0.00	
2-- 7	0.000	10.82	-2.44	-111.87	
7-- 2	6.648	-5.39	-2.44	-124.24	
MAX	0.0	10.82	-2.44	-111.87	
3-- 8	0.000	-2.77	0.63	-162.52	
8-- 3	6.648	1.39	0.63	-174.88	
MAX	0.0	-2.77	0.63	-162.52	
4-- 9	0.000	2.77	-0.63	-162.52	
9-- 4	6.648	-1.37	-0.63	-174.88	
MAX	0.0	2.77	-0.63	-162.52	
5-- 10	0.000	-10.82	2.44	-111.87	
10-- 5	6.648	5.39	2.44	-124.24	
MAX	0.0	-10.82	2.44	-111.87	

00 CASE-- 2

MEMBER	DISTANCE	MOMENT	SHEAR	AXIAL	MOVED MOMENT
1-- 2	0.000	0.000	-32.30	0.0	
0 1	1.650	-43.24	-32.30	0.0	
0 2	2.200	-77.52	-64.60	0.0	
2-- 1	2.500	-96.90	-64.60	0.0	
MAX	2.500	-96.90	-64.60	0.0	
2-- 3	0.000	-54.59	10.58	2.60	
0 1	0.300	-81.42	10.58	2.60	
0 2	0.850	-75.60	10.58	2.60	
0 3	2.900	-53.91	10.58	2.60	
0 4	5.000	-31.70	10.58	2.60	
0 5	7.100	-9.49	10.58	2.60	
0 6	9.150	12.21	10.58	2.60	
0 7	9.700	10.02	10.58	2.60	
3-- 2	10.000	21.20	10.58	2.60	
MAX	0.0	-64.59	10.58	2.60	
3-- 4	0.000	15.99	-1.92	1.24	
0 1	0.300	15.42	-1.92	1.24	
0 2	0.850	14.76	-1.92	1.24	
0 3	2.900	10.44	-1.92	1.24	
0 4	5.000	6.42	-1.92	1.24	
0 5	7.100	2.60	-1.92	1.24	
0 6	9.150	-1.53	-1.92	1.24	
0 7	9.700	-2.59	-1.92	1.24	
4-- 3	10.000	-3.16	-1.92	1.24	
MAX	0.0	15.99	-1.92	1.24	
4-- 5	0.000	-4.80	0.71	0.70	
0 1	0.300	-4.59	0.71	0.70	
0 2	0.850	-4.19	0.71	0.70	
0 3	2.900	-2.73	0.71	0.70	
0 4	5.000	-1.24	0.71	0.70	
0 5	7.100	-0.25	0.71	0.70	
0 6	9.150	1.71	0.71	0.70	
0 7	9.700	2.10	0.71	0.70	
5-- 4	10.000	2.32	0.71	0.70	
MAX	0.0	-4.80	0.71	0.70	
5-- 6	0.000	0.00	-0.00	-0.00	
0 1	0.300	0.00	-0.00	-0.00	
0 2	0.850	0.00	-0.00	-0.00	
6-- 5	2.500	0.00	-0.00	-0.00	
MAX	0.0	0.00	-0.00	-0.00	
2-- 7	0.000	-12.31	2.60	-75.16	
7-- 2	6.648	4.76	2.60	-75.16	
MAX	0.0	-12.31	2.60	-75.16	
3-- 8	0.000	5.21	-1.35	12.49	
8-- 3	6.648	-3.79	-1.35	12.49	
MAX	0.0	5.21	-1.35	12.49	
4-- 9	0.000	1.64	-0.55	-2.63	
9-- 4	6.648	-5.94	-0.55	-2.63	
MAX	0.0	1.64	-0.55	-2.63	
5-- 10	0.000	-2.32	-0.70	0.71	
10-- 5	6.648	-2.33	-0.70	0.71	
MAX	0.0	-2.32	-0.70	0.71	

\* BASIC MEMBER FORCES

00 CASE-- 3

MEMBER	DISTANCE	MOMENT	SHEAR	AXIAL	MOVED MOMENT
1-- 2	0.000	-0.00	0.00	-0.00	
0 1	1.650	0.00	0.00	-0.00	
0 2	2.200	0.00	0.00	-0.00	
2-- 1	2.500	0.00	0.00	-0.00	
MAX	2.500	0.00	0.00	-0.00	
2-- 3	0.000	-16.81	70.90	-3.68	
0 1	0.300	-0.66	68.27	-3.68	
0 2	0.850	20.06	57.77	-3.68	
0 3	2.900	92.55	26.10	-3.68	
0 4	5.000	106.58	-6.35	-3.68	
0 5	7.100	85.89	-38.79	-3.68	
0 6	9.150	-26.87	-70.46	-3.68	
0 7	9.700	-80.31	-78.96	-3.68	
3-- 2	10.000	-80.27	-83.60	-3.68	
MAX	4.488	104.21	0.01	-3.68	
3-- 4	0.000	-66.75	8.13	-0.51	
0 1	0.300	-64.31	8.13	-0.51	
0 2	0.850	-59.84	8.13	-0.51	
0 3	2.900	-43.18	8.13	-0.51	
0 4	5.000	-26.51	8.13	-0.51	
0 5	7.100	-9.04	8.13	-0.51	
0 6	9.150	7.03	8.13	-0.51	
0 7	9.700	12.10	8.13	-0.51	
4-- 3	10.000	14.54	8.13	-0.51	
MAX	0.0	-66.75	8.13	-0.51	
4-- 5	0.000	13.60	-1.58	-0.61	
0 1	0.300	13.13	-1.58	-0.61	
0 2	0.850	12.26	-1.58	-0.61	
0 3	2.900	9.02	-1.58	-0.61	
0 4	5.000	5.70	-1.58	-0.61	
0 5	7.100	2.38	-1.58	-0.61	
0 6	9.150	-0.86	-1.58	-0.61	
0 7	9.700	-1.73	-1.58	-0.61	
5-- 4	10.000	-2.21	-1.58	-0.61	
MAX	0.0	11.69	-1.58	-0.61	
5-- 6	0.000	0.00	0.00	0.00	
0 1	0.300	0.00	0.00	0.00	
0 2	0.850	0.00	0.00	0.00	
6-- 5	2.500	0.00	0.00	0.00	
MAX	2.500	0.00	0.00	0.00	
2-- 7	0.000	16.81	-3.68	-55.70	
7-- 2	6.648	-7.03	-3.68	-55.70	
MAX	0.0	16.81	-3.68	-55.70	
3-- 8	0.000	-13.52	3.16	-76.53	
8-- 3	6.648	7.51	3.16	-76.53	
MAX	0.0	-13.52	3.16	-76.53	
4-- 9	0.000	0.94	-0.10	9.71	
9-- 4	6.648	0.29	-0.10	9.71	
MAX	0.0	0.94	-0.10	9.71	
5-- 10	0.000	-2.21	0.61	-1.53	
10-- 5	6.648	1.85	0.61	-1.53	
MAX	0.0	-2.21	0.61	-1.53	

00 CASE-- 4

MEMBER	DISTANCE	MOMENT	SHEAR	AXIAL	MOVED MOMENT
1-- 2	0.000	-0.00	0.00	0.00	
0 1	1.650	0.00	0.00	0.00	
0 2	2.200	0.00	0.00	0.00	
2-- 1	2.500	0.00	0.00	0.00	
MAX	0.0	-0.00	0.00	0.00	
2-- 3	0.000	3.50	-5.80	0.79	
0 1	0.300	1.75	-5.80	0.79	
0 2	0.850	-1.43	-5.80	0.79	
0 3	2.900	-13.11	-5.80	0.79	
0 4	5.000	-35.49	-5.80	0.79	
0 5	7.100	-37.65	-5.80	0.79	
0 6	9.150	-49.55	-5.80	0.79	
0 7	9.700	-52.73	-5.80	0.79	
3-- 2	10.000	-54.47	-5.80	0.79	
MAX	10.000	-54.47	-5.80	0.79	
3-- 4	0.000	-65.07	77.25	-1.60	
0 1	0.300	-47.02	72.61	-1.60	
0 2	0.850	-16.81	64.12	-1.60	
0 3	2.900	62.69	32.45	-1.60	
0 4	5.000	90.05	0.00	-1.60	
0 5	7.100	62.69	-32.45	-1.60	
0 6	9.150	-16.81	-64.12	-1.60	
0 7	9.700	-47.02	-72.61	-1.60	
4-- 3	10.000	-65.07	-77.25	-1.60	
MAX	5.000	90.05	0.00	-1.60	
4-- 5	0.000	-54.47	5.80	0.79	
0 1	0.300	-52.73	5.80	0.79	
0 2	0.850	-49.55	5.80	0.79	
0 3	2.900	-37.65	5.80	0.79	

\* BASIC MEMBER FORCES

\*\* CASE-- 5

MEMBER	DISTANCE	MOMENT	SHEAR	AXIAL	MOVED MOMENT
1-- 2	0.000	0.00	-32.30	0.0	
1	1.650	-53.29	-32.30	0.0	
2	2.200	-77.52	-64.60	0.0	
2-- 1	2.500	-96.90	-64.60	0.0	
MAX	2.500	-96.90	-64.60	0.0	
2-- 3	0.000	-97.29	83.04	-0.13	
1	0.300	-81.91	78.40	-0.18	
2	0.850	-55.93	69.90	-0.19	
3	2.900	15.96	33.23	-0.18	
4	5.000	48.79	5.79	-0.13	
5	7.100	40.21	-26.66	-0.18	
6	9.150	-7.89	-58.33	-0.18	
7	9.700	-27.51	-66.83	-0.18	
3-- 2	10.000	-39.61	-71.46	-0.18	
MAX	5.617	50.56	0.01	-0.19	
3-- 4	0.000	-34.41	4.22	0.86	
1	0.300	-33.14	4.22	0.86	
2	0.850	-30.82	4.22	0.86	
3	2.900	-22.16	4.22	0.86	
4	5.000	-13.30	4.22	0.86	
5	7.100	-4.43	4.22	0.86	
6	9.150	4.23	4.22	0.86	
7	9.700	6.55	4.22	0.86	
4-- 3	10.000	7.82	4.22	0.86	
MAX	0.0	-34.41	4.22	0.86	
4-- 5	0.000	5.47	-0.48	0.24	
1	0.300	5.33	-0.48	0.24	
2	0.850	5.06	-0.48	0.24	
3	2.900	4.07	-0.48	0.24	
4	5.000	3.06	-0.48	0.24	
5	7.100	2.05	-0.48	0.24	
6	9.150	1.06	-0.48	0.24	
7	9.700	0.79	-0.48	0.24	
5-- 4	10.000	0.65	-0.48	0.24	
MAX	0.0	5.47	-0.48	0.24	
5-- 6	0.000	0.00	0.00	-0.00	
1	0.300	0.00	0.00	-0.00	
2	0.850	0.00	0.00	-0.00	
6-- 5	2.500	0.00	0.00	-0.00	
MAX	0.0	0.00	0.00	-0.00	
2-- 7	0.000	0.38	-0.18	-117.24	
7-- 2	6.648	-0.80	-0.18	-117.24	
MAX	6.648	-0.80	-0.18	-117.24	
3-- 8	0.000	-5.00	1.04	-45.29	
8-- 3	6.648	1.89	1.04	-45.29	
MAX	0.0	-5.00	1.04	-45.29	
4-- 9	0.000	2.35	-0.62	4.71	
9-- 4	6.648	-1.73	-0.62	4.71	
MAX	0.0	2.35	-0.62	4.71	
5-- 10	0.000	0.65	-0.24	-0.48	
10-- 5	6.648	-0.71	-0.24	-0.48	
MAX	6.648	-0.71	-0.24	-0.48	

\* BASIC MEMBER FORCES

\*\* CASE-- 7

MEMBER	DISTANCE	MOMENT	SHEAR	AXIAL	MOVED MOMENT
1-- 2	0.000	0.00	-32.30	0.0	
1	1.650	-53.29	-32.30	0.0	
2	2.200	-77.52	-64.60	0.0	
2-- 1	2.500	-96.90	-64.60	0.0	
MAX	2.500	-96.90	-64.60	0.0	
2-- 3	0.000	-81.10	4.78	3.39	
1	0.300	-79.65	4.78	3.39	
2	0.850	-73.03	4.78	3.39	
3	2.900	-62.23	4.78	3.39	
4	5.000	-57.19	4.78	3.39	
5	7.100	-47.14	4.78	3.39	
6	9.150	-37.34	4.78	3.39	
7	9.700	-34.71	4.78	3.39	
3-- 2	10.000	-33.28	4.78	3.39	
MAX	0.0	-81.10	4.78	3.39	
3-- 4	0.000	-49.09	75.33	-0.36	
1	0.300	-31.62	70.70	-0.36	
2	0.850	-2.45	62.20	-0.36	
3	2.900	73.13	30.53	-0.36	
4	5.000	96.47	-1.92	-0.36	
5	7.100	65.08	-34.36	-0.36	
6	9.150	-18.36	-65.03	-0.36	
7	9.700	-49.60	-74.53	-0.36	
4-- 3	10.000	-68.23	-79.17	-0.36	
MAX	4.845	96.62	0.01	-0.36	
4-- 5	0.000	-59.27	6.51	1.49	
1	0.300	-57.32	6.51	1.49	
2	0.850	-53.74	6.51	1.49	
3	2.900	-40.39	6.51	1.49	
4	5.000	-26.73	6.51	1.49	
5	7.100	-13.05	6.51	1.49	
6	9.150	0.28	6.51	1.49	
7	9.700	3.86	6.51	1.49	
5-- 4	10.000	5.81	6.51	1.49	
MAX	0.0	-59.27	6.51	1.49	
5-- 6	0.000	0.00	-0.00	-0.00	
1	0.300	0.00	-0.00	-0.00	
2	0.850	0.00	-0.00	-0.00	
6-- 5	2.500	0.00	-0.00	-0.00	
MAX	0.0	-0.00	-0.00	-0.00	
2-- 7	0.000	-15.30	3.39	-69.38	
7-- 2	6.648	6.70	3.39	-69.38	
MAX	0.0	-15.30	3.39	-69.38	
3-- 8	0.000	15.81	-3.74	-55.35	
8-- 3	6.648	-9.01	-3.74	-55.35	
MAX	0.0	15.81	-3.74	-55.35	
4-- 9	0.000	-8.96	1.85	-70.47	
9-- 4	6.648	3.33	1.85	-70.47	
MAX	0.0	-8.96	1.85	-70.47	
5-- 10	0.000	5.81	-1.49	0.51	
10-- 5	6.648	-4.03	-1.49	0.51	
MAX	0.0	5.81	-1.49	0.51	

\*\* CASE-- 6

MEMBER	DISTANCE	MOMENT	SHEAR	AXIAL	MOVED MOMENT
1-- 2	0.000	0.00	-0.00	0.0	
1	1.650	-0.00	-0.00	0.0	
2	2.200	-0.00	-0.00	0.0	
2-- 1	2.500	0.0	-0.00	0.0	
MAX	0.0	-0.00	-0.00	0.0	
2-- 3	0.000	-10.05	60.08	-2.18	
1	0.300	0.83	63.45	-2.18	
2	0.850	10.59	54.95	-2.18	
3	2.900	59.82	23.28	-2.18	
4	5.000	61.23	-9.17	-2.18	
5	7.100	21.32	-43.81	-2.18	
6	9.150	-57.51	-73.29	-2.18	
7	9.700	-35.35	-81.78	-2.18	
3-- 2	10.000	-101.74	-86.42	-2.18	
MAX	4.021	65.72	0.00	-2.18	
3-- 4	0.000	-99.53	83.19	-1.60	
1	0.300	-84.06	73.75	-1.60	
2	0.850	-57.89	70.26	-1.60	
3	2.900	14.73	39.50	-1.60	
4	5.000	48.25	6.14	-1.60	
5	7.100	40.51	-25.31	-1.60	
6	9.150	-6.94	-57.98	-1.60	
7	9.700	-26.34	-65.48	-1.60	
4-- 3	10.000	-38.15	-71.11	-1.60	
MAX	5.655	50.29	0.00	-1.60	
4-- 5	0.000	-30.86	3.18	0.13	
1	0.300	-29.91	3.18	0.13	
2	0.850	-28.15	3.18	0.13	
3	2.900	-21.63	3.18	0.13	
4	5.000	-14.94	3.18	0.13	
5	7.100	-8.26	3.18	0.13	
6	9.150	-1.73	3.18	0.13	
7	9.700	0.02	3.18	0.13	
5-- 4	10.000	0.97	3.18	0.13	
MAX	0.0	-30.86	3.18	0.13	
5-- 6	0.000	0.00	0.00	0.00	
1	0.300	0.00	0.00	0.00	
2	0.850	0.00	0.00	0.00	
6-- 5	2.500	0.00	0.00	0.00	
MAX	0.0	-0.00	0.00	0.00	
2-- 7	0.000	10.05	-2.18	-37.68	
7-- 2	6.648	-4.44	-2.18	-37.68	
MAX	0.0	10.05	-2.18	-37.68	
3-- 8	0.000	-2.20	0.58	-109.01	
8-- 3	6.648	1.68	0.58	-109.01	
MAX	0.0	-2.20	0.58	-109.01	
4-- 9	0.000	-7.30	1.73	-63.93	
9-- 4	6.648	4.21	1.73	-63.93	
MAX	0.0	-7.30	1.73	-63.93	
5-- 10	0.000	0.97	-0.13	3.18	
10-- 5	6.648	0.01	-0.13	3.18	
MAX	0.0	0.97	-0.13	3.18	

\*\* CASE-- 8

MEMBER	DISTANCE	MOMENT	SHEAR	AXIAL	MOVED MOMENT
1-- 2	0.000	0.00	0.00	0.0	
1	1.650	0.00	0.00	0.0	
2	2.200	0.00	0.00	0.0	
2-- 1	2.500	0.00	0.00	0.0	
MAX	2.500	0.00	0.00	0.0	
2-- 3	0.000	-19.02	72.48	-4.29	
1	0.300	-2.39	67.85	-4.29	
2	0.850	25.19	59.35	-4.29	
3	2.900	94.92	27.68	-4.29	
4	5.000	112.28	-4.77	-4.29	
5	7.100	74.91	-37.21	-4.29	
6	9.150	-14.36	-69.98	-4.29	
7	9.700	-47.19	-77.38	-4.29	
3-- 2	10.000	-66.67	-82.02	-4.29	
MAX	4.615	113.20	0.01	-4.29	
3-- 4	0.000	-52.22	0.00	-1.02	
1	0.300	-52.22	0.00	-1.02	
2	0.850	-52.22	0.00	-1.02	
3	2.900	-52.22	0.00	-1.02	
4	5.000	-52.22	0.00	-1.02	
5	7.100	-52.22	0.00	-1.02	
6	9.150	-52.22	0.00	-1.02	
7	9.700	-52.22	0.00	-1.02	
4-- 3	10.000	-52.22	0.00	-1.02	
MAX	0.0	-52.22	0.00	-1.02	
4-- 5	0.000	-66.67	02.02	-4.29	
1	0.300	-47.19	77.38	-4.29	
2	0.850	-14.36	65.88	-4.29	
3	2.900	74.91	37.21	-4.29	
4	5.000	112.25	4.77	-4.29	
5	7.100	94.92	-27.68	-4.29	
6	9.150	-25.19	-59.35	-4.29	
7	9.700	-2.39	-67.85	-4.29	
5-- 4	10.000	-19.0			

