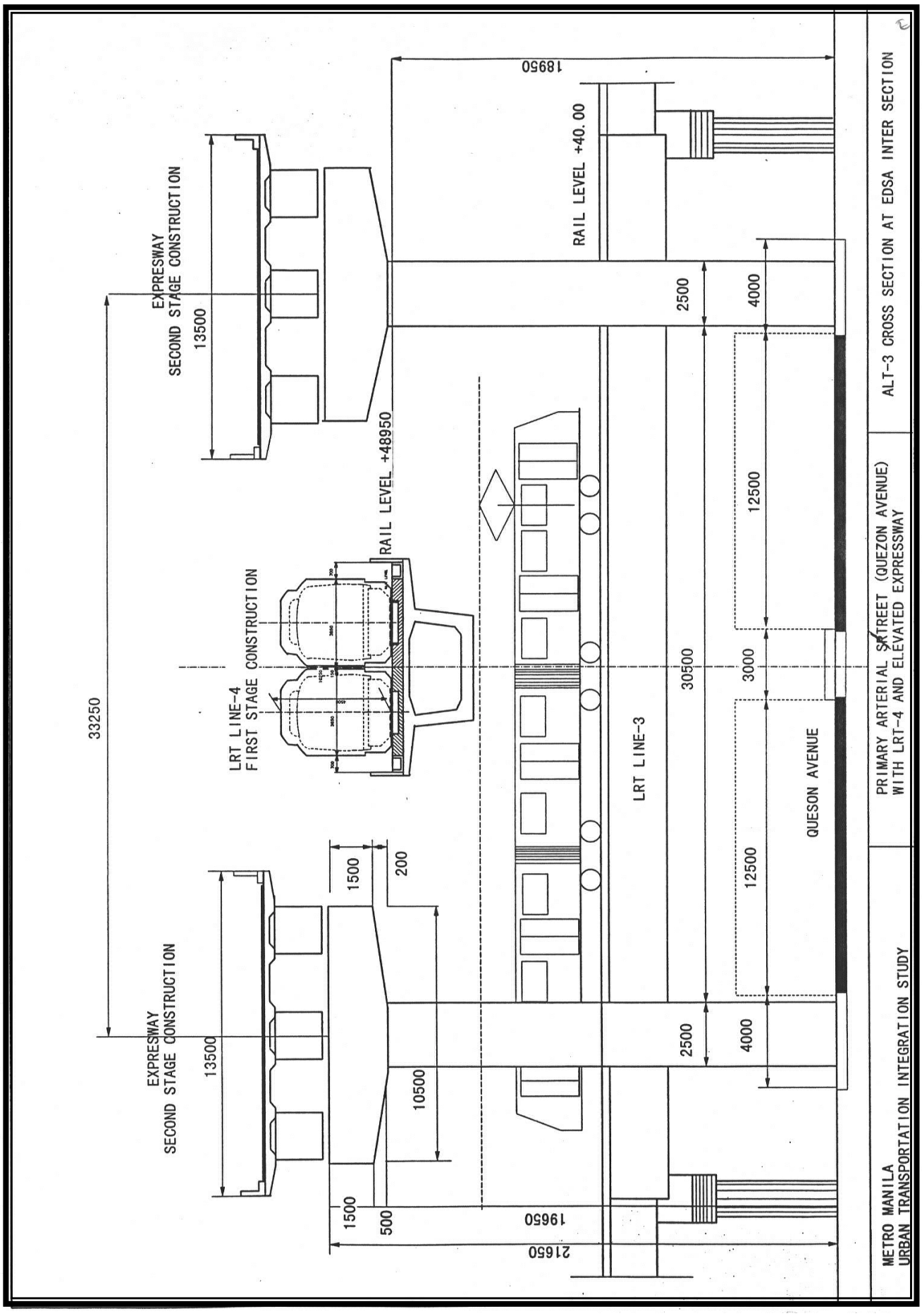
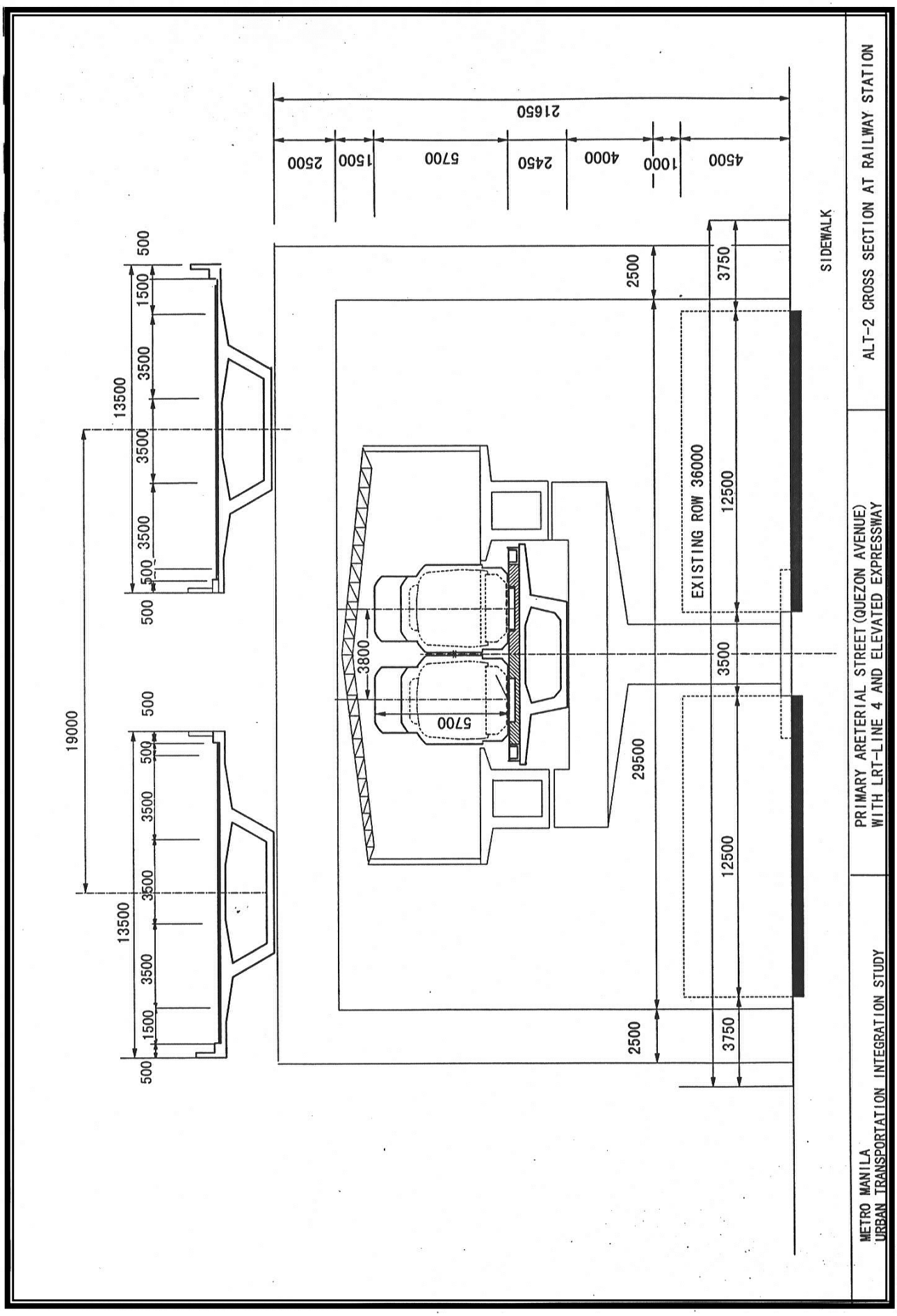
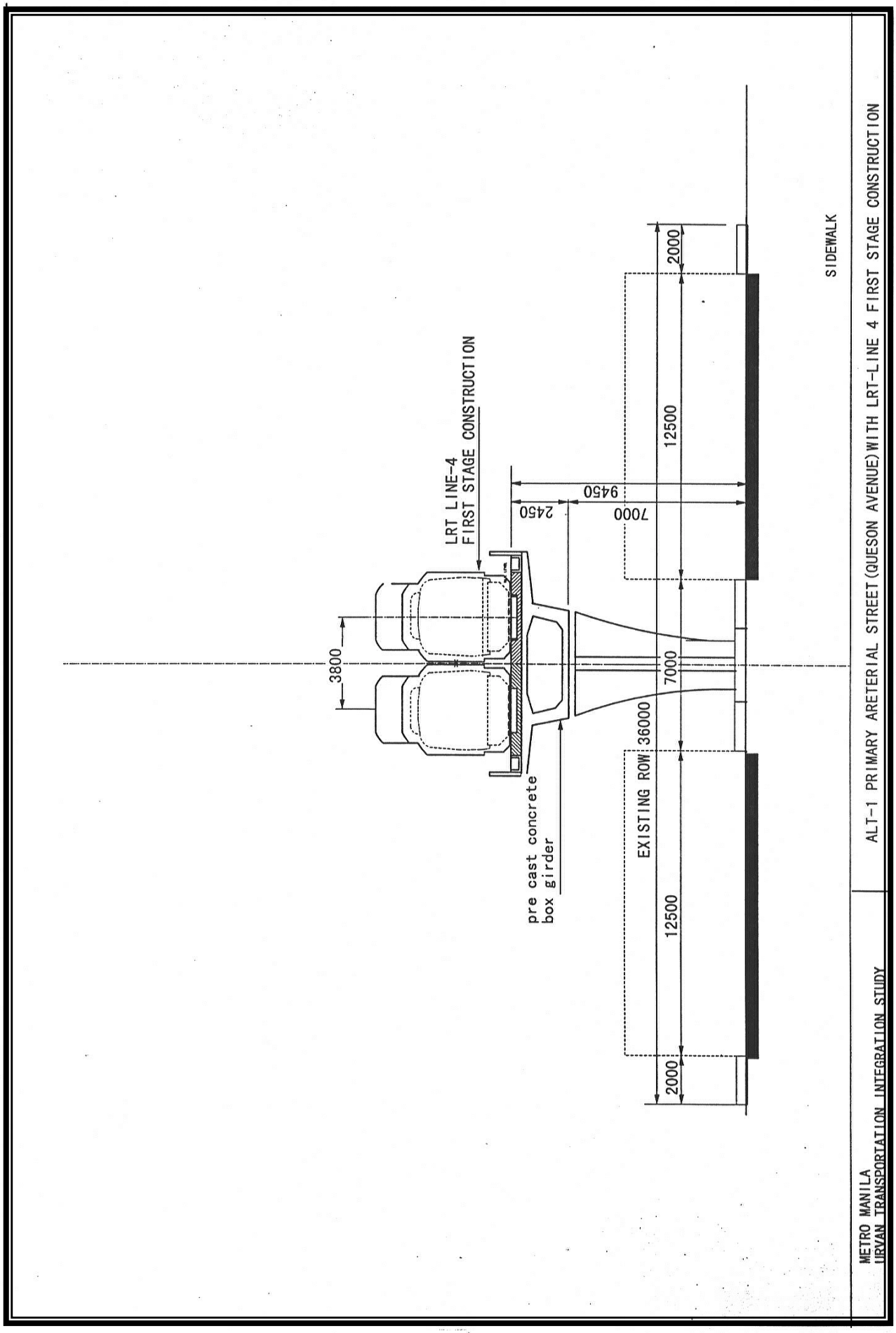
