1-8 COST DATA FOR LOW-RISE HOUSES

D-15 (2 Unit/Building)

FLOOR AREA — NET 18.00 M² / GROSS 18.00 M²

Section	Item		Volume	Unit	Unit cost ×10³Rp	Cost ×10³Rp	Sub-total ×10³Rp	Note
Temporary Work		Warehouse	2	Unit	0.90	1.80		
		Temp. water	2	Unit	1.20	2.40		
		Grading	-	-	-	-		-See. land development
		Setting & staking out	42.00	M	0.175	7.35		-per wall length (M)
		Scaffolding		Unit	4.50, 9.00		11.55	-only for 2F
Earth Work		Insectisidation	-	M	1.26			-Other cost incl. foundation and floor work
Masonry & Concrete Work	Foundation	F_1		M	5.96			
		F_2		M	3.33			
		F_3		M	3.07			
		F_4	38.60	M	2.69	103.83		
	1F. Floor	Slab on grade	36.00	M²	1.79	64.44		
		Soil floor		M²	0.11			
	Ridge stone	F_3		M	0.72			
		F_4	8.70	M	0.47	4.09		
	Concrete block	HB-15		M²	2.99			
		HB-10	71.69	M²	2.27	162.74		
		Finish plaster		M²	0.92			
		WC/M floor mortar	26.01	M²	1.34	34.85		
	RC-Course	C_1		M	3.81			
		C_2		M	2.92			
		C_3		M	2.38			-incl. horizontal RC-brace
		C_4		M	3.37			
		C_5		M	3.77			
		C_6	30.79	M	2.03	62.50		
	Wall reinforcement	A-1	11.60	M	0.41	4.76		
		A-2	5.80	M	1.16	6.73		
		A-3	5.80	M	0.86	4.99		
	2F. Floor	RC floor S_1		M²	13.16			
		RC floor S_2		M²	11.76		448.93	
Wood Work	Upper wall etc.	Wood floor		M²	7.02			
		Head plate	24.00	M	0.41	9.84		-incl. bolts + nuts
		Upper unit wall	6.00	M²	5.76	34.56		
		Other upper wall	12.00	M²	2.40	28.80		
		Upper staircase		Set				
		Upper WC/M	2	Set	2.70	5.40		
	Handrail	Wooden rail		Unit				
		Pipe rail		Unit	10.76			
	Staircase	(Wooden)		Unit			78.60	
Ceiling Work	Ceiling	Asbestos		M²	2.38			-per horizontal M²
Door & Window Work		J_{1B}	2	Pc	12.00	24.00		
		J_{1}	2	Pc	18.83	37.66		
		J_{2}	2	Pc	11.58	23.16		
				Pc				
				Pc				
				Pc				
	Lock + Hook		2+0	Pc	2.50+0.20	5.00	89.82	
Roof Work	Rafter + Batten + Tile		33.60	M²	5.82	195.55		-per horizontal M² (incl. laves)
	Canopy			Set				
	Ridge tile		4	M	1.04	4.16		
	Ridge column		2	Pc	L×1.44+1.79	8.04		L = 1.55M
	Ridge board		4	M	1.52	6.08		
	Brace		2	Pc	4.00	8.00		
	Eaves fascia		29.20	M	0.35	10.22		
	Valley gutter		4	M	2.40	9.60		
	Down pipe		4	M	1.80	7.20		
	Water-tightening		25.6	M	1.65	42.24		
	Collar			Pc			291.09	
Plumbing Work	Water tub		2	Unit	5.50	11.00		
	Closet		2	Unit	7.00	14.00		
	Cleanout, Trap		4	Pc	3.00	12.00		
	Waste pipe		12.00	M	3.60	43.20		
	Water pipe		14.00	M	0.62	8.68		
	Water head		4	Pc	1.50	6.00		
	Kitchen sink		2	Unit	7.00	14.00		
	Connection pit		2	Unit	3.00	6.00	114.88	
Electrical Work	Fixture etc.		2	Unit	42.00	84.00		
	Power intake	-	-	Unit	-	-	84.00	-See. electricity cost
Outside Work	Step plate + gutter plate		12+2	Pc	0.30+0.90	5.40		
	Fence			M	1.61		5.40	-incl. foundation
Painting	Painting			M²				-incl. each item
Other Work	Guard		2	Unit	1.20	2.40		
	Cleaning		2	Unit	0.46	0.92		
	ALAP² Keselamato Karja		2	Unit	0.60	1.20	4.52	
Total	1,128.79 Rp/Building × 1.1 ÷ (2) Unit = 620.83 ×10³Rp/Unit ÷ 18.0 M² = 34.49 ×10³Rp/M²							

D-21 (2 Unit/Building)

FLOOR AREA — NET 24.00 M² — GROSS 24.00 M²

Section	Item		Volume	Unit	Unit cost ×10³Rp	Cost ×10³Rp	Sub-total ×10³Rp	Note
Temporary Work		Warehouse	2	Unit	0.90	1.80		
		Temp. water	2	Unit	1.20	2.40		
		Grading	-	-	-	-		-See. land development
		Setting & staking out	54	M	0.175	9.45		-per wall length (M)
		Scaffolding	-	Unit	4.50, 9.00	-	13.65	-only for 2F
Earth Work		Insectisidation		M	1.26			-Other cost incl. foundation and floor work
Masonry & Concrete Work	Foundation	F_1		M	5.96			
		F_2		M	3.33			
		F_3		M	3.07			
		F_4	50.60	M	2.69	136.83		
	1F. Floor	Slab on grade	60.00	M²	1.79	107.40		
		Soil floor		M²	0.11			
	Ridge stone	F_5		M	0.72			
		F_6	14.00	M	0.47	6.58		
	Concrete block	HB-15		M²	2.99			
		HB-10	91.94	M²	2.27	208.70		
		Finish plaster		M²	0.92			
		WC/M floor mortar	26.01	M²	1.34	34.85		
	RC-Course	C_1		M	3.81			
		C_2		M	2.92			
		C_3		M	2.38			-incl. horizontal RC-brace
		C_4		M	3.37			
		C_5		M	3.77			
		C_6	49.58	M	2.03	100.65		
	Wall reinforcement	A-1	34.80	M	0.41	14.27		
		A-2	-	M	1.16			
		A-3	14.50	M	0.86	12.47		
	2F. Floor	RC floor S_1		M²	13.16			
		RC floor S_2		M²	11.76		621.75	
		Wood floor		M²	7.02			
Wood Work	Upper wall etc.	Head plate	30.00	M	0.41	12.30		-incl. bolts + nuts
		Upper unit wall	10.38	M²	5.76	59.79		
		Other upper wall	10.38	M²	2.40	24.91		
		Upper staircase		Set				
		Upper WC/M		Set		5.40		
	Handrail	Wooden rail		Unit				
		Pipe rail		Unit	10.76			
	Staircase	(Wooden)		Unit			102.40	
Ceiling Work	Ceiling	Asbestos		M²	2.38			-per horizontal M²
Door & Window Work		J_1	4	Pc	12.00	48.00		
		J_2	4	Pc	18.83	75.32		
		J_3	2	Pc	11.58	23.16		
				Pc				
				Pc				
				Pc				
	Lock + Hook		2+2	Pc	2.50+0.20	5.40	151.88	
Roof Work	Rafter + Batten + Tile		49.20	M²	5.82	286.34		-per horizontal M² (incl. laves)
	Canopy			Set				
	Ridge tile		6.00	M	1.04	6.24		
	Ridge column		2	Pc	L×1.44+1.79	8.04		L = 1.55M
	Ridge board		6.00	M	1.52	9.12		
	Brace		2	Pc	4.00	8.00		
	Eaves fascia		33.20	M	0.35	11.62		
	Valley gutter		4.00	M	2.40	9.60		
	Down pipe		4.00	M	1.80	7.20		
	Water-tightening		27.20	M	1.65	44.88		
	Collar			Pc			391.04	
Plumbing Work	Water tub		2	Unit	5.50	11.00		
	Closet		2	Unit	7.00	14.00		
	Cleanout, Trap		4	Pc	3.00	12.00		
	Waste pipe		12.00	M	3.60	43.20		
	Water pipe		14.00	M	0.62	8.68		
	Water head		4	Pc	1.50	6.00		
	Kitchen sink		2	Unit	7.00	14.00		
	Connection pit		2	Unit	3.00	6.00	114.88	
Electrical Work	Fixture etc.		2	Unit	42.00	84.00		
	Power intake	-	-	Unit	-	-	84.00	-See. electricity cost
Outside Work	Step plate + gutter plate		12+2	Pc	0.30+0.90	5.40		
	Fence			M	1.61		5.40	-incl. foundation
Painting	Painting			M²				-incl. each item
Other Work	Guard		2	Unit	1.20	2.40		
	Cleaning		2	Unit	0.46	0.92		
	ALAF[1] Keselamato Karja		2	Unit	0.60	1.20	4.52	

Total 1,489.52 Rp/Building × 1.1 ÷ (2) Unit = 819.24 ×10³Rp/Unit ÷ 24 M² = 34.14 ×10³Rp/M²

D-36					(2 Unit/Building)		FLOOR AREA	NET 36.00 M²
								GROSS 36.00 M²
Section	Item		Volume	Unit	Unit cost ×10³Rp	Cost ×10³Rp	Sub-total ×10³Rp	Note
Temporary Work		Warehouse	2	Unit	0.90	1.80		
		Temp. water	2	Unit	1.20	2.40		
		Grading	-	-	-	-		-See. land development
		Setting & staking out	70.00	M	0.175	12.25		-per wall length (M)
		Scaffolding	-	Unit	4.50, 9.00		16.45	-only for 2F
Earth Work		Insectisidation		M	1.26			-Other cost incl. foundation and floor work
Masonry & Concrete Work	Foundation	F_1		M	5.96			
		F_2		M	3.33			
		F_3		M	3.07			
		F_4	70.00	M	2.69	188.30		
	1F. Floor	Slab on grade	77.70	M²	1.79	139.08		
		Soil floor		M²	0.11			
	Ridge stone	F_4		M	0.72			
		F_4	15.60	M	0.47	7.33		
	Concrete block	HB-15		M²	2.99			
		HB-10	127.20	M²	2.27	288.74		
		Finish plaster		M²	0.92			
		WC/M floor mortar	20.50	M²	1.34	27.47		
	RC-Course	C_1		M	3.81			
		C_2		M	2.92			
		C_3		M	2.38			-incl. horizontal RC-brace
		C_4		M	3.37			
		C_5		M	3.77			
		C_6	97.15	M	2.03	197.21		
	Wall reinforcement	A-1	52.87	M	0.41	21.68		
		A-2	24.00	M	1.16	27.84		
		A-3	16.80	M	0.86	14.45		
	2F. Floor	RC floor S_1		M²	13.16			
		RC floor S_7		M	11.76			
		Wood floor		M²	7.02			
Wood Work	Upper wall etc.	Head plate	56.00	M	0.41	22.96		-incl. bolts + nuts
		Upper unit wall	5.19	M²	5.76	29.89		
		Other upper wall	26.48	M²	2.40	63.55		
		Upper staircase		Set				
		Upper WC/M		Set				
	Handrail	Wooden rail		Unit				
		Pipe rail		Unit	10.76			
	Staircase	(Wooden)		Unit			116.40	
Ceiling Work	Ceiling	Asbestos		M²	2.38			-per horizontal M²
Door & Window Work		J_{11}	8	Pc	18.01	144.08		
		J_{10}	6	Pc	10.29	61.74		
		J_8	2	Pc	11.58	23.16		
				Pc				
				Pc				
				Pc				
	Lock + Hook		2+2	Pc	2.50+0.20	5.40	234.38	
Roof Work	Rafter + Batten + Tile		93.60	M²	5.82	544.75		-per horizontal M² (incl. laves)
	Canopy			Set				
	Ridge tile		12.00	M	1.04	12.48		
	Ridge column		5	Pc	1.44+1.79	20.47		L = 1.6M
	Ridge board		12.00	M	1.52	18.24		
	Brace		5	Pc	4.00	20.00		
	Eaves fascia		42.40	M	0.35	14.84		
	Valley gutter			M	1.90			
	Down pipe			M	1.80			
	Water-tightening		30.40	M	1.65	50.16		
	Collar			Pc			680.94	
Plumbing Work	Water tub		2	Unit	5.50	11.00		
	Closet		2	Unit	7.00	14.00		
	Cleanout, Trap		4	Pc	3.00	12.00		
	Waste pipe		39.00	M	3.60	140.40		
	Water pipe		17.00	M	0.62	10.52		
	Water head		4	Pc	1.50	6.00		
	Kitchen sink		2	Unit	7.00	14.00		
	Connection pit		2	Unit	3.00	6.00	213.92	
Electrical Work	Fixture etc.		2	Unit	42.00	84.00		
	Power intake	-	-	Unit	-	-	84.00	-See. electricity cost
Outside Work	Step plate + gutter plate		4+2	Pc	0.30+0.90	3.00		
	Fence			M	1.61		3.00	-incl. foundation
Painting	Painting			M²				-incl. each item
Other Work	Guard		2	Unit	1.20	2.40		
	Cleaning		2	Unit	0.46	0.92		
	ALAP² Keselamato Karja		2	Unit	0.60	1.20	4.52	
Total	2,265.71 Rp/Building × 1.1 ÷ (2) Unit = 1,246.14 ×10³Rp/Unit ÷ 36 M² = 34.62 ×10³Rp/M²							

D-45			(2 Unit/Building)				FLOOR AREA	NET. 45.00 M²
								GROSS 45.00 M²
Section	Item		Volume	Unit	Unit cost ×10³Rp	Cost ×10³Rp	Sub-total ×10³Rp	Note
Temporary Work		Warehouse	2	Unit	0.90	1.80		
		Temp. water	2	Unit	1.20	2.40		
		Grading	-	-	-	-		-See. land development
		Setting & staking out	77.50	M	0.175	13.56		-per wall length (M)
		Scaffolding		Unit	4.50, 9.00		17.76	-only for 2F
Earth Work		Insectisidation		M	1.26			-Other cost incl. foundation and floor work
Masonry & Concrete Work	Foundation	F_1		M	5.96			
		F_2		M	3.33			
		F_3		M	3.07			
		F_4	77.50	M	2.69	208.48		
	1F. Floor	Slab on grade	95.10	M²	1.79	170.23		
		Soil floor		M²	0.11			
	Ridge stone	F_1		M	0.72			
		F_2	15.60	M	0.47	7.33		
	Concrete block	HB-15		M²	2.99			
		HB-10	140.64	M²	2.27	319.25		
		Finish plaster		M²	0.92			
		WC/H floor mortar	20.50	M²	1.34	27.47		
	RC-Course	C		M	3.81			
		C_2		M	2.92			
		C_3		M	2.38			-incl. horizontal RC-brace
		C_5		M	3.37			
		C_6		M	3.77			
		C_8	104.65	M	2.03	212.44		
	Wall reinforcement	A-1	52.80	M	0.41	21.65		
		A-2	24.00	M	0.16	27 84		
		A-3	16.80	M	0.86	14 45		
	2F. Floor	RC floor S_1		M²	13.16			
		RC floor S_2		M	11.76		1,009.14	
Wood Work		Wood floor		M²	7.02			
	Upper wall etc.	Head plate	60.50	M	0.41	24 81		-incl. bolts + nuts
		Upper unit wall	8.14	M²	5.76	46.89		
		Other upper wall	32.38	M²	2.40	77.71		
		Upper staircase		Set				
		Upper WC/H		Set				
	Handrail	Wooden rail		Unit				
		Pipe rail		Unit	10.76			
	Staircase	(Wooden)		Unit			149.41	
Ceiling Work	Ceiling	Asbestos		M²	2.38			-per horizontal M²
Door & Window Work		J_{11}	8	Pc	18.01	144.08		
		J_{20}	6	Pc	10.29	61.74		
		J_8	2	Pc	11.58	23.16		
				Pc				
				Pc				
				Pc				
	Lock + Hook		2+2	Pc	2.50+0.20	5.40	383.79	
Roof Work	Rafter + Batten + Tile		111.60	M²	5.82	649.51		-per horizontal M² (incl. laves)
	Canopy			Set				
	Ridge tile		12.00	M	1.04	12.48		
	Ridge column		5.00	M	1.41+1.79	23.35		L = 2.0M
	Ridge board		12 00	M	1.52	18.24		
	Brace		5	Pc	4.00	20.00		
	Eaves fascia		45.60	M	0.35	15.96		
	Valley gutter			M	3.90			
	Down pipe			M	1.80			
	Water-tightening		33.60	M	1.65	55.44		
	Collar			Pc			794.98	
Plumbing Work	Water tub		2	Unit	5.50	11.00		
	Closet		2	Unit	7.00	14.00		
	Cleanout, Trap		4	Pc	3.00	12.00		
	Waste pipe		42.00	M	3.60	151.20		
	Water pipe		20.00	M	0.62	12.40		
	Water head		4	Pc	1.50	6.00		
	Kitchen sink		2	Unit	7.00	14.00		
	Connection pit		2	Unit	3.00	6.00	226.60	
Electrical Work	Fixture etc.		2	Unit	42.00	84.00		
	Power intake	-	-	Unit	-	-	84.00	-See. electricity cost
Outside Work	Step plate + gutter plate		4+2	Pc	0.30+0.90	3.00		
	Fence			M	1.61		3.00	-incl. foundation
Painting	Painting			M²				-incl. each item
Other Work	Guard		2	Unit	1.20	2.40		
	Cleaning		2	Unit	0.46	0.92		
	ALAT Keselamato Karja		2	Unit	0.60	1.20	4.52	
Total	2,673.20 Rp/Building × 1.1 ÷ (2) Unit = 1,470.26 ×10³Rp/Unit ÷ 45 M² = 32.67 ×10³Rp/M²							

R-15					(6 Unit/Building)		FLOOR AREA	NET 18.00 M² GROSS 18.00 M²
Section	Item		Volume	Unit	Unit cost ×10³Rp	Cost ×10³Rp	Sub-total ×10³Rp	Note
Temporary Work		Warehouse	6	Unit	0.90	5.40		
		Temp. water	6	Unit	1.20	7.20		
		Grading	-	-	-	-		-See. land development
		Setting & staking out	135.00	M	0.175	23.63		-per wall length (M)
		Scaffolding	-	Unit	4.50, 9.00		36.23	-only for 2F
Earth Work		Insectisidation		M	1.26			-Other cost incl. foundation and floor work
Masonry & Concrete Work	Foundation	F_1		M	5.96			
		F_2		M	3.33			
		F_3		M	3.07			
		F_4	135.00	M	2.69	363.15		
	1F. Floor	Slab on grade	115.98	M²	1.79	207.60		
		Soil floor		M²	0.11			
	Ridge stone	F_5		M	0.72			
		F_6	25.20	M	0.47	11.84		
	Concrete block	HB-15		M²	2.99			
		HB-10	176.16	M²	2.27	399.88		
		Finish plaster		M²	0.92			
		WC/M floor mortar	68.52	M²	1.34	91.82		
	RC-Course	C_1		M	3.81			
		C_2		M	2.92			
		C_3		M	2.38			
		C_4		M	3.37			-incl. horizontal RC-brace
		C_5		M	3.77			
		C_6	89.36	M	2.03	181.40		
	Wall reinforcement	A_1-1	57.60	M	0.41	23.62		
		A_2-2	9.60	M	1.16	11.14		
		A_3-3	24.00	M	0.86	20.64		
	2F. Floor	RC floor S_1		M²	13.16			
		RC floor S_2		M²	11.76		1,311.09	
		Wood floor		M²	7.02			
Wood Work	Upper wall etc.	Head plate	69.00	M	0.41	28.29		-incl. bolts + nuts
		Upper unit wall	-	M²	5.76			
		Other upper wall	27.72	M²	2.40	66.53		
		Upper staircase	-	Set				
		Upper WC/M	6	Set	9.335	56.01		
	Handrail	Wooden rail		Unit				
		Pipe rail		Unit	10.76			
	Staircase	(Wooden)		Unit			150.83	
Ceiling Work	Ceiling	Asbestos		M²	2.38			-per horizontal M²
Door & Window Work		J_{11}	12	Pc	18.01	216.12		
		J_{28}	12	Pc	10.29	123.48		
		J_5	6	Pc	11.58	69.48		
				Pc				
				Pc				
				Pc				
	Lock + Hook		6+6	Pc	2.50+0.20	16.20	576.11	
Roof Work	Rafter + Batten + Tile		141.30	M²	5.82	822.37		-per horizontal M² (incl. laves)
	Canopy			Set				
	Ridge tile		14.40	M	1.04	14.98		
	Ridge column		6	Pc	L×1.44×1.79	28.88		L = 2.1M
	Ridge board		14.40	M	1.52	21.89		
	Brace		6	Pc	4.00	24.00		
	Eaves fascia		125.40	M	0.35	43.89		
	Valley gutter		14.40	M	3.90	56.16		
	Down pipe		16.20	M	1.80	29.16		
	Water-tightening		109.20	M	1.65	180.18		
	Collar			Pc			1,221.51	
Plumbing Work	Water tub		6	Unit	5.50	33.00		
	Closet		6	Unit	7.00	42.00		
	Cleanout, Trap		12	Pc	3.00	36.00		
	Waste pipe		20.00	M	3.60	72.00		
	W ter pipe		15.00	M	0.62	9.30		
	Water head		12	Pc	1.50	18.00		
	Kitchen sink		6	Unit	7.00	42.00		
	Connection pit		6	Unit	3.00	18.00	270.30	
Electrical Work	Fixture etc.		6	Unit	42.00	252.00		
	Power intake	-	-	Unit	-	-	252.00	-See. electricity cost
Outside Work	Step plate + gutter plate		18+12	Pc	0.30+0.90	16.20		
	Fence			M	1.61		16.20	-incl. foundation
Painting	Painting			M²				-incl. each item
Other Work	Guard		6	Unit	1.20	7.20		
	Cleaning		6	Unit	0.46	2.76		
	PLAF' Keselamato Kerja		6	Unit	0.60	3.60	13.56	
Total	3,847.83 Rp/Building × 1.1 ÷ (6) Unit = 705.44 ×10³Rp/Unit ÷ 18 M² = 39.19 ×10³Rp/M²							

			R-22			(6 Unit/Building)		FLOOR AREA	NET 27.00 M²
									GROSS 27.00 M²
Section	Item		Volume	Unit	Unit cost ×10³Rp	Cost ×10³Rp	Sub-total ×10³Rp	Note	
Temporary Work		Warehouse	6	Unit	0.90	5.40			
		Temp. water	6	Unit	1.20	7.20			
		Grading	-	-	-	-		-See. land development	
		Setting & staking out	198.0	M	0.175	34.65		-per wall length (M)	
		Scaffolding		Unit	4.50, 9.00		47.25	-only for 2F	
Earth Work		Insectisidation		M	1.26			-Other cost incl. foundation and floor work	
Masonry & Concrete Work	Foundation	F_1		M	5.96				
		F_2		M	3.33				
		F_3		M	3.07				
		F_4	186.00	M	2.69	500.34			
	1F. Floor	Slab on grade	148.50	M²	1.79	265.82			
		Soil floor		M²	0.21				
	Ridge stone	F_5		M	0.72				
		F_6	12.00	M	0.47	5.64			
	Concrete block	HB-15		M²	2.99				
		HB-10	282.00	M²	2.27	640.14			
		Finish plaster		M²	0.92				
		WC/M floor mortar	68.52	M³	1.34	91.82			
	RC-Course	C_1		M	3.81				
		C_2		M	2.92				
		C_3		M	2.38			-incl. horizontal RC-brace	
		C_4		M	3.37				
		C_5		M	3.77				
		C_6	160.73	M	2.03	326.28			
	Wall reinforcement	A-1	108.00	M	0.41	44.28			
		A-2	19.20	M	1.16	22.27			
		A-3	36.00	M	0.86	30.96			
	2F. Floor	RC floor S_1		M²	13.16				
		RC floor S_2		M²	11.76		1,927.55		
		Wood floor		M²	7.02				
Wood Work	Upper wall etc.	Head plate	84.00	M	0.41	34.44		-incl. bolts + nuts	
		Upper unit wall	41.58	M²	5.76	239.50			
		Other upper wall	62.28	M²	2.40	149.47			
		Upper staircase	6	Set	4.065	24.39			
		Upper WC/M	6	Set	9.335	56.01			
	Handrail	Wooden rail		Unit					
		Pipe rail		Unit	10.76				
	Staircase	(Wooden)		Unit			503.81		
Ceiling Work	Ceiling	Asbestos		M²	2.38			-per horizontal M²	
Door & Window Work		J_1	12	Pc	18.01	216.12			
		J_2	12	Pc	10.29	123.48			
		J_3	6	Pc	11.58	69.48			
				Pc					
				Pc					
				Pc					
	Lock + Hook		6+6	Pc	2.50+0.20	16.20	576.11		
Roof Work	Rafter + Batten + Tile		203.40	M²	5.82	1,183.79		-per horizontal M² (incl. laves)	
	Canopy			Set					
	Ridge tile		23.40	M	1.04	24.34			
	Ridge column		9	Pc	L×1.44+1.79	43.33		L = 2.1M	
	Ridge board		23.40	M	1.52	35.57			
	Brace		9	Pc	4.00	36.00			
	Eaves fascia		143.40	M	0.35	50.19			
	Valley gutter		23.40	M	3.90	91.26			
	Down pipe		16.20	M	1.80	29.16			
	Water-tightening		118.20	M	1.65	195.03			
	Collar			Pc			1,688.67		
Plumbing Work	Water tub		6	Unit	5.50	33.00			
	Closet		6	Unit	7.00	42.00			
	Cleanout, Trap		12	Pc	3.00	36.00			
	Waste pipe		20.00	M	3.60	72.00			
	Water pipe		15.00	M	0.62	9.30			
	Water head		12	Pc	1.50	18.00			
	Kitchen sink		6	Unit	7.00	42.00			
	Connection pit		6	Unit	3.00	18.00	270.30		
Electrical Work	Fixture etc.		6	Unit	42.00	252.00			
	Power intake	-	-	Unit	-	-		-See. electricity cost	
Outside Work	Step plate + gutter plate		30+12	Pc	0.30×0.90	19.80			
	Fence			M	1.61		19.80	-incl. foundation	
Painting	Painting			M²				-incl. each item	
Other Work	Guard		6	Unit	1.20	7.20			
	Cleaning		6	Unit	0.46	2.76			
	ALAP' Keselamato Kerja		6	Unit	0.60	3.60	13.56		
Total	5,299.05 Rp/Building × 1.1 ÷ (6) Unit = 971.49 ×10³Rp/Unit ÷ 25 M² = 38.86 ×10³Rp/M²								

R-36N (6 Unit/Building)

FLOOR AREA: NET 38.00 M² / GROSS 38.00 M²

Section	Item		Volume	Unit	Unit cost ×10³Rp	Cost ×10³Rp	Sub-total ×10³Rp	Note
Temporary Work		Warehouse	6	Unit	0.90	5.40		
		Temp. water	6	Unit	1.20	7.20		
		Grading	-	-	-	-		-See. land development
		Setting & staking out	214.0	M	0.175	37.45		-perc wall length (M)
		Scaffolding	-	Unit	4.50, 9.00		50.05	-only for 2F
Earth Work		Insectisidation		M	1.26			-Other cost incl foundation and floor work
Masonry & Concrete Work	Foundation	F_1		M	5.96			
		F_2		M	3.33			
		F_3		M	3.07			
		F_4	214.00	M	2.69	575.66		
	1F. Floor	Slab on grade	228.05	M²	1.79	408.75		
		Soil floor		M²	0.11			
	Ridge stone	F_3		M	0.72			
		F_4	29.10	M	0.47	13.68		
	Concrete block	HB-15		M²	2.99			
		HB-10	359.04	M²	2.27	815.02		
		Finish plaster		M²	0.92			
		WC/M floor mortar	11.21	M²	1.34	15.02		
	RC-Course	C_1		M	3.81			
		C_2		M	2.92			
		C_3		M	2.38			-incl. horizontal RC-brace
		C_4		M	3.37			
		C_5		M	3.77			
		C_6	291.46	M	2.03	591.66		
	Wall reinforcement	A_1-1	225.60	M	0.41	92.50		
		A_2-2	33.60	M	1.16	38.98		
		A_3-3	52.80	M	0.86	45.41		
	2F. Floor	RC floor S_1		M²	13.16			
		RC floor S_2		M²	11.76		2,596.68	
		Wood floor		M²	7.02			
Wood Work	Upper wall etc.	Head plate	210.0	M	0.41	86.10		-incl. bolts + nuts
		Upper unit wall	51.9	M²	5.76	298.94		
		Other upper wall	54.14	M²	2.40	129.94		
		Upper staircase		Set				
		Upper WC/M		Set				
	Handrail	Wooden rail		Unit				
		Pipe rail		Unit	10.76			
	Staircase	(Wooden)		Unit			514.98	
Ceiling Work	Ceiling	Asbestos		M²	2.38			-per horizontal M²
Door & Window Work		J_{12}	12	Pc	15.39	184.68		
		J_{13}	24	Pc	18.01	432.24		
		J_{14}	18	Pc	10.29	185.22		
		J_{21}	6	Pc	5.11	30.66		
				Pc				
				Pc				
	Lock + Hook		6+12	Pc	2.50+0.20	17.40	1,347.78	
Roof Work	Rafter + Batten + Tile		275.76	M²	5.82	1,604.92		-per horizontal M² (incl. laves)
	Canopy			Set				
	Ridge tile		54.60	M	1.04	56.78		
	Ridge column		L_1=12pc L_2=12pc	Pc	L_1×1.44+1.79	75.38		L_1 = 1.5M L_2=0.7M
	Ridge board		107.76	M	1.52	163.80		
	Brace		22	Pc	4.00	88.00		
	Eaves fascia		106.40	M	0.35	37.24		
	Valley gutter			M	3.90			
	Down pipe			M	1.80			
	Water-tightening		174.56	M	1.65	288.02		
	Collar			Pc			2,314.14	
Plumbing Work	Water tub		6	Unit	5.50	33.00		
	Closet		6	Unit	7.00	42.00		
	Cleanout, Trap		12	Pc	3.00	36.00		
	Waste pipe		63.00	M	3.60	226.80		
	Water pipe		72.00	M	0.62	44.64		
	Water head		12	Pc	1.50	18.00		
	Kitchen sink		6	Unit	7.00	42.00		
	Connection pit		6	Unit	3.00	18.00	460.44	
Electrical Work	Fixture etc.		6	Unit	42.00	252.00		
	Power intake		-	Unit	-	-	252.00	-See. electricity cost
Outside Work	Step plate + gutter plate		30+12	Pc	0.30+0.90	19.80		
	Fence			M	1.61		19.80	-incl. foundation
Painting	Painting			M²				-incl. each item
Other Work	Guard		6	Unit	1.20	7.20		
	Cleaning		6	Unit	0.46	2.76		
	ALAF² Kesolamato Karja		6	Unit	0.60	3.60	13.56	
Total	7,569.43 Rp/Building × 1.1 ÷ (6) Unit = 1,387.73 ×10³Rp/Unit ÷ 38 M² = 36.52 ×10³Rp/M²							

