BAB VI

KESIMPULAN DAN SARAN

6.1. Kesimpulan

Berdasarkan uraian yang telah dipaparkan pada bab-bab sebelumnya, maka dapat disimpulkan bahwa :

a. Perencanaan penyediaan air yang benar adalah perencanaan penyediaan air bersih yang berdasarkan pedoman plambing yang berlaku, seperti halnya pada Pedoman Plambing Indonesia.
b. Dalam membuat program komputer, tidak semua bentuk permasalahan dapat langsung ditulis dalam bahasa komputer, akan tetapi harus dibuat dalam bentuk yang ada pada bahasa komputer tersebut dan dapat diartikannya dengan benar.
c. Perencanaan instalasi penyediaan air bersih dapat dilakukan dengan program komputer sebagai alat bantu dalam menghitung, agar lebih efisien dalam waktu dan dalam hal ketelitian.
d. Dengan penggunaan program *Espipe Basic*, cara *trial and error* untuk menghitung dimensi pipa distribusi pada instalasi penyediaan air bersih dilakukan oleh program.
e. Prosentase beda terbesar antara perhitungan manual dan program adalah sebesar 6,66667 % pada perbandingan perhitungan laju aliran air, hal ini dimungkinkan karena program memakai persamaan pendekatan kurva hubungan antara beban unit alat plambing dengan laju aliran air

f. Prosentase beda terbesar antara perhitungan dalam buku referensi dengan program sebesar 63,84 % hal ini dimungkinkan karena kecepatan batas yang dipakai dalam program adalah kurang dari 2 m/detik sedangkan perhitungan kecepatan pada buku referensi ada yang melebihi 2 m/detik.

6.2. Saran

Saran bagi siapa saja yang berkeinginan meneruskan pembahasan tentang pemrograman instalasi penyediaan air bersih ini.

a. Persamaan pengganti kurva hubungan beban unit dengan laju aliran agar lebih dioptimalkan lagi.
b. Batasan pada penentuan diameter pipa seperti batasan kecepatan aliran ditentukan dengan jelas sebagai batasan program.
c. Peralatan lain yang ada didalam instalasi penyediaan air bersih seperti pompa tekan, peralatan penyangga pipa, agar dibahas dan dimasukkan dalam program.
d. Perhitungan jumlah rencana anggaran biaya untuk instalasi penyediaan air bersih dapat dimasukkan dalam program.
e. Sistem yang digunakan agar diperluas sehingga tidak hanya untuk sistem pengaliran dari atas kebawah saja.
f. *Out put* gambar sistem pemipaan atau pun peralatan pelengkap dapat menjadi nilai yang positif bagi perkembangan program.

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Tabel "Pemakaian air rata-rata per orang setiap hari"

No.	Jenis gedung	Pemakaian air rata-rata sehari (liter)	Jangka waktu pemakaian air rata-rata sehari (jam)	Perbandingan luas lantai efektif/total (%)	Keterangan
1	Perumahan mewah	250	8-10	42-45	Setiap penghuni
2	Rumah biasa	160-250	8-10	50-53	Setiap penghuni
3	Apartment	200-250	8-10	45-50	Mewah 250 l Menengah 180 l Bujangan 120 l
4	Asrama	120	8		Bujangan
5	Rumah sakit	Mewah > 1000 Menengah 500-1000 Umum 350-500	8-10	45-48	(setiap tempat tidur pasien) Pasien luar:8 l Staf/pegawai:120 l Keluarga-pasien:160 l
6	Sekolah dasar	40	5	58-60	Guru:100 l
7	SLTP	50	6		Guru:100 l
8	SLTA dst	80	6		Guru/Dosen:100 l
9	Ruko	100-200	8	58-60	Penghuni:160 l
10	Gedung kantor	100	8	60-70	Setiap pegawai
11	Toserba	3	7	55-60	Pemakaian air hanya untuk kakus, belum termasuk bagian restorannya
13	Pabrik	Buruh pria: 60 Wanita: 100	8		Per orang, setiap giliran (kalau kerja > 8 jam per hari)
14	Stasiun	3	15		Setiap penumpang
15	Restorant	10	5		Penghuni:100 l
16	Gedung pertunjukan	30	5	53-55	Kalau digunakan siang dan malam, pemakaian air dihitung per penonton. Jam pemakaian air dalam tabel adalah untuk satu kali pertunjukan
17	Bioskop	10	3		-idem-
18	Toko pengecer	40	6		Pedagang besar:30 lt/tamu, 150 l/staf atau 5 l/per hari setiap m^2
19	Hotel	250-300	10		Untuk setiap tamu, staf: 120-150 l; Penginapan:200 l
20	Gedung peribadatan	10	2		Didasarkan pada jumlah jemaah per hari
21	Perpustakaan	25	6		Untuk setiap pembaca yang tinggal
22	Bar	30	6		Setiap tamu
23	Perkumpulan sosial	30			Setiap tamu
24	Kelab malam	120-350			Setiap tempat duduk
25	Gedung perkumpulan	150-200			Setiap tamu
26	Laboratorium	100-200	8		Setiap staf

Tabel "Pemakaian air tiap plambing, laju aliran dan ukuran pipa cabang"

No	Nama alat plambing	Pemakaian air untuk penggunaan satu kali (liter)	Pakai /jam	Laju aliran (l/dt)	Waktu untuk pengisian (detik)	Pipa sambungan alat plambing (mm)	Pipa cabang air bersih ke alat plambing (mm)	
							Pipa baja	Tembaga[4]
1	Kloset (+katup gelontor)	13,5-16,5[1]	6-12	110-180	8,2-10	24	32[2]	25
2	Kloset (+tangki gelontor)	13-15	6-12	15	60	13	20	13
3	Peturasan (+katup gelontor)	5	12-20	30	10	13	20[3]	13
4	Peturasan 2-4 org (+katup gelontor)	9-18 (@4,5)	12	1,8-3,6	300	13	20	13
5	Peturasan 5-7 org (katup gelontor)	22,5-31,5 (@4,5)	12	4,5-6,3	300	13	20	13
6	Bak cuci tangan kecil	3	12-20	10	18	13	20	13
7	Bak cuci tangan biasa (*lavatory*)	10	6-12	15	40	13	20	13
8	B. cuci dapur (sink)+keran 13 mm	15	6-12	15	60	13	20	13
9	Bak cuci dapur (*sink*) dengan keran 20 mm	25	6-12	25	60	20	20	20
10	Bak mandi rendam (*bath-tub*)	125	3	30	250	20	20	20
11	*Shower*	24-60	3	12	120-300	13-20	20	20
12	Bak mandi gaya jepang	Tergantung ukurannya		30		20	20	20

Catatan :

[1] Standar pemakaian air untuk kloset dengan katup gelontor untuk satu kali pemakaian adalah 15 liter selama 10 detik.

[2] Pipa sambungan ke katup gelontor untuk kloset biasanya adalah 25 mm, tetapi untuk mengurangi kerugian akibat gesekan dianjurkan memesang pipa ukuran 32 mm.

[3] Pipa sambungan ke katup gelontor untuk peturasan biasanya adalah 13 mm, tetapi untuk mengurangi kerugian akibat gesekan dianjurkan memasang pipa ukuran 20 mm.

[4] Karena pipa tembaga kurang cenderung berkerak dibandingkan dengan pipa baja, maka ukurannya bisa lebih kecil. Pipa PVC bisa juga dipasang dengan ukuran yang sama dengan pipa tembaga.

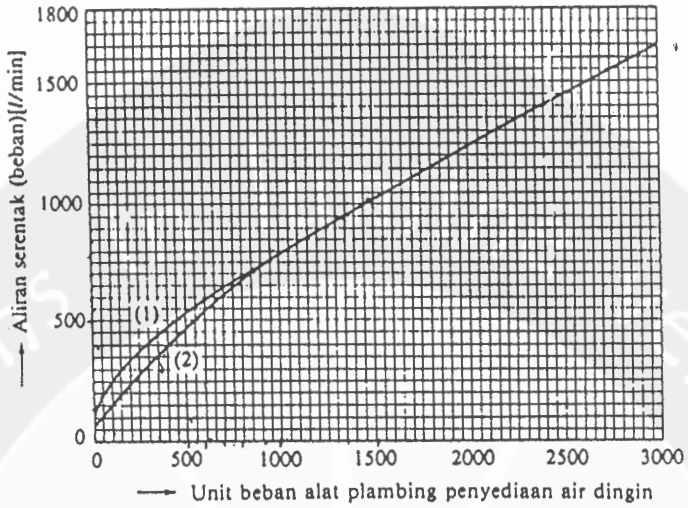
Tabel "Faktor pemakaian (%) dan jumlah alat plambing"

Jumlah alat plumbing / Jenis alat plumbing	1	2	4	8	12	16	24	32	40	50	70	100
Kloset (+katup gelontor)	1	50 satu	50 2	40 3	30 4	27 5	23 6	19 7	17 7	15 8	12 9	10 10
Alat plumbing biasa	1	100 dua	75 3	55 5	48 6	45 7	42 10	40 13	39 16	38 25	35 25	33 33

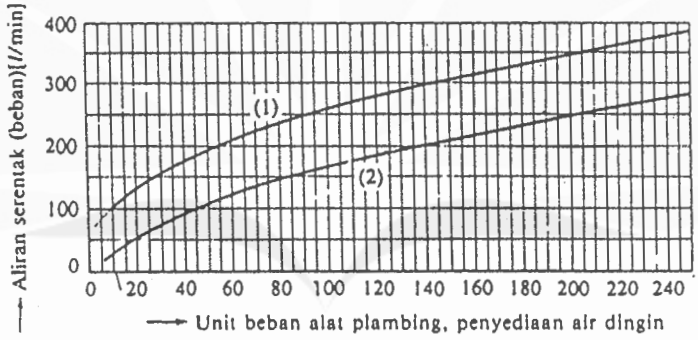
Tabel "Beban kebutuhan alat plambing[1)] "

Jenis alat plumbing[2)]	Jenis penyediaan air	Unit alat plumbing[3)]		Keterangan
		Untuk pribadi[4)]	untuk umum[5)]	
Kloset	Katup gelontor	6	10	
Kloset	Tangki gelontor	3	5	
Peturasan, dengan tiang	Katup gelontor	-	10	
Peturasan terbuka (*urinal stall*)	Katup gelontor	-	5	
Peturasan terbuka (*urinal stall*)	Tangki gelontor	-	3	
Bak cuci (kecil)	Keran	0,5	1	
Bak cuci tangan	Keran	1	2	
Bak cuci tangan untuk kamar operasi	Keran	-	3	
Bak mandi rendam (*bath tub*)	Keran pencampuran air dingin dan panas	2	4	
Pancuran mandi (*Shower*)	Keran pencampuran air dingin dan panas	2	4	
Pancuran mandi tunggal	Keran pencampuran air dingin dan panas	2	-	
Satuan kamar mandi dengan bak mandi rendam	Kloset dengan katup gelontor	8	-	
Satuan kamar mandi dengan bak mandi rendam	Kloset dengan tangki gelontor	6	-	
Bak cuci bersama	(untuk tiap keran)	-	2	
Bak cuci pel	Keran	3	4	Gedung kantor,dll
Bak cuci dapur	Keran	2	4	Untuk umum: hotel atau restoran, dsb.
Bak cuci piring	Keran	-	5	
Bak cuci pakaian (satu sampai tiga)	Keran	3	-	
Pancuran minum	Keran air minum	-	2	
Pemanas air	Katup bola	-	2	

Catatan:
1) Alat plambing yang airnya mengalir secara kontinyu harus dihitung secara terpisah, dan ditambahkan pada jumlah unit alat plambing.
2) Alat plambing yang tidak ada dalam daftar dapat diperkirakan, dengan membandingkan dengan alat plambing yang mirip/terdekat.
3) Nilai unit alat plambing dalam tabel ini adalah keseluruhan.
4) Alat plambing untuk keperluan pribadi dimaksudkan pada rumah pribadi atau *apartement* dimana pemakaiannya tidak terlalu sering.
5) Alat plambing untuk keperluan umum dimaksudkan yang dipasang dalam gedung kantor, sekolah, pabrik, dsb, dimana pemakaiannya cukup sering.



(a) Untuk unit beban sampai 3000



(b) Untuk unit beban sampai 250 (skala gambar diperbesar)

Gbr. 3.61 Hubungan antara unit beban alat plambing dengan laju aliran.
Kurva (1) untuk sistem yang sebagian besar dengan katup gelontor.
Kurva (2) untuk sistem yang sebagian besar dengan tangki gelontor.

Tabel "Faktor kecepatan untuk berbagai jenis pipa"

C	Jenis pipa
140	Pipa baru: kuningan, tembaga, timah hitam, besi tuang, baja (dilas atau ditarik), baja atau besi lapis semen. Pipa asbes-semen (selalu "licin" dan sangat lurus).
130	Pipa baja baru: (lurus tanpa perlengkapan,dilas atau ditarik), pipa besi tuang baru (biasanya angka ini yang dipakai), pipa tua : kuningan, tembaga, timah hitam. Pipa PVC-keras.
110	Pipa dengan lapisan semen yang sudah tua, pipa keramik yang masih baik.
100	Pipa besi tuang atau pipa baja yang sudah tua.

Tabel "Ukuran minimum pipa penyediaan air alat plambing"

Alat plambing	Ukuran Nominal	
	mm	Inci
Bak mandi	15	1/2
Gabungan bak cuci dan dulang cuci pakaian	15	1/2
Pancuran air minum	10	3/8
Mesin cuci piring untuk rumah tangga	15	1/2
Bak cuci dapur untuk rumah tangga	15	1/2
Bak cucidapur komersiil	20	3/4
Bak cuci tangan	10	3/8
Bak cuci pakaian (1, 2 atau 3 bagian)	15	1/2
Dus (untuk tiap Dus)	15	1/2
Bak cuci (service slop)	15	1/2
Bak cuci (jenis bibir pengglontor)	20	3/4
Peturasan (Katup gelontor 3/4")	20	3/4
Peturasan (katup gelontor 1")	25	1
Peturasan (tangki gelontor)	15	1/2
Kakus (tangki gelontor)	10	3/8
kakus (katup gelontor)	25	1
Kran untuk penyambung slang	15	1/2
Hidrant diding	15	1/2

Tabel "Ukuran Nominal Pipa"

D (mm)	Inci	D (mm)	Inci
6	1/8	100	4
8	¼	125	5
10	3/8	150	6
15	½	175	7
20	¾	200	8
25	1	225	9
32	1 ¼	250	10
40	1 ½	300	12
50	2	350	14
65	2 ½	400	16
80	3	450	18
90	3 ½	500	20

Tabel "Tekanan yang dibutuhkan alat plambing"

Nama alat plambing	Tekanan yang dibutuhkan (kg/cm^2)	Tekanan standar (kg/cm^2)
Katup gelontor kloset	0.7[1)]	1,0
Katup gelontor peturasan	0,4[1)]	
Keran automatik	0,7[2)]	
Pancuran mandi dengan pancaran halus	0,7	
Pancuran mandi biasa	0,35	
Keran biasa	0,3	
Pemanas air langsung dengan bahan bakar gas	0,25-0,7[3)]	

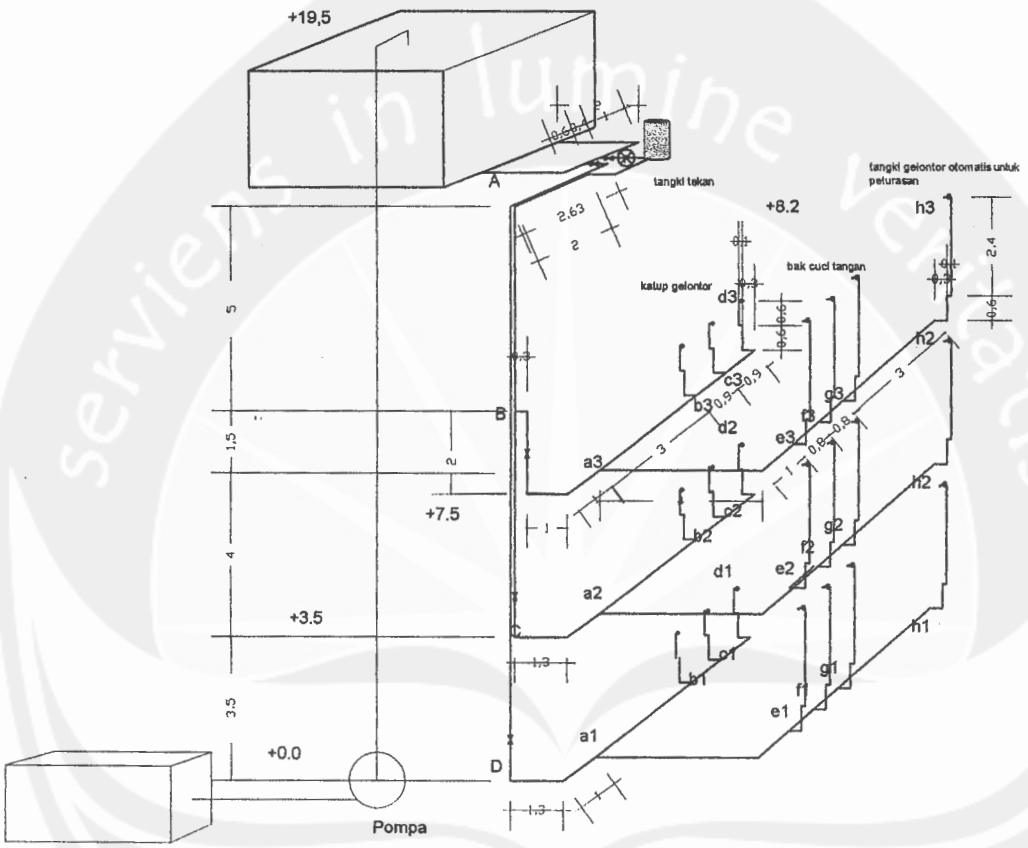
Catatan:
[1)] Tercantum adalah tekanan minimum, sedangkan maksimalnya adalah 4 kg/cm^2.
[2)] Jika tekanan air kurang dari tekanan minimum maka katup tidak akan tertutup rapat sehingga air dapat terus menetes .
[3)] Pemanas menggunakan gas biasanya tekanan minimum sudah dinyatakan.

Tabel "Panjang ekivalen untuk katup dan perlengkapan lainnya"

Diameter minimal (mm)	Panjang ekivalen (m)							
	Belokan 90°	Belokan 45°	T-90° aliran cabang	T-90° aliran lurus	Katup sorong	Katup bola	Katup sudut	Katup satu arah
15	0,60	0,36	0,9	0,18	0,12	4,5	2,4	1,2
20	0,75	0,45	1,2	0,24	0,15	6	3,6	1,6
25	0,9	0,54	1,5	0,27	0,18	7,5	4,5	2
32	1,2	0,72	1,8	0,36	0,24	10,5	5,4	2,5
40	1,5	0,9	2,1	0,45	0,30	13,5	6,6	3,1
50	2,1	1,2	3	0,6	0,39	16,5	8,4	4
65	2,4	1,5	3,6	0,75	0,48	19,5	10,2	4,6
80	3	2,1	4,5	0,9	0,63	24	12	5,7
100	4,2	2,4	6,3	1,2	0,81	37,5	16,5	7,6
125	5,1	3	7,5	1,5	0,99	42	21	10
150	6	3,6	9	1,8	1,2	49,5	24	12
200	6,5	3,7	14	4	1,4	70	33	15
250	8	4,2	20	5	1,7	90	43	19

Catatan :

- Katup pipa hisap (*foot valve*) mempunyai panjang ekivalen sama dengan sudut (*angle valve*), katup satu arah (*chek valve*) dari jenis yang dengan engsel.
- Kalau sambungan antara pipa dengan perlengkapannya halus dan rata (seperti pada pipa dan perlengkapan tembaga), maka angka ekivalen untuk belokan dan "T" dikurangi dengan setengahnya.



Gambar kasus 1

Kasus1/3lt/tkn/ekonm
****
ESPIPE BASIC\OUT PUT PROJECT
****

General Data :
Many floor = 3
Number of people each floor = 100
Water usage rate in a day = 100 m3/hour
Usage hour in a day = 10hour

Equipment Data :
Water needed for fire protection = 0.4 m3/hour
Capasity of public water source pipe = 2.4 m3/hour
Elevation of input roof tank pipe = 19.5 meters
friction loss in head factor = 20 (per hundred potential high)
Motor pump spesification ratio = 0.2
Pump efficiency = 80 %
Minutes of peak flow demands = 30
Minutes of filler pump operation = 10
Elevation of water rate level = 18 meters
Elevation of highest fixture plumbing = 8.2 meters
Length of pipe from roof tank out put to highest fixture = 22 meters
Distribution system ratio = 25
Many floor using pressure storage tank = 2 floor

Pipe Data :
With pressure storage tank :
Section of pipe = 18 section
Down feed rises section of pipe = 2 section
Without pressure stoage tank :
Section of pipe = 9section
Down feed rises section of pipe = 1 section
Velocity factor for pipe materials = 100

Out Put Tank Dimention:
Maximum total demand flow per hour = 7.2 m3/hour
Maximum total demand flow per minutes = 0.18 m3/minutes
Volume of ground tank = 60 m3
Volume of roof tank = 3 m3
Roof tank pump motor power = 1.29 kW
Volume of pressure storage tank = 4.2 m3
Pressure used for pressure tank = 1.5 Kg/cm2

Elevation of each floor

Floor	Elv.(m)	Fixture Elv.(m)
1	7.5	8.2
2	4	4.7
3	0.5	1.2

Input pipe system (with pressure storage tank per section)

Section	Length(m)	Fixture unit	Q(l/minutes)
1	11.3	78	236
2	4.3	39	175
3	3	30	156
4	0.9	20	131
5	2.4	10	97
6	5	9	30
7	0.8	7	25
8	0.8	5	20
9	6.4	3	14
10	5.5	39	175
11	2.3	39	175
12	3	30	156
13	0.9	20	131
14	2.4	10	97
15	5	9	30
16	0.8	7	25
17	0.8	5	20
18	6.4	3	14

Input pipe system (without pressure storage tank per section)

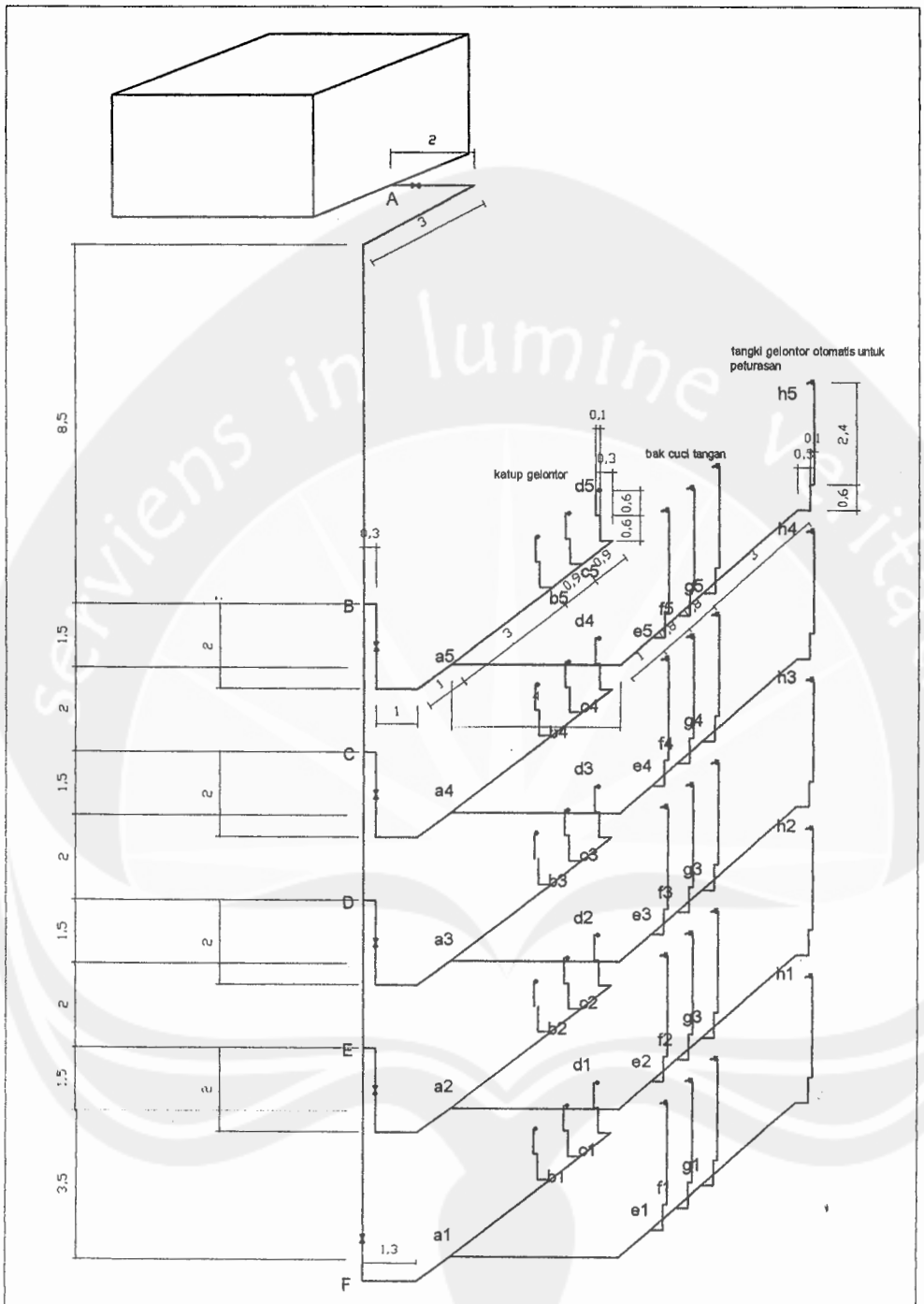
Section	Length(m)	Fixture unit	Q(l/minutes)
1	12	39	175
2	4.3	39	175
3	3	30	156
4	0.9	20	131
5	2.4	10	97
6	5	9	30
7	0.8	7	25
8	0.8	5	20
9	6.4	3	14

Pipe dimention (with pressure storage tank)

Section	Fixture unit	Q(l/minutes)	D(mm)	R(mm/m)	V(m/s)
1	78	236	65	44.9	1.1853
2	39	175	50	92.62	1.4854
3	30	156	50	74.87	1.3242
4	20	131	40	160.62	1.7374
5	10	97	40	92.08	1.2865
6	9	30	20	306.53	1.5915
7	7	25	20	218.7	1.3263
8	5	20	15	587.32	1.8863
9	3	14	15	303.4	1.3204
10	39	175	50	92.62	1.4854
11	39	175	50	92.62	1.4854
12	30	156	50	74.87	1.3242
13	20	131	40	160.62	1.7374
14	10	97	40	92.08	1.2865
15	9	30	20	306.53	1.5915
16	7	25	20	218.7	1.3263
17	5	20	15	587.32	1.8863
18	3	14	15	303.4	1.3204

Pipe dimention (without pressure storage tank)

Section	Fixture unit	Q(l/minutes)	D(mm)	R(mm/m)	V(m/s)
1	39	175	50	92.62	1.4854
2	39	175	50	92.62	1.4854
3	30	156	50	74.87	1.3242
4	20	131	40	160.62	1.7374
5	10	97	40	92.08	1.2865
6	9	30	20	306.53	1.5915
7	7	25	20	218.7	1.3263
8	5	20	15	587.32	1.8863
9	3	14	15	303.4	1.3204



Gambar kasus 2 perencanaan sistem penyediaan air bersih

Kantor/5lt/tptkn/noneknm
****
ESPIPE BASIC\OUT PUT PROJECT
****

General Data :
Many floor = 5
Number of people each floor = 100
Water usage rate in a day = 100 m3/hour
Usage hour in a day = 8hour

Equipment Data :
Water needed for fire protection = 0.4 m3/hour
Capasity of public water source pipe = 5 m3/hour
Elevation of input roof tank pipe = 29.5 meters
friction loss in head factor = 20 (per hundred potential high)
Motor pump spesification ratio = 0.2
Pump efficiency = 80 %
Minutes of peak flow demands = 30
Minutes of filler pump operation = 10
Elevation of water rate level = 0 meters
Elevation of highest fixture plumbing = 0 meters
Length of pipe from roof tank out put to highest fixture = 0 meters
Distribution system ratio = 20
Many floor using pressure storage tank = 1 floor

Pipe Data :
With pressure storage tank :
Section of pipe = 0 section
Down feed rises section of pipe = 0 section
Without pressure stoage tank :
Section of pipe = 45section
Down feed rises section of pipe = 5 section
Velocity factor for pipe materials = 100

Out Put Tank Dimention:
Maximum total demand flow per hour = 15 m3/hour
Maximum total demand flow per minutes = 0.375 m3/minutes
Volume of ground tank = 68 m3
Volume of roof tank = 6.25 m3
Roof tank pump motor power = 4.06 kW
Volume of pressure storage tank = (none) m3
Pressure used for pressure tank = (none) Kg/cm2

Elevation of each floor

Floor	Elv.(m)	Fixture Elv.(m)
1	14	14.7
2	10.5	11.2
3	7	7.7
4	3.5	4.2
5	0	0.7

Input pipe system (with pressure storage tank per section)

Section	Length(m)	Fixture unit	Q(l/minutes)

Input pipe system (without pressure storage tank per section)

Section	Length(m)	Fixture unit	Q(l/minutes)
1	13.5	195	352
2	4.3	39	175
3	3	30	156
4	0.9	20	131
5	2.4	10	97
6	5	9	92
7	0.8	7	83
8	0.8	5	72
9	6.4	3	57
10	3.5	152	316
11	4.3	39	175
12	3	30	156
13	0.9	20	131
14	2.4	10	97

15	5	9	92
16	0.8	7	83
17	0.8	5	72
18	6.4	3	57
19	3.5	117	282
20	4.3	39	175
21	3	30	156
22	0.9	20	131
23	2.4	10	97
24	5	9	92
25	0.8	7	83
26	0.8	5	72
27	6.4	3	57
28	3.5	78	236
29	4.3	39	175
30	3	30	156
31	0.9	20	131
32	2.4	10	97
33	5	9	92
34	0.8	7	83
35	0.8	5	72
36	6.4	3	57
37	5.5	39	175
38	2.3	39	175
39	3	30	156
40	0.9	20	131
41	2.4	10	97
42	5	9	92
43	0.8	7	83
44	0.8	5	72
45	6.4	3	57

Pipe dimention (with pressure storage tank)

Section	Fixture unit	Q(l/minutes)	D(mm)	R(mm/m)	V(m/s)

Pipe dimention (without pressure storage tank)

