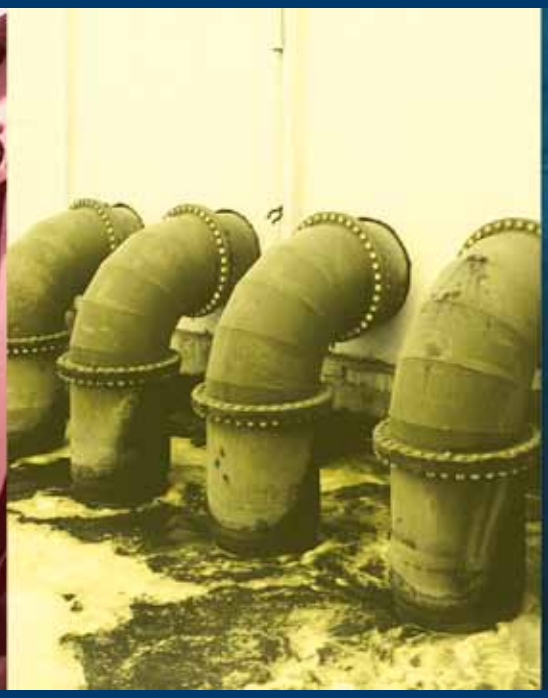
FLOOD CONTROL REFERENCES



BE › THINK › INNOVATE ›

GRUNDFOS

FLOOD CONTROL, MINIMISE THE LOSSES AND DAMAGES

Flood is unavoidable and unexpected but it can be controlled to minimise the losses and damages.

Floods occur through several ways. Inland flooding happens either as a result of slow flooding due to sustained heavy precipitation such as monsoons or snow-melt. It can also be the 'fast kind' caused by extreme and intense rainfall which often appears in relation to storms such as tropical cyclones. In the same way coastal floods can appear slowly like a tide rising after storms and increasing water level in the sea. They can also strike quickly as a result of intensive storms, hurricanes or even a tsunami.

Flooding is a common issue in many areas in most develop countries with large population. Most of the major cities in Asia including Kuala Lumpur, Jakarta, Bangkok and Shanghai experience the same problem. Indeed, any region faced with high annual rainfalls, increased populations, and expanding cities will be called upon to place increasingly great focus on flood control.

Most of the major cities in Indonesia had been suffering from flooding for years because of the climate and topography reasons. In some cities, the height of the surface is equal or even lower than the sea level. This condition is aggravated by soil surface subsidence in major cities including Jakarta, Semarang, Surabaya and Samarinda. Water shortage has also become a result of the population growth, accompanied by industrialisation and urbanisation.

In Indonesia, Grundfos was actively involved on the first Grundfos Indonesia flood control project of Surabaya Urban Development starting from 2000 to 2006. An award was received as an appreciation for outstanding contribution to this flood control project from the Local Government.

Flooding is not easily overcome and best effort that can be done is to minimise the flood losses and damages. With the latest technology, Grundfos offers the flood control system that ensuring cost-efficient performance.

COMPETENCES TO OFFER THE RIGHT SOLUTION

Thinking ahead to counteract flooding.

Basic methods of flood control have been practiced since ancient times. These include reforestation, dams, reservoirs and floodways – artificial channels that divert floodwater. These days, floodways are often built to carry floodwater into reservoirs where excess water is pumped into rivers. Flood control strategies usually cover a whole city or region. In practical terms, the solutions typically involve multiple pumping stations at several locations to ensure sufficient flood management when required.

Flood control pumping stations – the fundamentals

Any flood control strategy should be based on the overall city plan, carefully identifying where pumping stations are necessary – and which design will work best. If this process can also help reduce construction costs, so much the better for everyone involved. Getting the design right requires accurate information, so it is always worthwhile for consulting/design engineers to work closely with equipment suppliers to identify the optimum solution in each individual case.

Flood control pumping is characterized by a requirement for high flow and low head. Axial and mixed-flow pumps meet these requirements: they are high-flow, low-head pumps specially designed to pump large volumes of water. They are often installed in columns, an ideal design for these applications. Reliability is the most important factor when dealing with flood control pumping stations. The duty time is limited and when the pumping station for flood control has to meet its duty point it is essential that it works.

