

**VERIFICATION OF  
DESIGN & DEVELOPMENT**



**PT. DHARMA POLIMETAL  
HYDRAN PROJECT (1<sup>ST</sup> STEP)**

**PREPARED BY :**

- |                               |   |
|-------------------------------|---|
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| <b>2. Santosa Setianegara</b> | <b>: Project Leader</b>                   |
| <b>3. Agung Hanggono</b>      | <b>: Mechanical &amp; Design Engineer</b> |
| <b>4. Paber Simanjuntak</b>   | <b>: Electrical &amp; Design Engineer</b> |

**PT. DHARMA POLIMETAL  
Jl. Raya Serang Km. 24 Balaraja – Tangerang  
Banten**



PT. DHARMA POLIMETAL

# VERIFICATION OF DESIGN AND DEVELOPMENT

Doc No  
01/IE/VER

PROJECT

HYDRANT FOR EX ADISTAR, DPM, DAN, MUFFLER PLANT

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## DESIGN OF HYDRANT PROJECT

### A. DESIGN SPECIFICATION

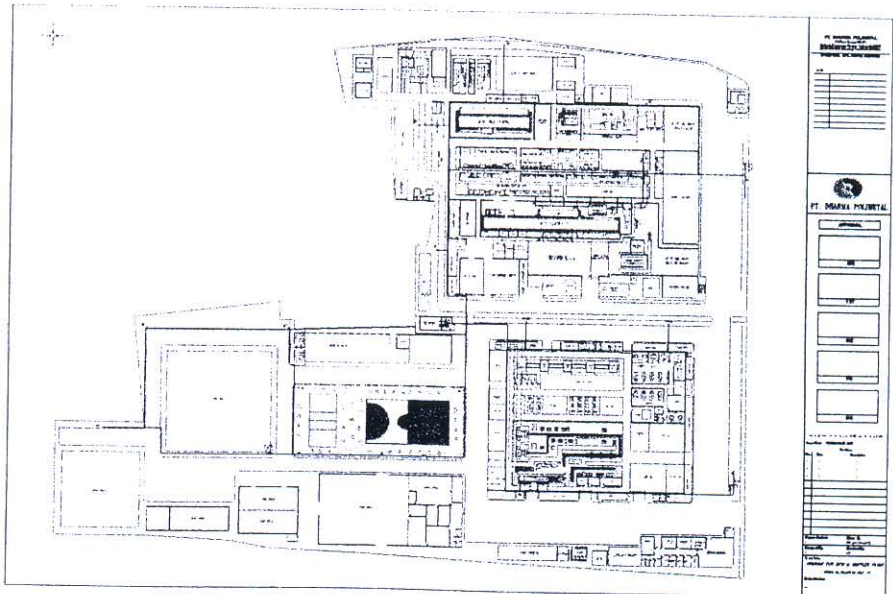
- a. Pump Capacity (Q) : 200 L/mt = 3,33<sup>3</sup> m/s
- b. Head Pump (H<sub>t</sub>) : 80 m
- c. Type of Pump : Centrifugal Pump
- d. Outlet Pump Diameter (d1) : 3 Inch (75 mm)
- e. Material Pipe : Black Pipe
- f. Pump Pressure (P1) : 8 Bar
- g. Nozzle Hose Diameter (d2) : 1.5 Inch (37.5 mm)
- h. Max. No. of Hydrant Operation (n) : 3 Point

### B. WATER RESERVOIR


Water Reservoir Capacity is 60 m<sup>3</sup>, with Main Pump capacity is 200 L/mt, estimate enough for 5 h operation. So, this condition enough to fire fighting mobile come to fire location (from Tangerang to Balaraja).

### C. DRAWING DESIGN

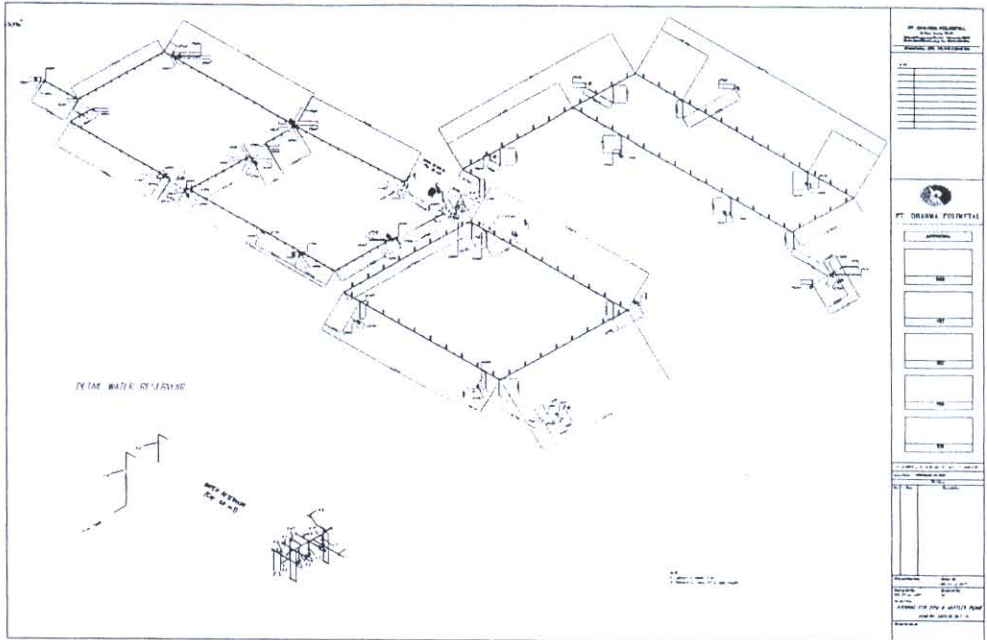
#### a. Layout Drawing



**Fig. 1. Layout Drawing Hydrant for Ex. Adistar, Muffler, DPM and DAN Building**

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**b. Isometric Drawing**



**Fig. 2. Isometric Drawing Hydrant for Ex. Adistar, Muffler, DPM and DAN Building**

**D. PUMP & NOZZLE HOSE FLOW RATE**

**a. Pump Flow Rate ( $v_1$ )**

$$Q = v_1 \cdot A_1$$

Where, A is the section area for outlet of pump pipe.

$$v_1 = \frac{4 \cdot Q}{\pi \cdot d_1^2}$$

$$= \frac{4,3,33 \cdot 10^{-3}}{\pi \cdot (75 \cdot 10^{-3})^2} = 0,75 \text{ m/s}$$

**b. Nozzle Hose Flow Rate ( $v_2$ )**

$$Q = n \cdot v_2 \cdot A_2$$

Where ; A is the section area for outlet of nozzle hose

N is number of hydrant operation point





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$$v_2 = \frac{4.Q}{n.\pi.d_2^2}$$
$$= \frac{4.3,33.10^{-3}}{3.\pi.(37.5.10^{-3})^2} = 1.11 \text{ m/s}$$

### E. TOTAL HEAD ( $H_T$ )

$$H_T = H_{Suct} + H_{Disch} + H_{Loss}$$

Where, Head Discharge ( $H_{Disch}$ ) for this design is 2 meters.