• BASIC MEMBER FORCES

•• CASE-- 9

MEMBER	DISTANCE	MOMENT	SHEAR	AXIAL	MOVED MOMENT
1-- 2	0.000	-0.00	-32.30	0.0	
# 1	1.650	-53.29	-32.30	0.0	
# 2	2.200	-77.52	-64.60	0.0	
2-- 1	2.500	-96.90	-64.60	0.0	
MAX	2.500	-96.90	-64.60	0.0	
2-- 3	0.000	-94.00	79.14	0.65	
# 1	0.300	-79.77	75.81	0.65	
# 2	0.850	-55.95	66.01	0.65	
# 3	2.900	7.98	34.34	0.65	
# 4	5.000	32.59	1.89	0.65	
# 5	7.100	15.91	-30.55	0.65	
# 6	9.150	-40.24	-62.22	0.65	
# 7	9.700	-62.00	-70.72	0.65	
3-- 2	10.000	-75.07	-75.36	0.65	
MAX	5.202	32.78	0.00	0.65	
3-- 4	0.000	-75.72	77.25	0.51	
# 1	0.300	-62.09	72.61	0.51	
# 2	0.850	-39.29	64.12	0.51	
# 3	2.900	20.74	34.45	0.51	
# 4	5.000	41.40	0.00	0.51	
# 5	7.100	20.74	-32.45	0.51	
# 6	9.150	-39.29	-64.12	0.51	
# 7	9.700	-62.09	-72.61	0.51	
4-- 3	10.000	-75.72	-77.25	0.51	
MAX	5.000	41.40	-0.00	0.51	
4-- 5	0.000	-75.07	75.36	0.65	
# 1	0.300	-62.00	70.72	0.65	
# 2	0.850	-40.24	62.22	0.65	
# 3	2.900	15.91	30.55	0.65	
# 4	5.000	32.59	-1.89	0.65	
# 5	7.100	7.98	-16.34	0.65	
# 6	9.150	-55.95	-46.01	0.65	
# 7	9.700	-79.79	-74.51	0.65	
5-- 4	10.000	-94.00	-79.14	0.65	
MAX	4.797	32.79	0.01	0.65	
5-- 6	0.000	-96.90	64.60	0.00	
# 1	0.300	-77.52	64.60	0.00	
# 2	0.850	-53.30	32.30	0.00	
6-- 5	2.500	-96.90	64.60	0.00	
MAX	0.0	-96.90	64.60	0.00	
2-- 7	0.000	-2.90	0.65	-113.34	
7-- 2	6.648	1.45	0.65	-113.34	
MAX	0.0	-2.90	0.65	-113.34	
3-- 8	0.000	-0.65	-0.15	-91.81	
8-- 3	6.648	-0.33	-0.15	-91.81	
MAX	0.0	-0.65	-0.15	-91.81	
4-- 9	0.000	-0.65	0.15	-91.81	
9-- 4	6.648	0.33	0.15	-91.81	
MAX	0.0	-0.65	0.15	-91.81	
5-- 10	0.000	2.90	-0.65	-113.34	
10-- 5	6.648	-1.45	-0.65	-113.34	
MAX	0.0	2.90	-0.65	-113.34	

•• CASE-- 10

MEMBER	DISTANCE	MOMENT	SHEAR	AXIAL	MOVED MOMENT
1-- 2	0.000	0.00	-0.00	-0.00	
# 1	1.650	-0.00	-0.00	-0.00	
# 2	2.200	-0.00	-0.00	-0.00	
2-- 1	2.500	-0.00	-0.00	-0.00	
MAX	2.500	-0.00	-0.00	-0.00	
2-- 3	0.000	21.43	-3.60	-0.22	
# 1	0.300	20.40	-3.60	-0.22	
# 2	0.850	18.47	-3.60	-0.22	
# 3	2.900	11.03	-3.60	-0.22	
# 4	5.000	3.46	-3.60	-0.22	
# 5	7.100	-4.11	-3.60	-0.22	
# 6	9.150	-11.50	-3.60	-0.22	
# 7	9.700	-13.43	-3.60	-0.22	
3-- 2	10.000	-14.36	-3.60	-0.22	
MAX	0.0	21.48	-3.60	-0.22	
3-- 4	0.000	8.83	-1.77	0.00	
# 1	0.300	8.30	-1.77	0.00	
# 2	0.850	7.33	-1.77	0.00	
# 3	2.900	3.71	-1.77	0.00	
# 4	5.000	-0.00	-1.77	0.00	
# 5	7.100	-3.71	-1.77	0.00	
# 6	9.150	-7.33	-1.77	0.00	
# 7	9.700	-8.30	-1.77	0.00	
4-- 3	10.000	-8.83	-1.77	0.00	
MAX	10.000	-8.83	-1.77	0.00	
4-- 5	0.000	14.56	-3.60	0.22	
# 1	0.300	13.48	-3.60	0.22	
# 2	0.850	11.50	-3.60	0.22	
# 3	2.900	4.11	-3.60	0.22	
# 4	5.000	-3.46	-3.60	0.22	
# 5	7.100	-11.03	-3.60	0.22	
# 6	9.150	-18.47	-3.60	0.22	
# 7	9.700	-20.40	-3.60	0.22	
5-- 4	10.000	-21.43	-3.60	0.22	
MAX	10.000	-21.48	-3.60	0.22	
5-- 6	0.000	-0.00	0.00	0.00	
# 1	0.300	-0.00	0.00	0.00	
# 2	0.850	-0.00	0.00	0.00	
6-- 5	2.500	-0.00	0.00	0.00	
MAX	0.0	-0.00	0.00	0.00	
2-- 7	0.000	-21.48	6.66	3.60	
7-- 2	6.648	22.82	6.66	3.60	
MAX	0.0	-21.48	6.66	3.60	
3-- 8	0.000	-23.39	7.10	1.34	
8-- 3	6.648	23.78	7.10	1.34	
MAX	0.0	-23.39	7.10	1.34	
4-- 9	0.000	-23.39	7.10	1.34	
9-- 4	6.648	23.78	7.10	1.34	
MAX	0.0	-23.39	7.10	1.34	
5-- 10	0.000	-21.48	6.66	3.60	
10-- 5	6.648	22.82	6.66	3.60	
MAX	0.0	-21.48	6.66	3.60	

• BASIC MEMBER FORCES

•• CASE-- 11

MEMBER	DISTANCE	MOMENT	SHEAR	AXIAL	MOVED MOMENT
1-- 2	0.000	0.00	-0.00	-0.00	
# 1	1.650	0.00	-0.00	-0.00	
# 2	2.200	0.00	-0.00	-0.00	
2-- 1	2.500	0.00	-0.00	-0.00	
MAX	0.0	0.00	-0.00	-0.00	
2-- 3	0.000	-6.43	0.92	-2.00	
# 1	0.300	-6.15	0.92	-2.00	
# 2	0.850	-5.65	0.92	-2.00	
# 3	2.900	-3.77	0.92	-2.00	
# 4	5.000	-1.84	0.92	-2.00	
# 5	7.100	0.09	0.92	-2.00	
# 6	9.150	1.97	0.92	-2.00	
# 7	9.700	2.47	0.92	-2.00	
3-- 2	10.000	2.75	0.92	-2.00	
MAX	0.0	-6.43	0.92	-2.00	
3-- 4	0.000	0.23	-0.00	-2.76	
# 1	0.300	0.23	-0.00	-2.76	
# 2	0.850	0.23	-0.00	-2.76	
# 3	2.900	0.23	-0.00	-2.76	
# 4	5.000	0.23	-0.00	-2.76	
# 5	7.100	0.23	-0.00	-2.76	
# 6	9.150	0.23	-0.00	-2.76	
# 7	9.700	0.23	-0.00	-2.76	
4-- 3	10.000	0.23	-0.00	-2.76	
MAX	0.0	0.23	-0.00	-2.76	
4-- 5	0.000	2.75	-0.92	-2.00	
# 1	0.300	2.67	-0.92	-2.00	
# 2	0.850	1.97	-0.92	-2.00	
# 3	2.900	0.97	-0.92	-2.00	
# 4	5.000	-1.84	-0.92	-2.00	
# 5	7.100	-3.77	-0.92	-2.00	
# 6	9.150	-5.65	-0.92	-2.00	
# 7	9.700	-6.15	-0.92	-2.00	
5-- 4	10.000	-6.43	-0.92	-2.00	
MAX	10.000	-6.43	-0.92	-2.00	
5-- 6	0.000	-6.00	0.00	0.00	
# 1	0.300	-6.00	0.00	0.00	
# 2	0.850	-6.00	0.00	0.00	
6-- 5	2.500	0.00	0.00	0.00	
MAX	0.0	-6.00	0.00	0.00	
2-- 7	0.000	-6.43	-2.00	-0.92	
7-- 2	6.648	2.67	-2.00	-0.92	
MAX	0.0	-6.43	-2.00	-0.92	
3-- 8	0.000	-2.52	-0.75	0.92	
8-- 3	6.648	2.49	-0.75	0.92	
MAX	0.0	-2.52	-0.75	0.92	
4-- 9	0.000	-2.52	0.75	0.92	
9-- 4	6.648	2.49	0.75	0.92	
MAX	0.0	-2.52	0.75	0.92	
5-- 10	0.000	-6.43	2.00	-0.92	
10-- 5	6.648	6.90	2.00	-0.92	
MAX	0.0	-6.43	2.00	-0.92	

•• CASE-- 12

MEMBER	DISTANCE	MOMENT	SHEAR	AXIAL	MOVED MOMENT
1-- 2	0.000	0.00	-3.00	0.0	
# 1	1.650	-0.00	-0.00	0.0	
# 2	2.200	-0.00	-0.00	0.0	
2-- 1	2.500	-0.00	-0.00	0.0	
MAX	2.500	-0.00	-0.00	0.0	
2-- 3	0.000	25.70	-3.67	8.02	
# 1	0.300	24.63	-3.67	8.02	
# 2	0.850	22.58	-3.67	8.02	
# 3	2.900	15.06	-3.67	8.02	
# 4	5.000	7.35	-3.67	8.02	
# 5	7.100	-0.35	-3.67	8.02	
# 6	9.150	-7.85	-3.67	8.02	
# 7	9.700	-9.90	-3.67	8.02	
3-- 2	10.000	-11.00	-3.67	8.02	
MAX	0.0	25.70	-3.67	8.02	
3-- 4	0.000	-0.92	0.00	11.03	
# 1	0.300	-0.92	0.00	11.03	
# 2	0.850	-0.92	0.00	11.03	
# 3	2.900	-0.92	0.00	11.03	
# 4	5.000	-0.92	0.00	11.03	
# 5	7.100	-0.92	0.00	11.03	
# 6	9.150	-0.92	0.00	11.03	
# 7	9.700	-0.92	0.00	11.03	
4-- 3	10.000	-0.92	0.00	11.03	
MAX	0.0	-0.92	0.00	11.03	
4-- 5	0.000	-11.00	3.67	8.02	
# 1	0.300	-9.90	3.67	8.02	
# 2	0.850	-7.85	3.67	8.02	
# 3	2.900	-0.35	3.67	8.02	
# 4	5.000	7.35	3.67	8.02	
# 5	7.100	15.06	3.67	8.02	
# 6	9.150	22.58	3.67	8.02	
# 7	9.700	24.63	3.67	8.02	
5-- 4	10.000	25.70	3.67	8.02	
MAX	10.000	25.70	3.67	8.02	
5-- 6	0.000	0.00	0.00	-0.00	
# 1	0.300	0.00	0.00	-0.00	
# 2	0.850	0.00	0.00	-0.00	
6-- 5	2.500	0.00	0.00	-0.00	
MAX	0.0	0.00	0.00	-0.00	
2-- 7	0.000	-25.70	8.02	3.67	
7-- 2	6.648	27.61	8.02	3.67	
MAX	0.0	-25.70	8.02	3.67	
3-- 8	0.000	-10.03	3.01	-3.67	
8-- 3	6.648	9.95	3.01	-3.67	
MAX	0.0	-10.03	3.01	-3.67	
4-- 9	0.000	-10.03	3.01	-3.67	
9-- 4	6.648	9.95	3.01	-3.67	
MAX	0.0	-10.03	3.01	-3.67	
5-- 10	0.000	-25.70	8.02	3.67	
10-- 5	6.648	27.61	8.02	3.67	
MAX	0.0	-25.70	8.02	3.67	

• BASIC MEMBER FORCES

\*\* CASE-- 13

MEMBER	DISTANCE	MOMENT	SHEAR	AXIAL	MOVED MOMENT
1-- 2	0.000	0.00	-0.00	0.0	
• 1	1.650	-0.00	-0.00	0.0	
• 2	2.200	-0.00	-0.00	0.0	
2-- 1	2.500	-0.00	-0.00	0.0	
MAX	2.500	-0.00	-0.00	0.0	
2-- 3	0.000	44.65	-7.49	-0.45	
• 1	0.300	42.40	-7.49	-0.45	
• 2	0.850	36.28	-7.49	-0.45	
• 3	1.900	22.92	-7.49	-0.45	
• 4	5.000	7.19	-7.49	-0.45	
• 5	7.100	-8.54	-7.49	-0.45	
• 6	9.150	-23.90	-7.49	-0.45	
• 7	9.700	-28.02	-7.49	-0.45	
3-- 2	10.000	-30.27	-7.49	-0.45	
MAX	0.0	44.65	-7.49	-0.45	
3-- 4	0.000	18.35	-3.67	0.00	
• 1	0.300	17.25	-3.67	0.00	
• 2	0.850	15.23	-3.67	0.00	
• 3	2.900	7.71	-3.67	0.00	
• 4	5.000	0.0	-3.67	0.00	
• 5	7.100	-7.71	-3.67	0.00	
• 6	9.150	-15.23	-3.67	0.00	
• 7	9.700	-17.25	-3.67	0.00	
4-- 3	10.000	-18.35	-3.67	0.00	
MAX	10.000	-18.35	-3.67	0.00	
4-- 5	0.000	30.27	-7.49	0.45	
• 1	0.300	28.02	-7.49	0.45	
• 2	0.850	23.90	-7.49	0.45	
• 3	2.900	8.54	-7.49	0.45	
• 4	5.000	-7.19	-7.49	0.45	
• 5	7.100	-22.92	-7.49	0.45	
• 6	9.150	-38.28	-7.49	0.45	
• 7	9.700	-42.40	-7.49	0.45	
5-- 4	10.000	-44.65	-7.49	0.45	
MAX	10.000	-44.65	-7.49	0.45	
5-- 6	0.000	-0.00	-0.00	0.00	
• 1	0.300	-0.00	-0.00	0.00	
• 2	0.850	-0.00	-0.00	0.00	
6-- 5	2.500	-0.00	-0.00	0.00	
MAX	2.500	-0.00	-0.00	0.00	
2-- 7	0.000	-44.65	13.85	7.49	
7-- 2	6.648	47.44	13.85	7.49	
MAX	6.648	47.44	13.85	7.49	
3-- 8	0.000	-48.62	14.75	-3.82	
8-- 3	6.648	49.42	14.75	-3.82	
MAX	6.648	49.42	14.75	-3.82	
4-- 9	0.000	-48.62	14.75	3.82	
9-- 4	6.648	49.42	14.75	3.82	
MAX	6.648	49.42	14.75	3.82	
5-- 10	0.000	-44.65	13.85	-7.49	
10-- 5	6.648	47.44	13.85	-7.49	
MAX	6.648	47.44	13.85	-7.49	

\*\* CASE-- 13

MEMBER	DISTANCE	MOMENT	SHEAR	AXIAL	MOVED MOMENT
1-- 2	0.000	0.00	-0.00	0.0	
• 1	1.650	-0.00	-0.00	0.0	
• 2	2.200	-0.00	-0.00	0.0	
2-- 1	2.500	-0.00	-0.00	0.0	
MAX	2.500	-0.00	-0.00	0.0	
2-- 3	0.000	44.65	-7.49	-0.45	
• 1	0.300	42.40	-7.49	-0.45	
• 2	0.850	36.28	-7.49	-0.45	
• 3	1.900	22.92	-7.49	-0.45	
• 4	5.000	7.19	-7.49	-0.45	
• 5	7.100	-8.54	-7.49	-0.45	
• 6	9.150	-23.90	-7.49	-0.45	
• 7	9.700	-28.02	-7.49	-0.45	
3-- 2	10.000	-30.27	-7.49	-0.45	
MAX	0.0	44.65	-7.49	-0.45	
3-- 4	0.000	18.35	-3.67	0.00	
• 1	0.300	17.25	-3.67	0.00	
• 2	0.850	15.23	-3.67	0.00	
• 3	2.900	7.71	-3.67	0.00	
• 4	5.000	0.0	-3.67	0.00	
• 5	7.100	-7.71	-3.67	0.00	
• 6	9.150	-15.23	-3.67	0.00	
• 7	9.700	-17.25	-3.67	0.00	
4-- 3	10.000	-18.35	-3.67	0.00	
MAX	10.000	-18.35	-3.67	0.00	
4-- 5	0.000	30.27	-7.49	0.45	
• 1	0.300	28.02	-7.49	0.45	
• 2	0.850	23.90	-7.49	0.45	
• 3	2.900	8.54	-7.49	0.45	
• 4	5.000	-7.19	-7.49	0.45	
• 5	7.100	-22.92	-7.49	0.45	
• 6	9.150	-38.28	-7.49	0.45	
• 7	9.700	-42.40	-7.49	0.45	
5-- 4	10.000	-44.65	-7.49	0.45	
MAX	10.000	-44.65	-7.49	0.45	
5-- 6	0.000	-0.00	-0.00	0.00	
• 1	0.300	-0.00	-0.00	0.00	
• 2	0.850	-0.00	-0.00	0.00	
6-- 5	2.500	-0.00	-0.00	0.00	
MAX	2.500	-0.00	-0.00	0.00	
2-- 7	0.000	-44.65	13.85	7.49	
7-- 2	6.648	47.44	13.85	7.49	
MAX	6.648	47.44	13.85	7.49	
3-- 8	0.000	-48.62	14.75	-3.82	
8-- 3	6.648	49.42	14.75	-3.82	
MAX	6.648	49.42	14.75	-3.82	
4-- 9	0.000	-48.62	14.75	3.82	
9-- 4	6.648	49.42	14.75	3.82	
MAX	6.648	49.42	14.75	3.82	
5-- 10	0.000	-44.65	13.85	-7.49	
10-- 5	6.648	47.44	13.85	-7.49	
MAX	6.648	47.44	13.85	-7.49	

\*\* PICK UP TABLE 1 13

\*\* AXIAL F. MAXIMUM

MEMBER	CA	DISTANCE	MOMENT	SHEAR	AXIAL	MOVED MOMENT
1-- 2	23	0.0	0.00	-28.09	0.00	
• 1	23	1.650	-66.83	-50.33	0.00	
• 2	23	2.200	-101.45	-86.33	0.00	
2-- 1	23	2.500	-126.88	-86.33	0.00	
2-- 3	25	0.0	-29.68	50.45	4.85	
• 1	25	0.300	-14.92	47.35	4.85	
• 2	25	0.850	9.97	42.55	4.85	
• 3	25	2.900	72.84	17.99	4.85	
• 4	25	5.000	85.41	-4.43	4.85	
• 5	25	7.100	32.15	-37.36	4.85	
• 6	25	9.150	-70.44	-61.92	4.85	
• 7	25	9.700	-103.99	-67.23	4.85	
3-- 2	25	10.000	-126.55	-67.23	4.85	
3-- 4	25	0.0	-115.38	60.15	8.02	
• 1	25	0.300	-97.72	57.54	8.02	
• 2	25	0.850	-67.50	52.23	8.02	
• 3	25	2.900	19.23	27.68	8.02	
• 4	25	5.000	48.15	9.26	8.02	
• 5	25	7.100	15.23	-27.69	8.02	
• 6	25	9.150	-67.50	-52.23	8.02	
• 7	25	9.700	-97.72	-57.54	8.02	
4-- 3	25	10.000	-115.38	-60.15	8.02	
4-- 5	25	0.0	-126.55	69.44	4.85	
• 1	25	0.300	-103.99	67.23	4.85	
• 2	25	0.850	-70.44	61.92	4.85	
• 3	25	2.900	32.15	37.36	4.85	
• 4	25	5.000	65.41	14.95	4.85	
• 5	25	7.100	72.84	-17.97	4.85	
• 6	25	9.150	9.97	-42.55	4.85	
• 7	25	9.700	-14.92	-47.45	4.85	
5-- 4	25	10.000	-29.68	-50.46	4.85	
5-- 6	22	0.0	-126.88	86.33	0.00	
• 1	22	0.300	-101.45	83.22	0.00	
• 2	22	0.850	-66.83	50.33	0.00	
6-- 5	22	2.500	0.00	28.09	0.00	
2-- 7	26	0.0	-22.55	7.61	-69.49	
7-- 2	26	6.648	23.03	7.61	-77.83	
3-- 8	27	0.0	30.57	-9.41	-105.80	
8-- 3	27	6.648	-32.02	-9.41	-114.04	
4-- 9	26	0.0	-30.57	9.41	-105.80	
9-- 4	26	6.648	32.02	9.41	-114.04	
5-- 10	27	0.0	22.55	-7.61	-69.49	
10-- 5	27	6.648	-28.03	-7.61	-77.83	