Because of the seasonal or unforeseen nature of many flood scenarios, a pumping station for flood control may only run once or twice a year. This places heavy demands reliability of the pumping solution. Through a combination of technical know-how, industry leadership and solution-oriented product development, Grundfos is able to supply axial and mixed-flow pumps for flood control, tailored and optimized for the application.

"Grundfos does not only provide product but also offer solutions, conduct a survey before starting a project and actively involve in system design, and also lay out with full engineering support side" says Didiet A Rahardjo, Waste Water Segment Manager, Grundfos Indonesia.

FROM INSTALATION TO MAINTENANCE

Based on our experiences and reliable product, Grundfos was chosen to manage the flood control project in Samarinda.

The height of some large areas along Mahakam river are lower than the river's tide, so even though there is no rain, water would get into the land area. It is aggravated by the high rainfall which most likely happen throughout the year, so it would be flooded when the rain comes. "The inundation is influenced by three creeks of the Mahakam river, i.e.: Karang Asem Besar, Karang Asem Kecil, and Mumus. Water would flow through those 3 creek when the tide is high. So the most important thing is to build water gate to hold the flood water not to go further into land area as pump would drain the water when the rain comes", says Ir. Saiful Yudha, MT, Chief of water system and irrigation services sub-department, Samarinda municipal government

Saiful explained that Samarinda topography has caused the technical planning to be divided into several sub-systems, one of them is Air Hitam (Black Water) sub-system. "To drain the reservoir into a certain level, we can no longer use the gravity system but it has to be done by pump. We use three units of Grundfos pumps with capacity of 1.5 cubic meters," he added.

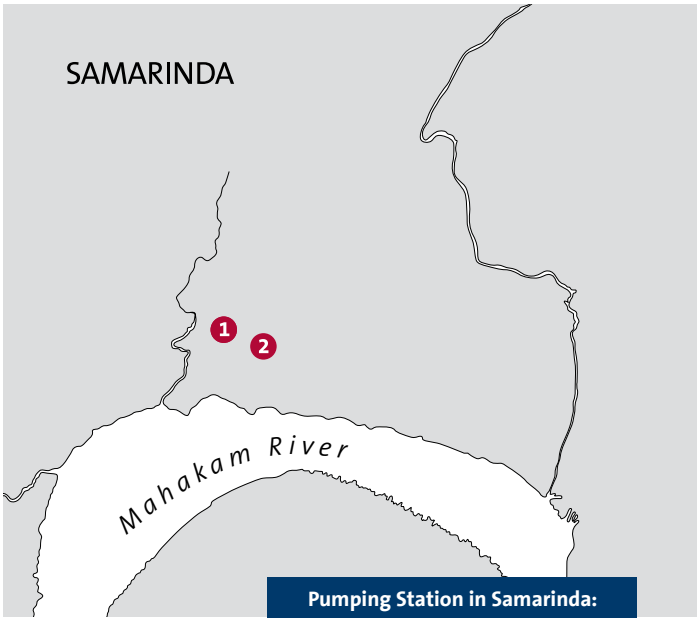
Grundfos involvement in Samarinda pumping station project has begun after a product presentation. "Surabaya experienced the same issue as we do, and came out with good result by using Grundfos product," Saiful said. The decision of using Grundfos was also made based on the fact that Grundfos products are reliable and meet with specifications needed. "Over the last two years, flooding areas were treated using our four mobile pumps. In the first year, we were assisted by Grundfos, but now our staffs have managed to operate the system by themselves", he added.

Mahakam River, Samarinda.

Grundfos has contributed and given full support on design system, layout and engineering consultancy concerning pump house and related material starting from the beginning stage to final placement on Air Hitam Pumping Station.

“Grundfos also provides supervision, commissioning, and training services for operators. Our dedicated dealers and service partners are ready in any time to provide technical advices based on our customer oriented vision and mission”, says Didiet A Rahardjo, Waste Water Segment Manager, Grundfos Indonesia.

“In the future, we would be more than happy to work closely together with Grundfos in a larger scale of flood control projects”, Saiful added.



Pumping Station in Samarinda:

1. Air Hitam Pumping Station
2. Gang Indra Pumping Station

Pump Gate Station, Poglar, Jakarta

BEST PERFORMANCE: COST-EFFICIENT AND USER-FRIENDLY

To compare the cost of ordinary pump station with Pump Gate, great reduction can be achieved and the maintenance is very simple and easy.