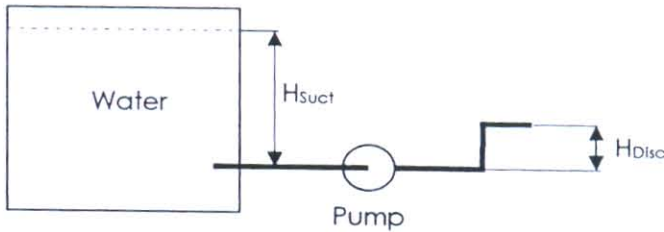



Fig. 3. Pump Head Suction and Head Discharge

Total Head was taken from the point most far, at the Muffler Plant, then :

- Max. Pipe Length ( $L_{max}$ ) : 195 m
- Elbow  $90^\circ$  : 13 Pcs
- Gate Valve : 4 Pcs
- Check Valve : 1 Pcs
- Entrance : 1 Point
- Exits : 3 Point
- Reducer : 1 Point
- Pipe Diameter (d) : 4 Inch (100 mm)

#### a. Water Flow Rate (v) :

$$v = \frac{4.Q}{\pi.d^2}$$
$$= \frac{4.3.33.10^{-3}}{\pi.(100.10^{-3})^2} = 0.42 \text{ m/s}$$

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**b. Reynold Number (Re) :**

$$Re = \rho \cdot \frac{v \cdot d}{\mu}$$

$$= 1000 \cdot \frac{0.42 \cdot 100 \cdot 10^{-3}}{10^{-3}} = 42000 \text{ (Turbulent Flow)}$$

**c. Head Loss (H<sub>L</sub>) :**

$$H_L = H_{fric} + H_{elb} + H_{gv} + H_{cv} + H_{en} + H_{ex} + H_R$$


Where ;

- H<sub>L</sub> : Head Loss (m)
- H<sub>fric</sub> : Head loss of friction (m)
- H<sub>elb</sub> : Head loss of elbow (m)
- H<sub>gv</sub> : Head loss of gate valve (m)
- H<sub>cv</sub> : Head loss of check valve (m)
- H<sub>en</sub> : Head loss of entrance (m)
- H<sub>ex</sub> : Head loss of exits (m)
- H<sub>R</sub> : Head loss of reducer (m)

$$H_L = f \cdot \frac{L}{d} \cdot \frac{v^2}{2} + n \cdot f \cdot \frac{L_e}{d} \cdot \frac{v^2}{2} + n \cdot f \cdot \frac{L_e}{d} \cdot \frac{v^2}{2} + n \cdot f \cdot \frac{L_e}{d} \cdot \frac{v^2}{2} + K_{en} \cdot \frac{v^2}{2} + K_{ex} \cdot \frac{v^2}{2} + K_{red} \cdot \frac{v^2}{2}$$

- **Coofecient of Friction (f) :**

From the fig. 4, with Re = 42 000 and smooth pipe getted the cooficient of friction (f) is 0. 0218

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- **Length Equivalent for Valve ( $L_e/d$ ) :**

From the table 1, with type of valve is gate valve with  $\frac{3}{4}$  open, length equivalent ( $L_e/d$ ) is 35.

From the table 1, with type of valve is check valve, length equivalent ( $L_e/d$ ) is 75.

**Table 1. Representative Dimensionless Equivalent Lengths  
( $L_e/d$ ) for Valves and Fittings**


Fitting Type	Description	Equivalent Length, $L_e/D$
Globe valve	Fully open	350
Gate valve	Fully open	13
	$\frac{3}{4}$ open	35
	$\frac{1}{2}$ open	160
	$\frac{1}{4}$ open	900
Check valve		50-100
90° std. elbow		30
45° std. elbow		16
90° elbow	Long radius	20
90° street elbow		50
45° street elbow		26
Tee	Flow through run	20
	Flow through branch	60
Return bend	Close pattern	50

Based on  $h_L = f \frac{L_e}{D} \frac{v^2}{2}$

- **Loss Coefficient for Reducer ( $K_{red}$ ) :**

From the table 2, with type of reducer is gradual contractions and angle of contractions is 45°, the loss coefficient of reducer ( $K_{red}$ ) is 0.04.

**Table 2. Loss Coefficient for Gradual Contractions**

Diagram	Included Angle, $\theta$ , Degrees	Loss Coefficient, $K^*$
	30	0.02
	45	0.04
	60	0.07

Based on  $h_L = K_{red} \frac{v^2}{2}$

- **Loss Coefficient of Exits ( $K_{ex}$ ) :**

From the table 3, with the type of exits is projecting pipe, the loss coefficient of exits ( $K_{ex}$ ) is 1.



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**Table 3. Minor Loss Coefficient for Pipe Exit**

Exit Type	Diagram	Minor Loss Coefficient, $K'$
Projecting pipe		1.0
Square-edged		1.0
Rounded		1.0

\* Based on  $h_L = K(V^2/2)$ .

• **Loss Coefficient of Entrances ( $K_{en}$ ):**

From table 4, with type of entrances is well rounded, the loss coefficient of entrances ( $K_{en}$ ) is 0.04.

**Table 4. Minor Loss Coefficients of Pipe Entrances**

Entrance Type	Diagram	Minor Loss Coefficient, $K'$
Reentrant		1.0
Square-edged		0.5
Well rounded <sup>1</sup>		~0.04

\* Based on  $h_L = K(V^2/2)$ , where  $V$  is the mean velocity in the pipe ( $R > 0.25$ ).

$$\begin{aligned}
 H_L &= f \cdot \frac{L}{d} \cdot \frac{v^2}{2} + 13 \cdot f \cdot 58 \cdot \frac{v^2}{2} + 4 \cdot f \cdot 35 \cdot \frac{v^2}{2} + f \cdot 75 \cdot \frac{v^2}{2} + 0.04 \cdot \frac{v^2}{2} + 1 \cdot \frac{v^2}{2} + 0.04 \cdot \frac{v^2}{2} \\
 &= \frac{v^2}{2} \left\{ f \left( \frac{L}{d} + 754 + 140 + 75 \right) + 1.008 \right\} \\
 &= \frac{v^2}{2} \left\{ 0.0218 \left( \frac{195}{100 \cdot 10^{-3}} + 754 + 140 + 75 \right) + 1.008 \right\} \\
 &= \frac{0.42^2}{2} \cdot 64.64 = 5.7 \text{ m}
 \end{aligned}$$





