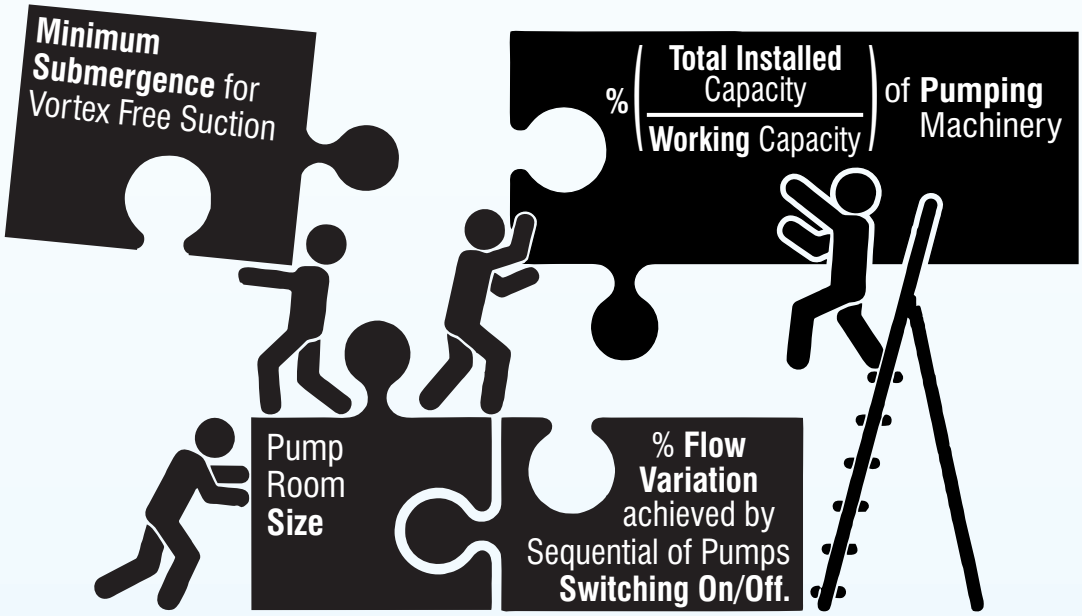
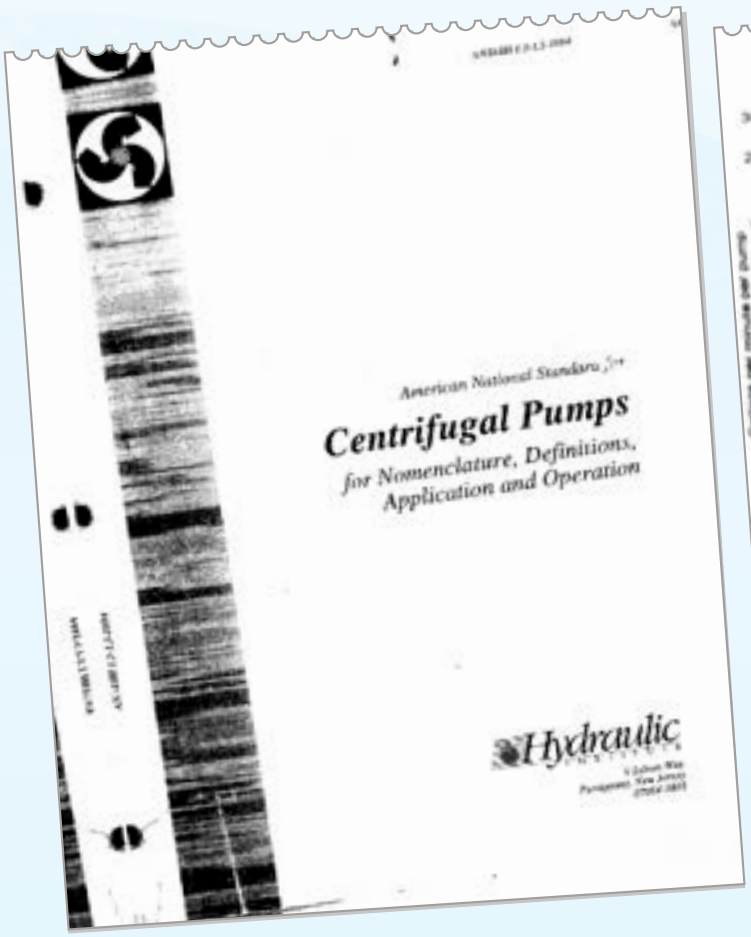
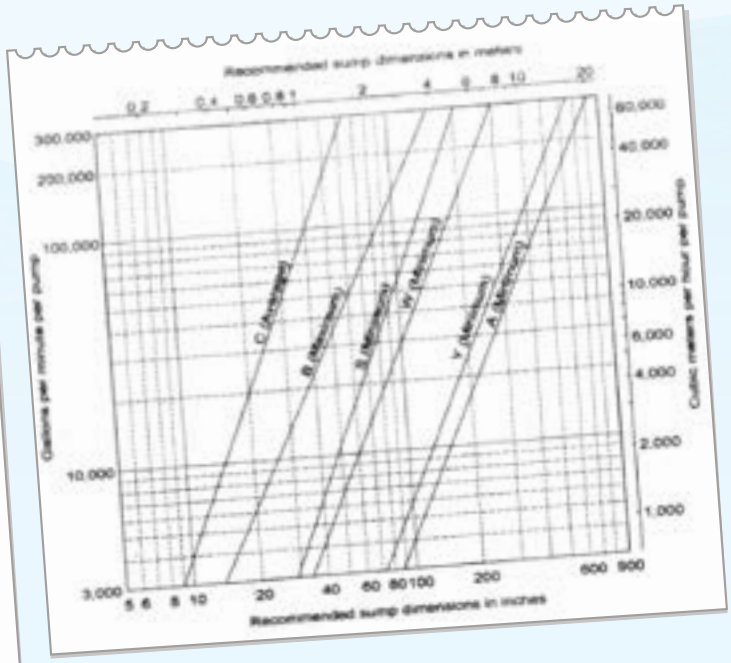
Dilemma : Quantity of Pumpsets ….??