"Flooding is the main problem in many areas in Jakarta , one of them is Poglar which located at Kapuk, Cengkareng, West Jakarta. And Flooding is actually a common issue here at Poglar because of the high tide. Whenever the tide is high even though there is no rain, Poglar would definitely be a flooded area, " Toni Sudarsono, Field Supervisor, Water Resources Management Public Works Department Jakarta , expained. "It is not easily overcome due to geographical condition. Therefore, one of the strategic program of Government of Indonesia is to minimise the flood damage through integrated water resource management. It is initiated by Jakarta Provincial Government through public works department. We need high technology and perfect solution, so our business partner would be Grundfos," he added.

Toni informed that Poglar has limited space, and this area is greatly influenced by Angke River flow . That is why Pump Gate was chosen for this flood control project

"A traditional pump station requires a large scale site area for a pump station and reservoir with the result of a high cost land of purchase. Also took a long period of time to prepare pump station site. Due to construction of large scale site, cost for civil and structural construction were very high. By applying Pump Gate, no sum pit and pumping stations are required. Minimum space requirement, less than any other conventional pump. And there is no need for extra land, cost saving for land acquisition. To compare the cost of ordinary pump station with Pump Gate, great reduction can be achieved," says Supriyadi, Operations Manager Grundfos Indonesia.

"Pump Gate is integrated to the water gate. No requirement needed for other parts, such as the column pipe and separate water gate. As pump is integrally equipped with the gate, the operation and maintenance of pump gate is very simple and easy," he explained.