Section	Fixture unit	Q(l/minutes)	D(mm)	R(mm/m)	V(m/s)
1	195	352	65	94.1504	1.768
2	39	175	50	92.6239	1.4854
3	30	156	50	74.8671	1.3242
4	20	131	40	160.6236	1.7374
5	10	97	40	92.0754	1.2865
6	9	92	32	247.4961	1.9065
7	7	83	32	204.5373	1.72
8	5	72	32	157.1914	1.4921
9	3	57	25	339.3881	1.9353
10	152	316	65	77.0997	1.5872
11	39	175	50	92.6239	1.4854
12	30	156	50	74.8671	1.3242
13	20	131	40	160.6236	1.7374
14	10	97	40	92.0754	1.2865
15	9	92	32	247.4961	1.9065
16	7	83	32	204.5373	1.72
17	5	72	32	157.1914	1.4921
18	3	57	25	339.3881	1.9353
19	117	282	65	62.4455	1.4164
20	39	175	50	92.6239	1.4854
21	30	156	50	74.8671	1.3242
22	20	131	40	160.6236	1.7374
23	10	97	40	92.0754	1.2865
24	9	92	32	247.4961	1.9065
25	7	83	32	204.5373	1.72
26	5	72	32	157.1914	1.4921
27	3	57	25	339.3881	1.9353
28	78	236	65	44.9039	1.1853
29	39	175	50	92.6239	1.4854
30	30	156	50	74.8671	1.3242
31	20	131	40	160.6236	1.7374
32	10	97	40	92.0754	1.2865
33	9	92	32	247.4961	1.9065
34	7	83	32	204.5373	1.72

35	5	72	32	157.1914	1.4921
36	3	57	25	339.3881	1.9353
37	39	175	50	92.6239	1.4854
38	39	175	50	92.6239	1.4854
39	30	156	50	74.8671	1.3242
40	20	131	40	160.6236	1.7374
41	10	97	40	92.0754	1.2865
42	9	92	32	247.4961	1.9065
43	7	83	32	204.5373	1.72
44	5	72	32	157.1914	1.4921
45	3	57	25	339.3881	1.9353

Kantor/5lt/tptkn/ekonm
****
ESPIPE BASIC\OUT PUT PROJECT
****

General Data :
Many floor = 5
Number of people each floor = 100
Water usage rate in a day = 100 m3/hour
Usage hour in a day = 8hour

Equipment Data :
Water needed for fire protection = 0.4 m3/hour
Capasity of public water source pipe = 5 m3/hour
Elevation of input roof tank pipe = 29.5 meters
friction loss in head factor = 20 (per hundred potential high)
Motor pump spesification ratio = 0.2
Pump efficiency = 80 %
Minutes of peak flow demands = 30
Minutes of filler pump operation = 10
Elevation of water rate level = 0 meters
Elevation of highest fixture plumbing = 0 meters
Length of pipe from roof tank out put to highest fixture = 0 meters
Distribution system ratio = 20
Many floor using pressure storage tank = 1 floor

Pipe Data :
With pressure storage tank :
Section of pipe = 0 section
Down feed rises section of pipe = 0 section
Without pressure stoage tank :
Section of pipe = 45section
Down feed rises section of pipe = 5 section
Velocity factor for pipe materials = 100

Out Put Tank Dimention:
Maximum total demand flow per hour = 15 m3/hour
Maximum total demand flow per minutes = 0.375 m3/minutes
Volume of ground tank = 68 m3
Volume of roof tank = 6.25 m3
Roof tank pump motor power = 4.06 kW
Volume of pressure storage tank = (none) m3
Pressure used for pressure tank = (none) Kg/cm2

Elevation of each floor

Floor	Elv.(m)	Fixture Elv.(m)
1	14	14.7
2	10.5	11.2
3	7	7.7
4	3.5	4.2
5	0	0.7

Input pipe system (with pressure storage tank per section)

Section	Length(m)	Fixture unit	Q(l/minutes)

Input pipe system (without pressure storage tank per section)

Section	Length(m)	Fixture unit	Q(l/minutes)
1	13.5	195	352
2	4.3	39	175
3	3	30	156
4	0.9	20	131
5	2.4	10	97
6	5	9	30
7	0.8	7	25
8	0.8	5	20
9	6.4	3	14
10	3.5	156	319
11	4.3	39	175
12	3	30	156
13	0.9	20	131
14	2.4	10	97

15	5	9	30
16	0.8	7	25
17	0.8	5	20
18	6.4	3	14
19	3.5	117	282
20	4.3	39	175
21	3	30	156
22	0.9	20	131
23	2.4	10	97
24	5	9	30
25	0.8	7	25
26	0.8	5	20
27	6.4	3	14
28	3.5	78	236
29	4.3	39	175
30	3	30	156
31	0.9	20	131
32	2.4	10	97
33	5	9	30
34	0.8	7	25
35	0.8	5	20
36	6.4	3	14
37	5.5	39	175
38	2.3	39	175
39	3	30	156
40	0.9	20	131
41	2.4	10	97
42	5	9	30
43	0.8	7	25
44	0.8	5	20
45	6.4	3	14

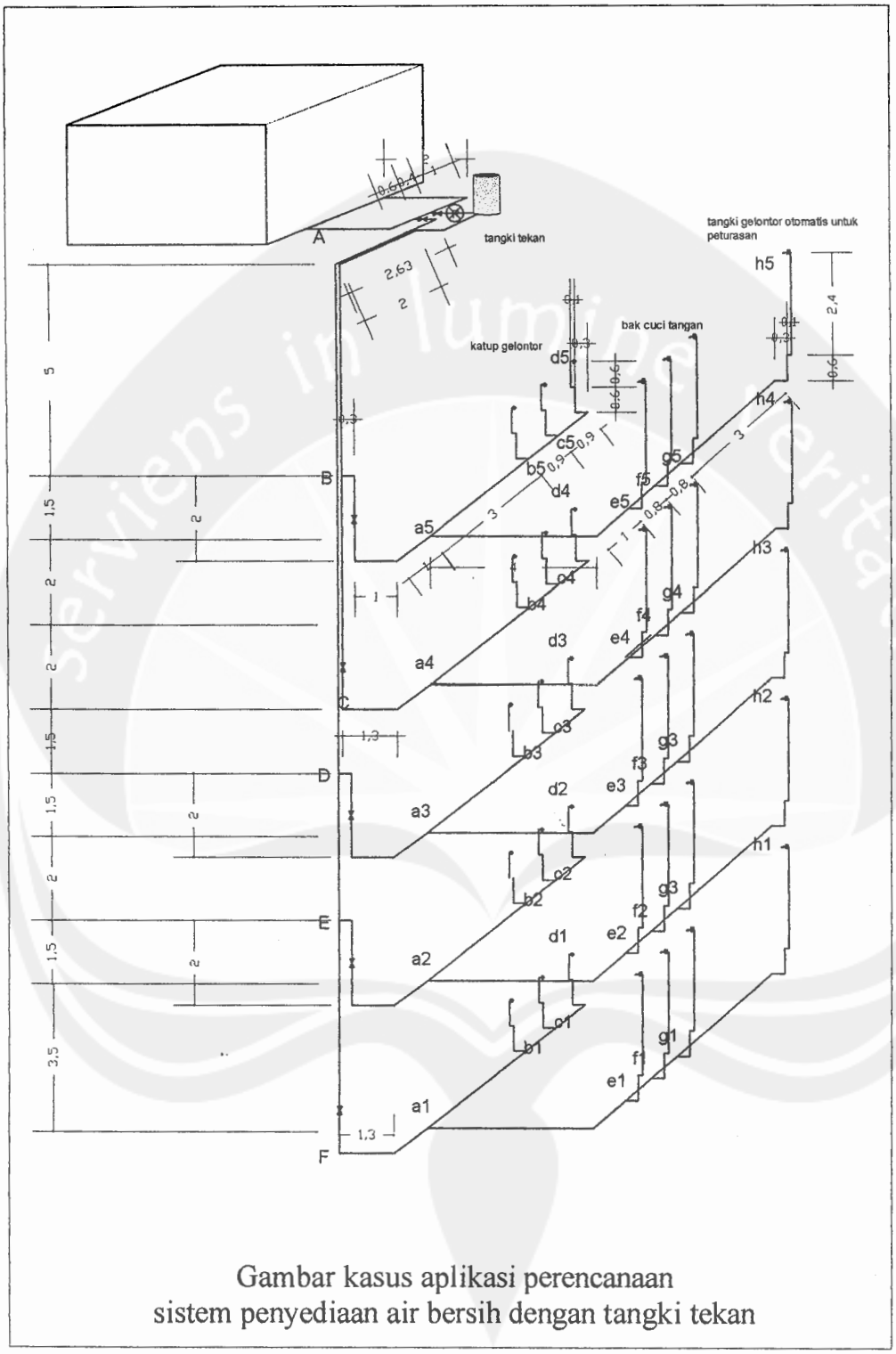
Pipe dimention (with pressure storage tank)

Section	Fixture unit	Q(l/minutes)	D(mm)	R(mm/m)	V(m/s)

Pipe dimention (without pressure storage tank)

Section	Fixture unit	Q(l/minutes)	D(mm)	R(mm/m)	V(m/s)
1	195	352	65	94.1504	1.768
2	39	175	50	92.6239	1.4854
3	30	156	50	74.8671	1.3242
4	20	131	40	160.6236	1.7374
5	10	97	40	92.0754	1.2865
6	9	30	20	306.5306	1.5915
7	7	25	20	218.6966	1.3263
8	5	20	15	587.3228	1.8863
9	3	14	15	303.4041	1.3204
10	156	319	65	78.4607	1.6022
11	39	175	50	92.6239	1.4854
12	30	156	50	74.8671	1.3242
13	20	131	40	160.6236	1.7374
14	10	97	40	92.0754	1.2865
15	9	30	20	306.5306	1.5915
16	7	25	20	218.6966	1.3263
17	5	20	15	587.3228	1.8863
18	3	14	15	303.4041	1.3204
19	117	282	65	62.4455	1.4164
20	39	175	50	92.6239	1.4854
21	30	156	50	74.8671	1.3242
22	20	131	40	160.6236	1.7374
23	10	97	40	92.0754	1.2865
24	9	30	20	306.5306	1.5915
25	7	25	20	218.6966	1.3263
26	5	20	15	587.3228	1.8863
27	3	14	15	303.4041	1.3204
28	78	236	65	44.9039	1.1853
29	39	175	50	92.6239	1.4854
30	30	156	50	74.8671	1.3242
31	20	131	40	160.6236	1.7374
32	10	97	40	92.0754	1.2865
33	9	30	20	306.5306	1.5915
34	7	25	20	218.6966	1.3263

35	5	20	15	587.3228	1.8863
36	3	14	15	303.4041	1.3204
37	39	175	50	92.6239	1.4854
38	39	175	50	92.6239	1.4854
39	30	156	50	74.8671	1.3242
40	20	131	40	160.6236	1.7374
41	10	97	40	92.0754	1.2865
42	9	30	20	306.5306	1.5915
43	7	25	20	218.6966	1.3263
44	5	20	15	587.3228	1.8863
45	3	14	15	303.4041	1.3204



Gambar kasus aplikasi perencanaan
sistem penyediaan air bersih dengan tangki tekan

Kantor/5lt/tkn/eknm
****
ESPIPE BASIC 6.0\OUT PUT PROJECT
****

General Data :
Many floor = 5
Number of people each floor = 100
Water usage rate in a day = 100 m3/hour
Usage hour in a day = 8hour

Equipment Data :
Water needed for fire protection = 0.4 m3/hour
Capasity of public water source pipe = 5 m3/hour
Elevation of input roof tank pipe = 26 meters
friction loss in head factor = 20 (per hundred potential high)
Motor pump spesification ratio = 0.2
Pump efficiency = 80 %
Minutes of peak flow demands = 30
Minutes of filler pump operation = 10
Elevation of water rate level = 24.5 meters
Elevation of highest fixture plumbing = 14.7 meters
Length of pipe from roof tank out put to highest fixture = 22 meters
Distribution system ratio = 25
Many floor using pressure storage tank = 2 floor

Pipe Data :
With pressure storage tank :
Section of pipe = 18 section
Down feed rises section of pipe = 2 section
Without pressure stoage tank :
Section of pipe = 27section
Down feed rises section of pipe = 3 section
Velocity factor for pipe materials = 100

Out Put Tank Dimention:
Maximum total demand flow per hour = 15 m3/hour
Maximum total demand flow per minutes = 0.375 m3/minutes
Volume of ground tank = 68 m3
Volume of roof tank = 6.25 m3
Roof tank pump motor power = 3.58 kW
Volume of pressure storage tank = 5.25 m3
Pressure used for pressure tank = 1.5 Kg/cm2

Elevation of each floor

Floor	Elv.(m)	Fixture Elv.(m)
1	14	14.7
2	10.5	11.2
3	7	7.7
4	3.5	4.2
5	0	0.7

Input pipe system (with pressure storage tank per section)

Section	Length(m)	Fixture unit	Q(l/minutes)
1	11.3	78	236
2	4.3	39	175
3	3	30	156
4	0.9	20	131
5	2.4	10	97
6	5	9	30
7	0.8	7	25
8	0.8	5	20
9	6.4	3	14
10	5.5	39	175
11	2.3	39	175
12	3	30	156
13	0.9	20	131
14	2.4	10	97
15	5	9	30
16	0.8	7	25
17	0.8	5	20

18	6.4	3	14

Input pipe system (without pressure storage tank per section)

Section	Length(m)	Fixture unit	Q(l/minutes)
1	12	117	282
2	4.3	39	175
3	3	30	156
4	0.9	20	131
5	2.4	10	97
6	5	9	30
7	0.8	7	25
8	0.8	5	20
9	6.4	3	14
10	3.5	78	236
11	4.3	39	175
12	3	30	156
13	0.9	20	131
14	2.4	10	97
15	5	9	30
16	0.8	7	25
17	0.8	5	20
18	6.4	3	14
19	5.5	39	175
20	2.3	39	175
21	3	30	156
22	0.9	20	131
23	2.4	10	97
24	5	9	30
25	0.8	7	25
26	0.8	5	20
27	6.4	3	14

Pipe dimention (with pressure storage tank)

Section	Fixture unit	Q(l/minutes)	D(mm)	R(mm/m)	V(m/s)
1	78	236	65	44.9	1.1853
2	39	175	50	92.62	1.4854
3	30	156	50	74.87	1.3242
4	20	131	40	160.62	1.7374
5	10	97	40	92.08	1.2865
6	9	30	20	306.53	1.5915
7	7	25	20	218.7	1.3263
8	5	20	15	587.32	1.8863
9	3	14	15	303.4	1.3204
10	39	175	50	92.62	1.4854
11	39	175	50	92.62	1.4854
12	30	156	50	74.87	1.3242
13	20	131	40	160.62	1.7374
14	10	97	40	92.08	1.2865
15	9	30	20	306.53	1.5915
16	7	25	20	218.7	1.3263
17	5	20	15	587.32	1.8863
18	3	14	15	303.4	1.3204

Pipe dimention (without pressure storage tank)

Section	Fixture unit	Q(l/minutes)	D(mm)	R(mm/m)	V(m/s)
1	117	282	65	62.45	1.4164
2	39	175	50	92.62	1.4854
3	30	156	50	74.87	1.3242
4	20	131	40	160.62	1.7374
5	10	97	40	92.08	1.2865
6	9	30	20	306.53	1.5915
7	7	25	20	218.7	1.3263
8	5	20	15	587.32	1.8863
9	3	14	15	303.4	1.3204
10	78	236	65	44.9	1.1853
11	39	175	50	92.62	1.4854
12	30	156	50	74.87	1.3242
13	20	131	40	160.62	1.7374
14	10	97	40	92.08	1.2865
15	9	30	20	306.53	1.5915
16	7	25	20	218.7	1.3263

17	5	20	15	587.32	1.8863
18	3	14	15	303.4	1.3204
19	39	175	50	92.62	1.4854
20	39	175	50	92.62	1.4854
21	30	156	50	74.87	1.3242
22	20	131	40	160.62	1.7374
23	10	97	40	92.08	1.2865
24	9	30	20	306.53	1.5915
25	7	25	20	218.7	1.3263
26	5	20	15	587.32	1.8863
27	3	14	15	303.4	1.3204

