

## Procedure for Water Submission

**Division of Work between M&E and C&S - C&S' scope of work (submission to JBA Selangor) is from the tapping-off point to the bulk meter. M&E's scope of work (submission to local district JBA) is from the bulk meter onwards. Bulk meter details to be provided by M&E.**

For small project, such as individual Bungalow Development, Architect can submit directly (to JBA local) and does not involved us (010409). The division of work is flexible. I think the guide will still be as above, i.e. we are responsible to JBA main (JBA Selangor) as long as there is new water pipe on surrendered land and the quantity of water is big enough to be deal by Main JBA. Other should deal with by M/E together with the piping to local JBA.

\* For individual block development, it is compulsory for a separate bulk meter for fire hydrant located within the private compound (= on road not surrendered to the authority) in order to obtain the JBA approval

\* JBA prefers the bulk meter to be located at the entrance to the apartment compound (guard house area) so that the maintenance beyond the bulk meter would be under the Building Management.

Note Position, number of meter is to be approval by local JBA (under M/E)

The approval obtained by us only from tapping point to meter position only

### Stages of Approval

1. Submission of application and proposals (conceptual design) - details are discussed here
2. Submission of detailed design - details are discussed here
3. Construction, inspection and testing of water supply installation. For pumping installation, a working drawing is to be
4. Handing-over and turning-on of the water supply system
5. Application for service connections

### Reference

1) JKR Design Criteria & Standards For Water Supply Systems Volume 3

2) JBA Guideline for Uniform Application Procedures For Water Supply To Housing Scheme in Selangor

3) PAM Guideline for Uniform Application Procedures For Water Reticulation To Housing & Industry Schemes in Melaka

No	Task	Action			Remarks
		Yes	No	N.A.	
<b>A</b>	<b>Particulars of Authority</b>				...\\Authority Telephone Directory 2227x7\Authority - Telephone Directory.xls
	Address : Jabatan Bekalan Air Selangor, Peti Surat 5001, Jalan Pantai Bahru, 59990 Kuala Lumpur				
	Contact No.: 03-2282 6244 & Fax 03-2282 7535				
	Ir. Hussein bin Salikin (Ext.1604) = Engineer in charge of Petaling, Kuala Lumpur & Gombak				
<b>B</b>	<b>Planning Approval Stage - Technical Requirements by Authority</b>				> 20,000 gpd to apply directly to JBA Selangor, otherwise to JBA Daerah
1	To check with the authority on their requirements for the development.				
	The information on the technical requirements by the Authority may be obtained by the Architect or the Engineer - to be incorporated into the proposed planning layout.				For project with big land area, we may have to help to sort out the Drain Reserve if exist (in many case, redesign to reduce the width provision), road reserve provision, water supply provision from JBA, and sewer requirement from JPP (whether treatment plant at site or central sewer).
2	To obtain the TYPE OF PROPOSED DEVELOPMENT from the Planner / Architect				Normally, in the layout plan, Architect has stated the type of development, area/units
3	To obtain the relevant BASIS OF WATER DEMAND for the type of houses/buildings. Demand = 50gpd per person				Refer to Table1=Basis of Water Demand (gpd) : tabulated list as per requirements by (1) JBA Selangor, (2) PAM Melaka, (3) Miscellaneous past individual projects
4	To calculate the TOTAL WATER DEMAND in gallon per day				Refer to Table2=Total Water Demand (gpd) : tabulated sample of demand calculations based on the individual type of buildings in the project. JBA to approve on the availability of water supply for this demand.

5	If support form JBA is required for the planning approval stage, we have to write to inform the water demand and get their support on the planning approval submission. (we have done this for 175, in Melaka)			<a href="#">1=Preliminary &amp; Planning Stage_Sample Letter1_1=To Authority PAM=planning approval submission.doc</a>
	<b>C Architect to Obtain the Development Order (Surat Perintah Pembangunan) and the Approved / Endorsed Planning Layout from Planning Department</b>			<i>To obtain 1 copy each from the Architect for submission to Authority</i>
1	The <b>Development Order</b> / Perintah Pembangunan - Engineer to study all the requirements on the civil works.			
2	The <b>Approved &amp; Endorsed Planning Layout</b> / Pelan Tapak - Engineer to study and identify the road reserve / area to be surrendered to Authority.			<i>The laying of pipe / location of bulk meter will be affected by whether the road is surrendered or not.</i>
	<b>D Submission of Application and 1 Proposals (Conceptual Design)</b>			<b>PRELIMINARY ENQUIRY</b>
1	<b>To prepare preliminary enquiry letter to JBA to request for available water supply.</b>			<a href="#">1=Preliminary &amp; Planning Stage_Sample Letter1_1=To Authority JBA=Preliminary Enquiry on Water Supply.doc</a>
*	<i>key plan and site location plan</i>			
*	<i>an estimate of the total water supply requirement of the project complete with break-down figures, phasing of development and the time when the different quantities of water are required.</i>			
*	<i>an estimate of proposed / existing platform level of project site</i>			Project 139 - available water supply at 28.0m ODL and site platform at >29.0m at entrance, 6km away. This info will enable PAM to determine whether the available water pressure is sufficient to supply to the site.
*	<i>to enquire on the availability of water supply</i>			The amount is for internal use affect by M/E. Letter need to cc to them so that there can object if our quantity of water demand is wrong due to some specific M/E requirement
*	<i>to enquire the size and location of the public mains</i>			
*	<i>to enquire the available supply pressure in the public mains</i>			As informed by to En. Hussein of JBA Selangor, tapping from the trunk mains is not allowed - as it will affect the supply pressure downstream.
*	<i>to enquire the location of tap-off point</i>			
*	<i>to include the payment for water pressure test, if applicable</i>			
2	To obtain the relevant BASIS OF WATER DEMAND for individual building type			<a href="#">Refer to Table1</a>
3	To calculate the TOTAL WATER DEMAND in gal per day			<a href="#">Refer to Table2</a>
4	To obtain from the Client/Owner, the cheque for payment due to the authority for the payment for water pressure test, if applicable.			Payment to JBA for Pressure Test Requirement : (1) JBA Selangor - none, (2) SAJ Johor (110 Bukit Saujana) - RM 300/-, (3) PAM Melaka (139 Tanjung Minyak) - RM 300/-
5	For project for mixed developments (generally more than >20 acres and may be in phases), to prepare 2 sets of preliminary water report : "PRELIMINARY WATER ENQUIRY REPORT" on			
(a)	to describe the preliminary design concept			

