Package 3: C Baru Pumping Station

SUMMARY OF BARU PUMPING STATION WORK VOLUME

1.	STRUCTURE EXCAVATION	=	855 m^3
2.	STRUCTURE EMBANKMENT (SANDY SOIL)	=	880 m^3
3.	LEVELING CONCRETE, TYPE E	=	38.50 m^3
	FORM WORK	=	20.80 m^2
4.	CONCRETE FOR STRUCTURE, TYPE C1	=	948 m^3
	FORM WORK	=	1,310 m^2
5.	REINFORCING STEEL BAR	=	49,094 Kg
6.	WET STONE MASONRY	=	26.50 m^3
7.	SECONDARY CONCRETE FOR SCREW (C2)	=	83 m^3
8.	CONCRETE SHEET PILE (W=200, t=20)	=	916 m'
9.	STEEL SHEET PILE (W=400)	=	387 m'
10.	CONCRETE PILE ϕ 500	=	2,904.8 m'
11.	GABION MATTRESS (3,000 x 1,500 x 500)	=	33.34 m^3
12.	SAFETY HAND RAIL, TYPE I	=	858 Kg
13.	SAFETY HAND RAIL, TYPE II	=	481 Kg
14.	DOWEL BAR (ϕ 19, L=1,240)	=	118.90 Kg
15.	WATER STOP (W=200, t=20)	=	29.20 m
16.	BACK FILL	=	151.41 m^3
17.	POINTING	=	37.74 m^2

1. STRUCTURE EXCAVATION

BA-37
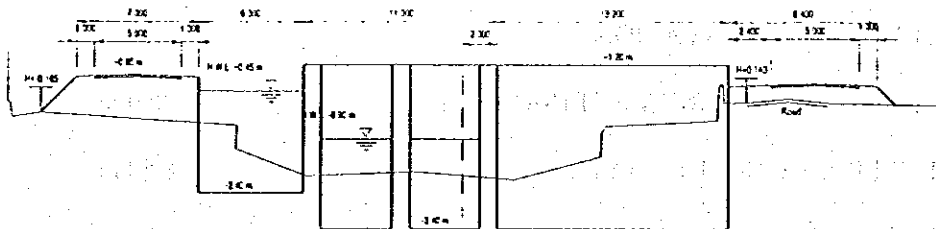
$$1.48 \times 10 \quad = \quad 14.80 \ m^2$$
$$1.18 \times 8.2 \quad = \quad 9.676 \ m^2$$
$$\text{Total A} \quad = \quad 24.476 \ m^2$$

BA-38
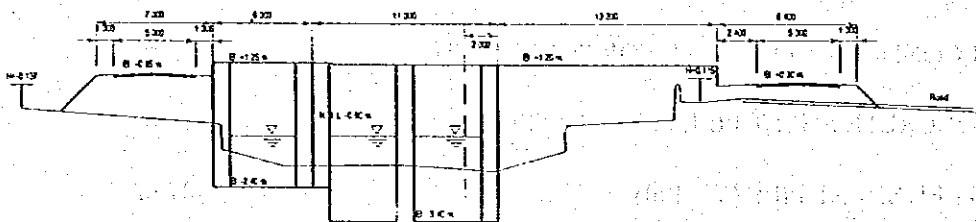
$$1.57 \times 10 \quad = \quad 15.70 \ m^2$$
$$1.055 \times 8.2 \quad = \quad 8.651 \ m^2$$
$$\text{Total A} \quad = \quad 24.351 \ m^2$$

Area of Excavation $= (24.476 + 24.351) / 2 = 24.414 \ m^2$

Length of Excavation $= 35 \ m$

Volume of Excavation $= 24.414 \times 35 = 855 \ m^3$

2. STRUCTURE EMBANKMENT WITH SANDY SOIL

Area BA-38 $= \dfrac{1.92 + 1.2 + (1.2 - 0.23)}{2} \times 12 = 24.54 \ m^2$

Area BA-37 $= \dfrac{2.03 + 1.2 + (1.2 - 0.14)}{2} \times 12 = 25.74 \ m^2$

A $= (24.54 + 25.74) / 2 = 25.14 \ m^2$

L $= 35 \ m$

V $= 25.14 \times 35 = 880 \ m^3$

3. LEVELING CONCRETE TYPE E

Volume $= 0.1 \times 11 \times 35 = 38.50 \ m^3$

4. CONCRETE FOR STUCTURE

   a. Section B-B (L=10,000)

- Walls	$= (3 \times 1.0 \times 4.9 \times 10.0)$		$=$	$+147 \ m^3$
	$3 \times 3.0 \times 0.4$		$=$	$-3.6 \ m^3$
	$3 \times 2.4 \times 0.4$		$=$	$-2.88 \ m^3$
	Total for Walls		$=$	$140.52 \ m^3$
- Bottom Slab	$= 0.8 \times 11 \times 10 - (2 \times 1.0 \times 1.2 \times 0.25) =$			$87.40 \ m^3$
- TOE	$= (0.4 + 0.2) / 2 \times 0.8 \times (11 + 10)$		$=$	$5.04 \ m^3$
- Bridge No. 2 & 1	$= (0.4 \times 3 \times 11) + (0.4 \times 2.4 \times 11)$		$=$	$23.76 \ m^3$
Sub Total Section B-B			$=$	$256.72 \ m^3$

   b. Section F-F (L=8,206)

- Walls	$= (3 \times 1.0 \times 6.0 \times 8.206)$		$=$	$+147.71 \ m^3$
	$3 \times 3.0 \times 0.40$		$=$	$-3.60 \ m^3$
	Total for Walls		$=$	$144.11 \ m^3$
- Bottom Slab	$= 0.8 \times 11 \times 8.206 - (2 \times 1.0 \times 1.4 \times 0.25) =$			$71.51 \ m^3$
- TOE	$= (0.4 + 0.2) / 2 \times 0.8 \times 8.206$		$=$	$1.97 \ m^3$
- Bridge No. 1	$= (0.4 \times 3 \times 11)$		$=$	$13.20 \ m^3$
Sub Total Section F-F			$=$	$230.79 \ m^3$

Bridge	$0.4 \times 3 \times 2 \times 4.4$	$=$	10.56
	$0.4 \times 3 \times 2 \times 4.4$	$=$	10.56
	Total	$=$	21.12

   c. Section C-C (L=7,794 m)

- Walls	$= (3 \times 1.0 \times 5.076 \times 7.794)$	$=$	$118.69 \ m^3$
- Bottom Slab	$= (0.924 \times 11 \times 7.794$	$=$	$79.22 \ m^3$
- TOE	$= (0.4 + 0.2) / 2 \times 0.8 \times 9.293$	$=$	$2.23 \ m^3$
- Bridge	$= 0.5 \times 0.693 \times 11$	$=$	$3.81 \ m^3$
Sub Total Section C-C		$=$	$203.95 \ m^3$

   d. Section D-D (L=9.00m)

      - Box Culvert (L = 7.00 m)

$0.5 \times 11.225 \times 7.0$	$=$	$39.29 \ m^3$
$0.8 \times 11.225 \times 7.0$	$=$	$62.86 \ m^3$
$1.9 \times 1.225 \times 7.0$	$=$	$16.29 \ m^3$
$2 \times 1.9 \times 1.0 \times 7.0$	$=$	$26.60 \ m^3$
Total	$=$	$145.04 \ m^3$

      - Box Culvert (L = 2.00 m)

$0.5 \times 11.225 \times 2.0$	$=$	$11.23 \ m^3$

0.8 x 11.225 x 2.0	=	17.96 m³
4.3 x 1.225 x 2.0	=	10.54 m³
2 x 4.3 x 1.0 x 2.0	=	17.20 m³
Total	=	56.93 m³

- Pump Block $= \dfrac{1.269 \times 0.7}{2} \times 2 \times 4.0$ = 3.55 m³

- TOE $= \dfrac{0.4 + 0.2}{2} \times (11.225 + 9.0)$ = 6.07 m³

Sub Total D-D = 211.59 m³

e. Section E-E

- Slab = 0.50 x 10.0 x 9.0 = 45.00 m³

Total a + b + c + d + e = 948 m³

5. WET STONE MASONRY

$$V = \frac{0.3 + 1.15}{2} \times 1.9 \times (9.573 + 10.575) \qquad = \qquad 26.29 \text{ m}^3$$

6. SECONDARY CONCRETE FOR SCREW

$$V = 2 \times 4 \times 2.0 - (\tfrac{1}{2} \times \pi \times 15^2 \times 2)\} \times 9.293 \qquad = \qquad 83 \text{ m}^3$$

7. CONCRETE SHEET PILE (W = 500, t = 220)

$$\left\{ \frac{21.225}{0.5} + \frac{9}{0.5} + 10 \right\} \times 13 \qquad = \qquad 916 \text{ m}'$$

8. STEEL SHEET PILE (W = 400)

$$\{ \frac{10.0}{0.4} + \frac{8.206}{0.4} + \frac{11}{0.4} \} \times 5.3 \qquad = \qquad 387 \text{ m}'$$

9. CONCRETE PILE Ø 500

a. Section B-B: 6 x 7 x 21.6	=	907.2 m'
b. Section F-F: 6 x 8 x 20	=	960 m'
c. Section C-C: 4 x (21.9 + 23.6 + 25.2)	=	282.8 m'
d. Section D-D: 4 x 4 x 25.8	=	412.8 m'
e. Section E-E: 3 x 4 x 28.5	=	342 m'
Total Length of Concrete Pile Ø 500	=	2,904.8 m'

10. GABION MATTRESS (3,000 x 1,500 x 500)

$$V = (11 + 11.225) \times 3.0 \times 0.50 \qquad = \qquad 33.34 \text{ m}^3$$

11. REINFORCING STEEL BAR

1. Reinforcing bar for structure $\qquad = \qquad$ 48,623 kg
   (See table of Bar Weight)

2. Anchor bar for secondary concrete

   a) For stop log grove

N =	8 x 2 x 2	= 32	nos.
	8 x 2 x 2	= 32	nos.
	3 x 10 x 4	= 120	nos.
		184	nos.

   b) For screen support

   $N = \quad 8 \cdot x \, 3 \, x \, 2 \qquad = \quad 48 \quad$ nos.

   c) for screw support

   $\underline{N = \quad 3 \, x \, 3 \, x \, 2 \qquad = \quad 18 \quad \text{nos.}}$

   Total (a) + (b) + (c) (N) = 250 nos.