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### Head Total ( $H_T$ ):

$$\begin{aligned} H_T &= H_{Disch} + H_{Suct} + H_{Loss} \\ &= 0 + 2 + 5.7 \\ &= 7.7 \text{ m (Pump Head Total is 80 m, so design is OK)} \end{aligned}$$

### F. DROPP OF PRESSURE ( $\Delta P$ ):

$$\begin{aligned} (P_1 + \frac{\rho \cdot v_1^2}{2} + \rho \cdot g \cdot z_1) - (P_2 + \frac{\rho \cdot v_2^2}{2} + \rho \cdot g \cdot z_2) &= H_L \cdot \rho \\ (P_1 - P_2) + (\frac{\rho \cdot v_1^2}{2} - \frac{\rho \cdot v_2^2}{2}) &= H_L \cdot \rho \\ (\Delta P) &= H_L \cdot \rho - (\frac{\rho \cdot v_1^2}{2} - \frac{\rho \cdot v_2^2}{2}) \\ &= 1000 \cdot 5.7 - (\frac{1000 \cdot (0.75)^2}{2} - \frac{1000 \cdot (1.11)^2}{2}) \\ &= 6034.8 \text{ kg/m}^2 = 0.7 \text{ Bars} \end{aligned}$$


### G. PRESSURE AT OUTLET NOZZLE HOSE ( $P_2$ ):

$$\begin{aligned} \Delta P &= P_1 - P_2 \\ P_2 &= P_1 - \Delta P \\ &= 8 - 0.7 = 7.3 \text{ Bars (Regulation is 4.9 - 6 Bars)} \end{aligned}$$

### H. SUMMARY:

Based the calculation, pump capacity (Head Pump, Drop Pressure, and Capacity) is **enough** for hydrant construction at DPM, Muffler and DAN Plant.



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NOTE :	Prepared By	Checked By,	Approved By
	Agung Hanggono Mechanical Engineer	Santosa S Project Leader	Phillipus Naftali Project Owner
DATE : 5 Maret 2007			





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## BILL of QUANTITY for HYDRANT (STEP 1)

