

Drainage Analysis
Job # 16182 - Texas Viejo Land Co.-Austin Colony Sec. 1B

Rainfall Intensity calculations for Brazoria County

i = Intensity (in/hr)
b = coefficient
t = time of concentration
d = coefficient
e = coefficient

subscript i = 1 = 2 year storm
i = 2 = 5 year storm
i = 3 = 10 year storm
i = 4 = 25 year storm
i = 5 = 50 year storm
i = 6 = 100 year storm

i = 1.6

b ₁	A ₆	d ₁
71.0	0.774	8.4
70.1	0.752	7.7
96.6	0.770	17.2
89.2	0.736	10.4
86.5	0.709	10.0
120.2	0.741	21.3

T₀ = 53.33 ENTER PREDEVELOPMENT TIME OF CONCENTRATION

I₁ = $\frac{b_1}{(d_1 + T_0)^{e_1}}$ I₀ = 4.921 Predevelopment Intensity of interest

C_p = .091 ENTER PREDEVELOPMENT C VALUE

A_p = 13.52 ENTER AREA

C_r = 1.00
Q = C_rI₀A
Q = 6.055

Must Insert correct subscript for I to obtain the relevant Q

V_{max} = (C)A-43560-1.08
V = 5.788 × 10⁴

For these calculations, total volume storage is assumed to equal (C)A with A converted to square feet multiplied by 13" (1.08)

DEVELOPMENT OF RUNOFF HYDROGRAPH MALCOM'S METHOD AS DESCRIBED IN THE BRAZORIA COUNTY DRAINAGE CRITERIA MANUAL

T = $\frac{V}{1.39-Q}$ T = 6.877 × 10³

T = Time to peak, presented as a function of volume and peak flow and therefore indirectly related to time of concentration

t = 0, 1000, 84000

f(t) = $\left(\frac{Q}{2}\right)\left(1 - \cos\left(\frac{t\pi}{T}\right)\right)$ f(t) describes rising limb of hydrograph

g(t) = 4.34-Q-exp[-1.30($\frac{t}{T}$)] g(t) describes descending limb of hydrograph

q(t) := if(t ≤ 1.25-T, f(t), g(t))

Volume_{post} := $\int_0^{86400} q(t) dt$

Volume_{pre} = 5.808 × 10⁴

Predevelopment hydrograph

T₀ = 26.42 ENTER POST DEVELOPMENT TIME OF CONCENTRATION

I₁ = $\frac{b_1}{(d_1 + T_0)^{e_1}}$ I₀ = 6.855 Post development I of interest

C_p = 0.65
A_p = 1.25
Q_{max} = C_pI₀A_pC_r

ENTER POST DEVELOPMENT C FACTOR REVISE CF AND AREA IF NECESSARY

Q = 75.299

V_{max} = (C)A-43560-1.08
V = 4.134 × 10⁵

T = $\frac{V}{1.39-Q}$ T = 3.95 × 10³

t = 0, 1000, 25000

f(t) = $\left(\frac{Q}{2}\right)\left(1 - \cos\left(\frac{t\pi}{T}\right)\right)$

g(t) = 4.34-Q-exp[-1.30($\frac{t}{T}$)]

q(t) := if(t ≤ 1.25-T, f(t), g(t))

Volume_{post} := $\int_0^{86400} q(t) dt$

Volume_{post} = 4.149 × 10⁵

Post development hydrograph

Combined pre and post development hydrographs

v(t) := ((r(t) - q(t)) - 1)

v(t) := if(f(t) > 0, f(t), 0)

THE REQUIRED STORAGE COMPUTED AS THAT PART OF THE POST DEVELOPMENT HYDROGRAPH THAT FALLS ABOVE THE PREDEVELOPMENT HYDROGRAPH

ACRE- FEET

$\int_0^{86400} v(t) dt = 8.236$

Hydrological and Hydraulic Impacts
Texas Viejo Land Co.-Austin Colony Sec. 1B
Anchor Road

