

Republic of the Philippines

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Japan International Cooperation Agency (JICA)**

**METRO MANILA
URBAN TRANSPORTATION
INTEGRATION STUDY**

TECHNICAL REPORT NO. 11

**COST ESTIMATION AND
DESIGN CRITERIA**

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mmutis

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TABLE OF CONTENTS

	Page No.
1. INTRODUCTION.....	1-1
1.1 Direct Cost Component.....	1-1
1.1.1 Labor Cost.....	1-1
1.1.2 Material Cost.....	1-1
1.1.3 Equipment Cost.....	1-2
1.2 Indirect Cost.....	1-4
1.3 Currency Component.....	1-4
1.4 Land Acquisition Costs.....	1-6
1.5 Construction Cost Estimates.....	1-6
2. COST ANALYSIS.....	2-1
3. TYPHICAL CROSS SECTION.....	3-1
STRUCTURAL DESIGN CODES AND STANDARD.....	3-11
3.1 General.....	3-11
3.2 Loading Specifications.....	3-11
3.2.1 Dead Loads.....	3-11
3.2.2 Standard Truck and Lane Loads.....	3-12
3.2.3 Impact Load.....	3-13
3.2.4 Longitudinal Forces.....	3-13
3.2.5 Centrifugal Forces.....	3-13
3.2.6 Wind Load.....	3-13
3.2.7 Collision Load.....	3-14
3.2.8 Train Load.....	3-14
3.2.9 Seismic Load.....	3-14
3.3 Material.....	3-16
3.4 Quantity Calculation.....	3-17
3.4.1 ALT-1 PC Box Girder + Single Concrete Pier.....	3-17
3.4.2 ALT-2 PC Box Girder + Single Rigid Portal Frame Pier.....	3-19
3.4.3 ALT-3 EDSA Interchange Flyover.....	3-20
3.4.4 Railway Viaduct Simply Support Concrete Box Girder.....	3-20
3.4.5 Standard Span Bridge L=30m.....	3-22
3.4.6 Standard Span Bridge L=35+40+35 = 110m.....	3-22
3.4.7 At Grade Section for Primary Arterial Expressway.....	3-24

LIST OF TABLES

Table No.	Title	Page No.
1.1	Equipment Rental Rates (ACEL Rates as of Nov. 1993).....	1-3
1.2	Cost Component for Major Equipment, Materials, Labor and Construction Items	1-5
1.3	Land Acquisition Cost Estimate for Highway	1-7
1.4	Initial Construction Cost Estimate for Highway	1-9
1.5	Construction Cost for Expressway with Arterial Street	1-11
1.6	Construction Cost for Secondary Arterial Street.....	1-12
1.7	Summary of Construction Cost for Railway (MTDP 1999-2004	1-14
1.8	Cost Estimate of MMUTIS Project (MRT).....	1-15
2.1	Summary of Project Unit Cost for Roadway	2-1
2.2	R-7 Expressway Viaduct	2-2
2.3	ALT-1 PC Box Girder for Expressway (Flared Type Pier).....	2-3
2.4	ALT-2 PC Box Girder + Steel Rigid Portal Frame Pier.....	2-3
2.5	ALT-3 Steel Box Girder + T-Shape Steel Single Pier.....	2-4
2.6	ALT-4 PC Box Girder for Railway Viaduct (Standard Height H=9m).....	2-4
2.7	Standard Bridge –1 Span=30m (Super + Sub Structure)	2-5
2.8	Standard Bridge –2 Span=35 + 40 + 35 (Super + Sub Structure).....	2-5
2.9	At Grade Section (Primary Arterial Street).....	2-6
2.10	PC Box Girder for Expressway (T-Shape Concrete Pier).....	2-6
2.11	Unit Price Analysis for CCP Pile D=120 cm	2-7
2.12	Unit Price Analysis For CCP Pile D=150 cm	2-7
2.13	Unit Price Analysis.....	2-8

LIST OF FIGURES

Figure No.	Title	Page No.
1.1	Cost Comparison of Similar Project	1-16
1.2	Construction Cost of Major Tollway.....	1-17
1.3	Construction Cost of Ordinary Road.....	1-18

1. INTRODUCTION

An investigation and analysis of equipment, materials and labor prices are pre-requisite for estimation of unit costs of major civil works. The construction costs of similar projects in the Philippines and Southeast Asia also are investigated.

1.1 Direct Cost Component

The direct construction costs basically consists of the followings

- a) Labor Costs
- b) Material Costs
- c) Equipment Costs

Data collected in the preliminary investigation are as follows

1.1.1 Labor cost

The prescribed minimum wage in the National Capital Region is P 198 per day effective from February 1998 .

Department of Labor and Employment and labor indexes for other categories are in compliance with the indexes of Department of Public Works and Highways as of December 1993.

	Labor Index	Wage daily (Pesos)
a) Foreman	2.14	423
b) Assistant Foreman	1.98	392
c) Heavy Equipment Operator	1.90	376
d) Light Equipment Operator	1.65	327
e) Driver	1.45	287
f) Skilled Labor	1.74	344
g) Unskilled Labor	1.00	198

1.1.2 Material Cost

The current market prices of construction materials are collected by Canvass, Market price survey and similar projects. Materials applied to the project are divided into commercial materials and processed materials by contractors. The result of investigation for major materials are listed as follows.

	UNIT	PESOS
a) Reinforcing Steel Grade 40	kgs	21
b) Reinforcing Steel Grade 60	kgs	23
c) Pre-stressing Steel Grade 270	kgs	85
d) Portland Cement TYPE – 1	Bag	105
e) Structural Steel	kgs	29
f) Asphalt Cement penetration 60/70	ton	14000
g) Asphalt Cement penetration 85/100	ton	14000
h) Coarse Aggregate for Sub base course	Cu.m	400 ¹⁾
i) Coarse Aggregate for base course	Cu.m	250 ¹⁾
j) Aggregate for Cement Concrete	Cu.m	229 ¹⁾
k) Fine Aggregate (washed)	Cu.m	288 ¹⁾
l) Plywood Marine ½” x 4’ x 8’	pcs	570 ¹⁾
m) Plywood ordinary ½” x 4’ x 8’	pcs	270
n) Gasoline (Regular)	Litters	11.15
o) Diesel	Litters	7.13
p) Motor Oil (Lubricant)	Litters	60
q) Lumber (Apitong)	Bd. ft.	21

Sources

- 1) Construction Industry Authority of the Philippines
- 2) Similar road projects in the Philippines 1997.

Notes: * Hauling distances 35 km from quarry to site is assumed.
 1) processed prices

1.1.3 Equipment Cost

The operated rental rates per hour of the construction equipment normally are adopted based on the Associated Construction Equipment Lessors (ACEL), Inc. “Equipment Rental Rates as of November 1993. For the purpose of estimating current rates, latest inflation rate and oil price increase must be added by 5%. Major Equipment Rental Costs are given in Table 1.1.

TABLE 1.1
EQUIPMENT RENTAL RATES
(ACEL RATES AS OF NOVEMBER 1993)

DESCRIPTION	OPERATED RENTAL COST (P/Hr)	BARE RENTAL COST (P/Month)
Concrete Batch Plant, 60 cu.m per hour		261,000
HEAVY EQUIPMENT		
Bulldozer, D 80 A-12 DD 180 hp	996	132,964
Bulldozer, D 80 A- 8DD 140 hp.	791	109,441
Crawler Loader, D53 S-16 1.40 cu.m	777	98,992
Hydraulic Crane, 10 – 12.5 tons	825	96,556
Hydraulic Crane, 3.5 – 4.5	427	39,955
Backhoe, pc. 80-1.60 hp	761	114,057
Backhoe w/Hydraulic Breaker, 120 – 150 hp. Ex 220-2	2,209	317,937
Motor Grader, 150 hp. 140G	1,837	251,776
Truck Mounted Crane, 11 – 15 tons	634	59,621
Crawler Crane, 16 – 20 tons	679	71,022
Crawler Crane, 21 – 25 tones	762	84,401
LIGHT EQUIPMENT		
Transit Mixer, 6 –7 cu.m		
Concrete pump 100 cu. Yds	1,061	121,159
Concrete Vibrator	1,150	167,660
Concrete Paver/Finisher, 120 hp.	78	7,736
Asphalt Paver/Finisher, DF – SOP 4.0 m width 52 hp	897	107,478
Asphalt Distributor, 3000 gal.	1,125	169,803
Vibratory Tamping foot Roller, 8 tons	757	97,541
Vibratory Tandem Roller, 8 tons	1,029	138,665
Vibratory Tandem Roller, 10 tons	856	116,970
Pneumatic Tired Roller, BW20R, 8 Wheels	836	110,748
Plate Compactors 7 hp	1,080	143,362
Mobil Air Compressor, 456 – 500 cfm.	98	8,119
	649	63,076
Jack Hammer / Pneumatic Breaker HS – 300	170	46,982
Bar Bender, 10 hp.	36	-
Water Pump, 3 ½ “- 4” Low Pressure electronic	-	2,594
Welding Machine, Diesel Driven 18 hp	254	-
TRUCKS		
Dump Truck, 9 – 10 cu.m	727	21,026
Dump Trucks, 6.1 – 8.41 cu.m.	642	60,200
Water Tank Truck w/Pump, 1001 – 3000 gal.	1,054	46,265
Service Pick-up Mitsubishi 1990, L300	324.	44,550
MISCELLANEOUS EQUIPMENT		
Pile hammer Kobe. K35 – DSL	-	201,566
Pre-stressing Machine	222	-
Generator Set, 101 – 150 kw.	-	30,471
Water Pump 4” diameter, High Pressure	-	13,213
Grouting Pump, Air Driver	211	26,505
Hydraulic Jack, 100 tons	31	-
Cable Cutting Tools	60	-

1.2 Indirect Cost

Mark-ups on the estimated direct cost that are not directly involved in the work items are classified under the “Indirect Cost”. The mark-up on the enumerated indirect cost elements are as follows;

1.	Miscellaneous of other facilities	15% of direct cost
2.	Relocation of existing utilities	10% of direct cost
3.	Contractor’s over head and profit	15% of direct cost
4.	Physical contingencies	10% of direct cost
5.	Engineering service	7% of direct cost

Value Added taxes are included in Direct Cost Analysis

1.3 Currency Component

Foreign component includes the cost of imported equipment and spare parts portion of locally purchased goods. Local component includes cost of locally produced equipment material, material supplies and remuneration of local personnel and local overhead.

Taxes component includes applicable taxes on equipment material and labor.

Cost component of major equipment, materials, labor and construction items are estimated as given in Table 1.2 based on survey of similar latest road projects in the Philippines.

TABLE 1.2
COST COMPONENT FOR MAJOR EQUIPMENT, MATERIALS, LABOR AND CONSTRUCTION ITEMS

Item No.	Description	Foreign (%)	Local (%)	Taxes (%)
Basic Cost				
E1	Heavy Equipment	65	5	30
E2	Light Equipment	65	5	30
M3	Reinforcing Steel	55	45	10
M4	Pre-Stressing Steel	65	5	30
M5	Structural Steel	85	5	10
L6	Lumber	0	90	10
E7	Asphalt	75	5	20
E8	Diesel Oil	60	10	30
E9	Engine Oil	60	30	10
M10	Tires	47	43	10
M11	Imported Miscellaneous Materials	65	5	30
M12	Locally Produced Miscellaneous Materials	20	70	10
K13	Skilled Labor	0	90	10
L14	Skilled Foreman	0	90	10
L15	Unskilled Labor	0	95	5
Composite				
Pay item-1	Concrete			
Pay item-2	Class P-1	35	48	17
Pay item-3	Class A-1	35	48	17
Pay item-4	Class A-2	35	48	17
Pay item-5	Class A-3	35	48	17
Pay item-6	Class P-2	35	48	17
Pay item-7	Reinforcing Bar	45	44	11
Pay item-8	Pre-Stressing Steel			
Pay item-9	Longitudinal	65	5	30
Pay item-10	Transversal	65	5	30
Pay item-11	Expansion joint (A)	75	13	12
Pay item-12	Expansion joint (B)	75	13	12
Pay item-13	Metal Bearing	55	15	30
Pay item-14	Elastomeric Bearing Pad	20	70	10
Pay item-15	PCI girder 1=30m	45	35	20
Pay item-16	PC square pile 450*405	46	33	21
Pay item-17	Concrete Bridge Railing	33	55	12
Pay item-18	CCP Pile	46	33	21
Pay item-19	Structure Excavation	50	25	25
Pay item-20	Clearing and Grubbing	60	10	30
Pay item-21	Common Excavation	60	10	30
Pay item-22	Borrow Materials	40	36	24
Pay item-23	Sub-grade Preparation	65	7	28
Pay item-24	Concrete pavement t=25m	40	45	15
Pay item-25	Aggregate Base Course	60	13	27
Pay item-26	Aggregate Sub Base Course	58	14	28
Pay item-27	Structural Steel	73	12	15
Pay item-28	Asphalt Pavement (wearing course)	66	10	24
Pay item-29	Bridge Railing	55	15	30
Pay item-30	Catch Basin	36	47	17
Pay item-31	RCRC 1.0m dia.	40	43	17
Pay item-32	Vehicle guard rail (metal)	22	64	14
Pay item-33	Concrete curd and gutter	25	60	15
Pay item-34	Concrete curd	27	56	17

Note: Figure given in table above are estimated based on latest similar road projects in the Philippines.

