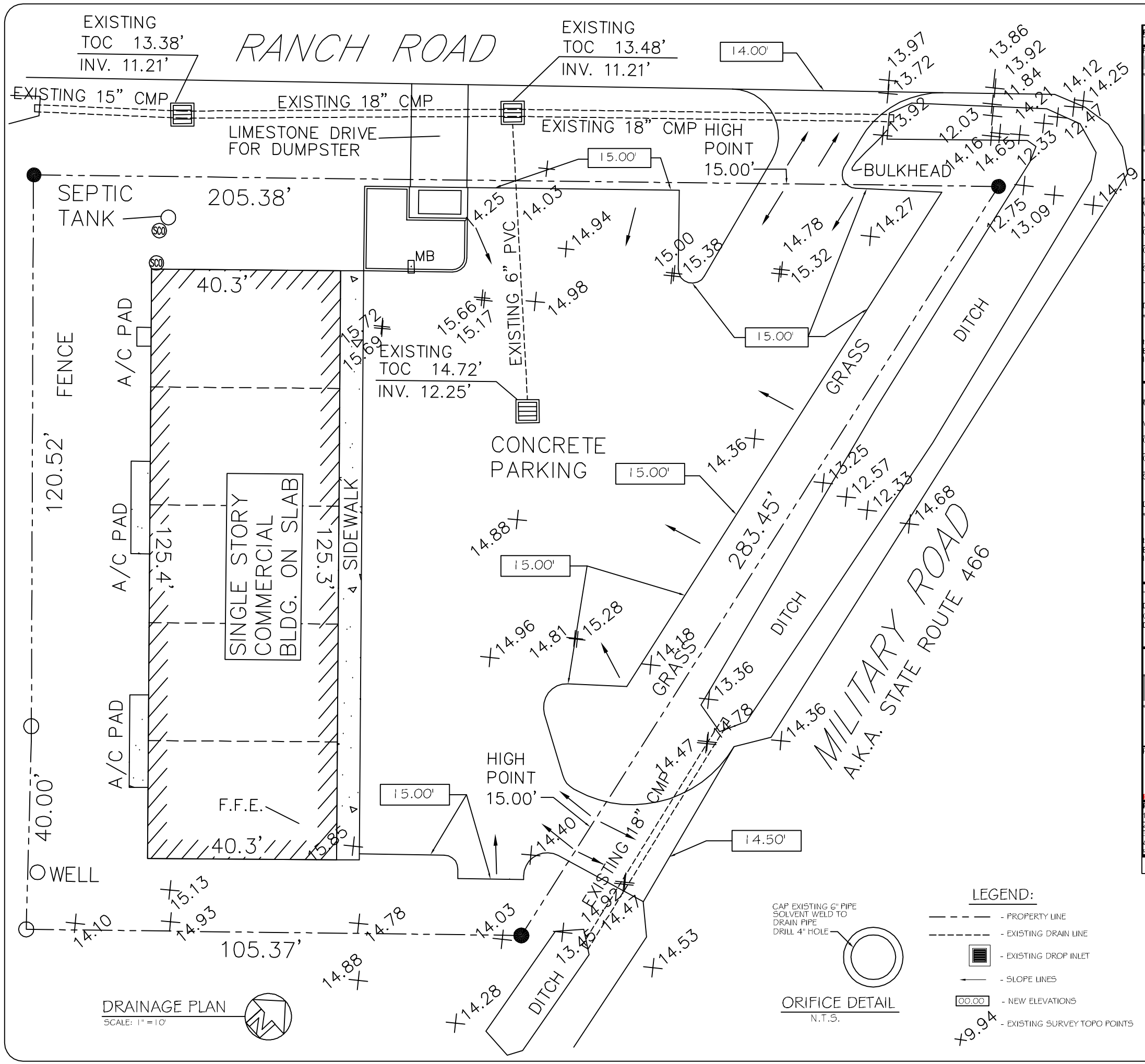

DRAINAGE PLAN
SCALE: 1" = 10'

CAP EXISTING 6" PIPE
SOLVENT WELD TO
DRAIN PIPE
DRILL 4" HOLE

ORIFICE DETAIL
N.T.S.

LEGEND:

- PROPERTY LINE
- EXISTING DRAIN LINE
- EXISTING DROP INLET
- SLOPE LINES
- 00.00 - NEW ELEVATIONS
- x9.94 - EXISTING SURVEY TOPO POINTS

PROJECT:	SHOPPING CENTER

STORMWATER RUN-OFF CALCULATIONS

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		12675	sqft =	0.296 Acres
c(1) =	0.9			
Gravel Surface		0	sqft =	0.000 Acres
c(2) =	0.25			
Green Space		11970	sqft =	0.275 Acres
c(3) =	0.1			
Summary		24645	sqft =	0.570 Acres
c =	0.51			

Duration (D) = Time of concentration (TC)

where	L = 152	run-off length ft	Elev diff = 0.5
	c = 0.51	run-off coef	
	S = 0.3289	percent slope	
therefore	TC = D = 5.59	minutes	
Expected Rainfall Intensity	i = 3.50	in/hr	

Q_1 = 1.027 cfs — 10% retention= 0.103 cfs

AREA OF WORK - POST DEVELOPMENT
25 Year Frequency

$Q_2 = Aci$

Watertight Surfaces		16682	sqft =	0.383 Acres
c(1) =	0.9			
Gravel Surface		0	sqft =	0.000 Acres
c(2) =	0.25			
Green Space		8183	sqft =	0.188
c(3) =	0.1			
Summary		24845	sqft =	0.570 Acres
c =	0.64			

D = Time of concentration (TC)

where	L = 188	Runoff length ft	Elev diff = 0.75
	c = 0.64	Runoff coef	
	S = 0.3989	Percent Slope	
therefore	TC = D = 6.29	minutes	
Expected Rainfall Intensity	I = 3.50	in/hr	

Total Retention Required

Q_2 = 1.271 cfs — Q2-Q1+10%= 0.346 cfs

RESULTS

DETENTION REQUIRED	0.346	cfs
ONE HOUR DETENTION	1246.1	cuft
DETENTION DIMENSIONS	WIDTH 84	feet
	LENGTH 147	feet
	DEPTH 0.10	feet

DISCHARGE END AREA REQUIREMENTS
25 Year Frequency
Area requirements for pipe servicing On-Site Retention Pond

[5] $A = \frac{Q}{(c\sqrt{(2gh)})}$

where:
- A= Discharge Area required
- g= Acceleration of gravity
- c= Discharge coefficient
- h= Hydraulic head
- Q= Flow volume from run-off

Pipe Servicing Offsite Drainage

Q =	0.346 cfs	H =	1.00 feet
c =	0.62 coefficient	A =	0.07 sqft
g =	32.16 ft/ft/sec		

REQUIRED CONDUIT = 3.57 inch diameter — Use 4" Orifice

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

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DRAINAGE
PLAN

REV:

SCALE: AS NOTED

JOB#:

DATE: 01-17-11

SHEET 1

C-1

OF 1