Job # 16182

Brazoria County, Texas

A = 13.52 Acre Development :
(50 Lots, Road ROW and 1.8 Ac. Detention)

Pre Development:
C = 0.30 (Adjust to 0.091)
TC = 53.33 Minutes, I = 4.921
Q = 100 Year Storm = 17.248 cfs
Q-allowable is 0.45 cfs / ac. = 6.08 cfs

Post Development
C = 0.65
TC = 26.42 Minutes, I = 6.855
Q = 100 Year Storm = 75.299 cfs

Required Detention:
8.236 acre - feet (358,760 c.f.)
0.61 ac-ft/ac

Douglas B. Roesler, P.E. Jan. 23, 2025

EXISTING CONDITIONS
Bra. Co. Master Drg. Study allows only 0.45 cfs/acre in this area. This is Oyster Creek drainage areas OC 25.
TC = 15 Minutes gather time plus diagonal length 1,150' overland at 0.50 fps = 53.33 Minutes

PROPOSED CONDITIONS
TC = 15 Minutes gather time + 140' overland at 0.50 fps + 320' gutter @ 2.0 fps + 735' I.F. storm sewer @ 3.0 fps = 26.42 Minutes
C = 0.65 per Bra. Co. Drg. Criteria manual.

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CHECKED	DR
DATE	2/5/2025

REVISIONS

NO.	DATE	DESCRIPTION	APPROVED
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ANGLETON, TEXAS 77515 (979) 849-6661
REG. NO. F-825

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Tejas Viejo Land Company
5454 Newcastle Drive Unit# 1101
Houston, Texas 77081
waynerea@swbell.net (713) 993-6453

PROJECT:
Austin Colony Subdivision
Section 1B - 50 Lots
CR 44 (Anchor Road), Angleton TX

HYDROLOGICAL CALCULATIONS

PROJECT NO. 16182

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STORM SEWER CALCULATIONS (10-YEAR AND 100-YEAR FREQUENCY STORMS)

JOB NO: 16182
PROJECT: ANGLETON AUSTIN COLONY SEC. 1B

INTENSITY COEFFICIENTS
5-YEAR b 58.019 d 9.24 e 0.7120
10-YEAR 57.515 7.78 0.6760
100-YEAR 46.316 1.56 0.5330

STORM SEWER CALCULATIONS (5-YEAR FREQUENCY STORM)

Table with columns: DRAINAGE AREA, FROM, TO, AREA, CUM. AREA, RUNOFF COEFF. C, FREQUENCY CORRECTION FACTOR Cf, C*Ci, C*Ci*A, SUM OF C*Ci*A, TIME OF CONC., INLET THROAT LENGTH, INTENSITY i, SUM OF FLOWS, REACH LENGTH, PIPE COUNT, DIAM OR RISE, SPAN, AREA, SLOPE, MANNINGS 'N', DESIGN CAPACITY, DESIGN VELOCITY, FALL, MH DROP, FLOWLINE UP STREAM, FLOWLINE DOWN STREAM, ACTUAL VELOCITY, HYDRAULIC GRADIENT, CHANGE IN HEAD, HYD GRAD UP STREAM, HYD GRAD DOWN STREAM, GUTTER UP STREAM.

STORM SEWER CALCULATIONS (100-YEAR FREQUENCY STORM)

Table with columns: DRAINAGE AREA, FROM MH, TO MH, AREA, CUM. AREA, RUNOFF COEFF. C, FREQUENCY CORRECTION FACTOR Cf, C*Ci, C*Ci*A, SUM OF C*Ci*A, TIME OF CONC., INTENSITY i, SUM OF FLOWS, REACH LENGTH, PIPE COUNT, DIAM OR RISE, SPAN, AREA, SLOPE, MANNINGS 'N', DESIGN CAPACITY, DESIGN VELOCITY, FALL, MH DROP, FLOWLINE UP STREAM, FLOWLINE DOWN STREAM, ACTUAL VELOCITY, HYDRAULIC GRADIENT, CHANGE IN HEAD, HYD GRAD UP STREAM, HYD GRAD DOWN STREAM, GUTTER UP STREAM.