1.4 Land Acquisition Costs

Land Acquisition costs given in Table 1.3 are calculated based on “Zonal Valuation 1996 – 1997. Implementation of revised Zonal Valuation values of Real Properties for Internal Revenue Tax Purposes” Bureau of Internal Revenue, Department of Finance, Republic of Philippines.

1.5 Construction Cost Estimates

Based on the basic prices component prescribed above, construction cost estimates are carried out and results are given in Table 1.4 to 1.6 and Table 1.7 for Roads and Railway respectively.

TABLE 1.3
LAND ACQUISITION COST ESTIMATE FOR HIGHWAY

Project	Structure	Route / km	ROW (m)	Land (SQMX103)	Unit Price P/sqm	Land Acquisition Cost P mil	Land Acquisition Cost \$mil	Remarks	
A Primary Arterial Missing (6 lanes)									
(1)	C -3 (1)	AG	0.8	34.0	27.2	4,500	122.4	3.06	1) Improvement
(2)	C -3 (2)	AG	5.5	34.0	187	12,800	2,393.6	59.84	2) Widening
(3)	C - 4	AG	1.3	56.0	72.8	6,500	473.2	11.83	3) Partial Widening
Sub Total A			7.6				2,989.2	74.73	
B Urban Expressway (6 lanes)									
(4)	MMS (1)	EL	2.0	51.0	102	10,000	1,020.0	25.50	
(5)	MMS (2)	EL	10.5	51.0	535.5	18,000	9,639.0	240.98	
(6)	MMS (3)	EL	2.5	51.0	127.5	18,000	2,295.0	57.38	
(7)	R 101 C3	EL	7.5	51.0	382.5	10,000	3,825.0	95.63	
(8)	R-7E (1)	EL	7.5	-					
(9)	R-4E (2)	EL	0.4	51.0	20.4	4,000	81.6	2.04	
(42)	MMS (4)	EL	9.2	51.0	469.2	-	-	-	
(43)	MMS (5)	EL	7.8	51.0	397.8	-	-	-	
(44)	MMS (6)	EL	7.5	51.0	382.5	-	-	-	
(45)	C-5E (4)	EL	6.4	-		-	-	-	
(46)	S-1E (1)	EL	8.0	-		-	-	-	
(47)	S-1E (2)	EL	6.5	-		-	-	-	
(48)	S-4E (1)	EL	8.0	51.0	408	3,250	1,326.0	33.15	
(49)	S-4E (2)	EL	14.5	51.0	739.5	2,750	2,033.6	50.84	
(75)	N-3E (1)	EL	8.0	-		-	-	-	
(76)	N-3E (2)	EL	16.0	-		-	-	-	
(77)	W-2E	EL	5.5	-		-	-	-	
(86)	S-5E (1)	EL	5.0	51.0	255	-	-	-	
(87)	S-5E (2)	EL	12.5	51.0	637.5	-	-	-	
(88)	S-5E (3)	EL	7.0	51.0	357	-	-	-	
(89)	E-7E (2)	EL	6.0	-	-	-	-	-	
(90)	R-4E (2)	EL	5.0	-	-	-	-	-	
Sub Total B			163.3				20,220.2	505.51	
A2 Primary Arterial (6 lanes)									
(15)	S-1 (1)	AG	16.5	51.0	841.5	1,000	841.5	21.04	
(16)	S-1 (2)	AG	11.5	51.0	586.5	1,000	586.5	14.66	
17	S-1 (3)	AG	7.0	34.0	238	1,000	238.0	5.95	
18	S-2 (1)	AG	20.5	34.0	697	550	383.4	9.58	
19 ¹⁾	S-2 (2)	AG	3.5	-		550	-	-	
20 ¹⁾	S-2 (3)	AG	8.0	-		450	-	-	
21	S-3 (1)	AG	5.5	34.0	187	1,000	187.0	4.68	
22	S-3 (2)	AG	11.0	34.0	374	750	280.5	7.01	
23	S-4 (1)	AG	8.0	51.0	408	3,250	1,326.0	33.15	
24	S-4 (2)	AG	12.5	51.0	637.5	2,750	1,753.1	43.83	
25	S-4 (3)	AG	16.5	34.0	561	400	224.4	5.61	
26	S-5 (4)	AG	12.5	34.0	425	3,800	1,615.0	40.38	
27	S-5 (5)	AG	19.5	34.0	663	2,000	1,326.0	33.15	
28	E-1 (1)	AG	14.5	34.0	493	1,100	542.3	13.56	
29	E-1 (2)	AG	10.0	34.0	340	2,350	799.0	19.98	
30	E-2 (1)	AG	19.0	34.0	646	900	581.4	14.54	
31	E-2 (2)	AG	11.5	34.0	391	1,000	391.0	9.78	
32	E-3 (1)	AG	12.5	34.0	425	700	297.5	7.44	

PROJECT	Structure	Route / km	ROW (m)	Land (SQMX103)	Unit Price P/sqm	Land Acquisition Cost P mil	Land Acquisition Cost \$mil	Remarks	
33 ¹⁾	E-3 (2)	AG	13.0	34.0	442	850	375.7	9.39	
34	E-3 (3)	AG	8.5	34.0	289	1,100	317.9	7.95	
35	E-3 (4)	AG	7.5	34.0	255	1,000	255.0	6.38	1) Improvement
36	E-4 (1)	AG	14.0	34.0	476	400	190.4	4.76	2) Widening
37 ¹⁾	E-4 (2)	AG	5.0	-	-	100	-	-	3) Partial
38	E-4 (3)	AG	10.0	34.0	340	250	85.0	2.13	
39	E-4 (4)	AG	22.0	34.0	748	800	598.4	14.96	
40	C-5 (2)	AG	6.4	51.0	326.4	7,900	2,578.6	64.46	
41	2-1	AG	2.5	34.0	85	2,400	204.0	5.10	
51	N-1 (1)	AG	9.0	34.0	306	1,500	459.0	11.48	
52	N-1 (2)	AG	14.0	34.0	476	800	380.8	9.52	
53	N-2	AG	10.5	34.0	357	1,200	428.4	10.71	
54	N-3 (1)	AG	14.0	51.0	714	900	642.6	16.07	
55	N-3 (2)	AG	14.0	51.0	714	450	321.3	8.03	
(56)	N-4 (1)	AG	7.0	34.0	238	12,000	2,856.0	71.40	
57 ¹⁾	N-4 (2)	AG	7.5	-	-	7,500	-	-	
(58)	N-4 (3)	AG	15.5	34.0	527	900	474.3	11.86	
(59)	W-1 (1)	AG	7.0	34.0	238	3,400	809.2	20.23	
(60)	W-1 (2)	AG	7.0	34.0	238	3,400	809.2	20.23	
(61)	W-1 (3)	AG	5.5	34.0	187	5,000	935.0	23.38	
62 ²⁾	W-1 (4)	AG	7.5	34.0	255	4,500	1,147.5	28.69	
(63)	W-2 (1)	AG	5.5	51.5	283.25	4,500	1,274.6	31.87	
(64)	W-2 (2)	AG	5.5	34.0	187	800	149.6	3.74	
(65)	W-2 (3)	AG	13.0	34.0	442	1,500	663.0	16.58	
(66)	W-3 (1)	AG	6.5	34.0	221	2,000	442.0	11.05	
(67)	W-3 (2)	AG	8.5	34.0	289	1,000	289.0	7.23	
(68)	W-3 (3)	AG	6.0	34.0	204	600	122.4	3.06	
(69)	W-4 (1)	AG	5.5	34.0	187	1,000	187.0	4.68	
(70)	W-4 (2)	AG	13.5	34.0	459	800	367.2	9.18	
(71)	W-4 (3)	AG	7.0	34.0	238	500	119.0	2.98	
(72)	W-5 (1)	AG	4.0	34.0	136	5,000	680.0	17.00	
(73)	W-5 (2)	AG	19.0	34.0	646	1,000	646.0	16.15	
(74)	W-5 (3)	AG	5.5	34.0	187	300	56.1	1.40	
(78)	C-5 (1)	AG	1.1	51.0	56.1	2,600	145.9	3.65	
(79)	S-5 (1)	AG	7.5	34.0	255	2,600	663.0	16.58	
(80)	S-5 (2)	AG	17.0	34.0	578	3,000	1,734.0	43.35	
(81)	S-5 (3)	AG	14.5	34.0	493	3,000	1,479.0	36.98	
(82)	R-7	AG	6.0	51.0	306	15,000	4,590.0	114.75	
(83)	R-4	AG	5.0	51.0	255	4,000	1,020.0	25.50	
(84) ¹⁾	B-1 (1)	AG	3.2	34.0	109	27,000	2,937.6	73.44	
(85)	B-1 (2)	AG	3.0	34.0	102	2,500	255.0	6.38	
Sub Total A2			755.1				43,061.2	1,076.53	
C Existing Primary Arterial									
(12) ²⁾	R-4	AG	9.5	17.0	161.5	13,200	2,131.8	53.30	
(13) ³⁾	R-5	AG	8.0	11.3	90.7	10,000	906.7	22.67	
(14) ³⁾	R-5	AG	13.0	11.3	147.3	6,000	884.0	22.10	
(19) ²⁾	R-8(1)	AG	3.0	17.0	51.0	25,000	1,275.0	31.88	
(20) ³⁾	R-8(2)	AG	40.0	11.3	453.3	10,400	4,714.7	117.87	
(21) ²⁾	N-1	AG	14.0	17.0	238.0	3,400	809.2	20.23	
Sub Total C			87.5				94,326.9	268.03	
Total							160,598	1,925	

TABLE 1.4
INITIAL CONSTRUCTION COST ESTIMATE FOR HIGHWAY

Project	Structure	Route/km	Cost \$mil/km	Cost \$mil	% Cost Borne by Public Sec.	Cost Borne by Public (\$ mil)	Cross Section Type	
A. Primary Arterial Missing (6 lanes)								
(1)	C -3 (1)	AG	0.8	3.76	3.008	1.0	3.008	II
(2)	C -3 (2)	AG	5.5	3.76	20.68	1.0	20.680	II
(3)	C - 4	AG	1.3	4.13	5.369	1.0	5.369	II
Sub Total A1			7.6				29.057	
B. Urban Expressway (6 lanes)								
(4)	MMS (1)	EL	2.0	48.14	96.280	1.0	96.280	I
(5)	MMS (2)	EL	10.5	48.14	505.47	1.0	505.470	I
(6)	MMS (3)	EL	2.5	48.14	120.35	1.0	120.350	I
(7)	R 101 C3	EL	7.5	48.14	361.05	1.0	361.050	I
(8)	R-7E (1)	EL	7.5	48.14	361.05	1.0	361.050	I
(9)	R-4E (2)	EL	7.5	48.14	361.05	1.0	361.050	I
(42)	MMS (4)	EL	9.2	48.14	442.888	1.0	442.888	I
(43)	MMS (5)	EL	7.8	48.14	375.492	1.0	375.492	I
(44)	MMS (6)	EL	7.5	48.14	361.05	1.0	361.050	I
(45)	C-5E (4)	EL	6.4	48.14	308.096	1.0	308.096	I
(46)	S-1E (1)	EL	8.0	48.14	385.120	1.0	385.120	I
(47)	S-1E (2)	EL	6.5	48.14	312.91	1.0	312.910	I
(48)	S-4E (1)	EL	8.0	48.14	385.120	1.0	385.120	I
(49)	S-4E (2)	EL	14.5	48.14	698.03	1.0	698.030	I
(75)	N-3E (1)	EL	8.0	48.14	385.120	1.0	385.120	I
(76)	N-3E (2)	EL	16.0	48.14	770.240	1.0	770.240	I
(77)	W-2E	EL	5.5	48.14	264.77	1.0	264.770	I
(86)	S-5E (1)	EL	5.0	48.14	240.700	1.0	240.700	I
(87)	S-5E (2)	EL	12.5	48.14	601.75	1.0	601.750	I
(88)	S-5E (3)	EL	7.0	48.14	336.980	1.0	336.980	I
(89)	E-7E (2)	EL	6.0	48.14	288.840	1.0	288.840	I
(90)	R-4E (2)	EL	5.0	48.14	240.700	1.0	240.700	I
Sub Total B			170.4				8,203.056	
A2. Primary Arterial (6 lanes)								
(15)	S-1 (1)	AG	16.5	48.14	794.31	1.0	794.310	II
(16)	S-1 (2)	AG	11.5	48.14	553.61	1.0	553.610	II
17	S-1 (3)	AG	7.0	3.76	26.320	1.0	26.320	II
18	S-2 (1)	AG	20.5	3.76	77.08	1.0	77.080	II
19 ¹⁾	S-2 (2)	AG	3.5	3.76	13.16	1.0	13.160	II
20 ¹⁾	S-2 (3)	AG	8.0	3.76	30.080	1.0	30.080	II
21	S-3 (1)	AG	5.5	3.76	20.68	1.0	20.680	II
22	S-3 (2)	AG	11.0	3.76	41.360	1.0	41.360	II
23	S-4 (1)	AG	8.0	48.14	385.120	1.0	385.120	I-B
24	S-4 (2)	AG	12.5	48.14	601.75	1.0	601.750	I-B
25	S-4 (3)	AG	16.5	3.76	62.04	1.0	62.040	II
26	S-5 (4)	AG	12.5	3.76	47	1.0	47.000	II
27	S-5 (5)	AG	19.5	3.76	73.32	1.0	73.320	II
28	E-1 (1)	AG	14.5	3.76	54.52	1.0	54.520	II
29	E-1 (2)	AG	10.0	3.76	37.6	1.0	37.600	II
30	E-2 (1)	AG	19.0	3.76	71.44	1.0	71.440	II
31	E-2 (2)	AG	11.5	3.76	43.24	1.0	43.240	II
32	E-3 (1)	AG	12.5	3.76	47	1.0	47.000	II
33 ¹⁾	E-3 (2)	AG	13.0	3.76	48.88	1.0	48.880	II
34	E-3 (3)	AG	8.5	3.76	31.96	1.0	31.960	II
35	E-3 (4)	AG	7.5	3.76	28.2	1.0	28.200	II
36	E-4 (1)	AG	14.5	3.76	54.52	1.0	54.520	II

