

KEY MAP
SCALE: 1"=100'

DETENTION POND OUTFALL CALCULATIONS

EQUATIONS
 $Q_{ALLOWABLE} = Q_{TOTAL}$
 $Q_{TOTAL} = Q_{CHANNEL} + Q_{ORIFICE}$
 $Q_{CHANNEL} = 1.49AR^{2/3}S^{1/2}$
 $Q_{ORIFICE} = CA(2gh)^{1/2}$

VARIABLES
 C = COEFFICIENT OF DISCHARGE (0.60)
 A = AREA (ft²)
 g = ACCELERATION DUE TO GRAVITY (32.2 ft/s²)
 h₁ = HEAD ACTING ON THE CENTROID
 h₂ = HEAD ACTING ON ORIFICE (WSE-HGL)
 W_p = WETTED PERIMETER (ft)
 R = HYDRAULIC RADIUS (ft) = A/W_p
 S = CHANNEL SLOPE (ft/ft) (0.0030)
 n = MANNINGS ROUGHNESS COEFF. (0.013)

EAST

WEST

100-YR STORM EVENT (Q_{ALLOWABLE} = 255.67 cfs)
 CHANNEL: A = 31.72, W_p = 24.85, R = 1.28, Q_{CHANNEL} = 149(31.72)(1.28^{2/3})(0.0030^{1/2}) = 234.28 cfs
 ORIFICE: A = 3.14, h₂ = 2.00, C = 0.60, Q_{ORIFICE} = 0.60(3.14)√2*32.2*2.00 = 21.39 cfs
 Q_{TOTAL} = 234.28 + 21.39 = 255.67 cfs

100-YR STORM EVENT (Q_{ALLOWABLE} = 399.61 cfs)
 CHANNEL: A = 48.43, W_p = 35.99, R = 1.35, Q_{CHANNEL} = 149(48.43)(1.35^{2/3})(0.0030^{1/2}) = 370.51 cfs
 ORIFICE: A = 3.14, h₁ = 3.70, C = 0.60, Q_{ORIFICE} = 0.60(3.14)√2*32.2*3.70 = 29.10 cfs
 Q_{TOTAL} = 370.51 + 29.10 = 399.61 cfs

25-YR STORM EVENT (Q_{ALLOWABLE} = 206.38 cfs)
 CHANNEL: A = 27.14, W_p = 23.99, R = 1.13, Q_{CHANNEL} = 149(27.14)(1.13^{2/3})(0.0030^{1/2}) = 185.00 cfs
 ORIFICE: A = 3.14, h₂ = 2.00, C = 0.60, Q_{ORIFICE} = 0.60(3.14)√2*32.2*2.00 = 21.38 cfs
 Q_{TOTAL} = 185.00 + 21.38 = 206.38 cfs

25-YR STORM EVENT (Q_{ALLOWABLE} = 322.58 cfs)
 CHANNEL: A = 41.77, W_p = 35.14, R = 1.19, Q_{CHANNEL} = 149(41.77)(1.19^{2/3})(0.0030^{1/2}) = 294.24 cfs
 ORIFICE: A = 3.14, h₁ = 3.51, C = 0.60, Q_{ORIFICE} = 0.60(3.14)√2*32.2*3.51 = 28.34 cfs
 Q_{TOTAL} = 294.24 + 28.34 = 322.58 cfs

10-YR STORM EVENT (Q_{ALLOWABLE} = 181.74 cfs)
 CHANNEL: A = 24.72, W_p = 23.52, R = 1.05, Q_{CHANNEL} = 149(24.72)(1.05^{2/3})(0.0030^{1/2}) = 160.37 cfs
 ORIFICE: A = 3.14, h₂ = 2.00, C = 0.60, Q_{ORIFICE} = 0.60(3.14)√2*32.2*2.00 = 21.37 cfs
 Q_{TOTAL} = 160.37 + 21.37 = 181.74 cfs