   Weight of anchor bar = 250 x 0.3 x 2.23 = 167.25 kg

3. Anchor Pad for steel strengthening

   For L = 650 → N = 10 x 4 = 40 nos.

   For L = 1050 → N = 10 x 4 = 40 nos.

   Weight = {(0.65 x 40) + (1.05 x 40)} x 2.23 = 303.28 kg

   TOTAL WEIGHT OF 1, 2 & 3 = 49,094 KG

12. DOWEL BAR

$$\text{Weight} \quad = \quad \left\{ \left(\frac{11}{0.5} + 1 \right) + \left(\frac{9.5}{0.5} + 1 \right) \right\} \times 1.24 \times 2.23 \quad = \quad 118.90 \text{ kg}$$

13. FORM WORK

a. Section B-B (L=10 m)

   $10 \times (5.7 + 0.8) + 10 \times 5.7 + 10 \times 4 \times 4.9 + 10 \times 4 \times$
   $\sqrt{0.15^2 + 0.15^2} + 10 \times \sqrt{0.4^2 + 0.8^2} + 2 \times 4 \times 4.9 \times$
   $0.3 + 4 \times 4.9 \times 0.65 + 2 \times \pi \times 0.5 \times 4.9 + \frac{1}{2} \pi \times 0.5 \times 4.9 = 379.172 \text{ m}^2$

b. Section B$_1$-B$_1$ (L=8.026 m)

   $8.026 \times (7.7 + 0.8) + 8.026 \times 7.7 + 8.026 \times 4 \times 6.4$
   $+ 8.026 \times 4 \times \sqrt{0.15^2 + 0.15^2} + 8.026 \times \sqrt{0.4^2 + 0.8^2} = 349.476 \text{ m}^2$

c. Section C-C (L=7.794 m)

$7.794 \times (6.0 + 0.8) + 7.794 \times 6.0 + 7.794 \times 4 \times 5.076$

$+ 7.794 \times \sqrt{0.4^2 + 0.8^2} + 2 \times 7.794 \times 0.5 \times \pi \times 3.0 = 338.440 \text{ m}^2$

d. Section D_1-D_1 (L=2.0 m)

$2.0 \times (3.2 + 0.8) + 2.0 \times 3.2 + 2.0 \times 4 \times 1.9 + 2.0 \times 4.0 \times 2$

$+ 4 \times 2 \times 2.0 \times \sqrt{0.15^2 + 0.15^2} + 2.0 \times \sqrt{0.4^2 + 0.8^2} = 50.783 \text{ m}^2$

e. Section D-D (L=7.0 m)

$7.0 \times (3.2 + 0.8) + 7.0 \times 3.2 + 7.0 \times 4 \times 1.9 + 7.0 \times 4.0 \times 2$

$+ 4 \times 2 \times 7.0 \times \sqrt{0.15^2 + 0.15^2} + 7.0 \times \sqrt{0.4^2 + 0.8^2} = 177.740 \text{ m}^2$

f. Slab (9 x 10 m)

2 x 10 x 0.5 + 9 x 0.5   =   14.50 m²

Total Form Work   = 1,310.111 m²

14. SAFETY HAND RAIL

TYPE I

(A)   L = 11.00 m

Column: h   =   800 mm

$\varnothing$ =   42.7 mm

t   =   2.3 mm

L   =   11.00 m

Number of Column =   11.00 / 166 + 1   =   8 nos.

Weight   =   (8 x 0.8) x 2.29 =   14.65

Horison: Upper Steel ($\varnothing$ 60.5, t = 5 m)

L   = 11 m

Weight = 11 x 5.57   =   61.27 kg

Lower Steel ($\varnothing$ 42.7, t = 2.3 m)

L   = 11 m

Weight = 11 x 2.29   =   25.19 kg

Total   =   101.11 kg

(B)   L = 3 + 1.2 = 4.2 m

Column   (420 / 166 +1)   =   3 nos.

Weight   =   (3 x 0.8) x 2.29   =   5.49 kg

Horison: Upper Steel

L   = 4.2 m

Weight = 4.2 x 5.57   =   23.39 kg

Lower Steel

    L   = 4.2 m

    Weight = 4.2 x 2.29   = 9.62 kg

    Total   = 38.5 kg

(C1) L = 4 m

    Column   (400 / 166 +1)   = 4 nos.

        Weight   = 4 x 0.8   = 3.2 kg

(C2) L = 3 m

    Column   3 / 1.66   = 2 nos.

(C3) L = 4 m

    Column   4 / 1.66   = 3 nos.

(C4) L = 3 m

    Column   3 / 1.66   = 2 nos.

    Total number of Column   = 4 + 2 + 3 + 2   = 11 nos.

    Weight   = 11 x 0.8 x 2.29   = 20.15 kg

    Total Length of Upper Steel   = 4 + 3.1 + 4 + 3.1   = 14.2 m

    Weight   = 14.2 x 5.57   = 79.09 kg

    Total Length of Lower Steel   = 4 + 3.1 + 4 + 3.1   = 14.2 m

    Weight   = 14.2 x 2.29   = 32.52 kg

    Total Weight   = 131.76 kg

(D)   For D = C

    Weight of Column   = 20.15 kg

    Weight of Upper Steel   = 79.09 kg

    Weight of Lower Steel   = 32.52 kg

    Total Weight   = 131.76 kg

(E)   For E1, L = 4 m

    Number of Column   = (4000 / 1660 + 1)   = 4 nos.

    For E2, L = 5.206 m

    Number of Column   = (5206 / 1660)   = 2 nos.

    For E3 = E2

    Number of Column   = (5206 / 1660)   = 2 nos.

    Total Number of Column   = 4 + 2 + 2   = 8 nos.

    Weight   = 8 x 0.8 x 2.29   = 14.66 kg

    Total Length of Upper Steel   = 4 + 5.206 + 5.206   = 14.412 m

    Weight   = 14.412 x 5.57   = 80.27 kg

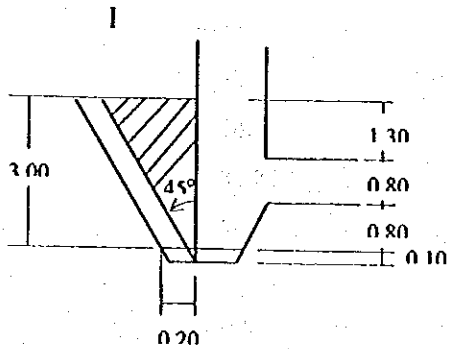   Total Length of Lower Steel   = 4 + 5.206 + 5.206   = 14.412 m

	Weight	= 14.412 x 2.29	= 33.00 kg
	Total Weight		= 127.93 kg

(F) For F = D

Weight of Column	=	14.66 kg
Weight of Upper Steel	=	80.27 kg
Weight of Lower Steel	=	33.00 kg
Total Weight	=	127.93 kg

(G) L = 5.206

Number of Column	= (5.206 / 1.66 + 1)	= 3 nos.
Weight	= 3 x 0.8 x 2.29	= 5.49 kg
Weight of Upper Steel	= 5.206 x 5.57	= 28.99 kg
Weight of Lower Steel	= 5.206 x 2.29	= 11.92 kg
Total Weight		= 46.40 kg

(H) L = 4.000

Number of Column	= (4000 / 1660 + 1)	= 3 nos.
Weight	= 3 x 0.8 x 2.29	= 5.49 kg
Weight of Upper Steel	= 4 x 5.57	= 22.28 kg
Weight of Lower Steel	= 4 x 2.29	= 9.16 kg
Total Weight		= 36.93 kg

(I) For I = H

Weight of Column	=	7.33 kg
Weight of Upper Steel	=	22.28 kg
Weight of Lower Steel	=	9.16 kg
Total Weight	=	36.93 kg

(P) L = 693

Number of Column		=	2 nos.
Weight of Column	= (2 x 0.8) x 2.29	=	3.66 kg
Weight of Upper Steel	= 0.693 x 5.57	=	3.86 kg
Weight of Lower Steel	= 0.693 x 2.29	=	1.58 kg
Total Weight		=	9.10 kg

(Q) For Q = P

Weight of Column	=	3.66 kg
Weight of Upper Steel	=	3.86 kg
Weight of Lower Steel	=	1.58 kg
Total Weight	=	9.10 kg

TYPE II

(J) $L = \sqrt{7.101^2 + (5.3 - 1.2)^2}$ =   8.200 m

Number of Column		=	6 nos.
Weight of Column	= 6 x 0.8 x 2.29	=	10.99 kg
Weight of Upper Steel	= 8.2 x 5.57	=	45.67 kg
Weight of Lower Steel	= 8.2 x 2.29	=	18.78 kg
Total Weight		=	75.44 kg

(K)   For K, L, M, N & O = J

Total Weight of Column	= 5 x 10.99	=	54.9 kg
Total Weight of Upper Steel	= 5 x 45.67	=	228.3 kg
Total Weight of Lower Steel	= 5 x 18.78	=	93.9 kg
Total Weight		=	377.1 kg

Total of Column (A to Q)   =   106 nos.

Total Weight   =   (0.1 x 0.1 x 0.01 x 7.800) x 106   =   83 kg

Number of Anchor bolts   =   2 x 106   =   212 nos.

TYPE I

Total Weight   =   (A + B + C + D + E + F + G + H + I + P + Q) + (70 / 106) x 83

=   803.45 + 54.81

=   858.2 kg

TYPE II

Total Weight   =   (J + K + L + M + N + O) + (36 / 106) x 83

=   (75.44 + 377.1) + 28.18

=   480.73 kg

Total Weight   =   858.2 + 480.73

=   1,338.99

15. POINTING

$\sqrt{(1.9)^2 + (0.95)^2}$ =   1.873

Length	= (9.573 + 10.575)	=	20.148 m
Area	= 1.873 x 20.148	=	37.74 m²

16. WEEP HOLE DIA 50

Length   =   (20.148 / 1.5 + 1)   =   15 nos.

