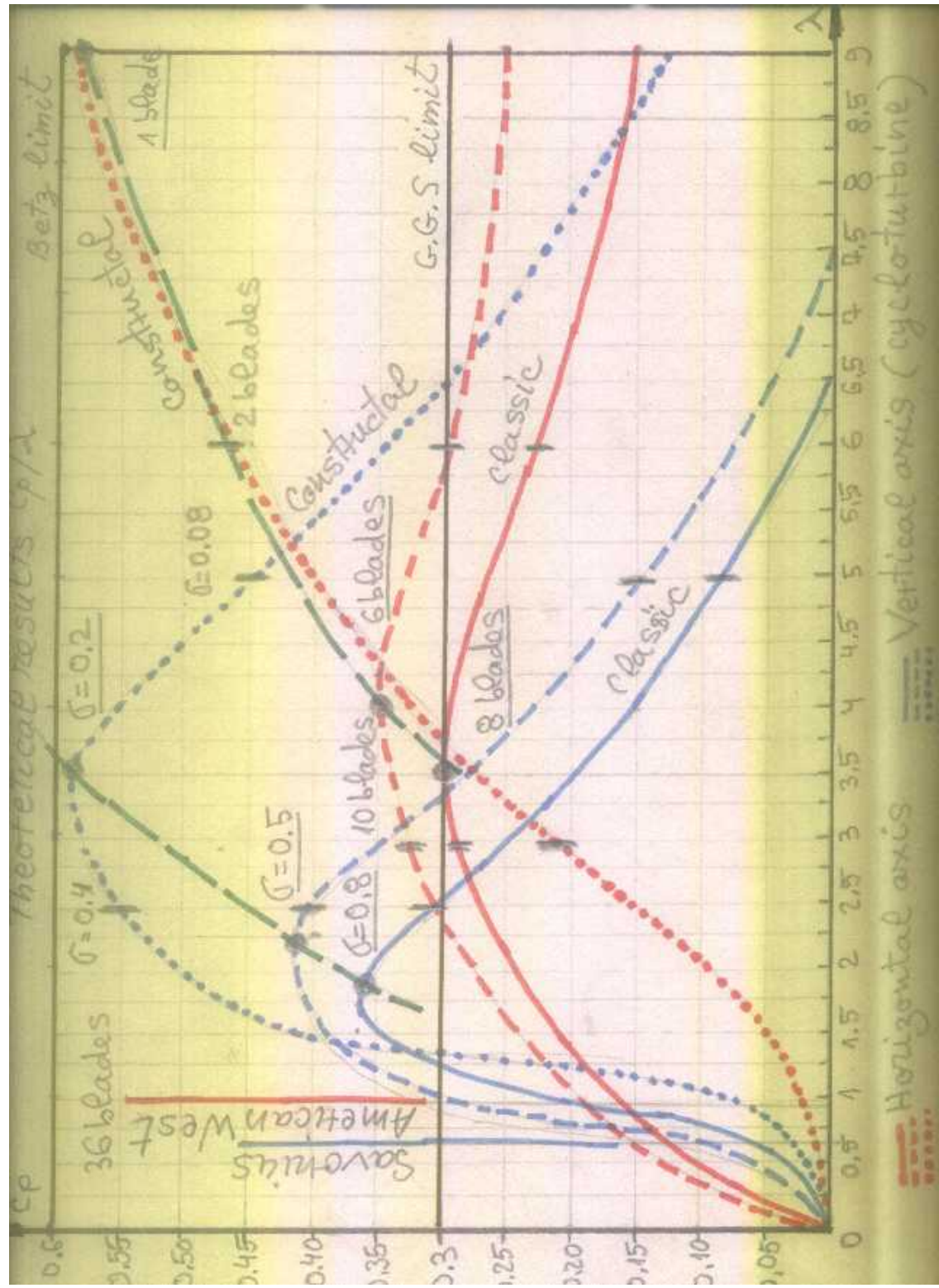


Small gas motor 1/2hp

Brushless motor/generator with clutch

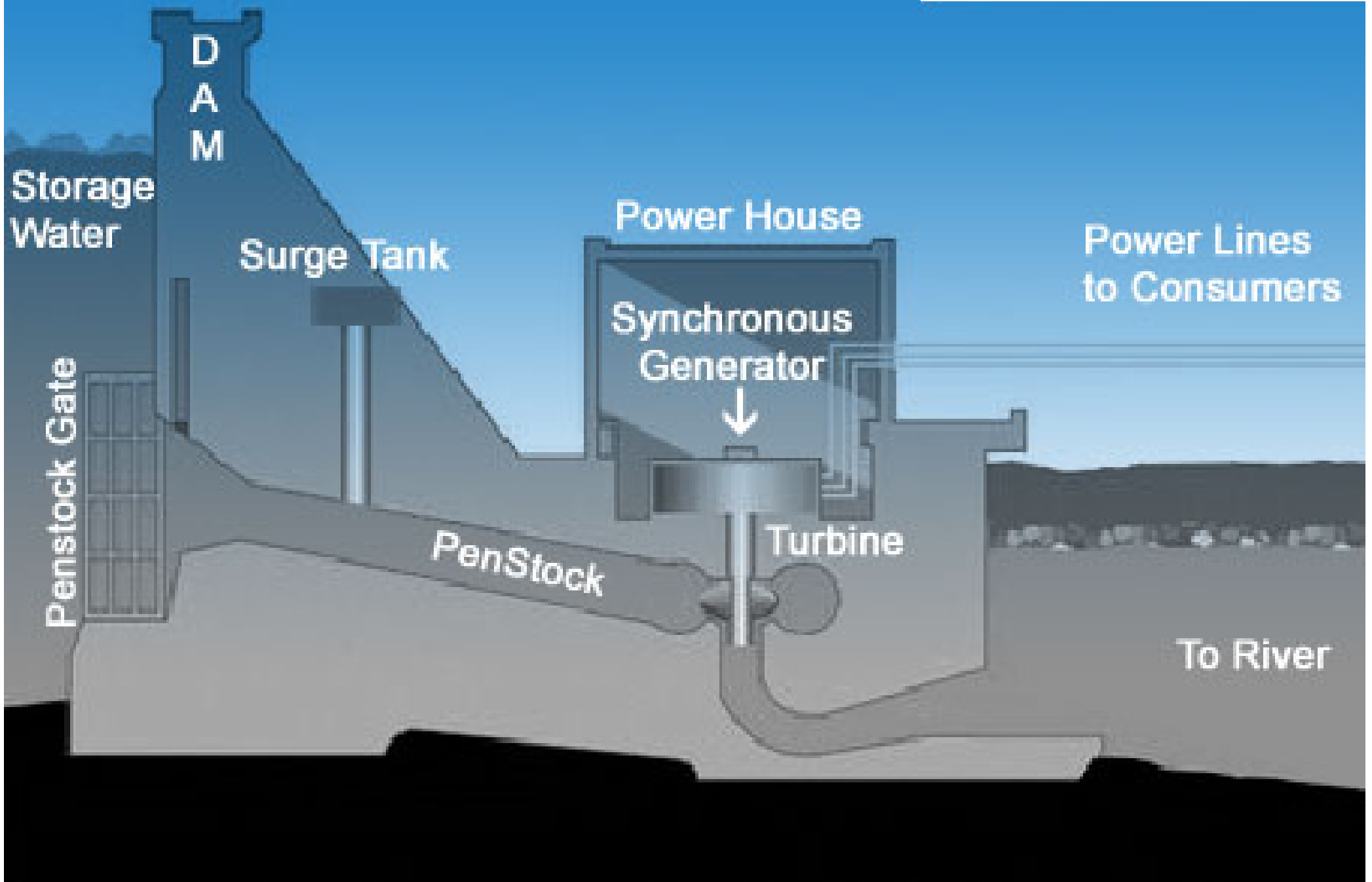








# Layout of Hydro Power Station





THE HOME DEPOT 3408  
451 WASHINGTON ST  
CLAREMONT, NH 03743 (603)542-4471

SALE 3408 00005 24827 05/28/05  
11 HG51D1 11:43 AM



090604071001	40LB LIME		
5 @	2.99	14.95	
013013223380	FERTILIZER	8.96	
071514004440	3/8X50MNL RPE		
3 @	5.97	17.91	
078627582124	50FT HOSE		
3 @	7.97	23.91	
025528105105	MALE ADAPT	0.44	
019442148157	11/4GLMALCPL	2.10	
019442147839	11/4X1BSHGGA	2.17	
019442147914	1X3/4BSHGGA	1.66	
441228	60D NAILS		
54 @	0.18	9.72	
300683012105	11/4X100PIPE	31.98	
	SUBTOTAL	113.80	
	SALES TAX	0.00	
	TOTAL	\$113.80	
XXXXXXXX0381	GIFT CARD	16.78	
CARD BALANCE		0.00	
	TA		
XXXXXXXX2207	GIFT CARD	25.00	
CARD BALANCE		0.00	
	TA		
XXXXXXXX2206	GIFT CARD	25.00	
CARD BALANCE		0.00	
	TA		
XXXXXXXX2205	GIFT CARD	25.00	
CARD BALANCE		0.00	
	TA		
XXXXXXXX2204	GIFT CARD	22.02	
CARD BALANCE		2.98	
	TA		