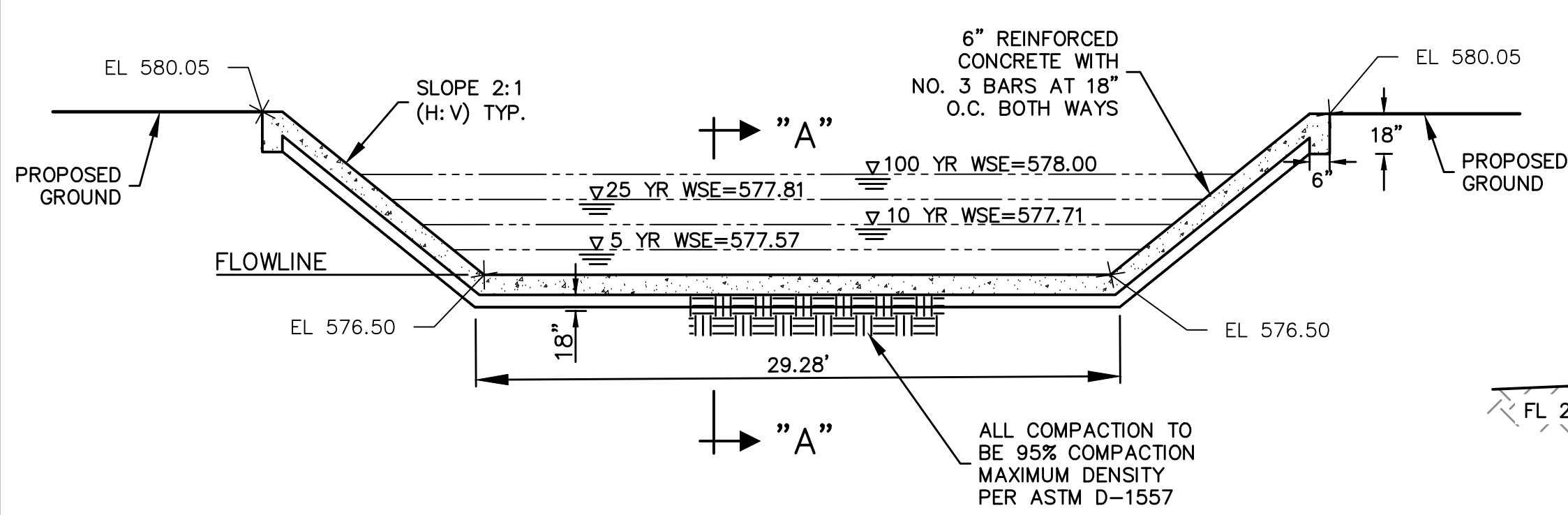
10-YR STORM EVENT (Q_{ALLOWABLE} = 284.06 cfs)
 CHANNEL: A = 38.23, W_p = 34.68, R = 1.10, Q_{CHANNEL} = 149(38.23)(1.10^{2/3})(0.0030^{1/2}) = 256.14 cfs
 ORIFICE: A = 3.14, h₁ = 3.41, C = 0.60, Q_{ORIFICE} = 0.60(3.14)√2*32.2*3.41 = 27.92 cfs
 Q_{TOTAL} = 256.14 + 27.92 = 284.06 cfs

5-YR STORM EVENT (Q_{ALLOWABLE} = 150.94 cfs)
 CHANNEL: A = 21.51, W_p = 22.89, R = 0.94, Q_{CHANNEL} = 149(21.51)(0.94^{2/3})(0.0030^{1/2}) = 129.58 cfs
 ORIFICE: A = 3.14, h₂ = 1.99, C = 0.60, Q_{ORIFICE} = 0.60(3.14)√2*32.2*1.99 = 21.36 cfs
 Q_{TOTAL} = 129.58 + 21.36 = 150.94 cfs

