HYDROLOGY - Peak Discharge Calculations

Description of Catchment	:		Date	:	**2023/10/30**
Job Name	:	**Channel sizing check**	By	:	**KRW**
Job Number	:		Checked:		

Physical Characteristics

Size of Catchment	=	0,76 km2			
Longest Water Course	=	1,620 km			
Highst Ground Level	=	875 m	**dH**	=	**4 m**
Ground Level 80% Length	=	874 m	**Output**		
Ground Level 10% Length	=	872 m	**Slope**	=	**0,0025 m/m**
Lowest Ground Level	=	871 m	**Average Slope**	=	**0,0016 m/m**

Rainfall

Mean Annual Precipitation	=	628 mm	
Region	= S		("W"inter. "S"ummer &" T"hrought out)
Region	= I		("C"oastal, "I"nland)

Run-Off Coefficient

Rural		***Av***				
C slope h/s	=	0,03				
C permeable d/v	=	0,16				
C vegetation p/k	=	0,21		C1	=	0,40
				C1 max	=	0,80
Urban		***C2***	***%***			
Lawns & Parks	=	0,075	95			
Industrial	=	0,65	0			
City / Residencial	=	0,6	0			
Streets	=	0,825	5			
			100	C2	=	0,1125
				C2 max	=	1,00
Area Distribution						
Rural	=	1,00				
Urban	=	0,00				
Lakes	=	0,00				
Total	=	1,00	(= 1.00)			

Output		
C	=	**0,400**
C max	=	**0,800**

Rational Method

Q = CIA/3.6

Overland

Tc = 0.604(rL/(S^.5))^.467

r = **0,4**

Slope = 0,0025 m/m

Choose **r** from :				
Paved	Comp.Soil	Sparce Grass	Med Grass	Thick Grass
0,02	0,1	0,3	0,4	0,8

Tc = 2,004 hours

v = L/Tc (conservative) **v = 0,225 m/s**

Check ARF for Tc= 0,963

Defined Water Course

Tc = (0.87L^2/1000 Sav)^.385

Average Slope = 0,0016 m/m **Tc = 1,134 hours**

v = L/Tc (conservative) **v = 0,397 m/s**

Check ARF for Tc= 0,963

Return Period	**2**	**5**	**10**	**20**	**50**	**100**	**Max**
Ft =	0,75	0,80	0,85	0,90	0,95	1,00	1,00
Ft (very flat areas)	0,50	0,55	0,60	0,67	0,83	1,00	
C =	0,4						0,8
HRU 2/78							
Factors =	0,47	0,64	0,81	1	1,3	1,6	1,6

Overland							
Depth of Rain =	35,8	48,7	61,7	76,1	99,0	121,8	121,8
Q = CIA =	1,5	2,1	2,6	3,2	4,2	5,1	10,3
Q = CIA adjusted =	**1,1**	**1,6**	**2,1**	**2,8**	**3,8**	**4,9**	**10,3**

Defined Water Course							
Depth of Rain =	31,2	42,5	53,8	66,4	86,4	106,3	106,3
Q = CIA =	2,3	3,2	4,0	4,9	6,4	7,9	15,8
Q = CIA adjusted =	**1,7**	**2,4**	**3,3**	**4,3**	**5,9**	**7,6**	**15,8**

Rational Method - NTC Blue Manual Method

Time of Concentration **Fig 4.3**

Description	Reach (m)	Type	GL top	GL bot	Slope	Velocity	Tc
1 Grassveld (Overland flow)	1620	3	875	871	0,0025	0,104	4,312
2 Undefined		0				0,000	0,000
3 Undefined		0				0,000	0,000
4 Undefined		0				0,000	0,000
5 Undefined		0				0,000	0,000
	1620						4,312

Fig 4.4 **Ts = 4,31 hours**

Size of Catchment = 0,76 km2

Check ARF = 0,963

C = 0,4

Return Period	**2**	**5**	**10**	**20**	**50**	**100**
d =	40	55	67	85	120	138
Q = CIA =	**0,75**	**1,04**	**1,26**	**1,60**	**2,26**	**2,60**

Empirical Methods

Qip = a.k.l.m.n.A^2/3							
a =	0,015						
MAP k =	628						
m = 1.588/(L/a^.5)^2/3 =	1,0506163						
n = 3.24.S^1/4 =	0,6526171			*interpolated*			
Return Period	**2**	**5**	**10**	***20***	**50**	**100**	
l =	0,19	0,45	0,67	*0,89*	1,26	1,52	
Qip =	**1,02**	**2,42**	**3,60**	***4,78***	**6,78**	**8,18**	

Qip = 0.6.Kt.p.A^.6.B^.2						
MAP p =	900					
B =A.S/L.Lc =	1,958E-08	(Lc = .6.L)				
Return Period		**10**	**20**	**50**	**100**	
Kt - Veld Zones : Col Ref						
1	1	0,17	0,23	0,32	0,4	
2 winter	2	0,42	0,52	0,68	0,8	
2 year round	3	0,83	1,04	1,36	1,6	
3	4	0,29	0,4	0,55	0,7	
4,5A,9	5	0,5	0,68	0,95	1,2	
5	6	0,59	0,8	1,11	1,4	
6,7 year round	7	0,67	0,91	1,26	1,6	
6	8	0,33	0,45	0,63	0,8	
8	9	0,42	0,57	0,79	1	
Choose Col Ref =	**4**					
therefore Kt =		0,29	0,4	0,55	0,7	
Qip =		**3,82**	**5,26**	**7,24**	**9,21**	