17. BACK FILL

Section B – B   Section C - C
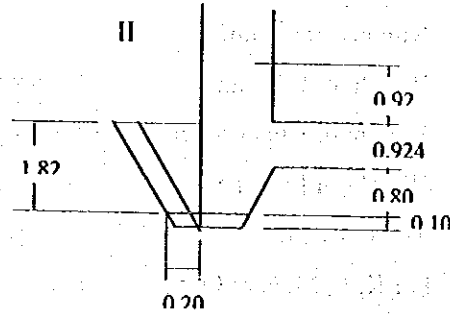
Length = (11 + 1.5 + 3.00)   = 15.5 m   Length = 4 m

$$(11 + 18.25) \times \frac{3 \times 3}{2} = 131.625 \text{ m}^3$$

$$\text{I} = (11 + 18.25) \times \frac{0.2 + 3.2}{2} \times 3 = 149.18 \text{ m}^3$$

$$\text{II} = \frac{0.2 + 2024}{2} \times \frac{4}{2} = 2.23 \text{ m}^3$$

Total = 149.18 + 2.23   = 151.41 m³

18. FORM WORK CONCRETE TYPE E

Section B – B

$(11 + 10) \times 2 \times 0.1$ = 4.2 m²

Section F – F

$(11 + 8.206) \times 2 \times 0.1$ = 3.84 m²

Section C – C

$(11 + 9.00) \times 2 \times 0.1$ = 4.00 m²

Section D – D

$(21.223 + 9) \times 2 \times 0.1)$ = 6.05 m²

Sub Total = 18.09 m²

$10 + 8.206 + 9 \times 0.1$ = 2.72 m²

Total = 20.81 m²

19. WATER STOP W = 200 mm

$3 \times 6.4 + 10$ = 29.2 m'

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SUMMARY OF SCAFOLDING AND FORM SUPPORT VOLUME, FOR BANDARHARJO DRAINAGE SYSTEM

No.	STRUCTURE VOLUME	SCAFFOLDING (m²)	FORM SUPPORT (m³)
1	BARU PUMPING STATION	1049	549
2	BARU PUMPING STA. GATE	350	120
3	BARU CONVEYANCE CHANNEL	6574	2768
4	BARU CONVEYANCE CHANNEL INLET STRUCTURE	150	35
5	BARU CONVEYANCE CHANNEL OUTLET STRUCTURE	106	20
6	BANDARHARJO EAST SECONDARY CHANNEL	1166	491
7	BANDARHARJO EAST SECONDARY CHANNEL OUTLET STR.	90	31
8	BARU RETARDING POND INLET STRUCTURE NO. 1	-	77
9	BARU RETARDING POND INLET STRUCTURE NO. 2	-	42
10	FUEL TANK BOX FOR BARU PUMPING STATION	133	62
	TOTAL	9618	4195

1. SCAFFOLDING

(A) Section A – A (L=10.0 m)

$(6.5 + 5.7 + 4 \times 4.9) \times 10.0$ $= 318 \text{ m}^2$

$\{(\frac{1}{2} \times 2 \times \pi \times \frac{1.0}{2}) + (\frac{1}{4} \times \pi \times \frac{1.0}{2})\} \times 4.9$ $= 9.621 \text{ m}^2$

Total A $= 327.621 \text{ m}^2$

(B) Section F – F (L=8.206 m)

$(7.6 + 6.8 + 4 \times 6.9) \times 8.206$ $= 315.110 \text{ m}^2$

(C) Section C – C (L=7.794 m)

$(6.8 + 6.0 + 4 \times 5.076) \times 7.794$ $= 258.013 \text{ m}^2$

(D) Section $D_1 – D_1$ (L=2.0 m)

$(6.4 + 5.6 + 4 \times 4.8) \times 2.0$ $= 62.40 \text{ m}^2$

(E) Section D – D (L=7.0 m)

$(4.0 + 3.2 + 4) \times 7.0$ $= 78.40 \text{ m}^2$

$\{(\frac{1}{2} \times 2 \times \pi \times \frac{1.225}{2}) + (\frac{1}{2} \times \pi \times \frac{1.0}{2}) + (\frac{1}{4} \times \pi \times \frac{1.0}{2})\} \times 4.9 = 6.849 \text{ m}^2$

Total E $= 85.249 \text{ m}^2$

Total A + B + C + D + E $= 1,048.393 \text{ m}^2$

2. SUPPORT AREA

(A) Section B – B & F - F

$(2 \times 4.0 \times 3.0 \times 4.5) + (2 \times 4 \times 5.4 \times 5.6)$ $= 349.92 \text{ m}^3$

(B) Section $D_1 – D_1$ & D – D

$(2 \times 4.0 \times 4.3 \times 2.693) + (2 \times 4 \times 1.9 \times 7.0)$ $= 199.04 \text{ m}^3$

Total A + B $= 548.96 \text{ m}^3$

SUMMARY OF WORK VOLUME

1. SOIL EXCAVATION $=$ 621.35 m^3

2. BACK FILL $=$ 511.66 m^3

3. LEVELING CONCRETE, TYPE E $=$ 3.24 m^3

4. CONCRETE FOR STRUCTURE, TYPE C1 $=$ 49.21 m^3

5. REINFORCING BAR $=$ 6,810.034 Kg

6. FORM WORK FOR CONCRETE, TYPE C1 $=$ 166.69 m^2

7. FORM WORK FOR CONCRETE, TYPE E $=$ 3 m^2

(A) SOIL EXCAVATION
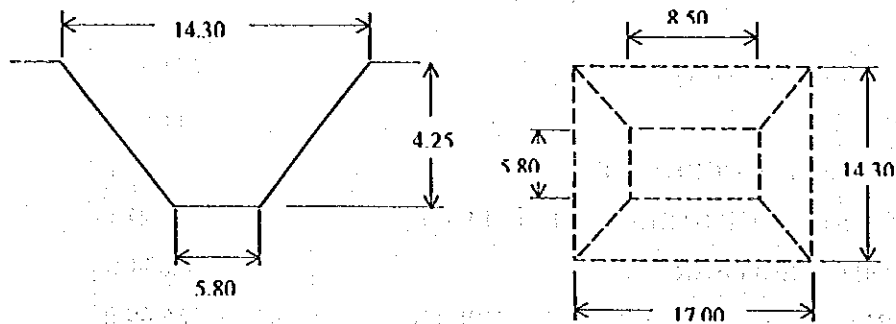
$$\text{Volume} = \frac{(5.80 \times 8.50) + (14.30 \times 17.00)}{2} \times 4.25 \qquad = \qquad 621.35 \text{ m}^3$$

(B) PLAIN CONCRETE

$$4.5 \times 7.20 \times 0.10 \qquad\qquad = \qquad 3.240 \text{ m}^3$$

(C) BACK FILL

$$621.35 - (4.30 \times 7.00 \times 3.60) - 0.1 \times 0.1 \times 4.5 \times 2 - 0.1$$

$$\times 0.1 \times 7.0 \times 2 - 1.2 \times 1.2 \times 0.65 - 0.5 \times 0.5 \times 0.65 = \qquad 511.66 \text{ m}^3$$

(D) CONCRETE K 225

1. $0.35 \times (7.00 \times 4.30 - \frac{1}{4} \pi \times 0.70^2$

   $- \frac{1}{4} \pi \times 0.2^2 - 0.8 \times 0.8)$ $\qquad = \qquad 10.167 \text{ m}^3$

2. $0.45 \times 7.00 \times 4.30$ $\qquad = \qquad 13.55 \text{ m}^3$

(3+4) $\quad 2 \times 0.35 \times 2.70 \times 6.3$ $\qquad = \qquad 11.907 \text{ m}^3$

(5+6) $\quad 2 \times 0.35 \times 2.70 \times 4.30$ $\qquad = \qquad 8.127 \text{ m}^3$

7. $1 \times 4 \times 1.05 \times 0.20$ $\qquad = \qquad 0.84 \text{ m}^3$

8. $0.35 \times 4 \times 1.05 \times 0.15$ $\qquad = \qquad 0.221 \text{ m}^3$

9. $(0.9 + 0.9) \times 1.05 \times 0.20$ $\qquad = \qquad 0.38 \text{ m}^3$

10. $(1 + 1.35) \times 1.05 \times 0.35$ $\qquad = \qquad 0.864 \text{ m}^3$

11. a. $0.2 \times 3.20 \times 0.20$ $\qquad = \qquad 0.128 \text{ m}^3$

    b. $((3.2 + 2.40)/2 \times 1.00 - 0.5 \times \frac{1}{4} \times \pi \times 2.0^2) \times 0.2 \quad = \quad 0.246 \text{ m}^3$

    Number of Concrete Tank Support $\qquad = \qquad 5$

    Volume of Concrete $= 5 \times (0.128 + 0.246)$ $\qquad = \qquad 1.87 \text{ m}^3$

12. Cover of Tank Drain

    $0.35 \times 0.35 \times 0.15$ $\qquad = \qquad 0.0184 \text{ m}^3$

13. Cover of Man Hole

    $0.90 \times 0.90 \times 0.15$ $\qquad = \qquad 0.122 \text{ m}^3$

14. Concrete Corner

    $0.5 \times 0.24 \times 0.2 \times 6.3 \times 4$

    $+ 0.5 \times 0.24 \times 0.24 \times 3.6 \times 4$ $\qquad = \qquad 1.14 \text{ m}^3$

Total Volume Concrete K 225

$$10.167 + 13.55 + 11.907 + 8.127 + 0.84 + 0.221$$

$$+ 0.38 + 0.864 + 1.87 + 0.0184 + 0.122 + 1.14 \quad = \quad 49.206 \ m^3$$

(E) REINFORCING BAR = 6,810.034 kg

(F) FUEL TANK AND ACCESSORY = 1 Set

(G) GROUNDING BC 50 mm = 1 Set

(H) FUEL PIPE SET = 1 Set

FORM WORK

(A) Wall Slab

$2 \times 3.5 \times 4.30 + 2 \times 3.5 \times 7.0$ = $79.10 \ m^2$

$2 \times 2.4 \times 3.30 + 2 \times 2.4 \times 6.0$ = $44.64 \ m^2$

(B) Top Slab

$3.30 \times 6.0 - 2 \times 0.8 \times 0.8 - 0.20 \times 0.20$ = $18.48 \ m^2$

(C) Fuel Pipe Hole

$4 \times 1.20 \times 0.75 + 4 \times 0.8 \times 0.85 + 4 \times 1.0 \times 0.10$ = $6.72 \ m^2$