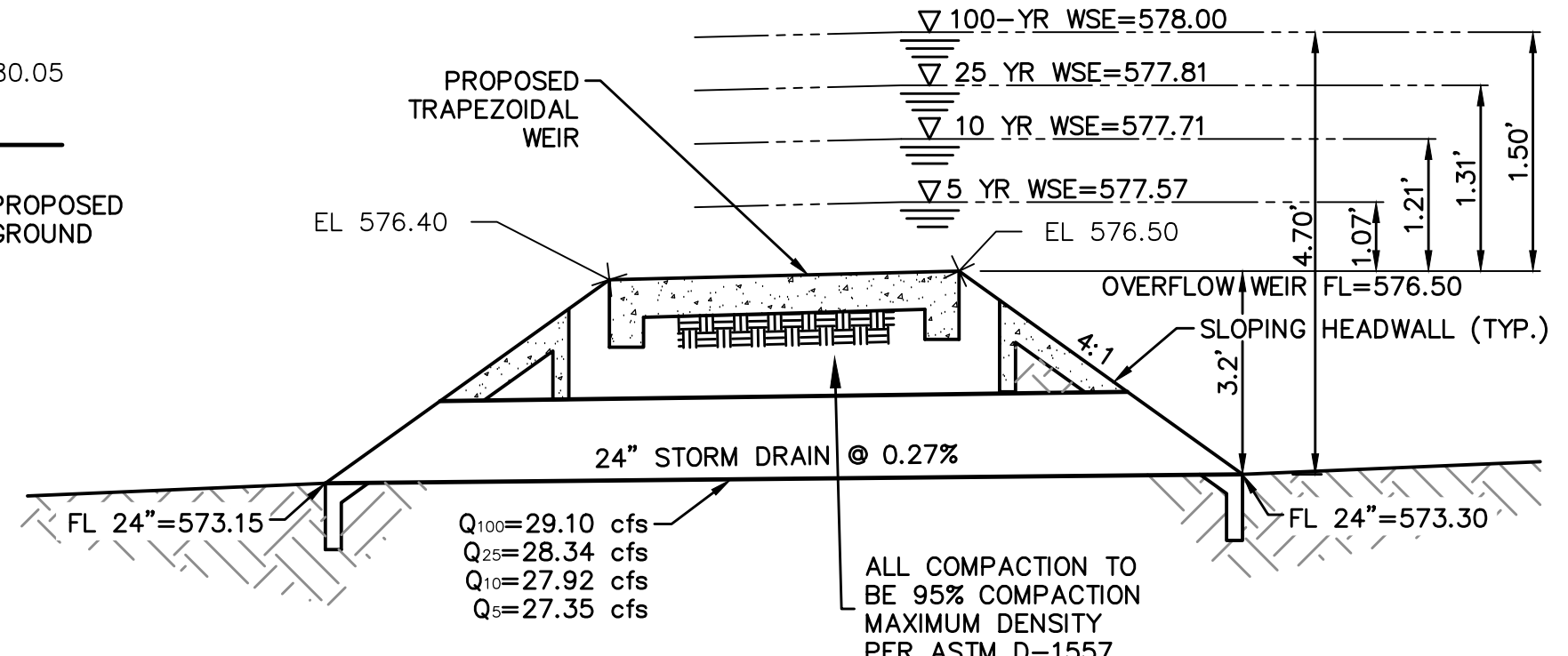
5-YR STORM EVENT (Q_{ALLOWABLE} = 235.92 cfs)
 CHANNEL: A = 33.56, W_p = 34.06, R = 0.99, Q_{CHANNEL} = 149(33.56)(0.99^{2/3})(0.0030^{1/2}) = 208.57 cfs
 ORIFICE: A = 3.14, h₁ = 3.27, C = 0.60, Q_{ORIFICE} = 0.60(3.14)√2*32.2*3.27 = 27.35 cfs
 Q_{TOTAL} = 208.57 + 27.35 = 235.92 cfs

EMERGENCY SPILLWAY
 CHANNEL: A = 88.01, W_p = 33.80, R = 2.60, Q_{CHANNEL} = 149(88.01)(2.60^{2/3})(0.0030^{1/2}) = 1045.75 cfs
 ORIFICE: A = 3.14, h₂ = 2.00, C = 0.60, Q_{ORIFICE} = 0.60(3.14)√2*32.2*2.00 = 21.39 cfs
 Q_{TOTAL} = 1045.75 + 21.39 = 1067.14 cfs