Table with columns: NO., DATE, DESCRIPTION, APPROVED. Includes a REVISIONS section.

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DATE 2/5/2025

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Professional Engineer Seal: DOUGLAS B. ROESLER, LICENSED PROFESSIONAL ENGINEER, No. 56739, State of Texas.

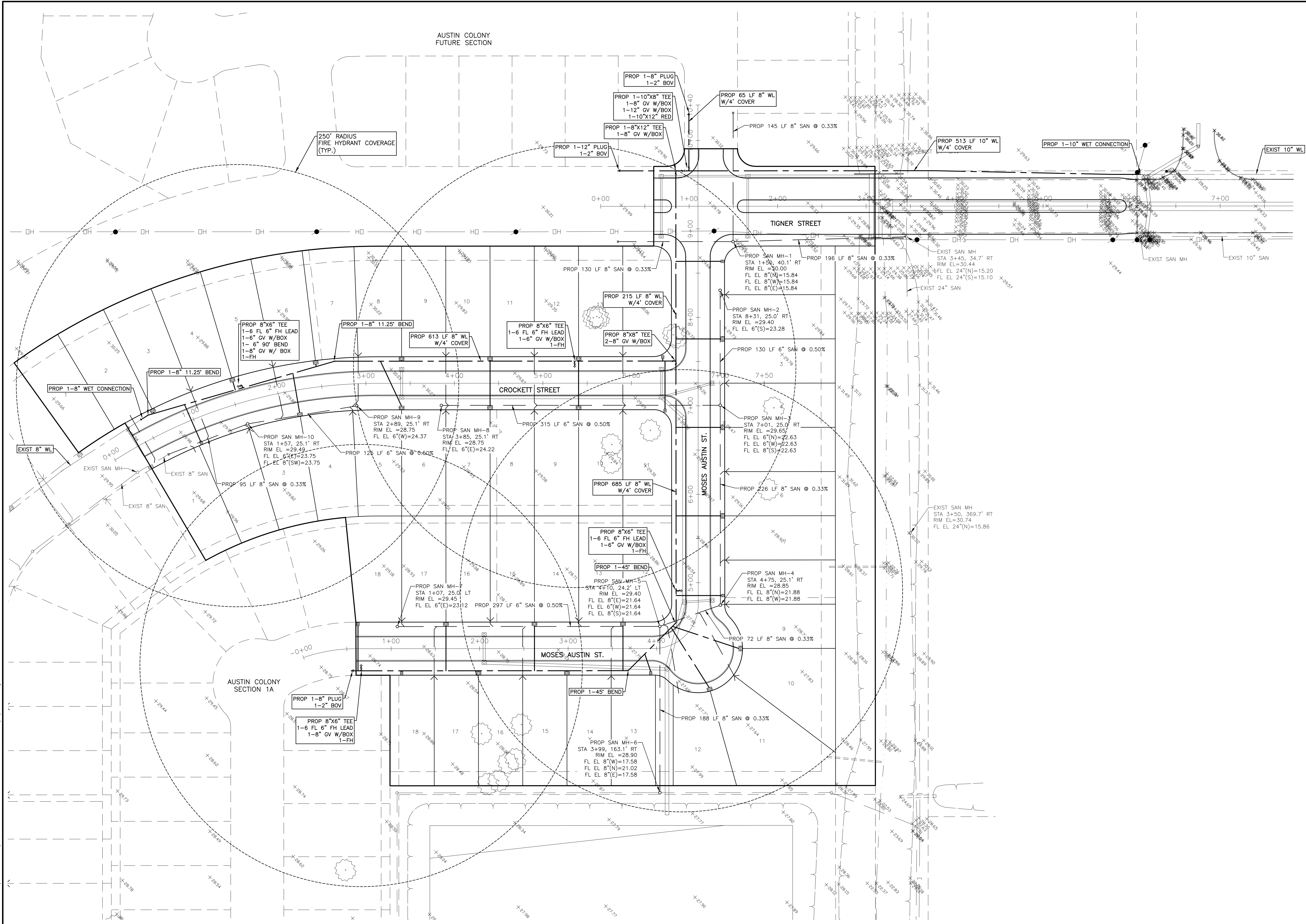
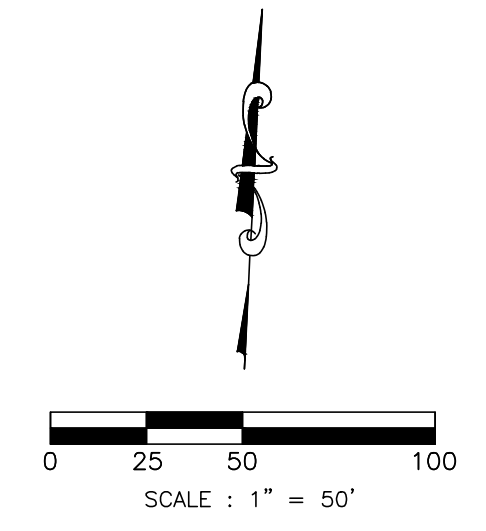
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waynerea@swbell.net (713) 993-6453