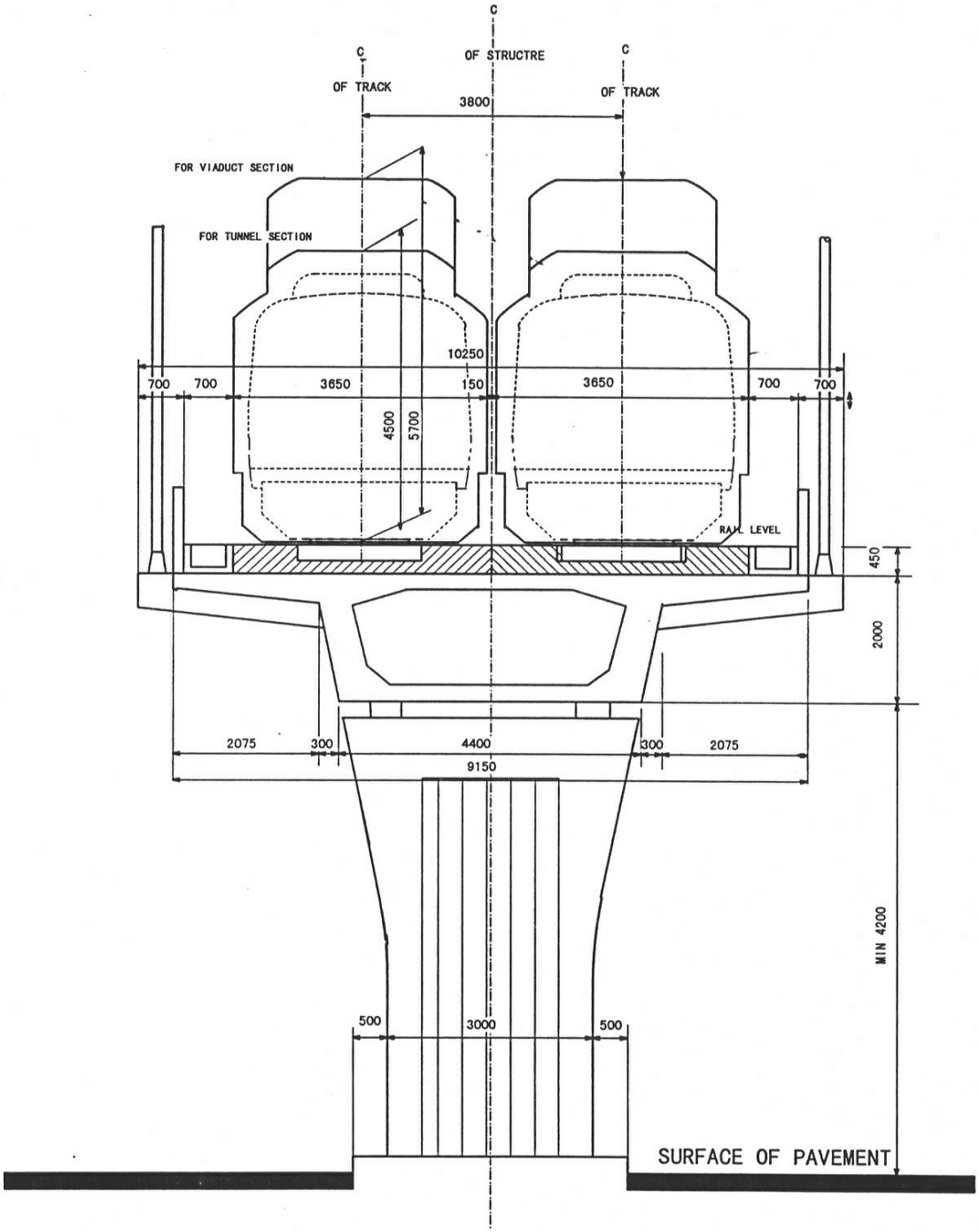
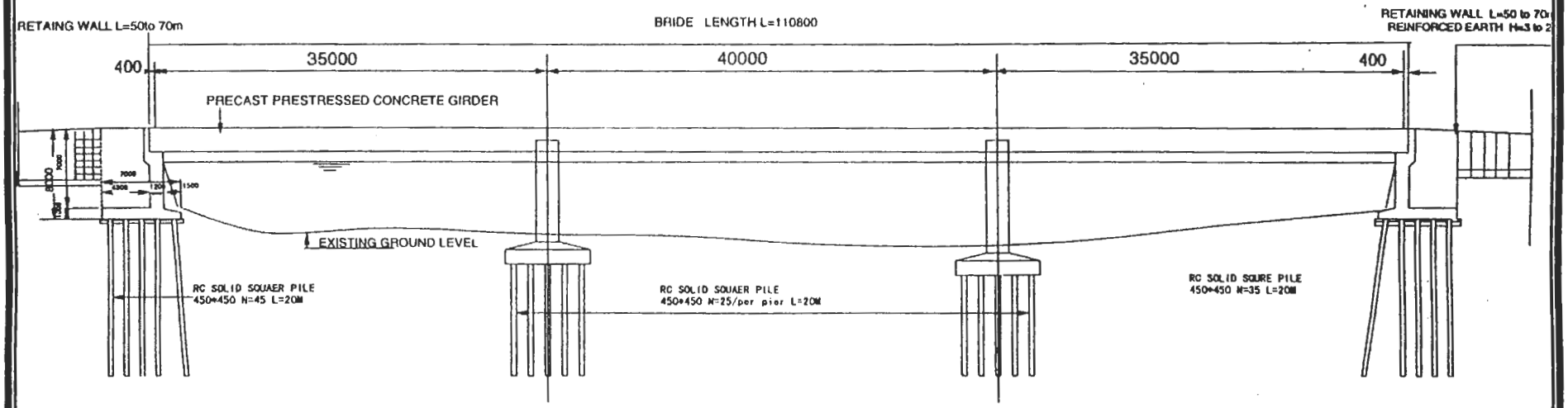