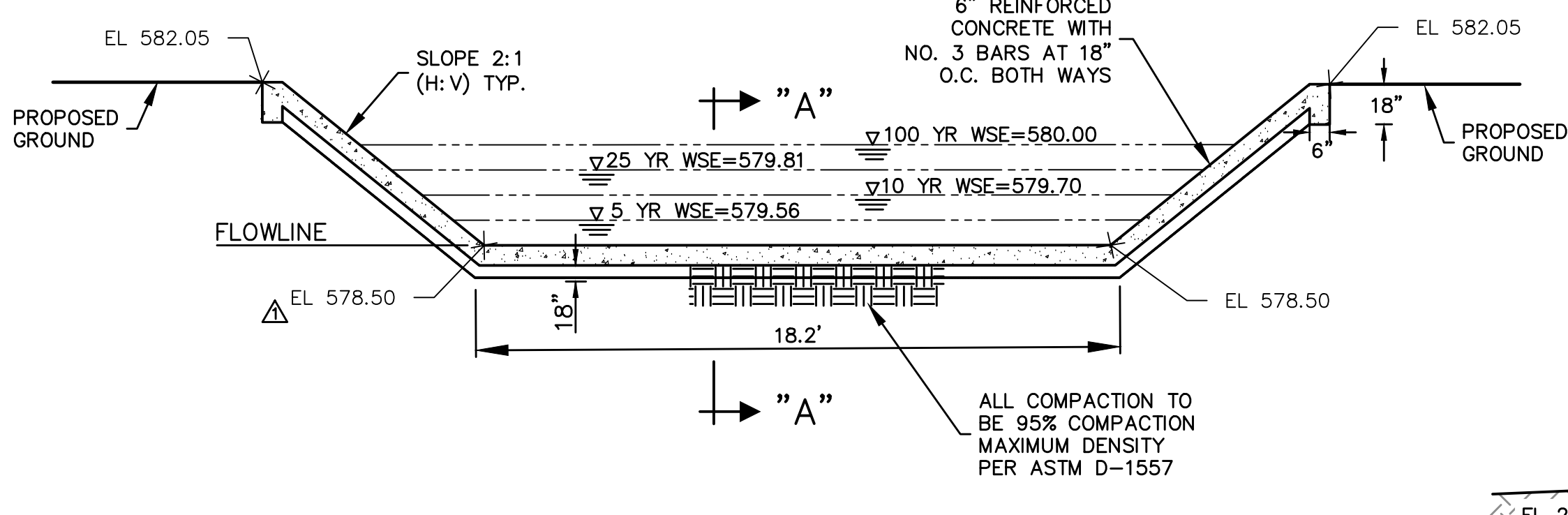
EMERGENCY SPILLWAY
 CHANNEL: A = 127.00, W_p = 44.94, R = 2.83, Q_{CHANNEL} = 149(127.00)(2.83^{2/3})(0.0030^{1/2}) = 1593.62 cfs
 ORIFICE: A = 3.14, h₁ = 5.70, C = 0.60, Q_{ORIFICE} = 0.60(3.14)√2*32.2*5.70 = 36.11 cfs
 Q_{TOTAL} = 1593.62 + 36.11 = 1629.73 cfs