3408 05 24827 05/28/2005 5419

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CLAREMONT, NH 03743 (603)542-4471

SALE 3408 00001 39204 05/27/05  
61 YG1313 05:36 PM



610333002123	2X10-8 #2 PT	9.29	
759388100641	1 1/2X10 PVC	4.28	
032888010048	3/4CKVLVTHD		
2 @	6.97	13.94	
019442149178	3/4" GALVTEE		
2 @	1.26	2.52	
039923137623	FITTING	0.49	
078864177329	PIPE TAPE	0.99	
019442147990	3/4X1/2BSHGA	1.30	
032888030039	1/2HOSBIBTHD	3.48	
019442153052	3/4X6GALNIPL	1.24	
019442152987	3/4X21/2GNPL		
4 @	0.71	2.84	
019442147914	1X3/4BSHGGA	1.66	
038753319117	CPVC GLUE	4.46	
039923136862	FITTING	0.61	
039923130662	FITTING	0.76	
025528105457	COUPLING		
2 @	0.39	0.78	
019442147822	GALV. BUSH	2.47	
	SUBTOTAL	51.11	
	SALES TAX	0.00	
	TOTAL	\$51.11	
XXXXXXXX6128	STORE CREDIT	15.88	
CARD BALANCE		0.00	
	TA		
XXXXXXXX0382	GIFT CARD	2.01	
CARD BALANCE		0.00	
	TA		
XXXXXXXX2208	GIFT CARD	25.00	
CARD BALANCE		0.00	
	TA		
XXXXXXXX0381	GIFT CARD	8.22	
CARD BALANCE		16.78	
	TA		

Pump Cost \$79.39  
+ travel & time

Leftover parts *approx value*  
\* ± 5' x 1 1/2 pvc pipe 2.14  
\* most of the glue 4.00  
\* 1 1/2" pvc union .50  
\$ 6.64

hoses to bring water up to  
camp - 3 x 50ft.

\$ 7.97 x 3 = \$ 23.91

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SALE 3408 00005 24827 05/28/05  
11 HG5101 11:43 AM



090604071001	40LB LIME	
5 @ 2.99		14.95
013013223380	FERTILIZER	8.96
071514004440	3/8X50MNLRPE	
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CARD BALANCE		0.00
	TA	
XXXXXXXX2207	GIFT CARD	25.00
CARD BALANCE		0.00
	TA	
XXXXXXXX2206	GIFT CARD	25.00
CARD BALANCE		0.00
	TA	
XXXXXXXX2205	GIFT CARD	25.00
CARD BALANCE		0.00
	TA	
XXXXXXXX2204	GIFT CARD	22.02
CARD BALANCE		2.98
	TA	



3408 05 24827 05/28/2005 5419

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SALE 3408 00001 39204 05/27/05  
61 YG1313 05:36 PM



610333002123	2X10-8 #2 PT	9.29
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032888010048	3/4CKVLVTHD	
2 @ 6.97		13.94
019442149178	3/4"GALVTEE	
2 @ 1.26		2.52
039923137623	FITTING	0.49
078864177329	PIPE TAPE	0.99
019442147990	3/4X1/2BSHGA	1.30
032888030039	1/2HOSBIBTHD	3.48
019442153052	3/4X6GALNIPL	1.24
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4 @ 0.71		2.84
019442147914	1X3/4BSHGGA	1.66
038753319117	CPVC GLUE	4.46
039923136862	FITTING	0.61
039923130662	FITTING	0.76
025528105457	COUPLING	
2 @ 0.39		0.78
019442147822	GALV.BUSH	2.47
	SUBTOTAL	51.11
	SALES TAX	0.00
	TOTAL	\$51.11
XXXXXXXX6128	STORE CREDIT	15.88
CARD BALANCE		0.00
	TA	
XXXXXXXX0382	GIFT CARD	2.01
CARD BALANCE		0.00
	TA	
XXXXXXXX2208	GIFT CARD	25.00
CARD BALANCE		0.00
	TA	
XXXXXXXX0381	GIFT CARD	8.22
CARD BALANCE		16.78
	TA	

Pump Cost \$79.39  
+ travel & time

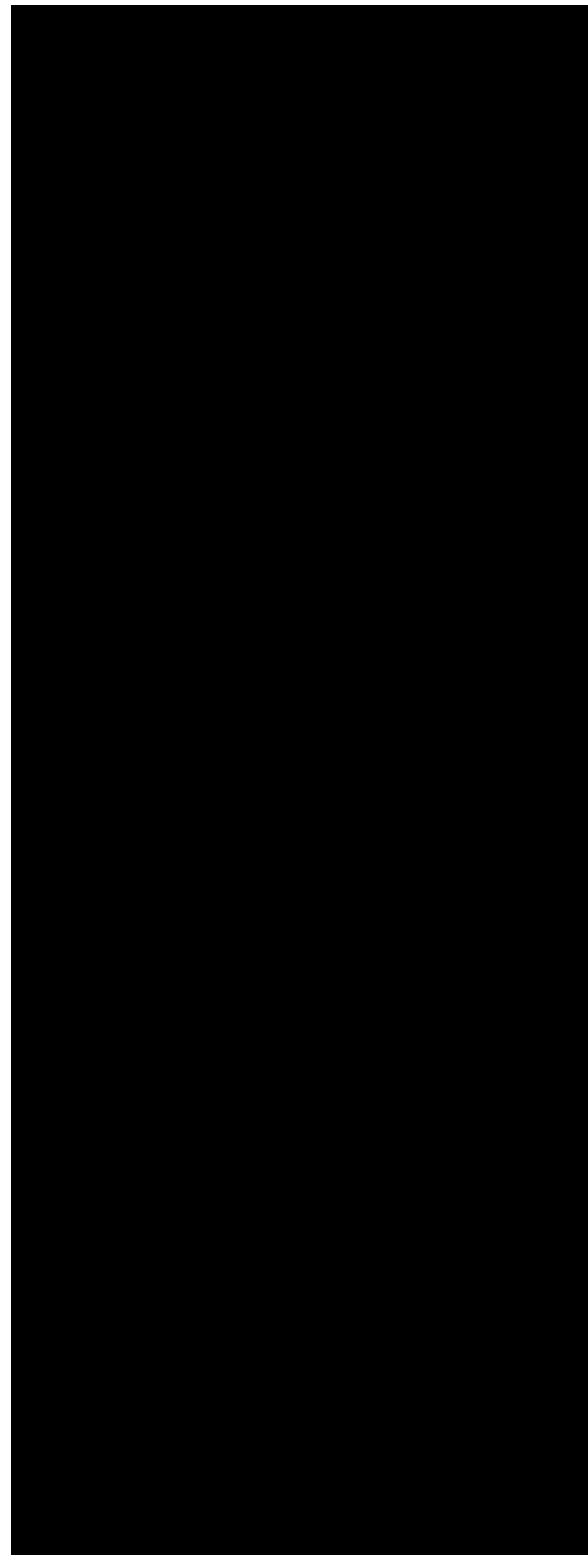
Leftover parts *approx value*  
\* ± 5'x1 1/2 PVC pipe 2.14  
\* most of the glue 4.00  
\* 1 1/2" PVC Union .50  
\$6.64

hoses to bring water up to  
camp - 3x 50ft.  
\$7.97 x 3 = \$23.91

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# Infrastructure Loss Due to Dam Failure in China





