

LIVING THE WORD INTERNATIONAL CHURCH

STORMWATER DRAINAGE CALCULATIONS

FORMULAS USED

where: Q_p = Peak discharge of watershed in cubic feet per second (CFS) due to maximum storm
 A_p = Area of watershed in acres
 C = Coefficient of runoff (2)
 I = Intensity of rainfall in inches per hour based on concentration time (3)

$$[2] Q_p = \left(\frac{1.48 \sqrt{100 - 9} \cdot 0.7}{1140 \cdot C \cdot 3.6} \right)$$

where: T_C = Time of concentration = time required for rain falling at most remote point to reach discharge point.
 n = Slope coefficient based on conditions shown.
 L = Length of overland flow

PRIOR DEVELOPMENT
 100 Year Frequency

Q = Ad

Watershed Surfaces

Gravel Surface	$C(1) = 0.9$	$sqft = 34971$	$sqft = 0.789$	Acres
Gravel Surface	$C(2) = 0.25$	$sqft = 99930$	$sqft = 2.280$	Acres
Green Space	$C(3) = 0.15$	$sqft = 80946$	$sqft = 0.191$	Acres
Summary	$C = 0.40$	$sqft = 1420056$	$sqft = 3.260$	Acres

Duration (D) = Time of concentration (TOC)
 where: $L = 600$ ft run-off length
 $C = 0.40$ run-off coef
 $S = 0.8000$ percent slope
 $T_C = D = 24.92$ minutes
 $I = 4.41$ in/hr

Q = Ad

100 Year Frequency

POST DEVELOPMENT
 5% reduction

Watershed Surfaces	$C(1) = 0.9$	$sqft = 101951$	$sqft = 2.339$	Acres
Gravel Surface	$C(2) = 0.25$	$sqft = 6829$	$sqft = 0.138$	Acres
Green Space	$C(3) = 0.15$	$sqft = 841296$	$sqft = 0.178$	Acres
Summary	$C = 0.69$	$sqft = 1240056$	$sqft = 3.280$	Acres

Duration (D) = Time of concentration (TOC)
 where: $L = 600$ ft run-off length
 $C = 0.69$ run-off coef
 $S = 0.4000$ percent slope
 $T_C = D = 18.33$ minutes
 $I = 4.41$ in/hr

DETENTION REQUIREMENTS

Operation: $Q = 0.24 \cdot 2901 = 696.24$ CFS
 ONE HOUR DETENTION
 DETENTION DIMENSIONS

DISCHARGE END AREA REQUIREMENTS
 100 Year Frequency

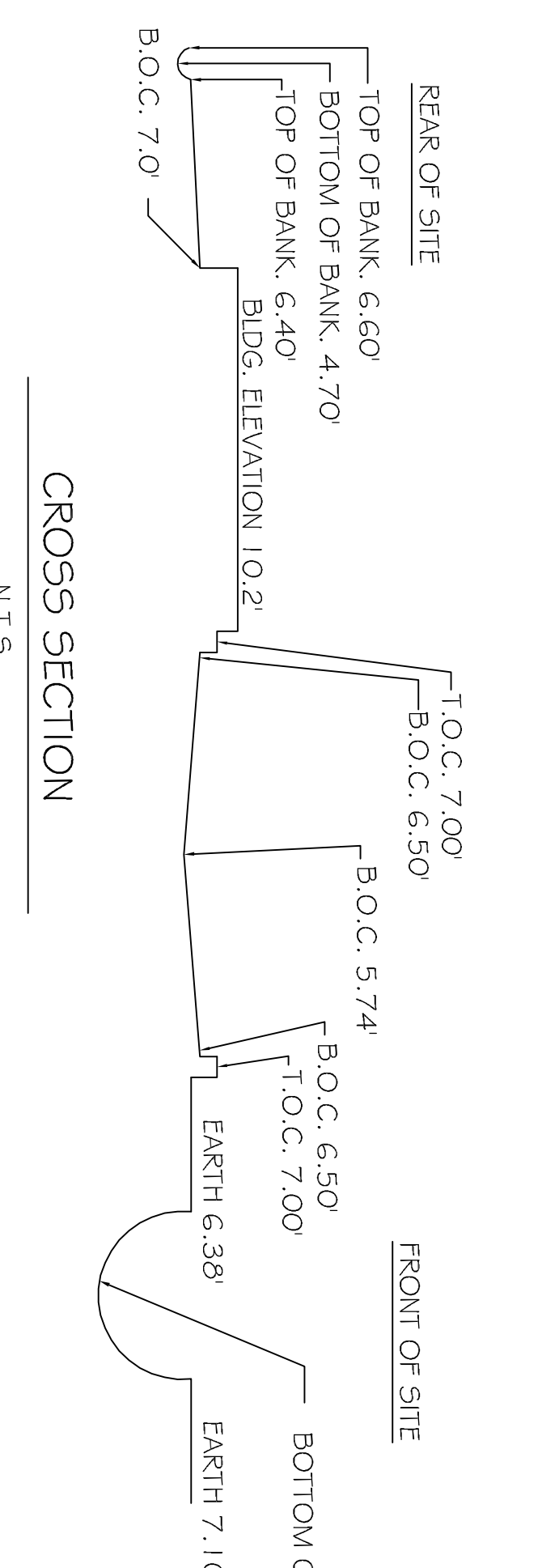
LENGTH	60 feet
WIDTH	240 feet
DEPTH	1.41 feet