PLAN: 1" = 40'
PROFILE:
HORIZONTAL:
VERTICAL:

PROJECT: Austin Colony Subdivision
Section 1B - 50 Lots
CR 44 (Anchor Road), Angleton TX

WINDSTORM DATA I-1 THRU I-14
PROJECT NO. 16182

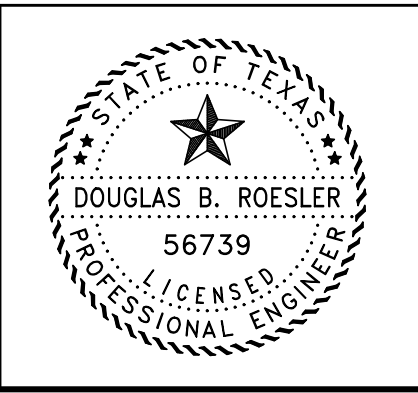


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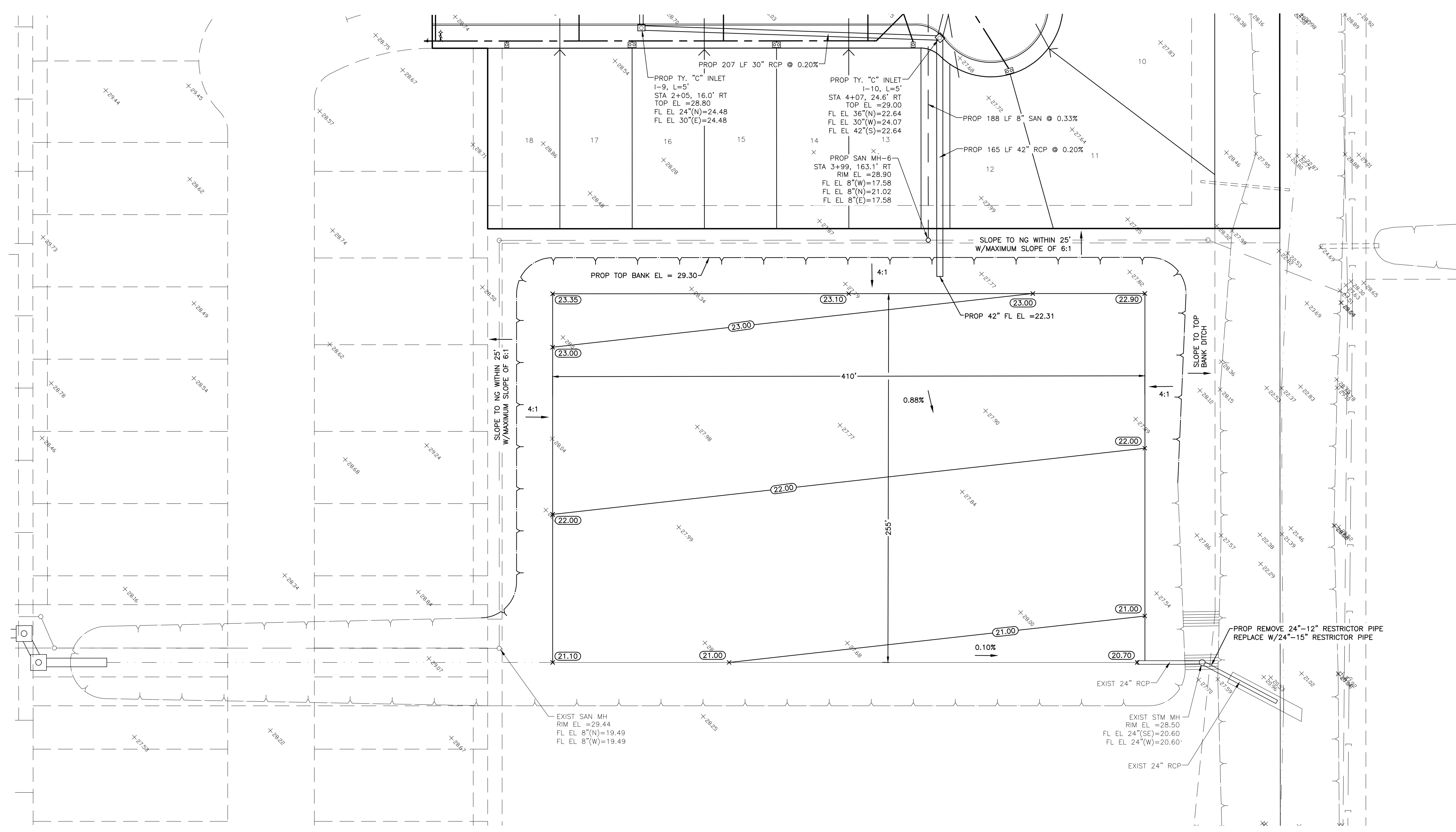
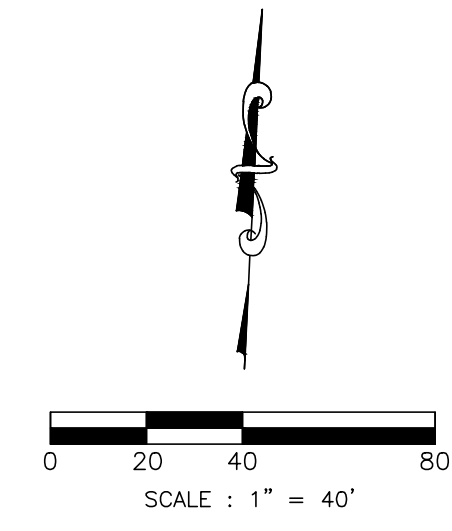
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VERTICAL: _____

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UTILITY LAYOUT
PROJECT NO. 16182



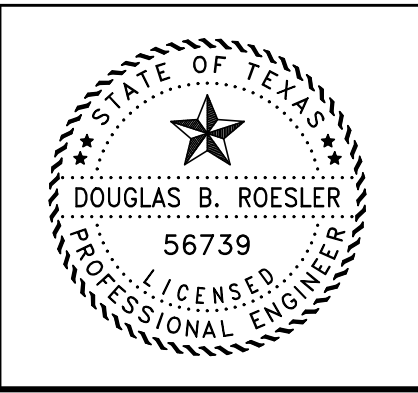
SEC 1A & 1B DETENTION VOLUME REQUIRED = 17.037 AC-FT
 DETENTION PROVIDED:
 TOP EL. 29.30 = (306 x 460) = 3.231 AC
 BOTTOM AVG. EL. 22.0 = (255 x 410) = 2.400 AC
 AVG. AREA (28 TO 22) = 2.74 AC
 AVG. DEPTH = 6.3'
 STORAGE PROVIDED = 17.26 AC-FT