R-36	(6 Unit/Building)	FLOOR AREA	NET 35.00 M²
			GROSS 39.00 M²

Section	Item		Volume	Unit	Unit cost ×10³Rp	Cost ×10³Rp	Sub-total ×10³Rp	Note
Temporary Work		Warehouse	6	Unit	0.90	5.40		
		Temp. water	6	Unit	1.20	7.20		
		Grading	-	-	-	-		-See. land development
		Setting & staking out	207.00	M	0.175	36.23		-per wall length (M)
		Scaffolding	-	Unit	4.50, 9.00		48.83	-only for 2F
Earth Work		Insectisidation		M	1.26			-Other cost incl. foundation and floor work
Masonry & Concrete Work	Foundation	F_1		M	5.96			
		F_2		M	3.33			
		F_3		M	3.07			
		F_4	207.00	M	2.69	556.83		
	1F. Floor	Slab on grade	217.23	M²	1.79	388.84		
		Soil floor		M²	0.11			
	Ridge stone	F_5		M	0.72			
		F_6	17.40	M	0.47	8.18		
	Concrete block	HB-15		M²	2.99			
		HB-10	360.96	M²	2.27	819.38		
		Finish plaster		M²	0.92			
		WC/M floor mortar	12.48	M²	1.34	16.72		
	RC-Course	C_1		M	3.81			
		C_2		M	2.92			
		C_3		M	2.38			-incl. horizontal RC-brace
		C_4		M	3.37			
		C_5		M	3.77			
		C_6	285.46	M	2.03	579.48		
	Wall reinforcement	A_1-1	194.40	M	0.41	79.70		
		A_2-2	67.20	M	1.16	77.95		
		A_3-3	50.40	M	0.86	43.34		
	2F. Floor	RC floor S_1		M²	13.16			
		RC floor S_2		M²	11.76		2,570.42	
		Wood floor		M²	7.02			
Wood Work	Upper wall etc.	Head plate	174.00	M	0.41	71.34		-incl. bolts + nuts
		Upper unit wall	25.95	M²	5.76	149.47		
		Other upper wall	76.26	M²	2.40	183.02		
		Upper staircase		Set				
		Upper WC/M		Set				
	Handrail	Wooden rail		Unit				
		Pipe rail		Unit	10.76			
	Staircase	(Wooden)		Unit			403.83	
Ceiling Work	Ceiling	Asbestos		M²	2.38			-per horizontal M²
Door & Window Work		J_{12}	12	Pc	15.39	184.68		
		J_{11}	18	Pc	18.01	324.18		
		J_{10}	18	Pc	10.29	185.22		
		J_{21}	6	Pc	5.11	30.66		
				Pc				
				Pc				
	Lock + Hook		6+6	Pc	2.50+0.20	16.20	740.94	
Roof Work	Rafter + Batten + Tile		280.80	M²	5.82	1,634.26		-per horizontal M² (incl. laves)
	Canopy			Set				
	Ridge tile		36.0	M	1.04	37.44		
	Ridge column		19	Pc	L=1.44+1.79	77.79		L = 1.6M
	Ridge board		36.00	M	1.52	54.72		
	Brace		19	Pc	4.00	76.00		
	Eaves fascia		152.80	M	0.35	53.48		
	Valley gutter			M	3.90			
	Down pipe			M	1.80			
	Water-tightening		164.80	M	1.65	271.92		
	Collar			Pc			2,205.61	
Plumbing Work	Water tub		6	Unit	5.50	33.00		
	Closet		6	Unit	7.00	42.00		
	Cleanout, Trap		12	Pc	3.00	36.00		
	Waste pipe		53.00	M	3.60	190.80		
	Water pipe		54.00	M	0.62	33.48		
	Water head		12	Pc	1.50	18.00		
	Kitchen sink		6	Unit	7.00	42.00		
	Connection pit		6	Unit	3.00	18.00	413.28	
Electrical Work	Fixture etc.		6	Unit	42.00	252.00		
	Power intake	-	-	Unit	-	-	252.00	-See. electricity cost
Outside Work	Step plate + gutter plate		30+12	Pc	0.30+0.90	19.80		
	Fence			M	1.61		19.80	-incl. foundation
Painting	Painting			M²				-incl. each item
Other Work	Guard		6	Unit	1.20	7.20		
	Cleaning		6	Unit	0.46	2.76		
	ASAP' Keselamato Karja		6	Unit	0.60	3.60	13.56	

Total 6,668.27 Rp/Building × 1.1 ÷ (6) Unit = 1,222.52 ×10³Rp/Unit ÷ 39 M² = 31.35 ×10³Rp/M²

R-45 (6 Unit/Building)

FLOOR AREA — NET 48.00 M² — GROSS 48.00 M²

Section	Item		Volume	Unit	Unit cost ×10³Rp	Cost ×10³Rp	Sub-total ×10³Rp	Note
Temporary Work		Warehouse	6	Unit	0.90	5.40		
		Temp. water	6	Unit	1.20	7.20		
		Grading	-	-	-	-		-See. land development
		Setting & staking out	226.50	M	0.175	39.64		-per wall length (M)
		Scaffolding	-	Unit	4.50, 9.00		52.24	-only for 2F
Earth Work		Insectisidation		M	1.26			-Other cost incl. foundation and floor work
Masonry & Concrete Work	Foundation	F_1		M	5.96			
		F_2		M	3.33			
		F_3		M	3.07			
		F_4	226.50	M	2.69	609.29		
	1F. Floor	Slab on grade	269.43	M²	1.79	482.28		
		Soil floor		M²	0.11			
	Ridge stone	F_5		M	0.72			
		F_6	17.40	M	0.47	8.18		
	Concrete block	HB-15		M²	2.99			
		HB-10	400.56	M²	2.27	909.27		
		Finish plaster		M²	0.92			
		WC/M floor mortar	62.28	M²	1.34	83.46		
	RC-Course	C_1		M	3.81			
		C_2		M	2.92			
		C_3		M	2.38			-incl. horizontal RC-brace
		C_4		M	3.37			
		C_5		M	3.77			
		C_6	304.96	M	2.03	619.07		
	Wall reinforcement	A-1	194.40	M	0.41	79.70		
		A-2	67.20	M	1.16	77.95		
		A-3	50.40	M	0.86	43.34		
	2F. Floor	RC floor S_1		M²	13.16			
		RC floor S_2		M²	11.76		2,912.54	
		Wood floor		M²	7.02			
Wood Work	Upper wall etc.	Head plate	193.50	M	0.41	79.34		-incl. bolts + nuts
		Upper unit wall	40.70	M²	5.76	234.43		
		Other upper wall	102.50	M²	2.40	246.00		
		Upper staircase		Set				
		Upper WC/M		Set				
	Handrail	Wooden rail		Unit				
		Pipe rail		Unit	10.76			
	Staircase	(Wooden)		Unit			559.77	
Ceiling Work	Ceiling	Asbestos		M²	2.38			-per horizontal M²
Door & Window Work		J_{12}	12	Pc	15.39	184.68		
		J_{11}	18	Pc	18.01	324.18		
		J_{21}	18	Pc	10.29	185.22		
		J_{22}	6	Pc	5.11	30.66		
				Pc				
				Pc				
	Lock + Hook		6+6	Pc	2.50+0.20	16.20	740.94	
Roof Work	Rafter + Batten + Tile		334.80	M²	5.82	1,948.54		-per horizontal M' (incl. laves)
	Canopy			Set				
	Ridge tile		36.00	M	1.04	37.44		
	Ridge column		19	Pc	1.1×1.44×1.79	88.73		L = 2.0M
	Ridge board		36.00	M	1.52	54.72		
	Brace		19	Pc	4.00	76.00		
	Eaves fascia		165.60	M	0.35	57.96		
	Valley gutter			M	1.90			
	Down pipe			M	1.80			
	Water-tightening		187.20	M	1.65	308.88		
	Collar			Pc			2,572.27	
Plumbing Work	Water tub		6	Unit	5.50	33.00		
	Closet		6	Unit	7.00	42.00		
	Cleanout, Trap		12	Pc	3.00	36.00		
	Waste pipe		45.00	M	3.60	162.00		
	Water pipe		48.00	M	0.62	29.76		
	Water head		12	Pc	1.50	18.00		
	Kitchen sink		6	Unit	7.00	42.00		
	Connection pit		6	Unit	3.00	18.00	389.76	
Electrical Work	Fixture etc.		6	Unit	42.00	252.00		
	Power intake	-	-	Unit	-	-	252.00	-See. electricity cost
Outside Work	Step plate + gutter plate		30+12	Pc	0.30+0.90	19.80		
	Fence			M	1.61		19.80	-incl. foundation
Painting	Painting			M²				-incl. each item
Other Work	Guard		6	Unit	1.20	7.20		
	Cleaning		6	Unit	0.46	2.76		
	ALAT' Keselamato Karja		6	Unit	0.60	3.60	13.56	

Total 7,503.80 Rp/Building × 1.1 ÷ (6) Unit = 1,375.71 ×10³Rp/Unit ÷ 48 M² = 28.66 ×10³Rp/M²

M-24 (6 Unit/Building)

FLOOR AREA — NET 26.40 M² / GROSS 30.00 M²

Section	Item		Volume	Unit	Unit cost ×10³Rp	Cost ×10³Rp	Sub-total ×10³Rp	Note
Temporary Work		Warehouse	6	Unit	0.90	5.40		
		Temp. water	6	Unit	1.20	7.20		
		Grading	-	-	-	-		-See. land development
		Setting & staking out	162.20	M	0.175	28.39		-per wall length (M)
		Scaffolding	6	Unit	4.50, 9.00	27.00	67.99	-only for 2F
Earth Work		Insectisidation		M	1.26			-Other cost incl. foundation and floor work
Masonry & Concrete Work	Foundation	F_1		M	5.96			
		F_2	94.80	M	3.33	315.68		
		F_3	3.90	M	3.07	11.97		
		F_4	68.00	M	2.69	182.92		
	1F. Floor	Slab on grade	98.78	M²	1.79	176.02		
		Soil floor		M²	0.11			
	Ridge stone	F_5		M	0.72			
		F_6	25.20	M	0.47	11.84		
	Concrete block	HB-15	207.98	M²	2.99	621.86		
		HB-10	100.80	M²	2.27	228.82		
		Finish plaster		M²	0.92			
		WC/M floor mortar	68.52	M²	1.34	91.82		
	RC-Course	C_1		M	3.81			
		C_2		M	2.92			
		C_3	165.48	M	2.38	393.84		-incl. horizontal RC-brace
		C_4	72.00	M	3.37	242.64		
		C_5	6.00	M	3.77	22.62		
		C_6		M	2.03			
	Wall reinforcement	B_1 -1	290.40	M	0.88	255.55		
		B_2 -2	46.00	M	2.72	125.12		
		B_3 -3	32.80	M	2.71	88.89		
	2F. Floor	RC floor S_1		M²	13.16			
		RC floor S_2		M²	11.76		2,770.39	
Wood Work		Wood floor	64.80	M²	7.02	454.90		
	Upper wall etc.	Head plate	81.60	M	0.41	33.46		-incl. bolts + nuts
		Upper unit wall	2.62	M²	5.76	15.09		
		Other upper wall	10.48	M²	2.40	25.15		
		Upper staircase		Set		13.04		
		Upper WC/M		Set		56.01		
	Handrail	Wooden rail	3	Pc	4.98	14.94		
		Pipe rail		Unit	10.76			
	Staircase	(Wooden)	3	Pc	35.32	105.96	718 55	
Ceiling Work	Ceiling	Asbestos		M²	2.38			-per horizontal M²
Door & Window Work		J_9	6	Pc	16.63	99.78		
		J_{11}	18	Pc	11.74	211.32		
		J_{13}	12	Pc	18.01	216.12		
		J_{15}	18	Pc	16.10	289.80		
		J_M	6	Pc	11 97	71.82		
		J_S	6	Pc	11.58	69.48		
	Lock + Hook		12+6	Pc	2.50+0.20	31.20	989.52	
Roof Work	Rafter + Batten + Tile		144.72	M²	5.82	842 27		-per horizontal M² (incl. laves)
	Canopy			Set				
	Ridge tile		24.00	M	1.04	24.96		
	Ridge column		8	Pc	L×1.44+1.79	22.38		L = 0.7M
	Ridge board		20.40	M	1.52	31.01		
	Brace		8	Pc	4.00	32.00		
	Eaves fascia		157,60	M	0.35	55.16		
	Valley gutter		-	M	3.90			
	Down pipe			M	1.80			
	Water-tightening		130.60	M	1.65	215.49		
	Collar		3	Pc	5.76	17.28	1,240.55	
Plumbing Work	Water tub		6	Unit	5.50	33.00		
	Closet		6	Unit	7.00	42.00		
	Cleanout, Trap		12	Pc	3.00	36.00		
	Waste pipe		20.00	M	3.60	72.00		
	Water pipe		15.00	M	0.62	9.30		
	Water head		12	Pc	1.50	18.00		
	Kitchen sink		6	Unit	7.00	42.00		
	Connection pit		6	Unit	3.00	18.00	270.30	
Electrical Work	Fixture etc.		6	Unit	42.00	252.00		
	Power intake	-	-	Unit	-	-	252.00	-See. electricity cost
Outside Work	Step plate + gutter plate		18+12	Pc	0.30+0.90	16.20		
	Fance			M	1.61		16.20	-incl. foundation
Painting	Painting			M²				-incl. each item
Other Work	Guard		6	Unit	1.20	7.20		
	Cleaning		6	Unit	0.46	2.76		
	ALAP² Keselamato Karja		6	Unit	0.60	3.60	13.56	

Total 6,339.06 Rp/Building × 1.1 ÷ (6) Unit = 1,162.16 ×10³Rp/Unit ÷ 30 M² = 38.74 ×10³Rp/M²

M-36
(In case of roof tile) (6 Unit/Building)

FLOOR AREA — NET 38.00 M² / GROSS 38.00 M²

Section	Item		Volume	Unit	Unit cost ×10³Rp	Cost ×10³Rp	Sub-total ×10³Rp	Note
Temporary Work		Warehouse	6	Unit	0.90	5.40		
		Temp. water	6	Unit	1.20	7.20		
		Grading	-	-	-	-		-See. land development
		Setting & staking out	146.00	M	0.175	25.55		-per wall length (M)
		Scaffolding	6	Unit	4.50, 9.00	27.00	65.15	-only for 2F
Earth Work		Insectisidation		M	1.26			-Other cost incl. foundation and floor work
Masonry & Concrete Work	Foundation	F_1		M	5.96			
		F_2	146.00	M	3.33	486.18		
		F_3		M	3.07			
		F_4		M	2.69			
	1F. Floor	Slab on grade	131.46	M²	1.79	235.31		
		Soil floor		M²	0.11			
	Ridge stone	F_3		M	0.72			
		F_4	29.40	M	0.47	13.82		
	Concrete block	HB-15	408.98	M²	2.99	1,222.85		
		HB-10		M²	2.27			
		Finish plaster		M²	0.92			
		WC/M floor mortar	10.97	M²	1.34	14.70		
	RC-Course	C_1		M	3.81			
		C_2		M	2.92			
		C_3	264.00	M	2.38	628.32		-incl. horizontal RC-brace
		C_4	67.00	M	3.37	225.79		
		C_5	41.50	M	3.77	156.46		
		C_6		M	2.03			
	wall reinforcement	B-1	231.90	M	0.88	204.07		
		B-2	73.60	M	2.72	200.19		
		B-3	51.20	M	2.71	138.75		
	2F. Floor	RC floor S_1		M²	13.16			
		RC floor S_2		M²	11.76		3,526.44	
		Wood floor	88.20	M²	7.02	619.16		
Wood Work	Upper wall etc.	Head plate	102.50	M	0.41	42.03		-incl. bolts + nuts
		Upper unit wall	7.50	M²	5.76	43.20		
		Other upper wall	31.13	M²	2.40	74.71		
		Upper staircase		Set		14.25		
		Upper WC/M		Set				
	Handrail	Wooden rail	6	Unit	5.73	34.38		
		Pipe rail		Unit	10.76			
	Staircase	(Wooden)	6	Pc	35.32	211.92	1,039.65	
Ceiling Work	Ceiling	Asbestos		M²	2.38			-per horizontal M²
Door & Window Work		J_5	6	Pc	16.63	99.78		
		J_6'	6	Pc	7.32	43.92		
		J_7	6	Pc	28.56	171.36		
		J_{10}	6	Pc	27.23	163.38		
		J_{13}	6	Pc	16.10	96.60		
		J_8	6	Pc	11.58	69.48		
	Lock + Hook		6+6	Pc	2.50+0.20	16.20	660.72	
Roof Work	Rafter + Batten + Tile		155.40	M²	5.82	904.43		-per horizontal M² (incl. laves)
	Canopy			Set		115.95		
	Ridge tile		24.00	M	1.04	24.96		
	Ridge column		10	Pc	L×1.44+1.79	16.62		L = 1.3M
	Ridge board		18.00	M	1.52	27.36		
	Brace		12	Pc	4.00	48.00		
	Eaves fascia		112.00	M	0.35	39.20		
	Valley gutter			M	3.90			
	Down pipe			M	1.80			
	Water-tightening		91.00	M	1.65	150.15		
	Collar		3	Pc	11.70	35.10	1,181.77	
Plumbing Work	Water tub		6	Unit	5.50	33.00		
	Closet		6	Unit	7.00	42.00		
	Cleanout, Trap		12	Pc	3.00	36.00		
	Waste pipe		45.00	M	3.60	162.00		
	Water pipe		9.00	M	0.62	5.58		
	Water head		12	Pc	1.50	18.00		
	Kitchen sink		6	Unit	7.00	42.00		
	Connection pit		6	Unit	3.00	18.00	356.58	
Electrical Work	Fixture etc.		6	Unit	42.00	252.00		
	Power intake	-	-	Unit	-	-	252.00	-See. electricity cost
Outside Work	Step plate + gutter plate		4+2	Pc	0.30+0.90	3.00		
	Fence			M	1.61		3.00	-incl. foundation
Painting	Painting			M²				-incl. each item
Other Work	Guard		6	Unit	1.20	7.20		
	Cleaning		6	Unit	0.46	2.76		
	ALAP² Keselamato Karja		6	Unit	0.60	3.60	13.56	
Total	7,298.87 Rp/Building × 1.1 ÷ (6) Unit = 1,338.13 ×10³Rp/Unit ÷ 38 M² = 35.21 ×10³Rp/M²							

M-36
(In case of corrugated asbestos) (6 Unit/Building)

FLOOR AREA — NET 38.00 M² — GROSS 38.00 M²

Section	Item		Volume	Unit	Unit cost ×10³Rp	Cost ×10³Rp	Sub-total ×10³Rp	Note
Temporary Work		Warehouse	6	Unit	0.90	5.40		
		Temp. water	6	Unit	1.20	7.20		
		Grading	-	-	-	-		-See. land development
		Setting & staking out	146.00	M	0.175	25.55		-per wall length (M)
		Scaffolding	6	Unit	4.50, 9.00	27.00	65.15	-only for 2F
Earth Work		Insectisidation		M	1.26			-Other cost incl. foundation and floor work
Masonry & Concrete Work	Foundation	F_1		M	5.96			
		F_2	146.00	M	3.33	486.18		
		F_3		M	3.07			
		F_4		M	2.69			
	1F. Floor	Slab on grade	131.46	M²	1.79	235.31		
		Soil floor		M²	0.11			
	Ridge stone	F_3		M	0.72			
		F_4	29.40	M	0.47	13.82		
	Concrete block	HB-15	424.70	M²	2.99	1,269.85		
		HB-10		M²	2.27			
		Finish plaster		M²	0.92			
		WC/M floor mortar	10.97	M²	1.34	14.70		
	RC-Course	C_1		M	3.81			
		C_2		M	2.92			
		C_3	264.00	M	2.38	628.32		-incl. horizontal RC-brace
		C_4	67.00	M	3.37	225.79		
		C_5	41.50	M	3.77	156.46		
		C_6		M	2.03			
	Wall reinforcement	B-1	240.9	M	0.88	211.99		
		B-2	76.8	M	2.72	208.90		
		B-3	52.8	M	2.71	143.09		
	2F. Floor	RC floor S_1		M²	13.16			
		RC floor S_2		M²	11.76		3,594.41	
Wood Work		Wood floor	88.20	M²	7.02	619.16		
	Upper wall etc.	Head plate	102.50	M	0.41	42.03		-incl. bolts + nuts
		Upper unit wall	3.50	M²	5.76	20.16		
		Other upper wall	14.57	M²	2.40	34.97		
		Upper staircase		Set				
		Upper WC/M		Set				
	Handrail	Wooden rail	6	Unit	5.73	34.38		
		Pipe rail		Unit	10.76			
	Staircase	(Wooden)	6	Unit	35.32	211.92	962.62	
Ceiling Work	Ceiling	Asbestos		M²	2.38			-per horizontal M²
Door & Window Work		J_{11}	6	Pc	18.005	108.03		
		J_4'	6	Pc	7.320	43.92		
		J_7	6	Pc	28.560	171.36		
		J_8	6	Pc	30.225*	181.35		
		J_{13}	6	Pc	17 600*	105.60		
		J_a	6	Pc	11.575	69.45		
	Lock + Hook		6+6	Pc	2.50+0.20	16.20	679.71	
Roof Work	Rafter + Batten + Tile Perlin		155.40	M²	4.535	704.74		-per horizontal M² (incl. laves)
	Canopy			Set	115.95	115.95		
	Nok patent		24.00	M	2.00	48.00		
	Ridge column			M				
	Roof truss		119.50	M	1.44	172.08		
	Brace		48.00	Pc	0.45	21.60		
	Eaves fascia		105.60	M	0.35	36.96		
	Valley gutter			M	3.90			
	Down pipe			M	1.80			
	Water-tightening		24.00	M	1.65	39.60		
	Collar		3	Pc	11.70	35.10	1,174.03	
Plumbing Work	Water tub		6	Unit	5.50	33.00		
	Closet		6	Unit	7.00	42.00		
	Cleanout, Trap		12	Pc	3.00	36.00		
	Waste pipe		45.00	M	3.60	162.00		
	Water pipe		9.00	M	0.62	5.58		
	Water head		12	Pc	1.50	18.00		
	Kitchen sink		6	Unit	7.00	42.00		
	Connection pit		6	Unit	3.00	18.00	356.58	
Electrical Work	Fixture etc.		6	Unit	42.00	252.00		
	Power intake	-	-	Unit	-	-	252.00	-See. electricity cost
Outside Work	Step plate + gutter plate		4+2	Pc	0.30+0.90	3.00		
	Fence			M	1.61		3.00	-incl. foundation
Painting	Painting			M²				-incl. each item
Other Work	Guard		6	Unit	1.20	7.20		
	Cleaning		6	Unit	0.46	2.76		
	ALAP° Keselamato Karja		6	Unit	0.60	3.60	13.56	

Total 7,101.06 Rp/Building × 1.1 ÷ (6) Unit = 1,301.86 ×10³Rp/Unit ÷ 38 M² = 34.26 ×10³Rp/M²

M-45A (6 Unit/Building)

FLOOR AREA — NET 50.00 M² — GROSS 50.00 M²

Section	Item		Volume	Unit	Unit cost ×10³Rp	Cost ×10³Rp	Sub-total ×10³Rp	Note
Temporary Work		Warehouse	6	Unit	0.90	5.40		
		Temp. water	6	Unit	1.20	7.20		-Sep. land development
		Grading	-	-	-	-		
		Setting & staking out	174.50	M	0.175	30.54		-per wall length (M)
		Scaffolding	6	Unit	4.50, 9.00	27.00	62.94	-only for 2F
Earth Work		Insectisidation		M	1.26			-Other cost incl. foundation and floor work
Masonry & Concrete Work	Foundation	F_1		M	5.96			
		F_2	153.50	M	3.33	511.16		
		F_3		M	3.07			
		F_4		M	2.69			
	1F. Floor	Slab on grade	177.96	M²	1.79	246.95		
		Soil floor		M²	0.11			
	Ridge stone	F_3		M	0.72			
		F_4	18.00	M	0.47	8.46		
	Concrete block	HB-15	508.00	M²	2.99	1,518.92		
		HB-10		M²	2.27			
		Finish plaster		M²	0.92			
		WC/M floor mortar	62.88	M²	1.34	84.26		
	RC-Course	C_1		M	3.81			
		C_2		M	2.92			
		C_3	324.87	M	2.38	773.19		-incl. horizontal RC-brace
		C_4	88.00	M	3.37	296.56		
		C_5	31.00	M	3.77	116.87		
		C_6		M	2.03			
	Wall reinforcement	B_1-1	336.90	M	0.88	296.47		
		B_2-2	68.80	M	2.72	187.14		
		B_3-3	41.60	M	2.71	112.74		
	2F. Floor	RC floor S_1		M²	13.16			
		RC floor S_2		M²	11.76		4,152.72	
Wood Work		Wood floor	121.28	M²	7.02	851.39		
	Upper wall etc.	Head plate	125.00	M	0.41	51.25		-incl. bolts + nuts
		Upper unit wall	16.15	M²	5.76	93.02		
		Other upper wall	48.88	M²	2.40	117.31		
		Upper staircase		Set		38.81		
		Upper WC/M		Set				
	Handrail	Wooden rail	6	Unit	5.73	34.38		
		Pipe rail		Unit	10.76			
	Staircase	(Wooden)	6	Unit	35.32	211.92	1,178.08	
Ceiling Work	Ceiling	Asbestos		M²	2.38			-per horizontal M²
Door & Window Work		J_1-12×16.63	J_6-6×8.64	Pc				
		J_4-6×7.32	J_8-12×16.10	Pc				
		J_{11}-6×11.74	J_{10}-6×7.77	Pc				
		J_{12}-12×15.39	J_9-12×11.58	Pc				
		J_{13}-6×18.01		Pc				
				Pc		1,037.28		
	Lock + Hook		6+6	Pc	2.50+0.20	16.20	1,053.48	
Roof Work	Rafter + Batten + Tile		191.40	M²	5.82	1,113.95		-per horizontal M² (incl. laves)
	Canopy		3	Set	19.59	58.77		
	Ridge tile		24.00	M	1.04	24.96		
	Ridge column		L_1:10pc+L_2:6Pc	Pc	L_1:1.44+L_2:1.79	59.17		L_1= 1.77 L_2= 0.7
	Ridge board		24.00	M	1.52	36.48		
	Brace		16	Pc	4.00	64.00		
	Eaves fascia		130.00	M	0.35	45.50		
	Valley gutter			M	3.90			
	Down pipe			M	1.80			
	Water-tightening		136.60	M	1.65	225.39		
	Collar			Pc			1,628.22	
Plumbing Work	Water tub		6	Unit	5.50	33.00		
	Closet		6	Unit	7.00	42.00		
	Cleanout, Trap		12	Pc	3.00	36.00		
	Waste pipe		42.00	M	3.60	151.20		
	Water pipe		42.00	M	0.62	26.04		
	Water head		12	Pc	1.50	18.00		
	Kitchen sink		6	Unit	7.00	42.00		
	Connection pit		6	Unit	3.00	18.00	366.24	
Electrical Work	Fixture etc.		6	Unit	42.00	252.00		
	Power intake	-	-	Unit	-	-	252.00	-See. electricity cost
Outside Work	Step plate + gutter plate		30+12	Pc	0.30+0.90	19.80		
	Fence			M	1.61		19.80	-incl. foundation
Painting	Painting			M²				-incl. each item
Other Work	Guard		6	Unit	1.20	7.20		
	Cleaning		6	Unit	0.46	2.76		
	ALAP Keselamato Karja		6	Unit	0.60	3.60	13.56	