	- Sufficient pressure from tap-off point => water will be supplied directly to individual building's roof storage tank (1 day capacity) for up to maximum 5 storey building			For area without water problem along main road, Other may have problem
	- Insufficient pressure from tap-off point => water will be supplied to individual building's ground suction tank (1/3 day capacity) and pumped to roof storage tank (2/3 day capacity)			If water tank is inside the building, its is under M/E
	- Insufficient pressure from tap-off point => water will be supplied to central ground suction tank (1/3 day capacity) and pumped to elevated water tank (2/3 day capacity) with pump house included			Height of elevated water tank shall be based on the most optimised height to distribute water to all individual buildings via gravity using 150mm dia. pipe (if possible); and also based on the multiplication of the stroey of rc frame.
	Set back Requirement for Central Water Tank -Ground Suction tank = 20 feet -Elevated Water tank = 30 feet			Inform by En. Tusseint of JBA Selangor on 001206
	Note: According to En. Tussein (001206), they have increased the setback requirement for elevated tank to 30 feet (previously is 20 feet). Reason : not save for the high elevated water tank to be located too near to other building.			
	(b) to enquire on the availability of water supply, tap-off location, pipe size and supply pressure in the nearby public mains.			
	<b>7 Upon Approval of Tapping Point</b>			
	- To write to the Client to forward the approval letter, cc to M&E and Architect			
	- To update the Status of Authority Follow-up file accordingly.			<a href="#">..\Status of Follow up 2422x4</a>
	- To incorporate the information on the tapping point pipe size, available pressure, location, etc into the design.			
	- In case the available pressure is lower that the proposed platform level, to write to JBA to confirm the			
	(a) request for confirmation of available pressure with pressure test			<a href="#">1=Preliminary &amp; Planning Stage_Sample Letter\1_2=To Authority JBA=Confirmation of Available Pressure With Test.doc</a>
	(b) request for alternative tapping point			<a href="#">1=Preliminary &amp; Planning Stage_Sample Letter\037_JBA_appeal tapping point.doc</a>
	8 To write to M&E Consultant for the positions and numbers of bulk meter			<a href="#">1=Preliminary &amp; Planning Stage_Sample Letter\086_Enmac asking for watersupply information2.doc</a>
	<b>D2 Submission of Detailed Design</b>			<b>DISTRIBUTION BY GRAVITY</b>
	<b>Detailed Submission Stage - Important Items to Incorporate into Water Plans (to be continually updated)</b>			> 20,000 gpd to apply directly to JBA Selangor, otherwise to JBA Daerah. Tapping point to bulk meter to be submitted by C&S Engineer.
	1 To prepare the water layout plan -based on the earthwork plan. The existing ground level and proposed level are clearly defined.			Mengemukakan rekabentuk terperinci dan kelulusan rekabentuk terperinci
	2 To obtain the Bomba approved layout plan from architect. To adopt the position and number of hydrants in the water reticulation layout			Location of hydrants in the layout plan - to ensure no obstruction to the entrance to the bungalow lots or commercial/housing units.