where: A^* = Discharge area required
 D^* = Acceleration of gravity
 C = Discharge coefficient
 n = Hydraulic head
 Q = Flow volume from runoff

Pipe Sizing: $Q = 5.622$ CFS, $n = 0.015$, $A = 3.30$ sqft, $D = 0.622$ ft, $V = 32.18$ ftsec, 2

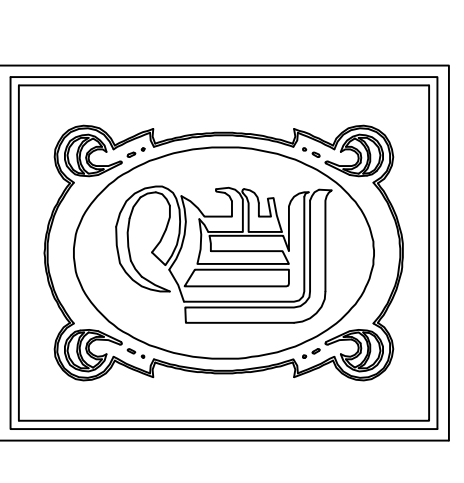
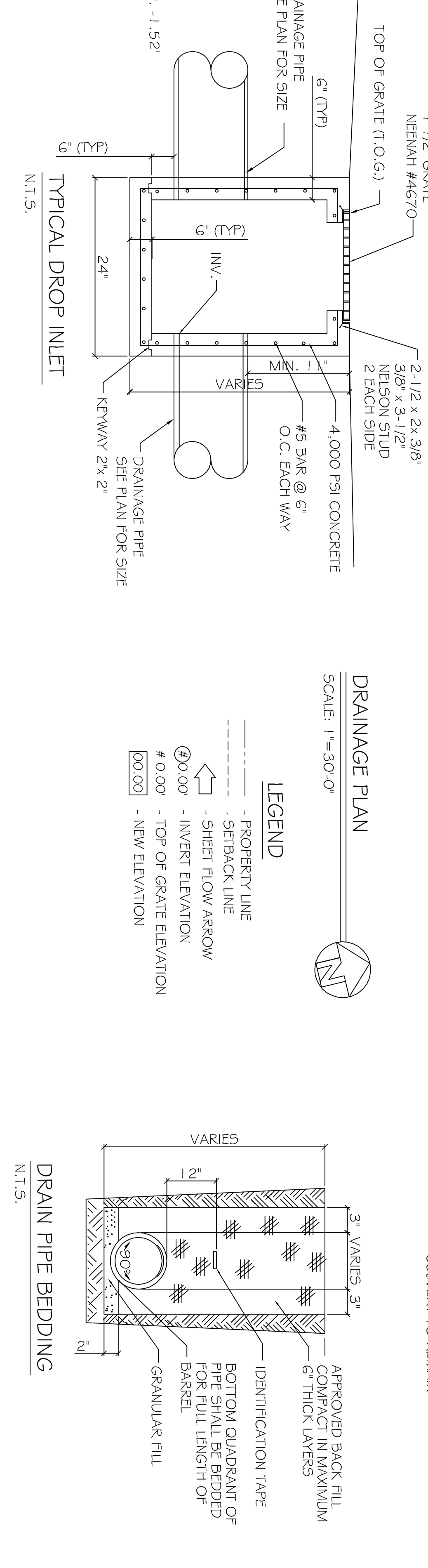
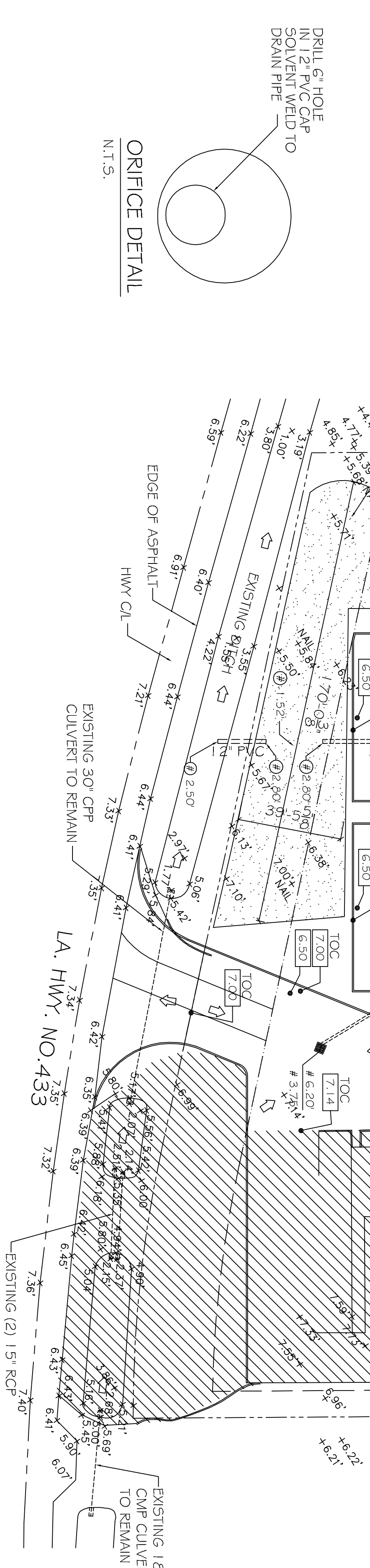
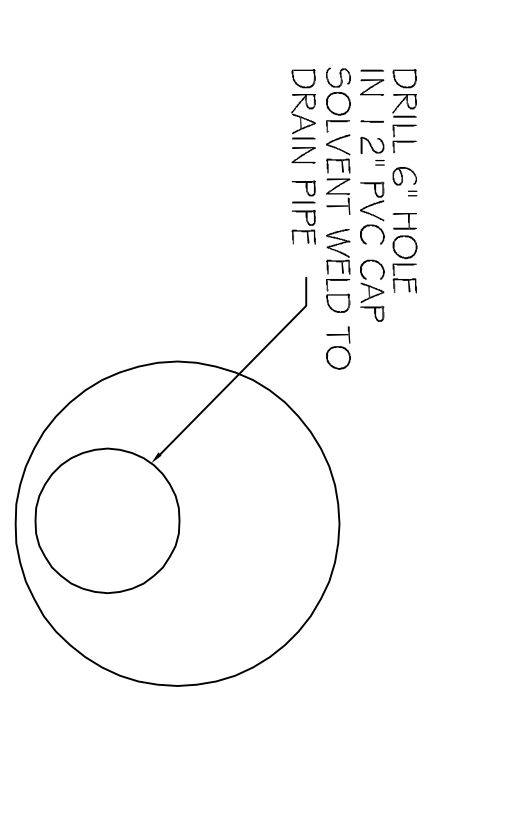
REQUIRED CONDUIT = 10.881 inch inside diameter