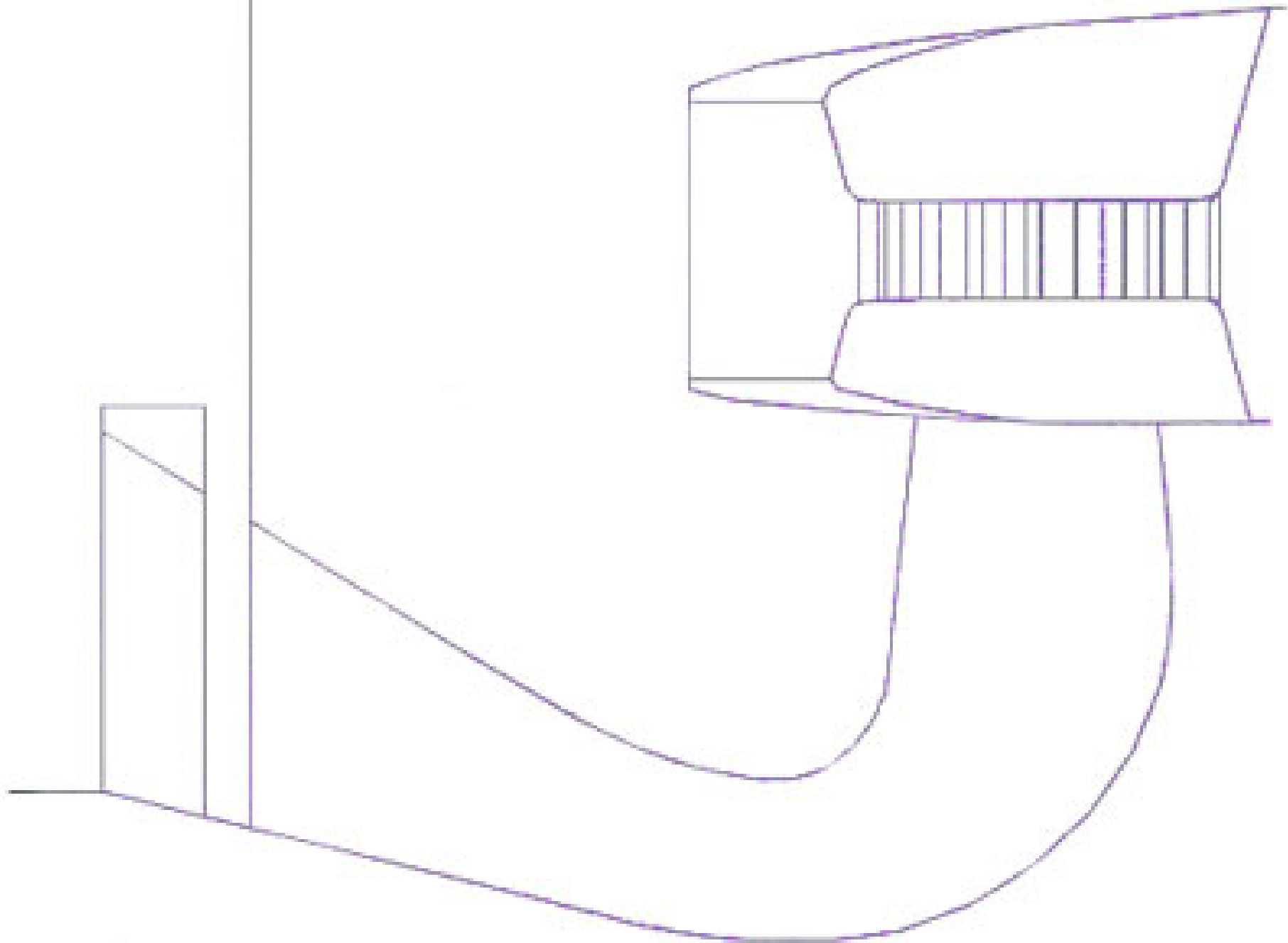
$$Vel = \frac{Cantidad}{Area_{\text{base}}} = \frac{0.10}{\pi \left( \frac{0.200}{2} \right)^2}$$