Prepared By

Checked By

Approved By

AHN SSE PNI

No	Part Name	Qty	Material				Jasa	Total Price	Remarks	
			Specification	Dimension	Price	Total Price				
<b>A PREPARATION WORK</b>										
1	Preparation Work									
	- Preparation Work	1	Lot	-	-	Rp 3,000,000.00	Rp 3,000,000.00	Rp 300,000.00	Rp 3,300,000.00	-
<b>SUB TOTAL A</b>						<b>Rp 3,000,000.00</b>	<b>Rp 300,000.00</b>	<b>Rp 3,300,000.00</b>		
<b>B PUMP HOUSE &amp; MAIN PUMP RECONDITION</b>										
1	Diesel Fire Hydrant Pump Overhaul	1	Lot	-	-	Rp 15,000,000.00	Rp 15,000,000.00	Rp 1,500,000.00	Rp 16,500,000.00	-
2	Electric Fire Hydrant Pump Overhaul	2	Lot	-	-	Rp 5,000,000.00	Rp 10,000,000.00	Rp 1,000,000.00	Rp 11,000,000.00	-
3	Jockey Pump Overhaul	1	Lot	-	-	Rp 5,000,000.00	Rp 5,000,000.00	Rp 500,000.00	Rp 5,500,000.00	-
4	Pressure Gauge K10	4	Pcs	JIS K 10	Range 16 Bar	Rp 700,000.00	Rp 2,800,000.00	Rp 280,000.00	Rp 3,080,000.00	-
5	Pressure Switch	2	Pcs	JIS K 10	Range 1 - 10 Bar	Rp 1,250,000.00	Rp 2,500,000.00	Rp 250,000.00	Rp 2,750,000.00	-
6	Flexible Rubber Joint	2	Pcs	-	Ø 3"	Rp 350,000.00	Rp 700,000.00	Rp 70,000.00	Rp 770,000.00	-
7	Flexible Rubber Joint	1	Pcs	-	Ø 2"	Rp 200,000.00	Rp 200,000.00	Rp 20,000.00	Rp 220,000.00	-
8	Water Level Control (WLC)	1	Pcs	-	-	Rp 1,000,000.00	Rp 1,000,000.00	Rp 100,000.00	Rp 1,100,000.00	-
9	Electrical Panel Recondition	1	Lot	-	-	Rp 1,000,000.00	Rp 1,000,000.00	Rp 100,000.00	Rp 1,100,000.00	-
10	Pump House & Water Reservoir Recondition	1	Lot	-	-	Rp 15,000,000.00	Rp 15,000,000.00	Rp 1,500,000.00	Rp 16,500,000.00	-
11	Black Pipe	6	m	Schedul 40	Ø 8"	Rp 300,000.00	Rp 1,800,000.00	Rp 180,000.00	Rp 1,980,000.00	-
12	Black Pipe	30	m	Schedul 40	Ø 6"	Rp 225,000.00	Rp 6,750,000.00	Rp 675,000.00	Rp 7,425,000.00	-
13	Black Pipe	6	m	Schedul 40	Ø 0.5"	Rp 20,000.00	Rp 120,000.00	Rp 12,000.00	Rp 132,000.00	-
14	Gate Valve	1	Pcs	KHz	Ø 6"	Rp 3,000,000.00	Rp 3,000,000.00	Rp 300,000.00	Rp 3,300,000.00	-
15	Gate Valve	5	Pcs	KHz	Ø 3"	Rp 800,000.00	Rp 4,000,000.00	Rp 400,000.00	Rp 4,400,000.00	-
16	Gate Valve	1	Pcs	KHz	Ø 2.5"	Rp 750,000.00	Rp 750,000.00	Rp 75,000.00	Rp 825,000.00	-
17	Gate Valve	2	Pcs	KHz	Ø 2"	Rp 700,000.00	Rp 1,400,000.00	Rp 140,000.00	Rp 1,540,000.00	-
18	Ball Valve	7	Pcs	KHz	Ø 0.5"	Rp 45,000.00	Rp 315,000.00	Rp 31,500.00	Rp 346,500.00	-
19	Safety Valve	1	Pcs	KHz	Ø 0.5"	Rp 500,000.00	Rp 500,000.00	Rp 50,000.00	Rp 550,000.00	-
20	Check Valve	4	Pcs	KHz	Ø 3"	Rp 750,000.00	Rp 3,000,000.00	Rp 300,000.00	Rp 3,300,000.00	-
21	Check Valve	2	Pcs	KHz	Ø 2"	Rp 600,000.00	Rp 1,200,000.00	Rp 120,000.00	Rp 1,320,000.00	-
22	Foot Valve	2	Pcs	KHz	Ø 3"	Rp 750,000.00	Rp 1,500,000.00	Rp 150,000.00	Rp 1,650,000.00	-
23	Foot Valve	1	Pcs	KHz	Ø 2"	Rp 600,000.00	Rp 600,000.00	Rp 60,000.00	Rp 660,000.00	-
24	Strainer	2	Pcs	KHz	Ø 3"	Rp 550,000.00	Rp 1,100,000.00	Rp 110,000.00	Rp 1,210,000.00	-
25	Strainer	1	Pcs	KHz	Ø 2"	Rp 450,000.00	Rp 450,000.00	Rp 45,000.00	Rp 495,000.00	-
26	Blind Flange	2	Pcs	JIS K 10	Ø 8"	Rp 30,000.00	Rp 60,000.00	Rp 6,000.00	Rp 66,000.00	-
27	Flange	2	Pcs	JIS K 10	Ø 8"	Rp 30,000.00	Rp 60,000.00	Rp 6,000.00	Rp 66,000.00	-
28	Flange	16	Pcs	JIS K 10	Ø 6"	Rp 15,000.00	Rp 240,000.00	Rp 24,000.00	Rp 264,000.00	-
29	Flange	28	Pcs	JIS K 10	Ø 3"	Rp 12,500.00	Rp 350,000.00	Rp 35,000.00	Rp 385,000.00	-
30	Flange	17	Pcs	JIS K 10	Ø 2.5"	Rp 9,000.00	Rp 153,000.00	Rp 15,300.00	Rp 168,300.00	-
31	Flange	4	Pcs	JIS K 10	Ø 2"	Rp 8,000.00	Rp 32,000.00	Rp 3,200.00	Rp 35,200.00	-
32	Reducer	2	Pcs	Schedul 40	Ø 2.5" x Ø 2"	Rp 12,500.00	Rp 25,000.00	Rp 2,500.00	Rp 27,500.00	-
33	Reducer	2	Pcs	Schedul 40	Ø 6" x Ø 4"	Rp 45,000.00	Rp 90,000.00	Rp 9,000.00	Rp 99,000.00	-
34	T Joint	2	Pcs	Schedul 40	Ø 6"	Rp 90,000.00	Rp 180,000.00	Rp 18,000.00	Rp 198,000.00	-
35	T Joint	2	Pcs	Schedul 40	Ø 8"	Rp 125,000.00	Rp 250,000.00	Rp 25,000.00	Rp 275,000.00	-
36	Weld Elbow 90°	2	Pcs	Schedul 40	Ø 2"	Rp 20,000.00	Rp 40,000.00	Rp 4,000.00	Rp 44,000.00	-
37	Weld Elbow 90°	2	Pcs	Schedul 40	Ø 2.5"	Rp 25,000.00	Rp 50,000.00	Rp 5,000.00	Rp 55,000.00	-
38	Weld Elbow 45°	4	Pcs	Schedul 40	Ø 3"	Rp 45,000.00	Rp 180,000.00	Rp 18,000.00	Rp 198,000.00	-
39	Air Balancing Tank Recondition	1	Lot	-	-	Rp 500,000.00	Rp 500,000.00	Rp 50,000.00	Rp 550,000.00	-
40	Bolt & Nut	40	Pcs	JIS Grade 8.8	M22 x 40	Rp 2,000.00	Rp 80,000.00	Rp 8,000.00	Rp 88,000.00	-
41	Bolt & Nut	100	Pcs	JIS Grade 8.8	M19 x 40	Rp 1,500.00	Rp 150,000.00	Rp 15,000.00	Rp 165,000.00	-
42	Gasket	2	Pcs	Asbestos	Ø 8"	Rp 10,000.00	Rp 20,000.00	Rp 2,000.00	Rp 22,000.00	-
43	Gasket	10	Pcs	Asbestos	Ø 6"	Rp 7,000.00	Rp 70,000.00	Rp 7,000.00	Rp 77,000.00	-
44	Gasket	15	Pcs	Asbestos	Ø 3"	Rp 5,000.00	Rp 75,000.00	Rp 7,500.00	Rp 82,500.00	-
45	Gasket	10	Pcs	Asbestos	Ø 2.5"	Rp 5,000.00	Rp 50,000.00	Rp 5,000.00	Rp 55,000.00	-
46	Gasket	3	Pcs	Asbestos	Ø 2"	Rp 4,000.00	Rp 12,000.00	Rp 1,200.00	Rp 13,200.00	-
47	U Bolt	8	Pcs	JIS Grade 8.8	Ø 8"	Rp 2,000.00	Rp 16,000.00	Rp 1,600.00	Rp 17,600.00	-
48	U Bolt	30	Pcs	JIS Grade 8.8	Ø 6"	Rp 1,500.00	Rp 45,000.00	Rp 4,500.00	Rp 49,500.00	-
50	Consumable									
	- Primer Cat	10	Kg	Surfacor	Epoxy	Rp 25,000.00	Rp 250,000.00	Rp 25,000.00	Rp 275,000.00	-
	- Cat Besi	10	Kg	FTALIT	Red	Rp 35,000.00	Rp 350,000.00	Rp 35,000.00	Rp 385,000.00	-
	- Thinner	25	Ltr	Nippon Denso	High Gloss	Rp 11,500.00	Rp 287,500.00	Rp 28,750.00	Rp 316,250.00	-
	- Kuas	5	Pcs	Eterna	-	Rp 3,000.00	Rp 15,000.00	Rp 1,500.00	Rp 16,500.00	-
	- Polish Wheel	30	Pcs	Nippon Resbon	Ø 350 x 1.6 x Ø 16	Rp 8,500.00	Rp 255,000.00	Rp 25,500.00	Rp 280,500.00	-
	- Cutting Wheel	15	Pcs	Nippon Resbon	Ø 100 x 2 x Ø 16	Rp 32,500.00	Rp 487,500.00	Rp 48,750.00	Rp 536,250.00	-
	- Weld Elektrode	50	Kg	LB-32	Ø 3.2 mm	Rp 13,000.00	Rp 650,000.00	Rp 65,000.00	Rp 715,000.00	-
51	Support	1	Lot	UNP	80 x 40 x 5	Rp 750,000.00	Rp 750,000.00	Rp 75,000.00	Rp 825,000.00	-
<b>SUB TOTAL B</b>						<b>Rp 85,458,000.00</b>	<b>Rp 8,545,800.00</b>	<b>Rp 94,003,800.00</b>		
<b>C PUMP RECONDITION AT EX ADISTAR BUILDING</b>										
1	Outdoor Hydrant Box	5	Set	OZEKI	Type C	Rp 2,000,000.00	Rp 10,000,000.00	Rp 1,000,000.00	Rp 11,000,000.00	-
	- Roll Fire Hose	5	Set	-	Ø 2.5" x 30 m					-
	- Hose Nozzel	5	Set	-	Ø 2.5"					-
2	Flar Hydrant	5	Set	OZEKI	H-14AP	Rp 1,750,000.00	Rp 8,750,000.00	Rp 875,000.00	Rp 9,625,000.00	-
3	Black Pipe	60	m	Schedul 40	Ø 4"	Rp 200,000.00	Rp 12,000,000.00	Rp 1,200,000.00	Rp 13,200,000.00	-
4	Seamless Connection	1	Set	OZEKI	S7	Rp 3,250,000.00	Rp 3,250,000.00	Rp 325,000.00	Rp 3,575,000.00	-
	- Check Valve	1	Pcs	KHz	Ø 4"					-
	- Flange	3	Pcs	JIS K10	Ø 4"					-
	- Foundation	1	Lot	-	Bata					-
	- Check Valve Main Hole	1	Lot	-	Bata					-
	- Bolt & Nut	12	Pcs	JIS Grade 8.8	M19 x 40					-
5	Drain	1	Lot	-	-	Rp 3,000,000.00	Rp 3,000,000.00	Rp 300,000.00	Rp 3,300,000.00	-