Listing Program :

```
Form1:
Private Sub Form_Click()
Form1.Hide
Form2.Show
End Sub

Private Sub Form_Load()
Form1.Show
Form2.Hide
Form3.Hide
Form4.Hide
End Sub

Private Sub Label1_Click()
Form1.Hide
Form2.Show
End Sub

Private Sub Label2_Click()
Form1.Hide
Form2.Show
End Sub

Private Sub Label3_Click()
Form1.Hide
Form2.Show
End Sub

Private Sub Label4_Click()
Form1.Hide
Form2.Show
End Sub

Private Sub Label5_Click()
Form1.Hide
Form2.Show
End Sub

Private Sub Picture1_Click()
Form1.Hide
Form2.Show
End Sub

Form2 :
Dim nomorfile As Integer
Const phi = 3.14159265358979
Private Sub About_Click()
Form6.Show
End Sub

Private Sub Combo1_Click()
'FUNGSI BANGUNAN UNTUK MENCARI KEBUTUHAN MAXIMUM
If Combo1 = Combo1.List(0) Then
Text3.Text = 250
ElseIf Combo1 = Combo1.List(1) Then
Text3.Text = 200
ElseIf Combo1 = Combo1.List(2) Then
Text3.Text = 250
ElseIf Combo1 = Combo1.List(3) Then
Text3.Text = 120
ElseIf Combo1 = Combo1.List(4) Then
Text3.Text = 1500
ElseIf Combo1 = Combo1.List(5) Then
Text3.Text = 1000
ElseIf Combo1 = Combo1.List(6) Then
Text3.Text = 500
ElseIf Combo1 = Combo1.List(7) Then
Text3.Text = 100
ElseIf Combo1 = Combo1.List(8) Then
```

```
Text3.Text = 200
ElseIf Combo1 = Combo1.List(9) Then
Text3.Text = 100
ElseIf Combo1 = Combo1.List(10) Then
Text3.Text = 3
ElseIf Combo1 = Combo1.List(11) Then
Text3.Text = 100
ElseIf Combo1 = Combo1.List(12) Then
Text3.Text = 3
ElseIf Combo1 = Combo1.List(13) Then
Text3.Text = 110
ElseIf Combo1 = Combo1.List(14) Then
Text3.Text = 30
ElseIf Combo1 = Combo1.List(15) Then
Text3.Text = 10
ElseIf Combo1 = Combo1.List(16) Then
Text3.Text = 40
ElseIf Combo1 = Combo1.List(17) Then
Text3.Text = 300
ElseIf Combo1 = Combo1.List(18) Then
Text3.Text = 10
ElseIf Combo1 = Combo1.List(19) Then
Text3.Text = 25
ElseIf Combo1 = Combo1.List(20) Then
Text3.Text = 30
ElseIf Combo1 = Combo1.List(21) Then
Text3.Text = 30
ElseIf Combo1 = Combo1.List(22) Then
Text3.Text = 350
ElseIf Combo1 = Combo1.List(23) Then
Text3.Text = 200
ElseIf Combo1 = Combo1.List(24) Then
Text3.Text = 200
End If
End Sub

Private Sub Combo2_Click()
Dim jlt, hum, qbut, jam, qh
'MENCARI KPD
If Combo2 = Combo2.List(0) Then
If Text1.Text = "" Or Text2.Text = "" Or Text3.Text = "" Or Text4.Text = "" Then
Combo2.Text = "(none)"
Text8.Text = ""
Pesan = MsgBox("Input general data not complete", vbCritical, "WARNING !")
Text1.SetFocus
Else:
jlt = Text1.Text
hum = Text2.Text
qbut = Text3.Text
jam = Text4.Text
qh = 1.2 * qbut * hum * jlt / (1000 * jam)
Text8.Text = 2 * qh / 3
End If
Label13.Enabled = False
Label14.Enabled = False
Text8.Text = 2 * qh / 3
Text8.Enabled = False
ElseIf Combo2 = Combo2.List(1) Then
Label13.Enabled = True
Label14.Enabled = True
Text8.Enabled = True
Text8.Text = ""
Text8.SetFocus
End If
End Sub

Sub Combo3_Click()
If Combo3 = Combo3.List(0) Then
'MENGHITUNG DAYA POMPA
Text7.Enabled = True
```

```
Text10.Enabled = True
Text12.Enabled = True
Text18.Enabled = True
HScroll1.Enabled = True
Combo4.Enabled = True
Label11.Enabled = True
Label12.Enabled = True
Label22.Enabled = True
Label23.Enabled = True
Label24.Enabled = True
Label25.Enabled = True
Text7.Text = ""
Text10.Text = HScroll1.Min
Text12.Text = ""
Text18.Text = ""
ElseIf Combo3 = Combo3.List(1) Then
'TIDAK MENGHITUNG DAYA POMPA
Text7.Enabled = False
Text10.Enabled = False
Text12.Enabled = False
Text18.Enabled = False
HScroll1.Enabled = False
Combo4.Enabled = False
Label11.Enabled = False
Label12.Enabled = False
Label22.Enabled = False
Label23.Enabled = False
Label24.Enabled = False
Label25.Enabled = False
Text7.Text = 0
Text10.Text = HScroll1.Min
Text12.Text = 0
Text18.Text = 0
End If
End Sub

Private Sub Combo4_Click()
'PILIHAN MOTOR POMPA
If Combo4 = Combo4.List(0) Then Text12.Text = 0.2
If Combo4 = Combo4.List(1) Then Text12.Text = 0.2
If Combo4 = Combo4.List(2) Then Text12.Text = 0.25
End Sub

Private Sub Combo5_Click()
If Combo5 = Combo5.List(0) Then
'JIKA MEMAKAI TANGKI TEKAN
Label31.Enabled = True
Label32.Enabled = True
Label33.Enabled = True
Label34.Enabled = True
Label35.Enabled = True
Label36.Enabled = True
Label37.Enabled = True
Label38.Enabled = True
Label39.Enabled = True
Label46.Enabled = True
Label40.Enabled = True
Label43.Enabled = True
Label44.Enabled = True
Label45.Enabled = True
Text9.Enabled = True
Text16.Enabled = True
Text15.Enabled = True
Text17.Enabled = True
Text20.Enabled = True
Text21.Enabled = True
Option1.Enabled = True
Option2.Enabled = True
Option1.Value = True
Form3.MSFlexGrid1(0).Enabled = True
```

```
Form3.Command1.Enabled = True
Form3.Option1.Enabled = True
Form3.Text4.Visible = False
Form4.MSFlexGrid1.Enabled = True
Form4.Text8.Visible = False
ElseIf Combo5 = Combo5.List(1) Then

'TIDAK PAKAI TANGKI TEKAN
Label31.Enabled = False
Label32.Enabled = False
Label33.Enabled = False
Label34.Enabled = False
Label35.Enabled = False
Label36.Enabled = False
Label37.Enabled = False
Label38.Enabled = False
Label39.Enabled = False
Label46.Enabled = False
Label40.Enabled = False
Label43.Enabled = False
Label44.Enabled = False
Label45.Enabled = False
Text9.Enabled = False
Text16.Enabled = False
Text15.Enabled = False
Text17.Enabled = False
Text20.Enabled = False
Text21.Enabled = False
Option1.Enabled = False
Option2.Enabled = False
Option1.Value = True
Text9.Text = 0
Text16.Text = 0
Text15.Text = 0
Text17.Text = HScroll3.Min
Text20.Text = 0
Text21.Text = 0
Form3.MSFlexGrid1(0).Enabled = False
Form3.Command1.Enabled = False
Form3.Option1.Enabled = False
Form3.Text4.Visible = True
Form4.MSFlexGrid1.Enabled = False
Form4.Text8.Visible = True
End If
End Sub

Private Sub Combo6_Click()
'PILIHAN PEMAKAIAN HYDRANT
If Combo6 = Combo6.List(0) Then
Text5.Text = 0.4
Else: Text5.Text = 0
End If
End Sub


Private Sub Combo7_Click()
'KOEFISIEN KECEPATAN BERDASARKAN MATERIAL PIPA
With Form2
If .Combo7 = .Combo7.List(0) Then
.Text25.Text = 140
.Text24.Text = "Kind of new pipe : red brass pipe, galvanized iron, black lead pipe,
mild steel, cooper, stainless steel, weld-steel, steel with cement wall, cement."
ElseIf .Combo7 = .Combo7.List(1) Then
.Text25.Text = 130
.Text24.Text = "Kind of new steel pipe, new iron pipe, old cooper pipe, old blak lead
pipe, old red brass pipe, plastic pipe (PVC,PE, and ABS)."
ElseIf .Combo7 = .Combo7.List(2) Then
.Text25.Text = 110
.Text24.Text = "Kind of old pipe with cement wall."
ElseIf .Combo7 = .Combo7.List(3) Then
```

```
.Text25.Text = 100
.Text24.Text = "Kind of old galvanized iron and steel pipe."
End If
End With
End Sub

Private Sub Command1_Click()
'PINDAH FORM PIPA
If Form2.Text20.Text = "" Or Form2.Text21.Text = "" Or Form2.Text22.Text = "" Or
Form2.Text23.Text = "" Then
Pesan = MsgBox("Input section pipe not complete", vbCritical, "WARNING !")
Else:
Form2.Hide
Form3.Show
End If
End Sub

Private Sub Command2_Click()
Dim jlt As Integer, ejl As Single
Dim elt(1000000#), efl(1000000#)
'MEMASUKKAN DATA ELEVASI LANTAI DAN ALAT PLUMBING
If Form2.Text1.Text = "" Then
Pesan = MsgBox("Many floor data is empty.", vbCritical, "WARNING !")
Else:
jlt = Form2.Text1.Text
For ejl = 1 To jlt
    elt(ejl) = InputBox("Elevation of floor number [" & ejl & "]", "Floor Elevation")
    efl(ejl) = InputBox("Elevation of highest fixture in floor number [" & ejl & "]",
"Fixture Elevation")
   With MSFlexGrid1
    .TextMatrix(ejl, 0) = ejl
    .TextMatrix(ejl, 1) = elt(ejl)
    .TextMatrix(ejl, 2) = efl(ejl)
    .Rows = jlt + 1
    End With
    With Form4.MSFlexGrid3
    .TextMatrix(ejl, 0) = ejl
    .TextMatrix(ejl, 1) = elt(ejl)
    .TextMatrix(ejl, 2) = efl(ejl)
    .Rows = jlt + 1
    End With
Next ejl
End If
End Sub

Private Sub Command3_Click()
Form2.Picture1.Visible = False
Form2.Command3.Visible = False
Form2.Picture2.Visible = True
Form2.Command4.Visible = True
Form2.Picture3.Visible = False
Form2.Command5.Visible = False
End Sub

Private Sub Command4_Click()
Form2.Picture1.Visible = False
Form2.Command3.Visible = False
Form2.Picture2.Visible = False
Form2.Command4.Visible = False
Form2.Picture3.Visible = True
Form2.Command5.Visible = True
End Sub

Private Sub Command5_Click()
Form2.Picture1.Visible = True
Form2.Command3.Visible = True
Form2.Picture2.Visible = False
Form2.Command4.Visible = False
Form2.Picture3.Visible = False
Form2.Command5.Visible = False
```

```
End Sub

Private Sub Exit_Click()
End
End Sub

Private Sub Form_Activate()
Text1.SetFocus
SSTab1.Tab = 0
SSTab2.Tab = 0
End Sub

Private Sub Form_Load()
With Form2
.Option1.Value = True
.Text1.Text = ""
.Text2.Text = ""
.Text3.Text = ""
.Text4.Text = ""
.Text5.Text = ""
.Text7.Text = ""
.Text8.Text = ""
.Text9.Text = ""
.Text10.Text = HScroll1.Min
.Text12.Text = ""
.Text13.Text = 30
.Text14.Text = HScroll2.Min
.Text15.Text = ""
.Text16.Text = ""
.Text17.Text = HScroll3.Min
.Text18.Text = ""
.Text20.Text = ""
.Text21.Text = ""
.Text22.Text = ""
.Text23.Text = ""
.Text24.Text = ""
.HScroll1.Value = HScroll1.Min
.HScroll2.Value = HScroll2.Min
.HScroll3.Value = HScroll3.Min
.Combo1.Text = "(none)"
.Combo2.Text = "(none)"
.Combo3.Text = "(none)"
.Combo4.Text = "(none)"
.Combo5.Text = "(none)"
.Combo6.Text = "(none)"
.Combo7.Text = "(none)"
.MSFlexGrid1.TextMatrix(0, 0) = "Floor Number"
.MSFlexGrid1.TextMatrix(0, 1) = "Floor Elevation (m)"
.MSFlexGrid1.TextMatrix(0, 2) = "Highest Fixture Elevation (m)"
.MSFlexGrid1.ColWidth(0) = 1300
.MSFlexGrid1.ColWidth(1) = 1700
.MSFlexGrid1.ColWidth(2) = 2200
.MSFlexGrid1.ColAlignment(-1) = 4
.Picture1.Visible = True
.Command3.Visible = True
.Picture2.Visible = False
.Command4.Visible = False
.Picture3.Visible = False
.Command5.Visible = False
End With
End Sub

Private Sub HScroll1_Change()
Text10.Text = HScroll1.Value
End Sub

Private Sub HScroll2_Change()
Text14.Text = HScroll2.Value
End Sub
```

```
Private Sub HScroll3_Change()
Text17.Text = HScroll3.Value
End Sub

Private Sub Htopic_Click()
Form5.Show
End Sub

Private Sub New_Click()
With Form2
.MSFlexGrid1.Clear
.MSFlexGrid1.TextMatrix(0, 0) = "Floor Number"
.MSFlexGrid1.TextMatrix(0, 1) = "Floor Elevation (m)"
.MSFlexGrid1.TextMatrix(0, 2) = "Highest Fixture Elevation (m)"
.MSFlexGrid1.ColWidth(0) = 1300
.MSFlexGrid1.ColWidth(1) = 1700
.MSFlexGrid1.ColWidth(2) = 2200
.MSFlexGrid1.ColAlignment(-1) = 4
.MSFlexGrid1.Rows = 2
.Option1.Value = True
.Text1.Text = ""
.Text2.Text = ""
.Text3.Text = ""
.Text4.Text = ""
.Text5.Text = ""
.Text7.Text = ""
.Text8.Text = ""
.Text9.Text = ""
.Text10.Text = HScroll1.Min
.Text12.Text = ""
.Text13.Text = 30
.Text14.Text = HScroll2.Min
.Text15.Text = ""
.Text16.Text = ""
.Text17.Text = HScroll3.Min
.Text18.Text = ""
.Text20.Text = ""
.Text21.Text = ""
.Text22.Text = ""
.Text23.Text = ""
.Text25.Text = ""
.Text24.Text = ""
.HScroll1.Value = HScroll1.Min
.HScroll2.Value = HScroll2.Min
.HScroll3.Value = HScroll3.Min
.Combo1.Text = "(none)"
.Combo2.Text = "(none)"
.Combo3.Text = "(none)"
.Combo4.Text = "(none)"
.Combo5.Text = "(none)"
.Combo6.Text = "(none)"
.Text1.SetFocus
.Save.Enabled = True
End With
Form3.Text5.Text = ""
With Form3.MSFlexGrid1(0)
.Clear
.TextMatrix(0, 0) = "Pipe Section"
.TextMatrix(0, 1) = "Length (m)"
.TextMatrix(0, 2) = "Fixture Unit"
.TextMatrix(0, 3) = "Flow Demand (liter/minutes)"
.ColWidth(0) = 1300
.ColWidth(1) = 1000
.ColWidth(2) = 1300
.ColWidth(3) = 2200
.ColAlignment(-1) = 4
.Rows = 2
End With
With Form3.MSFlexGrid1(1)
.Clear
```

```
.TextMatrix(0, 0) = "Pipe Section"
.TextMatrix(0, 1) = "Length (m)"
.TextMatrix(0, 2) = "Fixture Unit"
.TextMatrix(0, 3) = "Flow Demand (liter/minutes)"
.ColWidth(0) = 1300
.ColWidth(1) = 1000
.ColWidth(2) = 1300
.ColWidth(3) = 2200
.ColAlignment(-1) = 4
.Rows = 2
End With

With Form3.MSFlexGrid2
.Clear
.TextMatrix(0, 0) = "Fixture"
.TextMatrix(0, 1) = "Occupancy"
.TextMatrix(0, 2) = "Supply Controller"
.TextMatrix(0, 3) = "Fixture Unit"
.TextMatrix(0, 4) = "Many Fixture"
.TextMatrix(0, 5) = "Total Fixture Unit"
.ColWidth(0) = 1500
.ColWidth(1) = 1120
.ColWidth(2) = 2000
.ColWidth(3) = 1200
.ColWidth(4) = 1200
.ColWidth(5) = 1600
.ColAlignment(-1) = 4
.Rows = 2
End With
With Form4.MSFlexGrid1
.Clear
.TextMatrix(0, 0) = "Pipe Section"
.TextMatrix(0, 1) = "Fixture Unit"
.TextMatrix(0, 2) = "Flow Demand (liter/minutes)"
.TextMatrix(0, 3) = "Diameter (mm)"
.TextMatrix(0, 4) = "R (mm/m)"
.TextMatrix(0, 5) = "Velocity (m/s)"
.ColWidth(0) = 1300
.ColWidth(1) = 1300
.ColWidth(2) = 2000
.ColWidth(3) = 1500
.ColWidth(4) = 1000
.ColWidth(5) = 1500
.ColAlignment(-1) = 4
.Width = .ColWidth(0) + .ColWidth(1) + .ColWidth(2) + .ColWidth(3) + .ColWidth(4) +
.ColWidth(5) + 100
.Rows = 2
End With
With Form4.MSFlexGrid2
.Clear
.TextMatrix(0, 0) = "Pipe Section"
.TextMatrix(0, 1) = "Fixture Unit"
.TextMatrix(0, 2) = "Flow Demand (liter/minutes)"
.TextMatrix(0, 3) = "Diameter (mm)"
.TextMatrix(0, 4) = "R (mm/m)"
.TextMatrix(0, 5) = "Velocity (m/s)"
.ColWidth(0) = 1300
.ColWidth(1) = 1300
.ColWidth(2) = 2000
.ColWidth(3) = 1500
.ColWidth(4) = 1000
.ColWidth(5) = 1500
.ColAlignment(-1) = 4
.Width = .ColWidth(0) + .ColWidth(1) + .ColWidth(2) + .ColWidth(3) + .ColWidth(4) +
.ColWidth(5) + 100
.Rows = 2
End With
With Form4.MSFlexGrid3
.Clear
.TextMatrix(0, 0) = "Floor Number"
```

```
.TextMatrix(0, 1) = "Floor Elevation (m)"
.TextMatrix(0, 2) = "Highest Fixture Elevation (m)"
.ColWidth(0) = 1300
.ColWidth(1) = 1700
.ColWidth(2) = 2200
.ColAlignment(-1) = 4
.Rows = 2
End With
End Sub

Private Sub Open_Click()
Form2.Save.Enabled = False
Form4.Command2.Enabled = False
buka
Form2.New.Enabled = True
End Sub

Sub buka()
'BUKA FILE TXT
On Error GoTo other1
dlgfile.Filter = "Text Document (*.txt)| *.txt"
dlgfile.DialogTitle = "Open File..."
dlgfile.ShowOpen
nomorfile = FreeFile
Open dlgfile.FileName For Input As #nomorfile
sdata
Close #nomorfile
Form2.Caption = "ESPIPE BASIC 6.0  " + dlgfile.FileName
other1:
Form2.Show
End Sub

Sub sdata()
'general
Input #nomorfile, jlt, hum, qbut, jam
    Form2.Text1.Text = jlt              'jmlh lantai
    Form2.Text2.Text = hum              'jml orang
    Form2.Text3.Text = qbut             'q kebutuhan
    Form2.Text4.Text = jam              'jam per hari
'groundtank
Input #nomorfile, Vf, kpd
    Form2.Text5.Text = Vf               'vol kebakaran
    Form2.Text8.Text = kpd              'kapasitas pipa dinas
'pump
Input #nomorfile, epi, hf, mf, ef
    Form2.Text7.Text = epi              'elv pipa output rooftank
    Form2.Text10.Text = hf              'head factor
    Form2.Text12.Text = mf              'motor factor
    Form2.Text18.Text = ef              'efs. pompa
'rooftank
Input #nomorfile, tp, tpu
    Form2.Text13.Text = tp              'menit puncak
    Form2.Text14.Text = tpu             'menit operasi pompa
'tangki tekan
Input #nomorfile, ewr, ehf, pjp, sr, Presfloor
    Form2.Text9.Text = ewr              'elv m.a. rata
    Form2.Text15.Text = ehf             'elv higest plumb or flush valve
    Form2.Text16.Text = pjp             'pjg bentang pipa dari out put tank sampai
alat plumb
    Form2.Text17.Text = sr              'system ratio
    Form2.Text19.Text = Presfloor       'jum area
'dengan presure
Input #nomorfile, jspp, jsip, jsp, jsi, c
    Form2.Text20.Text = jspp            'jum section pipa
    Form2.Text21.Text = jsip            'jum induk section
'tanpa
    Form2.Text22.Text = jsp             'jum section pipa
    Form2.Text23.Text = jsi             'jum induk pipa
'umum pipa
    Form2.Text25.Text = c               'ratio kecepatan akibat bahan pipa
```

```
'tabel elv
Form2.Text1.Text = jlt
For elv1 = 1 To jlt
    Input #nomorfile, ejl1, elt1, efl1

      Form2.MSFlexGrid1.TextMatrix(elv1, 0) = ejl1      'lantai
      Form2.MSFlexGrid1.TextMatrix(elv1, 1) = elt1      'elv
      Form2.MSFlexGrid1.TextMatrix(elv1, 2) = efl1      'alv fixture hi
      Form2.MSFlexGrid1.Rows = jlt + 1
Next elv1
For elv2 = 1 To jlt
    Input #nomorfile, ejl2, elt2, efl2

      Form4.MSFlexGrid3.TextMatrix(elv2, 0) = ejl2
      Form4.MSFlexGrid3.TextMatrix(elv2, 1) = elt2
      Form4.MSFlexGrid3.TextMatrix(elv2, 2) = efl2
      Form4.MSFlexGrid3.Rows = jlt + 1
Next elv2
'tabel pipa dg pres
jspp = Form2.Text20.Text
For pres1 = 1 To jspp
    Input #nomorfile, spt1, panjangt1, fixt1, flowt1

      Form3.MSFlexGrid1(0).TextMatrix(pres1, 0) = spt1
      Form3.MSFlexGrid1(0).TextMatrix(pres1, 1) = panjangt1
      Form3.MSFlexGrid1(0).TextMatrix(pres1, 2) = fixt1
      Form3.MSFlexGrid1(0).TextMatrix(pres1, 3) = flowt1
      Form3.MSFlexGrid1(0).Rows = jspp + 1
Next pres1

For pres2 = 1 To jspp
    Input #nomorfile, spt2, fixt2, flowt2

        Form4.MSFlexGrid1.TextMatrix(pres2, 0) = spt2
        Form4.MSFlexGrid1.TextMatrix(pres2, 1) = fixt2
        Form4.MSFlexGrid1.TextMatrix(pres2, 2) = flowt2
        Form4.MSFlexGrid1.Rows = jspp + 1
Next pres2
'tabel pipa tanpa pres
jsp = Form2.Text22.Text
For tpres1 = 1 To jsp
    Input #nomorfile, spb1, panjangb1, fixb1, flowb1
      Form3.MSFlexGrid1(1).TextMatrix(tpres1, 0) = spb1
      Form3.MSFlexGrid1(1).TextMatrix(tpres1, 1) = panjangb1
      Form3.MSFlexGrid1(1).TextMatrix(tpres1, 2) = fixb1
      Form3.MSFlexGrid1(1).TextMatrix(tpres1, 3) = flowb1
      Form3.MSFlexGrid1(1).Rows = jsp + 1
Next tpres1
For tpres2 = 1 To jsp
    Input #nomorfile, spb2, fixb2, flowb2
        Form4.MSFlexGrid2.TextMatrix(tpres2, 0) = spb2
        Form4.MSFlexGrid2.TextMatrix(tpres2, 1) = fixb2
        Form4.MSFlexGrid2.TextMatrix(tpres2, 2) = flowb2
        Form4.MSFlexGrid2.Rows = jsp + 1
Next tpres2
'tabel fixture
Input #nomorfile, jlf
Form3.Text5.Text = jlf
For fiks = 1 To jlf
    Input #nomorfile, kind$, occ$, supl$, bebanunit, jumlahfu, tot
      Form3.MSFlexGrid2.TextMatrix(fiks, 0) = kind$
      Form3.MSFlexGrid2.TextMatrix(fiks, 1) = occ$
      Form3.MSFlexGrid2.TextMatrix(fiks, 2) = supl$
      Form3.MSFlexGrid2.TextMatrix(fiks, 3) = bebanunit
      Form3.MSFlexGrid2.TextMatrix(fiks, 4) = jumlahfu
      Form3.MSFlexGrid2.TextMatrix(fiks, 5) = tot
      Form3.MSFlexGrid2.Rows = jlf + 1
Next fiks
If Val(Text5.Text) = 0.4 Then
Combo6.Text = Combo6.List(0)
```

```
Else: Combo6.Text = Combo6.List(1)
End If
If Val(Text8.Text) = 0 Then
Combo2.Text = "(none)"
Text8.Enabled = False
Else: Combo2.Text = Combo2.List(1)
End If
If Val(Text7.Text) = 0 Then
'TIDAK MENGHITUNG DAYA POMPA
Combo3.Text = Combo3.List(1)
Text7.Enabled = False
Text10.Enabled = False
Text12.Enabled = False
Text18.Enabled = False
HScroll1.Enabled = False
Combo4.Enabled = False
Label11.Enabled = False
Label12.Enabled = False
Label22.Enabled = False
Label23.Enabled = False
Label24.Enabled = False
Label25.Enabled = False
Else
'MENGHITUNG DAYA POMPA
Combo3.Text = Combo3.List(0)
Text7.Enabled = True
Text10.Enabled = True
Text12.Enabled = True
Text18.Enabled = True
HScroll1.Enabled = True
Combo4.Enabled = True
Label11.Enabled = True
Label12.Enabled = True
Label22.Enabled = True
Label23.Enabled = True
Label24.Enabled = True
Label25.Enabled = True
End If
If Val(Text12.Text) = 0.2 Then Combo4.Text = Combo4.List(0)
If Val(Text12.Text) = 0.2 Then Combo4.Text = Combo4.List(1)
If Val(Text12.Text) = 0.25 Then Combo4.Text = Combo4.List(2)
If Text16.Text = 0 Then
'TIDAK PAKAI TANGKI TEKAN
Combo5 = Combo5.List(1)
Label31.Enabled = False
Label32.Enabled = False
Label33.Enabled = False
Label34.Enabled = False
Label35.Enabled = False
Label36.Enabled = False
Label37.Enabled = False
Label38.Enabled = False
Label39.Enabled = False
Label46.Enabled = False
Label40.Enabled = False
Label43.Enabled = False
Label44.Enabled = False
Label45.Enabled = False
Text9.Enabled = False
Text16.Enabled = False
Text15.Enabled = False
Text17.Enabled = False
Text20.Enabled = False
Text21.Enabled = False
Option1.Enabled = False
Option2.Enabled = False
Option1.Value = True
Form3.MSFlexGrid1(0).Enabled = False
Form3.Command1.Enabled = False
Form3.Option1.Enabled = False
```

```
Form3.Text4.Visible = True
Form4.MSFlexGrid1.Enabled = False
Form4.Text8.Visible = True
Else
Combo5 = Combo5.List(0)
'JIKA MEMAKAI TANGKI TEKAN
Label31.Enabled = True
Label32.Enabled = True
Label33.Enabled = True
Label34.Enabled = True
Label35.Enabled = True
Label36.Enabled = True
Label37.Enabled = True
Label38.Enabled = True
Label39.Enabled = True
Label46.Enabled = True
Label40.Enabled = True
Label43.Enabled = True
Label44.Enabled = True
Label45.Enabled = True
Text9.Enabled = True
Text16.Enabled = True
Text15.Enabled = True
Text17.Enabled = True
Text20.Enabled = True
Text21.Enabled = True
Option1.Enabled = True
Option2.Enabled = True
Option1.Value = True
Form3.MSFlexGrid1(0).Enabled = True
Form3.Command1.Enabled = True
Form3.Option1.Enabled = True
Form3.Text4.Visible = False
Form4.MSFlexGrid1.Enabled = True
Form4.Text8.Visible = False
End If
If Val(Text25.Text) = 140 Then
Combo7.Text = Combo7.List(0)
Text24.Text = "Kind of new pipe : Cooper, Brass pipe, Galvanized iron, Steel, Steel
with cement wall, Cement."
ElseIf Val(Text25.Text) = 130 Then
Combo7.Text = Combo7.List(1)
Text24.Text = "Kind of new galvanized iron and steel pipe, Hard-PVC pipe."
ElseIf Val(Text25.Text) = 110 Then
Combo7.Text = Combo7.List(2)
Text24.Text = "Kind of old pipe with cement wall."
ElseIf Val(Text25.Text) = 100 Then
Combo7.Text = Combo7.List(3)
Text24.Text = "Kind of old steel pipe."
End If
End Sub

Private Sub Option1_Click()
Form2.Text19.Text = 1
End Sub

Private Sub Option2_Click()
Form2.Text19.Text = 2
End Sub

Private Sub Run_Click()
Dim jlt As Integer, hum As Integer, qbut, jam As Integer, qh As Double, qhmax As
Double, qmmax As Double
Dim kpd, Vf, Vgt As Double, Vgtot As Double
Dim epi As Integer, ep As Single, ha As Double, hfsd As Double, hf, ef As Integer, H
As Double, Nm As Double, mf
Dim tp, tpu, Ve As Double, qp As Double, qm As Double, Vrt As Double
Dim ewr As Integer, ehf As Integer, pjp As Integer, sr, sa, ab As Single, abz, R As
Single, p As Double, pmax As Single, pmin As Single, beda As Single, qlt As Double,
qpres As Double, Vpres As Double
```

```
'JIKA DATA BELUM LENGKAP
With Form2
If .Text1.Text = "" Or .Text2.Text = "" Or .Text3.Text = "" Or .Text4.Text = "" Or
.Text5.Text = "" Or .Text7.Text = "" Or .Text8.Text = "" Or .Text9.Text = "" Or
.Text10.Text = "" Or .Text12.Text = "" Or .Text13.Text = "" Or .Text14.Text = "" Or
.Text15.Text = "" Or .Text16.Text = "" Or .Text17.Text = "" Or .Text18.Text = "" Or
.Text19.Text = "" Or .Text20.Text = "" Or .Text21.Text = "" Or .Text22.Text = "" Or
.Text23.Text = "" Or .MSFlexGrid1.TextMatrix(1, 1) = "" Or
Form3.MSFlexGrid1(1).TextMatrix(1, 2) = "" Then
Pesan = MsgBox("Data not complete.", vbCritical, "WARNING !")
Text1.SetFocus
Else:
Form2.Hide
Form4.Show
jampuncak
groundtank
rooftank
tankitekan
End If
If Val(Text16.Text) <> 0 Then
pipatekan
ElseIf Val(Text16.Text) = 0 Then
pipabiasa
End If
End With
End Sub

Sub jampuncak()
'MENGHITUNG JAM PUNCAK
With Form2
jlt = .Text1.Text                'jmlh lantai
hum = .Text2.Text                'jml orang
qbut = .Text3.Text               'q kebutuhan
jam = .Text4.Text                'jam per hari
End With
qh = 1.2 * qbut * hum * jlt / (1000 * jam)
qhmax = 2 * qh
qmmax = 3 * qh / 60
Form4.Text1.Text = qhmax
Form4.Text2.Text = qmmax
End Sub

Sub groundtank()
'MENGHITUNG VOLUME GROUND TANK
With Form2
jlt = .Text1.Text                'jmlh lantai
hum = .Text2.Text                'jml orang
qbut = .Text3.Text               'q kebutuhan
jam = .Text4.Text                'jam per hari
qh = 1.2 * qbut * hum * jlt / (1000 * jam)
Vf = .Text5.Text
kpd = .Text8.Text
Vgt = (qh * jam) - (kpd * jam)
Vgtot = Vgt + (2 * 60 * Vf)
End With
Form4.Text3.Text = Vgtot
End Sub

Sub rooftank()
'MENGHITUNG VOLUME ROOF TANK
'A. MENGHITUNG POMPA UNTUK MENGISI ROOF TANK

If Form2.Combo3 = Form2.Combo3.List(1) Then
Form4.Text5.Text = "(none)"
ElseIf Form2.Combo3 = Form2.Combo3.List(0) Then
With Form2
jlt = .Text1.Text                'jmlh lantai
hum = .Text2.Text                'jml orang
qbut = .Text3.Text               'q kebutuhan
jam = .Text4.Text                'jam per hari
```

```
qh = 1.2 * qbut * hum * jlt / (1000 * jam)
qhmax = 2 * qh
qmmax = 3 * qh / 60
epi = .Text7.Text   'elv pipa input
hf = .Text10.Text
mf = .Text12.Text
ef = .Text18.Text
hfsd = hf * epi / 100
H = epi + hfsd
Nm = (0.163 * qmmax * H / (0.01 * ef)) * (1 + mf) / (0.01 * ef)
Nm = Round(Nm, 2)
End With
Form4.Text5.Text = Nm
End If

'B. MENGHITUNG VOLUME ROOF TANK
With Form2
jlt = .Text1.Text                'jmlh lantai
hum = .Text2.Text                'jml orang
qbut = .Text3.Text               'q kebutuhan
jam = .Text4.Text                'jam per hari
qh = 1.2 * qbut * hum * jlt / (1000 * jam)
qhmax = 2 * qh
qmmax = 3 * qh / 60
tp = .Text13.Text
tpu = .Text14.Text
qp = qhmax * 1000 / 60
qm = qmmax * 1000
Ve = (((qm - qp) * tp) + (qp * tpu))
Vrt = Ve / 1000
End With
Form4.Text4.Text = Vrt
End Sub

Sub tankitekan()
'MENGHITUNG TANGKI TEKAN
If Form2.Combo5 = Form2.Combo5.List(1) Then
Form4.Text6.Text = "(none)"
Form4.Text7.Text = "(none)"
ElseIf Form2.Combo5 = Form2.Combo5.List(0) Then
With Form2

jlt = .Text1.Text                'jmlh lantai
hum = .Text2.Text                'jml orang
qbut = .Text3.Text               'q kebutuhan
jam = .Text4.Text                'jam per hari
qh = 1.2 * qbut * hum * jlt / (1000 * jam)
qhmax = 2 * qh
qmmax = 3 * qh / 60
tp = .Text13.Text
tpu = .Text14.Text
qp = qhmax * 1000 / 60
qm = qmmax * 1000
Ve = (((qm - qp) * tp) + (qp * tpu))
Vrt = Ve / 1000
tpu = .Text14.Text
ewr = .Text9.Text
ehf = .Text15.Text
pjp = .Text16.Text
sr = .Text17.Text
ab = ewr - ehf - 10
abz = Abs(ab)
R = 1000 * (abz) / (sr * pjp)
p = (R + 10) / 10
beda = 0.5
pmin = 1.5
Do Until beda < 0.5
beda = pmin - p
If beda > 0.5 Then pmin = pmin + 0.5
Loop
```

```
pmax = pmin + 1
sa = .Text19.Text
qlt = 3 * 1.2 * qbut * hum * sa / (60 * jam)
qpres = qlt * tpu
Vpres = (qpres / (1 - ((pmin + 1) / (pmax + 1)))) / 1000
Form4.Text6.Text = Vpres
Form4.Text7.Text = pmin
End With
End If
End Sub
Sub pipatekan()
Dim jspp As Integer, c As Integer, Q(1000000#)
Dim d(1000000#), diam(1000000#), A(1000000#), V(1000000#), R(1000000#)

jspp = Form2.Text20.Text
c = Form2.Text25.Text
For f = 1 To jspp
Q(f) = Form4.MSFlexGrid1.TextMatrix(f, 2)
If Q(f) >= 1 And Q(f) <= 3 Then d(f) = 0.006
If Q(f) >= 4 And Q(f) <= 6 Then d(f) = 0.008
If Q(f) >= 7 And Q(f) <= 9 Then d(f) = 0.01
If Q(f) >= 10 And Q(f) <= 21 Then d(f) = 0.015
If Q(f) >= 22 And Q(f) <= 37 Then d(f) = 0.02
If Q(f) >= 38 And Q(f) <= 58 Then d(f) = 0.025
If Q(f) >= 59 And Q(f) <= 96 Then d(f) = 0.032
If Q(f) >= 97 And Q(f) <= 150 Then d(f) = 0.04
If Q(f) >= 151 And Q(f) <= 235 Then d(f) = 0.05
If Q(f) >= 236 And Q(f) <= 398 Then d(f) = 0.065
If Q(f) >= 399 And Q(f) <= 603 Then d(f) = 0.08
If Q(f) >= 604 And Q(f) <= 763 Then d(f) = 0.09
If Q(f) >= 764 And Q(f) <= 942 Then d(f) = 0.1
If Q(f) >= 943 And Q(f) <= 1472 Then d(f) = 0.125
If Q(f) >= 1473 And Q(f) <= 2120 Then d(f) = 0.15
If Q(f) >= 2121 And Q(f) <= 2885 Then d(f) = 0.175
If Q(f) >= 2886 And Q(f) <= 3768 Then d(f) = 0.2
If Q(f) >= 3769 And Q(f) <= 4770 Then d(f) = 0.225
If Q(f) >= 4771 And Q(f) <= 5889 Then d(f) = 0.25
If Q(f) >= 5890 And Q(f) <= 8480 Then d(f) = 0.3
If Q(f) >= 8481 And Q(f) <= 11542 Then d(f) = 0.35
If Q(f) >= 11543 And Q(f) <= 15075 Then d(f) = 0.4
If Q(f) >= 15076 And Q(f) <= 19080 Then d(f) = 0.45
If Q(f) >= 19081 And Q(f) <= 23556 Then d(f) = 0.5

A(f) = 0.25 * phi * (d(f) ^ 2)
V(f) = Q(f) / (A(f) * 60000)
V(f) = Round(V(f), 4)
R(f) = ((Q(f) / (1.67 * c * ((d(f)) ^ 2.63) * 10000)) ^ (1 / 0.54)) * 1000
R(f) = Round(R(f), 2)
diam(f) = d(f) * 1000
With Form4.MSFlexGrid1
.TextMatrix(f, 3) = diam(f)
.TextMatrix(f, 4) = R(f)
.TextMatrix(f, 5) = V(f)
End With
Next f

jsp = Form2.Text22.Text
c = Form2.Text25.Text
For g = 1 To jsp
Q(g) = Form4.MSFlexGrid2.TextMatrix(g, 2)
If Q(g) >= 1 And Q(g) <= 3 Then d(g) = 0.006
If Q(g) >= 4 And Q(g) <= 6 Then d(g) = 0.008
If Q(g) >= 7 And Q(g) <= 9 Then d(g) = 0.01
If Q(g) >= 10 And Q(g) <= 21 Then d(g) = 0.015
If Q(g) >= 22 And Q(g) <= 37 Then d(g) = 0.02
If Q(g) >= 38 And Q(g) <= 58 Then d(g) = 0.025
If Q(g) >= 59 And Q(g) <= 96 Then d(g) = 0.032
If Q(g) >= 97 And Q(g) <= 150 Then d(g) = 0.04
If Q(g) >= 151 And Q(g) <= 235 Then d(g) = 0.05
If Q(g) >= 236 And Q(g) <= 398 Then d(g) = 0.065
```

```
If Q(g) >= 399 And Q(g) <= 603 Then d(g) = 0.08