Dam Failure of  
Banqiao Shimantan- China

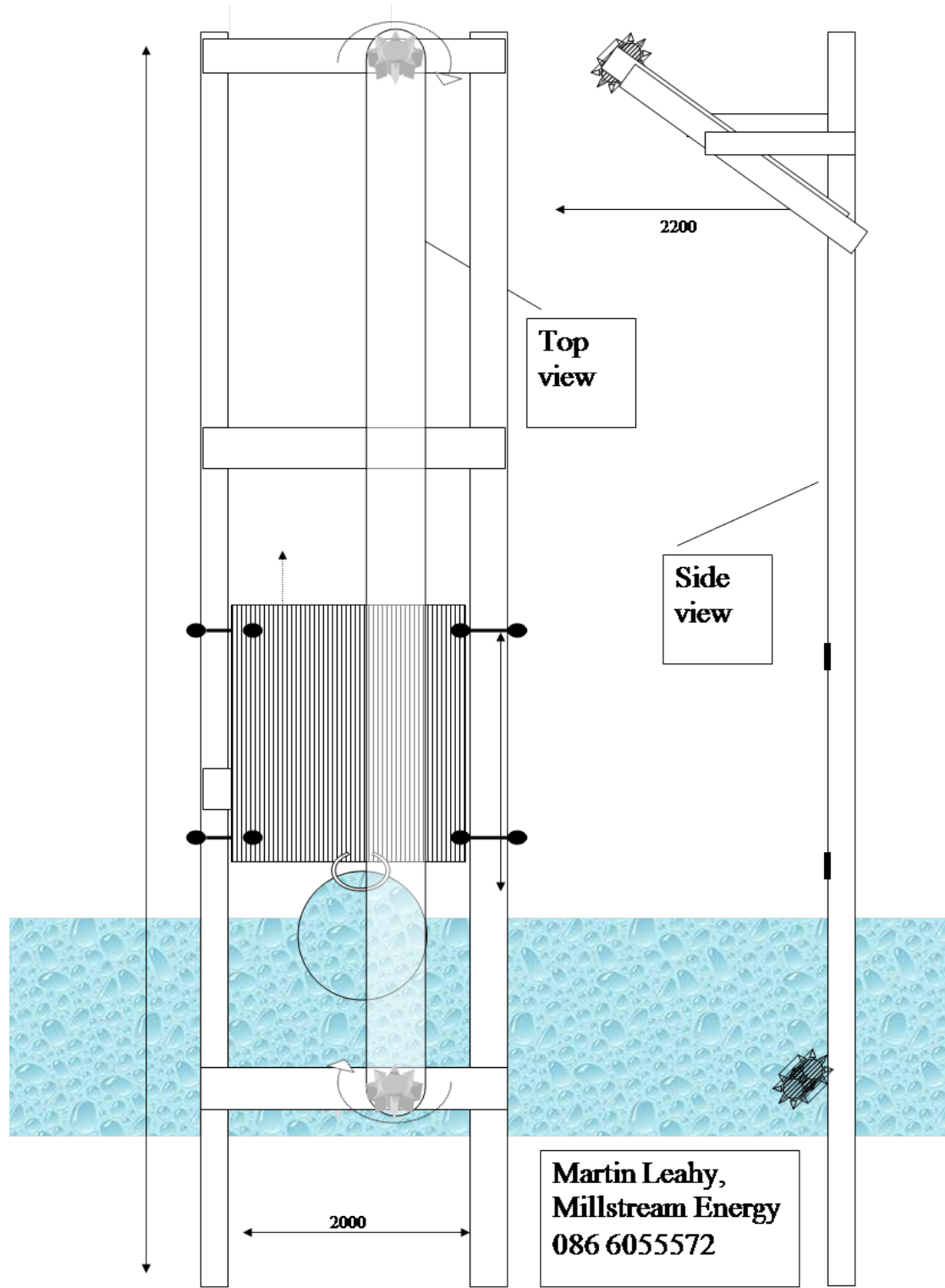
11000

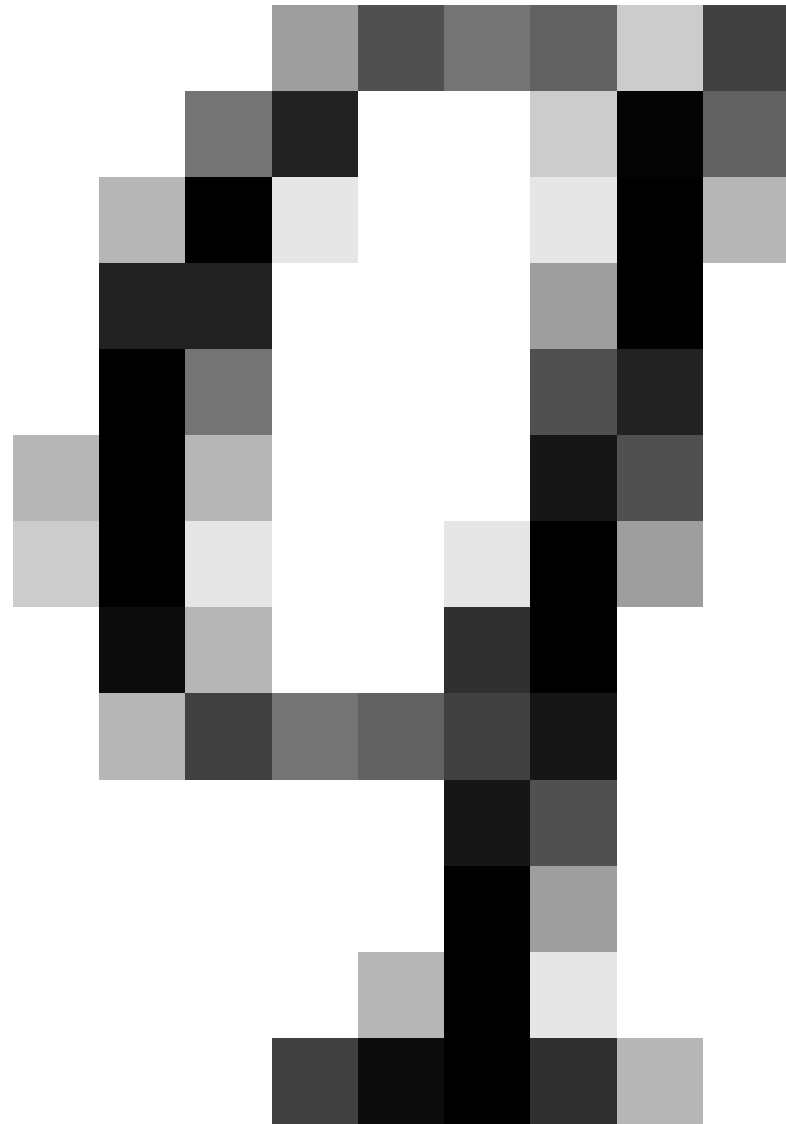
## Diagram of a Draft Tube



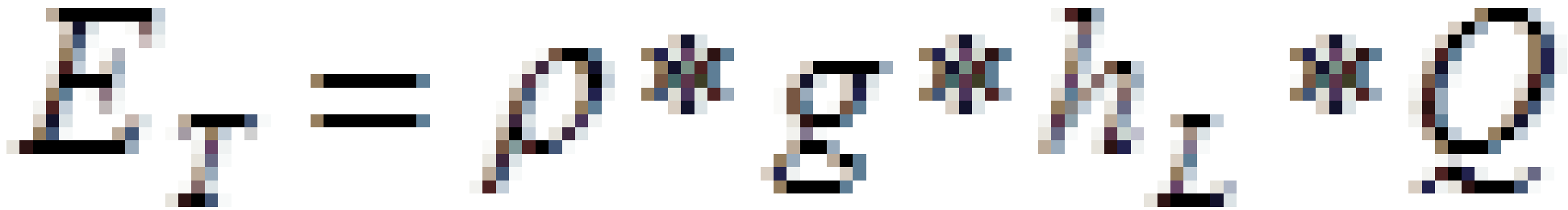
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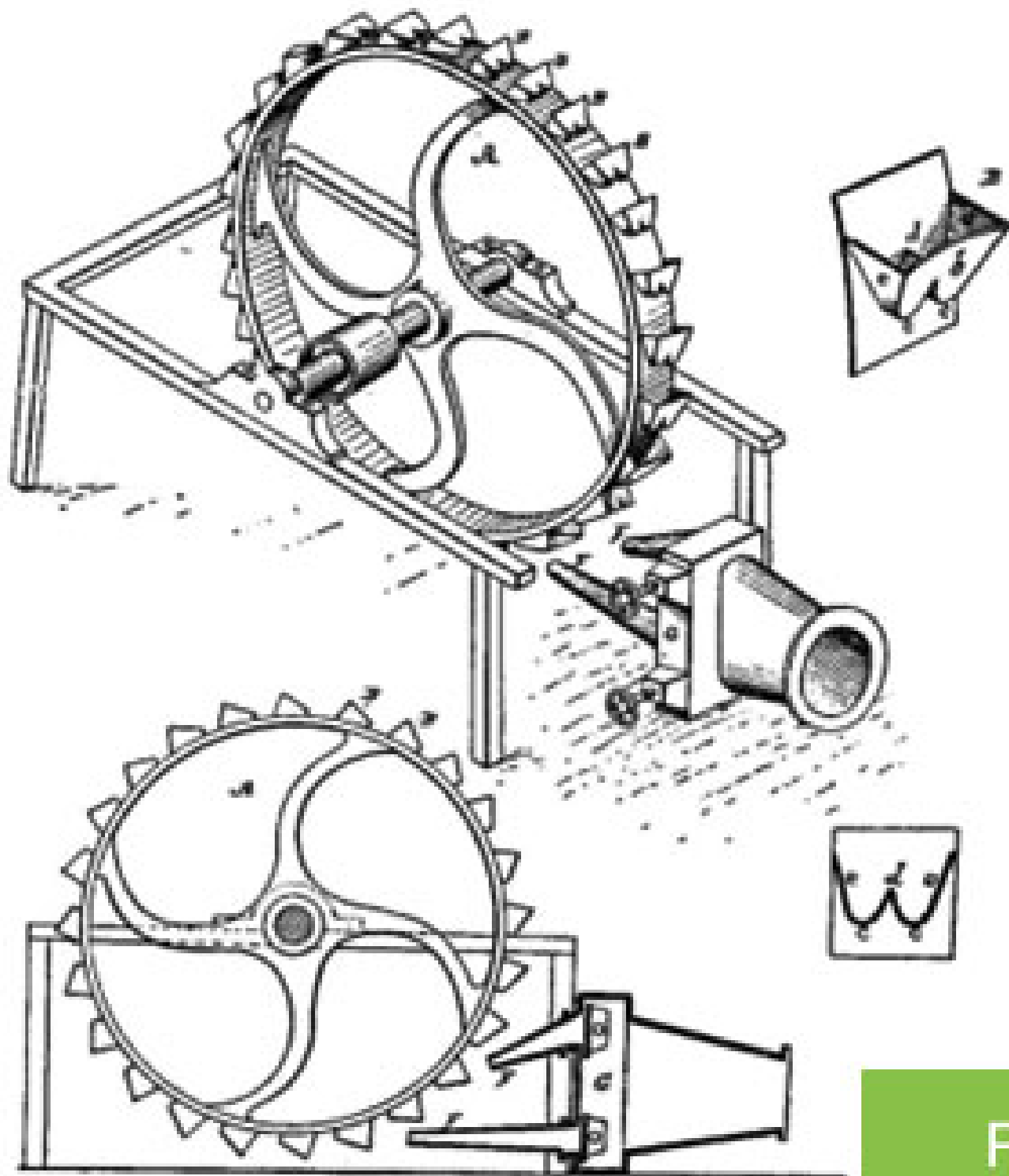
$$P = \eta \cdot \rho \cdot g \cdot h \cdot \dot{q}$$