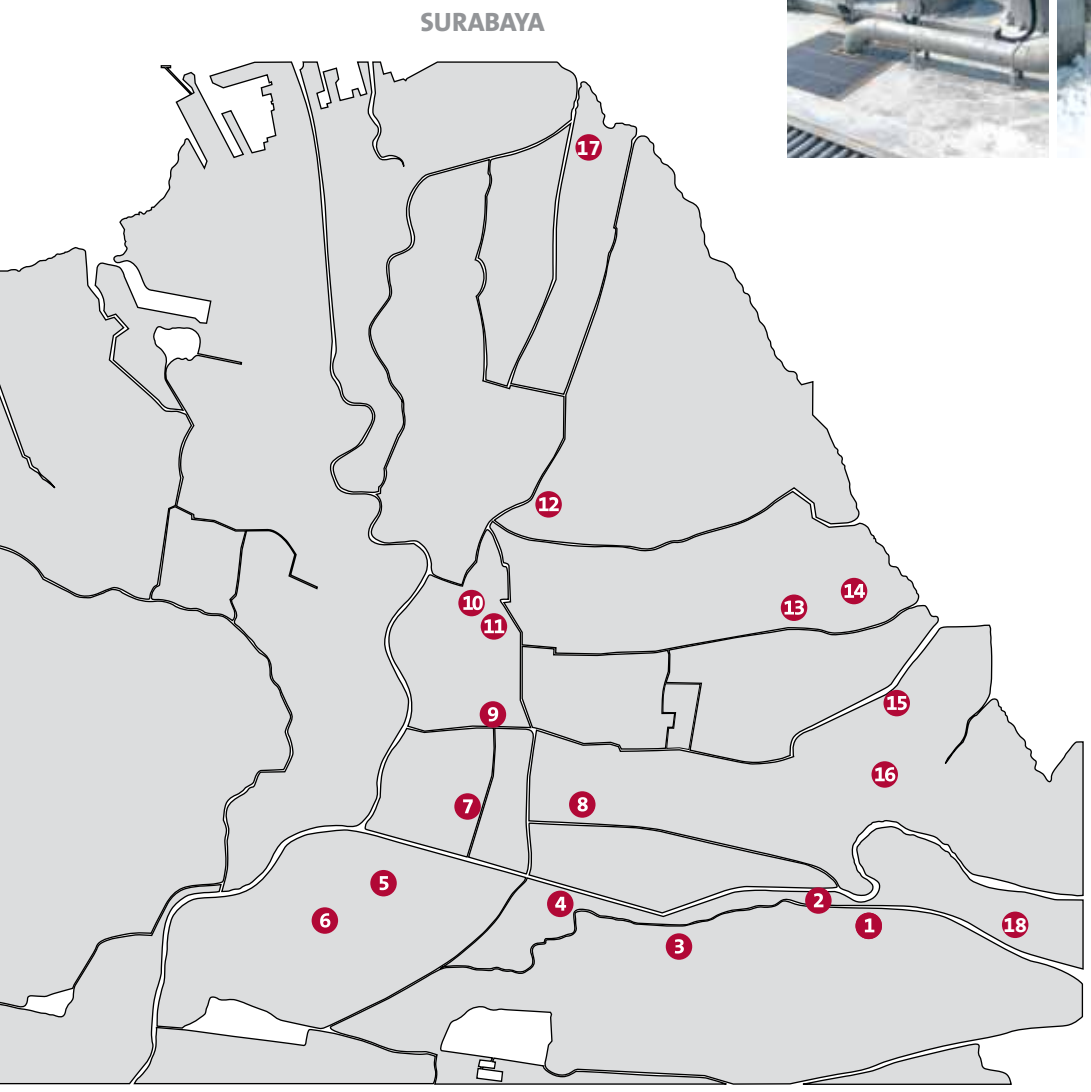

Pump Gate is pumping facilities which are consisted of a Flood Gate equipped with pumps. “A new technology pump station combined Floodgate on the existing waterway, equipped with the submersible pump without the need for reservoir and pump station, performing the function of the floodgate and pump at the same time. Compared to the traditional method, by installing the New Technology Pump Gate, there is no need for the extra land and the maintenance is easy. Even there is no space for pump station, as Pump Gate performs both functions of the floodgate and pump, it enable us to make better use of space. And also, construction will be easy and quick, ”says Yong Hyun Kim Engineering Manager Hasuh, Korea. “The Flood Gate and screen will be open and discharge the inside water by gravity flow. And if the outside water gets higher, to block the back flow, the pump gate will be closed. If the inside water reaches a certain level, the pump and screen will start operating to forcibly discharge the inside water out,” he added.

”Grundfos Indonesia, as business partner of Jakarta Provincial Government has applied this flood gate system. 3 (three) gates and 6 (six) pumps had already been installed. I think Flood gate seems to be similar to other flood control project. But I also believe the Flood gate is more suitable for Poglar, concerning its limited area and water conditions that influenced by Angke River flow. This Pump Gate is the first project that ever been installed in Jakarta”, Toni added.

RELIABLE IN PROJECT MANAGEMENT

Surabaya Urban Development Project (SUDP) is the first Grundfos Flood Control Project in Indonesia. Grundfos has demonstrated the expertise in this project management by completing the project much faster than the deadline.