\*\* AXIAL F. MINIMUM

MEMBER	CA	DISTANCE	MOMENT	SHEAR	AXIAL	MOVED MOMENT
1-- 2	22	0.0	0.00	-28.09	-0.00	
• 1	22	1.650	-66.83	-50.03	-3.00	
• 2	22	2.200	-101.45	-83.42	-0.00	
2-- 1	22	2.500	-126.88	-86.03	-0.00	
2-- 3	20	0.0	-78.55	134.17	-5.73	
• 1	20	0.300	-44.16	126.55	-5.73	
• 2	20	0.850	14.07	111.95	-6.73	
• 3	20	2.900	163.63	52.04	-6.73	
• 4	20	5.000	203.15	-8.19	-6.73	
• 5	20	7.100	112.23	-78.51	-6.73	
• 6	20	9.150	-87.49	-136.42	-6.73	
• 7	20	9.700	-159.18	-151.02	-5.73	
3-- 2	20	10.000	-201.21	-159.66	-6.73	
3-- 4	24	0.0	-115.38	60.15	-3.98	
• 1	24	0.300	-95.72	57.54	-3.98	
• 2	24	0.850	-66.50	52.23	-3.98	
• 3	24	2.900	16.23	27.63	-3.98	
• 4	24	5.000	49.15	5.26	-3.98	
• 5	24	7.100	16.23	-27.69	-3.98	
• 6	24	9.150	-66.50	-52.23	-3.98	
• 7	24	9.700	-95.72	-57.54	-3.98	
4-- 3	24	10.000	-115.38	-50.15	-3.98	
4-- 5	20	0.0	-201.21	158.06	-6.73	
• 1	20	0.300	-159.18	151.02	-5.73	
• 2	20	0.850	-87.49	136.42	-5.73	
• 3	20	2.900	112.23	76.51	-6.73	
• 4	20	5.000	203.15	19.27	-6.73	
• 5	20	7.100	163.63	-52.04	-6.73	
• 6	20	9.150	14.07	-111.95	-6.73	
• 7	20	9.700	-44.16	-126.55	-6.73	
5-- 4	20	10.000	-78.45	-136.19	-6.73	
5-- 6	25	0.0	-42.82	29.65	-0.00	
• 1	25	0.300	-34.04	27.25	-0.00	
• 2	25	0.850	-23.69	21.95	-0.00	
6-- 5	25	2.500	0.00	0.00	-0.00	
2-- 7	17	0.0	11.21	-2.62	-227.11	
7-- 2	17	6.648	-9.19	-2.62	-241.47	
3-- 8	18	0.0	-4.97	1.21	-271.52	
8-- 3	18	6.648	3.07	1.21	-283.49	
4-- 9	21	0.0	2.11	-0.45	-256.12	
9-- 4	21	6.648	-1.05	-0.45	-266.69	
5-- 10	21	0.0	-7.92	1.79	-225.21	
10-- 5	21	6.648	3.94	1.79	-237.58	

00 PICK UP TABLE I 11

00 SHEARING F. MAXIMUM

MEMBER	CA DISTANCE	MOMENT	SHEAR	AXIAL	MOVED MOMENT
1-- 2 15 0.0		-0.00	0.00	-0.00	
* 1 27 1.550		-15.71	-16.82	0.00	
* 2 27 2.200		-26.10	-20.87	0.00	
2-- 1 27 2.500		-32.57	-22.59	0.00	
2-- 3 17 0.0		-157.12	144.74	-2.62	
* 1 17 0.300		-123.68	137.10	-2.62	
* 2 17 0.850		-67.05	122.40	-2.62	
* 3 17 2.900		84.66	62.59	-2.62	
* 4 14 5.000		59.17	9.16	0.16	
* 5 27 7.100		30.58	-21.20	-1.33	
* 6 27 9.150		-32.82	-40.03	-1.33	
* 7 27 9.700		-55.98	-44.10	-1.33	
3-- 2 27 10.000		-69.51	-46.10	-1.33	
1-- 4 18 0.0		-231.30	152.56	-3.41	
* 1 18 0.300		-195.52	144.92	-3.41	
* 2 18 0.850		-134.59	130.32	-3.41	
* 3 18 2.900		33.16	70.41	-3.41	
* 4 15 5.000		30.18	14.14	-2.32	
* 5 27 7.100		17.43	-18.77	-1.21	
* 6 27 9.150		-40.98	-37.60	-1.21	
* 7 27 9.700		-62.81	-41.67	-1.21	
4-- 3 27 10.000		-75.61	-43.57	-1.21	
4-- 5 20 0.0		-201.21	158.66	-6.73	
* 1 20 0.300		-159.18	151.52	-6.73	
* 2 20 0.850		-87.49	136.42	-6.73	
* 3 20 2.900		112.23	76.51	-6.73	
* 4 19 5.000		64.14	20.03	-0.95	
* 5 27 7.100		61.08	-11.84	-1.92	
* 6 27 9.150		18.10	-30.57	-1.92	
* 7 27 9.700		0.42	-34.14	-1.92	
5-- 4 27 10.000		-10.12	-36.14	-1.92	
5-- 6 21 0.0		-145.91	98.94	-0.00	
* 1 21 0.300		-116.67	95.94	-0.00	
* 2 21 0.850		-76.85	57.54	-0.00	
6-- 5 21 2.500		0.00	32.30	-0.00	
2-- 7 26 0.0		-22.55	7.61	-69.58	
7-- 2 26 6.648		28.03	7.61	-77.83	
3-- 8 26 0.0		-34.26	10.25	-110.89	
8-- 3 26 6.648		33.88	10.25	-117.14	
4-- 9 26 0.0		-30.57	9.41	-105.80	
9-- 4 26 6.648		32.02	9.41	-114.04	
5-- 10 26 0.0		-36.98	10.86	-79.58	
10-- 5 26 6.648		35.22	10.86	-87.92	

00 SHEARING F. MINIMUM

MEMBER	CA DISTANCE	MOMENT	SHEAR	AXIAL	MOVED MOMENT
1-- 2 14 0.0		0.00	-32.30	0.00	
* 1 14 1.650		-76.85	-57.54	0.00	
* 2 14 2.200		-116.57	-95.94	0.00	
2-- 1 14 2.500		-145.91	-98.94	0.00	
2-- 3 26 0.0		-10.12	36.14	-1.92	
* 1 26 0.300		0.42	34.14	-1.92	
* 2 26 0.850		18.10	30.07	-1.92	
* 3 26 2.900		61.08	11.25	-1.72	
* 4 18 5.000		152.10	-10.59	-6.62	
* 5 18 7.100		58.64	-30.91	-6.62	
* 6 18 9.150		-130.64	-143.83	-6.62	
* 7 18 9.700		-197.34	-155.42	-6.62	
3-- 2 18 10.000		-235.28	-163.06	-6.62	
3-- 4 26 0.0		-75.61	43.67	-1.21	
* 1 26 0.300		-62.91	41.67	-1.21	
* 2 26 0.850		-40.98	37.60	-1.21	
* 3 26 2.900		17.43	15.77	-1.21	
* 4 26 5.000		17.53	1.59	-1.21	
* 5 19 7.100		83.51	-66.19	-2.17	
* 6 19 9.150		-95.05	-126.10	-2.17	
* 7 19 9.700		-161.06	-140.70	-2.17	
4-- 3 19 10.000		-200.00	-148.34	-2.17	
4-- 5 26 0.0		-69.51	46.10	-1.33	
* 1 26 0.300		-51.98	44.10	-1.33	
* 2 26 0.850		-32.82	40.03	-1.33	
* 3 26 2.900		30.58	21.20	-1.33	
* 4 26 5.000		55.79	4.02	-1.33	
* 5 21 7.100		76.66	-58.69	-1.78	
* 6 21 9.150		-67.07	-113.61	-1.78	
* 7 21 9.700		-121.56	-133.21	-1.78	
5-- 4 21 10.000		-153.53	-140.85	-1.78	
5-- 6 26 0.0		-32.57	22.89	0.00	
* 1 26 0.300		-25.10	20.87	0.00	
* 2 26 0.850		-15.71	16.82	0.00	
6-- 5 26 2.500		0.00	0.00	0.00	
2-- 7 27 0.0		36.98	-10.86	-79.58	
7-- 2 27 6.648		-35.22	-10.86	-87.92	
3-- 8 27 0.0		30.57	-9.41	-105.80	
8-- 3 27 6.648		-32.02	-9.41	-114.04	
4-- 9 27 0.0		-34.26	-10.25	-110.89	
9-- 4 27 6.648		-33.88	-10.25	-117.14	
5-- 10 27 0.0		-36.98	-10.86	-79.58	
10-- 5 27 6.648		-28.03	-10.86	-87.92	

00 PICK UP TABLE I 11

00 MOMENT MAXIMUM

MEMBER	CA DISTANCE	MOMENT	SHEAR	AXIAL	MOVED MOMENT
1-- 2 14 0.0		0.00	-32.30	0.00	
* 1 27 1.650		-15.71	-16.82	0.00	
* 2 27 2.200		-26.10	-20.87	0.00	
2-- 1 27 2.500		-32.57	-22.59	0.00	
2-- 3 26 0.0		-10.12	36.14	-1.92	
* 1 26 0.300		0.42	34.14	-1.92	
* 2 26 0.850		18.10	30.07	-1.92	
* 3 26 2.900		163.63	52.04	-6.73	
* 4 20 5.000		203.15	-6.19	-6.73	
* 5 20 7.100		112.23	-76.51	-6.73	
* 6 27 9.150		-32.82	-40.03	-1.33	
* 7 27 9.700		-55.98	-44.10	-1.33	
3-- 2 27 10.000		-69.51	-46.10	-1.33	
3-- 4 26 0.0		-75.61	43.57	-1.21	
* 1 26 0.300		-62.91	41.67	-1.21	
* 2 26 0.850		-40.98	37.60	-1.21	
* 3 19 2.900		91.56	62.36	-2.17	
* 4 19 5.000		152.76	4.13	-2.17	
* 5 19 7.100		83.51	-66.19	-2.17	
* 6 27 9.150		-40.98	-37.60	-1.21	
* 7 27 9.700		-62.81	-41.67	-1.21	
4-- 3 27 10.000		-75.61	-43.57	-1.21	
4-- 5 26 0.0		-69.51	46.10	-1.33	
* 1 26 0.300		-55.98	44.10	-1.33	
* 2 26 0.850		-32.82	40.03	-1.33	
* 3 20 2.900		112.23	76.51	-6.73	
* 4 20 5.000		203.15	18.29	-6.73	
* 5 20 7.100		163.63	-52.04	-6.73	
* 6 21 9.150		18.10	-30.57	-1.92	
* 7 27 9.700		0.42	-34.14	-1.92	
5-- 4 27 10.000		-10.12	-36.14	-1.92	
5-- 6 27 0.0		-32.57	22.89	-0.00	
* 1 27 0.300		-26.10	20.87	-0.00	
* 2 27 0.850		-15.71	16.82	-0.00	
6-- 5 21 2.500		0.00	32.30	-0.00	
2-- 7 27 0.0		36.98	-10.86	-79.58	
7-- 2 27 6.648		28.03	7.61	-77.83	
3-- 8 27 0.0		30.57	-9.41	-105.80	
8-- 3 27 6.648		33.88	10.25	-117.14	
4-- 9 27 0.0		-34.26	-10.25	-110.89	
9-- 4 27 6.648		-32.02	-9.41	-114.04	
5-- 10 27 0.0		-36.98	-10.86	-79.58	
10-- 5 27 6.648		22.55	-7.61	-69.58	

00 MOMENT MINIMUM

MEMBER	CA DISTANCE	MOMENT	SHEAR	AXIAL	MOVED MOMENT
1-- 2 19 0.0		-0.00	-32.30	0.00	
* 1 21 1.650		-76.85	-57.54	0.00	
* 2 14 2.200		-116.57	-95.94	0.00	
2-- 1 14 2.500		-145.91	-98.94	0.00	
2-- 3 17 0.0		-157.12	144.74	-2.62	
* 1 17 0.300		-123.68	137.10	-2.62	
* 2 17 0.850		-80.15	57.35	0.95	
* 3 19 2.900		1.47	29.14	0.95	
* 4 19 5.000		33.89	3.36	0.95	
* 5 19 7.100		-9.92	-34.52	0.95	
* 6 18 9.150		-130.64	-140.83	-6.62	
* 7 18 9.700		-197.34	-155.42	-6.62	
3-- 2 18 10.000		-235.28	-163.06	-6.62	
3-- 4 18 0.0		-231.30	152.56	-3.41	
* 1 18 0.300		-195.52	144.92	-3.41	
* 2 15 0.850		-136.55	60.20	-2.32	
* 3 20 2.900		-33.79	31.81	-2.44	
* 4 20 5.000		4.07	6.05	-2.64	
* 5 20 7.100		-33.79	-31.83	-2.44	
* 6 20 9.150		-125.93	-60.01	-2.64	
* 7 21 9.700		-173.55	-138.74	-1.31	
4-- 3 21 10.000		-207.49	-166.62	-1.31	
4-- 5 21 0.0		-209.61	152.00	-1.78	
* 1 21 0.300		-173.99	144.36	-1.78	
* 2 19 0.850		-125.47	74.05	-0.95	
* 3 19 2.900		-31.07	45.81	-0.95	
* 4 26 5.000		54.79	4.02	-1.31	
* 5 26 7.100		30.52	-21.23	-1.31	
* 6 22 9.150		-74.34	-104.27	-1.18	
* 7 22 9.700		-123.44	-118.97	-1.36	
5-- 4 21 10.000		-153.83	-140.85	-1.78	
5-- 6 21 0.0		-145.91	98.94	-0.00	
* 1 21 0.300		-116.67	95.94	-0.00	
* 2 21 0.850		-76.85	57.54	-0.00	
6-- 5 26 2.500		0.00	0.00	0.00	
2-- 7 26 0.0		-22.55	7.61	-69.58	
7-- 2 27 6.648		-35.22	-10.86	-87.92	
3-- 8 26 0.0		-34.26	10.25	-110.89	
8-- 3 27 6.648		-32.02	-9.41	-114.04	
4-- 9 26 0.0		-30.57	9.41	-105.80	
9-- 4 27 6.648		-33.88	-10.25	-117.14	
5-- 10 26 0.0		-36.98	10.86	-79.58	
10-- 5 27 6.648		-23.03	-7.61	-77.93	

Appendix 1-5 POWER SUPPLY SYSTEM OF EMELEC

1. Power supply system of EMELEC

Power supply network of the EMELEC in Guayaquil is shown in Appendix 1-5 "LINEAS DE TRANSMISION 69kV PLANO GENERAL", substation short-circuit capacities in Table A-1 ; and the capacities are enough for operation of the MRT.

Table A-1 SHORT-CIRCUIT CAPACITY OF EMELEC SUBSTATIONS

Substation	Minimum current [kA]	Minimum capacity [MVA]
Pascuales	3.99	477
Germania	3.82	457
Cridesa	3.13	374
Sauce	3.03	362
Alborada	2.59	310
Terminal Terrestre	2.26	270
Mapasingue	2.62	313
FISA	2.68	320
Ceibos	2.53	302

Source: Data supplied by EMELEC

## 2. Substation capacity & interval

Rectifier capacity and interval between the MRT substations are determined by train operation Condition, rolling stock performance, transportation demand and track condition; they are calculated as below.

### 1) Calculation conditions

- (1) Route length : 14.7 km, 12 stations
- (2) Operation speed : 30 km/h (scheduled)  
80 km/h (maximum)
- (3) Operation headway : 2.5 minutes
- (4) Power consumption : 60 kwh/1000ton-km (traction)  
30 kwh/car (HVAC & auxiliary)
- (5) Train weight : 230 ton/train

### 2) Calculation

Interval of train operations is:

$$\frac{30 \text{ km/h}}{60/2.5} = 1.25 \text{ km}$$

Number of operated trains is:

$$14.7 \text{ km}/1.25 \text{ km} = 11.76 \text{ trains, one way}$$

Number of both way train-kilometers per hour is:

$$11.76 \text{ trains} \times 2 \text{ ways} \times 30 \text{ km/h} = 705.6 \text{ trains-km/h}$$

Required traction power is:

$$705.6 \text{ train-km/h} \times 230 \text{ tons/train} \times 60 \text{ kwh}/1,000\text{ton-km} = 9,737 \text{ kwh}$$

Required power for HVAC & auxiliary equipment is:

$$30 \text{ kwh/car} \times 5 \text{ cars} \times 11.76 \text{ trains} \times 2 \text{ ways} = 3,528 \text{ kwh}$$



Total power demand is:

$$9,737 \text{ kwh} + 3,528 \text{ kwh} = 13,265 \text{ kwh}$$

Power demand per unit length is:

$$13,265/14.7 \text{ km} = 902 \text{ kw/km}$$

### 3) Rectifier Capacity & Coverage

MRT substations are required to supply power of 902 kw/km for train operations; if a substation provides 2000 kw rectifier, the substation is capable of power supply to cover about 2.2 km of both north bound and south bound tracks in one direction. Therefore, each end substation is provided with one set of 2000 kw rectifier, and the others with two sets; then, standard interval between substations is about 4 km.

Capacities of rectifiers are rated at 1000 kw, 1500kw, 2000 kw, 3000 kw, 4000 kw and so on; 2000 kw rectifier is generally adopted as a standard for an urban transportation system.

Feeding circuit length of 4 km is most appropriate to clear requirements of voltage drop and fault protection; if the interval is longer, the conductor size of the feeder will become unusually larger.

### 3. Catenary system

#### 1) Types of catenary systems

Suitable catenary system is generally selected in consideration of train speed, current collection capacity, maintainability and economy.

Systems are broadly classified in:

- a. direct suspension system,
- b. simple catenary system,
- c. stitched catenary system, and
- d. compound catenary system.





Table A-2 shows the features of each catenary system. The maximum speeds as shown are in case of one pantograph passing; The speed performance will lower when multipantograph passing, since the frequency of contact loss and the amount of uplift will increase due to the multiple vibration caused by successively passing pantographs.

#### 2) Comparison of catenary systems

##### a. Direct suspension system

Direct suspension system is classified in two types; one directly supports the contact wire, and the other suspends the contact wire through short rods or wires to improve the system performance. This system can be adopted most economically for sections where the maximum train speed is 60 km/h (80 km/h for one pantograph passing).

Table A-2 CATENARY SYSTEMS

Type	Typical construction	Standard wire type (mm <sup>2</sup> )			Wire tension (ton)	Maximum speed (km/h)
		Catenary	Auxiliary catenary	Contact wire		
1 Direct suspension system		nil	nil	GT 110	1	80
2 Simple catenary system		St 90	nil	GT 110	2	120
3 Stitched catenary system		St 90	nil	GT 110	2	150
4 Compound catenary system		St 135	Cu 100	GT 110	3	200

Speed performance is based on one-pantograph passing

St: Galvanized steel wire

Cu: Hard-drawn copper wire

GT: Hard drawn grooved contact wire

b. Simple catenary system

This system is generally used for sections where the maximum train speed is 120 km/h.

c. Stitched catenary system

Stitched wire is added to the simple catenary system to improve system performance.

d. Compound catenary system

This is another modification of the simple catenary system, in which auxiliary wire is provided to improve overall performance.

Both stitched and compound catenary systems have excellent speed performance; However, they require relatively high construction costs.

### 3) Selection of Catenary System

Simple catenary system will be employed since train speed is planned at 80 km/h.

Direct suspension system may be adopted in limited sections, e.g., low speed sections. However, the installation of two types of catenary systems on a short route of 14.7 km will make the following demerits, and the economical characteristic of direct suspension will be lost.

a. Complication and variation of maintenance

b. Variety of maintenance parts

c. Complication of trolley wires and their suspension equipment at track transfer sections in the car depot.

#### 4. Calculation of fixed monthly charge of power supply

Electric power to the MRT system will be supplied from EMELEC: and its charge is shown in tariff as attached herewith.

Management organization will be classified into official entities, this reason is described in our reports and Supplementary Vol 4 section entitled as Management Plan. Tarifa E-0 in the tariff, therefore, will be applicable; the fixed monthly charges at each case and year are calculated as shown in Table A-3. And rate of electricity per kwh is 3.5544 sucres.