3	To determine the proposed layout of the pipeline reticulation			
4	To determine the pipe references and node references			
5	To determine the type of pipe materials to be used. MS pipe shall be used for all road crossings			
	Housing Scheme trunk and reticulation mains - HDPE (PN10)/UPVC (Class D) for coastal areas with corrosive soils - UPVC (Class D) with non-solvent joints for the small sizes/HDPE (PN10) for the larger sizes for filled ground and mining land - DI/Steel/HDPE (PN10)/UPVC (Class E) for road crossings, pavements & pedestrian mall - DI/Steel/HDPE (PN10) for larger sizes /AC(Class 20)/UPVC (Class D) for smaller sizes for general use.			
6	To calculate the WATER DEMAND DRAW-OFF for each node in litre/sec.			Table 3 - Water Demand Draw-off (lps) : tabulated sample of draw-off calculations based on the individual nodes. Average Flow - is the total daily demand requirement divided by 24 hours. Peak Flow - Peak Factor x Average Flow, the use of peak factors due to hourly variations in water demand. Peak factors to be determined based on the type of distribution.
7	Design Flow for the reticulation mains shall be greater of the below:-			
a)	<b>Peak Flow = Peak Factor x Average Flow</b> => To use 1.2 Peak Flow Factor for design of pipe from tap-off point to elevated water tank / suction tank => To use 2.5 Peak Flow Factor for design of pipe from tap-off point to individual building under gravity flow. => Minimum head to inlet pipe in ground suction tank = 10 feet = 3m			Peak factor in the design of trunk main supplying water to a service reservoir is 1.2  Peak factor in the design of reticulation mains is 2.5
b)	<b>Average Flow + Fire Flow</b> => to use fire flow at any one or two critical node depending on the class of risk as stated.  => Bomba's required minimum pressure to each hydrant = 10 psi (23.1 feet) = 7m and the head to inlet pipe in suction tank can be temporarily without sufficient head (as long as positive suction). => Quantity of hydrant flow is 1370 lpm (= 300 gpm = 22.83 lps) per hydrant. Number of hydrant as per JBA's requirement.			Strictly, this aspect is governed by Bomba. Submission by architect to Bomba for approval. The approval letter may specify the number of hydrant and water discharge rate for hydrant.
7	To determine the Top Water Level for each building - ie. highest supply level.			TWL is the Elevation in metres. At node with draw-off, TWL = Platform Level + Building Height + 3m Water Tank Height (ie. supply to roof tank), or TWL = Platform Level + 3m Suction Tank Height (ie. supply to suction tank). At node without draw-off, TWL = Platform Level only.
8	To carry out the water reticulation design using AUTOCIVIL MAXPAC Ver 5.0 : AUTOWATER for pipe network analysis and headloss calculation based on Hazen William Formula.			AUTOWATER Definition : Fixed Grade - the supply pressure at tapped-off point, Demand - the water draw-off (in l/sec), Elevation - the height of TWL (in m), Pressure - the residual head where Grade Line minus Elevation (in m) should be more than the minimum allowable head
9	DESIGN CRITERIA			
*	Minimum pipe size shall be 150mm diameter			
*	Minimum residual head above highest supply level is 25ft (= 7.6m)			Minimum Residual Head : (1) <b>JBA Selangor</b> 25ft = 7.6m to TWL of roof tank on single/double storey building and 10-15ft=3-4.6m to incoming pipe level of ground suction tank (at side of tank), (2) <b>PAM Melaka</b> 15 ft = 4.6m.

*	Maximum head available in mains is 100ft (= 30.5m)			
*	Minimum pipe flow velocity 0.6 m/sec.			PAM's maximum pipe flow velocity is 1.0m/s.
*	Head losses in pipe limited to 2m/1000m (2ft/1000ft).			Major frictional losses in pipeline through pipe length. Minor frictional losses in pipelines through valves and fitting (usually minimal as compared to major losses).
*	Adopt C=100 for all pipes			
*	Minimum pipe cover below roads and hardstandings is 1200mm, other area is 1000mm			
*	Air valves shall be provided at peak points			
*	Sluice valves shall be provided to isolate sections and to facilitate maintenance			
*	Anchor blocks shall be provided at all bends and tees and designed to withstand full test pressure			
10	Details as per JBA's requirements/comments:-			
*	<u>Tap-off from the trunk mains</u> are not allowed as it affects the supply pressure downstream			
*	The JBA Selangor's <u>residual pressure requirement</u> is (1) 25ft to TWL of roof tank (on single/double storey buildings) and (2) 10 to 15ft to Incoming Pipe Level of ground suction tank (to be placed at the side of the tank (for water to fill up in the tank) instead of top of the tank (for water to fall into the tank).			PAM's minimum requirement is 15 feet.
*	<u>Bulk meter for cold water (domestic &amp; commercial)</u> . C&S to submit water reticulation up to the bulk meter only. After bulk meter, submission will be made by M&E to the respective local JBA. Bulk meters to be located at the entrance to the private property/compound (near guard house) and not near the water tank in the building. The maintenance beyond the bulk meter is under the Building Management.			JBA will control the water flow in domestic supply line through a constant flow valve based on the water usage of 20 hours/day.
*	<u>No bulk meter for external hydrants on surrendered roads</u> . The water to external hydrants to be tapped from public mains and need not be metered. The supply line to be submitted by C&S. The pipe and hydrant to be maintained by JBA.			
*	<u>Separate bulk meter for internal hydrant located within the private property / non-surrendered roads</u> . The water to internal hydrants to be supplied via a separate bulk meter. C&S to submit up to the bulk meter. The supply line of the internal hydrants to be submitted by M&E. The pipe and hydrant to be maintained by the Building Management.			The separate internal hydrant line and bulk meter is to discourage abuse of the hydrant supply for personal use. JBA will not control water flow in this pipeline unlike that for domestic supply line. Any leakage / malfunction in the line can be traced from the bulk meter reading.
*	Water pipes which are part of the building internal plumbing system (eg. pipe supplying water from the ground suction tank to the roof tank of another building) after the bulk meter must not enter, along or cross surrendered road.			