Until now, Grundfos has worked on flood control projects in Surabaya including Bratang, Dinoyo, Darmokali, Kenari, Kalimir, Semolowaru, Kalidami, Kalikepiting, Simolawang, Kalijudan, Gunung sari, Brantas, Semampir and Kenjeran.



Pumping Station in Surabaya:

1. *Semolowaru 1 Pumping Station*
2. *Semolowaru 2 Pumping Station*
3. *Wonorejo Pumping Station*
4. *Bratang Pumping Station*
5. *Gunungsari 1 Pumping Station*
6. *Gunungsari 2 Pumping Station*
7. *Darmokali Pumping Station*
8. *Grundfos Surabaya*
9. *Dinoyo Pumping Station*
10. *Kenari Pumping Station*
11. *Kantor Gubernur Pumping Station*
12. *Simolawang Pumping Station*
13. *Kalisari Pumping Station*
14. *Kalikepiting Pumping Station*
15. *Busem Kalidami Pumping Station*
16. *Kali Bokor Pumping Station*
17. ***Kenjeran Pumping Station***
18. ***Semampir Pumping Station***

GRUNDFOS MOBILE PUMP

High-speed operation is one of the advantages offered by Grundfos Mobile Pump to overcome inundation in flooding area.

In 2002, Grundfos has initiated to develop the mobile pump to handle inundation issue quickly and easily. The mobile pump is the right solution for temporarily inundation and most effective on concave or flat area that frequently flooded by draining water with capacity up to 300 liters per second.

The mobile pump is made locally and received good responses from customers “Previously we used centrifugal pump and the operation took about two hours. By using submersible pump the operation takes 15 minutes so definitely would save more time” says Didiet A Rahardjo Waste Water Segment Manager, Grundfos Indonesia.