Table A-3 MONTHLY CHARGE OF ELECTRICITY

Case description	Year	Number of rectifiers [Sets]	Payable demand [MW]	Fixed charge [S/.1000]
Basic Case	1990	5	24.4	1963
	1993	6	28.9	2325
	1996	6	28.9	2325
	2000-	8	37.9	3049
Case A-1,B-1,D-1	1990	3	15.2	1223
	1993	6	28.9	2325
Case A-2	1990	3	15.2	1223
	1993	3	15.2	1223
Case C-1	1990	2	10.7	861
	1993	6	28.9	2325
Case C-2	1990	2	10.7	861
	1993	3	15.2	1223
Case E, F, G	1990 to 2000	3	15.2	1223
	2010	3	15.2	1223
Case F, G	2010	4	19.7	1592









Appendix 1-8 MAJOR MACHINES, MECHANICAL FACILITIES & INSTRUMENTS

I T E M	Q'ty
<u>Machinery</u>	
<u>Work Shop</u>	
--(Carbody Shop)	
Underfloor equipment setting/removing machine 1 ton	1
Underfloor equipment setting/removing machine 1.5 ton	1
Arc welder	1
Carbody stand	24
Upright drilling machine	1
Double wheel grinder	1
Surface plate	1
--(Bogie Shop)	
Double wheel grinder	1
Coil spring tester	1
Bogie frame washer	1
Hydraulic press 10 ton	1
Magnaflux flaw detector	1
Arc welder	1
Bogie frame support stand	6 set
--(Wheel set Shop)	
Wheel axle lathe	1
Ultra-sonic flaw detector	1
Gear box flushing equipment	1
Wheel fitting press 200 ton	1
Jib crane 1.5 ton	2
Axle box fitting/removing equipment	2
--(Rotating machine shop)	
Parts washer	1
Traction motor tester (no load test)	1
Rotating machine coil characteristic tester	1
Static inverter tester	1
Air compressor tester	1
Commutator lathe	1
Electric drying oven	1
Withstans voltage tester	1
Stand for traction motor frame and armature	10 set
Oil bath for bearing and pinion	1

I T E M	Q'ty
--(Mechanical parts shop)	
Upright drilling machine	4
Double wheel grinder	3
Buffing machine	1
Magnalux flaw detector	1
Lathe center distance 1,000 mm	1
Universal milling machine	1
Circular shearing machine	1
Pipe bender	1
Pipe threader	1
TIG welder	1
Shearing machine thickness 6 mm	1
Folding machine thickness 6 mm	1
Cutting disc grinder	1
Oxyacetylene welder	1
Gas cutting machine	1
Universal tool grinder	1
Band sawing machine	1
Surface plate	1
Parts washer	1
Air blow dust collector	1
Air brake valve tester	1
Bench drill	1
Air compressor for testing	1
--(Electrical parts shop)	
Double wheel grinder	1
Buffing machine	1
Soft-blasting parts cleaner	1
Electric belt sander	1
Parts washer	1
Electro pneumatic valve tester	1
Jumper coupler tester	1
Battery charging dis-charging tester	1
Circuit breaker tester	1
Withstand voltage tester	1
Public address tester	1

I T E M	Q'ty
Speedmeter tester	1
Brake receiver tester	1
Line breaker tester	1
Low voltage large current generator	1
High voltage small current generator	1
Pantograph tester	1
<u>Car Depot</u>	
--(Inspection shed)	
Upright drilling machine	1
Double head grinder	1
Parts air blowing cleaner	1
Air compressor	1
--(Temporary inspection shop)	
Lifting jack 40 ton	1 set
Arc welder	1
Upright drilling machine	1
Parts air blasting booth	1
--(Wheel tread re-profiling shed)	
Under-floor type wheel tread reprofiling machine	1
--(Turnout & Electrical maintenance shop)	
Hydraulic press 100 ton	1
Metal band saw	1
Arc welder	2
Upright drilling machine	1
Double wheel grinder	1
Oxy-acetylene welder	1
<u>Overhead travelling crane</u>	
Overhead travelling crane for carbody shop 15/3 ton	2
" for bogie shop 5 ton	2
" for mechanical/electrical parts shop 1.5 ton	2
" for mechanical/electrical parts shop 1 ton	1
" for temporary inspection shop 3 ton	1
Gantry crane 3 ton	1

I T E M	Q'ty
<u>Auxiliary equipment</u>	
Shunting locomotive	1
Motor car	2
Wagon	5
Fork lift 1 ton	1
Fork lift 1.5 ton	1
Battery car 1 ton platform type	2
<u>Airconditioning Facilities</u>	
Airconditioning facility for administration building	1
" for signal cabin	1
<u>Utility service facilities</u>	
Compressed air pipe line	1
Effluent treatment facility	1
Diesel oil supply plant	1
<u>Measuring instrument</u>	
DC volt meter	8
DC ammeter	9
Frequency indicator	1
Power factor meter	1
Current transformer for meter	2
Shunt	1
Wheatstone bridge	1
Double bridge	1
Slide rheostat	2
Slide transformer	1
Insulation resistance tester	1
Tachometer	1
Tester	1
Surface thermometer	1
Diode curve tracer	1
Transister curve tracer	1
Synchroscope	2
Direct-wiring electromagnetic oscillograph	1
Universal counter	1
Digital tester	1
Automatic voltage regulator	1
Capacitance tester	1

I T E M	Q'ty
Oscillator	1
Detector	1
Vibrometer	1
Outside micrometer	6
Straight metal rule	6
Vernier cariper	3
<u>Tools</u>	
Portable electric grinder	2
Air grinder	1
Impact wrench	10
Portable tool set	5
Tool set for tool tray	5
Electrician's tool set	15
Tools for fitter	2
Carpenter's tools	1
Tools for cleaning personnel	5 month use
Tools and instrument for permanent way	1
<u>Accessories</u>	
Locker for machine tool	11
Locker for storage of tools	2
Locker for storage of small parts	5
Working bench	17
Working bench with oil bath	1
Wood working bench	1
Electric bench	2
Tool tray	5
Movable screen	2
Rack	52



Appendix 1-9 DETAILS OF PROJECT COST ESTIMATION

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TEST CASES

Test Case	Opening Year and its Section
Basic Case	
Case A-1	
Case A-2	
Case B-1	
Case C-1	
Case C-2	
Case D-1	
Case E	
Case F	
Case G	

I. PROJECT COST (SUMMARY)

PROJECT COST (SUMMARY) (1) CASE: Basic Case-1

(Unit: Million Sucres in 1985 Prices)

Item	Year Currency	1990			1993			1996			2000			TOTAL				
		L.C	F.C	Total	L.C	F.C	Total	L.C	F.C	Total	L.C	F.C	Total	L.C	F.C	Total		
Civil Work	Track (A.1)	687	484	1,181	-	-	-	-	-	-	-	-	-	687	494	1,181		
	Structure of Way (A.2)	4,502	5,167	9,669	-	-	-	-	-	-	-	-	-	4,502	5,167	9,669		
	Station (A.3)	792	1,435	2,227	-	-	-	-	-	-	-	-	-	792	1,435	2,227		
	Depot & Maintenance Shop (A.4)	588	838	1,426	324	678	1,002	36	46	82	-	-	23	42	65	971	1,604	2,575
	Miscellaneous (A.5)	455	201	656	-	-	-	-	-	-	-	-	-	-	455	201	656	
	Sub-total	7,024	8,135	15,159	324	678	1,002	36	46	82	-	-	23	42	65	7,407	8,901	16,308
	Substation (B.1)	175	963	1,138	4	55	59	-	-	-	-	-	-	-	187	1,128	1,315	
	Power Distribution (B.2)	180	385	565	-	-	-	-	-	-	-	-	-	-	181	385	566	
	Signal & Telecommunication (B.3)	60	338	398	-	-	-	-	-	-	-	-	-	-	62	353	415	
	Others (B.4)	31	0	31	-	-	-	-	-	-	-	-	-	-	31	0	31	
Sub-total	446	1,686	2,132	4	55	59	-	-	-	-	-	-	-	461	1,866	2,327		
Electrical Facilities	Rolling Stock (C)	28	5,327	5,355	4	761	765	8	1,522	1,530	2	381	383	12	2,283	2,295	10,328	
	(Number of rolling stocks)			(70)		(10)			(20)			(5)			(30)		(135)	
Land	Land Acquisition (D.1)	145	0	145	-	-	-	-	-	-	-	-	-	-	145	0	145	
	Compensation (D.2)	117	0	117	-	-	-	-	-	-	-	-	-	-	117	0	117	
	Sub-total	262	0	262	-	-	-	-	-	-	-	-	-	-	262	0	262	
	Engineering Services* (Survey, Design, Supervision) (E)	367	718	1,085	-	-	-	-	-	-	-	-	-	-	367	718	1,085	
Contingency (F)	452	456	908	16	34	50	2	2	4	0	0	0	1	2	3	471	494	965
Project Cost (G)	8,579	16,322	24,901	348	1,528	1,876	46	1,570	1,616	13	506	519	36	2,327	2,363	9,022	22,253	31,275

(Note) 1. L.C = Local Currency Portion  
F.C = Foreign Currency Portion

2. Exchange Rate

1 US\$ = 120 Sucres = 210 Yens

3. A.3 incl. structure of way  
A.4 incl. track, mechanical and electrical facilities  
A.5 incl. road improvement, obstacles elimination, etc.  
A.4 = costs for EMELEC and IETEL

4. F = 5% of (I(A.1 - A.4) + B.2) + 20% of (A.5 + D.2)

5. G = I(A - F)

6. Opening year and operating kilometrage in 1990, 14.7 km

PROJECT COST (SUMMARY) (2)

CASE: Case A-1

(Unit: Million Sucres in 1985 Prices)

Item	1990			1993			1996			2000			2010			TOTAL			
	L.C	F.C	Total	L.C	F.C	Total	L.C	F.C	Total	L.C	F.C	Total	L.C	F.C	Total	L.C	F.C	Total	
Civil Work	Track (A.1)	327	246	573	362	248	610	-	-	-	-	-	-	-	-	689	494	1,183	
	Structure of Way (A.2)	1,936	1,945	3,881	2,566	3,221	5,787	-	-	-	-	-	-	-	-	4,502	5,166	9,668	
	Station (A.3)	389	600	989	403	836	1,239	-	-	-	-	-	-	-	-	792	1,436	2,228	
	Depot & Maintenance Shop (A.4)	571	804	1,375	342	715	1,057	36	46	82	-	-	-	23	42	65	972	1,607	2,579
	Miscellaneous (A.5)	106	135	241	349	67	416	-	-	-	-	-	-	-	-	-	455	202	657
Electrical Facilities	Sub-total (A)	3,329	3,730	7,059	4,022	5,087	9,109	36	46	82	-	-	-	23	42	65	7,410	8,905	16,315
	Substation (B.1)	107	594	701	73	424	497	-	-	-	8	110	118	-	-	-	188	1,128	1,316
	Power Distribution (B.2)	87	189	276	93	197	290	-	-	-	1	0	1	-	-	-	181	366	567
	Signal & Telecommunication (B.3)	33	191	224	29	158	187	-	-	-	2	15	17	-	-	-	64	364	428
	Others (B.4)	28	0	28	3	0	3	-	-	-	-	-	-	-	-	-	31	0	31
	Sub-total (B)	255	974	1,229	198	779	977	-	-	-	11	125	136	-	-	-	464	1,878	2,342
	Rolling Stock (Number of rolling stocks) (C)	12	2,283	2,295	20	3,810	3,830	8	1,522	1,530	2	381	383	12	2,283	2,295	54	10,279	10,333
	Land Acquisition (D.1)	127	0	127	18	0	18	-	-	-	-	-	-	-	-	-	145	0	145
	Land Compensation (D.2)	87	0	87	30	0	30	-	-	-	-	-	-	-	-	-	117	0	117
	Sub-total (D)	214	0	214	48	0	48	-	-	-	-	-	-	-	-	-	262	0	262
Land	Engineering Services (Survey, Design, Supervision) (E)	233	431	664	242	463	705	-	-	-	-	-	-	-	-	475	894	1,369	
	Contingency (F)	204	216	420	264	274	538	2	2	4	0	0	1	2	3	471	494	965	
	Project Cost (G)	4,247	7,634	11,881	4,794	10,413	15,207	46	1,570	1,616	13	506	519	36	2,327	2,363	9,136	22,450	31,586

(Note) 1. L.C = Local Currency Portion

F.C = Foreign Currency Portion

2. Exchange Rate

1 US\$ = 120 Sucres = 210 Yens

3. A.3 incl. structure of way

A.4 incl. track, mechanical and electrical facilities

A.5 incl. road improvement, obstacles elimination, etc.

A.4 = costs for EMELEC and IETEL

4. F = 5% of (A.1 + A.4) + B.2 + 20% of (A.5 + D.2)

5. G = I (A-F)

6. Opening year and operating kilometrage

in 1990, 6.7 km

in 1993, 14.7 km

PROJECT COST (SUMMARY) (3)

CASE: Case A-2

(Unit: Million Sucres in 1985 Prices)

Item	Year Currency	1990			1993			1996			2000			2010			TOTAL		
		L.C	F.C	Total	L.C	F.C	Total	L.C	F.C	Total	L.C	F.C	Total	L.C	F.C	Total			
Civil Work	Track (A.1)	327	246	573	108	74	182	255	175	430	-	-	-	-	-	-	690	495	1,185
	Structure of Way (A.2)	1,936	1,945	3,881	727	924	1,651	1,840	2,297	4,137	-	-	-	-	-	-	4,503	5,166	9,669
	Station (A.3)	399	600	999	166	438	604	236	398	634	-	-	-	-	-	-	791	1,436	2,227
	Depot & Maintenance Shop (A.4)	571	804	1,375	335	700	1,035	39	63	102	0	0	0	23	42	65	968	1,609	2,577
	Miscellaneous (A.5)	106	135	241	238	46	284	111	20	131	-	-	-	-	-	-	455	201	656
Sub-total	(A)	3,329	3,730	7,059	1,574	2,183	3,756	2,481	2,953	5,434	-	-	-	23	42	65	7,407	8,907	16,314
Electrical Facilities	Substation (B.1)	107	594	701	-	-	0	73	424	497	8	110	118	-	-	-	188	1,128	1,316
	Power Distribution (B.2)	87	189	276	32	59	91	62	138	200	1	0	1	-	-	-	182	386	568
	Signal & Telecommunication (B.3)	33	191	224	13	70	83	18	96	114	2	15	17	-	-	-	66	372	438
	Others (B.4)	28	0	28	-	-	0	3	0	3	-	-	0	-	-	-	31	0	31
	Sub-total	(B)	255	974	1,229	45	129	174	156	638	814	11	125	136	-	-	-	467	1,886
Land	Rolling Stock (Number of rolling stocks) (C)	12	2,283	2,295 (30)	6	1,142 (15)	1,148 (15)	22	4,186 (55)	4,208 (55)	2	381 (5)	383 (5)	12	2,283 (30)	2,295 (30)	54	10,275 (135)	10,329 (135)
	Land Acquisition (D.1)	127	0	127	-	-	-	18	0	18	-	-	-	-	-	-	145	0	145
Land	Compensation (D.2)	87	0	87	-	-	-	30	0	30	-	-	-	-	-	-	117	0	117
	Sub-total (D)	214	0	214	-	-	-	48	0	48	-	-	-	-	-	-	262	0	262
	Engineering Services (Survey, Design, Supervision) (E)	233	431	664	83	154	237	195	360	555	-	-	-	-	-	-	511	945	1,456
Project Cost	Contingency (F)	204	216	420	116	119	235	150	158	308	0	0	0	1	2	3	471	495	966
	Project Cost (G)	4,247	7,634	11,881	1,824	3,726	5,550	3,052	8,315	11,367	13	506	519	36	2,327	2,363	9,172	22,508	31,680

(Note) 1. L.C = Local Currency Portion  
F.C = Foreign Currency Portion

2. Exchange Rate

1 US\$ = 120. Sucres = 210 Yens

3. A.3 incl. structure of way  
A.4 incl. track, mechanical and electrical facilities  
A.5 incl. road improvement, obstacles elimination, etc.  
A.4 = costs for EMELEC and IETEL

4. F = 5% of ((A.1 - A.4) + B.2) + 20% of (A.5 + D.2)

5. G = E (A-F)

6. Opening year and operating kilometrage

in 1990, 6.7 km  
in 1993, 9.1 km  
in 1996, 14.7 km

PROJECT COST (SUMMARY) (4)

CASE: Case B-1

(Unit: Million Sucres in 1985 Prices)

Item	Year			1990			1993			1996			2000			2010			TOTAL			
	Currency	L.C	F.C	Total	L.C	F.C	Total	L.C	F.C	Total	L.C	F.C	Total	L.C	F.C	Total	L.C	F.C	Total	L.C	F.C	Total
Civil Work	Track (A.1)	433	319	752	255	175	430	-	-	-	-	-	-	-	-	-	688	494	1,182			
	Structure of Way (A.2)	2,662	2,869	5,531	1,840	2,297	4,137	-	-	-	-	-	-	-	-	-	4,502	5,166	9,668			
	Station (A.3)	555	1,038	1,593	236	398	634	-	-	-	-	-	-	-	-	-	791	1,436	2,227			
	Depot & Maintenance Shop (A.4)	579	822	1,401	335	697	1,032	36	46	82	23	42	65	23	42	65	973	1,607	2,580			
	Miscellaneous (A.5)	346	184	530	111	20	131	-	-	-	-	-	-	-	-	-	457	204	661			
Electrical Facilities	Sub-total (A)	4,575	5,232	9,807	2,777	3,587	6,364	36	46	82	-	-	-	8	110	118	7,411	8,907	16,318			
	Substation (B.1)	107	594	701	73	424	497	-	-	-	-	-	-	1	0	1	188	1,128	1,316			
	Power Distribution (B.2)	118	247	365	62	138	200	-	-	-	-	-	-	2	15	17	181	385	566			
	Signal & Telecommunication (B.3)	43	247	290	18	102	120	-	-	-	-	-	-	2	15	17	63	364	427			
	Others (B.4)	28	0	28	3	0	3	-	-	-	-	-	-	-	-	-	31	0	31			
Land	Sub-total (B)	209	1,088	1,384	156	664	820	-	-	-	11	125	136	-	-	-	463	1,877	2,340			
	Rolling Stock (C)	16	3,044	3,060	16	3,044	3,060	8	1,522	1,530	2	381	383	12	2,283	2,295	54	10,274	10,328			
	(Number of rolling stocks)			(40)			(40)			(20)			(5)			(30)			(135)			
	Land Acquisition (D.1)	127	0	127	18	0	18	-	-	-	-	-	-	-	-	-	145	0	145			
	Compensation (D.2)	87	0	87	30	0	30	-	-	-	-	-	-	-	-	-	117	0	117			
Engineering Services (Survey, Design, Supervision)	Sub-total (D)	214	0	214	48	0	48	-	-	-	-	-	-	-	-	-	262	0	262			
	Contingency (F)	304	302	606	165	189	354	2	2	4	0	0	2	0	0	2	471	887	1,358			
	Project Cost (G)	5,681	10,193	15,874	3,357	7,844	11,201	46	1,570	1,616	13	506	519	36	2,327	2,363	9,133	22,440	31,573			

4. F = 5% of (Σ(A.1-A.4) + B.2) + 20% of (A.5 + D.2)

5. G = Σ(A-F)

6. Opening year and operating kilometrage  
in 1990, 9.1 km  
in 1993, 14.7 km

(Note) 1. L.C = Local Currency Portion  
F.C = Foreign Currency Portion

2. Exchange Rate  
1 US\$ = 120 Sucres = 210 Yens

3. A.3 incl. structure of way  
A.4 incl. track, mechanical and electrical facilities  
A.5 incl. road improvement, obstacles elimination, etc.  
A.4 = costs for EMELEC and IATEL

PROJECT COST (SUMMARY) (5)

CASE: Case C-1

(Unit: Million Sucras in 1985 Prices)