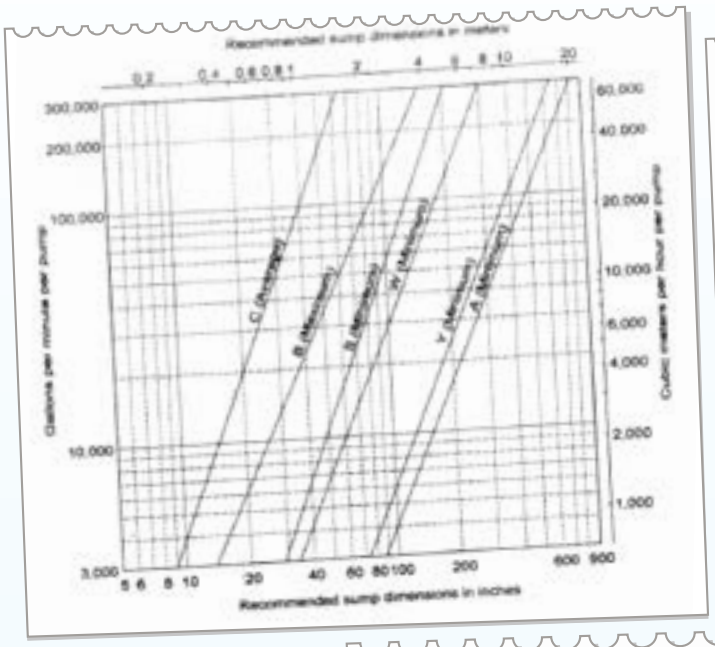
Bigger the Better …! ? Or More the Merrier …! ?







Lower the Number of Working Pumps - Higher the Unit Flow per Pump; which in turn forces Higher Sump Dimensions