Project	Structure	Route/km	Cost \$mil/km	Cost \$mil	% Cost Borne by Public Sec.	Cost Borne by Public (\$ mil)	Cross Section Type	
37 ¹⁾	E-4 (2)	AG	5.0	3.76	18.8	1.0	18.800	II
38	E-4 (3)	AG	10.0	3.76	37.600	1.0	37.600	II
39	E-4 (4)	AG	22.0	3.76	82.720	1.0	82.720	II
40	C-5 (2)	AG	6.4	48.14	308.096	1.0	308.096	I
41	2-1	AG	2.5	48.14	120.35	1.0	120.350	II
51	N-1 (1)	AG	9.0	48.14	433.260	1.0	433.260	II
52	N-1 (2)	AG	14.0	48.14	673.960	1.0	673.960	II
53	N-2	AG	10.5	3.76	39.48	1.0	39.480	II
54	N-3 (1)	AG	14.0	48.14	673.960	1.0	673.960	I-B
55	N-3 (2)	AG	14.0	48.14	673.960	1.0	673.960	I-B
(56)	N-4 (1)	AG	7.0	48.14	336.980	1.0	336.980	II
57 ¹⁾	N-4 (2)	AG	7.5	48.14	361.05	1.0	361.050	II
(58)	N-4 (3)	AG	15.5	48.14	746.17	1.0	746.170	II
(59)	W-1 (1)	AG	7.0	48.14	336.980	1.0	336.980	II
(60)	W-1 (2)	AG	7.0	48.14	336.980	1.0	336.980	II
(61)	W-1 (3)	AG	5.5	48.14	264.770	1.0	264.770	II
62 ¹⁾	W-1 (4)	AG	7.5	3.76	28.2	1.0	28.200	II
(63)	W-2 (1)	AG	5.5	48.14	264.77	1.0	264.770	I
(64)	W-2 (2)	AG	5.5	3.76	20.68	1.0	20.680	II
(65)	W-2 (3)	AG	13.0	3.76	48.880	1.0	48.880	II
(66)	W-3 (1)	AG	6.5	3.76	24.44	1.0	24.440	II
(67)	W-3 (2)	AG	8.5	3.76	31.96	1.0	31.960	II
(68)	W-3 (3)	AG	6.0	3.76	22.560	1.0	22.560	II
(69)	W-4 (1)	AG	5.5	3.76	20.68	1.0	20.680	II
(70)	W-4 (2)	AG	13.5	3.76	50.76	1.0	50.760	II
(71)	W-4 (3)	AG	7.0	3.76	26.320	1.0	26.320	II
(72)	W-5 (1)	AG	4.0	3.76	15.040	1.0	15.040	II
(73)	W-5 (2)	AG	19.0	3.76	71.440	1.0	71.440	II
(74)	W-5 (3)	AG	5.5	3.76	20.68	1.0	20.680	II
(78)	C-5 (1)	AG	1.1	48.14	52.954	1.0	52.954	I
(79)	S-5 (1)	AG	7.5	3.76	28.2	1.0	28.200	II
(80)	S-5 (2)	AG	17.0	3.76	63.920	1.0	63.920	II
(81)	S-5 (3)	AG	14.5	3.76	54.52	1.0	54.520	II
(82)	R-7	AG	6.0	48.14	288.840	1.0	288.840	I
(83)	R-4	AG	5.0	48.14	240.700	1.0	240.700	I
(84) ¹⁾	B-1 (1)	AG	4.0	3.76	15.040	1.0	15.040	II
(85)	B-1 (2)	AG	3.0	3.76	11.280	1.0	11.280	II
Sub Total A2			585.5				9,990.170	
C. Grade Separation (4 lanes)								
(10) ²⁾	GS-1	EL	0.5	25.8	12.900	1.0	12.900	-
(11)	GS-2	EL	0.5	25.8	12.900	1.0	12.900	-
(12)	GS-3	EL	0.5	25.8	12.900	1.0	12.900	-
(13)	GS-4	EL	0.5	25.8	12.900	1.0	12.900	-
(14)	GS-5	EL	0.5	25.8	12.900	1.0	12.900	-
(50)	GS-6	EL	0.5	25.8	12.900	1.0	12.900	-
(91)	GS-7	EL	0.5	25.8	12.900	1.0	12.900	-
(92)	GS-8	EL	0.5	25.8	12.900	1.0	12.900	-
Sub Total C			4.0				103.200	
Total			767.5				18325.483	

**TABLE 1.5
 CONSTRUCTION COST FOR EXPRESSWAY WITH ARTERIAL STREET**

Code	Name	Length (km)	Unit Cost (10 ³ x pesos)	Direct cost (10 ³ x pesos)				Indirect cost (10 ³ x pesos)				Total Cost (10 ³ x pesos)		
				through way	on/off ramp	miscellaneous	relocation	physical contingency	contractor's overhead	Engineering service	Foreign	Local	Tax	Total
XMMS	Metro Manila Skyway	36.5	834,012	30,441,438	6,086,288	5,479,459	4,200,918	3,044,144	4,566,216	3,767,432	23,783,801	23,495,861	10,308,233	57,587,895
XR10C3	R-10(C-3 Expressway (n-Habour-A, Bonifacio)	7.5	834,012	6,255,090	1,251,018	1,125,916	863,202	625,509	938,264	774,130	4,887,082	4,827,917	2,118,130	11,833,129
XR4	Pasig Expressway (C-3 Marcos Highway)	20.2	834,012	16,847,042	3,369,408	3,032,468	2,324,892	1,684,704	2,527,056	2,084,990	13,162,542	13,003,189	5,704,830	31,870,561
XR7	R-7 Expressway (C-3-DPWH 3)	30.5	834,012	25,437,366	5,087,473	4,578,726	3,510,357	2,543,737	3,815,605	3,148,128	19,874,135	19,633,528	8,613,729	48,121,392
XMC	Manila-Cavite Expressway (South EDSA-Kawit)	14.5	834,012	12,093,174	2,418,635	2,176,771	1,668,858	1,209,317	1,813,976	1,496,651	9,448,359	9,333,972	4,095,052	22,877,383
XC5	C-5 Expressway Diliman-Roxas Blvd.)	25.9	834,012	21,600,911	4,320,182	3,888,164	2,980,926	2,160,091	3,240,137	2,673,329	16,876,724	16,672,406	7,314,609	40,863,739
	Total	135	5,004,072	112,675,021	22,535,004	20,281,504	15,549,153	11,267,502	16,901,254	13,944,660	88,032,643	86,966,873	38,154,583	213,154,099

A Direct Cost

- 1) Major works (through way) 20% of direct cost
- 2) On / off ramp and others 10% of direct cost
- 3) Relocation of existing utilities 15% of (1) + 2)
- 4) Miscellaneous of other facilities

B Indirect Cost

- 1) Contractor's overhead and general expenses 15% of direct cost
- 2) Physical Contingency 10% of direct cost
- 3) Engineering Service 7% of direct cost + cost (B-1), and (B-2)

C Unit Cost of Major Works

Unit	Width	Length	Cost per Km
Construction Cost			
at grade rehabilitation ^{1/}	3068	1000	104,312,000

TABLE 1.6
CONSTRUCTION COST FOR SECONDARY ARTERIAL STREET

Category	Code	Name	Type	Length (k.m)	Direct cost (10 ³ x peso)		Indirect Cost (10 ³ x pesos)			Total Cost (10 ³ x pesos)					
					unit cost per km	cost	relocation exst. util.	physical contractor's	Engineering service	foreign	local	tax	total		
Primary Arterial Roads	PN3	North Central Road (Qurino Hwy-SM16)	II	At grade	5.0	104,312	521,560	52,156	78,234	49,287	487,240	2,287,752	158,213	2,943,204	
				elevated	6.000	717,286	4,303,716	430,372	645,557	406,701	2,735,356	855,630	1,174,960	4,765,945	
				bridge type-1	0.350	879,599	307,860	30,786	46,179	29,093	195,669	169,514	84,049	449,232	
				bridge type-2	0	717,286	0	0	0	0	0	1,165,635	0	1,165,635	
				re-wall	360,000	0	0	0	0	0	0	0	0	0	0
				total	11.350	513,314	513,314	769,970	485,081	3,428,530	4,478,530	1,417,221	9,324,016		
Primary Arterial Roads	PS1	Talaba-Kawit roads	II	At grade	3.000	104,312	312,936	31,294	45,940	29,572	298,344	78,060	94,928	471,331	
				elevated	3.000	717,286	2,151,858	215,186	322,779	203,351	1,355,244	1,089,378	587,480	3,032,102	
				bridge type-1	0	879,599	0	0	0	0	0	0	0	0	0
				bridge type-2	0	717,286	0	0	0	0	0	0	0	0	0
				re-wall	360,000	0	0	0	0	0	0	0	0	0	0
				total	6.000	246,479	246,479	369,719	232,923	1,653,588	1,167,438	682,407	3,503,433		
Primary Arterial Roads	PS3	Kawit-Bucandala roads	II	At grade	2.000	104,312	208,624	20,862	31,294	19,715	198,896	64,835	63,285	327,016	
				elevated	3.500	717,286	2,510,501	251,050	376,575	237,242	1,581,119	1,359,907	685,393	3,626,419	
				bridge type-1	0	879,599	0	0	0	0	0	0	0	0	0
				bridge type-2	0	717,286	0	0	0	0	0	0	0	0	0
				re-wall	360,000	0	0	0	0	0	0	0	0	0	0
				total	5.500	2,719,125	2,719,125	407,869	256,957	1,780,014	1,424,742	748,678	3,953,435		
ROW=34m C.W=25m	PE1	Bucandala-Muntinglupa road	II	At grade	2.400	104,312	250,349	25,035	37,552	23,658	238,675	133,079	75,942	447,697	
				elevated	13.600	717,286	9,755,090	975,509	1,463,263	921,856	6,143,775	5,284,210	2,663,242	14,091,227	
				bridge type-1	0	879,599	0	0	0	0	0	0	0	0	0
				bridge type-2	0	717,286	0	0	0	0	0	0	0	0	0
				re-wall	360,000	0	0	0	0	0	0	0	0	0	0
				total	16.000	10,005,438	10,005,444	1,500,916	945,514	6,382,450	5,417,290	2,739,184	16,780,884		
				SUB TOTAL	A			1,908,685	12,024,711	13,244,318	12,487,999	5,587,491	253,023		
SM1	Aurora Ave. Ext to R-10	IV	IV	At grade	2.365	59,826	141,488	14,149	21,223	13,371	134,891	75,212	42,920	253,023	
				elevated	0.0	482,313	0	0	0	0	0	0	0	0	0
				bridge type-1	0.035	591,454	20,701	2,070	3,105	1,956	19,736	11,004	6,280	37,019	
				bridge type-2	0	482,313	0	0	0	0	0	0	0	0	0
				re-wall	360,000	0	0	0	0	0	0	0	0	0	0
				total	2.400	187,389	187,389	18,739	28,108	17,708	13,396	7,644	45,065		
SM2	A.M Masada & Ext. to Aurora Blvd	IV	IV	At grade	3.200	59,826	191,443	19,144	28,716	18,091	182,516	101,767	58,073	342,356	
				elevated	0.0	482,313	0	0	0	0	0	0	0	0	0
				bridge type-1	0.0	591,454	0	0	0	0	0	0	0	0	0
				bridge type-2	0	482,313	0	0	0	0	0	0	0	0	0
				re-wall	360,000	0	0	0	0	0	0	0	0	0	0
				total	3.200	191,443	191,444	19,144	28,716	18,091	101,767	58,073	342,356		
SM3	F. Martines Ext. to Ortigas Ave.	IV	IV	At grade	2.200	59,826	131,617	13,162	19,743	12,438	125,430	69,965	39,925	235,370	
				elevated	0	482,313	0	0	0	0	0	0	0	0	0
				bridge type-1	0	591,454	0	0	0	0	0	0	0	0	0
				bridge type-2	0	482,313	0	0	0	0	0	0	0	0	0
				re-wall	360,000	0	0	0	0	0	0	0	0	0	0
				total	2.200	131,617	131,622	13,162	19,743	12,438	69,965	39,925	235,370		
SM4	SLE Ext. (Pres. Qurino- (J.P. Laurel)	IV	IV	At grade	1.160	59,826	69,388	6,940	10,410	6,558	66,162	36,890	21,052	124,104	
				elevated	0.750	482,313	361,735	36,173	54,260	34,184	344,880	192,290	109,730	646,887	
				bridge type-1	0.040	591,454	23,658	2,366	3,549	2,236	22,555	12,576	7,177	42,308	
				bridge type-2	0	482,313	0	0	0	0	0	0	0	0	0
				re-wall	360,000	0	0	0	0	0	0	0	0	0	0
				total	2.200	72,000	72,000	7,200	10,800	6,804	38,273	21,841	128,757		