Item	Year Currency	1990			1993			1996			2000			2010			TOTAL			
		L.C	F.C	Total	L.C	F.C	Total	L.C	F.C	Total	L.C	F.C	Total	L.C	F.C	Total				
Civil Work	Track	(A.1)	276	211	487	413	283	696	-	-	-	-	-	-	-	689	494	1,183		
	Structure of Way	(A.2)	1,851	2,312	4,163	2,651	2,854	5,505	-	-	-	-	-	-	-	4,502	5,166	9,668		
	Station	(A.3)	305	591	896	487	844	1,331	-	-	-	-	-	-	-	792	1,435	2,227		
	Depot & Maintenance Shop	(A.4)	571	804	1,375	342	715	1,057	36	46	82	-	-	-	23	42	65	972	1,607	2,579
	Miscellaneous	(A.5)	122	23	145	333	179	512	-	-	-	-	-	-	-	455	202	657		
	Sub-total	(A)	3,125	3,941	7,066	4,226	4,875	9,101	36	46	82	-	-	-	23	42	65	7,410	8,904	16,314
	Substation	(B.1)	72	414	486	107	603	710	-	-	-	8	110	118	-	-	-	187	1,127	1,314
Electrical Facilities	Power Distribution	(B.2)	71	148	219	109	237	346	-	-	-	1	0	1	-	-	-	181	385	566
	Signal & Telecommunication	(B.3)	25	166	191	36	183	219	-	-	-	2	15	17	-	-	-	63	364	427
	Others	(B.4)	9	0	9	22	0	22	-	-	-	-	-	-	-	-	-	31	0	31
	Sub-total	(B)	177	728	905	274	1,023	1,297	-	-	-	11	125	136	-	-	-	462	1,876	2,338
	Rolling Stock	(C)	8	1,522	1,530	24	4,566	4,590	8	1,522	1,530	2	381	383	12	2,283	2,295	54	10,274	10,328
	(Number of rolling stocks)				(20)		(60)			(20)			(5)			(30)				(135)
	Land Acquisition	(D.1)	224	0	224	89	0	89	-	-	-	-	-	-	-	-	-	313	0	313
Land	Compensation	(D.2)	1,030	0	1,030	87	0	87	-	-	-	-	-	-	-	-	1,117	0	1,117	
	Sub-total	(D)	1,254	0	1,254	176	0	176	-	-	-	-	-	-	-	-	1,430	0	1,430	
	Engineering Services (Survey, Design, Supervision)	(E)	195	360	555	276	527	803	-	-	-	-	-	-	-	471	887	1,358		
Project Cost	Contingency	(F)	384	208	592	284	282	566	2	2	4	0	0	1	2	3	671	494	1,165	
	Project Cost	(G)	5,143	6,759	11,902	5,260	11,273	16,533	46	1,570	1,616	13	506	519	36	2,327	2,363	10,498	22,435	32,933

(Note) 1. L.C = Local Currency Portion  
F.C = Foreign Currency Portion

2. Exchange Rate

1 US\$ = 120 Sucras = 210 Yens

3. A.3 incl. structure of way  
A.4 incl. track, mechanical and electrical facilities  
A.5 incl. road improvement, obstacles elimination, etc.  
A.4 = costs for EMELEC and IETEL

4. F = 5% of (I(A.1 - A.4) + B.2) + 20% of (A.5 + D.2)

5. G = I(A-F)

6. Opening year and operating kilometrage  
in 1990, 5.6 km  
in 1993, 14.7 km

PROJECT COST (SUMMARY) (6)

CASE: Case C-2

(Unit: Million Sucres in 1985 Prices)

Item	1990			1993			1996			2000			2010			TOTAL			
	L.C	F.C	Total	L.C	F.C	Total	L.C	F.C	Total	L.C	F.C	Total	L.C	F.C	Total				
Civil Work	Track (A.1)	276	211	487	108	73	181	307	210	517	-	-	-	691	494	1,185			
	Structure of Way (A.2)	1,651	2,312	4,163	723	919	1,642	1,928	1,935	3,863	-	-	-	4,502	5,166	9,668			
	Station (A.3)	305	591	896	166	438	604	320	406	726	-	-	-	791	1,435	2,226			
	Depot & Maintenance Shop (A.4)	571	804	1,375	327	683	1,010	47	77	124	-	-	-	23	42	65			
	Miscellaneous (A.5)	122	23	145	237	45	282	95	132	227	-	-	-	-	454	200			
Sub-total	3,125	3,941	7,066	1,561	2,158	3,719	2,697	2,760	5,457	-	-	-	23	42	65	7,406	8,901	16,307	
Electrical Facilities	Substation (B.1)	72	414	486	35	179	214	73	424	497	8	110	118	-	-	-	188	1,127	1,315
	Power Distribution (B.2)	71	148	219	32	59	91	78	179	257	1	0	1	-	-	-	182	386	568
	Signal & Telecommunication (B.3)	25	166	191	13	70	83	25	120	145	2	15	17	-	-	-	65	371	436
	Others (B.4)	9	0	9	2	0	2	20	0	20	-	-	0	-	-	-	31	0	31
	Sub-total	177	728	905	82	308	390	196	723	919	11	125	136	-	-	-	466	1,884	2,350
Land	Rolling Stock (Number of rolling stocks) (C)	8	1,522	1,530 (20)	8	1,522	1,530 (20)	24	4,566	4,590 (60)	2	381	383 (5)	12	2,283 (30)	2,295	54	10,274 (135)	10,328
	Land Acquisition (D.1)	224	0	224	-	-	-	89	0	89	-	-	-	-	-	-	313	0	313
Land (Engineering Services (Survey, Design, Supervision))	Compensation (D.2)	1,030	0	1,030	-	-	-	87	0	87	-	-	-	-	-	-	1,117	0	1,117
	Sub-total (D)	1,254	0	1,254	-	-	-	176	0	176	-	-	-	-	-	-	1,430	0	1,430
	Engineering Services (Survey, Design, Supervision) (E)	195	360	555	83	154	237	233	431	664	-	-	-	-	-	-	511	945	1,456
	Contingency (F)	384	208	592	115	118	233	170	167	337	0	0	0	1	2	3	671	484	1,155
	Project Cost (G)	5,143	6,759	11,902	1,849	4,260	6,109	3,496	8,647	12,143	13	506	519	36	2,327	2,363	10,537	22,499	33,036

(Note) 1. L.C = Local Currency Portion  
F.C = Foreign Currency Portion

- Exchange Rate  
1 US\$ = 120 Sucres = 210 Yens
- Opening year and operating kilometrage  
in 1990, 5.6 km  
in 1993, 8.0 km  
in 1996, 14.7 km

3. A.3 incl. structure of way  
A.4 incl. track, mechanical and electrical facilities  
A.5 incl. road improvement, obstacles elimination, etc.  
A.4 = costs for EMELEC and INTEL

4.  $F = 5\%$  of  $(\Sigma(A.1 - A.4) + B.2) + 20\%$  of  $(A.5 + D.2)$   
(x 0.05)

5.  $G = \Sigma(A-F)$

6. Opening year and operating kilometrage

PROJECT COST (SUMMARY) (7)

CASE: Case D-1

(Unit: Million Sucres in 1985 Prices)

Item	1990			1993			1996			2000			2010			TOTAL		
	L.C	F.C	Total	L.C	F.C	Total	L.C	F.C	Total	L.C	F.C	Total	L.C	F.C	Total	L.C	F.C	Total
Track	382	284	666	307	210	517	-	-	-	-	-	-	689	484	1,183	-	-	-
Structure of Way	2,574	3,231	5,805	1,928	1,935	3,863	-	-	-	-	-	-	4,502	5,166	9,668	-	-	-
Station	471	1,029	1,500	320	406	726	-	-	-	-	-	-	791	1,435	2,226	-	-	-
Depot & Maintenance Shop	519	822	1,401	335	697	1,032	36	46	82	-	-	-	23	42	65	973	1,607	2,580
Miscellaneous	359	69	428	95	133	228	-	-	-	-	-	-	454	202	656	-	-	-
Sub-total	4,365	5,435	9,800	2,985	3,381	6,366	36	46	82	-	-	-	23	42	65	7,409	8,904	16,313
Substation	107	504	701	73	424	497	-	-	-	8	110	118	-	-	-	188	1,128	1,316
Power Distribution	102	207	309	78	179	257	-	-	-	1	0	1	-	-	-	181	386	567
Signal & Telecommunication	36	224	260	25	125	150	-	-	-	2	15	17	-	-	-	63	364	427
Others	11	0	11	20	0	20	-	-	-	-	-	-	-	-	-	31	0	31
Sub-total	256	1,025	1,281	196	728	924	-	-	-	11	125	136	-	-	-	463	1,878	2,341
Rolling Stock	16	3,044	3,060	16	3,044	3,060	8	1,522	1,530	2	381	383	12	2,283	2,295	54	10,274	10,328
(Number of rolling stocks)			(40)			(40)			(20)			(5)			(30)			(135)
Land Acquisition	224	0	224	89	0	89	-	-	-	-	-	-	-	-	-	313	0	313
Compensation	1,030	0	1,030	87	0	87	-	-	-	-	-	-	-	-	-	1,117	0	1,117
Sub-total	1,254	0	1,254	176	0	176	-	-	-	-	-	-	-	-	-	1,430	0	1,430
Engineering Services	242	463	705	233	431	664	-	-	-	-	-	-	-	-	-	475	894	1,369
(Survey, Design, Supervision)																		
Contingency	483	292	775	185	198	383	2	2	4	0	0	0	1	2	3	671	484	1,165
Project Cost	6,616	10,259	16,875	3,791	7,782	11,573	46	1,570	1,616	13	506	519	36	2,327	2,363	10,502	22,444	32,946

(Note) 1. L.C = Local Currency Portion  
F.C = Foreign Currency Portion

2. Exchange Rate

1 US\$ = 120 Sucres = 210 Yens

3. A.3 incl. structure of way  
A.4 incl. track, mechanical and electrical facilities  
A.5 incl. road improvement, obstacles elimination, etc.  
A.4 = costs for EMELEC and IETEL

4. F = 5% of (L(A.1 - A.4) + B.2) + 20% of (A.5 + D.2)

5. G = L (A - F)

6. Opening year and operating kilometrage  
in 1990, 8.0 km  
in 1993, 14.7 km



PROJECT COST (SUMMARY) (8)

CASE: Case E

(Unit: Million Sucres in 1985 Prices)

Item	Year			1990			1993			1996			2000			TOTAL			
	Item	L.C	F.C	Total	L.C	F.C	Total	L.C	F.C	Total	L.C	F.C	Total	L.C	F.C	Total	L.C	F.C	Total
Civil Work	Track (A.1)	327	246	573	-	-	-	-	-	-	-	-	-	327	246	573	-	-	-
	Structure of Way (A.2)	1,936	1,945	3,881	-	-	-	-	-	-	-	-	-	1,936	1,945	3,881	-	-	-
	Station (A.3)	389	600	989	-	-	-	-	-	-	-	-	-	389	600	989	-	-	-
	Depot & Maintenance Shop (A.4)	571	804	1,375	327	683	1,010	-	-	-	-	-	-	898	1,487	2,385	-	-	-
	Miscellaneous (A.5)	106	135	241	-	-	-	-	-	-	-	-	-	106	135	241	-	-	-
Sub-total	3,329	3,730	7,059	327	683	1,010	-	-	-	-	-	-	3,656	4,413	8,069	-	-	-	
Electrical Facilities	Substation (B.1)	106	604	710	-	-	-	-	-	-	-	-	-	110	659	769	-	-	-
	Power Distribution (B.2)	87	189	276	-	-	-	-	-	-	-	-	-	87	189	276	-	-	-
	Signal & Telecommunication (B.3)	33	197	230	-	-	-	-	-	-	-	-	-	33	197	230	-	-	-
	Others (B.4)	28	0	28	-	-	-	-	-	-	-	-	-	28	0	28	-	-	-
	Sub-total	254	990	1,244	-	-	-	-	-	-	-	-	-	4	55	59	-	-	-
Land	Rolling Stock (Number of rolling stocks)	12	2,283	2,295 (30)	2	381	383 (5)	-	-	-	-	-	-	2	381	383 (5)	-	-	-
	Land Acquisition (D.1)	127	0	127	-	-	-	-	-	-	-	-	-	127	0	127	-	-	-
Land (Survey, Design, Supervision)	Compensation (D.2)	87	0	87	-	-	-	-	-	-	-	-	-	87	0	87	-	-	-
	Sub-total	214	0	214	-	-	-	-	-	-	-	-	-	214	0	214	-	-	-
	Engineering Services (Survey, Design, Supervision)	233	431	664	-	-	-	-	-	-	-	-	-	233	431	664	-	-	-
	Contingency (F)	204	216	420	16	34	50	-	-	-	-	-	-	220	250	470	-	-	-
	Project Cost (G)	4,246	7,650	11,896	345	1,098	1,443	-	-	-	-	-	-	6	436	442	4,597	9,184	13,781

4. F = 5% of (Σ(A.1-A.4) + B.2) + 20% of (A.5 + D.2)

5. G = Σ(A-F)

6. Opening year and operating kilometrage in 1990, 6.7 km (no further construction of the system)

(Note) 1. L.C = Local Currency Portion  
F.C = Foreign Currency Portion

2. Exchange Rate

1 US\$ = 120 Sucres = 210 Yens

3. A.3 incl. structure of way  
A.4 incl. track, mechanical and electrical facilities  
A.5 incl. road improvement, obstacles elimination, etc.  
A.4 = costs for EMELEC and IETEL

PROJECT COST (SUMMARY) (9)

CASE: Case F

(Unit: Million Sucres in 1985 Prices)

Item	1990			1993			1996			2000			2010			TOTAL			
	L.C	F.C	Total	L.C	F.C	Total	L.C	F.C	Total	L.C	F.C	Total	L.C	F.C	Total				
Civil Work	Track (A.1)	433	319	752	-	-	-	-	-	-	-	-	433	319	752				
	Structure of Way (A.2)	2,662	2,869	5,531	-	-	-	-	-	-	-	-	2,662	2,869	5,531				
	Station (A.3)	555	1,038	1,593	-	-	-	-	-	-	-	-	555	1,038	1,593				
	Depot & Maintenance Shop (A.4)	579	827	1,401	336	681	1,007	-	-	-	-	-	7	15	22				
	Miscellaneous (A.5)	346	184	530	-	-	-	-	-	-	-	-	-	-	-				
	Sub-total (A)	4,575	5,232	9,807	326	681	1,007	-	-	-	-	-	7	15	22	4,908	5,928	10,836	
	Substation (B.1)	106	604	710	-	-	-	-	-	-	-	-	-	4	55	59	110	659	769
Electrical Facilities	Power Distribution (B.2)	113	247	365	-	-	-	-	-	-	-	-	-	-	-	0	118	247	365
	Signal & Telecommunication (B.3)	43	250	293	-	-	-	-	-	-	-	-	-	-	-	0	43	250	293
	Others (B.4)	28	0	28	-	-	-	-	-	-	-	-	-	-	-	0	28	0	28
	Sub-total (B)	295	1,101	1,396	-	-	-	-	-	-	-	-	-	4	55	59	299	1,156	1,455
	Rolling Stock (Number of rolling stocks) (C)	16	3,044	3,060 (40)	2	381	383 (5)	2	381	383 (5)	-	-	-	10	1,903	1,913 (25)	30	5,709	5,739 (25)
	Land Acquisition (D.1)	127	0	127	-	-	-	-	-	-	-	-	-	-	-	-	127	0	127
	Compensation (D.2)	87	0	87	-	-	-	-	-	-	-	-	-	-	-	-	87	0	87
Land	Sub-total (D)	214	0	214	-	-	-	-	-	-	-	-	-	-	-	214	0	214	
	Engineering Services (Survey, Design, Supervision) (E)	276	527	803	-	-	-	-	-	-	-	-	-	-	-	276	527	803	
	Contingency (F)	304	302	606	16	34	50	-	-	-	-	-	-	-	-	320	337	657	
Project Cost (G)	5,680	10,206	15,886	344	1,096	1,440	2	381	383	-	-	-	21	1,974	1,995	6,047	13,657	19,704	

4. F = 5% of (I(A.1-A.4) + B.2) + 20% of (A.5 + D.2)

5. G = I(A-F)

6. Opening year and operating kilometrage in 1990, 9.1 km (no further construction of the system)

(Note) 1. L.C = Local Currency Portion  
F.C = Foreign Currency Portion

2. Exchange Rate

1 US\$ = 120 Sucres = 210 Yens

3. A.3 incl. structure of way  
A.4 incl. track, mechanical and electrical facilities  
A.5 incl. road improvement, obstacles elimination, etc.  
A.4 = costs for EMELEC and IETEL

PROJECT COST (SUMMARY) (10)

CASE: Case G

(Unit: Million Sucres in 1985 Prices)

Item	Year Currency	1990			1993			1996			2000			TOTAL		
		L.C	F.C	Total	L.C	F.C	Total	L.C	F.C	Total	L.C	F.C	Total	L.C	F.C	Total
Civil Work	Track (A.1)	382	284	666	-	-	-	-	-	-	-	-	-	382	284	666
	Structure of Way (A.2)	2,574	3,231	5,805	-	-	-	-	-	-	-	-	-	2,574	3,231	5,805
	Station (A.3)	471	1,029	1,500	-	-	-	-	-	-	-	-	-	471	1,029	1,500
	Depot & Maintenance Shop (A.4)	579	802	1,401	317	664	981	-	-	-	9	17	26	905	1,503	2,408
	Miscellaneous (A.5)	359	69	428	-	-	-	-	-	-	-	-	-	359	69	428
Electrical Facilities	Sub-total (A)	4,365	5,435	9,800	317	664	981	-	-	-	9	17	26	4,691	6,116	10,807
	Substation (B.1)	106	604	710	-	-	-	-	-	-	4	55	59	110	659	769
	Power Distribution (B.2)	102	207	309	-	-	-	-	-	-	-	-	-	102	207	309
	Signal & Telecommunication (B.3)	36	225	261	-	-	-	-	-	-	-	-	-	36	225	261
	Others (B.4)	11	0	11	-	-	-	-	-	-	-	-	-	11	0	11
	Sub-total (B)	255	1,036	1,291	-	-	-	-	-	-	4	55	59	259	1,091	1,350
	Rolling Stock (C)	16	3,044	3,060	-	-	-	-	-	-	2	381	383	18	3,425	3,443
	(Number of rolling stocks)			(40)							(5)				(45)	
	Land Acquisition (D.1)	224	0	224	-	-	-	-	-	-	-	-	-	224	0	224
	Compensation (D.2)	1,030	0	1,030	-	-	-	-	-	-	-	-	-	1,030	0	1,030
Land	Sub-total (D)	1,254	0	1,254	-	-	-	-	-	-	-	-	-	1,254	0	1,254
	Engineering Services (Survey, Design, Supervision) (E)	242	463	705	-	-	-	-	-	-	-	-	-	242	463	705
	Contingency (F)	483	292	775	16	33	49	-	-	-	0	1	1	499	326	825
Project Cost (G)	6,615	10,270	16,885	333	697	1,030	-	-	-	15	454	469	6,963	11,421	16,384	

(Note) 1. L.C = Local Currency Portion  
F.C = Foreign Currency Portion

- Exchange Rate  
1 US\$ = 120 Sucres = 210 Yens
- A.3 incl. structure of way  
A.4 incl. track, mechanical and electrical facilities  
A.5 incl. road improvement, obstacles elimination, etc.  
A.4 = costs for EMELEC and IETEL
4. F = 5% of (Σ(A.1-A.4) + B.2) + 20% of (A.5 + D.2)  
5. G = Σ(A-F)  
6. Opening year and operating kilometrage  
in 1990, 8.0 km  
(no further construction of the system)

I. DETAILS  
 1. Civil Work  
 1) Civil Work (Summary) (1)

(Unit: 1,000 acres)

