



AREA
 (BASIN)
 ACREAGE

EXISTING CONTOUR

PROPOSE CONTOUR

DRAINAGE AREA LIMITS

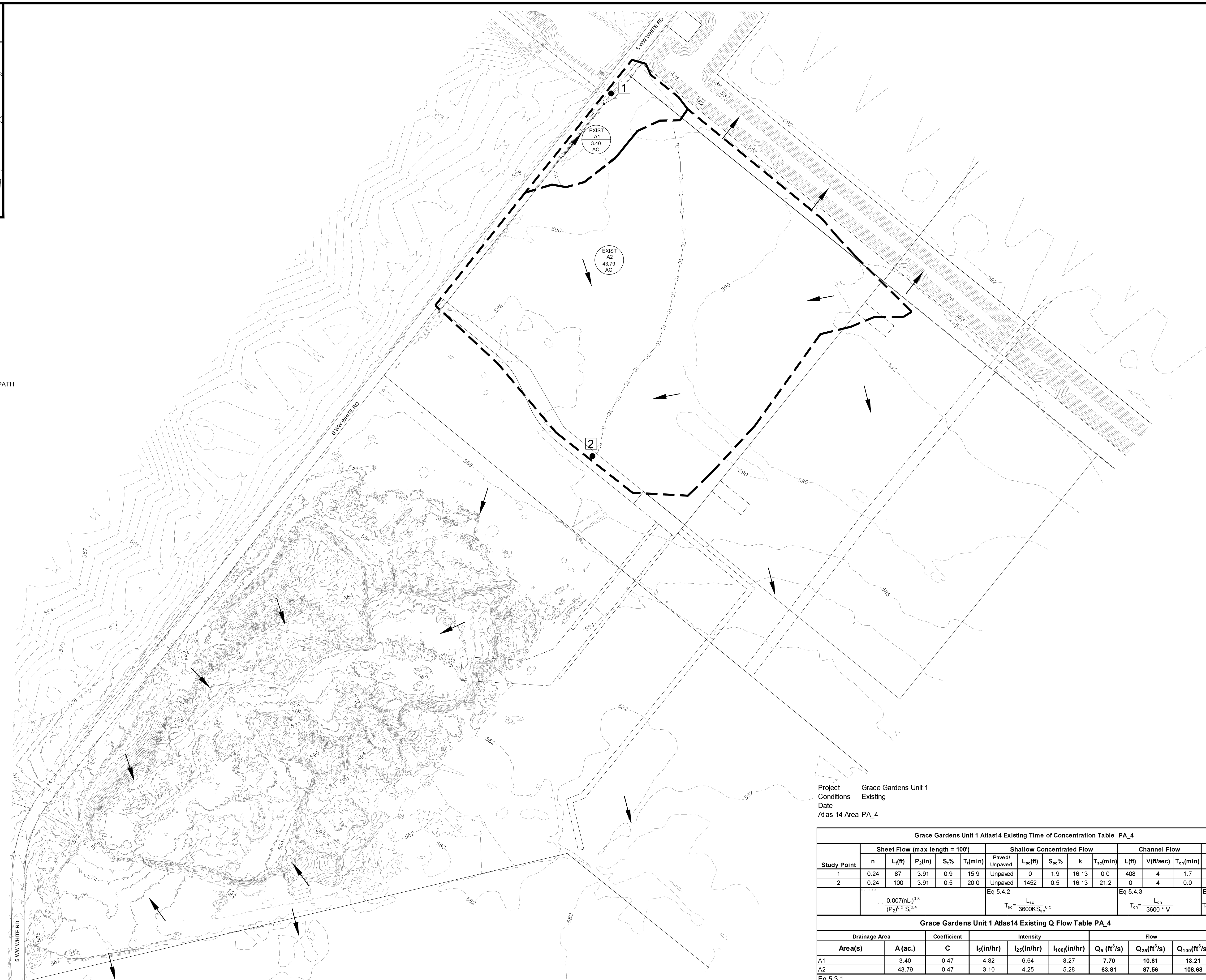
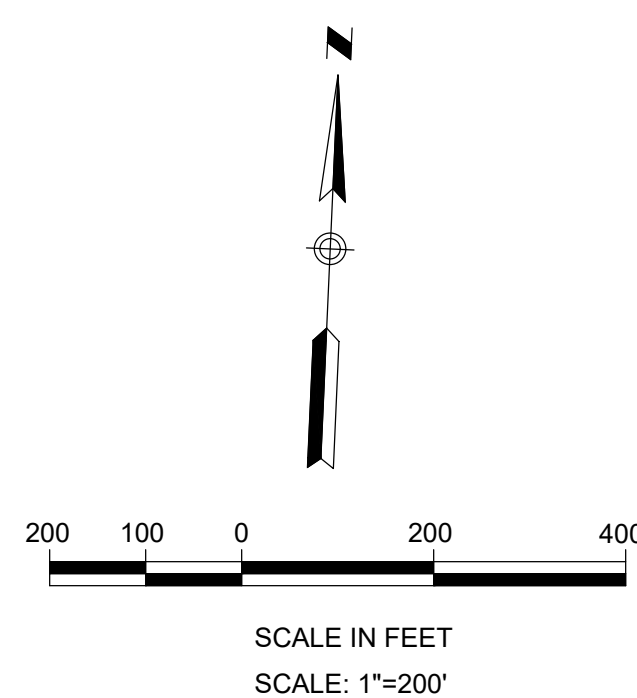
TIME OF CONCENTRATION PATH

FLOW ARROWS

PROPOSED BOUNDARY

EXISTING LOT LINES

REFERENCE POINT



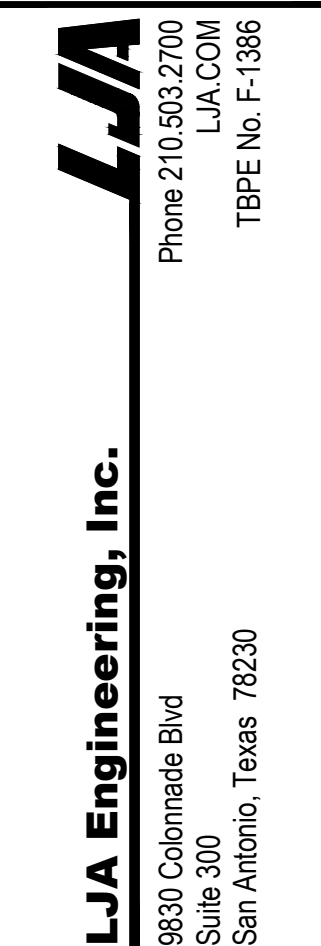
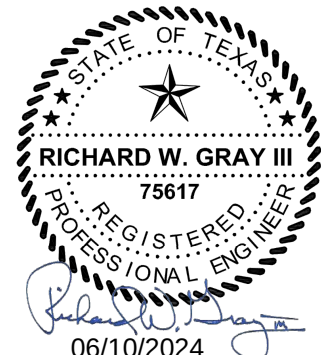
Project Grace Gardens Unit 1
Conditions Existing
Date
Atlas 14 Area PA 4

Grace Gardens Unit 1 Atlas14 Existing Time of Concentration Table PA_4															
Study Point	Sheet Flow (max length = 100')					Shallow Concentrated Flow					Channel Flow		Total		
	n	L(ft)	P ₂ (in)	S ₁ %	T ₁ (min)	Paved/ Unpaved	L _{sc} (ft)	S _{sc} %	k	T _{sc} (min)	L(ft)	V(ft/sec)		T _{ch} (min)	
1	0.24	87	3.91	0.9	15.9	Unpaved	0	1.9	16	0.0	408	4	1.7	17.59	
2	0.24	100	3.91	0.5	20.0	Unpaved	1452	0.5	16	13	21.2	0	4	0.0	41.2
						Eq 5.4.2					Eq 5.4.3		Eq 5.4		
$T_{sc} = \frac{0.007(nL)^{0.8}}{(P_2)^{0.37} S_1^{0.4}}$						$T_{sc} = \frac{L_{sc}}{3600 K S_{sc}^{0.5}}$					$T_{ch} = \frac{L_{ch}}{3600 \cdot V}$		$T_t = T_{sc} + T_{ch}$		

Grace Gardens Unit 1 Atlas14 Existing Q Flow Table PA_4								
Drainage Area		Coefficient	Intensity			Flow		
Area(s)	A (ac.)	C	I ₅ (in/hr)	I ₂₅ (in/hr)	I ₁₀₀ (in/hr)	Q ₅ (ft ³ /s)	Q ₂₅ (ft ³ /s)	Q ₁₀₀ (ft ³ /s)
A1	3.40	0.47	4.82	6.64	8.27	7.70	10.61	13.21
A2	43.79	0.47	3.10	4.25	5.28	63.81	87.56	108.68
Eq 5.3.1								
Q = C IA								

GRACE GARDENS SUBDIVISION UNIT 1
LAND-PLAT-23-11800410
EXISTING DRAINAGE AREA MAP

REVISIONS		DATE
NO.	DESCRIPTION	BY
	DESIGNED BY: _____	
	DRAWN BY: _____	
	CHECKED BY: _____ RG	
	DRAWING NAME: _____	
	sh_Existing DMap.dwg	



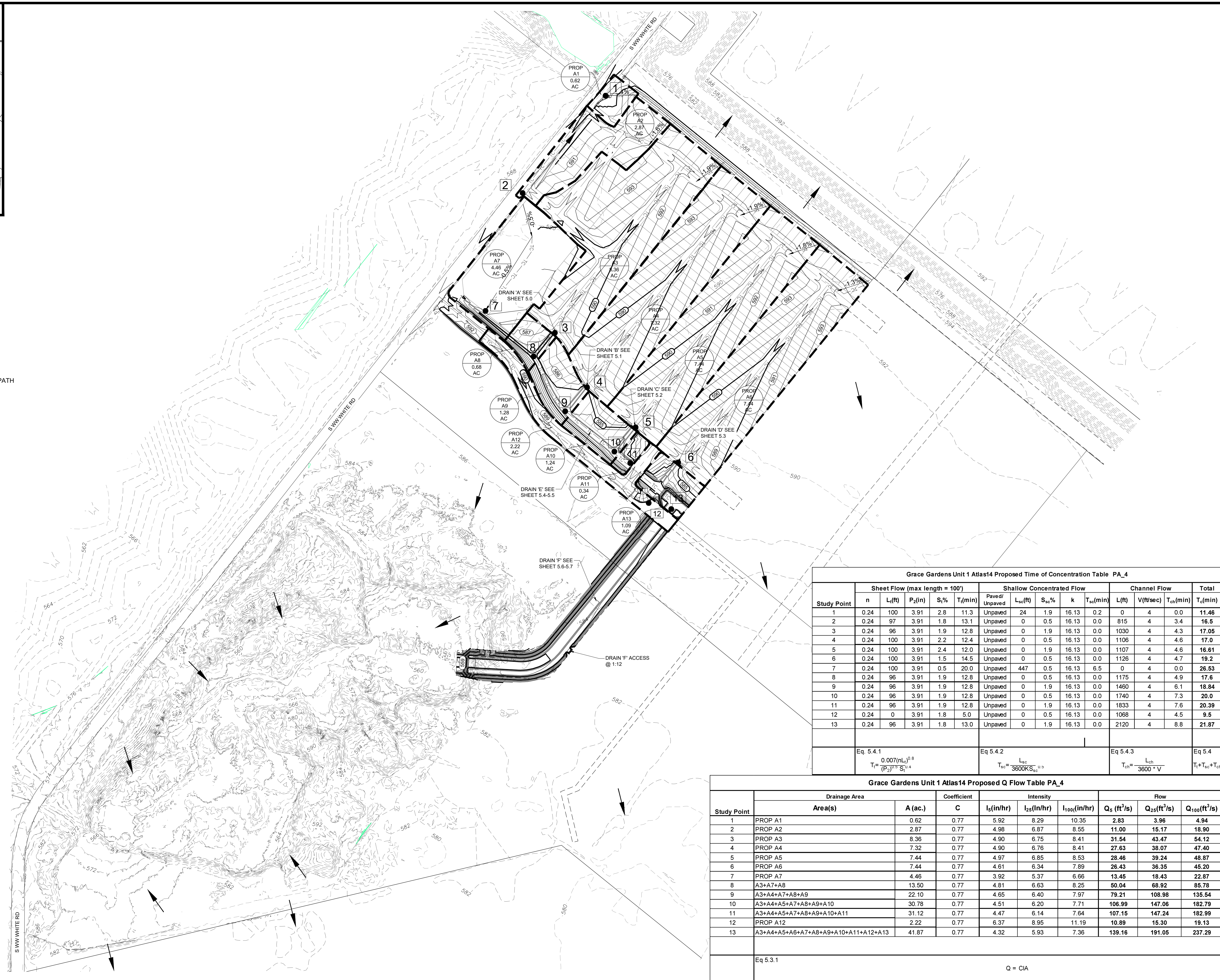
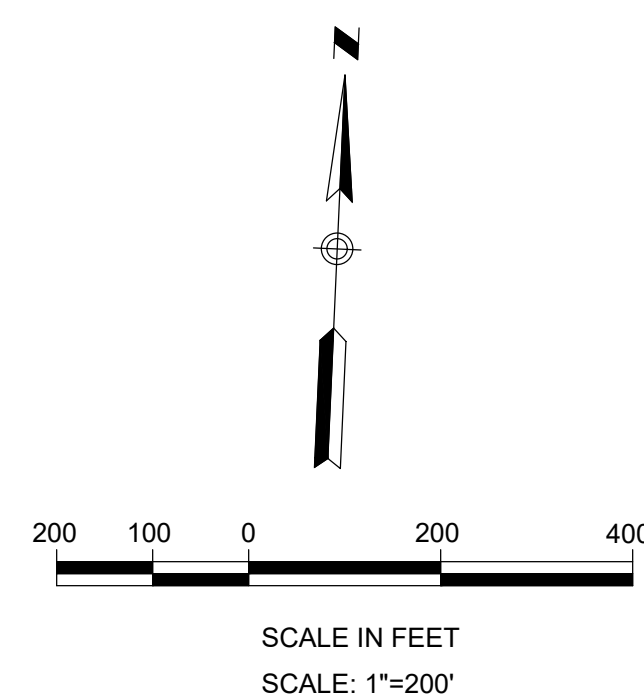
JOB NUMBER:
SA202-0401B-426

SHEET NO

4.0

OF - SHEETS

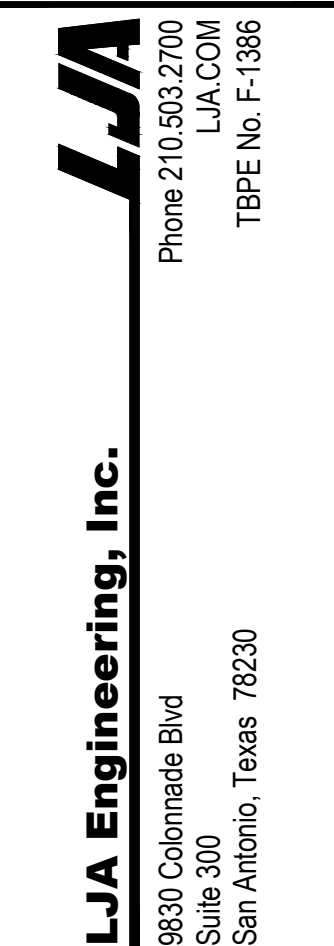
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[illegible]

Grace Gardens Unit 1 Atlas14 Proposed Time of Concentration Table PA_4															
	Sheet Flow (max length = 100')					Shallow Concentrated Flow					Channel Flow		Total		
Study Point	n	L _f (ft)	P ₂ (in)	S _t %	T _r (min)	Paved/ Unpaved	L _c (ft)	S _w %	k	T _d (min)	L(t)	V(ft/sec)	T _{ch} (min)	T _c (min)	
1	0.24	100	3.91	2.8	11.3	Unpaved	24	1.9	16.13	0.2	0	4	0.0	11.46	
2	0.24	97	3.91	1.8	13.1	Unpaved	0	0.5	16.13	0.0	815	4	4.3	16.5	
3	0.24	96	3.91	1.9	12.8	Unpaved	0	1.9	16.13	0.0	1030	4	4.3	17.05	
4	0.24	100	3.91	2.2	12.4	Unpaved	0	0.5	16.13	0.0	1106	4	4.6	17.0	
5	0.24	100	3.91	2.4	12.0	Unpaved	0	1.9	16.13	0.0	1107	4	4.6	16.61	
6	0.24	100	3.91	1.5	14.5	Unpaved	0	0.5	16.13	0.0	1126	4	4.7	19.2	
7	0.24	100	3.91	0.5	20.0	Unpaved	447	0.5	16.13	6.5	0	4	0.0	26.53	
8	0.24	96	3.91	1.9	12.8	Unpaved	0	0.5	16.13	0.0	1175	4	4.9	17.6	
9	0.24	96	3.91	1.9	12.8	Unpaved	0	1.9	16.13	0.0	1460	4	6.1	18.84	
10	0.24	96	3.91	1.9	12.8	Unpaved	0	0.5	16.13	0.0	1740	4	7.3	20.0	
11	0.24	96	3.91	1.9	12.8	Unpaved	0	1.9	16.13	0.0	1833	4	7.6	20.39	
12	0.24	0	3.91	1.8	5.0	Unpaved	0	0.5	16.13	0.0	1068	4	4.5	9.5	
13	0.24	96	3.91	1.8	13.0	Unpaved	0	1.9	16.13	0.0	2120	4	8.8	21.87	
	Eq. 5.4.1	$T_{sc} = \frac{0.007(nL_c)^{0.8}}{(P_2)^{0.5} S_w^{0.4}}$				Eq. 5.4.2	$T_{sc} = \frac{L_{lc}}{3600 S_{w,UB}}$				Eq. 5.4.3	$T_{ch} = \frac{L_{ch}}{3600 \cdot V}$		Eq. 5.4	$T_t + T_{sc} + T_{ch}$

Grace Gardens Unit 1 Atlas14 Proposed Q Flow Table PA_4									
Study Point	Drainage Area		Coefficient	Intensity			Flow		
	Area(s)	A (ac.)		C	I ₅ (in/hr)	I ₂₅ (in/hr)	I ₁₀₀ (in/hr)	Q ₅ (ft³/s)	Q ₂₅ (ft³/s)
1	PROP A1	0.62	0.77	5.92	8.29	10.35	2.83	3.96	4.84
2	PROP A2	2.87	0.77	4.98	6.87	8.55	11.00	15.17	18.90
3	PROP A3	8.36	0.77	4.90	6.75	8.41	31.54	43.47	54.12
4	PROP A4	7.32	0.77	4.90	6.76	8.41	27.63	38.07	47.40
5	PROP A5	7.44	0.77	4.97	6.85	8.53	28.46	39.24	48.87
6	PROP A6	7.44	0.77	4.61	6.34	7.89	26.43	36.35	45.20
7	PROP A7	4.46	0.77	3.92	5.37	6.66	13.45	18.43	22.87
8	A3+A7+A8	13.50	0.77	4.81	6.63	8.25	50.04	68.82	85.78
9	A3+A4+A7+A8+A9	22.10	0.77	4.65	6.40	7.97	79.21	108.98	135.54
10	A3+A4+A5+A7+A8+A9+A10	30.78	0.77	4.51	6.20	7.71	106.99	147.06	182.79
11	A3+A4+A5+A7+A8+A9+A10+A11	31.12	0.77	4.47	6.14	7.64	107.15	147.24	182.99
12	PROP A12	2.22	0.77	6.37	8.95	11.19	10.89	15.30	19.13
13	A3+A4+A5+A6+A7+A8+A9+A10+A11+A12+A13	41.87	0.77	4.32	5.93	7.36	139.16	191.05	237.29
	Eq 5.3.1								
				Q = CIA					

GRACE GARDENS SUBDIVISION UNIT 1
LAND-PLAT-23-11800410
PROPOSED DRAINAGE AREA MAP

[illegible]

JOB NUMBER:
SA202-0401B-426

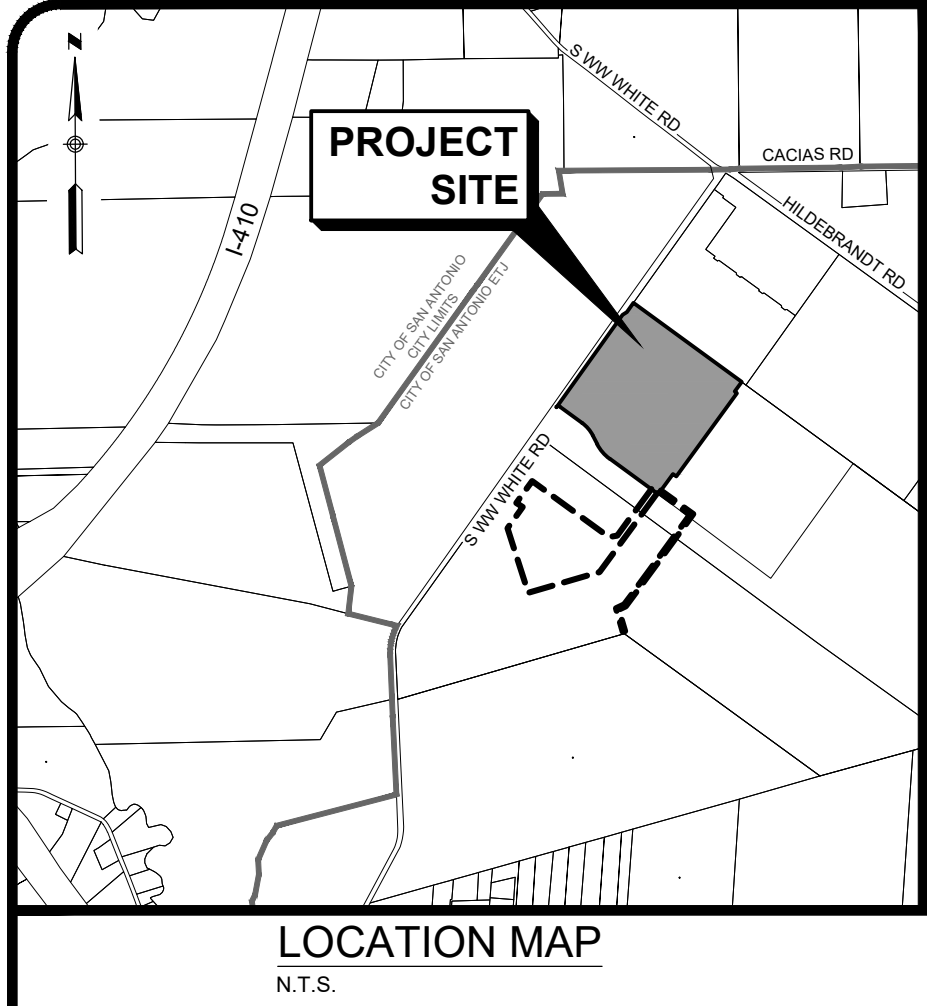
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4.1

OF - SHEETS

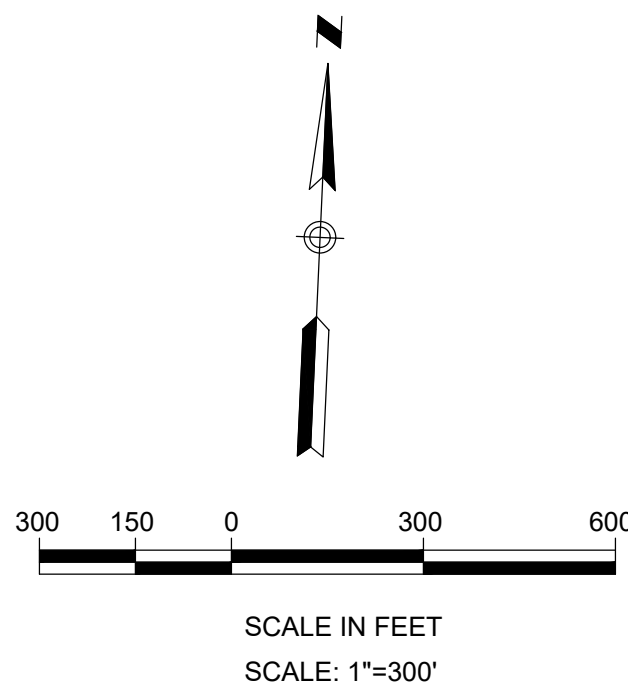
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User: rlvener
Last Modified: May 28, 24 - 10:28
Plot Date/Time: Jun 10, 24 - 11:53:13



LEGEND

	AREA (BASIN) ACREAGE
	EXISTING CONTOUR
	PROPOSE CONTOUR
	DRAINAGE AREA LIMITS
	TIME OF CONCENTRATION PATH
	FLOW ARROWS
	PROPOSED BOUNDARY
	EXISTING LOT LINES
	REFERENCE POINT



PROJECT SITE

LOCATION MAP
N.T.S.

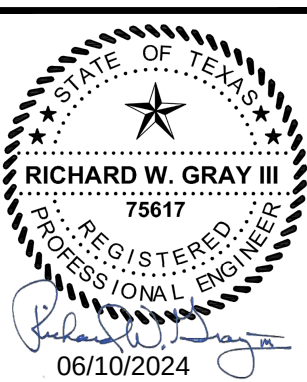
Grace Gardens Unit 1 Atlas14 Ultimate Time of Concentration Table PA_4												
Study Point	Sheet Flow (max length = 100')					Shallow Concentrated Flow				Channel Flow		Total
	n	L _f (ft)	P ₂ (in)	S ₁ %	T _f (min)	Paved/Unpaved	L _{sc} (ft)	S _{sc} %	k	T _{sc} (min)	L _{ch} (ft)	T _{ch} (min)
1	0.24	100	3.91	2.8	11.3	Unpaved	24	1.9	16.13	0.2	0	4
2	0.24	97	3.91	1.8	13.1	Unpaved	0	0.5	16.13	0.0	815	4
3	0.24	96	3.91	1.9	12.8	Unpaved	0	1.9	16.13	0.0	1030	4
4	0.24	100	3.91	2.2	12.4	Unpaved	0	0.5	16.13	0.0	1106	4
5	0.24	100	3.91	2.4	12.0	Unpaved	0	1.9	16.13	0.0	1107	4
6	0.24	100	3.91	1.5	14.5	Unpaved	0	0.5	16.13	0.0	1126	4
7	0.24	100	3.91	0.5	20.0	Unpaved	447	0.5	16.13	6.5	0	4
8	0.24	96	3.91	1.9	12.8	Unpaved	0	0.5	16.13	0.0	1175	4
9	0.24	96	3.91	1.9	12.8	Unpaved	0	1.9	16.13	0.0	1460	4
10	0.24	96	3.91	1.9	12.8	Unpaved	0	0.5	16.13	0.0	1740	4
11	0.24	96	3.91	1.9	12.8	Unpaved	0	1.9	16.13	0.0	1833	4
12	0.24	0	3.91	1.8	5.0	Unpaved	0	0.5	16.13	0.0	1162	4
13	0.24	100	3.91	1.8	13.5	Unpaved	0	1.9	16.13	0.0	3201	4
14	0.24	100	3.91	1.8	13.5	Unpaved	0	1.9	16.13	0.0	4463	4
Eq 5.4.1 $T_f = \frac{0.007(nL_f)^{0.8}}{(P_2)^{0.48} S_1^{0.6}}$						Eq 5.4.2 $T_{sc} = \frac{L_{sc}}{3600K S_{sc}^{0.5}}$					Eq 5.4.3 $T_{ch} = \frac{L_{ch}}{3600 \cdot V}$	
											Eq 5.4 $T_t = T_{sc} + T_{ch}$	

Grace Gardens Unit 1 Atlas14 Ultimate Q Flow Table PA_4									
Study Point	Drainage Area		Coefficient C	Intensity			Flow		
	Area(s)	A (ac.)		I ₅ (in/hr)	I ₂₅ (in/hr)	I ₁₀₀ (in/hr)	Q ₅ (ft³/s)	Q ₂₅ (ft³/s)	Q ₁₀₀ (ft³/s)
1	ULT A1	0.62	0.77	5.92	8.29	10.35	2.83	3.96	4.94
2	ULT A2	2.87	0.77	4.98	6.87	8.55	11.00	15.17	18.90
3	ULT A3	8.36	0.77	4.90	6.75	8.41	31.54	43.47	54.12
4	ULT A4	7.32	0.77	4.90	6.76	8.41	27.63	38.07	47.40
5	ULT A5	7.44	0.77	4.97	6.85	8.53	28.46	39.24	48.87
6	ULT A6	7.44	0.77	4.61	6.34	7.89	26.43	36.35	45.20
7	ULT A7	4.46	0.77	3.92	5.37	6.66	13.45	18.43	22.87
8	A3+A7+A8	13.50	0.77	4.81	6.63	8.25	50.04	68.92	85.78
9	A3+A4+A7+A8+A9	22.10	0.77	4.65	6.40	7.97	79.21	108.98	135.54
10	A3+A4+A5+A7+A8+A9+A10	30.78	0.77	4.51	6.20	7.71	106.99	147.06	182.79
11	A3+A4+A5+A7+A8+A9+A10+A11	31.12	0.77	4.47	6.14	7.64	107.15	147.24	182.99
12	ULT A12	3.21	0.77	6.28	8.81	11.02	15.52	21.79	27.23
13	A3+A4+A5+A6+A7+A8+A9+A10+A11+A12+A13+A14	109.93	0.77	3.90	5.34	6.62	329.87	451.99	560.66
14	A3+A4+A5+A6+A7+A8+A9+A10+A11+A12+A13+A14+A15	113.20	0.77	3.56	4.87	6.04	309.95	424.47	528.33
Eq 5.3.1				Q = CIA					



GRACE GARDENS SUBDIVISION UNIT 1
LAND-PLAT-23-11800410
ULTIMATE DRAINAGE AREA MAP

REVISIONS		DATE	DESCRIPTION
NO.	BY		
1			
2			
3			
4			
5			
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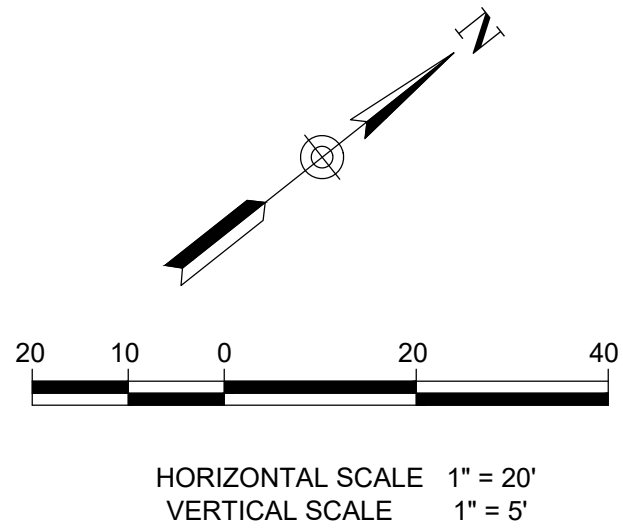
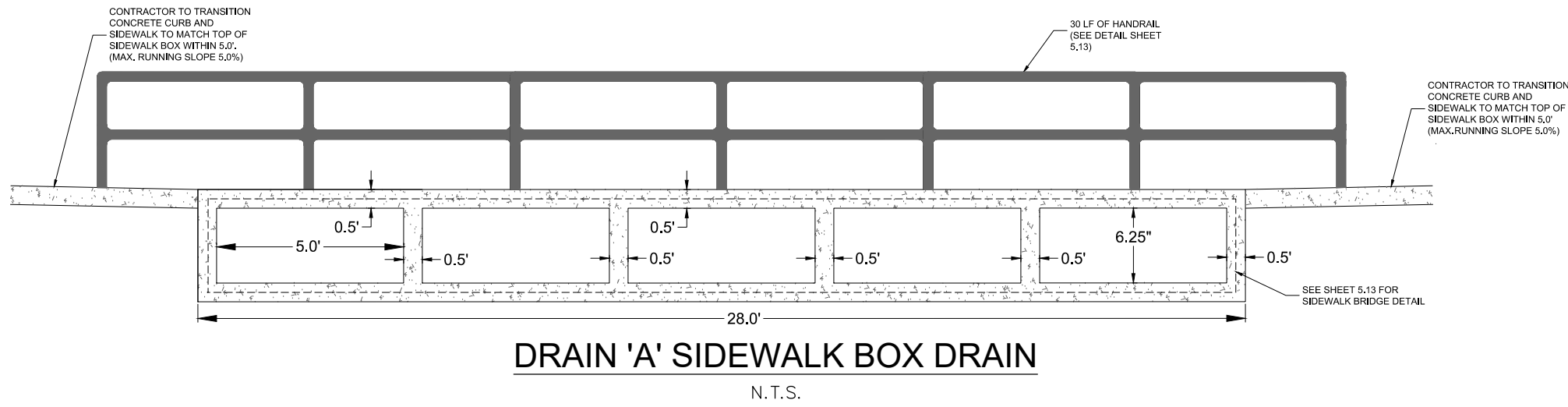
06/10/2024
LJA
Phone 210.503.2700
JLA.COM
TPE No. F-1386

LJA Engineering, Inc.
9830 Colonnade Blvd
Suite 300
San Antonio, Texas 78230

JOB NUMBER:
SA202-0401B-426
SHEET NO.