(D) Man Hole

$4 \times 1.20 \times 0.85 + 4 \times 0.8 \times 0.75 + 4 \times 1.0 \times 0.10$ = $6.88 \ m^2$

(E) Main Hole

$4 \times 0.50 \times 0.85 + 4 \times 0.20 \times 1.10 + 4 \times 0.35 \times 0.10$ = $2.72 \ m^2$

(F) Slope Concrete in the Corner

$(\sqrt{0.15^2 + 0.15^2}) \times (4 \times 6.15 + 4 \times 3.45)$ = $8.15 \ m^2$

Total Form Work   = $166.69 \ m^2$

SUMMARY OF SCAFOLDING AND FORM SUPPORT VOLUME, FOR BANDARHARJO DRAINAGE SYSTEM

No.	STRUCTURE VOLUME	SCAFFOLDING (m^2)	FORM SUPPORT (m^3)
1	BARU PUMPING STATION	1049	549
2	BARU PUMPING STA. GATE	350	120
3	BARU CONVEYANCE CHANNEL	6574	2768
4	BARU CONVEYANCE CHANNEL INLET STRUCTURE	150	35
5	BARU CONVEYANCE CHANNEL OUTLET STRUCTURE	106	20
6	BANDARHARJO EAST SECONDARY CHANNEL	1166	491
7	BANDARHARJO EAST SECONDARY CHANNEL OUTLET STR.	90	31
8	BARU RETARDING POND INLET STRUCTURE NO. 1	-	77
9	BARU RETARDING POND INLET STRUCTURE NO. 2	-	42
10	FUEL TANK BOX FOR BARU PUMPING STATION	133	62
	TOTAL	9618	4195

1. SCAFFOLDING

   (A) Outer of Side Walls

      $3.5 \times (2 \times 4.3 + 2 \times 7.0)$ $=$ $79.10 \ m^2$

   (B) Inner of Side Walls

      $2.7 \times (2 \times 6.3 + 2 \times 3.6)$ $=$ $53.46 \ m^2$

  Total A + B $=$ $132.56 \ m^2$

2. SUPPORT AREA

      $6.3 \times 3.6 \times 2.7$ $=$ $61.24 \ m^3$

Package 3: D Baru Pumping Station Gate

SUMMARY OF WORK QUANTITY

1. CONCRETE TYPE C1 $= 193 \text{ m}^3$
2. SECONDARY CONCRETE TYPE C_2 $= 9 \text{ m}^3$
3. LEVELING CONCRETE TYPE E $= 9 \text{ m}^3$
4. STEEL SHEET PILE TYPE II $= 273 \text{ m}^1$
5. PHC pile dia 500 (L = 22.6 m) $= 339 \text{ m}^1$
6. GABION MATTRESS (3,000 x 1,500 x 500) $= 18 \text{ m}^3$
7. REINFORCING BAR $= 16,501 \text{ Kg}$
8. SAFETY HAND RAIL $= 113 \text{ Kg}$
9. FORM WORK CONCRETE TYPE C1 $= 479 \text{ m}^2$
10. FORM WORK CONCRETE TYPE E $= 4 \text{ m}^2$
11. EXCAVATION $= 336 \text{ m}^3$
12. BACK FILL $= 138 \text{ m}^3$
13. THE STAIRS

    a. Main pipe   Ø 200   Length 6.8 m   Weight = 279 Kg

    b. Checkered plate: t = 6 mm   Area = 8 m^2

    c. Galvanized pipe

         Ø 1.5 "   Weight = 47 Kg

         Ø 2 "   Weight = 56 Kg

14. WATER STOP (W=200) $= 18.5 \text{ m}'$
15. DOWEL BAR (D_{19} ; L = 1,000) $= 156 \text{ kg.}$

1. CONCRETE TYPE C1
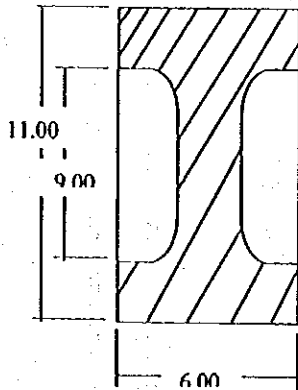
Wall : $1 \times 9 \times 3.25 \times 2$ = 58.5 m³

Floor : $6 \times 11 \times 1$ = 66 m³

Toe : $\dfrac{0.7 + 1}{2} \times 0.8 \times (6 + 11 + 6)$ = 15.64 m³

Total = 140.14 m³
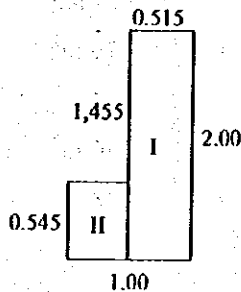
Column:

- Length = 3.25 m

   I = $0.515 \times 2\,3.25 \times 2$ = 6.695 m³

   II = $0.485 \times 0.545 \times 3.25 \times 2$ = 1.718 m³

Total = 8.413 m³
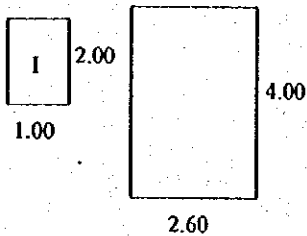
- Length = 3.25 m

   I = $1 \times 2 \times 1 \times 2$ = 4 m³

- Length = 0.3 m

   $\dfrac{(1 \times 2) + (2.60 \times 4)}{2} \times 0.30 \times 2$ = 3.72 m³

Total = 7.72 m³
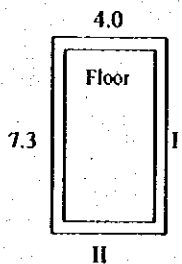
Floor of Home

t = 0.4 $(4 \times 7.2) \times 0.4 = 11.52$ m³

Wall House I = $0.2 \times 7.2 \times 3 \times 2$ = 8.64 m³

Wall House II = $0.2 \times 3.6 \times 3 \times 2$ = 4.32 m³

Window = $-(0.6 \times 3 + 0.2 + 0.6 \times 4 + 0.25) \times 1.25 \times 0.2$ = -1.162 m³

Total = 11.798 m³

Roof

$\dfrac{0.13 + 0.18}{2} \times 2.5 \times 2 \times 8.2$ = 6.355 m³

$\dfrac{0.13 + 0.23}{2} \times 0.05 \times 5 \times 6$ = 0.270 m³

Bridge = 7.2 m³

Total Concrete C1 = 140.14 + 8.413 + 7.72 + 11.52 + 11.798

       6.625 + 7.2 = 193.416 m³

2. SECONDARY CONCRETE

Floor $= 0.5 \times 0.3 \times 4.97$ $= 0.745 \, m^3$

$0.65 \times 0.4 \times 4.97$ $= 1.297 \, m^3$

Wall $= \{(0.485 \times 0.65) - (0.3 \times 0.3)\} \times 3.25 \times 2$ $= 1.464 \, m^3$

Column Wall $= \{1.06 \times 0.485 - (0.31 \times 0.31)\} \times 3.25 \times 2$ $= 2.717 \, m^3$

Column $= \{(0.485 \times 4.455 - (0.335 \times 1.005)\} \times 3.25 \times 2$ $= 2.398 \, m^3$

Total Secondary Concrete $= 8.621 \, m^3$

3. LEVELING CONCRETE

Horizontal $= \{11 + 0.4 - (0.4 \times 2)\} \times (6 + 0.4 - 0.4) \times 0.1$ $= 6.36 \, m^3$

$\{0.894 \times 0.1 \times (5.8 \times 2 + 11.00)\}$ $= 2.02 \, m^3$

Total $= 6.36 + 2.02$ $= 8.38 \, m^3$

4. STEEL SHEET PILE TYPE II

Length = 5.0 m, Width = 0.4

Length $= \dfrac{(6 - 0.3) \times 2 + (11.06)}{0.4} \times 5$ $= 272.5 \, m'$

$\cong 273 \, m'$

5. PHC PILE DIA 500, LENGTH = 22.6 m

Total Length $= 15 \times 22.6$ $= 339 \, m'$

6. GABION MATTRESS (3 x 1.5 x 0.5)

Volume $= (3 \times 6 \times 0.5) \times 2$ $= 18 \, m^3$

7. BRIDGE

Concrete Type C1

$3 \times 0.4 \times 6$ $= 7.20 \, m^3$

8. REINFORCING BAR

Gate $= 11,534 \, kg$

Roof $= 1,851 + 894 + 1,540$ $= 4,285 \, kg$

Bridge $= 305 + 93$ $= 398 \, kg$

Total Reinforcing Bar

$= 11,535 + 4,285 + 398$ $= 16,218 \, kg$

9. HAND RAIL

Horizontal

I	$= 6 \times 2 \times 5.57$	$=$	66.84 kg
II	$= 6 \times 2 \times 2.29$	$=$	27.48 kg

Column

I	$= (5 \times 0.8 \times 2) \times 2.29$	$=$	18.32 kg
Total		$=$	112.64 kg

10. FORM WORK

- Roof A

I	$= 1.492 \times 5$	$=$	7.46 m²
II	$= (5 \times 2 + 1.492 \times 2) \times 0.18$	$=$	2.33 m²
Sub Total		$=$	9.79 m²
Total	$= 2 \times 9.79$	$=$	19.58 m²

- Roof B

I	$= 1.285 \times 5$	$=$	6.425 m²
II	$= (5 \times 2 + 1.285 \times 2) \times 0.18$	$=$	2.26 m²
Sub Total		$=$	8.685 m²
Total	$= 4 \times 8.685$	$=$	34.74 m²

- Wall

Front W	$= \{7.2 \times 3 - 3.2 \times (2.260 - 0.9) - (1.22 \times 0.9)\} \times 2$	$=$	32.30 m²
Back W	$= \{7.2 \times 3 - (1.36 \times 2.9)\} \times 2$	$=$	35.32 m²
- Side Wall	$= \{(4 \times 3 - (0.25 \times 1.625)) \times 2\} \times 2$	$=$	46.36 m²
- Floor	$= 4 \times 7.2$	$=$	28.8 m²
- Column	$= \{(2 \times 1 + 1 \times 1) \times 2\} \times 2$	$=$	12 m²
	$\{2 + 1 + 2 + 1\} \times 2 \times 3.25$	$=$	39 m²