Total 8,927.28 Rp/Building × 1.1 ÷ (6) Unit = 1,636.67 ×10³Rp/Unit ÷ 50 M² = 32.73 ×10³Rp/M²

FS'-2-36 (5.4M) (12 Unit/Building)

FLOOR AREA — NET 35.70 M² — GROSS 37.80 M²

Section	Item		Volume	Unit	Unit cost ×10³Rp	Cost ×10³Rp	Sub-total ×10³Rp	Note
Temporary work		Warehouse	12	Unit	0.90	10.80		
		Temp. water	12	Unit	1.20	14.40		-See. land development
		Grading	-	-	-	-		
		Setting & staking out	230.80	M	0.175	40.39		-per wall length (M)
		Scaffolding	12	Unit	4.50, 9.00	108.00	173.59	-only for 2F
Earth Work		Insectisidation		M	1.26			-Other cost incl. foundation and floor work
Masonry & Concrete Work	Foundation	F_1	198.70	M	5.96	1,184.25		
		F_2	28.20	M	3.33	93.91		
		F_3	3.90	M	3.07	11.97		
		F_4		M	2.69			
	1F. Floor	Slab on grade	226.44	M²	1.79	405.33		
		Soil floor		M²	0.11			
	Ridge stone	F_3		M	0.72			
		F_4	43.50	M	0.47	20.45		
	Concrete block	HB-15	596.32	M²	2.99	1,783.00		
		HB-10		M²	2.27			
		Finish plaster		M²	0.92			
		WC/M floor mortar	121.80	M²	1.34	163.21		
	RC-Course	C_1	230.50	M	3.81	878.21		
		C_2	308.36	M	2.92	900.41		-incl. horizontal RC-brace
		C_3		M	2.38			
		C_4		M	3.37			
		C_5		M	3.77			
		C_6		M	2.03			
	Wall reinforcement	C -1	237.60	M	1.44	342.14		
		B -1	198.00		0.88	174.24		
		C -2	96.00	M	3.92	376.32		
		B -2	68.00		2.72	184.96		
		C -3	48.60	M	4.37	209.76		
		B -3	40.00		2.71	108.40		
	2F. Floor	RC floor S_1	23.94	M²	13.16	315.05		
		RC floor S_2	168.84	M²	11.76	1,985.56	9,137.17	
Wood Work	Upper wall etc.	Wood floor		M²	7.02			
		Head plate	156.10	M	0.41	64.00		-incl. bolts + nuts
		Upper unit wall	14.00	M²	5.76	80.64		
		Other upper wall	72.21	M²	2.40	173.30		
		Upper staircase		Set		18.93		
		Upper WC/M		Set				
	Handrail	Wooden rail		Unit				
		Pipe rail	6	Unit	8.37	50.22		
	Staircase	(Wooden)	1	Unit	41.69	125.07	512.16	-per horizontal M²
Ceiling Work	Ceiling	Asbestos		M²	2.38			
Door & Window Work		J_1 6×18.48	J_1 6×14.23	Pc				
		J_2 6×20.995	J_2 6×17.73	Pc				
		J_3 10×16.63	J_3 6×27.23	Pc				
		J_4 6×24.86	J_4 24×18.01	Pc				
		J_5 6×28.56	J_5 12×5.11	Pc				
			J_6 12×4.81	Pc		1,962.69		
	Lock + Hook		12×18	Pc	2.50+0.20	33.60	1,996.29	
Roof Work	Rafter + Batten + Tile		291.06	M²	5.82	1,693.97		-per horizontal M² (incl. laves)
	Canopy			Set		136.98		
	Ridge tile		32.40	M	1.04	33.70		
	Ridge column		7.00	Pc	4×1.44×1.79	31.68		L = 1.9M
	Ridge board		32.40	M	1.52	49.25		
	Brace		7	Pc	4.00	28.00		
	Eaves fascia		116.20	M	0.35	47.67		
	Valley gutter			M	3.90			
	Down pipe			M	1.80			
	Water-tightening Collar		120.60	M	1.65	198.99	2,220.24	
Plumbing Work				Pc				
	Water tub		12	Unit	5.50	66.00		
	Closet		12	Unit	7.00	84.00		
	Cleanout, Trap		30	Pc	3.00	90.00		
	Waste pipe		87.00	M	3.60	313.20		
	Water pipe		63.00	M	0.62	39.06		
	Water head		24	Pc	1.50	36.00		
	Kitchen sink		12	Unit	7.00	84.00		
	Connection pit		6	Unit	3.00	18.00	730.26	
Electrical Work	Fixture etc.		12	Unit	42.00	504.00	504.00	-See. electricity cost
	Power intake		-	Unit	-	-		
Outside Work	Step plate + gutter plate		60+24	Pc	0.30+0.90	39.60		
	Fence		56.00	M	1.61	90.16		-incl. foundation
				M²				-incl. each item
Painting	Painting							
Other Work	Guard		12	Unit	1.20	14.40		
	Cleaning		12	Unit	0.46	5.52		
	ALAF' Keselamato Kerja		12	Unit	0.60	7.20	27.12	
Total	15,430.59 Rp/Building × 1.1 ÷ (12) Unit = 1,414.47 ×10³Rp/Unit ÷ 37.8 M² = 37.42 ×10³Rp/M²					33.6	47.10	

FS'-2-26 (12 Unit/Building)

FLOOR AREA — NET 25.90 M² / GROSS 28.00 M²

Section	Item		Volume	Unit	Unit cost ×10³Rp	Cost ×10³Rp	Sub-total ×10³Rp	Note
Temporary Work		Warehouse	12	Unit	0.90	10.80		
		Temp. water	12	Unit	1.20	14.40		
		Grading	-	-	-	-		-See. land development
		Setting & staking out	161.50	M	0.175	28.26		-per wall length (M)
		Scaffolding	12	Unit	4.50, 9.00	108.00	161.46	-only for 2F
Earth Work		Insectisidation	-	M	1.26			-Other cost incl. foundation and floor work
Masonry & Concrete Work	Foundation	F_1	152.50	M	5.96	908.90		
		F_2	9.00	M	3.33	29.97		
		F_3	3.90	M	3.07	11.97		
		F_4		M	2.69			
	1F. Floor	Slab on grade	204.90	M²	1.79	366.77		
		Soil floor		M²	0.11			
	Ridge stone	F_3		M	0.72			
		F_4	36.61	M	0.47	17.20		
	Concrete block	HB-15	407.02	M²	2.99	1,216.99		
		HB-10	14.04	M²	2.27	31.87		
		Finish plaster		M²	0.92			
		WC/M floor mortar	123.12	M²	1.34	164.98		
	RC-Course	C_1	156.10	M	3.81	594.74		
		C_2	203.41	M	2.92	593.96		
		C_3		M	2.38			-incl. horizontal RC-brace
		C_4		M	3.37			
		C_5		M	3.77			
		C_6		M	2.03			
	Wall reinforcement	C -1	115.20	M	1.44	165.89		
		B -1	96.00		0.88	84.48		
		C -2	24.00	M	3.92	94.08		
		B -2	20.00		2.72	54.40		
		C -3	48.00	M	4.37	209.76		
		B -3	40.00		2.71	108.40		
	2F. Floor	RC floor S_1	29.97	M²	13.16	394.41		
		RC floor S_2	114.57	M²	11.76	1,347.34	6,396.11	
		Wood floor		M²	7.02			
Wood Work	Upper wall etc.	Head plate	141.10	M	0.41	57.85		-incl. bolts + nuts
		Upper unit wall	14.00	M²	5.76	80.64		
		Other upper wall	66.50	M²	2.40	159.60		
		Upper staircase		Set		18.93		
		Upper WC/M		Set				
	Handrail	Wooden rail		Unit				
		Pipe rail		Unit	10.76			
	Staircase	(Wooden)	3	Unit	41.69	125.07	442.09	
Ceiling Work	Ceiling	Asbestos		M²	2.38			-per horizontal M²
Door & Window Work		J_1×6×31.57	Js 12×11.58	Pc		941.22		
		J_2×6×18.48		Pc				
		J_3×6×21.00		Pc				
		J_4×6×21.17		Pc				
		J_5×6×16.63		Pc				
		J_6×6×24.86		Pc				
	Lock + Hook		12+18	Pc	2.50+0.20	33.60	974.82	
Roof Work	Rafter + Batten + Tile		225.72	M²	5.82	1,313.69		-per horizontal M² (incl. laves)
	Canopy			Set		90.90		
	Ridge tile		24.00	M	1.04	24.96		
	Ridge column		7	Pc	L=1.44+1.79	31.68		L = 1.9M
	Ridge board		24.00	M	1.52	36.48		
	Brace		7	Pc	4.00	28.00		
	Eaves fascia		99.00	M	0.35	34.65		
	Valley gutter			M	3.90			
	Down pipe			M	1.80			
	Water-tightening		115.80	M	1.65	191.07		
	Collar			Pc			1,751.43	
Plumbing Work	Water tub		12	Unit	5.50	66.00		
	Closet		12	Unit	7.00	84.00		
	Cleanout, Trap		24	Pc	3.00	72.00		
	Waste pipe		87.00	M	3.60	313.20		
	Water pipe		63.00	M	0.62	39.06		
	Water head		24	Pc	1.50	36.00		
	Kitchen sink		12	Unit	7.00	84.00		
	Connection pit		6	Unit	3.00	18.00	712.26	
Electrical Work	Fixture etc.		12	Unit	42.00	504.00		
	Power intake	-	-	Unit	-	-	504.00	-See. electricity cost
Outside Work	Step plate + gutter plate		60+24	Pc	0.30+0.90	39.60		
	Fence		56.00	M	1.61	90.16	129.76	-incl. foundation
Painting	Painting			M²				-incl. each item
Other Work	Guard		12	Unit	1.20	14.40		
	Cleaning		12	Unit	0.46	5.52		
	ALAT Keselamato Karja		12	Unit	0.60	7.20	27.12	
Total	11,099.05 Rp/Building × 1.1 ÷ (12) Unit = 1,017.41 ×10³Rp/Unit ÷ 28 M² = 36.34 ×10³Rp/M²							

39.13

I-9 COST DATA FOR WALK-UP FLAT

FS'5-24			FLOOR AREA	NET 26.18 M²		
				GROSS 30.80 M²		
Items		Unit cost ×10³Rp	Volume	Unit	Cost ×10³Rp	Sub-total ×10³Rp
Temporary Work	Warehouse, site office etc.				3.75	27.76
	Setting & staking out	0.26	2.11	M	0.55	
	Scaffolding	0.80	29.33	M²	23.46	
Earth Work & 1FL. Floor Work	Excavation	0.42	5.87	M³	2.47	24.79
	Backfilling	0.10	4.68	M³	0.47	
	Sand bedding	5.60	0.28	M³	1.57	
	Batukali bedding	9.40	0.54	M³	5.08	
	1FL. concrete slab	22.35	0.54+0.14 =0.68	M³	15.20	
Structural Work						1,348.03
Outer Wall Work	Doors & windows				119.59	137.58
	Brick exposure	5.45	3.30	M²	17.99	
Inside Door & Partition						71.71
Concrete Block and other Mortar Work	Concrete block t=100	2.27	21.36	M²	48.49	101.40
	Light-weight concrete t=120	2.68	3.78	M²	10.13	
	Floor mortar t=30	0.84	28.70	M²	24.11	
	Water proof mortor t=30	1.23	15.18	M²	18.67	
Roof Work						106.55
Miscellaneous Work	Outside painting	1.00	14.18	M²	14.18	43.68
	Veranda screen					
	Handrail	10.76	2.00	M	21.52	
	Gutter	1.90	4.20	M	7.98	
Equipment Work	Plumbing				41.16	83.16
	Electricity				42.00	
Cleaning & Safety Work					2.26	2.26
Total	1,946.92 × 1.1 = 2,141.61 ×10³Rp/unit			NET.	81.80	×10³Rp/M²
				GROSS	69.53	×10³RP/M²

FS'5-36			FLOOR AREA	NET	38.78	M^2
				GROSS	43.40	M^2

Items		Unit cost $\times 10^3$Rp	Volume	Unit	Cost $\times 10^3$Rp	Sub-total $\times 10^3$Rp
Temporary Work	Warehouse, site office etc.				3.75	35.96
	Setting & staking out	0.26	2.83	M	0.74	
	Scaffolding	0.80	39.34	M^2	31.47	
Earth Work & 1FL. Floor Work	Excavation	0.42	8.27	M^3	3.47	30.63
	Backfilling	0.10	6.59	M^3	0.66	
	Sand bedding	5.60	0.40	M^3	2.24	
	Batukali bedding	9.40	0.75	M^3	7.05	
	1FL. concrete slab	22.35	0.20+0.75 =0.77	M^3	17.21	
Structural Work						1,858.48
Outer Wall Work	Doors & windows				200.51	218.50
	Brick exposure	5.45	3.30	M^2	17.99	
Inside Door & Partition						139.67
Concrete Block and other Mortar Work	Concrete block t=100	2.27	22.80	M^2	51.76	115.25
	Light-weight concrete t=120	2.68	3.78	M^2	10.13	
	Floor mortar t=30	0.84	41.30	M^2	34.69	
	Water proof mortor t=30	1.23	15.18	M^2	18.67	
Roof Work						140.04
Miscellaneous Work	Outside painting	1.00	20.24	M^2	20.24	63.40
	Veranda screen	22.79	0.50		11.90	
	Handrail	10.76	2.00	M	21.52	
	Gutter	1.90	5.60	M	10.64	
Equipment Work	Plumbing				41.16	83.16
	Electricity				42.00	
Cleaning & Safety Work					2.26	2.26
Total	2,687.35 × 1.1 = 2,956.09 $\times 10^3$Rp/unit			NET.	76.23	$\times 10^3$Rp/M^2
				GROSS	68.11	$\times 10^3$RP/M^2

FS'5-45			FLOOR AREA	NET 46.84 M^2		
				GROSS 51.46 M^2		
Items		Unit cost $\times 10^3$Rp	Volume	Unit	Cost $\times 10^3$Rp	Sub-total $\times 10^3$Rp
Temporary Work	Warehouse, site office etc.				3.75	36.69
	Setting & staking out	0.26	2.90	M	0.75	
	Scaffolding	0.80	40.24	M^2	32.19	
Earth Work & 1FL. Floor Work	Excavation	0.42	9.81	M^3	4.12	41.47
	Backfilling	0.10	7.81	M^3	0.78	
	Sand bedding	5.60	0.47	M^3	2.63	
	Batukali bedding	9.40	0.90	M^3	8.46	
	1FL. concrete slab	22.35	0.90+0.24 =1.14	M^3	25.48	
Structural Work						2,176.90
Outer Wall Work	Doors & windows				200.51	209.98
	Brick exposure	5.45	4.02	M^2	9.47	
Inside Door & Partition						151.83
Concrete Block and other Mortar Work	Concrete block t=100	2.27	27.35	M^2	62.08	132.34
	Light-weight concrete t=120	2.68	3.78	M^2	10.13	
	Floor mortar t=30	0.84	49.36	M^2	41.46	
	Water proof mortor t=30	1.23	15.18	M^2	18.67	
Roof Work						167.50
Miscellaneous Work	Outside painting	1.00	20.44	M^2	20.44	63.40
	Veranda screen	22.79	0.50		11.9	
	Handrail	10.76	2.00	M	21.52	
	Gutter	1.90	5.60	M	10.64	
Equipment Work	Plumbing				41.16	83.16
	Electricity				42.00	
Cleaning & Safety Work					2.26	2.26
Total	3,065.53 × 1.1 = 3,372.08 $\times 10^3$Rp/unit			NET.	71.99	$\times 10^3$Rp/M^2
				GROSS	65.53	$\times 10^3$Rp/M^2

FGS-36			FLOOR AREA	NET	38.88	M^2
				GROSS	49.74	M^2

Items		Unit cost $\times 10^3$Rp	Volume	Unit	Cost $\times 10^3$Rp	Sub-total $\times 10^3$Rp
Temporary Work	Warehouse, site office etc.				3.75	
	Setting & staking out	0.26	2.64	M	0.69	38.52
	Scaffolding	0.80	42.60	M^2	34.08	
Earth Work & 1FL. Floor Work	Excavation	0.42	11.66	M^3	4.90	
	Backfilling	0.10	9.32	M^3	0.93	
	Sand bedding	5.60	0.52	M^3	2.91	41.37
	Batukali bedding	9.40	0.88	M^3	8.27	
	1FL. concrete slab	22.35	0.88+0.21 =1.09	M^3	24.36	
Structural Work						1,957.07
Outer Wall Work	Doors & windows				152.52	172.52
	Brick exposure	5.45	3.67	M^2	20.00	
Inside Door & Partition						118.36
Concrete Block and other Mortar Work	Concrete block t=100	2.27	33.19	M^2	75.34	
	Light-weight concrete t=120	2.68	2.16	M^2	5.79	
	Floor mortar t=30	0.84	35.52	M^2	29.84	143.92
	Water proof mortor t=30	1.23	26.79	M^2	32.95	
Roof Work						133.44
Miscellaneous Work	Outside painting	1.00	25.16	M^2	25.16	
	Veranda screen	18.23	0.50		9.12	
	Handrail	10.76	8.81	M	94.80	
	Gutter	1.90	5.60	M	10.64	142.72
	Corridor roof drain				3.00	
Equipment Work	Plumbing				41.16	83.16
	Electricity				42.00	
Cleaning & Safety Work					2.26	2.26
Total	2,833.34 × 1.1 = 3,116.67 $\times 10^3$Rp/unit			NET.	80.16	$\times 10^3$Rp/M^2
				GROSS	62.66	$\times 10^3$RP/M^2

FG5-45			FLOOR AREA	NET 48.06 M²		
				GROSS 58.92 M²		
Items		Unit cost ×10³Rp	Volume	Unit	Cost ×10³Rp	Sub-total ×10³Rp
Temporary Work	Warehouse, site office etc.				3.75	39.81
	Setting & staking out	0.26	2.75	M	0.72	
	Scaffolding	0.80	44.18	M²	35.34	
Earth Work & 1FL. Floor Work	Excavation	0.42	13.92	M³	5.85	49.36
	Backfilling	0.10	11.14	M³	1.11	
	Sand bedding	5.60	0.62	M³	3.47	
	Batukali bedding	9.40	1.05	M³	9.87	
	1FL. concrete slab	22.35	1.05+0.25 =1.30	M³	29.06	
Structural Work						2,317.15
Outer Wall Work	Doors & windows				191.51	218.27
	Brick exposure	5.45	4.91	M²	26.76	
Inside Door & Partition						155.87
Concrete Block and other Mortar Work	Concrete block t=100	2.27	34.68	M²	78.72	155.67
	Light-weight concrete t=120	2.68	2.16	M²	5.79	
	Floor mortar t=30	0.84	43.0	M²	36.12	
	Water proof mortor t=30	1.23	28.49	M²	35.04	
Roof Work						153.08
Miscellaneous Work	Outside painting	1.00	26.44	M²	26.44	160.14
	Veranda screen	18.23	0.50		9.12	
	Handrail	10.76	10.31	M	110.94	
	Gutter	1.90	5.60	M	10.64	
	Corridor roof drain				3.00	
Equipment Work	Plumbing				41.16	83.16
	Electricity				42.00	
Cleaning & Safety Work					2.26	2.26
Total	3,334.77 × 1.1 = 3,668.25 ×10³Rp/unit			NET.	76.33	×10³Rp/M²
				GROSS	62.26	×10³RP/M²

FM6-36			FLOOR AREA	NET	38.70	M^2
				GROSS	46.36	M^2

	Items	Unit cost $\times 10^3$Rp	Volume	Unit	Cost $\times 10^3$Rp	Sub-total $\times 10^3$Rp
Temporary Work	Warehouse, site office etc.				3.75	40.18
	Setting & staking out	0.26	2.68	M	0.70	
	Scaffolding	0.80	44.67	M^2	35.74	
Earth Work & 1FL. Floor Work	Excavation	0.42	8.41	M^3	3.53	31.27
	Backfilling	0.10	6.72	M^3	0.67	
	Sand bedding	5.60	0.38	M^3	2.13	
	Batukali bedding	9.40	0.68	M^3	6.39	
	1FL. concrete slab	22.35	0.68+0.15 =0.83	M^3	58.55	
Structural Work						1,843.85
Outer Wall Work	Doors & windows				241.55	323.95
	Brick exposure	5.45	15.12	M^2	82.40	
Inside Door & Partition						77.54
Concrete Block and other Mortar Work	Concrete block t=100	2.27	23.05	M^2	52.32	101.12
	Light-weight concrete t=120	2.68	3.60	M^2	9.65	
	Floor mortar t=30	0.84	13.65	M^2	11.47	
	Water proof mortor t=30	1.23	22.50	M^2	27.68	
Roof Work						131.35
Miscellaneous Work	Outside painting	1.00	11.70	M^2	11.70	318.60
	Veranda screen	13.67	1.0		13.67	
	Handrail	10.76	7.24	M	77.90	
	Gutter	1.90	5.60	M	10.64	
	Wood floor + staircase				194.69	
	Roofdrain				10.00	
Equipment Work	Plumbing				41.16	83.16
	Electricity				42.0	
Cleaning & Safety Work					2.26	2.26
Total	2,953.28 × 1.1 = 3,248.61 $\times 10^3$Rp/unit			NET.	83.94	$\times 10^3$Rp/M^2
				GROSS	70.07	$\times 10^3$RP/M^2

FM6-45			FLOOR AREA	NET	46.80	M^2
				GROSS	54.46	M^2

Items		Unit cost $\times 10^3$Rp	Volume	Unit	Cost $\times 10^3$Rp	Sub-total $\times 10^3$Rp
Temporary Work	Warehouse, site office etc.				3.75	40.77
	Setting & staking out	0.26	2.75	M	0.72	
	Scaffolding	0.80	45.38	M^2	36.30	
Earth Work & 1FL. Floor Work	Excavation	0.42	9.95	M^3	4.18	37.24
	Backfilling	0.10	7.95	M^3	0.80	
	Sand bedding	5.60	0.45	M^3	2.52	
	Batukali bedding	9.40	0.81	M^3	7.61	
	1FL. concrete slab	22.35	0.81+0.18 =0.99	M^3	22.13	
Structural Work						2,132.81
Outer Wall Work	Doors & windows				266.42	336.94
	Brick exposure	5.45	12.94	M^2	70.52	
Inside Door & Partition						97.68
Concrete Block and other Mortar Work	Concrete block t=100	2.27	28.08	M^2	63.74	117.04
	Light-weight concrete t=120	2.68	3.96	M^2	10.61	
	Floor mortar t=30	0.84	17.34	M^2	14.57	
	Water proof mortor t=30	1.23	22.86	M^2	28.12	
Roof Work						157.03
Miscellaneous Work	Outside painting	1.00	11.97	M^2	11.97	346.23
	Veranda screen	18.23	1.00		18.23	
	Handrail	10.76	9.39	M	90.28	
	Gutter	1.90	5.60	M	10.64	
	Wood floor + staircase				205.11	
	Roofdrain				10.0	
Equipment Work	Plumbing				41.16	83.16
	Electricity				42.00	
Cleaning & Safety Work					2.26	2.26
Total	3,351.16 × 1.1 = 3,686.28 $\times 10^3$Rp/unit			NET.	78.77	$\times 10^3$Rp/M^2
				GROSS	67.69	$\times 10^3$RP/M^2

PT5-36			FLOOR AREA	NET	36.90	M^2
				GROSS	40.93	M^2

Items		Unit cost $\times 10^3$Rp	Volume	Unit	Cost $\times 10^3$Rp	Sub-total $\times 10^3$Rp
Temporary Work	Warehouse, site office etc.				3.75	51.54
	Setting & staking out	0.26	4.20	M	1.09	
	Scaffolding	0.80	58.38	M^2	46.70	
Earth Work & 1FL. Floor Work	Excavation	0.42	7.80	M^3	3.28	36.67
	Backfilling	0.10	6.21	M^3	0.62	
	Sand bedding	5.60	0.38	M^3	5.98	
	Batukali bedding	9.40	0.71	M^3	6.67	
	1FL. concrete slab	22.35	0.71+0.19 =0.90	M^3	20.12	
Structural Work						1,874.10
Outer Wall Work	Doors & windows				126.79	238.68
	Brick exposure	5.45	20.53	M^2	111.89	
Inside Door & Partition						76.79
Concrete Block and other Mortar Work	Concrete block t=100	2.27	26.90	M^2	61.06	120.10
	Light-weight concrete t=120	2.68	2.63	M^2	7.05	
	Floor mortar t=30	0.84	37.21	M^2	31.26	
	Water proof mortor t=30	1.23	16.85	M^2	20.73	
Roof Work						286.84
Miscellaneous Work	Outside painting	1.00	27.34	M^2	27.34	85.33
	Veranda screen	22.79	0.50		11.90	
	Handrail	10.76	2.80	M	30.13	
	Gutter	1.90	8.40	M	15.96	
Equipment Work	Plumbing				41.16	83.16
	Electricity				42.00	
Cleaning & Safety Work					2.26	2.26
Total	2,855.47 × 1.1 = 3,141.02 $\times 10^3$Rp/unit			NET.	85.12	$\times 10^3$Rp/M^2
				GROSS	76.74	$\times 10^3$RP/M^2

2 ROUGH STRUCTURAL CALCULATION (EXAMPLES)

2-1

FS'5-36 WALK-UP FLATS

We will apply the Indonesian Standards 'NI-2' in principle, but when the relevant standards do not exist, we will refer to the Japanese Building Standards, etc.

1. STRUCTURAL PLANNING

1-1 PLANNING POLICY

Super structure

This building is a five storied reinforced concrete above the ground, consisting of 6 units per floor; and pure Rahmen structure with spans of 2.5 m width and 3.5 m depth. It is desirable to avoid irregular surfaces in rooms for better use of space. Also the types of columns used -, L and T are suited to room arrangement, and - shaped columns only supply bending resistance in one direction. Thus, caution shall be taken as to the direction of columns. In addition, column thickness on each floor makes minimum size enough to be able to place concrete to a height of 2.8 m. And the changing length of columns on each floor shall correspond to the stresses. Each floor will be of concrete but will likely be made thin to lighten the structure. The roof will consist of roof tiles and wooden truss beams, and horizontal bracing will be provided to maintain horizontal rigidity and to prevent spiral grain twist.

Sub-structure

Underground beams are being considered as a measure against bending stress due to unexpected settlement and the ratio of rigidity with the columns of upper structure, and for maintaining the stability of the whole building, supposing it is larger than upper beams. Also, the first floor slab is a slab on grade. The foundation should be of isolated footings and should maintain sufficient rigidity and bending bearing capacity in order to transmit the upper load to the piles. The piles to be used will be of reinforced concrete cast in place by the formwork method. Piles will be driven by Drop-hammer , or Diesel-hammer, etc. because the bearing layer is located from 10 m to 15 m below the ground, and concrete of high strength (Fc=400 kg/cm^2) is used to protect the pile head from damage. The amount of additional tensile reinforcement is more than 0.8 %, increasing the bending bearing capacity of piles.

2. ALLOWABLE UNIT STRESS OF MATERIALS

Concrete (Refer to 'NI-2')

Unit; kg/cm^2

	Permanent stress			Temporary stress		
	Compression	Tension	Shearing	Compression	Tension	Shearing
δ'_{bk}	$0.33\delta'_{bk}$	$0.36\sqrt{\delta'_{bk}}$	$0.43\delta'_{bk}$	$0.56\delta'_{bk}$	$0.51\sqrt{\delta'_{bk}}$	$0.68\delta'_{bk}$
175	60	5	5.5	100	6.5	9

Reinforcing Bar (Refer to 'NI-2')

Unit; kg/cm^2

Kind	Permanent stress	Temporary stress
u-24	1,400	2,000

Cast-in-situ Pile

Unit; ton/pile

Section (cm)	Permanent stress		Temporary stress	
	Boring No.1	Boring No.2	Boring No.1	Boring No.2
25 x 25	19.2	27.0	Double of permanent stress, respectively	
30 x 30	27.2	40.5		

Note: Basic data for the design of pile driving footings; The bearing capacity of piles should be 1/3 of ultimate bearing capacity (Ru) obtained from the bearing capacity formula.