TABLE 1.6
 CONSTRUCTION COST FOR SECONDARY ARTERIAL STREET

SM	Description	IV	At g	0.500	126	126	31	24,116	38,173	4	54	36	128,193	481	6,986
SM5	Gilmore Ave. to Roosevelt	IV	At grade elevated bridge type-1 bridge type-2 re-wall total	0.500	482,313 591,454 482,313 360,000	241,157 0 0 0	24,116 0 0 0	38,173 0 0 0	4 0 0 0	54 22,189 0 0	36 229,911 0 0	128,193 0 0 0	481 1,154 0 0	6,986 431,258 0 0	
SM6	Victometa Ave.EXT to Congressional Ave	IV	At grade elevated bridge type-1 bridge type-2 re-wall total	0.050 0.130 0.200 2.660	591,454 482,313 360,000 59,826	29,573 62,701 72,000 312,642	2,957 6,270 7,200 31,264	4,436 9,405 6804 29,545	2,795 5,925 6,804 29,545	27,95 59,777 68,643 298,063	28,194 33,330 19,020 15,720	8,971 19,020 128,127 112,127	91,302 128,757 559,095 113,940	45,007 265,326 0 0	538,244 265,326 0 0
SM14	Qurino Hwy Novaliches Bypass	IV	At grade elevated bridge type-1 bridge type-2 re-wall total	1.065 0 0.350	59,826 482,313 591,454 482,313 360,000	63,715 0 207,009 0	6,371 20,701 0 0	9,557 31,051 0 0	6,371 19,562 0 0	60,744 197,356 0 0	60,744 197,356 0 0	33,869 110,041 62,795 370,192	19,328 62,795 0 0	0 0 0 0	370,192 0 0 0
SM17	Kalayaan Ave.EXT. to 21th Ave	IV	At grade elevated bridge type-1 bridge type-2 re-wall total	0.100 1.415 0.995 0.075	59,826 482,313 591,454 482,313 360,000	36,000 306,724 59,327 44,959	3,600 30,672 5,953 4,436	5,400 48,009 8,929 6,654	3,600 48,009 8,929 6,654	3,402 29,985 56,751 41,92	34,321 292,421 56,751 42,291	19,137 163,047 31,643 23,580	10,320 93,043 18,057 13,456	0 0 0 0	64,378 548,511 106,451 79,327
SM18	New Marikina Road	IV	At grade elevated bridge type-1 bridge type-2 re-wall total	0.300 1.070 2.625 0.000	59,826 482,313 591,454 482,313 360,000	108,000 211,886 157,043 166,398	10,800 21,189 15,704 16,840	16,200 31,783 23,556 24,960	10,206 20,023 148,91	10,206 20,023 148,91	10,206 20,023 148,91	57,410 112,633 82,322 87,226	32,761 64,275 47,638 50,478	0 0 0 0	193,135 378,914 279,681 296,341
SM20	Col. B. Serrano Ave to Marcos Hwy	IV	At grade elevated bridge type-1 bridge type-2 re-wall total	0.300 2.970 2.090 0.410	59,826 482,313 591,454 482,313 360,000	431,441 125,036 197,748 36,000	43,144 12,504 19,775 3,600	64,716 18,755 29,662 5,400	64,716 18,755 29,662 5,400	40,771 118,16 18,687 3,600	411,323 119,266 188,527 3,600	228,162 64,321 101,725 18,519	130,876 37,329 59,986 10,920	0 0 0 0	788,361 221,456 350,238 63,761
SM21	Passay road Ext. (Lawyer-Gen. Santos)	IV	At grade elevated bridge type-1 bridge type-2 re-wall total	2.000 3.500 0.100 2.500	59,826 482,313 591,454 482,313 360,000	119,652 1,688,096 358,785 1,807,748	11,965 168,810 35,878 180,775	17,948 253,214 39,878 180,775	17,948 253,214 39,878 180,775	11,307 159,525 33,905 170,832	114,073 1,609,380 342,055 1,723,452	868,384 888,384 184,565 929,935	36,296 512,075 108,836 1,446,182	0 0 0 0	2,989,839 2,989,839 635,455 2,989,839
	SUB TOTAL	B	subtotal	27,365	4,767,448	476,745	715,117	450,524	2,493,902	1,446,182	8,485,225	25,266,110			
	Ground Total	A+B		38.9	17,492,012	1,749,201	2,623,802	1,852,995	17,789,460	14,981,901	7,033,672				

Notes:
 A. Retaining wall lengths given above are to be excluded from road's length.
 Direct cost
 1) major works
 2) miscellaneous other items
 3) relocation of existing utilities
 Indirect cost
 1) contractor's overhead and profit
 2) physical contingency
 3) engineering services
 B. Unit cost of major works
 primary arterial street
 at grade
 elevated
 bridge type-1
 bridge type-2
 secondary arterial
 at grade
 elevated
 bridge type-1
 bridge type-2
 unit cost per km
 per side m
 3088
 24734
 30331
 24734
 3088
 24734
 30331
 24734
 length
 m
 34
 29
 29
 29
 1000
 1000
 1000
 1000
 cost per km
 104,312,000
 17,285,000
 879,595,000
 717,265,000
 carriage side walk effective width(m)
 2 x 12.5
 2 x 12.5
 2 x 12.5
 2 x 12.5
 15.0
 15.0
 15.0
 15.0

TABLE 1.7
SUMMARY OF CONSTRUCTION COST FOR RAIL WAY
(MTDP 1999-2004)

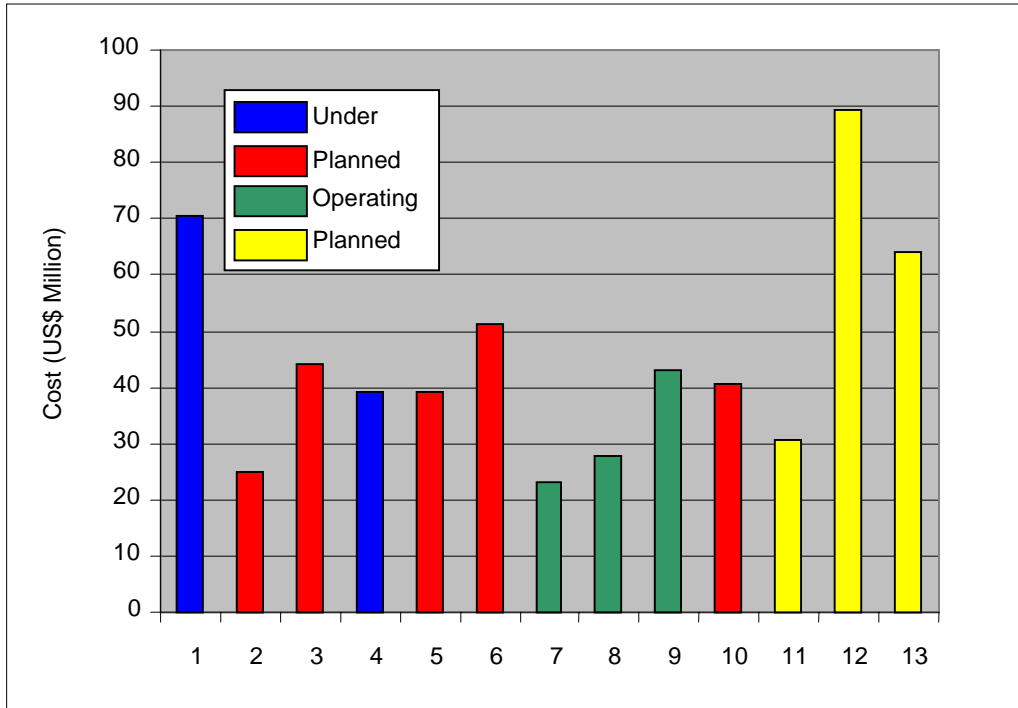
		Line 1	Line 2	Line 3	Line 4	MCX	North Rail	Remarks
1. Line length (km)	at-grade	0	0	0	0	37.2	0	
	elevated	15	9.5	11.5	27.4	12.4	18	
Total		15	9.5	11.5	27.4	49.6	18	
2. Infrastructure								
	Civil works	230.60	152.10	182.50	385.40	337.00	207.90	1495.50
	Station / terminal	111.60	51.90	56.10	200.10	72.00	71.40	563.10
	Car Depot	7.35	3.92	6.70	13.43	24.30	8.80	64.50
Sub-Total		349.55	207.92	245.30	598.93	433.30	288.10	2123.10
3. Electronic / Mechanics								
	Rolling stock	84.00	44.80	64.40	153.44	277.76	100.80	725.20
	Power supply and feeder system	45.00	24.00	34.50	82.20	148.80	54.00	388.50
	Overhead catenary and signal	52.50	28.00	40.25	95.90	173.60	63.00	453.25
	Telecommunication	22.50	12.00	17.25	41.10	74.40	27.00	194.25
	Automatic fare collection system	25.50	13.60	19.55	46.58	84.32	30.60	220.15
	Depot equipment	5.79	3.08	4.44	10.58	19.15	6.95	49.99
	Depot building / facilities	48.00	25.60	36.80	87.68	158.72	57.60	414.40
	Track work and other maintenance facilities	35.29	18.81	27.06	64.47	116.70	42.35	304.68
Sub-Total		318.58	169.89	244.25	581.95	1053.45	382.30	2750.42
4. Engineering Serve								
	design supervision	50.38	328.38	33.97	78.54	56.50	38.82	586.59
	Preparation and contract management	15.93	8.50	12.21	29.10	52.67	19.12	137.53
	Consultancy and administration	6.37	3.40	4.89	11.64	21.07	7.65	55.02
Sub-Total		72.68	340.28	51.07	119.28	130.24	65.59	779.14
Sub-Total 2+3+4		740.81	718.09	540.62	1300.16	1616.99	735.99	5652.66
5. Physical Contingency 10% above		74.08	71.81	54.06	130.02	161.70	73.60	565.27
6. Land Acquisition / Compensation		28.20	19.10	27.48	29.37	18.72	22.49	145.36
Grand Total		843.09	809.00	622.16	1459.55	1797.41	832.08	6363.29

TABLE 1.8
COST ESTIMATE OF MMUTIS PROJECT (MRT)

NO.	ID	PROJECT	STRUCTURE	ROUTE Km	COST \$Mil/Km	COST \$Mil	% COST Borne To Pub. Sec.	COST BORNE \$mil BY PUB.
1	R-IN	MRT LINE-1 Meycauayan –	EL	9.5	30.56	290.3	0.6	174.2
2	R-10	MRT LINE-1 Monumento - South	EL	14.5	30.56	443.1	0.6	265.9
3	R-IS	MRT LINE-1 S. Terminal –	EL	28.7	30.56	877.1	0.6	526.2
A		Sub Total Line-1				1610.5		966.3
4	R-2E	MRT LINE-2 Santolan – Mambungan	EL	5.2	30.56	158.9	0.6	95.3
5	R-2E	MRT LINE-2 Mambungan – Antipolo	AG	6.8	21.67	147.4	0.6	88.4
		Sub Total R-2E				306.3		183.8
6	R-20	MRT LINE-2 Recto – Santolan	EL	14	32.5	988.0	0.0	0.0
7	R-2W	MRT LINE-2 Recto – Bictan	UG(S)	16.9	89.52	1512.9	0.6	907.7
8	R-2S(1)	MRT LINE-2 Bictan – Taytay	EL	9.8	30.56	299.5	0.6	179.7
9	R-2S(2)	MRT LINE-2 Taytay – Binangonan	AG	10.0	21.67	216.7	0.6	130.0
		Sub Total R-2S				516.2		1217.4
B		Sub Total Line-2				3323.3		1401.2
10	R-3W	MRT LINE 3 Monumento - R10	EL	10.0	30.56	498.1	0.6	298.9
11	R-30	MRT LINE 3 Monumento - South	EL	16.8	30.56	655.0	0.0	-
12	R-3S	MRT LINE 3 South Terminal –	EL	15.0	30.56	458.4	0.6	275.0
C		Sub Total LINE 3				1611.5		573.9
13	R-40	MRT LINE 4 Old Bilibid – EDSA	UG(S)	9.0	64.23	578.1	0.6	346.9
14	R-40	MRT LINE 4 EDSA - Quirino	UG(c/c)	13.8	30.56	421.7	0.6	253.0
		Sub Total R-40				999.8		599.9
15	R-4E	MRT LINE 4 Doña Carmen - San	EL	6.2	30.56	189.5	0.6	113.7
D		Total LINE R-4				1189.3		713.6
16	R-5N	North Rail Malolos – Santolan	AG	19.0	21.67	411.7	0.6	247.0
17	R-5N	North Rail Santolan – Solis	EL	11.5	30.56	351.4	0.6	210.8
		Sub Total R-5N				763.1		457.9
18	R-5M(1)	North Rail C.M. Recto - Fort	UG(S)	13.65	89.52	1221.9	0.6	733.1
	R-5M(2)	North Rail C.M. Recto - Fort	UG(c/c)	5.85	64.23	375.7	0.6	225.4
19	R-5S(1)	North Rail Fort Bonifacio - Don	EL	5	30.56	152.8	0.6	91.7
	R-5S(2)	North Rail Don Bosco – Dasmariñas	EL	19.5	30.56	595.9	0.6	357.5
		Sub Total R-5S				748.7		449.2
E		Sub Total Line-5				3109.4		1865.6
20	R-6N	MRT LINE 6 San Jose Delmonte –	EL	13.9	30.56	424.8	0.6	254.9
	R-6N	MRT LINE 6 Canumay – EDSA	UG(c/c)	4.2	64.23	269.8	0.6	161.9
		Sub Total R-6N				694.6		416.8
21	R-6C	MRT LINE 6 EDSA - San Andres	UG(S)	10.7	89.52	957.8	0.6	574.7
22	R-6M	MRT LINE 6 San Andres - West	UG(S)	11.8	89.52	1056.3	0.6	633.8
23	R-6M	MRT LINE 6 West Bicutan – Alabang	EL	10.3	30.52	314.8	0.6	188.9
		Sub Total R-6M				1371.1		822.7
24	R-6S	MRT LINE 6 Alabang – Binal	EL	10.3	30.56	314.8	0.6	188.9
25	R-6S	MRT LINE 6 Binal – Calamba	AG	18.0	21.67	390	0.6	234.0
		Sub Total 6S				704.8		422.9
F		Sub Total Line-6				3728.3		2237.0
TOTAL						14572.4		7757.6