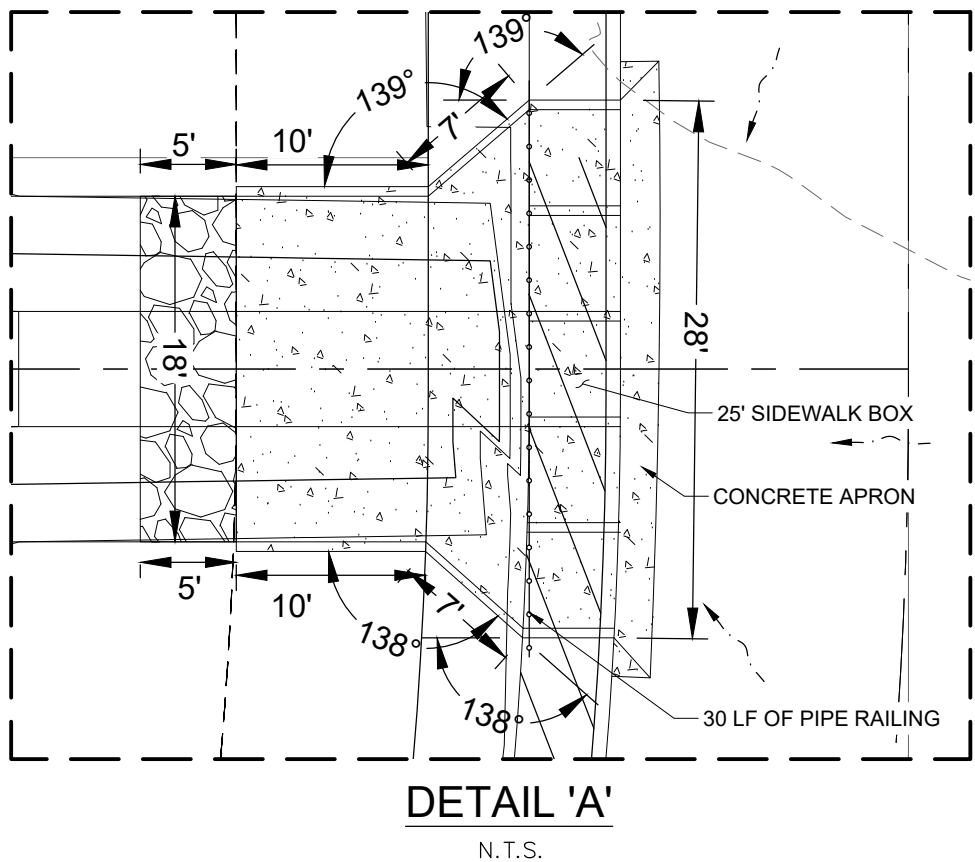
4.2
OF SHEETS

DRAIN 'A'			
$\tau d = \gamma R S$	Retardance Class 'E' Vegetation (Bermuda Grass 1.5 in)		
$\tau d =$ average shear stress at normal depth	$\tau d =$ 0.31 lb/ft ²		
$\gamma =$ unit weight of water	62.4 lb/ft ³		
$R =$ hydraulic radius	0.98 ft		
$S =$ channel slope	$S = 0.50\%$		



LEGEND	
	PROPOSED CONTOUR
	FLOW ARROW
	GRASSED DRAIN FLOW
	PROPOSED STREET GRADE
	EXISTING GROUND LEFT
	EXISTING GROUND RIGHT
	SIDEWALK (HOMEOWNER'S RESPONSIBILITY)
	SIDEWALK (DEVELOPER'S RESPONSIBILITY)
	GAS, ELECTRIC, TELEPHONE & CABLE TV EASEMENT
	BUILDING SETBACK LINE
	EASEMENT
	LEFT
	RIGHT

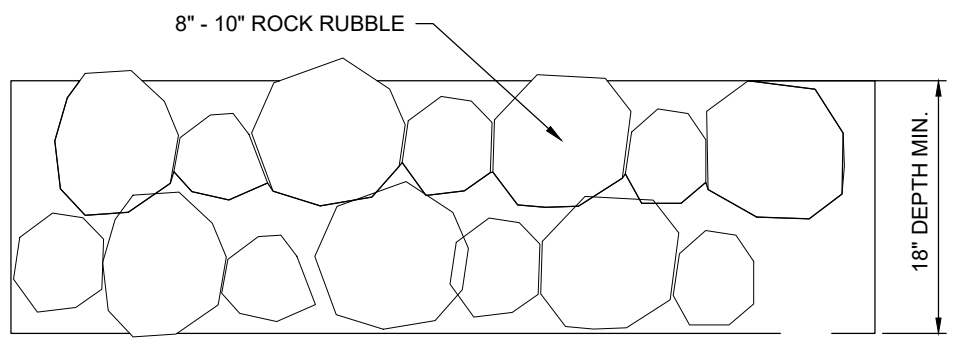
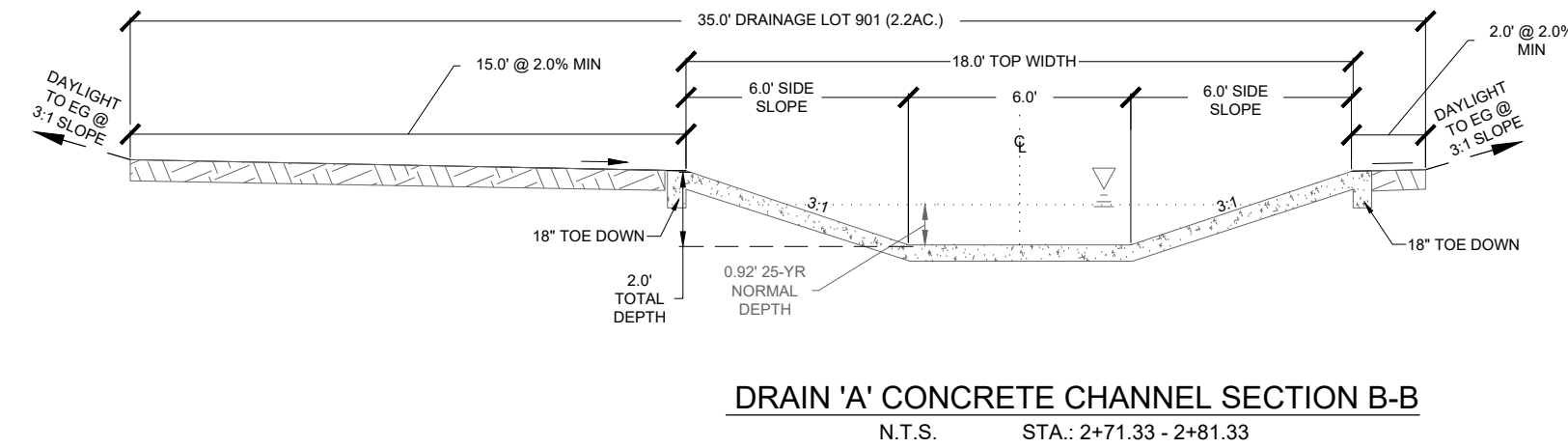
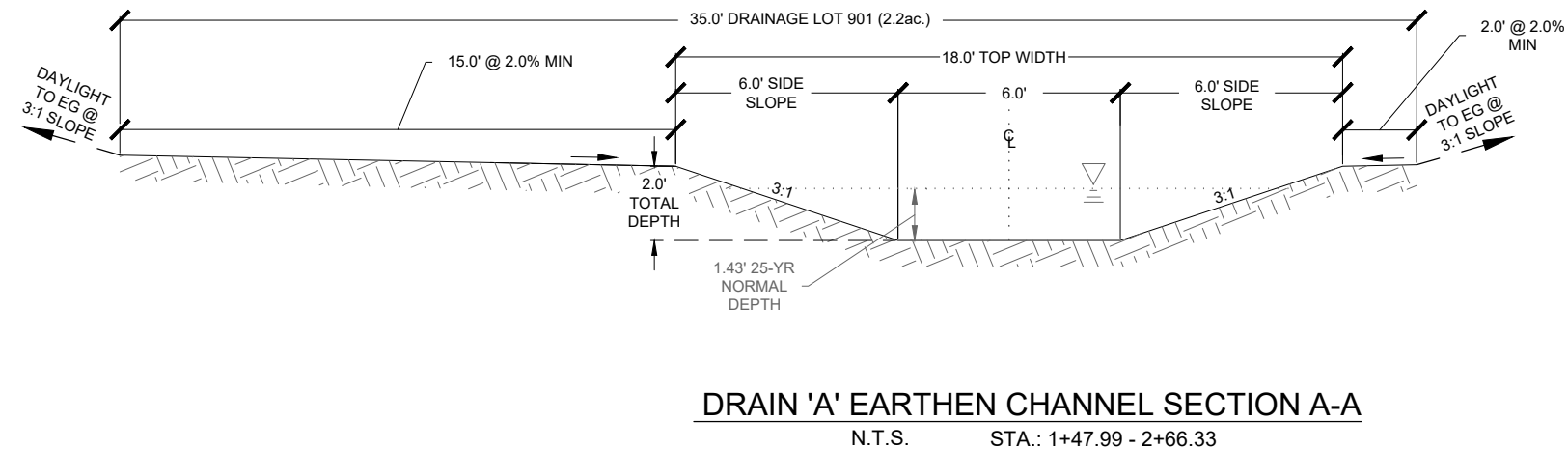
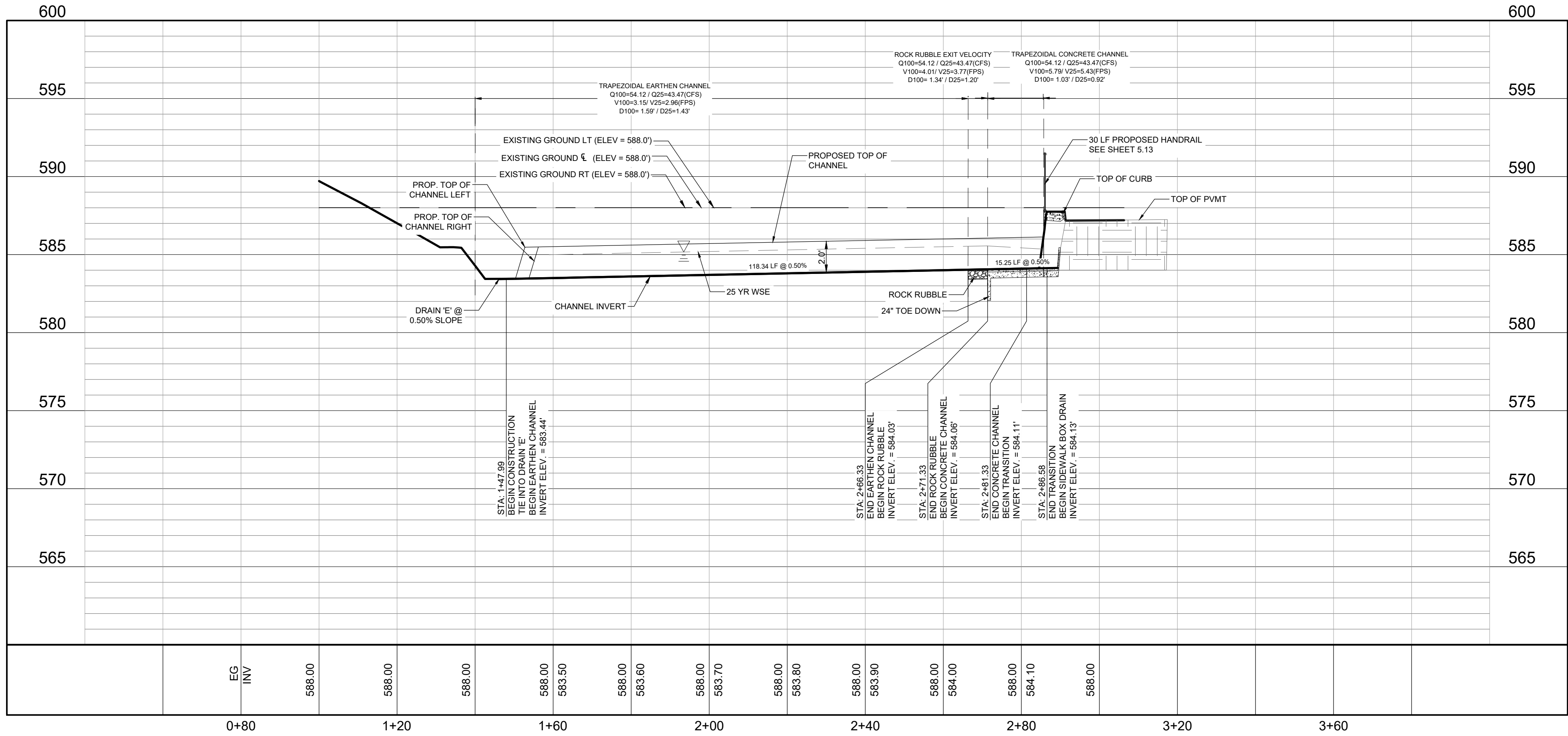
- GENERAL NOTES:**
- ALL CONCRETE LINING SHALL BE A MINIMUM OF FIVE (5) INCHES THICK AND REINFORCED WITH NO. 4 ROUND BARS @ 18 INCHES ON CENTER EACH WAY. ALL CONCRETE LINING SHALL DEVELOP A MINIMUM COMPRESSIVE STRENGTH OF NOT LESS THAN THREE THOUSAND (3000) POUNDS PER SQUARE INCH IN TWENTY EIGHT (28) DAYS. THE DEPTH OF ALL TOEDOWNS SHALL BE 36 INCHES UPSTREAM, 24 INCHES DOWNSTREAM, AND 18 INCHES OF SIDE SLOPES.
 - IMPROVED EARTHEN CHANNELS AND DETENTION PONDS WILL BE VEGETATED BY SEEDING OR SODDING. EIGHTY-FIVE PERCENT OF THE CHANNEL SURFACE AREA MUST HAVE ESTABLISHED VEGETATION BEFORE THE CITY OF SAN ANTONIO WILL ACCEPT THE CHANNEL FOR MAINTENANCE.
 - REFER TO SHEETS 5.12 & 5.13 FOR DRAINAGE DETAILS.



- DETAIL 'A' N.T.S.**
- A 10' G.E.T.C.A. ESMT
 - B OFF-LOT PERMEABLE VARIABLE WIDTH UTILITY ESMT TO EXPIRE UPON INCORPORATION OF FUTURE STREET R.O.W. (1.92 ACRES)
 - C OFF-LOT VARIABLE WIDTH PRIVATE DRAINAGE ESMT (2.86 ACRES, PERMEABLE)
 - D 5' R.O.W. DEDICATION (0.102 ACRES)
 - E 5' G.E.T.C.A. ESMT
 - F 1' V.N.A.E. ESMT
 - G OFF-LOT 15' GRADING ESMT (0.486 ACRES)
 - A VARIABLE WIDTH ELECTRIC EASEMENT (VOL. 7517, PGS. 863-867 OFR)

SIDEWALK BOX DRAIN 'A'		
$Q = C L(h)^{3/2}$	8.3.2.a	
Amount of flow in CFS = Q (cfs)	43.47	ft ³ /sec
The Weir coefficient 3.087 = C	3.087	
The length of drop curb opening required in feet = L_R	20.05	ft
Length Provided = L_P	25.00	ft
The head or depth of water at the opening in feet = h	0.79	ft
$h^3(3/2)$	0.70	ft ³
CHECK	43.47	ft ³ /sec

DRAIN 'A' STA 1+00 TO END



ROCK RUBBLE CALCULATIONS	
6' BOTTOM WIDTH	
3:1, 3:1 SIDE SLOPE	
$S = 0.50\%$	
$N = 0.025$ (STONE, COBBLE, GRAVEL)	
$Q(100) = 54.12 / Q(25) = 43.47$ (CFS)	
$V(100) = 4.01 / V(25) = 3.77$ (FPS)	
$D(100) = 1.34' / D(25) = 1.20'$	

GRACE GARDENS SUBDIVISION UNIT 1
LAND-PLAT-23-11800410
DRAIN 'A'
STA 1+00 TO END PLAN & PROFILE

REVISIONS		DATE	BY	DESCRIPTION
NO.				

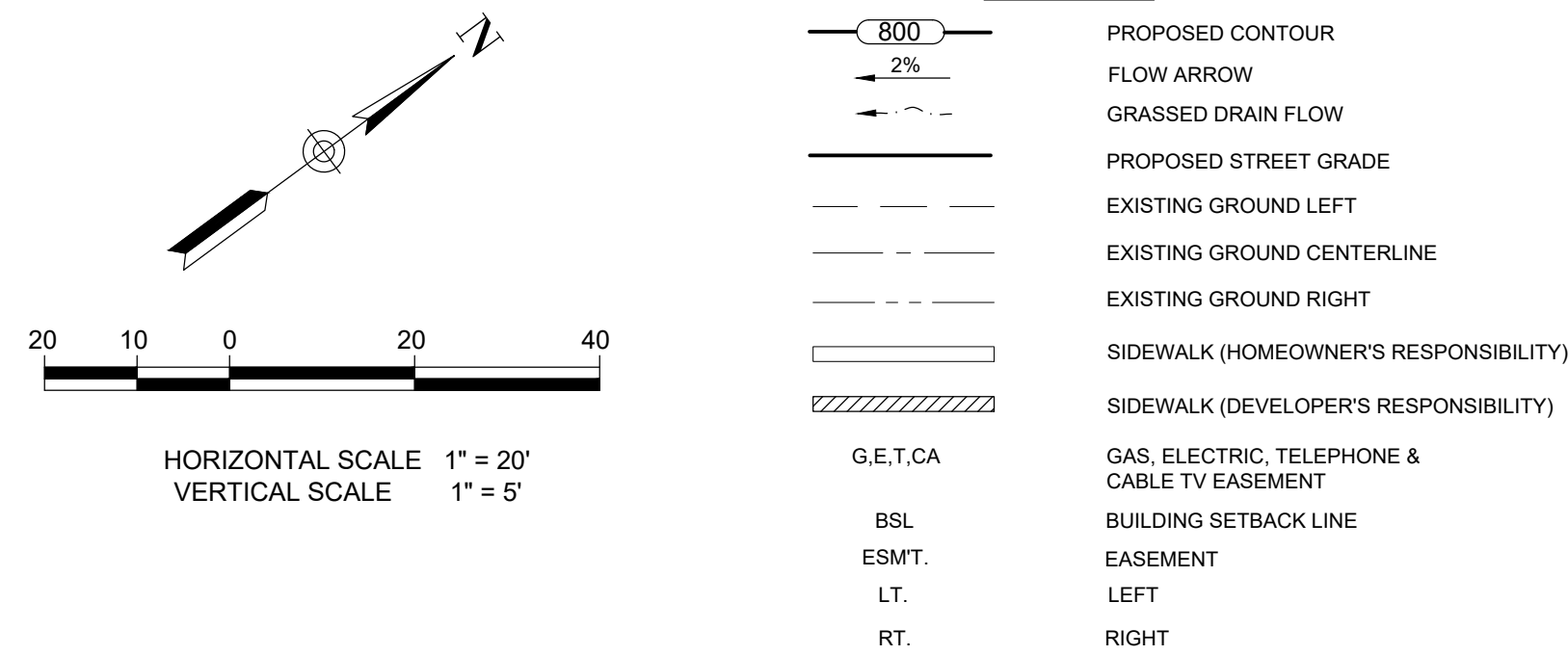
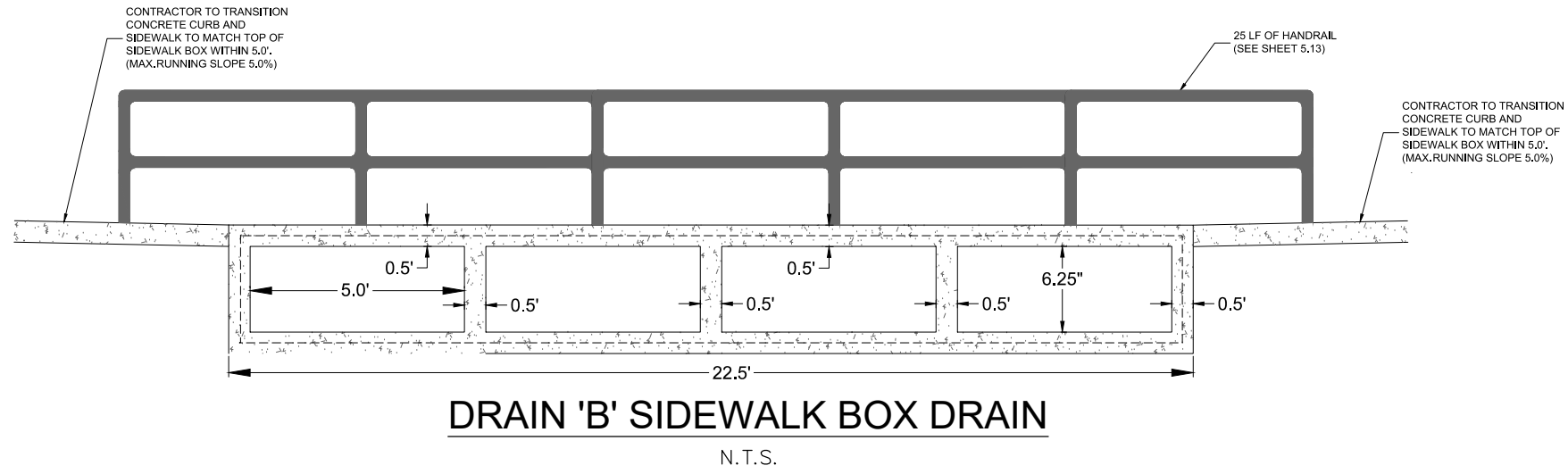
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	CHECKED BY: [Signature]	DRAWING NAME: [Signature]



LJA Engineering, Inc.
Phone 210.503.2700
9830 Colonnade Blvd
Suite 300
San Antonio, Texas 78230
TBE No. F-1386

JOB NUMBER: SA202-0401B-426
SHEET NO. 5.0
OF SHEETS

DRAIN 'B'			
$\tau d = \gamma R S$	Retardance Class 'E' Vegetation (Bermuda Grass 1.5 in)		
$\tau d =$ average shear stress at normal depth	$\tau d =$	0.28 lb/ft ²	
$\gamma =$ unit weight of water	62.4 lb/ft		
$R =$ hydraulic radius	0.92 ft		
$S =$ channel slope	$S =$ 0.50%		

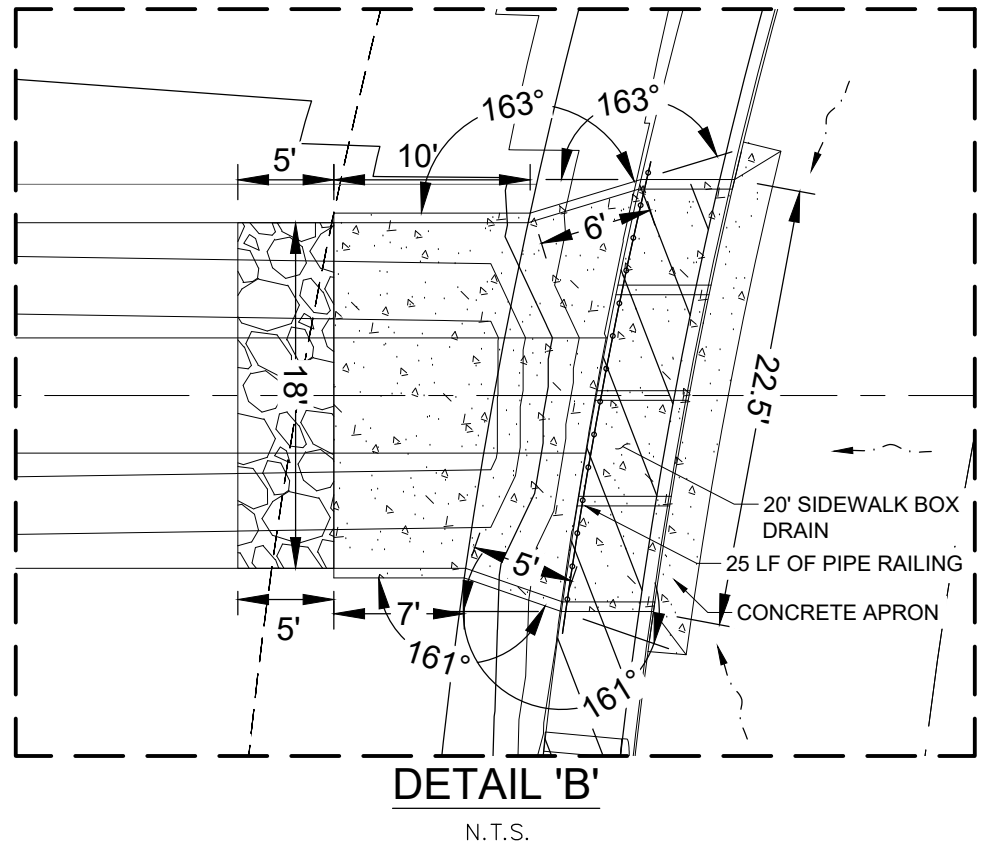


HORIZONTAL SCALE 1" = 20'
VERTICAL SCALE 1" = 5'

GENERAL NOTES:

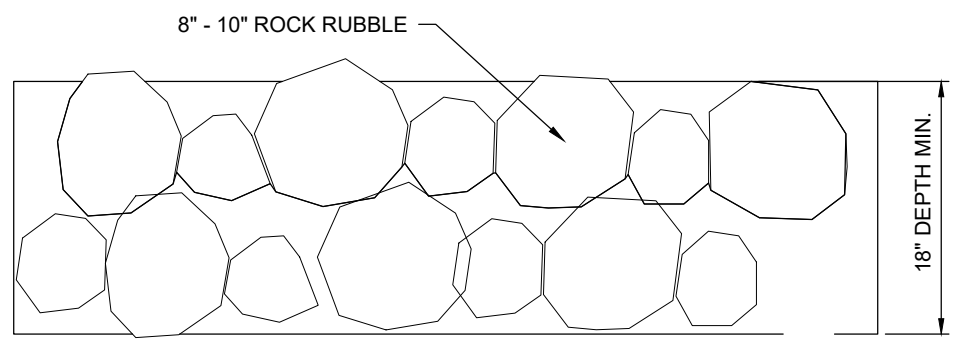
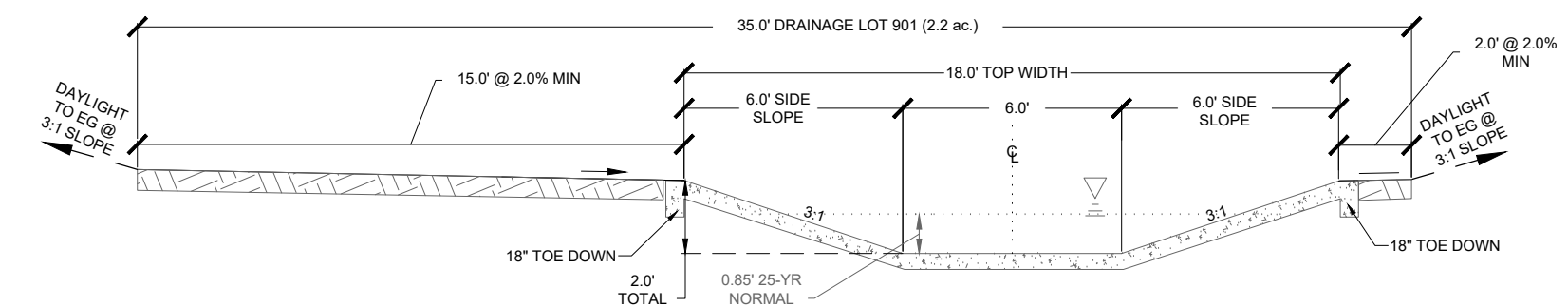
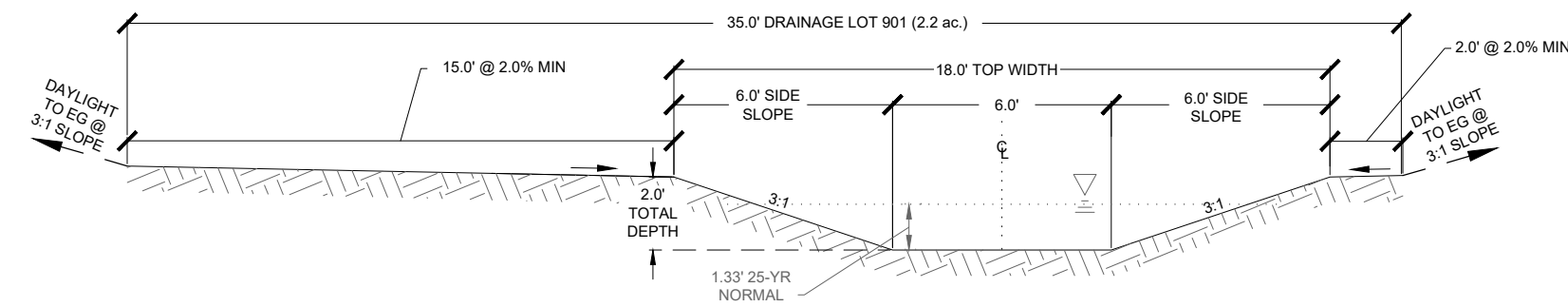
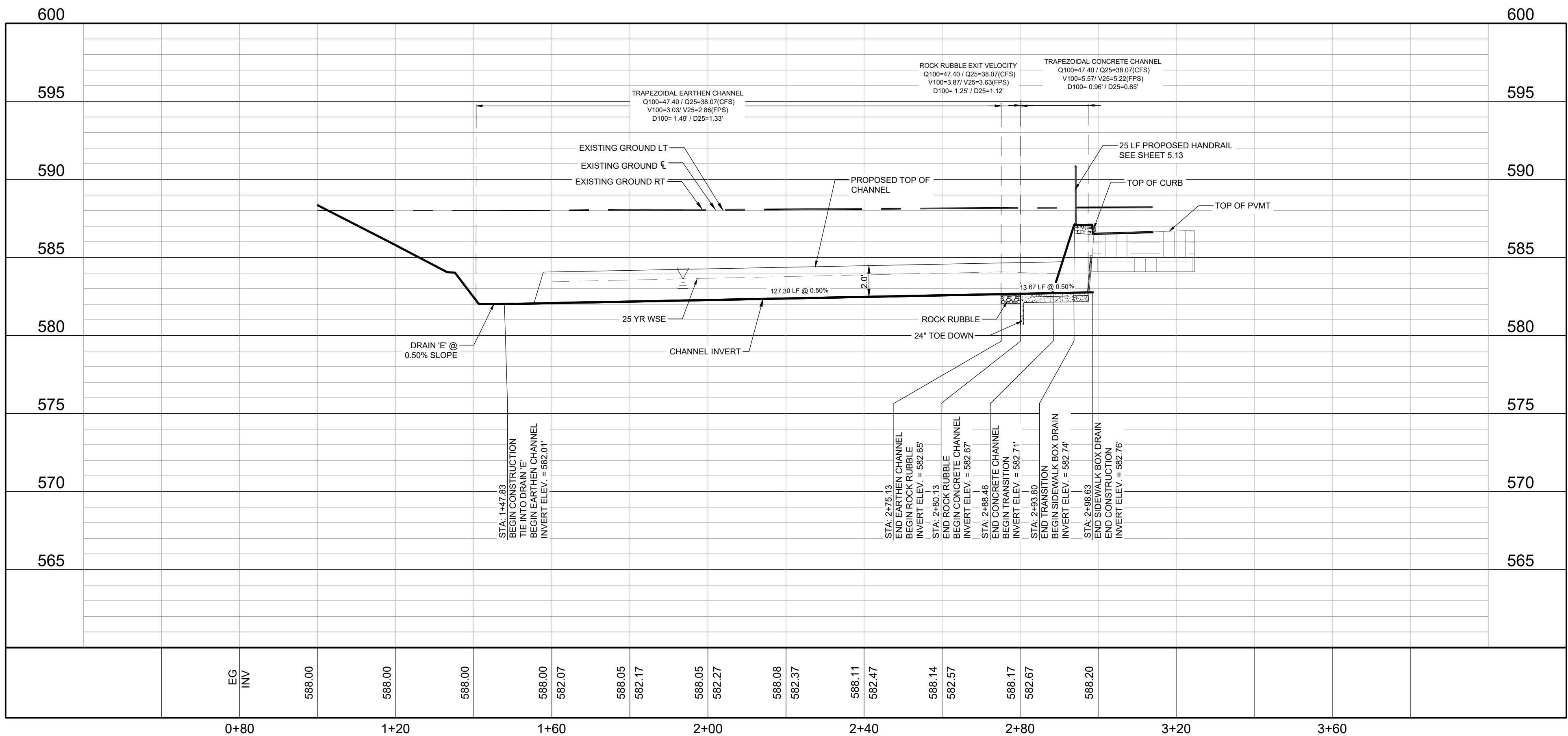
- ALL CONCRETE LINING SHALL BE A MINIMUM OF FIVE (5) INCHES THICK AND REINFORCED WITH NO. 4 ROUND BARS @ 18 INCHES ON CENTER EACH WAY. ALL CONCRETE LINING SHALL DEVELOP A MINIMUM COMPRESSIVE STRENGTH OF NOT LESS THAN THREE THOUSAND (3000) POUNDS PER SQUARE INCH IN TWENTY EIGHT (28) DAYS. THE DEPTH OF ALL TOEDOWNS SHALL BE 36 INCHES UPSTREAM, 24 INCHES DOWNSTREAM, AND 18 INCHES OF SIDE SLOPES.
- IMPROVED EARTHEN CHANNELS AND DETENTION PONDS WILL BE VEGETATED BY SEEDING OR SODDING. EIGHTY-FIVE PERCENT OF THE CHANNEL SURFACE AREA MUST HAVE ESTABLISHED VEGETATION BEFORE THE CITY OF SAN ANTONIO WILL ACCEPT THE CHANNEL FOR MAINTENANCE.
- REFER TO SHEETS 5.12 & 5.13 FOR DRAINAGE DETAILS.