$Ru = 30\bar{N}\cdot Ap + 1/5\cdot\bar{N}s\cdot\psi\cdot Ls = \bar{q}u/2\cdot\psi\cdot Lc$ ····· (1)

$\bar{N}$: Tip Resistance b, Ap: Total Area of Tip of Pile (m^2)

c, $\bar{N}s$: Average measured N value for the loose portion of earth around the piles

Ls : Length of Pile in the loose portion

qu : Averaged Axial Compression Strength for clay portion around the piles

Lc : Length of Pile in the clay portion

ψ : Length of periphery of pile (m)

Here, $\bar{N} \leq 60$, $\bar{N}s/5 \leq 10$ t/m^2, $\bar{q}u/2 \leq 10$ t/m^2.

3. LOAD

i) Dead load

roof (tile) (average 20 mm)	40 kg/m^2
Truss for gable roof	20 "
2 ∿ 4^F slab (100 mm)	240 "
1F slab: slab on grade	-

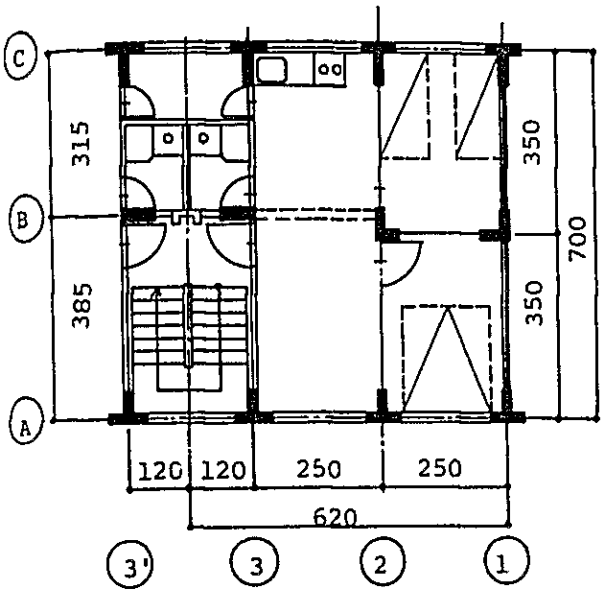
ii) Table for load

	Contents			For floor	For frame	For earthquake
roof	tile (20 mm)	40	D.L	60	60	60
	truss	20	B	-	70	70
		60	L.L	-	-	-
				60	130	130
each floor	monolithic finish 5 mm		D.L	252	252	252
	slab	12	B	-	70	70
		240	L.L	200	140	60
		252		452	462	382
W.C mandy	cinder concrete (150 mm)		D.L	465	465	465
	slabe	225	B	-	70	70
		240	L.L	200	140	60
		465		665	675	595
stairway	slab (220 mm)	528	D.L	528	528	528
			B	-	-	-
			L.L	200	150	60
				728	668	588

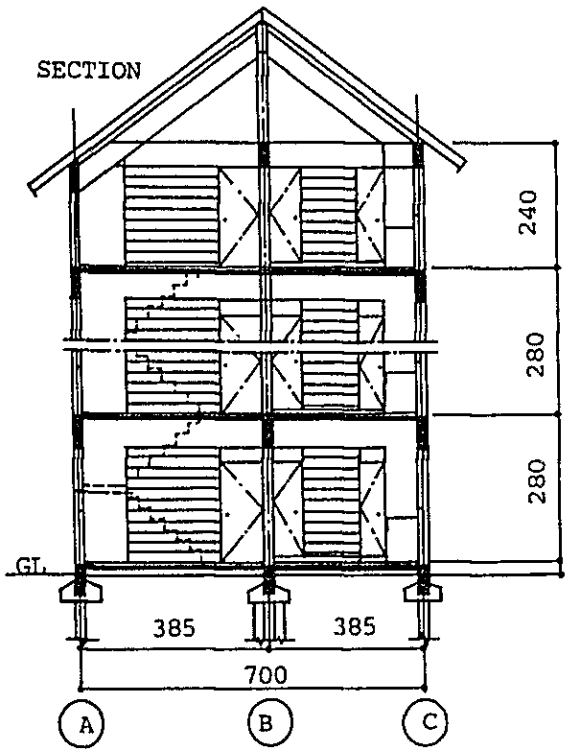
iii) Walls

Bamboo mat (double)	10 kg/m^2
Concrete block (100 mm)	200 "

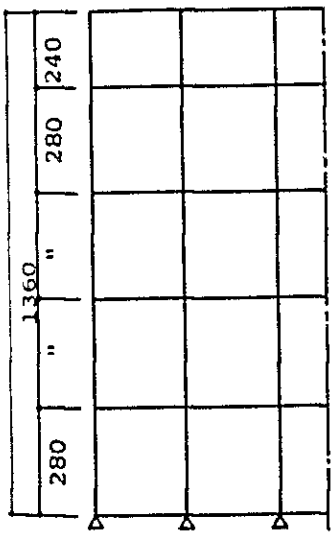
PLAN



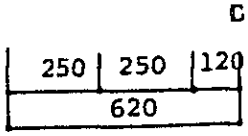
SECTION



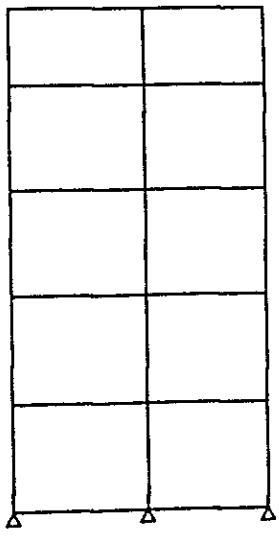
FLAME

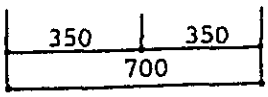


C

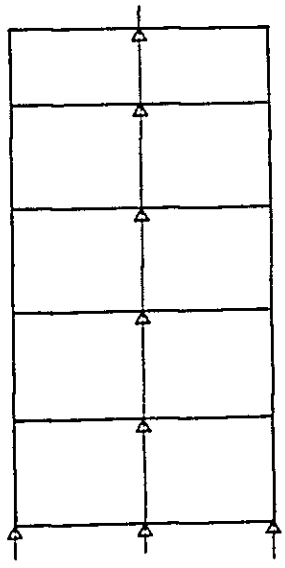


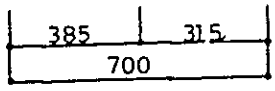
line A,B,C





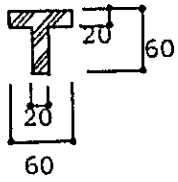
line 1,2





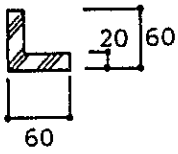
line 3

iv) Columns

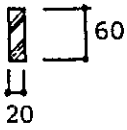


A_1 = 60 c — 480 kg/m

A_2 = 100 c — 672 "



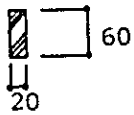
480 "



288 "

v) Girders

general girder — 288 "



ground-girdes — 840 "

4. C, Mo, Q

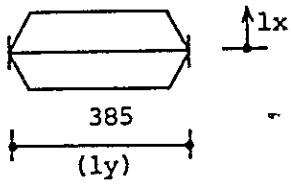
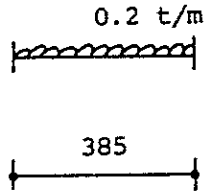
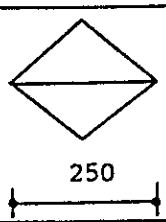
	Diagram	Floor	Contents
Line x_2		2 ∿ 5	lx = 2.5 λ = 1.54 ly = 3.85 w = 0.462 t/m² c = (1.3) x 0.462 x 2 = 1.2 tm Mo = (2.1) x 0.462 x 2 = 1.94 tm Q = (1.65) x 0.462 x 2 = 1.53 t
		R	$c = \frac{1}{12} \times 0.2 \times 3.85^2 = 0.25$ tm Mo = 1.5 x c = 0.37 tm Q = 0.39 t
		2 ∿ 5	lx = 2.5 λ = 1.0 w = 0.462 t/m² c = (0.4) x 0.462 = 0.19 tm Mo = (0.65) x 0.462 = 0.30 tm Q = (0.80) x 0.462 = 0.37 t

	Diagram	Floor	Contents
Line B	0.2 t/m 250	R	w = 0.2 t/m c = $\frac{1}{12}$ x 0.2 x 2.5^2 = 0.11 tm Mo = 0.17 tm Q = 0.25 t

5. PERMANENT STRESS

Omitted because stress is small

6. COLUMN AXIAL LOAD

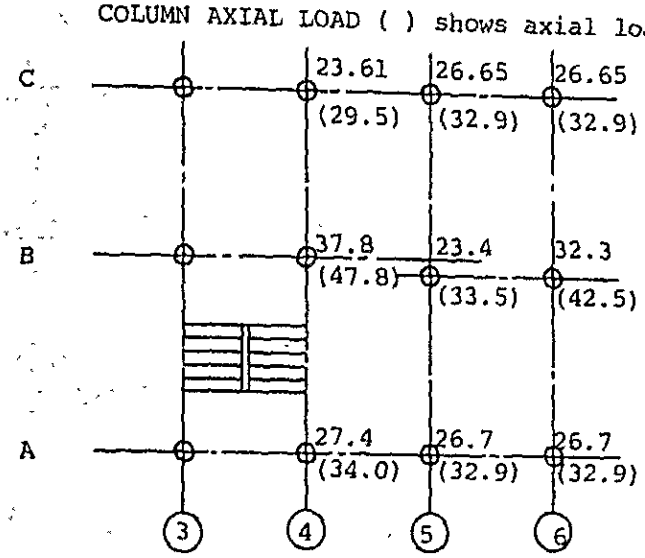
Unit; ton

C	Floor	Position	Contents		Sub-total	Total
3-B	5	roof block	0.13 x 2.45 x 3.5 0.20 x 2.0 x (1.59 + 1.2 + 0.9)	1.12 1.48	2.60	2.60
	4	mandy living room block stairway column	0.675 x 1.59 x 1.2 0.462 x 3.5 x 1.25 0.2 x (1.59 + 1.2 + 0.9) x 2.8 0.668 x 1.2 x 1.92 0.675 x 2.8	1.29 2.02 2.07 1.54 1.89	8.81	11.41
	3		the same to above		"	20.22
	2		"		"	29.03
	1		"		"	37.84
	Footing	mandy living room " ground-girder footing	0.675 x 1.59 x 1.2 0.462 x 3.5 x 1.25 0.462 x 3.5 x 1.25 2.4 x 1.2 x 0.2 x (3.5 + 3.7) 0.5 x 0.8 x 1.5 x 2.4	1.29 2.02 1.06 4.20 1.44	10.00	47.84
2-B	5	roof partition	0.13 x 3.5 x 2.5 0.01 x 2.0 x (3.5 + 1.25)	1.14 0.10	1.15	1.15
	4	room wall column	0.462 x 3.5 x 2.5 0.01 x 2.8 x (3.5 + 1.25) 0.48 x 2.8	4.07 0.13^3 1.35	5.56	6.71
	3		The same above		5.56	12.27
	2		"		5.56	17.83
	1		"		5.56	23.39
	Footing	living room ground-girder footing	0.462 x 3.5 x 2.5 0.576 x (3.5 + 2.5)	4.07 4.00 1.44	10.11	33.50
1-B	5	roof block	0.13 x 3.5 x 2.5 0.20 x (3.5 x 2.0)	1.14 1.40	2.54	2.54
	4	living room wall block column	0.462 x 3.5 x 2.5 0.01 x 2.5 x 2.8 0.2 x 2.8 x 3.5 0.48 x 2.8	4.07 0.07 1.96 1.35	7.45	10.0
	3		The same above		7.45	17.45
	2				7.45	24.90
	1				7.45	32.35

Unit; ton

C	Floor	Position	Contents		Sub-total	Total
	Footing	floor ground-girder footing	0.462 x 3.5 x 2.5 0.576 x (3.5 + 2.5)	4.07 4.60 1.44	10.11	42.46
3-C	5	roof block	0.13 x 2.6 x 2.5 0.2 x 2.0 x 2.5	0.845 1.00	1.85	1.85
	4	mandy living room block column	0.675 x 1.2 x 1.575 0.462 x 1.25 x 1.575 0.2 x (2.4 + 1.0) x 2.8 0.48 x 2.8	1.28 0.91 1.91 1.31	5.44	7.29
	3		The same above		5.44	12.73
	2		"		5.44	18.17
	1				5.44	23.61
	Footing	mandy living room ground-girder footing	0.675 x 1.2 x 1.575 0.462 x 1.25 x 1.575 0.576 x (2.4 + 1.575)	1.28 0.91 2.29 1.44	5.91	29.52
3-A	5	roof block	0.13 x 2.4 x 2.6 0.2 x 2.0 x (1.93 + 1.25)	0.82 1.27	2.10	2.10
	4	living room stairway block column	0.462 x 1.25 x 1.93 0.668 x 1.2 x 1.92 0.2 x 2.8 x (1.93 + 1.25) 0.675 x 2.8	1.12 1.54 1.78 1.89	6.33	8.43
	3		The same above		6.33	14.76
	2				6.33	21.10
	1				6.33	27.42
	Footing	living room ground-girder	0.462 x 1.25 x 1.93 0.668 x 1.2 x 1.93 0.576 x (2.4 + 1.93)	1.12 1.55 2.49 1.44	6.60	34.02
1-A	5	roof block	0.13 x 2.5 x 1.93 0.2 x 2.0 x (1.93 + 2.5)	0.63 1.77	2.41	2.41
	4	loving room block column	0.462 x 2.5 x 1.93 0.2 x (2.5 + 1.93) x 2.8 1.48 x 2.8	2.23 2.48 1.35	6.06	8.47
	3		The same above		6.06	14.53
	2				6.06	20.60
	1				6.06	26.65
	Footing	living room ground-girder footing	0.462 x 2.5 x 1.93 0.576 x (2.5 + 1.93)	2.23 2.55 1.44	6.22	32.87

Diagram for foundation axial load



7. SEISMIC LOAD

Calculated on 6 units per building

Floor	Position	Contents		Sub-total	Total
5	roof (tile)	0.04 x (7.0 + 2.0) x (6.2 x 6 + 2) x 1.3	16.00	16.00	
	block (out)	0.2 x 2.0 x (3.7 x 2 x 6)	17.76		
	(in)	0.2 x 2.0 x 2.5 x 2 x 4	8.00		35.62
		0.2 x 2.0 x 2.0 x 2 x 6	9.60	19.62	
		0.2 x 2.0 x (1.8 x 3 + 2.4 + 1.4)	3.68		
	partition	0.01 x 2.0 x (2.85 + 2.15 + 1.5 + 3.0)	0.19		
4	Floor			19.62	
	L.room	0.38 x (7.0 x 5.0) x 6	80.22		
		0.382 x 1.35 x 1.2 x 6	3.72		
	M/W	0.595 x 1.8 x 2.4 x 3	7.72	107.96	
	stairway	0.588 x 2.4 x 3.85 x 3	16.30		156.02
1	column				
	-type	0.288 x 2.8 x 2	1.62		
	L,T type	0.24 x 2.8 x 8	10.76		
	T type	0.672 x 2.8 x 2	3.77		
	wall				
	block (out)	0.20 x (2.8-1.0) x 3.7 x 2 x 6	16.00	28.44	
	(in)	0.20 x (2.8-0.5) x 2.5 x 2 x 4	9.20		
		0.20 x (2.8-0.5) x 2.0 x 2 x 6	11.04		
		0.20 x (2.8-0.5) x (1.8 x 3 + 2.4 + 1.4)	4.24		164.84
	partition	0.01 x 2.8 x (2.85 + 2.15 + 1.5 + 3.0)	0.27		
				28.44	

Floor	HM	K	W	KW	Σkw
5	14.6	0.15	35.62	5.35	5.35
4	12.2	0.14^3	156.02	22.31	27.66
3	9.4	0.13^6	164.84	22.09	49.75
2	6.6	0.10	164.84	16.49	66.24
1	3.8	0.10	164.84	16.49	82.73

Here:

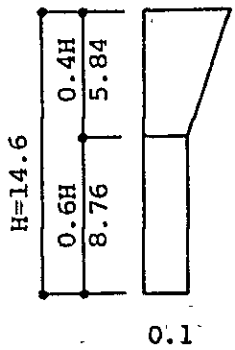
$10^M < H$, Ko = 0.1

$Kih/Kbh = 1 + 0.5H$

$Kbh = \frac{1}{10 + 0.1 \times H}$

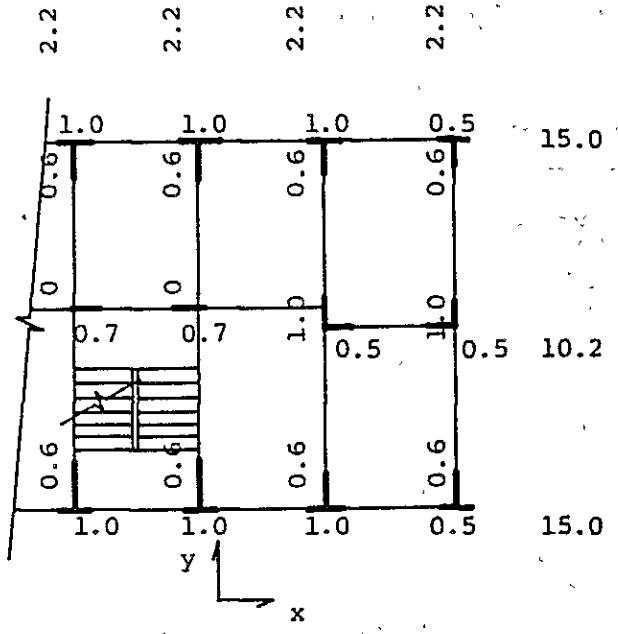
Kth; Top floor

Kbh; Base floor



8. RATIO OF DISTRIBUTION FOR COLUMNS

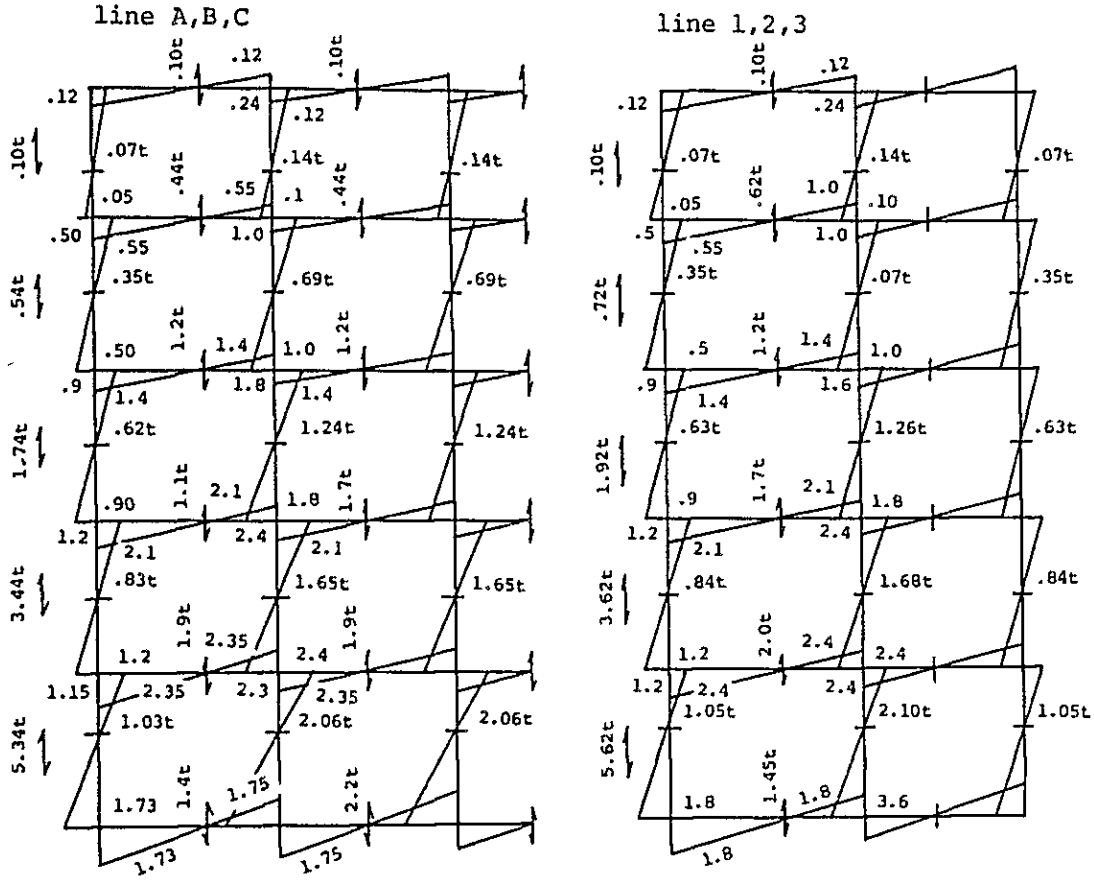
This is based on the Muto's D method and the following values are estimated: That is, the exterior column is 0.5, inside column is 1.0 ∿ 0.7, inflection point is 0.3 at highest floor, 0.5 at middle floors and 0.7 at lowest floor.



Shearing stress shared at D = 1.0

Floor	ΣK·W	X-Direction		Y-Direction	
		ΣDx	Σkw/ΣDx	ΣDy	Σkw/ΣDy
5	5.35	39.6	0.14	40.2	0.14
4	27.66	"	0.70	"	0.69
3	49.75	"	1.26	"	1.24
2	66.24	"	1.68	"	1.65
1	82.73	"	2.10	"	2.06

9. SEISMIC STRESS



MOMENT STRESS DIAGRAMME

10. CROSS SECTION

i) Girder (Both X & Y-Direction)

RF $sM = 0.25 \pm 1.09 = 1.34$ tm

$sQ = 0.39 \pm 0.1 = 0.49$ t

18C x 40C $j = 7/8 \times 35 = 30.6$ $ft \cdot j = 2.0 \times 30.6 = 61.2$

$$at = \frac{1.34 \cdot 10^2}{61.2} = 2.2 \text{ cm}^2$$ 2 - 16φ

$$\tau = \frac{8.49 \cdot 10^3}{18 \times 30.6} = 0.9 \text{ kg/cm}^2, < 5.5$$

5F $sM = 1.2 \pm .55 = 1.75$ tm

$xQ = 1.53 \pm .62 = 2.15$ t

18C x 40C

$at = 2.9 \text{ cm}^2$

$$\tau = \frac{2.15 \cdot 10^3}{18 \times 30.6} = 3.91 \text{ kg/cm}^2, < 5.5$$ 2 - 16φ

4 ∿ 2F

$sM = 1.2 \pm 2.4 = 3.6$ tm

$sQ = 1.53 \pm 2.0 = 3.53$ t

18C x 60C $j = 7/8 \times 55 = 48$ $ft \cdot j = 2.0 \times 48 = 96$

$$at = \frac{3.6 \cdot 10^2}{96} = 3.75 \text{ cm}^2$$ 2 - 16φ

$$\tau = \frac{3.53 \cdot 10^3}{18 \times 48} = 4.1 \text{ kg/cm}^2, < 5.5$$

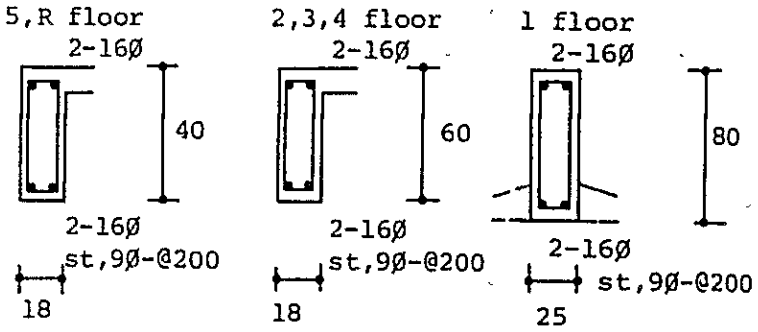
1F

sM = 1.8 tm

sQ = 1.45 t

25C x 80C j = 7/8 x 74 = 65 ft·j = 2.0 x 65 = 130

at = 1.4 cm² 2 - 13φ → 2 - 16φ



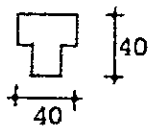
ii) Column

Exterior column (1-A)

1F

$$\begin{cases} Nx = 26.65 \pm 5.62 = 32.27\ t,\ 21.03\ t \\ Mx = - \pm 1.8 = 1.8\ tm \\ Qx = 1.05\ t \end{cases}$$

$$\begin{cases} Ny = 26.65 \pm - = 26.65\ t \\ My = - \pm 3.5 = 3.5\ tm \\ Qy = - \pm 2.06 = 2.06\ t \end{cases}$$



$BD = 20 \times (40 + 20) = 1.2 \times 10^3$

$BD^2 = 20 \times 40^2 = 0.32 \times 10^5$

$Nx/BD = 26.9,\ 17.5$ $My/BD = 22.2$

$Mx/BD^2 = 5.62$ $My/BD^2 = 11.0$

From the diagram

xPt = - yPt = 0.3 %

xat = - yat = 0.003 x 1.2 x 10^3 = 3.6 cm²

2 - 16φ

$Jy = \frac{2.06 \cdot 10^3}{20 \times 7/8 \times 35} = 0.66\ kg/cm^2$ st - 9φ - c200 (Pw = 0.32 %)

3F

$$\begin{cases} Nx = 14.53 \pm 1.92 = 16.45t,\ 12.61t \\ Mx = - \pm .9 = .9\ tm \\ Qx = .63\ t \end{cases}$$

$$\begin{cases} Ny = 14.53 \pm - = 14.53\ t \\ My = - \pm 1.8 = 1.8\ tm \\ Qy = 1.24 = 1.24\ t \end{cases}$$

Section is the same above $BD = 1.2 \times 10^3$

$BD^2 = 0.32 \times 10^5$

$Nx/BD = 13.7$ 10.5 $Ny/BD = 12.1$

$Mx/BD^2 = 2.8$ $My/BD^2 = 5.6$

From the diagram

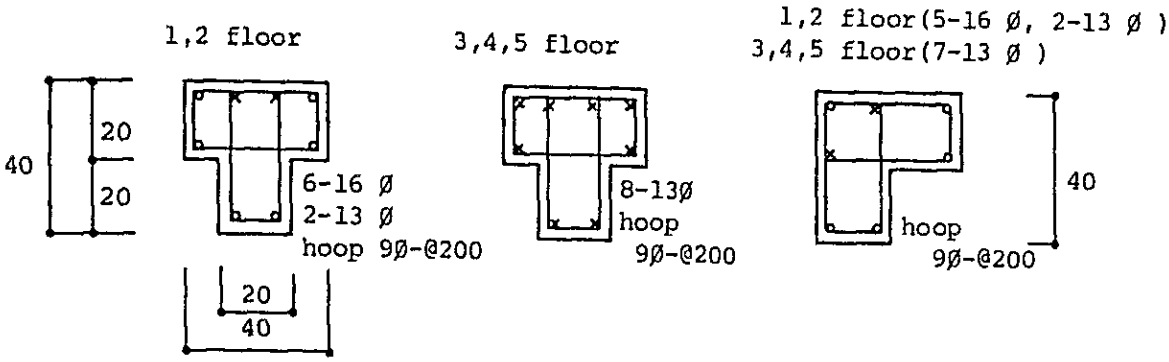
xPt = -

yPt = 0.05

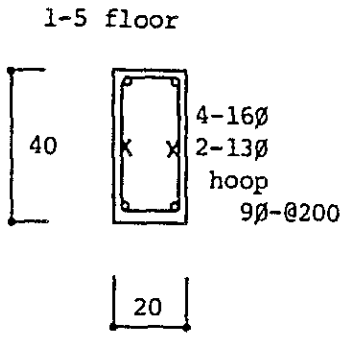
$\therefore$ yat = 0.0005 x 1.2 x 10^3

= 0.6 cm^2

1 - 16¢



(Pt=14.6 /1200 =1.2 %, Pt= 10.15/1200 =0.85 %)



11. PILES

supposed cast-in-situ Piles

Strength of materials; Fc $\leq$ 400 kg/cm^2

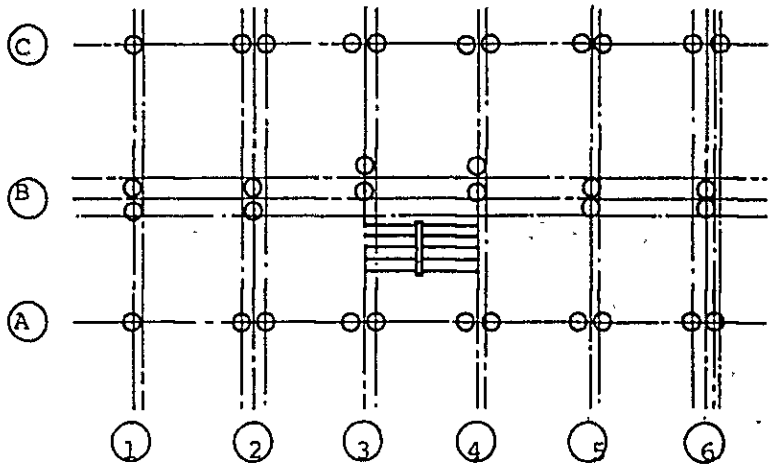
Formula for bearing strength of piles; Formula (1)

The bearing capacity is obtained by the bearing strength of pile head from the below.