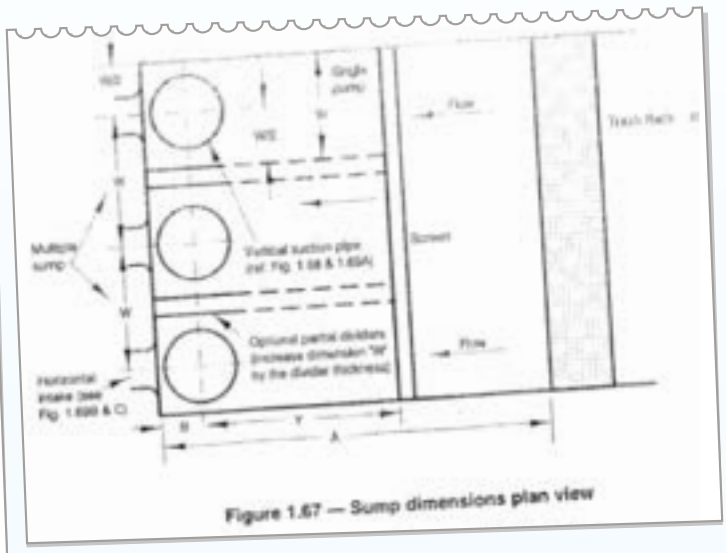


Figure 1.67 — Sump dimensions plan view

With given (similar) Water Levels, a Small pump will fit in better

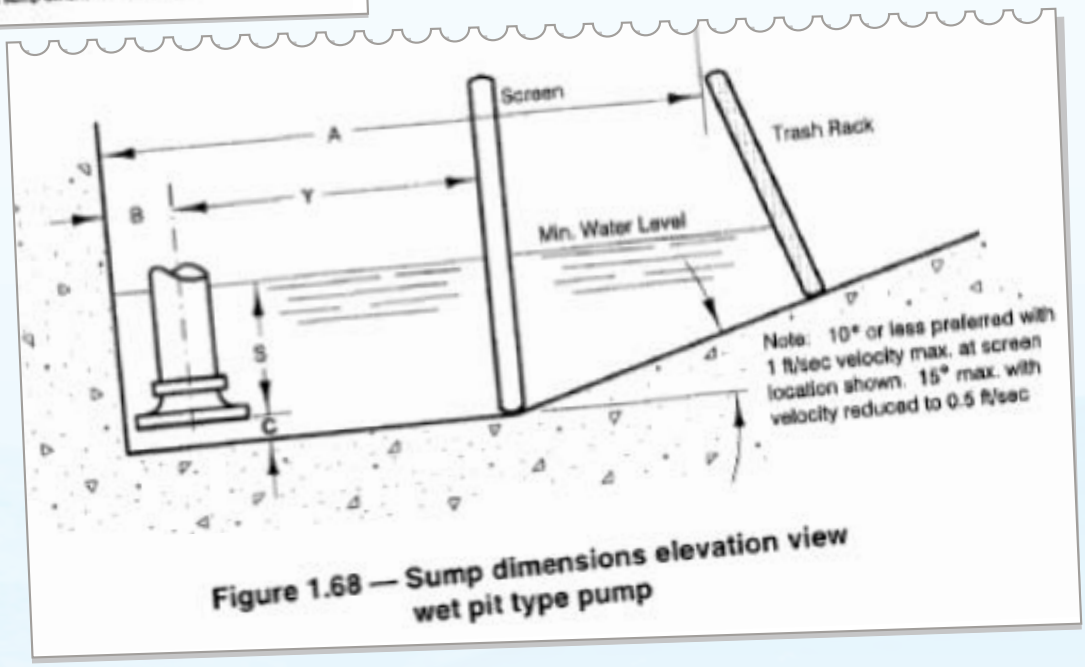
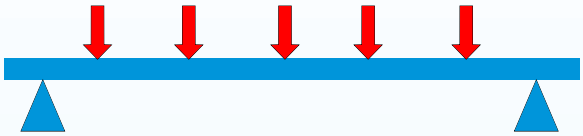


Figure 1.68 — Sump dimensions elevation view wet pit type pump

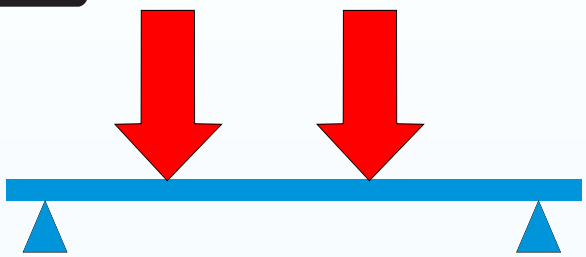
With given (similar) Water Levels, a Small pump will fit in better

Stress *(& Vibration Concentration)* on Civil Load Bearing Slab



Higher Quantity x Smaller Pump

~= *Uniformly Distributed Load*



Lower Quantity x Larger Pump

~= *Point Load*

Comparitive Analysis : Impact of Number of Working Pumps

		Option 1	Option 2	Remarks
Station Flow	*Vs*	2,591	2,591	
Head	*mwc*	75	75	
Number of Working Pumps	*nos*	**1**	**4**	
Number of Standby Pumps	*nos*	1	1	
Number of Total Pumps	*nos*	2	5	
Flow per Pump	*Vs*	2,591	648	
	m^3/hr	9,328	2,332	
Individual Pump Motor Rating *(Calculated)*	*kW*	2,465	616	Very Big & Heavy
Motor Voltage	*V*	**11kV / 6.6kV**	**3.3kV / 6.6kV**	Lower Voltage maybe easier for O&M
Total Installed Pumping Machinery	*kW*	**4,931**	**3,082**	
Capital Cost Of Pumping Machinery *(excluding Transformer)*	*Rs*	₹ 14,79,29,066	₹ 9,24,55,666	4W option is Economical
% of Flow Variation achieved *(by Switching On or Off of Single pump to Regulate Flow of Pumping Station)*	%	0%	0%	4W option gives benefits of Smooth Flow Variation without Stopping or Overflowing to achieve variable seasonal demand
		✗	25%	
		✗	50%	
		✗	75%	
		100%	100%	
Peak InRush Power during Starting of *(last working)* pumpset = 3X x Last Pump +1X x No of Cumm Working Pumps	*kVA*	7,396	3,698	4W option has Lower Peak Inrush Power demand
Transformer	*MVA*	7.5	4	Smaller Transformer will Reduce No Load Losses
Capital Cost of Transformer	*Rs*	₹ 1,87,50,000	₹ 1,00,00,000	4W option is Economical
Total Capital Cost of Pumping Machinery & Substation	*Rs*	**₹18,66,79,066**	**₹12,24,55,666**	4W option is much more Economical
		₹ 6,42,23,400	-	
	%	152%	100%	
Minimum Submergence required *(by Pumps for Vortex Free Suction)* - i.e. Excavation	*m*	2.2	1.7	4W option will require Lower Excavation
EoT Tonnage required	*MT*	15T	7.5T	Apart from reduced EoT Tonnage, 4W pumps will also require Lighter Beams & Columns in RCC Pump Room