Case	Item	1990			1993			1996			2010			TOTAL		
		L.C	F.C	Total	L.C	F.C	Total	L.C	F.C	Total	L.C	F.C	Total	L.C	F.C	Total
Basic Case	Track	687	494	1,181	-	-	-	-	-	-	-	-	-	687	494	1,181
	Structure of Way	4,502	5,167	9,669	-	-	-	-	-	-	-	-	-	4,502	5,167	9,669
	Station	792	1,435	2,227	-	-	-	-	-	-	-	-	-	792	1,435	2,227
	Depot & Maintenance shop	464	215	679	256	184	440	21	20	41	19	23	42	760	442	1,202
	Electrical	98	236	334	36	24	60	15	26	41	4	19	23	153	305	458
	Mechanical	26	387	413	32	470	502	0	0	0	0	0	0	58	857	915
	Sub Total	588	838	1,426	324	678	1,002	36	46	82	23	42	65	971	1,604	2,575
	Miscellaneous	455	201	656	-	-	-	-	-	-	-	-	-	455	201	656
	Total	7,024	8,135	15,159	324	678	1,002	36	46	82	23	42	65	7,407	8,901	16,308
	Track	327	246	573	362	248	610	-	-	-	-	-	-	689	494	1,183
Structure of Way	1,936	1,945	3,881	2,566	3,221	5,787	-	-	-	-	-	-	4,502	5,166	9,668	
Station	389	600	989	403	836	1,239	-	-	-	-	-	-	792	1,436	2,228	
Depot & Maintenance shop	451	200	651	270	201	471	21	20	41	19	23	42	761	444	1,205	
Electrical	94	217	311	40	44	84	15	26	41	4	19	23	153	306	459	
Mechanical	26	387	413	32	470	502	0	0	0	0	0	0	58	857	915	
Sub Total	571	804	1,375	342	715	1,057	36	46	82	23	42	65	972	1,607	2,579	
Miscellaneous	106	135	241	349	67	416	-	-	-	-	-	-	455	202	657	
Total	3,329	3,730	7,059	4,022	5,087	9,109	36	46	82	23	42	65	7,410	8,905	16,315	
Track	327	246	573	108	74	182	255	175	430	-	-	-	690	495	1,185	
Structure of Way	1,936	1,945	3,881	727	924	1,651	1,840	2,297	4,137	-	-	-	4,503	5,166	9,669	
Station	389	600	989	166	438	604	236	398	634	-	-	-	791	1,436	2,227	
Depot & Maintenance shop	451	200	651	265	194	459	22	28	50	19	23	42	757	445	1,202	
Electrical	94	217	311	38	36	74	17	35	52	4	19	23	153	307	460	
Mechanical	26	387	413	32	470	502	0	0	0	0	0	0	58	857	915	
Sub Total	571	804	1,375	335	700	1,035	39	63	102	23	42	65	968	1,609	2,577	
Miscellaneous	106	135	241	238	46	284	111	20	131	-	-	-	455	261	656	
Total	3,329	3,730	7,059	1,574	2,182	3,756	2,481	2,953	5,434	23	42	65	7,407	8,907	16,314	

1) Civil Work (Summary) (2)

(Unit: 1,000 sucres)

Case	Item	1990			1993			1996			2010			TOTAL		
		L.C	F.C	Total	L.C	F.C	Total	L.C	F.C	Total	L.C	F.C	Total	L.C	F.C	Total
Case B-1	Track	433	310	752	255	175	430	-	-	-	-	-	-	588	494	1,182
	Structure of Way	2,662	2,869	5,531	1,840	2,297	4,137	-	-	-	-	-	-	4,502	5,166	9,668
	Station	555	1,038	1,593	236	398	634	-	-	-	-	-	-	791	1,436	2,227
	Civil	457	207	664	265	194	459	21	20	41	19	23	42	762	444	1,206
	Electrical	96	228	324	38	33	71	15	26	41	4	19	23	153	306	459
Case C-1	Maintenance shop	26	387	413	32	470	502	0	0	0	0	0	0	58	857	915
	Sub Total	579	822	1,401	335	697	1,032	36	46	82	23	42	65	973	1,607	2,580
	Miscellaneous	346	184	530	111	20	131	-	-	-	-	-	-	457	204	661
	Total	4,575	5,232	9,807	2,777	3,587	6,364	36	46	82	23	42	65	7,411	8,907	16,318
	Track	276	211	487	413	283	696	-	-	-	-	-	-	689	494	1,183
Case C-2	Structure of Way	1,851	2,312	4,163	2,651	2,854	5,505	-	-	-	-	-	-	4,502	5,166	9,668
	Station	305	591	896	487	844	1,331	-	-	-	-	-	-	792	1,435	2,227
	Civil	451	200	651	270	201	471	21	20	41	19	23	42	761	444	1,205
	Electrical	94	217	311	40	44	84	15	26	41	4	19	23	153	306	459
	Maintenance shop	26	387	413	32	470	502	0	0	0	0	0	0	58	857	915
Case C-2	Sub Total	571	804	1,375	342	715	1,057	36	46	82	23	42	65	972	1,607	2,579
	Miscellaneous	122	23	145	333	179	512	-	-	-	-	-	-	455	202	657
	Total	3,125	3,941	7,066	4,226	4,875	9,101	36	46	82	23	42	65	7,410	8,904	16,314
	Track	276	211	487	108	73	181	307	210	517	-	-	-	691	494	1,185
	Structure of Way	1,851	2,312	4,163	723	919	1,642	1,928	1,935	3,863	-	-	-	4,502	5,166	9,668
Case C-2	Station	305	591	896	166	438	604	320	406	726	-	-	-	791	1,435	2,226
	Civil	451	200	651	258	186	444	29	34	63	19	23	42	757	443	1,200
	Electrical	94	217	311	37	27	64	18	43	61	4	19	23	153	306	459
	Maintenance shop	26	387	413	32	470	502	0	0	0	0	0	0	58	857	915
	Sub Total	571	804	1,375	327	683	1,010	47	77	124	23	42	65	968	1,606	2,574
Case C-2	Miscellaneous	122	23	145	237	45	282	95	132	227	-	-	-	454	200	654
	Total	3,125	3,941	7,066	1,561	2,158	3,719	2,697	2,760	5,457	23	42	65	7,406	8,901	16,307

1) Civil Work (Summary) (3)

(Unit: 1,000 sucres)

Case	Item	1990			1993			1996			2010			TOTAL		
		L.C	F.C	Total	L.C	F.C	Total	L.C	F.C	Total	L.C	F.C	Total	L.C	F.C	Total
Case D-1	Track	382	284	666	307	210	517	-	-	-	-	-	-	689	494	1,183
	Structure of Way	2,574	3,231	5,805	1,928	1,935	3,863	-	-	-	-	-	-	4,502	5,166	9,668
	Station	471	1,029	1,500	320	406	726	-	-	-	-	-	-	791	1,435	2,226
	Depot & Maintenance shop	457	207	664	265	194	459	21	20	41	19	23	42	762	444	1,206
	Electrical	96	228	324	38	33	71	15	26	41	4	19	23	153	306	459
	Mechanical	26	387	413	32	470	502	0	0	0	0	0	0	58	857	915
	Sub Total	579	822	1,401	335	697	1,032	36	46	82	23	42	65	973	1,607	2,580
	Miscellaneous	359	69	428	95	133	228	-	-	-	-	-	-	454	202	656
	Total	4,365	5,435	9,800	2,985	3,381	6,366	36	46	82	23	42	65	7,409	8,904	16,316
	Track	327	246	573	-	-	-	-	-	-	-	-	-	327	246	573
Case E	Structure of Way	1,936	1,945	3,881	-	-	-	-	-	-	-	-	-	1,936	1,945	3,881
	Station	389	600	989	-	-	-	-	-	-	-	-	-	389	600	989
	Depot & Maintenance shop	451	200	651	258	186	444	-	-	-	-	-	-	709	386	1,095
	Electrical	94	217	311	37	27	64	-	-	-	-	-	-	131	244	375
	Mechanical	26	387	413	32	470	502	-	-	-	-	-	-	58	857	915
	Sub Total	571	804	1,375	327	683	1,010	-	-	-	-	-	-	898	1,487	2,385
	Miscellaneous	106	135	241	-	-	-	-	-	-	-	-	-	106	135	241
	Total	3,329	3,730	7,059	327	683	1,010	-	-	-	-	-	-	3,656	4,413	8,069
	Track	433	319	752	-	-	-	-	-	-	-	-	-	433	319	752
	Structure of Way	2,662	2,869	5,531	-	-	-	-	-	-	-	-	-	2,662	2,869	5,531
Case F	Station	555	1,038	1,593	-	-	-	-	-	-	-	-	-	555	1,038	1,593
	Depot & Maintenance shop	457	207	664	258	186	444	-	-	-	5	7	12	720	400	1,120
	Electrical	96	228	324	36	25	61	-	-	-	2	8	10	134	261	395
	Mechanical	26	387	413	32	470	502	-	-	-	0	0	0	58	857	915
	Sub Total	579	822	1,401	326	681	1,007	-	-	-	7	15	22	912	1,518	2,430
	Miscellaneous	346	184	530	-	-	-	-	-	-	-	-	-	346	184	530
	Total	4,575	5,232	9,807	326	681	1,007	-	-	-	7	15	22	4,908	5,928	10,836

1) Civil Work (Summary) (4)

(Unit: 1,000 acres)

Case	Item	1990			1993			1996			2010			TOTAL		
		L.C	F.C	Total	L.C	F.C	Total	L.C	F.C	Total	L.C	F.C	Total	L.C	F.C	Total
Case G	Track	382	284	666	-	-	-	-	-	-	-	-	-	382	284	666
	Structure of Way	2,574	3,231	5,805	-	-	-	-	-	-	-	-	-	2,574	3,231	5,805
	Station	471	1,029	1,500	-	-	-	-	-	-	-	-	-	471	1,029	1,500
	Depot & Civil	457	207	664	251	178	429	-	-	-	7	8	15	715	393	1,108
	Maintenance shop	96	228	324	34	16	50	-	-	-	2	9	11	132	253	385
		26	387	413	32	470	502	-	-	-	0	0	0	58	857	915
	Sub Total	579	822	1,401	317	664	981	-	-	-	9	17	26	905	1,503	2,408
Miscellaneous	359	69	428	-	-	-	-	-	-	-	-	-	359	69	428	
Total	4,365	5,435	9,800	317	664	981	-	-	-	9	17	26	4,691	5,116	10,807	

I. Civil Work: 2) Track (1)

(Unit: 1,000 Sucras)

Applicable Case	Item	Specification	Q'ty	Unit	Local Currency Portion				Foreign Currency Portion				Total	Grand Total
					Material	Labor	Equipment	Total	Material	Labor	Equipment	Transport & Insurance		
Basic Case in 1990	Double Track	50 kg/m	14.82	km	92,180	360,126	161,390	613,969	249,865	0	35,568	43,274	328,707	942,403
	Single track	40 kg/m	0.47	km	1,358	3,835	1,894	7,087	2,585	0	390	390	3,365	10,452
	Turnout	SC 8#	2	Set	810	3,620	2,830	7,260	20,640	0	100	3,100	23,840	31,100
	Sub-total				94,348	367,581	166,114	628,043	273,090	0	36,058	46,764	355,912	883,955
	Indirect Cost							59,037					137,754	196,791
	Total						687,087					1,493,666	1,180,746	
Case A-1 in 1990 Case A-2 in 1990 Case E in 1990	Double Track	50 kg/m	6.85	km	42,607	166,455	74,597	283,659	115,491	0	16,440	20,002	151,933	435,592
	Single Track	40 kg/m	0.47	km	1,358	3,835	1,894	7,087	2,585	0	390	390	3,365	10,452
	Turnout	SC 8#	2	Set	810	3,620	2,830	7,260	20,640	0	100	3,100	23,840	31,100
	Sub-total				44,775	173,910	79,321	298,006	138,716	0	16,930	23,492	179,138	477,144
	Indirect Cost							28,629					66,800	95,429
	Total						326,635					245,938	572,573	
Case A-1 in 1993	Double Track	50 kg/m	7.97	km	49,573	193,673	86,793	330,039	134,374	0	19,128	23,272	176,774	506,813
	Turnout (relocation)	SC 8#	1	Set	90	905	270	1,265	0	0	0	0	0	1,265
	Sub-total				49,663	194,578	87,063	331,304	134,374	0	19,128	23,271	176,774	508,078
	Indirect Cost							30,485					71,131	101,616
	Total							361,789					247,905	609,694

I. Civil Work: 2) Track (2)

(Unit: 1,000 Sucras)

Applicable Case	Item	Specification	Q'ty	Unit	Local Currency Portion				Foreign Currency Portion				Total	Grand Total
					Material	Labor	Equipment	Total	Material	Labor	Equipment	Transport & Insurance		
Case A-2 in 1993	Double Track	50 kg/m	2.36	km	14,679	57,348	25,700	97,727	39,790	0	5,664	6,891	52,345	150,072
	Turnout (relocation)	SC 8#	1	Set	90	905	270	1,265	0	0	0	0	0	1,265
	Sub-total				14,769	58,253	25,970	98,992	39,790	0	5,664	6,891	52,345	151,337
	Indirect Cost							9,080					21,187	30,267
	Total							108,072					73,532	181,604
Case A-2 in 1996, Case B-1 in 1993	Double Track	50 kg/m	5.61	km	34,894	136,323	61,093	232,310	94,585	0	13,464	16,381	124,430	356,740
	Turnout (relocation)	SC 8#	1	Set	90	905	270	1,265	0	0	0	0	0	1,265
	Sub-total				34,984	137,228	61,363	233,575	94,585	0	13,464	16,381	124,430	358,005
	Indirect Cost							21,480					50,121	71,601
	Total							255,055					174,551	429,606
Case B-1 in 1990, Case F in 1990	Double Track	50 kg/m	9.21	km	57,286	223,803	100,297	381,386	155,281	0	22,104	26,893	204,278	585,664
	Single Track	40 kg/m	0.47	km	1,358	3,835	1,894	7,087	2,585	0	390	390	3,365	10,452
	Turnout	SC 8#	2	Set	810	3,620	2,830	7,260	20,640	0	100	3,100	23,840	31,100
	Sub-total				59,454	231,258	105,021	395,733	178,506	0	22,594	30,383	231,483	627,216
	Indirect Cost							37,633					87,810	125,443
Total							433,366					319,293	752,659	



1. Civil Work: 2) Track (3)

(Unit: 1,000 Suces)

Applicable Case	Item	Specification	Q'ty	Unit	Local Currency Portion				Foreign Currency Portion				Total	Grand Total
					Material	Labor	Equipment	Total	Material	Labor	Equipment	Transport & Insurance		
Case C-1 in 1990, Case C-2 in 1990	Double Track	50 kg/m	5.72	km	35,578	138,996	62,291	236,865	96,439	0	13,728	16,702	126,869	363,734
	Single Track	40 kg/m	0.47	km	1,358	3,835	1,894	7,087	2,585	0	390	390	3,365	10,452
	Turnout	SC 8#	2	Set	810	3,620	2,830	7,260	20,640	0	100	3,100	23,840	31,100
	Sub-total				37,746	146,451	67,015	251,212	119,664	0	14,218	20,192	154,074	405,286
	Indirect Cost							24,317					56,740	81,057
	Total						275,529					210,814	486,343	
Case C-1 in 1993	Double Track	50 kg/m	9.10	km	56,602	221,130	99,099	376,831	153,426	0	21,840	26,572	201,838	578,669
	Turnout (relocation)	SC 8#	1	Set	90	905	270	1,265	0	0	0	0	0	1,265
	Sub-total				56,692	222,035	99,369	378,096	153,426	0	21,840	26,572	201,838	579,934
	Indirect Cost							34,796					81,191	115,987
	Total						412,892					283,029	695,921	
Case C-2 in 1993	Double Track	50 kg/m	2.35	km	14,617	57,105	25,592	97,314	39,621	0	5,640	6,862	52,123	149,437
	Turnout (relocation)	SC 8#	1	Set	90	905	270	1,265	0	0	0	0	0	1,265
	Sub-total				14,707	58,010	25,862	98,579	39,621	0	5,640	6,862	52,123	150,702
	Indirect Cost							9,042					21,098	30,140
	Total							107,621					73,221	180,842

1. Civil Work: 2) Track (4)

(Unit: 1,000 Suces)

Applicable Case	Item	Specification	Q'ty	Unit	Local Currency Portion				Foreign Currency Portion				Total	Grand Total
					Material	Labor	Equipment	Total	Material	Labor	Equipment	Transport & Insurance		
Case C-2 in 1996, Case D-1 in 1993	Double Track	50 kg/m	6.75	km	41,985	164,025	73,508	279,518	113,805	0	16,200	19,710	149,715	429,233
	Turnout (relocation)	SC 8#	1	Set	90	905	270	1,265	0	0	0	0	0	1,265
	Sub-total				42,075	164,930	73,778	280,783	113,805	0	16,200	19,710	149,715	430,498
	Indirect Cost							25,830					60,270	86,100
	Total						306,613					209,985	516,598	
Case D-1 in 1990, Case G in 1990	Double Track	50 kg/m	8.07	km	50,195	196,101	87,882	334,178	136,060	0	19,368	23,564	178,992	513,170
	Single Track	40 kg/m	0.47	km	1,358	3,835	1,894	7,087	2,585	0	390	390	3,365	10,452
	Turnout	SC 8#	2	Set	810	3,620	2,830	7,260	20,640	0	100	3,100	23,840	31,100
	Sub-total				52,363	203,556	92,606	348,525	159,285	0	19,858	27,054	206,197	554,722
	Indirect Cost							33,283					77,661	110,944
	Total						381,808					283,858	665,666	

1. Civil Work: 3) Structure of Way (1)

(Unit: 1,000 Sucre)

Applicable Case	Item	Specification	Q'ty	Unit	Local Currency Portion				Foreign Currency Portion				Grand Total		
					Material	Labor	Equipment	Total	Material	Labor	Equipment	Transport & Insurance		Total	
Basic Case in 1990	Ground		1,160	m	19,711	4,090	43,534	67,335	5,720	0	2,383	970	9,073	76,408	
	Rigid A		302	m	30,502	13,348	40,951	84,801	6,765	0	14,315	1,117	22,197	106,998	
	Rigid B		1,302	m	124,732	61,064	110,279	296,075	29,035	0	57,679	4,817	91,531	387,606	
	Girder (W) A		760	m	96,026	59,090	72,428	227,544	25,764	34,428	216,334	4,522	281,048	508,592	
	Girder (W) B		9,250	m	1,150,700	584,870	916,860	2,752,430	300,440	363,340	2,428,680	52,910	3,145,370	5,897,800	
	Girder (W) C		379	m	44,737	27,087	38,533	110,357	11,927	13,367	93,905	2,100	121,299	231,656	
	Girder (S) B		325	m	26,952	16,042	21,476	64,470	7,036	8,512	56,888	1,238	73,674	138,144	
	Girder (S) C		40	m	3,148	1,906	2,711	7,765	839	940	6,607	148	8,534	16,299	
	Special A		170	m	21,004	10,800	25,158	56,962	3,328	4,264	40,708	586	48,886	105,848	
	Special B		570	m	115,482	56,191	179,254	350,927	16,046	20,252	197,904	2,822	237,025	581,951	
	Sub-total					632,994	938,488	1,451,184	4,018,666	406,900	445,103	3,115,403	71,230	4,038,636	8,051,302
	Indirect Cost								483,438					1,128,022	1,611,460
Total								4,502,104					5,166,658	9,668,762	
Case A-1 in 1990 Case A-2 in 1990 Case B in 1990	Ground		1,160	m	19,711	4,090	43,534	67,335	5,720	0	2,383	970	9,073	76,408	
	Rigid A		302	m	30,502	13,348	40,951	84,801	6,765	0	14,315	1,117	22,197	106,998	
	Rigid B		1,302	m	124,732	61,064	110,279	296,075	29,035	0	57,679	4,817	91,531	387,606	
	Girder (W) A		147	m	18,573	11,429	14,009	44,011	4,983	6,659	41,844	875	54,361	98,372	
	Girder (W) B		2,975	m	370,090	220,269	294,882	885,241	96,628	116,858	781,116	17,017	1,011,619	1,896,860	
	Girder (W) C		199	m	23,490	14,223	20,232	57,945	6,263	7,019	49,306	1,102	63,690	121,635	
	Girder (S) B		325	m	26,952	16,042	21,476	64,470	7,036	8,512	56,888	1,238	73,674	138,144	
	Girder (S) C		40	m	3,148	1,906	2,711	7,765	839	940	6,607	148	8,534	16,299	
	Special A		0	m											
	Special B		380	m	76,988	37,460	119,502	233,947	10,697	13,501	131,936	1,881	158,015	391,962	
	Sub-total					694,186	379,831	667,576	1,741,599	167,966	153,489	1,342,074	29,165	1,492,694	3,234,287
	Indirect Cost								194,057					452,800	646,857
Total								1,935,650					1,945,494	3,881,144	

1. Civil Work: 3) Structure of Way (2)

(Unit: 1,000 Sucre)