Unit: ton

Pile section	A cm^2	L^M	Wt	Strength of materials	Strength of pile head	
				Fc = 75	Boring No.1	Boring No.2
25 x 25	607	10 or 15	1.46	45.5	19.2	27.0
30 x 30	882	"	2.11	66.0	27.2	40.5
35 x 35	1207	"	2.90	90.5	37.0	54.8

Arrangement of piles



Ex. 25 x 25 cm

point No.1 (L = 15 m)

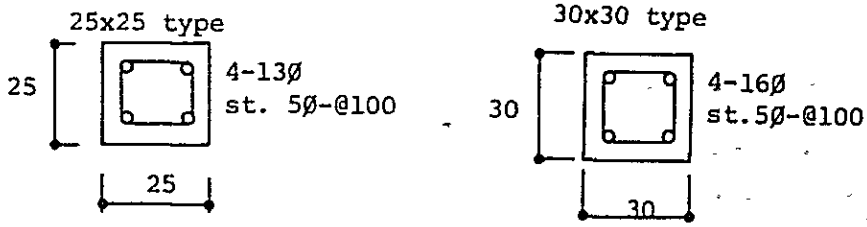
We get $\bar{N}$ = 30, $\bar{N}s$ = 0, $\bar{q}u$ = 1.0 kg/cm^2, Ap = 0.0607 m^2, ψ = 1.0 m, Lc = 6.0 m from the boring data and the bearing strength of pile head from formula (1)

$$qu = \frac{1}{3} \times (30 \times 30 \times 0.0607 + 0 + \frac{1}{2} \times 1.0 \times 6.0)$$

$$= \frac{1}{3} \times (54 + 0 + 3)$$

$$= 19.2 \text{ t}$$

Cross section of pile is as follow.



12. SLAB

Calculation is made on the assumption that the edge side of slab is fixed elastically and the axis of center of gravity is less than the balanced steel ratio in analysis.

i) Case; S_1

Common to both X & Y-direction

lx = 2.7 $\quad \lambda = 1.0 \quad \omega_1 = 0.54\ t/m^2$

ly = 2.7 $\quad \omega_1 lx^2 = 0.54 \times 2.7^2 = 3.94$

$Mx_1 = (0.04) \times 3.94 = 0.16$ tm/m, $(= My_1)$

$x_2 = (0.028)$ " $= 0.11$ tm/m, $(= My_2)$

D = 100 cm $\quad j = 6.5 \quad ft \cdot j = 1.6 \times 6.5 = 10.4$

End ; $at = Mx_1/ft \cdot j = 1.54\ cm^2/m$

9φ - 250@

Center; $at = Mx_2/ft \cdot j = 1.06\ cm^2/m$

9φ - 250@

ii) Case; S_2

lx = 2.7 $\quad \lambda = 1.37 \quad \omega_2 = 0.452\ t/m^2$

ly = 3.7 $\quad \omega_1 \cdot lx^2 = 3.30$

$Mx_1 = (0.065) \times 3.3 = 0.215$ tm/m

$x_2 = (0.044) \times$ " $= 0.145$ "

$My_1 = (0.042) \times 3.3 = 0.139$ "

$y_2 = (0.028) \times$ " $= 0.093$ "

D = 100 cm

Short span

End ; $at = 0.215 \cdot 10^2/10.4 = 2.07\ cm^2/m$

9φ - @ 200

Center; at = 1.40

9φ - @ 200

Long span

End ; $at = 1.34\ cm^2/m$

9φ - @ 300

Center; $at = 0.9\ cm^2/m$

9φ - @ 300

Note; Slab thickness is regulated more than 12 cm in general floors under 'NI-2' standards, but it is sufficient for the existing stress, here.

13. FOUNDATION

i) In the case of two piles

Spacing of pile; $2.5 \times D = 2.5 \times 30 = 75$ cm

N = 47.84 t (Axial load)

$n = N/27.2 \rightarrow 2$

Reaction of one pile

$\bar{N} \doteqdot 24.0$ t

Bending moment

$M = 0.375 \times 24.0 = 9.0$ tm

Q = 24.0 t

D = 60 cm, j = 48 cm $\quad ft \times j = 1.4 \times 48 = 67.2$ t/cm

$at = M/ft \times j = 13.4\ cm^2 \rightarrow 6 - 16\phi$

Shearing force

$\bar{D} = 55$ cm, j = 43 cm, b = 800

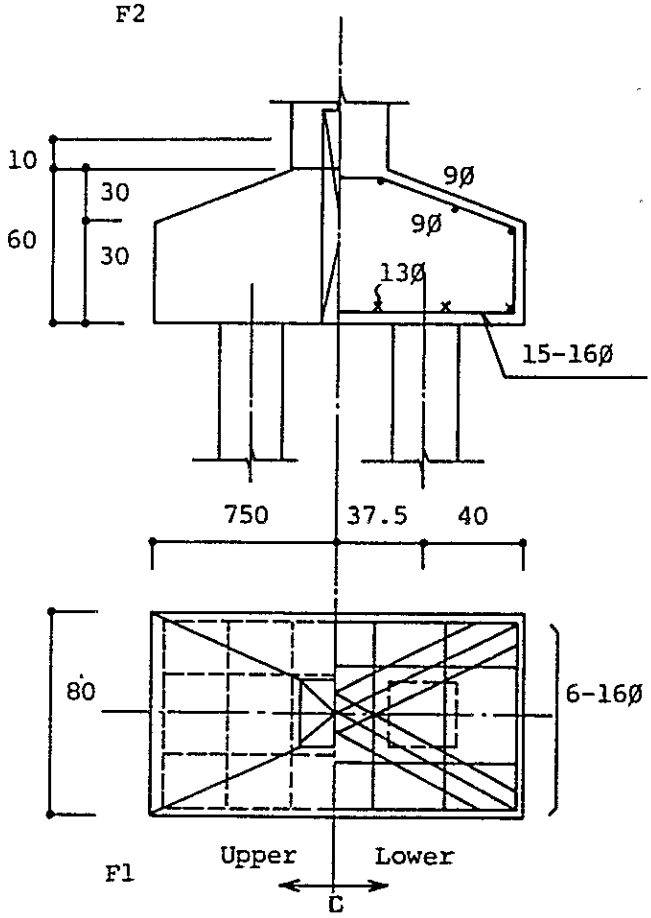
$J = \bar{N}/bxj \doteqdot 7.0\ kg/cm^2$ OK

ii) In the case of one pile

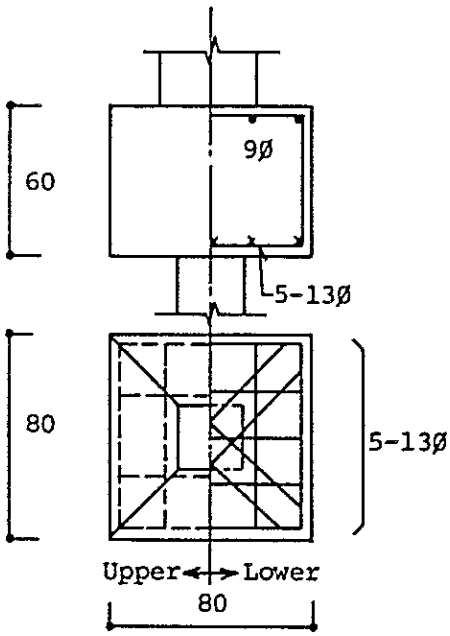
No stress occurs

FOOTING

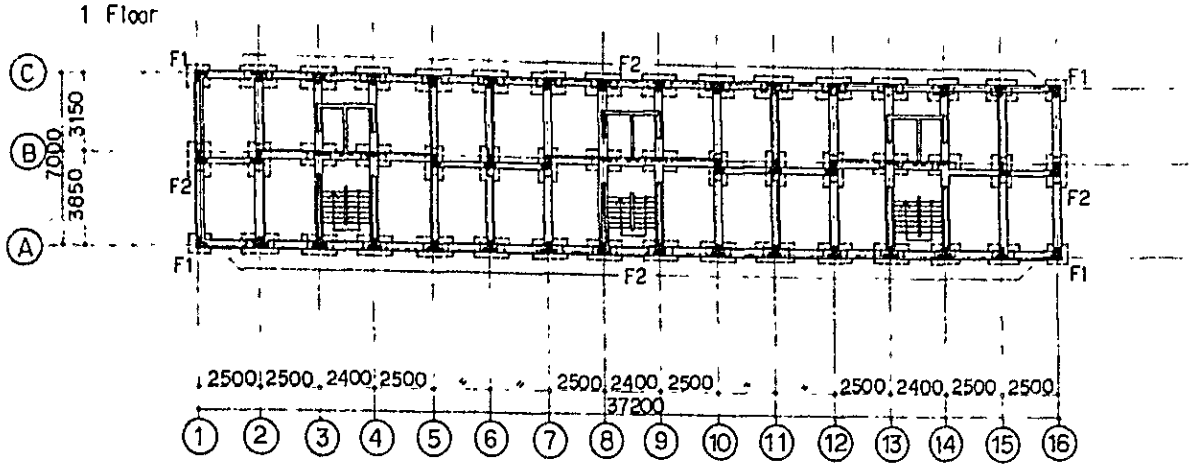
F2



F1

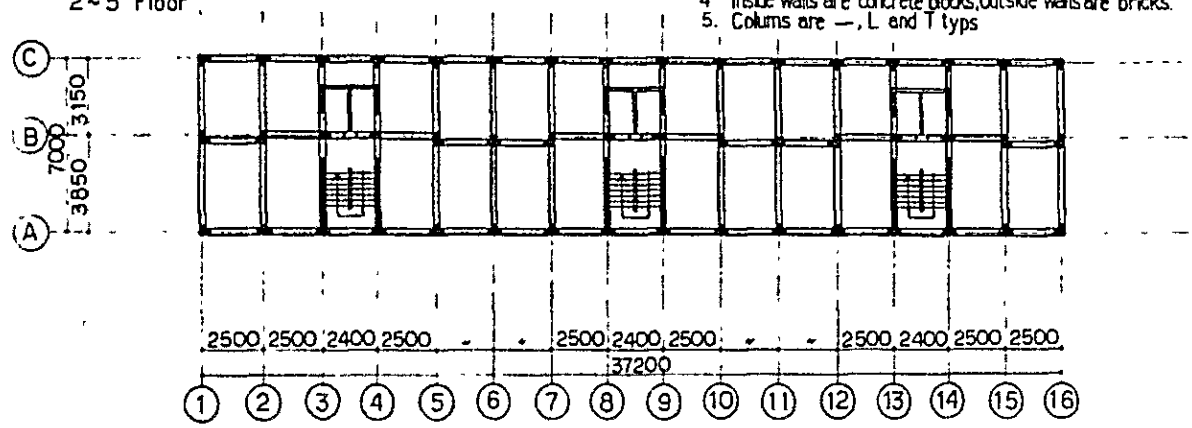


1 Floor



Except written specially
1. Mateial of floor is composed of sand and lime addicy to compaction
2 Foundations are all F3 Types.
3 Girders are all G1 Types
4 Inside walls are concrete blocks, Outside walls are bricks.
5. Colums are —, L and T typs

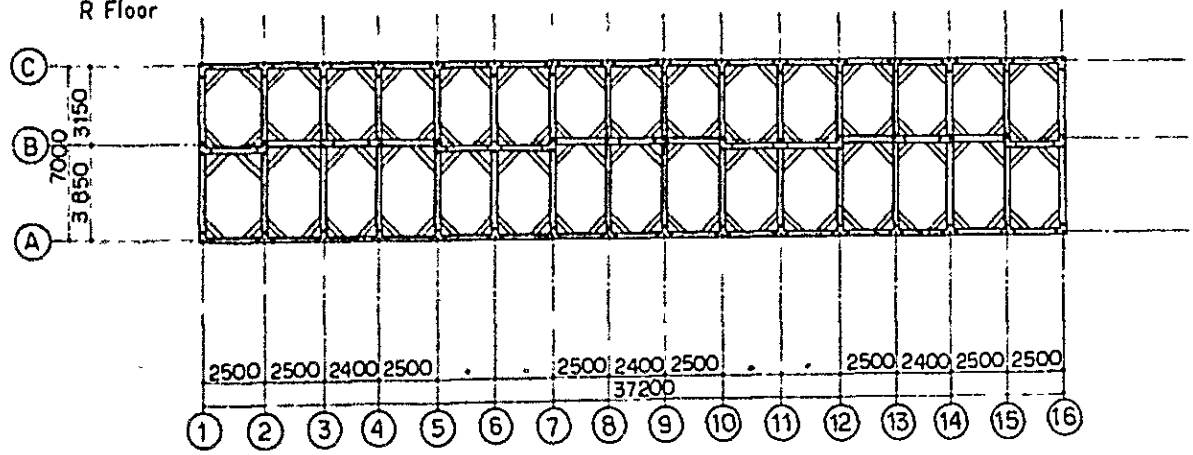
2~5 Floor



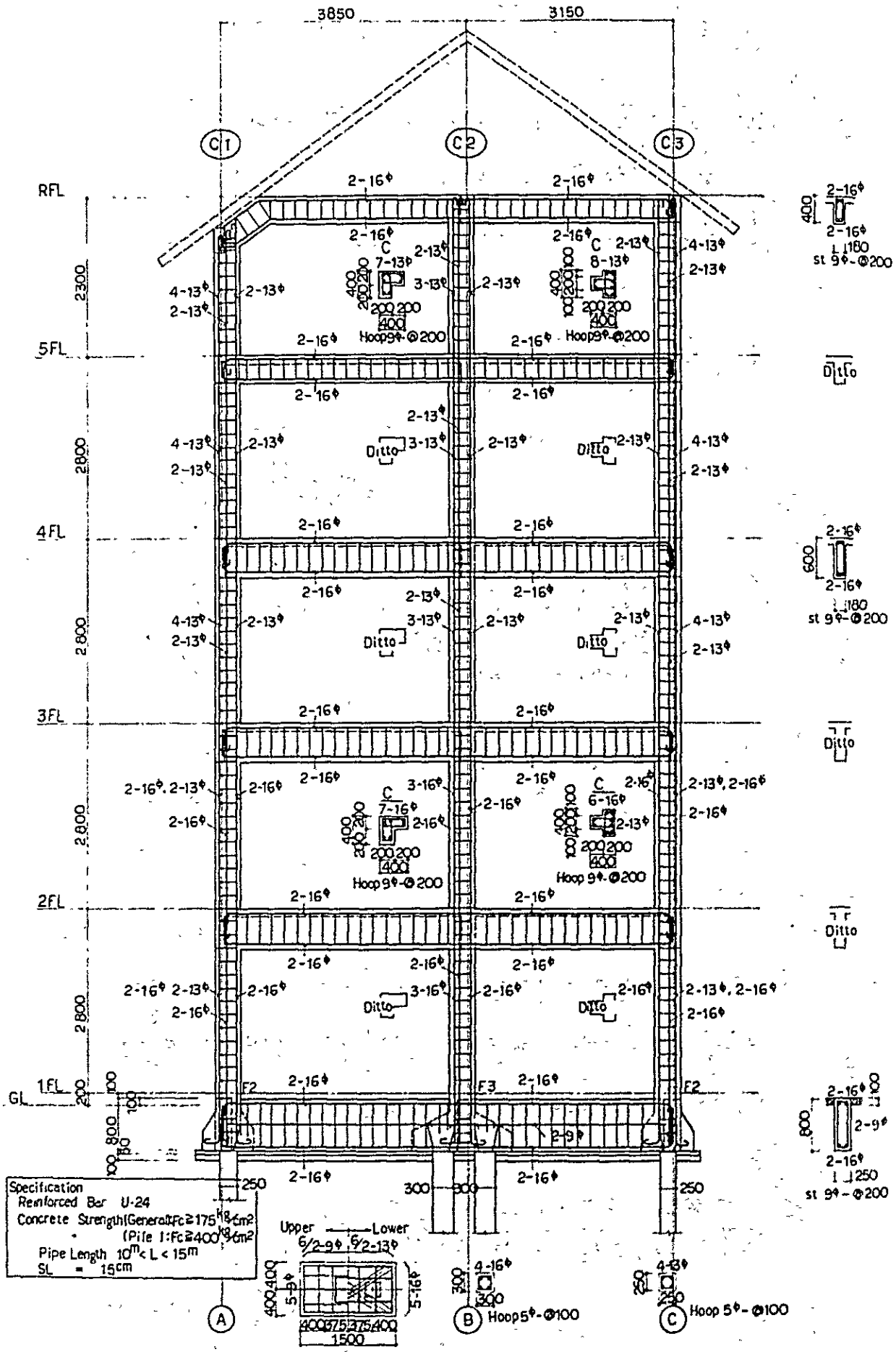
Except witten specially

1 Girdess are all G1 types
2. Slabs are R C with thickness of 10 cm.
3 Inside and outside walls are the same above.

R Floor



Except witten specially
1. Girders and lateral braces are G1 types.
2. Slabs are unnecessary.


3850
3150
C1
C2
C3
RFL
5FL
4FL
3FL
2FL
1FL
GL
2300
2800
2800
2800
2800
200
100
100
800
100
2-16φ
2-13φ
4-13φ
7-13φ
8-13φ
3-13φ
Hoop 9φ-@200
Ditto
7-16φ
6-16φ
3-16φ
2-16φ
2-13φ, 2-16φ
F2
F3
2-9φ
Specification
Reinforced Bar U-24
Concrete Strength (General Fc≥175 kg/cm²
(Pile 1: Fc≥400 kg/cm²
Pipe Length 10m < L < 15m
SL = 15cm
250
300
Upper
Lower
6/2-9φ
6/2-13φ
5-9φ
5-16φ
400
675
1500
4-16φ
4-13φ
Hoop 5φ-@100
A
B
C
400
600
800
st 9φ-@200
180
250

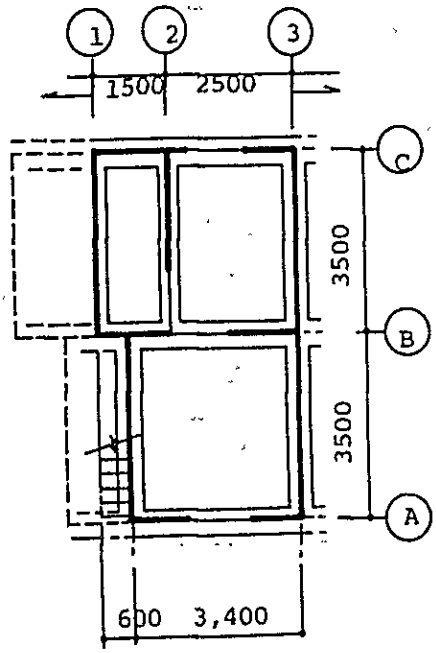
2-2

FS'2-26

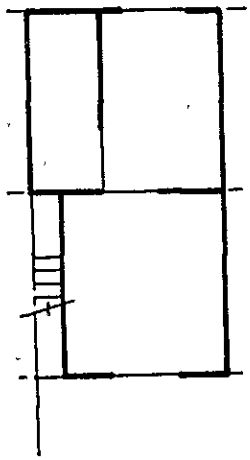
1. SCOPE OF PLANNING

The building is two storied, having six units of 26 m^2 each floor. The inside are of concrete hollow blocks, the roof covering is tile on the joist, and the slab in the second floor is of 10 cm thick concrete and of direct slab on grade in the first floor. The structural planning was made to satisfy the above mentioned specifications, and the figures were obtained after analysis of the required stresses.

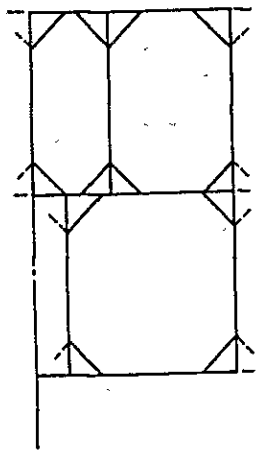
PLAN



sym. 1 FLOOR

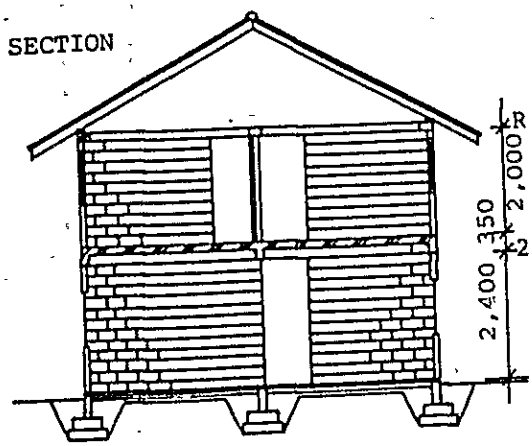


sym. 2 FLOOR



sym. R FLOOR

SECTION



2. LOADS

Dead load

Roof (tile), 15 mm γ = 1.6	25 kg/m^2
Wooden joist	10 "
Concrete slab, sF (100 mm thick)	240 "
Exterior & enterior wall (concrete block 150 mm)	200 "
Beams, 35 x 15 cm	126 kg/m
Stairway (wood)	15 kg/m^2

	Contents	kg/m^2		For floor	For frame	For earthquake
roof	tile	25	D.L	35	35	35
	truss	10	B	-	30	30
			L.L	-	-	-
		35		35	65	65
2nd floor	concrete slsb	240	D.L	240	240	240
			B	-	30	30
			L.L	200	140	60
				440	410	330
wc mandi	water-proof mortar (30 mm)	60	D.L	300	300	300
			B	-	30	30
	concrete slsb	240	L.L	200	140	60
		300		500	470	390
stairway	wooden stair	15	D.L	15	15	15
			B	-	-	-
			L.L	200	140	60
				215	155	75

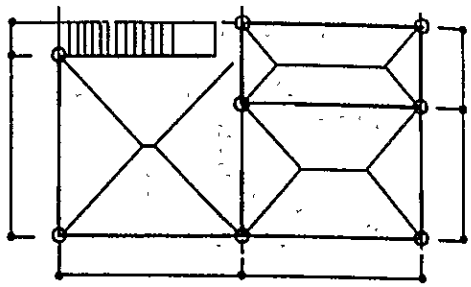
3. AXIAL LOAD (EXCLUDING DEAD LOAD OF FOUNDATION)

C	Floor	Position	Contents		Sub-total	Total
YW1 YW2	2	roof block	0.065 x (3.5/2 + 1.0) x (3.4 + 0.6) 0.2 x 2.0 x 2.0 0.2 x 1.6 x 1.0	0.72 0.81 0.32	1.85	1.85
	1	floor block	0.41 x 3.4 x 3.5/4 0.2 x 2.0 x 2.4 0.2 x 1.6 x 1.0	1.22 0.96 0.32	2.50	4.35
	ΣLy = 1.9 m then 2.29 t/m					
YW3 YW4	2	roof block	0.065 x 3.5 x 4.0 0.2 x 1.65 x 3.5 0.2 x (1.5 + 1.3) x 2.0	0.91 1.16 1.12	3.19	3.19
	1	floor wc/m floor block	0.45 x 3.4 x 3.5/4 0.45 x 1.2 x 1.2 0.47 x 1.5 x 0.75 x 1/2 0.41 x 2.5 x 1.25 x 1/2 0.2 x (1.5 + 1.3) x 2.4	1.22 0.95 0.27 0.64 1.35	4.07	7.26
	ΣLy = 1.5 + 1.3 = 2.8 m then 2.60 t/m					
YW5 YW6	2	roof block	0.065 x (3.5/2 + 1.0) x 4.0 0.2 x 2.0 x (2.0 + 0.9) 0.2 x 1.0 x 1.2	0.715 1.16 0.24	2.11	2.11
	1	wc/m floor block	0.47 x 1.5 x 0.75 x 1/2 0.41 x 2.5 x 1.25 x 1/2 0.2 x 2.4 x (2.0 + 0.9) 0.2 x 1.0 x 1.2	0.27 0.64 1.40 0.24	2.55	4.66
	ΣLy = 1.5 + 0.9 = 2.4 m then 1.95 t/m					
XW1	2	roof block	0.065 x 2.0 x (3.5 + 1.0) 0.2 x 3.5 x 3.1	0.59 2.17	2.76	2.76
	1	wc/m block	0.47 x 1/2 x 0.75 x (3.5 + 2.1) x2 0.2 x 3.5 x 2.4	1.94 1.68	3.62	6.38
	ΣLx = 3.5 m then 1.83 t/m					
XW2	2	roof block	0.065 x 2.0 x 4.5 0.2 x 3.5 x 3.1	0.59 2.17	2.76	2.76
	1	stair floor block	0.155 x 0.6 x 3.5 0.41 x 3.5 x 3.4/4 0.2 x 3.5 x 2.4	0.33 1.19 1.68	3.20	5.96
	ΣLx = 2.6 m then 2.3 t/m					
XW3	2	roof block	0.065 x (0.75 + 1.0) x 4.5 0.2 x 3.5 x 3.1	0.51 2.17	2.68	2.68
	1	wc/m floor block	0.47 x 1/2 x 0.75 x (3.5 + 2.0) 0.41 x 1/2 x (3.5 + 1.0) x 1.25 0.2 x 3.5 x 2.4	0.97 1.16 1.68	3.81	6.49
	ΣLx = 2.5 m then 2.6 t/m					
XW4	2	roof block	0.065 x 2.0 x 4.5 0.2 x 3.5 x 3.1	0.59 2.17	2.76	2.76
	1	floor block	0.41 x 3.4 x 3.5/4 x 2 0.2 x 3.5 x 2.4	2.44 1.68	4.12	6.88
	ΣLx = 3.5 m then 1.97 t/m					
XW5	2	roof block	0.065 x 2.0 x 4.5 0.2 x 3.5 x 3.1	0.59 2.17	2.76	2.76
	1	floor block	0.41 x 1/2 x (3.5 + 1.0) x 1.25 x 2 0.2 x 3.5 x 2.4	2.31 1.68	3.99	6.75
	ΣLx = 3.5 m then 1.93 t/m					

Maximum and minimum compressive unit stresses

$$\max \sigma c = \frac{1040}{15 \times 40} = 1.74 \text{ kg/cm}^2$$

$$\min \sigma c = \frac{732}{15 \times 40} = 1.23 \text{ kg/cm}^2$$



4. HORIZONTAL LOAD

2nd floor

Floor	Position	Contents		Sub-total	Total
	roof	0.065 x 9.0 x 4.0 x 6 x 1.13	15.87		
	block (x)	0.20 x 3.5 x 3.1 x 8	17.36		
		0.20 x (3.5 x 3.1 - 0.9 x 2.0) x 6	10.86		
		0.20 x (3.5 x 3.1 x 9) -(1.0 x 2.0 x 6)	17.13		82.1+
	(y)				
	(out)	0.20 x (3.4 x 2.0 - 1.6 x 1.0) x 6	6.24		
		0.20 x (4.0 x 2.0 - 1.6 x 1.0) x 6	7.68		
	(in)	0.20 x (4.0 x 2.0 - 1.1 x 2.0) x 6	6.96		
	2nd floor				
	wc/m	0.39 x 1.5 x 3.5 x 6	12.30		
2	floor	0.33 x 2.5 x 3.5 x 6	17.33	56.1	
		0.33 x 3.4 x 3.5 x 6	23.60		
		0.33 x 1.2 x 1.2 x 6	2.86		85.1+
	block (x)	0.20 x 3.5 x 2.4 x 8	13.44		
		0.20 x (3.5 x 2.4- 0.9 x 2.0) x 6	8.16	29.0	
		0.20 x (3.5 x 2.4- 1.0 x 2.0) x 6	7.68		
	(y)				
	(out)	0.20 x (3.4 x 2.4- 1.6 x 1.0) x 6	7.88		
		0.20 x (4.0 x 2.4- 1.6 x 1.0) x 6	9.60	56.9	
	(in)	0.20 x (4.0 x 2.4-1.1 x 2.0) x 6	8.88		
	stairway	0.075 x 1.2 x 2.3 x 6	1.25	29.0	

5. SEISMIC LOAD AND LENGTH OF WALL

	K x W	KW	ΣKW	ΣLx m	ΣLy m
2 F	0.1 x 82.10	8.21	8.21	68.5	7.5 x6
1 F	0.1 x 85.10	8.51	16.72	"	"

6. AVERAGE SHEARING UNIT STRESS

(τ kg/cm^2)

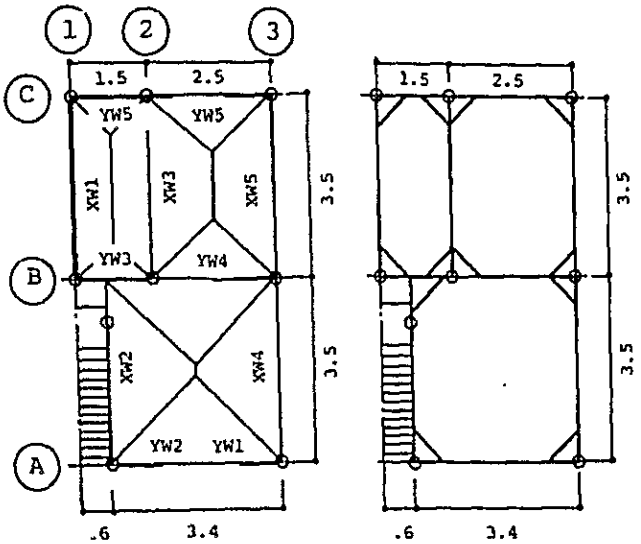
	Shearing stress	
	x-direction	y-direction
2 F	0.13	0.18[1]
1 F	0.25	0.37[2]

$$\tau = \frac{KW \times 1.5}{\Sigma L \times t}$$

Both figures satisfy the allowable shearing unit stress of blocks (1.36 kg/cm^2)

7. STUDY AFTER THE FAILURE OF UNREINFORCED BLOCKS

Calculations were made supposing a sufficiently sound reinforced block column at the end of a wall and a regid-framed structure of beams.