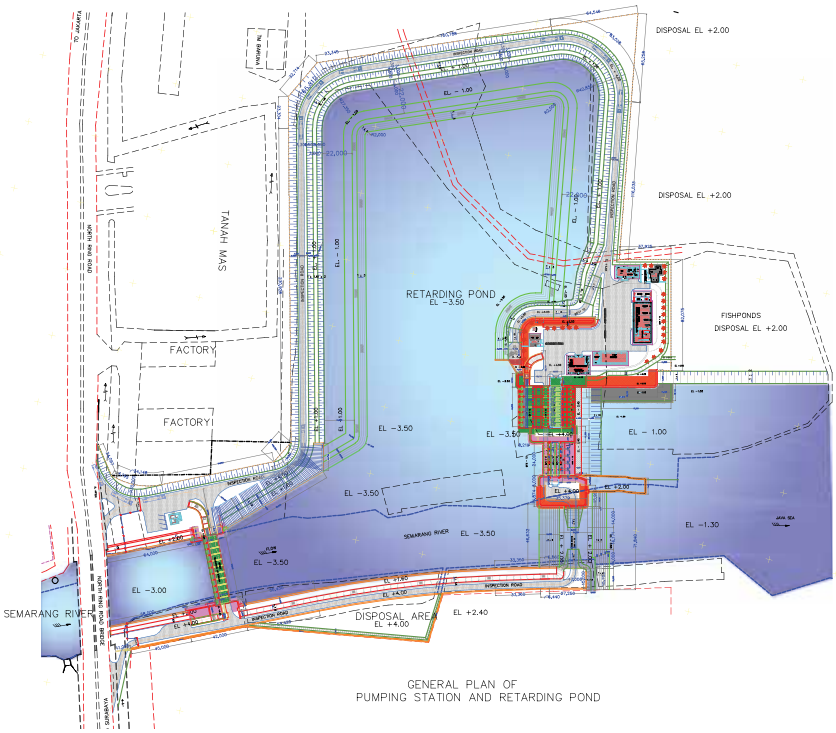
Today, Grundfos Mobil Pumps operate in Jakarta, Surabaya, Samarinda, Balikpapan and Semarang. Grundfos supplies “ready to use” package from trailer, pump, panel, pipe, and other supporting accessories. In central Jakarta, there are eight sub-districts and all of them use a mobile pump. During the rainy season, the units are operating in flooded area,” Didiet said.

INTEGRATED WATER RESOURCES MANAGEMENT:
Semarang Pumping Station

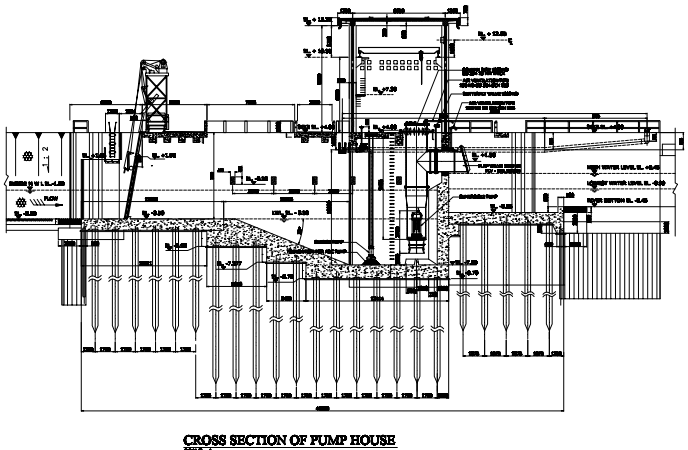
Semarang, one of the large cities in Indonesia, has been suffering from flooding for many years because of the climate and topography reasons. Water shortage has become a result of the population growth, accompanied by industrialization and urbanization. One of the strategic program of the Government of Indonesia is to increase water supply systems and minimize the flood damage through integrated water resource management.

On the 4th quarter of 2011, Grundfos Indonesia has been awarded as the successful bidder based on JICA (Japan International Corporation Agency) concurrence and The Government of the Republic of Indonesia, cq Directorate General of Human Settlement Minister of Public Works approval on Semarang Pumping Station (Mechanical and Electrical Works) project. The main objectives of this project are to minimise the flood damage through Floodway/River improvement, urban drainage system improvement and multipurpose dam construction in Semarang, and also to improve more actions on climate change and development of local economy.