- Wall $= (9 + 1 + 9 + 1 + 0.485 \times 4) \times 3.250 \times 2$ $= 159.15 \ m^2$

- Toe $= (6 + 11 + 6) \times 1.8$ $= 41.4 \ m^2$

11×1 $= 11 \ m^2$

Total Form Work $= 19.58 + 34.74 + 32.3 + 35.32 + 46.36 + 28.8 + 12$

$+ 39 + 159.15 + 41.4 + 11$ $= 459.65 \ m^2$

O & M Bridge : $3 \times 4 + (0.4 \times 4) 2 + (0.4 \times 3) 2$

$= 12 + 3.2 + 2.4$

$= 19.68 \ m^2$

Total : $459.65 + 19.68 = 479.33 \ m^2$

11. THE STAIRS

Column: main pipe: length $= (5.80 - 0.85 + 0.85 + 1)$

$\varnothing\, 200 \quad = 6.80 \ m$

$\varnothing\, 216.3 / 8 \quad W = 41.1 \ kg/ m^3$

Weight of Column $= 6.8 \times 41.1$ $= 279.5 \ kg$
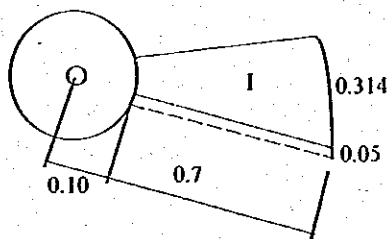
Area I $= \left\{ \dfrac{0.364 + 0.128}{2} \times 0.7 \right\} = 0.1722 \ m^2$

No. Of Plate $= 21$

Total Area I $= 21 \times 0.1722$ $= 3.616 \ m^2$
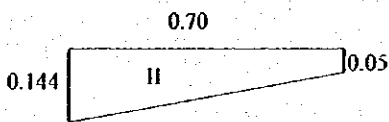
Area II $= \left\{ \dfrac{0.05 + 0.144}{2} \times 0.7 \right\} = 0.0679 \ m^2$

Total Area II $= 21 \times 0.0679$ $= 1.426 \ m^2$
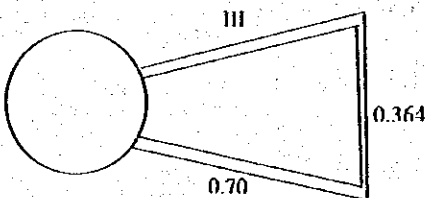
Plate III $= (0.7 + 0.364 + 0.7) \times 0.05 = 0.0882 \ m^2$

Tot. Area III $= 0.0882 \times 21$ $= 1.852 \ m^2$

Top Stairs $= 0.3 \times 0.9$ $= 0.27 \ m^2$

Bottom Stairs $= 0.8 \times 0.7$ $= 0.56 \ m^2$

Total Plate Area $= 3.616 + 1.426 + 1.852 + 0.27 + 0.56 = 7.724 \ m^2$

- GALVANIZED PIPE

Diameter 1.5" $\varnothing$ 42.7/ 2.3   W=5.57 kg/m'

Length $= 0.85 \times 24$ $=$ 20.4 m'

Diameter 2" $\varnothing$ 60.5/ 4   W=5.57 kg/m'

Length 1 $= 0.42 \times 20$ $=$ 8.4 m'

Length 2 $= 0.3 + 0.3$ $=$ 0.6 m'

Length 3 $= 0.6 + 0.3$ $=$ 0.9 m'

Total Length $=$ 9.9 m'

Weight $\varnothing$ 1.5" $= 20.4 \times 2.29$ $=$ 46.71 kg

Weight $\varnothing$ 2" $= 9.9 \times 5.57$ $=$ 55.14 kg

Total Weight $=$ 101.85 kg

12. FORM WORK FOR CONCRETE TYPE E

$0.1 \times (11.4 + 6.4) \times 2$ $=$ 3.56 m²

13. EXCAVATION
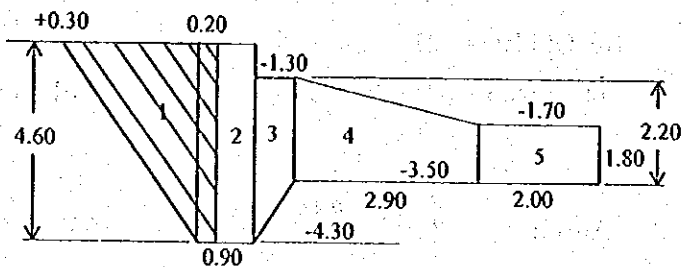
Volume 1 $= \dfrac{4.6 \times 4.6}{2} \times 11$ $=$ 116.38 m³

Volume 2 $= 4.6 \times 0.9 \times 11$ $=$ 45.54 m³

Volume 3 $= \dfrac{2.2 + 3.0}{2} \times 0.40 \times 11$ $=$ 11.44 m³

Volume 4 $= \dfrac{2.2 + 1.8}{2} \times 2.9 \times 11$ $=$ 63.80 m³

Volume 5 $= 1.8 \times 2 \times 11$ $=$ 39.60 m³

Sub Total $=$ 276.76 m³
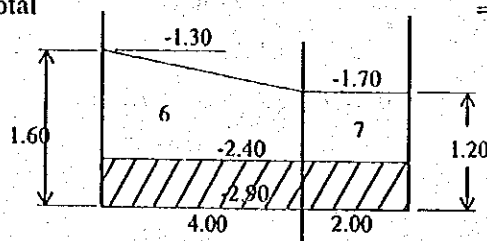
3 - 69

$$\text{Volume 6} \quad = \frac{1.2 + 1.6}{2} \times 4 \times 6 \quad = \quad 33.6 \ m^3$$

$$\text{Volume 7} \quad = 1.2 \times 2 \times 6 \quad = \quad 14.40 \ m^3$$

$$\text{Volume 8} \quad = \frac{1.4 \times 1.4}{2} \times 6 \times 2 \quad = \quad 11.76 \ m^3$$

$$\underline{\hspace{3cm}}$$

$$59.76 \ m^3$$

Total Excavation = 276.60 + 59.76 = 336.30 m³

Total Back fill = 116.38 + 11.76 + (0.2 x 4.6 x 11) = 138.26 m³

14. FALSE WORK

Floor of the House

$$\text{I} \quad = 4 \times 4 \times (3.25 + 4.25 + 0.3) \quad = \quad 124.8 \ m^3$$

$$\text{II} \quad = (4 \times 7.2 - 4 \times 4 - 2 \times 1 \times 2) \times (4.25 + 0.3) \ = \quad 38.28 \ m^3$$

Sub Total = 163.08 m³

Bridge

$$\text{I} \quad = 4 \times 3 \times 3.25 \quad = \quad 39.1 \ m^3$$

Total False Work = 202.18 m³

15. SCAFFOLDING

Wall	:	3 x 3.6 x 4	=	43.2 m²
		3 x 7.2 x 4	=	86.4 m²
Floor	:	0.4 x 4 x 2	=	3.2 m²
		0.4 x 7.2 x 2	=	5.76 m²
Column	:	2 x 4.25 x 4	=	34 m²
		1 x 4.25 x 4	=	17 m²
Wall	:	9 x 3.25 x 4	=	117 m²
		1 x 3.25 x 4	=	13 m²
Foundation			=	25.2 m²
Total Scaffolding			=	344.8 m²

16. WATER STOP
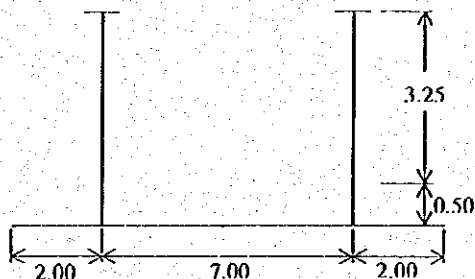
$$(3.25 + 0.5) \times 2 + 7 + 4 \quad = \quad 18.5 \ m$$

3.25

0.50

2.00 7.00 2.00

17. DOWEL

$$\frac{(17.5 / 0.5 \times 1 \times 2.23 \times 20)}{1\ m} = 156\ kg$$

Distance of Dowel = 0.5 m

18. ANCHOR BAR (D_{19} ; L=300)

a. For stop log grove

$$N = 6 \times 3 \times 2 \quad = \quad 36\ nos.$$
$$10 \times 4 \quad = \quad \underline{40\ nos.}$$
$$76\ nos.$$

b. For gate grove

$$N = 13 \times 5 \times 2 \quad = \quad 130\ nos.$$
$$10 \times 3 \quad = \quad \underline{30\ nos.}$$
$$160\ nos.$$

Total N = 236 nos.

Weight of anchor bar = 236 × 0.3 × 2.23 = 157.88 kg

ANCHOR PAD (D_{19})

For L = 1.05 m → N = 13 × 2 = 26 nos.

For L = 0.80 m → N = 6 × 6 = 36 nos.