If Q(g) >= 604 And Q(g) <= 763 Then d(g) = 0.09
If Q(g) >= 764 And Q(g) <= 942 Then d(g) = 0.1
If Q(g) >= 943 And Q(g) <= 1472 Then d(g) = 0.125
If Q(g) >= 1473 And Q(g) <= 2120 Then d(g) = 0.15
If Q(g) >= 2121 And Q(g) <= 2885 Then d(g) = 0.175
If Q(g) >= 2886 And Q(g) <= 3768 Then d(g) = 0.2
If Q(g) >= 3769 And Q(g) <= 4770 Then d(g) = 0.225
If Q(g) >= 4771 And Q(g) <= 5889 Then d(g) = 0.25
If Q(g) >= 5890 And Q(g) <= 8480 Then d(g) = 0.3
If Q(g) >= 8481 And Q(g) <= 11542 Then d(g) = 0.35
If Q(g) >= 11543 And Q(g) <= 15075 Then d(g) = 0.4
If Q(g) >= 15076 And Q(g) <= 19080 Then d(g) = 0.45
If Q(g) >= 19081 And Q(g) <= 23556 Then d(g) = 0.5
A(g) = 0.25 * phi * (d(g) ^ 2)
V(g) = Q(g) / (A(g) * 60000)
V(g) = Round(V(g), 4)
R(g) = ((Q(g) / (1.67 * c * ((d(g)) ^ 2.63) * 10000)) ^ (1 / 0.54)) * 1000
R(g) = Round(R(g), 2)
diam(g) = d(g) * 1000
With Form4.MSFlexGrid2
.TextMatrix(g, 3) = diam(g)
.TextMatrix(g, 4) = R(g)
.TextMatrix(g, 5) = V(g)
End With
Next g
End Sub
Sub pipabiasa()
Dim jspp As Integer, c As Integer, Q(1000000#)
Dim d(1000000#), diam(1000000#), A(1000000#), V(1000000#), R(1000000#)
jsp = Form2.Text22.Text
c = Form2.Text25.Text
For g = 1 To jsp
Q(g) = Form4.MSFlexGrid2.TextMatrix(g, 2)
If Q(g) >= 1 And Q(g) <= 3 Then d(g) = 0.006
If Q(g) >= 4 And Q(g) <= 6 Then d(g) = 0.008
If Q(g) >= 7 And Q(g) <= 9 Then d(g) = 0.01
If Q(g) >= 10 And Q(g) <= 21 Then d(g) = 0.015
If Q(g) >= 22 And Q(g) <= 37 Then d(g) = 0.02
If Q(g) >= 38 And Q(g) <= 58 Then d(g) = 0.025
If Q(g) >= 59 And Q(g) <= 96 Then d(g) = 0.032
If Q(g) >= 97 And Q(g) <= 150 Then d(g) = 0.04
If Q(g) >= 151 And Q(g) <= 235 Then d(g) = 0.05
If Q(g) >= 236 And Q(g) <= 398 Then d(g) = 0.065
If Q(g) >= 399 And Q(g) <= 603 Then d(g) = 0.08
If Q(g) >= 604 And Q(g) <= 763 Then d(g) = 0.09
If Q(g) >= 764 And Q(g) <= 942 Then d(g) = 0.1
If Q(g) >= 943 And Q(g) <= 1472 Then d(g) = 0.125
If Q(g) >= 1473 And Q(g) <= 2120 Then d(g) = 0.15
If Q(g) >= 2121 And Q(g) <= 2885 Then d(g) = 0.175
If Q(g) >= 2886 And Q(g) <= 3768 Then d(g) = 0.2
If Q(g) >= 3769 And Q(g) <= 4770 Then d(g) = 0.225
If Q(g) >= 4771 And Q(g) <= 5889 Then d(g) = 0.25
If Q(g) >= 5890 And Q(g) <= 8480 Then d(g) = 0.3
If Q(g) >= 8481 And Q(g) <= 11542 Then d(g) = 0.35
If Q(g) >= 11543 And Q(g) <= 15075 Then d(g) = 0.4
If Q(g) >= 15076 And Q(g) <= 19080 Then d(g) = 0.45
If Q(g) >= 19081 And Q(g) <= 23556 Then d(g) = 0.5
A(g) = 0.25 * phi * (d(g) ^ 2)
V(g) = Q(g) / (A(g) * 60000)
V(g) = Round(V(g), 4)
R(g) = ((Q(g) / (1.67 * c * ((d(g)) ^ 2.63) * 10000)) ^ (1 / 0.54)) * 1000
R(g) = Round(R(g), 4)
diam(g) = d(g) * 1000
With Form4.MSFlexGrid2
.TextMatrix(g, 3) = diam(g)
.TextMatrix(g, 4) = R(g)
.TextMatrix(g, 5) = V(g)
End With
Next g
```

```
End Sub
Private Sub Save_Click()
'SIMPAN DATA DALAM TXT
On Error GoTo debug1
dlgfile.Filter = "Text Document (*.txt)|*.txt"
dlgfile.DialogTitle = "Save Input File..."
dlgfile.DefaultExt = "txt"
dlgfile.ShowSave
nomorfile = FreeFile
Open dlgfile.FileName For Output As #nomorfile
simpan
Close #nomorfile
Exit Sub
debug1:
Close #nomorfile
Form2.Show
End Sub
Sub simpan()
'general
jlt = Form2.Text1.Text                  'jmlh lantai
hum = Form2.Text2.Text                  'jml orang
qbut = Form2.Text3.Text                 'q kebutuhan
jam = Form2.Text4.Text                  'jam per hari
'groundtank
Vf = Form2.Text5.Text                   'vol kebakaran
kpd = Form2.Text8.Text                  'kapasitas pipa dinas
'pump
epi = Form2.Text7.Text                  'elv pipa output rooftank
hf = Form2.Text10.Text                  'head factor
mf = Form2.Text12.Text                  'motor factor
ef = Form2.Text18.Text                  'efs. pompa
'rooftank
tp = Form2.Text13.Text                  'menit puncak
tpu = Form2.Text14.Text                 'menit operasi pompa
'tangki tekan
ewr = Form2.Text9.Text                  'elv m.a. rata
ehf = Form2.Text15.Text                 'elv higest plumb or flush valve
pjp = Form2.Text16.Text                 'pjg bentang pipa dari out put tank sampai alat
plumb
sr = Form2.Text17.Text                  'system ratio
Presfloor = Form2.Text19.Text           'jumlah lantai pres
'distribusi pipa
'dengan presure
jspp = Form2.Text20.Text                'jum section pipa
jsip = Form2.Text21.Text                'jum induk section
'tanpa
jsp = Form2.Text22.Text                 'jum section pipa
jsi = Form2.Text23.Text                 'jum induk pipa
'umum pipa
c = Form2.Text25.Text                   'ratio kecepatan akibat bahan pipa
    Print #1, jlt; Tab(12); hum; Tab(24); qbut; Tab(36); jam
    Print #1, Vf; Tab(10); kpd
    Print #1, epi; Tab(12); hf; Tab(24); mf; Tab(36); ef
    Print #1, tp; Tab(12); tpu
    Print #1, ewr; Tab(12); ehf; Tab(24); pjp; Tab(36); sr; Tab(49); Presfloor
    Print #1, jspp; Tab(12); jsip; Tab(24); jsp; Tab(36); jsi; Tab(45); c
'tabel elv
jlt = Form2.Text1.Text                  'jmlh lantai
For elv1 = 1 To jlt
    ejl1 = Form2.MSFlexGrid1.TextMatrix(elv1, 0)       'lantai
    elt1 = Form2.MSFlexGrid1.TextMatrix(elv1, 1)       'elv
    efl1 = Form2.MSFlexGrid1.TextMatrix(elv1, 2)      'alv fixture hi
        Print #1, ejl1; Tab(12); elt1; Tab(24); efl1
Next elv1
For elv2 = 1 To jlt
    ejl2 = Form4.MSFlexGrid3.TextMatrix(elv2, 0)
    elt2 = Form4.MSFlexGrid3.TextMatrix(elv2, 1)
    efl2 = Form4.MSFlexGrid3.TextMatrix(elv2, 2)
        Print #1, ejl2; Tab(12); elt2; Tab(24); efl2
Next elv2
```

```
'tabel pipa dg pres
jspp = Form2.Text20.Text
For pres1 = 1 To jspp
    spt1 = Form3.MSFlexGrid1(0).TextMatrix(pres1, 0)
    panjangt1 = Form3.MSFlexGrid1(0).TextMatrix(pres1, 1)
    fixt1 = Form3.MSFlexGrid1(0).TextMatrix(pres1, 2)
    flowt1 = Form3.MSFlexGrid1(0).TextMatrix(pres1, 3)
        Print #1, spt1; Tab(12); panjangt1; Tab(24); fixt1; Tab(36); flowt1
Next pres1
For pres2 = 1 To jspp
    spt2 = Form4.MSFlexGrid1.TextMatrix(pres2, 0)
    fixt2 = Form4.MSFlexGrid1.TextMatrix(pres2, 1)
    flowt2 = Form4.MSFlexGrid1.TextMatrix(pres2, 2)
        Print #1, spt2; Tab(12); fixt2; Tab(24); flowt2
Next pres2
'tabel pipa tanpa pres

jsp = Form2.Text22.Text
For tpres1 = 1 To jsp
    spb1 = Form3.MSFlexGrid1(1).TextMatrix(tpres1, 0)
    panjangb1 = Form3.MSFlexGrid1(1).TextMatrix(tpres1, 1)
    fixb1 = Form3.MSFlexGrid1(1).TextMatrix(tpres1, 2)
    flowb1 = Form3.MSFlexGrid1(1).TextMatrix(tpres1, 3)
        Print #1, spb1; Tab(12); panjangb1; Tab(24); fixb1; Tab(36); flowb1
Next tpres1
For tpres2 = 1 To jsp
    spb2 = Form4.MSFlexGrid2.TextMatrix(tpres2, 0)
    fixb2 = Form4.MSFlexGrid2.TextMatrix(tpres2, 1)
    flowb2 = Form4.MSFlexGrid2.TextMatrix(tpres2, 2)
        Print #1, spb2; Tab(12); fixb2; Tab(24); flowb2
Next tpres2
'tabel fixture
jlf = Form3.Text5.Text
Print #1, jlf
For fiks = 1 To jlf
    kind$ = Form3.MSFlexGrid2.TextMatrix(fiks, 0)
    occ$ = Form3.MSFlexGrid2.TextMatrix(fiks, 1)
    supl$ = Form3.MSFlexGrid2.TextMatrix(fiks, 2)
    bebanunit = Form3.MSFlexGrid2.TextMatrix(fiks, 3)
    jumlahfu = Form3.MSFlexGrid2.TextMatrix(fiks, 4)
    tot = Form3.MSFlexGrid2.TextMatrix(fiks, 5)
        Print #1, kind$; Tab(15); occ$; Tab(30); supl$; Tab(45); bebanunit; Tab(60);
jumlahfu; Tab(75); tot
Next fiks
End Sub
Private Sub Text1_KeyPress(KeyAscii As Integer)
If (KeyAscii) = 13 Then Text2.SetFocus
End Sub

Private Sub Text14_Change()
If Val(Text14.Text) < 10 Or Val(Text14.Text) > 15 Then
Pesan = MsgBox("Minutes of filler pump operation must be in range given.",
vbCritical, "WARNING !")
Text14.SetFocus
Else
HScroll2.Value = Val(Text14.Text)
End If
End Sub

Private Sub Text17_Change()
If Val(Text17.Text) < 20 Or Val(Text14.Text) > 30 Then
Pesan = MsgBox("Ratio must be in range given.", vbCritical, "WARNING !")
Text17.SetFocus
Else
HScroll3.Value = Val(Text17.Text)
End If
End Sub
Private Sub Text2_KeyPress(KeyAscii As Integer)
```

```
If (KeyAscii) = 13 Then Combo1.SetFocus
End Sub

Private Sub Text20_KeyPress(KeyAscii As Integer)
If (KeyAscii) = 13 Then Text21.SetFocus
End Sub

Private Sub Text22_KeyPress(KeyAscii As Integer)
If (KeyAscii) = 13 Then Text23.SetFocus
End Sub

Private Sub Text23_KeyPress(KeyAscii As Integer)
If (KeyAscii) = 13 Then Command1.SetFocus
End Sub

Private Sub Text4_KeyPress(KeyAscii As Integer)
If (KeyAscii) = 13 Then Combo6.SetFocus
End Sub

Private Sub Text7_KeyPress(KeyAscii As Integer)
If (KeyAscii) = 13 Then Text10.SetFocus
End Sub

Private Sub Text10_KeyPress(KeyAscii As Integer)
If (KeyAscii) = 13 Then
SSTab1.Tab = 0
Combo4.SetFocus
End If
End Sub

Private Sub Text18_KeyPress(KeyAscii As Integer)
If (KeyAscii) = 13 Then Text13.SetFocus
End Sub

Private Sub Text13_KeyPress(KeyAscii As Integer)
If (KeyAscii) = 13 Then Text14.SetFocus
End Sub

Private Sub Text14_KeyPress(KeyAscii As Integer)
If (KeyAscii) = 13 Then Combo5.SetFocus
End Sub

Private Sub Text9_KeyPress(KeyAscii As Integer)
If (KeyAscii) = 13 Then Text15.SetFocus
End Sub

Private Sub Text15_KeyPress(KeyAscii As Integer)
If (KeyAscii) = 13 Then Text16.SetFocus
End Sub

Private Sub Text16_KeyPress(KeyAscii As Integer)
If (KeyAscii) = 13 Then Text17.SetFocus
End Sub

Form 3 :
Private Sub Command1_Click()
'MEMASUKKAN JUMLAH PIPA DAN PANJANG PIPA -->sistem tangki tekan

nopipa
Lpipa
End Sub
Sub nopipa()
Dim jsp As Integer, sp As Single
'JUMLAH PIPA
jsp = Form2.Text20.Text
For sp = 1 To jsp
With Form3.MSFlexGrid1(0)
.TextMatrix(sp, 0) = sp
.Rows = jsp + 1
End With
```

```
With Form4.MSFlexGrid1
.TextMatrix(sp, 0) = sp
.Rows = jsp + 1
End With
Next sp
End Sub
Sub Lpipa()
Dim jsc As Integer, l As Single, panjang(1000000#)
'PANJANG PIPA
jsc = Form2.Text20.Text
For l = 1 To jsc
panjang(l) = InputBox("Length of pipe [" & l & "]", "Length of pipe per section", 0)
With Form3.MSFlexGrid1(0)
.TextMatrix(l, 1) = panjang(l)
.Rows = jsc + 1
End With
Next l
End Sub

Private Sub Command2_Click()
If Form3.Option1.Value = True Then
    If MSFlexGrid1(0).TextMatrix(1, 0) = "" Then
    Pesan = MsgBox("Input section pipe first.", vbCritical, "WARNING !")
    Command1.SetFocus
    Else
    Form4.SSTab1.Tab = 0
    fixturetekan
    Command6.SetFocus
    End If
ElseIf Form3.Option2.Value = True Then
    If MSFlexGrid1(1).TextMatrix(1, 0) = "" Then
    Pesan = MsgBox("Input section pipe first.", vbCritical, "WARNING !")
    Command5.SetFocus
    Else
    Form4.SSTab1.Tab = 1
    fixturebiasa
    Command6.SetFocus
    End If
End If
End Sub

Sub fixturetekan()
Dim jst As Integer, ptk As Single, fixt(1000000#), flust(1000000#) As String,
flowt(1000000#)
jst = Form2.Text20.Text
For ptk = 1 To jst
fixt(ptk) = InputBox("Fixture unit pipe number [" & ptk & "]", "Fixture Unit For
System With Pressure Tank", 1)
flust(ptk) = InputBox("Using flush valve ? (Y for Yes or N for No)", "Curve 1 Or 2",
"Y")
flust(ptk) = Format(flust(ptk), ">")
If flust(ptk) = "Y" And fixt(ptk) <= 1000 Then
flowt(ptk) = 35.597 * (fixt(ptk) ^ 0.4344)
ElseIf flust(ptk) = "Y" And fixt(ptk) > 1000 Then
flowt(ptk) = 7.296 * (fixt(ptk) ^ 0.6762)
ElseIf flust(ptk) = "N" And fixt(ptk) <= 1000 Then
flowt(ptk) = 6.6135 * (fixt(ptk) ^ 0.6888)
ElseIf flust(ptk) = "N" And fixt(ptk) > 1000 Then
flowt(ptk) = 7.296 * (fixt(ptk) ^ 0.6762)
End If
flowt(ptk) = Round(flowt(ptk), 0)
With Form3.MSFlexGrid1(0)
.TextMatrix(ptk, 2) = fixt(ptk)
.TextMatrix(ptk, 3) = flowt(ptk)
.Rows = jst + 1
End With
With Form4.MSFlexGrid1
.TextMatrix(ptk, 1) = fixt(ptk)
.TextMatrix(ptk, 2) = flowt(ptk)
.Rows = jst + 1
```

```
End With
Next ptk
End Sub

Sub fixturebiasa()
Dim jsb As Integer, pb As Single, fixb(1000000#), flusb(1000000#) As String,
flowb(1000000#)
jsb = Form2.Text22.Text
For pb = 1 To jsb
fixb(pb) = InputBox("Fixture unit pipe number [" & pb & "]", "Fixture Unit For System
With Pressure Tank", 1)
flusb(pb) = InputBox("Using flush valve ? (Y for Yes and N for No)", "Curve 1 Or 2",
"Y")
flusb(pb) = Format(flusb(pb), ">")
If flusb(pb) = "Y" And fixb(pb) <= 1000 Then
flowb(pb) = 35.597 * (fixb(pb) ^ 0.4344)
ElseIf flusb(pb) = "Y" And fixb(pb) > 1000 Then
flowb(pb) = 7.296 * (fixb(pb) ^ 0.6762)
ElseIf flusb(pb) = "N" And fixb(pb) <= 1000 Then
flowb(pb) = 6.6135 * (fixb(pb) ^ 0.6888)
ElseIf flusb(pb) = "N" And fixb(pb) > 1000 Then
flowb(pb) = 7.296 * (fixb(pb) ^ 0.6762)
End If
flowb(pb) = Round(flowb(pb), 0)
With Form3.MSFlexGrid1(1)
.TextMatrix(pb, 2) = fixb(pb)
.TextMatrix(pb, 3) = flowb(pb)
.Rows = jsb + 1
End With
With Form4.MSFlexGrid2
.TextMatrix(pb, 1) = fixb(pb)
.TextMatrix(pb, 2) = flowb(pb)
.Rows = jsb + 1
End With
Next pb
End Sub

Private Sub Command3_Click()
Dim jlf, fu As Integer
Dim kind(1000) As String, supl(1000) As String, occ(1000) As String, jumlahfu(1000)
Dim bebanunit(10000), tot(10000)

jlf = InputBox("How many kind of fixture used ?", "Many Kind Of Fixture Unit", 1,
320, 120, "DEMO.HLP", 10)
Form3.Text5.Text = jlf
For fu = 1 To jlf
kind(fu) = InputBox("Fixture kind number [" & fu & "].", "Fixture Kind", "water
closet", 320, 120)
kind(fu) = Format(kind(fu), "<")
occ(fu) = InputBox("Occupancy of fixture and suplier number [" & fu & "].",
"Occupancy", "public", 320, 120)
occ(fu) = Format(occ(fu), "<")
supl(fu) = InputBox("Supply controller type number [" & fu & "].", "Supply controller
type", "flush valve", 320, 120)
supl(fu) = Format(supl(fu), "<")
jumlahfu(fu) = InputBox("How many fixture with this type [" & fu & "]", "Number Of
One Kind Fixture", 1, 320, 120)
With Form3.MSFlexGrid2
.TextMatrix(fu, 0) = kind(fu)
.TextMatrix(fu, 1) = occ(fu)
.TextMatrix(fu, 2) = supl(fu)
.TextMatrix(fu, 4) = jumlahfu(fu)
.Rows = jlf + 1

If .TextMatrix(fu, 0) = "water closet" And .TextMatrix(fu, 1) = "public" And
.TextMatrix(fu, 2) = "flush valve" Then
.TextMatrix(fu, 3) = 10
ElseIf .TextMatrix(fu, 0) = "water closet" And .TextMatrix(fu, 1) = "public" And
.TextMatrix(fu, 2) = "flush tank" Then
.TextMatrix(fu, 3) = 5
```

```
ElseIf .TextMatrix(fu, 0) = "water closet" And .TextMatrix(fu, 1) = "privat" And
.TextMatrix(fu, 2) = "flush valve" Then
.TextMatrix(fu, 3) = 6
ElseIf .TextMatrix(fu, 0) = "water closet" And .TextMatrix(fu, 1) = "privat" And
.TextMatrix(fu, 2) = "flush tank" Then
.TextMatrix(fu, 3) = 3
ElseIf .TextMatrix(fu, 0) = "pedestal urinal" And .TextMatrix(fu, 1) = "public" And
.TextMatrix(fu, 2) = "flush valve" Then
.TextMatrix(fu, 3) = 10
ElseIf .TextMatrix(fu, 0) = "stall urinal" And .TextMatrix(fu, 1) = "public" And
.TextMatrix(fu, 2) = "flush valve" Then
.TextMatrix(fu, 3) = 5
ElseIf .TextMatrix(fu, 0) = "stall urinal" And .TextMatrix(fu, 1) = "public" And
.TextMatrix(fu, 2) = "flush tank" Then
.TextMatrix(fu, 3) = 3
ElseIf .TextMatrix(fu, 0) = "lavatory" And .TextMatrix(fu, 1) = "public" And
.TextMatrix(fu, 2) = "faucet" Then
.TextMatrix(fu, 3) = 2
ElseIf .TextMatrix(fu, 0) = "lavatory" And .TextMatrix(fu, 1) = "privat" And
.TextMatrix(fu, 2) = "faucet" Then
.TextMatrix(fu, 3) = 1
ElseIf .TextMatrix(fu, 0) = "bathtub" And .TextMatrix(fu, 1) = "public" And
.TextMatrix(fu, 2) = "faucet" Then
.TextMatrix(fu, 3) = 4
ElseIf .TextMatrix(fu, 0) = "bathtub" And .TextMatrix(fu, 1) = "privat" And
.TextMatrix(fu, 2) = "faucet" Then
.TextMatrix(fu, 3) = 2
ElseIf .TextMatrix(fu, 0) = "shower head" And .TextMatrix(fu, 1) = "public" And
.TextMatrix(fu, 2) = "mixing valve" Then
.TextMatrix(fu, 3) = 4
ElseIf .TextMatrix(fu, 0) = "shower head" And .TextMatrix(fu, 1) = "privat" And
.TextMatrix(fu, 2) = "mixing valve" Then
.TextMatrix(fu, 3) = 2
ElseIf .TextMatrix(fu, 0) = "service sink" And .TextMatrix(fu, 1) = "office" And
.TextMatrix(fu, 2) = "faucet" Then
.TextMatrix(fu, 3) = 3
ElseIf .TextMatrix(fu, 0) = "kitchen sink" And .TextMatrix(fu, 1) = "hotel" And
.TextMatrix(fu, 2) = "faucet" Then
.TextMatrix(fu, 3) = 4
ElseIf .TextMatrix(fu, 0) = "kitchen sink" And .TextMatrix(fu, 1) = "restaurant" And
.TextMatrix(fu, 2) = "faucet" Then
.TextMatrix(fu, 3) = 4
ElseIf .TextMatrix(fu, 0) = "kitchen sink" And .TextMatrix(fu, 1) = "privat" And
.TextMatrix(fu, 2) = "faucet" Then
.TextMatrix(fu, 3) = 2
ElseIf .TextMatrix(fu, 0) = "bathroom group" And .TextMatrix(fu, 1) = "privat" And
.TextMatrix(fu, 2) = "flush valve for closet" Then
.TextMatrix(fu, 3) = 8
ElseIf .TextMatrix(fu, 0) = "bathroom group" And .TextMatrix(fu, 1) = "privat" And
.TextMatrix(fu, 2) = "flush tank for closet" Then
.TextMatrix(fu, 3) = 6
ElseIf .TextMatrix(fu, 0) = "separate shower" And .TextMatrix(fu, 1) = "privat" And
.TextMatrix(fu, 2) = "mixing valve" Then
.TextMatrix(fu, 3) = 2
ElseIf .TextMatrix(fu, 0) = "laundry trays" And .TextMatrix(fu, 1) = "privat" And
.TextMatrix(fu, 2) = "faucet" Then
.TextMatrix(fu, 3) = 3
ElseIf .TextMatrix(fu, 0) = "combination fixture" And .TextMatrix(fu, 1) = "privat"
And .TextMatrix(fu, 2) = "faucet" Then
.TextMatrix(fu, 3) = 3
Else: .TextMatrix(fu, 3) = 0
End If
bebanunit(fu) = .TextMatrix(fu, 3)
jumlahfu(fu) = .TextMatrix(fu, 4)
tot(fu) = bebanunit(fu) * jumlahfu(fu)
.TextMatrix(fu, 5) = tot(fu)
End With
Next fu
End Sub
```

```
Private Sub Command5_Click()
'MEMASUKKAN JUMLAH PIPA DAN PANJANG PIPA -->sistem tanpa tangki tekan
nopipe
Lpipe
End Sub

Sub nopipe()
Dim jsp As Integer, sp As Single
'JUMLAH PIPA
jsp = Form2.Text22.Text
For sp = 1 To jsp
With Form3.MSFlexGrid1(1)
.TextMatrix(sp, 0) = sp
.Rows = jsp + 1
End With
With Form4.MSFlexGrid2
.TextMatrix(sp, 0) = sp
.Rows = jsp + 1
End With
Next sp
End Sub

Sub Lpipe()
Dim jsc As Integer, l As Single, panjang(1000000#)
'PANJANG PIPA
jsc = Form2.Text22.Text
For l = 1 To jsc
panjang(l) = InputBox("Length of pipe [" & l & "]", "Length of pipe per section", 0)
With Form3.MSFlexGrid1(1)
.TextMatrix(l, 1) = panjang(l)
.Rows = jsc + 1
End With
Next l
End Sub

Private Sub Command6_Click()
Form3.Hide
Form2.Show
End Sub

Private Sub Form_Activate()
Form3.Option2.SetFocus
Form3.Command3.SetFocus
End Sub

Private Sub Form_Load()
'INPUT PIPA TANGKI TEKAN
With Form3.MSFlexGrid1(0)
.TextMatrix(0, 0) = "Pipe Section"
.TextMatrix(0, 1) = "Length (m)"
.TextMatrix(0, 2) = "Fixture Unit"
.TextMatrix(0, 3) = "Flow Demand (liter/minutes)"
.ColWidth(0) = 1300
.ColWidth(1) = 1000
.ColWidth(2) = 1300
.ColWidth(3) = 2200
.ColAlignment(-1) = 4
End With
'INPUT PIPA TANPA TANGKI TEKAN
With Form3.MSFlexGrid1(1)
.TextMatrix(0, 0) = "Pipe Section"
.TextMatrix(0, 1) = "Length (m)"
.TextMatrix(0, 2) = "Fixture Unit"
.TextMatrix(0, 3) = "Flow Demand (liter/minutes)"
.ColWidth(0) = 1300
.ColWidth(1) = 1000
.ColWidth(2) = 1300
.ColWidth(3) = 2200
.ColAlignment(-1) = 4
```

```
End With
'INPUT FIXTURE UNIT PLUMBING
With Form3.Text1
.Text = "Fixture given :" & vbCrLf
.Text = .Text & "   1.     water closet/public;privat/flush valve;flush tank" &
vbCrLf
.Text = .Text & "   2.     pedestal urinal/public/flush falve" & vbCrLf
.Text = .Text & "   3.     stall urinal/public/flush valve;flush tank" & vbCrLf
.Text = .Text & "   4.     lavatory/public;privat/faucet" & vbCrLf
.Text = .Text & "   5.     bathtub/public;privat/faucet" & vbCrLf
.Text = .Text & "   6.     shower head/public;privat/mixing valve" & vbCrLf
.Text = .Text & "   7.     service sink/office/faucet" & vbCrLf
.Text = .Text & "   8.     kithcen sink/hotel;restaurant/faucet" & vbCrLf
.Text = .Text & "   9.     bathroom group/privat/flush valve for closet;flush tank
for closet" & vbCrLf
.Text = .Text & "   10.   separate shower/privat/mixing valve" & vbCrLf
.Text = .Text & "   11.   laundry trays/privat/faucet" & vbCrLf
.Text = .Text & "   12.   combination fixture/privat/faucet" & vbCrLf
End With

With Form3.MSFlexGrid2
.TextMatrix(0, 0) = "Fixture"
.TextMatrix(0, 1) = "Occupancy"
.TextMatrix(0, 2) = "Supply Controller"
.TextMatrix(0, 3) = "Fixture Unit"
.TextMatrix(0, 4) = "Many Fixture"
.TextMatrix(0, 5) = "Total Fixture Unit"
.ColWidth(0) = 1500
.ColWidth(1) = 1120
.ColWidth(2) = 2000
.ColWidth(3) = 1200
.ColWidth(4) = 1200
.ColWidth(5) = 1600
.ColAlignment(-1) = 4
End With
End Sub

Private Sub Option1_Click()
SSTab1.Tab = 0
End Sub

Private Sub Option2_Click()
SSTab1.Tab = 1
End Sub

Form 4:
Dim nomorfile As Integer
Private Sub Command1_Click()
Form4.Hide
Form2.Show
End Sub

Private Sub Command2_Click()
'SIMPAN DATA DALAM TXT
On Error GoTo momo
peve.Filter = "Text Document (*.txt)|*.txt"
peve.DialogTitle = "Print to file..."
peve.DefaultExt = "txt"
peve.ShowSave
nomorfile = FreeFile
Open peve.FileName For Output As #1
prot
Close #1
Exit Sub

momo:
Close #kuya
Form2.Show

End Sub
```

```
Sub prot()
'general
jlt = Form2.Text1.Text                  'jmlh lantai
hum = Form2.Text2.Text                  'jml orang
qbut = Form2.Text3.Text                 'q kebutuhan
jam = Form2.Text4.Text                  'jam per hari
'groundtank
Vf = Form2.Text5.Text                   'vol kebakaran
kpd = Form2.Text8.Text                  'kapasitas pipa dinas
'pump
epi = Form2.Text7.Text                  'elv pipa output rooftank
hf = Form2.Text10.Text                  'head factor
mf = Form2.Text12.Text                  'motor factor
ef = Form2.Text18.Text                  'efs. pompa
'rooftank
tp = Form2.Text13.Text                  'menit puncak
tpu = Form2.Text14.Text                 'menit operasi pompa
'tangki tekan
ewr = Form2.Text9.Text                  'elv m.a. rata
ehf = Form2.Text15.Text                 'elv higest plumb or flush valve
pjp = Form2.Text16.Text                 'pjg bentang pipa dari out put tank sampai alat
plumb
sr = Form2.Text17.Text                  'system ratio
Presfloor = Form2.Text19.Text           'jumlah lantai pres
'distribusi pipa
'dengan presure
jspp = Form2.Text20.Text                 'jum section pipa
jsip = Form2.Text21.Text                 'jum induk section
'tanpa
jsp = Form2.Text22.Text                 'jum section pipa
jsi = Form2.Text23.Text                 'jum induk pipa
'umum pipa
c = Form2.Text25.Text                   'ratio kecepatan akibat bahan pipa
'output tangki
Qjam = Form4.Text1.Text
Qmet = Form4.Text2.Text
Vgto = Form4.Text3.Text
Vrto = Form4.Text4.Text
pom = Form4.Text5.Text
Vpress = Form4.Text6.Text
pres = Form4.Text7.Text

    Print #1, "*************************************************************************"
    Print #1, "ESPIPE BASIC 6.0\OUT PUT PROJECT"
    Print #1, "*************************************************************************"
    Print #1, ""
    Print #1, "General Data :"
    Print #1, "Many floor = "; jlt
    Print #1, "Number of people each floor = "; hum
    Print #1, "Water usage rate in a day = "; qbut; " m3/hour"
    Print #1, "Usage hour in a day = "; jam; "hour"
    Print #1, ""
    Print #1, "Equipment Data :"
    Print #1, "Water needed for fire protection = "; Vf; " m3/hour"
    Print #1, "Capasity of public water source pipe = "; kpd; " m3/hour"
    Print #1, "Elevation of input roof tank pipe = "; epi; " meters"
    Print #1, "friction loss in head factor = "; hf; " (per hundred potential high)"
    Print #1, "Motor pump spesification ratio = "; mf
    Print #1, "Pump efficiency = "; ef; " %"
    Print #1, "Minutes of peak flow demands = "; tp
    Print #1, "Minutes of filler pump operation = "; tpu
    Print #1, "Elevation of water rate level = "; ewr; " meters"
    Print #1, "Elevation of highest fixture plumbing = "; ehf; " meters"
    Print #1, "Length of pipe from roof tank out put to highest fixture= "; pjp; "
meters"
    Print #1, "Distribution system ratio = "; sr
    Print #1, "Many floor using pressure storage tank = "; Presfloor; " floor"
    Print #1, ""
    Print #1, "Pipe Data :"
    Print #1, "With pressure storage tank :"
```

```
    Print #1, "Section of pipe = "; jspp; " section"
    Print #1, "Down feed rises section of pipe = "; jsip; " section"
    Print #1, "Without pressure stoage tank :"
    Print #1, "Section of pipe = "; jsp; "section"
    Print #1, "Down feed rises section of pipe = "; jsi; " section"
    Print #1, "Velocity factor for pipe materials = "; c
    Print #1, ""
    Print #1, "Out Put Tank Dimention:"
    Print #1, "Maximum total demand flow per hour = "; Qjam; " m3/hour"
    Print #1, "Maximum total demand flow per minutes = "; Qmet; " m3/minutes"
    Print #1, "Volume of ground tank = "; Vgto; " m3"
    Print #1, "Volume of roof tank = "; Vrto; " m3"
    Print #1, "Roof tank pump motor power = "; pom; " kW"
    Print #1, "Volume of pressure storage tank = "; Vpress; " m3"
    Print #1, "Pressure used for pressure tank = "; pres; " Kg/cm2"
Print #1, ""
Print #1, "Elevation of each floor"
Print #1, "Floor"; Tab(12); "Elv.(m)"; Tab(24); "Fixture Elv.(m)"
jlt = Form2.Text1.Text                'jmlh lantai
For elv1 = 1 To jlt
    ejl1 = Form2.MSFlexGrid1.TextMatrix(elv1, 0)       'lantai
    elt1 = Form2.MSFlexGrid1.TextMatrix(elv1, 1)       'elv
    efl1 = Form2.MSFlexGrid1.TextMatrix(elv1, 2)      'alv fixture hi
        Print #1, ejl1; Tab(12); elt1; Tab(24); efl1
Next elv1

Print #1, ""
Print #1, "Input pipe system (with pressure storage tank per section)"
Print #1, "Section"; Tab(12); "Length(m)"; Tab(24); "Fixture unit"; Tab(40);
"Q(l/minutes)"
jspp = Form2.Text20.Text
For pres1 = 1 To jspp
    spt1 = Form3.MSFlexGrid1(0).TextMatrix(pres1, 0)
    panjangt1 = Form3.MSFlexGrid1(0).TextMatrix(pres1, 1)
    fixt1 = Form3.MSFlexGrid1(0).TextMatrix(pres1, 2)
    flowt1 = Form3.MSFlexGrid1(0).TextMatrix(pres1, 3)
        Print #1, spt1; Tab(12); panjangt1; Tab(24); fixt1; Tab(40); flowt1
Next pres1

Print #1, ""
Print #1, "Input pipe system (without pressure storage tank per section)"
Print #1, "Section"; Tab(12); "Length(m)"; Tab(24); "Fixture unit"; Tab(40);
"Q(l/minutes)"
jsp = Form2.Text22.Text
For tpres1 = 1 To jsp
    spb1 = Form3.MSFlexGrid1(1).TextMatrix(tpres1, 0)
    panjangb1 = Form3.MSFlexGrid1(1).TextMatrix(tpres1, 1)
    fixb1 = Form3.MSFlexGrid1(1).TextMatrix(tpres1, 2)
    flowb1 = Form3.MSFlexGrid1(1).TextMatrix(tpres1, 3)
        Print #1, spb1; Tab(12); panjangb1; Tab(24); fixb1; Tab(40); flowb1
Next tpres1
Print #1, ""

Print #1, "Pipe dimention (with pressure storage tank)"
Print #1, "Section"; Tab(12); "Fixture unit"; Tab(30); "Q(l/minutes)"; Tab(45);
"D(mm)"; Tab(52); "R(mm/m)"; Tab(62); "V(m/s)"
jspp = Form2.Text20.Text
For f = 1 To jspp
With Form4.MSFlexGrid1
    s = .TextMatrix(f, 0)
    fu = .TextMatrix(f, 1)
    Q = .TextMatrix(f, 2)
    d = .TextMatrix(f, 3)
    R = .TextMatrix(f, 4)
    V = .TextMatrix(f, 5)
        Print #1, s; Tab(12); fu; Tab(30); Q; Tab(45); d; Tab(52); R; Tab(62); V
End With
Next f
Print #1, ""
```

```
Print #1, "Pipe dimention (without pressure storage tank)"
Print #1, "Section"; Tab(12); "Fixture unit"; Tab(30); "Q(l/minutes)"; Tab(45);
"D(mm)"; Tab(52); "R(mm/m)"; Tab(62); "V(m/s)"
jsp = Form2.Text22.Text
For g = 1 To jsp
With Form4.MSFlexGrid2
    s1 = .TextMatrix(g, 0)
    fu1 = .TextMatrix(g, 1)
    Q1 = .TextMatrix(g, 2)
    d1 = .TextMatrix(g, 3)
    R1 = .TextMatrix(g, 4)
    V1 = .TextMatrix(g, 5)
        Print #1, s1; Tab(12); fu1; Tab(30); Q1; Tab(45); d1; Tab(52); R1; Tab(62);
V1
End With
Next g
End Sub

Private Sub Form_Activate()
SSTab1.Tab = 0
End Sub

Private Sub Form_Load()
With Form4.MSFlexGrid1
.TextMatrix(0, 0) = "Pipe Section"
.TextMatrix(0, 1) = "Fixture Unit"
.TextMatrix(0, 2) = "Flow Demand (liter/minutes)"
.TextMatrix(0, 3) = "Diameter (mm)"
.TextMatrix(0, 4) = "R (mm/m)"
.TextMatrix(0, 5) = "Velocity (m/s)"
.ColWidth(0) = 1300
.ColWidth(1) = 1300
.ColWidth(2) = 2200
.ColWidth(3) = 1500
.ColWidth(4) = 2000
.ColWidth(5) = 1500
.ColAlignment(-1) = 4
.Width = .ColWidth(0) + .ColWidth(1) + .ColWidth(2) + .ColWidth(3) + .ColWidth(4) +
.ColWidth(5) + 300
End With
With Form4.MSFlexGrid2
.TextMatrix(0, 0) = "Pipe Section"
.TextMatrix(0, 1) = "Fixture Unit"
.TextMatrix(0, 2) = "Flow Demand (liter/minutes)"
.TextMatrix(0, 3) = "Diameter (mm)"
.TextMatrix(0, 4) = "R (mm/m)"
.TextMatrix(0, 5) = "Velocity (m/s)"
.ColWidth(0) = 1300
.ColWidth(1) = 1300
.ColWidth(2) = 2200
.ColWidth(3) = 1500
.ColWidth(4) = 2000
.ColWidth(5) = 1500
.ColAlignment(-1) = 4
.Width = .ColWidth(0) + .ColWidth(1) + .ColWidth(2) + .ColWidth(3) + .ColWidth(4) +
.ColWidth(5) + 300
End With
With Form4.MSFlexGrid3
.TextMatrix(0, 0) = "Floor Number"
.TextMatrix(0, 1) = "Floor Elevation (m)"
.TextMatrix(0, 2) = "Highest Fixture Elevation (m)"
.ColWidth(0) = 1300
.ColWidth(1) = 1700
.ColWidth(2) = 2200
.ColAlignment(-1) = 4
End With
End Sub
```