PT. DHARMA POLIMETAL

**BILL of QUANTITY for HYDRANT (STEP 1)**

Prepared By

Checked By

Approved By

AHN

SSE

PNI

- Gate Valve	1	Pcs	Kitz K10	Ø 4"					
- Flange	2	Pcs	JIS K10	Ø 4"					
- Bolt & Nut	8	Pcs	JIS Grade 8.8	M19 x 40					
- Gate Valve Man Hole	1	Lot	-	Bata					
- Foundation	1	Lot	-	Bata					
<b>SUB TOTAL C</b>						<b>Rp 37,000,000.00</b>	<b>Rp 3,700,000.00</b>	<b>Rp 40,700,000.00</b>	
<b>D. PIPING INSTALLATION FOR SUPPLIER PLANT</b>									
1 Black Pipe	12	m	Schedul 40	Ø 6"	Rp 225,000.00	Rp 2,700,000.00	Rp 270,000.00	Rp 2,970,000.00	-
2 Black Pipe	384	m	Schedul 40	Ø 4"	Rp 200,000.00	Rp 76,800,000.00	Rp 7,680,000.00	Rp 84,480,000.00	-
3 Flange	8	Pcs	JIS K10	Ø 6"	Rp 15,000.00	Rp 120,000.00	Rp 12,000.00	Rp 132,000.00	-
4 Flange	110	Pcs	JIS K10	Ø 4"	Rp 10,000.00	Rp 1,100,000.00	Rp 110,000.00	Rp 1,210,000.00	-
5 Weld Elbow 90°	4	Pcs	Schedul 40	Ø 6"	Rp 120,000.00	Rp 480,000.00	Rp 48,000.00	Rp 528,000.00	-
6 Weld Elbow 90°	24	Pcs	Schedul 40	Ø 4"	Rp 100,000.00	Rp 2,400,000.00	Rp 240,000.00	Rp 2,640,000.00	-
7 T Joint	10	Pcs	Schedul 40	Ø 4"	Rp 90,000.00	Rp 900,000.00	Rp 90,000.00	Rp 990,000.00	-
8 Reducer	1	Pcs	Schedul 40	Ø 6 x Ø 4"	Rp 45,000.00	Rp 45,000.00	Rp 4,500.00	Rp 49,500.00	-
9 Bolt & Nut	480	Pcs	JIS Grade 8.8	M19 x 40	Rp 1,500.00	Rp 720,000.00	Rp 72,000.00	Rp 792,000.00	-
10 Gasket	4	Pcs	Asbestor	Ø 6"	Rp 7,000.00	Rp 28,000.00	Rp 2,800.00	Rp 30,800.00	-
11 Gasket	55	Pcs	Asbestor	Ø 4"	Rp 5,000.00	Rp 275,000.00	Rp 27,500.00	Rp 302,500.00	-
12 Seamwese Connection	1	Set	OZEKI	S7	Rp 3,250,000.00	Rp 3,250,000.00	Rp 325,000.00	Rp 3,575,000.00	-
- Check Valve	1	Pcs	Kitz	Ø 4"					
- Flange	3	Pcs	JIS K10	Ø 4"					
- Foundation	1	Lot	-	Bata					
- Check Valve Man Hole	1	Lot	-	Bata					
- Bolt & Nut	12	Pcs	JIS Grade 8.8	M19 x 40					
13 Drain	1	Lot	-	-	Rp 3,000,000.00	Rp 3,000,000.00	Rp 300,000.00	Rp 3,300,000.00	-
- Gate Valve	1	Pcs	Kitz K10	Ø 4"					
- Flange	2	Pcs	JIS K10	Ø 4"					
- Bolt & Nut	8	Pcs	JIS Grade 8.8	M19 x 40					
- Gate Valve Man Hole	1	Lot	-	Bata					
- Foundation	1	Lot	-	Bata					
14 Outdoor Hydrant Box	7	Set	OZEKI	Type C	Rp 2,000,000.00	Rp 14,000,000.00	Rp 1,400,000.00	Rp 15,400,000.00	-
- Roll Free Hose	7	Set	-	Ø 2.5" x 30 m					
- Hose Nozzel	7	Set	-	Ø 2.5"					
15 Pilar Hidrant	7	Set	OZEKI	H-14AP	Rp 1,750,000.00	Rp 12,250,000.00	Rp 1,225,000.00	Rp 13,475,000.00	-
16 Support	1	Lot	UNP	80 x 40 x 5	Rp20,000,000.00	Rp 20,000,000.00	Rp 2,000,000.00	Rp 22,000,000.00	-
17 Consumable									
- Primer Cat	100	Kg	Surfacor	Epoxy	Rp 25,000.00	Rp 2,500,000.00	Rp 250,000.00	Rp 2,750,000.00	-
- Cat Besi	100	Kg	FTALIT	Red	Rp 35,000.00	Rp 3,500,000.00	Rp 350,000.00	Rp 3,850,000.00	-
- Thinner	200	Ltr	Nippon Denso	High Gloss	Rp 11,500.00	Rp 2,300,000.00	Rp 230,000.00	Rp 2,530,000.00	-
- Kuas	10	Pcs	Eterna	--	Rp 3,000.00	Rp 30,000.00	Rp 3,000.00	Rp 33,000.00	-
- Polish Wheel	120	Pcs	Nippon Resbon	Ø 350 x 1.6 x Ø 16	Rp 8,500.00	Rp 1,020,000.00	Rp 102,000.00	Rp 1,122,000.00	-
- Cutting Wheel	75	Pcs	Nippon Resbon	Ø 100 x 2 x Ø 16	Rp 32,500.00	Rp 2,437,500.00	Rp 243,750.00	Rp 2,681,250.00	-
- Weld Elektrode	250	Kg	LB-32	Ø 3.2 mm	Rp 13,000.00	Rp 3,250,000.00	Rp 325,000.00	Rp 3,575,000.00	-
<b>SUB TOTAL D</b>						<b>Rp 153,105,500.00</b>	<b>Rp 15,310,850.00</b>	<b>Rp 168,416,350.00</b>	
<b>E TESTING &amp; COMMISSIONING</b>									
i Testing & Commissioning	1	Lot	-	-	Rp 5,000,000.00	Rp 5,000,000.00	Rp 500,000.00	Rp 5,500,000.00	-
<b>SUB TOTAL E</b>						<b>Rp 5,000,000.00</b>	<b>Rp 500,000.00</b>	<b>Rp 5,500,000.00</b>	
<b>TOTAL A + B + C + D + E</b>						<b>Rp 283,843,500.00</b>	<b>Rp 28,356,800.00</b>	<b>Rp 311,919,300.00</b>	
<b>JASA KONTRAKTOR (10%)</b>								<b>Rp 31,191,930.00</b>	
<b>TOTAL + JASA KONTRAKTOR</b>								<b>Rp 343,111,230.00</b>	
<b>GRAND TOTAL</b>								<b>Rp 343,111,230.00</b>	