With an integrated teamwork between Sales, Engineering, Operations and Service, Grundfos Indonesia is preparing a perfect solution for this flood control project.



GENERAL PLAN OF
PUMPING STATION AND RETARDING POND


CROSS SECTION OF PUMP HOUSE

FLOOD CONTROL PROJECT REFERENCES IN INDONESIA

No	CUSTOMER (Locations)	PUMPS TYPE	PUMP DUTY	QTY	YEAR
1	**Pemkot Surabaya (SUDP)**				
	Bratang Pumping Station	900KPL75.10.T3	Q = 1.5 m3/s, H = 3.5 meter	3	2000
		1000KPL110.12.T3	Q = 2 m3/s, H = 3.5 meter	2	2000
	Dinoyo Pumping Station	900KPL55.14.T3	Q = 1.5 m3/s, H = 2.5 meter	4	2000
		1000KVP150	Q = 2.5 m3/s, H = 3.5 meter	2	2000
	Darmokali Pumping Station	300KSE45.6.T3	Q = 0.25 m3/s, H = 7 meter	2	2000
		900KPL55.14.T3	Q = 1.5 m3/s, H = 2.7 meter	3	2001
		1000KPL110.12.T3	Q = 2 m3/s, H = 3.7 meter	1	2001
		1000KPL 75.12.T	Q = 2 m3/s, H = 3.5 meter	2	2001
		1000KPV 150	Q = 2.5 m3/s, H = 3.5 meter	1	2001
		300 KSE.45.6.T	Q = 0.25 m3/s, H = 7 meter	2	2001
2	**DPU-DKI Jakarta**				
	Kali Item Pumping Station	900KPL110.8.T3	Q = 2 m3/s, H = 3.7 meter	3	2002
3	**Pemkot Surabaya**				
	Kenari Pumping Station	800KPL90.8.T3	Q = 2.5 m3/s, H = 3.7 meter	1	2002
		300KSE65.6.T3	Q = 0.25 m3/s, H = 15 meter	1	2002
	Kalimir Pumping Stations	800KPL90.8.T3	Q = 2.5 m3/s, H = 3.7 meter	2	2002
4	**DPU-DKI Jakarta**				
	Kapuk Muara 1	700KPL75.8.T3	Q = 1 m3/s, H = 5 meter	1	2003
5	**PT. Sumarecon Agung**				
	Kelapa Gading Pumping Station	700KPL110.8.T3	Q = 1 m3/s, H = 7 meter	2	2003
		500KPL30.8.T3	Q = 0.5 m3/s, H = 4 meter	1	2003
6	**Pemkot Surabaya**				
	Semolowaru 1	900KPL130.10.T3	Q = 1.5 m3/s, H = 6 meter	4	2003
		300KSE65.6.T3	Q = 0.25 m3/s, H = 15 meter	2	2003
	Semolowaru 2	900KPL130.10.T3	Q = 1.5 m3/s, H = 6 meter	1	2003
		300KSE65.6.T3	Q = 0.25 m3/s, H = 15 meter	1	2003
	Kalidami Pumping Station	900KPL130.10.T3	Q = 1.5 m3/s, H = 6 meter	4	2003
		300KSE65.6.T3	Q = 0.25 m3/s, H = 15 meter	2	2003
	Kalikepiting	900KPL130.10.T3	Q = 1.5 m3/s, H = 6 meter	1	2003
		300KSE65.6.T3	Q = 0.25 m3/s, H = 15 meter	1	2003
	Simolawang Pumping Station	900KPL130.10.T3	Q = 1.5 m3/s, H = 6 meter	3	2003
		300KSE65.6.T3	Q = 0.25 m3/s, H = 15 meter	1	2003
	Kalijudan	300KSE65.6.T3	Q = 0.25 m3/s, H = 15 meter	2	2003
7	**DPU Samarinda**				
	Mobile Pumps	APB150.110.A3	Q = 0.15 m3/s, H = 5 meter	6	2003
8	**DPU Surakarta**				
	Kaliwingko Pumping Station	250KSE11.4.T3	Q = 0.125 m3/s, H = 9 meter	6	2003
9	**Pemkot Surabaya**				
	Gunungsari 1	900KPL130.8.T3	Q = 1.5 m3/s, H = 6 meter	2	2004
		300KSE65.6.T3	Q = 0.25 m3/s, H = 15 meter	2	2004
	Gunungsari 2	900KPL130.8.T3	Q = 1.5 m3/s, H = 6 meter	2	2004
		300KSE65.6.T3	Q = 0.25 m3/s, H = 15 meter	1	2004
10	**Proyek Brantas Surabaya**				
	Brantas River	900KPL150.6.T3	Q = 1.5 m3/s, H = 7 meter	2	2004
11	**DPU Samarinda**				
	Gang Indra Pumping Station	700KPL110.8.T3	Q = 1,5 m3/s, H = 5 meter	2	2004
		M & E Work			
12	**Sumarecon Jakarta**				
	Arta Gading Pumping Station	500KPL37.6.T3	Q = 0,5 m3/s, H = 5 meter	2	2004
	Bulevard Pumping Station	500KPL65.4.T3	Q = 0,5 m3/s, H = 10 meter	2	2004
13	**DPU Rokan Hilir - Riau**				
	Jumrah Pumping Station	800KWM190.8.T3	Q = 1,5 m3/s, H = 9 meter	1	2004
14	**DPU Bali**				
	Ponton Pump	250KAO.22.4.T3	Q = 1,5 m3/s, H = 9 meter	1	2004
15	**DPU Samarinda**				
	Air Hitam Pumping Station	700KPL75.8.T3	Q = 1 m3/s, H = 5 meter	2	2004
		M & E Work			
16	**DPU Samarinda**				
	Mobile Pumps	APB150.110.A3	Q = 0.15 m3/s, H = 5 meter	2	2004
17	**DPU-DKI Jakarta**				
	Kapuk Muara 1	700KPL75.8.T3	Q = 1 m3/s, H = 5 meter	3	2005
		M & E Work			
18	**DPU Samarinda**				
	Air Hitam Pumping Station	150KSE22.6.T3	Q = 150 Lt/s, H = 15 meter	1	2005
		M & E Work			
19	**DPU Sidoarjo**				
	Mapan Sentosa Pump Station	400KPL37.6.T3	Q = 150 Lt/s, H = 15 meter	3	2005
		M & E Work			
20	**SDPU Jakarta Pusat**				
	Mobile Pumps	DW150.100.A3	Q =75 Lt/s, H = 5 meter	16	2005
		Acessories			