ALT-3 CROSS SECTION AT EDSA INTER SECTION
PRIMARY ARTERIAL STREET (QUEZON AVENUE)
WITH LRT-4 AND ELEVATED EXPRESSWAY
METRO MANILA
URBAN TRANSPORTATION INTEGRATION STUDY
18950
RAIL LEVEL +40.00
RAIL LEVEL +48950
EXPRESWAY
SECOND STAGE CONSTRUCTION
13500
LRT LINE-4
FIRST STAGE CONSTRUCTION
LRT LINE-3
QUESON AVENUE
33250
30500
2500
4000
12500
3000
1500
200
10500
500
19650
21650


METRO MANILA
URBAN TRANSPORTATION INTEGRATION STUDY
PRIMARY ARETERIAL STREET (QUEZON AVENUE)
WITH LRT-LINE 4 AND ELEVATED EXPRESSWAY
ALT-2 CROSS SECTION AT RAILWAY STATION
SIDEWALK
EXISTING ROW 36000
21650
4500
1000
4000
2450
5700
1500
2500
19000
13500
29500
12500
3750
2500
3800
500
1500
3500

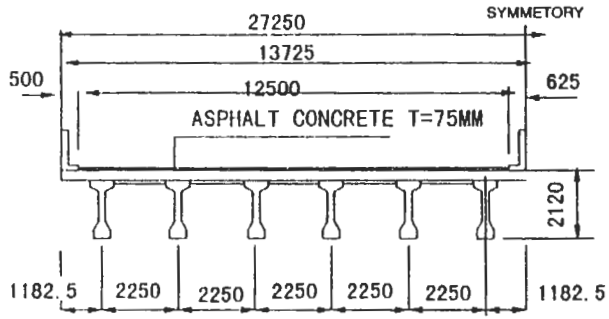

METRO MANILA
URVAN TRANSPORTATION INTEGRATION STUDY
ALT-1 PRIMARY ARETERIAL STREET (QUESON AVENUE) WITH LRT-LINE 4 FIRST STAGE CONSTRUCTION
SIDEWALK
LRT LINE-4
FIRST STAGE CONSTRUCTION
pre cast concrete
box girder
EXISTING ROW: 36000
2000
12500
7000
12500
2000
3800
2450
7000
9450