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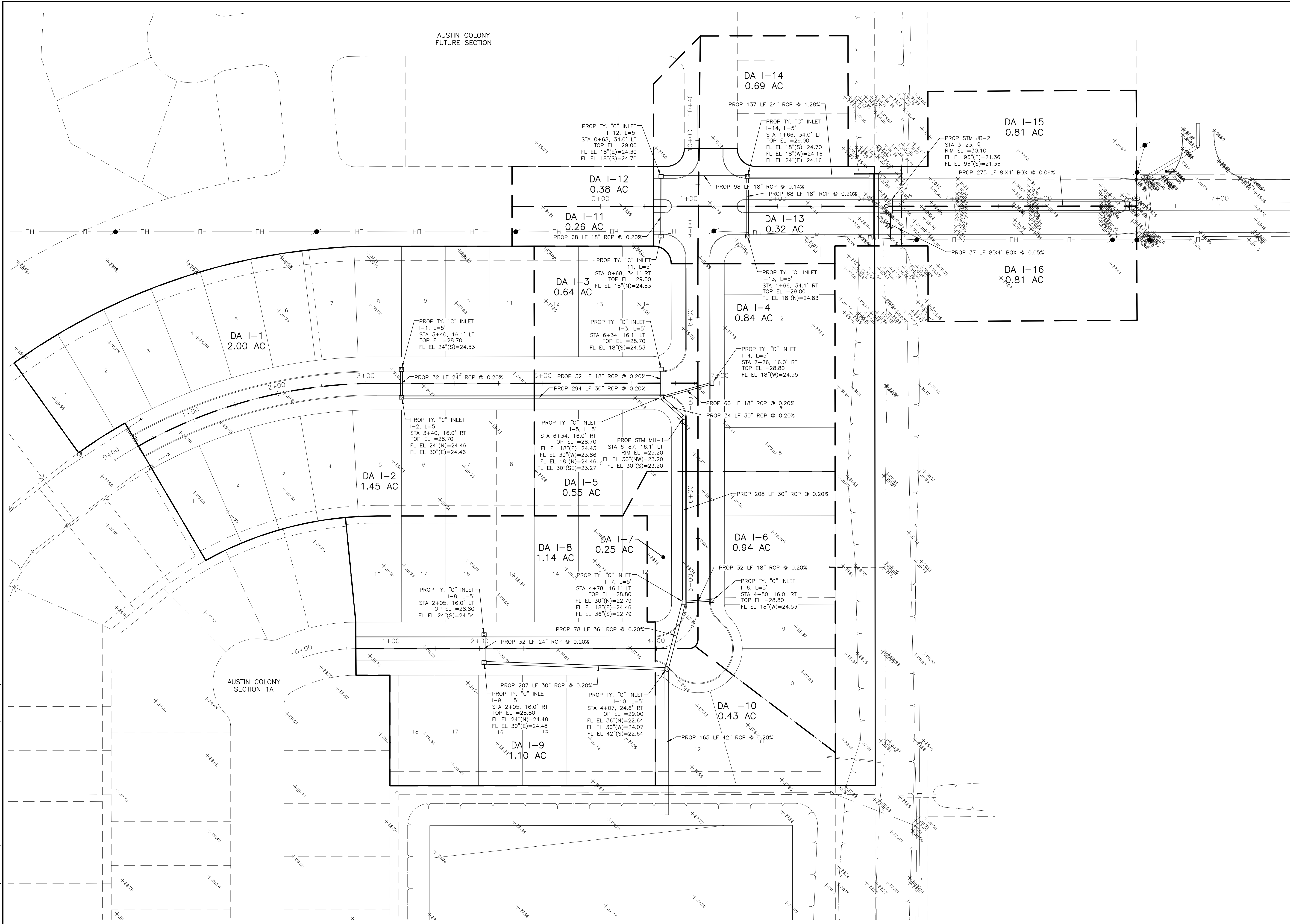
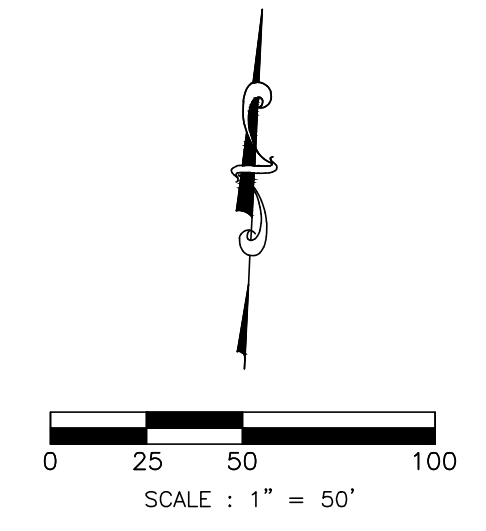
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DETENTION POND LAYOUT AND CROSS SECTIONS
 PROJECT NO. 16182