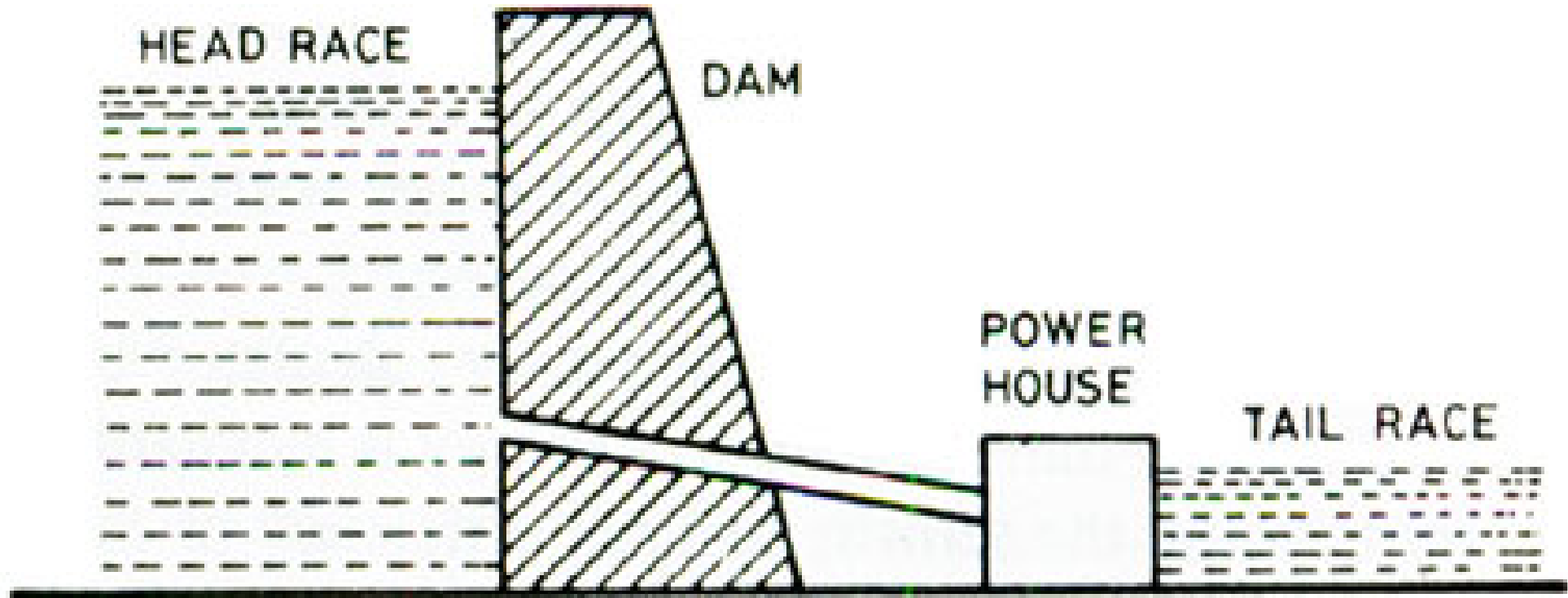




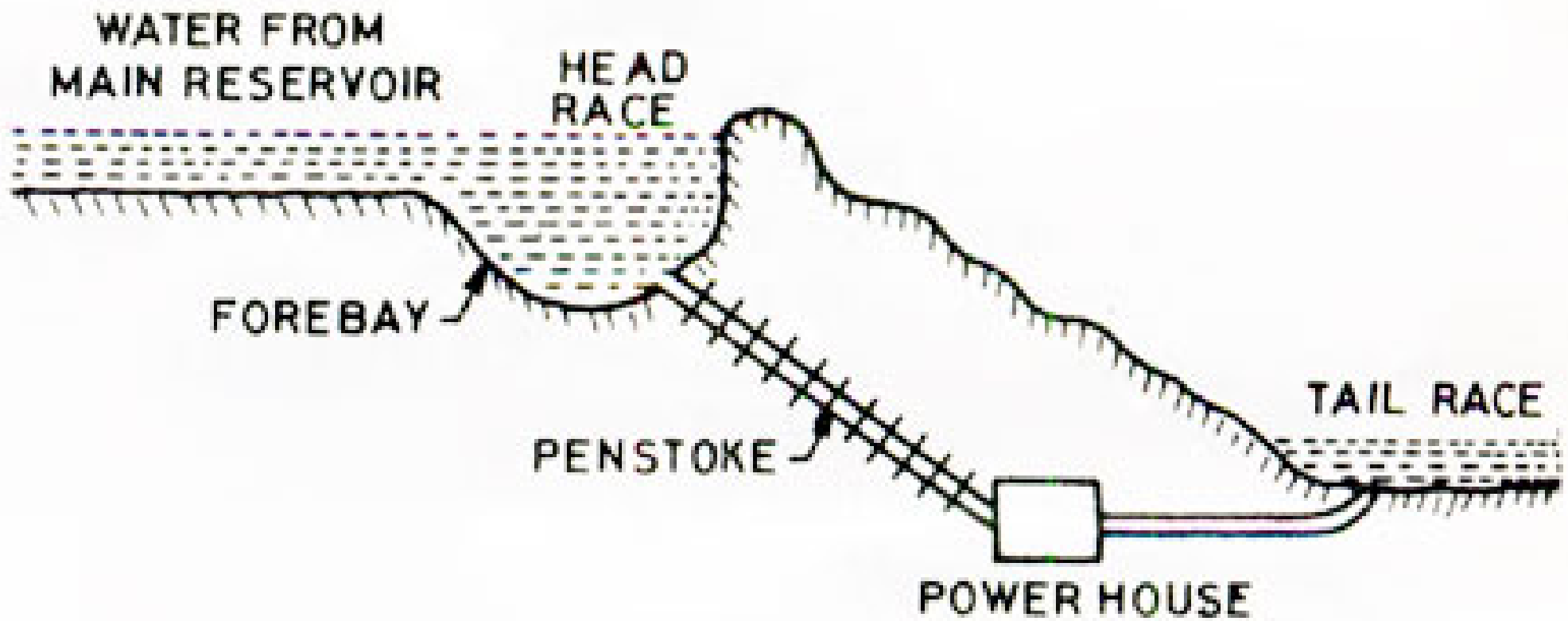


Pelton Wheel

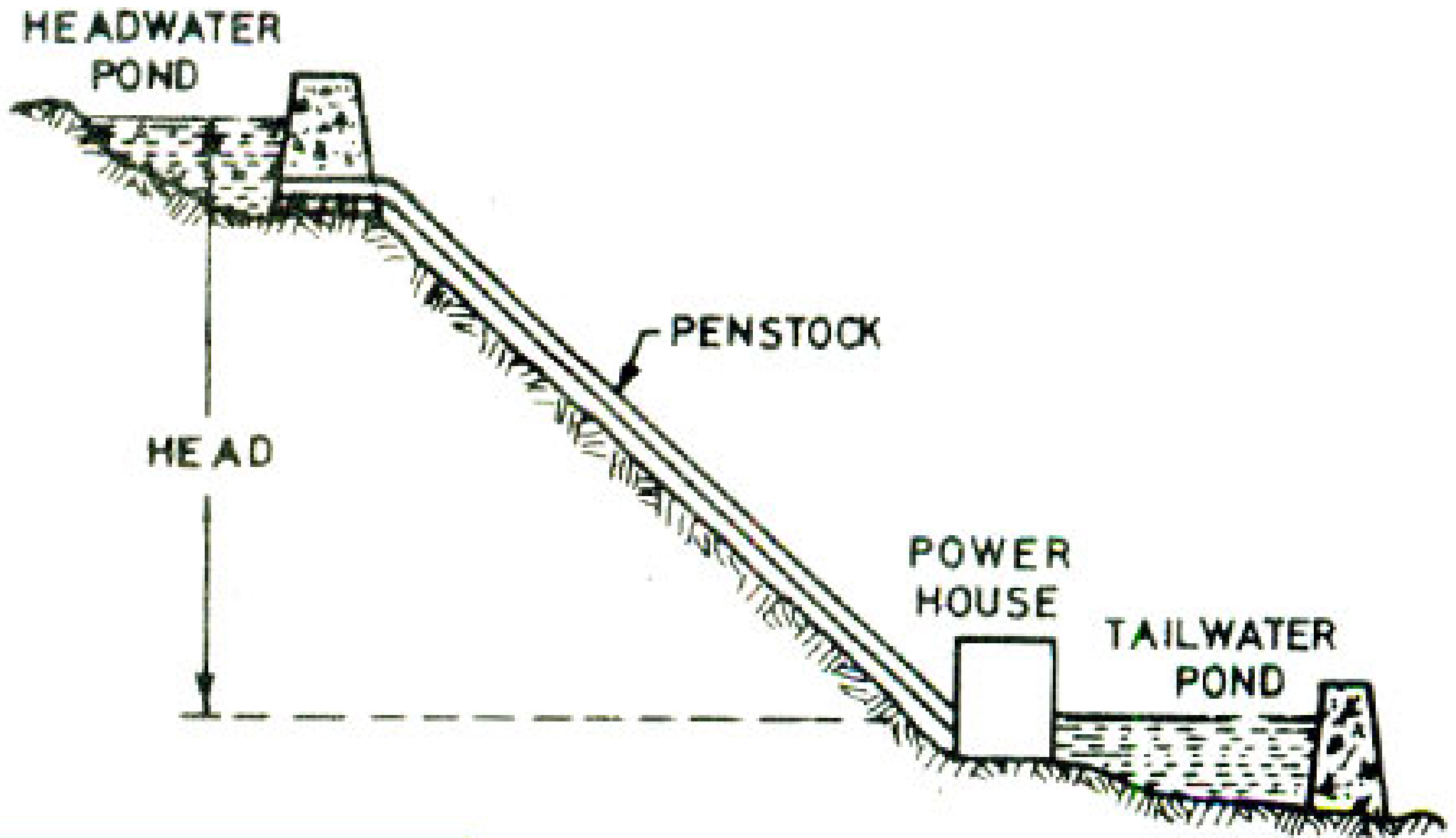
# Low Head Plant



## Medium Head Plant

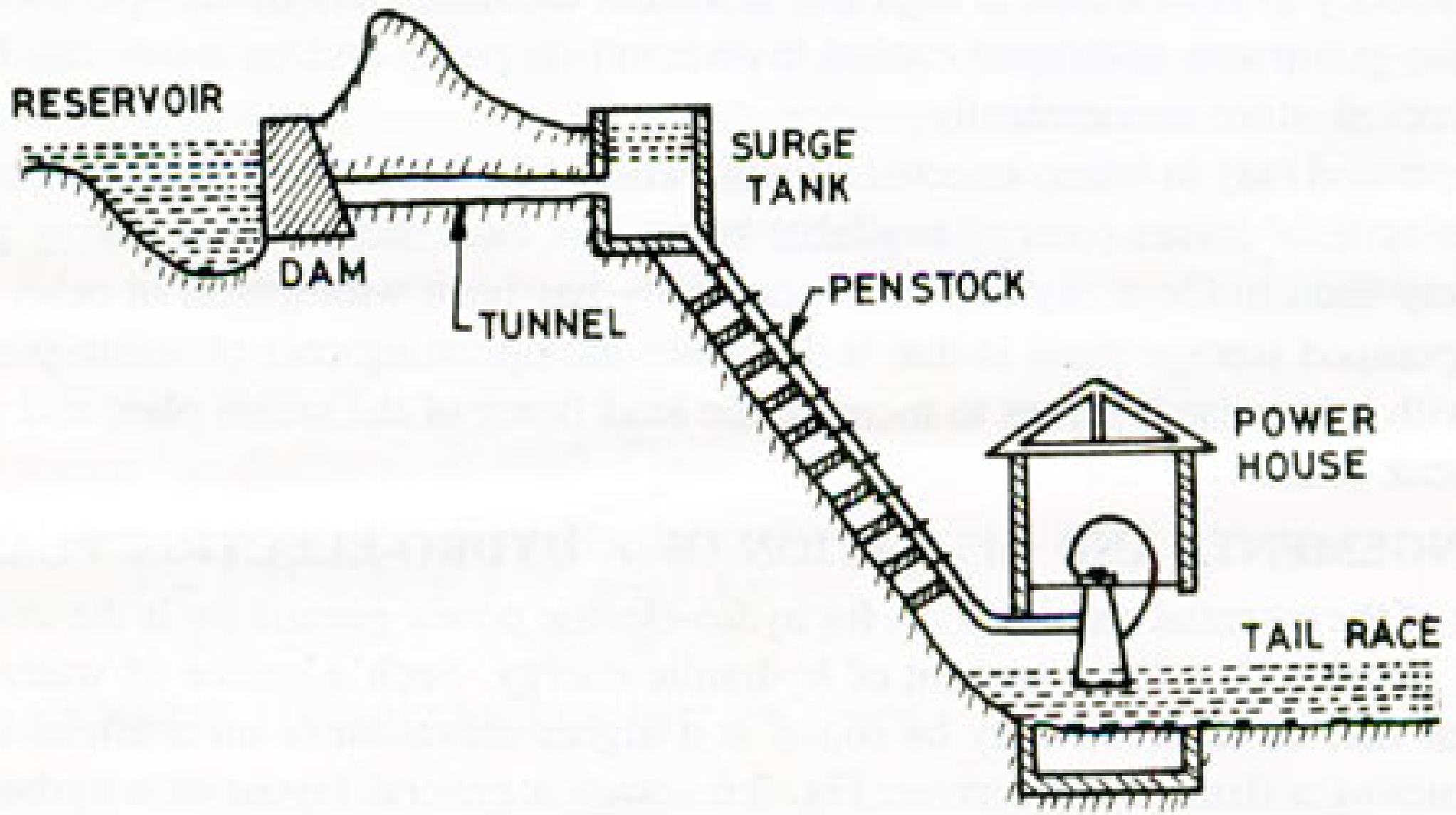