METRO MANIRA URBAN TRANSPORTATION INTEGRATION STUDY	FIGURE-1 RAILWAY VIADUCT CROSS SECTION

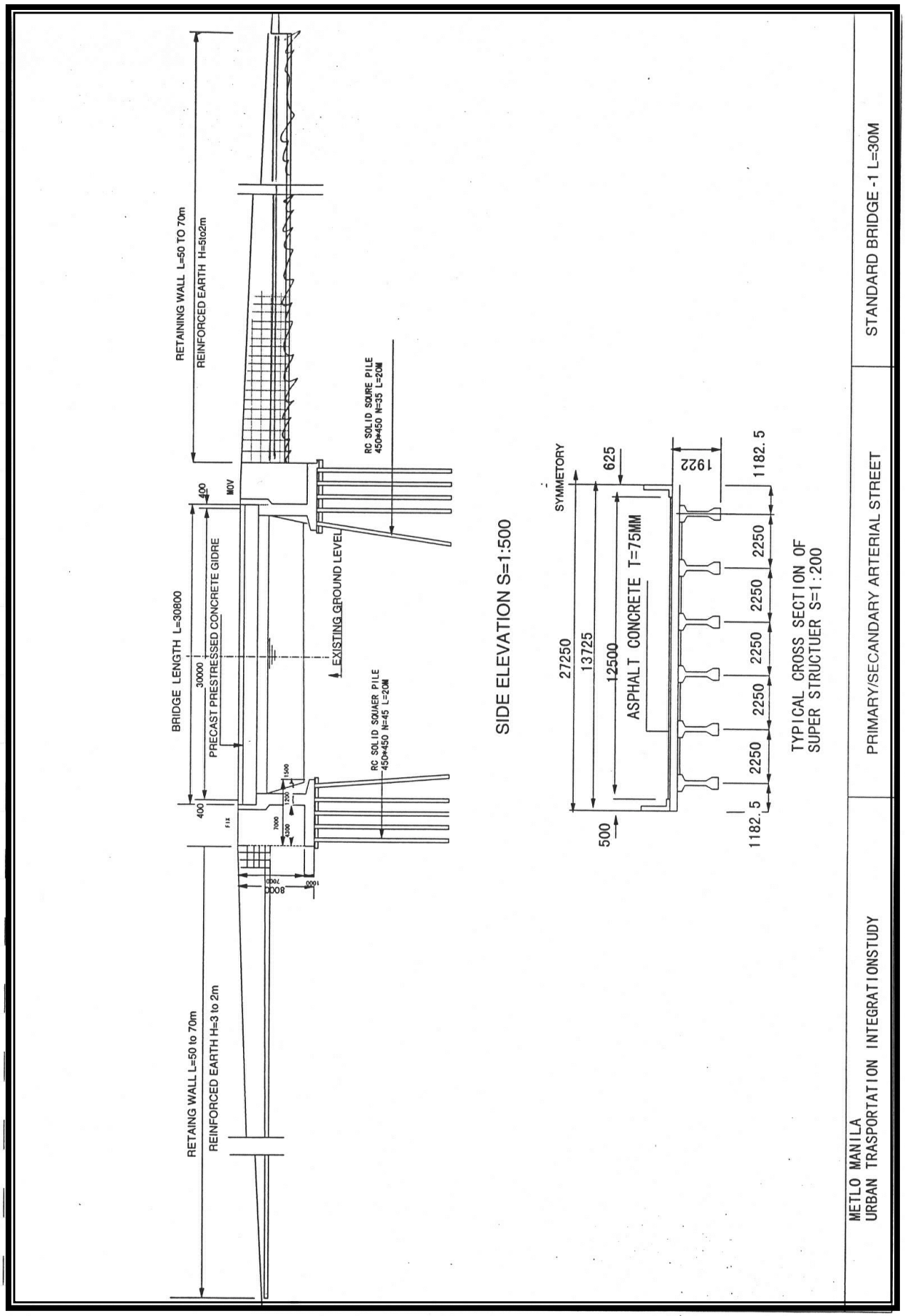


SIDE ELEVATION S=1:500



TYPICAL CROSS SECTION OF
SUPER STRUCTUER S=1:200

METLO MANILA URBAN TRASPORTATION INTEGRATIONSTUDY	PRIMARY AERTERIAL STREET	STANDARD BRIDGE -2 L=110m


RETAINING WALL L=50 TO 70m
REINFORCED EARTH H=5to2m
BRIDGE LENGTH L=30800
30000
400
400
MOV
PRECAST PRESTRESSED CONCRETE GIDRE
EXISTING GROUND LEVEL
RC SOLID SQURE PILE 450*450 N=35 L=20M
RC SOLID SQUAER PILE 450*450 N=45 L=20M
RETAING WALL L=50 to 70m
REINFORCED EARTH H=3 to 2m
SIDE ELEVATION S=1:500
SYMMETORY
27250
13725
12500
625
1922
1182.5
ASPHALT CONCRETE T=75MM
2250
2250
2250
2250
2250
500
1182.5
TYPICAL CROSS SECTION OF
SUPER STRUCTUER S=1:200
METLO MANILA
URBAN TRASPORTATION INTEGRATIONSTUDY
PRIMARY/SECANDARY ARTERIAL STREET
STANDARD BRIDGE -1 L=30M

3. STRUCTURAL DESIGN CODES AND STANDARD

3.1 General

Structural Design shall be in accordance with the following documents.

- Standard Specifications for Highway Bridges. 16th Edition 1996 AASHTO
- Design Guideline Criteria and Standard 1983 DPWH
- An Advisory for Seismic Design of Bridges Department Order No. 75 1992 DPWH

For any design aspects not specifically covered by the code and standards reference shall be made to either of the followings

– Specifications for Road Bridges, Volume I to V 1996, Japan Road Association.

Design of reinforced concrete members shall be based on STRENGTH DESIGN METHOD which has been used for most similar project in the Philippines. Design of pre-stressed concrete members shall be based on STRENGTH DESIGN METHOD (Load Factor Design) and on behavior at service conditions at all load stages such as at transfer of pre-stressing.

3.2 Loading Specifications

3.2.1 Dead Loads

A) Unit Weight of Materials

The Unit weight of materials specified in clause 3.3.6 of AASHTO 1996 may be used for the calculation of dead load

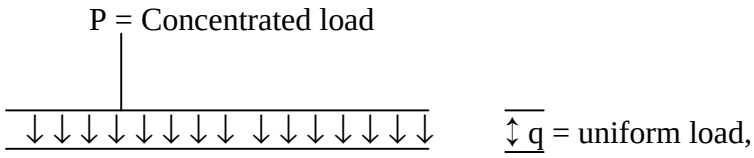
Material	Specified Unit Weight (kN/M^3)
Steel of cast steel	78.5
Cast Iron	72.2
Aluminum Alloy	28.1
Timber hard wood	8.0
Concrete, plain or reinforced	24.0
Compacted sand earth, gravel	19.3
Loose sand	16.0
Bituminous wearing surface	22.0
Concrete (Asphalt)	22.0
Stone Masonry	23.5

3.2.2 Standard Truck and Lane Loads

The highway live loading shall be HS-20-44

1) Lane Loading

(a) Uniform Load per liner meter of load



q = 9.34 KN/lane = 3.06 kN/m2

Lane width = 3.048 m

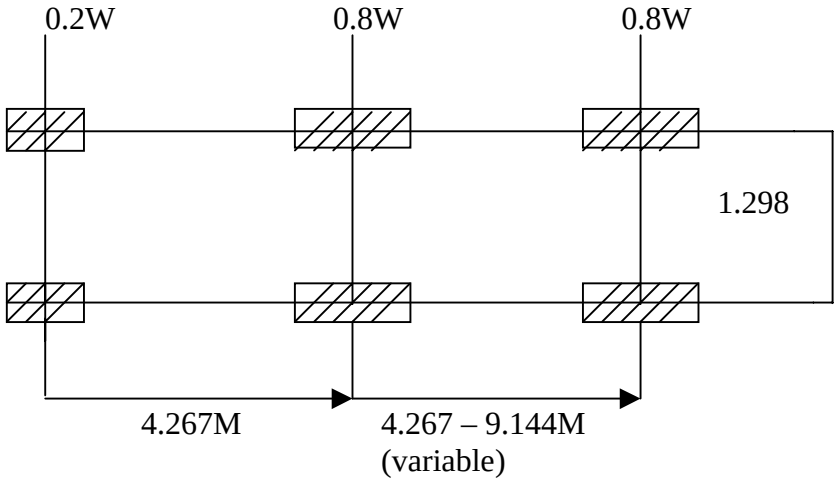
(b) Concentrated load (P)

P = 80.06 kN for moment
P = 115.65 kN for shear

The concentrated load and uniform load shall be placed us uniformally distributed over 10 – foot width of the lane. In case of continuos spans. Two concentrated loads shall be placed on the spans to produce maximum stress.