NOTE :




**PT. DHARMA POLIMETAL**

APPROVAL
SSE
YST
EAZ
PNI
IDB

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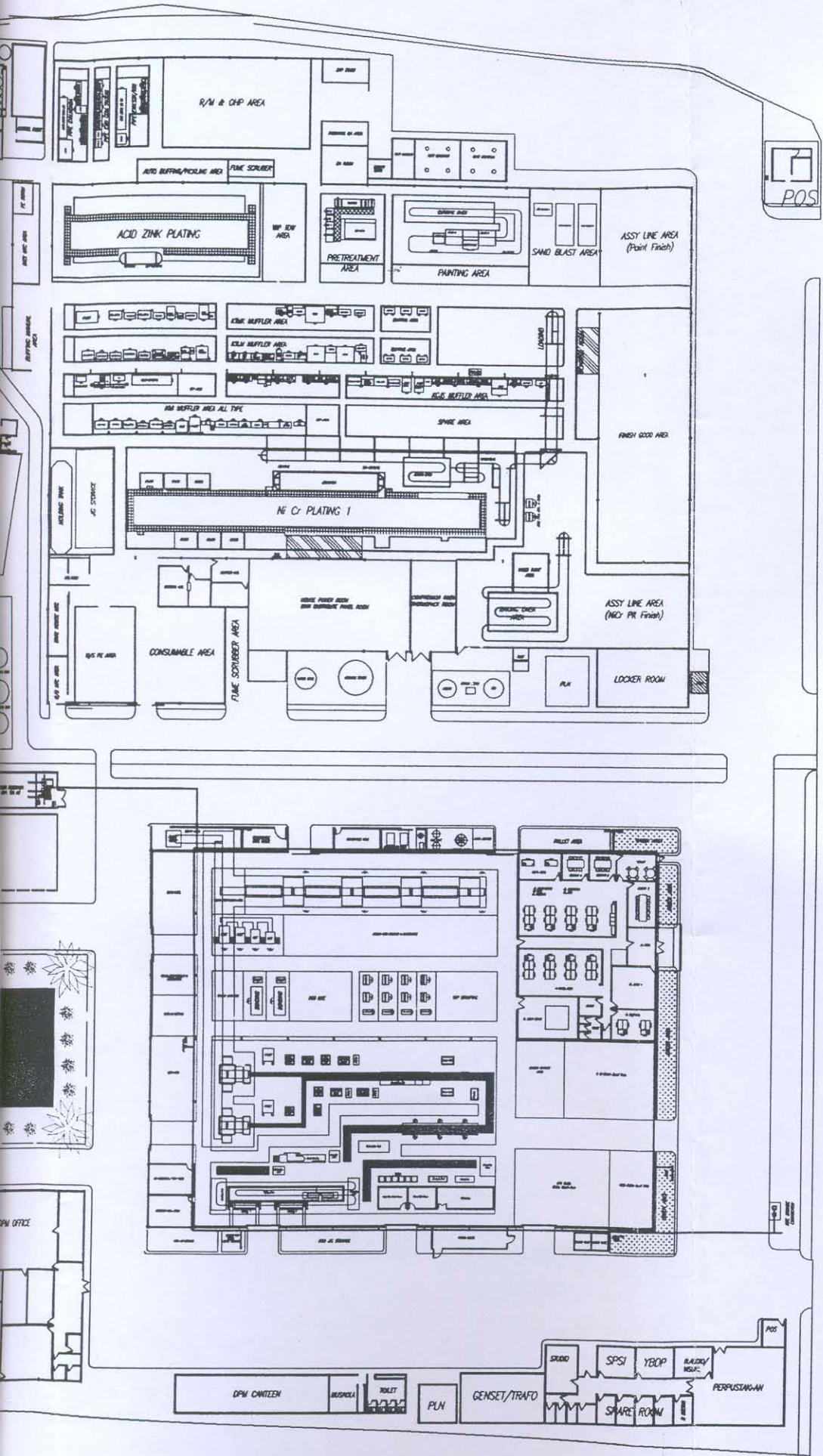
Issue Date FEBRUARY, 01, 2007