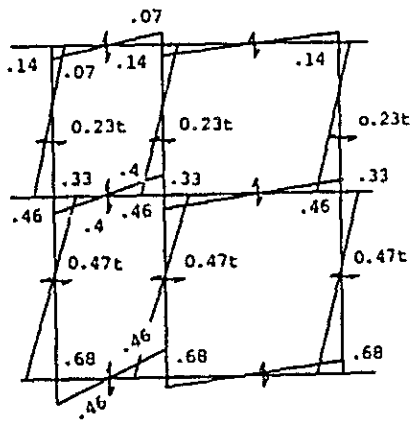
O shows reinforced block column.

1 FLOOR 2 FLOOR

7-1 PERMANENT STRESS

Omitted because the stress is small.

7-2 SEISMIC STRESS



	No. of column/Building	Shearing force / Column
	36	0.23 t
	36	0.47 t

7-3 CROSS SECTION

a. Beams

1F; M = 0.46 tm

Q = 0.31 t

B x D = 15C x 25C j = 17.5C

at = $0.46 \cdot 10^2 / 2.0 \times 17.5 = 1.31\ cm^2$ → 1-13φ

Q = $0.31 \times 10^3 / 15 \times 17.5 = 1.2 < 9.0\ kg/cm^2$

2F; M = 0.40 tm

Q = 0.54 t

B x b = 15C x 25C

at = $1.16\ cm^2$ → 1-13φ

Same to 1F.

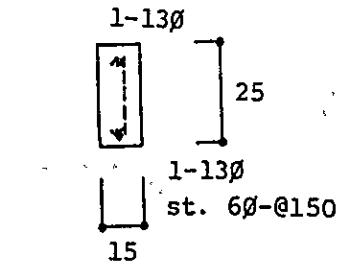
RF. (Include lateral blace)

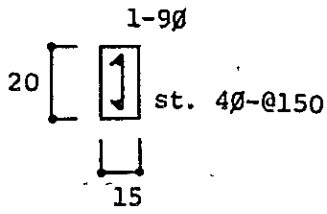
M = 0.07 tm

Q = 0.1 t

B x D = 15C x 20C

at = $0.28\ cm^2$ → 1-9φ





7-4 AXIAL LOAD

Supposing the reinforced block columns will support a floor load near the column after the failure of the unreinforced block wall

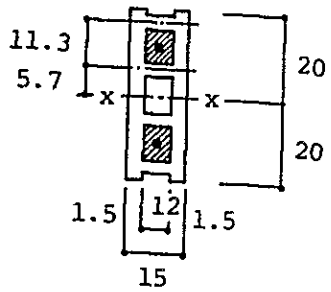
Colum (2-B)

roof	0.065 x (0.75 x 1.25) x 1.13	0.15		
	0.065 x (1.65 x 1.75) x 1.13	0.25	1.3	
wall	0.20 x 2.0 x (1.25 + 1.0)	0.90		
2nd floor				
slab	0.47 x 0.75 x 1.75	0.62		
	0.41 x 1.25 x 1.75	0.90		
	0.41 x 1.7 x 1.75	1.22	3.92	5.22+
wall	0.20 x 2.4 x (0.45 + 2.0)	1.18		

Colum (3-B)

roof	0.065 x 1.75 x 3.4 x 1.13	0.44		
	0.065 x 1.75 x 2.5 x 1.13	0.33	3.14	
wall	0.20 x 2.0 x (2.5 + 3.4)	2.36		
2nd floor				
slab	0.41 x 1.75 x (2.5 + 3.4)	4.24		
wall	0.20 x 2.0 x (2.5 + 3.4)	2.36	6.60	9.74+

7-5 EFFICIENCY OF REINFORCED BLOCK COLUMN



a. With no filling

x-x axis

$Ix_1 = \frac{1}{12} \times 1.5 \times 40^3 \times 2 + (12 \times 1.5) \times (20 - 3.0)^2 \times 2 + (12 \times 1.5) \times 5.7^2 \times 2$

$= 27{,}737.5\ cm^4$

$Zx_1 = 1386.8\ cm^3$

$A_1 = 192.0\ cm^2$

b. With filling (No.1)

$Ix_2 = 78557.0\ cm^4$

$Zx_2 = 3928\ cm^3$

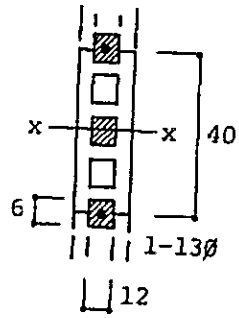
$A_2 = 415.2\ cm^2$

c. With filling (No.2)

$Ix_2 = 86137.5\ cm^4$

$Zx_3 = 4306.9\ cm^3$

$A_3 = 447.6\ cm^2$



Fiber stress of column

$6c = \frac{N}{A} \pm \frac{M}{Z} = \frac{5220}{447.6} \pm \frac{68000}{4306.9} = 11.7 \pm 15.8$

$= 27.5$ or $-4.1\ kg/cm^2$

$\tau = \frac{470}{40 \times 20} = 0.59\ kg/cm^2 < 1.36\ kg/cm^2$

From the bending moment, the fiber stress gives the above value. Reinforcement is provided on the tension side and twice the 13.6 kg/cm^2 specified is provided on the compression side. But, it is enough, if the above value in compression stress is less than two third strength of additional cement mortar or concrete. Therefore, it will be necessary to appraise the strength of these composite columns.

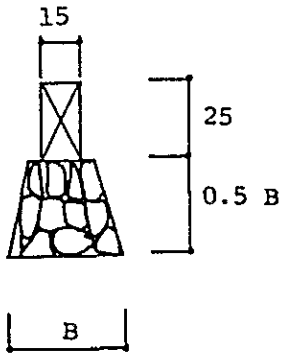
8. FOUNDATION

Upper axial load; Two kinds of less than 2.0 t/m and 2.6 t/m bearing capacity of soil; Two kinds of 3.0 t/m^2 and 5.0 t/m^2

Footing weight

Ground-beam	0.15 x 1.0 x 2.4	= 0.36 t/m	≒ 1.0 t/m
Batukali	0.6 x 1.0 x 0.4 x 2.6 t/m^2	= 0.63	

Contact pressure is both 3.0 t/m and 3.6 t/m per meter. We get effective widths of footing according to the bearing capacity of soil.



In case of 3.0 t/m^2

$$B_1 = \frac{3.0\ t/m}{3.0\ t/m^2} \rightarrow 1.0\ m$$

$$B_2 = \frac{3.6\ t/m}{5.0\ t/m^2} \rightarrow 1.2\ m$$

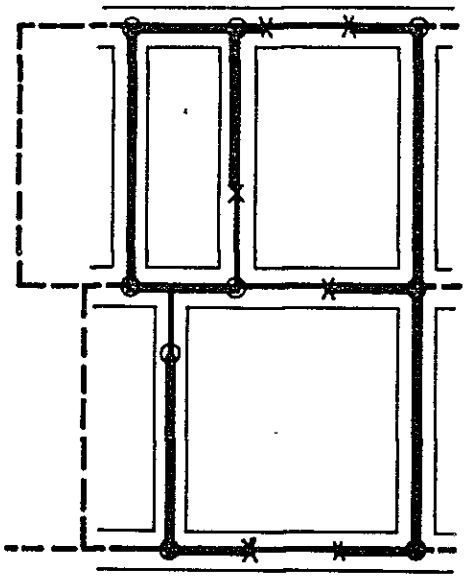
In case of 5.0 t/m^2

$$B_1 = \frac{3.0\ t/m}{5.0\ t/m^2} \rightarrow 0.6\ m$$

$$B_2 = \frac{3.6\ t/m}{5.0\ t/m} \rightarrow 0.75\ m$$

Conclusion

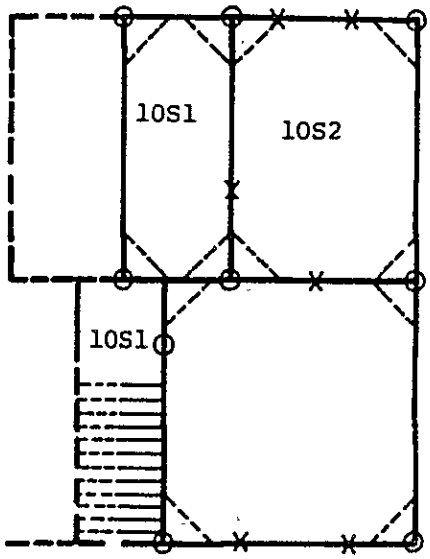
PLAN



1 FLOOR

Besides above

1. Footing F1
2. Ground-beam G1
3. Slab-on-grade



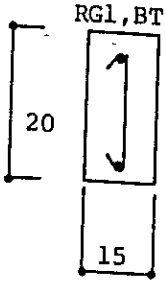
2 FLOOR

Besides above

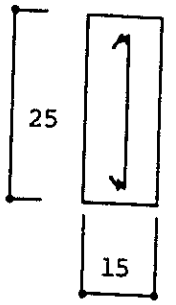
1. shows DT
2. Beam G1
3. Slab 10S2
4. Stairway wood
5. O shows reinforced concrete block (Type B.C)
6. × shows the open reinforcement (Type A)

CROSS SECTION

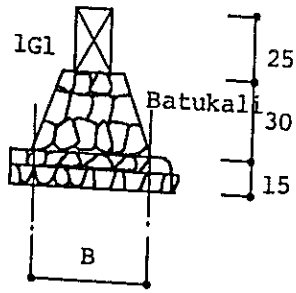
RG1, BT



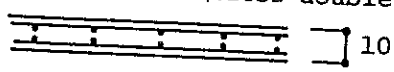
1G1, 2G1



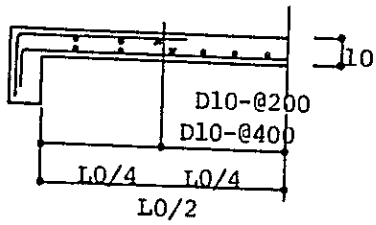
F1



S1 9Ø-@250(cross double)



S2 D10-@200



Same arrangement of bar
both in long and short span.

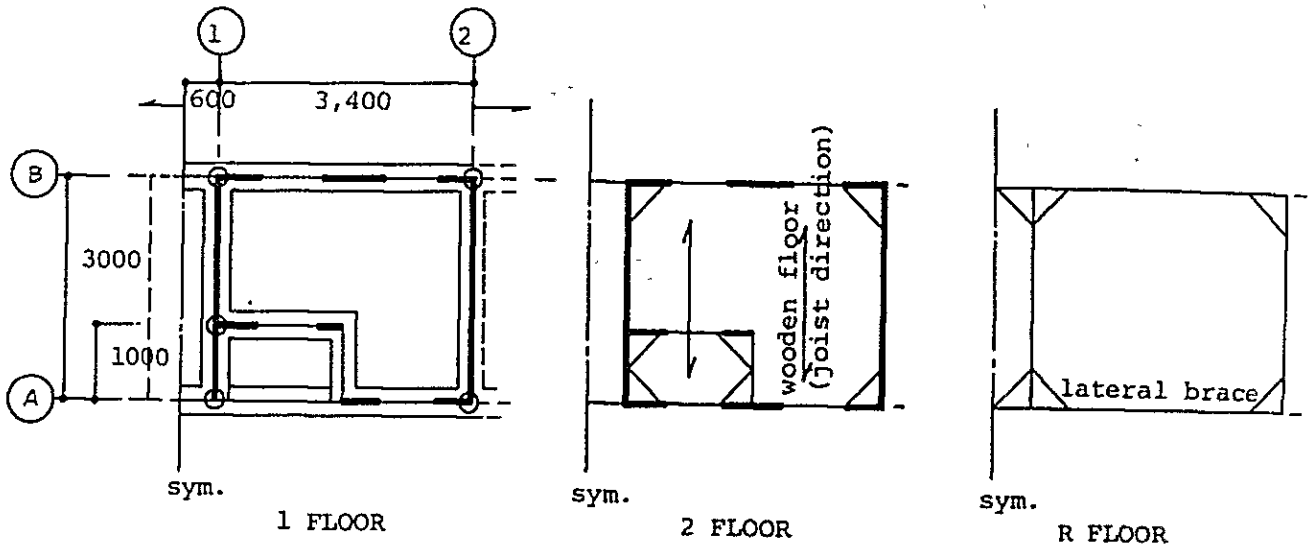
2-3

M-24

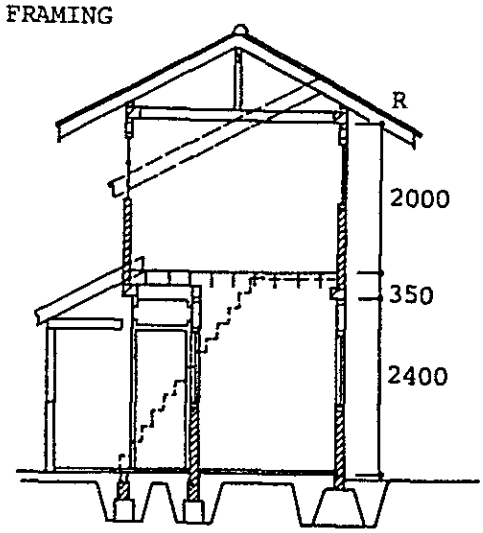
1. OUTLINE OF PLANNING

The building is a six units per floor, two storey house of 24 square meter maisonettes. This material is used the same ones for FS'2-26, but the building itself is light in weight because of the use of wooden floor joists for the second floor. The structural planning satisfy the above-mentioned specifications and stresses are obtained by the analysis.

2. PLANS AND FRAMING



FRAMING



3. LOADS

Dead load

Same to FS'2-28 type except below

Wooden floor, 2F 25 kg/m^2

Beam 20 x 15 72 kg/m

	Contents		Floor	Frame	Seismic
2F	Wooden floor 25 kg/m^2	D.L	25	25	25
		Beam		20	20
		L.L	200	140	60
			225	185	105

4. AXIAL LOAD

* Averaged axial stress of wall along line (B) (Y-Direction)

2F

roof	0.065 x (1 + 1.5)	= 0.163 t/m	
wall	0.20 x 2.0	= 0.40	> 0.563 t/m
1F			
slab	0.185 x 1.5	= 0.278	
wall	0.20 x 2.4	= 0.48	> 0.758 t/m
		Total 1.32 t/m	

* Averaged axial stress of wall along line (1) (X-Direction)

2F

roof	(0.065 + 1/2 x 3.0 x 1.5) x 2 x 1/3	= 0.1 t/m	
wall	0.2 x 2.0	= 0.4	> 0.50 t/m
1F			
slab	0.185 x 1.0	= 0.185	> 0.665 t/m
wall	0.2 x 2.4	= 0.48	
		Total 1.265 t/m	

5. HORIZONTAL LOAD AND SHEARING UNIT STRESS

2nd floor

roof	0.065 x 4.0 x (3.0 + 2.0) x 6 x 1.13	= 10.14 t	27.19 t
block	0.2 x 2.0 x (3.0 x 10 + 4.6 x 6 x 2)	= 34.10	

1st floor

floor	0.185 x 3.0 x 4.0 x 6	= 13.32	
stairway	0.155 x 1.2 x 3.0 x 1.2 x 3	= 2.0	52.82 t
block	0.2 x 2.4 x (3.0 x 10 + 4.6 x 6 x 2)	= 40.9	

For each building (6 units)

Floor	W	K	KW	ΣKW	ΣBwx^m	ΣBwy^m	τx kg/cm^2	τy kg/cm^2
2	27.19	0.1	2.72	2.72	31.2	24	0.09	0.1
1	52.82	0.1	5.32	8.02	31.2	30	0.26	0.27

Average shearing unit stress is sufficient in the allowable shearing unit stress.

6. STUDY AFTER THE FAILURE OF UNREINFORCED BLOCKS

Taking FS'2-28 into account.

6-1 PERMANENT STRESS

Line (A) ; The distance between supporting points on the beam is small due to reinforced blocks being placed at the opening near the corner so, stress is small.

Span 2.0m, ω = 0.075 t/m (beam itself)

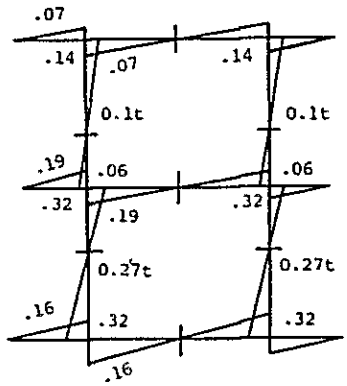
$c = \frac{1}{12} \times 0.075 \times 2.0^2 = 0.025$ tm

Mo = 0.038 tm

Q = 0.075 t

6-2 SEISMIC STRESS

Line (B) stress



No. of column	Shearing force	Shearing force/ Column
30	1.82	0.1
30	5.35	0.27

Shearing force is the same to x and y directions.

6-3 AXIAL LOAD ON REINFORCED BLOCK COLUMN AT CORNER

(2)-(A), (2)-(B) column.

2F

Line (A) 0.563 t/m x 1.0 = 0.563 t
Line (1) 0.5 x 3.0/2 = 0.750 } 1.31 t

1F

Line (A) 0.758 t/m x 1.0 = 0.758 t
Line (1) 0.665 x 3.0/2 = 1.00 } 1.76

Total 3.07 t

6-4 CROSS SECTION

a. Beams

1F; M = 0.16 tm

Q = 0.11 t

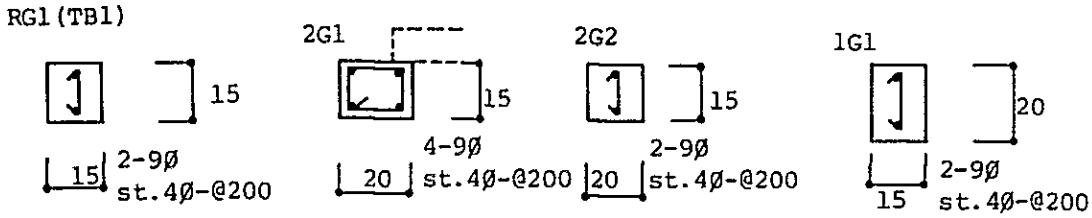
B x D = 15C x 20C j = 13.0

at = 0.16/2.0 x 13.0 = 0.62 cm^2 → 1-9ϕ

$\tau = 0.11 \times 10^3 / 15 \times 13 = 0.6$ kg/cm^2 OK

2F; M = 0.215 tm
Q = 0.21 t
B x D = 20C x 15C j = 8.3
at = 1.3 cm^2 → 2-9φ
τ = 1.23 kg/cm^2 OK

RF; M = 0.095 tm
Q = 0.13 t
B x D = 15C x 15C
at = 0.58 cm^2 1-9φ
τ = 1.1 kg/cm^2 OK



b. Column

1F; Nx = 3.07 ± 0.36 = 3.43 t or 2.71
Mx = 0.32 tm
Qx = 0.27 t

Efficiency of column
I = 85333.5 cm^4
Z = 4266.6 cm^3
A = 303.6 cm^2

Fiber stress

$$\sigma c_1,\ t_1 = \frac{3.43 \times 10^3}{303.3} \pm \frac{0.32 \times 10^5}{4266.6}$$

$$= 11.3 \pm 7.5$$

$$= 18.8 \text{ or } 3.8 \text{ kg/cm}^2$$

Only compression stress.

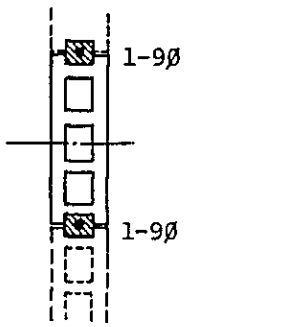
$$\sigma c_2,\ t_2 = \frac{2.71 \times 10^3}{303.3} \pm \frac{0.32 \times 10^5}{4266.6} = 8.9 \pm 7.5$$

$$= 16.4 \text{ or } 1.4 \text{ kg/cm}^2$$

Only compression stress

$$\tau = \frac{0.27 \times 10^3}{40 \times 15} = 0.45 \text{ kg/cm}^2 < 1.36 \text{ kg/cm}^2$$

OK



reinforced concrete block

7. FOUNDATION

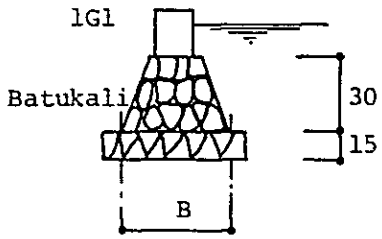
We calculate the same condition as FS'2-38 type.

Upper axial load		1.32 t/m	
Footing;	Groundbeam	0.06	Total 1.62 t/m
	Batukali	0.24	

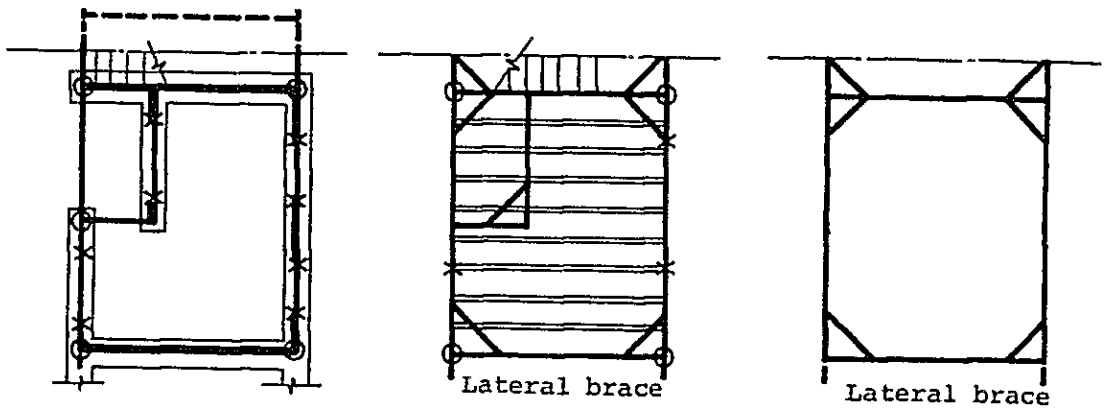
We get effective widths of footing according to the bearing capacity of soil.

In case of 3.0 t/m^2; $B_1 = \frac{1.62\ t/m}{3.00\ t/m^2} \rightarrow 55$ cm

In case of 5.0 t/m^2; $B_2 = \frac{1.62\ t/m}{5.00\ t/m^2} \rightarrow 35$ cm



CONCLUSION



Besides above

1. Footing F1
2. Ground beam G1
3. Slab on grade

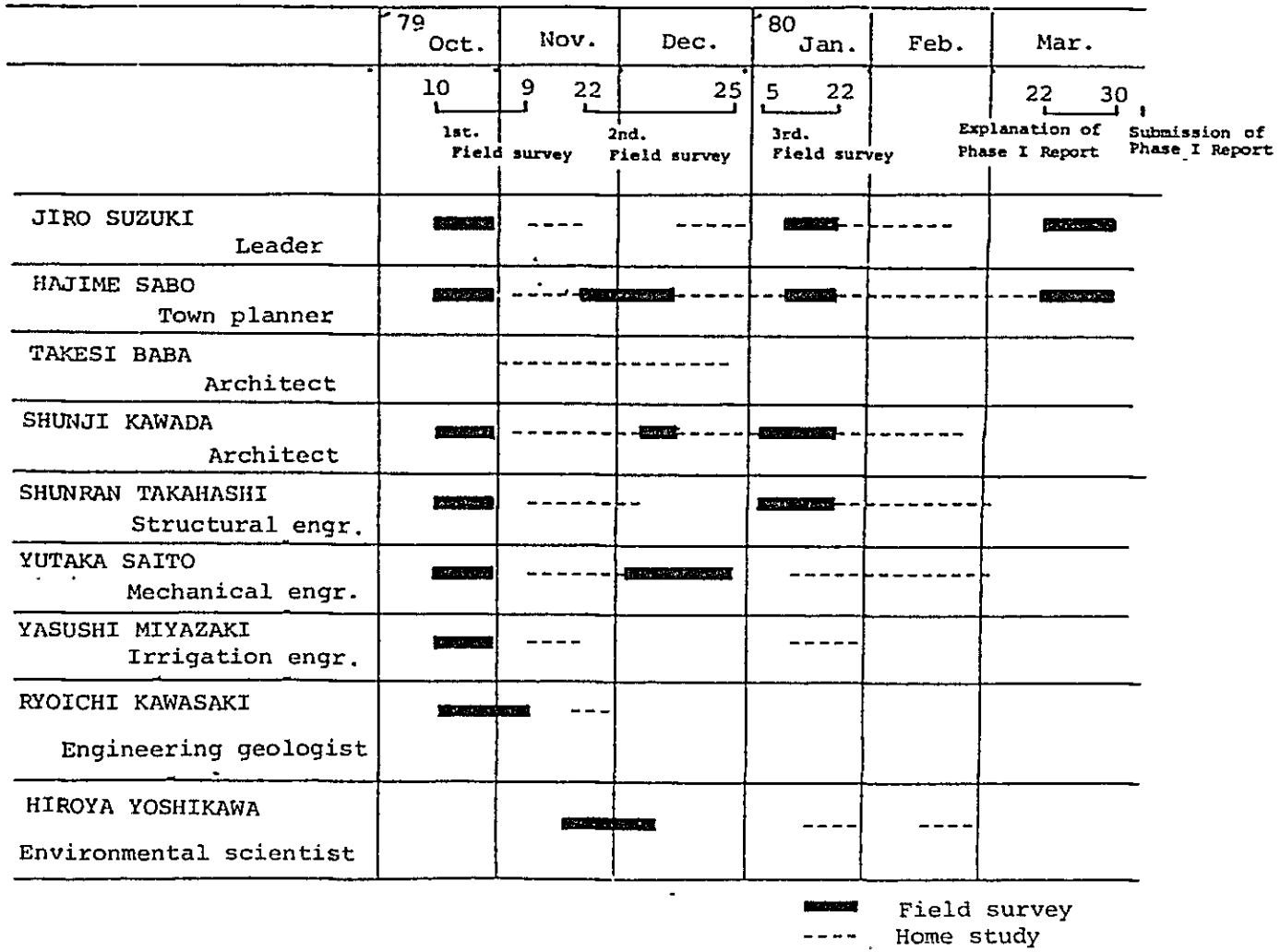
1. Beam G1
2. Wooden floor + joist
3. Staircase;wood
4. O shows reinforced concrete block(type B,C)
5. x shows open reinforcement (type A0

3 SCHEDULES AND MINUTES

SCHEDULE OF PHASE I STUDY (Oct.1979 ~ March.1980)

Studies including field surveys, which were carried out three times consecutively, were carried out according to the following schedule.

General schedule



Main items

1979 12th Oct.	Inception report discussion
16th Oct.	-do-
17th Oct.	-do-
18th Oct.	Arrangement of studies and schedule
26th Oct.	Inceptioh report discussion and signature of the minutes on the discussion by Ir. Suyono,and Suzuki.
26th Oct.	Discussion on the results of the first field survey
27th Oct.	"
14th Dec.	Presentation report by the Japanese Study Team. (Joint conference with Indonesian Steering Committee and Counterpart.)
15th Jan.	Discussion on the results of the studies based on the first and second field surveys.
18th Jan.	Interim report by the Japanese Study Team. Joint conference of Indonesian Steering Committee, Counterpart, Japanese Advisory Committee, delegated experts, Japanese Embassy and JICA.
21st Jan.	Signature of the minutes on the interim report conference by Ir. Suyono,and Suzuki.
27th March.	Signature of the minutes on the Phase I Report by Ir. Suyono and Mr. Suzuki.

