PROJECT:	EL-BETHEL CHURCH

STORMWATER RUN-OFF CALCULATIONS (TOTAL SITE)

Formulas used:

[1] RATIONAL METHOD: Q=Aci

where:
- Q= Peak discharge of watershed in cubic feet per second (cfs) due to maximum storm assumed.
- A= Area of watershed in acres.
- c= Coefficient of run-off [2].
- i= Intensity of rainfall in inches per hour based on concentration time. [3]

[4] $TC = \frac{\left(L^{0.8}\left(\frac{1000}{c} - 9\right)^{0.7}\right)}{(1140(s^{0.5}))}$

where:
- TC= Time of concentration= time required for rain falling at most remote point to reach discharge point.
- c= Site run-off coefficient based on conditions shown.
- s= Percent slope of overland flow.

AREA OF WORK – PRIOR DEVELOPMENT

25 Year Frequency

Q_1 = Aci

Watertight Surfaces		0	sqft =	0.000	Acres
c(1) =	0.9				
Gravel Surface		0	sqft =	0.000	Acres
c(2) =	0.25				
Green Space		86804	sqft =	1.993	Acres
c(3) =	0.1				
Summary		86804	sqft =	1.993	Acres
c =	0.10				

Duration (D) = Time of concentration (TC)

where	L =	290	run-off length ft	Elev diff = 1.45
	c =	0.10	run-off coef	
	S =	0.5000	percent slope	
therefore	TC = D =	36.49	minutes	
Expected Rainfall Intensity	i =	3.50	in/hr	

Q1 = 0.697 cfs — 10% retention= 0.070 cfs

AREA OF WORK - POST DEVELOPMENT

25 Year Frequency

Q_2 = Aci

Watertight Surfaces		10400	sqft =	0.239	Acres
c(1) =	0.9				
Gravel Surface		32585	sqft =	0.748	Acres
c(2) =	0.25				
Green Space		43819	sqft =	1.006	
c(3) =	0.1				
Summary		86804	sqft =	1.993	Acres
c =	0.25				

D = Time of concentration (TC)

where	L =	120	Runoff length ft	Elev diff = 0.7
	c =	0.25	Runoff coef	
	S =	0.5833	Percent Slope	
therefore	TC = D =	10.18	minutes or	
Expected Rainfall Intensity	I =	3.50	in/hr	

Total Retention Required

Q_2 = 1.759 cfs — Q2-Q1+10%= 1.131 cfs

References:

1. Chen, W.F. The Civil Engineering Handbook. 1995. Eq.# 31.1, pg. 1036
2. Seelye, Elwyn E. Data Book for Civil Engineers. Vol.1 1960. Tbl. B, pg. 18-02
3. Seelye, Elwyn E. Data Book for Civil Engineers. Vol.1 1960. Fig.B, pg. 18-01
4. Chen, W.F. The Civil Engineering Handbook. 1995. Tbl. 31.2 Regan Equation (*n*=0.013)
5. Chen, W.F. The Civil Engineering Handbook. 1995. Eq.# 28.32, pg. 969