SYMBOLS LEGEND

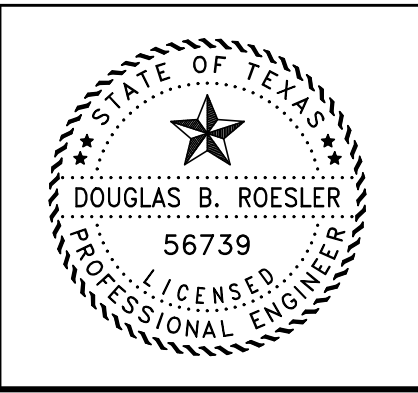
- EXIST NATURAL GROUND ELEVATION
- \times 80.20 PROP GRADE ELEVATION
- \times 81.35 PROP TOP OF 4" CURB ELEVATION
- \times TC=81.00 PROP RIM ELEVATION OF CURB INLET
- \times GUT=81.50 PROP GUTTER LINE ELEVATION
- \times TG=81.50 PROP TOP OF GRATE INLET
- DOUBLE WATER METER
- SINGLE WATER METER
- FIRE HYDRANT
- WATER VALVE
- TAPPING SLEEVE AND VALVE
- REDUCER
- STORM SEWER MANHOLE
- SANITARY SEWER MANHOLE
- TOP BANK
- STORM SEWER LINE (REINFORCED CONCRETE PIPE, ASTM C76)
- SANITARY SEWER LINE (D3034, SDR 26, 160 PR)
- WATERLINE (AWWA C900, CLASS 150, DR18)