- 1) AG : At Grade
 2) EL : Elevated
 3) UG (S) : Under Ground Shield Tunnel
 4) UG (c/c) : Under Ground Cut and Cover
 5) AG : 0.35 km x 21.67 = 7.58
 UG (c/c) : 0.90 km x 64.23 = 57.81
 EL : 2.75 km x 30.56 = 384.64
 14.00 km 450.13 / 14 = 32.50

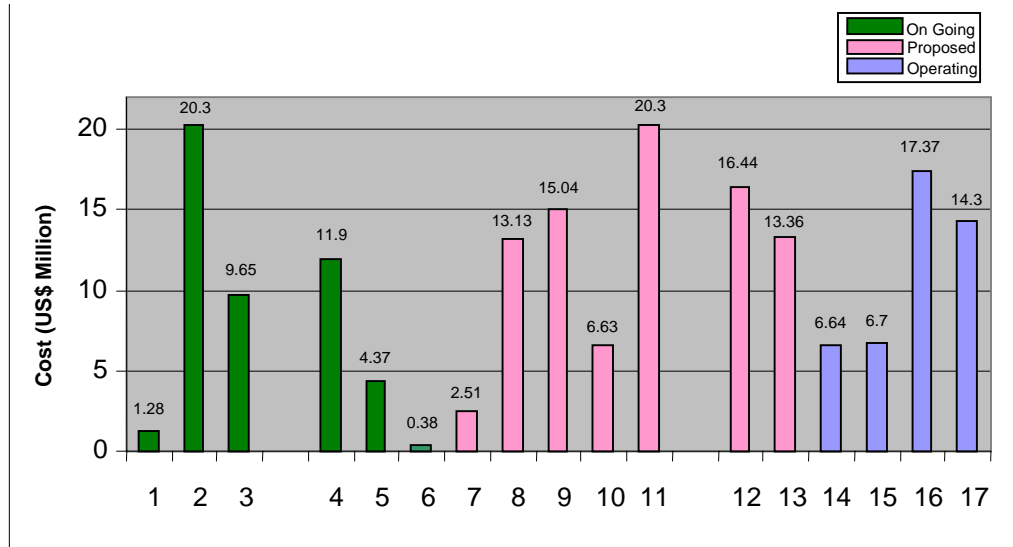
FIGURE 1.1
COST COMPARISON OF SIMILAR PROJECT



Project		Km.	Location	US\$ Million	US\$ Million/km	Remarks	
1	MRT LINE-2 Phase 1	14.0	CM Recto - Santolan	988	70.6	U.C.	1997
2	MRT LINE-2 W-Extension	2.5	Recto - North Harbor	62.1	24.8	P.L.	
3	MRT LINE-2 E-Extension	4.8	Santolan - Masingag	212	44.1	P.L.	
4	MRT LINE-3 Phase-1	16.8	North Ave. - F.B. Harrison	655	39	U.C.	1996
5	MRT LINE-4 Phase-1	15.1	Old Bilibid - Batasan	590	39.1	P.L.	
6	MRT LINE-6	12.0	Baclaran - Zapote	616	51.3	P.L.	
7	LRT	30.0	Kuala Lumpur	700	23.3	O.P.	1994
8	SKYTRAIN PROJECT	29.0	Vancouver	800	27.6	O.P.	1985
9	LRT LINE PROJECT	14.0	Karachi	600	42.9	O.P.	1996
10	LRT	23.0	Hanoi	936	40.7	P.L.	1996
11	MRT (MMUTIS) Elevated	1.0	Manila		30.6	P.L.	1998
12	MRT (MMUTIS) Shield	1.0	Manila		89.5	P.L.	1998
13	MRT (MMUTIS) Cut/Cover	1.0	Manila		64.2	P.L.	1998

UC : Under Construction
 PL : Proposed
 OP : Operating
 1) : Civil Work Only

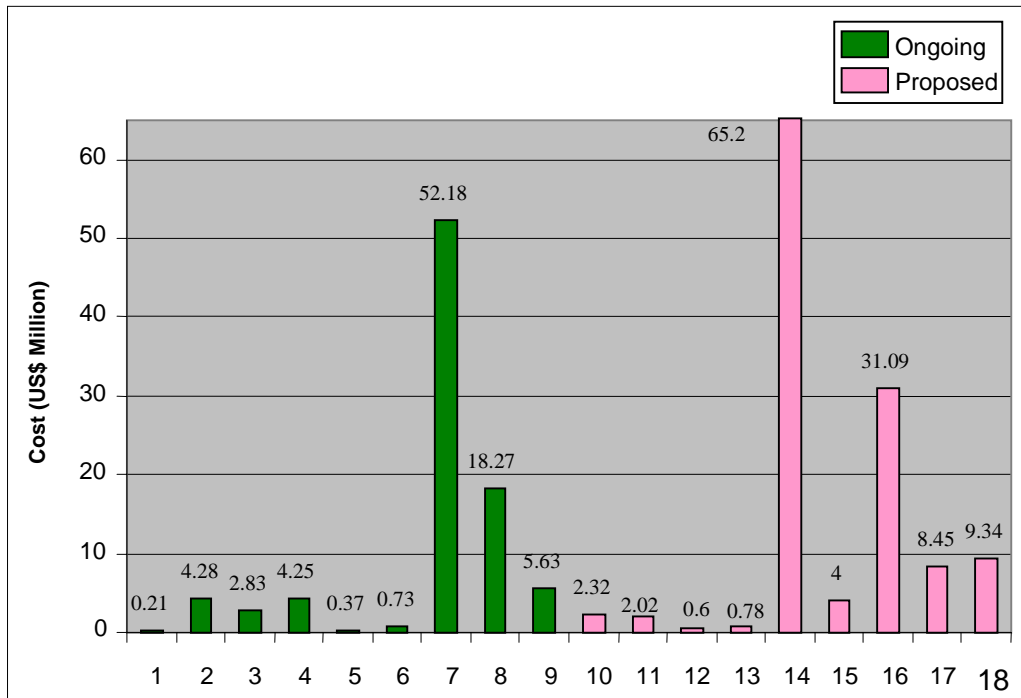
FIGURE 1.2
CONSTRUCTION COST OF MAJOR TOLLWAY



Notes:

Project	Length (Km)	Location	(Pesos) Mil	US\$ Mil/km	Structure	Lane
1 South Luzon Expressway, Ext.	22.16	Sto.Tomas-Lipa City	1,143	1.28	AG	4
2 Metro manila Skyway Stage 1	9.3	Buendia-Bicutan & Ayala	7,575	20.3	EL	6
3 Manila Cavite and C5 Expressway	16.1	Seaside Drive-Noveleta	6,475	9.65	AG	4
Manila Cavite and C5 Expressway	6.0	Zapote - SLE			AG	6
4 Pabahay Sa Riles Tollway	16.3	SamsonRd-Magallanes	7,769	11.9	AG	6
5 C5 Northern Segment	21.0	Commonwealth-Letre Rd	3,670	4.37	EL	-
6 NLE Rehabilitation and Extension	9,604	Balintawak-Clark	1,476	0.38	AG	-
7 Subic Expressway	642	San Simon-Subic	6,437	2.51	AG	-
8 C6 Metro Manila Tollway	384	Meycauyan-Bicutan	20,181	13.13	AG	6
9 C6 Laguna de Bay Coastal Road	186	Bicutan-San Pedro	11,972	15.04	EL	6
10 C6 Cavite - Laguna Expressway	19.0	C6-Cavite	5,037	6.63	AG	
11 Metro Manila Skyway stage 2	13.8	Bicutan-Alabang	20,700	20.3	EL	6
Metro Manila Skyway stage 3	11.59	Bicutan-Alabang			EL	6
12 Metro Manila Expressway	16.55	R4 Pasig Expressway	10,887	16.44	EL	
13 Metro Manila Expressway	5.70	R5 Ortigas Expressway	3,045	13.36	EL	6
14 Metro Manila Expressway (R6)	12.0	C3-Sumulong Highway	3,200	6.64		
15 Metro Manila Expressway R7)	12.2	España Rtd.-Batasan	3,270	6.7	AG	4
16 Bangkok Expressway No. 2	295	Bangkok	20,500	17.37	EL	6
17 Tate Tunnel	15.0	Hongkong	5,737	14.3	UL	4

FIGURE 1.3
CONSTRUCTION COST OF ORDINARY ROAD

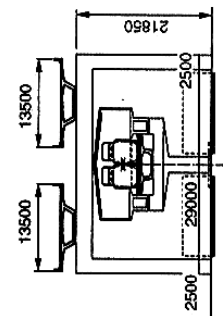
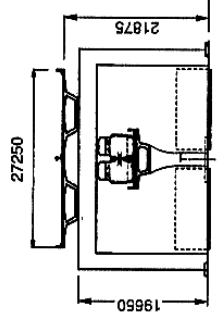
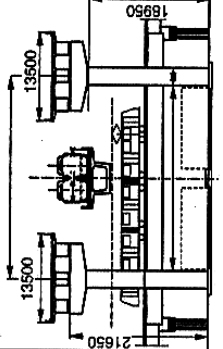
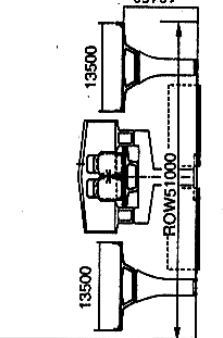


		Length	Cost P/Mil	Cost US\$ Mil/Km
1	Mindanao Ave. Extension (Stage II B/C)	8.2 Km	69.8	0.21
2	Nagtahan Link Road Bridge	1.95Km	333.8	4.28
3	San Mateo - Batasan Road	2.08Km	235.4	2.83
4	C3 Missing Link, Northern Package	0.90Km	153.0	4.25
5	C5 Comembo Link Road	2.7Km	40.0	0.37
6	C5 Lower Bicutan Access Road	1.2Km	35.0	0.73
7	Alabang - Zapote Flyover (Interchange)	0.217	453.0	52.18
8	C5/Padig Blvd./J.P. Rizal Interchange	0.684	500.0	18.27
9	EDSA/Shaw Blvd. Overpass	0.65Km	147.0	5.63
10	Visaya Ave. Extension	4.20Km	390.0	2.32
11	Alabang - Zapote Rd. Widening	10.30Km	834.0	2.02
12	C.P. Garcia Ave. Widening	2.50Km	60.0	0.6
13	R-10 Widening	4.96Km	156.0	0.78
14	C5/B. Serrrano Ave./Katipunan Interchange	0.23Km	600.0	65.2
15	C5/Lanuza Ave./Julia Vargas Ave. Flyover	1.00Km	160.0	4
16	C5/Ortigas Ave. Interchange	0.505Km	628.0	31.09
17	C5/R4 (Kalayaan Ave.) Flyover	0.65Km	220.0	8.45
18	EDSA/Roosevelt Grade Separation	0.40KM	150.0	9.34

TABLE 2.1
 SUMMARY OF PROJECT UNIT COST FOR ROAD WAY

CATEGORY	TYPE-1	TYPE-2	TYPE-3	TYPE-4	REMARKS
PRIMARY ARTERIAL STREET WITH URBAN EXPRESSWAY					
ROW (m)	51.00	34.0	27.50	19.50	SECONDARY ARTERIAL STREET
EXPRESSWAY	25.00	NON	NON	NON	
ARTERIAL	40.00	25.00	22.50	15.00	
SUPER ST	PRE CAST BOX GIDER	-	-	-	
SUB ST	T-SHAPE CONCRETE PIER	-	-	-	
FOUNDATION	C CP PILE D=1200MM	-	-	-	
DIRECT CONSTRUCTION COST WITH ON/OFF RAMP (A)	875.629	84.208	68.109	48.298	
RELOCATION OF EXISTING UTILITIES (B)	87.563	8.421	6.811	4.830	10%OF (A)
PHYSICAL CONTENGENCY (C)	87.563	8.421	6.811	4.830	10%OF(A)
CONTRACTOR'S OVERHEAD AND PROFIT (D)	131.344	12.631	10.216	7.244	15%OF(A)
ENGINEERING SERVICE (E)	82.747	7.957	6.436	4564	7%OF (A+B+C+D)
TOTAL PROJECT COST (mill P/km)	1264.766	121.638	98.383	69.763	
TYPICAL CROSS SECTION					

TABLE 2.2
 R-7 EXPRESSWAY VIADUCT

TYPE	TYPE-5	TYPE-6	TYPE-7	TYPE-8
LOCATION	SKYWAY TO EDSA. QUEZON AV (AT STATION)	SKYWAY TO EDSA (STANDARD SECTION)	EDSA INTERSECTION (CROSS OVER LRT-3)	COMMON WEALTH AVENUE AND OHTERS
CARRIAGEWAY	EXPRESSWAY 25.00	25.00	20.00	25.00
	ARTERIAL 26.00	26.00	26.00	51.00
STRUCTURE	SUPER ST PRE CAST BOX GIRDER	PRE CAST BOX GIRDER	STEEL BOX GIRDER	PRE CAST BOX GIRDER
	SUB ST T-SHAPE CONCRETE	STEEL PORTAL PIER	T-SHAPE STEEL PIER	FLAERD TYPE CONCRETE PIER
	FOUNDATION CCP D=1500mm	CCP D=1500mm	CCP D=1500mm	CCP D=1200mm
DIRECT CONSTRUCTION COST WITH ON/OFF RAMP	1567.778	1567.778	21182.633	770.991
RELOCATION OF EXISTING UTILITIES COST	156.778	156.778	218.263	77.099
PHYSICAL CONTENGENCY	156.778	156.778	218.263	77.099
CONTRACTOR'S OVER HEAD AND PROFIT	235.167	335.167	327.394	115.648
ENGINEERING SERVICE	148.155	148.155	206.258	72.858
TOTAL PROJECT COST (millP/km)	2,264.6	2,264.6	3,152.8	1,113.6
TYPICAL CROSS SECTION				

NOTES
 PROJECT COSTS ABOVE DOES NOT INCLUDE COSTS OF RAILWAY STRUCTURES AND ARTEIAL STREETS.