Applicable Case	Item	Specification	Q'ty	Unit	Local Currency Portion				Foreign Currency Portion				Grand Total		
					Material	Labor	Equipment	Total	Material	Labor	Equipment	Transport & Insurance		Total	
Case A-1 in 1993	Ground		0	m											
	Rigid A		0	m											
	Rigid B		0	m											
	Girder (W) A		613	m	77,453	47,661	58,419	183,532	20,781	27,769	174,490	3,647	226,687	410,219	
	Girder (W) B		6,275	m	780,610	464,601	621,978	1,867,189	203,812	246,482	1,647,564	35,893	2,133,751	4,000,940	
	Girder (W) C		180	m	21,247	12,865	18,301	52,413	5,665	6,349	44,599	997	57,610	110,023	
	Girder (S) B		0	m	0	0	0	0	0	0	0	0	0	0	
	Girder (S) C		0	m	0	0	0	0	0	0	0	0	0	0	
	Special A		120	m	21,004	10,800	25,158	56,962	3,328	4,264	40,708	586	48,886	105,848	
	Special B		190	m	38,494	18,730	59,751	116,975	5,349	6,751	65,968	941	79,009	195,984	
	Sub-total					938,808	554,657	783,607	2,277,071	238,935	291,615	1,973,329	42,064	2,545,943	4,823,014
	Indirect Cost								289,381					675,222	964,603
Total								2,566,452					3,221,165	5,787,617	
Case A-2 in 1993	Ground		0	m											
	Rigid A		0	m											
	Rigid B		0	m											
	Girder (W) A		293	m	37,021	22,781	27,923	87,725	9,933	13,273	83,402	1,743	108,351	196,076	
	Girder (W) B		1,600	m	199,040	118,464	158,592	476,096	51,968	62,848	420,096	9,152	544,064	1,020,160	
	Girder (W) C		145	m	17,116	10,363	14,742	42,221	4,563	5,114	35,927	803	46,407	88,628	
	Girder (S) B		0	m											
	Girder (S) C		0	m											
	Special A		80	m	14,002	7,200	16,772	37,974	2,218	2,842	27,138	390	32,588	70,562	
	Special B		0	m											
	Sub-total					267,179	158,808	218,029	644,016	68,682	84,077	566,563	12,088	731,410	1,375,426
	Indirect Cost								82,526					192,560	275,066
Total								726,542					923,970	1,650,512	

(Unit 1,000 Sucres)

## 1. Civil Work: 3) Structure of Way (3)

Applicable Case	Item	Specification	Q'ty	Unit	Local Currency Portion				Foreign Currency Portion				Grand Total		
					Material	Labor	Equipment	Total	Material	Labor	Equipment	Transport & Insurance		Total	
Case A-2 in 1996, Case B-1 in 1993	Ground		0	m											
	Rigid A		0	m											
	Rigid B		0	m											
	Girder (W) A		320	m	40,432	24,880	30,496	95,808	10,848	14,496	91,088	1,904	118,336	214,144	
	Girder (W) B		4,675	m	581,570	346,137	463,386	1,391,093	151,844	183,634	1,227,468	26,741	1,589,687	2,980,780	
	Girder (W) C		35	m	4,131	2,501	3,558	10,191	1,101	1,234	8,672	194	11,202	21,393	
	Girder (S) B		0	m											
	Girder (S) C		0	m											
	Special A		40	m	7,001	3,600	8,386	18,987	1,109	1,421	13,569	195	16,294	35,281	
	Special B		190	m	38,494	18,730	59,751	116,974	5,349	6,751	65,968	941	79,008	195,982	
Sub-total					671,628	395,848	565,577	1,633,053	170,251	207,536	1,406,765	29,975	1,814,527	3,447,580	
Indirect Cost								206,855					482,661	689,516	
Total								1,839,908					2,297,188	4,137,097	
Case B-1 in 1990, Case F in 1990	Ground		1,160	m	19,711	4,090	43,534	67,335	5,720	0	2,383	970	9,073	76,408	
	Rigid A		302	m	30,502	13,348	40,951	84,801	6,765	0	14,315	1,117	22,197	106,998	
	Rigid B		1,302	m	124,732	61,064	110,279	296,075	29,035	0	57,679	4,817	91,531	387,606	
	Girder (W) A		440	m	55,594	34,210	41,932	131,736	14,916	19,932	125,246	2,618	162,712	294,448	
	Girder (W) B		4,575	m	569,130	338,733	453,474	1,361,337	148,596	179,706	1,201,212	26,169	1,555,683	2,917,020	
	Girder (W) C		344	m	40,606	24,586	34,974	100,166	10,826	12,133	85,233	1,906	110,099	210,264	
	Girder (S) B		325	m	26,952	16,042	21,476	64,470	7,036	8,512	56,888	1,238	73,674	138,144	
	Girder (S) C		40	m	3,148	1,906	2,711	7,765	839	940	6,607	148	8,534	16,299	
	Special A		80	m	14,002	7,200	16,772	37,974	2,218	2,842	27,138	390	32,588	70,362	
	Special B		380	m	76,988	37,460	119,502	233,950	10,697	13,501	131,936	1,881	158,015	391,965	
Sub-total					961,365	538,639	885,605	2,385,609	236,448	237,566	1,708,637	41,254	2,224,105	4,609,714	
Indirect Cost								276,583					645,360	921,943	
Total								2,662,192					2,869,465	5,531,657	

(Unit: 1,000 Sucres)

## 1. Civil Work: Structure of Way (4)

Applicable Case	Item	Specification	Q'ty	Unit	Local Currency Portion				Foreign Currency Portion				Grand Total	
					Material	Labor	Equipment	Total	Material	Labor	Equipment	Transport & Insurance		Total
Case C-1 in 1990, Case C-2 in 1990	Ground		0	m										
	Rigid A		0	m										
	Rigid B		0	m										
	Girder (W) A		353	m	44,602	27,446	33,641	105,689	11,967	15,991	100,481	2,100	130,539	236,228
	Girder (W) B		4,675	m	581,570	346,137	463,386	1,391,093	151,844	183,634	1,227,468	26,741	1,589,687	2,980,780
	Girder (W) C		35	m	4,131	2,501	3,558	10,191	1,101	1,234	8,672	194	11,202	21,393
	Girder (S) B		0	m										
	Girder (S) C		0	m										
	Special A		40	m	7,001	3,600	8,386	18,987	1,109	1,421	13,569	195	16,294	35,281
	Special B		190	m	38,494	18,730	59,751	116,974	5,349	6,751	65,968	941	79,008	195,982
Sub-total					675,798	418,414	568,722	1,642,934	21,370	209,031	1,416,158	30,171	1,826,730	3,469,664
Indirect Cost								208,180					485,753	693,933
Total								1,851,114					2,312,483	4,163,597
Case C-1 in 1993	Ground		1,160	m	19,711	4,090	43,534	67,335	5,720	0	2,383	970	9,073	76,408
	Rigid A		302	m	30,502	13,348	40,951	84,801	6,765	0	14,315	1,117	22,197	106,998
	Rigid B		1,302	m	124,732	61,064	110,279	296,075	29,035	0	57,679	4,817	91,531	387,606
	Girder (W) A		407	m	51,424	31,644	38,787	121,855	13,797	18,437	115,853	2,422	150,509	272,364
	Girder (W) B		4,575	m	569,130	338,733	453,474	1,361,337	148,596	179,706	1,201,212	26,169	1,555,683	2,917,020
	Girder (W) C		344	m	40,606	24,586	34,974	100,166	10,826	12,133	85,233	1,906	110,099	210,264
	Girder (S) B		325	m	26,952	16,042	21,476	64,470	7,036	8,512	56,888	1,238	73,674	138,144
	Girder (S) C		40	m	3,148	1,906	2,711	7,765	839	940	6,607	148	8,534	16,299
	Special A		80	m	14,002	7,200	16,772	37,974	2,218	2,842	27,138	390	32,588	70,362
	Special B		380	m	76,988	37,460	119,502	233,947	10,697	13,501	131,936	1,881	158,015	391,962
Sub-total					957,195	536,073	882,460	2,375,728	235,529	236,071	1,699,244	41,058	2,211,902	4,587,630
Indirect Cost								275,258					642,268	917,526
Total								2,650,986					2,854,170	5,505,156

1. Civil Work: 3) Structure of Way (5)

(Unit: 1,000 Sucres)

Applicable Case	Item	Specification	Q'ty	Unit	Local Currency Portion				Foreign Currency Portion				Grand Total	
					Material	Labor	Equipment	Total	Material	Labor	Equipment	Transport & Insurance		Total
Case C-2 in 1993	Ground		0	m										
	Rigid A		0	m										
	Rigid B		0	m										
	Girder (W) A		282	m	35,631	21,926	26,875	84,432	9,560	12,775	80,271	1,678	104,284	188,716
	Girder (W) B		1,600	m	199,040	118,464	158,592	476,096	51,968	62,848	420,096	9,152	544,064	1,020,160
	Girder (W) C		145	m	17,116	10,363	14,742	42,221	4,563	5,114	35,927	803	46,407	88,628
	Girder (S) B		0	m										
	Girder (S) C		0	m										
	Special A		80	m	14,002	7,200	16,772	37,974	2,218	2,842	27,138	390	32,588	70,562
	Special B		0	m										
	Sub-total					265,789	157,953	216,981	640,723	68,309	83,579	563,432	12,023	727,343
Indirect Cost								82,084					191,529	273,613
Total								722,807					918,872	1,641,679
Case C-2 in 1996, Case D-1 in 1993	Ground		1,160	m	19,711	4,090	43,534	67,335	5,720	0	2,383	970	9,073	76,408
	Rigid A		302	m	30,502	13,348	40,951	84,801	6,765	0	14,315	1,117	22,197	106,998
	Rigid B		1,302	m	124,732	61,064	110,279	296,075	29,035	0	57,679	4,817	91,531	387,606
	Girder (W) A		125	m	15,793	9,719	11,913	37,425	4,238	5,663	35,580	744	46,225	83,650
	Girder (W) B		2,975	m	370,090	220,269	294,882	885,241	96,628	116,858	781,116	17,017	1,011,619	1,896,860
	Girder (W) C		199	m	23,490	14,223	20,232	57,945	6,263	7,019	49,306	1,102	63,690	121,635
	Girder (S) B		325	m	26,952	16,042	21,476	64,470	7,036	8,512	56,888	1,238	73,674	138,145
	Girder (S) C		40	m	3,148	1,906	2,711	7,765	839	940	6,607	148	8,534	16,299
	Special A		0	m										
	Special B		380	m	76,988	37,460	119,502	233,947	10,697	13,501	131,936	1,881	158,015	391,962
	Sub-total					691,406	378,121	665,480	1,735,007	167,221	152,493	1,135,810	29,034	1,484,558
Indirect Cost								193,174					450,739	643,913
Total								1,928,181					1,935,297	3,863,478

1. Civil Work: 3) Structure of Way (6)

(Unit: 1,000 Sucres)

Applicable Case	Item	Specification	Q'ty	Unit	Local Currency Portion				Foreign Currency Portion				Grand Total	
					Material	Labor	Equipment	Total	Material	Labor	Equipment	Transport & Insurance		Total
Case D-1 in 1990, Case C in 1990	Ground		0	m										
	Rigid A		0	m										
	Rigid B		0	m										
	Girder (W) A		635	m	80,232	49,371	60,516	190,119	21,527	28,766	180,753	3,778	234,824	424,943
	Girder (W) B		6,275	m	780,610	464,601	621,978	1,867,189	203,812	246,482	1,647,564	35,893	2,133,751	4,000,940
	Girder (W) C		180	m	21,247	12,865	18,301	52,413	5,665	6,349	44,599	997	57,610	110,023
	Girder (S) B		0	m	0	0	0	0	0	0	0	0	0	0
	Girder (S) C		0	m	0	0	0	0	0	0	0	0	0	0
	Special A		120	m	21,004	10,800	25,158	56,962	3,328	4,264	40,708	586	48,886	105,848
	Special B		190	m	38,494	18,730	59,751	116,975	5,349	6,751	65,968	941	79,009	195,984
	Sub-total					941,587	556,567	785,704	2,283,658	239,681	292,612	1,979,592	42,195	2,554,080
Indirect Cost								290,264					677,283	967,547
Total								2,573,922					3,231,363	5,805,285

(Unit: 1,000 Sucre)

## 1. Civil Work: 4) Station (1)

Applicable Case	Item	Specification	Q'ty	Unit	Local Currency Portion				Foreign Currency Portion				Grand Total	
					Material	Labor	Equipment	Total	Material	Labor	Equipment	Transport & Insurance		Total
Basic Case in 1990	No. 12 st		1		41,989	29,971	45,265	117,225	30,698	251	4,423	5,417	40,789	158,014
	No. 11 st		1		25,960	19,040	25,670	70,670	11,740	0	1,290	2,070	15,100	85,770
	No. 1 st		1		30,160	22,090	31,400	83,650	12,910	0	1,860	2,280	17,050	100,700
	Main St.	No. 5, 8, 10	3		65,538	35,534	67,974	167,046	396,873	9,561	12,783	70,035	489,252	656,298
	Standard		6		94,992	51,120	95,592	241,704	497,418	10,968	17,076	87,780	613,242	854,946
	Sub-total				258,639	157,755	265,901	680,295	949,639	20,780	37,432	167,582	1,175,433	1,855,728
	Indirect Cost							111,344					259,802	371,166
Total							791,639					1,435,235	2,226,874	
Case A-1 in 1990, Case A-2 in 1990, Case E in 1990	No. 12 st		1		41,989	29,971	45,265	117,225	30,698	251	4,423	5,417	40,789	158,014
	No. 11 st		1		25,960	19,040	25,670	70,670	11,740	0	1,290	2,070	15,100	85,770
	No. 1 st		1		30,160	22,090	31,400	83,650	12,910	0	1,860	2,280	17,050	100,700
	Main St.	No. 8, 10	2		43,692	22,356	45,316	111,364	264,582	6,374	8,522	46,690	326,168	437,532
	Standard		1		15,832	8,520	15,932	40,284	82,903	1,828	2,846	14,630	102,207	142,491
	Sub-total				127,673	79,887	132,183	339,543	389,923	8,453	17,081	68,807	484,264	623,807
	Indirect Cost							49,428					115,333	164,761
Total							388,971					599,597	988,568	

(Unit: 1,000 Sucre)

## 1. Civil Work: 4) Station (2)

Applicable Case	Item	Specification	Q'ty	Unit	Local Currency Portion				Foreign Currency Portion				Grand Total	
					Material	Labor	Equipment	Total	Material	Labor	Equipment	Transport & Insurance		Total
Case A-1 in 1993	No. 12 st													
	No. 11 st													
	No. 1 st		1		30,160	22,090	31,400	83,650	12,910	0	1,860	2,280	17,050	100,700
	Main St.	No. 5	1		21,846	11,178	22,658	55,682	132,291	3,187	4,261	23,345	163,084	218,766
	Standard		5		79,160	42,600	79,660	201,420	414,515	9,160	14,230	73,150	511,035	712,655
	Sub-total				131,166	75,868	133,718	340,752	559,716	12,327	20,351	98,775	691,169	1,031,921
	Indirect Cost							61,915					144,469	206,384
Total							402,667					835,638	1,238,305	
Case A-2 in 1993, Case C-2 in 1993	No. 12 st													
	No. 11 st													
	No. 1 st													
	Main St.	No. 5 or 8	1		21,846	11,178	22,658	55,682	132,291	3,187	4,261	23,345	163,084	218,766
	Standard		2		31,664	17,040	31,864	80,568	165,806	3,656	5,692	29,260	204,414	284,982
	Sub-total				53,510	28,218	54,522	136,250	298,097	6,843	9,953	52,065	367,498	503,748
	Indirect Cost							30,225					70,525	100,750
Total							166,475					438,023	604,498	

1. Civil Work: A) Station (3)

(Unit: 1,000 Sucras)

Applicable Case	Item	Specification	Q'ty	Unit	Local Currency Portion				Foreign Currency Portion					Grand Total	
					Material	Labor	Equipment	Total	Material	Labor	Equipment	Transport & Insurance	Total		
Case A-2 in 1996, Case 9-1 in 1993	No. 12 st														
	No. 11 st														
	No. 1 st		1		30,160	22,090	31,400	83,650	12,910	0	1,860	2,280	17,050	100,700	
	Main Sb.														
	Standard		3		47,496	25,560	47,796	120,852	248,709	5,484	8,538	43,890	306,621	427,473	
	Sub-total				77,656	47,650	79,196	204,502	261,619	5,484	10,398	46,170	323,671	528,173	
	Indirect Cost							31,690					73,944	105,634	
Total							236,192					397,615	633,807		
Case 2-1 in 1990, Case 7 in 1990	No. 12 st		1		41,989	29,971	45,265	117,225	30,698	251	4,423	5,417	40,789	158,014	
	No. 11 st		1		25,960	19,040	25,670	70,670	11,740	0	1,290	2,070	15,100	85,770	
	No. 1 st														
	Main St.	No. 5, 8, 10	3		65,538	35,534	67,974	167,046	396,873	9,561	12,783	70,035	489,252	656,298	
	Standard		3		47,496	25,560	47,796	120,852	248,709	5,484	8,538	43,890	306,621	427,473	
	Sub-total				180,983	110,105	186,705	475,793	688,020	15,296	27,034	121,412	851,762	1,327,555	
	Indirect Cost							79,653					185,858	265,511	
Total							555,446					1,037,620	1,593,066		

1. Civil Work: A) Station (4)

(Unit: 1,000 Sucras)

Applicable Case	Item	Specification	Q'ty	Unit	Local Currency Portion				Foreign Currency Portion					Grand Total
					Material	Labor	Equipment	Total	Material	Labor	Equipment	Transport & Insurance	Total	
Case C-1 in 1990, Case C-2 in 1990	No. 12 st													
	No. 11 st													
	No. 1 st		1		30,160	229,090	31,400	83,650	12,910	0	1,860	2,280	17,050	100,700
	Main St.	No. 5	1		21,846	11,178	22,658	55,682	132,291	3,187	4,261	23,365	163,084	218,766
	Standard		3		47,496	25,560	47,796	120,852	248,709	5,484	8,538	43,890	306,621	427,473
	Sub-total				99,502	58,828	101,854	260,184	393,910	8,671	14,659	69,515	486,755	746,939
	Indirect Cost							44,816					104,571	149,387
Total							305,000					591,326	896,326	
Case C-1 in 1993	No. 12 st		1		41,989	29,971	45,265	117,225	30,698	251	4,423	5,417	40,789	158,014
	No. 11 st		1		25,960	19,040	25,670	70,670	11,740	0	1,290	2,070	15,100	85,770
	No. 1 st													
	Main St.	No. 8, 10	2		43,692	22,356	45,316	111,364	264,582	6,374	8,522	46,690	326,168	437,532
	Standard		3		47,496	25,560	47,796	120,852	248,709	5,484	8,538	43,890	306,621	427,473
	Sub-total				159,137	96,926	164,047	420,111	555,729	12,109	22,773	98,067	688,678	1,108,789
	Indirect Cost							66,527					155,230	221,758
Total							486,638					843,908	1,330,547	

(Unit: 1,000 Sucres)

## 1. Civil Work: 4) Station (5)

Applicable Case	Item	Specification	Q'ty	Unit	Local Currency Portion				Foreign Currency Portion				Grand Total		
					Material	Labor	Equipment	Total	Material	Labor	Equipment	Transport & Insurance		Total	
Case C-2 in 1996, Case D-1 in 1993	No. 12 st		1		41,989	29,971	45,265	117,225	30,698	251	4,423	5,417	40,789	158,014	
	No. 11 st		1		25,960	19,040	25,670	70,670	11,740	0	1,290	2,070	15,100	85,770	
	No. 1 st		1		21,846	11,178	22,658	55,682	132,291	3,187	4,261	23,345	163,084	218,760	
	Main St.	No. 10	1		15,832	8,520	15,932	40,284	82,903	1,828	2,846	14,630	102,207	142,491	
	Standard		1												
	Sub-total					105,627	68,709	109,525	283,861	257,632	5,266	12,820	45,462	321,180	605,041
	Indirect Cost								36,302					84,706	121,008
Total								320,163					405,886	726,049	
Case D-1 in 1990, Case C in 1990	No. 12 st														
	No. 11 st														
	No. 1 st		1		30,160	22,090	31,400	83,650	12,910	0	1,860	2,280	17,050	100,700	
	Main St.	No. 5, 8	2		43,692	22,356	45,316	111,364	264,582	6,374	8,522	46,690	326,168	437,532	
	Standard		5		79,160	42,600	79,660	201,420	414,515	9,140	14,230	73,150	511,035	712,455	
	Sub-total				153,012	87,046	156,376	396,434	692,007	15,514	24,612	122,120	854,253	1,250,687	
	Indirect Cost							75,041					175,096	250,137	
Total							471,475					1,029,349	1,500,824		