- (A) 10' G.E.T.C.A. ESMT
(B) OFF-LOT PERMEABLE VARIABLE WIDTH UTILITY ESMT TO EXPIRE UPON INCORPORATION OF FUTURE STREET R.O.W. (1.92 ACRES)
(C) OFF-LOT VARIABLE WIDTH PRIVATE DRAINAGE ESMT (2.86 ACRES, PERMEABLE)
(D) 5' R.O.W. DEDICATION (0.102 ACRES)
(E) 5' G.E.T.C.A. ESMT
(F) 1' V.N.A.E. ESMT
(G) OFF-LOT 15' GRADING ESMT (0.486 ACRES)
(A) VARIABLE WIDTH ELECTRIC EASEMENT (VOL. 7517, PGS. 863-867 OPR)



SIDEWALK BOX DRAIN 'B'			
$Q = C L(h)^{3/2}$ 8.3.2.a			
Amount of flow in CFS = Q (cfs)		38.07	ft ³ /sec
The Weir coefficient 3.087 = C		3.087	
The length of drop curb opening required in feet = L_R		17.56	ft
Length Provided = L_p		20.00	ft
The head or depth of water at the opening in feet = h		0.79	ft
$h^{3/2}$		0.70	ft ^{3/2}
CHECK		38.07	ft ³ /sec

DRAIN 'B' STA 1+00 TO END



ROCK RUBBLE CALCULATIONS

6' BOTTOM WIDTH
3:1, 3:1 SIDE SLOPE
 $S=0.50\%$
 $N=0.025$ (STONE, COBBLE, GRAVEL)
 $Q100=47.40 / Q25=38.07$ (CFS)
 $V100=3.87 / V25=3.63$ (FPS)
 $D100=1.25 / D25=1.12$

GRACE GARDENS SUBDIVISION UNIT 1
LAND-PLAT-23-11800410
DRAIN 'B'
STA 1+00 TO END PLAN & PROFILE

REVISIONS		DATE	BY	DESCRIPTION
NO.				

DATE: 9/8/2023	DESIGNED BY: RICHARD W. GRAY III	CHECKED BY: RG	DRAWING NAME: DRAIN 'B' P&P.dwg
----------------	----------------------------------	----------------	---------------------------------



LJA Engineering, Inc.
Phone 210.503.2700
JLA.COM
Suits 300
San Antonio, Texas 78230
TBE No. F-1386

JOB NUMBER:
SA202-0401B-426

SHEET NO.

5.1

OF SHEETS

CONTRACTOR TO TRANSITION CONCRETE CURB AND SIDEWALK TO MATCH TOP OF BRIDGING AND VERTICAL CURB (NO. RUNNING SLOPE 5.0%)

15' LF OF HORIZONTAL RISE (SHEET 13.7)

CONTRACTOR TO TRANSITION CONCRETE CURB AND SIDEWALK TO MATCH TOP OF BRIDGING AND VERTICAL CURB (NO. RUNNING SLOPE 5.0%)

5.0'

0.5'

0.5'

0.5'

0.5'

6.25'

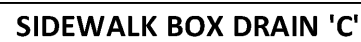
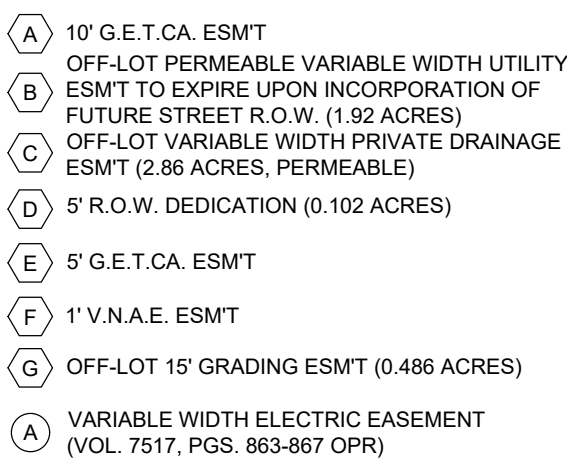
22.5'



PROPOSED CONTOUR
FLOW ARROW
GRASSSED DRAIN FLOW
PROPOSED STREET GRADE
EXISTING GROUND LEFT
EXISTING GROUND CENTERLINE
EXISTING GROUND RIGHT
SIDEWALK (HOMEOWNER'S RESPONSIBILITY)
SIDEWALK (DEVELOPER'S RESPONSIBILITY)
GAS, ELECTRIC, TELEPHONE &
CABLE TV EASEMENT
BUILDING SETBACK LINE
EASEMENT
LEFT
RIGHT

GENERAL NOTES:

1. ALL CONCRETE LINING SHALL BE A MINIMUM OF FIVE (5) INCHES THICK AND REINFORCED WITH NO. 4 ROUND BARS @ 18 INCHES ON CENTER. EACH WALL OF ALL CONCRETE LINING SHALL DEVELOP A MINIMUM COMPRESSIVE STRENGTH OF NOT LESS THAN THREE THOUSAND (3000) POUNDS PER SQUARE INCH IN TWENTY EIGHT (28) DAYS AFTER DETENTION. THE LINING SHALL BE 36 INCHES UPSTREAM, 24 INCHES DOWNSTREAM, AND 18 INCHES OF SIDE SLOPES.
2. IMPROVED EARTHEN CHANNELS AND DETENTION PONDS WILL BE VEGETATED BY SEEDING OR SODDING. EIGHTY-FIVE PERCENT OF THE CHANNEL SURFACE AREA MUST HAVE ESTABLISHED VEGETATION BEFORE THE CITY OF SAN ANTONIO WILL ACCEPT THE CHANNEL FOR MAINTENANCE.
3. REFER TO SHEETS 512 & 513 FOR DRAINAGE DETAILS.



$$Q = CL(h)^{3/2} \quad 8.3.2.a$$

Amount of flow in CFS =	Q (cfs)	39.24 ft ³ /sec
The Weir coefficient 3.087 =	C	3.087
The length of drop curb opening required in feet =	L _a	18.10 ft
Length Provided =	L _p	20.00 ft
The head or depth of water at the opening in feet =	h	0.79 ft
	h ³ (3/2)	0.70 ft ³
CHECK		39.24 ft ³ /sec

GRACE GARDENS SUBDIVISION UNIT 1
LAND-PLAT-23-11800410
DRAIN 'C'
STA 1+00 TO END PLAN & PROFILE

REVISIONS	
NO.	DESCRIPTION
9/8/2023	DATE: _____
	DESIGNED BY: _____
	DRAWN BY: _____
	CHECKED BY: _____ RG
	DRAWING NAME: _____
	th Drain C P&P.dwg

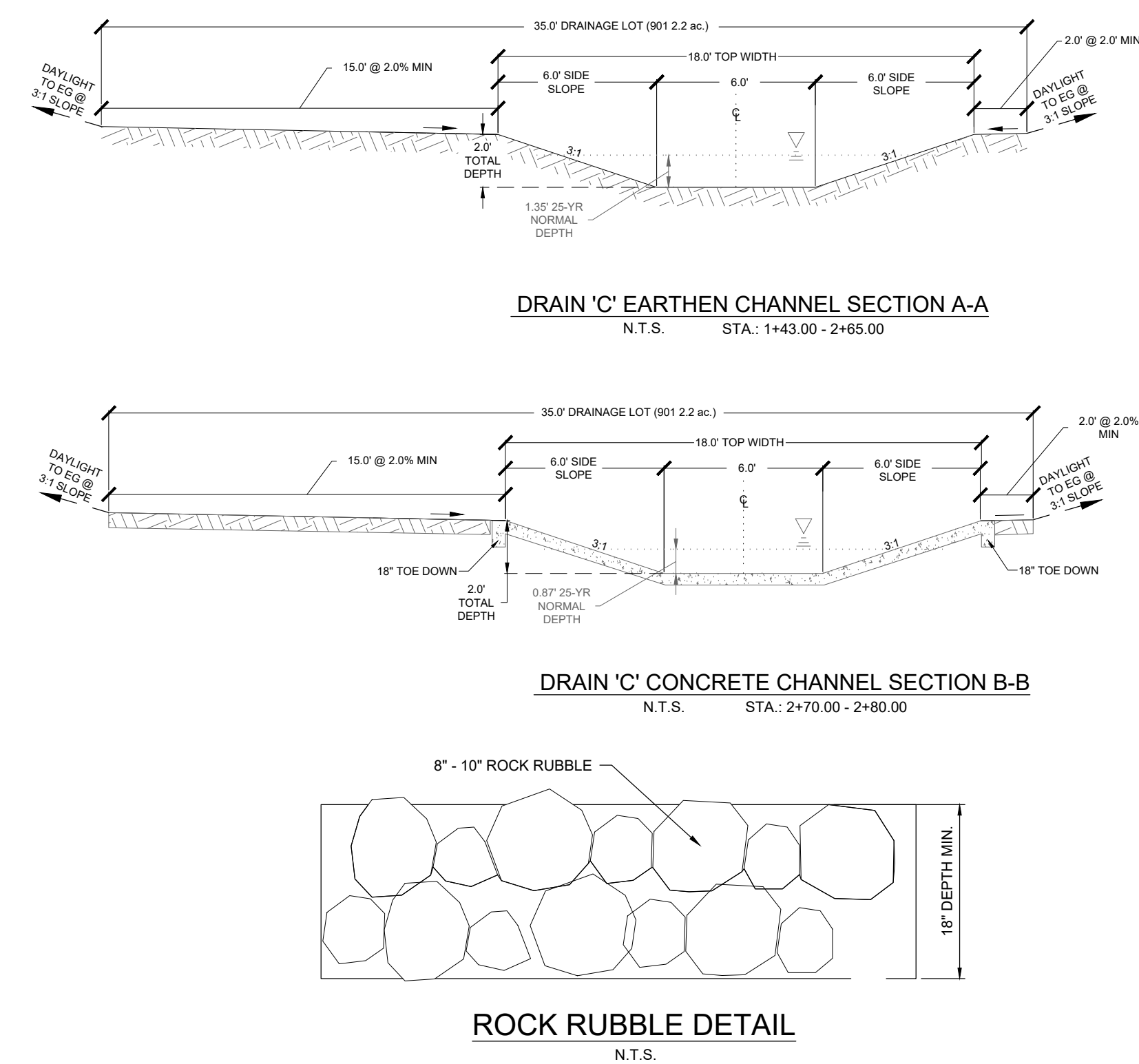
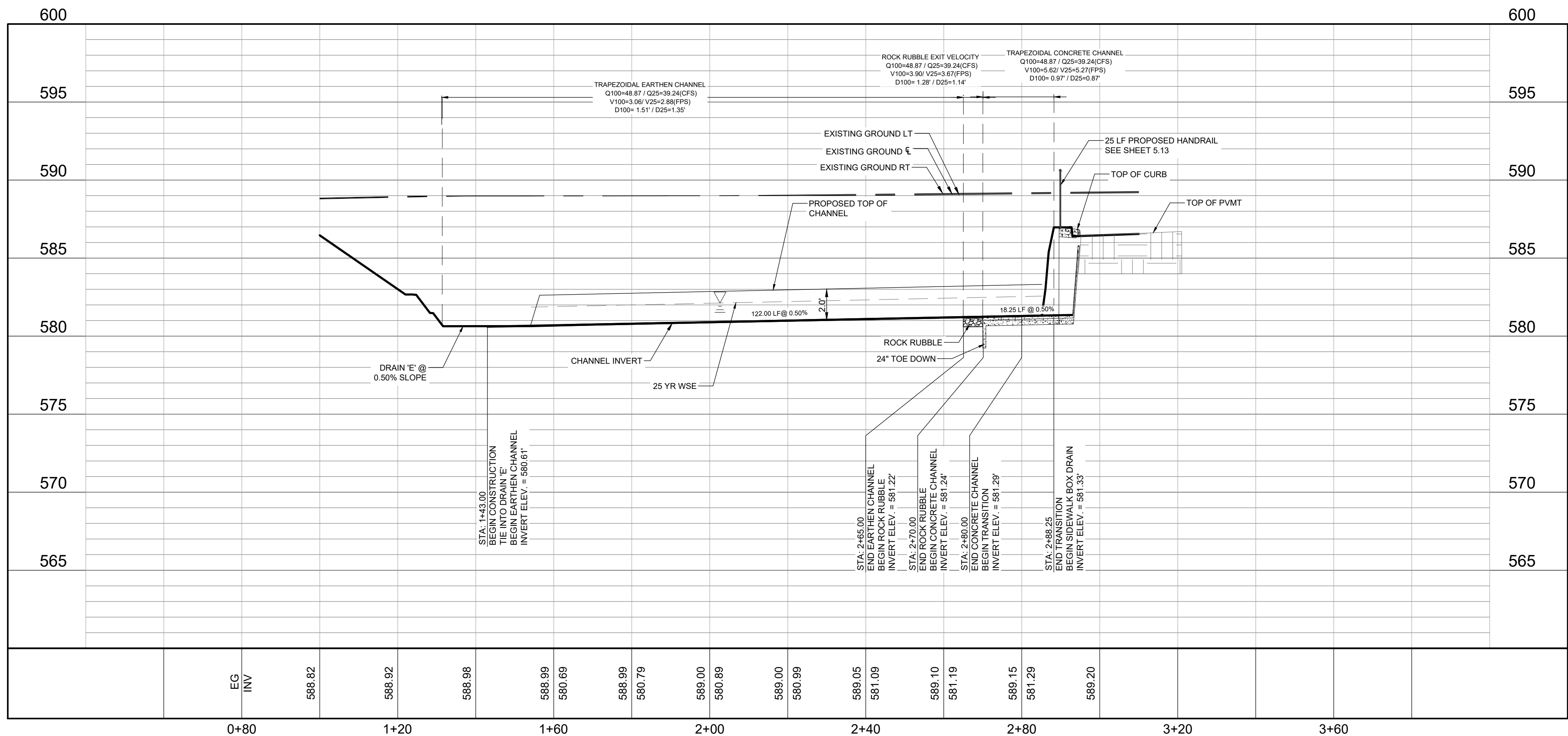
LJA
Phone 210.503.2700
LJA.COM
TBPE No. F-1386

LJA Engineering, Inc.
9830 Colonnade Blvd
Suite 300
San Antonio, Texas 78230

JOB NUMBER:
SA202-0401B-426

SHEET NO. _____

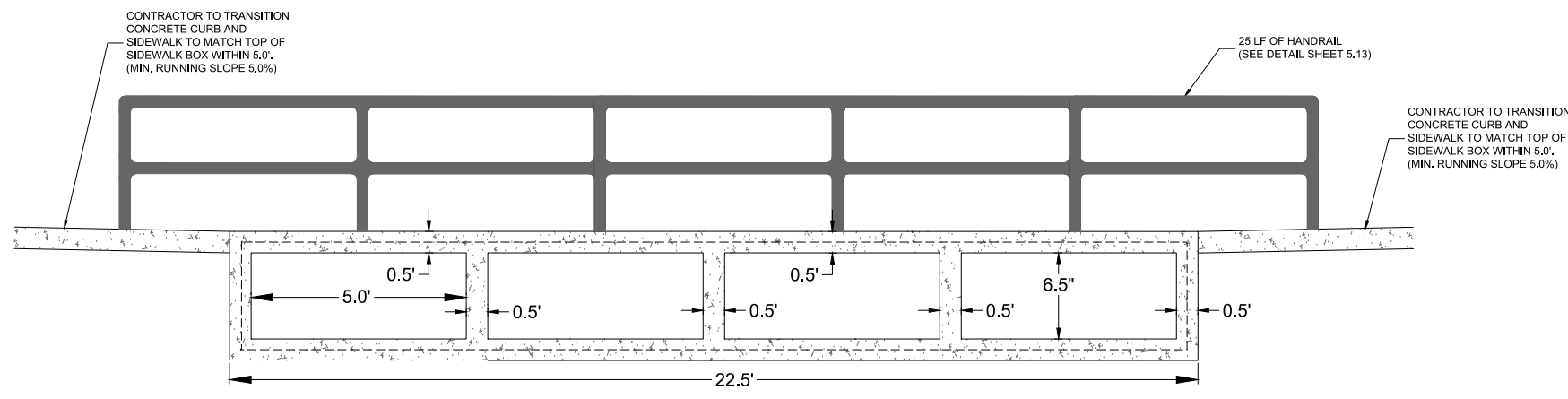
5.2
OF - SHEET



ROCK RUBBLE CALCULATIONS

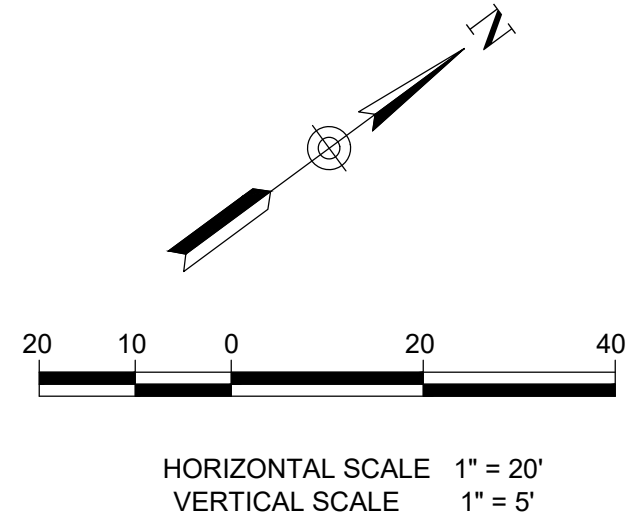
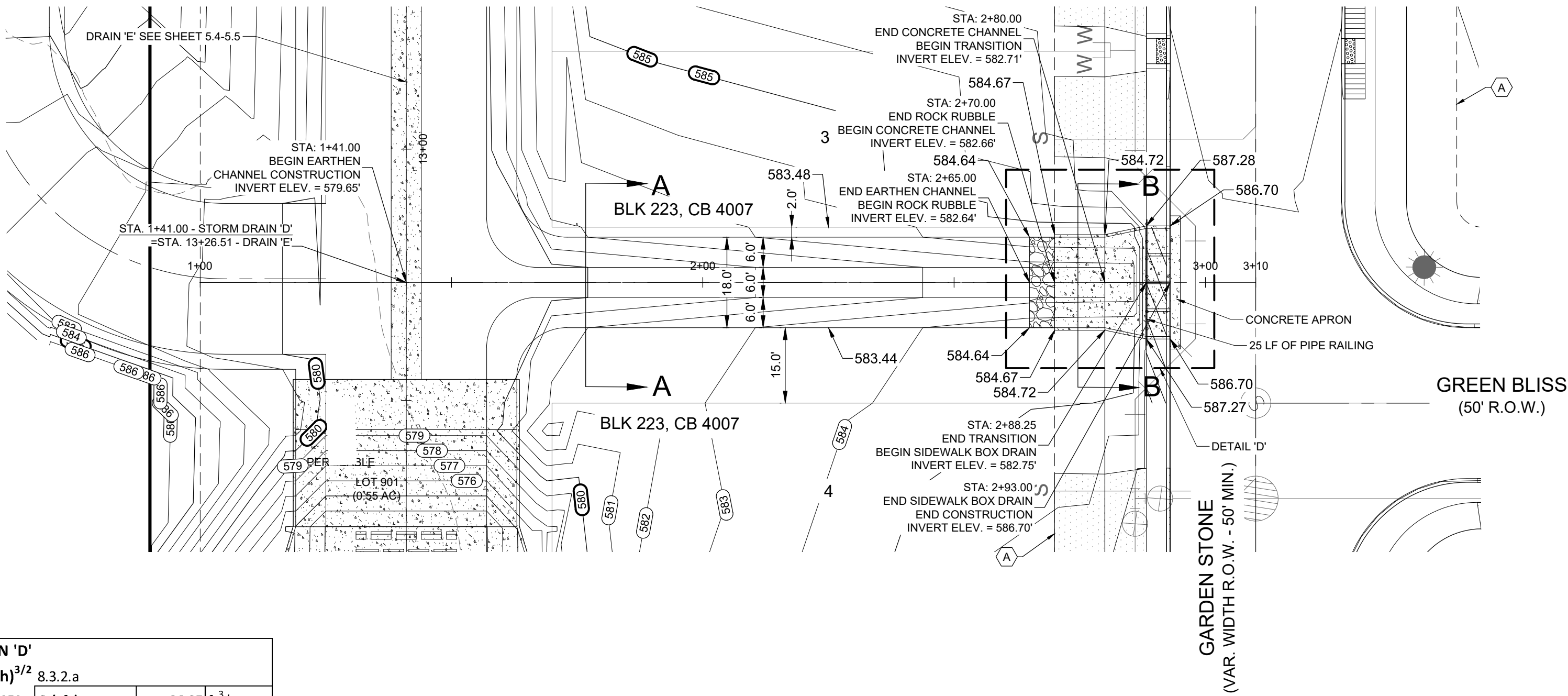
6' BOTTOM WIDTH
3:1, 3:1 SIDE SLOPE
S=0.50%
N=0.025 (STONE, COBBLE, GRAVEL)
Q100=48.87 / Q25=39.24(CFS)
V100=3.90/ V25=3.67(FPS)
D100= 1.28' / D25= 1.14'

DRAIN 'D'			
$Td = yRS$	Retardance Class 'B' Vegetation (Bermuda Grass, Tall 12 in)	$Td =$	1.14 lb/ft ²
$Td =$	average shear stress at normal depth	$Td =$	62.4 lb/ft
$y =$	unit weight of water	$R =$	hydraulic radius
$R =$	hydraulic radius	$S =$	channel slope
$S =$	channel slope	$S =$	3.00%



DRAIN 'D' SIDEWALK BOX DRAIN

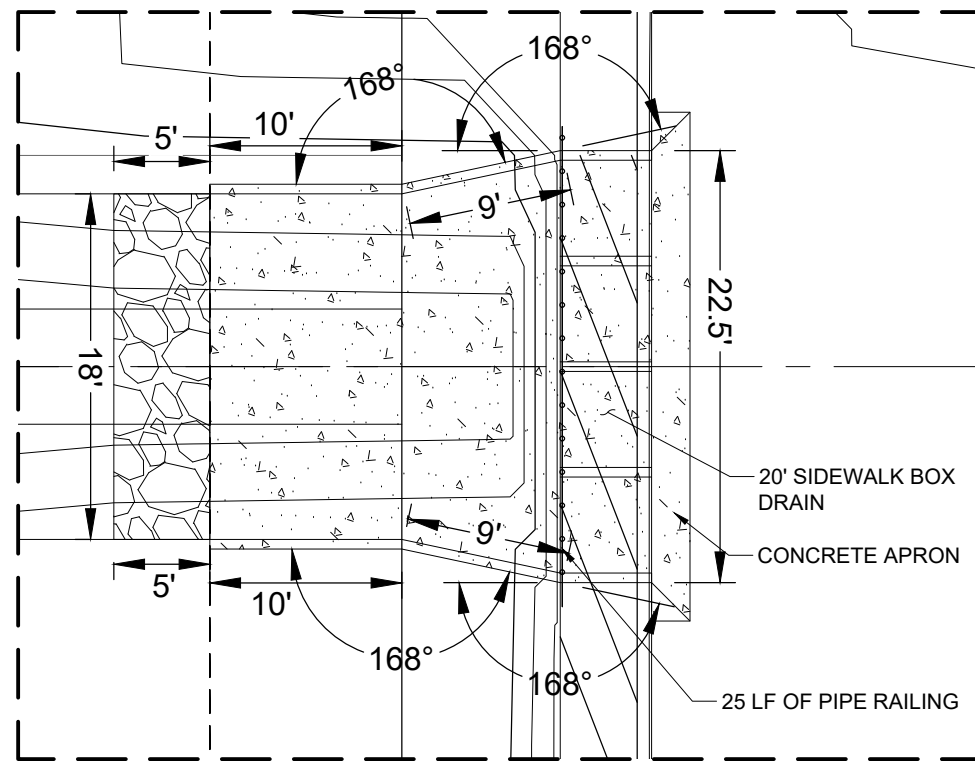
N.T.S.



LEGEND	
	PROPOSED CONTOUR
	FLOW ARROW
	GRASSED DRAIN FLOW
	PROPOSED STREET GRADE
	EXISTING GROUND LEFT
	EXISTING GROUND RIGHT
	SIDEWALK (HOMEOWNER'S RESPONSIBILITY)
	SIDEWALK (DEVELOPER'S RESPONSIBILITY)
	GAS, ELECTRIC, TELEPHONE & CABLE TV EASEMENT
	BUILDING SETBACK LINE
	EASEMENT
	LEFT
	RIGHT

GENERAL NOTES:

- ALL CONCRETE LINING SHALL BE A MINIMUM OF FIVE (5) INCHES THICK AND REINFORCED WITH NO. 4 ROUND BARS @ 18 INCHES ON CENTER EACH WAY. ALL CONCRETE LINING SHALL DEVELOP A MINIMUM COMPRESSIVE STRENGTH OF NOT LESS THAN THREE THOUSAND (3000) POUNDS PER SQUARE INCH IN TWENTY EIGHT (28) DAYS. THE DEPTH OF ALL TOEDOWNS SHALL BE 36 INCHES UPSTREAM, 24 INCHES DOWNSTREAM, AND 18 INCHES OF SIDE SLOPES.
- IMPROVED EARTHEN CHANNELS AND DETENTION PONDS WILL BE VEGETATED BY SEEDING OR SODDING. EIGHTY-FIVE PERCENT OF THE CHANNEL SURFACE AREA MUST HAVE ESTABLISHED VEGETATION BEFORE THE CITY OF SAN ANTONIO WILL ACCEPT THE CHANNEL FOR MAINTENANCE.
- REFER TO SHEETS 5.12 & 5.13 FOR DRAINAGE DETAILS.



DETAIL 'D'

N.T.S.