2) Truck Loading

Truck loading is a single heavy vehicle with three axles total weight w = 352.8 kN as shown below. Which shall be applied in any position in a design traffic lane.



3) Reduction of Load Intensity

The following percentage of reduction for line load intensity shall be applied taken in to account the improbability of coincident maximum loading.

	Percent (%)
One of two lanes	100
Three lanes	90
Four lanes or more	75

3.2.3 Impact Load

Impact fraction $\longrightarrow$ $I = \frac{15.24}{L+38} < 0.3$

In which
L: Span Length in meter.

3.2.4 Longitudinal Forces

The effect of a longitudinal force of 5 percent of line load (HS-20-44) without impact in all lanes. Longitudinal forces apply 1.8 m above the deck slab

3.2.5 Centrifugal Forces

One standard truck on each design traffic lane shall be considered for calculation of centrifugal force

$$C = \frac{0.79\ S^2}{R}$$

Where:
C: The centrifugal force in percent of line load without impact.
S: The design speed in Km. Per hour.
R: The radius of curve in meter.

3.2.6 Wind Load

For the superstructure design, following intensities of wind loads shall be applied horizontally or right angles to the longitudinal axis of girders and beams.

For truss and arches	2.394 Pa
For girder and beams	1.596 Pa

3.2.7 Collision Load

The pier column or walls which are not protected by guardrail or other barrier devices and are place closer than 9 m from the edge of through traffic lanes shall be designed to resist and equivalent static load of 500 kn applied at an angle of 10 degree from the direction of the road centerline passing under the bridge. The load shall be applied 1.2 m above road surface.

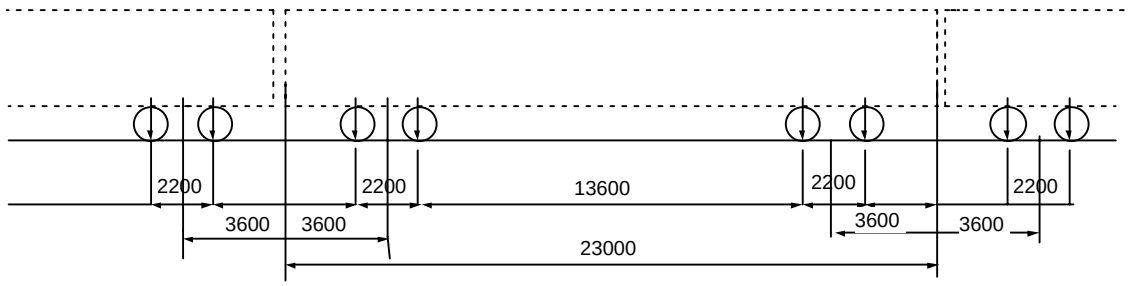
The pier columns located within 5.5 m of a rail truck centerline shall be to resist the following minimum.

1,000 kN parallel to rails, and
500 kN normal to rails

Both load shall be applied horizontally 2 m above rail

3.2.8 Train Load

The railway live loading for MMUTIS is defined as follows:



3.2.9 Seismic Load

Seismic Design shall be in accordance with AASHTO Standard Specification Division 1-A. 1992 and an Advisory for Seismic Design of Bridges DPWH

1) Acceleration Coefficient (A)

The acceleration coefficient at the bridge site is determined A=0.4g from Seismic Zone Map of the Philippines.

2) Importance Classification (IC)

IC = I for essentials bridges

3) Seismic Performance Category (SPC)

SPC = D for A=0.4q > 0.29q, IC = I

4) Site Coefficient (S)

The site coefficient (S) shall be determined from soil profile type based on the soil investigation at bridge site. In general, the depths of alluvium which consist of stiff soil in Metro Manila Area (except coastal area) are considered as less than 60 m from previous soil investigation for similar projects. Therefore Site coefficient (S) are as follows.

Hill Side	(S) = 1.0
Coastal area	(S) = 1.5

5) Response Modification Factor (R)

`

For Substructure Design

	R
Wall Type Pier	2
Reinforced Concrete Pier bent (Rigid frame)	
a) Vertical pile only	3
b) One or more better pile	2
Single Column (T or hammer head piers)	3
Steel rigid frame pier	
a) Vertical pile only	5
b) One or more batter pile	3
Multiple Column Bent	5

6) Elastic Seismic Response Coefficient (Cs)

$$Cs = \frac{1.2\ A.S}{T^{2/3}}$$

Where:

A = the Acceleration Coefficient
S = the site coefficient
T = the period of vibration of bridge (sec)

$$T = 2\sqrt{\frac{W}{g.K}}$$

W: Total nominal weight of superstructure including superimposed load plus half weight of pies (adjusted by judgement as appropriate) kN

K: Combined stiffness of bridge piers expressed as the horizontal force required to produces a unit deflection at the pier top (kN/m)

Q: Acceleration due to gravity (m/sec2)

7) Equivalent static earthquake loading (Pe) (kN/m)

$Pe = \frac{Cs.w}{}$ for regular bridges

8) Combination of orthogonal seismic forces

A combination seismic force is used to account for the directional uncertainly of earthquake motions and the simultaneous occurrences of earthquake force in two perpendicular horizontal direction.

Load Case I	1.0 EQ long + 0.3 EQ trans
Load Case II	0.3 EQ long + 1.0 EQ trans

9) Modified seismic forces (EQM)

Design forces for structural member and connection shall be determined by the elastic seismic forces from Load case I/and Load case II by the appropriate Response Modification Factors (R).

10) Thermal Forces

The range of temperature shall be as follow

Metal structure from 17.8 ^{0}C to 48.9 ^{0}C

Concrete structure 16.7 ^{0}C Temperature Rise
22.2 ^{0}C Temperature fall

3.3 Material

All material to be used in the project shall conform to DPWH standard Specification (1988) and AASHTO Code 1996.