*	No. xxx-CVL-WR-072=Typical Details Of Pillar Hydrant, PC Post Marker And Air Valve			The bulk meter detail in the drawing is indicative only - to be provided by M&E.
*	No. xxx-CVL-WR-073=Details Of Thrust Block For Tee, Horizontal Bend, Vertical Bend And Typical Pipe Trenches			
*	No. xxx-CVL-WR-074=Typical Pipe Culvert And Road Crossing Details			
2	To note that all tracings to be signed by the Engineer-in-charge and to be counter-signed by Mr.Neo before any paper printing is allowed. This also applies to all revised drawings/tracings. Old tracings to be marked "SUPERSEDED" with the date and reason for revision.			
3	To stamp on all plans and reports (1) PE - <b>Jurutera Profesional (Awam)</b> seal and (2) JKA's piawai jabatan " <b>I hereby certify that these works have been designed by me in accordance with sound engineering practice and that I take full responsibility for the design and proper performance of the same</b> ".			
4	To write to the Architect for a copy of the <b>Development Order</b> (Surat Perintah Pembangunan) and the approved & endorsed <b>Planning Layout</b> (Pelan Tatatur/Tapak) as approved by Jabatan Perancang & Kawalan Bangunan.			<i>This is obtained from the Architect upon the planning approval. The Authority requires this to confirm that the planning of project is approved.</i>
5	To prepare 4 sets of the PE endorsed <b>Water Reticulation Report</b>			<a href="#">..\Project Report 222487\152 Jalan Shelley\152 Water Report=Resubmission991006.doc</a>
6	To incorporate Schematic Diagram into the report. To prepare the diagram to illustrate the water supply concept and indicate if the suction tank and internal pumping (by M&E) is required.			<a href="#">WR=General\Standard Schematic Diagram for Water Supply Concept 20000218.dwg</a>
7	To incorporate the relevant pipe specification into the report.			<a href="#">\\NT98\ STD_Doc 444\General Specification 4449xx\Adopted 4449xx\Water Supply</a>
8	<b>Engineer's P.E. Endorsement</b> - To arrange for Mr.Neo to P.E. endorse on the followings: -			
	- Water Reticulation Drawings			
	- Sewerage Reports with pipe specification			
9	<b>Owner/Developer's Endorsement</b> - To write to Client for the Owner/Developer's endorsement on the followings: -			
	- Sewerage Drawings			<a href="#">2=Design &amp; Submission Stage_Sample Letter\2_1=Standard Letter_Client's Endorsement on Water Plans.doc</a>
10	No Processing Fee is required by JBA at submission stage.		X	

<b>F</b>	<b>Checklist of Items - Submission to Jabatan Bekalan Air Selangor</b>			
1	Water <u>Submission Cover Letter</u> .			<a href="#">2=Design &amp; Submission Stage Sample Letter</a> 2 2=Standard Letter Water Submission.doc
2	1 copy of the <b>Development Order</b> (Surat Perintah Pembangunan yang berkaitan untuk keseluruhan pembangunan) as approved by Jabatan Perancang & Kawalan Bangunan. Authority will only process the submission when the planning layout has been approved.			Planning Approval Letter
3	1 copy of the approved & endorsed <b>Planning Layout</b> (Pelan Tatatur/Tapak) as approved by Jabatan Perancang & Kawalan Bangunan. Authority will only process the submission when the planning layout has been approved.			Planning Approval Layout
4	Four (4) sets of the PE endorsed <b>Water Reticulation Report</b> with relevant pipe specification			
5	Three (3) sets of the <b>Water Drawings</b>			
<b>G</b>	<b>Follow-up With Authority</b>			
	<b>To follow-up with the Authority after a minimum period of two weeks. This is to ensure that the file has reached the relevant officer.</b>			<b>To update the details of follow-up and status of submission. To follow up after minimum of two weeks, one month is better.</b>
1	Immediately upon submission, to inform the technical assistant / engineer-in-charge so. Normally, file is submitted to the admin who will then distribute to the relevant department for processing.			To ensure that they are aware that our proposal has been submitted for their comments/approval.
2	To follow-up with the authority 2 weeks after submission, and subsequently at a regular interval.			
3	To update the Status of Authority Follow-up file accordingly.			<a href="#">..\Status of Follow up 2422x4</a>
4	If resubmission is required, to proceed accordingly.			
<b>H</b>	<b>Upon Approval -To Issue Water Construction Drawings</b>			
1	Upon confirmation by the authority, to arrange to collect from them the approval letter, endorsed plans and reports.			
2	To forward a copy of the approval letter to Client, Architect, QS and M&E consultants, attached to our cover letter.			The external supply and conditional of approval will most probably affect the M/E portion and Architect, which they must be given a chance to know. It is more than simply courtesy to cc letter to them.
3	To file a copy of the approval letter each in the Correspondence File and in the Authority File.			
4	The original approval letter and endorsed plans and reports to be kept in the cabinet in Mr Neo's room.			