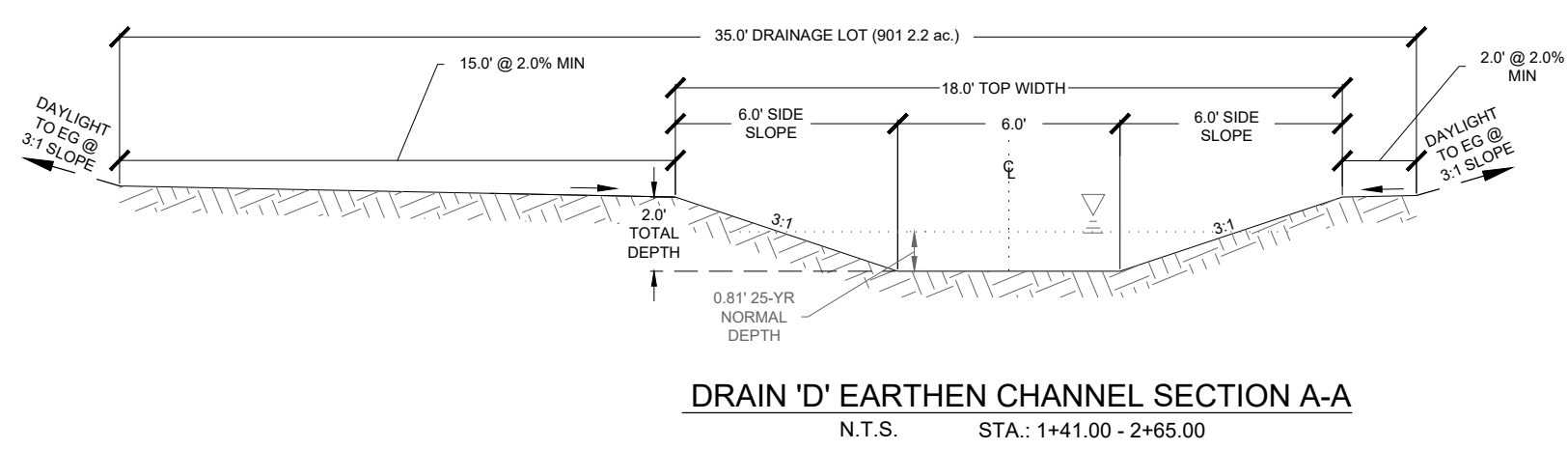
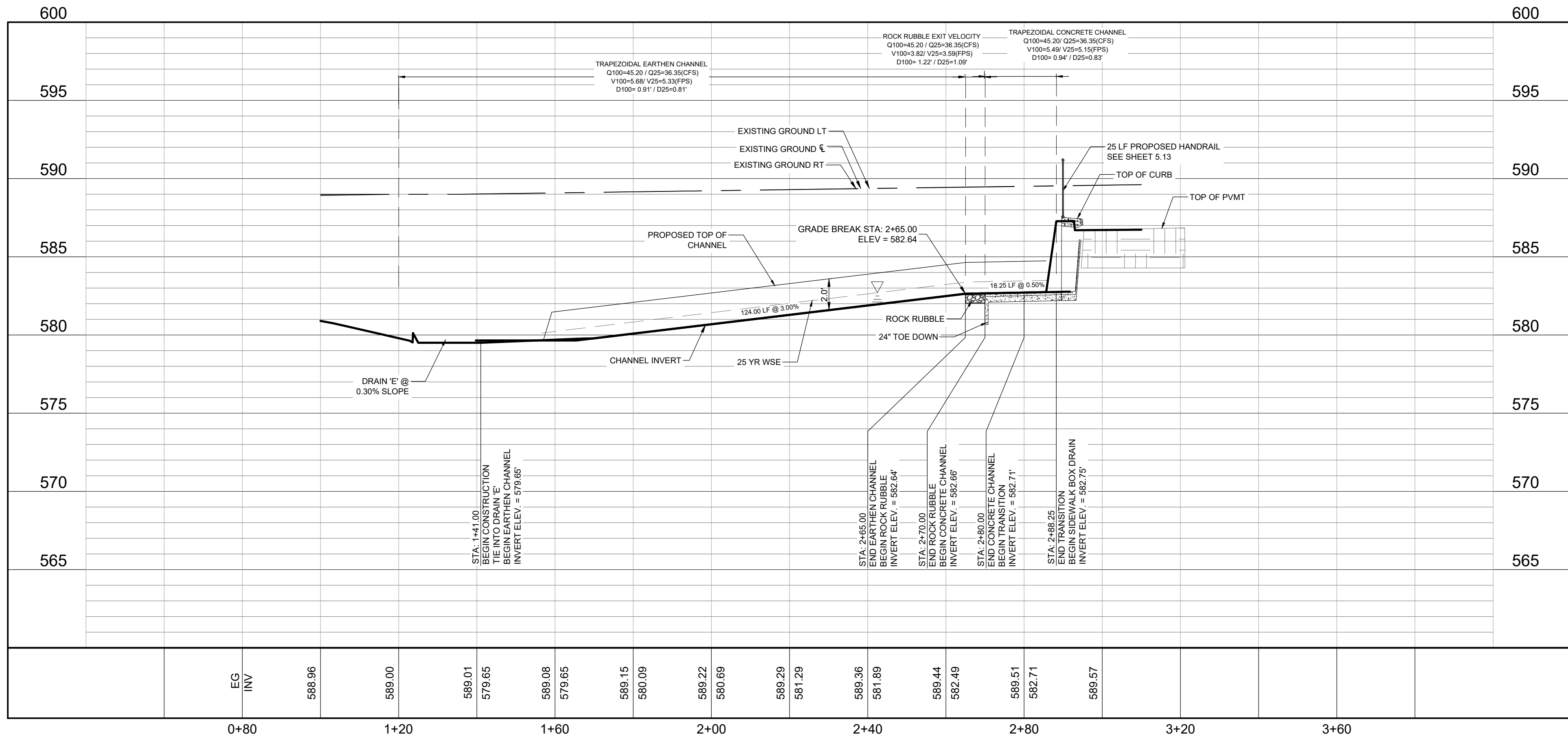
- (A) 10' G.E.T.C.A. ESMT
- (B) ESMT TO EXPIRE UPON INCORPORATION OF FUTURE STREET R.O.W. (1.92 ACRES)
- (C) OFF-LOT VARIABLE WIDTH PRIVATE DRAINAGE ESMT (2.86 ACRES, PERMEABLE)
- (D) 5' R.O.W. DEDICATION (0.102 ACRES)
- (E) 5' G.E.T.C.A. ESMT
- (F) 1' V.N.A.E. ESMT
- (G) OFF-LOT 15' GRADING ESMT (0.486 ACRES)
- (A) VARIABLE WIDTH ELECTRIC EASEMENT (VOL. 7517, PGS. 863-867 OFR)

SIDEWALK BOX DRAIN 'D'

$$Q = C L (h)^{3/2} \quad 8.3.2.a$$

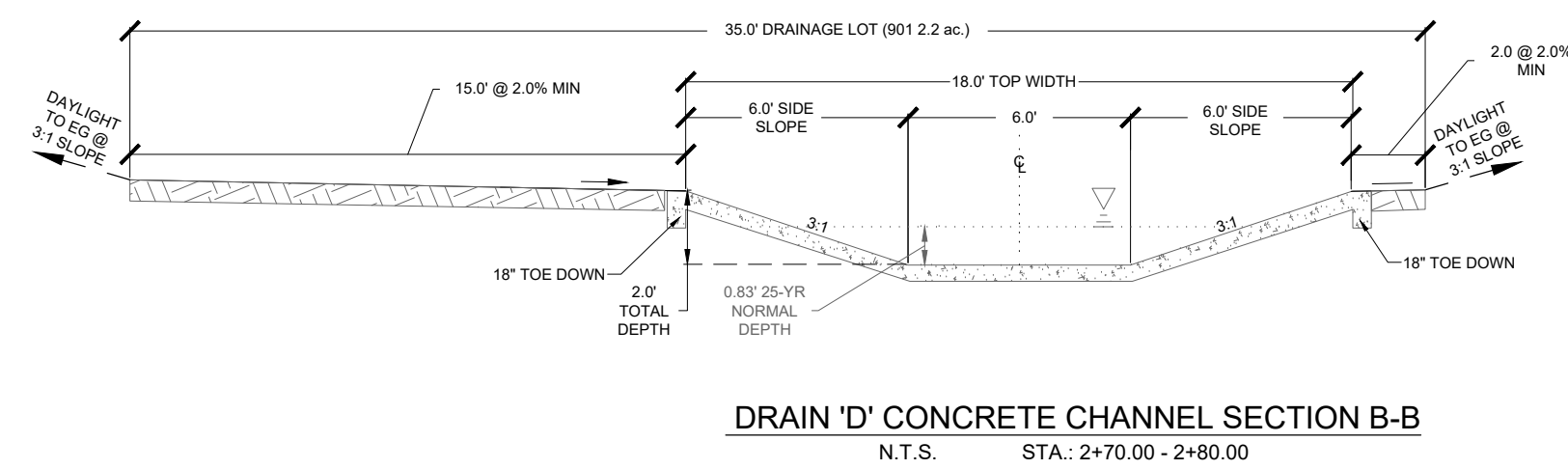
Amount of flow in CFS = Q (cfs)	36.35 ft ³ /sec
The Weir coefficient 3.087 = C	3.087
The length of drop curb opening required in feet = L_R	16.77 ft
Length Provided = L_p	20.00 ft
The head or depth of water at the opening in feet = h	0.79 ft
$h \wedge (3/2)$	0.70 ft ^{3/2}
CHECK	36.35 ft ³ /sec

DRAIN 'D' STA 1+00 TO END



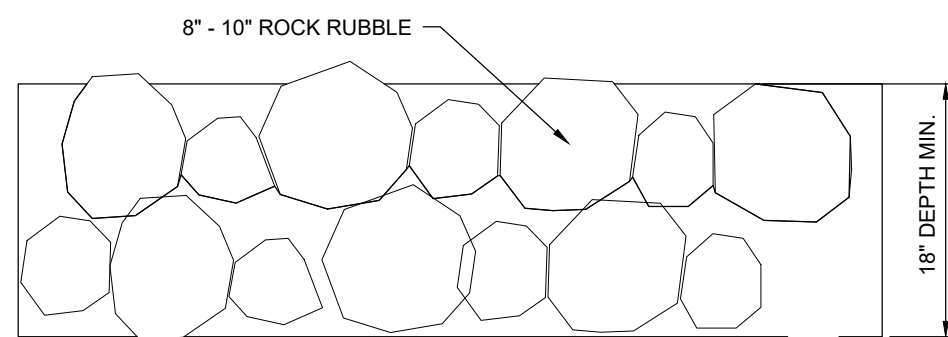
DRAIN 'D' EARTHEN CHANNEL SECTION A-A

N.T.S. STA: 1+41.00 - 2+65.00



DRAIN 'D' CONCRETE CHANNEL SECTION B-B

N.T.S. STA: 2+70.00 - 2+80.00



ROCK RUBBLE DETAIL

N.T.S.

ROCK RUBBLE CALCULATIONS

6\"/>

GRACE GARDENS SUBDIVISION UNIT 1
LAND-PLAT-23-11800410
DRAIN 'D'
STA 1+00 TO END PLAN & PROFILE

NO.	REVISIONS	DATE	BY	DESCRIPTION
1				
2				
3				
4				
5				
6				
7				
8				
9				
10				

DATE: 9/8/2023
DESIGNED BY: RICHARD W. GRAY III
DRAWN BY: RG
CHECKED BY: RG
DRAWING NAME: 23-11800410.DRAIN 'D' P&P.dwg
06/10/2024

Phone 210.503.2700
LJA.COM
TBE No. F-1386

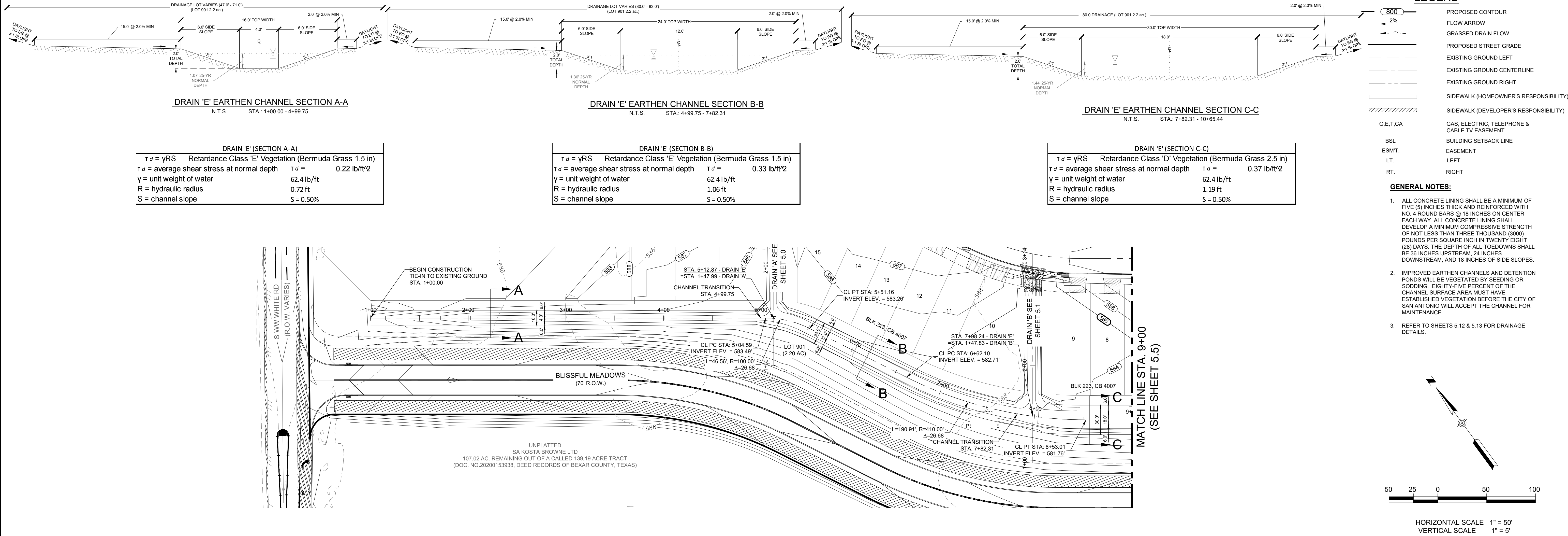
LJA Engineering, Inc.
9830 Colomade Blvd
Suite 300
San Antonio, Texas 78230

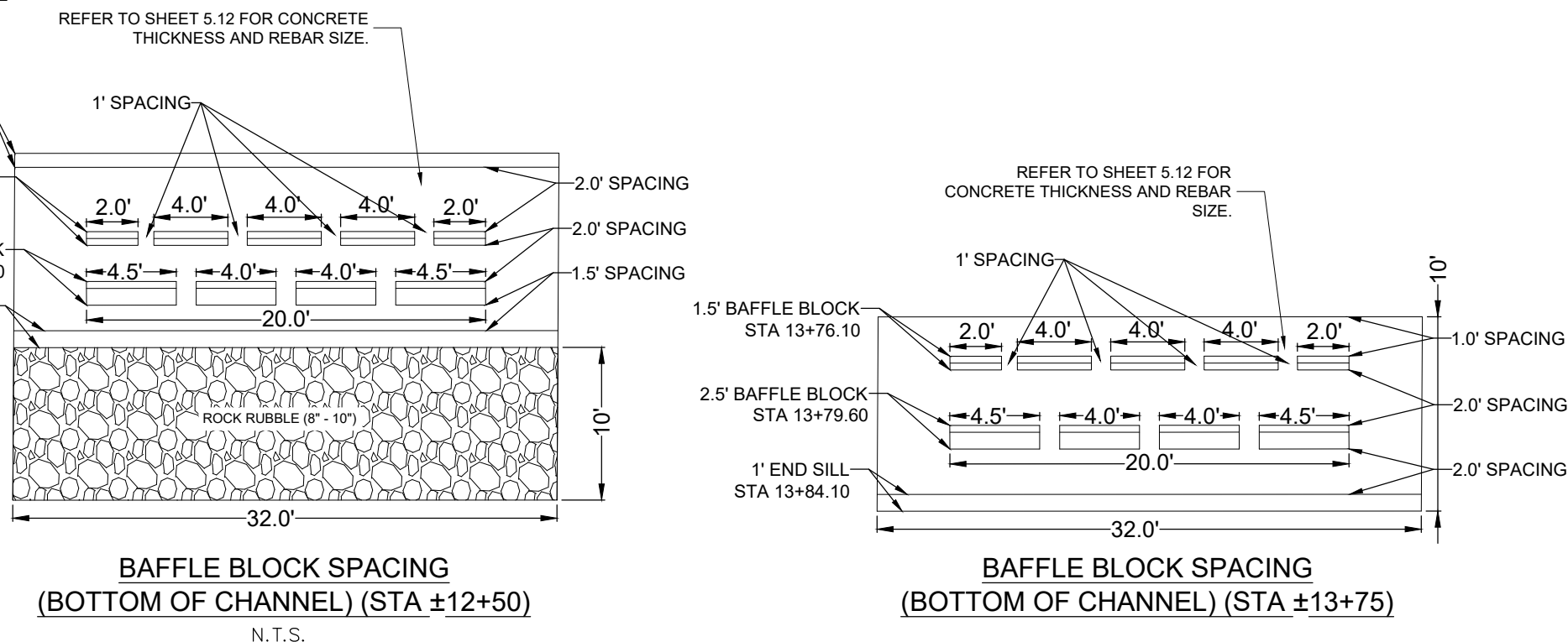
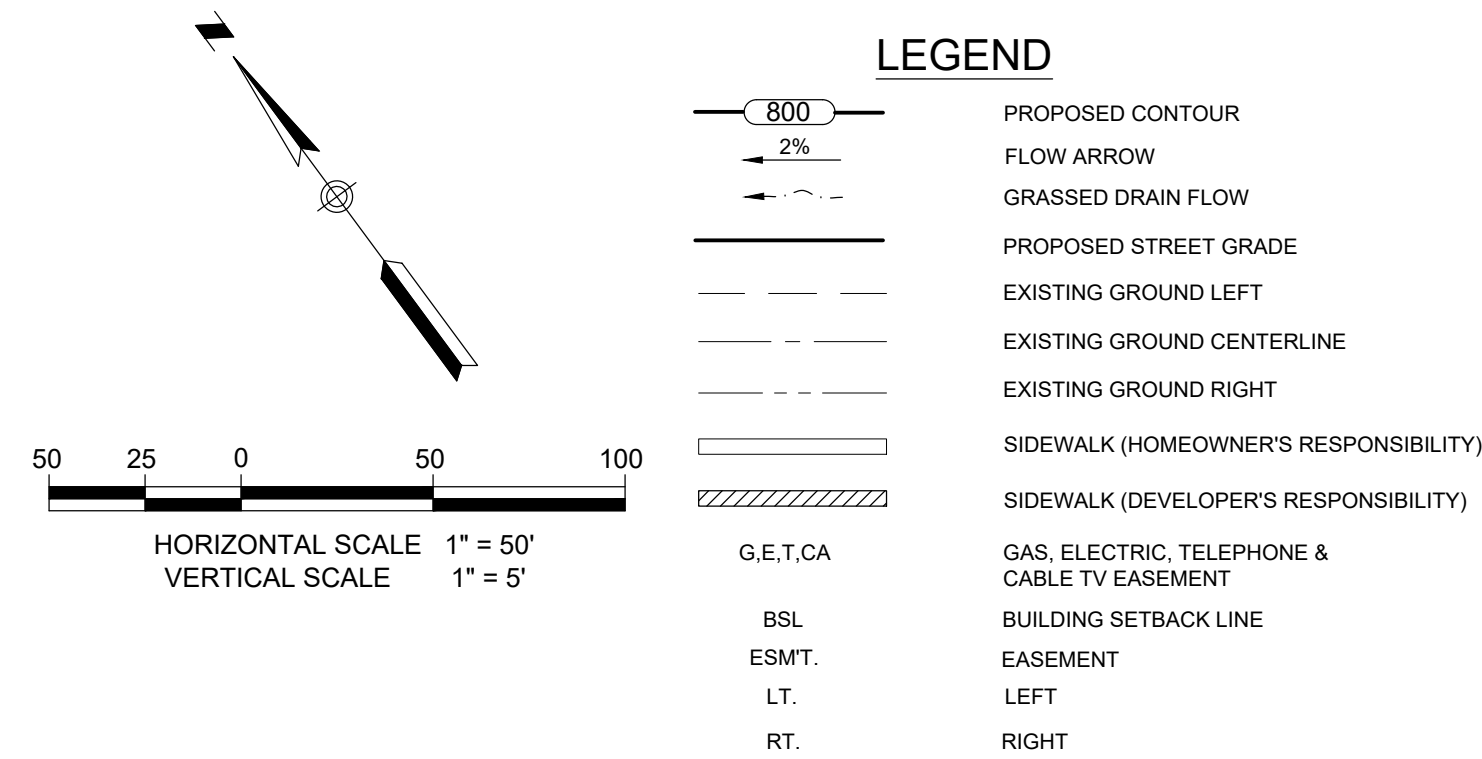
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SA202-0401B-426

SHEET NO.
5.3

OF - SHEETS

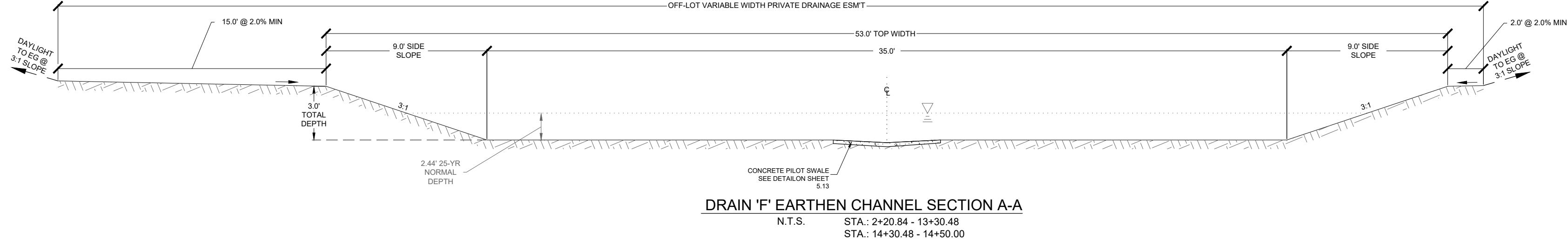
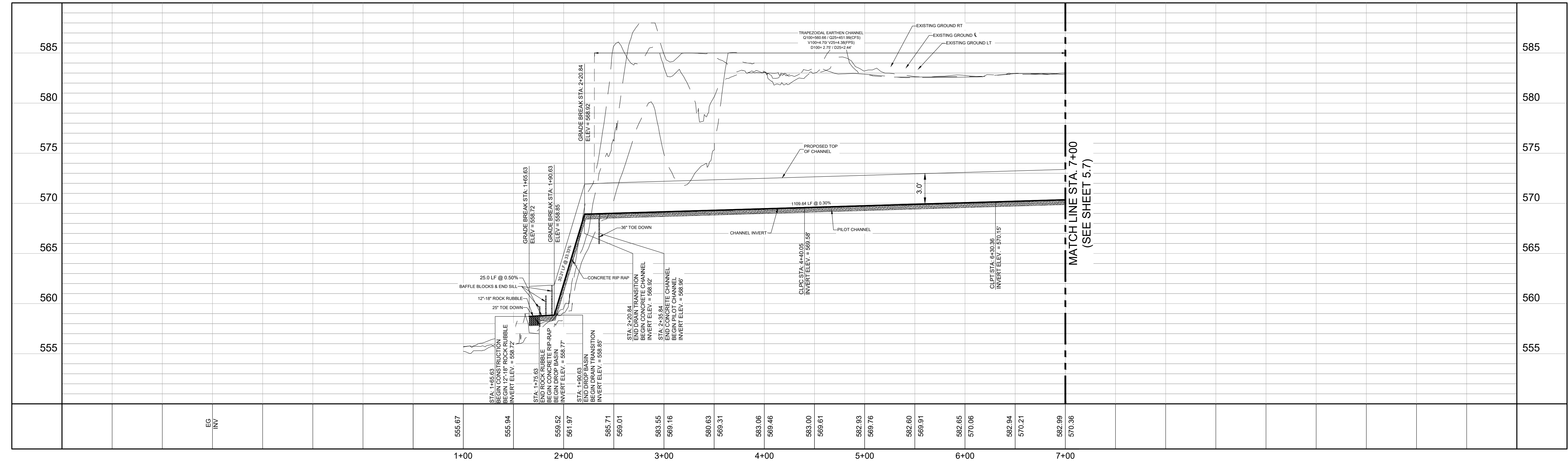
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Plot Date/Time: Jun 10, 24 - 15:02:29



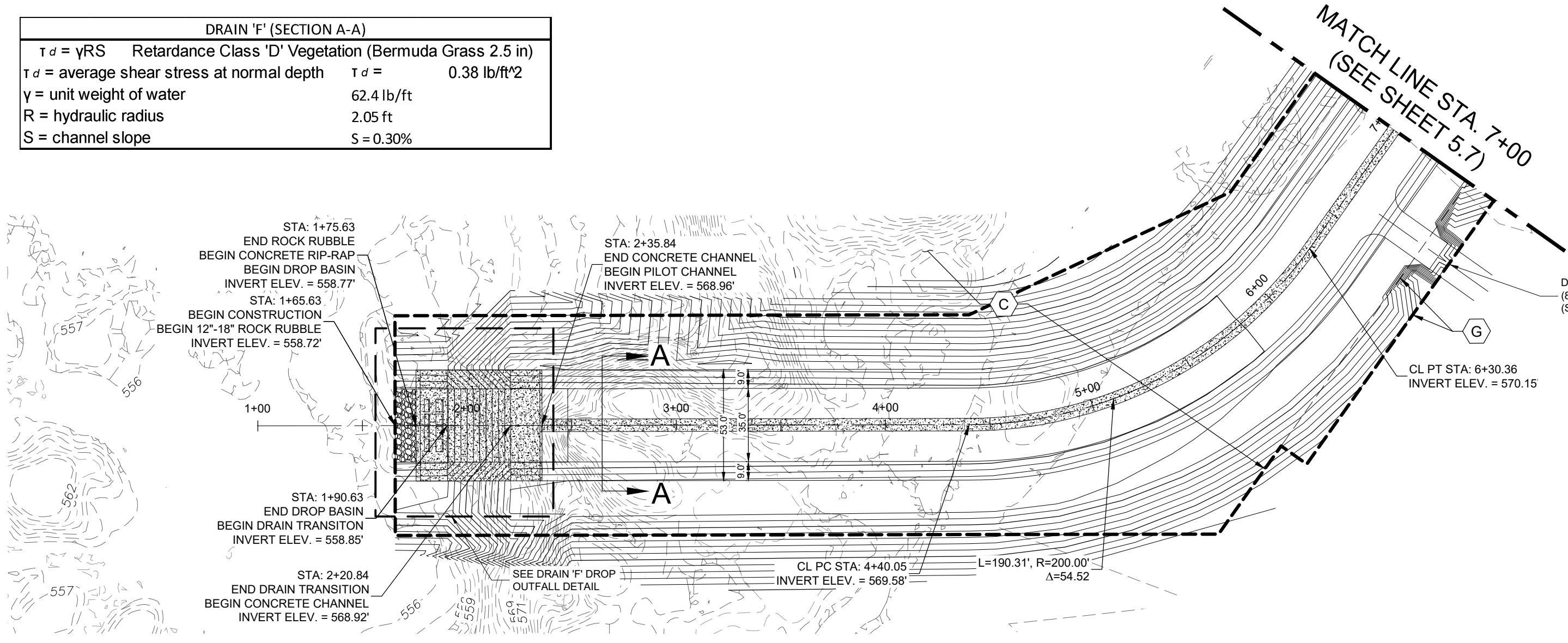
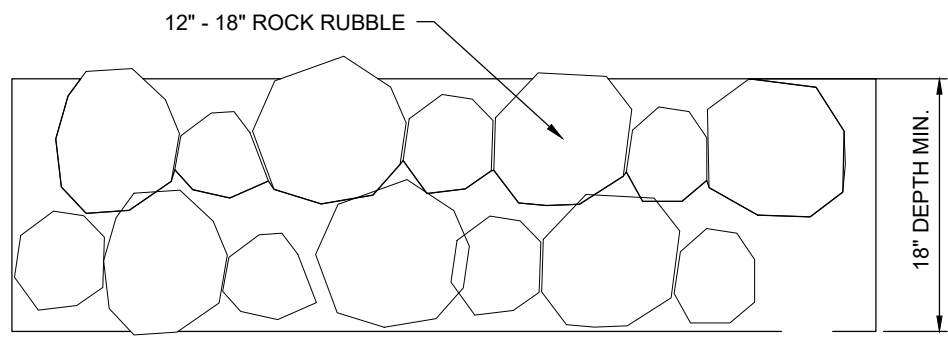
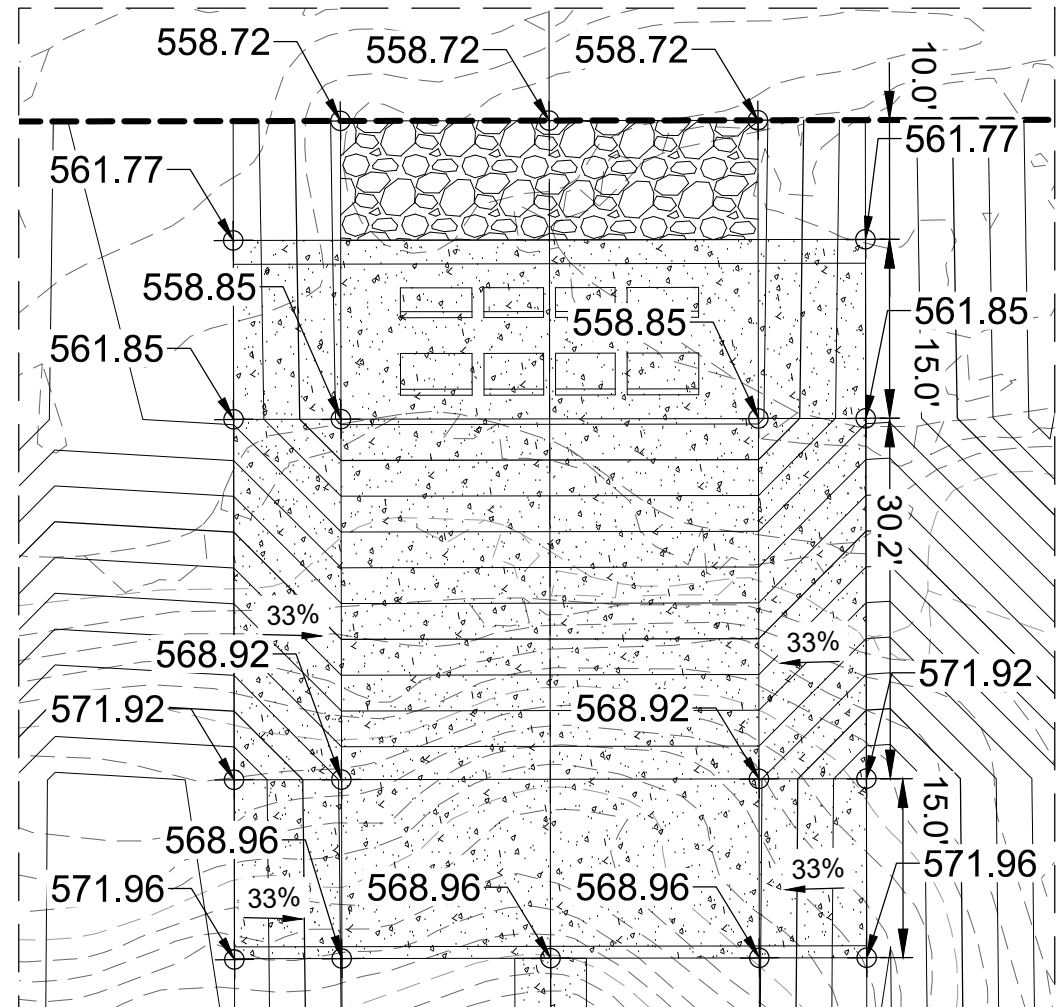


DRAIN 'E' (SECTION C-C)			
$\tau_d = \gamma R S$	Retardance Class 'D' Vegetation (Bermuda Grass 2.5 in)		
$\tau_d =$ average shear stress at normal depth		$\tau_d =$	0.37 lb/ft ²
$\gamma =$ unit weight of water		62.4 lb/ft	
$R =$ hydraulic radius		1.19 ft	
$S =$ channel slope		$S = 0.50\%$	
DRAIN 'E' (SECTION D-D)			
$\tau_d = \gamma R S$	Retardance Class 'D' Vegetation (Bermuda Grass 2.5 in)		
$\tau_d =$ average shear stress at normal depth		$\tau_d =$	0.38 lb/ft ²
$\gamma =$ unit weight of water		62.4 lb/ft	
$R =$ hydraulic radius		1.22 ft	
$S =$ channel slope		$S = 0.50\%$	
DRAIN 'E' (SECTION E-E)			
$\tau_d = \gamma R S$	Retardance Class 'E' Vegetation (Bermuda Grass 1.5 in)		
$\tau_d =$ average shear stress at normal depth		$\tau_d =$	0.24 lb/ft ²
$\gamma =$ unit weight of water		62.4 lb/ft	
$R =$ hydraulic radius		1.29 ft	
$S =$ channel slope		$S = 0.30\%$	

