

PROJECT:	State Farm
DRAINAGE RUN OFF CALCULATIONS -- RATIONAL METHOD	

PRIOR DEVELOPMENT			
10 Year Frequency			
Q₁ = CIA			
Watertight Surfaces		82	sqft = 0.002 Acres
c(1) =	0.9		
Gravel Surface		0	sqft = 0.000 Acres
c(2) =	0.21		
Green Space		13816	sqft = 0.317 Acres
c(3) =	0.35		
Summary		13898	sqft = 0.319 Acres
c =	0.35		
Duration (D) = Time of concentration (TC)			
TC = .7039(L^{.3917})(c^{-1.1309})(S^{-1.985})			
where	L = 125	Runoff length ft	Elev diff = 0.5
	c = 0.35	Runoff coef	
	S = 0.4000	Percent Slope	
therefore	TC = D = 18.16	minutes or	
and from Rainfall Intensity T:	I = 4.50	in/hr	
Q₁ =		0.507 cfs	RUNOFF LIMIT 90%
		0.456 cfs	

POST DEVELOPMENT			
10 Year Frequency			
Q₂ = CIA			
Watertight Surfaces		10538	sqft = 0.242 Acres
c(1) =	0.9		
Gravel Surface		0	sqft = 0.000 Acres
c(2) =	0.21		
Green Space		3360	sqft = 0.077
c(3) =	0.35		
Summary		13898	sqft = 0.319 Acres
c =	0.77		
D = Time of concentration (TC)			
TC = .7039(L^{.3917})(c^{-1.1309})(S^{-1.985})			
where	L = 108	Runoff length ft	Elev diff = 1.5
	c = 0.77	Runoff coef	
	S = 1.3889	Percent Slope	
therefore	TC = D = 5.57	minutes or	
and from Rainfall Intensity T:	I = 7.60	in/hr	
Q₂ =		1.860 cfs	

RESULTS			
DETENTION REQUIRED Q ₂ -Q ₁		1.403	cfs
ONE HOUR DETENTION		5052.4	cuft
DETENTION DIMENSIONS	WIDTH	40	feet
	LENGTH	100	feet
	DEPTH	1.26	feet

DISCHARGE END AREA CALCULATIONS			
Q = cA(2gH)^{1/2}			
where Q is allowable run off			
Allowable run off	Q =	0.456	cfs
Friction loss factor	c =	0.98	coefficient
Acceleration	g =	32.2	ft/ft/sec
Height above invert	if H =	2.00	feet
End area	A =	0.04	sqft
REQUIRED CONDUIT =		2.74	inch diameter
USE		3	