**Table 1 - Basis of Water Demand (gpd)**

Note : Equivalent Population (EP) Discharge = 50 gal/EP/day = 225 litre/EP/day

In case when contribution depends on demand,,the client may be particular and wants a very minimum design

The units, area etc for total demand should be obtained from the DO or other summary in drawings by others, not by our direct drawings area calculation.

Generally, a lot of area like office in hospital are deemed included in the basis.

Note:

For commercial, water demand calculation is based on Gross Floor area which includes M/E services.

The hostel, our suggestion is to use water demand same as sewer, based on 4 person per room (deems to include dining & laundry & reception & Mezzanine & Health Center & Children Game room etc

The swimming pool water demand is calculated based on assumption of 100 person/day.

**JBA SELANGOR REQUIREMENT**

Type of Building	Basis of Demand (gpd)	
Low Cost Houses	250	per unit
Single Storey Terrace Houses	250	per unit
Double Storey Terrace Houses	300	per unit
Semi-Detached	300	per unit
Bungalows	500	per unit
Flats	250	per unit
Condominium / Apartment	300	per unit
Shop Houses (1 storey)	500	per unit
Shop Houses (2 storey)	600	per unit
Shop Houses (3 storey)	900	per unit
Shop Houses (4 storey)	1,000	per unit
Schools	10	per head
Boarding Schools	60	per head
Government Complex	2,500	per acre
Institutions	2,000	per acre
Suaru/Balairaya	400	per unit
Mosque	2,000	per acre
Petrol Kiosk	2,500	per unit
Light Industrial Workshop	350	per unit
Terrace Factories	1,000	per unit
Others	-	
Surau	2,000	per acre
Library	2,000	per acre
Dewan Serbaguna	2,000	per acre
Gerai	2,000	per acre
Office	215	per 100 sq. m

acreage only used when the details is uncertain without building plan , for land 2000=40PE=2000/200x1000sf ft=10000 sq ft=.25 acres, =>buildup=.25 of area.

**PAM MELAKA REQUIREMENT**

Type of Building	Basis of Demand (gpd)	
Low Cost Houses	200	per unit
Low Cost Flats	200	per unit
Single Storey Terrace Houses	300	per unit
Double Storey Terrace Houses	300	per unit
Single Storey Semi-Detached Houses	350	per unit
Double Storey Semi-Detached Houses	400	per unit
Single Storey Bungalows / Shophouses	500	per unit
Double Storey Bungalows / Shophouses	600	per unit
3-storey Shophouses	900	per unit
4-storey Shophouses	1,000	per unit
1-room Apartments / Condominiums	200	per unit
2-room Apartments / Condominiums	250	per unit
3-room Apartments / Condominiums	300	per unit
Light Industrial Workshop - Terrace	350	per unit
Light Industrial Workshop - Semi-Detached	500	per unit
Light Industrial Workshop - Single Unit	1,500	per unit
Medium Industries	5,000	per acre
Heavy Industries	7,000	per acre
Residential Hostels	100	per student
Schools	10	per student
Hostels	100	per person/room
Commercial Complexes	200	per 1000 ft <sup>2</sup>
Commercial Complexes(with canteens )	300	per 1000 ft <sup>2</sup>
Restaurants	5	per head/meal
Mosques / Surau	5	per head

equivalent to 4 person per room

**MISCELLANEOUS - FOR INDIVIDUAL PROJECT**

Type of Building	Basis of Demand (gpd)	
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<i>SAJ - 110 Bukit Saujana</i>		
<b>Clubhouse</b>	50,000	per unit
<b>Mosque</b>	10	per head
<b>Shopping Complex/Office</b>	250	per 100 m2
<b>Swimming Pool Make-Up</b>	400	per unit
<b>Driving Range</b>	500	per unit
<i>JBA - 121 BTS</i>		
<b>Offices</b>	20	per 100 ft2
	215	per 100 m2
<b>GF of Shopoffices</b>	300	per unit
<i>PAM - 139 Tanjung Minyak</i>		
<b>Mosque</b>	2,000	per acre
<b>Balairaya</b>	2,000	per acre
<b>Gerai</b>	2,000	per acre
<b>Commercial Complexes (use estimated plot ration 1:3)</b>	2,000	per acre

\* 1000 person for 29 acres project

For office sewerage =150gpd per 100m2, water is higher due to aircon usage?

**990806**

The following water demand list is obtained through the M&E Engineer (Enmac Sekutu) from Cik Maimunah bte Musa of JBA, KL on 6 August 1999.

This list was obtained on 21 May 1998 and according to Cik Maimunah, there is some minor change in the latest update. Any engineer going to JBA, KL to ask for the latest copy (if available).