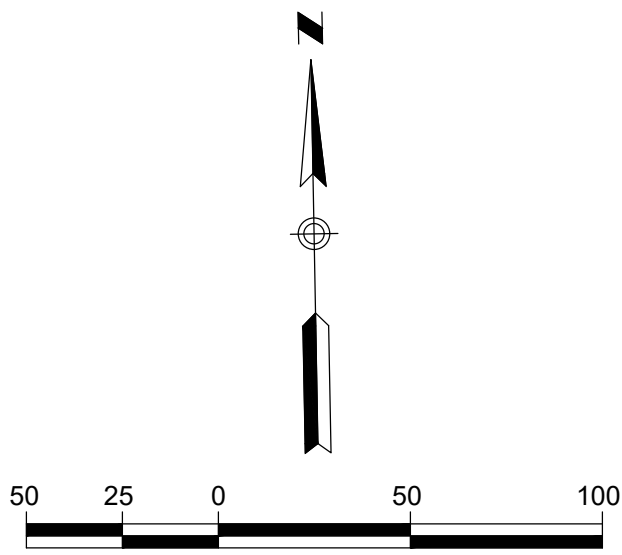
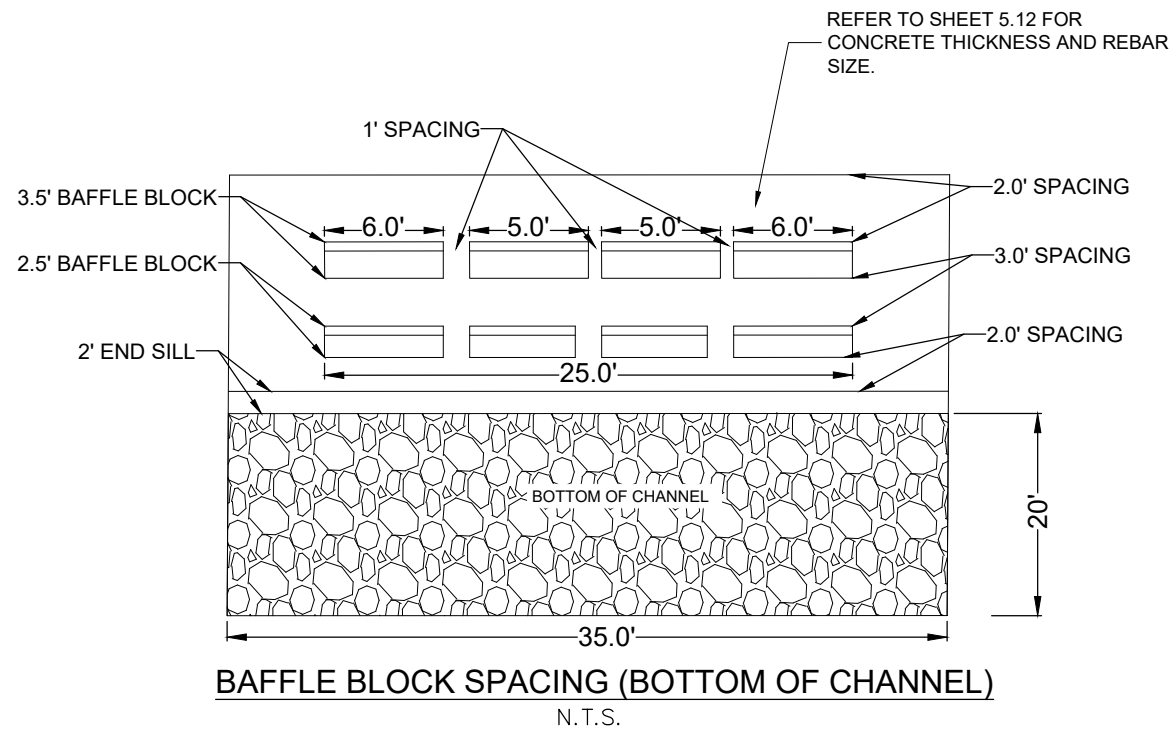
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Plot Date/Time: Jun 10, 24 - 12:54:15



DRAIN 'F' (SECTION A-A)			
$\tau_d = \gamma R S$	Retardance Class 'D' Vegetation (Bermuda Grass 2.5 in)	$\tau_d =$	0.38 lb/ft ²
τ_d = average shear stress at normal depth		τ_d =	
γ = unit weight of water	62.4 lb/ft ³	R = hydraulic radius	2.05 ft
R = hydraulic radius		S = channel slope	$S = 0.30\%$



Baffle Calculations	
V_{12}	30.33 ft/sec
V_{15}	2.26 ft
Length of Basin =	15 ft
Width of Basin =	35 ft
First Baffle:	
Distance to First Block =	2 ft
Height =	3 ft
Top Width =	0.5 ft
Total Width =	3.5 ft
Second Baffle:	
Distance to Second Block =	3 ft
Height =	2 ft
Top Width =	0.5 ft
Total Width =	2.5 ft
End Sill:	
Distance to End Sill from Second Block =	2 ft
Height =	1.00 ft
Exist Depth =	2.67 ft
Exit Velocity =	4.35 ft/sec



- GENERAL NOTES:**
- ALL CONCRETE LINING SHALL BE A MINIMUM OF FIVE (5) INCHES THICK AND REINFORCED WITH NO. 4 ROUND BARS @ 18 INCHES ON CENTER EACH WAY. ALL CONCRETE LINING SHALL DEVELOP A MINIMUM COMPRESSIVE STRENGTH OF NOT LESS THAN THREE THOUSAND (3000) POUNDS PER SQUARE INCH IN TWENTY EIGHT (28) DAYS. THE DEPTH OF ALL TOEDOWNS SHALL BE 36 INCHES UPSTREAM, 24 INCHES DOWNSTREAM, AND 18 INCHES OF SIDE SLOPES.
 - IMPROVED EARTHEN CHANNELS AND DETENTION PONDS WILL BE VEGETATED BY SEEDING OR SODDING. EIGHTY-FIVE PERCENT OF THE CHANNEL SURFACE AREA MUST HAVE ESTABLISHED VEGETATION BEFORE THE CITY OF SAN ANTONIO WILL ACCEPT THE CHANNEL FOR MAINTENANCE.
 - REFER TO SHEETS 5.12 & 5.13 FOR DRAINAGE DETAILS.

GRACE GARDENS SUBDIVISION UNIT 1
LAND-PLAT-23-11800410
DRAIN 'F'
STA 1+00 TO STA 7+00 PLAN & PROFILE

REVISIONS		DATE	BY	DESCRIPTION
NO.				
1		9/8/2023		
2				
3				
4				
5				
6				
7				
8				
9				
10				

DATE: 9/8/2023
DESIGNED BY:
DRAWN BY:
CHECKED BY: RG
DRAWING NAME: sh_annotated\Draw_T1.dwg
06/10/2024

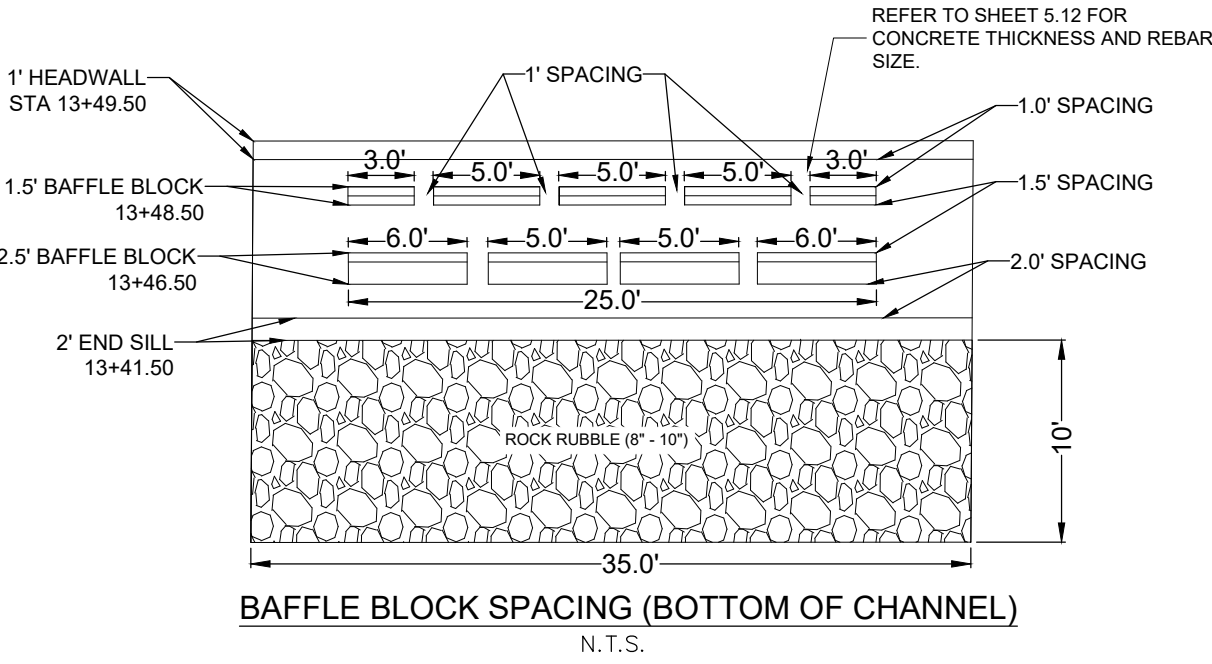
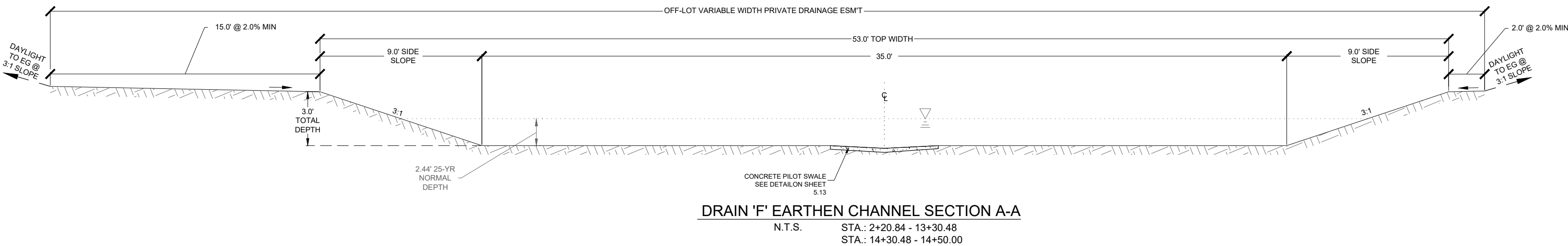
OF
RICHARD W. GRAY III
REGISTERED
PROFESSIONAL ENGINEER
15817

LJA Engineering, Inc.
9830 Colonnade Blvd
Suite 300
San Antonio, Texas 78230
Phone 210.503.2700
LJA.COM
TBP# No. F-1386

JOB NUMBER:
SA202-0401B-426

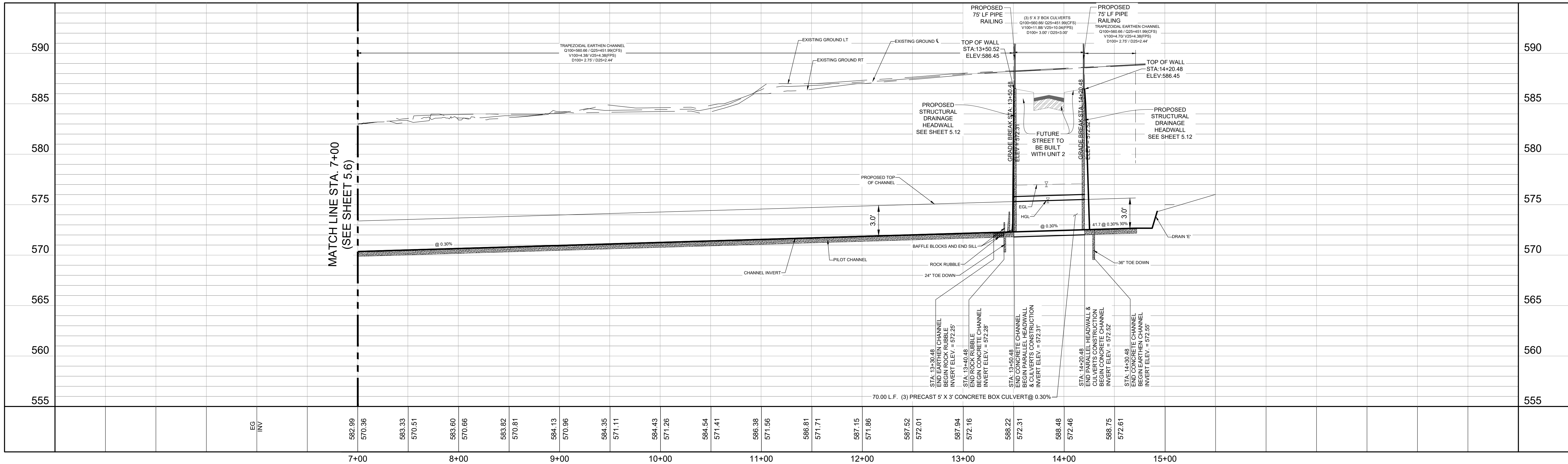
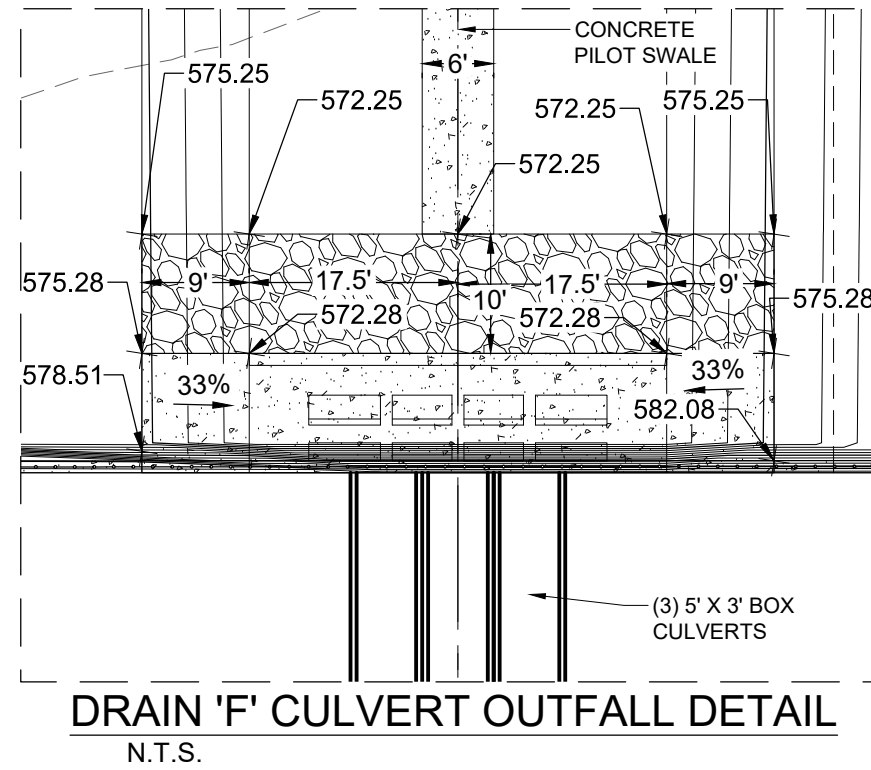
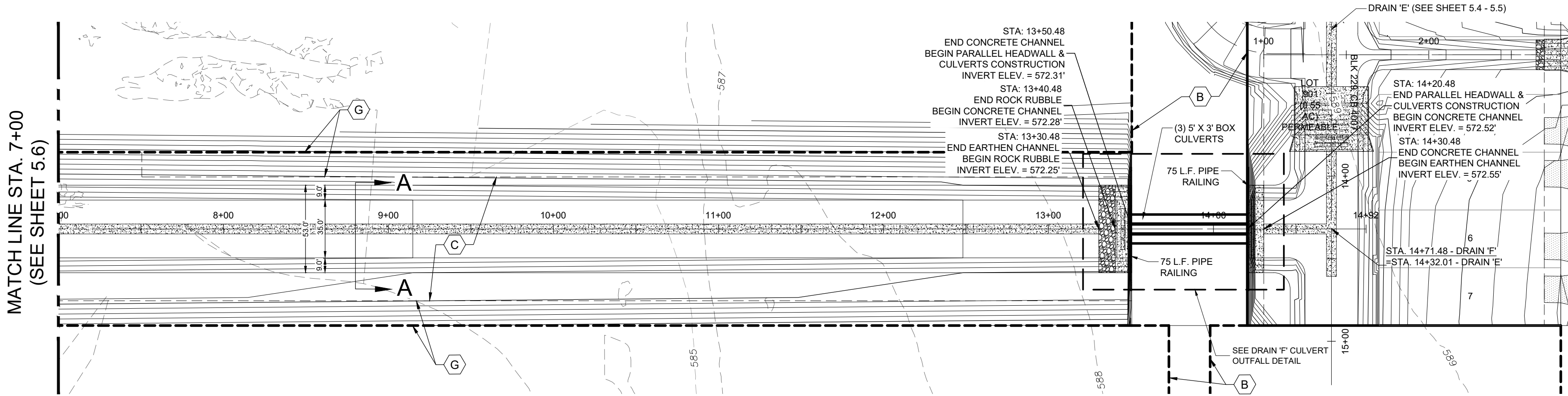
SHEET NO.
5.6
OF SHEETS

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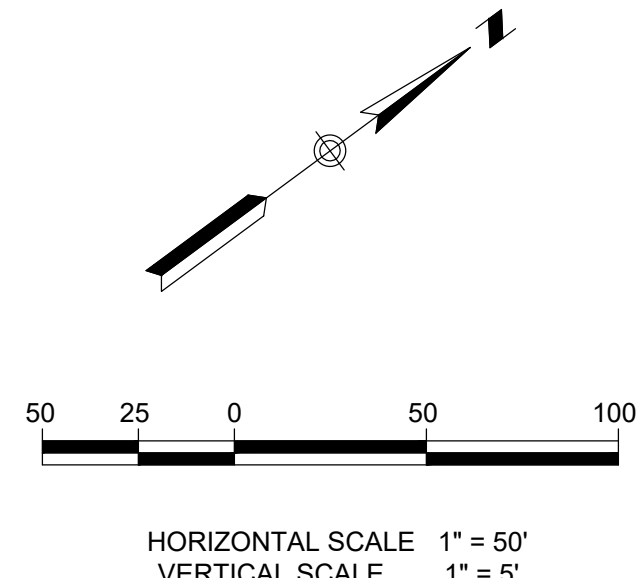


Baffle Calculations	
V _L	10.04 ft/sec
Y _L	2.3 ft
Length of Basin =	10.5 ft
Width of Basin =	35 ft
First Baffle:	
Distance to First Block =	1 ft
Height =	1 ft
Top Width =	0.5 ft
Total Width =	1.5 ft
Second Baffle:	
Distance to Second Block =	1.5 ft
Height =	2 ft
Top Width =	0.5 ft
Total Width =	2.5 ft
End Sill:	
Distance to End Sill from Second Block =	2 ft
Height =	1.00 ft
Exist Depth =	2.67 ft
Exit Velocity =	4.49 ft/sec

DRAIN 'F' (SECTION A-A)			
$\tau_d = \gamma R S$	Retardance Class 'D' Vegetation (Bermuda Grass 2.5 in)	$\tau_d =$	0.38 lb/ft ²
τ_d	= average shear stress at normal depth	$\tau_d =$	0.38 lb/ft ²
γ	= unit weight of water		62.4 lb/ft ³
R	= hydraulic radius		2.05 ft
S	= channel slope		S = 0.30%



- (A) 10' G.E.T.CA. ESMT
- (B) OFF-LOT PERMEABLE VARIABLE WIDTH UTILITY ESMT TO EXPIRE UPON INCORPORATION OF FUTURE STREET R.O.W. (1.92 ACRES)
- (C) OFF-LOT VARIABLE WIDTH PRIVATE DRAINAGE ESMT (2.86 ACRES, PERMEABLE)
- (D) 5' R.O.W. DEDICATION (0.102 ACRES)
- (E) 5' G.E.T.CA. ESMT
- (F) 1' V.N.A.E. ESMT
- (G) OFF-LOT 15' GRADING ESMT (0.486 ACRES)
- (A) VARIABLE WIDTH ELECTRIC EASEMENT (VOL 7517, PGS. 863-867 OPR)



LEGEND

- PROPOSED CONTOUR
- FLOW ARROW
- GRASSED DRAIN FLOW
- PROPOSED STREET GRADE
- EXISTING GROUND LEFT
- EXISTING GROUND CENTERLINE
- EXISTING GROUND RIGHT
- SIDEWALK (HOMEOWNER'S RESPONSIBILITY)
- SIDEWALK (DEVELOPER'S RESPONSIBILITY)
- G.E.T.CA
- BSL
- ESMT
- LT
- RT

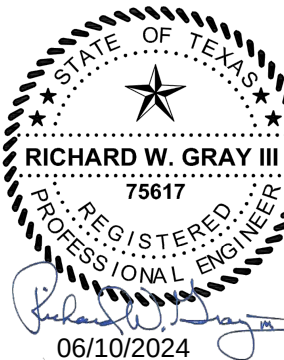
GENERAL NOTES:

- ALL CONCRETE LINING SHALL BE A MINIMUM OF FIVE (5) INCHES THICK AND REINFORCED WITH NO. 4 ROUND BARS @ 18 INCHES ON CENTER EACH WAY. ALL CONCRETE LINING SHALL DEVELOP A MINIMUM COMPRESSIVE STRENGTH OF NOT LESS THAN THREE THOUSAND (3000) POUNDS PER SQUARE INCH IN TWENTY EIGHT (28) DAYS. THE DEPTH OF ALL TOEDOWNS SHALL BE 36 INCHES UPSTREAM, 24 INCHES DOWNSTREAM, AND 18 INCHES OF SIDE SLOPES.
- IMPROVED EARTHEN CHANNELS AND DETENTION PONDS WILL BE VEGETATED BY SEEDING OR SODDING. EIGHTY-FIVE PERCENT OF THE CHANNEL SURFACE AREA MUST HAVE ESTABLISHED VEGETATION BEFORE THE CITY OF SAN ANTONIO WILL ACCEPT THE CHANNEL FOR MAINTENANCE.
- REFER TO SHEETS 5.12 & 5.13 FOR DRAINAGE DETAILS.

GRACE GARDENS SUBDIVISION UNIT 1
LAND-PLAT-23-11800410
DRAIN 'F'
STA 7+00 TO END PLAN & PROFILE

REVISIONS		DATE	BY	DESCRIPTION
NO.				
1		9/8/2023		

DATE	DESIGNED BY	CHECKED BY	DRAWING NAME
9/8/2023		RG	sh_Infrastructure Drain 'F'.dwg



LJA Engineering, Inc.
9830 Colonnade Blvd
Suite 300
San Antonio, Texas 78230
Phone 210.503.2700
LJA.COM
TBP# No. F-1386

JOB NUMBER:
SA202-0401B-426

SHEET NO.

5.7

OF - SHEETS

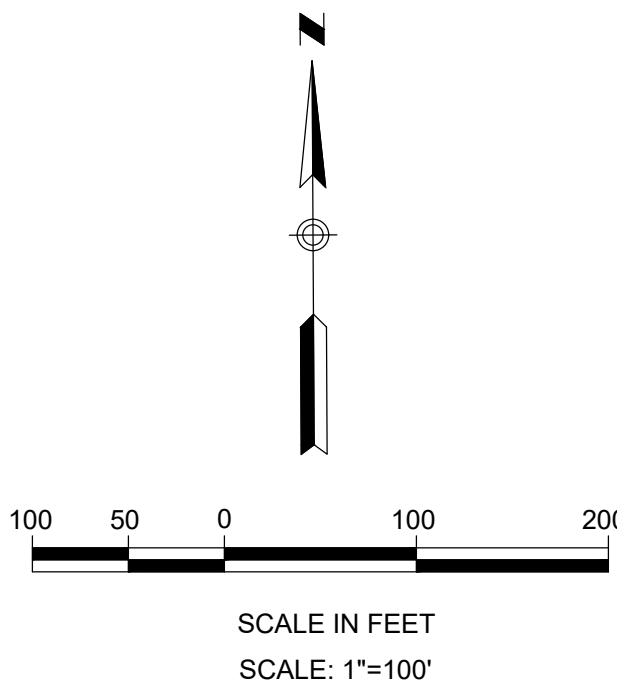
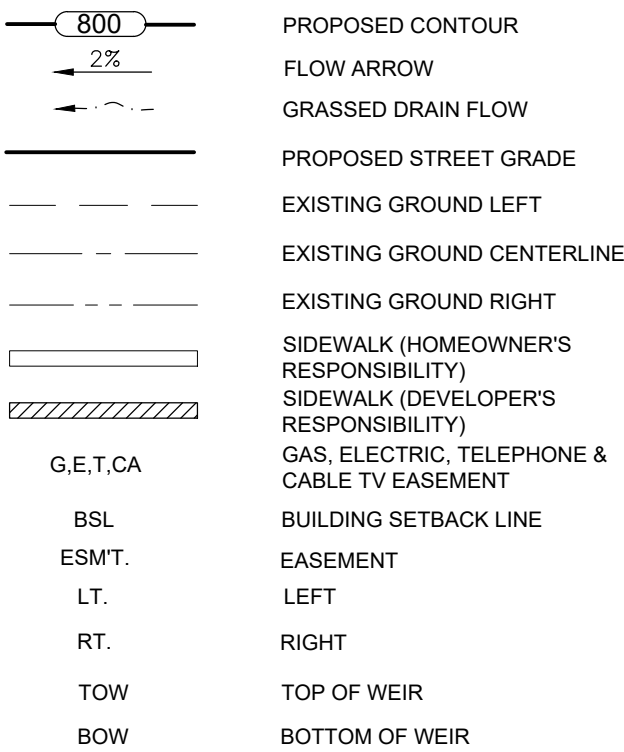


POND OUTFALL
(SEE SHEET 5.11)

Temporary Condition Run off Summary									
Point of analysis	Storm event	Existing flow (cfs)	Ultimate with Detention (cfs)	Detention Storage (ACRE- FT)	detention storage (cf)	Proposed Flow with detention (cfs)	Water Surface Elevation (ft)	Ultimate Analysis Point Flow with detention (cfs)	Net Change (cfs) (Ultimate - Exist)
EXIST: OFF-SITE POND - ULTIMATE FLOWS									
A1	1yr	498.20	63.50	39.1	1,703,196	63.50	560.00	494.20	-4.0
A1	5yr	1003.60	81.20	60.6	2,639,736	63.50	561.30	889.20	-114.40
A1	25yr	1697.90	102.80	97.7	4,255,812	65.50	563.20	1414.50	-283.4
A1	100yr	2365.40	121.50	141.3	6,155,028	79.50	565.30	1912.20	-453.20

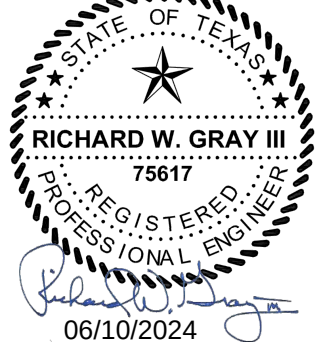
- GENERAL NOTES:**
- 1) CONTRACTOR SHALL PHASE CONSTRUCTION AND/OR PROVIDE NECESSARY BMPs TO MITIGATE INTERIM CONDITIONS RUNOFF DURING CONSTRUCTION DUE TO CLEARING, GRADING, SUBGRADE PREPARATION, PAVING, BUILDINGS, ETC., AND TO PREVENT ADVERSE IMPACTS TO OTHER PROPERTY, STRUCTURES, AND INFRASTRUCTURE DURING CONSTRUCTION.
 - 2) DETENTION POND EXCAVATION AND/OR EMBANKMENT NECESSARY FOR PROVIDING STORAGE MUST BE SUBSTANTIAL AND COMPLETE PRIOR TO CITY INSPECTION OF STRUTTED SUBGRADE, CURB, FLEX BASE, AND PAVEMENT WITHIN THE WATERSHED DRAINING TO THE DETENTION POND.

LEGEND



GRACE GARDENS SUBDIVISION UNIT 1
LAND-PLAT-23-11800410
EXISTING DRAINAGE BASIN

REVISIONS		NO.	DESCRIPTION	BY	DATE
DATE: 9/9/2023					
DESIGNED BY:					
DRAWN BY:					
CHECKED BY: RG					
DRAWING NAME: 10. Contractor - Pond.dwg					



LJA Engineering, Inc.

9830 Colonnade Blvd
Suite 300
San Antonio, Texas 78230

LJA

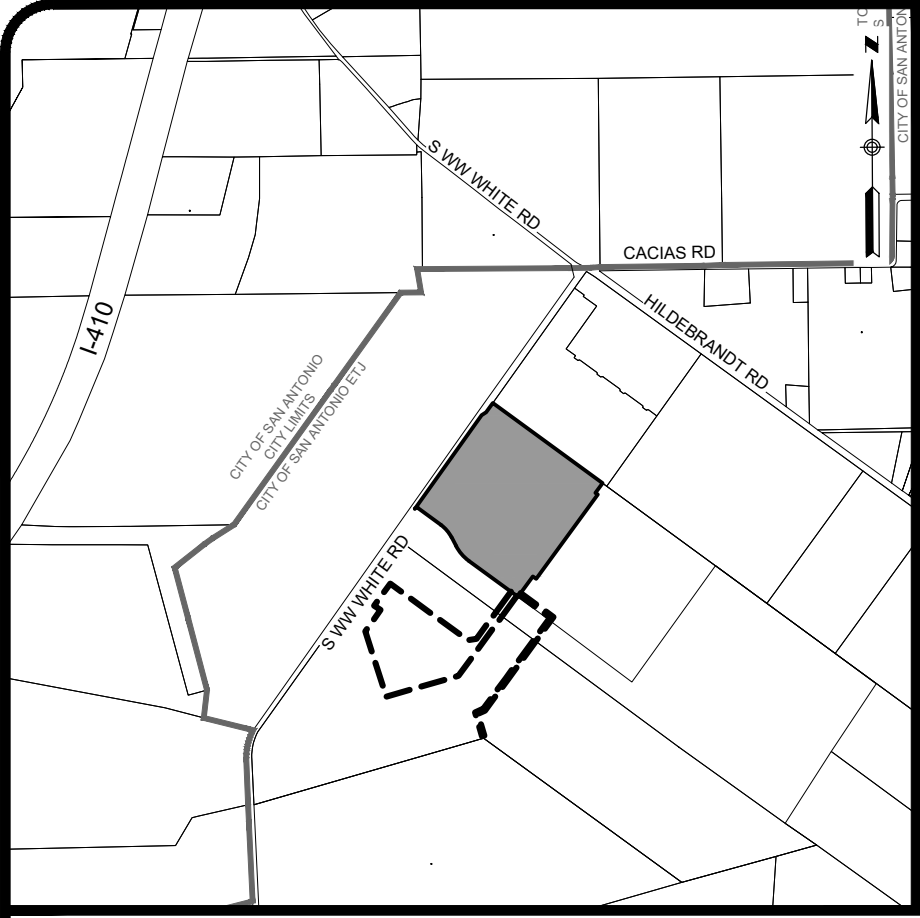
Phone 210.503.2700
LJA.COM
TBPE No. F-1386

JOB NUMBER:
SA202-0401B-426

SHEET NO.