Concrete:

The classes of concrete and specified compressive strength of Concrete (28 days) are as follows:

Class	Specified Compressive Strength (28 days)	Structure
Class A	28 Mpa (4000 psi)	Concrete deck slab, Diaphragm Column, Cast in place bored pile Pier cap. Retaining wall Pile cap. Concrete Parapet
Class B	21 Mpa (3000 psi)	Gravity type of retaining wall Median barrier, concrete curb
Class P	35 Mpa (5000 psi)	Pre-stressed concrete super structures (segmental box I – shape Girders)

(1) Reinforced Concrete

Reinforcing steel shall conform to ASTM Specification A615 "Deformed and Plain Billet – Steel Bars for concrete Reinforcement Grade 60 bars shall be used for diameter 20 mm and greater for smaller diameter, Grade 40 bars are used.

Minimum yield strengths of Grade 60 and Grade 40 are fy = 413.70 Mpa and fy = 275.8 Mpa respectively.

(2) Pre-Stressing Steel

1) Strand

Uncoated seven-wire strand shall conform to ASTM Specification A 416 and supplement S1 for Law Relaxation strand. Following type of pre-stressing tendons Grade 270 are used.

Notation	Nominal Diameter (mm)	Yield Strength (Mpa)	Tensile Strength (mpa)
PC 7-wire strand SWPR 7BN	T 12.7	1569	1863
PC7 Wire Strand (SWPR 7 BN)	T 15.2	1569	1863

(3) Structural Steel

Structural steel for bridges shall conform to the requirement of following Specification

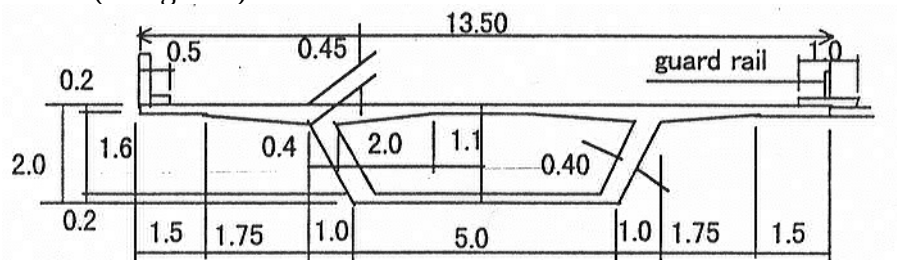
a) High – Strength Low – Alloy structural steel (ASTMA 709 Grade 50 or Grade 50 W

b) High –Strength Low – Alloy, Quenched and Tempered Structural Steel (ASTMA 709) Grade 70 W

3.4 Quantity Calculation

3.4.1 ALT-1 PC Box Girder + Single Concrete Pier (flare type pier)

1. Super Structure
   PC Box Girder
   Concrete (box girder)



	B (m)	H (m)	A (cm^2)	
Top Slab	13.50	0.20	2.70	
Haunch-1	1.75	0.25	0.44	
Huanch-2	2.00	0.25	1.50	
Bottom Slab	5.00	0.20	1.00	
Web	0.40	1.35	1.08	
Area (m^2)			5.72	
Volume				228.70
Diaphragm	1.00	1.35	5.60	15.12
Debater	0.50	1.50	5.00	7.50
				251.32
Other 10% above				25.13
Total Volume				276.45 (m^3)
Parapet	0.20	1.00	40.00	8.00
Curb	1.00	0.15	40.00	6.00
Total volume per 1.0 k				14,523 (m^3)

Pre-Stressing Steel			
Longitudinal	12T12.7	43 kg/m^3	594,372 kg
Transversal	4T15.2	17 kg/m^3	234,984 kg
Total			**829,356 kg**
Re-Bar	100/kg		1,452,260 kg
Asphalt Pavement T=75mm	0.075	12.5 1,000	4,312.5 ton
Guard Rail			1,000m

2. Sub Structure

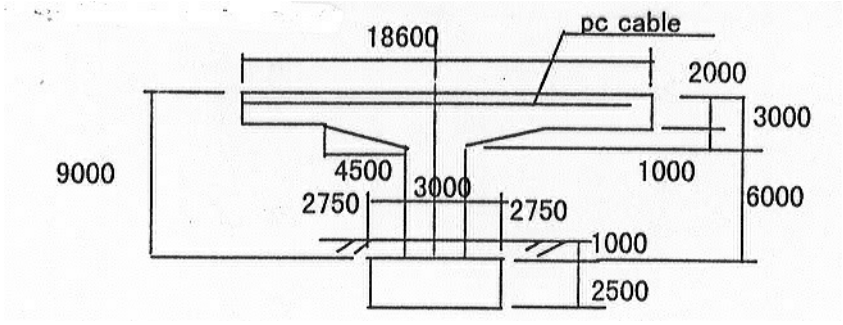
A. Flared Type Column

Concrete		D	BI	BT	Nos.	
	Pile Cap	2	6	6	50	3,600 m^3
		H	Tu	Ti	Bt	
	Column	8	5	2.5	2.5	2,981 m^3

Re-Bar	pile Cap	160 kg/m^3	576,000 kg
	Column	200 kg/ m^3	578,125 kg

Structure Excavation				5,400 m^3
	Length (m)	nos./pile cap	Nos.	
CCP Pile	d=120 cm 20	5	50	5,000 m

B. T-Shape Pier for Two Way



Concrete		B	H	L	Nos.	Volume
	Beam 1	18.6	2.0	3	26	2,902
	Beam 2	4.5	1.0	3	26	351
	Column	3.0	7.0	3.0	26	1,638
	Total					4,891 m^3
	Pile Cap	8.5	8.5	2.5	26	4,696
Structural Excavation		8.7	8.7	3.8	26	7,478 m^3
Reinforcement						
	Beam	100 kg/ m^3				325,260 kg
	Column	200 kg/ m^3				327,600 kg
	Pile Cap	160 kg/ m^3				751,400 kg
	Total					1,404,260 kg
Pre-Stressing Cable		12T12.7	40 kg/ m^3			195,624 kg
CCP Pile d=150 n=5				20	25	5,200 m

3.4.2 ALT-2 PC Box Girder + Steel Rigid Portal Frame Pier

1. Super Structure

   Box Girder (same as Alt-1)

2. Sub Structure (steel rigid frame)

   Steel Rigid Frame h=21.65m span=29.5m

	B1(m)	B2(m)	Te(m)	Tb(m)	H9m)	weigh (ton)
Column	2.50	2.50	0.040	0.040	21.65	132.934
Beam	2.50	2.50	0.032	0.013	29.50	51.390
Inner rib	20% of Above					36.865
Anchor Frame						20.000
	Total Weight					241.189

Pile Cap	3*6*6				
	D	Bt	Bl	Nos.	Volume
Concrete	3	6	6	50	5,400(m^3)

CCP Pile d=1.5	n=4	l=2		
	Length	nos.	Nos.	
	20	5	50	5,000 (m)

Reinforcement 160 kg/ 864,000 (kg)

Structure Excavation 7,740 (m^3)