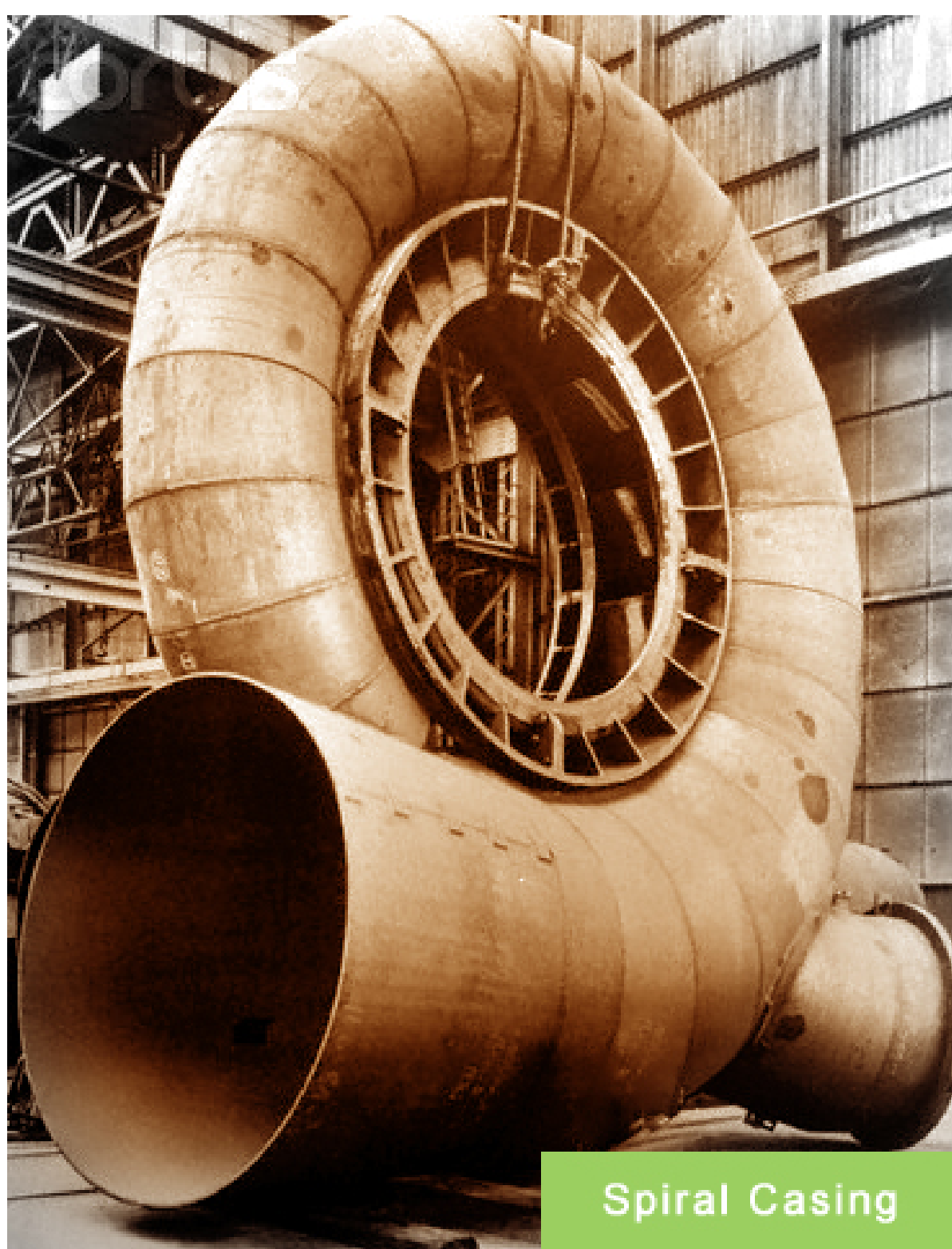
$$0.995 \left( \frac{\text{N}}{\text{m}^2} \right) * 9.81 \left( \frac{\text{m}}{\text{s}^2} \right) * 49 (\text{m}) * 0.10 \left( \frac{\text{m}^3}{\text{s}} \right)$$