5.8

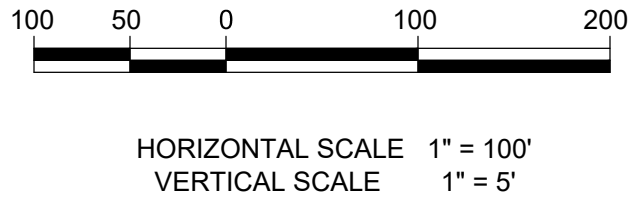
OF - SHEETS,



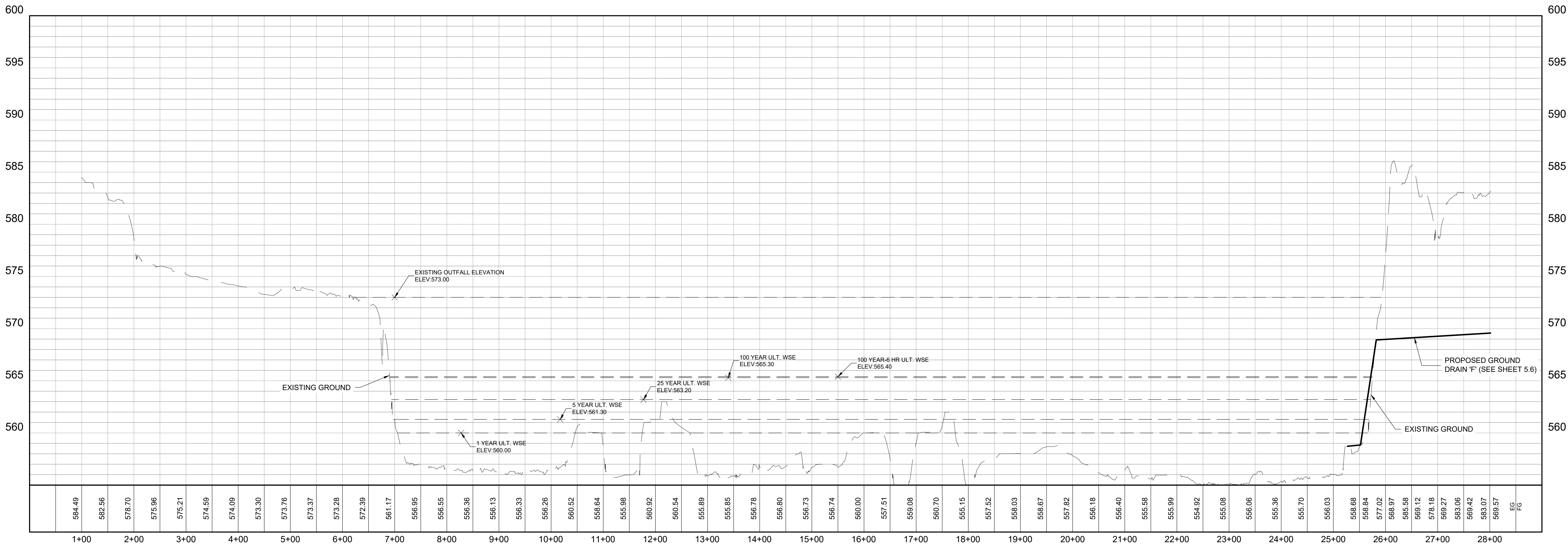
LOCATION MAP
N.T.S.

GENERAL NOTES:

- 1) CONTRACTOR SHALL PHASE CONSTRUCTION AND/OR PROVIDE NECESSARY BMP'S TO MITIGATE INTERIM CONDITIONS RUNOFF DURING CONSTRUCTION DUE TO CLEARING, GRADING, SUBGRADE PREPARATION, PAVING, BUILDINGS, ETC., AND TO PREVENT ADVERSE IMPACTS TO OTHER PROPERTY, STRUCTURES, AND INFRASTRUCTURE DURING CONSTRUCTION.
- 2) DETENTION POND EXCAVATION AND/OR EMBANKMENT NECESSARY FOR PROVIDING STORAGE MUST BE SUBSTANTIALLY COMPLETE PRIOR TO CITY INSPECTION OF STREET SUBGRADE, CURB, FLEX BASE, AND PAVEMENT WITHIN THE WATERSHED DRAINING TO THE DETENTION POND.



EXISTING BASIN SECTION A-A



GRACE GARDENS SUBDIVISION UNIT 1
LAND-PLAT-23-11800410
EXISTING DRAINAGE BASIN PROFILE

REVISIONS		NO.	DESCRIPTION	BY	DATE

DATE: 9/8/2023

DESIGNED BY:

DRAWN BY:

CHECKED BY: RG

DRAWING NAME: 01B Detention Pond.dwg

LJA Engineering, Inc.
9830 Colonnade Blvd
Suite 300
San Antonio, Texas 78230
Phone 210.503.2700
LJA.COM
TPE No. F-1386

JOB NUMBER:
SA202-0401B-426

SHEET NO.
5.9

OF - SHEETS

POND OUTFALL EARTHEN CHANNEL
N.T.S. STA: 1+53.43 - 1+67.65

POND OUTFALL CONCRETE CHANNEL
N.T.S. STA: 1+67.65 - 1+77.65

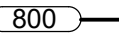
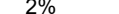
GENERAL NOTES:

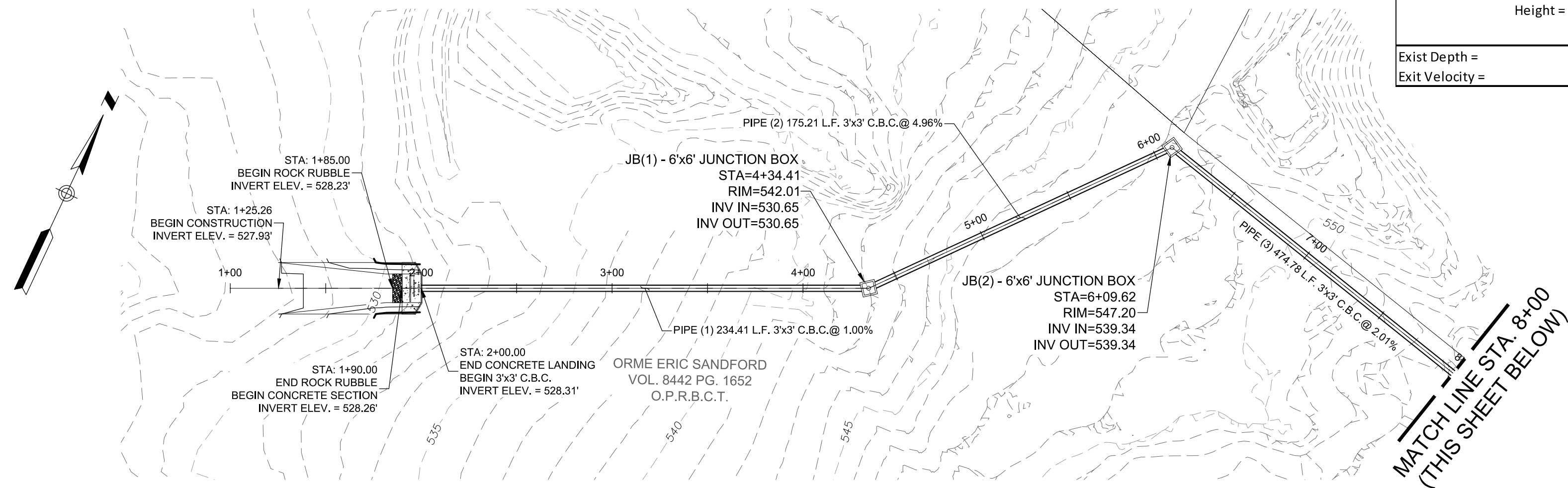
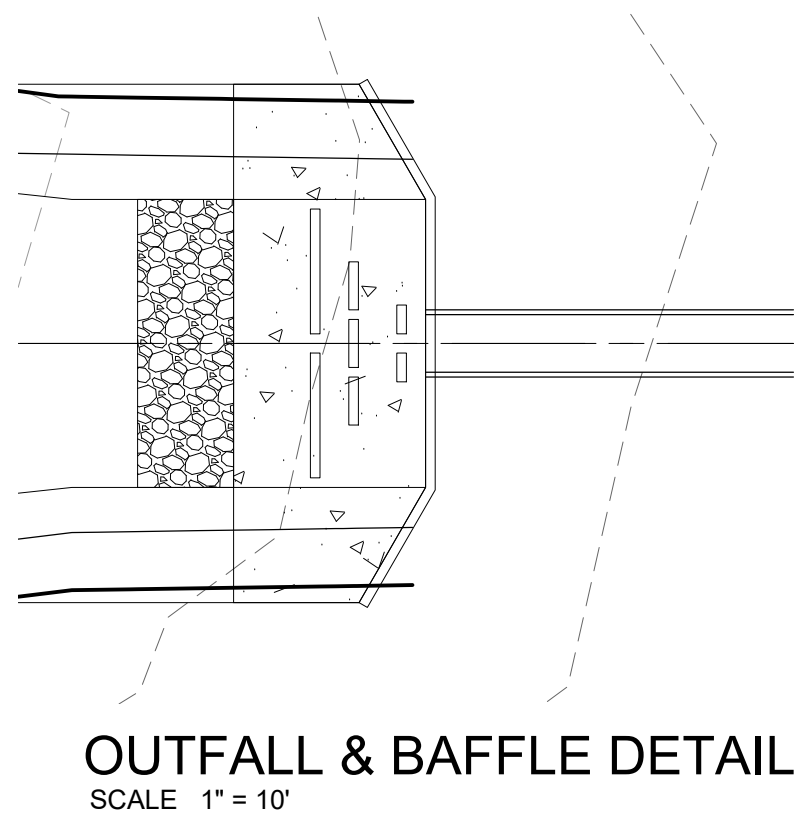
1. ALL CONCRETE LININGS SHALL BE A MINIMUM OF FIVE (5) INCHES THICK AND REINFORCED WITH NO. 4 ROUND BARS @ 18 INCHES ON CENTER EACH WAY. ALL CONCRETE LINING SHALL DEVELOP A MINIMUM CLOSING STRENGTH OF NOT LESS THAN THREE THOUSAND (3000) POUNDS PER SQUARE INCH IN TWENTY EIGHT (28) DAYS. THE DEPTH OF ALL TOEDRIPS SHALL BE 36 INCHES UPSTREAM, 24 INCHES DOWNSTREAM, AND 18 INCHES OF SIDE SLOPES.
2. IMPROVED EARTHEN CHANNELS AND DETENTION PONDING WILL BE VEGETATED BY SEEDING OR SODS. EIGHTY-FIVE PERCENT OF THE CHANNEL BEDFACE AREA SHALL BE COVERED BY ESTABLISHED VEGETATION BEFORE THE CITY OF SAN ANTONIO WILL ACCEPT THE CHANNEL FOR MAINTENANCE.
3. REFER TO SHEETS 5.12 & 5.13 FOR DRAINAGE DETAILS.



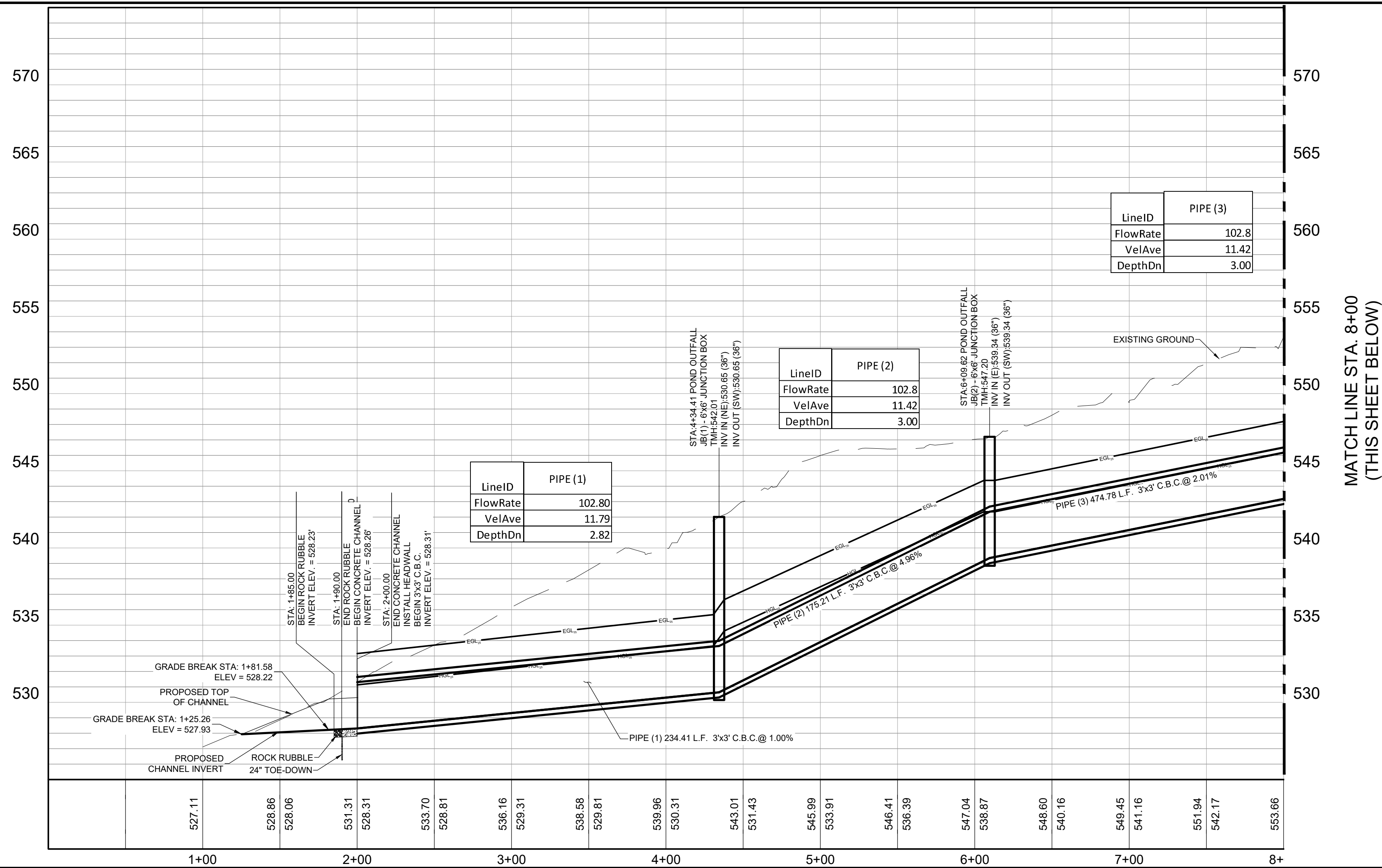
HORIZONTAL SCALE 1" = 50'

VERTICAL SCALE 1" = 5'

LEGEND	
	PROPOSED CONTOUR
	FLOW ARROW
	GRASSED DRAIN FLOW
	PROPOSED STREET GRADE
	EXISTING GROUND LEFT
	EXISTING GROUND CENTERLINE
	EXISTING GROUND RIGHT
	SIDEWALK (HOMEOWNER'S RESPONSIBILITY)
	SIDEWALK (DEVELOPER'S RESPONSIBILITY)
G.E.T. CA	GAS, ELECTRIC, TELEPHONE & CABLE TV EASEMENT
BSL	BUILDING SETBACK LINE
ESM.T.	EASEMENT
LT.	LEFT
RT.	RIGHT



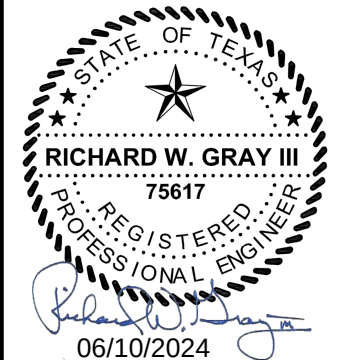
MATCH LINE STA. 8+00
(THIS SHEET BELOW)



User: nrbmsr
 Last Modified: Jun. 07, 24 - 16:23
 Plot Date/Time: Jun. 10, 24 - 12:07:28

GRACE GARDENS SUBDIVISION UNIT 1
LAND-PLAT-23-11800410
POND OUTFALL
STA 1+00 TO 8+00 PLAN & PROFILE

DATE: 9/8/2023	REVISIONS		
DESIGNED BY: _____	NO.	DESCRIPTION	BY DATE
DRAWN BY: _____			
CHECKED BY: _____			
DRAWING NAME: _____			
30" Round Outfall drop			



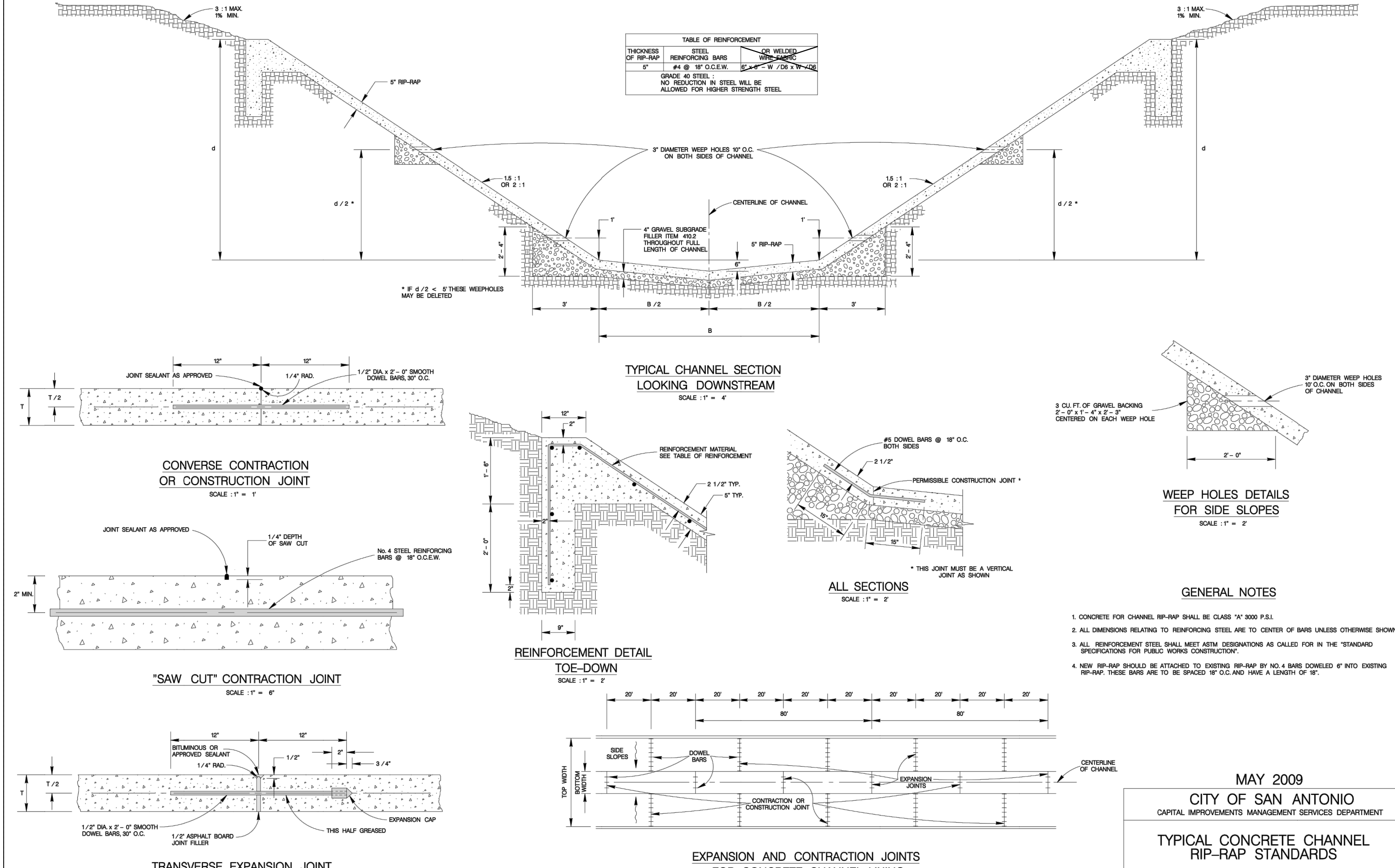
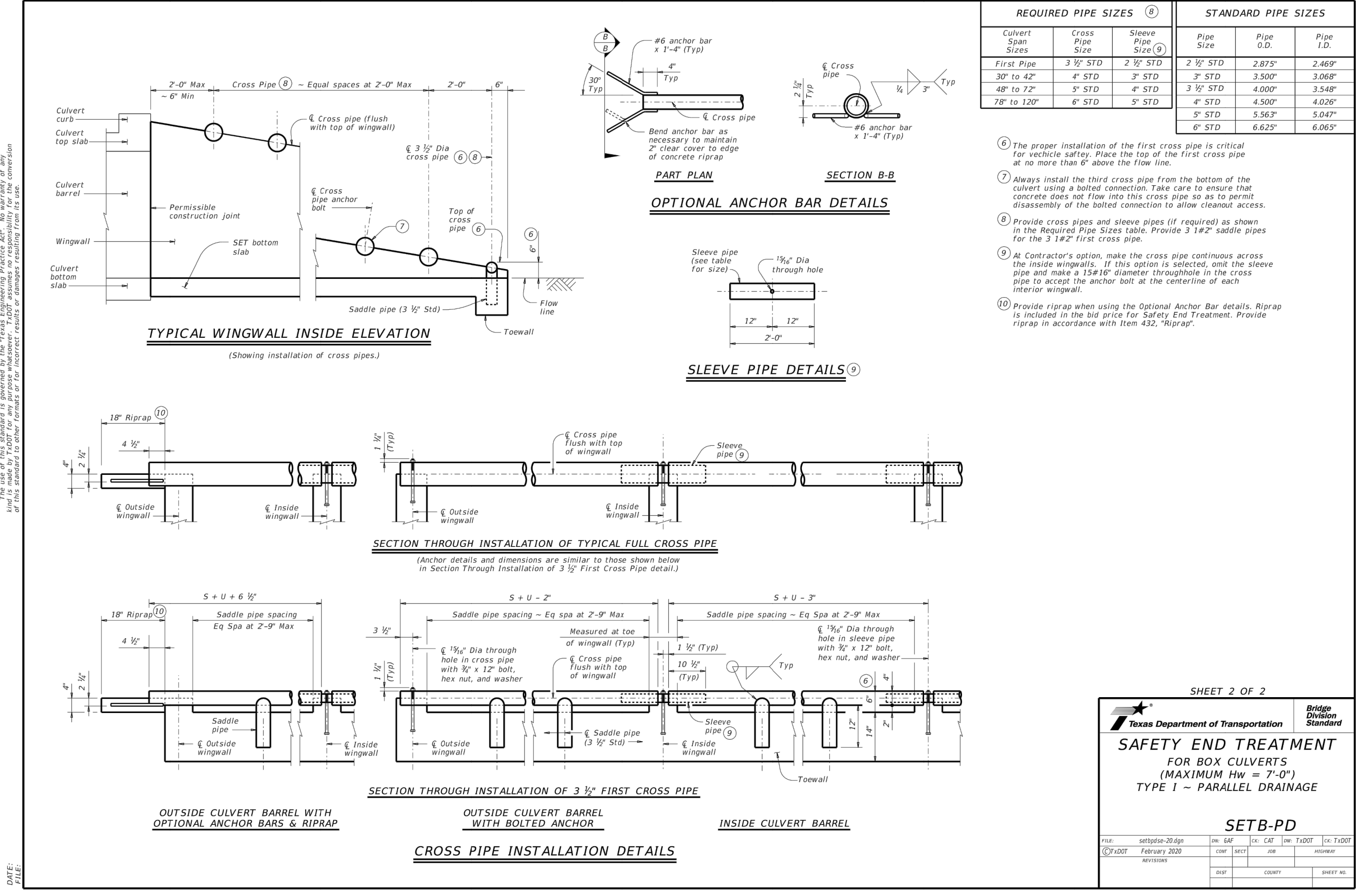
LJA Engineering, Inc.
9830 Colonnade Blvd
Suite 300
San Antonio, Texas 78230
Phone 210.503.2700
LJA.COM
TBPE No. F-1386

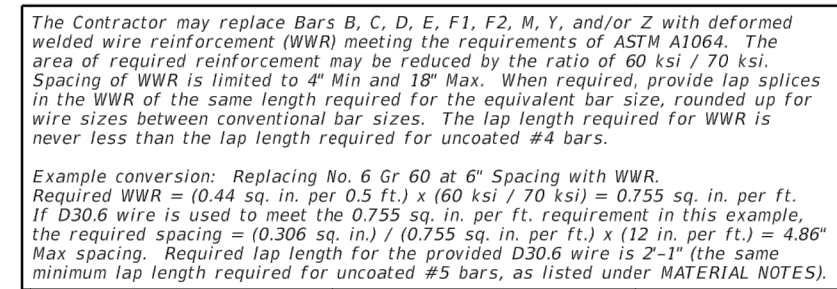
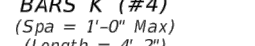
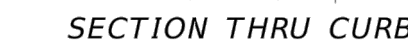
JOB NUMBER:
SA202 0401B 426

SHEET NO.

5.11

OF - SHEETS





CONSTRUCTION NOTES:

Optionally, raise construction joints shown at the flow line by a maximum of 6". If this option is taken, Bars M may be cut off or raised, Bars C and D may be reverse

MATERIAL NOTES:

- Provide Grade 60 reinforcing steel.
- Provide galvanized reinforcing steel if required elsewhere in the plans.
- Provide Class C concrete ($f'_c = 3600$ psi) for culvert barrel and curb, with the following exceptions: provide Class S concrete ($f'_c = 4000$ psi) for top slabs of:
 - culverts with overlay
 - culverts with top-to-2-course surface treatment, or
 - culverts with the top slab as the final riding surface.
- Provide bar laps, where required, as follows:
 - Uncoated or galvanized – #4 = 1'-8" Min
 - Uncoated or galvanized – #5 = 2'-1" Min
 - Uncoated or galvanized – #6 = 2'-6" Min

GENERAL NOTES:
 Designed according to AASHTO LRFD Bridge Design Specifications for the range of fill heights shown.
 See also Sample Box Culverts Cast-In-Place Miscellaneous Detail (SCC-MD) standard sheet for details pertaining to skewed ends, angle sections, and lengthening.
 Cover dimensions are clear dimensions, unless noted otherwise.
 Reinforcing bar dimensions shown are out-to-out of bar.

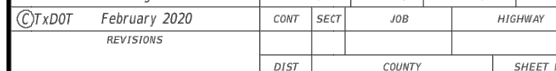
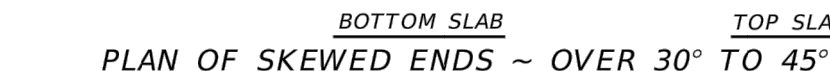


CONSTRUCTION NOTES:
Do not use permanent forms.
When required, lap Bars H 1'-8" for uncoated or galvanized bars.
Provide a minimum of 1 1/2" clear cover.

MATERIAL NOTES:
Provide Grade 60 reinforcing steel.
Provide galvanized reinforcing steel, if required elsewhere in the
Provide Class C concrete ($f'_c = 3,600$ psi) with these exceptions:
provide Class S concrete ($f'_c = 4,000$ psi) for top slabs of culverts w/
overlay, with 1-to-2 course surface treatment, or with the top slab a
final riding surface.

GENERAL NOTES:
Designed according to AASHTO LRFD Bridge Design Specifications.
Refer to Multiple Box Culverts Cast-in-Place (MC) standard sheets for details of straightaways.
For skewed sections and angle sections, refer to Multiple Box Culverts Cast-in-Place (MC) standard sheets for slab and wall dimensions, bar maximum bar spacing, and any other details not shown.
For skewed ends with curbs, adjust length of Bars H, number of Bars H, and volume and reinforcing steel weight by dividing the value shown on the Multiple Box Culverts Cast-in-Place (MC) standard sheet by the cosine of the skew angle.

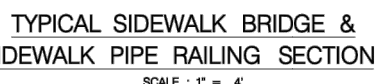
Cover dimensions are clear dimensions, unless noted otherwise.