Weight of anchor pad = {(1.05 × 26) + (0.8 × 36)} × 2.23

= 125.10 kg

TOTAL OF ANCHOR WEIGHT = 157.88 + 125.10 = 282.98 kg

TOTAL OF REINFORCING BAR = 16,218 + 283 = 16501 kg

SUMMARY OF SCAFOLDING AND FORM SUPPORT VOLUME, FOR BANDARHARJO DRAINAGE SYSTEM

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8	BARU RETARDING POND INLET STRUCTURE NO. 1	-	77
9	BARU RETARDING POND INLET STRUCTURE NO. 2	-	42
10	FUEL TANK BOX FOR BARU PUMPING STATION	133	62
	TOTAL	9618	4195

1. SCAFFOLDING

(A) Pier

$(8.5 + 9.3 + 2 \times 7.5) \times 9.0$ $\qquad$ = 295.20 m²

$(4 \times \frac{1}{4} \times \pi \times 0.5) \times 3.25$ $\qquad$ = 5.105 m²

Sub Total A $\qquad$ = 300.305 m²

(B) Operating Room

$(2 \times 4.0 + 2 \times 7.2) \times 3.4$ $\qquad$ = 76.16 m²

$(2 \times 3.7 + 2 \times 6.8) \times 3.0$ $\qquad$ = 63.0 m²

Sub Total B $\qquad$ = 139.16 m²

Total A + B $\qquad$ = 349.465 m²

2. FORM SUPPORT AREA

$4.0 \times 4.0 \times 7.50$ $\qquad$ = 120 m³

Package 3: E Buildings

NO.	ITEM OF WORK	UNIT	QUANTITY
I	EXCAVATION, FILLING & GRADING WORK		
1	Earth fill (new)	m3	22.45
2	Sand fill under foundation	m3	2.91
II	FOUNDATION WORK		
1	Stone masonry 1 : 3 : 10	m3	3.83
III	REINFORCEMENT CONCRETE WORK		
1	Concrete K-225	m3	34.73
2	Steel bar	m3	146.63
3	Steel bar (D 16)	m3	3617.60
IV	ROOFING WORK		
1	Wood Purlin	m3	0.70
2	Channel C Purlin	Kg	2916.80
3	Timber rafter	m2	411.80
4	Gutter timber batten	m2	13.06
5	Facing timber batten	m2	27.92
6	Roof ventilation frame	m3	0.35
7	Plywood roof cover	m2	411.80
8	Asphalt sheet roof cover	m2	411.80
9	Ceramic roof tile	m2	411.80
10	Ceramic ridge tile	m	27.92
11	Termite protection	Ls	1.00
12	Fiber cement roof tile	m2	4.06
13	Truss beagle & bolt	kg	18.00
V	CONCRETE BLOCK WORK & BRICKWORK		
1	Brick wall 1 : 3 : 10	m3	24.35
VI	PLASTER WORK		
1	Mortar plaster 1 : 3	m2	8.89
2	Mortar plaster 1 : 3 : 10	m2	383.90
3	Concrete plastering 1 : 2	m2	252.13
4	Hole ridge mortar plastering	m	156.00
5	Terra-cotta	m2	0.00
VII	DOORS & WINDOWS WORK		
1	Light concrete for ventilation	Pc	52.00
VIII	MISCELLANEOUS METAL WORK		
1	Steel door (sliding)	kg	109.52
2	Steel door (swing)	kg	82.80
3	Steel staircase	kg	755.24
4	Steel grill for pipe line	kg	89.71
5	Steel rail for crab	kg	687.16
6	Ventilation hole	kg	125.45
IX	INTERIOR FINISHING		
1	Fiber cement 6 mm + wood frame	m2	0.00
2	Wood cornice	m	0.00
X	TILE WORK		
1	Waterproofing mortar H=100 (for wall base)	m	42.75
2	Concrete plastering (for floor)	m2	200.82
XI	SANITARY WORK		
1	Water supply installation (PVC pipe D=19 mm)	m	12.00
2	Waste water installation (PVC pipe D = 110 mm)	m	4.00
3	Closet	pc	0.00
4	Hand sink	pc	1.00
5	Floor drain	pc	0.00
6	Septictank	unit	0.00
7	Water cock	pc	1.00
8	Bath tub (watertank)	pc	0.00

NO.	ITEM OF WORK	UNIT	QUANTITY
XII	ELECTRICAL WORK		
1	Installation & lighting 40W-1 FL	pc	7.00
2	Installation & lighting 40W-2 FL	pc	12.00
3	Installation & lighting 20W-1 FL	pc	0.00
4	Installation & lighting 15W-2 FL	pc	0.00
5	Installation & lighting 15W-1 FL	pc	0.00
6	Installation & lighting 10W-1 FL	pc	0.00
7	Installation & lighting 250W-1 H	pc	2.00
8	Lighting switch (single)	PC	2.00
9	Lighting switch (double)	pc	5.00
10	Outlet socket switch	pc	4.00
11	Outlet socket & Installation	pc	4.00
12	Lightning protector	pc	3.00
13	Fuse box	pc	1.00
14	Extinguisher 5 lt.	pc	2.00
15	Fuse	pc	3.00
16	New installation from PLN (2,200 VA)	pc	1.00
XIII	PAINTING WORK		
1	Wall painting	m2	573.90
2	Wood painting	m2	201.49
3	Wood protection painting	m2	0.00
4	Steel protection painting	m2	40.90
5	Ceiling painting	m2	388.82

Name of work	Height (M)	Lenth (M)	Each	Qty. (M2)	Subtotal (M2)	Total (M3)
BRICKBLOCK	7.50	5.50	2.00	82.50		
1 : 3 : 10	20.00	5.50	1.00	110.00		
	9.50	5.50	1.00	52.25		
	10.50	3.10	1.00	32.55	277.30	
	2.40	3.50	1.00	8.40		
	1.75	0.80	2.00	2.80		
	1.20	1.20	2.00	2.88		
	1.35	0.30	66.00	26.73		
	0.50	20.00	2.00	20.00		
	7.50	0.30	7.00	15.75		
	3.10	0.30	3.00	2.79		
	7.50	0.40	2.00	6.00	85.35	
					191.95	23.03

Name of work	Height (M)	Lenth (M)	Each	Qty. (M2)	Subtotal (M2)	Total (M2)
MORTAR PLASTERING	7.50	5.50	4.00	165.00		
1 : 3 : 10	20.00	5.50	2.00	220.00		
	9.50	5.50	2.00	104.50		
	10.50	3.10	2.00	65.10	554.60	
	2.40	3.50	2.00	16.80		
	1.75	0.80	4.00	5.60		
	1.20	1.20	4.00	5.76		
	1.35	0.30	132.00	53.46		
	0.50	20.00	4.00	40.00		
	7.50	0.30	14.00	31.50		
	3.10	0.30	6.00	5.58		
	7.50	0.40	4.00	12.00	170.70	
					383.90	383.90

Name of work	Height (M)	Lenth (M)	Each	Qty. (M2)	Subtotal	Total (M2)
CONCRETE PLASTERING	7.50	1.10	7.00	57.75		
1 : 2	3.10	1.10	3.00	10.23		
	7.50	1.10	2.00	16.50		
	20.00	1.10	2.00	44.00		
	0.50	20.00	2.00	20.00		
	0.50	7.50	2.00	7.50		
	1.05	17.50	3.00	55.13		
	1.05	12.50	1.00	13.13		
	1.05	7.50	2.00	15.75		
	0.90	4.50	3.00	12.15		252.13

Name of work	Wide (M)	Lenth (M)	Each	Weight (Kg)	Subtotal (Kg)	Total (Kg)
STAIR & RAILING						
C-TYPE 200x75x25x3.2		2.92	2.00	5.84	55.60	
PIPE D=50.8		2.80	2.00	5.60	15.96	
PIPE D= 38.1		0.76	4.00	3.04	5.78	
S-ANGLE 50x50x6		0.16	20.00	3.20	14.18	
S-PLATE t= 5 mm	0.70	0.44	10.00	3.08	120.74	
S-PLATE t= 5 mm	0.10	0.06	4.00	0.02	0.86	
S-PLATE t= 5 mm	0.18	0.22	4.00	0.15	6.04	
PIPE D=50.8		4.20	2.00	8.40	23.94	
PIPE D= 38.1		0.76	6.00	4.56	8.66	251.75
				251.75	X 3	755.24
Anchor bolt 14 mm			20.00			20.00

Name of work		Vol. (M3)	Each	Qty. (M3)	Subtotal	Total (M3)
CONCRETE FRAME		0.06	2.00	0.12	0.23	
FOR RADIATOR HOLE		0.09	1.00	0.09	0.18	0.41
				0.41	X 2	0.83

Name of work			Lenth (M)	Each	Qty. (M)	Weight (Kg/M)	Total (Kg)
STEEL FRAME	C-TYPE	120X60X2	4.00	2.00	6.51	52.08	
FOR RADIATOR HOLE	PLAIN-S	D=12	1.00	12.00	0.89	10.64	
						62.72	
					62.72	X 2	125.45

Name of work	Height (M)	Lenth (M)	Each	Qty. (M)	Weight (Kg/M)	Total (Kg)
STEEL RAIL		20.00	2.00	40.00	22.29	891.60
FOR CRAB						

Name of work	Height (M)	Lenth (M)	Each	Qty. (M)	Weight (Kg/M)	Total (Kg)
STEEL GRILL	0.03	0.15	21.00	6.60	0.98	20.79
FOR PIPE LINE	0.03	0.15	21.00	15.88	0.98	50.02
	0.03	0.15	21.00	6.00	0.98	18.90
						89.71

Name of work		Length	Each	Qty.	Weight (Kg/M)	Subtotal (Kg)	Total (M3)
ST- DOOR (SLIDING)							
O-TYPE	60x60x1.6	2.70	1.00	1.00	1.51	4.06	
	60x60x1.6	2.40	4.00	1.00	1.51	14.45	
U-TYPE	60x30x1.6	2.40	1.00	1.00	1.13	2.71	
	60x30x1.6	2.70	1.00	1.00	1.13	3.05	
	60x30x1.6	2.45	1.00	1.00	1.13	2.77	
S-PLATE	t=3.2 mm	1.32	2.20	2.00	2.51	14.57	
	t=3.2 mm	0.64	2.20	2.00	2.51	7.06	
	t=3.2 mm	0.80	0.18	2.00	2.51	0.72	
	t=6.0 mm	0.20	0.26	3.00	4.70	0.73	
	t=6.0 mm	0.07	0.08	4.00	4.70	0.11	
	t=6.0 mm	0.20	0.10	2.00	4.70	0.19	
L-TYPE	65X65X6	5.00	1.00	2.00	5.91	59.10	109.52

Name of work	Height (M)	Lenth (M)	Each	Qty.	Subtotal (M2)	Total (M2)
WALL BASE	0.10	20.00	1.00		20.00	
MORTAR PLASTERING 1 : 2	0.10	7.50	1.00		7.50	
	0.10	5.75	1.00		5.75	
	0.10	9.50	1.00		9.50	42.75

Name of work	Height (M)	Lenth (M)	Each	Qty.	Subtotal (M2)	Total (M2)
WALL PAINTING	7.50	5.50	4.00		165.00	
	20.00	5.50	2.00		220.00	
	9.50	5.50	2.00		104.50	
	10.50	3.10	2.00		65.10	
	7.50	1.10	7.00		57.75	
	3.10	1.10	3.00		10.23	
	7.50	1.10	2.00		16.50	
	20.00	1.10	2.00		44.00	
	0.50	20.00	2.00		20.00	
	0.50	7.50	2.00		7.50	710.58