**JBA Daerah Kuala Lumpur REQUIREMENT**

Type of Building	Basis of Demand (gpd)	
<b>Low Cost Houses</b>	250	per unit
<b>Single Storey Low Cost</b>	250	per unit
<b>Single Storey House</b>	300	per unit
<b>Double Storey House</b>	300	per unit
<b>Semi-Detached House</b>	400	per unit
<b>Bungalow</b>	500	per unit
<b>Shop Houses (1 storey)</b>	250	per unit
<b>Low Cost Flat</b>	250	per unit
<b>Apartment</b>	330	per unit
<b>Condomium - 1 room</b>	330	per unit
<b>Condomium - 2 rooms</b>	330	per unit
<b>Condomium - 3 rooms</b>	330	per unit
<b>Condomium - 4 rooms &amp; above</b>	500	per unit
<b>Condomium - Penthouse</b>	500	per unit
<b>Hotel</b>	350	per room
<b>Schools</b>	10	per head

<b>Balairaya</b>	300	per unit
<b>Tadika</b>	500	per unit
<b>Surau</b>	1,000	per unit
<b>Masjid</b>	5,000	per unit
<b>Dewan Serbaguna</b>	1,000	per unit
<b>Hindu temple</b>	2,000	per acre
<b>Chinese temple</b>	2,000	per unit
<b>Petrol Station</b>	10,000	per unit
<b>Wet market</b>	300	per unit
<b>Hawker Centre</b>	300	per lot
<b>Club House</b>	10,000	per unit
<b>Bomba</b>	3,000	per unit
<b>Balai Polis</b>	5,000	per unit
<b>TNB Sub-station</b>	500	per unit
<b>Terraced factory - 1 storey</b>	500	per unit
<b>Terraced factory - 2 storey</b>	1,000	per unit
<b>Industrial</b>	5,000	per acre
<b>Office space</b>	20	per 100 sq ft
<b>Hostel</b>	40	per head
<b>Hospital</b>	60	per bed

**An allowance of 10% of the overall demand shall be allowed for water loss.**

**Table 2 - Total Water Demand (gpd)**

No.	Type of Building	Description of Build-up Area / Lot Size / No. of Units	Basis of Water Demand (gpd)		No. of Units / Acres	Total Water Demand (gpd)
1	Kedai - 3 storey	22' x 70'	900	per unit	26	23,400
2	Kedai - 2 storey	22' x 70'	600	per unit	159	95,400
3	Teres Kos Tinggi - 2 Storey	20' x 70'	300	per unit	379	113,700
4	Teres Kos Sederhana - 1 Storey	20' x 65'	250	per unit	379	94,750
5	Teres Kos Sederhana Rendah - 1 Storey	20' x 60'	250	per unit	138	34,500
6	Lot Banglo - 2 storey		500	per unit	9	4,500
7	Lot Berkembar - 2 storey	40' x 80'	300	per unit	16	4,800
8	Rumah Pangsa Murah - 4 storey	4 acres	250	per unit	280	70,000
9	Tapak Gerai	0.50 acres	2,000	per acres	0.50	1,000
10	Kompleks Perniagaan	2.40 acres	2,000	per acres	2.40	4,800
11	Air-Cond Top-Up		2,000	per unit	1	2,000
12	Balairaya	0.68 acres	2,000	per acres	0.68	1,360
13	Masjid	1.00 acres	2,000	per acres	1.00	2,000
			<b>Total Daily Demand</b>			<b>452,210</b>
			<b>total Estimate Deman</b>			<b>500,000</b>

**Table 3 - Water Demand Draw-off (lps)**Flow Factor = **2.5**

Node No.	Type of Demand	No. of Units	Water Demand per Unit (Based on Table 1)		Water Demand			
			gpd	lpd	Average Flow		Peak Flow	
					lpd	lps	lpd	lps
2	RTB	11	300	1,364	15,002	0.17	37,505	0.43
3	RTB	22	300	1,364	30,004	0.35	75,010	0.87
5	Masjid	1	2,000	9,092	9,092	0.11	22,730	0.26
6	RTB	11	300	1,364	15,002	0.17	37,505	0.43
7	RTA	11	300	1,364	15,002	0.17	37,505	0.43
8	RTB	23	300	1,364	31,368	0.36	78,420	0.91
9	RTB	39	300	1,364	53,189	0.62	132,973	1.54
12	RTB	27	300	1,364	36,823	0.43	92,058	1.07
13	BL	1	1,360	6,183	6,183	0.07	15,457	0.18
15	RTB	18	300	1,364	24,549	0.28	61,372	0.71
16	RTB	16	300	1,364	21,821	0.25	54,553	0.63
17	RTB	15	300	1,364	20,457	0.24	51,144	0.59
18	RTB	11	300	1,364	15,002	0.17	37,505	0.43
19	RTB	31	300	1,364	42,279	0.49	105,697	1.22
	RTA	25	300	1,364	34,096	0.39	85,239	0.99
21	RTA	24	300	1,364	32,732	0.38	81,830	0.95
22	RTA	20	300	1,364	27,277	0.32	68,191	0.79
23	RTA	22	300	1,364	30,004	0.35	75,010	0.87
24	RTA	15	300	1,364	20,457	0.24	51,144	0.59
25	RTA	11	300	1,364	15,002	0.17	37,505	0.43
26	RTA	25	300	1,364	34,096	0.39	85,239	0.99
27	RTA	14	300	1,364	19,094	0.22	47,734	0.55
28	RTA	22	300	1,364	30,004	0.35	75,010	0.87
29	RTA	24	300	1,364	32,732	0.38	81,830	0.95
30	RTA	18	300	1,364	24,549	0.28	61,372	0.71
31	RTA	12	300	1,364	16,366	0.19	40,915	0.47
32	RTA	14	300	1,364	19,094	0.22	47,734	0.55
33	RTA	21	300	1,364	28,640	0.33	71,601	0.83
36	RTA	15	300	1,364	20,457	0.24	51,144	0.59
37	RTA	16	300	1,364	21,821	0.25	54,553	0.63
38	RTA	13	300	1,364	17,730	0.21	44,324	0.51
40	RTA	12	300	1,364	16,366	0.19	40,915	0.47
41	RTA	12	300	1,364	16,366	0.19	40,915	0.47
42	RTA	33	300	1,364	45,006	0.52	112,516	1.30
43	K2	13	600	2,728	35,460	0.41	88,649	1.03
46	K2	25	600	2,728	68,191	0.79	170,478	1.97
47	K2	20	600	2,728	54,553	0.63	136,383	1.58
48	K2	10	600	2,728	27,277	0.32	68,191	0.79
49	K2	10	600	2,728	27,277	0.32	68,191	0.79
50	K2	16	600	2,728	43,642	0.51	109,106	1.26
51	K2	12	600	2,728	32,732	0.38	81,830	0.95
52	K2	4	600	2,728	10,911	0.13	27,277	0.32
	BG	2	500	2,273	4,546	0.05	11,365	0.13
54	K2	11	600	2,728	30,004	0.35	75,010	0.87
55	K2	22	600	2,728	60,008	0.69	150,021	1.74
56	K3	11	900	4,091	45,006	0.52	112,516	1.30
57	K3	15	900	4,091	61,372	0.71	153,431	1.78
58	G	1	200	909	909	0.01	2,273	0.03
59	P	1	4,800	21,821	21,821	0.25	54,553	0.63