APLIKASI PROGAM PADA PERENCANAAN INSTALASI PENYEDIAAN AIR BERSIH GEDUNG KAMPUS BABARSARI UPN "VETERAN" YOGYAKARTA

Kasus perencanaan instalasi penyediaan air bersih pada gedung kampus Babarsari UPN "Veteran" Yogyakarta. Beberapa data yang diketahui dari gambar rencana dan juga beberapa data anggapan penulis antara lain sebagai berikut :

1. Jumlah orang per lantai adalah 200 orang.
2. Lama pemakaian gedung adalah 10 jam per hari.
3. Kapasitas pipa dinas adalah 2/3 dari kebutuhan puncak per jam.
4. Alat plambing yang digunakan adalah *closet* dengan tangki gelontor, peturasan terbuka dengan katup gelontor, dan bak cuci tangan.
5. Diameter pipa distribusi yang diperhitungkan adalah sebagai berikut :

Section	Panjang (m)	Beban unit alat plambing	Diameter (mm)
1	5	162	80
2	2.85	27	65
3	1.425	25	65
4	0.675	20	65
5	2.025	18	65
6	4.15	13	65
7	0.85	4	50
8	0.95	27	50
9	0.75	25	50
10	1.425	21	40
11	0.675	19	40
12	0.675	14	32
13	0.675	12	32
14	0.675	7	32
15	0.675	5	20
16	1	4	20
17	4.25	108	80
18	2.85	27	65
19	1.425	25	65
20	0.675	20	65
21	2.025	18	65
22	4.15	13	65
23	0.85	4	50
24	0.95	27	50
25	0.75	25	50

26	1.425	21	40
27	0.675	19	40
28	0.675	14	32
29	0.675	12	32
30	0.675	7	32
31	0.675	5	20
32	1	4	20
33	4.25	54	65
34	2.85	27	65
35	1.425	25	65
36	0.675	20	65
37	2.025	18	65
38	4.15	13	65
39	0.85	4	50
40	0.95	27	50
41	0.75	25	50
42	1.425	21	40
43	0.675	19	40
44	0.675	14	32
45	0.675	12	32
46	0.675	7	32
47	0.675	5	20
48	1	4	20

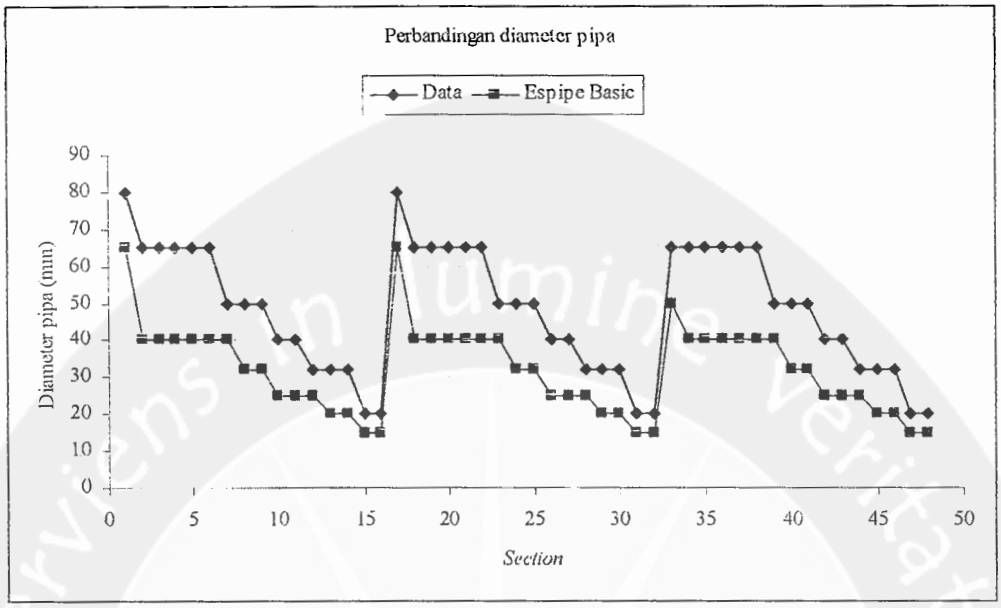
6. Keterangan lain dapat dilihat pada gambar rencana.

Data diameter pipa dibandingkan dengan hasil perhitungan dengan Espipe Basic. Hasil perbandingan tersebut adalah sebagai berikut :

Section	Diameter (mm)	Out put Diameter (mm)	Beda (%)
1	80	65	18.75
2	65	40	38.46154
3	65	40	38.46154
4	65	40	38.46154
5	65	40	38.46154
6	65	40	38.46154
7	50	40	20
8	50	32	36
9	50	32	36
10	40	25	37.5
11	40	25	37.5
12	32	25	21.875
13	32	20	37.5

14	32	20	37.5
15	20	15	25
16	20	15	25
17	80	65	18.75
18	65	40	38.46154
19	65	40	38.46154
20	65	40	38.46154
21	65	40	38.46154
22	65	40	38.46154
23	50	40	20
24	50	32	36
25	50	32	36
26	40	25	37.5
27	40	25	37.5
28	32	25	21.875
29	32	20	37.5
30	32	20	37.5
31	20	15	25
32	20	15	25
33	65	50	23.07692
34	65	40	38.46154
35	65	40	38.46154
36	65	40	38.46154
37	65	40	38.46154
38	65	40	38.46154
39	50	40	20
40	50	32	36
41	50	32	36
42	40	25	37.5
43	40	25	37.5
44	32	25	21.875
45	32	20	37.5
46	32	20	37.5
47	20	15	25
48	20	15	25

Hasil perbandingan diameter pipa dibuat grafik seperti pada gambar berikut :

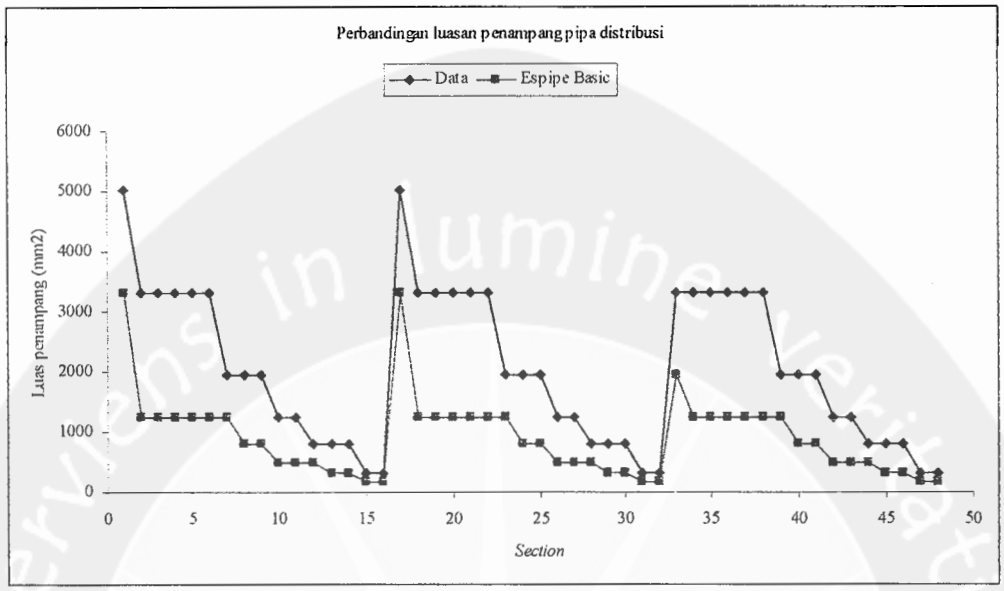


Dari hasil perbandingan diameter diatas didapat beda terjauh sebesar 38.46154 %, sedangkan perbandingan luasan penampang pipa distribusi adalah sebagai berikut :

Section	A (mm2)	Out put A (mm2)	Beda (%)
1	5024	3316.625	33.984375
2	3316.625	1256	62.13017751
3	3316.625	1256	62.13017751
4	3316.625	1256	62.13017751
5	3316.625	1256	62.13017751
6	3316.625	1256	62.13017751
7	1962.5	1256	36
8	1962.5	803.84	59.04
9	1962.5	803.84	59.04
10	1256	490.625	60.9375
11	1256	490.625	60.9375
12	803.84	490.625	38.96484375
13	803.84	314	60.9375
14	803.84	314	60.9375
15	314	176.625	43.75
16	314	176.625	43.75
17	5024	3316.625	33.984375
18	3316.625	1256	62.13017751
19	3316.625	1256	62.13017751
20	3316.625	1256	62.13017751

21	3316.625	1256	62.13017751
22	3316.625	1256	62.13017751
23	1962.5	1256	36
24	1962.5	803.84	59.04
25	1962.5	803.84	59.04
26	1256	490.625	60.9375
27	1256	490.625	60.9375
28	803.84	490.625	38.96484375
29	803.84	314	60.9375
30	803.84	314	60.9375
31	314	176.625	43.75
32	314	176.625	43.75
33	3316.625	1962.5	40.82840237
34	3316.625	1256	62.13017751
35	3316.625	1256	62.13017751
36	3316.625	1256	62.13017751
37	3316.625	1256	62.13017751
38	3316.625	1256	62.13017751
39	1962.5	1256	36
40	1962.5	803.84	59.04
41	1962.5	803.84	59.04
42	1256	490.625	60.9375
43	1256	490.625	60.9375
44	803.84	490.625	38.96484375
45	803.84	314	60.9375
46	803.84	314	60.9375
47	314	176.625	43.75
48	314	176.625	43.75

Hasil perbandingan luasan penampang pipa distribusi dibuat grafik seperti berikut :



Dari hasil perbandingan luasan penampang pipa distribusi diatas didapat beda terjauh sebesar 62.13017751 %.

Out put perhitungan Espipe Basic adalah sebagai berikut :

```
**************************************************************************
ESPIPE BASIC \ OUT PUT PROJECT \ UPN
**************************************************************************

General Data :
Many floor = 3
Number of people each floor = 150
Water usage rate in a day = 100 m3/hour
Usage hour in a day = 10hour

Equipment Data :
Water needed for fire protection = 0.4 m3/hour
Capasity of public water source pipe = 3.6 m3/hour
Elevation of input roof tank pipe = 0 meters
friction loss in head factor = 2 (per hundred potential high)
Motor pump spesification ratio = 0
Pump efficiency = 0 %
Minutes of peak flow demands = 30
Minutes of filler pump operation = 10
Elevation of water rate level = 0 meters
Elevation of highest fixture plumbing = 0 meters
Length of pipe from roof tank out put to highest fixture = 0 meters
```

Distribution system ratio = 20
Many floor using pressure storage tank = 1 floor

Pipe Data :
With pressure storage tank :
Section of pipe = 0 section
Down feed rises section of pipe = 0 section
Without pressure stoage tank :
Section of pipe = 48section
Down feed rises section of pipe = 3 section
Velocity factor for pipe materials = 100

Out Put Tank Dimention:
Maximum total demand flow per hour = 10.8 m3/hour
Maximum total demand flow per minutes = 0.27 m3/minutes
Volume of ground tank = 66 m3
Volume of roof tank = 4.5 m3
Roof tank pump motor power = (none) kW
Volume of pressure storage tank = (none) m3
Pressure used for pressure tank = (none) Kg/cm2

Elevation of each floor

Floor	Elv.(m)	Fixture Elv.(m)
1	9.35	10.05
2	5.1	5.78
3	0.85	1.53

Input pipe system (with pressure storage tank per section)

Section	Length(m)	Fixture unit	Q(l/minutes)

Input pipe system (without pressure storage tank per section)

Section	Length(m)	Fixture unit	Q(l/minutes)
1	5	162	325
2	2.85	27	149
3	1.425	25	144
4	0.675	20	131
5	0.675	18	125
6	2.025	13	108
7	4.15	4	17
8	0.85	27	64
9	0.95	25	61
10	0.75	21	54
11	1.425	19	50
12	0.675	14	41
13	0.675	12	37
14	0.675	7	25
15	0.675	5	20
16	1	4	17

17	4.25	108	272
18	2.85	27	149
19	1.425	25	144
20	0.675	20	131
21	0.675	18	125
22	2.025	13	108
23	4.15	4	17
24	0.85	27	64
25	0.95	25	61
26	0.75	21	54
27	1.425	19	50
28	0.675	14	41
29	0.675	12	37
30	0.675	7	25
31	0.675	5	20
32	1	4	17
33	4.25	54	201
34	2.85	27	149
35	1.425	25	144
36	0.675	20	131
37	0.675	18	125
38	2.025	13	108
39	4.15	4	17
40	0.85	27	64
41	0.95	25	61
42	0.75	21	54
43	1.425	19	50
44	0.675	14	41
45	0.675	12	37
46	0.675	7	25
47	0.675	5	20
48	1	4	17

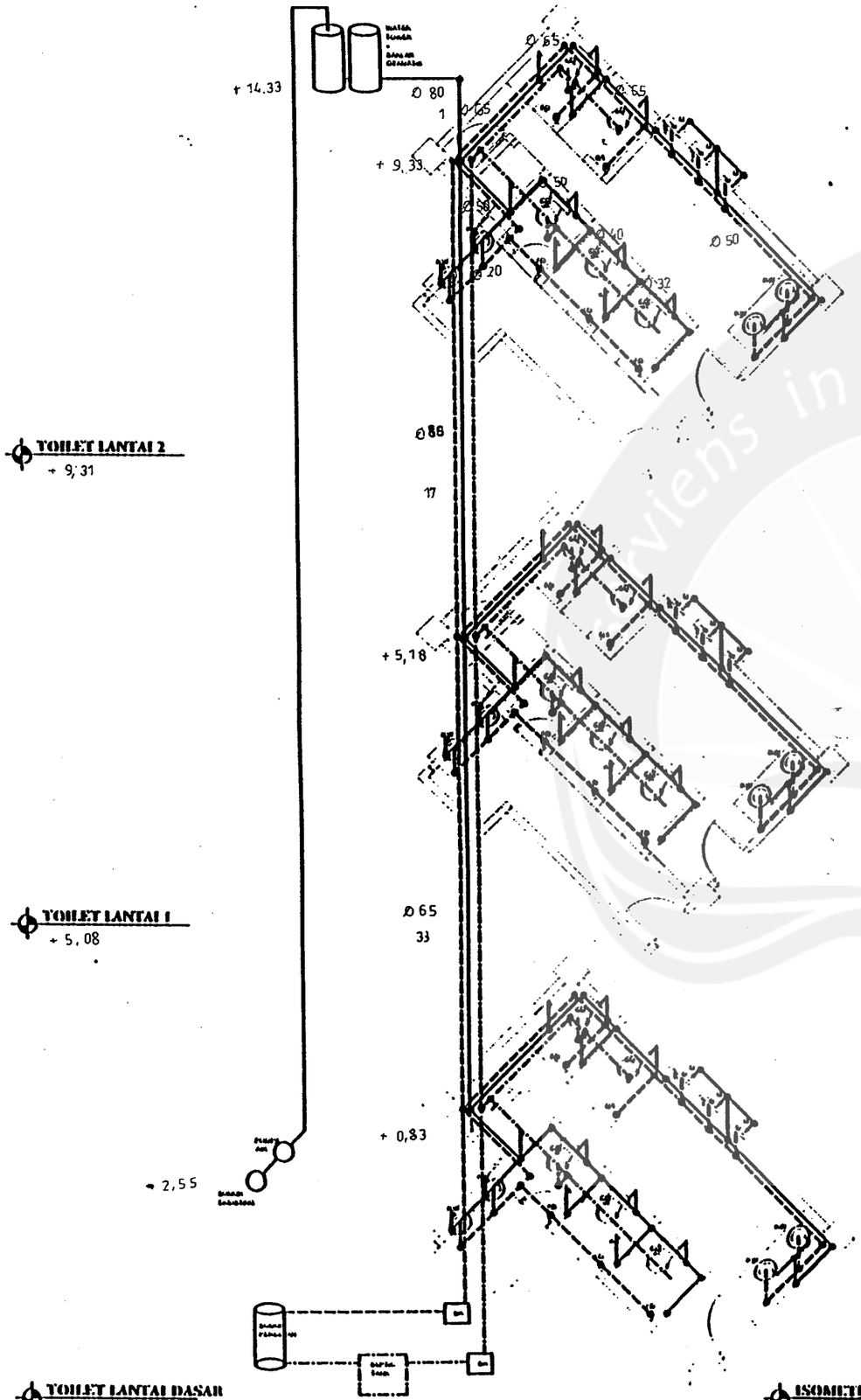
Pipe dimention (with pressure storage tank)

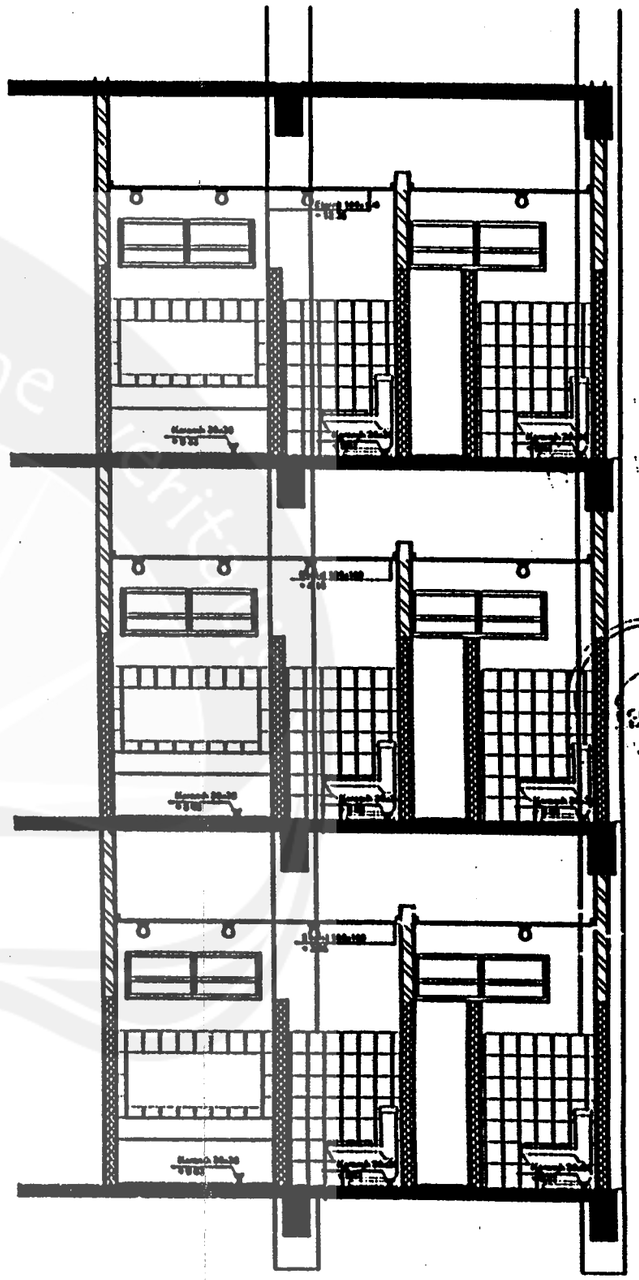
Section	Fixture unit	Q(l/minutes)	D(mm)	R(mm/m)	V(m/s)

Pipe dimention (without pressure storage tank)

Section	Fixture unit	Q(l/minutes)	D(mm)	R(mm/m)	V(m/s)
1	162	325	65	81.2154	1.6324
2	27	149	40	203.8711	1.9762
3	25	144	40	191.3834	1.9099
4	20	131	40	160.6236	1.7374
5	18	125	40	147.2663	1.6579
6	13	108	40	112.3404	1.4324
7	4	17	15	434.6815	1.6033
8	27	64	32	126.3869	1.3263
9	25	61	32	115.6353	1.2641
10	21	54	25	307.0528	1.8335

11	19	50	25	266.2669	1.6977
12	14	41	25	184.3798	1.3921
13	12	37	20	452.0031	1.9629
14	7	25	20	218.6966	1.3263
15	5	20	15	587.3228	1.8863
16	4	17	15	434.6815	1.6033
17	108	272	65	58.4068	1.3662
18	27	149	40	203.8711	1.9762
19	25	144	40	191.3834	1.9099
20	20	131	40	160.6236	1.7374
21	18	125	40	147.2663	1.6579
22	13	108	40	112.3404	1.4324
23	4	17	15	434.6815	1.6033
24	27	64	32	126.3869	1.3263
25	25	61	32	115.6353	1.2641
26	21	54	25	307.0528	1.8335
27	19	50	25	266.2669	1.6977
28	14	41	25	184.3798	1.3921
29	12	37	20	452.0031	1.9629
30	7	25	20	218.6966	1.3263
31	5	20	15	587.3228	1.8863
32	4	17	15	434.6815	1.6033
33	54	201	50	119.709	1.7061
34	27	149	40	203.8711	1.9762
35	25	144	40	191.3834	1.9099
36	20	131	40	160.6236	1.7374
37	18	125	40	147.2663	1.6579
38	13	108	40	112.3404	1.4324
39	4	17	15	434.6815	1.6033
40	27	64	32	126.3869	1.3263
41	25	61	32	115.6353	1.2641
42	21	54	25	307.0528	1.8335
43	19	50	25	266.2669	1.6977
44	14	41	25	184.3798	1.3921
45	12	37	20	452.0031	1.9629
46	7	25	20	218.6966	1.3263
47	5	20	15	587.3228	1.8863
48	4	17	15	434.6815	1.6033





POTONGAN A
Skala 1 : 50

PROYEK

PEMBANGUNAN GEDUNG KAMPUS BABARSARI
UPN "VETERAN"
BABARSARI YOGYAKARTA

PEKERJAAN

PEMBANGUNAN GEDUNG KAMPUS BABARSARI
UPN "VETERAN"
BABARSARI YOGYAKARTA
(TAHAP 2)

LOKASI

KAMPUS BABARSARI
UPN "VETERAN" YOGYAKARTA

TAHUN ANGGARAN

2002-2003

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RETNO WINARNI
JUDUL GAMBAR & SKALA

DETAIL TOILET
SKALA 1:50

KODE GAMBAR
ARCH-19
BOSTOCOPY JURUSAN ARSITEKTUR DETAIL TOILET

SENITA ARSANA PENUNJANG

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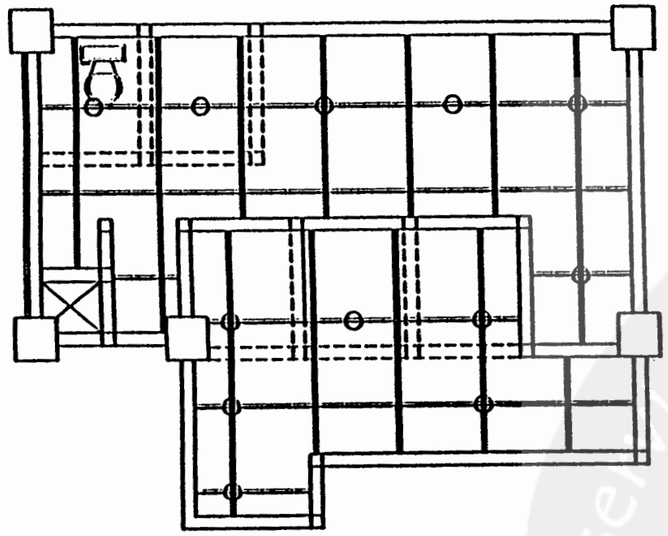
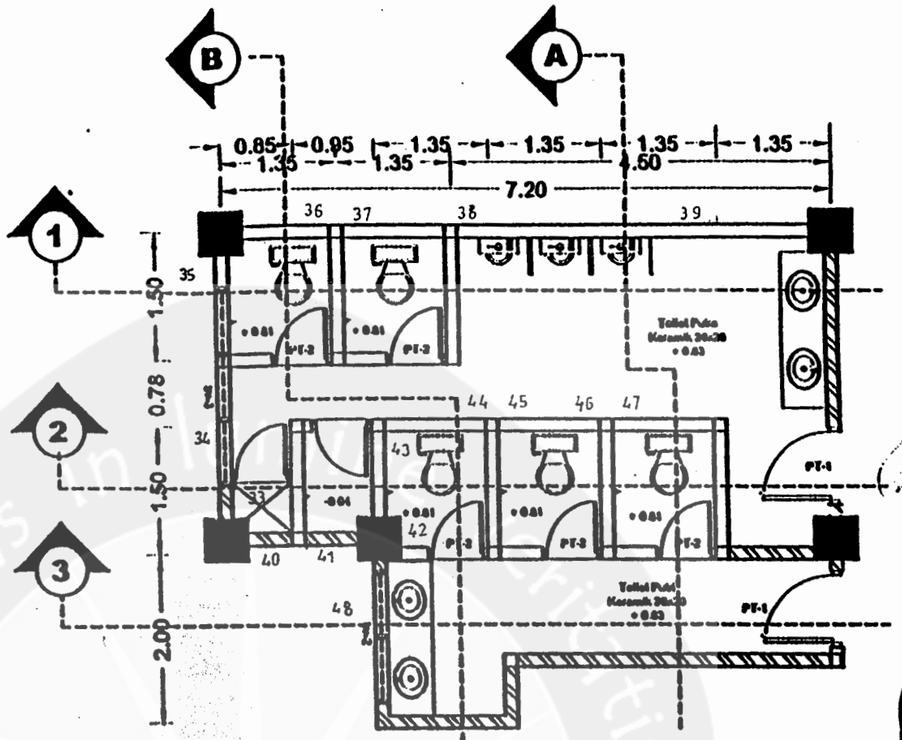
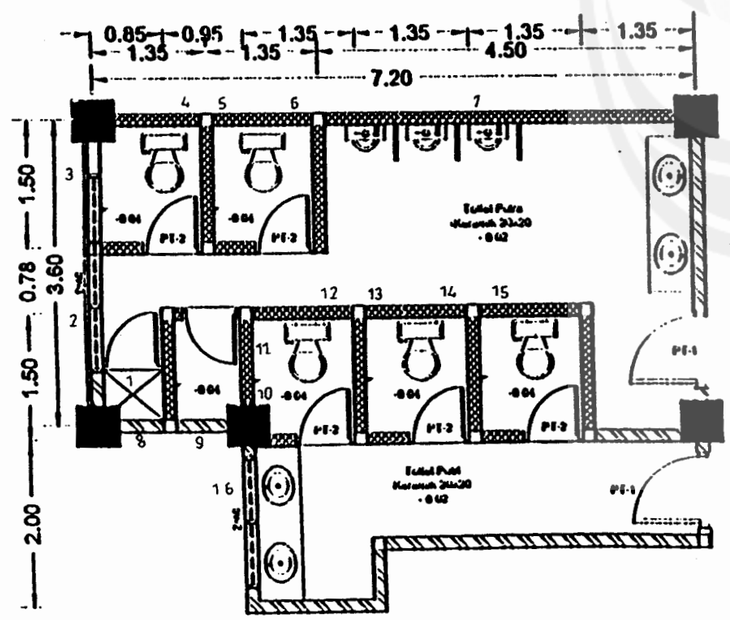