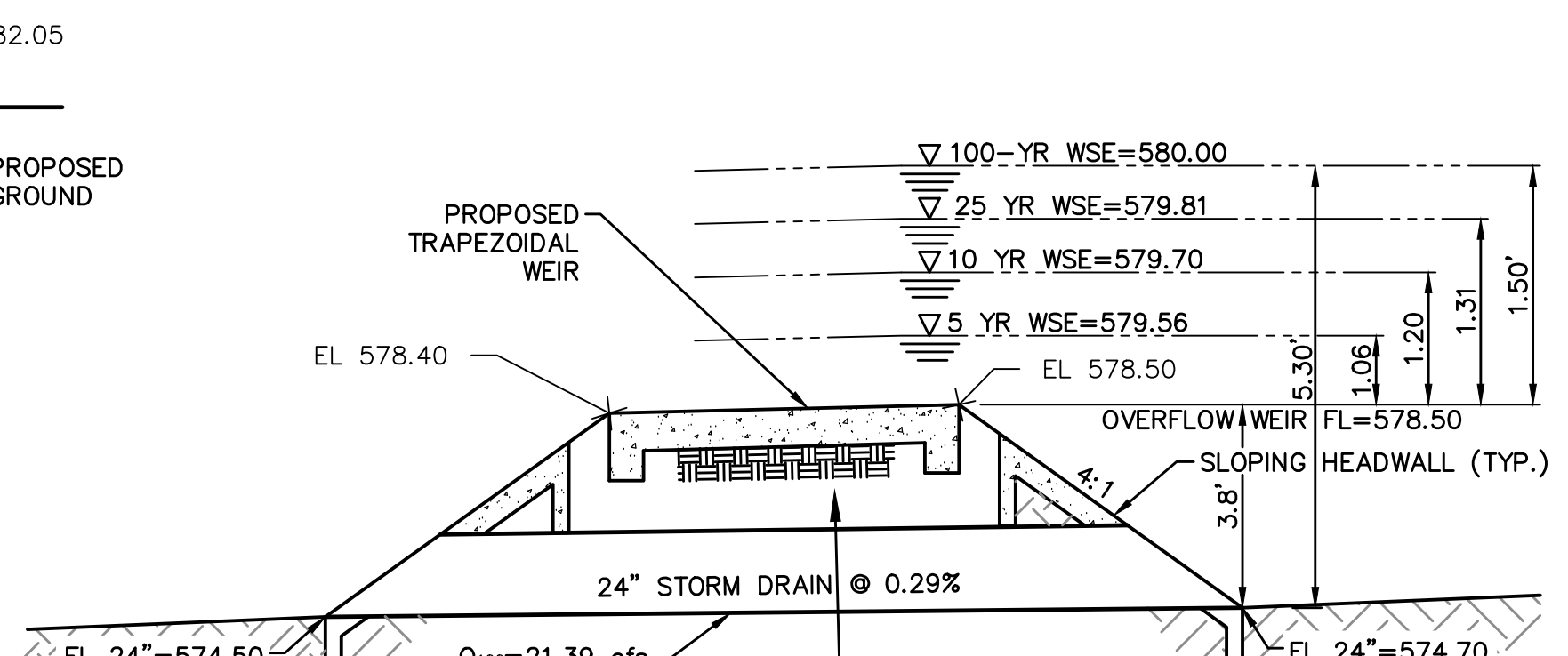
1 WEST TRAPEZOIDAL WEIR DETAIL
(NOT TO SCALE)



WEST DETENTION POND OUTFALL DETAILS
NTS



2 EAST TRAPEZOIDAL WEIR DETAIL
(NOT TO SCALE)



EAST DETENTION POND OUTFALL DETAILS
NTS

RECORD DRAWING
 THE SIGNED AND SEALED CONSTRUCTION DOCUMENT HAS BEEN REVISED TO REFLECT CONSTRUCTION RECORDS MAINTAINED AND PROVIDED BY THE CONTRACTOR FOR THIS PROJECT. THE INFORMATION SHOWN ON THIS RECORD DRAWING, WHICH WAS PROVIDED BY THE CONTRACTOR, OR OTHERS NOT ASSOCIATED WITH THE DESIGN ENGINEER, CANNOT BE VERIFIED FOR ACCURACY OR COMPLETENESS. PACHECO KOCH SHALL ASSUME NO LIABILITY FOR ANY CHANGES MADE DURING CONSTRUCTION THAT WERE NOT SPECIFICALLY APPROVED BY THE ENGINEER PRIOR TO CONSTRUCTION. THE SEALED CONSTRUCTION DRAWINGS ARE ON FILE AT THE OFFICES OF PACHECO KOCH.
 ATTESTED BY: *[Signature]*
 ENGINEER OF RECORD: CHET LEUGERS, P.E.
 CONTRACTOR: MILLER-VALENTINE CONSTRUCTION
 DATE REVISED: 09/18/2017

NO.	DATE	REVISION
1	09/18/2017	RECORD DRAWINGS
2	09/19/2016	REVISED DETAIL

Pacheco Koch
 7557 RAMBLER ROAD, SUITE 1400
 DALLAS, TX 75231 972.235.3031
 TX REG. ENGINEERING FIRM F-14439
 TX REG. SURVEYING FIRM LS-10193805

DETENTION CALCULATIONS
ROCKWALL REGIONAL DETENTION POND
LOT 1, BLOCK B
ROCKWALL TECHNOLOGY PARK PHASE IV
CITY OF ROCKWALL, ROCKWALL COUNTY, TEXAS

DESIGN	DRAWN	DATE	SCALE	NOTES	FILE	NO.
CTL	RHB	AUG 2016	1"=100'			C3.3

NELSON 9/18/2017 9:32 AM
 M:\DWG-37\3782-16\168\DWG\CIVIL C3D 2015\3782-16\168\DWG.DWG
 9/18/2017 9:32 AM

ROCKWALL REGIONAL DETENTION POND, ROCKWALL, TEXAS