61	RTB	11	300	1,364	15,002	0.17	37,505	0.43
62	RTB	31	300	1,364	42,279	0.49	105,697	1.22
63	RTB	16	300	1,364	21,821	0.25	54,553	0.63
64	BG	3	500	2,273	6,819	0.08	17,048	0.20
65	RBK	16	400	1,818	29,095	0.34	72,737	0.84
	BG	4	500	2,273	9,092	0.11	22,730	0.26
66	RTB	13	300	1,364	17,730	0.21	44,324	0.51
68	K2	16	600	2,728	43,642	0.51	109,106	1.26
70	RTB	12	300	1,364	16,366	0.19	40,915	0.47
71	RTB	21	300	1,364	28,640	0.33	71,601	0.83
72	RTB	24	300	1,364	32,732	0.38	81,830	0.95
	RTC	12	300	1,364	16,366	0.19	40,915	0.47
73	RTC	24	300	1,364	32,732	0.38	81,830	0.95
74	RTC	12	300	1,364	16,366	0.19	40,915	0.47
75	RTB	27	300	1,364	36,823	0.43	92,058	1.07
78	RP	280	250	1,137	318,226	3.68	795,566	9.21
79	RTC	22	300	1,364	30,004	0.35	75,010	0.87
81	RTC	31	300	1,364	42,279	0.49	105,697	1.22
82	RTC	24	300	1,364	32,732	0.38	81,830	0.95
83	RTC	13	300	1,364	17,730	0.21	44,324	0.51
<b>Total Daily Demand</b>					<b>2,167,848</b>	<b>25.09</b>	<b>5,419,621</b>	<b>62.73</b>

Notes :-

- 1) gpd = gallons per day
- 2) lpd = litres per day, lps = litres per second
- 2) 1 gallons = 4.54609 litres
- 3) 1 gallons = 0.00454609 m<sup>3</sup>

\*Remarks

RTA Lot Teres Kos Tinggi  
 RTB Lot Teres Kos Sederhana  
 RTC Lot Teres Kos Sederhana Rendah  
 K2 Lot Kedai (2 Tingkat)  
 K3 Lot Kedai (3 Tingkat)  
 RBK Lot Berkembar  
 BG Lot Banglo  
 RP Rumah Pangsa Murah  
 BL Balairaya  
 G Gerai  
 P Lot Perniagaan

When tapping point is  
far from site:

We need to ensure that the whole new proposed pipe from tapping point to site, pressure head and actual level must be less than tapping pressure express as height equivalent (hydraulic gradient must be possible, otherwise is physically impossible. To ensure above, we need to know the level of the pipe road to check no practically impossible very deep excavation need to be carried out.

**Items to discuss**

1) Peak Flow Factor - 1.2 & 2.5

In SAJ 110 Bukit Saujana - distribution of water by gravity to building (with ground suction tank to be pumped to roof tank) use 1.2, other direct distribution to roof tank is 2.5

Building inclusive of condominium, clubhouse, service apartment, shopping complex/office.

*In other projects, to used 1.2 instead of 2.5 ?*

*eg, 123 Rawang - supply to ten-storey medium cost apartment, ten-storey low cost flat - used 2.5*

2) JBA Guideline - Appendix B (4) : Peak flow factor in the design of trunk main supplying water to a service reservoir is 1.2, and of reticulation mains is 2.6

PAM Guideline - Item (4) STILL UNDER DRAFT : Peak factor in the design of upstream trunk mains (treatment plants to reservoirs) is 1.2, and of distributor trunk mains (supplying to service reservoir & suction tank) is 1.5, and of reticulation mains (distribution mains) is 2.5.