Revisions		
No.	Date	Description

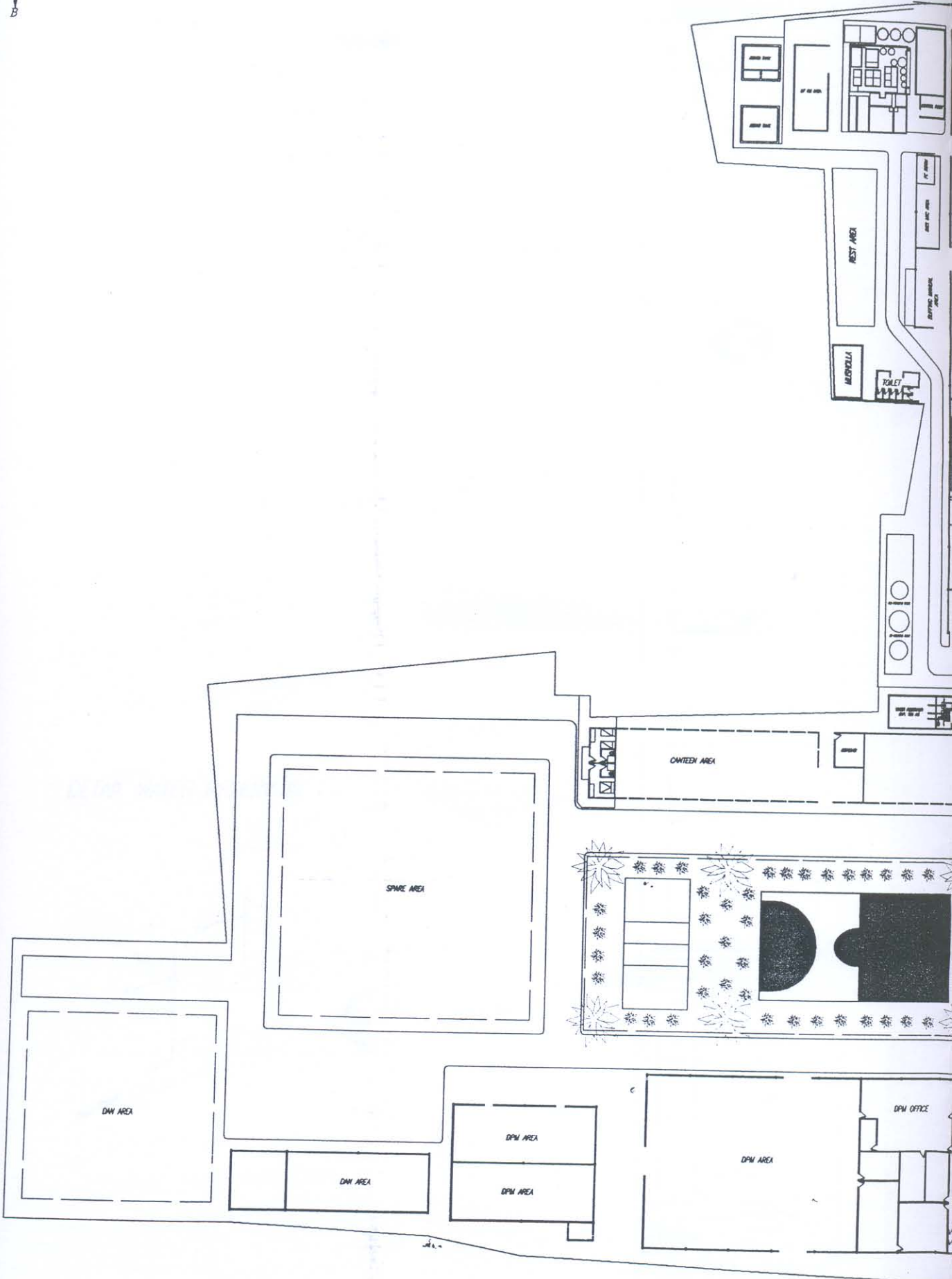
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 Designed By: -  
 Checked By: **SSE**

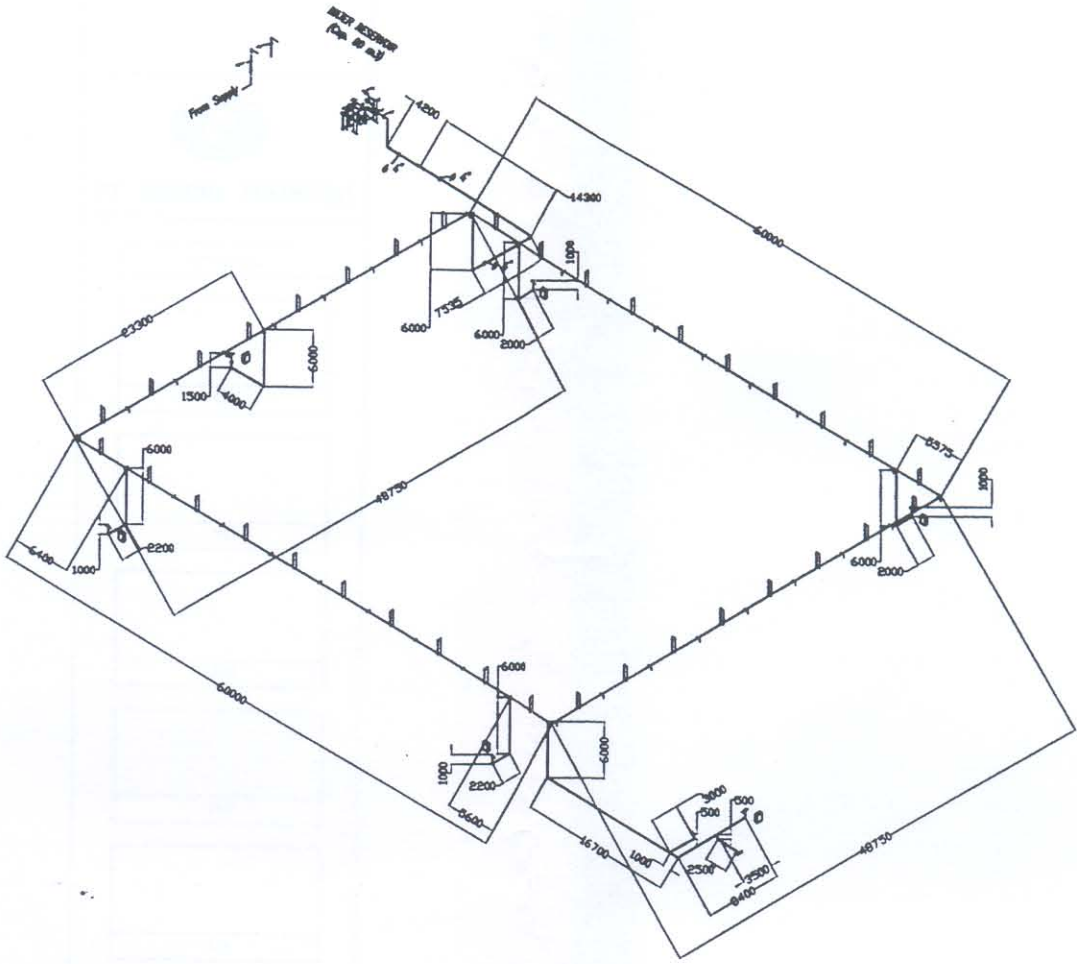
Sheet Title:  
**HYDRANT FOR DPM & MUFFLER PLANT  
 PIPING INSTALLATION (CURRENT)**

