

DESIGN FOR Kamalpoor Village

TRAPEZOIDAL SHAPED WATERCOURSE HYDRAULIC SECTION B-B

B. Hydraulic Calculation for Trapezoidal Section of Canal

Reshaping / Cleaning

Method	b	h	T	Z	A	P	R	$R^{2/3}$	$A \cdot R^{2/3}$	$S^{0.2}$	n	V	Q	Q
Trial	(m)	(m)	(m)		(m ²)	(m)	(m)					(m/sec)	(Lit/sec)	(m ³ /sec)
1.00	1.50	0.60	2.70	1.00	1.26	3.20	0.39	0.54	0.68	0.04	0.03	0.89	1117	1.12

$A = h (b + Z \times h)$	Q (m3/sec)	0.290	For Economical Section		
$P = b + 2h(n^2 + 1)^{0.5}$	n	0.025	Stipulation	Calculation	Result
$R = A / P$	Slope (m/m)	0.0017	R / (h/2) = 1	0.97	OK
$V = (R^{2/3} \times S^{1/2})/n$	Q (L/Sec)	1117			
$Q = (A \times R^{2/3} \times S^{1/2})/n$					
FB = (1/3 * h to 15 or more then that some time)					

C. Design X-Sections at Different Locations **Table A1**

Location	From	To	Length (m)	Longitudinal Slope (m/m)	Bottom Width (b) (m)	Flow Depth (h) (m)	Total Depth (D) (m)	Velocity (m/sec)	Discharge (Lit/sec)	Top Width (T) (m)
Kamalpoor	0+000	0+012	12	0.00170	1.50	0.60	0.77	0.89	1117	2.70
Total Length (m)			12							

Table A2

Table of Roughness Coefficient "n" for Small Channels					
Description		Minimum	Maximum	Recommended	
Unlined Earthen Channels					
1. new- straight and uniform		0.020	0.025	0.025	
2. aged and vegetated with;					
a. Short grass		0.030	0.040	0.035	
b. Long grass		0.050	0.080		
Lined Channels					
1. concrete		0.012	0.018	0.014	
2. brick plastered		0.012	0.018	0.013	
3. brick unplastered		0.016	0.020	0.018	
1/ Source : Engineering Design Standards Soil Conservation Service, USDA.					
2/ Source : Irrigation Canal Lining, FAO and Water Development Series No.1 1977, Table 9					

SUB-PROJECT NAME: Kamalpoor VILLAGE

SCOUR CALCULATION

Note: Fill the values in yellow highlighted cells

INPUT

Location	Severity factor X	Discharge Q (m3/s)	Bed width B (m)	Flow depth y (m)	Silt factor f
Canal at sraight reach	1.25	1.12	1.50	0.60	2

OUTPUT

Unit discharge q (m2/s)	Scour R	Factored Scour XR	Scour depth Ds	Apron length Lu and Ld
0.74	0.88	1.10	0.50	1.00

Lacey's silt factor

Material	Average d_{50} size (mm)	Silt factor f
Very fine SILT	0.05	0.4
Fine SILT	0.12	0.5
Medium SILT	0.15	0.7
Standard SILT	0.32	1
Medium SAND	0.5	1.2
Coarse SAND	0.72	1.5
Fine GRAVEL	1.3	2
Medium GRAVEL	7.3	4.7
Heavy GRAVEL	26	9
Small BOULDERS	50	12
Medium BOULDERS	72	15
Large BOULDERS	185	24

Scour dep X * R - y

X = severity factor

R = scour, in m $1.35 * (q^2/f)^{1/3}$

Y = tail wate level, in m

Severity factor

Location	Severity
Upstream of structure	1.25
Downstream of structure	1.5
Nose of spur	2.25
Transition from nose to straight	1.5
Straight reach of guide bank	1.75

Designing of Under Ground Wall of KAMAL POOR
Protection Wall of Qarghayee District /Kamalpoor Village

Item	Data	Formula	Calcollation	Formula	Calcollation	Result	Remarks
a=	0.5	$P = (w_s \cdot h^2) / 2 \cdot (1 - \sin\phi) / (1 + \sin\phi)$	0.11	Checking of stability			
b=	0.7			1-Against sliding			
h=	0.6	h= From Bed of River		$P < \mu W =$			
W wall=	2000	$W = W_{wall} \cdot (a+b) / 2 \cdot H$	1.2	P=	0.11		
$\phi =$	30			$\mu \cdot W =$	0.72		
$\sin\phi =$	0.5			$Sf = \mu W / P =$	6.67	>1.5	Ok,
W soil=	1800	$X_1 = (a^2 + ab + b^2) / 3(a+b)$	0.30	2-Against over turning			
1-sin $\phi =$	0.5			$MP \leq MW$			
1+sin $\phi =$	1.5			MP=	0.02	$MP < MW$	$MP = (P \cdot H) / 3$
h2=	0.36			MW=	0.36		$MW = W \cdot X_1$
a2+ab+b2=	1.090			$Sf = (MW / MP \geq 1.5)$	16.82	>2	Ok,
3(a+b)=	3.60	$X_2 = (p \cdot h) / 3w$	0.02	3-Against Crushing			
ph=	0.06	$d = x_1 + x_2$	0.32	R be in middlr third			
3w=	3.6	b/3=	0.23333	2b/3 =	0.47		
$\mu =$	0.6	$b/3 \leq d \leq (2b/3)$		$0.3 < 0.33 < 0.5$		Ok,	
hw=	0.72						
(a+b)/2 =	0.6	$e = (x_1 + x_2) - b/2$	-0.029	4- Against settlement			
b/6	0.117	$e \leq b/6$				Ok,	
B	0.7						
Wstone	0.7	$W_{stone} = (W_{wall} \cdot B \cdot \text{depth}) / 1000$		Total w foundation=	0.9448	T/M	
Wpcc	0.245	$W_{pcc} = (W_{wall} \cdot B \cdot \text{depth}) / 1000$		W pcc=	1800	$\Sigma W = w_{sto}$	2.1448
$\mu \cdot W =$	0.72	$1 + (6 \cdot e) / b =$	1.15	$F_{max} = W / b (1 + 6e/b)$	1.98		
6*e=	0.108	$1 - (6 \cdot e) / b =$	0.85	$F_{min} = W / b (1 - 6e/b)$	1.45	Ok,	