Construction Direct Cost

TABLE 2.3
ALT-1 PC BOX GIRDER FOR EXPRESSWAY
(FLARED TYPE PIER)

Price Component	Unit	Quantity	Unit Rate	Cost Component			Total Cost (pesos)	Remarks
				Foreign	Local	Tax		
Structure Excavation	Cu.m	5,400	210	567,000	283,500	283,500	1,134,000	Common soil
Concrete								
Class P	Cu.m	13,823	22,500	108,856,125	149,288,400	52,872,975	311,017,500	Pc box girder
Class A-1	Cu.m		6,000	0	0	0	0	Deck slab
Class P-2	Cu.m	2,891	5,300	5,362,805	7,354,704	2,604,791	15,322,300	Pier head cln
Class A-2	Cu.m	3,600	4,000	5,040,000	6,912,000	2,448,000	14,400,000	Pile cap
Class A-3	Cu.m	700	4,500	1,102,500	1,512,000	535,500	3,150,000	Parapet curb
Reinforcing Bar	Kg.	2,606,385	35	41,050,564	40,138,329	10,034,582	91,223,475	
Pre-stressing Steel								
Longitude	Kg.	594,372	95	36,702,471	2,823,267	16,939,602	56,465,340	12T12.7
Transversal	Kg.	234,984	125	19,092,450	1,468,650	8,811,900	29,373,000	4T15.2
Expansion joint (A) Mov	l.m	625	10,800	5,062,500	877,500	810,000	6,750,000	Rubber joint
Expansion joint (B) Fix	l.m	625	6,600	3,093,750	536,250	495,000	4,125,000	Seal joint
Metaseall Bearing	Each	200	100,000	11,000,000	3,000,000	6,000,000	20,000,000	Rmax=350
Elastomeric Bearing Pad	Each		5,800	0	0	0	0	45*55*5
Pavement (wearing surface)	Ton	4,312	1,800	5,264,952	797,720	1,914,528	7,977,200	T=7.5 cm
PC I - Shape Girder1=30m	Each		290,000	0	0	0	0	
PC Square Pile 45 cm * 45 cm	l.m		3,800	0	0	0	0	
Concrete Bridge Railing	l.m	0	1,840	0	0	0	0	
CCp Pile d=120 cm	l.m	5,000	19,960	45,908,000	32,934,000	20,958,000	99,800,000	
Total Cost				288,103,117	247,926,320	124,708,378	660,737,815	
Percentage (%)				43.6	37.5	18.9		
Cost per Square meter							26,430	US\$ 660

TABLE 2.4
ALT - 2 PC BOX GIRDER + STEEL RIGID PORTAL FRAME PIER

Price Component	Unit	Quantity	Unit Rate	Cost Component			Total Cost (pesos)	Remarks
				Foreign	Local	Tax		
Structure Excavation	Cu.m	15,480	210	1,625,400	812,700	812,700	3,250,800	Common soil
Concrete								
Class P	Cu.m	13,823	22,500	108,856,125	149,288,400	52,872,975	311,017,500	Pc box girder
Class A-1	Cu.m		6,000	0	0	0	0	Deck slab
Class P-2	Cu.m		5,300	0	0	0	0	Pier head cln
Class A-2	Cu.m	5,400	4,000	7,560,000	10,368,000	3,672,000	21,600,000	Pile cap
Class A-3	Cu.m	700	4,500	1,102,500	1,512,000	535,500	3,150,000	Parapet curb
Reinforcing Bar	Kg.	2,246,260	35	35,378,595	34,592,404	8,648,101	78,619,100	
Pre-stressing Steel								
Longitude	Kg.	594,372	95	36,702,471	2,823,267	16,939,602	56,465,340	12T12.7
Transversal	Kg.	232,911	125	18,924,019	1,455,694	8,734,163	29,113,875	4T15.2
Expansion joint (A) Mov	l.m	625	10,800	5,062,500	877,500	810,000	6,750,000	Rubber joint
Expansion joint (B) Fix	l.m	625	6,600	3,093,750	536,250	495,000	4,125,000	Seal joint
Metal Bearing	Each	200	100,000	11,000,000	3,000,000	6,000,000	20,000,000	Rmax=350
Elastomeric Bearing Pad	Each		5,800	0	0	0	0	45*55*5
Pavement (wearing surface)	Ton	4,312	1,850	5,264,952	797,720	1,914,528	7,977,200	T=7.5 cm
PC I - Shape Girder1=30m	Each		290,000	0	0	0	0	
PC Square Pile 45 cm * 45 cm	l.m		3,800	0	0	0	0	
Concrete Bridge Railing	l.m	0	1,840	0	0	0	0	
Structure Steel	Ton	6,029	150,000	660,175,500	108,522,000	135,652,500	904,350,000	Portal frame
CCp Pile d=150 cm	l.m	5,000	24,272	55,825,600	40,048,800	25,485,600	121,360,000	
Total Cost				950,571,412	354,634,735	262,572,669	1,567,778,815	
Percentage (%)				60.6	22.6	16.7		
Cost per Square meter							62,711	US\$ 1557

TABLE 2.5
ALT - 3 STEEL BOX GIRDER + T-SHAPE STEEL SINGLE PIER

out put 1.0 km

Price Component	Unit	Quantity	Unit Rate	Cost Component			Total Cost (pesos)	Remarks
				Foreign	Local	Tax		
Structure Excavation	Cu.m	7,121	210	747,705	373,853	373,853	1,495,410	Common soil
Concrete								
Class P	Cu.m		22,500	0	0	0	0	Pc box girder
Class A-1	Cu.m	8,340	6,000	17,514,000	24,019,200	8,506,800	50,040,000	Deck slab
Class P-2	Cu.m		5,300	0	0	0	0	Pier head cln
Class A-2	Cu.m	4,968	4,000	6,955,200	9,538,560	3,378,240	19,872,000	Pile cap
Class A-3	Cu.m	1,100	4,500	1,732,500	2,376,000	841,500	4,950,000	Parapet curb
Reinforcing Bar	Kg.	1,545,180	35	24,336,585	23,795,772	5,948,943	54,081,300	
Pre-stressing Steel								
Longitude	Kg.		95	0	0	0	0	12T12.7
Transversal	Kg.		125	0	0	0	0	4T15.2
Expansion joint (A) Mov	l.m	625	10,800	5,062,500	877,500	810,000	6,750,000	Rubber joint
Expansion joint (B) Fix	l.m	625	6,600	3,093,750	536,250	495,000	4,125,000	Seal joint
Metal Bearing	Each	552	70,000	21,252,000	5,796,000	11,592,000	38,640,000	Rmax=350
Elastomeric Bearing Pad	Each		5,800	0	0	0	0	45*55*5
Pavement (wearing surface)	Ton	4,312	1,850	5,264,952	797,720	1,914,528	7,977,200	T=7.5 cm
PC I - Shape Girder1=30m	Each		290,000	0	0	0	0	
PC Square Pile 45 cm * 45 cm	l.m		3,800	0	0	0	0	
Concrete Bridge Railing	l.m		1,840	0	0	0	0	
Structure Steel	Ton	12,001	150,000	1,314,109,500	216,018,000	270,022,500	1,800,150,000	Portal frame
CCp Pile d=150 cm	l.m	5,280	36,847	89,493,994	64,202,213	40,855,954	194,552,160	
Total Cost				1,489,562,686	348,331,068	344,739,318	2,182,633,070	
Percentage (%)				68.2	16.0	15.8		
Cost per Square meter							87,305	US\$ 2182

TABLE 2.6
ALT-4 PC BOX GIRDER FOR RAILWAY VIADUCT
(STANDARD HEIGHT H=9M)

Price Component	Unit	Quantity	Unit Rate	Cost Component			Total Cost (pesos)	Remarks
				Foreign	Local	Tax		
Structure Excavation	Cu.m	4,292	210	450,660	225,330	225,330	901,320	Common soil
Concrete								
Class P	Cu.m	5,433	22,500	42,784,875	58,676,400	20,781,225	122,242,500	Pc box girder
Class A-1	Cu.m		6,000	0	0	0	0	Deck slab
Class P-2	Cu.m	2,825	5,300	5,240,375	7,186,800	2,545,325	14,972,500	Pier head cln
Class A-2	Cu.m	1,997	4,000	2,795,800	3,834,240	1,357,960	7,988,000	Pile cap
Class A-3	Cu.m	400	4,500	630,000	864,000	306,000	1,800,000	Parapet curb
Reinforcing Bar	Kg.	1,427,733	35	22,486,795	21,987,088	5,496,772	49,970,655	
Pre-stressing Steel								
Longitude	Kg.	380,333	95	23,485,563	1,806,582	10,839,491	36,131,635	12T12.7
Transversal	Kg.	73,350	125	5,959,688	458,438	2,750,625	9,168,750	4T15.2
Expansion joint (A) Mov	l.m		10,800	0	0	0	0	Rubber joint
Expansion joint (B) Fix	l.m	338	6,600	1,673,100	290,004	267,696	2,230,800	Seal joint
Metal Bearing	Each	132	100,000	7,260,000	1,980,000	3,960,000	13,200,000	Rmax=350
Elastomeric Bearing Pad	Each		5,800	0	0	0	0	45*55*5
Pavement (wearing surface)	Ton		1,850	0	0	0	0	T=7.5 cm
PC I - Shape Girder1=30m	Each		290,000	0	0	0	0	
PC Square Pile 45 cm * 45 cm	l.m		3,800	0	0	0	0	
Concrete Bridge Railing	l.m		1,840	0	0	0	0	
Structure Steel	Ton		150,000	0	0	0	0	Portal frame
CCp Pile d=120 cm	l.m	5,280	19,920	48,381,696	34,708,608	22,087,296	105,177,600	
Total Cost				161,148,552	132,017,490	70,617,720	363,783,760	
Percentage (%)				44.3	36.3	19.4		
Cost per Square meter							34,646	US\$ 866

Bridge Width: 10.5m

TABLE 2.7
STANDARD BRIDGE - 1 SPAN = 30M
(SUPER + SUB STRUCTURE)

out put 30m

Price Component	Unit	Quantity	Unit Rate	Cost Component			Total Cost (pesos)	Remarks
				Foreign	Local	Tax		
Structure Excavation	Cu.m	2,056	210	215,880	107,940	107,940	431,760	Common soil
Concrete								
Class P	Cu.m		22,500	0	0	0	0	Pc box girder
Class A-1	Cu.m	223	6,000	401,400	936,600	227,460	1,338,000	Deck slab
Class P-2	Cu.m	460	5,300	731,400	1,706,600	414,460	2,438,000	Pier head cln
Class A-2	Cu.m	384	4,000	460,800	1,075,200	261,120	1,536,000	Pile cap
Class A-3	Cu.m	17	4,500	27,540	48,960	13,005	76,500	Parapet curb
Reinforcing Bar	Kg.	129,084	35	2,033,073	1,987,894	496,973	4,517,940	
Pre-stressing Steel								
Longitude	Kg.		95	0	0	0	0	12T12.7
Transversal	Kg.		125	0	0	0	0	4T15.2
Expansion joint (A) Mov	l.m	25	7,800	146,250	25,350	23,400	195,000	Rubber joint
Expansion joint (B) Fix	l.m	25	3,300	61,875	10,725	9,900	82,500	Seal joint
Metal Bearing	Each	0	100,000	0	0	0	0	Rmax=350
Elastomeric Bearing Pad	Each	24	5,800	27,840	97,440	13,920	139,200	45*55*5
Pavement (wearing surface)	Ton	129	1,850	157,509	23,865	57,276	238,650	T=7.5 cm
PC I - Shape Girder1=30m	Each	12	454,500	2,454,300	1,908,900	1,090,800	5,454,000	
PC Square Pile 45 cm * 45 cm	l.m	1,600	3,800	2,796,800	2,006,400	1,276,800	6,080,000	
Concrete Bridge Railing	l.m	120	1,840	72,864	121,440	26,496	220,800	
Structure Steel	Ton		150,000	0	0	0	0	Portal frame
CCp Pile d=120 cm	l.m		19,920	0	0	0	0	
Total Cost				9,587,531	10,057,314	4,019,550	22,748,350	
Percentage (%)				42.1	44.2	17.7		
Cost per Square meter							30,331	US\$ 758