No	CUSTOMER (Locations)	PUMPS TYPE	PUMP DUTY	QTY	YEAR
21	**Badak NGL - Bontang**				
	Public STP Community	100KWO5,5T	Q = 1 m3/s, H = 5 meter	8	2005
		M & E Work			
22	**DPU Sidoarjo**	400KPL37.6.T3	Q = 500 Lt/s, H = 5 meter	5	2006
		M & E Work			
23	**PT. Sumarecon Agung**				
	Kelapa Gading Ujung	500KPL37.6.T3	Q = 500 Lt/s, H = 5 meter	2	2006
		M & E Work			
24	**Lapindo Brantas Surabaya**	KPL, KWM, KSE	Q = 5000 Lt/s @ H = 5 meter	5	2006
	Proyek Lapindo	Panel Control			
25	**DPU Semarang**				
	Kali Tenggang & Kali Baru	500KPL55.6.T3	Q = 650 L/s @ H = 5 meter	7	2006
		Panel Control			
26	**SDPU Jakarta Barat**				
	Pedongkelan & Gang Macan	600KPL75.8.T3	Q = 1000 L/s @ H = 5 meter	2	2006
		500KPL37.6T3	Q = 500 L/s @ H = 5 meter	2	
27	**DPU-DKI Jakarta**				
	Yos Sudarso Pumping station	700KPL75.8.T3	Q = 1 m3/s, H = 5 meter	3	2007
		M & E Work			
28	**DPU-DKI Jakarta**				
	Depag Pumping station	500KPL37.6.T3	Q = 0.5 m3/s, H = 5 meter	2	2007
		M & E Work			
29	**Suku Dinas PU**				
	Tata Air Kotamadya Jakarta	500KPL55.6.T3	Q = 0.6 m3/s, H = 5 meter	2	2007
	Utara	M & E Work			
30	**DPU Semarang**				
	Lanal Pumping station	500KPL55.6.T3	Q = 0,6 m3/s, H = 5 meter	2	2007
	Kali Pacar Pumping station	500KPL55.6.T3	Q = 0,6 m3/s, H = 5 meter	4	2007
	Telogosari Pumping Station	500KPL55.6.T3	Q = 0,6 m3/s, H = 5 meter	2	2007
31	**Proyek Jratun Semarang**				
	Madukoro, Sawah Besar	500KPL55.6.T3	Q = 0,6 m3/s, H = 5 meter	2	2008
32	**PU Cipta Karya Wiyung**				
	Kali dami 1	900KPL 130 10 T3	Q= 80m3/min H, 6 M	3	2010
		350 KSE 45 6 T3	Q= 15m3/min H, 10m	2	2010
	Kali dami 2	800KPL90 8 T3	Q= 60m3.min; H, 6 M	3	2010
		350 KSE 45 6 T3	Q= 15m3/min H, 10m	2	2010
33	**PU Cipta Karya Wiyung**				
	Medokan Semampir	800KPL90 8 T3	Q= 60m3.min; H, 6 M	3	2010
		350 KSE 45 6 T3	Q= 15m3/min H, 10m	2	2010
	Medokan Ayu	500 KPL 37 6 T3	Q= 30m3/min; H. %	2	2010
		350 KSE 45 6 T3	Q= 15m3/min H, 10m	1	2010
	Kenjeran	900KPL130 8 T3	Q= 90m3/min H.5 m	5	2010
		350 KSE 45 6 T3	Q= 15m3/min H, 10m	2	2010
34	**BBWS Bengawan Solo**				
	IPAL Semanggi Solo	250KSE75.4T3	Q=7m3/min. H = 40m	4	2011
35	**Satuan Kerja PPLP-**				
	Provinsi Jawa Tengah				
	- Drainase Primer Pekalongan	SL1.80.100.75.A.4.51D	50 lps @ 10 mH	2	2011
		SE1.100.150.40.A.4.51D	50 lps @ 4 mH	1	2011
		S1.80.200.75.4.50E.S.198.G.N.D.511	100 lps @ 4 mH	1	2011
		800KPL45 8T3	700 lps @ 4 mH	3	2011
		900KPL90 8T3	1000 lps @ 6 mH	3	2011
	- Drainase Primer Surakarta	SL1.80.100.75.A.4.51D	50 lps @ 10 mH	1	2011
		S1.100.200.170.4.54L.S.285.G.N.D.511	100 lps @ 10 mH	3	2011
		S1.80.200.100.4.50E.S.220.G.N.D.511	100 lps @ 6 mH	2	2011
		SL1.100.150.55.A.4.51D	50 lps @ 6 mH	2	2011
	- Drainase Primer Kota Tegal	S1.80.200.100.4.50E.S.220.G.N.D.511	100 lps @ 6 mH	1	2011
		SL1.100.150.55.A.4.51D	50 lps @ 6 mH	1	2011
36	Pemkot Semarang	DW.150.110.A3	50 lps @ 10 mH	2	2011
37	Satuan Kerja Pengembangan	1600KPL350 14T3.3	5000 lps @ 5 mH	7	2012
	Penyehatan Lingkungan	1200KPL190 10T3	2500 lps @ 5 mH	4	2012
	Pemukiman Jawa Tengah	200KPLAO19 6T3	50 lps @ 10 mH	4	2012
			TOTAL	**225**	**PUMPS**

BE > THINK > INNOVATE >

Being responsible is our foundation
Thinking ahead makes it possible
Innovation is the essence

SEE THE BIGGER PICTURE

Grundfos is a global leader withinwater handling technology. Our passion is to bring you all the products you require to create and operate pump systems that combine reliability, cost-efficiency – and innovation. Our products are for use in water supply and wastewater infrastructure on any scale.

Grundfos has a full line of products and systems for the intake, treatment and distribution of drinking water and for the transport and treatment of wastewater. We also offer expertise and industry insight that can increase reliability and reduce lifecycle costs for water utilities.

Key product areas include:


Submersible pumps


Surface pumps


Sewage pumps


Mixers, flowmakers & recirculation pumps


Pumping stations


Monitoring & controls


Dosing & disinfection


Aeration equipment

Our products are the result of decades of engineering expertise. Supported by a worldwide service network. Visit www.grundfos.com/water-utility for more.

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