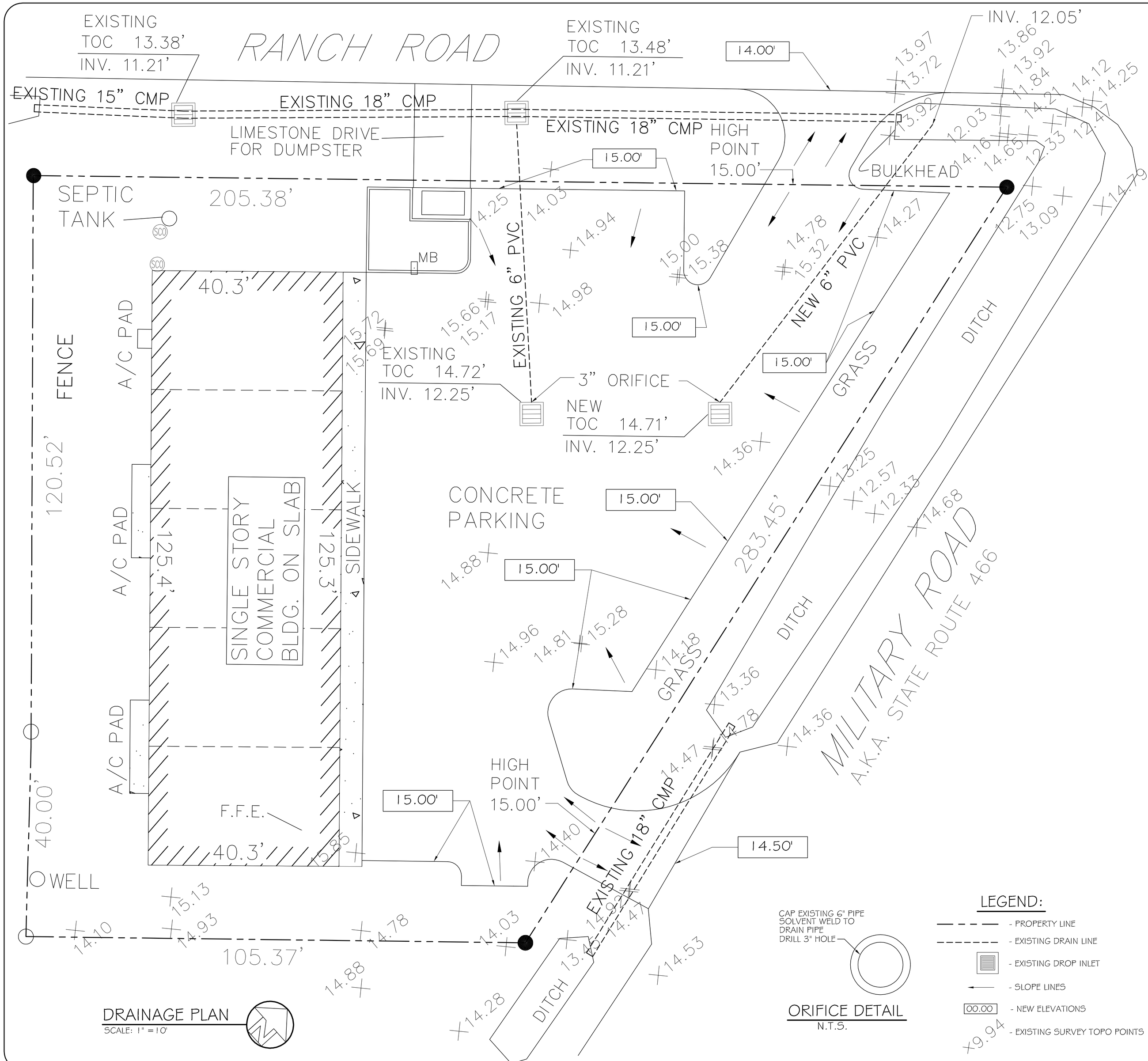


DRAINAGE PLAN
SCALE: 1" = 10'

CAP EXISTING 6" PIPE
SOLVENT WELD TO
DRAIN PIPE
DRILL 3" HOLE

ORIFICE DETAIL
N.T.S.

LEGEND:

- PROPERTY LINE
- EXISTING DRAIN LINE
- EXISTING DROP INLET
- SLOPE LINES
- 00.00 NEW ELEVATIONS
- 9.94 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=** $\frac{\left(L^{0.8}\left(\frac{1000}{s}-9\right)^{0.7}\right)}{(1140(s^{0.5}))}$

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 | c(1) = 0.9 | 12875 | sqft = 0.296 | Acres |
| Gravel Surface | c(2) = 0.25 | 0 | sqft = 0.000 | Acres |
| Green Space | c(3) = 0.1 | 11970 | sqft = 0.275 | Acres |
| Summary | c = 0.51 | 24845 | sqft = 0.570 | Acres |

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 = 3.60 | in/hr | |

$Q1$ = 1.027 cfs — 10% retention= 0.103 cfs

**AREA OF WORK - POST DEVELOPMENT**
25 Year Frequency

$Q_2$ = Aci

| | | | | |
|---|---|---|---|---|
| Watertight Surfaces | c(1) = 0.9 | 16862 | sqft = 0.383 | Acres |
| Gravel Surface | c(2) = 0.25 | 0 | sqft = 0.000 | Acres |
| Green Space | c(3) = 0.1 | 8183 | sqft = 0.188 | |
| Summary | c = 0.64 | 24845 | sqft = 0.570 | Acres |

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: 5-5-11

SCALE: AS NOTED

JOB#:

DATE: 01-17-11

SHEET 1

C-1

OF 1