Sheet Number:  
 -

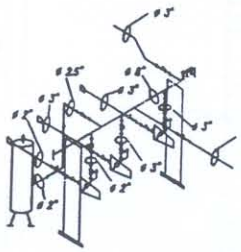






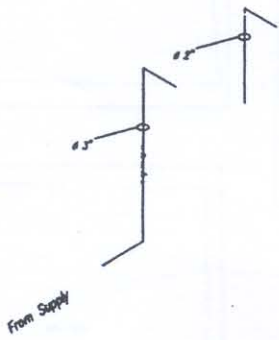


RESERVOIR  
(m<sup>3</sup>)

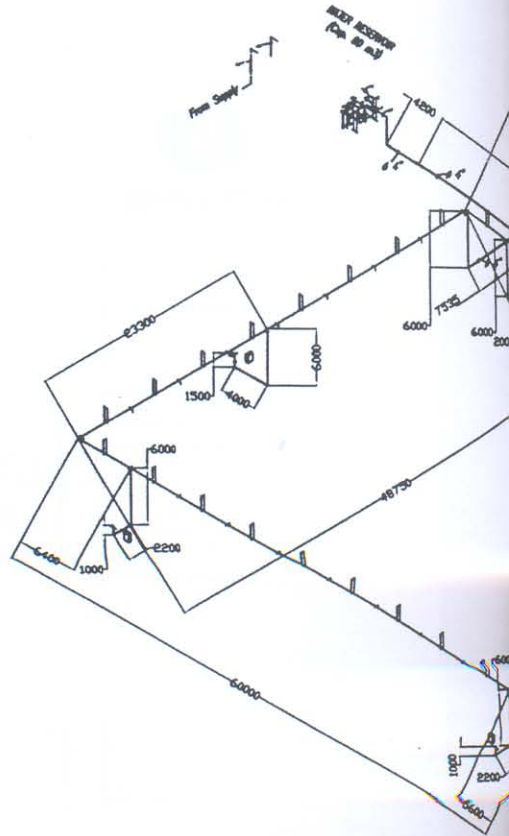
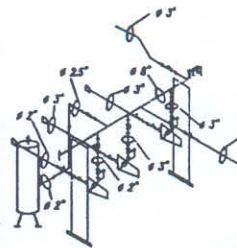


NOTE :  
 1. Support is every 3 m  
 2. Flanged is every 12 m pipe length.

DETAIL WATER RESERVOIR

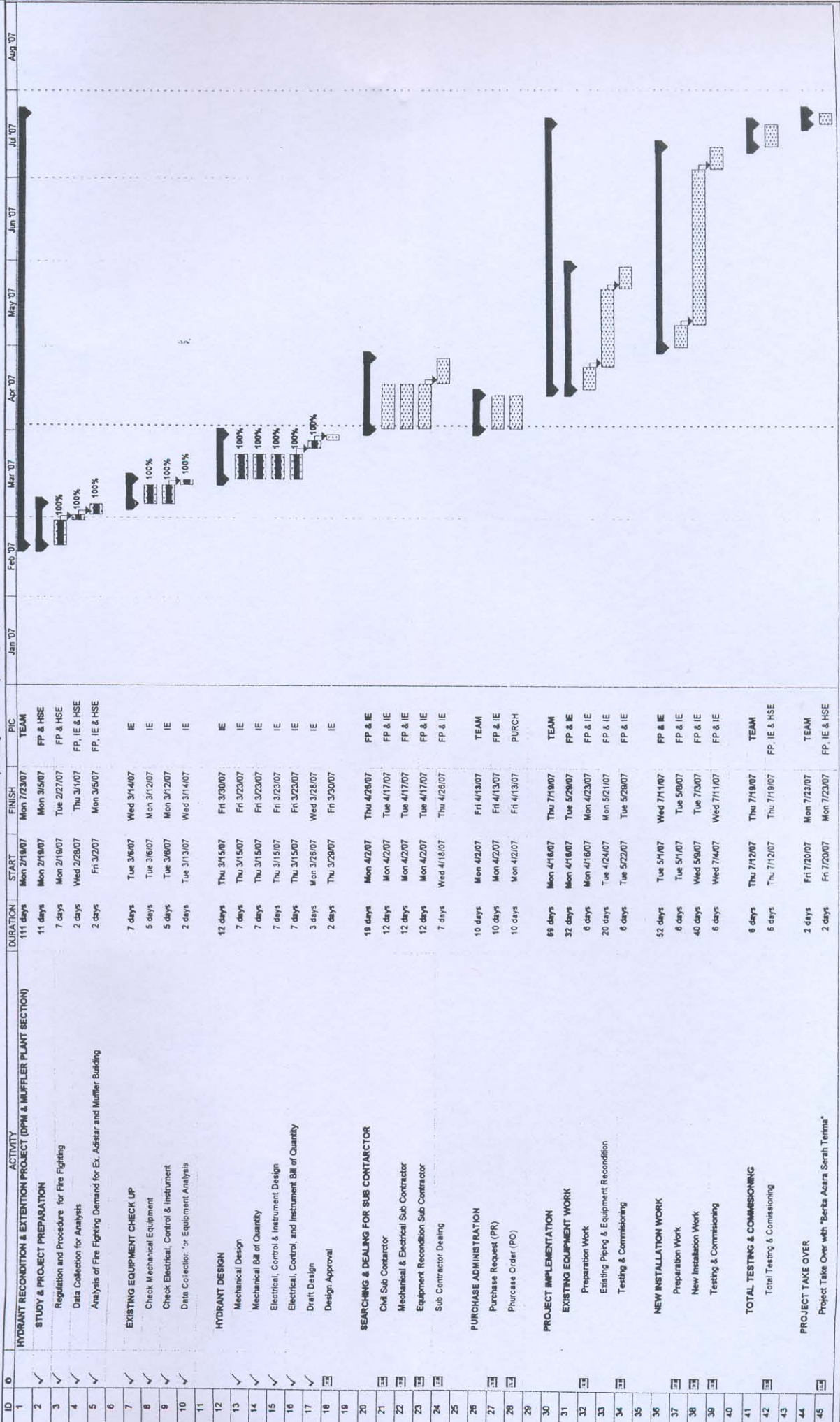


WATER RESERVOIR  
(Cap. 60 m<sup>3</sup>)



HYDRANT RECONDDITION & EXTENTION PROJECT (DPM & MUFFLER PLANT SECTION)

P.T. DHARMA POLIMEVAL  
Jl. Raya Serang Km. 24 Balaraja - Tangerang



Project: HYDRANT SCHEDULE  
Date: Tue 4/3/07  
Project Team: FP, IE, HSE

Legend:  
 Progress: Solid bar  
 Milestone: Dotted bar  
 External Tasks: Hatched bar  
 External Milestone: Diamond symbol

Summary: Project Summary  
 External Tasks: External Tasks  
 External Milestone: External Milestone

Page 1