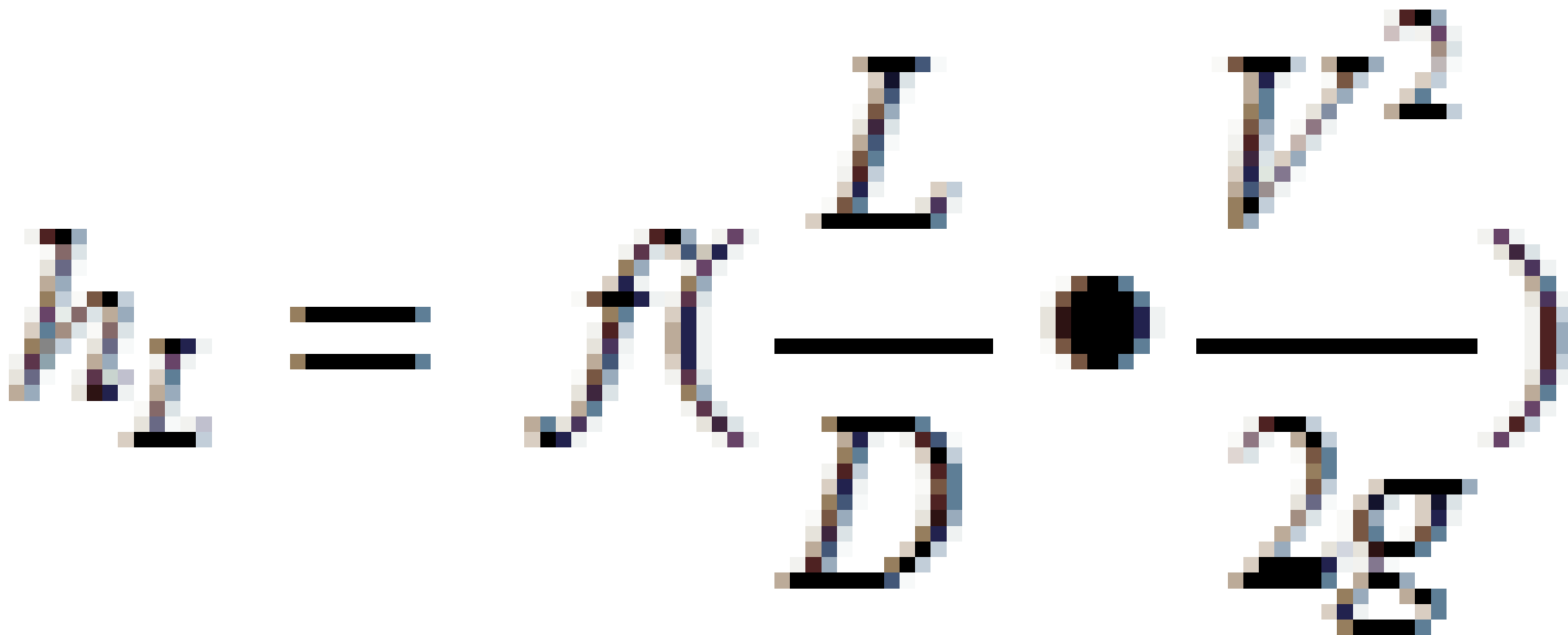
Pumped Storage  
Plant

# High Head Plant

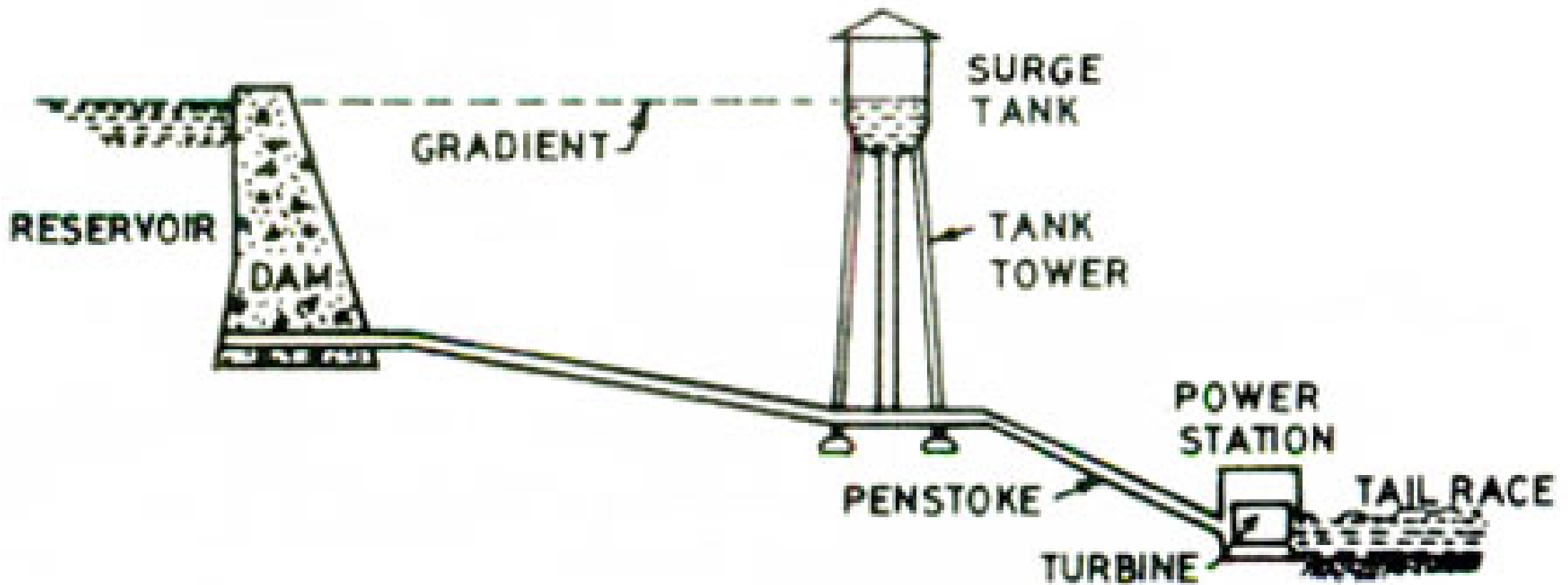




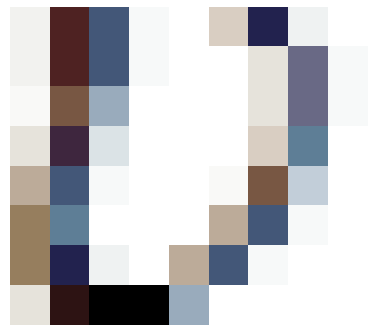
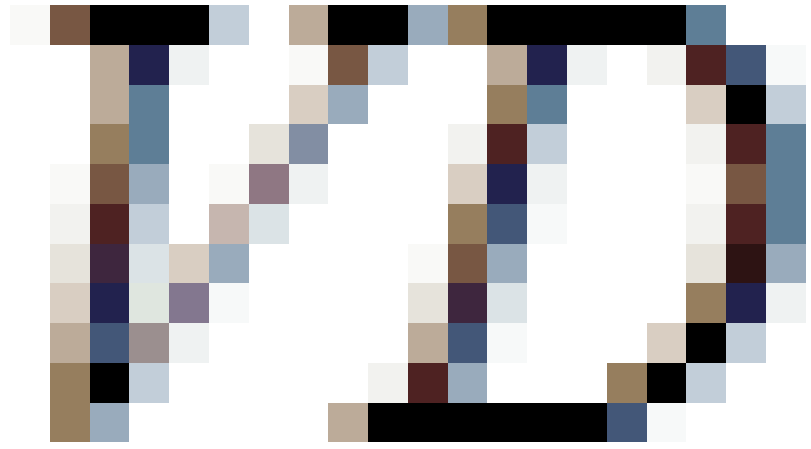