SCHEDULE OF PHASE II STUDY (Jul.1980 ～ March.1981)

General schedule

	80 Jul.	Aug.	Sept.	Oct.	Nov.	Dec.	81 Jan.	Feb.	Mar.
	16 — 29 1st. Field survey			7 — 3 2nd. Field survey					4 — 13 Explanation of Draft Report; Submission of Final Report
JIRO SUZUKI Leader									
HAJIME SABO Town planner									
MASANORI ONOE Town planner									
MICHIKO INAGAKI Architect									
SHUNJI KAWADA Architect									
SHUNRAN TAKAHASHI Construction engr.									
NAOHARU NAGAO Structural engr.									
YUTAKA SAITO Mechanical engr.									
GEN FUJIWARA Civil engr.									
MIKIO TANEMURA Civil engr.									
NAOFUMI HIROTA Cost analizer									
MOTOHIDE NISHIO Economist									
TAKASHI INOUE Economist									

Field survey

Home study

Main items

1980	17th July	: Inception report discussion
	24th July	: Joint conference of Indonesian Steering Committee,Counterpart, Japanese Advisory Committee,delegated housing experts,Japanese Embassy and JICA.
	" "	: Signature of the minutes of the discussion on the Inception Report by Ir.Suwarno and Mr. Suzuki.
	9th Oct.	: Discussion with local government(DKI)
	17th Oct.	: Discussion with PERUM PERUMNAS directors (Planning and construction div.)
	22nd Oct.	: Discussion with relating government body on the drainage system at PERUMNAS.
	4th Nov.	: Joint conference of Indonesian Steering Committee,Counterpart,Japanese Advisory Committee,delegated housing experts, Japanese Embassy,JICA and other relating government body officials.
	7th Nov.	: Signature of the minute of the discussion on the Progress Report by Ir.Suwarno and Mr. Suzuki.
	12th Mar.	: Joint conference of Indonesian Steering Committee,Counterpart,Japanese Advisory Committee,delegated housing experts, Japanese Embassy, JICA and other relating government body officials.
	" "	: Signature of the minute of the discussion on the Draft Final Report by Ir.Radinal Moochtar and Mr.Suzuki.

SCOPE OF WORK

FOR

THE STUDY OF LOW COST HOUSING PROJECT

(KTA 20)

Agreed

Between

JAPAN INTERNATIONAL COOPERATION AGENCY

And

CIPTA KARYA

Dated :

(Mr. Takao Hirota)
Director of
Social Development Cooperation
Department, Japan International
Cooperation Agency.

Ir. Radinal Moochtar
Director General of Cipta Karya
Department of Public Works.

I. INTRODUCTION

In response to a request of the Government of the Republic of Indone: the Government of Japan has decided to conduct a feasibility study fc the low cost housing project. The Japan International Cooperation Agency (hereinafter referred to as " JICA ") the official agency responsible for implementation of technical cooperation programs of the Government of Japan, will carry out the study in close cooperation with the Government of the Republic of Indonesia and its authorities concerned.

II. BACKGROUND OF THE STUDY.

Housing Policies in Indonesia has been developed since PELITA II (1974/75 - 1978/79).
Low cost housing, one of the main housing program of the government in PELITA II, were mainly supplied with low rise housing development.
But in PELITA III (1979/80 - 1984/85) some changes in the policy are going to be implemented which will include the development of four storied housing or so called " walk-up-flats ", with the objective of optimizing the use of land especially in the large and density populated urban areas.

According to the housing program in PELITA III, 50.000 units of four storied housing are planned to be constructed by PERUM PERUMNAS as part of the 120.000 units houses to be built by PERUM PERUMNAS in the coming five years period. In this framework, the development of four storied housing is considered of high priority by the Indonesian Government.

It is widely known, that many parts of the northern coast of Java consist of low level and swampy lands presently left undeveloped.
Many of these lands are situated close to the city center. Therefore if it can be proven that such undeveloped land can be successfully changed into a good housing estate, such experience can be applied more widely in other areas in Indonesia.

III. OBJECTIVES.

The study aims at two targets :

One is to conduct feasibility study and preliminary engineering design for housing development project in the site of Cengkareng. The coverage of the engineering design will be subject to further decision by both parties. Secondly is to develop standardized designs for pilot Walk-up flat for public housing, with possible development in Cengkareng Site.

IV. THE SCOPE OF THE STUDY.

4.1. The feasibility study of housing development project in the site of Cengkareng.

4.1.1. In order to achieve the said objectives, the study will cover :

1. Survey and analysis of general conditions, with particular attention to social, drainage, sewerage and other civil engineering aspects.
2. Assessment of socio-economic development potentials of the site, including preliminary estimate of development cost.
3. Conducting basic designs of site planning in some parts of the site.

4.1.2. The Implementation programme for the feasibility study in Cengkareng site will be decided taking in to consideration the feasibility of the development of standardized designs of pilot walk-up flat..

4.1.3. The size of the site will be decided based on criteria such as the target group, population density, mixed community, etc. The tentative site area is considered within the range of 30 Ha to 50 Ha.

4.2. The development study for the pilot walk-up flat.

4.2.1. In order to achieve the previously mentioned objectives, the study will consider the following :

1. Feasibility of utilizing local materials with due consideration to its socio-economic and employment effects.

2. Conformity between the affordability of the target group and cost of house which will be provided.

3. The minimum building standard and regulation, and other provision as appropriate.

4. Rationalization of construction works in order to shorten the term of works and to simplify the construction works.

4.2.2 The results of studies that will be prepared and submitted are the formulation of standardized designs of the pilot walk-up flat , the identification of structural calculation and the estimation of construction cost.

4.2.3. The implementation program of study is as follows :

(The first stage).

The following preliminary study will be implemented by the Japanese team dispatched to Indonesia under the cooperation with the Indonesian counterpart team.

1. Inventory and analysis of the data and the following fields covered :
   - The characteristics of housing demands.
   - The present situation of housing industries and housing supply system.
   - Construction cost , land price , building materials available and the others.

2. Setting up the pre-condition for tentative design.
   - The floor size of a dwelling unit.
   - The dimentions of each part of building
   - The size of building and the number of storey.
   - The housing equipment performance level
   - The dwelling performance level.
   - The estimation construction cost.
   - The building materials by each part of building.

(The second stage).

According to the pre-condition for tentative design, draft designs will be formulated either in Indonesia or in Japan. In the latter case , possibilities will be explored for the provision of funds for counterpart personnel to participate in drafting the design in Japan.

(The third stage).

The draft designs prepared on the second stage will be reassessed fully and orientation of modification is considered in detail by the joint team of Japan and Indonesia.

(The fourth stage).

In accordance with the result of reassessment on the third stage, modification of the draft designs will be implemented and the final standardized designs of pilot walk-up flat will be completed in Indonesia or in Japan.

V. STAFFING.

The study will be undertaken by a team of professionals covering the following fields :

1. Project management.
2. Architecture designs
3. Building structure engineering
4. Building equipment engineering
5. Civil engineering

It is understood , that city planning and financial / economic analysis necessary for the project is already covered in the above mentioned fields.

VI. CONTRIBUTION OF THE GOVERNMENT OF INDONESIA.

For the purpose of the study , the Government of Indonesia through PERUM PERUMNAS will cooperate to the extent possible by :

1. Providing the team with the data and information concerned with its use in connection with the study.
2. Carrying out works of soil test.
3. Facilitate for obtaining exemption from taxes and duties for machinery equipment and materials necessary for the study.
4. Assigning counterpart personnel (officials/engineers) to the team during the study period.
5. Providing the team with suitable office space and office equipment necessary for the study.
6. Providing vehicles with drivers.

7. Providing any other available facilities that may be required for the execution of the study as it will be agreed upon between both parties.

VII. CONTRIBUTION OF JICA.

For the purpose of the study , the Government of Japan will assist to the extent possible :

1. Sending the Japanese expert team to conduct the study.
2. Transferring the knowledge to the Indonesian counterpart experts during the period of the study.
3. Arranging the equipment necessary for the efficient conduct of the study.

別添-(3)

MINUTES OF THE DISCUSSIONS ON THE INCEPTION REPORT FOR THE LOW COST HOUSING PROJECT (KTA-20)

(Phase I)

The discussion on the Inception Report were held on the 12th, 16th and 17th of October in 1979 at PERUM PERUMNAS (see ATTACHMENT I) and the contents of the Inception Report were fundamentally agreed upon by both parties after recognizing the following items :

1 - a) The objective of this study is to make pre-feasibility study for Housing Development Project on the site of PERUM PERUM - NAS in Cengkareng considering the combination of types of housing.

b) It will be studied whether a walk up flat is suitable or not to the site of Cengkareng as one of the housing types mentioned above.

2 The organization of the study and the members of each part of the organization is shown in ATTACHMENT II.
The complete members for the steering committee and the counterpart will be nominated in December 1979.

3 Indonesian side requested that the transfer of technology shall be considered more.
Japanese side replied that they would try their best for the effective transfer of technology such as adjustment of working schedule and the way of working.

October 23, 1979.

Ir. Suyono, M.Sc.
Director of Planning
PERUM PERUMNAS

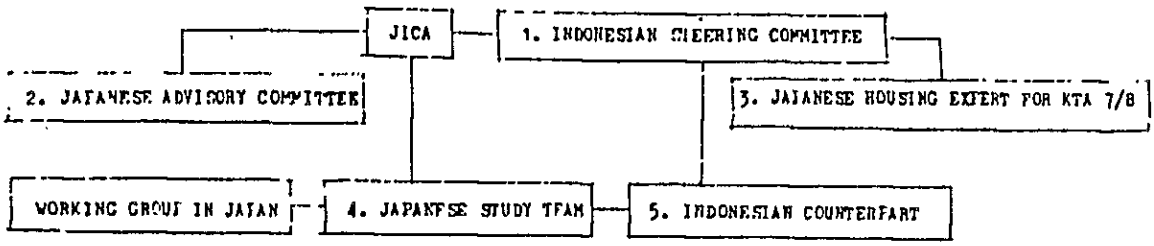
Jiro SUZUKI
Team Leader of Japanese
Study Team

ATTENDANTS' LIST OF MEETINGS

ATTACHMENT I.

	1st	2nd	3rd	
Date	Oct. 12, 1979	Oct. 16, 1979.	Oct. 17. 1979	
Place	PERUM PERUMNAS	PERUM PERUMNAS	PERUM PERUMNAS	
ATTENDANTS	INDONESIAN SIDE	INDONESIAN SIDE	INDONESIAN SIDE	
	PERUM PERUMNAS	PERUM PERUMNAS	PERUM PERUMNAS	
	Ir. Soenarjono Danoedjo Ir. Suyono, M.Sc. Mr. Soelistijo Tjitrohamidjojo Ir. Duddy Soegoto Ir. Aziz Dahlan Ir. Yos Sidharta	Ir. Duddy Soegoto Ir. Aziz Dahlan	Ir. Suyono, M.Sc. Ir. Duddy Soegoto Ir. Aziz Dahlan	
	JAPANESE SIDE	JAPANESE SIDE	JAPANESE SIDE	
	ADVISORY COMMITTEE	ADVISORY COMMITTEE	ADVISORY COMMITTEE	
	Mr. Nobuaki Ohkubo Mr. Toshio Ishiguro Mr. Tetsuo Numaoi	Mr. Nobuaki Ohkubo Mr. Toshio Ishiguro Mr. Tetsuo Numaoi	Mr. Nobuaki Ohkubo Mr. Toshio Ishiguro Mr. Tetsuo Numaoi	
	STUDY TEAM	STUDY TEAM	STUDY TEAM	
	Mr. Jiro Suzuki Mr. Hajime Sabo Mr. Shunji Kawada Mr. Shunran Takahashi Mr. Yutaka Saito Mr. Yashushi Miyazaki Mr. Ryoichi Kawasaki	Mr. Jiro Suzuki Mr. Hajime Sabo Mr. Shunji Kawada Mr. Yutaka Saito	Mr. Jiro Suzuki Mr. Hajime Sabo Mr. Shunji Kawada Mr. Shunran Takahashi Mr. Yutaka Saito Mr. Yashushi Miyazaki Mr. Ryoichi Kawasaki	
	JICA Mr. Takeshi Shinoura		JICA Mr. Takeshi Shinoura	
	EMBASSY Mr. Takeo Yamazaki		EMBASSY Mr. Takeo Yamazaki	
	EXPERT FOR KTA 7/8 Mr. Shinsaku Kanetaki Mr. Toshio Uetami Mr. Hajime Obata		EXPERT FOR KTA 7/8 Mr. Shinsaku Kanetaki Mr. Toshio Uetami Mr. Hajime Obata	

ATTACHMENT II Work Organization



1. INDONESIAN STEERING COMMITTEE

Director General Of CIPTA KARYA
IR. RADINAL MOOCHTAR

Director of Housing of CIPTA KARYA

Director of Sanitation Technic of CIPTA KARYA

President Director of PERUM PERUMNAS

Director of Planning of PERUM PERUMNAS

Director of ~~Estate Management~~ of PERUM PERUMNAS

The head of institutions of DKI Jakarta .

2. JAPANESE ADVISORY COMMITTEE

SOICHIRO MATSUTANI Chairman
Director of Housing Construction Division, Housing Bureau, Ministry of Construction (MOC)

NOBUAKI OHKUBO Adviser to the Team
Deputy Head of Urban Building Division, Housing Bureau, MOC

TOSHIO ISHIGURO Adviser to the Team
Deputy Head of Land Development Planning Project Division, Tsukuba Academic New Town, Development Bureau, Japan Housing Corporation

YASUNORI YAMANAKA Adviser to the Team
Deputy Head of Housing Construction Division, Housing Bureau, MOC

YUJI ISHIYAMA Adviser to the Team
Head of the First Earthquake Engineering Division, International Institute of Seismology and Earthquake Engineering, Building Research Institute, MOC

TETSUO NOMAGI Adviser to the Team
Overseas Cooperation Officer, International Division, Planning Bureau, MOC

3. JAPANESE HOUSING EXPERT for KTA 7/8

SHINSAKU KANETAKI

TOSHIO UTTAMA

HAJIME OBATA

HAJIME YOKOHORI

4. JAPANESE STUDY TEAM

JIRO SUZUKI Leader
Nihon Architects, Engineers & Consultants, Inc. (NAEC)

HAJIME SABO Town Planner
NAEC

CHUNJI KAWADA Architect
NAEC

SHUNRAN TAKAHASHI Structural Engineer
NAEC

YUTAKA SAITO Mechnical Engineer
NAEC

TASUSHI MIYAZAKI Irrigation Engineer
NAEC

RYOICHI KAWASAKI Engineering Geologist
NAEC

HIROYA YOSHIKAWA Environmental Scientist
NAEC

5. INDONESIAN COUNTERPART

IR. DODDY SOEGOTO Coordinater
PERUM PERUMNAS

IR. AZIZ DAHLAN Planner
PERUM PERUMNAS

IR. HERRY PURNOMO Architect
PERUM PERUMNAS

IR. PARYATNO PARNO Civil Engineer
PERUM PERUMNAS

MINUTES OF THE DISCUSSIONS
ON THE INTERIM REPORT FOR LOW COST HOUSING PROJECT
IN CENGKARENG, JAKARTA (KTA-20) PHASE I.

The Interim Report (see ATTACHMENT 1) was submitted and explained by the Japanese Study Team and discussed by the participants (see ATTACHMENT 2) at the Joint Meeting on the 18th of January in 1980 in Jakarta.

The Interim Report which orientates the frame of the Final Report (draft) was fundamentally agreed upon by both parties after recognizing the following items :

1) The Final Report of Phase I (draft) shall be formulated on the basis of the Interim Report with the accomplishment of the purpose of Phase I explained at the Joint Meeting.

2) The findings and alternatives proposed during Phase I will be evaluated in Phase II after considering additional data, especially socio-economical aspects.

3) The boundary of planning area shall be decided before Phase II.

4) The study on various types of houses shall be developed in Phase II on the basis of the Interim Report.

January 21,1980.

Ir. Suyono, M.Sc.
Director of Planning
PERUM PERUMNAS

Jiro Suzuki
Team Leader of Japanese
Study Team

THE STUDY OF LOW COST HOUSING PROJECT (KTA-20)
PHASE I

INTERIM REPORT

1. INTRODUCTION

2. STUDY OF URBAN DEVELOPMENT

   2-1. DEVELOPMENT POLICY
   - A. Site Planning
   - B. Infrastructure

   2-2. SITE PLANNING
   - A. Alternative I
   - B. Alternative II

   2-3. INFRASTURCTURE

3. STUDY OF VARIOUS TYPES OF HOUSES

   3-1. STUDY POLICY
   - A. Architectural Planning
   - B. Structural Planning

   3-2. FLAT HOUSING STUDY
   - A. Architectural Planning
   - B. Structural Planning

   3-3. LOW RISE HOUSING STUDY
   - A. Architectural Planning
   - B. Structural Planning

4. SUMMARY
   - A. Proposal on Alternatives
   - B. Total Cost Estimate

JAN. 16th, 1980

JAPANESE STUDY TEAM (JICA)

ATTENDANCE LIST
18TH JANUARY 1980

No	NAME	INSTITUTION	SIGNATURE
1	SUYONO	PERUMNAS	
4	IMAN SUNARIO	DKI Jakarta	
5	RAI PRATAOAJA	DKI Jakarta	
6	ACSITA D. SAPUTRO	DKI - JKT	
7	Suryatna P.		
8	HERA PURWOMO	PERUMNAS	
9	AZIZ DAHLAN	PERUMNAS	
10	Yuji Ishiyama	IISEE, BRI.	
11	Yasunori YAMAMAKA	Ministry of Construction	
12	Takeo YAMAZAKI	Ministry of Construction	
		Embassy of Japan	
13.	Tadashi SHINOURA	J. I. C. A.	
14	Shinsaku Kametaki	Cipta Karya Expert	
15	JIRO SUZUKI	JICA TEAM (NIHON ARCHITECTS ENGINEERS 2 CONSULTANTS KEO INC.)	
16	Hajime SADO	"	
17	SHUNRAU TAKAHASHI	Jica Team	
18	Hajime Obata	Perumahan Expert	
19	Hajime YOKOBORI	Perumahan Expert	

MINUTES OF THE DISCUSSIONS
ON THE PHASE I REPORT FOR LOW COST HOUSING PROJECT
IN CENGKARENG JAKARTA (KTA-20).

The Phase I Report was submitted and explained by the Japanese Study Team and discussed by the participants (see attachment) at a joint meeting in Jakarta on the 27th of March in 1980. The report was principaly accepted by both parties , written comments will be sent to Japan by the end of April 1980.

The fundamental items of the further study was recognized as follows :

1). The planning area is around 400 Ha which is surrounded by trunk roads and major drainage canal based on the DKI Jakarta Master Plan. The supplementary survey will be mainly carried out in this planning area.

2). The first stage project area will be fixed in August 1980 on the basis of the results of the land acquisition at that moment.

3). The scope of work during the Phase II covers :
   a. general planning for the planning area.
   b. detail planning and preliminary engineering for the first stage project area.
   c. detailed engineering for land development expecially drainage system.
   d. detailed study on the walk up flat and other housing types.
   e. financial feasibility of the above aspects.

4). It was requested by the Indonesian party that the joint Study should be performed more continuously in Indonesia.

Jakarta, March 27, 1980

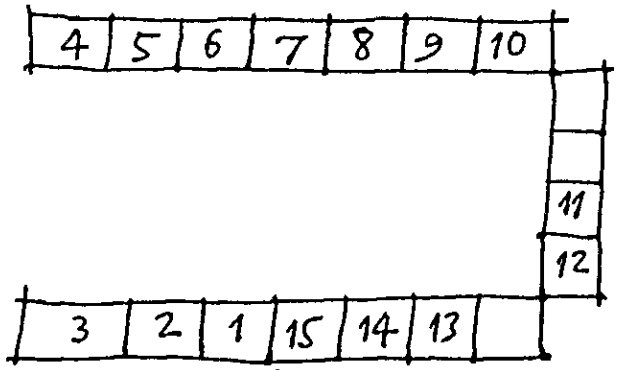
Ir. Suyono, M.Sc.
Director of Planning
PERUM PERUMNAS

Jiro Suzuki
Team Leader of Japanese
Study Team

Attachment

ATTENDANCE LIST
27TH MARCH 1980

NO	NAME	INSTITUTION	SIGNATURE
1.	Toshio A I	JICA Tokyo	
2.	Tadashi SHINOURA	JICA. Jakarta	
3.	Hajime YOKOBORI	Japanese Housing Expert	
4.	Tochio UETAMA	"	
5.	Shinsaku KANETAKI	"	
6.	Takeo Yamazaki	Embassy of Japan	
7.	Toshio ISHIGURO	Japanese Advisory Committee	
8.	Hajime OBATA	Japan Housing Expert	
9.	Hajime SABO	Japanese Study Team	
10.			
11.		Perumnas	
12.		"	
13.		—"—	
14.			
15.	AZIZ DAHLAN	—"—	



MINUTES OF THE DISCUSSIONS

ON

THE INCEPTION REPORT

FOR

THE LOW COST HOUSING PROJECT IN CENGKARENG (KTA-20)

PHASE II.

The discussions on the Inception Report were held between PERUM PERUMNAS and the Japanese Study Team at PERUM PERUMNAS on 18th and 21st of July in 1980.

The contents of the Inception Report were agreed upon and the following items were recognized by both the Japanese and Indonesia parties :

1. The feasibility study at the First Round will be carried out in the project area which will be acquired in September 1980,covered ± 110 Ha and is located at Kecamatan Cengkareng, wilayah Jakarta Barat.

2. The study at the Second Round will be carried out at the fixed project area which will be appointed by the Indonesian party by the beginning of October 1980 when the Japanese Study Team is expected to arrive in Indonesia.

Jakarta, July 24, 1980.

Mr. Jiro Suzuki

Team Leader of
JICA Low Cost Housing
Project Study Team

Ir. Suwarno Prawirasumantri

Director of Planning
PERUM PERUMNAS

DEPARTEMEN PEKERJAAN UMUM
PERUM PERUMNAS
Perusahaan Umum Pembangunan Perumahan Nasional
(National Urban Development Corporation)
Alamat : Jl. Letjen Haryono M.T. Kav. 17 Jakarta
Telpon : 822808 (4 saluran)
Kotak Pos No. 1371/K

Nomor : Dirut/2843/10/VII/80 Jakarta, 22 Juli 1980
Lampiran : 1 (satu) lembar.

Kepada Yth.
Mr. Hajime Sabo
.....
Japanese Study Team
.....
di.
J A K A R T A

Perihal : U N D A N G A N

Dengan hormat kami mengundang Bapak/ Sdr untuk menghadiri rapat pengarahan Studi Proyek PERUM PERUMNAS Cengkareng Fase II yang akan diadakan pada :

Hari : K a m i s
Tanggal : 24 Juli 1980
J a m : 12.00 WIB - selesai
Tempat : Dit. Jen. Cipta Karya.

Atas perhatian dan kesediaannya kami ucapkan terima kasih.

An. Steering Committee
KTA 20 Cengkareng,

PERUSAHAAN UMUM ★ DIREKSI ★ Pembangunan Perumahan Nasional

Ir. Soegarjono Danoedjo
Direktur Utama

Tembusan Yth.
1. Direksi PERUM PERUMNAS
2. A r s i p

ad/sd.

DAFTAR UNDANGAN

STEERING COMMITTEE

1.	Ir. Radinal Moochtar	- Dir. Jen. Cipta Karya
2.	Ir. Suyono, M.Sc.	- Direktur Perumahan Rakyat
3.	Ir. Susanto	- Direktur Direktorat Tehnik Penyehatan
4.	Ir. Soenarjono Danoedjo	- Direktur Utama PERUM PERUMNAS
5.	Ir. Suwarno P	- Direktur Perencanaan PERUM PERUMNAS
6.	Ir. Nursaijidi M.K.	- Direktur Pembangunan PERUM PERUMNAS
7.	Ir. Herbowo	- Ketua BAPPEDA D.K.I.
8.	Ir. Imam Sunarjo	- Ketua Team Perencanaan Perumahan D.K.I.

JAPAN EMBASSY & JICA

1.	Mr. Takeo Yamazaki	- First Secretary, Embassy of Japan
2.	Mr. Tadashi Shinoura	- Assistant Resident Representative of JICA

JAPANESE ADVISORY COMMITTEE

1.	Mr. Yuji Ishiyama	- Advisor, Japanese Advisory Committee KTA 20 Cengkareng Project

JAPANESE HOUSING EXPERT

1.	Mr. Shinsaku Kanetaki	- Japanese Housing Expert
2.	Mr. Toshio Uetama	- Japanese Housing Expert
3.	Mr. Hajime Obata	- Japanese Housing Expert
4.	Mr. Hajime Yokobori	- Japanese Housing Expert

JAPANESE STUDY TEAM

1.	Mr. Jiro Suzuki	- Leader, Japanese Study Team KTA 20 Cengkareng Project.
2.	Mr. Hajime Sabo	- Japanese Study Team
3.	Mr. Masanori Onoe	- Japanese Study Team
4.	Mrs. Michiko Inagaki	- Japanese Study Team
5.	Mr. Shunran Takahashi	- Japanese Study Team
6.	Mr. Yutaka Saito	- Japanese Study Team
7.	Mr. Gen Fujiwara	- Japanese Study Team
8.	Mr. Mikio Tanemura	- Japanese Study Team
9.	Mr. Motohide Nishio	- Japanese Study Team
10.	Mr. Takashi Inone	- Japanese Study Team

COUNTERPART

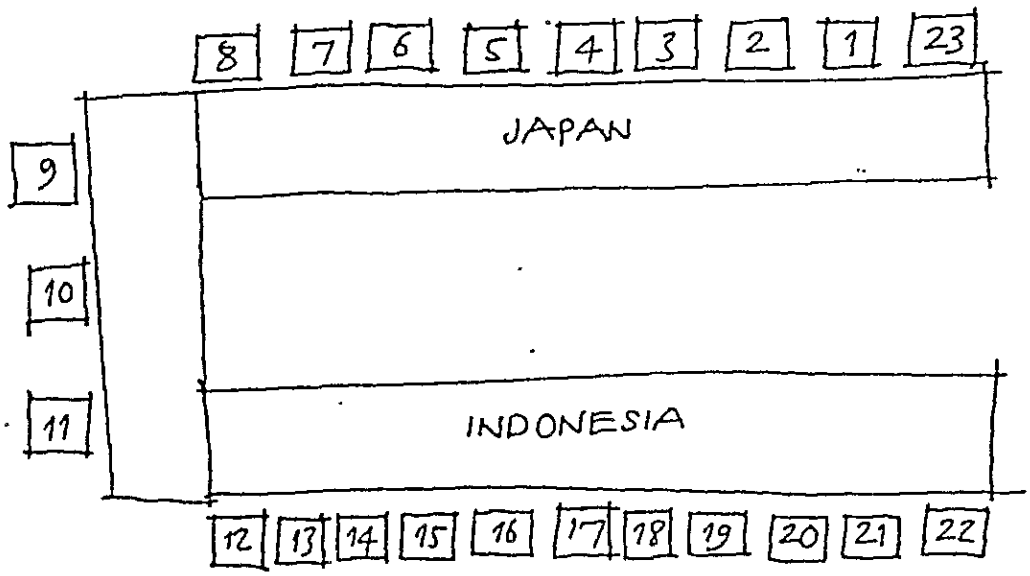
1.	Ir. Duddy Soegoto	- Kepala Bagian Perencanaan Feasibility PERUM PERUMNAS
2.	Ir. Aziz Dahlan	- Kasubag. Kerjasama Luar Negeri PERUM PERUMNAS
3.	Ir. Herry Purnomo	- Staf Perencanaan Feasibility PERUM PERUMNAS
4.	Ir. Paryatno Parno	- Staf Perencanaan Feasibility PERUM PERUMNAS
5.	Ir. Rai Pratadaya	- Ka. Ur. Pengarahan Perencanaan Lingkungan D.K.I.
6.	Ir. Ny. Rosita Saputro	- Kepala Distrik Perencanaan I Wilayah Jawa Barat.