BILLS OF REINFORCING STEEL (For Box Length = 40 feet)

QUANTITIES

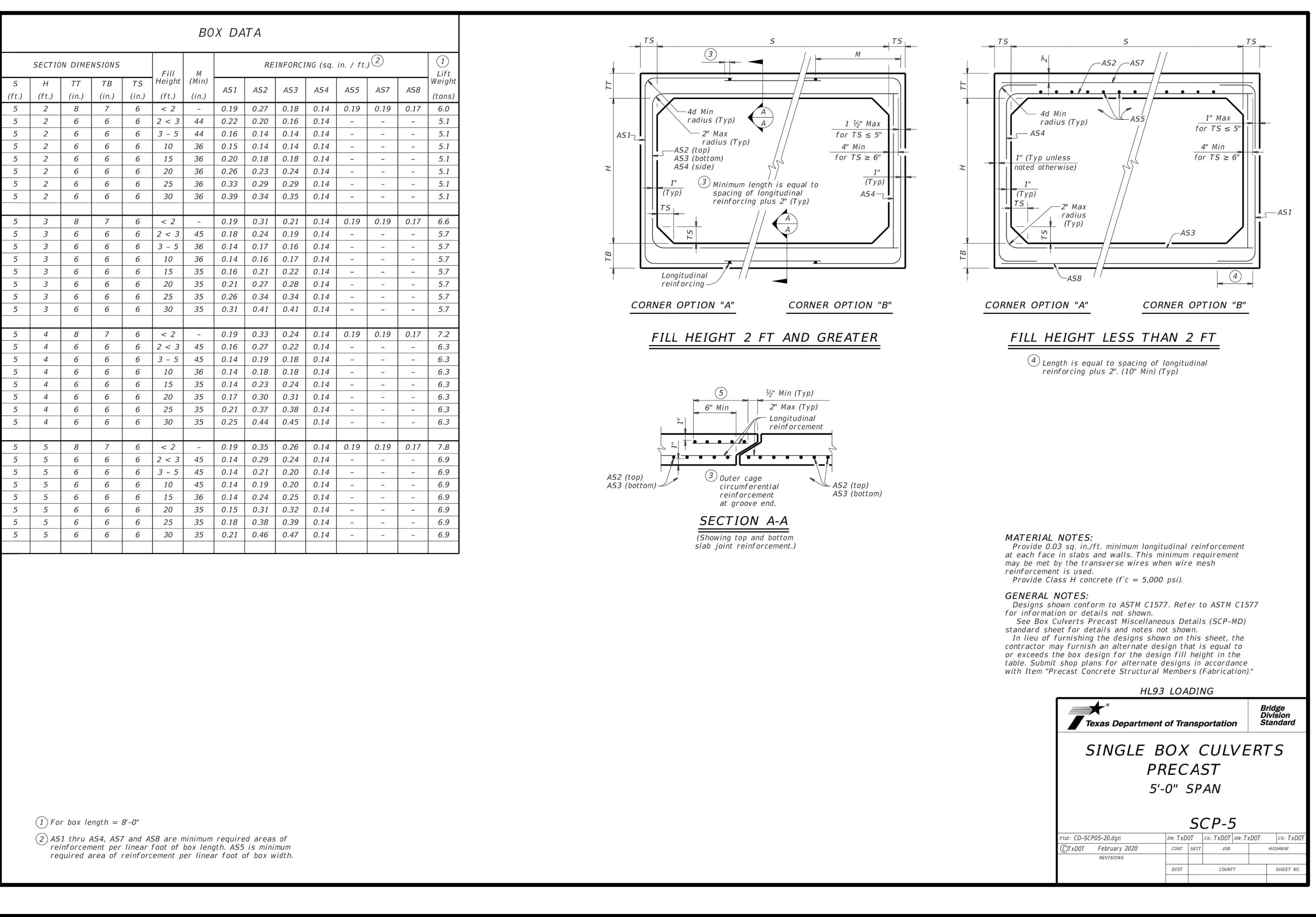
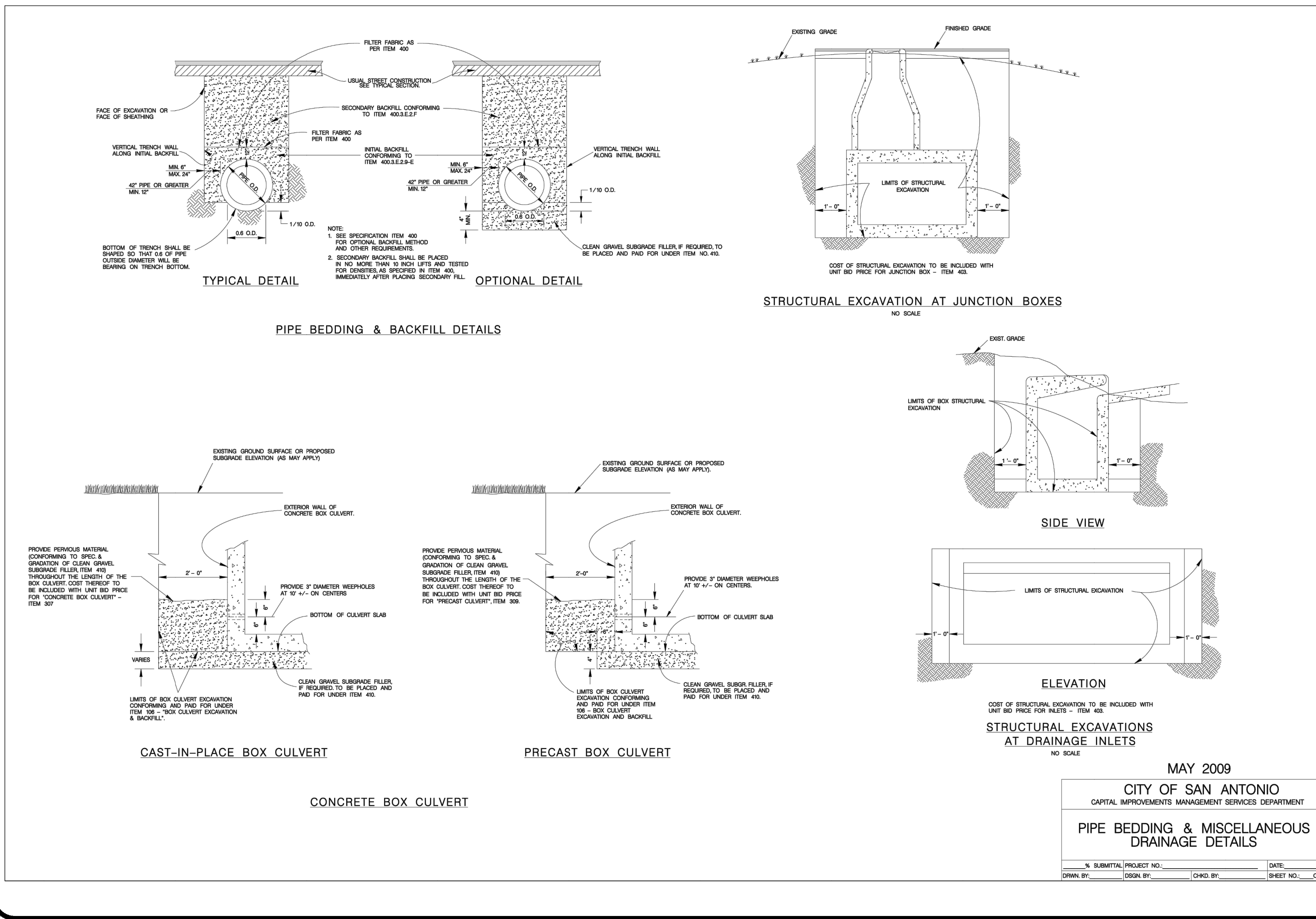
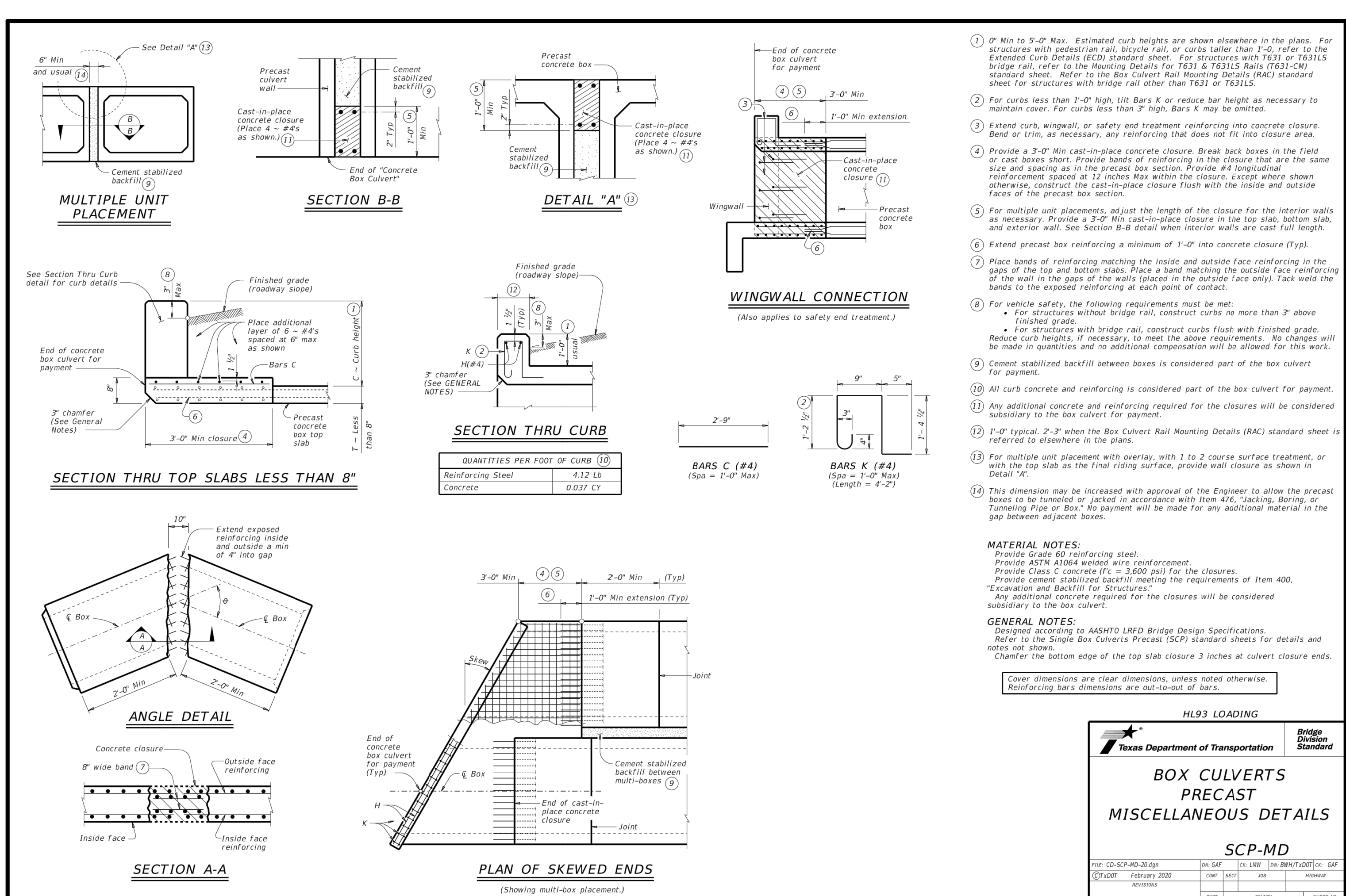
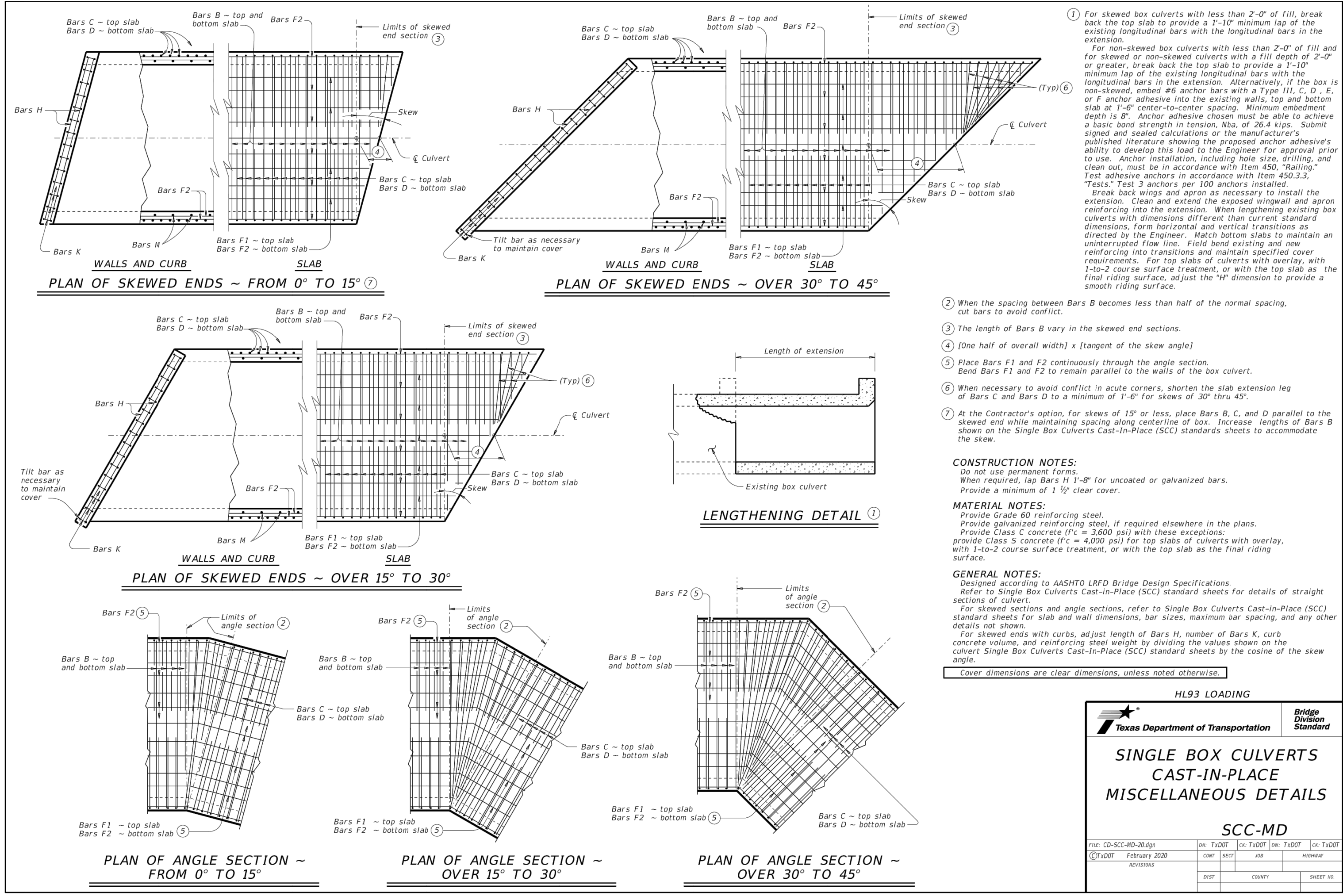
⑤ For direct traffic culverts (II height ≤ 2 ft.), identify the required box size and select the option with the minimum II height.



CONCRETE PILOT CHANNEL
N.T.S.

DRAIN 'E' CULVERT OUTFALL DETAIL (SHEET 5.5)

N.T.S



GRACE GARDENS SUBDIVISION UNIT 1

LAND-PLAT-23-11800410

DRAINAGE DETAILS (SHEET 3 OF 3)

DATE: 9/8/2023

BY: [Signature]

REVISIONS

DESCRIPTION

NO. 1

DATE: 9/8/2023

DESIGNED BY: [Signature]

DRAWN BY: [Signature]

CHECKED BY: [Signature]

DRAWING NAME: [Signature]

APPROVED BY: [Signature]

06/10/2024

REGISTERED PROFESSIONAL ENGINEER

RICHARD W. GRAY III

15817

LJA Engineering, Inc.

9830 Colomado Blvd

Suite 300

San Antonio, Texas 78230

Phone 210.503.2700

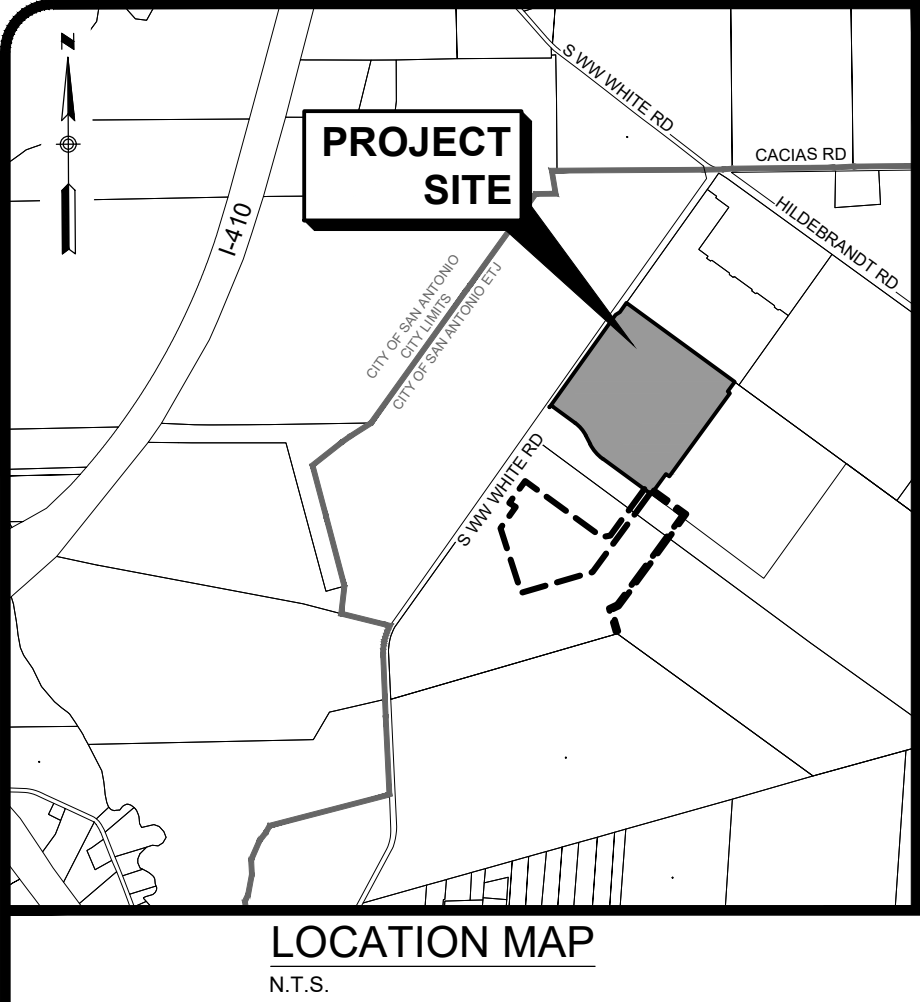
LJA.COM

TSPE No. F-1386

JOB NUMBER: SA202-04018-426

SHEET NO. 5.14

OF SHEETS



GENERAL SPECIFICATIONS FOR SITE PREPARATION

GENERAL DESCRIPTION

THE ITEM SHALL CONSIST OF ALL CLEARING AND PREPARATION OF LAND TO BE FILLED, FILLING OF THE LAND, SPREADING, COMPACTION TESTING AND INSPECTION OF THE FILL, AND ALL SUBSIDIARY WORK NECESSARY TO COMPLETE THE GRADING OF THE CUT AND FILL AREAS TO CONFORM WITH THE LINES, GRADES AND SLOPES AS SHOWN ON THE APPROVED PLANS.

SCARIFYING THE AREA TO BE FILLED

ALL ORGANIC MATTER SHALL BE REMOVED FROM THE SURFACE UPON WHICH THE FILL IS TO BE PLACED, AND SURFACE SHALL THEN BE DISKED OR SCARIFIED TO A MINIMUM DEPTH OF SIX INCHES (6"). ALL SURFACE RUTS OR OTHER UNEVEN FEATURES WILL BE LEVELED PRIOR TO FIELD DENSITY TESTING.

COMPACTING THE AREA TO BE FILLED

FOLLOWING THE CLEARING AND DISKING OR SCARIFYING OF THE FILL AREA, IT SHALL BE BLADED UNTIL IT IS UNIFORM AND FREE FROM LARGE CLODS. THE AREA SHALL BE BROUGHT TO THE ADEQUATE MOISTURE CONTENT AND COMPACTED (TYPICALLY) TO NOT LESS THAN NINETY PERCENT (90%) OF MAXIMUM DENSITY IN ACCORDANCE WITH THE CURRENT ASTM D 1557 COMPACTION PROCEDURE, OR 95% OF MAXIMUM DENSITY IN ACCORDANCE WITH THE CURRENT TxDOT TEX-113-E COMPACTION PROCEDURE.

FILL MATERIALS

THE MATERIALS USED SHALL BE FREE FROM ORGANIC MATTER AND OTHER DELETERIOUS SUBSTANCES, SUCH AS TREES, BRUSH AND RUBBISH.

DEPTH AND MIXING OF FILL LAYERS

THE SELECTED FILL MATERIAL SHALL BE PLACED IN LEVEL, UNIFORM LAYERS WHICH, WHEN COMPACTED, SHALL HAVE A DENSITY CONFORMING TO THE STIPULATED ABOVE. EACH LAYER SHALL BE THOROUGHLY MIXED DURING THE SPREADING TO ENSURE UNIFORMITY OF MATERIAL IN EACH LAYER. COMPACTED LAYER THICKNESS MAY VARY DEPENDING ON THE COMPACTION EQUIPMENT OF THE DEMONSTRATED CAPABILITY. THE MAXIMUM LOOSE DEPTH FOR ANY MATERIAL SHALL NOT EXCEED TWELVE INCHES (12").

ROCK

WHEN FILL MATERIAL INCLUDES ROCK, THE MAXIMUM ROCK SIZE SHALL BE AS APPROVED BY THE GEOTECHNICAL ENGINEER. NO LARGE ROCKS SHALL BE ALLOWED TO NEST AND ALL VOIDS MUST BE FILLED WITH SMALL STONES OR SOIL AND ADEQUATELY COMPACTED. NO LARGE ROCKS WILL BE PERMITTED WITHIN EIGHTEEN INCHES (18") OF THE FINISHED GRADE.

COMPACTION OF FILL LAYER

COMPACTION EQUIPMENT SHALL BE CAPABLE OF COMPACTING THE FILL TO THE SPECIFIED DENSITY. COMPACTION SHALL BE ACCOMPLISHED WHILE THE FILL MATERIAL IS AT OR NEAR THE APPROPRIATE MOISTURE CONTENT. COMPACTION OF EACH LAYER SHALL BE CONTINUOUS OVER THE ENTIRE STRUCTURAL AREA (BENEATH PROPOSED STRUCTURES).

DENSITY TEST

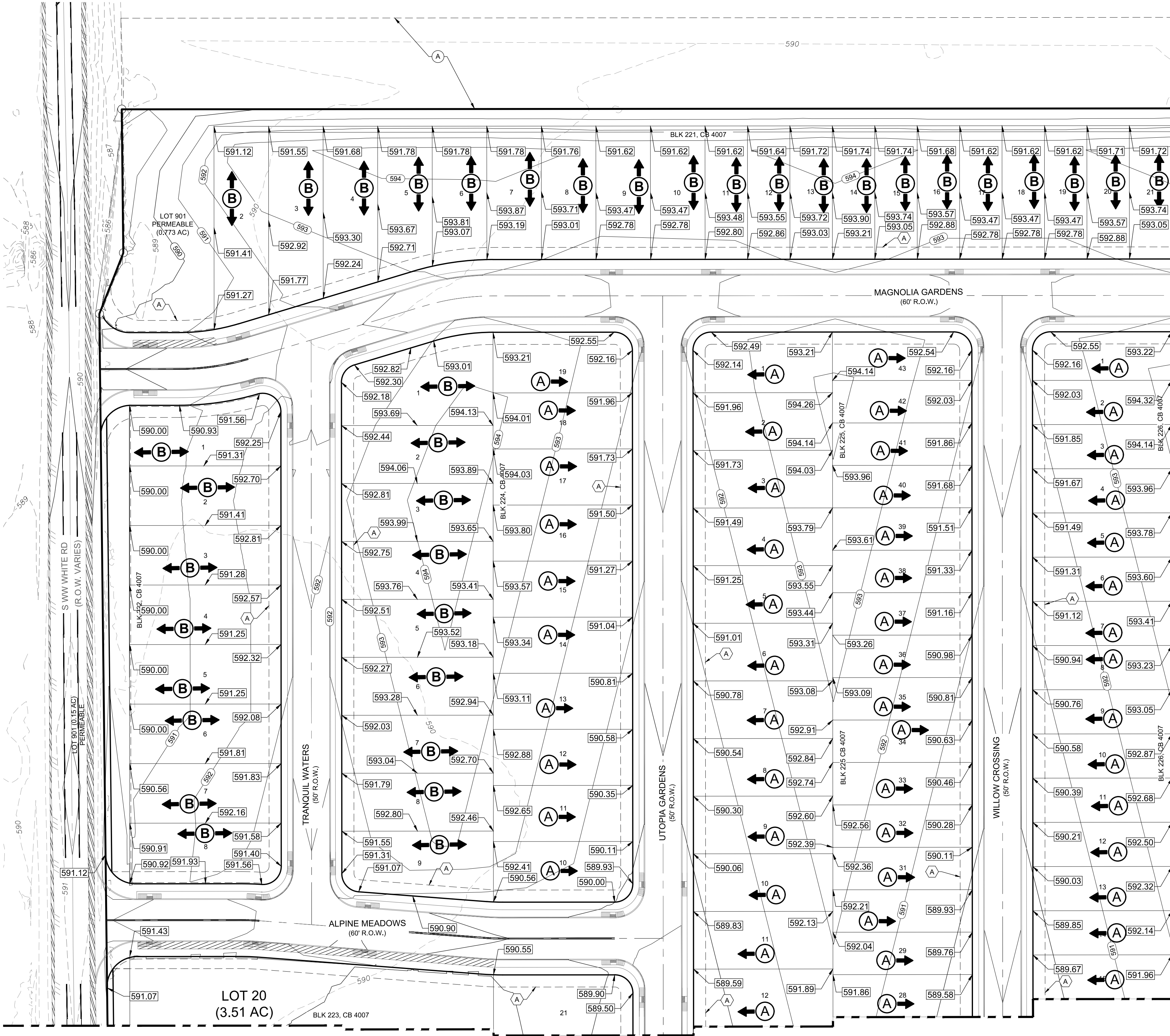
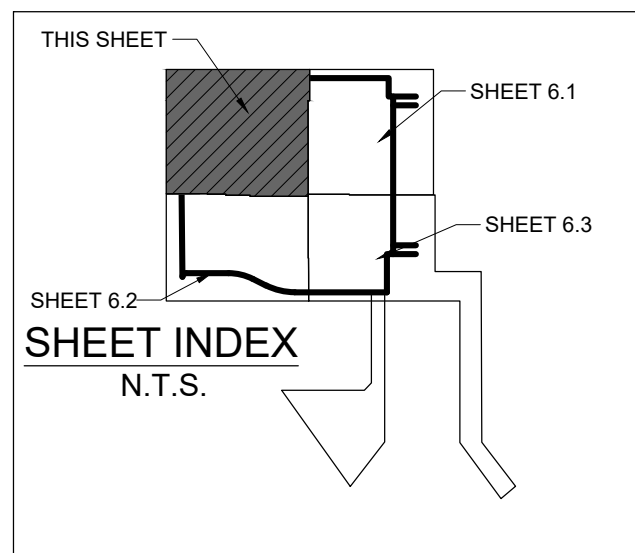
FIELD DENSITY TESTS SHALL BE PERFORMED ON LAYERS OF FILL WHEN THE FILL IS BEING PLACED AS DIRECTED BY THE GEOTECHNICAL ENGINEER. THE MAXIMUM FILL HEIGHT BETWEEN DENSITY TESTING SHALL BE EIGHTEEN INCHES (18"). ALL TESTING SHALL BE REQUESTED BY THE CONTRACTOR TO MEET THE CONTRACTOR'S CONSTRUCTION SCHEDULE. CONTRACTOR SHALL BE RESPONSIBLE FOR SEEING THAT THE TESTING LAB PERFORMS ALL TEST REQUIRED BY FHA SPECIFICATION.

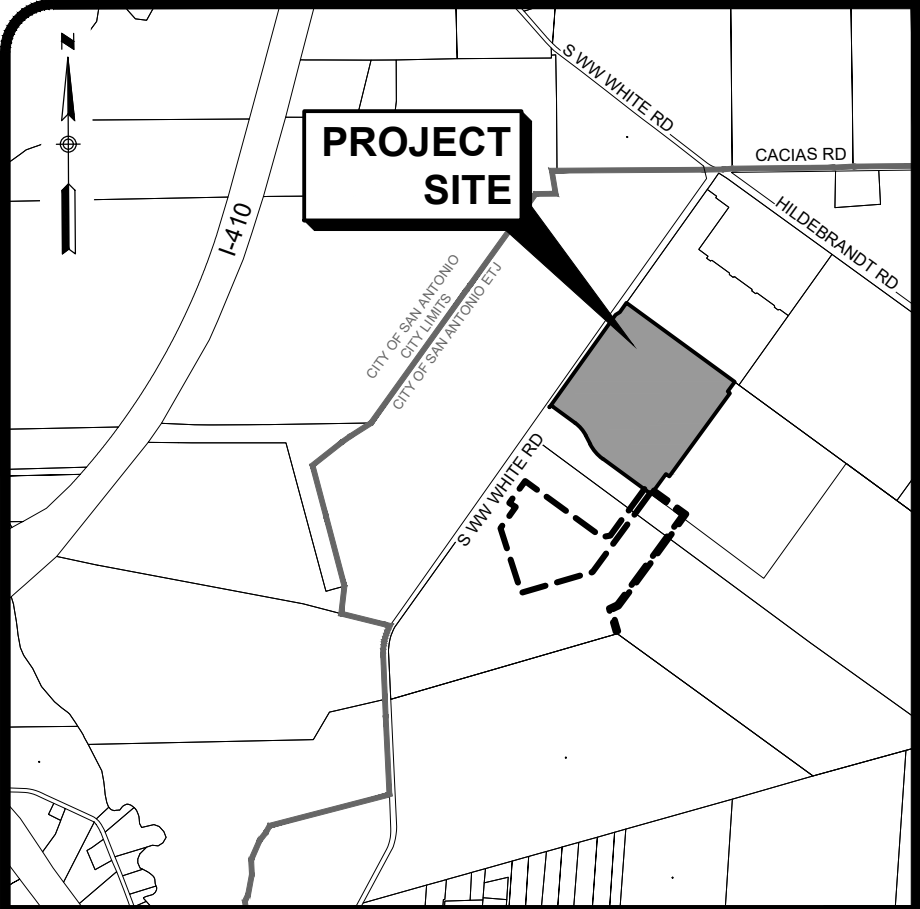
LOT GRADING

ALL LOT GRADING SHALL BE IN ACCORDANCE WITH H.U.D. - F.H.A. DATA SHEET 79G.

GENERAL NOTES:

- CONTRACTOR SHALL PROVIDE OWNER ALL NECESSARY DENSITY TESTS FOR FILL LOTS AS REQUIRED BY HUD SPECIFICATIONS.
- THE HOMEOWNER WILL BE RESPONSIBLE FOR DETAILED GRADING ON EACH INDIVIDUAL LOT TO INCLUDE MINOR GRADING ON THE LOTS AND ANY SIDE OR BACK-LOT SWALES REQUIRED TO MEET THE DEPICTED DRAINAGE PATTERNS (SEE OVERALL MASTER DRAINAGE PLAN).
- HOMEOWNER SHALL REFER TO THE APPROVED SUBDIVISION PLAT TO CONFIRM ALL BUILDING SETBACKS PRIOR TO ANY FOUNDATION WORK.
- AS SOON AS PRACTICAL HOMEOWNER SHALL ESTABLISH VEGETATION (HYDROMULCH, SEEDING, SODDING, ETC...) TO PREVENT EROSION FROM OCCURRING.
- CONTRACTOR SHALL CONTACT ENGINEER REGARDING ANY QUESTIONS ON THE INTENT OF THIS PLAN.
- ELEVATIONS IN STREET ARE FINISHED GRADE AT PROPERTY LINE.
- FINISHED FLOOR ELEVATIONS FOR EACH LOT SHALL BE A MINIMUM OF 8 INCHES ABOVE THE FINISHED ADJACENT GRADE.
- EXISTING TOPOGRAPHIC CONTOURS SHOWN BASED ON FIELD SURVEY PROVIDED BY D.A. MAWYER LAND SURVEYING (210-325-0858).





LOCATION MAP
N.T.S.

GENERAL SPECIFICATIONS FOR SITE PREPARATION

GENERAL DESCRIPTION

THE ITEM SHALL CONSIST OF ALL CLEARING AND PREPARATION OF LAND TO BE FILLED, FILLING OF THE LAND, SPREADING, COMPACTION TESTING AND INSPECTION OF THE FILL, AND ALL SUBSIDIARY WORK NECESSARY TO COMPLETE THE GRADING OF THE CUT AND FILL AREAS TO CONFORM WITH THE LINES, GRADES AND SLOPES AS SHOWN ON THE APPROVED PLANS.

SCARIFYING THE AREA TO BE FILLED

ALL ORGANIC MATTER SHALL BE REMOVED FROM THE SURFACE UPON WHICH THE FILL IS TO BE PLACED, AND SURFACE SHALL THEN BE DISKED OR SCARIFIED TO A MINIMUM DEPTH OF SIX INCHES (6"). ALL SURFACE RUTS OR OTHER UNEVEN FEATURES WILL BE LEVELED PRIOR TO FIELD DENSITY TESTING.

COMPACTING THE AREA TO BE FILLED

FOLLOWING THE CLEARING AND DISKING OR SCARIFYING OF THE FILL AREA, IT SHALL BE BLADED UNTIL IT IS UNIFORM AND FREE FROM LARGE CLODS. THE AREA SHALL BE BROUGHT TO THE ADEQUATE MOISTURE CONTENT AND COMPACTED (TYPICALLY) TO NOT LESS THAN NINETY PERCENT (90%) OF MAXIMUM DENSITY IN ACCORDANCE WITH THE CURRENT ASTM D 1557 COMPACTION PROCEDURE, OR 95% OF MAXIMUM DENSITY IN ACCORDANCE WITH THE CURRENT T10-113-E COMPACTION PROCEDURE.

FILL MATERIALS

THE MATERIALS USED SHALL BE FREE FROM ORGANIC MATTER AND OTHER DELETERIOUS SUBSTANCES, SUCH AS TREES, BRUSH AND RUBBISH.

DEPTH AND MIXING OF FILL LAYERS

THE SELECTED FILL MATERIAL SHALL BE PLACED IN LEVEL, UNIFORM LAYERS WHICH, WHEN COMPACTED, SHALL HAVE A DENSITY CONFORMING TO THE STIPULATED ABOVE. EACH LAYER SHALL BE THOROUGHLY MIXED DURING THE SPREADING TO ENSURE UNIFORMITY OF MATERIAL IN EACH LAYER. COMPACTED LAYER THICKNESS MAY VARY DEPENDING ON THE COMPACTION EQUIPMENT OF THE DEMONSTRATED CAPABILITY. THE MAXIMUM LOOSE DEPTH FOR ANY MATERIAL SHALL NOT EXCEED TWELVE INCHES (12").