*In PAM 139 Tanjung Minyak Design, we should use factor 1.5 in the design of pipe from tap-off point to ground suction tank?*

3) Project 120 Korakyat - Extract from report EXTERNAL WATER SUPPLY FOR ELEVATED WATER TANK

The amount of water stored in the elevated water tank is 250,000 gallons. In the report titled “External Water Supply Reticulation Submission” the fire hydrant discharging 300 imperial gallons per minute for the case of fire flow + average flow is located at node 36. Assuming that the fire lasts one (1) hour, the amount of water consumed to fight the fire is 18,000 gallons. This is very much less than the 250,000 gallons of water stored in the elevated water tank. Hence we have not provided a bypass pipe joining the pipe supplying water from the tapping point to the elevated water tank with the outlet pipe from the elevated water tank supplying water to the factories, gerai-gerai, surau and research and development building.

3) Info on Comparison between JBA Selangor & PAM's requirement

JBA			PAM		
Low Cost Houses	250	per unit	Low Cost Houses	200	per unit
Single Storey Terrace Houses	250	per unit	Single Storey Terrace Houses	300	per unit
Double Storey Terrace Houses	300	per unit	Double Storey Terrace Houses	300	per unit
Semi-Detached	300	per unit	Single Storey Semi-Detached Houses	350	per unit
			Double Storey Semi-Detached Houses	400	per unit
Bungalows	500	per unit	Single Storey Bungalows / Shophouses	500	per unit
			Double Storey Bungalows / Shophouses	600	per unit
Flats	250	per unit	Low Cost Flats	200	per unit

Note

<b>Condominium / Apartment</b>	300	per unit

<b>1-room Apartments / Condominiums</b>	200	per unit
<b>2-room Apartments / Condominiums</b>	250	per unit
<b>3-room Apartments / Condominiums</b>	300	per unit

<b>Shop Houses (1 storey)</b>	500	per unit
<b>Shop Houses (2 storey)</b>	600	per unit
<b>Shop Houses (3 storey)</b>	900	per unit
<b>Shop Houses (4 storey)</b>	1,000	per unit

<b>Single Storey Bungalows / Shophouses</b>	500	per unit
<b>Double Storey Bungalows / Shophouses</b>	600	per unit
<b>3-storey Shophouses</b>	900	per unit
<b>4-storey Shophouses</b>	1,000	per unit

<b>Schools</b>	10	per head
<b>Boarding Schools</b>	60	per head

<b>Schools</b>	10	per student
<b>Residential Hostels</b>	100	per student
<b>Hostels</b>	100	per person/room

<b>Government Complex</b>	2,500	per acre
<b>Institutions</b>	2,000	per acre
<b>Suaru/Balairaya</b>	400	per unit
<b>Mosque</b>	2,000	per acre
<b>Petrol Kiosk</b>	2,500	per unit
<b>Light Industrial Workshop</b>	350	per unit

<b>Mosques / Surau</b>	5	per head
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<b>Light Industrial Workshop - Terrace</b>	350	per unit
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<b>Terrace Factories</b>	1,000	per unit
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<b>Light Industrial Workshop - Semi-Detached</b>	500	per unit
<b>Light Industrial Workshop - Single Unit</b>	1,500	per unit
<b>Medium Industries</b>	5,000	per acre
<b>Heavy Industries</b>	7,000	per acre

<b>Commercial Complexes (without Canteen)</b>	200	per 1000 ft <sup>2</sup>
<b>Commercial Complexes (with Canteen)</b>	300	per 1000 ft <sup>2</sup>
<b>Restaurants</b>	5	per head/meal

**JBA Selangor Case (recorded on 1st March 99)**

For small quantity below 10,000 gal. (possibly new revision is 20,000 gal), all application is to local JBA.  
 For PJ at JBA Petaling, Jln Templer.

**Water Reticulation Design - for Fire Flow**

1) 5-Oct-99 - Spoken to En. Hussein of JBA Selangor.

He informed the followings:-

- a) at Peak Flow => minimum head to inlet pipe in ground suction tank = 10 feet
- b) at Average + Fire Flow => Bomba's required minimum pressure to each hydrant = 10 psi (23.1 feet) and the head to inlet pipe in suction tank can be temporarily without sufficient head (as long as positive suction).

2) 11-Oct-99 - Spoken to En. Wan Razali (Tel. 559-444 Ext.122), the head of department of Bahagian Pencegah (same department that we obtained approval for 135 Blue Lagoon project) Jabatan Perkhidmatan Bomba Negeri Selangor - to check on the requirement for minimum pressure at fire hydrant.

He informed that their requirement is

- a) quantity 1135 lpm (=250 gpm = 18.92 lps)
- b) distance between hydrants 300 ft (=90m). There is no specific requirement on the psi pressure by their department.

To note that the quantity stated in the JBA Selangor Guideline is 1370 lpm (= 300 gpm = 22.83 lps)

2) Refer to JKR Design Criteria & Standards For Water Supply Systems Vol.3 - pg.14.30 Item (k) on Hydrants

=> All fire hydrants shall have a maximum permissible working pressure of 16 bar

I will further check on the requirement for minimum pressure at hydrant.