3.4.3 Alt-3 EDSA Interchange Flyover (3-span steel box girder 40+50+40)

1. Super Structure

			B(m)	L(m)	weight (ton)
Steel Weight per sq.m=300 kg/sq.m)			13.5	1000	8100
Deck Slab t=23cm			13.5	1000	
Haunch (400+900)*1/2*220					6210 cu.m.
	0.4	0.23	5		0.92
	0.22	0.25	10		0.55
	1.5	0.22	2		0.66
per meter					2.13 cu.m
parapet wall and curb h=75 mm					
	0.2	1.00	0.15	0.5	1100 cu.m
Asphalt Pavement t=75mm		w=2.3 kg/ m^3			
	0.075	12.5	1000		4312.5

2. Sub Structure

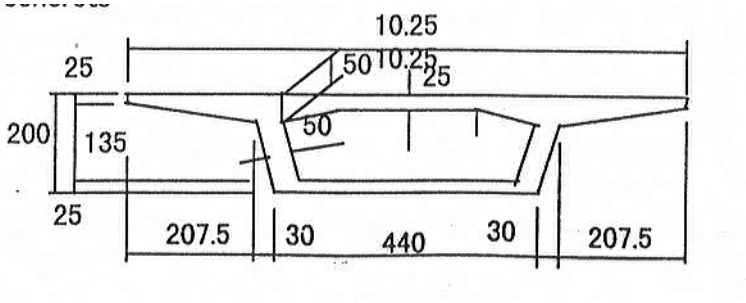
Steel Single Column h=21.65m

	B1(m)	B2(m)	Te(m)	Tb(m)	H(m)	weight (ton)
Column	2.50	2.50	0.040	0.040	19.65	120.654
Beam	2.00	2.50	0.020	0.013	10.50	12.364
Inner Rib	20% of above					26.604
	Total weight per one pier					10.000
	Total Weight per km meter					169.621

Pile Cap	3*6*6 n=46					
		Bl	Bt	D	Nos	Volume
Concrete		3	6	6	46	4,968 cu.m.
CCP Pile	d=1.5 n=4	l=2	L	Nos/pier	Nos/km	
			20	8	23	3,680 cu.m
Reinforcement 160kg/cu.m						794,880 kg
		Depth	Bi	Bt	Nos	
Structure Excavation		3	7	7	33	6,953 cu.m

3.4.4 Railway Viaduct Simply Support Concrete Box Girder (span=30m)

1. Super Structure
   Concrete



Top Slab	10.25	0.25	2.56		
Haunch-1	2.0075	0.25	0.52		
Huanch-2	1.00	0.25	0.25		
Bottom Slab	4.40	0.20	0.88		
Web	0.5	1.50	1.50		
Area (m^2)			5.71		
Volume				171.34	
Diaphragm	1.0	1.35	3.3	8.91	
Debater	05	0.5	5	1.25	
Other				3.29	
Total Volume/30m				16.3.00 (m^3)	
Total volume per/km				5,433 (m^3)	

Pre-Stressing Steel

Longitudinal	70 kg/m^3	380,333 kg
Transversal	13.50 kg/m^3	73,350 kg

Re-Bar

Super Structure	100 kg/cu.m	543,333 kg

Parapet h=100 cm

B(m)	H9m)	L(m)	Volume
0.2	1.00	2000.00	400 cu.m

2. Sub Structure (standard height h=17.0m)

Concrete

	Bl(m)	Bt(m)	B(top)	H1(m)	H2(m)	Volume
Column	2.00	2.00	4.40	4.00	13	2,825 cu.m

Pile Cap 2.0*5.5*5.5

Bl	Bt	D	Nos	Volume
2	5.5	5.5	33	1,997 cu.m

CCP Pile d=1.20 n=4 l=20

20	4	2	33	5,280 m

Reinforcement

Column	200 kg/cu.m	564.960
Pile Cap	160 kg/cu.m	319.440
Total		884.400

Structure Excavation	depth	Bl	Bt	
	3	5.5	5.5	4,292 cu.m

3. Sub Structure (flare shape pier for EDSA interchange)

Concrete

	Bl(m)	Bt(m)	B(top)	H1(m)	H2(m)	Volume
Column	2500	2.50	4.40	4.00	13	4,067 cu.m

Pile Cap	2.0*7.0*7.0					
		Bl	Bt	D	Nos	Volume
		2	7	7	33	3,234 cu.m
CCP Pile d=1.20 n=5 l=20						
		20	5		33	3,300 m
Reinforcement						
	Column	200 kg/cu.m				813,450
	Pile Cap	160 kg/cu.m				517,440
	Total					1,330,890
Structure Excavation		depth	Bl	Bt	Nos	
		3	7	7	33	6,953 cu.m

3.4.5 Standard Span Bridge L=30m

1. Super Structure

Concrete	Class A	T	B	L	Nos	Volume
	Deck Slab	0.22	13.725	31	2	187.2
	Diaphragm	1.5	0.2	2.05	15	902
	Diaphragm	1.7	1.0	1.55	10	26.4
	Total					222.8
	Parapet	0.2	1.0	31	2	12.4
	Curb	0.15	0.5	31	2	4.7
	Total					17.1
Reinforcement 200/kg						44,557
Pavement 2.3t/m		0.075	12.5	30	2	129 ton

2. Sub Structure (2 abutment)

		B	H	L	Nos	Volume
Concrete	Stem	1.2	5	27.45	2	329
	Parapet	0.5	2	27.45	2	55
	Footing	7	1	27.45	2	384
	Seat	0.3	1	27.45	2	16
	Wing Wall	4.3	7	0.5	4	60
	Total					845 cu.m
Reinforcement Excavation 100/kg						84,527 kg
PC Pile 45cm*45 c L=20 N=80						1,600 m
Structural Excavation		½(4.3+6.4)*7*27.45*2				2056

3.4.6 Standard Span Bridge L=35+40+35=110m

1. Super Structure

Concrete	Class A	T	B	L	Nos	Volume
	Deck Slab	0.22	13.725	110.8	2	669.1
	Diaphragm	1.5	0.2	2.05	45	27.7
	Diaphragm	1.7	1.0	1.55	30	79.1
	Total					775.8
	Parapet	0.2	1.0	111	2	44.4
	Curb	0.15	0.5	111	2	16.7
	Total					61.1
Reinforcement 200/kg						155,169
Pavement 2.3t/m		0.075	12.5	30	2	129 ton

2. Sub Structure (abutment)

		B	H	L	Nos	Volume
Concrete	Stem	1.2	5	27.45	2	329
	Parapet	0.5	2	27.45	2	55
	Footing	7	1	27.45	2	384
	Seat	0.3	1	27.45	2	16
	Wing Wall	4.3	7	0.5	4	60
	Total					845 cu.m
Reinforcement Excavation 100/kg						84,527 kg
PC Pile 45cm*45 c L=20 N=80						1,600 m
Structural Excavation		½(4.3+6.4)*7*27.45*2				2056