TYPICAL LT DASAR, 1& 2 RANGKA PLAFON & LAYOUT LAMPU
Skala 1 : 50



DENAH TOILET LT DASAR
Skala 1 : 50



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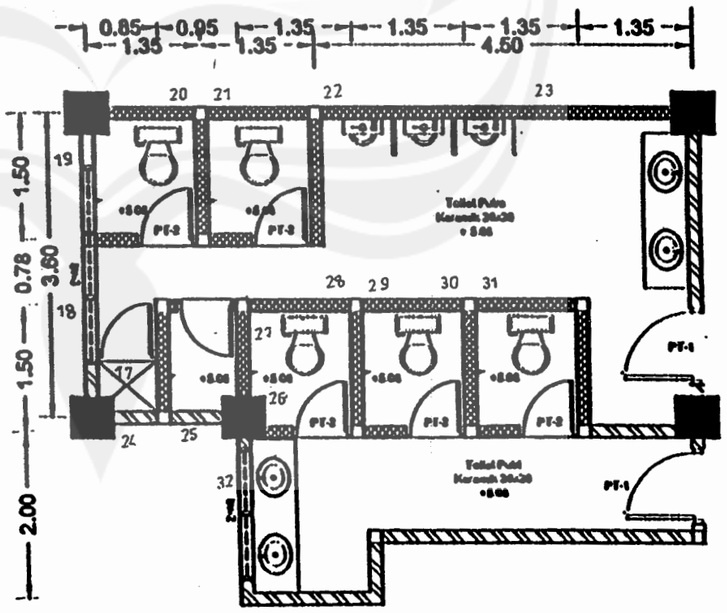
Skala 1 : 50



DENAH TOILET LT1
Skala 1 : 50

PROYEK

PEMBANGUNAN GEDUNG KAMPUS BARANSARI
UPN "VETERAN"
BARANSARI YOGYAKARTA

PEKERJAAN

PEMBANGUNAN GEDUNG KAMPUS BARANSARI
UPN "VETERAN"
BARANSARI YOGYAKARTA
(TAHAP 2)

LOKASI

KAMPUS BARANSARI
UPN "VETERAN" YOGYAKARTA

TAHUN ANGGARAN

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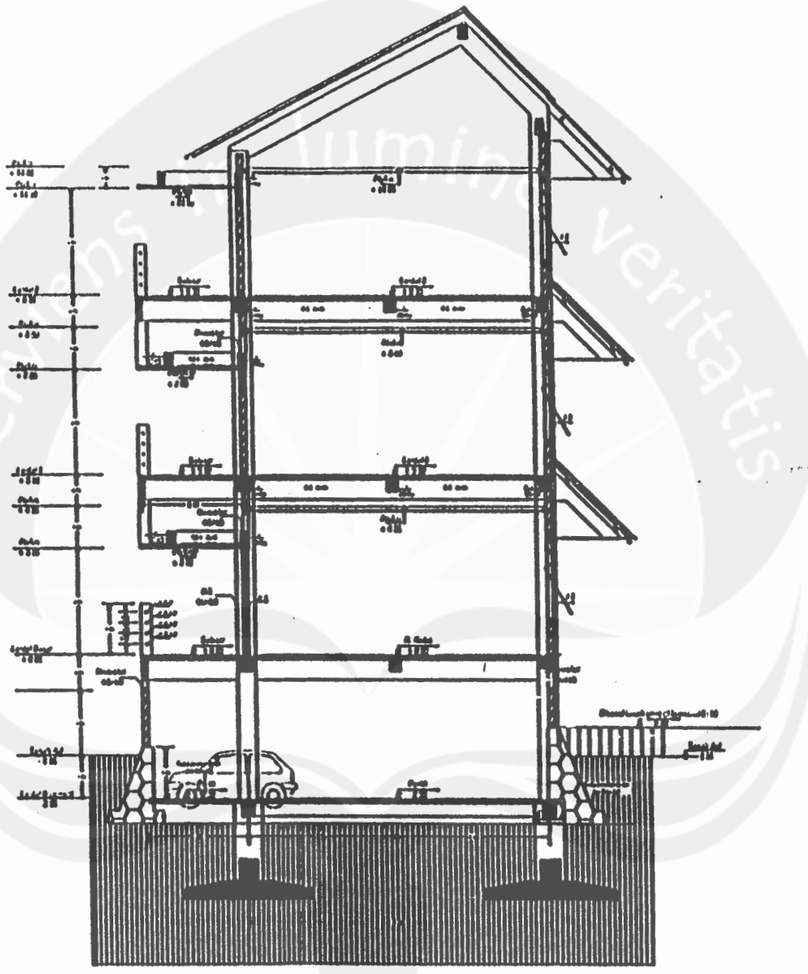
RETNO WINARNI
JUDUL GAMBAR & SKALA

DETAIL TOILET
SKALA 1:50

KODE GAMBAR
ARCH-18
SOFTCOPY AUTOCAD FILE DETAIL TOILET

REKAYA ARSIP PERUBAHAN

NO	TANGGAL	REVISI



POTONGAN 3-3
Skala 1 : 100

PROYEK

PEMBANGUNAN GEDUNG KAMPUS BAHANSARI
UPN "VETERAN"
BABARSARI YOGYAKARTA

PEKERJAAN

PEMBANGUNAN GEDUNG KAMPUS BAHANSARI
UPN "VETERAN"
BABARSARI YOGYAKARTA
(TAHAP 2)

LOKASI

KAMPUS BAHANSARI
UPN "VETERAN" YOGYAKARTA

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TAMPAK SELATAN (C)
SKALA 1:100

KODE GAMBAR

ARCH-13

DAFTAR ARAH PERUBAHAN

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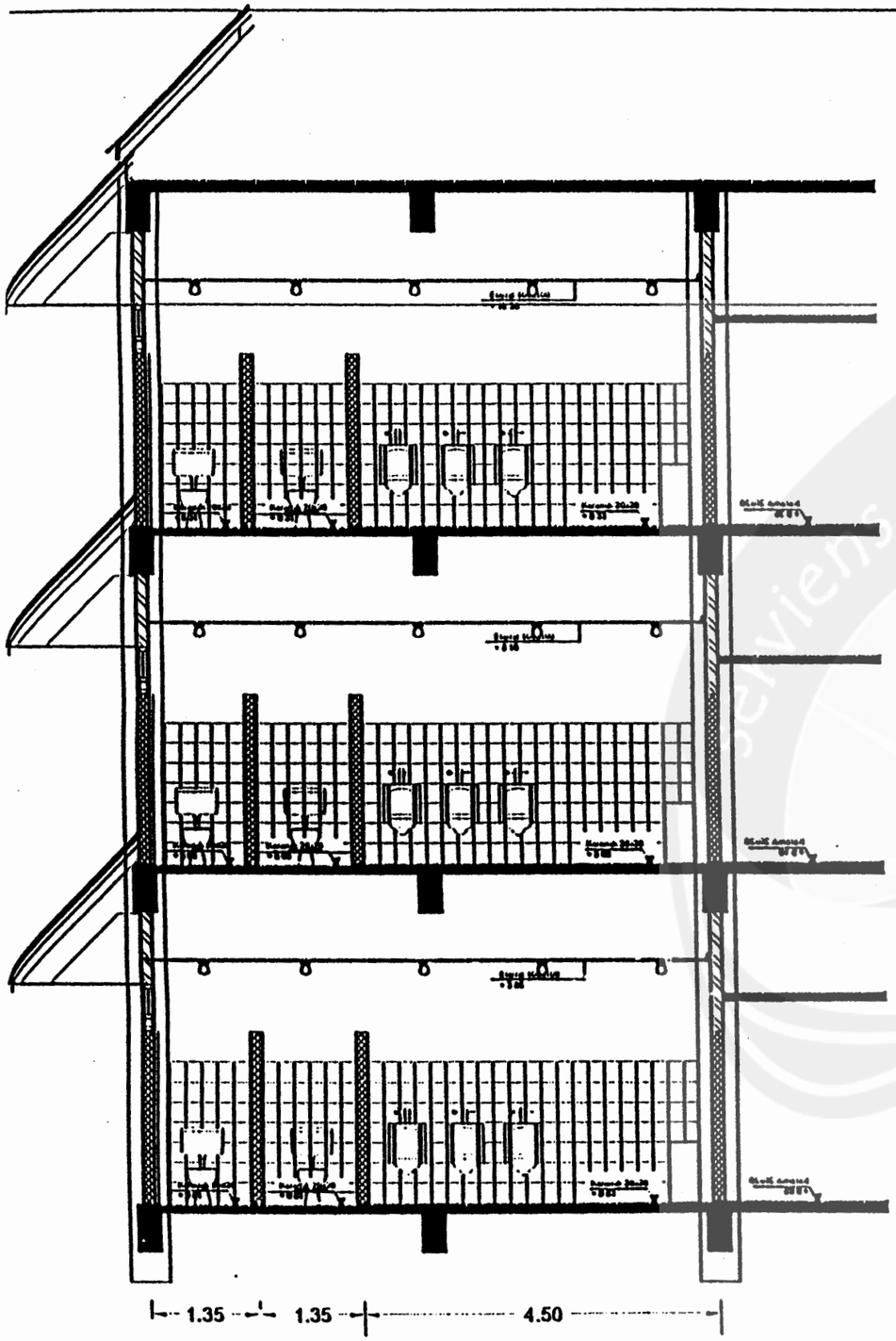
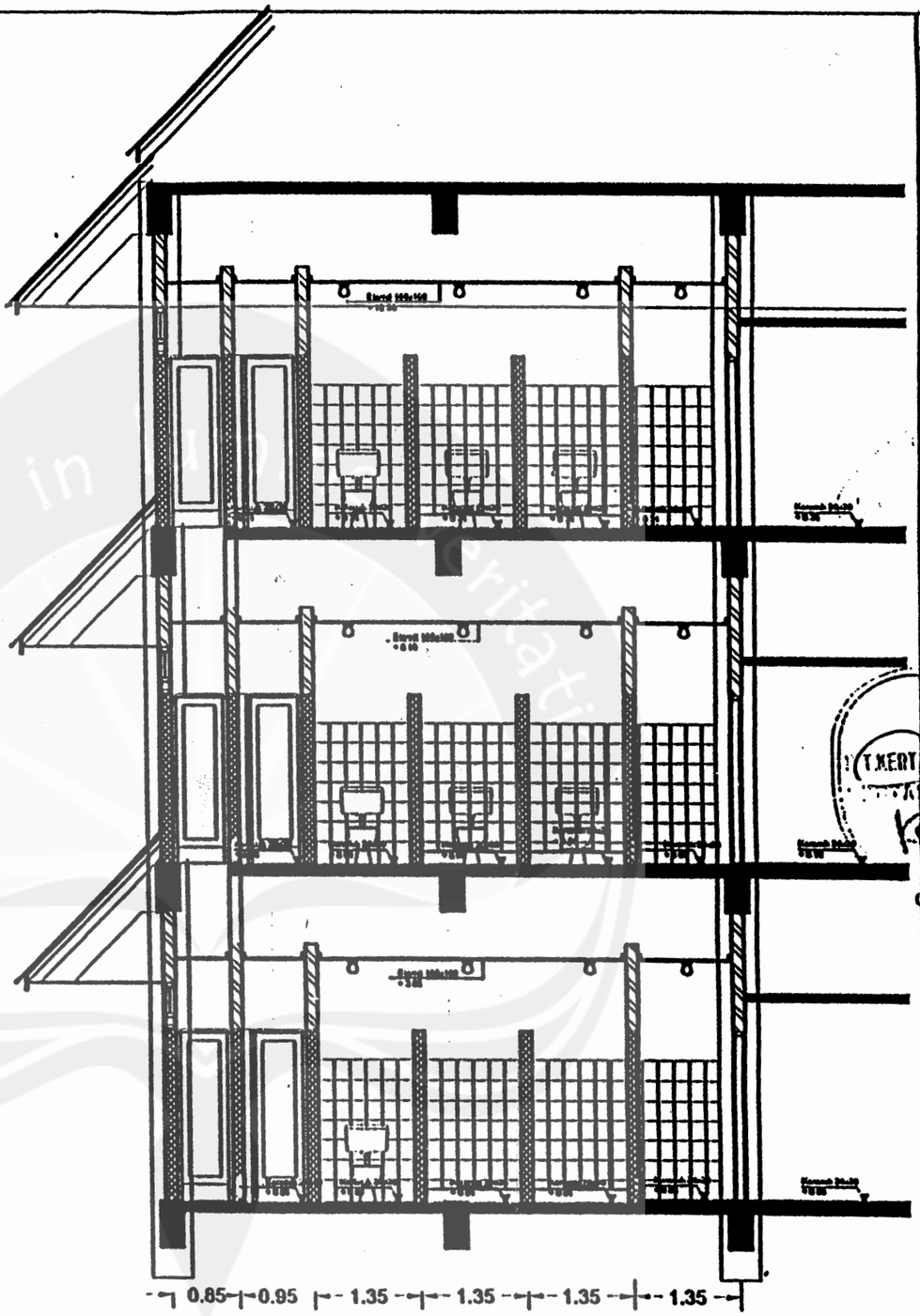


1.35 1.35 4.50

POTONGAN 1
Skala 1 : 50



0.85 0.95 1.35 1.35 1.35 1.35

POTONGAN 2
Skala 1 : 50

PROYEK

PEMBANGUNAN GEDUNG KAMPUS BABARSARI
UPN "VETERAN"
BABARSARI YOGYAKARTA

PEKERJAAN

PEMBANGUNAN GEDUNG KAMPUS BABARSARI
UPN "VETERAN"
BABARSARI YOGYAKARTA
(TAHAP 2)

LOKASI

KAMPUS BABARSARI
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MEKANIKAL ELEKTRIKAL

DIGAMBAR

JUDUL GAMBAR & SKALA

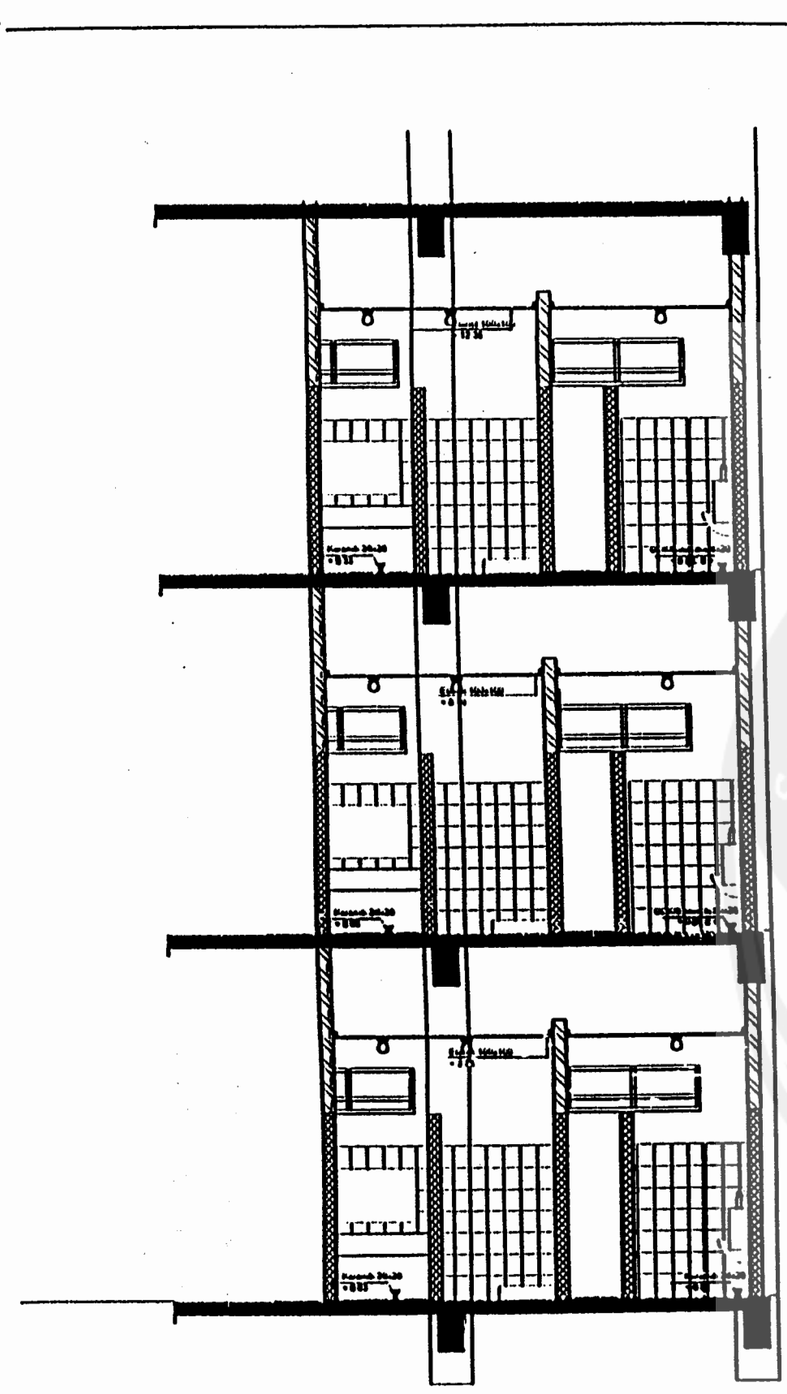
DETAIL TOILET
SKALA 1:50

KODE GAMBAR

ARCH-20
BOFOCOPY MAPHOGRAFI FINALDETAIL TOILET

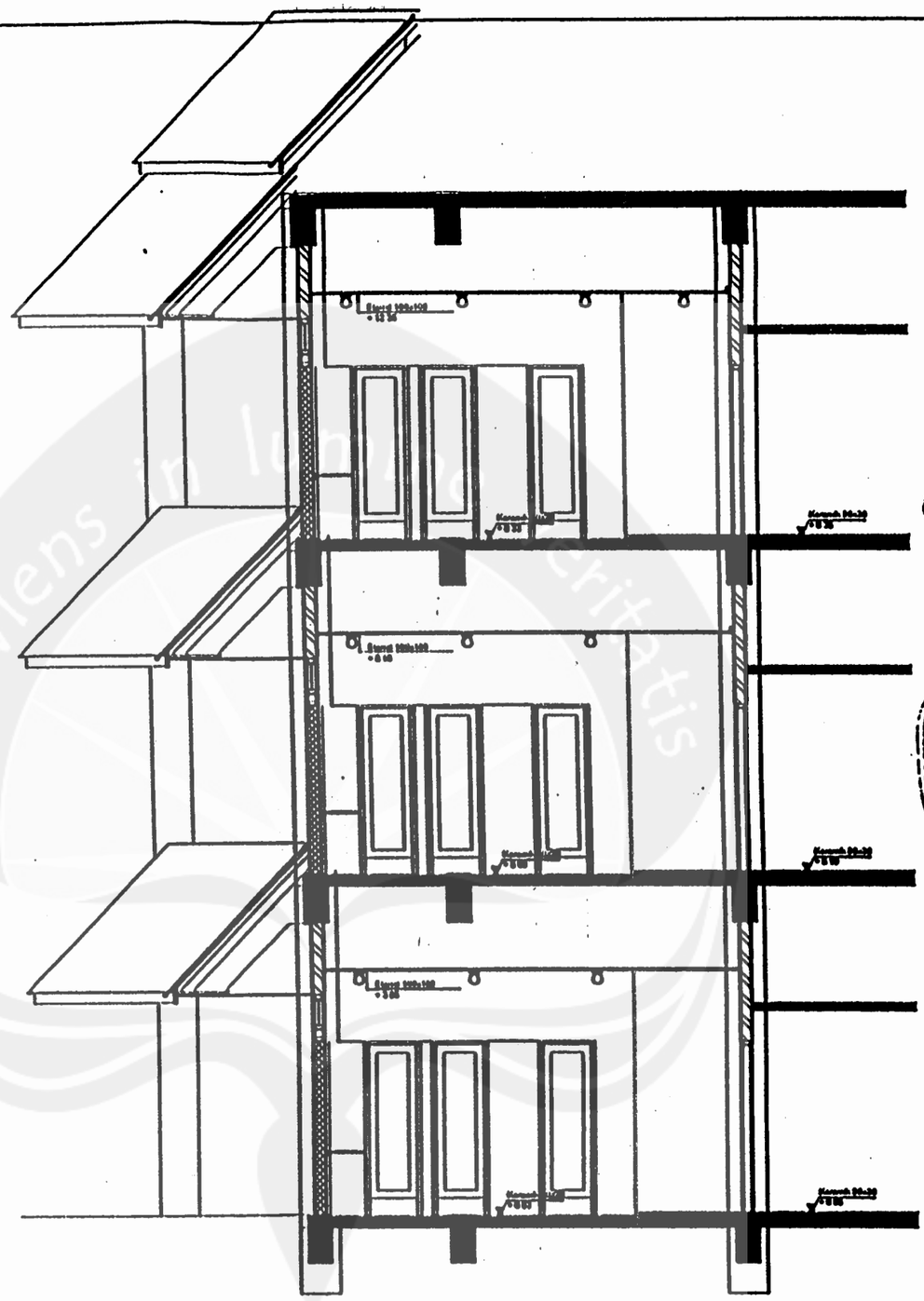
BERITA ACARA PENGUMUMAN

NO	TANGGAL	REVISI



2.00 | 1.50 | 0.78 | 1.50

POTONGAN B
Skala 1 : 50



1.35 | 1.35 | 1.35 | 1.35

POTONGAN 3
Skala 1 : 50

PROYEK

PEMBANGUNAN GEDUNG KAMPUS BABARSARI
UPN "VETERAN"
BABARSARI YOGYAKARTA

PEKERJAAN

PEMBANGUNAN GEDUNG KAMPUS BABARSARI
UPN "VETERAN"
BABARSARI YOGYAKARTA
(TAHAP 2)

LOKASI

KAMPUS BABARSARI
UPN "VETERAN" YOGYAKARTA

TAHUN ANGGARAN

2002-2003

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Drs. MUJANI BAHRI

DIGAMBAR

RETNO WINAHYU

JUDUL GAMBAR & SKALA

DETAIL TOILET
SKALA 1:50

KODE GAMBAR

ARCH-21

SOFTCOPY MAPHOCRAFT FOR DETAIL TOILET

REKITA ARSIP PERKULIAHAN

NO	TANGGAL	REVISI

APLIKASI PROGAM PADA PERENCANAAN INSTALASI PENYEDIAAN AIR BERSIH RUMAH SAKIT PANTI RAPIH GEDUNG RAWAT INAP UNIT 2

Kasus perencanaan instalasi penyediaan air bersih pada RS. Panti Rapih, Gedung Rawat Inap Unit 2. Beberapa data yang diketahui dari gambar rencana dan juga beberapa data anggapan penulis antara lain sebagai berikut :

1. Jumlah orang per lantai adalah 200 orang.
2. Lama pemakaian gedung adalah 24 jam per hari.
3. Kapasitas pipa dinas adalah 2/3 dari kebutuhan puncak per jam.
4. Sistem perpipaan yang dihitung adalah sistem A dan B.
5. Volume tangki bawah adalah 670 m^3.
6. Volume tangki atas adalah 425 m^3.
7. Alat plambing yang digunakan adalah *Bathroom Group* dengan tangki gelontor pada *closet*, dan satuan bak cuci tangan.
8. Dipakai jangka waktu kebutuhan menit puncak sebesar 6 jam, dengan waktu pengisian oleh pompa angkat adalah 10 menit.
9. Diameter pipa distribusi yang diperhitungkan adalah sebagai berikut :

Sistem A (tangki tekan)			
Section	**Panjang (m)**	**Beban unit alat plambing**	**Diameter (mm)**
1	10	307	100
2	1,5	51	80
3	2,15	6	50
4	4	45	65
5	2,15	6	50
6	4	39	65
7	2,15	6	50
8	4	12	50
9	2,15	6	50
10	17,26	23	50
11	6	8	50
12	15,34	14	50
13	9,6	2	20
14	6	1	15
15	7	12	50

16	4	12	20
17	10,77	260	100
18	2	8	40
19	1,5	2	20
20	4	6	40
21	1,5	2	20
22	4	4	32
23	1,5	2	20
24	4	2	25
25	1,5	2	23
26	15	252	100
27	13,85	108	65
28	1,5	24	40
29	0,5	6	25
30	0,5	6	25
31	4	12	40
32	0,5	6	25
33	0,5	6	25
34	13,85	84	65
35	1,5	24	40
36	0,5	6	25
37	0,5	6	25
38	4	12	40
39	0,5	6	25
40	0,5	6	25
41	13,85	60	50
42	1,5	24	40
43	0,5	6	25
44	0,5	6	25
45	4	12	40
46	0,5	6	25
47	0,5	6	25
48	13,85	36	40
49	1,5	24	40
50	0,5	6	25
51	0,5	6	25
52	4	12	40
53	0,5	6	25
54	0,5	6	25
55	7.69	12	40
56	1,5	12	40
57	1,5	6	25
58	4	6	25
59	1,5	6	25

60	1,5	144	80
61	8	84	65
62	1,5	36	50
63	0,5	6	25
64	0,5	6	25
65	4	24	40
66	0,5	6	25
67	0,5	6	25
68	4	12	40
69	0,5	6	25
70	0,5	6	25
71	7.69	48	50
72	1,5	48	50
73	0,5	6	25
74	0,5	6	25
75	4	36	50
76	0,5	6	25
77	0,5	6	25
78	4	24	40
79	0,5	6	25
80	0.5	6	25
81	6	12	40
82	0,5	6	25
83	0,5	6	25
84	6,15	12	65
85	1,5	12	40
86	0,5	6	25
87	4	6	25
88	0,5	6	25
89	2,3	48	50
90	1,5	48	50
91	0,5	6	25
92	0,5	6	25
93	4	36	50
94	0,5	6	25
95	0,5	6	25
96	4	24	40
97	0,5	6	25
98	0,5	6	25
99	4	12	40
100	0,5	6	25
101	0,5	6	25

Sistem B (tanpa tangki tekan)			
Section	**Panjang (m)**	**Beban unit alat plambing**	**Diameter (mm)**
1	26	88	80
2	0,5	1	15
3	14,35	12	65
4	0,5	6	50
5	4	6	65
6	0,5	6	50
7	2,05	60	80
8	10,25	24	40
9	0,5	6	25
10	0,5	6	25
11	12,3	12	40
12	0,5	6	25
13	0,5	6	25
14	4,1	21	65
15	2,2	6	25
16	4	8	40
17	6,4	8	40
18	9,6	2	20
19	9,6	1	15
20	24,6	15	50
21	14,35	14	50
22	6,05	8	40
23	3,2	8	40
24	6,4	2	20
25	3,2	1	15
26	4	15	50
27	12,8	7	50
28	17,6	6	50
29	9,6	8	32
30	32	7	32
31	8	1	15

10. Keterangan lain dapat dilihat pada gambar rencana.

Data volume tangki dan diameter pipa dibandingkan dengan hasil perhitungan dengan Espipe Basic. Hasil perbandingan tersebut adalah sebagai berikut :

1. Perbandingan volume tangki

Volume tangki			
Tangki	**Data (m3)**	**Hasil perhitungan Espipe Basic (m3)**	**beda (%)**
Tangki Bawah	670	768	14.6269
Tangki Atas	425	480	12.9412

Dari hasil perbandingan tabel diatas dapat dilihat bahwa hasil perhitungan volume tangki bawah dengan Espipe Basic membesar 14,6269 %, sedangkan volume tangki atas membesar 12.9412 %.