Name of work	Height (M)	Lenth (M)	Each	Qty.	Subtotal (M2)	Total (M2)
WALL PAINTING	2.40	3.50	2.00		16.80	
	1.75	0.80	4.00		5.60	
	1.20	1.20	4.00		5.76	
	1.35	0.30	48.00		19.44	
	0.50	20.00	4.00		40.00	
	7.50	0.30	14.00		31.50	
	3.10	0.30	6.00		5.58	
	7.50	0.40	4.00		12.00	
					136.68	
					573.90	573.90

Name of work	Height (M)	Lenth (M)	Each	Qty.	Subtotal (M2)	Total (M2)
CEILING PAINT PLYWOOD	7.00	18.00	2.00	252.00		
	7.00	5.25	2.00	73.50	325.50	
	1.05	17.50	3.00	55.13		
	1.05	12.50	1.00	13.13		
	1.05	7.50	2.00	15.75		
	0.90	4.50	3.00	12.15	96.15	
	7.00	0.07	46.00	22.54		
	7.00	0.07	21.00	10.29	32.83	
					388.82	388.82

Name of work	Height (M)	Lenth (M)	Each	Qty.	Subtotal (M2)	Total (M2)
CONCRETE PLASTERING (for floor)	7.50	20.00	1.00		150.00	
	0.50	10.50	1.00		5.25	
	0.50	1.75	1.00		0.88	
	10.50	1.00	1.00		10.50	
	7.50	1.00	1.00		7.50	
	1.50	0.80	1.00		1.20	
	1.62	0.80	1.00		1.30	
	6.00	4.00	1.00		24.00	200.62

Name of work	Height (M)	Lenth (M)	Wide	Qty. (M)	Subtotal (Pc)	Total (Pc)
LIGHT CONCRETE FOR VENTILATION HOLE	0.05	0.40	0.40	16.00		
	0.05	0.40	0.40	8.00		
	0.05	0.40	0.40	8.00		
	0.05	0.40	0.40	20.00	52.00	52.00

Name of work	Height (M)	Lenth (M)	Wide	Qty. (M)	Subtotal	Total (M3)
CONCRETE FOR RAMP	0.10	6.20	3.60	1.00		2.23
SAND BEND	0.10	6.20	3.60	1.00	2.23	
	0.10	3.60	0.45	1.00	0.16	
	0.10	6.00	0.45	1.00	0.27	
	0.10	0.90	0.30	9.00	0.24	2.91
EARTH FILL	1.80	6.20	3.60	0.50		20.09
STONE MASONRY	0.45	3.60	0.30	1.00	0.49	
	1.20	6.20	0.45	1.00	3.35	3.83

Name of work	Weight (Kg/M)	Lenth (M)	Wide	Qty.	Subtotal	Total (Kg)
STEEL BAR 10 mm	0.62	6.30		19.00	73.72	
	0.62	3.70		32.00	72.91	146.63

Name of work	Weight (Kg/M)	Lenth (M)	Wide	Qty.	Subtotal	Total (Kg)
GALVANISH PIPE	3.13	0.90		3.00	8.45	
	3.13	3.20		1.00	10.01	18.46
STEEL PLATE	0.006	0.10	0.10	3.00		1.41

Name of work	Height (M)	Lenth (M)	Wide	Qty. (M)	Subtotal	Total (M3)
BRICKBLOCK 1 : 3 : 10	0.40	0.90	0.30	9.00		0.97
	0.85	2.70	0.15	1.00	0.34	0.34

Name of work	Height (M)	Lenth (M)	Wide	Qty. (M)	Subtotal	Total (M3)
MORTAR PLASTER 1 : 3 : 10		0.90	0.47	9.00	3.81	
		0.85	2.70	1.00	2.30	
		0.45	6.20	1.00	2.79	8.89

NO.	ITEM OF WORK	UNIT	QUANTITY
I	EXCAVATION, FILLING & GRADING WORK		
1	Earth cut	m³	96.83
2	Earth fill (old)	m³	34.10
3	Earth fill (new)	m³	17.25
4	Sand fill	m³	14.36
5	Sand fill under foundation	m³	8.71
II	FOUNDATION WORK		
1	Dry stone masonry	m³	14.74
2	Stone masonry 1 : 3 : 10	m³	7.04
3	Brick block 1 : 3 : 10	m³	5.69
III	REINFORCEMENT CONCRETE WORK		
1	Concrete K·225	m³	4.19
2	Steel bar	kg	1605.64
3	Steel bar (D 16)	kg	0.00
4	Light concrete	m³	10.05
IV	ROOFING WORK		
1	Wood truss	m³	2.60
2	Wood Purlin	m³	1.75
3	Timber rafter & timber batten	m²	296.21
4	Gutter timber batten	m²	17.40
5	Facing timber batten	m²	2.22
6	Roof ventilation frame	m³	0.66
7	Aluminum sheet	m²	14.00
8	Plywood roof cover	m²	296.21
9	Asphalt sheet roof cover	m²	296.21
10	Ceramic roof tile	m²	296.21
11	Ceramic ridge tile	m	44.00
12	Termite protection	Ls	1.00
13	Fiber cement roof tile	m²	4.06
14	Truss beagle & bolt	kg	30.00
V	CONCRETE BLOCK WORK & BRICKWORK		
1	Brick wall 1 : 3	m³	3.72
2	Brick wall 1 : 3 : 10	m³	16.62
VI	PLASTER WORK		
1	Mortar plaster 1 : 3	m²	62.07
2	Mortar plaster 1 : 3 : 10	m²	289.41
3	Concrete plastering 1 : 2	m²	22.79
4	Terra-cotta	m²	31.60
VII	DOORS & WINDOWS WORK		
1	Aluminum awakening	m	189.07
2	Double plywood door (Teak frame)	m²	0.00
3	Aluminum door frame	m²	49.00
4	Aluminum sliding-window frame	m²	126.44
5	Door keys for aluminum door	pc	4.00
6	Door keys for wood door	pc	4.00
7	Door keys for toilet door	m²	1.00
8	Espagnolete	pr	3.00
9	Door hinges (125 mm)	pr	11.00
10	Window hinges (75 mm)	pr	6.00
11	Double teakwood door (w/ louver)	m²	6.36
12	Wood frame for ventilation	m³	0.41
13	Door stopper	pc	8.00
VIII	GLAZING WORK		
1	Float glass 5 mm (natural color)	m²	29.78
2	Float glass 8 mm (natural color)	m²	2.20
3	Mirror for lavatory 5 mm	m²	0.24
4	Etching glass 5 mm	m²	0.18

NO.	ITEM OF WORK	UNIT	QUANTITY
IX	MISCELLANEOUS METAL WORK		
1	Roof ventilation hole	kg	29.00
X	INTERIOR FINISHING		
1	Fiber cement 6 mm + wood frame	m²	170.40
2	Wood cornice	m	186.00
XI	TILE WORK		
1	Ceramic tile 300 x 300	m²	104.00
2	Ceramic tile 300 x 300 (textured, non-slip)	m²	34.26
3	Ceramic tile 200 x 200 (for wall covered)	m²	13.44
4	Ceramic tile 200 x 200 (textured, non-slip)	m²	3.13
5	Float glass H=100 mm, rayband (for wall base)	m	112.00
XII	SANITARY WORK		
1	Water supply installation (PVC pipe D=19 mm)	m	12.00
2	Waste water installation (PVC pipe D = 110 mm)	m	8.00
3	Water closet	pc	1.00
4	Kitchen Washbak	pc	1.00
5	Floor drain	pc	1.00
6	Septictank	unit	1.00
7	Water cock	pc	2.00
8	Bath tub (watertank)	pc	1.00
9	Kitchen table (reinforcement concrete)	m³	0.14
XIII	ELECTRICAL WORK		
1	Installation & lighting 40W-1 FL	pc	0.00
2	Installation & lighting 40W-2 FL	pc	11.00
3	Installation & lighting 20W-1 FL	pc	9.00
4	Installation & lighting 15W-2 FL	pc	0.00
5	Installation & lighting 15W-1 FL	pc	0.00
6	Installation & lighting 10W-1 FL	pc	0.00
7	Installation & lighting 250W-1 H	pc	0.00
8	Lighting switch (single)	pc	5.00
9	Lighting switch (double)	pc	3.00
10	Outlet socket switch	pc	7.00
11	Outlet socket & Installation	pc	7.00
12	Fuse box	pc	1.00
13	Waterpump	pc	1.00
14	Fuse	pc	3.00
15	New installation from PLN (1,300 VA)	Unit	1.00
XIV	PAINTING WORK		
1	Wall painting	m²	232.61
2	Wood painting	m²	11.96
3	Polish	m²	12.72
4	Wood protection painting	Ls	1.00
5	Steel protection painting	m²	1.78
6	Ceiling painting	m²	170.40
XV	FURNITURE		
1	Office table	Unit	6.00
2	Meeting table	Unit	1.00
3	Meeting chair	Unit	8.00
4	Filling cabinet	Unit	6.00
5	Sofa	Unit	1.00
6	Portable stove	Unit	1.00

Name of work	Height (M)	Lenth (M)	Wide (M)	Qty.	Subtotal (M3)	Total (M3)
EARTH FILL	0.12	18.00	6.00		12.96	
	0.12	0.90	8.00		0.89	
	0.12	0.90	12.00		1.30	
	0.12	1.50	6.00		1.08	
	0.12	0.90	9.50		1.03	17.25

Name of work	Height (M)	Lenth (M)	Wide (M)	Qty.	Subtotal (M3)	Total (M3)
SAND FILL	0.10	18.00	6.00		10.80	
	0.10	0.90	8.00		0.72	
	0.10	0.90	12.00		1.08	
	0.10	1.50	6.00		0.90	
	0.10	0.90	9.50		0.86	14.36

Name of work	Height (M)	Lenth (M)	Wide (M)	Qty.	Subtotal (M3)	Total (M3)
LIGHT CONCRETE	0.07	18.00	6.00		7.56	
	0.07	0.90	8.00		0.50	
	0.07	0.90	12.00		0.76	
	0.07	1.50	6.00		0.63	
	0.07	0.90	9.50		0.60	10.05