TABLE 2.8
STANDARD BRIDGE - 2 SPAN = 35+40+35
(SUPER + SUB STRUCTURE)

out put 111

Price Component	Unit	Quantity	Unit Rate	Cost Component			Total Cost (pesos)	Remarks
				Foreign	Local	Tax		
Structure Excavation		2,056	210	215,880	107,940	107,940	431,760	Common soil
Structure Ex in Water	Cu.m	720	700	252,000	126,000	126,000	504,000	
Cofferdam	Ea	4	2,500,000	5,000,000	2,500,000	2,500,000	10,000,000	
Concrete								
Class P	Cu.m	0	22,500	0	0	0	0	Pc box girder
Class A-1	Cu.m	0	6,000	0	0	0	0	Deck slab
Class P-2	Cu.m	1,221	5,300	1,941,390	4,529,910	1,100,121	6,471,300	Pier head cln
Class A-2	Cu.m	450	4,000	540,000	1,260,000	306,000	1,800,000	Pile cap
Class A-3	Cu.m	61	4,500	98,820	175,680	46,665	274,500	Parapet curb
Reinforcing Bar	Kg.	386,896	35	6,093,612	5,958,198	1,489,550	13,541,360	
Pre-stressing Steel								
Longitude	Kg.	0	95	0	0	0	0	12T12.7
Transversal	Kg.	0	125	0	0	0	0	4T15.2
Expansion joint (A) Mov	l.m	75	7,800	438,750	76,050	70,200	585,000	Rubber joint
Expansion joint (B) Fix	l.m	75	3,300	185,625	32,175	29,700	247,500	Seal joint
Metal Bearing	Each	0	100,000	0	0	0	0	Rmax=350
Elastomeric Bearing Pad	Each	36	5,800	41,760	146,160	20,880	208,800	45*55*5
Pavement (wearing surface)	Ton	478	1,850	583,638	88,430	212,232	884,300	T=7.5 cm
PC I - Shape Girder1=30m	Each	0	454,500	0	0	0	0	
PC I - Shape Girder1=35m	Each	24	500,000	5,400,000	4,200,000	2,400,000	12,000,000	
PC I - Shape Girder1=40m	Each	12	600,000	3,240,000	2,520,000	1,440,000	7,200,000	
PC Square Pile 45 cm * 45 cm	l.m	3,600	3,800	6,292,800	4,514,400	2,872,800	13,680,000	
Concrete Bridge Railing	l.m	440	1,840	267,168	445,280	97,152	809,600	
Structure Steel	Ton		150,000	0	0	0	0	Portal frame
CCp Pile d=120 cm	l.m		19,920	0	0	0	0	
Total Cost				30,591,443	26,680,223	12,819,240	68,638,120	
Percentage (%)				44.6	38.9	18.7		
Cost per Square meter							24,734	US\$ 530

**TABLE 2.9
 AT GRADE SECTION
 (PRIMARY ARTERIAL STREET)**

Price Component	Unit	Quantity	Unit Rate	Cost Component			Total Cost (pesos)	Remarks
				Foreign	Local	Tax		
Clearing and Grubbing	Sq.m	40,000	4	96,000	16,000	48,000	160,000	
Common Excavation	Cu,m	51,000	140	4,284,000	714,000	2,142,000	7,140,000	
Hollow Material	Cu,m	51,000	450	9,180,000	8,262,000	5,508,000	22,950,000	
Sub Grade Preparation	Cu,m	34,000	13	287,300	30,940	123,760	442,000	
Concrete Pavement	Sq,m	25,000	800	8,000,000	9,000,000	3,000,000	20,000,000	
Aggregate Base Course	Cu,m	6,800	650	2,652,000	574,600	1,193,400	4,420,000	
Aggregate Sub Base Course	Cu,m	10,200	500	2,958,000	714,000	1,428,000	5,100,000	
RCRC 1.0m dia.	l.m	2,000	2,920	2,320,000	2,494,000	986,000	5,800,000	
Catch Basin 1.2m	Each	40	18,000	259,200	338,400	122,400	720,000	
Lighting Pole	Each	50	70,000	2,100,000	840,000	560,000	3,500,000	
Vehicle Guard Rail	l.m	2,000	1,300	572,000	1,664,000	364,000	2,600,000	
Concrete Curb and Gutter	l.m	4,000	920	920,000	2,208,000	552,000	3,680,000	
Concrete Block	Sq,m	4,000	1,50	1,500,000	3,600,000	900,000	6,000,000	
Concrete Curb and Gutter	l.m	2,000	470	253,800	526,400	159,800	940,000	
Sub Total				35,382,300	30,982,340	17,087,360	83,452,000	
Miscellaneous 25% of above				8,845,575	7,745,585	4,271,840	20,863,000	
Total Cost				44,227,875	38,727,925	21,359,200	104,315,000	
Percentage				42.4	37.1	20.5		
Per Square meter							3,068.1	US\$ 77

**TABLE 2.10
 PC BOX GIRDER FOR EXPRESSWAY
 (T-SHAPE CONCRETE PIER)**

Price Component	Unit	Quantity	Unit Rate	Cost Component			Total Cost (pesos)	Remarks
				Foreign	Local	Tax		
Structure Excavation		7,478	210	785,190	392,595	392,595	1,570,380	Common soil
Structure Ex in Water	Cu,m	0	700	0	0	0	0	
Cofferdam	Ea	0	2,500,000	0	0	0	0	
Concrete								
Class P	Cu,m	13,823	22,500	108,856,125	149,288,400	52,872,975	311,017,500	Pc box girder
Class A-1	Cu,m	0	6,000	0	0	0	0	Deck slab
Class P-2	Cu,m	4,891	5,300	7,776,690	18,145,610	4,406,791	25,922,300	Pier head cln
Class A-2	Cu,m	4,696	4,000	5,635,200	13,148,800	3,193,280	18,784,000	Pile cap
Class A-3	Cu,m	700	4,500	1,134,000	2,016,000	535,500	3,150,000	Parapet curb
Reinforcing Bar	Kg.	2,856,520	35	44,990,190	43,990,408	10,997,602	99,978,200	
Pre-stressing Steel								
Longitude	Kg.	768,312	95	47,443,266	3,649,482	21,896,892	72,989,640	12T12.7
Transversal	Kg.	234,984	125	19,092,450	1,468,650	8,811,900	29,373,000	4T15.2
Expansion joint (A) Mov	l.m	625	10,800	5,062,500	877,500	810,000	6,750,000	Rubber joint
Expansion joint (B) Fix	l.m	625	6,600	3,093,750	536,250	495,000	4,125,000	Seal joint
Metal Bearing	Each	200	100,000	11,000,000	3,000,000	6,000,000	20,000,000	Rmax=350
Elastomeric Bearing Pad	Each	0	5,800	0	0	0	0	45*55*5
Pavement (wearing surface)	Ton	4,312	1,850	5,264,952	797,720	1,914,528	7,977,200	T=7.5 cm
PC I - Shape Girder1=30m	Each	0	454,500	0	0	0	0	
PC I - Shape Girder1=35m	Each	0	500,000	0	0	0	0	
PC I - Shape Girder1=40m	Each	0	600,000	0	0	0	0	
PC Square Pile 45 cm * 45 cm	l.m	0	3,800	0	0	0	0	
Concrete Bridge Railing	l.m	1,000	1,840	607,200	1,012,000	220,800	1,840,000	
Structure Steel	Ton	0	150,000	0	0	0	0	
CCp Pile d=120 cm	l.m	5,200	24,272	58,058,624	41,650,752	26,505,024	126,214,400	
Total Cost				318,800,137	279,974,167	139,052,887	729,691,620	
Percentage (%)				43.7	38.4	19.1		
Cost per Square meter							262,952	US\$ 530

TABLE 2.11
UNIT PRICE ANALYSIS FOR CCP PILE D=120CM

Price Component	Unit	Quantity	Unit Rate	Cost Component	
				Foreign	Local
A. Equipment					
Boring Machine 150cm	Hr	7.0	5,120	23,296	12,544
Hydraulic Crane 7.9t	Hr	7.0	870	3,959	2,132
Dump Truck 7.8t	Hr	7.0	674	3,067	1,651
Bentnite Set	Hr	7.0	400	1,820	980
Total: A				32,142	17,307
B. Labor					
Forman	Hr	10	65	0	520
Skilled Labor	Hr	20	52	0	1,040
Unskilled Labor	Hr	38	31	0	1,178
Total: B					2,738
Total: A+B				32,142	20,045
C. Out Put					
	L.m / Hr				10
D. Unit Cost (A+B)/C					
	P / L.m			3,214	2,005
E. Material					
Reinforcement	Kg	293	35	5,640	4,615
Structure Concrete Class	Cum	1.23	1,800	1,218	996
Miscellaneous 10% of Above				686	561
Total: E				7,544	6,172
F. Estimated Direct Cost					
Total: D+E	P / L.m			10,758	8,177

TABLE 2.12
UNIT PRICE ANALYSIS FOR CCP PILE D=150CM

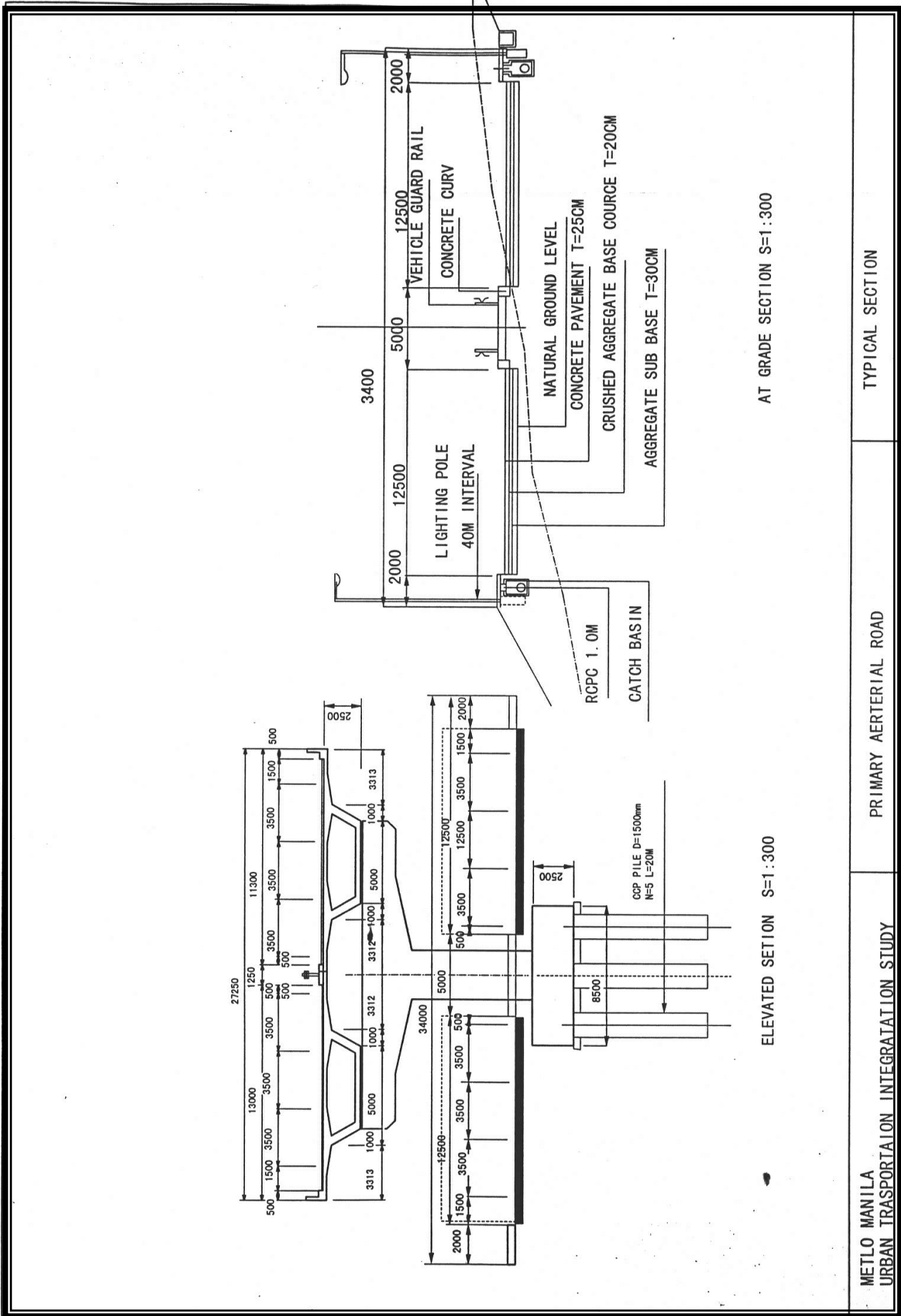
Price Component	Unit	Quantity	Unit Rate	Cost Component	
				Foreign	Local
A. Equipment					
Boring Machine 150cm	Hr	8.0	7,000	36,400	19,600
Hydraulic Crane 7.9t	Hr	8.0	1,130	5,876	3,164
Dump Truck 7.8t	Hr	8.0	876	4,555	2,453
Bentnite Set	Hr	8.0	520	2,704	1,456
Total: A				49,535	26,673
B. Labor					
Forman	Hr	12	65	0	624
Skilled Labor	Hr	24	52	0	1,248
Unskilled Labor	Hr	48	31	0	1,488
Total: B					3,360
Total: A+B				49,535	30,033
C. Out Put					
	L.m / Hr				10
D. Unit Cost (A+B)/C					
	P / L.m			4,954	3,003
E. Material					
Reinforcement	Kg	324	35	6,237	5,103
Structure Concrete Class	Cum	1.94	1,800	1,921	1,571
Miscellaneous 10% of Above				816	667
Total: E				8,974	7,341
F. Estimated Direct Cost					
Total: D+E	P / L.m			13,928	10,344