## 1. Civil Work: 5) Depot and Maintenance Shop : A. Civil Work (1)

(Unit: 1,000 Sucres)

Applicable Case	Item	Specification	Q'ty	Unit	Local Currency Portion				Foreign Currency Portion				Grand Total	
					Material	Labor	Equipment	Total	Material	Labor	Equipment	Transport & Insurance		Total
Basic Case in 1990	Site Clearance		94,000	m <sup>2</sup>	38,299	6,155	4,418	48,872	4,235	0	6,487	750	11,492	60,364
	Main Office	RC 3F	3,240	m <sup>2</sup>	57,024	49,896	71,280	178,200	0	0	0	0	0	178,200
	Main Store, Signal Cabin, Control room	RC 1F	1,560	m <sup>2</sup>	15,575	13,628	19,469	48,672	0	0	0	0	0	48,672
	Other building	SC 1F	3,720	m <sup>2</sup>	23,152	20,258	28,940	72,350	36,325	0	6,415	7,308	50,048	122,398
	Track (Single)	40 kg/m	4.52	km	13,063	36,883	18,216	68,162	24,860	0	3,752	3,752	32,364	100,526
	Turnout	6#	22	Set	1,540	6,820	5,236	13,596	36,300	0	220	5,500	42,020	55,616
	Sub-total					148,653	133,640	147,559	429,852	101,740	0	16,874	17,310	135,924
Indirect Cost								33,947					79,209	113,156
Total								463,799					215,133	678,932
Basic Case in 1993	Work Shop	SC 1F	8,190	m <sup>2</sup>	73,326	64,160	91,658	229,144	92,642	0	16,347	18,637	127,626	356,770
	Track	40 kg/m	0.23	km	665	1,877	927	3,469	1,265	0	191	191	1,647	5,116
	Turnout	6#	2	Set	140	620	476	1,236	3,300	0	20	500	3,820	5,056
	Sub-total				74,131	66,657	93,061	233,849	97,207	0	16,558	19,328	133,093	366,942
	Indirect Cost							22,017					51,372	73,389
Total							255,866					184,465	440,330	

1. Civil Works: 5) Depot and Maintenance Shop: A. Civil Work (2)

(Unit: 1,000 Sucra)

Applicable Case	Item	Specification	Qty	Unit	Local Currency Portion				Foreign Currency Portion					Grand Total
					Material	Labor	Equipment	Total	Material	Labor	Equipment	Transport & Insurance	Total	
Basic Case in 2010, Case A-1 in 2010, Case A-2 in 2010, Case B-1 in 2010, Case C-1 in 2010, Case C-2 in 2010, Case D-1 in 2010	Track	40 kg/m	0.87	km	2,514	7,099	3,506	13,119	4,785	0	722	722	6,229	19,348
	Turnout	6#	6	Set	420	1,860	1,428	3,708	9,900	0	60	1,500	11,460	15,168
	Sub-total				2,934	8,959	4,934	16,827	14,685	0	782	2,222	17,689	34,516
	Indirect Cost							2,071					4,832	6,903
	Total							18,898					22,521	41,419
	Work Shop	SC 1F	8,190	m <sup>2</sup>	73,326	64,160	91,658	229,144	92,642	0	16,347	18,637	127,626	356,770
	Track	40 kg/m	0.96	km	2,774	7,834	3,869	14,477	5,280	0	797	797	6,874	21,351
	Turnout	6#	8	Set	560	2,480	1,904	4,944	13,200	0	80	2,000	15,280	20,224
	Sub-total				76,660	74,474	97,431	248,565	111,122	0	17,224	21,434	149,780	398,345
	Indirect Cost							23,901					55,768	79,669
Total							272,466					205,548	478,014	

1. Civil Works: 5) Depot and Maintenance Shop: A. Civil Work (3)

(Unit: 1,000 Sucra)

Applicable Case	Item	Specification	Qty	Unit	Local Currency Portion				Foreign Currency Portion					Grand Total
					Material	Labor	Equipment	Total	Material	Labor	Equipment	Transport & Insurance	Total	
Case A-1 in 1990, Case A-2 in 1990, Case C-1 in 1990, Case C-2 in 1990, Case E in 1990	Site Clearance		94,000	m <sup>2</sup>	38,299	6,155	4,418	48,872	4,255	0	6,487	750	11,492	60,364
	Main Office	RC 3F	3,240	m <sup>2</sup>	57,024	49,896	71,280	178,200	0	0	0	0	0	178,200
	Main Store, Signal Cabin, Control room	RC 1F	1,560	m <sup>2</sup>	15,570	13,628	19,469	48,672	0	0	0	0	0	48,672
	Other building	SC 1F	3,720	m <sup>2</sup>	23,152	20,258	28,940	72,350	36,325	0	6,415	7,308	50,048	122,398
	Track (Single)	40 kg/m	3.93	km	11,358	32,070	15,838	59,266	21,615	0	3,262	3,262	28,139	87,405
	Turnout	6#	18	Set	1,260	5,580	4,284	11,124	29,700	0	180	4,500	34,380	45,504
	Sub-total				146,668	127,587	144,229	418,484	91,898	0	16,344	15,820	124,059	542,543
Indirect Cost							32,554					75,956	108,509	
Total							451,037					200,015	651,052	
Case A-1 in 1996, Basic Case in 1996, Case B-1 in 1996, Case C-1 in 1996, Case D-1 in 1996	Track	40 kg/m	0.75	km	6,675	6,120	3,023	15,818	4,125	0	623	623	5,371	21,189
	Turnout	6#	5	Set	350	1,550	1,190	3,090	8,290	0	50	1,250	9,550	12,640
	Sub-total				7,025	7,670	4,213	18,908	12,375	0	673	1,873	14,921	
	Indirect Cost							2,030					4,736	6,766
Total							20,938					19,657	40,595	



(Unit: 1,000 Sucres)

## 1. Civil Work: 5) Depot and Maintenance Shop: A. Civil Work (4)

Applicable Case	Item	Specification	Q'ty	Unit	Local Currency Portion				Foreign Currency Portion				Grand Total	
					Material	Labor	Equipment	Total	Material	Labor	Equipment	Transport & Insurance		Total
Case A-1 in 1993, Case C-1 in 1993	Work Shop	SC 1F	8,190	m	73,326	64,160	91,658	229,144	92,642	0	16,347	18,637	127,626	356,770
	Track	40 kg/m	0.93	km	2,688	1,589	3,748	14,025	5,115	0	772	772	6,659	20,684
	Turnout	6#	6	Set	420	1,860	1,428	3,708	9,900	0	60	1,500	11,460	15,168
	Sub-total				76,434	73,609	96,834	246,877	107,657	0	17,179	20,909	145,745	392,622
	Indirect Cost							23,557					54,967	78,524
	Total						270,434					200,712	471,146	
Case A-2 in 1993, Case B-1 in 1993, Case D-1 in 1993	Work Shop	SC 1F	8,190	m	73,326	64,160	91,658	229,144	92,642	0	16,347	18,637	127,626	356,770
	Track	40 kg/m	0.70	km	2,023	5,712	1,821	10,556	3,850	0	581	581	5,012	15,368
	Turnout	6#	4	Set	280	1,240	952	2,472	6,600	0	40	1,000	7,640	10,112
	Sub-total				75,629	71,112	95,431	242,172	103,092	0	16,968	20,218	140,278	382,450
	Indirect Cost							22,947					33,543	76,490
	Total						265,119					193,821	458,940	

## 1. Civil Work: 5) Depot and Maintenance Shop: A. Civil Work (5)

(Unit: 1,000 Sucres)

Applicable Case	Item	Specification	Q'ty	Unit	Local Currency Portion				Foreign Currency Portion				Grand Total	
					Material	Labor	Equipment	Total	Material	Labor	Equipment	Transport & Insurance		Total
Case A-2 in 1996	Track	40 kg/m	0.96	km	2,774	7,834	3,869	14,477	5,280	0	797	797	6,874	21,351
	Turnout	6#	8	Set	560	2,480	1,904	4,944	13,200	0	80	2,000	15,280	20,224
	Sub-total				3,334	10,314	5,773	19,421	18,480	0	877	2,797	22,154	41,575
	Indirect Cost							2,495					5,821	8,316
	Total							21,916					27,975	49,891
Case B-1 in 1990, Case D-1 in 1990, Case F in 1990, Case G in 1990	Site Clearance		94,000	m <sup>2</sup>	38,299	6,155	4,418	48,872	4,225	0	6,487	750	11,492	60,364
	Main Office	RC 3F	3,240	m <sup>2</sup>	57,024	49,896	71,280	178,200	0	0	0	0	0	178,200
	Main Store, Signal Cabin, Control room	RC 1F	1,560	m <sup>2</sup>	15,575	13,628	19,469	48,672	0	0	0	0	0	48,672
	Other building	SC 1F	3,720	m <sup>2</sup>	23,152	20,258	28,940	72,350	36,325	0	6,415	7,308	50,048	122,398
	Track (Single)	40 kg/m	4.21	km	12,167	34,354	16,966	63,487	23,155	0	3,494	3,494	30,143	93,630
	Turnout	6#	20	Set	1,400	6,200	4,760	12,360	33,000	0	200	5,000	38,200	50,560
	Sub-total				147,617	130,491	145,833	423,941	96,735	0	16,596	16,552	129,883	553,814
Indirect Cost							33,229					77,535	110,764	
	Total						457,170					207,418	664,588	

1. Civil Works: 5) Depot and Maintenance Shop: A. Civil Work (6)

(Unit: 1,000 Sucras)

Applicable Case	Item	Specification	Q'ty	Unit	Local Currency Portion				Foreign Currency Portion					Grand Total
					Material	Labor	Equipment	Total	Material	Labor	Equipment	Transport & Insurance	Total	
Case C-2 in 1993. Case-E in 1993	Work Shop	SC 1F	8,190	m <sup>2</sup>	73,326	64,160	91,658	229,144	92,642	0	16,347	18,637	127,626	356,770
	Track	40 kg/m	0.36	km	1,040	2,938	1,451	5,429	1,980	0	299	299	2,578	8,007
	Turnout	6#	2	Set	140	620	476	1,236	3,300	0	20	500	3,820	5,056
	Sub-total				74,506	67,718	93,585	235,809	97,922	0	16,666	19,436	134,024	369,833
	Indirect Cost							22,190					51,777	73,967
	Total							257,999					185,801	443,800
Case C-2 in 1996	Track	40 kg/m	1.32	km	3,815	10,771	5,320	19,906	7,260	0	1,096	1,096	9,452	29,358
	Turnout	6#	9	Set	630	2,790	2,142	5,562	14,850	0	90	2,250	17,190	22,752
	Sub-total				4,445	13,561	7,462	25,468	22,110	0	1,186	3,346	26,642	52,110
	Indirect Cost							3,127					7,295	10,422
	Total							28,595					33,937	62,532

1. Civil Works: 5) Depot and Maintenance Shop: A. Civil Work (7)

(Unit: 1,000 Sucras)

Applicable Case	Item	Specification	Q'ty	Unit	Local Currency Portion				Foreign Currency Portion					Grand Total
					Material	Labor	Equipment	Total	Material	Labor	Equipment	Transport & Insurance	Total	
Case F in 1993	Work Shop	SC 1F	8,190	m <sup>2</sup>	73,326	64,160	91,658	229,144	92,642	0	16,347	18,637	127,626	356,770
	Track	40 kg/m	0.35	km	1,012	2,856	1,411	5,279	1,925	0	291	291	2,507	7,786
	Turnout	6#	2	Set	140	620	476	1,236	3,300	0	20	500	3,820	5,056
	Sub-total				74,478	67,636	93,545	235,659	97,867	0	16,658	19,428	133,953	369,612
	Indirect Cost							22,177					51,746	73,922
	Total							257,836					185,699	443,534
Case-P in 2010	Track	40 kg/m	0.23	km	665	1,877	927	3,469	1,265	0	191	191	1,647	5,116
	Turnout	6#	2	Set	140	620	476	1,236	3,300	0	20	500	3,820	5,056
	Sub-total				805	2,497	1,403	4,705	4,565	0	211	691	5,467	10,172
	Indirect Cost							610					1,424	2,034
	Total							5,315					6,891	12,206

1. Civil Works: 5) Depot and Maintenance Shop: A. Civil Work (8)

(Unit: 1,000 Sucrea)

Applicable Case	Item	Specification	Q'ty	Unit	Local Currency Portion				Foreign Currency Portion				Grand Total	
					Material	Labor	Equipment	Total	Material	Labor	Equipment	Transport & Insurance		Total
Case-G in 1993	Work Shop	SC 1F	8,190	m <sup>2</sup>	73,326	64,160	91,658	229,144	92,642	0	16,347	18,637	127,626	356,770
	Sub-total				73,326	64,160	91,658	229,144	92,642	0	16,347	18,637	127,626	356,770
	Indirect Cost							21,406					49,948	71,354
	Total							250,550					177,574	428,124
Case-G in 2010	Track	40 kg/m	0.35	km	1,012	2,856	1,411	5,279	1,925	0	291	91	2,507	7,786
	Turnout	6#	2	Set	140	620	476	1,236	3,300	0	20	500	3,820	5,056
	Sub-total				1,152	3,476	1,887	6,515	5,225	0	311	791	6,327	12,842
	Indirect Cost							771					1,798	2,569
	Total							7,286					8,125	15,411

1. Civil Work: 5) Depot & Maintenance Shop: B. Electrical Facilities (1)

(Unit: 1,000 Sucrea)

Applicable Case	Description	Unit	Quantity	Local Currency			Foreign Currency			Grand Total		
				Material	Labor	Total	Material	Labor	Instrument & Transport		Total	
Basic Case in 1990	1. Catenary	Lump sum		5,213	3,519	8,732	40,608	3,745	3,247	47,600	56,332	
	2. Power Distribution	Lump sum		40,002	8,813	48,815	11,109	6,250	888	18,247	67,062	
	3. Signalling	Lump sum		6,796	6,649	13,445	75,182	8,110	6,014	89,306	102,751	
	4. Telecommunication	Lump sum		7,398	2,799	10,197	35,385	3,896	2,829	42,110	52,307	
	Sub-total				59,409	21,780	81,189	162,284	22,001	12,978	197,263	278,452
	Indirect Cost										38,982	55,690
	Total										236,245	334,142
Case A-1, A-2, C-1, C-2, E in 1990	1. Catenary	Lump sum		5,000	3,238	8,238	37,256	3,393	2,979	43,628	51,866	
	2. Power Distribution	Lump sum		40,002	8,813	48,815	11,109	6,250	888	18,247	67,062	
	3. Signalling	Lump sum		5,869	5,256	11,125	65,468	6,425	5,237	77,130	88,255	
	4. Telecommunication	Lump sum		7,398	2,799	10,197	34,645	3,896	2,769	41,310	51,507	
	Sub-total				58,269	20,106	78,375	148,478	19,964	11,873	180,315	258,690
	Indirect Cost										36,216	51,738
	Total										216,531	310,428

1. Civil Work: 5) Depot & Maintenance Shop : B. Electrical Facilities (2)

(Unit: 1,000 Sucre)

Applicable Case	Description	Unit	Quantity	Local Currency			Foreign Currency				Grand Total
				Material	Labor	Total	Material	Labor	Instrument & Transport	Total	
Case B-1, D-1, F, G in 1990	1. Catenary	Lump sum		5,192	3,468	8,660	39,842	3,686	3,185	46,713	55,373
	2. Power Distribution	Lump sum		40,002	8,813	48,815	11,109	6,250	888	18,247	67,062
	3. Signalling	Lump sum		6,487	5,976	12,463	70,294	7,299	5,623	83,216	95,679
	4. Telecommunication	Lump sum		7,398	2,799	10,197	35,015	3,896	2,799	41,710	51,907
	Sub-total			59,079	21,056	80,135	156,260	21,131	12,495	189,886	270,021
	Indirect Cost					16,202				37,802	54,004
	Total					96,337				227,688	324,025
Basic Case in 1993	1. Catenary	Lump sum		294	232	526	2,663	243	213	3,119	3,645
	2. Power Distribution	Lump sum		26,325	914	27,239	0	635	0	635	27,874
	3. Signalling	Lump sum		370	885	1,255	6,727	1,068	538	8,333	9,588
	4. Telecommunication	Lump sum		3,218	700	3,918	4,797	167	383	5,347	9,265
	Sub-total			30,207	2,731	32,938	14,187	2,113	1,134	17,434	50,372
	Indirect Cost					3,023				7,051	10,074
	Total					35,961				24,485	60,446

1. Civil Work: 5) Depot & Maintenance Shop : B. Electrical Facilities (3)

(Unit: 1,000 Sucre)

Applicable Case	Description	Unit	Quantity	Local Currency			Foreign Currency				Grand Total
				Material	Labor	Total	Material	Labor	Instrument & Transport	Total	
Case A-1, C-1 in 1993	1. Catenary	Lump sum		507	513	1,020	6,015	595	481	7,091	8,111
	2. Power Distribution	Lump sum		26,325	914	27,239	0	635	0	635	27,874
	3. Signalling	Lump sum		1,297	2,278	3,575	16,441	2,753	1,315	20,509	24,084
	4. Telecommunication	Lump sum		3,218	700	3,918	5,537	167	443	6,147	10,065
	Sub-total			31,347	4,405	35,752	27,993	4,150	2,239	34,382	70,134
	Indirect Cost					4,208				9,818	14,026
	Total					39,960				44,200	84,160

1. Civil Work: 5) Depot & Maintenance Shop : B. Electrical Facilities (4)

(Unit: 1,000 Sucres)

Applicable Case	Description	Unit	Quantity	Local Currency			Foreign Currency				Grand Total
				Material	Labor	Total	Material	Labor	Instrument & Transport	Total	
Case A-2 in 1993	1. Catenary	Lump sum		346	416	762	4,929	423	393	5,815	6,577
	2. Power Distribution	Lump sum		26,325	915	27,240	0	634	0	634	27,874
	3. Signalling	Lump sum		989	1,614	2,603	11,615	1,952	929	14,496	17,099
	4. Telecommunication	Lump sum		3,218	698	3,916	5,537	167	441	6,145	10,061
	Sub-total			30,878	3,643	34,521	22,081	3,246	1,763	27,090	61,611
	Indirect Cost					3,697				8,625	12,322
	Total					38,218				35,715	73,933
Case C-2, E in 1993	1. Catenary	Lump sum		325	365	690	4,163	434	331	4,928	5,618
	2. Power Distribution	Lump sum		26,325	915	27,240	0	634	0	634	27,874
	3. Signalling	Lump sum		680	941	1,621	6,727	1,141	538	8,406	10,027
	4. Telecommunication	Lump sum		3,218	698	3,916	5,167	167	411	5,745	9,661
	Sub-total			30,548	2,919	33,467	16,057	2,376	1,280	19,713	53,180
	Indirect Cost					3,191				7,445	10,636
	Total					36,658				27,158	63,816

1. Civil Work: 5) Depot & Maintenance Shop : B. Electrical Facilities (5)

(Unit: 1,000 Sucres)

Applicable Case	Description	Unit	Quantity	Local Currency			Foreign Currency				Grand Total
				Material	Labor	Total	Material	Labor	Instrument & Transport	Total	
Case B-1, D-1 in 1993	1. Catenary	Lump sum		315	283	598	3,429	302	275	4,006	4,604
	2. Power Distribution	Lump sum		26,325	914	27,239	0	635	0	635	27,874
	3. Signalling	Lump sum		679	1,558	2,237	11,615	1,879	929	14,423	16,660
	4. Telecommunication	Lump sum		3,218	700	3,918	5,167	167	413	5,747	9,665
	Sub-total			30,537	3,455	33,992	20,211	2,983	1,617	24,811	58,803
	Indirect Cost					3,528				8,232	11,760
	Total					37,520				33,043	70,563
Basic Case, Case A-1, C-1, B-1, D-1 in 1996	1. Catenary	Lump sum		596	371	967	4,190	390	333	4,913	5,880
	2. Power Distribution	Lump sum		7,009	2,747	9,756	1,851	1,955	148	3,954	13,710
	3. Signalling	Lump sum		927	1,345	2,272	9,587	1,622	766	11,975	14,247
	4. Telecommunication	Lump sum		54	31	85	398	0	31	429	514
	Sub-total			8,586	4,494	13,080	16,026	3,967		21,271	34,351
	Indirect Cost					2,061				4,809	6,870
	Total					15,141				26,080	41,221