# Surge Tank



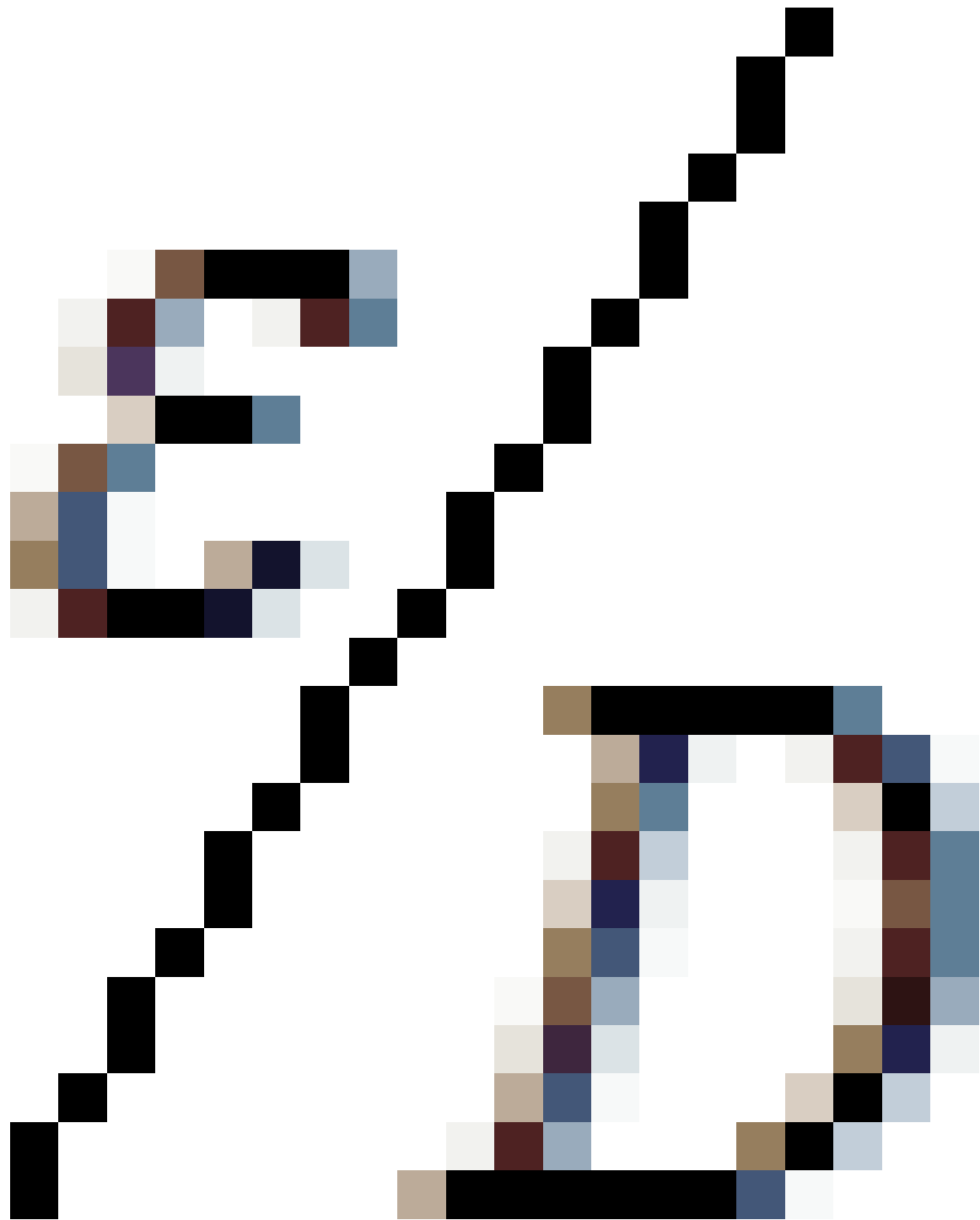
$$\frac{1}{\sqrt{s}} = -2 \log \left( \frac{e/D}{3.7} + \frac{2.51}{\text{Re} \sqrt{s}} \right)$$



$$3.12 \left( \frac{m}{s} \right) \rightarrow 0.202 \left( \frac{m}{s} \right)$$

---

$$0.801 \times 10^{-6} \left( \frac{m}{s} \right)$$





$$\Rightarrow M_1 = \left( \begin{array}{c} I \\ - \\ D \end{array} * \frac{V^2}{2g} \right)$$



$$0.0121 \left( \frac{680(m)}{0.202(m)} * \frac{(3.12(m/s))^2}{2 * 9.81(m/s^2)} \right)$$



$$E_I = 0.995 \left( \frac{KE}{m^3} \right) * 9.81 \left( \frac{m}{s^2} \right) * 20.5 (m) * 0.10 \left( \frac{m^3}{s} \right)$$

$$Vel = \frac{Cantidad}{Area_{\text{base}}} = \frac{0.08}{\pi \left( \frac{0.200}{2} \right)^2}$$

$$0.995 \left( \frac{N}{m} \right) * 9.81 \left( \frac{m}{s^2} \right) * 49 (m) * 0.08 \left( \frac{m^3}{s} \right)$$

$$2.49(\pi) \cdot 0.202(\pi)$$

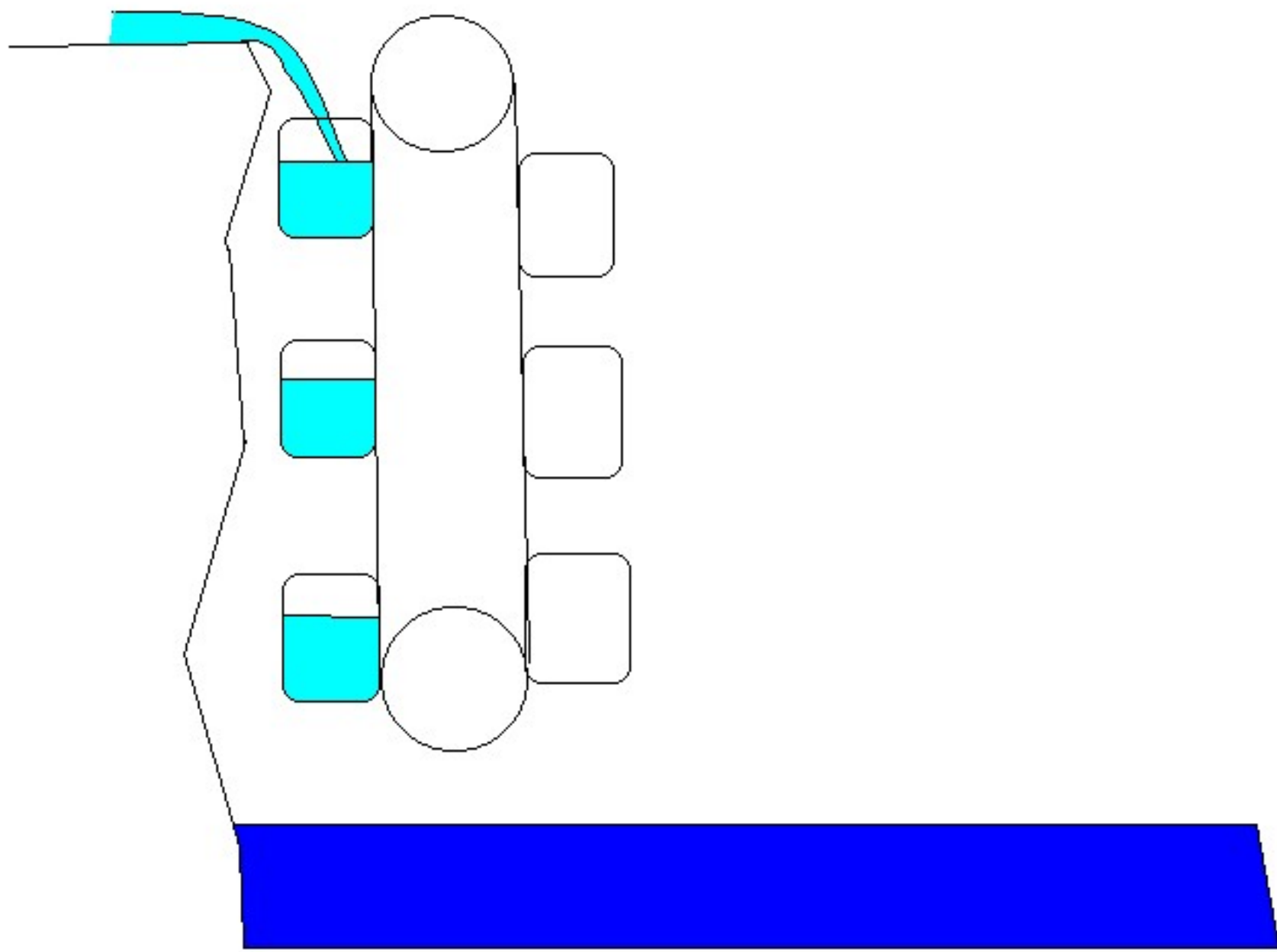
---

$$0.801 \times 10^{-6}(\pi)$$

$$0.0128 \left( \frac{680(m)}{0.202(m)} * \frac{(2.49(m/s))^2}{2 * 9.81(m/s^2)} \right)$$

$$E_I = 0.995 \left( \frac{N_{SE}}{m^3} \right) * 9.81 \left( \frac{m}{s^2} \right) * 13.6 (m) * 0.08 \left( \frac{m^3}{s} \right)$$











### LOAD CONTROLLER

Alternator voltage = 120 VAC

Increase pot to increase cut-in voltage

Rectifiers are not required if three separate loads are connected

Circuit is not guaranteed - use at own risk