TABLE 2.13
UNIT PRICE ANALYSIS

Price Component	Unit	Quantity	Unit Rate	Cost Component	
				Foreign	Local
A. Equipment					
Boring Machine 150cm	Hr	10.0	7,000	45,500	24,500
Hydraulic Crane 7.9t	Hr	10.0	1,130	7,345	3,955
Dump Truck 7.8t	Hr	10.0	870	5,694	3,066
Bentnite Set	Hr	10.0	520	3,380	1,820
Total: A				61,919	33,341
B. Labor					
Forman	Hr	15	65	0	780
Skilled Labor	Hr	31	52	0	1,612
Unskilled Labor	Hr	62	31	0	1,922
Total: B					4,314
Total: A+B				61,919	37,655
C. Out Put					
	L.m / Hr				10
D. Unit Cost (A+B)/C					
	P / L.m			6,192	3,766
E. Material					
Reinforcement	Kg	474	35	9,125	7,466
Structure Concrete Class	Cum	2.79	1,800	2,762	2,260
Miscellaneous 10% of Above				1,189	973
Total: E				13,076	10,699
F. Estimated Direct Cost					
Total: D+E	P / L.m			19,268	14,465

12 Retaining Wall Reinforced Earth H=3m

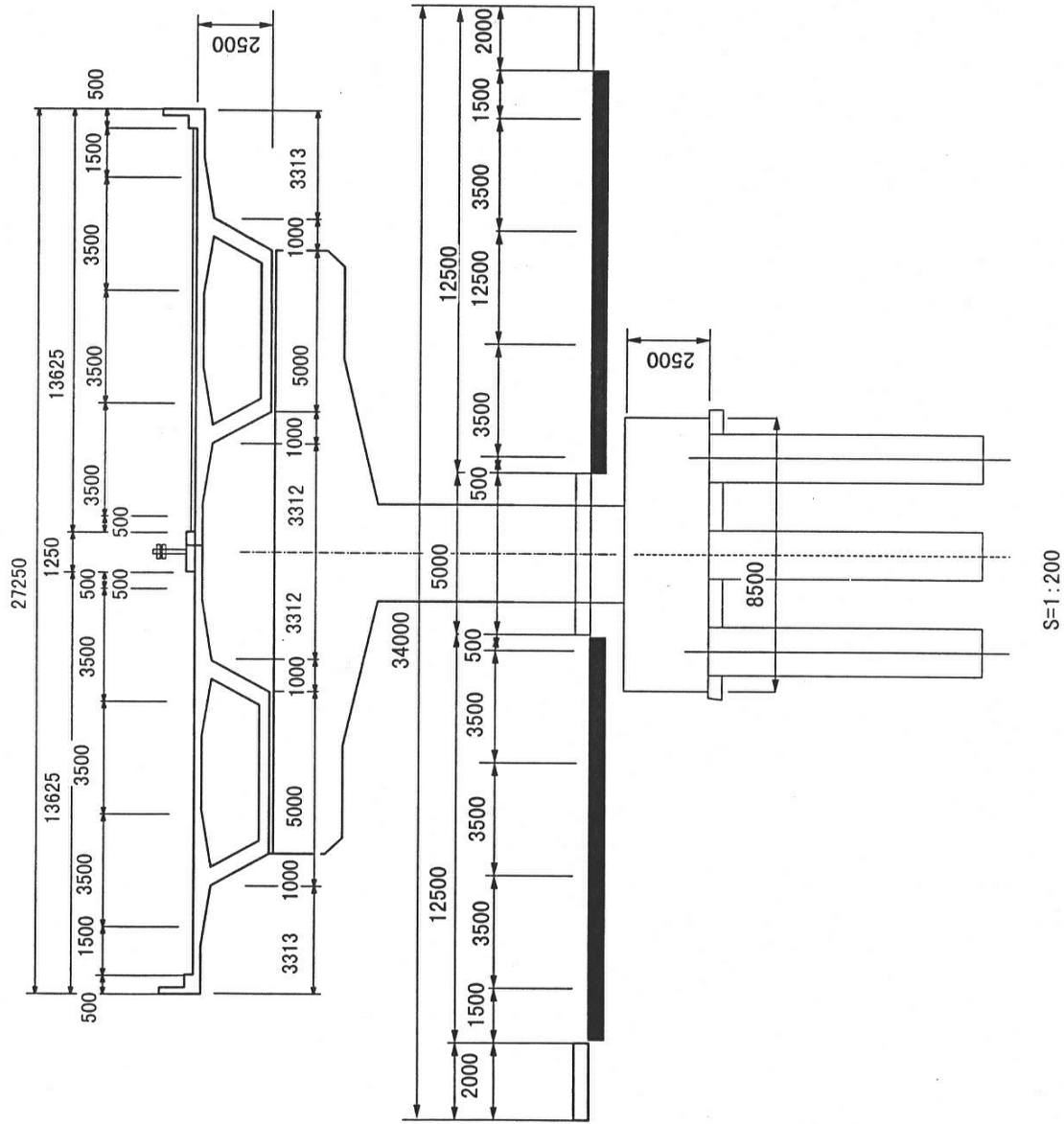
Re-wall	H	L	Area	Unit Cost	Cost/100m
	3	100	600	6000	3,600,000



TYPICAL SECTION

PRIMARY ARTERIAL ROAD

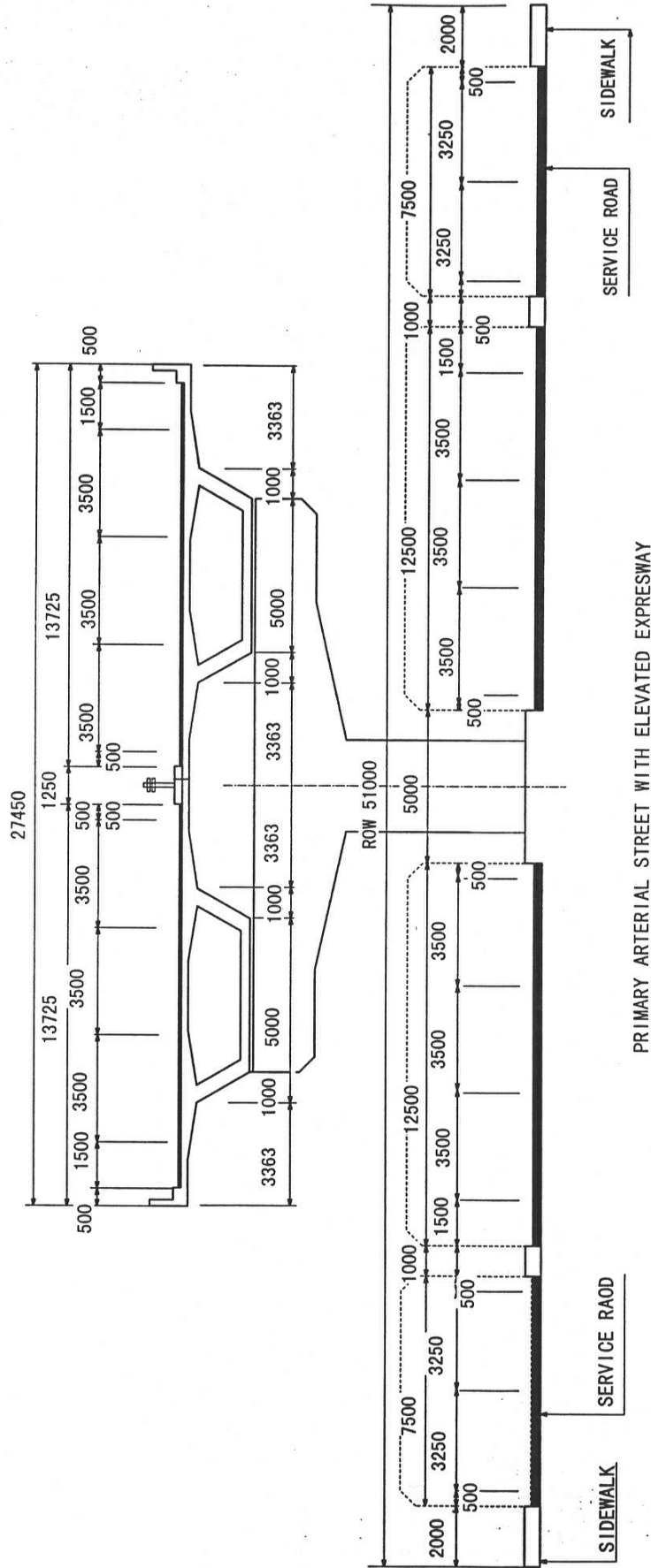
METRO MANILA URBAN TRANSPORTATION INTEGRATION STUDY



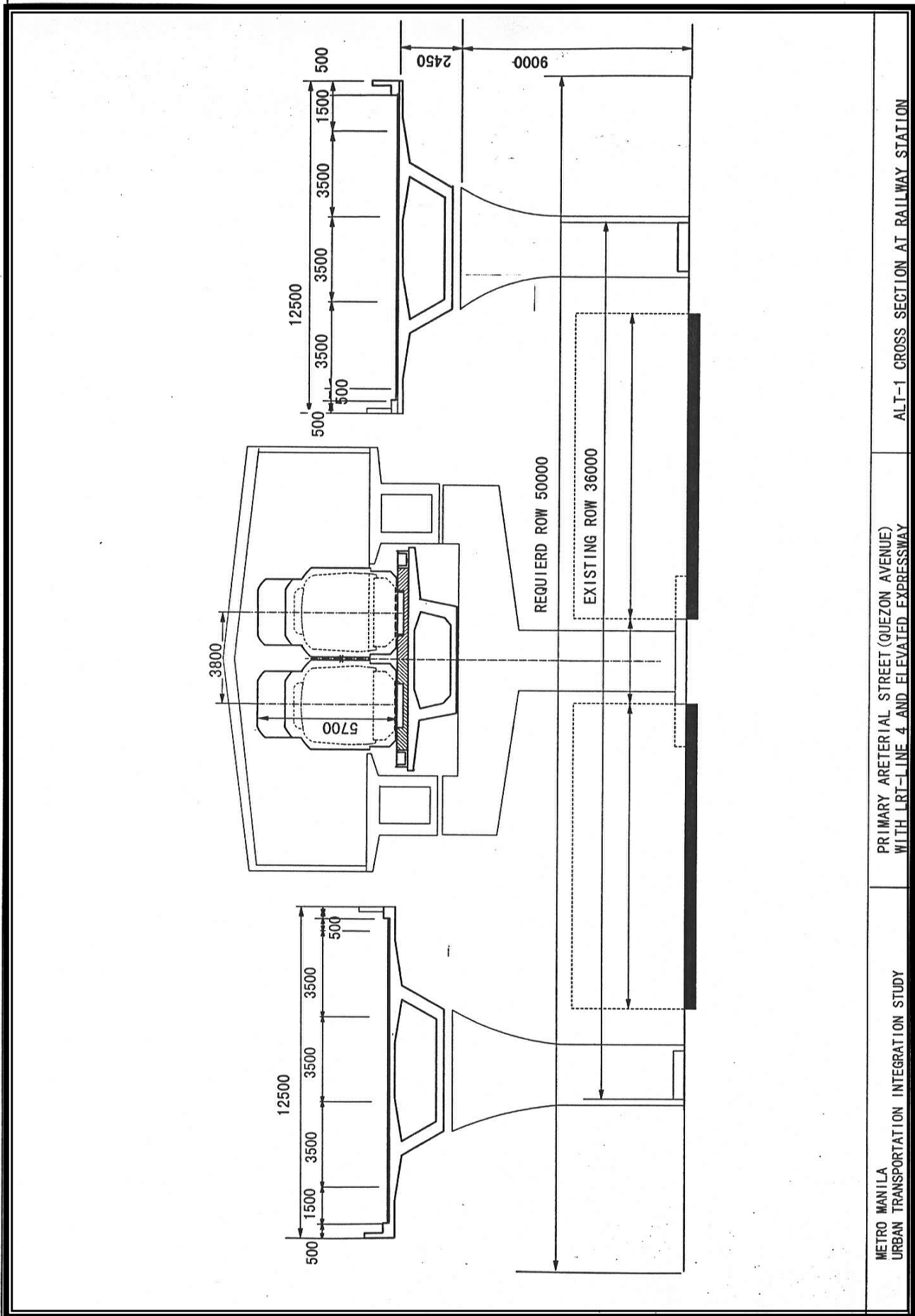
BOX GIRDER WITH T-SHAPE CONCRETE PIER

PRIMARY ARTERIAL RRD

METRO MANILA
 URBAN TRANSPORTATION INTEGRATION STUDY



PRIMARY ARTERIAL STREET WITH ELEVATED EXPRESSWAY



ALT-1 CROSS SECTION AT RAILWAY STATION

PRIMARY ARTERIAL STREET (QUEZON AVENUE)
 WITH LRT-LINE 4 AND ELEVATED EXPRESSWAY

METRO MANILA
 URBAN TRANSPORTATION INTEGRATION STUDY