PIERS

		B	H	L	Nos	Volume
Concrete	Beam	13	2	2	4	208
	Column	2	7	3	4	168
	Pile Cap	7.5	2	7.5	4	450
Reinforcement 100/kg						
	Beam	200 kg/cu.m				41,600 kg
	Column	200 kg/cu.m				33,600 kg
	Pile Cap	160 kg/cu.m				72,000 kg
	Total					147,200 kg
Structure Excavation		7.5	7.5	3.2	4	720 cu.m
PC Square Pile		25*20*4				2,000

Total Super ST + abutment + Pier

		Super ST	**Abutment**	**Pier**	**Total**
Concrete A-1	Deck Slab	775.8			775.8
Concrete A-2	Pile Cap			450	450
Concrete A-3	Parapet	61			61
Concrete P-2	Column		845	376	1221
Reinforcement		155,169	84,527	147,200	386,896
Structure Excavation					
Structure Excavation Water					720
Structure					2,056
PC Square Pile 450:450			1,600	2,000	3,600

		B	H	L	Nos	Volume
Concrete	Beam	13	2	2	4	208
	Column	2	7	3	4	168
	Pile Cap	7.5	2	7.5	4	450
Reinforcement 100/kg						
	Beam	200 kg/cu.m				41,600 kg
	Column	200 kg/cu.m				33,600 kg
	Pile Cap	160 kg/cu.m				72,000 kg
	Total					147,200 kg
Structure Excavation		7.5	7.5	3.2	4	720 cu.m
PC Square Pile		25*20*4				

Total Super ST + abutment + Pier

		Super ST	**Abutment**	**Pier**	**Total**
Concrete A-1	Deck Slab	72,000.0			72,000.0
Concrete A-2	Pile Cap			450	450
Concrete A-3	Parapet	720			720
Concrete P-2	Column		845	376	1221
Reinforcement		2,000	0	147,200	149,200
Structure Excavation					
Structure Excavation Water					720
Structure					
PC Square Pile 450:450			0	2,000	2,000

3.4.7 At Grade Section for Primary Arterial Expressway

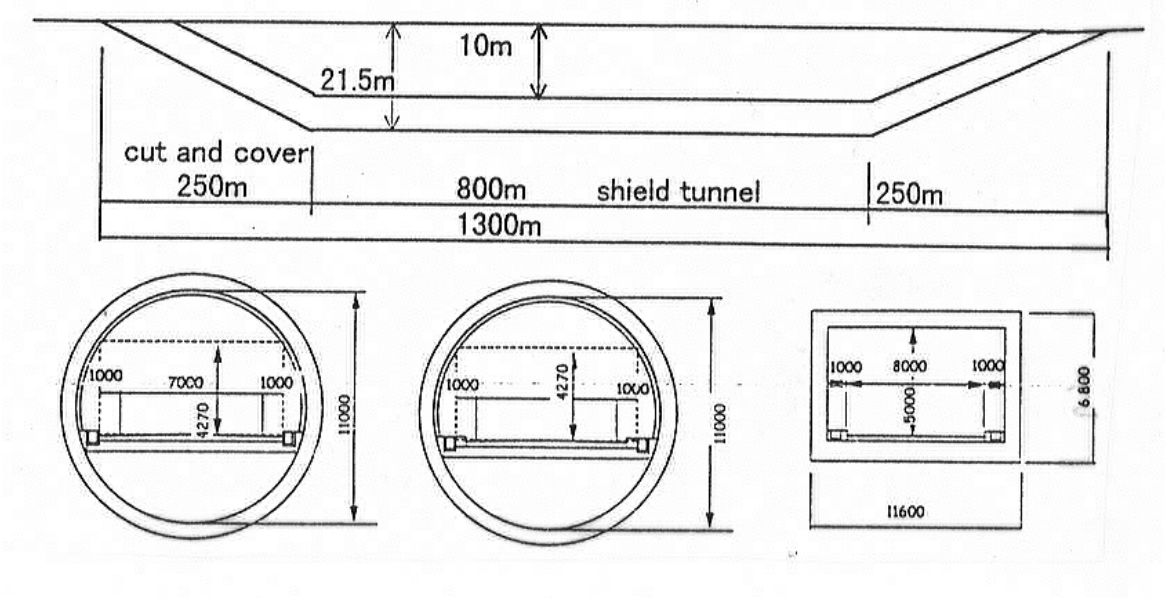
Pay Item	Unit	B(m)	L(m)	Thickness	Quantities
Cleaning & Grubbing	sq.m	40	1000		40000
Common Excavation	cu.m	40	1000	1.275	51000
Borrow material	cu.m	40	1000	1.275	51000
Sub Grade Preparation	cu.m	40	1000		40000
Concrete Pavement t=25	cu.m	25	1000	0.25	6250
Aggregate Base Course	cu.m	34	1000	0.20	6800
Aggregate Sub Base Course t=30	cu.m	34	1000	0.30	10200
RCRC 1.0m dia.	each		2000		
Catch Basin 1.2m	each				40
Lighting Pole	each				50
Vehicle Guard Rail	l.m				2000
Concrete curb and Gutter	l.m				4000
Concrete Block	sq.m	4	1000		4000
Concrete Curb (for median)	l.m				2000

1. Approximate Cost Estimation of Air Port Access Tunnel

	Dia.	Length	Volume	Unit Cost	Cost
Civil Works	12.0	800	90,432	450	40,694,400
Secondary Works	20% above				8,138,880
Sub-Total					48,833,280

Cut & Cover 5.0x11m	Mean Depth	Length	Volume	Unit Cost US$	Cost US$
Civil Works	10.75	500	64500	320	20,640,000
Secondary Works	20% above				4,128,000
Sub-Total					24,768,000

Total Cost	**Double Cell**	**147,202,560**
		56,616,369



2. Direct Construction Cost Comparison of R-7 Expressway

Alternative-1

Non-Standard Structure (Combined Structure of Concrete and Steel)

Section	Location	Length	Type of Structure[1/]	Unit Cost (mil. P/km)	Cost (mil P)	Remarks
Sec-1	Skyway-EDSA	2.87	5 and6	2246.6	6447.7	Portal steel pier
Sec-2	EDSA Intersection	0.50	7	3152.8	1576.4	T-shape single pier w/ steel box girder
Sec-3	EDSA Intersection Quezon Circle	2.4	5 and 6	2246.6	5391.8	
Sec-4	After Quezon Circle	21.23	8	1113.6	23641.7	Concrete flared pier w/ concrete box girder
Total		**27.00**			**37057.7**	

1/ Type of Structure: refer to table 20

Alternative-2

Standard Structure (concrete box girder with flared type concrete pier)

Section	Location	Length	Type of Structure	Unit Cost (mil. P/km)	Cost (mil P)	Remarks
All Section	Skyway to Commonwealth Ave.	27.00	8	1113.6	30067.2	

Cost Comparison

Cost Index = 1.2325