STEERING COMMITTEE
meeting, 12. , July 24, 1980

ATTENDANCE LIST

NO	NAME	POSITION	SIGNATURE
1.	Hajime YOKOBORI.	Directrate Perumahan	[signature]
2.	ONOE MASANORI	Japan Housing Expert JICA mission	[signature]
3.	MICHIKO INAGAKI	JICA study team	[signature]
4.	Hajime SABO	"	Hajime Sabo
5.	HITONORI. ONO	JICA HDQ	Hitonori Ono
6	RYONOSUKE GOTO	Assistant Resident Representative, JICA JAKARTA	R Goto
7	Yuji ISHIYAMA	Japanese Advisory Committee Ministry of Construction	Y. Ishiyama
8.	Takeo Yamazaki	First Secretary Embassy of Japan	[signature]
9	JIRO SUZUKI	LEADER OF JAPANESE STUDY TEAM	Jiro Suzuki
10	Radinal Moochtar	DirGen Ciptakarya	[signature]
11	Soenanjono	DIRUT PERUMNAS	[signature]
12	Suyono	Dir Perumahan	[signature]
13	Susanto	Dir. Teknik Pengelolaan	[signature]
14	Suwarno	Dir Can. Perumnas	[signature]
15.	NOER SAIJIDI	DIR. BANG. Perumnas	[signature]
16.	Duddy Soegato	Perumnas	[signature]
17.	Rai Pratadaja	DKI	Rai
18.	Marwan Affandy.	Perumnas	[signature]
19	Iman Surario	DKI	[signature]

NO	NAME	POSITION	SIGNATURE
20	Shinsaku Kanetaki	Cipta Karya Expert	
21	AZIZ DAHLAN	PERUM PERUMNAS	
22.	Paryatno Parno	PERUM PERUMNAS	
23	Toshio UETAMA	Perumahan Expert	



MINUTES OF THE DISCUSSION

ON

THE PROGRESS REPORT

FOR

THE LOW COST HOUSING PROJECT IN CENGKARENG (KTA - 20)

(PHASE II)

The Progress Report for the project submitted by the Japanese Study Team was discussed by the participants (see attachment) of the steering committee meeting on the 4 th of November 1980, and the following items were confirmed.

1). The General Plan for the planning area (± 370 Ha) and the Master Plan for the project area (± 110 Ha) were approved.

2). Alternatives on the major infrastructures which are indispensable for this housing project were evaluated and selected as follow :

a). DRAINAGE - Direct discharge system to the Java Sea (ALT 1).

b). WATER SUPPLY -60l/dc from PAM-JAYA with setting up the booster pumping station at Grogol (ALT 1A).

c). SEWERAGE - Combined system with kitchen and toilet (ALT 3).

3). The development cost of the off-site infrastructures is not included into the selling price.

4). The target income group is within 20 - 70 of the percentile of the income distribution in 1984.

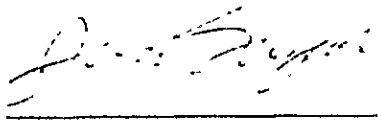
5). The proportion of the empty and commercial lots if necessary can be increased more than 30% of the productive area.

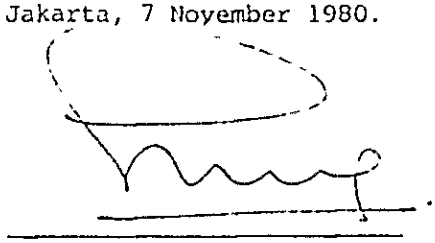
6). The low rise housing type (R.15 and D.15) is not recommendable for the lowest income group of the target group.

7). The high .....

7). The high density housing was recommend·d.
The distribution of mainsonette, walk up flat and empty lot should be studied further.

Jakarta, 7 November 1980.





MR. JIRO SUZUKI
Team Leader of JICA
Low Cost Housing Project
Study Team

IR. SUWARNO PRAWIRASUMANTRI
Director of Planning
PERUM PERUMNAS

HS/sd.

ATTENDANTS OF STEERING COMMITTEE

ON

THE DRAFT FINAL REPORT ON THE LOW COST HOUSING PROJECT

IN CENGKARENG, JAKARTA (KTA-20)

12 MARCH, 1981

1. STEERING COMMITTEE

Ir. Radinal Moochtar	:	Dit. Jen. Cipta Karya
Ir. Suyono M Sc	:	Direktur Perumahan Rakyat
Ir. Susanto	:	Direktur Direktorat Teknik Penyehatan
Ir. Soenarjono Danoejo	:	Direktur Utama PERUM PERUMNAS
Ir. Suwarno Prawirasumantri	:	Direktur Perencanaan PERUM PERUMNAS
Ir. Nursalimdi M.K.	:	Direktur Pembangunan PERUM PERUMNAS
Ir. Herbowo	:	Ketua BAPPEDA D.K.I.
Ir. Iman Sunaryo	:	Ketua Team Perencanaan Perumahan D.K.I.

2. JAPANESE EMBASSY,JICA

Mr. K. Teshima	:	First Secretary,Embassy of Japan
Mr. Ryonosuke Goto	:	Assistant Resident Representative of JICA

3. JAPANESE ADVISORY COMMITTEE

Mr. Toshio Ishiguro	:	Advisor, Japanese Advisory Committee KTA 20 Cengkareng Project

4. JAPANESE HOUSING EXPERTS

Mr. Shinsaku Kanetaki	:	Japanese Housing Expert
Mr. Hajime Obata	:	Japanese Housing Expert
Mr. Hajime Yokobori	:	Japanese Housing Expert

5. JAPANESE STUDY TEAM

Mr. Jiro Suzuki	:	Leader. Japanese Study Team KTA 20 Cengkareng
Mr. Hajime Sabo	:	Japanese Study Team
Mrs. Michiko Inagaki	:	Japanese Study Team
Mr. Motohide Nishio	:	Japanese Study Team

6. COUNTERPARTS

Ir. Duddy Soegoto	:	Kepala Bagian Perencanaan Feasibility PERUM PERUMNAS
Ir. Aziz Dahlan	:	Kasubag. Kerjasama Luar Negeri PERUM PERUMNAS
Ir. Rai Pratadaya	:	Ka Ur. Pengarahan Perencanaan Lingkungan DKI

7. PROYEK BANJIR JAKARTA, DEP. P.U.

Ir. Martsanto Ds	:	Pemimpin Proyek Banjir Jaya

8. DIT. JEN. BINA MARGA DEP. P.U.

Ir. Wiyoto Wiyono	:	Kasubit. Perencanaan Jalan Kota

9. KTA 7/8 REVIEW MISSION (OBSERVER)

Mr. Makoto Tateishi	:	Ministry of Construction, Japan
Mr. Shigetada Utsumi	:	Ministry of Construction, Japan
Mr. Shunichi Hokura	:	Ministry of Construction, Japan

10. CIPTA KARYA

Ir. Hendro Pranoto	:	Dit. Jen. Cipta Karya

11. PERUM PERUMNAS

Ir. Didi Suwandhi	:	Kepala Kabag Perencanaan Umum PERUM PERUMNAS
Ir. Marwan Affandi	:	Kepala Kabag Perencanaan Teknis PERUM PERUMNAS
Ir. Moegijono Bae	:	Kepala Kabag Persiapan Pembangunan PERUM PERUMNAS

PERIHAL : UNDANGAN

DAFTAR UNDANGAN
RAPAT BERSAMA "STEERING COMMITTEE"
KTA-20 CENGKARENG, 4 NOV 1980.

TANDA TANGAN / SIGNATI

1 STEERING COMMITTEE

1.1.	Ir. Radinal Moochtar	- Dir. Jen Cipta Karya	1.1.
1.2.	Ir. Suyono M Sc	- Direktur Perumahan Rakyat	1.2.
1.3.	Ir. Susanto	- Direktur Direktorat Teknik Penyehatan	1.3.
1.4.	Ir. Soenarjono Danoedjo	- Direktur Utama PERUM PERUMNAS	1.4.
1.5.	Ir. Suwarno Prawirasumantri	- Direktur Perencanaan PERUM PERUMNAS	1.5.
1.6.	Ir. Nursaijidi M.K.	- Direktur Pembangunan PERUM PERUMNAS	1.6.
1.7.	Ir. Herbowo	- Ketua BAPPEDA D.K.I	1.7.
1.8.	Ir. Imam Sunarjo	- Ketua Team Perencanaan Perumahan D.K.I	1.8.

2. JAPAN EMBASSY & JICA

2.1.	Mr. Takeo Yamazaki	- First Secretary, Embassy of Japan	2.1.
2.2.	Mr. Moriya Miyamoto	- Resident Representative of JICA	2.2.
2.3.	Mr. Ryonosuke Goto,	- Assitant Resident Representative of JICA	2.3.

3. JAPANESE ADVISORY COMMITTEE

3.1.	Mr. ~~Syunichi Hokura~~ Yaoi	- Advisor, Japanese Advisory Committee KTA 20 Cengkareng Project	3.1.

4. JAPANESE HOUSING EXPERTS

4.1.	Mr. Shinsaku Kanetaki	- Japanese Housing Expert	4.1.
4.2.	Mr. Toshio Uetama	- Japanese Housing Expert	4.2.
4.3.	Mr. Hajime Obata	- Japanese Housing Expert	4.3.
4.4.	Mr. Hajime Yokobori	- Japnese Housing Expert	4.4.

5. JAPANESE STUDY TEAM

5.1.	Mr. Jiro Suzuki	- Leader, Japanese Study Team KTA 20 Cengkareng	5.1.
5.2.	Mr. Hajime Sabo	- Japanese Study Team	5.2.
5.3.	Mr. Michio Inagaki	- Japanese Study Team	5.3.
5.4.	Mr. Yutaka Saito	- Japanese Study Team	5.4.
5.5.	Mr. Mikio Tanemura	- Japanese Study Team	5.5.
5.6	Mr. Motohide Nishio	- Japanese Study Team	5.6.
5.7.	Mr. Sunji Kawada	- Japanese Study Team	5.6.

6. COUNTERPARTS

6.1.	Ir. Duddy Soegoto	- Kepala Bagian Perencanaan Feasibility PERUM PERUMNAS	6.1.
6.2.	Ir. Aziz Dahlan	- Kasubag. Kerjasama Luar Negeri PERUM PERUMNAS	6.2.
6.3.	Ir. Paryatno Parno	- Kasubag. Pengukuran & Pemetaaan PERUM PERUMNAS	6.3.
6.4.	Ir. Herry Purnomo	- Staf Perenc. Feasibility PERUM PERUMNAS	6.4.
6.5	Ir. Rai Pratadaya	- Ka Ur Pengarahan Perencanaan Lingkungan DKI	6.5.
6.6	Ir. Ny. Rosita Saputro	- Kepala Distrik Perencanaan I Wilayah Jakarta Barat	6.6.

7. PROYEK BANJIR JAKARTA, DEP. P.U

7.1.	Ir. Achmad Lanti Dipl H.E	- Kepala Staf Proyek Banjir Jaya	7.1.

8. DITJEN BINA MARGA DEP.P.U

8.1.	Ir. Wiyoto Wiyono	- Kasubdit. Perencanaan Jalan Kota	8.1.

9. PERUSAHAAN AIR MINUM. PEMDA D.K.I

9.1.	Ir. Budi Raharjjo	- Direktur PAM D.K.I	9.1.

sd/sd.

MINUTES OF DISCUSSION

ON

THE DRAFT FINAL REPORT ON THE LOW COST HOUSING PROJECT IN CENGKARENG, JAKARTA (KTA-20)

1. The draft final report was submitted and explained by the Japanese Study Team, and discussed by the participants (see Attach) of the Steering Committee Meeting in Jakarta on the 12th of March, 1981.

2. The report was discussed by the Steering Committee, and the Steering Committee agrees that the draft final report be processed and printed as final report.

Note : the following expressions were made by the Steering Committee :

a) PERUM PERUMNAS and the Local Government will continue the land acquisition process and it should be finished at latest in December 1981.

b) In parallel with the land equisition, PERUM PERUMNAS is going to proceed the review of the feasibility study then to start the detailed design in the fiscal year of 1981/1982.

c) In relation with the above mentioned process, a request for Japanese loan including the detailed design will be submitted.

Signed at Jakarta, March 12, 1981.

Ir. Radinal Moochtar	Jiro Suzuki
Director General	Team Leader
of	of
CIPTA KARYA	JAPANESE STUDY TEAM

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I: Indonesian E: English J: Japanese

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STATISTICAL YEAR BOOK OF JAKARTA 1979	ジャカルタ市統計年鑑 1979	CENSUS & STATISTICAL OFFICE JAKARTA	I·E
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LAPORAN HASIL PROYEK PERINTISAN PELAYANAN KESEJAHTERAAN HASYARAKAT TERPADLI DI DAERAH PENUKIMAN BARU DEPOK BUKU 1	デポック新住宅団地の社会報告	KEJIASANA ANTARA PERSAHAAN UMUM PEMBANGUNAN PERUMA-HAAN NASIONAL DENGAN FAKULTASI ILMU^2 SOSIAL UNIVERSITAS INDONESIA 1979	I
PENELITIAN KEAPAAN SOCIAL EKONOMI DAN TANGGAAPAN MASYARAKAT PERKAMPUNGAN TERHADAP PROJEK MUHAMMAD HUSNI THAMRIN DKI JAKARTA TAHUN 1973/74	モハメット・クスニ・ヤムリンプロジェクト社会経済調査	PEMERINTAH DAERAH KHUSUS IBKOTA JAKARTA	I
PENELITIAN KEAPAAN SOCIAL EKONOMI MASYARAKAT PADA KAMPUNG^2 YANG AKAN MENDAPAT PERBAIKAN DALAM RANGKA PROJEK MUHAMMAD HUSNI THAMRIN DKI JAKARTA TAHUN 1975/76	モハメット クスニ・ヤムリンプロジェクト調査 －付表の修復と社会・経済状況－	"	I
HOUSING WORLD BANK SECTOR POLICY PAPER	ハウジング－世銀白書－	WORLD BANK	E
LAND REFORM " "	ランドリフォーム－世銀白書－	"	E
WORLD DEVELOPMENT INDICATORS 1979	世界開発指標－世銀－	WORLD BANK	E
NATIONAL SOCIO-ECONOMIC SURVEY 1976	インドネシア国民家計統計	CENTRAL BUREAU OF STATIS-TICS	I·E

TYTLE (題名)	TYTLE IN JAPANESE (和文)	AUTHOR OR PUBLISHER (著者または発行所)	
INDONESIAN PRICE INDEX	物価動向	JETRO	J
HOUSEHOLD AND COTTAGE INDUSTRIES IV	家計と家内工業 VOL IV	CENTRAL BUREAU OF STATISTICS	I·E
" V	〃 VOL V	"	I·E
AVERAGE WAGES OF ESTATE WORKERS 1976 ∿ 1979	農業労働者賃金統計 1976-79	"	I·E
STATISTIK WILAYAH DKI JAKARTA 1979	ジャカルタ地域統計	KANTOR SENSUS DAN STATISTIK DKI JAKARTA	I
BULLETIN OF INDONESIAN ECONOMIC STUDIES	インドネシア経済スタディー期報	AUSTRALIAN NATIONAL UNIV.	E
PROGRAM PELITA III	PELITA Ⅲ に対する建設計画	PERUMNAS PROGRAMMING DIVISION	I
IMPOR: MANURUT JENIS BARANG DAN NEGERI ASAL 1978	輸入物資統計 1978	BIRO PUSAT STATITIKS	I
TABEL-TABEL POKOK PENDARATAN NASIONAL INDONESIA	〃	"	I
RINGKASAN PENDUK INDONESIA	〃	"	I
KEADAAN ANGKATAN KERJA DI INDONESIA	〃	"	I
EXPOR: MANURUT JENIS BARANG DAN NEGERI ASAL 1978	輸出物資統計 1978	MINISTRY OF INDUSTRY	I
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CITY PLANNING AND COMMUNITY PLANNING

DASAR-DASAR PERENCANAAN LINGKUNGAN	コミュニティー設計基準	BUILDING INFORMATION CENTRE	I
PEDOMAN PERENCANAAN LINGKUNGAN PEMUKIMAN KOTA	住戸地域計画基準	CIPTA KARYA	I
JAKARTA PLANNING ATLAS 1975	ジャカルタ計画アトラス	DINAS DATA KOTA	I
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PROGRAM PENDANAAN KOMPONEN LOKAL JALAN TOL	インドネシア道路建設投資計画書 -LOKAL	BINA MARGA	I
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PETUNJUK MEMBANGUN DIWILAYAH DAERAH KHUSUS IBUKOTA JAKARTA	地区計画指針	"	I

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HOUSING PROJECT REPORT			
FINAL REPORT VOL. 4, SITES & SERVICES AND LOW COST HOUSING AT TANDES IN SURABAYA APR. '78	スラバヤS&SとLCH開発計画報告書	PERUM PERUMNAS	E
PROPOSAL FOR A SITES & SERVICES PROJECT IN CIREBON, INDONESIA DEC. '74	チレボンS&SとLCH開発計画報告	"	E
DRAFT REPORT - SITES & SERVICES/ LOW COST HOUSING PROJECT ANNEXES MAR. '76	〃	"	E
IMPLEMENTATION REPORT P.I.U. NOV./DEC. '77	〃	"	E
FINAL REPORT LOW COST HOUSING IN BEKASI II (SUMMARY)	ベカシⅡLCH開発計画報告書	"	I
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APPRAISAL OF THE JAKARTA URBAN DEVELOPMENT PROJECT IN INDONESIA AUG. '74	クレンダーアプレイザルレポート	IBRD	E
REQUEST FOR FUNDING TO THE IBRD, A SITE & SERVICE PROGRAM JAKARTA METROPOLITAN AREA	クレンダーデポックチェンカレンのフィーンビリティ・スタデイ・レポート	PPU	E
FINAL REPORT SITES & SERVICES BANYUMANIK, SEMARANG VOL. 1 & 3	スマランのフィーンビリティ・スタディ・レポート	PERUM PERUMNAS	E
INTERIM REPORT SITES & SERVICES SEMARANG, SULAKARTA VOL. 1	〃	"	E
INTERIM REPORT SITES & SERVICES SEMARANG, SULAKARTA VOL. 2	〃	"	E
DETAILED DESIGN REPORT SITES & SERVICES SEMARANG, SULAKARTA VOL. 3	スマランの詳細設計レポート	"	E
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BANDUNG URBAN DEVELOPMENT AND SANITATION PROJECT-BACK GROUND PAPER VOL. 1, 2, 3	バンドンのフィーンビリティ・スタディ・レポート	CIPTA KARYA	E
REPORT TANAH ABANG	タナアバン中層団地レポート	PERUM PERUMNAS	I
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PERATURAN SEMEN PORTALAND INDONESIA 1972 N.I-8	ポルトランドセメント基準	BUILDING INFORMATION CENTRE	I
MANUAL BANGUNAN TAHAN GEMPA	耐震工法マニアル	"	I
KAYU SEBAGAI BAHAN BANGUNAN	木材ガイダンス	"	I
A BRIEF OUTLINE OF SEISMICITY AND EARTHQUAKE	耐震設計の手引	"	E
DEVELOPMENT OF A STEAM-CURED BUILDING MATERIAL ON THE BASIS OF LATERTIC SOIL & LIME	ホト石灰をベースにした建材の開発	DIRECTORATE OF BUILDING RESEARCH	E
PERATURAN BETON BERTULANG INDONESIA N.I-2	RCコンクリート基準	CIPTA KARYA	

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ULTIMATE STRENGTH ANALYSIS OF RC-SECTION	RC終局強度計算法手引	BUILDING RESEARCH INSTITUTE	E
PERHITUNGAN LENTUR	RCコンクリート計算基準	CIPTA KARYA	I
KEAMANAN KONSTRUKSI DALAM PERHITUNGAN BETON	コンクリート安全要領	"	I
REPORT BANDUNG	バンドンセミナーレポート	BANDUNG INSTITUTE OF TECHNOLOGY	E
REINFORCED CONCRETE DESIGNER'S HANDBOOK	RCコンクリートデザイナーハンドブック	VIEWPOINT PUBLICATION	E
PERATURAN BANGUNAN NASIONAL	国家建築規則	CIPTA KARYA	I
RERATURAN KONSTRUKSI KAYU INDONESIA	木構造基準	"	I
	インドネシア国家建築施工規則 (1-25の和訳)	JAPAN-INDONESIAN ASSOCIATION	J
BATA MERAH SEBAGAI BAHAN BANGUNAN	レンガ造基準	CIPTA KARYA	I
PERATURAN UMUM UNTUK BAHAN BANGUNAN DI INDONESIA	建材一般基準	"	I
PEMBANGUNAN PERUMAH BERTINGKAT EMPAT VOL. 1, 2, 3	Perumnas の新築ビル設計図	PERUM PERUMNAS	I
TECHNICAL REPORT NO. 22	コンクリート関連技術レポート	"	I
MAISONETTE 80	メゾネット住宅資料	BANDUNG TECHNICAL INSTITUTE	I
COMPETITION "FLAT INDONESIAN"	中層コンペ入選作-プレコン方式案-	PERUM PERUMNAS	I
" "FLAT MEXICAN"	〃 -メキシコ方式案-	"	I
" "FLAT BRECAST"	〃 -フィンコリダー・プレキャスト方式案-	"	I
PEDOMAN TEKNIK PERENCANAAN PERUMAHAN FLAT DAN MAISONETE	中層・メゾネット住宅技術ガイダンス	CIPTA KARYA	I
EVALUASI KERJA SUB-INTI	サブコア住宅のコヴァリエーション	PERUM	I
PEDOMAN PERENCANAAN LINGKUNGAN PEMUKIMAN KOTA	ジャカルタ市建築関連条例	DKI JAKARTA	I

SEWERAGE, WATER SUPPLY AND POWER SUPPLY

USAHA MEMANFAATKAN AIR HUJAN UNTUK AIR MINUM	雨水と飲料水手引	BUILDING INFORMATION CENTER	I
MANUAL OF STANDARD & CRITERIA FOR PLANNING WATER RESOURCE PROJECT	水源プロジェクトマニアル	"	E
RENCANA SEPTIK TANK	セプティックタンク手引	"	I
KAKUS SEDERHANA	し尿処理手引	"	I
MASTER PLAN FOR JAKARTA WATER SUPPLY SYSTEM	ジャカルタ給水システムマスタープラン	NIHON SUIDO CONSULTANT	E
PENJELASAN SINGKAT PENAUGGULANGAN MASLAH BANJIR'DI DKI JAKARTA	ジャカルタ洪水防止策の説明	DIREKTORAT JENDERAL PENGAIRAN	I
JAKARTA DRAINAGE AND FLOOD CONTROL PROJECT PHASE II	ジャカルタ排水及び村洪水プロジェクト	NEDECO	E

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FINAL REPORT PHASE II JAKARTA DRAINAGE AND FLOOD CONTROL PROJECT	ジャカルタ排水及び対洪水プロジェクト	NEDECO	E
CISADANE-JAKARTA-CIBEET WATER RESOURCES DEVELOPMENT PLAN	チサダネージャカルタ チベット水資開発計画	CIPTA KARYA	E
NUCLEAR APPLICATIONS IN FLOOD CONTROL RESEARCH OVER JAKARTA	洪水予防への放射線の導入	BADAN TENAGA ATOM NASIONAL	E
PERATURAN INSTALASI LISTRIK SYRAT-SYRAT PENYAMBUNGAN LISTRIK	電気設備基準	PERUM PERUMNAS	I
CISADANE-JAKARTA-CIBEET WATER RESOURCES DEVELOPMENT PLAN ANNEX D	CJC水資源計画	CIPTA KARYA	I
JAKARTA SEWERAGE AND SANITATION PROJECT SEP. '77	Jakarta排水マスタープラン	CIPTA KARYA	E
PEDOMAN PLAMBING INDONESIA MAR. '74	給排水基準	DIRECTORAT TEKNIK PENYEHATAN	I
OPEN CHANEL HYDRAULICS	開渠の水理	VET TE CHOW, McGRAW-HILL, KOGAKUSHA	E
SEWAGE TREATMENT IN HOT CLIMATE	熱帯地方の汚水処理	DUNCAN MARA, WILEY CO.	E
JAKARTA DRAINAGE FLOOD CONTROL REPORT (FIRST PROGRESS)	ジャカルタ洪水調整プロジェクトレポート	PBJR (NEDECO)	E
" (THIRD PROGRESS)	"	"	E
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COST AND CONSTRUCTION DATA

DAFTAR HARGA SATUAN BAHAN BANGUNAN DI JAKARTA AUG. '79	ジャカルタ建材コスト資料 Aug. 1979	BUILDING INFORMATION CENTER	I
DAFTAR HARGA SATUAN BAHAN BANGUNAN DI JAKARTA	ジャカルタ建材コスト資料OCT. '79	"	I
DAFTAR HARGA SATUAN BAHAN BANGUNAN DI JAKARTA JUN. '80	ジャカルタ建材コスト	"	I
DAFTAR HARGA SATUAN PEKERJAAN (UNIT PRICE) DI INDONESIA IV/1979	インドネシア都市別ユニット建設コスト資料	"	I
A GUIDANCE TO THE INDONESIAN TAXATION	TAX関連	GUNUNG AGUNG	E
PAKET 20 APRIL 1979	"	"	I
PENETAPAN HASIL PREKWALIFIKASI PEMBORONG PERUM PERUMNAS UNTUK TAHUN ANGGARAN '78/'79, '79/'80	業者別能力決定一覧	PERUM PERUMNAS	I
PELAKSANAAN PEKERJAAN PEMBANGUNAN GEDUNG KANTOR PUSAT PERUM PERUMNAS	プルムナス本社ビル工事契約書	"	I
S&S IN KLENDER BILL OF QUANTITIES AND SPECIFICATIONS	クレンダーS&Sプロジェクト仕様書	"	I
PELAKSANAN PEKERJAAN LAND CLEARING DI LOKASI PROJEK PERUM PERUMNAS MEDAN II	メダン土地造工事契約書	"	I

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PELAKSANAAN PEKERJAAN PEMBUATAN SALAN ROW 10, 6, SALURAN, DUIKER DAN BAK KONTROL DI LOKASI PROJEK PERUM PERUMNAS MEDAN II	メダン‖道路フットパス工事契約書	PERUM PERUMNAS	I
PELAKSANAAN PEKERJAAN PEMBUATAN SEBUAH MENARA AIR DARI BETON DI LOKASI PROYEK BEKASI	ベカシ給水タワー契約書	"	I
PELAKSANAAN PEKERJAAN PEMBANGUNAN 500 UNIT RUMAH TYPE D-21 DI LOKASI DEPOK II	デポック‖D－21タイプ住戸工事契約書	"	I
PELAKSANAAN PEKERJAAN PEMBUATAAN JALAN SETAPAK DAN SALURAN LINGKUNGAN 400 UNIT RUMAH TYPE D-21 PADA SITE TIMUR BAGIAN UTARA DI LOKASI DEPOK II	デポック‖道路排水、宅造工事契約書	"	I
PELAKSANAAN PEKERJAAN PEMBANGUNAN 640 UNIT/10 TWIN BLOCK RUMAH FLAT SYSTEM BRECAST TYPE-36 DI LOKASI BANDUNG DAN SEKITARNYA	バンドンF－36タイプ中層プレキャスト住宅工事契約書	"	I
PELAKSANAAN PEKERJAAN PEMBUATAN JALAN KERJA DI LOKASI BEKASI II	ベカシ‖仮設道路工事契約書	"	I
PELAKSANAAN PEKERJAAN PEMBANGUNAN 400 UNIT RUMAH TYPE D-33 DI LOKASI TANGERANG	タングランプロジェクトD－33タイプ住戸工事契約書	"	I
SURAT PERJANJIAN KERJA SAMA PELAKSANAAN PEKERJAAN PENYAMBUNGAN TENAGA LISTRIK UNTUK 174 UNIT RUMAH DI LOKASI CIREBON	チレボン174ユニット住宅の電気施設工事契約書	"	I
BIAYA PELAKSANAAN PEMBANGUNAN PEKERJAAN JALAN KONSTRUKSI BAJA	BINA MARGAの道路・橋梁建設コスト歩掛表	BINA MARGA	I
PELAKSANAAN PEKERJAAN PEMBUATAN LAND-DEVELOPMENT DI LOKASI, KLENDER	クレンダープロジェクト宅造工事契約書	PERUM PERUMNAS	I
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PELAKSANAAN PEKERJAAN LAND DEVELOPMENT (PEKERJAAN JALAN, KANALAIR, AIR MINUM) DI LOKASI PROJEK CIREBON	チレボン宅造工事契約書		I
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PELAKSANAAN PEKERJAAN UP GRADING KALI DAN PINTU PENGENDALI BANJIR PADA KALI CIKALONG DI LOKASI PROJEK CIREBON	チレボン治水工事契約書	PERUM PERUMNAS	I
PELAKSANAAN PEKERJAAN PEMBUATAN INSPEKTION DAN PENGATUR DAN TUTUP-TUTUP BESI BAR METER AIR PIT SERTA PER-BAIKAN SALURAN AIR KOTOR DI LOKASI PROJEK CIREBON	チレボン排水・飲料水工事契約書		
PELAKSANAAN PEKERJAAN PEMASANGAN PIPA AIR KOTOR DAN AIR MINUM FOOT PATH BERIKUT GUTTERNYA DI LOKASI PROJEK CIREBON	チレボン給・排水、道路工事契約書	"	I

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Others			
GEOLOGICAL MAP (JAKARTA)	ジャカルタ地質図	DIRECTORAT GEOLOGI	I.E
SOIL INVESTIGATION DATA SHEET	土質データ	PBJR	I
BERTANAN POHON BUAH-BUAHAN 2	果樹の植樹について	GNUNG AGUN	I
TANAMAN HIAS	インドネシアの観木	"	I
TUMBUHAN LIAR	インドネシアの草花	"	I
TANAMAN PERINPUNG	インドネシアの樹木	"	I