

Detailed Design Sheet for Configuration of Sewage Pumps for Ujjain SPS			
Design of non-clog Centrifugal sewage pumps for stage-1 requirements for Ujjain SPS under ground Sewerage Scheme			
Sewage pumps for Ujjain Sewage Pumping Stations at Ujjain			
	DATA REQUIRED	Unit	INPUT DATA
	Pumping Stations		SPS at Ujjain
1	Design Population for Intermediate Design year-2035	<u>Input</u>	700800
2	Peak Factor for above Intermediate Year Population range	<u>If in built</u>	2.25
3	Average Dry Weather Flow in MLD for Stage-1 flow of 15 years (Refer Forcemain/Pumping main designs)		Force Main- SPS to STP
3-A	Average of Dry Weather Flow for Stage-1 for 15 years	MLD	92
3-B	Daily WW(Sewage) demand= Q in lpd =	lpd	92000000
3-C	Daily pumping hours= n in hours =	hrs.	23
3-D	Discharge or Duty of pump for desired 23 hours of pumping= q	lps	1111.11
4	STATIC HEAD = Hh = h₁+h₂+h₃+h₄		
4-A	h ₁ = Difference of RL's of the initial point(SPS) to Terminal point (STP)		
4-B	RL OF TERMINAL POINT-	m.	483.25
4-C	RL OF INITIAL POINT-	m.	479.5
4-D	h ₁ = Difference of RL's of the initial point and terminal pointIf (only RL diff made available then fill in that value else diff. is calculated)	m.	3.75
4-E	h₂ = suction lift (For lifting of sewage from wet well of SPS(Consider as per the depth of wet well	m.	22.75
4-F	h₃=Height of container of EDC or discharge point head	m.	2
4-G	h₄=Velocity Head or residual head at least 1.5 to 7 meters	m.	1.5
4-H	Static Head = Hh = h₁+h₂+h₃+h₄	m.	30.000

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Pumping Stations			SPS at Ujjain
5	DETAILS from design of Sewage pumping main/Force main		
5-A	Type of pumping main (material of pipe) & class =>		DI K9
5-B	Diameter of pumping main /Force main	mm	1200
5-C	Value of Hazen Williams coefficient considered "C"/Else Mod.CR	CR	1
5-D	Length of pumping/force main	m.	2500
6	FRICION head loss in Sewage Pumpingmain/Force main design		
6-A	Friction head loss for actual length of pumping main_ $h_{f1} = (hf \times L)/1000 =$ (consider from pumping main design)	m.	1.27
6-B	Friction head loss due to valves & specials_ h_{f2} (10% of val in 4-A (consider from pumping main design)	m.	0.13
6-C	Total head loss (consider from pumping main design) $H_f = h_{f1} + h_{f2}$	m.	1.40
7	Total pumping head _ $H_t = H_h + H_f =$	m.	31.397
6	TOTAL PUMPING HEAD CONSIDERED _ $H_t = H_h + H_f$ for (Stage1) Total pumping head arrived in pumping main design in Pumping main design H1 for 15 Years (Refer PM Design considering 100 % standby. Therefore total head for stage one is considered as per PM design & rounded of	m. Ht1=	32
7	H.P. OF THE PUMP H_t adopted is the max of two values in 5 & 6 above = $\frac{q \times H_t \times 100}{75 \times 75}$		632.10
	(assuming overall combined efficiency of pumping unit as 75%)	Say HP	650

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Pumping Stations		SPS at Ujjain	
8	Lean flow Pumps i.e. Peak flow/4	Nos.	2
		lps2	625.00
		H2 in m.	32
	Mean flow Pumps i.e. Peak flow/2	HP1	355.56
		Nos.	3
		lps2	1250.00
	H2 in m.	32	
	HP2	711.11	
	Therefore it is proposed to provide at stage1 (for Intermediate year of design) pumping sets each for discharge in lps,head in meters & HP		
9	Lean flow Pumps i.e.Peak flow/4	2 nos.-Each for 625 lps discharge, 32 M Head, 360 HP	
	Mean flow Pumps i.e. Peak flow/2	3 nos.-Each for 1250 lps discharge, 32 M Head, 715 HP	
Provide configuration of pumps as per Guidelines of NRCP MOEF GOI(2010)			