References:
 1. Chen W.F. The Civil Engineering Handbook, 1995, Eq.#31.1, pg. 1036
 2. Seele, Edwin E. Data Book for Civil Engineers, Vol. 1 1980, Tab. B.191, 18.02
 3. Seele, Edwin E. Data Book for Civil Engineers, Vol. 1 1980, Fig. B.191, 18.01
 4. Chen W.F. The Civil Engineering Handbook, 1995, Tab. 31.2, Regn. Equation (7-0.19)
 5. Chen W.F. The Civil Engineering Handbook, 1995, Eq.# 28.92, pg. 959



- DRAINAGE PLAN NOTES:**
1. DRAIN PIPE & FITTINGS WITHIN PROPERTY LINE SHALL BE POLYVINYL CHLORIDE PLASTIC PIPE, METTING CLASS 100 C-900 PVC.
 2. ELEVATIONS SHOWN ARE M.S.L.
 3. FIELD VERIFY ALL ELEVATIONS AND DRAINAGE SYSTEM PLACEMENT PRIOR TO START OF WORK.
 4. THERE IS NO EVIDENCE OF EXISTING OFF-SITE FLOW CROSSING THE PROPERTY.

RELOCATE EXISTING POND TO ALLOW FOR PARKING LOT. EXISTING POND'S DIMENSIONS ARE 1.45 X 3.4'. THE RELOCATED POND SHALL BE 170' X 39' AND MAINTAIN A NEW AVERAGE DEPTH OF 7.9 FT.



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DRAINAGE PLAN

REV: 03-12-12
 SCALE: AS NOTED
 JOB#: 2128
 DATE: 01-27-12
 SHEET 6