Name of work	Height (M)	Lenth (M)	Wide (M)	Qty. (M2)	Subtotal (M2)	Total (M3)
BRICKBLOCK 1 : 3	0.60	18.00	2.00	21.60		
	0.60	6.00	4.00	14.40		
	0.60	2.00	2.00	2.40		
				38.40		
	0.60	1.50	3.00	2.70		
	0.60	0.80	4.00	1.92		
	0.60	0.90	1.00	0.54		
	0.15	0.60	24.50	2.21		
				7.37	31.04	3.72

Name of work	Height (M)	Lenth (M)	Wide (M)	Qty. (M2)	Subtotal (M2)	Total (M3)
BRICKBLOCK 1 : 3 : 10	3.10	18.00	2.00	111.60		
	3.10	6.00	4.00	74.40		
	3.10	2.00	2.00	12.40	198.40	
	2.00	1.45	9.00	26.10		
	1.50	1.65	2.00	4.95		
	0.80	1.65	4.00	5.28		
	0.65	1.40	1.00	0.91		
	1.01	0.50	4.00	2.02		
	1.90	1.50	1.00	2.85		
	0.90	1.65	1.00	1.49		
	3.10	0.15	24.50	11.39		
	1.10	1.40	1.00	1.54		
	0.20	0.20	85.00	3.40	59.93	
					138.47	16.62

Name of work	Height (M)	Lenth (M)	Wide (M)	Qty.	Subtotal (M2)	Total (M3)
TERRACOTA	0.80	1.20	4.00		3.84	
	1.20	2.20	1.00		2.64	
	1.20	4.20	1.00		5.04	
	1.20	2.30	2.00		5.52	
	0.80	2.30	2.00		3.68	
	0.80	2.40	2.00		3.84	
	0.80	4.40	2.00		7.04	31.60

Name of work	Height (M)	Lenth (M)	Wide (M)	Qty.	Subtotal (M2)	Total (M2)
MORTAR PLASTERING 1 : 3	0.60	18.00	4.00		43.20	
	0.60	6.00	8.00		28.80	
	0.60	2.00	4.00		4.80	
					76.80	
	0.60	1.50	6.00		5.40	
	0.60	0.80	8.00		3.84	
	0.60	0.90	2.00		1.08	
	0.15	0.60	49.00		4.41	
					14.73	62.07

Name of work	Height (M)	Lenth (M)	Wide (M)	Qty.	Subtotal (M3)	Total (M3)
MORTAR PLASTERING 1 : 3 : 10	3.10	18.00	4.00		223.20	
	3.10	6.00	8.00		148.80	
	3.10	2.00	4.00		24.80	
					396.80	
	2.00	1.45	18.00		52.20	
	1.50	2.25	4.00		13.50	
	0.80	2.25	8.00		14.40	
	0.65	1.40	2.00		1.82	
	1.01	0.50	8.00		4.04	
	2.50	1.50	2.00		7.50	
	0.90	2.25	2.00		4.05	
	1.10	1.40	2.00		3.08	
	0.20	0.20	170.00		6.80	
					107.39	289.41

Name of work	Height (M)	Lenth (M)	Wide (M)	Qty.	Subtotal (M3)	Total (M3)
CONCRETE PLASTERING 1 : 2	2.50	0.15		49.00	18.38	
	0.15	0.60		49.00	4.41	
					22.79	22.79

Name of work	Height (M)	Each	Qty.		Subtotal (M)	Total (M)
ALUMINIUM AWAKENING	1.35	2.00	9.00		24.30	
	2.01	2.00	9.00		36.09	
	2.20	2.00	1.00		4.40	
	0.90	1.00	1.00		0.90	
	1.50	1.00	2.00		3.00	
	2.20	2.00	2.00		8.80	
	2.50	2.00	1.00		5.00	
	1.50	1.00	1.00		1.50	
	2.00	1.00	1.00		2.00	
	1.35	1.00	1.00		1.35	
	1.15	1.00	1.00		1.15	
	2.20	2.00	1.00		4.40	
	2.20	2.00	1.00		4.40	
	1.45	1.00	1.00		1.45	
	0.65	1.00	1.00		0.65	
	2.20	2.00	3.00		13.20	
	1.76	1.00	3.00		5.28	
	0.96	1.00	3.00		2.88	
	0.50	1.00	3.00		1.50	
	1.06	2.00	1.00		2.12	
	0.50	3.00	1.00		1.50	
					125.87	125.87

Name of work	Height (M)	Each	Qty.	Qty.	Subtotal (M)	Total (M)
ALUMINIUM WINDOWS FRAME	0.65	6.00	9.00		35.10	
	1.35	6.00	9.00		72.90	
	0.58	2.00	2.00		2.30	
	1.35	4.00	1.00		5.40	
	1.35	2.00	1.00		2.70	
	0.60	2.00	1.00		1.20	
	0.40	8.00	1.00		3.20	
	0.46	4.00	2.00		3.64	
					126.44	126.44

Name of work	Height (M)	Each	Qty.	Qty.	Subtotal (M)	Total (M)
ALUMINIUM DOOR FRAME	2.20	4.00	2.00	17.60		
	0.50	6.00	2.00	6.00		
	2.50	4.00	1.00	10.00		
	0.50	3.00	2.00	3.00		
	2.20	2.00	2.00	8.80		
	0.60	3.00	2.00	3.60		
				49.00		49.00

Name of work	Height (M)	Lenth (M)	Each	Qty.	Subtotal (M2)	Total (M2)
GLASS 5 mm NATURAL	0.64	1.35	27.00		23.15	
	0.60	1.35	1.00		0.81	
	1.90	1.00	2.00		3.80	
	2.20	1.00	1.00		2.20	
	1.00	1.30	1.00		1.30	
	0.40	0.45	4.00		0.72	
					31.98	31.98

Name of work	Height (M)	Lenth (M)	Each	Qty.	Subtotal (M2)	Total (M2)
WOOD DOOR	0.70	2.20	4.00		6.16	6.16

Name of work	Height (M)	Lenth (M)	Wide (M)	Qty.	Subtotal (M3)	Total (M3)
WOOD VENTILATION HOLE	0.03	0.20	0.80	85.00		0.41

Name of work	Height (M)	Lenth (M)	Each	Qty.	Subtotal (M2)	Total (M2)
BLUR GLASS	0.40	0.45	1.00		0.18	0.18

Name of work	Height (M)	Lenth (M)	Wide (M)	Qty. (M)	Subtotal (M3)	Total (M3)
CEILING	2.00	2.00	3.00	12.00		
	6.00	4.00	1.00	24.00		
	6.00	12.00	1.00	72.00		
	1.20	20.00	2.00	48.00		
	1.20	6.00	2.00	14.40		
				170.40		170.40

Name of work	Height (M)	Each		Qty.	Subtotal (M)	Total (M)
CEILING CORNICE	18.00	4.00			72.00	
	6.00	8.00			48.00	
	2.00	5.00			10.00	
	20.00	2.00			40.00	
	8.00	2.00			16.00	
					186.00	186.00

Name of work	Height (M)	Lenth (M)	Qty.		Subtotal (M2)	Total (M2)
CERAMIC TILE 30 X 30	12.00	6.00	1.00		72.00	
	4.00	6.00	1.00		24.00	
	2.00	2.00	2.00		8.00	
					104.00	104.00

Name of work	Height (M)	Lenth (M)	Qty.		Subtotal (M2)	Total (M2)
CERAMIC TILE 30 X 30 (NON-SLIP)	0.90	12.00	1.00		10.80	
	0.90	8.00	1.00		7.20	
	0.90	9.40	1.00		8.46	
	0.60	6.00	1.00		3.60	
	0.70	6.00	1.00		4.20	
					34.26	34.26

Name of work	Height (M)	Lenth (M)	Qty.		Subtotal (M2)	Total (M2)
CERAMIC TILE 20 X 20 (FOR WALL)	0.60	0.80	1.00		0.48	
	0.60	0.60	4.00		1.44	
	1.60	2.00	3.00		9.60	
	1.20	1.60	1.00		1.92	
					13.44	13.44

Name of work	Height (M)	Lenth (M)	Wide (M)	Qty. (M)	Subtotal (M)	Total (M)
WALL BASE RAYBAND GLASS 5 mm	18.00	3.00		54.00		
	6.00	7.00		42.00		
	2.00	4.00		8.00		
	2.00	4.00		8.00		
				112.00		112.00

Name of work	Height (M)	Lenth (M)	Each		Subtotal (M2)	Total (M2)
WALL PAINTING	3.00	18.00	2.00		108.00	
	3.00	6.00	5.00		90.00	
	2.80	2.00	12.00		67.20	
	2.80	18.00	2.00		100.80	
	2.80	6.00	2.00		33.60	
					399.60	
	18.00	3.00	0.10		5.40	
	6.00	7.00	0.10		4.20	
	2.00	4.00	0.10		0.80	
	2.00	4.00	0.10		0.80	
	0.60	0.80	1.00		0.48	
	0.60	0.60	4.00		1.44	
	1.60	2.00	3.00		9.60	
	1.20	1.60	1.00		1.92	
	2.00	1.45	9.00		26.10	
	1.50	2.25	2.00		6.75	
	0.80	2.25	4.00		7.20	
	0.65	1.40	1.00		0.91	
	1.01	0.50	4.00		2.02	
	2.50	1.50	1.00		3.75	
	0.90	2.25	1.00		2.03	
	1.10	1.40	1.00		1.54	
	0.20	0.20	85.00		3.40	
	0.60	1.50	3.00		2.70	
	0.60	0.80	4.00		1.92	
	0.60	0.90	1.00		0.54	
					83.50	
					166.99	232.61

Name of work	Height (M)	Lenth (M)	Each		Subtotal (M2)	Total (M2)
CEILING PAINT	2.00	2.00	3.00		12.00	
	6.00	4.00	1.00		24.00	
	6.00	12.00	1.00		72.00	
	1.20	20.00	2.00		48.00	
	1.20	6.00	2.00		14.40	
					170.40	170.40

Name of work	Height (M)	Lenth (M)	Each		Subtotal (M2)	Total (M2)
CERAMIC TILE	1.40	2.00	1.00		2.80	
20 X 20 (NON-SLIP)	0.60	0.55	1.00		0.33	
					3.13	3.13