2. Perbandingan dimensi pipa sistem A

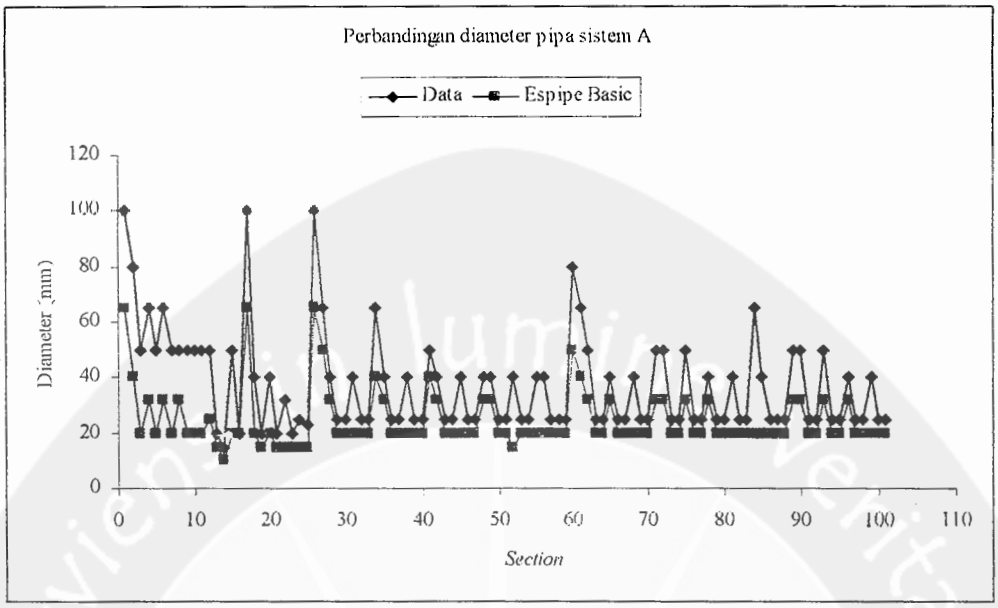
Perbandingan diameter pipa distribusi pada sistem A adalah sebagai berikut :

Sistem A (tangki tekan)			
Section	**Diameter (mm)**	**Out put Diam. (mm)**	**Beda (%)**
1	100	65	35
2	80	40	50
3	50	20	60
4	65	32	50.76923
5	50	20	60
6	65	32	50.76923
7	50	20	60
8	50	32	36
9	50	20	60
10	50	20	60
11	50	20	60
12	50	25	50
13	20	15	25
14	15	10	33.33333
15	50	20	60
16	20	20	0
17	100	65	35
18	40	20	50
19	20	15	25
20	40	20	50
21	20	15	25
22	32	15	53.125

23	20	15	25
24	25	15	40
25	23	15	34.78261
26	100	65	35
27	65	50	23.07692
28	40	32	20
29	25	20	20
30	25	20	20
31	40	20	50
32	25	20	20
33	25	20	20
34	65	40	38.46154
35	40	32	20
36	25	20	20
37	25	20	20
38	40	20	50
39	25	20	20
40	25	20	20
41	50	40	20
42	40	32	20
43	25	20	20
44	25	20	20
45	40	20	50
46	25	20	20
47	25	20	20
48	40	32	20
49	40	32	20
50	25	20	20
51	25	20	20
52	40	15	62.5
53	25	20	20
54	25	20	20
55	40	20	50
56	40	20	50
57	25	20	20
58	25	20	20
59	25	20	20
60	80	50	37.5
61	65	40	38.46154
62	50	32	36
63	25	20	20
64	25	20	20
65	40	32	20
66	25	20	20

67	25	20	20
68	40	20	50
69	25	20	20
70	25	20	20
71	50	32	36
72	50	32	36
73	25	20	20
74	25	20	20
75	50	32	36
76	25	20	20
77	25	20	20
78	40	32	20
79	25	20	20
80	25	20	20
81	40	20	50
82	25	20	20
83	25	20	20
84	65	20	69.23077
85	40	20	50
86	25	20	20
87	25	20	20
88	25	20	20
89	50	32	36
90	50	32	36
91	25	20	20
92	25	20	20
93	50	32	36
94	25	20	20
95	25	20	20
96	40	32	20
97	25	20	20
98	25	20	20
99	40	20	50
100	25	20	20
101	25	20	20

Hasil perbandingan diameter pipa sistem A dibuat grafik seperti pada gambar berikut :



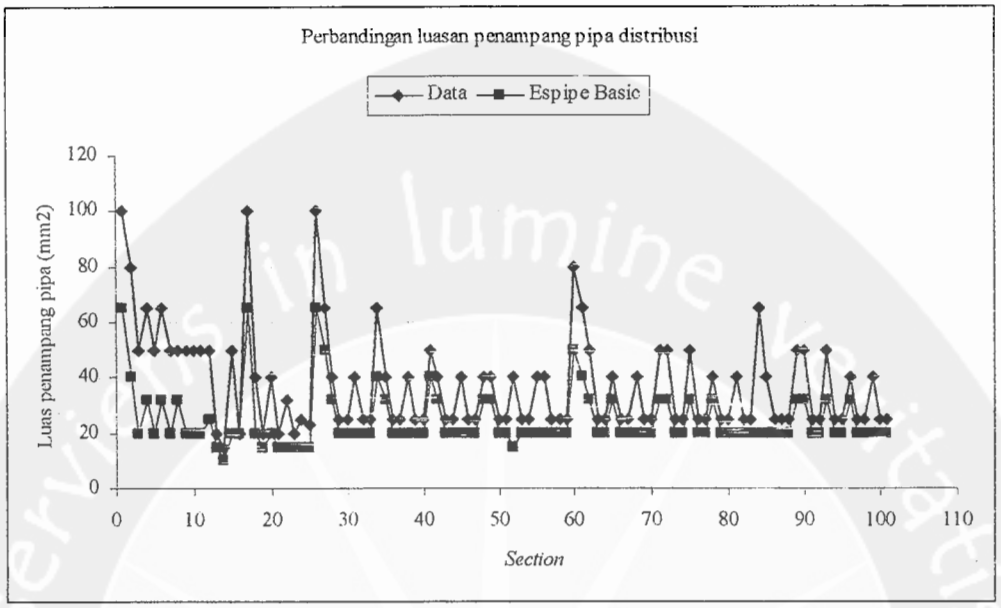
Dari hasil perbandingan diameter diatas didapat beda terjauh sebesar 69.23077 %, sedangkan perbandingan luasan penampang pipa distribusi adalah sebagai berikut :

Sistem A (tangki tekan)			
Section	**A (mm2)**	**Out put A (mm2)**	**Beda (%)**
1	7850	3316.625	57.75
2	5024	1256	75
3	1962.5	314	84
4	3316.63	803.84	75.76331
5	1962.5	314	84
6	3316.63	803.84	75.76331
7	1962.5	314	84
8	1962.5	803.84	59.04
9	1962.5	314	84
10	1962.5	314	84
11	1962.5	314	84
12	1962.5	490.625	75
13	314	176.625	43.75
14	176.625	78.5	55.55556
15	1962.5	314	84
16	314	314	0
17	7850	3316.625	57.75
18	1256	314	75

19	314	176.625	43.75
20	1256	314	75
21	314	176.625	43.75
22	803.84	176.625	78.02734
23	314	176.625	43.75
24	490.625	176.625	64
25	415.265	176.625	57.46692
26	7850	3316.625	57.75
27	3316.63	1962.5	40.8284
28	1256	803.84	36
29	490.625	314	36
30	490.625	314	36
31	1256	314	75
32	490.625	314	36
33	490.625	314	36
34	3316.63	1256	62.13018
35	1256	803.84	36
36	490.625	314	36
37	490.625	314	36
38	1256	314	75
39	490.625	314	36
40	490.625	314	36
41	1962.5	1256	36
42	1256	803.84	36
43	490.625	314	36
44	490.625	314	36
45	1256	314	75
46	490.625	314	36
47	490.625	314	36
48	1256	803.84	36
49	1256	803.84	36
50	490.625	314	36
51	490.625	314	36
52	1256	176.625	85.9375
53	490.625	314	36
54	490.625	314	36
55	1256	314	75
56	1256	314	75
57	490.625	314	36
58	490.625	314	36
59	490.625	314	36
60	5024	1962.5	60.9375
61	3316.63	1256	62.13018
62	1962.5	803.84	59.04

63	490.625	314	36
64	490.625	314	36
65	1256	803.84	36
66	490.625	314	36
67	490.625	314	36
68	1256	314	75
69	490.625	314	36
70	490.625	314	36
71	1962.5	803.84	59.04
72	1962.5	803.84	59.04
73	490.625	314	36
74	490.625	314	36
75	1962.5	803.84	59.04
76	490.625	314	36
77	490.625	314	36
78	1256	803.84	36
79	490.625	314	36
80	490.625	314	36
81	1256	314	75
82	490.625	314	36
83	490.625	314	36
84	3316.63	314	90.53254
85	1256	314	75
86	490.625	314	36
87	490.625	314	36
88	490.625	314	36
89	1962.5	803.84	59.04
90	1962.5	803.84	59.04
91	490.625	314	36
92	490.625	314	36
93	1962.5	803.84	59.04
94	490.625	314	36
95	490.625	314	36
96	1256	803.84	36
97	490.625	314	36
98	490.625	314	36
99	1256	314	75
100	490.625	314	36
101	490.625	314	36

Hasil perbandingan luasan penampang pipa distribusi dibuat grafik seperti berikut :



Dari hasil perbandingan luasan penampang pipa distribusi diatas didapat beda terjauh sebesar 90.53254 %.

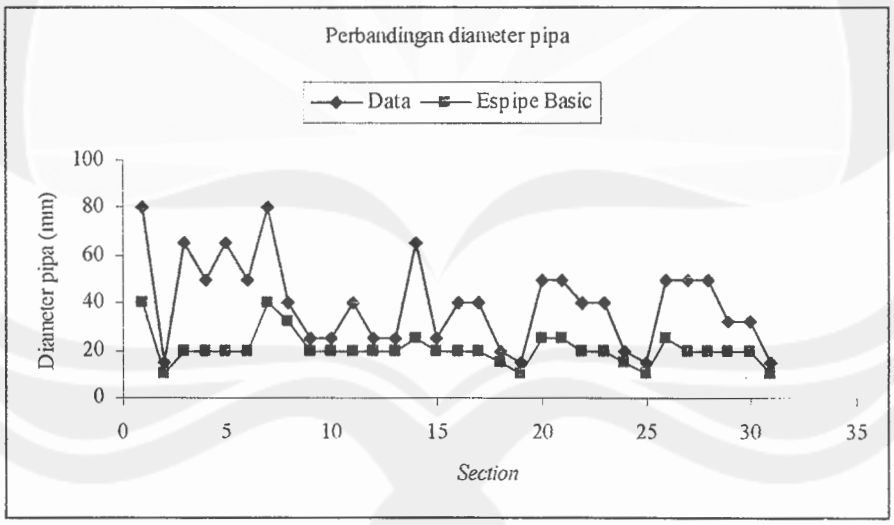
3. Perbandingan dimensi pipa sistem B

Perbandingan diameter pipa distribusi pada sistem B adalah sebagai berikut :

Sistem B (tanpa tangki tekan)			
Section	**Diameter (mm)**	**Out put Diam. (mm)**	**Beda (%)**
1	80	40	50
2	15	10	33.33333
3	65	20	69.23077
4	50	20	60
5	65	20	69.23077
6	50	20	60
7	80	40	50
8	40	32	20
9	25	20	20
10	25	20	20
11	40	20	50
12	25	20	20
13	25	20	20
14	65	25	61.53846
15	25	20	20

16	40	20	50
17	40	20	50
18	20	15	25
19	15	10	33.33333
20	50	25	50
21	50	25	50
22	40	20	50
23	40	20	50
24	20	15	25
25	15	10	33.33333
26	50	25	50
27	50	20	60
28	50	20	60
29	32	20	37.5
30	32	20	37.5
31	15	10	33.33333

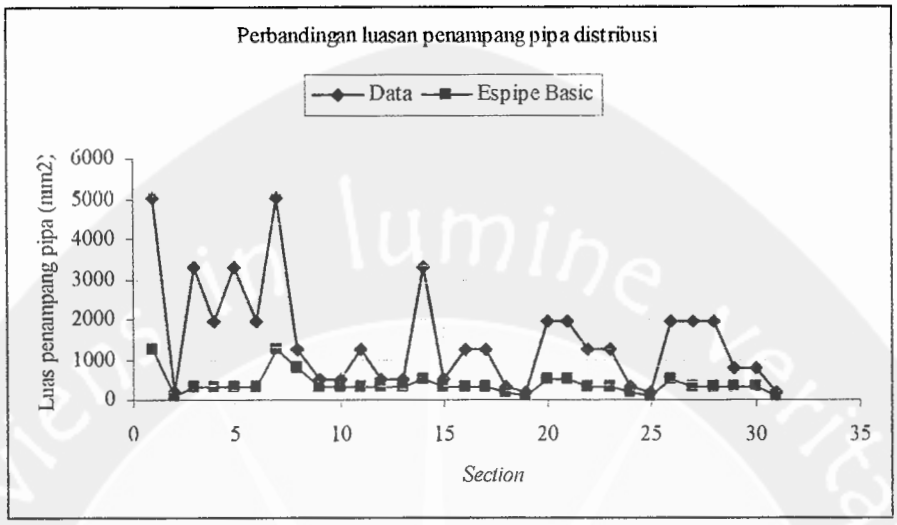
Hasil perbandingan diameter pipa distribusi sistem B dibuat grafik seperti pada gambar berikut :



Dari hasil perbandingan diameter diatas didapat beda terjauh sebesar 69.23077 %, sedangkan perbandingan luasan penampang pipa distribusi adalah sebagai berikut :

Sistem B (tanpa tangki tekan)			
Section	**A (mm2)**	**Out put A (mm2)**	**Beda (%)**
1	5024	1256	75
2	176.625	78.5	55.55555556
3	3316.625	314	90.53254438
4	1962.5	314	84
5	3316.625	314	90.53254438
6	1962.5	314	84
7	5024	1256	75
8	1256	803.84	36
9	490.625	314	36
10	490.625	314	36
11	1256	314	75
12	490.625	314	36
13	490.625	314	36
14	3316.625	490.625	85.20710059
15	490.625	314	36
16	1256	314	75
17	1256	314	75
18	314	176.625	43.75
19	176.625	78.5	55.55555556
20	1962.5	490.625	75
21	1962.5	490.625	75
22	1256	314	75
23	1256	314	75
24	314	176.625	43.75
25	176.625	78.5	55.55555556
26	1962.5	490.625	75
27	1962.5	314	84
28	1962.5	314	84
29	803.84	314	60.9375
30	803.84	314	60.9375
31	176.625	78.5	55.55555556

Hasil perbandingan luasan penampang pipa distribusi dibuat grafik seperti pada gambar berikut :



Dari hasil perbandingan luasan penampang pipa distribusi diatas didapat beda terjauh sebesar 90.53254438 %.

Out put perhitungan dengan Espipe Basic adalah sebagai berikut :

```
**************************************************************************
ESPIPE BASIC \ OUT PUT PROJECT \ RS
**************************************************************************

General Data :
Many floor = 6
Number of people each floor = 200
Water usage rate in a day = 1500 m3/hour
Usage hour in a day = 24hour

Equipment Data :
Water needed for fire protection = 0.4 m3/hour
Capasity of public water source pipe = 60 m3/hour
Elevation of input roof tank pipe = 32 meters
friction loss in head factor = 20 (per hundred potential high)
Motor pump spesification ratio = 0.2
Pump efficiency = 55 %
Minutes of peak flow demands = 300
Minutes of filler pump operation = 10
Elevation of water rate level = 31.5 meters
Elevation of highest fixture plumbing = 21.7 meters
Length of pipe from roof tank out put to highest fixture = 11.5 meters
Distribution system ratio = 25
Many floor using pressure storage tank = 4 floor
```

Pipe Data :
With pressure storage tank :
Section of pipe = 101 section
Down feed rises section of pipe = 11 section
Without pressure stoage tank :
Section of pipe = 31section
Down feed rises section of pipe = 4 section
Velocity factor for pipe materials = 100

Out Put Tank Dimention:
Maximum total demand flow per hour = 180 m3/hour
Maximum total demand flow per minutes = 4.5 m3/minutes
Volume of ground tank = 768 m3
Volume of roof tank = 480 m3
Roof tank pump motor power = 111.73 kW
Volume of pressure storage tank = 105 m3
Pressure used for pressure tank = 1.5 Kg/cm2

Elevation of each floor

Floor	Elv.(m)	Fixture Elv.(m)
1	20	21.7
2	16	17.7
3	12	13.7
4	8	9.7
5	4	5.7
6	0	1.7

Input pipe system (with pressure storage tank per section)

Section	Length(m)	Fixture unit	Q(l/minutes)
1	10	307	342
2	1.5	51	99
3	2.15	6	23
4	4	45	91
5	2.15	6	23
6	4	39	82
7	2.15	6	23
8	17.26	12	37
9	6	6	23
10	15.34	23	57
11	9.6	8	28
12	6	14	41
13	7	2	11
14	4	1	7
15	10.77	12	37
16	2	12	37
17	1.5	260	305
18	4	8	28

19	1.5	2	11
20	4	6	23
21	1.5	2	11
22	4	4	17
23	1.5	2	11
24	4	2	11
25	1.5	2	11
26	15	252	298
27	13.85	108	166
28	1.5	28	66
29	0.5	6	23
30	0.5	6	23
31	4	12	37
32	0.5	6	23
33	0.5	6	23
34	13.85	84	140
35	1.5	24	59
36	0.5	6	23
37	0.5	6	23
38	4	12	37
39	0.5	6	23
40	0.5	6	23
41	13.85	60	111
42	1.5	24	59
43	0.5	6	23
44	0.5	6	23
45	4	12	37
46	0.5	6	23
47	0.5	6	23
48	13.85	36	78
49	1.5	24	59
50	0.5	6	23
51	0.5	6	23
52	4	4	17
53	0.5	6	23
54	0.5	6	23
55	7.69	12	37
56	1.5	12	37
57	1.5	6	23
58	4	6	23
59	1.5	6	23
60	1.5	144	203
61	8	84	140
62	1.5	36	78
63	0.5	6	23
64	0.5	6	23
65	4	24	59
66	0.5	6	23

67	0.5	6	23
68	4	12	37
69	0.5	6	23
70	0.5	6	23
71	7.69	48	95
72	1.5	48	95
73	0.5	6	23
74	0.5	6	23
75	4	36	78
76	0.5	6	23
77	0.5	6	23
78	4	24	59
79	0.5	6	23
80	0.5	6	23
81	6	12	37
82	0.5	6	23
83	0.5	6	23
84	6.15	12	37
85	1.5	12	37
86	0.5	6	23
87	4	6	23
88	0.5	6	23
89	2.3	48	95
90	1.5	48	95
91	0.5	6	23
92	0.5	6	23
93	4	36	78
94	0.5	6	23
95	0.5	6	23
96	4	24	59
97	0.5	6	23
98	0.5	6	23
99	4	12	37
100	0.5	6	23
101	0.5	6	23

Input pipe system (without pressure storage tank per section)

Section	Length(m)	Fixture unit	Q(l/minutes)
1	26	88	144
2	0.5	1	7
3	14.35	12	37
4	0.5	6	23
5	4	6	23
6	0.5	6	23
7	2.05	60	111
8	10.25	24	59
9	0.5	6	23
10	0.5	6	23

11	12.3	12	37
12	0.5	6	23
13	0.5	6	23
14	4.1	21	54
15	2.2	6	23
16	4	8	28
17	6.4	8	28
18	9.6	2	11
19	9.6	1	7
20	24.6	15	43
21	14.35	14	41
22	6.05	8	28
23	3.2	8	28
24	6.4	2	11
25	3.2	1	7
26	4	15	43
27	12.8	7	25
28	17.6	6	23
29	9.6	8	28
30	32	7	25
31	8	1	7

Pipe dimention (with pressure storage tank)

Section	Fixture unit	Q(l/minutes)	D(mm)	R(mm/m)	V(m/s)
1	307	342	65	89.26	1.7177
2	51	99	40	95.62	1.313
3	6	23	20	187.41	1.2202
4	45	91	32	242.54	1.8858
5	6	23	20	187.41	1.2202
6	39	82	32	200	1.6993
7	6	23	20	187.41	1.2202
8	12	37	20	452	1.9629
9	6	23	20	187.41	1.2202
10	23	57	25	339.39	1.9353
11	8	28	20	269.77	1.4854
12	14	41	25	184.38	1.3921
13	2	11	15	194.12	1.0375
14	1	7	10	605.6	1.4854
15	12	37	20	452	1.9629
16	12	37	20	452	1.9629
17	260	305	65	72.2	1.5319
18	8	28	20	269.77	1.4854
19	2	11	15	194.12	1.0375
20	6	23	20	187.41	1.2202
21	2	11	15	194.12	1.0375
22	4	17	15	434.68	1.6033
23	2	11	15	194.12	1.0375
24	2	11	15	194.12	1.0375

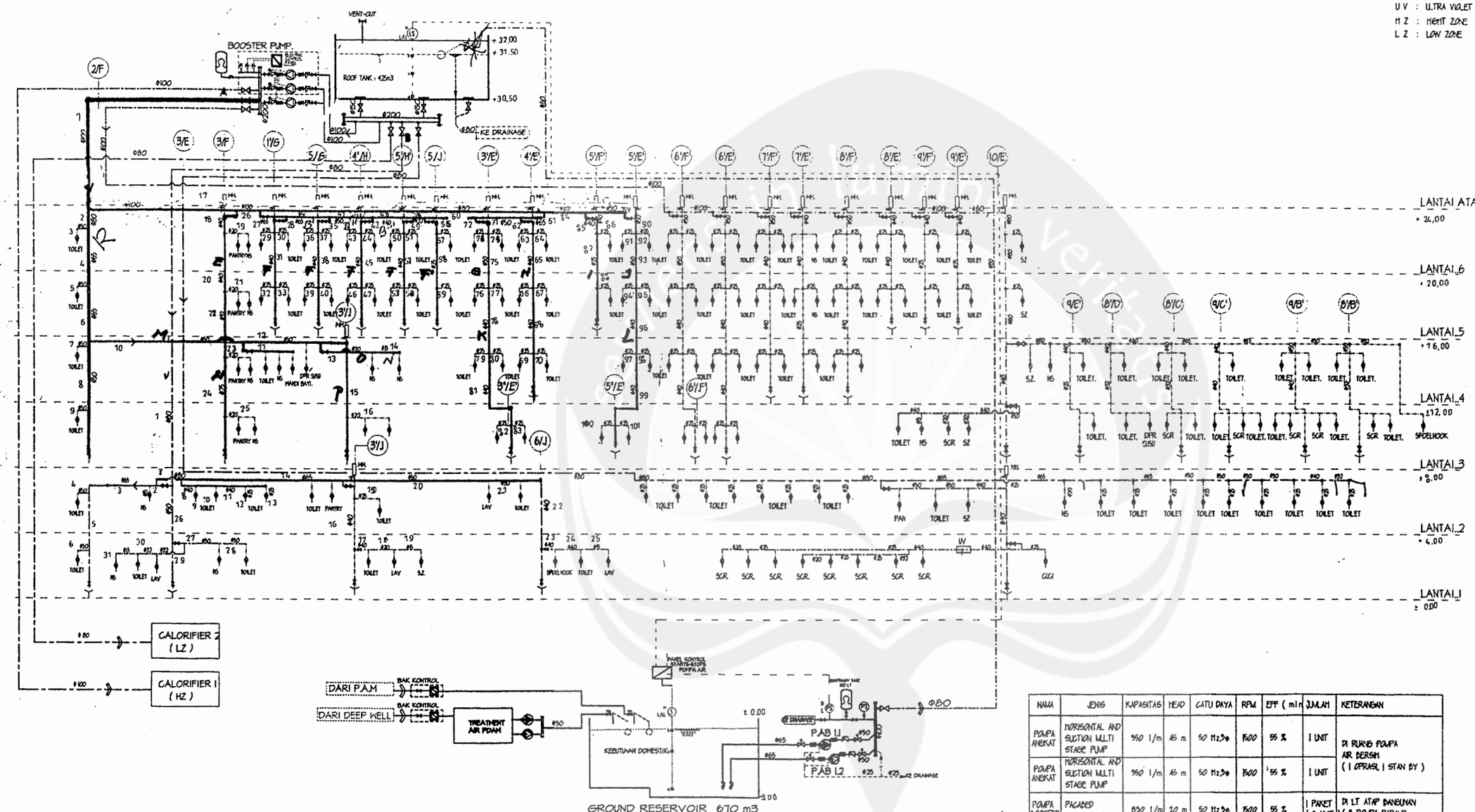
25	2	11	15	194.12	1.0375
26	252	298	65	69.16	1.4967
27	108	166	50	84	1.4091
28	28	66	32	133.8	1.3677
29	6	23	20	187.41	1.2202
30	6	23	20	187.41	1.2202
31	12	37	20	452	1.9629
32	6	23	20	187.41	1.2202
33	6	23	20	187.41	1.2202
34	84	140	40	181.66	1.8568
35	24	59	32	108.71	1.2227
36	6	23	20	187.41	1.2202
37	6	23	20	187.41	1.2202
38	12	37	20	452	1.9629
39	6	23	20	187.41	1.2202
40	6	23	20	187.41	1.2202
41	60	111	40	118.19	1.4722
42	24	59	32	108.71	1.2227
43	6	23	20	187.41	1.2202
44	6	23	20	187.41	1.2202
45	12	37	20	452	1.9629
46	6	23	20	187.41	1.2202
47	6	23	20	187.41	1.2202
48	36	78	32	182.31	1.6164
49	24	59	32	108.71	1.2227
50	6	23	20	187.41	1.2202
51	6	23	20	187.41	1.2202
52	4	17	15	434.68	1.6033
53	6	23	20	187.41	1.2202
54	6	23	20	187.41	1.2202
55	12	37	20	452	1.9629
56	12	37	20	452	1.9629
57	6	23	20	187.41	1.2202
58	6	23	20	187.41	1.2202
59	6	23	20	187.41	1.2202
60	144	203	50	121.92	1.7231
61	84	140	40	181.66	1.8568
62	36	78	32	182.31	1.6164
63	6	23	20	187.41	1.2202
64	6	23	20	187.41	1.2202
65	24	59	32	108.71	1.2227
66	6	23	20	187.41	1.2202
67	6	23	20	187.41	1.2202
68	12	37	20	452	1.9629
69	6	23	20	187.41	1.2202
70	6	23	20	187.41	1.2202
71	48	95	32	262.65	1.9687
72	48	95	32	262.65	1.9687

73	6	23	20	187.41	1.2202
74	6	23	20	187.41	1.2202
75	36	78	32	182.31	1.6164
76	6	23	20	187.41	1.2202
77	6	23	20	187.41	1.2202
78	24	59	32	108.71	1.2227
79	6	23	20	187.41	1.2202
80	6	23	20	187.41	1.2202
81	12	37	20	452	1.9629
82	6	23	20	187.41	1.2202
83	6	23	20	187.41	1.2202
84	12	37	20	452	1.9629
85	12	37	20	452	1.9629
86	6	23	20	187.41	1.2202
87	6	23	20	187.41	1.2202
88	6	23	20	187.41	1.2202
89	48	95	32	262.65	1.9687
90	48	95	32	262.65	1.9687
91	6	23	20	187.41	1.2202
92	6	23	20	187.41	1.2202
93	36	78	32	182.31	1.6164
94	6	23	20	187.41	1.2202
95	6	23	20	187.41	1.2202
96	24	59	32	108.71	1.2227
97	6	23	20	187.41	1.2202
98	6	23	20	187.41	1.2202
99	12	37	20	452	1.9629
100	6	23	20	187.41	1.2202
101	6	23	20	187.41	1.2202

Pipe dimention (without pressure storage tank)

Section	Fixture unit	Q(l/minutes)	D(mm)	R(mm/m)	V(m/s)
1	88	144	40	191.38	1.9099
2	1	7	10	605.6	1.4854
3	12	37	20	452	1.9629
4	6	23	20	187.41	1.2202
5	6	23	20	187.41	1.2202
6	6	23	20	187.41	1.2202
7	60	111	40	118.19	1.4722
8	24	59	32	108.71	1.2227
9	6	23	20	187.41	1.2202
10	6	23	20	187.41	1.2202
11	12	37	20	452	1.9629
12	6	23	20	187.41	1.2202
13	6	23	20	187.41	1.2202
14	21	54	25	307.05	1.8335
15	6	23	20	187.41	1.2202
16	8	28	20	269.77	1.4854

17	8	28	20	269.77	1.4854
18	2	11	15	194.12	1.0375
19	1	7	10	605.6	1.4854
20	15	43	25	201.38	1.46
21	14	41	25	184.38	1.3921
22	8	28	20	269.77	1.4854
23	8	28	20	269.77	1.4854
24	2	11	15	194.12	1.0375
25	1	7	10	605.6	1.4854
26	15	43	25	201.38	1.46
27	7	25	20	218.7	1.3263
28	6	23	20	187.41	1.2202
29	8	28	20	269.77	1.4854
30	7	25	20	218.7	1.3263
31	1	7	10	605.6	1.4854



5/G No. SHAFT PIPA

MV AUTOMATIC AIR VALVE

WATER HAMMER

BALL VALVE

U V : ULTRA VIOLET
H Z : HIGHT ZONE
L Z : LOW ZONE

NAMA	JENIS	KAPASITAS	HEAD	CATU DAYA	RPM	EFF (m)	JUMLAH	KETERANGAN
POMPA ANGKAT	HORISONTAL AND SUCTION MULTI STAGE PUMP	950 l/m	45 m	50 Hz,3ø	1500	55 %	1 UNIT	DI RUANG POMPA AIR BERSIH (1 OPRASI, 1 STAN BY)
POMPA ANGKAT	HORISONTAL AND SUCTION MULTI STAGE PUMP	950 l/m	45 m	50 Hz,3ø	1500	55 %	1 UNIT	
POMPA BOOSTER	PACABED BOOSTER PUMP	850 l/m	20 m	50 Hz,3ø	1500	55 %	1 PAKET (5 UNIT)	DI LT ATAP BANGUNAN (5 POMPA PARALEL OPRATION)
POMPA SUMPIT	SUBMERSIBLE PUMP	100 l/m	11 m	50 Hz,3ø	1500	55 %	1 UNIT	DI RUANG POMPA AIR BERSIH (OPRASI STAN BY)
POMPA SUMPIT	SUBMERSIBLE PUMP	100 l/m	11 m	50 Hz,3ø	1500	55 %	1 UNIT	
POMPA KURAS	SEND SUCTION CENTRIFUGAL	950 l/m	11 m	50 Hz,3ø	1500	55 %	1 UNIT	PORTABLE PUMP DI RG POMPA AIR BERSIH

SKEDUL KAPASITAS POMPA AIR BERSIH

DIAGRAM SISTEM DISTRIBUSI AIR BERSIH.
TANPA SKALA

NO.	DI KIRIM KE	TGL	PAR.
1	UNTUK PERIZINAN	16-06-2003	
2	FINAL REVIEW	26-07-2003	

MENGETAHUI/MENYETUJUI

Keuskupan Agung Semarang

Dr. J.Chr. Purwawidyana, Pr
Yang mewakili Uskup

DPP Kongregasi Suster-suster CB

Sr. Evarieta Setyowati CB
Provinsial

Yayasan Panti Rapih

Prof. Dr. Ag. Dibyo Probowo, M.Sc
Ketua

Rumah Sakit Panti Rapih

dr.St. Arif Hoiman, MPH
Direktur

Panitia Pembangunan Gedung Unit A2

Ir. Hrc. Priyosulistyo, M.Sc, Ph. D.
Ketua

PEMILIK
YAYASAN PANTI RAPIH

PROYEK
PEMBANGUNAN RUMAH SAKIT PANTI RAPIH
PEKERJAAN REVIEW MASTERPLAN
DAN PERENCANAAN DETAIL
GEDUNG RAWAT INAP UNIT A2

NAMA GEDUNG
RAWAT INAP UNIT A2

NAMA GAMBAR	SKALA
DIAGRAM SISTEM DISTRIBUSI AIR BERSIH	TANPA SKALA

DI GAMBAR	DI PERIKSA	DI SETUJUI
LN	Ir.Anno	Ir.Widjaja

DIKETAHUI
Ir.Ruchijat Cakrawiralaksana

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ATELIER 6 PROFESIO

ARSITEK

TGL. GBR SELESAI - JUN-2003
NO PROYEK
NO GAMBAR
M1.001.