ROCK

WHEN FILL MATERIAL INCLUDES ROCK, THE MAXIMUM ROCK SIZE SHALL BE AS APPROVED BY THE GEOTECHNICAL ENGINEER. NO LARGE ROCKS SHALL BE ALLOWED TO NEST AND ALL VOIDS MUST BE FILLED WITH SMALL STONES OR SOIL AND ADEQUATELY COMPACTED. NO LARGE ROCKS WILL BE PERMITTED WITHIN EIGHTEEN INCHES (18") OF THE FINISHED GRADE.

COMPACTION OF FILL LAYER

COMPACTION EQUIPMENT SHALL BE CAPABLE OF COMPACTING THE FILL TO THE SPECIFIED DENSITY. COMPACTION SHALL BE ACCOMPLISHED WHILE THE FILL MATERIAL IS AT OR NEAR THE APPROPRIATE MOISTURE CONTENT. COMPACTION OF EACH LAYER SHALL BE CONTINUOUS OVER THE ENTIRE STRUCTURAL AREA (BENEATH PROPOSED STRUCTURES).

DENSITY TEST

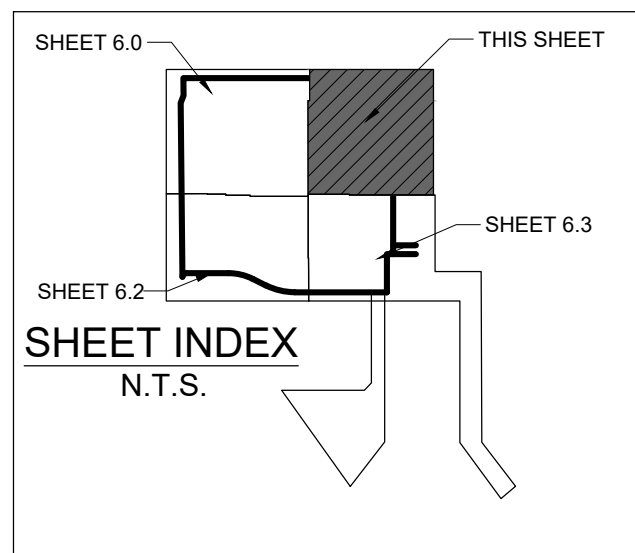
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LOT GRADING

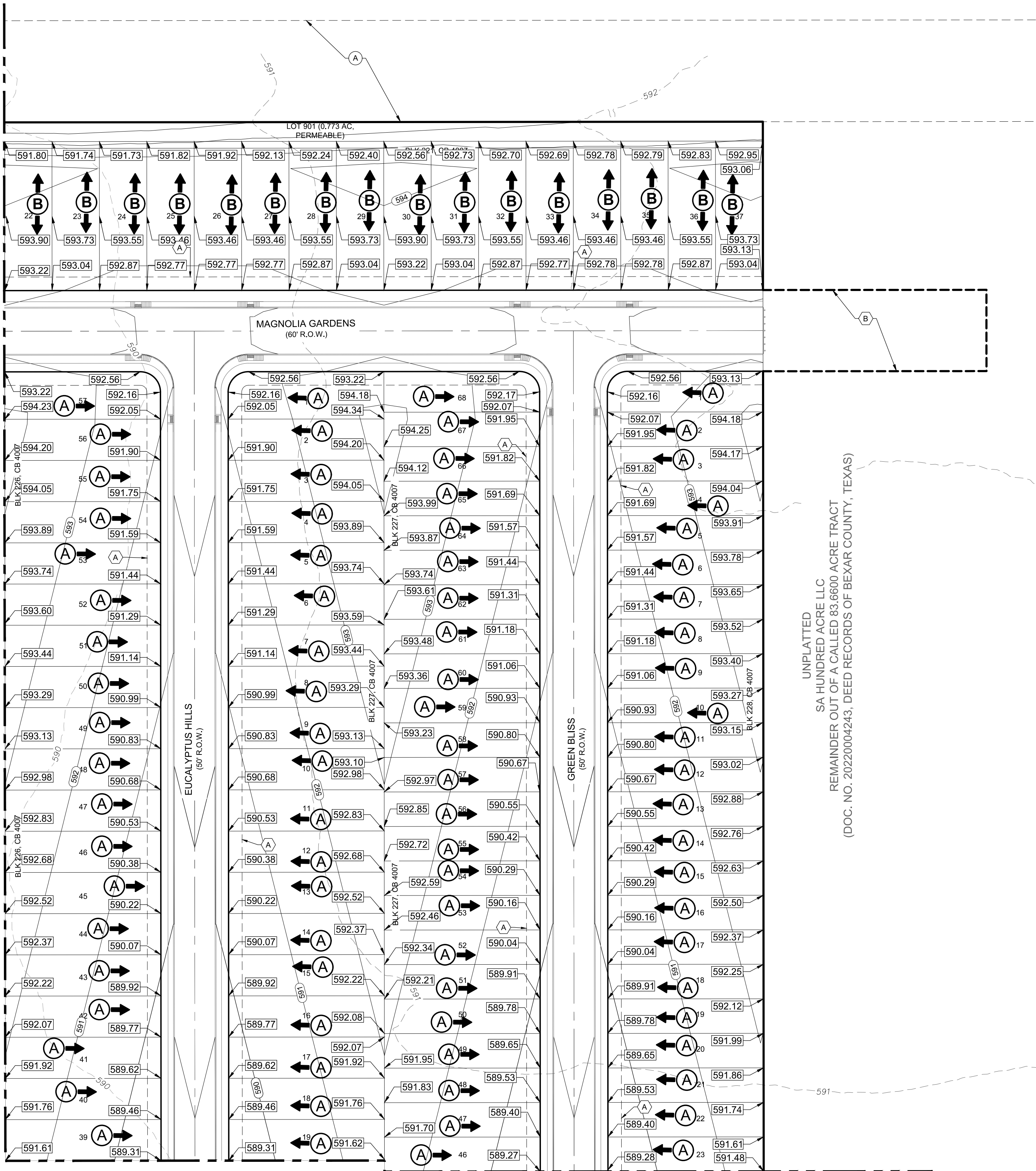
ALL LOT GRADING SHALL BE IN ACCORDANCE WITH H.U.D. - F.H.A. DATA SHEET 79G.

GENERAL NOTES:

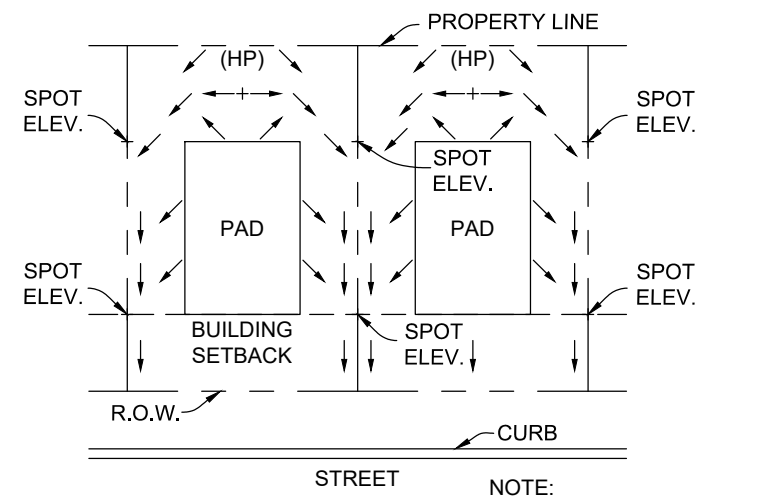
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- THE HOMEOWNER WILL BE RESPONSIBLE FOR DETAILED GRADING ON EACH INDIVIDUAL LOT TO INCLUDE MINOR GRADING ON THE LOTS AND ANY SIDE OR BACK-LOT SWALES REQUIRED TO MEET THE DEPICTED DRAINAGE PATTERNS (SEE OVERALL MASTER DRAINAGE PLAN).
- HOMEOWNER SHALL REFER TO THE APPROVED SUBDIVISION PLAT TO CONFIRM ALL BUILDING SETBACKS PRIOR TO ANY FOUNDATION WORK.
- AS SOON AS PRACTICAL HOMEOWNER SHALL ESTABLISH VEGETATION (HYDROMULCH, SEEDING, SODDING, ETC...) TO PREVENT EROSION FROM OCCURRING.
- CONTRACTOR SHALL CONTACT ENGINEER REGARDING ANY QUESTIONS ON THE INTENT OF THIS PLAN.
- ELEVATIONS IN STREET ARE FINISHED GRADE AT PROPERTY LINE.
- FINISHED FLOOR ELEVATIONS FOR EACH LOT SHALL BE A MINIMUM OF 8 INCHES ABOVE THE FINISHED ADJACENT GRADE.
- EXISTING TOPOGRAPHIC CONTOURS SHOWN BASED ON FIELD SURVEY PROVIDED BY D.A. MAWYER LAND SURVEYING (210-325-0858).



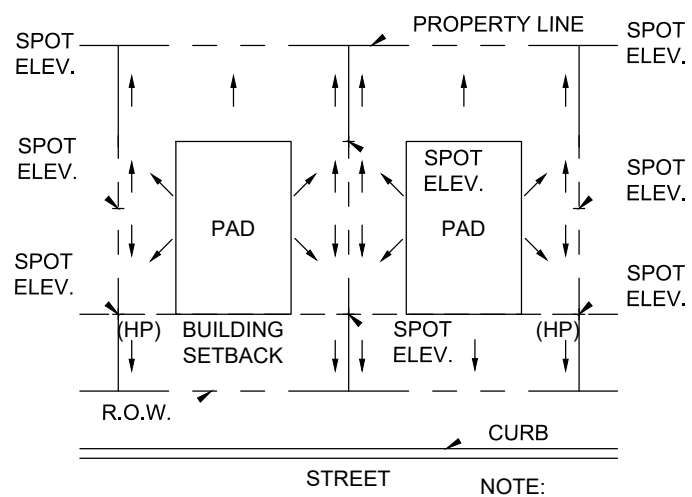
MATCH LINE "A" (SEE SHEET 6.0)



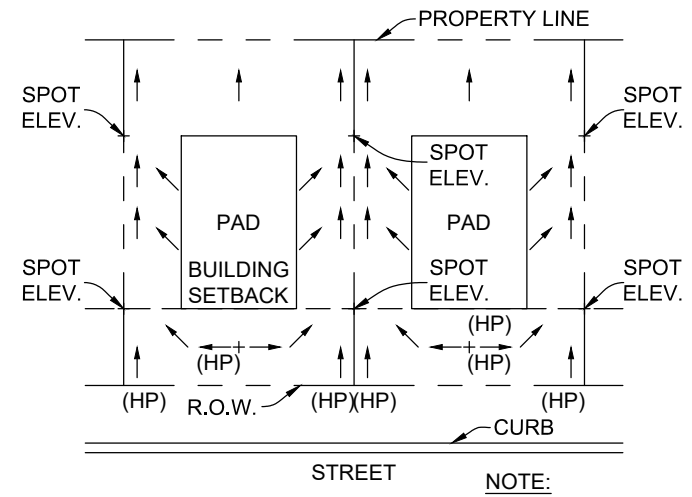
MATCH LINE "C" (SEE SHEET 6.3)



TYPICAL "A" LOT GRADING
N.T.S.



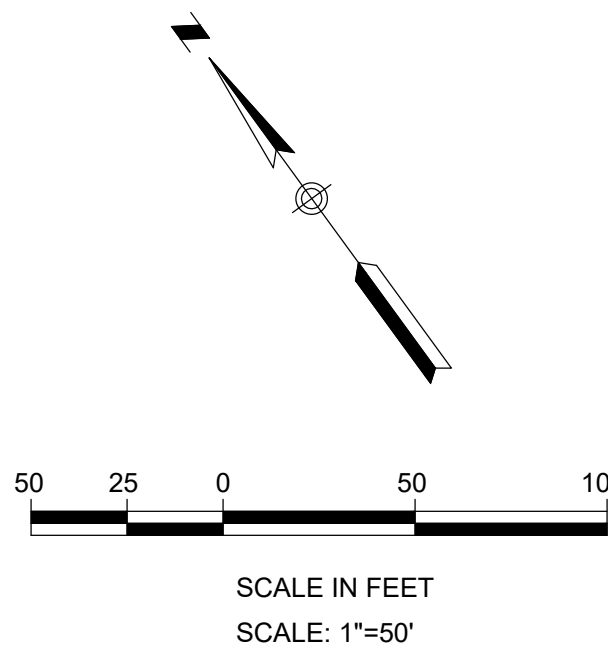
TYPICAL "B" LOT GRADING
N.T.S.



TYPICAL "C" LOT GRADING
N.T.S.

LEGEND

PROPOSED	EXISTING	
		CONTOUR
		FLOW ARROW
		GRASSED DRAIN FLOW
		GROUND ELEVATION
		MATCH EXISTING GROUND
		LOT DRAINS TO FRONT
		LOT DRAINS TO REAR
		LOT TYPE A MODIFIED
		LOT TYPE B MODIFIED
		LOT TYPE C MODIFIED
		TOP OF MAN-HOLE
		EXISTING
		GAS, ELEC, TELE & CABLE TV ESMT.
		EASEMENT
		VOLUME
		PAGE
		RETAINING WALL



- A 10' G.E.T.C.A. ESMT
- B OFF-LOT PERMEABLE VARIABLE WIDTH UTILITY ESMT TO EXPIRE UPON INCORPORATION OF FUTURE STREET R.O.W. (1.92 ACRES)
- C OFF-LOT VARIABLE WIDTH PRIVATE DRAINAGE ESMT (2.86 ACRES, PERMEABLE)
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- E 5' G.E.T.C.A. ESMT
- F 1' V.N.A.E. ESMT
- G OFF-LOT 15' GRADING ESMT (0.486 ACRES)
- A VARIABLE WIDTH ELECTRIC EASEMENT (VOL. 7517, PGS. 863-867 OFR)

GRACE GARDENS SUBDIVISION UNIT 1
LAND-PLAT-23-11800410
GRADING PLAN (SHEET 2 OF 4)

REVISIONS	DATE	DESCRIPTION	NO.
DESIGNED BY:	9/8/2023		
DRAWN BY:			
CHECKED BY:			
DRAWING NAME:			
DATE:			
DESIGNED BY:			
DRAWN BY:			
CHECKED BY:			
DRAWING NAME:			
DATE:			

LJA Engineering, Inc.
9830 Colomado Blvd
Suite 300
San Antonio, Texas 78230
Phone 210.503.2700
LJA.COM
TPE No. F-1386

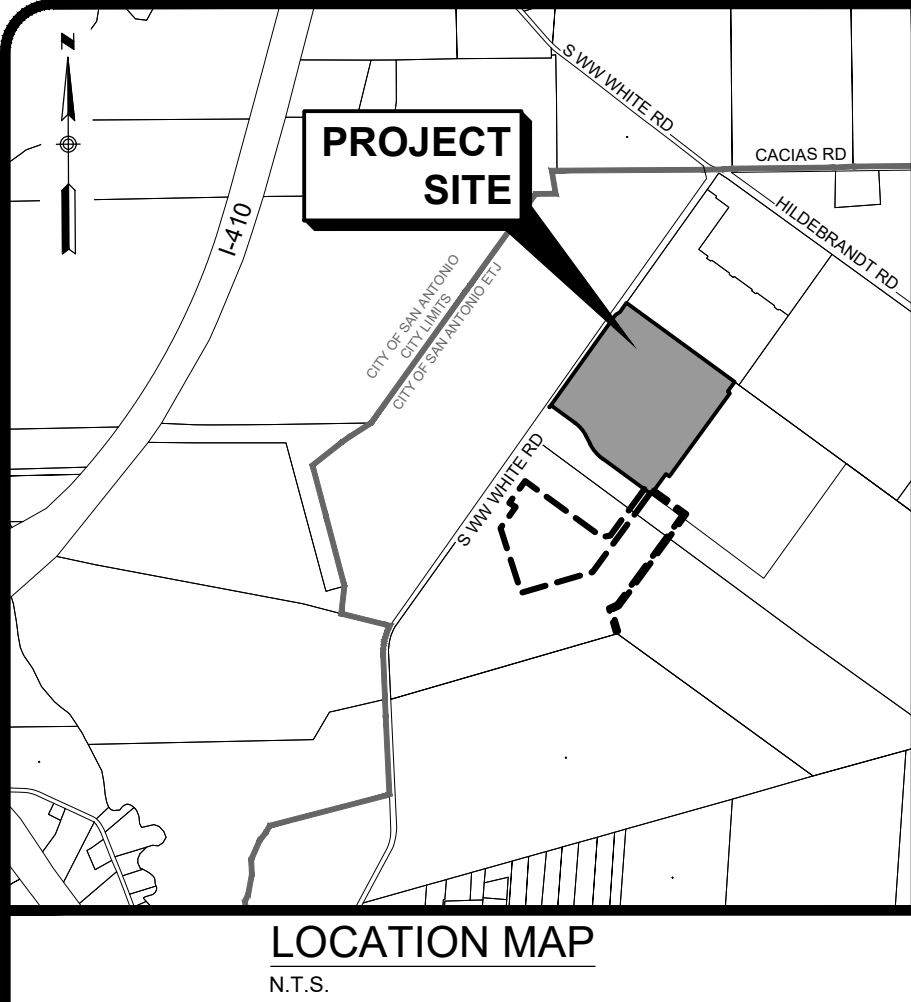
JOB NUMBER:
SA202-0401B-426
SHEET NO.

6.1

OF SHEETS



K:\2023 Mapic Land Development\04018 Grace Gardens Unit 1\4018 Site Development Plans\04018-Submittal\Grading Plan.dwg
User: rnewman
Last Modified: Jun 07, 24 - 14:27
Plot Date/Time: Jun 10, 24 - 12:10:09



GENERAL SPECIFICATIONS FOR SITE PREPARATION

GENERAL DESCRIPTION

THE ITEM SHALL CONSIST OF ALL CLEARING AND PREPARATION OF LAND TO BE FILLED, FILLING OF THE LAND, SPREADING, COMPACTION TESTING AND INSPECTION OF THE FILL, AND ALL SUBSIDIARY WORK NECESSARY TO COMPLETE THE GRADING OF THE CUT AND FILL AREAS TO CONFORM WITH THE LINES, GRADES AND SLOPES AS SHOWN ON THE APPROVED PLANS.

SCARIFYING THE AREA TO BE FILLED

ALL ORGANIC MATTER SHALL BE REMOVED FROM THE SURFACE UPON WHICH THE FILL IS TO BE PLACED, AND SURFACE SHALL THEN BE DISKED OR SCARIFIED TO A MINIMUM DEPTH OF SIX INCHES (6"). ALL SURFACE RUTS OR OTHER UNEVEN FEATURES WILL BE LEVELED PRIOR TO FIELD DENSITY TESTING.

COMPACTING THE AREA TO BE FILLED

FOLLOWING THE CLEARING AND DISKING OR SCARIFYING OF THE FILL AREA, IT SHALL BE BLADED UNTIL IT IS UNIFORM AND FREE FROM LARGE CLODS. THE AREA SHALL BE BROUGHT TO THE ADEQUATE MOISTURE CONTENT AND COMPACTED (TYPICALLY) TO NOT LESS THAN NINETY PERCENT (90%) OF MAXIMUM DENSITY IN ACCORDANCE WITH THE CURRENT ASTM D 1557 COMPACTION PROCEDURE, OR 95% OF MAXIMUM DENSITY IN ACCORDANCE WITH THE CURRENT TxDOT-113-E COMPACTION PROCEDURE.

FILL MATERIALS

THE MATERIALS USED SHALL BE FREE FROM ORGANIC MATTER AND OTHER DELETERIOUS SUBSTANCES, SUCH AS TREES, BRUSH AND RUBBISH.

DEPTH AND MIXING OF FILL LAYERS

THE SELECTED FILL MATERIAL SHALL BE PLACED IN LEVEL, UNIFORM LAYERS WHICH, WHEN COMPACTED, SHALL HAVE A DENSITY CONFORMING TO THE STIPULATED ABOVE. EACH LAYER SHALL BE THOROUGHLY MIXED DURING THE SPREADING TO ENSURE UNIFORMITY OF MATERIAL IN EACH LAYER. COMPACTED LAYER THICKNESS MAY VARY DEPENDING ON THE COMPACTION EQUIPMENT OF THE DEMONSTRATED CAPABILITY. THE MAXIMUM LOOSE DEPTH FOR ANY MATERIAL SHALL NOT EXCEED TWELVE INCHES (12").

ROCK

WHEN FILL MATERIAL INCLUDES ROCK, THE MAXIMUM ROCK SIZE SHALL BE AS APPROVED BY THE GEOTECHNICAL ENGINEER. NO LARGE ROCKS SHALL BE ALLOWED TO NEST AND ALL VOIDS MUST BE FILLED WITH SMALL STONES OR SOIL AND ADEQUATELY COMPACTED. NO LARGE ROCKS WILL BE PERMITTED WITHIN EIGHTEEN INCHES (18") OF THE FINISHED GRADE.

COMPACTION OF FILL LAYER

COMPACTION EQUIPMENT SHALL BE CAPABLE OF COMPACTING THE FILL TO THE SPECIFIED DENSITY. COMPACTION SHALL BE ACCOMPLISHED WHILE THE FILL MATERIAL IS AT OR NEAR THE APPROPRIATE MOISTURE CONTENT. COMPACTION OF EACH LAYER SHALL BE CONTINUOUS OVER THE ENTIRE STRUCTURAL AREA (BENEATH PROPOSED STRUCTURES).

DENSITY TEST

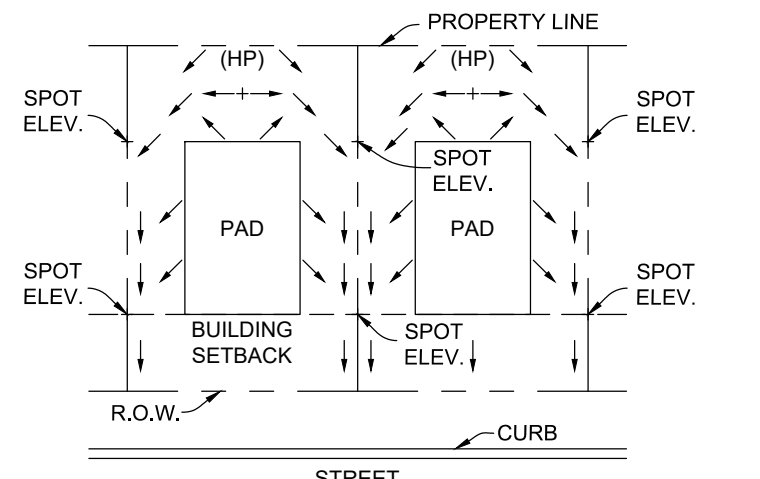
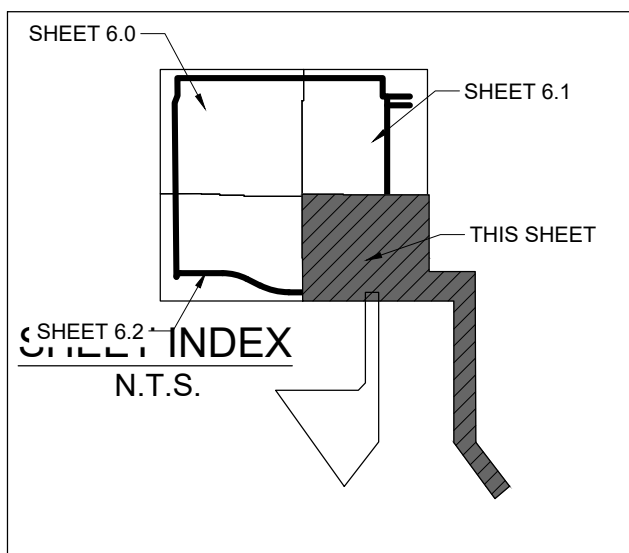
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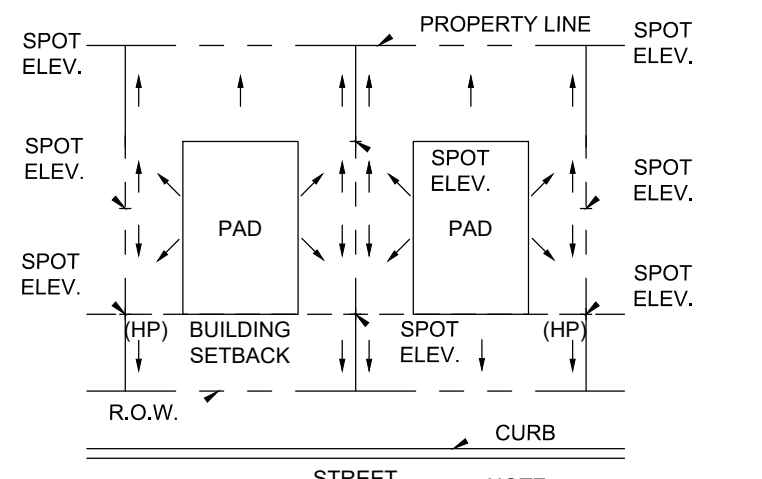
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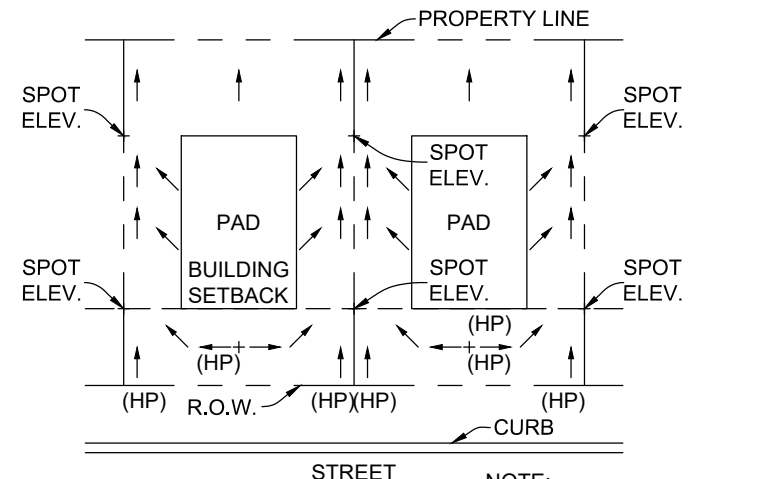
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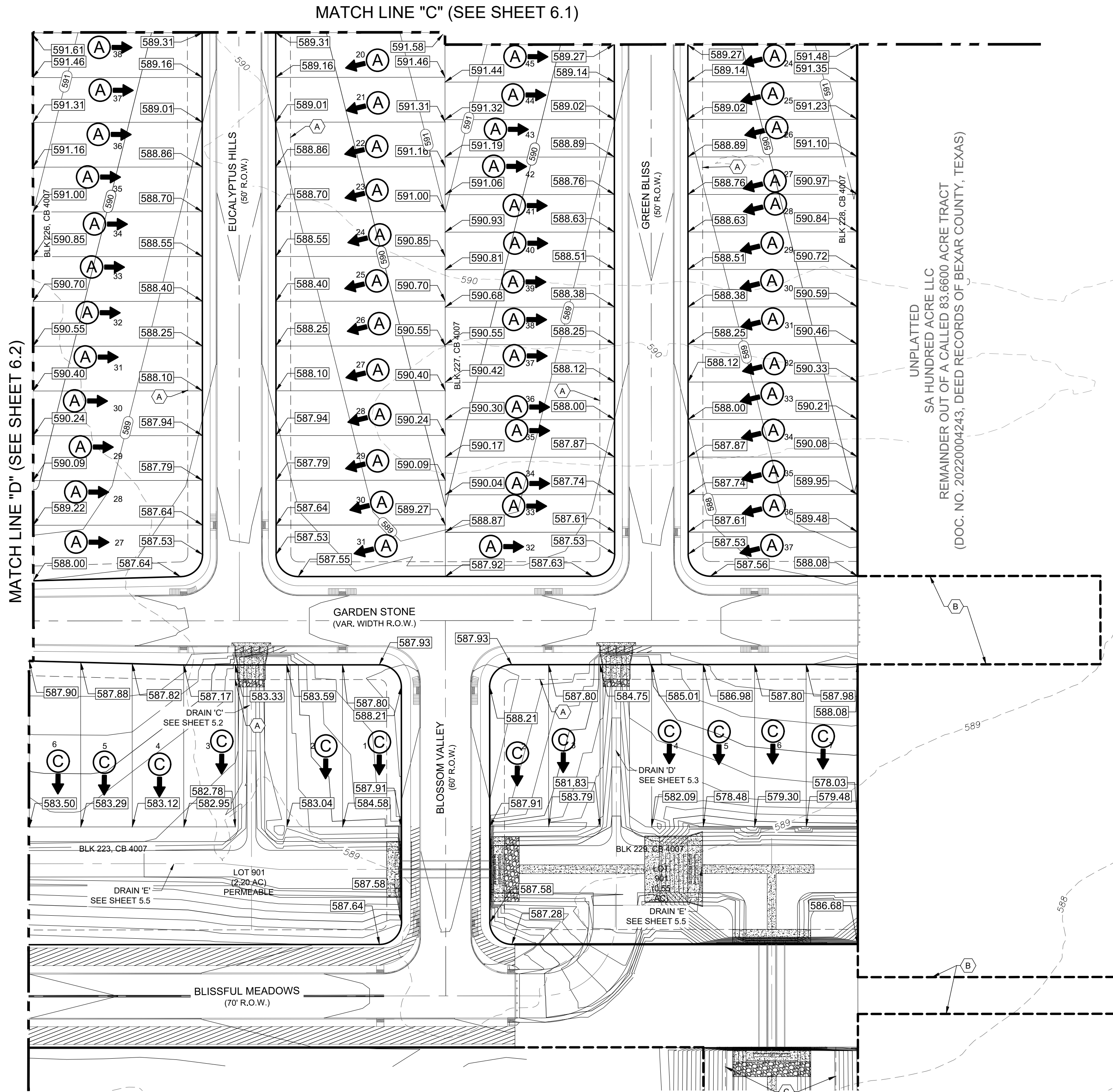
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N.T.S.



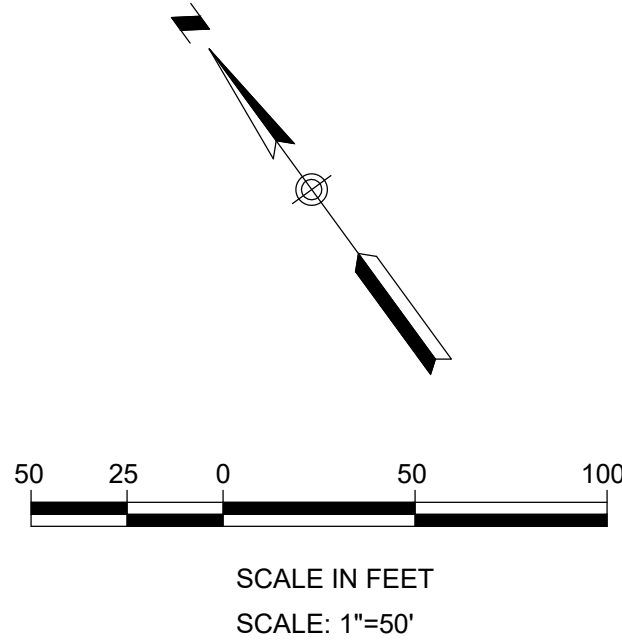
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LEGEND		
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GRADING PLAN (SHEET 4 OF 4)

REVISIONS	DATE	DESCRIPTION
NO.	BY	
1	9/8/2023	DESIGNED BY: [Signature]
2		DRAWN BY: [Signature]
3		CHECKED BY: [Signature]
4		DRAWING NAME: [Signature]
5		DATE: 06/10/2024

LJA Engineering, Inc.
9830 Colomade Blvd
Suite 300
San Antonio, Texas 78230
Phone 210.503.2700
LJA.COM
TBE No. F-1386

JOB NUMBER:
SA202-0401B-426

SHEET NO.

6.3

OF SHEETS