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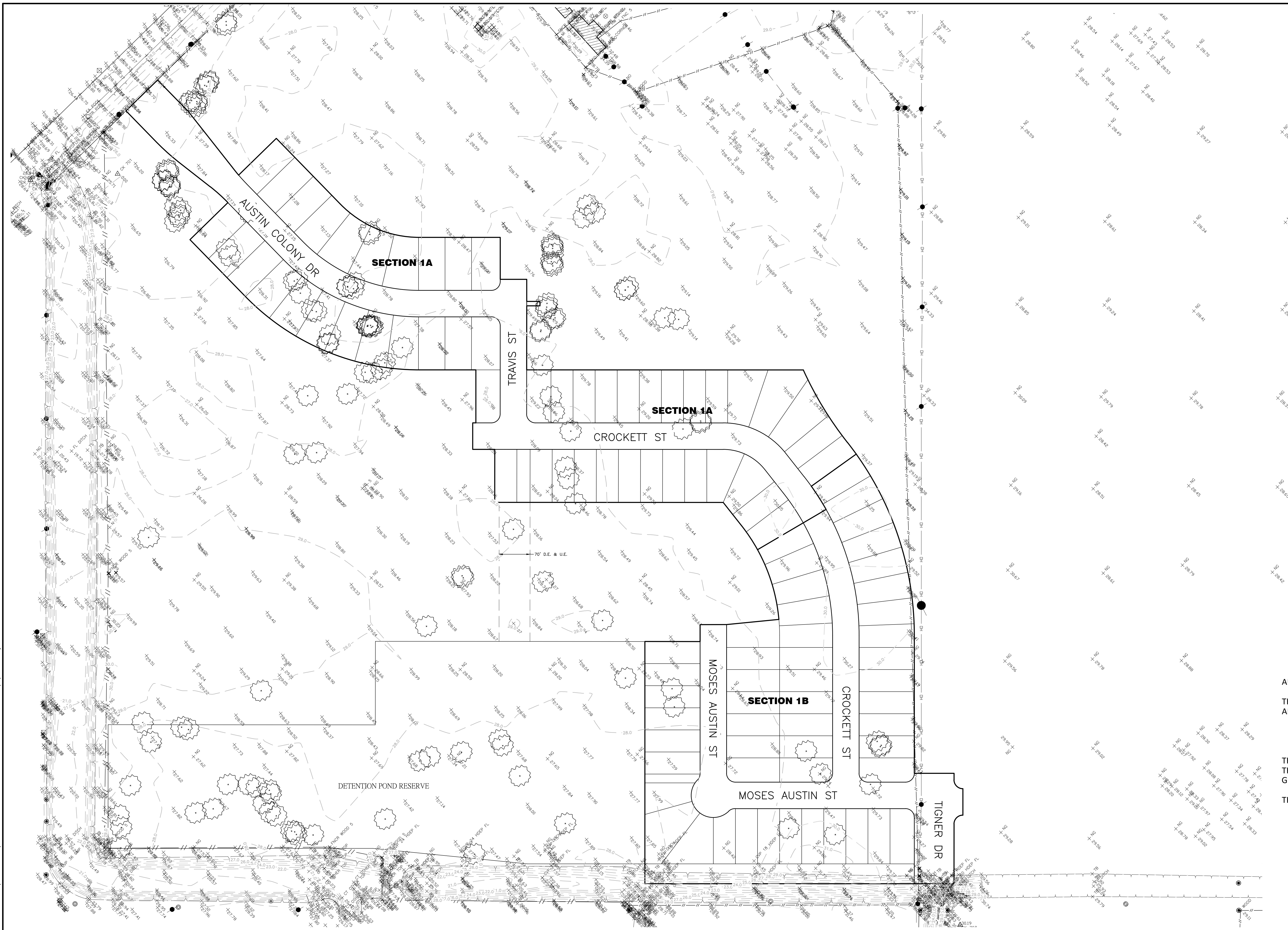
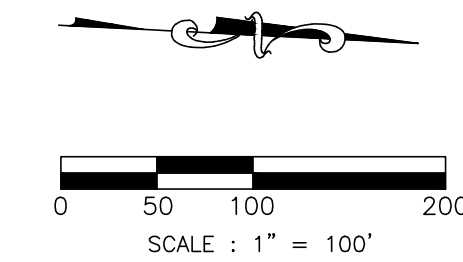
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PLAN: _____ 1" = 50'
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PROJECT:
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Section 1B - 50 Lots
CR 44 (Anchor Road), Angleton TX

DRAINAGE MAP

PROJECT NO. 16182



AUSTIN COLONY SECTION 1A AND 1B HERITAGE TREES

THERE ARE NO LIVE OAK OR PECAN TREES IN THE AREA SURVEYED.

TOTAL NUMBER OF HERITAGE TREES = 0
TOTAL CALIPER OF HERITAGE TREES = 0

TREE SYMBOLS SHOWN ON THIS DRAWING REPRESENT TREES HAVING 12" DIAMETER TRUNKS AT 4.5' ABOVE GROUND.

THE VARIETY OF TREES TIED IN CONSISTED OF:

- BIRCH
- BUR OAK
- ELM
- HACKBERRY
- POST OAK
- SYCAMORE
- CHINESE TALLOW
- WATER OAK

J:\16005\16100\16182\ENGINEERING-SURVEY\ENGINEERING\16182.HERITAGE TREE SEC. 1A AND 1B.DWG PLOT DATE:2/6/2025 Bloyer

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STATE OF TEXAS
DOUGLAS B. ROESLER
56739
PROFESSIONAL ENGINEER

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PLAN: 1" = 100'
PROFILE:
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HERITAGE TREE
PRESERVATION PLAN
PROJECT NO. 16182
LS-1