CATATAN

PIPA AIR KOTOR
PIPA AIR BEKAS
PIPA VENT
PIPA AIR PANAS
PIPA AIR BERSIH

Pipa Air Hujan ø 150
Pipa Air Hujan ø 150
Pipa Air Kotor ø 100
Pipa Vent ø 65
Pipa Air Bekas ø 100
Pipa Air Hujan ø 150
Pipa Air Hujan ø 150
Pipa Air Hujan ø 150
Pipa Air Hujan ø 150

KELAS I (1)
KELAS I (2)
KELAS I (3)
KELAS I (4)
KELAS I (5)
KELAS I (6)
KELAS I (7)
KELAS I (8)
KELAS I (9)
KELAS I (10)
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KELAS I (18)
KELAS I (19)
KELAS I (20)
KELAS I (21)
KELAS I (22)
KELAS I (23)
KELAS I (24)
KELAS I (25)
KELAS I (26)
KELAS I (27)

CUCI
GUD
TOILET
PANTRY
ALAT
OBAT
KA. NURSE
HALL
DOKTER
LINEN
IST. NURSE
NS
OBAT
GUDANG
CONFERENCE
R.M.
M/E
TAMAN
STORAGE

Pipa Air Kotor ø 100
Pipa Vent ø 65
Pipa Air Bekas ø 100
Pipa Air Bersih Hz ø 65
Pipa Supply Air Panas ø 100
Pipa Air Bekas ø 100
Pipa Air Vent ø 50
Pipa Air Panas ø 40
Pipa Air Bersih ø 40
Pipa Air Bersih Lz Kanan ø 80
Pipa Air Bersih Lz Kiri ø 80
Pipa Supply Air Panas ø65
Pipa Air bersih Ke Rooftank ø 80
Pipa Air Bersih Hz ø 80
Pipa Air Kotor ø 100
Pipa Vent ø 80
Pipa Air Bekas ø 100
Pipa Air Hujan ø 150

LANTAI 5
INSTALASI PEMIPAAN AIR BERSIH , AIR KOTOR DAN AIR PANAS
SKALA 1 : 100

NO.	DI KIRIM KE	TGL.	PAR
1	FINAL REVIEW	26/07 2003	

MENGETAHUI/MENYETUJUI

Keuskupan Agung Semarang

Dr. J.Chr. Purwawidyana, Pr
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Sr. Evarista Setyawati CB
Provinsial

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dr.St. Arif Haliman, MPH
Direktur

Panitia Pembangunan Gedung Unit A2

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Ketua

PEMILIK
YAYASAN PANTI RAPIH

PROYEK
PEMBANGUNAN RUMAH SAKIT PANTI RAPIH
PEKERJAAN REVIEW MASTERPLAN
DAN PERENCANAAN DETAIL
GEDUNG RAWAT INAP UNIT A2

NAMA GEDUNG
RAWAT INAP UNIT A2

NAMA GAMBAR	SKALA
LANTAI V INSTALASI PEMIPAAN AIR BERSIH, AIR KOTOR, DAN AIR PANAS	1 : 100

DI GAMBAR	DI PERIKSA	DI SETUJUI
Wahyu	Ir.Anna	Ir.Widjaja

DIKETAHUI
Ir.Rucnijat Cakrawiralaksana

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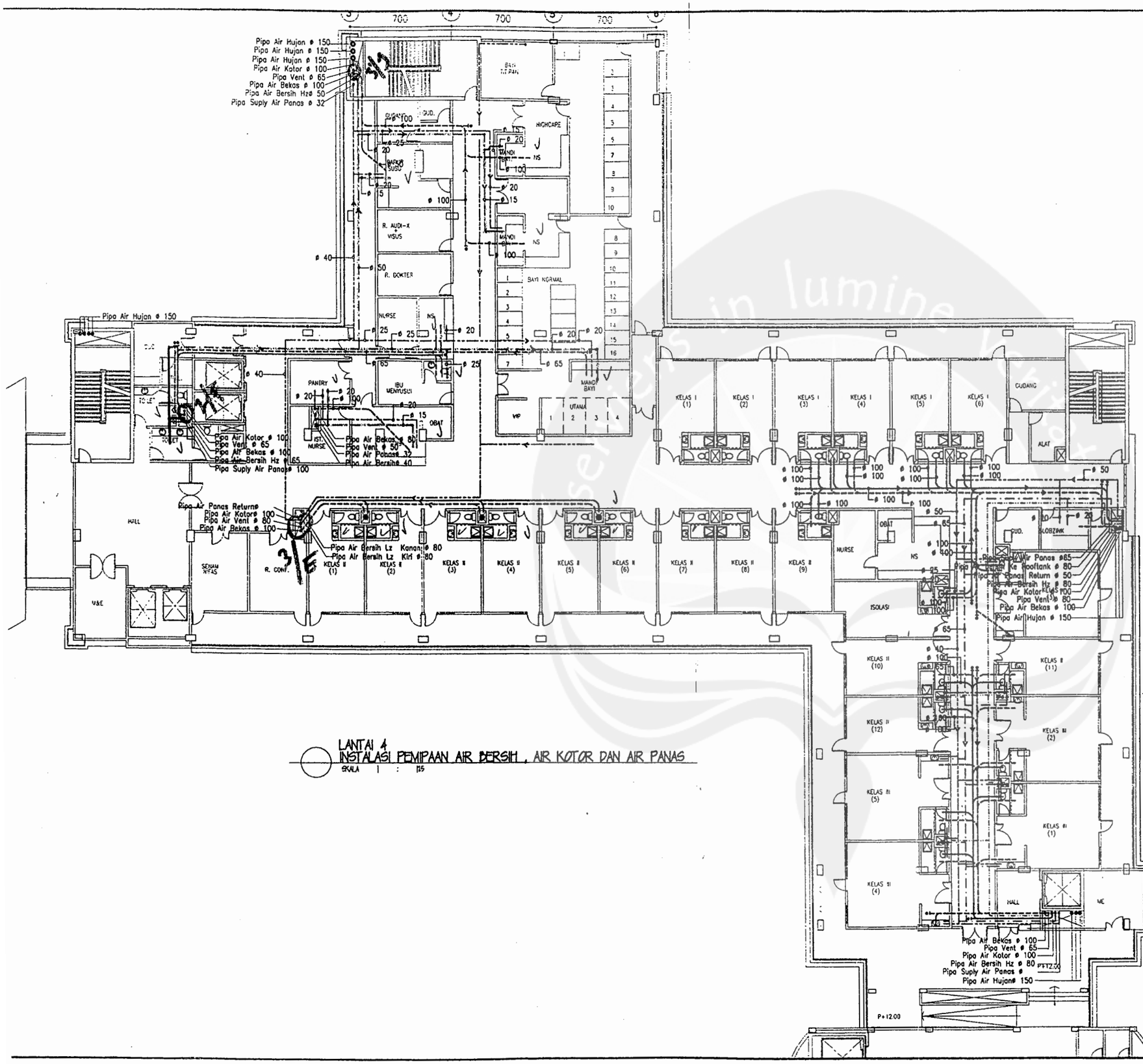
PT. ATELIER ENAM STRUKTUR
ATELIER 6 PROFESIO

ARSITEK

TGL GBR SELESAI	
NO PROYEK	
NO GAMBAR	M1.104

arsitek



LANTAI 4
INSTALASI PEMIPAAN AIR BERSIH, AIR KOTOR DAN AIR PANAS
SKALA 1 : 125

CATATAN
- PIPA AIR KOTOR
- PIPA AIR BEKAS
- PIPA VENT
- PIPA AIR PANAS
- PIPA AIR BERSIH

NO.	DI KIRIM KE	TGL.	PAR.
1	FINAL REVIEW	25 07 2003	

MENGETAHUI/MENYETUJUI

Keuskupan Agung Semarang

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Sr. Evaristo Setyawati CB
Provinsial

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Ketua

Rumah Sakit Panti Rapih

dr.St. Arif Hatman, MPH
Direktur

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Ketua

PEMILIK
YAYASAN PANTI RAPIH

PROYEK
PEMBANGUNAN RUMAH SAKIT PANTI RAPIH
PEKERJAAN REVIEW MASTERPLAN
DAN PERENCANAAN DETAIL
GEDUNG RAWAT INAP UNIT A2

NAMA GEDUNG
RAWAT INAP UNIT A2

NAMA GAMBAR	SKALA
LANTAI IV INSTALASI PEMIPAAN AIR BERSIH, AIR KOTOR DAN AIR PANAS	1 : 100

DI GAMBAR	DI PERIKSA	DI SETUJUI
Wahyu	Ir.Anna	Ir.Widjaja

DIKETAHUI
Ir.Ruchijat Gakrawiralaksana

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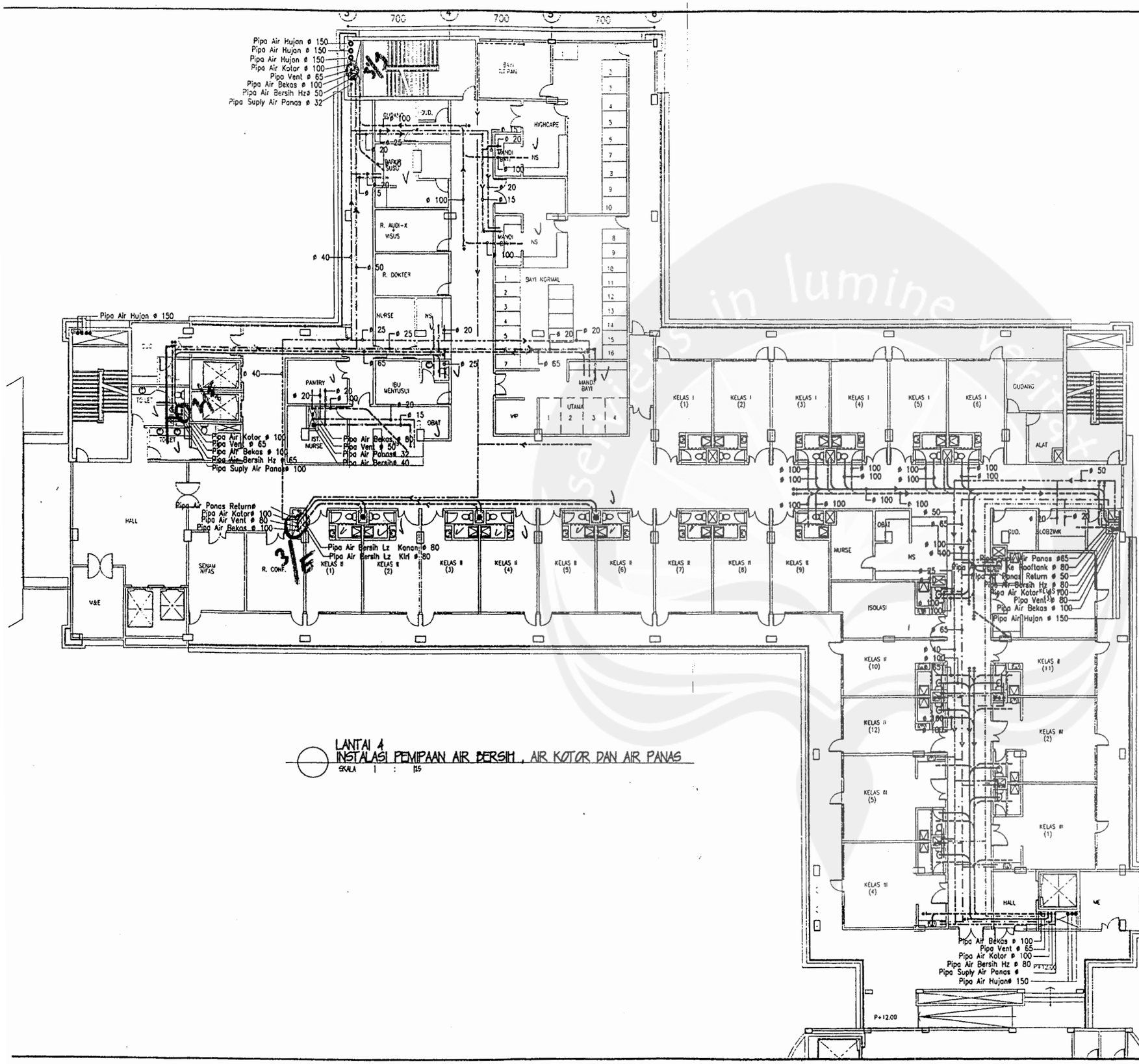
PT. ATELIER ENAM STRUKTUR
ATELIER 6 PROFESIO

ARSITEK
arsitek

TGL. GBR SELESAI
NO PROYEK
NO GAMBAR
M1.103



LANTAI 4
INSTALASI PEMIPAAN AIR BERSIH , AIR KOTOR DAN AIR PANAS
SKALA 1 : 125

CATATAN
- PIPA AIR KOTOR
- PIPA AIR BEKAS
- PIPA VENT
- PIPA AIR PANAS
- PIPA AIR BERSIH

NO.	DI KIRIM KE	TGL.	PAR.
1	FINAL REVIEW	26 07 2003	

MENGETAHUI/MENYETUJUI

Keuskupan Agung Semarang

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Sr. Evarista Setyawati CB
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Ketua

Rumah Sakit Panti Rapih

dr.St. Arif Hatiman, MPH
Direktur

Panitia Pembangunan Gedung Unit A2

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PEMILIK
YAYASAN PANTI RAPIH

PROYEK
PEMBANGUNAN RUMAH SAKIT PANTI RAPIH
PEKERJAAN REVIEW MASTERPLAN
DAN PERENCANAAN DETAIL
GEDUNG RAWAT INAP UNIT A2

NAMA GEDUNG
RAWAT INAP UNIT A2

NAMA GAMBAR	SKALA
LANTAI IV INSTALASI PEMIPAAN AIR BERSIH, AIR KOTOR, DAN AIR PANAS	1 : 200

DI GAMBAR	DI PERIKSA	DI SETUJUI
Wahyu	Ir.Anna	Ir.Widjaja

DIKETAHUI
Ir.Ruchijat Cakrawiralaksana

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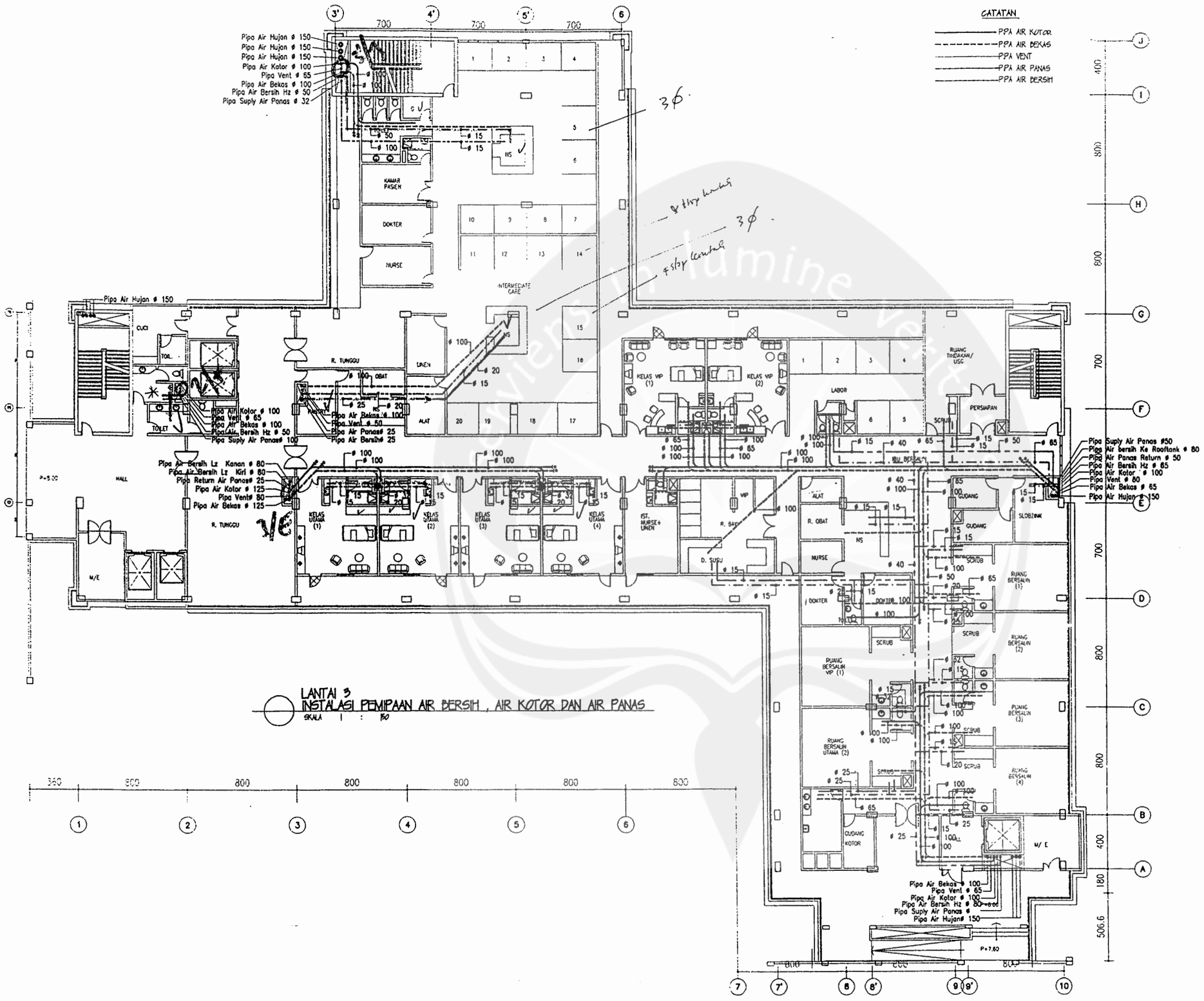
ATELIER 6 PROPERTY

ARSITEK
arsitek

TGL GBR SELESAI
NO PROYEK
NO GAMBAR
M1.103



LANTAI 3
INSTALASI PEMIPAAN AIR BERSIH , AIR KOTOR DAN AIR PANAS
SKALA 1 : 150

NO.	DI KIRIM KE	TGL.	PAR.
1	RINAL REVIEW	26/07 2003	

MENGETAHUI/MENYETUJUI

Keuskupan Agung Semarang

Dr. J.Chr. Purwawidyana, Pr
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Sr. Evorista Setyawati CB
Provinsial

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Prof. Dr. Ag. Dibyo Prabowo, M.Sc
Ketua

Rumah Sakit Panti Rapih

dr.St. Arif Hatman, MPH
Direktur

Panitia Pembangunan Gedung Unit A2

Ir. Hrc. Priyosulistyo, M.Sc, Ph. D.
Ketua

PEMILIK
YAYASAN PANTI RAPIH

PROYEK
PEMBANGUNAN RUMAH SAKIT PANTI RAPIH
PEKERJAAN REVIEW MASTERPLAN
DAN PERENCANAAN DETAIL
GEDUNG RAWAT INAP UNIT A2

NAMA GEDUNG
RAWAT INAP UNIT A2

NAMA GAMBAR	SKALA
LANTAI 3 INSTALASI PEMIPAAN AIR BERSIH, AIR KOTOR DAN AIR PANAS	1 : 150

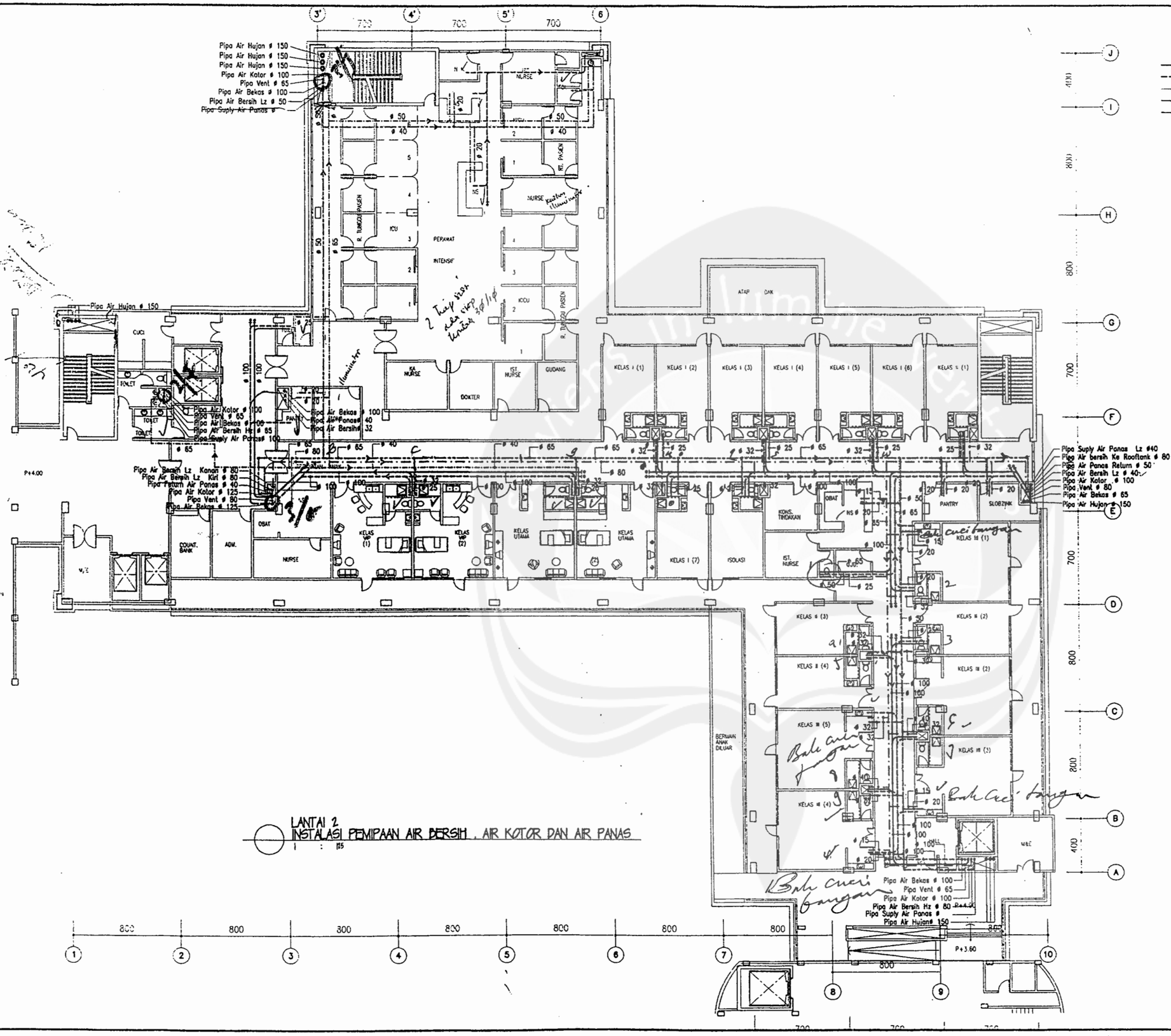
DI GAMBAR	DI PERIKSA	DI SETUJUI
Wahyu	Ir.Anna	Ir.Widjojo

DIKETAHUI
Ir.Ruchijat Cakrawirataksana

KONSULTAN
PT. ATELIER ENAM STRUKTUR
ATELIER 6 PROFESIO

ARSITEK
arsitek

TGL GBR SELESAI
NO PROYEK
NO GAMBAR
M1.102



CATATAN

- PIPA AIR KOTOR
- PIPA AIR BEKAS
- PIPA VENT
- PIPA AIR PANAS
- PIPA AIR BERSIH

LANTAI 2
INSTALASI PEMIPAAN AIR BERSIH , AIR KOTOR DAN AIR PANAS
1 : 125

NO.	DI KIRIM KE	TGL	PAR
1	FINAL REVIEW	26/7/2009	

MENGETAHUI/MENYETUJUI

Keuskupan Agung Semarang

Dr. J.Chr. Purwawidyana, Pr
Yang mewakili Uskup

DPP Kongregasi Suster-suster CB

Sr. Evarista Setyowati CB
Provinsial

Yayasan Panti Rapih

Prof. Dr. Ag. Dibyo Prabowo, M.Sc
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Rumah Sakit Panti Rapih

dr.Sl. Arif Hafiman, MPH
Direktur

Panitia Pembangunan Gedung Unit A2

Ir. Hrc. Priyousilstyo, M.Sc, Ph. D.
Ketua

PEMILIK
YAYASAN PANTI RAPIH

PROYEK
PEMBANGUNAN RUMAH SAKIT PANTI RAPIH
PEKERJAAN REVIEW MASTERPLAN
DAN PERENCANAAN DETAIL
GEDUNG RAWAT INAP UNIT A2

NAMA GEDUNG
RAWAT INAP UNIT A2

NAMA GAMBAR	SKALA
LANTAI II INSTALASI PEMIPAAN AIR BERSIH, AIR KOTOR DAN AIR PANAS	1 : 150

DI GAMBAR	DI PERIKSA	DI SETUJUI
Wahyu	Ir.Anna	Ir.Widjaja

DIKETAHUI
Ir.Ruchijat Cakrawiralaksana

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PT. ATELIER ENAM STRUKTUR
ATELIER 6 PROFESIO

ARSITEK
arsitek

TGL GBR SELESAI
NO PROYEK
NO GAMBAR
M1.101

CATATAN :

- PIPA AIR PANAS
- PIPA AIR KOTOR
- PIPA AIR BERSIH/DINGIN
- PIPA AIR BEKAS

BK-D : BAK KONTROL DOBLE CLEAN OUT - (80x80.)cm
BK-S : BAK KONTROL SINGLE CLEANOUT -(40x40.)cm
BOP : BOTTOM OF PIPE

PIPA A./B.-KE ROOF TANK ø80

RG.POMPA

GR.RESERVOIR

ANTONIUS/ MRI

KANTIN KARYAWAN

DAPUR

GEDUNG EXISTING

DETAIL I

ø 100
ø 80
ø 32 - ø32
ø 40
ø 100
ø 80

PIPA AIR BERSIH DARI ROOF TANK KE RG STEAM (HZ & LZ)
PIPA RETURN AIR PANAS DARI BANGUNAN A2 KE RG STEAM (HZ & LZ)
PIPA SUPLY AIR PANAS DARI RG STEAM KE BANGUNAN A2 (HZ & LZ)

RG.STEAM

1 TATALETAK INSTALASI PEMIPAAN AIR BERSIH /KOTOR & AIR PANAS
SKALA 1 : 200

NO.	DI KIRIM KE	TGL.	PAR.
1	UNTUK PERIZINAN	16-06-2003	
2	REVIEW --	25-06-2003	
3	FINAL REVIEW	26-07-2003	

MENGETAHUI/MENYETUJUI

Keuskupan Agung Semarang

Dr. J.Chr. Purwawidyana, Pr
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DPP Kongregasi Suster-suster CB

Sr. Evarista Setyawati CB
Provinsial

Yayasan Panti Rapih

Prof. Dr. Ag. Dibyo Prabowo, M.Sc
Ketua

Rumah Sakit Panti Rapih

dr.St. Arif Haliman, MPH
Direktur

Panitia Pembangunan Gedung Unit A2

Ir. Hrc. Priyosulistyo, M.Sc, Ph. D.
Ketua

PEMILIK
YAYASAN PANTI RAPIH

PROYEK
PEMBANGUNAN RUMAH SAKIT PANTI RAPIH
PEKERJAAN REVIEW MASTERPLAN
DAN PERENCANAAN DETAIL
GEDUNG RAWAT INAP UNIT A2

NAMA GEDUNG
RAWAT INAP UNIT A2

NAMA GAMBAR	SKALA
INSTALASI PEMIPAAN AIR BERSIH & KOTOR	1 : 200

DI GAMBAR	DI PERIKSA	DI SETUJUI
WAHYU	Ir ANNA	Ir.Widjaja.W

DIKETAHUI
Ir.Ruchjat Tjokrowiraloksana, IAI

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PT. ATELIER ENAM STRUKTUR
ATELIER 6 PROPERTY

ARSITEK
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TGL GBR SELESAI
NO PROYEK
NO GAMBAR
M1.100

CATATAN

- PIPA AIR KOTOR
- PIPA AIR BEKAS
- PIPA VENT
- PIPA AIR PANAS
- PIPA AIR BERSIH

Pipa Air Hujan 2x ø 150
Pipa Vent ø 65
Pipa Air Hujan ø 150
Pipa Vent ø 80
Vent ark
KELAS I (1)
KELAS I (2)
KELAS I (3)
KELAS I (4)
KELAS I (5)
KELAS I (6)
KELAS I (7)
KELAS I (8)
KELAS I (9)
CHC
ALAT
OBAT
KA. NURSE
PANTRY
NS
DOKTER
LINEN
ISTIRAHAT NURSE
KELAS I (10)
KELAS I (11)
KELAS I (12)
KELAS I (13)
KELAS I (14)
KELAS I (15)
KELAS I (16)
Pipa Air Bersih Ke Cooltiser Hz ø 100
Pipa Air Bersih Ke Cooltiser Lt ø 65
Pipa Air Kotor ø 100
Pipa Vent ø 65
Pipa Air Bekas ø 80
Pipa Air Bersih Hz ø 100
Pipa Air Bersih Hz ø 65
Pipa Air Bersih Ke Rooftank ø 80
TOILET
HALL
LOBBY
Pipa Air Bekas ø 100
Pipa Vent ø 50
Pipa Air Panas ø 40
Pipa Air Bersih ø 40
Pipa Suply Air Panas Hz ka ø 80
Pipa Suply Air Panas Hz ki ø 80
Pipa Air Panas Hz Dari Ruang Steam ø 100
Pipa Air Panas Lt Dari Ruang Steam ø 80
M/E
JSG
R.CONF
KELAS I (17)
KELAS I (18)
KELAS I (19)
KELAS I (20)
KELAS I (21)
KELAS I (22)
KELAS I (23)
KELAS I (24)
KELAS I (25)
GUDANG
OBAT
KELAS I (26)
KELAS I (27)
Pipa Suply Air Panas ø 65
Pipa Air Bersih Ke Rooftank ø 150
Pipa Air Panas Return ø 50
Pipa Air Bersih Hz ø 80
Pipa Vent ø 80
Pipa Air Bekas ø 65
Pipa Air Hujan ø 150
OBZINK
JANT

3' 700 4' 700 5' 700 6

J 400 I 800 H 800 G 700 F 700 E 700 D

1 800 2 800 3 800 4 800 5 800 6 800 7 800 8 800 9 800 10

LANTAI 6
INSTALASI PEMIPAAN AIR BERSIH , AIR KOTOR DAN AIR PANAS
SKALA 1 : 100

NO.	DI KIRIM KE	TGL.	PAR.
1	FINAL REVIEW	26 07 2003	

MENGETAHUI/MENYETUJUI

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Ketua

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GEDUNG RAWAT INAP UNIT A2

NAMA GEDUNG
RAWAT INAP UNIT A2

NAMA GAMBAR	SKALA
LANTAI 6 INSTALASI PEMIPAAN AIR BERSIH AIR KOTOR DAN AIR PANAS	1 : 100

DI GAMBAR	DI PERIKSA	DI SETUJUI
Wahyu	Ir.Anna	Ir.Widjaja

DIKETAHUI
Ir.Ruchjat Tjakrawiraksana

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ARSITEK
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TGL. CGK SELESAI
NO PROYEK
NO GAMBAR
M1.105